auma®
Solutions for a world in motion

# EPAC

## Operation Instruction Manual

## VERSION: V3.XMP

## (Weather Proof & Explosion Proof)

# Table of Contents

# 1. SAFETY INSTRUCTIONS

## 1.1 Basic information on safety

### Standards/Directives

AUMA products are designed and manufactured in compliance with recognized standards and directives. This is certified in a Declaration of Incorporation and a EC Declaration of Conformity. The end user or the contractor must ensure that all legal requirements, directives, guidelines, national regulations and recommendations with respect to assembly, electrical connection, commissioning and operation are met at the place of installation.
They include among others:

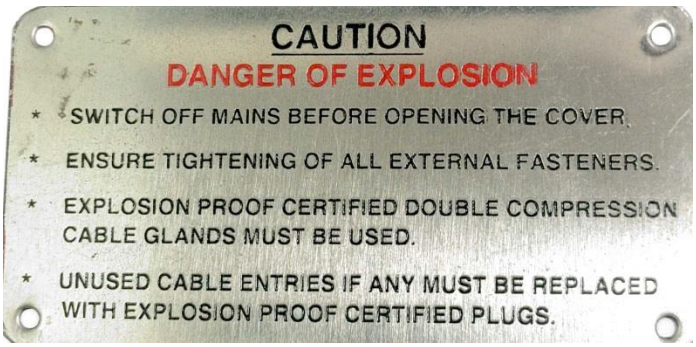
- Standards and directives such as: EN 60079 “Electrical apparatus for explosive gas atmospheres" – Part 14: Electrical installations in hazardous areas (other than mines).
Part 17: Inspection and maintenance of electrical installations in hazardous areas (other than mines).
- Applicable configuration guidelines for Modbus applications.

They include among others applicable configuration guidelines for Modbus RTU applications.

### Safety Instructions/Warnings

All personnel working with this device must be familiar with the safety and warning instructions in this manual and observe the instructions given. Safety instructions and warning signs on the device must be observed to avoid personal injury or property damage. Common Electrical and Electronic related safety instructions must be followed according to industrial standards. The main mechanical safety instructions are fixed on the actuators as shown below.
*Weather Proof Safety Instructions:*


*Explosion Proof Safety Instructions:*



## Qualification of staff

Assembly, electrical connection, commissioning, operation, and maintenance must be carried out exclusively by suitably qualified personnel having been authorized by the end user or contractor of the plant only. Prior to working on this product, the staff must have thoroughly read and understood these instructions and, furthermore, know and observe officially recognized rules regarding occupational health and safety.

Work performed in potentially explosive atmospheres is subject to special regulations which have to be observed. The end user or contractor of the plant is responsible for respect and control of these regulations, standards, and laws.

### Commissioning

Prior to commissioning, it is important to check that all settings meet the requirements of the application. Incorrect settings might present a danger to the application, e.g. cause damage to the valve or the installation. The manufacturer will not be held liable for any consequential damage. Such risk lies entirely with the user.

### Operation

Prerequisites for safe and smooth operation:

- Correct transport, proper storage, mounting and installation, as well as careful commissioning.
- Only operate the device if it is in perfect condition while observing these instructions.
- Immediately report any faults and damage and allow for corrective measures.
- Observe recognized rules for occupational health and safety.
- Observe the national regulations.

### Protective measures

The end user or the contractor is responsible for implementing required protective measures on site, such as enclosures, barriers, or personal protective equipment for the staff.

### Maintenance

After commissioning, check part-turn actuator for damage to paint finish. Do a thorough touch-up to prevent corrosion. Original paint in small quantities can be supplied by AUMA. AUMA part-turn actuators require very little maintenance. Precondition for reliable service is correct commissioning. Seals made of elastomers are subject to aging and must therefore regularly be checked and, if necessary, exchanged. It is also very important that the O-rings at the covers are placed correctly and cable glands fastened firmly to prevent ingress of dirt or water.

We recommend additionally:

- If operated seldom, perform a test run about every 6 months. This ensures that the actuator is always ready to operate.
- Approximately six months after commissioning and then every year check bolts between part-turn actuator and valve for tightness. If required, tighten applying appropriate torques.
- The gear housing is filled with lubricant in the factory. This filling lasts for several years of service.

Any device modification requires the consent of the manufacturer.

## 1.2 Range of application

AUMA actuator controls are exclusively designed for the operation of AUMA actuators. Other applications require explicit (written) confirmation by the manufacturer. The following applications are not permitted.

- Motor control
- Pump control

No liability can be assumed for inappropriate or unintended use.

Observance of these operation instructions is considered as part of the device's designated use.

## 1.3 References and symbols

The following references and symbols are used in these instructions:

**Information**

The term Information preceding the text indicates important notes and information.

-  Symbol for CLOSED (valve closed)
-  Symbol for OPEN (valve open)
- 

Symbol for STOP (valve stop)

# 2. INTRODUCTION

Auma India has developed a new range of electric actuators with intelligent integral starter using microcontroller for weather proof and explosion proof applications. The important features of these electric actuators are as follows:

### STATUS DISPLAY

LCD screen for easier understanding of status, operation and parameter setting details.

### SUPPORTING ALL DUTY TYPES

With the use of microcontroller, it can support ON-OFF Duty and Regulating Duty along with MODBUS RTU- Two wire field bus communication on a single board.

### INBUILT FRONT PANEL OPTION SELECTION

Options can be selected by using the selector switches, push buttons based on the instructions displayed on the LCD screen.

**NOTE:** The features supported by your actuator is with respect to the wiring diagram (WDP) provided with it. Please remember that it might not have all the features described in this document.

# 3. FRONT PANEL DETAILS

This section outlines the front panel details of 3.XMP Actuators. Fig. A shows the picture of the same. The functions of each of these components are discussed below.

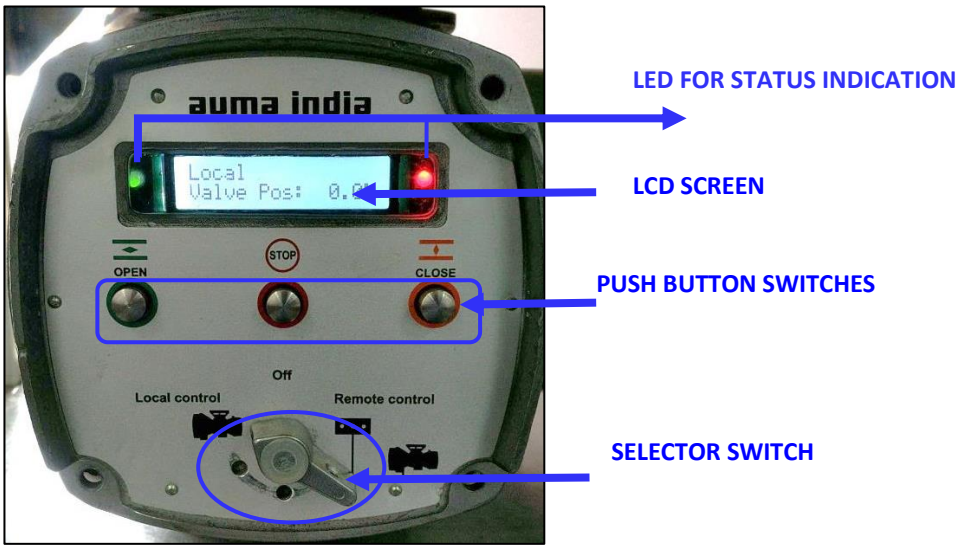



**Fig. A: 3.XMP FRONT PANEL**

## Selector Switch

There are 3 modes available; LOCAL, OFF & REMOTE. The mode selection can be done by using the selector switch.

## Push Button Switches

Actuators are made to run in OPEN or CLOSE direction by pressing the respective push buttons and can be stopped in middle during travel by pressing STOP push button. These three push buttons are also used for programming and calibrating the actuator.

## LCD Screen

The LCD view is split into two lines. The first line shows the status details - The left half shows selector switch position status whereas the right half displays the actuator status. The second line shows the valve position or the faults/warnings if any (Fault/Warnings toggle in the sequence of occurrence.) The details are as shown in the Fig. B. The valve position display feature is optional. If required, an appropriate Electronic Position Transmitter (EPT) must be chosen for this feature. Please contact Auma India for more information.


**Fig. B: 3.XMP LCD SCREEN**

## LEDs

Information regarding the selector switch positions and running indication of the actuator (status) are indicated by the LEDs present on the left and right side (respectively) of the LCD screen which is as shown in Fig. C.


**Fig. C: LEDS ON THE FRONT PANEL**

The color change on the LEDS indicates the information as tabulated below:

LED (right side): Color indication for Actuator Status

| COLOR | INDICATION | MODE |
|---|---|---|
| GREEN | | If LED is blinking then actuator is running in OPEN direction<br>If blinking is stopped then actuator is fully OPENED |
| ORANGE | | If LED is blinking then actuator is running in CLOSE direction<br>If blinking is stopped then actuator is fully CLOSED |
| RED | | If LED is blinking -- Fault condition<br>If blinking is stopped– Actuator stopped in Mid Travel |

LED (left side): Color indication for Selector Switch Position

| COLOR | INDICATION | MODE |
|---|---|---|
| GREEN | | Local mode |
| ORANGE | | Remote mode |
| RED | | OFF mode |

# 4. MODES IN 3.XMP MODULE

This section describes about the modes available for selection in this module. The options are:

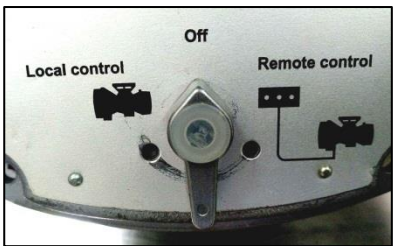
- **MODE 1** - Program mode
- **MODE 2** - Calibration mode

There are several options/settings that are available in each of these modes. These are discussed below.

## 4.1 PROGRAM MODE

The push buttons on the Front Panel can be used for programming. To enter into PROGRAM MODE, follow the below steps.

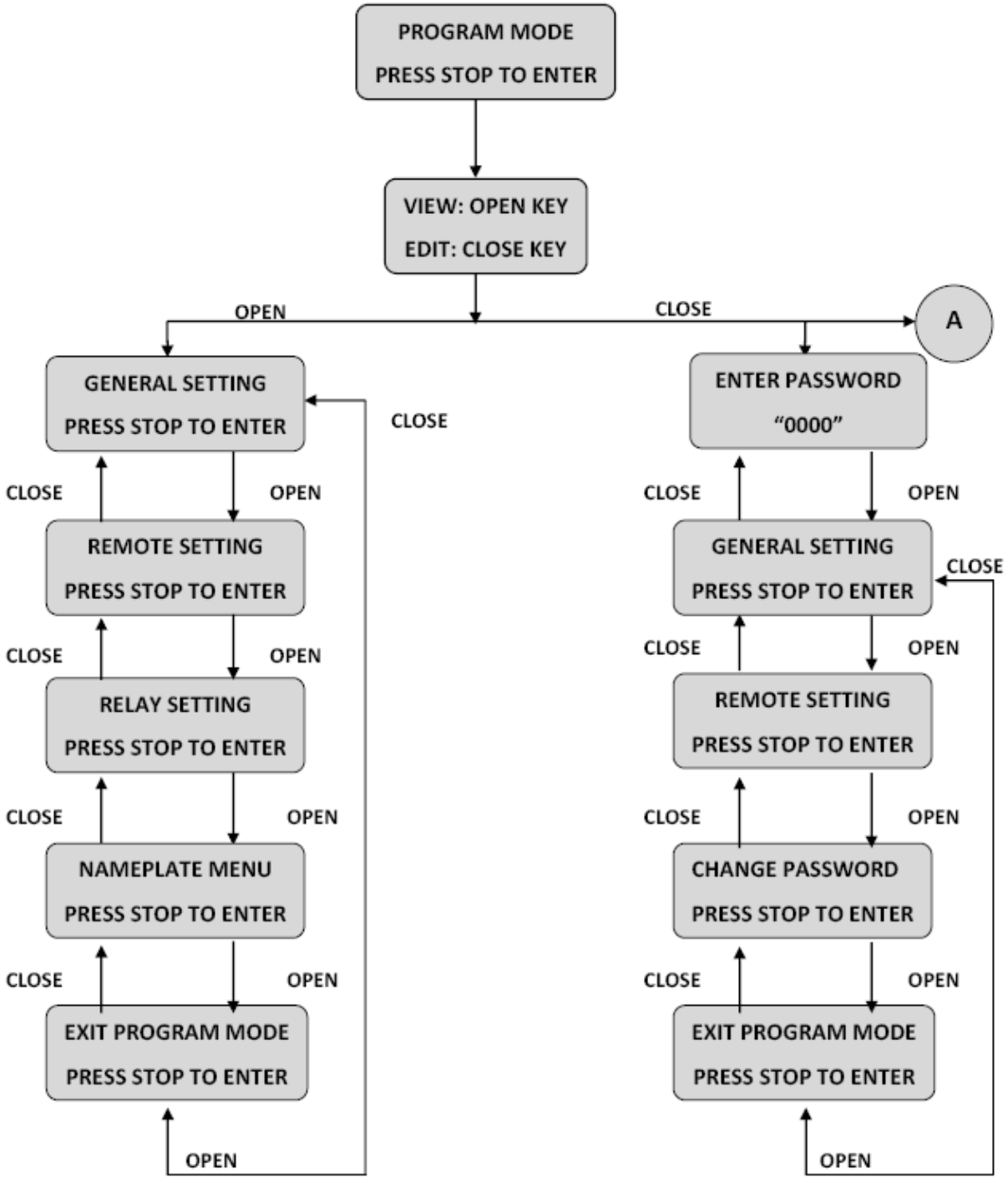
**Step 1:** Keep the selector switch in OFF position

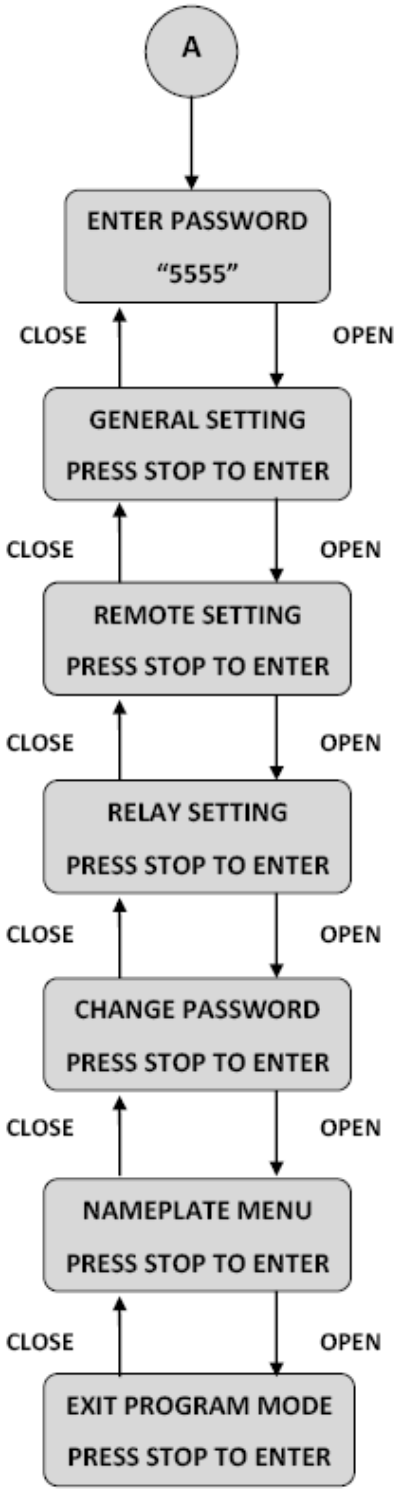



**Step 2:** Press Open + Close keys together for approximately 6 seconds.


**Step 3:** Press the STOP key on the display of "Program Mode" as shown in the below figure.


In the program mode, one can choose to VIEW the existing settings or EDIT settings as per custom requirements. Each of the EDIT and VIEW mode has three sub-categories – General settings, Remote settings and Relay settings. The flowcharts to choose EDIT/VIEW and any one subcategory are given below.


PROGRAM MODE
PRESS STOP TO ENTER
VIEW: OPEN KEY
EDIT: CLOSE KEY
OPEN
CLOSE
A
GENERAL SETTING
PRESS STOP TO ENTER
CLOSE
CLOSE
OPEN
REMOTE SETTING
PRESS STOP TO ENTER
CLOSE
OPEN
RELAY SETTING
PRESS STOP TO ENTER
CLOSE
OPEN
NAMEPLATE MENU
PRESS STOP TO ENTER
CLOSE
OPEN
EXIT PROGRAM MODE
PRESS STOP TO ENTER
OPEN
ENTER PASSWORD
"0000"
CLOSE
OPEN
GENERAL SETTING
PRESS STOP TO ENTER
CLOSE
CLOSE
OPEN
REMOTE SETTING
PRESS STOP TO ENTER
CLOSE
OPEN
CHANGE PASSWORD
PRESS STOP TO ENTER
CLOSE
OPEN
EXIT PROGRAM MODE
PRESS STOP TO ENTER
OPEN



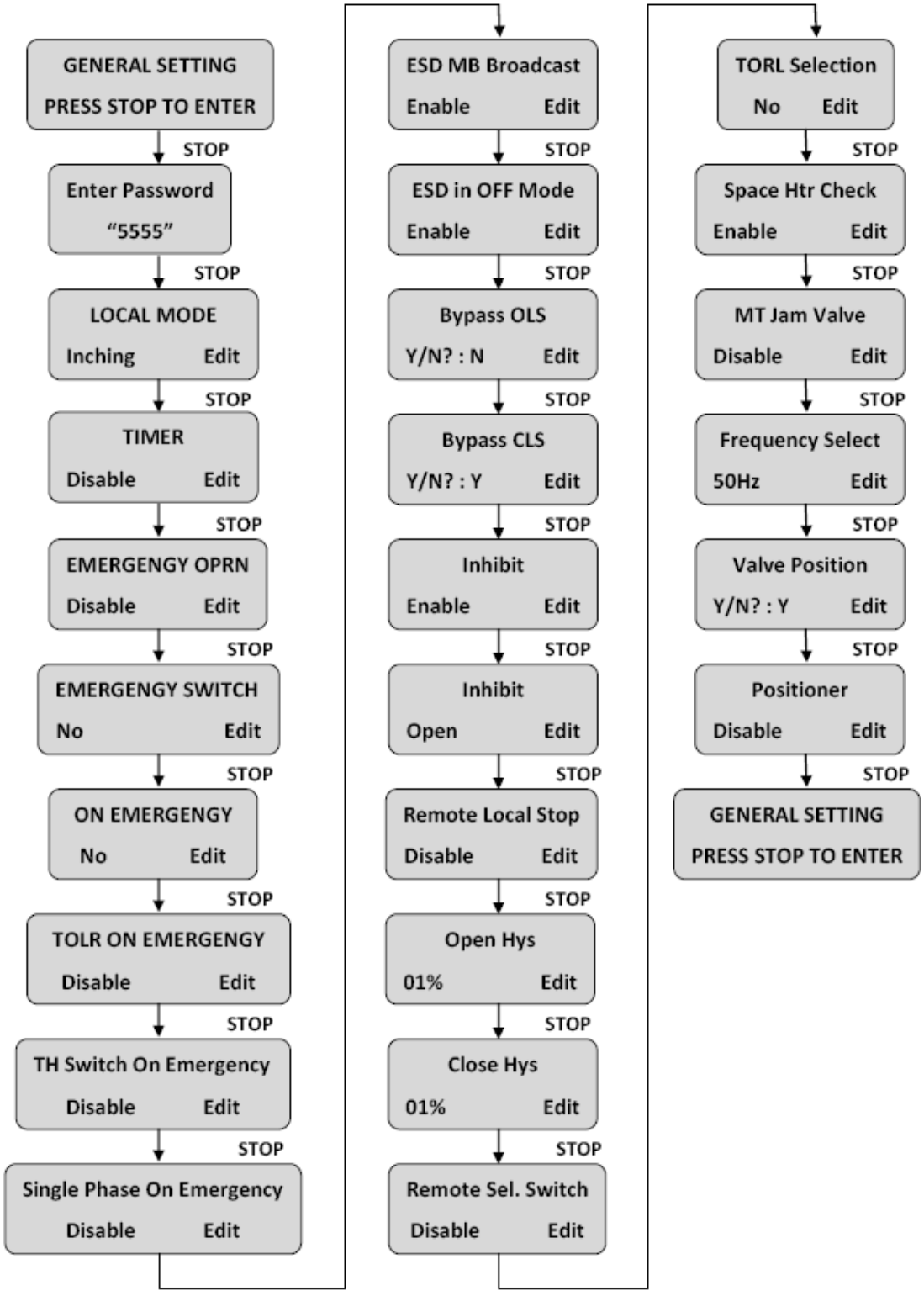

### 4.1.1 EDIT option of PROGRAM MODE

By entering the appropriate password, user can enter into the "EDIT" option of "**PROGRAM MODE**" for 3.XMP Version 2.0 EPAC as shown in the above flowchart. The features that can be set in this are given in the below flowchart.

#### 4.1.1.1 General Settings:

Following options can be set by using the Open or Close keys in "EDIT" options in "**GENERAL SETTING**" of "**PROGRAM MODE**" for 3.XMP Version 2.0 EPAC.

**EDIT IN PROGRAM MODE - General Settings Flowchart: 2 wire make/break for 3.XMP Version 2.0**



#### 4.1.1.2 Remote Settings:

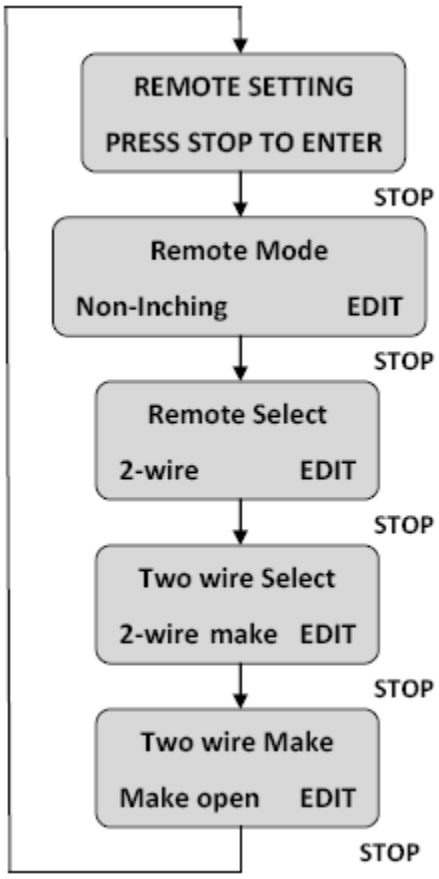
The sub options available in this category are shown below.

I. Selection of remote inching /non inching

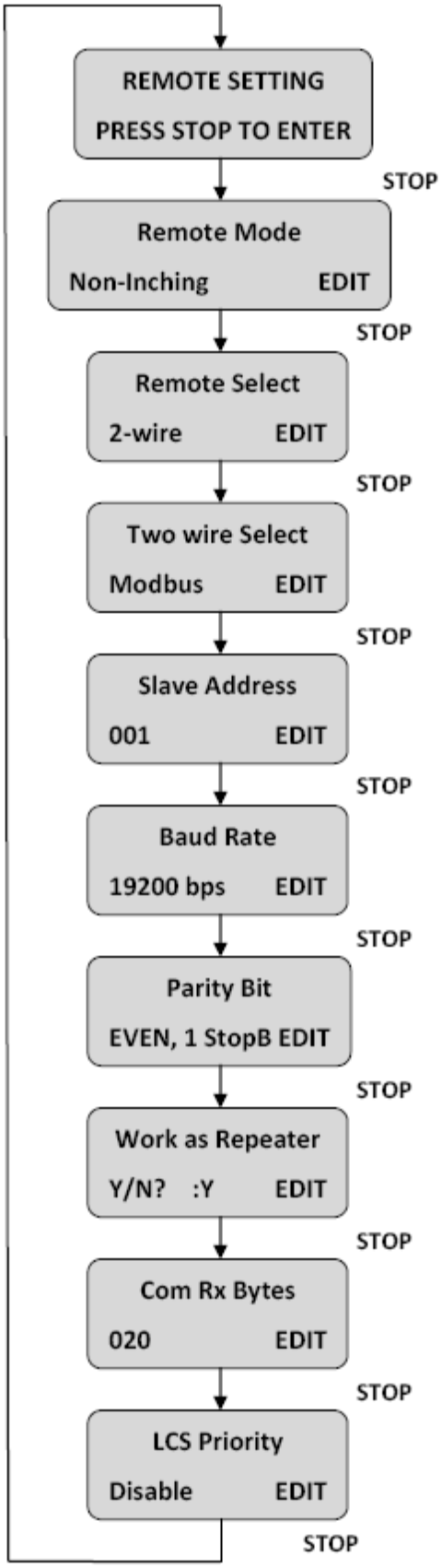
II. 2-wire remote operation: One of the following option will be available with the default/factory setting

- 2-wire make/break
- 2-wire Modbus
- 2-wire 4-20mA
- 4-wire

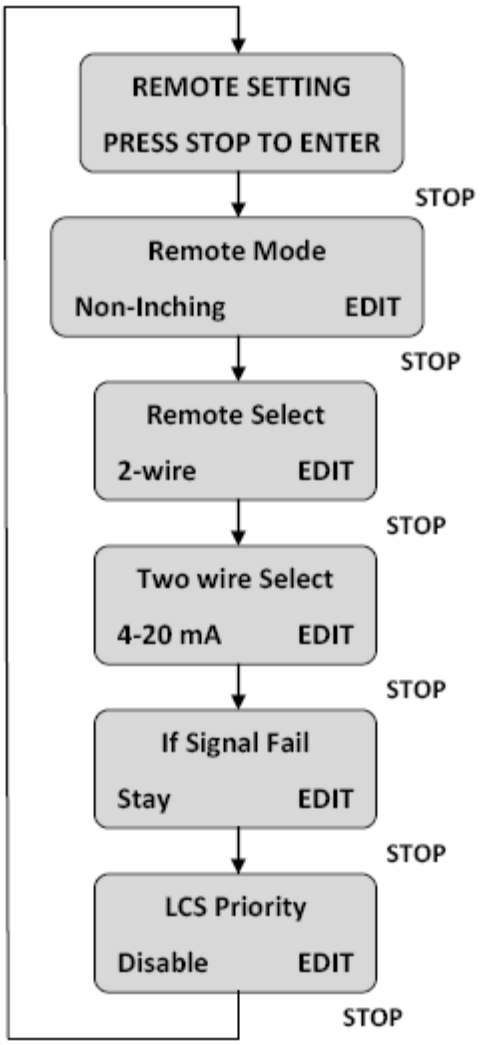
**EDIT IN PROGRAM MODE - Remote Settings Flowchart: 2 wire make/break for 3.XMP Version 2.0**



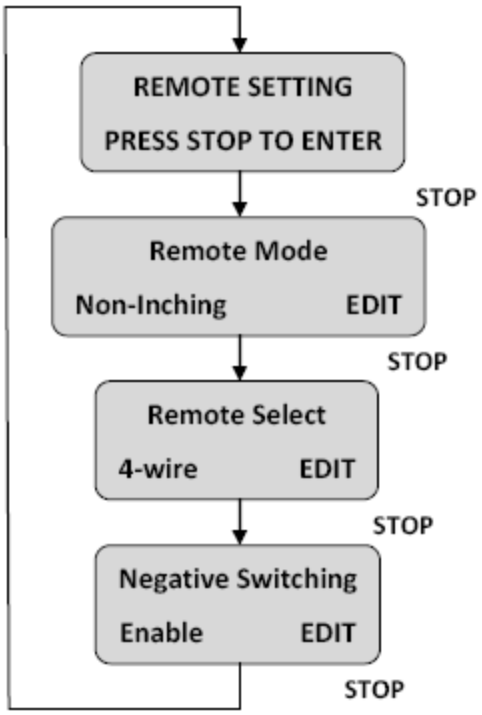
**EDIT IN PROGRAM MODE - Remote Settings Flowchart: 2 wire Modbus for 3.XMP Version 2.0**



**EDIT IN PROGRAM MODE - Remote Settings Flowchart: 2 wire 4-20mA for 3.XMP Version 2.0**



**EDIT IN PROGRAM MODE - Remote Settings Flowchart: 4 wire for 3.XMP Version 2.0**



**4.1.1.3 Relay Settings:**

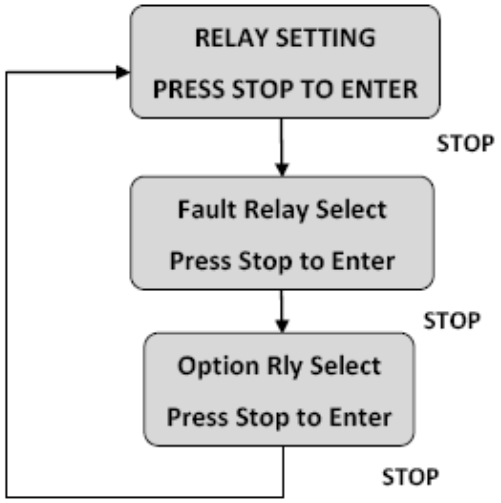
In this category the user can edit the following.

(Note: During the relay setting selection, one or multiple option can be selected for the same relay)

a. Fault Relay selection (FLT REL): The features associated with this relay are,
   1. 24V supply fail Enable /Disable
   2. Control supply fail Enable /Disable
   3. Single phasing
   4. Jammed Valve
   5. Space heater Fault

b. Optional Relay selection (OPT REL):: The features associated with this relay are,
   1. Local Stop
   2. Control supply failure
   3. Remote Local stop
   4. Jammed Valve
   5. Space heater Fault
   6. TOLR Trip
   7. Thermal switch Trip
   8. Open torque trip
   9. Close torque trip
   10. Opened
   11. Closed
   12. Program Mode
   13. Set point reached
   14. Single phasing
   15. Phase sequence Error
   16. 24VDC Supply Failure
   17. Power On
   18. Selector switch in Remote
   19. Selector switch in Local
   20. Selector switch in OFF

**EDIT IN PROGRAM MODE - Relay Settings flowchart for 3.XMP Version 2.0**



## 4.1.2 VIEW option of PROGRAM MODE

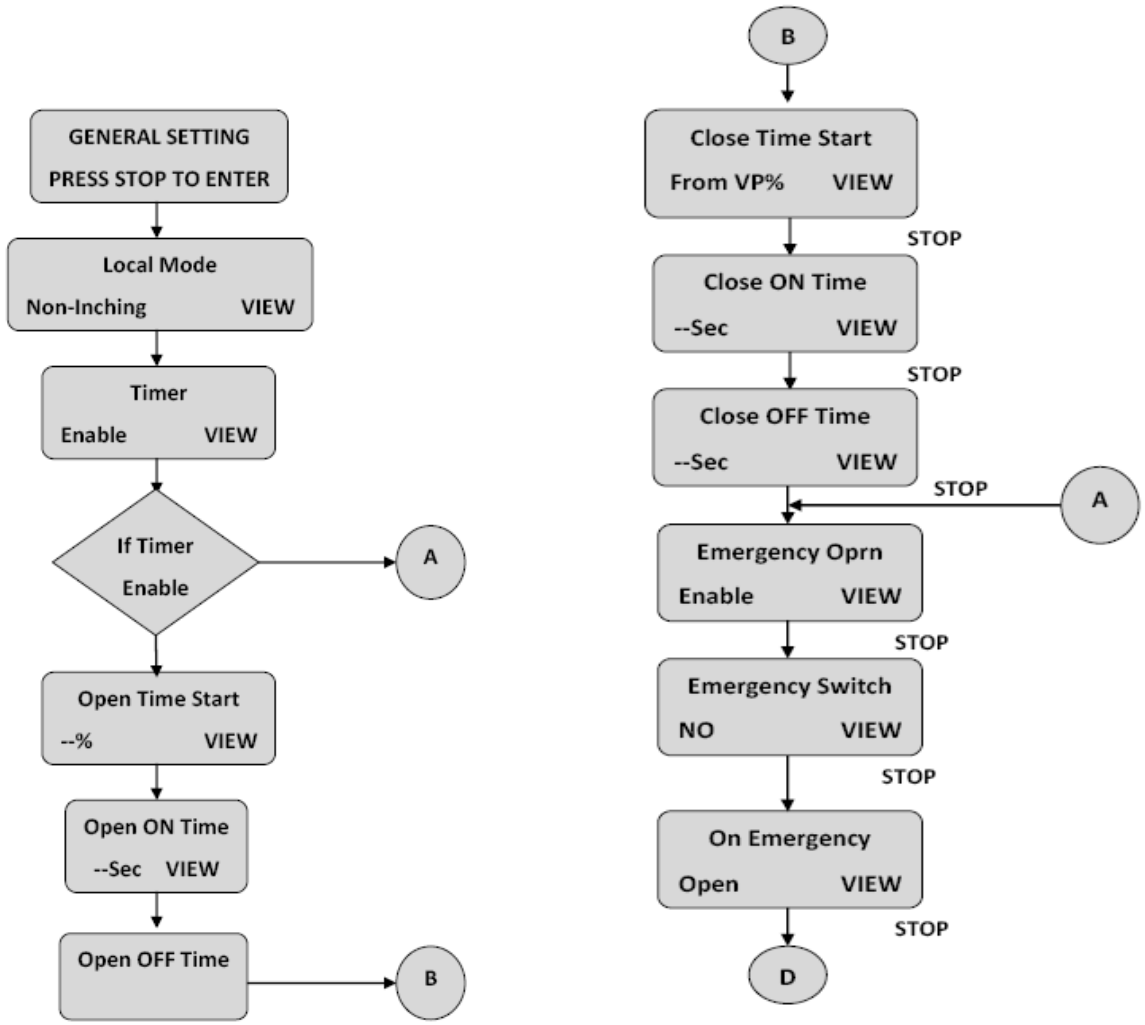
By pressing the Open pushbutton in the Program mode, the user can enter into the VIEW option. The various settings that can be viewed with this option are.

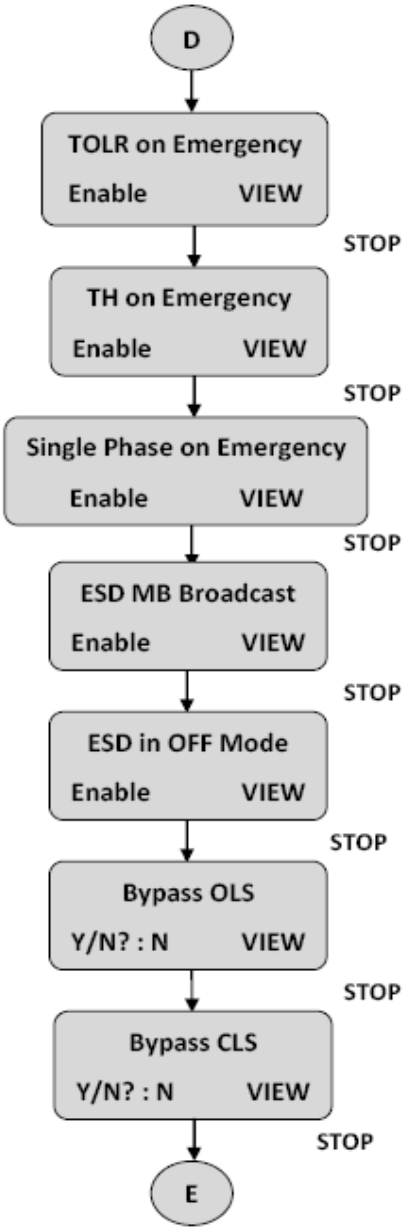
### 4.1.2.1 General Settings

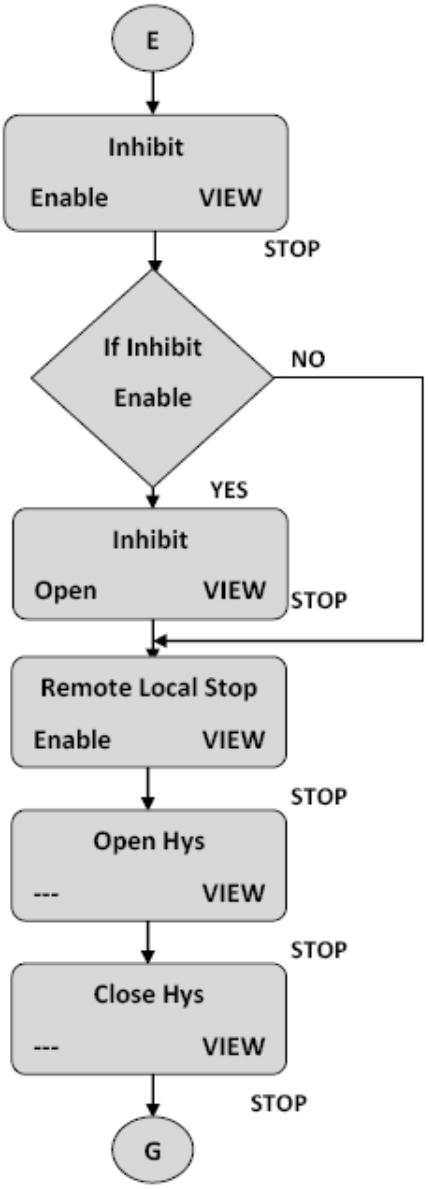
In this category user can view the following;

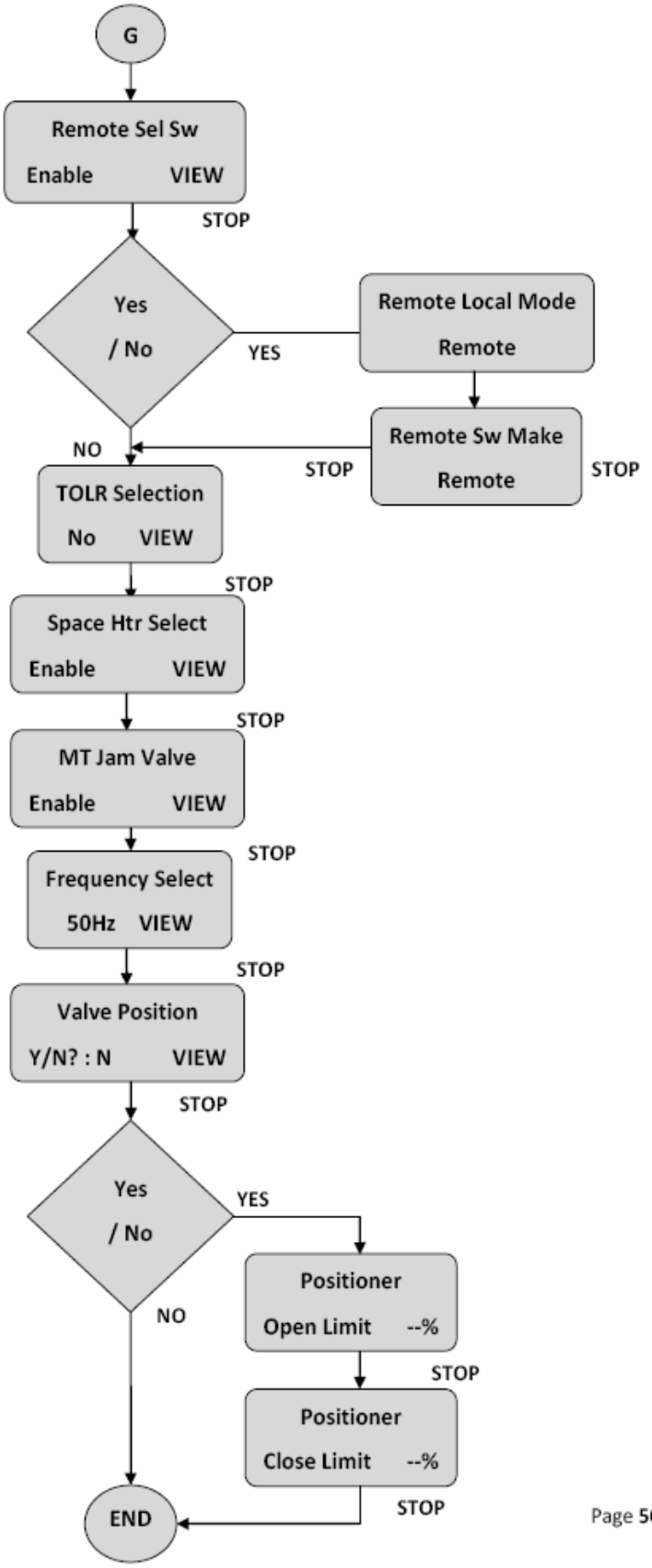
I. Timer Settings
II. Emergency Settings
III. Inhibit Settings
IV. Remote selector switch settings
V. Positioner Settings
VI. Selection status of the TOLR, SH, MT Jam valve

**VIEW IN PROGRAM MODE – General Settings Flowchart for 3.XMP Version 2.0**




D
TOLR on Emergency
Enable VIEW
STOP
TH on Emergency
Enable VIEW
STOP
Single Phase on Emergency
Enable VIEW
STOP
ESD MB Broadcast
Enable VIEW
STOP
ESD in OFF Mode
Enable VIEW
STOP
Bypass OLS
Y/N? : N VIEW
STOP
Bypass CLS
Y/N? : N VIEW
STOP
E


E
Inhibit
Enable VIEW
STOP
If Inhibit
Enable
NO
YES
Inhibit
Open VIEW
STOP
Remote Local Stop
Enable VIEW
STOP
Open Hys
--- VIEW
STOP
Close Hys
--- VIEW
STOP
G

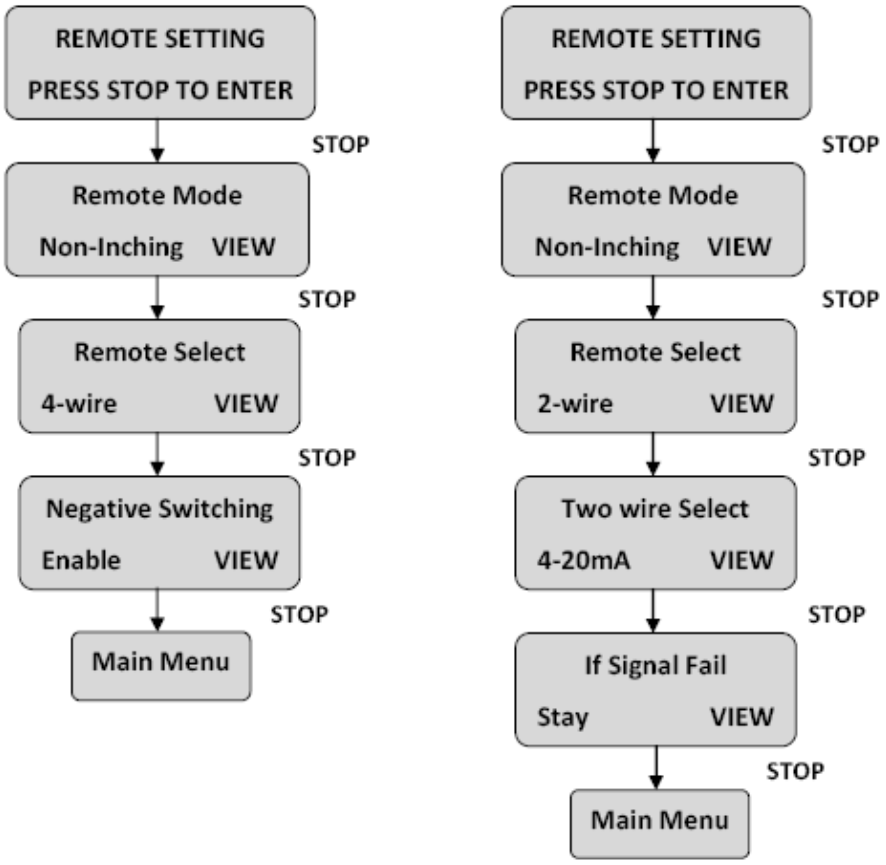

G
Remote Sel Sw
Enable VIEW
STOP
Yes
/ No
YES
Remote Local Mode
Remote
Remote Sw Make
Remote
STOP
STOP
NO
TOLR Selection
No VIEW
STOP
Space Htr Select
Enable VIEW
STOP
MT Jam Valve
Enable VIEW
STOP
Frequency Select
50Hz VIEW
STOP
Valve Position
Y/N? : N VIEW
STOP
Yes
/ No
YES
NO
Positioner
Open Limit --%
STOP
Positioner
Close Limit --%
STOP
END

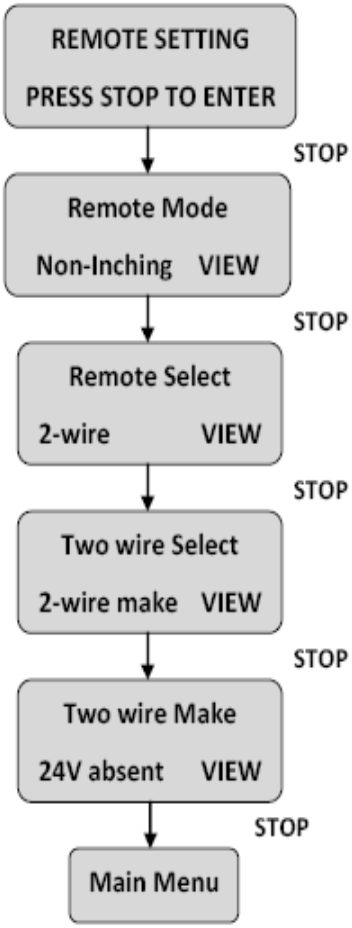
#### 4.1.2.2 Remote Settings

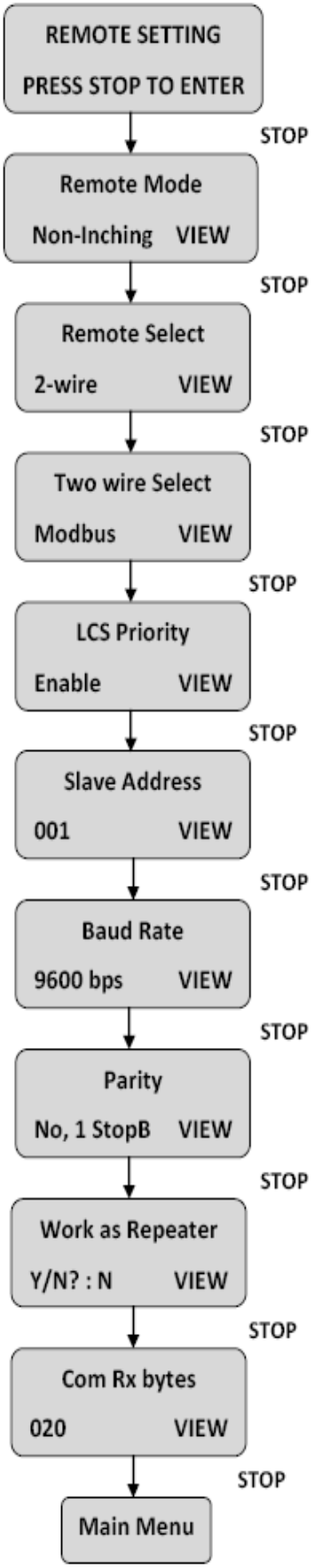
In this category user can view the following:

I. Remote inching/non inching mode
II. 4 wire settings
III. 2 wire settings
- Modbus details like parity, baud rate, slave address etc.
- Make/break settings
- 4-20mA selection

**VIEW IN PROGRAM MODE – Remote Settings Flowchart for 3.XMP Version 2.0**




REMOTE SETTING
PRESS STOP TO ENTER
STOP
Remote Mode
Non-Inching VIEW
STOP
Remote Select
2-wire VIEW
STOP
Two wire Select
2-wire make VIEW
STOP
Two wire Make
24V absent VIEW
STOP
Main Menu


REMOTE SETTING
PRESS STOP TO ENTER
STOP
Remote Mode
Non-Inching VIEW
STOP
Remote Select
2-wire VIEW
STOP
Two wire Select
Modbus VIEW
STOP
LCS Priority
Enable VIEW
STOP
Slave Address
001 VIEW
STOP
Baud Rate
9600 bps VIEW
STOP
Parity
No, 1 StopB VIEW
STOP
Work as Repeater
Y/N? : N VIEW
STOP
Com Rx bytes
020 VIEW
STOP
Main Menu

**4.1.2.3 Relay Settings:**

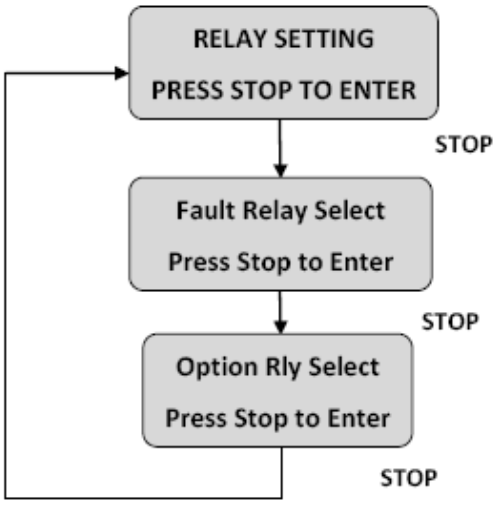
In this category the user can view the following.

(Note: During the relay setting selection, one or multiple option can be selected for the same relay)

c. Fault Relay selection (FLT REL): The features associated with this relay are,
   1. 24V supply fail Enable /Disable
   2. Control supply fail Enable /Disable
   3. Single phasing
   4. Jammed Valve
   5. Space heater Fault

d. Optional Relay selection (OPT REL):: The features associated with this relay are,
   1. Local Stop
   2. Control supply failure
   3. Remote Local stop
   4. Jammed Valve
   5. Space heater Fault
   6. TOLR Trip
   7. Thermal switch Trip
   8. Open torque trip
   9. Close torque trip
   10. Opened
   11. Closed
   12. Program Mode
   13. Set point reached
   14. Single phasing
   15. Phase sequence Error
   16. 24VDC Supply Failure
   17. Power On
   18. Selector switch in Remote
   19. Selector switch in Local
   20. Selector switch in OFF

**VIEW IN PROGRAM MODE - Relay Settings flowchart for 3.XMP Version 2.0**



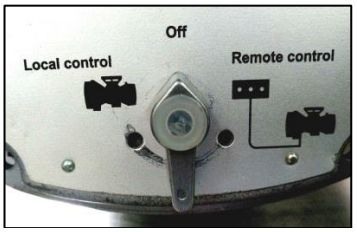
## 4.2 CALIBRATION MODE

In this mode, the following three key parameters can be calibrated:

I. Potentiometer Calibration (“Pot Calib”)
II. Position Feedback (E2: DAC Output Calibration [“DAC Calib”])
III. Command signal Input(E1: 4 – 20 mA Calibration [“4-20mA Calib”])

To enter into the Calibration Mode follow the below steps.

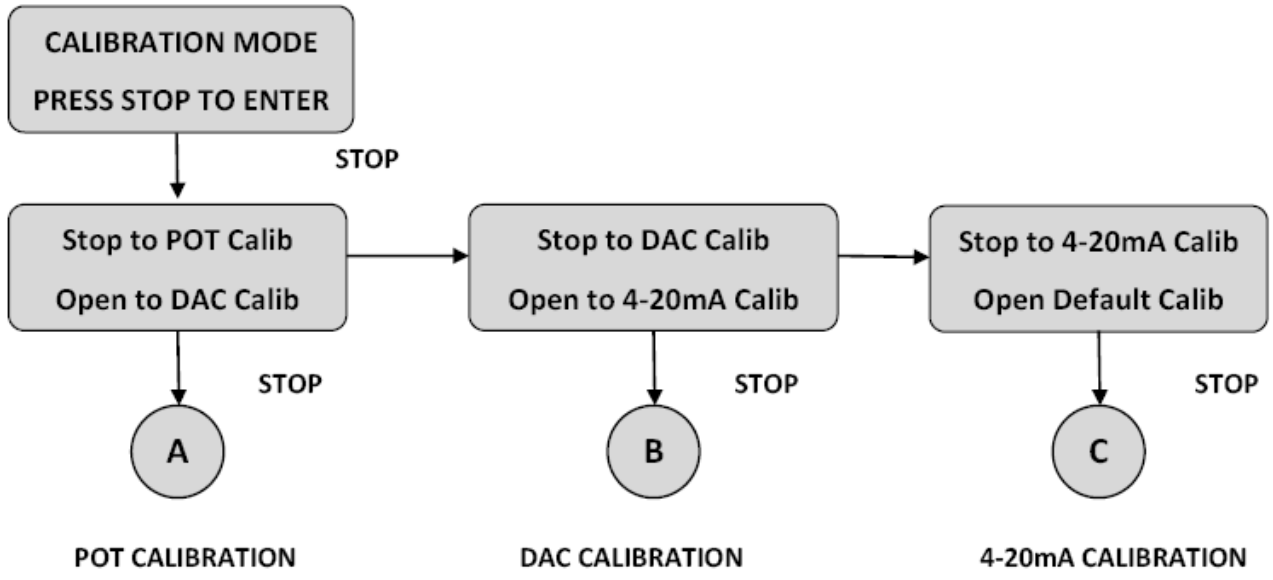
**Step 1:** Keep the selector switch in OFF position




**Step 2:** Press Open + Stop keys (together) approximately 6 seconds


**Step 3:** Press the STOP key on the display of “Calibration Mode” as shown below.

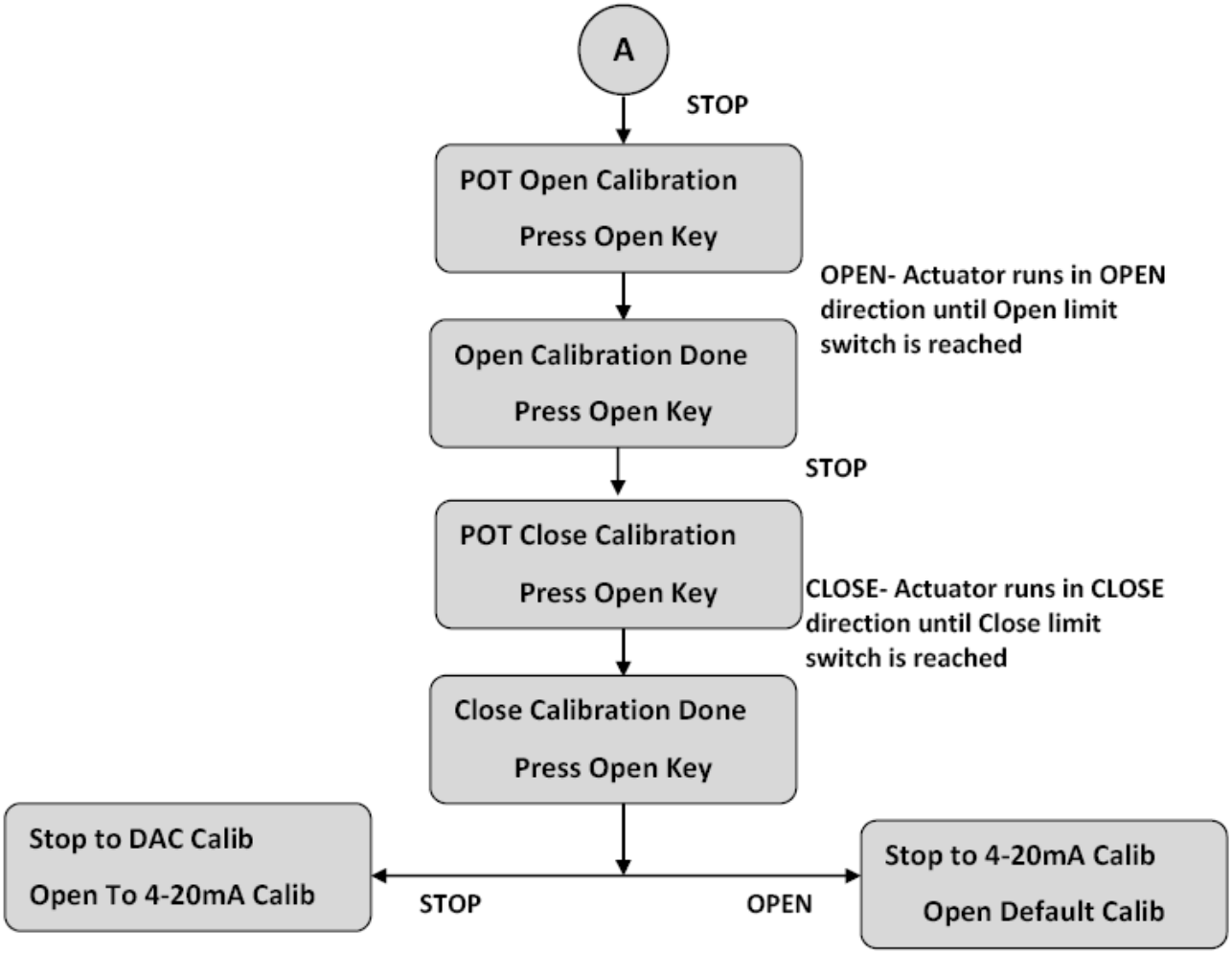

The below flowchart depicts how to enter into different calibration modes. For clear understanding of all options of CALIBRATION MODE, refer to the detailed flowcharts presented in the following sections.



## 4.2.1. POTENTIOMETER CALIBRATION

The flowchart for POT CALIBRATION is as given below. In the Calibration mode, press STOP key to enter into POT Open Calibration.

**POT CALIBRATION**




**Note: Use STOP key to store the value and OPEN/CLOSE key to change the Output value

**POT OPEN CALIBRATION**

a. The LCD screen will toggle to show the Potentiometer Voltage and the next instruction to be followed which is as shown below.

| | |
|---|---|
| **Pot Open Calib .78*** | **Pot Open Calib Press open key** |

b. Press OPEN push button to run the actuator in Open direction until the Limit switch end position is reached. Once valve is completely opened then the following message toggles on the screen.

| | |
|---|---|
| **Open Calib Done 2.0*** | **Open Calib Done Stop to Store** |

c. Now press STOP button to accept the OPEN position. This completes the OPEN calibration

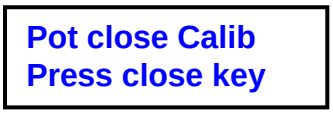
**NOTE: The initial value which is displayed is the valve position which could be between 0 to 2.2Volts. Please ensure that when the open key is pressed this value should get incremented and if not, there will be fault in the POT wiring connection.*

In case of any fault during the OPEN operation, it will display the below message on the screen.


Please ensure that the POT connectivity is proper and on assurance repeat the POT Close Calibration procedure.

**POT CLOSE CALIBRATION**

a. Again the LCD screen will toggle to show the Potentiometer Voltage and next instruction to be followed as shown below;


b. Press CLOSE push button to run the actuator in Close direction until Limit switch end position is reached. Once valve is completely closed, then the following message toggles on the screen



c. Now press STOP button to complete CLOSE calibration

**NOTE: The initial value which is displayed is the valve position which could be between 0 to 2.2Volts. Please ensure that when the close key is pressed this value should get decremented and if not there will be fault in the POT wiring connection.*

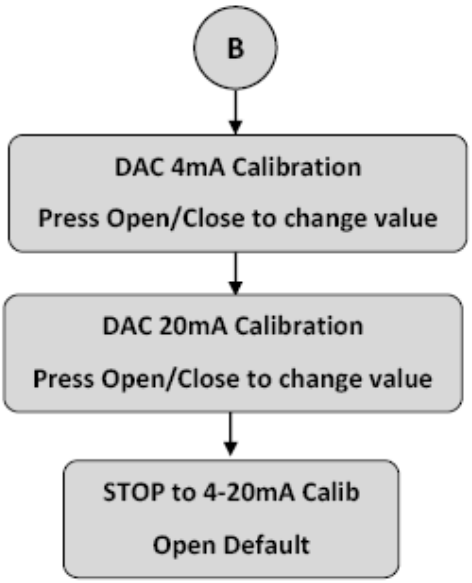
In case of any fault during the CLOSE operation, it will display the below message on the screen.


If required, verify the POT calibration by repeating the procedure given above.

### 4.2.2 DAC Calibration

The flowchart for DAC CALIBRATION is as given below. In the Calibration mode, press OPEN key (once) to select DAC Calibration. Press STOP key to enter DAC Calibration.

**DAC CALIBRATION**




In the Calibration mode, use the below steps to enter into DAC calibration

a. Press STOP key when the following screen appears on LCD

| **Calibration Mode**<br>**Press Stop Key** |
|---|

The below screen appears

| **Pot → Stop Key**<br>**DAC → Open Key** |
|---|

b. Press OPEN push button to select DAC calibration and enter into the DAC calibration mode, which shows the screen as below.

| **DAC → Stop Key**<br>**4-20mA → Open Key** |
|---|

c. Press STOP push button to select and enter into the DAC calibration mode

d. Now connect the multi meter/current reading meter (ammeter) to IO+ and IO- points. The following messages are displayed on the screen

| | |
|---|---|
| **DAC 4mA CALIB**<br>**Press open/close key** | **DAC 4mA CALIB**<br>**Until……4mA** |

e. Press OPEN push button to increment the DAC output value or press CLOSE push button to decrement the DAC output value until it reaches 4mA (see the display on the Multi meter/Ammeter).

f. On reaching 4mA (as read on current meter) press the STOP push button to store the value. This completes the DAC-4mA Calibration. Now the following messages will toggle on the LCD display.

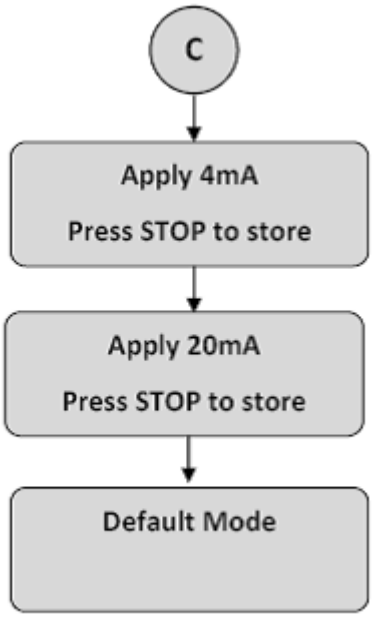
| | |
|---|---|
| **DAC 20mA CALIB**<br>**Press open/close key** | **DAC 20mA CALIB**<br>**Until……20mA** |

g. Press OPEN push button to increment the DAC output value or press CLOSE push button to decrement the DAC output value until it reaches 20mA (see the display on the multi meter/ammeter).

h. On reaching 20mA (as read on current meter) press the STOP push button to store the value. This completes the DAC-20mA Calibration.

### 4.2.3 4-20mA Calibration

**4-20mA CALIBRATION**



In the Calibration mode, use the below steps to enter into 4-20mA calibration

a. Press STOP key when the following screen appears on LCD

| Calibration Mode<br>Press Stop Key |
|---|

The below screen appears

| Pot → Stop Key<br>DAC → Open Key |
|---|

b. Press OPEN push button which displays the below screen

| DAC → Stop Key<br>4-20mA → Open Key |
|---|

c. Press OPEN push button to select 4-20mA calibration and enter into the 4-20mA calibration mode

d. Now use the current source for 4-20mA input; the input to be connected to the terminals II+ & II-. The following message is displayed on the screen

| Apply 4mA<br>.65* |
|---|

| Apply 4mA<br>Stop to store |
|---|

e. Apply 4mA input and measure the voltage across II+ & II- to ensure that it is 200mV and once the measured value is 200mV, press STOP push button to store the value.

f. Now the below message appears on the screen

| Apply 20mA<br>2.1* |
|---|

| Apply 20mA<br>Stop to store |
|---|

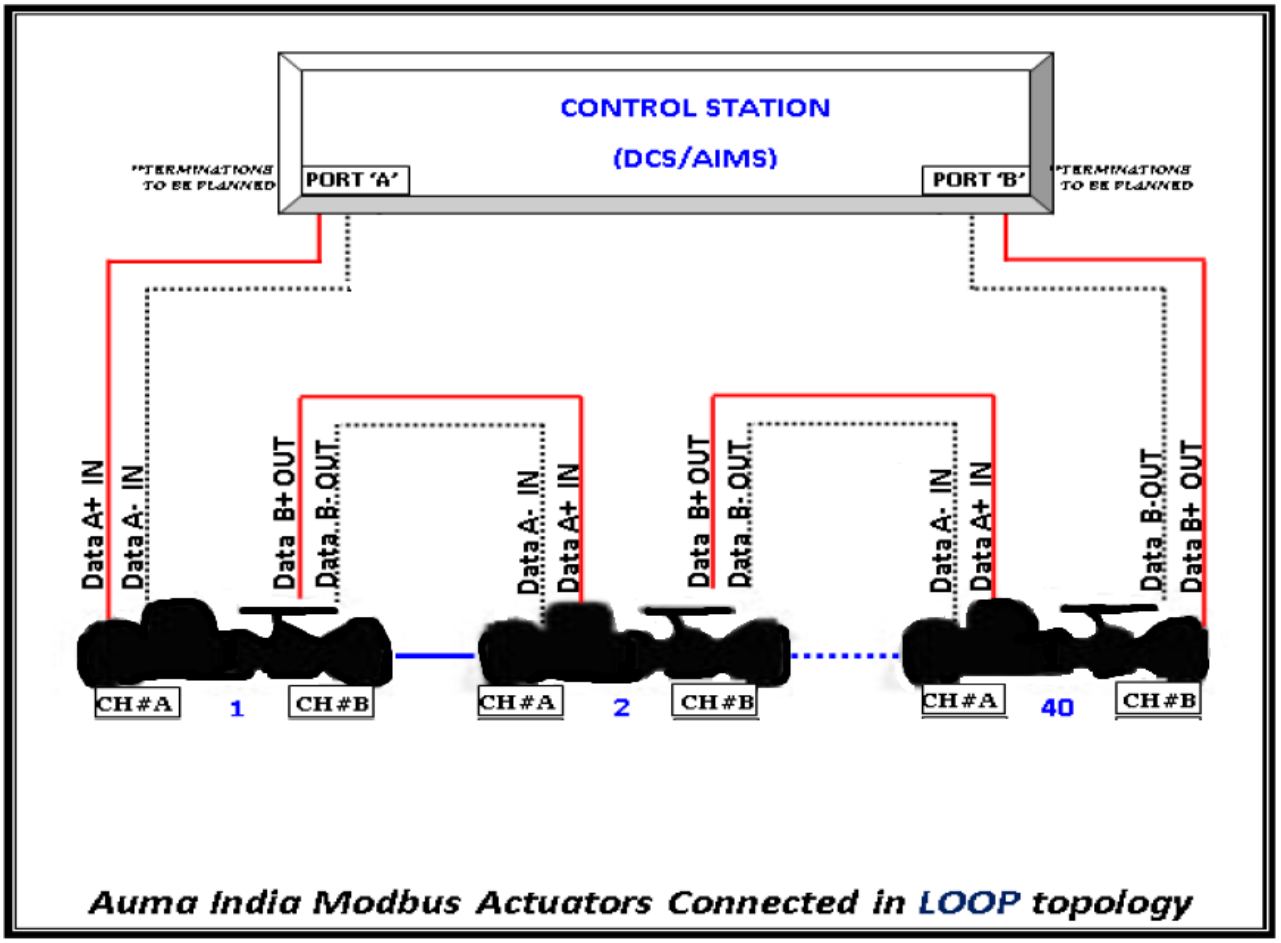
g. Now apply 20mA input and measure the voltage across II+ & II- to ensure that it is 1V and once the measured value is 1V, press STOP push button to store the value

**NOTE: The initial value which is displayed is dependent on the source which is applied to it and this value could vary between 0.0 to 2.2Volts. In case if the input current were in out of range (4 – 20mA), it would display fault on the screen as follows*

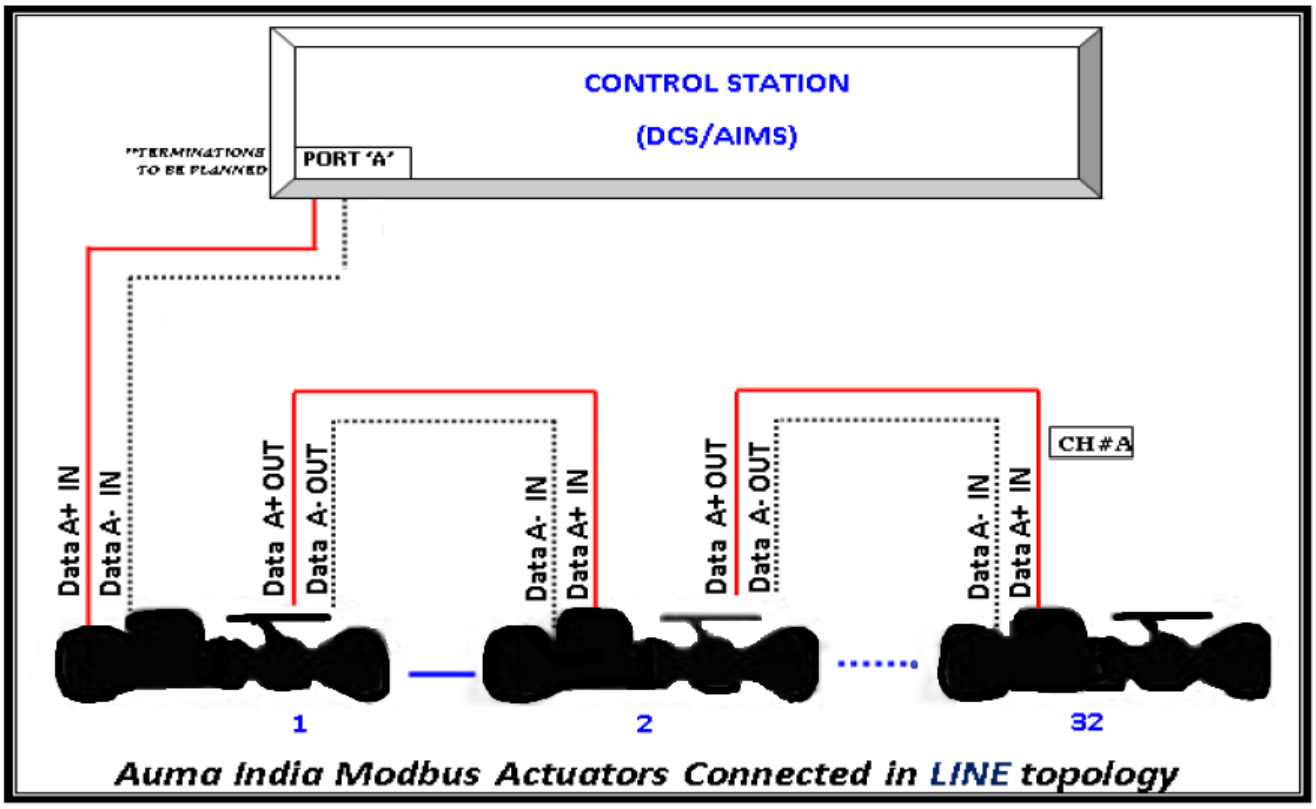
| Apply 20 mA<br>2.5 SIGNAL FLT |
|---|

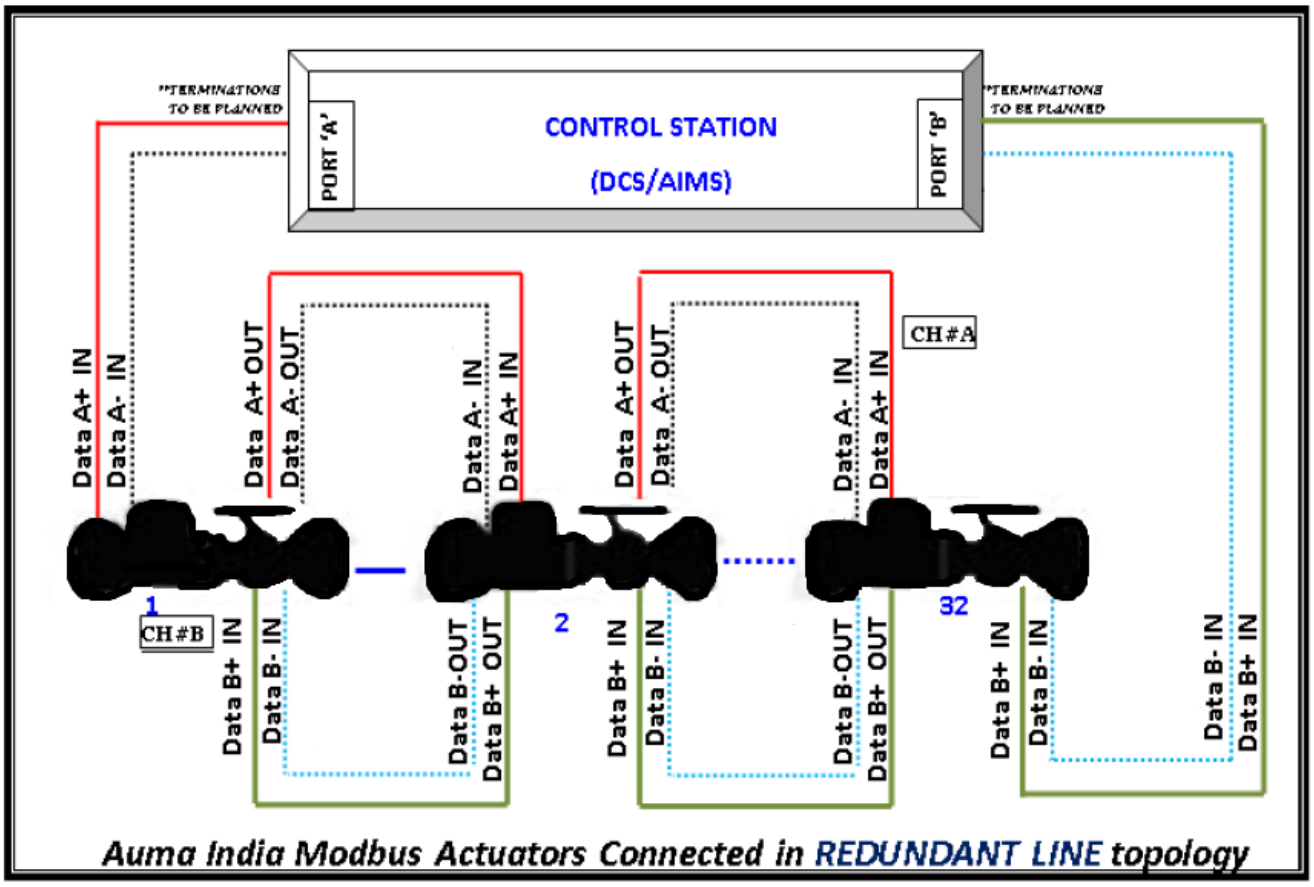
# 5. TOPOLOGY CONNECTION

Topology is a pattern in which DCS/AIMS and several actuators are connected in a network. The figures below show the two main topologies – Line and Loop - used to connect our actuators for MODBUS communication. The figures below represent the same. This configuration for Line and Loop is decided by the DIP switch settings in the new IF card.




*Auma India Modbus Actuators Connected in LOOP topology*

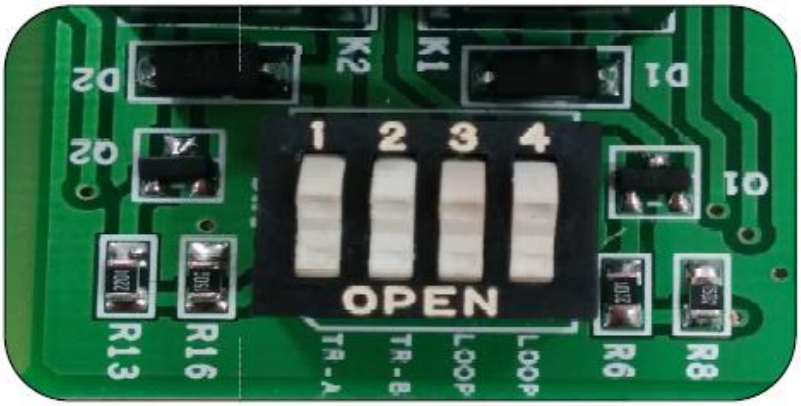



*NOTE: Refer to the Wiring Diagrams for Terminal numbers present at customer end connection Use the repeaters if the distance between the active adjacent participants exceeds 1.2km In case of line/redundant line topology, use repeaters after 32 participants*

**DIP SWITCH SETTING**

The table for DIP switches selection is as given below. If termination is required for Channel A/Channel B in line topology, then dip switch 1/ 2 should be on respectively. All the dip switch should be put on for LOOP topology. This configuration takes care of all the terminations that are to be carried out for MODBUS communication.




| DIP SWITCH | LOOP TOPOLOGY | LINE TOPOLOGY |
|---|---|---|
| 1 | ON | TO BE PUT "ON" IF TERMINATION IS TO BE DONE : CHANNEL A |
| 2 | ON | TO BE PUT "ON" IF TERMINATION IS TO BE DONE : CHANNEL B |
| 3 | ON | OFF |
| 4 | ON | OFF |

# 6. REGISTER DETAILS FOR MODBUS COMMUNICATION

Modbus is a two-wire serial communication protocol that is used for information exchange between DCS/AIMS and our actuators. The details needed for the Modbus communication such as Function Code, Address, Data to be written is listed below.

Function Code Details (as implemented by AUMA):

| DESCRIPTION | VALUE |
|---|---|
| 1. READ COIL STATUS | 0x01 |
| 2. READ INPUT STATUS | 0x02 |
| 3. READ HOLDING REGISTERS | 0x03 |
| 4. READ INPUT REGISTERS | 0x04 |
| 5. FORCE SINGLE COIL | 0x05 |
| 6. FORCE MULTIPLE COIL | 0x0F |
| 7. PRESET SINGLE REGISTER | 0x06 |
| 8. PRESET MULTIPLE REGISTERS | 0x10 |
| 9. DIAGNOSTICS | 0x08 |
| a. LOOP BACK | 0x00 |
| b. CLEAR COUNTERS | 0x0A |
| c. RETURN BUS MESSAGE COUNT | 0x0B |
| d. RETURN BUS COMMUNICATION ERROR COUNT | 0x0C |
| e. RETURN BUS EXCEPTION ERROR COUNT | 0x0D |
| f. RETURN SLAVE MESSAGE COUNT | 0x0E |
| g. RETURN SLAVE NO RESPONSE COUNT | 0x0F |

**Function Code 1, 5 & 6**: The register details for read & write operations associated with the function codes 1, 5 & 6 (coil status) are as below.

| DESCRIPTION | ADDRESS IN HEX |
|---|---|
| 1. REMOTE OPEN | 0x0000 |
| 2. REMOTE CLOSE | 0x0001 |
| 3. REMOTE SET POINT | 0x0002 |
| 4. REMOTE SW POSITION | 0x0020 |
| 5. OFF SW POSITION | 0x0021 |
| 6. LOCAL SW POSITION | 0x0022 |

Note: The data values of the function code 1, 5 & 6 are to be indicated in binary (1/0).

**Function Code 2:** The register details associated with the function code 2 (Read Input Status) are as below.

| DESCRIPTION | ADDRESS IN HEX |
|---|---|
| OPEN POSITION | 0x0000 |
| CLOSE POSITION | 0x0001 |
| SET POINT REACHED | 0x0002 |
| RUNNING OPEN | 0x0004 |
| RUNNING CLOSE | 0x0005 |
| THERMAL FAULT | 0x0008 |
| REMOTE SW POSITION | 0x000A |
| LOCAL SW POSITION | 0x000B |
| LSO | 0x000C |
| LSC | 0x000D |
| TSO | 0x000E |
| TSC | 0x000F |

Note: The data values of the function code 2 is to be indicated in binary (1/0).

**Function Code 4:** There are two registers present with the address 0x03E8 & 0x03E9 from which the status details can be got. The details of the data associated with each address are as tabulated below.

| | 3.XMP-Version 1.0 | | | 3.XMP-Version 2.0 | | |
|---|---|---|---|---|---|---|
| ADDRESS | 0x3E8 | 0x3E9 | | 0x3E8 | 0x3E9 | 0x3EA |
| DATA DETAILS | | | | DATA DETAILS | | |
| BIT POSITION | DESCRIPTION | | | DESCRIPTION | | |
| 0 | LOCAL POSITION | TSC | | LOCAL POSITION | TSC | Valve Position (0-1000) |
| 1 | REMOTE POSITION | TSO | | REMOTE POSITION | TSO | |
| 2 | RUNNING OPEN | LSC | | RUNNING OPEN | LSC | |
| 3 | RUNNING CLOSE | LSO | | RUNNING CLOSE | LSO | |
| 4 | STOPPED | LOCAL POSITION | | STOPPED | LOCAL POSITION | |
| 5 | OPENED POSITION | REMOTE POSITION | | OPENED POSITION | REMOTE POSITION | |
| 6 | CLOSED POSITION | LOSS OF PHASE | | CLOSED POSITION | LOSS OF PHASE | |
| 7 | TSO | TH FAULT | | TSO | TH FAULT | |
| 8 | TSC | COMMON FAULT | | TSC | COMMON FAULT | |
| 9 | TH FAULT | PHASE REVERSE | | TH FAULT | PHASE REVERSE | |
| 10 | TOLR | RUNNING CLOSE | | TOLR | RUNNING CLOSE | x |
| 11 | JAMMED VALVE | RUNNING OPEN | | JAMMED VALVE | RUNNING OPEN | x |
| 12 | - | ESD-HARDWIRED | | PHASE SEQ. ERROR | ESD-HARDWIRED | x |
| 13 | PHASE SEQ. ERROR | SET POINT REACHED | | SET POINT REACHED | SET POINT REACHED | x |
| 14 | FAULT | CLOSED | | FAULT | CLOSED | x |
| 15 | PROGRAM MODE | OPENED | | LCS ACTIVATED | OPENED | x |

**Function Code 3, 7 & 8:** The holding register details for read & write operations associated with the function codes 3, 7 & 8 (holding registers) are as below;

| ADDRESS | | DATA | | | |
|---|---|---|---|---|---|
| **DESCRIPTION** | **VALUE** | **RANGE (MIN-MAX)** | **STD. VALUE** | **NOTE (MEANING)** | |
| REMOTE CONTROL | 0x3E8 | | | BIT 8=1 | OPEN |
| | | | | BIT 9=1 | CLOSE |
| | | | | BIT 12=1 | STOP |
| | | | | BIT 10=1 | SET POINT BIT |
| READ VALVE POSITION | 0x3E9 | 0-1000 | | | |
| SET VALVE POSITION | 0x3EA | 0-1000 | | | |

# 7. TROUBLESHOOTING

If the right hand side LED (red color) blinks (as shown in Fig. C), it indicates the FAULT. To identify the fault, check the status displayed on the LCD. Following are the typical displays of the FAULT condition and the trouble shooting methods to resolve those issues.

I. DISPLAY-"24V supply fail"

TROUBLESHOOTING:

a. Check whether FRC cable is properly connected between CPU card and Power Supply card.

b. Measure the DC voltage between '+' and '-' terminals in Customer Terminal Compartment using a multimeter. Here we are supposed to get 24VDC. If no voltage is coming, then measure the resistance between those terminals using a multimeter by disconnecting the MAINS. If there is a dead short, then replace Power Supply Card.

II. DISPLAY- "Single Phase"

TROUBLESHOOTING:

a. Check whether the fuses in R (FS1) &/or B (FS2) phases are blown.

b. Ensure that the MAINS 3phase input supply voltage and frequency of operation is matching the ratings mentioned on the name plate.

c. Check whether FRC cable is properly connected between CPU card and Power Supply card.

d. Check J2 of Power Supply card is connected properly.

e. If still Single Phase indication is present then measure the AC Voltage in J2 Connector (Male) using multimeter between two white wires and two black wires; this voltage is supposed to be 16VAC. If this voltage is very less than 16VAC then problem could be with transformer; replace the transformer and check.

III. DISPLAY- "TH Switch Trip"

TROUBLESHOOTING:

a. Check the motor thermo switch continuity; if continuity is not there then we have to replace the motor.

b. With motor thermo switch continuity check the continuity between wires with ferrule TH and F1 of the J6 on CPU card; if there is no continuity then check the wiring error.

c. With the above two corrections, if the same error message display continues, then replace the CPU card.

IV. DISPLAY- “TOLR Trip”

TROUBLESHOOTING:

a. Disconnect the supply to actuator and check whether TOLR is tripped; if yes then reset TOLR using reset switch as shown in fig below.

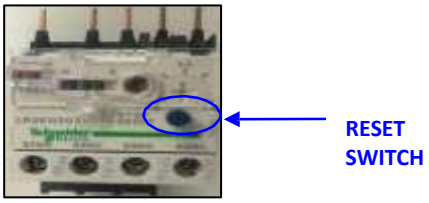



Fig. D: TOLR

b. Check the continuity between the input and output terminals of TOLR, if there is no continuity then TOLR are faulty, replace the TOLR.

c. If TOLR is not tripped and the error message continues then check the TOLR selection NO/NC under program mode; verify wires with ferrule 95 and 96 coming from J6 on Power Supply card are connected properly to TOLR‘s respective contacts depending on NO (Terminals-97, 98) or NC (Terminals-95, 96). Check continuity for these wires from TOLR terminals to J6 connector of Power Supply card.

d. If continuity is present but still TOLR trip is showing then check FRC Cable is connected properly between Power supply card and CPU Card.

e. If still problem continues then replace CPU and POWER cards.

V. DISPLAY- “Space Heater fault”

TROUBLESHOOTING:

a. Check whether Fuse -F4 is blown; if yes replace with good fuse of 1A, 250V rating.

b. With the help of multimeter measure the Space heater voltage (ACV) voltage between brown and brown wires of J3 on Power Supply card. (The value will be 220VAC / 110VAC /24VAC depending on the customer requirement). If the requisite voltage is not measured then check the Molex connector between fuse plate and transformer.

c. If the requisite voltage is measured; but display continue to show the same error message then replace the power supply card. But if the requisite voltage is not measured then the fault could be with transformer, replace with new transformer and check again.

VI. DISPLAY- “Control supply fail”

TROUBLESHOOTING:

a. Check whether Fuse-F3 is blown; if yes replace with good fuse of 1A, 250V rating

b. With the help of multimeter measure the control supply voltage (AC voltage between Orange and Black wires of J3 on Power Supply card), which is to be 220VAC/110VAC as per the customer requirement. If voltage is not coming then check the Molex connector between fuse plate and transformer.

c. If the requisite voltage is measured; but display continue to show the same error message then replace the power supply card. But if the requisite voltage is not measured then the fault could be with transformer, replace with new transformer and check again.

VII. DISPLAY- “Jammed Valve”

TROUBLESHOOTING:

a. The Jammed valve condition is to be released manually

VIII. DISPLAY- “TW ERROR”

TROUBLESHOOTING:

Whenever there is a replacement of new transformer, there is a possibility of occurrence of this error. To troubleshoot this interchange the 2 wires (white pairs or the black pairs) in the connector J2 (i.e. 1&2 or 3&4 of the connector J2) of the PS Card

IX. Motor running in wrong direction

Whenever there is a replacement of Motor then there is a possibility of occurrence of this error i.e. the actuator will run in wrong direction for the respective command inputs (actuator runs in open direction for close command and vice versa). To troubleshoot this, interchange any 2 wires of the motor when the Motor is replaced.

X. In case if Remote-local mode selection option from REMOTE is not happening (optional feature); check for the wiring at the customer end according to the WD.

XI. In case of actuator running inadvertently (with 'ESD' message on LCD) either in OPEN or CLOSE direction depending on the selection done, check if ESD is activated (wiring mistake) using the WD provided.

XII. In case the actuator is not taking command in any particular direction check if INHIBIT feature is enabled (wiring mistake) using the WD provided.

XIII. In case the motor is not responding to the OPEN & CLOSE command and OPENING/CLOSING is indicated on LCD:
Check if J4 of Power Supply card is plugged properly. Check the requisite voltages (110/230V) at the contactor terminals (K, K1 & K, K2 –refer Fig. E).

a) If the voltages are proper it could be the failure of the contactor; replace the contactor.

b) If the voltages are not proper, it means relay failure on the PS card; replace the PS card.

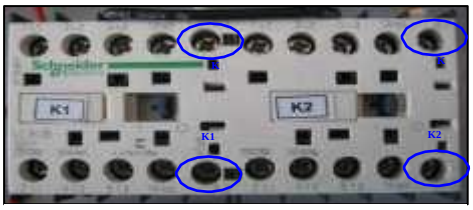



Fig. E: Contactor

XIV. Actuator showing Single Phase error / TW error under running condition: This problem is due to Transformer module; hence it is to be replaced.

XV. Mode selected in Local option is not displaying on the LCD screen: This problem arises if "Remote Sel. Switch" option is enabled. To disable this option, enter into the Program Mode – General Settings or use the Remote-MODBUS command (input '0' to the register 309 in the single register Modbus function code).

XVI. "Signal Fault" indication in Remote-2 Wire mode:
Under Remote-regulating duty mode we have to give 4-20mA DC Current from external DC source to the respective terminals (as per WD) named with ferrule "II+" and "II-"; Check the connectivity of J5 connector at the Interface Board and also verify the wiring with respect to WD and ensure that the 4- 20mA input is coming from DCS.

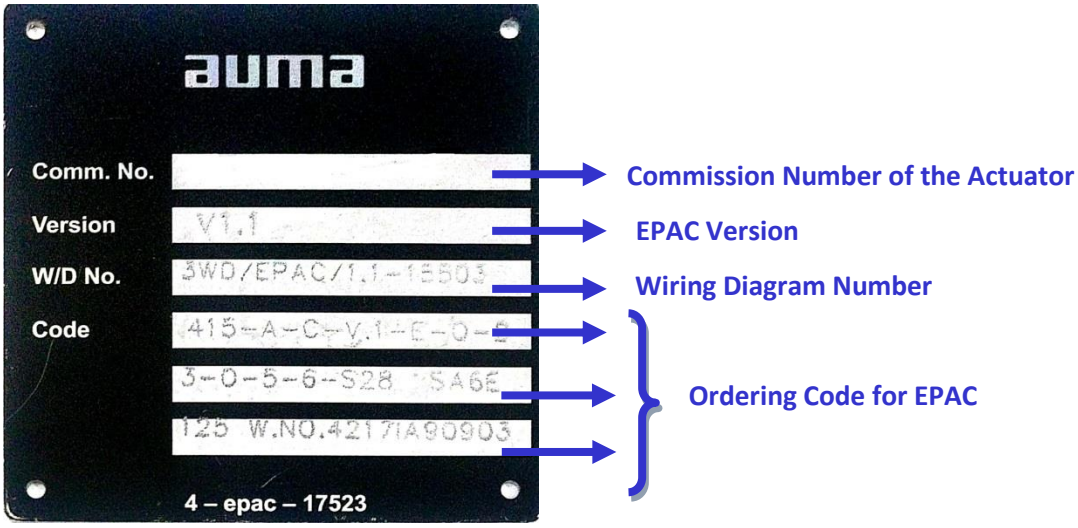
XVII. LCD Display is blank with back light ON:
Check whether all respective connectors are plugged properly and ensure that the shorting link is connected properly (as shown) on J2 and J3 of CPU card.

# 8. EPAC NAMEPLATE

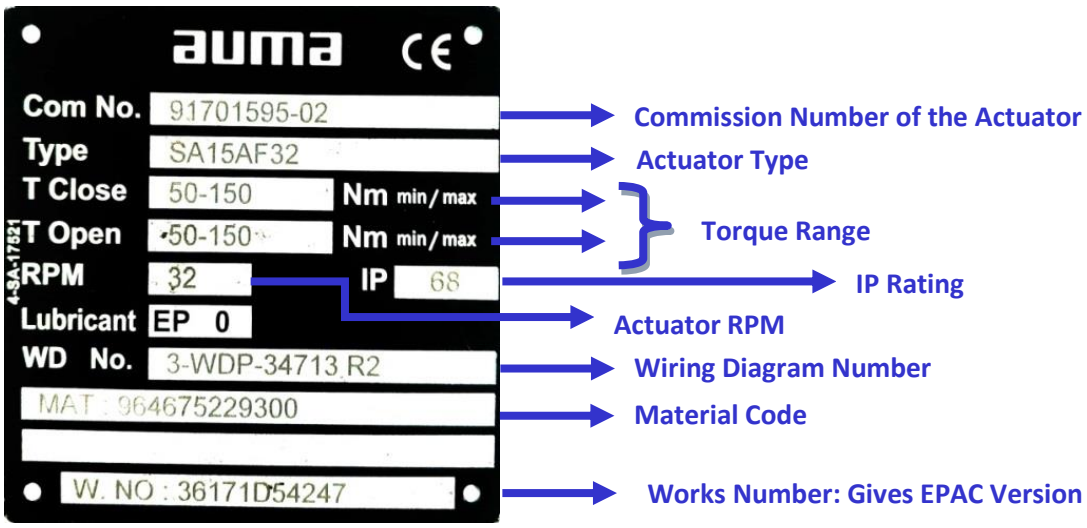
Each actuator will have a nameplate associated with it which contains several important details. Please locate where the plate is present in your actuator. The information provided in the nameplates is delineated below. These are required to ensure our support after supply. There are several variations of nameplates available. Please match your actuator nameplate with the appropriate one below to obtain the required information. You are requested to furnish the below details of the name plate while ordering spare parts/after sales support.

**Weather Proof Name Plates:**

Variation 1:




Variation 2:




The Works Number mentioned in this name plate gives other details besides giving the EPAC Version. The actuator type gives the maximum torque, RPM of the actuator, weather proof/explosion proof and on-off/regulating duty.

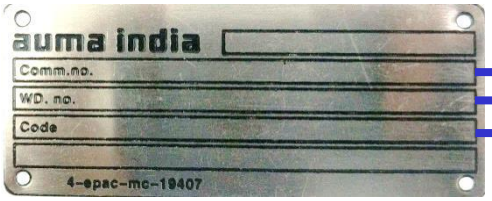
**Explosion Proof Name Plates:**

Actuator Nameplate: This plate contains the actuator specifications.


**Commission Number of the Actuator**

**Actuator Type**

EPAC Nameplate : This gives the complete information of the EPAC version and Wiring diagram used.




**Commission Number of the Actuator**

**Wiring Diagram Number**

**EPAC Version**

# 9. DISPOSAL AND RECYCLING

AUMA actuators have a long lifetime. However based on frequent usage and site conditions, one will have to replace them. As our actuators have a modular design structure, they may be easily disassembled, separated and sorted according to materials i.e.

- Electronic scrap
- Plastics
- Various metals
- Greases and Oils

The guidelines to be followed are:

- Please collect greases and oils during disassembly. As these substances are hazardous to the environment, please make sure not to release them into water.
- Ensure sound disposal or recycling process for each disassembled material.
- Ensure observation of the national regulations for waste disposal.

# 10. SERVICE

AUMA offers extensive services such as maintenance and inspection for actuators. The contact details are given below. For Spare parts related details, please refer to 3.XMP OEM SPARES LIST (Available on Auma India Website – www.auma.co.in ).


auma india pvt ltd

***Regd. Office & Works:***
38A & 39-B, II Phase, Peenya Industrial Area Bangalore – 560058
Ph: 080-30412222/28394656
Fax: 080-28392809
Email: info@auma.co.in

***Noida Branch:***
#1310, Tower 'A', Corenthum Complex
Sector -62, Noida -201309
Ph: 0120-3060522 – 26
Fax: 0120-3060523
Email: VeereshS@auma.co.in

***Pune Branch:***
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Ph: 020-25410465
Fax: 020-25443186
Email: NCPatil@aumaindia.com

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