

Fatigue-rated Pancake Load Cells

Models 201 and 202

32318655

Issue 1

Datasheet



FEATURES

- Alloy steel (Model 201) or aluminum (Model 202) construction
- Metric thread
- Enhanced accuracy: $\pm 0.05\%$ (5 kN to 250 kN), $\pm 0.1\%$ (450 kN)
- Lower deflection for enriched strength and reliability
- Fatigue resistant and heightened cycle count (>100 million load cycle)
- Tension and compression measurement
- Static overload capacity: 300%
- Higher resistance to extraneous loads which enhances reliability and lifetime under less-than-perfect system set up (see page 6 for details)

DESCRIPTION

Models 201 and 202 Series are fatigue-resistant, low-profile, tension and compression load cells with all metric dimensions ranging from 5 kN to 450 kN capacities. These load cells are designed with enhanced stiffness for extended life while exhibiting heightened measurement performance. The proprietary structure minimizes bending strains on the sensor, thus reducing a main cause of load cell failure.

Models 201 and 202 are designed for testing machines (physical characteristic of material, component, system, etc.) and other measurement applications requiring a durable and more reliable load sensor. They are often ideal for high duty-cycle applications.

VALUE TO CUSTOMERS

- Easier installation with metric standard dimensions
- Rated for extended life and reliability, allowing for use in fatigue testing applications
- Precisely calibrated in both tension and compression directions for every unit manufactured

POTENTIAL APPLICATIONS

- Industrial: Testing
 - Dynamic universal test machines/material test machines
 - Automotive components/vehicle durability/fatigue testing
 - Motor and engine torque testing
- Industrial: Factory automation
 - Pressure/load control for electric injection molding machines
 - Press machines tonnage monitor
 - Rolling machines testing control
 - Paper machines web tension measurement
- Aerospace
 - Aerospace ground testing
 - Material/component/full-frame testing

PORTFOLIO

Honeywell offers many different stainless steel, aluminum, and carbon steel models of fatigue-rated pancake load cells that suit a variety of applications, including Models 201, 202, 75, 73, 45, and 47.

Fatigue-rated Pancake Load Cells, Models 201 and 202

Table 1. Electrical Specifications

Characteristic	Parameter
Strain gage type	Bonded foil
Excitation voltage	10 Vdc (20 Vdc max.)
Insulation resistance	>5000 MΩ @ 50 Vdc
Bridge resistance (input)	700 Ω
Bridge resistance (output)	700 Ω
Zero balance	± 1% FS
Electrical termination	PT02E-10-6P connector

Table 2. Performance Specifications

Characteristic	Parameter
Load range	5 kN to 450 kN
Non-linearity (5 kN to 250 kN)	±0.05 %FS
Non-linearity (450 kN)	±0.1 %FS
Hysteresis (5 kN to 250 kN)	±0.05 %FS
Hysteresis (450 kN)	±0.1 %FS
Non-repeatability	±0.02 %FS
Output @ rated capacity (5 kN)	1.0 mV/V ±1.0 %
Output @ rated capacity (10 kN to 450 kN)	2.0 mV/V ±1.0 %
Operation	Tension & Compression
Standard calibration	Ten-point calibration tension (+) and compression (-)

Table 3. Environmental Specifications

Characteristic	Parameter
Temperature, operating	-55 °C to 95 °C [-65 °F to 200 °F]
Temperature, compensated	-10 °C to 45 °C [15 °F to 115 °F]
Temperature effect, zero	±0.0015 % FS/°C
Temperature effect, sensitivity	±0.0015 % of reading / °C
Protection level	IP65

Table 4. Wiring Codes

Letter	Designation
A	(+) Excitation
B	(+) Output
C	(-) Output
D	(-) Excitation
E	TEDS ground*
F	TEDS data*

* If TEDS chip is not present in bridge, TEDS connections will be no connection.

Fatigue-rated Pancake Load Cells, Models 201 and 202

Table 5. Mechanical Specifications

Capacity	Characteristics							
	Static Overload	Material	Fatigue Life (0 to FS)	Fatigue Life (tension FS to compression FS)	Deflection	Ringing Frequency	Mass with Tension Base	Mass without Tension Base
5 kN	300 %FS	Aluminum (CL202)	100 x 10 ⁶ cycles	50 x 10 ⁶ cycles	0,01 mm [0.0005 in]	10.8 kHz	1,5 kg [3 lb]	1 kg [2 lb]
10 kN		Alloy (CL201)			0,02 mm [0.001 in]	6.3 kHz	3 kg [7 lb]	2 kg [4 lb]
15 kN					0,02 mm [0.001 in]	8.7 kHz	3 kg [7 lb]	2 kg [4 lb]
25 kN					0,03 mm [0.001 in]	10.0 kHz	3 kg [7 lb]	2 kg [4 lb]
50 kN					0,04 mm [0.002 in]	6.2 kHz	10 kg [22 lb]	5 kg [11 lb]
100 kN					0,04 mm [0.002 in]	8.1 kHz	10 kg [22 lb]	5 kg [11 lb]
150 kN					0,05 mm [0.002 in]	5.3 kHz	25 kg [55 lb]	14 kg [30 lb]
250 kN					0,06 mm [0.002 in]	6.4 kHz	25 kg [55 lb]	14 kg [30 lb]
450 kN					0,06 mm [0.002 in]	5.7 kHz	70 kg [150 lb]	36 kg [80 lb]

Fatigue-rated Pancake Load Cells, Models 201 and 202

Figure 2. Product Nomenclature



Table 6. Order Guide

Range	Description	Order Code	Honeywell Part Number
5 kN	Model 202 5 kN	CL202MQ,1AI,2U,6AB,9A,15C,30B,32AA,34A	060-P644-01
10 kN	Model 201 10 kN	CL201MR,1AI,2U,6AB,9A,15C,30B,32AA,34A	060-P645-01
15 kN	Model 201 15 kN	CL201ZJ,1AI,2U,6AB,9A,15C,30B,32AA,34A	060-P646-02
25 kN	Model 201 25 kN	CL201ZA,1AI,2U,6AB,9A,15C,30B,32AA,34A	060-P645-02
50 kN	Model 201 50 kN	CL201MT,1AI,2U,6AB,9A,15C,30B,32AB,34A	060-P647-01
100 kN	Model 201 100 kN	CL201MU,1AI,2U,6AB,9A,15C,30B,32AB,34A	060-P645-03
150 kN	Model 201 150 kN	CL201ZB,1AI,2U,6AB,9A,15C,30B,32AC,34A	060-P646-01
250 kN	Model 201 250 kN	CL201ZK,1AI,2U,6AB,9A,15C,30B,32AC,34A	060-P647-02
450 kN	Model 201 450 kN	CL201ZL,1AI,2U,6AB,9A,15C,30B,32AD,34A	060-P648-01
5 kN	Model 202 5 kN without tension base	CL202MQ,1AI,2U,6AB,9A,15C,30B,32AA,34B	060-P702-01
10 kN	Model 201 10 kN without tension base	CL201MR,1AI,2U,6AB,9A,15C,30B,32AA,34B	060-P703-01
15 kN	Model 201 15 kN without tension base	CL201ZJ,1AI,2U,6AB,9A,15C,30B,32AA,34B	060-P704-02
25 kN	Model 201 25 kN without tension base	CL201ZA,1AI,2U,6AB,9A,15C,30B,32AA,34B	060-P703-02
50 kN	Model 201 50 kN without tension base	CL201MT,1AI,2U,6AB,9A,15C,30B,32AB,34B	060-P705-01
100 kN	Model 201 100 kN without tension base	CL201MU,1AI,2U,6AB,9A,15C,30B,32AB,34B	060-P703-03
150 kN	Model 201 150 kN without tension base	CL201ZB,1AI,2U,6AB,9A,15C,30B,32AC,34B	060-P704-01
250 kN	Model 201 250 kN without tension base	CL201ZK,1AI,2U,6AB,9A,15C,30B,32AC,34B	060-P705-02
450 kN	Model 201 450 kN without tension base	CL201ZL,1AI,2U,6AB,9A,15C,30B,32AD,34B	060-P706-01

Fatigue-rated Pancake Load Cells, Models 201 and 202

DIMENSIONAL DRAWING

Figure 2. Model 201 & 202 Dimensions

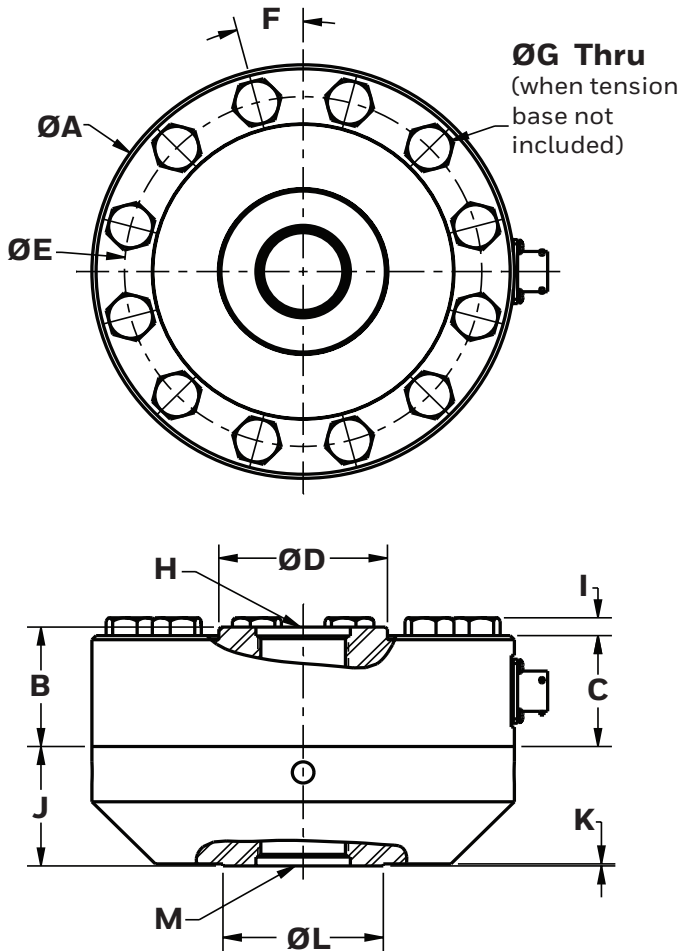
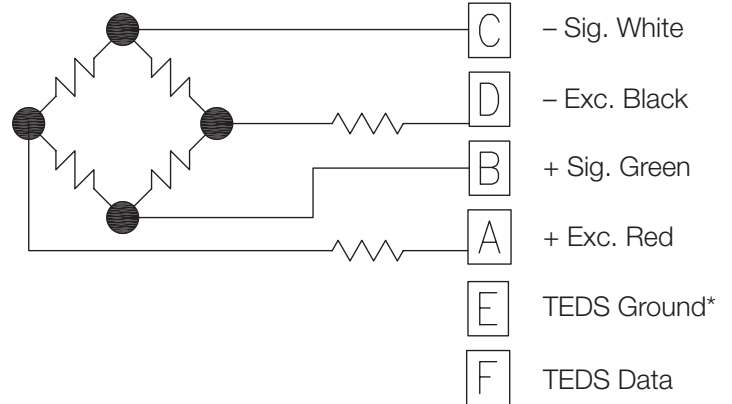


Figure 3. Wiring Diagram



*If TEDS chip is not present in bridge, TEDS connections will be no connection.

Table 7. Dimensions

Size drawing	Capacity (kN)			
	5, 10, 15, 25	50, 100	150, 250	450
A	104,9 mm [4.13 in]	153,9 mm [6.06 in]	203,2 mm [8.00 in]	279,4 mm [11.00 in]
B	34,8 mm [1.37 in]	44,5 mm [1.75 in]	63,5 mm [2.50 in]	88,9 mm [3.50 in]
C	31,8 mm [1.25 in]	41,3 mm [1.63 in]	57,2 mm [2.25 in]	76,2 mm [3.00 in]
D	32,3 mm [1.27 in]	61,4 mm [2.42 in]	99,0 mm [3.90 in]	127,0 mm [5.00 in]
E	88,9 mm [3.50 in]	130,2 mm [5.13 in]	165,1 mm [6.50 in]	228,6 mm [9.00 in]
F	22.5°	15.0°	11.25°	11.25°
G	6,8 mm [0.27 in]	10,7 mm [0.42 in]	12,7 mm [0.50 in]	22,0 mm [0.87 in]
H	M16x2-4H	M33x2-4H	M42x2-4H	M72x2-4H
	29,5 mm [1.16 in] deep	36,6 mm [1.44 in] deep	54,9 mm [2.16 in] deep	82,6 mm [3.25 in] deep
I	4,1 mm [0.16 in]	6,6 mm [0.26 in]	7,9 mm [0.31 in]	13,0 mm [0.51 in]
J	28,7 mm [1.13 in]	44,5 mm [1.75 in]	50,8 mm [2.00 in]	76,2 mm [3.00 in]
K	0,8 mm [0.03 in]	0,8 mm [0.03 in]	0,8 mm [0.03 in]	0,8 mm [0.03 in]
L	31,8 mm [1.25 in]	58,4 mm [2.30 in]	82,6 mm [3.25 in]	116,3 mm [4.58 in]
M	M16x2-4H	M33x2-4H	M42x2-4H	M72x2-4H
	24,1 mm [0.95 in] deep	36,6 mm [1.44 in] deep	42,9 mm [1.69 in] deep	69,9 mm [2.75 in] deep

Fatigue-rated Pancake Load Cells, Models 201 and 202

EXTRANEOUS LOADS

Formula to Determine Allowable Extraneous Loads

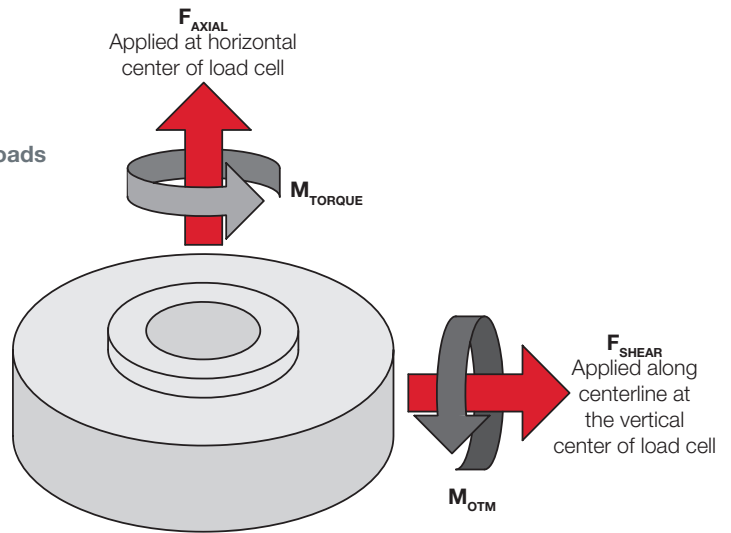
$$"A" * F_{\text{Axial}} + "B" * F_{\text{Shear}} + "C" * M_{\text{OTM}} + "D" * M_{\text{Torque}} \leq 1$$

Forces should be used in units of N and moments in units of Nm.

Table 8. Table of Coefficients to Determine Allowable Extraneous Loads

Capacity	"A" F_{AXIAL}	"B" F_{SHEAR}	"C" M_{OTM}	"D" M_{TORQUE}
5kN	1.33E-04	1.98E-04	1.38E-02	1.83E-02
10kN	6.67E-05	6.27E-05	6.15E-03	6.24E-03
15kN	4.44E-05	5.14E-05	3.65E-03	4.82E-03
25kN	2.67E-05	3.43E-05	2.63E-03	3.25E-03
50kN	1.33E-05	1.57E-05	7.07E-04	5.97E-04
100kN	6.67E-06	9.05E-06	3.27E-04	2.90E-04
150kN	4.44E-06	6.39E-06	1.65E-04	1.33E-04
250kN	2.67E-06	3.03E-06	8.90E-05	7.51E-05
450kN	1.48E-06	1.92E-06	3.43E-05	3.39E-05

Figure 3. Identification of Loads and Moments



The formula and table of coefficients above can be used to determine if a combination of extraneous loads are within the allowable limits for a given range. As long as the combination of forces and moments, multiplied by their respective coefficients, do not exceed one, the allowable limit will not be exceeded. F_{SHEAR} is a pure shear load applied along the center line of the load cell at its vertical center. In real world applications, a shear load will likely be applied above the top of the cell and contribute to both F_{SHEAR} , M_{OTM} and possibly M_{TORQUE} . F_{AXIAL} will also contribute to M_{OTM} if not applied at the center of the load cell. In cases where F_{AXIAL} and F_{SHEAR} both contribute to M_{OTM} , a resultant M_{OTM} will need to be found and used in the formula.

For an example: An application for a 5kN load cell where F_{AXIAL} has a value of 4kN applied at the load cell center, and F_{SHEAR} has a value of 500N applied 20 mm off the centerline of the load cell and 20 mm above the vertical center of the load cell. F_{SHEAR} will create M_{OTM} with a value of 10 Nm and M_{TORQUE} with a value of 10 Nm. See below for combination of forces, moments and coefficients:

$$(1.33E-04) * 4000 \text{ N} + (1.98E-04) * 5000 \text{ N} + (1.38E-02) * 10 \text{ Nm} + (1.83E-02) * 10 \text{ Nm} = .95$$

The left hand side of the equation will equal .95, which is correct because it is less than or equal to 1.

ADDITIONAL MATERIALS

The following associated literature is available on the Honeywell web site at sensing.honeywell.com:

- Product range guide

WARNING **PERSONAL INJURY**

DO NOT USE these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury.

Failure to comply with these instructions could result in death or serious injury.

WARNING **MISUSE OF DOCUMENTATION**

- The information presented in this product sheet is for reference only. Do not use this document as a product installation guide.
- Complete installation, operation, and maintenance information is provided in the instructions supplied with each product.

Failure to comply with these instructions could result in death or serious injury.

Find out more

Honeywell serves its customers through a worldwide network of sales offices, representatives and distributors. For application assistance, current specifications, pricing or name of the nearest Authorized Distributor, contact your local sales office. To learn more about Honeywell's sensing and control products, call **+1-815-235-6847** or **1-800-537-6945**, visit sensing.honeywell.com, or e-mail inquiries to info.sc@honeywell.com

Warranty/Remedy

Honeywell warrants goods of its manufacture as being free of defective materials and faulty workmanship. Honeywell's standard product warranty applies unless agreed to otherwise by Honeywell in writing; please refer to your order acknowledgement or consult your local sales office for specific warranty details. If warranted goods are returned to Honeywell during the period of coverage, Honeywell will repair or replace, at its option, without charge those items it finds defective. **The foregoing is buyer's sole remedy and is in lieu of all other warranties, expressed or implied, including those of merchantability and fitness for a particular purpose. In no event shall Honeywell be liable for consequential, special, or indirect damages.**

While Honeywell may provide application assistance personally, through our literature and the Honeywell web site, it is up to the customer to determine the suitability of the product in the application.

Specifications may change without notice. The information we supply is believed to be accurate and reliable as of this printing. However, we assume no responsibility for its use.

Honeywell Sensing and Productivity Solutions

9680 Old Bailes Road
Fort Mill, SC 29707
honeywell.com

32318655-1-EN IL50 GLO
August 2016
© 2016 Honeywell International Inc. All rights reserved.

Honeywell