

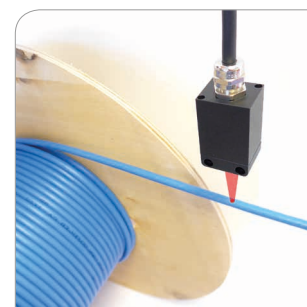
# PyroCube Series

Infrared Temperature Sensors for Special Applications

**CALEX**  
ELECTRONICS LIMITED








- High performance infrared temperature sensors
- Choice of specialised models for demanding applications
- Continuous LED sighting on all models shows position and size of measured spot while readings are being taken
- Current, voltage and alarm outputs
- Digital communications
- Optional touch-screen display with configuration and data logging



## PYROCUBE SENSOR SPECIFICATIONS

| PyroCube Type  | S  |      |      |      |      | F   |       |       |       |  | G   |  |  |  |  |
|--|--|------|------|------|------|---|-------|-------|-------|--|---|--|--|--|--|
| Application  | General purpose  |      |      |      |      | Fast response   |       |       |       |  | Glass   |  |  |  |  |
| Description  |  |      |      |      |      |   |       |       |       |  |   |  |  |  |  |
| Description  | The general-purpose PyroCube S is suitable for measuring most non-reflective non-metals.<br>Advantages over other general-purpose sensors are the built-in LED aiming light, fast response time, and small measured spot size. |      |      |      |      | The PyroCube F has a lightning-fast response time of 0.001 seconds.         |       |       |       |  | Glass-specific measurement wavelength for improved accuracy when measuring glass surface temperature.<br>G models are ideal for annealing, e.g. light bulb and fluorescent lamp manufacturing.<br>GH models are suitable for high-temperature glass melting, such as in glass-to-metal sealing. |  |  |  |  |
| Temperature Range  | 0°C - 500°C  |      |      |      |      | 50°C - 500°C<br>Measurements below 50°C are possible with reduced stability |       |       |       |  | 100°C - 1200°C<br>Measurements below 100°C are possible with reduced stability  |  |  |  |  |
| Analogue output scale (adjustable via optional touch screen module or RS232) | Factory set:<br>4 mA = 0°C<br>20 mA = 500°C  |      |      |      |      | Factory set:<br>4 mA = 50°C<br>20 mA = 1200°C                               |       |       |       |  | Factory set:<br>4 mA = 50°C<br>20 mA = 2400°C   |  |  |  |  |
| Response Time (adjustable up to 5 s via averaging function)                  | 10 ms  |      |      |      |      | 1 ms  |       |       |       |  | 50 ms   |  |  |  |  |
| Accuracy of Measurement †  | ± 3°C or 1%, whichever is greater  |      |      |      |      | ± 3.5°C or 1%, whichever is greater   |       |       |       |  | All models: ± 3°C or 1%, whichever is greater<br>-GH models: ± 2% above 1200°C  |  |  |  |  |
| Repeatability †  | ± 0.5°C  |      |      |      |      | ± 1°C   |       |       |       |  | ± 1°C   |  |  |  |  |
| Temperature Resolution †   | <0.5°C   |      |      |      |      | <0.7°C  |       |       |       |  | 0.5°C   |  |  |  |  |
| Spectral Response  | 2 - 7 µm   |      |      |      |      | 5 µm  |       |       |       |  | 5 µm  |  |  |  |  |
| Model No. PCU-   | S1.6   | S1.6 | S5.5 | F3.5 | F7.0 | G7.0  | G20.0 | GH2.2 | GH4.5 |  |   |  |  |  |  |
| Focal Spot Diameter (mm)   | 1.6  | 3    | 5.5  | 3.5  | 7    | 7   | 20    | 2.2   | 4.5   |  |   |  |  |  |  |
| Focal Distance (mm)  | 35   | 70   | 120  | 100  | 200  | 180   | 500   | 150   | 300   |  |   |  |  |  |  |
| Maximum Measurement Distance (mm)  | 150  | 200  | 300  | 300  | 500  | 500   | 1000  | 300   | 500   |  |   |  |  |  |  |
| Weight (without cable)   | 85g  |      |      |      |      | 85g   |       |       |       |  | 190g  |  |  |  |  |

| PyroCube Type  | P  | XS  |  | M  |   |       |        |
|--|--|---|--|--|---|-------|--------|
| Application  | Thin film plastics   | Very small targets  |  | Metals, low temperature  |   |       |        |
| Description  |   |    |  |   |  |       |        |
|  | Accurately measures the temperature of thin film plastics that cannot be measured with general-purpose sensors. Materials include polyolefins, polyamide, polyethylene, polypropylene, polystyrene, nylon, PVC, acrylic, polyurethane and polycarbonate. | Extremely small measured spot size.<br><br>Applications include measuring individual electronic component temperatures on a circuit board, and plastic welding where the seam is very narrow. |  | Short-wavelength sensors for measuring metals as cool as 50°C, with a very fast response time of 0.001 seconds and a very small measured spot size |   |       |        |
| Temperature Range  | 120°C - 350°C<br>Measurements below 120°C are possible with reduced stability  | 50°C - 500°C<br>Measurements below 50°C are possible with reduced stability   | 100°C - 500°C<br>Measurements below 100°C are possible with reduced stability      | 100°C - 600°C<br>Measurements below 100°C are possible with reduced stability  |   |       |        |
| Analogue output scale (adjustable via optional touch screen module or RS232) | Factory set:<br>4 mA = 80°C<br>20 mA = 350°C   | Factory set:<br>4 mA = 0°C<br>20 mA = 500°C   |  | Factory set:<br>4 mA = 50°C<br>20 mA = 600°C   |   |       |        |
| Response Time (adjustable up to 5 s via averaging function)                  | 10 ms  | 10 ms   | 50 ms  | 1 ms   |   |       |        |
| Accuracy of Measurement †  | ± 4°C  | ± 3°C or 1%, whichever is greater   | ± 5°C  | ± 3°C or 1%, whichever is greater  |   |       |        |
| Repeatability †  | ± 1°C  | ± 1°C   | ± 2°C  | ± (0.2% + 2°C)   |   |       |        |
| Temperature Resolution †   | 0.5°C  | 0.5°C   | 1.5°C  | 0.5°C  |   |       |        |
| Spectral Response  | 3.4 µm   | 5 - 7 µm  |  | 2.2 µm   |   |       |        |
| Model No. PCU-   | P12.0  | XSA0.7  | XSB1.0   | MA1.0  | MA2.0   | MA3.5 | MB11.0 |
| Focal Spot Diameter (mm)   | 12   | 0.7   | 1  | 1  | 2   | 3.5   | 11     |
| Focal Distance (mm)  | 200  | 40  | 100  | 50   | 100   | 200   | 200    |
| Maximum Measurement Distance (mm)  | 500  | 100   | 300  | 100  | 200   | 400   | 500    |
| Weight (without cable)   | 85g  | 200g  | 85g  | 190g   |   |       | 85g    |

## GENERAL SPECIFICATIONS (ALL MODELS)

| Measurement Specifications |   |
|----------------------------|---|
| <b>Emissivity Setting</b>  | Adjustable, 0.3 to 1.0, via RS232C or optional touch screen interface   |
| <b>Averaging</b>           | Adjustable up to 5 seconds  |
| <b>Target Sighting*</b>    | Red LED built-in as standard on all models, shows the position and size of the measurement area. Switchable on/off. |

### \* LED SIGHTING AND ALARMS

#### Sensor Only

These functions are selectable via RS232C and share a common connection, which is configurable either as an input to switch the LED sighting on/off, or an open drain alarm output, but not both at once.

#### Sensor with PM030

These functions may be configured via the PM030 interface. Two alarm relay outputs are provided in place of the open drain output.

| Environmental Specifications         |                              |
|--------------------------------------|------------------------------|
| <b>Environmental rating</b>          | IP67                         |
| <b>Operating ambient temperature</b> | 0°C to 50°C                  |
| <b>Storage temperature</b>           | -15°C to 70°C                |
| <b>Operating ambient humidity</b>    | 30% to 85% RH non condensing |

† Ambient temperature 23 ± 5°C, emissivity 1.0, averaging time 50 ms  
 ‡ Voltage can be 0-1, 0-5, or 0-10 V DC, depending on model (see Model Numbers).

| Electrical Specifications      |  |
|--------------------------------|--|
| <b>Outputs</b>                 | 1 analogue output and 1 alarm output   |
| <b>Analogue Output Type</b>    | 4-20 mA (set by default), 0-20 mA, mV/°C or voltage‡, selectable via optional PM030 touch screen interface |
| <b>Alarm Output*</b>           | 1 open drain alarm output, rated 27 V DC, 0.2 A  |
| <b>Digital Communications</b>  | RS232C Modbus RTU, non-isolated  |
| <b>Output Cable Connection</b> | Hardwired  |
| <b>Supply Voltage</b>          | 5 to 27 V DC, 100 mA max   |

| Analogue Outputs (configurable via touch screen)            |  |
|---|--|
| <b>Output Type</b>  | 0 to 1 V DC<br>mV/°C<br>0 to 20 mA<br>4 to 20 mA |
| <b>Effective Minimum Output</b>                             | 30 mV<br>30 mV<br>0.2 mA<br>4.0 mA               |
| <b>Output Accuracy (additional to Measurement Accuracy)</b> | ±1.5 mV<br>±1.5 mV<br>±0.02 mA<br>±0.02 mA       |



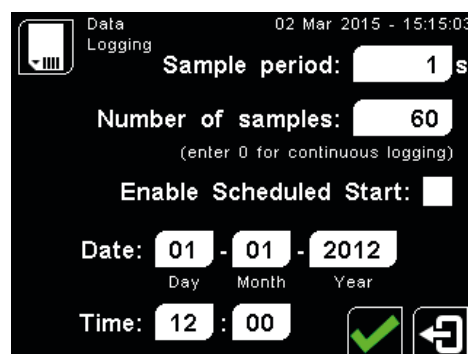
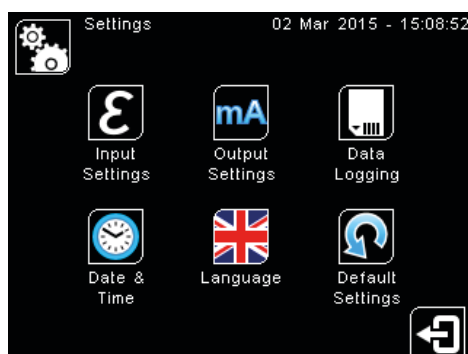
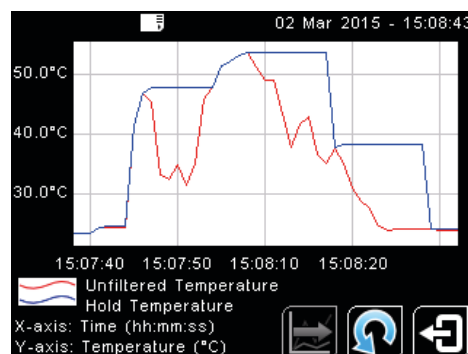
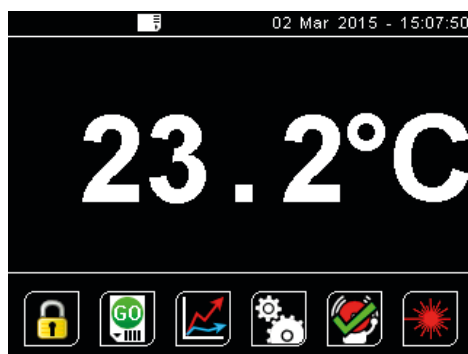
## PM030 - TOUCH SCREEN INTERFACE FOR PYROCUBE (ALL MODELS)

- Optional wall-mounted display, data logging, configuration and alarm unit for PyroCube sensor
- **Read the temperature**  
The large, bright backlit temperature display is visible from a distance and turns red in an alarm condition.
- **Record the temperature history**  
See a graph of the measured temperature, and log more than a year of data to a single MicroSD Card. The data is stored in a simple text format that can be imported easily into Excel.
- **Configure the sensor**  
All the sensor's configuration settings can be adjusted via the intuitive touch screen interface.
- **Trigger temperature alarms**  
Two alarms are individually configurable as high, low, band or error. The screen turns bright red to signal an alarm condition, and the built-in 24 V, 1 A relay outputs can be connected directly to alarm sounders and beacons.
- **Accurate measurements, even with reflections of hot objects**  
Place the sensor outside an oven or furnace and accurately measure the temperature of objects inside by using the Reflected Energy Compensation feature.

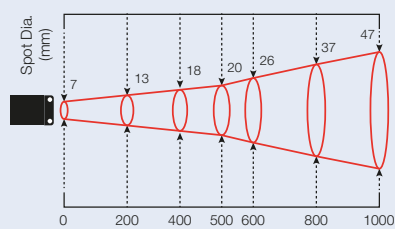
| PM030 Specifications                           |   |
|--|---|
| <b>Inputs</b>                                  | 1 x PyroCube sensor (any model)   |
| <b>Outputs</b>                                 | Retransmitted analogue output from PyroCube sensor, plus 2 relays, rated 24 V DC, 1 A                     |
| <b>Display Format</b>                          | 2.83" (72 mm) resistive touch TFT, 320x240 pixels, backlit  |
| <b>Touch Screen Display Format</b>             | 2.83" (72 mm) resistive touch TFT, 320 x 240 pixels, backlit  |
| <b>Storage</b>                                 | MicroSD Card (optional), max. 32 GB, equal to 16 years of data at the fastest sample rate of 1 per second |
| <b>Data Logging Interval</b>                   | 1 second to 1 day (configurable)  |
| <b>Internal Clock Battery</b>                  | 1 x BR 1225 3V (not included)   |
| <b>Variables Logged</b>                        | Instantaneous target temperature, hold temperature, alarm events  |
| <b>File format</b>                             | .csv  |
| <b>Configurable Parameters (Data Logging)</b>  | Sample period<br>Number of samples<br>Scheduled start   |
| <b>Configurable Parameters (Alarm Logging)</b> | Log times when triggered, acknowledged, reset<br>Log data while triggered                                 |

| Configurable Parameters                             |   |
|---|---|
| Languages   | English, Chinese (simplified), Japanese |
| Temperature units                                   | °C/°F                                   |
| Displayed temperature                               |   |
| LED sighting on/off                                 |   |
| Password  |   |
| Date & time (for data logging time stamps)          |   |
| Peak hold period, decay level                       |   |
| Averaging period                                    |   |
| Correction (gain/offset)                            |   |
| Emissivity setting (with teach function)            |   |
| Reflected energy compensation (with teach function) |   |
| Output type   |   |
| Output temperature range                            |   |
| Polarity on error                                   |   |
| Alarm mode, levels, hysteresis                      |   |

## SCREENSHOTS (PM030 interface)

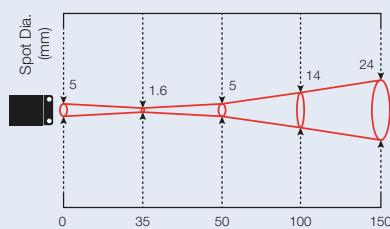


## OPTICS



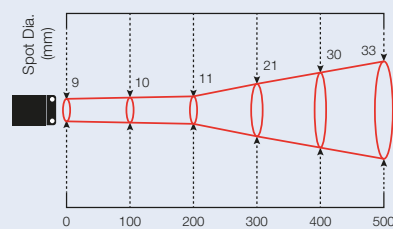
Distance: Sensor to object (mm)

PCU-G20.0



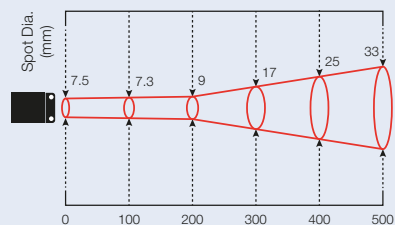
Distance: Sensor to object (mm)

PCU-S1.6



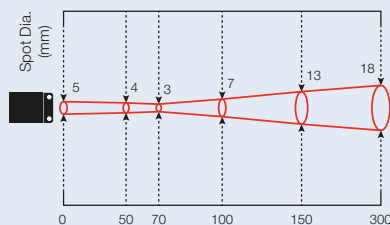
Distance: Sensor to object (mm)

PCU-MB11.0



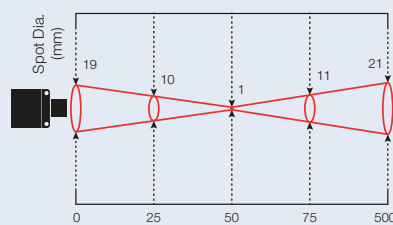
Distance: Sensor to object (mm)

PCU-G7.0



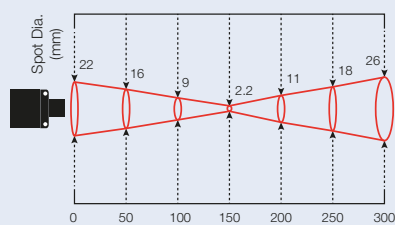
Distance: Sensor to object (mm)

PCU-S3.0



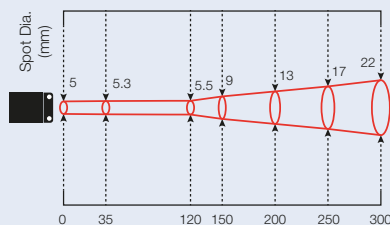
Distance: Sensor to object (mm)

PCU-MA1.0



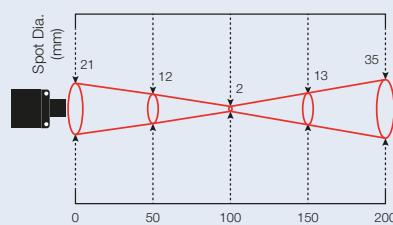
Distance: Sensor to object (mm)

PCU-GH2.2



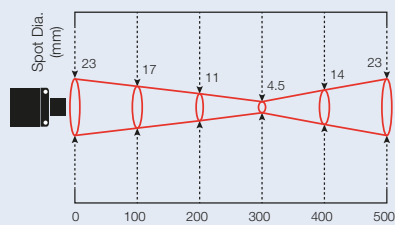
Distance: Sensor to object (mm)

PCU-S5.5



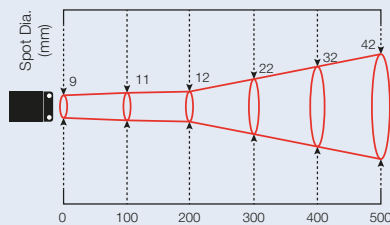
Distance: Sensor to object (mm)

PCU-MA2.0



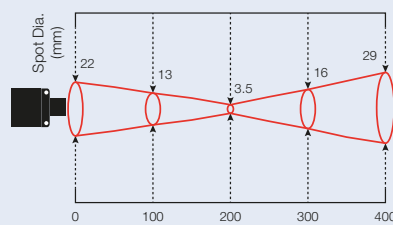
Distance: Sensor to object (mm)

PCU-GH4.5



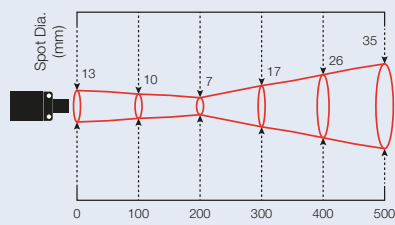
Distance: Sensor to object (mm)

PCU-P12.0



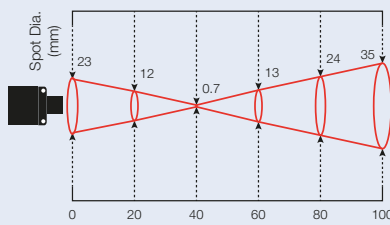
Distance: Sensor to object (mm)

PCU-MA3.5



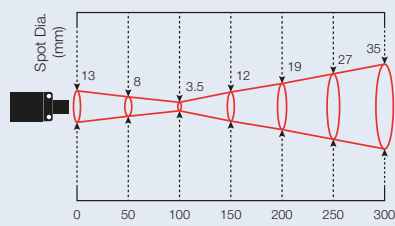
Distance: Sensor to object (mm)

PCU-F7.0



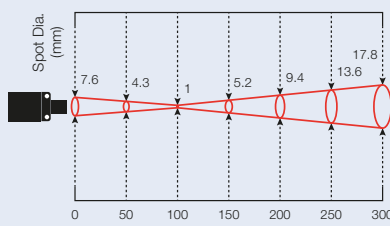
Distance: Sensor to object (mm)

PCU-XSA0.7



Distance: Sensor to object (mm)

PCU-F3.5



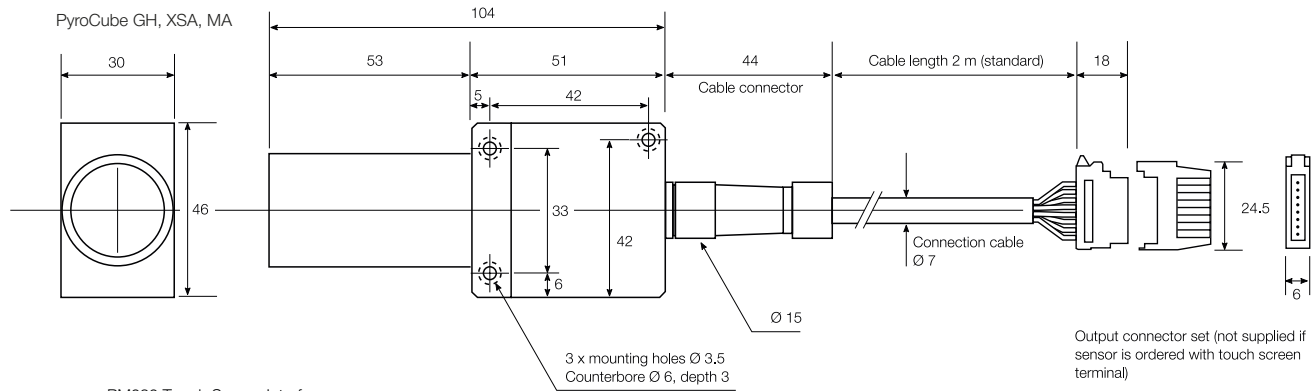
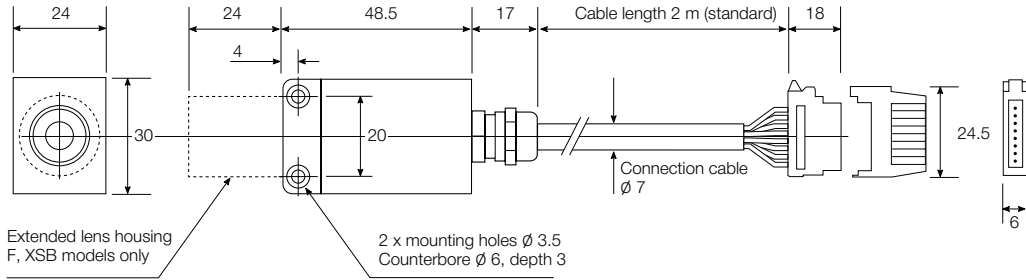
Distance: Sensor to object (mm)

PCU-XSB1.0

PyroCube accuracy specifications are valid up to the maximum distances shown.

## DIMENSIONS

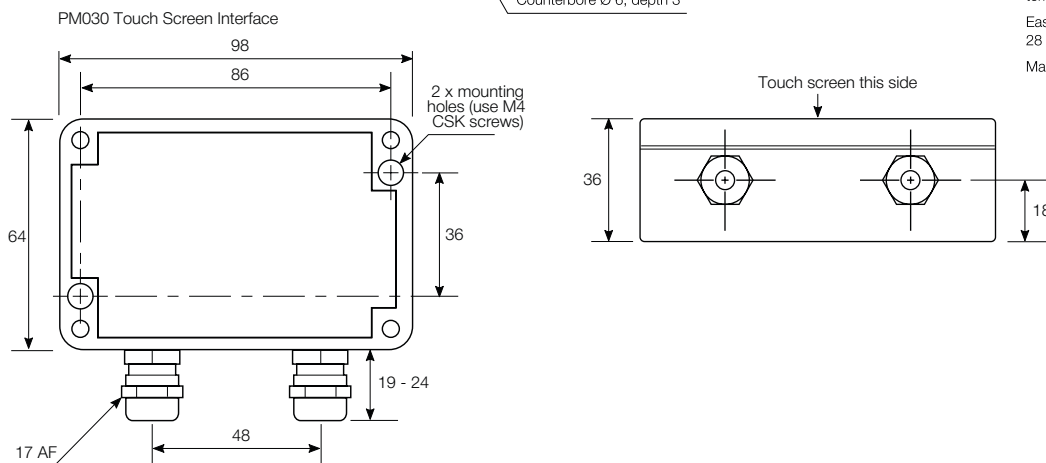
PyroCube Sensor  
S, F, G, P, XSB, MB models



Output connector set (not supplied if sensor is ordered with touch screen terminal)

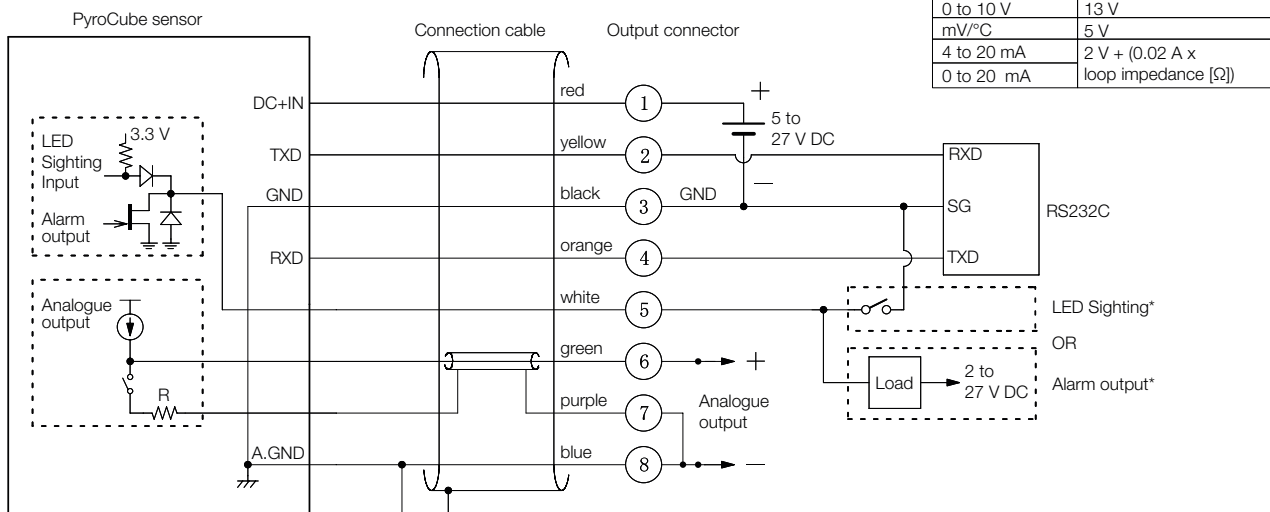
Easy-wire connectors for wire sizes  
28 to 20 AWG (0.08 to 0.5 mm<sup>2</sup>)

Max sheath Ø 1.5 mm



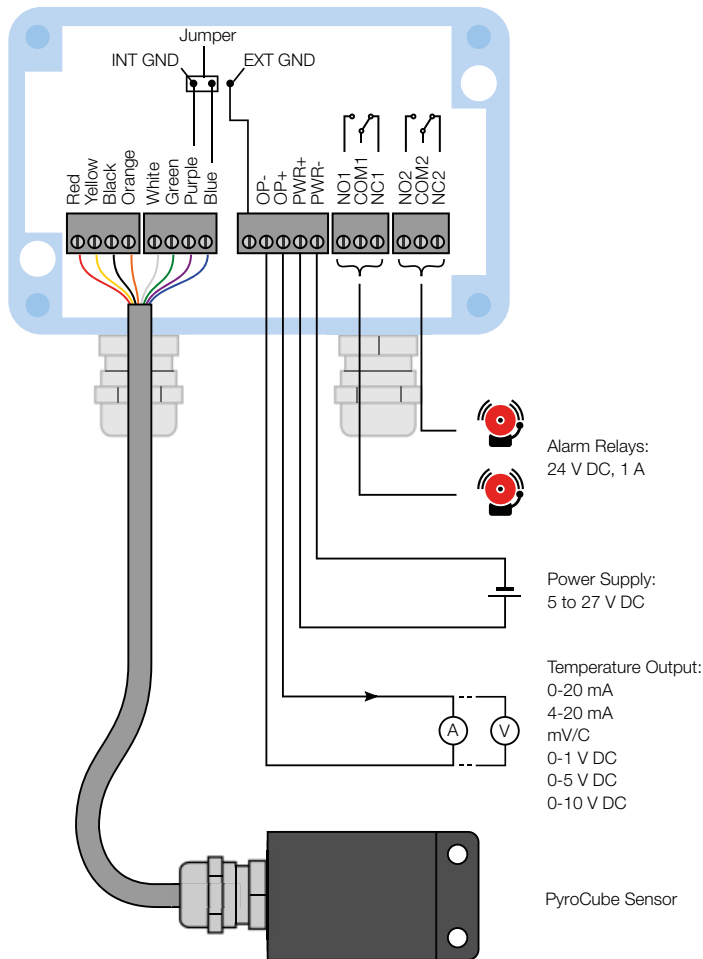
All dimensions in mm

## PYROCUBE CONNECTIONS - SENSOR ONLY

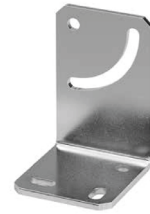


\* See LED SIGHTING AND ALARMS (with Specifications)

## PM030 CONNECTIONS



## ACCESSORIES



Mounting bracket



Protective lens cover



Air purge collar



Airless dust protector



Right angled mirror



Water Cooling Jacket



5 m extension cable with connectors



Panel Mounting Kit

## MODEL NUMBERS



PyroCube S, G, P, MB



PyroCube F, XSB



PyroCube GH, XSA, MA



PCU - S1.6 - 2M - 1V

Series  
PCU = PyroCube  
sensor

### Voltage output option

1V = 0 to 1 V DC  
5V = 0 to 5 V DC  
10V = 0 to 10 V DC  
Note: All models also have 0-20 mA, 4-20 mA, and mV/°C outputs as standard.

### Cable length

2M = 2 metres  
5M = 5 metres  
10M = 10 metres

### Response time and optics

S1.6 = 10 ms response, 1.6 mm spot at 35 mm distance  
S3.0 = 10 ms response, 3.0 mm spot at 70 mm distance  
S5.5 = 10 ms response, 5.5 mm spot at 120 mm distance  
F3.5 = 1 ms response, 3.5 mm spot at 100 mm distance  
F7.0 = 1 ms response, 7.0 mm spot at 200 mm distance

### Application and Optics

#### General Purpose

S1.6 = 1.6 mm measured spot diameter at 35 mm distance  
S3.0 = 3 mm measured spot diameter at 70 mm distance  
S5.5 = 5.5 mm measured spot diameter at 120 mm distance

#### Fast Response

F3.5 = 3.5 mm measured spot diameter at 100 mm distance  
F7.0 = 7 mm measured spot diameter at 200 mm distance

#### Glass

G7.0 = 7 mm measured spot diameter at 180 mm distance  
G20.0 = 20 mm measured spot diameter at 500 mm distance  
GH2.2 = 2.2 mm measured spot diameter at 150 mm distance  
GH4.5 = 4.5 mm measured spot diameter at 300 mm distance

#### Thin Film Plastics

P12.0 = 12 mm measured spot diameter at 200 mm distance  
Very Small Measured Spot  
XSA0.7 = 0.7 mm measured spot diameter at 40 mm distance  
XSB1.0 = 1 mm measured spot diameter at 100 mm distance

#### Metals

MA1.0 = 1 mm measured spot diameter at 50 mm distance  
MA2.0 = 2 mm measured spot diameter at 100 mm distance  
MA3.5 = 3.5 mm measured spot diameter at 200 mm distance  
MB11.0 = 11 mm measured spot diameter at 200 mm distance

PM030

Touch screen  
interface module  
for PyroCube  
sensor (any model)