

Modbus Thermocouple Sensor Adapter Datasheet



1 Introduction

The Modbus Thermocouple Sensor Adapter is designed to operate with any K-type thermocouple probe and provides temperature measurements ranging between -200°C to 1372°C with an accuracy of $\pm 0.5^\circ\text{C}$. The adapter automatically manages all the necessary signal conditioning and analog to digital conversions to produce linearized temperature readings and can sustain high report rates. The Modbus Thermocouple Sensor Adapter may be used in applications such as food production, metal extruders, furnaces, cryogenic baths, and freezers to name a few.

1.1 Features

- Thermocouple Sensor Adapter connects with any K-type Thermocouple probe
- Measures Temperature in the range of -200°C to 1372°C with an accuracy of $\pm 0.5^\circ\text{C}$
- Automatic cold junction compensation and linearization for high accuracy readings
- Implements Modbus RTU protocol.
- Low power consumption 5V, 85mW
- High report rate of 1 report every 5 seconds
- Operating temperature range: 0°C to +70°C
- Flush mount and DIN Rail Mount options



Neither the whole nor any part of the information contained in, or the product described in this manual, may be adapted, or reproduced in any material or electronic form without the prior written consent of the copyright holder. This product and its documentation are supplied on an as-is basis and no warranty as to their suitability for any particular purpose is either made or implied. Bridgetek Pte Ltd will not accept any claim for damages howsoever arising as a result of use or failure of this product. Your statutory rights are not affected. This product or any variant of it is not intended for use in any medical appliance, device, or system in which the failure of the product might reasonably be expected to result in personal injury. This document provides preliminary information that may be subject to change without notice. No freedom to use patents or other intellectual property rights is implied by the publication of this document. Bridgetek Pte Ltd, 1 Tai Seng Avenue, Tower A, #03-05, Singapore 536464. Singapore Registered Company Number: 201542387H

2 Part Numbers / Ordering Information

Part Number	Description
MS-0301-01A	Modbus Thermocouple Sensor Adapter
MA-0102-01A	Modbus RS485-RJ11 Cable (30cm)
LA-1201-01A	LDSBus DIN Rail Mount Set

Table 1 - Part Numbers / Ordering Information

Table of Contents

1 Introduction	1
1.1 Features	1
2 Part Numbers / Ordering Information	2
3 Specifications	4
4 FCC Compliance Statement.....	5
5 Hardware Features	6
6 Sensor Adapter Configuration and Installation.....	8
6.1 Connection Diagram for Standard Modbus Power Supply	8
6.2 RS485-RJ11 Cable(30cm)	9
7 Mounting Instructions	10
7.1 Flush Mount.....	10
7.2 DIN Rail Mount.....	10
8 Modbus Registers	11
9 Mechanical Dimensions	12
10 System Status LED Indicators.....	13
11 Type-K Plug Interface Probe Standard	14
12 Contact Information	15
Appendix A – References	16
Document References	16
Acronyms and Abbreviations.....	16
Appendix B – List of Figures and Tables.....	17
List of Figures	17
List of Tables.....	17
Appendix C – Revision History	18

3 Specifications

Features	Interface	K-type connector (connect to K-type probe), RS485 Modbus RTU
	LED Indicator (RGB)	System Status Indicator (Please refer to LED section)
	Mounting	Flush Mount DIN-Rail Mount
Power	Modbus Voltage	9-24V DC Bus Power
	Device Input Voltage	5V DC Bus Power
	Typical Power	85mW
	Max. Power	320mW
Thermocouple Sensor input module	Range	-200°C to +1372°C
	Accuracy	±0.5C
	Resolution	0.0625°C/ 0.25°C (Configurable)
	Response Time	<3 seconds
	Thermocouple Type	Type-K
Physical Characteristics	Color	White
	Housing	Polycarbonate
	Dimensions	L117.6mm x W42.9mm x H29.7mm
Environmental Limits	Operating Temperature	0 to 70°C
	Storage Temperature	-20 to 85°C
	Ambient Relative Humidity	5 to 95% (non-condensing)
Package Contents	Device	1x Modbus Thermocouple Sensor Adapter
	Wire Assembly	1X Modbus RS485-RJ11 Cable(30cm)
Optional	Mounting Accessories	1x DIN Rail Bracket Set

Table 2 - Modbus Thermocouple Sensor Adapter Specifications

4 FCC Compliance Statement

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) These devices may not cause harmful interference, and
- (2) These devices must accept any interference received, including interference that may cause undesired operation.

NOTE: The 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 the 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:

- Re-orient 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.

To maintain compliance with FCC's RF exposure guidelines, at least 20cm of separation distance between the device and the user's body must be always maintained.

FCC Radiation Exposure Statement

This device complies with FCC radiation exposure limits set forth for an uncontrolled environment and it also complies with Part 15 of the FCC RF Rules. This equipment must be installed and operated in accordance with the instructions provided, and the antenna(s) used for this transmitter must be installed to provide a separation distance of at least 20 cm from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter. End-users and installers must be provided with antenna installation instructions and consider removing the no-collocation statement.

Caution

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.



5 Hardware Features

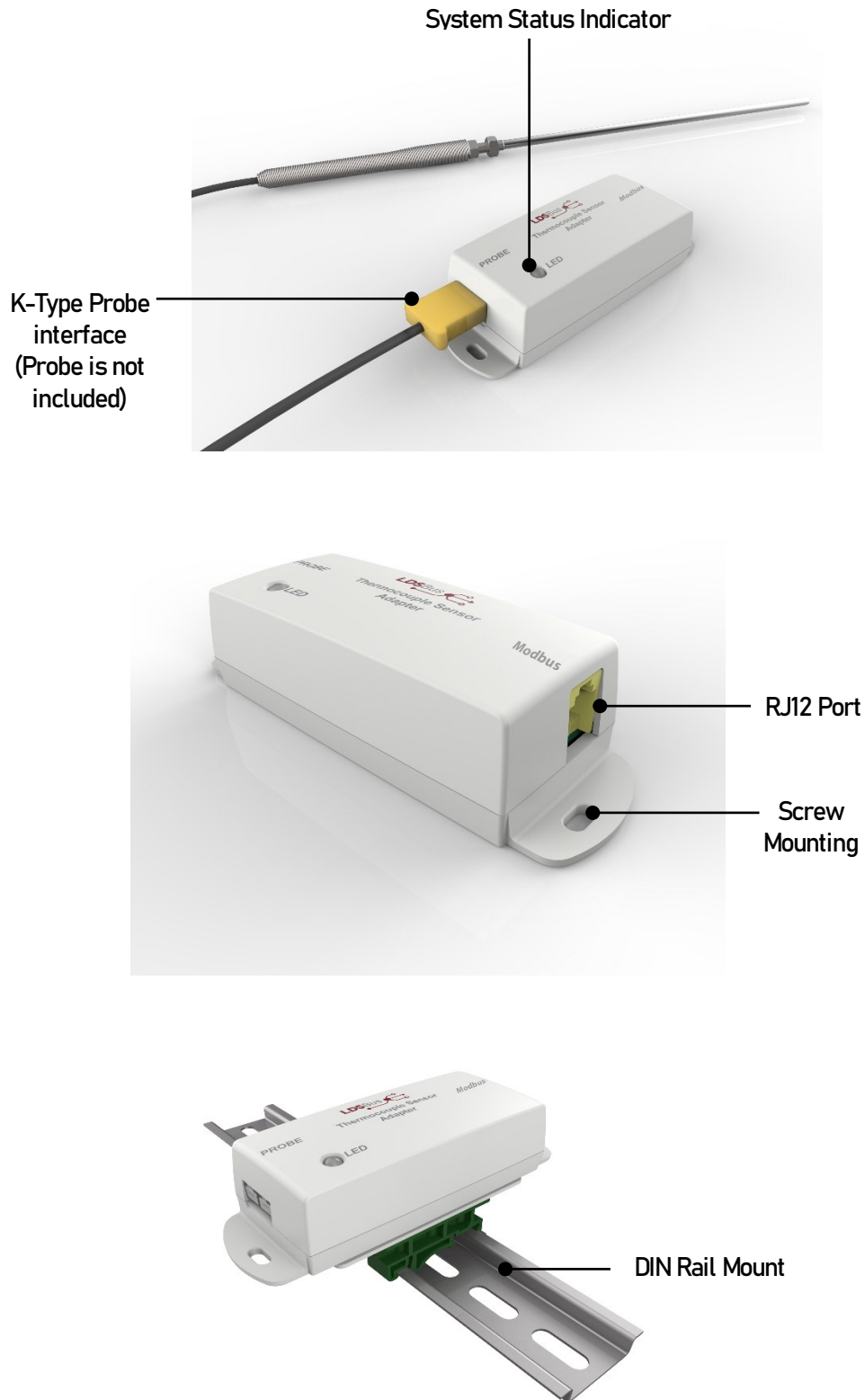


Figure 1 - Modbus Thermocouple Sensor Adapter - Hardware Features

Function	Labels	Description
K-Type Probe Interface	Probe	Probe Interface
System Status LED Indicator	LED	Modbus status LED
RJ12 Port	Modbus	Modbus data and power interface port. The physical port is RJ12. The connection interface can be RJ11/RJ12.

Table 3 - Modbus Thermocouple Sensor Adapter Hardware Features

6 Sensor Adapter Configuration and Installation

Please visit <https://brtsys.com/resources/software/utility-tools> to access the Modbus Configuration Utility guide on how to configure the device name, device address and termination settings before using it for your specific application.

6.1 Connection Diagram for Standard Modbus Power Supply

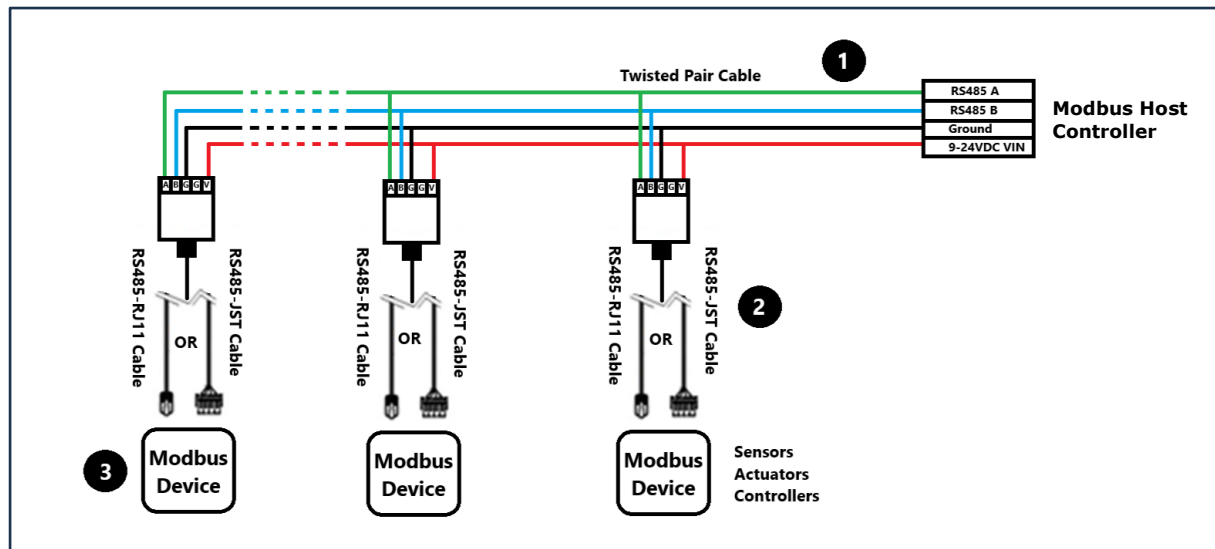


Figure 2 - Modbus Thermocouple Sensor Adapter Connection Diagram

Setup Instructions:

1. Use a Cat5e/Cat6e RJ45 Twisted Pair Cable to connect the Modbus controller (Host) to the network for RS485 communication and power.
2. Connect each Modbus device to the network using either an RS485-JST cable or an RS485-RJ11 cable, as provided with the device.
3. Modbus devices have built-in bus termination resistors. These resistors can be enabled or disabled by using the [Modbus Configuration Utility](#). When installing the device as the last device on the bus, these terminations may be used to terminate the bus.

6.2 RS485-RJ11 Cable(30cm)



Figure 3 - RS485-RJ11 Cable(30cm)

PIN Legend	Function
VIN	Modbus Input Voltage 9-24VDC
GND	Ground
GND	Ground
B	RS485-B
A	RS485-A

Table 4 - RS485-RJ11 Cable(30cm) Pin Configuration

7 Mounting Instructions

7.1 Flush Mount

The device can be flush mounted directly on a wall or any flat surface using 2 M3.5*16mm (thread) screws.

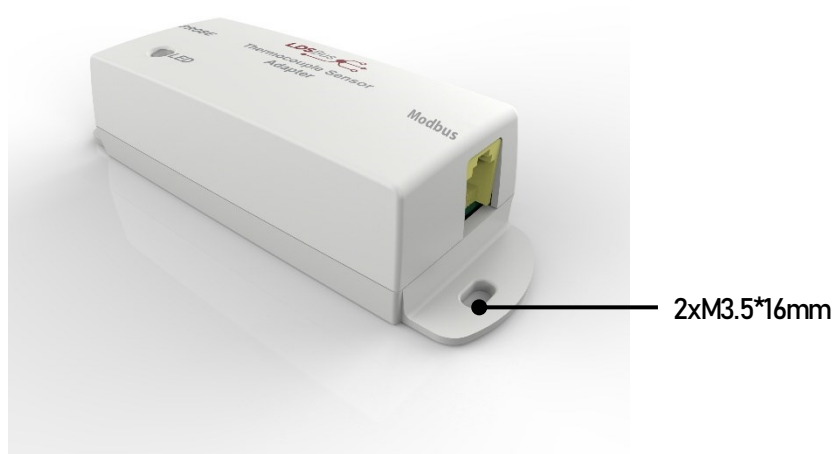


Figure 4 - Modbus Thermocouple Sensor Adapter Flush Mount

7.2 DIN Rail Mount

The device can be mounted on a DIN Rail using the LDSBus DIN Rail Mount set. This set is optional and includes the bracket and mounting screws.

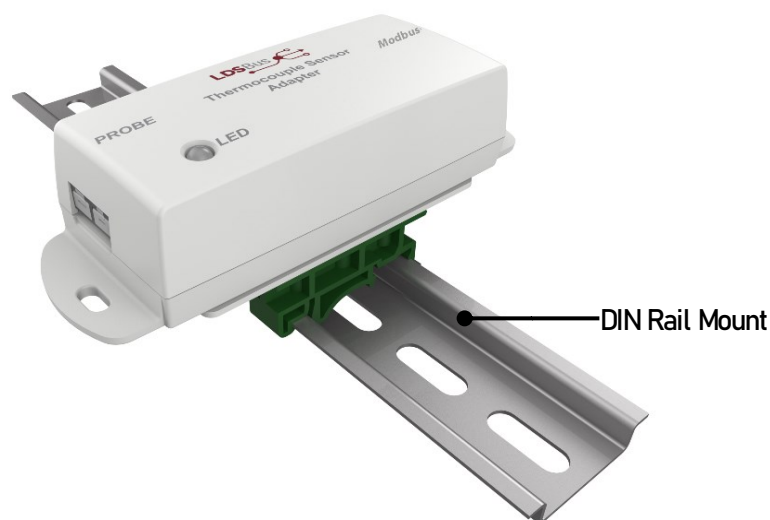


Figure 5 - Modbus Thermocouple Sensor Adapter DIN Rail Mount

8 Modbus Registers

Parameter	Starting Address	Quantity of Registers	Supported Function Code	Parameter Range and Description	Default
Address⁽¹⁾	0000H	1	0x03/0x10	1 to 126	126
RS485 Termination⁽¹⁾	0001H	1	0x03/0x10	0 - Termination OFF 1 - Termination ON	Termination OFF
Baud Rate⁽¹⁾	0002H	1	0x03/0x10	0 - 1200 bps 1 - 2400 bps 2 - 4800 bps 3 - 9600 bps 4 - 19200 bps 5 - 38400 bps 6 - 115200 bps	9600 bps
Parity⁽¹⁾	0003H	1	0x03/0x10	0 - None 1 - Odd 2 - Even	Even
Status LED Enable⁽¹⁾	0004H	1	0x03/0x10	0 - LED OFF 1 - LED ON	LED ON
Device UUID	0026H	8	0x03	MSxxxxxxxxxyy where x is ASCII char and yy is 16-bit running number	N/A
Device Firmware Version	002EH	1	0x03	0xXXMN XX - Not concerned M - Major N - Minor	N/A
Device Part Number	002FH	1	0x03	Device ID	0x8001
Reserved	0030H	N/A	N/A	Reserved	N/A
Temperature	0031H	2	0x03	-20000 to 137200 (-200 to 1372°C)	N/A
Reset	0150H	1	0x06	Write 1 to reset	N/A
Reserved	0151H	N/A	N/A	Reserved	N/A
Identify	0152H	1	0x06	Write 1 to start blinking the device @1Hz for 10 seconds	N/A

Table 5 - Modbus Registers

⁽¹⁾This indicates that any updates to these communication/status register(s) will only take effect after the device has been rebooted.

9 Mechanical Dimensions

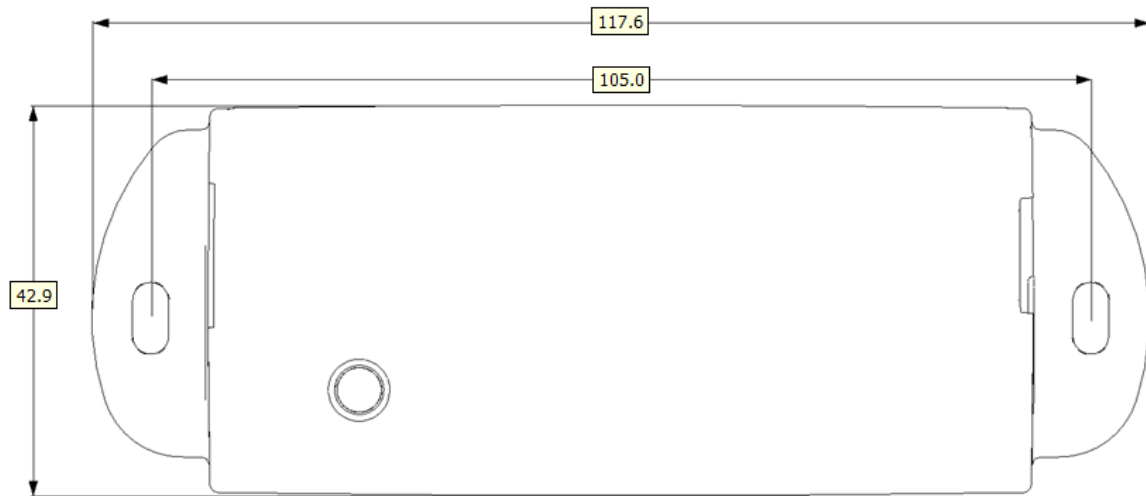


Figure 6 - Modbus Thermocouple Sensor Adapter Dimension – Top View

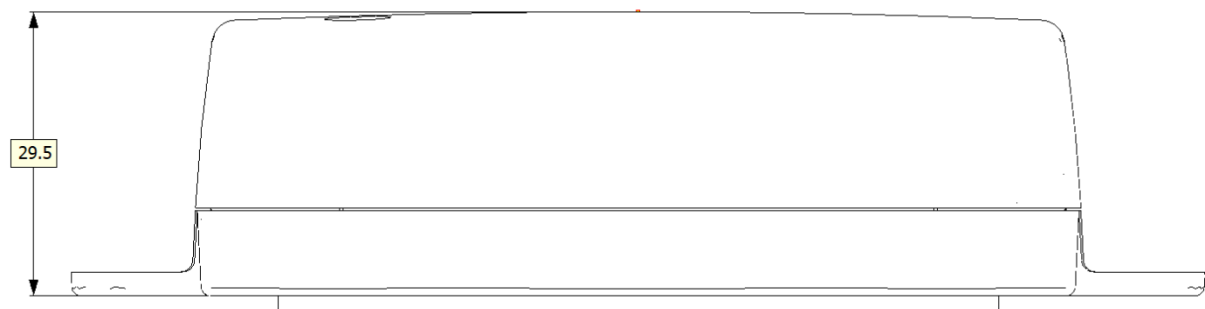


Figure 7 - Modbus Thermocouple Sensor Adapter Dimension – Side View

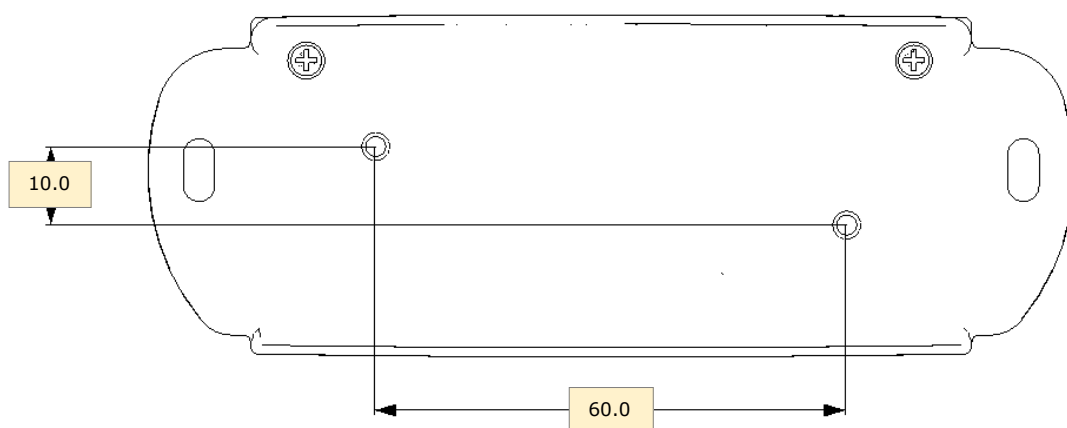


Figure 8 – Modbus Thermocouple Sensor Adapter Dimension – Bottom View

Note: All dimensions are in millimetres.

10 System Status LED Indicators





Device Status	LED Color		Flashing Frequency	Description
Termination ON	BLUE		Steady – Non- flashing	
Termination OFF	GREEN		Steady – Non- flashing	
Device Configuration Error	RED		Steady – Non- flashing	Device configuration error
Communication	RED/GREEN/ BLUE/YELLOW	-	Blink twice (Short blink)	Device in communication
Firmware update	YELLOW		Steady – Non- flashing	Device firmware update

Table 6 - System Status LED Indicators

Note:

1. For reliable communication, ensure that the power supply and the RS485 termination settings are correct.
2. Ensure that the Modbus address and baud rate are configured correctly before deployment.

11 Type-K Plug Interface Probe Standard

Table 7 provides a list of Type K Plugs to terminate Type K thermocouple probes for connection to Modbus Thermocouple Sensor Adapter.

‘+’ Contact	‘-’ Contact	IEC Miniature		ANSI Miniature		JIS Miniature	
		Color	Green	Color	Yellow	Color	Blue
Nickel Chromium	Nickel Alloy						

Table 7 - Type-K Plugs Interface

For information related to probes recommendation and selection criteria, please refer to [LDSBus Probe Specifications](#).

12 Contact Information

Refer to <https://brtchip.com/contact-us/> for contact information.

Distributor and Sales Representatives

Please visit the Distribution Network – IC & Module (brtchip.com) page for the contact details of our distributor(s) and sales representative(s) in your country.

System and equipment manufacturers and designers are responsible to ensure that their systems, and any Bridgetek Pte Ltd (BRTChip) devices incorporated in their systems, meet all applicable safety, regulatory and system-level performance requirements. All application-related information in this document (including application descriptions, suggested Bridgetek devices and other materials) is provided for reference only. While Bridgetek has taken care to assure it is accurate, this information is subject to customer confirmation, and Bridgetek disclaims all liability for system designs and for any applications assistance provided by Bridgetek. Use of Bridgetek devices in life support and/or safety applications is entirely at the user's risk, and the user agrees to defend, indemnify and hold harmless Bridgetek from any and all damages, claims, suits, or expense resulting from such use. This document is subject to change without notice. No freedom to use patents or other intellectual property rights is implied by the publication of this document. Neither the whole nor any part of the information contained in, or the product described in this document, may be adapted, or reproduced in any material or electronic form without the prior written consent of the copyright holder. Bridgetek Pte Ltd, 1 Tai Seng Avenue, Tower A, #03-05, Singapore 536464. Singapore Registered Company Number: 201542387H.

Appendix A – References

Document References

[Modbus Configuration Utility User Guide](#)

[LDSBus Probe Specifications](#)

Acronyms and Abbreviations

Terms	Description
DC	Direct Current
IoT	Internet of Things
LED	Light Emitting Diode

Appendix B – List of Figures and Tables

List of Figures

Figure 1 - Modbus Thermocouple Sensor Adapter - Hardware Features	6
Figure 2 - Modbus Thermocouple Sensor Adapter Connection Diagram	8
Figure 3 - RS485-RJ11 Cable(30cm).....	9
Figure 4 - Modbus Thermocouple Sensor Adapter Flush Mount.....	10
Figure 5 - Modbus Thermocouple Sensor Adapter DIN Rail Mount.....	10
Figure 6 - Modbus Thermocouple Sensor Adapter Dimension – Top View.....	12
Figure 7 - Modbus Thermocouple Sensor Adapter Dimension – Side View.....	12
Figure 8 – Modbus Thermocouple Sensor Adapter Dimension – Bottom View	12

List of Tables

Table 1 - Part Numbers / Ordering Information	2
Table 2 - Modbus Thermocouple Sensor Adapter Specifications	4
Table 3 - Modbus Thermocouple Sensor Adapter Hardware Features	7
Table 4 - RS485-RJ11 Cable(30cm) Pin Configuration	9
Table 5 - Modbus Registers	11
Table 6 - System Status LED Indicators	13
Table 7 - Type-K Plugs Interface	14

Appendix C – Revision History

Document Title: Modbus Thermocouple Sensor Adapter Datasheet

Document Reference No.: BRT_000495

Clearance No.: BRT#259

Product Page: <https://brtchip.com/product/modbus-thermocouple-sensor-adapter/>

Document Feedback: [Send Feedback](#)

Revision	Changes	Date
Version 1.0	Initial release under Bridgetek	13-10-2025