

MUSTER

Calibration certificate XXXXXXXX

Item	Calibration Source
Manufacturer	DMMCheck Plus
Type	DMMCheck Plus r7 mit Option L/C
Serial no.	174
PM no.	
Inv. no.	
Customer	Welectron
User	Welectron Marco Wünschmann Haid-und-Neu-Str. 7 76131 Karlsruhe (Germany)
Order no.	XXXXXX
Date of calibration	XXXXXXXXXX
Place of calibration	D-73269 Hochdorf
Number of pages of the calibration certificate	6

Calibration takes place through the comparison with standards or with standard measuring equipment, or on the basis of documented calibration methods. The calibration and this calibration certificate fulfill the principles of DIN EN ISO IEC 17025.

This calibration certificate documents traceability to national or international standards for representation of the physical units in accordance with the International System of Units (SI). This traceability is established by metrology institutes, which are signatories of the "CIPM Mutual Recognition Arrangement".

Cited measurement uncertainties pertain to a confidence level of $\geq 95\%$ ($k=2$) and comprise the measurement uncertainties of the calibration method and those of the calibration object. The measurement uncertainty has been determined in accordance with EA-4/02 M:2013. A portion for the long-term stability of the calibration object is not included.

The calibration results pertain exclusively to the calibrated object at the time of calibration.

The limit values specified in the log have been derived from published specifications. It is the responsibility of the user to determine whether these limit values also apply to this device. Absolutely no guarantee of correctness is provided! Subject to changes and errors excepted!

Calibration has been performed in accordance with the internal calibration instruction #13577 in compliance with the series of directives VDI/VDE/DGQ/DKD 2622.

The user is responsible for observing an appropriate interval for renewed calibration.

This calibration certificate must be distributed in complete and unchanged form only. Extracts or amendments must be approved by Esenwein GmbH. Calibration certificates are not valid without a signature!
In case of doubt regarding authenticity, please contact Esenwein GmbH!

Date	Technician XXXXXXXXXX	Laboratory manager XXXXXXXXXX
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Notes

Declaration of conformity and decision rule (status)

Compliance with the specification (conformity) is disclosed according to the ILAC publication ILAC-G8:09/2019. The statement regarding compliance is based on a confidence interval of $\geq 95\%$ for the expanded measurement uncertainty and is only valid for the tested points. The status of compliance is presented as follows:

P (Pass) COMPLIANCE:

The measured value lies within the limit values of the specification with consideration to the measurement uncertainty.

N+ (Not defined) UNCERTAIN:

It is not possible to confirm compliance with the specification with a confidence interval of $\geq 95\%$ for the expanded measurement uncertainty, although the measured value lies within the limit values. This means that the margin between the value measured within the limit values and the limit value is less than the measurement uncertainty.

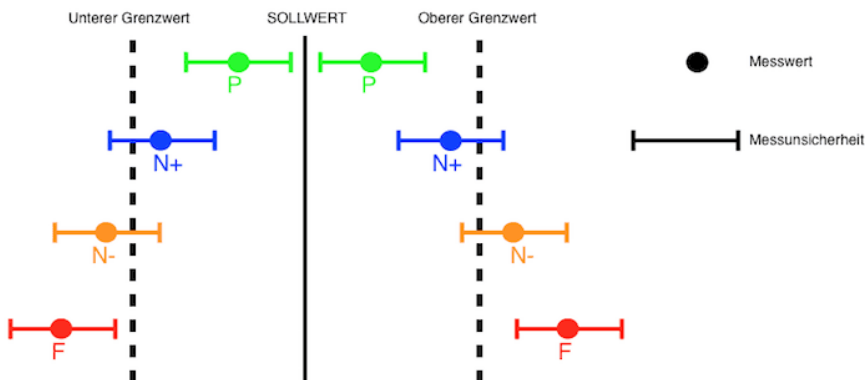
N- (Not defined) UNCERTAIN:

It is not possible to confirm non-compliance with the specification with a confidence interval of $\geq 95\%$ for the expanded measurement uncertainty, although the measured value lies outside the limit values. This means that the margin between the value measured outside the limit values and the limit value is less than the measurement uncertainty.

F (Fail) NON-COMPLIANCE:

The measured value lies outside the limit values of the specification with consideration to the measurement uncertainty.

Every statement regarding compliance with the specifications pertains to the classification set out above. An evaluation as to whether the tested measuring device fulfils the requirements of the planned application must be performed by the user.



Measured values

Selection of the measuring points and stipulation of the scope of calibration took place with consideration to the measuring possibilities and the technical infrastructure of the laboratory. The comma is used as a decimal point.

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Calibration log for the calibration certificate XXXXXXXX

DMMCheck Plus DMMCheck Plus r7 mit Option L/C Calibration Source

Evaluation with reference to the measured values and limit values in the log

Measured values, for which this statement is limited per the note on page 2, are marked accordingly (status)

The measured values determined lie **inside the specified tolerances**

Device status at the time of delivery: **inside the tolerances**

Work performed:

Traceable calibration

Measuring standards used:

designation, ident.nr., document of traceability
Type, next calibration

Fluke 8588A, JE0266, D-K-15115-01-00 40412 2021-02
Digitalmultimeter, 02/2022

HP 4274A, JE0098, D-K-15019-01-00 272131-01 2019-07
LCR Meter, 01/2022

Datum 2000, JE0250, GPS-Synchronisiert
Rubidium GPS-System,

Tektronix FCA3120, JE0213, D-K-15168-01-00 4102436 2021-03
Timer/Counter/Analyzer, 03/2022

Ambient conditions

Temperature: 23 °C \pm 2 °C

Humidity: 50 % rel. \pm 30 % rel.

Remarks

This calibration certificate has been translated from German. In case of deviations between the German and English version or with other doubts, the German version takes precedence.

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Batteryvoltage

INTERVAL / REMARK	SETPOINT	MIN. PERMITTED	ACTUAL VALUE / DEVIATION (REFERENCE VALUE)	MAX. PERMITTED	UNCERTAINTY	% OF TOL.	STATUS
	9 V DC	7,6 V DC	9,303 V DC		10 mV		P

Resistances

INTERVAL / REMARK	SETPOINT	MIN. PERMITTED	ACTUAL VALUE / DEVIATION (REFERENCE VALUE)	MAX. PERMITTED	UNCERTAINTY	% OF TOL.	STATUS
	100 Ohm	99,9 Ohm	99,965 Ohm	100,1 Ohm	7,0 mOhm	35 %	P
	1 kOhm	0,999 kOhm	0,99980 kOhm	1,001 kOhm	70 mOhm	20 %	P
	10 kOhm	9,99 kOhm	10,0026 kOhm	10,01 kOhm	0,80 Ohm	26 %	P
	100 kOhm	99,9 kOhm	100,065 kOhm	100,1 kOhm	8,0 Ohm	65 %	P

Direct Voltage

in 10 MOhm

INTERVAL / REMARK	SETPOINT	MIN. PERMITTED	ACTUAL VALUE / DEVIATION (REFERENCE VALUE)	MAX. PERMITTED	UNCERTAINTY	% OF TOL.	STATUS
	5 V DC	4,99965 V DC	4,99987 V DC	5,00035 V DC	0,10 mV	37 %	P

Alternating Voltage

in 1 MOhm

INTERVAL / REMARK	SETPOINT	MIN. PERMITTED	ACTUAL VALUE / DEVIATION (REFERENCE VALUE)	MAX. PERMITTED	UNCERTAINTY	% OF TOL.	STATUS
@ 100 Hz	5 Vrms	4,995 Vrms	4,9997 Vrms	5,005 Vrms	1,4 mV	6 %	P
@ 10 kHz	5 Vrms		4,9941 Vrms		3,0 mV		

Direct Current

INTERVAL / REMARK	SETPOINT	MIN. PERMITTED	ACTUAL VALUE / DEVIATION (REFERENCE VALUE)	MAX. PERMITTED	UNCERTAINTY	% OF TOL.	STATUS
	1 mA DC	0,999 mA DC	0,99997 mA DC	1,001 mA DC	0,25 µA	3 %	P

Alternating Current

INTERVAL / REMARK	SETPOINT	MIN. PERMITTED	ACTUAL VALUE / DEVIATION (REFERENCE VALUE)	MAX. PERMITTED	UNCERTAINTY	% OF TOL.	STATUS
	1 mArms 100 Hz	0,995 mArms 100 Hz	0,99953 mArms 100 Hz	1,005 mArms 100 Hz	0,70 µA	9 %	P

Frequency

INTERVAL / REMARK	SETPOINT	MIN. PERMITTED	ACTUAL VALUE / DEVIATION (REFERENCE VALUE)	MAX. PERMITTED	UNCERTAINTY	% OF TOL.	STATUS
	100 Hz	99,98 Hz	100,0074 Hz	100,02 Hz	2,0 mHz	37 %	P
Option	10 kHz	9,998 kHz	10,000739 kHz	10,002 kHz	10 mHz	37 %	P

Pos. Duty Cycle

INTERVAL / REMARK	SETPOINT	MIN. PERMITTED	ACTUAL VALUE / DEVIATION (REFERENCE VALUE)	MAX. PERMITTED	UNCERTAINTY	% OF TOL.	STATUS
@ 100 Hz	50 %	49,95 %	50,000 %	50,05 %	0,020 % abs.	0 %	P
@ 10 kHz	50 %		50,01 %		0,030 % abs.		

Capacity (Option L/C)

Measurefrequency: 1 kHz
(No Specification)

INTERVAL / REMARK	SETPOINT	MIN. PERMITTED	ACTUAL VALUE / DEVIATION (REFERENCE VALUE)	MAX. PERMITTED	UNCERTAINTY	% OF TOL.	STATUS
	1 nF		0,9890 nF		3,0 pF		
	10 nF		9,851 nF		20 pF		
	100 nF		100,74 nF		0,20 nF		
	1 µF		0,9989 µF		2,0 nF		

Inductance (Option L/C)

Measurefrequency: 1 kHz
(No Specification)

INTERVAL / REMARK	SETPOINT	MIN. PERMITTED	ACTUAL VALUE / DEVIATION (REFERENCE VALUE)	MAX. PERMITTED	UNCERTAINTY	% OF TOL.	STATUS
	1 µH		1,071 µH		3,0 nH		
	10 µH		10,60 µH		20 nH		
	100 µH		108,2 µH		0,20 µH		

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INTERVAL / REMARK	SETPOINT	MIN. PERMITTED	ACTUAL VALUE / DEVIATION (REFERENCE VALUE)	MAX. PERMITTED	UNCERTAINTY	% OF TOL.	STATUS
	1 mH		1,078 mH		3,0 μH		