

temperature



» **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

## Compact Temperature Calibrator **CTC-series**



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, thermostats, thermistors, and other common temperature sensing devices.

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 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.

**ISO 9001 Manufacturer**

Specification Sheet  
SS-CTC

**AMETEK®**  
TEST & 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.

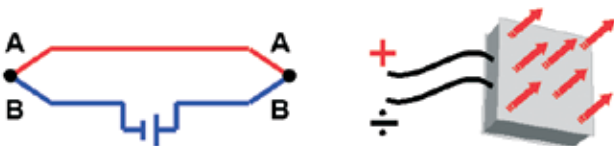


### Deep immersion depth

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.

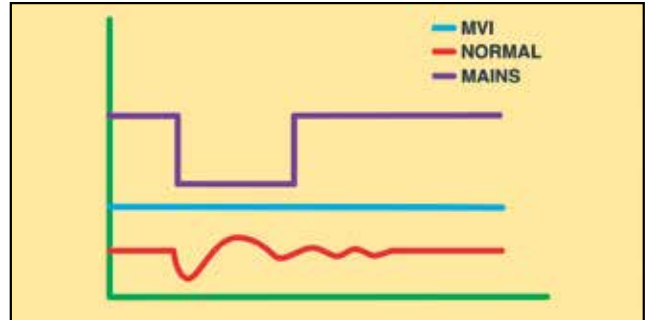
### Maximum temperature

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.

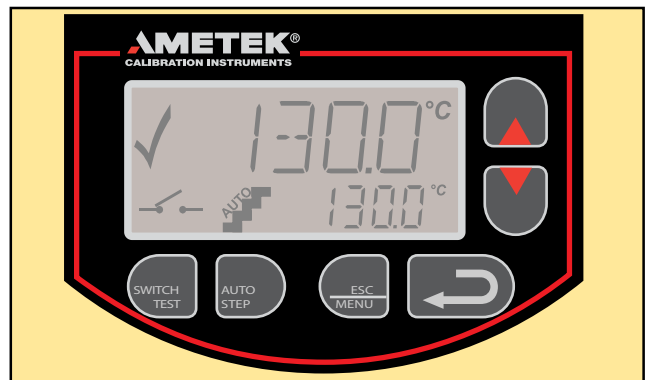


The CTC series employ the MVI, thus avoiding such stability problems. The MVI circuitry continuously monitors the supply voltage and ensures a constant energy flow to the heating elements.

### 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

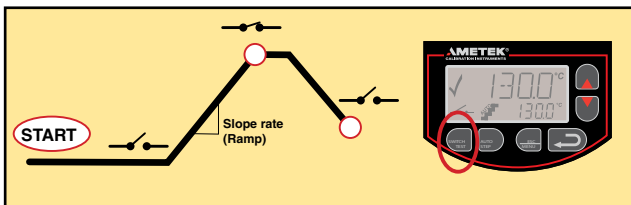
The CTC series stores the complete instrument setup, including: engineering units, stability criteria, resolution, display contrast, slope (ramp) rate, auto-step settings, and maximum temperature.

### 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.

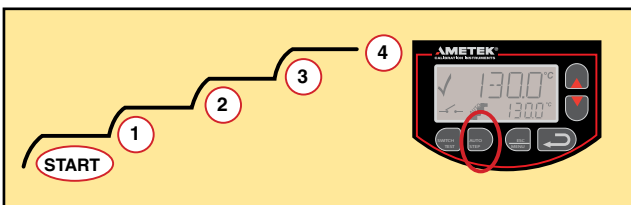
### Automatic switch test

Operators can save a lot of time using the automatic thermostat 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 thermostats. 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 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.



## JOFRACAL CALIBRATION SOFTWARE

JOFRACAL calibration software ensures easy calibration of RTD's, thermocouples, transmitters, thermoswitches, pressure gauges and pressure switches. JOFRACAL can be used with JOFRA DPC-500, HPC and IPI pressure calibrators, all JOFRA temperature calibrators, as well as 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](http://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 grib
- 125067 Extra sensor grib
- 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 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

*Use of other inserts may reduce performance of the calibrator. To get the best results out of the calibrator, the insert dimensions, tolerance and material is critical. We highly advise using JOFRA inserts, as they guarantee trouble free operation.*

### 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

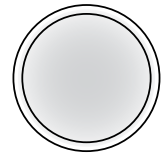
CTC-320 B ..... 11 kg / 24 lb  
CTC-650 B ..... 14 kg / 26 lb  
CTC-1200 A ..... 15 kg / 32 lb  
Size L x W x H: 465 x 255 x 470 mm / 18.3 x 10.0 x 18.5 in

### Shipping (carrying case only)

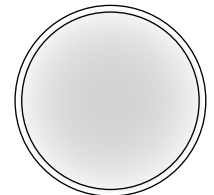
Weight: ..... 5.0 kg / 11 lb  
Size L x W x H:.. 507 x 232 x 415 mm / 19.9 x 9.1 x 16.3 in

## INSERTS FOR CTC SERIES

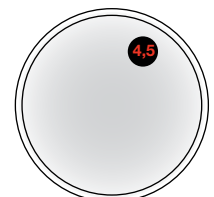
Inserts for CTC-140 A and CTC-320 A/B are made of aluminum. Inserts for CTC-650 A/B are made of brass. Inserts for CTC-1200 A are made of high-temperature steel alloy. All specifications on hole sizes are referring to the outer diameter of the sensor-under-test. The correct clearance size is applied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



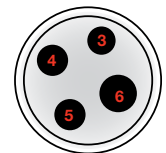
Undrilled inserts  
(CTC-140 A)



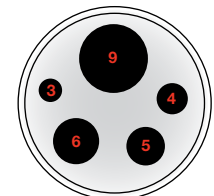
Undrilled inserts  
(CTC-320 / 650 A/B)



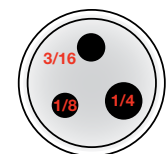
Undrilled inserts  
(CTC-1200 A)



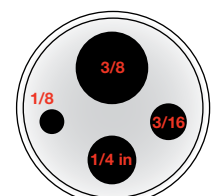
Multi-hole type 1  
(CTC-140 A)



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)

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

| Spare part no. for predrilled inserts - metric (mm) |                          |                        |           |           |           |           |                         |
|---|--------------------------|------------------------|-----------|-----------|-----------|-----------|-------------------------|
|   |                          | Instruments            |           |           |           |           |                         |
| Probe diameter                                      | Insert code <sup>1</sup> | CTC-140 A <sup>2</sup> | CTC-320 A | CTC-650 A | CTC-320 B | CTC-650 B | CTC-1200 A <sup>4</sup> |
| 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 <sup>3</sup>    | 123475    | 123476    | N/A       | N/A       | N/A                     |

| Spare part no. for predrilled inserts - imperial (inch) |                          |                        |           |           |           |           |                         |
|---|--------------------------|------------------------|-----------|-----------|-----------|-----------|-------------------------|
|   |                          | Instruments            |           |           |           |           |                         |
| Probe diameter  | Insert code <sup>1</sup> | CTC-140 A <sup>2</sup> | CTC-320 A | CTC-650 A | CTC-320 B | CTC-650 B | CTC-1200 A <sup>4</sup> |
| 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 <sup>3</sup>    | 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).

## ORDERING INFORMATION

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

**CTC650A230AM01FX** **Sample order number**  
 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.



### 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.

**AMETEK®**  
 TEST & CALIBRATION INSTRUMENTS

**UK**  
 AMETEK Calibration Instruments  
 Tel +44 (0)1243 833 302  
 jofra@ametek.co.uk

**France**  
 AMETEK S.A.S.  
 Tel +33 (0)1 30 68 89 40  
 general.lloyd-instruments@ametek.fr

**Germany**  
 AMETEK GmbH  
 Tel +49 (0)2159 9136 510  
 info.mct-de@ametek.de

**Denmark**  
 AMETEK Denmark  
 Tel +45 4816 8000  
 jofra@ametek.com

**USA**  
 AMETEK Mansfield & Green  
 Tel +1 (800) 527 9999  
 cal.info@ametek.com

**India**  
 AMETEK Instruments India Pvt Ltd.  
 Tel +91 22 2836 4750  
 jofra@ametek.com

**Singapore**  
 AMETEK Singapore Pte Ltd  
 Tel +65 6484 2388  
 jofra@ametek.com

**China**  
 AMETEK Inc. - Shanghai  
 Tel +86 21 5868 5111  
 AMETEK Inc. - Beijing  
 Tel +86 10 8526 2111

AMETEK Inc. - Guangzhou  
 Tel +86 20 8363 4768  
 jofra.sales@ametek.com.cn

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