

KALIBROINTITODISTUS

KALIBRERINGSBEVIS

CERTIFICATE OF CALIBRATION

Nro
nro • no. M-18K271 100%

Tilaja
Uppdragsgivare • Customer Teknoscale Oy
Kiitoradantie 11
01530 VANTAA

Kalibroitu laite
Kalibrerat instrument • Calibrated instrument Wheel load scale, max. 37 t

Valmistaja
Tillverkare • Manufactured by Teknoscale Oy


Tyyppi
Typ • Model Evocar 2000


Sarjanumero
Serienummer • Serial number 35000

Kalibrointipäivä
Kalibreringsdatum • Date of calibration 4.9.2018

Päiväys
Datum • Date 5.9.2018

Allekirjoitukset
Underskrifter • Signatures


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Sivu
Sida • Page 1/5

Liitteitä
Bilagor • Appendices -



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Kalibroitu laite Kalibrerat instrument • Calibrated instrument

4 load cells, without indicator

Nominal force	350 kN	compression
Calibration range	350 kN	compression
Manufacturer	Precia Molen	
Type	CSP-M-10t-C3-SC-CC	
Serial numbers	8778574_7, 8778614_7, 8778624_7 and 8778628_7	

Amplifier / indicator

Manufacturer	Teknoscale Oy
Type	Evocar 2000
Serial number	35000
Measurement range	0 ... 37000 kg
Resolution	0,5 kg
Fluctuation	±0,5 kg

Load transmitting parts

Calibration laboratory's compression transmitting parts.

Kalibroidun laitteen kunto Kondition av kalibrerat instrument • Condition of calibrated instrument

No remarks.

Kalibrointimenetelmä Kalibreringsmetod • Calibration method

Adapted EN ISO 376 calibration.

Kalibroinnissa käytetyt mittanormaalit ja jäljitettävyys Mätnormalerna som använts i kalibrering och spårbarhet • Measurements standards used in calibration and traceability

Force standard

Force standard no. 4 Stack of masses 50 kN

Force, produced by deadweights, is multiplied times ten by hydraulic amplification.

Traceability

The traceability: Calibration of the masses. The traceability of masses via MIKES and PTB to national standards of Finland and Germany. The force scale is compared against PTB's scale with laboratory's transfer normals.

MIKES = Center for Metrology and Accreditation (Mittatekniikan keskus), Finland.
PTB = Physikalisch Technische Bundesanstalt, Germany.

Kalibrointiolosuhteet Kalibreringsförhållanden • Calibration conditions

Instrument was calibrated at MIKES Metrology, VTT Technical Research Centre of Finland force and torque laboratory in Kajaani. Local value for gravity in laboratory is $9,821725 \text{ m/s}^2$.

Meanvalue of the temperature: $(20,3 \pm 0,2) \text{ }^\circ\text{C}$
Meanvalue of the atmospheric pressure: $(1005 \pm 1) \text{ hPa}$
Meanvalue of the air humidity: $(30 \pm 3) \% \text{ R.H.}$

Date: 4.9.2018

Measured by: Jani Korhonen

Kalibrointitulokset ja mittausepävarmuus Kalibreringsresultat och mätosäkerhet • Calibration results and measurement uncertainty

The results of the calibration are given in tables 1 ... 4. The given results are readings of the indicators display subtracted by zero reading.

Contents of the tables:

Table 1: Readings of the indicator with increasing test force, series 1 of the measurement.

Table 2: Readings on the indicator with increasing test force, series 2 of the measurement.
Readings on the indicator with decreasing test force, series 2' of the measurement.

Table 3: Relative zero error.

Table 4: Masses calculated from force. Applied value for gravity for mass calculations is $9,81950 \text{ m/s}^2$.
The effect of air buoyancy was not taken in to account in mass calculations.
Arithmetical mean values with increasing test force, series 1 and 2 of the measurement.
Relative deviation, series 1 and 2 of the measurement.
Relative reversibility, series 2 and 2' of the measurement.

The reported expanded relative uncertainty of the measurement is calculated according JCGM 100:2008, given by the coverage factor $k = 2$
Effect of zero error, repeatability, rotation and reversibility has been taken into account in measurement uncertainty calculation.

The zero reading of the instrument: 0,0 kg

The zero reading is taken before the first loading series without any correction.

Table 1:

Readings on the indicator with increasing test force, series 1 of the measurement, without rotation.

Force	Series 1 0° kg
0	0,0
50	5091,0
100	10182,5
150	15272,5
200	20365,5
250	25456,0
300	30548,5
350	35638,0
0	-1,5

Table 2:

Readings on the indicator with increasing, series 2 of the measurement, and decreasing test force, series 2' of the measurement, with rotation.

Force	Series 2 180° kg	Series 2' 180° kg
0	0,0	-0,5
50	5091,0	5089,5
100	10182,5	10180,0
150	15273,0	15269,0
200	20365,5	20361,5
250	25456,0	25452,5
300	30548,5	30546,0
350	35638,0	

Table 3:

Relative zero error to NF.

Series of the measurement:	1	2
Relative change of zero %:	0,00	0,00

Table 4:

Arithmethical mean values, relative deviations and relative reversibility:

Force F	Mass calculated from force	Series 1 and 2 posit. 0° and 180°		Rel. revers.	Rel. uncert.
		Arithmetical mean value	Rel. dev.		
kN	kg	kg	%	%	%
0	0,00	0,0			
50	5091,91	5091,0	0,00	-0,03	0,03
100	10183,82	10182,5	0,00	-0,02	0,03
150	15275,73	15272,8	0,00	-0,03	0,03
200	20367,64	20365,5	0,00	-0,02	0,02
250	25459,54	25456,0	0,00	-0,01	0,02
300	30551,45	30548,5	0,00	-0,01	0,02
350	35643,36	35638,0	0,00		0,02

Huomautukset Anmärkningar • Remarks

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