

# SP-005

## Thermocouple and RTD Temperature Smart Probe



- 2x Thermocouple
- 1x RTD (2, 3, 4-wire)
- Software configurable through SYNC configuration software
- 2x Digital I/O
- Modular M12 construction
- OMEGA Smart Core enabled
  - Data Logging
  - Integrated Alarm and Control
  - Plug and Play Device Detection
  - Sensor health monitoring



The Layer N SP-005 Thermocouple and RTD Smart Probe provides an easy way to integrate your thermocouple and RTD probes to the Layer N Ecosystem. The SP-005 accepts standard M12 thermocouples and RTDs through its M12 4-pin connector and Layer N Smart Interfaces through its M12 8-pin connector. The optional M12-S-M-FM connector can be utilized to easily connect wire leads typically found on thermocouples or RTD probes to your SP-005.

### Edge Control and Built in I/O

The Layer N SP-005 features 2 configurable digital I/O pins. These can be used for a myriad of applications including driving relays, physical alarms, or sensing dry contacts like door switches. The SP-005 can also be utilized as an edge controller, with autonomous independent decision-making capabilities to generate local alarms or provide control outputs based on sensor inputs.

### Smart Core Enabled

Smart core is integral to all Layer N Smart Probes. This powerful suite of advanced features enable plug and play connectivity, alarms and notifications, data assurance, data logging, and storage.

### Smart Interface Modularity

Customize your Layer N Ecosystem with modular Smart Interfaces that connect and transmit data from your Smart Probe to the Layer N Cloud.

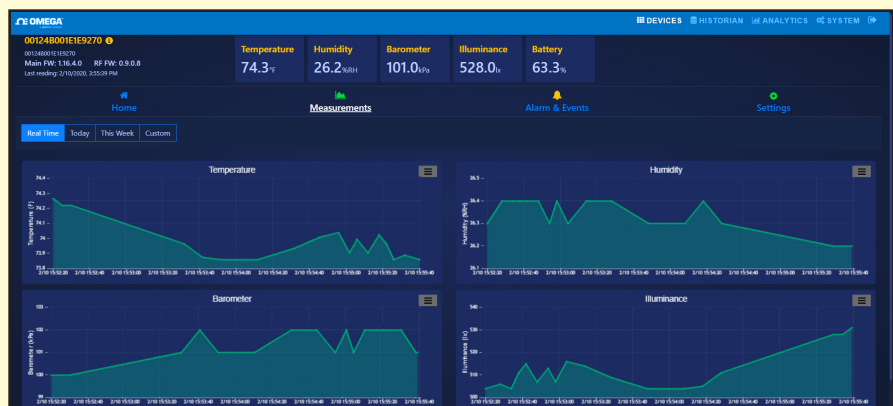
The SP-005 supports up to 2 thermocouple inputs or a single 2, 3, or 4-wire RTD input.

### Intuitive Configuration

Configure your Layer N Smart Probe using SYNC's intuitive configuration interface.

### Your Data at a Glance with Layer N Cloud

Layer N Cloud consolidates and brings your data to you when you need it, wherever you are. The intuitive cloud interface allows you to monitor and store your data, set alarms and alerts, and provides insights on device activity. Visit the OMEGA website for more details.



## Specifications

### INPUT POWER

**Voltage:** 2.8 V<sub>DC</sub> - 3.3 V<sub>DC</sub>

### DIO DIGITAL INPUTS

$V_{inHighThreshold} = 2.2 V_{MAX}$

$V_{inLowThreshold} = 0.3 V_{MIN}$

$V_{inMAX} = 30 V_{DC}$

### DIO DIGITAL OUTPUTS

2x Open Drain 100 mA max

$V_{MAX} = 30 V_{DC}$

### ENVIRONMENTAL

**Operating Temperature:** -40 to 85°C (-40 to 185°F)

**Rating:** IP67 when mated

### MECHANICAL

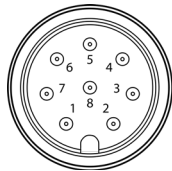
**Dimensions:** 22.1 mm W x 96.7 mm L (0.87" x 3.80") not including mounting tabs

### GENERAL

**Agency Approvals:** CE, EMC 2014/30/EU, LVD 2014/35/EU

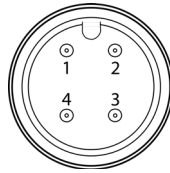
**Compatibility:** Compatible with OEG, SYNC configuration software, Layer N Cloud, and Modbus Networks

## M12 8-Pin Wiring



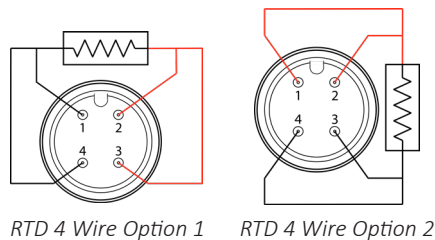
Pin	Name	Function
Pin 1	DIO 0	Discrete I/O Signal 0
Pin 2	INTR	Interrupt Signal
Pin 3	SCL	I2C Clock Signal
Pin 4	SDA	I2C Data Signal
Pin 5	Shield	Shield Ground
Pin 6	DIO 1	Discrete I/O Signal 1
Pin 7	GND	Power Ground
Pin 8	3.3VDD	Power Supply

## Thermocouple Wiring



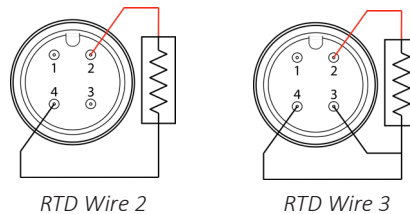
Pin	Thermocouple
Pin 1	TC 2 Negative
Pin 2	TC 1 Positive
Pin 3	TC 1 Negative
Pin 4	TC 2 Positive

## RTD Wiring



RTD 4 Wire Option 1

RTD 4 Wire Option 2



RTD Wire 2

RTD Wire 3

## Thermocouple Types

Type	Range	Accuracy
J	-210°C to 1200°C	0.4°C
K	-160°C to 1372°C	0.4°C
T	-190°C to 400°C	0.4°C
E	-200°C to 1000°C	0.4°C
N	-100°C to 1300°C	0.4°C
R	40°C to 1788°C	0.5°C
S	100°C to 1768°C	0.5°C
B	640°C to 1820°C	0.5°C
C	0°C to 2320°C	0.4°C

## RTD Types

Type	Range	Accuracy
385, 4 Wire	-200°C to 850°C	0.3°C
385, 3 Wire	-200°C to 850°C	0.3°C
385, 2 Wire	-200°C to 850°C	0.6°C
392, 4 Wire	-200°C to 660°C	0.3°C
392, 3 Wire	-200°C to 660°C	0.3°C
392, 2 Wire	-200°C to 660°C	0.6°C

## Layer N SP-005

Model Number	Description
SP-005-1	Thermocouple and RTD Temperature Smart Probe with discrete I/O

## Layer N Smart Interface

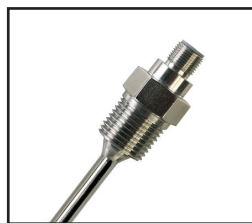
Layer N Smart Probes require a Layer N Smart Interface to operate and connect to your Layer N Ecosystem. There are both wired and wireless options.

Model Number	Description
IF-001	USB Smart Interface
IF-002	RS485/Modbus Smart Interface

## Accessories

An optional M12 4-pin screw terminal adapter is available for users who wish to connect wire leads directly to the SP-005.

Model Number	Description
M12-S-M-FM	M12 4-pin screw terminal adapter
M12.8-T-SPLIT	Smart Probe M12-8 pin shielded T-Splitter - enables access to I/O pins
M12.8-S-M-FM	M12-8 pin Straight Plug Field install connector with screw terminals
DM12CAB-8-1-RA	1m (3.3') cable dual M12-8 connector, right angle terminator
DM12CAB-8-3-RA	3m (9.8') cable dual M12-8 connector, right angle terminator
DM12CAB-8-5-RA	5m (16.4') cable dual M12-8 connector, right angle terminator
DM12CAB-8-1	1m (3.3') cable dual M12-8 straight connector
DM12CAB-8-3	3m (9.8') cable dual M12-8 straight connector
DM12CAB-8-5	5m (16.4') cable dual M12-8 straight connector



M12 Series  
Thermocouple

+



SP-005-1

+



IF-001

## Thermocouple and RTD Probes

Omega recommends using the following supported thermocouple and RTD probes. Supported probes are not limited to those in this list.

### M12 TC Probes

M12 Series	J Type (Stainless Steel) / K Type (Inconel 600) 6" Thermocouple probes, single and dual element configuration, -50 to 85°C (-58 to 185°F) temp range, available in 1/8" or 1/4" diameter
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## Thermocouple and RTD Probes (continued)

### M12 TC Probes (continued)

M12M	J Type (Stainless Steel) / K Type (Inconel 600) multi-length Thermocouple probes, single and dual element configuration, -50 to 90°C (-58 to 194°F) temp range, available in 1/4" or 1/8" diameter
<b>M12 TC Cables and Connectors</b>	
M12CM Series	Straight and right-angled M12 Field mountable connector sensor end, compensated thermocouple pins, IEC or ANSI color coded cable insulation options, variety of connection methods
<b>M12 RTD Probes</b>	
PR-21A Series	6" RTD Probes, -50 to 250°C (-58 to 482°F) sensing end, 85°C (185°F) max at connector, Class A, Pt100, or PT1000 element, available in 1/4" or 1/8" probe diameter
PR-22 Series	Multi-Length RTD Probes, -30 to 350°C (-22 to 622°F) Class A probe temp range, -50 to 500°C (-58 to 932°F) Class B probe temp range, -50 to 90°C (-58 to 194°F) connector temp range, available in 1/4" or 1/8" diameter
PR-23 Series	Multi-Length RTD Probes, -30 to 350°C (-22 to 622°F) Class A probe temp range, -50 to 500°C (-58 to 932°F) Class B temp range, -50 to 90°C (-58 to 194°F) connector temp range, 1/8" diameter
<b>M12 RTD Cables and Connectors</b>	
M12C-PVC-4-S-M-R-F-2	M12, 4 pin Straight Plug to Angled Socket cable - 2m
M12C-PVC-4-S-M-R-F-5	M12, 4 pin Straight Plug to Angled Socket cable - 5m