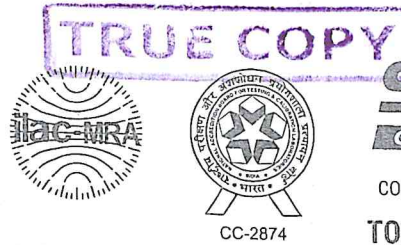


# CALIBRATION CERTIFICATE 2023



**SUSHMA**  
CALIBRATION  
connect@sushmacalibration.com  
TOLL FREE N O. 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	SI.No.	ID.No	Capacity	Channel	Resolution	Mode
Torque Sensor	Sushma	TS - 103 F	TS13 - 0091		100 Nm			
Smart Display Unit	Sushma	TDU-RB-103	DU13-0032	NCQC-M/022	LCD Display	100 Nm	0.01 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 - 025  
Range: 0.001 - 110 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-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 Humidity : (50 ± 10)%



NCQC  
Valid up to 03-03-2024  
Reviewed *[Signature]*

Authorised signatory

Suveer Sadanand  
(C.E.O.)

or

*[Signature]*  
Manjula .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.

NCQC System Certificate No. 152/2

SC01-CCT-01 v1.1 12/11/202

# CALIBRATION CERTIFICATE 2023



**SUSHMA**  
CALIBRATION

connect@sushmacalibration.com

TOLL FREE N O. 1800 270 227

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 Nm	Resolution in Nm	Applied Torque uncertainty in %, k=2		Mode	
Before	After			0.005		Clockwise	
22.6	22.8		0.01				
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	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 position and once after each rotation before restarting 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 $\pm$ '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
19.995	-0.025	0.18	0.20	
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
60.000	0.000	0.05	0.05	0.5
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	

Cal Signal : 21DC97

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

# CALIBRATION CERTIFICATE 2023

TRUE COPY



CC-2874

**SUSHMA**  
CALIBRATION

connect@sushmacalibration.com

TOLL FREE NO. 1800 270 227

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

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			0.01	0.005		Counter Clockwise
23.0	23.1						
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	-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 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 <sub>interval</sub> 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
-19.993	-0.038	0.12	0.16	
-29.990	-0.033	0.12	0.15	0.05
-39.990	-0.025	0.09	0.12	
-49.985	-0.030	0.08	0.11	0.1
-59.985	-0.025	0.07	0.09	
-69.983	-0.025	0.05	0.08	0.2
-79.978	-0.028	0.06	0.08	
-89.973	-0.031	0.06	0.09	0.5
-99.968	-0.032	0.06	0.09	

Cal Signal : 21DC97

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

If the range is blank, then the UUT does not meet the classification criteria as per the above referred standard

Authorised signatory

Suveer Sadanand or  
(C.E.O.)

Manjula .G.M  
( Manager- Calibration)