

Calibrators

Product Selection Guide



JOFRA calibrators

- because calibration is a matter of confidence

AMETEK[®]
TEST & CALIBRATION INSTRUMENTS

<http://www.instrumentation2000.com/ametec-online-store.aspx>



AMETEK Test & Calibration Instruments

AMETEK Test & Calibration Instruments 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. Our main brands are JOFRA for calibration instruments, FP for industrial temperature sensors, and M&G for pumps and deadweight testers.

AMETEK Test & Calibration Instruments has its headquarters in Denmark and consists of two production facilities: AMETEK Denmark A/S which is based in Allerød, Denmark, and Mansfield & Green based in Largo, Florida, USA. Both locations have R&D, production, sales, and service facilities. Furthermore the company operates through a worldwide network of sales and service offices and distributors.

Calibration means that the performance of the measuring instrument is compared to a known reference. In this way, all sources of errors are analyzed and provided with numerical values. Increasing quality demands have continuously resulted in a growing number of industry customers requesting calibration of their measuring equipment.

For over 25 years, AMETEK has solved a multitude of calibration problems. The experience therefore makes us a well-reputed and competent advisor to the benefit of our customers. As a manufacturing enterprise, AMETEK knows the need for first-class quality products delivered on time and sometimes - in case of emergency - at very short notice. Our Quality Assurance System is ISO 9001 certified.

Instruments from AMETEK Test & Calibration Instruments are tested in our own accredited laboratory where precision calibration also takes place. All calibrations are documented by means of a certificate being our customers documentation to third parties. Our calibration laboratory is accredited according to ISO17025.



JOFRA RTC Series – Reference Temperature Calibrator

We are proud to introduce our new top models RTC-156, RTC-157, RTC-158, RTC-250 and RTC-700.

The RTC-156/157 features the active dual-zone temperature control and the RTC-700 features our innovative triple-zone technology. Both technologies improve the homogeneity in the well by adjusting the temperature in the top of the well to the same temperature as in the bottom.

The RTC-158/250 are fitted with a 160 mm (6.3 in) deep well with a diameter of 63.5 mm (2.5 in) and can be used both as dry-block calibrator and as liquid calibration bath.

To bring our dual-/triple-zone technology to an even higher level, we have developed the patent pending DLC system.

The DLC sensor improves the homogeneity even more by controlling the homogeneity not only in the well, but also inside the insert, where the sensors-under-test are placed during calibration. This feature makes it possible to perform top calibration specifications without being affected by the actual load e.g. many sensors or very big sensors.

All of this makes the RTC series "Best performing dry-block with regard to the EURAMET/cg-13/v.01 guideline for testing of dry blocks".

- 12-month accuracy
RTC-156/157 - $\pm 0.04^{\circ}\text{C}$
RTC-158/250 - $\pm 0.04^{\circ}\text{C}$
RTC-700 - $\pm 0.11^{\circ}\text{C}$
- Temperature range from -45 to 700°C (-49 to 1292°F)
- Stability
RTC-156/157: to 0.005°C
RTC-158/250: to 0.01°C
RTC-700: to 0.008°C
- Patent pending DLC, Dynamic Load Compensation, for perfect temperature uniformity in the insert
- Input for external reference sensor and sensor-under-test
- Unique intelligent reference sensors for plug'n'play connection
- Auto-stepping and thermo switch test functions
- New multi-hole insert kits
- Active dual-zone or innovative triple-zone
- Easy-to-read color VGA display
- New functional carrying case design
- MVI stability circuitry
- USB connector for communication



JOFRA ATC-125 – Advanced Temperature Calibrator

The ATC-125 ultra cooler features a unique free piston stirring cooler technology for optimum performance and superior temperature homogeneity throughout the block at very low temperatures. The ATC-125 is the world's first temperature dry-block calibrator capable of reaching -90°C . Featuring patent-applied Free Piston Stirring Cooler (FPSC) technology for cooling, together with a special heating element, the ATC-125 offers high accuracy and excellent stability.

- 12-month accuracy to $\pm 0.04^{\circ}\text{C}$ / 0.07°F
- Temperature range -90 to 125°C / -130 to 257°F
- Stability to $\pm 0.01^{\circ}\text{C}$ / 0.018°F
- MVI stability circuitry
- 100% automatic calibration
- Input for external reference sensor and sensor-under-test
- Auto-stepping and thermo switch test functions
- Interchangeable inserts including multi-hole designs
- Active dual zone

JOFRA PTC Series – Professional Temperature Calibrator

The PTC series offers a wide range of innovative features and has been specifically designed to provide an intuitive easy-to-use interface.

Other features include the active dual-zone heating that provides high temperature uniformity, unique intelligent sensors for plug 'n' play connectivity, an easy-to-read full-color VGA display and a USB connection for improved communications and software downloads.

The PTC series also includes a newly designed STS-150 reference sensor that is angled at 90° and customized so the top of the sensor is only slightly higher than the top of the calibrator. This unique design makes it possible for the PTC Series to calibrate threaded sensors and sensors with connection heads. The STS-150 sensor contains all individual calibration data regarding the sensor, allowing users to change the reference sensor and be up and running immediately.

Along with a wide temperature range, PTC calibrators have increased heating and cooling speeds, making them even more versatile and cost effective.

The PTC calibrator is rugged, light weight and available with a highly functional carrying case for improved portability and convenience. A specially designed carrying case makes it possible to store and protect reference sensors, inserts, support rods, wires, manuals, plugs and insert tools.

- Down to $\pm 0.06^{\circ}\text{C}$ ($\pm 0.11^{\circ}\text{F}$) using the external reference sensor
- Temperature range
PTC-155 from -25 to 155°C (-22 to 311°F)
PTC-350 from 33 to 350°C (91 to 662°F)
PTC-660 from 33 to 660°C (91 to 1220°F)
- Excellent stability 0.01°C
- Input for external reference sensor and sensor-under-test
- Unique intelligent sensors for plug'n'play connection
- Auto-stepping and thermo switch test functions
- New multi-hole insert kits
- Active dual-zone or innovative triple-zone
- Easy-to-read color VGA display
- New functional carrying case design
- MVI stability circuitry
- USB connector for communication



JOFRA ITC series – Industrial Temperature Calibrator

This calibrator combines the demand for small physical dimensions with high accuracy and stability. The ITC contains a dual-zone heating block and offers one-key-one-function operation. The ITC-320 and ITC-650 also offer a deep immersion depth and a wide enough diameter to allow for simultaneous insertion of a reference sensor and the sensor-under-test or for multiple sensor tests.

- Temperature range -23 to 650°C / -9 to 1202°F
- 12-month accuracy to $\pm 0.18^{\circ}\text{C}$ / 0.32°F
- Stability to $\pm 0.01^{\circ}\text{C}$ / 0.02°F
- MVI stability circuitry
- Stability indicator
- Auto-stepping and thermo switch test functions
- Central dual-zone



JOFRA CTC series – Compact Temperature Calibrator

This is the economical, timesaving, and reliable solution for on-site true temperature calibration. The applications are generally critical process control but can vary based on calibration and testing requirements. The JOFRA CTC series consists of six different models that differ in temperature ranges and immersion depths. Two of the models have especially deep immersion depths.

- Temperature range -17 to 1205°C / -1 to 2200°F
- 12-month accuracy to $\pm 0.4^{\circ}\text{C}$ / 0.7°F
- Stability to $\pm 0.05^{\circ}\text{C}$ / 0.09°F
- MVI stability circuitry
- Stability indicator
- Deep immersion depth versions
- Auto-stepping and switch test functions



JOFRA ETC series – Easy Temperature Calibrator

The ETC series may be the fastest dry-block temperature calibrator on the market as it completes a dual-point test in less than 10 minutes. One model, the ETC-400 R is designed for calibration of infrared thermometers, where the 36 mm (1.4 in) target provides the optimum size for reliable calibration of infrared thermometers in the process industry. The small handheld physical size makes the ETC easy to fit into a toolbox and you can bring it almost anywhere.

- 3 different models, including an infrared version
- Temperature range -10 to 400°C / 14 to 752°F
- 12-month accuracy to $\pm 0.5^{\circ}\text{C}$ / 0.9°F
- Stability to $\pm 0.05^{\circ}\text{C}$ / 0.09°F
- Heats up as quickly as 100°C / 210°F per minute
- Stability indicator
- Auto-stepping function



JOFRA HPC series – Handheld Pressure Calibrator

Our HPC series is designed to meet high accuracy pressure calibration applications, and combines deadweight tester accuracy in a modern digital package with a wide range of user friendly features.

All HPCs have a broad selection of useful functions, ranging from basic features to advanced high speed switch test. The more powerful members of the family have advanced error calculation, leak test and mathematic functions.

HPC600 includes a complete mA loop calibrator with all common features, and has a built-in electrical pump system for generation of pressure and vacuum.

HPC500/502 and HPC600 can be combined with many different external pressure modules.

HPC550/552Ex can be used in a very broad range of applications from tool type jobs to complex calibration jobs in custody transfer systems. They are the pressure calibrators of choice in potential explosive atmospheres. The intrinsically safe HPC550/552Ex calibrators complies with ATEX/IECEX.

The ruggedized HPC has a large backlit graphical display, a user friendly menu that shows current status and mode, and one, two or three measurement windows to suit specific applications. Furthermore a dedicated zero test button to provide convenient zero before test and ensures better accuracy.

- Accuracy
HPC400: $\pm 0.05\%$ F.S.
HPC500/502: $\pm 0.025\%$ of reading, $+ 0.01\%$ F.S.
HPC550/552Ex: $\pm 0.025\%$ of reading $+ 0.01\%$ F.S.
HPC600: $\pm 0.02\%$ of reading, $+ 0.015\%$ F.S.
- HPC400, HPC500/502 and HPC550/552 are available as indicators or in complete systems
- HPC500/502 and HPC600 can be extended with many different external pressure modules
- HPC500 and HPC550 is equipped with one internal sensor, HPC502 and HPC552 are equipped with two internal sensors to be chosen by the customer
- Dedicated zero button available to provide convenient zero before test
- Unique built-in electric pump in the HPC600
- HPC400: 3 different pressure ranges up to 20 bar/300 psi
HPC500/502: 16 different pressure ranges up to 700 bar/ 10,000 psi
HPC550/552: 16 different pressure ranges up to 700 bar/ 10,000 psi
HPC600: 4 different pressure ranges up to 20 bar/300 psi
- Special designed HPC softcase which is included with the HPC600.



Built-in electrical pump

JOFRA DPC-501 – Documenting Pressure Calibrator

The DPC-501 is designed for high precision calibration of pressure gauges, transmitters, digital manometers, pressure switches and overpressure valves. The documenting feature makes it possible to handle 16 work orders with up to 22 calibration points each and have the result uploaded to a PC via JOFRACAL calibration software.

- Accuracy from $\pm 0.02\%$ F.S.
- Available as indicator or a complete system
- 43 pressure ranges up to 1,000 bar/15,000 psi (vacuum, gauge, compound, absolute)
- Interchangeable DPC-J reference sensor (up to 10 sensors per instrument)
- 15 standard pressure units and 1 user specified
- RS232 interface and JOFRACAL calibration software



JOFRA IPI – Industrial Pressure Indicator

The IPI pressure indicator combines the ease of an analog gauge with the accuracy and easy-to-read display of a digital calibrator. The IPI offers a long battery life, high accuracy and serial communication. The accuracy of the IPI rivals a pressure calibrator and is temperature compensated for shop or machine room applications.

- Accuracy up to $\pm 0.05\%$ F.S.
- Available as an indicator or in a complete system
- Pressure range vacuum to 700 bar/10,000 psi
- 17 different pressure units and 1 user specified
- Min/max readings
- RS232 interface and JOFRACAL calibration software
- ATEX and CSA certified and designed for use in potentially explosive environments



JOFRA APM Mk. II – Advanced Pressure Module

The APM pressure modules extend the usage of the HPC calibrators as well as the ASC301 and AMC910 multi function signal calibrators. The modules are available in series of accuracies, ranges, units and pressure references from vacuum to absolute pressure.

- Accuracy up to 0.025% RDG + 0.01% F.S.
- Pressure range from 25 mbar to 700 bar (0.4 to 10,000 psi)
- Rugged and dependable for field or lab use
- Gauge, absolute, vacuum, differential pressure modules
- Supplied with fittings for NPT and BSP threads
- Temperature compensated from 0 to 50°C (32 to 122°F) for on-site operation



Accuracy includes hysteresis, nonlinearity, repeatability and reference standard uncertainty, 1 Year typical long-term stability, operated inside the rated temperature span and pressure range.

<http://www.instrumentation2000.com/ametec-online-store.aspx>

Ready-to-use pressure systems for the HPC400, HPC500, HPC502, DPC-501 and IPI

AMETEK offers several solutions for pressure generation. This line spans from a small pneumatic "bicycle" type pump to a hydraulic pump that generates up to 1,000 bar/15,000 psi. These are durable pumps with features such as venier valves, manifold connections, swivel fittings, and optional O-ring materials and fittings making the pumps flexible to meet your calibration and testing applications.

For all pressure systems, the pump and the indicator are separate systems. Therefore, a replacement of the pump does not mean that you have to send a complete system for repair. Maintenance of the instrument is also made easy. Recalibration of the unit can be performed locally with an accurate pressure reference: No need to send the unit back to us for recalibration. If you do require a factory calibration, the pump and indicator are independent and only the indicator needs to be returned.

JOFRA pressure calibrators are as standard delivered as individual indicators or as complete calibration systems ready to use in a carrying case, including pump, hose, set of fittings, batteries, test leads, user manual, and a traceable calibration certificate.

All pumps are also available separately.



Our systems come in carrying cases with cut-outs for fittings, hose and the complete assembled calibration unit - no time required to assemble the unit before use!

Pump System A



- DPC-501, HPC400, HPC500, HPC502 and IPI
- 0 to 40 bar
- 0 to 580 psi

Pump System B



- DPC-501, HPC400, HPC500, HPC502 and IPI
- Vacuum to 40 bar
- Vacuum to 580 psi

Pump System C



- DPC-501, HPC500, HPC502 and IPI
- 0 to 350 bar
- 0 to 5,000 psi

Pump System D



- DPC-501, HPC500, HPC502 and IPI
- 0 to 350 bar
- 0 to 5,000 psi

Pump System E



- DPC-501, HPC500, HPC502 and IPI
- 0 to 700 bar
- 0 to 10,000 psi

Pump System F



- DPC-501, HPC500, HPC502 and IPI
- 0 to 1,000 bar
- 0 to 15,000 psi



JOFRA ASM - Advanced Signal Multi-scanner

The ASM signal multi-scanner adds flexibility and time-saving features to your calibration routines, as the ASM is delivered in 3 versions, enabling you to calibrate different kinds of sensors and to calibrate up to 8 sensors with one ASM. Connecting three ASMs makes it possible to perform automatic calibrations of up to 24 sensors at the same time using JOFRACAL calibration software. Furthermore the JOFRALOG software allows the user to use the ASM as a data-logging device.

- 6 different models
- Accuracy to 0.026°C / 0.047°F
- Input: TCs (12 types), RTDs (13 types), 0-12 VDC, 0-24 mA, 0-4000Ω
- 24 V supply for transmitters
- 100% automatic calibration of up to 24 sensors
- RS232 interface and JOFRACAL calibration software
- STS temperature reference sensor capability



JOFRA AMC910 - Advanced Multi-purpose Calibrator

The AMC910 multi-purpose calibrator is the right solution for high precision signal, temperature, and pressure calibrations, as it combines sourcing and measuring in one instrument.

- Accuracy to $\pm 0.003\%$ of reading $\pm 0.001\%$ F.S.
- Output: 0-100 mA, 0-100 VDC, -10-100 mV, TCs (13 types), RTDs (9 types), 5-4000Ω
- Input: -10-75 mV, TCs (13 types), RTDs (10 types), 5-4000Ω
- Isolated input: 0-100 VDC, 0-50 mA
- External JOFRA APM pressure module capability
- STS temperature reference sensor capability
- RS232, IEEE-488 or optional USB interface



JOFRA ASC301 - Advanced Signal Calibrator

JOFRA ASC301 is a portable process signal calibrator that provides the functionality and accuracy you expect from a laboratory calibration system, but compact enough to fit into the tool box and be operated with one hand for easy field calibration.

APM external pressure modules or a JOFRA dry-block calibrator, it will calibrate pressure and temperature, and used together with JOFRACAL even document it as well.

- Accuracy to $\pm 0.2^\circ\text{C}$ / 0.36°F
- Simultaneous input and output
- Input and output: TCs (13 types), RTDs (14 types), 0-20 VDC, 0-24 mA, 5-4000V, 0-10 kHz, and pulse trains
- Isolated read-back circuit with 24 VDC loop power
- External JOFRA APM pressure module capability
- RS232 interface and JOFRACAL calibration software



JOFRA CSC series - Compact Signal Calibrator

The CSC series is a dedicated calibrator designed to make calibration and maintenance tasks easier to perform.

The CSC200 is engineered for the calibration of temperature instruments offering the ability to measure and simulate several different types of RTDs and TCs.

The CSC100 is engineered for instrument loop calibrations and is specifically manufactured for 4 to 20 mA loops. It can also be used as a signal simulator to test transmitters without the need for actual operation.

- Accuracy
CSC100: to $\pm 0.015\%$ of reading
CSC200: to $\pm 0.2^\circ\text{C}$ / 0.36°F
- Input/output
CSC100: mA and voltage
CSC200: TC and RTD
- CSC100 sources and reads loop voltage and current
- CSC200 reads and simulates temperature
- Fuseless protection on all inputs



JOFRA mAcal Calibrator

This is the economical answer to easy and accurate loop calibration. Test all 4-20 mA loops in the process with this handy calibrator that sources, reads, steps through test points, converts readings to percentages etc.

- Accuracy to $\pm 0.05\%$ F.S.
- Auto-stepping and ramping
- 24 VDC loop power
- Measure 0 to 45 volt
- Flow reading function
- Reading in mA, %, VDC or sec

JOFRA DTI-1000 Reference Digital Temperature Indicator

The JOFRA DTI-1000 is a fully traceable thermometer recommended as the high accuracy reference instrument to verify true temperature in any type of process or temperature calibrator, liquid bath, or dry-block calibrator. Use the DTI-1000 and the JOFRA STS sensors as the working temperature reference in any calibration application or use the set-up directly in custody transfer applications where high accuracy (low uncertainty) means money. The superior specifications combined with a long history of reliability and low drift have made the DTI-1000 and the STS sensors standard in many National Laboratories worldwide.

- 2 different models
- Accuracy to $\pm 0.005^{\circ}\text{C}$ / $\pm 0.009^{\circ}\text{F}$
- Temperature range -200 to 750°C / -328 to 1382°F
- Stability
 - DTI-1000A: $\pm(6 \text{ ppm rdg} + 1.4 \text{ m}\Omega)$
 - DTI-1000B: $\pm(6 \text{ ppm rdg} + 0.7 \text{ m}\Omega)$
- 2 reference sensor inputs
- True Ohm Measurement



JOFRA DTI050 Digital Temperature Indicator and JOFRA STS-050 Intelligent Reference Sensor

The JOFRA DTI050 is a small sized and easy-to-use reference indicator. Combined with an JOFRA STS reference sensor, it is the perfect handheld reference instrument. The DTI050 uses intelligent detection technology for sensors, meaning that it is able to automatically read calibration data and sensor type from a memory chip placed in the JOFRA STS-050, especially developed for the DTI050 indicator.

- Temperature range -200 to 2500°C / -328 to 4532°F
- Accuracy to $\pm 0.012^{\circ}\text{C}$ / 0.021°F
- Works with both "smart" and standard temperature sensors



FP Industrial Temperature Sensors

Besides manufacturing and selling calibrators under the brand name JOFRA, AMETEK Calibration Instruments are also producing and selling industrial temperature sensors under the brand name FP (Frode Pedersen).

The FP product line includes a complete range of thermocouple assemblies and resistance thermometers, measuring inserts, thermo-couples of precious as well as base material, thermocouple wire, extension wire, temperature transmitters and portable digital thermometers.

Customized RTD's and thermocouple for OEM's

As it is our objective to be a company specialized in temperature measurement, with a high know-how and service level, AMETEK Calibration Instruments can provide much more than just standard sensors and assemblies.

Our long experience, developing and producing industrial temperature sensors and calibrators, provides us with a wide knowledge about applications and customer needs, which enables us to build and deliver quick and custom-designed quality temperature sensors for all kinds of solutions and applications no matter what industry.



M&G deadweight testers (primary standards)

In 1966, Mansfield & Green introduced the deadweight tester based on the "floating ball" principle. This deadweight tester is an extremely easy-to-use, reliable and accurate primary standard and is now earning its reputation as the "standard of standards". A range of hydraulic deadweight testers are also available, up to 1,000 bar/15,000 psi.

Typical deadweight tester applications are:

- laboratory or field use
- hazardous locations
- critical process control loops extending the time between calibrations due to better accuracy and uncertainty
- calibrating instruments on custody transfer stations thereby reducing the uncertainty of the measurement
- calibrating portable digital calibrators to achieve the highest possible accuracy and reducing maintenance costs



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 all JOFRA calibration instruments. When used with ASM-800 signal multi scanner, JOFRACAL can perform a simultaneous semi automatic calibration on up to 24 pressure and/or temperature devices under test in any combination.

JOFRACAL software controls the complete calibration procedure, stores the results and provides a calibration audit trail through hard-copy certificates. All calibration data are stored for each sensor to monitor drift and optimise recalibration intervals. A scheduler feature allows planning of future calibrations.



AMETEK Test & Calibration Instruments

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

JOFRA Calibration Instruments

Temperature Calibrators

Portable dry-block calibrators, precision thermometers and liquid baths. Temperature ranges from -90°C (-130°F) to 1205°C (2200°F). Temperature sensors for industrial and marine use.

Pressure Calibrators

Convenient electronic systems ranging from -25 mbar to 1000 bar - fully temperature-compensated for problem-free and accurate field use.

Signal Instruments

Process signal measurement and simulation for easy control loop calibration and measurement tasks.

M&G Pressure Testers & Pumps

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

Lloyd Instruments

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

Davenport Polymer Test Equipment

Allows measurement and characterization of moisture-sensitive PET polymers and polymer density.

Chatillon Force Measurement

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

Newage Testing Instruments

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

AMETEK[®]
TEST & CALIBRATION INSTRUMENTS

Contact:
Industrial Process Measurement, Inc.
3910 Park Avenue, Unit 7
Edison, NJ 08820
732-632-6400
support@instrumentation2000.com
<http://www.instrumentation2000.com>