ATS-FL2000

Flow Controller

User Instruction Manual

ATS-FL2000 Process Controller

Read this before using ATS-FL2000

Thank you for choosing the **ATS-FL2000** controller.

ATS-FL2000 Flow Controller is an industry standard flow controller used for monitoring, analyzing, logging and controlling of flow in various industrial processes. It is directly compatible to **FT-1000** flow transmitter. The controller supports RS485 communication and comes with advanced functions like Micro SD card support for data logging after user defined intervals and WiFi communication support for data transmission and logging on remote server. The controller can be connected to the AT Systems software for real time data monitoring and data analytics. **ATS-FL2000** 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-FL2000** 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 flow 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-FL2000 Flow Controller is an industry standard flow controller used for monitoring, analyzing, logging and controlling of flow in various industrial processes. It is directly compatible to **FT-1000** flow transmitter. The controller supports RS485 communication and comes with advanced functions like Micro SD card support for data logging after user defined intervals and WiFi communication support for data transmission and logging on remote server. The controller can be connected to the AT Systems software for real time data monitoring and data analytics. **ATS-FL2000** 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-FL2000 flow Controller is fully compatible with FT-1000 flow transmitter and is packed with advanced features like:

- RS485 based communication with AT Systems software for real time data monitoring and data analysis.
- WiFi module for data logging and transmission on remote server.
- 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.

1.3 SPECIFICATIONS

Measuring Range	Flow Values up to 99999, 0.001 resolution, (Please check the individual Flow transmitter FT-1000 for Accuracy)
Micro SD Card Support	Micro SD card support for data acquisition of parameters.

Display Units	• Cubic Meter per hour (m^3/hr) • US Gallons per minute (gpm) • Litres per minute (LPM)
Totalizer Units	• Cubic Meter (m^3) • US Galons (g) • Litres (L)
Transmitter Selection	FT-1000 is directly compatible to ATS-FL2000. User can select appropriate flow transmitter in the flow transmitter settings
Wi-Fi Communication	Built in Wi-Fi module (requires Wi-Fi connection). Data transmission and logging on remote server, can be accessed on mobile app and computer software remote control of relays and current loop output.
RS485 Communication	RS 485 based communication with AT System's custom built software for data retrieval, real time data monitoring, data analytics and remote relay operation.
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.
Password Protection	For write protection of critical parameters.
Relays	2x relays with independent local and remote operation. Relays can be used for batch processing Rating: 277VAC, 125VDC-Max, 5A.
Device ID	Unique device ID allocation for interfacing multiple controllers with AT Systems Flow Software.
IP Class	IP65 (in panel mount installation)
Weight (assembly)	≈ 255 grams
IP Class Protection	IP 65 (In Panel Mount Installation)
Power Requirement	24 VDC with high voltage, polarity and short circuit protection

1.4 APPLICATIONS

ATS-FL2000 controller can be used for various industrial applications such as:

- Water Filtration
- Water Management
- Reverse Osmosis
- Ultra-Filtration
- Tube Wells
- Chemical Processes
- Food Industries
- Food Industries
- Water Softeners
- Power Plants
- Cooling Towers

SECTION 2: INSTALLATION

2.1 PANEL MOUNTING

ATS-FL2000 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.

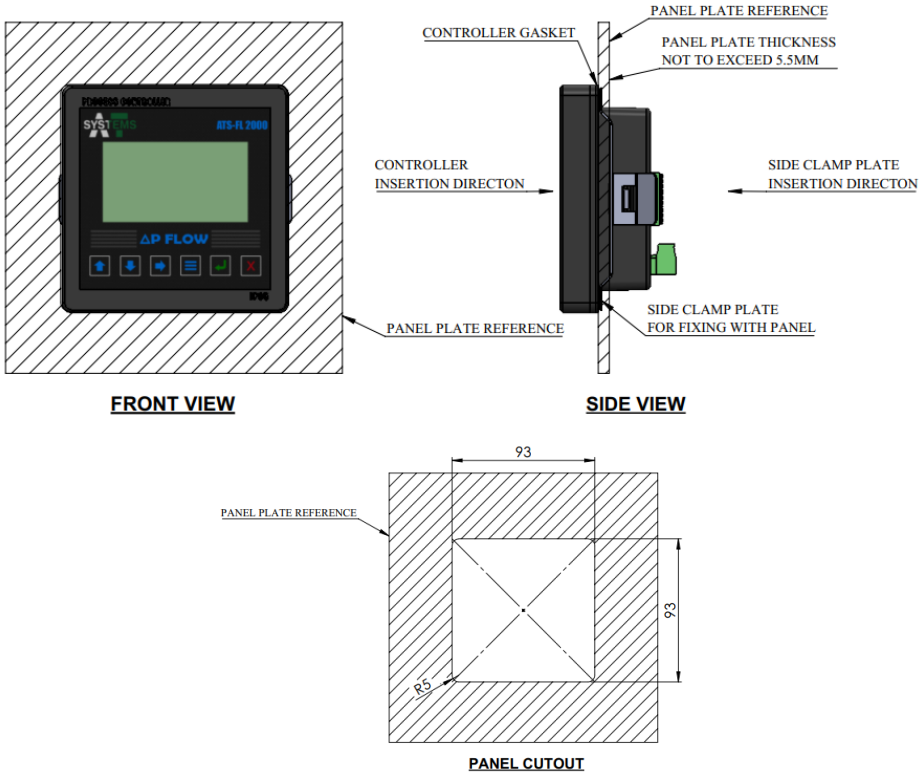

Fig. 1 - ATS-FL2000 Panel Mounting

2.2 CONNECTIONS

ATS-FL2000 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-FL2000 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-FL2000** 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.

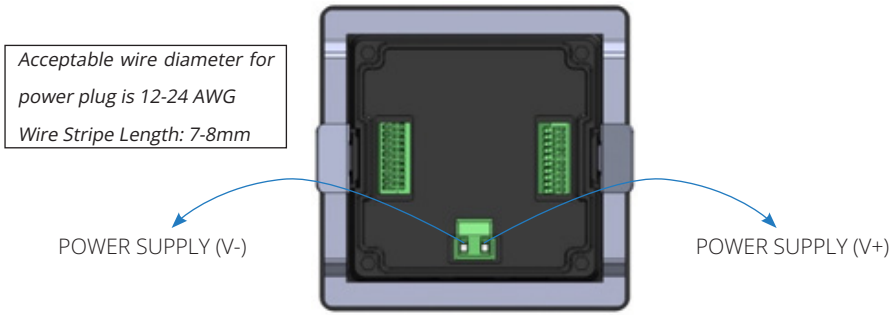

Fig. 2 - ATS-FL2000 VDC Connections

2.2.2 TRANSMITTER CONNECTIONS

Flow transmitter cable can be connected to the ATS-FL2000 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.

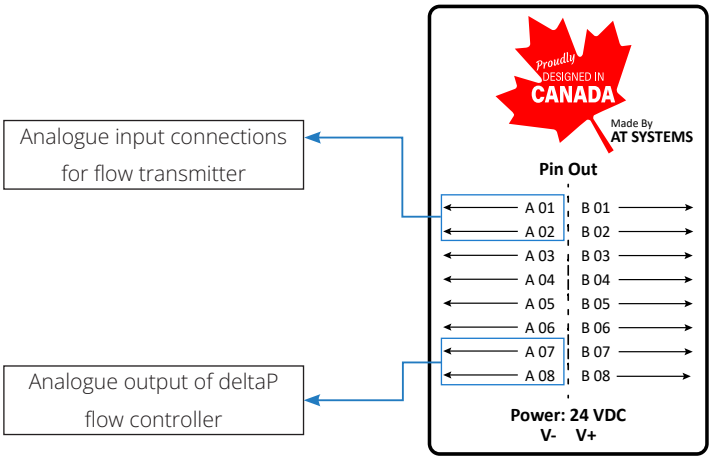

Fig. 3 - Transmitter Connections

Figure above shows the wiring connection names for 4~20mA transmitters and controller **ATS-FL2000**. Each transmitter wire connection detail is given below:

1. For analogue input connection from Flow Transmitter, use **A01** for positive and **A02** for negative connection.
2. For analogue output of deltaP Flow controller, use **A07** for output and **A08** for negative connection.

Warning!
Do not connect any sensor with flow 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-FL2000** 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).

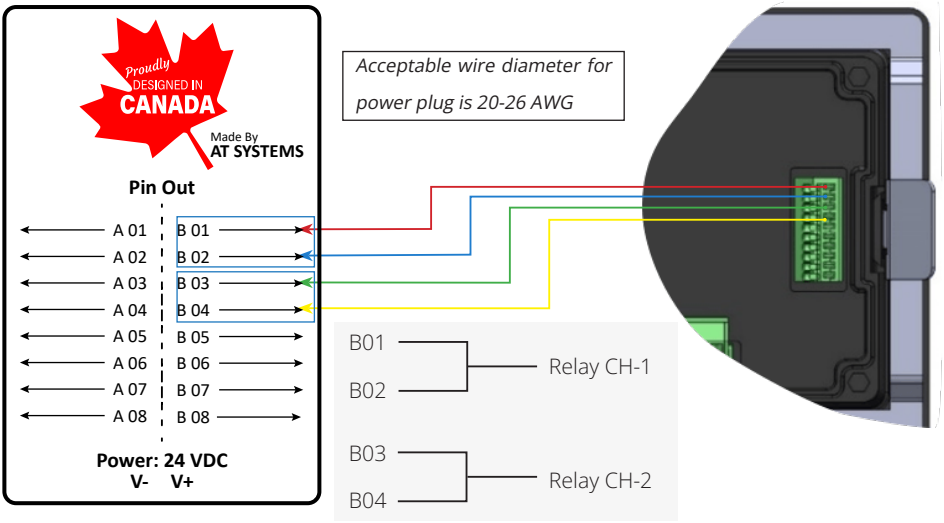

Fig. 4 - Relay 1/2 Connection

2.2.4 RS485-A AND RS485-B COMMUNICATION WIRE CONNECTION

ATS-FL2000 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.

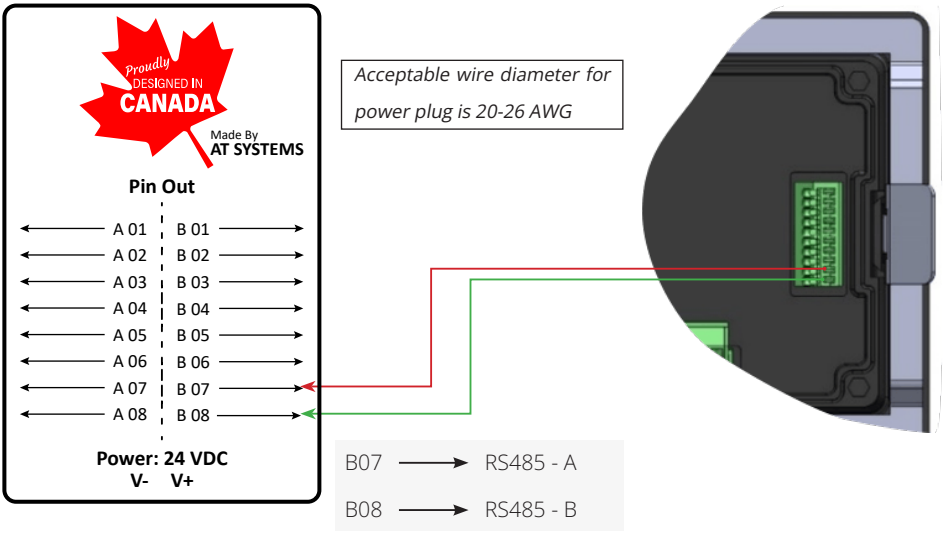

Fig. 5 - Digital Input 1/2 Connection

2.3.5 RELAY CONNECTION LEAFLET

Caution
Read this before connecting ATS-FL2000 controller to any external relays

ATS-FL2000 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-FL2000** controller as shown in the figure below.

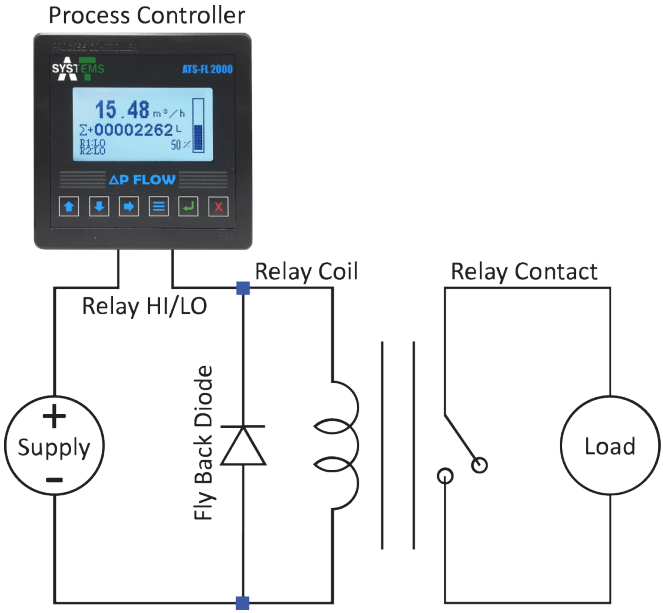

Fig: FLy Back Diode Circuit Diagram

SECTION 3: GENERAL OPERATION

ATS-FL2000 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

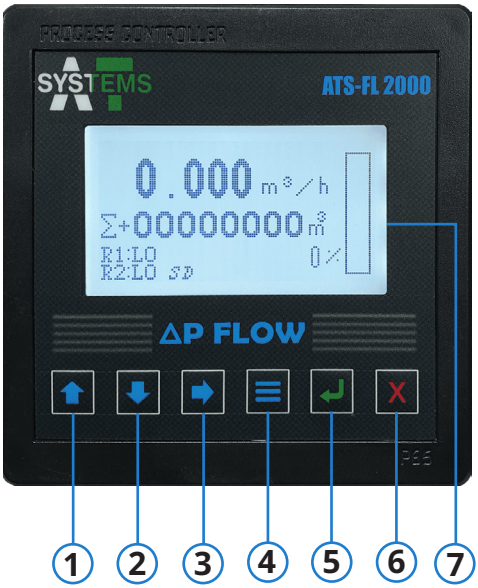

Fig. 6 - ATS-FL2000 Layout

3.1 START UP

Before Startup, ensure proper transmitter wire connections and the clamping of controller with panel plate. To start **ATS-FL2000** connect the power connector to the back of instrument. Fig. 7 shows the main LCD display and the information it displays.

1	Flow value with units
2	Totalizer value with units
3	Relays status
4	SD card indicator
5	Diagramatic representation of with percentage

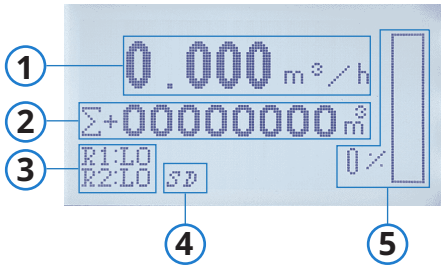

Fig. 7 - Main Screen

3.2 OPERATING THE CONTROLLER

3.2.1 MENU NAVIGATION

ATS-FL2000 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 fig 8.

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.

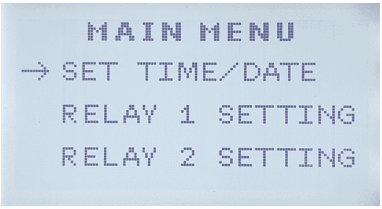

Fig. 8 - Main Menu

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, and setting desired units 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. 9(a).

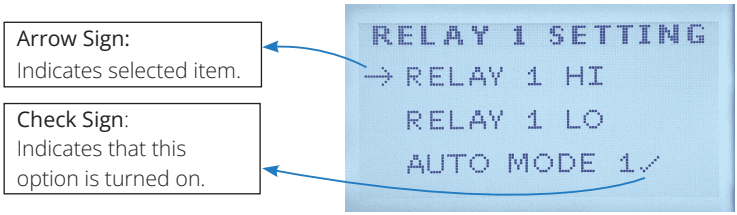

Fig. 9 - Menu Navigation **-** Selected and checked menu options

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.

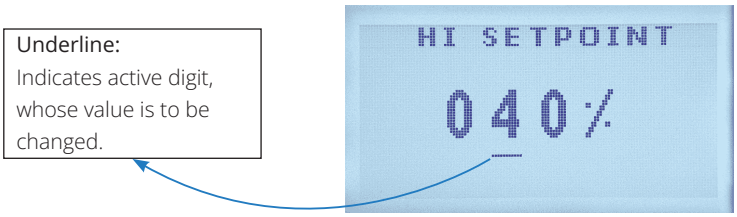

Fig. 10 - Menu Navigation - Setting values

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.

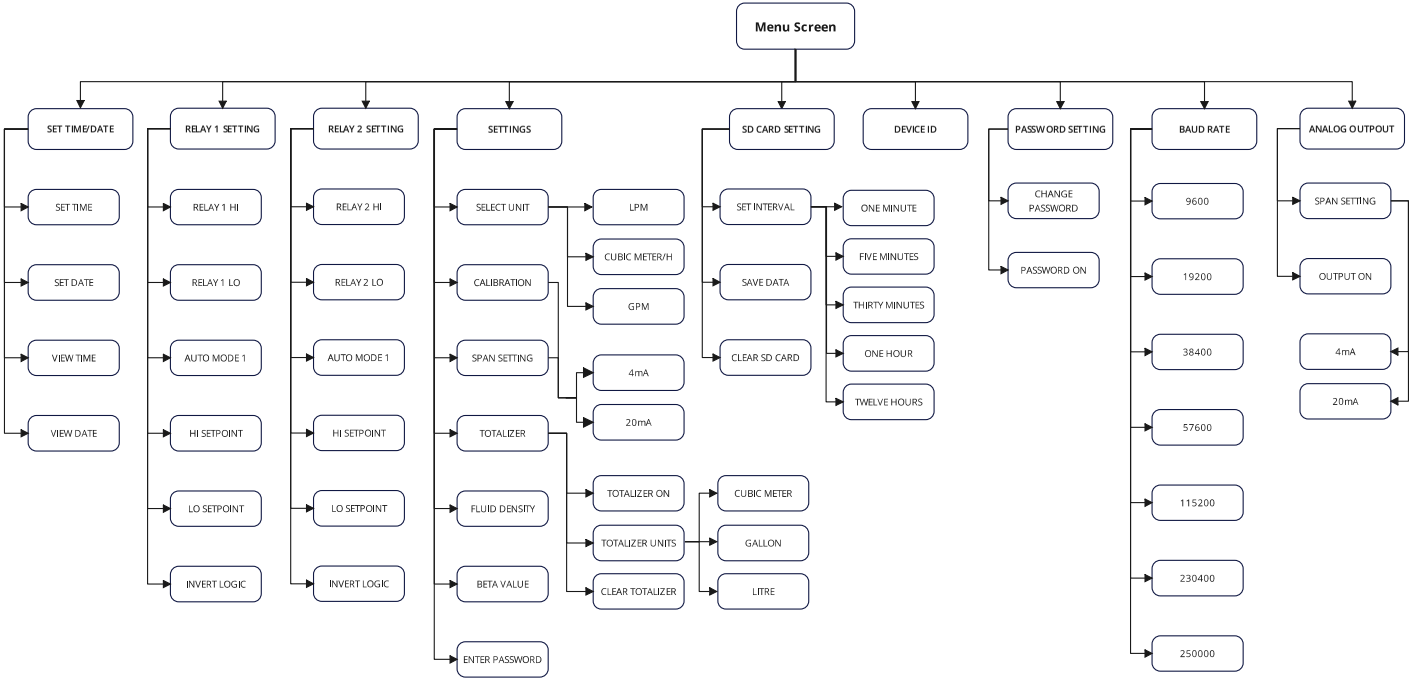

Fig. 11 - Menu Tree

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.

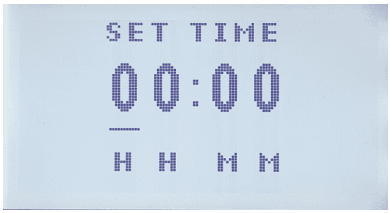

Fig. 12 - Set Time

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.

Fig. 16 - Relay 1 Hi and Relay 1 Lo

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.

5.1.3 AUTO MODE 1

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. For auto operation of relay 1, navigate to Menu > RELAY 1 SETTING > AUTO MODE 1 and press ***enter*** button.

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).

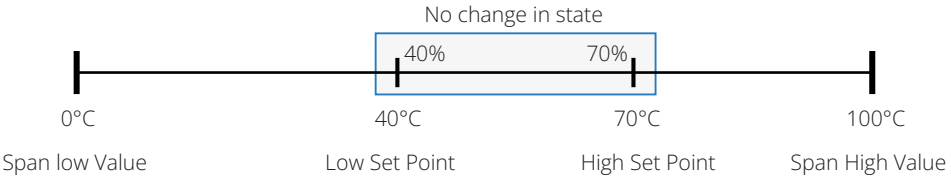

Fig. 17 - Auto Mode 1

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.

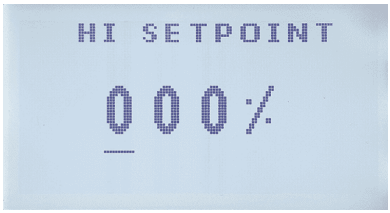

Fig. 18 - Relay 1 High Set Point

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. A check sign next to INVERT LOGIC as shown in fig. 20 below indicates that this option is turned on.

Fig. 20 - Auto Mode 1 - Invert Logic

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: SETTINGS

To access settings navigate to Menu > SETTINGS. Fig. 21 shows SETTINGS screen.

Fig. 21 - Settings

6.1 SELECT UNITS

Three predefined units:

- LPM
- Cuibc meters per hour
- GPM

are available for the user to choose from. To select a desired unit, navigate to Menu > SETTINGS > SELECT UNITS. A check sign next to a unit's name indicates that it is the selected unit. See fig. 22.

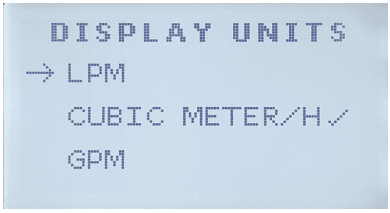

Fig. 22 - Settings - Select Units

6.2 CALIBRATION

ATS-FL2000 is factory calibrated. However, if needed, can be calibrated using an industrial grade loop calibrator to calibrate 4~20mA channel input. Navigate to Menu > SETTINGS > CALIBRATION for calibration of the controller. High and low values can be calibrated through 4mA and 20mA options respectively in this menu.

6.2.1 4mA

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

Fig. 23 - Calibration - 4mA

6.2.2 20MA

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

Fig. 24 - Calibration - 20mA

6.3 SPAN SETTING

Span is the difference between lowest and highest value.

For example, a 1.6 bar pressure transmitter maybe re-scaled to read 4mA at 0.8 bar and 20 mA at 1.2 bar. In this example the pressure transmitter would be described as having a span ranging from 0 to 0.4 bar.

For span settings, navigate to Menu > SETTINGS > SPAN SETTING. Span setting consists of Low and High values which are fed manually by the user. Low and high value for span setting can be set in 4mA and 20mA respectively in this menu.

6.3.1 4mA

To set low value for span, navigate to Menu > SETTINGS > SPAN SETTING > 4mA. See fig. 28. Use ***up*** and ***down*** buttons to change a value, ***right*** button to navigate between digits, and once the value is set, press ***accept/confirm*** button to save changes.

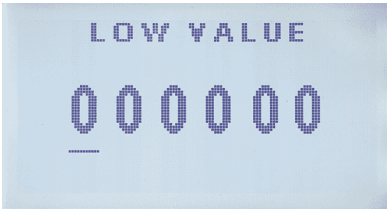

Fig. 25 - Span Setting - 4mA

6.3.2 20mA

To set high value for span, navigate to Menu > SETTINGS > SPAN SETTING > 20mA. See fig. 29. Use ***up*** and ***down*** buttons to change value, ***right*** button to navigate between digits, and once the value is set, press ***accept/confirm*** button to save changes.

Fig. 26 - Span Setting - 20mA

6.4 TOTALIZER

Totalizer sums any time based value. **For example**, a flow rate of 70m³/hr will totalize to a value of 140m³ in two hours.

6.4.1 TOTALIZER ON

Totalizer can be turned on or off by navigating to Menu > SETTINGS > TOTALIZER. Select TOTALIZER ON and press ***enter*** button to toggle totalizer on or off. A check sign next to TOTALIZER ON shows that totalizer is on. See fig. 30.

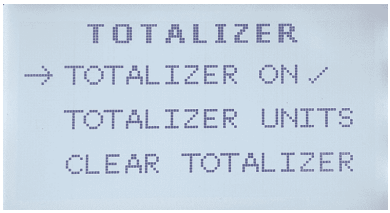

Fig. 27 - Totalizer on

6.4.2 TOTALIZER UNITS

Navigate to Menu > SETTINGS > TOTALIZER > TOTALIZER UNITS. In this menu user can choose from three predefined units:

- Cubic Meters
- Gallons
- Litres

Selected unit is indicated by a check sign next to it. See fig. 31.

Fig. 28 - Totalizer on

6.4.3 CLEAR TOTALIZER

This option clears the totalizer. Navigate to Menu > SETTINGS > TOTALIZER > CLEAR TOTALIZER and press *enter* button. This will take the user to a confirmation screen. Select YES and press *enter* button to clear the totalizer or else select NO and press *enter* button to cancel. See fig. 32.

Fig. 29 - Clear Totalizer

6.5 FLUID DENSITY

For accurate readings, user can input the density of fluid whose flow is to be measured. Navigate to Menu > SETTINGS > FLUID DENSITY and press *enter* button. Use *up* and *down* buttons to enter change the value of the digit and *right* button to navigate between digits. Once the value is set, press *accept/confirm* button to set the value.

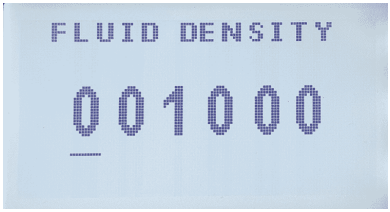

Fig. 30 - Clear Totalizer

6.6 BETA VALUE

Navigate to Menu > SETTINGS > BETA VALUE and press *enter* button. Use *up* and *down* buttons to enter change the value of the digit and *right* button to navigate between digits. Once the value is set, press *accept/confirm* button to set the value.

Fig. 31 - Clear Totalizer

SECTION 7: SD CARD SETTING

ATS-FL2000 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.

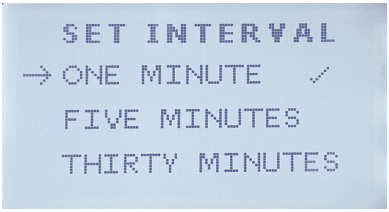

Fig. 32 - Set Interval

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.

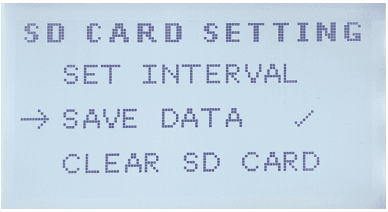

Fig.33 - Save Data

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.

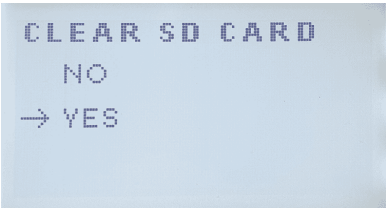

Fig. 34 - Clear SD Card Data

SECTION 8: DEVICE ID

Device ID is a unique six digit number. This is the ID through which ATS-FL2000 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.

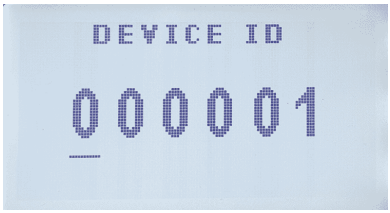

Fig. 35 - Device ID

SECTION 09: PASSWORD SETTING

ATS-FL2000 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. 36 - 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.

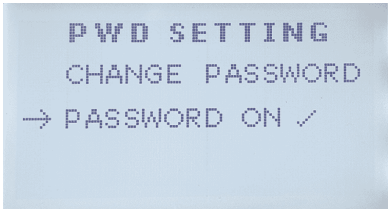

Fig. 37 - Password on

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 10: BAUD RATE

The term baud rate is commonly used when discussing electronics that use serial communication. Baud rate is the information transfer rate in a communication channel.

For example, In the serial port context "9600" baud means that the port is capable of transferring a maximum of 9600 bits of information per second.

10.1 SETTING BAUD RATE

Navigate to MENU > BAUD RATE to access this option. User can select from seven available BAUD rates. Use ***up*** and ***down*** buttons to navigate to the desired BAUD rate and press the ***enter*** button to select it. Selected BAUD rate is indicated by a check sign next to it. See fig. 41.

Fig. 38 - Selected Baud Rate

Following baud rates are available to choose from:

- 9600
- 19200
- 38400
- 57600
- 115200
- 230400
- 250000

SECTION 11: 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 flow rate values displaying or not.

SECTION 12: 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***.

12.1 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.

12.2 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.

12.3 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.

SECTION 13: TECHNICAL DRAWINGS

ATS-FL2000 controller technical detailed dimensions can be seen below:

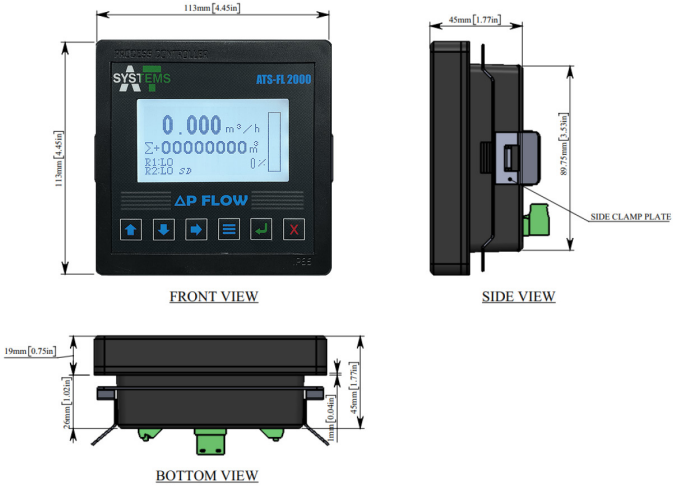

Fig. 39 - Technical Drawings

13.1 EXPLODED VIEW

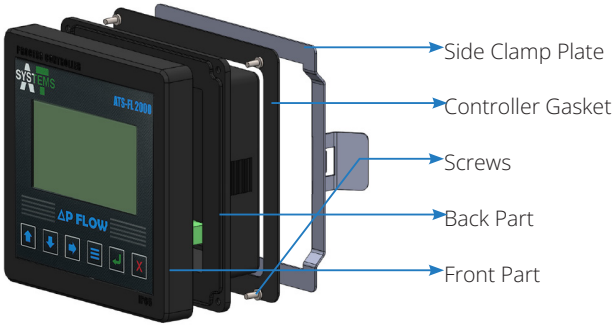

Fig. 40 - Exploded View

Front Part includes LCD and controller buttons PCB.
Back Part includes power supply PCB, Main PCB and connectors.
Controller Gasket is provided for insulation of controller with electrical panel and IP65 protection.
Side Clamp Plate is provided for clamping of controller with electrical panel.
Screws are for front and back box encapsulation and IP65 protection.

NOTES:

NOTES:

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