

JOFRA™

Model CTC-series Compact Temperature Calibrator

Temperature ranges

| | |
|------------|-------------------------------|
| CTC-140 A | -17 to 140°C / -1 to 284°F |
| CTC-320 A | 33 to 320°C / 91 to 608°F |
| CTC-320 B | 33 to 320°C / 91 to 608°F |
| CTC-650 A | 33 to 650°C / 91 to 1202°F |
| CTC-650 B | 33 to 650°C / 91 to 1202°F |
| CTC-1200 A | 300 to 1205°C / 572 to 2200°F |

Fast calibration is timesaving

The specially designed heating block profile heats up to 320°C / 608°F in just 4 minutes and to 650°C / 1202°F in only 10 minutes

High flexibility

You are not limited by fixed holes. Inter-changeable insertion tubes are used to match the diameter of your sensor-under-test

Enhanced stability

MVI circuitry ensures stability despite mains supply variations in the process environment

Timesaving features

Fast one-key-one-function access to the automatic switch test and auto stepping

Documentation made easy

RS232 communication and JOFRACAL calibration software are included in the standard delivery

Complete marine program

Part of a complete program of marine approved temperature, pressure and signal calibrators; including temperature sensors
See more at www.jofra.com

ISO 9001 Manufacturer

PRODUCT DESCRIPTION

A fast, timesaving, and reliable true temperature calibrator designed for on-site use.

The CTC series is a fast dry-block that offers both interchangeable inserts, the MVI stability circuitry, and calibration software. Both speed and portability are superior to liquid baths. Dry-block calibrators do not require hazardous liquids and provide a wide temperature range.

Calibrate RTD's, thermocouples, thermoswitches, thermistors, and other common temperature sensing devices.



Features

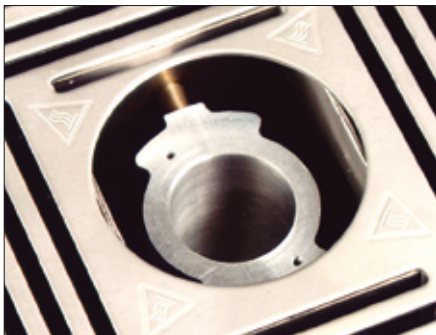
The CTC series is designed for both on-site and maintenance shop use. The applications are generally critical process control but can vary based on calibration and testing requirements. The user interface is easy and intuitive. One-key-one-function gives you quick access to timesaving features such as the switch test or the auto-stepping function.

All models feature a large, backlit LCD display panel, which is easy-to-read even in well-lit areas. Units feature an informative display that provides icons and information regarding the status of the CTC and the calibration in-progress. The JOFRA CTC series consists of six different models that differ in temperature ranges and immersion depths. All units offer similar features. A rugged, slim-line, aluminum outer casing with die-cast top and bottom protects the CTC series of dry-block calibrators. For easy documentation and automatic calibration, all units are delivered with RS232 serial communication and JOFRACAL calibration software.

AMETEK®
CALIBRATION INSTRUMENTS

Fast heating and cooling

The CTC-320 A and the CTC-650 A contain an innovative heating block profile. This design heats up the CTC-320 A to maximum temperature in just 4 minutes and the CTC-650 A in only 10 minutes. The fast performance of the heating block is due to the special profile that minimizes mass and yet, still accepts an insertion tube with a 25 mm / 1 in. outer diameter. This design is a balanced compromise between temperature stability / homogeneity and rapid heating / cooling.

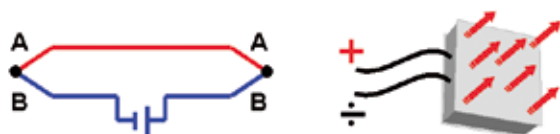


Deep immersion depth

The CTC-320 B and CTC-650 B models offer a deeper immersion depth of 200 mm / 7.9 in. If you have liquid-filled sensors or other sensors that require a deeper immersion depth, look for the B versions. While the units do not heat and cool as quickly as their shorter counterparts, they offer the capability to accommodate longer sensors.

Peltier effect (CTC-140 A)

The model CTC-140 A features Peltier elements. In 1834, Jean Peltier, a French physicist found that an "opposite thermocouple effect" could be observed when an electric current was connected to a thermocouple. Heat would be absorbed at one of the junctions and discharged at the other junction. This effect is called the "PELTIER EFFECT".



The practical Peltier element (electronic heating pump) consists of many elements of semiconductor material connected electrically in series and thermally in parallel. These thermoelectric elements and their electrical interconnections are mounted between two ceramic plates. The plates serve to mechanically hold the overall structure together and to electrically insulate the individual elements from one another.

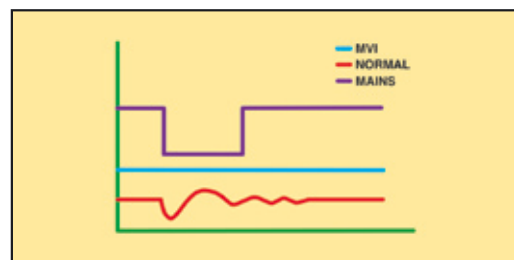
Maximum temperature

From the setup menu, the user can select the maximum temperature limit for the calibrator. This function prevents damage to the sensor-under-test caused by the application of excessive temperatures. The feature also aids in reducing drift resulting from extended periods of exposures to high temperatures. This feature can be locked with an access code.

MVI - Improved temperature stability

MVI stands for "Mains power Variance Immunity".

Unstable mains power supplies are a major contributor to on-site calibration inaccuracies. Traditional temperature calibrators often become unstable in production environments where large electrical motors, heating elements, and other devices are periodically cycled on or off. The cycling of supply power can cause the temperature regulator to perform inconsistently leading to both inaccurate readings and unstable temperatures.



The CTC series employ the MVI, thus avoiding such stability problems. The MVI circuitry continuously monitors the supply voltage and ensures a constant energy flow to the heating elements.

Easy-to-use, intuitive operation

All instrument controls may be performed from the front panel. The heat source is positioned away from the panel. This design helps to protect the operator.

The main functions on the CTC series are designed with one-key-one-function logic. This means that there are no sub-menus or difficult to remember multiple keystrokes necessary 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°.

Instrument setups

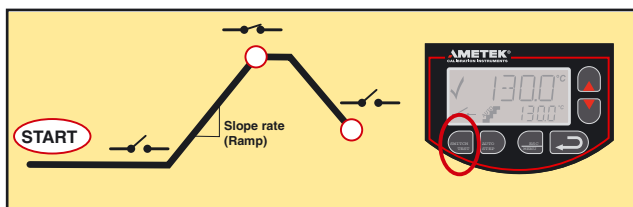
The CTC series stores the complete instrument setup, including: engineering units, stability criteria, resolution, display contrast, slope (ramp) rate, auto-step settings, and maximum temperature.

Stability indicator

A 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 sense of security in the calibration results. A convenient countdown timer is activated five minutes before the unit reaches stability.

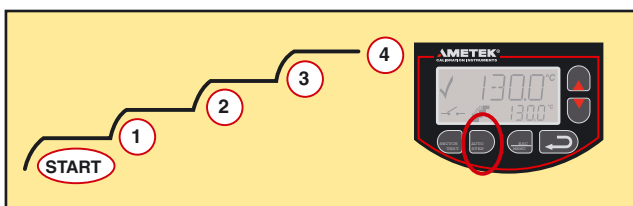
Automatic switch test

Operators can save a lot of time using the automatic thermoswitch test function to find values for the "Open" and "Close" temperatures. Additionally, this feature displays the hysteresis (deadband) between the two points. The feature ensures a very high repeatability when testing thermoswitches. Simply press the "SWITCH TEST" key to activate the function.



Auto-stepping

This feature saves manpower. The operator may stay in the control room, or another remote location, monitoring the output from the sensor-under-test while the CTC 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.



Liquid filled sensors and switches

The tall B models with an immersion depth of 190 mm / 7.5 in are ideal for calibration of liquid filled sensors. The specially designed non-linear heating elements in the CTC-650 B and the increased block mass provide a very homogeneous temperature throughout the block. It is essential for the quality of the calibration/test that the full length of the sensing part of the sensor is exposed to the same temperature. Calibrate analog reading devices or switches with very high repeatability.



Re-calibration/adjustments

The CTC 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. Third-party labs and calibration facilities will be able to perform this function if a certificate from an independent source is necessary. Of course, AMETEK can provide you with a traceable calibration certificate from our labs when you require a higher level of confidence.

Calibration of up to 24 sensors with JOFRA ASM

Using the JOFRA CTC 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, thermistors, temperature switches and voltage.

Please also see more in specification sheet SS-CP-2360, which can be found at www.jofra.com



JOFRACAL CALIBRATION SOFTWARE

JOFRACAL calibration software ensures easy calibration of RTD's, thermocouples, transmitters, thermostats, 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 downloaded from our web-page www.jofra.com.

Please also see more about JOFRACAL calibration software in specification sheet SS-CP-2510, which can be found 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

- CTC dry-block calibrator (user specified)
- Mains power cable (user specified)
- Traceable certificate - temperature performance
- Insert (user specified)
- Tool for insertion tubes
- User manual
- Reference manual (English)
- Test cables (1 x red, 1 x black)
- RS232 cable (9-pin)
- JOFRACAL calibration software
- CTC-140A only: Matching insulation plug kit (3 pcs)
- CTC-1200 A only: Matching Insulation plug kit (3 pcs)

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
- 65-F100 Insulation in Tube, 100 mm x Ø25 mm
- 65-F101 Insulation in Tube, 150 mm x Ø25 mm
- 65-F102 Insulation in Tube, 200 mm x Ø25 mm
- 65-F103 Insulation in Tube, 250 mm x Ø25 mm
- 65-F104 Insulation in Tube, 300 mm x Ø25 mm
- 65-F105 Insulation in Tube, 350 mm x Ø25 mm
- 65-F106 Insulation in Tube, 400 mm x Ø25 mm
- 65-F107 Insulation in Tube, 450 mm x Ø25 mm
- 105173 Set of Insulation Plates (10 pcs)
- 125066 Extra fixture for sensor grip
- 125067 Extra sensor grip
- 125002 Edgeport Converter with 4 pcs of RS232 ports
- 123408 Carrying Case CTC/MTC A models
- 123409 Carrying Case CTC B models and for CTC-1200 A

Insulation Plugs for CTC-1200:

- 124414 Insulation plug (3 pcs) 12 mm - ½ in.
- 124415 Insulation plug (3 pcs.) 3, 4 mm and 1/8 in.
- 124416 Insulation plug (3 pcs) 5, 6 mm and 1/4, 3/16in.
- 124518 Insulation plug (3 pcs) 7, 8, 9 mm and 5/16 in.
- 124519 Insulation plug (3 pcs) 10,11 mm and 3/8, 7/16 in.

Carrying case (Optional)

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



FUNCTIONAL SPECIFICATIONS

Mains specifications

Voltage CTC-140/320/650/1200 115V(90-127) / 230V(180-254)
Voltage CTC-650 B 115V(105-127) / 230V(210-254)
Frequency, non US deliveries 50 Hz \pm 5, 60 Hz \pm 5
Frequency, US deliveries 60 Hz \pm 5
Power consumption (max.) CTC-140 A 150 VA
Power consumption (max.) CTC-320 B 600 VA
Power consumption (max.) CTC-1200 A 650 VA
Power consumption (max.) CTC-320 A / 650 A/B.. 1150 VA

Temperature range

CTC-140 A
Maximum 140°C / 284°F
Minimum @ ambient temp. 0°C / 32°F -30°C / -22°F
Minimum @ ambient temp. 23°C / 73°F -17°C / 1°F
Minimum @ ambient temp. 40°C / 104°F -2°C / 28°F
CTC-320 A/B 33 to 320°C / 91 to 608°F
CTC-650 A/B 33 to 650°C / 91 to 1202°F
CTC-1200 A 300 to 1205°C / 572 to 2200°F

Resolution (user-selectable)

Selectable 1° or 0.1°C/°F

Stability

CTC-140 A \pm 0.05°C / 0.09°F
CTC-320 A/B \pm 0.1°C / 0.18°F
CTC-650 A / 1200 A \pm 0.1°C / 0.18°F
CTC-650 B \pm 0.05°C / 0.09°F
Measured after the stability indicator has been on for 10 minutes.
Measuring time is 30 minutes.

Time to stability (approximate)

CTC-140 A 5 minutes
CTC-320/650 A/B 8 minutes
CTC-1200 A 20 minutes

Accuracy

CTC-140 A \pm 0.4°C / 0.7°F
CTC-320 A/B \pm 0.5°C / 0.9°F
CTC-650 A \pm 0.9°C / 1.62°F
CTC-650 B \pm 0.6°C / 1.08°F
CTC-1200 A \pm 2.0°C / 3.6°F

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

Thermal protection shield (Optional) - 104216

An external heat shield is available and may be placed on top of the calibrator to reduce the hot air stream around the sensor-under-test. This is especially important for testing thermocouples having head-mounted transmitters with cold-junction compensation.



Immersion depth

CTC-140 A (insulation included)
. 115 mm / 4.5 in
CTC-320 A / CTC-650 A / CTC-1200 A 110 mm / 4.3 in
CTC-320 B / CTC-650 B 190 mm / 7.5 in

Well diameter

CTC-140 19,2 mm / 0.76 in
CTC-320 / CTC-650 26 mm / 1.0 in
CTC-1200 27 mm / 1.6 in

Heating time

CTC-140 A
-17 to 23°C / 1 to 73°F 3 minutes
23 to 140°C / 73 to 284°F 15 minutes
CTC-320 A
23 to 320°C / 73 to 608°F 4 minutes
CTC-650 A
23 to 650°C / 73 to 1202°F 10 minutes
CTC-320 B
23 to 320°C / 73 to 608°F 20 minutes
CTC-650 B
23 to 650°C / 73 to 1202°F 39 minutes
CTC-1200 A
23 to 1205°C / 73 to 2200°F 45 minutes

Cooling time

CTC-140 A
100 to 0°C / 212 to 32°F 10 minutes
0 to -15°C / 32 to 5°F 16 minutes
140 to 100°C / 284 to 212°F 2 minutes
CTC-320 A
320 to 100°C / 608 to 212°F 16 minutes
CTC-650 A
650 to 100°C / 1202 to 212°F 28 minutes
CTC-320 B
320 to 100°C / 608 to 212°F 22 minutes
CTC-650 B
650 to 100°C / 1202 to 212°F 65 minutes
CTC-1200 A
1205 to 300°C / 2200 to 572°F 120 minutes

Switch input (dry contact)

Test voltage Maximum 5 VDC
Test current Maximum 2.5 mA

Support rod set (Optional) - 125068

Support rod for sensors to be mounted on all JOFRA dry-block calibrators. Holds the sensor under test in their position, while calibrating. Includes 2 sensors grips and 2 fixtures for sensor grips.



KEY FEATURES

Automatic switch test

Finds switching temp. Open, close, hysteresis
Slope rate, programmable 0.1 to 9.9 °C/°F

Auto stepping

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

Enhanced stability

Unstable mains protection MVI Circuitry
Clear stability indication..... Yes, in display

Multi-information display

Stability indicator..... Bold checkmark
Countdown timer before stable 4 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 Displays serial number,
..... software revision level, and last calibration date

Setup facilities

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

Miscellaneous

Serial data interface RS232 (9-pin Male)
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



PHYSICAL SPECIFICATIONS

Instrument dimensions

CTC-140 A / CTC-320 A / CTC-650 A
L x W x H: 241 x 139 x 325 mm / 9.5 x 5.5 x 12.8 in
CTC-320 B / CTC-650 B / CTC-1200 A
L x W x H: 241 x 139 x 408 mm / 9.5 x 5.5 x 16.1 in

Instrument weight

CTC-140 A / CTC-320 B 7 kg / 15.5 lb
CTC-320 A 5 kg / 11 lb
CTC-650 A 6 kg / 13 lb
CTC-650 B 10.5 kg / 23 lb
CTC-1200 A 12 kg / 26.5 lb

Insert dimensions

CTC-140 A outer diameter 19,1 mm / 0.75 in
CTC-140 A inner diameter 15,0 mm / 0.59 in
CTC-140 A length 100 mm / 3.9 in

CTC-320 / CTC-650 A outer diameter 25,7 mm / 1.01 in
CTC-320 / CTC-650 A inner diameter 21,5 mm / 0.85 in
CTC-320 / CTC-650 A length 120 mm / 4.7 in

CTC-320 / CTC-650 B outer diameter 25,7 mm / 1.01 in
CTC-320 / CTC-650 B inner diameter 21,5 mm / 0.85 in
CTC-320 / CTC-650 B length 200 mm / 7.9 in

CTC-1200 A outer diameter 25 mm / 0.98 in
CTC-1200 A inner diameter 22 mm / 1.6 in
CTC-1200 A length 155 mm / 6.1 in

Weight of non-drilled insert (approximate)

CTC-140 A 75 g / 2.6 oz
CTC-320 A 170 g / 5.8 oz
CTC-650 A 510 g / 17.8 oz
CTC-320 B 280 g / 9.8 oz
CTC-650 B 860 g / 30.3 oz
CTC-1200 A 460 g / 16.3 oz

Shipping (including optional carrying case)

CTC-140 A 12.5 kg / 27.6 lb
CTC-320 A 11 kg / 24 lb
CTC-650 A 12 kg / 27 lb
CTC-320 B 13.5 kg / 21 lb
CTC-650 B 17 kg / 37 lb
CTC-1200 A 18 kg / 39 lb
Size L x W x H: .. 507 x 232 x 415 mm / 19.9 x 9.1 x 16.3 in

Shipping (without carrying case)

CTC-140 A 10 kg / 22 lb
CTC-320 A 8 kg / 17.5 lb
CTC-650 A 9.5 kg / 21 lb
Size L x W x H: 465 x 255 x 470 mm / 18.3 x 10.0 x 18.5 in

CTC-320 B 11 kg / 24 lb
CTC-650 B 14 kg / 26 lb
CTC-1200 A 15 kg / 32 lb
Size L x W x H: 465 x 255 x 470 mm / 18.3 x 10.0 x 18.5 in

Shipping (carrying case only)

Weight: 5.0 kg / 11 lb
Size L x W x H: .. 507 x 232 x 415 mm / 19.9 x 9.1 x 16.3 in

INSERTS FOR CTC SERIES

Inserts for CTC-140 A and CTC-320 A/B are made of aluminum. Inserts for CTC-650 A/B are made of brass. Inserts for CTC-1200 A are made of high-temperature steel alloy. All specifications on hole sizes are referring to the outer diameter of the sensor-under-test. The correct clearance size is applied in all predrilled inserts.

| Inserts, undrilled | | | | | | |
|---------------------------|------------------------|-----------|-----------|-----------|-----------|-------------------------|
| Inserts | Instruments | | | | | |
| | CTC-140 A ² | CTC-320 A | CTC-650 A | CTC-320 B | CTC-650 B | CTC-1200 A ⁴ |
| 5-pack, undrilled inserts | 60F448 | 100175 | 100194 | 60F356 | 60F420 | 124403 |
| Undrilled insulation plug | 123937 | N/A | N/A | N/A | N/A | see below ⁴ |

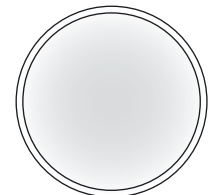
| Spare part no. for predrilled inserts - metric (mm) | | | | | | | |
|---|--------------------------|------------------------|-----------|-----------|-----------|-----------|-------------------------|
| Probe diameter | Insert code ¹ | Instruments | | | | | |
| | | CTC-140 A ² | CTC-320 A | CTC-650 A | CTC-320 B | CTC-650 B | CTC-1200 A ⁴ |
| 3 mm | 003 | 123428 | 123436 | 123444 | N/A | N/A | 124503 |
| 4 mm | 004 | 60F451 | 100177 | 100196 | 60F359 | 60F423 | 124406 |
| 5 mm | 005 | 123429 | 123437 | 123445 | 123452 | 123460 | 124504 |
| 6 mm | 006 | 60F453 | 100179 | 100198 | 60F361 | 60F425 | 124407 |
| 7 mm | 007 | 123430 | 123438 | 122516 | 123453 | 123461 | 124505 |
| 8 mm | 008 | 105185 | 100182 | 100201 | 105190 | 105195 | 124506 |
| 9 mm | 009 | 105186 | 100183 | 100202 | 105191 | 105196 | 124507 |
| 10 mm | 010 | 105187 | 100185 | 105188 | 105192 | 105197 | 124508 |
| 11 mm | 011 | 123431 | 100188 | 100204 | 105193 | 105198 | 124509 |
| 12 mm | 012 | 123432 | 100186 | 100206 | 105194 | 105199 | 124510 |
| 13 mm | 013 | 123433 | 60F339 | 105189 | 123454 | 123462 | N/A |
| 14 mm | 014 | N/A | 100190 | 100208 | 123455 | 123463 | N/A |
| 15 mm | 015 | N/A | 100191 | 100209 | 123456 | 123464 | N/A |
| 16 mm | 016 | N/A | 123439 | 123446 | 123457 | 123465 | N/A |
| 18 mm | 018 | N/A | 123440 | 122517 | 123458 | 123466 | N/A |
| 20 mm | 020 | N/A | 123441 | 122518 | 123459 | 123467 | N/A |
| Package of the above inserts | | 124679 | 124681 | 124685 | 124683 | 124687 | 124689 |
| Multi-hole type 1 | M01 | 123479 ³ | 123475 | 123476 | N/A | N/A | N/A |

| Spare part no. for predrilled inserts - imperial (inch) | | | | | | | |
|---|--------------------------|------------------------|-----------|-----------|-----------|-----------|-------------------------|
| Probe diameter | Insert code ¹ | Instruments | | | | | |
| | | CTC-140 A ² | CTC-320 A | CTC-650 A | CTC-320 B | CTC-650 B | CTC-1200 A ⁴ |
| 1/8 in | 125 | 60F450 | 100176 | 100195 | 60F358 | 60F422 | 124511 |
| 3/16 in | 187 | 60F452 | 100178 | 100197 | 60F360 | 60F424 | 124512 |
| 1/4 in | 250 | 60F454 | 100180 | 100199 | 60F362 | 60F426 | 124404 |
| 5/16 in | 312 | 60F456 | 100181 | 100200 | 60F364 | 60F428 | 124513 |
| 3/8 in | 375 | 60F458 | 100184 | 100203 | 60F366 | 60F430 | 124514 |
| 7/16 in | 437 | 60F460 | 100187 | 100205 | 60F368 | 60F432 | 124515 |
| 1/2 in | 500 | 60F462 | 100189 | 100207 | 60F370 | 60F434 | 124405 |
| 9/16 in | 562 | 60F464 | 60F344 | 60F408 | 60F372 | 60F436 | N/A |
| 5/8 in | 625 | 60F466 | 100192 | 100210 | 60F374 | 60F438 | N/A |
| 11/16 in | 688 | N/A | 60F348 | 60F412 | 60F376 | 60F440 | N/A |
| 3/4 in | 750 | N/A | 100193 | 100211 | 60F378 | 60F442 | N/A |
| 13/16 in | 813 | N/A | 60F352 | 60F416 | 105184 | 60F444 | N/A |
| 7/8 in | 875 | N/A | 60F354 | 60F418 | 60F377 | 60F446 | N/A |
| Package of the above inserts | | 124680 | 124682 | 124686 | 124684 | 124688 | 124690 |
| Multi-hole type 2 | M02 | 123480 ³ | 123477 | 123478 | N/A | N/A | N/A |

- Note 1: Use the insert code, when ordered as the standard insert together with a new calibrator.
- Note 2: CTC-140 A only: Remember to use matching insulation plugs (see accessories).
- Note 3: CTC-140 A only: All multi-hole inserts are delivered with a matching insulation plug.
- Note 4: CTC-1200 A only: Remember to order matching insulation plugs (see accessories).



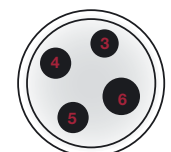
Undrilled inserts
(CTC-140 A)



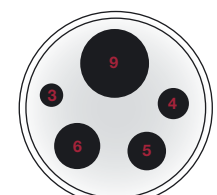
Undrilled inserts
(CTC-320 / 650 A/B)



Undrilled inserts
(CTC-1200 A)



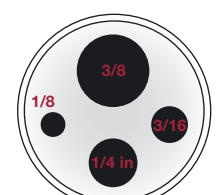
Multi-hole type 1
(CTC-140 A)



Multi-hole type 1
(CTC-320 A / 650 A)



Multi-hole type 2
(CTC-140 A)



Multi-hole type 2
(CTC-320 A / 650 A)

ORDERING INFORMATION

| Order number | Description |
|--------------|---|
| | Base model number |
| CTC140A | CTC-140 A, -17 to 140°C / -1 to 284°F |
| CTC320A | CTC-320 A, 33 to 320°C / 91 to 608°F |
| CTC650A | CTC-650 A, 33 to 650°C / 91 to 1202°F |
| CTC320B | CTC-320 B, 33 to 320°C / 91 to 608°F |
| CTC650B | CTC-650 B, 33 to 650°C / 91 to 1202°F |
| CTC1200A | CTC-1200 A, 300 to 1205°C / 572 to 2200°F |

| | | |
|--|-----|--|
| | | Power supply (US deliveries 60 Hz only) |
| | 115 | 115VAC |
| | 230 | 230VAC |
| | | 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 |
| | | Insert type and size |
| | XXX | 1 x Insert for dry-block configuration (please see the previous insert pages for the right insert codes) |
| | | Calibration certificate |
| | F | NLP Traceable temperature certificate (standard for Europe, Asia, Australia and Africa) |
| | G | NIST traceable temperature certificate (standard for Western Hemisphere) |
| | H | Accredited certificate with 5 std. points (except CTC-1200 A) |
| | H | Accredited certificate with 4 std. points (for CTC-1200 A) |
| | | Options |
| | C | Carrying case |
| | X | No option used |

| | |
|-------------------------|--|
| CTC650A230AM01FX | Sample order number |
| | JOFRA CTC-650 A dry-block, 230 VAC power with European power cord and insert: Pre-drilled multi-hole type 1 (1 x 3 mm, 1 x 4 mm, 1 x 5 mm, 1 x 6 mm, 1 x 9 mm), and NLP traceable certificate. |



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is one of the world's leading manufacturers and
developers of calibration instruments for
temperature, pressure and process signals
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