

Service Provider

2F,NO.17,Lane 171,Jiu Zong Rd., Sec.2 Taipei 11494

Calibration Certificate for METTLER TOLEDO Titrators Titration Excellence T50/T70/T90

Customer

Company: 瑞士商梅特勒-托利多股份有限公司台灣分公司-高雄
Address: 左營區明誠二路332號5樓之3
City: 高雄市 Zip/Postal: 81359
State/Province: Cust. ID No.: 97171937-2

Device

Certified Titrator: T50
Serial No.: B430850345 Firmware Ver.: 4.0.1
Main Board Chip ID: 01D87B5E170000B8 MB Firmware Ver.: 1.5
Asset Number:

Procedure


The equipment detailed in this document has been calibrated and certified according to the METTLER TOLEDO certification guideline. The certification guideline document is METTLER TOLEDO's internal document, intended for exclusive use by METTLER TOLEDO service specialists.



The measurements were carried out under ambient conditions and the results on the following pages of this certificate were obtained under the conditions prevailing at the time of the calibration. The values in this certificate are reported in SI units and traceable to a National or International Metrology Institute.

Building
Floor
Room
Date: 28-08-2023
Next Certificate Date: 27-08-2024

Service Technician: *Alva Lu*
Alva Lu

Acceptance Summary

Overall Result:  Passed

Type	Slot	Chip ID	FW Ver.	As Found	As Left
Analog Board	1	017C8F8A1700008E	1.2		N/A
Internal Burette Drive		014A705E17000017	1.2		N/A

Analog Board - As Found

Chip ID

017C8F8A1700008E

pH Sensor Input - As Found

Impedance Table

Voltage	Measured Value [mV]	
	Sensor Input 1 [TΩ]	Sensor Input 2 [TΩ]
500 mV		
Voltage measured w/o resistor [mV]	500.68	500.82
Voltage measured w/250 MΩ resistor [mV]	500.40	500.33
Δ voltage [mV]	-0.28	-0.49
Max. permissible error [mV]	0.5	0.5
Result	✓	✓

Sensor Input 1

Nominal Value [mV]	Sensor Input 1			Result
	DVM Value [mV]	Sensor Value [mV]	MPE [mV]	
-1900.00	-1900.80	-1900.81	0.2	✓
-1000.00	-1000.90	-1001.01	0.2	✓
0.00	0.00	0.03	0.2	✓
1000.00	1001.00	1000.98	0.2	✓
1900.00	1900.80	1900.79	0.2	✓

Sensor Input 2

Nominal Value [mV]	Sensor Input 2			Result
	DVM Value [mV]	Sensor Value [mV]	MPE [mV]	
-1900.00	-1900.80	-1900.77	0.2	✓
-1000.00	-1001.00	-1001.00	0.2	✓
0.00	0.00	0.01	0.2	✓
1000.00	1001.00	1001.00	0.2	✓
1900.00	1900.80	1900.82	0.2	✓

Polarized Voltametric Sensor - As Found

Current Source

Certified Value of Resistor [Ω]	Measured at Target Current [μA]	Positive Voltage Value* [mV]	Negative Voltage Value* [mV]	Measured Current [μA]	Target Current [μA]	MPE [μA]	Result
9996.92	10.00	100.47	-99.97	10.03	10.00	1.00	✓
	20.00	199.96	-199.59	19.98	20.00	1.00	✓

Sensor Input

Measured at Target Current [μA]	Average Voltage [mV]	Voltage Sensor Input [mV]	Difference Found [mV]	MPE [mV]	Result
10.00	100.22	99.98	0.24	2.00	✓
20.00	199.78	199.92	-0.14	2.00	✓

* Reading from the DVM

Polarized Amperometric Sensor - As Found

Voltage Source

Certified Value of Resistor [Ω]	Measured at Target Voltage [mV]	Positive Voltage Value* [mV]	Negative Voltage Value* [mV]	Average Voltage [mV]	MPE [mV]	Result
9996.92	1000.00	1008.40	-1002.70	1005.55	10.00	✓
	2000.00	2000.10	-2000.20	2000.15	10.00	✓

Sensor Input

Measured at Target Voltage [mV]	Average Current [µA]	Current Sensor Input [µA]	Difference Found [µA]	MPE [µA]	Result
1000.00	100.59	100.40	0.19	0.2	✓
2000.00	200.08	200.22	-0.14	0.2	✓

* Reading from the DVM

Temperature Sensor Input Pt1000 - As Found

Pt1000 [°C]	Measured Value [°C]	Difference [°C]	MPE [°C]	Result
0	0.01	0.01	0.2	✓
130	130.03	0.03	0.2	✓

Stroke of the Burette Drive As Found

Serial Number: B430850345

Measured Values at 10% Burette Stroke

Measured	Zero Point [µM]	Max Value [µM]	Actual Value [µM]	Set Value [µM]	Deviation [µM]
1	0	4998	4998	5000	-2
2	0	4998	4998	5000	-2
3	0	4998	4998	5000	-2
\bar{x}	0.00	4998.00	4998.00	5000	-2.00

Measured Values at 30% Burette Stroke

Measured	Zero Point [µM]	Max Value [µM]	Actual Value [µM]	Set Value [µM]	Deviation [µM]
1	0	14996	14996	15000	-4
2	0	14996	14996	15000	-4
3	0	14995	14995	15000	-5
\bar{x}	0.00	14995.67	14995.67	15000	-4.33

Measured Values at 50% Burette Stroke

Measured	Zero Point [µM]	Max Value [µM]	Actual Value [µM]	Set Value [µM]	Deviation [µM]
1	0	24997	24997	25000	-3
2	0	24997	24997	25000	-3
3	1	24998	24997	25000	-3
\bar{x}	0.33	24997.33	24997.00	25000	-3.00

Measured Values at 100% Burette Stroke

Measured	Zero Point [µM]	Max Value [µM]	Actual Value [µM]	Set Value [µM]	Deviation [µM]
1	0	50000	50000	50000	0
2	0	49994	49994	50000	-6
3	-2	49992	49994	50000	-6
\bar{x}	-0.67	49995.33	49996.00	50000	-4.00

These values are transferred to "Summary of the burette stroke measurements." In the summary, deviation values are shown as absolute values and two digits are added to the computed mean value to reduce rounding errors.

Summary of Burette Stroke Drive Measurements As Found

Burette Drive	10%	30%	50%	100%
Set Stroke [μM]	5000	15000	25000	50000
Actual Stroke [μM]	4998.00	14995.67	24997.00	49996.00
Absolute Deviation [μM]	2.00	4.33	3.00	4.00
Volume error calculated for 10mL burette [μL]	0.40	0.87	0.60	0.80
Max. Permissible Error [μM]	15	15	25	50
Result	✓	✓	✓	✓

Test Equipment

Digital Voltmeter

Serial No:	78845177	Certificate No:	A112-02-210-01
Model Type:	187	Last Certification Date:	09-02-2023
Supplier	Fluke		

KF Resistor Unit

Serial No:	TC02A0314	Certificate No:	69393
Supplier	METTLER TOLEDO	Last Certification Date:	02-05-2023

Micrometer

Serial No:	2215B70036	Certificate No:	CC129 121-L
Model Type:	S_Dial WORK	Last Certification Date:	27-07-2022
Supplier	Sylvac		

mV Sensor Resistor

Serial No:	TC01A0294	Certificate No:	69391
Supplier	METTLER TOLEDO	Last Certification Date:	03-05-2023

Temperature Resistors PT100 & PT1000

Serial No:	B450365984	Certificate No:	69392
Supplier	METTLER TOLEDO	Last Certification Date:	02-05-2023

Test Unit

Serial No:	5129350029	Certificate No:	N/A
Supplier	METTLER TOLEDO	Firmware Version:	2.0
Chip ID:	01347082120000B		

Remarks

This document is issued to record completion of the work performed by METTLER TOLEDO on the subject device in accordance with agreed standards. It does not guarantee the continued performance of the subject device. Any measurements recorded are based on the subject device's performance at a given time as tested by METTLER TOLEDO and, except where explicitly stated otherwise, do not express an opinion as to the sufficiency of any customer designed procedures used to test the device. This document is not a warranty, either implied or express. METTLER TOLEDO expressly disclaims any liability arising from the use of the information in this document for any purpose other than as specified herein.