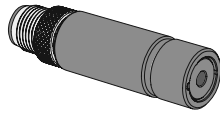


# S15S Modbus Non-Contact Infrared Temperature Sensor Datasheet

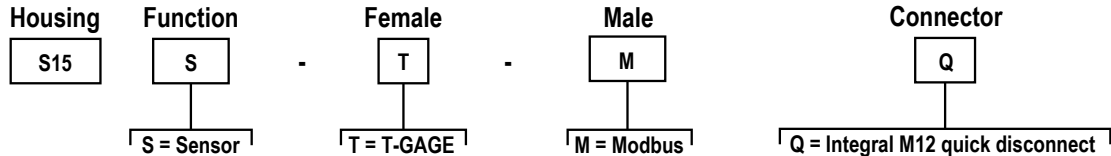


## Features



- Non-contact infrared temperature sensor outputs temperature to Modbus registers
- By detecting emitted infrared energy, the S15S Non-Contact Infrared Temperature Sensor quickly and reliably checks temperatures without needing to be touching the target
- Rugged overmolded design

## Models



## Overview

The S15S-T-MQ temperature sensor is a non-contact temperature sensing device. The S15S-T-MQ sensor detects the infrared light energy emitted by objects instead of its own emitted light. The sensor uses a thermopile detector, made up of multiple infrared-sensitive elements (thermocouples) to detect this infrared energy within its field of view. The S15S-T-MQ presents the temperature data over the RS-485 Modbus network.

Potential Applications include:

- Hot part detection (baked goods, metals, bottles, rubber)
- Ejection verification of injection-molded parts
- Flame process verification
- Hot glue detection (packaging equipment, book binding)
- Cold part detection (frozen foods, ice, dairy)
- Roller monitoring
- Temperature monitoring of busbars
- Continuous temperature monitoring of critical assets



**WARNING:** DO NOT attempt to rotate the sensor after it is connected to the cable end. This will damage the sensor.

## Configuration Instructions

### Sensor Configuration Software

The Sensor Configuration Software offers an easy way to manage the sensor Modbus settings, retrieve data, and visually show sensor data. The Sensor Configuration Software runs on any Windows machine and uses an adapter cable (BWA-UCT-900, p/n 19970) to connect the sensor to the computer.

Download the most recent version of the Sensor Configuration Software from the Banner Engineering website: [https://info.bannerengineering.com/cs/groups/public/documents/software/b\\_3128586.exe](https://info.bannerengineering.com/cs/groups/public/documents/software/b_3128586.exe).

### Modbus Configuration

*Temperature Data – Read Only*

Sensor Address	Description	I/O Range	Comments	Default	Access
40002	Temperature (°C)	-20 to +320	Temperature = Register Value ÷ 5	-	RO
40003	Temperature (°F)	-4 to +644	Temperature = Register Value ÷ 5	-	RO
40004	Core/Ambient Temperature (°C)	-20 to +320	Temperature = Register Value ÷ 5	-	RO

Continued on page 2



Continued from page 1

Sensor Address	Description	I/O Range	Comments	Default	Access
40007	Core/Ambient Temperature (°F)	-4 to +644	Temperature = Register Value + 5	-	RO

*COMS Settings*

Sensor Address	Description	I/O Range	Comments	Default	Access
40601	Baud Rate	0 = 9.6k 1 = 19.2k 2 = 38.4k	0 = 9600 1 = 19200 2 = 38400	1	RW
40602	Parity	0 = None 1 = Odd 2 = Even	0 = None 1 = Odd 2 = Even	0	RW
40603	Address	1-254	-	1	RW
40605	Restore Factory Configuration	0 = No Operation, 1 = Restore	-	-	WO

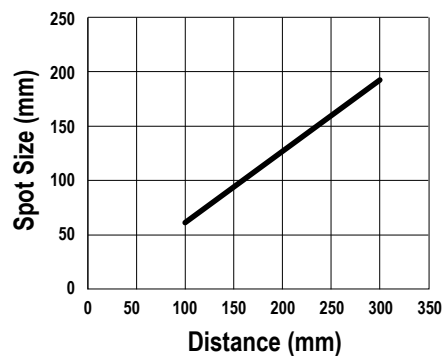
*Device Information*

Sensor Address	Description	I/O Range	Comments	Default	Access
40606-40615	Banner Name	0..65535	-	Banner Engineering	RO
40616-40631	Product Name	0..65535	-	S15S-T-MQ	RO
40632	Item H	0..65535	813163 split into two registers	12	RO
40633	Item L	0..65535		27164	RO
40634	Serial Number 1 (H)	0..65535	-	-	RO
40635	Serial Number 2	0..65535	-	-	RO
40636	Serial Number 3	0..65535	-	-	RO
40637	Serial Number 4 (L)	0..65535	-	-	RO
40644-40659	User Define Tag	0..65535	User writable space	More Sensors. More Solutions.	RW

## Sensing Field of View

Sensing range is determined by the sensor's field of view or viewing angle, combined with the size of the object(s) being detected. The S15S-T-MQ has a 35° viewing angle.

*Detection spot size versus distance from sensor*



*Distance from Sensor Face vs. Spot Size*

Distance (mm)	100	150	200	250	300
Spot Size (mm)	63.1	94.6	126.1	157.7	189.2

## S15S Apparent Temperature

Two factors that have a large influence on apparent temperature are the object's emissivity and whether or not the object fills the sensor field of view.

**Object Emissivity**

A "blackbody" is a "perfect" emitter, with an emissivity of 1.0 at all temperatures and wavelengths. Most surfaces emit only a fraction of the amount of thermal energy that a blackbody would. Typical T-GAGE applications will be sensing objects with emissivities ranging from 0.5 to 0.95. Many references are available with tables of emissivity coefficients for common materials. In general, shiny unpainted metals have low emissivity, while non-glossy surfaces have high emissivity.

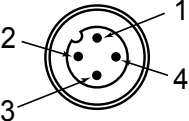
**Shiny Surfaces**

A mirror or shiny surface can redirect an object's emitted energy to an undesired location, or even bring additional unintended thermal energy into the sensor's field of view.

**Object Size**

If the object being detected does not fill the sensor field of view, then the sensor averages the temperature of that object and whatever else is in the sensing field of view. For the sensor to collect the maximum amount of energy, the object should completely fill the sensor field of view. In some applications, when the object is too small, this may not be possible. In such cases, if the object is hot enough, the thermal contrast may still be adequate to trigger the sensor output.

## Wiring Diagrams

Male (Gateway)	Pin	Wire Color	Signal Description
	1	Brown	10 V DC to 30 V DC
	2	White	RS485/D1/B/+
	3	Blue	Ground
	4	Black	RS485/D0/A/-

## Status Indicators

**Power LED Indicator (Green)**

- Solid Green = Power On
- Off = Power Off

**Modbus Communication LED Indicator (Amber)**

- Flashing Amber = Modbus communications are active
- Off = Modbus communications are not present

## S15S Specifications

**Supply Voltage**

10 V DC to 30 V DC at 50 mA maximum

**Supply Protection Circuitry**

Protected against reverse polarity and transient voltages

**Leakage Current Immunity**

400  $\mu$ A

**Indicators**

Green LED: Power

Amber LED (Flashing): Modbus communications active

**Connections**

Integral 4-pin M12 male quick-disconnect connector

**Linearity**

From 0 °C to +50 °C:  $\pm 0.5$  °C

From 50 °C to +100 °C:  $\pm 1$  °C

From 100 °C to +150 °C:  $\pm 2$  °C

From 150 °C to +200 °C:  $\pm 3$  °C

From 200 °C to +350 °C:  $\pm 4$  °C

**Required Overcurrent Protection**

**WARNING:** Electrical connections must be made by qualified personnel in accordance with local and national electrical codes and regulations.

Overcurrent protection is required to be provided by end product application per the supplied table.

**Construction**

Coupling Material: Nickel-plated brass

Connector Body: PVC translucent black

**Vibration and Mechanical Shock**

Meets IEC 60068-2-6 requirements (Vibration: 10 Hz to 55 Hz, 1.0 mm amplitude, 5 minutes sweep, 30 minutes dwell)

Meets IEC 60068-2-27 requirements (Shock: 15G ms duration, half sine wave)

**Operating Conditions**

**Temperature:** -40 °C to +70 °C (-40 °F to +158 °F)

90% at +70 °C maximum relative humidity (non-condensing)

**Storage Temperature:** -40 °C to +80 °C (-40 °F to +176 °F)

Overcurrent protection may be provided with external fusing or via Current Limiting, Class 2 Power Supply.

Supply wiring leads < 24 AWG shall not be spliced.

For additional product support, go to [www.bannerengineering.com](http://www.bannerengineering.com).

Supply Wiring (AWG)	Required Overcurrent Protection (A)	Supply Wiring (AWG)	Required Overcurrent Protection (A)
20	5.0	26	1.0
22	3.0	28	0.8
24	1.0	30	0.5

#### Certifications



Banner Engineering BV  
Park Lane, Culliganlaan 2F bus 3  
1831 Diegem, BELGIUM



Turck Banner LTD Blenheim House  
Blenheim Court  
Wickford, Essex SS11 8YT  
GREAT BRITAIN



## Application Note

The following are examples of materials with high and low emissivity. Additional examples can be found online.

Sensor-Friendly Materials (High Emissivity)		Materials to Sense with Caution (Low Emissivity)
<ul style="list-style-type: none"> <li>Aluminum - anodized</li> <li>Asphalt</li> <li>Brick</li> <li>Carbon - lampblack or plate material</li> <li>Cardboard - corrugated or chipboard</li> <li>Concrete</li> <li>Glass - smooth, lead, or borosilicate (e.g., Pyrex®)</li> <li>Gypsum (including finished boards)</li> </ul>	<ul style="list-style-type: none"> <li>Ice</li> <li>Iron and steel (except bright galvanized)</li> <li>Paper - most types, regardless of color</li> <li>Styrofoam® insulation</li> <li>Plastics</li> <li>Water</li> <li>Wood</li> <li>Rubber (for example, tires)</li> </ul>	<ul style="list-style-type: none"> <li>Aluminum - plain or highly polished</li> <li>Copper</li> <li>Galvanized iron</li> <li>Stainless steel</li> <li>Vapor-deposited materials</li> </ul>

## FCC Part 15 Class B

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

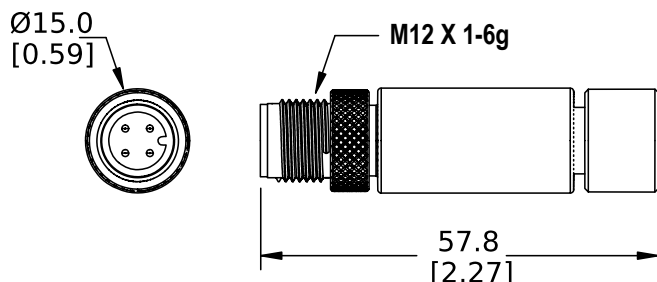
## Industry Canada ICES-003(B)

This device complies with CAN ICES-3 (B)/NMB-3(B). Operation is subject to the following two conditions: 1) This device may not cause harmful interference; and 2) This device must accept any interference received, including interference that may cause undesired operation.

Cet appareil est conforme à la norme NMB-3(B). Le fonctionnement est soumis aux deux conditions suivantes : (1) ce dispositif ne peut pas occasionner d'interférences, et (2) il doit tolérer toute interférence, y compris celles susceptibles de provoquer un fonctionnement non souhaité du dispositif.

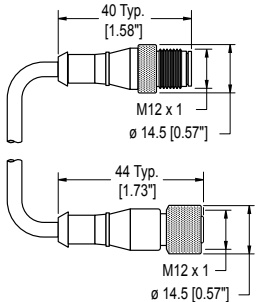
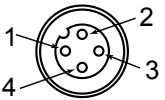
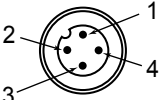
## Dimensions

All measurements are listed in millimeters [inches], unless noted otherwise.

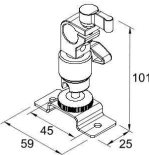
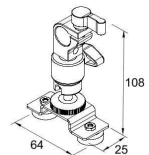


## Accessories

### Cordsets

4-Pin Threaded M12 Cordsets—Double Ended				
Model	Length	Style	Dimensions	Pinout
MQDEC-401SS	0.31 m (1 ft)	Male Straight/Female Straight		Female
MQDEC-403SS	0.91 m (2.99 ft)			
MQDEC-406SS	1.83 m (6 ft)			Male
MQDEC-412SS	3.66 m (12 ft)			
MQDEC-420SS	6.10 m (20 ft)			
MQDEC-430SS	9.14 m (30.2 ft)			
MQDEC-450SS	15.2 m (49.9 ft)			 <p>1 = Brown 2 = White 3 = Blue 4 = Black</p>

### Brackets

<b>SMB-S15S-SWIVEL</b> <ul style="list-style-type: none"> <li>15 mm swivel bracket for S15 housing</li> <li>Aluminum alloy</li> <li>Screw mount</li> </ul>	
<b>SMB-S15S-SWIVEL-MAG</b> <ul style="list-style-type: none"> <li>15 mm swivel bracket for S15 housing</li> <li>Aluminum alloy</li> <li>Magnetic mount</li> </ul>	

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For patent information, see [www.bannerengineering.com/patents](http://www.bannerengineering.com/patents).

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Part number: 227295

Revision: B

Original Instructions

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