Matsushima
Matsushima Measure Tech

TPFMAP-001E
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OPERATION MANUAL

FOR

AIR PARTICLE MONITER

TYPE: PFM-AP01

Contents

To Use in Safety ····· 1
1. Summary ····· 2
2. Measurement Principle ····· 2
3. Specifications ····· 2
4. Profile and Parts ····· 3
5. Mounting ····· 4
6. Connection ····· 5
7. Wi-Fi communication ····· 5
8. Wi-Fi access procedure ····· 6
9. Web browser screen ····· 10
10. Troubleshooting ····· 17

 # Certainly perform the right operation by operators perusing this Manual.

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To Use in Safety;

- Surely read this Manual in advance before use the product.
- Keep this Manual in a certain place to look anytime.
- Contents in this Manual may change without previous notice.
- About part replacement;

  Product modification to improve quality will be done very often.

  Therefore, providing the same part may not be available.

  In this case, an alternative part or product could be provided.

! WARNING (Failure to observe this WARNING may cause a fatal or serious injury.)

- Start mounting the product confirming peripheral devices to be fixed.
  And, perform mounting the product with strictly observing the safety instructions, if working in high places.
- Start wiring, setting and transporting, after surely confirming a power shut-down.
  + Shock and injury can be concerned, and a short can cause product damages.
- Perform wiring after confirming the operational drawings with the right way.
- Simply do not disassemble the product.
  + Watch out a shock!
- Do not open the cover through running in an explosive circumstance.
  + Shock and injury can be concerned and can cause product damages.
- Do not store the product in a hostile environment like as under sunlight, or under rain and water drops, or in place of toxic gas and liquid.

! CAUTION (Failure to observe this CAUTION may cause a moderate injury or equipment damage.)

- Do not use the product without the original purpose to use.
- Use the product within the specifications after surely confirming the specification list.
  + Keep the installation environments of the temperature, the operating voltage, frequency, etc.)
- Confirm setting wires before running.
- Do not fall the product and make a hard impact to the product.
  + Product damages can be occurred.
- Surely wire the necessary terminals (ground terminal, etc.)
- Make sure to take off all wires, if operating electric welding near the product.
- Do not force to bend and pull the lead wires, and not use an unnecessary length of wire.
- Certainly tighten up the cover and the lead inlets to prevent dusts and rain drops.
- Do not use the product in a corrosive atmosphere (NH3, SO2, Cl2, etc.).

! IMPORTANT (Indicates notes or information to help customers.)

About Guarantee;

- The guarantee term of the product is 1 year after shipment from our plant.
- Damages of any other products caused by using the Product will be out of the Guarantee.
- Any breakdown or defect occurred by the following cases will be out of the Guarantee;
  In case of no following instructions in the Manual;
  In case of fixing and modification by any other person without ours;
  In case of storing, mounting, using, inspection and maintenance by a method out of our specifications;
  In case of arising from any other peripheral devices and equipment without our products;
  In case of any force majeure accident of fire, earthquake, wind and flood, lightning strike, disorder, riot, radioactive contamination, war and other act of providence;
  These conditions of Guarantee will not restrict the legal rights of customers.
- The price of delivered product does not include expenses of supervising and servicing.

1. Summery

Air Particle Monitor (hereinafter called “Product”) is the device to measure floating particle (diameter 0.3 μm to 10.0 μm) in the air using light diffusion feature.
Through analog output according to an amount of floating particles in the air, contact output is on when an amount of particles exceeds a threshold.
And, mounting the cable communication module, display of measurement and modification of parameter can be available by using PCs and cable communication.

2. Measurement Principle

This is the sensor to detect the particulate matters (PM) in the air optically and simply.
The laser diode (LD) as a light emitting device and the photo diode as a light receiving device can be used.
Irradiating incident light by the light emitting device in the air to be detected, and the scattering light according to an amount of floating particles can be detected by the light receiving device.
A signal value of mass concentration (μg/m^3) can be output with calculation by counting PM in the environment.

3. Specifications

Table 1: Product Specifications

1.	Type		PFM-AP01
2.	Power		DC 24 V ± 10%
3.	Current consumption		Less 150 mA (in case of DC 24 V)
4.	Minimum particle diameter to be detected		0.3 μm
5.	Measurement	Mass concentration [μg/m^3]	Particle diameter to be detected: Less PM1.0 / Less PM2.5 / Less PM10 Range to be detected: 0 μg/m^3 to 1000 μg/m^3 (Reference value below 35μg/m^3)
		Particle counting [cnt]	Particle diameter to be detected: More 0.3 μm / More 0.5 μm / More 1.0 μm / More 5.0 μm
		Cleanliness equivalent [class]	Calculating with conversion factor based on the particle counting (class over 10,000)
6.	Output signal	Analog output	DC 4 mA to 20 mA (Resolution: Less 1 μA) Load resistance: Max. 500 Ω
		Contact output	1c (Contact point capacity: DC 30 V 3 A, AC 250 V 3 A) Can be used for threshold over alarm and device failure output signals (shared)
7.	Display		RGB full colored LED×1 (#1)
8.	Cumulative count time		1 min to 60 min (In case of 1 min / Updating number of particles counting per 1 min)
9.	Update time of mass concentration		20 s
10.	Moving average		1 time to 60 times (particle counting only)
11.	Adjustment method of devices		Web app on your PC or smartphone (via Wi-Fi) (#2)
12.	Wi-Fi	Standards	IEEE 802.11 b/g/n compliance
		Frequency band	2.4 GHz
		Comm. distance (Ref.)	Approx. 100 m (line-of-sight distance)
13.	Connection	Power terminal	Leg spring terminal block (Screwless) / φ5.5 plug-jack x 1
		Output terminal	Leg spring terminal block (Screwless)
14.	Fitting cable size of terminal block		0.25 mm^2 to 1.5 mm^2
15.	Mounting		M3 Screw x 2 Fixed
16.	Case material		ABS resin
17.	Temperature to be used		0℃ to +50℃
18.	Humidity to be used		0%RH to 80%RH (without dew condensation)
19.	Protection		IP20
20.	Molarity		Approx. 150 g/unit
21.	Insulation resistance		Between power terminal and housings: Over 1 MΩ / DC 500 V
22.	Voltage resistance		Between power terminal and housings: AC 500 V 1min.
23.	Attachment (option)		AC adapter x 1 (#3)

(#1) Green light: measurement value is below threshold / Orange light: exceed threshold / Blue light: below threshold and Wi-Fi connecting / Red flashing: Out of order on device / Green, Orange and Blue flashing: Under mock output
(#2) Recommended OS: Windows10 and 11 / Android OS / iOS
(#3) AC adapter specification conditions: Output power DC 24.0 V / over 0.5 A / Center plus / Plug outer diameter 5.5mm, inner diameter 2.1mm

4. Profile and Parts

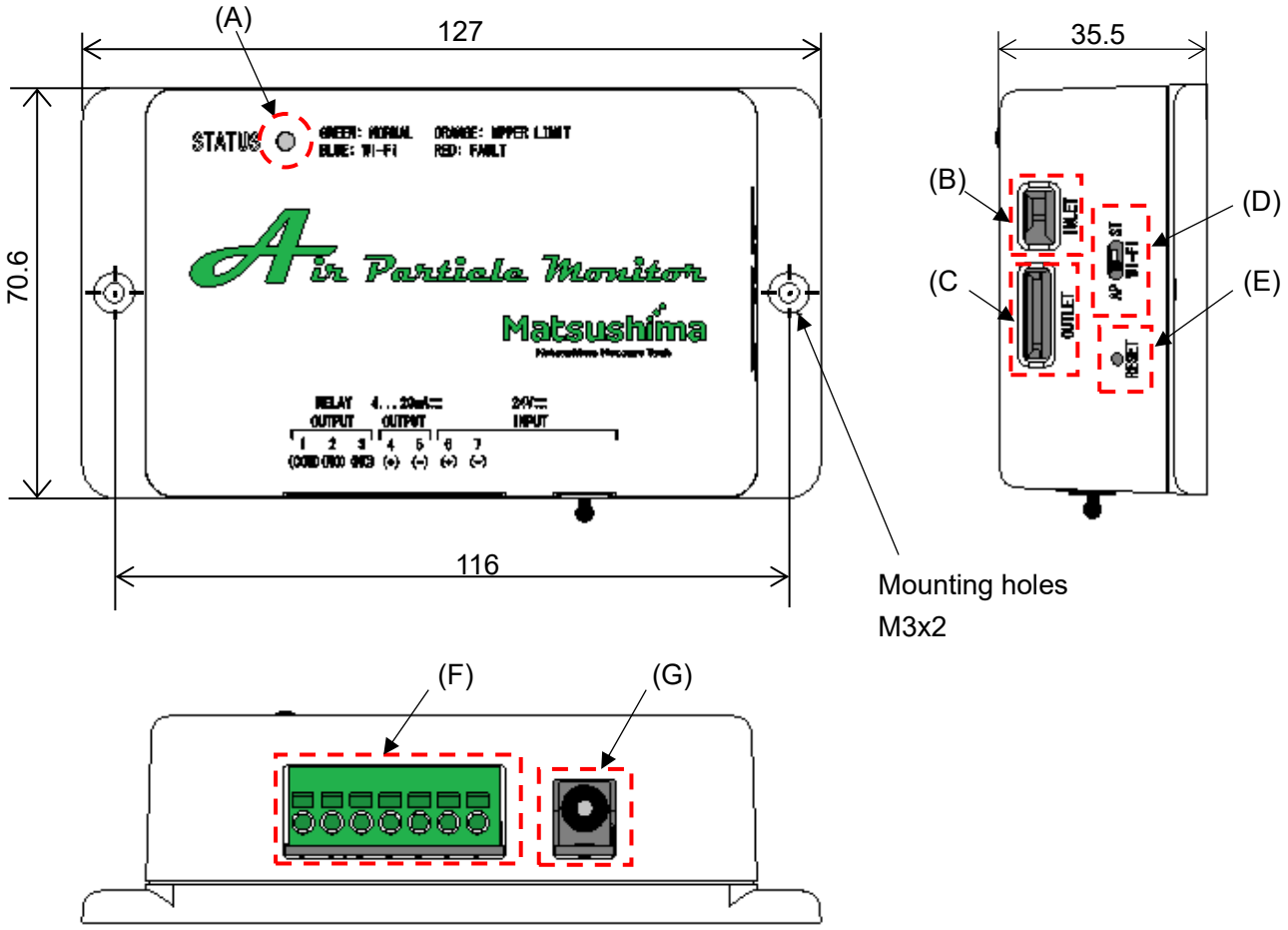


Fig. 1: Profile of Product and Name of Parts

(A)	Status of LED	:	Led to be shown condition of devices
	- Green light	:	Normal work (Below threshold)
	- Orange light	:	Work at contact point (Exceeding threshold)
	- Blue light	:	Wi-Fi connecting
	- Red flashing	:	Out of order on devices
	- Green/Orange/Blue flashing	:	Under mock output testing mode
(B)	Air inlet	:	To intake floating particles in the air
(C)	Air outlet	:	To exhaust floating particles
(D)	Wi-Fi mode switch	:	To switch Wi-Fi communication mode
(E)	Reset button	:	To initialize SSID and password If you hold the reset button for 3 seconds, the SSID and password are reset to their default values.
(F)	Terminal block	:	Leg spring terminal block Recommended cable size: 0.25 mm^2 to 1.5 mm^2
(G)	DC jack	:	Power jack for φ5.5 plug (#1)

(#1) Please remove the protective cap connected in the DC jack in case of using the AC adapter.

5. Mounting

Please avoid mounting and using under the following circumstances not to be caused any short-life and errors of devices.

- Any place to be caused shaking, shocking and breakdown.
- Any place of surround temperature out of rang 0℃ to +50℃, surround humidity exceeding 80%RH and under dew condensation.
- Any place where Product may be exposed to direct rain or mist.

5-1. Coverage of Wi-Fi communication

A guide of Wi-Fi communication distance is within approx. 100 m approx. 100 m as direct distance in better prospects without barricade.

 # Please do mounting with confirming an available area for Wi-Fi communication. If any barricade or stepping over rooms and floors, connection will be not available or to be unstable.

5-2. Mounting

Please do mounting Product using holes for mounting (M3 screw holes at 2 positions).
Please refer the recommended mounting directions on Fig. 2

Recommended mounting directions

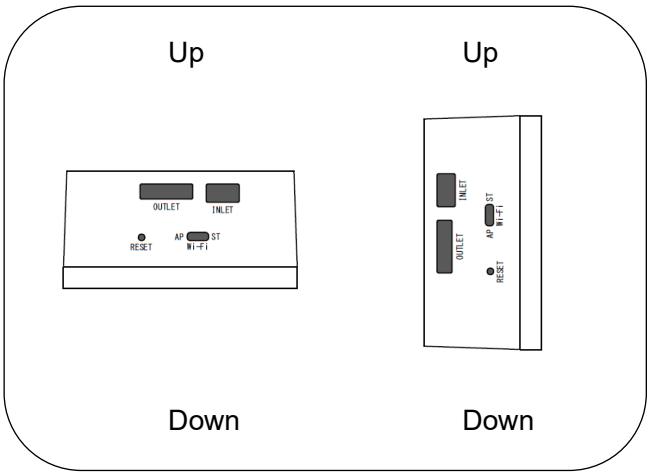


Fig. 2-1: Drawing of recommended mounting directions

Mounting directions not to be recommended

Please avoid the following mounting due to concerning low accuracy and deposition of floating particles.

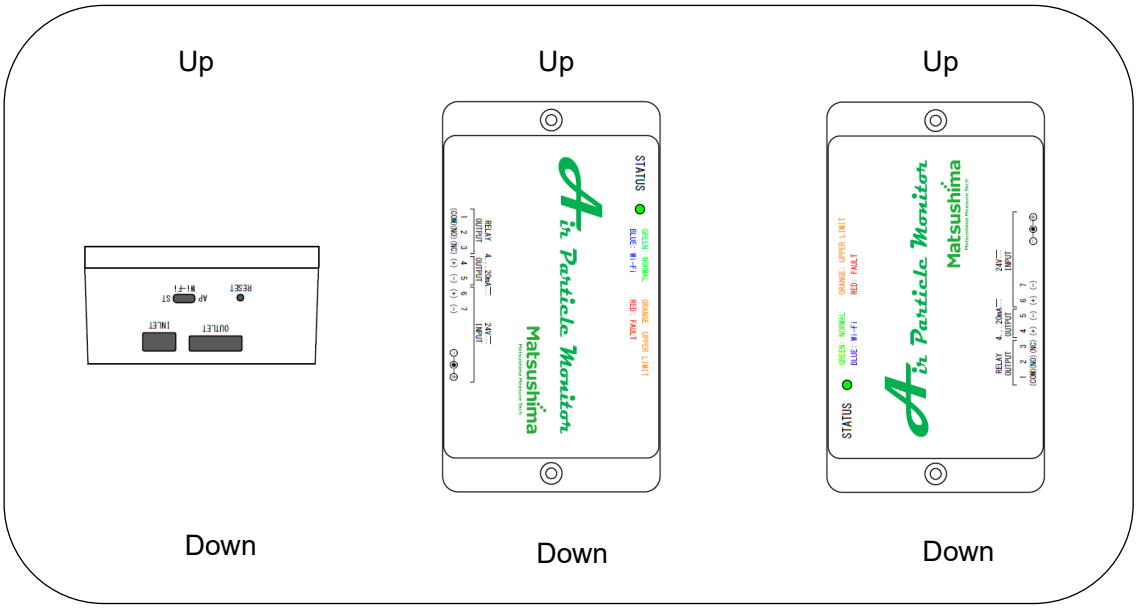


Fig. 2-2: Drawing of mounting directions not to be recommended

6. Connection

Power supply will be 2 methods of connecting the AC adapter (optional) to the φ5.5 plug jack and leg spring terminal block.

Numbering on the terminal block will be as follows;

	Contact point			Current output DC4 to 20mA		Power supply (DC24V±10%)	
Terminal No.	1 (COM)	2 (NO)	3 (NC)	4 (+)	5 (-)	6 (+)	7 (-)

 # The power supply must be connected to only one of DC jack or terminal block.

 # Removing wire: Insert a slotted screwdriver and pull out a wire. Use a blade edge about 3 mm.

7. Wi-Fi communication

Measuring data display and modification of parameter on the web browser of Product will be performed by Wi-Fi communication.

Communication has 2 modes of “Access point mode: AP” and “Station mode: ST”, and you can switch between them using the Wi-Fi mode switch.

7-1. Access point mode (AP)

This is the one by one mode, one sensor to one PC or one tablet.



Fig. 3: Image of Access point mode

 # Not available to access more than one terminal to a Product in the same time.

7-2. Station mode (ST)

This is the mode using a wireless LAN (router), measuring display and modifying on Product can be available on a PC or a tablet connected to the wireless LAN of Product.

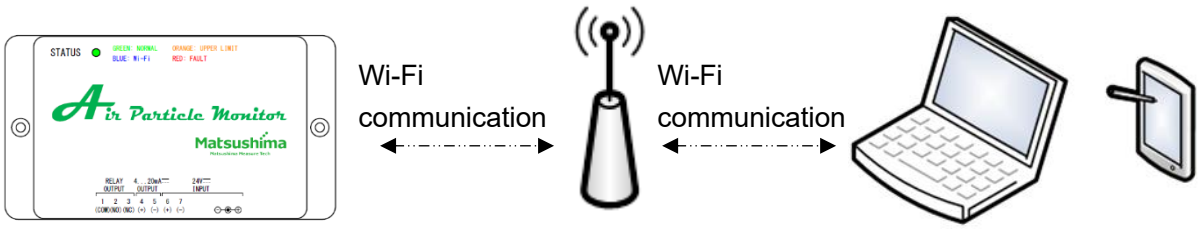


Fig. 4: Image of Station mode

 # If ST accessing to Product, please access from only one terminal.
In case of accessing from more than one terminal, communication may not work well.

 # Communication speed will be significantly changed by a Wi-Fi situation.
In case of slow communication speed, please change the location of Product and wireless LAN router or set Product close to a wireless LAN router.

8. Wi-Fi access procedure

8-1. Setting at the initial access

Please power ON after confirming the Wi-Fi switch【AP】.

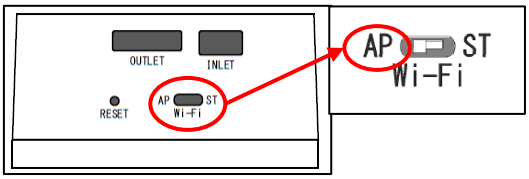


Fig. 5: Wi-Fi Switch

[In case of PC]

a. Please access to the network “PFM-AP01-#” from your PC terminal.
(“#”: Displaying last triple digits of the MAC address on the product tag for individual identification)
Input the password “matsushima” to access to the network.
And, displaying a screen to be detected the network. Please surely select “Yes”.
If select “No”, unable to access to the network。

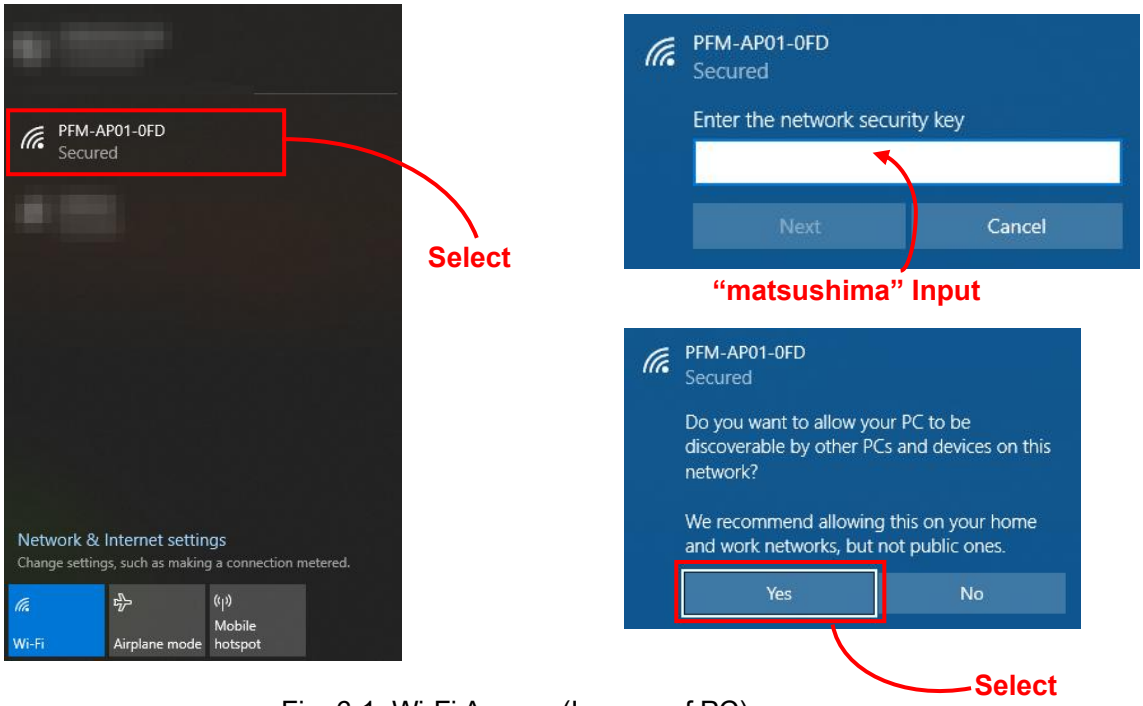


Fig. 6-1: Wi-Fi Access (In case of PC)

[In case of AndroidOS / iOS]

a. Please access to the network “PFM-AP01-#” from your individual terminal (Tablet / Cell phone).
(“#”: Displaying last triple digits of the MAC address on the product tag for individual identification)
Input the password “matsushima” to access to the network.
Please tap on the notice of restricted network access.
Displaying a pop-up for using, please surely select “Yes”.
If select “No”, unable to access to the network.

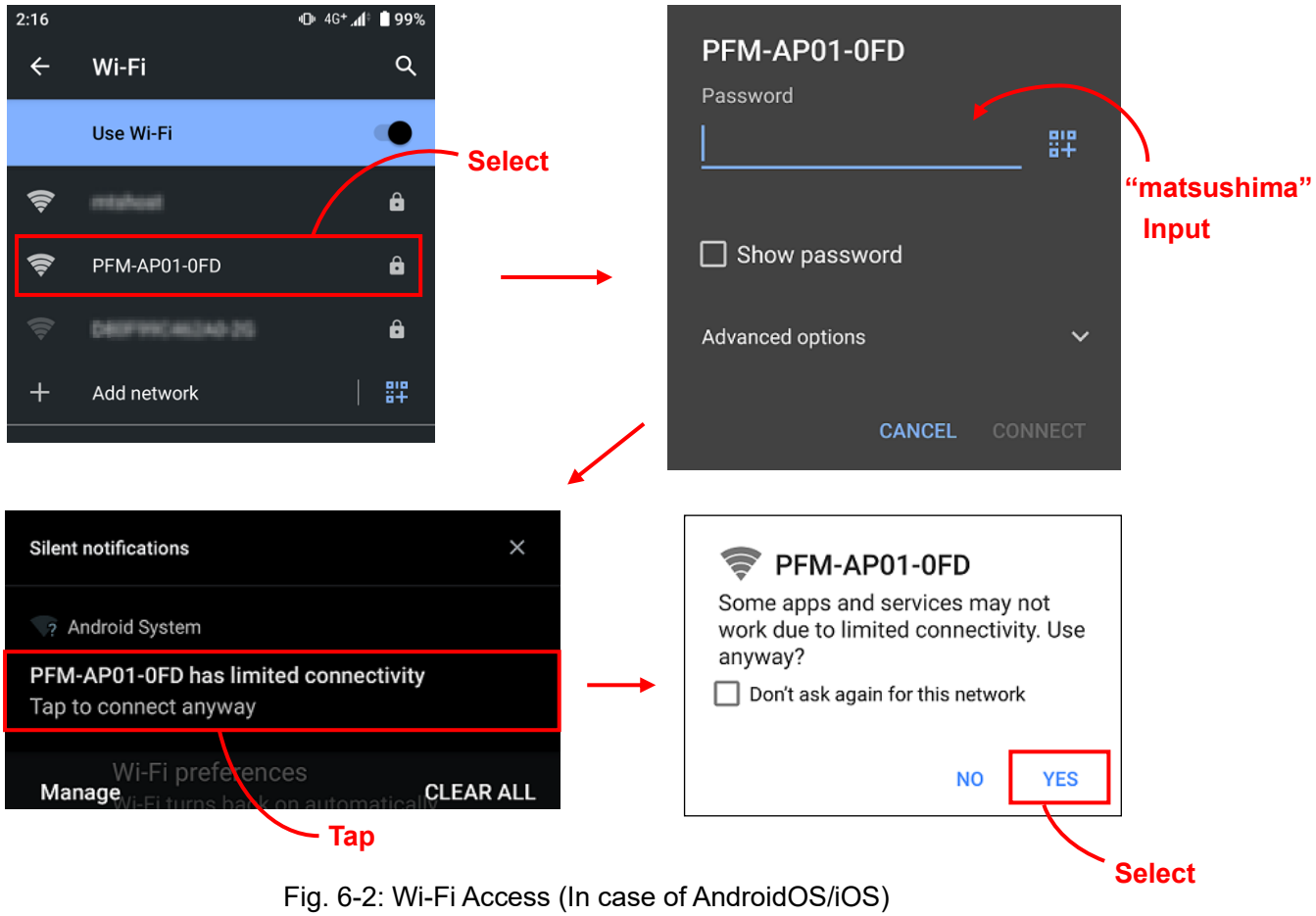


Fig. 6-2: Wi-Fi Access (In case of AndroidOS/iOS)

b. The status LED will be blue light Wi-Fi access to the device can be completed.
Changing the status LED may take over 20 seconds.

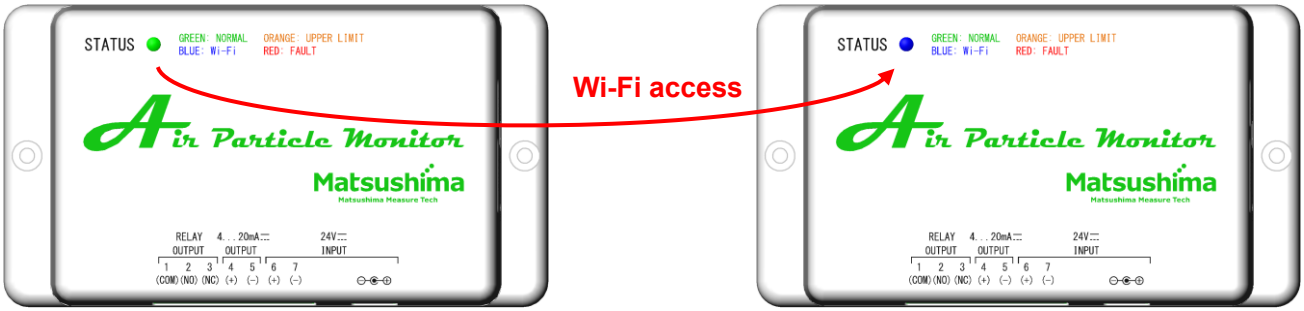


Fig. 7: LED Color

c. Please input “10.10.10.1” or “10.10.10.1/webapp/index.html” on the address bar of web browser.
Web applications will be displayed on the web browser.

 # Terminals to be confirmed and browser will be as follows;

- Windows PC (Windows10 and 11):
Microsoft Edge / 116.0.1938.81 Google Chrome / 117.0.5938.63 Firefox / 117.0
- iPhone (iOS 16.6): Safari 16.6
- Android Smart Phone (Android10): Google Chrome 116.0.5845.172

 # It may not work properly except for terminals to be confirmed and browser.

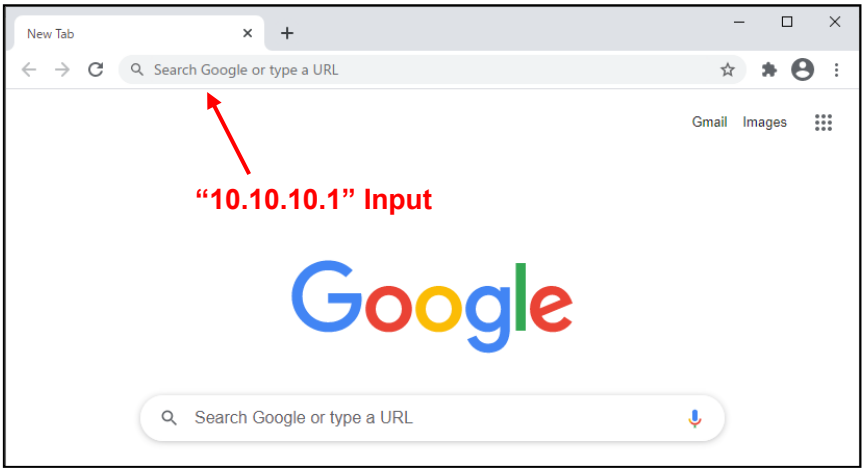


Fig. 8: Web browser access

d. After activating the web browser screen, the password login screen will be displayed.
Please input “matsuap” and press the button “OK”.
If wrong inputting, “Authorization Required” is displayed on the screen.
Please input “10.10.10.1” or “10.10.10.1/webapp/index.html” on the address bar of web browser again and re-enter the password.
After corrected the password, the app will be displayed correctly, and you can use it.
Please select “English” on the “Language Setting”.
Display of “Japanese” will be changed to display of “English” on the web applications.
If you want to change the Wi-Fi password or use ST mode, select “Network setting” button on the left side of the web applications screen and follow step "e" to configure the network settings.

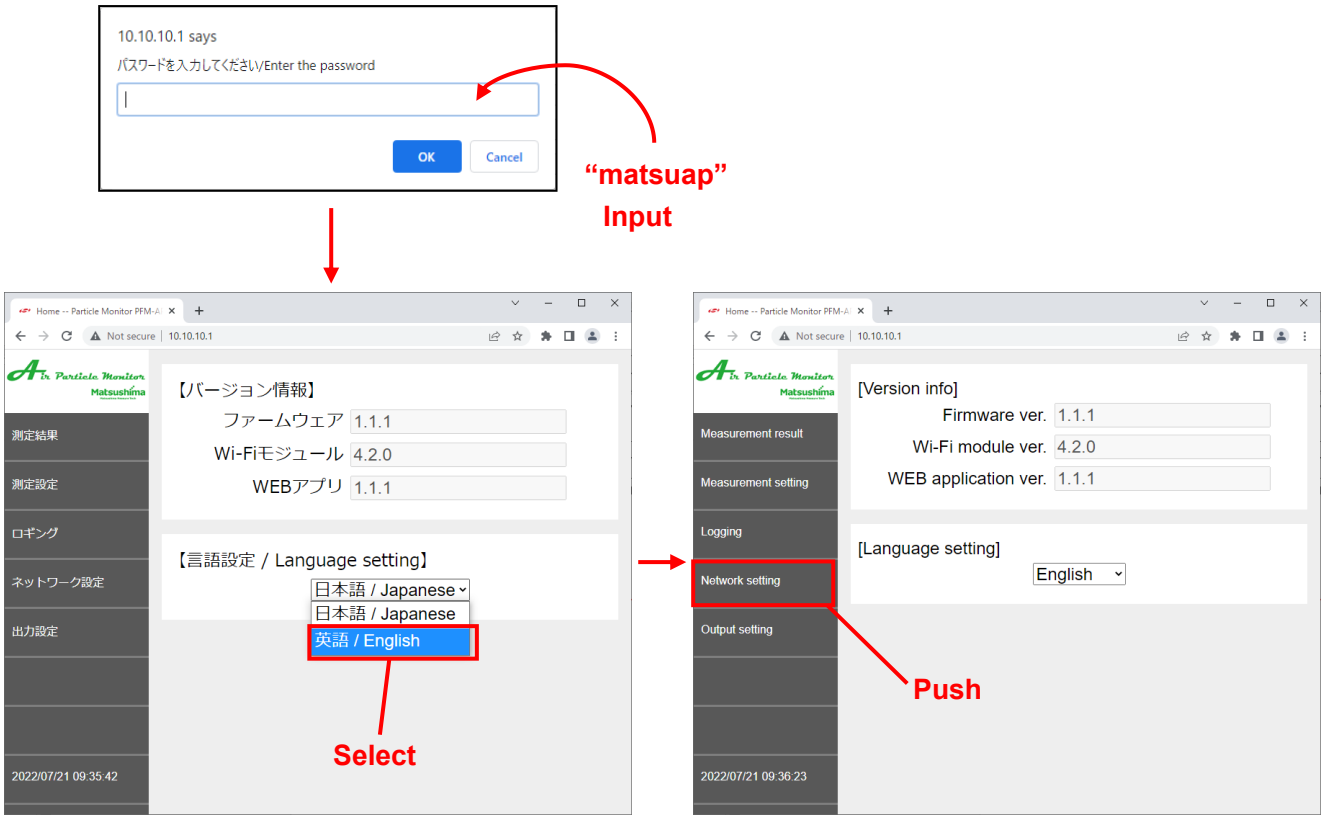


Fig.9: Password login screen, Language setting and access to Network setting

e. When displaying the Network setting, please input necessary items on Access point mode or Station mode, and push on the “Apply” button to update.
For details such as input range, please refer to section 9-5.

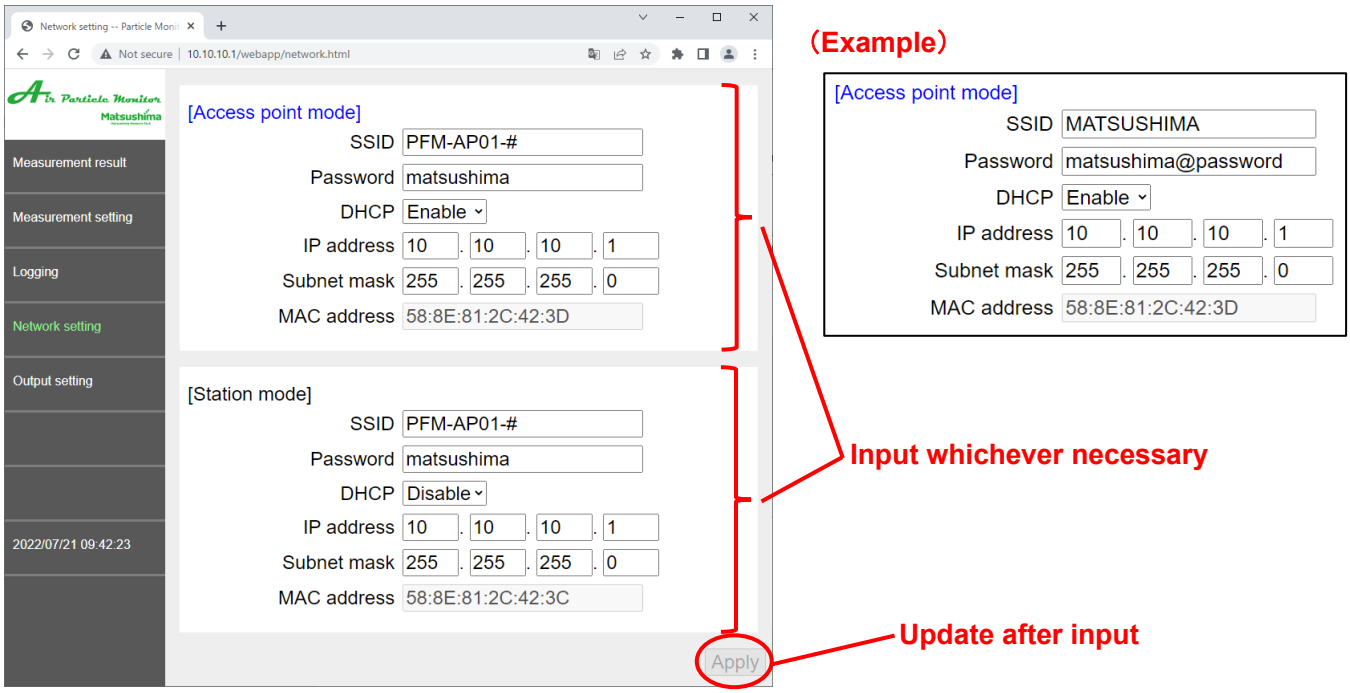


Fig. 10: Input items on Network Setting

 # If no necessary to modify the IP address of Access point mode, use the initial value.
 # Keep the password by individual.
 # More than one character for SSID and more than 8 characters for password will be necessary.
 # If not found the password, please long-press the reset button on the device.
SSID and password on both of Access point mode and Station mode will be reset, and please do setting again.
 # If modifying the network setting, Wi-Fi access was released once, so please perform Wi-Fi access again from step “a”.

8-2. Method of connection after the initial access start-up

[Access point mode]

If modified the network setting of Access point mode, Wi-Fi access was released, so please perform Wi-Fi access again according the above.
If modified the IP address from "10.10.10.1", please input the modified IP address in the web browser URL in section 8-1-c.

[Station mode]

In case of using Station mode, please switch on the Wi-Fi mode “ST (Station mode)”.
When Wi-Fi access between the wireless LAN router and Product to be used and the device can be completed, the status LED will be blue light.
If inputting the specified IP address on the web browser after Wi-Fi connecting, web applications will be displayed.

9. Web browser screen

Previously perform Wi-Fi access procedure according to Item 8.
Please input all alphanumeric characters by one-byte.

9-1. Top screen

This is initial screen when starting the web applications.
Pushing on the button in the left side, moving to each item will be available.

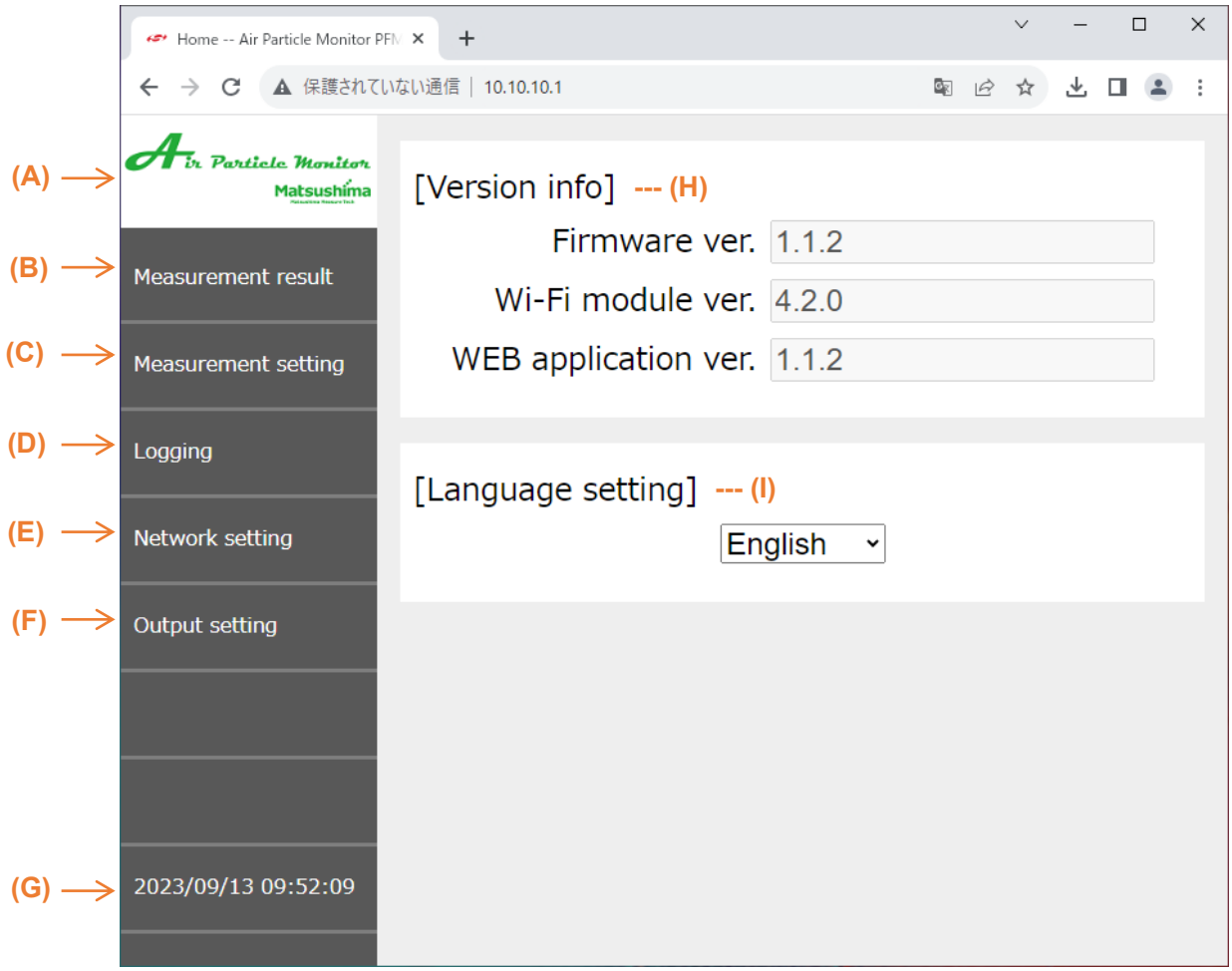


Fig. 11: Top screen

(A)	Product logo	:	Move to top screen from each item
(B)	Measurement result	:	Display measuring result of Product
(C)	Measurement setting	:	Set-up parameters for measurement
(D)	Logging	:	Specify parameters for logging
(E)	Network setting	:	Specify parameters for Wi-Fi access
(F)	Output setting	:	Perform mock output testing of current and contact point
(G)	Calendar	:	Display present date and time
(H)	Version information	:	Show version of device
(I)	Language setting	:	Switch language on operation of web applications Changing the language setting will immediately switch the language. Options “Japanese / English”

9-2. Screen of Measurement result

This is screen to be displayed the measuring results.
The measuring point of current output and contact point output will be marked (✔).
Also, by color changing on the measuring point and background, confirming condition of contact point output will be available.
Contact point output is OFF if blue character and background. Contact point output is ON if orange.

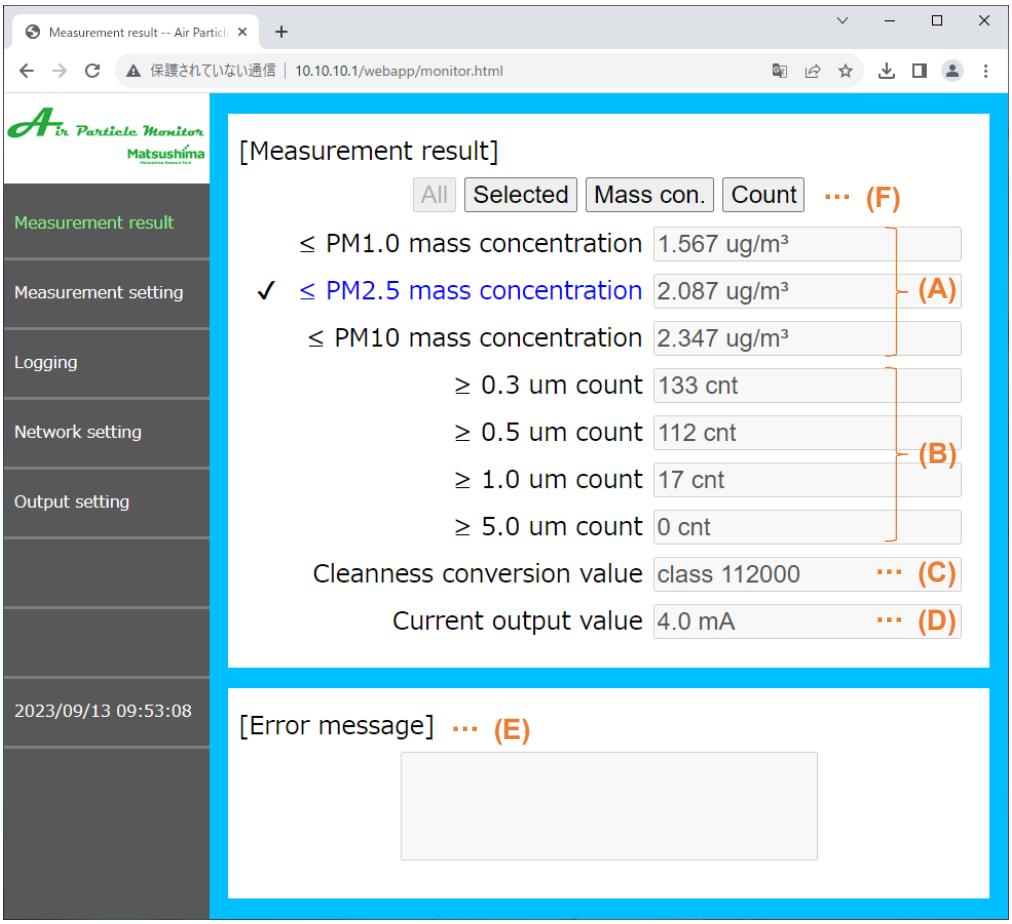


Fig. 12: Screen of Measuring Results

(A) PM1.0 mass concentration
PM2.5 mass concentration
PM10 mass concentration
: Display mass concentration [μg/m^3] of floating particles in the air.
Display mass concentration below the target particle size.
Updating cycle is each 20 seconds.
Displaying range is 0.000 to 9999.999 [μg/m^3].

(B) 0.3um Count
0.5um Count
1.0um Count
5.0um Count
: Display floating particle counting [cnt] detected within accumulated time of counting.
Display particle counting that are larger than the target particle size.
Updating cycle is specified by accumulated time of counting with calculation.
(Initial value of accumulated time of counting is 1[min], it means updating each 1 minute initially.)
Displaying range is 0 to 1,000,000 [cnt].

(C) Cleanness conversion value : Display value with conversion factor based on cleaning level.
Use in case of operation in clean room.
Displaying range [class] 10,000 to 1,000,000 (#1)

(D) Current output value : Display current output value (Ref.) calculated by portion of maximum range of selected measuring point value. (#2)

(E) Error message : Display errors on device
Please refer to Table 3 in Section 10 for the display contents.

(F) Display switching button : By pressing each button, each selected item will be displayed.
“All”: Display all measurement items. (initial selection)
“Selected”: Display item set as Range selection.
“Mass con.”: Display mass concentration items.
“Count”: Display counting items and cleanness conversion value.

(#1) Displaying “class 10,000” even if calculated less than 10,000
(#2) Displaying “4 mA” as Mass concentration (0.000 μg/m^3), Count (0 cnt) and Cleanness conversion value (class 10,000)
 # When the device error occurs, the background color changes to red.
 # Changing the background color is a function only for this screen.

9-3. Screen of Measurement setting

This is the screen of parameters setting for measurement.
Press the “Apply” button to update after inputting and modifying each value.

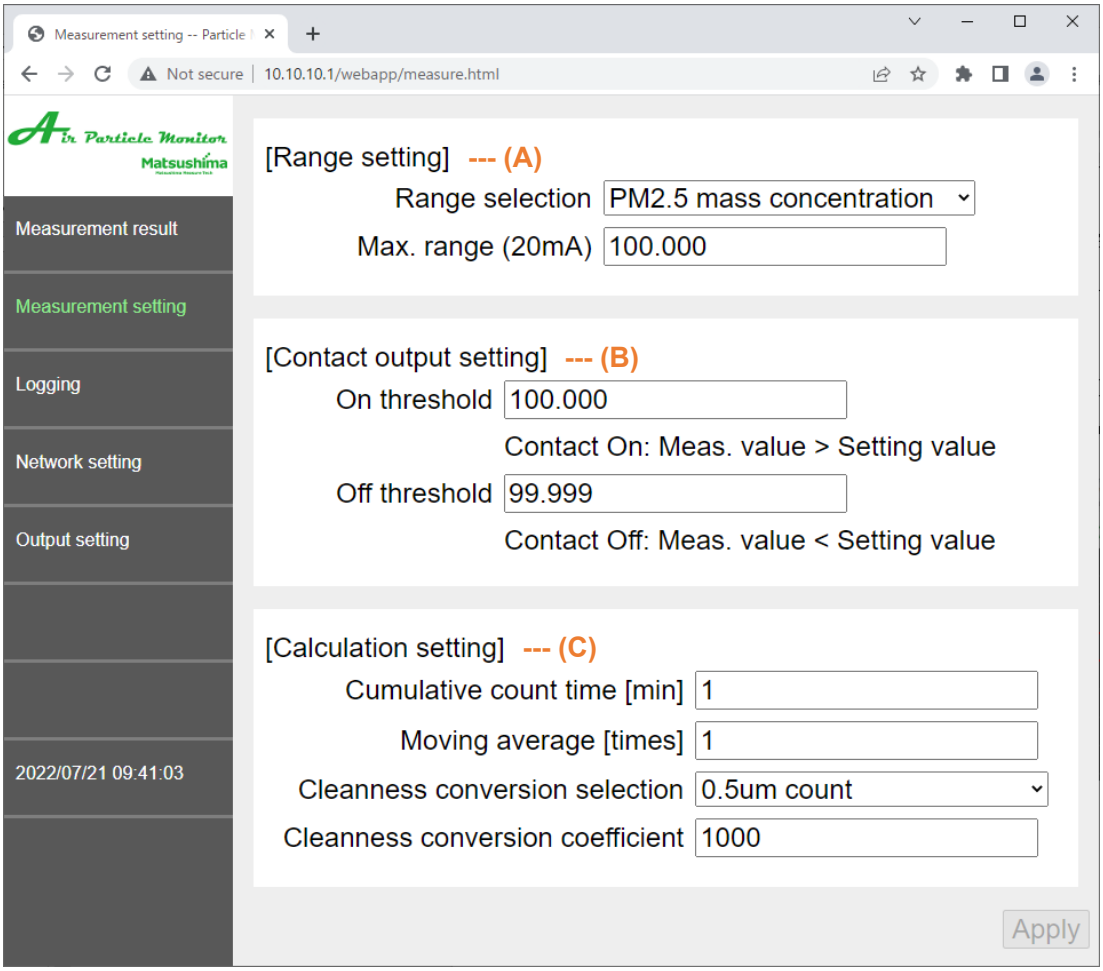


Fig. 13: Screen of measuring setting

(A) Range setting	:	Specify max. range value according to current value 20 mA of the selected parameter.
- Range selection	:	Select parameter as standard for current output and contact point output on the list box (#1). Initial value “PM2.5 Mass concentration” Options “Each PM Mass concentration / Each PM Count / Conversion value of cleaning level”
- Max. range (20mA)	:	Specify selected max. range on the target of range. (#2)
- Mass concentration of each PM	:	Initial value 1,000.000 [μg/m^3] Range of setting 35.000～1,000.000 [μg/m^3] (#3)
- Count of each PM	:	Initial value 5,000 [cnt] Range of setting 2 to 1,000,000 [cnt]
- Cleanness conversion value	:	Initial value [class] 100,000 Range of setting [class] 10,002 to 1,000,000
(B) Contact output setting	:	Specify threshold of contact point output ON or OFF (#4).
- On threshold	:	Value to be ON for contact point output when each measuring value is bigger. Contact point will be ON if bigger measuring value than the specified value.
- Off threshold	:	Value to be OFF for contact point output when each measuring value is smaller. Contact point will be OFF if smaller measuring value than the specified value.
(C) Calculation setting	:	Specify calculation for each measuring value.

- Cumulative count time [min] : Time to accumulate number of each PM counting. Specified time will be updating time.
  Initial value 1 [min] Range of setting 1 to 60 [min]
- Moving average [times] : Output Ave. value of past output values among the specified times on the parameter for each PM counting. If it is “1”, moving average is not performed.
  Initial value 1 [times] Range of setting 1 to 60 [times]
- Cleanness conversion selection : Select target to calculate conversion value of cleaning level on the list box.
  Initial value “0.5 um count” Options “Each particle counting”
- Cleanness conversion coefficient : Specify factor to calculate conversion value of cleaning level.
  Conversion value of cleaning level = Value of target x Conversion factor
  Initial value 1,000 Range of setting 1 to 1,000,000

(#1) If switching the selection of range, max. range, On threshold and Off threshold of the specified selection of range will return to initial value.
(#2) In case of lowest value setting of measurement value, “4 mA” will be output.
(#3) Regardless of specified values, display of measurement result is available up to “9999.999 µg/m^3 “.
(#4) Please specify a value of On threshold bigger than a value of Off threshold. And, if specifying Of threshold = max. range, contact point will never be ON (always OFF). Please specify On threshold = max. range, if using contact point output as abnormal output.
 # Updating of current output is 20 seconds on each mass concentration and the same value of accumulated time of counting per each counting and cleanness conversion value.

9-4. Screen of Logging

This is the screen for logging measurement results.
Outputting CSV data of measuring results on Product is available.
Press the “Apply” button to update after modified sampling cycle of logging and target of logging.
Please refer to decide a maximum range and a threshold.

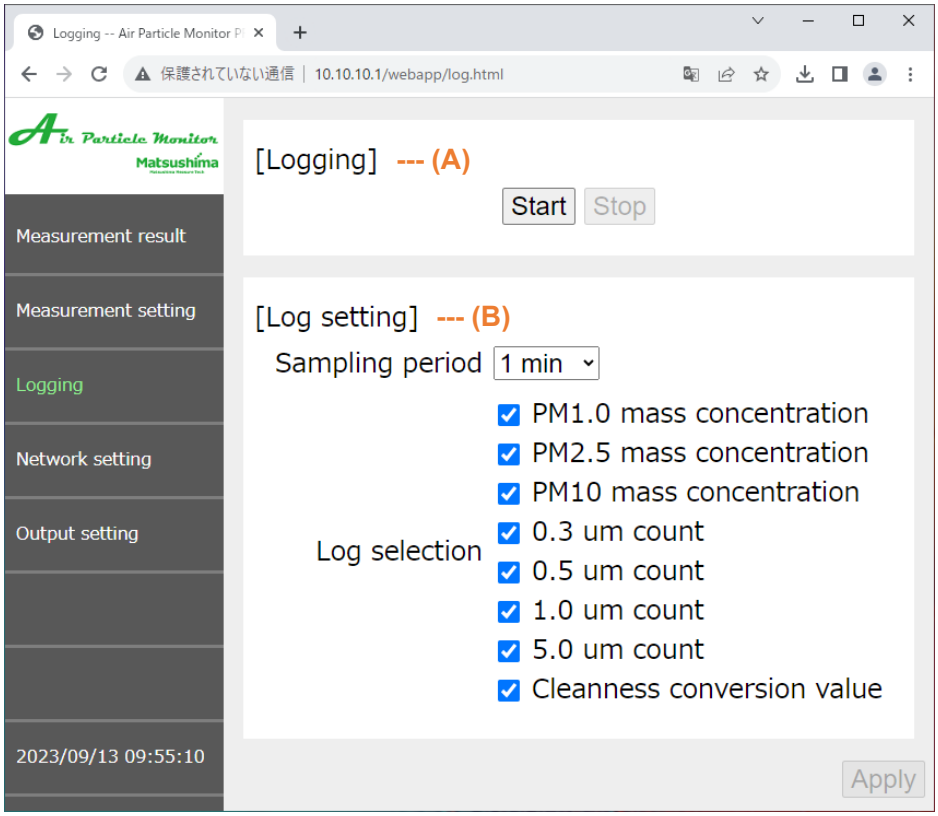


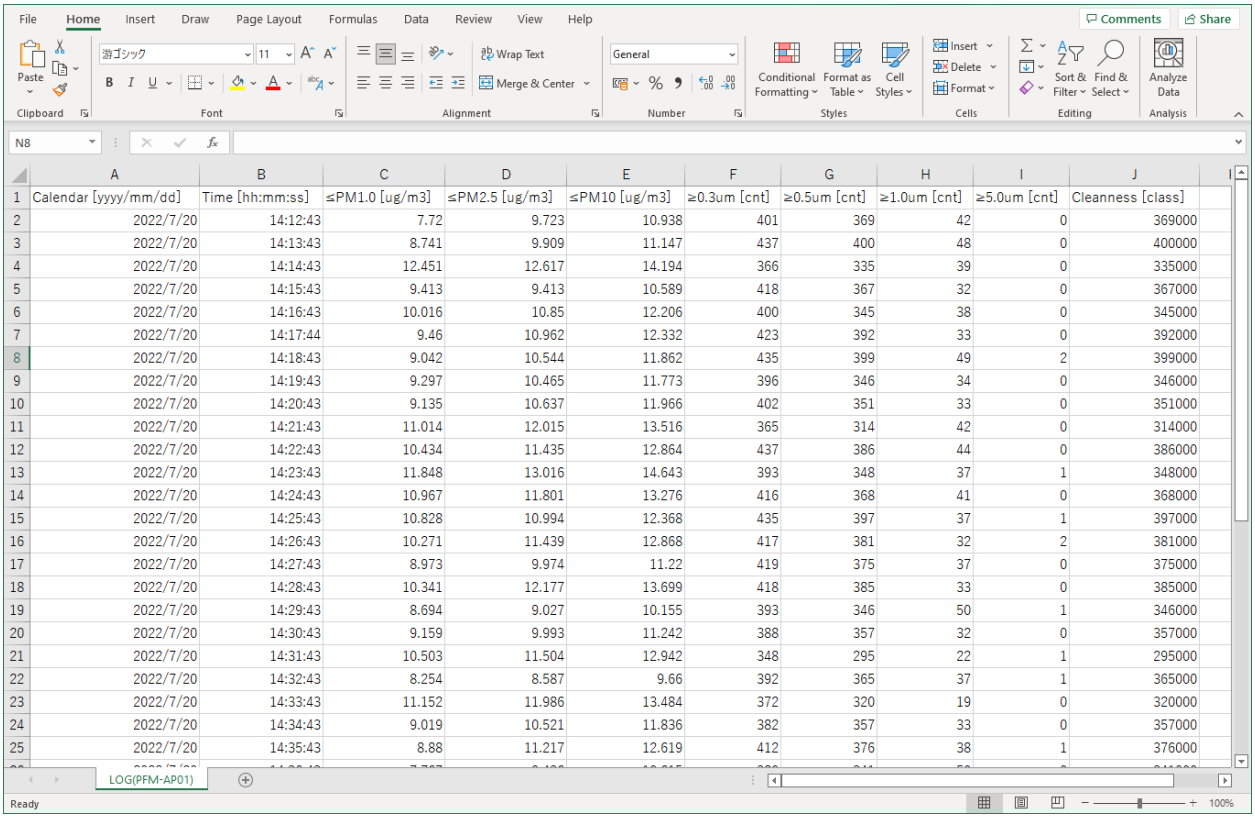
Fig. 14: Screen of Logging setup

(A) Logging : Operation of logging
- “Start” button : Start logging. During logging, the “Start” button” is disabled and the “Stop” button is enabled.
- “Stop” button : Stop logging. When “Stop” button is pressed, the log file (CSV) will be automatically downloaded to the download folder.

(B) Log setting : Specify when logging.

- Sampling period [min] : Select a cycle of data sampling.
  Initial value “1min”
  Options “20s / 1min / 5min / 10min / 30min / 60min”
- Target to be logged : Select the target data on the check box.

 # If modifying log setting, please be sure to update before start logging.
 # Performing logging by PC (WindowsOS) will be recommendable.
 # Log data by WindowsOS and AndroidOS will be saved on the OS standard download folder.
 # By iOS setting, the log data may be saved on iCloud Drive.
In this case, uploading on iCloud Drive will be not available during Wi-Fi accessing by AP mode. Please try to upload on iCloud Drive after cutting Wi-Fi access once.
 # The first logging data will be recorded after updated sampling time when the start button is pressed.
For example, the first logging data will be recorded in one minute later than when the start button is pressed if a cycle of updating is set as 1[min].
 # Log data during logging is saved on the web browser of the connected Wi-Fi device.
Log data during logging will remain in the web browser until you press “Stop” button, so be sure to press the stop button before ending logging.
 # Logging is not available if shutting the web browser during logging, disconnecting, sleep mode and screen lock on the OS, and background action (AndroidOS/iOS).
If performing logging long time, please keep Wi-Fi access and specify on the OS not to be sleep mode, locking and background action.
 # Log data can be recorded for “20s” per each sampling and for approx. 20 days according to all log data.
When the log data is recorded to the upper limit, no more will be recorded and no downloads will be executed until “Stop” button is pressed.
 # The cycle of sampling on logging is not related with updating of current output.
 # If no log data due to a bad situation of network, “*” is recorded on the data.**



	A	B	C	D	E	F	G	H	I	J
1	Calendar [yyyy/mm/dd]	Time [hh:mm:ss]	≤PM1.0 [ug/m3]	≤PM2.5 [ug/m3]	≤PM10 [ug/m3]	≥0.3um [cnt]	≥0.5um [cnt]	≥1.0um [cnt]	≥5.0um [cnt]	Cleanness [class]
2	2022/7/20	14:12:43	7.72	9.723	10.938	401	369	42	0	369000
3	2022/7/20	14:13:43	8.741	9.909	11.147	437	400	48	0	400000
4	2022/7/20	14:14:43	12.451	12.617	14.194	366	335	39	0	335000
5	2022/7/20	14:15:43	9.413	9.413	10.589	418	367	32	0	367000
6	2022/7/20	14:16:43	10.016	10.85	12.206	400	345	38	0	345000
7	2022/7/20	14:17:44	9.46	10.962	12.332	423	392	33	0	392000
8	2022/7/20	14:18:43	9.042	10.544	11.862	435	399	49	2	399000
9	2022/7/20	14:19:43	9.297	10.465	11.773	396	346	34	0	346000
10	2022/7/20	14:20:43	9.135	10.637	11.966	402	351	33	0	351000
11	2022/7/20	14:21:43	11.014	12.015	13.516	365	314	42	0	314000
12	2022/7/20	14:22:43	10.434	11.435	12.864	437	386	44	0	386000
13	2022/7/20	14:23:43	11.848	13.016	14.643	393	348	37	1	348000
14	2022/7/20	14:24:43	10.967	11.801	13.276	416	368	41	0	368000
15	2022/7/20	14:25:43	10.828	10.994	12.368	435	397	37	1	397000
16	2022/7/20	14:26:43	10.271	11.439	12.868	417	381	32	2	381000
17	2022/7/20	14:27:43	8.973	9.974	11.22	419	375	37	0	375000
18	2022/7/20	14:28:43	10.341	12.177	13.699	418	385	33	0	385000
19	2022/7/20	14:29:43	8.694	9.027	10.155	393	346	50	1	346000
20	2022/7/20	14:30:43	9.159	9.993	11.242	388	357	32	0	357000
21	2022/7/20	14:31:43	10.503	11.504	12.942	348	295	22	1	295000
22	2022/7/20	14:32:43	8.254	8.587	9.66	392	365	37	1	365000
23	2022/7/20	14:33:43	11.152	11.986	13.484	372	320	19	0	320000
24	2022/7/20	14:34:43	9.019	10.521	11.836	382	357	33	0	357000
25	2022/7/20	14:35:43	8.88	11.217	12.619	412	376	38	1	376000

Fig. 15: Log results

9-5. Screen of Network setting

This is the screen of Wi-Fi access.
On the selected Wi-Fi communication mode, a color of character is changed.
Press the “Apply” button to update after modifying the setting.
If using Station mode, please input after confirmation by your network authority.

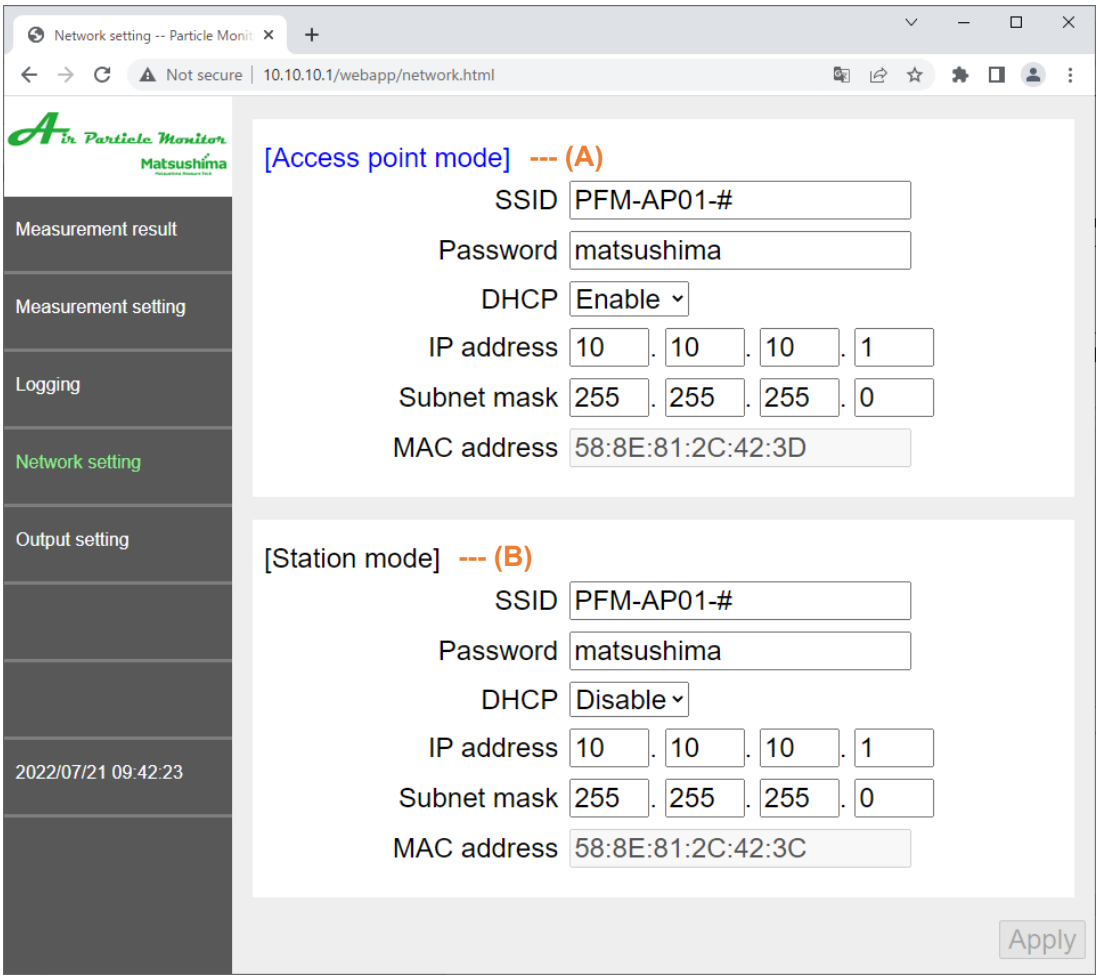


Fig. 16: Screen of network setting

(A) Access point mode	:	One by one communication mode between Product and PC mounted Wi-Fi.	
- SSID	:	Initial value: PFM-AP01-#	#: Display last triple digits of MAC address For individual identification Max. 32 alphanumeric characters by one-byte (Min. number: 1 character)
- Password	:	Initial value: matsushima	Max. 32 alphanumeric characters by one-byte (Min. number: 8 characters)
- DHCP	:	Initial value: Enable	Range: Select Enable or Disable (#1)
- IP address	:	Initial value: 10.10.10.1	Range: 0 to 255 x 4
- Subnet mask	:	Initial value: 255.255.255.0	Range: 0 to 255 x 4
(B) Station mode	:	Mode through wireless LAN (router) between Product and PC / Tablet. Displaying measuring values and modifying setting of Product will be available. (#2)	
- SSID	:	Initial value: PFM-AP01-#	Max. 32 alphanumeric characters by one-byte (Min. number: 1 character)
- Password	:	Initial value: matsushima	Max. 32 alphanumeric characters by one-byte (Min. number: 8 characters)
- DHCP	:	Initial value: Disable	Range: Select Enable or Disable (#1)
- IP address	:	Initial value: 10.10.10.1	Range: 0 to 255 x 4
- Subnet mask	:	Initial value: 255.255.255.0	Range: 0 to 255 x 4

(#1): Please select Valid on DHCP by Access point mode if no need.
(#2): Use Station mode if having internal LAN.
 # If modifying the network setting, Wi-Fi module will be restarted and Wi-Fi access is released once.

9-6. Screen of Output setting

This is the screen to perform mock output testing of current output and contact point output.
And, this is the screen to specify actions of contact point output and current output under trouble on Product.

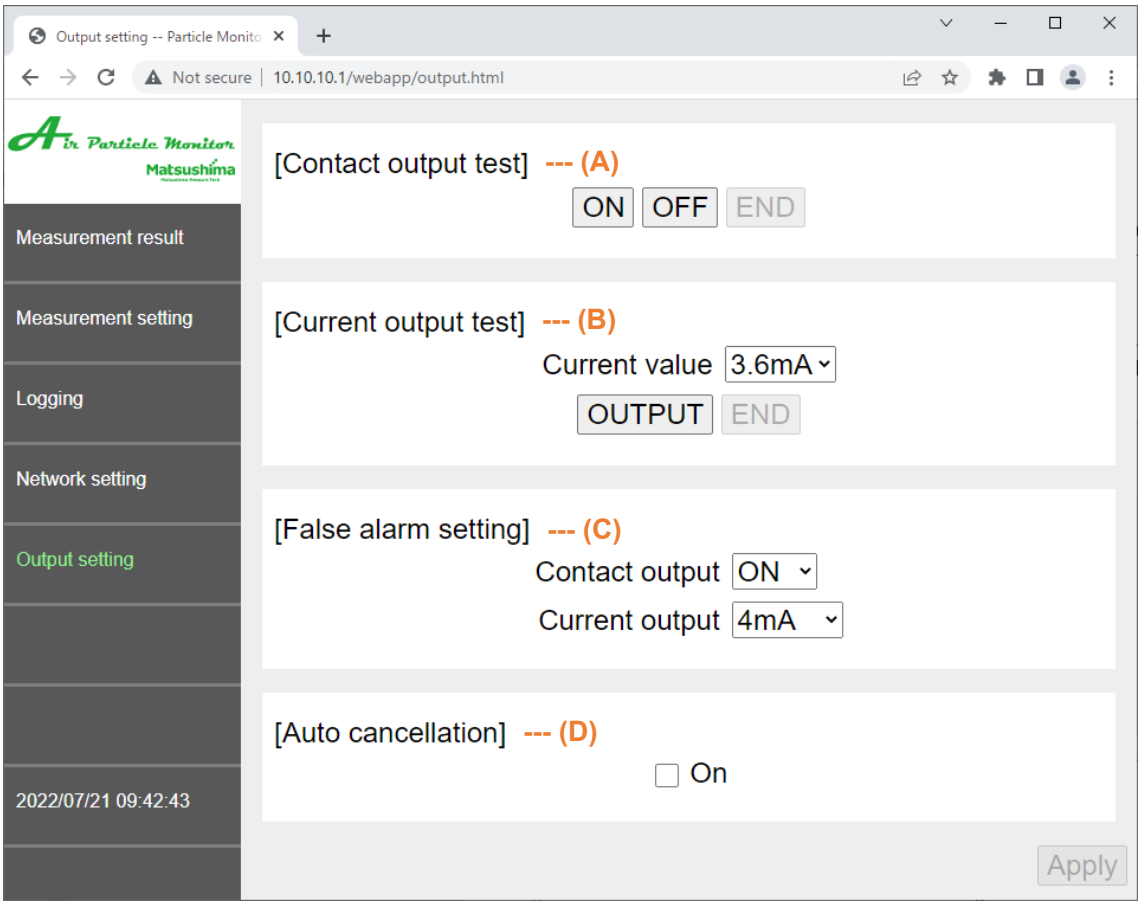


Fig. 17: Screen of output setting

(A) Contact output test	:	Perform Contact point testing (#1)
- “ON” Button	:	Contact point output to be ON
- “OFF” Button	:	Contact point output to be OFF
- “END” Button	:	Complete Output testing
(B) Current Output Test	:	Perform Current output testing (#1)
- Current Value	:	Select among 3.6 mA / 4 mA / 12 mA / 20 mA / 22 mA.
- “OUTPUT”/”END” Button	:	Press the “OUTPUT” button to output the selected current value. Press the “END” button to return to normal output.
(C) False alarm setting	:	Specify actions under trouble on Product. If modifying the setting, please press the Apply button to update.
- Contact output	:	Select ON or OFF. Initial value “ON”
- Current output	:	Select among 3.6 mA /4 mA / 20 mA / 22 mA / HOLD. Initial value “4mA”
(D) Auto cancellation	:	Select Automatic release of output testing. After modified setting, please press the Apply button to update. The check box is Blank (Invalid) initially. If checking, automatic release will be done in 5 minutes later after output testing started.

(#1) During output testing, the status LED is flashing with the status color, and “Now testing” is displayed on Output setting button in the left of Fig. 17 when output testing.

 # When completed output tests (A) and (B), please be sure to press the End button without Valid on (D). The output testing will be continued if not press the End button.

10. Troubleshooting

When the following phenomena occurred, please confirm items corresponding to the phenomena before judgement of breakdown.

Tabel 2: Troubleshooting list

Item	Failure	Confirmation / Treatment
1.	No power	- Try to perform absolute power supply after confirmed wiring.
2.	LED has red color flashing.	- Set power OFF -> ON. - If the problem does not improve, please check if there is anything displayed in “Error message” of “Measurement results”.
3.	A message is displayed in "Measurement result" -> "Error message" of the web applications.	- Product may be malfunctioning or have reached its end of life. Please contact our office near from you. - The details of each error are shown in Table 3.
4.	Unable to access to web browser	- Please confirm the Wi-Fi access start-up in Item 8.
5.	No output current signals	- Please check wiring.
6.	Led has green/orange/ blue flashing.	- Please check mock output test mode to be completed. - If not completed, please press the End button to be completed. - If completed, please set power OFF -> ON.
7.	On work on contact point	
8.	No changing on current output value	
9.	No display of result on the screen of measurement result.	- Please update the web browser. - Please try to check the terminals to be confirmed and browser as described in Item 8-1 (c). - If you are using IE mode in Microsoft Edge, the web applications will not work properly. Please disable IE mode or use another web browser.
10.	All measuring results are displayed “0”.	
11.	Not updating on the web application.	
12.	Logging cannot be performed.	- Please try to check the terminals to be confirmed and browser as described in Item 8-1 (c).
13.	SSID and password have been forgotten.	- Please reset SSID and password according to the procedure described in Item 8-1 (e).

 # If above failures couldn’t be recovered or any other failure could come, please contact our office near from you.

Tabel 3: Error message list

Item	Error message	Contents
1.	Abnormality in light receiver	- Abnormality in the light receiving part of the particle detection circuit (Decreased amount of light received)
2.	Abnormality in laser controller	- Abnormality in the light emitting part of the particle detection circuit (Decreased in laser power)
3.	Abnormality in air flow controller	- Suction fan abnormality (Decreased in fan speed)
4.	I2C communication error	- Communication error between modules inside the device
5.	PM UART communication error	
6.	Wi-Fi UART communication error	
7.	Checksum error	- The device firmware error