

# CERTIFICADO DE CALIBRACIÓN / CALIBRATION CERTIFICATE

**INNOVATECIS CIA LTDA**

General José María Guerrero N69-170 y Alfonso del Hierro

Quito, Ecuador

(+593) 02 6040 607

innovatec@innovatec.com.ec

**Certificado No. (Certificate #):** 60013

**Fecha de Recepción (Reception Date):** 2025-08-22

**Fecha de Calibración (Calibration Date):** 2025-08-22

**Próxima Fecha de Calibración (Calibration Due):** 2026-08

**Fecha de Emisión (Emission Date):** 2025-08-22

**Cliente (Client):** CONSTRUCCIONES Y PRESTACIONES PETROLERAS S.A. CPP  
LA CORUÑA N28-14 Y MANUEL ITURREY, QUITO, PICHINCHA

## Información del Instrumento (Instrument Information)

|                             |                    |                            |               |                                |                  |
|-----------------------------|--------------------|----------------------------|---------------|--------------------------------|------------------|
| <b>Equipo (Instrument):</b> | HORNO DE POZO SECO | <b>Int. de Medición:</b>   | (50 a 600) °C | <b>Ubicación:</b>              | *****            |
| <b>Marca (Brand):</b>       | FLUKE              | <b>(Measurement Range)</b> |               | <b>(Location):</b>             |                  |
| <b>Modelo (Model):</b>      | 9144               | <b>División de escala:</b> | 0.01 °C       | <b>Lugar de Calibración:</b>   | Lab. INNOVATEC   |
|                             |                    | <b>(Resolution)</b>        |               | <b>(Place of Calibration):</b> | INNOVATEC's Lab. |
| <b>Serie/Código:</b>        | B3A443 / *****     |                            |               |                                |                  |

## Datos de Calibración (Calibration Info)

**Procedimiento (Procedure):** INN-PC-29

## Condiciones Ambientales (Environmental Conditions)

**Temp. Inicial (Initial Temp.):** 21.14 °C

**Hum. Inicial (Initial Hum.):** 62.15 %HR

**Temp. Final (Final Temp.):** 21.92 °C

**Hum. Final (Final Hum.):** 61.77 %HR

## Trazabilidad (Traceability Info)

| Patrón (Standard)   | Marca (Brand) | Cert. #       | Última Calibración (Last Cal.) | Periodo (Period) |
|---------------------|---------------|---------------|--------------------------------|------------------|
| PRT                 | ISOTECH       | AC-31859      | 2025-06-30                     | 2                |
| Advanced Multimeter | Transmille    | 51065         | 2024-03-26                     | 2                |
| Termocupla          | -             | 51731 / 51732 | 2024-11-26                     | 1                |
| -                   | -             | -             | -                              | -                |
| -                   | -             | -             | -                              | -                |
| -                   | -             | -             | -                              | -                |

## Resultados (Results)

Ver Resultados en Hoja Adjunta

See results in attached Sheet

El presente Certificado de Calibración posee la trazabilidad en esta magnitud hacia el Patrón Nacional, a través de la realización de la unidad de medida en el NPL, NIST, u otro Laboratorio Nacional reconocido al Sistema Internacional de Medidas. La calibración fue realizada bajo un Sistema de Gestión de Laboratorio conforme a la Norma ISO/IEC 17025:2017. Los resultados y su incertidumbre reportada con un nivel de confianza de  $k=2$ , 95% son relacionados a este instrumento y en el tiempo que se realizó las medidas. Este Laboratorio no se responsabiliza de los perjuicios que pueda ocasionar el uso inadecuado del instrumento calibrado. La reproducción parcial es prohibida, la reproducción total deberá hacerse con la autorización escrita aprobada por INNOVATEC Industrial Solutions. *This Certificate of Calibration provides traceability of measurement to the National Standard, through units of measurement realized at the NPL, NIST or other recognized National Standard Laboratories to the International System of Units. The calibration was performed under a Laboratory Management System in accordance with the ISO/IEC 17025:2017 Standard. The results and the reported uncertainty at a confidence level of  $k=2$ , 95% are related only to this instrument and at the time of measurement. This Laboratory is not responsible for any damages that may result from improper use of the calibrated instrument. Partial reproduction is forbidden, the total reproduction must have an approved written authorization by INNOVATEC Industrial Solutions.*

**Comentarios:** Los resultados son un promedio de los datos tomados durante la calibración.

**Comments**

**Calibrado por:** Ing. Patricio Llerena  
**Calibrated by:**

**Aprobado por:**  
**Approved by:**



**Fin de Certificado (End of Certificate)**

| Certificado No.:      | 60013                | Equipo (Instrument): HORNO DE POZO SECO |                  |                         |                            |                             |                                |
|-----------------------|----------------------|---|------------------|-------------------------|----------------------------|-----------------------------|--------------------------------|
| Fecha de Calibración: | 2025-08-22           | Marca (Brand): FLUKE                    |                  |                         |                            |                             |                                |
| Nominal<br>(Nominal)  | Patrón<br>(Standard) | UBP<br>(UUT)                            | Error<br>(Error) | Precisión<br>(Accuracy) | Estabilidad<br>(Stability) | Uniformidad<br>(Uniformity) | Incertidumbre<br>(Uncertainty) |
| 50 °C                 | 49.907 °C            | 50 °C                                   | 0.089 °C         | ± 0.5 °C                | 0.027 °C                   | 0.015 °C                    | ± 0.03 °C                      |
| 200 °C                | 201.769 °C           | 200 °C                                  | -1.769 °C        | ± 0.5 °C                | 0.028 °C                   | 0.015 °C                    | ± 0.07 °C                      |
| 400 °C                | 401.813 °C           | 400 °C                                  | -1.816 °C        | ± 0.5 °C                | 0.027 °C                   | 0.020 °C                    | ± 0.07 °C                      |
| 600 °C                | 604.034 °C           | 600.01 °C                               | -4.028 °C        | ± 0.5 °C                | 0.036 °C                   | 0.02 °C                     | ± 0.07 °C                      |

Diagram de Posición de Sensores (Sensor Position Diagram)

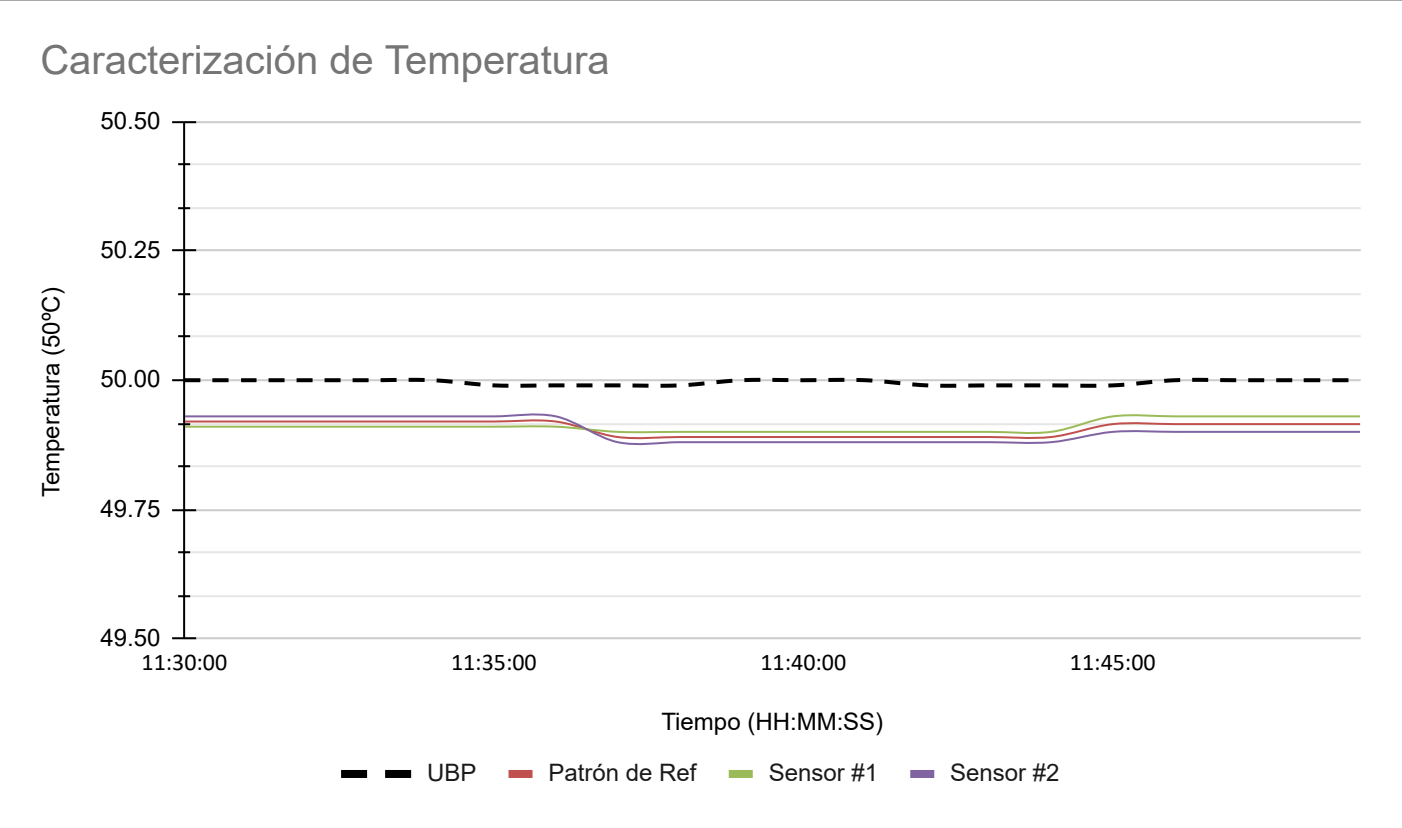


- Leyenda:**
- 1: Patrón de Referencia
  - 2: Sensor #1
  - 2: Sensor #2

Las imagenes utilizadas solo son un ejemplo de lo puntos de medida empleados y posición de los sensores.

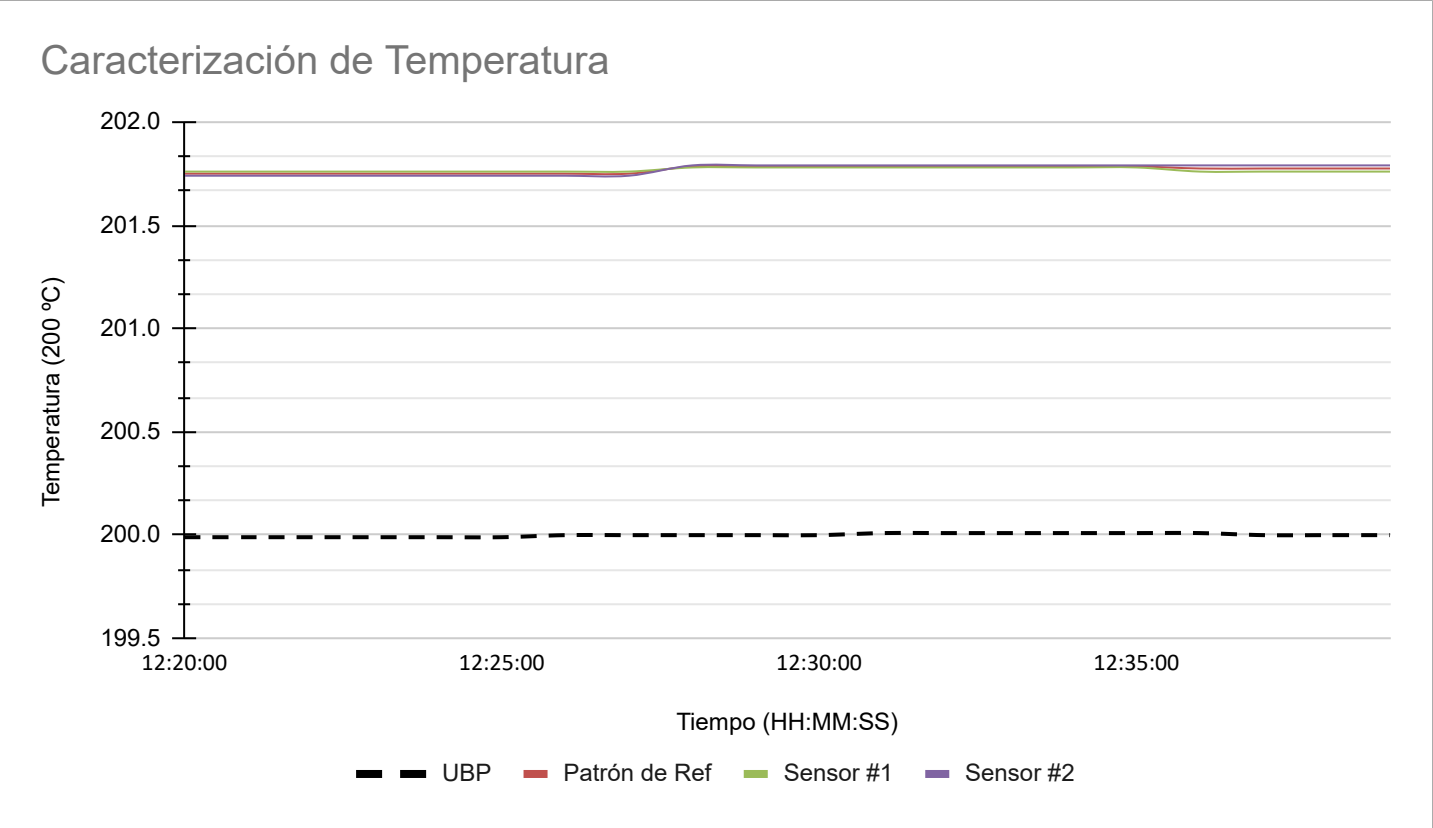
| Hora<br>(Time) | UBP<br>(UUT) | Patrón de Ref<br>(Ref. Standard) | Sensor #1<br>(Sensor #1) | Sensor #2<br>(Sensor #2) | Sensor #3<br>(Sensor #3) | Sensor #4<br>(Sensor #4) | Sensor #5<br>(Sensor #5) | Sensor #6<br>(Sensor #6) | Sensor #7<br>(Sensor #7) | Sensor #8<br>(Sensor #8) | Error<br>(Error) |
|----------------|--------------|----------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------------|
| 11:30:00       | 50.00 °C     | 49.92 °C                         | 49.910 °C                | 49.930 °C                | -                        | -                        | -                        | -                        | -                        | -                        | 0.08 °C          |
| 11:31:00       | 50.00 °C     | 49.92 °C                         | 49.910 °C                | 49.930 °C                | -                        | -                        | -                        | -                        | -                        | -                        | 0.08 °C          |
| 11:32:00       | 50.00 °C     | 49.92 °C                         | 49.910 °C                | 49.930 °C                | -                        | -                        | -                        | -                        | -                        | -                        | 0.08 °C          |
| 11:33:00       | 50.00 °C     | 49.920 °C                        | 49.910 °C                | 49.930 °C                | -                        | -                        | -                        | -                        | -                        | -                        | 0.080 °C         |
| 11:34:00       | 50.00 °C     | 49.92 °C                         | 49.910 °C                | 49.930 °C                | -                        | -                        | -                        | -                        | -                        | -                        | 0.08 °C          |
| 11:35:00       | 50.00 °C     | 49.92 °C                         | 49.910 °C                | 49.930 °C                | -                        | -                        | -                        | -                        | -                        | -                        | 0.07 °C          |
| 11:36:00       | 50.00 °C     | 49.920 °C                        | 49.910 °C                | 49.930 °C                | -                        | -                        | -                        | -                        | -                        | -                        | 0.070 °C         |
| 11:37:00       | 50.00 °C     | 49.890 °C                        | 49.90 °C                 | 49.880 °C                | -                        | -                        | -                        | -                        | -                        | -                        | 0.10 °C          |
| 11:38:00       | 50.00 °C     | 49.890 °C                        | 49.90 °C                 | 49.880 °C                | -                        | -                        | -                        | -                        | -                        | -                        | 0.10 °C          |
| 11:39:00       | 50.00 °C     | 49.89 °C                         | 49.90 °C                 | 49.880 °C                | -                        | -                        | -                        | -                        | -                        | -                        | 0.11 °C          |
| 11:40:00       | 50.00 °C     | 49.890 °C                        | 49.90 °C                 | 49.880 °C                | -                        | -                        | -                        | -                        | -                        | -                        | 0.110 °C         |
| 11:41:00       | 50.00 °C     | 49.89 °C                         | 49.90 °C                 | 49.880 °C                | -                        | -                        | -                        | -                        | -                        | -                        | 0.110 °C         |
| 11:42:00       | 50.00 °C     | 49.89 °C                         | 49.90 °C                 | 49.880 °C                | -                        | -                        | -                        | -                        | -                        | -                        | 0.1 °C           |
| 11:43:00       | 50.00 °C     | 49.89 °C                         | 49.90 °C                 | 49.880 °C                | -                        | -                        | -                        | -                        | -                        | -                        | 0.1 °C           |
| 11:44:00       | 50.00 °C     | 49.890 °C                        | 49.90 °C                 | 49.880 °C                | -                        | -                        | -                        | -                        | -                        | -                        | 0.10 °C          |
| 11:45:00       | 50.00 °C     | 49.915 °C                        | 49.930 °C                | 49.90 °C                 | -                        | -                        | -                        | -                        | -                        | -                        | 0.075 °C         |
| 11:46:00       | 50.00 °C     | 49.915 °C                        | 49.930 °C                | 49.90 °C                 | -                        | -                        | -                        | -                        | -                        | -                        | 0.085 °C         |
| 11:47:00       | 50.00 °C     | 49.915 °C                        | 49.930 °C                | 49.90 °C                 | -                        | -                        | -                        | -                        | -                        | -                        | 0.085 °C         |
| 11:48:00       | 50.00 °C     | 49.915 °C                        | 49.930 °C                | 49.90 °C                 | -                        | -                        | -                        | -                        | -                        | -                        | 0.085 °C         |
| 11:49:00       | 50.00 °C     | 49.915 °C                        | 49.930 °C                | 49.90 °C                 | -                        | -                        | -                        | -                        | -                        | -                        | 0.085 °C         |

Graficos (Graphs):



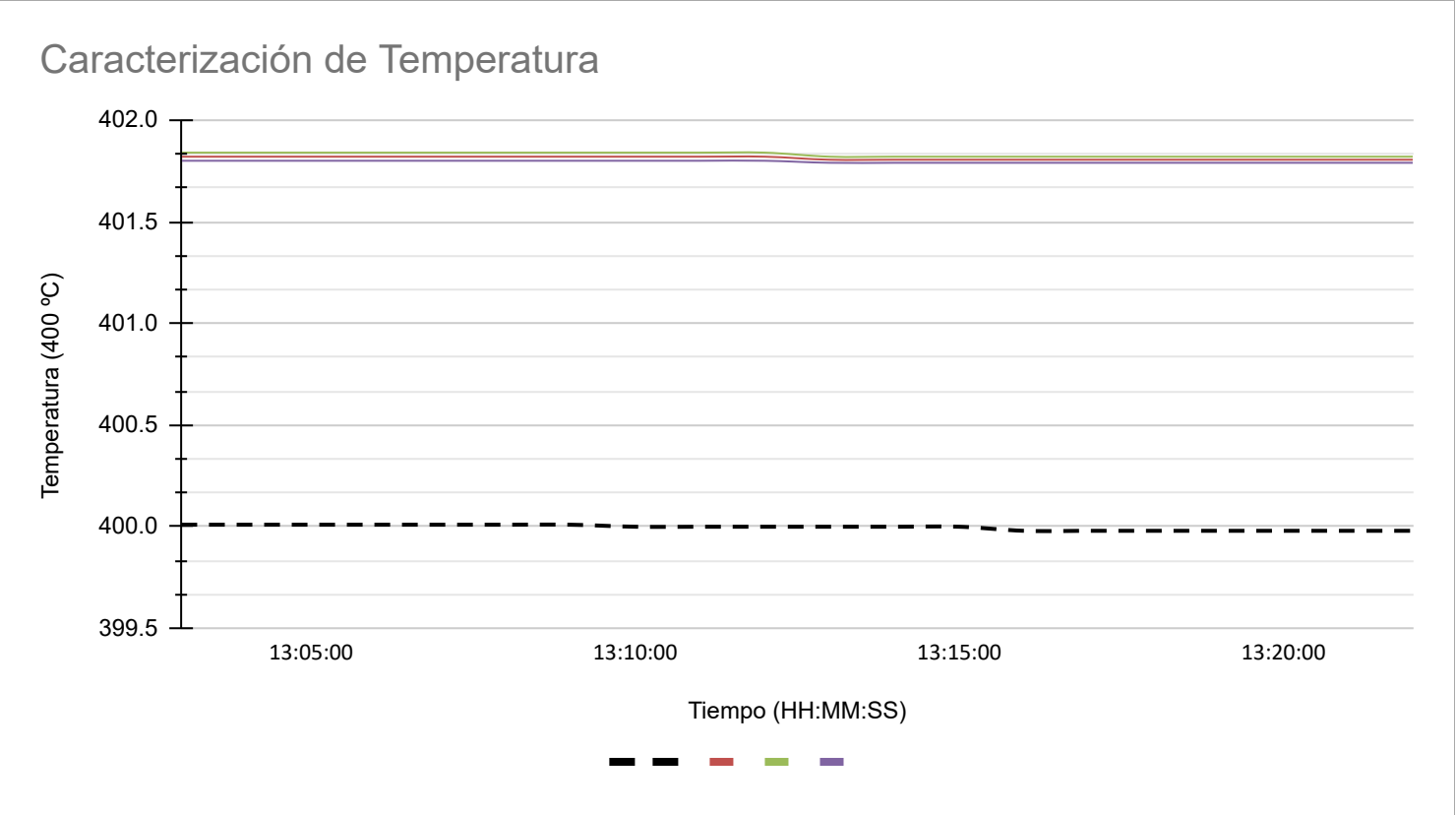
| Hora<br>(Time) | UBP<br>(UUT) | Patrón de Ref<br>(Ref. Standard) | Sensor #1<br>(Sensor #1) | Sensor #2<br>(Sensor #2) | Sensor #3<br>(Sensor #3) | Sensor #4<br>(Sensor #4) | Sensor #5<br>(Sensor #5) | Sensor #6<br>(Sensor #6) | Sensor #7<br>(Sensor #7) | Sensor #8<br>(Sensor #8) | Error<br>(Error) |
|----------------|--------------|----------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------------|
| 12:20:00       | 199.99 °C    | 201.750 °C                       | 201.760 °C               | 201.740 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -1.760 °C        |
| 12:21:00       | 199.99 °C    | 201.750 °C                       | 201.760 °C               | 201.740 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -1.760 °C        |
| 12:22:00       | 199.99 °C    | 201.750 °C                       | 201.760 °C               | 201.740 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -1.760 °C        |
| 12:23:00       | 199.99 °C    | 201.750 °C                       | 201.760 °C               | 201.740 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -1.760 °C        |
| 12:24:00       | 199.99 °C    | 201.75 °C                        | 201.760 °C               | 201.740 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -1.76 °C         |
| 12:25:00       | 199.99 °C    | 201.750 °C                       | 201.760 °C               | 201.740 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -1.760 °C        |
| 12:26:00       | 200.00 °C    | 201.750 °C                       | 201.760 °C               | 201.740 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -1.750 °C        |
| 12:27:00       | 200.00 °C    | 201.75 °C                        | 201.760 °C               | 201.740 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -1.75 °C         |
| 12:28:00       | 200 °C       | 201.785 °C                       | 201.780 °C               | 201.790 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -1.785 °C        |
| 12:29:00       | 200.00 °C    | 201.785 °C                       | 201.780 °C               | 201.790 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -1.785 °C        |
| 12:30:00       | 200.00 °C    | 201.785 °C                       | 201.780 °C               | 201.790 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -1.785 °C        |
| 12:31:00       | 200.01 °C    | 201.785 °C                       | 201.780 °C               | 201.790 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -1.775 °C        |
| 12:32:00       | 200.01 °C    | 201.785 °C                       | 201.780 °C               | 201.790 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -1.775 °C        |
| 12:33:00       | 200.01 °C    | 201.785 °C                       | 201.780 °C               | 201.790 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -1.775 °C        |
| 12:34:00       | 200.01 °C    | 201.785 °C                       | 201.780 °C               | 201.790 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -1.775 °C        |
| 12:35:00       | 200.010 °C   | 201.785 °C                       | 201.780 °C               | 201.790 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -1.775 °C        |
| 12:36:00       | 200.01 °C    | 201.775 °C                       | 201.760 °C               | 201.790 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -1.765 °C        |
| 12:37:00       | 200.00 °C    | 201.775 °C                       | 201.760 °C               | 201.790 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -1.775 °C        |
| 12:38:00       | 200.00 °C    | 201.775 °C                       | 201.760 °C               | 201.790 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -1.775 °C        |
| 12:39:00       | 200.00 °C    | 201.775 °C                       | 201.760 °C               | 201.790 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -1.775 °C        |

Graficos (Graphs):



| Hora<br>(Time) | UBP<br>(UUT) | Patrón de Ref<br>(Ref. Standard) | Sensor #1<br>(Sensor #1) | Sensor #2<br>(Sensor #2) | Sensor #3<br>(Sensor #3) | Sensor #4<br>(Sensor #4) | Sensor #5<br>(Sensor #5) | Sensor #6<br>(Sensor #6) | Sensor #7<br>(Sensor #7) | Sensor #8<br>(Sensor #8) | Error<br>(Error) |
|----------------|--------------|----------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------------|
| 12:03:00 PM    | 400.01 °C    | 401.82 °C                        | 401.840 °C               | 401.80 °C                |                          |                          |                          |                          |                          |                          | -1.81 °C         |
| 12:04:00 PM    | 400.00 °C    | 401.82 °C                        | 401.840 °C               | 401.80 °C                |                          |                          |                          |                          |                          |                          | -1.81 °C         |
| 12:05:00 PM    | 400.00 °C    | 401.82 °C                        | 401.840 °C               | 401.80 °C                |                          |                          |                          |                          |                          |                          | -1.81 °C         |
| 12:06:00 PM    | 399.99 °C    | 401.82 °C                        | 401.840 °C               | 401.80 °C                |                          |                          |                          |                          |                          |                          | -1.81 °C         |
| 12:07:00 PM    | 400.02 °C    | 401.82 °C                        | 401.840 °C               | 401.80 °C                |                          |                          |                          |                          |                          |                          | -1.81 °C         |
| 12:08:00 PM    | 400.01 °C    | 401.82 °C                        | 401.840 °C               | 401.80 °C                |                          |                          |                          |                          |                          |                          | -1.81 °C         |
| 12:09:00 PM    | 399.99 °C    | 401.82 °C                        | 401.840 °C               | 401.80 °C                |                          |                          |                          |                          |                          |                          | -1.81 °C         |
| 12:10:00 PM    | 400.00 °C    | 401.82 °C                        | 401.840 °C               | 401.80 °C                |                          |                          |                          |                          |                          |                          | -1.82 °C         |
| 12:11:00 PM    | 400.01 °C    | 401.82 °C                        | 401.840 °C               | 401.80 °C                |                          |                          |                          |                          |                          |                          | -1.82 °C         |
| 12:12:00 PM    | 400.01 °C    | 401.82 °C                        | 401.840 °C               | 401.80 °C                |                          |                          |                          |                          |                          |                          | -1.82 °C         |
| 12:13:00 PM    | 400.01 °C    | 401.805 °C                       | 401.820 °C               | 401.790 °C               |                          |                          |                          |                          |                          |                          | -1.805 °C        |
| 12:14:00 PM    | 400.02 °C    | 401.805 °C                       | 401.820 °C               | 401.790 °C               |                          |                          |                          |                          |                          |                          | -1.805 °C        |
| 12:15:00 PM    | 399.99 °C    | 401.805 °C                       | 401.820 °C               | 401.790 °C               |                          |                          |                          |                          |                          |                          | -1.805 °C        |
| 12:16:00 PM    | 399.99 °C    | 401.805 °C                       | 401.820 °C               | 401.790 °C               |                          |                          |                          |                          |                          |                          | -1.825 °C        |
| 12:17:00 PM    | 400.00 °C    | 401.805 °C                       | 401.820 °C               | 401.790 °C               |                          |                          |                          |                          |                          |                          | -1.825 °C        |
| 12:18:00 PM    | 399.99 °C    | 401.805 °C                       | 401.820 °C               | 401.790 °C               |                          |                          |                          |                          |                          |                          | -1.825 °C        |
| 12:19:00 PM    | 399.97 °C    | 401.805 °C                       | 401.820 °C               | 401.790 °C               |                          |                          |                          |                          |                          |                          | -1.825 °C        |
| 12:20:00 PM    | 399.98 °C    | 401.805 °C                       | 401.820 °C               | 401.790 °C               |                          |                          |                          |                          |                          |                          | -1.825 °C        |
| 12:21:00 PM    | 400.01 °C    | 401.805 °C                       | 401.820 °C               | 401.790 °C               |                          |                          |                          |                          |                          |                          | -1.825 °C        |
| 12:22:00 PM    | 400.01 °C    | 401.805 °C                       | 401.820 °C               | 401.790 °C               |                          |                          |                          |                          |                          |                          | -1.825 °C        |

Graficos (Graphs):



| Hora<br>(Time) | UBP<br>(UUT) | Patrón de Ref<br>(Ref. Standard) | Sensor #1<br>(Sensor #1) | Sensor #2<br>(Sensor #2) | Sensor #3<br>(Sensor #3) | Sensor #4<br>(Sensor #4) | Sensor #5<br>(Sensor #5) | Sensor #6<br>(Sensor #6) | Sensor #7<br>(Sensor #7) | Sensor #8<br>(Sensor #8) | Error<br>(Error) |
|----------------|--------------|----------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|------------------|
| 11:00:00 AM    | 600.020 °C   | 604.025 °C                       | 604.020 °C               | 604.030 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -4.005 °C        |
| 11:02:00 AM    | 600.020 °C   | 604.025 °C                       | 604.020 °C               | 604.030 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -4.005 °C        |
| 11:04:00 AM    | 600.020 °C   | 604.025 °C                       | 604.020 °C               | 604.030 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -4.005 °C        |
| 11:06:00 AM    | 600.02 °C    | 604.025 °C                       | 604.020 °C               | 604.030 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -4.005 °C        |
| 11:08:00 AM    | 600.02 °C    | 604.025 °C                       | 604.020 °C               | 604.030 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -4.005 °C        |
| 11:11:00 AM    | 600.02 °C    | 604.025 °C                       | 604.020 °C               | 604.030 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -4.005 °C        |
| 11:12:00 AM    | 600.02 °C    | 604.025 °C                       | 604.020 °C               | 604.030 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -4.005 °C        |
| 11:14:00 AM    | 600.02 °C    | 604.025 °C                       | 604.020 °C               | 604.030 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -4.005 °C        |
| 11:16:00 AM    | 600.02 °C    | 604.025 °C                       | 604.020 °C               | 604.030 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -4.005 °C        |
| 11:18:00 AM    | 600.02 °C    | 604.025 °C                       | 604.020 °C               | 604.030 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -4.005 °C        |
| 11:20:00 AM    | 599.98 °C    | 604.025 °C                       | 604.020 °C               | 604.030 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -4.045 °C        |
| 11:22:00 AM    | 599.98 °C    | 604.025 °C                       | 604.020 °C               | 604.030 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -4.045 °C        |
| 11:24:00 AM    | 599.98 °C    | 604.025 °C                       | 604.020 °C               | 604.030 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -4.045 °C        |
| 11:26:00 AM    | 599.98 °C    | 604.05 °C                        | 604.030 °C               | 604.070 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -4.07 °C         |
| 11:28:00 AM    | 599.98 °C    | 604.05 °C                        | 604.030 °C               | 604.070 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -4.07 °C         |
| 11:30:00 AM    | 599.98 °C    | 604.05 °C                        | 604.030 °C               | 604.070 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -4.07 °C         |
| 11:32:00 AM    | 600.01 °C    | 604.05 °C                        | 604.030 °C               | 604.070 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -4.04 °C         |
| 11:34:00 AM    | 600.01 °C    | 604.05 °C                        | 604.030 °C               | 604.070 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -4.04 °C         |
| 11:36:00 AM    | 600.01 °C    | 604.05 °C                        | 604.030 °C               | 604.070 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -4.04 °C         |
| 11:38:00 AM    | 600.01 °C    | 604.05 °C                        | 604.030 °C               | 604.070 °C               | -                        | -                        | -                        | -                        | -                        | -                        | -4.04 °C         |

Graficos (Graphs):

