

OMEGA[®] User's Guide

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OS-MINI HUB SERIES



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OS-MINIHUB non-contact infrared sensors measure temperatures from -20°C to 1000°C and provide an RS485 Modbus RTU interface.

The sensors are capable of being used in ambient temperatures up to 120°C without cooling, and are compatible with the 6-channel TSD600 touch screen interface, which provides temperature display, data logging, alarms and analogue outputs.

A 6-channel junction box is available to easily connect OS-MINIHUB sensors to the TSD600 as a complete temperature monitoring system.

SENSOR SPECIFICATIONS

Model Numbers

Field of View	Model Number
2:1	OS-MINIHUB-SN21
20:1	OS-MINIHUB-SN201
Close Focus	OS-MINIHUB-SN801

Interface	RS485 Modbus RTU
Accuracy	±1% of reading or ±1°C whichever is greater
Repeatability	± 0.5% of reading or ± 0.5°C whichever is greater
Emissivity	0.2 to 1.0
Response Time, t_{90}	125 ms (90% response)
Spectral Range	8 to 14 μ m
Supply Voltage	12-24 V DC nominal (6 - 28 V DC)
Supply Current	50 mA max.
Baud Rate	9600 baud *
Format	8 data bits, no parity, 1 stop bit *

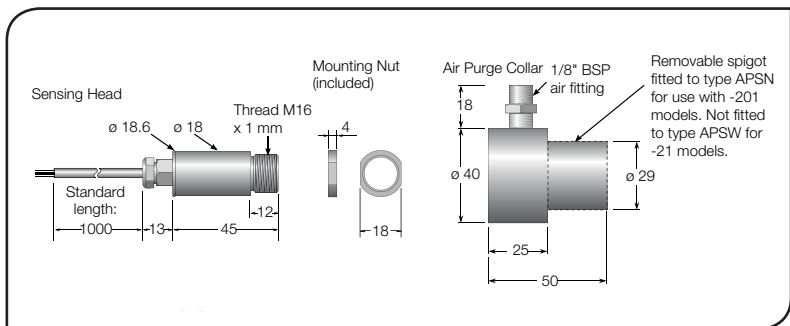
MECHANICAL

Construction	Stainless Steel
Dimensions	18 mm diameter x 45 mm long (excluding cable gland)
Thread Mounting	M16 x 1 mm pitch
Cable Length	1 m standard, longer cable available to order
Weight with 1 m Cable	85 g

ENVIRONMENTAL

Environmental Rating	IP65
Ambient Temperature	0°C to 120°C
Relative Humidity	95% max. non-condensing

* Other configurations available upon request



ACCESSORIES

A range of accessories to suit different applications and industrial environments is available. These may be ordered at any time and added on-site. The following accessories are available:

- Fixed mounting bracket
- Adjustable mounting bracket
- Air purge collar
- Laser sighting tool
- Junction box for 6 sensors
- TSD600 6-channel touch screen interface module with data logging
- Analogue output module
- Relay output module

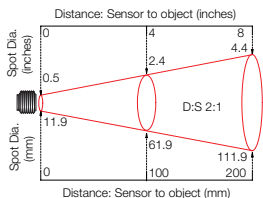
OPTIONS

The following options are available. Options are factory installed and must be ordered with the sensor.

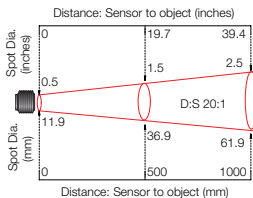
- Certificate of calibration
- Longer cable

OPTICAL CHART

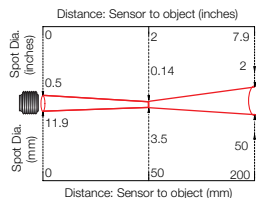
The optical chart below indicates the nominal target spot diameter at any given distance from the sensing head and assumes 90% energy.



OS-MINIHUB-SN21



OS-MINIHUB-SN201



OS-MINIHUB-SN801

All model can measure at longer distances than shown, with a larger spot size.

Accuracy is not affected by measurement distance in clean air.

INSTALLATION

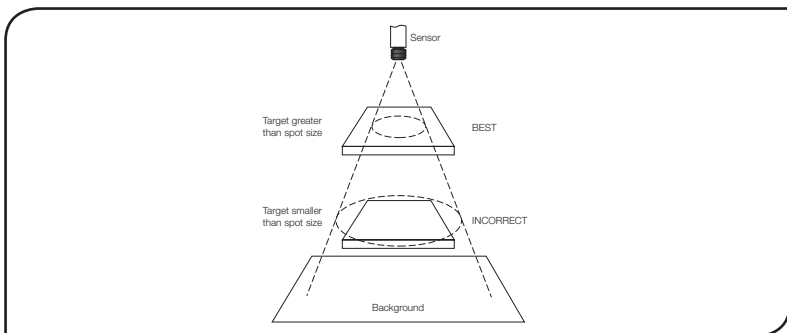
The installation process consists of the following stages:

- Preparation
- Mechanical installation
- Electrical installation

Please read the following sections thoroughly before proceeding with the installation.

PREPARATION

Ensure that the sensor is positioned so that it is focused on the target only.



DISTANCE AND SPOT SIZE

The size of the area (spot size) to be measured determines the distance between the sensor and the target. The spot size must not be larger than the target. The sensor should be mounted so that the measured spot size is smaller than the target.

AMBIENT TEMPERATURE

The sensor is designed to operate in ambient temperatures from 0°C to 120°C.

Avoid thermal shock. Allow 20 minutes for the unit to adjust to large changes in ambient temperature.

ATMOSPHERIC QUALITY

Smoke, fumes or dust can contaminate the lens and cause errors in temperature measurement. In these types of environment the air purge collar should be used to help keep the lens clean.

ELECTRICAL INTERFERENCE

To minimise electromagnetic interference or 'noise', the sensor should be mounted away from motors, generators and such like.

WIRING

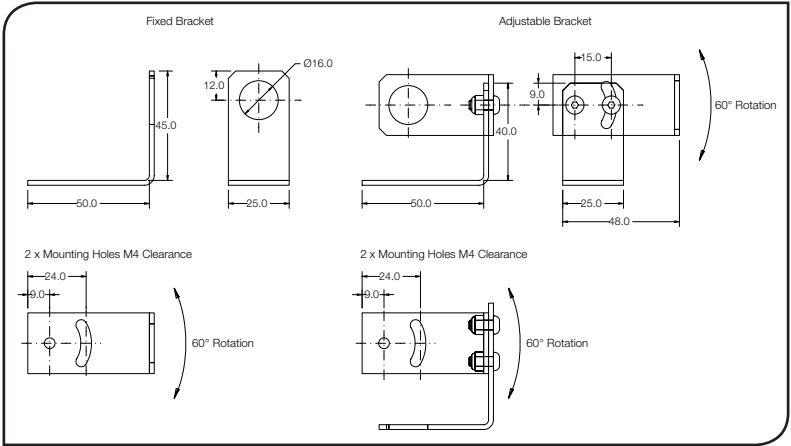
Check the distance between the sensor and the Modbus Master. If necessary, the sensor can be ordered with a longer cable attached.

POWER SUPPLY

Be sure to use a 12 to 24 V DC power supply. The maximum current draw is 50 mA per sensor.

MECHANICAL INSTALLATION

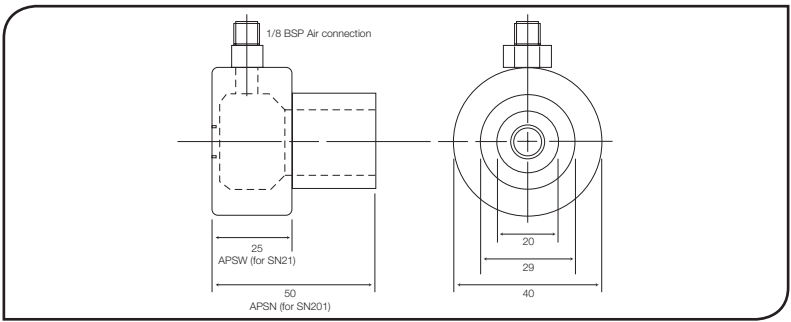
All sensors come with a 1m cable and a mounting nut. The sensor can be mounted on brackets or cut outs of your own design, or you can use the fixed and adjustable mounting bracket accessories which are shown below. **Note:** The sensor must be grounded at only one point, either the cable shield or the sensor housing, but not both.



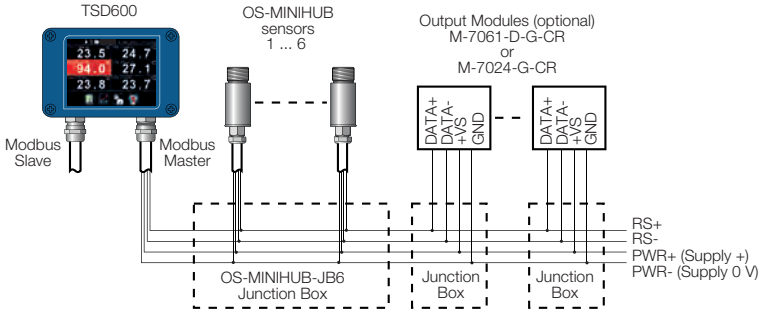
AIR PURGE COLLAR

The air purge collar below is used to keep dust, fumes, moisture, and other contaminants away from the lens. It must be screwed in fully. Air flows into the 1/8" BSP fitting and out of the front aperture. Air flow should be no more than 5 to 15 litres/min.

Clean or 'instrument' air is recommended.



ELECTRICAL INSTALLATION



Ensure PWR- of all sensors and GND of all output modules on this network is connected to PWR- of the TSD600 Modbus Master interface.

For more information on electrical connections to the TSD600, including how to connect the Modbus Slave interface, please see the TSD600 Operator's Guide.

Sensors may be connected to an alternative Modbus Master, such as a SCADA system or PLC. Ensure the PWR- wires are connected to the Signal Ground of the Modbus Master and the 0 V of the sensor power supply.

MODBUS OVER SERIAL LINE

INTERFACE

Baud rate	9600
Format	8 data, No parity, 1 stop
Reply delay (ms)	20

SUPPORTED FUNCTIONS

Read register	0x03, 0x04
Write single register	0x06
Write multiple register	0x10
Mask write register	0x17

The list below includes all available addresses:

R = Read, W = Write

Address	Length (words)	Description	R/W
0x00	1	Sensor Type (16 for OS-MINIUSB, 17 for OS-MINIHUB)	R
0x01	1	Field of view 0 for 2:1; 1 for 20:1	R
0x02	2	Serial number	R
0x04	1	Modbus slave address	R/W
0x05	1	Reflected Energy Compensation 0 for Off; 1 for On	R/W
0x06	1	Reflected Temperature	R/W
0x07	1	Emissivity (1 LSB = 0.0001) Minimum 0.2000, Maximum 1.0000	R/W
0x08	1	Hold Mode 0 for Off; 1 for Peak; 2 for Valley	R/W
0x09	1	Hold Period (1 LSB = 0.1 seconds) Minimum 0.1 seconds, Maximum 1200.0 seconds	R/W
0x0A	1	Average Period (1 LSB = 0.1 seconds) Minimum 0.1 seconds, Maximum 60.0 seconds	R/W
0x0B	1	Average Temperature	R
0x0C	1	Minimum Temperature	R
0x0D	1	Maximum Temperature	R
0x0E	1	Filtered Temperature	R
0x0F	1	Unfiltered Temperature	R
0x10	1	Sensor Temperature	R
0x11	1	Status (bits active high) Bit 0: Measurement error Bit 1: Sensor temperature low Bit 2: Sensor temperature high Bit 3: Object temperature low Bit 4: Object temperature high	R
0x16	1	Reflected Temperature (not saved to non-volatile memory)	R/W
0x17	1	Emissivity (not saved to non-volatile memory)	R/W

Notes:

1. All temperature are in tenths of degrees C
2. With the exception of addresses 0x16 and 0x17, all write operations are saved to non-volatile memory
3. For further information please refer to <http://www.modbus.org/specs.php>
4. Use address 255 to communicate with any connected sensor (only one sensor connected)
5. Use address 0 to broadcast to all connected sensors (no response expected)

OPERATION

Once the sensor is in position and the appropriate power, air, water, and cable connections are secure, the system is ready for continuous operation by completing the following simple steps:

1. Turn on the power supply
2. Turn on the Modbus Master
3. Read / monitor the temperature

IMPORTANT

Be aware of the following when using the sensor:

- If the sensor is exposed to significant changes in ambient temperature (hot to cold, or cold to hot), allow 20 minutes for the temperature to stabilise before taking or recording measurements.
- Do not operate the sensor near large electromagnetic fields (e.g. around arc welders or induction heaters).
Electromagnetic interference can cause measurement errors.
- Wire must be connected only to the appropriate terminals.

MAINTENANCE

Our customer service representatives are available for application assistance, calibration, repair, and solutions to specific problems. Contact our Service Department before returning any equipment. In many cases, problems can be solved over the telephone. If the sensor is not performing as it should, try to match the symptom below to the problem. If the table does not help, call Omega for further advice.

Troubleshooting		
Symptom	Probable Cause	Solution
No output	No power to sensor	Check power supply
Erroneous temperature	Incorrect wire connection	Check wire colour codes
Erroneous temperature	Faulty sensor cable	Verify cable continuity
Erroneous temperature	Field of view obstruction	Remove obstruction

LENS CLEANING

Keep the lens clean at all times. Any foreign matter on the lens would affect measurement accuracy. Blow off loose particles (if not using the air purge accessory) with an air 'puffer'.

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **25 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **two (2) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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