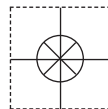


1 YEAR
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User's Guide



OS35-20

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OS35-3

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OS35 Series Smart Infrared Temperature Sensors



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It is the policy of OMEGA Engineering, Inc. to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

The information contained in this document is believed to be correct, but OMEGA accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, human applications.

OS35 HIGHLIGHTS

- Smart air purge assures maintenance free long term accuracy
- Smart continuous auto calibration
- All digital system
- Smart housing resists mechanical and thermal shocks
- Smart emissivity shift and ambient radiation correction
- Easy plug and play installation
- Lowest cost air purged, linealized sensor on the market
- Optics of 3:1 & 20:1 available
- Outputs of 0-5V, 0-10V, 4-20mA, & RS232
- Temperature ranges from -22 - 1832 °F (-30 - 1000 °C)
- LOW impedance, results in no offset errors due to leakage current in your input device
- Custom scaling and programming for low emissivity materials and low temperatures available



OS35-3 (3:1 FOV)

3.71" x 1.37" x 0.76" (94.3 x 34.9 x 19.4 mm)



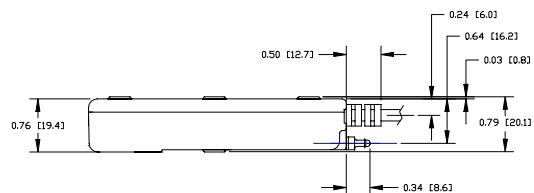
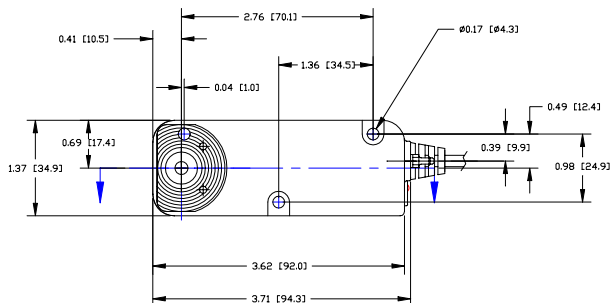
OS35-20 (20:1 FOV)

3.71" x 1.37" x 0.76"
 (94.3 x 34.9 x 19.4 mm)
 & 1.63" (41.3 mm) x 0.75" diameter snout

MEASUREMENT SPECIFICATIONS

	Temperature Range	Accuracy	Repeatability	Interchangeability
OS35-3	-30-70 °C, 0-100 °C & 0-250 °C	±1 °C or 1%	± 1 BIT -30-70 °C = ± 0.1 °C 0-100 °C = ± 0.1 °C 0-250 °C = ± 0.25 °C 0-500 °C = ± 0.5 °C 0-1000 °C = ± 1 °C	±1 °C (1.8 °F) or 0.5%
		± 1.5 °C or ± 1.5%		± 1.5 °C or ± 1.5%
				±1 °C (1.8 °F) or 0.5%
				± 1.5 °C or ± 1.5%
OS35-20	0-100 °C, 0-250 °C, & 0-500 °C	± 1.5 °C or ± 1.5%		±1 °C (1.8 °F) or 0.5%
				± 1.5 °C or ± 1.5%
	0-1000 °C	± 1.5 °C or ± 2.0%		±1 °C (1.8 °F) or 0.5%
				± 1.5 °C or ± 1.5%

OUTLINE DRAWING





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OS35

Infrared Temperature Sensor Installation Instructions

1. Install OS35 as close as practical to view target material to be measured
2. Wire OS35 with Red to Positive Power, Black to Ground, White to Positive Output Signal, and Green to Reference Output Signal
3. Measure actual temperature of target material with OS950 Thermometer or any reliable reference
4. Adjust “offset”, “zero”, or “low cal” on input device to match reading to actual thermometer reading
5. Installation calibration complete

ERROR MESSAGES						
Condition	Priority	LED Display	0-5V	0-10V	4-20mA	RS-232
Low Power	1	OFF	Under 0.1V	Under 0.1V	Under 4mA	Not Implemented
Hardware Internal Errors	2, 13	Uniform Flash	Over 4.9V	Over 9.8V	Over 19.7mA	Not Implemented
Vsig-Offset High	3	Uniform Flash	Over 4.9V	Over 9.8V	Over 19.7mA	Not Implemented
Vsig-Offset Low	4	Uniform Flash	Over 4.9V	Over 9.8V	Over 19.7mA	Not Implemented
EMI	5	Uniform Flash	Over 4.9V	Over 9.8V	Over 19.7mA	Not Implemented
Range Error	6	Uniform Flash	Over 4.9V	Over 9.8V	Over 19.7mA	Not Implemented
High Ambient	7	Long Flash**	Over 4.9V	Over 9.8V	Over 19.7mA	Not Implemented
Low Ambient	8	Short Flash*	Over 4.9V	Over 9.8V	Over 19.7mA	Not Implemented
Too Much Heat Flow	9	Long Flash**	Over 4.9V	Over 9.8V	Over 19.7mA	Not Implemented
Too Little Heat Flow	10	Short Flash*	Over 4.9V	Over 9.8V	Over 19.7mA	Not Implemented
High Target	11	Long Flash**	Over 4.9V	Over 9.8V	Over 19.7mA	Not Implemented
Low Target	12	Short Flash*	Over 4.9V	Over 9.8V	Over 19.7mA	Not Implemented

*Six counts off one count on

**Six counts on one count off

PIN OUT					
Pin	Color	Function	Pin	Color	Function
1	White	Positive Output Signal	6	Brown	TA Pull Down Pin / IO option
2	Green	Reference Output Signal	7	Yellow	RS232_TXD / IO option
3	Red	Positive Power	8	Violet	RS232_RXD / IO option
4	Black	Ground	9	Blue	RS232_RTD (READY_TO_SEND)
5	Bare	Shield	10	Orange	RS232_CTS (CLEAR_TO_SEND)

AVAILABLE MODELS

OS35-3-MA-100C-24V	Infrared temperature sensor, 3:1 optics, 0 to 100 °C range
OS35-3-MA-250C-24V	Infrared temperature sensor, 3:1 optics, 0 to 250 °C range
OS35-3-MA-700C-24V	Infrared temperature sensor, 3:1 optics, -30 to 70 °C range
OS35-20-MA-100C-24V	Infrared temperature sensor, 20:1 optics, 0 to 100 °C range
OS35-20-MA-250C-24V	Infrared temperature sensor, 20:1 optics, 0 to 250 °C range
OS35-20-MA-500C-24V	Infrared temperature sensor, 20:1 optics, 0 to 500 °C range
OS35-20-MA-1000C-24V	Infrared temperature sensor, 20:1 optics, 0 to 1000 °C range

Note: * Note: For 12 V power requirement, change 24 V in Model number to 12 V, no price change. For 5 V output, change MA to 5 V, no price change. For 10 V output, which is available only on 24 V power models, change MA to 10 V, no price change. For RS232 output, which is available only on 250°C range with 12 V power, change MA to RS, no price change. Comes with air tubing.

Ordering Example: (1) **OS35-3-MA-100C-24V**

ELECTRICAL SPECIFICATIONS

	OS35-3		OS35-20	
LINEAR TEMPERATURE RANGES (custom scaling also available upon request)	-30-70 °C (-22-158 °F) 0-100 °C (32-212 °F) 0-250 °C (32- 482 °F)		0-100 °C (32-212 °F), 0-250 °C (32- 482 °F), 0-500 °C (32- 932 °F), 0-1000 °C (32 - 1832 °F)	
OUTPUT	0-5V, 0-10V (24VDC power only), 4-20mA (50 ohm max), RS232 (12VDC power only)			
UPDATE TIME	Approximately 250 msec.			
FIRST READING UPON POWER UP	Approximately 2 seconds			
EMISSIONITY SETTING	0.90 (custom low emissivity settings available for metals, etc. upon request)			
SPECTRAL RESPONSE	5.5 to 20 microns (other ranges available for specific applications, thin films, etc.)			
POWER	12 or 24 VDC (10%). Shuts off when voltage is functionally low.			
OUTPUT IMPEDANCE	750 ohms on 0-5V and 0-10V models			
MINIMUM LOAD IMPEDANCE	100 K ohms			
MAXIMUM LOOP IMPEDANCE	1 K ohm max			
POWER CONSUMPTION	< 800 mW at 24 VDC and < 600 mW at 12VDC			

MECHANICAL SPECIFICATIONS

	OS35-3		OS35-20	
Minimum Spot Size	0.12" (3.0 mm)		0.625" (15.9 mm)	
Ambient Temperature Range	0 to 70 °C (32 to 158 °F)			
Storage Temperature	-10 to 70 °C (14 to 158 °F)			
Construction	Heavy Duty Alloy Casting			
Weight	Approximately 8 oz. (227 g)			
Relative Humidity	95% non condensing			
Air Purge	Integral built in air purge with small sized aperture and heat exchanged which minimizes drift for superb accuracy			
Cable	3 ft (0.9 m) of 5 conductor, tinned copper, twisted pair, polypropylene, insulated with shielded wire			
Ratings	NEMA , IP54 (with air on)			

ORDERING INFORMATION

OS35-F-P-O-T

F	FIELD OF VIEW	P	POWER	O	OUTPUT	T	TEMPERATURE RANGE
.3	3:1	12V	12 VDC	05	0-5V	70C	-30-70C
		24V	24 VDC	010	0-10V	100C	0-100C
.20	20:1			420	4-20 mA	250C	0-250C
				232	RS232	500C	0-500C
						1000C	0-1000C

OPTION: Add Ta to any part # to add ambient temperature option to output ambient temperature

NOTE: 0-10V only available in 24VDC and RS232 only available in 12VDC

Example: OS35-3-24V-420-250C (with 4-20mA output measuring target temperature from 0-250C) or
OS35-3-24V-420-250C-Ta (with 4-20mA outputting target temperature and ambient temperature from 0-250C)

OS35™ and OS35-RS™



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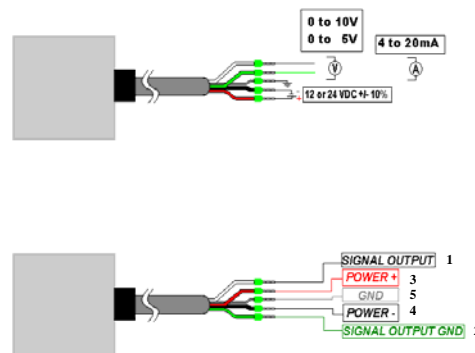
Infrared Temperature Sensor

INSTALLATION INSTRUCTIONS

The following procedure is recommended:

1. Install the SmartIRt/c as close as practical to view the target material to be measured.
2. Wire the SmartIRt/c to the controller, PLC, etc. in standard fashion (see PIN-OUT and wiring diagram)
3. Bring the process up to normal operating temperature and measure the actual temperature of the target material with the Microscanner D-Series, DX-Series Infrared Thermometer or any other reliable reference.
4. Adjust "input offset," "zero," "low cal," on the readout device to match the reading of your reference.

Installation Complete. (For OEM installations preset the same adjustments. Individual calibration is not required.)



WIRING DIAGRAM

PIN OUT

Carol C074 Series/Belden 953 Series/Alpha 630 Series

Pin	Color	Function	Pin	Color	Function
1	White	Positive Output Signal	6	Brown	TA Pull Down Pin / IO option
2	Green	Reference Output Signal	7	Yellow	RS232_TXD / IO option
3	Red	Positive Power	8	Violet	RS232_RXD / IO option
4	Black	Ground	9	Blue	RS232_RTD (READY_TO_SEND)
5	Bare	Shield	10	Orange	RS232_CTS (CLEAR_TO_SEND)

ORDERING INFORMATION

SmartIRt/c-F-P-O-T or Smart-microIRt/c-F-P-O-T (F is -.SV, .4, .4SV only for Smart-microIRt/c)

F	FIELD OF VIEW	P	POWER	O	OUTPUT	T	TEMPERATURE RANGE
.3	3:1	12V	12 VDC	05	0-5V	100C	0-100C
.5	5:1	24V	24 VDC	010	0-10V	250C	0-250C
.20	20:1			420	4-20 mA	500C	0-500C
.40	40:1			232	RS232	1000C	0-1000C
-	1:2					70C	-30-70C
.SV	1:2						
.4	4:1						
.4SV	4:1						

OPTION: Add Ta to any part # to add ambient temperature option to output ambient temperature surrounding sensor

NOTE: 0-10V only available in 24VDC and RS232 only available in 12VDC from 0-250C

Examples: SmartIRt/c.3-24V-420-250C (3:1 field of view, 24VDC power, 4-20mA output from 0-250C),
Smart-microIRt/c-12V-05-250C (1:2 field of view, 12VDC power, 0-5V output from 0-250C). or
SmartIRt/c.3-24V-420-250C-Ta (with 4-20mA outputting target temperature and ambient temperature from 0-250C)

	0-5V	0-10V	4-20mA	RS232
Sensing Range	-30 to 70 °C, 0 to 100 °C, 0 to 250 °C, 0 to 500 °C, or 0 to 1000 °C			
Ambient Temperature Range	0 °C to 70 °C (internal case temperature)			
Storage Temperature Range	-10 °C to 70 °C			
Field of View of Sensing Element	1:2, 3:1, 4:1, 5:1, 20:1, or 40:1 (distance:spot)			
Minimum Spot size	3 mm (0.1”) (Smart-micro) 5 mm (0.2”) (Smart) (16 mm (0.625”) (SmartIRt/c.20 and 40)			
Dominant Spectral Response	5 to 14 um (Smart-micro), 5.5 to 20 um (Smart)			
Impedance	Less than 1 Kohms	50 ohm max	NA	
Emissivity Setting (e)	0.90 can be factory adjusted			
Measurement Type	Thermopile			
Resolution	10 bit***			4 Digit w/ floating decimal
Update Time	Less than 250ms after first reading**			
Response Time (95% of step change)	Less than 650 ms**			
Bandwidth	Typically 5Hz			
First Reading in	Less than 2 seconds			
Accuracy (Includes Repeatability and Interchangeability)	Typically: ±1 °C (±1.8 °F) or 1% of reading at e 0.9			
Recommended Power Supply	12 ± 10% V DC or 24 ± 10% V DC; depending on model			
Power Accepted*	Shuts off when voltage is functionally low*			
Power Consumption	12V power less then 400mW 24V Power less than 800 mW			
Dimensions	Contact Exergen for Drawing			
Housing	Zinc-Aluminum Alloy Z-12 (ISO/DIS 301)			
Sensor Connection	3 foot pigtail (and 3 feet from sensor to box on Smart-microIRt/c)			DB9 and loose power wires
Recommended Air Purge Pressure	3 PSI - Contact Exergen for Pressure\Flow\Error Graphs			
Maximum Air Pressure	20 PSI - may cause reading errors			
Air Cleanliness	Instrument Air is Recommended, ANSI/ISA-7.0.01-1996			
Humidity	Non-Condensing - ISA-71.01-1985 Environment Class C Severity X			
Shock	100G			
Weight	Approximately 200 grams (7oz.)			
LED	Constantly on for normal operation			

* The unit will not give an error message if the input voltage exceeds recommended high limit, but functionality or accuracy is not guaranteed when exceeding the Recommended Power Supply voltage.

** At room temperature

*** Current Output 10bit 0-20mA



WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) 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.

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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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