PyroCouple Series

Operator's Guide

PyroCouple non-contact infrared sensors measure temperatures from -20°C to 500°C and provide either a linear 4 to 20 mA output, a voltage output or a thermocouple output. This range of output signals is compatible with almost any indicator, controller, recorder, data logger etc., without the need for special interfacing or signal conditioning. They are suitable for most materials such as food, paper, textiles, plastics, leather, tobacco, pharmaceuticals, chemicals, rubber, coal and asphalt; but not materials with a low emissivity, for example polished metals. Two-wire and four-wire versions are available:

Two-wire PyroCouple sensors transmit the target temperature as a 4-20 mA output and offer a simple solution for most applications.

Four-wire PyroCouple sensors transmit the target temperature as a 0-50 mV or thermocouple output (type J or K) plus the internal sensor temperature as a 4-20 mA output. This second output can be used to ensure that the sensor is being operated within the correct ambient temperature limits and prevent damage caused by overheating or overcooling. It can also be used to give an approximate indication of the air temperature surrounding the sensor.

SPECIFICATION

MODEL NUMBERS (X = Output: see Output Table)

Field of View	-20°C to 100°C	0°C to 250°C	0°C to 500°C
2:1	PC21LT-X	PC21MT-X	PC21HT-X
15:1	PC151LT-X	PC151MT-X	PC151HT-X
30:1	PC301LT-X	PC301MT-X	PC301HT-X
ø5mm @ 100mm	PCCFLT-X	PCCFMT-X	PCCFHT-X

Output Table

Model (-X)	Target Temperature Output	Sensor Temperature Output
-0	4-20 mA (two wire, loop powered)	None
-1	0-50 mV	4-20 mA
-3	Type J thermocouple	4-20 mA
-4	Type K thermocouple	4-20 mA

EXAMPLE MODEL NUMBER:
PC151MT-0: PyroCouple infrared temperature sensor with 15:1 optics, temperature range 0°C to 250°C, two-wire 4-20 mA output

GENERAL SPECIFICATIONS

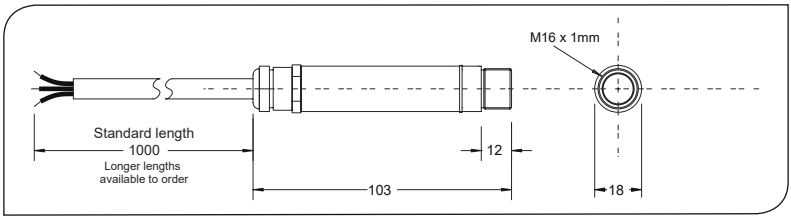
Accuracy	±1% of reading or ±1°C whichever is greater
Repeatability	±0.5% of reading or ±0.5°C whichever is greater
Emissivity	0.95 (fixed)
Response Time	240 ms (90% response)
Spectral Response	8 to 14 µm
Supply Voltage	24 V DC (28 V DC max.)
Sensor Voltage	6 V DC min.
Maximum Loop Impedance	900 ohms (4-20 mA output)
Output Impedance	56 ohms (voltage/thermocouple output)

MECHANICAL SPECIFICATIONS

Construction	Stainless Steel
Dimensions	18 mm diameter x 103 mm
Cable Length	1 m as standard (up to 30 m available on request)
Weight with 1 m Cable	95 g

ENVIRONMENTAL SPECIFICATIONS

Environmental Rating	IP65
Ambient Temperature Range	0°C to 70°C
Relative Humidity	95% maximum 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

OPTIONS

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

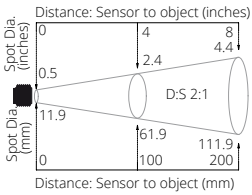
Air/water cooled housing Certificate of calibration Longer cable (30m max.)

OPTICS

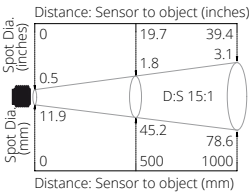
The sensor may be used at longer distances than shown, and will measure a larger spot. The measurement accuracy is not affected by the measurement distance.

There is no maximum measurement distance, provided the air between the sensor and target is free of obstructions.

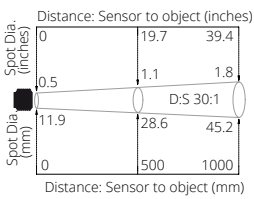
Diagrams show measured spot diameter vs measurement distance for 90% energy.



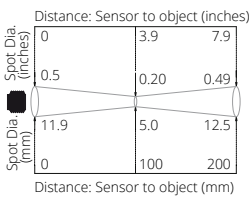
PC21



PC151



PC301



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INSTALLATION

The installation process consists of the following stages:

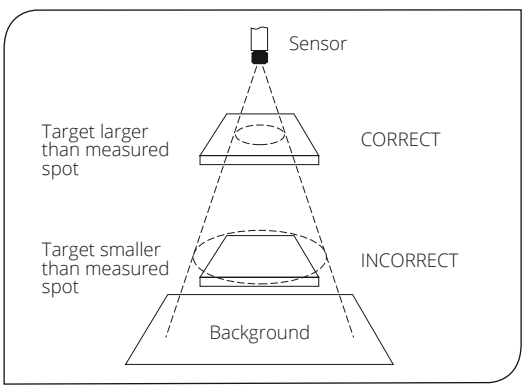
1. Preparation
2. Mechanical installation
3. Electrical installation

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

1. PREPARATION

Mount the sensor at a distance where the measured spot is smaller than the target.

The measurement spot must not be larger than the target.



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 70°C. For ambient temperatures above 70°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 indicating/controlling device. If necessary, the PyroCouple sensor can be ordered with a longer cable attached.

MODELS WITH THERMOCOUPLE OUTPUT

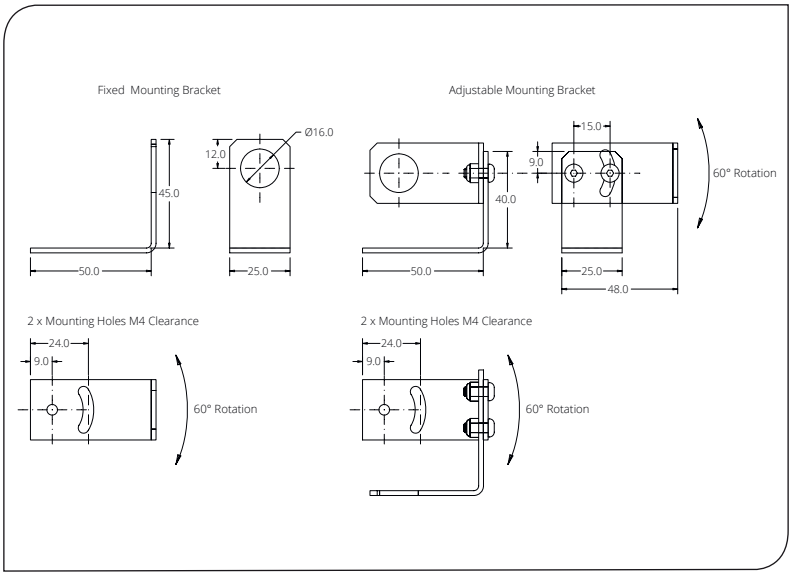
When extending the cable, ensure thermocouple extension cable and connectors are used.

POWER SUPPLY

Be sure to use a 24 V DC (25 mA) power supply.

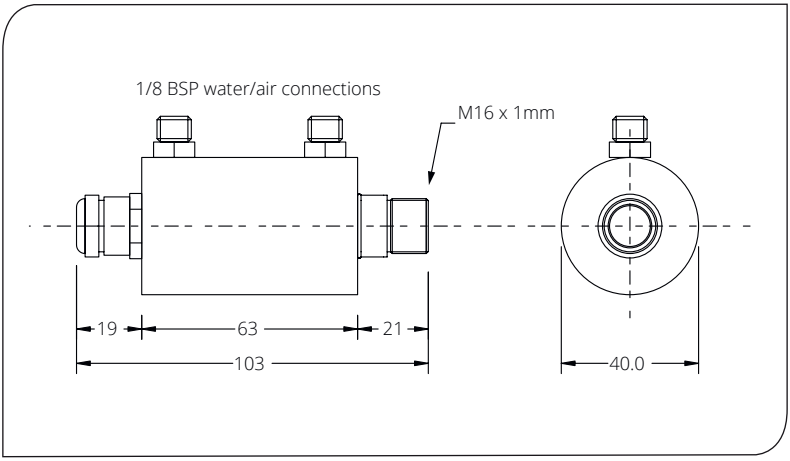
2. MECHANICAL INSTALLATION

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 housing must be connected to earth at one point, either the cable shield termination or the sensor housing.



AIR/WATER COOLED HOUSING

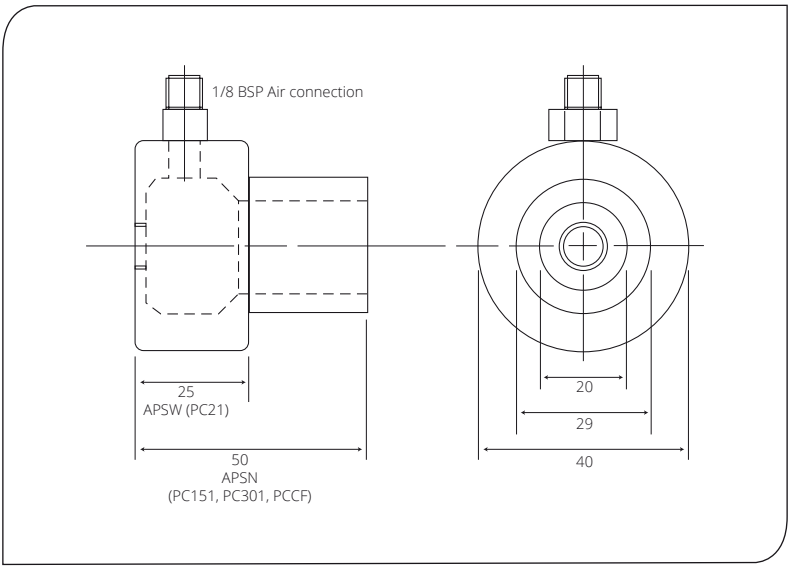
The air/water cooled housing shown below allows the sensor to withstand high ambient temperatures. It is equipped with two 1/8" BSP fittings. Water temperature should be 10°C to 27°C for efficient cooling. Chilled water below 10°C is not recommended. To avoid condensation, the air purge collar should be used with the water-cooled housing. Water flow rate should be no more than 0.5 to 1.5 litres/min.



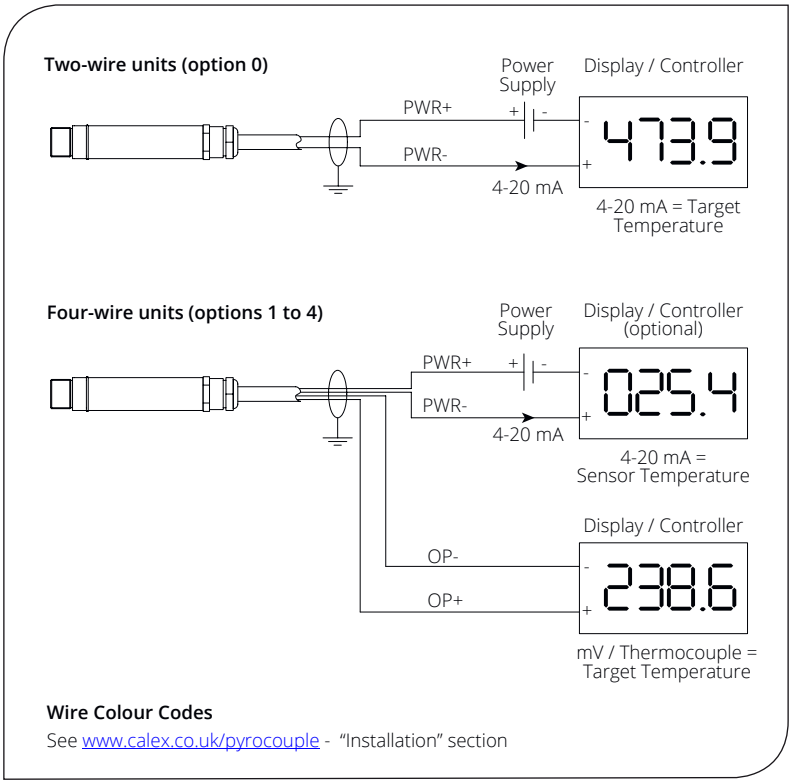
AIR PURGE COLLAR

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.



3. ELECTRICAL INSTALLATION



Wire Colour Codes

See www.calex.co.uk/pyrocouple - "Installation" section

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 meter, chart recorder or controller
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.
- Wires must be connected only to the appropriate terminals.
- Do not damage the cable, as this could provide a path for moisture and vapour into the sensor.
- Do not open the sensor housing. This will damage the sensor and invalidate the warranty.

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.

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
Erroneous temperature (mA or mV outputs)	Output temperature scale mismatch	Re-scale input temperature range on measurement instrument to match sensor
Erroneous temperature (thermocouple output)	No Cold Junction Compensation (CJC) or wrong type of extension cable	Enable CJC on measurement instrument; ensure extension cable and connectors are of the correct thermocouple type

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 two years from the date of purchase. This guarantee extends only to the original buyer according to Calex Terms and Conditions of Sale.