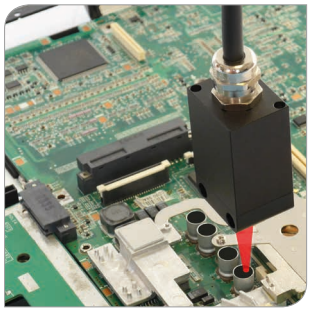
PyroCube Series

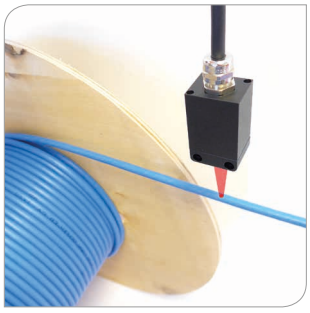
Infrared Temperature Sensors for Special Applications

CALEX ELECTRONICS LIMITED

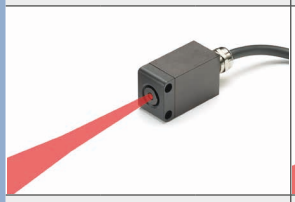
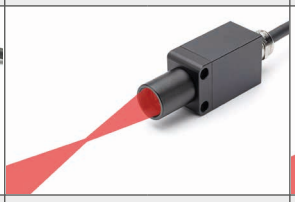
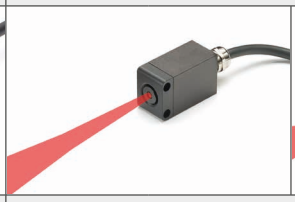
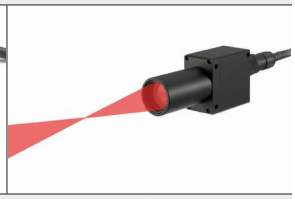
PyroCube sensor with optional touch screen interface

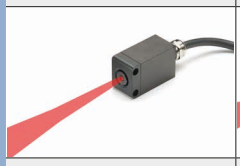
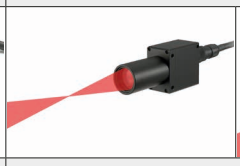
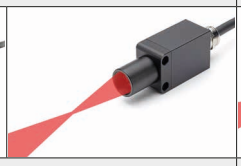
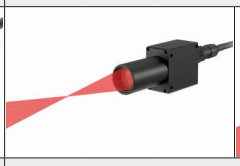
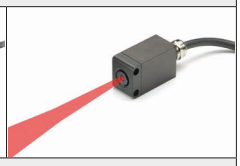
- High performance infrared temperature sensors
- Choice of specialised models for demanding applications
- Continuous LED sighting on all models shows position and size of measured spot while readings are being taken
- Current, voltage and alarm outputs
- Digital communications
- Optional touch-screen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





PYROCUBE SENSOR SPECIFICATIONS

PyroCube Type	S			F		G			
Application	General purpose			Fast response		Glass			
									
Description	The general-purpose PyroCube S is suitable for measuring most non-reflective non-metals. 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. G models are ideal for annealing, e.g. light bulb and fluorescent lamp manufacturing. 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 Measurements below 50°C are possible with reduced stability		100°C - 1200°C Measurements below 100°C are possible with reduced stability		100°C - 2400°C Measurements below 100°C are possible with reduced stability	
Analogue output scale (adjustable via optional touch screen module or RS232)	Factory set: 4 mA = 0°C 20 mA = 500°C					Factory set: 4 mA = 50°C 20 mA = 1200°C		Factory set: 4 mA = 50°C 20 mA = 2400°C	
Response Time (adjustable up to 5 s via averaging function)	10 ms			1 ms		50 ms		10 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 -GH models: ± 2% above 1200°C			
Repeatability †	± 0.5°C			± 1°C		± 1°C		± 0.2% + 2°C	
Temperature Resolution †	<0.5°C			<0.7°C		0.5°C			
Spectral Response	2 - 7 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. 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 Measurements below 120°C are possible with reduced stability	50°C - 500°C Measurements below 50°C are possible with reduced stability	100°C - 500°C Measurements below 100°C are possible with reduced stability	100°C - 600°C Measurements below 100°C are possible with reduced stability			
Analogue output scale (adjustable via optional touch screen module or RS232)	Factory set: 4 mA = 80°C 20 mA = 350°C	Factory set: 4 mA = 0°C 20 mA = 500°C		Factory set: 4 mA = 50°C 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	
Emissivity Setting	Adjustable, 0.3 to 1.0, via RS232C or optional touch screen interface
Averaging	Adjustable up to 5 seconds
Target Sighting*	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	
Environmental rating	IP67
Operating ambient temperature	0°C to 50°C
Storage temperature	-15°C to 70°C
Operating ambient humidity	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	
Outputs	1 analogue output and 1 alarm output
Analogue Output Type	4-20 mA (set by default), 0-20 mA, mV/°C or voltage‡, selectable via optional PM030 touch screen interface
Alarm Output*	1 open drain alarm output, rated 27 V DC, 0.2 A
Digital Communications	RS232C Modbus RTU, non-isolated
Output Cable Connection	Hardwired
Supply Voltage	5 to 27 V DC, 100 mA max

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

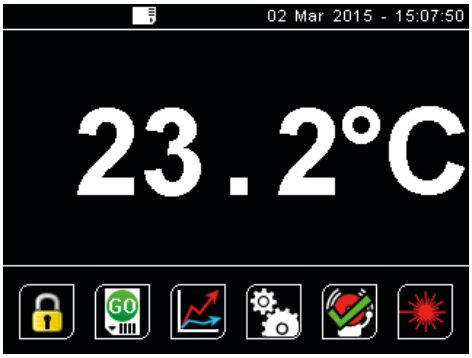
PM030 - TOUCH SCREEN INTERFACE FOR PYROCUBE (ALL MODELS)

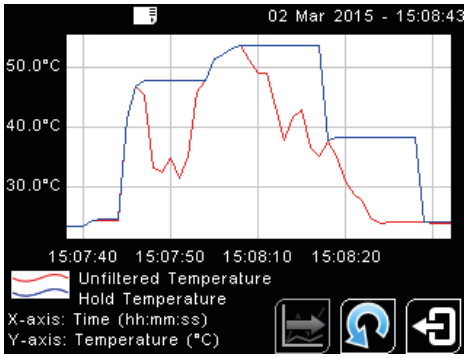
- Optional wall-mounted display, data logging, configuration and alarm unit for PyroCube sensor
- **Read the temperature**
  The large, bright backlit temperature display is visible from a distance and turns red in an alarm condition.
- **Record the temperature history**
  See a graph of the measured 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.

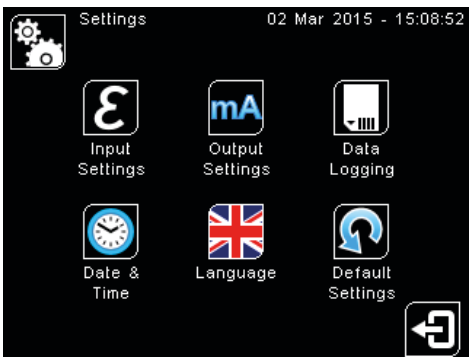
PM030 Specifications	
Inputs	1 x PyroCube sensor (any model)
Outputs	Retransmitted analogue output from PyroCube sensor, plus 2 relays, rated 24 V DC, 1 A
Display Format	2.83" (72 mm) resistive touch TFT, 320x240 pixels, backlit
Touch Screen Display Format	2.83" (72 mm) resistive touch TFT, 320 x 240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

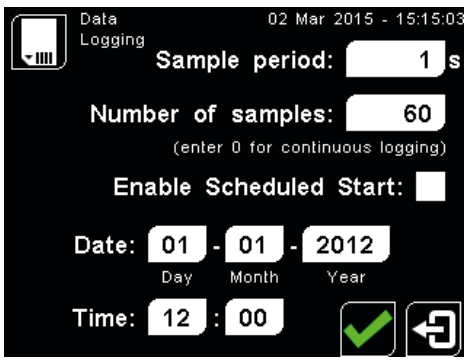
Configurable Parameters
Languages English, Chinese (simplified), Japanese
Temperature units °C/°F
Displayed temperature
LED sighting on/off
Password
Date & time (for data logging time stamps)
Peak hold period, decay level
Averaging period
Correction (gain/offset)
Emissivity setting (with teach function)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

SCREENSHOTS (PM030 interface)

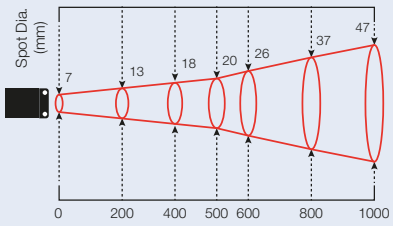






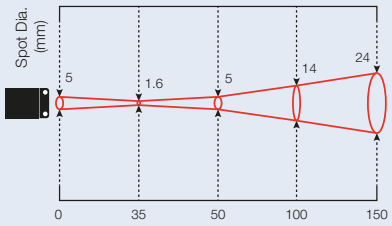


OPTICS



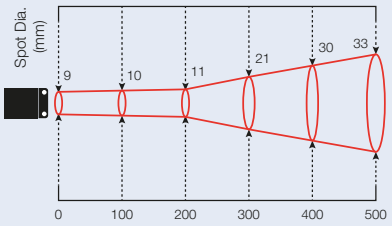
Distance: Sensor to object (mm)

PCU-G20.0



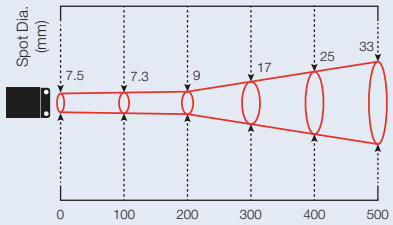
Distance: Sensor to object (mm)

PCU-S1.6



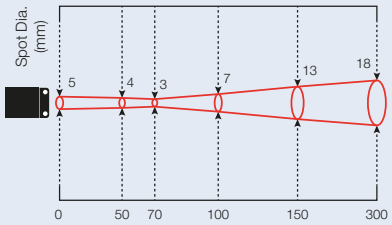
Distance: Sensor to object (mm)

PCU-MB11.0



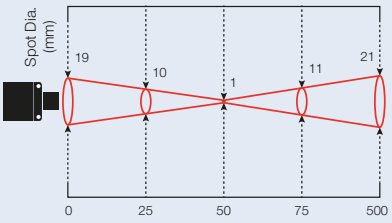
Distance: Sensor to object (mm)

PCU-G7.0



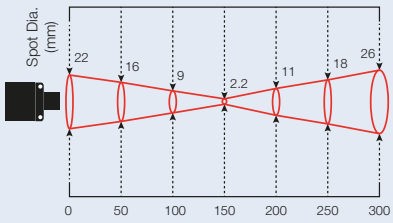
Distance: Sensor to object (mm)

PCU-S3.0



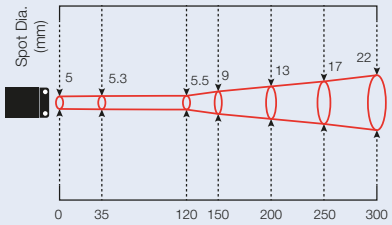
Distance: Sensor to object (mm)

PCU-MA1.0



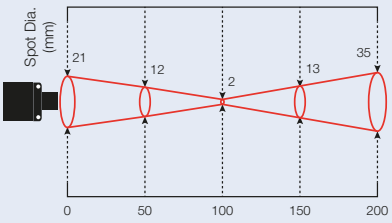
Distance: Sensor to object (mm)

PCU-GH.2.2



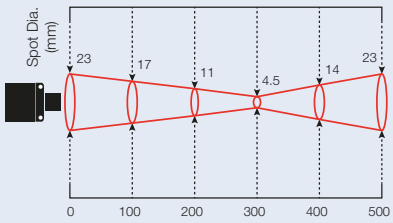
Distance: Sensor to object (mm)

PCU-S5.5



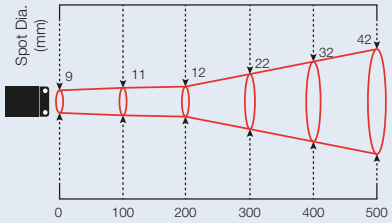
Distance: Sensor to object (mm)

PCU-MA2.0



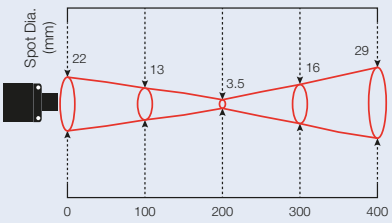
Distance: Sensor to object (mm)

PCU-GH4.5



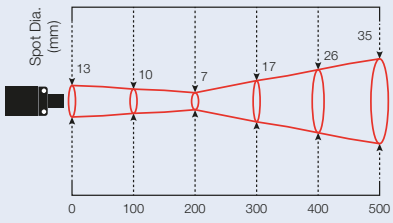
Distance: Sensor to object (mm)

PCU-P12.0



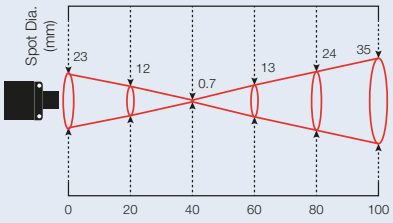
Distance: Sensor to object (mm)

PCU-MA3.5



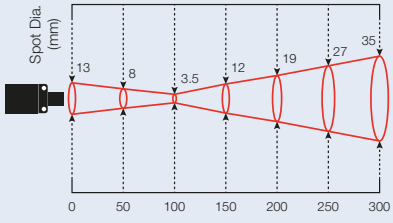
Distance: Sensor to object (mm)

PCU-F7.0



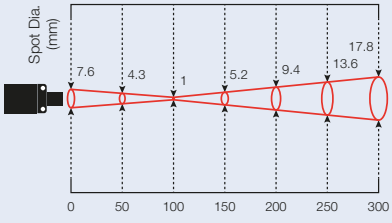
Distance: Sensor to object (mm)

PCU-XSA0.7



Distance: Sensor to object (mm)

PCU-F3.5



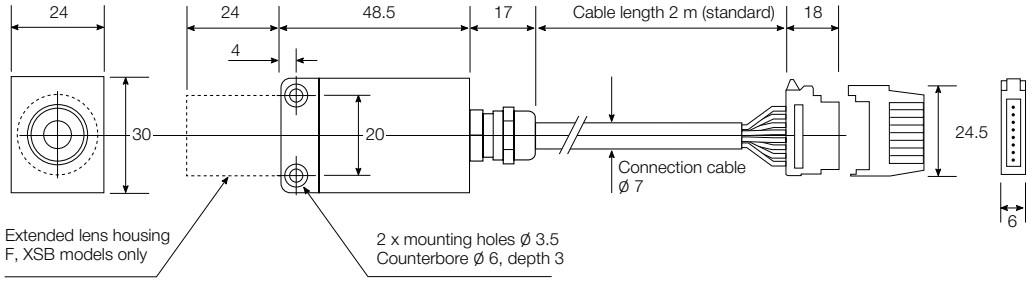
Distance: Sensor to object (mm)

PCU-XSB1.0

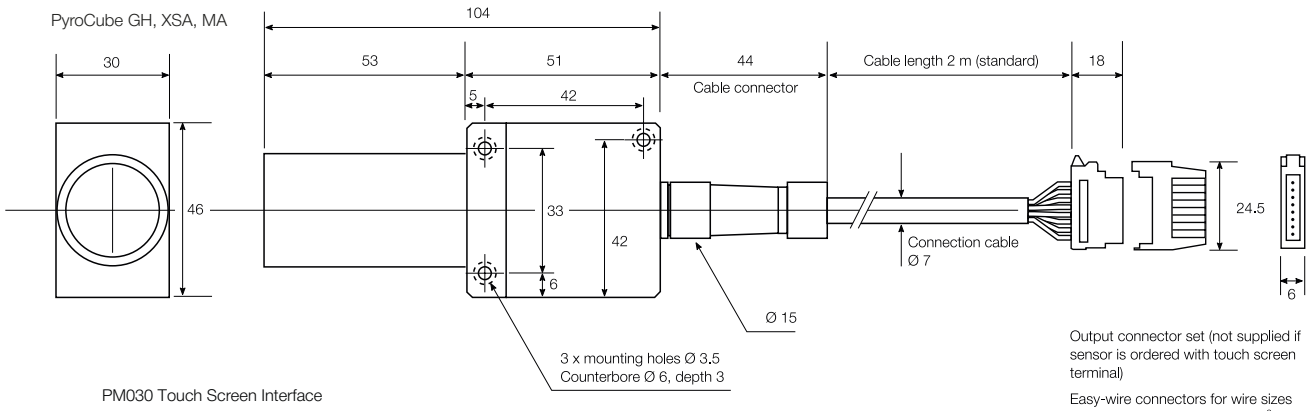
PyroCube accuracy specifications are valid up to the maximum distances shown.

DIMENSIONS

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



PyroCube GH, XSA, MA

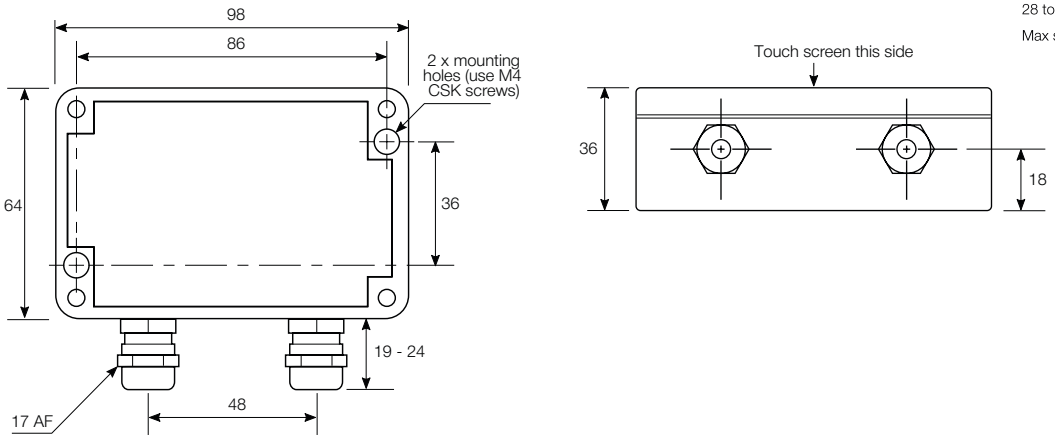


Output connector set (not supplied if sensor is ordered with touch screen terminal)

Easy-wire connectors for wire sizes 28 to 20 AWG (0.08 to 0.5 mm²)

Max sheath Ø 1.5 mm

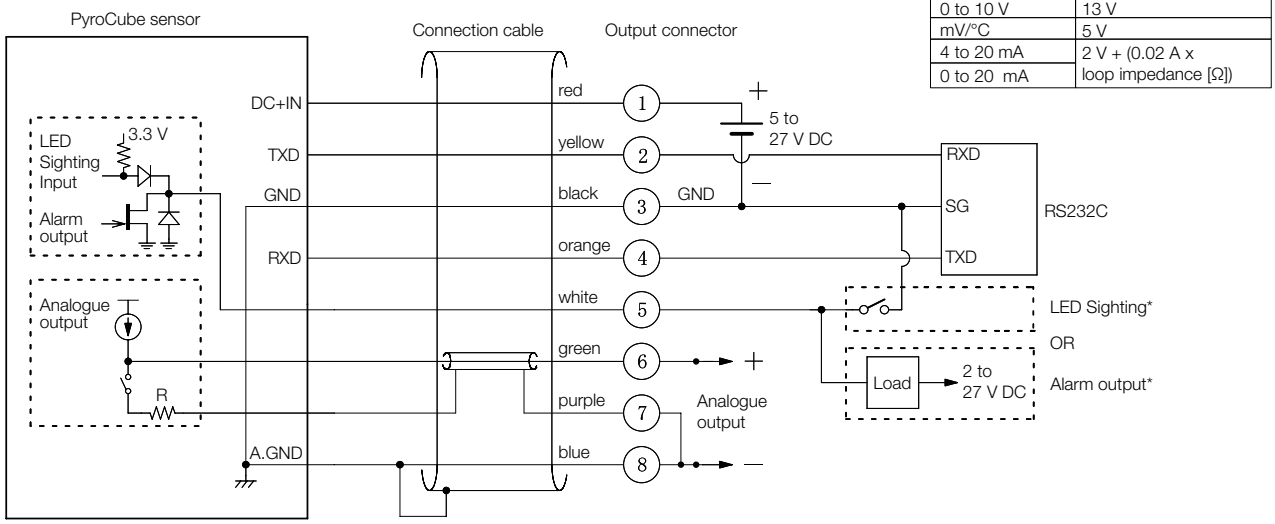
PM030 Touch Screen Interface



All dimensions in mm

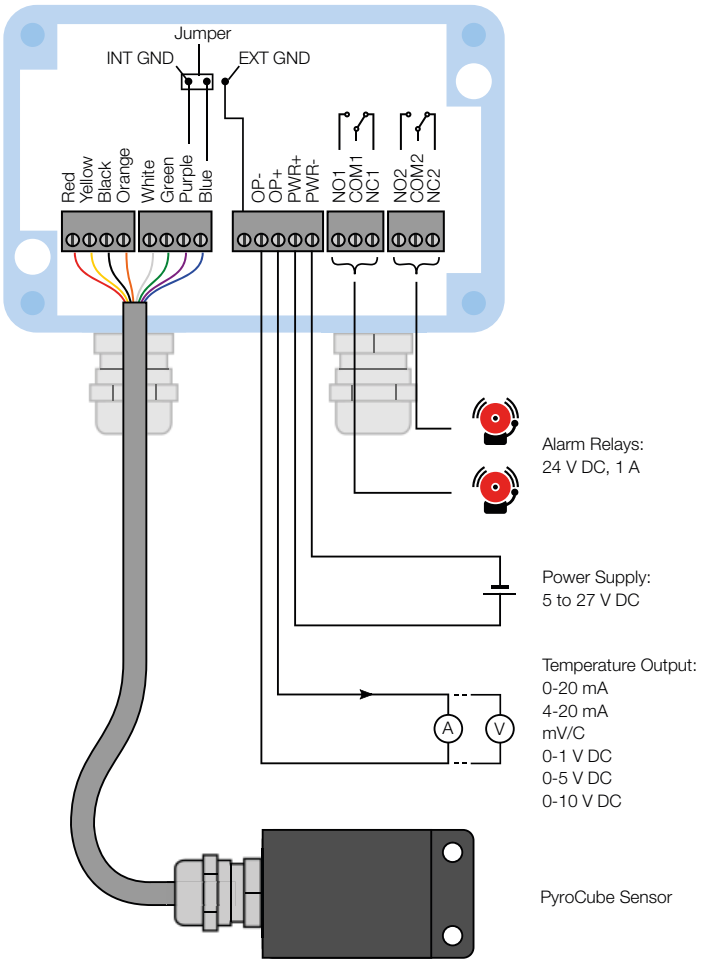
PYROCUBE CONNECTIONS - SENSOR ONLY

Analogue output	Minimum supply voltage
0 to 1 V	5 V
0 to 5 V	8 V
0 to 10 V	13 V
mV/°C	5 V
4 to 20 mA	2 V + (0.02 A x loop impedance [Ω])
0 to 20 mA	

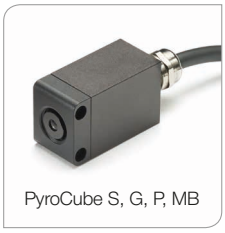


* See LED SIGHTING AND ALARMS (with Specifications)

PM030 CONNECTIONS



MODEL NUMBERS



PyroCube S, G, P, MB

PyroCube F, XSB

PyroCube GH, XSA, MA

PCU - S1.6 - 2M - 1V

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

Series
PCU = PyroCube sensor

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)

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