AFA1000/Rm
Room Pressure Controller

Installation & Operating Manual

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1. SAFETY

1   SAFETY

1.1   Safety Practices

This document describes the general safety practices and precautions that must be observed when operating the Airflow Monitor.

This advice is intended to supplement, not supersede, the normal safety codes in the user's country. The information provided does not cover every safety procedure that should be followed. Ultimately, maintenance of a safe laboratory environment is the responsibility of the user and the user's organisation.

Please consult all documentation supplied with the Airflow Monitor before starting to work. Carefully read the safety information in this document and in the other documentation supplied. When setting up the equipment or performing analysis or maintenance procedures, strictly follow the instructions provided.

1.2   Warning Notices

Within this User Guide WARNINGS are used to highlight information or instructions that must be followed in order to avoid personal injury to yourself or other people in the vicinity, eg. switch off the mains voltage before any maintenance.

WARNINGS appear as below:

⚠️ WARNING	**Switch off the mains voltage and remove the power supply before maintenance.**

1.3   Precautions

The following precautions must be observed when using the Airflow Monitor and associated systems:

- Be sure that the voltage of the Airflow Monitor equipment corresponds to the voltage available where it is to be installed.
- Never remove the side or back panels of the Airflow Monitor without first shutting down the equipment and disconnecting the mains cord.

1.4   General Operating Conditions

The Airflow Monitor and equipment have been designed and tested in accordance with the safety requirements of the International Electrotechnical Commission (IEC). The Airflow Monitor conforms to IEC61010-1 (Safety Requirements for electrical equipment for measurement, control and laboratory use) as it applies to IEC Class 1 (earthed) appliances, and therefore meets the requirements of EC directive 73/23/EEC.

If possible, avoid any adjustment, maintenance or repair to the eqipment whilst covers are open or it is operative. However, if any adjustment, maintenance or repair is necessary while the covers are open, this must be done by a skilled person who is aware of the hazards involved.

Whenever circumstances arise that mean an Airflow Monitor may be unsafe, make it inoperative. In particular, an Airflow Monitor may be unsafe if it:

· Shows visible damage.

· Fails to perform correctly.

· Has been subjected to severe transport stresses.

· Has been subjected to prolonged storage in unfavorable conditions.

1.5   Environmental Conditions

The Airflow Monitor should only be used under the following conditions:

· Indoors.

· In ambient temperatures between 5°C and 40°C.

· With relative humidity below 80% for temperatures up to 31°C, decreasing linearly to 50% relative humidity at 40°C.

· Electrical supply fluctuations not exceeding +10% of the nominal voltage.

⚠️ WARNING	The protection provided by the equipment may be impaired if the environmental conditions do not lie within these parameters.

1.6   Electrical Safety

The Airflow Monitor and associated equipment are designed to protect the user from potential electrical hazards. This section describes some recommended electrical safety practices.

⚠️ WARNING	**Lethal voltages are present at certain points within the equipment.**
	When the equipment is connected to mains power, removing the equipment covers is likely to expose live parts.
	Even when the power switch is off, high voltages can still be present – capacitors within the equipment may still be charged even if the equipment has been disconnected from all live voltage sources.

The Airflow Monitor and associated equipment must be correctly connected to a suitable electrical supply. The supply must have a correctly installed protective conductor (earth or ground) and must be installed and checked by a qualified electrician before initial power up.

⚠️ WARNING	**Any interruption of the protective conductor inside or outside the Airflow Monitor System, or disconnection of the protective conductor terminal is likely to make the equipment dangerous.**
	Intentional interruption of the protective conductor is prohibited.

⚠️ WARNING	**If the mains power cord has to be replaced, ensure that the replacement cord is appropriately rated and approved for the intended use.**

⚠️ WARNING	**To prevent potential personal injury and damage to the equipment, switch OFF all components in the system and disconnect them from the mains power supply before altering, or making any new electrical connections.**

When working with the Airflow Monitor System:

· Connect the equipment to a correctly installed mains power outlet that has a protective conductor connection.

· Do not operate the equipment with any covers or internal parts removed.

· Disconnect the equipment from all live voltage sources before opening it to make any adjustments, replacements, maintenance or repair. If the opened equipment must be operated for further adjustment, maintenance or repair, this must only be done by a supplier's Service Engineer.

If it is possible that the equipment is no longer electrically safe for use, make the equipment inoperative and secure it against any unauthorised or unintentional operation.

The electrical safety of the equipment is likely to be impaired if:

· It has any signs of visible damage.

· If it has been subjected to prolonged storage in unfavourable conditions.

· If it has been subjected to severe stress during transportation.

1.7   Electrical Protection

Observe the following electrical protection precautions:

· Insulation: Class I rating for external circuits. Only connect equipment that meets the requirements of IEC 61010-1, IEC 60950 or equivalent standards.

· Installation Category: The equipment is able to withstand transient over-voltages typically present on the mains supply. The normal level of transient over-voltages is impulse withstand (overvoltage) Category II of IEC 60364-4-443.

· Pollution Degree 2: Normally only non-conductive pollution occurs. Occasionally, however, temporary conductivity caused by condensation must be expected.

1.8   EMC Compliance

EC Directive
The Airflow Monitor System is designed and tested to meet the requirements of the EC directive 89/336/EEC and 93/68/EEC and complies with the EMC standard EN61326 (EMC standard for electrical equipment for measurement, control and laboratory use) and EN55011 (ISM) Class A (RF emissions).

FCC Rules and Regulations
The Airflow Controller System is classified as a digital device used exclusively as industrial, commercial or medical test equipment. It is exempt from the technical standards specified in Part 15 of the FCC Rules and Regulations based on Section 15.103 (c).

1.9   Warning Labels

Warning labels attached to the equipment draw attention to specific hazards - refer to this guide and other documentation provided with the equipment for more details concerning potential hazards and any precautions or other actions that must be taken.

2. OVERVIEW OF THE PRESSURE CONTROLLER

2 OVERVIEW OF THE PRESSURE CONTROLLER

2.1 Operator Display Panel

Control output bar graph or Alarm Time Line

Pressure display in Pa or Ins Wg

LED indicators

Function and up/down buttons for Menu Configuration and Calibration.
ENTER – also used as
Mute button for audible alarm
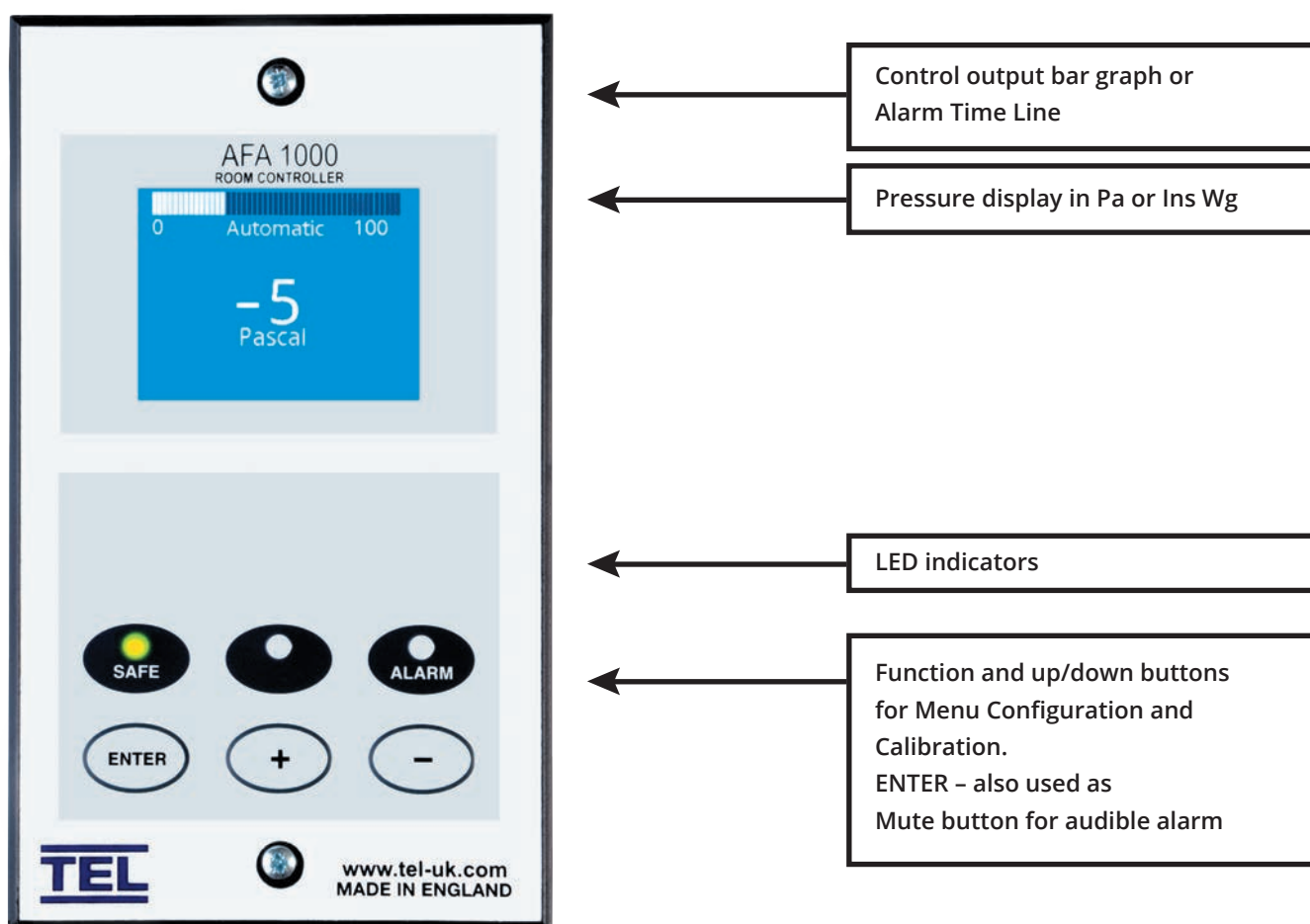
Note:
Access to the Calibration and Configuration menus is password protected and is factory set. To access and or change the password contact the supplier for the engineers password and enter the Passwords in the Main Menu or alternatively use a Laptop connected to the Com port and use the Upload/Download software provided.

2.2   Display Features

The Pressure Monitor display has the following features:

The digital display is a backlit, full colour high resolution graphic unit with a visual display area of approx 45 x 34mm. The display operates through the software allowing the generation of figures, wording and icons. The display background colour can be provided as either Blue or Black.

The display shows the static pressure in **Pa** or **In Wg** when enabled or the alternative with no pressure reading but showing **AIR FAIL / AIR SAFE** as continuous display. All of the above are configurable via the alarm key pad.

The displayed pressure colour will change when in an alarm condition:-

Air Safe = White / Low or High Air Alarm = Red / Warning Air Alarm = Amber.

An **'event time line '** segmented into 60 x 1 minute segments will scroll across the display (when enabled) .This takes the form of a graphical scale ranged over 0-1.00 m/sec that will progress from the right hand side to the left hand side of the screen – representing the airflow value at each segment. The segment colour will change if the value is in the range of an airflow alarm:-

Air Safe = White / Low or High Air Alarm = Red / Warning Air Alarm = Amber.

The alternative to the event time line is a dynamic **'bar graph'** representing the control output.

The display shows a **Horn** icon (with line through it) when the audible alarm is in the Muted condition.

2.3   Displayed Alarms and Events

Low Pressure –   will be displayed when the Extract system pressure falls below the alarm point. This display will alternate on/off with the pressure reading.

High Pressure –   will be displayed when the Extract system pressure rises above the alarm point. This display will alternate on/off with the pressure reading.

Emergency –   will be displayed when the Emergency input is activated (when enabled) This display will alternate on/off with the pressure reading

Set-back -   will be displayed if the night set-back function is activated (when enabled) This display will alternate on/off with the pressure reading

2.4   LED Indicators

The alarm unit has three LED indicators:

RED – Alarm

Amber – Caution

Green – Safe

2.5   Audible Alarm Sounder

The AFA1000/RM has an audible sounder with local or remote mute facility. The audible alarm can be permanently disabled in the cal config menu.

The audible alarm is muted when the Setback input function is active.

The display will show a Mute Icon in the bottom left hand side of the screen whenever the audible alarm is muted or disabled.

If an Input is set to the Mute function the keypad mute Enter button is disabled and the audible alarm is only mutable using the selected Mute input.

2.6 Pushbuttons

a. Enter

The alarm has an Enter button -- this is multi-functional as follows:-
Press **Enter** momentarily when alarm is sounding will mute the alarm.
Press **Enter** for 5 secs will gain access to **Calibration** and **Configuration** menus (both menus password protected).

b. +& -

The alarm has + / - buttons that can be used to scroll through the calibration and configuration menu or to select options or values.

2.7   Diagnostics Menu

The AFA1000/RM has a diagnostics menu that shows current Input and Output status, Coms data and also includes an Alarm Test function.

To access the diagnostics menu press the '+' and '-' buttons together whilst in the run screen.

The diagnostics sub menu will appear showing the following options-

a. Alarm Test
b. Coms data
c. I/O Status
d. Done

Use the +/- buttons to scroll and Enter to select the required parameter.

a. Alarm Test - the Screen will show "Testing Safe LED" and the Green Safe LED will illuminate. The screen will then show "Testing Warning LED" and the Amber Warning LED will illuminate. The screen will then show Testing Alarm" and the Red Alarm LED will illuminate and the audible alarm will sound.

The screen will then return to the Diagnostics menu.

b. Coms data - the Screen will show the coms setting data for the relevant selected protocol:-

Protocol = None/TEL/Modbus/BACnet
ID = Slave ID for Modbus or Device Instance for BACnet
Baud Rate = Shows selected Baud Rate
Parity = Shows selected Parity

Tx & Rx = the display will show the current data packets sent and received, the displayed value will rollover to zero when the maximum count is reached.

c. I/O Status - when selected the following options are shown:-

Input Data
Output Data
Sensor Data
Done

Input Data:-

Input 1 - 0 / Off / On / Not Used
Input 2 - 0 / Off / On / Not Used
Input 3 - 0 / Off / On / Not Used

Off = Input Open
On = Input Closed
Not Used = Input not assigned

Output Data:-

Output 1 - Off / On   A Out 1 - 10.0
Output 2 - Off / On   A Out 2 - 10.0
Output 3 - Off / On

Output Off = Output Open or not assigned
Output On = Output Closed
A Out 1 = Analogue Output 1 voltage (0-10VDC)
A Out 2 = Analogue Output 2 voltage (0-10VDC)

Sensor Data:-

Pressure 00.0 %

Pressure % = Output of Pressure sensor in %, 0% = no Pressure

Done - returns to Diagnostics menu.

d. Done - when selected the monitor returns to the run screen.

2.8   External Connections

The AFA1000/RM has the following Inputs:-

Setback Input

Volt free input configurable for normally closed, normally open relays.

Emergency Input

Volt free input configurable for normally closed, normally open relays.

Pressure Sensor Input

Analogue input (0-5V) of the pressure sensor range (selectable on the pressure transducer)

The AFA1000/RM has the following Outputs:-

Relay Output 1

Volt free relay output configurable as normally closed or normally open relays.

Relay Output 2

Volt free relay output configurable as normally closed or normally open relays.

Relay Output 3

Volt free relay output configurable as normally closed or normally open relays.

Pressure Output 1

0-10VDC / 2-10VDC control output – configurable for direct or indirect action.

Pressure Output 2 (optional)

Retransmission of pressure output 1.

Sensor Output

0-5VDC retransmission of pressure reading.

Com Port

RS 485 to enable connection to Laptop or PC for full diagnostics, logging or setting up and for communications to building computer system (BMS)

See section 8 for other specific information on Modbus RTU and BACnet options and settings.

Power supply

Low voltage DC power supply from PCB power supply (damper control type) or Mains power adaptor.

3. FUNCTIONS & OPERATION

3 FUNCTIONS & OPERATION

3.1 Pressure Functions

The AFA1000/RM Pressure display can be set up using the pushbutton menus to display airflow in units of m/sec or fpm and can also be set to show plain text "Air Safe" & "Air Fail" only

The AFA1000/RM has 3 programmable airflow alarms.

Safe pressure

· Display reading above Low pressure alarm level and below High pressure alarm level
· Green LED on

Warning pressure

· Display reading below Warning level and above Low pressure alarm level
· Amber LED on

Low pressure

· Meter reads below Low pressure alarm level for longer than the delay time
· **LOW PRES.** toggles on / off with display
· Red LED on (Flashing)
· Audible alarm sounds -- can be muted via Enter pushbutton
· Low pressure relay operates (if configured)

Reset: -- when pressure rises above Low pressure alarm level (including pre-set hysteresis) the Low pressure alarm resets automatically

High pressure

If configured:
· Meter reads above high pressure alarm level for longer than the delay time
· **HIGH PRES** toggles on / off with display
· Audible alarm sounds – can be muted via Enter pushbutton.

Reset: -- when pressure falls below High pressure alarm level (including pre-set hysteresis) the High pressure alarm resets automatically

3.2   Input Functions

Night set-back

· When input configured as Night set-back is activated

· Night **SETBACK** Icon toggles on / off with display

· Unit is driven to the pre-determined **MIN** position depending on **Control function** selected (see below)

Night set-back mute

· Audible alarm muted Mute Icon shown on display (when enabled)

Emergency

· When input configured as Emergency is activated

· Red LED on (Flashing) – (if configured)

· **EMERGENCY** toggles on /off with display -- (if configured)

· Audible alarm sounds – can be muted via Enter pushbutton

· Emergency alarm relay operates (if configured)

· Unit is driven to the pre-determined **MAX** position depending on **Control function** selected (see below)

Note:- The external Emergency input can be a remote relay contact or a local Emergency Stop stay-put pushbutton.

Door Open

· When input configured as Door open is activated
· Red LED on (Flashing) – (if configured)
· DOOR OPEN toggles on /off with display -- (if configured)
· Audible alarm sounds – can be muted via Enter pushbutton

Audible alarm Mute

When the audible alarm is muted via the Enter button – an Icon (horn with forward slash) is shown on the display.

3.3   Control Functions

This menu options sets the type of control for the unit to suit the application and determines how the voltage output operates in the Night setback and the Emergency conditions.

a.   Action of controller :-

Damper

· Display value above the set point the output voltage increases => 10 V

· Display value below the set point the output voltage decreases =>   0 V

Inverter

· Display value above the set point the output voltage decreases =>   0 V

· Display value below the set point the output voltage increases =>   10 V

b.   Min/Max and Limit settings:-

Direct Action

· **Max Output:** Output voltage increases => 10 V

· **Minimum Output:** Output voltage decreases => 0 V

· **High limit:** Output voltage increases => 10 V

· **Low Limit:** Output voltage decreases => 0 V

Reverse Action

· **Max Output:** Output voltage decreases => 0 V

· **Minimum Output:** Output voltage increases => 10 V

· **High limit:** Output voltage decreases => 0 V

· **Low Limit:** Output voltage increases => 10 V

CONTROL FUNCTION	Control Action	Night Setback action	Emergency action
Damper	Direct	Drive to Min (2V) (Bleed damper closes)	Drive to min (2V) (Bleed damper)
Inverter	Reverse	Drive to Max (0V) (Extract fan to min speed)	Drive to Min (10V) (Extract fan to max speed)

4. COMPONENTS

4   COMPONENTS

4.1   Pressure Controller Components

1 – AFA1000/RM Pressure Controller (in wall mounted enclosure)
1 – Pressure Transducer (0-1000Pa)
1 – Fast acting actuator (only for damper control)

Enclosure Dimensions
255mm x 190mm x 110mm Deep

> **Enclosure with Hinged Lid**
>
> **(Hinges on Left Hand Side)**
>
> **Cable knock outs**
>
> **3 x M20 Top**
>
> **3 x M20 Bottom**

Pressure Transducer Notes

1. The transducer should be mounted vertically using the fixing lugs with the tube and cable connections at the bottom.

2. The transducer is rated to IP66 and is suitable for installation outside providing that the cable connection gland is weather proof.
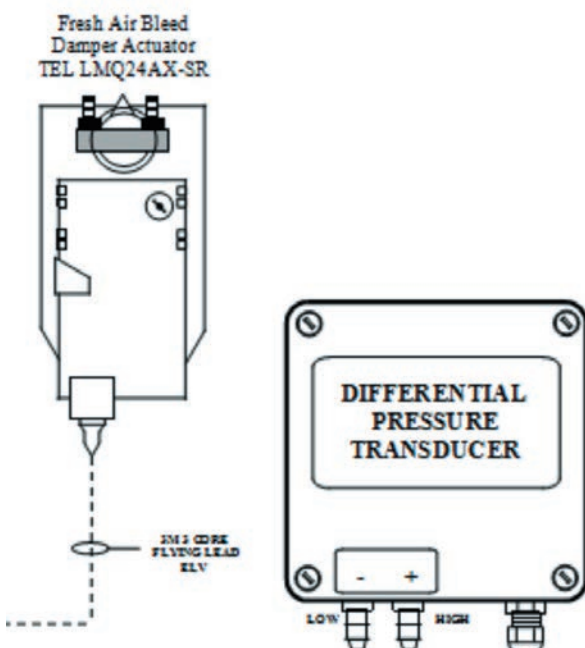
5. INSTALLATION

5   INSTALLATION

5.1   Installation of standard components

Follow the instructions below for installing and commissioning the unit. :-

1. Mount the AFA1000/E/RM unit in a clean dry environment convenient to the Supply air damper or AHU fan speed control Inverter using the mounting details provided with the unit --- see page 23

2. Mount the duct Pressure transducer and connect to the extract duct using the tube and adapter provided--- see page 23

3. Connect the Mains supply , pressure transducer and bleed damper to the controls --- see typical connection diagram on page 28

4. For Inverter control --- see typical connection diagram on page 29.

5. Power up the unit and wait at least 60 secs while the system stabilises.

6. If the unit has not been calibrated the unit will display 'Set Up/Run' – to continue in the 'Main Menu' use the +/- buttons on the alarm facia to select 'SETUP' and then press the ENTER button.

7. In the Setup Menu select 'CONFIGURE' and press the ENTER button

8. At this stage you will be requested to enter the PASSWORD. Use the +/- buttons to select the individual digits in turn and then press ENTER. If the password is correct the unit will go to the 'Configure Menu'. If the password is not correct you will be requested to try again --- on the third wrong password entry the calibration menu will lock out for 10 mins

9. In the 'Configure Menu' select 'CAL Configure ' and go to 'Pressure Range' and select the pressure range to suit the pressure transducer being used . This menu also allows the Low Warning and High pressure alarms to be set. When completed select 'Done' to return to the Main menu.

Note:- The pressure transducer is a fully calibrated unit and selecting the appropriate transducer automatically calibrates the AFA1000/RM. However since we use a multi-range transducer it will be necessary to ZERO the controller pressure.

In the Setup Menu select 'CALIBRATION' and press the ENTER button

At this stage you will be requested to enter the PASSWORD. Use the +/- buttons to select the individual digits in turn and then press ENTER. If the password is correct the unit will go to the 'Calibration Menu'. If the password is not correct you will be requested to try again --- on the third wrong password entry the calibration menu will lock out for 10 mins

If the password is OK the display will instruct you how to ZERO the controller –

(Remove the tubes from the Pressure Transducer and press ENTER – the controller will then sample the Zero point and return to the Main Menu)

10. Repeat steps 7. & 8. above to enter the Configure Menu and then select 'Control Configure' and go to 'Control Function' -- then select the function and the output range to suit the application and press done to return to the Main Menu. The controls are now ready to be set up for the particular application -- see the Operation Notes below for the procedures for the different applications.

5.2   Typical Installation diagram
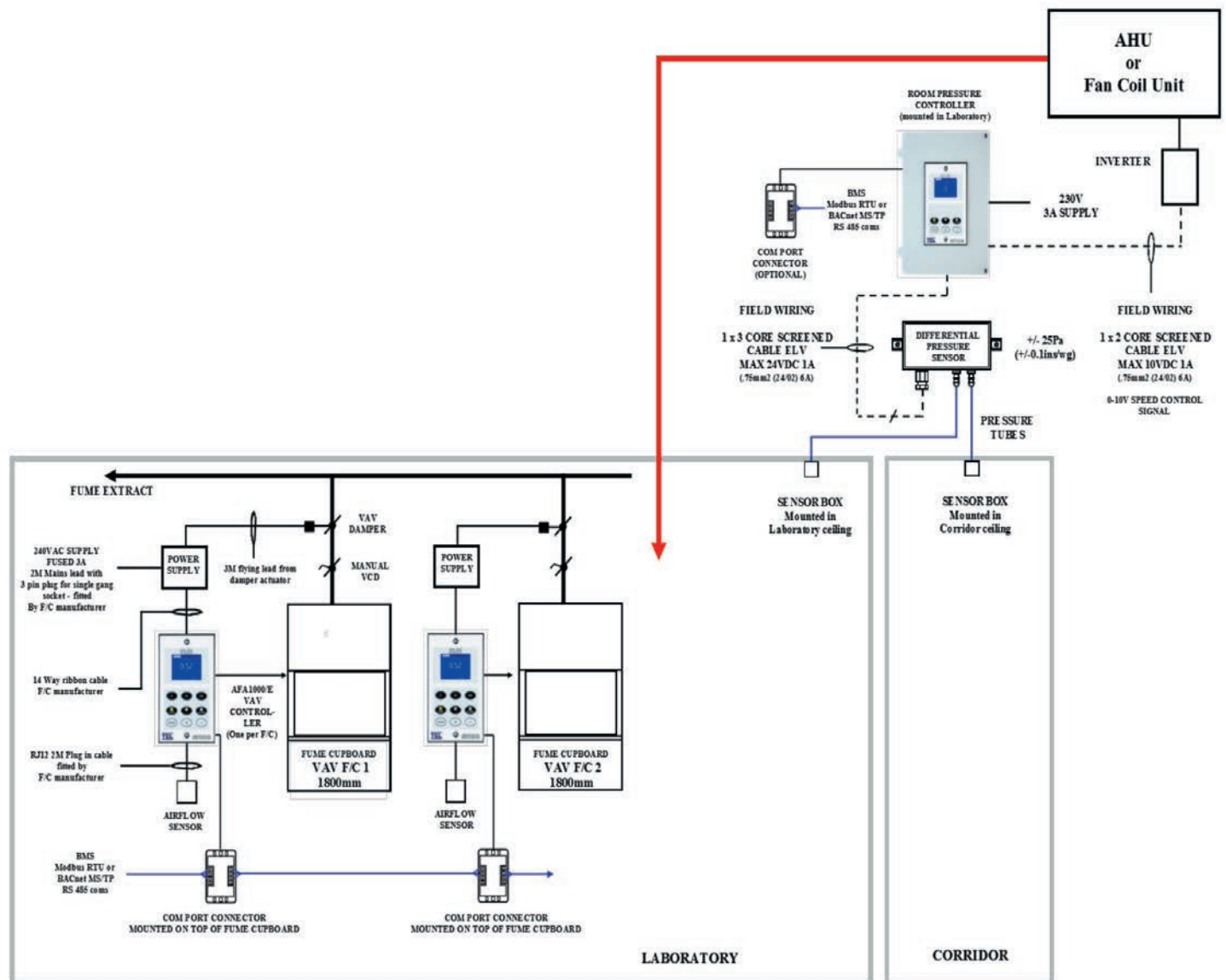
5.3   Dimensions details

NOT TO SCALE
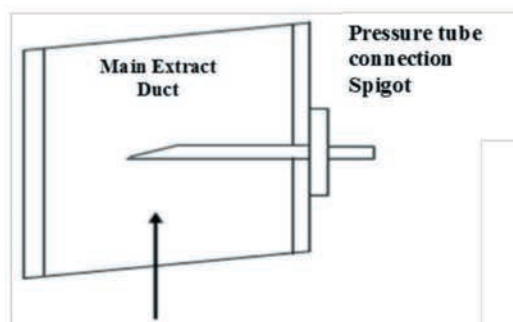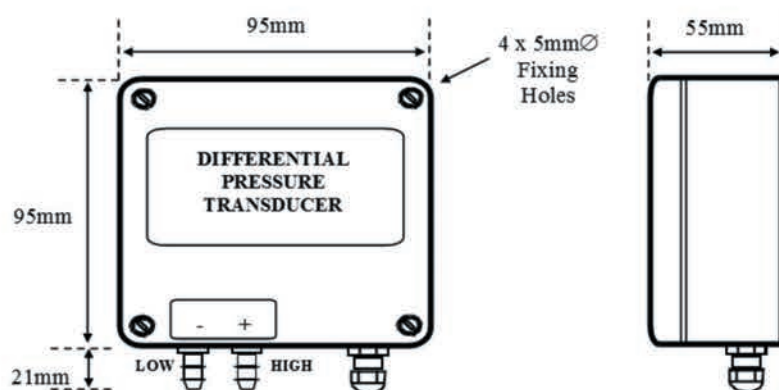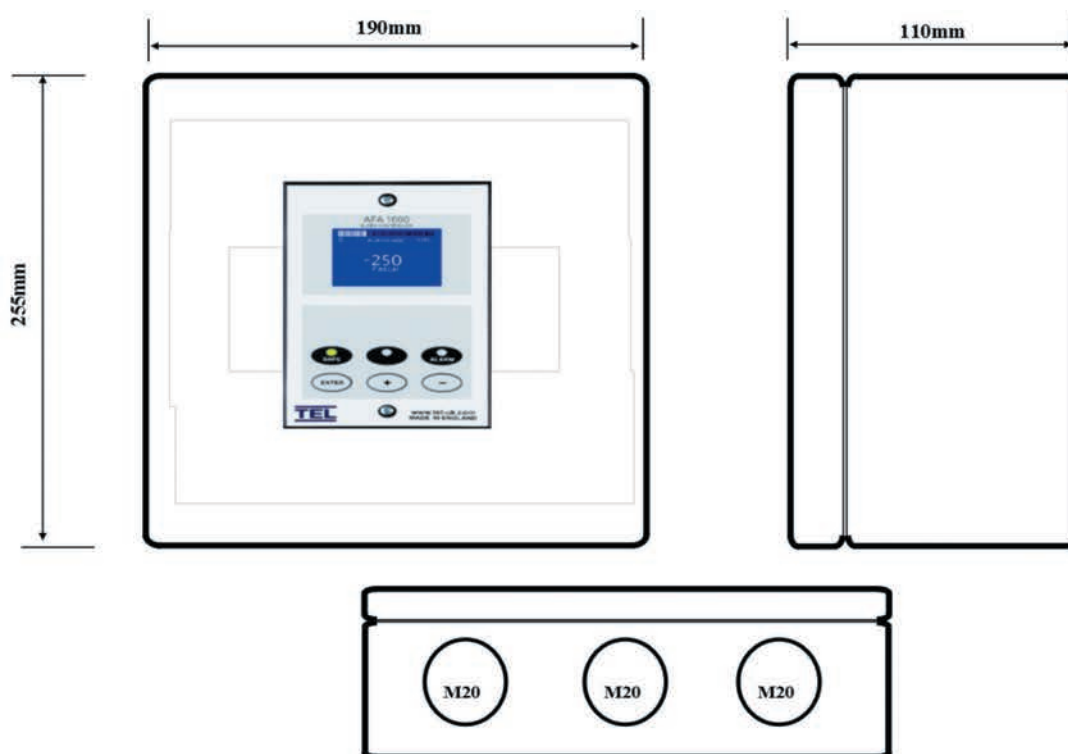
5.4 Typical Wring diagram – Damper Control.

5.5   Typical Wring diagram – Inverter Control
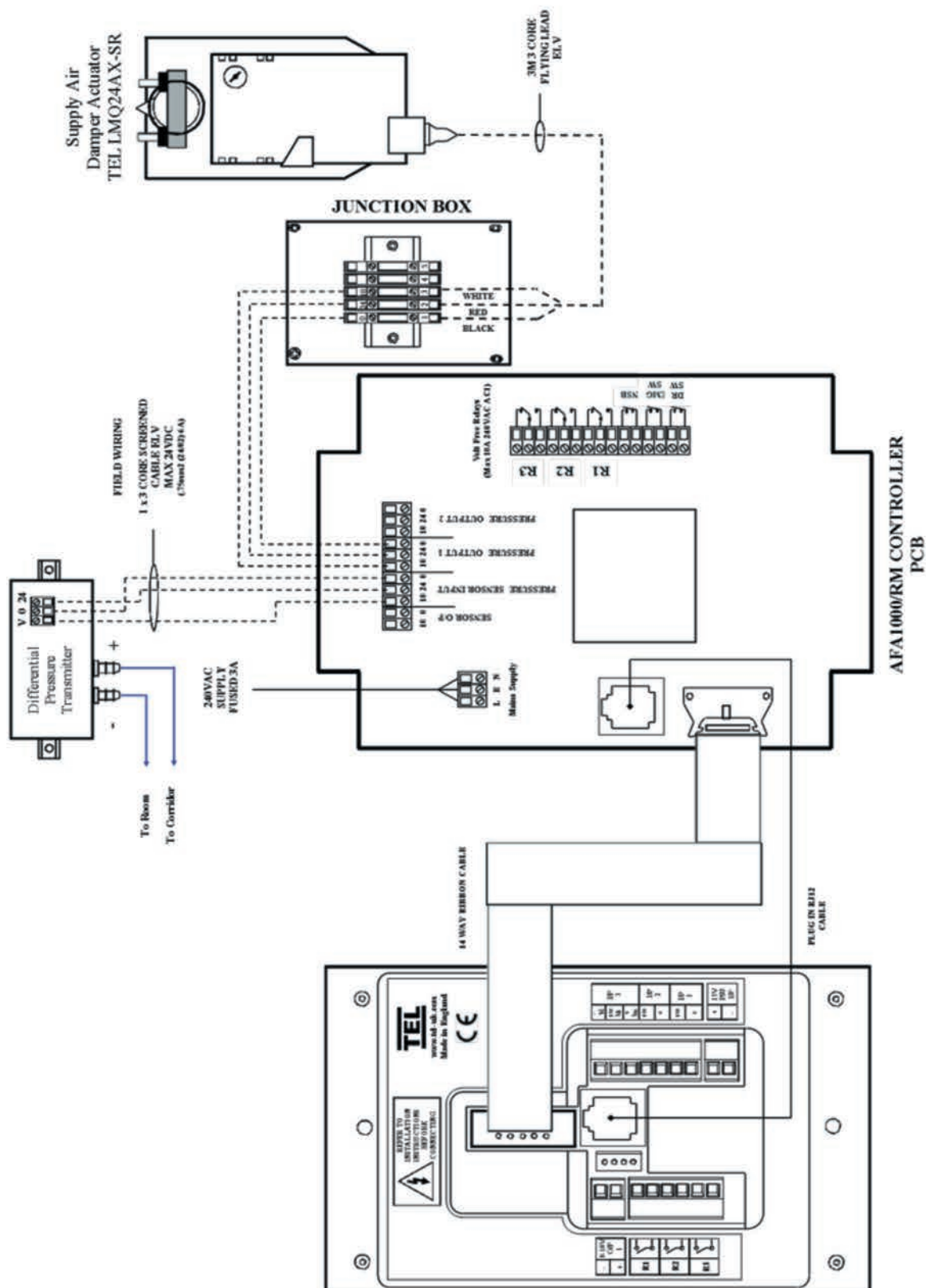
6. OPERATION NOTES

6   OPERATION NOTES

6.1   Operation Notes

1. Room Air Supply Damper for VAV extract systems :-

This application is for the Fresh Air Supply damper control on ECON VAV systems.

Before setting up the manual balancing dampers and the ECON controls on the fume cupboards the Supply Air Bleed Damper needs to be fully open.

To do this select Setup in the Main Menu and go to Configure via the password and then to Control Configure. In this menu select Manual/Auto and go to Manual. When in the Manual mode use the +/- buttons to drive the bleed damper closed then and press Done to return to the Main Menu and select Run .

Then complete the setting up of the fume cupboard ECON controls and set the system running at the design volume taking into account any diversity on the system.

At this point the AFA1000/Rm will read the system pressure on the display.

Note this pressure and in the Control Config menu enter the displayed pressure reading as the Set Point. Then switch the controls to the Automatic mode and press Done to return to the Main Menu and select Run .

The system will now operate automatically and maintain the extract set point pressure and thus the extract volume as the volume from the fume cupboards varies.

See Control Settings below for details on the fine tuning of the controls

2. AHU Fan speed control for VAV extract systems :-

This application is for the extract fan speed control on ECON VAV systems.

Before setting up the manual balancing dampers and the ECON controls on the fume cupboards the extract fan speed needs to be manually set.

To do this select Setup in the Main Menu and go to Configure via the password and then to Control Configure. In this menu select Manual/Auto and go to Manual. When in the Manual mode use the +/- buttons to set the desired speed of the extract fan then and press Done to return to the Main Menu and select Run .

Then complete the setting up of the fume cupboard ECON controls and set the system running at the design volume taking into account any diversity on the system.

At this point the AFA1000/E/Rm will read the system pressure on the display.

Note this pressure and in the Control Config menu enter the displayed pressure reading as the Set Point. Then switch the controls to the Automatic mode and press Done to return to the Main Menu and select Run .

The system will now operate automatically and maintain the extract set point pressure as the ECON controls on the fume cupboards vary the volume extracted from the lab.

See Control Settings below for details on the fine tuning of the controls

7. CONTROL SETTINGS

7 CONTROL SETTINGS

7.1 Control Settings

1. There are various operational setting that need to be set to give good control of the extract duct pressure. These setting are adjustable in the 'Control configure menu'. Due to the possible variations in the applications each unit will be supplied with a printed sheet giving the values of the parameters as set in the factory before dispatch. (These can also be viewed using a Laptop computer plugged into the 'Com port'). The factory settings are based on previous experience of similar installations but may require some adjustment to suit the particular installation.(These setting should only be adjusted by experienced engineers familiar with controls and the requirements of the fume cupboard installations.)

2. Certain parameters can be pre-set from knowledge of the installation :-

Set point   This is the desired extract duct pressure (during commissioning)

Damper / Inverter   For systems with bleed damper control or variable speed extract fan using an Inverter

Output range   2-10V or 0-10V depending on what is being controlled

3. Certain parameters can be adjusted (in small increments) to improve the stability and performance of the control :-

Stability: The stability of the system can be effected by two main items – turbulent airflow across the face of the pressure sensor or the 'sensitivity' of the control loop. It is important to establish the cause of the problem before attempting to adjust any parameters.

To do this put the control system into 'Manual' operation and check the stability of the measured pressure. In this condition the bleed damper or

Inverter will be at a fixed   position so any instability seen will be due to the extract system or to turbulent air across the sensor. This can be check and corrected.

If the system is stable in the 'Manual mode' the problem could be due to the control sensitivity being too high. The sensitivity is set by the 'Prop Band' in the 'Control config menu'. This can be increased to reduce the sensitivity.

Performance: To reduce the time for the measured value to go to the set point value (ie removal of the 'offset') after a change in duct pressure the 'Integral time' in the 'Control config menu' can be increased. This is normally set to 20 reps/min

4. **MIN ---** This is a manual fixed position select by the Night set-back activation and can be adjusted to the desired value.

MAX -- This is a manual fixed position select by the Emergency activation and can be adjusted to the desired value.

Low limit - This is used to limit the travel of the damper in the opening position or the min speed of the extract fan to maintain the desired extract rate from the fume cupboards in normal operation as the sashes are closed.

High limit - This is used to limit the travel of the damper in the closing position or the max speed of the extract fan to maintain the desired max extract rate from the fume cupboard in normal operation as the Sash is opened.

Note :- The above information is a guide only on how to set up and calibrate the controls incorporating the AFA1000 / E / Bld controller.

8. RS485 COMS OUTPUT

8 RS485 COMS OUTPUT

8.1 Overview and connections

The AFA1000 series has on board RS485 coms with 3 protocols:-

Protocol	Description
TEL	Protocol for connection to TEL Configure Manager PC software and room controls
Modbus	Modbus RTU protocol
BACnet	BACnet MS/TP protocol (To connect to BACnet IP a 3rd party router is required)

See separate coms registers for further technical, compliance and register information:-

AFA1000/Rm Modbus Registers
AFA1000/Rm BACnet Registers

Typical connection diagram

8.2 Configuration settings

Note - when changing Protocols the AFA1000 should be power cycled once re-configured to ensure the changed take effect.

The TEL protocol has fixed parameters so cannot be adjusted in the field, to select the TEL protocol using the pushbutton menus:-

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

2. Using the + / - buttons select SET UP, and then select CONFIGURE, then enter the password (the factory default password is 0-0-0-0), press Enter to continue.

3. Using the + / - buttons select PROTOCOL and press Enter, then using the +/- buttons select TEL and then press Enter to continue, then select DONE to return to the CONFIG MENU, then select DONE and RUN.

To Setup the AFA1000 with MODBUS protocol using the pushbutton menus:-

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

2. Using the + / - buttons select SET UP, and then select CONFIGURE, then enter the password (the factory default password is 0-0-0-0), press Enter to continue.

3. Using the + / - buttons select PROTOCOL, and press Enter, then using the +/- buttons select MODBUS and then press Enter to return to the CONFIG MENU.

4. Using the + / - buttons select MODBUS SETTINGS and then press Enter, a sub menu will appear with the following parameters:-

	Parameter	Description	Range	Default
A	Slave ID	Set the slave ID for the unit	1-255	1
B	Baud Rate	Set the network Baud Rate	1200/2400/4800/9600/1440/19200/38400/57600	9600
C	Parity	Set the required parity	None/Even/Odd	None

5. Using the + / - buttons select the SLAVE ID parameter and then press Enter, then using the +/- buttons select the required ID and press Enter to continue.

6. Using the + / - buttons select the BAUD RATE parameter and then press Enter, then using the +/- buttons select the required rate and press Enter to continue.

7. Using the + / - buttons select the PARITY parameter and then press Enter, then using the +/- buttons select the required rate and press Enter to continue then select DONE to return to the CONFIG MENU, then select DONE and RUN.

To Setup the AFA1000 with BACnet protocol using the pushbutton menus:-

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

2. Using the + / - buttons select SET UP, and then select CONFIGURE, then enter the password (the factory default password is 0-0-0-0), press Enter to continue.

3. Using the + / - buttons select PROTOCOL, and press Enter, then using the +/- buttons select BACnet and then press Enter to return to the CONFIG MENU.

4. Using the + / - buttons select BACnet SETTINGS and then press Enter, a sub menu will appear with the following parameters:-

	Parameter	Description	Range	Default
A	Device Instance	Set the slave ID for the unit	0000000 to 4194303	0000000
B	Station ID	Set the network ID	0-127	1
C	Baud Rate	Set the required Baud Rate	1200/2400/4800/9600/1440/19200/38400/57600	38400
D	Parity	Set the required Parity	None/Even/Odd	None
E	Max Masters	Set the max masters (max devices on the network)	0-127	1

5. Using the + / - buttons select the DEVICE INSTANCE parameter and then press Enter, then using the +/- buttons select the required Instance and press Enter to continue.

6. Using the + / - buttons select the STATION ID parameter and then press Enter, then using the +/- buttons select the required ID and press Enter to continue.

7. Using the + / - buttons select the BAUD RATE parameter and then press Enter, then using the +/- buttons select the required rate and press Enter to continue.

8. Using the + / - buttons select the PARITY parameter and then press Enter, then using the +/- buttons select the required rate and press Enter to continue.

9. Using the + / - buttons select the MAX MASTERS parameter and then press Enter, then using the +/- buttons select the required number of Masters and press Enter to continue, then select DONE to return to the CONFIG MENU, then select DONE and RUN.

8.3   Testing and troubleshooting

The AFA1000 diagnostics menu can be used to check the coms settings and operation once the AFA1000 coms parameter settings have been set up.

From the run screen press the + & - buttons together to access the diagnostics screen.

The diagnostics sub menu will appear showing the following options-

a. Alarm Test
b. Coms data
c. I/O Status
d. Done

Using the +/- buttons to scroll select **Coms data** and press Enter.

b. Coms data - the Screen will show the coms setting data for the relevant selected protocol:-

Protocol = None/TEL/Modbus/BACnet
ID = Slave ID for Modbus or Device Instance for BACnet
Baud Rate = Shows selected Baud Rate
Parity = Shows selected Parity

Tx & Rx = the display will show the current data packets sent and received, the displayed value will rollover to zero when the maximum count is reached.

BACnet protocol troubleshooting guide

	Protocol	Fault	Remedy
A	BACnet	Device not present on Network	Ensure the AFA1000 is in Run mode or Diagnostics screen, the coms are interrupted when the AFA1000 is in the pushbutton menus.
			Power cycle the AFA1000, this is required if the Protocol has been changed.
			Ensure Max Masters is set to the number of devices on the network, if the value set is larger than the actual number of devices the coms will be slowed so may cause time out issues.
			Ensure the network is BACnet MS/TP not BACnet IP (a separate router is required for IP).
			Using the diagnostics menu check the coms settings are correct (see below).
	Diagnostics menu		
		Tx & Rx = 0	AFA1000 is not connected to the network (initial set up).
		Tx & Rx >0 but fixed values	AFA1000 has lost connection to the network.
		Rx is counting but Tx is a fixed value	AFA1000 is connected to the network but the Master (BMS) is offline or not polling the AFA1000.

Modbus protocol troubleshooting guide

	Protocol	Fault	Remedy
B	Modbus	Device not present on Network	Ensure the AFA1000 is in Run mode or Diagnostics screen, the coms are interrupted when the AFA1000 is in the pushbutton menus..
			Power cycle the AFA1000, this is required if the Protocol has been changed.
			Ensure the network is Modbus RTU.
			Using the diagnostics menu check the coms settings are correct (see below).
	Diagnostics menu		
		Tx & Rx = 0	AFA1000 is not connected to the network (initial set up).
		Tx & Rx >0 but fixed values	AFA1000 has lost connection to the network.
		Rx is counting but Tx is a fixed value	AFA1000 is connected to the network but the Master (BMS) is offline or not polling the AFA1000.

8.4   Config Manager

TEL software package CONFIG MANAGER is available for uploading and downloading parameter configuration files to the AFA1000. The config manager software is Windows based software that runs on a PC or Laptop and requires a RS232/485 converter and TEL coms adaptor to communicate with the RS485 coms port on the AFA1000.

The software is free to download and the coms adaptor is available to buy from TEL.

Most 3rd party RS232/485 converters will work with the AFA1000, the recommended converter is the following 1 port isolated converter part number:- EasySYNC ES-U-2101-M which is also available to buy from directly from TEL.
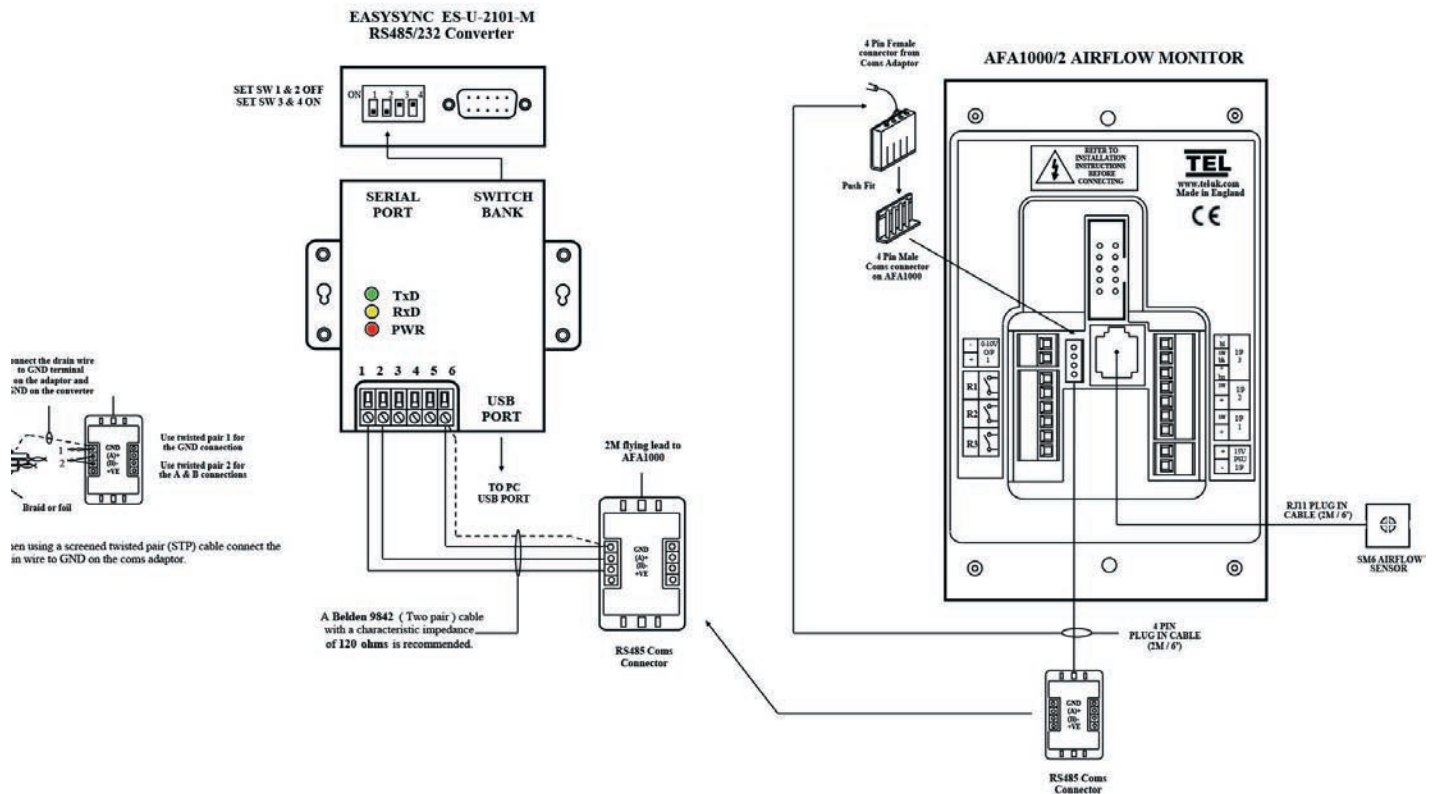
Recommended minimum PC requirements:-

Windows XP or later, 2GHz processor, 3.00GB Ram, 1MB free storage space.

Config Manager uses the TEL protocol on the AFA1000.

See separate Config Manager manual for further information.

Connection Diagram with RS232/485 converter

9. WARRANTY

9   WARRANTY

Seller warrants that this product, under normal use and service as described in the operator's manual shall be free from defects in workmanship and material for a period of twelve (12) months, or the length of time specified in the operator's manual, from the date of shipment to the customer. This limited warranty is subject to the following exclusion :-

a. Batteries and certain other components when indicated in specifications are warranted for a period of 90 days from the date of shipment to the customer.
b. With respect to any repair services rendered, Seller warrants that the parts repaired or replaced will be free from defects in workmanship and material, under normal use, for a period of 90 days from the date of shipment to the customer
c. Seller does not provide any warranty on finished goods manufactured by others. Only the original manufacturer's warranty applies.
d. Unless specifically authorized in a separate writing by Seller, Seller makes no warranty with respect to, and shall have no liability in connection with, any goods which are incorporated into other products or equipment by the Buyer. All goods returned under warranty shall be at the Buyer's risk of loss, Seller's factory prepaid, and will be returned at Seller's risk of loss, Buyer's factory prepaid.

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Temperature Electronics Ltd.
Unit 2, Wren Nest Road, Glossop,
SK13 8HB United Kingdom

Tel: +44 (0)1457 865635
Fax: +44 (0)1457 868843

Temperature Electronics Ltd.
Unit 2, Wren Nest Road, Glossop,
SK13 8HB United Kingdom

Tel: +44 (0)1457 865635
Fax: +44 (0)1457 868843