# 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

*Probe and interface not included*

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.

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.

### 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

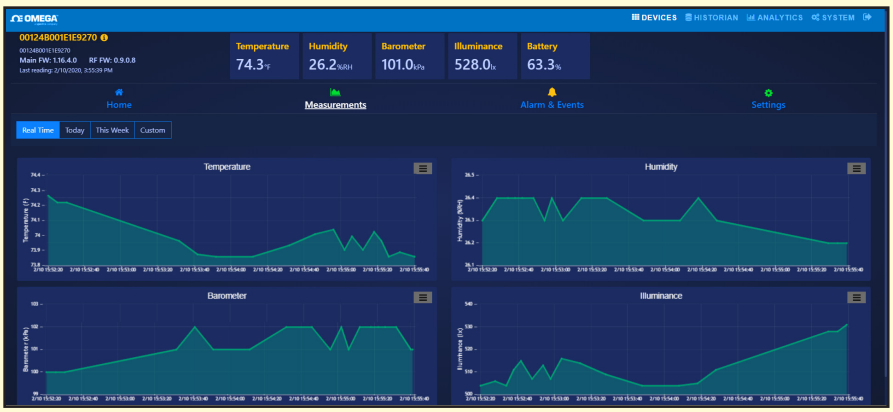
Smart core is integral to all Layer N Smart Probes. This powerful suite of advanced features enable plug and play connectivity, alarms and notifications, data assurance, data logging, and storage.

### 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.

**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 $V_{DC}$ - 3.3 $V_{DC}$

## 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 85ºC (-40 to 185ºF)
***Rating:*** IP67 when mated

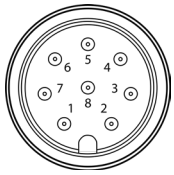
## MECHANICAL

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

## GENERAL

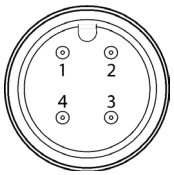
***Agency Approvals:*** CE, EMC 2014/30/EU, LVD 2014/35/EU
***Compatibility:*** Compatible with OEG, SYNC configuration software, Layer N Cloud, and Modbus Networks

## M12 8-Pin Wiring



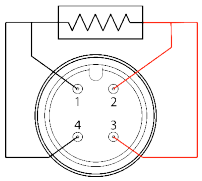

| Pin | Name | Function |
|---|---|---|
| Pin 1 | DIO 0 | Discrete I/O Signal 0 |
| Pin 2 | INTR | Interrupt Signal |
| Pin 3 | SCL | I2C Clock Signal |
| Pin 4 | SDA | I2C Data Signal |
| Pin 5 | Shield | Shield Ground |
| Pin 6 | DIO 1 | Discrete I/O Signal 1 |
| Pin 7 | GND | Power Ground |
| Pin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

## Thermocouple Wiring

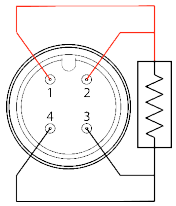



| Pin | Thermocouple |
|---|---|
| Pin 1 | TC 2 Negative |
| Pin 2 | TC 1 Positive |
| Pin 3 | TC 1 Negative |
| Pin 4 | TC 2 Positive |

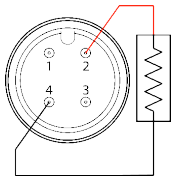
## RTD Wiring



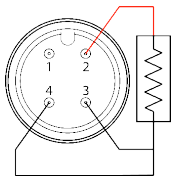

*RTD 4 Wire Option 1*




*RTD 4 Wire Option 2*




*RTD Wire Option 2*




*RTD Wire Option 3*

## Thermocouple Types

| Type | Range | Accuracy |
|---|---|---|
| J | -210ºC to 1200ºC | ± 0.5ºC |
| K | -160ºC to 1372ºC | ± 0.5ºC |
| T | -190ºC to 400ºC | ± 0.5ºC |
| E | -200ºC to 1000ºC | ± 0.5°C |
| N | -100ºC to 1300ºC | ± 0.5ºC |
| R | 40ºC to 1788ºC | ± 0.5ºC |
| S | 100ºC to 1768ºC | ± 0.5ºC |
| B | 640ºC to 1820ºC | ± 0.5ºC |
| C | 0ºC to 2320ºC | ± 0.8ºC |

***Temperature Stability @ 25ºC:*** 0.04 C/C

## RTD Types

| Type | Range | Accuracy |
|---|---|---|
| 385, 4 Wire | -200ºC to 850ºC | ± 0.5ºC |
| 385, 3 Wire | -200ºC to 850ºC | ± 0.5ºC |
| 385, 2 Wire | -200ºC to 850ºC | ± 0.6ºC |
| 392, 4 Wire | -200ºC to 660ºC | ± 0.5ºC |
| 392, 3 Wire | -200ºC to 660ºC | ± 0.5ºC |
| 392, 2 Wire | -200ºC to 660ºC | ± 0.6ºC |

***Temperature Stability @ 25ºC:*** 0.01 C/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

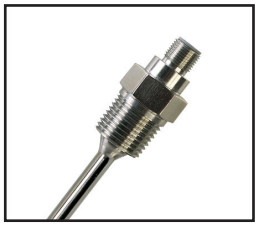
Layer N Smart Probes require a Layer N Smart Interface to operate and connect to your Layer N Ecosystem. There are both wired and wireless options.

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

## Accessories

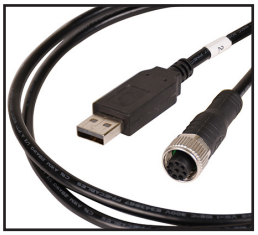
An optional M12 4-pin screw terminal adapter is available for users who wish to connect wire leads directly to the SP-005.

| 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 |

## Thermocouple and RTD Probes (continued)

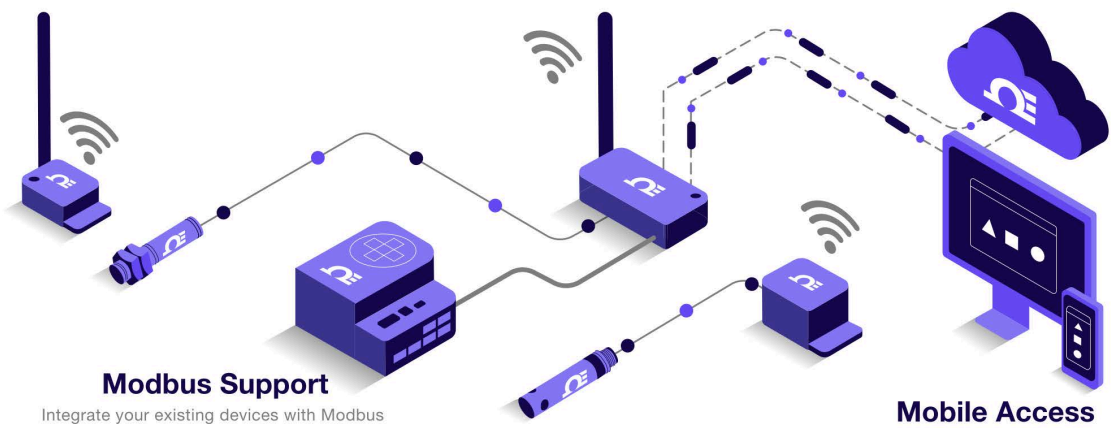
| | |
|---|---|
| **M12 TC Probes (continued)** | |
| M12M | J Type (Stainless Steel) / K Type (Inconel 600) multi-length Thermocouple probes, single and dual element configuration, -50 to 90°C (-58 to 194°F) temp range, available in 1/4” or 1/8” diameter |
| **M12 TC Cables and Connectors** | |
| M12CM 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 |
| **M12 RTD Probes** | |
| 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 |
| **M12 RTD Cables and Connectors** | |
| 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 |

## How Do Layer N Products Work?

**Smart Sensors**
Sense, store, and process real-time data with superior connectivity

**Gateway**
Collect and securely transport data from the sensor layer to the cloud

**Cloud**
Continuously collects and process sensor data providing real-time reporting and analytics



**Modbus Support**
Integrate your existing devices with Modbus for intelligent data transport to the cloud.

**Wireless Smart Interface**
Provides wireless integration of Smart Probes to the Layer N Gateway to create a fully customized wireless solution that fits your application

**Mobile Access**
Access your data anytime anywhere with an Internet connection