

# RTC Series

## Reference Temperature Calibrator

### RTC-158 & RTC-250



# Product Description

**A** **METEK** continues to develop new techniques to improve the performance, accuracy, convenience, and functionality of the popular Jofra calibration products. By doing so, we maintain our position as the leading worldwide manufacturers of temperature dry-block calibrators.

We are proud to introduce our top model RTC (Reference Temperature Calibrator) series, which is more sophisticated than any existing calibrators.

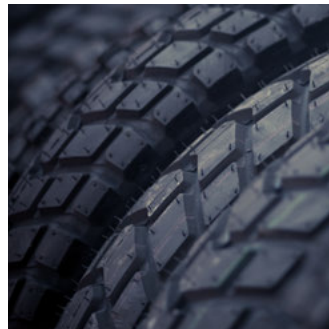
## Features & Models

The RTC offers many new fantastic features such as:

- Patented DLC (Dynamic Load Compensation) system for perfect temperature uniformity in the insert.
- Unique, intelligent sensors for plug n' play connection.
- USB connector for communication.
- Easy-to-read color VGA display with a perfect overview of the actual status.
- Intuitive, fast, and user-friendly navigation.
- Lightweight and easy to carry around.
- New functional carrying case design.
- New multi-hole insert kits covering all of the most used sensor sizes.
- High profile design and well-known, long lasting Jofra quality.

The new RTC calibrator comes in three different models—A, B, and C.

- RTC-A reference temperature calibrator.
- RTC-B reference temperature calibrator with input for reference sensor, DLC sensor, and sensors-under-test.
- RTC-C reference temperature calibrator with input for reference sensor and DLC sensor.



## Key Features

- ▶ **High Accuracy**  
Down to  $\pm 0.04^{\circ}\text{C}$  using the external reference sensor. 4-wire True-Ohm Measurement technology is used.
- ▶ **Excellent Stability,  $0.01^{\circ}\text{C}$**
- ▶ **Wide Temperature Range**  
RTC-158: From  $-22$  to  $155^{\circ}\text{C}$  ( $-8$  to  $311^{\circ}\text{F}$ ).  
RTC-250: From  $28$  to  $250^{\circ}\text{C}$  ( $82$  to  $482^{\circ}\text{F}$ ).
- ▶ **Excellent Temperature Homogeneity**  
Unique, active dual-zone block ensures good temperature homogeneity in the calibration zone.
- ▶ **DLC (Dynamic Load Compensation)**  
Perfect temperature uniformity in the insert, even when calibrating large sensors or many sensors at a time. (B and C models only.)
- ▶ **New Sensor Basket**  
In Combination with the stirrer, the newly developed sensor basket ensures virtually zero axial and radial gradients in the calibration zone.
- ▶ **Intelligent Reference Sensors**  
Jofra reference sensors are supplied with intelligent plugs, holding the calibration data (coefficients) of the reference sensor. This is a truly plug n' play calibration system.
- ▶ **USB Communication**  
All RTC calibrators communicate via an easy-to-use USB port.
- ▶ **EURAMET**  
Best performing dry-block with regard to the EURAMET/cg-13v.01 guideline for the testing of dry-blocks.

## Liquid Bath/Large Diameter Insert



The RTC-158/250 calibrators are fitted with a 160 mm (6.3") deep well with a diameter of 63.5 mm (2.5"), which are twice the size of any other dry-block. And, they can be used both as dry-block calibrators and as liquid calibration baths with a magnetic stirrer.

With these options, it is now possible to calibrate even more temperatures sensors simultaneously and to calibrate both large and odd-shaped sensors—which is not possible with the remaining product range.

The RTC-158/250 calibrators can be used without an external reference sensor. But if an STS-200 reference sensor is connected directly to a B or C model, or to the DTI-1000 reference thermometer, you can take advantage of the full potential of the calibrator's potential, achieving even better accuracy.

### Advantages of a Combined Liquid Bath/Dry-Block Calibrator

Save time with the ability to calibrate multiple sensors and validate multiple thermocouples.

- Automatic calibration of as many as 24 sensors at a time.
- Perfect for technicians who only want to use liquid baths.
- With JOFRACAL software, operators of B models can handle online calibration and documentation of multiple sensors calibrated simultaneously.

## Liquid Bath vs Dry Block



**Advantages of the liquid bath configuration:**

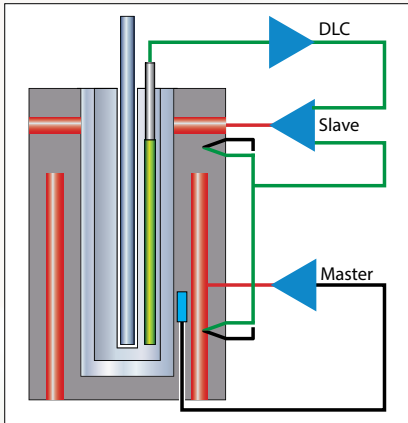
- You do not need insertion tubes for all of your different types of sensors.
- You can calibrate sensors which do not otherwise fit into insertion tubes.
- You can calibrate glass thermometers and gas or liquid-filled sensors.
- You can be ready to calibrate immediately, no matter what sensor you may have.

**Advantages of the dry-block configuration:**

- No hazardous hot liquids.
- Easier to handle insertion tubes than liquids.
- More convenient to carry a dry-block than one filled with liquid.
- No need for external exhaustion.
- No hazardous hot liquids
- 100% repeatability in the sensor position in the block

All specifications given for the liquid bath configuration are based on the silicone oil supplied and recommended by JOFRA.

## DLC—Dynamic Load Compensation



To bring our well documented active dual-zone technology to an even higher level, we have developed the patented DLC system.

This feature makes it possible to perform top calibration specifications without being affected by the actual load, e.g. many sensors or very big sensors.

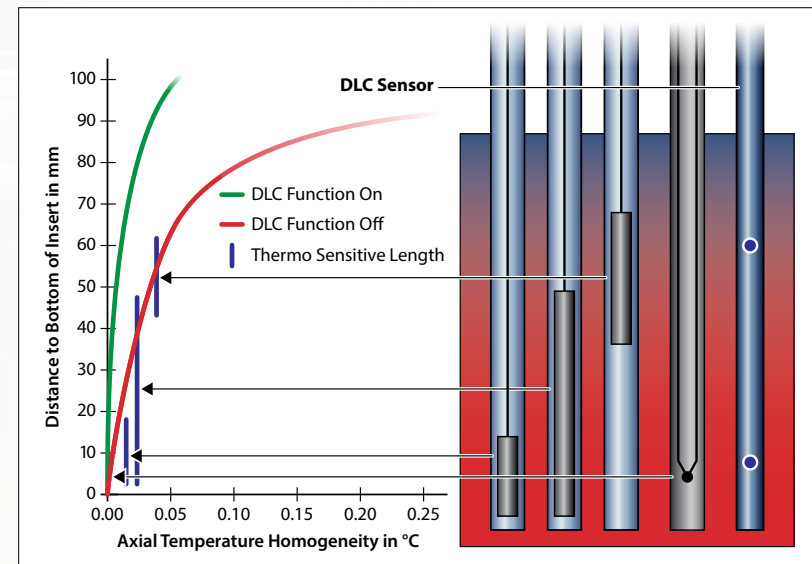
The DLC sensor improves on the RTC calibrator's already advanced dual-zone technology by controlling the homogeneity in not only the well, but inside the insert where the sensors-under-test are placed during calibration. The DLC sensor measures the temperature homogeneity in the insert and provides feedback to the active dual-zone system, which compensates the temperature difference to a minimum inside the insert. In this way, the DLC function makes the homogeneity independent of the different loads of the insert, making the RTC the best performing dry-block calibrator on the market when calibrated and tested according to the globally accepted EURAMET/cg-13v.01 guideline for calibration and testing of dryblocks.

The DLC system is comprised of a special differential temperature sensor designed especially for the RTC. The sensor is placed in the insert and connected to the calibrator. When the DLC function is enabled, the calibrator will automatically equalize the temperature homogeneity inside the insert, along with the normal temperature control and stabilization.

## DLC—User Advantages

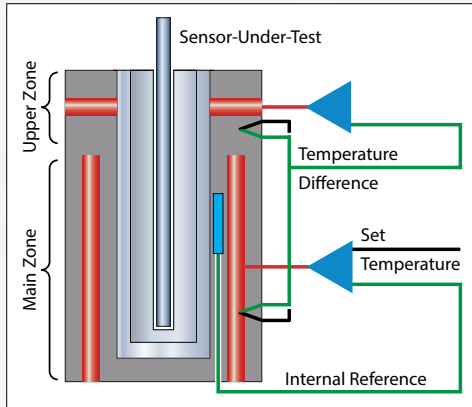
Calibrating with the DLC sensor offers the following advantages:

- 1 Calibration of several sensors simultaneously.
- 2 Calibration of thick sensors.
- 3 Gives TSL (Thermo Sensitive Length) independency. It is no longer necessary to know the TLS of the sensor.
- 4 Compensates for sensor production tolerances like the PT100 element being mounted in various positions in the sensor.
- 5 Trouble free calibration of sensors with PT100 elements up to 60 mm length.
- 6 The DLC indicator proves that the dual-zone is active and functioning well.
- 7 Proves that the calibrator is working perfectly. The DLC value should be very close to 0.00 when the calibrator is loaded with DLC sensor and an external reference sensor.
- 8 Together with the stability indication, the DLC indicates when the calibration values can be read.



Axial temperature curves for an RTC calibrator with and without the DLC functionality activated.

## Unique Temperature Performance



The RTC series of calibrators provide precision temperature calibration of sensors, whatever the type or format. This is accomplished through an innovative active dual-zone heating technology.

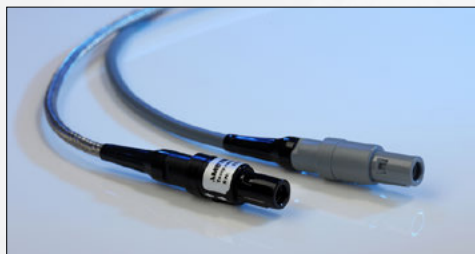
With JOFRA's active dual-zone heating technology, each heating zone is independently controlled for precision temperature calibration. The homogeneity in the lower part is close to that of a laboratory liquid bath. The lower zone ensures optimum heat dissipation throughout

the entire calibration zone. The upper zone compensates for heat loss from the sensor-under-test, and from the open top. This design also eliminates the need for extra insulation of sensors-under-test and makes it possible to calibrate liquid-filled and other mechanical sensors.

## USB and LAN/Ethernet Connection

A USB connection facilitates easy communication with JofraCal. The USB connection also supports easy download of future firmware upgrades. The USB connection provides fast and easy access to all laptops without the need of RS-232 to USB converters.

Future-proof through e.g. a flash capability for easy firmware upgrades as well as already integrated LAN communication, SD-card slot, and USB host connectors for future use.



## Intelligent Reference Sensors

The JOFRA STS-200 intelligent reference sensors and the DLC sensor contain individual calibration data regarding the sensor. Firstly, this means that the time-consuming coefficient

downloading sequence with risk of errors is no longer necessary. Secondly, the user can change the reference sensor and be up and running immediately.

With the intelligent sensors, AMETEK has eliminated a source of error, and the system is now giving a fail-safe plug'n'play calibration system.

## Unique Reference Sensors



The STS-200 reference sensors and the DLC sensors have been specially designed. They are both angled 90° and have been customized to fit the calibrator so that they are only slightly higher than the top of the RTC calibrator.

The unique design makes it possible to calibrate threaded sensors and sensors with connection heads without any problems.

## Sensor Basket



The sensor basket prevents sensors from interfering with the stirrer. It was designed to create the largest possible temperature homogeneous zone. The sensor basket produces virtually zero axial and radial gradients in the calibration zone.

## Easy to Carry **Only 24.25 lbs/11 kg**

A calibrator is carried from one job to another. Therefore, it is essential that the weight of the calibrator is as low as possible. We factored the weight issue into our design, and engineered the RTC calibrator to be lightweight and easy to carry around without compromising its quality, durability, and functionality.

## Fast Temperature Calibration

Time is money! This is why all the RTC calibrators have an increased heating and cooling speed compared to all other calibrators. Heating and cooling speeds have been increased by up to 25%. The implication is savings in both production downtime and general calibration costs.

## Multi-Hole Insert Kits



Two special multi-hole insert kits have been developed to comply with the calibration of almost any sensor diameter without having to buy numerous inserts.

The first kit is a metric insert kit consisting of only four inserts covering all diameters from 3 to 12 mm. The other is an imperial insert kit consisting of only three inserts covering six different sizes from 1/8" to 1/2".

All inserts have holes for both STS reference sensors and DLC sensors.

With this insert kit in the carrying case, the user is now able to calibrate all commonly known sensor sizes. These insert kits are part of the JOFRA lightweight strategy.

## Special Designed Carrying Case

AMETEK has designed an all-in-one-handle carrying case that makes it possible to store both the STS reference sensors and DLC sensors in the carrying case with optimum physical protection. There is room for inserts and insulation plugs to cover all dimensions and compartments for the integrated support rod set, wires, manuals, certificates, plugs, insert tools etc.

All compartments are specially designed to hold one of the above mentioned items. This makes it very easy to keep track of any accessories.

For optimum protection of the calibrator and the accessories, the compartments are designed to hold the accessories fixed during transportation.

## Intelligent Recalibration Information

In order to comply with ISO, SOP's and the FDA, it is imperative that the calibration equipment never exceeds the expiry of the calibration certificate. RTC Series calibrators are constantly checking calibration dates on the calibrator, as well as any connected STSD and DLC sensors. If the calibration period has expired, a warning will appear in the display. This feature prevents costly consequence evaluation.

## Easy to Read Color Display and User-Friendly Navigation



The 5.7" full color VGA display is very easy to read. The main temperatures, like SET, READ, TRUE, and SUT (Sensor under test), are always displayed at all stages of the programming or calibration procedure.

The navigation is menu-driven and very logical to use, and the display shows any important information needed for the current function in use. The communication window pops up and

is followed by discrete sound messages. The display is very bright, and the main information can easily be read from a distance. The advanced simplicity RTC user interface is available in English, German, Chinese, and Japanese.

The large display contains more detailed information at a glance, such as:

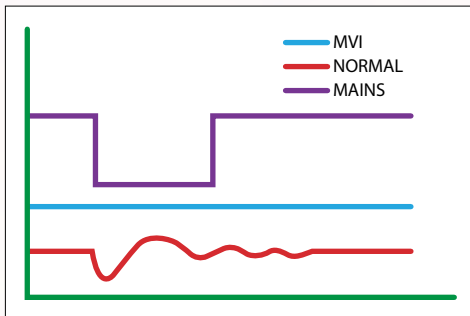
- Stability status.
- Load compensation status.
- Real time clock.
- Serial number of reference sensor.
- Sensor-under-test status.

## Integrated Support Rod



The integrated support rod is part of the reduced weight philosophy. It is lightweight and very easy to mount on the RTC. Two fixing holes are integrated in the calibrator where the support rods can be mounted.

## MVI—Secure Temperature Stability



MVI stands for “Mains power Variance Immunity”. Unstable mains power is 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 per-

form inconsistently, leading to both inaccurate readings and unstable temperatures.

The JOFRA RTC calibrators all employ the MVI functionality, thus avoiding such stability problems. The MVI functionality is obtained by running the calibrator on stabilized DC voltage.

## Highest Accuracy (models B & C only)

The RTC series calibrators may be supplied with a built-in reference thermometer to be used with an external reference sensor. This feature allows the instrument to perform calibrations on-site, while maintaining high accuracy.

The user can decide whether to read the built-in reference sensor or the more accurate angled reference sensor from the large, easy-to-read LCD display of the calibrator. The external sensor and the internal sensor readings are independent of one another.

## SET-Follows-TRUE (models B & C only)

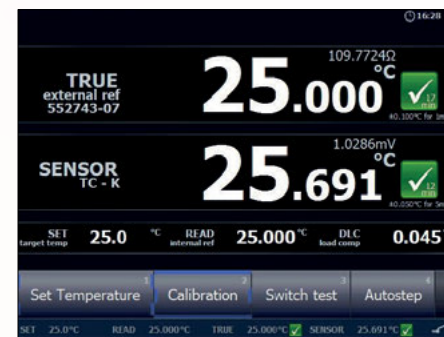
The “SET-Follows-TRUE” makes the instrument tune in until the temperature reading of the external reference “TRUE” meets the desired “SET” temperature. This feature is important when it is critical that the temperature of the calibration zone matches the desired temperature when measured with accurate external reference sensors.

## Reading of Sensor-Under-Test (model B only)

Model B of the RTC is equipped with a built-in accurate measuring circuit for sensor-under-test (input), which enables measurement of virtually any type of temperature sensors including:

Resistance thermometers (RTD), thermocouples (TC), transmitters, milliamps (mA), voltage (V), and thermostats.

The RTC calibrators can be user-programmed from the keyboard for fully automatic sensor calibrations. Once the unit is programmed, the instrument is self-operating and performs the configured calibration routine. All calibration data is stored and can be read on the display.



## Switch Test (model B only)

Users may perform a thermostwitch test and find “Open,” “Closed,” and the hysteresis (deadband) automatically. The instrument retains the last twenty test results.

## Auto-Stepping



Up to 20 different temperature steps may be programmed including the hold time for each step. Upon completion of an auto-step routine, the user can easily read the results for the sensor-under-test on the RTC display. Results from twenty auto-step calibrations are stored.

The “Set temperature” feature allows the user to set the exact desired temperature with a resolution of 0.001°.

## Enhanced Stability

A stability indicator shows when the RTC calibrator has reached the desired temperature and is stable. The user may change the stability criteria for the external reference and the sensor-under-test quickly and simply. The stability criterion is the user’s security of a correct calibration. A count-down timer is displayed next to the temperature read-out.

## Instrument Setups

The RTC series allows the user to store up to ten (10) complete instrument setups. You may store all sorts of information including temperature units, stability criteria, use of external reference sensors, resolutions, sensors-under-test (SUT), conversions to temperature, display contrasts, etc. The setup may be recalled at any time.

## Maximum and Minimum Temperature

From the setup menu, the user can select the maximum and minimum temperature limit for the calibrator. This function prevents damage to the sensor-under-test caused by excessive temperatures, and it helps reducing sensor drift from exposures of too high temperatures. This feature can be locked with an access code.

## Silent Operation

The RTC calibrator can be programmed to run in silent operation. This function is an advantage if calibrating in a laboratory or in an office. If used in silent operation, the calibrator is not using its full speed potential.

## As Found/As Left (model B only)

When running a calibration initiated from a work order, the user can select the calibration as an As Found or an As Left calibration.

## Sync Output

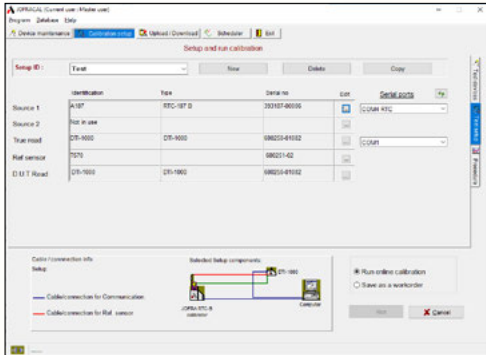
A synchronization output signals when the instrument is stable and may be used with ancillary devices such as video recorders, digital cameras or as an input to a data logging device. The SYNC output may be useful for automating and documenting your calibrations when calibrating external reading devices.

## Calibration of Indication Devices

When calibrating an indicating device in the work order mode, users may key in the results during or after the test. Using the “Calibration info” function, the user may view the complete calibration task, including the “Scenario” before the calibration takes place.



## JofraCal Calibration Software



JofraCal is a highly versatile calibration software that is supplied together with the RTC calibrators. The software ensures easy calibration of all kinds of temperature sensors, such as RTD's, thermocouples, transmitters, and thermoswites. Furthermore, it can be used for pressure calibration i.e. pressure gauges and pressure switches. JofraCal integrates with Jofra calibration instruments. As for temperature calibrators, it is the whole range

of temperature calibrators. Regarding pressure calibrators, it integrates with the Crystal XP2i and nVision. JofraCal also has full integration with the series of signal calibrators.

JofraCal 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 can be stored on a PC for later recall or analysis. The RTC calibrator stores the calibration procedure and may be taken out to the process site without bringing a personal computer.

This allows the RTC calibrator to:

- Operate as a stand-alone instrument, using advanced calibration routines without the assistance of a personal computer on site. The work order functionality
- Prevent unauthorized changes to a calibration routine. Personnel who are not authorized to alter a calibration routine cannot do so

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

JOFRACAL offers extended output formats of the captured calibration data such as PDF file format and ASCII/ semicolon separated text format for further processing and calculation of data in spreadsheets and word processors.

## JofraCal Hardware Requirements

- 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).

## Calibration of Up To 24 Sensors with the Jofra ASM Scanner



Using the JOFRA RTC 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 the JOFRACAL software on a PC. Up to 3 ASM units can be stacked to calibrate up to 24 sensors at a time. It can handle signals from 2-, 3- and 4 wire RTD's, thermocouples, transmitters, temperature switches, and voltage.

# Specifications

## Functional Specifications

### Temperature Range

#### RTC-158

@ ambient temp. 0°C/32°F..... **-37 to 155°C/-35 to 311°F**  
 @ ambient temp. 23°C/73°F ..... **-22 to 155°C/-8 to 311°F**  
 @ ambient temp. 40°C/104°F ..... **-9 to 155°C/16 to 311°F**

#### RTC-250

@ ambient temp. 0°C/32°F..... **5 to 250°C/41 to 482°F**  
 @ ambient temp. 23°C/73°F ..... **28 to 250°C/82 to 482°F**  
 @ ambient temp. 40°C/104°F ..... **45 to 250°C/113 to 482°F**

Patented heating technology: Patent No. EP2074374/US8342742.

### Accuracy with External STS Ref. Sensor (models B and C)

RTC-158 ..... **±0.04°C/±0.07°F**  
 RTC-250 ..... **±0.07°C/±0.13°F**  
 12-month period. Relative to reference standard. Specifications by use of the external JOFRA STS-200 reference sensor.

### Accuracy with Internal Ref. Sensor (models A, B, and C)

RTC-158 ..... **±0.18°C/±0.32°F**  
 RTC-250 ..... **±0.28°C/±0.50°F**  
 In insert. Calibrated with insert.  
 RTC-158 ..... **±0.3°C/±0.54°F**  
 RTC-250 ..... **±0.5°C/±0.90°F**  
 In Bath. Calibrated with insert.

### Stability

RTC-158 ..... **±0.01°C/±0.018°F**  
 RTC-250 ..... **±0.02°C/±0.036°F**  
 Measured after the stability indicator has been on for 15 minutes.  
 Measuring time is 30 minutes

### Resolution (user selectable)

All Temperatures..... **1° or 0.1° or 0.01° or 0.001°**

### Temperature Unit in Display

User Selectable ..... °C, °F, or K

### Radial Homogeneity (difference between holes)

RTC-158 @ -22°C/-8°F, Block..... **0.03°C/0.05°F**  
 RTC-158 @ 155°C/311°F, Block ..... **0.05°C/0.09°F**  
 RTC-158 @ range, Bath ..... **0.015°C/0.03°F**  
 RTC-250 @ range, Block ..... **0.05°C/0.09°F**  
 RTC-250 @ range, Bath ..... **0.015°C/0.03°F**

### Heating Time

#### RTC-158

-22 to 23°C/-8 to 73°F..... **9 minutes**  
 23 to 100°C/73 to 212°F ..... **23 minutes**  
 100 to 155°C/212 to 311°F..... **28 minutes**

#### RTC-250

28 to 100°C/82 to 212°F ..... **3 minutes**  
 50 to 100°C/122 to 212°F..... **2 minutes**  
 100 to 250°C/212 to 482°F..... **9 minutes**

### Cooling Time

#### RTC-158

155 to 100°C/311 to 212°F..... **9 minutes**  
 100 to 23°C/212 to 73°F ..... **24 minutes**  
 23 to 0°C/73 to 32°F..... **15 minutes**  
 0 to -15°C/32 to 5°F ..... **21 minutes**

#### RTC-250

250 to 100°C/482 to 212°F..... **27 minutes**  
 100 to 50°C/212 to 122°F..... **27 minutes**  
 50 to 28°C/122 to 82°F ..... **28 minutes**

### Time to Stability (approx.)

RTC-158 ..... **15 minutes**  
 RTC-250 ..... **15 minutes**

### Immersion Depth

RTC-158/250 incl. insulation plug..... **180 mm/7.1 in**  
 RTC-158/250 bath version..... **150 mm/5.9 in**

## Input Specifications

All input specifications apply to the dry-block of the calibrator running at the respective temperature (stable plus an additional 20 minute period).

All input specifications are valid for the RTC-158 and RTC-250.

### RTD Reference Input (models B and C)

Type ..... **4-wire RTD with true ohm measurements (1)**  
 F.S. (Full Scale)..... **400 ohm**  
 Accuracy (12 months)..... **±(0.0012% rdg. + 0.0005% F.S.)**

RTD Type	Temperature		12 Months	
	°C	°F	°C	°F
Pt100 Reference	-22	-8	± 0.008	± 0.015
	0	32	± 0.008	± 0.015
	28	82	± 0.009	± 0.016
	155	311	± 0.011	± 0.020
	250	482	± 0.012	± 0.022

(1) True ohm measurement is an effective method to eliminate errors from induced thermoelectrical voltage.

### DLC Sensor Input (models B and C)

TC diff	Temperature		12 Months	
	°C	°F	°C	°F
DLC 155	-22	-58	± 0.014	± 0.025
	0	32	± 0.010	± 0.018
	28	82	± 0.010	± 0.018
	155	311	± 0.008	± 0.015
	250	482	± 0.008	± 0.015

At 0.00°C/0.00°F DLC reading.

# Specifications

## RTD Sensor Under Test Input (model B)

F.S. (range) ..... **400 ohm**  
 Accuracy (12 months)..... **±(0.002% Rdg.+0.002% F.S)**  
 F.S. (range)..... **4000 ohm**  
 Accuracy (12 months)..... **±(0.005% Rdg. + 0.005% F.S.)**  
 2-wire..... **add 50 mOhm**

RTD Type	Temperature		12 Months	
	°C	°F	°C	°F
Pt100	-22	-8	± 0.025	± 0.045
	0	32	± 0.026	± 0.047
	28	82	± 0.026	± 0.047
	155	311	± 0.030	± 0.054
	250	482	± 0.033	± 0.060
Pt500	-22	-8	± 0.113	± 0.203
	0	32	± 0.116	± 0.209
	28	82	± 0.118	± 0.212
	155	311	± 0.129	± 0.232
	250	482	± 0.131	± 0.236
Pt1000	-22	-8	± 0.063	± 0.114
	0	32	± 0.064	± 0.115
	28	82	± 0.066	± 0.119
	155	311	± 0.075	± 0.135
	250	482	± 0.082	± 0.148

Input and curves for many different resistance sensors such as:  
 0-400Ω  
 P10(90)386/P50(90)385/P100(90)385/P50(90)391/P100(90)391/  
 P100(90)392/M50(90)428/M100(90)428/H120(90)672Pt-100 MILL  
 0-400Ω  
 P200(90)385/P500(90)385/P1000(90)385/YSI-400

## Thermocouple Input

Range ..... **± 78 mV**  
 F.S. (Full Scale)..... **78 mV**  
 Accuracy (12 months) ..... **±(0.005% Rdg. + 0.005% F.S.)**

TC Type	Temperature		12 Months*	
	°C	°F	°C	°F
E	-50	-58	± 0.09	± 0.17
	0	32	± 0.06	± 0.11
	155	311	± 0.06	± 0.11
J	320	608	± 0.07	± 0.13
	-50	-58	± 0.10	± 0.18
	0	32	± 0.08	± 0.14
K	155	311	± 0.09	± 0.16
	320	608	± 0.09	± 0.16
	-50	-58	± 0.14	± 0.24
T	0	32	± 0.10	± 0.19
	155	311	± 0.11	± 0.20
	320	608	± 0.11	± 0.20
R	-50	-58	± 0.15	± 0.26
	0	32	± 0.10	± 0.18
	155	311	± 0.08	± 0.15
S	320	608	± 0.08	± 0.15
	-50	-58	± 1.30	± 2.35
	0	32	± 0.78	± 1.40
N	155	311	± 0.47	± 0.84
	320	608	± 0.40	± 0.72
	-50	-58	± 0.98	± 1.76
U	0	32	± 0.78	± 1.40
	155	311	± 0.49	± 0.89
	320	608	± 0.45	± 0.81
U	-50	-58	± 0.20	± 0.35
	0	32	± 0.15	± 0.27
	155	311	± 0.13	± 0.23
U	320	608	± 0.13	± 0.24
	-50	-58	± 0.13	± 0.24
	0	32	± 0.10	± 0.18
U	155	311	± 0.08	± 0.14
	320	608	± 0.08	± 0.15

\* Excludes CJC accuracy ± 0.3° C / ± 0.54° F.

## Transmitter Supply

Output Voltage ..... **24VDC ±10%**  
 Output Current ..... **Maximum 28 mA**

## Transmitter Input mA (model B)

Range ..... **0 to 24 mA**  
 Accuracy (12 months)..... **±(0.005% Rdg. +0.010% F.S.)**

## Voltage Input VDC (model B)

Range ..... **0 to 12 VDC**  
 Accuracy (12 months)..... **±(0.005% Rdg. +0.010% F.S.)**

## Switch Input (model B)

### Switch Dry Contacts

Test Voltage..... **Maximum 5 VDC**  
 Test Current..... **Maximum 2.5 mA**

## Mains Specifications

Voltage ..... **115V (90-127) / 230V (180-254)**  
 Frequency, non US Deliveries ..... **50/60 Hz (47-63 Hz)**  
 Frequency, US Deliveries ..... **60 Hz (57-63 Hz)**  
 Power Consumption (max.), RTC-158..... **400 W**  
 Power Consumption (max.), RTC-250..... **1150 W**

## Communications Interface

Serial Data Interface..... **USB 2.0 Device Port**  
 Serial Data Interface..... **USB 2.0 host Double Port\***  
 LAN..... **Ethernet MAC 10/100 Base-T\***  
 SD..... **SD slot\***

\* For future expansion.

## Miscellaneous

Operating Ambient 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**

# Specifications

## Physical Specifications

### Weight and Instrument Size (LxWxH)

RTC-158 .....	11 kg /24.3 lb
RTC-250 .....	9.9 kg /21.8 lb
RTC-158/250 .....	366 x 171 x 363 mm /14.4 x 6.7 x 14.3 in

### Shipping (without carrying case)

RTC-158 .....	17 kg /37.5 lb
RTC-250 .....	16 kg /35.3 lb
(LxWxH) .....	580 x 250 x 500 mm /22.8 x 9.8 x 19.7 in

### Shipping (including optional carrying case)

RTC-158 .....	28 kg /61.7 lb
RTC-250 .....	27 kg /59.6 lb
(LxWxH) .....	550 x 430 x 660 mm /21.7 x 16.9 x 26.0 in

## Inserts

### Insert Dimensions

Outer Diameter .....	63.5 mm /2.5 in
Length .....	160 mm /6.3 in

### Weight of Non-Drilled Insert (approx.)

1200 g /42.3 oz

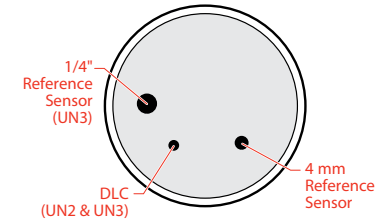
### Alloy

#### Special Aluminum Alloy

Use of other inserts may reduce the 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.

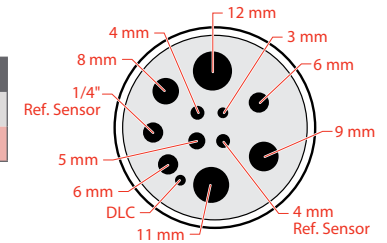
### Undrilled Inserts (A/B/C)

Inserts	Instrument		
	Insert Code*	RTC-158	RTC-250
Undrilled Insert	UN1	124899	127758
Undrilled Insert with DLC	UN2	127829	127834
Undrilled Insert with DLC and reference sensor 4 mm and 1/4 in	UN3	127831	127835



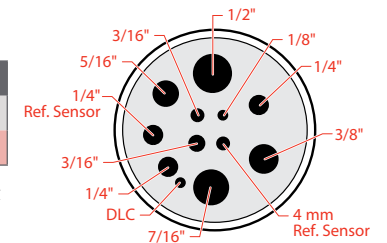
### Metric (mm) Multi-hole Insert (A/B/C)

Inserts	Instrument		
	Insert Code*	RTC-158	RTC-250
Metric Multi-Hole Insert	M01	124897	127759



### Imperial (in) Multi-hole Insert (A/B/C)

Inserts	Instrument		
	Insert Code*	RTC-158	RTC-250
Imperial Multi-Hole Insert	M02	124898	127760



\* Use the insert code, when ordering a JOFRA standard undrilled insert together with the RTC calibrator.

### Liquid Bath Kit-Option BAT



The liquid bath kit for the RTC-158/250 contains a sensor basket, two covering lids, a magnet, a magnetic remover, a liquid drainage tube, and 0.75 litres of silicone oil.

All inserts are supplied with a matching insulation plug.

# Options & Accessories

## Standard Delivery

### Models A, B, and C Include:

- RTC dry-block calibrator (user specified)
- Mains power cable (user specified)
- Traceable certificate - temperature performance
- Tool for insertion tubes
- JOFRACAL
- AMETRIM
- USB cable
- Set of rubber cones for insulation plugs
- Manual

### Model B Instruments Also Include:

- Test cables (2 x red, 2 x black)
- Traceable certificate - input performance for reference sensor and DLC sensor
- Traceable certificate - input performance for sensor-under-test inputs

### Model C Instruments Also Include:

- Traceable certificate - input performance for reference sensor and DLC sensor

## Accessories

Support Rod Set for Sensors (2 grips, 2 fixtures).....	<b>127277</b>
Extra fixture for sensor grip.....	<b>125066</b>
Extra sensor grip.....	<b>125067</b>
Mini-Jack connector for stable relay output.....	<b>122771</b>
Thermocouple Male Plug — Type J — Black.....	<b>120516</b>
Thermocouple Male Plug — Type K — Yellow.....	<b>120517</b>
Thermocouple Male Plug — Type N — Orange.....	<b>120514</b>
Thermocouple Male Plug — Type T — Blue.....	<b>120515</b>
Thermocouple Male Plug — Type R / S — Green.....	<b>120518</b>
Thermocouple Male Plug — Type Cu-Cu — White.....	<b>120519</b>
Silicone Oil, Type 200/10cST, 0.75 L, RTC-158.....	<b>125033</b>
Silicone Oil, Type 200/50cST, 0.75 L, RTC-250.....	<b>124885</b>
Liquid Bath Kit, RTC-158.....	<b>125022</b>
Liquid Bath Kit, RTC-250.....	<b>125035</b>
Carrying Case with Trolley.....	<b>127782</b>

## Options

### Carrying Case—Option CT

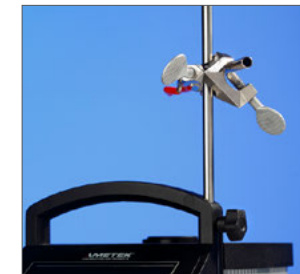
With our new special designed carrying case it is now possible to store all your sensors in the case with an optimum physical protection. With improved integrated trolley system for easy and safe transportation.



### Support Rod Set—Option SR

Support rod for sensors to be mounted on all Jofra RTC dry-block calibrators. Holds the sensor-under-test in its position, while calibrating.

Includes 2 sensor grips and 2 fixtures for sensor grips.



## Functional Comparison

	Model A	Model B	Model C
Dual-zone heating/cooling block	■	■	■
MVI — Mains Variance Immunity (or similar)	■	■	■
Stability indicator	■	■	■
Automatic step function	■	■	■
USB communication	■	■	■
Display resolution 0.001°	■	■	■
Programmable max. temperature	■	■	■
SYNC output (for external recording device)	■	■	■
Calibration of short sensors in special insert		■	■
External precision reference sensor input		■	■
External precision DLC reference sensor input		■	■
“SET” follows “TRUE”		■	■
Load compensation functionality		■	■
Input for RTD, TC, V, mA		■	■
4-20 mA transmitter input incl. 24 VDC supply		■	■
All inputs scalable to temperature		■	■
Automatic switch test (open, close, and hysteresis)		■	■
Download of calibration work orders from PC		■	■
Upload of calibration results (as found & as left)		■	■



Model A



Model B



Model C

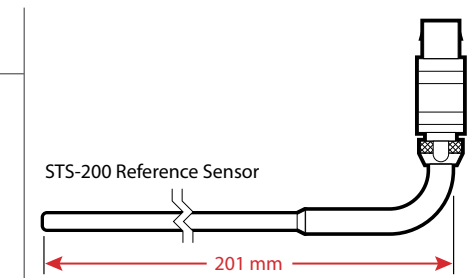
# Ordering Information

Base Model Number	
RTC158 .....	RTC-158 series, -22 to 155°C (-8 to 311°F)
RTC250 .....	RTC-250 series, 28 to 250°C (82 to 482°F)
Model Version	
A .....	Basic model, without input
B .....	Full model, incl. DLC sensor input, Reference sensor input, Sensor-under-test input
C .....	Middle model, incl. DLC sensor input, Reference sensor input
Power Supply (US deliveries 60 Hz only)	
115 .....	115 VAC
230 .....	230 VAC
Mains Power Cable	
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	
NON .....	No insert selected (standard)
UNX .....	1 x Undrilled Insert (Please see Insert selection for code)
MXX .....	1 x Multi hole insert (Please see Insert selection for code)
BAT .....	Liquid Bath Kit
Dynamic Load Compensation (B and C models only— optional)	
DLC .....	DLC sensor
STS Reference Sensor (B and C models only— optional)	
R1 .....	STS-102 Ref. sensor. Dia. 4 mm. Length 30 mm (STS102A030EH) for RTC-158
R6 .....	STS-200 Ref. sensor. Dia. 4 mm. Length 201 mm (STS200A916) for RTC-158
R7 .....	STS-200 Ref. sensor. Dia. 1/4". Length 201 mm (STS200B916) for RTC-158
R8 .....	STS-200 Ref. sensor. Dia. 4 mm. Length 201 mm (STS200A925) for RTC-250
R9 .....	STS-200 Ref. sensor. Dia. 1/4". Length 201 mm (STS200B925) for RTC-250
Calibration Certificate	
F .....	Traceable Certificate to International Standards
H .....	Accredited Certificate — ISO17025
EA .....	Full EURAMET Accredited Certificate — ISO17025
HS .....	System Calibration — Accredited Certificate — ISO17025 (B & C model only)
EAS .....	System Calibration — Full EURAMET Accredited Certificate — ISO17025 (B & C model only)
EASD .....	System Calibration — Full EURAMET Accredited Certificate with DLC — ISO17025 (B & C model only)
Base Model Number	
CT ..	Solid Protective Carrying case with trolley
SR ..	Support rod set
TR ..	Solid Protective Carrying case with trolley & Support rod set

## Sample Order Number

**RTC158B230AMXXDLCR1EACT**

JOFRA RTC-158 B with 230VAC, EU power cord, 1 multi-hole inert, DLC, 4 mm diameter STS-200 reference sensor, full EA temperature calibration certificate, and carrying case with trolley.



RTC158 B 230 A MXX DLC R1 EA CT

**USA, Florida**  
Tel +1 (800) 527 9999  
[cal.info@ametek.com](mailto:cal.info@ametek.com)

**USA, California\***  
Tel +1 (800) 444 1850  
[crystal@ametek.com](mailto:crystal@ametek.com)

**India**  
Tel +91 22 2836 4750  
[jofra@ametek.com](mailto:jofra@ametek.com)

**Singapore**  
Tel +65 6484 2388  
[jofra@ametek.com](mailto:jofra@ametek.com)

**China, Shanghai**  
Tel +86 21 5868 5111  
[jofra.sales@ametek.com.cn](mailto:jofra.sales@ametek.com.cn)

**China, Beijing**  
Tel +86 10 8526 2111  
[jofra.sales@ametek.com.cn](mailto:jofra.sales@ametek.com.cn)

**United Kingdom**  
Tel +44 (0) 1243 833 302  
[caluk.sales@ametek.com](mailto:caluk.sales@ametek.com)

**France**  
Tel +33 (0) 30 68 89 40  
[general.lloyd-instruments@ametek.fr](mailto:general.lloyd-instruments@ametek.fr)

**Germany**  
Tel +49 (0) 2159 9136 510  
[info.mct-de@ametek.de](mailto:info.mct-de@ametek.de)

**Denmark\***  
Tel +45 4816 8000  
[jofra@ametek.com](mailto:jofra@ametek.com)

[ametekcalibration.com](http://ametekcalibration.com)

No part of this document may be reproduced or modified in any form or by any means, electronic or mechanical, without express written permission from JOFRA.  
©2023 AMETEK Incorporated

