

Instrument calibration sheet

Certificate N°	000038/2021	Date of issue	13.12.21
Client	ENEL Produzione	Work order	8000000591

Instrument specification

Type	pH meter	Manufacturer	Endress-Hauser	Serial number	E3087105G00
Min capacity	0	Max capacity	14	Model	Liquiline CM442
Readability At 0	0,1	Readability	0,1	Unit of measure	pH
Description	C1 Itar pH meter	Next Calibration	28.12.21		

Test ambient conditions

Location	ENEL - C1 Itar			Date of test	13.12.21	00:00
Temperature	24,3 °C	Humidity	77	Pressure	1020hPa	

Standard certificates used

Name	Number	Issuer	Date of issue
pH	17L93	Hanna Instruments	28.07.20

Calibration summary

Test	Certificate name	Uncertainty	Temperature	Humidity	Pressure
Repeatability	pH	0,029212pH	24.3	78	1020hPa
Linearity	pH	0,047958pH	243	78	1020
Expanded uncertainty					0,095917pH

Notes

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Repeatability

Measure	Nominal value	Conventional value	Read value	Deviation
1	7	7	7,01	0,01
2	7	7	7,01	0,01
3	7	7	7,02	0,02
4	7	7	7,01	0,01
5	7	7	7,01	0,01

Standard reference

Serial	Uncertainty	OIML
06K92	0,01	
06K92	0,01	
06K92	0,01	
06K92	0,01	
06K92	0,01	

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Linearity

Measure	Nominal value	Conventional value	Read value	Error	Uncertainty of error	Standard reference	
						Uncertainty	OIML
1	4,01	4,01	4,01	0	0,04272	0,01	
2	7,01	7,01	7,01	0	0,04272	0,01	
3	10,01	10,01	10,01	0	0,047958	0,02	

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Instrument

pH meter - Liquiline CM442 - E3087105G00

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Formulas

Repeatability

The test consists in the repeated measure of the same reference value, under identical conditions of handling the reference and the instrument, and under constant test conditions, both as far as possible

Standard deviation is computed to allow an appraisal of the instrument's performance.

$$s(I) = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (I_i - \bar{I})^2} \quad \bar{I} = \frac{1}{n} \sum_{i=1}^n I_i$$

Repeatability standard uncertainty has been computed with the following formula, taking into account instrument's scale interval (d)

$$u_{rep} = \sqrt{s(I)^2 + \left(\frac{d_I^2}{12}\right)}$$