OPERATION MANUAL

DR-324

HANDHELD PARTICLE COUNTER DR-324-9800 Rev A

Met One Instruments

POWERED BY ACOEM

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Met One Instruments

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1. Introduction

The DR-324 is a full–featured, battery operated, handheld particle counter. The unit will measure particle counts at four sizes. Default count sizes are 0.3 µm, 0.5 µm, 5.0 µm, and 10.0 µm. Each of the four sizes is user configurable.

This instrument can store up to 15,000 sample events including data from the ambient temperature (AT) / relative humidity (RH) probe. Sample history events can be viewed on the LCD display and downloaded to a computer.

An optional Docking Station complements the DR-324. It charges the unit and increases communication options with RS-485, Ethernet, and WiFi.

1.1. About This Manual

This document is organized with the most important information toward the front of the manual. All users should read and understand the sections on setup, operation, and field audits. Toward the back are sections that provide in-depth information on subjects such as diagnostics and accessories. These sections should be consulted as needed. This manual is periodically revised for maximum accuracy and to incorporate new features or updates. User feedback is welcome. An electronic version of this manual is available upon request.

1.2. Technical Service

This manual is structured by customer feedback to provide the required information for setup, operation, testing, maintaining, and troubleshooting the DR-324. Should you still require support after consulting the documentation, we encourage you to contact one of our expert Technical Service representatives during normal business hours of 7:00 a.m. to 4:00 p.m. Pacific Time, Monday through Friday. Product warranty information is available at https://metone.com/met-one-warranty. In addition, technical information and service bulletins are often posted on our website. Please contact us and obtain a Return Authorization (RA) number before sending any equipment back to the factory. This allows us to track and schedule service work and to expedite customer service.

Contact Information:	Tel:	+ 541 471 7111	Address:	Met One Instruments
	Fax:	+ 541 471 7116		200 NE Greenfield Rd
	Web:	www.metone.com		Grants Pass, Oregon 97526
	Email:	service.moi@acoem.com		U.S.A.

Please have the instrument serial number available when contacting the manufacturer. On most models manufactured by Met One Instruments, it will be located on a silver product label on the unit and also printed on the calibration certificate. The serial number will begin with a letter(s) and be followed by a unique five-digit number such as U15915.

NOTICE

CAUTION—Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

WARNING—This product, when properly installed and operated, is considered a Class I laser product. Class I products are not considered to be hazardous.

There are no user serviceable parts located inside the cover of this device.

Do not attempt to remove the cover of this product. Failure to comply with this instruction could cause accidental exposure to laser radiation.

2. Setup

The following sections cover unpacking, layout and performing a test run to verify operation.

2.1. Unpacking

Unpack and inspect the contents of the shipping container. Standard items (included) are shown in Figure 1 - Standard Equipment. Optional accessories are shown in Figure 2 – Optional Accessories. Contact the supplier if any items are missing. Any damages incurred during shipping are the responsibility of the carrier. If any damage to the shipment is noticed before unpacking, a claim must be filed with the commercial carrier immediately. You should follow any special unpacking instructions provided by the carrier as you then carefully remove all items from the containers and inspect each component. It is recommended to document and photograph all damaged packages and items before, during, and after unpacking them. Contact Met One Instruments, Inc. (see the Technical Support section at the beginning of this manual) to arrange for any replacement items needed.

ATTENTION:
A Silicon Labs CP210x Driver for the USB connection must be installed before connecting to the USB Type C port.

Driver download weblink: https://metone.com/usb-drivers/

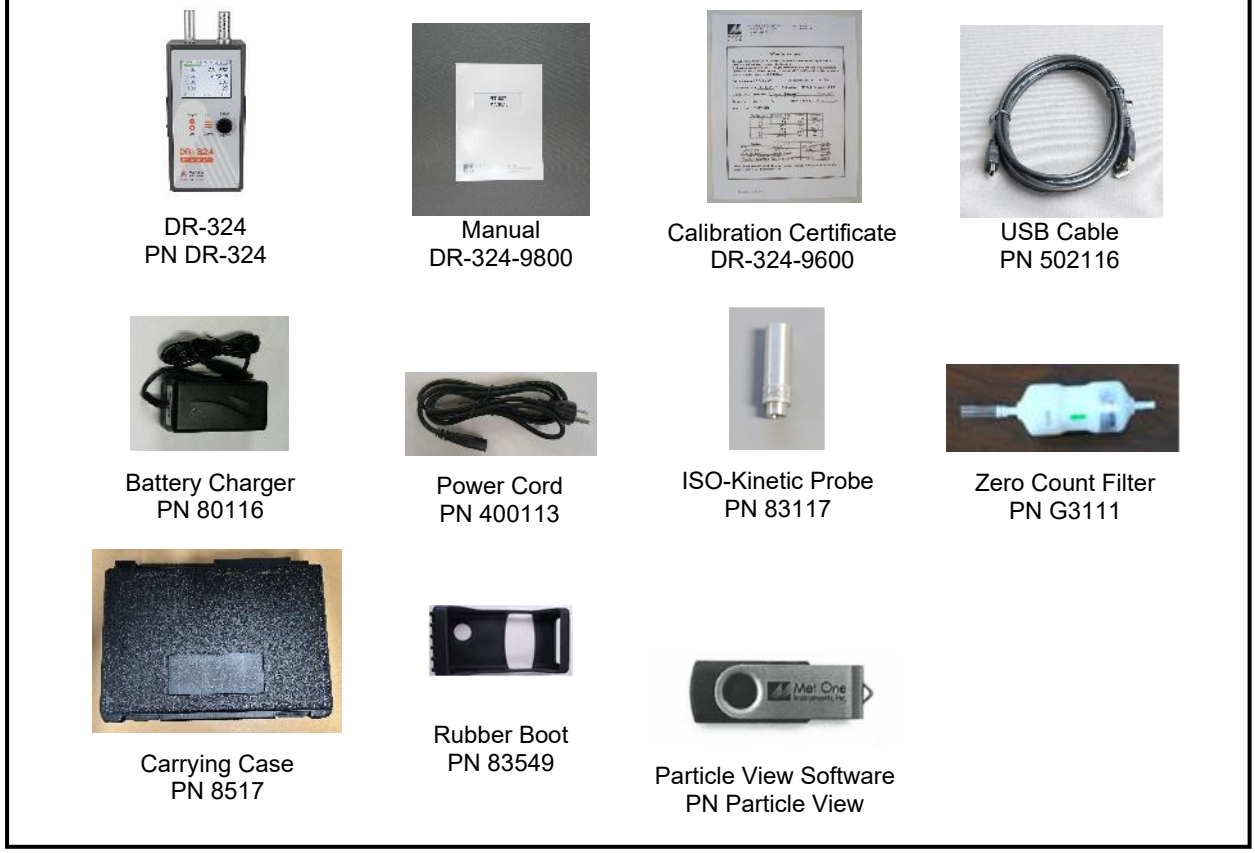


Figure 1 - Standard Equipment

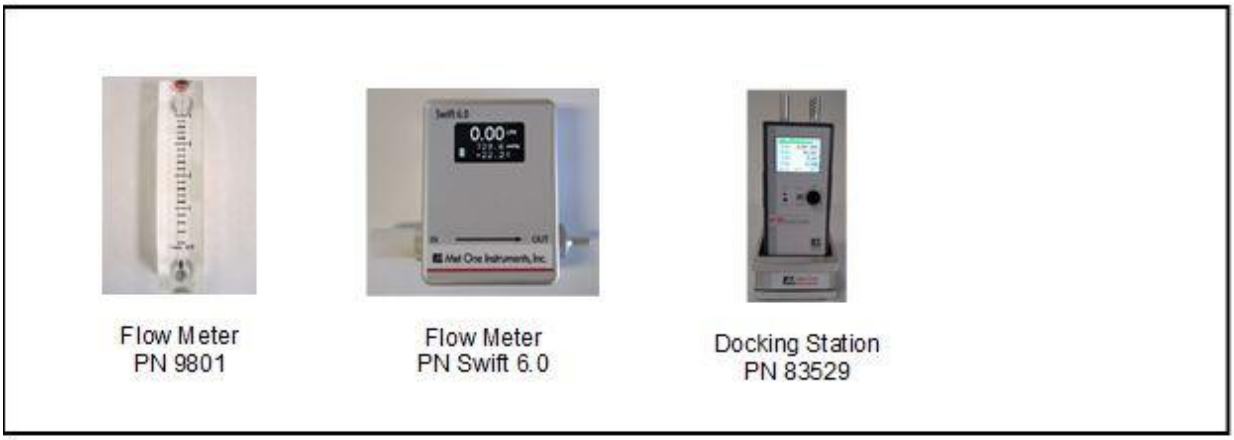


Figure 2 – Optional Accessories

2.2. Layout

Figure 3 shows the layout of the DR-324 and provides a description of each of the components.

Figure 3 – DR-324 Layout

Component	Description
Power Switch	Switch that turns the DR-324 on or off. Slide up (towards inlet nozzle) to turn on and slide down to turn off.
Charging Jack	Input jack for the battery charger. This connection charges the internal battery pack and provides continuous operating power for the unit.
Keypad	2 key membrane keypad.
USB C Port	For USB serial communication and data download.
Rotary Dial	Multifunction dial (rotate and press).
AT/RH Sensor	Integrated sensor that measures ambient temperature and relative humidity.
Isokinetic Probe	The isokinetic probe reduces turbulence in the air sample. It attaches over the air inlet nozzle.
Bottom Connection	For use with the optional 83529 Docking Station. This is used to charge the unit and transfer data through the docking station.

2.3. Default Settings

The DR-324 comes with the user settings configured as follows.

Parameter	Value
Sample Mode	Continuous
Count Mode	Cumulative
Sample Time	60 seconds
Sample Hold Time	0 seconds
Volume (concentration)	CF (particles / ft^3)
Temperature Units	C
USB Baud Rate	115200

2.4. Initial Operation

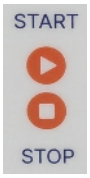
Before operating the DR-324 for the first time, it is recommended that the unit be fully charged. Information regarding charging the battery is found in section 6 of this manual.

Complete the following steps to verify proper operation.

1. Slide the power switch up to turn on the power.
2. Observe the Startup screen for 2 seconds then the Operate screen (Section 4.3)
3. Press **START/STOP** key. The DR-324 will begin sampling.
4. Observe the count levels on the display.
5. Turn the rotary dial to view location setting.
6. The unit is ready for use.

3. User Interface

The DR-324 user interface is composed of a rotary dial, 2 button keypad, and an LCD display. The following table describes keypad functionality. Note some keys have more than one function.

Key	Description
	• Operate Screen: Starts or stops a sample. • Settings Menu: Return to Operate screen. • Edit Setting: Cancel edit mode and return to Operate screen.
	• Operate Screen: Display the Settings menu. • Settings Menu: Return to previous screen. • Edit Setting: Cancel edit mode and return the previous menu.
	**Press Function** • Operate Screen: Display the sample history. • Settings Menu: Select the highlighted menu item. • Edit Setting: Enter setting edit mode. **Dial Function** • Operate Screen: dial to scroll parameter list. • Settings Menu: dial to move/scroll highlight to menu item. • Edit Setting: dial to change picklist and numerical parameters

4. Operation

The following sections cover the basic operation.

4.1. About the Measurement

The DR-324 counts and sizes particles in 4 different size ranges.

4.2. Power Up

DR-324 power is controlled by a slide switch located on the left hand side of the unit. Move the power switch to the on position (towards the top of the case) to power up the unit.

The first screen shown on power up is the Startup screen. This screen briefly displays the company logo before loading the Operate Screen.

4.3. Operate Screen

The Operate screen displays the sample status, date and time, battery status, sample data, location, temperature, and relative humidity. Figure 4 shows the Operate screen. Four size channels are displayed. Rotate the dial to display the location.

Figure 4 – Operate Screen

4.3.1. Sampling

The Operate screen displays current sample information when the unit is sampling (real time data). Concentration values are time dependent so these values may fluctuate early in the sample; however, after several seconds the measurement will stabilize.

4.3.2. Sample Status

The top of the Operate screen displays the status of the DR-324 while the unit is sampling. The time remaining is shown at the top left of the screen. A status bar fills with green as time progresses. If a hold time is entered, the status bar will fill yellow during the hold time.

4.3.3. Sample History

Sample history (previous data) can be viewed on the Operate screen when the unit is stopped or sampling. Pressing the knob puts the Operate screen in History Mode. History mode allows you to scroll through previously recorded samples and view the historical data.

In history mode, use the dial action of the rotary knob to scroll through the previous sample data records. Note the red arrows at the top indicate record scrolling mode (see Figure 5). To see additional data for a given record, press down on the rotary dial to enter the data scrolling mode. Using the dial action of the rotary knob will scroll the data up and down and enable users to view the data stored on each channel. Data scrolling mode is indicated by black arrows on the right side of the display (see Figure 6). Press down on the rotary knob again to switch back to record scrolling mode; use the ESC button to exit history mode. A new sample can be started without exiting the history mode by pressing the START button.

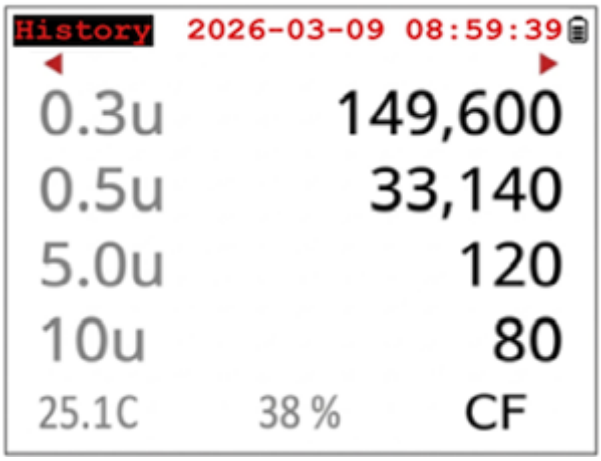


Figure 5 - History Record Scroll Screen

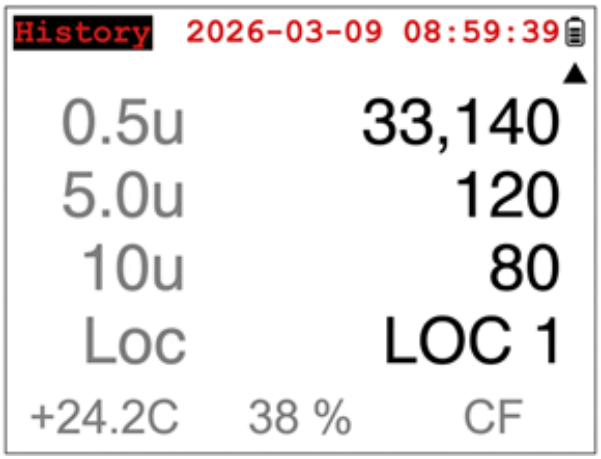


Figure 6 – History Data Scroll Screen

4.4. Sample Related Functions

The following sub-sections cover sample related functions.

4.4.1. Starting/Stopping

To start or stop a sample, press the **START/STOP** key. A sample event can be manually started or stopped from either the Operate screen or the menu.

4.4.2. Samples

Samples controls the number of samples or continuous sampling. See section 5.2.2.

4.4.3. Count Mode

The count mode determines if particle counts are displayed in `Cumulative` or `Differential` mode. Count modes are discussed in section 5.2.3

4.4.4. Sample Time

The sample time is the length of time, in seconds, that the unit will operate for each sample. The sample time is user selectable for 30-9,999 seconds. See section 5.2.4

4.4.5. Hold Time

The hold time is used when the Samples is set to 0 (continuous) or some number >1. The hold time represents the time from the completion of the last sample to the start of the next sample. The hold time is user settable from 0 – 9,999 seconds and is discussed in section 5.2.5.

4.4.6. Sample Timing

The following figures depict the sample timing sequence for both single and multiple sample modes. Figure 7 shows the timing for single sample mode. Figure 8 shows the timing for multiple sample mode.

Figure 7 – Single Sample Mode

Figure 8 – Multiple Sample mode

5. Menu Selections

The Main Menu is accessible by pressing the **MENU** key on the Operate screen. The table below and Figure 9 show the Main Menu items. Use the rotary dial to highlight the desired menu item and then press it to enter that menu screen.

Menu Item	Description
`Sample Setup`	View / change sample settings (location ID, single or continuous mode, cumulative or differential count mode, sample time and hold time) and sample sizes.
`Toolbox`	View / change units, memory, flow, and display.
`Initial Setup`	View / change serial settings, clock, and locations.
`About`	Display firmware version, serial number, service contact, calibration date, and run time.

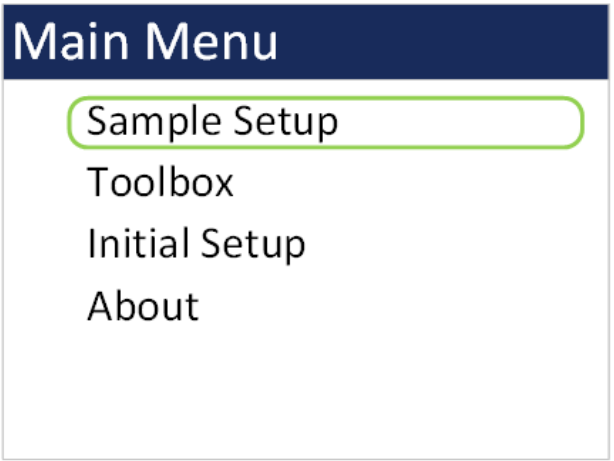


Figure 9 – Main Menu Screen

5.1. Edit Menu Items

To change settings, press **MENU** to display the Main Menu, rotate the dial to navigate to the desired item and press the dial to display the item view/edit screen.

To edit pick list items (e.g. `Sample Setup: Cumulative` or `Differential`), rotate the dial to navigate to the item. Press the dial to select the item. Rotate the dial to change the setting. Press the dial to save the setting or **ESCAPE** to cancel and return to the previous screen.

To edit alpha-numeric and numeric values (e.g. `Location`), rotate the dial to navigate to the item. Press the dial to select the item. Rotate the dial to increment or decrement a value. Press the dial to select the next character. Press the dial for all remaining characters to save the value or **ESCAPE** to cancel and return to the previous screen.

5.2. Sample Setup Screen

The first sample setup screen gives the user the option to select and edit sample parameters or channel sizes. Figure 10 shows the `Sample Setup` Screens. The parameters are covered in the following sections.

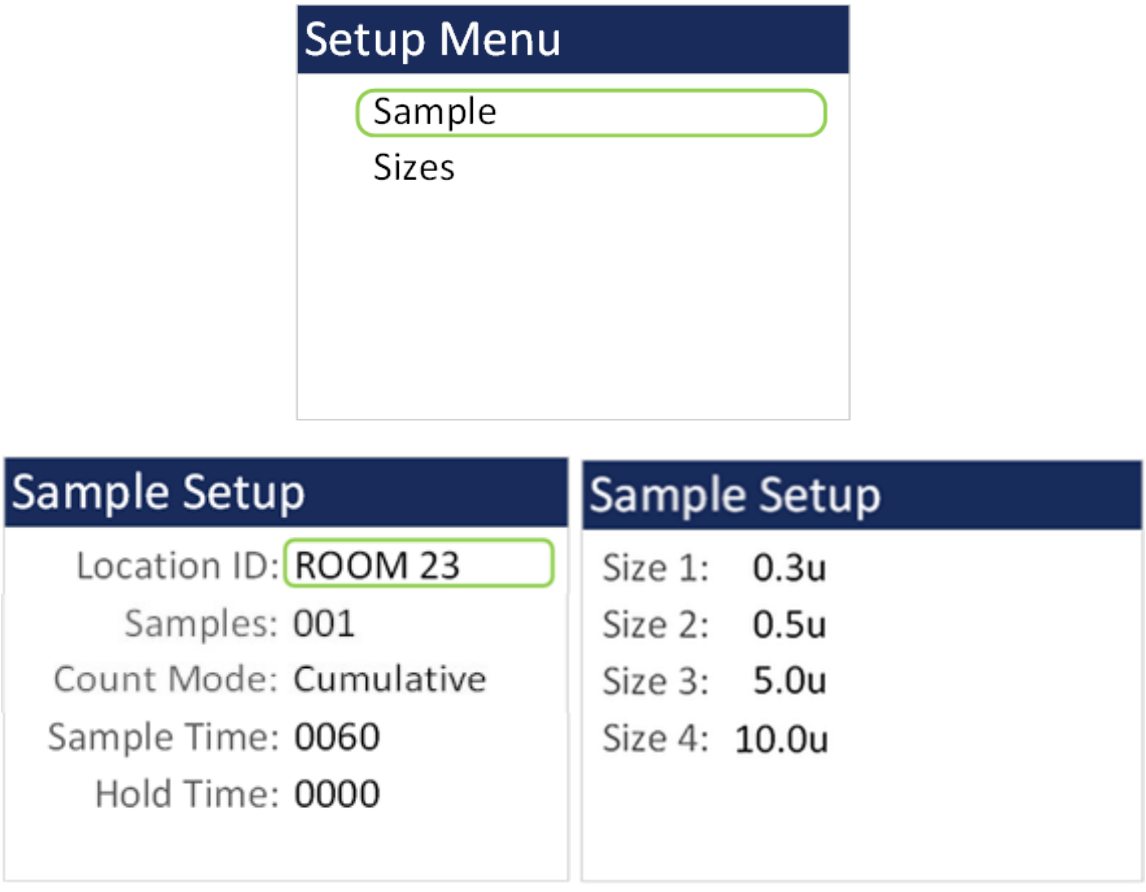


Figure 10 – Sample Setup Screens

5.2.1. Location ID

The Location ID is used to assign a unique name to a location or area. This important field is included in sample data records (display and csv output). Use the dial to scroll through a list of customizable location IDs. To edit the list, see Toolbox > location ID in section 5.4.4.

5.2.2. Samples

Samples controls the number of samples as described below.

Selection	Description
000	Setting Samples to 000 configures the unit for continuous sampling.
nnn	Setting Samples to any number other than 000 configures the unit to sample a finite number of samples before terminating the sampling operation.

5.2.3. Count Mode

The count mode determines if particle counts are displayed in Cumulative or Differential mode. Cumulative mode displays the particles as all sizes greater than the selected size. Differential mode displays the counts as all particles between the selected size and the next larger size channel.

5.2.4. Sample Time

The Sample Time is the length of time the unit will sample and store data. In Single mode the unit will stop sampling after this period and in Continuous mode the unit will save a count record and continue to sample at the sample time interval. The Sample Time is user settable from 30-9,999 seconds.

5.2.5. Hold Time

The Hold Time is the time between samples when sampling in multiple sample mode. The Hold Time is user settable from 0 – 9,999 seconds. The pump will remain on during the hold period if the HOLD time is 60 seconds or less. If the Hold time is greater than 60 seconds the pump will stop after each sample, and start a few seconds before the next sample. Hold times greater than 60 seconds will increase pump life, as well as increase operating time because of lower battery usage.

5.2.6. Size Setup

This allows the user to set custom particle sizes to measure. The screen sorts sizes from small to large after each size change. Duplicate sizes are not allowed.

5.3. Toolbox Screen

Figure 11 shows the `Toolbox` screen.

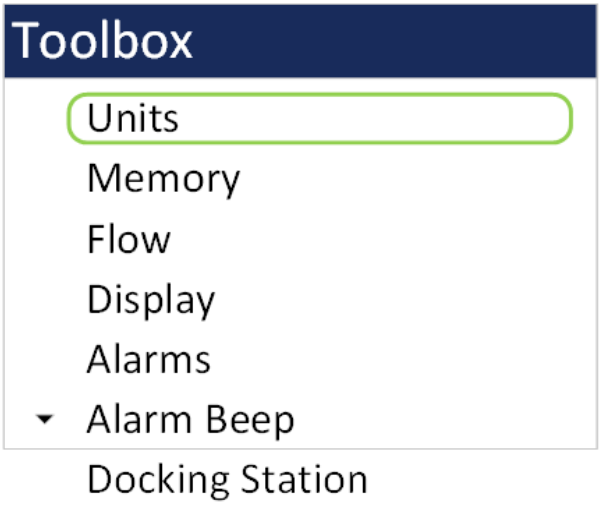


Figure 11 – Toolbox Screen

5.3.1. Units

The `Units` setting allows the volume and temperature units to be selected.

`Volume:` The DR-324 supports particles per cubic foot (CF), particles per liter (/L), particles per cubic meter (M3), and total counts per timed sample (TC). Particle count information updates while the unit is sampling. Concentration values (/L, CF, M3) are time dependent so these values may fluctuate early in the sample; however, after several seconds the measurement will stabilize.

`AT:` The DR-324 displays ambient temperature (AT) in Celsius (C) or Fahrenheit (F).

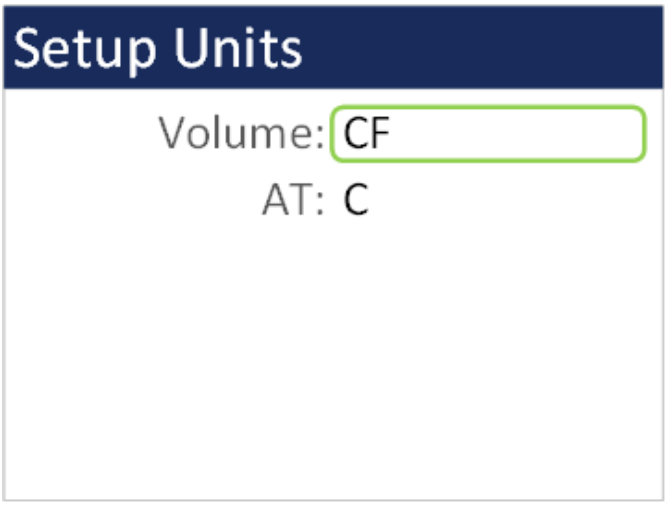


Figure 12 - Units Setup Screen

5.3.2. Memory

The DR-324 can store up to 15,000 sample records in its memory. For instructions on viewing stored data, see section 4.3.3. Because this memory is circular, once all 15,000 records are full, any new samples taken will overwrite the oldest stored sample data.

The Memory screen indicates the available memory capacity and a means to completely erase all data currently saved in memory. The Free field shows the percentage of space available for data storage. When 0% is displayed, the memory is full and the oldest data will be overwritten by new data.

Press down on the rotary dial to activate the CLEAR command and erase the unit's memory. A confirmation screen will appear. Select the CLEAR option on the confirmation screen to continue with erasing the data and then returning to the memory screen. Selecting CANCEL on the confirmation screen will return to the Memory screen without erasing the data.

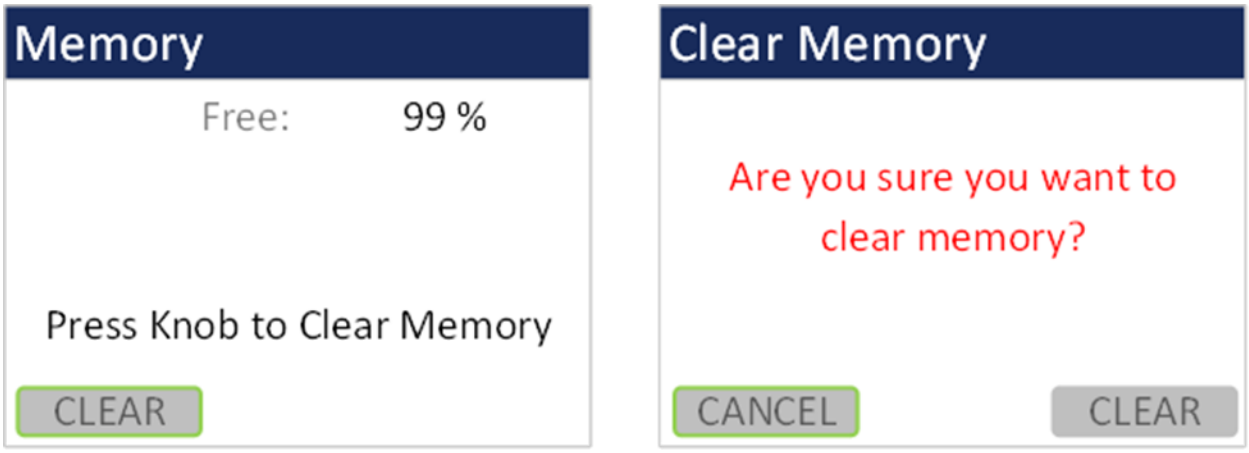


Figure 13 - Memory Screens

5.3.3. Flow

The `Flow` screen is where a flow calibration is performed. When this screen is selected, a warning will appear to use an external flow meter to adjust the DR-324 flow to 2.83 LPM. Select OK to proceed or CANCEL to exit.
The pump will start automatically when you enter the `Flow` screen and stop when you leave the screen. Use the following procedure to adjust the flow rate when a periodic flow rate check (Section 8.3) indicates a flow rate error greater than ± 5%.

1. Remove the isokinetic inlet.
2. Connect a reference flow meter to the inlet fitting on the top of the unit and allow the flow to stabilize.
3. Twist the dial clockwise to increase the flow rate and turn the dial counterclockwise to decrease the flow rate until the measured flow rate is 2.83 LPM (0.1 CFM) ± 5%.
4. Press the dial to save the calibration. Press ESCAPE to cancel without saving.

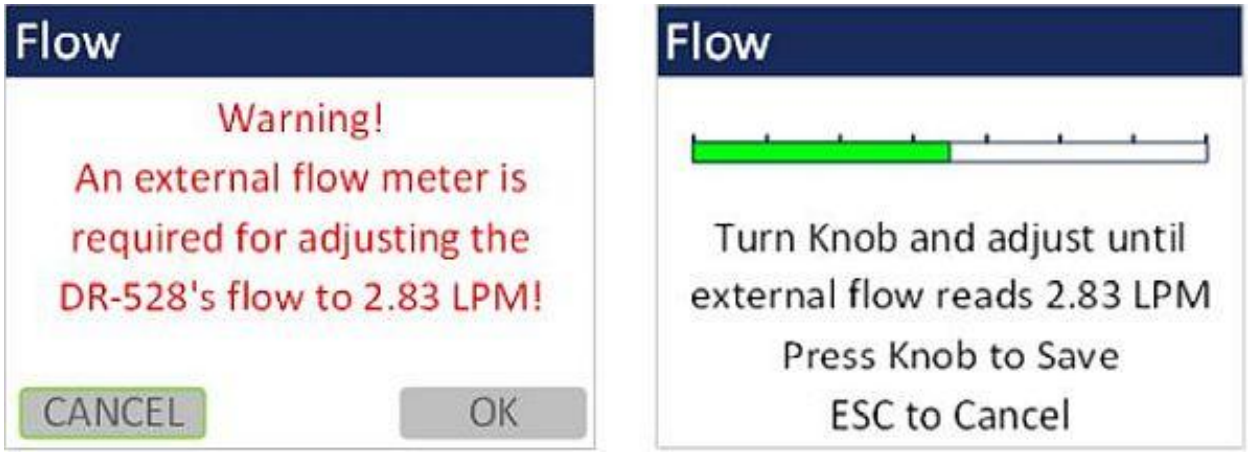


Figure 14 - Flow Screen

The progress bar shows the pump pulse width modulation (PWM) as a percentage. A green progress bar means the PWM is within normal range. An orange progress bar indicates the filter is getting close to requiring replacement. A red progress bar indicates the filter needs to be replaced.

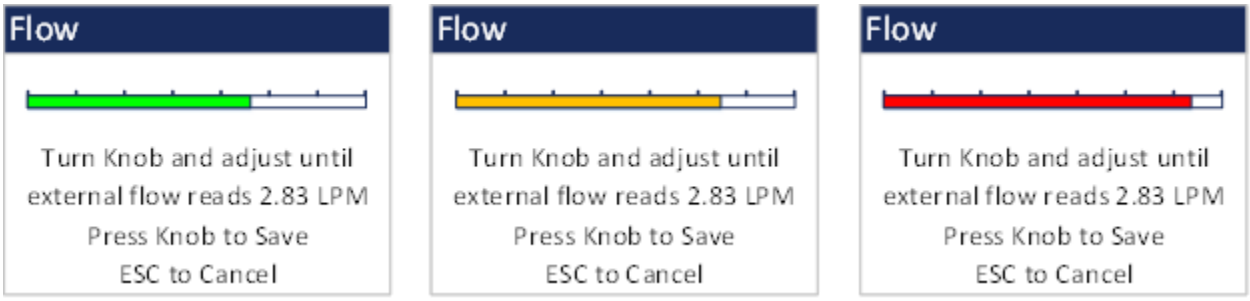


Figure 15 - Flow Screen Progress Bar Color Changes

5.3.4. Display

The `Display` screen allows the user to change the backlight brightness from 10-100% and select the display timeout to dim the screen for none, 1, 5, or 10 minutes.

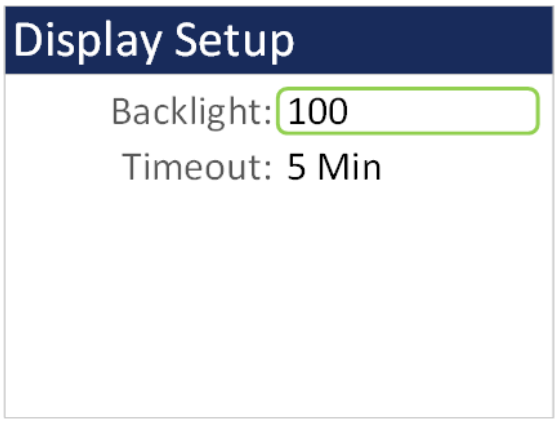


Figure 16 - Display Setup Screen

5.3.5. Alarms

The DR-324 features alarm limits for each channel size. Setting the alarm limit above zero will enable the alarm on that channel. When sampling, if the alarm limit is set and the counts go over the limit then the alarm will be active. By default, the Alarm Beep is disabled. If Alarm Beep is enabled, the unit will continuously produce an audible beep.. Alarms are reset at the beginning of the next sample or turned off if the user manually stops the sample. Setting the alarm limit to zero will disable the alarm on that channel. The maximum alarm limit value is 9,999,999.
Figure 17 shows the Count Alarm Screen.

Alarms are displayed in increasing particle size order.

Alarm values do not change with the count units setting (TC, /L, CF, M3). In other words, a value of 1,000 will alarm at 1,000 counts or 1,000 particles per liter or 1,000 particles per cubic foot depending on the count unit setting.

Figure 17 - Alarm Screen

5.3.6. Alarm Beep

This screen will enable or disable the alarm sound when an alarm count condition occurs.

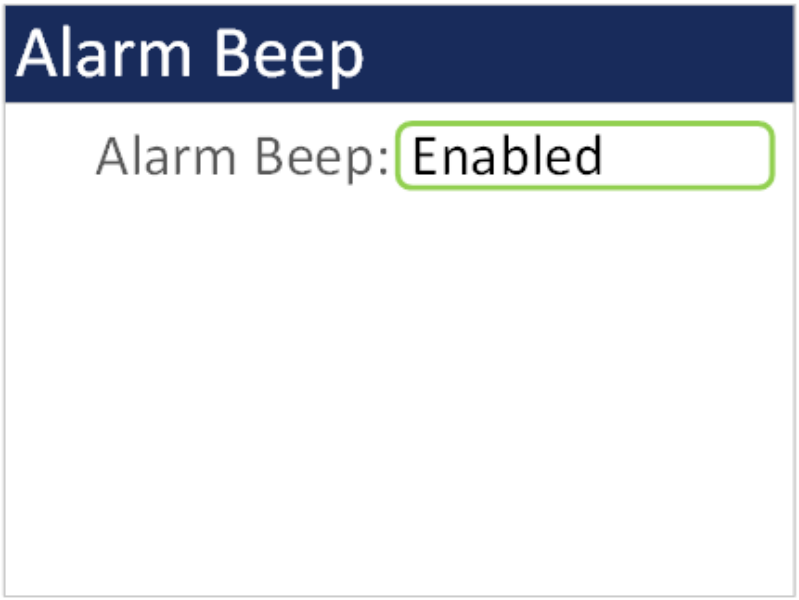


Figure 18 - Alarm Beep Screen

5.3.7. Docking Station

The `Docking Station` screen is a troubleshooting feature that determines the unit WiFi credentials if it was set up as a DHCP connection instead of a static connection and the IP address changes. The 83529 Docking Station quick setup manual explains how to connect the unit to the optional docking station. Select WiFi Discovery to begin the procedure.

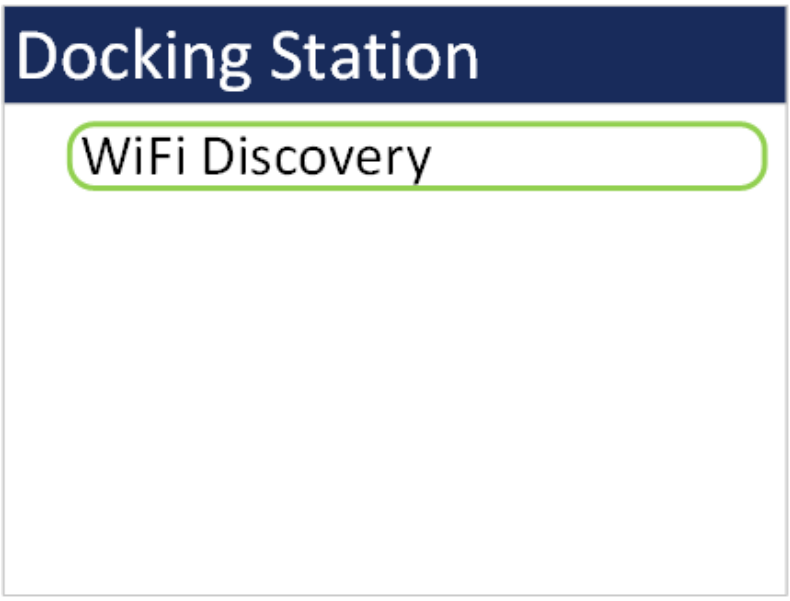


Figure 19 - Docking Station Screen

The subsequent screens describe each process step. Remove the unit from the Docking Station. Then remove the power plug from the back of the Docking Station (it will receive power from the unit during this procedure). Make sure the network switch on the Docking Station is set to WiFi and not Ethernet. Select NEXT and then place the unit in the dock. A green bar will show the progress of the scan.

Figure 20 - WiFi Discovery Screens

Once the scan completes the WiFi connection credentials will display on the screen. If the procedure was not performed correctly (e.g. dock plugged in/unit not docked/ network switch set to Ethernet) a time out message will appear. The Docking Station can be plugged back in once the scan completes. Press escape to exit this screen.

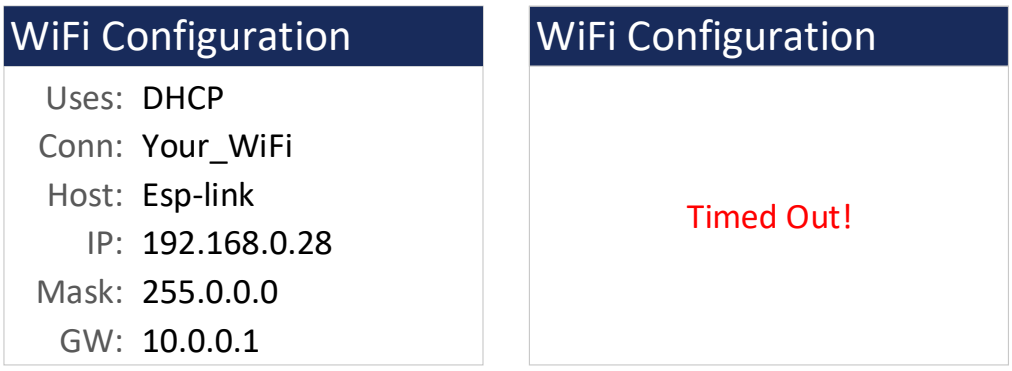


Figure 21 - WiFi Configuration Results (left) and Time Out Screen (right)

5.4. Initial Setup Screen

Figure 22 shows the `Initial Setup` screen. These items are not expected to need to be changed frequently but need to be configured when first using the instrument.

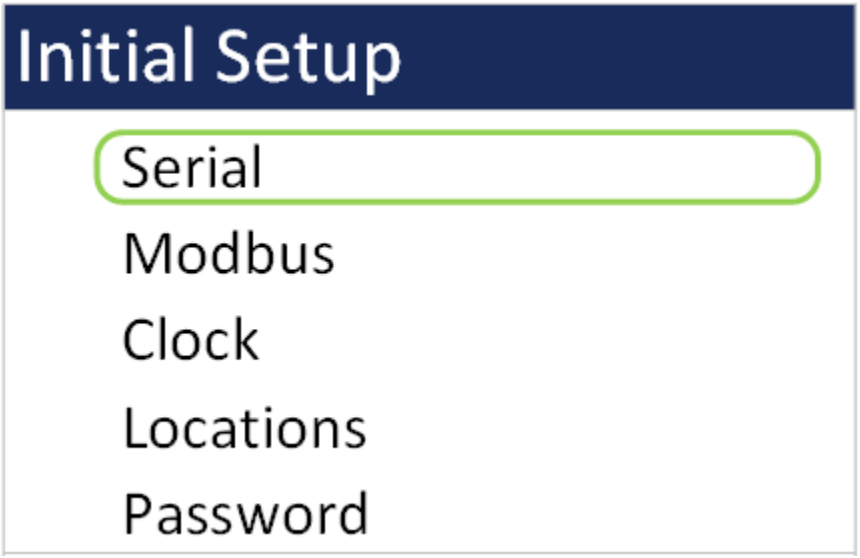


Figure 22 – Initial Setup Screen

5.4.1. Serial

The `Serial` setting controls the behavior of the DR-324 serial output hardware available on the optional docking station. The following table lists the `Serial` settings and describes their meanings. USB baud rate is fixed at 115,200.

Selection	Description
`Network ID`	Unique ID assigned to each device for networking mode (1 – 999).
`485 Baud`	Baud rate for the docking station RS-485 serial port. The baud rate list includes 2400, 4800, 9600, 19200, 38400, 57600, and 115200.
`Dock Baud`	Baud rate for the optional docking station WiFi/Ethernet port. Same baud rates as listed above.
`Flow Ctrl`	Flow control for the optional docking station Ethernet Netburner (None, XON/XOFF). This should be set to None for USB, RS-485, and WiFi communication and if MODBUS is employed.

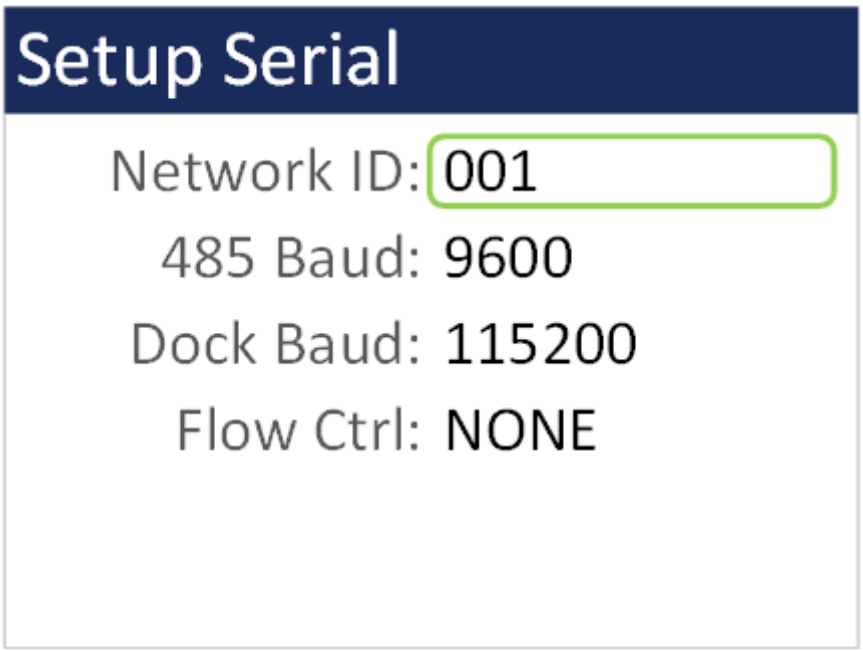


Figure 23 – Serial Setup Screen

5.4.2. Modbus

The `Modbus` setup allows the user to choose which communication port to use if employing Modbus. Port options are USB, RS-485, or Network. RS-485 and Network options are available through the optional 83529 Docking Station. Network options are either WiFi or Ethernet and are selected by a switch on the Docking Station. The equipment Modbus address is also set in this screen with values of 1-247.

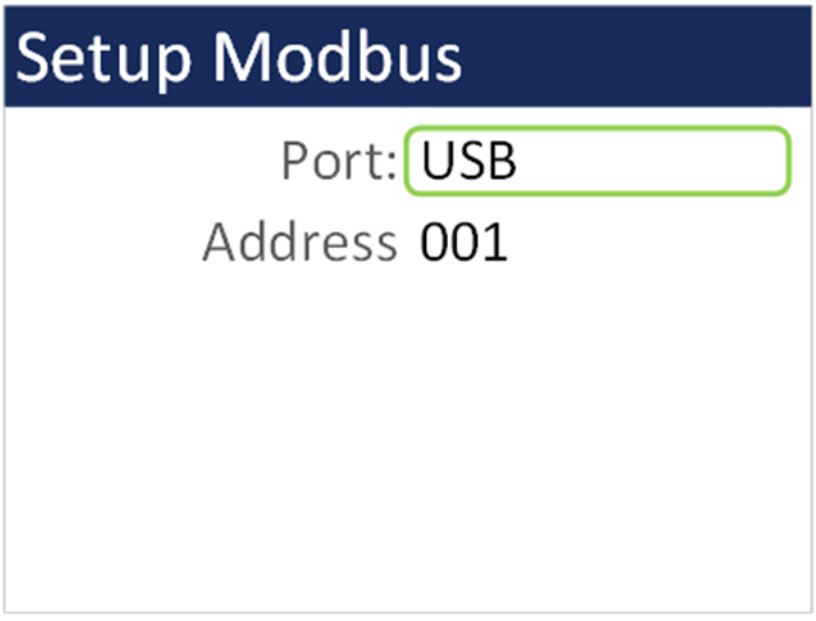


Figure 24 - Modbus Setup Screen

5.4.3. Clock

Use the `Clock` selection to set the date and time. Turn the dial to select year/month/date/hour/minute/second to change. A green box will surround the selection. Press the dial to edit. Turn the dial to change, then press to confirm the change. Press the dial on the SET box to change the settings and return to the Initial Setup screen.

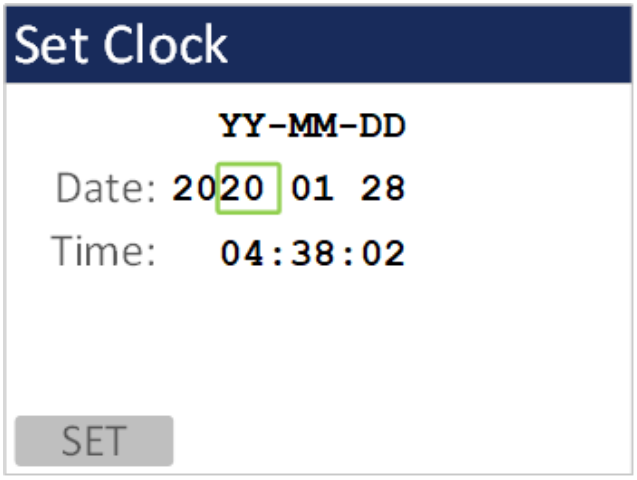


Figure 25 - Clock Screen

5.4.4. Locations

The `Locations` screens allow the user to set up to 30 alpha numeric locations. Each location can use up to 7 characters. To enter a new location name, press the dial on the location to change. Rotate the dial to scroll through alpha/number/space options for each character. Press the dial to select each character. All 7 characters must be selected to save the location ID. Use spaces for locations with fewer than 7 characters. To access the 2nd and 3rd screens, select Next.

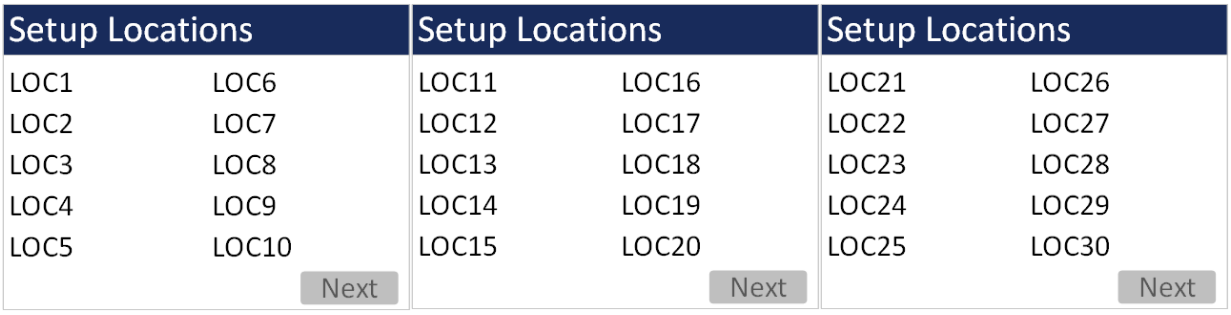


Figure 26 - Locations Screen

5.4.5. Password

Users have the option to set a user password. Setting the value to 0 disables the password. Setting it to anything greater than 0 will enable the password. If the password is set, users will be prompted for the password upon trying to enter any setting screens.

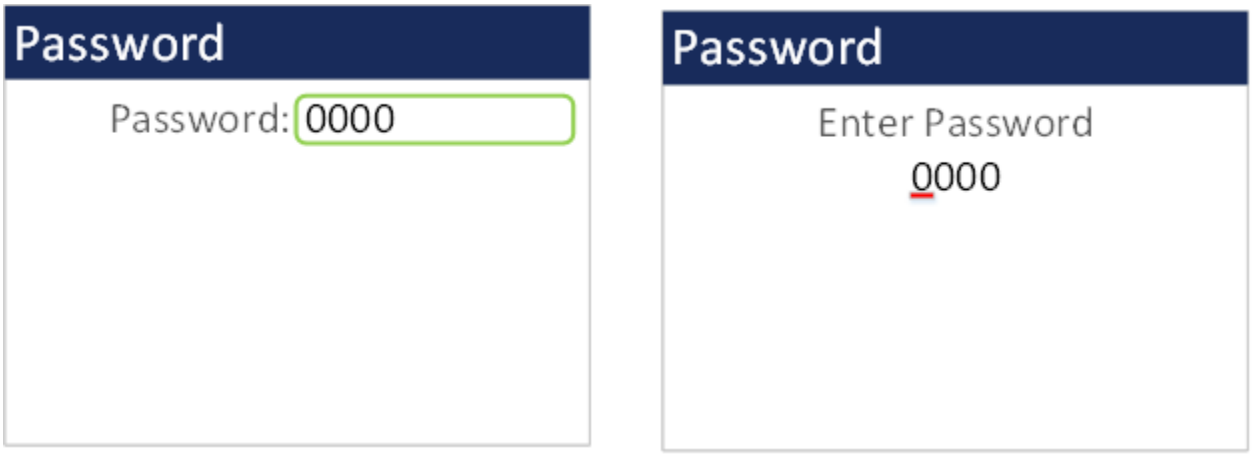


Figure 27 - Password Screen

5.5. About Screen

Figure 28 shows the ABOUT screen. The ABOUT screen shows the manufacturer's serial number, the firmware version, Met One Instruments, Inc. service contact details, date of last calibration, and instrument run time.

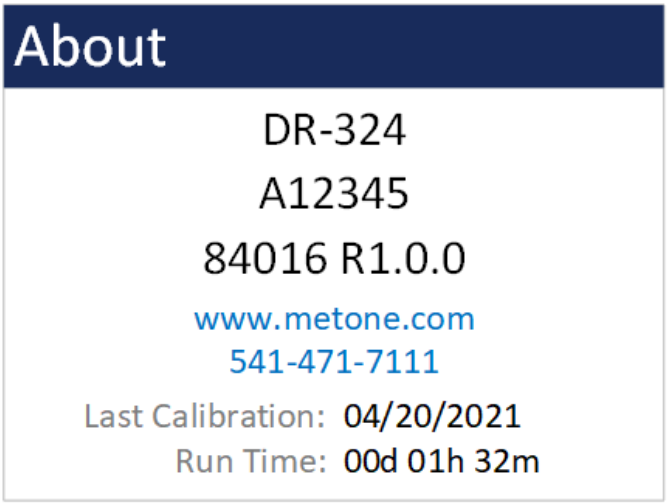


Figure 28 – About Screen

6. Charging the Battery

Caution:
The provided battery charger is designed to work safely with this device. Do not attempt to connect any other charger or adapter to this device. Doing so may result in equipment damage and will void the warranty.

To charge the battery, connect the battery charger to an AC power outlet and the DC barrel connector to the socket on the left side of the DR-324. The battery charger is universal and will work with power line voltages of 100 to 240 volts, 50 to 60 Hz. A discharged battery pack will take approximately 2.5 hours to fully charge.

When fully charged the battery inside the DR-324 will power the unit for over 8 hours of continuous sampling. For continuous operation, operate the unit with the battery charger attached. Charge the battery before storing the DR-324. Storing a discharged battery will degrade its performance.

The DR-324 can also be charged using the optional 83529 Docking Station. The device will fit securely onto the Docking Station when encased in its rubber boot. If the rubber boot is not used, an 83584 bootless adapter is placed at the base of the docking station to hold the device.

7. Serial Communications

The DR-324 provides serial communications via the USB connector located on the right-hand side of the unit. RS-485, WiFi, and Ethernet communications are also available with the optional 83529 Docking Station. Refer to the 83529 Docking Station Quick Setup Guide to configure the optional communications. The following sections discuss the various serial communications available with DR-324.

ATTENTION:
A Silicon Labs CP210x Driver for the USB connection must be installed before connecting to the USB Type C port.

Driver download weblink: https://metone.com/usb-drivers/

7.1. Commands

The DR-324 provides serial commands for accessing stored data and settings. All commands are terminated by a carriage return. These commands are not case sensitive. The following table lists the available commands. These commands are available via USB, WiFi, ethernet, and RS-485 hardware interfaces. The settings (baud rate, parity and stop bits) must match the computer setting for proper communication regardless of the hardware interface type.

Settings (must match computer settings):

- Baud Rate = 115200 (USB Default); 9600 (RS-485 Default); 38400 (Dock Default)
- Parity = None
- Stop Bits = 1
- Flow Control = None (XON/XOFF available for Ethernet)

The following table lists the available commands:

Command	Description
?	Help command
1	Report settings
2	Report all the data
3	Report the new data
4	Report the last record
A	Network address command
C	Clear the data file
E	Stop sample
H	Help Menu
Q	Exit Terminal Mode
S	Start sample
X	Exit Terminal Mode
AB	Enable/Disable alarm beep: AB 0=Disable, AB 1=Enable
AL	Get/Set the alarm limit for a specific channel using format AL c v, where c – Channel number (1 – 4) v – Alarm limit value (0 – 9999999) (0 = OFF)
BL	Back Light (%) 10 – 100%
CM	Count Mode: CM 0=Cumulative, CM 1=Differential
CS	Get/Set Count Sizes: CS S1 S2 S3 S4 Cannot be set while sampling. All 4 sizes must be specified.
CU	Count Units: CU 0=CF, CU 1= /L, CU 2= TC, CU 3=M3
DISPTO	Manual Display Timeout. 0=None, 1=1-min, 2=5-min, 3=10-min.
DS	Report data log channel descriptors
DT	Date / Time (DT YYYY-MM-DD hh:mm:ss)
HS	Get/Set Hardware Handshaking
ID	Location ID
LN	Get/Set the location name for a specific location index using LN i n, where i – Location Index (1 – 30); n – Location Name (Capitol Letters and numbers only) (no symbols except spaces) (7 characters max)
MA	Modbus Address (1-247)
NW	Network On/Off. NW 0=Off, NW 1=On
OI	Output Interval OI 0=Off, OI 1=On
PR	Print File PR 0=Settings, PR 1=Data, PR 1 n=Data, last n records, PR 1 YYYY-MM-DD hh:mm:ss=Data from date and time specified.
PW	Enter password to change settings (if password is enabled)
QH	Report data record header
RQ	Report (ReQuest) last data record
RV	Report Firmware Revision
RZ	Report Measurement Sizes
SB	Get/Set USB Baud Rate. 9=115200
SH	Hold Time (0-9999)
SN	Sample Number. (0-999) SN 0=Continuous, SN n=n samples
SS	Get Serial Number

Command	Description
ST	Sample Time in seconds (30-9999)
TU	Temperature Units. TU 0=C, TU 1=F

7.2. Comma Separated Value (CSV)

The CSV report will be generated for each data inquiry. The format is fixed field length.

7.2.1. Count Data Report

```
Count Data Report
2026-03-04 13:43:57
Serial Number, B12561

Time,0.3(CF),0.5(CF),0.7(CF),1.0(CF),2.0(CF),3.0(CF),5.0(CF),
10(CF),AT(C),RH(%),Location,Sample(Sec),Status
2026-03-04 11:31:13,00202780,00038040,00008940,00002460,00000940,
00000680,00000220,00000080,+022.6,044,LOC1    ,0030,0000
```

CSV Fields		
Field	**Parameter**	**Example Value**
1	Date and Time	2026-03-04 11:31:13
2	Channel 1 Size 0.3 (TC, /L, CF, M3)	202780
3	Channel 2 Size 0.5 (TC, /L, CF, M3)	38040
4	Channel 3 Size 1.0 (TC, /L, CF, M3)	8940
5	Channel 4 Size 2.5 (TC, /L, CF, M3)	2460
6	Channel 5 Size 4.0 (TC, /L, CF, M3)	940
7	Channel 6 Size 5.0 (TC, /L, CF, M3)	680
8	Channel 7 Size 7.0 (TC, /L, CF, M3)	220
9	Channel 8 Size 10 (TC, /L, CF, M3)	80
10	AT (C, F)	22.6
11	RH (%)	44
12	Location	LOC1
13	Seconds	30
14	Status	0

7.2.2. Status

The last entry of the CSV output is the status indicating alarms or errors. Status bit combinations are possible. For example, 18 = IOP Alarm and Temperature Sensor Alarm.

Status Bits		
Bit	**Value**	**Condition**
	0	OK (no alarms or errors)
0	1	Not used
1	2	IOP Alarm (Laser)
2	4	Not used
3	8	Not used
4	16	Temperature Sensor Alarm
5	32	Pressure Sensor Alarm
6	64	Not Used
7	128	Count Alarm

7.3. MODBUS Communication

The DR-324 supports MODBUS communications protocol. The serial transmission is RTU mode. The following MODBUS registers are used to access various readings.

7.3.1. Instantaneous Real Time Readings

Name	Address	Type	Points	Description
Time	1000	dword	2	Current Timestamp (Unix)
Stat	1002	dword	2	Current Status
Location	1004	string	4	Current Location Name
Elapsed	1008	dword	2	Current Elapsed Time
Size1	1012	float	2	Current Channel 1 Size
Size2	1014	float	2	Current Channel 2 Size
Size3	1016	Float	2	Current Channel 3 Size
Size4	1018	Float	2	Current Channel 4 Size
Count1	1028	dword	2	Current Channel 1 Counts
Count2	1030	dword	2	Current Channel 2 Counts
Count3	1032	dword	2	Current Channel 3 Counts
Count4	1034	dword	2	Current Channel 4 Counts
IOP	1044	float	2	Current IOP Laser Reading
AT	1046	float	2	Current Temperature Reading
RH	1048	float	2	Current Relative Humidity Reading
BP	1052	float	2	Current Barometric Pressure Reading
BV	1054	float	2	Current Battery Voltage Reading

7.3.2. Last Data Record Readings

Name	Address	Type	Points	Description
Time	1500	dword	2	Last Timestamp (Unix)
Stat	1502	dword	2	Last Sample Status
Location	1504	string	4	Last Sample Location
Duration	1508	dword	2	Last Sample Duration
Size1	1512	float	2	Last Sample Size 1
Size2	1514	float	2	Last Sample Size 2
Size3	1516	float	2	Last Sample Size 3
Size4	1518	float	2	Last Sample Size 4
Count1	1528	dword	2	Last Channel 1 Counts
Count2	1530	dword	2	Last Channel 2 Counts
Count3	1532	dword	2	Last Channel 3 Counts
Count4	1534	dword	2	Last Channel 4 Counts
IOP	1544	float	2	Last Sample IOP Laser Reading
AT	1546	float	2	Last Sample Temperature
RH	1548	float	2	Last Sample Relative Humidity
BP	1552	float	2	Last Sample Barometric Pressure
BV	1554	float	2	Last Sample Battery Voltage

8. Maintenance

Due to the nature of the instrument, there are minimal customer serviceable components in the DR-324. The case of the DR-324 should never be removed or opened for any reason. ***Opening or removing the case of the DR-324 voids the warranty and may result in exposure to laser radiation, which can cause eye injury.***

8.1. Recommended Service Schedule

Although there are no customer serviceable components in the DR-324, there are service items which ensure the proper operation of the instrument. The table below shows the service schedule for the DR-324.

Time Period	Item	Manual Section
Weekly	Zero Count Test	8.2
Monthly	Flow Rate Test	8.3
Yearly	Annual Calibration	8.4
Yearly/As required	Filter change	8.5

8.2. Zero Count Test

Air leaks or debris in the particle sensor can cause false counts which may result in significant count errors when sampling clean environments. Perform the following zero count test weekly to ensure proper operation:

1. Attach zero count filter to the inlet nozzle (PN G3111).
2. Configure the unit as follows: Sample = 001, Sample Time = 60 seconds, Volume Units = Total Count (TC).
3. Start and complete a sample.
4. The smallest particle size should have a count <= 1.
5. Run this test multiple times to flush out particles in the air stream if the goal is not met.

8.3. Flow Rate Test

The flow rate test verifies the sample flow rate is within tolerance. The reference flow meter must be non-loading because the vacuum pump can be loaded down by external restrictions. Met One Instruments, Inc. sells suitable flow meters (PN 9801 or Swift 6.0). The flow rate test is described in section 5.3.3.

8.4. Annual Calibration

The DR-324 should be sent back to Met One Instruments, Inc. yearly for calibration and inspection. The annual calibration cannot be performed by the customer because this calibration requires specialized equipment and a skilled technician. Met One

Instruments, Inc. maintains a calibration facility for calibrating particle counters according to industry accepted methods such as ISO and NIST. The annual calibration also includes inspection and preventative maintenance to improve product reliability.

8.5. Filter Change

The DR-324 filter cartridge is located on the bottom rear instrument panel. A 0.2 micron filter, MOI part number 580302, is used to filter the instrument exhaust. It can be removed by unscrewing the black aluminum filter holders with a coin using the slot in the face of the holder. The frequency of filter changes depends on the particulate concentrations measured.

8.6. Flash Upgrade

The DR-324 is firmware upgradeable via the serial connection using a Met One Instruments, Inc. update utility. The new firmware and update utility must be provided by Met One Instruments, Inc.

9. Troubleshooting

The following section covers some common failure symptoms, causes and solutions. It is important to note that there are no customer serviceable components in this product. The DR-324 case should never be removed or opened for any reason. **Opening or removing the case will void the warranty and may result in exposure to laser radiation, which can cause eye injury.**

Symptom	Possible Cause	Solution
Display does not turn on	• Low Battery • Defective Battery	• Charge battery • Contact service center
Pump does not turn on when a sample is started	• Low Battery • Defective pump	• Charge battery • Contact service center
Flow rate does not reach 2.83 LPM setpoint	• Dirty filter • Defective pump	• Change filter • Contact service center
Keypad/dial does not work	• Loose connector • Internal hardware failure	• Contact service center
Sample result is lower than normal	• Atypical sample results may be real • Flow rate is low • Optics may be contaminated	• Perform flow rate test • Contact service center
Sample result is higher than normal	• Atypical sample results may be real • Flow rate is high • Optics may be contaminated	• Perform flow rate test • Contact service center
Battery does not hold a charge	• Defective or worn out battery • Defective charger	• Contact service center
Low battery	• Low Battery	• Charge battery – the unit can sample while running on the charger
Data does not transfer completely when using WiFi	• High data transfer speeds can cause data to drop.	• Reduce the baud rate
Data does not transfer completely when using Ethernet	• High data transfer speeds can cause data to drop.	• Lower baud rate • Set serial flow control to Xon/Xoff
Unit will not communicate using WiFi	• WiFi has not been set up • Unit is not seated in Docking Station/no power to Docking Station • No Internet connection • WiFi was originally configured to DHCP and the IP Address has changed	• Configure a WiFi connection per the Docking Station manual • Ensure the Docking Station is plugged in and powered. • Verify WiFi is enabled and detected at location • Perform a WiFi Discover per Section 5.3.7

10. Specifications

Performance

Particle Counter Sizes	0.3-10 µm user selectable (default sizes = 0.3 µm, 0.5 µm, 0.7 µm, 1.0 µm, 2.0 µm, 3.0 µm, 5.0 µm, 10.0 µm)
Concentration Range	0 – 3,000,000 particles per cubic foot (105,900 particles/L)
Particle Size Accuracy	± 10% to calibration aerosol
Flow Rate	0.1 cfm (2.83 lpm)
Sample Time	30-9,999 seconds
Hold Time	Adjustable: 0 to 9999 seconds
Temp/RH Probe	± 3 °C / ± 5% RH

Electrical

Light Source	Laser Diode, 90mW, 780 nm
Battery	7.4V Li-ion battery pack.
Battery Life	8 hours continuous operation
Battery Charge Time	Fully changed in 2.5 hours
AC Adapter/Charger	Li-ion battery charger, 100 – 240 VAC, 50/60Hz
Communications	USB (WiFi, Ethernet, and RS-485 available on optional docking station)

Interface

Display	2.8 inch TFT full-color LCD
Keyboard	2 button membrane keypad with rotary dial

Physical

Height	8.8” (22.35 cm)
Width	3.75” (9.53 cm)
Depth	2.25” (5.72 cm)
Weight	1.00 lb 13.5 oz (0.84 kg)

Environmental

Operating Temperature	0º C to +50º C
Storage Temperature	-20º C to +60º C

Accessories

Supplied	Operation Manual	
	USB Cable	
	Comet Software	
	Particle View Software	
	AC Adapter/Battery Charger	
	Iso-kinetic Sample Probe	
	RH and Temperature Probe	
	Carrying Case	
	Rubber Boot	
	Zero Particulate Filter	
Optional	Ball Flow Meter kit	(PN 9801)
	Digital Flow Meter	(PN Swift 6.0)
	Docking Station	(PN 83529)