

PB90/DC

Electronic Actuator Positioner Card

Features

- D.C. 24V or 12V
- Auto-ranging facility that allows simple site commissioning.
- Accepts either a current or voltage command signal and a potentiometer feedback signal.
- An isolated, internally excited, current output proportional to the actuator.
- MANUAL mode that allows positioning by operation of board switches.
- Selectable electronic braking option.

Operation

The "PB90" is designed to be used for the closed loop positioning of reversing actuators.

The instrument compares two analogue signals, one representing the desired position (command signal) and the other representing the actual position (feedback signal) of the actuator.

A difference between these two signals will cause the "PB90" outputs to operate, driving the actuator to the desired position.

When the desired position is reached, both outputs operate momentarily, producing an electrical braking effect, if the braking option is selected.

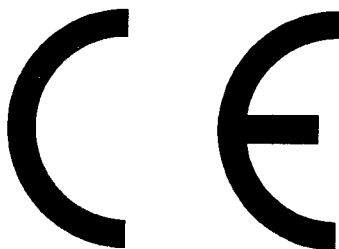
A positional Dead-zone may be adjusted to overcome "hunting" problems associated with mechanical overrun of the actuator.

Wiring

The "PB90" is supplied pre-wired within the actuator housing by the actuator Manufacturer. Please refer to the actuator handbook for customer wiring details. The following notes are for guidance only in the external connection of the equipment.

- AN EARTH CONNECTION MUST ALWAYS BE MADE TO THE DESIGNATED EARTH TERMINAL.
- To ensure RFI compliance the analogue signals MUST be routed in copper braided screened cables with a fill factor density of at least 0.7.
- The screens should be terminated to the metal of the actuator housing, ideally at a suitable metal cable gland.
- Signal cables should be routed separately from power and switching conductors.

Declaration of Conformity



EMC Directive 89/336/EMC

Relevant Standards
EN50081-1 (Emissions)
EN50082-2 (Immunity)

The product has been successfully tested to the relevant parts of the above standards. Wiring must conform to the above notes to retain compliance.



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First time operation

WARNING !!

The actuator and associated mechanical equipment connected to it could possibly move in an unpredictable manner during initial calibration. Ensure that all personnel take appropriate precautions.

1. Ensure that end of travel limit switches and mechanical stops are correctly adjusted before operation.
2. Check the Manufacturer's delivery documents for supply and command signal details and compare this with site information.
 - i) Check that the PB90 supply is 24v d/c or 12V*
 - ii) Check that the command signal link blocks are correctly set as follows: -
Voltage input (range 0 - 10V) - Upper link (V1) ONLY made
Current input (range 4-20mA) - BOTH lower links (I1 & I2) ONLY made.
3. Set 8 way switch (DIL switch) no.3 to the ON position. This selects MANUAL mode.
4. Apply power and check.
 - i) That the right-most LED (LD5) is lit indicating MANUAL mode.
 - ii) That the actuator can be driven open or closed by operating DIL switch no.1 and no.2 respectively.

The correct operation of the end-of-travel limit switches can be checked by driving the actuator fully open and closed. Drive the actuator to desired minimum position and remove power.

Calibration

1. Check that DIL switch no.3 is in the ON position (MANUAL mode).
2. Connect a command signal source and monitor the position output signal with a DVM, set to the 200mA DC range. Apply power to the actuator.
3. Set the command signal to the desired MINIMUM value (e.g. 4mA / 0V). **Note 1.*
Use the MANUAL open/close switches (1 and 2) to drive the actuator to the required MINIMUM position. Move DIL switch no.5 to the ON position. LED 1 will light and LED 5 will extinguish. Move DIL switch no.5 to the OFF position. LED 1 will extinguish and LED 5 will light. This procedure sets the minimum end of the positioner calibration.

**Note 1 - If it is important that the limit switch activates at minimum position (i.e. if the switch is being used as indication of minimum position) then it is recommended that the command signal be set to 4.2mA / 0.1V to ensure that the limit switch is activated when operating in auto mode over the full range.*

4. Set the command signal to the desired MAXIMUM value (e.g. 20mA / 10V). **Note 2.*
Use the MANUAL open/close switches (1 and 2) to drive the actuator to the required MAXIMUM position. Move DIL switch no.6 to the ON position. LED 2 will light and LED 5 will extinguish. Move DIL switch no. 6 to the OFF position. LED 2 will extinguish and LED 5 will light. This procedure sets the maximum end of the positioner calibration and completes the positional calibration.

**Note 2 - If it is important that the limit switch activates at maximum position (i.e. if the switch is being used as indication of maximum position) then it is recommended that the command signal be set to 19.8mA / 9.9V to ensure that the limit switch is activated when operating in auto mode over the full range.*

5. Set the command signal to centre scale and move DIL switch no.3 to the OFF position (AUTO mode). The actuator should move to its centre position and stop. If there is any instability in positioning (i.e. "hunting"), then potentiometer RV1 should be adjusted clockwise until the positioning is stable. The positioner incorporates an electronic brake, which causes BOTH motor outputs to be briefly energised at balance, thus locking the rotation. In certain circumstances, such as when the positioner is operating the actuator via interposing relays or contactors, this braking action can cause "chattering" of the switching device. Moving DIL switch no.4 to the ON position will inhibit the braking action.

Calibration (continued)

6. The next stage involves the ranging of the position output signal. If this option is not required, then calibration can be terminated at this stage.
7. Using the command signal, drive the actuator to the minimum position.
8. Move DIL switch no.7 to the ON position, LED 3 will light.
 Monitor the position output signal with the DVM and adjust the *command signal source* until the desired MINIMUM output signal is obtained on the DVM (e.g. 4mA).
 Note that the command signal source is being used as a convenient adjustment and will NOT move the actuator.
 Move DIL switch no.7 to the OFF position, LED 3 will extinguish.
9. Using the command signal, drive the actuator to the maximum position.
10. Move DIL switch no.8 to the ON position, LED 4 will light.
 Monitor the position output signal with the DVM and adjust the *command signal source* until the desired MAXIMUM output signal is obtained on the DVM (e.g. 20mA).
 Note that the command signal source is being used here as a convenient adjustment and will NOT move the actuator.
 Move DIL switch no.8 to the OFF position, LED 4 will extinguish.

Maintenance

A 3.15A, 20mm anti-surge fuse is situated in the printed circuit board mounted fuse holder.

No other parts are user serviceable and component level repairs should not be attempted. If a fault occurs then please return the unit to the Manufacturers describing the nature and circumstances of the problem.

Connections - these are included for completeness, positioner to actuator wiring will be undertaken by the Manufacturer. Please consult the actuator handbook for customer wiring details.

0.5mm² wire - Group 1

Red	Supply +VE	Supply Voltage
Black	Supply 0V	Supply Voltage
Green/Yellow	Supply EARTH	

0.5mm² wire - Group 2

Brown	Actuator Open Limit Sw (Motor)	Supply Voltage
Orange	Actuator Open Limit Sw (Motor)	Supply Voltage
Blue	Actuator Close Limit Sw(Motor)	Supply Voltage
Pink	Actuator Close Limit Sw (Motor)	Supply Voltage

0.25mm² wire - Group 3

Yellow	Command positive	< 10V dc
Black	Command negative	< 10V dc

0.25mm² wire - Group 4

White	Feedback clockwise	< 10V dc
Grey	Feedback wiper	< 10V dc
Green	Feedback anticlockwise	<10V dc

0.25mm² wire - Group 5

Red	Position O/P +ve	< 20V dc
Purple	Position O/P -ve	< 20V dc

Specification

COMMAND SIGNAL INPUT - The following options are available - selected by jumpers.

- 4-20mA nominal 150R input impedance Jumpers I1 and I2
- 0-10V nominal 260K input impedance Jumper V1

ANALOGUE POSITION OUTPUT SIGNAL

4-20mA self powered, can drive up to 300R

FEEDBACK SIGNAL INPUT

Potentiometer 3-wire, any value greater than 1K 10K preferred

INSTRUMENT SUPPLY

24V or 12V* d/c

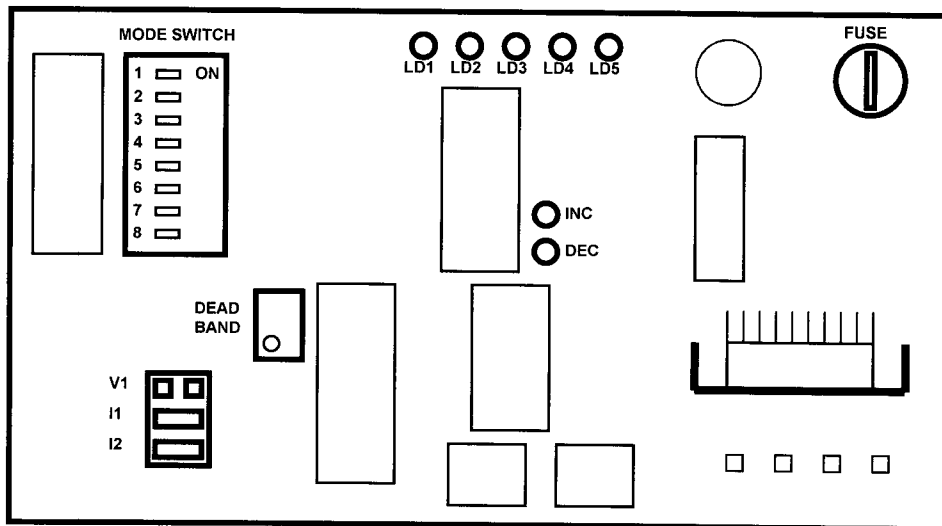
USER ADJUSTMENTS - the following functions are available on an 8 way DIL switch.

- Switch no.1 ON OPEN in manual INC LED lit
- Switch no.2 ON CLOSE in manual DEC LED lit
- Switch no.3 ON Select MANUAL mode LED 5 lit
- Switch no.4 ON BRAKE disabled no indication
- Switch no.5 ON Position minimum calibration LED 1 lit
- Switch no.6 ON Position maximum calibration LED 2 lit
- Switch no.7 ON Position O/P minimum cal. LED 3 lit
- Switch no.8 ON Position O/P maximum cal. LED 4 lit

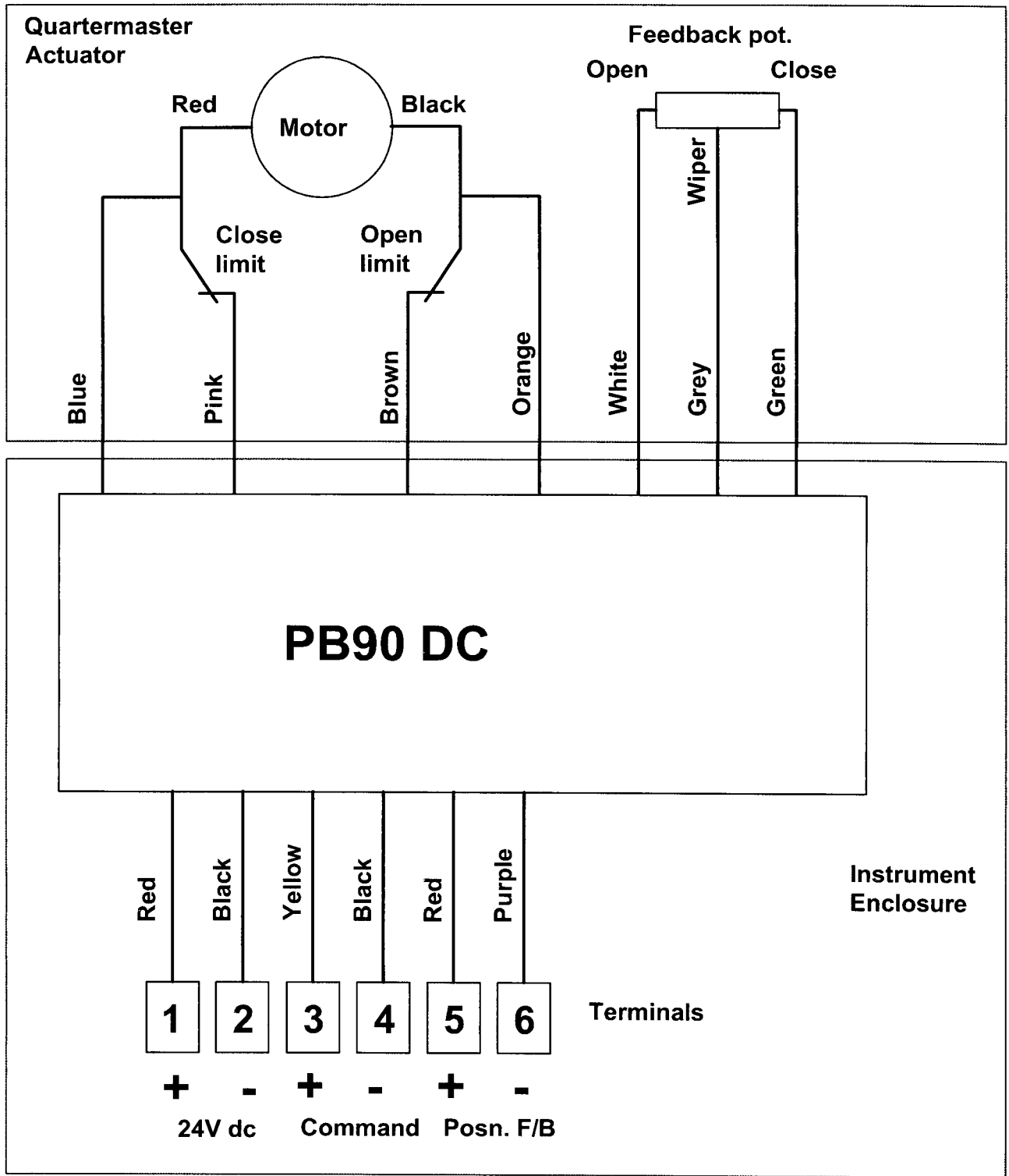
PERFORMANCE - the following applies to the PB90 only, characteristics of the feedback element and actuator system response will have additional effects.

- Conversion 12 bit max., normal conversion range (4-20mA) = 1 in 3200.
- O/P switch res. +/-1 bit theoretically, modified to up to +/-5% of span by dead band .
- Accuracy (Theo.) 0.03% span based on conversion resolution of 1 in 3200.
- Accuracy (actual) 0.1% span based on 25% turn down of feedback range.

*Note - * depends on specified supply, either 12V OR 24V.*



Main Component Positions



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Rev	Date	Drawn by	Checked	Description			Title	
Customer				Drawn	AGM	13/03/02	Wiring Details - PB90 DC in Quartermaster Actuator	
				Checked				
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