temperature

JOFRA™

Reference Digital Temperature Indicator

DTI-1000 and STS-100

Wide temperature range
DTI-1000: -200 to 750°C (-328 to 1382°F)
STS-100: -150 to 650°C (-238 to 1202°F)

Improve your accuracy
DTI-1000: accuracy to ±0.005°C (±0.009°F)
DTI-1000 + STS probe:
±0.03°C (±0.054°F) ± LSD

Reliable temperature readings
The measuring principle is a 4-wire True Ohm Measurement, which eliminates the EMF in cables, sockets, and sensors

Dual channel inputs
Sensor 1 and sensor 2, with differential value 1 - 2, peak hold etc.

Minimize paperwork
RS232 communication, special calibration and data storage software are included

Fast response time
Ensures correct monitoring of the temperature stability

Specified low drift
Maintains a minimum uncertainty budget over the entire period between re-calibration intervals

Wide selection of probes
Including 90° angled or cable probe, and 4 mm / 0.16 in or 6.35 mm / 0.25 in, offering flexibility in test methods and sensors-under-test

Wherever there is a demand for reliable and accurate temperature measurement, you can rely on the JOFRA DTI-1000 reference thermometer and the JOFRA STS reference probes; backed on more than 50 years of experience.

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.

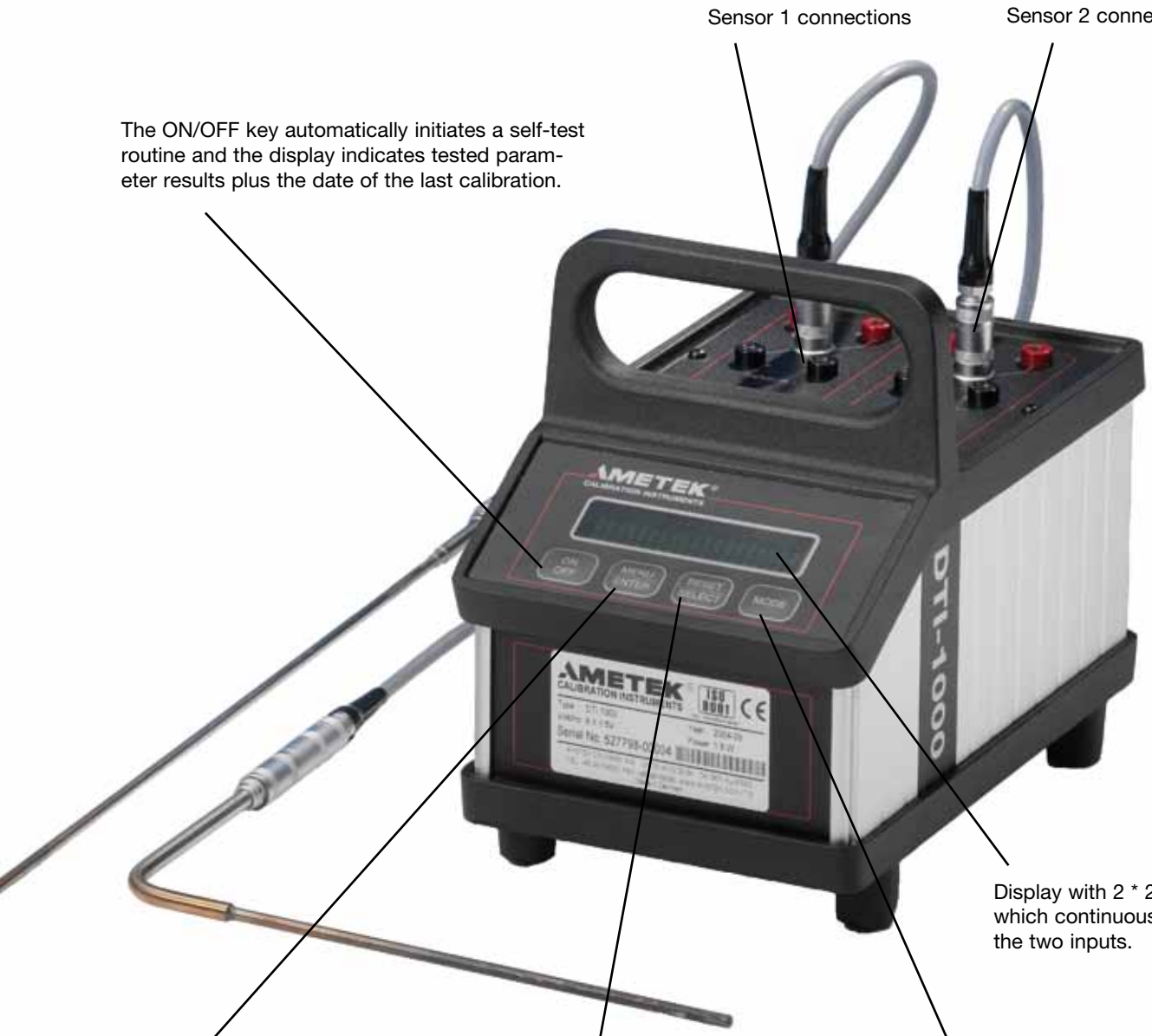
Use the DTI-1000 and the STS probes as your working temperature reference in any calibration application or use the set-up directly in custody transfer applications where high accuracy (low uncertainty) means money.

The superior specifications combined with a long history of reliability and low drift have made the DTI-1000 and the STS probes the working standard in many national laboratories worldwide.

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.

ISO 9001 Manufacturer

AMETEK®
TEST & CALIBRATION INSTRUMENTS



Carrying case (Optional) - 124944

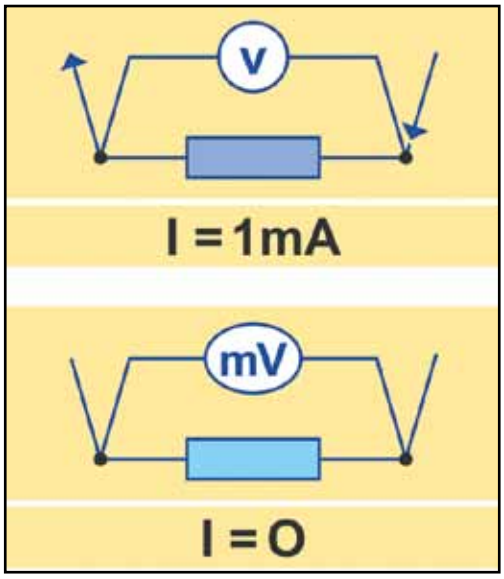
The optional protective carrying case ensures safe transportation and storage of the instrument and associated equipment.

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”.



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.

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. one of the JOFRA STS probes. The DTI-1000 provides 3 different linearity setups:

- Certified data pairs of ohm and reference temperature. Use JOFRACAL for calculating and downloading of individual coefficients from a certified sensor e.g. a STS JOFRA probe based on “best curve fit”
- Coefficients, according to IEC 751 (Callender van Dusen)
- Coefficients according to ITS-90

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 certificate for the sensor, 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.

Simplified operation

The DTI-1000 features an easy-to-read VFD display and dedicated function keys. All operations are performed from the instrument’s front panel.

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JOFRACAL CALIBRATION SOFTWARE

JOFRACAL calibration software ensures easy calibration of RTD´s, thermocouples, transmitters, thermoswithes, pressure gauges and pressure switches.

JOFRACAL can be used with DPC-500, HPC and IPI pressure calibrators, all JOFRA temperature calibrators, as well as JOFRA AMC910, ASC300 multi signal calibrator and ASM-800 signal multi scanner. When used with JOFRA ASM-800 signal multi scanner, JOFRACAL can perform a simultaneous semi automatic calibration on up to 24 pressure and/or temperature devices under test in any combination.

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.

REQUIREMENTS JOFRACAL

Minimum hardware requirements:

- Intel® Pentium® II 1.4 GHz processor.
- 64MB RAM (128MB recommended)
- 80MB free disk space on hard disk (120MB recommended) prior to installation
- Standard VGA (800x600, 256 colours). 1024x768 recommended.
- CD-ROM drive for installation of program
- 1 or 2 free RS-232 serial ports, depending on configuration

Minimum software equirements:

- Microsoft Windows® 98, Microsoft Windows® NT 4.0, Microsoft Windows® 2000, Microsoft Windows® ME, Microsoft Windows® XP, Vista.
- System fonts: MS Sans Serif and Arial

FUNCTIONAL SPECIFICATIONS

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 below

Power supply

Mains ..... 9 VDC / 200 mA
Batteries ..... 8 x 1.5 V (type AA)
Battery life ..... 15 hours typically

Mains specifications

Temperature range ..... -200 to 750°C / -328 to 1382°F
Temperature coeffecient: .. outside 23°C ±3°C / 73°F ±5°F
..... 0.8 ppm/°C / 0.45 ppm/°F
Input channels 2
Termination Goldplated LEMO / 4 mm banana test sockets
Resolution (user-selectable) .. 0.1, 0.01 or 0.001 °C/°F/K/Ω
Update rate (0.1 / 0.01 / 0.001°) ..... 2 / 3 / 12 seconds
Measuring units ..... °C, °F, K and Ω
Measuring current 1mA

Instrument dimensions

L x W x H: ..... 225 x 135 x 195 mm / 8.9 x 5.3 x 7.7 in
Weight ..... 2.2 kg / 4.9 lb

Shipping (+ std. accessories + carrying case)

L x W x H ..... 600 x 380 x 310 mm / 23.6 x 15.0 x 12.2 in
Weight ..... 10.4 kg / 22.9 lb

Shipping (+ std. accessories but no carrying case)

L x W x H ..... 320 x 240 x 270 mm / 12.6 x 9.5 x 10.6 in
Weight: ..... 3.5 kg / 7.7 lb

Shipping (carrying case only)

L x W x H ..... 600 x 380 x 310 mm / 23.6 x 15.0 x 12.2 in
Weight: ..... 6.9 kg / 15.2 lb

Miscellaneous

Serial data interface RS232
Display: ..... VFD, two lines, 20 characters alphanumeric
Operating (ambient) temperature .... 0 to 50°C / 32 to 122°F
Storage (ambient) temperature .... -20 to 60°C / -4 to 140°F
Humidity ..... 0 to 90% RH

JOFRA STS REFERENCE SENSORS

To get an ideal reference system, JOFRA offers a range of reference sensors. JOFRA 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 JOFRA Superior Temperature Standard 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 or traceable certificate stating the sensor coefficients.

System accuracy for JOFRA DTI-1000 with JOFRA STS-100/102

STS-100 probe:

-50 to 250°C (-58 to 482°F):	±0.030°C (±0.054°F) [1) 2)] ±0.045°C (±0.081°F) [1) 3)]
-50 to 320°C (-58 to 608°F):	±0.040°C (±0.072°F) [1) 2)] ±0.050°C (±0.090°F) [1) 3)]
-50 to 400°C (-58 to 752°F):	±0.060°C (±0.108°F) [1) 2)] ±0.070°C (±0.126°F) [1) 3)]
-50 to 650°C (-58 to 1202°F):	±0.060°C (±0.108°F) [1) 2)] ±0.080°C (±0.144°F) [1) 3)]
-90 to 650°C (-130 to 1202°F):	±0.080°C (±0.144°F) [1) 2)] ±0.110°C (±0.198°F) [1) 3)]

STS-102 cable sensor:

-45 to 155°C (-49 to 311°F):	±0.040°C (±0.072°F) [1) 2)] ±0.070°C (±0.126°F) [1) 3)]

All sensors are as standard supplied with an accredited certificate stating the sensor coefficients. A traceable certificate is optional.

Note 1: Specified at 95% confidence interval k=2, over full range, including calibration uncertainty, excluding 1 LSD (Least Significant Digit).

Note 2: Excl. sensor drift

Note 3: Incl. sensor drift after 100 hours at max. temperature.

Accuracy - 12 months Temperature range	DTI-1000 A with Pt-100 (excl. sensor uncertainty)	DTI-1000 A with Pt-25 (excl. sensor uncertainty)	DTI-1000 B with Pt-25 (excl. sensor uncertainty)
-200°C / -328°F	±0.004°C / ±0.006°F	±0.014°C / ±0.026°F	±0.007°C / ±0.013°F
0°C / -32°F	±0.005°C / ±0.009°F	±0.016°C / ±0.028°F	±0.009°C / ±0.015°F
-155°C / -311°F	±0.006°C / ±0.011°F	±0.017°C / ±0.031°F	±0.010°C / ±0.018°F
200°C / 392°F	±0.007°C / ±0.013°F	±0.018°C / ±0.032°F	±0.010°C / ±0.019°F
320°C / 608°F	±0.008°C / ±0.014°F	±0.019°C / ±0.035°F	±0.012°C / ±0.021°F
400°C / 752°F	±0.008°C / ±0.015°F	±0.020°C / ±0.037°F	±0.012°C / ±0.022°F
600°C / 1112°F	±0.010°C / ±0.019°F	±0.023°C / ±0.041°F	±0.014°C / ±0.026°F
650°C / 1202°F	±0.011°C / ±0.020°F	±0.024°C / ±0.043°F	±0.015°C / ±0.027°F
750°C / 1382°F	±0.012°C / ±0.021°F	±0.026°C / ±0.047°F	±0.017°C / ±0.030°F

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ORDERING JOFRA DTI-1000 AND STS-100

Order No.	Description
	Base model number
DTI-1000A	DTI-1000 A, -200 to 750°C / -328 to 1382°F (Pt-25 or Pt-100)
DTI-1000B	DTI-1000 B, -200 to 750°C / -328 to 1382°F (only Pt-25)
	Calibration certificate DTI-1000
F	NPL traceable calibration certificate
H	Accredited calibration certificate (Option)
	Channels
C1	One channel
C2	Two channels
	STS reference sensor
100	Pt100 reference probe, solid, -150 to 650°C (-238 to 1207°F)
	Diameter of the probe
A	Overall diameter 4 mm (0.16 in)
B	Overall diameter 6.35 mm (0.25 in)
	Shape and length
250	Straight probe, 250 mm (9.8 in) in alu case
350	Straight probe, 350 mm (13.8 in) in alu case
500	Straight probe, 500 mm (19.7 in) in alu case
901	90° angled probe, 207 mm (8.1 in) in plastic case
	Calibration certificate
F	NPL traceable calibration certificate on sensor
H	Accredited calibration certificate on sensor (standard)
FS	NPL traceable system calibration certificate
HS	Accredited system calibration certificate
	Options
C	System carrying case (max. 350 mm. probe)

DTI1000AFC1100A250HC Sample order number
JOFRA DTI-1000 A with NPL traceable calibration certificate, One channel and 4 mm STS-100 reference sensor, straight 250 mm. with accredited calibration certificate and carrying case.

SYSTEM CALIBRATION DTI-1000 AND STS-100

If you need a system calibration certificate for the DTI-1000 and STS-100 reference sensor you can choose between:

FS, which is a standard traceable system calibration certificate
HS, which is a standard accredited system calibration certificate

Please specify in the above ordering structure.

A standard system calibration of a DTI-1000 and a STS-100 probe includes the following calibration points:

-45, -20, 0, 50, 100, 200, 320, 450, 650°C / -49, -4, 32, 122, 212, 392, 608, 842, 1202°F

ORDERING JOFRA DTI-1000 AND STS-102

Order No.	Description
	Base model number
DTI-1000A	DTI-1000 A, -200 to 750°C / -328 to 1382°F (Pt-25 or Pt-100)
DTI-1000B	DTI-1000 B, -200 to 750°C / -328 to 1382°F (only Pt-25)
	Calibration certificate DTI-1000
F	NPL traceable calibration certificate
H	Accredited calibration certificate (Option)
	Channels
C1	One channel
C2	Two channels
	STS reference sensor
102	Pt100 reference probe, cable, -50 to 155°C (-58 to 311°F)
	Diameter of the probe
A	Overall diameter 4 mm (0.16 in)
	Shape and length
030	Short sensor 30 mm / 1.18 in in plastic case
	Calibration certificate
F	NPL traceable calibration certificate on sensor
H	Accredited calibration certificate on sensor (standard)
FS	NPL traceable system calibration certificate
HS	Accredited system calibration certificate
	Options
C	System carrying case (max. 350 mm. probe)

DTI1000AFC1102A030HC Sample order number
JOFRA DTI-1000 A with NPL traceable calibration certificate, One channel and 4 mm STS-102 reference sensor, short 30 mm with accredited calibration certificate and carrying case.

SYSTEM ACCESSORIES DTI-1000 AND STS-102

If you need a system calibration certificate for the DTI-1000 and STS-100 reference sensor you can choose between:

FS, which is a standard traceable system calibration certificate
HS, which is a standard accredited system calibration certificate

Please specify in the above ordering structure.

A standard accredited system calibration of a DTI-1000 and a STS-102 probe includes the following calibration points:

-45, -20, 0, 50, 100, 155°C / -49, -4, 32, 122, 212, 311°F

ORDERING INFORMATION DTI-1000

Order No.	Description
	Base model number
DTI-1000A	DTI-1000 A, -200 to 750°C / -328 to 1382°F Pt-25 or Pt-100
DTI-1000B	DTI-1000 B, -200 to 750°C / -328 to 1382°F only Pt-25
	Calibration certificate
F	NPL traceable calibration certificate
H	Accredited calibration certificate (Option)
	Options
C	Carrying case, aluminum

DTI1000AFC Sample order number
JOFRA DTI-1000 A with NPL traceable certificate and carrying case.

STANDARD DELIVERY

- DTI-1000
- JOFRACAL calibration software
- AmeTrim ATC/DTI to adjust the DTI-1000
- RS232 cable, 9 pin connector
- 8 batteries
- User manual
- Calibration certificate, traceable to International Standards
- Mains adapter

ACCESSORIES

124716	4x 1,5 Volt rechargeable batteries * The DTI-1000 requires 8 x 1.5 Volt batteries
124718	Charger for rechargeable batteries 115/230 VAC
124944	Carrying Case for DTI-1000 * (May also hold two connected STS sensors up to 350 mm)
124315	Removable trolley for carrying case
125002	Edgeport Converter with 4 pcs of RS232 ports
124720	Mains adapter 9VDC/200mA - 230VAC/115VAC

AMETEK Calibration Instruments
is one of the world's leading manufacturers and developers of calibration instruments for temperature, pressure and process signals as well as for temperature sensors both from a commercial and a technological point of view.

JOFRA Temperature Instruments
Portable precision thermometers. Dry-block and liquid bath calibrators: 5 series, with more than 25 models and temperature ranges from -90° to 1205°C / -130° to 2200°F. All featuring speed, portability, accuracy and advanced documenting functions with JOFRACAL calibration software.

JOFRA Pressure Instruments
Convenient electronic systems ranging from -25 mbar to 1000 bar (0.4 to 15,000 psi) - multiple choices of pressure ranges, pumps and accuracies, fully temperature-compensated for problem-free and accurate field use.

JOFRA Signal Instruments
Process signal measurement and simulation for easy control loop calibration and measurement tasks - from handheld field instruments to laboratory reference level bench top instruments.

JOFRA / JF Marine Instruments
A complete range of calibration equipment for temperature, pressure and signal, approved for marine use.

FP Temperature Sensors
A complete range of temperature sensors for industrial and marine use.

M&G Pressure Testers
Pneumatic floating-ball or hydraulic piston dead weight testers with accuracies to 0.015% of reading.

M&G Pumps
Pressure generators from small pneumatic "bicycle" style pumps to hydraulic pumps generating up to 1,000 bar (15,000 psi).

...because calibration is a matter of confidence

AMETEK®
TEST & CALIBRATION INSTRUMENTS

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