PyroCAN Series

Operator's Guide

CALEX
ELECTRONICS LIMITED

PyroCAN infrared temperature sensors measure temperatures from -20°C to 1000°C and transmit the reading digitally via a Raw CAN interface.

SPECIFICATIONS

Models and Optics	
Model	**Optical Field of View**
PCAN21	2:1 wide-angle, for larger targets
PCAN201	20:1 narrow-angle, for smaller targets and longer distances

General	
Temperature Range	-20°C to 1000°C
Accuracy	±1% of reading or ±1ºC whichever is greater
Repeatability	± 0.5% of reading or ± 0.5ºC whichever is greater
Emissivity	0.2 to 1.0, adjustable via CAN
Response Time	200 ms (90% response)
Spectral Range	8 to 14 µm
Supply Voltage	12 to 24 V DC
Supply Current	50 mA max.

Communication	
Interface	Raw CAN
Baud Rate	250 kbps
Format	see PROTOCOL

Mechanical	
Construction	Stainless Steel
Dimensions	18 mm diameter x 103 mm long
Thread Mounting	M16 x 1 mm pitch
Cable Length	1 m (standard length; longer lengths available)
Weight with 1 Metre Cable	95 g

Environmental	
Environmental Rating	IP65
Ambient Temperature	0ºC to 90ºC
Relative Humidity	95% max. non-condensing

OPTIONS

Options are factory-installed and cannot be retrofitted. The following options are available:

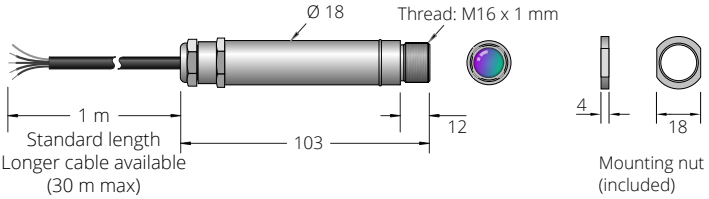
- Extended cable (30 m max)
- Air/water cooled jacket (includes air purge collar)
- Calibration certificate, 3 temperature points, UKAS traceable (recalibration of existing sensors also available)

ACCESSORIES

Accessories may be ordered at any time and added on-site. The following accessories are available:

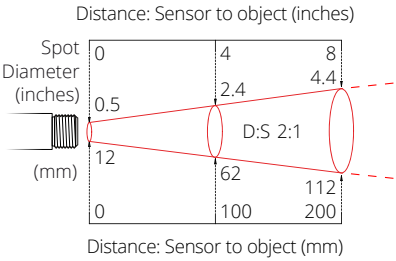
- **FBS** Fixed mounting bracket
- **ABS** Adjustable mounting bracket
- **APSW** (PCAN21) **/ APSN** (PCAN201) Air purge collar
- **PWS / SIWS** Protective plastic / silicon window in stainless steel holder
- **LSTS** Laser sighting tool

DIMENSIONS (mm)

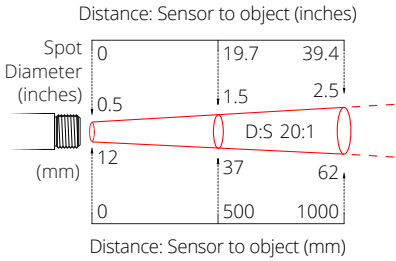


OPTICS

PCAN21



PCAN201



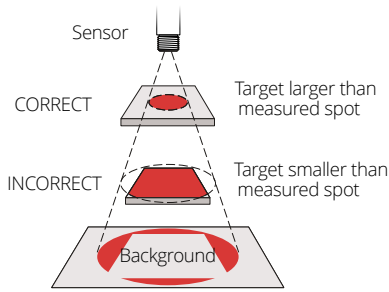
The sensor may be used at longer distances than shown, and will measure a larger spot. The measurement accuracy is not affected by the measurement distance.

There is no maximum measurement distance provided the air between the sensor and target is free of obstructions, steam, smoke, dust etc. The above measured spot sizes contain 90% of the detected infrared energy.

DISTANCE AND SPOT SIZE

Mount the sensor at a distance where the measured spot size is smaller than the target. The spot size must not be larger than the target.

We normally recommend that the target is at least twice as large as the measured spot for maximum accuracy.



CALIBRATION

All sensors are calibrated at the time of manufacturing. A UKAS-traceable certificate of calibration with three temperature points is available as an option at the time of ordering.

Calex can also check the calibration of existing sensors, and recalibrate as necessary. A UKAS traceable certificate of calibration is also provided with this service.

INSTALLATION

The installation process consists of the following stages:

1. Preparation - 2. Mechanical installation - 3. Electrical installation

Please read the following sections thoroughly before proceeding with the installation.

1. PREPARATION

Ensure that the sensor is positioned so that it is focused on the target only.

AMBIENT TEMPERATURE

The sensor is designed to operate in ambient temperatures from 0°C to 90°C. For ambient temperatures above 90°C, an air/water-cooled housing will be required.

Avoid thermal shock. Allow 20 minutes for the unit to adjust to large changes in ambient temperature.

ATMOSPHERIC QUALITY

Smoke, fumes or dust can contaminate the lens and cause errors in temperature measurement.

In these types of environment the air purge collar should be used to help keep the lens clean.

ELECTRICAL INTERFERENCE

To minimise electromagnetic interference or 'noise', the sensor should be mounted away from motors, generators and such like.

CABLE LENGTH

Check the distance between the sensor and the connected instrumentation. If necessary, the cable can be extended by the user via suitable connectors, or the sensor can be ordered with a longer cable attached.

POWER SUPPLY

Be sure to use a 12 to 24 V DC (50 mA max.) power supply.

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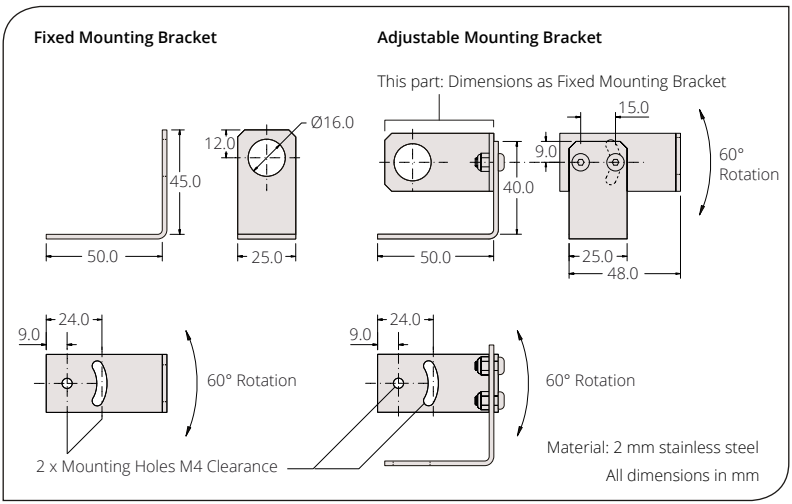
2. MECHANICAL INSTALLATION

All sensors are supplied with a 1 m cable and a mounting nut as standard. The sensor can be mounted on brackets or cut-outs of your own design, or you can use the fixed and adjustable mounting bracket accessories shown below. Both brackets are compatible with cooled and uncooled sensors, and with the air purge collar.

Note: The sensor must be grounded at only one point, either the cable shield or the sensor housing.

MOUNTING BRACKETS



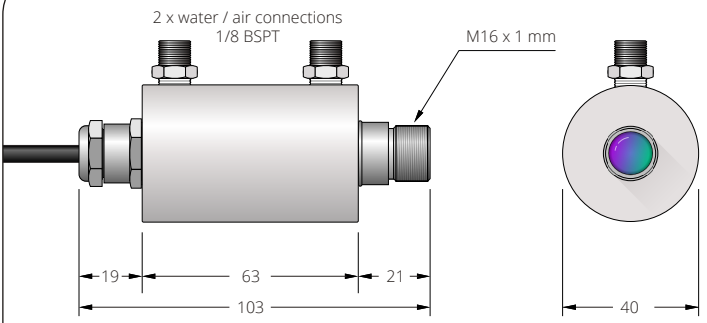
AIR/WATER COOLED HOUSING

The air/water cooled housing allows the sensor to withstand high ambient temperatures.

This factory-fitted option is equipped with two 1/8" BSP threaded fittings.

Water temperature should be 10°C to 27°C for efficient cooling. Chilled water below 10°C is not recommended. Water flow rate should be 0.5 to 1.5 litres/min. Adjust the flow rate and temperature of the cooling fluid to keep the sensor body between 0°C and 90°C.

An air purge collar is supplied as standard with each cooled sensor. This should be used to help prevent condensation on the lens.



Cooling jacket material: Anodised aluminium

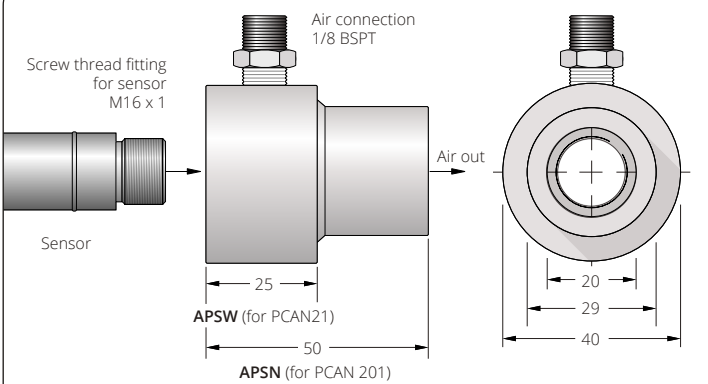
Air purge collar included with air/water cooled housing (see below)

All dimensions in mm

AIR PURGE COLLAR

The air purge collar is used to keep dust, fumes, moisture, and other contaminants away from the lens. It must be screwed in fully. Air flows into the 1/8" BSP fitting and out of the front aperture. Air flow should be 5 to 15 litres/min.

Clean or 'instrument' air is recommended.

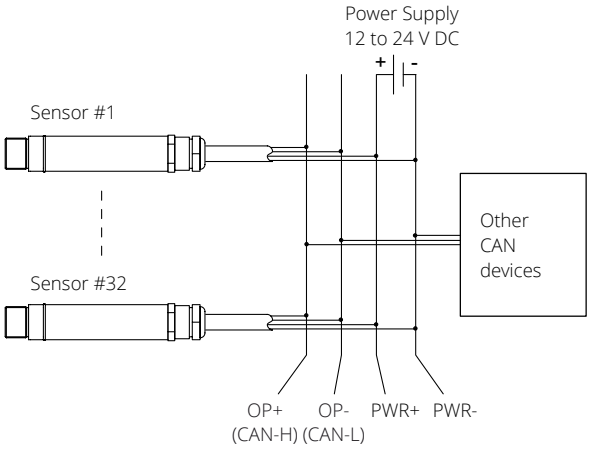


Material: Anodised aluminium

All dimensions in mm

3. ELECTRICAL INSTALLATION

The sensor cable has four wires, supplied with bare ends, and should be connected as shown below. PyroCAN sensors may be connected to the same network as other CAN devices.



Wire colour codes		
Brown	PWR+	Power supply +12 to +24 V DC
White	PWR-	0 V
Yellow	OP+	CAN-H
Green	OP-	CAN-L

OPERATION

Once the sensor is in position and the appropriate power, air, water and cable connections are secure, the system is ready for continuous operation after completing the following steps:

1. Turn on the power supply
2. Turn on the CAN instrumentation
3. Use the following information to read the measured temperature

PROTOCOL

- The sensor transmits an 8-byte message every 200 ms containing the internal sensor temperature and object temperature in °C.
- The first 4-bytes are the object temperature encoded as a floating-point.
- The second 4-bytes are the internal sensor temperature encoded as a floating-point.
- This message is sent to the CAN ID stored in non-volatile memory. The ID is persistent between power cycles.
- The CAN ID may be set to a value from 0 to 2047 (0x0 to 0x7FF) as a 4-byte unsigned integer.
- The emissivity setting may be set to a value from 0.2 to 1.0 as a 4-byte floating-point.
- These floating-point values can be decoded simply using an IEEE 754 binary-to-decimal converter.

READING THE MEASURED TEMPERATURE

Example message received from sensor:

		Object Temperature				Internal Sensor Temperature			
Bytes	**DLC**	**DATA0**	**DATA1**	**DATA2**	**DATA3**	**DATA4**	**DATA5**	**DATA6**	**DATA7**
Value	8	0x51	0x39	0xB2	0x41	0xA4	0x70	0xDF	0x41
Hex		0x41B23951				0x41DF70A4			
Encoding		Float				Float			
Decimal		22.28 °C				27.93 °C			

COMMANDS

Get Emissivity Setting [0x86]

After this command is sent, the sensor will return the emissivity setting as a floating point value as follows:

Value No value is sent. The sensor will return the emissivity setting.
Encoding Float
Hex 0x00000000

Bytes	DLC	DATA0	DATA1	DATA2	DATA3	DATA4	DATA5	DATA6	DATA7
Value	5	0x86	0x00	0x00	0x00	0x00	-	-	-
		Command ID	Send the command with these bytes empty. The sensor will return the emissivity setting in these bytes as a floating-point value.						

After the following commands are sent, the sensor will send back the same data as an "echo" to confirm it was received:

Set Emissivity Setting [0x06]

Value (Example) 0.95 (decimal)
Encoding Float
Hex 0x3F733333

Bytes	DLC	DATA0	DATA1	DATA2	DATA3	DATA4	DATA5	DATA6	DATA7
Value	5	0x06	0x33	0x33	0x73	0x3F	-	-	-
		Command ID	Emissivity Setting						

Note: The default emissivity setting is 0.95.

Set CAN ID [0x0D]

Value (Example) 13 (decimal)
Encoding Unsigned Integer
Hex 0x0000000D

Bytes	DLC	DATA0	DATA1	DATA2	DATA3	DATA4	DATA5	DATA6	DATA7
Value	5	0x0D	0x0D	0x00	0x00	0x00	-	-	-
		Command ID	CAN ID						

Note 1: Changing the CAN ID is effective immediately and therefore any following commands must be to the new CAN ID.

Note 2: The default CAN ID is 0.

IMPORTANT

Be aware of the following when using the sensor:

- If the sensor is exposed to significant changes in ambient temperature (hot to cold, or cold to hot), allow 20 minutes for the temperature to stabilise before taking or recording measurements.
- Do not operate the sensor near large electromagnetic fields (e.g. around arc welders or induction heaters). Electromagnetic interference can cause measurement errors.
- Wires must be connected only to the appropriate terminals.
- Ensure the sensor is grounded at one point: either the cable shield termination, or the sensor housing, but not both.

LENS CLEANING

Keep the lens clean at all times. Any foreign matter on the lens could affect measurement accuracy. Blow off loose particles (if not using the air purge accessory) with an air 'puffer'.

MAINTENANCE

Our customer service representatives are available for application assistance, calibration, repair, and solutions to specific problems. Contact our Service Department before returning any equipment. In many cases, problems can be solved by email or phone. If the sensor is not performing as it should, try to match the symptom below to the problem. There are no user-serviceable parts inside the sensor. Do not attempt to open the sensor housing as this will void the warranty. If the table does not help, call Calex for further advice.

TROUBLESHOOTING

Symptom	Probable Cause	Solution
No output	No power to sensor	Check power supply and wiring
Inaccurate measured temperature	Target too small for sensor's field of view	Ensure the sensor's view is completely filled by the target. Position the sensor closer to the target to measure a smaller area.
	Target is a reflective metal surface	Measure a non-reflective area, or paint or coat a measurable area of the target to make it non-reflective
	Field of view obstruction	Remove obstruction; ensure sensor has a clear view of target
	Dust or condensation on lens	Ensure lens is clean and dry. Clean gently with a soft lens cloth and water. If problem recurs, consider using an air purge collar.
	Incorrect wire connections	Check wire colour codes
Communication error	Incorrect CAN ID	Check the CAN ID of the sensor and ensure it is set correctly in the Master

GUARANTEE

Calex guarantees each instrument it manufactures to be free from defect in material and workmanship under normal use and service for the period of two years from the date of purchase. This guarantee extends only to the original buyer according to Calex's standard Terms and Conditions of Sale.

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