



Certificate of Calibration

Resistivity, Conductivity, Temperature

Millipore SAS certifies that the instrument has been successfully calibrated in accordance to Millipore SAS calibration system, whose Quality Assurance is approved by the accredited organization DQS GmbH in conformity with ISO 9001 Quality Standard – Certificate registration N° 005356 QM08.

Product Information

Product name:	MILLI-Q® IQ 7000	This product is composed of resistivity/conductivity meters, temperature sensors.
Catalog number:	ZIQ7000T0	
Serial number:	F6NA14107A	
PCB number:	01116J00059	
Calibration date:	2017-03-02	

Calibration due date: the product is designed to have long term stability. However where required by the user, we recommend recalibrating two years after original calibration or one year after installation date, whichever is earlier.

Calibration and Verification Method

The process of calibration consists in defining:

- The adjustment factor to be applied to the reading of resistivity or conductivity measurements.
- The correction factor to be applied to the reading of the temperature measurements.

Calibration, correction, re-calibration and comparison to Maximum Permissible Error (MPE) are performed by placing the equipment probes in a Milli-Q ultrapure water loop (18.2 MΩ.cm @25°C) in which are placed Reference Standards traceable to National Standards (NIST for conductivity and COFRAC for temperature). The dedicated calibration bench and the calibration procedure are developed by Millipore SAS (20241671).

The expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$. The standard uncertainty of measurement has been evaluated taking into account the different components of uncertainty: Reference Standards, calibration methods, environmental conditions, contribution of calibrated measuring instruments, resolution of displaying devices and repeatability in agreement with guides to the expression of uncertainty in measurement (GUM series), the reference standards Joint Committee for Guides in Metrology (JCGM) 100.

All deviations pass the tolerance acceptance criteria specifications. The resistivity, conductivity and temperature sensors conform to their usage requirements.

Laetitia Breitwiller
Quality Assurance Manager- Lab Water

Calibration Results - Summary of measurements performed during calibration and the conformity by comparison to tolerance range.

Resistivity / Conductivity

Purification stage	Correction	Value	Tolerance Min	Tolerance Max
Product	Cell constant	0.0098	0.009	0.011
Product K1	Coefficient	0.9978	0.95	1.05
Product K2	Coefficient	0.9984	0.95	1.05
Product K3	Coefficient	0.9992	0.95	1.05
Product K4	Coefficient	0.9994	0.95	1.05
Intermediate	Cell constant	0.0095	0.009	0.011
Intermediate K1	Coefficient	0.9994	0.95	1.05
Intermediate K2	Coefficient	0.9984	0.95	1.05
Intermediate K3	Coefficient	0.9982	0.95	1.05
Intermediate K4	Coefficient	1.0001	0.95	1.05

Temperature

Purification stage	Correction	Value	Tolerance Min	Tolerance Max
Product	Coefficient	0.9997	0.95	1.05
Intermediate	Coefficient	1.0000	0.95	1.05

Reference Documents

- Joint Committee for Guides in Metrology JCGM 200 International vocabulary of metrology: Basic and general concepts and associated terms.
- Joint Committee for Guides in Metrology JCGM 100 Evaluation of measurement data: Guide to the expression of uncertainty in measurement.
- Millipore SAS internal procedure 20241671.