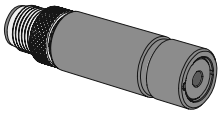
S15S Modbus Non-Contact Infrared Temperature Sensor Datasheet

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

Housing	Function		Female		Male	Connector
S15	S	-	T	-	M	Q
	S = Sensor		T = T-GAGE		M = Modbus	Q = Integral M12 quick disconnect

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.

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

Original Instructions
July 06, 2023

© Banner Engineering Corp.

p/n: 227295 Rev. B

ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

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

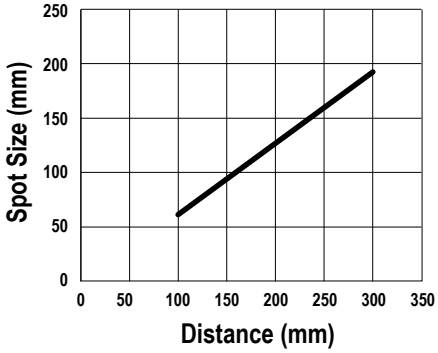
Device Information

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.

© Banner Engineering Corp.

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.

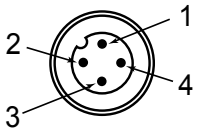
Shiny Surfaces

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 µA

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: ±0.5 °C

From 50 °C to +100 °C: ±1 °C

From 100 °C to +150 °C: ±2 °C

From 150 °C to +200 °C: ±3 °C

From 200 °C to +350 °C: ±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.

© Banner Engineering Corp.

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)
• Aluminum - anodized • Asphalt • Brick • Carbon - lampblack or plate material • Cardboard - corrugated or chipboard • Concrete • Glass - smooth, lead, or borosilicate (e.g., Pyrex®) • Gypsum (including finished boards)	• Ice • Iron and steel (except bright galvanized) • Paper - most types, regardless of color • Styrofoam® insulation • Plastics • Water • Wood • Rubber (for example, tires)	• Aluminum - plain or highly polished • Copper • Galvanized iron • Stainless steel • Vapor-deposited materials

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.

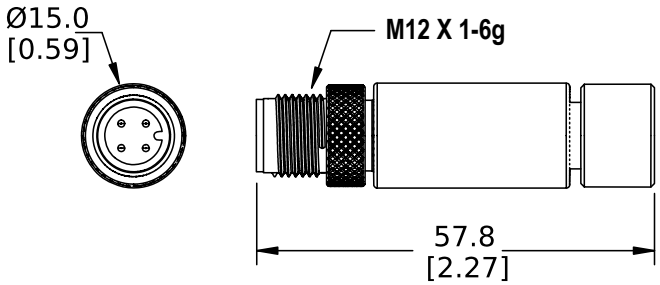
Industry Canada ICES-003(B)

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

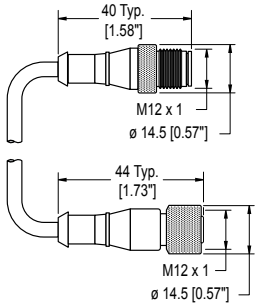
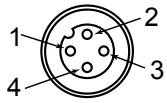
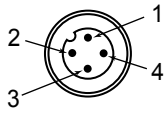
All measurements are listed in millimeters [inches], unless noted otherwise.



© Banner Engineering Corp.

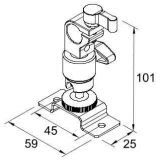
Accessories

Cordsets

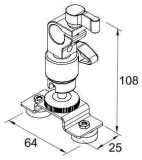
4-Pin Threaded M12 Cordsets—Double Ended				
Model	**Length**	**Style**	**Dimensions**	**Pinout**
MQDEC-401SS	0.31 m (1 ft)	Male Straight/Female Straight		Female  Male  1 = Brown 2 = White 3 = Blue 4 = Black
MQDEC-403SS	0.91 m (2.99 ft)			
MQDEC-406SS	1.83 m (6 ft)			
MQDEC-412SS	3.66 m (12 ft)			
MQDEC-420SS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

Brackets

SMB-S15S-SWIVEL
- 15 mm swivel bracket for S15 housing
- Aluminum alloy
- Screw mount



SMB-S15S-SWIVEL-MAG
- 15 mm swivel bracket for S15 housing
- Aluminum alloy
- Magnetic mount



Banner Engineering Corp Limited Warranty

Banner Engineering Corp. warrants its products to be free from defects in material and workmanship for one year following the date of shipment. Banner Engineering Corp. will repair or replace, free of charge, any product of its manufacture which, at the time it is returned to the factory, is found to have been defective during the warranty period. This warranty does not cover damage or liability for misuse, abuse, or the improper application or installation of the Banner product.

THIS LIMITED WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES WHETHER EXPRESS OR IMPLIED (INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE), AND WHETHER ARISING UNDER COURSE OF PERFORMANCE, COURSE OF DEALING OR TRADE USAGE.

This Warranty is exclusive and limited to repair or, at the discretion of Banner Engineering Corp., replacement. **IN NO EVENT SHALL BANNER ENGINEERING CORP. BE LIABLE TO BUYER OR ANY OTHER PERSON OR ENTITY FOR ANY EXTRA COSTS, EXPENSES, LOSSES, LOSS OF PROFITS, OR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES RESULTING FROM ANY PRODUCT DEFECT OR FROM THE USE OR INABILITY TO USE THE PRODUCT, WHETHER ARISING IN CONTRACT OR WARRANTY, STATUTE, TORT, STRICT LIABILITY, NEGLIGENCE, OR OTHERWISE.**

Banner Engineering Corp. reserves the right to change, modify or improve the design of the product without assuming any obligations or liabilities relating to any product previously manufactured by Banner Engineering Corp. Any misuse, abuse, or improper application or installation of this product or use of the product for personal protection applications when the product is identified as not intended for such purposes will void the product warranty. Any modifications to this product without prior express approval by Banner Engineering Corp will void the product warranties. All specifications published in this document are subject to change; Banner reserves the right to modify product

© Banner Engineering Corp.

specifications or update documentation at any time. Specifications and product information in English supersede that which is provided in any other language. For the most recent version of any documentation, refer to: www.bannerengineering.com.

For patent information, see www.bannerengineering.com/patents.

Document title: S15S Modbus Non-Contact Infrared Temperature Sensor Datasheet
Part number: 227295
Revision: B
Original Instructions
© Banner Engineering Corp. All rights reserved.

227295