

# 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 #):** 64504-A

**Fecha de Recepción (Reception Date):** 2025-12-18

**Fecha de Calibración (Calibration Date):** 2025-12-18

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

**Fecha de Emisión (Emission Date):** 2025-12-18

**Cliente (Client):** TECNOVA S.A.  
Parque Industrial Pascuales km 16.5 vía Daule. Guayaquil, Guayas

**Información del Instrumento (Instrument Information)**

|                             |                         |                                                 |                 |                                                         |                                   |
|-----------------------------|-------------------------|-------------------------------------------------|-----------------|---------------------------------------------------------|-----------------------------------|
| <b>Equipo (Instrument):</b> | Módulo de Ciclo de Vida | <b>Int. de Medición:</b><br>(Measurement Range) | 18 VDC; 25 ADC  | <b>Ubicación:</b><br>(Location)                         | Laboratorio de Ensayos Eléctricos |
| <b>Marca (Brand):</b>       | Bitrode                 |                                                 |                 |                                                         |                                   |
| <b>Modelo (Model):</b>      | CV8-25-12               | <b>División de escala:</b><br>(Resolution)      | 0.001 V; 0.01 A | <b>Lugar de Calibración:</b><br>(Place of Calibration): | In Situ<br>On Site                |
| <b>Serie (Serial #):</b>    | 119054                  |                                                 |                 |                                                         |                                   |

**Datos de Calibración (Calibration Info)**
**Procedimiento (Procedure):** INN-PC-08

**Condiciones Ambientales (Environmental Conditions)**
**Temperatura (Temp):** (24.1 °C a 23.4 °C)

**Humedad (Humidity):** (56.9 %HR a 58.3 %HR)

**Trazabilidad (Traceability Info)**

| Patrón (Standard)   | Marca (Brand) | Cert. # | Última Calibración (Last Cal.) | Período (Period) |
|---------------------|---------------|---------|--------------------------------|------------------|
| Mult-Calibrador     | Transmille    | 58472   | 2025-07-03                     | 2 años           |
| Multímetro Patrón   | FLUKE         | 54314   | 2025-01-07                     | 1 año            |
| Pinza Amperimétrica | FLUKE         | 54318   | 2025-05-07                     | 1 año            |

**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:** Código: CV005. Certificado corresponde a la calibración de las líneas 17 al 32 (16 líneas). Este certificado reemplaza al certificado número 64504, versión única corregida.  
**Comments**

**Calibrado por:** Ing. Mauricio Landivar  
**Calibrated by:**

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


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

Certificado No.:

64504-A

Equipo (Instrument):

Módulo de Ciclo de Vida

Fecha de Calibración:

2025-12-18

Marca (Brand):

Bitrode

| Tipo (Type)      | Rango (Range) | Patrón (Standard) | UBP (UUT) | Error (Error) | Incertidumbre (Uncertainty) |
|------------------|---------------|-------------------|-----------|---------------|-----------------------------|
| LINEA 17 - CV005 | 18 V          | 10.500 V          | 10.520 V  | 0.020 V       | ± 7.8 mV                    |
| LINEA 17 - CV005 | 18 V          | 12.700 V          | 12.701 V  | 0.001 V       | ± 7.8 mV                    |
| LINEA 17 - CV005 | 18 V          | 16.000 V          | 16.001 V  | 0.001 V       | ± 7.8 mV                    |
| LINEA 17 - CV005 | 18 V          | 18.000 V          | 18.014 V  | 0.014 V       | ± 7.8 mV                    |
| LINEA 17 - CV005 | 25 A          | 2.519 A           | 2.50 A    | -0.019 A      | ± 8.5 mA                    |
| LINEA 17 - CV005 | 25 A          | 12.576 A          | 12.50 A   | -0.076 A      | ± 8.5 mA                    |
| LINEA 17 - CV005 | 25 A          | 22.626 A          | 22.50 A   | -0.126 A      | ± 8.5 mA                    |
| LINEA 18 - CV005 | 18 V          | 10.500 V          | 10.526 V  | 0.026 V       | ± 7.8 mV                    |
| LINEA 18 - CV005 | 18 V          | 12.700 V          | 12.731 V  | 0.031 V       | ± 7.8 mV                    |
| LINEA 18 - CV005 | 18 V          | 16.000 V          | 16.027 V  | 0.027 V       | ± 7.8 mV                    |
| LINEA 18 - CV005 | 18 V          | 18.000 V          | 18.030 V  | 0.030 V       | ± 7.8 mV                    |
| LINEA 18 - CV005 | 25 A          | 2.510 A           | 2.50 A    | -0.010 A      | ± 8.5 mA                    |
| LINEA 18 - CV005 | 25 A          | 12.585 A          | 12.50 A   | -0.085 A      | ± 8.5 mA                    |
| LINEA 18 - CV005 | 25 A          | 22.656 A          | 22.50 A   | -0.156 A      | ± 8.5 mA                    |
| LINEA 19 - CV005 | 18 V          | 10.500 V          | 10.527 V  | 0.027 V       | ± 7.8 mV                    |
| LINEA 19 - CV005 | 18 V          | 12.700 V          | 12.722 V  | 0.022 V       | ± 7.8 mV                    |
| LINEA 19 - CV005 | 18 V          | 16.000 V          | 16.012 V  | 0.012 V       | ± 7.8 mV                    |
| LINEA 19 - CV005 | 18 V          | 18.000 V          | 18.006 V  | 0.006 V       | ± 7.8 mV                    |
| LINEA 19 - CV005 | 25 A          | 2.507 A           | 2.50 A    | -0.007 A      | ± 8.5 mA                    |
| LINEA 19 - CV005 | 25 A          | 12.541 A          | 12.50 A   | -0.041 A      | ± 8.5 mA                    |
| LINEA 19 - CV005 | 25 A          | 22.571 A          | 22.50 A   | -0.071 A      | ± 8.5 mA                    |
| LINEA 20 - CV005 | 18 V          | 10.500 V          | 10.504 V  | 0.004 V       | ± 7.8 mV                    |
| LINEA 20 - CV005 | 18 V          | 12.700 V          | 12.730 V  | 0.030 V       | ± 7.8 mV                    |
| LINEA 20 - CV005 | 18 V          | 16.000 V          | 16.012 V  | 0.012 V       | ± 7.8 mV                    |
| LINEA 20 - CV005 | 18 V          | 18.000 V          | 18.005 V  | 0.005 V       | ± 7.8 mV                    |
| LINEA 20 - CV005 | 25 A          | 2.517 A           | 2.50 A    | -0.017 A      | ± 8.5 mA                    |
| LINEA 20 - CV005 | 25 A          | 12.553 A          | 12.50 A   | -0.053 A      | ± 8.5 mA                    |
| LINEA 20 - CV005 | 25 A          | 22.580 A          | 22.50 A   | -0.080 A      | ± 8.5 mA                    |
| LINEA 21 - CV005 | 18 V          | 10.500 V          | 10.525 V  | 0.025 V       | ± 7.8 mV                    |
| LINEA 21 - CV005 | 18 V          | 12.700 V          | 12.716 V  | 0.016 V       | ± 7.8 mV                    |
| LINEA 21 - CV005 | 18 V          | 16.000 V          | 15.990 V  | -0.010 V      | ± 7.8 mV                    |
| LINEA 21 - CV005 | 18 V          | 18.000 V          | 17.986 V  | -0.014 V      | ± 7.8 mV                    |
| LINEA 21 - CV005 | 25 A          | 2.522 A           | 2.50 A    | -0.022 A      | ± 8.5 mA                    |
| LINEA 21 - CV005 | 25 A          | 12.581 A          | 12.50 A   | -0.081 A      | ± 8.5 mA                    |
| LINEA 21 - CV005 | 25 A          | 22.631 A          | 22.50 A   | -0.131 A      | ± 8.5 mA                    |
| LINEA 22 - CV005 | 18 V          | 10.500 V          | 10.518 V  | 0.018 V       | ± 7.8 mV                    |
| LINEA 22 - CV005 | 18 V          | 12.700 V          | 12.692 V  | -0.008 V      | ± 7.8 mV                    |
| LINEA 22 - CV005 | 18 V          | 16.000 V          | 16.007 V  | 0.007 V       | ± 7.8 mV                    |
| LINEA 22 - CV005 | 18 V          | 18.000 V          | 18.004 V  | 0.004 V       | ± 7.8 mV                    |
| LINEA 22 - CV005 | 25 A          | 2.517 A           | 2.50 A    | -0.017 A      | ± 8.5 mA                    |
| LINEA 22 - CV005 | 25 A          | 12.610 A          | 12.50 A   | -0.110 A      | ± 8.5 mA                    |
| LINEA 22 - CV005 | 25 A          | 22.695 A          | 22.50 A   | -0.195 A      | ± 8.5 mA                    |
| LINEA 23 - CV005 | 18 V          | 10.500 V          | 10.523 V  | 0.023 V       | ± 7.8 mV                    |
| LINEA 23 - CV005 | 18 V          | 12.700 V          | 12.724 V  | 0.024 V       | ± 7.8 mV                    |
| LINEA 23 - CV005 | 18 V          | 16.000 V          | 16.031 V  | 0.031 V       | ± 7.8 mV                    |
| LINEA 23 - CV005 | 18 V          | 18.000 V          | 18.032 V  | 0.032 V       | ± 7.8 mV                    |
| LINEA 23 - CV005 | 25 A          | 2.510 A           | 2.50 A    | -0.010 A      | ± 8.5 mA                    |

Certificado No.:

64504-A

Equipo (Instrument):

Módulo de Ciclo de Vida

Fecha de Calibración:

2025-12-18

Marca (Brand):

Bitrode

| Tipo (Type)      | Rango (Range) | Patrón (Standard) | UBP (UUT) | Error (Error) | Incertidumbre (Uncertainty) |
|------------------|---------------|-------------------|-----------|---------------|-----------------------------|
| LINEA 23 - CV005 | 25 A          | 12.588 A          | 12.50 A   | -0.088 A      | ± 8.5 mA                    |
| LINEA 23 - CV005 | 25 A          | 22.658 A          | 22.50 A   | -0.158 A      | ± 8.5 mA                    |
| LINEA 24 - CV005 | 18 V          | 10.500 V          | 10.497 V  | -0.003 V      | ± 7.8 mV                    |
| LINEA 24 - CV005 | 18 V          | 12.700 V          | 12.708 V  | 0.008 V       | ± 7.8 mV                    |
| LINEA 24 - CV005 | 18 V          | 16.000 V          | 16.016 V  | 0.016 V       | ± 7.8 mV                    |
| LINEA 24 - CV005 | 18 V          | 18.000 V          | 18.018 V  | 0.018 V       | ± 7.8 mV                    |
| LINEA 24 - CV005 | 25 A          | 2.504 A           | 2.50 A    | -0.004 A      | ± 8.5 mA                    |
| LINEA 24 - CV005 | 25 A          | 12.509 A          | 12.50 A   | -0.009 A      | ± 8.5 mA                    |
| LINEA 24 - CV005 | 25 A          | 22.506 A          | 22.50 A   | -0.006 A      | ± 8.5 mA                    |
| LINEA 25 - CV005 | 18 V          | 10.500 V          | 10.485 V  | -0.015 V      | ± 7.8 mV                    |
| LINEA 25 - CV005 | 18 V          | 12.700 V          | 12.716 V  | 0.016 V       | ± 7.8 mV                    |
| LINEA 25 - CV005 | 18 V          | 16.000 V          | 15.993 V  | -0.007 V      | ± 7.8 mV                    |
| LINEA 25 - CV005 | 18 V          | 18.000 V          | 17.982 V  | -0.018 V      | ± 7.8 mV                    |
| LINEA 25 - CV005 | 25 A          | 2.492 A           | 2.50 A    | 0.008 A       | ± 8.5 mA                    |
| LINEA 25 - CV005 | 25 A          | 12.492 A          | 12.50 A   | 0.008 A       | ± 8.5 mA                    |
| LINEA 25 - CV005 | 25 A          | 22.491 A          | 22.50 A   | 0.009 A       | ± 8.5 mA                    |
| LINEA 26 - CV005 | 18 V          | 10.500 V          | 10.488 V  | -0.012 V      | ± 7.8 mV                    |
| LINEA 26 - CV005 | 18 V          | 12.700 V          | 12.672 V  | -0.028 V      | ± 7.8 mV                    |
| LINEA 26 - CV005 | 18 V          | 16.000 V          | 15.995 V  | -0.005 V      | ± 7.8 mV                    |
| LINEA 26 - CV005 | 18 V          | 18.000 V          | 17.982 V  | -0.018 V      | ± 7.8 mV                    |
| LINEA 26 - CV005 | 25 A          | 2.506 A           | 2.50 A    | -0.006 A      | ± 8.5 mA                    |
| LINEA 26 - CV005 | 25 A          | 12.522 A          | 12.50 A   | -0.022 A      | ± 8.5 mA                    |
| LINEA 26 - CV005 | 25 A          | 22.535 A          | 22.50 A   | -0.035 A      | ± 8.5 mA                    |
| LINEA 27 - CV005 | 18 V          | 10.500 V          | 10.462 V  | -0.038 V      | ± 7.8 mV                    |
| LINEA 27 - CV005 | 18 V          | 12.700 V          | 12.677 V  | -0.023 V      | ± 7.8 mV                    |
| LINEA 27 - CV005 | 18 V          | 16.000 V          | 15.975 V  | -0.025 V      | ± 7.8 mV                    |
| LINEA 27 - CV005 | 18 V          | 18.000 V          | 17.963 V  | -0.037 V      | ± 7.8 mV                    |
| LINEA 27 - CV005 | 25 A          | 2.499 A           | 2.50 A    | 0.001 A       | ± 8.5 mA                    |
| LINEA 27 - CV005 | 25 A          | 12.442 A          | 12.50 A   | 0.058 A       | ± 8.5 mA                    |
| LINEA 27 - CV005 | 25 A          | 22.382 A          | 22.50 A   | 0.118 A       | ± 8.5 mA                    |
| LINEA 28 - CV005 | 18 V          | 10.500 V          | 10.505 V  | 0.005 V       | ± 7.8 mV                    |
| LINEA 28 - CV005 | 18 V          | 12.700 V          | 12.701 V  | 0.001 V       | ± 7.8 mV                    |
| LINEA 28 - CV005 | 18 V          | 16.000 V          | 15.992 V  | -0.008 V      | ± 7.8 mV                    |
| LINEA 28 - CV005 | 18 V          | 18.000 V          | 18.002 V  | 0.002 V       | ± 7.8 mV                    |
| LINEA 28 - CV005 | 25 A          | 2.493 A           | 2.50 A    | 0.007 A       | ± 8.5 mA                    |
| LINEA 28 - CV005 | 25 A          | 12.454 A          | 12.50 A   | 0.046 A       | ± 8.5 mA                    |
| LINEA 28 - CV005 | 25 A          | 22.411 A          | 22.50 A   | 0.089 A       | ± 8.5 mA                    |
| LINEA 29 - CV005 | 18 V          | 10.500 V          | 10.500 V  | 0.000 V       | ± 7.8 mV                    |
| LINEA 29 - CV005 | 18 V          | 12.700 V          | 12.694 V  | -0.006 V      | ± 7.8 mV                    |
| LINEA 29 - CV005 | 18 V          | 16.000 V          | 16.001 V  | 0.001 V       | ± 7.8 mV                    |
| LINEA 29 - CV005 | 18 V          | 18.000 V          | 18.001 V  | 0.001 V       | ± 7.8 mV                    |
| LINEA 29 - CV005 | 25 A          | 2.512 A           | 2.50 A    | -0.012 A      | ± 8.5 mA                    |
| LINEA 29 - CV005 | 25 A          | 12.479 A          | 12.50 A   | 0.021 A       | ± 8.5 mA                    |
| LINEA 29 - CV005 | 25 A          | 22.444 A          | 22.50 A   | 0.056 A       | ± 8.5 mA                    |
| LINEA 30 - CV005 | 18 V          | 10.500 V          | 10.486 V  | -0.014 V      | ± 7.8 mV                    |
| LINEA 30 - CV005 | 18 V          | 12.700 V          | 12.690 V  | -0.010 V      | ± 7.8 mV                    |
| LINEA 30 - CV005 | 18 V          | 16.000 V          | 15.975 V  | -0.025 V      | ± 7.8 mV                    |

Certificado No.:

64504-A

Equipo (Instrument):

Módulo de Ciclo de Vida

Fecha de Calibración:

2025-12-18

Marca (Brand):

Bitrode

| Tipo (Type)      | Rango (Range) | Patrón (Standard) | UBP (UUT) | Error (Error) | Incertidumbre (Uncertainty) |
|------------------|---------------|-------------------|-----------|---------------|-----------------------------|
| LINEA 30 - CV005 | 18 V          | 18.000 V          | 17.966 V  | -0.034 V      | ± 7.8 mV                    |
| LINEA 30 - CV005 | 25 A          | 2.518 A           | 2.50 A    | -0.018 A      | ± 8.5 mA                    |
| LINEA 30 - CV005 | 25 A          | 12.445 A          | 12.50 A   | 0.055 A       | ± 8.5 mA                    |
| LINEA 30 - CV005 | 25 A          | 22.368 A          | 22.50 A   | 0.132 A       | ± 8.5 mA                    |
| LINEA 31 - CV005 | 18 V          | 10.500 V          | 10.473 V  | -0.027 V      | ± 7.8 mV                    |
| LINEA 31 - CV005 | 18 V          | 12.700 V          | 12.721 V  | 0.021 V       | ± 7.8 mV                    |
| LINEA 31 - CV005 | 18 V          | 16.000 V          | 15.975 V  | -0.025 V      | ± 7.8 mV                    |
| LINEA 31 - CV005 | 18 V          | 18.000 V          | 17.993 V  | -0.007 V      | ± 7.8 mV                    |
| LINEA 31 - CV005 | 25 A          | 2.508 A           | 2.50 A    | -0.008 A      | ± 8.5 mA                    |
| LINEA 31 - CV005 | 25 A          | 12.454 A          | 12.50 A   | 0.046 A       | ± 8.5 mA                    |
| LINEA 31 - CV005 | 25 A          | 22.397 A          | 22.50 A   | 0.103 A       | ± 8.5 mA                    |
| LINEA 32 - CV005 | 18 V          | 10.500 V          | 10.475 V  | -0.025 V      | ± 7.8 mV                    |
| LINEA 32 - CV005 | 18 V          | 12.700 V          | 12.706 V  | 0.006 V       | ± 7.8 mV                    |
| LINEA 32 - CV005 | 18 V          | 16.000 V          | 16.025 V  | 0.025 V       | ± 7.8 mV                    |
| LINEA 32 - CV005 | 18 V          | 18.000 V          | 18.004 V  | 0.004 V       | ± 7.8 mV                    |
| LINEA 32 - CV005 | 25 A          | 2.520 A           | 2.50 A    | -0.020 A      | ± 8.5 mA                    |
| LINEA 32 - CV005 | 25 A          | 12.495 A          | 12.50 A   | 0.005 A       | ± 8.5 mA                    |
| LINEA 32 - CV005 | 25 A          | 22.465 A          | 22.50 A   | 0.035 A       | ± 8.5 mA                    |