temperature

JOFRA calibration

Easy Temperature Calibrator

ETC-series

Heats up by up to 100°C / 212°F per minute and completes a full dual-point test in less than 10 minutes, including stability time; timesavings at your fingertips! The ETC- series is designed for field testing of temperature measurement devices.

The small size and light weight make it a perfect instrument to verify sensors in difficult to reach places.

All JOFRA ETC units have many of the same useful and timesaving features offered in the more advanced JOFRA dry-block series.

Designed for people who perform tests and verifications of temperature sensing devices in the field. This instrument is ideal when time is a critical factor and the highest accuracy is not a critical factor.

Reduced size and weight are important considerations because the unit is able to fit into a tool box or instrument carrying case and can be used for sensors that are difficult to access.

One-key-one-function user interface provides immediate access to setting the temperature and the auto-step timesaving function. There is no need for manipulation of sophisticated menus.

The Stability indicator provides audible and visual prompts when the temperature is stable. This function also includes a 3 minute countdown before the stable condition.

Stainless steel and rubber side panels make the instrument suitable for many years of faithful duty in an industrial environment.

» Temperature ranges

ETC-125 A -10 to 125°C / 14 to 257°F
ETC-400 A 28 to 400°C / 82 to 752°F
ETC-400 R 28 to 400°C / 82 to 752°F

» Fast calibration saves money

Heats up as quickly as 100°C / 212°F per minute and stabilizes in just 3 minutes. Completes a 2-point test in less than 10 minutes

» Extreme flexibility

The small size makes it perfect to store in a tool box and to check temperature sensors that are difficult to access

» Fully-featured despite the small size

The multi-information display shows actual and set temperatures, a stability indicator, and a stability countdown timer

» Timesaving features

Fast one-key-one-function access to set the temperature and the auto-stepping function

» Documentation made easy

RS232 communication interface and JOFRACAL calibration software are part of the ready-to-use standard delivery

» Easy IR calibration

Standard delivery of the ETC-400 R includes JOFRA IR-LAB software enabling the user to calibrate IR thermometers with a fixed emission factor setting

» Complete marine program

Part of a complete program of marine approved temperature, pressure and signal calibrators; including temperature sensors

ISO 9001 Manufacturer

AMETEK®
TEST & CALIBRATION INSTRUMENTS

ETC-400 R for infrared thermometers

The ETC-400 R is designed for optimum speed in connection with calibration of infrared thermometers. The 36 mm target provides the optimum size for reliable calibration of infrared thermometers in the process industry as it is designed for high accuracy and long-term stability while maintaining speed.

With regard to the coating of the target it has been especially designed for space technology applications, which secure long time performance under high temperature influence. In combination with the shape of the target it ensures the emissivity of 0.96.

If higher accuracy is required, and for recalibration, a 3 mm external JOFRA STS reference probe can be placed under the surface of the target.

Super fast heating - ETC-400 A dry-block

The ETC-400 A is designed for optimum speed. The heating block is built around a highly efficient heating element. The insertion holes for the temperature device under test are located around this element. To reduce mass and increase effectiveness, there is no removable insertion tube; the holes are drilled directly into the block. The minimal mass offers an extremely fast heating and cooling time. The different layouts also make it possible to use an external JOFRA STS reference probe during the calibration. Choose the combination of holes that best suits your needs from our various design combinations.

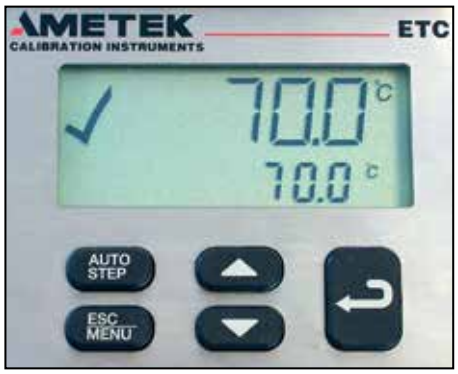
If your application requires a dry-block that can handle large sensors or more than one sensor at a time, we offer several other JOFRA dry-block calibrators that can meet your needs.

Cooling and heating - ETC-125 A dry-block

The ETC-125 A is a simple yet effective tool for verifying temperature instruments that also require references below ambient temperatures: e.g. air-conditioning and cold counters. The predrilled holes allow the use of an insertion tube in the largest bore. This increases the flexibility to match many sensor-under-test sizes.

Easy-to-use, intuitive operation

All instrument controls are accessed directly from the front panel. The main functions on the ETC series are designed with one-key-one-function logic. This means that there are no difficult multiple keystrokes to remember to access primary functions. The easy-to-read, backlit display features dedicated icons, which help in identifying instrument conditions and operational steps.



Set temperature

The ''Up'' and ''Down'' arrow keys allow the user to set the exact temperature desired with a resolution of 0.1°C or °F.

Instrument setups

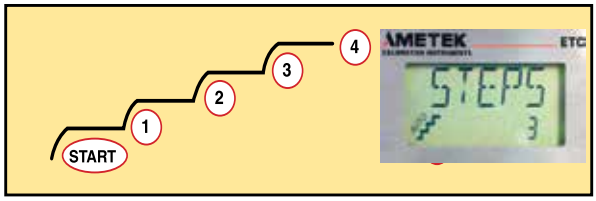
The ETC-series stores the complete instrument setup, including: engineering units, stability criteria, resolution, auto-step settings, and maximum temperature.

Stability indicator

The bold checkmark on the display indicates that the calibrator has reached the desired set temperature and is stable. The operator may change the stability criteria and establish a greater level of confidence in the calibration results as desired. A convenient countdown timer is activated three minutes before the unit reaches stability. This prompts you to be prepared to record results.

Auto-stepping

This feature saves time. The operator may stay in the control room, or another remote location, monitoring the output from the sensor-under-test while the ETC- series calibrator is placed in the process and automatically changes the temperature using a programmed step value and rate. Up to 9 different temperature steps may be programmed, including the hold time for each step. This feature is also ideal for burning-in new sensors prior to installation; this minimizes initial drift and allows for initial testing. It is also useful for testing temperature data loggers.



Maximum temperature

From the setup menu, you can select a lower maximum temperature limit for the calibrator. This function prevents damage to the sensor-under-test caused by the application of excessive temperatures.

Re-calibration/adjustments made easy

The ETC- series has a very easy and straightforward procedure for re-calibration/adjustment. There is no need for a screwdriver or PC software. The only thing you need is a reliable reference thermometer. Place the probe in the calibrator and follow the instructions on the display.

Use the ETC calibrator with JOFRACAL calibration software

JOFRA IR-LAB software for the ETC-400 R

As an extra feature the ETC-400 R will be delivered with a small mathematical program, which will constitute a powerful tool together with the calibrator. The program enables you to calculate at which temperatures you need to calibrate, if your IR thermometer is either locked to a fixed emission factor or if you just want to calibrate your thermometer at a certain emission factor. The program facilitates the whole issue of correcting settings of emission factors and temperatures.

The calibration surface of the JOFRA ETC-400 R IR calibrator has an emission factor of 0,96. If your IR-thermometer is using a different emission factor than 0.96, the result will be a faulty temperature reading on your IR thermometer. However if your IR thermometer is using an emission factor of 0.95 or 0.98 – a helpfull diagram is part of the standard delivery.

Example: Your thermometer is locked to an emission factor of 0,98 and you have set the JOFRA ETC-400 R to 300°C. The diagram indicates that 3,9°C must be subtracted from the calibrator temperature, to obtain the “true” IR thermometer reading (296,1°C).

If you are working with IR thermometers where the emission factor is different than 0.95, 0.96 or 0.98, or other parameters differ from “standard”, use the PC program JOFRA IR-Lab. The JOFRA IR-Lab program allows you to type in various emission factors, in order to get a “true” temperature readout on your thermometer or the other way around - what is the true surface temperature of the calibrator. But the IR-Lab will do more than that; it allows you to calculate “true” temperatures in simulated surroundings that approximate your actual test environments.

Calibration of up to 24 sensors with JOFRA ASM

Using the JOFRA ETC series together with the ASM Advanced Signal Multi-scanner offers a great time-saving automatic solution to calibrate multiple temperature sensors at the same time.

The ASM series is an eight channel scanner controlled by JOFRACAL software on a PC. Up to 3 ASM units can be stacked to calibrate up to 24 sensors at the same time. It can handle signals from 2-, 3- and 4 wire RTD’s, TC’s, transmitters, thermisters, temperature switches and voltage.

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 JOFRA DPC-500, APC, CPC and IPI pressure calibrators, all JOFRA temperature calibrators, as well as JOFRA AMC900, ASC300 multi signal calibrator and ASM-800 signal multi scanner.

JOFRACAL calibration software may also be used for manual calibrations, as it can be set up to accept manual entry of calibration data together with other liquid baths, ice points or dry-block heat sources.

The calibration data collected may be stored on a PC for later recall or analysis. The calibrator stores the calibration procedure and may be taken out to the process site without using a personal computer.

Once all calibrations are completed, the data may be uploaded to the JOFRACAL calibration software for post-processing and printing of certificates. The calibration data collected may be stored on the personal computer for later recall or analysis.

The JOFRACAL temperature calibration software may be donwloaded at www.jofra.com

JOFRACAL software

Minimum hardware requirements for JOFRACAL calibration software.

- INTEL™ 486 processor
- (PENTIUM™ 800 MHz recommended)
- 32 MB RAM (64 MB recommended)
- 80 MB free disk space on hard disk prior to installation
- Standard VGA (800 x 600, 16 colors) compatible screen
- (1024 x 786, 256 colors recommended)
- CD-ROM drive for installation of the program
- 1 free RS232 serial port

STANDARD DELIVERY

- JOFRA ETC dry-block calibrator
- Traceable calibration certificate - temperature performance
- JOFRACAL calibration software
- User and reference manual
- Mains power cable
- Shoulder strap
- RS232 cable
- 1 × predrilled insertion tube (ETC-125 A only)
- Tool for insertion tubes (ETC-125 A only)
- Carrying case (ETC-400 R only) 1)
- JOFRA IR-LAB calibration software (ETC-400 R only)
- Emissivity table (ETC-400 R only)

1) The ETC-400 R is delivered with a carrying case as standard because it is important to keep dust away from the surface of the target on the ETC-400 R. The reason being that a clean surface is important to keep the emissivity and thereby the accuracy. The carrying case is optional for ETC-400 A and ETC-125 A.

ACCESSORIES

122832	Cleaning Brushes - 4 mm - Package of 3 pcs
60F174	Cleaning Brushes - 6 mm - Package of 3 pcs
122822	Cleaning Brushes - 8 mm - Package of 3 pcs
125002	Edgeport Converter with 4 pcs of RS232 ports
124094	Carrying Case for ETC Series

Carrying case (Optional for ETC-125/400 A) - 124094

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

FUNCTIONAL SPECIFICATIONS

Temperature range @ ambient temp. 23°C / 73°F

ETC-125 A
Maximum.....125°C / 257°F
Minimum @ ambient temp. 0°C / 32°F ..... -18°C / -0°F
Minimum @ ambient temp. 23°C / 73°F ..... -10°C /14°F
Minimum @ ambient temp. 40°C / 104°F..... 6°C / 43°F
ETC-400 A .....28 to 400°C / 82 to 752°F@ 23°C
ETC-400 R .....28 to 400°C / 82 to 752°F@ 23°C

Resolution (user-selectable)

Selectable .....1° or 0.1°

Heating time

ETC-125 A
-10 to 23°C / 14 to 73°F .....3 minutes
23 to 100°C / 73 to 212°F ..... 11 minutes
100 to 125°C / 212 to 257°F .....7 minutes

ETC-400 A / R
28 to 200°C / 82 to 392°F.....2 minutes
200 to 400°C / 392 to 752°F .....3 minutes

Cooling time

ETC-125 A
125 to 100°C / 257 to 212°F ..... 1 minute
100 to 0°C / 212 to 32°F.....17 minutes
0 to -10°C / 32 to 14°F .....14 minutes

ETC-400 A
400 to 200°C / 752 to 392°F .....6 minutes
200 to 50°C / 392 to 122°F.....15 minutes

ETC-400 R
400 to 200°C / 752 to 392°F .....9 minutes
200 to 50°C / 392 to 122°F.....24 minutes

Stability

ETC-125 A .....±0.05°C / ±0.09°F
ETC-400 A ..... ±0.15°C / ±0.27°F
ETC-400 R .....±0.3°C / ±0.54°F

Measured after the stability indicator has been on for 10 minutes. Measuring time is 30 minutes.

Time to stability (approximate)

All models .....3 minutes

Accuracy

ETC-125 A .....±0.5°C / ±0.9°F 1)
ETC-400 A .....±0.5°C / ±0.9°F 1)
ETC-400 R ..... ±0.5°C / ±0.9°F 2)
ETC-400 R incl. emissivity
..... ±0.4% rdg ±1°C / ±0.4% rdg. ±1.8°F

1) Specification when using the internal reference. (Load 4 mm OD reference probe in the center of the insert).
2) Specification when using the internal reference. (Load 3 mm OD reference probe).

Immersion depth

ETC-125 A (insulation included) ..... 110 mm / 4.3 in
ETC-400 A .....105 mm / 4.1 in

Mains specifications

Voltage ETC-125 A.....Multivoltage 115VAC and 230VAC
.....115V(90-132) and 230V(180-264)
Voltage ETC-400 A/R ..... 115V(90-127) or 230V(180-254)
Frequency ETC-125 A.....47 - 63 Hz
Frequency ETC-400 A/R .....45 - 65 Hz
Power consumption (max.) ETC-125 A.....75 VA
Power consumption (max.) ETC-400 A/R .....350 W

KEY FEATURES

Auto stepping

Programmable.....Up to 9 steps
Dwell time on each step ..... Programmable

Multi-information display

Stability indicator.....Clear checkmark
Countdown timer before stable .....3 minutes
Temperature .....SET and READ simultaneously
Alphanumeric messages..... Yes
Calibration status icons..... Yes

Training mode (heating/cooling block disabled)

Simulation of all functions ..... Yes
Simulating heating and cooling..... Approx. 100° per minute

Service facilities

Adjustment of the unit from the keypad ..... Yes
Self explaining guide in display..... Yes
Other information: ..... Display serial number,
..... software revision level, and last calibration date

Setup facilities

Stability criteria: ..... Extra time before ”stable indication”
..... is shown
Display resolution..... .1° or 1°C/°F
Temperature units ..... °C or °F
Slope rate.....0.1 to 9.9°/minute
Maximum temperature .....Any value within range

PHYSICAL SPECIFICATIONS

Instrument dimensions

ETC-125 A, ETC-400 A and ETC-400 R
L × W × H: .....172 × 72 × 182 mm / 6.8 × 2.8 × 7.2 in

Instrument weight

ETC-125 A .....1.8 kg / 3.9 lb
ETC-400 A .....1.6 kg / 3.5 lb
ETC-400 R ..... 1.7 kg / 3.7 lb

Shipping (including shipping cargo box)

ETC-125 A: .....3.0 kg / 6.6 lb
ETC-400 A: .....2.8 kg / 6.2 lb
ETC-400 R .....4.5 kg / 9.9 lb

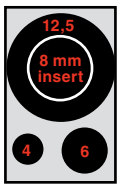
Size, L × W × H:
ETC-125 A / 400 A: .....
.....345 × 235 × 135 mm / 13.6 × 9.3 × 5.3 in
ETC-400 R .....425 x 320 x 165 mm / 16.7 x 12.5 x 6.5 in

Miscellaneous

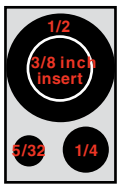
Serial data interface RS232
Operating temperature.....0 to 40°C / 32 to 104°F
Storage temperature .....-20 to 50°C / -4 to 122°F
Humidity .....0 to 90% RH
Protection class IP-10
DNV Marine Approval, Certificate no.....A-10384

INSERTS FOR ETC SERIES

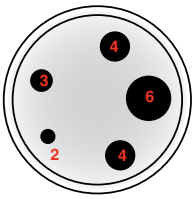
		Instruments	
	Type	ETC-125 A	ETC-400 A
5-pack, undrilled inserts	01 + 02	123939	N/A
Predrilled insert, metric 8 mm	01	123938	N/A
Predrilled insert, imperial 3/8 in	02	124045	N/A



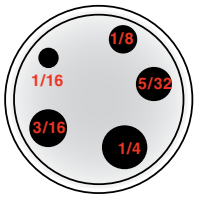
Metric Type 01 (ETC-125 A)



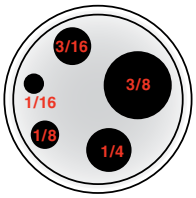
Imperial Type 02 (ETC-125 A)



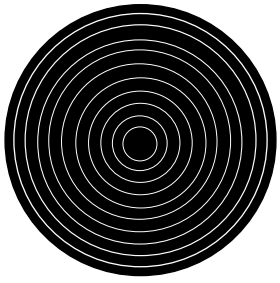
Metric Multi-hole Type 21 (ETC-400 A)



Imperial Multi-hole Type 11 (ETC-400 A)



Imperial Multi-hole Type 12 (ETC-400 A)



Type 51 ETC-400 R 36 mm (1.4 in) target

NOTE: All ETC400 calibrators are with fixed inserts. They can NOT be changed.

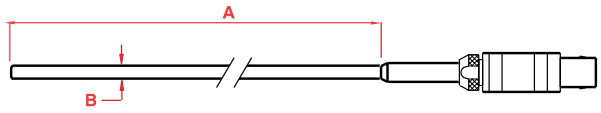
JOFRA STS-103 B

It is not easy to make a good quality reference probe. The main requirement of a reference probe is stability. This means minimal drift as a function of operating time at the actual temperature. The less the probe drifts, the lower the measurement uncertainty.

Especially for the ETC-400 R calibrator JOFRA has designed a special 3 mm STS reference sensor, the STS-103 B. The sensor can be used as a reference sensor when a higher accuracy is required or for recalibration of the ETC-400 R. Due to the small immersion depth requirement of the sensor it can be placed under the surface of the target.

Dimensions

Ref.	mm	inch
A	150	5.91
B	3	0.12



ORDERING INFORMATION STS-103 B

Order no.	Description
	Base model number
STS103	Pt100 reference probe, 0°C to 400°C
	Diameter of the probe
B	Overall diameter 3 mm
	Shape and length
150	Straight probe, 150 mm (5.9 in)
	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 connectors
	Calibration certificate
H	Accredited calibration certificate (standard)
F	NPL traceable calibration certificate
G	NIST traceable calibration certificate
I	No certificate - Annealed only (Useless without calibration certificate / co-efficients)
S	Special calibration certificate
STS103B150AH	**Sample order number** Reference Pt100 150 mm., cable length 0.5 m (1.6 ft.) with LEMO termination and accredited certificate

SPECIFICATIONS STS-103 B

Temperature range

All probes .....-50 to 400°C / -58 to 752°F

Accuracy

Hysteresis[1] @0°C / 32°F.....0.01°C / 0.02°F
Long term stability [2] @0°C / 32°F..... typ. 0.014°C / 0.025°F
Repeatability [1].....0.005°C / 0.009°F
Note 1: When used in the range -45 to 400°C / -49 to 752°F.
Note 2: When exposed to 400°C / 752°F for 100 h. Stability will depend on actual use of the sensor.

Sensing element

Type.....Pt100
Nominal resistance@0°C / 32°F.....100 Ω
Length ..... 6 mm / 0.2 in
Temperature coefficient ..... α_{100}=0.00385 1/°C

Minimum immersion depth

STS-103 B (3 mm / 0.12 in): .....40 mm / 1.6 in

Self-heating effect

0.06°C/mW / 0.108°F/mW

Response time

$\tau_{0.5}$ (50%).....5 seconds
$\tau_{0.9}$ (90%).....15 seconds

Liquid in motion v=0.4m/s.

Electrical connections

Cable.....4 wire + shield
Connection..... LEMO goldplated

Insulation resistance

@ 23°C / 73°F ..... 100 Gohm
@ 400°C / 752°F ..... 70 Mohm

Outer tube

Inconel 600

Operating conditions

(Probe, connection, and cable) .....Max. 70°C / 158°F
Storage temperature .....-20 to 70°C / -4 to 158°F
Humidity .....0 to 90% RH
Protection class (connectors) ..... DIN 40050 IP-50

Shipping dimensions - including carrying case

L x W x H..... 750 x 140 x 140 mm / 29.5 x 5.5 x 5.5 in

Shipping weight including packing

STS-103 B .....2 kg / 4.4 lb

STANDARD DELIVERY

- JOFRA STS-103 B probe
- Cable - according to order number
- Accredited certificate, points: -45, -20, 0, 50, 100, 200, 400°C
- Plastic carrying case with foam insert
- User manual

ORDERING INFORMATION

Order no.	Description
	Base model number
ETC125A	ETC-125 A, -10 to 125°C / 14 to 257°F
ETC400A	ETC-400 A, 28 to 400°C / 82 to 752°F
ETC400R	ETC-400 R, 28 to 400°C / 82 to 752°C
	Power supply
115	ETC-400 A/R only: 115 VAC, 50/60 Hz
230	ETC-400 A/R only: 230 VAC, 50/60 Hz
MUL	ETC-125 A only: Multi voltage 115 and 230 VAC
	Mains power cable type
A	European, 230 V,
B	USA/Canada, 115 V
C	UK, 240 V
D	South Africa, 220 V
E	Italy, 220 V
F	Australia, 240 V
G	Denmark, 230 V
H	Switzerland, 220 V
I	Israel, 230 V
	Holes for sensor-under-test
01	ETC125 A - Metric (12.5 mm, 6 mm, 4 mm, 8 mm)
02	ETC125 A - Imperial (1/2 in, 3/8 in, 1/4 in, 5/32 in)
11	ETC400 A - Imperial (1/16 in, 1/8 in, 5/32 in, 3/16 in, 1/4 in)
12	ETC400 A - Imperial (1/16, 1/8 in, 3/16 in, 1/4 in, 3/8 in)
21	ETC400 A - Metric (2 mm, 3 mm, 4 mm, 6 mm)
51	ETC400 R
	Calibration certificate
E	NPL and NIST traceable calibration certificate (standard delivery)
H	Accredited calibration certificate (on quotation basis)
	Options
C	Carrying case (standard for ETC-400 R)

ETC400A230A21EC Sample order number
JOFRA ETC-400 A series dry-block, 230 VAC power, European power cord, metric drilled multihole block, standard NPL/NIST traceable certificate and carrying case.

AMETEK Test & Calibration Instruments
A business unit of AMETEK Measurement & Calibration Technologies Division offering the following industry leading brands for test and calibration instrumentation.

JOFRA Calibration Instruments
Temperature Calibrators
Portable dry-block calibrators, precision thermometers and liquid baths. Temperature ranges from -90°C(-130°F) to 1205°C(2200°F). Temperature sensors for industrial and marine use.
Pressure Calibrators
Convenient electronic systems ranging from -25 mbar to 1000 bar - fully temperature-compensated for problem-free and accurate field use.
Signal Instruments
Process signal measurement and simulation for easy control loop calibration and measurement tasks.

M&G Pressure Testers & Pumps
Pneumatic floating-ball or hydraulic piston dead weight testers with accuracies to 0.015% of reading. Pressure generators delivering up to 1,000 bar.

Lloyd Instruments
Materials testing machines and software from Lloyd Instruments guarantees expert materials testing solutions. The comprehensive program also covers Texture Analysers to perform rapid, general food testing and detailed texture analysis on a diverse range of foods and cosmetics.

Davenport Polymer Test Equipment
Allows measurement and characterization of moisture-sensitive PET polymers and polymer density.

Chatillon Force Measurement
The hand held force gauges and motorized testers have earned their reputation for quality, reliability and accuracy and they represent the de facto standard for force measurement.

Newage Testing Instruments
Hardness testers, durometers, optical systems and software for data acquisition and analysis.

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