



Minebea

Passion to Exceed Precision

MINEBEA Co., Ltd.

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NMB-Minebea Thai Ltd., Bangkok Office

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NMB Technologies Corporation

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California 91311, U.S.A.
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■Germany

NMB-Minebea-GmbH

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TEL: 49-6103-913-0 / FAX: 49-6103-913-220
URL: <http://www.nmb-minebea.de/>

■France

NMB Minebea S.a.r.l.

5, Avenue des Bosquets, Les Ponts de Baillet,
95560, Baillet en France, France
TEL: 33-1-34083939 / FAX: 33-1-34083930
URL: <http://www.nmb-minebea.fr/>

SALES REPRESENTATIVES

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RdF Corporation

23 Elm Ave. Hudson, NH 03051, U.S.A.
TEL : 1-603-882-5195 / FAX : 1-603-882-6925
URL: <http://www.rdfcorp.com/>

沈阳瑞思达轴承有限公司 SHENYANG TOTAL BEARING CO.,LTD.

Tel: 024 22945833 22923833 24853899 Fax: 024 88729249

Mobile: 13940483518 15640413155 (微信)

Web: <https://www.rstbearing.com.cn>

■United Kingdom

StrainSense Limited

The Old Barn, Woods Lane, Potterspurty, Northants. NN12 7PT, U.K.
TEL : 44-1908-543038 / FAX : 44-8700-940810
URL: <http://www.strainsense.co.uk/>

■Italy

Pavone Sistemi S.r.l.

Via dei Chiosi, 18, 20040 Cavenago Brianza (MI) Italy
TEL : 39-2-95-339-165 / FAX : 39-2-95-01-252
URL: <http://www.pavonesistemi.it/>

Minebea
Passion to Exceed Precision

URL: <http://www.minebea-mcd.com>

Product Guide

Sensors, Components and Instruments



MINEBEA Co., Ltd.
Measuring Components Business Unit

Strain Gages

F-series Epoxy Foil Gage

- This catalog contains information about existing products of Measuring Components Business Unit (MCBU) of Minebea as of May, 2012.
- Specifications of products listed in this catalog are subject to change without notice to allow for continuous improvement.
- Proper use of products is described in the instruction manual. Minebea shall not be responsible for improper use or application of its products. Minebea shall not be responsible for any damage to its products due to improper use or handling.
- Do not adjoin the communication cable between the measuring instrumentations with a power supply cable. etc. It may cause a malfunction and defective performance.
- When selecting products from an old catalog, please consult Minebea.
- When application requires combining products from this catalog with older products of Minebea, consult Minebea to ensure proper connecting instructions.
- To prevent damage, avoid subjecting products to excessive shock due to vibration acceleration or dropping as well as any rapid change in environmental pressure and temperature.

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Conversion table

Mass	SI unit		MKS unit	
	Name of unit	Symbol of unit		
Load	Newton	N	kgf	dyn
		1	1.019 72×10 ⁻¹	1×10 ⁵
		1×10 ⁻⁵	1.019 72×10 ⁻⁶	1
Torque or Force Mornent	Newton·Meter	9.806 65	1	9.806 65×10 ⁵
		N·m	kgf·m	
		1	1.019 72×10 ⁻¹	
Pressure and Stress	Pascal or Newton per square meter	9.806 65	1	
		Pa	MPa	kgf/cm ²
		1	1×10 ⁻⁶	1.019 72×10 ⁻⁵
		1 000	1×10 ⁻³	9.869 23×10 ⁻⁶
		1×10 ⁶	1	1.019 72×10 ⁻²
Acceleration	Meter per square second	9.806 65×10 ⁴	9.806 65×10 ⁻²	9.869 23
		1.013 25×10 ⁵	1.013 25×10 ⁻¹	1
		m/s ²	G	
		1	1.019 72×10 ⁻¹	
		9.806 65	1	

Gage patern	Patern No.	Parts No.	Length	Base size	Patern Size
 31	31	F-02W-12T11W03	0.2	2.7 x 2.2	1.3 x 1.0
		F-02W-12T11W3			
	32	F-05W-12T11W03	0.5	3.0 x 2.5	1.3 x 1.4
 32		F-05W-12T11W3			
	33	F-1S-12MT11W03	1.0	5.2 x 2.5	2.6 x 1.4
		F-1S-12MT11W1			
 33		F-1S-12MT11W3			
		F-1S-12MT11W5			
 34		F-2-12T11W03	2.0	6.7 x 3.0	4.3 x 1.9
		F-2-12T11W1			
		F-2-12T11W3			
 35		F-3N-12T11W03	3.0	9.0 x 3.5	6.0 x 1.8
		F-3N-12T11W1			
		F-3N-12T11W3			
 36		F-4-12T11W03	4.0	8.2 x 3.5	5.6 x 2.0
		F-4-12T11W3			
 37		F-5N-12T11W03	5.0	10.2 x 3.0	7.6 x 1.8
		F-5N-12T11W3			
		F-5N-12T11W5			
 38		F-8-12T11W03	8.0	14.5 x 6.0	11.1 x 3.1
		F-8-12T11W3			
 39		FX-2-12T11W03	2.0	φ8.0	4.1 x 1.4
		FX-2-12T11W1			
		FX-2-12T11W3			
 40		FX-5-12T11W03	5.0	φ12.0	8.0 x 2.5
		FX-5-12T11W1			
		FX-5-12T11W3			
 41		FR-2-12T11W03	2.0	φ8.0	4.1 x 1.4
		FR-2-12T11W1			
		FR-2-12T11W3			
 42		FR-5-12T11W03	5.0	φ12.0	8.0 x 2.5
		FR-5-12T11W1			
		FR-5-12T11W3			
 43		F-02W-12T11W3-3	0.2	2.7 x 2.2	1.3 x 1.0
		F-02W-12T11W5-3			
		F-02W-12T11W10-3			
 44		F-1S-12T11W3-3	1.0	3.6 x 2.7	2.2 x 1.0
		F-1S-12T11W5-3			
		F-1S-12T11W10-3			
 45		F-2-12T11W3-3	2.0	6.7 x 3.0	4.3 x 1.9
		F-2-12T11W5-3			
		F-2-12T11W10-3			
 46		F-5N-12T11W3-3	5.0	10.2 x 3.0	7.6 x 1.8
		F-5N-12T11W5-3			
		F-5N-12T11W10-3			
 47		FX-2-12T11W3-3	2.0	φ8.0	4.1 x 1.4
		FX-2-12T11W5-3			
		FX-2-12T11W10-3			
 48		FX-5-12T11W3-3	5.0	φ12.0	8.0 x 2.5
		FX-5-12T11W5-3			
		FX-5-12T11W10-3			
 49		FR-2-12T11W3-3	2.0	φ8.0	4.1 x 1.4
		FR-2-12T11W5-3			
		FR-2-12T11W10-3			
 50		FR-5-12T11W3-3	5.0	φ12.0	8.0 x 2.5
		FR-5-12T11W5-3			
		FR-5-12T11W10-3			

Introduction to Measuring Components Business Unit

As we approach the beginning of 21st Century, we are preparing for our next stage of development and growth. At Measuring Components Business Unit (MCBU) of Minebea Co., Ltd, it is our goal to develop the finest products in performance and reliability. We aim to meet and exceed the existing requirements of the measuring components markets throughout the world.

For over 60 years, the Measuring Components Business Unit has been fulfilling the needs of its customers in numerous industries by supplying transducers based on most up-to-date strain gage technology, as well as specialized measurement instrumentation.

Our products are manufactured at vertically integrated facilities in Japan, Thailand and China. This permits us to meet the demanding standards that have long been pursued by Minebea to maintain the highest quality levels. We are able to structure our pricing according to our high volume manufacturing, and can therefore furnish the most competitive prices by passing our lower costs on to our customers worldwide.

In conjunction with its application engineering and software procedures, MCBU shall continue to research and develop its products to meet the stringent requirements in the field. In this way, MCBU will assure the highest degree of measurement accuracy and provide solutions to fulfill the needs of its customers.

Based upon its high level of product quality and technical expertise, the Measuring Components Business Unit is well positioned to provide measurement solutions well into the 21st Century.

Profile of Minebea Co., Ltd.

Date of Establishment : July 16, 1951

Capital : 68,258 million yen (As of March, 2011)

Representatives : Mr. Yoshihisa Kainuma, Representative Director, President and Chief Executive Officer

Number of Employee : Consolidated : 53,827 persons, Non consolidated : 2,844 persons (As of March, 2011)

Profile of Measuring Components Business Unit

Division Manager : Hideo Asakawa,
Head of Measuring Components Business Unit

Domestic Plant

Karuizawa Plant : 4106-73 Oaza Miyota, Miyota-machi, Kitasaku-gun, Nagano 389-0293, Japan
tel : 81-267-31-1309 / fax : 81-267-31-1353

Fujisawa Plant : 1-1-1, Katase, Fujisawa, Kanagawa 251-8531, Japan
tel : 81-466-22-7151 / fax : 81-466-22-1701

Overseas Plant

NMB-Minebea Thai LTd.

: 5/2 Moo 8, Phaholyothin Road, Km. 149, Tambol Nikom Sang Ton-Eng,
Amphoe Muang, Lop Buri Province, 15000 Thailand
tel : 66-36-413-811 / fax : 66-36-413-950

Minebea Electronics & Hi-Tech Components (Shanghai) Ltd.

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tel : 86-21-5929-3680 / fax : 86-21-5929-3697

Karuizawa Plant / Japan



Fujisawa Plant / Japan



Lop Buri Plant / Thailand



Shanghai Plant / China



Development of Measuring Components Business Unit

- 1941 ■ Shinkoh Tsushin Seisakusho was established as a partnership company at 1103, Zushi, Zushi-shi, Kanagawa-ken, Japan
- 1950 ■ The Company was incorporated into Shinkoh Tsushin Kogyo Co., Ltd. as a joint stock company.
- 1975 ■ A technical and marketing partnership was concluded with BLH Electronics, Inc., one of the manufacturers of strain measurement and applied equipment in U.S.A.
- 1991 ■ Technical partnership was concluded with SENSOTRON Inc., a subsidiary of Powerec International Inc., a powerful USA maker of a pressure transmitter.
- 1996 ■ ISO 9001 qualification was approved. (Karuizawa factory / Fujisawa factory in Japan)
- ISO 9002 qualification was approved. (Singapore factory / Thai factory)
- ISO 14001 qualification was approved. (All MINEBEA factory)
- 2000 ■ Mass-production of sensors for key board and health meter, etc., have been mainly developed to become a total measuring instrument manufacturer.
- 2001 ■ Operation at Singapore was closed, and the Shanghai factory in China was started.
- 2002 ■ Started mass production of sensors for automobile applications.
- 2003 ■ Operation at the Lop Buri factory in Thailand was started to increase sensor production for automobile applications.
- 2005 ■ Started the sales of 6-axis force sensors.
- 2006 ■ Started production of PSA (Pointing Stick A'ssy).
- 2007 ■ Started production of sensors for game consoles.

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Web: <https://www.rstbearing.com.cn>



New Products

Load cell for weighing systems CC010 series

Double convex canister type load cell



- ★ As equipped with auto alignment function, ideal for applying on hoppers, tank scales and weighing systems.
 - ★ High accuracy and High reliability
(OIML-D1 class or equivalent : Non-linearity + Hysteresis + Repeatability = 0.04 %R.O.)
 - ★ Hermetically sealed stainless steel construction providing excellent protection in a hazardous environment.
 - ★ Same height and diameter for all capacities.
- * Auto alignment function is the mechanism which keeps the balance of the tank scale and hopper against the rolling.

Mounting attachment with slide stop mechanism for CC010

Check rod method



CCACC010 series

- ★ Equipped with lift-off protection fittings.
- ★ All stainless steel structure.
(Selectable alloy steel structure)
- ★ Expansion capability in all directions.
- ★ Japanese patent No.4422099

Flexible stop method



FCACC010 series

- ★ Equipped with lift-off protection fittings.
- ★ All stainless steel structure
(Selectable alloy steel structure)
- ★ Most suitable for the tank where the vibration such as the pugmill is generated.

Digital Load Cell DC002 Series / Digital Indicator CSD-401

Achieve 1,000,000 count digital output without the data loss



DC002 series

(Mounting attachment is an option)

- ★ Excellent noise tolerance - An amount of the lightning surge is increased by the internal measures parts.
- ★ High precision measurement can be performed by the excellent temperature compensation.
- ★ Temperature error is compensated by measuring the temperature at gage section with the internal temperature detecting part.
- ★ Decrease the error factor with the use of an amplifier.
- ★ Improvement of maintenance efficiency
The calibration function of four corner adjustment, etc., is simplified by the use of a special indicator (CSD-401).
- ★ CE mark applicable. (DC002 series)

Up to (8) load cells
are connectable.



Summing Type
Junction Box
DB-307



Digital Indicator
CSD-401

SOS Type Pressure Sensor NS30T Series

Adopted Silicon-On-Sapphire Technology
Compact Size, High Accurate Pressure Sensor



- ★ Compact size and Light weight $\phi 16$ mm x approx.43 mm, Weight approx.50 g
- ★ Accuracy 0.2 %R.O. (High accurate type : 0.1 %R.O.) (Including non-linearity, hysteresis and repeatability)
- ★ Available for compound pressure measurement (-100 kPa to each rated capacity)
- ★ Applicable for low level pressure measurement (0 ~ 200 kPa, 0 ~ 500 kPa)
- ★ High speed response (Natural frequency : 72 kHz ~ 556 kHz / 200 kPa ~ 10 MPa)
- ★ Compensated temperature range : - 20 °C ~ 120 °C
Safe temperature range : - 45 °C ~ 160 °C
* Even if the environmental temperature exceeds the compensated temperature range, accuracy is guaranteed to the safe temperature range.
- ★ Application example
Automobile experimental use (Automatic transmission, Engine intake port),
Solenoid valve testing system, Aircraft oil pressure testing system,
Osmotic pressure measurement, Vapour pressure measurement, Leak tester

New Products

Graphic Digital Indicator CSD-912

Applicable to all around weighing system from an advanced
sequential control to a simple platform scale, etc.



- ★ Adopted 6.2 inches color liquid crystal touch panel display with excellent visibility STN color and wide viewing angle.
- ★ Waveform display of weighing status.
- ★ Adopted the visible 7 segment design with 22 mm height character to the load display section.
- ★ Correspond to DC12 V excitation for load cell.
- ★ Stored 100 kinds of mixing measurement in the internal brand memory.
- ★ Wide range power supply voltage (AC100 V ~ AC240 V)
- ★ High speed A/D conversion at 1 000 times/s. (Internal resolution : 24 bits)
- ★ Equipped with substantial measurment sequence adaptable in a various measurement system.
Available sequential control without connecting PLC etc. at outside.
- ★ Correspond to many kind of field bus, "CC-Link", "Profibus" enable to connect PLC directly, available simple construction for advanced and complicate measurement system.
- ★ CE mark applicable.

Digital Indicator CSD-903



New standard model consolidated
measurement know-how of Minebea.

- ★ Plentiful of weighing system
· High performance sequential mode, · Flexible simple comparison mode, · Two part of comparator mode
- ★ Active display
· Good visible main display, · Various kinds of sub-display, · Plentiful of status display
- ★ Various interface
Standard : 2-wires method serial interface, RS-485 (Corresponding to Modbus)
Option : Voltage output, Current output, BCD output, RS-422/485, RS-232C, CC-Link
- ★ Correspond to DC12 V excitation for load cell.
- ★ Communication tool ... Support the parameter set connecting with PC.
- ★ Light weight and compact size ... WHD : 144 × 72 × 136.5 mm, Weight : Approx.1.0 kg
- ★ High speed sampling
Flow and discharge can control in good accuracy by high speed A/D conversion at 200 times/s.
- ★ Correspond to dustproof and waterproof
Protection grade is IP65 when the attached panel mount gasket is installed.
- ★ CE mark applicable
- ★ World wide power supply ... AC100 V ~ 240 V.

Digital Conversion Module CSD-892-73

High performance and Palmtop size Digital Conversion Module
Fit and Smart model in FA systems.

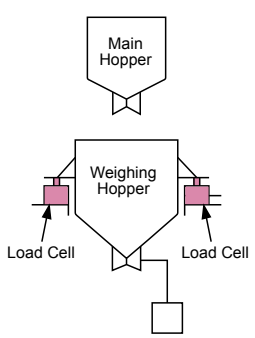


- ★ Best for High speed / High resolution application
· 500 times/s of A/D sampling speed and comparator output rate. Suitable for the high speed application, such as an automatic measurement machine, filling machine, etc. Input sensitivity is 0.15 μ V/d.
- ★ Various convinient capability
· Simple calibration
Equipped with a short-cut key for the setting related to ZERO, SPAN and the other calibrations. Therefore, the easy calibration is achieved.
· Various filters
Equipped with three filters corresponding to the various responses. Therefore, the stable measurement can be possible under the environment with a lot of vibrations.
· F key function
Selectable one from Zero set, Zero clear, Tare weight cancellation, Tare weight cancellation clear, Hold, Change display of Gross and Net or Confirmation of station number for CC-Link interface.
· Convenient monitoring function
The confirmation of load cell output voltage (mV/V) is convenient to divide the cause when the trouble occurs.
- ★ Easy installation and palmtop size ... Weight : Approx. 260 g, (W×H×D) 72 × 96 × 67.4 mm
Applicable to the rail type mounting for 35mm width of DIN standard. Achieved the lightening and minimizing.
- ★ Communication tool ... Support the parameter set connecting with PC.
- ★ The system is constructed with CC-Link interface easily.
- ★ The PC that installs EzCTS(Optional) and connects with USB interface.

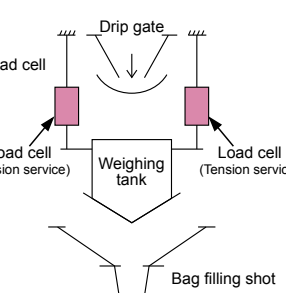
Applications for various type sensors, amplifiers and indicators

Application

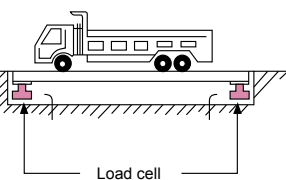
Hopper and tank scale



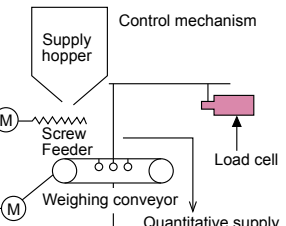
Packer scale



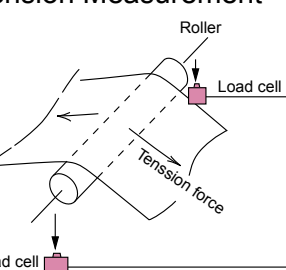
Truck scale



Feeder System



Tension Measurement



Transducers

Load Cell (Compression service)
CCP1(A) series CC010 series
C3B1-NS series C2B1B series

Load Cell (Tension service)
U3S1-NS series T3B1 series

Load cell for truck scale
CC002-NS series

Beam type load cell
C2G1-A series
CBE1(-U) series
C3B1-NS series

Load cell (Compression service)
CCR1(B) series
CMM1 series
C3B1-NS series

Junction Box

B-307 Summing type junction box
DB-307 Summing type junction box for digital load cell
SB-310 Summing type junction box
SB-320 Summing type junction box (Stainless steel structure)
B-304B Summing type junction box

Digital Indicator
CSD-892-73
CSD-891B
TMD-100

Instrumentations

Analog Transmitter
CSA-503C
CSA-507C

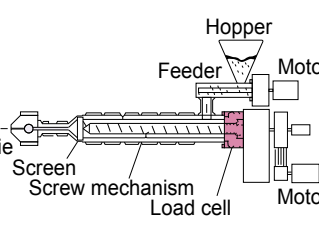
Digital Indicator
CSD-814B
CSD-815B
CSD-701B
CSD-581-15/74
CSD-912
CSD-903
CSD-904

** Various model recognition of intrinsically safe construction and flame-proof construction in preparation for the case measured in atmosphere with the explosion hazard is required. Please consult us separately.

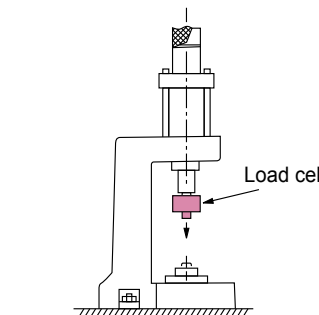
Applications for various type sensors, amplifiers and indicators

Application

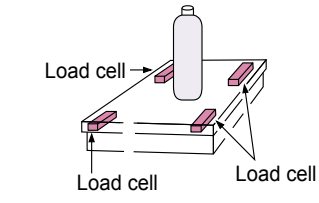
Injection molding machine



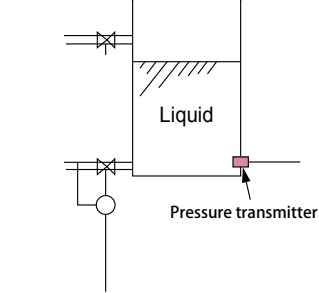
Press load measurement



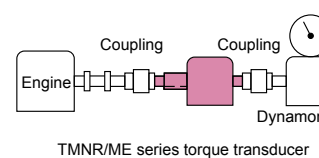
Platform Scale



Pressure measurement



Torque measurement



Transducers

Load Cell (Compression service)
UWV1 series
C1W1M series

Load Cell (Compression service)
LSM-B series
CMM1 series

Load Cell for Scale
C2G1-A series BCL-A series
CB14 series C2D1 series

Pressure transmitter
NS100A series
NS115P series PRN series

Torque Transducer
Optical transmission method
TMOFB series TMHFB series
TMOS series
CSA-562B

Junction Box

B-307 Summing type junction box
SB-310 Summing type junction box
SB-320 Summing type junction box (Stainless steel structure)
B-304B Summing type junction box

Instrumentations

Analog Transmitter
CSA-503C
CSA-507C
CSA-522B

Digital Indicator
CSD-814B
CSD-815B
CSD-701B
CSD-581-15/74
CSD-912
CSD-903
CSD-904

Torque Transducer
Rotary transformer method
TMNR series
CSA-561

Current Output 4 mA ~ 20 mA
Voltage output 0 V ~ 5 V,
0 V ~ 10 V

Load Cell Selection Table

Load Cell Selection Table

	Model No.	Page	Rated capacity																							Rated Output	Non-linearity	Safe Overload	Safe Temp. Range	Protection Grade	Characteristics	
			4.903 N	9.807 N	19.61 N	49.03 N	98.07 N	196.1 N	490.3 N	980.7 N	1.961 kN	2.942 kN	4.903 kN	9.807 kN	19.61 kN	29.42 kN	49.03 kN	58.84 kN	98.07 kN	147.1 kN	196.1 kN	294.2 kN	490.3 kN	980.7 kN								
			500 gf	1 kgf	2 kgf	5 kgf	10 kgf	20 kgf	50 kgf	100 kgf	200 kgf	300 kgf	500 kgf	1 tf	2 tf	3 tf	5 tf	6 tf	10 tf	15 tf	20 tf	30 tf	50 tf	100 tf								
Compression Service	CC010	8										●	●	●	●	●		●		●	★	★				2	± 0.04	150	-20 ~ 70	IP68	Double convex type, all stainless steel structure. High accuracy and reliability. OIML certified.	
	CCP1(A)	11							★	★	(A)●	●	●	●	●	●		●		●						3	0.05	500:under 100K 150:over 200K	-20 ~ 100	IP64	High accuracy canister type load cell. Suitable for Tank or Hopper weighing systms. High rated output 3 mV/V.	
	CMM1	9							●	●	●		●	●												2	0.15	150	-20 ~ 80	IP67	Compact, light weight load cell with all stainless steel construction. Suitable for use in a corrosive environment.	
	CMP1	10									2.452 kN (250 kgf)●	●	●	●		●		●		●						2 (1:250K)	0.05	150	-20 ~ 80	IP68	Precise low-profile load cell for compression service. All stainless steel construction.	
	CWV1	22												●		●		●		●			★	★		3	0.05:under 20T 0.1:over 50T	150	-20 ~ 80	IP64	Low profile, shear web type load cell. It is strong in lateral load. Suitable for use in the limited space.	
	C1W1M-S01	-															★	78.45 kN (8 tf)★	★	★	333.4 kN (34 tf)★	★				4 mA ~ 20 mA	0.6	150	-10 ~ 70	IP64	Canistar, through-hole type. Current output of 4 mA to 20 mA at the excitation voltage of 24 V.	
	LSM-B	12	●	●	●	●	●	●	●			★	★	★													1.3 (0.4:500G)	1	150 (200:500K~2T)	-10 ~ 60 (-10~70:500K~2T)	IP60	Miniature type load cell. Suitable for application with limited space.
	LSMS	12						★	★																		0.6	2	150	-20 ~ 60	IP60	Miniature type load cell with 5 mm height and 7 mm diameter. Suitable for application with limited space.
Tension Service	TCP1(A)	22							★	★	(A)★	★	★	★	★	★		★		★						3	0.05	500:under 100K 150:over 200K	-20 ~ 100	IP64	High accuracy canister type load cell. Suitable for Tank or Hopper weighing system.	
	T3B1	22						●	●	●	●		●	●	★		★									3	0.03	150	-20 ~ 80	IP64	Compact and light weight beam type load cell.	
	CLS-A	22													★		★	88.26 kN (9 tf)★		★						1	0.2	200	-30 ~ 70	IP64	Ideal for measuring the tension force of cable in crane application	
Beam Type	C3B1-NS	15									●	●	●	●	●	●										3	0.025	150	-20 ~ 80	IP67	Ideal for weighing systems such as tank, hopper or floor scale. OIML certified.	
	C2B1B	16									★	2.452 kN (250 kgf)★	★	★	★												2 (1.6:200K)	0.05	150	-20 ~ 80	IP68	High presicion, hermetically sealed all stainless steel load cell. OIML certified.
	CBE1(-U)	17				●	●	●	●	●	●																2	0.05	150	-20 ~ 80	IP67	Beam type load cell with all stainless steel construction. OIML certified.
Compression & Tension Service	U3B1-B	14						●	●	●	●		●	●													3	0.05	150	-20 ~ 80	IP64	High accuracy, tension/compression service load cell.
	U2S1	13									●	2.452 kN (250 kgf)★	●	●	●												2	0.025	150	-20 ~ 80	IP68	S-beam type high accurate load cell. All stainless structure and excelling in the environmental factor.
	U3S1-NS	22								●	●		●	●	●		●										3	0.025	150	-20 ~ 80az	IP67	High accuracy compact and light weight tension/compression service.
	UMM1	22							●	●	●		●	●	●												2	0.15	150	-10 ~ 80	IP67	Compact size light weight, tension/compression service with all stainless steel construction.

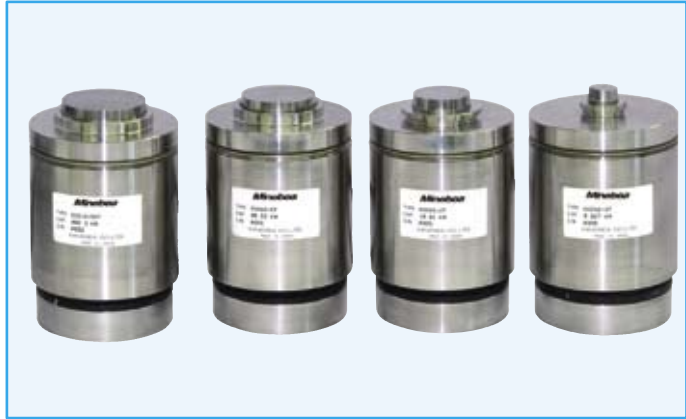
	Model No.	Page	Rated Capacity																				Rated Output	Non-linearity	Safe Overload	Safe Temp. Range	Protection Grade	Characteristics							
			2.942 N	5.884 N	9.807 N	19.61 N	29.42 N	58.84 N	98.07 N	147.1 N	196.1 N	245.2 N	294.2 N	343.3 N	490.3 N	588.4 N	980.7 N	2.942 kN	4.903 kN	5.884 kN	9.807 kN	19.61 kN							29.42 kN	49.03 kN					
			300 gf	600 gf	1 kgf	2 kgf	3 kgf	6 kgf	10 kgf	15 kgf	20 kgf	25 kgf	30 kgf	35 kgf	50 kgf	60 kgf	100 kgf	300 kgf	500 kgf	600 kgf	1 tf	2 tf							3 tf	5 tf					
for Electrical Scale	BCL-A	19	★	★	11.77 N (1.2 kgf)★	14.71 N (1.5 kgf)★	29.42 N (3 kgf)★	44.13 N (4.5 kgf)★																				1.6	0.02	150	-10 ~ 50	IP40	Low capacity, compact size, single point type load cell. OIML certified.		
	CB17-11	19		●	●	●	●																					1	0.02	300	-10 ~ 50	IP64	Low capacity, compact size, single point type load cell.		
	C2G1-A	20				117.7 N (12 kgf)★		●	●	●	●	●	●															2	0.015	150	-10 ~ 50	IP64	OIML and NTEP certified.		
	CB004	20							★	★	★	★	★	441.3 N (45 kgf)★	★	★												2	0.015	150	-10 ~ 50	IP64	Single point type load cell and strong in unbalanced load. OIML certified.		
	U2D1	21					●	●	●	●	●			●		●												2	0.015	200	-10 ~ 50	IP40	Single point type load cell with protective cover.OIML certified.		
	CB14-21	21													1.471 N (150 kgf)●	●	★	★	2.452 kN (250 kgf)●									2.2	0.02	150	-10 ~ 70	IP64	Middle range single point type load cell. OIML certified.		
	C2D1	22														●	●	4.413 kN (450 kgf)★	★	7.845 kN (800 kgf)★							2	0.02	150	-20 ~ 70	IP65	Middle range single point type load cell and strong in unbalanced load. OIML certified.			
	C2T1-A	23														●		●	●	●	●		39.23 kN (4 tf)●		68.65 kN (7 tf)★		2	0.025	150	-20 ~ 70	IP64	Highly accurate load cell for multipoint method platform type weighing scale.			
	CC002-NS	23																								★	★	★	★	2	0.02	150	-20 ~ 70	IP68	Good performance in severe environment. OIML certified.
	DC002-NS	23																								★	★	★	★	10 ⁶ count ±500 count	0.02	150	-20 ~ 70	IP68	Digital load cell excelling low noise. OIML certified.
	CB004S	23							★	★	★	★	★	★	441.3 N (45 kgf)★	★	★											2	0.025	150	-10 ~ 50	IP67	Tall profile stainless steel structure. Suitable for large size platform scale. OIML certified.		
CB063	23													★	1.471 kN (150 kgf)★	★	★	1.961 kN (200 kgf)★	2.452 kN (250 kgf)★							2	0.015	150	-10 ~ 50	IP67	Low profile, and suitable for high capacity and thin weighing scale. OIML certified.				

	Model No.	Page	Rated Capacity										Rated Output	Non-linearity	Safe Overload	Safe Temp. Range	Protection Grade	Characteristics	
			19.61 mN	98.07 mN	196.1 mN	490.3 mN	980.7 mN	1.961 N	4.903 N	9.807 N	19.61 N								
			2 gf	10 gf	20 gf	50 gf	100 gf	200 gf	500 gf	1 kgf	2 kgf								
for Slight load																			
	ULA	18	●	●	●	●	●							1.75 2GR:0.5	0.3	130	-10 ~ 60	IP30	Excellent in measuring the slight load and the tension of yarn, etc.
	UTA	18					●	●	●	●				2 100GR:1.75	0.3	150	-10 ~ 60	IP30	

	Model No.	Page	Rated Capacity																				Rated Output	Non-linearity	Safe Overload	Safe Temp. Range	Protection Grade	Characteristics				
			49.03 N	98.07 N	196.1 N	490.3 N	980.7 N	1.961 kN	2.942 kN	4.903 kN	5.884 kN	9.807 kN	19.61 kN	29.42 kN	49.03 kN	98.07 kN	196.1 kN	294.2 kN	392.3 kN	490.3 kN	980.7 kN	1.961 MN							2.942 MN			
			5 kgf	10 kgf	20 kgf	50 kgf	100 kgf	200 kgf	300 kgf	500 kgf	600 kgf	1 tf	2 tf	3 tf	5 tf	10 tf	20 tf	30 tf	40 tf	50 tf	100 tf	200 tf							300 tf			
Special Measurement	CCR1(B)	-								●		●	●		●	●	●										2	0.2	500	-20 ~ 100	IP64	Strong in overload and widely used as a load detector of a total weighing system.
	CCS1	22																	●	★	★	★				2	0.3	150	-20 ~ 100	IP64	Used in weighing system with high capacity popularly.	
	CL-B	-												★	★	★	★	★	★							0.5	0.5	300	-15 ~ 75	IP64	Used in crane applications to prevent falls caused by overload.	
	UWV1	-										★		★	★	★			★	★						3	0.1:under 20T 0.2:over 50T	150	-20 ~ 80	IP64	Low profile, shear web type compression/tension service load cell. Strong in lateral load.	
	CBC1	-	★	★	★	★	★	★	★		★	★														2	0.03	150	-20 ~ 100	IP64	Suitable for a weighing systems with limited installation height.	
	U3C1-B	-	●	●	●	●	●																			3	0.05	150	-20 ~ 80	IP64	Simple type load cell with aluminum alloy structure.	

★ : Make-to-order (MTO) manufacturing product, ● : Make-to-stock (MTS) manufacturing product

CC010 Series - Double Convex, Compression Type Load Cell



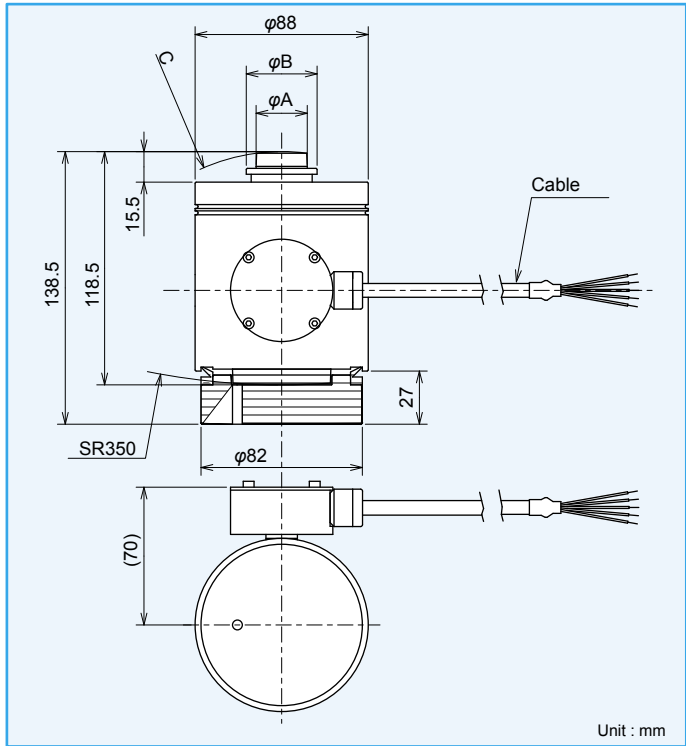
Features

- Double convex type, all stainless steel structure, and good performance in severe environment.
- Highly accurate compression service load cell with stable repeatability. (OIML-D1 or equivalent)

Specifications

Rated capacity : 4.903 kN {500 kgf} ~ 490.3 kN {50 tf}
Safe overload : 150 %R.C.
Ultimated overload : 200 %R.C.
Rated output : 2 mV/V±0.002 mV/V
Accuracy : 0.04 %R.O.
(Including Non-linearity, Hysteresis and Repeatability)
Creep : 0.03 %R.O./20 min
Creep recovery : 0.03 %R.O./20 min
Recomended excitation : 12 V
Maximum excitation : 20 V
Zero balance : ±0.02 mV/V
Input resistance : 700 Ω±7 Ω
Output resistance : 700 Ω±5 Ω
Insulation resistance : 5 000 MΩ or more (DC50 V)
(between bridge and body)
Compensated temp.range : - 10 °C ~ 50 °C
Safe temp. range : - 20 °C ~ 70 °C
Temp. effect on zero balance : 0.028 %R.O./10 °C
Temp. effect on output : 0.03 %LOAD/10 °C
Cable : φ7, 4-cores 5 m shielded cable directly attached.
Cable end is separated. (CC010-5T ~ -50T : 10 m)
Protection grade : IP68
Element material : Stainless steel
Durability : 10⁶ times at rated capacity.

Outlines



< Dimension table >

Parts No.	Rated Capacity	φA	φB	C	Displacement	Natural Freq. (Hz)	Weight (Approx.kg)
CC010-500K	4.903 kN {500 kgf}	17.5	27	SR50	0.09	5 400	5
CC010-1T	9.807 kN {1 tf}				0.06	9 400	
CC010-2T	19.61 kN {2 tf}	26	36	SR100	0.06	6 800	
CC010-3T	29.42 kN {3 tf}					8 100	
CC010-5T	49.03 kN {5 tf}	45	54	SR100	0.06	6 100	
CC010-10T	98.07 kN {10 tf}			SR150	0.13	2 000	
CC010-20T	196.1 kN {20 tf}				0.15	2 700	
CC010-30T	294.2 kN {30 tf}				0.16	3 100	
CC010-50T	490.3 kN {50 tf}	50	58	SR150	0.19	3 400	

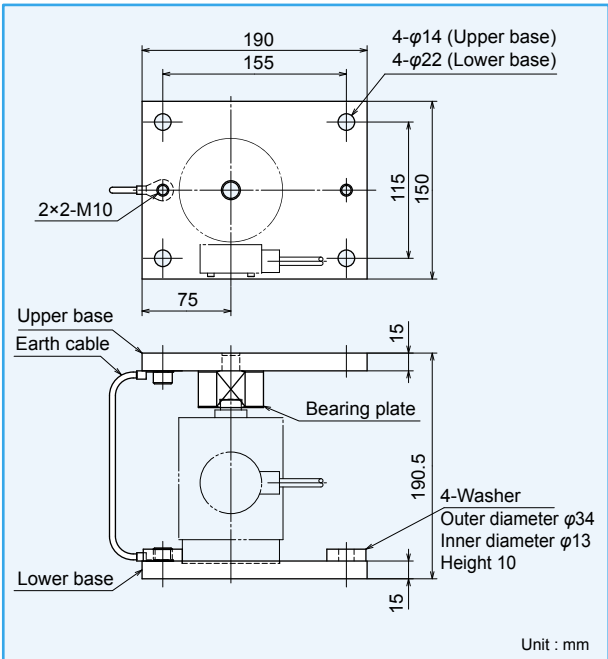
< Accessories >

- Inspection data sheet 1 copy

< Optional fittings >

- Metal fittings AIC-035*(-S)
- Mounting attachment with slide stop mechanism
Flexible stop type FCACC010-*Bx(S)
Check rod type CCACC010-*Bx(S)

< Metal fitting AIC-035*(-S) >



< Table of Parts No. >

Parts No.	Rated Capacity
AIC-035-500K/1T(-S)	CC010-500K, CC010-1T
AIC-035-2T/3T(-S)	CC010-2T, CC010-3T
AIC-035-5T/30T(-S)	CC010-5T, CC010-10T, CC010-20T, CC010-30T
AIC-035-50T(-S)	CC010-50T

(-S) : Stainless steel structure.

CMM1 Series - Compact Size Compression Type Load Cell



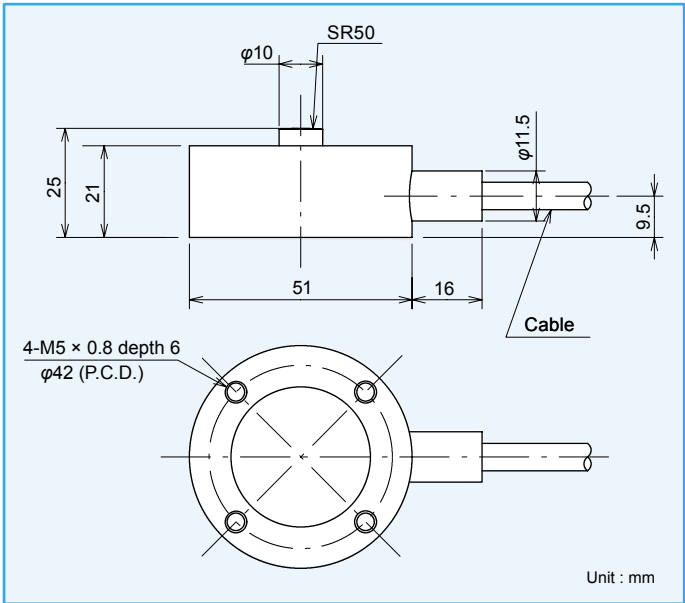
Features

- Compact, light weight load cell with all stainless steel construction.
- Suitable for use in a corrosive environment.

Specifications

Rated capacity : 490.3 N {50 kgf} ~ 19.61 kN {2 tf}
Safe overload : 150 %R.C.
Ultimated overload : 200 %R.C.
Rated output : 2 mV/V±0.005 mV/V
Non-linearity : 0.15 %R.O.
Hysteresis : 0.1 %R.O.
Repeatability : 0.05 %R.O.
Recomended excitation : 12 V or less
Maximum excitation : 18 V
Zero balance : ±0.06 mV/V
Input resistance : 425 Ω±50 Ω
Output resistance : 350 Ω±5 Ω
Insulation resistance : 2 000 MΩ or more (DC50 V)
(between bridge and body)
Compensated temp. range : - 10 °C ~ 70 °C
Safe temp. range : - 20 °C ~ 80 °C
Temp. effect on zero balance : 0.05 %R.O./10 °C
Temp. effect on output : 0.1 %LOAD/10 °C
Cable : φ6.3, 4-cores 3 m shielded cable directly attached with Y type terminals
Protection grade : IP67
Element material : Stainless steel
Durability : 10⁶ times at rated capacity.

Outlines



< Dimension table >

Parts No.	Rated Capacity	Displacement	Natural Freq. (Hz)	Weight (Approx.kg)
CMM1-50K	490.3 N {50 kgf}	0.15	3 600	0.34
CMM1-100K	980.7 N {100 kgf}	0.10	5 000	
CMM1-200K	1.961 kN {200 kgf}	0.07	6 000	
CMM1-500K	4.903 kN {500 kgf}	0.07	7 000	
CMM1-1T	9.807 kN {1 tf}	0.05	10 000	
CMM1-2T	19.61 kN {2 tf}	0.05	10 000	

< Accessories >

- Inspection data sheet 1 copy

< Optional fittings >

- Expansion Plate EPA-*
- Mounting Plate MPA-* with bolt for installation
- Mounting attachment with slide stop mechanism
Flexible stop type FCA-CMM1-50K/2T-S
Steel ball type SCA-CMM1-50K/2T

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CMP1 Series - Double Convex Type Load Cell



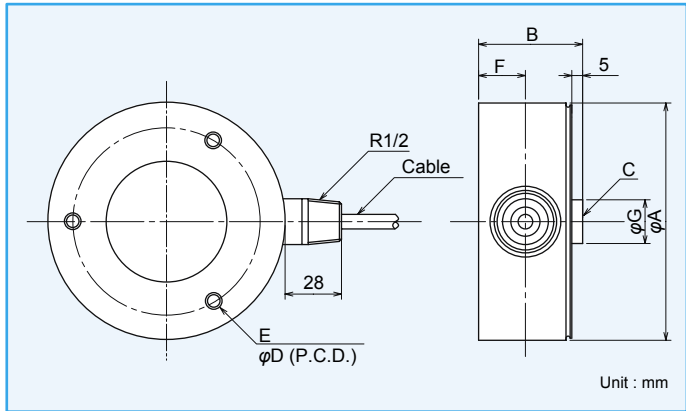
Features

- Precise low-profile load cell for compression service with all stainless steel construction.
- Suitable for use in a corrosive environment.

Specifications

Rated capacity : 2.452 kN {250 kgf} ~ 196.1 kN {20 tf}
Safe overload : 150 %R.C.
Ultimated overload : 200 %R.C.
Rated output : 2 mV/V±0.005 mV/V
(CMP1-250K : 1 mV/V±0.005 mV/V)
Non-linearity : 0.05 %R.O.
Hysteresis : 0.05 %R.O.
Repeatability : 0.05 %R.O.
Recomended excitation : 12 V or less
Maximum excitation : 18 V
Zero balance : ±0.02 mV/V
Input resistance : 350 Ω±3.5 Ω
Output resistance : 350 Ω±5 Ω
Insulation resistance : 2 000 MΩ or more (DC50 V)
(between bridge and body)
Compensated temp. range : - 10 °C ~ 70 °C
Safe temp. range : - 20 °C ~ 80 °C
Temp. effect on zero balance : 0.05 %R.O./10 °C
(CMP1-250K : 0.1 %R.O./10 °C)
Temp. effect on output : 0.1 %LOAD/10 °C
Cable : φ7, 4-cores 10 m shielded cable directly attached with Y-type terminal lugs.
Protection grade : IP68
Element material : Stainless steel
Durability : 10⁶ times at rated capacity.

Outlines



< Dimension table >											(Unit : mm)
Parts No.	Rated Capacity	φA	B	C	φD	E	F	φG	Displacement	Natural Freq. (Hz)	Weight (Approx.kg)
CMP1-250K	2.452 kN {250 kgf}	88	40	SR150	72	3-M6 x 1 depth 6	16	18	0.03	1 900	1.8
CMP1-500K	4.903 kN {500 kgf}								0.06	2 600	
CMP1-1T	9.807 kN {1 tf}									4 000	
CMP1-2T	19.61 kN {2 tf}									9 000	
CMP1-5T	49.03 kN {5 tf}									12 000	
CMP1-10T	98.07 kN {10 tf}	88	45	SR150	72	3-M6 x 1 depth 6	18	18	0.11	12 000	2.0
CMP1-20T	196.1 kN {20 tf}	114	50	SR230	90	3-M8 x 1.25 depth 6	22.5	21	0.14	12 000	3.7

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CCP1(A) Series - Precise Compression Type Load Cell



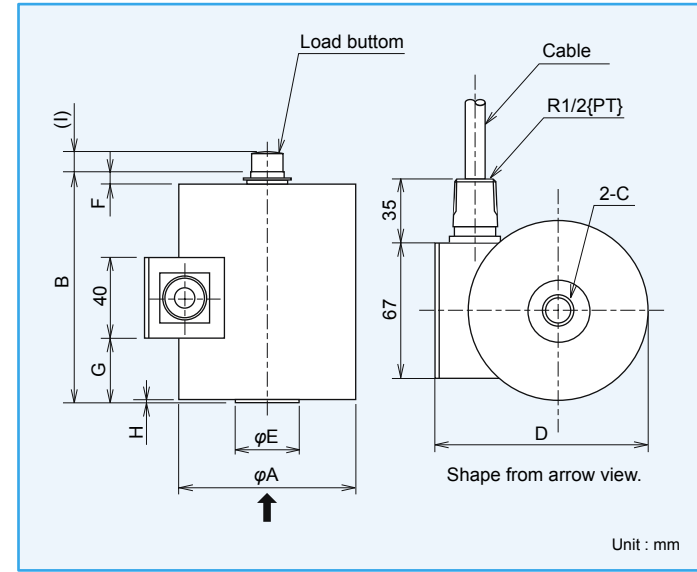
Features

- High accurate canister type load cell. Suitable for Tank or Hopper weighing systems.
- High rated output at 3 mV/V.

Specifications

Rated capacity : 490.3 N {50 kgf} ~ 196.1 kN {20 tf}
Safe overload : 150 %R.C. (CCP1-50K ~ 100K : 500 %R.C.)
Ultimated overload : 200 %R.C. (CCP1-50K ~ 100K : 500 %R.C.)
Rated output : 3 mV/V±0.003 mV/V
Non-linearity : 0.05 %R.O.
Hysteresis : 0.02 %R.O. (CCP1-50K ~ 100K : 0.05 %R.O.)
Repeatability : 0.02 %R.O. (CCP1-50K ~ 100K : 0.05 %R.O.)
Recomended excitation : 12 V or less
Maximum excitation : 20 V
Zero balance : ±0.03 mV/V
Input resistance : 350 Ω±3.5 Ω
Output resistance : 350 Ω±5 Ω
Insulation resistance : 5 000 MΩ or more (DC50 V)
(between bridge and body)
Compensated temp. range : - 10 °C ~ 70 °C
Safe temp. range : - 20 °C ~ 100 °C
Temp. effect on zero balance : 0.03 %R.O./10 °C
Temp. effect on output : 0.03 %LOAD/10 °C
Cable : φ10, 4-cores 3 m shielded cable directly attached, with Y-type terminal lugs at the end.
Protection grade : IP64
Element material : Alloy steel
Paint : Epoxy resin (Munsell 6GY 3.5/2 semi-gloss)
Durability : 10⁶ times at rated capacity.

Outlines

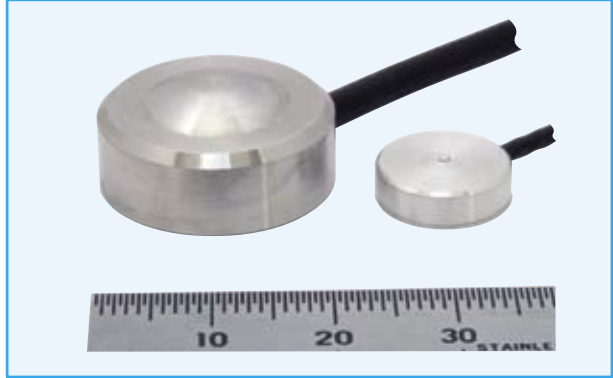


< Dimension table >													(Unit : mm)	
Parts No.	Rated Capacity	φA	B	C	D	φE	F	G	H	I	Displacement	Natural Freq. (Hz)	Weight (Approx.kg)	
CCP1-50K	490.3 N {50 kgf}	89	115	M10 X 1.25 depth 14	106	32	6	18	1.5	6.5	0.28	360	3.1	
CCP1-100K	980.7 N {100 kgf}										0.23	580		
CCP1-200K	1.961 kN {200 kgf}										0.18	1 200	2.7	
CCP1-300K	2.942 kN {300 kgf}										0.17	1 400		
CCP1-500K	4.903 kN {500 kgf}										0.15	1 800		
CCP1-1T	9.807 kN {1 tf}	89	150	M24 X 2 depth 30	106	64	9	46	1.6	18	0.13	2 800	4.3	
CCP1-2T	19.61 kN {2 tf}										0.17	2 100		
CCP1-3T	29.42 kN {3 tf}										0.16	2 600		
CCP1-5T	49.03 kN {5 tf}										0.13	3 500		
CCP1-10T	98.07 kN {10 tf}										0.18	2 500		11.9
CCP1-20T	196.1 kN {20 tf}	165	290	M50 X 2 depth 65	193	145	15	80	1.6	27	0.24	1 800	27	

- < Accessories >
- Load bottom (LBU-*) with O-shape ring 1 piece
 - Inspection data sheet 1 copy

- < Optional fittings >
- Expansion Plate EPA-*
 - Bearing Plate BPA-*
 - Mounting Plate MPA-* with mounting bolt
 - Mounting attachment with slide stop mechanism
 - Flexible stop type FCA-CCP1-*

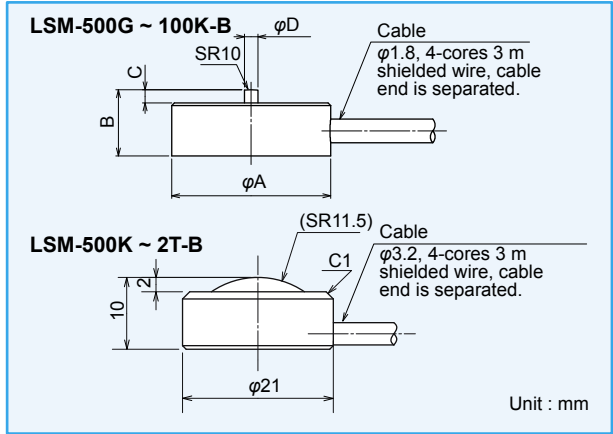
LSM-B Series - Miniture Compression Type Load Cell



Features

- Miniture type load cell. Suitable for application with limited space.

Outlines



Specifications

Rated capacity : 4.903 N {500 gf} ~ 19.61 kN {2 tf}
Safe overload : 150 %R.C.
Ultimated overload : 150 %R.C. (LSM-500K ~ 2T-B : 200 %R.C.)
Rated output : 1.3 mV/V±0.7 mV/V (LSM-500G-B : 0.4 mV/V or more)
Non-linearity : 1 %R.O. (LSM-2T-B : 2 %R.O.)
Hysteresis : 1 %R.O.
Repeatability : 1 %R.O.
Recommended excitation : 5 V or less
Maximum excitation : 8 V
Zero balance : ±0.2 mV/V
Input resistance : 350 Ω±10 Ω
Output resistance : 350 Ω±10 Ω
Insulation resistance : 1 000 MΩ or more (DC50 V) (between bridge and body)
Compensated temp. range : 0 °C ~ 50 °C (LSM-500K~2T-B: - 10 °C ~ 60 °C)
Safe temp. range : - 10 °C ~ 60 °C (LSM-500K~2T-B: - 10 °C ~ 70 °C)
Temp. effect on zero balance : 2 %R.O./10 °C (LSM-500K~2T-B: 1 %R.O./10 °C)
Temp. effect on output : 2 %LOAD/10 °C (LSM-500K~2T-B: 1 %LOAD/10 °C)
Cable : φ1.8, 4-cores 3 m shielded cable directly attached, Cable end is separated. (LSM-500K ~ 2T-B : φ3.2)
Protection grade : IP60
Material : LSM-500G~2K-B: Aluminium
LSM-5K~2T-B: Stainless steel
Mounting method : by adhesive or double coated adhesive tape.
Durability : 10⁶ times at rated capacity.

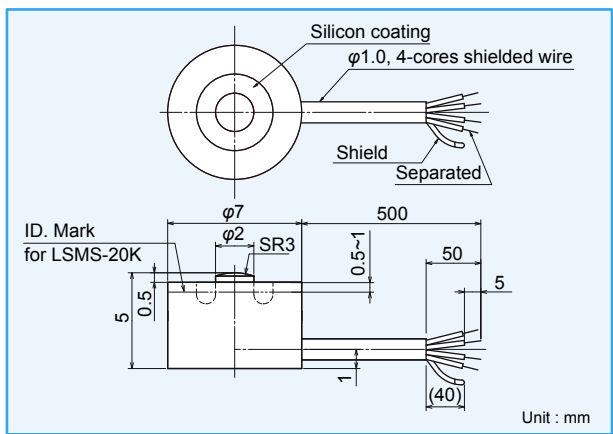
< Accessories >
• Inspection data sheet 1 copy

< Dimension table > (Unit : mm)									
Parts No.	Rated Capacity	φA	B	C	φE	Displacement	Natural Freq. (Hz)	Weight (Approx.g)	
LSM-500G-B	4.903 N {500 gf}	12	4	0.5	1	0.05	10 000	6	
LSM-1K-B	9.807 N {1 kgf}						16 000		
LSM-2K-B	19.61 N {2 kgf}						21 000		
LSM-5K-B	49.03 N {5 kgf}						14 000		
LSM-10K-B	98.07 N {10 kgf}	15	5	0.5	1		19 000	10	
LSM-20K-B	196.1 N {20 kgf}						29 000		
LSM-50K-B	490.3 N {50 kgf}	20	9.5	1.5	2	0.05	33 000	20	
LSM-100K-B	980.7 N {100 kgf}	20	9.5	1.5	3		50 000	22	
LSM-500K-B	4.903 kN {500 kgf}	see outlines.				0.05		25	
LSM-1T-B	9.807 kN {1 tf}								
LSM-2T-B	19.61 kN {2 tf}								

LSMS Series - Miniture Compression Type Load Cell



Outlines



Features

- Miniture type load cell with 5 mm at height and 7 mm at diameter. Suitable for application with limited space.

Specifications

Rated capacity : 196.1 N {20 kgf} ~ 490.3 N {50 kgf}
Safe overload : 150 %R.C.
Ultimated overload : 200 %R.C.
Rated output : 0.6 mV/V±0.1 mV/V
Non-linearity : 1 %R.O.
Hysteresis : 1 %R.O.
Repeatability : 1 %R.O.
Recommended excitation : 5 V
Maximum excitation : 12 V
Zero balance : ±0.1 mV/V
Input resistance : 350 Ω±5 Ω
Output resistance : 350 Ω±5 Ω
Insulation resistance : 1 000 MΩ or more (DC50 V) (between bridge and body)
Compensated temp. range : - 10 °C ~ 50 °C
Safe temp. range : - 20 °C ~ 60 °C
Temp. effect on zero balance : 1 %R.O./10 °C
Temp. effect on output : 1 %LOAD/10 °C
Cable : φ1.0, 4-cores 50 cm shielded cable directly attached, cable end is separated.
Protection grade : IP64
Material : Stainless steel
Mounting method : by adhesive or double coated adhesive tape.
Durability : 10⁶ times at rated capacity.

< Accessories >
• Inspection data sheet 1 copy

< Dimension table > (Unit : mm)				
Parts No.	Rated Capacity	Displacement	Natural Freq. (kHz)	Weight (Approx.g)
LSMS-20K	196.1 N {20 kgf}	0.003	67	2
LSMS-50K	490.3 N {50 kgf}	0.005	62	

U2S1 Series - S Type Beam Load Cell



Features

- High precise tension service load cell with stainless steel construction.
- Suitable for use in a tank / hopper scale and the other various tension service weighing systems.

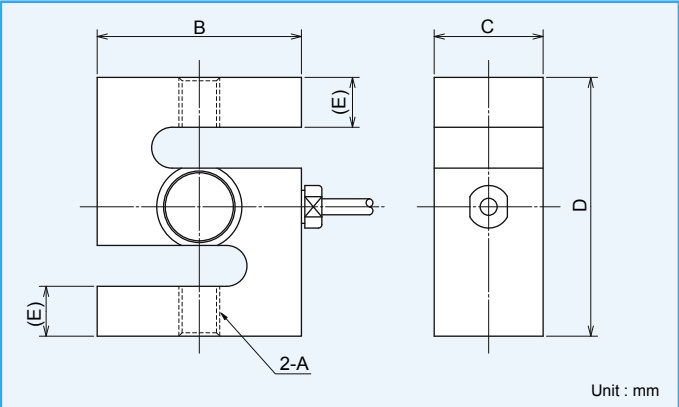
Specifications

Rated capacity : 1.961 kN {200 kgf} ~ 19.61 kN {2 tf}
Safe overload : 150 %R.C.
Ultimated overload : 200 %R.C.
Rated output : - 2 mV/V±0.02 mV/V (Tension service)
2 mV/V±0.02 mV/V (Compression service)
Non-linearity : 0.025 %R.O.
Hysteresis : 0.025 %R.O.
Repeatability : 0.025 %R.O.
Creep : 0.025 %R.O. / 20 min
Creep recovery : 0.025 %R.O. / 20 min
Recommended excitation : 12 V
Maximum excitation : 20 V
Zero balance : ±0.02 mV/V
Input resistance : 420 Ω±40 Ω
Output resistance : 350 Ω±5 Ω
Insulation resistance : 2 000 MΩ or more (DC50 V) (between bridge and body)
Compensated temp. range : - 10 °C ~ 70 °C
Safe temp. range : - 20 °C ~ 80 °C
Temp. effect on zero balance : 0.05 %R.O./10 °C
Temp. effect on output : 0.02 %LOAD/10 °C
Cable : φ4.7, 4-cores 6 m shielded cable directly attached, with Y-type terminal lugs.
Protection grade : IP68
Element material : Stainless steel
Durability : 10⁶ times at rated capacity.

< Accessories >
• Inspection data sheet 1 copy

< Optional fittings >
• Load bottom LBU-*
• Spherical rod-end (PR*, REB-*, HRT-*) with hexagon nuts for installation

Outlines



< Dimension table > (Unit : mm)									
Parts No.	Rated Capacity	φA	B	C	D	E	Displacement	Natural Freq. (Hz)	Weight (Approx.kg)
U2S1-200K	1.961 kN {200 kgf}	M12 x 1.75	60	32	76	15	0.10	2 000	0.9
U2S1-250K	2.452 kN {250 kgf}					15	0.10	2 000	
U2S1-500K	4.903 kN {500 kgf}					14	0.15	2 000	
U2S1-1T	9.807 kN {1 tf}	M24 x 2	80	38	108	13	0.30	2 000	
U2S1-2T	19.61 kN {2 tf}					25	0.30	2 500	2.0

U3B1-B Series - S Type Beam Load Cell



Features

- Compact size tension and compression service load cell.
- Suitable for a high accuracy weighing system.

Specifications

Rated capacity : 196.1 N {20 kgf} ~ 9.807 kN {1 tf}
Safe overload : 150 %R.C.
Ultimated overload : 200 %R.C.
Rated output : 3 mV/V±0.015 mV/V
Non-linearity : 0.05 %R.O.
Hysteresis : 0.05 %R.O.
Repeatability : 0.03 %R.O.
Recommended excitation : 10 V or less
Maximum excitation : 15 V
Zero balance : ±0.03 mV/V
Input resistance : 350 Ω±3.5 Ω
Output resistance : 350 Ω±5 Ω
Insulation resistance : 2 000 MΩ or more (DC50 V)
(between bridge and body)
Compensated temp. range : - 10 °C ~ 70 °C
Safe temp. range : - 20 °C ~ 80 °C
Temp. effect on zero balance : 0.05 %R.O./10 °C
Temp. effect on output : 0.1 %LOAD/10 °C
Cable : φ6.3, 4-cores 3 m shielded cable directly attached with Y-type terminal lugs.
Protection grade : IP64
Element material : U3B1-20K ~ 200K-B : Aluminium
U3B1-500K, 1T-B : Alloy steel
Paint : Main body : Painted with epoxy resin (Black)
Cover : Painted with polyurethane (Yellow)
Durability : 10⁶ times at rated capacity.

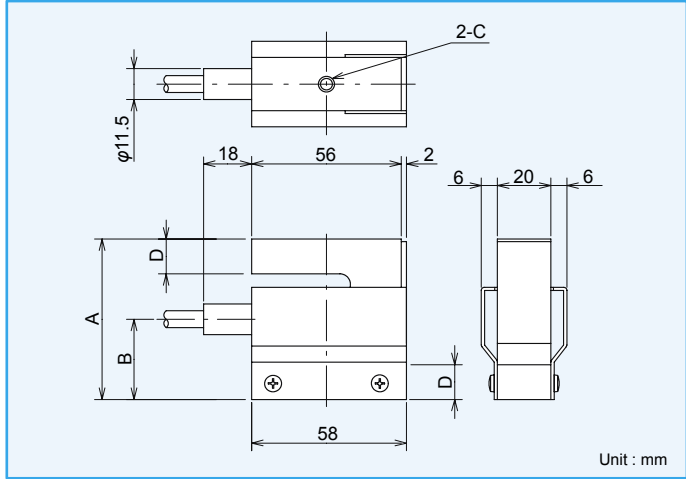
< Accessories >

- Inspection data sheet 1 copy

< Optional fittings >

- Load buttom LBU-*
- Spherical rod-end (PR*, HRT-*) with hexagon nuts for installation

Outlines



< Dimension table >								(Unit : mm)
Parts No.	Rated Capacity	φA	B	C	D	Displacement	Natural Freq. (Hz)	Weight (Approx.kg)
U3B1-20K-B	196.1 N {20 kgf}	60	30	M6 x 1 depth 13	13	0.18	600	0.33
U3B1-50K-B	490.3 N {50 kgf}			M6 x 1 depth 12	12	0.16	1 100	
U3B1-100K-B	980.7 N {100 kgf}	70	35	M6 x 1 depth 18	18	0.14	1 600	
U3B1-200K-B	1.961 kN {200 kgf}			M12 x 1.75 depth 17	17	0.12	2 100	0.63
U3B1-500K-B	4.903 kN {500 kgf}			M12 x 1.75 depth 17	17	0.14	2 600	
U3B1-1T-B	9.807 kN {1 tf}			M12 x 1.75 depth 16	16	0.12	3 000	

C3B1-NS Series - Square shape Beam Load Cell



Features

- Compact size tension and compression service load cell.
- Suitable for a high accuracy weighing system.
- OIML certified.

Specifications

Rated capacity : 1.961 kN {200 kgf} ~ 49.03 kN {5 tf}
Safe overload : 150 %R.C.
Ultimated overload : 200 %R.C.
Rated output : 3 mV/V±0.003 mV/V
Non-linearity : 0.025 %R.O.
Hysteresis : 0.025 %R.O.
Repeatability : 0.025 %R.O.
Creep : 0.03 %R.O. / 20 min
Creep recovery : 0.03 %R.O. / 20 min
Recommended excitation : 12 V or less
Maximum excitation : 20 V
Zero balance : ±0.03 mV/V
Input resistance : 420 Ω±40 Ω
Output resistance : 350 Ω±5 Ω
Insulation resistance : 2 000 MΩ or more (DC50 V)
(between bridge and body)
Compensated temp. range : - 10 °C ~ 70 °C
Safe temp. range : - 20 °C ~ 80 °C
Temp. effect on zero balance : 0.05 %R.O./10 °C
Temp. effect on output : 0.02 %LOAD/10 °C
Cable : φ4.7, 4-cores 6 m shielded cable directly attached with Y-type terminal lugs.
Protection grade : IP67
Element material : Alloy steel
Paint : Painted with epoxy resin (Black)
Durability : 10⁶ times at rated capacity.

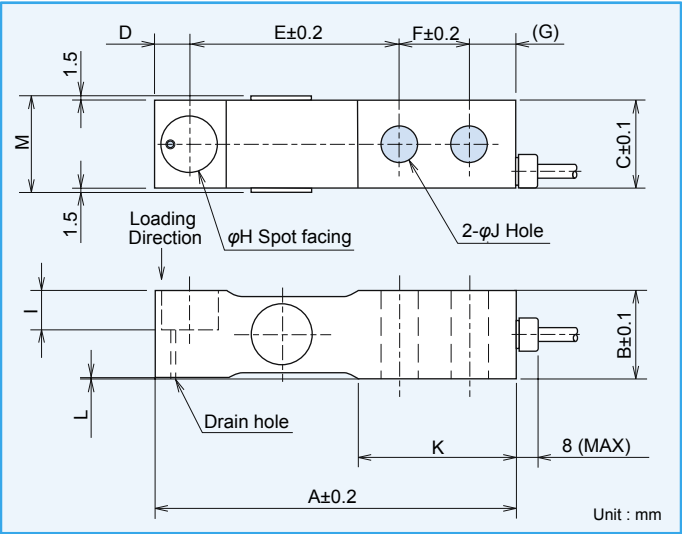
< Accessories >

- Inspection data sheet 1 copy

< Optional fittings >

- Bearing Plate BP-*
- Rocker-Pin RP-*
- Mounting attachment with slide stop mechanism
Rocker-Pin method RCA-C3B1-*

Outlines



< Dimension table >																	(Unit : mm)	
Parts No.	Rated Capacity	φA	B	C	D	E	F	G	φH	I	φJ	K	L	M	Displacement	Natural Freq. (Hz)	Weight (Approx.kg)	
C3B1-200K-NS	1.961 kN (200 kgf)	131	31.8	31.8	12.6	76.2	25.4	16.8	20.6	14.2	13.5	57.2	0.6	34.8	0.5	2 600	1.1	
C3B1-300K-NS	2.942 kN (300 kgf)															2 600		
C3B1-500K-NS	4.903 kN (500 kgf)															2 600		
C3B1-1T-NS	9.807 kN (1 tf)															2 500		
C3B1-2T-NS	19.61 kN (2 tf)	171.5	38.1	38.1	19	95.25	38.1	19.15	30.2	17	19.8	85	1	41.1	0.9	2 300	2.0	
C3B1-3T-NS	29.42 kN (3 tf)															2 200		
C3B1-5T-NS	49.03 kN (5 tf)															2 200		

C2B1B Series - Square shape Beam Load Cell



Features

- Suitable for weighing systems such as Floor scale / Tank scale / Hopper, etc.
- High accuracy measurement can be made when assembled in a rocker pin (Auto alignment mechanism).
- Hermetically sealed stainless steel construction providng excellent protection in a hazardous environment.
- OIML certified.

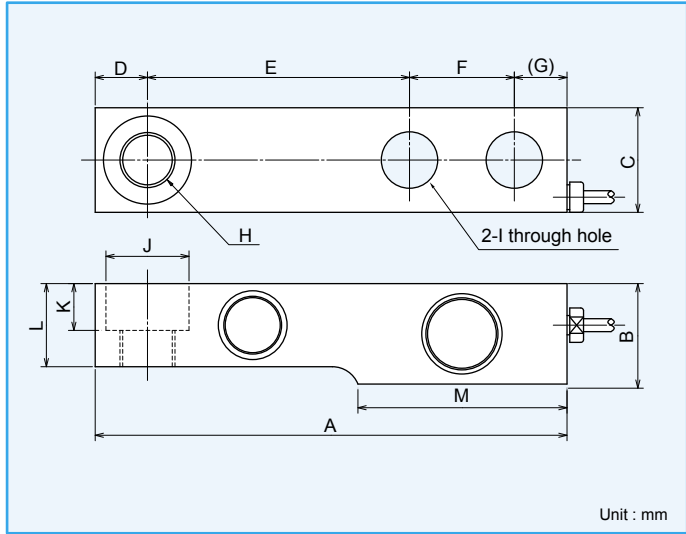
Specifications

Rated capacity : 1.961 kN {200 kgf} ~ 19.61 kN {2 tf}
Safe overload : 150 %R.C.
Ultimated overload : 200 %R.C.
Rated output : 2 mV/V±0.002 mV/V
(C2B1B-200K : 1.6 mV/V±0.002 mV/V)
Non-linearity : 0.025 %R.O.
Hysteresis : 0.025 %R.O.
Repeatability : 0.025 %R.O.
Creep : 0.03 %R.O. / 20 min
Creep recovery : 0.03 %R.O. / 20 min
Recommended excitation : 12 V or less
Maximum excitation : 20 V
Zero balance : ±0.02 mV/V
Input resistance : 420 Ω±40 Ω
Output resistance : 350 Ω±5 Ω
Insulation resistance : 2 000 MΩ or more (DC50 V)
(between bridge and body)
Compensated temp. range : - 10 °C ~ 70 °C
Safe temp. range : - 20 °C ~ 80 °C
Temp. effect on zero balance : 0.05 %R.O./10 °C
Temp. effect on output : 0.02 %LOAD/10 °C
Cable : φ4.7, 4-cores 6 m shielded cable directly attached.
with Y-type terminal lugs.
Protection grade : IP68
Element material : Stainless steel
Durability : 10⁶ times at rated capacity.

- < Accessories >
- Inspection data sheet 1 copy

- < Optional fittings >
- Bearing Plate BPSB-*
 - Rocker-Pin RPSB-*
 - Mounting attachment with slide stop mechanism
Rocker-Pin method RCA-C2B1B-*-S

Outlines



< Dimension table >															(Unit : mm)	
Parts No.	Rated Capacity	A	B	C	D	E	F	G	H	φI	φJ	K	L	Displacement	Natural Freq. (Hz)	Weight (Approx.kg)
C2B1B-200K	1.961 kN {200 kgf}	131	32	32	12.6	76.2	25.4	16.8	M12	13	26.6	14	22.4	0.15	1 000	0.8
C2B1B-250K	2.452 kN {250 kgf}												22.7	0.15		
C2B1B-500K	4.903 kN {500 kgf}												24.3	0.20		
C2B1B-1T	9.807 kN {1 tf}												26.9	0.30		
C2B1B-2T	19.61 kN {2 tf}	171.5	38	38	19	95.25	38.1	19.15	M20	19.8	30.2	17	30.2	0.50	1 500	1.5

CBE1(-U) Series - Load Beam type Load Cell



Features

- Suitable for weighing systems with limited height at the mounting point.
- All stainless steel structure.
- High accurate type (-U) with 0.03%R.O. for non-linearity and hysteresis is available.
- OIML certified.

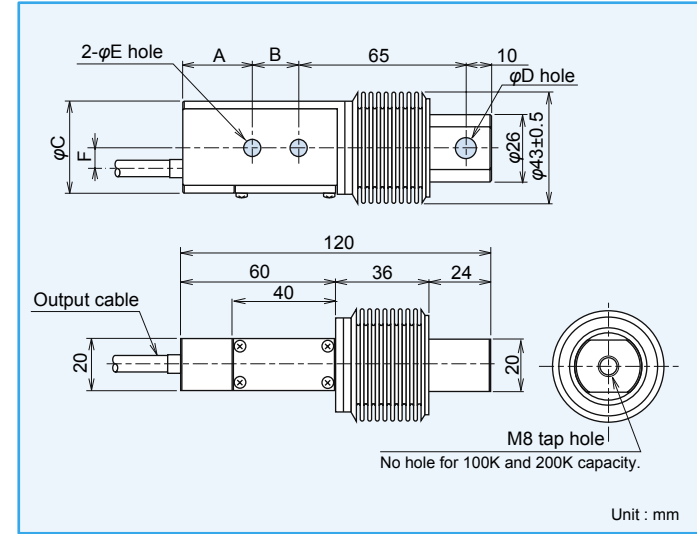
Specifications

Rated capacity : 49.03 N {5 kgf} ~ 1.961 kN {200 kgf}
Safe overload : 150 %R.C.
Ultimated overload : 200 %R.C.
Rated output : 2 mV/V±0.003 mV/V
Non-linearity : 0.05 %R.O. (High accurate type (-U) : 0.03 %R.O.)
Hysteresis : 0.05 %R.O. (High accurate type (-U) : 0.03 %R.O.)
Repeatability : 0.03 %R.O.
Recommended excitation : 12 V or less
Maximum excitation : 20 V
Zero balance : ±0.02 mV/V
Input resistance : 400 Ω±50 Ω
Output resistance : 350 Ω±5 Ω
Insulation resistance : 2 000 MΩ or more (DC50 V)
(between bridge and body)
Compensated temp. range : - 10 °C ~ 60 °C
Safe temp. range : - 20 °C ~ 80 °C
Temp. effect on zero balance : 0.03 %R.O./10 °C
Temp. effect on output : 0.03 %LOAD/10 °C
Cable : φ6.3, 4-cores 5 m shielded cable directly attached.
with Y-type terminal lugs.
Protection grade : IP67
Element material : Stainless steel
Durability : 10⁶ times at rated capacity.

- < Accessories >
- Inspection data sheet 1 copy

- < Optional fittings >
- Mounting attachment with slide stop mechanism
Check rod method CCACBE1-*S

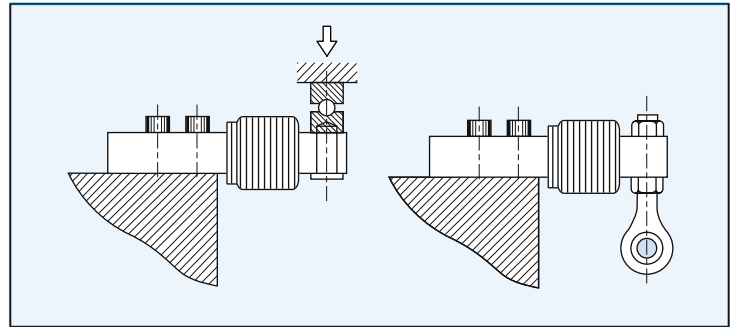
Outlines



< Dimension table >										(Unit : mm)
Parts No.	Rated Capacity	A	B	φC	φD	φE	F	Displacement	Natural Freq. (Hz)	Weight (Approx.kg)
CBE1-5K(-U)	49.03 N {5 kgf}	27	18	34	8.1	6.6	8.5	0.19	250	0.73
CBE1-10K(-U)	98.07 N {10 kgf}							0.21	384	
CBE1-20K(-U)	196.1 N {20 kgf}								420	
CBE1-50K(-U)	490.3 N {50 kgf}	25	20	36	10.1	8.4	9.5	0.25	555	0.76
CBE1-100K(-U)	980.7 N {100 kgf}							0.23	1 250	
CBE1-200K(-U)	1.961 kN {200 kgf}							0.32	1 428	

* (-U): High accurate type.

< Mounting example >



ULA Series - Low Capacity Load Cell



Features

- Low capacity, universal, bending beam load cell.
- ULA is excellent in small force measurement.

Specifications

Rated capacity : 19.61 mN {2 gf} ~ 980.7 mN {100 gf}
Safe overload : 130 %R.C.
Ultimated overload : 130 %R.C.
Rated output : 1.75 mV/V±0.35 mV/V (UL-2GR : 0.65 mV/V±0.15 mV/V)
Non-linearity : 0.2 %R.O.
Hysteresis : 0.2 %R.O.
Repeatability : 0.2 %R.O.
Recommended excitation : 3 V or less
Maximum excitation : 6 V
Zero balance : ±0.175 mV/V (UL-2GR : ±0.05 mV/V)
Input resistance : 270 Ω±40 Ω
Output resistance : 270 Ω±40 Ω
Insulation resistance : 2 000 MΩ or more (DC50 V) (between bridge and body)
Compensated temp. range : 0 °C ~ 50 °C
Safe temp. range : - 10 °C ~ 60 °C
Temp. effect on zero balance : 0.5 %R.O./10 °C
Temp. effect on output : 0.5 %LOAD/10 °C
Cable : 4-cores parallel vinyl 60 cm wire. Cable end is separated.
Protection grade : IP30
Durability : 10⁶ times at rated capacity.

< Accessories >

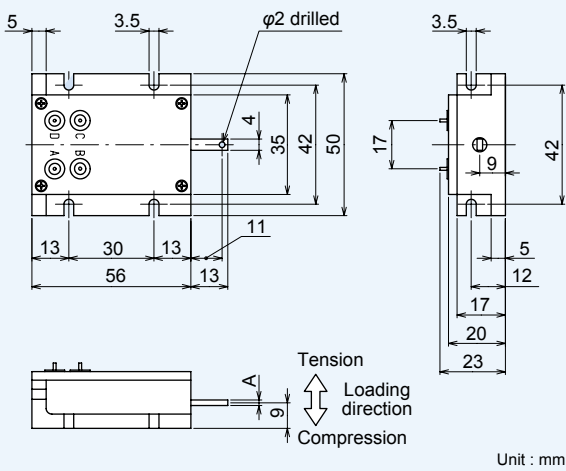
- Inspection data sheet 1 copy

< Dimension table >

(Unit : mm)

Parts No.	Rated Capacity	A	Displacement	Natural Freq. (Hz)	Weight (Approx.g)
UL-2GR	19.61 mN {2 gf}	2	±0.12	60	100
ULA-10GR	98.07 mN {10 gf}	1.5	±0.4	165	
ULA-20GR	196.1 mN {20 gf}			210	
ULA-50GR	490.3 mN {50 gf}			170	
ULA-100GR	980.7 mN {100 gf}			230	

Outlines



UTA Series - Low Capacity Load Cell



Features

- Measuring range of UTA series is little higher than ULA.
- Push-pull type load cell.

Specifications

Rated capacity : 980.7 mN {100 gf} ~ 19.61 N {2 kgf}
Safe overload : 150 %R.C.
Ultimated overload : 150 %R.C.
Rated output : ±2 mV/V±0.4 mV/V (UTA-100GR : ±1.75 mV/V±0.35 mV/V)
Non-linearity : 0.2 %R.O.
Hysteresis : 0.2 %R.O.
Repeatability : 0.2 %R.O.
Recommended excitation : 3 V or less
Maximum excitation : 6 V
Zero balance : ±0.2 mV/V (UTA-100GR : ±0.175 mV/V)
Input resistance : 270 Ω±40 Ω
Output resistance : 270 Ω±40 Ω
Insulation resistance : 2 000 MΩ or more (DC50 V) (between bridge and body)
Compensated temp. range : 0 °C ~ 50 °C
Safe temp. range : - 10 °C ~ 60 °C
Temp. effect on zero balance : 0.5 %R.O./10 °C
Temp. effect on output : 0.5 %LOAD/10 °C
Cable : 4-cores parallel vinyl 60 cm wire. Cable end is separated.
Protection grade : IP30
Durability : 10⁶ times at rated capacity.

< Accessories >

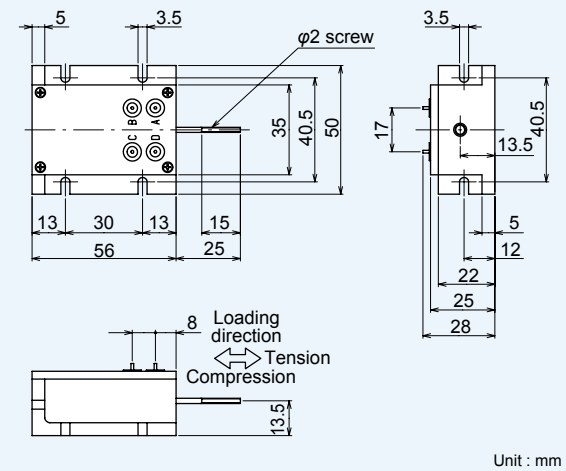
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< Table of parts No. >

(Unit : mm)

Parts No.	Rated Capacity	Displacement	Natural Freq. (Hz)	Weight (Approx.g)
UTA-100GR	980.7 mN {100 gf}	±0.04	300	100
UTA-200GR	1.961 N {200 gf}		440	
UTA-500GR	4.903 N {500 gf}		700	
UTA-1K	9.807 N {1 kgf}		980	
UTA-2K	19.61 N {2 kgf}		1 310	

Outlines



BCL-A Series - Load Cell for Electronic Scale



Features

- Low capacity load cell. • Loading plate can be greater taken. • OIML certified.

Specifications

Rated capacity : 2.942 N {300 gf} ~ 44.13 N {4.5 kgf}
Safe overload : 150 %R.C.
Ultimated overload : 200 %R.C.
Rated output : 1.6 mV/V±0.2 mV/V
Non-linearity : 0.02 %R.O.
Hysteresis : 0.02 %R.O.
Repeatability : 0.02 %R.O.
Creep : 0.02 %R.O. /20 min
Creep recovery : 0.02 %R.O. /20 min
Recommended excitation : 10 V or less
Maximum excitation : 15 V
Zero balance : ±0.04 mV/V
Input resistance : 420 Ω
Output resistance : 350 Ω±5 Ω
Insulation resistance : 2 000 MΩ or more (DC50 V) (between bridge and body)
Compensated temp. range : - 10 °C ~ 50 °C
Safe temp. range : - 10 °C ~ 50 °C
Temp. effect on zero balance : 0.04 %R.O./10 °C
Temp. effect on output : 0.02 %LOAD/10 °C
Cable : φ3.2, 4-cores shielded 40 cm wire directly attached. Cable end is separated.
Protection grade : IP40
Material : Aluminium

< Accessories >

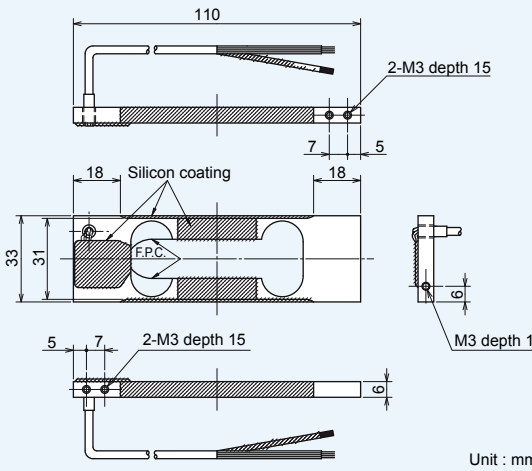
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< Table of Parts No. >

(Unit : mm)

Parts No.	Rated Capacity	Displacement	Natural Freq. (Hz)	Weight (Approx.g)
BCL-300GM-A	2.942 N {300 gf}	0.52	97	40
BCL-600GM-A	5.884 N {600 gf}	0.47	143	
BCL-1.2K-A	11.77 N {1.2 kgf}	0.49	235	
BCL-1.5K-A	14.71 N {1.5 kgf}		263	
BCL-3K-A	29.42 N {3 kgf}		372	
BCL-4.5K-A	44.13 N {4.5 kgf}		455	

Outlines



CB17-11 Series - Load Cell for Electronic Scale



Features

- Low capacity, Compact size.

Specifications

Rated capacity : 5.884 N {600 gf} ~ 29.42 N {3 kgf}
Safe overload : 300 %R.C.
Ultimated overload : 400 %R.C.
Rated output : 1 mV/V±0.1 mV/V
Non-linearity : 0.02 %R.O.
Hysteresis : 0.02 %R.O.
Repeatability : 0.02 %R.O.
Creep : 0.02 %R.O. / 20 min
Creep recovery : 0.02 %R.O. / 20 min
Recommended excitation : 10 V or less
Maximum excitation : 15 V
Zero balance : ±0.05 mV/V
Input resistance : 420 Ω
Output resistance : 350 Ω±5 Ω
Insulation resistance : 2 000 MΩ or more (DC50 V) (between bridge and body)
Compensated temp. range : - 10 °C ~ 50 °C
Safe temp. range : - 10 °C ~ 50 °C
Temp. effect on zero balance : 0.04 %R.O./10 °C
Temp. effect on output : 0.012 %LOAD/10 °C
Cable : φ3.2, 4-cores shielded 40 cm wire directly attached. Cable end is separated.
Protection grade : IP64
Durability : Aluminium

< Accessories >

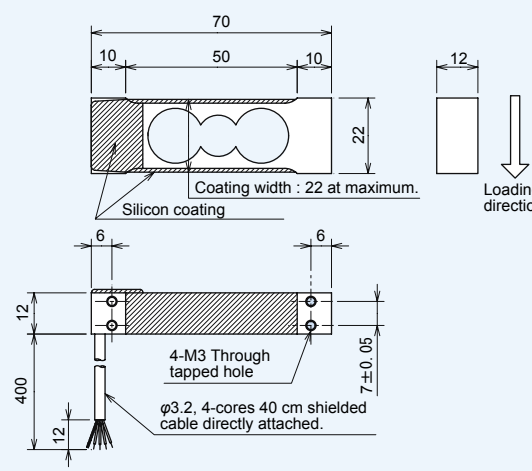
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< Table of parts No. >

(Unit : mm)

Parts No.	Rated Capacity	Displacement	Natural Freq. (Hz)	Weight (Approx.g)
CB17-600G-11	5.884 N {600 gf}	±0.17	200	40
CB17-1K-11	9.807 N {1 kgf}		290	
CB17-2K-11	19.61 N {2 kgf}		410	
CB17-3K-11	29.42 N {3 kgf}		500	

Outlines



C2G1-A Series - Load Cell for Electronic Scale



Features

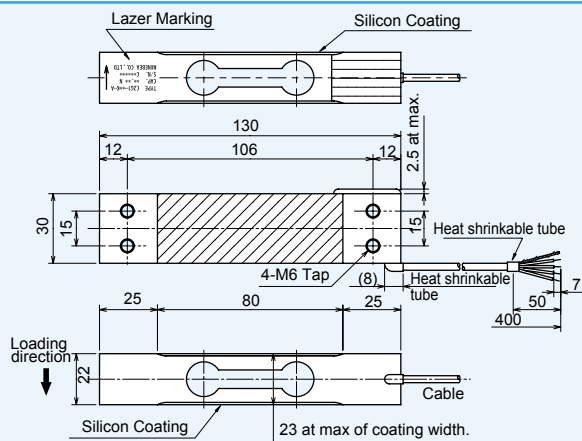
- Middle capacity load cell.
- Suitable for thin weighing scale. NTEP / OIML certification.

Specifications

Rated capacity : 58.84 N {6 kgf} ~ 490.3 N {50 kgf}
Safe overload : 150 %R.C.
Ultimated overload : 200 %R.C.
Rated output : 2 mV/V $\pm$ 0.2 mV/V
Non-linearity : 0.015 %R.O.
Hysteresis : 0.015 %R.O.
Repeatability : 0.02 %R.O.
Creep : 0.02 %R.O. /20 min
Creep recovery : 0.02 %R.O. /20 min
Recommended excitation : 12 V or less
Maximum excitation : 20 V
Zero balance : $\pm$ 0.1 mV/V
Input resistance : 420 Ω $\approx$ Ω
Output resistance : 350 Ω $\pm$ 5 Ω
Insulation resistance : 2 000 M Ω or more (DC50 V) (between bridge and body)
Compensated temp. range : - 10 $^{\circ}$ C ~ 50 $^{\circ}$ C
Safe temp. range : - 10 $^{\circ}$ C ~ 50 $^{\circ}$ C
Temp. effect on zero balance : 0.04 %R.O./10 $^{\circ}$ C
Temp. effect on output : 0.012 %LOAD/10 $^{\circ}$ C
Cable : ϕ 3.2, 4-cores shielded 40 cm cable directly attached.
Protection grade : IP64
Material : Aluminium

< Table of Parts No. >

Parts No.	Rated Capacity	Displacement	Natural Freq. (Hz)	Weight (Approx.g)
C2G1-6K-A	58.84 N {6 kgf}	0.62	220	200
C2G1-10K-A	98.07 N {10 kgf}	0.53	295	
C2G1-12K-A	117.7 N {12 kgf}		323	
C2G1-15K-A	147.1 N {15 kgf}		360	
C2G1-20K-A	196.1 N {20 kgf}	0.65	373	
C2G1-25K-A	245.2 N {25 kgf}		417	
C2G1-30K-A	294.2 N {30 kgf}		455	
C2G1-35K-A	343.3 N {35 kgf}		493	
C2G1-50K-A	490.3 N {50 kgf}	0.67	540	



Unit : mm

CB004 Series - Load Cell for Electronic Scale



Features

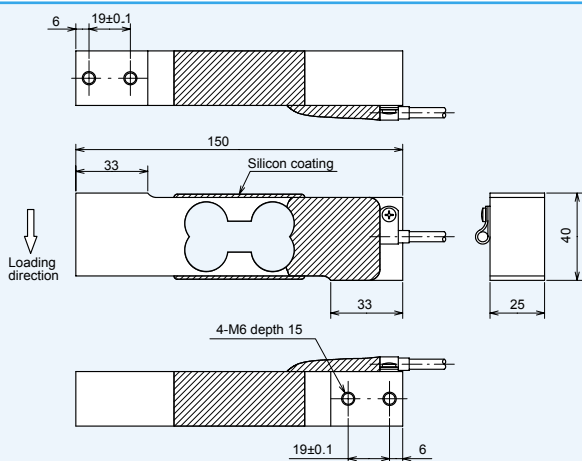
- Middle capacity.
- OIML certified.

Specifications

Rated capacity : 98.07 N {10 kgf} ~ 980.7 N {100 kgf}
Safe overload : 150 %R.C.
Ultimate overload : 200 %R.C.
Rated output : 2 mV/V $\pm$ 0.2 mV/V
Non-linearity : 0.015 %R.O.
Hysteresis : 0.015 %R.O.
Repeatability : 0.02 %R.O.
Creep : 0.02 %R.O. / 20 min
Creep recovery : 0.02 %R.O. / 20 min
Recommended excitation : 12 V or less
Maximum excitation : 20 V
Zero balance : ± 0.1 mV/V
Input resistance : 420 Ω $\approx$
Output resistance : 350 Ω ± 5 Ω
Insulation resistance : 2 000 M Ω or more (DC50 V) (between bridge and body)
Compensated temp. range : - 10 $^{\circ}$ C ~ 50 $^{\circ}$ C
Safe temp. range : - 10 $^{\circ}$ C ~ 50 $^{\circ}$ C
Temp. effect on zero balance : 0.04 %R.O./10 $^{\circ}$ C
Temp. effect on output : 0.012 %LOAD/10 $^{\circ}$ C
Cable : ϕ 3.2, 4-cores shielded 40 cm wire directly attached.
Cable end is separated.
Protection grade : IP64
Durability : Aluminium

< Table of parts No. >

Parts No.	Rated Capacity	Displacement	Natural Freq. (Hz)	Weight (Approx.g)
CB004-10K	98.07 N {10 gf}	0.55	160	350
CB004-15K	147.1 N {15 kgf}		200	
CB004-20K	196.1 N {20 kgf}		230	
CB004-25K	245.2 N {25 kgf}		250	
CB004-30K	294.2 N {30 kgf}		270	360
CB004-35K	343.2 N {35 kgf}		300	
CB004-45K	441.3 N {45 kgf}		330	370
CB004-60K	588.4 N {60 kgf}		380	380
CB004-100K	980.7 N {100 kgf}		480	390



Unit : mm

Outlines

U2D1 Series - Load Cell for Electronic Scale



Features

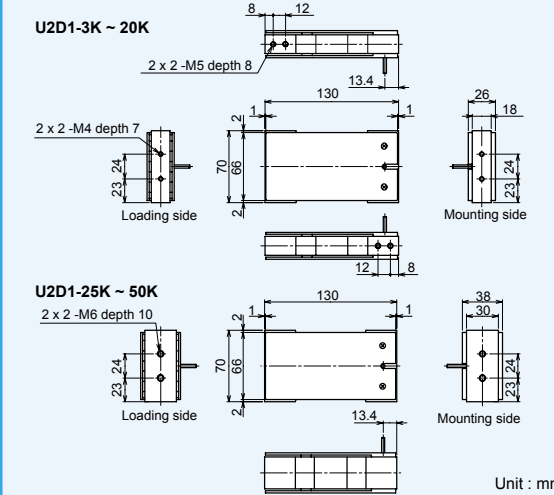
- Middle capacity load cell.
- Tall profile
- OIML certified.

Specifications

Rated capacity : 29.42 N {3 kgf} ~ 980.7 N {100 kgf}
Safe overload : 200 %R.O.
Ultimated overload : 300 %R.O.
Rated output : 2 mV/V $\pm$ 0.2 mV/V
Non-linearity : 0.015 %R.O.
Hysteresis : 0.015 %R.O.
Repeatability : 0.02 %R.O.
Creep : 0.02 %R.O. /20 min (U2D1-3K : 0.03 %R.O. /20 min)
Creep recovery : 0.02 %R.O. /20 min (U2D1-3K : 0.03 %R.O. /20 min)
Recommended excitation : 12 V or less
Maximum excitation : 20 V
Zero balance : $\pm$ 0.1 mV/V
Input resistance : 420 Ω $\approx$ ∞ Ω
Output resistance : 350 Ω $\pm$ 5 Ω
Insulation resistance : 2 000 M Ω or more (DC50 V) (between bridge and body)
Compensated temp. range : - 10 $^{\circ}$ C ~ 50 $^{\circ}$ C
Safe temp. range : - 10 $^{\circ}$ C ~ 50 $^{\circ}$ C
Temp. effect on zero balance : 0.04 %R.O./10 $^{\circ}$ C
Temp. effect on output : 0.012 %LOAD/10 $^{\circ}$ C
Cable : ϕ 3.2, 4-cores shielded 40 cm cable directly attached.
Cable end is separated.
Protection grade : IP40
Material : Aluminium

< Dimension table >

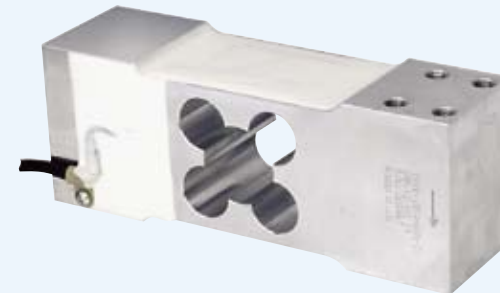
Parts No.	Rated Capacity	Displacement	Natural Freq. (Hz)	Weight (Approx.g)
U2D1-3K	29.42 N {3 kgf}	0.48	95	350
U2D1-6K	58.84 N {6 kgf}		140	
U2D1-10K	98.07 N {10 kgf}	0.45	180	550
U2D1-15K	147.1 N {15 kgf}	0.41	230	
U2D1-20K	196.1 N {20 kgf}	0.38	280	
U2D1-25K	245.2 N {25 kgf}	0.56	550	
U2D1-50K	490.3 N {50 kgf}	0.61	550	800
U2D1-100K	980.7 N {100 kgf}	0.53	540	



Unit : mr

Outlines

CB14-21 Series - Load Cell for Electronic Scale



Features

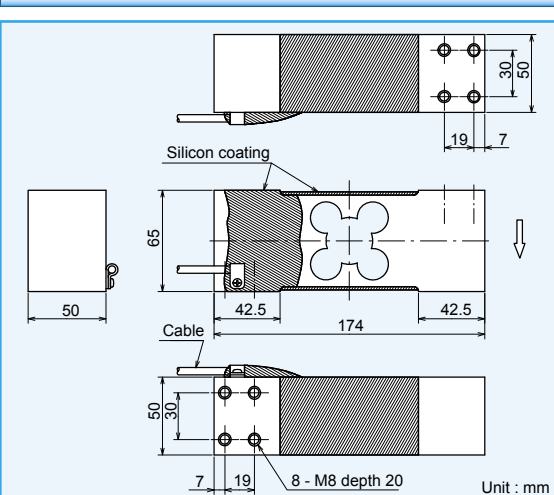
- Middle capacity.
- OIML certified.

Specifications

Rated capacity : 980.7 N {100 kgf} ~ 4.903 kN {500 kgf}
Safe overload : 150 %R.C.
Ultimated overload : 200 %R.C.
Rated output : 2.2 mV/V $\pm$ 0.11 mV/V
Non-linearity : 0.02 %R.O.
Hysteresis : 0.02 %R.O.
Repeatability : 0.02 %R.O.
Creep : 0.02 %R.O. / 20 min
Creep recovery : 0.02 %R.O. / 20 min
Recommended excitation : 12 V or less
Maximum excitation : 20 V
Zero balance : $\pm$ 0.11 mV/V
Input resistance : 405 Ω $\pm$ 10 Ω
Output resistance : 350 Ω $\pm$ 5 Ω
Insulation resistance : 2 000 M Ω or more (DC50 V) (between bridge and body)
Compensated temp. range : - 10 $^{\circ}$ C ~ 70 $^{\circ}$ C
Safe temp. range : - 10 $^{\circ}$ C ~ 70 $^{\circ}$ C
Temp. effect on zero balance : 0.05 %R.O./10 $^{\circ}$ C
Temp. effect on output : 0.02 %LOAD/10 $^{\circ}$ C
Cable : ϕ 4.7, 4-cores shielded 164.5 cm wire directly attached.
Cable end is separated.
Protection grade : IP64
Material : Aluminium

< Dimension table >

< Dimension table >				(Unit : mm)
Parts No.	Rated Capacity	Displacement	Natural Freq. (Hz)	Weight (Approx.kg)
CB14-100K-21	980.7 N {100 kgf}	0.5	84	1.3
CB14-150K-21	1.471 kN {150 kgf}		90	
CB14-250K-21	2.452 kN {250 kgf}		127	
CB14-300K-21	2.942 kN {300 kgf}		150	
CB14-500K-21	4.903 kN {500 kgf}		260	



Unit : mm

Outlines

Load Cells

Compression Service / Tension service for Industrial Scale	CCS1	CWV1	TCP1(A)	T3B1
			 *Rod end is optional.	 *Rod end is optional.
	Used in weighing systems for required high capacity generally.	Low profile, Shearweb type load cell. It is strong in lateral load. Suitable to use in the limited space.	High accuracy canister type load cell. Suitable for Tank or Hopper weighing systems.	High accuracy, compact and light weight load cell for process weighing systems.
Rated capacity	490.3 kN {50 tf} ~ 2.942 MN {300 tf}	19.61 kN {2 tf} ~ 980.7 kN {100 tf}	490.3 kN {50 kgf} ~ 196.1 kN {20 tf}	196.1 N {20 kgf} ~ 49.03 kN {5 tf}
Safe overload (%R.C.)	150	150	150 (TCP1-50K ~ 100K : 500)	150
Ultimate overload (%R.C.)	200	200	200 (TCP1-50K ~ 100K : 500)	200
Rated output (mV/V)	2±0.02	3±0.006	3±0.003	3±0.015
Non-linearity (%R.O.)	0.3	0.05 (CWV1-50T~100T : 0.1)	0.05	0.03
Hysteresis (%R.O.)	0.3	0.1 (CWV1-50T~100T : 0.15)	0.02 (TCP1-50K ~ 100K : 0.05)	0.03
Repeatability (%R.O.)	0.15	0.02 (CWV1-50T~100T : 0.05)	0.02 (TCP1-50K ~ 100K : 0.05)	0.03
Compensated temp. range (°C)	- 10 ~ 70	- 10 ~ 70	- 10 ~ 70	- 10 ~ 70
Safe temp. range (°C)	- 20 ~ 100	- 20 ~ 80	- 20 ~ 100	- 20 ~ 80
Temp. effect on zero balance	0.05 %R.O./10°C	0.03 %R.O./10°C	0.03 %R.O./10°C	0.05 %R.O./10°C
Temp. effect on output	0.1 %LOAD/10°C	0.03 %LOAD/10°C	0.03 %LOAD/10°C	0.1 %LOAD/10°C
Cable	φ10, 4-cores shielded 3 m cable with Y type terminals at the end.	φ10, 4-cores shielded 3 m cable with Y type terminals at the end.	φ10, 4-cores shielded 3 m cable with Y type terminals at the end.	φ10, 4-cores shielded 3 m cable with Y type terminalsat the end.
Material	Alloy steel	Alloy steel	Alloy steel	Alloy steel (20K-200K: Aluminium)
Protection grade	IP64	IP64	IP64	IP64

Tension Service / Tension-Compression Service for Industrial Scale	CLS-A	U3S1-NS	UMM1	C2D1
		 *Rod end is optional.		
	Ideal for measuring the tension force of cable in crane applications.	High accuracy small and light weight tension / compression service. NTEP approved.	Compact size and light weight. tension / compression service with all stainless steel construction.	High capacity. Because the output voltage is adjusted, it is available in both single point / multipoint. OIML certified.
Rated capacity	29.42 kN {3 tf} ~ 196.1 kN {20 tf}	980.7 kN {100 kgf} ~ 49.03 kN {5 tf}	490.3 N {50 kgf} ~ 19.61 kN {2 tf}	980.7 kN {100 kgf} ~ 7.845 kN {800 kgf}
Safe overload (%R.C.)	200	150	150	150
Ultimate overload (%R.C.)	500 (CLS-20T-A : 300)	200	200	200
Rated output (mV/V)	1±0.01	- 3±0.003 3±0.015	2±0.01	2 ^{±0.004} ₀
Non-linearity (%R.O.)	0.2	0.025	0.15	0.02
Hysteresis (%R.O.)	0.2	0.025	0.1	0.02
Repeatability (%R.O.)	0.1	0.025	0.05	0.02
Compensated temp. range (°C)	- 20 ~ 60	- 10 ~ 70	- 10 ~ 70	- 10 ~ 50
Safe temp. range (°C)	- 30 ~ 70	- 20 ~ 80	- 20 ~ 80	- 20 ~ 70
Temp. effect on zero balance	0.05 %R.O./10°C	0.05 %R.O./10°C	±0.05 %R.O./10°C	0.05 %R.O./10°C
Temp. effect on output	0.05 %LOAD/10°C	0.02 %LOAD/10°C	±0.1 %LOAD/10°C	0.02 %LOAD/10°C
Cable	φ10, 4-cores shielded 5 m cable with Y type terminals	φ4.7, 4-cores shielded 6 m cable with Y type terminals	φ6.3, 4-cores shielded 3 m cable directly attached.	φ6.3, 4-cores shielded 6 m cable with Y type terminals
Material	Alloy steel	Alloy steel	Stainless steel	Aluminium
Protection grade	IP64	IP67	IP67	IP65

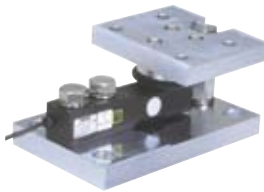
Load Cells

Compression Service / Tension Service for Industrial Scale	C2T1(-A)	CC002	DC002	FSA
				
	Highly accurate load cell for multipoint method platform type weighing scale.	High accuracy, double convex, hermetically sealed canister type load cell. OIML certified.	Digital load cell with output of 1 000 000 count. Error factor is decreased by the internal amplifier. CE mark applicable. OIML certified.	Stainless steel. 2 type of half and full bridge type.
Rated capacity	2.942 kN {300 kgf} ~ 68.65 kN {7 tf}	98.07 kN {10 tf} ~ 294.2 kN {30 tf}	98.07 kN {10 tf} ~ 294.2 kN {30 tf}	44.48 N {10 lb} ~ 177.9 N {40 lb}
Safe overload (%R.C.)	150	150	150	150
Ultimate overload (%R.C.)	200	200	200	250
Rated output (mV/V)	2±0.002	2±0.002	1 000 000 count±500 count	0.9~2.0 ± 0.105~0.300
Non-linearity (%R.O.)	0.025	0.02	0.02	0.15
Hysteresis (%R.O.)	0.025	0.02	0.02	0.15
Repeatability (%R.O.)	0.025	0.01	0.01	0.05
Compensated temp. range (°C)	- 10 ~ 50	- 10 ~ 50	- 10 ~ 50	- 10 to 50
Safe temp. range (°C)	- 20 ~ 70	- 20 ~ 70	- 20 ~ 70	- 40 to 65
Temp. effect on zero balance	0.05 %R.O./10°C	0.013 %R.O./10°C	0.013 %R.O./10°C	0.108 %R.O./10°C
Temp. effect on output	0.2 %LOAD/10°C	0.010 %LOAD/10°C	0.010 %LOAD/10°C	0.360 %LOAD/10°C (FSA-5L(-L) : 0.540 %LOAD/10°C)
Cable	φ6.3, 4-cores shielded 6 m cable directly attached with Y type terminals	φ7, 6-cores shielded 12 m cable cable end is separated.	φ7, 4-cores shielded 12 m cable cable end is separated.	-
Material	Aluminum (C2T1-7T: Alloy steel)	Element: Alloy steel Cover: Stainless steel	Element: Alloy steel Cover: Stainless steel	Stainless steel
Protection grade	IP64	IP68	IP68	IP64

Tension Service / Tension-Compression Service for Industrial Scale	FSU	FSI	CB004S	CB063
				
	Aluminum alloy. Full bridge type single point load cell.	Aluminum alloy. Full bridge type single point load cell.	Tall profile stainless steel structure. Suitable for large size platform scale. IP67 for protection grade. OIML certified.	Low profile, and suitable for high capacity thin type weighing scale. IP67 for protection grade. OIML certified.
Rated capacity	4.903 N {0.5 kgf} ~ 147.1 kN {5 kgf}	19.61 N {2 kgf} ~ 196.1 kN {20 kgf}	98.07 N {10 kgf} ~ 980.7 kN {100 kgf}	490.3 N {50 kgf} ~ 2.942 kN {300 kgf}
Safe overload (%R.C.)	450	150	150	150
Ultimate overload (%R.C.)	-	-	200	200
Rated output (mV/V)	0.5±0.05 (FSU-0.5K : 0.5 mV/V±0.075 mV/V)	- 1.58±0.158 ~ - 2.14±0.214	2.0±0.2	2.0±0.2
Non-linearity (%R.O.)	0.1	0.05	0.025	0.015
Hysteresis (%R.O.)	0.1	0.05	0.025	0.015
Repeatability (%R.O.)	0.1	0.05	0.020	0.02
Compensated temp. range (°C)	0 ~ 60	- 10 ~ 50	- 10 ~ 50	- 5 ~ 35
Safe temp. range (°C)	- 10 ~ 80	- 10 ~ 50	- 10 ~ 50	- 10 ~ 50
Temp. effect on zero balance	1 %R.O./10°C	1 %R.O./10°C	0.04 %R.O./10°C	0.020 %R.O./10°C
Temp. effect on output	1 %LOAD/10°C	1 %LOAD/10°C	0.012 %LOAD/10°C	0.012 %LOAD/10°C
Cable	AWG 30, 150 mm directly attached, cable end is separated.	AWG30, 30 cm cable and cable end is separated.	φ4.7, 4-cores shielded 5 m, and cable end is separated.	φ4.7, 4-cores shielded 40 cm, and cable end is separated.
Material	Aluminium	Aluminium	Stainless steel	Aluminum
Protection grade	-	-	IP67	IP67

Mounting Attachment with Slide Stop Mechanism

Flexible stop / Slide stop method	FCA-CMM1-S FCA-CMP1-S	SCA-CMM1 SCA-CMP1(-S)	FCACC010-*B(S)
			 < Asking for patent >
	Flexible stop method mounting attachment. Suitable for tank and hopper with stir machine.	Steel ball method mounting attach -ment. High horizontal intensity. Suitable to use for at severe terms such as belt conveyer scale and hopper legs.	Flexible stop method mounting attachment. Equipped with lift-off protection fitting.
Applicable load cell	CMM1-50K ~ 2T, CMP1-250K ~ 20T	CMM1-50K~2T, CMP1-250K~20T	CC010-500K~50T
Allowable horizontal load	FCA-CMM1-50K/2T-S, FCA-CMP1-250K/2T-S : ±11.77 kN {1.2 tf} FCA-CMP1-5T-S : ±29.42 kN {3 tf} FCA-CMP1-10T-S : ±58.84 kN {6 tf} FCA-CMP1-20T-S : ±117.7 kN {12 tf}	SCA-CMM1-50K~2T : ±29.42 kN {3 tf} SCA-CMP1-250K/5T, -10T : ±98.07 kN {10 tf} SCA-CMP1-250K/5T-S, -10T-S : ±58.84 kN {6 tf} SCA-CMP1-20T-S : ±117.7 kN {12 tf}	FCACC010-3B*(S) : ±29.42 kN {±3 tf} FCACC010-6B*(S) : ±58.84 kN {±6 tf} FCACC010-12B*(S) : ±117.7 kN {±12 tf}
Allowable horizontal moving length	±10 mm (Directionality)	±10 mm (Directionality)	±8 mm (Directionality)
Allowable lifting load	-	SCA-CMM1/CMP1-*S : 19.61 kN {2 tf} SCA-CMP1-*S : 49.03 kN {5 tf}	FCACC010-3B*S : 29.42 kN {±3 tf} FCACC010-6B*S : 58.84 kN {±6 tf} FCACC010-12B*S : 117.7 kN {±12 tf}
Material	Stainless steel (Rod end is stainless painting.)	SCA-CMM1/CMP1 : Alloy steel(Plating surface) SCA-CMM1/CMP1-S : Stainless steel	FCACC010-B : Alloy steel FCACC010-BS : Stainless steel

Flexible stop / Rocker Pin method	FCA-CCP1	RCA-C3B1	RCA-C2B1B-S
			
	Flexible stop method mounting attachment. The load cell of explosion-proof construction can be installed.	Rocker pin method mounting attach -ment. Low cost and space saving. There is no restriction for arrangement.	Rocker pin method mounting attachment. Low cost and space saving. All stainless structure.
Applicable load cell	CCP1(A) -50K~20T(-U, -Z)	C3B1-200K~5T-NS	C2B1B-250K ~ 2T
Allowable horizontal load	FCA-CCP1-50K/100K, FCA-CCP1-200K/1T : ±5.884 kN {600 kgf} FCA-CCP1-2T/5T : ±29.42 kN {3 tf} FCA-CCP1-10T : ±58.84 kN {6 tf} FCA-CCP1-20T : ±117.7 kN {12 tf}	30 %R.C. *1)	30 %R.C. *1)
Allowable horizontal moving length	±10 mm	±2 mm (No directionality)	±2 mm (No directionality)
Allowable lifting load	-	19.61 kN {2 tf} (Fall prevention)	19.61 kN {2 tf} (Fall prevention)
Material	Alloy steel (Plating surface)	Alloy steel (Plating surface)	Stainless steel

*1) R.C. = RATED CAPACITY of applied load cell.

Check Rod method	CCACC010-B(S)	CCACBE1-S
	 Japanese PAT No.4422099	
	Check rod method mounting attach -ment. All stainless construction. Equipped with Lift-off protection fitting.	Check rod method mounting attach -ment. All stainless construction. Equipped with Lift-off protection fitting.
Applicable load cell	CC010-500K ~ 50T	CBE1-5K ~ 200T(-U)
Allowable horizontal load	CCACC010-3B*(S) : ±29.42 kN {±3 tf}, CCACC010-6B*(S) : ±58.84 kN {±6 tf} CCACC010-12B*(S) : ±117.7 kN {±12 tf}, CCACC010-30B*(S) : ±294.2 kN {±30 tf}	±1.961kN {±0.2tf}
Allowable horizontal moving length	±3 mm (No directionality)	±3 mm (No directionality)
Allowable lifting load	(Same as allowable horizontal load)	(Same as allowable horizontal load)
Material	Stainless steel (Available alloy steel as an option.)	Stainless steel

*1) R.C. = RATED CAPACITY of applied load cell.

SOS type Pressure Transmitter NS100A series



Features

- Accuracy 0.2 %R.O.
Accuracy of 0.1 %R.O. is available as high accuracy version. (including non-linearity, hysteresis and repeatability)
- Negative pressure (Compound pressure) and absolute pressure can be measured.
- Application :
Automatic transmission test stand.
Test system for solenoid valve and valve body.
Test system for air conditioning system.
Precision machine pneumaticity operation control.
Approx. 60 units/1 plane are adopted for HIIA rocket.
- * Unavailable to the corrosive fluid and water/steam.

*Please check separately about voltage output (0 V ~ 5 V), a mounting thread (1/8, 1/4), a thread shape (R {PT}) and cable attached directly or terminal box.

*Please check pressure media when investigating pressure sensor because it may not match the usage.

< Special specifications >

A01 : Accurate model. Accuracy : 0.1 %R.O.

D6 : Power supply voltage ±DC15 V

Allow the minus voltage output at negative pressure side and accuracy 0.2 %R.O. is guaranteed.

H : For high temperature model with separate amplifier type.
(Temperature of pressure media : up to 200 °C, Accuracy:0.5 %R.O.)

S70 : IP67 as a protection grade, and zero point adjustment is equipped.

CE : CE marking applicable.

DR : Drain cock is equipped.

< NS100 series >

NS102: φ10 of pressure inlet hole. Accuracy : 0.5 %R.O.

Specifications

Rated capacity : 200 kPa ~ 50 MPa
Safe overload : 200 %R.C.
Ultimated overload : 300 %R.C.
Accuracy : 0.2 %R.O.
(including non-linearity, hysteresis and repeatability.)
Rated output : Current : 4 mA ~ 20 mA (Load resistance : 500 Ω or less)
Voltage : 0 V ~ 10 V (Load resistance : 5 kΩ or more)
Frequency Response : 1 kHz
Power supply voltage : DC24 V (18 V ~ 28 V)
Power consumption : Approx. 20 mA
Insulation resistance : 1 000 MΩ or more (at DC50 V)
Compensated temp. range : - 20 °C ~ 70 °C
Safe temp. range : - 30 °C ~ 80 °C
Temp. effect on zero balance : 0.2 %R.O./10 °C
Temp. effect on output : 0.2 %LOAD/10 °C
Connector : R03-RB5F with receptacle
Protection grade : IP44
Material of cover : Aluminum with almite treatment
Material of diaphragm : Single crystal sapphire
Tightening torque : 20 N·m ~ 40 N·m
Weight : Approx. 200 g (main body only)

< Accessories >

- Copper gasket 1 piece
- Inspection data sheet 1 sheet
- Instruction manual 1 sheet

< Option >

- Cable with plug (CAC-156-*M)

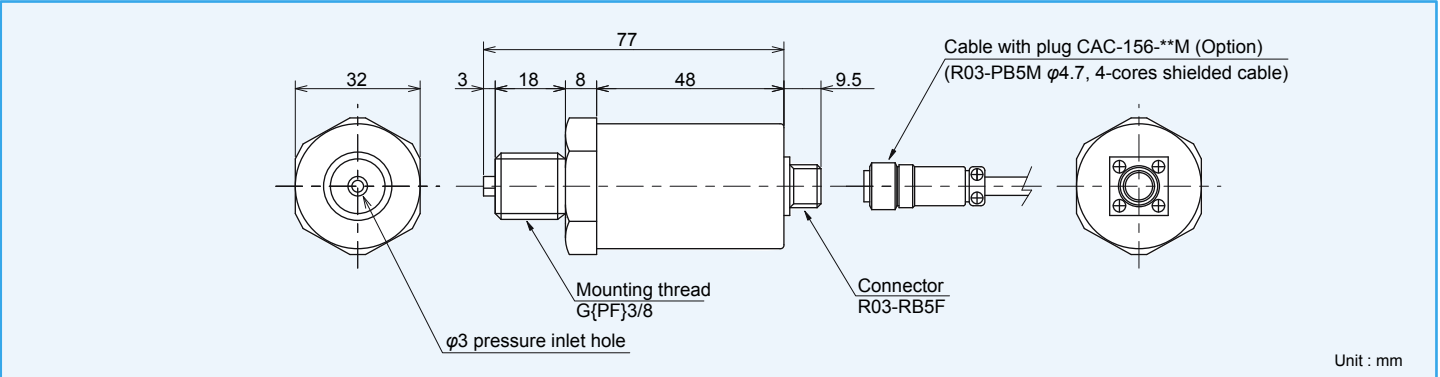
< Table of model No. >

Model No.	Rated Capacity
NS100A-200KP*-*132	200 kPa
NS100A-500KP*-*132	500 kPa
NS100A-1MP*-*132	1 MPa
NS100A-2MP*-*132	2 MPa
NS100A-5MP*-*132	5 MPa
NS100A-10MP*-*132	10 MPa
NS100A-20MP*-*132	20 MPa
NS100A-25MP*-*132	25 MPa
NS100A-30MP*-*132	30 MPa
NS100A-35MP*-*132	35 MPa
NS100A-50MP*-*132	50 MPa

< Model Composition >

NS100A -	*****-*-*	132**	
Rated capacity	(No sign) : Gage pressure A : Absolute pressure F : Negative (Compound) Pressure	Connection 2 : Connector Mounting thread 3 : 3/8 Male screw	Special specifications (See list at left side)
200KP : 200 kPa 500KP : 500 kPa 1MP : 1 MPa 2MP : 2 MPa 5MP : 5 MPa 10MP : 10 MPa 20MP : 20 MPa 25MP : 25 MPa 30MP : 30 MPa 35MP : 35 MPa 50MP : 50 MPa		Mounting thread (shape) 1 : G (PF) Output 1 : 4 mA ~ 20 mA 3 : 0 V ~ 10 V	

Outlines



SOS type pressure sensor NS10T series



Features

- Accuracy 0.2 %R.O./0.1 %R.O.(High accuracy version)
- Compound pressure (-100 kPa~ each rated capacity) is measurable.
- Low pressure (0~200 kPa, 0~500 kPa) is measurable.
- Available for high and low temperature.
- High response (Natural Frequency : 72 kHz~1 278 kHz).

Rated capacity	Natural Freq. (kHz)
200 kPa	72
500 kPa	90
1 MPa	119
2 MPa	152
5 MPa	406
10 MPa	566
20 MPa	813
30 MPa	900
35 MPa	988
50 MPa	1 278

< Model composition >
NS10T - * * * * (- * *)

Rated capacity

200KP : 200 kPa
500KP : 500 kPa
1MP : 1 MPa
2MP : 2 MPa
5MP : 5 MPa
10MP : 10 MPa
20MP : 20 MPa
30MP : 30 MPa
35MP : 35 MPa
50MP : 50 MPa

Options
A01: High accuracy model (200KP ~ 20MP)
CP: Plug connector at cable end (P/No.PRC03-12A10-7M)
CJ: Jack connector at cable end (P/No.PRC03-32A10-7F)
Y: Y-type terminal lugs at cable end.

None: Gage pressure
A: Absolute pressure
F: Negative (Compound) pressure

Specifications

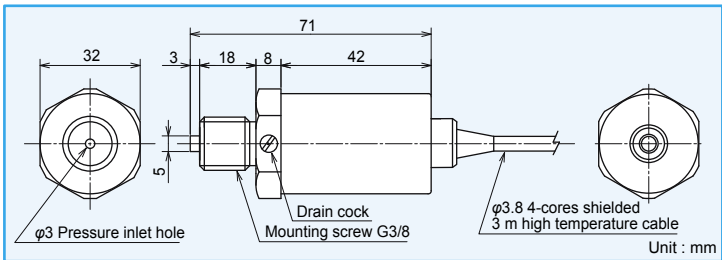
Rated capacity : 200 kPa ~ 50 MPa
Safe overload : 200 %R.C.
Ultimated overload : 300 %R.C.
Accuracy : 0.2 %R.O. / 0.1 %R.O. (High accuracy model) (including non-linearity, hysteresis and repeatability.)
Rated output : 1.5 mV/V±0.15 mV/V (200KP/500KP: 1.0 mV/V±0.10 mV/V)
Input/output resistance : 700 Ω ~ 1 000 Ω
Recommended excitation : DC10 V (15 V at maximum)
Compensated temp. range : - 20 °C ~ 120 °C (Special model: - 40 °C ~ 150 °C)
Safe temp. range : - 40 °C ~ 160 °C
Temp. effect on zero balance : 0.2 %R.O./10 °C
Temp. effect on output : 0.2 %LOAD/10 °C
Mounting screw : G3/8 {PF}
Cable : φ3.8, shielded 3 m high temperature cable directly attached, and cable end is separated.
Protection grade : IP55
Weight : Approx.200 g (for main body only)

< Accessories >

Copper gasket ----- 1 piece
Inspection data sheet ----- 1 piece
Drain cock ----- 1 piece
Teflon gasket for drain cock ----- 1 piece

Even if the temperature compensation range is exceeded, a normal measurement is possible up to safe temperature range. Standard sensor have limited the confirmation of the temperature characteristic to -20 °C ~ 120 °C.

Outlines



SOS type pressure sensor NS30T series



Features

- Compact (φ16x40 mm) and light weight (Approx.50 g).
- Accuracy 0.2 %R.O./0.1 %R.O. (High accuracy version)
- Compound pressure (-100 kPa ~ each rated capacity) is measurable.
- Low pressure (0~200 kPa, 0~500 kPa) is measurable.
- Available for high and low temperature.
- High response (Natural Frequency : 72 kHz~556 kHz).

Rated capacity	Natural Freq. (kHz)
200 kPa	72
500 kPa	90
1 MPa	119
2 MPa	152
5 MPa	406
10 MPa	566

< Model composition >
NS30T - * * * * (- * *)

Rated capacity

200KP : 200 kPa
500KP : 500 kPa
1MP : 1 MPa
2MP : 2 MPa
5MP : 5 MPa
10MP : 10 MPa

Options
A01: High accuracy model
CP: Plug connector at cable end (P/No.PRC03-12A10-7M)
CJ: Jack connector at cable end (P/No.PRC03-32A10-7F)
Y: Y-type terminal lugs at cable end.

None: Gage pressure
F: Negative (Compound) pressure

Specifications

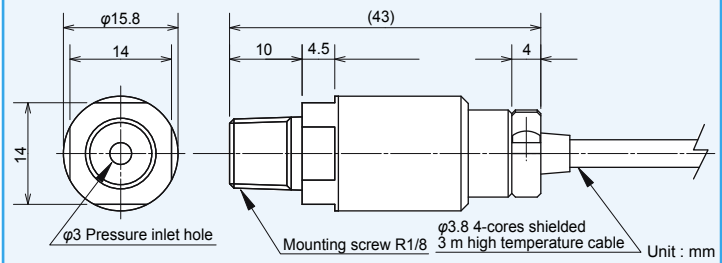
Rated capacity : 200 kPa ~ 10 MPa
Safe overload : 200 %R.C.
Ultimated overload : 300 %R.C.
Accuracy : 0.2 %R.O. / 0.1 %R.O. (High accuracy model) (including non-linearity, hysteresis and repeatability.)
Rated output : 1.5 mV/V±0.15 mV/V (200KP/500KP: 1.0 mV/V±0.10 mV/V)
Input/output resistance : 700 Ω ~ 1 000 Ω
Recommended excitation : DC10 V (15 V at maximum)
Compensated temp. range : - 20 °C ~ 120 °C (Special model: - 40 °C ~ 150 °C)
Safe temp. range : - 40 °C ~ 160 °C
Temp. effect on zero balance : 0.2 %R.O./10 °C
Temp. effect on output : 0.2 %LOAD/10 °C
Mounting screw : R1/8
Cable : φ3.8, shielded 3 m high temperature cable directly attached, and cable end is separated.
Protection grade : IP65
Weight : Approx.50 g (for main body only)

< Accessories >

Inspection data sheet ----- 1 piece

Even if the temperature compensation range is exceeded, a normal measurement is possible up to safe temperature range. Standard sensor have limited the confirmation of the temperature characteristic to -20 °C ~ 120 °C.

Outlines



Strain Gage type Pressure Transmitter PRN01/PRN02 series



Features

- Equipped with ASIC (Application Specific I.C.) type amplifier.
- Pressure sensor with built-in high performance type amplifier with minimum temperature and noise sensitivity.
- Incorporates a newlydeveloped strain gage with a stainless steel diaphragm with good stability characteristics and low power consumption.
- Application :
Injection molding machine, Pressing machine,
Various pumping systems, Hydraulic aparatus.

Specifications

Rated capacity : 5 MPa ~ 100 MPa
Safe overload : 150 %R.C.
Ultimated overload : 200 %R.C.
Accuracy : ±1.0 %F.S. (including non-linearity, hysteresis and repeatability.)
Rated output : Current : 4 mA ~ 20 mA
Voltage : 0 V ~ 5 V, 1 V ~ 5 V
Frequency Response : 1 kHz
Power supply voltage : DC12 V ~ 28 V
Insulation resistance : 1 000 MΩ or more (at DC50 V)
Compensated temp. range : - 20 °C ~ 70 °C
Safe temp. range : - 30 °C ~ 80 °C
Temp. effect on zero balance : ±1.0 %F.S./-20 °C ~ 70 °C (PRN01)
±2.0 %F.S./-20 °C ~ 70 °C (PRN02)
Temp. effect on output : ±1.0 %F.S./-20 °C ~ 70 °C (PRN01)
±2.0 %F.S./-20 °C ~ 70 °C (PRN02)
Cable : φ4.7, 4-cores shielded 1 m cable directly attached, and cable end is separated.(PRN02)
Protection grade : IP65
Material of diaphragm : Stainless steel
Mounting screw : G3/8 {PF}, R3/8 {PT} (PRN01/02-100MP:G1/2 {PF}, R1/2 {PT})
Tightening torque : 20 N·m ~ 40 N·m
Weight : Approx. 70 g (main body only)

< Accessories >

• Inspection data sheet ----- 1 sheet

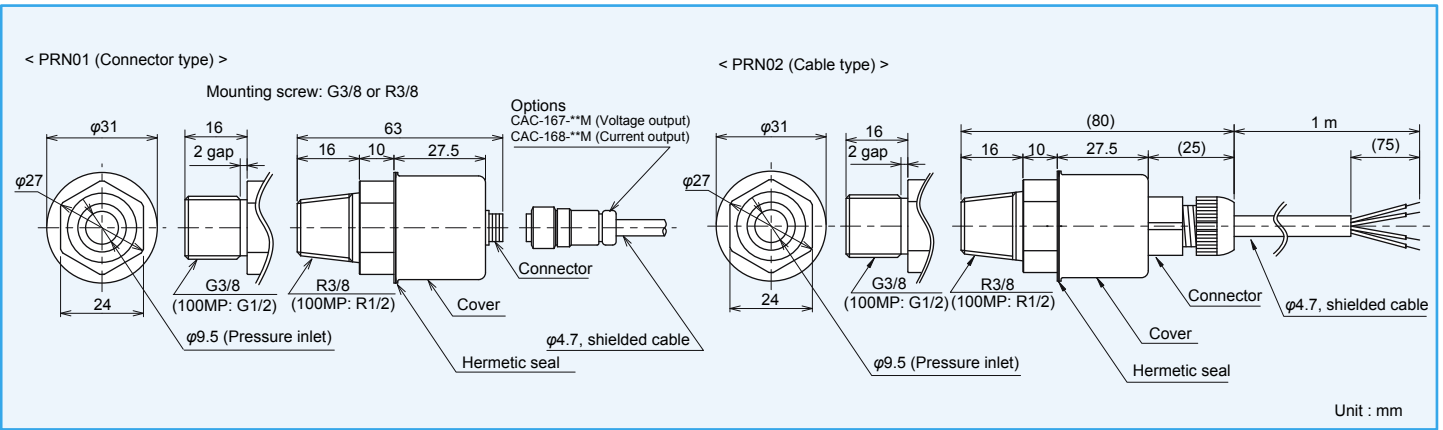
< Model Composition >
PRN0 * - * * * * - * * S*

1: Connector
2: Cable

Rated capacity
5MP : 5 MPa
10MP : 10 MPa
20MP : 20 MPa
35MP : 35 MPa
50MP : 50 MPa
100MP : 100 MPa

Special specification
Mounting screw
(5 MPa ~ 50 MPa)
G: G3/8 {PT}, R: R3/8 {PF}
(100 MPa)
G: G1/2 {PT}, R: R1/2 {PF}
Output 1: 4 mA ~ 20 mA
2: 0 V ~ 5 V
5: 1 V ~ 5 V

Outlines



Pressure Sensors

Pressure sensors with internal amplifier.	NS115P	NS403B/NS413B	PRN03	Pressure sensors PRO
				
	High accuracy (0.1%R.O.) Long-term stability. Automatic trans-mission testing device / Solenoid valve testing device	High accurate melt pressure meter. No push rod and no mercury. Excellent in temperature characteristics.	Uses the newly developed high stability strain gage. High accuracy and reliability sensor makes maximum use of the feature of a metallic foil strain gage.	Compact flash diaphragm type (Bolt shape). High response. Equipped with drain cock and no need to remove air from pressure inlet section.
Rated capacity (Pa)	500 k ~ 10 M	20 M ~ 50 M	350 k ~ 1 M	2 M ~ 20 M
Safe overload (%R.C.)	200	150	150	150
Ultimate overload (%R.C.)	300	200	-	200
Accuracy (%R.O.)	0.1 *1)	2.0 *2)	1.0 *1)	Non-linearity: 0.5 %R.O.
Rated output *3) (mA)	4 ~ 20	4 ~ 20	-	1.0 mV±0.3 mV
(V)	0 ~ 5, 0 ~ 10	-	0.5 ~ 4.5	
Compensated temp. range (°C)	- 20 ~ 70	- 25 ~ 350 (Sensing point)	- 20 ~ 60	- 30 ~ 150
Safe temp. range (°C)	- 30 ~ 80	- 25 ~ 400 (Sensing point)	- 20 ~ 70	- 40 ~ 160
Temp. effect on zero balance	0.15 %R.O./10 °C	-	±0.8 %F.S./10 °C	±0.8 %R.O./10 °C
Temp. effect on output	0.15 %LOAD/10 °C	-	-	±0.8 %LOAD/10 °C
Mounting screw	G1/8, G1/4, G3/8{PF}, R1/8, R1/4, R3/8{PT}	NS403B: 1/2-20UNF NS413B: G3/8{PF}	R1/4 {PT}	M10 x P1.0
Cable	Connector: R04-R5F (Receptacle)	Connector: TC1108-21B10-7F (Receptacle)	φ3, 4-cores 30 cm shielded cable directly attached. Cable end is separated	φ3.8, 4-cores 30 cm shielded cable directly attached. Cable end is separated
Protection grade	IP67	IP54	-	IP65
Weight (Approx.g)	250	400	-	25

*1) Including non-linearity, hysteresis and repeatability, *2) Including non-linearity, hysteresis, repeatability and temp. effect. *3) Select either of one output
Note) Please ask when you examine the sensor because the pressure medium is unavailable case.

Pressure sensors	PRB	PRC	PRJ	STD
				
	High reliability and general use for experimental measurement. Line-up for wide pressure range.	Flash type diaphragm. Fast response product.	High / Low temperature usage. Testing device, transmission, and various engine stands.	High pressure measurement. Pressure receiving part is an integration structure with screw.
Rated capacity ((MPa)	1 ~ 100	1 ~ 100	1 ~ 10	200 ~ 500
Safe overload (%R.C.)	150	150	150	120
Ultimate overload (%R.C.)	300 (PRB-100MP : 200)	300	300	120
Rated output (mV/V)	1.5±0.015 (PRB-1MP: 1±0.01)	1.5±0.15 (PRC-1MP: 1 ± _{0.1} ^{0.2})	PRJ-1MP : 1±0.2 PRJ-2MP : 1.5±0.3 PRJ-5MP ~ 10MP : 1.5±0.15	1±0.002 5 (STD-500MP : 0.75±0.007 5)
Non-linearity (%R.O.)	0.2 (PRB-1MP : 0.3)	0.5	0.3	0.35 (STD-500MP : 0.5)
Hysteresis (%R.O.)	0.2 (PRB-1MP : 0.3)	0.5	0.3	0.1
Repeatability (%R.O.)	0.3	0.5	0.3	0.05
Compensated temp. range (°C)	- 10 ~ 60	- 10 ~ 50	- 40 ~ 150	- 10 ~ 75
Safe temp. range (°C)	- 15 ~ 100	- 10 ~ 75	- 40 ~ 165	- 10 ~ 75
Temp. effect on zero balance	0.2 %R.O./10 °C	0.8 %R.O./10 °C	0.25 %R.O./10 °C	0.09 %R.O./10 °C
Temp. effect on output	0.2 %LOAD/10 °C	0.8 %LOAD/10 °C	0.5 %LOAD/10 °C	0.09 %LOAD/10 °C
Mounting screw	G3/8{PF} (PRB-100MP : G1/2{PF})	G3/8{PF}	R1/8{PT}	G1/2{PF} (STD-500MP : G3/4{PF})
Cable	CAC-101-5M (Option) Connector: NDI-7P-R(Receptacle)	φ6.3, 4-cores 30 cm shielded cable, and connector(NDI-7P-J)	φ5.6 4-cores 1.5 m shielded heat-proof cable, and connector (NDI-7P-J)	φ6.3, 4-cores 3 m shielded cable directly attached, cable end is Y-type terminals.
Protection grade	IP64	IP64	IP60	IP64
Weight (Approx.g)	220 ~ 450	120	45 ~ 60	1 400

Torque Transducers

Optical communication method	TMHFB	TMOFB	TMOS
			
	Optical transmission method thin flange type torque transducer.	Optical transmission method thin flange type torque transducer.	Bearing type torque transducer adopting the optical transmission method.
Rated capacity (N·m)	±100 ~ ±10 k	±100 ~ ±5 k	±3 k ~ ±5 k
Safe overload (%R.C.)	240	240	150
Ultimate overload (%R.C.)	400	400	200
Rated output (V)	0 ~ ±10	0 ~ ±10	0 ~ ±10
Accuracy of detected value(%R.O.)	±0.05 (±0.03 for an accurate version) *1)	±0.05 (±0.03 for an accurate version) *1)	±0.1
Maximum rotation (rpm)	TMHFB-100NM ~ -1KNM : 15 000 TMHFB-2KNM, -3KNM : 10 000 TMHFB-5KNM, -10KNM : 6 000	10 000 (TMOFB-5KNM : 6 000)	8 000
Safe temp. range (°C)	-10 ~ 60	-10 ~ 60	-10 ~ 80
Temp. effect on zero balance	0.05 %R.O./10 °C	0.05 %R.O./10 °C	0.1 %R.O./10 °C
Temp. effect on output	0.05 %LOAD/10 °C	0.05 %LOAD/10 °C	0.1 %LOAD/10 °C
Zero shift by rotation	0.5 %R.O.p-p (at WB=1 kHz)	0.5 %R.O.p-p (at WB=1 kHz)	0.5 %R.O.p-p (at WB=1 kHz)
Cable	φ11, 10-cores shielded cable with connector at the both end. (sold separately as an option.)	φ11, 10-cores shielded cable with connector at the both end. (sold separately as an option.)	φ11, 10-cores shielded cable with connector at the both end. (sold separately as an option.)
Protection grade	IP54	IP54	IP40
Material	Rotor part : Alloy steel, Stator part : Alluminium alloy	Rotor part : Alloy steel, Stator part : Alluminium alloy	Rotor part : Alloy steel, Stator part : Alluminium alloy + Alloy steel
Weight (Approx.kg)	Rotor part: 3.0 ~ 10.0 Stator part: 2.8 ~ 3.5	Rotor : 5.2 Stator part : 3.0	80

Rotary transformer method	TMNR	TMNR-ME	TMBN
			
	The stable performance is obtained because the driving side and the measuring side are noncontact by adopting the highly effective rotary transformer even for the measurement for a long time.	The torque from static state to high speed rotation can be measured by the double bearing system adopted. Available to coupling with propeller shaft, etc.directly as strength of radial and thrust is high by making bearing double.	Compact and light weight. Suitable for measuring a slight torque.
Rated capacity (N·m)	±10 ~ ±10 k	±500 ~ ±5 k	±20 N·cm ~ 300 N·cm
Safe overload (%R.C.)	120	120	120
Ultimate overload (%R.C.)	200	200	150
Rated output (mV/V)	1.3±0.26 (TMNR-10NM~20NM : 0.75±0.15)	1.3±0.26	1±0.2
Accuracy of detected value(%R.O.)	±0.5 *1)	±0.2 *1)	±0.5 *1)
Excitation, Recomend (VAC)	2	4	5 V
Maximum rotation (rpm)	TMNR-10NM~200NM : 10 000 TMNR-500NM~1KNM : 8 000 TMNR-2KNM~5KNM : 5 000 TMNR-10KNM : 4 000	TMNR-500NM~2KNM : 10 000 TMNR-3KNM : 8 000 TMNR-5KNM : 6 000	2 000
Safe temp. range (°C)	0 ~ 90	0 ~ 90	0 ~ 60
Temp. effect on zero balance	0.2 %R.O./10 °C	0.1 %R.O./10 °C	0.5 %R.O./10 °C
Temp. effect on output	0.2 %LOAD/10 °C	0.1 %LOAD/10 °C	0.5 %LOAD/10 °C
Zero shift by rotation (%R.O.)	0.3 (TMNR-10NM~1KNM : 0.5)	0.2	-
Temp. shift by rotation (°C)	TMNR-10NM~1KNM : up to 40 TMNR-2KNM~10KNM : up to 50	Single bearing side : Up to 40 Double bearing side : Up to 60	-
Cable	φ10, 4-cores shielded 5 m cable	φ10, 4-cores shielded 10~30 m cable	φ6.3, 4-cores shielded 3 m cable with connector
Protection grade	IP40	IP40	IP40
Weight (Approx.kg)	3 ~ 32	40 ~ 86	0.6

*1) Including non-linearity, hysteresis and repeatability.

Selection Table of Instrumentations

	Model no.	Page	Non-linearity (%F.S.)	Sampling speed /Response freq.	Nos. of com- parision output	I/O function
Digital Indicators	 For digital load cell CSD-401	36	-	15 times/s	5 points	       
	 P.C. Board type CSD-581-15 	37	0.01	100 times/s	-	 
	 P.C. Board type CSD-581-74	37	0.01	100 times/s	-	 
	 Compact Size CSD-701B	37	0.05	20 times/s	2 points	       
	 Compact Size CSD-702	37	Display : 0.05 Output : 0.1	20 times/s	2 points	  
	 CSD-814B(-U)	33	0.01	100 times/s	4 points	        
	 CSD-815B 	35	Display : 0.01 Output : 0.05	100 times/s	3 points	        
	 Digital Peak Holder CSD-819C 	34	0.025	2 000 times/s	5 points	       
	 Built-in Control panel CSD-891B	37	0.01	200 times/s	5 points	        
	 CSD-903 	31	0.01	200 times/s	4 points	         
	 CSD-904	37	0.01	15 times/s	2 points	        
	 Graphic indicator CSD-912 	32	0.01	1 000 times/s	6 points	           
	 For Tension meter TMD-100	37	0.1	100 times/s	-	   (can increase by an option)
Transmitters	 CSA-503C	38	0.01	10 Hz	-	 
	 P.C.board type CSA-504S*	38	CSA-504SB 0.1 CSA-504S-1B 0.05	10 Hz	-	
	 CSA-507C	38	0.02	1 kHz	-	 
	 P.C.board type CSA-521	38	0.02	1 kHz	-	
	 High response CSA-522B 	38	0.005	25 kHz	-	 
	 for torque transducer CSA-562B	38	0.01	1 kHz	-	

 Current output  Voltage output  BCD output  CONTROL I/O  Comparison output  RS-232C I/F  RS-422 I/F  RS-485 I/F  Serial I/F  CC-LINK
 PROFIBUS I/F  Digi-switch I/F

Digital Indicator CSD-903



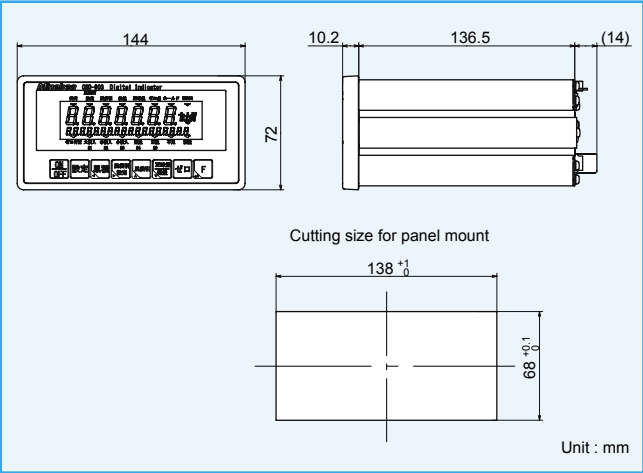
Features

- Best for high accuracy (6 000 div.) scale applications. (at the input of 0.6 μ V/d or more)
- The FLVFD (Front Luminous Vacuum Fluorescence Display) type fluorescence display tube of 11.55 mm character height provides good visibility to main display.
- Equipped with a serial interface and RS-485 interface as a standard.
- CE mark applicable.
- IP65 as a protection rating.

< Accessories >	
• Instruction manual	1 pad
• Time lag fuse	1 piece
• I/O connector for external control signal	1 piece
• Standard communication connector	1 piece
• Short bar between A ~ F and C ~ G	1 piece
• Panel mount gasket	2 pieces
• Connector for BCD output	1 piece
(When BCD output is equipped.)	
• Connector for CC-Link interface	1 piece
(When CC-Link interface is equipped.)	
• Instruction manual for CC-Link interface	1 pad
(When CC-Link interface is equipped.)	

- < Options >
- Current output
CSD-903-07 (DC4 mA ~ 20 mA)
 - Voltage output
CSD-903-25 (DC0 V ~ 10 V)
 - BCD output
CSD-903-15
 - CC-Link interface
CSD-903-73
 - RS-232C interface
CSD-903-74
 - RS-422 / RS-485 interface
CSD-903-76
- * Only either of one can be mounted.

Outlines



Specifications

Specifications for Analog
Bridge Power supply : DC10 V $\pm$ 0.5 V within 180 mA (Changeable to DC5 V or DC2.5 V), with remote sensing function
Applicable transducer : Up to 6 units of strain gage applied transducers (350 Ω)
Input sensitivity : 0.2 μ V/d or more (d = minimum scale)
Input range : -3.1 mV/V ~ 3.1 mV/V
Zero adjustment range : $\pm$ 2.5 mV/V
Non-linearity : 0.01 %F.S.
Temperature coefficient : Zero $\pm$ 0.2 μ V/ $^{\circ}$ C, Sensitivity $\pm$ 0.001 5 %F.S./ $^{\circ}$ C (When the calibration is set at 0.2 μ V/d or more for input sensitivity.)
Input noise : $\pm$ 0.2 μ Vp-p at maximum (When the analog filter, the digital filter and the stabilization filter are set to default.)
Analog filter : Selectable from 2 Hz, 4 Hz, 6 Hz, 8 Hz or 10 Hz
A/D sampling rate : 200 times/s (Changeable to 20 times/s)
A/D internal resolution : 24 bits

Specifications for Digital
Main display
Display range : - 999 999 ~ 999 999
Display unit : 7 segment green colored fluorescent display tube with 7 digits and 11.55 mm character height
Over display : '-OL' at minus over, 'OL' at plus over.
A/D value over display : '-OVF' at minus over, 'OVF' at plus over.
Sub display
Display range : Accumulation value : -19 999 999 ~ 99 999 999
Accumulation times : 0 ~ 999 999
Display unit : 7-segment green colored fluorescent display tube with 18 digits and 5 mm character height.
Display contents : Changeable to no display, accumulation times / accumulation value, latest accumulated data / accumulation value, accumulation times / latest accumulated data, latest accumulated data / final, accumulation times / final, final / accumulation value, final / over / under or zero band / final.
* it displays 'weighing value + unit' during the set of function.
Status display : STABLE, PRESET TARE, TARE, GROSS, NET, ZERO, HOLD, ERROR, Z-BAND, F.FLOW/S1, M.FLOW/S2, D.FLOW/S3, OVER/S4, OK/S0, UNDER, FULL
Display rate : 4 times/s (Changeable to 20 times/s)
External control input : 9 functions in the followings can be arbitrarily selected.
OFF, key operation of [ON/OFF], [SET], [ACCUM./ $\blacktriangleleft$], [PRESET TARE/ $\blacktriangleright$], [TARE/ $\blacktriangle$], [NET/ GROSS/ $\blacktriangledown$], [ZERO] or [F/ $\blacktriangleleft$]. Zero clear, Tare clear, Flow start, Discharge start, Cancell former accumulation, Clear accumulation, Error reset, Print command or Emergency stop,
* Above is pulse input, and effective once at a pulse width of 50 ms or more.
Change of Flow/Weigh out (ON: Weigh-out, OFF: Flow), Hold, Display of NET (ON: NET, OFF: GROSS)
* Above is level input, and effective during short input of 50 ms or more.
External control output : 13 functions in the followings can be arbitrarily selected.
OFF, RUN, Stable, During tare, Gross display, Net display, Center of zero, During hold, Error, Capacity exceeded error, Weighing sequece error, Zero band, OK(S0), Full flow (S1), Medium flow (S2), Dribble flow (S3), Over (S4), Under, Full, During weighing, Batch finish, Discharge (for gate open), Discharge finish (for gate close)

Comparator function
Set value : -999 999 ~ 999 999
No. of set point : 4 points of S1, S2, S3 and S4
Set value of hysteresis data : 0 ~ 99 digits
Direction of hysteresis : Selectable from "On delay" or "Off delay"
Conversion rate : Changeable to 200 times/s or 20 times/s (Synchronous with the A/D sampling rate.)
Various functions : Zero tracking, Digital filter, Stabilization filter, Calibration LOCK switch, Digital linearize, Accumulation, Preset tare

General specifications
Operating Temp. range : -10 $^{\circ}$ C ~ 50 $^{\circ}$ C
Humidity : 85 %RH or less (Non condensing)
Power supply : AC100 V ~ AC240 V (AC85 V ~ AC264 V) 50/60 Hz
Power consumption : Approx. 10 VA (without options, at AC100 V)
Approx. 18 VA at maximum (with options, at AC100 V)
Weight : Approx. 1.0 kg (without options)
Protection grade : IP65 (only for the front panel when the attached panel mount gasket is installed.)

Digital Indicator CSD-912



Features

- Includes a 6.2 inches STN color liquid crystal touch panel display with excellent visibility STN color and wide viewing angle.
- Waveform display of weighing status is available.
- 100 kinds of brands and recipes can be stored in the internal memory.
- High speed A/D conversion at 1 000 times/second. (Internal resolution : 24 bits)
- RS-485 interface and serial interface are equipped as a standard.
- CE mark applicable.
- IP65 as a protection rating.

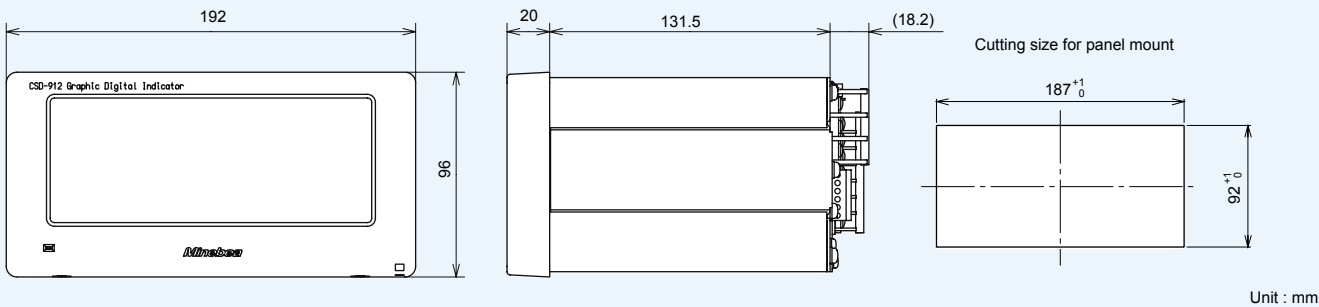
< Accessories >

- Instruction manual 1 pad
- Time lag fuse 1 piece
- External control I/O connector 1 piece
- Standard communication connector 1 piece
- Short bar for A~F and C~G 2 pieces
- Panel mount gascket 1 sheet
- BCD output connector 1 piece (When BCD output is equipped.)
- CC-Link connector 1 piece (When CC-Link interface is equipped.)
- Instruction manual for CC-Link interface 1 pad (When CC-Link interface is equipped.)
- Instruction manual for PROFIBUS interface 1 pad (When PROFIBUS interface is equipped.)

< Options >

- Current output CSD-912-07 (DC4 mA ~ 20 mA)
- Voltage output CSD-912-25 (DC0 V ~ 10 V)
- BCD output CSD-912-15
- RS-232C interface CSD-912-74
- RS-422 / RS-485 interface CSD-912-76
- CC-Link interface CSD-912-73
- PROFIBUS interface CSD-912-70

Outlines



Unit : mm

Specifications

Specifications for Analog

Bridge Power supply : DC12 V±0.3 V within 140 mA (Changeable to DC6 V or DC3 V) with remote sensing function
Applicable transducer : Up to 4 units of strain gage based transducers (350 Ω)
Input range : - 3.1 mV/V ~ 3.1 mV/V
Zero adjustment range : ±2.5 mV/V
Non-linearity : 0.01 %F.S.
Temperature coefficient : Zero ±0.1 μV/°C, Sensitivity ±0.000 8 %F.S./°C (When the calibration is made with the input sensitivity over 0.3 μV/d)
Analog filter : Approx. 4 Hz (Changeable to 2 Hz, 6 Hz, 8 Hz, 10 Hz or 100 Hz)
A/D sampling rate : 200 times/s (Changeable to 1 000 times/s, 100 times/s, 50 times/s, 20 times/s or 10 times/s)

Specifications for Digital

Display range : - 999 999 ~ 999 999
Display unit : Wide viewing angle 6.2 inches STN color liquid crystal display
No. of dots : 640 x 240 dots, Dot pitch : 0.077 x 0.231 mm
Status display : GROSS / NET, TARE, PRE.TARE, STABLE, HOLD, Z-ERR, RUN, CZ, F.FLOW/S1, M.FLOW/S2, D.FLOW/S3, OVER/S4, OK, UNDER, FULL, Z-BAND, FINISH, FLOW / DISCH., S-COMP / SEQ. / 4-COMP / MEAS. / OUT / MIX
Display of set value : Final, Preliminary-1, Preliminary-2, Over, Under, Free fall
Display of brand : Code No. : 00 ~ 99, Brand name : Up to 15 characters
Display rates : 4 times/s (Changeable to 20 times/s)
Accumulation display : Accumulation value : 0 ~ 99 999 999, Accumulation times : 0 ~ 999 999
Graphical display : Measurement status is displayed in a wavy graph
Internal set value : (EEPROM): Calibration data and the data that relates to calibration (SRAM): Dataes for Tare, Zero tracking, Zero set, Preset tare, Accumulation data, Temporary stop, Restart, Clear the accumulation data of reading out / all code / reading out recipe / all mixing code, Forced batch finish, Forced recipe finish, Forced discharge finish, Error reset, Print command, Changeover batch / discharge, Code No. 1~80, Safety input 1~8, Manual full / medium / dribble flow, Manual discharge / mixing, Hold

External control input : 11 functions in the followings can be arbitrarily selected. OFF, Gross/Net, Zero, Zero clear, Tare, Tare clear, Start of batch / recipe / discharge / mixture, Manual free fall compensation, Accumulation command, Clear the former accumulation data, Temporary stop, Restart, Clear the accumulation data of reading out / all code / reading out recipe / all mixing code, Forced batch finish, Forced recipe finish, Forced discharge finish, Error reset, Print command, Changeover batch / discharge, Code No. 1~80, Safety input 1~8, Manual full / medium / dribble flow, Manual discharge / mixing, Hold

External control output : 11 functions in the followings can be arbitrarily selected. OFF, Stable, Zero band, Full, Full / Medium / Dribble flow, Over, OK, Under, Mixing, Discharge, Measurement / Recipe / Discharge / Mixing finish, Nozzle down, During measurement, Weighing sequence error, Capacity exceeded error, error, During tare, Center of zero, Gross / Net display, During hold, Hopper 1 ~ 20, Full flow / Medium flow / Dribble flow of hopper 1 ~ 10

Various functions : Zero tracking, Digital filter, Stabilization filter, Calibration lock switch, Degital linearize, Accumulation, Preset tare

General specifications

Operating Temp. range : 0 °C ~ 40 °C
Humidity : 85 %RH or less (Non condensing)
Power supply : AC100 V ~ AC240 V (AC85 V ~ AC264 V) 50/60 Hz
Power consumption : Approx. 20 VA (without any options, at AC100 V)
Weight : Approx. 1.6 kg (without options)
Protection grade : IP65 (only for the front panel when the attached panel mount gasket is installed.)

Digital Indicator CSD-814B(-U)



Features

- 22 mm height clear fluorescent display character.
- The percentage of present loading value compared to the rated value is displayed by 11 dots of bar meter.
- Equipped with built-in four steps comparators, and available optional increase upto eight steps.
- Set value modification function that measurement is not interrupted while even changing a comparison set value.
- Plenty of options for connection with external systems.

< High accurate version CSD-814B-U >

- System accuracy 0.05 % is possible even if a barrier is used for load cell model CC010 series.
- Temperature effect on zero point is ±0.1 μV/°C.

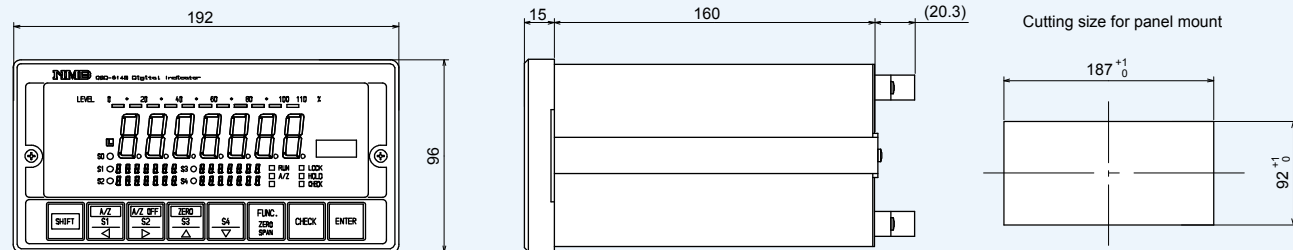
< Accessories >

- Instruction manual 1 pad
- Midget fuse 1 piece
- Unit seal 1 piece
- Short bar between A ~ F and C ~ G 1 piece
- Connector for BCD output 1 piece (When BCD output is equipped.)

< Options >

- Current output CSD-814B-07 (DC4 mA ~ 20 mA)
- Voltage output CSD-814B-23 (DC0 V ~ 1 V) CSD-814B-24 (DC0 V ~ 5 V) CSD-814B-25 (DC0 V ~ 10 V) CSD-814B-26 (DC1 V ~ 5 V)
- BCD output CSD-814B-15
- RS-232C interface CSD-814B-74
- RS-422 / RS-485 interface CSD-814B-76
- Serial interface CSD-814B-77
- Digi-switch interface CSD-814B-78

Outlines



Unit : mm

Specifications

Specifications for Analog

Bridge Power supply : DC10 V±0.3 V within 120 mA (Changeable to DC5 V or DC2.5 V), with remote sensing function
Applicable transducer : Up to 4 units of strain gage applied transducers (350 Ω)
Input range : F.S setting can be made with the input range from 0.3 mV/V ~ 3 mV/V(When bridge power supply at DC10 V)
Zero adjustment range : ±2.4 mV/V
Non-linearity : 0.01 %F.S.
Temperature coefficient : Zero ±0.2 μV/°C (±0.1 μV/°C for high accuracy model) Sensitivity ±0.001 5 %F.S./°C
A/D sampling rate : 100 times/s
Input filter : 4 Hz

Specifications for Digital

Display range : - 1 000 ~ 11 000 (Changeable to x 2, x 5 or x 10)
Display unit : 7 segment green colored fluorescent display tube with 22 mm character height
Over display : 'OL' at minus over, 'OL' at plus over.
Status display : RUN, A/Z, LOCK, HOLD, CHECK
Setting display : 7-segment fluorescent display tube with 4.5 mm character height and each 7 digits for S1, S2, S3 and S4
Judgment display : S0, S1, S2, S3 and S4
Bar meter display : Percentage of present loading value compared to the rated value (100 %) by 11 dots bar meter display.
Display rate : 4 times/s (Changeable to 20 times/s depending on the setting.)
Decimal point : Changeable to no display, 10¹, 10², 10³ or 10⁴.
External control inut : ZERO, A/Z, A/Z OFF, HOLD, LOCK, A-SEL

Comparator function

Set value : - 999 999 ~ 999 999
No. of set points : 4 points of S1, S2, S3 and S4
Conversion rate : 30 times/s
Contact output signal
S1, S2, S3, S4 : Make the contact shorted when more or less than the set value for comparsion.
S0 : Make the contact shorted depend on the condition set by the function
RUN : Make the contact shorted in the measurement mode.
ERROR : Make the contact shorted when various kinds of ERRORS are occurred or when power supply is OFF.

Specification of contact : 1a contact. 1b contact is only for ERROR output AC125 V 0.1 A, DC30 V 0.5 A
Various functions : Zero tracking, Digital filter, Motion detect, Change target for load display, Change target for HOLD, Sheet key lock, Change target for output, Changeover '+ display mode' and '+/- display mode', Changeover the target for comparator, Light on/off the bar meter display, Light on/off the comparator setting display

General specifications

Operating Temp. range : -10 °C ~ 50 °C
Humidity : 85 %RH or less (Non condensing)
Power supply : AC100 V (AC85 V ~ AC132 V) 50/60 Hz
Power consumption : Approx. 22 VA (without any options, at AC100 V)
Weight : Approx. 1.9 kg (without options)

Digital Peak Holder CSD-819C



Features

- High speed sampling at 2 000 times/s with the small unit.
- Various peak mode setting.
- Suitable for the press fit measuring.
- CE mark applicable.
- IP65 as a protection rating.
- Equipped with 4 points calibration dataes and the change-over function of comparative brand.

< Accessories >

- Instruction manual 1 pad
- Time lag fuse 1 piece
- Unit seal 1 sheet
- Panel fittings 2 pieces
- Panel mount gasket 1 piece
- BCD output connector 1 piece
- (When BCD output is equipped.)
- Instruction manual for voltage input 1 pad
- (When the voltage input is equipped.)

< Options >

- Current output
CSD-819C-07 (DC4 mA ~ 20 mA)
- BCD output
CSD-819C-15
- RS-232C interface
CSD-819C-74
- RS-422 / RS-485 interface
CSD-819C-76
- Voltage input
CSD-819C-31

Specifications

Specifications for Analog

Bridge Power supply : DC10 V±0.5 V within 60 mA
(Changeable to DC5 V or DC2.5 V)
Applicable transducer : Bridge power supply DC10 V : Up to 2 units
DC5 V : Up to 4 units
DC2.5 V : Up to 8 units
strain gage applied transducers (350 Ω).
Input range : F.S. setting is available at the input range from ±0.4 mV/V
~ ±3.1 mV/V
(When bridge power supply is DC10 V or DC5 V)
F.S. setting is available at the input range from ±0.8 mV/V
~ ±3.1 mV/V (When bridge power supply is DC2.5 V)
Output range : DC±10 V Load resistance 5 kΩ or more
(F.S. setting is available in the function.)
Output rate : 100 times/s, 500 times/s, 1 000 times/s, 2 000 times/s
(Synchronous with A/D sampling rate.)
Zero adjustment range : ±2.0 mV/V
Non-linearity : Display 0.025 %F.S., Output 0.025 %F.S.
Temperature coefficient : Zero ±0.5 μV/°C, Sensitivity ±0.01 %F.S./°C
(Input conversion, in F.S. setting at the input of ±0.5 mV/V
~ 3.1 mV/V)
Input filter : 10 Hz, 100 Hz, 1 kHz
A/D sampling rate : 2 000 times/s (Changeable to 100 times/s, 500 times/s
or 1 000 times/s.)

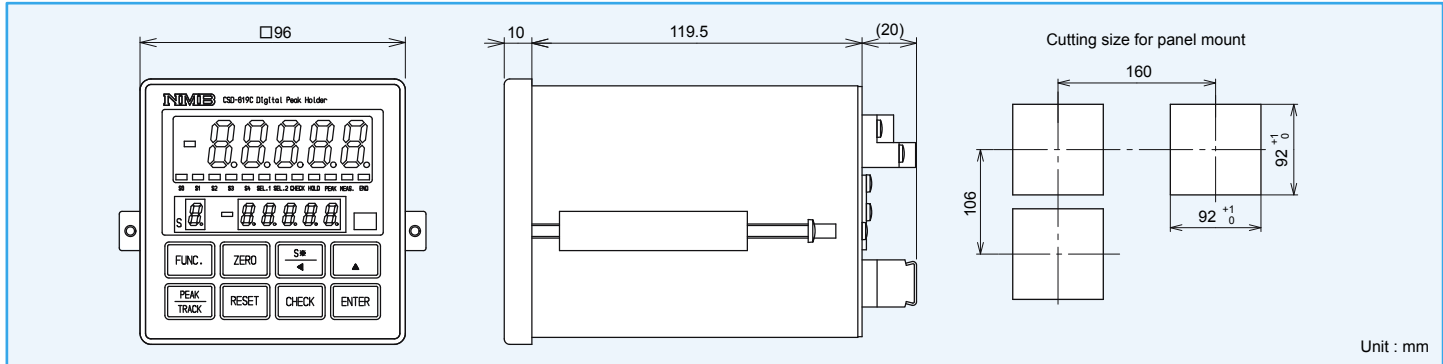
Specifications for Digital

Display range : - 11 000 ~ 11 000 (Changeable to x 2, x 5 or x 10)
Display unit : 7 segment red LED with 17 mm character height
Over display : '-OL' at minus over, 'OL' at plus over
Status display : SEL.1, SEL.2, CHECK, HOLD, PEAK, MEAS., END
Judgement display : S0, S1, S2, S3, S4
Display rate : 20 times/s
(Changeable to 4 times/s, 50 times/s or 100 times/s.)
Decimal display : Changeable to No display, 10¹, 10², 10³ or 10⁴.
External control function : ZERO, PEAK/TRACK, HOLD, RESET, SEL.1, SEL.2
Comparator function
Display range : -99 999 ~ 99 999
Display unit : 7 segment green LED with 8 mm character height
No. of display : 1 point (Selectable from S0, S1, S2, S3 or S4)
No. of set points : 5 points of S0, S1, S2, S3 and S4
Open collector output signal
S1, S2, S3, S4 : Open collector is ON when it reaches under/over the
comparator set value.
S0 : Open collector is ON with the condition set by function.

General specifications

Operating Temp. range : -10 °C ~ 50 °C
Humidity : 85 %RH or less (Non condensing)
Power supply : AC100 V ~ AC240 V (AC85 V ~ AC264 V) 50/60 Hz
Power consumption : Approx. 8 VA (without any options, at AC100 V)
Weight : Approx. 550 g (without options)
Protection grade : IP65 (only for the front panel when the attached panel
mount gasket is installed.)

Outlines



Digital Indicator CSD-815B



Features

- Compact size 96 mm x 96 mm.
- Equipped with peak hold function.
- Equipped with CC-Link interface.
- CE mark applicable.
- IP65 as a protection rating.
- Equipped with 4 points calibration dataes and the change-over function of comparative brand.

< Accessories >

- Instruction manual 1 pad
- Time lag fuse 1 piece
- Unit seal 1 sheet
- Panel fittings 2 pieces
- Panel mount gasket 1 piece
- BCD output connector 1 piece
- (When BCD output is equipped.)
- Connector for CC-Link interface 1 piece
- (When CC-link interface is equipped.)
- Instruction manual for CC-link interface 1 pad
- (When CC-link interface is equipped.)

< Options >

- Current output
CSD-815B-07 (DC4 mA ~ 20 mA)
- BCD output
CSD-815B-15
- RS-232C interface
CSD-815B-74
- RS-422 / RS-485 interface
CSD-815B-76
- CC-Link interface
CSD-815B-73

Specifications

Specifications for Analog

Bridge Power supply : DC5 V±0.25 V within 60 mA (Changeable to DC2.5 V)
Applicable transducer : Up to 4 units of strain gage applied transducers (350 Ω)
Input range : F.S. setting is available at the input range from ±0.4 mV/V
~ ±3.1 mV/V (When bridge power supply is DC5 V)
Output range : DC±10 V Load resistance 5 kΩ or more
(F.S. is set by the function.)
Output rate : Changeable to 4 times/s, 20 times/s, 50 times/s or
100 times/s (Synchronous with display rate.)
Zero adjustment range : ±2.4 mV/V
Non-linearity : Display 0.01 %F.S., Output 0.05 %F.S.
Temperature coefficient : Zero ±0.5 μV/°C, Sensitivity ±0.01 %F.S./°C
(Input conversion, in F.S. setting at the input of ±0.5 mV/V
~ 3.1 mV/V)
Input noise : ±0.6 μVp-p or less
Input filter : 2 Hz, 10 Hz, 100 Hz, 2 kHz
A/D sampling rate : 100 times/s
CHECK : Approx.0.3 mV/V
(Setting with the interval of about 0.1 mV/V is available
in the range from approx.0.1 mV/V to 1.5 mV/V)

Specifications for Digital

Display range : - 99 999 ~ 99 999
Display unit : 7 segment red LED with 17 mm character height
Over display : '-OL' at minus over, 'OL' at plus over
Status display : SEL.1, SEL.2, ◎, HOLD, A/Z, CHECK, PEAK, BOTTOM
Judgement display : S0, S1, S2
Display rate : 4 times/s
(Changeable to 20 times/s, 50 times/s or 100 times/s.)

External control function

SEL.1, SEL.2, ZERO, PEAK/TRACK/A/Z, HOLD,
RESET/A/Z OFF

Comparator function

Set value : -99 999 ~ 99 999
No. of set points : 3 points of S0, S1 and S2 (S0 is set by the function)
Conversion rate : Changeable to 4 times/s, 20 times/s, 50 times/s or
100 times/s.(Synchronous with display rate.)
* The measurement processing and the comparison
preprocessing interrupts while displaying the set value.

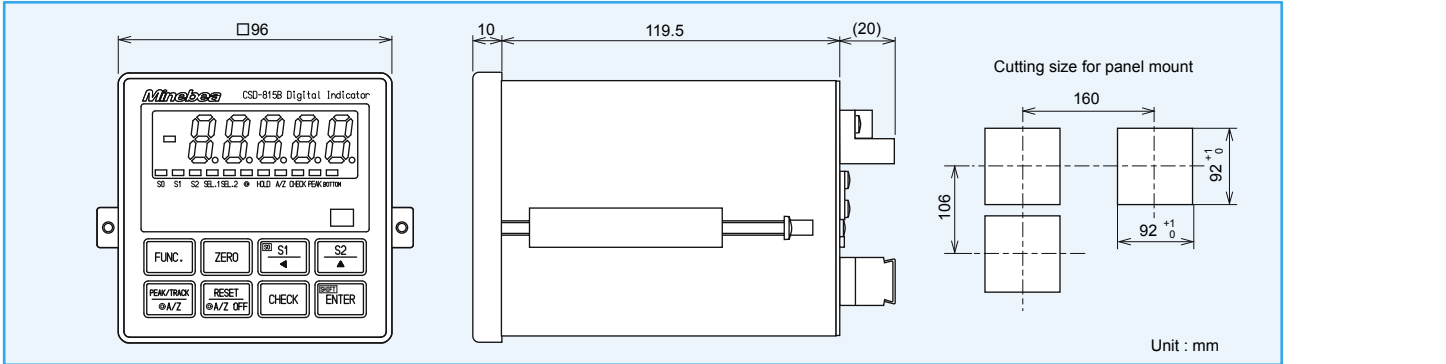
Contact output signal

S1, S2 : The contact operates when reached under/over the
comparator set value.
S0 : The contact operates with the condition set by function.
Contact specifications : 1a contact AC125 V 0.1 A (Resistance load)
DC30 V 0.5 A (Resistance load)

General specifications

Operating temp. range : -10 °C ~ 50 °C
Humidity : 85 %RH or less (Non condensing)
Power supply : AC100 V ~ AC240 V (AC85 V ~ AC264 V) 50/60 Hz
Power consumption : Approx. 12 VA (without any options, at AC100 V)
Approx. 16 VA at maximum (with options, at AC100 V ~ AC240 V)
Weight : Approx. 500 g (without options)
Protection grade : IP65 (only for the front panel when the attached panel
mount gasket is installed.)

Outlines



Digital Indicator for Digital Load Cell CSD-401



Features

- Up to 8 units of digital load cell are connectable.
- Compact size 96 mm x 48 mm.
- Equipped the RS-232C as a standard.
- IP65 as a protection rating.

< Accessories >

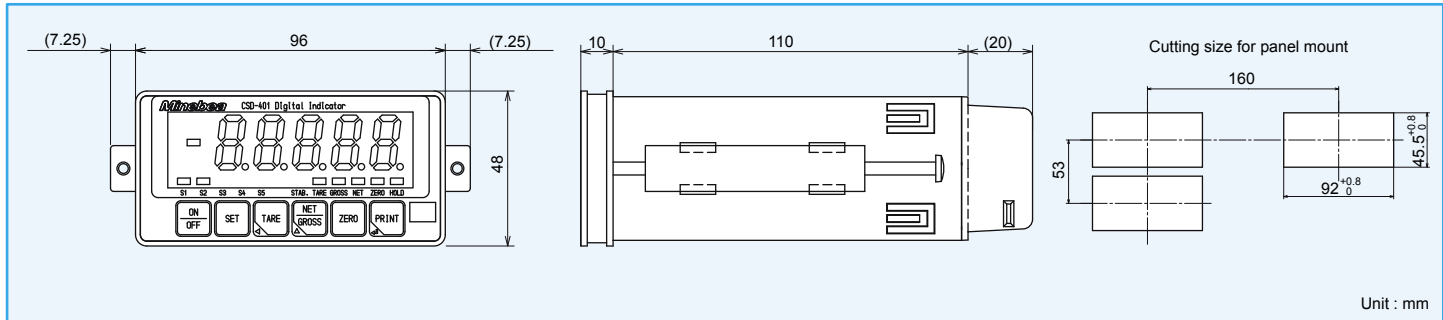
- Instruction manual 1 pad
- Midget fuse 1 piece
- Unit seal 1 sheet
- Panel fittings 2 pieces
- Panel mount gasket 1 piece
- BCD output connector 1 piece
(When BCD output is equipped.)

< Options >

- Current output
CSD-401-07 (DC4 mA ~ 20 mA)
- Voltage output
CSD-401-25 (DC0 V ~ 10 V)
- BCD output
CSD-401-15
- RS-422 / RS-485 interface
CSD-401-76
- Serial interface
CSD-401-77

* Please use a junction box model DB-307 for connecting with several digital load cells.

Outlines



Specifications

Specifications for Applied Sensor

Bridge Power supply : DC12 V±0.3 V within 280 mA
Applicable transducer : Up to 8 units of Minebea's digital load cells.
Input interface : RS-485 (2-wires method)
Baud rate : 56 700 bps
Termination : Apply a resistance (120 Ω) between the terminals in rear panel.

Specifications for Digital

Display range : - 99 999 ~ 99 999
(Changeable to x 2, x 5, x 10, x 20 or x 50)
Display unit : 7 segment red LED with 14.2 mm character height
Over display : 'OL' at minus over, 'OL' at plus over
A/D value over display : 'OVF' at minus over, 'OVF' at plus over
Status display : STAB, TARE, GROSS, NET, ZERO, HOLD
Judgement display : SET1, SET2, SET3, SET4, SET5
Display rate : 15 times/s (Changeable to 5 times/s.)
Decimal display : Changeable to No display, 10¹, 10², 10³ or 10⁴.

External control function

ON/OFF, SET, TARE, NET/GROSS, ZERO, PRINT,
NET display, Display HOLD

Comparator function

Display range : -99 999 ~ 99 999
(0 ~ 99 999 for flow mode and discharge mode.)
No. of set points : 5 points of SET1, SET2, SET3, SET4 and SET5
Set value of hysteresis
data width : 0 ~ 99 digit
Hysteresis direction : Changeable to either 'On-delay' or 'Off-delay'.
Conversion rate : Changeable to 5 times/s or 15 times/s.

RS-232C interface

Baud rate : Selectable from 1 200 bps, 2 400 bps, 4 800 bps or
9 600 bps.
Data bit length : Selectable from 7 bit or 8 bit
Parity bit : Selectable from none, even or odd.
Stop bit : Selectable from 1 bit or 2 bit.
Terminator : Selectable from CR+LF or CR.

Communication method : Half duplex

Synchronous method : Start-stop synchronous method

Transmission data : ASCII code

Cable length : 15 m at maximum

Signal name : TXD, RXD, COM.1

Various functions : Zero tracking, Digital filter, Stabilizing filter,
Digital linearization

General specifications

Operating temp. range : -10 °C ~ 50 °C,
Humidity : 85 %RH or less (Non condensing)
Power supply : AC100 V ~ AC240 V (AC85 V ~ AC264 V) 50/60 Hz
Power consumption : Approx. 13 VA (without any options, at AC100 V)
Weight : Approx. 300 g (without options)
Protection grade : IP65 (only for the front panel when the attached panel
mount gasket is installed.)

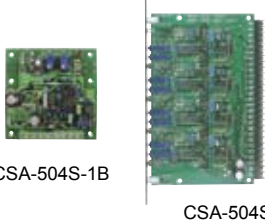
Instrumentations

Digital indicators	CSD-701B	CSD-702	CSD-904
	Compact size(48 mm×96 mm) with peak hold function. Up to 4 strain gage based transducers are connectable. Available BCD output and DC power supply as an option. IP65 for protection grade.	Compact size (48 mm x 96 mm) with peak hold function. Up to 4 strain gage based transducers can be connected. Available DC power supply as an option. IP65 for protection grade.	Best for high accuracy (6 000 div.) scale applications (at the input of 0.5 μV/d or more). Measurement value display with large scale, fluorescent display 22 mm character height. Full 6 digit (999 999) can be displayed. Built-in linearizer (up to 3 points).
Bridge power supply (VDC)	2.5, 5	5	5
Input range (mV/V)	0.4 ~ 3.1	0.4 ~ 3.1	- 3.1 ~ 3.1
Output range (V)	DC5	DC2	—
Output rate (times/s)	4, 20	4, 20	—
Output resolution	Approx. 1/10 000	Approx. 1/10 000	—
Zero adjustment range (mV/V)	- 0.3 ~ 2.4	- 0.3 ~ 2.4	- 2.5 ~ 2.5
Non-linearity (%F.S.)	Display 0.05, Output 0.05	Display 0.05, Output 0.1	0.01
A/D Sampling rate (times/s)	20	20	15
Display range	- 9 999 ~ 99 999	- 9 999 to 99 999	- 999 999 ~ 999 999
Display rate (times/s)	4, 20	4, 20	5, 15
Power supply voltage (VAC)	100 ~ 240	100	100
Power consumption (VA)	11	2.2	4
W×H×D (mm)	96 × 48 × 120	96 × 48 × 120	192 × 96 × 161.2
Weight (Approx. kg)	0.3	0.3	1.6
Input / Output (Standard) (Option)			

Digital indicator	for Tension meter system TMD-100	Built-in control panel type CSD-891B	PC Board type CSD-581-15/74
	Suitable for the application of tension meter system. Equipped with 2 channels input for load cell signals and displays ADD/SUB result digitally. Also equipped with analog output propotional to ADD/SUB result.	Small size with built-in control panel. Variety of interfaces with the computer, sequencer, etc.	DC24 V of power supply voltage. Plenty of calibrating function. High accuracy and high resolution. BCD digital output (CSD-581-15) RS-232C interface (CSD-581-74)
Bridge power supply (VDC)	2.5, 10	2.5, 5, 10	2.5, 10
Input range (mV/V)	0.2 ~ 3.1	0.2 ~ 3.1	0.2 ~ 3.1
Output range (V)	DC0 ~ 10, DC0 ~ 5, DC0 ~ 1, DC±10, DC±5, DC±1, DC4 mA ~ 20 mA	—	—
Output rate (times/s)	100, 20, 4	—	—
Output resolution	Approx. 1/24 000	—	—
Zero adjustment range (mV/V)	- 1.9 ~ 1.9	- 2.5 ~ 2.5	- 0.1 ~ 2.4
Non-linearity (%F.S.)	0.01	0.01	0.01
A/D Sampling rate (times/s)	100, 20, 4	200	100
Display range	- 19 999 ~ 99 999	- 9 999 ~ 99 999	- 1 000 ~ 11 000
Display rate (times/s)	4, 20	4, 20, 50, 100	4, 20, 50
Power supply voltage (VAC)	100 ~ 240	100 ~ 240	DC24 V
Power consumption (VA)	25	16	9 (at DC24 V)
W×H×D (mm)	200 × 150 × 201.6	67 × 208 × 140.7	220 × 130 × 35.6
Weight (Approx. kg)	4.4	1.2	0.25
Input / Output (Standard) (Option)	(Install more as an option)		

Current output Voltage output BCD output CONTROL I/O Comparison output RS-232C I/F RS-422 I/F RS-485 I/F Serial I/F CC-LINK DC Power Supply

Instrumentations

Transmitters	CSA-503C	P.C. board type CSA-504S	CSA-507C
		 CSA-504S-1B CSA-504SB	
	Internal remote sensing circuit, Automatic zero function (Option), Equipped with CALIB function (0.3 mV/V) and CHECK function.	Printed circuit board type 1 CH (CSA-504S-1B), 4 CH (CSA-504SB)	Compact size and light weight. Simple design, Lower price.
Bridge power supply (VDC)	2.5, 5, 10	10	2.5, 5, 10
Input range (mV/V)	0.3 ~ 3	1	0.5 ~ 3
Output (V)	DC±10	DC±10	DC±10
Output load resistance	2 kΩ or more	2 kΩ or more	2 kΩ or more
Zero adjustment range (mV/V)	- 2.4 ~ 2.4	- 0.1 ~ 0.1	- 0.25 ~ 0.25
Non-linearity (%F.S.)	0.01	CSA-504S-1B : 0.05 CSA-504SB : 0.1	0.02
Frequency response range (Hz)	1, 10, 100	10	1, 10, 100, 1k
Power supply voltage (VAC)	AC100	±DC15	AC100
Power consumption (VA)	10	CSA-504S-1B : 150 mA CSA-504SB : 550 mA	5
W x H x D (mm)	42 × 176 × 164.4	CSA-504S-1B : 70 × 70 × 21.6 CSA-504SB : 42 × 176 × 95	44 × 90 × 110
Weight (Approx.kg)	1.5	CSA-504S-1B : 0.2 CSA-504SB : 0.3	0.65
Input / Output (Standard) (Option)	  , Auto zero	 —	  , Auto zero

Transmitters	P.C. board type CSA-521	High response type CSA-522B	For optical transmission method Torque transducer CSA-562B
		 	
	Compact size and light weight. Simple design, Lower price	Most suitable direct-current amplifier for measurements of the load, pressure, the torque, and displacement, etc. Equipped with auto zero function as an option.	4 1/2 digit digital monitor. Exclusive use for optical transmission method non-contact flange type torque transducer.
Bridge power supply (VDC)	10	2.5, 5, 10	AC20 Vrms Square wave (Rotor service voltage)
Input range (mV/V)	0.5 ~ 1.5	0.35 ~ 3.5	5 kHz ~ 15 kHz
Output (V)	DC±10	DC±10, DC±20 mA	DC±10
Output load resistance	2 kΩ or more	500 Ω or more	2 kΩ or more
Zero adjustment range (mV/V)	- 0.25 ~ 0.25	- 0.6 ~ 0.6	±15 %R.O. (Rated output of torque transducer)
Non-linearity (%F.S.)	0.02	0.005	0.01
Frequency response range (Hz)	1 k	1, 30, 25 k	1, 10, 30, 50, 100, 300, 500, 1k
Power supply voltage (VAC)	DC24	100	100
Power consumption (VA)	100 mA	15	100
W x H x D (mm)	80 × 70 × 21.6	49.5 × 138 × 173.6	66 × 160 × 280
Weight (Approx.kg)	0.05	1.2	2.5
Input / Output (Standard) (Option)	 —	  Auto zero	 —

Strain Meter

Dynamic Strain Amplifiers	Carrier amplifier system DSA-631	Carrier amplifier system CSA-561	Direct current amplifier system DAS-406B
			
	Equipped with wire length correcting function and open circuit check function. High gain and high sensitivity. Excellent visibility and operativeness.	Isolated input and output. Digital switch for strain setting and 4 and 1/2 digital display.	Frequency characteristic : DC~200 kHz, Optional standard equivalent strain setting using 4 digit switch and 3 digit and 1/2 digital display.
Measuring point	Single channel	Single channel	Single channel
Applicable gage resistance	60 Ω ~ 1kΩ	60 Ω ~ 1kΩ	60 Ω ~ 1kΩ
Balancing adjustment method	Auto balance	Auto balance	Auto balance
Sensitivity	±10 V output at the input of 200×10 ⁻⁶ strain (When bridge power supply is AC2 Vrms)	1 V output at the input of 100×10 ⁻⁶ strain (When bridge power supply is AC2 Vrms)	0.5 V output at the input of 100×10 ⁻⁶ strain (When bridge power supply is DC2 V)
Output	OUT-1 ±10 V ±5 mA OUT-2 ±10 V ±10 mA	±10 V, Load resistance 2 kΩ or more	MONITOR ±10 V, ±5 mA OUTPUT ±10 V, ±30 mA
Non-linearity (%F.S.)	0.1	0.05	0.01
CALIB	±1 ~ ±9 999×10 ⁻⁶ strain	±1 ~ ±9 999×10 ⁻⁶ strain Accuracy ±0.5 %F.S.	±1 ~ ±9 999×10 ⁻⁶ strain Accuracy ±0.2 %F.S. for each point
Frequency response range	DC ~ 2 kHz±10 %	DC ~ 2 kHz (at W/B filter)	DC ~ 200 kHz +1 dB, -3 dB
Low-pass filter	10 Hz, 30 Hz, 100 Hz, 300 Hz, 500 Hz, W/B(2 kHz)	1 Hz, 10 Hz, 100 Hz, 300 Hz, 1 kHz, W/B	10 Hz, 100 Hz, 1 kHz, 10 kHz, W/B
Power supply voltage (VAC)	85 ~ 132/180 ~ 264, 10 ~ 30 VDC	100	100
Power consumption (VA)	9 (at AC100 V)	10	10
W × H × D (mm)	49.5 × 143 × 253	42 × 176 × 284.4	42 × 176 × 284.4
Weight (Approx.kg)	1.4	1.5	1.5

Static strain digital indicator PSD-704		Precision calibrator PSC-350		Digital moment limiter DML-802B		
						
Easily check output of strain gage based transducers in mV/V. Also measure I/O resistance of strain gage based transducers. Insulation resistance between main body and each cable wire is also available.		350 Ω precision calibrator The output can be calibrated by connecting this unit to a digital indicator, a transmitter, or dynamic strain instrumentation, etc., for strain gage based transducers.		The hanging load is detected with load cell, and the angle of jib (operating radius) is detected with a capacitance sensor. These signals are processed by microcomputer. These processed data is displayed and warning signals are available.		
Bridge power supply	DC2 V±0.02 V within 35 mA	Rated output	0.5 mV/V range 10 steps 2 mV/V range 10 steps 5 mV/V range 10 steps 10 mV/V range 10 steps	Applicable transducer	3 points (Load 1 ~ 3) of strain gage applied transducer(350Ω), 1 point of capacitive type angle detector	
Target for measurement	Measurement of strain, resistant value, output of strain gage applied transducer		Error	0.02 %F.S. (Temp. range from 15 °C to 25 °C)	Display	Display of moment ratio, Present load, Present operating radius, Status and monitor
Measuring method	Deflection method			Max. excitation voltage DC12 V Zero balance ±0.001 mV/V Input resistance 350 Ω±7 Ω Output resistance 350 Ω±7 Ω Temp. effect on zero 0.03 %F.S./10 °C Temp. effect on output 0.03 %F.S./10 °C	Monitoring display	Select one from Limit load, Angle of jib, Moment No., Jib No. or Range No.
Effect due to temp. variation	Zero point : ±0.2×10 ⁻⁶ strain/°C Sensitivity : ±0.01 %F.S./°C (after 15 min of warming up.)					
Effect due to temp. variation	Zero point ±0.2×10 ⁻⁶ strain/8 h Sensitivity ±0.01 %F.S./8 h (Within ±2 °C with the range of ×1)	Display rate (times/s)				
A/D sampling	4 times/s	Power supply voltage	DC24 V			
Display section	Dot matrix type liquid crystal display with LED back light.	W×H×D(mm)	185 × 47 × 125	W×H×D (mm)	100 × 210 × 162.9	
Power supply voltage	AC100 V or battery drive through Ni-Cd battery	Weight	Approx. 1.3 kg	Weight	Approx. 2.5 kg	
Power consumption	Approx.0.8 VA			Accessories	Angle detector : SCL-90A1MB Buzzer for warning	
W×H×D (mm)	210 × 148.5 × 40			I/O (Standard) (Options)	— 	
Weight	Approx. 1.7 kg					

Tensile and Compression Testing Machine

TGI series

Techno Graph



Universal testing machine providing high accuracy with simple operation

- **High accuracy**
Accuracy is ±1 % (JIS 1 class) of the indicated value from 1/1 ~ 1/1 000 of load cell capacity.
±0.5 % (JIS 0.5 class) is available as an option.
- **High performance and simple operation**
Automatic load cell span adjustment, One-touch auto-zero, Auto-return to test start position (No overshoots), Test condition registration, 3 level of manual speed setting, Analog output of test force and position. Corresponds to the tension / compression continuous repeat test.
- **Four highly accurate times in resolution from past servo motor**
The accuracy of the position control has been greatly improved, and the stable driving in a low speed region becomes possible.
- **The return speed can be arbitrarily set in the range from 0.1 ~ 1 500 mm/min (10kN or less) or from 0.1 ~ 750 mm/min (50kN or more).**

* Desk shown for illustration only.
*Test Fixture, PC and software are optional.

P/No.	TGI-250kN	TGI-100kN	TGI-50kN	TGI-10kN	TGI-5kN	TGI-1kN	TGI-500N	TGI-200N
Measuring range *1)	0.05 N ~ 250 kN	0.05 N ~ 100 kN	0.05 N ~ 50 kN	0.05 N ~ 10 kN	0.05 N ~ 5 kN	0.05 N ~ 1 kN	0.05 N ~ 500 N	0.05 N ~ 200 N
Measuring accuracy	within ±1 % of indicated value from 1/1 to 1/1 000 of load cell capacity for tension and compression (±0.5 % of indicated value is available as an option)							
Applicable standard	1 or 0.5 class of JIS B 7721, class 1 or 0.5 of ISO7500-1, Class 1 of ASTM E4							
Effective testing width *2) (mm)	600	600	420	420 (with protect cover for lead screw)				
Cross head stroke *2) (mm)	1 550	1 350	1 015	1 090				
Tension stroke *3) (mm)	630	860	480	715	825	870	900	920
	(with CH/CHT-250kN)	(with CH/CHT-100kN)	(with CH/CHT-50kN)	(with CH/CHT-10kN)	(with CH-5kN)	(with CH-1kN)	(with CH-1kN)	(with CH-200N)
Cross head speed (mm/min)	0.000 5 ~ 500 mm/min (Setting between 0.1 ~ 500 mm/min can be made by 0.1 mm/min pitch. Setting under 0.05 mm/min can be made by 9 steps of 0.05, 0.03, 0.02, 0.01, 0.005, 0.003, 0.002, 0.001 or 0.000 5.)			0.000 5 ~ 1 000 mm/min (Setting between 0.1 ~ 1 000 mm/min can be made by 0.1 mm/min pitch. Setting under 0.05 mm/min can be made by 9 steps of 0.05, 0.03, 0.02, 0.01, 0.005, 0.003, 0.002, 0.001 or 0.000 5.)				
Return speed	It can be set arbitrarily in the range from 0.1 ~ 750 mm/min			It can be set arbitrarily in the range from 0.1 ~ 1 500 mm/min				
Display	Test force: 5 digits display ±99 999, Peak and Rupture testing power can be displayed. Position: 6 and 1/2 digits ±1 999.999, Accuracy: within 0.1 % of indicated value.							
Standard function	Load cell capacity : Auto adjust, Load cell span : Auto set for tension / compression, Zero point : One push, Position reset : One push, Operation detected sample rupture : Selectable from either stop, reverse or ignore, Rupture detectivity : arbitrary set with 0.04 % to 99.00 % of the test force, Test condition registration : 10 conditions, Analog output of test force and position : DC0 V to ±DC5 V (with scaling function), Communication function : Conforming to USB interface 2.0/1.1 standard.							
Outline dimensions (mm)	1 400 x 2 450 x 894	1 221 x 2 192 x 720	900 x 1 507 x 490	700 x 1 583 x 513				
Weight (Approx. kg)	1 200	900	310	100				
Power supply / Power consumption	Three phase AC200 V~230 V, 7.0 kW at maximum	Three phase AC200 V~230 V, 5 kW at maximum	Three phase AC200 V~230 V, 2 kW at maximum	Three phase AC200 V~230 V, 750 W at maximum	Single phase AC100 V ~ 115 V, 400 W at maximum.			
Operating temp./Humidity range	Temperature 5 °C ~ 40 °C, Humidity : 20 % ~ 80 %RH (No condensing)							

*1) The measuring range changes depending on the capacity of the installed load cell. *2) The stroke extension type and the effective width expansion type are produced.
*3) The length of tension stroke is the condition in mounting the load cell and chuck for maximum testing capacity. JCSS:MINEBEA is a recognition trader of JCSS of one shaft tester (Metric Method Traceability System).

TGE series

Techno Graph



Universal testing machine providing high accuracy with simple operation

- **High accuracy**
Accuracy is ±1 % (JIS 1 class) of the indicated value from 1/1 ~ 1/500 of load cell capacity.
±0.5 % (JIS 0.5 class) is available as an option
- **High performance and simple operation**
Automatic load cell span adjustment, One-touch auto-zero, Auto-return to test start (No overshoots), Test condition registration, Manual 3 level speed setting, Analog output of test force and position. Corresponds to the tension/compression continuous repeat test.
- **Light weight and compact**
Improved model, weight reduced by 50 kg and width reduced by 100 mm from earlier model.

* Desk shown for illustration only. *Test Fixture, PC and software are optional.

P/No.	TGE-250kN	TGE-100kN	TGE-50kN	TGE-10kN	TGE-5kN	TGE-1kN	TGE-500N	TGE-200N
Measuring range *1)	0.1 N ~ 250 kN	0.1 N ~ 100 kN	0.1 N ~ 50 kN	0.1 N ~ 10 kN	0.1 N ~ 5 kN	0.1 N ~ 1 kN	0.1 N ~ 500 N	0.1 N ~ 200 N
Measuring accuracy	±1 % of indicated value from 1/1 ~ 1/500 of load cell capacity = JIS 1 class (±0.5 % of indicated value = JIS 0.5 class is an option)							
Applicable standard	1 or 0.5 class of JIS B 7721, class 1 or 0.5 of ISO7500-1, Class 1 of ASTM E4							
Effective testing width *2)(mm)	600	600	420	420 (with protect cover for lead screw)				
Cross head stroke (mm)	1 550	1 350	1 015	1 100 (The maximum installation interval is 1 180)				
Tension stroke (mm)	630 (with CH/CHT-250kN)	860 (with CH/CHT-100kN)	480 (with CH/CHT-50kN)	715 (with CH/CHT-10kN)	825 (with CH-5kN)	870 (with CH-1kN)	900 (with CH-1kN)	920 (with CH-200N)
Cross head speed (mm/min)	0.1, 0.5 and 1 ~ 500 (Possible to set by 1 mm/min pitch between this range)							
Setting method of speed	High value either of ±0.5 % of the setting speed, or ±0.002 5 mm/min							
Manual speed	Manual : Numeric input from control panel 0.1, 0.5, 1 ~ 500 mm/min (set by 1 mm/min pitch), PC : Automatically set by testing condition.							
Testing mode	3 level speed (H/M/L), Each speed can be arbitrarily set. Single or cycle mode (Combination of testing power and position) Option : Creep, Automatic load.							
Display	Test force: 5 digit display ±99 999, The peak and the rupture testing power can be displayed. Position: 5 digit and 1/2 ±1 999.99, Accuracy: within 0.1 % of indicated value.							
Standard installed function	Load cell capacity : Auto adjust, Load cell span : Auto set for tension / compression, Zero point : One push, Position reset : One push, Operation detected sample rupture : Selectable from either stop, reverse or ignore, Rupture detectivity : arbitrary set with 0.1 % to 9.9 % of the test force, Test condition registration : 10 condition, Analog output of test force and position : DC0 V to ±DC5 V (with scaling function), Communication function : Conforming to USB interface 2.0/1.1 standard.							
Outline dimensions (mm)	1 400 x 2 450 x 894	1 221 x 2 192 x 720	900 x 1 522 x 490	660 x 1 619 x 503				
Weight (Approx. kg)	1 200	900	200	80				
Power supply / Power consumption	Three phase AC200 V±20 V, 10 kW at maximum	Three phase AC200 V±20 V, 7.5 kW at maximum	Three phase AC200 V±20 V, 1.8 kW at maximum	Single phase AC100 V ~ 115 V, 50/60 Hz / 200 W				
Operating temp./Humidity range	5 °C ~ 40 °C / 20 % ~ 80 %RH (No condensing)							

*1) The measuring range changes depending on the capacity of the installed load cell. *2) The stroke extension type and the effective width expansion type are produced.
JCSS:MINEBEA is a recognition trader of JCSS of one shaft tester (Metric Method Traceability System).

Tensile and Compression Testing Machine

Data processing system

Characteristics

- ◆ Analyze the strength characteristics of various material and products
- ◆ Supports report creation of '.txt' and '.wmf' files and graphs which can be inserted into other applications.
- ◆ Double graph screen supports a single graph and overlapping graphs while testing.
- ◆ After the lot ends, the incremental test is possible.

1. Operating condition

- Applied OS: Windows XP®, Windows Vista®, Windows 7® (32 bit only)
- Memory: 512 MB or more
- Communication function
TG series D-sub 9 pin (Prepare the conversion connector for USB.)
TGI series / TGE series / LTS series USB 2.0/1.1 conforming.

* Windows® is the registered trade mark in the United States and other nations of Microsoft Corporation.

2. Software

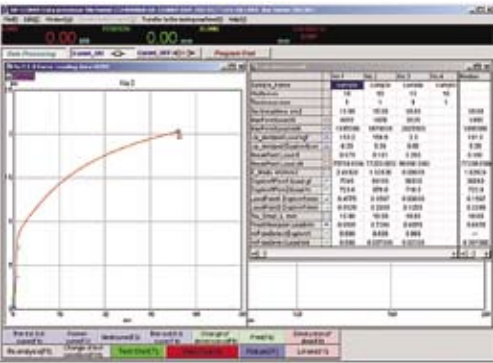
- Software for Standard testing
TgAnest (for TGI), SR-01-001 (for TG), SR-06-001(for TGE), SR-07-001(for LTS)
Corresponds to the test for tension, compression and bend (3 or 4 points)
An arbitrary formula and item name can be changed.
 - ◆ Analytical item
Sectional area of specimen, Elastic modulus, Elasticity inclination (Spring constant)
Upper yield point, Lower yield point
Yield strength point,
The middle test force (6 points at max.)
The middle displacement point (6 points at max.)
The maximum test emphasis, Rupture point
An initial tensile resistance degree, the fineness, and the specific gravity can be analyzed for the string examination.
Statistical work (50 or less in lot)
Mean value, Standard deviation, Standard deviation ×3, Minimum value of the maximum value, Median, Maximum value - minimum value, Coefficient of variation, Mean value of JIS K 6301, Sum total, Square of sum total, Number of N

- Software for Adhesion test, Tear test and Friction test
TgAnest (for TGI), SR-01-002 (for TG), SR-06-002(for TGE), SR-07-002(for LTS)
Corresponds to the adhesion test for 90°, 135° and 180°, tear test and friction test

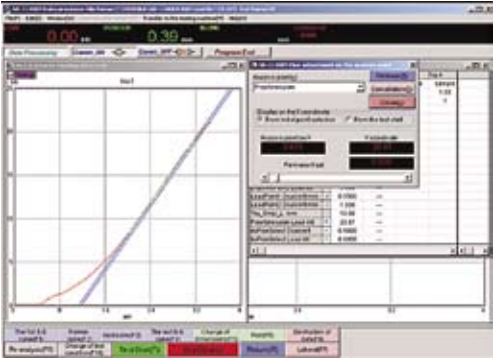
- ◆ Analytical item
Maximum local maximum point,
Minimum local minimum point,
The first maximum point,
The first local minimum point,
The middle displacement point (six points or less), Rupture point,
Starting point of expansion,
Integration average,
Simple arithmetic average
Average of the maximum point,
Local minimum point average,
The maximum local minimum point average,
Tear test power,
Big and small, maximum point six point average
The middle displacement for 2, 3, 4, 5, and 6 points average
Average of collection
Internal tearing strength
Coefficient of dynamic friction, Coefficient of static friction
Energy, No. of the maximum points and the minimum points
Statistical work ((50 or less in lot)
Mean value, Standard deviation, Standard deviation ×3, Minimum value of the maximum value, Median, Maximum value - minimum value, Coefficient of variation, Mean value of JIS K 6301, Sum total, Square of sum total, Number of N

- Software for other examinations
For rubber compression test (both appearance is possible)
For wood examination
For automatic load control examination
For spring examination

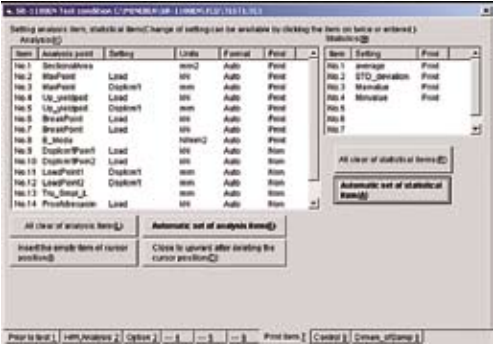
- Display in the test process.
(Tension and compression test)



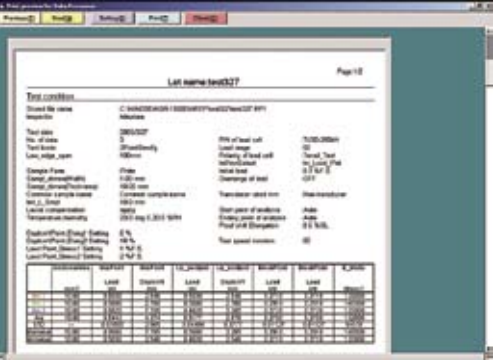
- Analysis display



- Setting display of print format

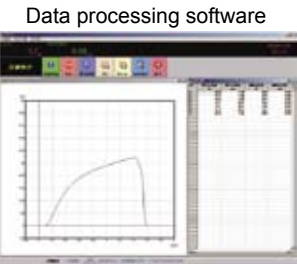


- Pre-view of print format



Load Tester

Load tester LTS-50N/LTS-200N/LTS-500N



The collection of data and the print out of the graph and the result is possible by PC installed with standard software.



Strength test by simple operation

- ★ Epoch-making design
Prominent digital display, Good operational key arrangement, Secure the space for work & jig.
- ★ Possible to test of tension / compression / bending
Power of opening a letter of bag, Adhesive strength/peel power, Tractive effort of film, Measurement of defective extraction forces of press fit and rivet parts. Because of the adopting the encoder to measure the displacement, it can be measured with the resolution of 0.01mm.
- ★ Equipped a convenient function and safety devices.
Automatic inverting function (set by load or displacement), Peak detecting function, Change for display range of testing force (1 time / 10 times), Automatic zero function, registration of load cell, Sample rupture detecting function, Communication function (USB 2.0/1.1 conforming), Overload prevention function, Load cell, Data collecting software, attached standard communication cable.

P/No.	LTS-50N / LTS-200N / LTS-500N
Maximum testing force	50 N / 200 N / 500 N
Cross head stroke (mm)	0 ~ 310 between the chuck (When installing the optional chuck PCH-500N-012.)
Cross head speed (mm/min)	LTS-50N, -200N-S300 : 30, 50, 100, 150, 200, 300 / 6 steps LTS-50N, -200N, -500N-S100 : 10, 20, 30, 50, 75, 100 / 6 steps LTS-50N, -200N, -500N-S50 : 5, 10, 20, 30, 40, 50 / 6 steps LTS-50N, -200N, -500N-S20 : 1.5, 2, 5, 10, 15, 20 / 6 steps
Accuracy of cross head speed	±3 % of the set speed (in no load)
Measurement	• Display of value (2 ranges) Range 1: -200.0 ~ 200.0 / -500.0 ~ 500.0 4 digit display Range 10: -20.00 ~ 20.00 / -50.00 ~ 50.00 4 digit display • Accuracy ±0.1 %F.S. at One time / ±0.5 %F.S. at 10 times (F.S. means the rated capacity of applied load cell)
	• Peak detection Attached
	• Auto zero Automatic zero adjustment by ZERO key
	• Analog output DC - 5 V ~ +5 V (Output connector : BNC)
Display of stroke	- 999.99 ~ 999.99 mm, with reset (Optional)
Communication	USB 2.0 conforming, available to use under the standard of USB1.1
Safety	• Emergency switch During the operation, turn off all the power supply.
Equipment	• Overload protection Crosshead stops when the testing force reaches at 102 % of the load cell capacity.
Power supply / Consumption	Single phase AC100 V±10 V, 50/60 Hz, Approx. 300 VA
Operating temp. / Humidity	5 °C ~ 40 °C / 20 % ~ 80 %RH (no condensing)

Optional Testing Jig for LTS series

□ Horizontal tightening type chuck : PCH-500N-012

□ Horizontal tightening type chuck : PCH-500N-002

□ Chuck for paper : PCHS-500N-014

□ Wrapping type chuck : CHW-200N-001

□ Horizontal tightening type air chuck : PCHA-50N-400

□ Horizontal tightening type air chuck : PCHA-500N-575

□ Compression type test device : PTHA-S03-003

□ Bending test device : PTHA-C00-031

□ 90° peel test device : PTHA-N00-007

(Horizontal tightening type chuck : PCH-200N) (Option)

単位 : mm

Tie Bar Gage Measuring System

Tie bar gage measuring system

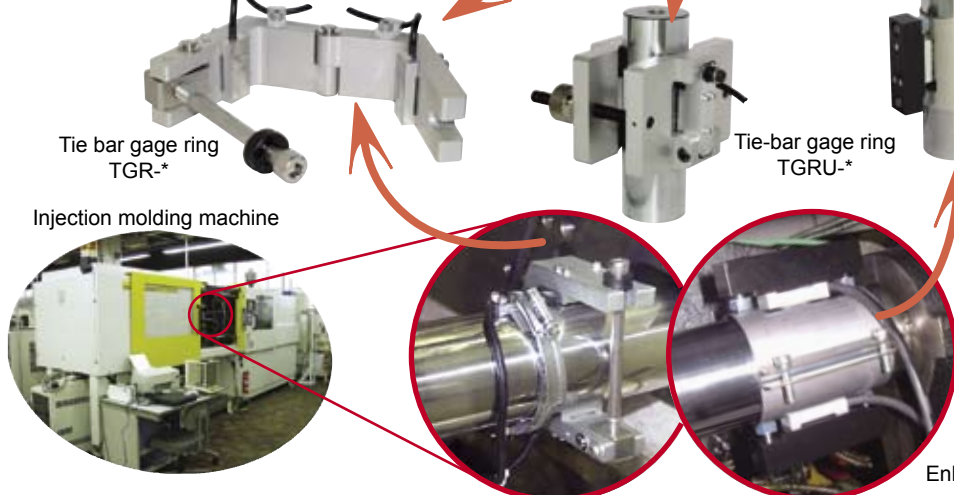
What the tie bar gage measuring system is?

It is a tensiometer using the strain gage, and the system to measure the clamping force and the opening force by installing to the tie bar such as an injection molding machine. All of bonding the strain gage and additional workers to the tie rod are unnecessary.

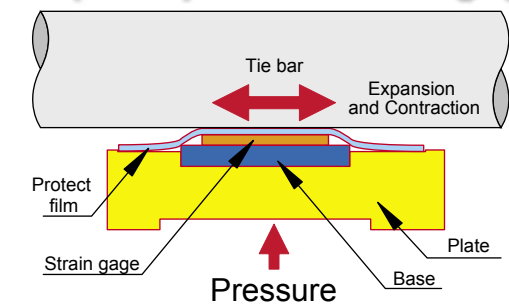
Most suitable for pushing pressure measurement of the injection molding machine and the press machine.

- The stability of the temperature characteristic has been maintained by developing a special strain gage.
- The tie bar gage detaching can be easily done, and the maintenance work has improved.
- The digital display of the stress in the tie bar (with voltage output)
- Display of actual load by inputting the tie bar parameter.
- 4 hours measurement is available in a full charge.
- Equipped one touch zero adjustment function.

Japanese patent acquired.
PAT No.3984037



The principles of tie bar gage



< Specifications of tie bar gage >

- Gage factor : 2.0±1 %
- Gage resistance : 350 Ω±0.3 %
- Measuring range : 0 ~ 1 000 μst
- Operating temp. range : -10°C ~ 75°C
- Self-temp. compensating acceptable material : Iron
- Cable : φ4.7, 4-cores shielded 0.3 m cable, with connector
- Material of sensor : Aluminum alloy
- Weight : Approx. 50 g

Digital indicator TSD-591	Transmitter CSA-591	Digital transmitter CSD-592
Suitable for balance adjustment. Possible to display 4 channel in a lump. Battery drive, One touch zero adjustment	Equipped with analog output. Suitable for control and operation management. Available for auto zero operation.	High responsiveness and low price Equipped digital output RS-422. Suitable for control and operation management.
Bridge power supply DC2 V±0.02 V, within 35 mA	Bridge power supply DC8 V±0.3 V within 30 mA	Bridge power supply DC5 V±0.05 V within 15 mA
Measuring target Up to 4 sets of tie bar gage (350 Ω type 2 pieces a couple)	Applicable transducer 1 set of tie bar gage (350 Ω type 2 pieces one couple)	Applicable transducer Tie bar gage (350 Ω type 2 pieces on pair) 1set
Measuring method Displacement method	Input range ±300×10 ⁻⁶ strain ~ ±2 000×10 ⁻⁶ strain	Input range -250×10 ⁻⁶ strain ~ 750×10 ⁻⁶ strain
Effect by temp. Zero point ±0.2×10 ⁻⁶ strain/°C, Sensitivity ±0.01 %F.S./°C (After the warming up for 15 min.)	Output voltage ±10 V	Zero adjustment range ±500×10 ⁻⁶ strain (Adjusted by trimmer)
A/D sampling rate 16 times/s	Non linearity 0.1 %F.S.	Non-linearity ±0.05 %F.S.
Display section Dot matrix type crystal liquid display with LED type back light.	Temp. effect Zero ±10 μV/°C (Input conversion) Sensitivity ±0.05 %F.S./°C	Temp. characteristic Zero ±2 μV/°C Sensitivity ±0.1 %F.S./°C
Power supply AC90 V ~ 132 V (When AC adapter is in use.), or battery drive	CALIB 300×10 ⁻⁶ strain±15×10 ⁻⁶ strain 1 point	Response frequency 2 kHz
Battery duration Approx. 4 hours (When 4 sets of tie bar gages are connected.)	Frequency response range Approx. 100 Hz or Approx. 30 Hz (Selected with dip switch on PCB)	Spec. of Interface RS-422 conforming
Operating Temp. range 0 °C ~ 50 °C	Operating temp. range 0 °C ~ 50 °C	Baud rate 11 500 kbps
Humidity 85 %RH or less (No condensing)	Humidity 80 %RH or less (No condensing)	Data bit length 8 bit
Power consumption Approx.0.8 VA	Power supply DC24 V (DC18 V ~ DC36 V)	Parity bit No
W×H×D (mm) 220 × 160 × 49	Power consumption Approx. 0.15 A (at DC24 V)	Start bit 1 bit
Weight (Approx. kg) 1.8	W×H×D (mm) 48 × 96 × 131	Stop bit 1 bit
I/O (Standard) (Option)	Weight (Approx. kg) 0.5	Communication method Full duplex
	I/O (Standard) (Option)	Handshake No
		Operation temp. range -10 °C ~ 50 °C
		Humidity 85 %RH or less (Non condensing)
		Power supply DC12 V ~ DC24 V 150 mA
		W×H×D (mm) 92 × 34 × 56
		Weight (Approx. kg) 0.25
		I/O (Standard) (Option)

Strain Gages

Gage desination code

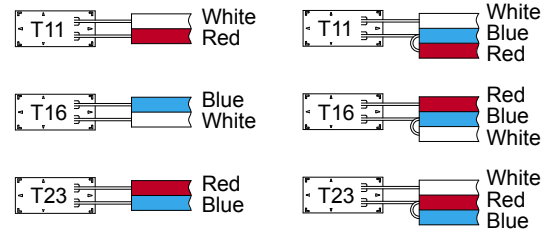
Carrier Material	Resistance ($\Omega/10$)	Temperature compensation
J : Polyimide		T11 : Ordinary carbon steel
F : Epoxy		T16 : Stainless steel
		T23 : Aluminum alloy

Gage length (mm)	Creep code	Length of vinyl wire
J		W03 : 0.3 m
T		W1 : 1 m
2		W3 : 3 m
A		W5 : 5 m
12		W3-3 : 3 m & 3 wires
D		W5-3 : 5 m & 3 wires
5		
T		
11		
W		
5		
3		

Grid configuration	Identifier mark	Optin code
- : Single element		A : with cover
D : Arrow shape	Improvement mark	B : with lead wire
2 : 2 elements		C : with cover & lead wire
3 : 3 elements		D : with tab & solder
4 : 4 elements		
5 : 5 elements		
S4 : Diaphragm		
R : Rosette		
T : Transverse		
X : Stacked		

Gage desination code

Strain gages of 2 and 3 elements shows the temperature compensation by the color of vinyl wires.



J-series Polyimide Foil Gage

Gage pattern	Patern No.	Parts No.	Length	Base size	Patern size
	1	J-02-12C0Txx*	0.2	2.5 x 2.0	1.3 x 1.0
	2	J-05-12D0Txx*	0.5	3.0 x 2.5	1.4 x 1.6
	3	J-1-12F0Txx*	1.0	4.1 x 2.5	2.2 x 1.6
	4	J-2-12D0Txx*	2.0	6.0 x 3.6	3.8 x 2.0
	5	J-3-12D5Txx*	3.0	6.9 x 4.7	5.2 x 3.0
	6	J-4-12D0Txx*	4.0	8.2 x 3.5	5.6 x 2.0
	7	J-5-12D0Txx*	5.0	10.0 x 3.0	7.5 x 1.8
	8	J-8-12D0Txx*	8.0	14.4 x 6.0	11.0 x 3.3
	9	J-1-35F0Txx	0.8	3.1 x 2.5	2.1 x 1.6
	10	J-2B35D0Txx	2.0	5.5 x 3.5	3.6 x 2.6
	11	J-5-35F0Txx	5.0	10.0 x 3.5	6.9 x 2.4
	12	JT-1-35G0Txx	1.2+2.8	5.6 x 5.6	4.5 x 4.3
	13	JT-3-35F0Txx	3.2	7.0 x 10.0	5.5 x 8.6
	14	JD-2-12D0Txx	2.0	7.0 x 12.0	6.7 x 3.6
	15	JD-4-12D0Txx	4.0	9.5 x 12.5	6.6 x 9.5
	16	JS4-16-35D5Txx	2.0	19.4 x 7.1	16.5 x 4.5
	17	JS4-9C35B5Txx	-	20.4 x 20.4	φ16
	18	JS4-9C35B5Txx	-	10.0 x 10.0	φ9.3
	19	J-02-12TxxW03	0.2	2.5 x 2.0	1.3 x 1.0
	20	J-05-12TxxW03	0.5	3.0 x 2.5	1.4 x 1.6
	21	J-1-12TxxW03	1.0	4.1 x 2.5	2.2 x 1.6
	22	J-2-12TxxW03	2.0	6.0 x 3.6	3.8 x 2.0
	23	J-3-12TxxW03	3.0	6.9 x 4.7	5.2 x 3.0
	24	J-4-12TxxW03	4.0	8.2 x 3.5	5.6 x 2.0
	25	J-5-12TxxW03	5.0	10.0 x 3.5	6.9 x 2.4
	26	J-8-12TxxW03	8.0	14.4 x 6.0	11.0 x 3.3
	27	J-02-12TxxW3-3	0.2	2.5 x 2.0	1.3 x 1.0
	28	J-02-12TxxW5-3	0.2	2.5 x 2.0	1.3 x 1.0
	29	J-02-12TxxW10-3	0.2	2.5 x 2.0	1.3 x 1.0
	30	J-1-12TxxW3-3	1.0	4.1 x 2.5	2.2 x 1.6
	31	J-1-12TxxW5-3	1.0	4.1 x 2.5	2.2 x 1.6
	32	J-1-12TxxW10-3	1.0	4.1 x 2.5	2.2 x 1.6
	33	J-2-12TxxW3-3	2.0	6.0 x 3.6	3.8 x 2.0
	34	J-2-12TxxW5-3	2.0	6.0 x 3.6	3.8 x 2.0
	35	J-2-12TxxW10-3	2.0	6.0 x 3.6	3.8 x 2.0
	36	J-3-12TxxW3-3	3.0	6.9 x 4.7	5.2 x 3.0
	37	J-3-12TxxW5-3	3.0	6.9 x 4.7	5.2 x 3.0
	38	J-3-12TxxW10-3	3.0	6.9 x 4.7	5.2 x 3.0
	39	J-4-12TxxW3-3	4.0	8.2 x 3.5	5.6 x 2.0
	40	J-4-12TxxW5-3	4.0	8.2 x 3.5	5.6 x 2.0
	41	J-4-12TxxW10-3	4.0	8.2 x 3.5	5.6 x 2.0
	42	J-5-12TxxW3-3	5.0	10.0 x 3.5	6.9 x 2.4
	43	J-5-12TxxW5-3	5.0	10.0 x 3.5	6.9 x 2.4
	44	J-5-12TxxW10-3	5.0	10.0 x 3.5	6.9 x 2.4
	45	J-8-12TxxW3-3	8.0	14.4 x 6.0	11.0 x 3.3
	46	J-8-12TxxW5-3	8.0	14.4 x 6.0	11.0 x 3.3
	47	J-8-12TxxW10-3	8.0	14.4 x 6.0	11.0 x 3.3