INSTALLATION & OPERATION
FGD & FGS RANGE

TECHNICAL SPECIFICATION

Power Supply	24V AC/DC ±10%	
Power Consumption	FGD	70mA Max
	FGS	100mA Max
BACnet	MS/TP over RS485	
	Baud: 9k6, 19k2, 38k4 or 76k8	
	127 Address (1/10th Load)	
Analogue Output	0/2-10V Full Scale Linear (FGS Only)	
VFC Output	SPDT - 1A @ 24V Max (FGS Only)	
Operating Conditions	Temp	5 - 40°C
	Humidity	0 - 95% (NC)
Response Time (T90)	< 1 Minute (Adjustable)	
Sampling Method	Diffusion	
Warm-up Time	1 Minute	
Material	PC/ABS	
Colour	Wall - Pure White (RAL9010)	
	Duct – Black/Clear	
Approval	CE, UKCA	

IMPORTANT – Please read carefully:

1. The sensors should not be exposed to high concentrations of the target gas or gases of a similar property. Such exposure can cause irreparable damage.
2. Following the detection of any significant gas leak, it is recommended that the sensor be replaced or recalibrated as a minimum as this may affect the sensor response or accuracy.
3. The Sensors are factory calibrated, however must be bump tested following installation to ensure that the sensing element has not been damaged and that the unit has been installed correctly.
4. All sensors must be calibrated in line with any site-specific requirements, however, must be calibrated at least annually by a competent person.

THE ABOVE NOTES ARE NOT SPECIFIC TO FLAMEFAST SENSORS, THIS SHOULD BE APPLIED TO THE MAJORITY OF GAS SENSOR DUE TO THE DETECTION PRINCIPLES.

MOUNTING LOCATION

Application and gas specific mounting locations are critical, however the below general guidance should be considered (please see gas specific mounting heights on sensor specification table);

- Do not install in high velocity air streams (near an air Inlet/Outlet).
- Do not install next to doors or opening windows.
- Ensure the sensor is installed near to where any gas escapes may occur.

INSTALLATION

All installation details shown on the wiring diagram should be followed carefully, failure to do so could result in irreparable damage to the unit.

Screened cable should be used at all times. Any voltage induction can result in corruption of the BACnet interface or failure of the analogue outputs.

It is recommended that the cable installation is checked prior to connecting the sensor to ensure that no voltage is applied to the BACnet terminals.

The connection details for the Wall and Duct mount units are the same, the only difference is the mounting.

Wall Mount Enclosure

The wall mount enclosure is designed to fit on a standard single gang junction box or conduit box. Please take care when tightening fixing screws as overtightening can distort the plastic.

To open/close:

1. Remove securing screw from the bottom of the enclosure.
2. Insert a flat screwdriver into the slot behind the screw and apply pressure until the bottom of the enclosure releases.
3. Pull the front of the enclosure outward from the bottom then up to release hooks securing the top.
4. When closing, hook the clips into place, then push the bottom until the securing clip fully engages.

Duct Mount Enclosure

The duct mount enclosure is IP66 external to the duct and although a foam gasket is provided, additional sealant may be required to maintain the integrity of the duct (the use of solvent-based sealant may damage the sensing elements).

A minimum hole size of 25mm should be drilled into the duct for clearance.

To open/close:

1. Remove securing screw from the lid of the enclosure.
2. Press on both securing clips simultaneously to release then simply open using the hinge mechanism.

SUPPLY VOLTAGE

The AC/DC jumper must be fitted to the appropriate position to suit your supply. This is designed to reduce the inrush current when using DC.

OPERATION

On power up, the LCD will cycle through Green, Amber, Red then white with a 60 second count down. During this 60 seconds the volt free contact will be in the default position for the selected programme and the voltage output will give 2.00V.

Once the warm-up is complete, the LCD will display:

LINE 1	Gas Type
LINE 2	Gas Concentration
LINE 3	Sensor Status

MAINTENANCE

All sensors must be calibrated at least annually, however please note for more sensitive applications it may be required to calibrate every 6 months.

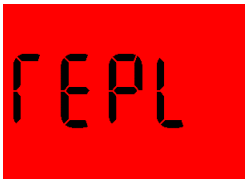
There are a number 'Fault' statuses the unit may display:

Display	Description	Audible	LCD	V Output	Relay
ERR	Sensor Error/No Sensor	Full	Red	0V	Fault
CAL	Calibration Due	1s / 30m	Amber	1V	-
REPL	Replacement Due	1s / 30m	Red	1V	-
EOL	Replacement Overdue	1s / 10m	Red	0V	Fault
9999	No Sensor Board	Full	Red	0V	Fault

The initial calibration reminder is set to 480 days to allow handover and defects on new projects, although the sensor should be calibrated at 360 days. The calibration notification will activate when it reaches 30 days.

All sensors have a set life to ensure that they are replaced in line with the expected life of the specific sensor. The replacement notification will activate when it reaches 30 days. If the sensor is not replaced within 90 days of the timer reaching 0, the sensor will cease to operate and will provide an alarm status.

When a sensor calibration or replacement is due (within 30 days), the LCD will cycle between the sensor reading and the below warnings. Please note, these warning will not affect the functionality of the sensor.



SENSOR REPLACEMENT

Following a sensor reaching the end of its life, the 'Sensor Board' must be replaced (it is not required to replace the complete unit). This must be done with the unit powered down.

All sensor alarm settings are on the Sensor Board, therefore if any site-specific alarms differ from the unit default these must be reset once replaced.

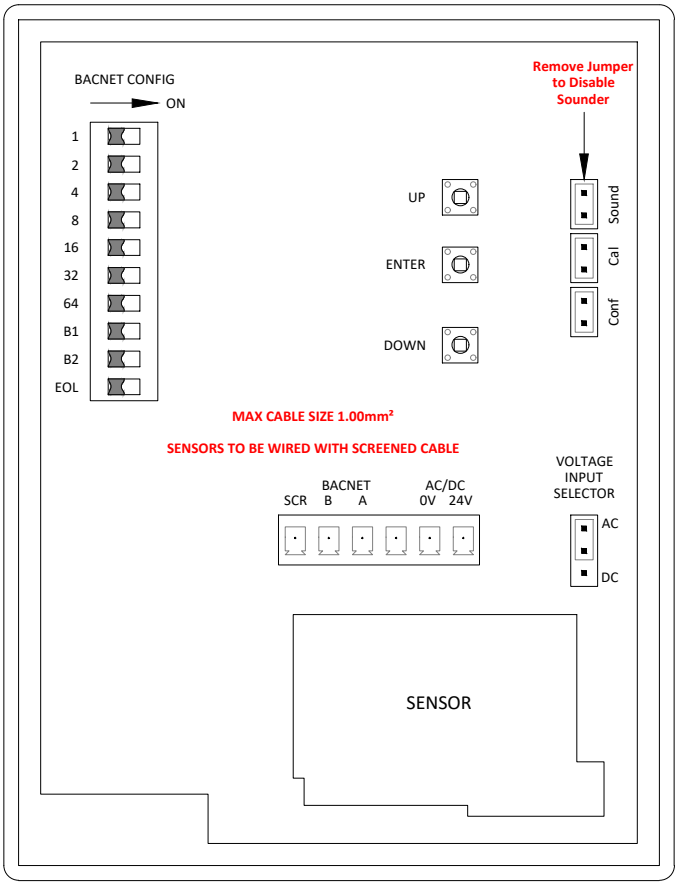
TROUBLESHOOTING

Screen Flashing	Jumper fitted to DC whilst powered with AC.
Displaying 9999	Sensor PCB loose/disconnected.

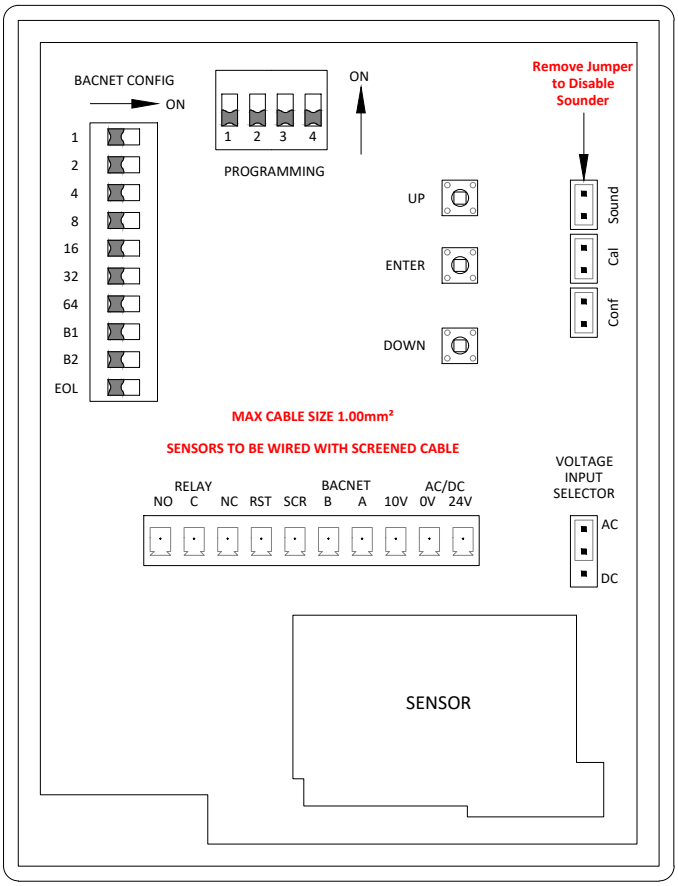
FLAMEFAST RESERVE THE RIGHT TO CHANGE PRODUCT SPECIFICATION WITHOUT PRIOR NOTICE

CONNECTIONS & CONFIG

FGD RANGE



FGS RANGE



BACNET CONFIGURATION

Label	Configuration	Setting
1	MAC Address	Max = 127
2	Sum of 1, 2, 4, 8, 16, 32 & 64	
4		
8	Example 1 + 4 ON	Address = 5
16	Example 4 + 16 ON	Address = 20
32	Example 32 + 64 ON	Address = 96
64		
B1	B1 OFF / B2 OFF	9600
B2	B1 OFF / B2 ON	19200
	B1 ON / B2 OFF	38400
	B1 ON / B2 ON	76800
EOL	End of Line Termination	

WHEN CONNECTED TO A FLAMEFAST GAS SAFETY SYSTEM:

- **Addresses 1-16 must be used.**
- **The Baud rate on the sensors must be set to 9600.**

PARAMETER CONFIGURATION

The following parameters can be adjusted:

Gas Type	This is set by Flamefast – DO NOT CHANGE.
Range	The 0/2-10V output will be full scale linear from 0 to the set Range.
Alarm 1	The display will turn Amber and the unit will beep every 10 seconds.
Alarm 2	The display will turn Red and the unit will beep constantly.
Relay Setpoint	The relay will change to an alarm state.
Auto Zero	The sensor will Auto zero calibrate by averaging any reading within 5% of Zero, then adjusting the Zero reading (if required) every 7 days, with a maximum adjustment of value of 1% of the factory def range, Please contact Flamefast for further details.

*Oxygen Sensors have dual alarms for Enrichment and Depletion.

To change any of the parameters,

1. Place the jumper onto the **CONFIG** pins.
2. Press **ENTER** to open, and cycle through the configuration menu.
3. Once on a parameter, pressing the **UP** or **DOWN** button changes the value.
4. Once all parameters are set and the end of the menu is reached, the LCD with show **SAVE**, before returning to normal operation.

Note: All default alarm settings are as per the HSE EH40 (where applicable) and should not be changed without carrying out a site-specific risk assessment.

SENSOR SPECIFICATION

	Sens Type	Range	Unit	AL 1 Amber	AL 2 Red	Relay	Life (Yrs)	Typical Mounting Height*
NG/CH4	CAT	100	%LEL	10	20	20	5	300mm from Ceiling
LPG	CAT	100	%LEL	10	20	20	5	300mm from Floor
H2	CAT	100	%LEL	10	20	20	5	300mm from Ceiling
HC	PEL	100	%LEL	10	20	20	5	Dependant on gas
IRHC	IR	100	%LEL	10	20	20	5	Dependant on gas
SF6	IR	2,000	PPM	500	1,000	1,000	5	300mm from Floor
CO2	IR	5.00	%	0.50	1.50	1.50	5	300mm from Floor
CO	EC	200	PPM	20	100	100	5	1,500mm from Floor
NO2	EC	5.00	PPM	0.50	1.00	1.00	5	300mm from Floor
NH3	EC	100	PPM	25	35	35	3	300mm from Floor
CL2	EC	5.00	PPM	0.20	0.50	0.50	3	300mm from Floor
H2e	EC	1,000	PPM	250	500	500	3	300mm from Ceiling
SO2	EC	5.00	PPM	0.50	1.00	1.00	3	300mm from Floor
O2	EC	25.0	%	19.5 / 22.5	18.5 / 23.5	18.5 / 23.5	5	Dependant on gas and application

*The Application, Gas and Specific Gravity should be considered

PROGRAMMING SWITCHES (FGS ONLY)

	OFF	ON
Switch 1	Traffic Light On	Traffic Light Off
Switch 2	Display Gas Concentration	Display Gas Formula
Switch 3	Relay Energised / 2-10V	Relay De-Energised / 0-10V
Switch 4	Non Latching	Latching

Failsafe Mode (DIP 3)

As default failsafe mode is enabled. This will result in the Relay being energised when healthy so a loss of power can be detected, therefore on the Normally Open becomes Normally Closed.

Latching / Non-Latching (DIP 4)

When the latching function is enabled, the unit will remain in an alarm condition until 24V is applied to the RESET terminal.

CALIBRATION

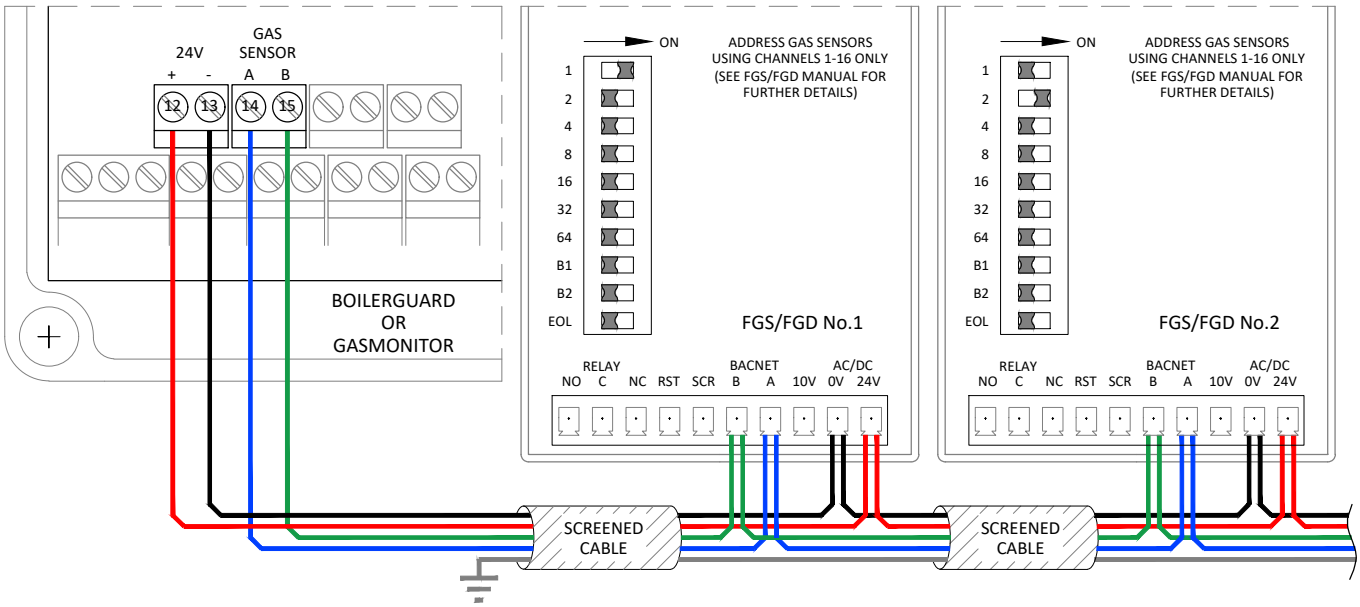
For sensor calibration, please contact Flamefast for details.

BOILERGUARD/GASMONITOR
FGD & FGS RANGE

PLEASE SEE BELOW CONNECTIONS WHEN CONNECTING TO A FLAMEFAST CONTROL PANEL.

SENSORS MUST BE WIRED IN ONE CONTINUOUS DAISY CHAIN. STAR WIRING CONFIGURATIONS MAY CAUSE THE PANEL TO 'LOSE' SENSORS.

ALL SENSORS MUST BE SET TO DIFFERENT ADDRESSES, AND WE RECOMMEND NUMBERING STARTING AT 1, 2.. IN THE ORDER THEY ARE WIRED FROM THE PANEL.



WIRING REQUIREMENTS

The sensors should always be wired in a daisy chain using a screened cable, with the screen grounded to earth (only at one end) - wiring is a star or parallel configuration may result in errors on the BACnet interface.

Typically we would recommend Belden 8723 (or Equivalent) for sensor wiring, however larger networks and cable runs may require a larger conductor to reduce voltage drop. Please ensure that the maximum terminal cable entry size of 1mm^2 is not exceeded.

SENSOR POWER CONSUMPTION

Sensor	FGD Max	FGD Typ	FGS Max	FGS Typ
Catalytic	70mA	50mA	100mA	80mA
Pellistor	70mA	50mA	100mA	80mA
Infra-red	70mA	50mA	100mA	80mA
Electrochemical	15mA	10mA	40mA	35mA

All sensors will have a small inrush on power up which should be considered, as should any Audible Visual Alarm Beacons running off the same supply.

REFRIGERANT SENSORS
FGS-REF

The refrigerant sensors operate slightly differently to the other sensors, whereas they provide coverage for a wide range of gases from a single sensor.

You simply select the gas being monitored and the FGS-REF automatically rescales and compensates for the target gas.

The specification for all units will be as below:

- Range 0 – 2000ppm
- Alarm 1 400ppm
- Alarm 2 800ppm
- Relay 800ppm

IMPORTANT – PLEASE SELECT THE TARGET GAS AS BELOW

1. Without **CAL** or **CONFIG** jumpers fitted, hold the **ENTER** button for 3 seconds.
2. This will enter a menu with a white backlight, and 'REF' on the top line of the display.
3. Use the **UP** and **DOWN** buttons to scroll through the target gas.
4. Press the **ENTER** button to select the required gas.

Note: The display is limited to 4 x 7 segment characters which limits what can be 'written'. Please use the table to correctly identify where required.

UNIT CALIBRATION CAN ONLY BE DONE USING 1,000ppm R1234ZE.

ALL SENSORS SHOULD BE MOUNTED AT LOW LEVEL.

The display will alternate between 'REF' and the below gas types:

DISPLAY	GAS
REF – 2E	R1234ze
REF – 407C	R407c
REF – 2d	R1233zd
REF – 422d	R422d
REF – 513A	R513a
REF – 22	R22
REF – 227	R227
REF – 452b	R452b
REF – 410A	R410a
REF – 123	R123
REF – 507	R507
REF – 449A	R449a
REF – YF	R1234yf
REF – 407F	R407f
REF – 32	R32
REF – 448A	R448a
REF – 417A	R417a
REF – 407A	R407a
REF – 125	R125
REF – 134A	R134a
REF – 404A	R404a

FLAMEFAST RESERVE THE RIGHT TO CHANGE PRODUCT SPECIFICATION WITHOUT PRIOR NOTICE

BACNET SPECIFICATION
FGD & FGS

This document is intended to provide details on BACnet functionality of the FGD & RGS Ranges, and It is assumed that anyone installing or configuring the sensor have at least a basic understanding of the BACnet protocol.

Please note: certain parameters relate to features only applicable to the FGS.

BACnet Interoperability Building Blocks Supported (Annex K)

Description	BIBB	Comments
Read Property	DS-RP-B	
Read Property Multiple	DS-RPM-B	
Write Property	DS-WP-B	
Dynamic Device Binding	DM-DDB-B	Execute Who-Is, Initiate I-Am
Dynamic Object Binding	DM-DOB-B	Execute Who-Has, Initiate I-Have
Device Comm Control	DM-DCC-B	
Reinitialize Device	DM-RD-B	

BACnet Standard Object Types Supported

Object	No Of Instance	Instance Assignments
Device Object	1	
Analog Input	4	AI-1 Gas Concentration AI-2 Value (FF Use Only) AI-3 Value (FF Use Only) AI-4 Value (FF Use Only)
Analog Output	1	AO-1 Voltage output 1
Analog Value	9	AV-1 Days until Calibration AV-2 Days until End of Life AV-3 Range AV-4 Alarm 1 set point (Amber) AV-5 Alarm 2 set point (Red) AV-6 Relay set point AV-7 O2E Alarm 1 AV-8 O2E Alarm 2 AV-9 O2E Relay set point
Binary Output	2	BO-1 Relay BO-2 Reset Latch
Binary Value	1	BV-1 Auto-zero

Device Object Properties (Required Object Properties)

Property Name /ID	Default	R/W
Object Identifier	1090000 + MAC_Address	R/W
Object Name	"FGS_XXX", XXX = MAC address	R/W
Object Type	8	R
System Status	OPERATIONAL	R
Vendor Name	Flamefast (UK) Ltd	R
Vendor Identifier	1090	R
Model Name	FGS	R
Location	Location	R/W
Description	Flamefast Gas Sensor / Detector	R/W
Application Software Revision	1.00	R
Protocol Version	1	R
Protocol Revision	10	R
Protocol Services Supported		R
Object List		R
Max APDU Length	480	R
Segmentation Support	None	R
APDU Timeout	3000 ms	R
Number APDu Retries	3	R
MaxMaster	127	R
Max_Info_Frames	1	R
Database Revision	0	R

Proprietary Properties

Property ID	Description	Range
1000 – 1028	Flamefast Use Only	

Analog Input Objects

Property Name /ID	Comments/Default Value	R/W
Object Identifier	OBJECT_ANALOG_INPUT:X	R
Object Name	AI-1 XXXX Sensor (XXXX = Gas Type)	R
Object Type	0	R
Present Value	REAL	R
Status Flag	0000	R
Event State	0 NORMAL 4 Low-Limit (Alarm 1) 3 High-Limit (Alarm 2) 1 Fault	R
Out-Of-Service	FALSE	R
Units	AI-1 PERCENT / PART-PER-MILLION	R

Analog Output Objects

Property Name /ID	Default	R/W
Object Identifier	OBJECT_ANALOG_OUTPUT:X	R
Object Name	AO-1 Voltage output 1	R
Object Type	1	R
Present Value	REAL	R
Status Flag	0000	R
Event State	NORMAL	R
Out-Of-Service	FALSE	R
Units	VOLTS	R
Min Pres Value	AO-1 2.0 (0.0 to 10.0)	R/W
Max Pres Value	AO-1 10.0 (0.0 to 10.0)	R/W

Analog Value Objects

Property Name /ID	Default	R/W
Object Identifier	OBJECT_ANALOG_VALUE:X	R
Object Name	AV-1 Days until Calibration AV-2 Days until End of Life AV-3 Range AV-4 Alarm 1 set point (Amber) AV-5 Alarm 2 set point (Red) AV-6 Relay set point AV-7 O2E Alarm 1 AV-8 O2E Alarm 2 AV-9 O2E Relay set point	R R R R R R R R R
Object Type	2	R
Present Value	AV-1 REAL AV-2 REAL AV-3 0 to 300 (20 Default) AV-4 to AV-10 0.00 to 10000	R R R R
Status Flag	0000	R
Event State	NORMAL	R
Out-Of-Service	FALSE	R
Units	AV-1 DAYS AV-2 DAYS AV-4 to AV-10 PERCENT / PART-PER-MILLION	R

Binary Input Objects

Property Name /ID	Default	R/W
Object Identifier	OBJECT_BINARY_INPUT:1	R
Object Name	BI-1 Remote Reset	R
Object Type	3	R
Present Value	0 = OFF 1 = ON	R/W
Status Flag	0000	R
Event State	NORMAL	R
Out-Of-Service	FALSE	R

Binary Output Objects

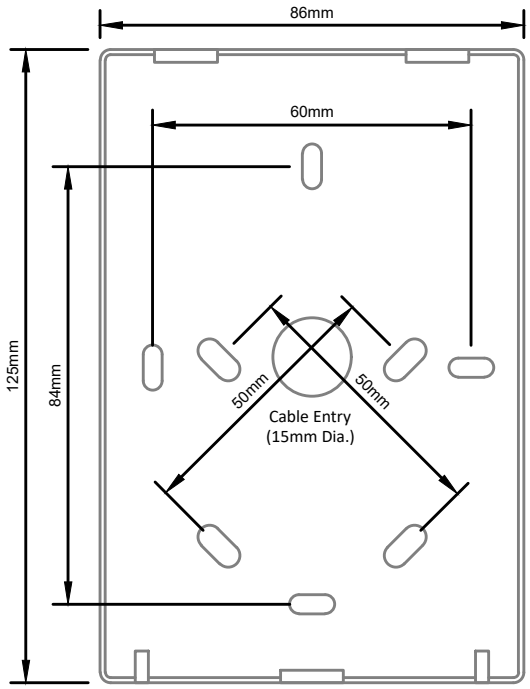
Property Name /ID	Default	R/W
Object Identifier	OBJECT_BINARY_OUTPUT:X	R
Object Name	BO-1 Relay BO-2 Reset Latch	R
Object Type	4	R
Present Value	BO-1 0 = OFF 1 = ON BO-2 1 = Reset Latch. Auto clears.	R R/W
Polarity	Normal	R
Status Flag	0000	R
Event State	NORMAL	R
Out-Of-Service	FALSE	R

Binary Value Objects

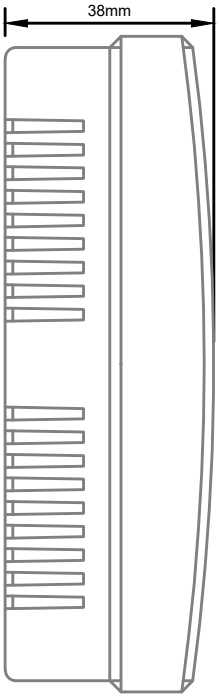
Property Name /ID	Default	R/W
Object Identifier	OBJECT_BINARY_VALUE:X	R
Object Name	BO-1 Auto-zero	R
Object Type	5	R
Present Value	0 = OFF 1 = ON	R
Status Flag	0000	R
Event State	NORMAL	R
Out-Of-Service	FALSE	R

For further information on the BACnet protocol, please visit www.bacnet.org.

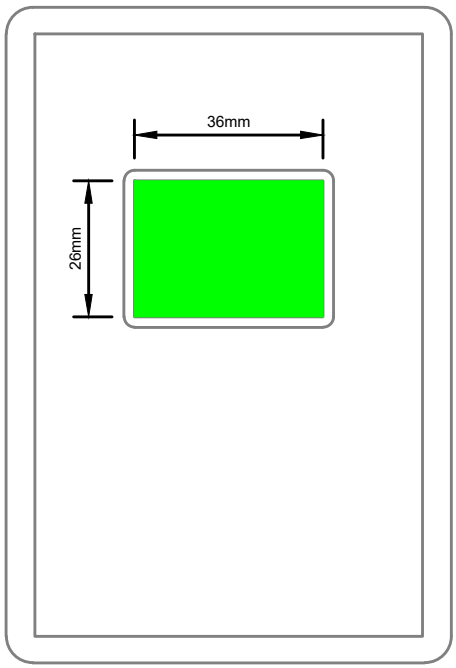
DIMENSIONS
WALL & DUCT



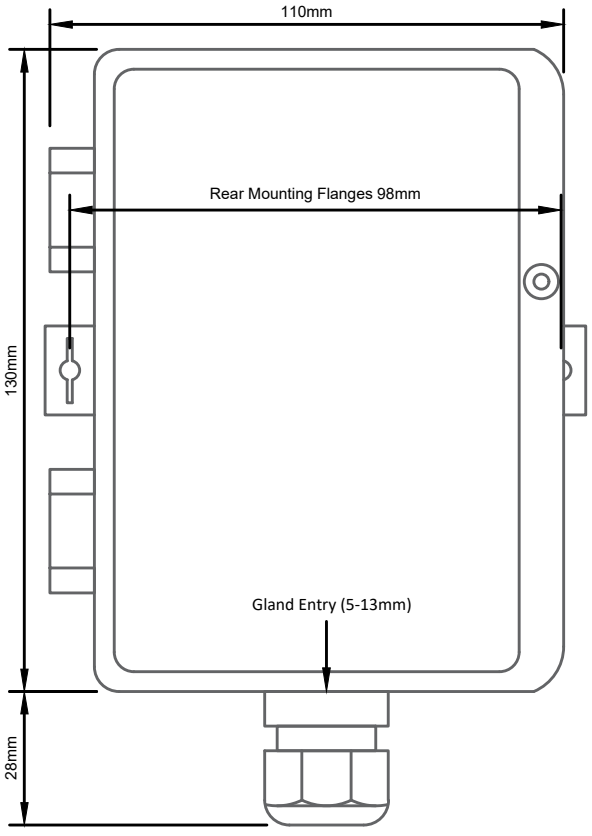
REAR ELEVATION



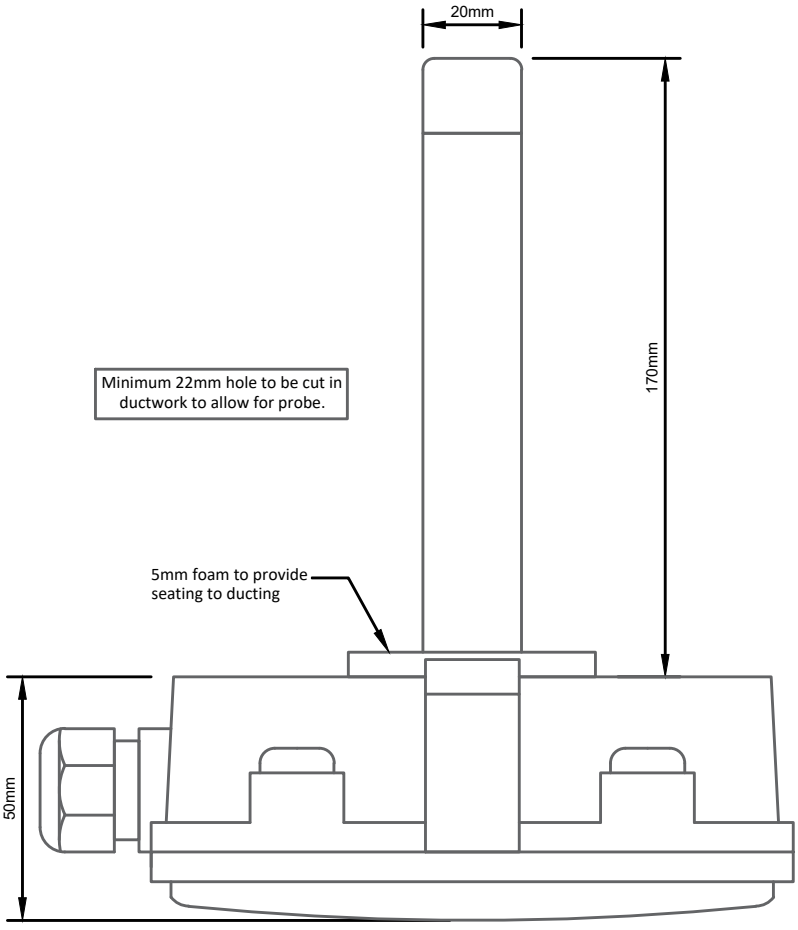
SIDE ELEVATION



FRONT ELEVATION



FRONT ELEVATION



SIDE ELEVATION