

1. Kalibriergegenstand / Calibration object

isolated amplifier DEWETRON DAQP-STG, S/N: 523351

2. Kalibrierverfahren / Calibration procedure

Die Kalibrierung erfolgt durch Vergleich der durch die Kalibrierstelle / Normale dargestellten Werte mit den Ausgangsgrößen am Kalibriergegenstand beziehungsweise den am Kalibriergegenstand angezeigten Werten.
The calibration is made by comparing the readings from the laboratory / standards to the output of the calibration object respectively the values displayed on the calibration object.

Prüfroutine / *Calibration procedure*: DAQP-STG_Akkred, Rev. 2.00

3. Messergebnisse / Measurement results

Die Kalibrierung im Rahmen der Akkreditierung umfasst die Messgrößen Gleichspannung, Wechselspannung, Gleichstrom, Wechselstrom und Gleichstromwiderstand.

Die Messergebnisse beziehen sich ausschließlich auf diesen Kalibriergegenstand zum Zeitpunkt der Kalibrierung.
The calibration scope of the accreditation contains the quantities direct voltage, alternating voltage, direct current, alternating current and direct current resistance.

The measurement results are exclusively linked to this calibration object at the time of calibration.

4. Messunsicherheit / Measurement uncertainty

Angegeben ist die erweiterte Messunsicherheit, die sich aus der Standardmessunsicherheit durch Multiplikation mit dem Erweiterungsfaktor $k=2$ ergibt. Sie wurde gemäß EA-4/02 ermittelt. Der Wert der Messgröße liegt im Regelfall mit einer Wahrscheinlichkeit von annähernd 95% im zugeordneten Werteintervall.

Ein Anteil für die Langzeitstabilität des Kalibriergegenstandes ist nicht enthalten.

The stated extended measurement uncertainty is derived from the standard uncertainty of measurement multiplied by the coverage factor $k=2$. It has been determined according to EA-4/02. The measured quantity is inside the corresponding value interval with a probability of approximately 95%.

A factor for the long time stability of the calibration object is not taken into account.

5. Umgebungsbedingungen / environmental conditions

Temperatur / *Temperature*: 23,1 °C

Rel. Luftfeuchte / *Rel. humidity*: 34,1 % r.H.

Kalibrierort / *Place of calibration*: DEWETRON GmbH, Parkring 4, 8074 Grambach, Austria

6. Auftragsnummer / Reference Number

7. Status / Status

PASS ()

AS-FOUND: Eingangskalibration / *Incoming calibration*

AS-LEFT: Ausgangskalibration / *Outgoing calibration*

FOUND/LEFT: Eingangskalibration erfüllt Herstellerspezifikation / *Incoming calibration according to manufacturer specifications*

PASS: Messergebnis liegt innerhalb der Herstellerspezifikationen (ohne Berücksichtigung der Messunsicherheiten) / *Measurement result is within manufacturer's specifications (without taking into account the measurement uncertainties)*

FAIL: Das Messergebnis liegt nicht innerhalb der Herstellerspezifikationen (ohne Berücksichtigung der Messunsicherheiten) / *Measurement result is out of manufacturer's specifications (without taking into account the measurement uncertainties)*

8. Verwendete Fußnoten / Used foot notes:

(1) Zusätzliche Messwerte außerhalb des akkreditierten Bereiches, es kann keine Konformitätsaussage getroffen werden.

(1) Additional measured values outside the accredited scope, a conformity statement cannot be made.

9. Kommentare / Comments

test

Für die Festlegung und Einhaltung einer angemessenen Frist zur Wiederholung der Kalibrierung ist der Benutzer verantwortlich.

The user is responsible for the definition and the compliance to a reasonable period for repeating the calibration.



DEWETRON GmbH
Parkring 4
8074 Grambach
AUSTRIA

Kalibrierschein nach ISO/IEC 17025
Calibration Certificate according to ISO/IEC 17025

AAT2560054
Akkreditierung Austria 0632
21.01.2025

10. Verwendete Normale / Standards used

<u>Asset</u>	<u>Description</u>	<u>Serial Number</u>	<u>Certificate No.</u>	<u>Cal Date</u>	<u>Due Date</u>
5522A 02	5522A CALIBRATOR	6032901	SA01246868	9-Feb-2024	8-Feb-2025
Keysight 3458A 08	3458A Multimeter	MY59353022	E5042024	23-Apr-2024	23-Apr-2025



DEWETRON GmbH
 Parking 4
 8074 Grambach
 AUSTRIA

Kalibrierschein nach ISO/IEC 17025
 Calibration Certificate according to ISO/IEC 17025

AAT2560054
Akkreditierung Austria 0632
21.01.2025

11. Testergebnisse / Test results

Test Description	True Value	Test Result	Lower limit	Upper limit	Exp Uncert	Error	% of Tol	Status
Kalibrierverfahren / calibration method: CAL-KV-01_Gleichspannung_v1.0_2024-07-04.xlsx-01 CAL-KV-01_Gleichspannung_v1.0_2024-07-04.xlsx-05 CAL-KV-03_Gleichstromstärke_v1.0_2024-07-04.xlsx-07								
Current Temperature of DMM and Calibrator DMM: 41.1°C Calibrator: 25.56°C								
Serial Number: 523351 Module Revision: 106 Firmware: 1.60 Sub FW: 1.20								
Excitation Current (0.05% ±2µA)								
0.100000 mA	0.100000 mA	0.099527 mA	0.097950 mA	0.102050 mA	4.50 e-06 mA	-0,000473 mA	23.1%	Pass
0.200000 mA	0.200000 mA	0.199784 mA	0.197900 mA	0.202100 mA	14.00 e-06 mA	-0,000216 mA	10.3%	Pass
0.500000 mA	0.500000 mA	0.499812 mA	0.497750 mA	0.502250 mA	25.00 e-06 mA	-0,000188 mA	8.33%	Pass
1.000000 mA	1.000000 mA	0.999940 mA	0.997500 mA	1.002500 mA	42.00 e-06 mA	-0,000060 mA	2.42%	Pass
2.000000 mA	2.000000 mA	2.000041 mA	1.997000 mA	2.003000 mA	140.00 e-06 mA	0,000041 mA	1.37%	Pass
5.000000 mA	5.000000 mA	5.000611 mA	4.995500 mA	5.004500 mA	240.00 e-06 mA	0,000611 mA	13.6%	Pass
10.000000 mA	10.000000 mA	9.999375 mA	9.993000 mA	10.007000 mA	420.00 e-06 mA	-0,000625 mA	8.93%	Pass
20.000000 mA	20.000000 mA	20.002499 mA	19.988000 mA	20.012000 mA	1.80 e-03 mA	0,002499 mA	20.8%	Pass
Excitation Voltage (0.03% ±1mV)								
0.250000 V	0.250000 V	0.249701 V	0.248925 V	0.251075 V	5.00 e-06 V	-0,000299 V	27.8%	Pass
0.500000 V	0.500000 V	0.499635 V	0.498850 V	0.501150 V	6.90 e-06 V	-0,000365 V	31.7%	Pass
1.000000 V	1.000000 V	0.999687 V	0.998700 V	1.001300 V	11.00 e-06 V	-0,000313 V	24.1%	Pass
2.500000 V	2.500000 V	2.499476 V	2.498250 V	2.501750 V	25.00 e-06 V	-0,000524 V	29.9%	Pass
5.000000 V	5.000000 V	4.998857 V	4.997500 V	5.002500 V	46.00 e-06 V	-0,001143 V	45.7%	Pass
10.000000 V	10.000000 V	9.997961 V	9.996000 V	10.004000 V	87.00 e-06 V	-0,002039 V	51%	Pass
12.000000 V	12.000000 V	11.997312 V	11.995400 V	12.004600 V	170.00 e-06 V	-0,002688 V	58.4%	Pass
Range Calibration All tests done with appropriate range and Filter set to off								
±500µV Range (±0.05% ± 10.1µV) Real Val. ±5V ±103.5mV / Scaled Val. ±500µV ±10.35µV								
Input 0µV	0.000000 V	0.044696 V	-0.101000 V	0.101000 V	12.00 e-03 V	0,044696 V	44.3%	Pass
Input 50µV	0.500000 V	0.544810 V	0.398750 V	0.601250 V	12.00 e-03 V	0,044810 V	44.3%	Pass
Input: 250µV	2.500000 V	2.545306 V	2.397750 V	2.602250 V	12.00 e-03 V	0,045306 V	44.3%	Pass
Input: 450µV	4.500000 V	4.544836 V	4.396750 V	4.603250 V	13.00 e-03 V	0,044836 V	43.4%	Pass
Input: -450µV	-4.500000 V	-4.456568 V	-4.603250 V	-4.396750 V	13.00 e-03 V	0,043432 V	42.1%	Pass
±1mV Range (±0.05% ± 10.2µV) Real Val. ±5V ±53.5mV / Scaled Val. ±1mV ±10.7µV								
Input 100µV	0.500000 V	0.521962 V	0.448750 V	0.551250 V	6.20 e-03 V	0,021962 V	42.9%	Pass
Input: 500µV	2.500000 V	2.522306 V	2.447750 V	2.552250 V	6.30 e-03 V	0,022306 V	42.7%	Pass
Input: 900µV	4.500000 V	4.522633 V	4.446750 V	4.553250 V	6.30 e-03 V	0,022633 V	42.5%	Pass
Input: -900µV	-4.500000 V	-4.480276 V	-4.553250 V	-4.446750 V	6.30 e-03 V	0,019724 V	37%	Pass
±2.5mV Range (±0.05% ± 10.5µV) Real Val. ±5V ±23.5mV / Scaled Val. ±2.5mV ±11.75µV								
Input 250µV	0.500000 V	0.508465 V	0.478750 V	0.521250 V	2.50 e-03 V	0,008465 V	39.8%	Pass
Input: 1250µV	2.500000 V	2.509239 V	2.477750 V	2.522250 V	2.50 e-03 V	0,009239 V	41.5%	Pass
Input: 2250µV	4.500000 V	4.509888 V	4.476750 V	4.523250 V	2.60 e-03 V	0,009888 V	42.5%	Pass
Input: -2250µV	-4.500000 V	-4.493994 V	-4.523250 V	-4.476750 V	2.60 e-03 V	0,006006 V	25.8%	Pass
±5mV Range (±0.05% ± 11µV) Real Val. ±5V ±13.5mV / Scaled Val. ±5mV ±13.5µV								
Input 500µV	0.500000 V	0.503912 V	0.488750 V	0.511250 V	1.30 e-03 V	0,003912 V	34.8%	Pass
Input: 2500µV	2.500000 V	2.504847 V	2.487750 V	2.512250 V	1.30 e-03 V	0,004847 V	39.6%	Pass
Input: 4500µV	4.500000 V	4.505640 V	4.486750 V	4.513250 V	1.40 e-03 V	0,005640 V	42.6%	Pass
Input: -4500µV	-4.500000 V	-4.498363 V	-4.513250 V	-4.486750 V	1.40 e-03 V	0,001637 V	12.4%	Pass
±10mV Range (±0.05% ± 12µV) Real Val. ±5V ±8.5mV / Scaled Val. ±10mV ±17µV								
Input 1mV	0.500000 V	0.501855 V	0.493750 V	0.506250 V	630.00 e-06 V	0,001855 V	29.7%	Pass
Input: 5mV	2.500000 V	2.502935 V	2.492750 V	2.507250 V	680.00 e-06 V	0,002935 V	40.5%	Pass
Input: 9mV	4.500000 V	4.503714 V	4.491750 V	4.508250 V	730.00 e-06 V	0,003714 V	45%	Pass
Input: -9mV	-4.500000 V	-4.500595 V	-4.508250 V	-4.491750 V	730.00 e-06 V	-0,000595 V	7.21%	Pass



DEWETRON GmbH
 Parking 4
 8074 Grambach
 AUSTRIA

Kalibrierschein nach ISO/IEC 17025
 Calibration Certificate according to ISO/IEC 17025

AAT2560054
Akkreditierung Austria 0632
21.01.2025

11. Testergebnisse / Test results

Test Description	True Value	Test Result	Lower limit	Upper limit	Exp Uncert	Error	% of Tol	Status
±25mV Range (±0.05% ± 15µV)								
Real Val. ±5V ±5.5mV / Scaled Val. ±25mV ±27.5µV								
Input: 2.5mV	0.500000 V	0.500836 V	0.496750 V	0.503250 V	260.00 e-06 V	0,000836 V	25.7%	Pass
Input: 12.5mV	2.500000 V	2.501885 V	2.495750 V	2.504250 V	310.00 e-06 V	0,001885 V	44.4%	Pass
Input: 22.5mV	4.500000 V	4.502662 V	4.494750 V	4.505250 V	360.00 e-06 V	0,002662 V	50.7%	Pass
Input: -22.5mV	-4.500000 V	-4.501397 V	-4.505250 V	-4.494750 V	360.00 e-06 V	-0,001397 V	26.6%	Pass
±50mV Range (±0.05% ± 20µV)								
Real Val. ±5V ±4.5mV / Scaled Val. ±50mV ±45µV								
Input: 5mV	0.500000 V	0.500446 V	0.497750 V	0.502250 V	140.00 e-06 V	0,000446 V	19.8%	Pass
Input: 25mV	2.500000 V	2.501573 V	2.496750 V	2.503250 V	190.00 e-06 V	0,001573 V	48.4%	Pass
Input: 45mV	4.500000 V	4.502424 V	4.495750 V	4.504250 V	240.00 e-06 V	0,002424 V	57%	Pass
Input: -45mV	-4.500000 V	-4.501848 V	-4.504250 V	-4.495750 V	240.00 e-06 V	-0,001848 V	43.5%	Pass
±100mV Range (±0.05% ± 30µV)								
Real Val. ±5V ±4mV / Scaled Val. ±0.1V ±80µV								
Input: 10mV	0.500000 V	0.500186 V	0.498250 V	0.501750 V	75.00 e-06 V	0,000186 V	10.6%	Pass
Input: 50mV	2.500000 V	2.501341 V	2.497250 V	2.502750 V	130.00 e-06 V	0,001341 V	48.8%	Pass
Input: 90mV	4.500000 V	4.502126 V	4.496250 V	4.503750 V	180.00 e-06 V	0,002126 V	56.7%	Pass
Input: -90mV	-4.500000 V	-4.502251 V	-4.503750 V	-4.496250 V	180.00 e-06 V	-0,002251 V	60%	Pass
±250mV Range (±0.05% ± 60µV)								
Real Val. ±5V ±3.7mV / Scaled Val. ±0.25V ±185µV								
Input: 25mV	0.500000 V	0.499975 V	0.498550 V	0.501450 V	38.00 e-06 V	-0,000025 V	1.74%	Pass
Input: 125mV	2.500000 V	2.500994 V	2.497550 V	2.502450 V	90.00 e-06 V	0,000994 V	40.6%	Pass
Input: 225mV	4.500000 V	4.501814 V	4.496550 V	4.503450 V	140.00 e-06 V	0,001814 V	52.6%	Pass
Input: -225mV	-4.500000 V	-4.502230 V	-4.503450 V	-4.496550 V	140.00 e-06 V	-0,002230 V	64.6%	Pass
±500mV Range (±0.05% ± 110µV)								
Real Val. ±5V ±3.6mV / Scaled Val. ±0.5V ±360µV								
Input: 50mV	0.500000 V	0.499949 V	0.498650 V	0.501350 V	26.00 e-06 V	-0,000051 V	3.79%	Pass
Input: 250mV	2.500000 V	2.501068 V	2.497650 V	2.502350 V	78.00 e-06 V	0,001068 V	45.4%	Pass
Input: 450mV	4.500000 V	4.501857 V	4.496650 V	4.503350 V	98.00 e-06 V	0,001857 V	55.4%	Pass
Input: -450mV	-4.500000 V	-4.502423 V	-4.503350 V	-4.496650 V	98.00 e-06 V	-0,002423 V	72.3%	Pass
±1V Range (±0.05% ± 210µV)								
Real Val. ±5V ±3.55mV / Scaled Val. ±1V ±0.71mV								
Input: 100mV	0.500000 V	0.500061 V	0.498700 V	0.501300 V	20.00 e-06 V	0,000061 V	4.71%	Pass
Input: 300mV	1.500000 V	1.500719 V	1.498200 V	1.501800 V	47.00 e-06 V	0,000719 V	39.9%	Pass
Input: -500mV	-2.500000 V	-2.501503 V	-2.502300 V	-2.497700 V	54.00 e-06 V	-0,001503 V	65.3%	Pass
Input: 500mV	2.500000 V	2.501329 V	2.497700 V	2.502300 V	54.00 e-06 V	0,001329 V	57.8%	Pass
Input: 700mV	3.500000 V	3.501822 V	3.497200 V	3.502800 V	71.00 e-06 V	0,001822 V	65.1%	Pass
Input: 900mV	4.500000 V	4.502293 V	4.496700 V	4.503300 V	87.00 e-06 V	0,002293 V	69.5%	Pass
Input: -900mV	-4.500000 V	-4.502425 V	-4.503300 V	-4.496700 V	87.00 e-06 V	-0,002425 V	73.5%	Pass
±2V Range (±0.05% ± 410µV)								
Real Val. ±5V ±3.525mV / Scaled Val. ±2V ±1.41mV								
Input: 200mV	0.500000 V	0.500356 V	0.498725 V	0.501275 V	17.00 e-06 V	0,000356 V	28%	Pass
Input: 1V	2.500000 V	2.501442 V	2.497725 V	2.502275 V	49.00 e-06 V	0,001442 V	63.4%	Pass
Input: 1.8V	4.500000 V	4.502303 V	4.496725 V	4.503275 V	81.00 e-06 V	0,002303 V	70.3%	Pass
Input: -1.8V	-4.500000 V	-4.502316 V	-4.503275 V	-4.496725 V	81.00 e-06 V	-0,002316 V	70.7%	Pass
±5V Range (±0.05% ± 1.01mV)								
Real Val. ±5V ±3.51mV / Scaled Val. ±5V ±3.51mV								
Input: 500mV	0.500000 V	0.500260 V	0.498740 V	0.501260 V	12.00 e-06 V	0,000260 V	20.6%	Pass
Input: 2.5V	2.500000 V	2.501262 V	2.497740 V	2.502260 V	45.00 e-06 V	0,001262 V	55.8%	Pass
Input: 4.5V	4.500000 V	4.502057 V	4.496740 V	4.503260 V	110.00 e-06 V	0,002057 V	63.1%	Pass
Input: -4.5V	-4.500000 V	-4.502166 V	-4.503260 V	-4.496740 V	110.00 e-06 V	-0,002166 V	66.4%	Pass
±10V Range (±0.05% ± 2.01mV)								
Real Val. ±5V ±3.505mV / Scaled Val. ±10V ±7.01mV								
Input: 1V	0.500000 V	0.500280 V	0.498745 V	0.501255 V	11.00 e-06 V	0,000280 V	22.3%	Pass
Input: 5V	2.500000 V	2.501394 V	2.497745 V	2.502255 V	59.00 e-06 V	0,001394 V	61.8%	Pass
Input: 9V	4.500000 V	4.502291 V	4.496745 V	4.503255 V	95.00 e-06 V	0,002291 V	70.4%	Pass
Input: -9V	-4.500000 V	-4.502274 V	-4.503255 V	-4.496745 V	95.00 e-06 V	-0,002274 V	69.9%	Pass

Non-Accredited Functional Tests

Filter Checks

Filtertest 10Hz @ 10Hz	Pass	(1)
Filtertest 10Hz @ 100Hz	Pass	(1)
Filtertest 30Hz @ 15Hz	Pass	(1)
Filtertest 30Hz @ 30Hz	Pass	(1)
Filtertest 30Hz @ 300Hz	Pass	(1)
Filtertest 100Hz @ 50Hz	Pass	(1)
Filtertest 100Hz @ 100Hz	Pass	(1)
Filtertest 100Hz @ 1000Hz	Pass	(1)
Filtertest 100Hz @ 1000Hz Butterworth	Pass	(1)



DEWETRON GmbH
 Parking 4
 8074 Grambach
 AUSTRIA

Kalibrierschein nach ISO/IEC 17025
Calibration Certificate according to ISO/IEC 17025

AAT2560054
Akkreditierung Austria 0632
21.01.2025

11. Testergebnisse / Test results

<u>Test Description</u>	<u>True Value</u>	<u>Test Result</u>	<u>Lower limit</u>	<u>Upper limit</u>	<u>Exp Uncert</u>	<u>Error</u>	<u>% of Tol</u>	<u>Status</u>
Filtertest 300Hz @ 150Hz								Pass (1)
Filtertest 300Hz @ 300Hz								Pass (1)
Filtertest 300Hz @ 3000Hz								Pass (1)
Filtertest 1kHz @ 500Hz								Pass (1)
Filtertest 1kHz @ 1000Hz								Pass (1)
Filtertest 1kHz @ 10000Hz								Pass (1)
Filtertest 1kHz @ 10000Hz Butterworth								Pass (1)
Filtertest 3kHz @ 1500Hz								Pass (1)
Filtertest 3kHz @ 3000Hz								Pass (1)
Filtertest 3kHz @ 30000Hz								Pass (1)
Filtertest 10kHz @ 5000Hz								Pass (1)
Filtertest 10kHz @ 10000Hz								Pass (1)
Filtertest 10kHz @ 100000Hz								Pass (1)
Filtertest 30kHz @ 30000Hz								Pass (1)
Filtertest 100kHz @ 100000Hz								Pass (1)
Bandwidth test @ 300000Hz								Pass (1)
CMRR Checks								
CMRR 0.5mV Range @ 50Hz								Pass (1)
CMRR 0.5mV Range @ 400Hz								Pass (1)
CMRR 0.5mV Range @ 1000Hz								Pass (1)
CMRR 0.5mV Range @ 10000Hz								Pass (1)
Bridge Checks								
Full-Bridge Function Check								Pass (1)
Half-Bridge Function Check								Pass (1)
120 Ohms Quarter-Bridge Completion								Pass (1)
350 Ohms Quarter-Bridge Completion								Pass (1)
175 kOhms Shunt Check								Pass (1)

Ende des Kalibrierscheines / End of Calibration Certificate

