CC-2029

Fie Research Institute

Prosperity through research

22/44, Ganganagar P. O., Near Sanjay Founders, ICHALKARANJI - 416116.
(Dist.Kolhapur), Maharashtra State, INDIA.
● Phone : (0230) 2441475 ● Cell : 98500 65882
● E-mail : fieresearch@gmail.com ● Website : www.fri-cal.com

CALIBRATION CERTIFICATE

ULR No.CC202923000012501F

OF FORCE MEASURING DEVICE

Date of Calibration	:	17/06/2023	Certificate No.	:	FRI/06/23/15043
Next Calibration due on	:	17/08/2025	Date of Issue	:	17/06/2023
Parameter	:	Force	Page No.	:	1/2

Calibrated for : M/s. National Centre For Quality Calibration,
4, Abhishree Corporate Park,
Near Swagat Bungalow BRTS,
Iskcon – Ambli Road, Ambli,
Ahmedabad – 380 058, Gujarat, India.

Customer Reference No. : Gate Pass No.: 130623 dated 13/06/2023

Identification :

Load Cell Make	: Star Embedded
Model	: Not Mentioned
Sr. No.	: 1364
ID No.	: NCQC/M-30
Capacity	: 200 kN
Readout	: Star Embedded
Model	: Not Mentioned
Sr. No.	: 1364
Resolution	: 0.001 kN

Date of receipt : 17/06/2023

Mode of Calibration : Compression

Calibration Method : The Load cell is calibrated in Compression mode as per FRI calibration procedure No. FRICAL/CAL/01 based on IS: 4169-2014 / ISO: 376-2011.

Machine used for calibration : Dead Weight Type Hydraulic Multiplication Force Calibration Machine

Traceability : FRI/12/21/HFCM/037A* valid upto 23/12/2023

Read out setting : Nil

Temperature : 24°C

Note :
1) Compression test were made out by using self-aligning Compression Pads provided with the force - measuring device.
2) Readout with load cell was warmed up for 30 min. before calibration.
3) This certificate refers only to the particular items submitted for calibration.
4) Creep is measured at no load.

NCQC
Valid up to 17-08-2025
Reviewed

NCQC System Certificate No. 241/1

Calibrated by :	Checked by :	Authorised by :
Scientific Asst. (D.D.Magdum)	Scientific Asst. (U.V.Patil)	Sr. Engineer (R.V.Tambad)

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Identification : Load Cell Make : Star Embedded
Sr. No. : 1364

Results : The calibration results are valid for specific force steps / interpolation

Applied Force in kN	Deflection (kN)				Average (X_1,X_3,X_4) (kN)
	Unchanged Position		Changed Position		
	Series 1 at 0°		Series 2 at 120°	Series 3 at 240°	
	Increasing (X_1)	Increasing (X_2)	Increasing (X_3)	Increasing (X_4)	
20	20.195	20.195	20.194	20.196	20.195
40	40.212	40.213	40.214	40.211	40.212
60	60.165	60.164	60.163	60.165	60.164
80	80.136	80.137	80.138	80.136	80.137
100	100.071	100.072	100.070	100.068	100.070
120	120.076	120.074	120.072	120.071	120.073
140	140.029	140.030	140.031	140.032	140.031
160	159.941	159.942	159.940	159.945	159.942
180	179.869	179.868	179.865	179.871	179.868
200	199.787	199.788	199.789	199.785	199.787
Creep at 30 sec.	0.017	0.016	0.017	0.016	
Creep at 300 sec.	0.002	0.001	0.002	0.001	

Interpolation Equation:

$Y = -0.00000003 * X^3 - 0.00000030 * X^2 + 0.99911530 * X + 0.22584444$

$X = 0.00000003 * Y^3 + 0.00000021 * Y^2 + 1.00088926 * Y - 0.22609152$

Where X = Force in kN, Y= Average Reading in kN

Class	Mode	From	To	Uncertainty of measurement
Class 0.5	Compression	200 kN	20 kN	± 0.06%

The reported uncertainty is at coverage factor k=2 which corresponds to a Coverage probability of approximately 95% for a normal distribution, considering the relative error of different components such as Zero, Resolution, Repeatability, Interpolation and combining the uncertainty of Applied force.

Calibrated by :	Checked by :	Authorised by :
Scientific Asst. (D.D.Magdum)	Scientific Asst. (U.V.Patil)	Sr. Engineer (R.V.Tambad)