PyroNFC Series

Operator's Guide

CALEX
ELECTRONICS LIMITED

The PyroNFC is a non-contact infrared temperature sensor with Near Field Communication (NFC) capability. It has linear voltage and open collector alarm outputs for connection to industrial process instrumentation.

By touching an NFC-enabled smartphone against the back of the sensor, the user can configure the sensor's settings, and read the measured temperature, via a free app.

SPECIFICATIONS

General	
Temperature Range	0 to 1000°C
Outputs	Model PN151: 0-5 V DC, 1-5 V DC or 0-10 V DC output, linear with measured temperature, configurable and rescalable via NFC Model PN151K: Type K Thermocouple
Field of View	15:1 (see OPTICS)
Accuracy	± 1.5% of reading or ± 1.5°C, whichever is greater
Repeatability	± 0.5% of reading or ± 0.5°C, whichever is greater
Response Time	125 ms
Configuration	Via iOS or Android app using NFC-equipped device (e.g. smartphone or tablet)
Emissivity Setting	Adjustable via app
Emissivity Setting Range	0.2 to 1.0
Max Temperature Span (Linear Output)	1000°C
Min Temperature Span (Linear Output)	100°C
Spectral Range	8-14 µm
Max. Supply Voltage	28 V DC
Min. Supply Voltage (at Sensor)	12 V DC (for 10 V output) 6 V DC (for 5 V output)
Max Current Draw	10 mA
Warm Up Time (PN151K)	Allow 10 seconds after power-on before a reading is observed.

Environmental & Conformity	
Environmental Rating	IP65
Ambient Temperature Range	0°C to 80°C
Relative Humidity	95% max. non-condensing
Electromagnetic Compatibility (EMC)	EN61326-1, EN61326-2-3 (Electrical Equipment for Measurement, Control and Laboratory Use - EMC Requirements - Industrial)
RoHS Compliant	Yes

App	
Configurable Parameters	Temperature range Linear voltage output type and scale Alarm output threshold and hysteresis Emissivity setting Reflected temperature
Temperature Units	°C / °F
Signal Processing	Averaging Period (0.125 to 60 seconds) Peak / Valley Hold Hold Period (0.125 to 120 seconds)
Real Time Temperature Reading	Hold NFC device against sensor for continuous in-app temperature updates

Mechanical	
Construction	Black anodised aluminium and ABS
Cable Length	1 metre standard (longer lengths available to order)
Weight with 1 Metre Cable	65 g

ACCESSORIES

Accessories may be ordered at any time and added on-site. The following accessories are available:
Fixed mounting bracket - Adjustable mounting bracket - Air purge collar

OPTIONS

Options are factory-installed and cannot be retrofitted. The following options are available:
Certificate of Calibration - Extended cable

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.

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.
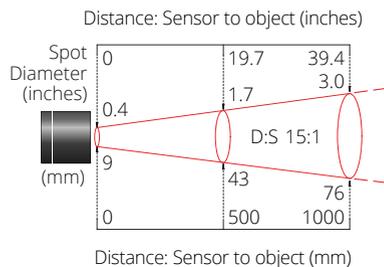
DISTANCE AND SPOT SIZE

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.

Distance: Sensor to object (inches)

Spot Diameter (inches)

D:S 15:1

Distance: Sensor to object (mm)

Sensor

CORRECT — Target larger than measured spot

INCORRECT — Target smaller than measured spot

Background
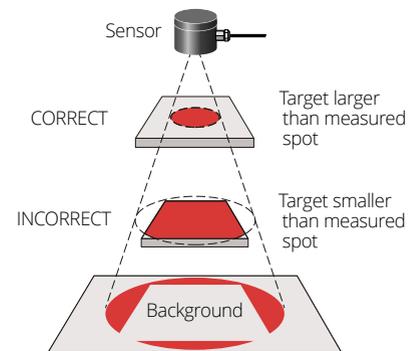
AMBIENT TEMPERATURE

The sensor is designed to operate in ambient temperatures from 0°C to 80°C.

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 measurement instrumentation. If necessary, the sensor can be ordered with a longer cable attached.

POWER SUPPLY

Check the supply voltage is between 6 V DC and 28 V DC.

To use the 0-10 V output, the supply voltage must be at least 12 V DC.

IMPORTANT: Ensure the power supply is only connected to the PWR+ and PWR- wires, and the polarity is correct, before switching the power on.

Do not switch the power off and on again quickly. If the power is switched off, allow 15 seconds before switching it back on.

MECHANICAL INSTALLATION

All sensors come with a 1 metre cable and two mounting screws. 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.

The supplied mounting screws are for use with a panel or bracket at least 2 mm thick. The screws are 8 mm long.

Between the mounting holes, there must be a hole to allow the sensor a clear view through the panel or bracket. This hole must be larger than the lens of the sensor or the aperture of the air purge, if used. Use as large a hole as possible.

Note: The sensor must be grounded at only one point, either the cable shield or the mounting screws, but not both.

MOUNTING BRACKETS

Fixed Mounting Bracket   Adjustable Mounting Bracket

Ø13.5 Clearance
4 x Mounting Holes Ø3.2
49.0
31.0
31.0
33.5
15.0
60°
9.0
49.0
50.0
24.0
9.0
25.0
60°
7.0
22.0
2 x Mounting Holes M4 Clearance
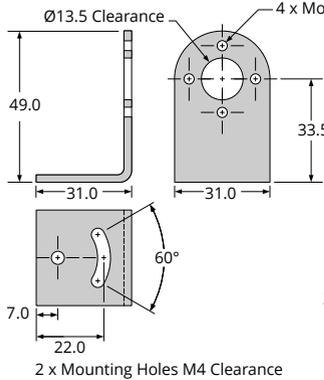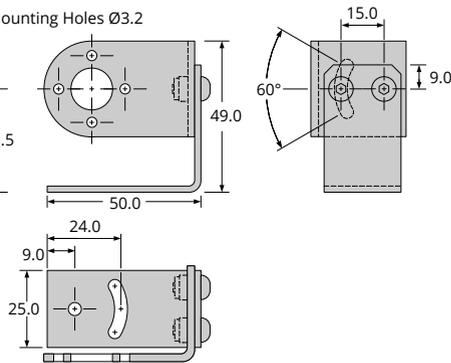
All dimensions in mm

AIR PURGE COLLAR

The air purge collar is used to keep dust, fumes, moisture, and other contaminants away from the lens. It fits between the sensor and the mounting surface. Longer screws are provided for use with a panel or bracket at least 2 mm thick.

Air flows into the hose barb fitting and out of the front aperture. Air flow should be 5 to 15 litres/min.

Clean or 'instrument' air is recommended.

Section A-A
14.0
A
2 x Hole Ø3.2
Ø13.5 AIR OUT
21.5
Ø31.0
THIS FACE AGAINST SENSOR
Air Inlet Hose barb Ø 5 mm
A
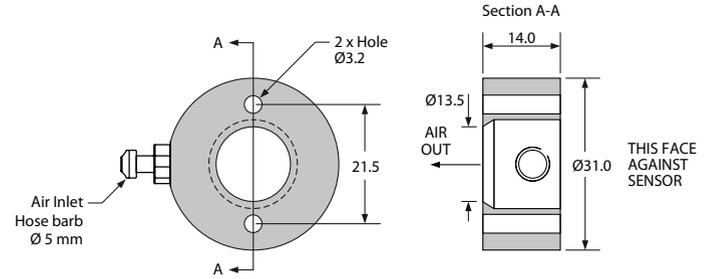
All dimensions in mm

ELECTRICAL INSTALLATION AND DIMENSIONS

PN151 (Voltage Output)

Wire Colours and Tags

Red	PWR+	Power Supply +
Blue	PWR-	Power Supply - (0 V)
Yellow	AL	Open Collector Alarm Output
Green	OP+	Linear Voltage Output +0-5 or +0-10 V DC
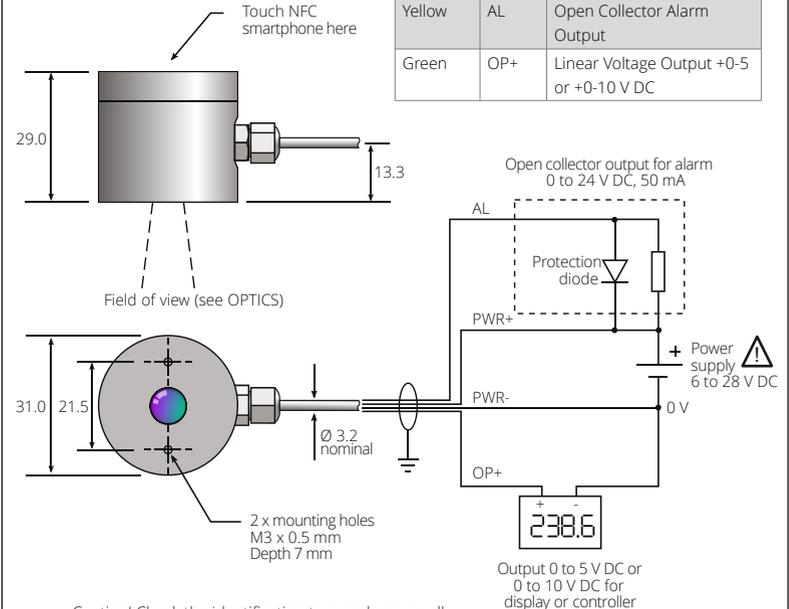
Touch NFC smartphone here

29.0
13.3

Field of view (see OPTICS)

31.0   21.5

Ø 3.2 nominal

2 x mounting holes M3 x 0.5 mm Depth 7 mm

Open collector output for alarm 0 to 24 V DC, 50 mA

AL

Protection diode

PWR+

PWR-

OP+

+ Power supply 6 to 28 V DC

0 V

238.6

Output 0 to 5 V DC or 0 to 10 V DC for display or controller

⚠ Caution! Check the identification tags and ensure all wiring is correct before applying power to the sensor.

All dimensions in mm

PN151-K (Thermocouple Output)

Wire Colours and Tags

Red	PWR+	Power Supply +
Black	PWR-	Power Supply -
Purple	OP-	Type K output -
Green	OP+	Type K output +
Yellow	AL	Alarm output

Open collector output for alarm
0 to 24 V DC, 50 mA

AL

Protection diode

PWR+

Ø 5.5 nominal

PWR-

Power supply 6 to 28 V DC

OP+

238.6

OP-

Type K Thermocouple output for display or controller
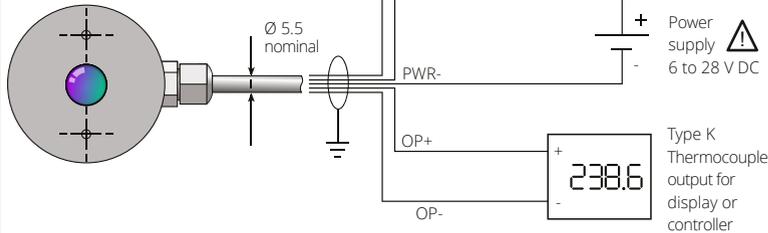
Ensure Cold Junction Compensation is enabled in the display or controller.

⚠ Caution! Check the identification tags and ensure all wiring is correct before applying power to the sensor.

If you extend the Type K output wires, ensure Type K thermocouple cable and connectors are used. Using copper or other metals will affect the accuracy of the measurement.

All dimensions in mm

OPERATION

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

• Turn on the power supply
• Turn on the measurement instrument
• Read / monitor the temperature

CONFIGURATION AND READING TEMPERATURES

The sensor is fully configurable via a smartphone or tablet with NFC capability. Download the free app for Android devices from the Google Play Store, or for iOS devices from the Apple App Store (search "PyroNFC")

Touch the NFC device against the back of the sensor to read the measured temperature. On Android, the reading updates continuously while the phone is touching the sensor. On iOS, the temperature is updated once each time the user taps "update" in the app.

The sensor must be powered to read the measured temperature with the app.

To change settings, edit the configuration parameters in the app, then tap "Write to Sensor". Touch the NFC device against the back of the sensor to write the settings. A message will appear in the app to confirm the settings have been written successfully.

Allow at least 5 seconds for the new settings to take effect. There is no need to power the sensor to read or write the settings.

CONFIGURATION (MODEL PN151K):

The Type K thermocouple output has a temperature range of 0 to 1000°C. This is not rescalable.

The settings in the app for configuring the voltage output type and scale on models with linear voltage output have no effect on PyroNFC-K models with Type K thermocouple output. Select the correct sensor model from the drop-down list in the app to hide these options.

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 mounting screws, but not both.
• When the power is switched off, allow at least 15 seconds before switching the power back on.

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'.

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 (voltage output)	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

DEFAULT SETTINGS

The PyroNFC is fully configurable via an iOS / Android app. No configuration is necessary: the sensor will work straight out of the box using the below default settings.

All settings are adjustable except those marked (fixed).

Setting	Range of Values	Default Value (PN151)	Default Value (PN151K)
Output Voltage*	0-5 V / 1-5 V / 0-10 V	0-10 V	Type K thermocouple (fixed)
Temperature Low*	0°C to 900°C	0°C	0°C (fixed)
Temperature High*	100°C to 1000°C	1000°C	1000°C (fixed)
Alarm Trigger	High / Low / Off	High	High
Alarm Monitor Temperature	Target / Internal	Target	Target
Alarm Set Point	0°C to 1000°C	30°C	30°C
Alarm Hysteresis	0°C to 30°C	1°C	1°C
Alarm Mode	Active High / Active Low	Active High	Active High
Alarm Reset	Auto / Manual	Automatic	Automatic
Emissivity Setting	0.2 to 1.0	0.95	0.95
Reflected Energy Compensation	On/Off	Off	Off
Reflected Temperature	0°C to 1000°C	25°C	25°C
Averaging Period	0.125 s to 60 s	0.125 s	0.125 s
Hold Mode	Peak/Valley/Off	Off	Off
Hold Period	0.125 s to 120 s	250 ms	250 ms

* These settings are not adjustable on model PN151K.

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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