

Product User Guide



HiTemp140-FR and HiTemp140-FR-TSK



HiTemp140-FR

High Temperature Data Logger with a 2 inch Fast Response Probe

HiTemp140-FR-TSK

High Temperature Data Logger with Thermal Shield

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Product Overview

MadgeTech has designed the HiTemp140-FR, a high temperature data logger with an ultra-fast response time, to record temperature during rapidly changing thermal processes. This high temperature data logger features a 2 inch x 0.0625 inch diameter probe and is capable of recording up to 4 Hz, which is 4 times faster than other data loggers in this class. This allows the temperature sensor to quickly adapt and accurately record temperature variations in changing environments. Applications include oven profiling, steam sterilization, chamber mapping, seafood processing, flash freezing and more.

MadgeTech's entire HiTemp140 data logger series is designed with food grade stainless steel. The device can be placed in environments up to 140 °C and the probe is capable of measuring from -200 °C to +260 °C (-328 °F to +500 °F). The HiTemp140-FR is also available with an optional thermal shield enclosure to extend the operating range of the data logger to -200 °C to +250 °C (-328 °F to +482 °F). The HiTemp140-FR-TSK (Thermal Shield Kit) comes with either a vented or flush top enclosure to accommodate a multitude of applications.

The Trigger Settings feature of the HiTemp140-FR allows users to configure high and low temperature thresholds that when met or exceeded, will automatically start or stop recording data to memory. This data logger is capable of storing up to 32,700 date and time stamped readings and features a nonvolatile solid state memory which retains data even if the battery becomes discharged.

Submergibility

The HiTemp140-FR is rated IP68 and is fully submersible. It can be placed in environments up to 230 ft (70 m) of water.

O-Rings

O-ring maintenance is a key factor when properly caring for the HiTemp140-FR. The O-rings ensure a tight seal and prevent liquid from entering the inside of the device. Please refer to the application note "O-Rings 101: Protecting Your Data", found on the MadgeTech website, for information on how to prevent O-ring failure.

Trigger Settings

The device can be programmed to only record based off user configured trigger settings.

1. In the **Connected devices** panel, select the intended device to change the settings.
2. On the **Device** tab, in the **Information** group, click **Properties**. Users can also right-click on the device and select **Properties** in the context menu.
3. Click **Trigger** and configure the Trigger settings. Trigger formats are available in Window and Two Point (bi-level) mode. Window mode allows for one range of temperature monitoring and two point mode allows for two ranges.

Note: This product is rated for use up to 140 °C. Please heed the battery warning. The product will explode if exposed to temperatures above 140 °C.

Installation Guide

Installing the Interface cable

- IFC400 or IFC406
Refer to the “**Quick Start Guide**” included in the package.

Installing the software

Insert the Software USB stick in an open USB port. If the autorun does not appear, locate the drive on the computer and double click on **Autorun.exe**. Follow the instructions provided in the Wizard.

Device Operation

Connecting and Starting the data logger

- Once the software is installed and running, plug the interface cable into the docking station.
- Connect the USB end of the interface cable into an open USB port on the computer.
- The device will appear in the Connected Devices list, highlight the desired data logger.
- For most applications, select “**Custom Start**” from the menu bar and choose the desired start method, reading rate and other parameters appropriate for the data logging application and click “**Start**”. (“**Quick Start**” applies the most recent custom start options, “**Batch Start**” is used for managing multiple loggers at once, “**Real Time Start**” stores the dataset as it records while connected to the logger.)
- The status of the device will change to “**Running**”, “**Waiting to Start**” or “**Waiting to Manual Start**”, depending upon your start method.
- Disconnect the data logger from the interface cable and place it in the environment to measure. *Note: The device will stop recording data when the end of memory is reached or the device is stopped. At this point the device cannot be restarted until it has been re-armed by the computer.*

Note: Please refer to the Disclaimer & Terms of Use section on the back page of this guide for product usage recommendations.

Downloading data from a data logger

- Place the logger into the docking station.
- Highlight the data logger in the **Connected Devices** list. Click “**Stop**” on the menu bar.
- Once the data logger is stopped, with the logger highlighted, click “**Download**”. You will be prompted to name your report.
- Downloading will offload and save all the recorded data to the PC.

Product Maintenance

Battery Replacement

Materials: ER1425S-HT Battery

1. Unscrew the bottom of the logger and remove the battery.
2. Place the new battery into the logger. Note the polarity of the battery.
3. Screw the cover back onto the logger.

Recalibration

The HiTemp140-FR standard calibrations are two points at 30 °C and 140 °C.

Pricing:

Recalibration traceable to NIST	\$70.00
Recalibration only	\$40.00

*Prices and specifications subject to change. See MadgeTech's terms and conditions at www.madgetech.com
To send the devices back, visit www.madgetech.com, select Services then RMA Process.*

RMA Instructions

To send a device back in to MadgeTech, follow the instructions below to create an RMA (Return Merchandise Authorization) on the MadgeTech website:

1. Visit www.madgetech.com, under the **Services** tab select **RMA Process**.
2. When the web page opens, please sign in. If this is the first time, select **Click here to register an account** and create one. Once signed in, click on the **Make New RMA** button and fill in all the blank fields.
3. Complete the applicable fields on the form including customer Billing and Shipping information, even if they are the same. Please see the field explanation below for a more detailed description about questions asked in the Device Information section.
4. When all of the fields are complete, click **Generate RMA**.
5. Print out the confirmation page that follows containing the RMA number and MadgeTech's address for shipping. **A Return Merchandise Authorization must be accompanied by a copy of the RMA paperwork and shipping is prepaid by the customer.** The RMA number should be clearly marked on the outside of the package.
6. Please ship the package via UPS, FedEx, TNT, or DHL to the address listed on the confirmation page. USPS will not ship MadgeTech data loggers.
7. A notification email will be automatically sent when MadgeTech has received the RMA.

HiTemp140-FR General Specifications

Temperature Sensor	100 Ω Platinum RTD	
Probe Measurement Range	-200 °C to +260 °C (-328 °F to +500 °F)	
Temperature Resolution	0.01 °C (0.02 °F)	
Calibrated Accuracy	± 0.1 °C/ ± 0.18 °F (20 °C to +140 °C/68 °F to +284 °F)	
Data Logger Response Time	In Air	In Water
	(hours : minutes : seconds : fractions of a second)	
	t ₆₀ - 00:00:39:00 t ₉₀ - 00:02:43:00	t ₆₀ - 00:00:10:00 t ₉₀ - 00:00:12:00
Reading Rate	4 readings per second up to 1 reading every 24 hours	
Memory	32,767 readings	
Start Modes	<ul style="list-style-type: none"> • Software programmable immediate start • Delay start up to 18 months in advance 	
Stop Modes	Manual or Timed (specific date and time)	
Trigger Settings	High & Low limits may be set. Once data meets or exceed sets limits, the device will record to memory. Bi-level start and stop triggers can also be programmed. Users can specify the number of readings to take after the device triggers.	
Readings in Trigger Settings Mode	10,922 readings	
Real Time Recording	May be used with PC to monitor and record data in real time	
Password Protection	An optional password may be programmed into the device to restrict access to configuration options. Data may be read out without the password.	
Memory Wrap Around	Yes	
Battery Type	3.6V high-temperature lithium battery included; user replaceable	
Battery Life	2 years typical (1 minute reading rate)	
Calibration	Digital calibration through software	
Calibration Date	Automatically recorded within device	
Data Format	Date and time stamped °C, °F, °R, K	
Time Accuracy	<ul style="list-style-type: none"> • ± 1 minute/month at 25 °C • Extended Operation: ± 20 minutes/month at 140 °C (± 450 ppm) 	
Computer Interface	IFC400 or IFC406 USB docking station required; 125,000 baud	
Operating System Compatibility	XP SP3/Vista/Windows 7/Windows 8	
MadgeTech Software Compatibility	<ul style="list-style-type: none"> • MadgeTech Standard Software version 4.2.3.0 • MadgeTech Secure Software version 4.2.2.0 or later 	
Operating Environment	-40 °C to +140 °C (-40 °F to +284 °F), 0 %RH to 100 %RH, 0 PSIA to 100 PSIA	
IP Rating	IP68	
Dimensions (<i>body</i>)	1.89 in x 0.970 in x 0.970 in (48 mm x 24.6 mm x 24.6 mm)	
Dimensions (<i>probe</i>)	1.75 in x 0.0625 in dia. (0.188 in transitional dia.) 44.5 mm x 1.59 mm (4.78 mm Transitional dia.)	
Weight	65 g (2.3 oz)	
Materials	316 Stainless Steel	
Approvals	CE	

HiTemp140-FR-TSK Specifications

Data Logger Response Time with Thermal Shield	HiTemp140-FR-TSK (<i>Flush</i>)		HiTemp140-FR-TSK (<i>Vented</i>)	
	Exposure Time in Air	Exposure Time in Water	Exposure Time in Air	Exposure Time in Water
	(hours : minutes : seconds : fractions of a second)			
	t60 - 00:00:30:00	t60 - 00:00:09:00	t60 - 00:00:59:00	t60 - 00:00:10:00
t90 - 00:13:10:00	t90 - 00:00:12:00	t90 - 00:22:10:00	t90 - 00:00:12:00	
Dimensions (<i>enclosure</i>)	2.75 in x 2.0 in dia. (69.85 mm x 51 mm dia.)		4.3 in x 2.0 in dia. (109.2 mm x 50.8 mm dia.)	
Weight	6.7 oz (190 g) not including data logger		9.5 oz (270 g) not including data logger	
Operating Environment	-200 °C to +250 °C (-328 °F to +482 °F) (Time limited) 0 %RH to 100 %RH			
Material	Enclosure: PTFE			

Maximum Exposure Time Chart	HiTemp140-TS (<i>Flush</i>)		HiTemp140-TS (<i>Vented</i>)	
	Exposure Time in Air (150 °C/302 °F)	Exposure Time in Liquid (150 °C/302 °F)	Exposure Time in Air (150 °C/302 °F)	Exposure Time in Liquid (150 °C/302 °F)
Ambient Temperature				
-200 °C (-328 °F)	12 minutes	N/A	14 minutes	N/A
-180 °C (-292 °F)	13 minutes	N/A	15 minutes	N/A
-160 °C (-256 °F)	15 minutes	N/A	16 minutes	N/A
-140 °C (-220 °F)	17 minutes	N/A	18 minutes	N/A
-120 °C (-184 °F)	19 minutes	N/A	21 minutes	N/A
-100 °C (-148 °F)	22 minutes	N/A	24 minutes	N/A
-80 °C (-112 °F)	27 minutes	N/A	30 minutes	N/A
-60 °C (-76 °F)	37 minutes	22 minutes	42 minutes	25 minutes
-40 °C to +140 °C (-40 °F to +284 °F)	Indefinitely	Indefinitely	Indefinitely	Indefinitely
150 °C (302 °F)	59 minutes	34 minutes	66 minutes	40 minutes
160 °C (320 °F)	51 minutes	29 minutes	57 minutes	34 minutes
170 °C (338 °F)	43 minutes	25 minutes	48 minutes	29 minutes
180 °C (356 °F)	37 minutes	23 minutes	42 minutes	26 minutes
190 °C (374 °F)	34 minutes	20 minutes	38 minutes	23 minutes
200 °C (392 °F)	31 minutes	18 minutes	34 minutes	21 minutes
210 °C (410 °F)	29 minutes	17 minutes	32 minutes	19 minutes
220 °C (428 °F)	27 minutes	16 minutes	30 minutes	18 minutes
230 °C (446 °F)	25 minutes	15 minutes	27 minutes	17 minutes
240 °C (464 °F)	23 minutes	14 minutes	26 minutes	16 minutes
250 °C (482 °F)	22 minutes	13 minutes	24 minutes	15 minutes

Battery Warning

WARNING: FIRE, EXPLOSION, AND SEVERE BURN HAZARD. DO NOT SHORT CIRCUIT, CHARGE, FORCE OVER DISCHARGE, CRUSH, PENETRATE, OR INCINERATE. BATTERY MAY LEAK OR EXPLODE IF HEATED ABOVE 150 °C (302 °F).

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Listed specifications can be used to determine maximum allowable exposure times for the HiTemp140 with Thermal Shield at different temperatures beyond the normal operating range of the logger. Both the data logger and Thermal Shield must be at ambient temperature (*approximately 25 °C*) before being placed in the extreme temperature environment.

Immediately following exposure to high temperature, the data logger should be removed from the thermal shield (*using appropriate precautions, as it could be VERY hot*) OR the data logger and shield should be placed in a water bath (*approximately 25 °C*) for at least 15 minutes to allow it to cool. Failing to do this may allow heat trapped in the Thermal Shield to continue to heat the data logger to potentially unsafe levels.

If your application involves a ramp up to a temperature above 140 °C and/or any complex temperature profile that isn't simply a constant temperature, please contact MadgeTech to determine whether the HiTemp140 with Thermal Shield is suitable.

Please provide MadgeTech with a detailed description of your temperature profile, including temperatures, durations, ramp times, and process media (*air, steam, oil, water, etc.*) If MadgeTech is unable to definitively calculate the suitability of our product for your application, we can provide a test unit outfitted with a high temperature indicator sticker. This sticker has an indicator dot which will turn black if exposed to temperatures above 143 °C. Apply the sticker to the bottom of the data logger itself (*not the thermal shield*), remove the battery for safety, place the data logger into the thermal shield and run the assembly through the proposed temperature program. The first indicator dot on the sticker will turn black at 143 °C. If that happens, the HiTemp140 with thermal shield is not appropriate for the application and we will work to find a solution that is.