ATS-LV 1000
Level Controller

User Instruction Manual

ATS-LV1000 Process Controller

Read this before using ATS-LV1000

Thank you for choosing the **ATS-LV1000** controller.

ATS-LV1000 Level Controller is an industry standard controller used for monitoring, analyzing, logging and controlling fluid level in a tank. With a wide range of user selectable tank shapes, dimensions, display units, relay settings and sensor and medium specifications, it provides an enhanced user experience. Built-in micro-SD card for data acquisition and communication with the custom-built desktop application add a dynamic data analytics capability. **ATS-LV1000** has a robust design with standard panel mount fitting and a simple user interface with 6 control buttons and a 128 x 64 graphics LCD display.

This manual explains the use of ATS-LV1000 controller. This instruction manual is written to cover as many anticipated applications of controller. The information presented in this manual is subject to change without notice as improvements are made. Inform and educate your personnel for the proper installation, operation, and maintenance of the product. To ensure proper performance make sure that proper personnel operates, maintains and update the product. When replacement parts are required, ensure that qualified personnel use replacement parts specified by AT Systems representative or call at provided number for assistance. Unauthorized parts and procedures can affect the product's performance and place the safe operation of the process at risk.

Refer installation ,operation and servicing to qualified personnel. Making cable connections to controller and servicing this instrument requires access to shock hazard level voltages which can cause death or serious injuries ,therefore disconnect all hazardous voltage before accessing the electronics. Relay contacts made to separate power sources must be disconnected before servicing. For safety and proper performance this instrument must be connected to a properly grounded three-wire power source.

The information presented in this manual is subject to change in future without prior notice. AT Systems does not accept any responsibility for damage or malfunctioning of the unit due to improper usage and maintenance of the instrument.

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SECTION 1: PRODUCT OVERVIEW

1.1 INTRODUCTION

ATS-LV1000 Level Controller is an industry standard controller used for monitoring, analyzing, logging and controlling fluid level in a tank. With a wide range of user selectable tank shapes, dimensions, display units, relay settings and sensor and medium specifications, it provides an enhanced user experience. Built-in micro-SD card for data acquisition and communication with the custom-built desktop application adds a dynamic data analytics capability. **ATS-LV1000** has a robust design with standard panel mount fitting and a simple user interface with 6 control buttons and a 128 x 64 graphics LCD display.

Inspect the exterior of the shipping package for any damage. Open the package and inspect the controller and related hardware for missing or damaged parts.

If there is evidence of damage, notify the carrier immediately. If parts are missing, contact AT Systems customer support representative.

1.2 FEATURES

ATS-LV1000 dataM Controller is designed to be a fully isolated instrument for two-wire DC applications.

- Wide range of user selectable display units
- Instrument supplied in durable (IP65) enclosure. (When installed in control panel)
- Built in password protection for safety of instrument and process
- 4 ~ 20 mA customizable analogue current output for plant operation
- High end encapsulated electronic components for humid and harsh environment
- Factory calibrated 4~20mA analog input for sensor connection, with in-field calibration functionality.
- Built-in micro SD card support for data acquisition and communication
- Stainless steel clamp (provided) for rigid mounting of controller with electric panels
- Quick connection with sensors through connectors (requires tinned wires sensor)

1.3 SPECIFICATIONS

Measuring Range	Height: up to 99.999m, 0.001 resolution, ± 0.1% accuracy. Volume: up to 99999m³, 0.001 resolution, ± 0.1% accuracy.

Tank Selection	Wide range of tank selection available (cube, cuboid, cylinder, horizontal cylinder and other customized options) with user programmable dimensions.
Micro SD Card for Data Acquisition	Micro SD card installed for data acquisition at user defined time intervals.
Display Units	Unit selection as per requirement. Height: meters. Volume: cubic meters, liters, gallons. Loop current: mA.
Sensor and Medium	User selectable medium Specific Gravity with corresponding sensor setting in meters.
RS485 Communication	RS 485 based communication with desktop application. AT Systems Level Software for microSD data retrieval, live data monitoring and data analytics.
Analog Input Calibration	Factory calibrated 4-20mA analog input for sensor connection, with in-field calibration functionality.
Clock	Internal clock and calendar, 24 Hour format, ± 1 min/month accuracy.
Volume Totalizer	Logging of total volume consumed, up to 999,999,999 liters.
Security Settings	Password protection.
Relays	1 (HI) – 24 VDC, 1A – On/Off Programmable 2 (LO) – 24 VDC, 1A – On/Off Programmable Relay function with customized dead band
Relay Auto Modes	Auto Mode 1: Level based turn-on and turn-off set points with inverse logic functionality Auto Mode 2: Time based turn-on and turn-off modes.
Device ID	Unique device ID allocation for interfacing multiple controllers with AT Systems Level Software.
Panel Cutout Size	L x W (93mm x 93mm)
Dimensions (Volume Based)	L x W x D (113.5mm x 113.5mm x 83mm)
IP Class Protection	IP 65 (In Panel Mount Installation)

Weight (Assembly)	≈ 255 grams
Power Requirement	24 VDC with high voltage, polarity and short circuit protection

Note: Dual sensor option and customized solution also available at user request.

1.4   APPLICATIONS

ATS-LV1000 controller can be used for various industrial applications such as:

· Silo Tanks
· Underground Tanks
· Fuel Tanks
· Edible Oil Tanks
· Dairy Storage Tanks
· Overhead Water Tanks
· Domestic Water Tanks

SECTION 2: INSTALLATION

2.1 PANEL MOUNTING

ATS-LV1000 controller can be mounted on control panel plate for different industrial applications. Fig. 1 below shows the controller with panel cutout dimensions in mm. Panel cutout sticker is also provided in package for reference cutting.
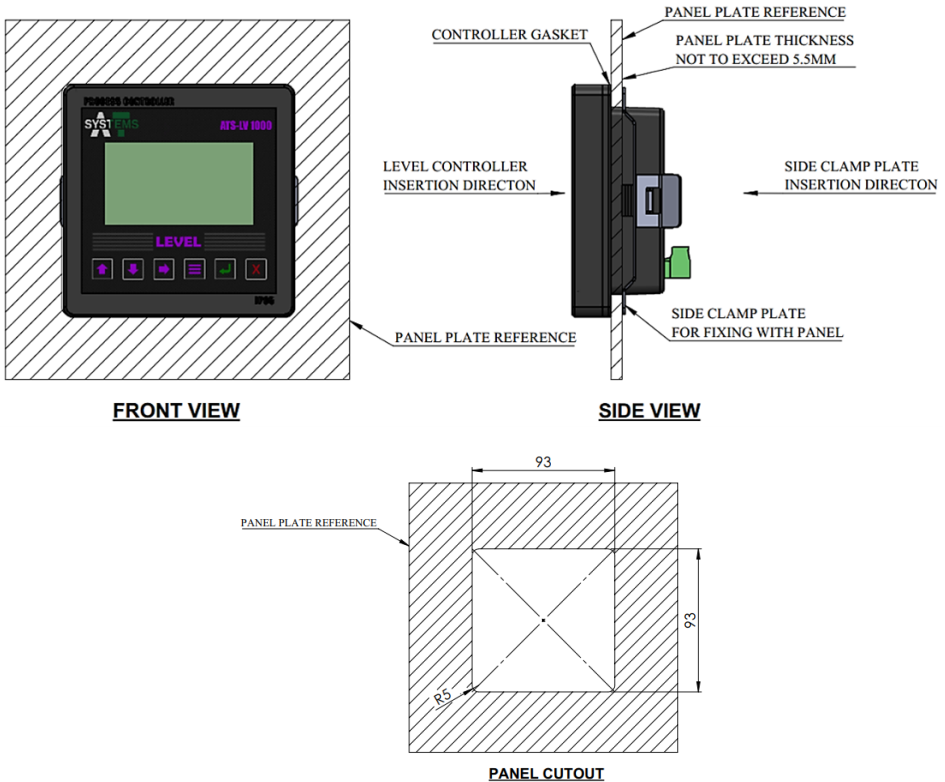

Fig. 1 - ATS-LV1000 Panel Mounting

2.2 CONNECTIONS

ATS-LV1000 controller requires a regulated 24 VDC connection from an external supply (not included in the package) to work.

> **Warning!**
> Don't connect AC power cables to the ATS-LV1000 controller.

IMPORTANT NOTES:

- All electrical installations must be supervised by a qualified and responsible electrician.
- Use wiring practices that conform to all national, international and local electrical codes.
- Do not put sensor cables or instrument 4-20 mA output wires in the same conduit that contains AC power wires. AC power wires require a separate conduit to prevent electrical noise from interfering with the instrumentation signals.

2.2.1   POWER

A 24 VDC power supply must be used to power the **ATS-LV1000** controller. To avoid electrical noise which can interfere in the output reading, keep the wiring shielded and away from high power sources.

The controller has the power polarity protection which means that if +ve terminal of the power supply is connected to the -ve terminal of controller, it will not power on the controller and will protect it from malfunctioning. Make sure input DC power is stable, noise free and non-fluctuating.
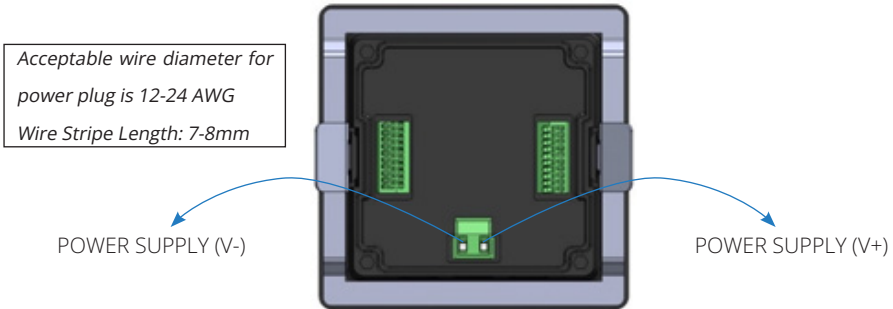
Acceptable wire diameter for power plug is 12-24 AWG
Wire Stripe Length: 7-8mm

POWER SUPPLY (V-)   POWER SUPPLY (V+)

Fig. 2 - ATS-LV1000 VDC Connections

2.2.2   TRANSMITTER CONNECTIONS

Level transmitter cable can be connected to the ATS-LV1000 controller terminal strip by connecting the transmitter 4 ~ 20mA wires with IN terminals. Make sure that positive and negative connections are connected same on both the devices. Route the signal cable away from AC power wires, frequency drives, motors, or other electrical signal wires. Do not put sensor or signal cables in conduit that contains AC power cables and motor cables.

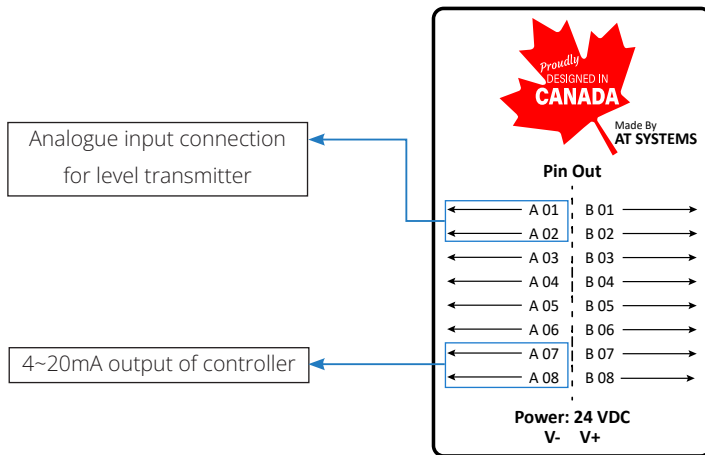Terminal blocks are labeled on back of the controller.

Fig. 3 - Transmitter Connections

Figure above shows the wiring connection names for 4~20mA transmitters and controller **ATS-LV1000**. Each transmitter wire connection detail is given below:

1. Connect 4~20mA Wire 1 with Input 1 (+) connection of controller.
2. Connect 4~20mA Wire 2 with Input 1 (-) connection of controller.
3. Connect Ground Wire with GND connection of controller.
4. Connect 2 core communication wire with RS485-A and RS485-B terminals of controller.
5. Connect output relays with Relay 1 and Relay 2 terminals of controller.

> **Warning!**
> Do not connect any sensor with level controller which does not support 4~20mA output.

2.2.3   RELAY 1 & RELAY 2 CONNECTIONS

Two relay outputs (Relay 1 & Relay 2) can be connected to the **ATS-LV1000** controller terminal strip by inserting the wires in Relay 1 and Relay 2 connection. This connection can be used for RELAY function. Connect top (red marked connection) with positive terminal and bottom (blue marked connection) with negative terminal. Same for Relay 2 yellow and green. Diagrammatic representation is shown in fig(4).
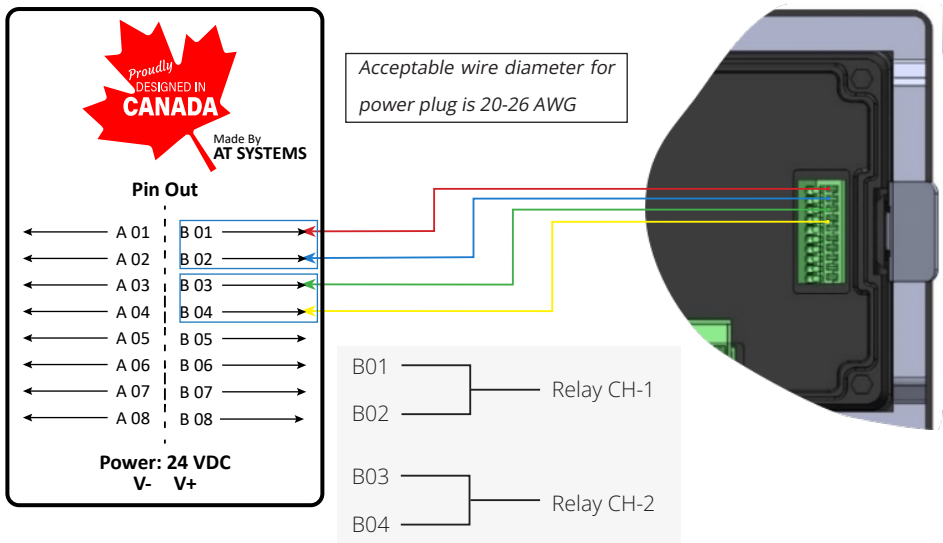
Fig. 4 - Relay 1/2 Connection

2.2.4   RS485-A AND RS485-B COMMUNICATION WIRE CONNECTION

ATS-LV1000 provides RS based communication with Personal Computers. User can control the process and check all logged data in tabular or graphical form through a custom built dataM compatible software.
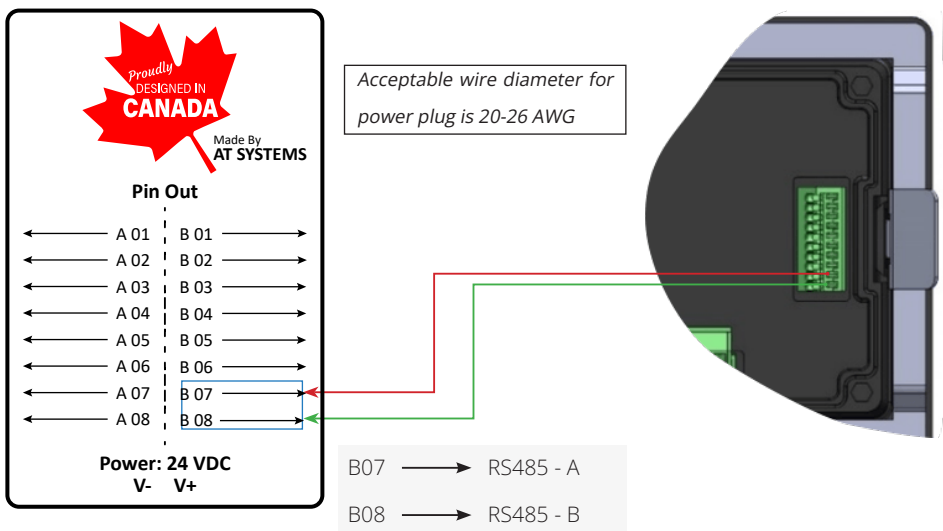

Fig. 5 - Digital Input 1/2 Connection

2.3.5   RELAY CONNECTION LEAFLET

⚠	**Caution** Read this before connecting ATS-CD1000 controller to any external relays

ATS-LV1000 controller comes with built in relays which can be connected to external relays for control function.

Make sure to use Fly Back Diode across External Relay Coil while connecting to the **ATS-LV1000** controller as shown in the figure below.
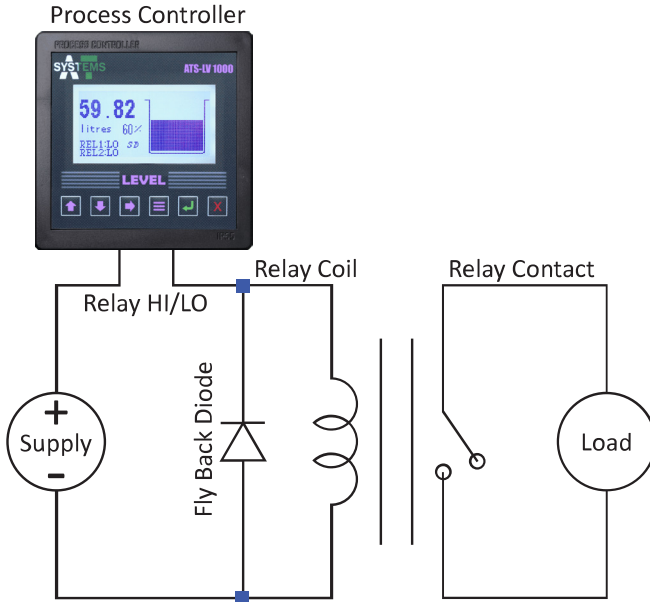

Process Controller

Fig: FLy Back Diode Circuit Diagram

ATS-LV1000 controller has a 6 button layout with a 128 x 64mm LCD display to display information.

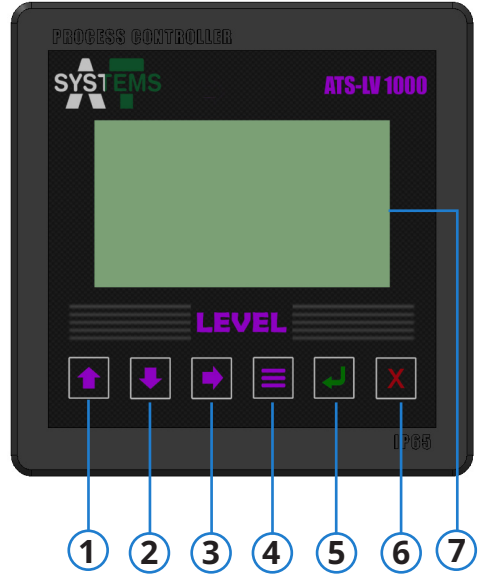| 1	Up
2	Down
3	Right / Forward
4	Menu
5	Accept / Confirm / Enter
6	Escape / Previous / Back
7	LCD Display

Fig. 6 - ATS-LV1000 Layout

3.1   START UP

Before Startup, ensure proper transmitter wire connections and the clamping of controller with panel plate. To start **ATS-LV1000** connect the power connector to the back of instrument. Fig. 7 shows the main LCD display and the information it displays.

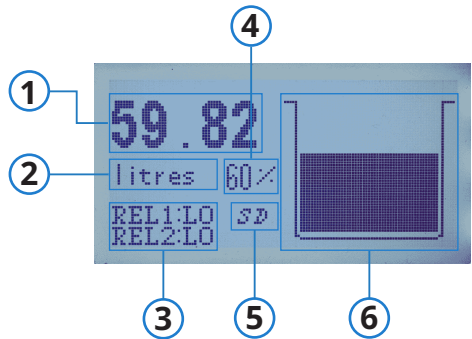| 1	Parameter value
2	Unit
3	Relays status
4	Tank level percentage
5	SD card indicator
6	Diagrammatic tank level representation

Fig. 7 - Parameters Screen
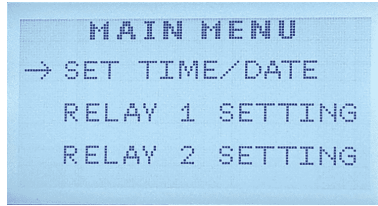
3.2   OPERATING THE CONTROLLER

3.2.1   MENU NAVIGATION

ATS-LV1000 is user friendly and easy to use with its 6 button layout. To access the menu screen, press the menu button. Main menu is shown in figure(9).

> ⚠️ **Caution**
> If password is turned on, pressing the menu button will take the user to password screen. Enter the password and press confirm button to enter the menu. For information about password refer to section 9.

```
     MAIN MENU
→ SET TIME/DATE
   RELAY 1 SETTING
   RELAY 2 SETTING
```

Fig(9) - Main Menu

Through main menu user can setup the controller as per operation's needs. Here several actions can be performed such as setting and viewing time and date, turning SD card data storage on of off, setting units and defining functions etc.

Use *up* and *down* buttons to navigate between the menu items. An arrow sign before a menu item name indicates that it is selected item. To enter a menu item, press *enter* button.

A check sign next to an option indicates that it is turned on. To turn it off, navigate to that option and press the *enter* button. The check sign will disappear. Both the arrow sign and check sign can be seen in fig. 10(a).
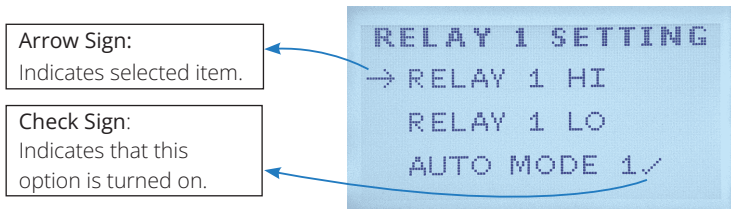
Arrow Sign:
Indicates selected item.

Check Sign:
Indicates that this option is turned on.

```
RELAY 1 SETTING
→ RELAY 1 HI
   RELAY 1 LO
   AUTO MODE 1 ✓
```

Fig. 10(a) - Menu Navigation - Selected and checked menu options

3.2.2   SETTING A VALUE

To set a value where required, press *up* and *down* button to change the value and *right* button to navigate between the digits. Once the value is set, press *enter/ accept* button to accept the changes. The active digit (whose value is to be changed) is indicated by an a line under that digit. Fig. 10(b) shows a diagrammatic representation of setting a value.
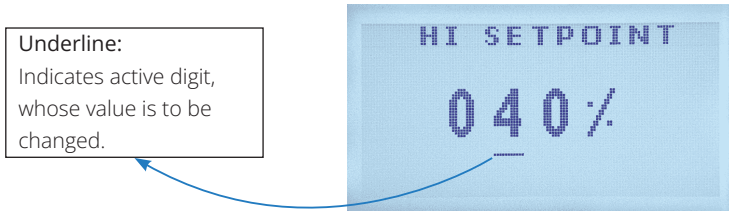

Fig. 10(b) - Menu Navigation - Setting values

3.2.3   MENU TREE

Below a menu tree is given for a quick over-view of all the options available. All these menu options are discussed in detail in section 4 through section 12.
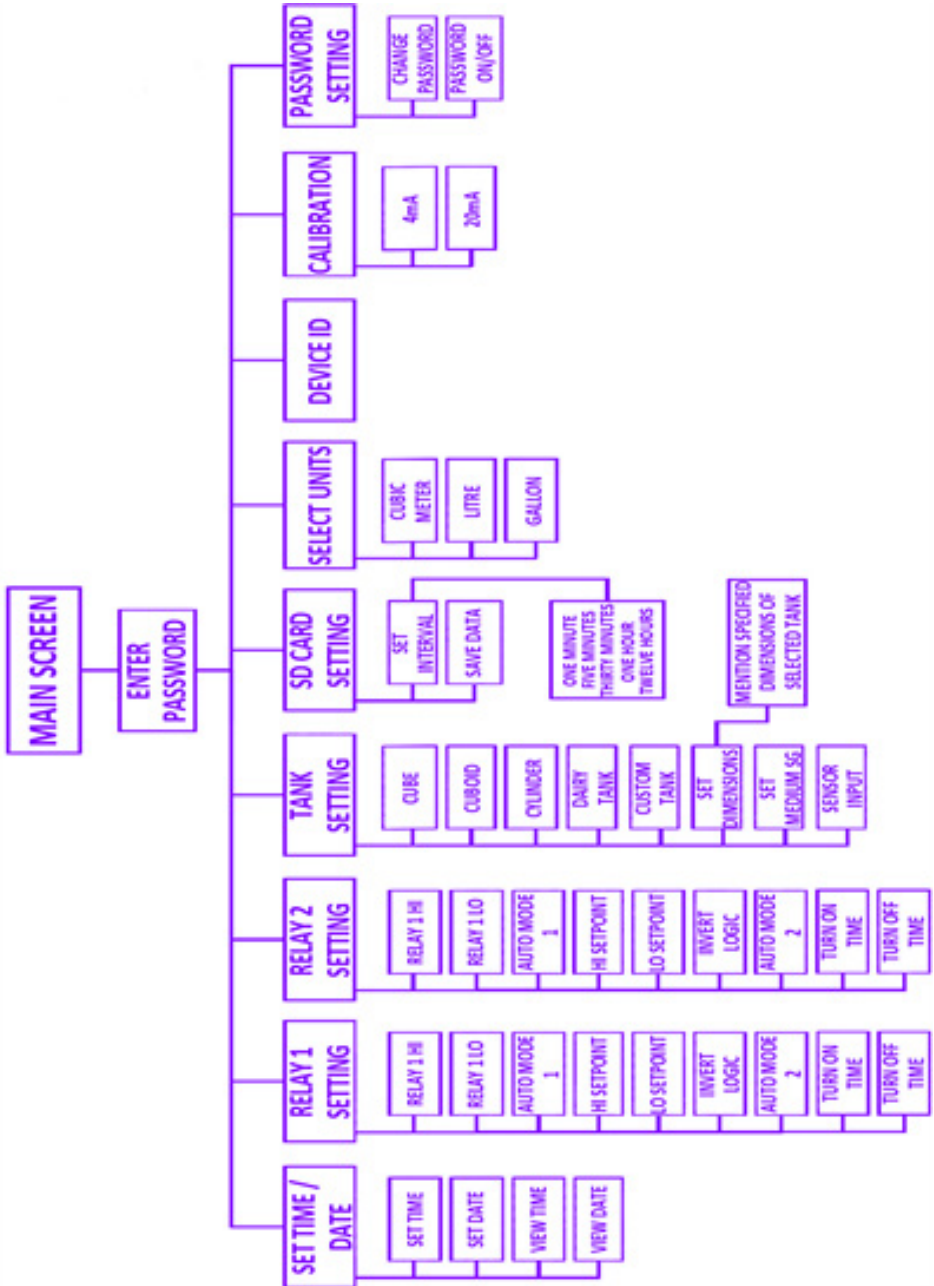
Fig. 11 - Menu Tree

SECTION 4: SET / VIEW TIME AND DATE

Navigate to Menu > SET TIME/DATE to set or view time and date.

4.1 SET TIME

To set time, Navigate to Menu > SET TIME/DATE > SET TIME. Set time screen as shown in fig. 12 will appear. Time is in 24-Hour format. "HH" represents hours and "MM" represents minutes. To navigate between digits, use the *right* button. To change a value use *up* and *down* buttons. Once the time is set, confirm by pressing *accept/ confirm* button.

Fig. 12 - Set Time

4.2 SET DATE

To set date, navigate to Menu > SET TIME/DATE > SET Date. Set date screen as shown in fig. 13 will appear. "DD" represents day, "MM" represents month, and "YY" represents year. To navigate between digits, use the *right* button. To change a value use *up* and *down* buttons. Once the date is set, confirm by pressing *accept/confirm* button.
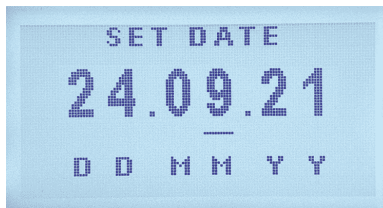

Fig. 13 - Set Date

4.3 VIEW TIME

To view time, navigate to Menu > SET TIME/DATE > VIEW TIME. Time can be seen in 24-hour format. "HH" represents hours and "MM" represents minutes. Fig. 14 shows VIEW TIME Screen.

Fig. 14 - View Time

4.3   VIEW DATE

To view time, navigate to   Menu>SET TIME/DATE>VIEW DATE. Time can be seen in 24-hour format. "HH" represents hours and "MM" represents minutes. Fig. 15 shows VIEW DATE Screen.

Fig. 15 - View Date

SECTION 5: RELAY SETTINGS

Two relay settings, RELAY 1 SETTING and RELAY 2 SETTING options can be found next to SET TIME/DATE option in main menu.

5.1 RELAY 1 SETTING

Relay 1 setting options can be accessed by going to Menu > RELAY 1 SETTING.

5.1.1 RELAY 1 HI

This option allows the user to manually turn relay 1 on. Check this option to turn relay 1 on. Press *enter* button to turn this option on or off.

5.1.2 RELAY 1 LO

This option allows the user to manually turn relay 1 off. Check this option to turn relay 1 off. Press *enter* button to turn this option on or off.

Fig. 16 - Relay 1 Hi and Relay 1 Lo

Other than manually setting relay 1 to on or off through RELAY 1 HI and RELAY 1 LO options, relay 1 can also be auto operated. There are two auto modes for relay 1, AUTO MODE 1 and AUTO MODE 2.

5.1.3 AUTO MODE 1

AUTO MODE 1 auto operates the relay 1 based on high set point and low set point values of a selected channel span values (for span settings, see section 6.1.3). High and low set point values can be defined by the user through HI SETPOINT and LO SETPOINT options (For details, see sections 5.1.3.1 and 5.1.3.2).
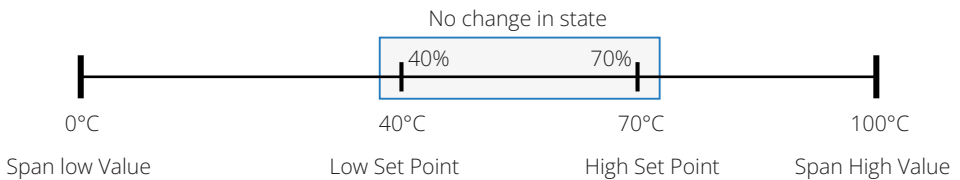
Fig. 17 - Auto Mode 1

Fig. 17 shows shown and example of auto mode 1 of relay operation. High and

low set point values are percentage values based on span. For example, a span of 0°C to 100°C for a thermal control system has a low set point of 40% (100°C x 40% = 40°C) and high set point of 70% (100°C x 70% = 70°C). From 40°C to 70°C, there will be no change in the state of relay 1. If the temperature falls below 40°C, relay 1 state will be changed to on until the temperature goes above high set point value of 70°C. Similarly, when temperature rises above 70°C, relay 1 state will change to off and will remain off until the temperature falls below 40°C.

5.1.3.1 HI SETPOINT

To set high set point value of relay 1, navigate to Menu > RELAY 1 SETTING > HI SETPOINT. It is a percentage value of the corresponding channel's span value. To navigate between digits, use the *right* button. To change value, use *up* and *down* buttons. Once the value is set, press *accept/confirm* button to confirm changes. Fig. 17 shows HI SETPOINT screen.

Fig. 18 - Relay 1 High Set Point

5.1.3.2 LO SETPOINT

To set low set point value of relay 1, navigate to Menu > RELAY 1 SETTING > LO SETPOINT. It is a percentage value of the corresponding channel's span value. To navigate between digits, use the *right* button. To change value, use *up* and *down* buttons. Once the value is set, press *accept/confirm* button to confirm changes. Fig. 19 shows LO SETPOINT screen.

Fig. 19 - Relay 1 Low Set Point

5.1.3.3 INVERT LOGIC

This options inverts AUTO MODE 1 logic for the auto operation of relay 1. If this option is checked, relay 1 will be in on state if the value is above high set point rather than low set point and will be in off state if value is below the low set point. Navigate to Menu > RELAY 1 SETTING > INVERT LOGIC to turn this option on or off. Press *enter* button to toggle INVERT LOGIC on or off.

5.1.4 AUTO MODE 2

In AUTO MODE 2, relay 1 will operate based on TURN ON TIME and TURN OFF TIME manually set by the user. Turn on and Turn off time can be fed to the controller by user by navigating to Menu > RELAY 1 SETTING and choosing TURN ON TIME or TURN OFF TIME under AUTO MODE 2.

5.1.4.1 TURN ON TIME

Turn on time for auto mode 2 can be set here. Navigate to Menu > RELAY 1 SETTING > TURN ON TIME under AUTO MODE 2 and press *enter* button. Use *up* and *down* buttons can be used to change the value and *right* button to navigate between digits. Once the time is set press *accept/confrim* button to set the turn on time. Fig. 20 below shows TURN ON TIME screen.
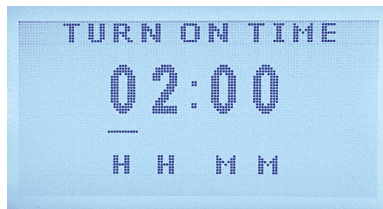

Fig. 20 - Auto Mode 2 - Turn on Time

5.1.4.2 TURN OFF TIME

Turn off time for auto mode 2 can be set here. Navigate to Menu > RELAY 1 SETTING > TURN OFF TIME under AUTO MODE 2 and press *enter* button. Use *up* and *down* buttons can be used to change the value and *right* button to navigate between digits. Once the time is set press *accept/confrim* button to set the turn on time. Fig. 21 below shows TURN OFF TIME screen.
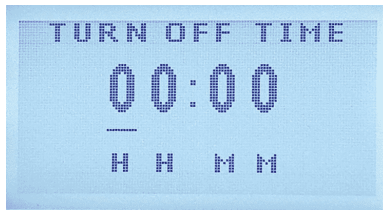
Fig. 21 - Auto Mode 2 - Select Function

5.2   RELAY 2 SETTING

Relay 2 setting options can be accessed by going to Menu > RELAY 2 SETTING.

All options in this mode are same as RELAY 1 SETTING. For details, refer to section 5.1.

SECTION 6: TANK SETTING

In this menu, type of tank can be selected by the user. To access tank settings, navigate to Menu > TANK SETTING. Fig. 22 shows tank setting menu.
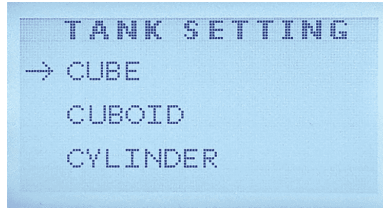

Fig. 22 - Tank Setting

6.1 TANK SELECTION

User can choose CUBE, CUBOID, CYLINDER and DAIRY TANK or CUSTOM TANK based on the type of tank to have an accurate measurement of volume. User can choose CUSTOM TANK. To select a tank, navigate to Menu > TANK SETTING. Selected tank type is indicated by a check sign next to its name. See fig. 23.
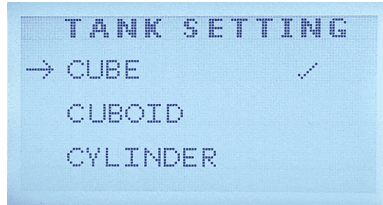

Fig. 23 - Tank Setting - Selected Tank

6.1.1 SET DIMENSIONS

This menu lets user enter the dimensions for chosen tank type. Options in this menu change on the basis of selected tank type.

6.1.1.1 CUBE

To select cube type tank, navigate to Menu > TANK SETTING > CUBE and press *enter* button. Now user can go to SET DIMENSIONS to set the dimensions of Tank. Fig. 24 shows SET DIMENSIONS menu for cube.

In this menu, user can set WIDTH, HEIGHT and HEIGHT OFFSET for cube dimensions. A width setting screen is shown in fig. 25 as an example. *Up* and *down* buttons can be used to change the value and *right* button can be used to navigate between digits. Once the value is set, press *accept/confirm* button to set the value.

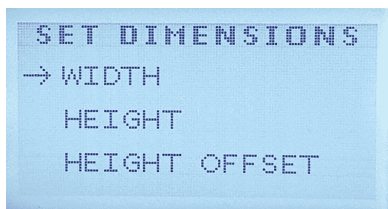Similarly user can set height and height offset of the tank.

Fig. 24 - Set Dimensions - Cube

Fig. 25 - Set Dimensions - Cube - Width

6.1.1.2 CUBOID

To select cuboid type tank, navigate to Menu > TANK SETTING > CUBOID and press *enter* button. Now user can go to SET DIMENSIONS to set the dimensions of Tank. Fig. 26 shows SET DIMENSIONS menu for cuboid.

In this menu, user can set WIDTH, LENGTH, HEIGHT and HEIGHT OFFSET for cuboid dimensions. A Length setting screen is shown in fig. 27 as an example. *Up* and *down* buttons can be used to change the value and *right* button can be used to navigate between digits. Once the value is set, press *accept/confirm* button to set the value. Similarly user can set width, height and height offset of the tank.
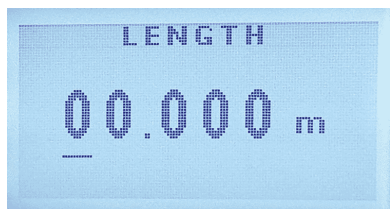

Fig. 26 - Set Dimensions - Cuboid

Fig. 27 - Set Dimensions - Cuboid - Length

6.1.1.3 CYLINDER

To select cylinder type tank, navigate to Menu > TANK SETTING > CYLINDER and press *enter* button. Now user can go to SET DIMENSIONS to set the dimensions of Tank. Fig. 28 shows SET DIMENSIONS menu for cylinder.

In this menu, user can set DIAMETER, HEIGHT and HEIGHT OFFSET for cylinder. A diameter setting screen is shown in fig. 29 as an example. *Up* and *down* buttons can be used to change the value and *right* button can be used to navigate between digits. Once the value is set, press *accept/confirm* button to set the value. Similarly user can set height and height offset of the tank.
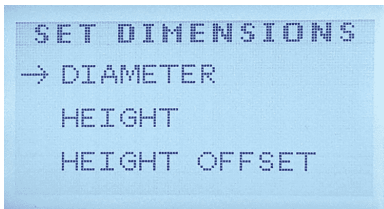
Fig. 28 - Set Dimensions - Cylinder

Fig. 29 - Set Dimensions - Cylinder - Diameter

6.1.1.4 DAIRY TANK

To select dairy tank, navigate to Menu > TANK SETTING > DAIRY TANK and press *enter* button. Now user can go to SET DIMENSIONS to set the dimensions of Tank. Fig. 30 shows SET DIMENSIONS menu for cylinder.

In this menu, user can set DIAMETER, SHELL, TOP HEIGHT OFFSET, and BOTTOM dimensions for dairy tank. A shell setting screen is shown in fig. 31 as an example. *Up* and *down* buttons can be used to change the value and *right* button can be used to navigate between digits. Once the value is set, press *accept/confirm* button to set the value. Similarly user can set diameter, top and height offset of the tank.

Fig. 30 - Set Dimensions - Dairy Tank

Fig. 31 - Set Dimensions - Dairry Tank - Shell

6.1.1.5 CUSTOM TANK

To select custom tank, navigate to Menu > TANK SETTING > CUSTOM TANK and press *enter* button. Now user can go to SET DIMENSIONS to set the dimensions of Tank. Fig. 32 shows SET DIMENSIONS menu for custom tank.

In this menu, user can set HEIGHT and HEIGHT OFFSET for custom tank. A height setting screen is shown in fig. 33 as an example. *Up* and *down* buttons can be used to change the value and *right* button can be used to navigate between digits. Once the value is set, press *accept/confirm* button to set the value. Similarly user can set height offset of the tank.
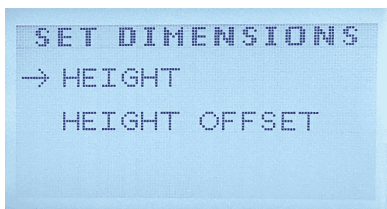
Fig. 32 - Set Dimensions - Custom Tank

Fig. 33 - Set Dimensions - Custom Tank - Height

Height Offset

Height offset is the vertical distance from the consumed bottom of the tank to the height of installed transmitter.

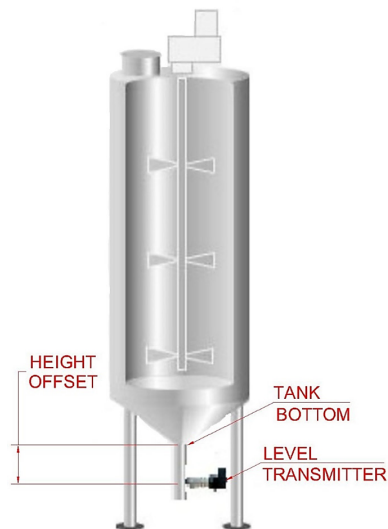HEIGHT OFFSET

TANK BOTTOM

LEVEL TRANSMITTER

Fig. 34 - Set Dimensions - Custom Tank

6.2   SET MEDIUM SG

Specific gravity for the medium can be set in this menu. Navigate to Menu > TANK SETTING > SET MEDIUM SG and press *enter* button. Fig. 35 shows the SET MEDIUM SG screen.

Fig. 35 - Set Medium SG

Use *up* and *down* buttons to change the value of a selected unit and the *right*

button to navigate between digits. Once the value is set, press **accept/confirm** button to set the specific gravity.

6.3   SENSOR INPUT

This is the sensor measuring height of the controller and has to be fed manually by the user. Navigate to Menu > TANK SETTING > SENSOR INPUT and press *enter* button to set sensor input value. Fig. 36 shows the SENSOR INPUT screen.
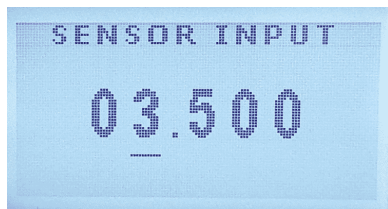

Fig. 36 - Sensor Input

Sensor input is set in meters and ranges from 1 meter to 40 meters. Use **up** and *down* buttons to change the value of a selected digit and the *right* button to navigate between digits. Once the value is set, press *accept/confirm* button to set the sensor input value.

SECTION 7: SD CARD SETTING

ATS-LV1000 controller has a built SD card for time based data logging. This data can be retrieved in graphical or tabular form or can be exported as an excel file to a personal computer through our custom built software. To access SD card settings, navigate to MENU > SD CARD SETTING.

7.1   SET INTERVAL

Interval is the time between two consecutive readings. Navigate to Menu > SD CARD SETTING > SET INTERVAL and press *enter* button. User can choose from five predefined time intervals which are:

- One minute
- Five minutes
- Thirty minutes
- One hour
- Twelve hours

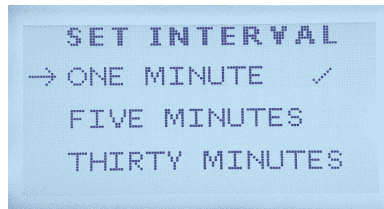Selected time interval has a check sign next to it as shown in fig. 37.

Fig. 37 - Set Interval

7.2   SAVE DATA

This option enables the time based SD card data logging function. Navigate to Menu > SD CARD SETTING > SAVE DATA and press the *enter* button to toggle data saving function on and off. A check sign next to SAVE DATA indicates that the data saving function is on. See fig. 38.
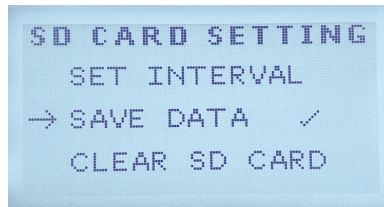

Fig.38 - Save Data

7.3   CLEAR SD CARD

User can clear SD card data by going to Menu > SD CARD SETTING > CLEAR SD CARD and press the *enter* button. The user is then taken to a confirmation screen where he can select YES to clear SD card or NO to cancel. See fig. 39.

Fig. 39 - Clear SD Card Data

SECTION 8: SELECT UNITS

User can select from three pre-defined units for volume. Navigate to MENU > SELECT UNITS to choose a desired unit. Available units are:
- *CUBIC METER*
- *LITRE*
- *GALLON*

Fig. 40 shows unit selection screen. A check sign next to a unit name indicates that it is the selected unit.

Fig. 40 - Select Units

SECTION 9: DEVICE ID

Device ID is a unique six digit number. This is the ID through which **ATS-LV1000** communicates with its custom built software. If multiple controllers are connected to a same computer, make sure that each devices has a different device ID to avoid conflicts. Navigate to MENU > DEVICE ID to access this option. Use *up* and *down* buttons to change the value, *right* button to navigate between digits, and press *accept/confirm* button to accept the changes once the value is set. See fig. 41.
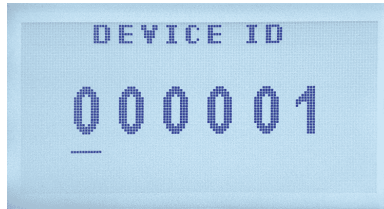

Fig. 41 - Device ID

SECTION 10: CALIBRATION

ATS-LV1000 is factory calibrated. However, if needed, can be calibrated using an industrial grade loop calibrator to calibrate 4~20mA channel input. Navigate to Menu > CALIBRATION for calibration of the controller. High and low values can be calibrated through 4mA and 20mA options respectively in this menu.

4mA

To calibrate low value, navigate to Menu > CALIBRATION > 4mA. See fig. 42.

Fig. 42 - Calibration - 4mA

20mA

To calibrate high value, navigate to Menu > CALIBRATION > 20mA. See fig. 43.

Fig. 43 - Calibration - 20mA

ATS-LV1000 menu access can be protected by a four digit password. Navigate to MENU > PASSWORD SETTING to access password settings.

11.1   CHANGE PASSWORD

Through CHANGE PASSWORD, user can set a new password or change an existing one. Password is a four digit sequence of *up*, *down*, *right* and *menu* buttons. To change or create a password, navigate to MENU > PASSWORD SETTING > CHANGE PASSWORD

11.1.1 PROCEDURE

Consider *up* button to be 1, *down* button to be 2, *right* button to be 3 and *menu* button to be 4. For example if you want to set your password to be 1124, then once you are on CHANGE PASSWORD screen, press *up*, *up*, *down* and then *menu* button. Press *accept/confirm* button to set the password. See fig. 44.

Fig. 44 - Change Password

11.2   PASSWORD ON

Passwrod protection can be turned on or off through this option. Navigate to MENU > PASSWORD SETTING > PASSWORD ON and press the *enter* button to toggle password protection on or off. A check sign next to the PASSWORD ON indicates that the password protection is on. See fig. 45.

Fig. 45 - Password on

> ⚠️ **Caution**
> Before turning Password on, make sure to remember previous password. Or else set a new password to avoid unexpected problems getting into menu screen.

SECTION 12: TROUBLESHOOTING

This section informs the user how to quickly resolve an operational problem with the system. During any troubleshooting phase, it will save time if the operator can firstly determine   the problem. Either it is related to the process controller, process sensor, or some external source. Therefore, this section is organized from the approach of excluding any likely external sources, isolating the controller and finally isolating the sensor. If these procedures still do not resolve the operational problems, any results noted here will be helpful when discussing the problem with the factory technical support group.

- Verify the proper power input is present (12 - 24VDC). Ensure the loads on the 4~20mA outputs do not exceed the limit (see section 2.2).
- Do not put sensor cables or instrument 4~20 mA output wires in the same conduit that contains AC power wires. AC power wires should be run in a separate conduit to prevent electrical noise from contacting with the instrumentation signals. Check for possible ground loops. High frequency sources of electrical noise may cause abrupt behavior in extreme conditions. If readings are very erratic after wiring has been checked, check for a possible AC ground loop, filter value, calibration k-factors or by temporarily moving the rotor of sensor with finger to check frequency and level rate values displaying or not.

SECTION 13: MAINTENANCE

Controller requires little to no maintenance for its smooth operation. Routine maintenance will be recommended for its ideal operation. Calibration for this controller should be checked periodically for measurement check. Calibration method is mentioned in *section 10*.

13.1   MAINTENANCE PARTS

Maintenance / replacement parts for controller are available as per requirement. For any requirement of parts kindly contact the AT Systems representative. Damaged electronic PCB's , PCB components, buttons, connectors and LED can also be replaced if required. AT System's corresponding personnel will remain in contact until the issue is resolved.

13.2   PANEL MOUNTING PARTS

Controller is already provided with high quality steel made side clamp for fixing with panel plate. For panel mounting procedure kindly refer to (section: 2.1). Side clamp plate can be ordered to AT Systems separately if required.

13.3   FIELD MOUNTING PARTS

Controller is already assembled in IP65 panel mount enclosure for dust and water protection. For field mounting, AT Systems can also provide IP67 field mount enclosure with installed cable glands for cables connection. Field enclosure also contains the through hole of lock for protection from unknown users' interaction on the field.

NOTES: