



Organismo  
de Evaluación  
y Fiscalización  
Ambiental

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## Equipos de la estación CA-RZC-02

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Organismo  
de Evaluación  
y Fiscalización  
Ambiental

[www.oefa.gob.pe](http://www.oefa.gob.pe)  
Dirección de Evaluación Ambiental

Av. Faustino Sánchez Carrión  
N° 603, 607 y 615  
Jesús María - Lima, Perú  
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## CERTIFICADO DE CALIBRACIÓN

*Certificate of calibration*

N°: **LG-328-2021**

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### Green Group PE S.A.C

Av. Aviación 4210 Surquillo Lima - Perú

www.greengroup.com.pe

Central: 560-6134 / 273-3550



Los resultados marcados con (\*) no están amparados por la acreditación de ENAC

#### INSTRUMENTO

*Equipment*

Analizador continuo de Dióxido de Azufre

#### FABRICANTE

*Manufacturer*

Thermo Scientific

#### MODELO

*Model*

43iQ

#### IDENTIFICACIÓN

*Identification*

12123713083

#### SOLICITANTE

*Customer*

ORGANISMO DE EVALUACIÓN Y FISCALIZACIÓN AMBIENTAL - OEFA

Av. Faustino Sánchez Carrión Nro. 603 - Jesús María - Lima

#### FECHA/S DE CALIBRACIÓN

*Date/s of calibration*

2021-10-23

#### Signatario/s autorizado/s

*Authorized signatory/ies*

#### Fecha de emisión

*Date of issue*

  
**ISAÍAS CURÍ MELGAREJO**  
Jefe de Laboratorio de Calibración  
GREEN GROUP PE S.A.C

2021-10-25

- . Este certificado se expide de acuerdo con las condiciones de la acreditación concedida por ENAC que ha comprobado las capacidades de medida del laboratorio y su trazabilidad a patrones nacionales e internacionales.
- . ENAC es firmante del Acuerdo de Reconocimiento Mutuo (MLA) de calibración de European Cooperation for Accreditation (EA) y de International Laboratory Accreditation Cooperation (ILAC).
- . Este certificado no podrá ser reproducido parcialmente sin la aprobación por escrito del laboratorio que lo emite
- . *This certificate is issued in accordance with the conditions of accreditation granted by ENAC which has assessed the measurement capability of the laboratory and its traceability to national or international standards.*
- . *ENAC is one of the signatories of the Multilateral Agreement of the European Cooperation for Accreditation (EA) and the international Laboratories Accreditation Cooperation (ILAC).*
- . *This certificate may not be partially reproduced, except with the prior written permission of the issuing laboratory.*

# Certificado de Calibración

LG-328-2021

## 1. DATOS TÉCNICOS DEL INSTRUMENTO

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Linealidad: 1 % de Escala.  
Deriva: 1 % de Escala.  
Resolución: 0,1ppb - 1 ppb

Esta información proviene del manual de fabricante.

## 2. MÉTODO DE CALIBRACIÓN

La calibración se realizó por lecturas del equipo con gases patrón según "Procedimiento PCG-01 para la calibración de analizadores de Gases" Green Group PE SAC.

## 3. LUGAR DE CALIBRACIÓN.

Laboratorio de Gases - Green Group PE

## 4. CONDICIONES AMBIENTALES

|         | Temperatura °C | Humedad relativa %hr |
|---------|----------------|----------------------|
| Inicial | 21,3           | 62,3                 |
| Final   | 21,0           | 61,2                 |

## 5. TRAZABILIDAD

| Patrón usado   | Código Interno | N° de lote o N° de certificado | F. Vencimiento |
|----------------|----------------|--------------------------------|----------------|
| GAS PATRÓN SO2 | GGP-CG-26.7    | EB0137989                      | 2023-12-14     |
| CAUDALÍMETRO   | GGP-41.2       | MM111020SO01                   | 2021-11-10     |
| CAUDALÍMETRO   | GGP-41.3       | MM111820SO01                   | 2021-11-17     |

## 6. PARÁMETROS DE MEDICIÓN

| Parámetros         | Inicial | Final  | Rango               |
|--------------------|---------|--------|---------------------|
| Rango (ppb)        | 500     | 500    | (0 - 20) ppm        |
| Average Time (sec) | 60      | 60     | (0 a 300) s         |
| SO2 BKG            | 9,5     | 9,3    | -                   |
| SO2 Coef           | 1,011   | 1,092  | -                   |
| Internal Temp (°C) | 27,2    | 27,7   | (8 a 47) °C         |
| Chamb Temp (°C)    | 45      | 45     | (44 a 46) °C        |
| Press (mmHg)       | 737,2   | 738,2  | (300 a 800) mmHg    |
| Flow (L/min)       | 0,439   | 0,438  | (0,3 a 1) L/min     |
| Lamp Intens (Hz)   | 100,7   | 100,8  | (60 a 120) Hz       |
| Lamp Voltage (v)   | 739     | 738,2  | (600 a 1200) Volt.  |
| PMT Supply (v)     | -663,9  | -663,4 | (-400 a -900) Volt. |

# Certificado de Calibración

LG-328-2021

## 7. LECTURAS DE AJUSTE DEL INSTRUMENTO

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### Lectura de SO<sub>2</sub>

|      | Patrón | Lectura inicial | Lectura Final | Unidades |
|------|--------|-----------------|---------------|----------|
| Zero | 1,2    | 0,2             | 1             | ppb      |
| Span | 400    | 373             | 400           | ppb      |
| Zero | 1,2    | 2,2             | 1,1           | ppb      |

## 8. RESULTADO DE MEDICIÓN

### Lectura de SO<sub>2</sub>

| Lectura del instrumento | Concentración del patrón | Corrección | Incertidumbre |
|-------------------------|--------------------------|------------|---------------|
| ppb                     | ppb                      | ppb        | ppb           |
| 401                     | 401                      | 0          | 9             |
| 301                     | 301                      | 0          | 7             |
| 200                     | 201                      | 1          | 6             |
| 100,3                   | 100,0                    | -0,3       | 5,2           |
| 1,2                     | 1,2                      | 0,0        | 2,3           |

## 9. OBSERVACIONES

- El instrumento se ajustó antes de la calibración.
- El tiempo de estabilización de la lectura es de 12 minutos.
- Considerar que 1 ppb equivale a  $1 \cdot 10^{-9}$  mol/mol.
- De los resultados de la curva de calibración de SO<sub>2</sub>, la pendiente es: 1,003 y el coeficiente de correlación es: 0,999. (\*)

- La incertidumbre expandida declarada se ha obtenido multiplicando la incertidumbre típica de medida por un factor de cobertura  $k=2$  tal que la probabilidad de cobertura sea de aproximadamente el 95%.
- La incertidumbre declarada en el presente certificado ha sido estimado siguiendo las directrices de: EA-4/02 M:2013 "Evaluación de la Incertidumbre de las Medidas de las Calibraciones" Rev01 Setiembre 2013
- Los resultados emitidos son válidos solo para el instrumento y sensores calibrados, en el momento de la calibración.
- Se recomienda al usuario recalibrar a intervalos adecuados, los cuales deben ser elegidos con base a las características del instrumento.

## Campbell Scientific Limited

80 Hathern Road,  
Shepshed,  
Leicestershire,  
LE12 9GX, United Kingdom.



Telephone: +44 (0) 1509 601141

### HygroVUE™10 Calibration Check

| Serial Number | Reference RH (%) | Probe RH (%) | Reference Temperature (°C) | Probe Temperature (°C) |
|---------------|------------------|--------------|----------------------------|------------------------|
| E2966.        | 50.46.           | 50.48.       | 23.30.                     | 23.31                  |

The Test Standards used have full traceability to UK Standards. All standards have been calibrated by Campbell Scientific or a UKAS accredited calibration service.

Check performed by: Keri

Date: 21st September 2021

Campbell Scientific Limited operates a Quality Assurance System approved to BS EN ISO 9001:2015



## CERTIFICATE OF CALIBRATION AND TESTING

|                       |   |
|-----------------------|---|
| <b>SERIAL NUMBER:</b> | <b>BPA0011713</b>                           |
| <b>CUSTOMER:</b>      | GREEN GROUP PE SAC                          |
| <b>P.O. NUMBER:</b>   | 001-6426                                    |
| <b>INV NUMBER:</b>    | 161845                                      |
| <b>MODEL:</b>         | 61402L BAROMETRIC PRESSURE SENSOR (4-20 MA) |

We hereby certify that the sensor serial number specified above has been inspected, tested, and found to comply with all process and material specifications established for the purpose of quality assurance of R. M. Young Company products. Engineering drawings, procedures, and specifications are maintained on file at our premises.

Standards established by R. M. Young Company for calibrating the measuring and test equipment used in controlling product quality are traceable to the National Institute of Standards and Technology (NIST).

Date of Certification: 15 Sep 2021

R. M. Young Company

Ed Chemosky  
Quality Assurance

## Product Test Report

Product Tested: MaxiMet GMX200-2B

Part Number: 1957-0200-60-000

Serial Number: 21340003

Test Date: 17/08/2021

Location: Gill Instruments Ltd

GILL ensures that quality is inherent in all aspects of their activities and ensures that compliance with BS EN ISO9001: 2015 is maintained.

This report certifies that the above instrument has been tested in accordance with Gill internal procedures

## Results

| <u>Test</u>                              | <u>Limits</u> | <u>Result</u> |
|--|---------------|---------------|
| Wind Still Air Test (Zero Wind Speed)    | Pass/Fail     | Pass          |
| Compass Calibration (Routine Successful) | Pass/Fail     | Pass          |
| Firmware Test (Current Version Loaded)   | Pass/Fail     | Pass          |
| Data Formats Test (Functional Test)      | Pass/Fail     | Pass          |

Other tests done to ISO 9001:2015 standards or (where applicable) more highly regarded international standards.

Wind sensor generic calibration is traceable to the University of Southampton wind tunnel and Gill instrumentation is maintained in accordance with UKAS.

Comparisons for Temperature, Humidity and Pressure are done against reference UKAS traceable instruments. The reference system numbers of these instruments are listed above.

All tests have been successfully completed

On behalf of Gill Instruments Ltd



Les Rann - Quality Control





Gill Instruments Limited

## Certificate of Conformance

This is to certify that:

Product: **1957-0200-60-000** **MAXIMET GMX200**



Serial Number: **21340003**



Has been manufactured within Gill Instruments Limited Quality Management System, approved to the requirements of BS EN ISO 9001.

The instrument has been tested and calibrated with equipment having full traceability to national standards where applicable and meets the requirements of the Operating Manual Specification and Electrical Conformity, both CE and FCC.

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference and
- (2) This device must accept any interference received, including interference that may cause undesired operation.

The instrument comes with a **24 Month** warranty against defective materials or workmanship from the date of purchase, providing it has not been tampered with and has been returned through an authorised route to Gill Instruments Limited.

Date created: 17 Aug 2021

Signed by: 

Les Rann  
Quality Engineer

Gill Instruments Limited  
Saltmarsh Park  
67 Gosport Street  
Lymington  
Hampshire  
SO41 9EG, UK

Tel: +44 (0)1590 613500  
Fax: +44 (0)1590 613501  
E-mail: [gill@gillinstruments.com](mailto:gill@gillinstruments.com)  
Web: [gillinstruments.com](http://gillinstruments.com)



View our current Anemometer range here





## CERTIFICATE OF CALIBRATION AND TESTING

|                       |  |
|-----------------------|--|
| <b>SERIAL NUMBER:</b> | <b>TB00016964</b>                          |
| <b>CUSTOMER:</b>      | GREEN GROUP PE SAC                         |
| <b>P.O. NUMBER:</b>   | 001-6426                                   |
| <b>INV NUMBER:</b>    | 161845                                     |
| <b>MODEL:</b>         | 52203 TIPPING BUCKET RAIN GAUGE (UNHEATED) |

We hereby certify that the sensor serial number specified above has been inspected, tested, and found to comply with all process and material specifications established for the purpose of quality assurance of R. M. Young Company products. Engineering drawings, procedures, and specifications are maintained on file at our premises.

Standards established by R. M. Young Company for calibrating the measuring and test equipment used in controlling product quality are traceable to the National Institute of Standards and Technology (NIST).

Date of Certification: 15 Sep 2021

R. M. Young Company

Ed Chemosky  
Quality Assurance