

INGENIOUS ACTUATORS INSTRUCTION MANUAL

1. Introduction:

Ingenious Actuator is a platform to provide an Easy & Suitable Solution for Actuating need.

We at Ingenious Actuator are making customized Actuator PCB cards of different shape, size & function for your needs.

We are also Excellent in all kinds of Actuator Automation.

2. Features:

*Digitalized limit/torque setting_

With the press of button, you will be able to set limit and torque setting with high Accuracy.

*Multifunction relay_

Our card is provided with two multifunction relay which can be assigned any function of actuator in case of original relay fails.

*Latchable relay_

Our card is provided with 2 latch able relay for open/close feedback to prevent loss of feedback at the time of power failure.

* Mode operation_

Our card can be operated in 3 modes.

1. ON/OFF
2. CONTINUOUS
3. INCHING

whichever suits, you can set it to.

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*4-20mA inching mode_

Our actuator card can transmit /receive 4-20mA signals which can improve the functionality of operation.

*Rechargeable battery with charging circuit_

Our card is provided with rechargeable battery with installed charging circuit which prevent operational malfunction during power loss or shutdown.

*Humidity/Temperature sensor_

Our card is provided with Humidity and temperature sensor to detect the internal environment of the card chamber to protect card from water ingress in chamber and high temperature.

3. Display introduction:

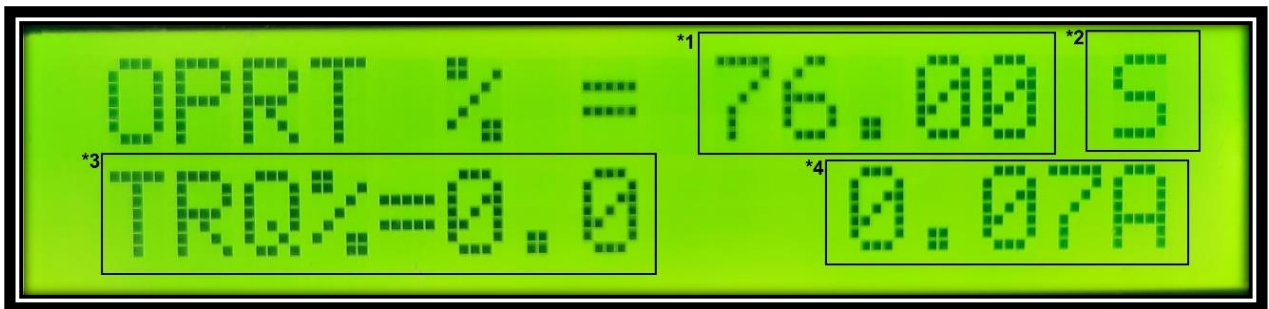


Fig.1

1* = Actuators operated percentage.

2* = It indicated Local (L), Stop(S) & Remote(R) status.

3* =It indicates the percentage of torque operated at the time of running.

4* = It indicated the amount of current drawn at the time of operation.

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4. Limit setting:

*Open setting_

In order to enter the open limit setting module, keep the L/S/R switch in stop(S) mode.

And after that press open push button for 5 sec., you will see the below image



Fig.2

In the picture $OPRTPOSOP = 67$ (*the value will change with rotation*) indicate the current position of the encoder

Now move the actuator manually to full open position after that rotate the handle for 1.5 turns against open direction and then press the close push button.

Your open limit setting is done.

*Close setting_

In order to enter the close limit setting module, keep the L/S/R switch in stop(S) mode.

And after that press close push button for 5 sec., you will see the below image



Fig.3

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In the picture OPRTPOSCL = 67(*the value will change with rotation*) indicate the current position of the encoder

Now move the actuator manually to full close position after that rotate the handle for 1.5 turns against close direction and then press the open push button.

Your close limit setting is done.

****In order to come out from the setting menu move L/S/R switch from Stop(S) to local(L) or remote (R) mode to exit completely****

5. Torque setting:

*Open torque settings

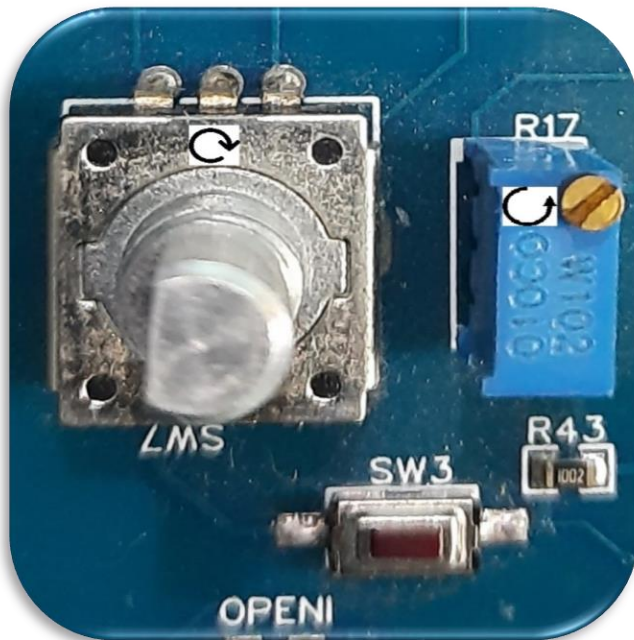


Fig.4

In order to enter the open torque setting module, keep the L/S/R switch in stop(S) mode.

And after that press the rotary switch SW7 (fig4). For 3 sec.

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You will be directed to below screen

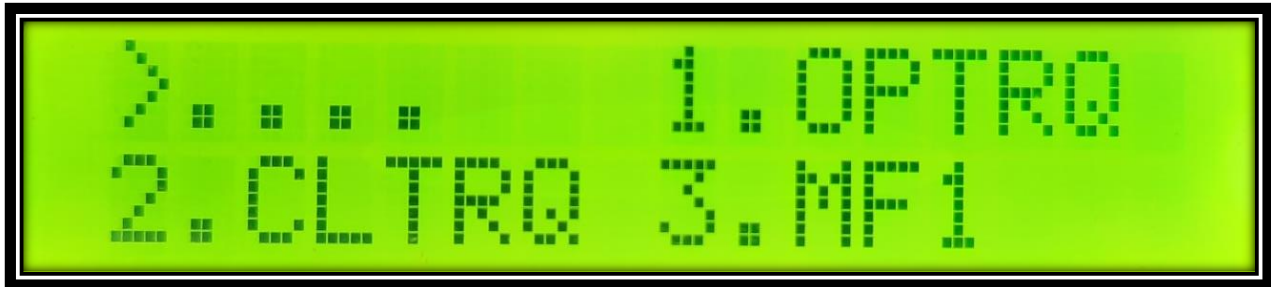


Fig.5

Rotate the rotary switch SW7 (fig4) clockwise to select from the menu -OPTRQ as show in the fig below.

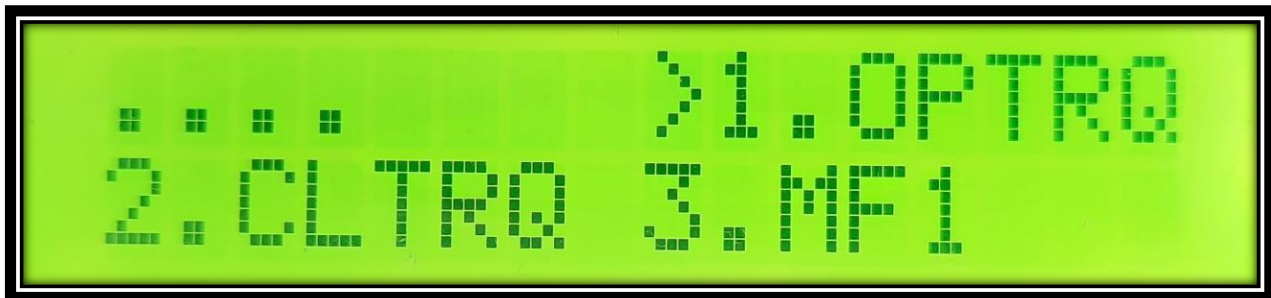


Fig.6

Press the SW3 as shown in fig4 switch to enter the open torque menu.



Fig. 7

Above image will appear on the screen, now to change the value, rotate rotary switch SW7 (fig4) clockwise to increase the value of torque and anticlockwise to decrease the value of torque after deciding the final value press the rotor switch SW7 (fig4) to set the open torque value. Below image will appear on pressing the rotary switch fig 8.

Open torque setting is done.

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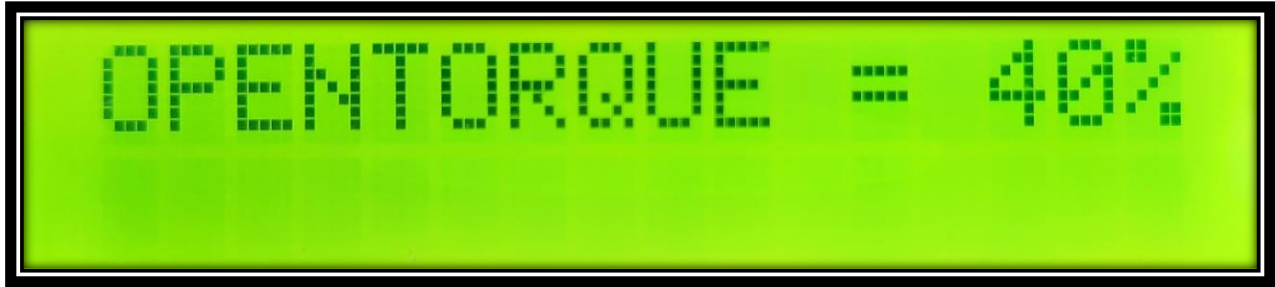


Fig.8

Now press switch SW3 as show in Fig 4 to exit the open torque setting menu or move L/S/R switch from Stop(S) to local(L) or remote (R) mode.

*Close torque setting_

In order to enter the close torque setting module, keep the L/S/R switch in stop(S) mode.

And after that press the rotary switch SW7 (fig4). For 3 sec.

You will be directed to below screen



Fig.9

Rotate the rotary switch SW7 (fig4) clockwise to select from the menu -CLTRQ as show

In the fig below.

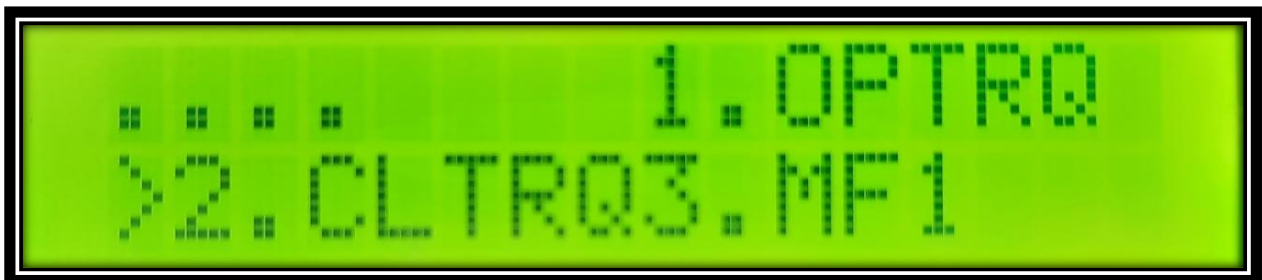


Fig.10

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Press the SW3 switch to enter the close torque menu.



Fig. 11

Above image will appear on the screen, now to change the value rotate rotary switch SW7 (fig4) clockwise to increase the value of torque and anticlockwise to decrease the value of torque after deciding the final value press the rotor switch SW7 (fig4) to set the close torque value. Below image will appear on pressing the rotary switch fig 12.

Close torque setting is done.

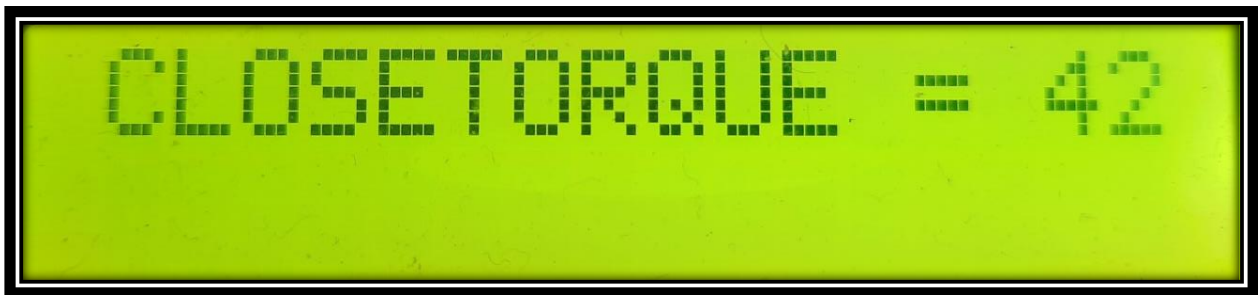


Fig.12

Now press switch SW3 as show in Fig 4 to exit the close torque setting menu.

****In order to come out from the setting menu move L/S/R switch from Stop(S) to local(L) or remote (R) mode to exit completely****

6. Multifunction relay setting_

The card is having 2 multifunction relays called MF1& MF2.

To enter the multifunction relay setting module, keep the L/S/R switch in stop(S) mode.

And after that press the rotary switch (SW7) which is shown in the fig4. For 3 sec.

Now rotate the rotary switch SW7 (fig4) to select option MF1.

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You will be directed to below screen

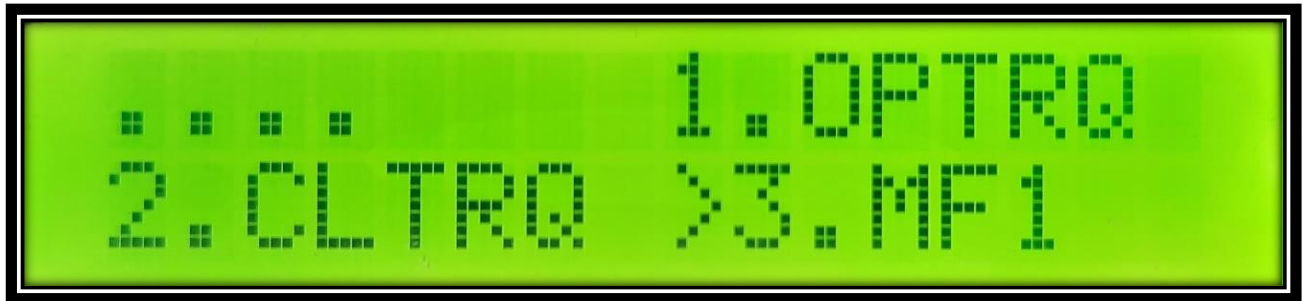


Fig.13

Press the SW3 (fig4) switch to enter the MF1 menu and for MF2 rotate the rotary switch in clockwise direction. You will see a below image



Fig.14

And then press SW3 (fig4) to select MF2 or MF1 setting.

After entering into the menu, you will see the below screen on display

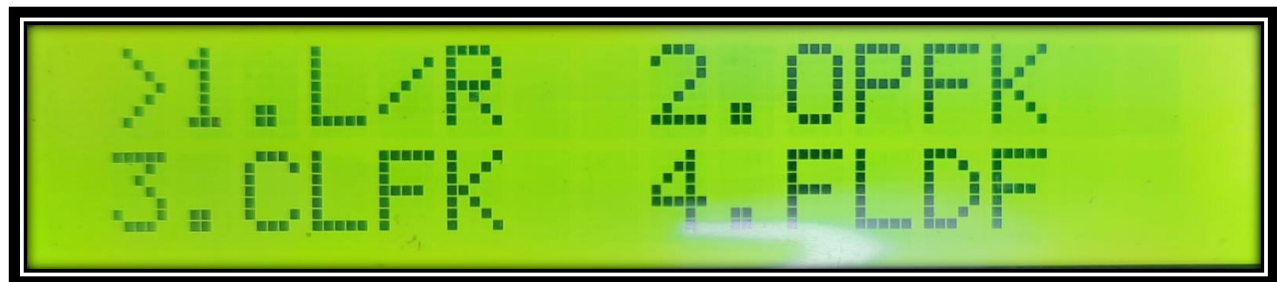


Fig.15

Now select any option from the menu available for MF1 or MF2 by pressing SW7 (fig4). Switch The relay will respond accordingly, to the selected function.

To reset the relay function, select

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RESET from the menu option as shown below in fig.



Fig.16

In order to come out of MF setting menu select BACK and press SW7 (fig4).

****In order to come out from the setting menu move L/S/R switch from Stop(S) to local(L) or remote (R) mode to exit completely****

7. Tordly setting_

At the time of start of Induction motor it draws 7-10 times it rated current and the torque sensing system of the card is dependent on the drawn current, it will create faulty sensing of torque so in order to bypass this phase a time delay is introduce at the time of starting of the motor

Now to enter the menu keep the L/S/R switch in stop(S) mode. And after that press the rotary switch SW7 (fig4) For 3 sec. Now rotate the rotary switch SW7 (fig4) to select option TORDLY.

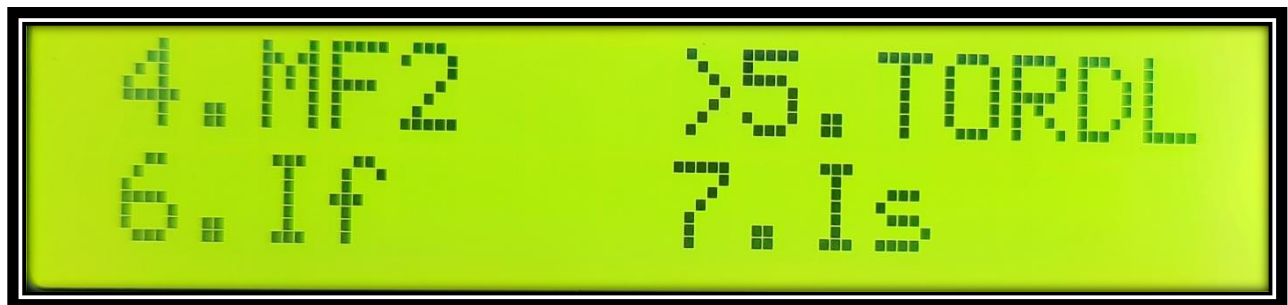


Fig.17

Press the SW3 (fig4) switch to enter the TORDLY setting you will see below image

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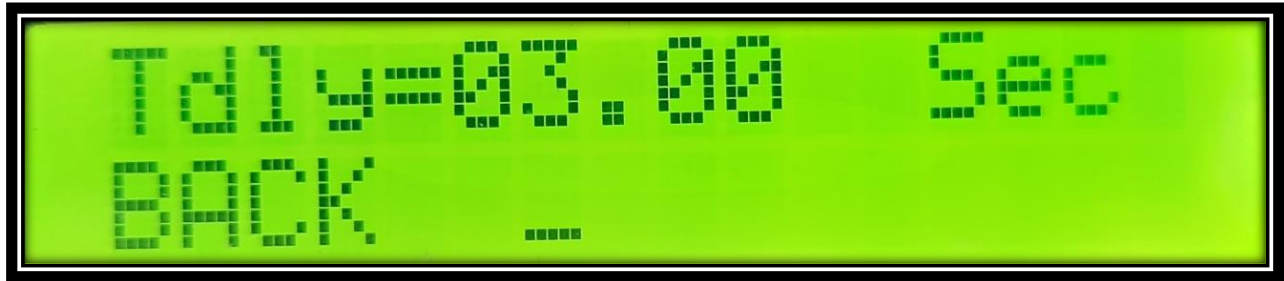


Fig.18

Now again press SW7 (fig4) switch to set TIME of delay in the case of Fig.18 (03 Sec)

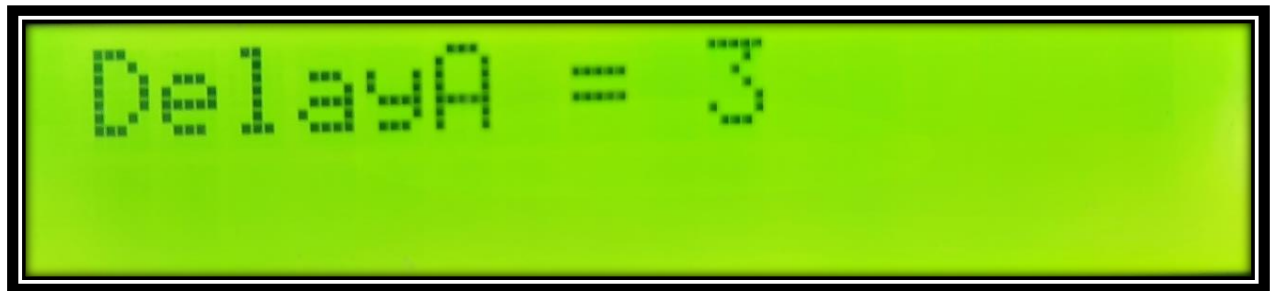


Fig.19

Now to change the value rotate rotary switch clockwise to increase the value of DelayA and anticlockwise to decrease the value of DelayA after deciding the final value press the rotor switch SW7 (fig4) to set the DelayA value.

Same for decimal point (.00) select rotating SW7 (fig4) clockwise below screen will appear

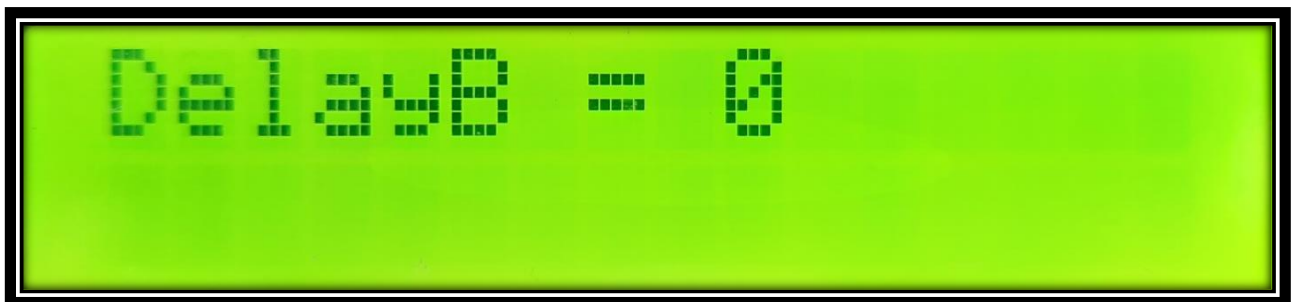


Fig.20

Now set the value of DelayB as we did for DelayA.

Now to come out of TORDLY setting rotate the SW7 (fig4) switch in clockwise direction and select BACK as shown in fig.21 below and press SW7 (fig4) switch.

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Fig.21

8. If setting_

In order for proper sensing of Torque of Actuator the motor name plate current needed to be filled in this setting.

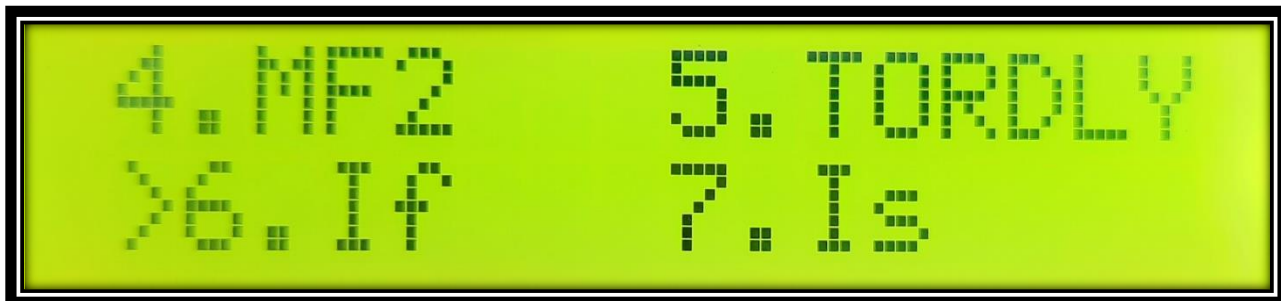


Fig.22

Select (If) option from the Menu as shown in fig 22. By rotating SW7 (fig4) in clockwise direction and then press SW3 (fig4) switch. You will see the below screen as fig 23.



Fig.23

Now press SW7 (fig4) switch to set the current integral part (in case of above fig 00) you will see the below fig 24

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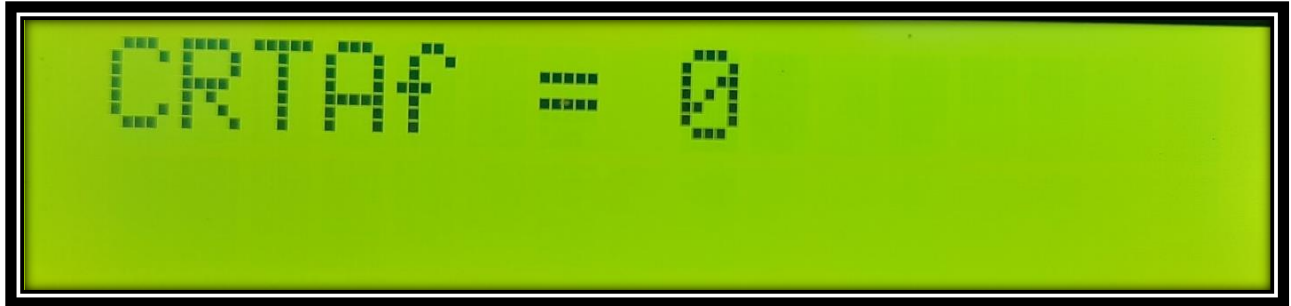


Fig. 24

Now to change the value rotate rotary switch clockwise to increase the value of CRTAf and anticlockwise to decrease the value of CRTAf after deciding the final value press the rotor switch SW7 (fig4) to set the CRTAf value.

Same for decimal point (.21) select rotating SW7 (fig4) clockwise below screen will appear



Fig. 25

Now set the value of CRTLf as we did for CRTAf.

Now to come out of (If) setting rotate the SW7 (fig4) switch in clockwise direction and select BACK as shown in fig.26 below and press SW7 (fig4) switch.



Fig. 26

9. Is setting_

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This is the starting current of the motor in order to provide protection to the motor from stalling and to improve the TORQUE sensing of the actuators.

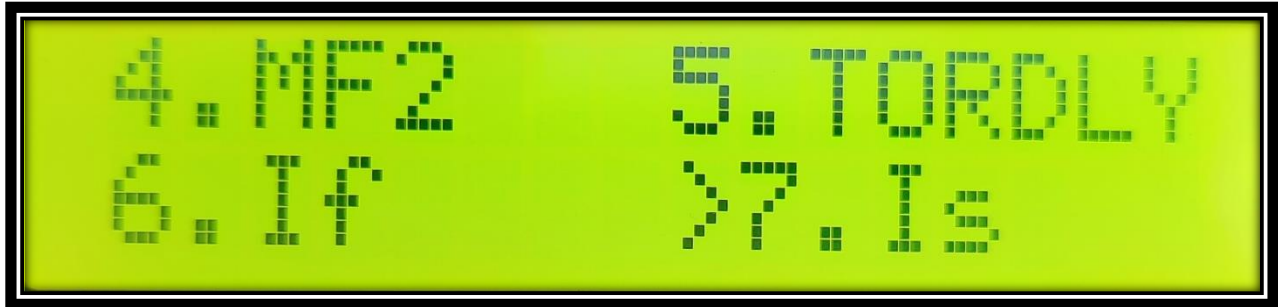


Fig.27

Select (Is) option from the Menu as shown in fig 27. By rotating SW7 (fig4) in clockwise direction and then press SW3 (fig4) switch. You will see the below screen as fig 28.

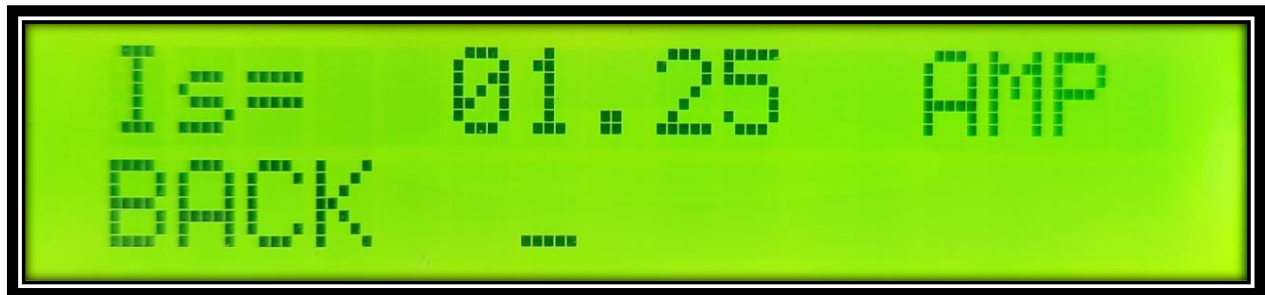


Fig.28

Now press SW7 (fig4) switch to set the current integral part (in case of above fig 01) you will see the below fig 29

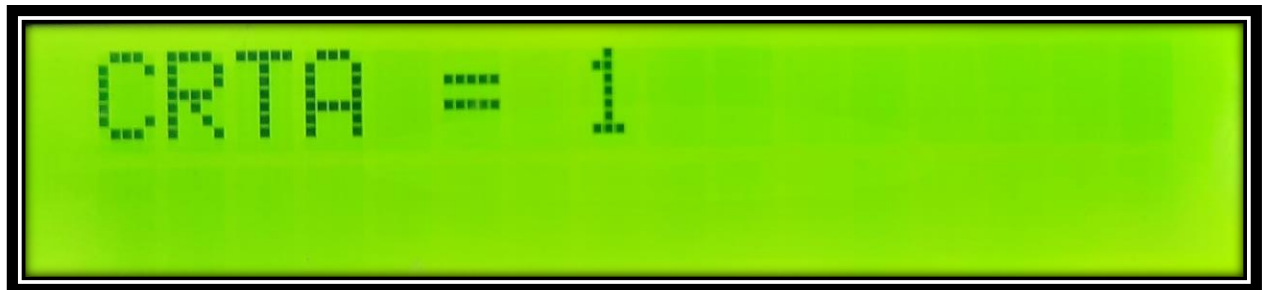


Fig. 29

Now to change the value, rotate rotary switch clockwise to increase the value of CRTA and anticlockwise to decrease the value of CRTA after deciding the final value press the rotor switch SW7 (fig4) to set the CRTA value.

Same for decimal point (.25) select rotating SW7 (fig4) clockwise below screen will appear

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Fig. 30

Now set the value of CRTL as we did for CRTA.

Now to come out of (Is) setting rotate the SW7 (fig4) switch in clockwise direction and select BACK as shown in fig.31 below and press SW7 (fig4) switch.



Fig. 31

****IMPORTANT NOTE****

AFTER DOING ANY CHANGE IN SETTING IT IS COMPULSORY TO RESET THE SYSTEM SO THAT THE SETTING ARE ACCEPTED PROPERLY.

TO RESET THE SYSTEM PRESS (SW1 *marked with red strike*) NEAR THE MICONROLLER AS SHOWN IN THE FIG.32 BELOW.

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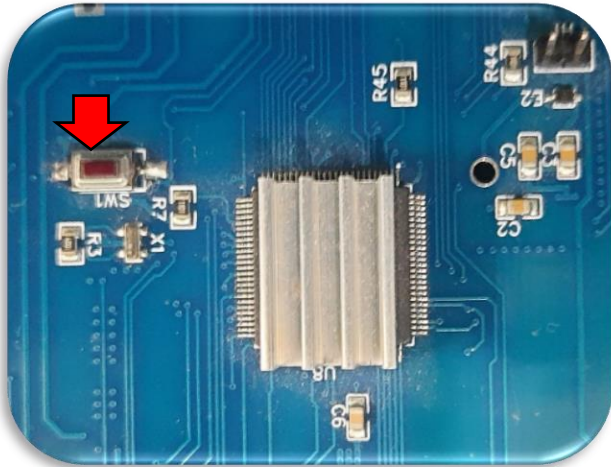


Fig. 32

10. 4-20mA transmitter setting_

The card is provided with 4-20mA transmitter based on the operating percentage of the Actuator

Now to read the 4-20mA output connect the PLC/DCS cable to the C+__C- terminals as show in the fig 33

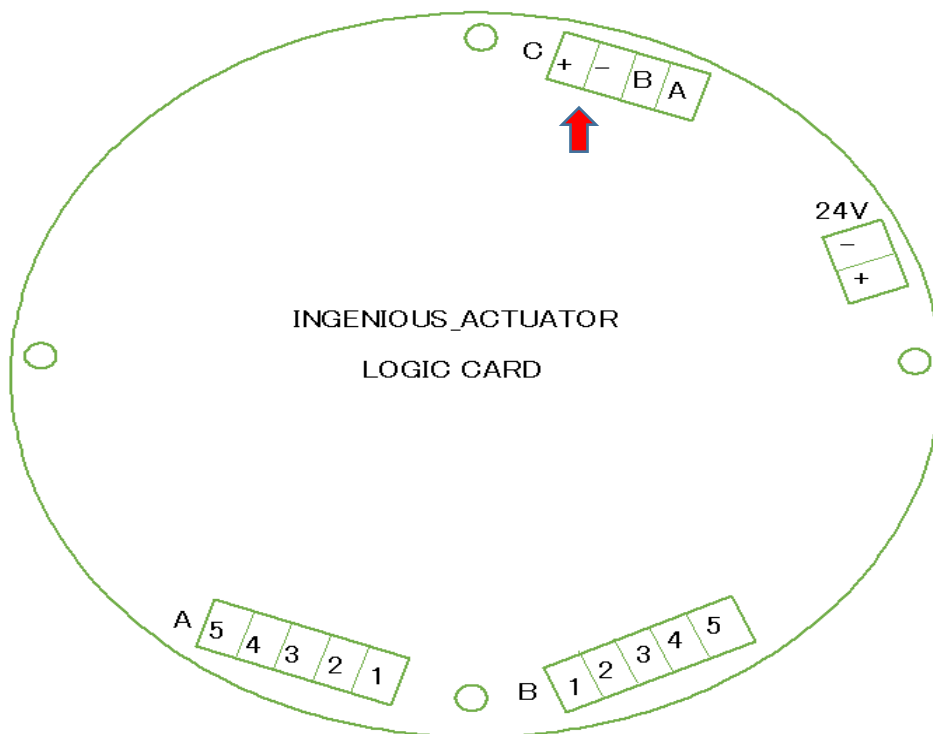


Fig.33

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* 4-20mA Span & Zero setting_

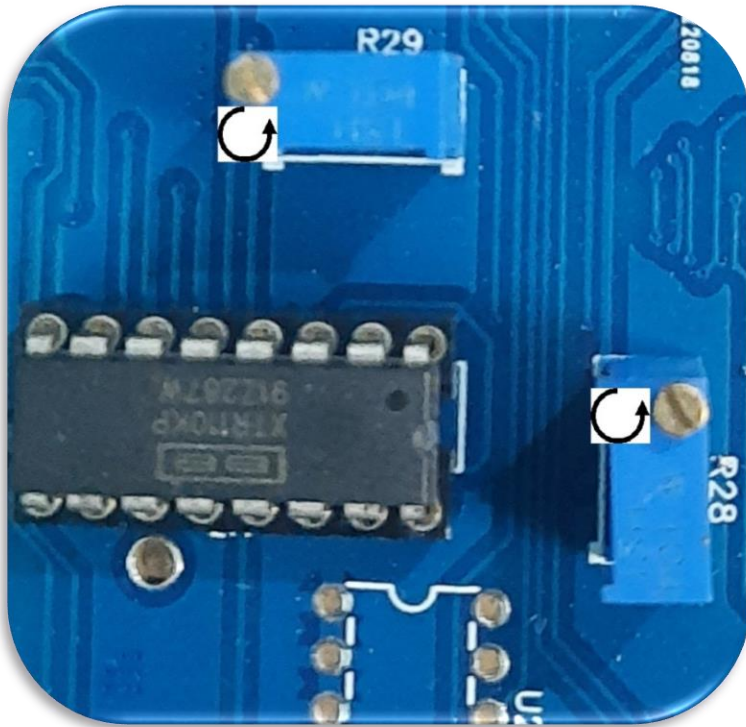


Fig. 34

**** FOR READING THE VALUE LOOP CALIBRATOR TO BE USED AT C+__C- TERMINALS AND POLARITY OF CONNECTION SHOULD BE CONFIRMED BEFORE CONNECTION ****

OFFSET (ZERO) ADJUSTMENT:

The offset current can be adjusted by using the potentiometer, R29, shown in Figure 34. Set the Actuator to zero position and do the close setting at this point and if the output is not 4mA adjust R29 to give 4mA at the output. The R29 should be rotated in the clockwise direction for increasing and vice-versa for decreasing adjustment.

SPAN ADJUSTMENT:

The span is adjusted at the full-scale output current using the potentiometer, R28, shown in Figure 34. This adjustment is interactive with the offset adjustment, and a few iterations may be necessary. For setting the span first move the actuator to full open and do the open setting and if the output is not 20mA adjust R28 to give 20mA full-scale output. . The R28 should be rotated in the clockwise direction for increasing and vice-versa for decreasing adjustment.

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11. MODE setting_

The card had a 3 mode of operation

1. ON/OFF
2. CONTINOUS
3. INCHINHG

Now to select any of the mode of operation turn on the dip switch as shown in the fig below



Fig.35

Now to run the Actuator in the ON/OFF mode turn on the Dip switch 1.

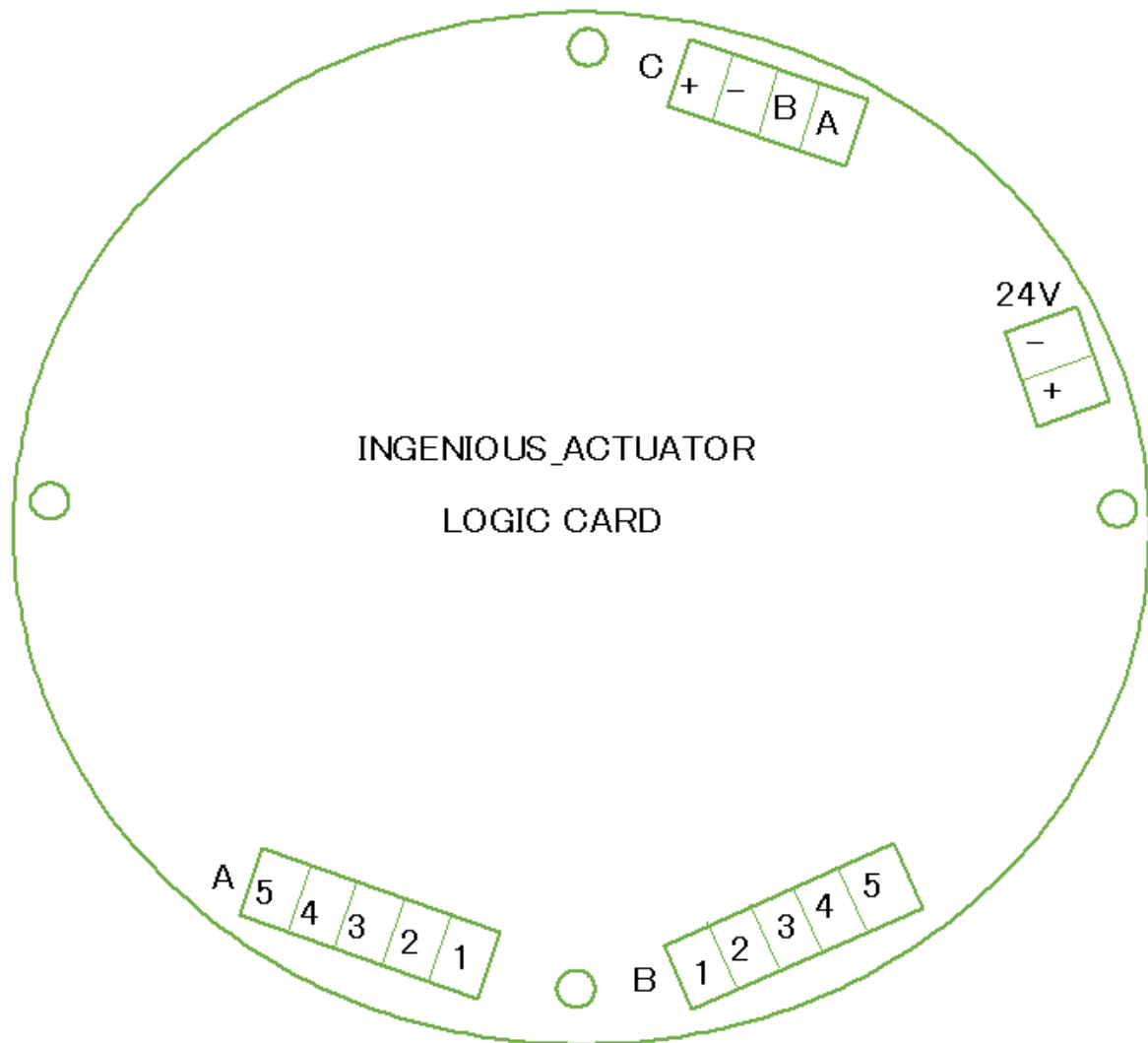
Same for INCHING mode turn on the Dip switch 2.

And for CONTINOUS mode turn on the Dip switch 3.

Care to be taken to turn ON any dip switch from 1 to 3 should be one at a time simultaneous turning on will lead to malfunctioning of actuator.

**** NOW TO CHANGE THE DIRECTION OF ROTATION OF ACTUATOR FROM CLOCKWISE (CW) TO COUNTER CLOCKWISE (CCW). TURN ON THE DIP SWITCH NO. 4****

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A1-A5=OVERLOAD I/L

A2-A5=LCLOSE I/L

A3-A5=LOPEN I/L

A4-A5=REMOTE I/L

B1-A5= LOCAL1 I/L

B2-A5= ROPEN1 I/L

B3-A5= SPARE I/L

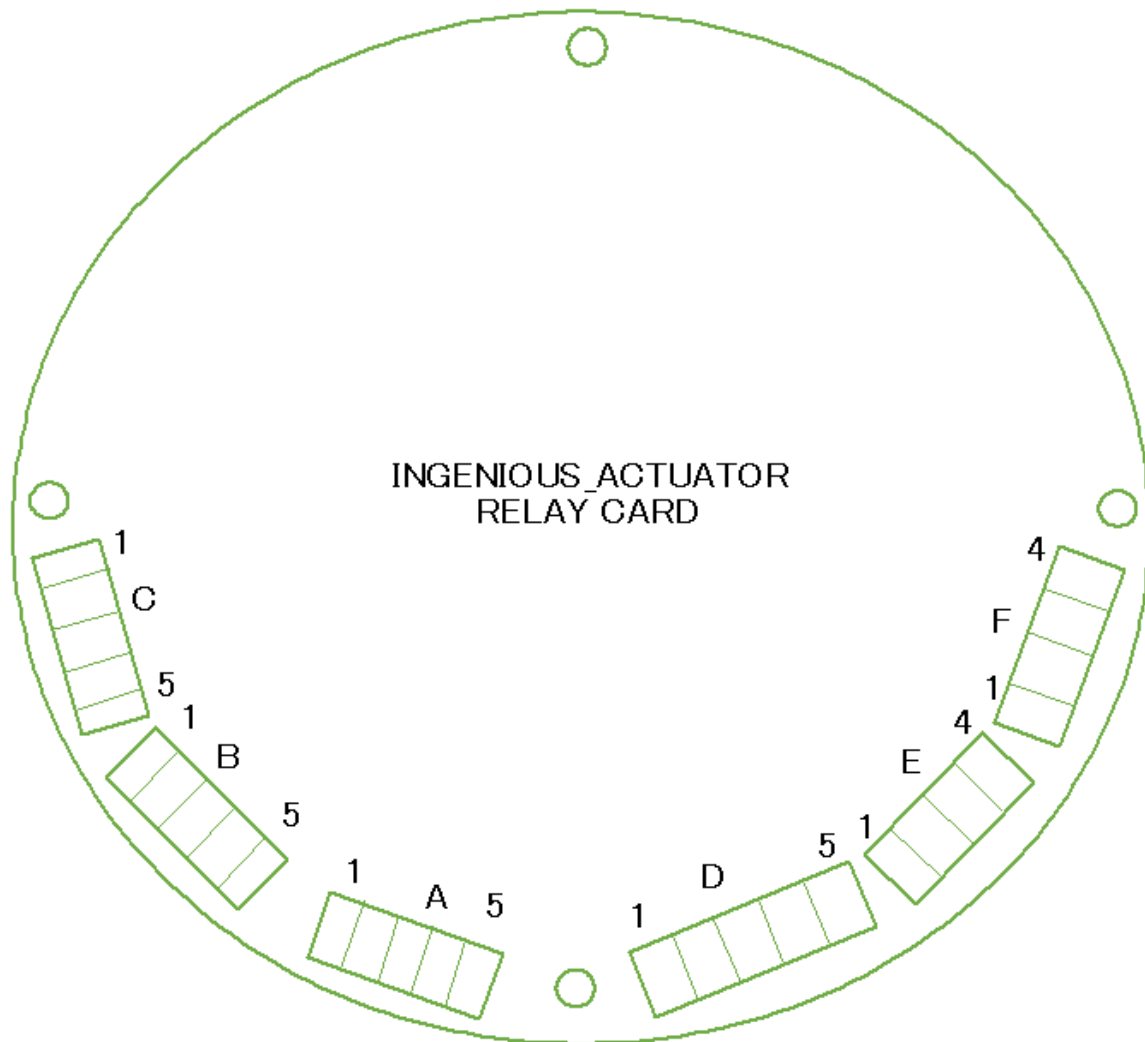
A5--24(-) = 24VDC

B4-A5= RCLOSE1 I/L

C+ __ C- = 4-20 _mA Transmitter

CA-CB= MODBUS COMMUNICATION (RS485)

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A1-A2= OPEN CONTACTOR CONTACT

A3-A4= CLOSE CONTACTOR CONTACT

B1-C5= MULTI FUNCTION RELAY 2 CONTACT

B2-B3= FIELD_FAULT CONTACT

B4-B5 = LOCAL/REMOTE CONTACT

C1-C2= PROGRAMMEABLE CONTACT

C3-C4= MULTI FUNCTION RELAY 1 CONTACT

D1-D2=OPEN FEEDBACK CONTACT

D3-D4= CLOSE FEEDBACK CONTACT

D5= +12V DC

E1-E2= ENCODER CONTACT

E3 = +5V DC FOR ENCODER

E4 = GND FOR ENCODER

F1= +24V DC

F2 = GND

F3-F4= 24V AC INPUT

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12. ERROR CODE & RECTIFICATION_

*Op_Trq_opt :

This fault indicate that open torque had been activated while moving toward open direction

Now to reset the fault move the actuator electrically or manually 5% toward close direction to reset it.

Care should be taken to ensure that the movement of actuator is free toward open side before giving open command after resetting.

*Cl_Trq_opt:

This fault indicate that close torque had been activated while moving toward close direction

Now to reset the fault move the actuator electrically or manually 5% toward open direction to reset it.

Care should be taken to ensure that the movement of actuator is free toward close side before giving close command after resetting.

*Temp_hi:

When the temperature of the chamber containing the card exceeds 65 °C then this fault is activated necessary steps are required to be taken to lower the chamber temperature.

*Humid_hi:

When the humidity of the chamber containing the card exceeds 95 H then this fault is activated necessary steps are required to be taken to lower the chamber Humidity, this fault also indicate that there is water ingress in the card chamber.

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* Mt_stl/chk:

When the current at the starting of the actuator exceeds the starting (Is) current mentioned for the actuator motor then this fault is activated.

Necessary steps is required to be taken as the actuator could be in complete jam condition or mismatch in limit setting.

To reset the fault move the actuator in open or close direction for 5% and ensure that the actuator movement is free or the setting is correctly

Coordinating to open/close setting by seeing the operated percentage.

If not then redo the open/close setting again

*Thermal_overload_actted:

When the motor overload relay sense any electrical fault it will give a fault command, this is a serious fault and should not be ignored.

Through checking of supply voltage and motor healthiness should be done to identify the fault cause.

To reset the fault open the card chamber and reset the overload relay inside it first and then reset it in the card by pressing reset button on the card

TO RESET THE SYSTEM PRESS (SW1 *marked with red strike*) NEAR THE MICONROLLER AS SHOWN IN THE FIG.32