

ATS-DM 1000

dataM Controller



User Instruction Manual

ATS-DM 1000 Process Controller

Read this before using ATS-DM 1000

Thank you for choosing ATS-DM 1000 controller.

ATS-DM 1000 dataM Controller is a general-purpose industry standard controller for use in real time monitoring, analyzing and logging of up to 4 parameters of any industrial system. With a wide range of user selectable display units, dataM packs advanced features like independent span adjustment and calibration, remote and local relay operation. A simple six button layout provides 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. Multiple dataM controllers can be installed for monitoring all parameters of a plant on a single screen to obtain a comprehensive profile of the entire plant performance. It has a robust design with standard panel mount fitting.

Inspect the shipping package for any damage. Open the package and inspect box content 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.

This manual explains describes the functions and use of ATS-DM 1000 controller. It is intended for use by trained personnel of the owner, who have the task of operating and/or maintaining the respective appliance. Before using ATS-DM 1000, read this manual careful to familiarize yourself with the instrument.

To ensure steady performance, use this manual to train your personnel for the proper installation, operation, and maintenance of the product. When replacement parts are required, ensure that qualified personnel use replacement parts specified by AT Systems representative or call at the number provided on the back of this manual for assistance. Unauthorized parts and procedures can affect the product's performance and endanger the safe operation of the process.



Warning!

Instrument maintenance and electrical connections require access to shock hazard level voltages which can cause death or serious injury. Disconnect all hazardous voltages and relay connections before making electrical connections to the instrument. The 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-DM 1000 dataM Controller is a general-purpose industry standard controller for use in real time monitoring, analyzing and logging of up to 4 parameters of any industrial system. With a wide range of user selectable display units, dataM packs advanced features like independent span adjustment and calibration, remote and local relay operation. A simple six button layout provides 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. It has a robust design with standard panel mount fitting and a user-friendly interface with 6 control buttons and a 128 x 64mm graphics LCD display.

1.2 FEATURES

ATS-DM 1000 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
- Independent span adjustment and calibration
- 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

Channel Selection	4x 4-20mA based input channels with independent unit selection and span settings.
Measuring Range	Values up to 99999, 0.001 resolution, $\pm 0.1\%$ accuracy.
Span Setting	5-digit independent span selection/adjustment corresponding to 4mA and 20mA inputs.
Micro SD Card for Data Acquisition	Micro SD card installed for data acquisition of all four parameters at user defined time intervals.

Display Units	<p>12 Programmable units:</p> <ul style="list-style-type: none"> • Loop Current - mA (milli amperes) • Conductivity - mS/cm (milli siemens per centimeter) • Conductivity - μS/cm (microsiemens per centimeter) • Total Dissolved Solids - ppt (parts per thousand) • Total Dissolved Solids - ppm (parts per million) • pH • Flow - m³/h (cubic meters per hour) • Flow - GPM (gallons per minute) • Flow - kg/h (Kilo grams per hour) • Pressure - Bar • Pressure - mBar (milli bar) • Pressure - PSI (pounds per square inch) • Temperature - °C (degrees celcius) • Temperature - Kelvin • Percentage - %
RS 485 Communication	RS 485 based communication with AT Systems dataM Software for microSD data retrieval, live data monitoring, data analytics and remote relay operation.
Analog Input Calibration	Factory calibrated 4-20mA analog channel inputs with in-field calibration functionality .
Clock	Internal clock and calendar, 24 Hour format, \pm 1 min/month accuracy.
Security Settings	Password protection.
Relays	2x relays with independent remote and local operation. Rating: 277VAC, 125VDC-Max, 5A .
Device ID	Unique device ID allocation for interfacing multiple controllers with AT Systems dataM 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

1.4 APPLICATIONS

ATS-DM 1000 dataM Controller can be used for various industrial applications such as:

- Reverse Osmosis
- Boilers
- Cooler Towers
- Closed Loop Systems
- Drinking Water Plants
- Textile Industry
- Waste Water Industry

SECTION 2: INSTALLATION

2.1 PANEL MOUNTING

ATS-DM 1000 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.

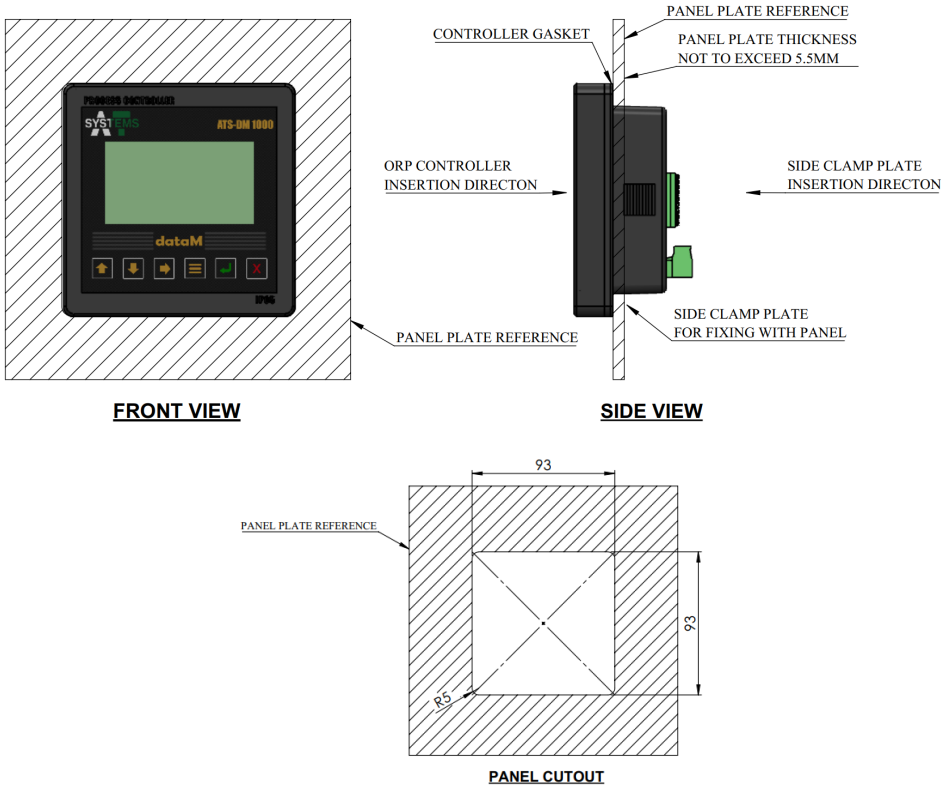


Fig. 1 - ATS-DM 1000 Panel Mounting

2.2 CONNECTIONS

ATS-DM 1000 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-DM 1000 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-DM 1000** 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.

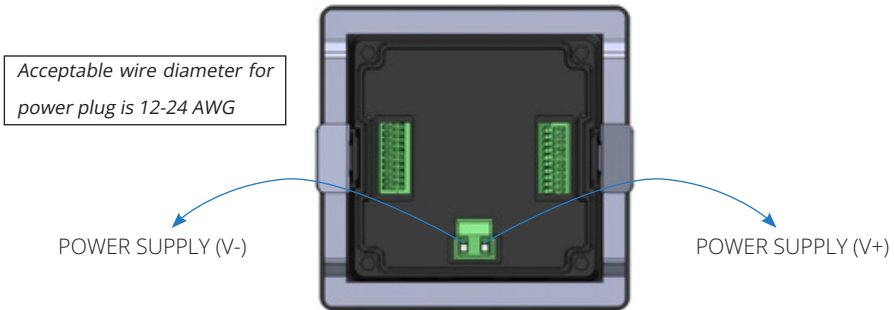


Fig. 2 - ASTDM 1000 VDC Connections

2.2.2 TRANSMITTER CONNECTIONS

Four transmitters can be connected to a single dataM controller. Transmitter cables can be connected to the **ATS-DM 1000** controller terminal strip by connecting the transmitter output 4 ~ 20mA connection with any of the 4 inputs of dataM controller. Make sure that positive and negative connections of the transmitter are connected to the positive and negative terminal of the controller consecutively of a corresponding channel. Route the signal cable away from AC power sources to avoid signal interference. Do not put sensor or signal cables in conduit that contains AC power cables and motor cables. Terminal blocks are labeled on controller back part.

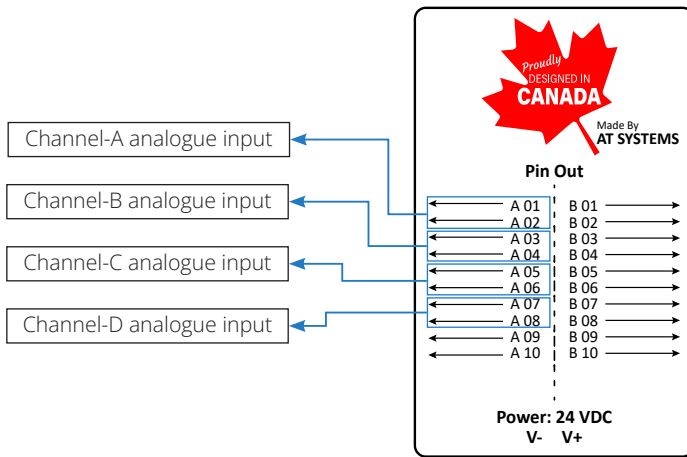


Fig. 3 - Transmitter Connections

Figure above shows the wiring connection names for 4~20mA transmitters and controller **ATS-DM 1000**. Each transmitter wire connection detail is given below:

1. Connect 4~20mA Wire 1 (Red) with Input 1 (+) connection of controller.
2. Connect 4~20mA Wire 2 (Black) 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 or controller with dataM controller which does not support 4~20mA output.

2.2.3 RELAY 1 & RELAY 2 CONNECTIONS

Two Channel relays (Relay low, Relay high) cables can be connected to the **ATS-DM 1000** controller terminal strip by inserting the wires for Relay 1 channel 1 (B01, B02), Relay 2 channel 2 (B03, B04) connections.

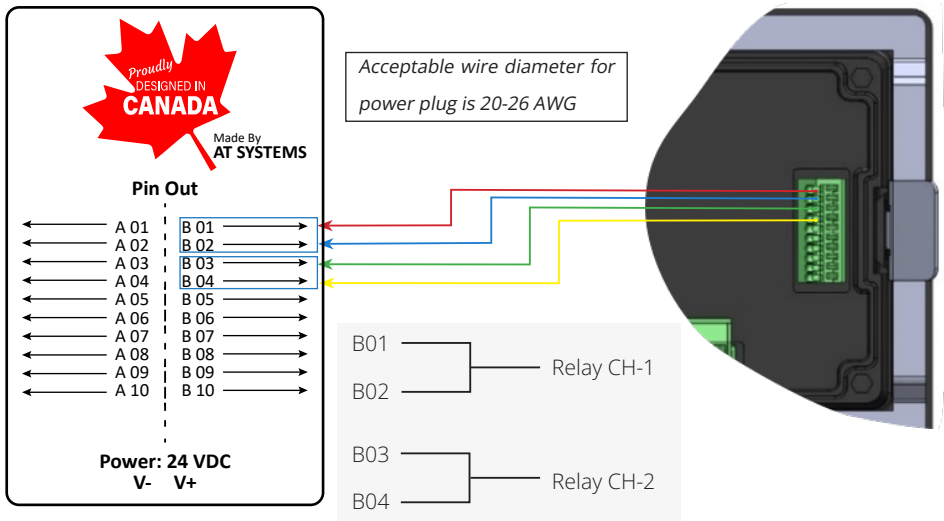


Fig. 4 - Relay 1/2 Connection

2.2.4 RS485 COMMUNICATION WIRE CONNECTIONS

ATS-DM 1000 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.

WIFI based communication can also be integrated on user request.

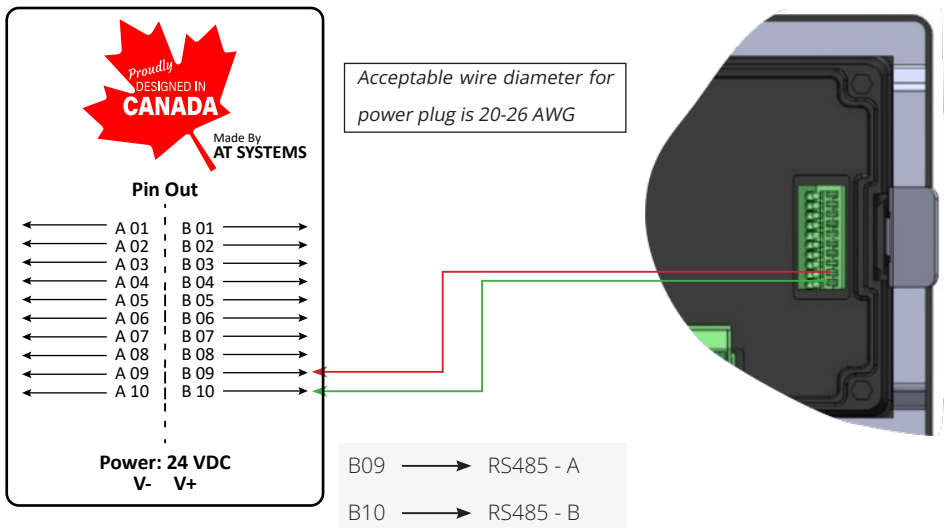


Fig. 5 - Digital Input 1/2 Connection

2.3.5 RELAY CONNECTION LEAFLET



Caution

Read this before connecting ATS-DM1000 controller to any external relays

ATS-DM1000 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-DM1000** controller as shown in the figure below.

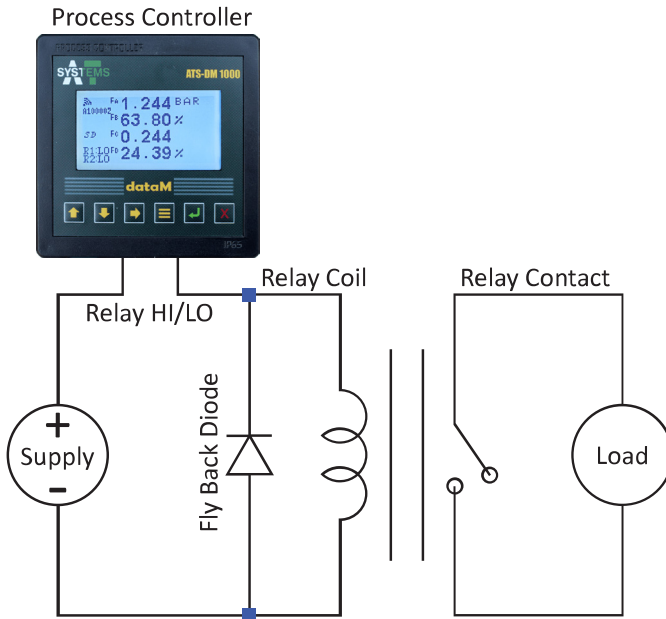


Fig.6 - Fly Black Diode Circuit Diagram

SECTION 3: GENERAL OPERATION

ATS-DM 1000 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

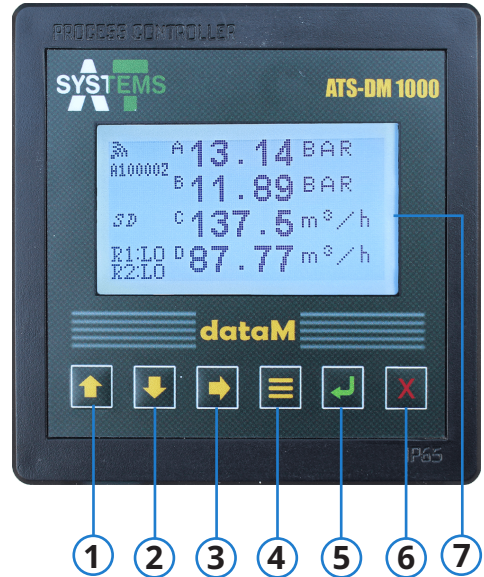



Fig. 6 - ATS-DM 1000 Layout

3.1 START UP

Before Startup, ensure proper transmitter wire connections and the clamping of controller with panel plate. To start **ATS-DM 1000** connect the power connector to the back of instrument. Fig. 7 shows the main LCD display and the information it displays.

1	WiFi Indication. This symbol changes to  when WiFi is connected.
2	WiFi ID
3	SD card indicator. Appears if SD is installed
4	Relay 1 and Relay 2 status
5	Parameters A, B, C and D
6	Value of each parameter
7	Parameter value units

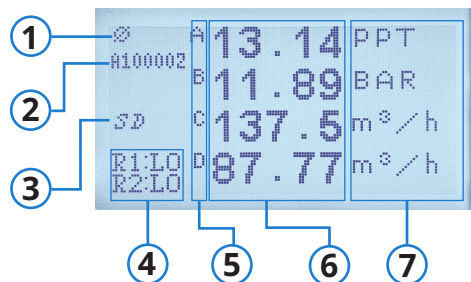



Fig. 7 - Parameters Screen

While on the main start-up screen, *right* button can be pressed to toggle between functions screen and parameters screen. Fig. 8 below shows the functions screen.

1	WiFi Indication. This symbol changes to  when WiFi is connected.
2	WiFi ID
3	SD card indicator. Appears if SD is installed
4	Relay 1 and Relay 2 status
5	Functions A, B, C and D
6	Value of each function
7	Function value units

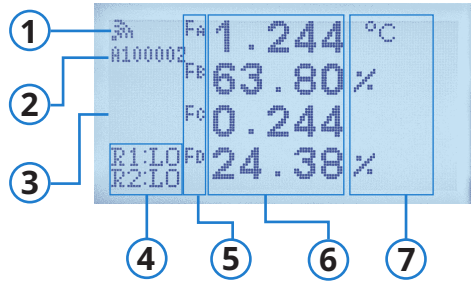


Fig. 8 - Functions Screen

3.2 OPERATING THE CONTROLLER

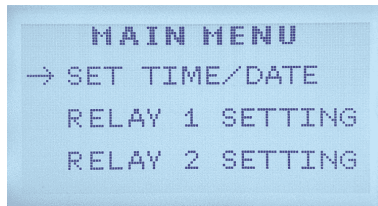
3.2.1 MENU NAVIGATION

ATS-DM 1000 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.



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).

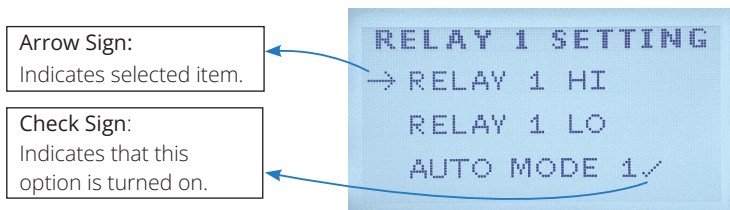


Fig. 10(a) - Menu Navigation - Selected and checked menu options

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.

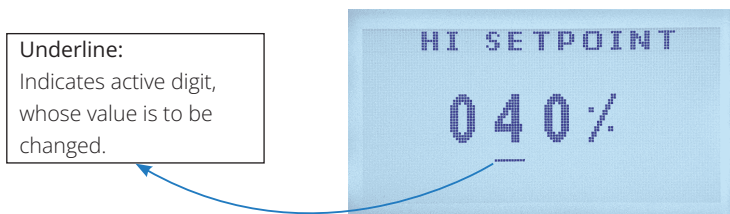


Fig. 10(b) - Menu Navigation - Setting values

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.

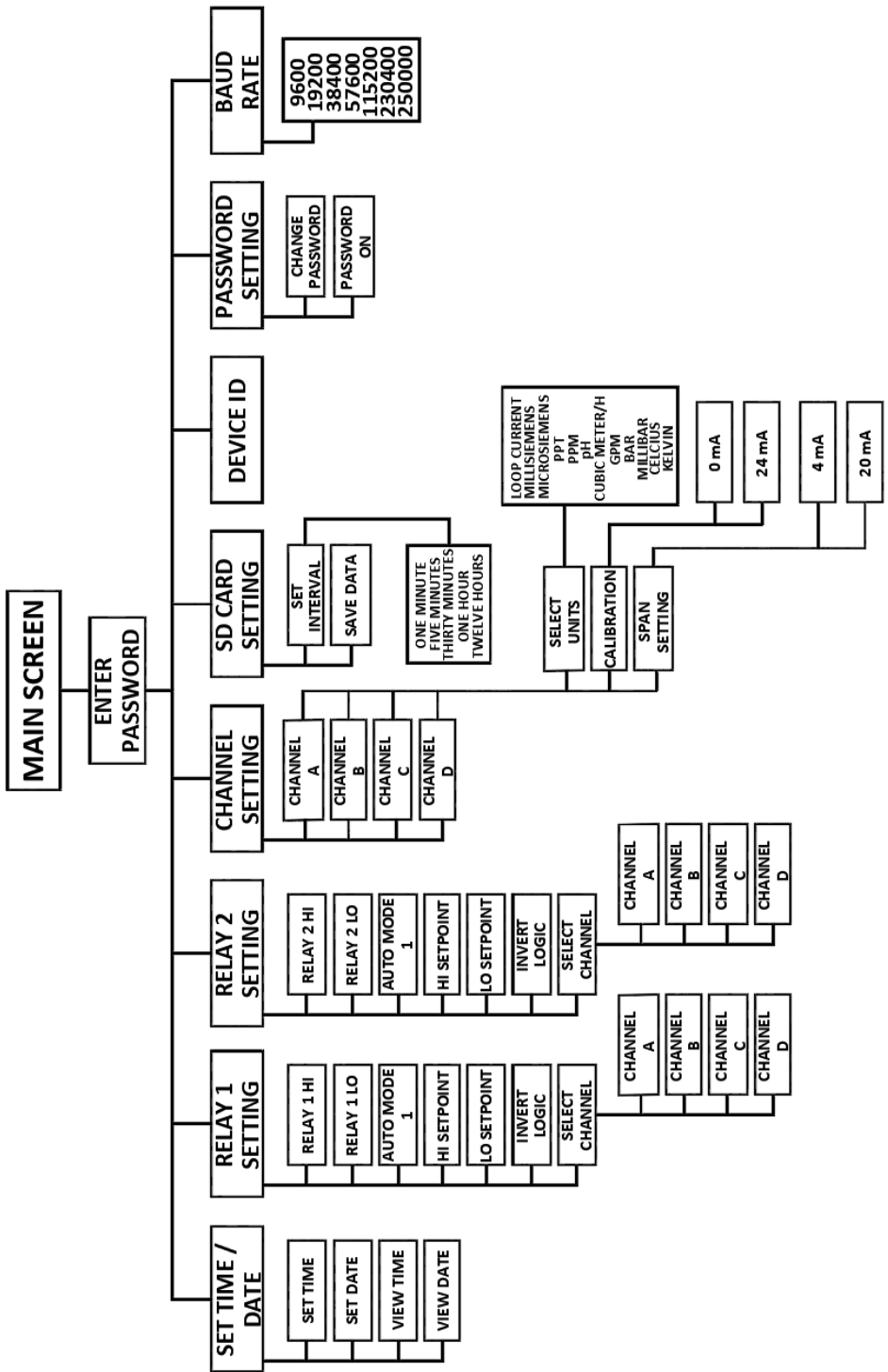


Fig. 11 - Menu Tree

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.

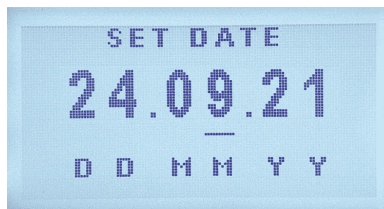


Fig. 13 - Set Date

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).

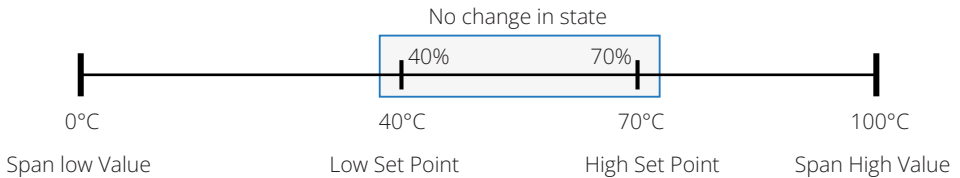


Fig. 17 - Auto Mode 1

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% ($100^{\circ}\text{C} \times 40\% = 40^{\circ}\text{C}$) and high set point of 70% ($100^{\circ}\text{C} \times 70\% = 70^{\circ}\text{C}$). 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.

5.1.3.4 SELECT CHANNEL

User can select a channel input for the auto operation of relay 1. Four channels, **CHANNEL A**, **CHANNEL B**, **CHANNEL C**, and **CHANNEL D** are available. Navigate to **Menu > RELAY 1 SETTING > SELECT CHANNEL** under **AUTO MODE 1** and press **enter** button. Select the desired channel and press **enter** button. A check sign next to a channel name indicates the selected channel (see fig. 20).

For channel settings refer to section 6.

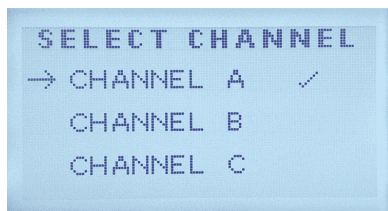


Fig. 20 - Auto Mode 1 - Select Channel

5.1.4 AUTO MODE 2

In **AUTO MODE 2**, relay 1 will operate based on the value of selected function. Low and high set points can be fed to the controller by user by navigating to **Menu > RELAY 1 SETTING** and choosing **LO SETPOINT** and **HI SETPOINT** under **AUTO MODE 2**.

Unlike **AUTO MODE 1**, low and high set points are not percentages of function values but are actual values with same units as a selected function.

*All options in this mode are same as **AUTO MODE 1** except for **SELECT CHANNEL** option. In **AUTO MODE 2**, since it operates based on function values rather than channel input values, it has **SELECT FUNCTION** option instead of **SELECT CHANNEL** option.*

5.1.4.1 SELECT FUNCTION

User can choose from four available functions, **FUNCTION A**, **FUNCTION B**, **FUNCTION C**, and **FUNCTION D**. Navigate to **Menu > RELAY 1 SETTING > SELECT FUNCTION** under **AUTO MODE 2** and press **enter** button. Select the desired function

and press **enter** button. A check sign next to a function name indicates the selected function (see fig. 21).

For channel functions refer to section .

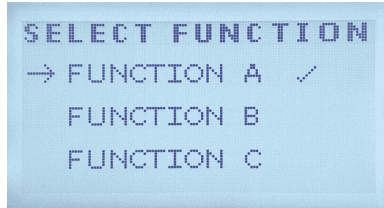


Fig. 21 - Auto Mode 2 - Select Function

5.1.5 TRIGGER DELAY

5.1.5.1 DESCRIPTION

Trigger delay is the time interval between a trigger event and when a controller actually triggers.

For example, Lets suppose that **AUTO MODE 1** is selected and low set point is set to 10%, which is a trigger event to turn the relay on. When the value falls below 10%, the controller will turn on the relay immediately. But if a trigger delay of 5 seconds is set and value falls below 10%, then the controller will wait 5 seconds and after 5 seconds, if value is still below 10%, then controller will set the relay to on state or else it will not.

5.1.5.2 TURN TRIGGER DELAY ON OR OFF

To turn trigger delay on or off, navigate to **Menu > RELAY 1 SETTING > TRIGGER DELAY**. Press **enter** button to turn trigger delay on or off. A check sign next to **TRIGGER DELAY** option shows that trigger delay is on. Fig. 22 shows trigger delay.

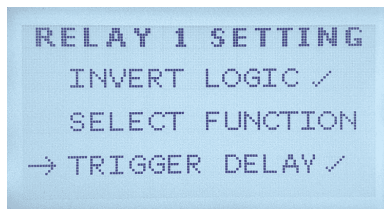


Fig. 22 - Trigger Delay

5.1.5.3 ON DELAY

This option lets the user to set a delay before setting relay to on state. Navigate to [Menu > RELAY 1 SETTING > ON DELAY](#) and Press *enter*. Use *up* and *down* buttons to change the value and *right* button to navigate between digits. Once the value is set, press *accept/confirm* button.



Fig. 23 - Trigger Delay - On delay

5.1.5.4 OFF DELAY

This option lets the user to set a delay before setting relay to off state. Navigate to [Menu > RELAY 1 SETTING > OFF DELAY](#) and Press *enter*. Use *up* and *down* buttons to change the value and *right* button to navigate between digits. Once the value is set, press *accept/confirm* button.



Fig. 24 - Trigger Delay - Off delay

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: CHANNEL SETTING

IN [CHANNEL SETTING](#) user can set up all four channels, CHANNEL A, CHANNEL B, CHANNEL C, and CHANNEL D as per needs of the operation. Navigate to [MENU > CHANNEL SETTING](#) and press *enter* button.

6.1 CHANNEL A

To set up channel A, navigate to [Menu > CHANNEL SETTING > CHANNEL A](#) and press *enter* button.

6.1.1 SELECT UNITS

This menu sets a unit for channel A. To select a desired unit, navigate to [Menu > CHANNEL SETTING > CHANNEL A > SELECT UNITS](#). Selected parameter unit is shown by a check sign next to its name as shown in fig. 25.

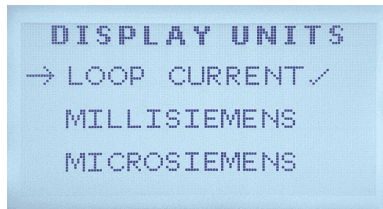


Fig. 25 - Display Units - Selected display unit

User can select a unit from a wide range of 16 units:

- Loop Current
- Milli Siemens
- Micro Siemens
- PPT
- PPM
- pH
- Cubic meters/hour
- GPM
- Bar
- Millibar
- Celsius
- Kelvin
- Meters
- PSI
- Kg/hour
- Percentage

6.1.2 CALIBRATION

ATS-DM 1000 is factory calibrated. However, if needed, can be calibrated using an industrial grade loop calibrator to calibrate 4~20mA channel input. To calibrate channel A analogue values, navigate to [Menu > CHANNEL SETTING > CHANNEL A > CALIBRATION](#). High and low values can be calibrated through [4mA](#) and [20mA](#) options respectively in this menu.

4mA

To calibrate low value, navigate to **Menu > CHANNEL SETTING > CHANNEL A > CALIBRATION > 4mA**. See fig. 26.



Fig. 26 - Calibration - 4mA

20mA

To calibrate high value, navigate to **Menu > CHANNEL SETTING > CHANNEL A > CALIBRATION > 20mA**. See fig. 27.

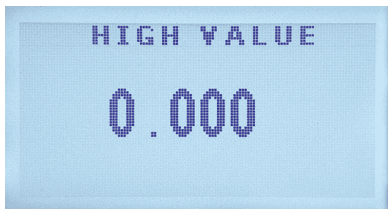


Fig. 27 - Calibration - 20mA

6.1.3 SPAN SETTING

DESCRIPTION

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 > CHANNEL SETTING > CHANNEL A > 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. Span unit is the same as selected for a corresponding channel.

4mA

To set low value for span, navigate to **Menu > CHANNEL SETTING > CHANNEL A > 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.

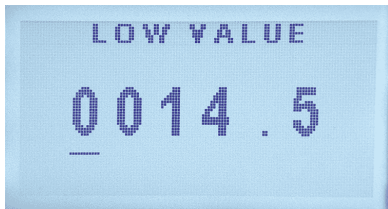


Fig. 28 - Span Setting - 4mA

20mA

To set high value for span, navigate to **Menu > CHANNEL SETTING > CHANNEL A > 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. 29 - Span Setting - 20mA

6.1.4 TOTALIZER

DESCRIPTION

Totalizer sums any time based value.

For example, a flow rate of 70m³/hr will totalize to a value of 140m³ in two hours.

TOTALIZER ON

Turn the totalizer on or off through this menu. Navigate to **Menu > CHANNEL SETTING > CHANNEL A > 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.

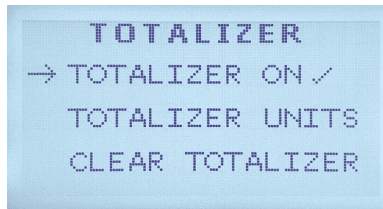


Fig. 30 - Totalizer on

To turn totalizer on, units selected for corresponding channel should must be time based.

For example, gallons per minute, gallons per hour, cubic meters per hour etc.

TOTALIZER UNITS

To select a unit for totalizer, navigate to **Menu > CHANNEL SETTING > CHANNEL A > TOTALIZER > TOTALIZER UNITS**. User can choose from four predefined units:

- Cubic meter
- Gallon
- Litre
- KG

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

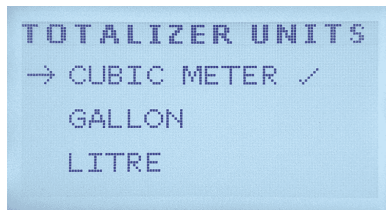


Fig. 31 - Totalizer units - Selected Unit

CLEAR TOTALIZER

This option clears the totalizer. Navigate to **Menu > CHANNEL SETTING > CHANNEL A > 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. 32 - Clear Totalizer

DISPLAY ON

This option displays the totalizer reading on main parameters screen. See fig. 31. Totalizer reading is shown against a corresponding channel.

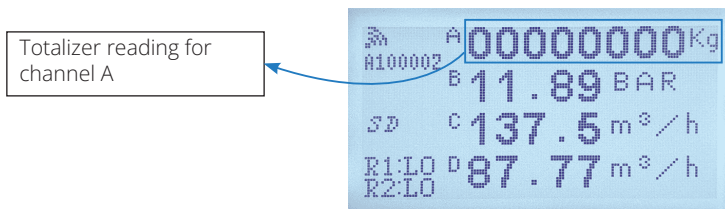


Fig. 33 - Totalizer - Display on Main Parameters Screen

Navigate to **Menu > CHANNEL SETTING > CHANNEL A > TOTALIZER > DISPLAY ON** and press **enter** button to toggle totalizer display on or off. A check sign next to **DISPLAY ON** indicates that the totalizer is on for a corresponding channel. See fig. 34.

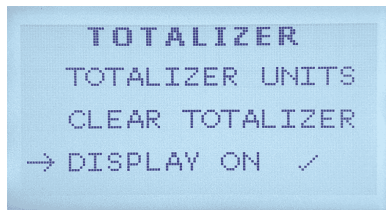


Fig. 34 - Totalizer - Display on

6.2 CHANNEL B

Navigate to [Menu > CHANNEL SETTING > CHANNEL B](#) to customize channel B setting as per user requirements.

All options for [CHANNEL B](#) are same as [CHANNEL A](#). See section 6.1 for details.

6.3 CHANNEL C

Navigate to [Menu > CHANNEL SETTING > CHANNEL C](#) to customize channel B setting as per user requirements.

All options for [CHANNEL C](#) are same as [CHANNEL A](#). See section 6.1 for details.

6.4 CHANNEL D

Navigate to [Menu > CHANNEL SETTING > CHANNEL D](#) to customize channel B setting as per user requirements.

All options for [CHANNEL D](#) are same as [CHANNEL A](#). See section 6.1 for details.

SECTION 7: SD CARD SETTING

ATS-DM 1000 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. 35.

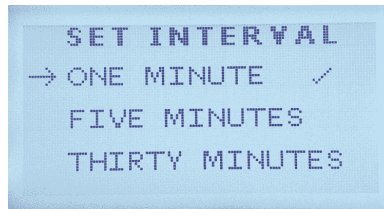


Fig. 35 - Set Interval

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. 36.



Fig.36 - 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. 37.



Fig. 37 - Clear SD Card Data

SECTION 8: DEVICE ID

Device ID is a unique six digit number. This is the ID through which **ATS-DM 1000** 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. 38.



Fig. 38 - Device ID

SECTION 9: PASSWORD SETTING

ATS-DM 1000 menu access can be protected by a four digit password. Navigate to [MENU > PASSWORD SETTING](#) to access password settings.

9.1 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](#)

9.1.1 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. 39.



Fig. 39 - Change Password

9.2 PASSWORD ON

Password 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. 40.

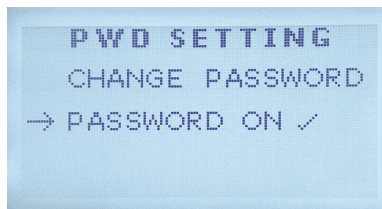


Fig. 40 - Password on



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

10.1 DESCRIPTION

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.

10.2 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. 41 - Selected Baud Rate

Following baud rates are available to choose from:

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

SECTION 12: CHANNEL FUNCTIONS

Functions can be used for auto mode 2 (See section 5.1.4) of relay operations or for other purposes like calculating recovery, salt reject, differential pressure etc. Functions are display on main function screen See section 3.1 for details.

Navigate to **MENU>CHANNEL FUNCTIONS** to access channel functions menu. Here you can define a specific function or select a unit for that function for any of the four available functions (FUNCTION A, FUNCTION B, FUNCTION C, and FUNCTION D).

12.1 FUNCTION A

FUNCTION A lets the user to define a function and select units for function A. Navigate to **MENU > CHANNEL FUNCTIONS > FUNCTION A** and press *accept/confirm* button. Function A screen is shown in fig. 42.

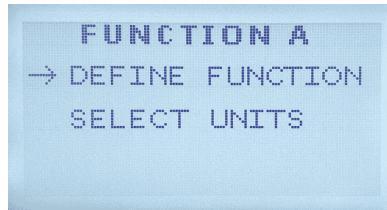


Fig. 42 - Function A

12.1.1 DEFINE FUNCTION

DESCRIPTION

Functions can be used to calculate complex values. Functions accept values from channel inputs as well as from other functions which adds to the various possible applications of **ATS-DM 1000** controller. Functions can be used to calculate salt rejection, recovery, differential pressure, percentage, temperature difference etc. A few examples are given below to help the user understand various applications of functions.

Example 1: Calculating plant recovery.

To calculate plant recovery, two parameters are required. One is feed flow rate and the other is permeate flow rate. Recovery can be calculated as:

$$\text{Recovery} = (\text{Permeate Flow Rate} / \text{Feed Flow Rate}) * 100$$

So to calculate recovery, permeate flow rate and feed flow rate can be input through channel A and channel B respectively. A function can be defined as below to

calculate recovery.

$$\text{Function A} = (A \div B) \times c$$

Where

A = Channel A input (Permeate Flow Rate)

B = Channel B input (Feed Flow Rate)

and constant "c" can be set to 100.

Example 2: Calculating differential pressure.

To calculate pressure drop between two points (say point 1 and point 2), Pressure P1 at point 1 and Pressure P2 at point 2 is required. Differential pressure between the two points can be calculated as:

$$\text{Differential Pressure} = P1 - P2$$

For calculating differential pressure, Pressure "P1" at point and pressure "P2" at point 2 can be fed to the controller as channel A and channel B inputs. A function (say function C) to calculate differential pressure can be defined as:

$$\text{Function C} = (A - B)$$

Where

A = Channel A input (P1)

B = Channel B input (P2)

Functions can also take other functions as input, rather than channel inputs.

DEFINING A FUNCTION

To define function A, navigate to [MENU > CHANNEL FUNCTIONS > FUNCTION A > DEFINE FUNCTION](#) and press **accept/confirm** button. Fig. 43 shows define function screen.

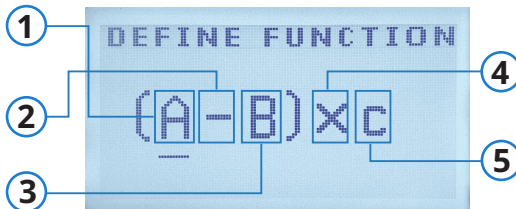


Fig. 43 - Define Function A

All components are described in table below.

1 & 3	Can be input from any of the channels represented by A, B, C, D for each of corresponding channel inputs or the value of any function (other than the function being defined) represented by F_A , F_B , F_C , F_D .
2 & 4	It can be any of the four basic arithmetic operators - Addition (+), subtraction (-), Multiplication (x), Division (\div), or it can be an underscore (_) which can be used if the value from next element is not needed as it disables the next value. See fig. 44.
5	"c" is constant whose value is manually fed to the controller by the user.

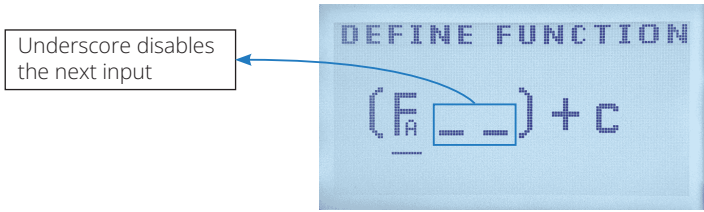


Fig. 44 - Defining a Function

To define a function use **right** button to navigate between digits. **Up** and **down** buttons can be used to navigate between channel inputs or function inputs or to cycle between arithmetic operators.

To set the value of constant "c", navigate to **c** using right button. Press the **enter** button to set the constant value. See fig. 45.



Fig. 45 - Constant Value

Constant value can be set to a positive or negative value. Use **up** and **down** buttons to change values or to change the constant value to a negative or positive number. Use **right** button to navigate between digits. Once the value is set, press **accept/confirm** button to set constant value.

12.1.2 SELECT UNITS

To select units for a function navigate to **MENU > CHANNEL FUNCTIONS > SELECT UNITS** and press **enter** button. Use **up** and **down** buttons to select a desired

unit from the list of available units and press **enter** button. A check sign next to a unit indicates that it is active unit. See fig. 46.

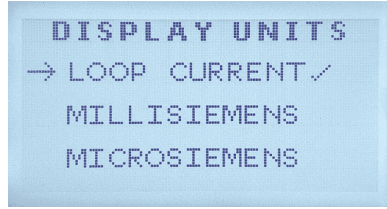


Fig. 46 - Selected Unit

Available units for a function are given below:

- Loop Current
- PPM
- Bar
- Meters
- Milli Siemens
- pH
- Millibar
- PSI
- Micro Siemens
- Cubic meters/hour
- Celsius
- Kg/hour
- PPT
- GPM
- Kelvin
- Percentage

12.2 FUNCTION B

Navigate to [Menu](#) > [CHANNEL FUNCTIONS](#) > [FUNCTION B](#) to customize channel B setting as per user requirements.

All options for [FUNCTION B](#) are same as [FUNCTION A](#). See section 12.1 for details.

12.3 FUNCTION C

Navigate to [Menu](#) > [CHANNEL FUNCTIONS](#) > [FUNCTION C](#) to customize channel B setting as per user requirements.

All options for [FUNCTION C](#) are same as [FUNCTION A](#). See section 12.1 for details.

12.4 FUNCTION D

Navigate to [Menu](#) > [CHANNEL FUNCTIONS](#) > [FUNCTION D](#) to customize channel B setting as per user requirements.

All options for [FUNCTION D](#) are same as [FUNCTION A](#). See section 12.1 for details.

