

# PyroCAN Series Operators Guide

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

## SPECIFICATIONS

### Temperature Range vs Field-of-View table

Field of View	Model Number
2:1	PCAN21
10:1	PCAN201

<b>Interface</b>	Raw CAN
<b>Accuracy</b>	±1% of reading or ±1°C whichever is greater
<b>Repeatability</b>	± 0.5% of reading or ± 0.5°C whichever is greater
<b>Emissivity</b>	0.2 to 1.0, adjustable via CAN
<b>Response Time, <math>t_{90}</math></b>	200 ms (90% response)
<b>Spectral Range</b>	8 to 14 $\mu$ m
<b>Supply Voltage</b>	12 to 24 V DC
<b>Supply Current</b>	50 mA max.
<b>Baud Rate</b>	250 kbps
<b>Format</b>	see PROTOCOL

### MECHANICAL

<b>Construction</b>	Stainless Steel
<b>Dimensions</b>	18 mm diameter x 103 mm long
<b>Thread Mounting</b>	M16 x 1 mm pitch
<b>Cable Length</b>	1 m
<b>Weight with Cable</b>	95 g

### ENVIRONMENTAL

<b>Environmental Rating</b>	IP65
<b>Ambient Temperature</b>	0°C to 90°C
<b>Relative Humidity</b>	95% max. non-condensing

### ACCESSORIES

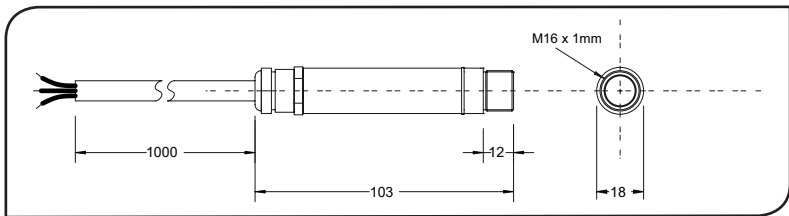
A range of accessories to suit different applications and industrial environments is available. These may be ordered at any time and added on-site. The accessories consist of the following parts .

Fixed mounting bracket                      Adjustable mounting bracket                      Air purge collar  
 Laser sighting tool                              Protective plastic window with stainless steel holder  
 Mounting bracket with continuous laser sighting

### OPTIONS

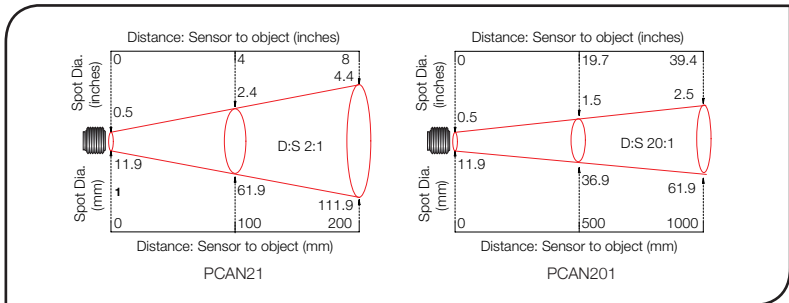
The following options are available. Options are factory installed and must be ordered with the sensor.

Air/water cooled housing                      Certificate of calibration                      Longer cable



## OPTICAL CHART

The optical chart below indicates the nominal target spot diameter at any given distance from the sensing head and assumes 90% energy.



## INSTALLATION

The installation process consists of the following stages:

Preparation

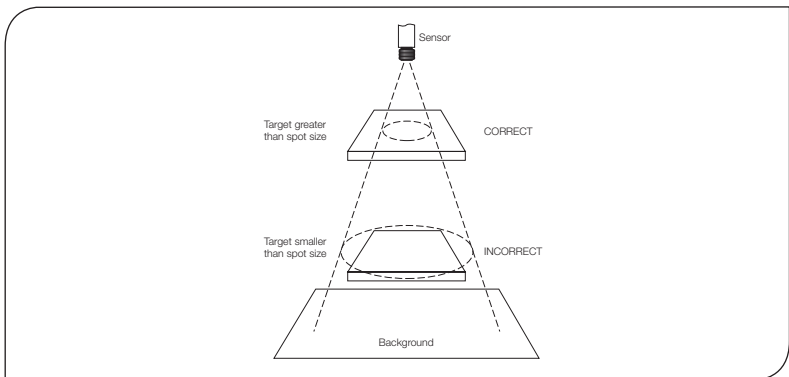
Mechanical installation

Electrical installation

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

## PREPARATION

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



## DISTANCE AND SPOT SIZE

The size of the area (spot size) to be measured determines the distance between the sensor and the target. The spot size must not be larger than the target. The sensor should be mounted so that the measured spot size is smaller than the target.

## 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.

## WIRING

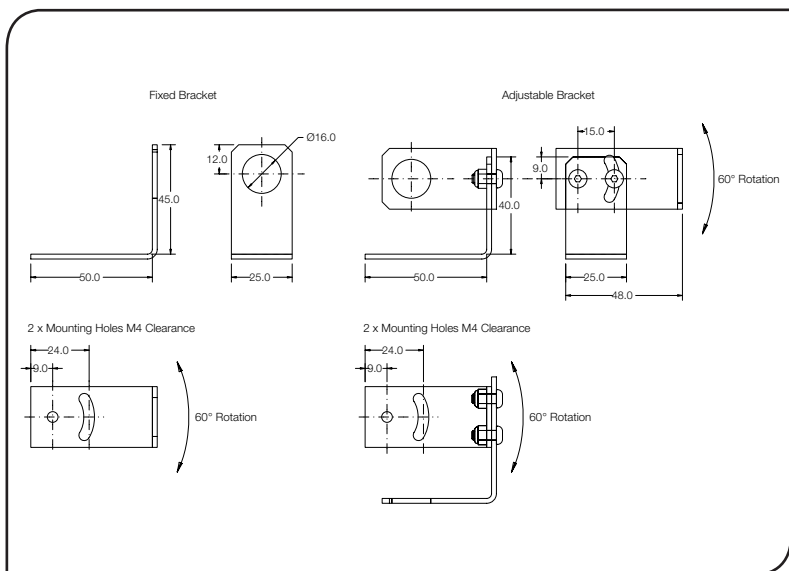
Check the distance between the sensor and the connected instrumentation. If necessary, the sensor can be ordered with a longer cable attached.

## POWER SUPPLY

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

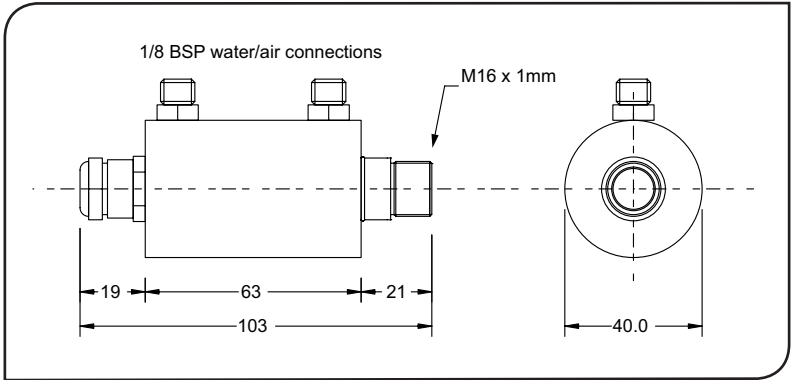
## MECHANICAL INSTALLATION

All sensors come with a 1m cable and a mounting nut. 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 which are shown below. Note: The sensor must be grounded at only one point, either the cable shield or the sensor housing.



### AIR/WATER COOLED HOUSING

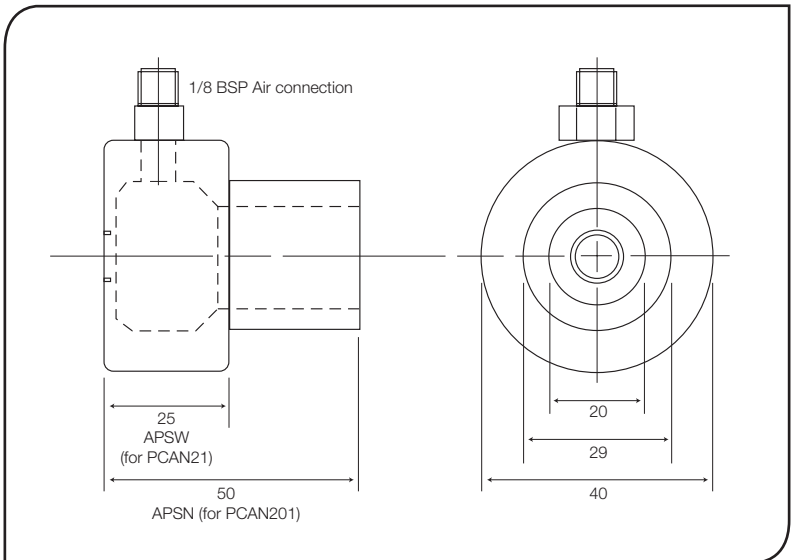
The air/water cooled housing shown below allows the sensor to withstand high ambient temperatures. It is equipped with two 1/8" BSP fittings. Water temperature should be 10°C to 27°C for efficient cooling. Chilled water below 10°C is not recommended. To avoid condensation, the air purge collar should be used with the water-cooled housing. Water flow rate should not be more than 0.5 to 1.5 litres/min.



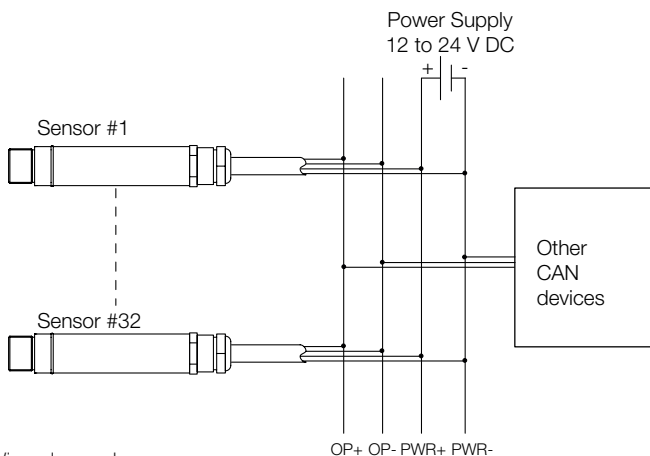
### AIR PURGE COLLAR

The air purge collar below 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 no more than 5 to 15 litres/min.

Clean or 'instrument' air is recommended.



## ELECTRICAL INSTALLATION



Wire colour codes:

Brown	PWR+	+12 to +24 V DC
White	PWR-	0 V
Yellow	OP+	CAN output +
Green	OP-	CAN output -

## PROTOCOL

- The sensor transmits an 8-byte message every 200 ms containing the ambient and object temperatures in °C.
- The first 4-bytes are the object temperature encoded as a floating-point.
- The second 4-bytes are the ambient 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 2048 (0x0 to 0x800) 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:

Bytes	DLC	Object Temperature				Ambient Temperature			
Value	8	DATA0	DATA1	DATA2	DATA3	DATA4	DATA5	DATA6	DATA7
Hex		0x51	0x39	0xB2	0x41	0xA4	0x70	0xDF	0x41
Encoding		0x41B23951				0x41DF70A4			
Decimal		Float				Float			
		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	0.95
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						

### Set CAN ID [0x0D]

Value	13
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: Changing the CAN ID is effective immediately and therefore any following commands must be to the new CAN ID.

## 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 by completing the following simple steps:

1. Turn on the power supply
2. Turn on the CAN instrumentation
3. Read / monitor the temperature

## 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.
- Wire must be connected only to the appropriate terminals.

## 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 over the telephone. If the sensor is not performing as it should, try to match the symptom below to the problem. If the table does not help, call Calex for further advice.

<b>Troubleshooting</b>		
<b>Symptom</b>	<b>Probable Cause</b>	<b>Solution</b>
No output	No power to sensor	Check power supply
Erroneous temperature	Incorrect wire connection	Check wire colour codes
Erroneous temperature	Faulty sensor cable	Verify cable continuity
Erroneous temperature	Field of view obstruction	Remove obstruction

## LENS CLEANING

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

## 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 one year from the date of purchase. This guarantee extends only to the original buyer according to Calex terms and conditions of Sale.

Issue A - March 2017

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### **Calex Electronics Limited**

PO Box 2, Leighton Buzzard, Bedfordshire, England LU7 4AZ

Tel: +44 (0)1525 373178 Fax: +44 (0)1525 851319 Lo-call tel: 0845 3108053

Email: mail@calex.co.uk Online: <http://www.calex.co.uk>