temperature

JOFRA® calibration

Reference Temperature Calibrator

RTC-159 Ultra Cooler

As low as you need to go!

Reach -80°C in 65 minutes

Patented cooling technology

» Widest temperature range
From -100 to 155°C (-148 to 311°F)

» High accuracy
Down to ±0.06°C (±0.11°F) using the external reference sensor. 4-wire True-Ohm-Measurement technology is used

» Most stable ultra cooler calibration on the market
±0.03°C (±0.05°F)

» Perfect temperature homogeneity in the insert
Even when calibrating large sensors or many sensors at once, the unique dynamic load compensation (DLC) system in combination with JOFRA´s active dual-zone technology ensures perfect temperature homogeneity. (B and C models only)

» Fastest calibration possible
The efficient free piston stirling cooler (FPSC) technology is used to secure fast cooling and heating temperature changes

» Easy to carry
Weighing only 15.2 kg (33.5 lb), the RTC-159 is by far the lightest and most portable ultra cooler on the market

» Intelligent reference sensor communication
JOFRA reference sensors are supplied with intelligent plugs, holding the calibration data (coefficients) of the reference sensor. This is a truly plug & play calibration system

» USB connector for communication
All RTC calibrators communicate via an easy-to-use USB port

» EURAMET
Best performing dry-block with regard to the EURAMET/cg-13 guideline for testing of dry blocks

ISO 9001 Manufacturer

Specification Sheet, SS-RTC-159

The top model dry-block temperature calibrator – the JOFRA® RTC-159, is unsurpassed in the market. It is the most versatile temperature calibrator available with a temperature range that makes it especially ideal for use in the health care, medical, pharmaceutical, biotechnology and food industries.

The RTC-159 offers many advantages, such as:

- **Relevant for many applications**
  With its extremely wide temperature reach, the RTC-159 can be used in many applications where either high heat or extreme cooling is needed
- **User friendly**
  Intuitive to use and easy to run, the RTC-159 is equipped with a large informative, easy-to-read color display, which makes reading error a thing of the past
- **Ergonomically correct**
  Lightweight and easy-to-carry, the RTC-159 is easy to move from job to job
- **Mechanically stable**
  With its high-tech design the RTC-159 ensures durability and lasting quality

The RTC-159 is the newest member of the well-known JOFRA RTC family. The RTC family can meet any type of industrial temperature calibration need within the -100 to +700°C (-148 to 1292°F) temperature range.

AMETEK®
TEST & CALIBRATION INSTRUMENTS

Standard features

Best-in-class temperature homogeneity

The RTC series of calibrators provides precision temperature calibration of sensors, whatever the type or format.

The JOFRA RTC-series features our well-known 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 any type of mechanical sensors.

Widest temperature range

The RTC-159 can perform calibration over a very wide temperature range starting from -100°C and up to 155°C (-148 to 311°F). This makes it possible to perform calibration of sensors in applications ranging from ultra-coolers to autoclaves.

Fastest temperature calibration

Time is money! This is why all the new RTC calibrators heat and cool faster than all other calibrators on the market. This saves you both in production downtime and general calibration costs.

Intelligent reference sensor communication

The JOFRA STS-200 intelligent reference sensor as well as the unique DLC sensor contain all individual calibration data regarding the sensor.

This means that the time-consuming coefficient downloading sequence with risk of errors is no longer necessary. As well, the user can change the reference sensor and be up and running immediately.

With these intelligent reference sensors, AMETEK has eliminated a source of error and the system is now a fail-safe plug & play calibration system.

Intelligent recalibration information, IRI

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

USB connector for communication

Another RTC feature is the USB connection that facilitates easy communication with the calibration management software 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 for 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.

Efficient cooling technology

The RTC-159 with both heating and cooling capabilities features the FPSC (Free piston stirling cooler) as the cooling source.

It is much more efficient than thermo-electric (Peltier) coolers.

Easy to read & user friendly

The new 5.7" full color VGA display is large, bright and very easy to read – even from a distance. 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 important information needed for the current function in use. The communication window pops up and is followed by discrete sound messages.

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

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

Easy to carry

A calibrator is carried from one job to another and therefore it needs to weigh as little as possible. AMETEK has designed the RTC calibrators to be lightweight and easy to carry, without compromising quality, durability or functionality.

The RTC-159 weighs only 15.2 kg (33.5 lb), making it one of the lightest ultra coolers on the market.

SET-Follows-TRUE (Models B & C only)

The “SET-Follows-TRUE” mode makes the instrument tune in to 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 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.

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 and results are stored and can be read on the display.

Switch test (Model B only)

Users may perform a thermoswitch test and find “Open”, “Closed” and the hysteresis (deadband) automatically. The instrument retains the last 20 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 read the results for the sensor-under-test on the RTC display. Results from twenty auto-step calibrations can be held.

The “Set temperature” feature allows the user to set the exact desired temperature with a resolution of 0.001°C (0.002°F).

Instrument setups

The RTC series allows the user to store up to 10 complete instrument setups. You may store all types 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 temperatures

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 reduce sensor drift from exposure to too high temperatures. This feature can be locked with an access code.

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.

Calibration of indication devices

When calibrating an indicating device in 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.

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.

Specially-designed carrying case

AMETEK has designed an all-in-one 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 sensor-under-test dimensions and compartments for the wires, manuals, certificates, plugs, insert tools, etc.

All compartments are specially designed to hold the above-mentioned items (5 inserts). This makes it easy to keep track of all your accessories.

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

JOFRACAL calibration software

JOFRACAL is a highly versatile calibration software that is supplied together with the RTC calibrator. The software ensures easy calibration of all kind of temperature sensors, such as RTD´s, thermocouples, transmitters and thermoswitches. Furthermore, it can be used for pressure calibration i.e. pressure gauges and pressure switches.

In conjunction with JOFRACAL, RTC calibrators can:

- Operate as a stand-alone instrument, using advanced calibration routines without the assistance of a personal computer on site. This is 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 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.

Free download at www.jofra.com

Optional features

Dynamic Load Compensation (DLC)

All RTC calibrators feature active dual-zone temperature control, which improves the homogeneity in the well by adjusting the temperature at the top of the well to the same temperature as at the bottom. The dual-zone keeps the temperature differences to a minimum.

To bring the well-documented active dual-zone technology to an even higher level, AMETEK has developed a patent-pending, new dynamic load compensation (DLC) system. This system makes it possible to achieve exceptional calibration specifications without being affected by the actual load (e.g. many sensors or very large sensors).

A Dynamic Load Compensation Sensor has been developed specifically for the RTC. This has been done to improve homogeneity by controlling the temperature not only within the well, but also inside the insert, where the sensors-under-test are placed during calibration.

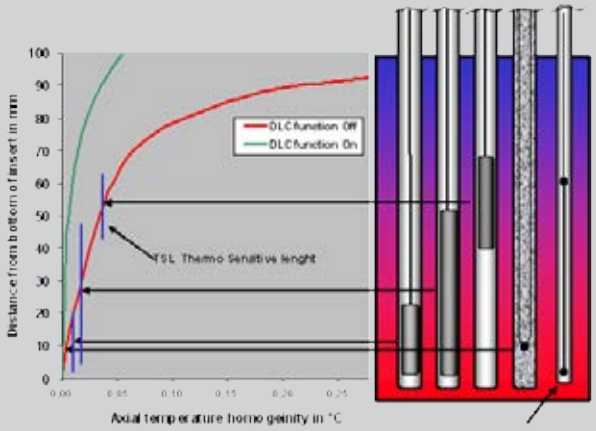
The DLC Sensor is placed in the insert and connected to the calibrator. When the DLC function is enabled, the calibrator will automatically equalize the temperature homogeneity inside the insert. This will together with the standard temperature control and stabilization, provide feedback to the active dual-zone system, which compensates the temperature difference to a minimum. In this way, the DLC function makes temperature homogeneity less dependent on the load of the insert.

When the DLC functionality is enabled, the RTC is the best performing dry-block calibrator on the market, when being calibrated and tested according to the globally accepted EURAMET/cg-13 guideline for calibration and testing of dry blocks.

DLC – user advantages

Calibrating with DLC sensor gives the following advantages:

1. Calibration of several sensors simultaneously
2. Calibration of thick sensors
3. Gives thermo sensitive length (TLS) 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 40 mm length
6. The DLC indicator proves that the dual-zone is active and functioning well
7. Proves that the calibrator is working perfect. 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



More information can be found on www.jofra.com

Unique reference sensors

The new STS-200 reference sensors and DLC sensors are designed with a 90° angled rod to fit the calibrator so 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.

STS-200 reference sensors also alert you when your calibration has expired.

Increased capacity with JOFRA ASM

Using the 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 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.

Sensor support rod

The support rod is lightweight and easy to mount on the RTC. Two fixing holes are integrated in the calibrator where the support rods can be mounted.

Multi-hole insert kits

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

The first kit is a metric insert kit consisting of four inserts covering all diameters from 3 to 13 mm. The other is an imperial insert kit consisting of three inserts covering six different sizes from 1/8" to 7/16".

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

With this new insert kit in the carrying case, the calibration technician is now able to calibrate all commonly-used sensor sizes with just one insert.

Optional: DLC sensor and Reference sensor

Dynamic Load Compensation Sensor JOFRA DLC-159

Superiour Temperature Reference Sensor JOFRA STS-200

SPECIFICATIONS DLC-159

Temperature range

DLC-159 ..... -100 to 155°C/-148 to 311°F

Sensing element

Type.....Differencial TC

Dimensions

Diameter.....3 mm / 0.12 in
Length .....196 mm / 7.72 in
Max height on calibrator top.....8 mm / 0.31 in

Standard delivery

DLC-159
Plastic protection case
Accredited certificate
Manual

SPECIFICATIONS STS-200 A/B 917

Temperature range

All sensors ..... -100 to 155°C/-148 to 311°F

Accuracy

Hysteresis[1] @ 0°C / 32°F ..... 0.01°C / 0.02°F
Long term stability[2] @ 0°C / 32°F.... typ. 0.014°C / 0.025°F
Repeatability[1] ..... 0.002°C / 0.004°F

[1] When used in the range -100 to 155°C / -148 to 311°F

[2] When exposed to 155°C / 311°F for 100 hours. Stability will depend on actual use of the sensor.

Sensing element

Type.....PT100

Response time

STS-200 A (4 mm / 0.16 in): $\tau_{0.5}$ (50%) .....9 sec.
STS-200 A (4 mm / 0.16 in): $\tau_{0.9}$ (90%) .....26 sec.
STS-200 B (6.35 mm / 0.25 in): $\tau_{0.5}$ (50%) .....18 sec.
STS-200 B (6.35 mm / 0.25 in): $\tau_{0.9}$ (90%) .....44 sec.

Dimensions

Diameter.....4 mm / 0.16 in or 1/4" / 6.35 mm
Length .....192 mm / 7.56 in
Max height on calibrator top.....22 mm / 0.87 in

Standard delivery

STS-200 A/B sensor
Plastic protection case
Accredited certificate
Cable
Manual

Compatible JOFRA instruments

DTI-050

JOFRA calibration

FUNCTIONAL SPECIFICATIONS

Temperature range

RTC-159
@ ambient temp. 0°C/32°F .... -100 to 155°C/-148 to 311°F
@ ambient temp. 23°C/73°F .. -100 to 155°C/-148 to 311°F
@ ambient temp. 40°C/104°F .. -83 to 155°C/-117 to 311°F

Accuracy (model B & C) with external STS ref. sensor

RTC-159 B & C ..... ±0.06°C/±0.11°F
12-month period. Relative to reference standard. Specifications by use of the external JOFRA STS-200 reference sensor

Accuracy with internal reference sensor

RTC-159 A, B & C ..... ±0.30°C/±0.54°F

Stability

RTC-159 .....±0.03°C/±0.054°F[1)]
Measured after the stability indicator has been on for 15 minutes. Measuring time is 30 minutes.

Radial homogeneity (difference between holes)

RTC-159 .....0.01°C/0.02°F

Resolution (user-selectable)

All temperatures .....1° or 0.1° or 0.01° or 0.001°

Heating time

RTC-159 -100 to 23°C/-148 to 73°F..... 12 minutes
23 to 155°C/73 to 311°F..... 14 minutes

Cooling time

RTC-159 155 to 23°C/311 to 73°F..... 40 minutes
23 to -80°C/73 to -112°F..... 65 minutes
-80 to -90°C/-176 to -130°F..... 20 minutes
-90 to -100°C/-194 to -148°F..... 50 minutes
23 to -100°C/73 to -148°F..... 135 minutes
155 to -100°C/311 to -148°F..... 175 minutes

Time to stability (approx.)

RTC-159 ..... 10 minutes

Immersion depth

RTC-159 ..... 190 mm/6.3 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 RTC-159.

RTD reference input (B & C models only)

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	-100	-148	±0.007	±0.013
	0	32	±0.008	±0.015
	155	311	±0.011	±0.020

Note 1: True ohm measurement is an effective method to eliminate errors from induced thermoelectrical voltage

DLC sensor input (B & C models only)

Type	Temperature		12 months	
	°C	°F	°C	°F
DLC-159	-100	-148	±0.014	±0.025
	0	32	±0.010	±0.018
	155	311	±0.010	±0.018

RTD sensor-under-test input (B model only)

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
Pt1000	-100	-148	±0.057	±0.103
	0	32	±0.064	±0.115
	155	311	±0.075	±0.136
Pt500	-100	-148	±0.107	±0.193
	0	32	±0.116	±0.209
	155	311	±0.119	±0.214
Pt100	-100	-148	±0.023	±0.042
	0	32	±0.026	±0.047
	155	311	±0.030	±0.054

Thermocouple input

Thermocouple types ..... E, J, L, K, N, R, S, T, U, B
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	-100	-148	±0.10	±0.18
	0	32	±0.06	±0.11
	155	311	±0.06	±0.11
J	-100	-148	±0.10	±0.18
	0	32	±0.08	±0.14
	155	311	±0.09	±0.16
K	-100	-148	±0.14	±0.25
	0	32	±0.10	±0.18
	155	311	±0.11	±0.20
T	-100	-148	±0.15	±0.27
	0	32	±0.10	±0.18
	155	311	±0.08	±0.14
R	-50	-58	±1.30	±2.34
	0	32	±0.78	±1.40
	155	311	±0.47	±0.85
S	-50	-58	±0.98	±1.76
	0	32	±0.78	±1.40
	155	311	±0.49	±0.88
N	-100	-148	±0.20	±0.36
	0	32	±0.15	±0.27
	155	311	±0.13	±0.23
XK (only in Russian versions)	-100	-148	±0.09	±0.16
	0	32	±0.06	±0.11
	155	311	±0.06	±0.11
U	-100	-148	±0.13	±0.23
	0	32	±0.10	±0.18
	155	311	±0.08	±0.14

* Excl. CJC accuracy ±0.3°C / ±0.54°F

Transmitter supply

Output voltage.....24VDC ±10%
Output current..... Maximum 28 mA

Transmitter input mA (B model only)

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

Voltage input VDC (B model only)

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

Switch input (B model only)

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 Hz ±5, 60 Hz ±5
Frequency, US deliveries .....60 Hz ±5
Power consumption (max.) .....450 VA

Communication 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 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

PHYSICAL SPECIFICATIONS

Weight and instrument size (L x W x H)

RTC-159 .....15.2 kg/33.5 lb
RTC-159 .....531 x 169 x 432 mm/20.9 x 6.65 x 17.0 in

Shipping (including carrying case)

RTC-159 .....38 kg/83.8 lb
RTC-159 .....800 x 500 x 800 mm/31.5 x 19.7 x 31.5 in

Note: Shipped on ½ pallet, binded

INSERTS

Insert dimensions

RTC-159 outer diameter .....29.7 mm/1.17 in
RTC-159 inner diameter .....25.6 mm/1.01 in
RTC-159 length.....150 mm/5.91 in

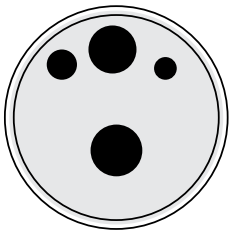
Weight of non-drilled insert (approx.)

RTC-159 .....290 g/10.2 oz

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

PREDRILLED INSERTS FOR RTC-159

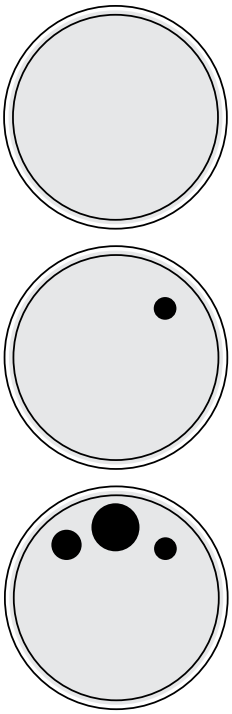
All predrilled inserts have holes for:
4 mm reference sensor • ¼" reference sensor • 3 mm hole for DLC sensor
All inserts are supplied with an insulation plug drilled with the necessary holes.



Spare part no. for predrilled inserts with reference and DLC holes		
Metric	Instrument	
Sensor diameter	**Insert code [1]**	**RTC-159 A/B/C**
3 mm	003	128477
4 mm	004	128478
5 mm	005	128479
6 mm	006	128480
7 mm	007	128481
8 mm	008	128482
9 mm	009	128483
10 mm	010	128484
11 mm	011	128485
12 mm	012	128486
13 mm	013	128487
14 mm	014	128488
15 mm	015	128489
16 mm	016	128490
Package of the above inserts	SMM	128492

Spare part no. for predrilled inserts with reference and DLC holes		
Imperial	Instrument	
Sensor diameter	**Insert code [1]**	**RTC-159 A/B/C**
1/8 in	125	128468
3/16 in	187	128469
1/4 in	250	128470
5/16 in	312	128471
3/8 in	375	128472
7/16 in	437	128473
1/2 in	500	128474
9/16 in	562	128475
5/8 in	625	128476
Package of the above inserts	SIM	128491

Note 1: Use the insert code, when ordering a JOFRA standard insert together with the RTC calibrator.



UNDRILLED INSERTS FOR RTC SERIES

Inserts, undrilled incl. insulation plugs		
	Instrument	
Inserts	**Insert code[1]**	**RTC-159 A/B/C**
5-pack, undrilled inserts with no holes	UN1	128453
5-pack, undrilled inserts with hole for DLC sensor	UN2	128454
5-pack, undrilled inserts with two holes for STS reference sensors (4mm & ¼") and 1 hole for DLC sensor	UN3	128455
Undrilled insulation plug		126040

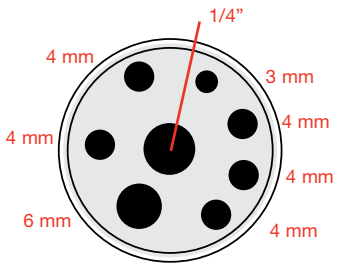
Note 1: Use the insert code, when ordering a JOFRA standard undrilled insert together with the RTC calibrator.

MULTI-HOLE INSERTS FOR RTC-159 - METRIC (MM)

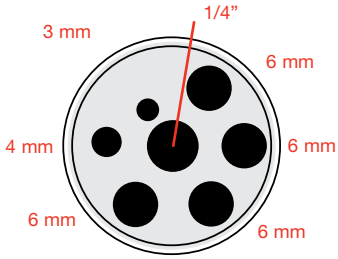
All inserts are supplied with an insulation plug drilled with the necessary holes.

Spare part no. for multi-hole inserts - metric (mm)		
	Instrument	
Insert type	**Insert code[1]**	**RTC-159 A/B/C**
Multi-hole type 1	M01	128456
Multi-hole type 2	M02	128457
Multi-hole type 3	M03	128458
Multi-hole type 4	M04	128459
Multi-hole type 7	M07	128462
Multi-hole type 8	M08	128463
Multi-hole type 9	M09	128464
Set of four Metric Multi Inserts, 3mm to 13mm *(M04, M07, M08 & M09)*	SMX	128466

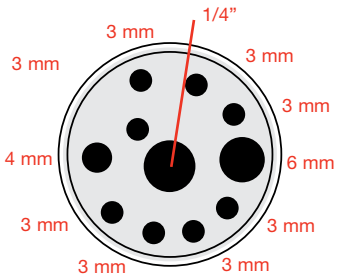
Note 1: Use the insert code, when ordering a JOFRA standard multi-hole insert together with the RTC calibrator.



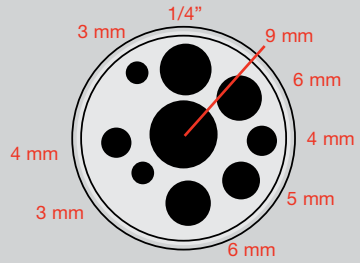
Multi-hole M01



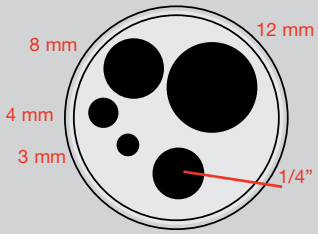
Multi-hole M02



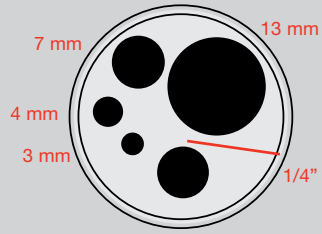
Multi-hole M03



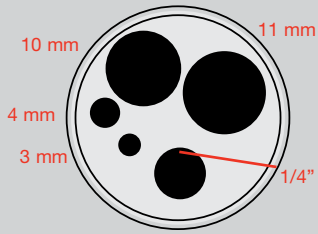
Multi-hole M04



Multi-hole M08



Multi-hole M07



Multi-hole M09

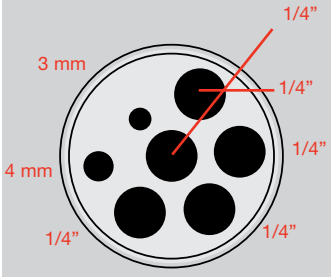
Set of four Metric Multi Inserts

MULTI-HOLE INSERTS FOR RTC-159 - IMPERIAL (INCH)

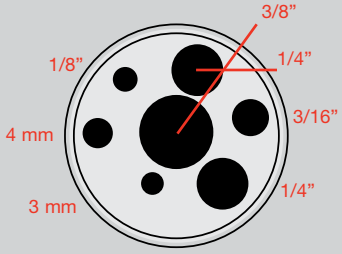
All inserts are supplied with an insulation plug drilled with the necessary holes.

Spare part no. for multi-hole inserts - imperial (inch)		
	Instrument	
Insert code	**Insert code[1]**	**RTC-159 A/B/C**
Multi-hole type 5	M05	128460
Multi-hole type 6	M06	128461
Multi-hole type 10	M10	128465
Set of three Imperial Multi Inserts, 1/8 to 7/16" *(M05, M06 & M10)*	SIX	128467

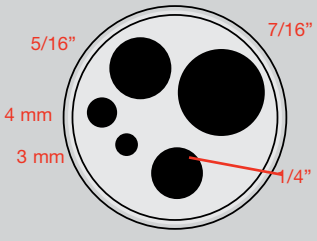
Note 1: Use the insert code, when ordering a JOFRA standard multi-hole insert together with the RTC calibrator.



Multi-hole M05



Multi-hole M06



Multi-hole M10

Set of three Imperial Multi Inserts

FUNCTIONAL COMPARISON

	Model A	Model B	Model C
Input	None	ref, DLC and SUT	ref and DLC
Dual-zone heating/cooling block	•	•	•
MVI - Mains Variance Immunity (or similar)	•	•	•
Stability indicator	•	•	•
Automatic step function	•	•	•
USB communication	•	•	•
Display resolution 0.001°C/°F/K	•	•	•
Programmable max. temperature	•	•	•
SYNC output (for external recording device)	•	•	•
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)		•	

Ref = Reference sensor, STS-200
DLC = Dynamic Load Compensation
SUT = sensor-under-test

STANDARD DELIVERY

	Model A	Model B	Model C
RTC dry-block calibrator (user spcified)	•	•	•
Mains power cable (user specified)	•	•	•
Tool for insertion tubes	•	•	•
JOFRACAL	•	•	•
USB cable	•	•	•
Set of rubber cones for insulation plugs	•	•	•
Carrying case	•	•	•
Manual	•	•	•
Traceable certificate - temperature performance	•	•	•
Traceable certificate - input performance for reference sensor and DLC sensor		•	•
Traceable certificate - input performance for sensor-under-test inputs		•	
Test cables (2 x red, 2 x black)		•	

ORDERING INFORMATION

Order number	Description
	Base model number
RTC159	RTC-159 series, -100°C to 155°C (-148°F to 311°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	115VAC
230	230VAC
	Mains power cable
A	European, 230V
B	USA/Canada, 115V
C	UK, 240V
D	South Africa, 220V
E	Italy, 220V
F	Australia, 240V
G	Denmark, 230V
H	Switzerland, 220V
I	Israel, 230V
	Insert type and size
NON	No insert selected (standard)
UNX	1 x Undrilled Insert (Please see Insert selection for code)
XXX	1 x Single hole insert (Please see Insert selection for code)
MXX	1 x Multi hole insert (Please see Insert selection for code)
SIX	Set of 3 Imperial multi hole inserts. Covering holes from 1/8" to 7/16"
SMX	Set of 4 Metric multi hole inserts. Covering holes from 3mm to 13mm
SIM	Set of 9 Imperial inserts. Covering holes from 1/8" to 5/8"
SMM	Set of 14 Metric inserts. Covering holes from 3mm to 16mm
	Dynamic Load Compensation (B & C models only, optional)
DLC	DLC sensor (DLC159)
	STS Reference sensor (B & C models only, optional)
R14	STS-200 Ref. sensor. Dia. 4mm. Length 192mm (STS200A917EH)
R15	STS-200 Ref. sensor. Dia. 1/4". Length 192mm (STS200B917EH)
	Calibration Certificate
F	Traceable Callibration Certificate. (standard)
H	Accredited Calibration Certificate - ISO17025
EA	Full EURAMET Calibration Certificate - ISO17025
FS	Traceable System Calibration Certificate (B & C model only)
HS	Accredited System Calibration Certificate (B & C model only) - ISO17025
EAS	Full EURAMET System Calibration Certificate (B & C model only) - ISO17025
EASD	Full EURAMET System Calibration Certificate with DLC (B & C model only) - ISO17025
	Accessories
CT	Solid Protective Carrying case with trolley (Carrying case included in standard delivery)
TR	Solid Protective Carrying case with trolley & Support rod set
	Sample order number
RTC159 B 230 A SM DLC R2 EA CT	JOFRA RTC-159 B with 230VAC, EU power cord, set of metric inserts, DLC, STS-200 ref. sensor, full EA temp. calibration certificate, and carrying case with trolley.

ACCESSORIES

125066	Extra fixture for sensor grip
125067	Extra sensor grip
122771	Mini-Jack connector for stable relay output
120516	Thermocouple Male Plug - Type J - Black
120517	Thermocouple Male Plug - Type K - Yellow
120514	Thermocouple Male Plug - Type N - Orange
120515	Thermocouple Male Plug - Type T - Blue
120518	Thermocouple Male Plug - Type R / S - Green
120519	Thermocouple Male Plug - Type Cu-Cu - White

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

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

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

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

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

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

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

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