



**OPERATING AND INSTALLATION INSTRUCTIONS**  
**FOR**  
**REGELTEK-SERIES ACTUATORS**

**MODEL ST-5102 / ST-5103**

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# OPERATING AND INSTALLATION INSTRUCTIONS FOR REGELTEK-SERIES ACTUATORS



## MODEL ST-5102 / ST-5103

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**NOTE :** It is advisable & recommended to cover the actuator by a canopy to protect it from rain water & heating due to sun rays.

## **I] SETTING OF BASIC ACTUATORS :**

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These actuators are basically reciprocating type and hence are used on Valves/dampers which need Linear motion to operate; viz. Globe Valves, butterfly valves (through linkages) etc.

### **Please take following steps to install and operate the actuators**

#### **1) IMPORTANT POINTS TO BE NOTED BEFORE HANDLING THE EQUIPMENT**

- 1) This actuator should be handled only by experienced technicians.
- 2) Please do not disturb the factory settings marked in red.
- 3) If in doubt, immediately refer to the manufacturers.

#### **2) INSTALLATION AND COMMISSIONING OF AN ACTUATOR FOR ON/OFF DUTY**

##### **1) SETTING THE ACTUATOR**

- i) Ensure that the Thrust and Stroke values and Potmeter output resistance of the actuator are correct to operate the final control element.
- ii) Remove the top Actuator cover.
- iii) Check whether the unit is meant for 230/110/24 VAC and arrange the supply accordingly.
- iv) Give proper electric supply to the actuator and do the wiring as per the diagram provided and ensure the following :- (Ref. Fig. No. 2)
  - a) The actuator Spindle Nut (1) moves 'UP' or 'DOWN' depending on the command 'OPEN' or 'CLOSE' from the control station.
  - b) Desired stroke length (as measured by the movement of (1) above) is available and the travel dependant micro-switches cut off the supply at the extreme-end-travel-limits in appropriate direction.
  - c) For the desired stroke length, one gets the required potentiometer-resistance-output (To be measured at 6, 7, & 8 or 15, 16 & 17 on the terminal strip -- Ref. Drg. No. R400)

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### **3) SETTING THE VALVE**

- i) Ensure valve-travel is exact as per the actuator-travel. Any variation in this will result in the malfunctioning of the assembled control-element.
- ii) The actuator adapter plate (4) (or actuator-mounting plate) on the valve, should be machined in such a way that the actuator, when mounted on it, will fit exactly on the two mounting holes (2 Nos.  $\varnothing 16 + 0.2$  on 100 mm PCD). and will be perfectly vertical. Any misalignment at this point will result into improper functioning of the actuator.
- iii) The valve coupling nut (5) provided in the actuator, is to be removed by loosening the Nut (3) and threaded to suit the valve-spindle.

### **4) MOUNTING THE ACTUATOR ON VALVE**

- i) Bring the actuator to 'TOP' (OPEN) position before mounting onto the valve.
- ii) Remove nut (3) on the actuator and slide it along with the disc spring pack on the valve stem.
- iii) Fit the actuator on the Adapter plate (4) firmly. Ensure proper concentricity and alignment of actuator.
- iv) Pull the valve stem to TOPMOST position and fix the nut (5) on it. Lock it with grub screw. Its position on valve spindle is to be decided in such a way that when the Nut (3) is retightened, the electrical and mechanical 'TOP' - POSITIONS of Actuator and valve match perfectly. Ensure free movement of the entire assembly by handwheel operation before giving electrical supply.
- v) By giving electrical supply, check the assembly for following:-
  - a) The complete valve lift is effectively controlled.
  - b) The position indicator on Support Rod (2) shows true position of valve-lift.
  - c) The settings and operation of travel-limit-switches match correctly with the valve-lift.
  - d) The feedback potentiometer gives resistance output as per the requirement.
- vi) Replace the actuator Top cover firmly, with the 'O' ring gasket.

*NOW THE CONTROL VALVE IS PERFECTLY ASSEMBLED AND READY FOR FURTHER TRIALS.*

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## II] : SETTING OF TWO WIRE TRANSMITTER :

### SETTING PROCEDURE :

The two wire transmitter model PPT 200 when supplied with the actuator should get an input from the potentiometer fixed inside the actuator. The potmeter output is normally fixed as 100 to 235 Ohms with respect to full mechanical movement of the final control element.

The two wire transmitter needs an external supply of 12/24/36 V DC. The output of 4-20 mA is generated in the supply wire itself and can be measured by inserting an ammeter in series as shown in the wiring diagram.

### STEPS TO BE TAKEN :

- 1) Check the output from the two wires of potentiometers as 100 to 235 ohms approx. (normally) with respect to the full movement of the final control element. If the potmeter output is reverse, i.e. 235 to 100 Ohms, then change the leads of the potmeter.

The potmeter output may not be exactly accurate, however, the variation if any can be corrected by SPAN/ZERO settings provided on the transmitter.

- 2) Connect potmeter output to input terminals of the transmitter.

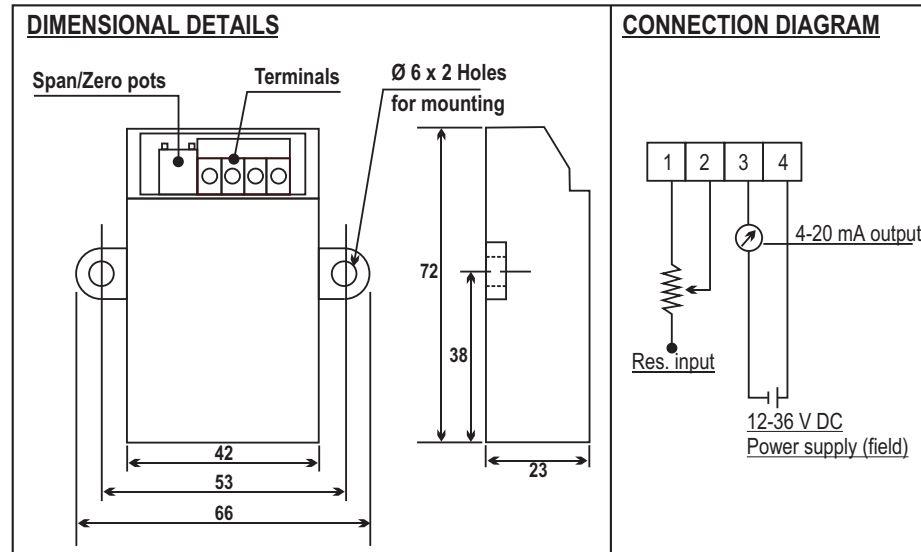


Fig. No. 1

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- 3) Connect 12/24/36 VDC supply to the output terminals of the transmitter.
  - 4) Connect ammeter in series of supply lines as shown in wiring diagram.
  - 5) The transmitter output will be 4-20mA corresponding to the Input of 100 to 235 Ohms.
  - 6) Adjust SPAN & ZERO settings very slowly to get accurate output results. The span & zero settings are interdependent & hence they have to be set repeatedly to get the final accurate results.

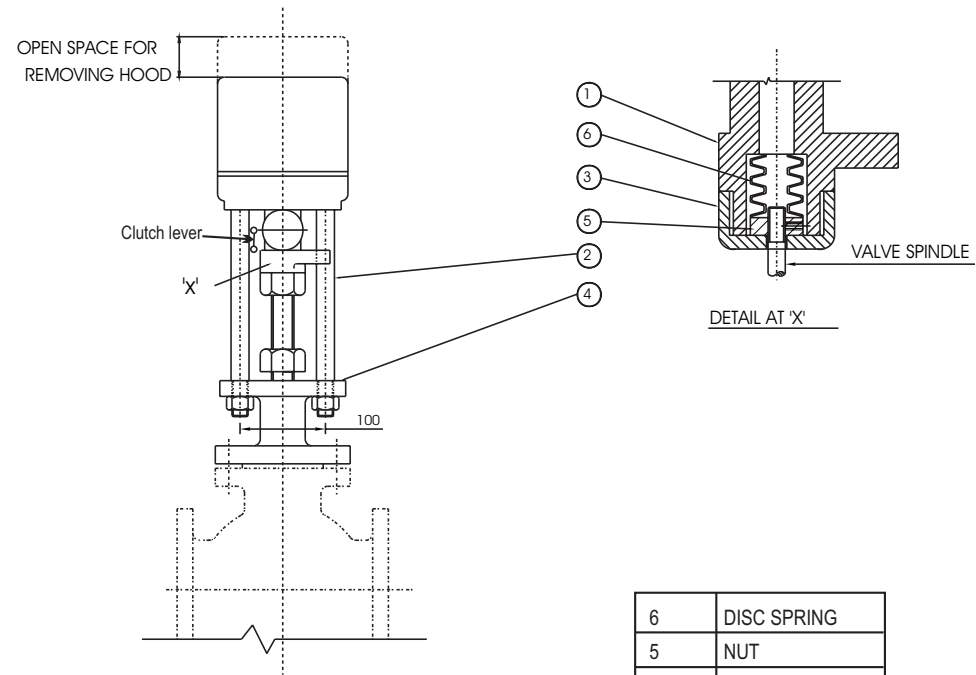
### III] SETTING OF ACTUATOR REGULATING / MODULATING DUTY :

- 1) Complete installation and commissioning of the actuator as per 'ON/OFF' duty actuator.
- 2) **Adjustments for Hooking-up with Valve Positioner :-**
  - i) Bring the valve to fully closed position. In this position, the signal input is 0 or 4 mA, valve is zero percent (0%) open and the feedback from Actuator-potentiometer is 100 ohms. If there is any deviation in any of these readings, make necessary adjustments in the setting of the instruments. Normally the potentiometer is set for output of 100 to 235 ohms.
  - ii) When the valve is brought to fully open position, the signal input should be 20 mA, valve is 100% open and feedback potentiometer gives full resistance output as specified on the test certificates. For any deviations make necessary adjustments.
  - iii) After making the adjustments, ensure the following :-
    - (a) The valve should fully close for 0 or 4 mA signal input and fully open for 20mA signal input.
    - (b) For any intermediate signal-value, the valve should proportionately respond.

#### NOTES :-

- (1) PLEASE REFER THE ENCLOSED DRAWING FOR THE PART NO REFERENCES :-
- (2) For putting the actuator on 'MANUAL-MODE', press the clutch lever and rotate the handwheel. The 'MANUAL-MODE' is 'ON' as long as the lever is kept in pressed condition. When the lever is released, the actuator is automatically transferred to 'ELECTRICAL MODE'.

## REGELTEK ACTUATOR-COUPLING DETAILS



6	DISC SPRING
5	NUT
4	ADAPTOR
3	NUT
2	SUPPORT ROD
1	SPINDLE NUT
SR. NO	DESCRIPTION

**Fig. No. 2**

## **IV] SETTING OF POSITIONER - PP 300 :**

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### **OPERATING INSTRUCTIONS FOR POSITIONER MODEL PP300 [SINGLE PHASE]**

The Positioner model PP300 has been designed to accept the control command of 4-20 mA [0-10 VDC in special versions) and feed back signal from the actuator in the form of 100 to 235 Ohms or 4-20 mA as the case may be.

Both the signals are processed by the positioner and Open/Close - 230 VAC Relay signal is given as an output for moving the motor in forward and reverse directions.

The positioner is provided with the following : (Ref. Fig. 3)

- 1] Power - on indicating LED. — PWR LED
- 2] Open-LED-Glows when the 'Open' Relay is energised and hence 'Opening' operation is being performed. — UP LED.
- 3] Close-LED-Glows when the 'Close' Relay is energised and hence 'Closing' operation is being performed. — DN LED
- 4] Span setting potentiometer. — P3 POT.
- 5] Zero setting potentiometer. — P2 POT.
- 6] Fault-LED-Glows when the feedback signal from the actuator is cut off. — FAULT LED.
- 7] Connectors for appropriate supply and control signal connections. — CN1 & CN2

### **STEPS TO BE TAKEN FOR THE OPERATION OF POSITIONER MODEL PP 300**

- 1] Check whether the unit is meant for 230 /110/24 VAC and arrange for the supply accordingly.
- 2] Check whether the unit is meant for the feedback signal in the form of 100 to 235 ohms or 4-20 mA DC and arrange for the correct signal accordingly. [Normally the actuator is supplied with only a potentiometer to give an out put as 100-235 Ohms if the Positioner is located in the vicinity and the actuator is supplied with a two wire transmitter - model PPT-200 to give an output of 4-20 mA DC if the Positioner is located away from the actuator. This is to avoid the problems of electrical noise]
- 3] Check whether the unit is meant for the input control command of 4-20 mA or 0-10 VDC and arrange for the same accordingly.



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- 4] Connect the above mentioned supply & control terminations correctly as per the wiring diagram and start the unit.
  - 5] As per the normal convention, for the control signal of 4 mA the valve will achieve closed position and for 20 mA signal, opened position. In between positions will be proportional to the command signal.  
This will also correspond to the feedback signal of 100-235 Ohms/ 4-20 mA, as the case may be.
  - 6] Perform Span / Zero adjustment as detailed below.

#### **SPAN/ZERO ADJUSTMENT**

##### **a) Setting of Zero : By Pot P2**

- Remove CN2 Plug from the positioner card.
- Close the actuator completely through the manual mode.
- Read the potentiometer (Mounted in the actuator) Out Put of that should be 100 .
- Give 4mA signal through the out side source.
- Rotate the ZERO-POT, provided on the positioner, slightly so that both UP/DN LEDS will go off.
- Through the above process it will be ensured that all the three parameters i.e. Valve closed, 4mA control signal & 100 feed back signal are equalized.

##### **b) Setting of SPAN : By Pot P3**

- Remove CN2 Plug from the positioner card.
- Open the actuator completely through the manual mode.
- Read the potentiometer (mounted in the actuator) Out Put of that should be around 235 .
- Give 20mA signal through the outside source.
- Rotate the SPAN-POT, provided on the positioner, slightly, so that both UP/DN LEDS will go off.
- Through the above process it will be ensured that all the three parameters i.e. valve opened, 20mA control signal & 235 (Approx.) feed back signal are equalized.
- Replace the plug CN2 & observe open/close operations of the valve by giving 4-20mA commands.

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- 7] Do not disturb any other settings on the positioner card.
  - 8] Adjust the travel limit switches in the actuators beyond the limits of control command of 4-20 mA so that they will serve as a back-up protection.
  - 9] If the Positioner does not function satisfactorily then check the correctness of all the input parameters and the wiring to achieve the desired results.
  - 10] If the desired position of the valve is reverse i.e. 4 mA - opened and 20 mA closed then set the actuator feed back accordingly.  
This has to be done by disconnecting the potmeter drive & readjusting it so that it's out put matches with the control signal. Normally two terminals of the potmeters are used for the signal hence for reverse operation the extreme terminal of potmeter has to be interchanged.

11] Setting of Dead-band/Sensitivity: By Pot P4

Normally it is set in the factory as per the order specifications/about 3 % and hence it is not recommended to disturb it at site, however in exceptional cases it can be reduced by rotating the pot slightly in Anti-clockwise direction. If the dead-band is too low the system will start hunting and both Up/Down LED's will start glowing alternately, in which case the dead band has to be increased by rotating Pot P4 in clockwise direction so that both LED's will shut off & system will not hunt. This has to be observed repeatedly so that system does not hunt due to very small dead-band zone

## COMPONENT DETAILS OF MODEL PP300 : PCB NO.001

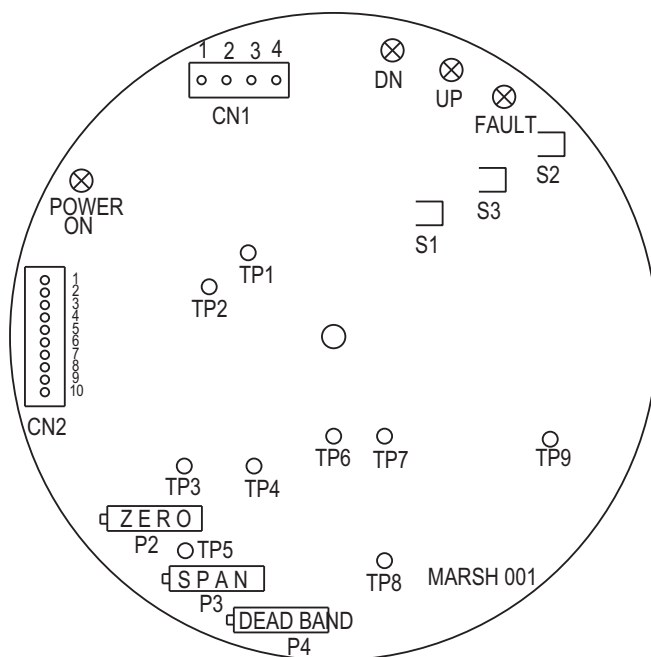


Fig. No. 3

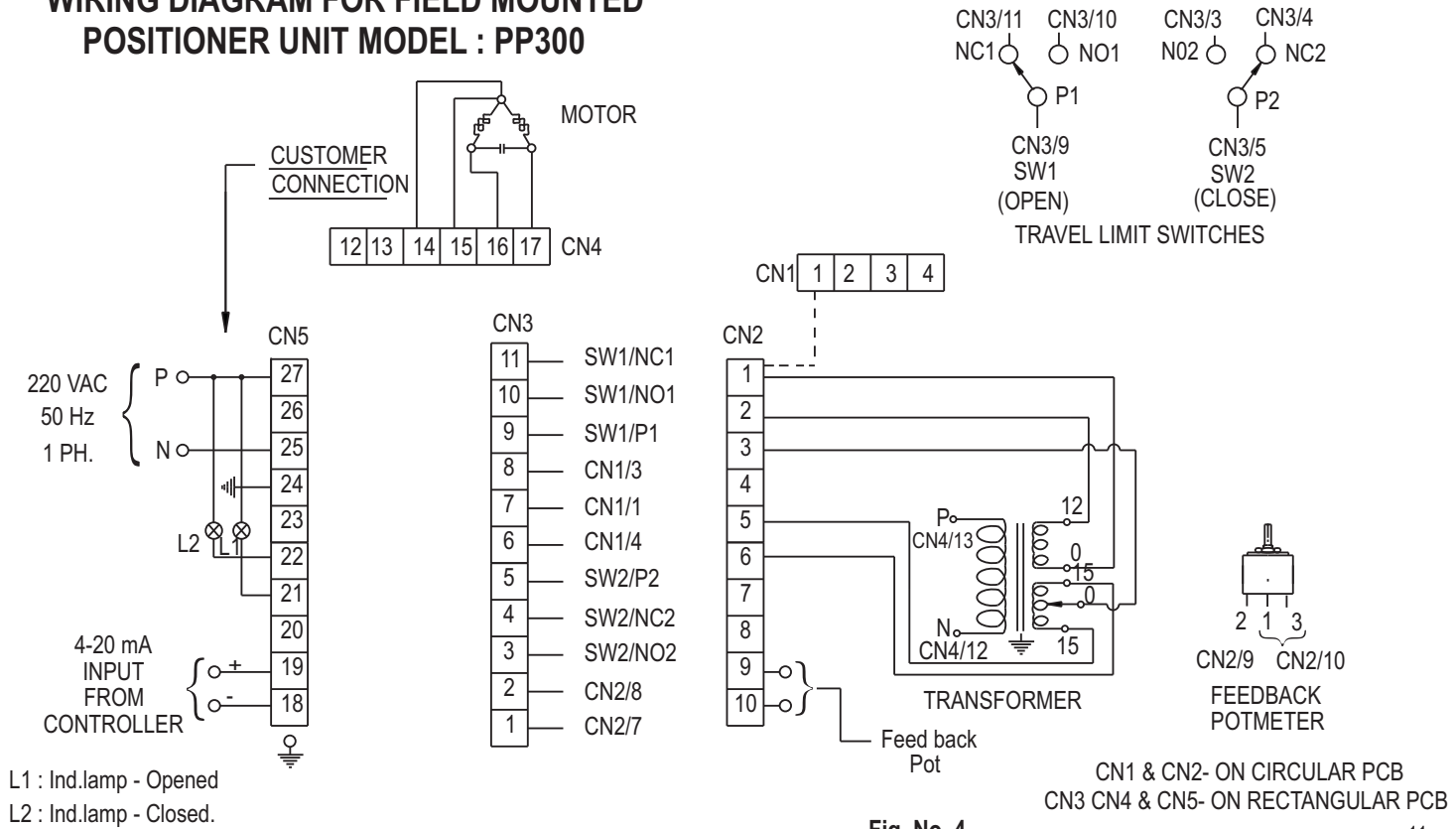
### TEST POINTS :

- TP1 : -12V
- TP2 : OV
- TP3 : 2.5V REFERENCE VOLTAGE, TOLLERENCE  $\pm 0.1v$
- TP4 : 4mA = 0.400V 20mA = 2.000V
- TP5 : FEEDBACK POT 100 = OV & FEED BACK 235 = 5.0 V
- TP6 : + 12 V
- TP7 : INPUT 4 mA = -0.400V AND I/P 20mA = -2.000V (Inverse of TP4)
- TP8 : FOR 100 -0.400 mV, FOR 235 2000 mVs
- TP9 : 6.3 V

ALL VOLTAGES WITH TP2 AS REFERENCE POINT & POWER ON CONDITION.

- CURRENT THRU FEED BACK POT : 12 mA DC
- UNDER CONDITION OF FEED BACK OPEN SAFETY CAN BE SET AS FOLLOWS :-(FAIL SAFE VERSION.)
- STAY PUT - STANDARD
- FAULT DN - } OPTIONAL -
- FAULT UP - }

## WIRING DIAGRAM FOR FIELD MOUNTED POSITIONER UNIT MODEL : PP300



**Fig. No. 4**

## V] SETTING OF CURRENT CONVERTER - PP 400 :

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### OPERATING INSTRUCTIPN MANUAL FOR PP 400

#### ***PP 400 RESISTANCE TO CURRENT CONVERTER.***

This is a fully solidstate 4 wire system which has resistance as input and its output is current, proportional to value of resistor. This card accepts 100 to 235 Ohms as input and gives 4 to 20mA as output. The output stage is a current source, hence while taking output from this system no other supply is necessary. Its output can be directly used for extracting the output signal (e.g. By connecting a-100 Ohms Resistor across the output line)

#### Important Electrical Specifications

Supply : 230 V AC, 50 Hz. 1 Phase

Input : Resistor 100 to 235 Ohms

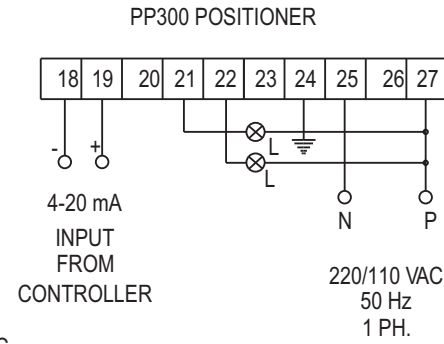
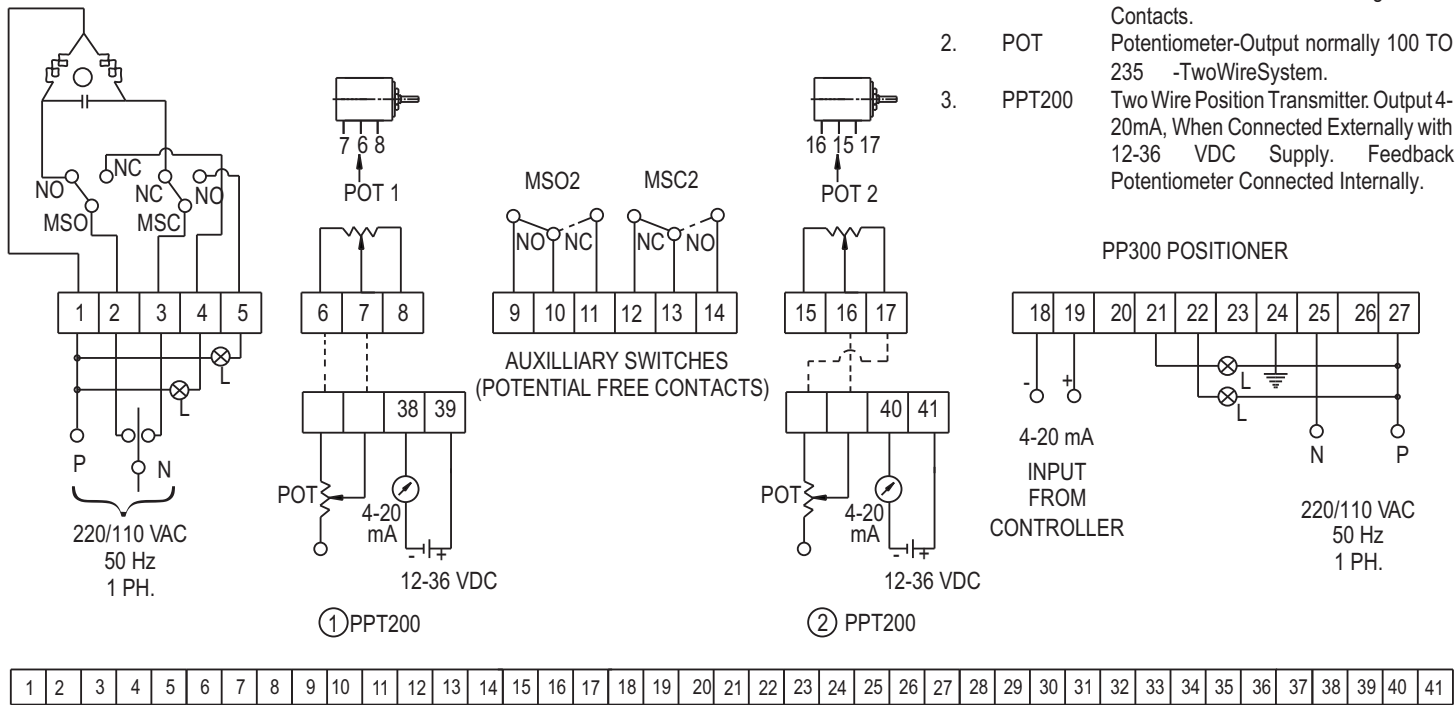
Output : 4-20 mA DC (Self Powered Current Source)

#### **INSTALLATION :**

- 1] Connect main supply to terminals marked 'L', 'N', 'E', respectively.
- 2] Connect output terminals to terminals marked 4-20 mA with proper polarity.
- 3] Ensure factory connected input resistor connections.
- 4] Take actuator to positions corresponding to 100 Ohms position.
- 5] Connect current meter at output.
- 6] Switch on Main supply output current meter should read 4 mA, DC. Incase of any deviation adjust set zero preset to get 4 mA reading on output meter.
- 7] Take actuator to position corresponding to 235 Ohms position. At this time output current should read 20 mA. Incase of any deviation adjust set span preset to get 20 mA reading on output meter.
- 8] This completes installation, and now this can be hooked to main system.

# MASTER WIRING DIAGRAM FOR REGELTEK ACTUATORS – ALL MODELS

SR. NO.	CODE NAME	TECHNICAL SPECIFICATIONS
1.	MSO/MSC	Travel Limit Switches for Open & Close Directions. 1NO+1NC Change Over Contacts.
2.	POT	Potentiometer-Output normally 100 TO 235 -TwoWireSystem.
3.	PPT200	Two Wire Position Transmitter. Output 4-20mA, When Connected Externally with 12-36 VDC Supply. Feedback Potentiometer Connected Internally.



TERMINAL STRIP FOR CUSTOMER USE

Fig. No. 5

\* NOTE : Page 13 and Page 14 should be seen in continuation.

4. PP300 Positioner Unit. Input 4-20mA From Controller. Feedback Potentiometer Connected Internally.
5. PP400 Source To Give An Output Of 4-20mA. Feedback Potentiometer Connected Internally.
6. S Space Heater
7. L Indicating Lamps for Open & Close Indications.

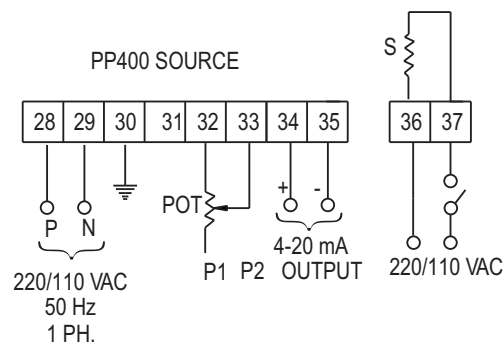
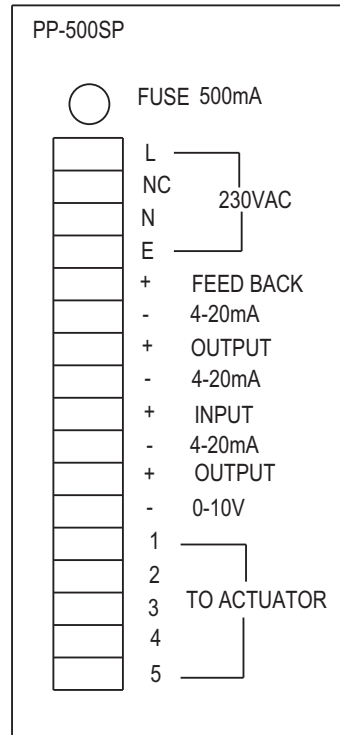


Fig. No. 5

#### CONNECTION DETAILS OF PANEL MOUNTED POSITIONER



#### NOTES:

- 1) Unique Terminal Numbers are given for the basic wiring & all accessories. Hence, only the required terminal numbers will appear on the customer-use terminal strip, as per the order specifications.
- 2) The wiring diagram shows all the possible optional accessories which can be supplied, however, all the accessories may not be supplied at a time.
- 3) Terminal Nos. 20, 23, 26 & 31 are blank, with no connections.
- 4) Normally only two wires of Potentiometers are used to get the feed back output of say 100 to 235 Ohms. As the two potmeters rotate in reverse directions with each other, during any motion, it is necessary to select the proper pair of fixed & moving terminals of potmeters to get the desired output from both of them.
- 5) For actuator series RTD 5000 the NO-NC terminals of open switch-MSO-will be interchanged.

**DRG.NO. - R 400**

\* NOTE : Page 13 and Page 14 should be seen in continuation.