

CALIBRATION CERTIFICATE 2023



SUSHMA
CALIBRATION

connect@sushmacalibration.com

TOLL FREE NO. 1800 270 2273

Certificate No.	SCPL/CC/2996/03/2022-2023	Calibrated On.	06-03-2023	Page 1/3
ULR No :	CC287423000000576F	Calibration Due on	05-03-2024	
Work Order	221429	Type of Parameter	TORQUE	

NAME & ADDRESS OF CUSTOMER

National Centre For Quality Calibration
4, Abhishree Corporate Park, Near Swagat Bungalows
BRTS, Iskcon - Ambli Road, Ambli,
AHMEDABAD - 380 058, Gujarat.

CUSTOMER REFERENCE

Ref No.: 200223/01
Date: 20-02-2023
Date of Receipt : 02-03-2023
Status of the item on receipt : Satisfactory

DETAILS OF UNIT UNDER CALIBRATION

Item	Make	Model	Sl.No.	ID.No	Capacity	Channel	Resolution	Mode
Torque Sensor	Sushma	TS - 103 F	TS13 - 0093		2000 Nm			
Smart Display Unit	Sushma	TDU-RB-103	DU13-0032	NCQC-M/022	LCD Display	2000 Nm	0.1 Nm	Clockwise & Counter Clockwise

REFERENCE EQUIPMENT USED

Dead weight torque calibration system is used for calibration of Torque measuring devices. Torque is realised from mass, gravity and length traceable to SI units.

Serial No.: SC9 - 022A [023-1LA & 023-2LA]

Range: 10 - 3000 Nm

METROLOGICAL TRACEABILITY & METHOD USED

Traceability for Weights used in the system are established through PTB, Germany calibrated 1 kg E0 Class weight, Vide their certificate No: PTB - 11092 19 dtd. 20.09.2019 valid upto 19.09.2024

Lever Arms traceable to SICC ,vide certificate No.: SCPL/CC/CMM/05/2022-2023 dated 11-05-2022 due on 11-05-2024.

CMC of our lab for Torque calibration is 0.01% with coverage factor k=2 at 95% confidence level

Calibration Procedure:

Done as per SCPL Document No: SC01-WIT-04 (based on BS 7882:2017)

Local gravity and its uncertainty has been determined by Geological survey of India.

Traceability of instruments used in monitoring temperature is established through approved accredited laboratories .

Temperature : (23 ± 1) °C during the day and within ± 1°C during calibration & Relative Humidity : (50 ± 10)%



Authorised signatory

Suveer Sadanand
(C.E.O.)

or

Mahjula .G.M
(Manager- Calibration)

Note : - This Certificate refers to the values obtained at the time of calibration and under the above stated conditions. *.Calibration Performed in As Received Condition*.All Calibration done in SI units and are traceable to National/International standards as required in ISO/IEC/17025. *.Certificate shall not be reproduced except in full without the written approval of Laboratory.

SC01-CCT-01 v1.1 12/11/2021

Sushma Calibration and Test Labs Pvt. Ltd.,

Plot No: 18E, Block '3', 2nd Phase, "C" Main Road, Peenya Industrial Area, Bangalore-560058. INDIA.

www.sushmaindustries.com

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Calibration results for				Torque Sensor with Smart Display Unit			
Temperature in °C		Output in Nm	Resolution in Nm	Applied Torque uncertainty in %, k=2		Mode	
Before	After			0.003		Clockwise	
23.0	23.1		0.1				
Applied Torque		Unchanged Position Indicated Readings		Changed Position Indicated Readings			
Sl.No.	Step in Nm	0° Series 1 Ascending	0° Series 2 Ascending	90° Series 3 Ascending	180° Series 4 Ascending	270° Series 5 Ascending	270° Series 5' Descending
1	0	0.0	0.0	0.0	0.0	0.0	0.0
2	200	200.2	200.2	199.7	200.2	199.9	200.3
3	400	400.5	400.5	399.5	400.4	400.0	400.4
4	600	600.6	600.5	598.9	600.6	600.0	600.5
5	800	800.7	800.6	798.7	800.7	800.1	800.5
6	1000	1000.7	1000.7	998.5	1000.8	1000.1	1000.6
7	1200	1200.7	1200.6	1198.4	1200.9	1200.1	1200.6
8	1400	1400.6	1400.5	1398.2	1401.0	1400.2	1400.6
9	1600	1600.3	1600.3	1598.1	1601.2	1600.2	1600.5
10	1800	1800.2	1800.2	1797.9	1801.3	1800.2	1800.4
11	2000	2000.1	2000.2	1997.8	2001.3	2000.3	2000.3

Pre-loaded for max. Torque thrice for a period of 1 min before taking readings at first fitted position and once after each rotation before starting the series. Readings are noted after 30 seconds between each step in all the series.

Mean Value in Nm	Relative Deviation in %	Expanded relative uncertainty ± 'U' in % k = 2	U _{interval} in % (inclusive of deviation)	Classification : The instrument is Classified considering relative errors of repeatability, reproducibility, resolution, residual deflection, reversibility, error of indication & applied torque as per BS 7882:2017
200.00	0.000	0.29	0.29	Class
400.10	0.025	0.21	0.24	
600.03	0.004	0.22	0.23	0.05
800.05	0.006	0.19	0.19	0.1
1000.03	0.002	0.17	0.18	0.2
1200.03	0.002	0.16	0.16	0.5
1400.00	0.000	0.15	0.15	1
1599.95	-0.003	0.14	0.14	2
1799.90	-0.006	0.13	0.14	5
1999.88	-0.006	0.12	0.13	

Cal Signal : 0F42F2

Note : Connecting Cables used, which are given by customer & Self Aligning Adaptors used are of SCPL.

Authorised signatory

Suveer Sadanand or
(C.E.O.)

Manjula .G.M
(Manager- Calibration)

SC01-CCT-01 v1.1 12/11/2021

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Temperature in °C Before After		Output in Nm		Resolution in Nm	Applied Torque uncertainty in %, k=2		Mode
22.8	23.1			0.1	0.003		Counter Clockwise
Applied Torque		Unchanged Position Indicated Readings		Changed Position Indicated Readings			
Sl.No.	Step in Nm	0° Series 1 Ascending	0° Series 2 Ascending	90° Series 3 Ascending	180° Series 4 Ascending	270° Series 5 Ascending	270° Series 5' Descending
1	0	0.0	0.0	0.0	0.0	0.0	0.0
2	200	-200.1	-200.2	-199.6	-199.6	-199.8	-200.1
3	400	-399.9	-399.9	-399.3	-399.3	-399.7	-400.0
4	600	-599.4	-599.5	-599.3	-599.1	-599.3	-599.8
5	800	-799.1	-799.2	-799.0	-798.9	-799.1	-799.3
6	1000	-998.9	-999.0	-998.6	-998.7	-998.9	-999.1
7	1200	-1198.5	-1198.7	-1198.4	-1198.6	-1198.7	-1198.9
8	1400	-1398.3	-1398.5	-1398.2	-1398.5	-1398.6	-1398.5
9	1600	-1598.0	-1598.1	-1598.0	-1598.3	-1598.1	-1598.2
10	1800	-1797.9	-1797.8	-1797.7	-1798.1	-1798.0	-1797.9
11	2000	-1997.7	-1997.6	-1997.4	-1998.0	-1997.8	-1997.8

Pre-loaded for max.Torque thrice for a period of 1 min before taking readings at first fitted position and once after each rotation before starting the series. Readings are noted after 30 seconds between each step in all the series.

Mean Value in Nm	Relative Deviation in %	Expanded relative uncertainty ± 'U' in % k = 2	U _{interval} in % (inclusive of deviation)	Classification : The instrument is Classified considering relative errors of repeatability, reproducibility, resolution, residual deflection, reversibility, error of indication & applied torque as per BS 7882:2017			
-199.78	-0.11	0.28	0.39	Class	Range in Nm		Expanded uncertainty in %
-399.55	-0.11	0.14	0.25		From	To	
-599.28	-0.12	0.11	0.23	0.05			
-799.03	-0.12	0.04	0.16	0.1			
-998.78	-0.12	0.04	0.16	0.2			
-1198.55	-0.12	0.03	0.15	0.5	2000	200	0.28
-1398.40	-0.11	0.02	0.14	1			
-1598.10	-0.12	0.02	0.14	2			
-1797.93	-0.12	0.02	0.13	5			
-1997.73	-0.11	0.02	0.14		If the range is blank, then the UUT does not meet the classification criteria as per the above referred standard		

Cal Signal : OF42F2

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