CALIBRATION CERTIFICATE 2023

ilac-MRA

CC-2874

SUSHMA CALIBRATION

connect@sushmacalibration.com

TOLL FREE NO. 1800 270 2273

Certificate No.	SCPL/CC/2994/03/2022-2023	Calibrated On.	04-03-2023	Page 1/3
ULR No :	CC287423000000574F	Calibration Due on	03-03-2024	
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 - 0091	NCQC-M/022	100 Nm	100 Nm	0.01 Nm	Clockwise & Counter Clockwise
Smart Display Unit	Sushma	TDU-RB-103	DU13-0032		LCD Display			

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 - 025   **Range:** 0.001 - 110 Nm

METROLOGICAL TRACEBILITY & 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-02 (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 Humdity : (50 ± 10)%

Authorised signatory

Suveer Sadanand   or   Manjula .G.M

(C.E.O.)   (Manager- Calibration)

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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Certificate No.	SCPL/CC/2994/03/2022-2023	Calibrated On.	04-03-2023	Page 2/3
ULR No :	CC287423000000574F	Calibration Due	03-03-2024	
Work Order	221429	Type of Parameter	TORQUE	

Calibration results for		Torque Sensor	with	Smart Display Unit	

Temperature in °C		Output in	Resolution in Nm	Applied Torque uncertainity in %, k=2	Mode
Before	After				
22.6	22.8	Nm	0.01	0.005	Clockwise

Applied Torque		Unchanged Position Indicated Readings		Changed Position Indicated Readings			
SI.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	0.00	0.00	0.00	0.00	0.00	0.00
2	10	10.00	10.00	10.00	9.99	9.99	10.02
3	20	20.00	20.00	20.00	19.99	19.99	20.02
4	30	30.00	30.00	30.00	29.99	29.99	30.01
5	40	40.01	40.01	40.01	39.99	39.99	40.01
6	50	50.01	50.02	50.01	49.99	49.98	50.00
7	60	60.02	60.02	60.01	59.99	59.98	59.99
8	70	70.02	70.03	70.02	69.99	69.98	69.97
9	80	80.02	80.03	80.02	80.00	79.96	79.95
10	90	90.03	90.03	90.03	90.01	89.95	89.94
11	100	100.03	100.03	100.03	100.02	99.94	99.94

Pre-loaded for max.Torque thrice for a period of 1 min before taking readings at first fitted postion and once after each rotation beforestarting the series.Readings are noted after 30seconds 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			
9.995	-0.050	0.36	0.41	Class	Range in Nm		Expanded uncertainity in %
19.995	-0.025	0.18	0.20		From	To	
29.995	-0.017	0.08	0.10	0.05			
40.000	0.000	0.07	0.07	0.1			
49.998	-0.005	0.08	0.08	0.2	100	20	0.18
60.000	0.000	0.05	0.05	0.5	100	10	0.36
70.003	0.004	0.05	0.06	1			
80.000	0.000	0.06	0.06	2			
90.005	0.006	0.06	0.07	5			
100.005	0.005	0.06	0.07	If the range is blank, then the UUT does not meet the classification criteria as per the above referred standard			

Cal Signal : 21DC97

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

Authorised signatory

Suveer Sadanand   or   Manjula .G.M

(C.E.O.)   (Manager- Calibration)

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

Certificate No. SCPL/CC/2994/03/2022-2023	Calibrated On.	04-03-2023	Page 3/3
ULR No : CC287423000000574F	Calibration Due	03-03-2024	
Work Order 221429	Type of Parameter	TORQUE	

Calibration results for   Torque Sensor   with   Smart Display Unit

Temperature in °C Before	After	Output in Nm	Resolution in Nm	Applied Torque uncertainity in %, k=2	Mode
23.0	23.1	Nm	0.01	0.005	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	0.00	0.00	0.00	0.00	0.00	0.00
2	10	-9.99	-9.99	-9.99	-9.99	-10.00	-10.01
3	20	-19.99	-19.99	-19.99	-19.99	-20.00	-20.02
4	30	-29.99	-29.99	-29.99	-29.99	-29.99	-30.02
5	40	-39.99	-39.99	-40.00	-39.99	-39.98	-40.01
6	50	-49.98	-49.98	-50.00	-49.98	-49.98	-50.01
7	60	-59.98	-59.98	-60.00	-59.99	-59.97	-60.00
8	70	-69.97	-69.98	-70.01	-69.98	-69.97	-69.99
9	80	-79.96	-79.97	-80.02	-79.97	-79.96	-79.97
10	90	-89.96	-89.96	-90.02	-89.96	-89.95	-89.94
11	100	-99.96	-99.96	-100.02	-99.95	-99.94	-99.94

Pre-loaded for max.Torque thrice for a period of 1 min before taking readings at first fitted postion and once after each rotation beforestarting the series.Readings are noted after 30seconds 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			
-9.993	-0.075	0.15	0.22	Class	Range in	Nm	Expanded uncertainty in %
-19.993	-0.038	0.12	0.16		From	To	
-29.990	-0.033	0.12	0.15	0.05			
-39.990	-0.025	0.09	0.12	0.1	100	20	0.12
-49.985	-0.030	0.08	0.11	0.2	100	10	0.15
-59.985	-0.025	0.07	0.09	0.5			
-69.983	-0.025	0.05	0.08	1			
-79.978	-0.028	0.06	0.08	2			
-89.973	-0.031	0.06	0.09	5			
-99.968	-0.032	0.06	0.09	If the range is blank, then the UUT does not meet the classification criteria as per the above referred standard			

Cal Signal : 21DC97

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

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