

**JOFRA™**

**TRANSCAT®**

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## Model ATC-156/157/320 and 650 Advanced Temperature Calibrator

### Wide temperature range

|         |                             |
|---------|-----------------------------|
| ATC-156 | -24 to 155°C (-11 to 311°F) |
| ATC-157 | -45 to 155°C (-49 to 311°F) |
| ATC-320 | 33 to 320°C (91 to 608°F)   |
| ATC-650 | 33 to 650°C (91 to 1202°F)  |

### Improved temperature homogeneity

Unique dual-zone block ensures good temperature homogeneity in the critical calibration zone

### High accuracy

Using the internal reference or the external reference sensor. 4-wire True-Ohm-Measurement technology is used

### Enhanced stability

MVI circuitry ensures temperature stability despite mains supply variations

### Cost effective calibration system

Stand-alone operation eliminates the need for secondary equipment and PC. Universal inputs handle multiple type temperature sensors

### Timesaving features

Up- and download complete calibration tasks. Auto-stepping, switch testing and many more features make the daily use smooth and fast

### 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

### PRODUCT DESCRIPTION

The JOFRA ATC series (Advanced Temperature Calibrators) combines the accuracy of laboratory temperature sources with the speed and portability of field dry-block calibrators.

The unique dual-zone design sets new standards for optimum temperature performance in dry-block calibrators.



### Features

The JOFRA ATC-156/157/320 and 650 all features the unique dual-zone heating block - designed for optimum performance and superior temperature homogeneity throughout the block. This new design has a performance equivalent to a liquid temperature bath. The ATC-157 features the widest temperature range for a cooling dry-block on the market today.

Each ATC dry-block calibrator may be used to perform fully automatic calibration routines without using an external computer. Use the computer for full upload and download capabilities. Units may also be supplied with inputs for external reference sensors and for sensors-under-test. All ATC calibrators feature RS232 serial communication and standard delivery also includes the JOFRACAL calibration PC software.

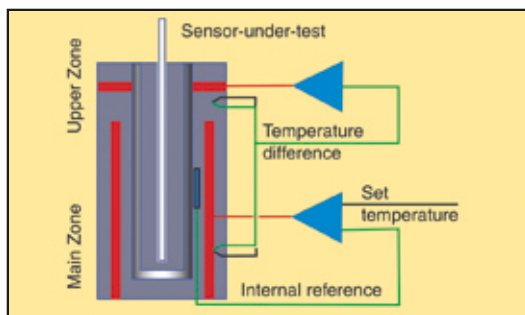
The ATC-156/157/320 and 650 dry-block calibrators are part of a series of calibrators, that also includes the ATC-140 (-20 to 140°C) and the ATC-250 (28 to 250°C) available as liquid bath or large diameter dry-block calibrators.

See more about the ATC-140 and ATC-250 calibrators at page 5 or in specification sheet SS-CP-2284 at [www.jofra.com](http://www.jofra.com)

### Unique temperature performance

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

The JOFRA ATC-156/157/320 and 650 all feature a 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 insulation of the sensors-under-test and makes it possible to calibrate liquid-filled and other mechanical sensors.

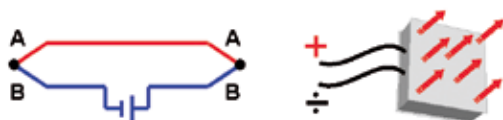


### ATC heating and cooling models

The models with both heating and cooling capabilities (ATC-156 and ATC-157) feature the Peltier element multi-stage-technology. This both improves efficiency and extends the life of the »electronic heat pump«. The JOFRA ATC-157 offers a typical differential temperature of 68°C (122 F) below the ambient temperature.

### Peltier effect (ATC-156 and -157)

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«.

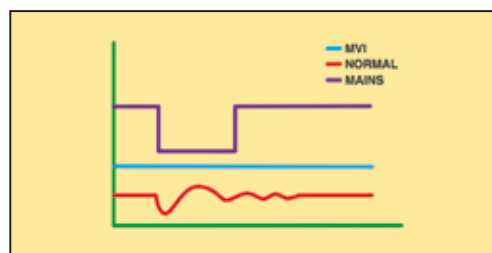


The practical Peltier element (electronic heating pump) consists of many elements of semiconductor material connected electrically in series and thermally in parallel. These thermoelectric elements and their electrical interconnections are mounted between two ceramic plates. The plates serve to mechanically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

### 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 JOFRA ATC-320 and ATC-650 calibrators 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. The JOFRA ATC-156 and ATC-157 models run on stabilized DC voltage and thus do not need the MVI circuitry.

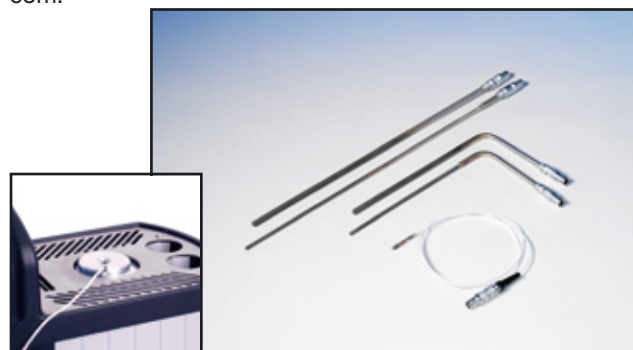
### Highest accuracy (model B only)

ATC series calibrators may be supplied with a built-in reference thermometer for use with an external sensor. This feature allows one instrument to provide the freedom and flexibility to perform calibrations at the process site while maintaining a high accuracy.

A special 90° angled external reference sensor has been designed to accommodate sensors with a transmitter head, top connector or similar arrangement.

The user can decide whether to read the built-in reference sensor or the more accurate angled reference sensor from the calibrator's large, easy-to-read LCD display. The external sensor and the internal sensor are independent of one another. Downloading of reference sensor linearization is done via a personal computer.

Please find more information about JOFRA STS reference sensors in specification sheet: SS-CP-2290 at [www.jofra.com](http://www.jofra.com).



### SET-Follows-TRUE (model B only)

Available on B models only, the “SET-Follows TRUE” makes the instrument tune in until the temperature of the external reference “TRUE” meets the desired “SET” temperature. This is used when it is critical that the temperature of the calibration zone matches the desired temperature when measured with accurate external reference sensors.

This feature is ideal when calibrating gas correctors or other custody transfer applications. It is also extremely useful to calculation procedures.

### Reading of sensor-under-test (model B only)

The ATC series model B is equipped with built-in converters (inputs) that enables measurement of virtually any type of temperature sensor including:

- thermostats
- resistance thermometers (RTD)
- thermocouples (TC)
- transmitters
- milliamps (mA)
- voltage (V)

The ATC calibrators can be user-programmed for completely automated temperature calibrations. Once the unit is programmed, the instrument operates itself by performing the configured calibration routine. All calibration data is stored and available for uploading and generating exact calibration certificates or reports.

### 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 five tests.

### 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. Up to five (5) auto step results are stored.

| AUTO STEP SETUP                                                                     |     |             |            |    |
|-------------------------------------------------------------------------------------|-----|-------------|------------|----|
|  | T1  | 0°C         | T11        | °C |
|                                                                                     | T2  | 100°C       | T12        | °C |
|                                                                                     | T3  | 200°C       | T13        | °C |
|                                                                                     | T4  | 300°C       | T14        | °C |
|                                                                                     | T5  | 400°C       | T15        | °C |
|                                                                                     | T6  | °C          | T16        | °C |
|                                                                                     | T7  | °C          | T17        | °C |
|                                                                                     | T8  | °C          | T18        | °C |
|                                                                                     | T9  | °C          | T19        | °C |
|                                                                                     | T10 | °C          | T20        | °C |
| No. of steps: 5                                                                     |     |             |            |    |
| Mode: One-way                                                                       |     |             |            |    |
| Hold time: 5 min                                                                    |     |             |            |    |
| Back-space                                                                          |     | Prev. field | Next field |    |

### Easy-to-use, intuitive operation

All instrument settings can be performed from the front panel. The heat source is positioned away from the panel which helps protect the operator.

The ATC keyboard is equipped with five, positive feedback function keys. They correspond to the text in the display and change functionality based on instrument operations. There are also dedicated function keys with permanent functions.

The easy-to-read, backlit display is large with a high contrast that is readable even in high ambient light conditions. The display is easily read from all angles and from a distance without parallax problems. The display also features icons which help identifying instrument conditions and operational steps, making it more intuitive to work with.



### Set temperature

The “Set temperature” feature allows the user to set the exact desired temperature with a resolution of 0.01°.

### Enhanced stability

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

### Instrument setups

The ATC series allows the user to store up to nine (9) complete instrument setups. You may store all sorts of information including temperature units, stability criteria, use of external reference sensor, resolution, sensor-under-test (SUT), conversion to temperature, display contrast, etc. The setup may be recalled at any time.

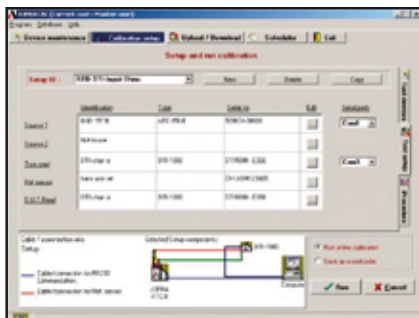
|                                                                                       |             |             |           |       |
|---------------------------------------------------------------------------------------|-------------|-------------|-----------|-------|
|  |             |             |           |       |
| READ: 85.00°C ✓                                                                       |             |             |           |       |
| SENSOR: 85.00°C                                                                       |             |             |           |       |
| SET: 85.00°C                                                                          |             |             |           |       |
| SET temp.                                                                             | Calibration | Switch test | Auto step | Setup |

### 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.

## 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, APC, CPC and IPI pressure calibrators, all JOFRA temperature calibrators, as well as JOFRA AMC900, ASC300 multi signal calibrator and ASM-800 signal multi scanner.



JOFRACAL calibration software may also be used for manual calibrations, as it can be set up to accept manual entry of calibration data together with other liquid baths, ice points or dry-block heat sources.

The calibration data collected may be stored on a PC for later recall or analysis. The ATC calibrator stores the calibration procedure and may be taken out to the process site without using a personal computer.

This allows the ATC calibrator to:

- Operate as a stand-alone instrument, using advanced calibration routines without the assistance of a personal computer on site;
- 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 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 free of charge from our web-page [www.jofra.com](http://www.jofra.com).

Please also see more about JOFRACAL calibration software in specification sheet SS-CP-2510, which can be found at [www.jofra.com](http://www.jofra.com)



## As found/as left (model B only)

The JOFRA ATC series calibrator automatically handles "As Found/As Left" calibrations. The calibrator stores both results. The first performed calibration is "As found" and the last performed calibration is the "As left", regardless of the number of calibrations/adjustments that may have been made in between.

## SYNC output

An output is located directly on the front of the ATC calibrator. This 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 (model B only)

Users may perform or read the results of the calibration tasks directly on the instrument. When calibrating an indicating device, 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.

## Calibration of up to 24 sensors with JOFRA ASM

Using the JOFRA ATC 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 the same time. It can handle signals from 2-, 3- and 4 wire RTD's, TC's, transmitters, thermistors, temperature switches and voltage.

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

## FUNCTIONAL COMPARISON

| ATC series                                          |               | ATC-125 A | ATC-125 B | ATC-140 A      | ATC-140 B      | ATC-156 A      | ATC-156 B | ATC-157 A      | ATC-157 B | ATC-250 A      | ATC-250 B | ATC-320 A      | ATC-320 B | ATC-650 A | ATC-650 B      |
|-----------------------------------------------------|---------------|-----------|-----------|----------------|----------------|----------------|-----------|----------------|-----------|----------------|-----------|----------------|-----------|-----------|----------------|
| <b>Temperature range @ ambient 23°C / 73°F</b>      |               |           |           |                |                |                |           |                |           |                |           |                |           |           |                |
| -90 to 125°C                                        | -130 to 257°F | X         | X         |                |                |                |           |                |           |                |           |                |           |           |                |
| -20 to 140°C                                        | -4 to 284°F   |           |           | X              | X              |                |           |                |           |                |           |                |           |           |                |
| -24 to 155°C                                        | -11 to 311°F  |           |           |                |                | X              | X         |                |           |                |           |                |           |           |                |
| -45 to 155°C                                        | -49 to 311°F  |           |           |                |                |                |           | X              | X         |                |           |                |           |           |                |
| 28 to 250°C                                         | 82 to 482°F   |           |           |                |                |                |           |                |           | X              | X         |                |           |           |                |
| 33 to 320°C                                         | 91 to 608°F   |           |           |                |                |                |           |                |           |                |           | X              | X         |           |                |
| 33 to 650°C                                         | 91 to 1202°F  |           |           |                |                |                |           |                |           |                |           |                |           | X         | X              |
| <b>Temperature stability</b>                        |               |           |           |                |                |                |           |                |           |                |           |                |           |           |                |
| ±0.01°C                                             | ±0.018°F      |           |           |                |                | S              | S         | S              | S         |                |           | S              | S         |           |                |
| ±0.02°C                                             | ±0.036°F      |           |           | X              | X              |                |           |                |           | X              | X         |                |           | S         | S              |
| ±0.03°C                                             | ±0.054°F      | X         | X         |                |                |                |           |                |           |                |           |                |           |           |                |
| <b>Accuracy incl. external STS reference sensor</b> |               |           |           |                |                |                |           |                |           |                |           |                |           |           |                |
| ±0.04°C                                             | ±0.07°F       |           |           | X <sup>1</sup> |                | X <sup>1</sup> |           | X <sup>1</sup> |           |                |           |                |           |           |                |
| ±0.06°C                                             | ±0.11°F       | X         | X         |                |                |                |           |                |           |                |           |                |           |           |                |
| ±0.07°C                                             | ±0.13°F       |           |           |                |                |                |           |                |           | X <sup>1</sup> |           | X <sup>1</sup> |           |           |                |
| ±0.11°C                                             | ±0.2°F        |           |           |                |                |                |           |                |           |                |           |                |           |           | X <sup>1</sup> |
| <b>Accuracy with internal reference sensor</b>      |               |           |           |                |                |                |           |                |           |                |           |                |           |           |                |
| ±0.10°C                                             | ±0.18°F       |           |           |                |                | S              | S         |                |           |                |           |                |           |           |                |
| ±0.13°C                                             | ±0.23°F       |           |           |                |                |                |           | S              | S         |                |           |                |           |           |                |
| ±0.18°C                                             | ±0.32°F       |           |           | S              | S              |                |           |                |           |                |           | S              | S         |           |                |
| ±0.20°C                                             | ±0.36°F       |           |           |                |                |                |           |                |           |                |           |                |           |           |                |
| ±0.28°C                                             | ±0.50°F       |           |           |                |                |                |           |                |           | S              | S         |                |           |           |                |
| ±0.30°C                                             | ±0.54°F       | X         | X         |                |                |                |           |                |           |                |           |                |           |           |                |
| ±0.35°C                                             | ±0.63°F       |           |           |                |                |                |           |                |           |                |           |                |           | S         | S              |
| <b>Immersion depth</b>                              |               |           |           |                |                |                |           |                |           |                |           |                |           |           |                |
| 185 mm                                              | 7.3 in        | X         | X         |                |                |                |           |                |           |                |           |                |           |           |                |
| 180 mm                                              | 7.1 in        |           |           | X <sup>2</sup> | X <sup>2</sup> |                |           |                |           |                |           |                |           |           |                |
| 160 mm                                              | 6.3 in        |           |           |                |                | X              | X         | X              | X         |                |           |                |           |           |                |
| 150 mm                                              | 5.9 in        |           |           | X <sup>3</sup> | X <sup>3</sup> |                |           |                |           | X <sup>4</sup> | X         | X              | X         | X         | X              |
| <b>Insertion tube diameter</b>                      |               |           |           |                |                |                |           |                |           |                |           |                |           |           |                |
| 63.5 mm                                             | 2.5 in        |           |           | X              | X              |                |           |                |           | X              | X         |                |           |           |                |
| 30 mm                                               | 1.2 in        | X         | X         |                |                | X              | X         |                |           |                |           | X              | X         | X         | X              |
| 20 mm                                               | 0.8 in        |           |           |                |                |                |           | X              | X         |                |           |                |           |           |                |

|                                                    | Model A | Model B |
|----------------------------------------------------|---------|---------|
| Dual-zone heating/cooling block                    | •       | •       |
| MVI - Mains Variance Immunity (or similar)         | •       | •       |
| Stability indicator                                | •       | •       |
| Automatic step function                            | •       | •       |
| JOFRACAL Calibration software included as standard | •       | •       |
| SYNC output (for external recording device)        | •       | •       |
| Display resolution 0.01°                           | •       | •       |
| Programmable max. temperature                      | •       | •       |
| 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) |         | •       |
| External precision reference sensor input          |         | •       |
| Download of calibration work orders from PC        |         | •       |
| Upload of calibration results (as found & as left) |         | •       |
| "SET" follows "TRUE"                               |         | •       |

## JOFFRA ATC-140/250



For a wider product description of the ATC-140 and ATC-250 please see spec. sheet SS-CP-2284 at [www.jofra.com](http://www.jofra.com)

## JOFFRA ATC-125



For a wider product description of the ATC-125 please see spec. sheet SS-CP-2282, at [www.jofra.com](http://www.jofra.com)

X = Delivered as standard

S = Improved specifications  
(from October 01, 2006)

- <sup>1</sup> Using an external STS reference sensor connected to the reference sensor input
- <sup>2</sup> Immersion depth for ATC-140 as dry-block
- <sup>3</sup> Immersion depth for ATC-140 as liquid bath
- <sup>4</sup> Immersion depth for ATC-250 as dry-block and as liquid bath

## FUNCTIONAL SPECIFICATIONS

### Mains specifications

ATC-156/157/320..... 115V(90-127) / 230V(180-254)  
ATC-650..... 115V(100-127) / 230V(200-254)  
Frequency, non US deliveries..... 50 Hz  $\pm$ 5, 60 Hz  $\pm$ 5  
Frequency, US deliveries..... 60 Hz  $\pm$ 5  
Power consumption (max.) ATC-156/157..... 300 VA  
Power consumption (max.) ATC-320/650..... 1150 VA

### Temperature range

ATC-156 Maximum..... 155°C / 311°F  
Minimum @ ambient temp. 0°C / 32°F..... -40°C / -40°F  
Minimum @ ambient temp. 23°C / 73°F..... -24°C / -11°F  
Minimum @ ambient temp. 40°C / 104°F..... -12°C / 10°F  
ATC-157 Maximum..... 155°C / 311°F  
Minimum @ ambient temp. 0°C / 32°F..... -57°C / -71°F  
Minimum @ ambient temp. 23°C / 73°F..... -45°C / -49°F  
Minimum @ ambient temp. 40°C / 104°F..... -31°C / -24°F  
ATC-320..... 33 to 320°C / 91 to 608°F  
ATC-650..... 33 to 650°C / 91 to 1202°F

### Stability

ATC-156/157..... +0.01°C / +0.018°F 1) 2)  
ATC-320..... +0.01°C / +0.018°F 1)  
ATC-650 (@100°C / 212°F)..... +0.01°C / +0.018°F 1)  
ATC-650 (@320°C / 608°F)..... +0.015°C / +0.027°F 1)  
ATC-650 (@650°C / 1202°F)..... +0.02°C / +0.036°F 1)

Measured after the stability indicator has been on for 10 minutes  
(ATC-156/157/320 and 650). Measuring time is 30 minutes.

- 1) Improved specifications (from October 1, 2006)  
2)  $\pm$  0.015°C @ set temp. ambient  $\pm$ 3°C

### Time to stability (approximate)

ATC-156..... 7 minutes  
ATC-157..... 6 minutes  
ATC-320/650..... 10 minutes

### Accuracy (model B) with external STS reference sensor

ATC-156/157 B..... +0.04°C / +0.07°F  
ATC-320 B..... +0.07°C / +0.13°F  
ATC-650 B..... +0.11°C / +0.20°F

12 month period. Relative to reference standard. Specifications  
by use of the external JOFRA STS-100 reference sensor

### Accuracy (model A+B) with internal reference sensor

ATC-156 A+B..... +0.10°C / +0.18°F 1)  
ATC-157 A+B..... +0.13°C / +0.23°F 1)  
ATC-320 A+B..... +0.20°C / +0.36°F 1)  
ATC-650 A+B (@320°C / 608°F)..... +0.30°C / +0.54°F 1)  
ATC-650 A+B (@650°C / 1202°F)..... +0.35°C / +0.63°F 1)

- 1) Improved specifications (from October 1, 2006)

### Resolution (user-selectable)

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

### Radial homogeneity (difference between holes)

ATC-156/157..... 0.01°C / 0.02°F  
ATC-320..... 0.01°C / 0.02°F  
ATC-650..... 0.05°C / 0.09°F

### Immersion depth

ATC-156/157..... 160 mm / 6.3 in  
ATC-320/650..... 150 mm / 5.9 in

### Well diameter

ATC-156/320/650..... 30 mm / 1.18 in  
ATC-157..... 20 mm / 0.79 in

### Heating time

ATC-156 -24 to 23°C / -11 to 73°F..... 4 minutes  
23 to 100°C / 73 to 212°F..... 9 minutes  
100 to 155°C / 212 to 311°F..... 10 minutes  
ATC-157 -45 to 23°C / -49 to 73°F..... 6 minutes  
23 to 100°C / 73 to 212°F..... 8 minutes  
100 to 155°C / 212 to 311°F..... 9 minutes  
ATC-320 50 to 320°C / 122 to 608°F..... 7 minutes  
ATC-650 50 to 320°C / 122 to 608°F..... 10 minutes  
50 to 650°C / 122 to 1202°F..... 27 minutes

### Cooling time

ATC-156 155 to 100°C / 311 to 212°F..... 4 minutes  
100 to 23°C ( 212 to 73°F..... 9 minutes  
23 to 0°C / 73 to 32°F..... 6 minutes  
0 to -20°C / 32 to -4°F..... 13 minutes  
ATC-157 155 to 100°C / 311 to 212°F..... 3 minutes  
100 to 23°C / 212 to 73°F..... 6 minutes  
23 to 0°C / 73 to 32°F..... 3 minutes  
0 to -30°C / 32 to -22°F..... 9 minutes  
-30 to -45°C / -22 to -45°F..... 15 minutes  
ATC-320 320 to 100°C / 608 to 212°F..... 22 minutes  
100 to 50°C / 212 to 122°F..... 20 minutes  
ATC-650 650 to 100°C / 1202 to 212°F..... 43 minutes  
100 to 50°C / 212 to 122°F..... 25 minutes

### SYNC output (dry contact)

Switching voltage..... Maximum 30 VDC  
Switching current..... Maximum 100 mA

## INPUT SPEC'S (B MODELS ONLY)

All input specifications apply to the calibrator's dry-block running  
at the respective temperature (stable plus an additional 20  
minutes period). Where the input measuring range is out of the  
calibrator's range, the SET temperature is either MIN. or MAX.

### Transmitter supply

Output voltage..... 24VDC +10%  
Output current..... Maximum 25 mA

### Transmitter input mA

Range..... 0 to 24 mA  
Accuracy (12 months)..... +0.01% Rdg. +0.015% F.S.

### Voltage input VDC

Range:..... 0 to 12 VDC  
Accuracy (12 months)..... +0.005% Rdg. +0.015% F.S.

### Switch input

Switch dry contacts  
Test voltage..... Maximum 5 VDC  
Test current..... Maximum 2.5 mA

### RTD reference input (B models only)

Type.....4-wire RTD with true ohm measurements1)  
F.S. (Full Scale) .....350 ohm  
Accuracy (12 months) .....±0.001% rdg. + 0.002% F.S.

| RTD Type           | Temperature |      | 12 months |        |
|--------------------|-------------|------|-----------|--------|
|                    | °C          | °F   | °C        | °F     |
| Pt100<br>reference | -50         | -58  | ±0.020    | ±0.036 |
|                    | 0           | 32   | ±0.021    | ±0.038 |
|                    | 155         | 311  | ±0.023    | ±0.041 |
|                    | 320         | 608  | ±0.026    | ±0.047 |
|                    | 650         | 1202 | ±0.032    | ±0.058 |
|                    | 700         | 1292 | ±0.034    | ±0.061 |

Note 1: True ohm measurements are an effective method to eliminate errors from induced thermoelectrical voltages

### RTD input

Type of RTD .....2-wire  
F.S. (range).....350 ohm or 2900 ohm  
Accuracy (12 months)±0.005% rdg. + 0.005% F.S. + 50 m  
Type of RTD .....3- or 4-wire  
F.S. (range).....350 ohm or 2900 ohm  
Accuracy (12 months) .....±0.005% rdg. + 0.005% F.S.

| RTD Type                           | Temperature |      | 12 months |        |
|------------------------------------|-------------|------|-----------|--------|
|                                    | °C          | °F   | °C        | °F     |
| Pt1000                             | -50         | -58  | ±0.046    | ±0.083 |
|                                    | 0           | 32   | ±0.050    | ±0.090 |
|                                    | 155         | 311  | ±0.061    | ±0.110 |
|                                    | 320         | 608  | ±0.071    | ±0.127 |
|                                    | 500         | 932  | ±0.087    | ±0.156 |
| Pt500                              | -50         | -58  | ±0.083    | ±0.149 |
|                                    | 0           | 32   | ±0.087    | ±0.157 |
|                                    | 155         | 311  | ±0.100    | ±0.180 |
|                                    | 320         | 608  | ±0.111    | ±0.200 |
|                                    | 500         | 932  | ±0.130    | ±0.235 |
| Pt100                              | -50         | -58  | ±0.054    | ±0.097 |
|                                    | 0           | 32   | ±0.058    | ±0.104 |
|                                    | 155         | 311  | ±0.069    | ±0.124 |
|                                    | 320         | 608  | ±0.079    | ±0.142 |
|                                    | 650         | 1202 | ±0.106    | ±0.191 |
|                                    | 700         | 1292 | ±0.112    | ±0.202 |
| Pt50<br>(only in Russian versions) | -50         | -58  | ±0.098    | ±0.176 |
|                                    | 0           | 32   | ±0.103    | ±0.185 |
|                                    | 155         | 311  | ±0.116    | ±0.209 |
|                                    | 320         | 608  | ±0.128    | ±0.230 |
|                                    | 650         | 1202 | ±0.161    | ±0.290 |
| Pt10                               | -50         | -58  | ±0.453    | ±0.815 |
|                                    | 0           | 32   | ±0.462    | ±0.831 |
|                                    | 155         | 311  | ±0.495    | ±0.891 |
|                                    | 320         | 608  | ±0.524    | ±0.943 |
|                                    | 650         | 1202 | ±0.610    | ±1.098 |
|                                    | 700         | 1292 | ±0.620    | ±1.116 |
| Cu100                              | -50         | -58  | ±0.050    | ±0.090 |
|                                    | 0           | 32   | ±0.052    | ±0.094 |
|                                    | 150         | 302  | ±0.060    | ±0.108 |
| Cu50                               | -50         | -58  | ±0.090    | ±0.162 |
|                                    | 0           | 32   | ±0.093    | ±0.167 |
|                                    | 150         | 302  | ±0.100    | ±0.180 |

If automatic cold junction compensation is used, the specification for CJ is ±0.40°C (±0.72°F).

### Thermocouple input

Range .....78 mV  
F.S. (Full Scale) .....78 mV  
Accuracy (12 months) .....0.01% rdg. + 0.005% F.S.

| TC Type                          | Temperature |      | 12 months |       |
|----------------------------------|-------------|------|-----------|-------|
|                                  | °C          | °F   | °C        | °F    |
| E                                | -50         | -58  | ±0.08     | ±0.14 |
|                                  | 0           | 32   | ±0.07     | ±0.12 |
|                                  | 155         | 311  | ±0.07     | ±0.12 |
|                                  | 320         | 608  | ±0.08     | ±0.14 |
|                                  | 650         | 1202 | ±0.11     | ±0.20 |
|                                  | 1000        | 1832 | ±0.15     | ±0.28 |
| J                                | -50         | -58  | ±0.10     | ±0.17 |
|                                  | 0           | 32   | ±0.08     | ±0.14 |
|                                  | 155         | 311  | ±0.08     | ±0.15 |
|                                  | 320         | 608  | ±0.10     | ±0.18 |
|                                  | 650         | 1202 | ±0.12     | ±0.22 |
|                                  | 1200        | 2192 | ±0.19     | ±0.34 |
| K                                | -50         | -58  | ±0.11     | ±0.20 |
|                                  | 0           | 32   | ±0.10     | ±0.18 |
|                                  | 155         | 311  | ±0.11     | ±0.20 |
|                                  | 320         | 608  | ±0.12     | ±0.22 |
|                                  | 650         | 1202 | ±0.16     | ±0.28 |
|                                  | 1372        | 2502 | ±0.28     | ±0.50 |
| T                                | -50         | -58  | ±0.12     | ±0.22 |
|                                  | 0           | 32   | ±0.10     | ±0.18 |
|                                  | 155         | 311  | ±0.09     | ±0.16 |
|                                  | 320         | 608  | ±0.09     | ±0.17 |
| R                                | -50         | -58  | ±1.31     | ±2.35 |
|                                  | 0           | 32   | ±0.78     | ±1.40 |
|                                  | 155         | 311  | ±0.50     | ±0.90 |
|                                  | 320         | 608  | ±0.42     | ±0.75 |
|                                  | 650         | 1202 | ±0.41     | ±0.74 |
|                                  | 1760        | 3200 | ±0.50     | ±0.90 |
| S                                | -50         | -58  | ±0.98     | ±1.77 |
|                                  | 0           | 32   | ±0.78     | ±1.40 |
|                                  | 155         | 311  | ±0.50     | ±0.90 |
|                                  | 320         | 608  | ±0.46     | ±0.83 |
|                                  | 650         | 1202 | ±0.45     | ±0.81 |
|                                  | 1768        | 3214 | ±0.52     | ±0.94 |
| B                                | 250         | 482  | ±1.57     | ±2.83 |
|                                  | 320         | 608  | ±0.99     | ±1.78 |
|                                  | 650         | 1202 | ±0.69     | ±1.23 |
|                                  | 1820        | 3308 | ±0.48     | ±0.86 |
| N                                | -50         | -58  | ±0.16     | ±0.29 |
|                                  | 0           | 32   | ±0.15     | ±0.27 |
|                                  | 155         | 311  | ±0.14     | ±0.24 |
|                                  | 320         | 608  | ±0.14     | ±0.25 |
|                                  | 650         | 1202 | ±0.16     | ±0.28 |
| XK<br>(only in Russian versions) | 800         | 1472 | ±0.17     | ±0.31 |
|                                  | -50         | -58  | ±0.07     | ±0.13 |
|                                  | 0           | 32   | ±0.06     | ±0.11 |
|                                  | 155         | 311  | ±0.06     | ±0.12 |
|                                  | 320         | 608  | ±0.07     | ±0.13 |
| U                                | 650         | 1202 | ±0.11     | ±0.19 |
|                                  | 800         | 1472 | ±0.12     | ±0.22 |
|                                  | -50         | -58  | ±0.12     | ±0.21 |
|                                  | 0           | 32   | ±0.10     | ±0.18 |
|                                  | 155         | 311  | ±0.09     | ±0.17 |
|                                  | 320         | 608  | ±0.09     | ±0.17 |
|                                  | 600         | 1112 | ±0.10     | ±0.19 |

## PHYSICAL SPECIFICATIONS

### Instrument dimensions (L x W x H)

All models ..... 352 x 156 x 360 mm / 3.9 x 6.1 x 14.2 in

### Instrument weight

ATC-156 ..... 12.2 kg / 26.9 lb  
ATC-157 ..... 13.1 kg / 28.9 lb  
ATC-320 ..... 10.2 kg / 22.5 lb  
ATC-650 ..... 12.1 kg / 26.7 lb

### Insert dimensions

ATC-156 outer diameter ..... 29,7 mm / 1.17 in  
ATC-156 inner diameter (multi hole) ..... 25,9 mm / 1.02 in  
ATC-156 inner diameter (single hole) ..... 22,0 mm / 0.87 in  
ATC-156 length ..... 150 mm / 5.91 in  
ATC-157 outer diameter ..... 19,9 mm / 0.78 in  
ATC-157 inner diameter ..... 16,9 mm / 0.67 in  
ATC-157 length ..... 150 mm / 5.91 in  
ATC-320/650 outer diameter ..... 29,7 mm / 1.17 in  
ATC-320/650 inner diameter (multi hole) ..... 25,9 mm / 1.02 in  
ATC-320/650 inner diameter (single hole) ..... 22,0 mm / 0.87 in  
ATC-320/650 length ..... 160 mm / 6.30 in

### Weight of non-drilled insert (approximate)

ATC-156 ..... 290 g / 10.2 oz  
ATC-157 ..... 130 g / 4.6 oz  
ATC-320/650 ..... 940 g / 33.2 oz

### Shipping (including optional carrying case)

ATC-156 ..... 22.2 kg / 48.9 lb  
ATC-157 ..... 23.1 kg / 50.9 lb  
ATC-320 ..... 20.7 kg / 45.6 lb  
ATC-650 ..... 22.6 kg / 49.8 lb  
Size: L x W x H.. 659 x 309 x 514 mm / 26 x 12.2 x 20.2 in

### Shipping (without carrying case)

ATC-156 ..... 16.5 kg / 36.4 lb  
ATC-157 ..... 17.4 kg / 38.4 lb  
ATC-320 ..... 15.0 kg / 33.1 lb  
ATC-650 ..... 16.9 kg / 37.2 lb  
Size: L x W x H. 570 x 235 x 440 mm / 22.4 x 9.3 x 17.3 in

### Shipping (carrying case only)

Weight: ..... 6.0 kg / 13.2 lb  
Size: L x W x H.. 659 x 309 x 514 mm / 26 x 12.2 x 20.2 in

### 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

## STANDARD DELIVERY

- ATC dry-block calibrator (user specified)
- Mains power cable (user specified)
- Traceable certificate - temperature performance
- Insert (user specified)
- Set of matching insulation plugs (4 mm OR 1/4 in hole for reference sensor)
- Tool for insertion tubes
- RS232 cable
- JOFRACAL calibration software
- AMETRIM-ATC software to adjust the ATC series
- User and reference manual

Model B instruments contain the following extra items:

- Test cables (2 x red, 2 x black)
- Traceable certificate - input performance

## ACCESSORIES

- 125066 Extra fixture for sensor grib  
125067 Extra sensor grib  
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  
122801 Cable 0.5 m with LEMO / LEMO connectors  
122823 2 m. Cable Female Banana to LEMO connection  
125002 Edge port Converter with 4 pcs of RS232 ports  
123374 Set of 3 pcs of insulation plugs  
125510 Set of 3 pcs of insulation plugs / 1/4in ref. Hole

### Heat shield (Optional) - 105496

External heat shield to be placed on top of the calibrator to reduce the hot air stream around the sensor-under-test. Especially important when testing thermocouples having head-mounted transmitters with cold-junction compensation.



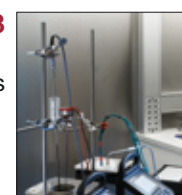
### Trolley (Optional) - 124315

A removable trolley for ATC carrying case 105805 ensures easy and safe transportation of the instrument. The protective carrying case ensures safe storage of the instrument and all associated equipment.



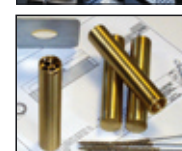
### Support rod set (Optional) - 125068

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



### Calibration kit (Optional)

Includes a heat protection shield, cleaning brushes, 3 undrilled inserts with 4mm reference hole and a self-drilling guide. ATC-156: 122833, ATC-157: 123685, ATC-320/650: 122834



## PREDRILLED INSERTS FOR ATC-156/157/320 AND 650 - 4 MM REFERENCE HOLE

JOFRA dry-block insert compatibility and materials:

ATC-320 = ATC-650 = ITC-320 = ITC-650 (made of brass)

ATC-155 = ATC-156 (made of aluminum)

ATC-157 = ITC-155 (made of aluminum)

All specifications on hole sizes are referring to the outer diameter (OD) of the sensor-under-test.

The correct clearance size is applied in all predrilled inserts.

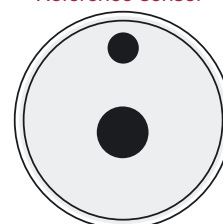
| Spare part no. for predrilled inserts with 4 mm reference hole |                          |                 |                     |                 |
|----------------------------------------------------------------|--------------------------|-----------------|---------------------|-----------------|
| Instruments                                                    |                          |                 |                     |                 |
| Sensor diameter                                                | Insert code <sup>1</sup> | ATC-155/156 A/B | ATC-157 A/B         | ATC-320/650 A/B |
| 3 mm                                                           | 003                      | 105623          | 123270              | 105622          |
| 4 mm                                                           | 004                      | 105625          | 123271              | 105624          |
| 5 mm                                                           | 005                      | 105627          | 123272              | 105626          |
| 6 mm                                                           | 006                      | 105629          | 123273              | 105628          |
| 7 mm                                                           | 007                      | 105631          | 123274              | 105630          |
| 8 mm                                                           | 008                      | 105633          | 123275              | 105632          |
| 9 mm                                                           | 009                      | 105635          | 123276              | 105634          |
| 10 mm                                                          | 010                      | 105637          | 123277              | 105636          |
| 11 mm                                                          | 011                      | 105639          | 123278              | 105638          |
| 12 mm                                                          | 012                      | 105641          | 123299 <sup>2</sup> | 105640          |
| 13 mm                                                          | 013                      | 105643          | 123300 <sup>2</sup> | 105642          |
| 14 mm                                                          | 014                      | 105645          | N/A                 | 105644          |
| 15 mm                                                          | 015                      | 105647          | N/A                 | 105646          |
| 16 mm                                                          | 016                      | 105649          | N/A                 | 105648          |
| Package of the above inserts                                   |                          | 124697          | 124699              | 124701          |
| Set of insulation plugs for 4 mm reference hole                |                          | 105810          | 123374              | N/A             |

4 mm  
Reference sensor



(ATC-157 A)

4 mm  
Reference sensor



(ATC-156/320/650 A/B)

| Spare part no. for predrilled inserts with 4 mm reference hole |                          |                 |                     |                 |
|----------------------------------------------------------------|--------------------------|-----------------|---------------------|-----------------|
| Instruments                                                    |                          |                 |                     |                 |
| Sensor diameter                                                | Insert code <sup>1</sup> | ATC-155/156 A/B | ATC-157 A/B         | ATC-320/650 A/B |
| 1/8 in                                                         | 125                      | 105677          | 123279              | 105676          |
| 3/16 in                                                        | 187                      | 105679          | 123280              | 105678          |
| 1/4 in                                                         | 250                      | 105681          | 123281              | 105680          |
| 5/16 in                                                        | 312                      | 105683          | 123282              | 105682          |
| 3/8 in                                                         | 375                      | 105685          | 123283              | 105684          |
| 7/16 in                                                        | 437                      | 105687          | 123301 <sup>2</sup> | 105686          |
| 1/2 in                                                         | 500                      | 105689          | 123302 <sup>2</sup> | 105688          |
| 9/16 in                                                        | 562                      | 105691          | N/A                 | 105690          |
| 5/8 in                                                         | 625                      | 105693          | N/A                 | 105692          |
| Package of the above inserts                                   |                          | 124698          | 124700              | 124702          |
| Set of insulation plugs for 4 mm reference hole                |                          | 105810          | 123374              | N/A             |

**Note:** All inserts (metric and inches) are supplied with a hole for the 4 mm OD reference sensor.

**Note 1:** Use the insert code, when ordered as the standard insert together with a new calibrator.

**Note 2:** ATC-157: 12 mm, 13 mm, 7/16 in and 1/2 in inserts are delivered without the 4 mm reference hole, but supplied with a matching insulation plug.

## APPLICATION KIT FOR CALIBRATION OF SANITARY SENSORS

At picture 1 you see a custom made insert and our STS-102 A cable reference sensor placed in a JOFRA ATC-156 B dry-block calibrator. At picture 2, the sanitary sensor has been fitted into the insert and is ready for calibration. Note that the design makes room for the reference sensor cable.

To learn more about calibration of sanitary temperature sensors please see accessory sheet AS-CP-2201 available at [www.jofra.com](http://www.jofra.com)



Picture 1



Picture 2



Application kit

## PREDRILLED INSERTS FOR ATC-156/157/320 AND 650 - 1/4 IN REFERENCE HOLE

| Spare part no. for predrilled inserts with 1/4 in (6.35 mm) reference hole |                          |                 |                     |                 |
|----------------------------------------------------------------------------|--------------------------|-----------------|---------------------|-----------------|
|                                                                            |                          | Instruments     |                     |                 |
| Sensor diameter                                                            | Insert code <sup>1</sup> | ATC-155/156 A/B | ATC-157 A/B         | ATC-320/650 A/B |
| 3 mm                                                                       | 803                      | 125260          | 125290              | 125259          |
| 4 mm                                                                       | 804                      | 125262          | 125291              | 125261          |
| 5 mm                                                                       | 805                      | 125264          | 125292              | 125263          |
| 6 mm                                                                       | 806                      | 125266          | 125293              | 125265          |
| 7 mm                                                                       | 807                      | 125268          | 125294              | 125267          |
| 8 mm                                                                       | 808                      | 125270          | 125295              | 125269          |
| 9 mm                                                                       | 809                      | 125272          | N/A                 | 125271          |
| 10 mm                                                                      | 810                      | 125274          | N/A                 | 125273          |
| 11 mm                                                                      | 811                      | 125278          | N/A                 | 125277          |
| 12 mm                                                                      | 812                      | 125280          | 123299 <sup>2</sup> | 125279          |
| 13 mm                                                                      | 813                      | 125282          | 123300 <sup>2</sup> | 125281          |
| 14 mm                                                                      | 814                      | 125284          | N/A                 | 125283          |
| 15 mm                                                                      | 815                      | 125286          | N/A                 | 125285          |
| Package of the above inserts                                               |                          | 125389          | 125387              | 125388          |
| Set of insulation plugs for 1/4 in (6.35 mm) ref. hole                     |                          | 125511          | 125510              | N/A             |

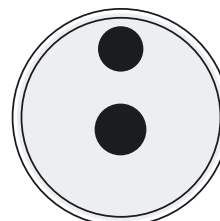
1:1

1/4 in  
Reference sensor



(ATC-157 A/B)

1/4 in  
Reference sensor



(ATC-156/320/650 A/B)

| Spare part no. for predrilled inserts with 1/4 in (6.35 mm) reference hole |                          |                 |                     |                 |
|----------------------------------------------------------------------------|--------------------------|-----------------|---------------------|-----------------|
|                                                                            |                          | Instruments     |                     |                 |
| Sensor diameter                                                            | Insert code <sup>1</sup> | ATC-155/156 A/B | ATC-157 A/B         | ATC-320/650 A/B |
| 1/8 in                                                                     | 901                      | 125297          | 125314              | 125296          |
| 3/16 in                                                                    | 902                      | 125299          | 125315              | 125298          |
| 1/4 in                                                                     | 903                      | 125301          | 125316              | 125300          |
| 5/16 in                                                                    | 904                      | 125304          | 125317              | 125303          |
| 3/8 in                                                                     | 905                      | 125306          | N/A                 | 125305          |
| 7/16 in                                                                    | 906                      | 125308          | 123301 <sup>2</sup> | 125307          |
| 1/2 in                                                                     | 907                      | 125310          | 123302 <sup>2</sup> | 125309          |
| 9/16 in                                                                    | 908                      | 125312          | N/A                 | 125311          |
| Package of the above inserts                                               |                          | 125392          | 125390              | 125391          |
| Set of insulation plugs for 1/4 in (6.35 mm) ref. hole                     |                          | 125511          | 125510              | N/A             |

Note: All inserts (metric and inches) are supplied with a hole for the 1/4 in OD reference sensor.

Note 1: Use the insert code, when ordered as the standard insert together with a new calibrator.

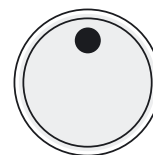
Note 2: ATC-157: 12 mm, 13 mm, 7/16 in and 1/2 in inserts are delivered without the 1/4 in reference hole, but supplied with a matching insulation plug.

1:1

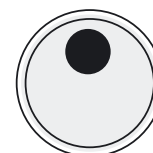
## UNDRILLED INSERTS FOR ATC SERIES

| Inserts, undrilled                                                    |                 |             |                 |
|-----------------------------------------------------------------------|-----------------|-------------|-----------------|
|                                                                       | Instruments     |             |                 |
| Inserts                                                               | ATC-155/156 A/B | ATC-157 A/B | ATC-320/650 A/B |
| 5-pack, undrilled inserts                                             | 122720          | 123286      | 122719          |
| 5-pack, undrilled inserts with a 4 mm hole for the reference sensor   | 122722          | 123285      | 122721          |
| 5-pack, undrilled inserts with a 1/4 in hole for the reference sensor | 125288          | 125313      | 125287          |
| Undrilled insulation plug                                             | 122781          | 123304      | N/A             |

4 mm Reference sensor



1/4 in Reference sensor



## MULTI-HOLE INSERTS FOR ATC-156/157/320 AND 650 - METRIC (MM)

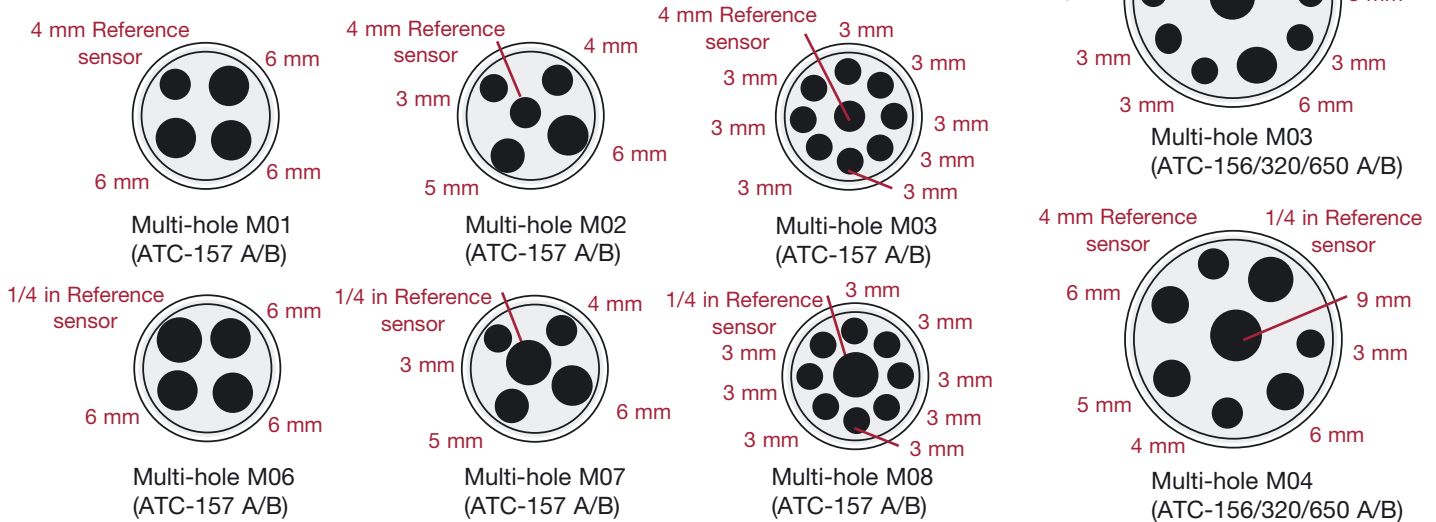
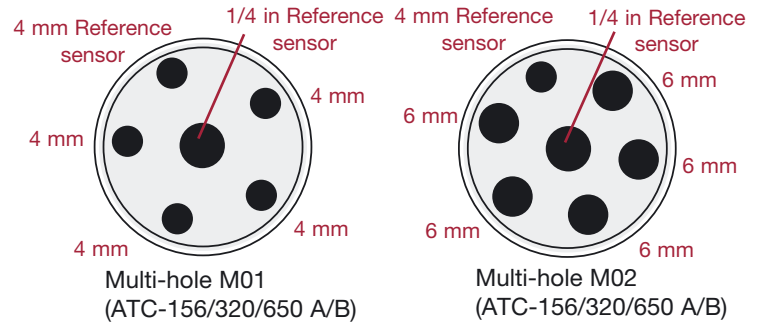
1:1

| Spare part no. for multi-hole inserts - metric (mm) |                 |             |                 |
|-----------------------------------------------------|-----------------|-------------|-----------------|
|                                                     | Instruments     |             |                 |
| Insert code <sup>1</sup>                            | ATC-155/156 A/B | ATC-157 A/B | ATC-320/650 A/B |
| M01                                                 | 122751          | 123294      | 122750          |
| M02                                                 | 122753          | 123295      | 122752          |
| M03                                                 | 122755          | 123296      | 122754          |
| M04                                                 | 122757          | N/A         | 122756          |
| M06                                                 | N/A             | 125377      | N/A             |
| M07                                                 | N/A             | 125378      | N/A             |
| M08                                                 | N/A             | 125379      | N/A             |

Note: All multi-hole inserts (metric and inches) for ATC-156/157 are supplied with a matching insulation plug.

Note: Remember to use matching insulation plugs.

Note 1: Use the insert code, when ordered as the standard insert together with a new calibrator.



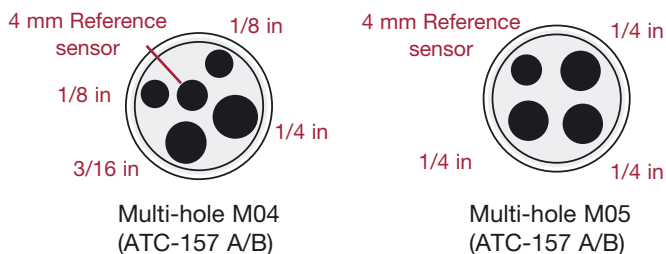
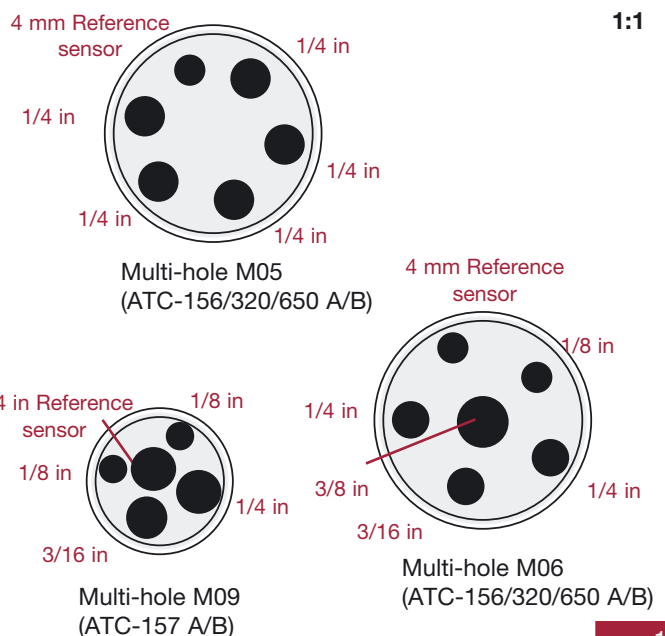
## MULTI-HOLE INSERTS FOR ATC-156/157/320 AND 650 - IMPERIAL (INCH)

| Spare part no. for multi-hole inserts - imperial (inch) |                 |             |                 |
|---------------------------------------------------------|-----------------|-------------|-----------------|
|                                                         | Instruments     |             |                 |
| Insert code <sup>1</sup>                                | ATC-155/156 A/B | ATC-157 A/B | ATC-320/650 A/B |
| M04                                                     | N/A             | 123297      | N/A             |
| M05                                                     | 122759          | 123298      | 122758          |
| M06                                                     | 122761          | N/A         | 122760          |
| M09                                                     | N/A             | 125380      | N/A             |

Note: All multi-hole inserts (metric and inches) for ATC-156/157 are supplied with a matching insulation plug.

Note: Remember to use matching insulation plugs.

Note 1: Use the insert code, when ordered as the standard insert together with a new calibrator.



## ORDERING INFORMATION

| Order number |  |  |  | Description                                                                                       |
|--------------|--|--|--|---------------------------------------------------------------------------------------------------|
|              |  |  |  | Base model number                                                                                 |
| ATC156       |  |  |  | ATC-156 series, -23 to 155°C (-9 to 311°F)                                                        |
| ATC157       |  |  |  | ATC-157 series, -45 to 155°C (-49 to 311°F)                                                       |
| ATC320       |  |  |  | ATC-320 series, 33 to 320°C (91 to 608°F)                                                         |
| ATC650       |  |  |  | ATC-650 series, 33 to 650°C (91 to 1202°F)                                                        |
|              |  |  |  | Model version                                                                                     |
| A            |  |  |  | Basic model no sensor-under-test or reference sensor input                                        |
| B            |  |  |  | Including sensor-under-test and reference sensor input                                            |
|              |  |  |  | Power supply (US deliveries 60 Hz only)                                                           |
| 115          |  |  |  | 115VAC                                                                                            |
| 230          |  |  |  | 230VAC                                                                                            |
|              |  |  |  | Mains power cable type                                                                            |
| 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                                                                              |
| XXX          |  |  |  | 1 x Insert for dry-block configuration (see the previous insert pages for the right insert codes) |
|              |  |  |  | Calibration certificate                                                                           |
| F            |  |  |  | NPL Traceable temperature certificate (standard for Europe, Asia, Australia and Africa)           |
| G            |  |  |  | NIST traceable temperature certificate (standard for Americas)                                    |
| H            |  |  |  | Accredited certificate                                                                            |
|              |  |  |  | Options                                                                                           |
| A            |  |  |  | Basic calibration kit                                                                             |
| C            |  |  |  | Carrying case                                                                                     |
| R            |  |  |  | 90° angled reference sensor with accredited certificate (STS100A901AH)                            |
| X            |  |  |  | No option used                                                                                    |

**ATC156B230AM01FX** **Sample order number**  
 JOFRA ATC-156 B with standard accessories, 230VAC, European power cord, dry-block configuration with multihole insert type M01, and NPL traceable temperature certificate.



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 is one of the world's leading manufacturers and developers of calibration instruments for temperature, pressure and process signals as well as for temperature sensors both from a commercial and a technological point of view.

**JOFRA Temperature Instruments**  
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**M&G Pumps**  
 Pressure generators from small pneumatic "bicycle" style pumps to hydraulic pumps generating up to 1,000 bar (15,000 psi).

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Pub code SS-CP-2285-US Issue 0901