

HQ Proportional Control Unit (PCU-A)

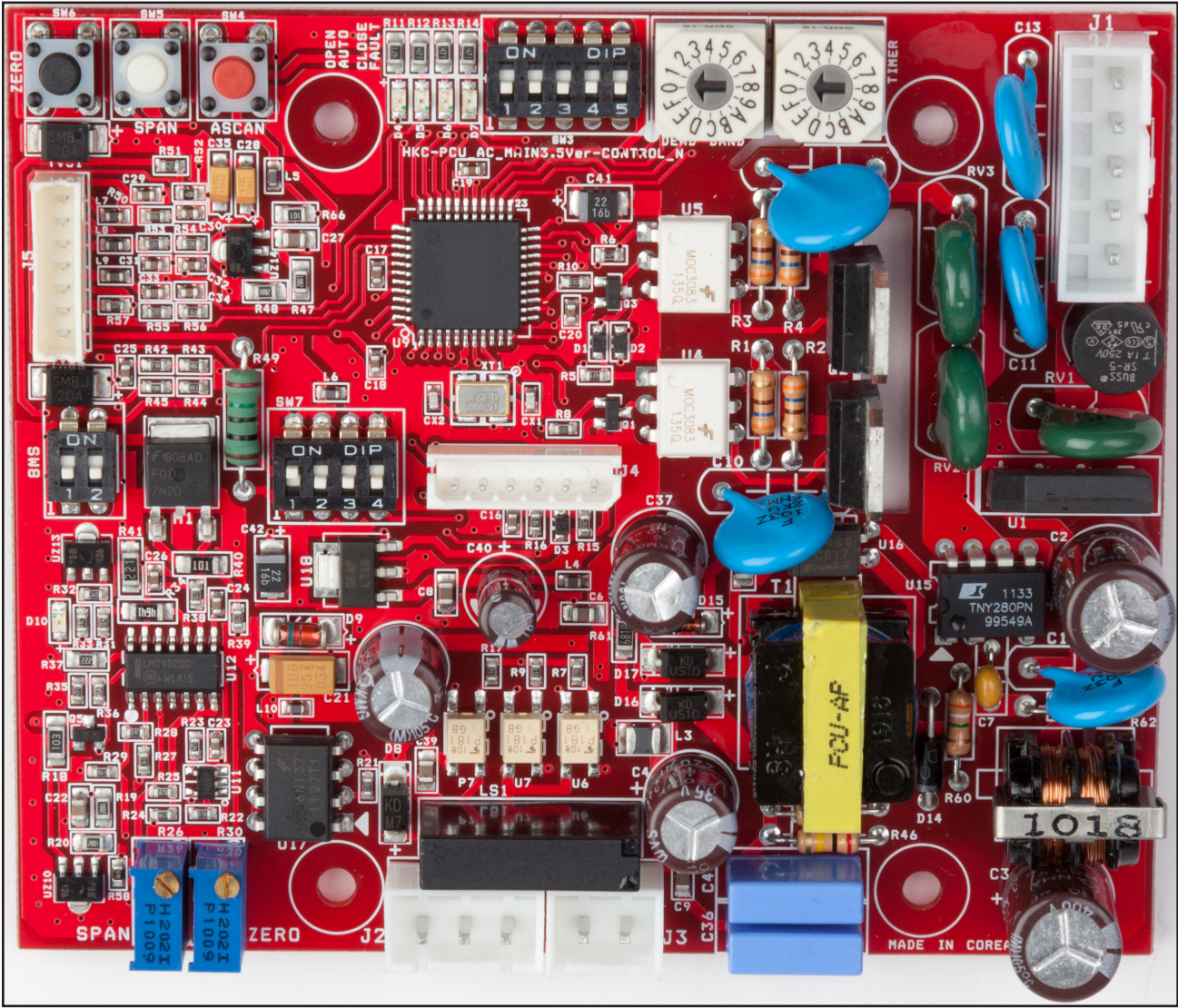


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*Thanks for purchasing our HQ series electric actuator.
Before installing or operating actuator, please read this manual to thoroughly know how to install and operate this device.

The contents of this manual are subject to change without notice due to continuously ongoing improvements.

Section 1: Check point before using actuator

1. Check if specification (Model No., Main Power, Control Power, Options) of delivered actuator meets your requirements or not.
2. Check the application such as valve, damper & etc.
3. Check if mounting of actuator on application is correct and tight enough.
4. Check if settings of actuator such as limit switch, stopper bolts, indicator is correct or not.
5. Check if electric wiring is correct or not.
6. In case of 3-phase motor, check rotating direction.
 - Check rotating direction of actuator
 - Open actuator about 50% by manual, supply power to actuator for 2-3 seconds.
 - Push close button and check if actuator closing direction is correct or not.
 - If actuator is moving in the wrong direction, turn off power supply to the actuator and reverse the open and close lines from the PCU card.
7. Generally, all PCU functions are set in the factory before delivery and there is no need to set the functions again.
 - Only in special cases where the customer wants to adjust the limit switches, is PCU function setting required.
 - Setting is simple and only requires the pushing of the AUTO SETTING button after putting actuator in 50% open (or close) position.
 - PCU automatically sets all the functions by itself.
8. Disassembly or modification without the factory's consent may affect the performance of the actuator.

Section 2: General Performance

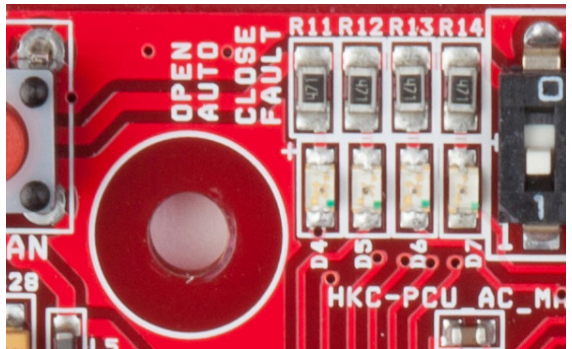
The PCU is the local actuator controller, using 12-bit A/D converter and an 8-bit Microprocessor, which operates the open and close functions according to the input signal from main controller.

After operating the actuator, the PCU detects the current position and transmits position feedback signals to the main controller.

Section 3: Standard Specification

1. Model: PCU REV A4
2. Power: 85V-260VAC +10% 50/60Hz 4VA Max (New Wide range of voltage)
3. Input signal: 4-20mA DC, 2-10V DC, 0-5V DC, 0-10V DC, 1-5V DC
Input resistance: 250 Ohms, Feedback signal: 100 - 10K Ohm
4. Output signal: 4-20mA DC, 2-10V DC, 0-5V DC, 0-10V DC, 1-5V DC
5. Load resistance: 500 Ohms Max.
6. Control output: TRIAC contact 250VAC 16A Max (Inductive load)
7. Number of output contact: 2 each (Open and close contact)
8. Delay time adjustment: 0.05-7.5 sec (0Step 50msec 0-15 Step)
1-4 Step (Step Number X200msec) 5-15 Step (Step Number X 500msec)
9. Dead Band adjustment: 0.12mA DC MAX
10. Resolution Adjustment: 0 Step: 0.068mA 0-15 Step (Step Number +0.068mA)
11. Position conversion accuracy: +0.5 - +1.5% (Depends on installation)
12. Ambient temperature: 25°C - +80°C
13. Ambient humidity: 90% RH Max (Non-condensate)
14. Dielectric strength: 1500V AC 1 Min (Input to output, Power to Ground)
15. Insulation resistance: Min. 500V DC 30Mohm
16. Vibration & Shock (X, Y, Z); 10g (6g based on RMF, Frequency: 0.2 - 34Hz, 30 Min)
17. LED Signal

Figure 1 PCB LED Panel

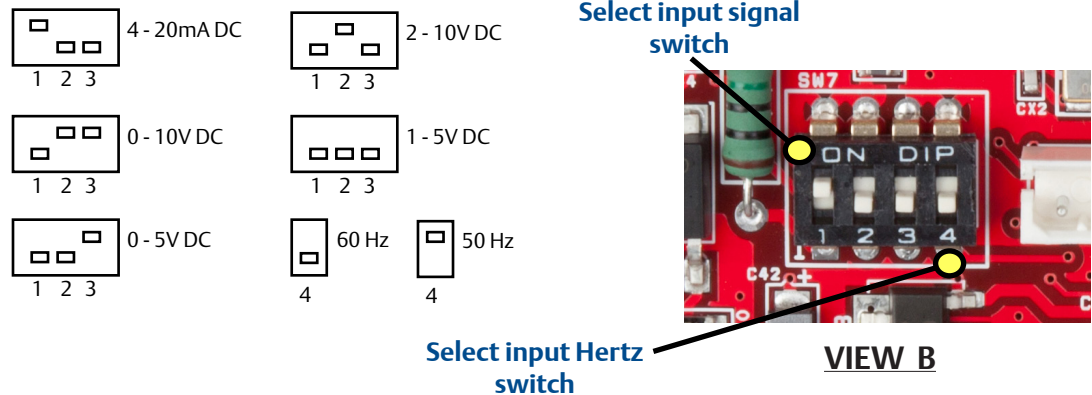
LED	SIGNAL	 <p>VIEW A</p>
Blue On	Power On (AUTO)	
Blue Flicker	AUTO SETTING	
Green Flicker	Closing	
Green On	Full Close	
Red Flicker	Opening	
Red On	Full Open	
Yellow On	Manual Mode	
Yellow Flicker	Fault in either No input signal, Wrong input wiring, Wrong PIU setting	

Section 4: Function of a PCU and how to set and use it

4.1 Selecting of the input signal

User can select suitable input signal by adjusting DIP switches as follows.

Figure 2 Input DIP switch



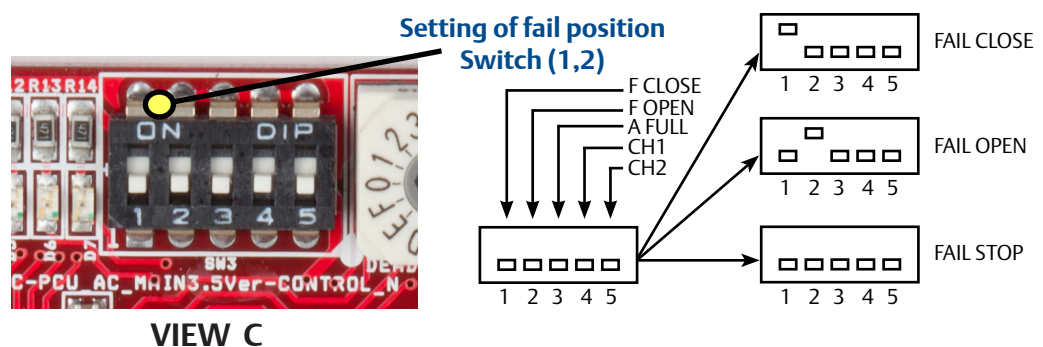
NOTE:

If there is no instruction for the input signal, the default is 4-20mA.

4.2 Setting of fail position

In order to prevent issues when the signal fails, the user can set the fail position of actuator by setting of DIP switches as follows.

Figure 3 Fail position DIP setting



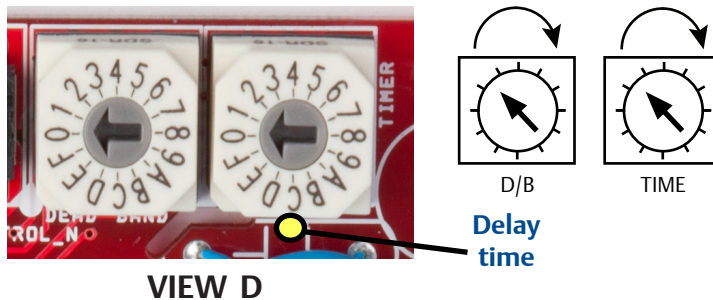
4.3 Delay Time

This prevents continuous operation of PCU card caused by abnormal signal input such as noise, microphone and other foreign frequency. Once the signal is detected, PCU follows that signal but if there is a preset time, PCU doesn't move within the time.

PCU can move when input signal lasts a certain time which is preset. Turning the switch clockwise, increases delay

Range 0.05- 7.5 sec (0Step 50msec 0-15Step)
1-4 Step (Step Number X 200msec)
5-15Step (Step Number X 500msec)

Figure 4 Delay rotary switch



4.4 Resolution adjustment

This is set allowance between input signal and position of actuator and if turned clockwise, sets it wider and vice versa.

Please observe caution when turning this counter-clockwise because if it is too narrow, it could cause "HUNTING".

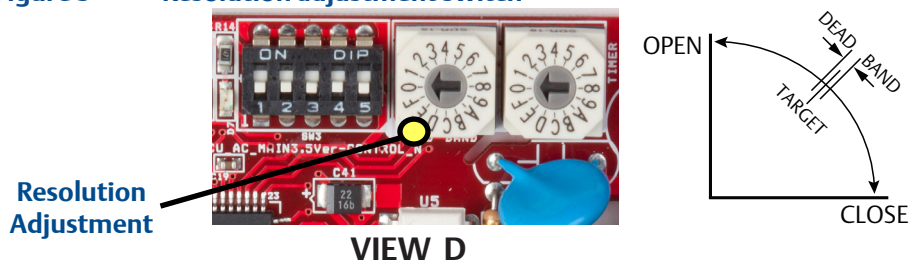
HUNTING is an issue where the actuator doesn't stop at a position and repeats the move of open and close

Dead Band adjustment: 0 .12mA DC MAX

Resolution Adjustment: 0 Step: 0.068mA

0-15Step (Step Number+0.068mA)

Figure 5 Resolution adjustment switch



NOTE:

HUNTING is one of the causes of motor burning and damage of potentiometer and PCU card.

4.5 Manual operation by PCU card

In order to operate actuator by card, press ZERO and SPAN buttons together for 2 seconds. The yellow LED will turn on to confirm manual operation mode.

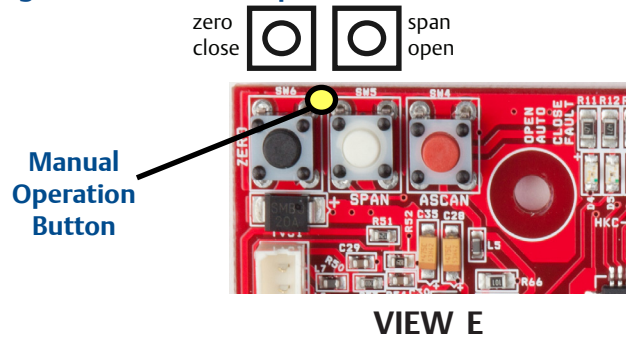
If ZERO button is pushed, actuator will move to close and if the SPAN button is pushed, the actuator will move to open.

Left alone for 15 seconds without operation, PCU will come out from manual operation mode.

NOTE:

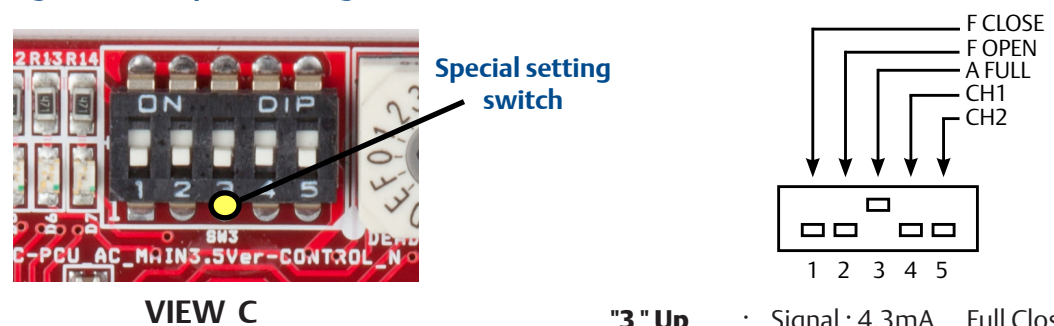
(During manual operation mode, input signal is ignored)

Figure 6 Manual operation button



4.6 Special signal setting for full open and full closed

Figure 7 Special setting switch



- | | | |
|-----------------|-------------------|-------------|
| "3" Up | : Signal : 4.3mA | Full Closed |
| | : Signal : 19.7mA | Full Open |
| "3" Down | : Signal : 4mA | Full Closed |
| | : Signal : 20mA | Full Open |

4.7 AUTO SETTING

If mounting between actuator and application is correct, and input signal, input power and wiring are correct, push AUTO SETTING button just once regardless of the position of actuator.

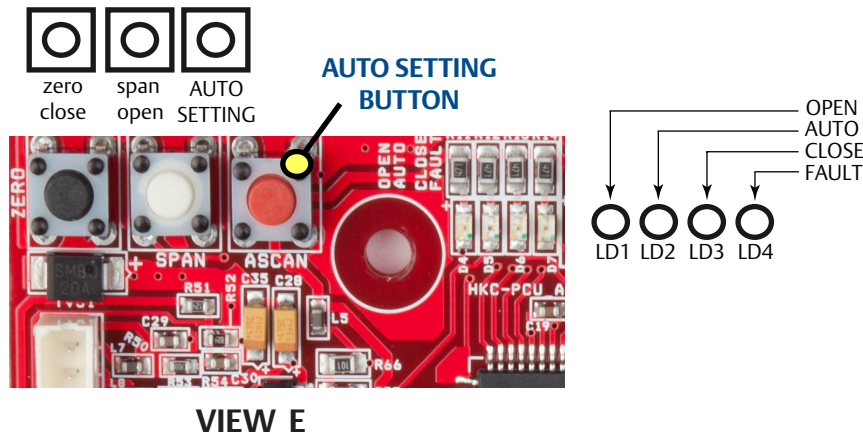
Then Blue LED flickers with indicating LED as following:

- 1) Opening with Red LED in 5 sec-> 2) Full Close with Green LED->
- 2) Full Open with Red LED.

NOTE:

Please make sure that Limit Cam touches (Open/Close) Limit Switch while Autosetting.

Figure 8 AUTO SETTING button



4.8 Split range (CH1)

The Split range is a useful function that allows the customer to set the actuator to full close and full open position using a signal if the input signal is not precise.

If customer wants to set actuator to full close position at 5mA, supply 5mA DC and actuator moves to the position.

Then put CH1 DIP switch on and push ZERO button once. Then actuator acknowledges that position as full close position and transmits 4mA DC.

Open set is same but instead, push SPAN Button.

Once setting is done, put CH1 DIP switch off.

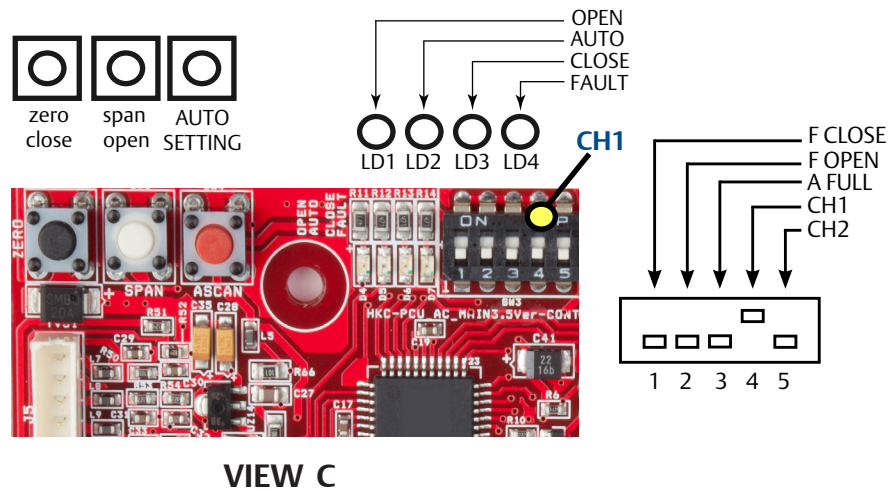
Adjustable range is:

- Close: 3 - 8mA DC
- Open: 16 - 21 mA DC

NOTE:

By using this DIP switch, the customer may set various positions at certain signal.

Figure 9 CH1 DIP switch



4.9 Reversal acting switch (CH2)

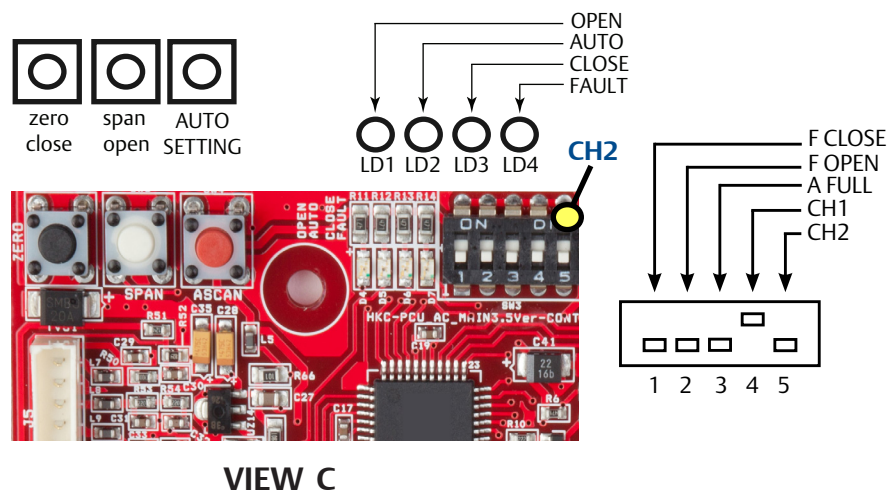
Generally, clockwise-rotating direction of actuator is to close but if user wants reverse action, please do the following:

Switch "5" Up : Signal : 20mA Full Closed
Signal : 4mA Full Open

Switch "5" Down : Signal : 4mA Full Closed
Signal : 20mA Full Open

Put the actuator to 50% open (or close) position, and push the AUTO SETTING button. Supplying 4-20mA, check operation and rotating direction.

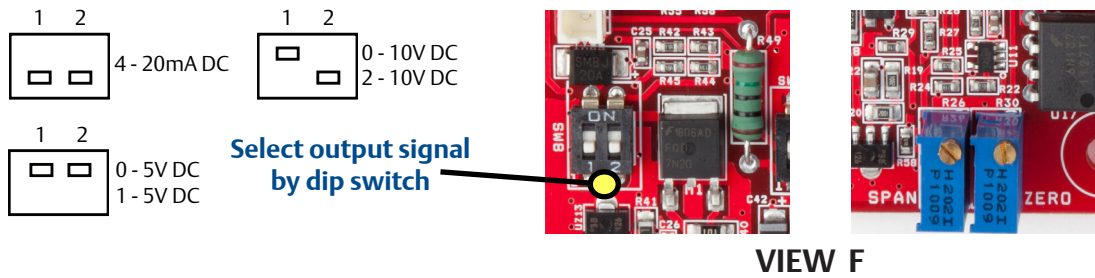
Figure 10 CH2 DIP switch



4.10 Selection of output signal

The user can select suitable output signal by adjusting DIP switches as follows:

Figure 11 Output selection DIP switch



NOTE:

If there is no instruction for the input signal, 4-20mA is the factory default signal setting.

Adjust zero or span volume switch to meet the exact value of output signal in accordance with input signal value.

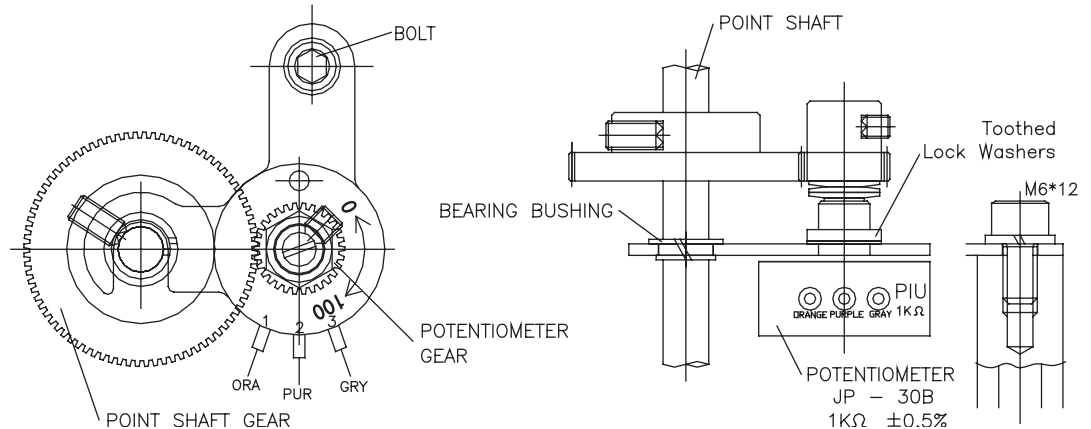
Section 5: Special tools

1. L-Wrench 1 set (metric)
2. Screw driver(-)
3. Monkey spanner (1 set)
4. DC signal generator (0-24mA DC)
5. Multi-meter
6. mA DC meter (0-25mA DC)

Section 6: Setting potentiometer (Replacing and setting)

1. Put actuator into full close position
2. Take P1 and P2 and measuring its resistance, turn potentiometer until it reaches a value between 30 -100 Ohm.
3. Engage the potentiometer gear into main gear and tighten the screw.

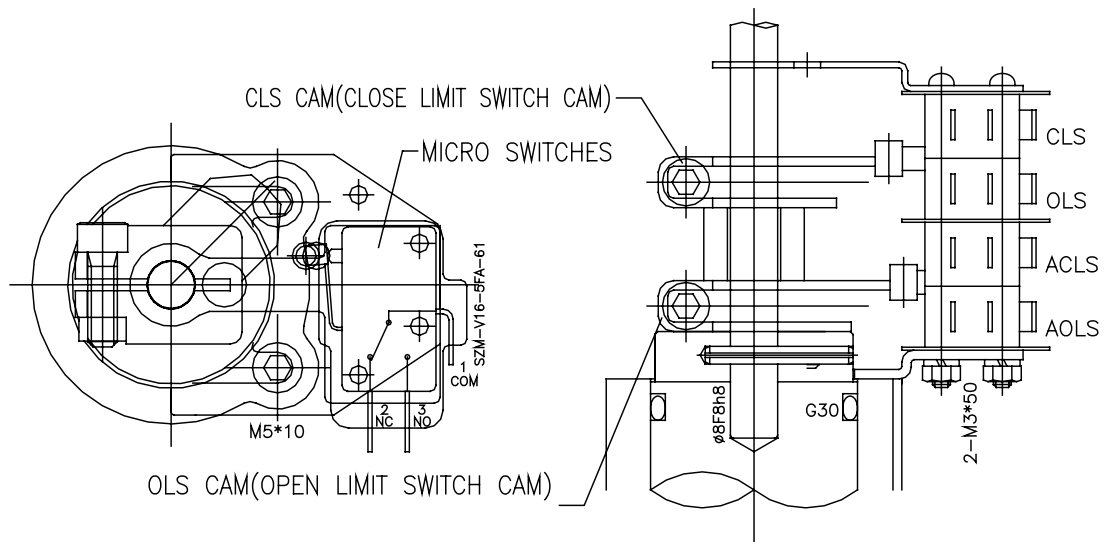
Figure 12 Potentiometer schematic



Section 7: Limit switch setting

1. Pull over the lever for manual operation and turn hand wheel to move actuator to full close (or open) position.
2. Loosen the bolts tightening cam by L-wrench, and turn CLS (or OLS) cam to CW (or to CCW), so that cam may hit the lever of close (or open) limit switch. Then tighten the bolt by L-wrench.

Figure 13 Potentiometer internal switch layout



Section 8: Check operation of PCU

Table 1. PCU operation legend

Actuator	Full Close	Full Open
Input signal	4mA DC (1V DC, 2V DC)	20mA DC (5V DC, 10V DC)
Output signal	4mA DC	20mA DC
Signal LED	Green LED on	Red LED on
Auto setting	Blue LED flicker	
Input signal failure	Yellow LED flicker	

Section 9: Layout of PCU Card

Figure 14 PCU Card component layout and function

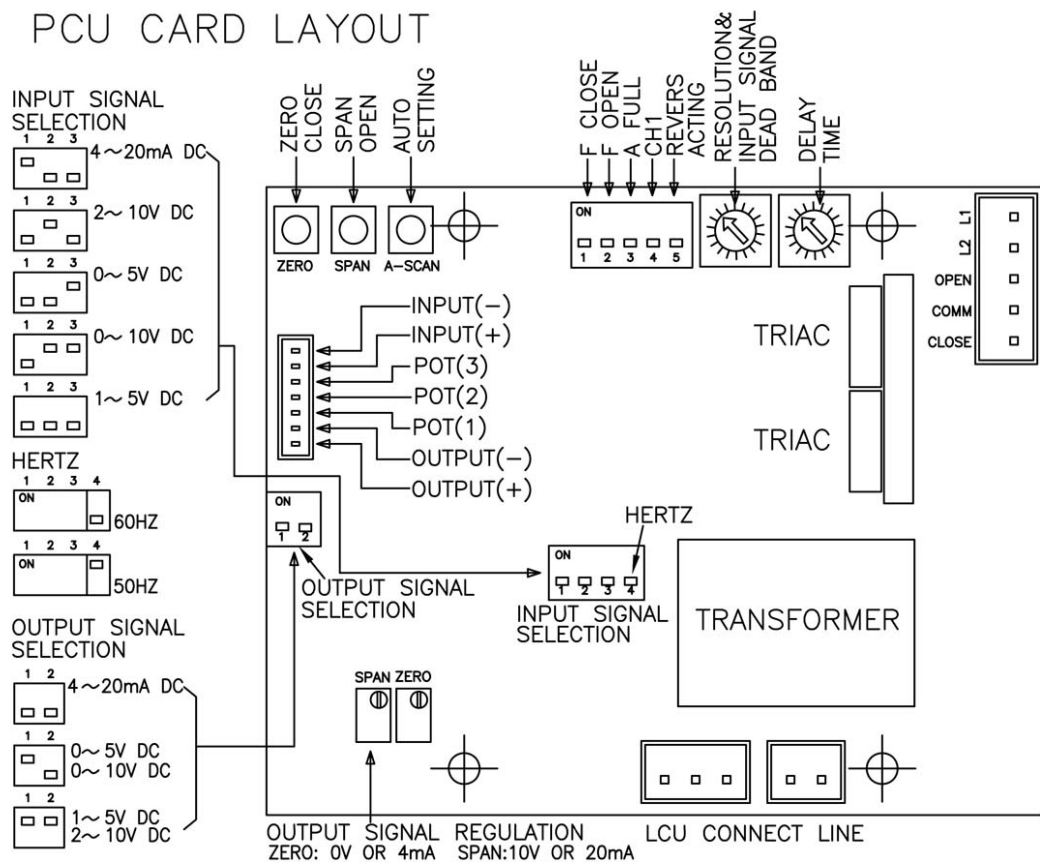
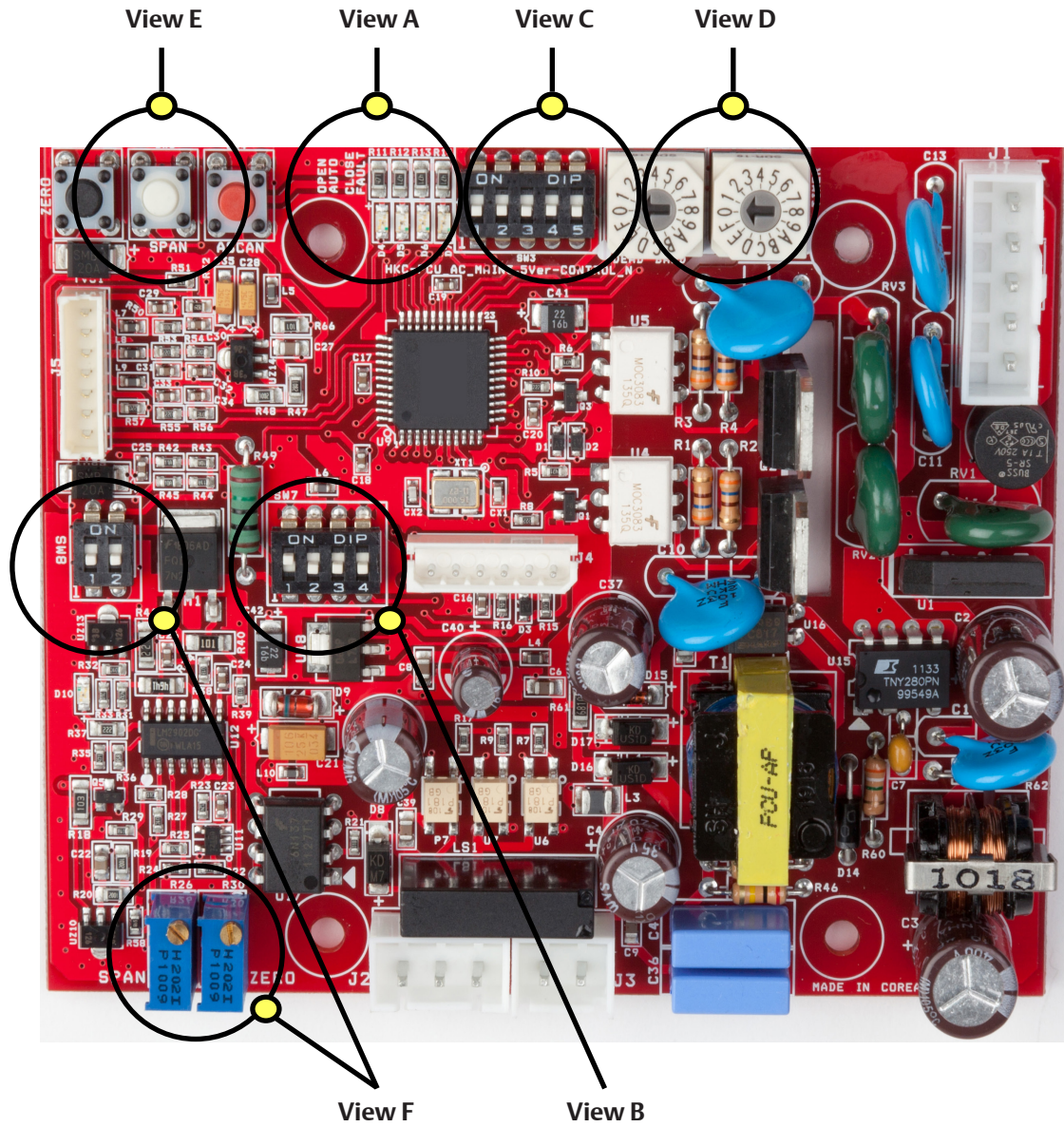


Figure 15 PCU Card PCB layout and function highlight views



Section 10: Document Revision

Table 2. Revision Overview

ECN	DATE	REV		BY *	DATE
Released	December 2013	1	COMPILED	C. Rico	December 2013
Reviewed			CHECKED	D. Hoke	December 2013
Approved			APPROVED	D. Hoke	December 2013

Appendix A: List of Tables

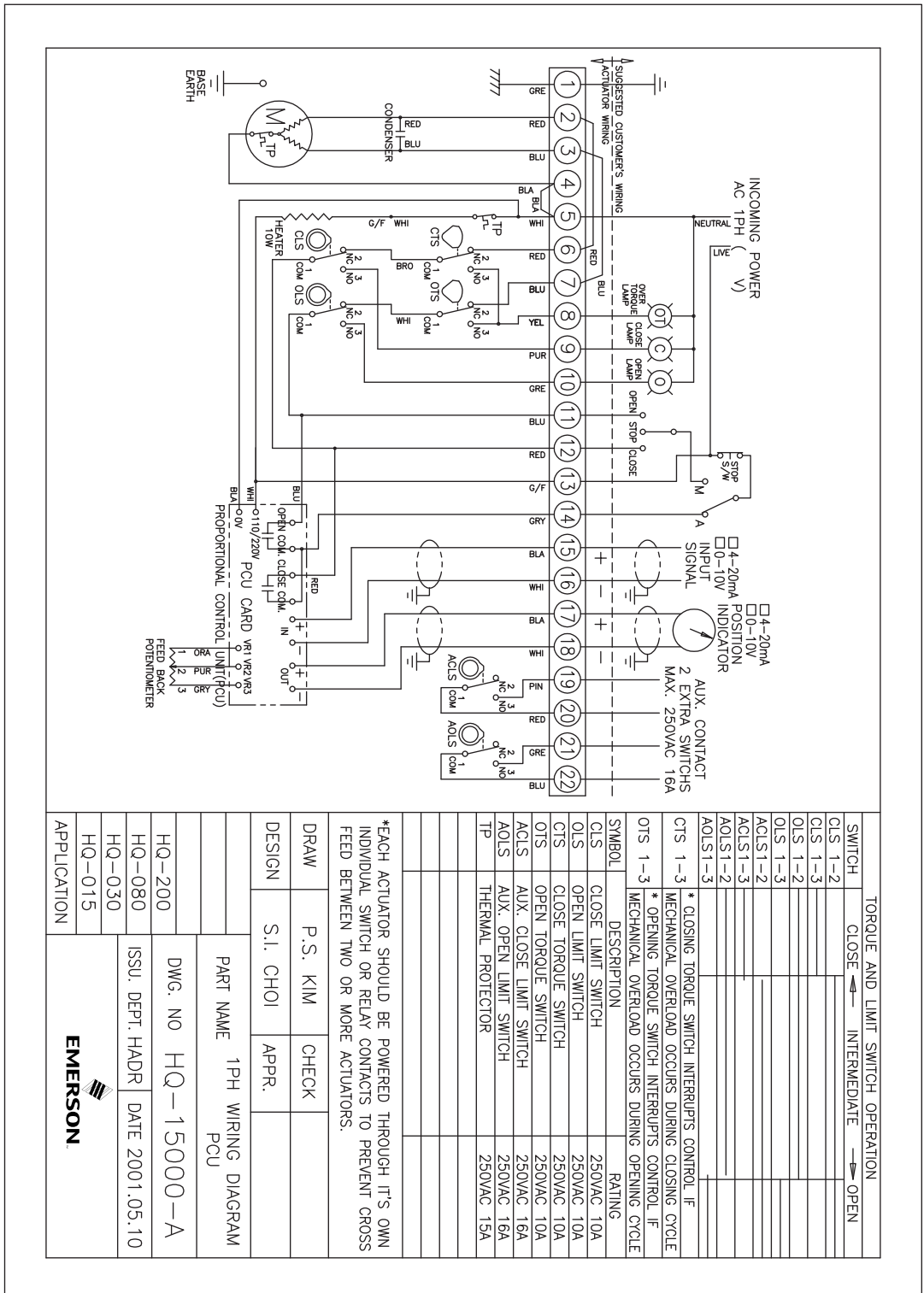
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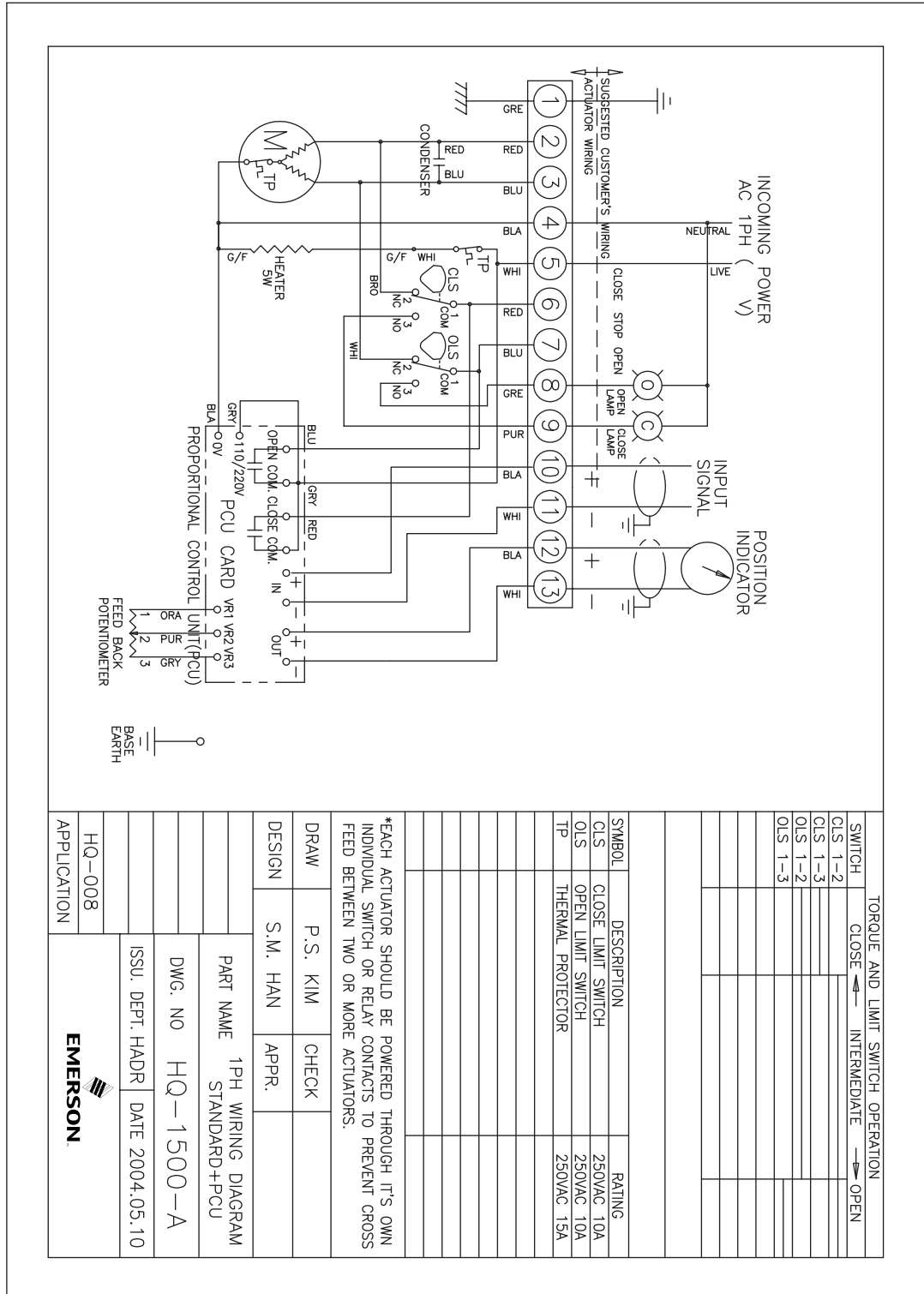
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Appendix C: List of Drawings

C.1 Dwg. No. HQ-15000-A , 1 Ph Wiring Diagram PCU



C.2 Dwg. No. HQ-1500-A , 1 Ph Wiring Diagram Std.



TORQUE AND LIMIT SWITCH OPERATION	
SWITCH	CLOSE → INTERMEDIATE → OPEN
CLS 1-2	
CLS 1-3	
OLS 1-2	
OLS 1-3	
TP	
CLS	CLOSE LIMIT SWITCH
OLS	OPEN LIMIT SWITCH
TP	THERMAL PROTECTOR
	RATING
	250VAC 10A
	250VAC 10A
	250VAC 15A

*EACH ACTUATOR SHOULD BE POWERED THROUGH IT'S OWN INDIVIDUAL SWITCH OR RELAY CONTACTS TO PREVENT CROSS FEED BETWEEN TWO OR MORE ACTUATORS.

DRAW	P.S. KIM	CHECK
DESIGN	S.M. HAN	APPR.
PART NAME 1PH WIRING DIAGRAM STANDARD+PCU		
DWG. NO HQ-1500-A		
ISSU. DEPT. HADR	DATE	2004.05.10
EMERSON		
APPLICATION		

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