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The Complete Solution in Valve Automation

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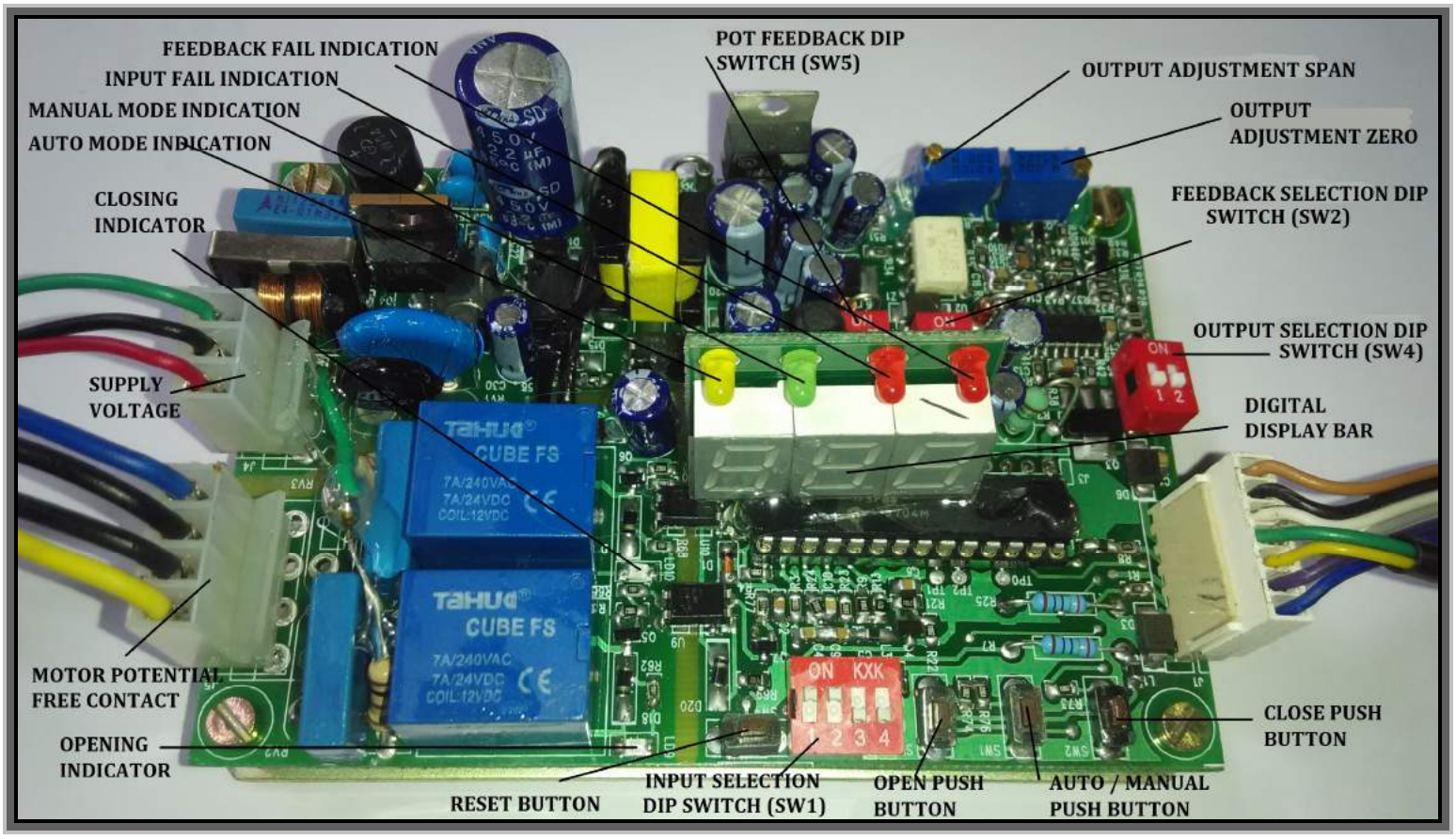
SPECIFICATION, INSTALLATION & MAINTENANCE MANUAL OF POSITION CONTROLLER UNIT (BE-8K10)

POSITION CONTROLLER UNIT (PCU)

Specification, Installation & Maintenance Manual



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SPECIFICATIONS

1. Operating Voltage : 110VAC /230VAC, +/-50Hz
2. Display Indication : 0 to 100% for Valve Opening
3. On Board LED Indications : For 24VDC, 5VDC, Valve Opening/Closing, Auto/Man, I/P fail and Feed Back Fail
4. Dip Switches Provided : Dip Switches provided to select the Particular control I/P, Feed Back I/P and Feed Back O/P
5. Control Input : 4-20mA, 0-5VDC, 1-5VDC, 0-10VDC, 2-10VDC (Field Selectable)
6. Feed Back Output : 4-20mA, 0-5VDC, 1-5VDC, 0-10VDC, 2-10VDC (Field Selectable)
7. Feed Back Input : 100-235 Ohms/100-500 Ohms/100-600 Ohms and 4-20mA (Field Selectable)
8. Control Output : 110VAC/230VAC for Motor for Opening/Closing OR Potential Free Contacts
9. Keys Provided : OPEN, AUTO/MAN, CLOSE and RESET
10. Settings Provided : Hysteresis, Pulse and Mode
11. AUTO/MAN Selection
    - AUTO Mode : Valve Operates according to the control Input given
    - Manual Mode : Valve Operates by pressing OPEN/ CLOSE Keys provided on board
12. Calibration : Auto Calibration facility provided
13. Load Resistance : 500 Ohms Max
14. Position Conversion Accuracy : ± 0.5% to ± 2%
15. Ambient Temperature : -25°C to +80°C
16. Ambient Humidity : 90% RH Max (Non Condensate)
17. Insulation Resistance : Min 500 VDC, 30µOhms
18. Vibration & Shock (X, Y, Z) : log

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Settings of the Functions:

There are 4 keys provided for different functions.

A. RESET Key B. OPEN Key C. AUTO/MAN Key D. CLOSE Key
All keys are mentioned in the drawing.

1. Hysteresis Setting:
Press and hold AUTO/MAN key, then press RESET key once. The display reads H03 (Default or earlier setting, 00 to 09). By using OPEN key the required value can be set from 00 to 09.

2. Pulse Setting:
After the hysteresis setting is over, again press AUTO/MAN key for pulse setting. The display reads P05 (Default or earlier setting, 00 to 25). By using OPEN key the required value can be set from 00 to 25.

3. Mode Setting:
After the pulse setting is over, again press AUTO/MAN key for forward or reverse mode setting. The display reads Π-F (Default or earlier setting, Π-F or Π-r). By using OPEN key forward (Π-F) or reverse (Π-r) mode can be set.

4. I/P fail position Setting:
After the mode setting is over, again press AUTO/MAN key for I/P fail position setting. The display reads F-L (Default or earlier setting, F-O, F-L or F-C). By using OPEN key the required position can be set, F-O for open, F-L for last position, F-C for close.

Press again AUTO/MAN key to save the settings.

Dip Switches Settings:
There are four Dip switched provided to select the different parameters as Input, Output and Feed Back. ON/OFF position of switches to select the different parameters is shown the diagram. Referring the diagram required parameter can be selected as Input, Output and Feed Back.

Functionality:

Hysteresis:
If the hysteresis value is set for 03, then the control accuracy of the instrument will be +/- 3%. i.e., for example if the control I/P is 12mA, then the valve opening percentage will be settled in between 47% to 53% instead of actual settling position of 50%.

This setting is useful to avoid the hunting where the inertia of the actuator motor is more and the accuracy is not a criteria.

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Pulse setting:

If the value of the pulse is set for 05, then the valve operates continuously to the nearest set position less 5%. And it reaches remaining 5% by inching mode. i.e., for example if the control I/P is 12mA, then the valve opening percentage should be 50%. If the pulse is set for 05, the valve operates continuously up to 45% and reaches 50% by inching mode while close to open. And the valve operates continuously up to 55% and reaches 50% by inching mode while open to close. Depending on the actuator inertia, pulse value should be set. If the there is no inertia then the value can be set for zero, so that the actuator operates continuously up to the set position.

This setting is useful to avoid the hunting where the inertia of the actuator motor is more and to achieve the control accuracy. Because of the inching operation at near to the set position the inertia factor can be avoided.

Mode Setting:

In mode setting the forward or reverse mode can be set. If the forward mode is selected, at 4mA I/P, the actuator will closes completely and if the I/P current increases, the actuator starts opening and at 20mA it opens completely.
If the reverse mode is selected, at 4mA I/P the actuator will opens completely and as if I/P current increases, the actuator starts closing and at 20mA it closes completely.

So, the operation of the actuator can be reversed as per the requirement.

I/P fail position setting:

In this setting we can select where should be the actuator remains, if the control I/P fail? If 'O' (Open) selected, the actuator will open completely when the control I/P fails. If 'L' (Last position) selected, the actuator will remain in the same position where it was, when the control I/P fails. If 'C' (Close) selected, the actuator will close completely when the control I/P fails.

Operating Instructions

Position Controller controls Opening/Closing function of the Valve fitted with Electrical Actuator. Supply, Feed Back, Motor and Input connections should be properly wired as per the terminal details mentioned in the drawing. Select required control I/P type, feed back I/P type and feed O/P type by using Dip switches provided on the board. The Dip switch selection method is shown in the diagram. Using AUTO/MAN key, select Auto or Manual mode. Selected mode is indicated by LED. In manual mode valve can be operated by pressing the OPEN/CLOSE keys provided on the board. In Auto mode valve operates depending upon the control I/P variation. Valve operation depends on the mode selected, forward or reverse. Now assume selected mode is forward, control I/P is 4-20mA, feed back I/P is 4-20mA and feed back O/P is 4-20mA. Now at 4mA the valve closes fully and at 20mA the valve opens fully. Accordingly for
4-20mA input variation valve operates close to open, 0 to 100% linearly. The display indicates the percentage opening position of the valve from 0 to 100% accordingly. If reverse mode is selected, the valve functions reverse for
4-20mA input variation. While valve opening/closing takes place the corresponding LED glows.

4-20mA feed back output is available for 0 to 100% valve operation.

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In this system five different control I/P type (4-20mA, 2-10VC, 0-5VDC, 0-10VDC and 1-5VDC), four different feed back I/P type (100-235E, 100-500E, 100-600E and 4-20mA) and five different feedback O/P type (4-20mA, 2-10VC, 0-5VDC, 0-10VDC and 1-5VDC) can be selected. Here for any type of control I/P, we can select any type of feedback I/P type and any type of feedback O/P type. For example if the control I/P type is 4-20mA, we can select 0-10VDC feedback I/P and 1-10VDC feedback O/P.

Whenever the different parameter is selected, the system should be calibrated for the particular parameter to get the accuracy.

For the feedback I/P 100-500E and 100-600E, the Dip switch position is same, but for the same position both the value can be calibrated.

Calibration

To calibrate the valve with controller auto calibration facility is provided. Select required control I/P type, feed back I/P type and feed O/P type by using Dip switches provided on the board. Connect the controller with actuator and confirm the feed back I/P and controller input connections are ok and as per the parameter selected. Now assume control I/P selected is 4-20mA and feed back I/P is 100-235E. Now to calibrate system, press and hold the CAL (A/M) key for about 5 seconds. The display reads CAL with flashing slowly. Now give input of 4mA and press ZERO (CLOSE) key. The display flashes little fast and the valve starts closing. After full close the display flashes again slowly, now give the input of 20mA and press SPAN (OPEN) key, the valve starts opening and after full open the display reads CAL without flashing. Now press and hold the CAL key for about 5 seconds to come out of the calibration mode. Now the valve is calibrated with controller and starts to operate as per the input given.

For feedback O/P calibration, ZERO and SPAN adjustment (Trimpots) provided, it is shown in the diagram. After the auto calibration is done, measure the corresponding feedback O/P for close to open. If any difference in the value, then adjust the value using ZERO and SPAN adjustment. For 0-10VDC and 2-10VDC feed back O/P, the Dip switch position is same. Also for 0-5VDC and 1-5VDC feed back O/P, the Dip switch position is same. But using ZERO and SPAN adjustment it should be calibrated.

Fault Indications:

If the feed back is not as per selected type or the value of the feed back input is exceeds the range the instrument displays FB with flashing, corresponding LED also flashes.
If the control I/P fail, the corresponding LED flashes.
While calibrating if the feed back fails or not as per selected type or exceeds the range or control I/P is not given as selected type or exceeds the range, then display reads Err (Error) with flashing.

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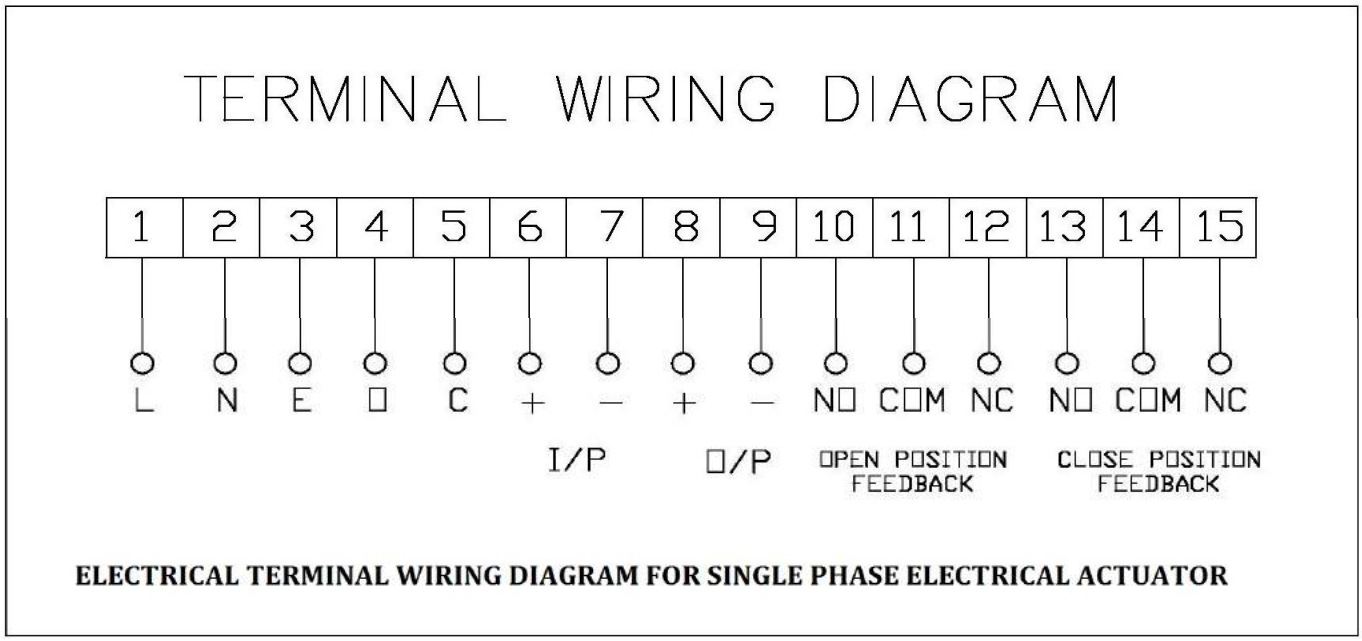
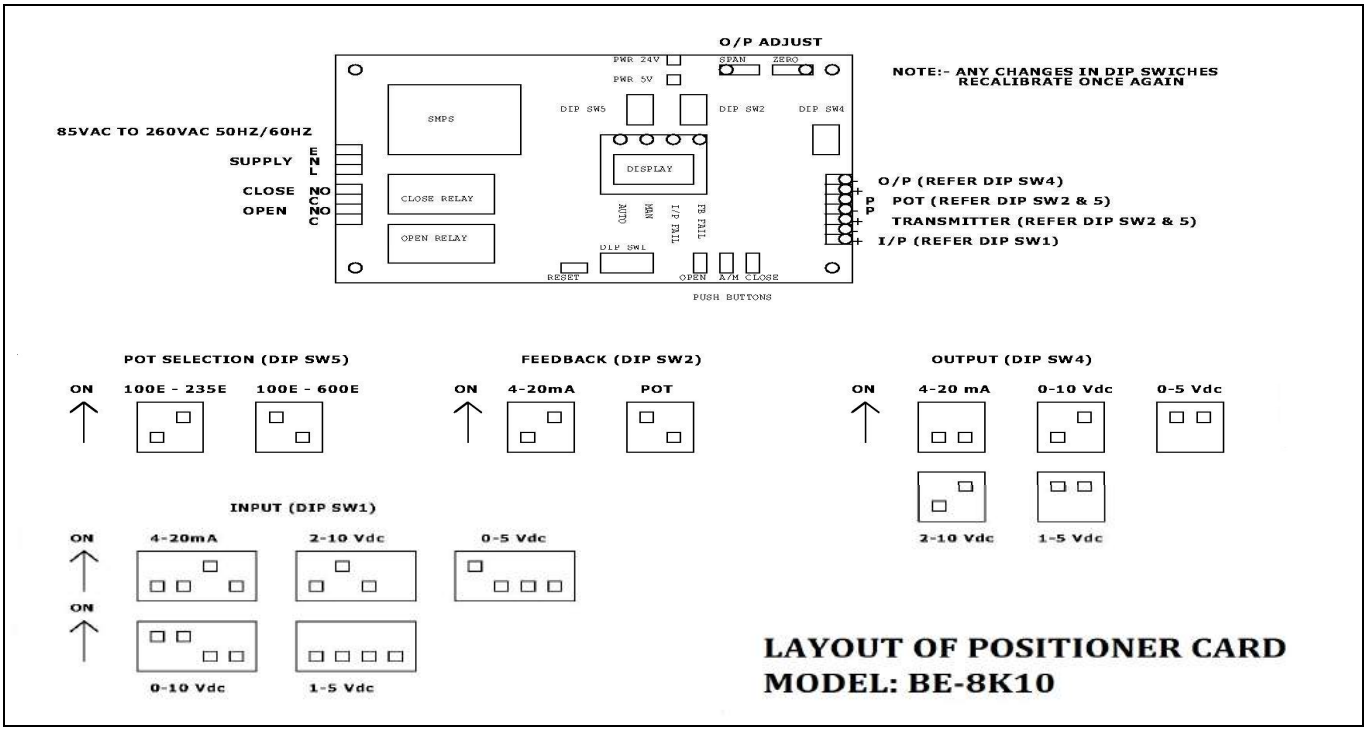


ELECTRICAL TERMINAL WIRING DIAGRAM FOR SINGLE PHASE ELECTRICAL ACTUATOR



LAYOUT OF POSITIONER CARD
MODEL: BE-8K10

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