NABL : CC-2029

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FRI
Prosperity through research

Fie Research Institute

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

ORIGINAL

CALIBRATION CERTIFICATE
OF FORCE MEASURING DEVICE

ULR No.CC202922000008492F

Date of Calibration	:	05/02/2022	Certificate No.	:	FRI/02/22/14030
Next Calibration due on	:	05/04/2024	Date of Issue	:	05/02/2022
Parameter	:	Force	Page No.	:	1/2

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

Customer Reference No. : Gate Pass No.: 290122/02 Dated 29/01/2022

Identification :

Load Cell Make	: Star Embedded
Model	: Not Mentioned
Sr. No.	: 14627
Capacity	: 100 kN
Readout	: Star Embedded
Model.	: LED-SD1
Sr. No.	: 14627
Resolution	: 1 Count

Date of receipt : 03/02/2022

Mode of calibration : Tension

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

Traceability : FRI/08/20/HFCM/019 Dated 18/08/2020 valid upto 18/10/2022

Read out setting : Nil

Temperature : 24°C

Note :
1) Tension test were made out by using self-aligning Tension Shackles provided with the force - measuring device.
2) Readout with load cell was warmed up for 30 min.before calibration.
3) The calibration is done as per IS: 4169-2014 / ISO: 376-2011.
4) 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.
5) Creep is measured at no load.

NCQC
Valid up to 05-04-2024
Reviewed

NCQC System Certificate No. 241/6

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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ORIGINAL

CALIBRATION CERTIFICATE

ULR No.CC202922000008492F

OF FORCE MEASURING DEVICE

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Next Calibration due on	:	05/04/2024	Date of Issue	:	05/02/2022
Parameter	:	Force	Page No.	:	2/2

Identification : Load Cell Make : Star Embedded
Sr. No. : 14627

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

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

Applied Force in kN	Deflection (Counts)				Average (X_1,X_3,X_4) (Counts)
	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)	
5	9565	9565	9566	9566	9566
10	19520	19520	19521	19521	19521
20	39503	39497	39505	39493	39500
30	59663	59658	59655	59651	59656
40	79777	79771	79780	79775	79777
50	100018	100020	100021	100015	100018
60	120349	120341	120345	120338	120344
70	140501	140497	140495	140491	140496
80	160615	160612	160609	160605	160610
100	200886	200851	200878	200875	200880
Creep at 30 sec.	1	2	1	2	
Creep at 300 sec.	1	2	1	2	

Interpolation Equation:

$Y = - 0.00423983 * X^3 + 0.72194887 * X^2 + 1982.57768570 * X - 376.13941939$

$X = 0.00000000 * Y^3 - 0.00000000 * Y^2 + 0.00050417 * Y + 0.19112636$

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

Class	Mode	From	To	Uncertainty of measurement
Class 0.5	Tension	100 kN	5 kN	± 0.10%

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