AF01 Air Flow Controller User Manual

Revision : 3.9

Date : 14 February 2025

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1. Air flow controller

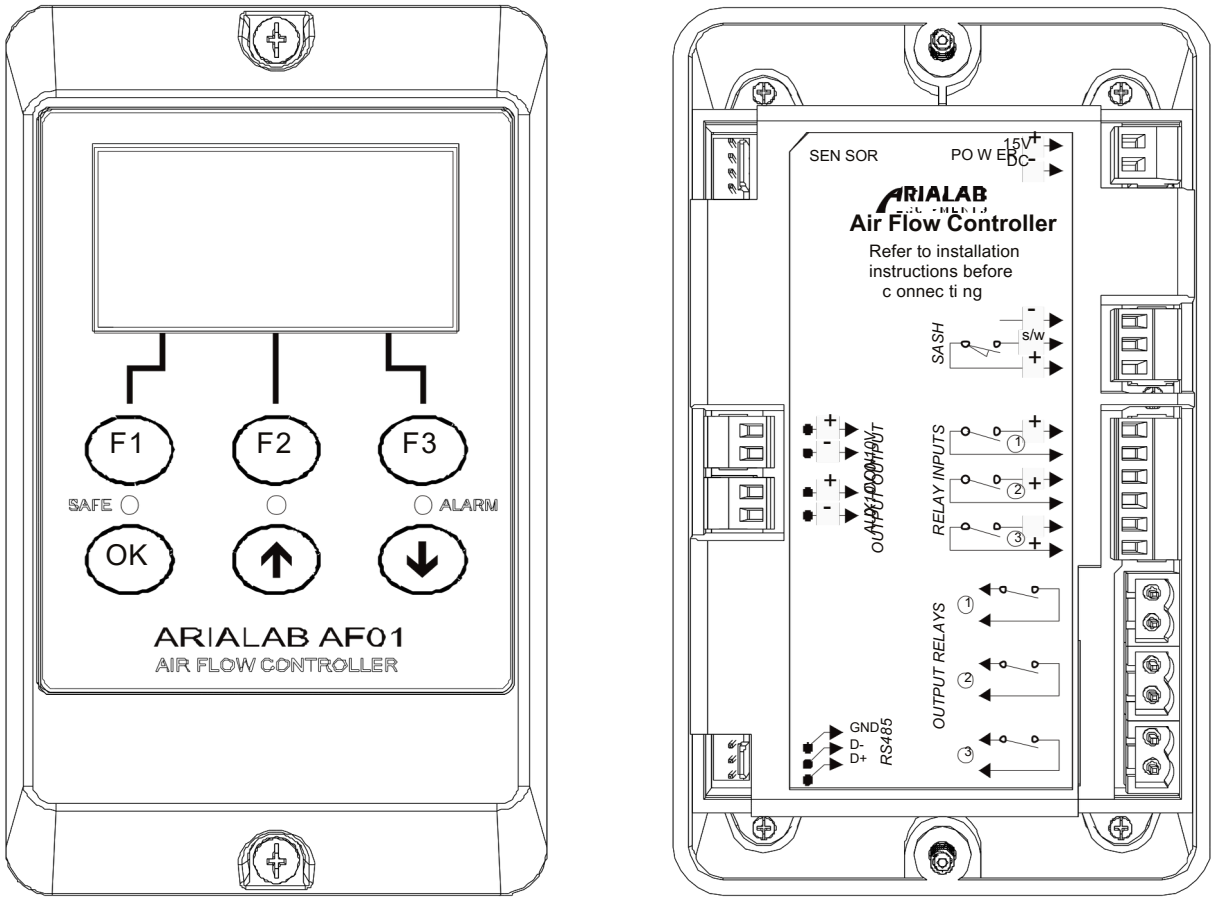

Figure 1, air flow controller

The controller is designed to allow ease of operation. On the front face of the controller, there are two rows of control buttons. On the top row, there are three dynamic function buttons labeled [F1], [F2] and [F3], their functions will change during the operation. The current functions are indicated on the LCD display. The LEDs on the controller give the indication on the air flow status, green for safe, yellow for warning and red for alarm.

The LCD display on the controller allow user to monitor the air flow, output level, system status. The LCD display also provides an interactive menu for system settings.

2. Powering up the unit

When the power is turned on, the air flow controller will display the boot screen for a brief moment. The number shown on the top right corner is the version number.

Figure 2, boot screen

The main screen will be displayed soon after the boot screen. At power up, the sensor requires about 60 seconds to stabilize. Please allow sufficient time for the sensor to stabilize before operating the controller.

If the air flow sensor is not connected or faulty, the display will show “SENSOR FAULT”. The fault should be rectified before resuming the operation.

3. Pre-purge

When the controller is powered up, a pre-purge operation will take place. During pre-purge, the fan is driven to maximum speed and the air flow will not be monitored. The LCD will display the pre-purge timer. Pre-purge operation can be cancelled by pressing the [Stop] button.

The pre-purge time can be set by selecting <Timer configuration><pre-purge time> in the setting menu. If pre-purge time is set to 0, the pre-purge operation will not take place.

4. Configuring the system

The controller’s operating parameter can be changed by entering setting mode. To enter setting mode, press and hold the [F1] button for 3 seconds. When entering menu mode you will be prompted for a 4-digit numerical password. To enter the password, use the [Up] or [Down] button to change the value and use the [<–] or [–>] button to select the digit. When done, press the [OK] button to authenticate the password or press the [Esc] button to return to normal operation.

The factory default password is 0000. If the password is forgotten, please contact local distributor for resetting the password.
In setting mode, press the [Scroll] button to scroll through the parameters. When the desire parameter is displayed, press the [OK] button to select the parameter for change.
When the parameter is selected, the value of the parameter will be displayed. Use the [UP] or [Down] button to adjust the value and press the [OK] button when done or press the [Esc] button to restore the value without change.

Press the [UP] button for longer than 3 seconds to repeat the [UP] button at a faster rate. Press the [Down] button for longer than 3 seconds to repeat the [Down] button at a faster rate.

In setting mode, if the controller is left idle for 60 seconds or more, the controller will return to normal operating mode.

5. Operate the controller

The air flow controller can be configured to operate in automatic or manual mode. Automatic mode is also called variable air volume mode (VAV). Manual mode is also called constant air volume mode (CAV). When the controller is ready for operation, press the [Run] button to operate.

5.1. Automatic operation (VAV)

In automatic mode, the air flow control is performed by the controller's PID algorithm. The air flow controller will adjust the fan speed to maintain a constant air flow (face velocity). As the sash is lifted, the air flow controller detects a drop in face velocity and it increases the fan speed to compensate the drop. When the sash is lowered, the air flow controller reduces the fan speed to keep the face velocity constant.

Automatic mode can be enabled by selecting <System configuration><Automatic mode> in the setting menu and set the value to 1. When automatic mode is enabled, the LCD display will show the "Auto" icon.

5.2. Air flow set point

In Automatic mode, the air flow set point can be changed by selecting <System configuration><Air flow set point> from the setting menu. The air flow set point is the target on which the controller will regulate the air flow to.

5.3. Manual operation (CAV)

In manual mode, the controller no longer controls the fan speed. Rather, the fan speed is controlled manually by pressing the [Up] or [Down] button.

Manual mode can be enabled by selecting <System configuration><Automatic mode> in the setting menu and set the value to 0. When manual mode is enabled, the LCD display will show the "MAN" icon.

6. Auto Run

Auto run automatically operates fan after pre purge. To activate, access <System Configuration> in Main Menu. Set value to 1 (Enable). Pre purge has to be enabled for Auto Run to activate

7. Air flow read out

The air flow reading will be displayed on the LCD display. To disable the reading, choose <System configuration><Show air flow> in the setting menu and set the value to 0. When the air flow reading is disabled, the LCD will show the current air flow status (SAFE, WARNING or ALARM).

The LCD brightness can be adjusted by selecting <System configuration><LCD brightness> in the setting menu. Increasing and decreasing the value will change the LCD brightness.

8. Air flow monitoring

When the air flow controller is operating in automatic or manual mode, the air flow controller monitors the air flow (face velocity). If the air flow is within the safe limit, the green colour {SAFE} indicator will light up. The safe limit is defined as the air flow rate above the warning air alarm setting and below the high air alarm setting.

If the air flow falls below the warning air alarm setting, the yellow indicator will light up indicating a warning condition.
If the air flow falls below the low air alarm setting for a period of time determined by the warning - alarm time, the red indicator will light up indicating a low air alarm condition. During alarm condition, the controller's buzzer will also sound if not muted. During low air alarm condition, if the air flow rises above the warning air alarm setting for a period of
time determined by the alarm – warning time, the alarm condition will cease.
If the air flow rises above the high air alarm setting, the controller will indicate an alarm condition and the buzzer will sound if not muted.

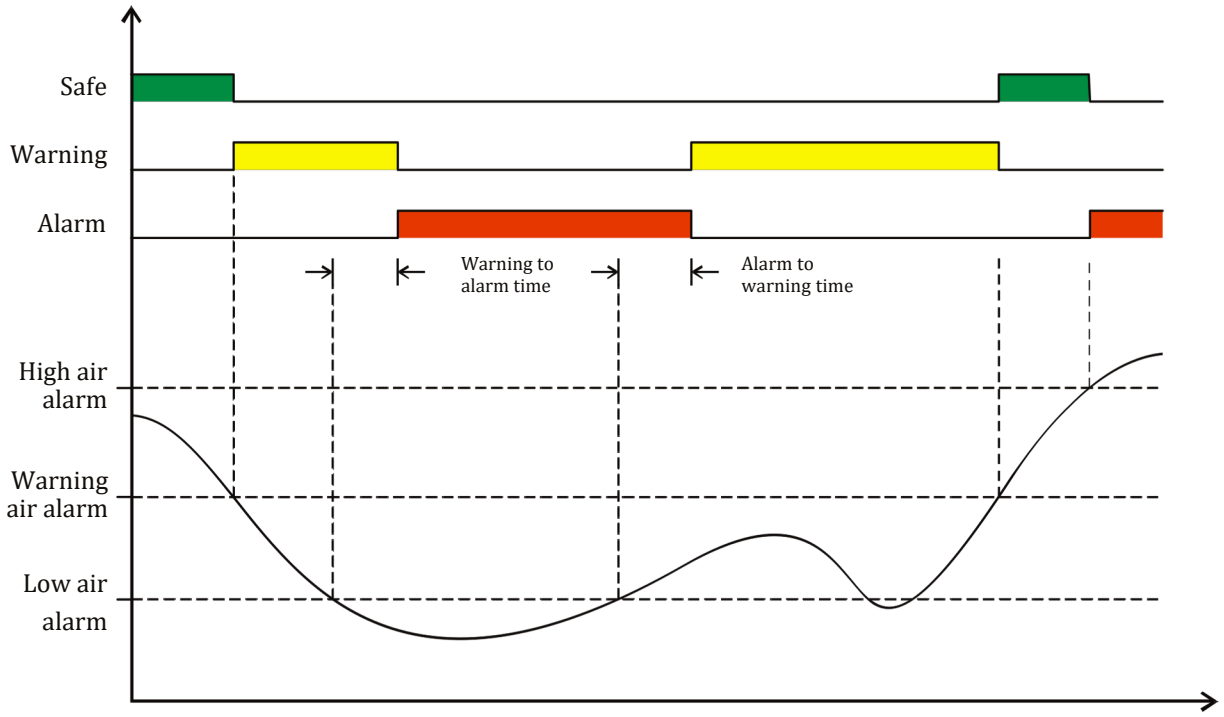

Figure 3, state diagram

9. Muting alarms

When the buzzer sounds during alarm condition, the buzzer can be muted by pressing the [OK] button or by selecting the <System configuration><Mute> in the setting menu and set the value to 1.

10. Alarm settings

There are five parameters that determine how the warning and alarm condition should be triggered and escalated. When an alarm is triggered, the controller will not escalate any alarm until all other condition related to the alarm are fulfilled. When a warning or alarm is escalated, the controller will sound the buzzer if the buzzer is not muted. The LEDs and LCD display will indicate the alarm condition accordingly.

To change the alarm settings, select <Alarm configuration> in the setting menu then select the desired parameter to be changed.
The following explains the parameters in detail.

a.	Warning air alarm	Warning will be escalated if the air flow falls below this setting
b.	Low air alarm	Alarm will be triggered if the air flow falls below this setting
c.	High air alarm	Alarm will be triggered if the air flow rises above this setting
d.	Warning – alarm time	Alarm will be escalated if the air flow falls below low air alarm setting for a period longer than this parameter
e.	Alarm – warning time	Alarm will be terminated if the air flow rises above low air alarm setting for a period longer than this parameter

11. Sash

The air flow controller has the ability to monitor the sash limit. If a sash limit sensor is fitted, when the sash is lifted above the maximum limit, the air flow controller will generate a sash high alarm.

To enable the sash monitoring, select <Alarm configuration><Sash High Alarm> in the setting menu and set the value to 1.
When sash alarm is generated, the red indicator will light up and the buzzer will sound if not muted.

12. Turning on/off the light

At any time when the [Light] button is shown on the LCD display, pressing the [Light] button will turn on and off the light.

13. Turn on/off OP3

OP3 is a relay output which can be used to control external devices such as pump and other. Different installation will have different devices that connect to this relay output. Please consult your local distributor for the exact device that has been connected to this relay output.

At any time when the [OP3] button is shown on the LCD display, pressing the [OP3] button will turn on and off the connected device.

14. Post purge

When the air flow controller is operating, press the [Stop] button will stop the operation. When [Stop] button is pressed, the light will turn off and the post purge operation will be activated with the fan running at maximum speed. The LCD display will show the post purge timer. Post purge operation can be cancelled by pressing the [Stop] button again.

The post purge time can be set by selecting <Timer configuration>< post-purge time> in the setting menu. If post purge time is set to 0, the post purge operation will not be activated. During post purge, the air flow controller will stop monitoring the air flow.

15. Quick operating profiles

The quick profiles allow user to quickly select preprogrammed operating mode. This feature is useful when the user need to act fast in changing the air flow without going through the setting menu.

The controller has 2 preprogrammed automatic mode (VAV) operating profiles and 2 preprogrammed manual mode (CAV) operating profiles.

15.1. *Automatic mode profile 1 (P-1)*

To use the automatic mode profile 1 (P1), press and hold the [F2] button for 3 seconds. When this profile is used, the LCD will show the “Auto” and “P1” icons. The air flow set point can be changed by selecting <System configuration><Profile 1 set point> from the setting menu. The air flow controller will use this set point to regulate the air flow when this profile is selected. By default, this profile is used to quickly set the air flow regulation to a higher level.

15.2. *Automatic mode profile 2 (P-2)*

To use the automatic mode profile 2 (P2), press and hold the [F3] button for 3 seconds. When this profile is used, the LCD will show the “Auto” and “P2” icons. The air flow set point can be changed by selecting <System configuration><Profile 2 set point> from the setting menu. The air flow controller will use this set point to regulate the air flow when this profile is selected. By default, this profile is used to quickly set the air flow regulation to a lower level.

15.3. *Manual mode profile 1 (MAX)*

To use manual mode profile 1 (MAX), press and hold the [Up] button for 3 seconds. When this profile is used, the LCD will show the “MAN” and “MAX” icons, the air flow controller stops regulating the air flow and set the fan to run at a higher constant speed. The output signal from the air flow controller to the fan inverter can be changed by selecting <System configuration><Max. output> from the setting menu. The fan speed can be further adjusted by pressing the [Up] or [Down] buttons. By default, this profile is used to quickly set the air flow to a higher constant level.

15.4. *Manual mode profile 2 (MIN)*

To use manual mode profile 2 (MIN), press and hold the [Down] button for 3 seconds. When this profile is used, the LCD will show the “MAN” and “MIN” icons, the air flow controller stops regulating the air flow and set the fan to run at a lower constant speed. The output signal from the air flow controller to the fan inverter can be changed by selecting <System configuration><Min. output> from the setting menu. The fan speed can be further adjusted by pressing the [Up] or [Down] buttons. By default, this profile is used to quickly set the air flow to a lower constant level.

15.5. *Manual mode profile 2 (MIN)*

To resume the operation in normal mode, press and hold the [OK] button for 3 seconds. In normal operating mode, the LCD display will show the “Auto” and “NOM” icons.

16. Auto-off timer

The air flow controller operation can be stopped by using the auto-off timer. When the auto-off timer elapsed, the air flow controller will stop the operation in the same way when the [Stop] button is pressed. If post purge timer is not 0, the post purge operation will be activated. The auto-off timer is shown on the LCD display at the top left corner by a message written as “A.OFF 00:00:00”

To use the auto-off timer, select <Timer configuration><Auto-off timer (hsr)> in the setting menu and enter the desired hour value and select <Timer configuration><Auto-off timer (min)> in the setting menu and enter the desired minute value. If the hour and minute value are set to 0, the auto-off timer will stop operating.

17. Service timer

The air flow controller has the ability to keep track of the operating life. When the service timer elapsed, the air flow controller will display and flash the “SERVICE DUE” message at the top middle of the LCD display reminding of a service.

The service timer can be renewed. To renew the service timer, select <Timer configuration><Service timer> in the setting menu and enter the desired value. When the service timer is renewed with a non-zero value, the LCD display will show the message “DUExxxxxhrs” indicating the number of hour to next service. Service timer will only operate when the fan is running.

18. Quiet Operation

The controller will produce a short beep every time a valid button is pressed. The beep sound adds a tactile feel to the button when pressed. This tactile beep sound can be deactivated by the selecting the <System configuration><Quiet Operation> in the setting menu and set the value to 0.

19. Calibration

The controller should be calibrated on every new installation or whenever the air flow sensor is replaced or <reset to defaults> command has been executed. Yearly calibration is also recommended.

To calibrate the air flow, follow the calibration steps below

Step 1:

Press and hold the [F1] button for 3 seconds to enter menu mode, press [Scroll] button repeatedly to scroll through the menu items, select <Calibration>< Calibrate air flow > in the setting menu.
Step 2:

Open sash to 3/4 of the maximum operating height, allow 30 seconds for the air flow to stabilize. Measure face velocity using a calibrated anemometer and enter the value by pressing the [Up] or [Down] button. Press [OK] button when done.

Please note that a stable face velocity reading on the anemometer must be obtained for accurate calibration. If the anemometer reading is not stable, try to turn off the air conditioner, blower of any surrounding equipments that may cause disturbance to the face velocity. The face velocity should be 0.2 to 0.5m/s. If face velocity falls below 0.15m/s, try to lower the sash to keep the face velocity within be 0.2 to 0.5m/s. Do otherwise if face velocity exceeds 0.5m/s Step 3: Lower the sash to about 1/4 of the

maximum operating height, allow 30 seconds for the air flow to
stabilize. Measure face velocity using a calibrated anemometer and enter the value by pressing the [Up] of [Down] button. Press [OK] button when done. Please note that a stable face velocity reading on the

anemometer must be obtained for accurate
calibration. If the anemometer reading is not stable, try to turn off the air conditioner, blower of any surrounding equipments that may cause disturbance to the face velocity. The face velocity should be 1.0 to 1.8m/s. If face velocity exceeded 2m/s, try to open the sash higher to keep the face velocity within 1.0 to 1.8m/s. Do otherwise if face velocity falls below 1.0m/s The air flow controller uses PID algorithm to

regulate the air flow. The PID constant can be changed for
different performance result. However changing PID constants require good knowledge in process control. It is recommended that the PID constants not to be changed unless it is absolutely necessary. The air flow controller comes with recommended PID settings for standard installations. Please contact local distributors for more details on setting the PID constants.

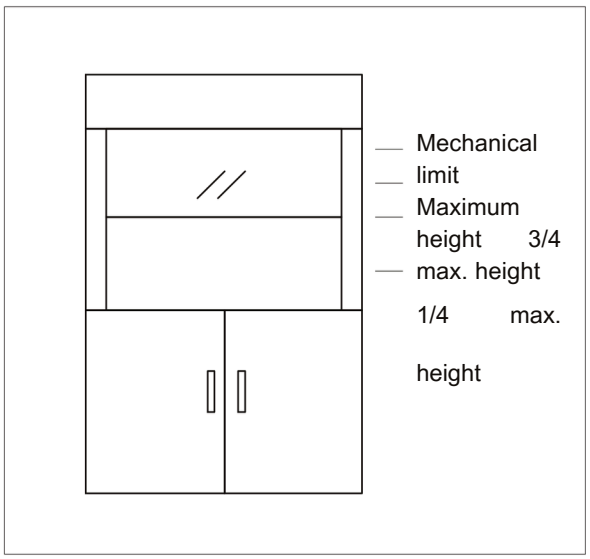

Figure 5, sash is positioned at 3/4 of the maximum operating height

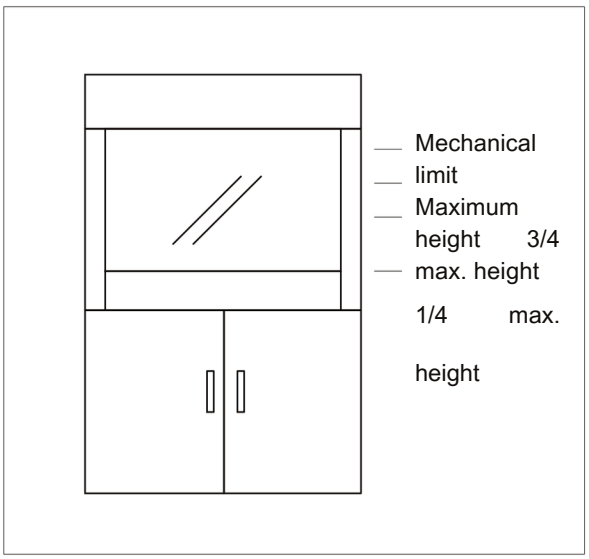

Figure 4, sash is positioned at 1/4 of the maximum operating height

20 Set password

The air flow controller is shipped with a default password. The default password is 0000. New password can be set to prevent unauthorized access to the menu and changing of system parameters.

To set new password, select <System configuration><Set password> in the setting menu, use the [Up] or [Down] button to change the value and use the [<–] or [–>] button to select the digit.
When done, press the [OK] button to save the new password. Press the [Esc] button to exit without changes.

21. Reset to defaults

In the event that the air flow controller is not operating properly due to incorrect settings, the reset to defaults function can be executed to reset all settings and calibrations to the original factory defaults. Please note that after executing the reset to defaults function, calibration should be conducted to ensure accuracy of the air flow.

To execute the reset to defaults function, select <System configuration><reset to defaults> and press the [OK] button for 3 seconds. Press the [Esc] will cancel the function.
The password will not reset by this function.