

# PRODUCT MANUAL

SPRING-LOADED 1.5 MM  
TEMPERATURE SENSOR

**TS-SL01.5-K**





# PRODUCT MANUAL

## SPRING-LOADED 1.5 MM TEMPERATURE SENSOR

### TS-SL01.5-K

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### TS-SL01.5-K

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## INTRODUCTION

Read, understand, and comply with all following instructions. This guide must be kept available for reference at all times.

### DISCLAIMER

Inasmuch as RJG, Inc. has no control over the use to which others may put this material, it does not guarantee that the same results as those described herein will be obtained. Nor does RJG, Inc. guarantee the effectiveness or safety of any possible or suggested design for articles of manufacture as illustrated herein by any photographs, technical drawings, and the like. Each user of the material or design or both should make his own tests to determine the suitability of the material or any material for the design as well as the suitability of the material, process, and/or design for his own particular use. Statements concerning possible or suggested uses of the material or designs described herein are not to be construed as constituting a license under any RJG, Inc. patent covering such use or as recommendations for use of such material or designs in the infringement of any patent.

### PRIVACY

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### ALERTS

The following three alert types are used as needed to further clarify or highlight information presented in the manual:

-  **DEFINITION** *A definition or clarification of a term or terms used in the text.*
-  **NOTES** *A note provides additional information about a discussion topic.*
-  **CAUTION** *A caution is used to make the operator aware of conditions that can cause damage to equipment and/or injury to personnel.*

### ABBREVIATIONS

DIA	diameter
MIN	minimum
MAX	maximum
R.	radius



## PRODUCT DESCRIPTION

The 1.5 mm spring-loaded cavity temperature sensor TS-SL01.5-K analyzes temperature variation inside the mold cavity. The TS-SL01.5-K is designed for use with RJG, Inc.'s Lynx™ Quad-Temperature Module LS-QTTB-K—which receives input from up to four thermocouples—and the eDART® system.

### APPLICATIONS

The sensor may be used to measure and monitor plastic flow front arrival timing and relative melt temperature, or to monitor mold temperature. Sensor application determines installation depth, as sensor depth and response time are directly related.

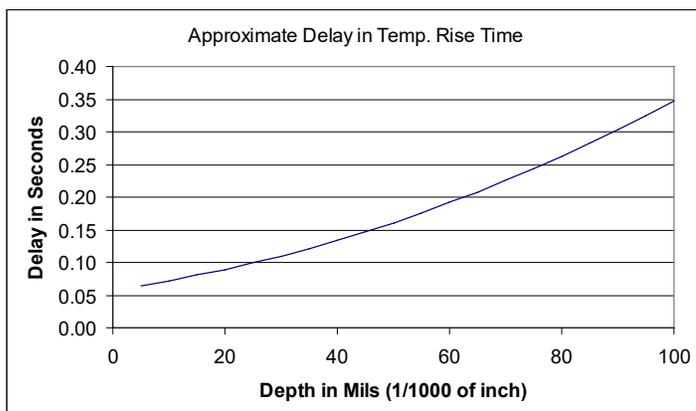
### FILL TIME AND EFFECTIVE MELT TEMPERATURE DETECTION

The sensor is retained in the mold, with the sensor tip situated in the mold at less than or equal to 0.02" (0,38 mm) from the cavity wall.

### MOLD TEMPERATURE MONITORING

The sensor is retained in the mold, with the sensor tip situated in the mold at greater than or equal to 0.02" (0,38 mm) from the cavity wall.

### SENSOR DEPTH AND RESPONSE TIME



### OPERATION

Thermocouples are comprised of two wires of dissimilar materials that are joined at one end. The joined end of the wires is heated (or cooled) creating a continuous current at the center. The voltage produced is measured and correlated to the temperature.

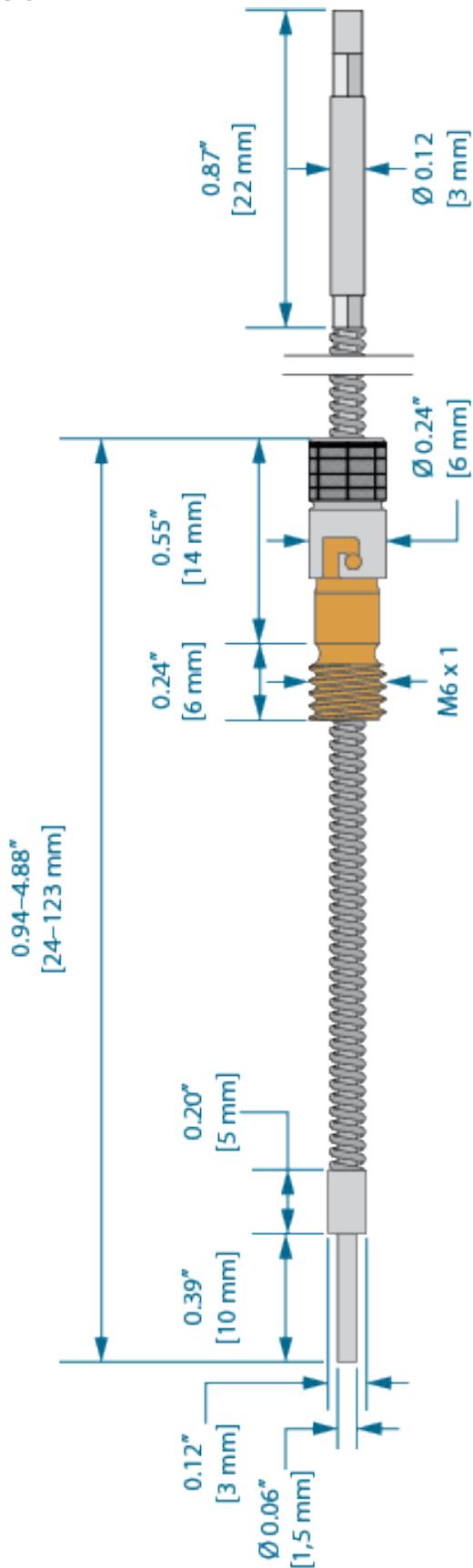
### TYPE K THERMOCOUPLES

Type K thermocouples are a common base-metal thermocouple known for general purpose applications due to their response time, accuracy, and temperature measurement range.

Type K thermocouples have a measurement range of 0–707 °F (0–375 °C) with an accuracy of  $\pm 1.8$  °F ( $\pm 1.5$  °C), or 707–752 °F (375–400 °C) with an accuracy of 0.4 % of reading.

## DIMENSIONS

### SENSOR



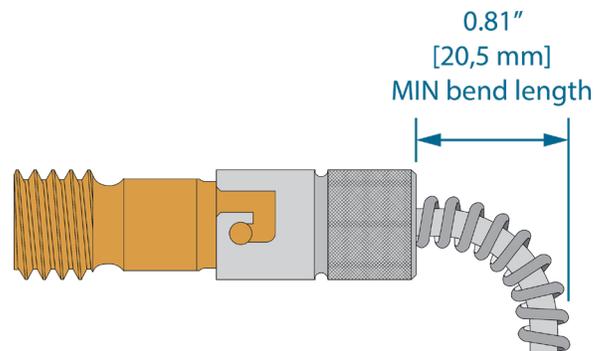
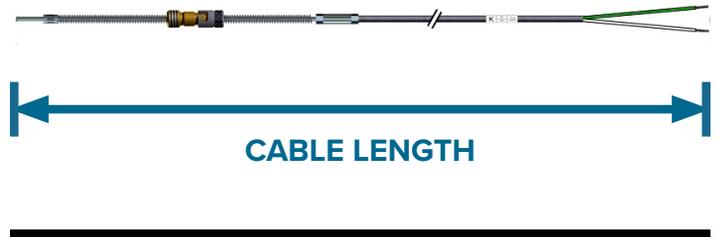
### CABLE LENGTHS

The TS-SL01.5-K sensor wire is available in three lengths. Length must be longer than needed to assure proper installation without tension on the lead wire.

#### PART NUMBER

#### LENGTH

PART NUMBER	LENGTH
TS-SL01.5m-K-.5M	19.7" (0,5 m)
TS-SL01.5m-K-1M	39.4" (1,0 m)
TS-SL01.5m-K-2M	78.7" (2,0 m)

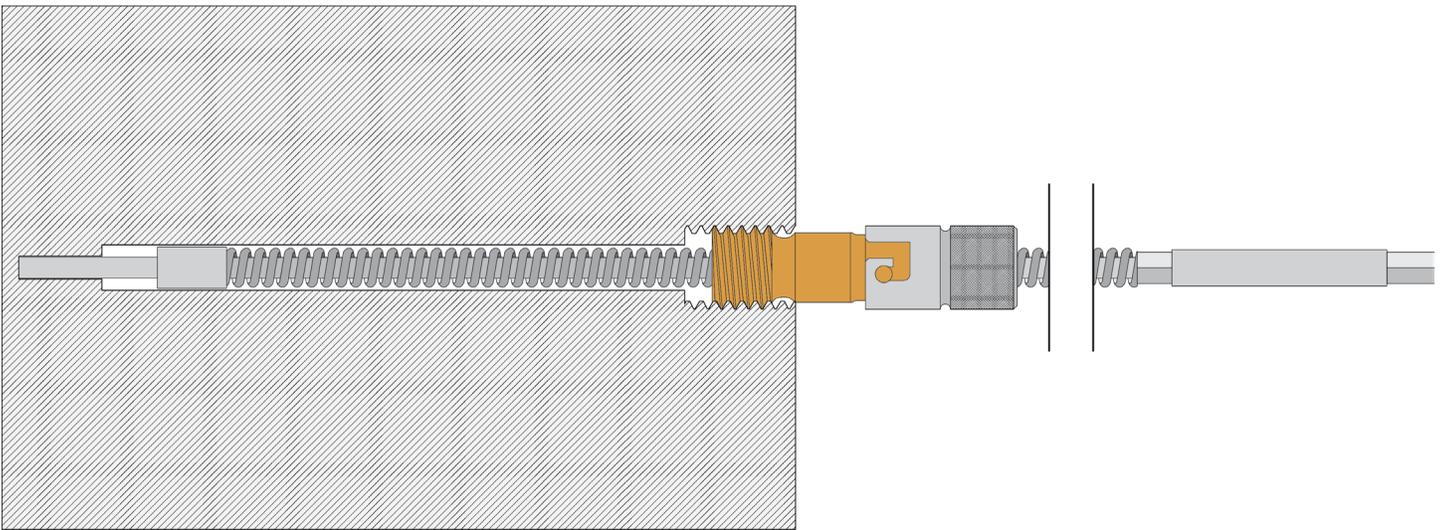
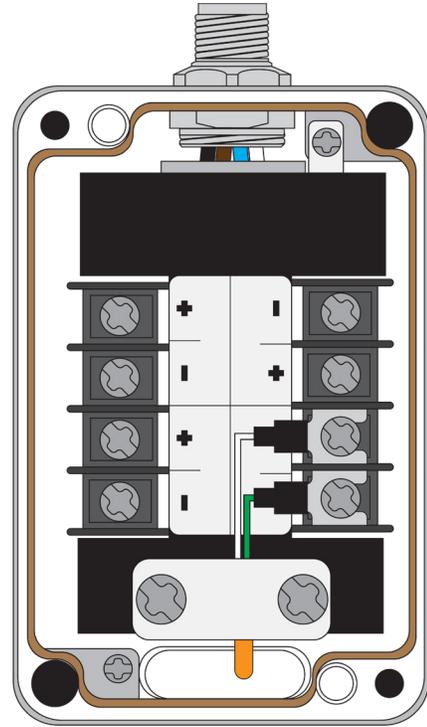


## INSTALLATION

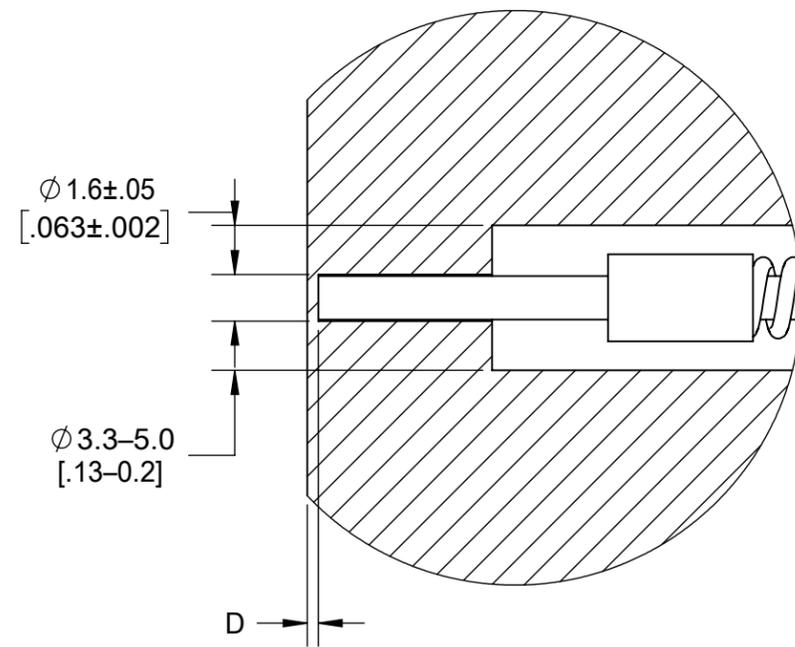
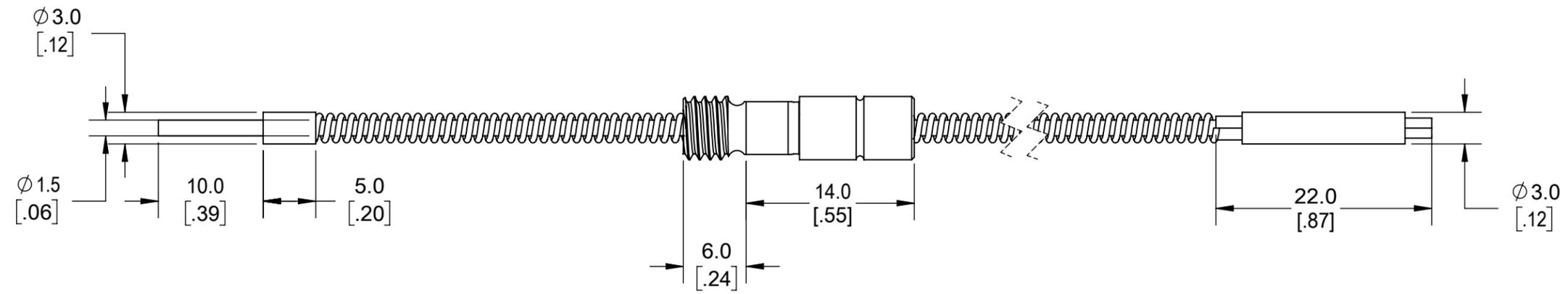
### INSTALLATION OVERVIEW

The sensor is retained in the mold by two fittings; a stainless steel bayonet fitting on the sensor cable retains the spring is clipped to a brass adapter fitting that is threaded into the cable channel. A tensioner outside of the mold can be turned clock or counter-clockwise to either increase or decrease the spring tension.

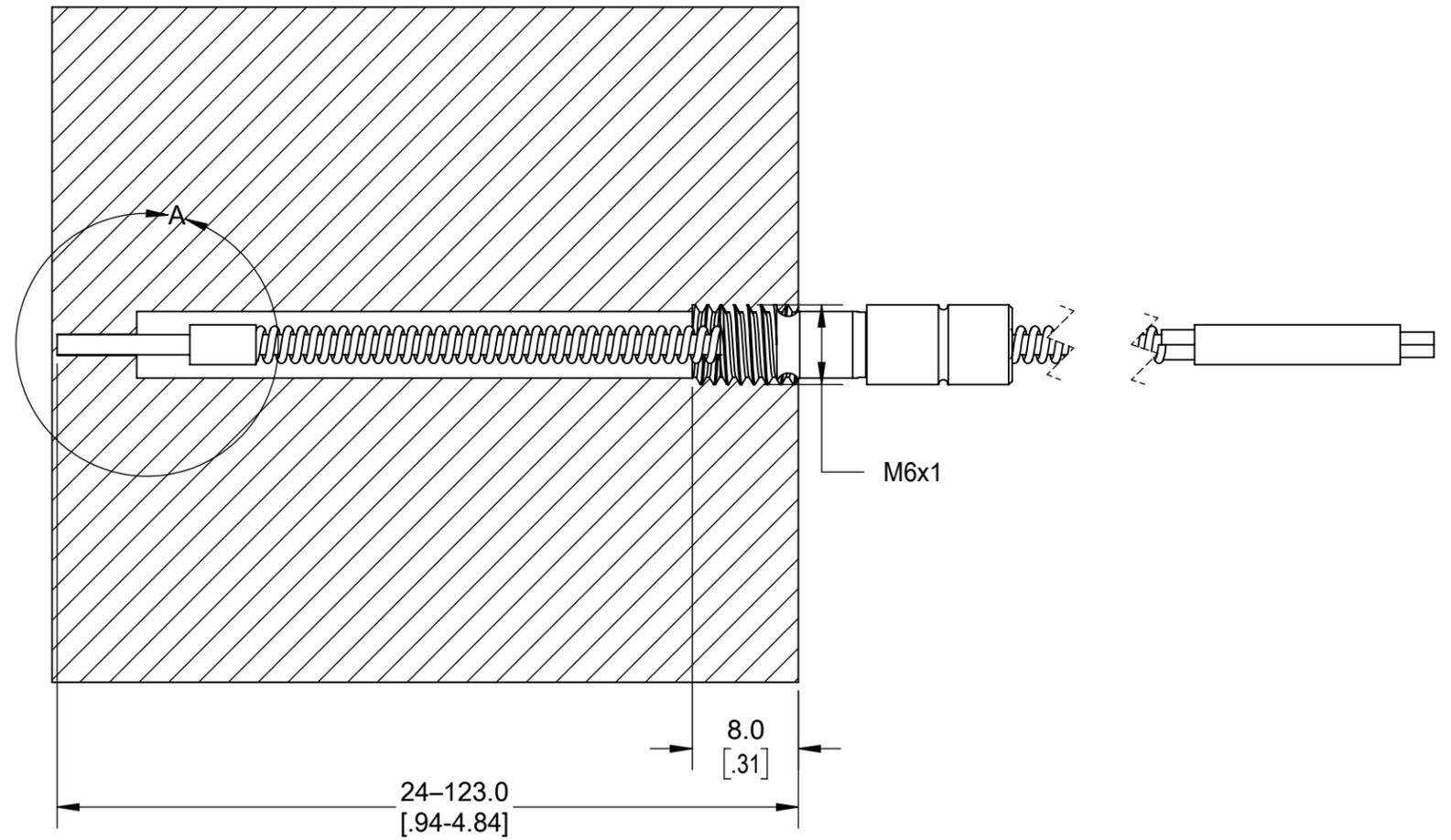
The sensor is wired through the slot in the Lynx Quad-Temperature Module LS-QTTB-K. The thermocouple wire is firmly restrained by a shield plate inside the module, and the two lead wires are connected to positive and negative terminals for the selected channel.



# INSTALLATION SPECIFICATIONS



DETAIL A  
SCALE 4 : 1



Application Depth (D)	
Flow Front Arrival and Effective Melt Temperature	D < .38 [.02]
Mold Temperature	D > .38 [.02]

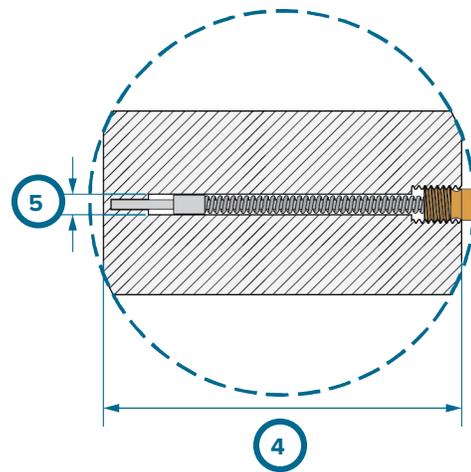
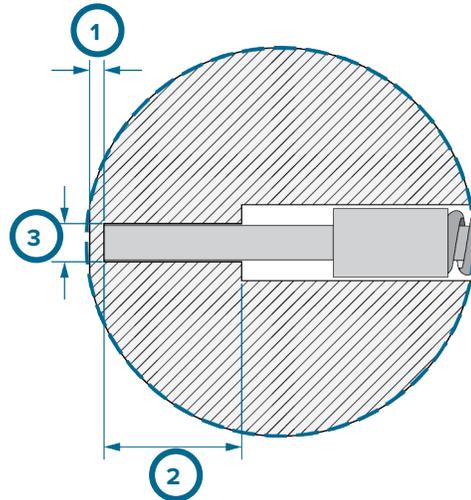
## INSTALLATION SPECIFICATIONS (continued)

### SENSOR POCKET

Machine the sensor pocket into the mold.

The sensor tip depth (1 at right) is dependent upon sensor application as sensor depth and response time are directly related. Refer to “Fill Time and Effective Melt Temperature Detection” and “Mold Temperature Monitoring” on page 1 for sensor application and depth information.

- Sensor head depth 0.24” (6,0 mm [2 at right])
- Sensor head DIA 0.063”  $\pm 0.002$ ” (1,6 mm  $\pm 0,05$  mm [3 at right])



### SENSOR CABLE CHANNEL

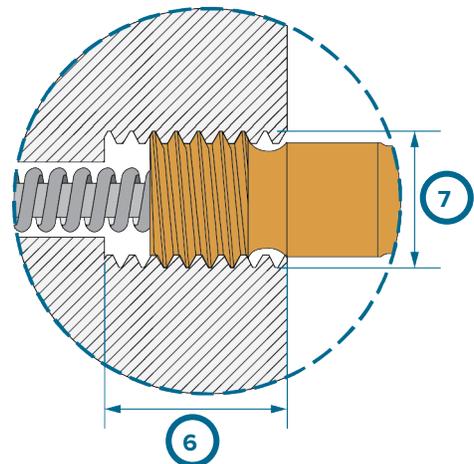
Mill a cable channel into the mold:

- The depth from the tip of the sensor to the plate surface may be between 0.94–4.84” (24–123 mm [4 at right])
- 0.13–0.19” (3,3–5,0 mm [5 at right]) DIA

### SENSOR ADAPTER

After forming the sensor pocket and cable channel, drill and tap to accommodate the sensor adapter threads:

- 0.31” (8,0 mm [6 at right]) Thread Depth
- M6x1 threads (7 at right)



1	TBD	5	0.13–0.19” (3,3–5,0 mm)
2	0.24” (6,0 mm)	6	0.31” (8,0 mm)
3	$\varnothing 0.063$ ” $\pm 0.002$ ” (1,6 mm $\pm 0,05$ mm)	7	M6x1
4	0.94–4.84” (24–123 mm)		

## INSTALLATION SPECIFICATIONS (continued)

### WIRING

#### 1. Remove cover.

- Remove screws (1) from LS-QTTB-K, then remove cover plate.

#### 2. Remove shield plate.

- Remove screws (2) from shield plate(3), then remove shield plate(3).

#### 3. Insert thermocouple wire.

- Feed thermocouple wire (4) through the mounting gasket and wire slot (5) in bottom of module.

#### 4. Connect negative (-) lead.

- Connect white wire (6) to the negative terminal.

#### 5. Connect positive lead (+).

- Connect green wire (7) to positive terminal.

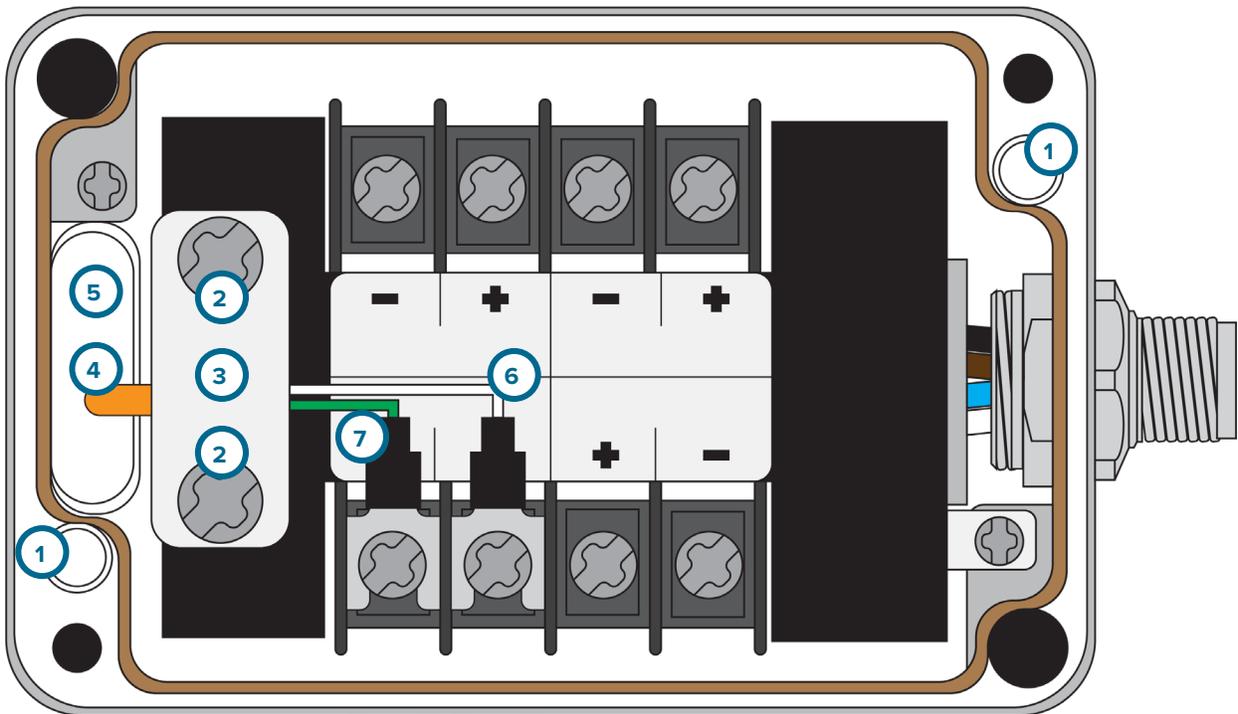
#### 6. Install shield plate.

- Install shield plate (3) over the thermocouple wire with screws (2)—ensure the plate contacts the shield.

**CAUTION** Do not over-tighten the plate; failure to comply will result in damage to equipment.

#### 7. Install cover plate.

- Install LS-QTTB-K cover plate with screws (1).



THERMOCOUPLE TYPE	THERMOCOUPLE WIRE COLORS	
	IEC 584-3	
Type K	Positive (+)	Green
	Negative (-)	White

## MAINTENANCE

The TS-SL01.5-K temperature sensor requires little maintenance.

### CLEANING

Keep sensor pocket, cable channel, and sensor components free from oil, dirt, grime, and grease.

### TESTING & CALIBRATION

Thermocouples are known to have drift in calibration dependent upon time and temperature. To test calibration, check the thermocouple output against the thermocouple rating and EMF tables in a known temperature source.

### RJG, INC. STANDARD THREE-YEAR WARRANTY

RJG, Inc. is confident in the quality and robustness of the TS-SL01.5-K cavity pressure sensors, and so are offering a three-year warranty on all RJG sensors. RJG's cavity pressure sensors are guaranteed against defects in material and workmanship for three years from the

original date of purchase. The warranty is void if it is determined that the sensor was subjected to abuse or neglect beyond the normal wear and tear of field use, or in the event the sensor has been opened by the customer. This new warranty policy is the most generous offered in the cavity pressure sensor industry, with one year being the most common.

### PRODUCT DISCLAIMER

RJG, Inc. is not responsible for the improper installation of this equipment, or any other equipment RJG manufactures.

Proper RJG equipment installation does not interfere with original equipment safety features of the machine. Safety mechanisms on all machines should never be removed.



## TROUBLESHOOTING

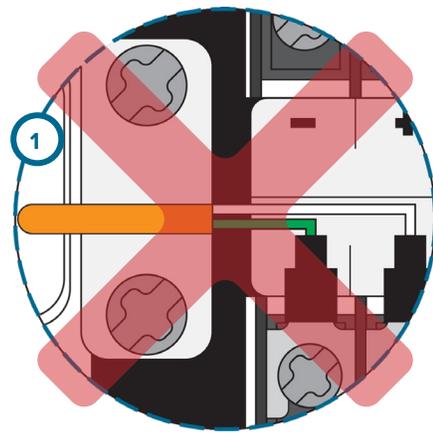
### MEASUREMENT ERRORS

Errors in measurement can result from connection problems, lead resistance issues, or electrical noise.

### CONNECTION PROBLEMS

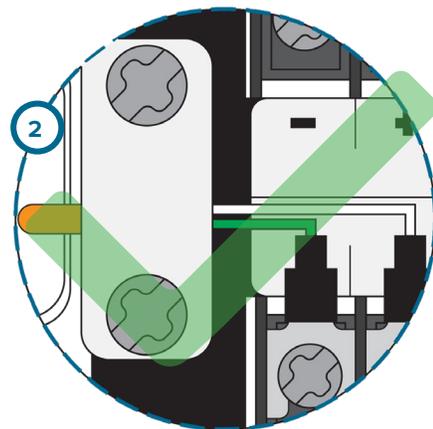
Connections must be clean and free from oil, dirt, grime, and grease.

If shielded wire is used, the wire must run under the LS-QTTB-K shield plate (1 & 2 at right). The shield plate should be tightened and have good contact with the shielded thermocouple wire to reduce radio-frequency interference (RF) noise susceptibility.



### WIRE EXTENSIONS

Thermocouple wires are typically thin, and have a high resistance, making them sensitive to noise. If extra wire is needed, use thermocouple extension wire between the thermocouple and measurement instrument. Thermocouple wire is much thicker and thus has a lower resistance.



### NOISE

Electromagnetic interference (EMI), or RF, is caused by electric devices such as motors, and can result in measurement reading errors. If noise is suspected, turn off all equipment that is suspect while monitoring the reading to determine the source.

Thermocouples and wiring can short or open circuit, causing error in signals. Check the thermocouple with a standard volt meter across the positive and negative leads to determine if the circuit is functioning correctly.

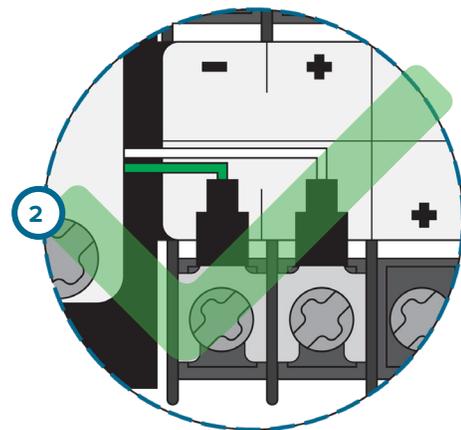
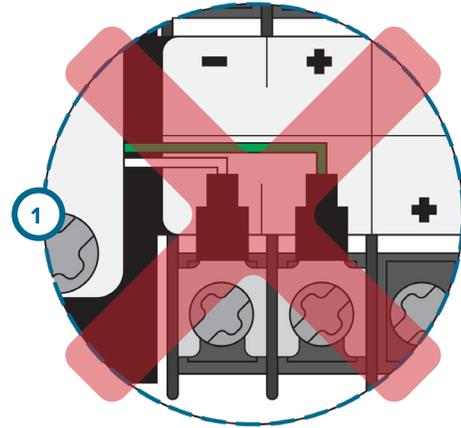
## INSTALLATION ERRORS

### REVERSED CONNECTIONS

Connections must not be reversed (1 & 2 at right). Reversed leads will provide a reading which will vary in the opposite direction relative to ambient temperature.

### LOOSE CONNECTIONS

Ensure connections are firmly in place, but are not over-tightened. Over tightening may crush the wires.



## CUSTOMER SUPPORT

Contact RJG's Customer Support team by phone or email.

RJG, Inc. Customer Support

P: 800.472.0566 (Toll Free)

P: +1.231.933.8170

[www.rjginc.com/support](http://www.rjginc.com/support)

The screenshot displays the RJG Customer Support website. The header is dark blue with the RJG logo on the left and navigation links: WHY RJG?, RJG SOLUTION SUITE, USE CASES, SUPPORT (underlined), RJG ACADEMY, RESOURCE CENTER, and ABOUT RJG. On the right of the header are links for ENG, PRODUCTS, CONTACT US, and Login. The main content area has a white background with a blue header section containing the text "Contact Support". Below this, there are three tabs: "General Questions" (selected with a purple underline), "RMA Request", and "Sensor Selection & Placement". The "General Questions" tab contains a light blue box with the following text: "Have a question? We're here for you! Be sure to check out our knowledge base first to see if you can find the answer to your question there. Or please feel free to reach out to our customer support team anytime at: Email: support@rjginc.com Phone: +1(231) 933-8170 Or Toll Free: +1(800) 472-0566 Or complete the form below:". Below the text is a contact form with six input fields arranged in two rows and three columns. The first row contains "First Name \*", "Last Name \*", and "Company". The second row contains "Job Title \*", "Phone \*", and "Email \*". Each field has a corresponding label below it: "First Name\*", "Last Name\*", "Company\*", "Job Title\*", "Phone Number\*", and "Email Address\*".



## RELATED PRODUCTS

### COMPATIBLE PRODUCTS

The TS-SL-01.5-K temperature sensor is compatible with other RJG, Inc. products for use with the eDART process control and monitoring system.

### LYNX QUAD TEMPERATURE TERMINAL— TYPE K LS-QTTB-K

The Lynx quad temperature terminal LS-QTTB-K (1 at right) connects up to four TS-SL-01.5-K temperature sensors to the eDART process control and monitoring system in order to track barrel zone, mold, and mold coolant temperatures.



### SIMILAR PRODUCTS

RJG, Inc. offers the following additional temperature sensors for flush-mount and cavity temperature applications.

### 1 MM FLUSH-MOUNT TEMPERATURE SENSOR TS-FM01-K

The TS-FM01-K 1 mm flush-mount temperature sensor (2 at right) analyzes temperature variations inside the mold cavity when used with the Lynx quad temperature terminal LS-QTTB-K and the eDART system.



### 3 MM PRESS FIT CAVITY TEMPERATURE SENSOR TS-PF03-K

The TS-PF03-K 3 mm press-fit cavity temperature sensor (3 at right) analyzes temperature variation inside the mold cavity when used with the Lynx quad temperature terminal LS-QTTB-K and the eDART system.







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