

# TS-1

Handheld Digital Pyrometer

## User Manual



## Contents

Foreword.....	i
Before You Start.....	ii
List of Figures .....	iii
List of Tables .....	iv
Introduction .....	1
Specifications.....	1
Application .....	2
Setup .....	3
Quick Start .....	5
Operating Controls and Indicators.....	5
Quick Start Procedure.....	6
Repeated temperature measurement guidelines.....	7
Lance/Immersion Probe temperature measurement guidelines.....	8
Technical Circuit Information .....	9
Maintenance.....	10
Battery Use and Charging .....	12
Important note regarding battery use.....	13
Troubleshooting .....	14
Ordering Information .....	15
Replacement Parts .....	16
Calibration Certificate.....	17
Contact Us .....	19

Warranty .....20

## Foreword

---

Thank you for purchasing the SYSCON Sensors TS-1 Handheld Digital Pyrometer. This User's Manual contains useful information about the functions, installation, wiring, operating procedures, safety, and troubleshooting of the TS-1. The user should carefully read and understand the contents of this manual prior to the use of this equipment. Using the instrument in manner not specified in this User Manual can damage the instrument.



Keep this manual in a safe place for quick reference in the event a question arises.


This manual is copyrighted by SYSCON Sensors, 1108 High Street, South Bend, Indiana, USA. No part of this document may be reproduced, transmitted, transcribed, stored in any retrieval system, or translated into any language by any means without the express written permission from SYSCON Sensors.


**SYSCON Sensors makes no warranties as to the contents of this documentation and specifically disclaims any implied warranties of merchantability or fitness for any particular purpose.** SYSCON Sensors further reserves the right to alter the specifications of the product without obligation to notify any person or organization of these changes. All Company and Product names are trademarks of their respective holders.

# Before You Start


---

<b><u>NOTE</u></b>	Contains important information for proper operation of the instrument
	Identifies conditions that may cause damage to the instrument or large errors in measurement
	Identifies conditions which may cause damage to the user. To avoid injury or death of personnel, the operator must refer to the explanation in the User Manual
Software Version	1-12

 **NOTE**



This product contains electronic boards and components which may be damaged by electrostatic discharge (ESD). When handling, care must be taken so that the devices are not damaged. Damage due to inappropriate handling is not covered by the warranty.

 **NOTE**

**Unauthorized repairs of the TS-1 Handheld Digital Pyrometer may damage the product and void the warranty.**

## List of Figures

---

Figure 1: TS-1 contact block (type S) .....	3
Figure 2: TS-1 lance assembly (internal wiring exposed for representation only) .....	3
Figure 3: TS-1 front panel with handle .....	4
Figure 4: Charging indicator status.....	12
Figure 5: SYSCON Sensor products for Foundries and Steel Mills.....	15
Figure 6: TS-1 schematic with replacement parts labeled. ....	16
Figure 7: Template Calibration Certificate for TS-1 .....	17
Figure 8: Template Report of Calibration for TS-1 .....	18

# List of Tables

---

Table 1: Thermocouple comparison (types S, R, B, and K).....	2
Table 2: Status indicator lights.....	5
Table 3: Frequent operating issues.....	11
Table 4: Troubleshooting guidelines.....	14
Table 5: Replacement part numbers .....	16

## Introduction

---

The SYSCON Sensors TS-1 Handheld Digital Pyrometer is a hand-held, battery operated, temperature measuring device for use with compatible expendable thermocouples in molten metals. This portable instrument allows for quick and accurate temperature measurements up to 3300°F, depending on the thermocouple type.

- Quick and accurate temperature measurement from 400°F – 3300°F with an instrument accuracy of  $\pm 3^\circ\text{F}$  ( $\pm 2^\circ\text{C}$ )
- 5-year battery life with approximately 200 readings per charge
- Automatic shutoff after 90 seconds and low power consumption
- Smart charging circuit with overload protection
- Rugged dust proof NEMA housing ideal for foundry and steel mill environments
- Designed to generate accurate readings in high electrical noise environments common in foundries and steel mills.

## Specifications

Measurement Input	Single Thermocouple Input (S, R, B, or K)
Temperature evaluation method	Flat plateau detection
Operating Temperature	32°F -122°F (0°C -50°C)
Storage Temperature	0°F -150°F (-17°C -65°C)
Temperature Display	0.5" (12.5 mm) LED with 4 digits
Battery	Four 1.2V 600mAh, AA NiCad
Battery Life	200 measurements on full charge approximately
Battery Charger	100 - 240V 60Hz AC Input, 12V 1A DC Output
Weight (with standard lance assembly)	4.5lb (2kg)
Housing	NEMA rated dust proof enclosure
Ambient Humidity	0 to 90% non-condensing



## Application

The TS-1 Handheld Digital Pyrometer is used to measure molten metal temperatures for an immersion/batch or continuous mode of operation. The thermocouple type is determined by the temperature range of the molten metal and the desired accuracy. The color codes and operating temperature limits (ANSI 96.1 Standard) for types S, R, B and K are listed in **Table 1**. The temperature limits are for the thermocouple wire diameter of 24-gauge wire for type S, R, and B and 8-gauge for type K. Temperatures above the maximum recommended temperature cause the thermocouple wires to melt resulting in an open circuit causing the TS-1 to display an error message.

**Table 1:** Thermocouple comparison (types S, R, B, and K)<sup>1</sup>

Thermocouple Type	Common Name	Alloy Type	Plug and Jack color	Wire Color	Maximum Temp. °F (°C)	Recommended Operating Temp. °F (°C)
		Positive end		Negative end		
S	10%	Platinum Rhodium – 10%	Green	Black	3214 (1600)	2640 (1450)
		Platinum		Red		
R	13%	Platinum Rhodium – 13%	Green	Black	2912 (1600)	2640 (1450)
		Platinum		Red		
B	6 / 30 %	Platinum Rhodium – 30%	White	Gray	3272 (1800)	3100 (1700)
		Platinum Rhodium – 6%		Red		
K	Chromel - Alumel	Nickel - Chromium	Yellow	Yellow	2460 (1350)	2300 (1260)

<sup>1</sup> Preston-Thomas, H. "The International Temperature Scale of 1990 (ITS-90)." Metrologia 27.1 (1990): 3

## Setup

---

The TS-1 Handheld Digital Pyrometer is easy to use and consists of:

- **Contact Block**

The thermocouple is installed such that its tip is in electrical contact with the contact block (see **Error! Not a valid bookmark self-reference.**). The contact block is shielded from high temperatures by a cardboard tube with or without a heat shield. SYSCON Sensors offers Single and Multi-use thermocouples with a protective cardboard tube with or without an additional heat shield.



**Figure 1:** TS-1 contact block (type S)

- **Lance Assembly**

The lance is made of stainless steel and comes in a standard total length of 48" (1220 mm); 12" (305 mm) is bent (see **Figure 2**) to make it easier to dip in molten metal.



**Figure 2:** TS-1 lance assembly (internal wiring exposed for representation only)

- **Grooved handle**

The grooved handle is ergonomically designed to grip the TS-1 Handheld Digital Pyrometer easily.

- **Instrument Housing and Cover Plate**

The cover plate is the front panel of the TS-1 (see **Figure 3**) which consists of the LED display, status indicator lights, POWER button and CHARGE jack. The display represents a TS-1 configured for type S thermocouple input for IPTS 48 calibration standard with degrees Fahrenheit (°F) temperature unit. Four Nickel-Cadmium (NiCad) rechargeable batteries are contained within the instrument housing, as are jumpers for selecting IPTS 48/68 calibration standard and °F vs °C temperature display. These batteries and jumpers should only be accessed by factory trained service personnel.



**Figure 3:** TS-1 front panel with handle

## Quick Start

---

### Operating Controls and Indicators

The **POWER** button (see **Figure 3**) turns the TS-1 Handheld Digital Pyrometer ON. The status indicator lights display the current operating mode, and the LED display is used to show the measured temperature, battery charge percentage, or error code.

The TS-1 Handheld Digital Pyrometer automatically turns off the LED display after 60 seconds and completely shuts down after 90 seconds of inactivity. The last temperature measurement reading is saved in memory and will be displayed the next time the TS-1 is turned ON.

The TS-1 Handheld Digital Pyrometer has a maximum immersion timer set to 10 seconds. To protect the measurement lance from overheating, the immersion timer limits the time the TS-1 searches for a stable temperature before signaling the end of the measurement.

The three-front panel status indicator lights display the operating mode of the TS-1 Handheld Digital Pyrometer as shown in **Table 2**.

**Table 2:** Status indicator lights

Status	Color	Measurement Status
<b>READY</b>	Green	Thermocouple tip (sensor) has made electrical contact with the contact block and is ready for measurement
<b>MEASURE</b>	Yellow	Temperature measurement is in progress
<b>COMPLETE</b>	Red	Measurement is complete. Remove thermocouple or take a new measurement

## Quick Start Procedure

1. Press the **POWER** button (see **Figure 3**) to turn ON the TS-1 Handheld Digital Pyrometer. The **POWER** button is also used to wake up the LED display after 60 seconds of inactivity and to recall the last temperature measurement.
2. During the start-up cycle, the TS-1 displays the program version, thermocouple input type, and calibration standard (IPTS 48/68). All three status indicator lights (Ready, Measure, and Complete) are ON during the startup cycle. **Figure 3** shows a TS-1 configured for a Type S thermocouple input, calibrated to IPTS 68 standard, and set to display the temperature in °F during the startup cycle.
3. After start-up cycle is complete,
  - a) If **no thermocouple is installed on the lance**: TS-1 displays percentage of battery charge remaining and the **COMPLETE light** turns ON.
  - b) If **thermocouple is installed correctly on the lance**: TS-1 displays the previous temperature measurement reading and the **READY light** turns ON indicating that the TS-1 is ready for a new measurement.

The TS-1 Handheld Digital Pyrometer continually monitors the temperature. If the input temperature is below the threshold temperature of 400°F, it is not displayed.

4. When the thermocouple is immersed into the molten metal bath and the input temperature exceeds the 400°F threshold temperature, the TS-1 starts the measuring cycle. The **MEASURE light** on the front panel turns ON.
5. A final temperature reading is displayed once the temperature measurement from the thermocouple stabilizes. The **COMPLETE light** turns ON and the Sonalert alarm sounds for 2 seconds.

6. If a stable voltage signal from the thermocouple is not found or if the thermocouple wire breaks, a 9001, 9002, or 9999 error message reading is displayed. **Refer to the note on Troubleshooting guidelines.**

 **NOTE**

Ensure that the thermocouple input type and calibration standard of the TS-1 (IPTS 48 or IPTS 68) matches that of the thermocouple tip used for temperature measurement.

Use only Rechargeable NiCad (Nickel Cadmium batteries). Non-rechargeable alkaline batteries can cause damage to the TS-1 and battery charger.

Refer to the note on **Battery Use and Charging**.

## Repeated temperature measurement guidelines

Usually, it takes 3 – 6 seconds to switch from **COMPLETE status** to **READY status** after taking a successful temperature reading. However, it is possible to take a new temperature measurement within this time interval if the last temperature measurement reading was successful (no error message displayed). This is done by reinserting the thermocouple into the molten bath and immediately pressing the **POWER** button. The **MEASURE light** turns **ON** to indicate that the measurement process is restarted. This procedure can be repeated as often as desired.

 **NOTE**

Overheating of the lance may damage the TS-1 Handheld Digital Pyrometer. Indications of overheating may include smoke near the contact block and erratic behavior such as sudden error messages.

Cool the thermocouple tips/contact block and/or increase time between measurements if overheating is observed.

DO NOT dip the exposed lance (without protective cardboard tube or heat shield) in molten metal. It may damage the internal thermocouple extension wires inside the lance.

**Contact** SYSCON Sensors for custom lance design and lengths.

## Lance/Immersion Probe temperature measurement guidelines

The proper immersion of the expendable thermocouple sensor into the molten metal can have a significant effect on the quality and reliability of the measurement. To get an accurate and reliable reading, SYSCON Sensors recommends the following procedure:

1. Immerse the probe quickly into the molten metal, penetrating the slag as quickly as possible. DO NOT force the tip of the probe on to or through hard slag as the probe might break.
2. When taking repeated measurements, allow the lance to cool between measurements. Contact block temperatures greater than 300°F (149°C) can cause erratic measurements.
3. Take measurements with gas stirring and oxygen blowing turned OFF. Wait at least 45 seconds after gas stirring to take a measurement.
4. Turn electrical power to the furnace OFF before taking a measurement. Electrical interference from the electrical field can cause erratic measurements. If the furnace grounding system is broken or corroded, electrical shock can result from taking temperatures when the furnace power is ON.
5. Stir for at least 3-5 minutes after alloy addition before taking a temperature measurement. Alloy additions affect temperature measurement if the probe is inserted in the alloy. Allow sufficient time for the alloy and the metal to be well-mixed before taking a measurement.



### **NOTE**

**DO NOT use the expendable thermocouple sensors if they have been exposed to moisture and are wet. Excessive moisture will cause erratic measurements and can result in injury from violent metal splashing.**

Always wear recommended Personal Protection Equipment.

## Technical Circuit Information

---

The TS-1 Handheld Digital Pyrometer electronic circuit consists of the following major components plus miscellaneous support components:

- **Battery Fast Charger**

The battery fast charger circuit converts the power from a 12V DC 1A battery charger to a voltage and current suitable for one-hour charging of the four Nickel-Cadmium (NiCad) batteries.

- **Analog to Digital Converter**

The analog to digital converter allows the microcontroller to monitor the thermocouple and the battery voltage. Auto-zero and calibration operations are performed internally in the analog to digital converter.

- **Precision Voltage Reference**

The precision voltage reference serves as the basis for all analog to digital conversions. A digital cold end sensor serves as an ambient temperature sensor for the TS-1 Handheld Digital Pyrometer.

- **LED Display**

The LED display on the TS-1 uses four one-half inch high LED digits that can be easily read even in high ambient light. The display reads temperature in °F or °C with one-degree resolution. The display is also used for other system functions such as error messages, percentage of battery charge remaining, and for calibration.

The TS-1 Digital Temperature Measurement System internal measurements and linearization are done in °F because of its higher resolution. If a degree Centigrade display is desired, the microcontroller converts °F to °C using the following formula before sending the information to the display.

$$^{\circ}\text{C} = (^{\circ}\text{F} - 32) / 1.8$$



## Maintenance

---

The internal electronics of the TS-1 require no maintenance. The most frequent cause of operating problems is the need for maintenance of the thermocouple lance hardware used with the TS-1 Handheld Digital Pyrometer. The most common issues are problems with contact blocks and the compensated measurement cable inside the lance. In the event of a problem, first check the polarity, continuity, and insulation resistance of the thermocouple lance assembly. SYSCON Sensors recommends that the TS-1 Handheld Digital Pyrometer thermocouple lance assembly be changed a minimum of every four months to ensure continued accuracy. **Table 3** shows a summary of common operating issues and their solutions. The schematic of TS-1 with replacement parts is shown in **Figure 6** and a list of spare parts can be found in **Table 5**.

### **NOTE**

SYSCON Sensors recommends that the TS-1 Handheld Digital Pyrometer be checked against a voltage source such as a potentiometer of standard accuracy for calibration every three months to ensure its continued accuracy.

SYSCON Sensors provides repair and maintenance services including recalibration.

**Contact** us for calibration or for your individual maintenance and cabling needs.

**Table 3:** Frequent operating issues

Issue	Cause	Effect	Action
Operating Practices	Taking reading with furnace power ON	Multiple electrical grounds created	Turn furnace power OFF
	Slag Thickness	Measurement probe doesn't penetrate to desired depth for an accurate and stable reading of molten metal temperature	Make measurements below the slag line.
	Excessive melt temperature	Thermocouple wire melts causing an open circuit condition	Check allowable operating temperatures for thermocouple. (see <b>Table 1</b> ).
Contact Block	Regular wear and tear	Corrosion results in poor electrical contact	Clean surfaces with wire brush. Replace every 3 months or when probes become loose.
Measurement cable inside lance	Overheating during measurement or Regular wear and tear	Breakdown of the insulation resistance between the internal wires or the cable causing a short circuit between the conductors.	Replace lance cable
Thermocouple Connectors	Regular wear and tear	Faulty electrical connection	Replace when worn or erratic measurements are recorded

## Battery Use and Charging

The TS-1 Handheld Digital Pyrometer uses four 1.2V rechargeable Nickel-Cadmium (NiCad) batteries. With proper care and maintenance, these batteries can last up to five years. The TS-1 Handheld Digital Pyrometer should be fully charged (approximately 1 hour) with the included battery charger before use. To charge the TS-1 Handheld Digital Pyrometer, plug the battery charger base into a power outlet (100 – 240V AC 60Hz). Ensure that the outlet is not switched OFF during the charging period. Insert the battery charger plug into the front panel jack marked **CHARGE**. When the battery charger is connected properly, the third digit decimal LED turns ON. To check the condition of the batteries, press the POWER button to turn ON the TS-1 Handheld Digital Pyrometer and remove the thermocouple from the lance. The TS-1 displays the percentage of battery charge remaining in the batteries in 10% increments - 100% denotes full charge and 0% indicates the batteries need to be recharged (see **Figure 4**). For longest life, NiCad batteries should be fully discharged before recharging again.

### Charging Modes

There are two charging modes – fast and slow. Under normal operating conditions, when the ambient temperature is between 40°F – 120°F, fast charging will occur. If the battery temperature is below 40°F or if the batteries are near the end of their useful life, slow charging will occur. During charging, the charging mode indicator (shown in Figure 4) will be solid. The charging mode indicator may blink for 2-5 seconds when the charger is connected. Blinking may persist when the battery temperature is below 40°C, batteries are near their end of life, or when the charging cable is not securely connected. Contact SYSCON Sensors if the blinking continues. If battery temperature rises above



**Figure 4:** Charging indicator status

120°F, charging stops even though the status indicator continues to flash. Disconnect the charger and allow the TS-1 to cool. If the batteries still do not charge, **contact** SYSCON Sensors.

### Important note regarding battery use

- Use only SYSCON Sensors NiCad Batteries (Part no. IN-B1) and Battery Charger (Part no. IN-C1) to prevent damage to the TS-1. Refer to the note on **Replacement Parts**.
- **The batteries should NOT be replaced with an Alkaline (AA) or Metal Hydride battery. These batteries leak and may damage the TS-1.**
- Always check the battery level after charging.
- For longest life, NiCad batteries should be fully discharged before recharging again.
- In the presence of strong DC magnetic fields (such as in Aluminum refining plants), the charger circuit should be shielded.

#### **NOTE**

Follow the instructions for battery use and charging.

Do NOT use Alkaline (AA) or Metal Hydride batteries. Batteries should be serviced only by SYSCON Sensors authorized personnel. Alteration to the TS-1 by unauthorized personnel will void the Warranty.

**Contact** SYSCON Sensors for assistance regarding battery use, maintenance, and replacement.

# Troubleshooting

Before proceeding with the troubleshooting guidelines, verify that the TS-1 is setup for the correct thermocouple type and calibration standard (IPTS 48 or IPTS 68). The calibration standard of the TS-1 is displayed after POWER is turned ON and should match that of the thermocouple tip used for temperature measurement.

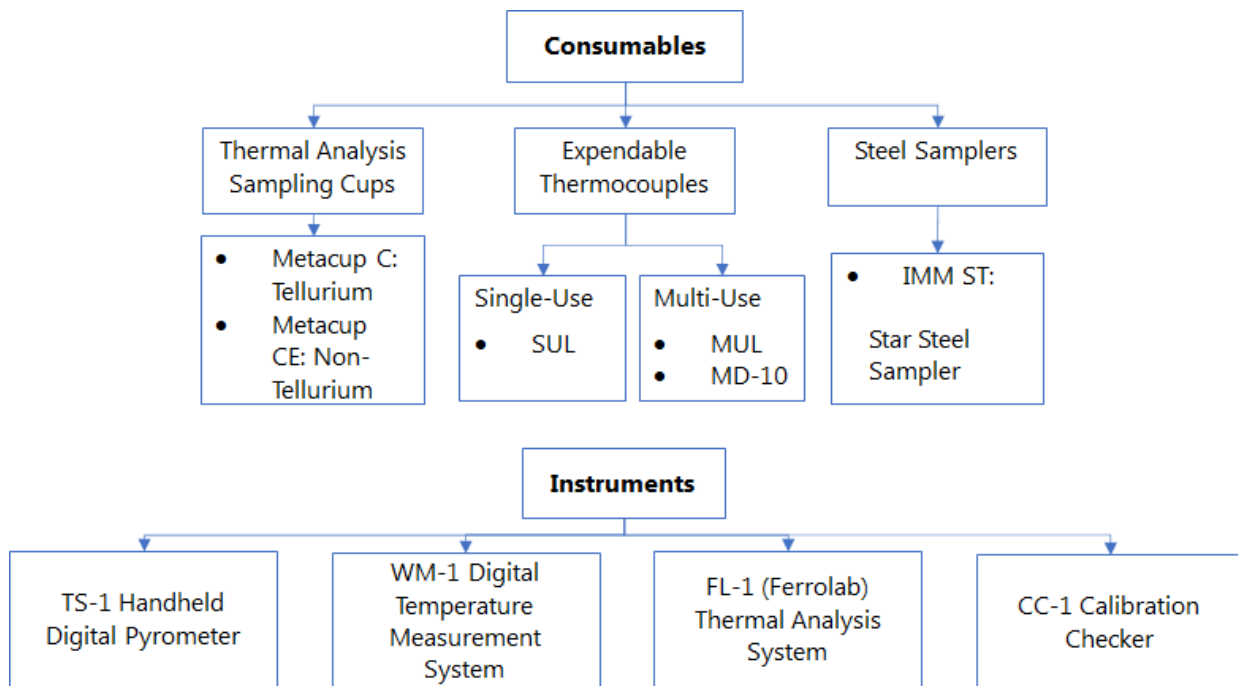
**Table 4:** Troubleshooting guidelines.

Error Message	Fault / Warning	Cause	Recommended Actions
9001	Slope Error	<ul style="list-style-type: none"> <li>• Thermocouple tip at end of life or defective</li> <li>• TS-1 lance not held steady</li> <li>• Contact block overheated</li> </ul>	<ul style="list-style-type: none"> <li>• Replace thermocouple tip</li> <li>• Increase the dip time of the thermocouple tip</li> <li>• Increase time between successive temperature readings</li> <li>• Fan cool thermocouple tip before dipping again</li> </ul>
9002	Noise Error	<ul style="list-style-type: none"> <li>• Improper furnace grounding</li> <li>• High voltage lines close to TS-1</li> <li>• Thermocouple tip end of life or defective</li> <li>• TS-1 lance not held steady</li> </ul>	<ul style="list-style-type: none"> <li>• Check furnace ground</li> <li>• Avoid high voltage lines close to the TS-1</li> <li>• Replace thermocouple tip</li> </ul>
9999	Broken Thermocouple or Open Circuit condition	<ul style="list-style-type: none"> <li>• Maximum operating temperature limit exceeded</li> </ul>	<ul style="list-style-type: none"> <li>• Replace thermocouple tip</li> </ul>
	With thermocouple tip connected, TS-1 fails to signal <b>READY status</b>	<ul style="list-style-type: none"> <li>• Thermocouple tip end of life or defective</li> <li>• Contact block overheated or worn out</li> <li>• Internal thermocouple cable worn out</li> </ul>	<ul style="list-style-type: none"> <li>• Replace thermocouple tip</li> <li>• Replace contact block</li> </ul>
	After dipping the thermocouple tip, <b>READY status</b> does not switch to <b>MEASURE</b> or <b>COMPLETE</b>	<ul style="list-style-type: none"> <li>• Incorrect polarity of internal thermocouple cable</li> </ul>	<ul style="list-style-type: none"> <li>• Reverse polarity of internal thermocouple cable</li> </ul>

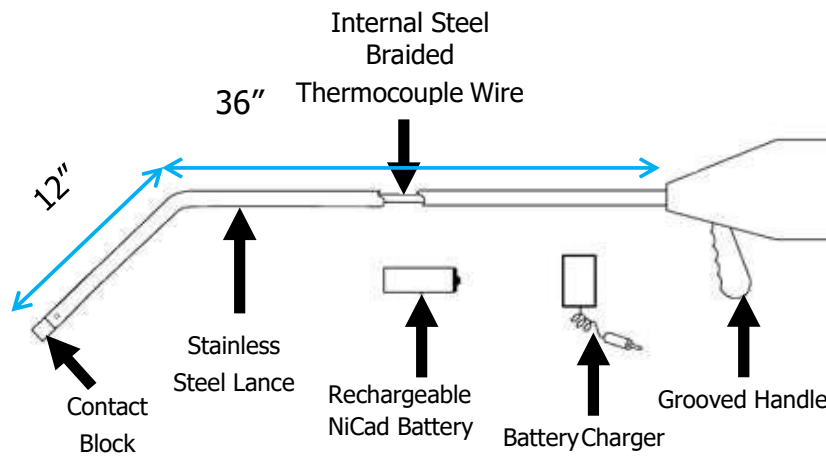
# Ordering Information

Ordering Information	
TS-1	TS-1 head unit + battery charger. Specify: Thermocouple type: S, K, R, B Specify: IPTS 48, 68 Calibration
LH-X-LL-BB	Measurement Lance, X: Type-S, R or B LL: Lance length: 36", 48", 60" BB: Bend radius: 00, 45, 90
LH-K-LL-BB	Measurement Lance, Type-K LL: Lance length: 31", 43", 55", 72" BB: Bend radius: 00, 45, 90

**NOTE**  
**Contact SYSCON Sensors for custom lance options.**



## Replacement Parts




**Figure 6:** TS-1 schematic with replacement parts labeled.

**Table 5:** Replacement part numbers

Part Number	Description
IN-C1	Battery Charger (100-240V AC 60Hz)
IN-B1	NiCad (Nickel-Cadmium Battery) Rechargeable battery, 1.2V, 600mAh, AA
CB-T1	Contact Block (type S)
LW-AT48S	Contact block (type S) assembly with steel braided thermocouple wire for 48" lance
LW-T1	20 feet long, type S, rubber insulated thermocouple wire


# Calibration Certificate

Calibration Certificate is available for IPTS 48 and 68 standards. SYSCON Sensors uses standards traceable to National Institute of Standards and Technology (NIST).

 <a href="http://www.sysconsensors.com">www.sysconsensors.com</a>		SYSCON International, Inc. 1108 High Street South Bend, IN 46601 (574-232-3900)																						
<h2>CERTIFICATE OF CALIBRATION</h2>																								
<div style="border: 1px solid black; padding: 5px; display: inline-block;"> <b>20231006-XXX-TS1</b> </div> Certificate Number																								
Equipment	TS-1	PO#																						
Serial Number	XXX	Procedure	TS-1 S_68_F																					
TC Type	S	Standard	IPTS 68																					
Name		Calibrated By	SYSCON Sensors																					
Address			1108 High street South Bend, In 46601 Tel: (574) 232-3900																					
Calibration Date		Lab Temp																						
Calibration Due Date		Lab Humidity																						
This is to certify that the above instrument was calibrated by SYSCON Sensors using standards traceable to National Institute of Standards & Technology (NIST). The results indicated on this certificate relate only to the instrument calibrated. This certificate shall not be reproduced except in full without the prior written approval of SYSCON Sensors.																								
<b>Model</b>	<b>Serial Number</b>	<b>Description</b>	<b>Calibration Date</b>	<b>Calibration Due Date</b>																				
HH41	A11351	HH41 Digital Thermometer	02/01/2023	02/01/2024																				
34465A	MY60071580	Digital Multimeter	03/06/2023	03/06/2024																				
7526A	5975004	Precision Voltage Supply	11/10/2022	11/10/2023																				
<table border="1"> <thead> <tr> <th colspan="5">Tolerance</th> </tr> <tr> <th>TC Type</th> <th>In °F</th> <th>In °C</th> <th colspan="2">In mV</th> </tr> </thead> <tbody> <tr> <td>S and B</td> <td>±3 °F</td> <td>±2 °C</td> <td colspan="2">±0.021 mV</td> </tr> <tr> <td>K</td> <td>±3 °F</td> <td>±2 °C</td> <td colspan="2">±0.060 mV</td> </tr> </tbody> </table>					Tolerance					TC Type	In °F	In °C	In mV		S and B	±3 °F	±2 °C	±0.021 mV		K	±3 °F	±2 °C	±0.060 mV	
Tolerance																								
TC Type	In °F	In °C	In mV																					
S and B	±3 °F	±2 °C	±0.021 mV																					
K	±3 °F	±2 °C	±0.060 mV																					
<b>Condition:</b> New Instrument																								

**Figure 7:** Template Calibration Certificate for TS-1



 <a href="http://www.sysconsensors.com">www.sysconsensors.com</a>	SYSCON International, Inc. 1108 High Street South Bend, IN 46601 (574-232-3900)																					
<h2 style="margin: 0;">Report of Calibration</h2> <hr style="border: 0.5px solid blue;"/>																						
<b>Instrument</b> TS-1 <b>Serial Number</b> XXX <b>Procedure</b> TS-1_S_68 <b>Technician</b>	<b>Test Result</b> <b>Cal Date</b> <b>Data type</b> <b>Temperature</b> <b>Humidity</b>																					
<p>Instruments Used</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">Model</th> <th style="width: 25%;">Serial Number</th> <th style="width: 50%;">Description</th> </tr> </thead> <tbody> <tr> <td>HH41</td> <td>A11351</td> <td>Digital Thermometer</td> </tr> <tr> <td>3456A</td> <td>2015A02226</td> <td>Digital Multimeter</td> </tr> <tr> <td>7526A</td> <td>5975004</td> <td>Precision Voltage Supply</td> </tr> </tbody> </table>		Model	Serial Number	Description	HH41	A11351	Digital Thermometer	3456A	2015A02226	Digital Multimeter	7526A	5975004	Precision Voltage Supply									
Model	Serial Number	Description																				
HH41	A11351	Digital Thermometer																				
3456A	2015A02226	Digital Multimeter																				
7526A	5975004	Precision Voltage Supply																				
<p>Test Results</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="3" style="width: 25%;">Type S Calibration Points</th> <th colspan="3" style="text-align: center;">IPTS68</th> </tr> <tr> <th rowspan="2" style="width: 20%;">STANDARD (V)</th> <th colspan="2" style="text-align: center;">INSTRUMENT</th> </tr> <tr> <th style="width: 20%;">As Found °F</th> <th style="width: 35%;">As Left °F</th> </tr> </thead> <tbody> <tr> <td>2450 °F</td> <td>13.681E-03</td> <td>°F</td> <td></td> </tr> <tr> <td>2700 °F</td> <td>15.362E-03</td> <td>°F</td> <td></td> </tr> <tr> <td>3050 °F</td> <td>17.672E-03</td> <td>°F</td> <td></td> </tr> </tbody> </table>		Type S Calibration Points	IPTS68			STANDARD (V)	INSTRUMENT		As Found °F	As Left °F	2450 °F	13.681E-03	°F		2700 °F	15.362E-03	°F		3050 °F	17.672E-03	°F	
Type S Calibration Points	IPTS68																					
	STANDARD (V)		INSTRUMENT																			
		As Found °F	As Left °F																			
2450 °F	13.681E-03	°F																				
2700 °F	15.362E-03	°F																				
3050 °F	17.672E-03	°F																				

**Figure 8:** Template Report of Calibration for TS-1

## Contact Us

---

### **SYSCON Sensors**

**Address:**

1108 High Street

South Bend, Indiana, USA -  
46601

**Phone: +1 (574) 232 - 3900**

**[www.sysconsensors.com](http://www.sysconsensors.com)**

## Warranty

---

SYSCON SENSORS warrants its product, when properly assembled and installed as recommended, to be free from defects in material and workmanship, under normal use and service, for a period of one year from the original date of purchase. The purchaser is requested to retain the invoice as proof of the purchase date. THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

The warranty stated above shall not apply to any product which, in SYSCON Sensor's judgment, has been repaired or altered in any way to affect its reliability nor to any product which has been subject to damage by fire or accident, misuse, abuse, negligent handling, used outside its capabilities, or from lack of periodic inspection.

SYSCON Sensors' obligation under this warranty shall be limited exclusively to the repair or replacement of any products determined to be defective by an authorized SYSCON Sensors representative, whose determination shall be final. Any product claimed to be defective shall be returned to an authorized SYSCON Sensors service facility. SYSCON Sensors reserves the right to satisfy its warranty obligation in full by refund of the purchase price upon return to it of the defective products if an authorized representative of SYSCON Sensors determines that the nature of the defect precludes remedy by repair or replacement. In no event shall SYSCON Sensor's obligation hereunder exceed the purchase price. Purchaser shall bear all costs and expense for transportation of products to and from an authorized SYSCON Sensors service facility, including removal and installation, inspection, and testing.

IN NO EVENT SHALL SYSCON SENSORS HAVE ANY LIABILITY WHATSOEVER FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING FROM ANY CAUSE INCLUDING BUT NOT LIMITED TO: BREACH OF CONTRACT, BREACH OF WARRANTY, STRICT LIABILITY (IN TORT OR WARRANTY) OR NEGLIGENCE.