METTLER TOLEDO

Calibration Certificate for METTLER TOLEDO Titrators Titration Excellence T5/T7/T9

Customer

Company:	瑞士商梅特勒-托利多股份有限公司台灣分公司		
Address:	內湖區舊宗路二段171巷17號2樓		
City:	台北市	**Zip/Postal:**	114
State/Province:		**Cust. ID No.:**	97171937

Device

Certified Titrator: T5

Serial No.:	B633890652	**Firmware Ver.:**	5.3.0
Main Board Chip ID:	019B0CF7180000CD	**MB Firmware Ver.:**	1.1
		Asset Number:	

Procedure

The equipment detailed in this document has been calibrated and certified according to the METTLER TOLEDO certification guideline FSM Compact Guideline Number. 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.

Building	
Floor	
Room	LAB
Date:	01-06-2020
Next Certificate Date:	31-05-2021

Service Technician: Phil Huang

瑞士商梅特勒托利多(股)台灣分公司 校正專用

Acceptance Summary

Overall Result: ✓ Passed

Type	Slot	Chip ID	FW Ver.	As Found	As Left
Analog Board	1	0130CFB5180000E2	1.2	✓	N/A
Internal Burette Drive		011B0AF7180000BB	1.2	✓	N/A

Analog Board - As Found

Chip ID 0130CFB5180000E2

pH Sensor Input - As Found

Impedance Table

Voltage	Measured Value [mV]	
500 mV	Sensor Input 1 [TΩ]	Sensor Input 2 [TΩ]
Voltage measured w/o resistor [mV]	500.48	500.70
Voltage measured w/250 MΩ resistor [mV]	500.24	500.36
Δ voltage [mV]	-0.24	-0.34
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	-1001.00	-1001.01	0.2	✓
0.00	0.00	-0.01	0.2	✓
1000.00	1001.00	1001.01	0.2	✓
1900.00	1900.90	1900.91	0.2	✓

Sensor Input 2

Nominal Value [mV]	Sensor Input 2			Result
	DVM Value [mV]	Sensor Value [mV]	MPE [mV]	
-1900.00	-1900.80	-1900.79	0.2	✓
-1000.00	-1001.00	-1000.99	0.2	✓
0.00	0.00	-0.01	0.2	✓
1000.00	1001.00	1000.99	0.2	✓
1900.00	1900.90	1900.92	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
9996.67	10.00	100.39	-100.39	10.04	10.00	1.00	✓
	20.00	199.79	-199.82	19.99	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	100.39	100.60	-0.21	2.00	✓
20.00	199.81	200.40	-0.59	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
9996.67	1000.00	1006.80	-1006.10	1006.45	10.00	✓
	2000.00	2002.20	-2001.60	2001.90	10.00	✓

Sensor Input

Measured at Target Voltage [mV]	Average Current [µA]	Current Sensor Input [µA]	Difference Found [µA]	MPE [µA]	Result
1000.00	100.68	100.75	-0.07	0.2	✓
2000.00	200.26	200.37	-0.11	0.2	✓

* Reading from the DVM

Temperature Sensor Input Pt1000 - As Found

Pt1000 [°C]	Measured Value [°C]	Difference [°C]	MPE [°C]	Result
0	-0.17	-0.17	0.2	✓
130	129.83	-0.17	0.2	✓

Stroke of Burette Drive As Found

Serial Number: B633890652

Measured Values at 10% Burette Stroke

Measured	Zero Point [µM]	Max Value [µM]	Actual Value [µM]	Set Value [µM]	Deviation [µM]
1	0	5001	5001	5000	1
2	-1	5000	5001	5000	1
3	-1	5001	5002	5000	2
$\bar{X}$	-0.67	5000.67	5001.33	5000	1.33

Measured Values at 30% Burette Stroke

Measured	Zero Point [µM]	Max Value [µM]	Actual Value [µM]	Set Value [µM]	Deviation [µM]
1	0	15002	15002	15000	2
2	0	15003	15003	15000	3
3	0	15003	15003	15000	3
$\bar{X}$	0.00	15002.67	15002.67	15000	2.67

Measured Values at 50% Burette Stroke

Measured	Zero Point [µM]	Max Value [µM]	Actual Value [µM]	Set Value [µM]	Deviation [µM]
1	1	25007	25006	25000	6
2	1	25006	25005	25000	5
3	0	25006	25006	25000	6
$\bar{X}$	0.67	25006.33	25005.67	25000	5.67

Measured Values at 100% Burette Stroke

Measured	Zero Point [µM]	Max Value [µM]	Actual Value [µM]	Set Value [µM]	Deviation [µM]
1	-1	50012	50013	50000	13
2	-1	50011	50012	50000	12
3	-2	50011	50013	50000	13
$\bar{X}$	-1.33	50011.33	50012.67	50000	12.67

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]	5001.33	15002.67	25005.67	50012.67
Absolute Deviation [µM]	1.33	2.67	5.67	12.67
Volume error calculated for 10mL burette [µL]	0.27	0.53	1.13	2.53
Max. Permissible Error [µM]	15	15	25	50
Result	✓	✓	✓	✓

Test Equipment

Digital Voltmeter

Serial No:	78845177	Certificate No:	A109-01-220-01
Model Type:	187	Last Certification Date:	16-01-2020
Supplier	FLUKE		

KF Resistor Unit

Serial No:	TC02A0314	Certificate No:	49981
Supplier	METTLER TOLEDO	Last Certification Date:	13-05-2019

Micrometer

Serial No:	7E 007 02	Certificate No:	166740
Model Type:	DIGICO 2	Last Certification Date:	29-04-2019
Supplier	TESA		

mV Sensor Resistor

Serial No:	TC01A0294	Certificate No:	49980
Supplier	METTLER TOLEDO	Last Certification Date:	13-05-2019

Temperature Resistors PT100 & PT1000

Serial No:	B450365984	Certificate No:	49982
Supplier	METTLERTOLEDO	Last Certification Date:	13-05-2019

Test Unit

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

Remarks

N/A

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.