TEL

AFA4000/E
VAV Controller

Installation and calibration guide

Operator Panel

A – Airflow bar-graph or timeline display & control status

B – Airflow velocity display with LED halo (red/amber/green)

C – Status window, airflow alarms and Auto Sash status

D – Menu pushbuttons & alarm mute

E – Airflow Controller Pushbuttons

F – Menu Pushbuttons & Alarm Mute

Overview

The AFA4000/E VAV Controller can be configured in the field to suit all applications, with password protected menus and diagnostic menus to aid installation and commissioning. Refer to the full manual for detailed information.

Startup

The AFA4000/E must be field-calibrated once the room air supply and exhaust is proportionally balanced. When the unit is powered up, the following sequence of events occurs:

1. The alarm performs a self-test of its functions and audible alarm (approximately 3 seconds)

2. At the end of the delay, the unit will do one of two things:

   a. If the Airflow controller has been calibrated, the unit enters normal operating mode (displays airflow velocity, LED's and audible alarm enabled).

   b. If the Airflow controller has not been calibrated, the unit will display "Requires set up, press Mute to continue"

Airflow Controller Calibration

1. Press Mute from the "Requires set up" screen or if the controller is in the Run Screen Press and Hold the Mute button for 5 seconds until the Main Menu is displayed.

2. Using the ↑ / ↓ buttons select SET UP MONITOR, then select CONFIGURE, then enter the password (the factory default password is 0-0-0-0), press Mute to continue.

3. Using the ↑ / ↓ buttons select ECON CONFIGURE, then select MANUAL / AUTO and press Mute, select MANUAL and press Mute to continue.

4. Open the sash to the normal operating height and measure the face velocity using a calibrated instrument. Using the ↑ / ↓ buttons adjust the Manual output so that the face velocity is equal to the design velocity, e.g. 0.50m/sec (100fpm), then press Mute, then select DONE and press Mute again.

5. Using the ↑ / ↓ buttons select SET UP, then select CALIBRATION, then enter the password (the factory default password is 0-0-0-0), press Mute to continue.

6. With the sash open to the normal operating height measure the face velocity using a calibrated instrument. Using the ↑ / ↓ buttons enter the measured face velocity then press Mute, the controller will then sample the airflow for 5 seconds.

7. If the airflow sample is unstable the controller will display "Deviations too High", follow the instructions to repeat the sample or quit the calibration.

8. If the sample is accepted, lower the sash by half and measure the face velocity using a calibrated instrument. Using the ↑ / ↓ buttons enter the measured face velocity and press Mute, the monitor will then sample the airflow for 5 seconds.

9. If the calibration is successful the controller will return the Main Menu, select RUN to go to normal operating mode and check the velocity reading is accurate and stable.

10. If the airflow sample is unstable the controller will display "Deviations too High", follow the instructions to repeat the sample or quit the calibration.

11. The controller will display "Increase higher airflow sample" if the second sample value is too close to the first value entered, close the sash a little and repeat the higher sample. The minimum difference between the samples that the controller will accept is 0.3m/sec (60fpm).

12. The controller will display "Sensor diff too low" if the controller doesn't detect any difference in the sensor output between the 2 airflow samples, check that the sensor hose is connected and repeat the calibration.

13. If the calibration is stable and accurate Press and Hold the Mute button for 5 seconds until the Main Menu is displayed.

14. Using the ↑ / ↓ buttons select SET UP, then select CONFIGURE, then enter the password (the factory default password is 0-0-0-0), press Mute to continue.

15. Using the ↑ / ↓ buttons select ECON CONFIGURE, then select MANUAL / AUTO and press Mute, then select AUTO and press Mute to continue, then select DONE and press Mute.

16. The controller will return to the MAIN MENU, select RUN to go to normal operating mode.

Airflow Controller Calibration Tips

1. Ensure that the sensor hose is connected correctly at the side wall and rear of the sensor.

2. Ensure that the extract fan is running and the Fume Cupboard is balanced before calibrating the monitor.

3. Take extra time (at least 15 to 20 seconds) to wait for the airflow to settle before capturing the airflow samples. This will minimize the chance of a calibration error due to turbulence or fluctuations.

4. Avoid movement in front of the Fume Cupboard whilst calibrating the monitor.

5. The Low and High air samples must be at least 0.3m/sec (60 fpm) apart to calibrate the monitor. This is to avoid inaccuracy in the calibration sue to insufficient difference between the samples. The minimum difference can be changed in the "Low High diff" parameter in the Cal Config menu.

6. Do not use fully open and fully closed sash positions for the calibration points, the recommended positions are normal operating height (e.g. 500mm 20") for the first sample and approximately half the sash opening (e.g. 250mm 10") for the second sample.

Airflow Controller Control Settings

The ECON CONFIG menu includes the following control parameters: -

1. MANUAL / AUTO -- Allows the control output to be set to Auto or Manual control, manual control is shown as 0-100% and can be adjusted using the ↑ / ↓ buttons. In Auto control, the output will automatically adjust to maintain the velocity set point.

2. HIGH SET POINT -- This is used to enter the required face velocity set point for standard VAV control or the High set point for dual set point occupancy control.

3. LOW SET POINT -- This is used to enter the required reduced face velocity set point for dual set point occupancy control.

4. OUTPUT TYPE -- This is used to set the output to 0-10v (direct - for damper) or 10 to 0v (reverse - for Inverter)

5. MIN OUTPUT -- This is used to set the MIN output volume when pushbutton III is set to Min/Run/Max operation.

6. MAX OUTPUT -- This is used to set the MAX output volume when pushbutton III is set to Min/Run/Max operation.

7. LOW LIMIT -- This is used to set the fume cupboard minimum volume when the sash is closed (limits the damper closed position).

8. HIGH LIMIT -- This is used to set the fume cupboard maximum volume (limits how far the damper opens).

9. OUTPUT RANGE -- This is used to set the output range to 0-10v (Inverter) or 2-10v (actuator).

10. PROP BAND -- This is the main control parameter for the VAV control output. If the value is too low the damper will be unstable and hunt, if the value is too low the damper will react too slowly. The ideal setting for this value is to select a value that is as small as possible but that gives stable control of the damper or Inverter without 'hunting'.

11. INTEGRAL TIME -- The Integral Time is the corrective action of the control output. The PROP BAND control will result in an offset from the set point, the Integral will correct the error in small steps over time. The ideal setting is to select the highest possible value that gives stable control.

12. BOOST DURATION -- The BOOST DURATION is used in conjunction with a sash position sensor for VAV control. The controller will drive the output to a pre-determined position for a brief period of time before switching back to face velocity control.

13. BOOST PERCENTAGE – This is used to adjust the pre-determined output position that the damper drives to when the boost function is active if the position needs to be adjusted.

Airflow Controller Coms Settings

The MONITOR CONFIG menu includes the following coms parameters: -

1. **PROTOCOL –** Sets Modbus RTU, BACnet MS/TP or TEL protocol.

2. **MODBUS SETTINGS –** Sets Slave ID, Baud Rate and Parity for the Modbus protocol.

3. **BACnet SETTINGS –** Sets the Device Instance, Station ID, Baud Rate, Parity and Max Masters for the BACnet protocol.

Note – The TEL protocol is used to connected to TEL Config Manager software and the TEL AFA5000 Room Space Controller, the Modbus Slave ID is used when set to TEL protocol.

Troubleshooting

Problem	Check for: -
No LED's, Screen blank	Check the power supply is securely plugged into the controller..
	Check the power supply is securely plugged into the mains power socket.
	Check that there is 15VDC power supply on the monitor terminals (broken wire or snagged cable sheath)
Sensor Error message	Check the sensor cable is securely plugged into the sensor.
	Check the sensor cable is securely plugged into the monitor.
	Replace the sensor.
	If Sensor Error message still displayed replace the sensor cable.
	If Sensor Error message still displayed replace the monitor.
Audible alarm not working	Check for screen messages - if SETBACK is displayed the monitor has been remotely muted.
	Check if alarm has been disabled in Cal Config menu.
Damper actuator not moving	Check the run screen to ensure the displayed status is Automatic and not set to Manual
	Set the output to Manual and manually drive the actuator output, if the actuator doesn't move check the wiring and ensure the actuator is not manually overridden
RS485 Coms not connected	See Diagnostics menu, Coms Data.
	Check the correct Protocol, Slave ID, Baud Rate, Parity have been set.
	Tx & Rx = 0 - AFA4000 is not connected to the network
	Tx & Rx >0 but fixed values – AFA4000 has lost connection to the network
	Rx is counting but Tx is a fixed value – AFA4000 Is connected to the network but the Master is offline or not polling the AFA4000.

Diagnostics Menu

Press the ↑/ ↓ buttons together from the Run screen to access the Diagnostics menu, the menu contains the following Input and Output data: -
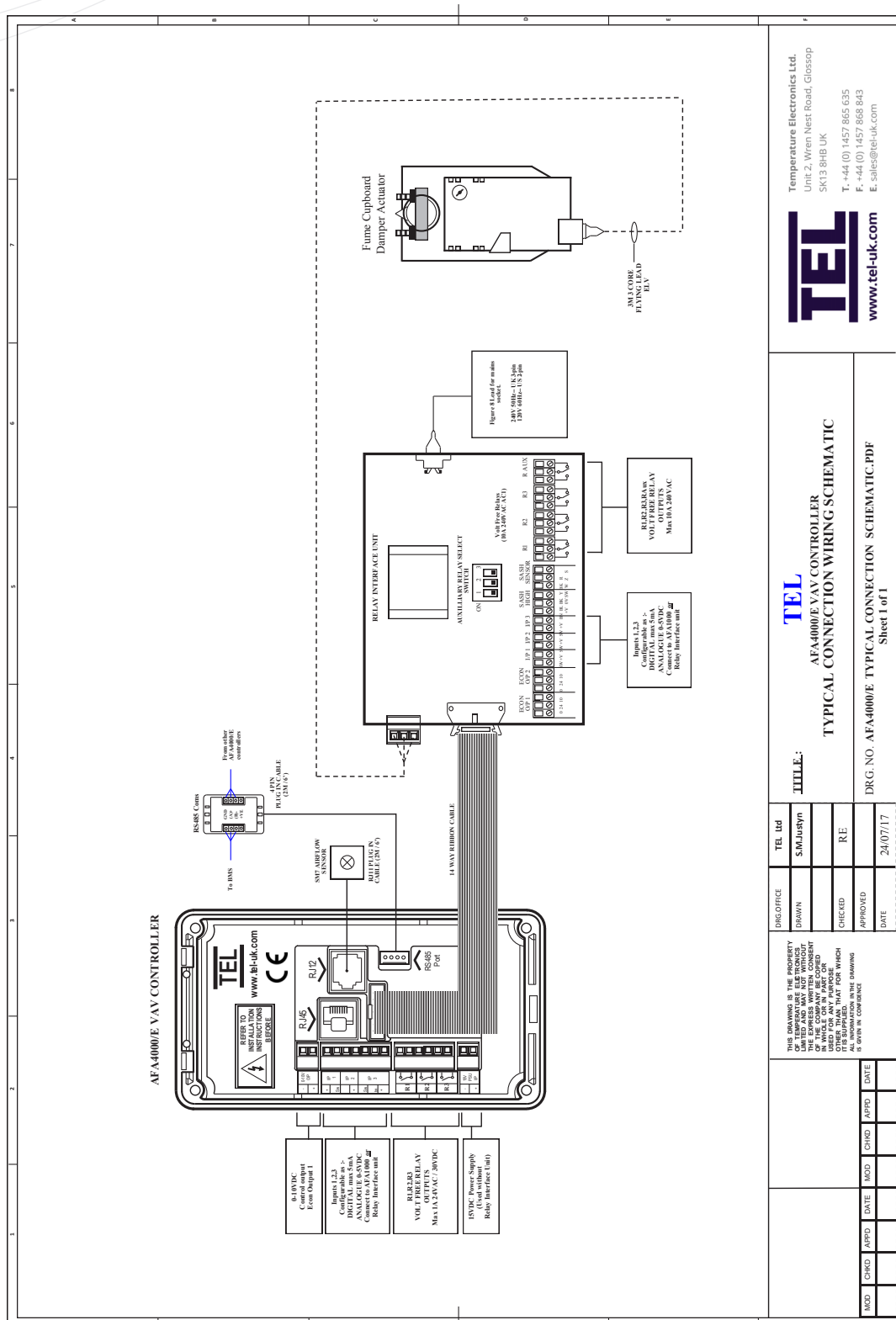
Menu	Parameter	Action
Alarm Test		Sounds the Audible Alarm
Coms Data		Displays the following: -
		Protocol, Slave ID, Baud Rate, Parity
		Tx – Number of Data Packets transmitted (increments when transmitting)
		Rx – Number of Data Packets received (increments when receiving)
I/O Status	Input Data	Displays the following: -
		Input 1 – On/Off or Analogue Voltage status
		Input 2 – On/Off or Analogue Voltage status
		Input 3 – On/Off or Analogue Voltage status
	Output Data	Displays the following: -
		Relay 1 – On/Off status
		Relay 2 – On/Off status
		Relay 3 – On/Off status
	Sensor Data	Displays the following: -
		Airflow sensor status 0-100% (100% = 0 airflow, 0% = max flow)
		Temperature °C or °F (Optional with additional Temperature sensor fitted)
		Sash Position mm or inches (Optional with additional sash position sensor fitted)
		Volume l/sec or CFM (Optional with venturi pressure cell or sash position sensor fitted)

AFA4000/E Controller Connection Details
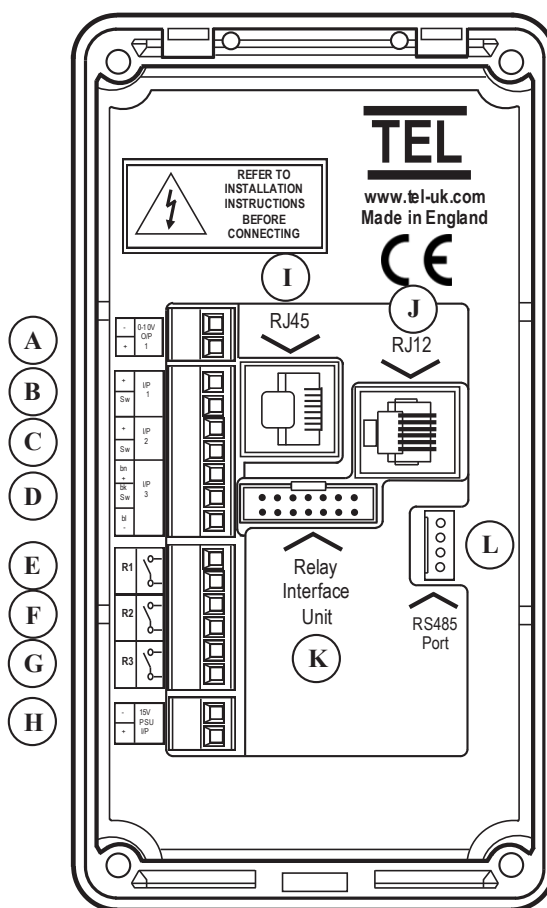
A – 0-10V Econ Output,1 (Used if relay interface is not fitted

B – Input 1 – Digital Or Analogue

C – Input 2 – Digital Or Analogue

D – Input 3 – Digital Or Analogue

E - Relay Output 1 (Used If Relay Interface Is Not Fitted)

F – Relay Output 2 (Used If Relay Interface Is Not Fitted)

G – Relay Output 3 (Used If Relay Interface Is Not Fitted)

H – 15Vdc Power Supply (Used If Relay Interface Is Not Fitted)

I – Auto Sash RJ45 Connection (Only Used On AFA4000/E Model)

J – Airflow Sensor RJ12 Connection

K – 14 Way Ribbon Cable Connection To Relay Interface

L – RS485 Coms Port Connection

AFA4000

148mm / 5.826"

80mm
3.15"

14.20mm
0.56"

11.70mm
0.46"

MOUNTING BRACKET

TOP

143.80mm / 5.66"

75.40mm
2.97"

AFA4000 Cut Out Template

65mm
2.56"

6.5mm
0.256"

6.5mm
0.256"

52mm
2.05"

38.3mm
1.50"

CUT OUT

78mm
3.07"
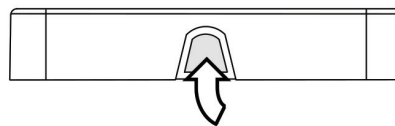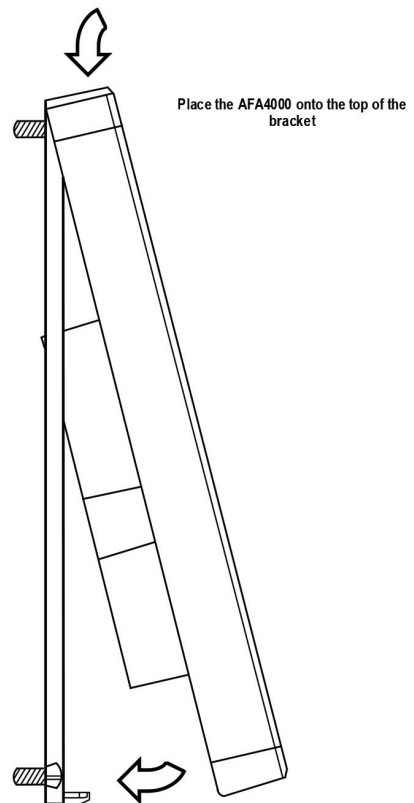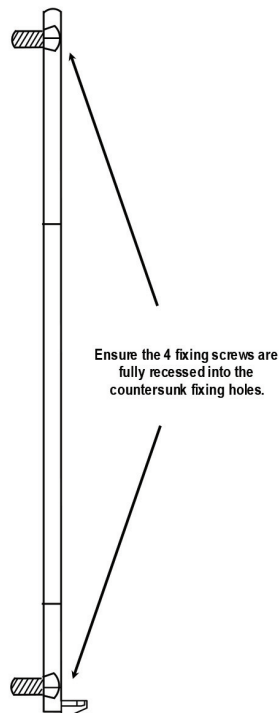
4 x Fixing Holes
Max 4mmØ
0.157"

17.3mm
0.673"
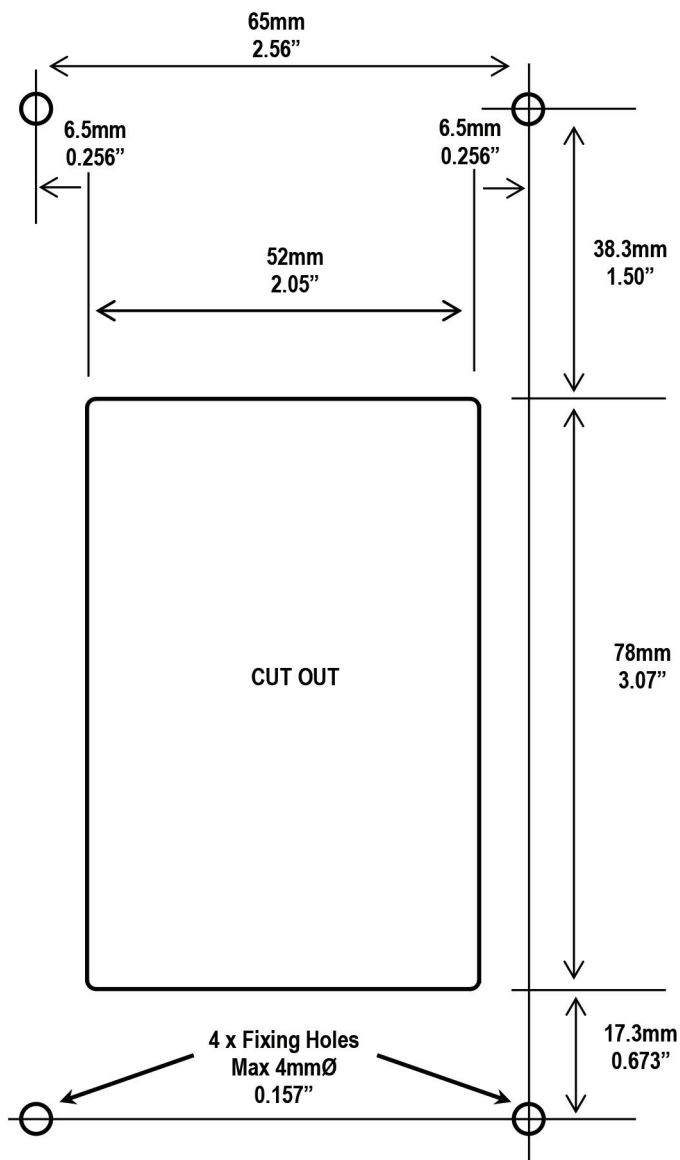
Note – Print to A4, do not scale or print to fit page.

AFA4000 Installation

TOP
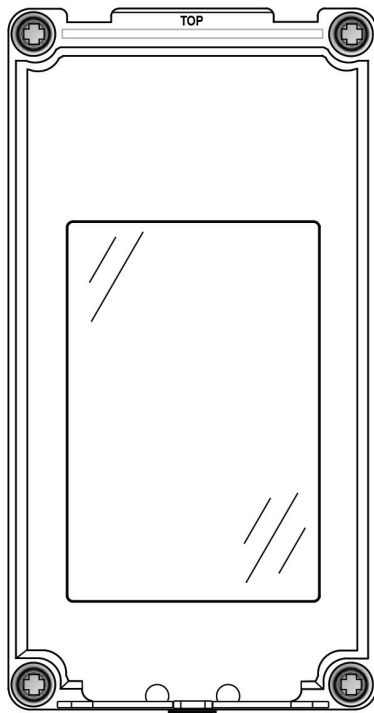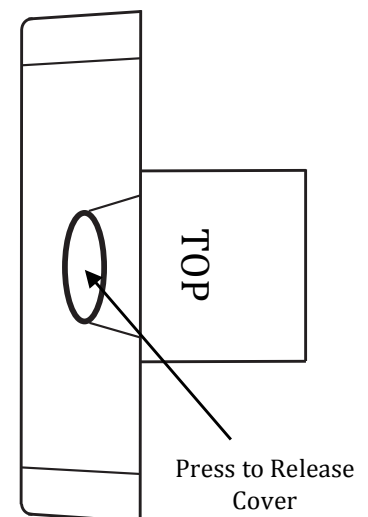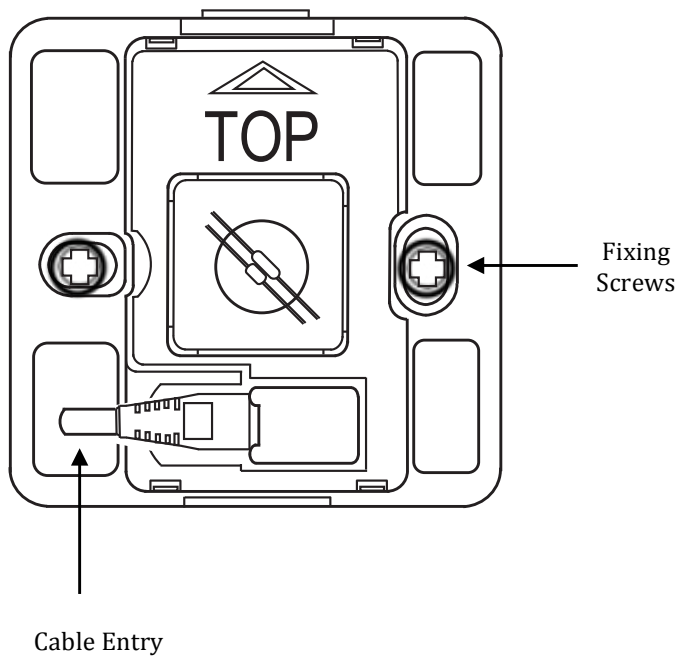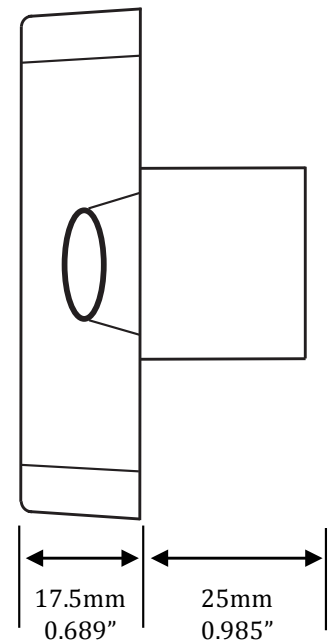
Fix the Bracket to the Front Panel using 4 Fixing screws.

Ensure the 4 fixing screws are fully recessed into the countersunk fixing holes.

Place the AFA4000 onto the top of the bracket

Push the bottom of the AFA4000 onto the bracket. The AFA4000 will click into place.
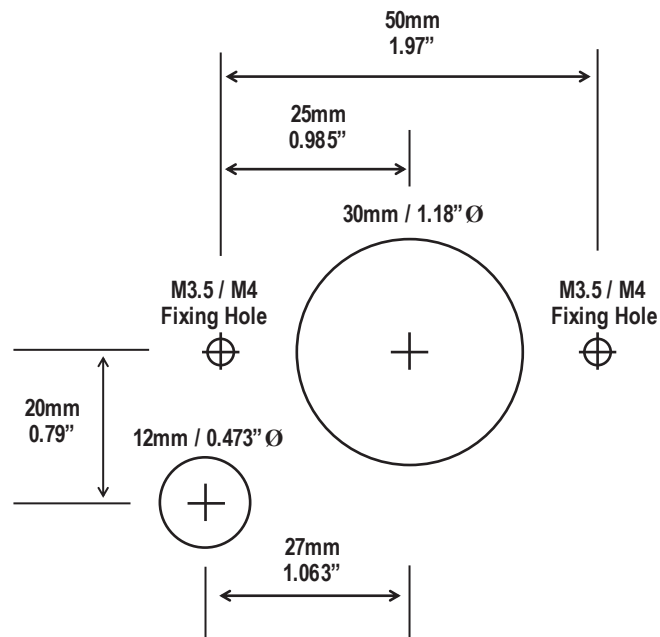
To remove the AFA4000 press the latch on the bottom edge to release the AFA4000 from the bracket. A screwdriver or blunt tool can be used if required.
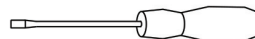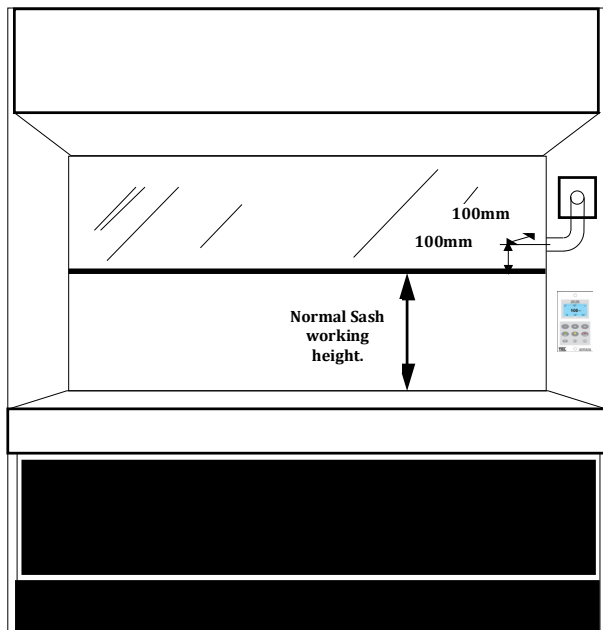
SM7 AIRFLOW SENSOR DIMENSIONS

SM7 Airflow Sensor Dimensions

76.2mm / 3"

76.2mm
3"

17.5mm
0.689"

25mm
0.985"

TOP

Fixing
Screws

TOP

Press to Release
Cover

Cable Entry

SM7 CUT OUT TEMPLATE

50mm
1.97"

25mm
0.985"

30mm / 1.18" Ø

M3.5 / M4
Fixing Hole

M3.5 / M4
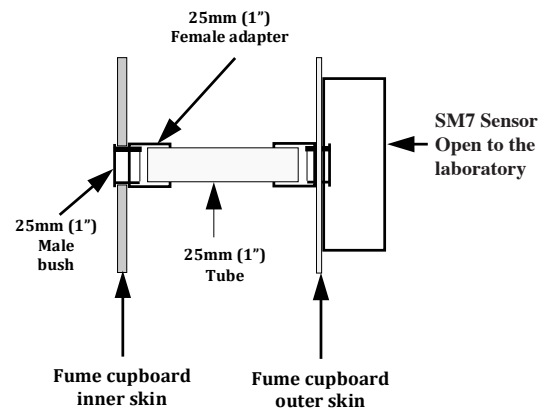**Fixing Hole**

20mm
0.79"

12mm / 0.473" Ø

27mm
1.063"
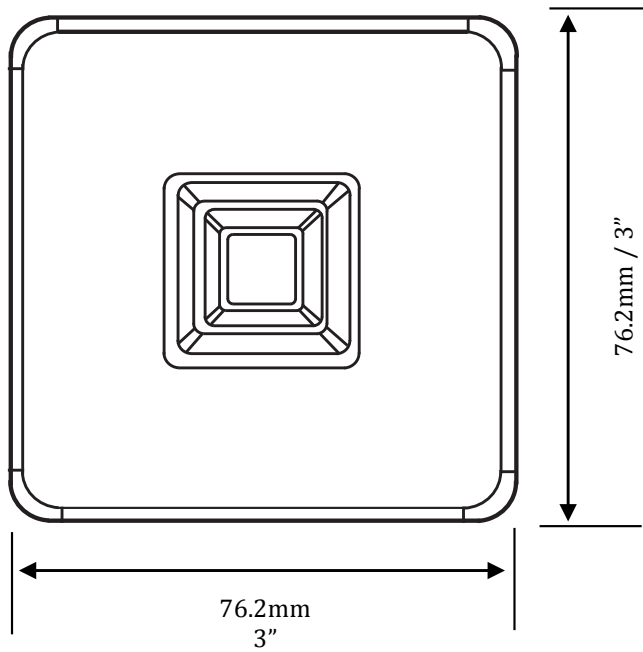
Note – Print to A4, do not scale or print to fit page.

Airflow Sensor Installation Diagram

SM6 airflow sensor

100mm

100mm

Normal Sash working height.

25mm (1") Female adapter

SM7 Sensor Open to the laboratory

25mm (1") Male bush

25mm (1") Tube

Fume cupboard inner skin

Fume cupboard outer skin

For complete manual and product information, log on to **www.tel-uk.com**