

# User Manual

## Load Cells



# User Manual

## Load Cells

**Model 329**

**Model 332**

**Model 338**

**Model 343**

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# 1.0 Introduction

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## 1.1 Warranty

This instrument is warranted against defects in workmanship, material and design for two (2) years from date of delivery to the extent that AMETEK will, at its sole option, repair or replace the instrument or any part thereof which is defective, provided, however, that this warranty shall not apply to instruments subjected to tampering or, abuse, or exposed to highly corrosive conditions.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES WHETHER EXPRESS OR IMPLIED AND AMETEK HEREBY DISCLAIMS ALL OTHER WARRANTIES, INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY. AMETEK SHALL NOT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING, BUT NOT LIMITED TO, ANY ANTICIPATED OR LOST PROFITS.

This warranty is voidable if the purchaser fails to follow any and all instructions, warnings or cautions in the instrument's User Manual.

If a manufacturing defect is found, AMETEK will replace or repair the instrument or replace any defective part thereof without charge; however, AMETEK's obligation hereunder does not include the cost of transportation, which must be borne by the customer. AMETEK assumes no responsibility for damage in transit, and any claims for such damage should be presented to the carrier by the purchaser.

### Technical assistance

Please contact the distributor from whom you acquired the instrument if you require technical assistance.

## 1.2 Safety symbols

This manual contains a number of safety symbols designed to draw your attention to instructions, which must be followed when using the instrument, as well as any risks involved.



### Warning

Conditions and actions that may compromise the safe use of the instrument and result in considerable personal or material damage.



### Caution...

Conditions and actions that may compromise the safe use of the instrument and result in slight personal or material damage.



### Note...

Special situations, which demand the user's attention.

## 2.0 Models and technical specifications

### 2.1 Type of measuring task

Occasional force checking :	Models 329 and 343
Occasional force checking and permanent installation :	Model 338
Permanent installation :	Model 332

### 2.2 Model 329 – Load button

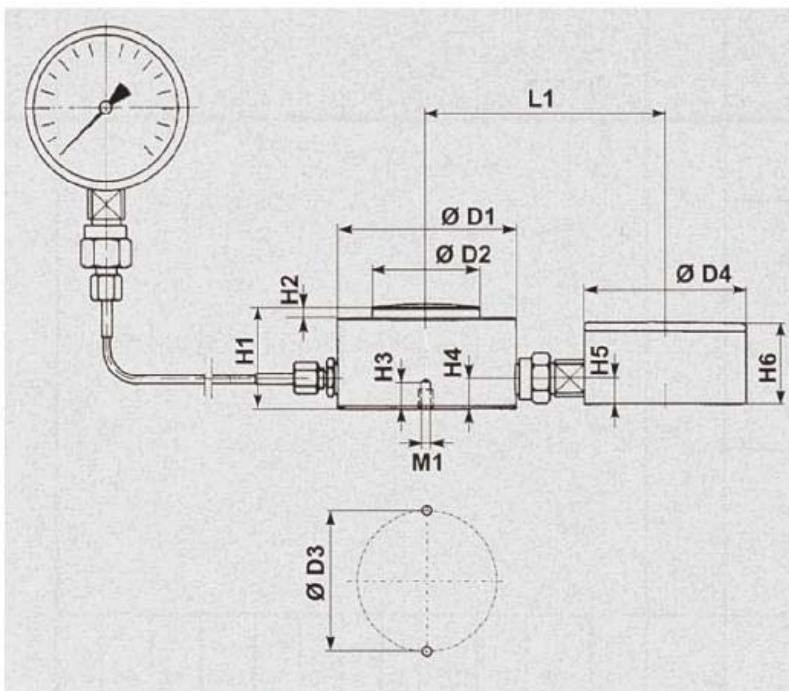


The load cell is particularly compact in height and this makes it very versatile. This particular instrument has been designed primarily for occasional force checks, for example for setting or service work, rather than continuous loading. The display units in 63 mm diameter size have a maximum reading pointer.

Available as:

- **A - version**  
Load cell with attached display unit, without any accessories or options
- **B - version**  
Load cell with accessories or options

#### DIMENSIONS (mm – see schedule)



## TECHNICAL SPECIFICATIONS

Model	Size	Nominal value	High-pressure hose (m)	Capillary tube (m)	Weight (kg)	Dimensions (mm)													
						øD1	øD2	øD3	øD4	H1	H2	H3	H4	H5	H6	L1	M1		
329- 250 N	0	250 N	-	-	1,0	75	~34	55	63	30	3	10	14	12,5	32	77	M6		
329- 400 N		400 N		0,5															
329- 630 N		630 N																	
329 - 1 kN		1 kN																	
329 - 1,6 kN		1,6 kN																	
329 - 2,5 kN		2,5 kN		1															
329 - 4 kN		4 kN																	
329 - 6,3 kN		6,3 kN																	
329 - 10 kN		10 kN	1	2,5															
329 - 16 kN		16 kN																	
329 - 25 kN		25 kN																	
329 - 40 kN		40 kN																	
329 - 40 kN		40 kN																	
329 - 63 kN	63 kN	1			2,5														
329 - 100 kN	100 kN																		
329 - 100 kN	100 kN																		
329 - 160 kN	II	160 kN	1	2,5	5,3	145	~112,5	130	63	38	4	10	16	12,5	32	111	M8		
329 - 250 kN		250 kN																	
329 - 400 kN		400 kN																	
329 - 400 kN		400 kN																1	2,5
329 - 400 kN		400 kN																	
329 - 630 kN		630 kN																	

Number of borings: 2 parts each displaced by 180°

Version "B" (e.g. High-pressure hose, capillary tube, borings etc.) on request.

### 2.3 Model 332 – Load button

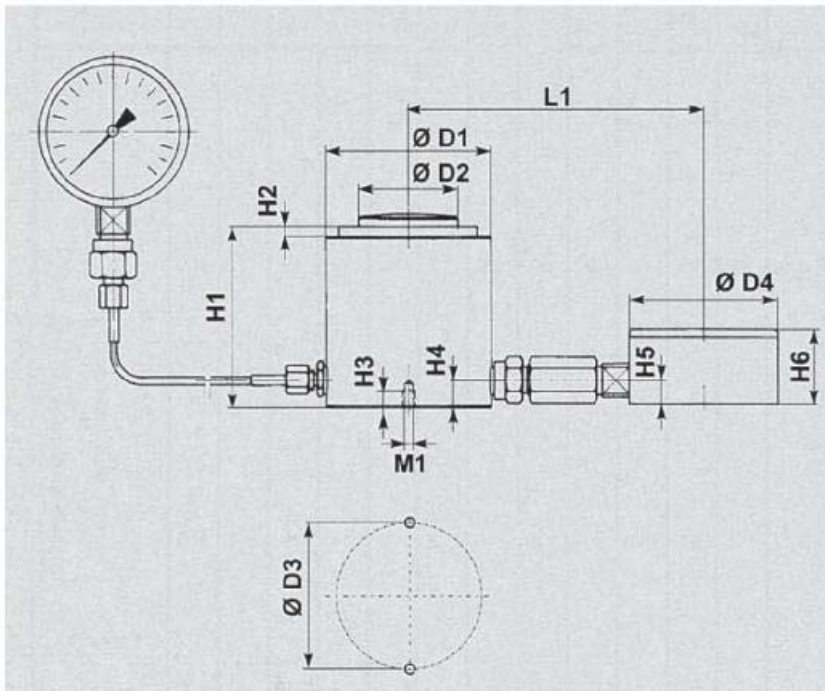


The high quality load cell model 332, is intended for permanent fitting into machines and installations of all kinds. The load cell is supplied with a precise pressure gauge 100 mm nominal diameter with zero point correction. A wide range of accessories are available to cover most applications.

Available as:

- **A - version**  
Load cell with directly attached display unit, without any kind of accessories or options
- **B - version**  
Load cell with accessories or options

**DIMENSIONS (mm – see schedule)**



**TECHNICAL SPECIFICATIONS**

Model	Size	Nominal value	High-pressure hose (m)	Capillary tube (m)	Weight (kg)	Dimensions (mm)											
						øD1	øD2	øD3	øD4	H1	H2	H3	H4	H5	H6	L1	M1
332 - 1 kN	I	1 kN	0,63	1	2	65	40	48	100	80	6,5	10	16	15	49	172	M6
332 - 1,6 kN		1,6 kN															
332 - 2,5 kN		2,5 kN															
332 - 4 kN		4 kN															
332 - 6,3 kN		6,3 kN															
332 - 10 kN		10 kN	1,5	4													
332 - 16 kN		16 kN															
332 - 25 kN		25 kN	5	10													
332 - 40 kN		40 kN															
332 - 63 kN		63 kN															
332 - 100 kN	100 kN																
332 - 100 kN	II	100 kN	5	10	9	110	66	50	100	128	9	12	18	15	49	195	M8
332 - 160 kN		160 kN															
332 - 250 kN		250 kN															
332 - 400 kN		400 kN	-														
332 - 250 kN	III	250 kN	5	10	30	175	103	170	100	157	12	15	18	15	49	228	M12
332 - 400 kN		400 kN															
332 - 630 kN		630 kN															
332 - 1 MN		1 MN	-														

Number of borings: 2 parts each displaced by 180°

Version "B" (e.g. High-pressure hose, capillary tube, borings etc.) on request.

## 2.4 Model 338 – Load button

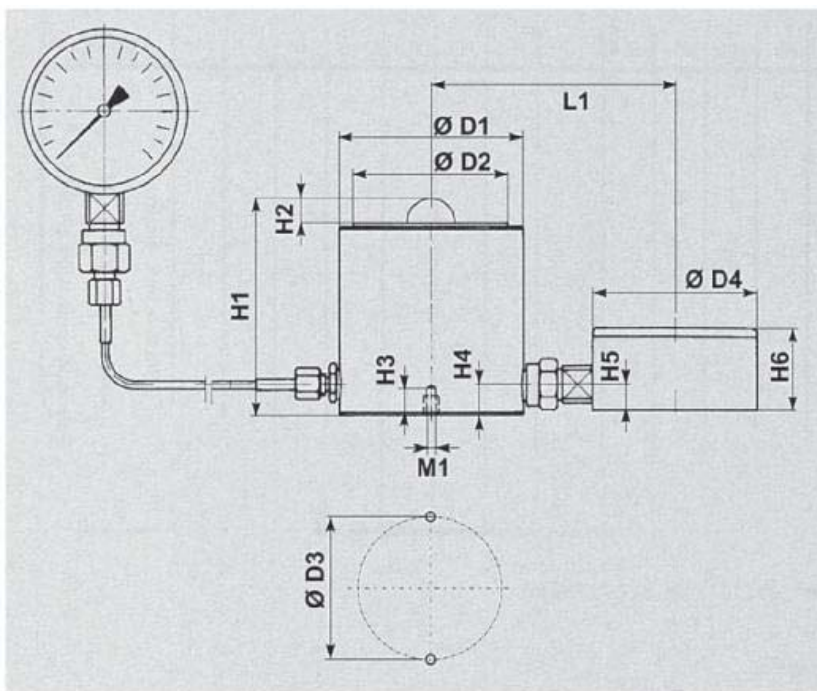


Load cell model 338 is designed both for occasional force checking and for permanent installation. The robust construction is suitable for rough operating conditions on machines and installations. The standard instrument is fitted with a 63 mm diameter gauge with maximum reading pointer.

Available as:

- **A - version**  
Load cell with attached display unit, without any accessories or options
- **B - version**  
Load cell with accessories or options

### DIMENSIONS (mm – see schedule)



### TECHNICAL SPECIFICATIONS

Model	Nominal value	High-pressure hose (m)	Capillary tube (m)	Weight (kg)	Dimensions (mm)											
					øD1	øD2	øD3	øD4	H1	H2	H3	H4	H5	H6	L1	M1
338 - 400 N	250 N	-	-	1,6	70	58	55	63	59,5	9,5	14	14	12,5	32	80	M6
338 – 630 N	400 N															
338 – 1 kN	1 kN															
338 - 1,6 kN	1,6 kN	0,63	1													
338 - 2,5 kN	2,5 kN															
338 - 4 kN	4 kN															
338 - 6,3 kN	6,3 kN	1,5	4													
338 - 10 kN	10 kN															
338 - 16 kN	16 kN															
338 - 25 kN	25 kN	5	10													
338 - 40 kN	40 kN															
338 - 63 kN	63 kN															

Number of borings: 2 parts each displaced by 180°

Version "B" (e.g. High-pressure hose, capillary tube, borings etc.) on request.



## 2.5 Model 343 – Thru hole

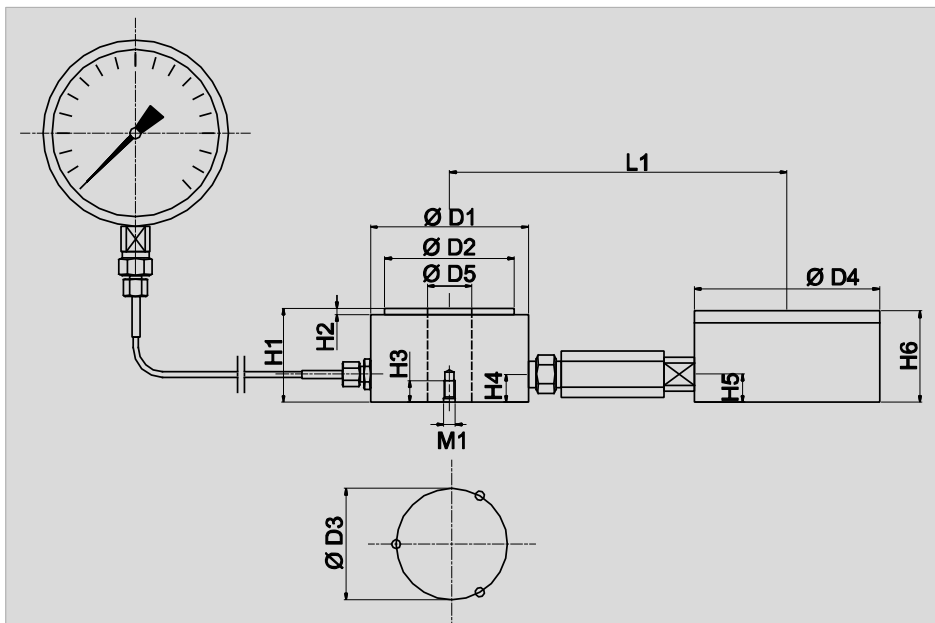


Model 343, can be used wherever there is a need to fit a link through the body of the load cell. The instrument is particularly suitable for continuous measurement of axial forces for example on anchoring devices, and to monitor bearing forces that arise on lathes, boring machines, extrusion presses etc. If suitable suspension links or housings are used this load cell can also be employed to measure tension. Loads must be purely along the axis of the load cell and without torque, but for cases where it is not assured in the first instance, hinged coupling links can be provided as an option.

Available as:

- **A - version**  
Load cell with attached display unit, without any accessories or options
- **B - version**  
Load cell with accessories or options

### DIMENSIONS (mm – see schedule)



## TECHNICAL SPECIFICATIONS

Model	Size	Nominal Value	High-pressure hose (m)	Capillary tube (m)	Weight (kg)	Dimensions (mm)																											
						øD1	øD2	øD3	øD4	øD5	H1	H2	H3	H4	H5	H6	L1	M1															
343 - 1,0 kN	I	1,0 kN	0,63	1	1,9	85	70	60	100	24	50	3	12	18	15	49	182	M8															
343 - 1,6 kN		1,6 kN																															
343 - 2,5 kN		2,5 kN																															
343 - 4 kN		4,0 kN	1,5	4																													
343 - 6,3 kN		6,3 kN																															
343 - 10 kN		10,0 kN																															
343 - 16 kN		16,0 kN	5	10																													
343 - 25 kN		25,0 kN																															
343 - 40 kN		40,0 kN																															
343 - 63 kN		63,0 kN																															
343 - 100 kN		100,0 kN																															
343 - 160 kN		160,0 kN																															
343 - 4 kN		II	4,0 kN	0,63															1	4,2	120	108	85	100	40	55	3	15	18	15	49	200	M10
343 - 6,3 kN	6,3 kN																																
343 - 10 kN	10,0 kN																																
343 - 16 kN	16,0 kN		1,5	4																													
343 - 25 kN	25,0 kN																																
343 - 40 kN	40,0 kN																																
343 - 63 kN	63,0 kN		5	10																													
343 - 100 kN	100,0 kN																																
343 - 160 kN	160,0 kN																																
343 - 250 kN	250,0 kN																																
343 - 400 kN	400,0 kN																																
343 - 10 kN	III				10,0 kN	0,63	1	15,6	190	172	150	100	68	65	3	18	22	15	49														
343 - 16 kN			16,0 kN																														
343 - 25 kN		25,0 kN																															
343 - 40 kN		40,0 kN	1,5	4																													
343 - 63 kN		63,0 kN																															
343 - 100 kN		100,0 kN																															
343 - 160 kN		160,0 kN	5	10																													
343 - 250 kN		250,0 kN																															
343 - 400 kN		400,0 kN																															
343 - 630 kN		630,0 kN																															
343 - 1 MN		1,0 MN																															
343 - 25 kN		25,0 kN			0,63	1	29,0													300	278	150	100	120	65	3	18	22	15	49	290	M16	
343 - 40 kN		40,0 kN																															
343 - 63 kN	63,0 kN																																
343 - 100 kN	100,0 kN	1,5	4																														
343 - 160 kN	160,0 kN																																
343 - 250 kN	250,0 kN																																
343 - 400 kN	400,0 kN	5	10																														
343 - 630 kN	630,0 kN																																
343 - 1 MN	1,0 MN																																
343 - 1,6 MN	1,6 MN																																

Number of borings: Options, 3 parts, each displaced by 120°

## 3.0 Selecting and operating the load cell

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All load cells are made from stainless steel and fitted with hermetically sealed cavities filled with hydraulic oil.

The cell uses a conventional piston and cylinder arrangement. Mechanical stops are placed to prevent over strain of the diaphragm inside the cell when the loads exceed certain limits.

The load cell is filled with oil. When the load is applied on the piston, the movement of the piston and the diaphragm results in an increase of oil pressure that in turn produces a change in the pressure on a Bourdon tube connected with the load cells.

Because this sensor has no electrical components, it is ideal for use in hazardous areas.

By example, a hydraulic load cell is immune to transient voltages (lightning) so these types of load cells can be a more effective device in outdoor environments.

### 3.1 Load cell capacity

In order to reach the best performance of the measuring system it is very important to select a load cell with the correct capacity.

The following guidelines should be considered when selecting a load cell for a specific task:

- All load cells selected must be of the same capacity.
- Estimate the dead weight, including all piping, pumps, agitators, insulation and heating fluid of the installation or device to be measured.
- Add the max. live weight or force of the product to be measured to the dead weight. This is the gross weight or force of the installation/device and contents.
- Divide the gross weight by the number of legs or support points. This is the nominal weight which will be carried by each load cell.
- Select a load cell with a capacity somewhat greater than the nominal weight. The following should be considered when determining how much greater the load cell capacity should be:
  - Is your dead weight accurate?
  - Will the load be evenly distributed on all cells?
  - Is the installation/machine fitted with an agitator or subjected to shock loading?
  - Is overload a risk and what excess force capacity should be added to compensate?
  - Will the installation/device be subjected to wind or seismic loading?

## 3.2 Operating the load cell



### Warning

Misuse of the load cell might cause major safety problems.



### Caution...

- Be careful not to apply excessive pressure on or mount anything in contact of the diaphragm area.
- Load must be applied uniformly on entire loading surface (Thru hole only)
- Any tampering or removal of covering, cable and/or connector will void warranty.

### 3.2.1. Mounting guideline

1. Make sure that the load cell is placed on a flat and even surface.		
2. Maintain a clean surface at all times.		
3a. The support fixture should contact the largest surface possible.		
3b. The support fixture must contact the lower outer ring only (Thru hole only)		
4. Side load may damage the sensor.		
5. The load fixture must contact the top inner ring only (Thru hole only).		
6. The load fixture should be applied in line.		
7. The load fixture should be applied on the centre of the button (Load button only).		

## 4.0 Inspection of the load cell

Periodically the load cell should be inspected for potential load cell problems.

The operator should look for :

- rust
- corrosion
- oxidation
- metal distortion
- cracks
- metal rippling
- cracks in the weld
- abrasions in the metal
- metal fatigue

If any of the above problems is detected the load cell must be removed from the installation and replaced.



### Note...

Please contact the distributor from whom you acquired the instrument if you require technical assistance or if you need to purchase a new load cell.

## 4.1 Maintenance



### Caution...

The load cell model 343 Size 4, 1.6MN is produced of a very hard metal material – 42CroMo4V -which has been selected to give the product high quality and long-term stability.

In order to maintain this high quality and stability it is very important that the surface of the load cell is coated with a thin layer of oil after use.

Recommended oil type : CRC SP 400II (AMETEK spare part no. 130268).

This is to prevent corrosion of the surface.

If needed, the surface can be polished with plastic wool before coating.



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