DTI-1000 & STS-050, -100, -102

Digital Temperature Indicator and STS Reference Sensors
What to expect

Wide Temperature Range
The DTI-1000 with a STS-probe is a fully traceable thermometer recommended as the reference instrument to verify the true temperature in any type of temperature calibrator, liquid bath, or dry-block calibrator.
- DTI-1000: -200 to 750°C
- STS-050: -50 to 400°C
- STS-100: -150 to 650°C
- STS-102: -50 to 155°C

Improve your Accuracy
Use the DTI-1000 and the STS probes as your working temperature reference in any calibration application or use the set-up directly in custody transfer applications where high accuracy (low uncertainty) means money.
- DTI-1000 accuracy up to ±0.005°C
- DTI-1000 & STS sensor ±0.03°C ± LSD

Dual Channel Inputs
Specify temperature modes on the dual channel inputs: sensor 1 and sensor 2, with differential values 1-2, peak hold etc.

Fast Response Time
This simple to use instrument offers great flexibility, being able to work with both ‘smart’ and standard temperature sensors. A fast response time ensures precise monitoring of temperature stability and low drift reduces uncertainty of measurement between calibration intervals.

Reliable Temperature Readings
The superior specifications combined with a long history of reliability and low drift have made the DTI-1000 and the STS sensor the working standard in many national laboratories worldwide.
The measuring principle is a 4-wire True Ohm Measurement, which eliminates the EMF in cables, sockets, and sensors.

Specified Low Drift
The STS industrial temperature reference probes are built to last. All Superior Temperature Standard probes are economical and offer fast response times, low immersion depths, compact physical sizes, and specified low drift rates; even at high temperatures. Maintains a minimum uncertainty budget throughout the period between re-calibration intervals.
Intuitive and fast navigation

Menu / Enter
The MENU/ENTER key includes intelligent prompts that guide the user through setup and operation. This key allows the user to specify measuring units, resolution, sensor identification, and coefficients.

On / Off
The ON/OFF key automatically initiates a self-test routine and the display indicates tested parameter results plus the date of the last calibration.

Reset / Select
The RESET/SELECT key allows the user to enter peakholds and to change settings in the MENU mode.

Sensor 1 connections

Sensor 2 connections

Display
Display with 2 * 20 characters, which continuously read out the two inputs.

Mode
The MODE key allows the user to specify temperature modes on the dual channel inputs; sensor 1 and sensor 2, with differential values 1-2, peak hold etc.
Conversion to Temperature

DTI-1000 will accept Callendar van Dusen coefficients $R_0$, A, B and C or ITS-90 coefficients for converting resistance to temperature. If you do not have these coefficients available from the sensors certificate, but have measurement data (temperature and resistance), JofraCal can help you calculate the coefficients required.

Combining a DTI-1000 and a STS reference sensor with the use of ITS-90 coefficients ensures the best overall accuracy.

True Ohm Measurement

The DTI-1000 has been designed to employ state-of-the-art DC measuring techniques in combination with powerful microprocessor technology. To achieve high accuracy, the measuring principle used by the DTI-1000 is True Ohm Measurement thus eliminating the EMF from cables, sockets, and sensors.

True Ohm Measurement is a proven method to achieve accurate compensation for errors induced by thermal effects.

The resistance is measured through the 4-wire system at 1 mA, after which the instrument takes a reading without any applied current; this second reading is the "error EMF".

Linearity

To obtain high accuracy, it is necessary to know the characteristics of the Pt100 sensor to be used with the DTI-1000 e.g. a STS sensor. The DTI-1000 provides 3 different linearity setups:

- Certified data pairs of ohm and reference temperature. Use JofraCal to calculate and download individual coefficients from a certified sensor e.g. a STS sensor based on "best curve fit"
- Coefficients, according to IEC 751
- Coefficients according to ITS-90

Reference Resistors

To minimize the effect of any drift caused by ambient temperature, humidity and/or aging, the DTI series is designed with built-in high precision and extremely stable reference resistors. This technique minimizes drift.

Calibration software included

JofraCal calibration software ensures easy calibration of RTD’s, thermocouples, transmitters, thermoswitches, pressure gauges and pressure switches.

JofraCal software controls the complete calibration procedure, stores the results and provides a calibration audit trail through hard-copy certificates. All calibration data are stored for each sensor to monitor drift and optimise recalibration intervals. A scheduler feature allows planning of future calibrations.
**Specifications DTI-1000**

### Functional

**Input Interface**
- DTI-1000 A (Pt100/Pt25) ......................... 0-360Ω
- DTI-1000 B (Pt25) .................................. 0-95

**Accuracy, 12 months use**
- DTI-1000 A ......................... ±(6 ppm rdg + 1.4 mΩ)
- DTI-1000 B ......................... ±(6 ppm rdg + 0.7 mΩ)

*For accuracies in °C and °F please see table*

**Temp. range** ................. -200 to 750°C / -328 to 1382°F

**Input channels** ........................................... 2

**Termination** ....... Goldplated LEMO/4mm banana test sockets

**Resolution** ...................... 0.1, 0.01 or 0.001 °C/F/K/Ω

**Update rate (0.1/0.01/0.001 °C)**  ............. 2 / 3 / 12 seconds

**Measuring units** ............................. °C, °F, K and Ω

**Measuring current** .................................... 1 mA

**Miscellaneous**

**Serial data interface** ................................. RS232

**Display** ............. VFD, two lines, 20 characters alphanumeric

**Operating temp. (ambient)** ............ 0 to 50°C / 32 to 122°F

**Storage temp. (ambient)** ........... -20 to 60°C / -4 to 140°F

**Humidity** ...................................... 0 to 90% RH

### Power Supply

**Mains Adapter**
- 9 VDC / 200 mA

**Battery**
- 8 x 1.5 V (type AA)

**Battery Life**
- Typically 15 hours

### Physical Specifications

**Serial data interface** ................................. RS232

**Display** ............. VFD, two lines, 20 characters alphanumeric

**Operating temp. (ambient)** ............ 0 to 50°C / 32 to 122°F

**Storage temp. (ambient)** ........... -20 to 60°C / -4 to 140°F

**Humidity** ...................................... 0 to 90% RH

### Power Supply

**Mains Adapter**
- 9 VDC / 200 mA

**Battery**
- 8 x 1.5 V (type AA)

**Battery Life**
- Typically 15 hours

### Physical Specifications

**Mains specifications**
- Temp. range: -200 to 750°C / -328 to 1382°F
- Temp. coefficient: inside 23°C ±3°C / outside 73°F ±5°F
- Input channels: 2
- Termination: Goldplated LEMO/4mm banana test sockets
- Resolution: 0.1, 0.01 or 0.001 °C/F/K/Ω
- Update rate (0.1/0.01/0.001 °C): 2 / 3 / 12 seconds
- Measuring units: °C, °F, K and Ω
- Measuring current: 1 mA

**Miscellaneous**

**Serial data interface** ................................. RS232

**Display** ............. VFD, two lines, 20 characters alphanumeric

**Operating temp. (ambient)** ............ 0 to 50°C / 32 to 122°F

**Storage temp. (ambient)** ........... -20 to 60°C / -4 to 140°F

**Humidity** ...................................... 0 to 90% RH

### Accuracy - 12 months

**Temperature range**

<table>
<thead>
<tr>
<th>Temperature range</th>
<th>DTI-1000 A with Pt100 (excl. sensor uncertainty)</th>
<th>DTI-1000 A with Pt25 (excl. sensor uncertainty)</th>
<th>DTI-1000 B with Pt25 (excl. sensor uncertainty)</th>
</tr>
</thead>
<tbody>
<tr>
<td>-200°C/-328°F</td>
<td>±0.004°C/±0.006°F</td>
<td>±0.014°C/±0.026°F</td>
<td>±0.007°C/±0.013°F</td>
</tr>
<tr>
<td>0°C/-32°F</td>
<td>±0.005°C/±0.009°F</td>
<td>±0.016°C/±0.028°F</td>
<td>±0.008°C/±0.015°F</td>
</tr>
<tr>
<td>-155°C/-311°F</td>
<td>±0.006°C/±0.011°F</td>
<td>±0.017°C/±0.031°F</td>
<td>±0.010°C/±0.018°F</td>
</tr>
<tr>
<td>200°C/392°F</td>
<td>±0.007°C/±0.013°F</td>
<td>±0.018°C/±0.032°F</td>
<td>±0.010°C/±0.019°F</td>
</tr>
<tr>
<td>320°C/608°F</td>
<td>±0.008°C/±0.014°F</td>
<td>±0.019°C/±0.035°F</td>
<td>±0.012°C/±0.021°F</td>
</tr>
<tr>
<td>400°C/752°F</td>
<td>±0.008°C/±0.015°F</td>
<td>±0.020°C/±0.037°F</td>
<td>±0.012°C/±0.022°F</td>
</tr>
<tr>
<td>600°C/1112°F</td>
<td>±0.010°C/±0.019°F</td>
<td>±0.023°C/±0.041°F</td>
<td>±0.014°C/±0.026°F</td>
</tr>
<tr>
<td>650°C/1202°F</td>
<td>±0.011°C/±0.020°F</td>
<td>±0.024°C/±0.043°F</td>
<td>±0.015°C/±0.027°F</td>
</tr>
<tr>
<td>750°C/1382°F</td>
<td>±0.012°C/±0.021°F</td>
<td>±0.026°C/±0.047°F</td>
<td>±0.017°C/±0.030°F</td>
</tr>
</tbody>
</table>

### Weight

| DTI-1000 | 2.2 kg / 4.9 lb |

### Shipping Dimension

| DTI-1000 | 600x380x310 mm / 23.6x15.0x12.2 in |

### Shipping Weight

| DTI-1000 | 10.4 kg / 22.9 lb |
STS Reference Sensors

System accuracy for DTI-1000 & STS

<table>
<thead>
<tr>
<th>Sensor Type</th>
<th>Temperature Range °C/°F</th>
<th>Accuracy ± °C/°F</th>
</tr>
</thead>
<tbody>
<tr>
<td>STS-050 sensor</td>
<td>-45 to 400 °C/-49 to 752 °F</td>
<td>±0.060/0.108 1,2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>±0.070/0.126 1,3</td>
</tr>
<tr>
<td>STS-100 sensor</td>
<td>-50 to 250 °C/-58 to 482 °F</td>
<td>±0.030/0.054 1,2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>±0.045/0.081 1,3</td>
</tr>
<tr>
<td>STS-100 sensor</td>
<td>-50 to 320 °C/-58 to 608 °F</td>
<td>±0.040/0.072 1,2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>±0.050/0.090 1,3</td>
</tr>
<tr>
<td>STS-100 sensor</td>
<td>-50 to 400 °C/-58 to 752 °F</td>
<td>±0.060/0.108 1,2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>±0.070/0.126 1,3</td>
</tr>
<tr>
<td>STS-100 sensor</td>
<td>-50 to 650 °C/-58 to 1202 °F</td>
<td>±0.060/0.108 1,2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>±0.080/0.144 1,3</td>
</tr>
<tr>
<td>STS-102 cable sensor</td>
<td>-45 to 155 °C/-49 to 311 °F</td>
<td>±0.040/0.072 1,2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>±0.070/0.126 1,3</td>
</tr>
</tbody>
</table>

All sensors are as standard supplied with an accredited certificate stating the sensor coefficients.

1 Specified at 95% confidence interval k=2 over full range, including calibration uncertainty, excluding 1 LSD (least significant digit)
2 Excluding sensor drift
3 Including sensor drift after 100 hours at max. temperature

STS Superior Temperature Reference Sensors

To get an ideal reference system, we offer a range of reference sensors. The STS Superior Temperature reference Sensors are based on more than 50 years of industrial temperature sensor manufacturing experience. The main requirement of a reference sensor is stability: The less the sensor drifts, the lower the measurement uncertainty. All STS sensors are economical and offer fast response times, low immersion depths, compact physical sizes, and specified low drift rates: even at high temperatures. These are all important considerations when selecting a reference sensor.

All sensors are supplied with an accredited certificate stating the sensor coefficients.
### Functional

**Temperature Range**
- STS-050: -50 to 400°C
- STS-100: -150 to 650°C
- STS-102: -50 to 155°C

**Accuracy, 12 months use**
- STS-100: Hysteresis @0°C/32°F: 0.01°C / 0.02°F
- Long Term Stability @0°C/32°F: typ. 0.014°C / 0.025°F
- Repeatability: 0.005°C / 0.009°F
- STS-102: Hysteresis @0°C/32°F: 0.01°C / 0.02°F
- Long Term Stability @0°C/32°F: typ. 0.014°C / 0.025°F
- Repeatability: 0.002°C / 0.0036°F

**STS-050**
- Hysteresis @0°C/32°F: 0.01°C / 0.02°F
- Long Term Stability @0°C/32°F: typ. 0.014°C / 0.025°F
- Repeatability: 0.002°C / 0.0036°F

**Sensing element**
- Type: Pt100
- Nominal resistance @0°C/32°F: 100Ω
- Temperature coefficient: α100 = 0.00385 1/°

**Minimum immersion depth**
- STS-050 (4 mm / 0.16 in): 100 mm / 3.9 in
- STS-100 A (4 mm / 0.16 in): 100 mm / 3.9 in
- STS-100 B (6.35 mm / 0.25 in): 110 mm / 4.3 in
- STS-102 A: 30 mm / 1.18 in

**STS-050 ................................. ... . . . .-50 to 400°C**

**Hysteresis3) @0°C/32°F ................ ... . . . . 0.01°C / 0.02°F**

**Long Term Stabilty4) @0°C/32°F  . . ..... . typ. 0.014°C / 0.025°F**

**Repeatability ....................... ... . . . . 0.005°C / 0.009°F**

**3) When used in the range -50°C to 400°C / -58°F to 752°F.**

**4) Stability when exposed to 400°C / 752°F for 100 hours. Stability will depend on actual use of the probe.**

### Physical Specifications

**Shipping dimensions incl. carrying case**
- STS-050: LxWxH: 750x150x140 mm / 29.5x5.9x5.5 in
- STS-100: LxWxH: 750x150x140 mm / 29.5x5.9x5.5 in
- STS-102: LxWxH: 360x290x50 mm / 14.2x11.4x1.9 in
- STS-050, weight: 1.0 kg / 2.2 lb
- STS-100, weight: 3.0 kg / 6.6 lb
- STS-102, weight: 1.0 kg / 2.2 lb

**STS-102 (4 mm / 0.16 in) .............. ... . . . .100 mm / 3.9 in**

**Response time**
- STS-050 & STS-100 A τ0.5 (50%): 8 sec
- STS-050 & STS-100 A τ0.9 (90%): 26 sec
- STS-100 B τ0.5 (50%): 18 sec
- STS-100 B τ0.9 (90%): 44 sec
- STS-102 A τ0.9 (90%): 16 sec

**Electrical connections**
- Cable: 4 wire + shield
- Connection: LEMO Goldplated

**Outer tube**
- STS-050 & STS-100: Inconel 600
- STS-102: AISI 316TI

**Operating conditions**
- Sensor connection and cable, STS-100: Max 70°C / 158°F
- Sensor connection, STS-102: Max 70°C / 158°F
- Sensor cable, STS-102: Max 175°C / 347°F
- Storage temperature: -20 to 70°C / -4 to 158°F
- Humidity: 0 to 90% RH
- Protection class (connectors): DIN 40050 IP-50

**Self-heating effect**
- STS-050: 0.06°C/mW / 0.108°F/mW
- STS-100, & STS-102: 0.04°C/mW / 0.07°F/mW

**Response time**
- STS-050 & STS-100 A τ0.5 (50%): 8 sec
- STS-050 & STS-100 A τ0.9 (90%): 26 sec
- STS-100 B τ0.5 (50%): 18 sec
- STS-100 B τ0.9 (90%): 44 sec
- STS-102 A τ0.9 (90%): 16 sec

**Electrical connections**
- Cable: 4 wire + shield
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**Electrical connections**
- Cable: 4 wire + shield
- Connection: LEMO Goldplated

**Outer tube**
- STS-050 & STS-100: Inconel 600
- STS-102: AISI 316TI

**Operating conditions**
- Sensor connection and cable, STS-100: Max 70°C / 158°F
- Sensor connection, STS-102: Max 70°C / 158°F
- Sensor cable, STS-102: Max 175°C / 347°F
- Storage temperature: -20 to 70°C / -4 to 158°F
- Humidity: 0 to 90% RH
- Protection class (connectors): DIN 40050 IP-50
Ordering Information

Base Model Number

<table>
<thead>
<tr>
<th>Base Model Number</th>
<th>Model Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>DTI-1000A</td>
<td>DTI-1000 A and Pt100 or Pt25</td>
</tr>
<tr>
<td>DTI-1000B</td>
<td>DTI-1000 B and Pt25</td>
</tr>
</tbody>
</table>

Calibration Certificate

<table>
<thead>
<tr>
<th>Option Code</th>
<th>Certificate Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>Carrying Case, aluminium</td>
</tr>
<tr>
<td>F</td>
<td>Traceable Certificate to international standards (Standard)</td>
</tr>
<tr>
<td>H</td>
<td>Accredited Certificate - ISO17025</td>
</tr>
</tbody>
</table>

Standard Delivery DTI-1000

- DTI-1000 Indicator
- USB containing manual and JOFRACAL software
- AmeTrim to adjust the DTI-1000
- RS232 cable, 9 pin adapter
- 8 batteries
- Calibration certificate, traceable to int. standards
- Mains adapter

DTI-1000 A temperature indicator with standard traceable certificate and carrying case

JOFRA calibration

AMETEK

SENSORS, TEST & CALIBRATION
### Ordering Information

**STSO50 A**

- **Base Model Number**: STSO50
- **Pt100 reference probe w/ handle, -50 to 400°C / -58 to 752°F**
- **Diameter of the sensor**
  - A: Overall diameter 4 mm / 0.16 in
- **Shape and length**
  - 250: Straight, 250 mm / 9.8 in, incl. cardboard box
  - 350: Straight, 350 mm / 13.8 in, incl. cardboard box
- **Cable length and termination**
  - G: Cable 1 m / 3.3 ft plus LEMO connector
- **Calibration certificate**
  - F: Traceable Certificate to Int'l Standards – Standard -45 to 400°C

4mm STS-050 A reference sensor, 250 mm straight sensor, 1m cable plus LEMO connector, and accredited certificate.

**STS102 A**

- **Base Model Number**: STS102
- **Pt100 reference sensor, cable, -50 to 155°C / -58 to 311°F**
- **Diameter of the sensor**
  - A: Overall diameter 4 mm / 0.16 in
- **Shape and length**
  - 030: Short sensor 30 mm / 1.18 in, incl. plastic case
- **Cable length and termination**
  - S: Cable 1 m / 3.3 ft plus LEMO connector
- **Calibration certificate**
  - I: No Certificate – Annealed only (Useless without certificate/coefficients)

4mm STS-102 A reference sensor, 30 mm short sensor, 1 m cable plus LEMO connector and accredited certificate.

**STS100 A/B**

- **Base Model Number**: STS100
- **Pt100 reference sensor, solid, -150 to 650°C / -238 to 1207°F**
- **Diameter of the sensor**
  - A: Overall diameter 4 mm / 0.16 in
  - B: Overall diameter 6.35 mm / 0.25 in
- **Shape and length**
  - 250: Straight, 250 mm / 9.8 in, incl. alu case
  - 350: Straight, 350 mm / 13.8 in, incl. alu case
  - 500: Straight, 500 mm / 19.7 in, incl. alu case
- **Cable length and termination**
  - A: Cable 0.5 m / 1.6 ft + LEMO connector
  - B: Cable 2 m / 6.6 ft + LEMO connector
  - C: Cable 2 m / 6.6 ft + Banana plug connector
- **Calibration certificate**
  - I: No Certificate – Annealed only (Useless without certificate/coefficients)

4mm STS-100 A reference sensor, 350mm straight sensor, 2m cable, plus LEMO connector and accredited certificate.

### Accessories STS-100

- 122801 ................. Cable 0.5 m / 1.6 ft. LEMO to LEMO
- 65-PT100-LL-Cable ........ Cable 2 m / 6.6 ft. LEMO to LEMO
- 65-PT100-LB-Cable ........ Cable 2 m / 6.6 ft. LEMO to banana
- 125522 ................. Cable 2 m / 6.6 ft. with LEMO / Redel

### System Calibration - DTI-1000 and STS-050

- SYS050/1…DTI/STS050 Cal.: -45, -30, -15, 0, 100, 250, 400°C

### System Calibration - DTI-1000 and STS-100

- SYS100/1…DTI/STS100 Cal.: -90, -45, -15, 0, 50, 100, 125°C
- SYS100/2…DTI/STS100 Cal.: -45, -30, -15, 0, 50, 100, 155°C
- SYS100/3…DTI/STS100 Cal.: 0, 50, 100, 150, 200, 250, 320°C
- SYS100/4…DTI/STS100 Cal.: 0, 50, 100, 200, 320, 450, 650°C
- SYS100/5…DTI/STS100 Cal.: -45, -30, -15, 0, 50, 100, 200, 320, 450, 650°C

### System Calibration - DTI-1000 and STS-102

- SYS102/1…DTI/STS102 Cal.: -45, -30, -15, 0, 50, 100, 155°C
EN ISO/IEC 17025 Laboratory accreditation

AMETEK Sensors, Test & Calibration has two EN ISO/IEC 17025 accredited laboratories that issues accredited certificates in accordance with international standards. Laboratory accreditation is a reliable indicator of technical competence assuring customers the most accurate documentation. We believe in being clear about our capabilities, our accuracy, and about what you can expect from us.

Because calibration is a matter of confidence!

Accessories - DTI-1000

124716... 4 x 1.5 Volt rechargeable batteries (requires 8 batteries)
124718... Charger for rechargeable batteries - 115/230VAC
124944... Carrying case
124315... Removeable trolley for carrying case
125002... Edgeport Converter with 4 pcs of RS232 ports
124720... Mains adapter 9VDC/800mA - 230VAC/115VAC

* ISO 17025 accredited calibration lab.