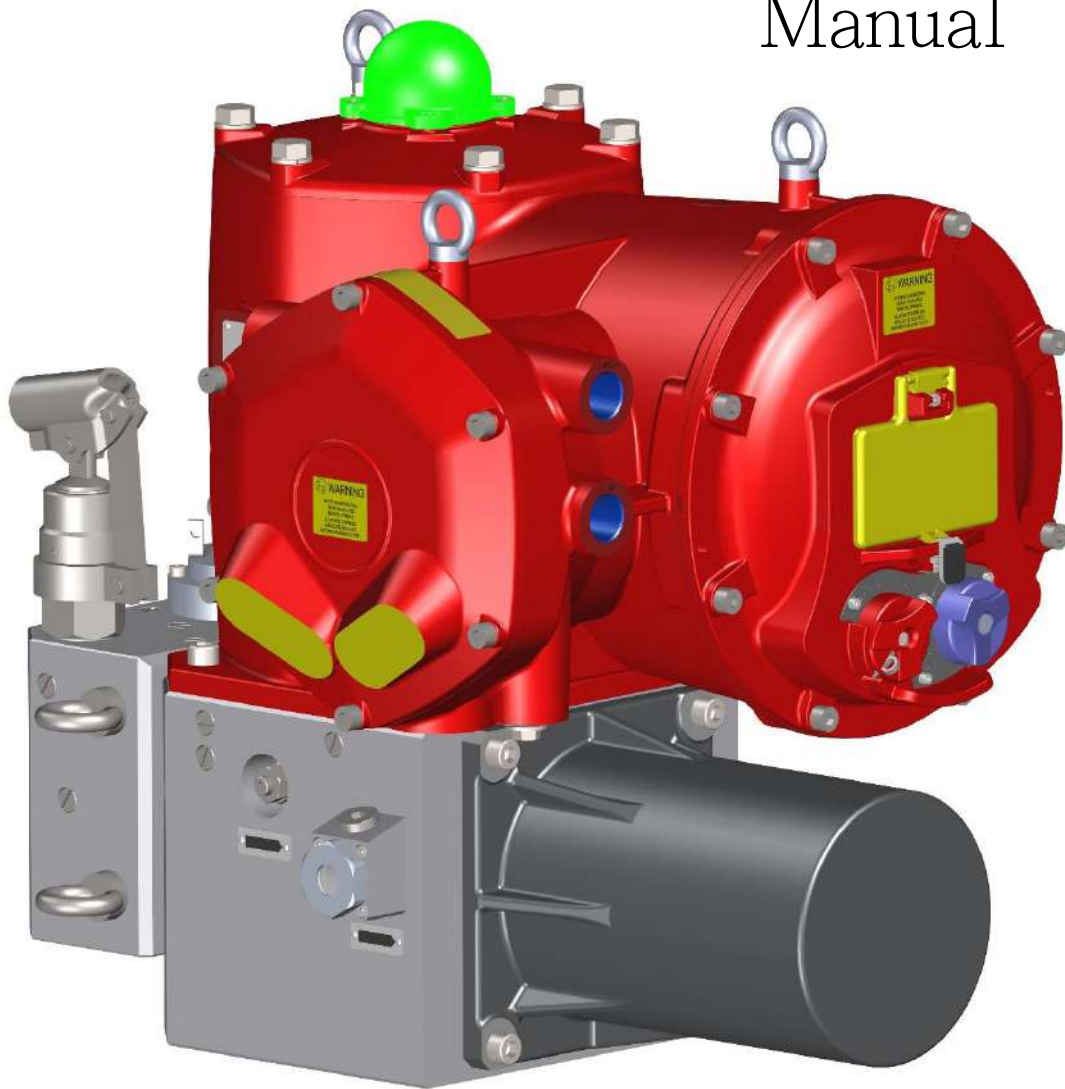


EHF-Compact series – INTELLIGENT Electrohydraulic Actuator

Installation
Operation and
Maintenance
Manual



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1. Introduction

Thank you for choosing a ROTEX product. EHF-Compact Series Actuators are self-contained; electro-hydraulic actuators which are particularly well suited for applications requiring critical control and high reliability. EHF-Compact includes an electronic control module which comprises of an AC-DC converter power supply, a feedback module, electronics, a motor, and an integral hydraulic tank. This combination of mechanical, hydraulic, and electronic technologies is clubbed together to produce actuators that ensure our customers get top class actuating.

The actuator is constructed for direct mounting on valves and similar devices according to ISO-standards. Torque requirements of up to 2,000 Nm can be easily accommodated.

Each product is fully inspected after the production to offer you the best quality. To fully utilize the product, we strongly recommend users to read this manual carefully and understand the functionality before operating.

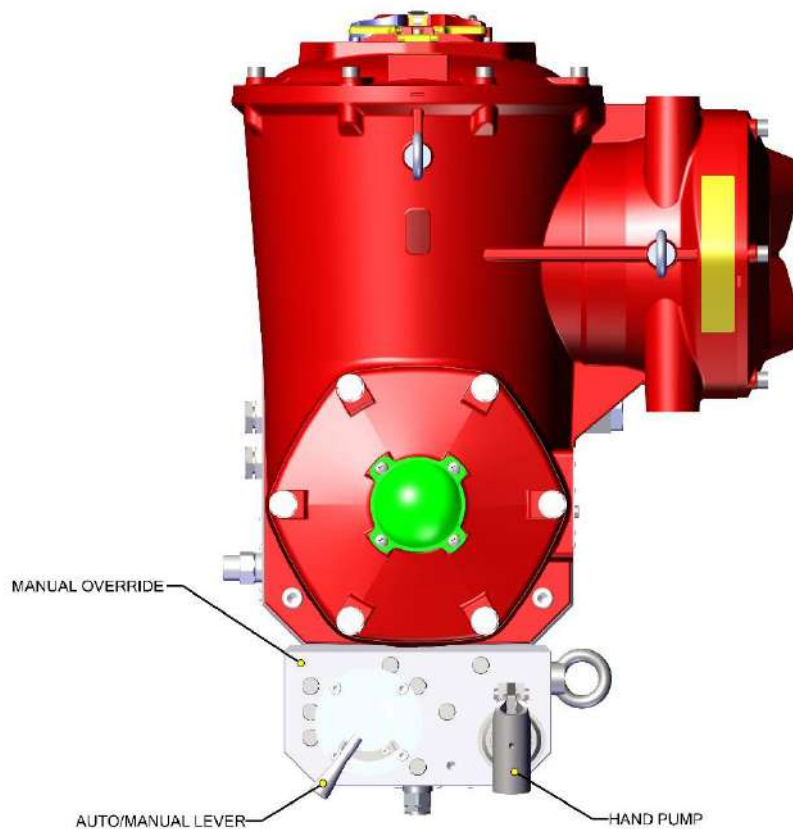
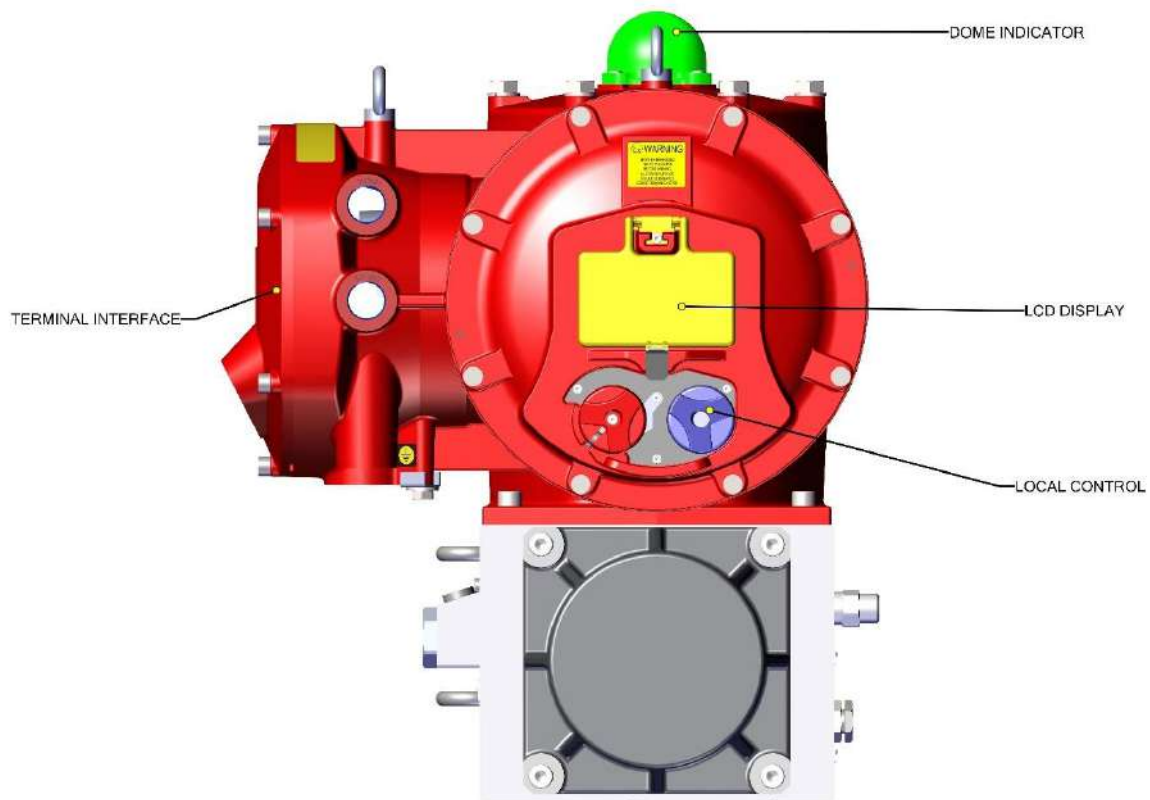
- This manual provides information on installation, operation, maintenance procedures, and related instructions for the **ROTEX** make electro-hydraulic actuator.
- The aim of this literature is to support the use of products in a correct manner and elaborate all the technical information provided in the product catalogue.
- The manual should be handed over to the end user to ensure minimal downtime and proficient use.
- The manual can be changed or revised without any prior notice. Any changes in product's specification, structure, and/or any components may not result in an immediate revised version of the manual.
- The manual should not be duplicated or reproduced for any purpose without prior consent from ROTEX Manufacturers and Engineers Private Limited, India.

Manufacturer Warranty

- For the safety, it is vital to follow instructions in the manual. ROTEX shall not be held liable for any damages which may be caused due to negligence on the user's part.
- ROTEX shall not be held liable for any damages or accidents which may arise due to any kind of alteration or modification of the product and/or parts. If alteration or modification is necessary, please contact ROTEX directly.
- ROTEX warrants the product from the date of original retail purchase up to one (1) year, except as otherwise stated.
- ROTEX warranty will not cover those products which have been subjected to abuse, accident, alteration, modification, tampering, negligence, misuse, faulty installation, lack of reasonable care, repair or service in any way that is not contemplated in the documentation for the product, or if the model or serial number has been altered, tampered with, defaced or removed; damages that occur in shipment, failure due to power surge, and cosmetic damage. Improper or incorrectly performed maintenance or reports void this Limited Warranty.
- For detailed warranty information, please contact:

ROTEX MANUFACTURERS AND ENGINEERS PRIVATE LIMITED
R 852/853, T.T.C Industrial Area, Rabale, Navi Mumbai, Maharashtra, India.

i. Identifying Actuator Parts



ii. Specification

Enclosure: The design of actuator construction conforms to EN/IEC 60079-0, EN/IEC 60079-1 for Gas group IIC and Dust group IIIC Ingress Protection of IP 67 as per EN/IEC 60529.

The EHF has been built in accordance with the following standards:

- Ex db IIC T4 Gb and Ex tb IIIC T135°C Db IP67
- IEC 61508
- SIL3 Capable

Ambient Temperature Range = -20 °C to +70 °C

Enclosure Materials:

Main body: WCB steel.

ON /OFF Indicator dome: Polycarbonate and ABS. The COT of polycarbonate is in the range of -100 °C to +135 °C and that of ABS is -40 °C to +110 °C.

iii. Specific conditions of use

1. It is the responsibility of the installation engineer to ensure that suitable IECEx/ATEX equipment certified Ex db, Ex tb, IIC cable glands and blanking plugs are installed in accordance with IEC60079-14 to ensure that the IP rating of IP67 is maintained on the enclosure.
2. It is the responsibility of the installation engineer to ensure that suitably rated cable and cable glands are used to install this equipment. See product label and instructions "Use Cable and Cable Glands suitable for 75°C."
3. Dust layers shall be prevented from building up on the outside surface of the enclosure, and the enclosure shall be routinely cleaned.
4. The equipment presents a potential electrostatic charging hazard. Please wipe it with a damp cloth, only if absolutely necessary.
5. The fastening screws shall be stainless steel socket head cap screws of property class A2-70 and yield stress 450 MPa.

Definitions:



WARNING:

- If not observed, user incurs a high risk of severe damage to product and/or fatal injury to personnel.



CAUTION:

- If not observed, user may incur damage to product and/or injury to personnel.



NOTE:

- *Advisory and information comments provided to assist maintenance personnel to carry out maintenance procedures.*

iv. General safety information

This Products is not Inherently safe if the instructions contained within this Service Instruction are strictly adhered to and executed by well-trained, equipped, prepared and competent personnel.

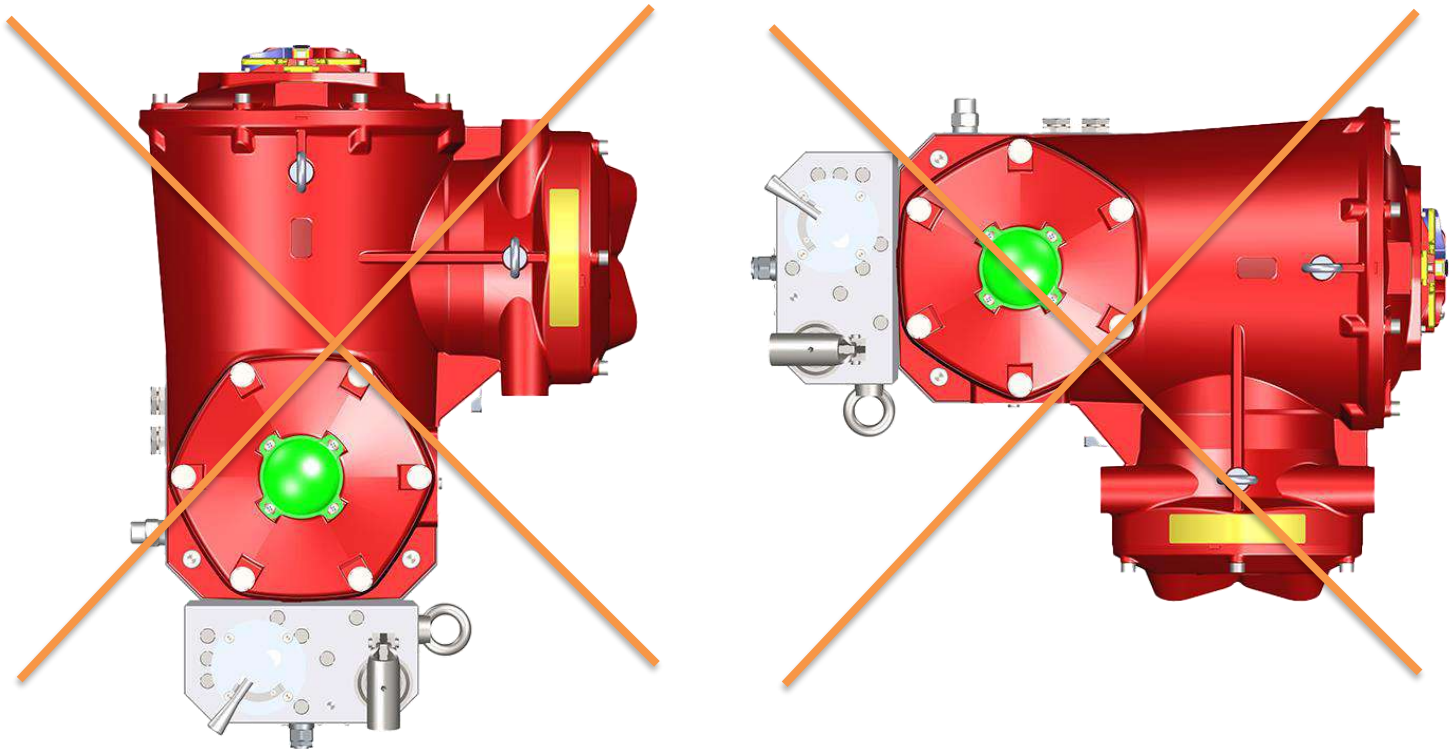


WARNING:

For the protection of personnel working on ROTEX actuators, this procedure should be reviewed and implemented for safe installation, disassembly and reassembly. Close attention should be paid to the WARNINGS, CAUTIONS and NOTES contained in this procedure.

v. Installation and mounting information

- EHF-Compact actuators allow many different mounting orientations. However, it is *not* permitted to mount the EHF-Compact assembly with the spring pack end facing downwards or the stopper bolts facing upwards as shown in the figure below.

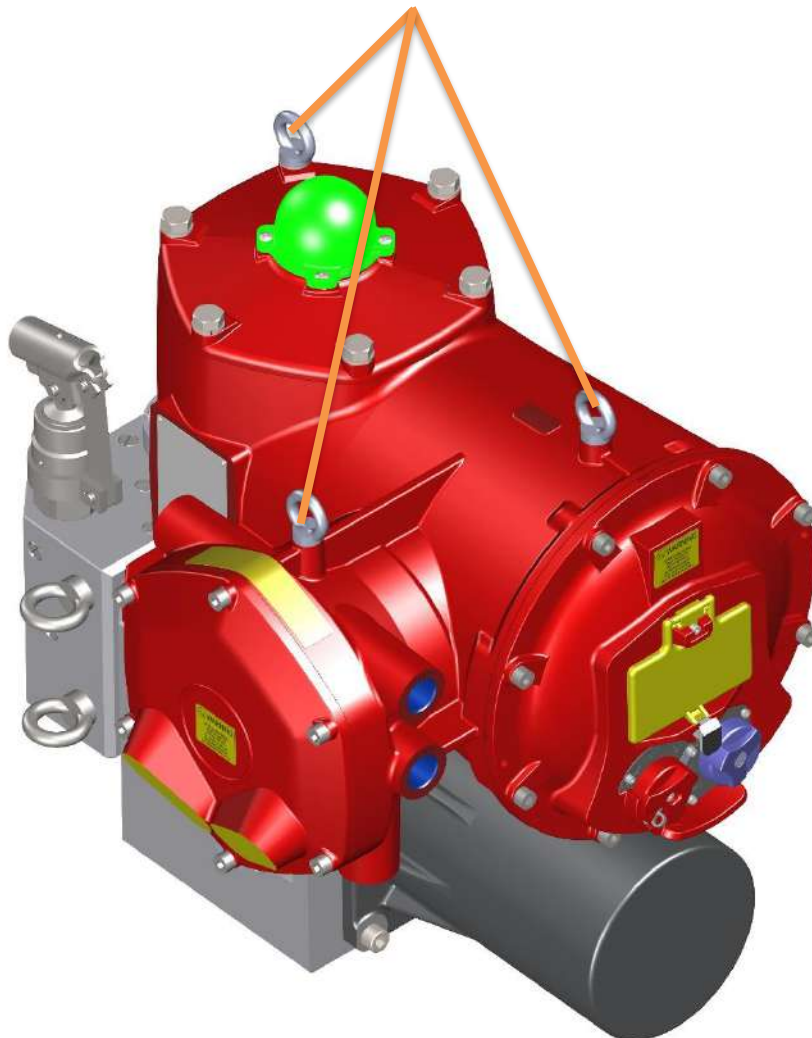


- Ensure that the actuator will not be exposed to pressure in excess to the maximum rating as indicated on the actuator nameplate or technical documents.
- Ensure that the valve is secured before fitting the actuator as the combination may become top heavy and therefore unstable.
- Ensure that throughout the installation, there are no leaks of the supply media.
- Ensure that the maximum operating temperature as indicated on the nameplate is not exceeded during operation, transportation or storage of the actuator.
- The environment and surrounding should not affect or limit the operational safety of the product.
- Product should not be installed in hazardous area that is not compatible with the gas group and temperature class indicated on the nameplate.
- If it is necessary to lift the EHF-Compact assembly, then use certified slings to lift the assembly with the help of lifting eyebolts as shown in the figure.



WARNING:

Use the lifting eye bolts for lifting the EHF assembly only.



- **Installation:** Before fitting an actuator onto a valve or any similar device, care needs to be taken to ascertain the position of the valve or the similar device and orientation of the actuator accordingly. While bolting the actuator to the mounting flange; the position of the stopper bolts should be checked to ensure full opening and closing of the valve/similar device. If the end positions are not suitable, the stopper bolts may be adjusted by loosening and screwing the bolts properly until desired position is obtained. When the desired position is obtained; retighten the lock nuts to freeze the limiting position.
- **Electrical Connections:** Always refer to the job specific wiring diagrams for connection instructions.

vi. Service information

Normal recommended service interval for this actuator series is 5 years.



NOTE: Storage time is counted as part of the service interval.

- This procedure is applicable with the understanding that all hydraulic pressure has been removed from the actuator.
- Remove all piping and mounted accessories that will interfere with the module that are to be worked on.
- Use a non-hardening thread sealant on all pipe threads.



CAUTION: Apply the thread sealant as per the manufacturer's instructions.

- All parts should be thoroughly inspected for excessive wear, stress cracking and pitting. Attention should be paid to threads, sealing surfaces and areas that will be subjected to sliding and rotating motion.
- ROTEX recommends that disassembly of the actuator modules should be done in a clean area, possibly on a workbench.
- Before installation on the valve or any similar device, the actuator needs to be stroked several times to ensure the desired function and safety.



WARNING: Hydraulic Fluid



- EHF-Compact actuators are filled with hydraulic fluid.
- Should there be a requirement to change the fluid, then first ensure that the system is depressurised, and the appropriate protective clothing including gloves and safety glasses are worn.



WARNING: Enclosure Materials

- External Fasteners: Stainless Steel-Class A2-70
- Actuator Body: WCB steel
- Display Window: Toughened Glass
- External Fasteners: Stainless Steel-Class A2-70
- Drive Shaft: Stainless Steel
- Paint Finish: PU type of 90 micron DFT

2. Identification of EHF Actuators



ROTEX
SMART ELECTRO HYDRAULIC
ROTEX MANUFACTURERS AND ENGINEERS PRIVATE
LIMITED, R852/853, RABALE, NAVI MUMBAI - 400701
WEBSITE :- WWW.ROTEXAUTOMATION.COM

MODEL :

MFG. DATE :

SUPPLY VOLTAGE:

SUPPLY RATING:

SERIAL NUMBER :

MAX. PRESSURE :

MAX. TORQUE/FORCE :

MAX. SEATING TORQUE/FORCE :

WIRING DIAGRAM :

HYDRAULIC CIRCUIT:

SO NO.:

ORDERING CODE

02- PRODUCT SERIES	
CODE	DESCRIPTION
EHF-B	BASIC VERSION
EHF-1	INTELLIGENT VERSION

01- ACTUATOR SIZE	
CODE	DESCRIPTION
0075C1,0075C2,0230C1,0230C2,0230C3,0400C0,0400C1,1245C0,1245C1	SIZE

03 - OPERATION	
CODE	DESCRIPTION
OO	ON-OFF
MO	MODULATING

04 – ACTION	
CODE	DESCRIPTION
E	SINGLE ACTING
D	DOUBLE ACTING

05 – MOUNTING POSITION	
CODE	DESCRIPTION
S	HORIZONTAL
V	VERTICAL

06 – ROTATIONAL DIRECTION	
CODE	DESCRIPTION
CC	SPRING TO ROTATE CLOCKWISE (FAIL SAFE CLOSE)
CW	SPRING TO ROTATE COUNTER CLOCKWISE (FAIL SAFE OPEN)

07- TEMPERATURE	
CODE	DESCRIPTION
NB	-20° C TO +70° C

08 – BODY/COVER MATERIAL	
CODE	DESCRIPTION
AL	ALUMINUM ENCLOSURE
8M	STAINLESS STEEL SS316/CF8M
WC	WCB ENCLOSURE
F8	CF8 ENCLOSURE
SG	SG IRON 500/7 ENCLOSURE

09 – HAND PUMP	
CODE	DESCRIPTION
HN	NONE
HB	HYD. HAND PUMP W/O FEEDBACK
HF	HYD. HAND PUMP WITH FEEDBACK

10 – POWER SUPPLY	
CODE	DESCRIPTION
A	24V DC
B	1PH 110-240 AC 50/60Hz
F	3PF 220-240V 50/60Hz
N	3PH 415V 50 Hz
Q	3PH 380–480 50/60Hz
Z	48 V DC

11- ESD POWER SUPPLY	
CODE	DESCRIPTION
NE	NO ESD
AA	24 V DC
CC	1PH 110V AC 50/60Hz
EF	1PH 220V AC 50/60Hz
AF	24V DC WITH FLOW CONTROL
CF	110V AC 50/60Hz WITH FLOW CONTROL
EF	220V AC 50/60Hz WITH FLOW CONTROL

12- TRANSMITTER	
CODE	DESCRIPTION
NT	NONE
PT	POSITION
RT	PRESSURE
BT	POSITION + PRESSURE

14- LIMIT SWITCH	
CODE	DESCRIPTION
1A*	HONEYWELL SWITCH
3A*	P&F NJ2V3N
13A*	P&F NBB3V3Z4
6A*	NON CONTACT TYPE, COBRA SWITCH

15- COMMUNICATION	
CODE	DESCRIPTION
NC	NONE
FF	FOUNDATION FIELDBUS
HA	HART
MB	MODBUS
PB	PROFIBUS DP

16 - ADDITIONAL COMMUNICATION	
CODE	DESCRIPTION
NN	NONE
BX	FOUNDATION FIELDBUS

17- CERTIFICATION	
CODE	DESCRIPTION
C0	WEATHER PROOF
C1	Exd,IEC-60079-1
C2	Exd, IS/IEC-60079-1 + PESO
C3	Exd ATEX
C4	IECex, IEC-60079-1
C5	Exd, IS/IEC-60079-1 + PESO + SIL3
C6	IECex,IEC-60079-1+SIL3
C7	Exd ATEX + SIL3

18 – SPECIAL VERSION	
CODE	DESCRIPTION
*	NONE
SUXXX	SPECIAL CUSTOMIZATION

3. Operation

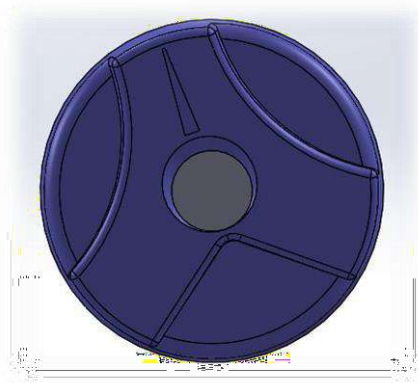
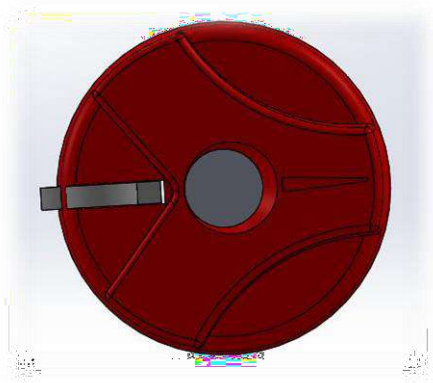
3.1 Operation by local and remote selector switches

- **Local/Remote Selection:** Local/Remote selection is via two rotary switches located on the control module. Rotate the left switch fully anti-clockwise to enable the remote control operation. Rotate the same switch fully clockwise to enable the local control operation. The mid position denotes offline mode, prohibiting the local or remote control of the actuator. When Local/Remote control is changed in the course of travel, the actuator will stop in the same position until new command is received.



- **Local Operation:** The Local/Remote selector switch must be pointing to Local position to manually operate the actuator. The Open/Close selector switch is disabled when the Local/Remote selector switch is set for Remote operation.
- **Open/Close Selection:** Open/Close selection is via the right-side rotary switch located on the control module. Rotate fully anti-clockwise to open or clockwise to close from the centre position. Direction of travel may be reversed during the stroke using this switch.
- **Local position Indicator:** Local position indication is available via LCD display visible through a window in the control module cover. The display is also used for configuration and fault indication which will be discussed in the *modulation and configuration* section.
- **Remote Operation:** The Local/Remote selector switch must be in the Remote position to operate the actuator remotely. The open close selector switch is disabled when the Local/Remote selector is set for Remote operation.

The local control of EHF actuator by rotary switches is explained below:



Red Rotary Switch

- The Red switch is to select the local control, remote control or offline control of the actuator
- In Local Control, rotate the red switch clockwise to stop the actuator and in Remote Control, rotate the red switch anticlockwise to stop the actuator.
- The red switch is also used to navigate through the menu in menu mode. The procedure to go into menu mode is shown in page19
- Rotate the switch clockwise to select the sub-options or store the changed value of the parameters which will act as enter key press.

Blue Rotary Switch

- The blue switch is used to open and close the actuator in Local control.
- In menu mode, rotate the switch clockwise or anti-clockwise to scroll down the menu options or to change the value of parameters.

3.2 Configuration and Diagnostic details for Auto Mode operation

Home Screen menu:

This menu is the home screen where position, pressure values are displayed. One can come to this screen by changing the mode. There are 4 modes depending on the position of the red knob namely:

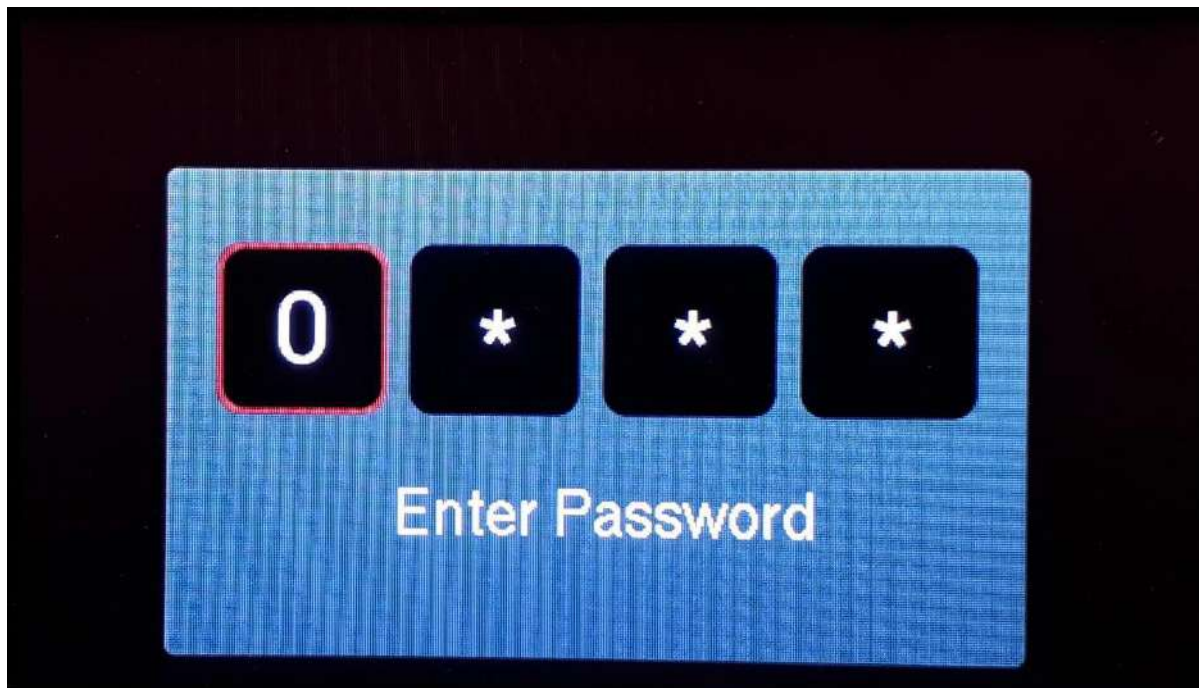


- a) Local Mode
- b) Remote Mode
- c) Menu mode
- d) OFF mode

The mode is displayed at the bottom left corner of the home screen.

Enter password menu:

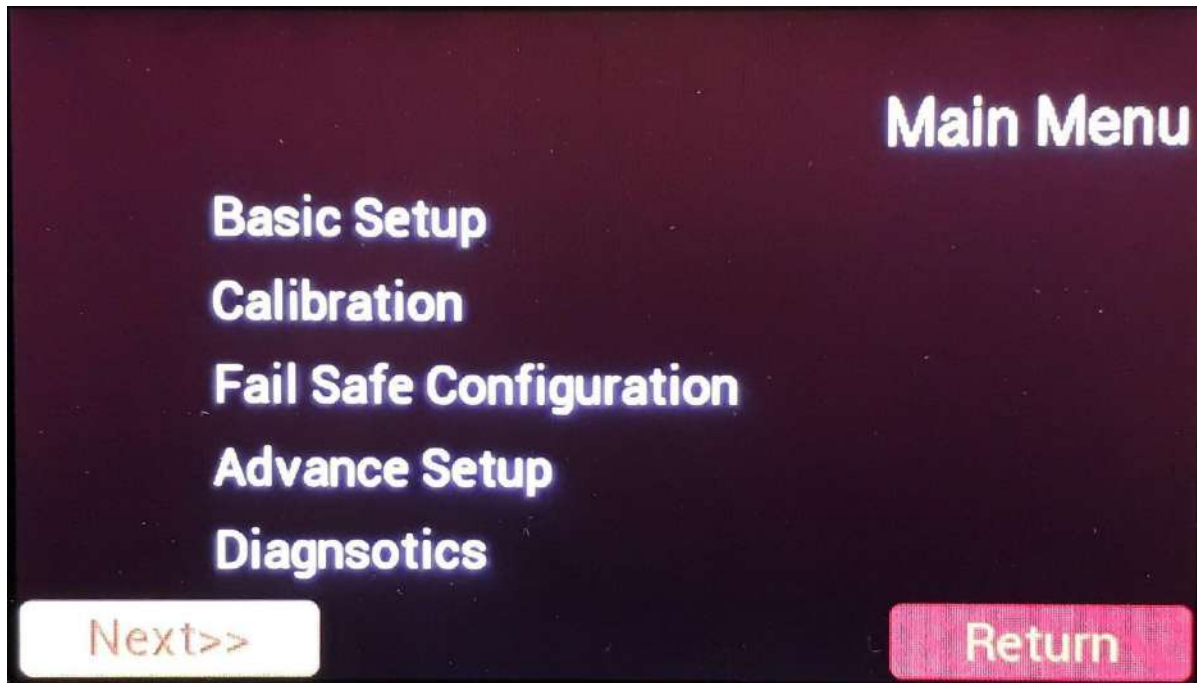
In local mode, the device will enter this mode (keyboard mode) on pressing red knob downwards or clockwise and simultaneously pressing blue knob first upwards or clockwise and then downwards or anticlockwise, the device will ask for password. On entering correct password (default = no password, press red knob downwards 4 times), it will enter main menu.



NOTE: The password is exactly of 4 numeric characters. In edit mode, on pressing blue knob upwards(clockwise) or downwards(anti-clockwise) the selected character can be scrolled and on pressing enter key (red knob press downwards(clockwise)), it will accept the displayed character and then move to the next character.

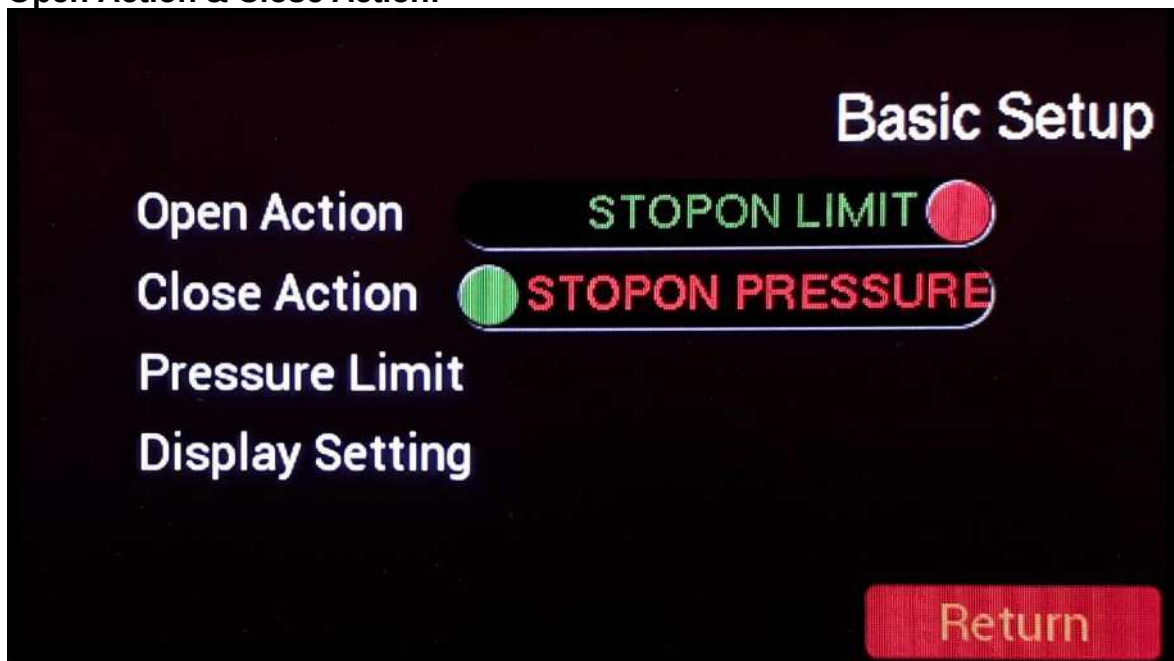
If the password set in Change password menu is default i.e. no password, then after pressing enter key (red knob downwards) four times, the password is accepted as OK displaying the main menu. If the entered password is incorrect then the display does not go to the main menu and display shows wrong password. To go to the home screen, change the mode or enter key press when return tab is selected

Setting Menu: This menu displays all the main menus for configuration setting and diagnostics of EHF



Basic Setup Menu: In Basic Setup, basic settings can be done for open, close action, Pressure Limit, Home screen

Open Action & Close Action:



Open Action: There are 2 options for Open action

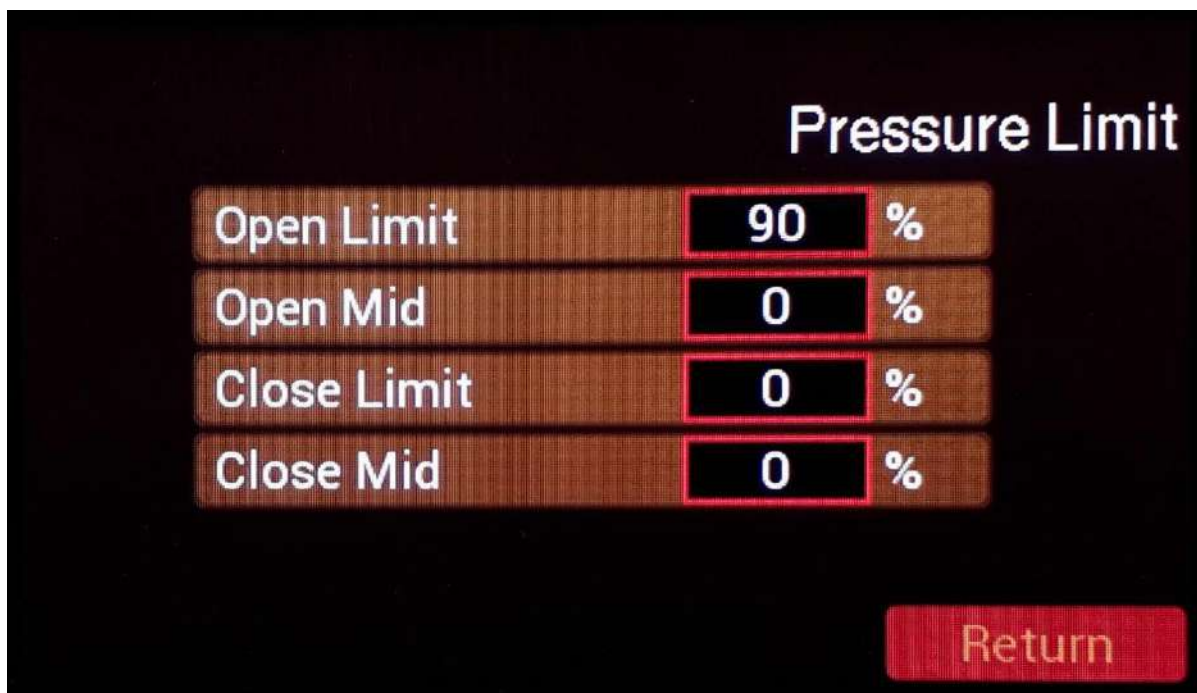
- **Stop ON Pressure:** The actuator will move the valve to electrical open limit and then further to mechanical end stop
- **Stop on Limit:** The actuator will move the valve to electrical open limit and then stop
Default value: Stop on Limit

Close Action: There are 2 options for Close action

- **Stop ON Pressure:** The actuator will move the valve to electrical close limit and then further to mechanical end stop
- **Stop on Limit:** The actuator will move the valve to electrical close limit and then stop

Default value: Stop on Pressure

Pressure Limit: Set the cut-off pressure limit for moving from electrical limit to mechanical end stop



Pressure Limit		
Open Limit	90	%
Open Mid	0	%
Close Limit	0	%
Close Mid	0	%

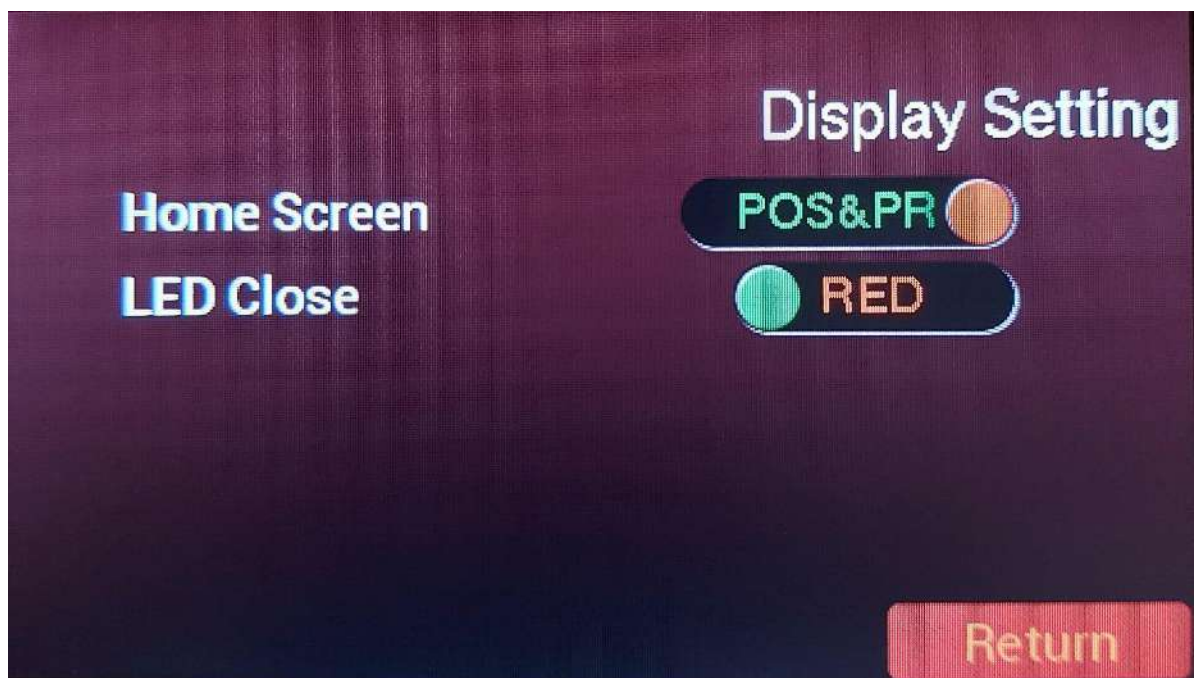
Return

- **Open:** This value is defined in % of maximum available pressure for system, in reference to limit set for pressure relief valve, while moving from open electrical limit to mechanical end stop. *Default Value is 90%.*
- **Open Mid:** NA
- **Close:** This value is defined in % of maximum available pressure for system, in reference to limit set for pressure relief valve, while moving from close electrical limit to mechanical end stop. *Default Value is 0%.*

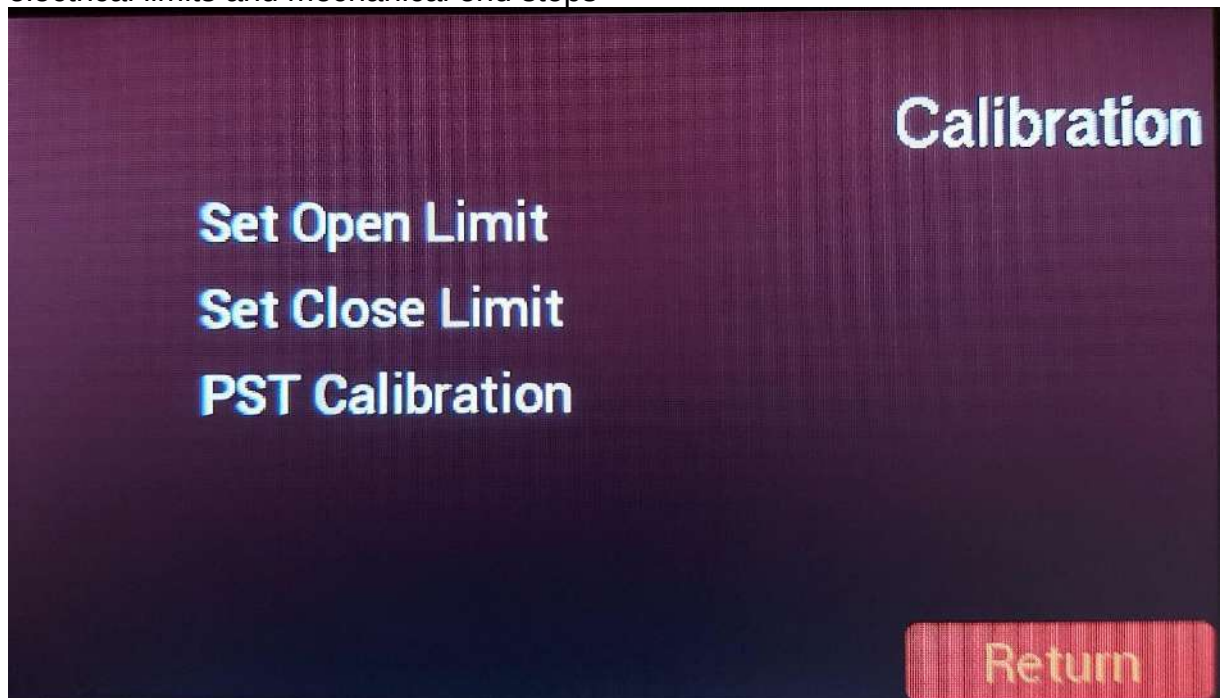
- **Close Mid:** NA

Display Setting:

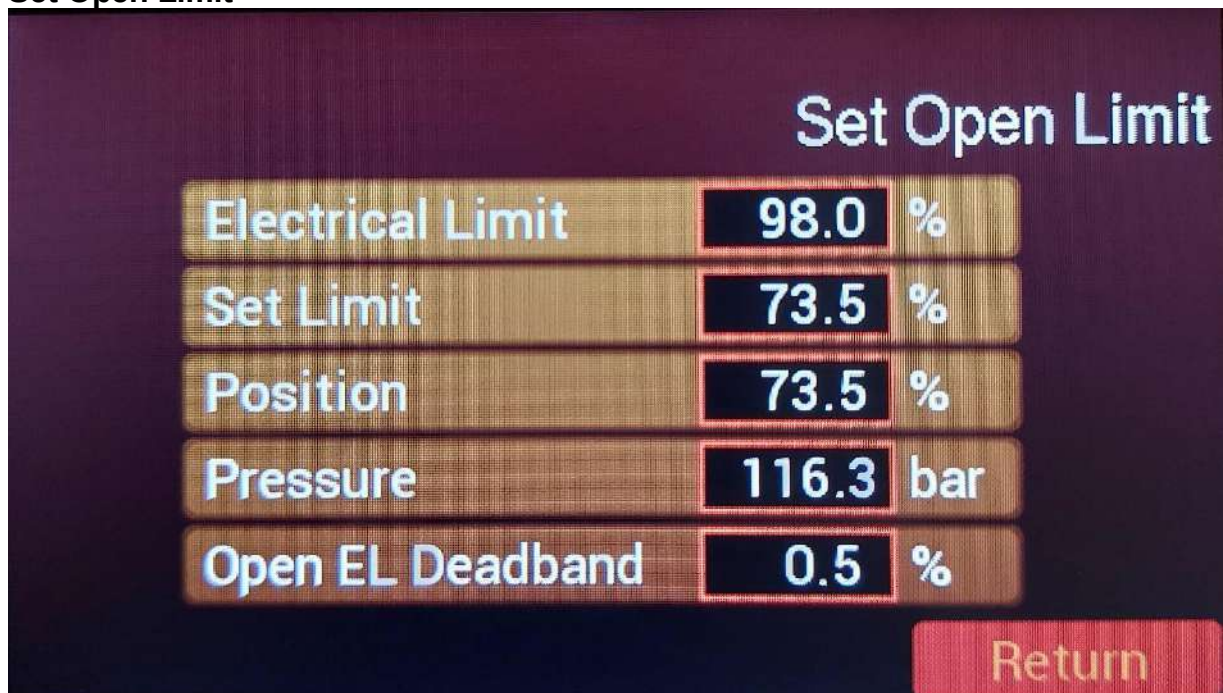
- **Home Screen:** If POS&PR is selected, home screen will show both position and pressure and if POSITION is selected, home screen will display only position. Default is POS&PR
- **LED Close:** NA



Calibration: Total travel of the actuator/valve can be configured to desired electrical limits and mechanical end stops



- **Set Open Limit**



Electrical Limit: This parameter is set to determine open electrical limit with reference to mechanical end stop. Once open mechanical end stop limit is recorded, electrical limit will be scaled by % set in this parameter.

Default Value is 98%

Set Limit:

Open limit can be set by moving actuator to open mechanical end stop and accepting limit in this parameter. While setting open limit, position sensor valve should be less than or equal to 100%.

NOTE: Actuator should be near to open mechanical end stop position and not in close mechanical end stop. On pressing enter key; it will enter in edit mode and the border of Set Limit numerical value turns green. Move the actuator/valve to open mechanical end stop by pressing scroll key (Blue knob upwards). In complete physical open condition, press enter key (red knob downwards) to accept the current sensor position value as mechanical open limit.

Position and Pressure:

These are current position and pressure values, and these fields are read-only.

Dead band for Open:

This parameter is used for precise open action. After Open command the actuator is stopped as soon as Position reaches Open Electrical limit + Deadband and Open action restarts as soon as Position drops below Open electrical limit

- **Set Close Limit:**



Electrical Limit: This parameter is set to determine close electrical limit with reference to mechanical end stop. Once close mechanical end stop limit is recorded, electrical limit will be scaled by % set in this parameter.

Default Value is 2%

Set Limit:

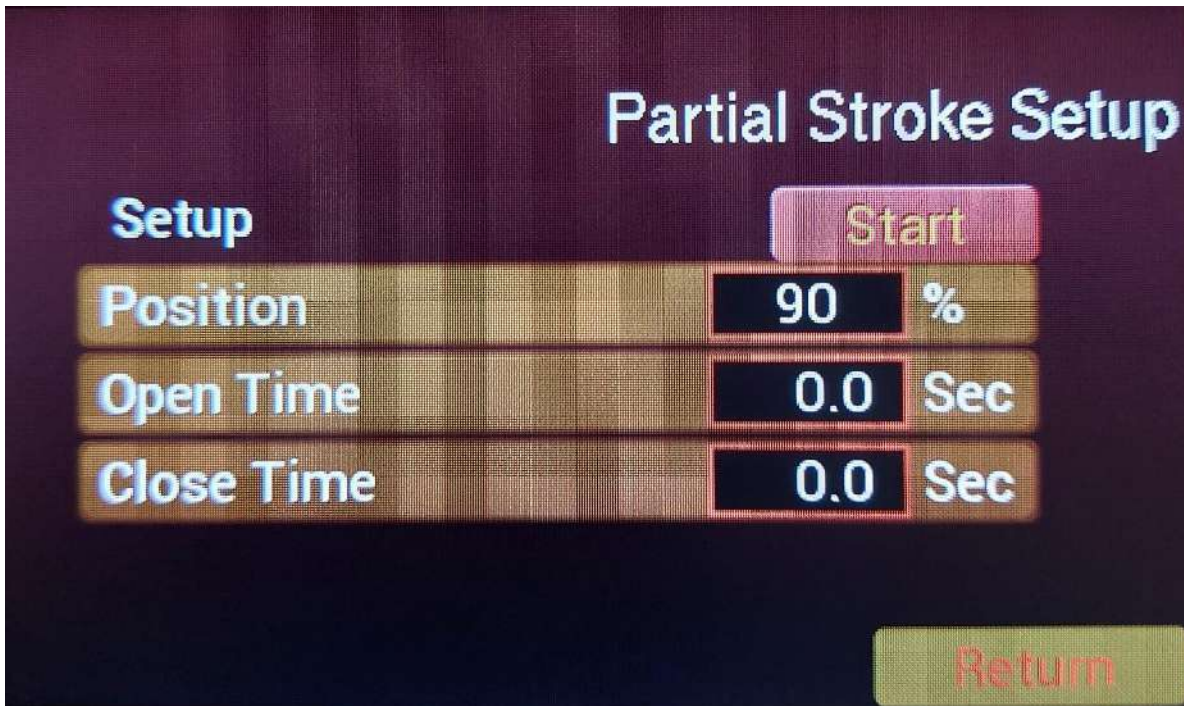
Close limit can be set by moving actuator to close mechanical end stop and accepting limit in this parameter. While setting close limit, position sensor valve should be more than or equal to 0%.

NOTE: Actuator should be near to close mechanical end stop position and not in open mechanical end stop. On pressing enter key; it will enter in edit mode. Move the actuator/valve to close mechanical end stop by pressing scroll key. In complete physical close condition, press enter key to accept the current sensor position value as mechanical close limit.

Dead band for Close:

This parameter is used for precise close action. After Close command the actuator is stopped as soon as Position reaches Close Electrical limit - Deadband and Close action restarts as soon as Position goes above Close electrical limit

Partial Stroke Setup:



The screenshot shows a 'Partial Stroke Setup' screen with a dark background. At the top right, the title 'Partial Stroke Setup' is displayed in large white letters. Below the title, there is a 'Setup' label on the left and a 'Start' button on the right. The main area contains three rows of input fields: 'Position' with a value of '90' and a '%' symbol, 'Open Time' with a value of '0.0' and a 'Sec' symbol, and 'Close Time' with a value of '0.0' and a 'Sec' symbol. At the bottom right, there is a 'Return' button.

Setup	Value	Unit
Position	90	%
Open Time	0.0	Sec
Close Time	0.0	Sec

This function will perform partial stroke setup. Initialising partial stroke setup will stroke valve multiple times from open to close or vice versa. It will perform a preliminary test and record the result for comparison. It is mandatory to perform partial stroke setup prior to partial stroke test.

Position: This parameter determines the step height of partial stroke test. Actuator will move from open limit to set position and move back to open limit. Default value is 90%.

Open Time: This will display operating time of actuator from Close limit to Open Limit. Display unit is seconds (s).

Close Time: This will display operating time of actuator from Open limit to Close Limit. Display unit is seconds (s).

Failsafe Config:

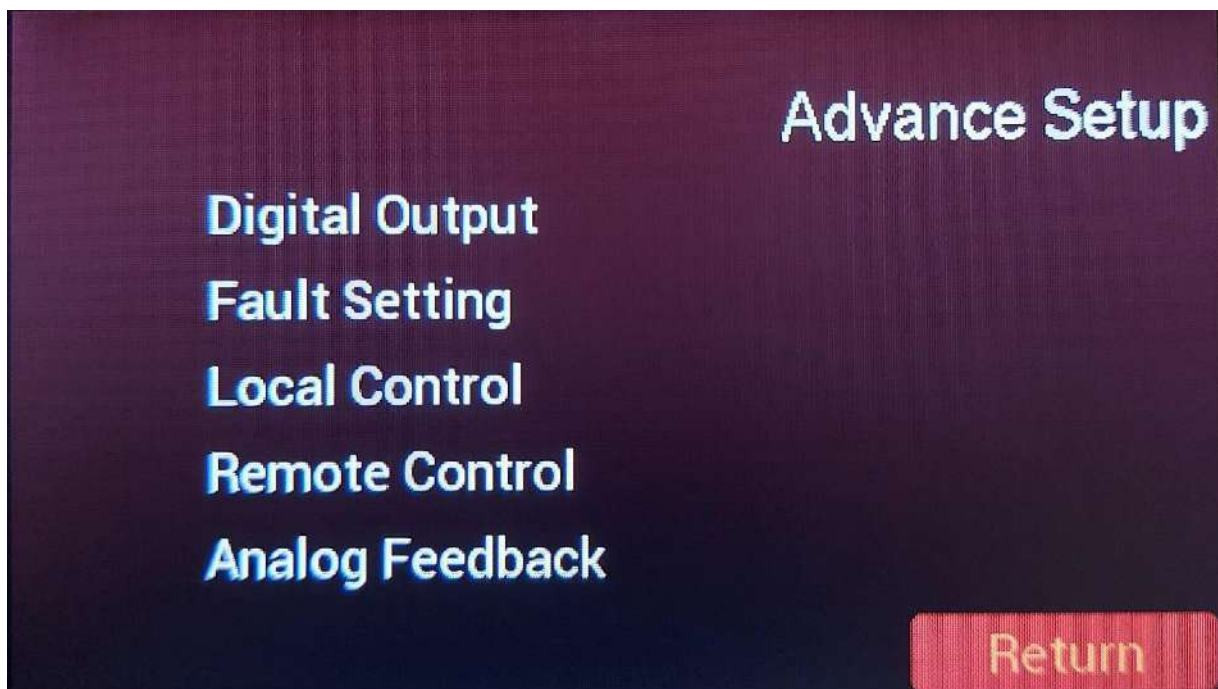


NOTE: ESD failsafe function is not configurable. Default ESD failsafe function is as per specifications.



For respective functions or signal, the failsafe can be set for open, close, stayput or none so that whenever there is failure related to that function or signal the corresponding failsafe action occurs

Advance Setup:



Under Advanced settings various parameters can be altered.

Digital Output Menu:

Digital Output		Digital Output	
Relay Contact 3	☐ NO	Monitor Relay	☒ FAULT ONLY
State 3		Relay Contact 1	
Relay Contact 4	☐ NO	State 1	☐ NO
State 4		Relay Contact 2	
		State 2	☐ NO
Next>>	Return	Next>>	Return

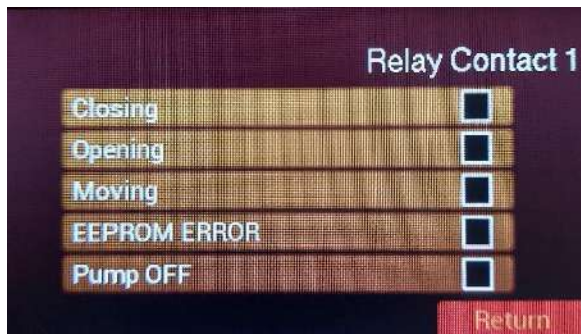
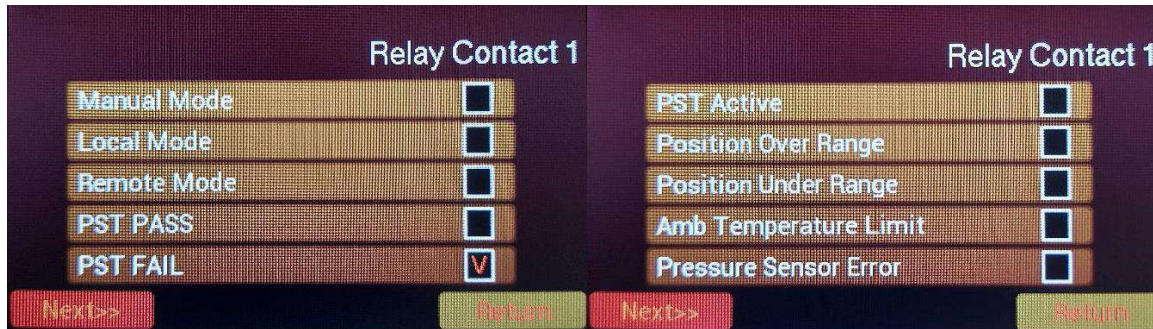
Digital Output		Digital Output	
Relay Contact 5	☐ NO	Relay Contact 7	
State 5		State 7	☐ NO
Relay Contact 6		Relay Contact 8	
State 6	☐ NO	State 8	☐ NO
Next>>	Return	Next>>	Return

These menus are used to select configurations for the relay contacts. These configurations are available for Relay Contacts 1-8 and their respective default states.

Relay Contacts:

Relay Contact 1		Relay Contact 1	
Close Limit	☐	Oil Temperature Limit	☐
Open Limit	☐	Thermostat Trip	☐
Fault/Alarm	☐	Mains/Phase Fail	☐
ESD Inactive	☐	OverPressure Limit	☐
Signal Loss	☐	Over Pressure Mid	☐
Next>>	Return	Next>>	Return

Relay Contact 1		Relay Contact 1	
Accumulator not Charging	☐	Pump Fail	☐
Stall	☐	PST Position	☐
Stall Mid	☐	Hydraulic Failure	☐
Stall Limit	☐	Motor Running	☐
Pump ON	☐	Stop	☐
Next>>	Return	Next>>	Return



Options for configuring relay1 are listed below with explanation:

1) **Close limit:** Close Limit is an event which occurs when the valve is in close position. If the option is selected for the relay contact, then the corresponding relay turns ON.

2) **Open limit:** Open Limit is an event which occurs when the valve is in open position. If the option is selected for the relay contact, then the corresponding relay turns ON.

3) **Alarm:** This occurs when any of the following faults occurred namely:

- | | |
|---------------------------------|--------------------------------|
| • ESD active | • System pressure high |
| • Phase/Mains fail | • System pressure sensor fail. |
| • Thermostat trip | • Temperature High |
| • EEPROM error | • Stall |
| • Max limit not reached | • Pump fail. |
| • Limits not set/Not calibrated | • PST fail. |

- 4) **ESD inactive:** This fault occurs when emergency shutdown is detected as signal provided for ESD is removed. If the option is selected for the relay contact, then the corresponding relay turns ON. This failure is also displayed as an alarm message “ESD Inactive” and monitor relay also turns OFF.
- 5) **Signal Loss:** NA
- 6) **Oil temperature limit:** NA
- 7) **Thermostat trip:** This fault occurs when motor temperature exceeds and the motor thermostat trips. If the option is selected for the relay contact then the corresponding relay turns ON. This failure is also displayed as an alarm message “Thermostat trip” and monitor relay also turns OFF.
- 8) **Mains/Phase fail:** This fault occurs when mains or phase failure is detected due to which corresponding fault relay turns ON. If the option is selected for the relay contact, then the corresponding relay turns ON. This failure is also displayed as an alarm message “Mains fail” and monitor relay also turns OFF.
- 9) **Overpressure limit:** This fault occurs when Pressure is detected to be greater than the set Max Pressure provided in fault settings. If the option is selected for the relay contact, then the corresponding relay turns ON. This event is also displayed as an alarm message “Pressure High”.
- 10) **Overpressure Mid:** NA
- 11) **Accumulator not charging:** NA.
- 12) **Stall:** This fault occurs when stall is detected at either open or close limit position of the actuator because actuator is not moving from that position. This failure is also displayed as an alarm message “Stall” and monitor relay also turns OFF.
- 13) **Stall limit:** Same as Stall but activated when actuator is not moving at either open or close limits.
- 14) **Stall mid:** Same as Stall but activated when actuator is not moving between open and close limits.
- 15) **Pump ON:** NA.
- 16) **Pump fail:** When Position and Pressure does not change even after open command

17) **PST position:** This status is ON whenever PST is started, and position is reached to PST set position. This status turns OFF when PST test is completed or stopped.

18) **Hydraulic fail:** NA.

19) **Motor Running:** Motor Running is an event which occurs when the motor is in ON condition. If the option is selected for the relay contact, then the corresponding relay turns ON.

20) **Stop:** This event occurs when if stop command via red knob. If the option is selected for the relay contact, then the corresponding relay turns ON.

21) **Manual Mode selected:** This event occurs when if manual mode is selected via manual selector switch provided. If the option is selected for the relay contact, then the corresponding relay turns ON

22) **Local Mode:** This event occurs when if local mode is selected via red knob. If the option is selected for the relay contact, then the corresponding relay turns ON.

23) **Remote Mode:** This event occurs when if remote mode is selected via red knob. If the option is selected for the relay contact, then the corresponding relay turns ON

23) **PST Pass:** This event occurs when result of PST test is passed. "PST Pass" is displayed on the screen

24) **PST Fail:** This event occurs when result of PST test is failed. "PST Fail" is displayed on the screen.

25) **PST Active:** This event occurs when PST is in progress. "PST in progress" is displayed on the screen.

26) **Position over range:** This is not detected as fault but displayed on home screen indicating that position is above 100% If the option is selected for the relay contact, then the corresponding relay turns ON. This event is also displayed as an alarm message "Position Over-range".

27) **Position under range:** This is not detected as fault but displayed on home screen indicating that position is below 0% . If the option is selected for the relay contact, then the corresponding relay turns ON. This event is also displayed as an alarm message "Position Under-range".

28) **Ambient Temperature Limit:** When ambient temperature crosses 80deg, then the relay is activated

26) **Pressure Sensor error:** This event is set when system pressure sensor is disconnected or short is detected at pressure sensor input.

27) **Closing:** Closing is an event which occurs when the valve is moving in close direction. If the option is selected for the relay contact, then the corresponding relay turns ON.

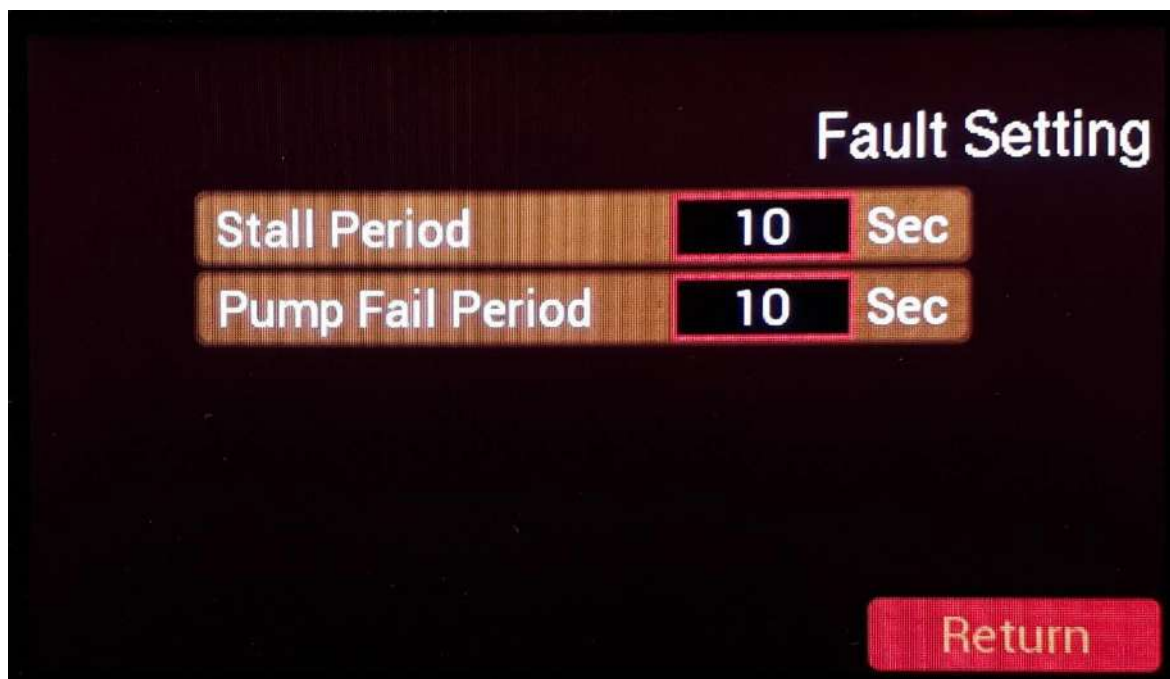
28) **Opening:** Opening is an event which occurs when the valve is moving in Open direction. If the option is selected for the relay contact, then the corresponding relay turns ON.

29) **Moving:** This is an event which occurs when the valve is moving in Open or close direction. If the option is selected for the relay contact, then the corresponding relay turns ON.

30) **EEPROM error:** This fault occurs when there is a CRC check error while writing data in internal EEPROM. If the option is selected for the relay contact, then the corresponding relay turns ON.

31) **Pump OFF:** NA.

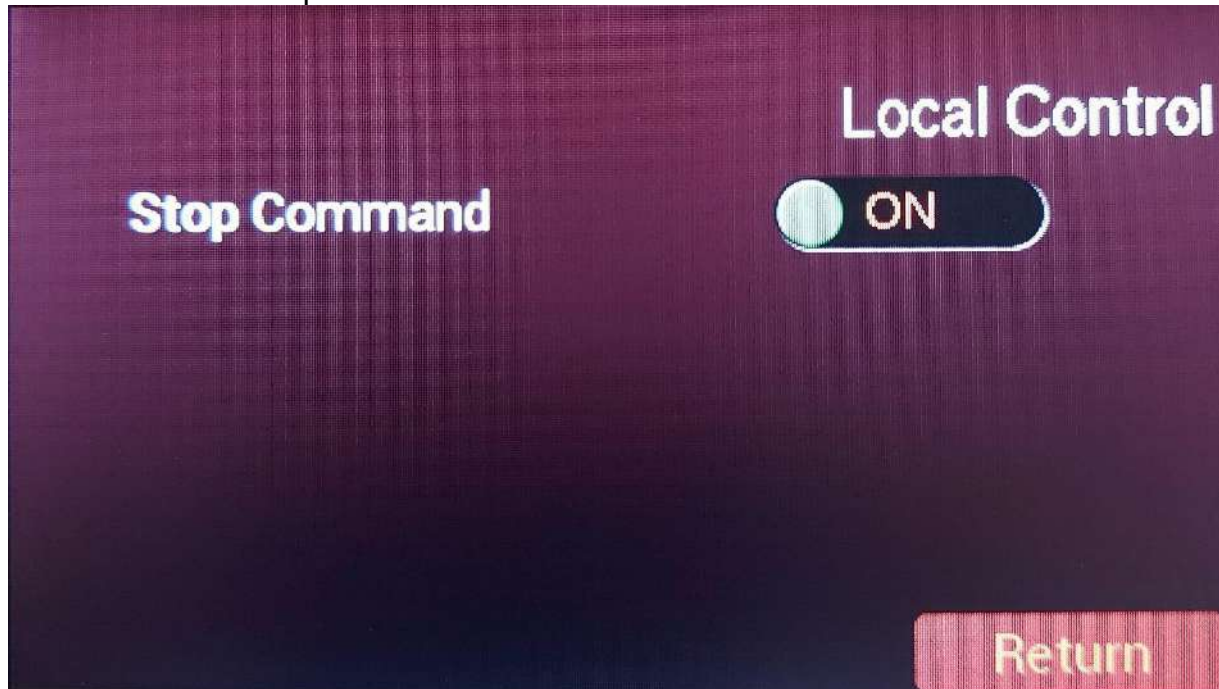
Fault Setting:



Stall Period: This parameter range is from 0 – 500Seconds. If open/close outputs are ON and if position does not move more than 0.2% while pressure changes, after stall period, “Stall” will appear on screen and outputs turns OFF.

Pump Fail Period: This parameter range is from 0 – 500Seconds. If open/close outputs are ON, pressure and Position both did not change then after Pump Fail period, Pump Fail is detected, “Pump Fail” will appear on screen and output turns OGG

Local Control: This parameter used to set the function of local control.

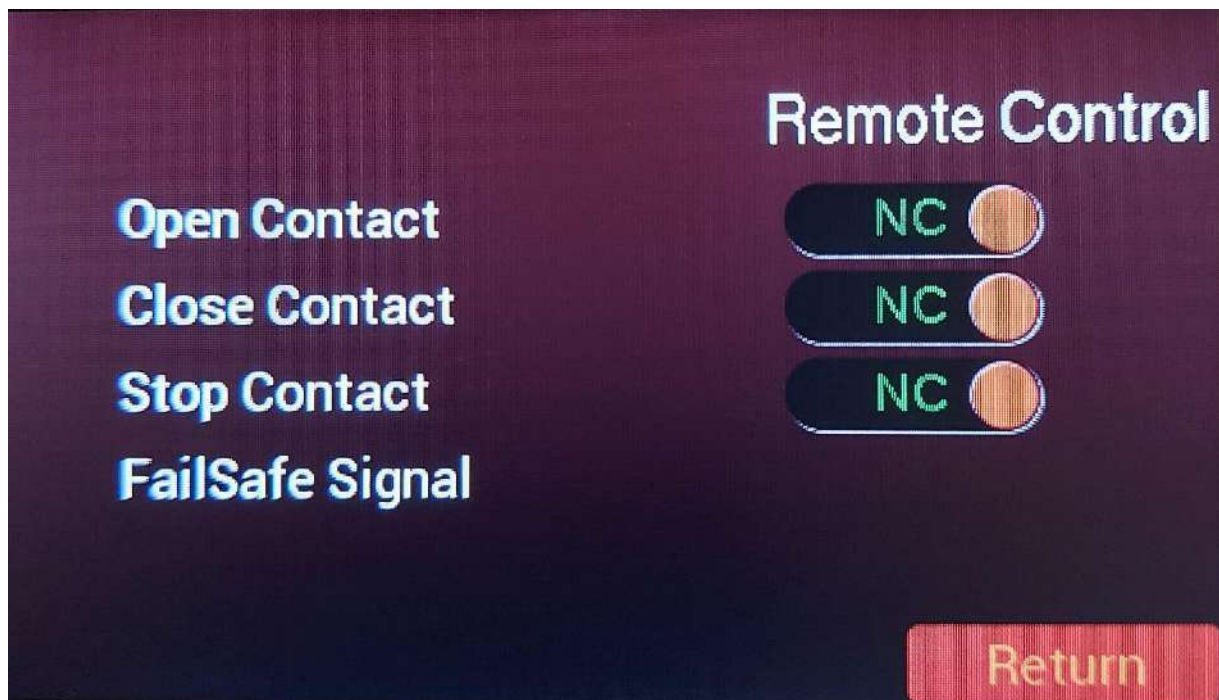


Stop Command:

Set the action to respond to local open and local close command.

- Off : Actuator will not self-maintain the position. It will operate only while open or close signal is applied.
- On – Default: Actuator will self-maintain the position till, stop command is applied or it reaches position limits.

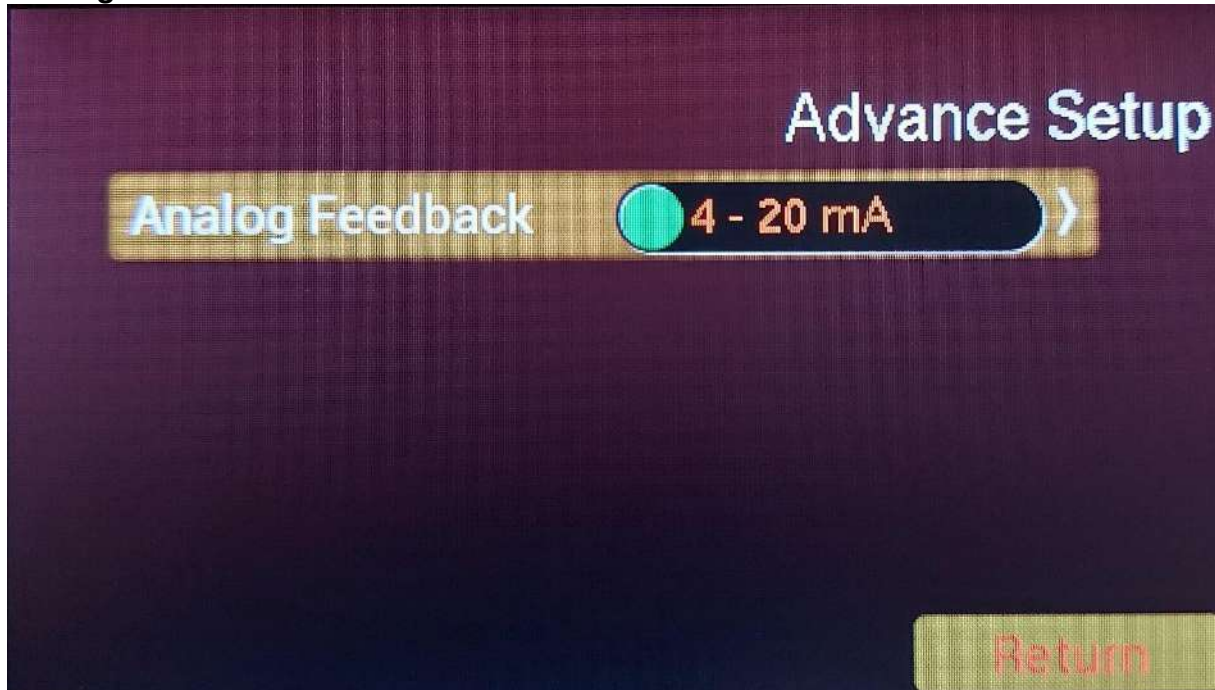
Remote Control: This parameter used to set the function of remote control.



Open/Close/Stop inputs are configurable NO/NC and command is processed accordingly

- **FailSafe Open:** When Set for Open, the remote signal would keep the valve in close position and as soon as the signal is lost Open action takes place
- **FailSafe Close:** When Set for Close, the remote signal would keep the valve in Open position and as soon as the signal is lost Close action takes place
- **FailSafe None:** When Set for None, the independent remote signal for Open and Close separate would keep the valve in open position and Close position respectively

Analog Feedback:



This parameter is used to set the feedback function of the Position transmitter module.

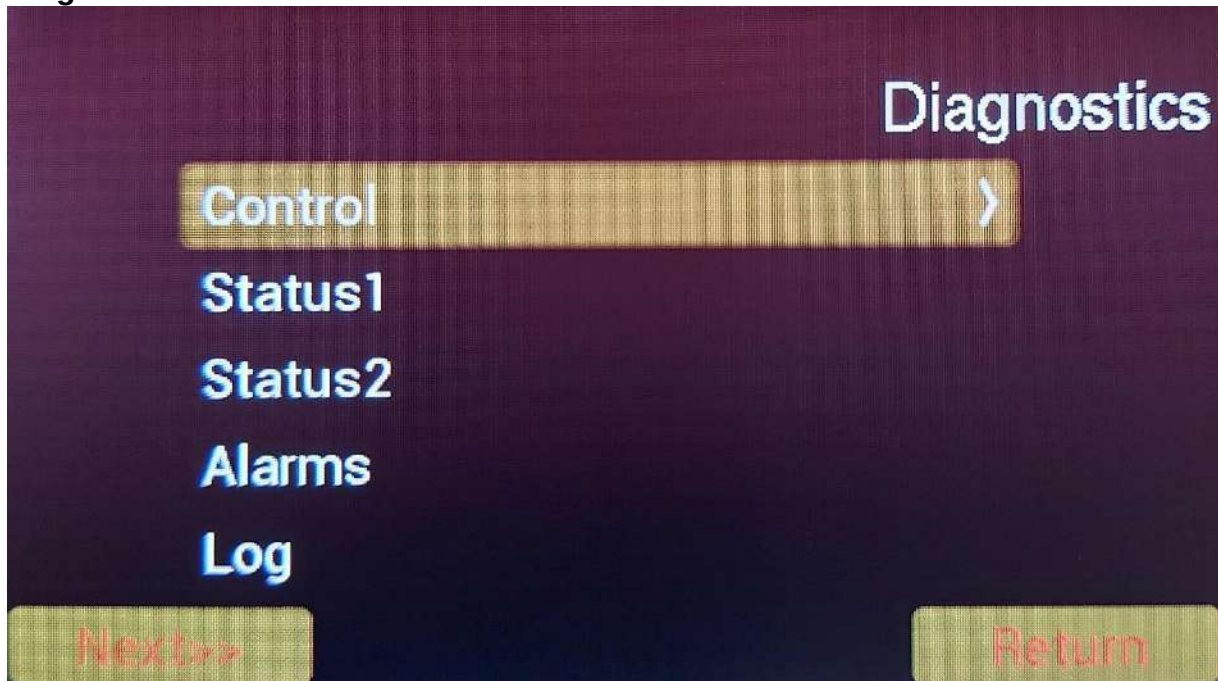
- 4...20 mA - Default

It provides remote indication of actuator position and temperature of oil. 4 mA is for close limit or 0 deg and 20 mA is for open limit or 100 deg.

- 20...4 mA

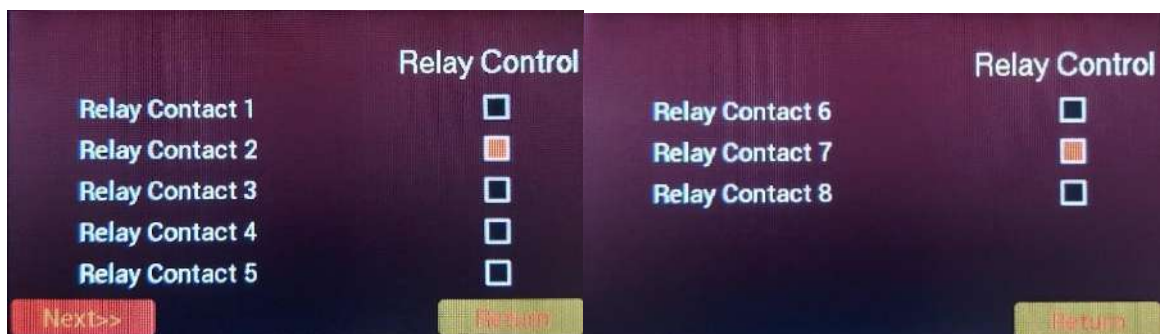
It provides remote indication of actuator position and temperature of oil. 20 mA is for close limit or 0 deg and 4 mA is for open limit or 100 deg

Diagnostics:



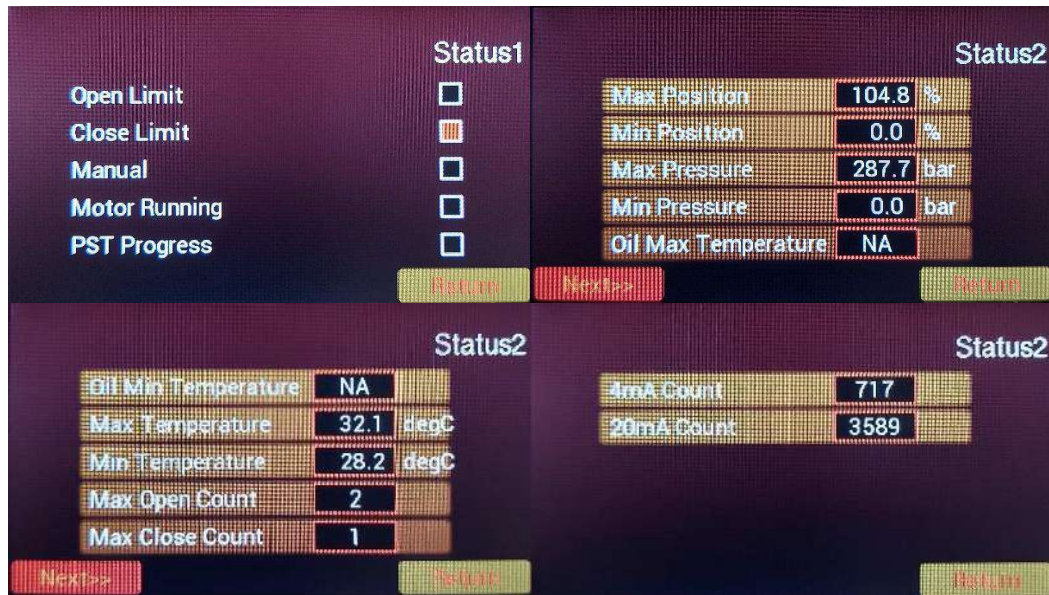
• Control

This function displays the signal status for each input. As the input changes the corresponding status changes. This status function is useful for testing of controls.



It provides indication of relay state and LED lamps

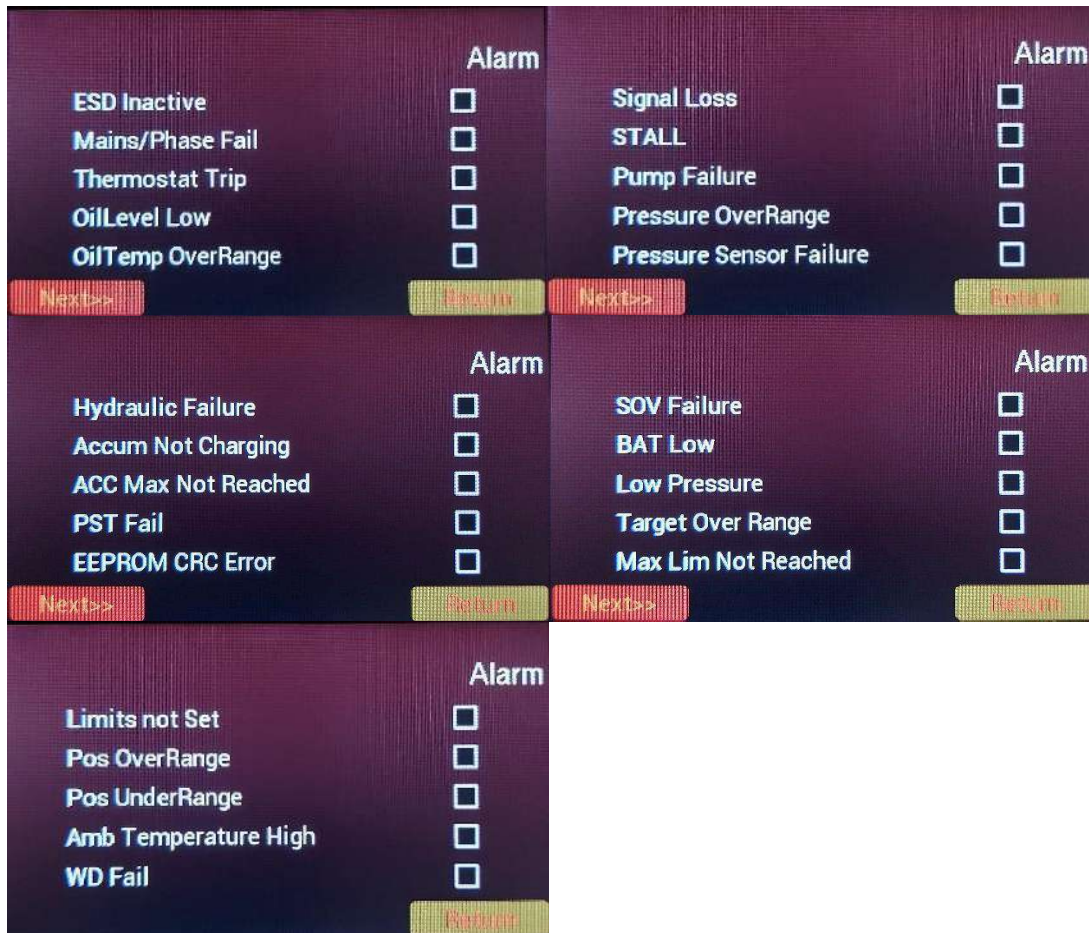
- Status



It provides status of position of the valve and motor. It also shows min max values for Position and pressure during operation.

Alarms:

This provides following set of alarms depending upon actuator type.

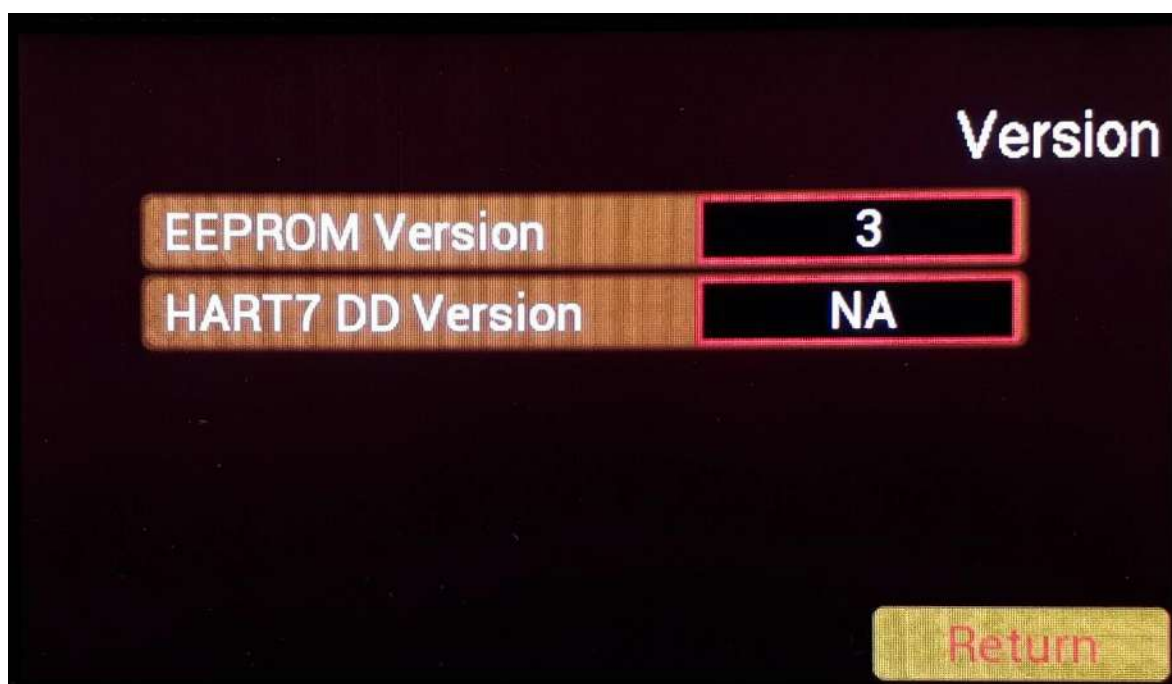
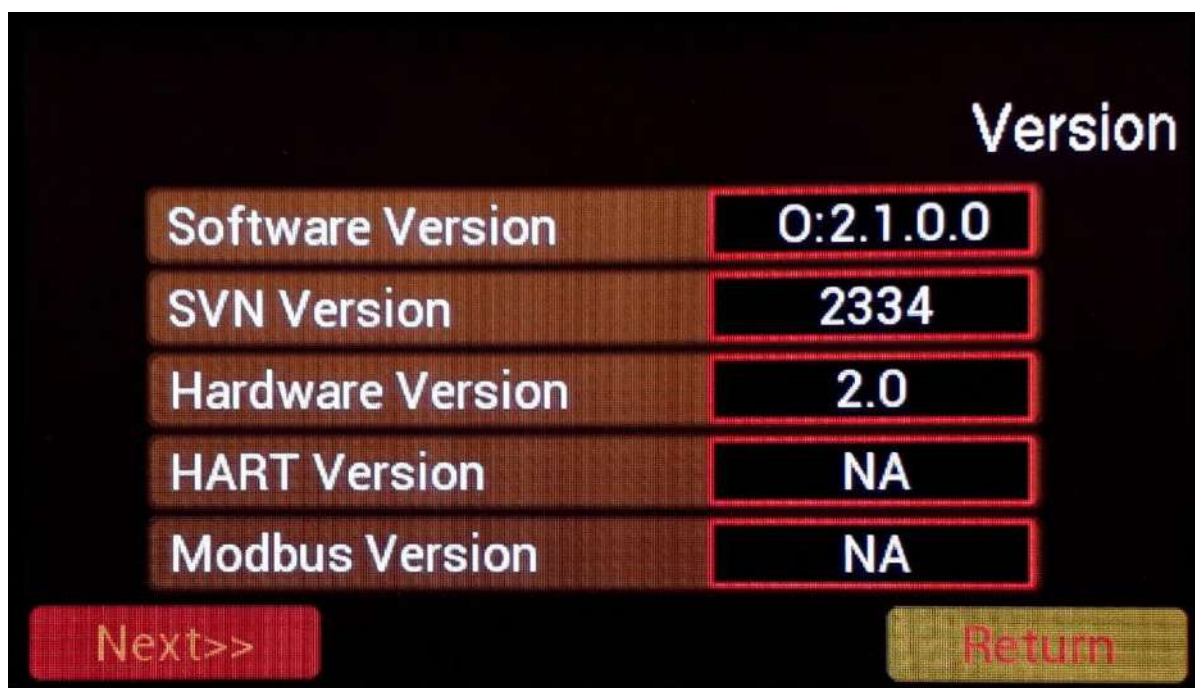


The alarms displayed are as follows:

- 1) **ESD Inactive:** This fault occurs when emergency shutdown is detected as 24V provided for ESD is OFF
- 2) **Mains failure or Phase failure:** This fault occurs when mains or phase failure is detected due to which corresponding fault relay turns OFF. Fault relay for Mains/Phase failure remains ON when there is no fault
- 3) **Motor Thermostat trip:** This fault occurs when motor temperature exceeds and the motor thermostat trips.
- 4) **Stall:** This fault occurs when stall is detected because actuator is not moving more than 0.2%
- 5) **Pump fail:** This fault is generated if there is no change position and pressure both

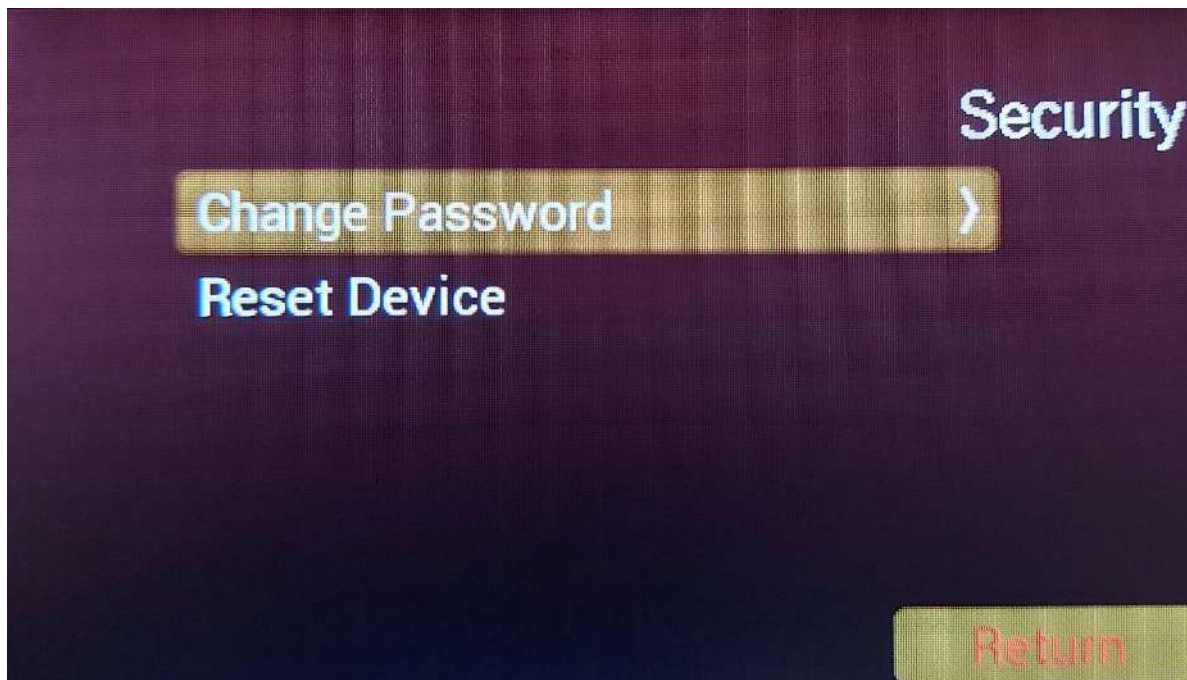
- 6) Pressure Overrange:** This fault occurs when Pressure is detected to be greater than the set Max pressure
- 7) Pressure sensor failure:** It is a fault which occurs when pressure sensor failure is detected
- 8) PST fail:** This fault is generated if result of PST test is failed
- 9) EEPROM error:** This fault is generated if CRC check in eeprom store is failed
- .
- 10) Max limits not reached:** This fault is generated if position is in the electrical limit and stop on pressure is selected but pressure has not reached pressure limit
- 11) Limits not set:** This fault is generated if system open/close calibration is incomplete
- 12) Position over range:** This is not detected as fault but displayed on home screen indicating that position is above 100%
- 13) Position under range:** This is not detected as fault but displayed on home screen indicating that position is below 0%
- 14) Amb temperature high:** This fault is generated whenever temperature goes above 80DegC

Version: This gives version no of software, firmware version control, hardware version, Hart version and Modbus version



Security:

This menu is used to set new password and to reset all parameters to default value.



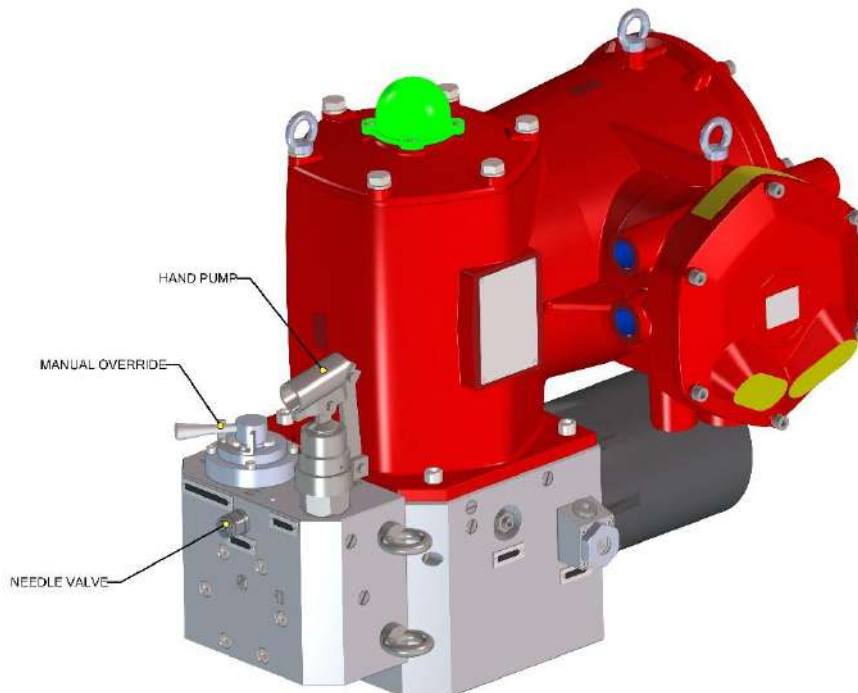
Reset Device:



- **Factory Default:** To perform factory default, user must select and hold on Factory Default for at-least 5 seconds.
- **Write protect:** Function used for HART communication
- **Log Reset:** event log can be reset

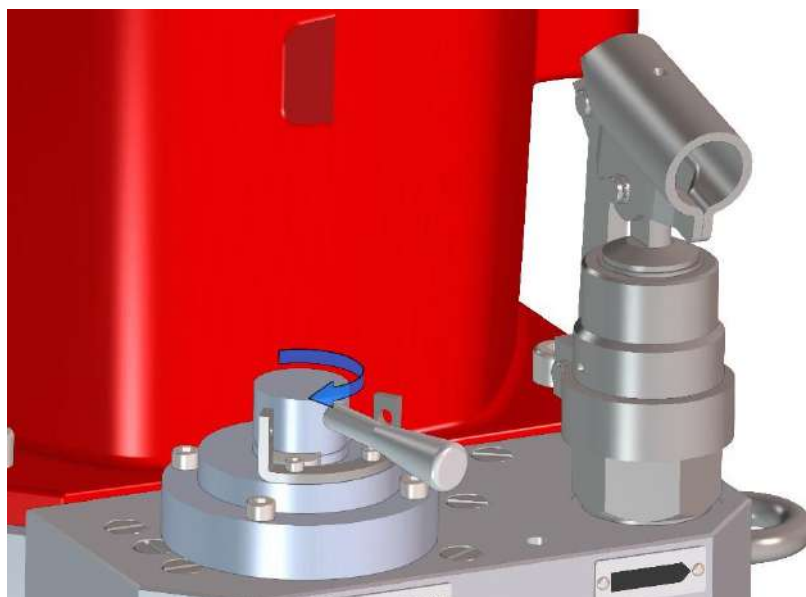
3.3 Operation by Hydraulic Manual Override

An optional, manually operated override is available to operate the actuator in the event of a loss of electrical supply to pump/motor. When supplied, a hand pump with a handle is located on the power unit. The procedure for manual override is as follows as per the following two cases:



a) When the valve is open

- Firstly, turn the manual override lever towards the manual override indication.
- Then open the needle valve and by doing so, the oil will be drained off to the reservoir and the valve will close.



When the valve is closed

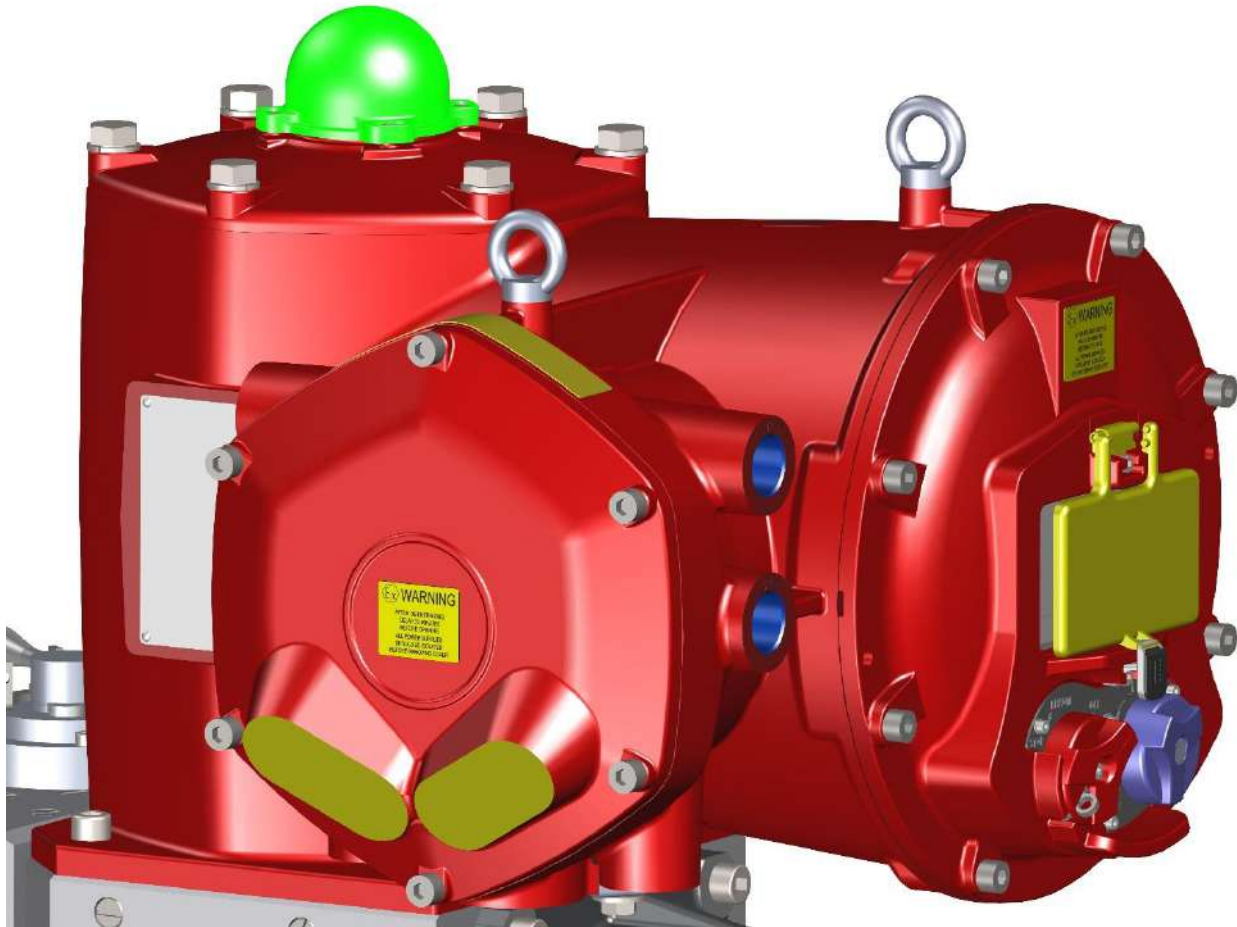
- Firstly, turn the manual override lever towards the manual override indication.
- Ensure that the needle valve is closed.
- Now insert the hand pump handle into the hand pump lever and insert the coupling pin to fix the handle to the lever.
- Pump the oil manually using the hand pump provided on the enclosure by moving the handle (hand pump) up and down.
- Thus, the oil will flow to the actuator and actuate the valve to its open position.
- To prevent the unauthorised access to the manual override, a lock is provided to the lever to restrict its motion.



WARNING: The actuator cannot be operated electrically when in manual operation mode and will not respond to emergency shutdown (ESD) signals until electrical operation mode is selected again.

S

4. Removal of terminal block and Cable Connections

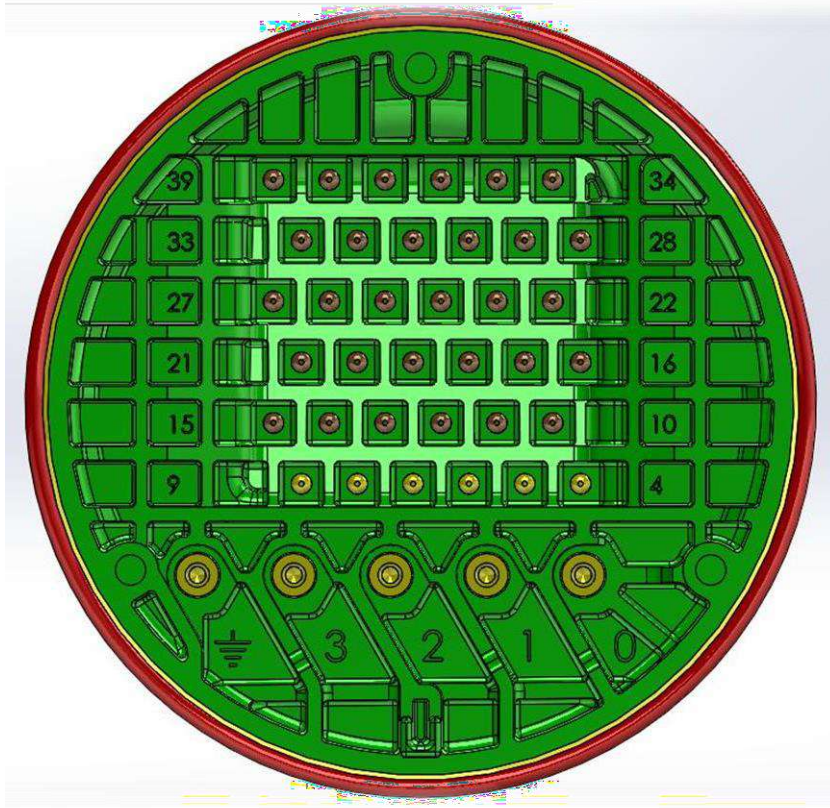


- There are 7 cable entries through the terminal cover which have a thread specification as per the ordering code mentioned on the nameplate for installing the cable glands.
- To carry out the wiring connections, first remove the terminal cover by unbolting the bolts with the help of suitable allen key. During its removal, ensure that the O-rings do not get damaged.
- The earth symbol on the electrical module indicates the internal earth connection.
- On the other hand, the hex bolt with a C-clamp is provided for external earth connection.



CAUTION:

1. Use Ex 'd', IP 67 certified cables, cable glands and plugs complying to IEC60079-14
2. Use cable size of 10mm² for connecting the earthing terminals



WARNING:

1. Do not open the terminal cover when an explosive atmosphere is present.
2. Ensure that the power supply is cut off before removing the terminal cover.

5. Operating Principle

Preconditions:

- Power fail to close

Description:

- SOV01: DCV used to close the actuator.
- CV1: Check valve used to ensure unidirectional flow.
- PT01: Pressure transducer used to transmit system pressure to the PLC.
- PRV1: Pressure relief valve used to control the system pressure.
- HP1: Hand pump to be used for manual operation.
- PRV2: Pressure relief valve used to control the system pressure in manual mode
- ESD: Emergency shut down is use to shut down the system in emergency situations.

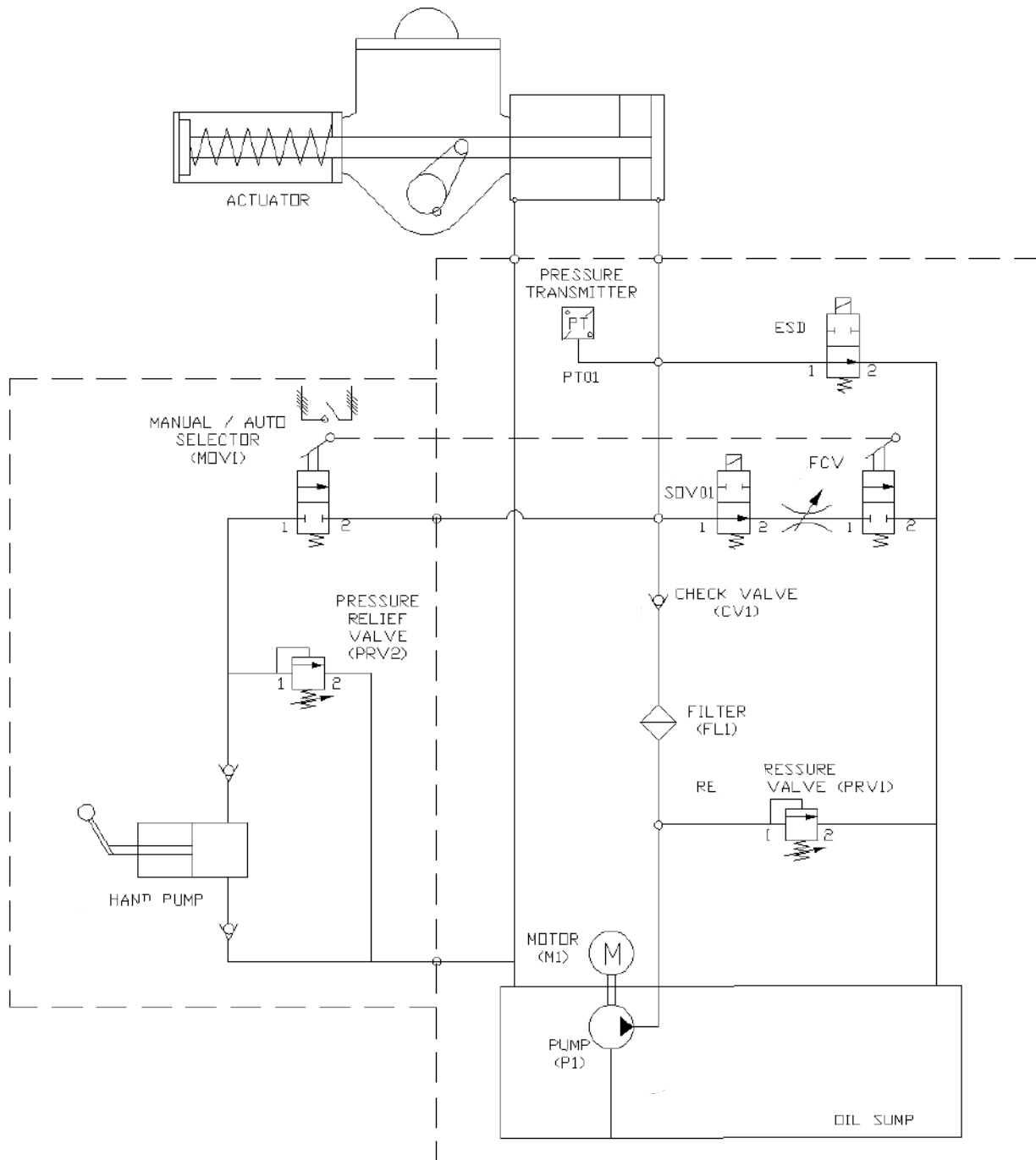
Auto Operation:

- Ensure that the selector switch is in auto mode.
- Motor is used to open the actuator (SOV01 is normally open, hence it is always energised to open the actuator)
- SOV01 is used to close the actuator. (When SOV01 is de-energised the actuator closes)

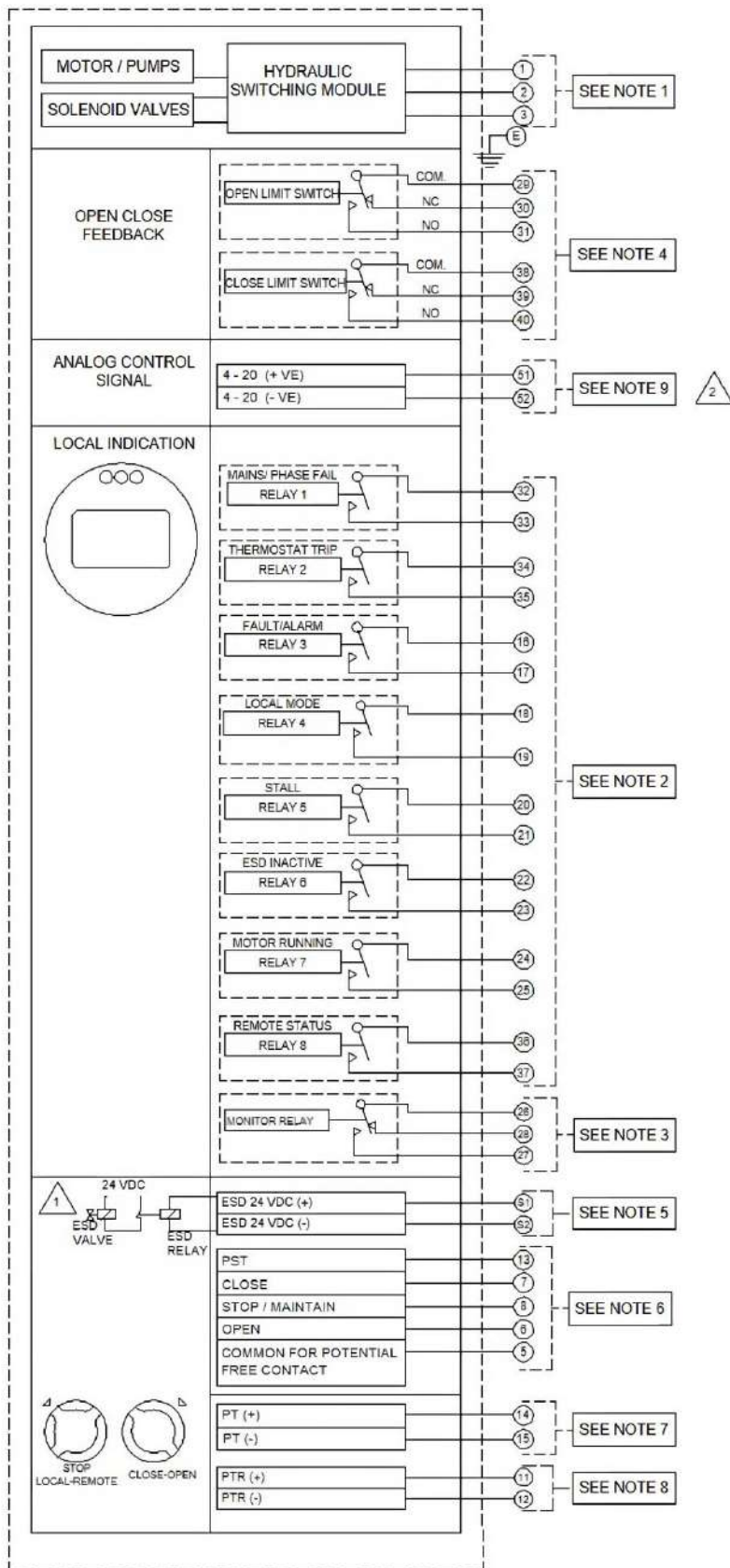
Manual operation:

- In-case the power is not available we use manual handpump and selector switch to operate the valve.
- To open valve in manual mode, rotate the lever of the selector switch such that the lever points to "manual" marking.
- Using handpump, pump the oil to the hydraulic actuator to open the valve.

Hydraulic circuit diagram:



Electrical wiring diagram:



NOTE:-1

480 VAC 60 Hz 3 PHASE	PHASE U	TERMINAL-1
	PHASE V	TERMINAL-2
	PHASE W	TERMINAL-3

NOTE:-3

MONITORS ACTUATOR AVAILABILITY.

NOTE:-4

LIMIT SWITCH FEEDBACK FOR OPEN AND CLOSE POSITION

NOTE:-5

SAFETY CONTROL SIGNALS 24 VDC.

NOTE:-6

DIGITAL CONTROL SIGNALS 20-60 Vac/dc
OR 60-120 Vac

NOTE:-7

ANALOG POSITION FEEDBACK SIGNAL
OUTPUT (4-20mA)

NOTE:-8

PRESSURE TRANSMITTER OUT PUT (4-20mA)

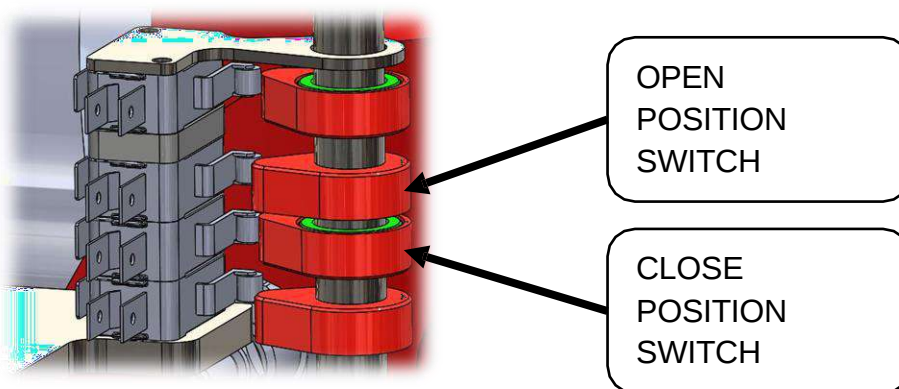


NOTE:-9

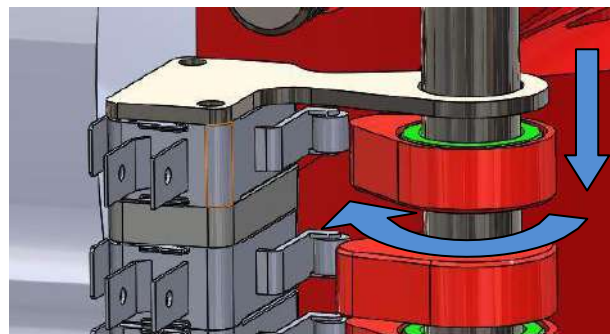
COMMUNICATION PROTOCOL (HART)

6. Adjustment of limit switch

- The cams actuating the limit switch are mounted on the operating rod which is coupled to the actuator shaft directly and the actuator shaft in turn is connected to the valve or similar device. So as the driven device opens/closes, the actuator shaft rotates thereby rotating the cam, thus actuating the mechanical switches mounted inside the cover.
- Open and Close limit switches are pre-set at the factory to correspond to the actuator mechanical stop. They can be manually set and accessed by removal of Dome cover. The lowermost switch is for the Close position while the third from bottom is for Open position.



- Switch cam adjustment is carried out by fingertip rotation in either direction.
- a. Open Switch Adjustment
- Move the Actuator to the fully open position and locate the uppermost switch cam. To locate the cam, push the cam down and rotate until the uppermost switch operates; and release the cam. The switch is now set.



- b. Close Switch Adjustment
- Move the Actuator to the fully closed position and locate the lower switch cam. Lift the cam up and rotate until the lower switch operates; and release the cam. The switch is now set.

7. Maintenance and Troubleshooting

a. General maintenance

Every ROTEX actuator is fully tested before dispatch to give years of trouble-free operation, provided it is installed and commissioned in accordance with the instructions given in this publication. The EHF-Compact actuator's non-intrusive enclosure provides complete protection for the actuator components. Covers should not be removed for routine inspection as this may be detrimental to the future reliability of the actuator. All electrical power supplies to the actuator must be isolated before any maintenance or inspection is carried out. Electrical supplies must be isolated before actuator covers are removed.

Routine Maintenance should include the following:

- Ensure tightness of the bolts.
- Check the actuator enclosure for damage or loose fasteners.
- Ensure there is not an excessive build-up of dust or contaminants on the actuator.
- If the fluid level is low, visually inspect the actuator and tighten any hydraulic fittings that may be leaking.
- Check the operating speeds in both the open and closed directions by conducting a full stroke test.
- Fully open the actuator. Leave the actuator on for 30 minutes and check that the actuator has not drifted from the open limit. Routine maintenance should include the following after 5 years of service:
 - The hydraulic fluid and filter should be replaced after 5 years if the actuator is operating a modulating application and 10 years for on/off application.
 - The actuator seals should be replaced after 5 years if the actuator is operating a modulating application and 10 years for on/off application.

b. Oil filling and replacement

Oil Specification: - Mobil SCH 626.

a. First fill

- For the first fill, open the M10 plug just above the oil level indicator, to create a breathing track to avoid any air bubbles in the hydraulic lines.
- Then open the oil filling plug from the Oil Level Indicator block.
- Using a pipe and funnel, pour in oil through the Oil Level Indicator block until the vertical column of the indicator is half filled.
- Ensure that the oil is filtered by passing it through a suitable filter before filling it into the tank.
- Also ensure that the suitable grade of mineral oil is used as a hydraulic fluid.

b. Oil drain

- For draining the oil, open the oil filing plug that will act as a breather for quick drain.
- Then open the Drain plug from the bottom of the actuator and collect the oil in a tray or a crucible to avoid any spillage.
- Replace both the plugs to complete the oil drain procedure.

c. Oil refilling

- Check for any loss of hydraulic fluid by checking the Oil level indicator markings against the oil level inside the indicator block.
- The fluid level should not be below the bottom most hole in the indicator.
- If the level is low, hydraulic fluid can be refilled by opening the oil filling plug and as described in the “first fill” section.

c. Replacement of pump

Please follow the step wise procedure to replace the hydraulic pump:

1. Drain the oil from the actuator as described in the “oil drain” section above.
2. After complete removal of hydraulic oil, plug the drain port.
3. Loosen the bolts of the pump cover and disassemble the pump, by removing the pump bolts.
4. Replace the faulty pump with the new pump.
5. During assembly of the pump, ensure that the delivery port on the manifold coincides with the delivery port of the pump and ensure that the pump shaft orientation matches with the motor coupler slot orientation. The pump shaft can be aligned with the motor shaft by rotating the motor shaft.

d. Replacement of the filter

- To replace the filter, open the Dome cover and unscrew the filter with the help of a suitable box spanner.
- After completely removing the filter from the manifold block, clean the filter cartridge and visually inspect the same and its O-rings for any damage.
- Replace the O-rings and/or filter cartridge in case of any damage as per the model no. engraved over its enclosure.

e. Replacement of SOV and Pressure Transducer

- Please ensure that the system is depressurized before proceeding for replacement.
- To replace the SOV and pressure transducer, unscrew the said parts with the help of a suitable spanner.
- Screw back the new replacement parts into the housing using a suitable spanner.