

SP-013 Series



Layer N Digital Pulse Input Smart Probe

- Digital Inputs: Rate, Pulse Width, Pulse Delay, Duty Cycle, Counters
- Mixed mode supports Digital Input and Process Input
- 2x Digital I/O (Input or Output)
- Software configurable through SYNC configuration software
- Modular M12 construction
- 10,000+ Sample data/event logging
- Integrated alarm and control
- Secure authentication and password protection



SP-013: Introduction

The Layer N SP-013 Digital Interface Smart Probe provides an easy way to integrate digital pulse inputs into the Layer N Ecosystem. The SP-013 accepts digital pulse inputs through its M12 5-pin connector and Layer N Smart Interfaces through its M12 8-pin connector. The optional M12.8-T-SPLIT Sensor Splitter can be used to access the Discrete I/O pins on the M12 8-pin connector. The optional M12.5-S-M-FM and M12.8-S-M-FM mating connectors can be utilized to easily connect wire leads to the SP-013 or sensor splitter.

The SP-013 may be configured to monitor the on/off state of the input signals, the pulse rate/ duty cycle of the primary input, or the pulse delay between the two signals. The pulse totalizing function supports both standard counting and up/down counting.

A mixed-mode configuration option allows for the measurement of one digital pulse input and one process input which may be independently configured as a 0-24 mA, 0-1.0 V DC, or 0-2.0 V DC input.

Smart Core Enabled

Smart Core is integral to all Layer N Smart Sensing Devices. In addition to allowing for modular integration to the Layer N Ecosystem using any Layer N Smart Interface, this powerful suite of advanced features enable plug-and-play connectivity, alarm and notifications, data logging, SYNC configuration, and storage of 10,000 data points and events.

Modularity

Customize your Layer N Ecosystem by taking advantage of discrete I/O features

accessible through the modular addition of an M12.8-T-SPLIT and M12.8-S-M-FM terminal.

Edge Control and Built in I/O

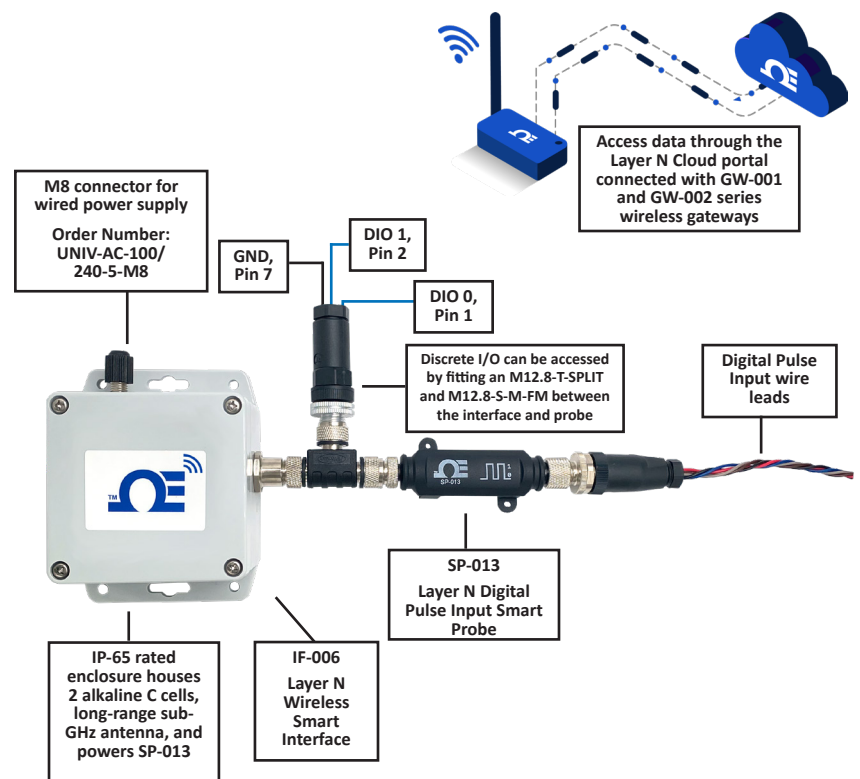
The Layer N SP-013 features 2 discrete I/O pins. These can be used for a myriad of applications including driving relays, physical alarms, or sensing dry contacts like door switches. The SP-013 can also be utilized as an edge controller, with autonomous independent decision-making capabilities to generate local alarms or provide control outputs based on sensor inputs.

Long-Range Wireless Solution*

Pairing the SP-013 with the IF-006 Series interface produces a self-contained, long-range, wireless solution. This setup can also be externally powered by adding the UNIV-AC100/240-M8 power adaptor.

**Note: IF-006 must be paired with a Layer N wireless gateway*

Wireless Configuration for Smart Probe with Optional DIO



Specifications

Input Power

Voltage: 2.8 V_{DC} - 3.3 V_{DC}

Digital Input Signals (see table on next page)

ON: 1.0 V_{DC}

OFF: 0.7 V_{DC}

Internal Pull Up/Down: 1.5k to 3.0 V_{DC}

Comparator (Pulse) Input: 100 mV, 500 mV, 1.0 V_{DC}, 2.0 V_{DC}

Type	Range	Operating Conditions	Accuracy
Frequency (Rate)	0.01 Hz to 100 Hz	T _{PW MIN} = 200 uS	±0.5%
Frequency (Rate)	100 to 1000 Hz	T _{PW MIN} = 200 uS	±1 Hz averaged over 1 sec.
Up Counter	0 to +8388608	1 kHz Max Rate	±1 Count Max
Up/Down Counter	-8388608 to + 8388608	1 kHz Max Rate	±1 Count Max
Pulse Width (T _{PW})	200 uS min		±50 uS ±1%
Pulse Delay (T _{PP})	200 uS min		±50 uS ±1%
Duty Cycle	1% to 99%	0.01 Hz to 1000 Hz, T _{PW MIN} = 200 uS	±1.5% Max

Analog Inputs

Type	Range	Resolution	Min	Max	Accuracy	Input Impedance
Current Loop	0 - 24 mA	±0.1 mA	0 mA	24 mA	±0.2 mA	50 ohm
Voltage	0 - 1.0 V _{DC}	±10 mV	0 V _{DC}	1.20 V _{DC}	±10 mV	100k ohm
Voltage	0 - 2.0 V _{DC}	±10 mV	0 V _{DC}	2.50 V _{DC}	±20 mV	100k ohm

Discrete I/O - Digital Inputs

V_{inHighThreshold} = 2.2 V_{MAX}

V_{inLowThreshold} = 0.3 V_{MIN}

V_{inMAX} = 30 V_{DC}

Discrete I/O - 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

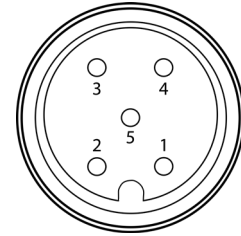
Agency Approvals: CE, UKCA

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

Layer N SP-013 Ordering Guide

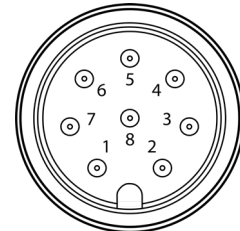
Model Number	Description
SP-013-1	Digital Interface Smart Probe with discrete I/O

M12 5-Pin Female Connector Wiring



Pin	Digital	Mixed Mode
Pin 1	Excitation Power 3.3 V _{DC} , 100 mA	Excitation Power 3.3 V _{DC} , 100 mA
Pin 2	DIN 0/Pulse A	DIN 0/Pulse A
Pin 3	Ground Reference	Ground Reference
Pin 4	DIN 2/Enable/ Direction/Pulse B	Process 0
Pin 5	DIN 1/Reset	DIN 1/Reset

M12 8-Pin Male Connector



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

Layer N Smart Interface

Layer N Smart Sensing devices 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	Wired USB Smart Interface
IF-002	Wired RS485/Modbus Smart Interface
IF-006-1-NA	Wireless Sub GHz Wireless Interface -915 MHz
IF-006-1-EU	Wireless Sub GHz Wireless Interface -868 MHz

Layer N Gateways

An Layer N Gateway is **required** to connect your Smart Probe to the Layer N Cloud or Omega Enterprise Gateway.

Model Number	Description
GW-001-0	Wired IIoT Gateway Standard, Ethernet connectivity, Modbus RTU RS232/RS485 and Modbus TCP
GW-001-2-NA	Wireless IIoT Gateway Standard, Ethernet connectivity, connects up to 100 Layer N Smart Sensors- 915 MHz
GW-001-2-EU	Wireless IIoT Gateway Standard, Ethernet connectivity, connects up to 100 Layer N Smart Sensors- 868 MHz
GW-001-3-NA	Wireless IIoT Gateway Pro, Ethernet connectivity, power over Ethernet, connects up to 100 Layer N Smart Sensors, Modbus RTU RS232/RS485 and Modbus TCP, 2x USB ports- 915 MHz
GW-001-3-EU	Wireless IIoT Gateway Pro, Ethernet connectivity, power over Ethernet, connects up to 100 Layer N Smart Sensors, Modbus RTU RS232/RS485 and Modbus TCP, 2x USB ports- 868 MHz
GW-002-1-LTE	Wireless LTE IIoT Gateway Pro connects up to 40 Layer N Smart Sensors, Modbus RTU RS232/RS485 and Modbus TCP, 1x RJ45 port, 1x USB port - 915 MHz

Accessories

Model Number	Description
M12.5-S-M-FM	M12 5-pin Straight Plug Field install connector with screw terminals
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

Your Data at a Glance with the Layer N Cloud

The 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.

