

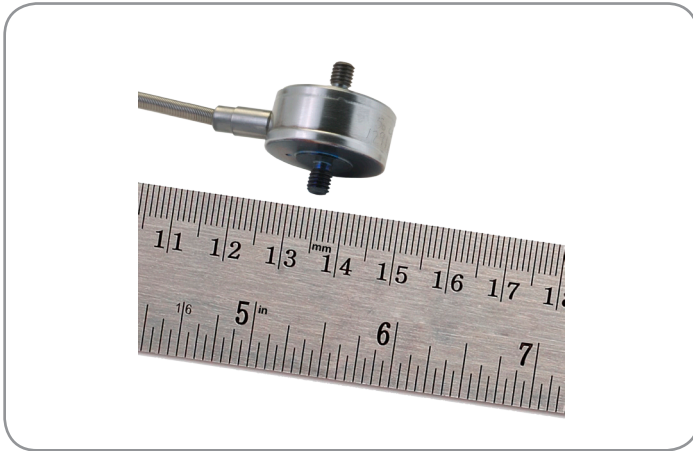
## Mid Range Precision Miniature Load Cells

Model 31 Mid

008630

Issue 2

Datasheet



### DESCRIPTION

The Model 31 mid range, precision miniature load cells measure both tension and compression with options covering 10N to 5 kN / 1000 g to 1000 lb.

The Model 31 is a durable miniature load cell with capability of high accuracies of 0.15 % to 0.2 % full scale. Welded, stainless steel construction is designed to minimize or eliminate the effects of off-axis loads.

Each bonded strain gage unit is built of welded 17-4 PH stainless steel for additional durability. This, combined with a reliable internal design provides enhanced long-term stability.

Further optional modification can permit this model to be completely welded for potential use in underwater applications.

### VALUE TO CUSTOMERS

- Enhanced accuracy of 0.15 % to 0.2 %
- Newton, gram, and pound force ranges available

### FEATURES

- 10 N to 5 kN / 1000 g to 1000 lb
- mV/V output
- Stainless steel
- Male thread attachments
- Miniature design

### POTENTIAL APPLICATIONS

- Cable tension
- Industrial process control
- Medical control systems
- Medical equipment testing
- Pharmaceutical process or product control
- Semiconductor/electronics testing
- Aerospace testing

### PORTFOLIO

Honeywell's miniature and subminiature load cells are designed to fit into systems and applications with limited space or tight clearances. Constructed of rugged stainless steel for precise measurements and excellent long term stability and reliability under harsh operating conditions, these load cells are designed to eliminate or reduce to a minimum the effect of off-axis loads. To view the entire product portfolio, click [here](#).

# Mid Range Precision Miniature Load Cells, Model 31 Mid

**Table 1. Performance Specifications**

Characteristic		Measure
Load ranges		10 N, 20 N, 50 N, 100 N, 200 N, 500 N, 1 kN, 2 kN, 5 kN 1000 g, 5 lb, 10 lb, 25 lb, 50 lb, 100 lb, 250 lb, 500 lb, 1000 lb
Non-Linearity	10 N to 1 kN, 1000 g to 250 lb	±0.15 % full scale
	2 kN to 5 kN, 500 lb to 1000 lb	±0.2 % full scale
Hysteresis	10 N to 1 kN, 1000 g to 250 lb	±0.15 % full scale
	2 kN to 5 kN, 500 lb to 1000 lb	±0.2 % full scale
Non-repeatability	10 N, 1000 g	±0.1 % full scale
	20 N to 5 kN, 5 lb to 1000 lb	±0.05 % full scale
Output (tolerance)	10 N, 1000 g	1 mV/V nominal
	20 N to 5 kN, 5 lb to 1000 lb	2 mV/V nominal
Operation		Tension/compression <sup>3</sup>
Resolution		Infinite

**Table 2. Environmental Specifications**

Characteristic	Measure
Temperature, operating	-55 °C to 125 °C [-67 °F to 257 °F]
Temperature, compensated	15 °C to 71 °C [60 °F to 160 °F]
Storage temperature	-73 °C to 148 °C [-100 °F to 300 °F]
Temperature effect, zero	±0.01 %FS/°C [±0.005 %FS/°F]
Temperature effect, span	±0.01 % reading/°C [±0.005 % reading/°F]

**Table 3. Electrical Specifications**

Characteristic	Measure
Strain gage type	Bonded foil
Excitation (calibration)	5 Vdc ≤ 50 N/10 lb 10 Vdc ≥ 100 N/25 lb
Insulation resistance	5000 Mohm @ 50 Vdc
Bridge resistance	350 ohm
Zero balance	±1 %FS max.
Electrical termination (std)	Teflon® cable (1,5 m [5 ft])

**Table 4. Mechanical Specifications**

Characteristic	Measure
Maximum allowable load	150 %FS <sup>1</sup>
Weight	see table
Material	17-4 PH stainless steel
Deflection full scale	see table
Natural frequency	see table

**Table 5. Wiring Codes**

Cable	Unamplified
<b>Red</b>	(+) excitation
<b>Black</b>	(-) excitation
<b>Green</b>	(-) output
<b>White</b>	(+) output

**Table 6. Range Codes**

Range Codes	Range	Range Codes	Range
<b>AR</b>	1000 g	<b>MH</b>	10 N
<b>AT</b>	5 lb	<b>MI</b>	20 N
<b>AV</b>	10 lb	<b>MK</b>	50 N
<b>BL</b>	25 lb	<b>ML</b>	100 N
<b>BN</b>	50 lb	<b>MM</b>	200 N
<b>BR</b>	100 lb	<b>MY</b>	500 N
<b>CN</b>	250 lb	<b>MN</b>	1000 N
<b>CR</b>	500 lb	<b>MO</b>	2000 N
<b>CV</b>	1000 lb	<b>MQ</b>	5000 N

**Table 7. Deflections and Ringing Frequencies**

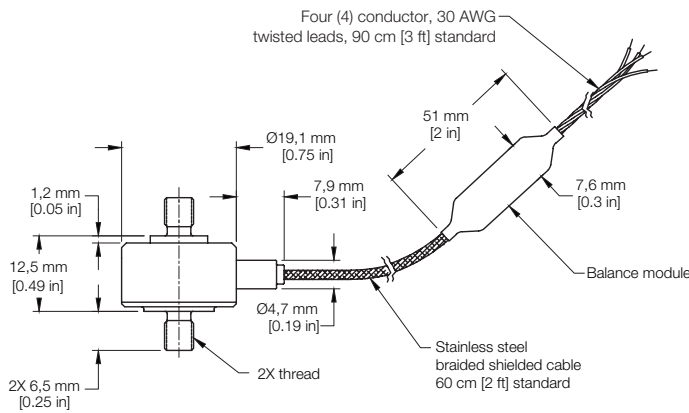
Capacity	Deflection at full scale	Ringing frequency	Weight
10 N to 50 N 1000 g to 10 lb	0,03 mm [0.001 in]	3 KHz	21 g
100 N to 500 N 20 lb to 100 lb	0,03 mm [0.001 in]	10 KHz	63 g
1 kN to 5 kN 250 lb to 1000 lb	0,04 mm [0.0015 in]	12 KHz	80 g

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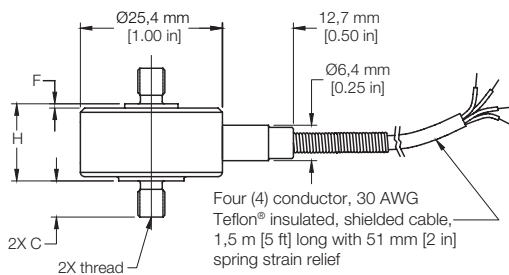
**Table 8. Mounting Dimensions**

Ranges	Thread	H	C	F
1000 g, 5 lb, 10 lb	#6-32 UNC	12,5 mm [0.49 in]	6,4 mm [0.25 in]	1,2 mm [0.05 in]
10 N, 20 N, 50 N	M4 x 0.7			
25 lb, 50 lb, 100 lb	#10-32 UNF	15,4 mm [0.61 in]	6,4 mm [0.25 in]	2,3 mm [0.09 in]
100 N, 200 N, 500 N	M5 x 0.8			
250 lb, 500 lb, 1000 lb	1/4-28 UNF	14,1 mm [0.56 in]	9,5 mm [0.38 in]	0,8 mm [0.03 in]
1 kN, 2 kN, 5 kN	M6 x 1.0			

**Figure 1. Mounting Dimensions for 10 N to 50 N / 1 kg to 10 lb (6AM termination required)**



**Figure 2. Mounting Dimensions for 100 N to 5 kN / 25 lb to 1000 lb (6E termination required)**



**Table 9. Option Codes**

	Many range/option combinations are available in our quick-ship and fast-track manufacture programs. Please click <a href="#">here</a> for updated listings.
<b>Load range</b>	1000 g, 5 lb, 10 lb, 25 lb, 50 lb, 100 lb, 250 lb, 500 lb, 1000 lb, 10 N, 20 N, 50 N, 100 N, 200 N, 500 N, 1000 N, 2000 N, 5000 N
<b>Temperature compensation</b>	1a. 15 °C to 71 °C [60 °F to 160 °F] 1c. -18 °C to 85 °C [0 °F to 185 °F] 1h. 21 °C to 204 °C [70 °F to 400 °F] <sup>4</sup>
<b>Internal amplifiers</b>	2u. Unamplified, mV/V output
<b>Electrical termination</b>	6am. Integral cable: Teflon® with balance module 6e. Integral cable: Teflon® 6i. Integral underwater cable 3 m [10 ft] (82 °C [180 °F] max.) <sup>5</sup>
<b>Additional point calibration</b>	9a. 10 point (5 up/5 down) 20 % increments @ 20 °C
<b>Electrical connector orientation</b>	15c. Radial electrical exit port orientation
<b>Special calibration</b>	30a. Compression only calibration, positive in compression 30b. Tension and compression calibration, positive in tension 30d. Tension and compression calibration, positive in compression
<b>Mounting interfaces<sup>6</sup></b>	(none) UN thread 32b. M4 x 0.7 32c. M5 x 0.8 32d. M6 x 1
<b>Electrical Interfaces<sup>7</sup></b>	53s. Phoenix connector with Signature Calibration module 53t. TEDS IEEE 1451.4 module <sup>8</sup>

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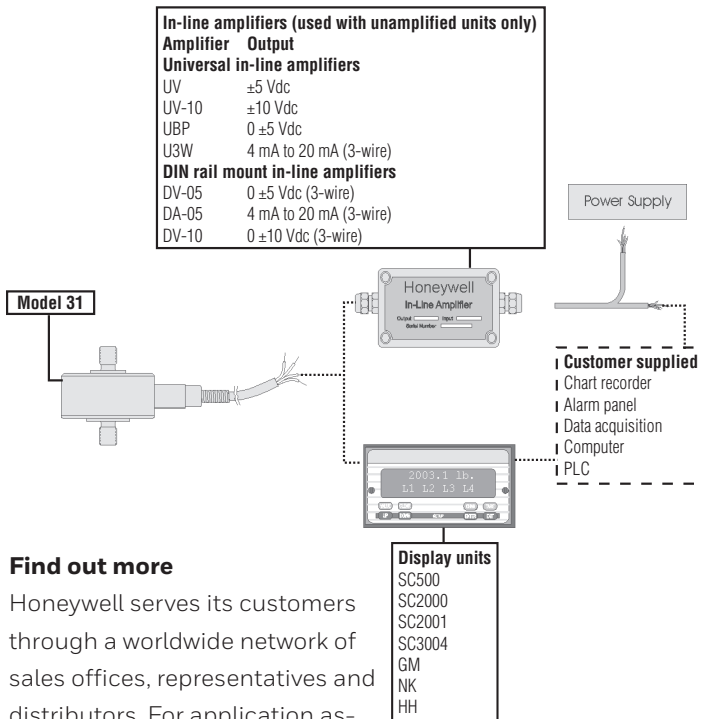
Figure 3. Product Nomenclature

	<b>AL311</b>	<b>MH</b>	<b>1A</b>	<b>2U</b>	<b>6AM</b>		<b>15C</b>		<b>32B</b>		
	Load Type	Range	Temperature Compensation	Internal Amplifiers	Electrical Termination	Additional Point Calibration	Electrical Conn. Orientation	Special Calibration <sup>3</sup>	Mounting Threads <sup>6</sup>	Calibration Memory <sup>7</sup>	
<b>Model 31 Mid</b> Precision Miniature Load Cell	<b>MH</b>	10 Newton	<b>1A</b> 15 °C to 71 °C [60 °F to 160 °F]	<b>2U</b> Unamplified, mV/V output	<b>6AM</b> Teflon*, Integral cable with balance module	Standard 5-point calibration (None)	<b>15C</b> Radial exit	Tension only (none)	UN thread (none)	No storage (none)	
	<b>MI</b>	20 Newton	<b>1C</b> -18 °C to 85 °C [0 °F to 185 °F]		<b>6E</b> Teflon*, Integral cable	<b>9A</b> 10-point calibration		<b>30A</b> Compression only (+)	<b>32B</b> M4 x 0.7	<b>53S</b> Phoenix connector with Signature Calibration Module	
	<b>MK</b>	50 Newton	<b>1H</b> 21 °C to 204 °C [70 °F to 400 °F]		<b>6I</b> Integral under-water cable, 3 m [10 ft]			<b>30B</b> Tension (+) and Compression (-)	<b>32C</b> M5 x 0.8	<b>53T</b> TEDS IEEEE 1451.4 module	
	<b>ML</b>	100 Newton						<b>30D</b> Tension (-) and Compression (+)	<b>32D</b> M6 x 1		
	<b>MM</b>	200 Newton									
	<b>MY</b>	500 Newton									
	<b>MN</b>	1000 Newton									
	<b>MO</b>	2000 Newton									
	<b>MQ</b>	5000 Newton									
	<b>AR</b>	1000 g									
	<b>AT</b>	5 lb									
	<b>AV</b>	10 lb									
	<b>BL</b>	25 lb									
	<b>BN</b>	50 lb									
	<b>BR</b>	100 lb									
	<b>CN</b>	250 lb									
	<b>CR</b>	500 lb									
<b>CV</b>	1000 lb										

**NOTES**

1. Allowable maximum loads - maximum load to be applied without damage.<sup>2</sup>
2. Without damage - loading to this level will not cause excessive zero shift or performance degradation. The user must consider fatigue life or long term use and structural integrity. All structurally critical applications (overhead loading, etc.) should always be designed with safety redundant load paths.
3. Standard calibration for tension/compression load cells is in tension only.
4. Consult factory for extended operation above 125 °C [257 °F].
5. Option 6i may increase the load cell height and/or diameter. Consult factory.
6. See Figures 1 and 2 to match the mounting interface option with the range code.
7. Maximum operating temperature for options 53s and 53t is 85 °C [185 °F].
8. TEDS IEEE 1451.4 module installed at end of cable.

**Figure 4. Typical System Diagram**



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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.**

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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.

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9680 Old Bailes Road  
Fort Mill, SC 29707  
[honeywell.com](http://honeywell.com)

