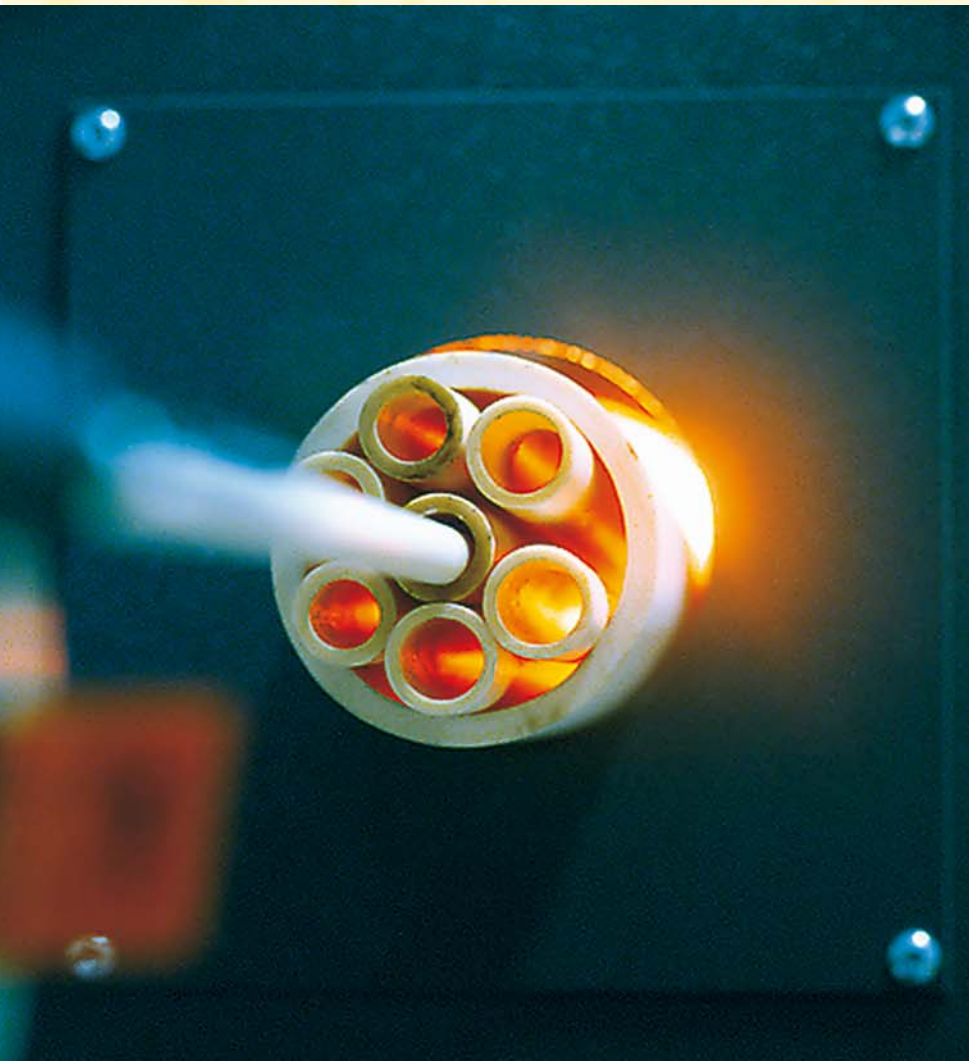


A quality response to your thermal process requirements

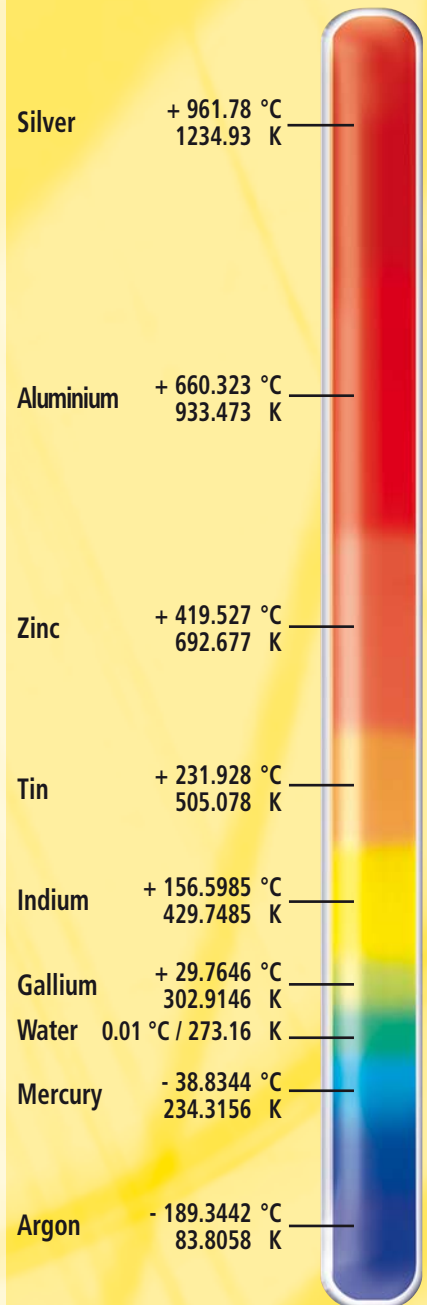


- **Reference sensors**
- **Fixed-point temperature cells ⁽¹⁾**
- **Calibration furnaces and baths**
- **Calibration of your temperature measurement sensors and instruments in our COFRAC-accredited laboratories ⁽²⁾**

(1) Manufactured under INM licence (National Metrological Institute, France)

(2) Cofrac accreditation no. 2-1385. Comparison calibration
 - from -20 °C to +450 °C for Pt100 Ω probes
 - from -20 °C to +1,550 °C for thermocouples

**CALIBRATION
 EQUIPMENT
 & SERVICES**



CONTENTS

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CALIBRATION METHODS FOR TEMPERATURE SENSORS

Two calibration methods are most commonly used:

■ The comparison method

■ The fixed-point method

It is often difficult to choose between these two methods. When very precise measurements are required, accurate to 0.01 °C or better, the fixed-point method must be used. When a large number of sensors are to be studied, or when the tolerances are greater, the comparison method is preferable. However, even in this case, having one or more fixed-point cells enables reference sensors to be periodically checked and indicates when the availability of complete recalibration is called for.

Comparison method

Sensor calibration using the comparison method consists of placing the sensor in a chamber whose constant uniform temperature has been measured using a standard sensor which is taken as a reference.

Advantages of the comparison method:

- Simultaneous calibration of large numbers of sensors;
- Calibration of a broad range of sensors of different shapes;
- Calibration at different temperatures

Limitations of the comparison method:

It is often difficult to be sure that the sensors to be calibrated and the reference sensor are at exactly the same temperature. A stable uniform temperature chamber is difficult to obtain, especially at high temperatures, and the accuracy of the results obtained is directly related to calibration conditions and to the stability of the reference sensor.

Pyro-Contrôle manufactures reference thermocouples and surface sensor calibration apparatus under licence from the BNM-LNE

Manufactured under BNM-LNE licence

Fixed-point method

Sensor calibration using the fixed-point method consists of placing the sensor in a chamber whose constant uniform temperature is defined by the thermodynamic equilibrium between different phases of a pure substance.

Main advantage of the fixed point method:

Enables highly accurate calibration at a known temperature, without being dependent on the characteristics of a reference sensor, which are liable to vary over time. The method is the one used to establish the ITS-90 International Temperature Scale.

Limitations of the fixed-point method:

- Calibration can be carried out for only a certain number of specific temperatures.
- During a change of phase, the number of sensors calibrated is limited, depending on the duration of the temperature plateau.
- The geometry of the sensors to be calibrated must comply with certain specifications.

The BNM-INM is the French body responsible for the references of the ITS-90 International Temperature Scale. The BNM-LNE is France's National Test Laboratory responsible for the implementation of ITS-90 in industry. ITS-90 is based on the temperature values assigned to a certain number of known states of equilibrium ("fixed points") of pure substances, and on the specific instruments calibrated at these temperatures. ITS-90 is the officially recognised-international temperature scale, providing the most accurate calculations available for thermodynamic temperatures.

(BNM: Bureau National de Métrologie, France – INM: Institut National de Métrologie, France. LNE: Laboratoire National d'Essai, France.)

Pyro-Contrôle designs and manufactures complete calibration assemblies for carrying out ITS-90 fixed-point temperature references. Pyro-Contrôle sealed cells are manufactured under official INM licence.

Manufactured under BNM-INM licence

SENSOR CALIBRATION IN OUR LABORATORIES



PYRO-CONTRÔLE

provides two types of calibration services:

COFRAC-accredited metrology services

Pyro-Contrôle provides COFRAC-accredited metrology services (accreditation no. 2-1385), using the comparison method, and issues official COFRAC certificates (COFRAC: French Accreditation Committee).



Calibration of Pt 100 Ω probes

For 2, 3 and 4-wire probe assemblies

- measurement range: -20 °C to +450 °C
- Standard calibration temperatures: 0 °C, 100 °C and 200 °C

(customised temperatures on request)

RANGE	UNCERTAINTY	METHOD	SENSOR DIMENSIONS
-20 °C to +30 °C	± 0.05 °C	- Comparison with a standard platinum resistance thermometer	$\varnothing \leq 10$ mm L ≥ 120 mm
+30 °C to +90 °C	± 0.08 °C		
+90 °C to +290 °C	± 0.12 °C	- Current generator - Channel scanner - Multimeter	$\varnothing \leq 11$ mm L ≥ 400 mm
+290 °C to +450 °C	± 0.39 °C		

Calibration of thermocouples

- Measurement range: -20 °C to +1,550 °C
- Standard calibration temperatures: 0 °C, 100 °C, 200 °C, 500 °C and 1,000 °C

(customised temperatures on request)

RANGE	UNCERTAINTY	METHOD	SENSOR DIMENSIONS
-20 °C to +290 °C	± 0.50 °C	- Comparison with a standard platinum resistance thermometer - Multimeter	$\varnothing \leq 10$ mm L ≥ 120 mm
+290 °C to +450 °C	± 0.65 °C		$\varnothing \leq 11$ mm L ≥ 400 mm
+450 °C to +980 °C	± 1.7 °C	- Comparison with an "S"-type reference thermocouple - Multimeter	$\varnothing \leq 11$ mm $\varnothing \leq 8$ mm L ≥ 550 mm L ≥ 350 mm
+980 °C to +1,200 °C	± 2 °C		$\varnothing \leq 11$ mm $\varnothing \leq 8$ mm L ≥ 800 mm L ≥ 350 mm
+1200 °C to +1,550 °C	± 3.3 °C		$\varnothing \leq 11$ mm L ≥ 800 mm

Pyro-Contrôle calibration laboratory

Pyro-Contrôle's calibration laboratory provides calibration services, using the comparison method, and linked to the International System of Units (SI) by our standard reference sensors (level 3), giving rise to an official calibration report.

Comparison calibration of Pt 100 Ω probes

- Measurement range: -20 °C to +450 °C
- Standard calibration temperatures: 0 °C, 100 °C and 200 °C
(customised temperatures on request)
- Resistance/Temperature correspondence table available on request

RANGE	UNCERTAINTY	METHOD	SENSOR DIMENSIONS
-20 °C to +90 °C	± 0.1 °C	Liquid thermostatic bath	$\varnothing \leq 11$ mm L ≥ 120 mm
+90 °C to +290 °C	± 0.2 °C		
+290 °C to +450 °C	± 0.5 °C	Fluidised bed thermostatic bath	$\varnothing \leq 11$ mm L ≥ 400 mm

Comparison calibration of thermocouples

- Measurement range: -20 °C to +1,550 °C
- Standard calibration temperatures: 0 °C, 100 °C, 200 °C, 500 °C and 1,000 °C
(customised temperatures on request)
- EMF/Temperature correspondence table available on request

RANGE	UNCERTAINTY	METHOD	SENSOR DIMENSIONS
-20 °C to +290 °C	± 0.5 °C	Liquid thermostatic bath	$\varnothing \leq 11$ mm L ≥ 120 mm
+290 °C to +450 °C	± 0.75 °C	Thermostatic bath with fluidised bed	
+450 °C to +980 °C	± 2 °C	High temperature thermal mass furnace	$\varnothing \leq 11$ mm $\varnothing \leq 8$ mm L ≥ 500 mm L ≥ 350 mm
+980 °C to +1,200 °C	± 2.5 °C		$\varnothing \leq 11$ mm $\varnothing \leq 8$ mm L ≥ 800 mm L ≥ 350 mm
+1,200 °C to +1,550 °C	± 3.5 °C		$\varnothing \leq 11$ mm L ≥ 800 mm

REFERENCE SENSORS

Working reference thermometers

For use in the workshop or in the laboratory, working reference thermometers enable you to carry out high-level calibration of instruments. These standard thermometers must be recalibrated regularly, however, using reference sensors. Pyro-Contrôle also issues calibration certificates using the comparison or ITS fixed-point methods: further details available on request.

Standard reference thermometers

For laboratory use only, standard reference thermometers enable you to carry out extremely precise calibration of instruments, and are in turn subject to regular calibration checks by a COFRAC-accredited laboratory. Pyro-Contrôle reference thermometers come in a protective presentation box, and are supplied with a calibration certificate using the comparison or ITS fixed-point method: further details available on request.

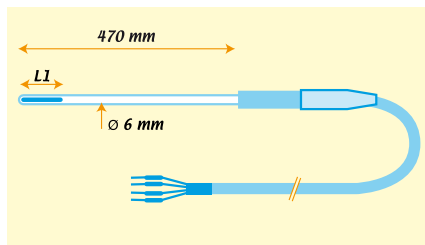
Pt100 Ω thermometric probes



Resistance at 0 °C: 100 $\Omega \pm 0.05$
Interchangeability class: Class A as per IEC 751
Alpha coefficient: 0.003850 °C \pm 4 ppm
Nominal current: 1 mA, sensing element 50 mm long (L1)
Dimensions of sensitive part: length 450 mm / \varnothing 6 mm
External connections: by 4-wire FEP insulated cable + chassis, length 2 m, banana plugs \varnothing 4 mm

Working reference thermometers

- Range: -100 °C to +400 °C. Consistency: ≤ 25 m Ω (or ≤ 60 mK)
Code: L918749-002 Presentation case available as option.
- Range: -100 °C to +550 °C. Consistency: ≤ 25 m Ω (or ≤ 60 mK)
Code: L918749-001 Presentation case available as option.



Standard reference thermometer

Comes in presentation case complete with comparison calibration certificate. An EMF/Temperature correspondence table is available on request for each degree.

- Range: -100 °C to +450 °C. Consistency: ≤ 10 m Ω (or ≤ 26 mK)
Code: L918746-001

S-type thermocouples



Rhodium plated 10 % / pure platinum
External connections: by insulated FEP cable, length 750 mm, 2 bare-wire conductors

Working reference thermocouple Model S90-03: 0 °C to 1,554 °C
Comes in presentation case complete with comparison calibration certificate. EMF/Temperature correspondence table available on request for each degree.

Code: L918189-000

Standard reference thermocouple Model LNE S80: 0 °C to 1,554 °C
Comes in presentation case, complete with calibration certificate using the comparison or ITS fixed-point method (7 points: 400, 600, 800, 1,000, 1,200, 1,400 and 1,500 °C). EMF/Temperature correspondence table available on request for each degree.

- Code: L968028-001 Comparison calibration method
- Code: L968028-002 Fixed-point calibration method

FIXED POINT CELLS

Before delivery, each fixed-point cell is verified by an official LNE/INM laboratory

Mini fixed-point cells

Manufactured
under BNM-INM
licence

Silver	+961.78 °C
Aluminium	+660.323 °C
Zinc	+419.527 °C
Tin	+231.928 °C
Indium	+156.5985 °C

Fixed-point cells at the most reasonable price.

Rapid calibration that is both practical and accurate, whether in the laboratory or on-site.

The mini-cell is composed of a crucible and a graphite thermowell. The interior of the crucible, surrounding the thermowell, is composed of 99.99 % - pure metal.

- Temperature plateau: 1 to 15 minutes
- Repeatability: 0.1 °C
- External dimensions: Ø 12 to 15 mm and length 70 mm
- Internal dimensions (thermowell): Ø 1.5 to 6.5 mm and length 50 mm

Pyro-Contrôle's top-selling range of mini fixed-point cells		
Metal	Diameter	Code:
Indium	1.5 mm	L916956-011
Tin	1.5 mm	L916956-012
Zinc	1.5 mm	L916956-013
Aluminium	5 mm	L916956-044
Silver	3 mm	L916956-025
Silver	5 mm	L916956-045

For other metals and dimensions please contact us.

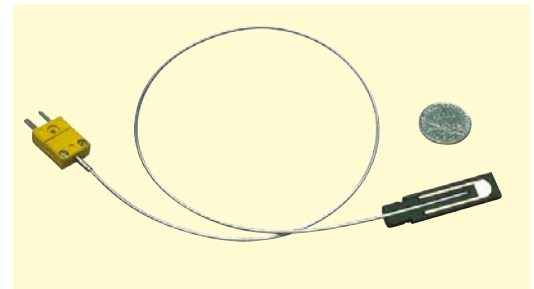


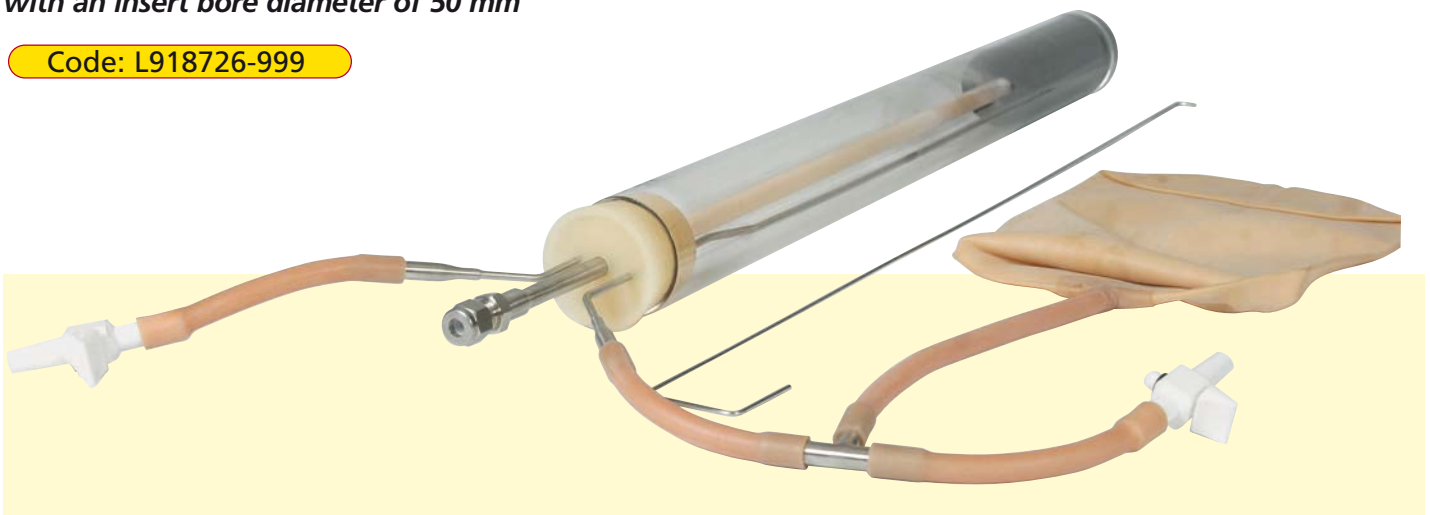
Photo credits: C. Le Toquin/CNAM

Mini-cell kit

Mini-cell kit enables you to increase the life span of mini fixed-point cells by carrying out calibration operations in a neutral atmosphere.

Suitable for use in all conventional calibrating ovens with an insert bore diameter of 50 mm

Code: L918726-999



Mercury Cells

Mercury -38.8344 °C

Code: L916718-000

The triple point of mercury offers a temperature plateau of at least 4 hours

Manufactured under BNM-INM licence

The mercury cell is composed of a sheath and a thermowell of stainless steel.

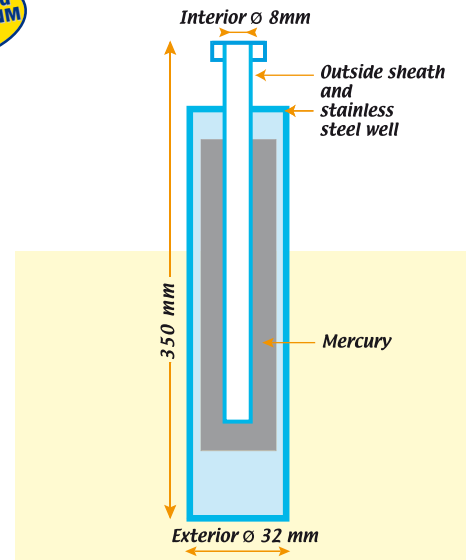
The cell contains approximately 1,440 grams of high-purity mercury (6N).

- External dimensions: Ø 32 mm - Length: 350 mm
- Interior dimensions (thermowell): Ø 8 mm - Length: 300 mm

The thermometer to be calibrated is placed in the mercury cell. In order to function properly, the complete assembled unit must be placed in a refrigerated bath, set to a temperature of approximately -39 °C. At the triple point temperature of mercury, thermal equilibrium is achieved between the metal's solid, liquid and gas phases. This equilibrium results in a temperature plateau of at least 4 hours.

Temperature maintenance device

Overflow calibration baths, operating with glycol water at a temperature set to slightly less than freezing point, are suitable for use with this cell and are particularly easy to use.



Water cell

Water +0.010 °C

Code: LA08645-001

At the triple point of pure water, the solid, liquid and gas phases coexist in thermal equilibrium. This temperature is unique and is equal to 0.010 °C or 273.16 K

The triple point of water holds a special place in metrology, given that the Kelvin is defined as 1/273.16 of the temperature of water at this point.

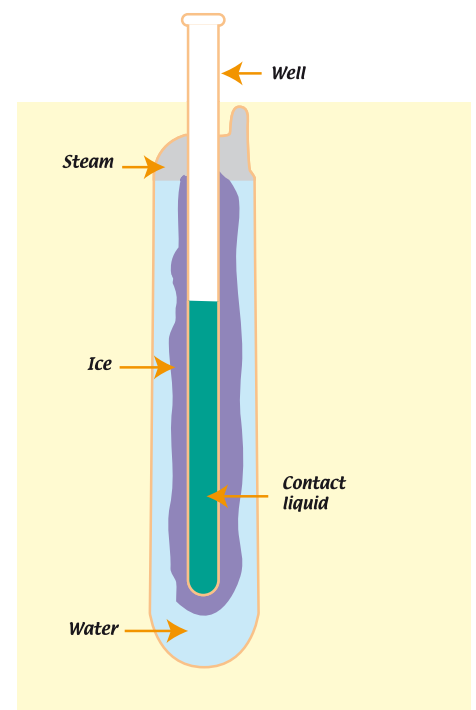
The sealed cell is composed of borosilicate glass. By introducing a contact liquid in the cell's well, thermal contact with the thermometer to be calibrated is improved.



Total length:	380 mm
Outside diameter:	40 mm
Inside diameter (thermowell)	12 mm
Uncertainty	± 0.0001 °C

Temperature maintenance device

Designed in accordance with INM specifications, this device enables you to operate the Water Cell in conditions close to those of primary standards laboratories, thus ensuring a temperature plateau with a high level of stability.



Gallium Cell

Gallium +29.7646 °C

Code: L915778-001

Manufactured
under BNM-INM
licence

Offers a temperature plateau of 10 hours minimum.
Cell tightness is achieved by sealing in an argon atmosphere. The external sheath and thermowell are composed of Teflon in order to allow for Gallium's high expansion coefficient.

- Gallium purity: 99.9999 %
- The cell is equipped with a valve enabling the triple point to be obtained.
- External dimensions: Ø 50 mm - Length: 400 mm
- Thermowell dimensions: Ø 8.7 mm - Length: 215 mm



*

Air furnace for Gallium Cell: PYGA™

Code: L915419-001

Electric furnace specially designed for use with Gallium cells by the BNM-INM

- Pulsated air furnace
- Light alloy casing - Stainless steel well
- Automatic temperature control system
- Safety system in case of overheating
- Dimensions: 310 x 310 x 610 mm
- Power supply: 230 V (50 Hz)
- Power: 640 W



*

* Photo credits: C. Le Toquin/Studio photo CNAM

Temperature maintenance apparatus for use with the ITS-90 fixed-point method

CELL	MANUFACTURED UNDER LICENCE	TEMPERATURE	FURNACE OR REFRIGERATION SYSTEM
MERCURY ⁽¹⁾	BNM-INM	-38.8344 °C	Overflow bath, °C
WATER ⁽¹⁾		+0.01 °C	Temperature maintenance apparatus
GALLIUM ⁽²⁾	BNM-INM	+29.7646 °C	PYGA™ furnace
INDIUM ⁽³⁾	BNM-INM	+156.5985 °C	PYMT™ furnace (see page 9)
TIN ⁽³⁾	BNM-INM	+231.928 °C	PYMT™ furnace (see page 9)
ZINC ⁽³⁾	BNM-INM	+419.527 °C	PYMT™ furnace (see page 9)
ALUMINIUM ⁽³⁾	BNM-INM	+660.323 °C	PYMT™ furnace (see page 9)
SILVER ⁽³⁾	BNM-INM	+961.78 °C	PYMT™ furnace (see page 9)

(1) triple point; (2) fusion point; (3) solidification point

Quartz sheath cells

Temperature plateaux of 5 to 10 hours
Accuracy to mK

Manufactured
under BNM-INM
licence

Silver	+961.78	°C
Aluminium	+660.323	°C
Zinc	+419.527	°C
Tin	+231.928	°C
Indium	+156.5985	°C



Principle

A pure metal melts and solidifies at a unique, precise temperature. When the thermal environmental conditions are correct and the quantity of metal used is sufficient, the latent heat absorbed or liberated during a phase change maintains the mass of metal enclosed in the cell, and the thermometer, at a constant temperature for a period of several hours.

Sealed cells

These cells, manufactured using metals of great purity, whose changes of phase serve as thermometric reference points, are sealed in an argon atmosphere that protects the metal used from all exterior pollution likely to cause deviations in the reference temperature.

The metal (approximately 110 cm³, with a purity level of 99.9999 %) is contained in a crucible of extremely pure graphite. Before final sealing, the cell is filled with pure argon, at a pressure equal to 101325 Pa at the melting point of the metal. The cell sheath, composed of quartz, has a frosted exterior so as to avoid reflection loss along its sides.

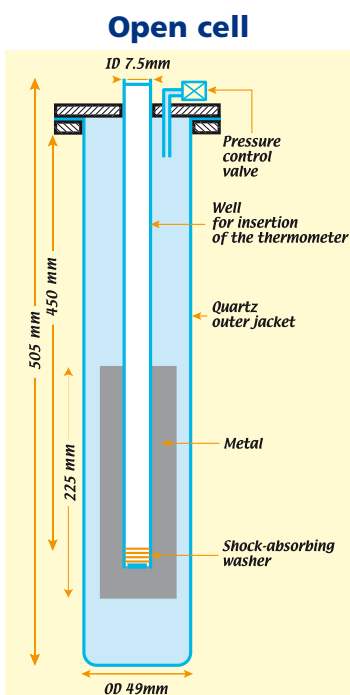
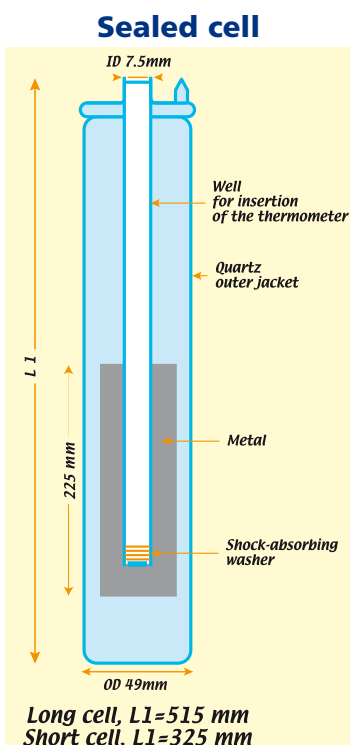
Open cells

Of identical specifications to sealed cells. A valve fitted to the head of the open cell enables the pressure at the interior of the cell to be controlled during the creation of the different phases of the fixed points.

Using open cells

The cell is put into the furnace and first of all heated to a temperature slightly higher than the melting point of the metal considered. Once stabilised, the reference temperature is fixed several degrees below that of the solidification point. When the temperature is close to the freezing point, solidification is triggered by inserting a stainless-steel rod in the well, or by momentarily withdrawing the cell from the furnace. The thermometer to be calibrated will first have been heated to a temperature a few tens of degrees below the freezing point so as to avoid any thermal shock.

There is then a solidification plateau that can last several hours - up to 10 hours - with a suitable furnace and regulation.



Each cell is delivered in its box

Metal	Sealed cell	Open cell
In	L915154-002	L918766-002
Sn	L915154-003	L918766-003
Zn	L915154-005	L918766-005
Al	L915154-007	L918766-007
Ag	L915154-008	L918766-008

FURNACES FOR FIXED-POINT CELLS

PYMT™ medium-temperature furnace*

Specially designed for use with the Zinc, Tin, and Indium fixed-point cells. The regulators and the power supply are mounted in a box independent of the furnace.

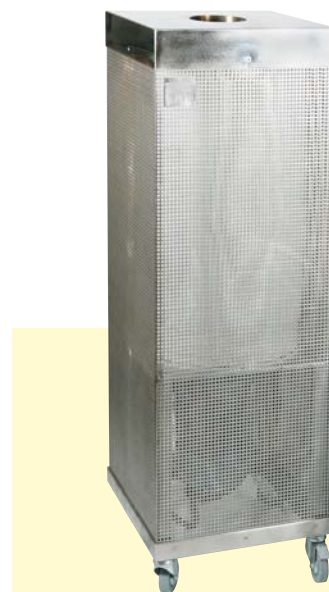
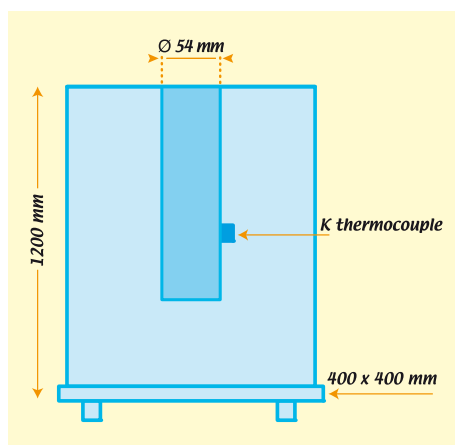
Code: L916899-001

Furnace: +50 °C to +430 °C

- Forced-air electric furnace
- Regulation by K thermocouple
- Working volume:
Ø 54 mm and depth 430 mm
- Dimensions:
400 x 400 x 1,200 mm
- Weight: 60 kg

Regulation box

- PID regulation with alarm
- Power supply and isolation transformer
- Power supply: 230 V (50 Hz)
- Power: 3 kW
- Overheating safety by fuse device



PYHT™ high-temperature furnace*

Specially designed for use with the Silver, Aluminium and Zinc fixed-point cells. The regulators and the power supply are mounted in a box independent of the furnace.

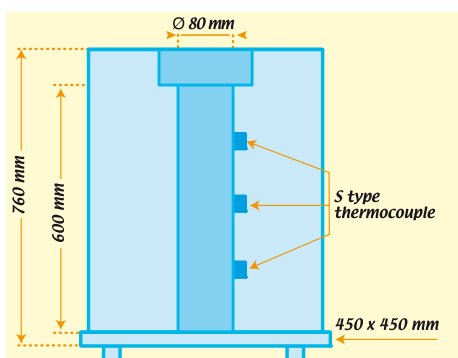
Code: L919108-001

Furnace: +300°C to +1,100°C

- Three resistance heating zones
- Regulation by S-type thermocouple in each zone
- Working volume:
Ø 80 mm and depth 600 mm
- Dimensions:
450 x 450 x 760 mm
- Weight: 70 kg

Regulation box

- Central zone regulator with heating rate adjustable to 1°C/hour
- Top and bottom zone regulators with set-points controlled by the central zone
- Adjustable overheating safety on each regulator
- Three thyristor power units with protection fuse
- Power supply and isolation transformer
- Power supply: 230 V (50 Hz)
- Power: 1.5 kW



Cell holder

Code: L918256-000

* Using equalisation units, it is also possible to calibrate temperature sensors by comparison.

CALIBRATION FURNACES

EXACAL laboratory furnace

Stability and precision from +50 °C to +1,200 °C *

Electric furnace for use in a horizontal position, with 3 heating zones. The calibration is performed in the central zone. Each zone has an S-type thermocouple connected to a high-stability PID indicator.

The separate box contains the regulators and the SCRs.

- Working volume: Ø 50 mm - depth 900 mm
- Equalisation mass matched to the sensors to be calibrated
- Homogeneity at 1,000 °C (with mass):
 - radial: ± 0.8 °C between wells
 - longitudinal: ± 0.2 °C in 20 mm
- Stability at 1,000 °C: ± 0.05 °C for 1 hour
- Power supply: 230 V (50 Hz)
- Power: 2.5 kW

* Range of use, to be specified with order: +50 °C to +500 °C or +500 °C to +1,200 °C



Furnace

- Dimensions: 360 x 300 x 900 mm
- Weight: 40 kg

Regulation unit

- Dimensions: 200 x 500 x 500 mm
- Weight: 30 kg

TRANSCAL field furnaces

Easily transported for on-site calibration from + 50 °C to + 1,100 °C

Electric resistance furnaces with built-in PID regulator. The large depth of penetration of the sensor (180 mm) combined with the action of a PID regulator allow precise calibrations. The presence of a blower shortens the cooling time and makes it possible to perform successive calibrations in shorter times.

The sensor(s) to be calibrated are placed in the inserts and the standard thermometer in the Ø 8 mm hole in the centre. The sensors are connected to a digital thermometer. The readings of the standard thermometer are compared to those of the sensors to be calibrated. The various set-points are programmed either directly on the regulator or using a PC, via the RS485 port.

- Working volume: Ø 30 mm – Depth: 180 mm
- Equalising mass adapted to sensors to be calibrated
- Homogeneity (1): ± 0.2 °C
- Stability (1) (2): ± 0.15 °C in 10 mm
- Power supply: 230 V (50 Hz)
- Power: 1.6 kW or 1.9 kW depending on model
- RS485 interface

(1) at 500 °C for the model T.550 and 1,000 °C for the T.1100

(2) Model T.1100, stability ± 0.3 °C in 10 mm



TRANSCAL 550:

+50 °C to +550 °C

Code: L919255-001

TRANSCAL 1100:

+500 °C to +1,100 °C

Code: L919025-001

- Dimensions: 200 x 265 x 335 mm
- Weight: 8 or 9 kg (depending on model)
- Option: Carrying case

SURFACAL TEMPERATURE REFERENCE

SURFACAL: +35 °C to +300 °C

Manufactured under BNM-LNE licence

The SURFACAL temperature reference generates a surface temperature by heating a metal plate, in order to calibrate surface sensors under conditions as close as possible to their normal conditions of use.

SURFACAL can be used as readily in a metrology laboratory as at a production site.

Made under BNM-LNE licence

SURFACAL is compact, robust, and transportable for field use. It can be used in a horizontal or vertical position.

Its range of use extends from +35 °C to +300 °C.

Two surfaces 90 mm in diameter are proposed: 316L stainless steel or aluminium.

Interchangeability is easy.

SURFACAL comes with a User Guide that explains the protocols to be observed. Training in calibration by the SURFACAL method is provided by specialists from the LNE.

Calibration by comparison to national references

The calibration method is based on the comparison principle, with COFRAC comparison of the resources used. The temperature read by the sensor to be calibrated is compared to the temperature of the standard surface as indicated by the reference probe (Pt100, which can be linked to a reader: see options).

On request, the apparatus is calibrated by the LNE and linked to the International System of Units (SI). An LNE Certificate of Calibration at 4 points (+50 °C, +100 °C, +200 °C, and +300 °C) is provided.

The advantages of the SURFACAL method

- Know, the difference between the temperature reading and the true temperature of a given surface.
- Help the user achieve a better understanding and control of a process or application.
- Satisfy the ISO standard by establishing the link to the International System of Units.

The old way of calibrating surface temperature sensors was comparison with a conventional standard sensor in a liquid bath or an enclosure. This method was not altogether representative of the use then made of the device in the application.

The calibration was done correctly, but the value indicated by the sensor in normal use was very different from the true value of the surface to be measured.

The sensors concerned

The sensors for which surface temperature calibration is appropriate are those of which the absolute value "I Corr - U I" of the calibration correction "Corr" minus the uncertainty U (with k=2) is less than or equal to the values given in the table below:

Surface temperature ranges (T_{surf})	I Corr -U I, less than or equal to:
$35\text{ °C} < T_{surf} < 100\text{ °C}$	3 °C for aluminium 4 °C for stainless steel
$100\text{ °C} < T_{surf} < 300\text{ °C}$	3 % for aluminium 4 % for stainless steel

In practice, it is recommended that the sensitive part (for example, the hot spot of the thermocouple) should be in direct contact with the plate.



Characteristics

- Temperature range: +35 °C to +300 °C
- Accuracy $\pm 0.6\text{ °C}$ to $\pm 2.8\text{ °C}$
- Regulation temperature displayed on front panel, resolution 0.1 °C.
- Stabilisation time: 1h (rise from +35 °C to +300 °C)
- Stability: < 0.2 °C (Aluminium at 150 °C)
- Homogeneity: < 0.5 °C (Aluminium at 150 °C)
- Dimensions: 400 x 300 x 200 mm
- Weight: 8.7 kg
- Power supply: 230 V mains

Codes:

SURFACAL

calibrated by Cofrac at 2 points (50 °C, 300 °C)

Code: L918763-001

Accessories

- Stainless-steel reference surface, calibrated by Cofrac at 2 points (50 °C, 300 °C)
Code: LEL1694-001
- Aluminium reference surface, calibrated by Cofrac at 2 points (50 °C, 300 °C)
Code: LEL1694-002
- Pt100 sensor calibrated by Cofrac
Code: L330121-508

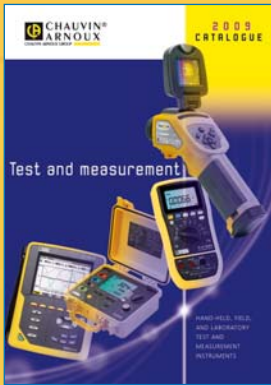
Options

- C.A 63 Pt100 calibrator
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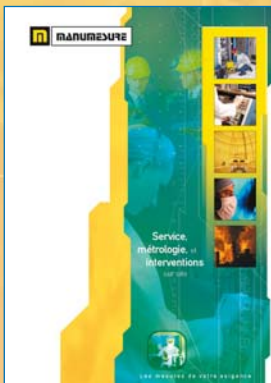
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