Specification Sheet
SS-CP-2280-US

JOFRA™ ETC Series

Easy Temperature Calibrator

NOW
With Calibrator ETC-400 R
for infrared thermometers

This may be the fastest dry-block

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.

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.

ISO 9001 Manufacturer

PRODUCT DESCRIPTION

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.

AMETEK®
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.

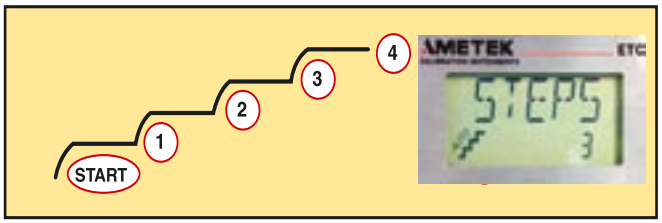
Set temperature

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

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.

Instrument setups

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

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.

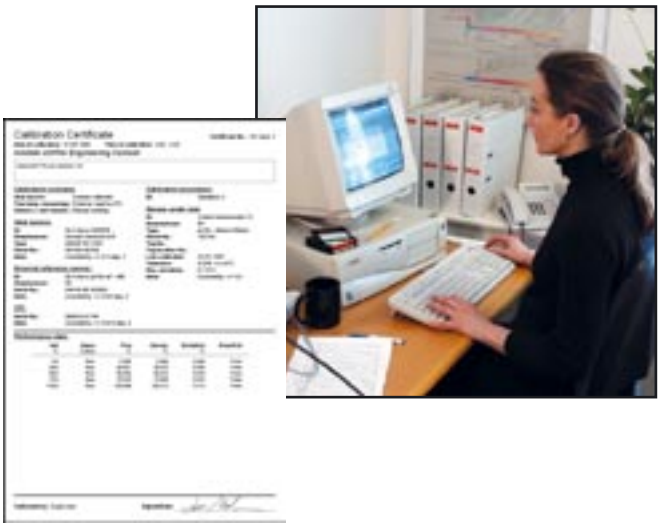
Place the probe in the calibrator and follow the instructions on the display.

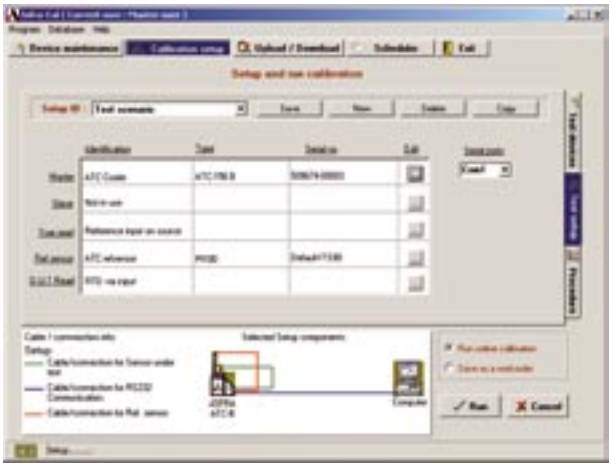
Simplified calibration documentation

All ETC series calibrators are provided with the JOFRACAL calibration software. This software allows the user to customize his or her calibration routines. The software is easy-to-use so you do not have to be a programmer to configure your own calibration procedures. The software features prompts, menus, and help functions that guide you through the configuration process.

The JOFRACAL calibration software supports automatic calibration for all JOFRA dry-block calibrators equipped with an RS232 serial data interface including the JOFRA DTI-1000 digital thermometer. For semi-automatic calibrations, the software also supports liquid baths, ice points, or other dry-block heating and cooling sources. Using the software's ''SCENARIO'' function allows for combining instruments in virtually any configuration.

The calibration data collected may be stored on a PC for later recall or analysis.





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.

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

JOFRACAL software

Minimum hardware requirements:

- INTEL™ 486 processor (PENTIUM™ 200 MHz recommended)
- 16 MB RAM (32 MB recommended)
- 40 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

KEY FEATURE TABLE

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)

Weight, ETC-125 A:..... 3.0 kg / 6.6 lb
Weight, ETC-400 A:..... 2.8 kg / 6.2 lb
Weight 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

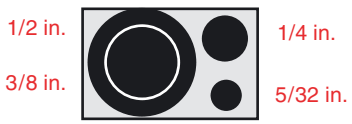
Serial data interface RS232
Operating temperature..... 0 to 40°C / 32 to 104°F
Storage temperature ..... -20 to 50°C / -4 to 122°F
Humidity ..... 0 to 90% RH
Protection class IP-10
CE Conformity.....EN61326-1 : 2001
..... EN61010-1 : 2001

STANDARD DELIVERY

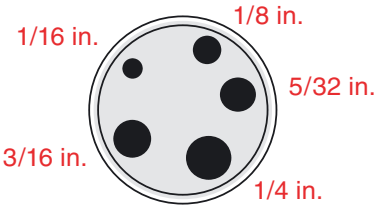
- JOFRA ETC- dry-block calibrator
- Traceable calibration certificate - temperature performance
- JOFRACAL software
- User and reference manual
- Mains power cable
- Shoulder strap
- RS232 cable
- 1 × predrilled insertion tube (ETC-125 A only)
- Tool for insertion tubes (ETC-125 A only)
- Carrying case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

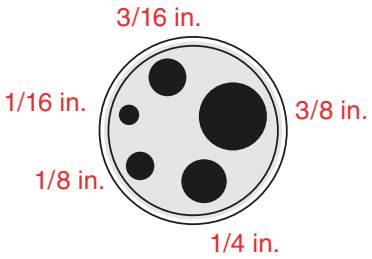
ETC-125 A type 01



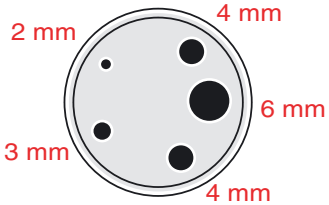
ETC-125 A type 02



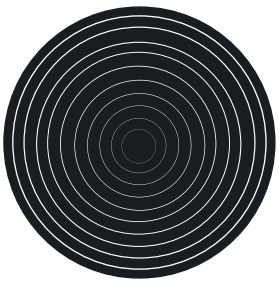
ETC-400 A type 11
Imperial 1:1



ETC-400 A type 12
Imperial 1:1



ETC-400 A type 21
Metric 1:1



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

ACCESSORIES

Part No.	Description
123943	ETC- series, user and reference manual
60F135	Mains cable, 115 V, USA, type B
60F139	Mains cable, 220 V, Australia, type F
60F138	Mains cable, 220 V, Italy, type E
60F137	Mains cable, 220 V, South Africa, Type D
60F141	Mains cable, 230 V, Denmark, type G
60F140	Mains cable, 230 V, Europe, type A
60F143	Mains cable, 230 V, Israel, type I
60F142	Mains cable, 230 V, Switzerland, type H
60F136	Mains cable, 240 V, UK, type C
123958	RS232 cable 2 m / 6 ft (Stereo Jack to 9 pol D-sub)
60F172	Tool for insertion tube (ETC-125A)
123939	5 x undrilled insertion tubes for ETC-125 A
123938	8 mm insertion tube for ETC-125 A
124045	3/8 in. insertion tube for ETC-125 A
124004	Shoulder strap with snap hooks
124094	Aluminum carrying case

Model JOFRA STS series temperature reference probe only for ETC-400 R

Order no. **Description**

Base model number- 1st thru 6th characters

STS103 Pt100 reference probe, 0°C to 400°C

Diameter of the probe - 7th character

B Overall diameter 3 mm

Shape and length - 8th thru 10th characters

150 Straight probe, 150 mm (5.9 in.) in length delivered in a carrying case

Cable length and termination - 11th character

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 - 12th character
(8 temperature points)

H Accredited calibration certificate - Standard delivery
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 - Custom-defined

STS103 B 150 A H **Sample order number**

Reference Pt100 150 mm. - Cable length 0.5 m (1.6 ft.)
with LEMO termination, accredited certificate 8 temperature points

Standard delivery for JOFRA STS-103 B probe only for ETC-400 R

- JOFRA STS-103 B probe
- Cable - according to order number
- Accredited certificate
- Plastic carrying case with foam insert
- User guide

ORDERING INFORMATION

Model JOFRA ETC series dry-block temperature calibrators

Order no. Description

Base model number - 1st thru 7th characters

ETC125 A	ETC-125 A, -10 to 125°C / 14 to 257°F
ETC400 A	ETC-400 A, 28 to 400°C / 82 to 752°F
ETC400 R	ETC-400 R, 28 to 400°C / 82 to 752°C

Power supply - 8th thru 10th characters

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 - 11th characters

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 - 12th thru 13th characters

01	ETC-125 A: Metric 12.5 mm 6 mm 4 mm 8 mm.
02	ETC-125 A: Imperial 1/2 in. 3/8 in. 1/4 in. 5/32 in.
11	ETC-400 A: Imperial 1/16 in. 1/8 in. 5/32 in. 3/16 in. 1/4 in.
12	ETC-400 A: Imperial 1/16 in. 1/8 in. 3/16 in. 1/4 in. 3/8 in.
21	ETC-400 A: Metric 2 mm 3 mm 4 mm 4 mm 6 mm
51	ETC-400 R: For infrared thermometers

Options- 14th thru 15th character

C	Carrying case (standard for ETC-400 R)
E	NPL and NIST traceable calibration certificate (standard delivery)
H	Accredited calibration certificate (on quotation basis)
X	Placeholder character for unused option

ETC400A 230 A 21 C E

Sample order number (all 15 characters)
JOFRA ETC-400 A series dry-block, 230 VAC power, European power cord, metric drilled multihole block including carrying case and standard NPL/NIST traceable certificate.

temperature
software
pressure
signal

AMETEK
Calibration Instruments
offers a complete range of calibration equipment for pressure, temperature, and signal - including software.

JOFRA Temperature standards
Portable precision thermometer. Dry-block calibrators: 4 series, more than 20 models - featuring speed, portability, accuracy, and advanced documenting functions.

M&G Primary pressure standards
Pneumatic floating-ball or hydraulic piston deadweight testers - easy-to-use with accuracies up to 0.015% of reading.

JOFRA Pressure standards
Convenient electronic systems ranging from -1 to 700 bar (25 inHg to 10,000 psi) - multiple choices of pressure ranges, pumps, and accuracies, fully temperature-compensated for problem-free and accurate field use.

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

...because calibration is a matter of confidence

AMETEK® CALIBRATION INSTRUMENTS

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ISO 9001 Manufacturer

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