

## ABL400 Cantilever Load Cell Roller

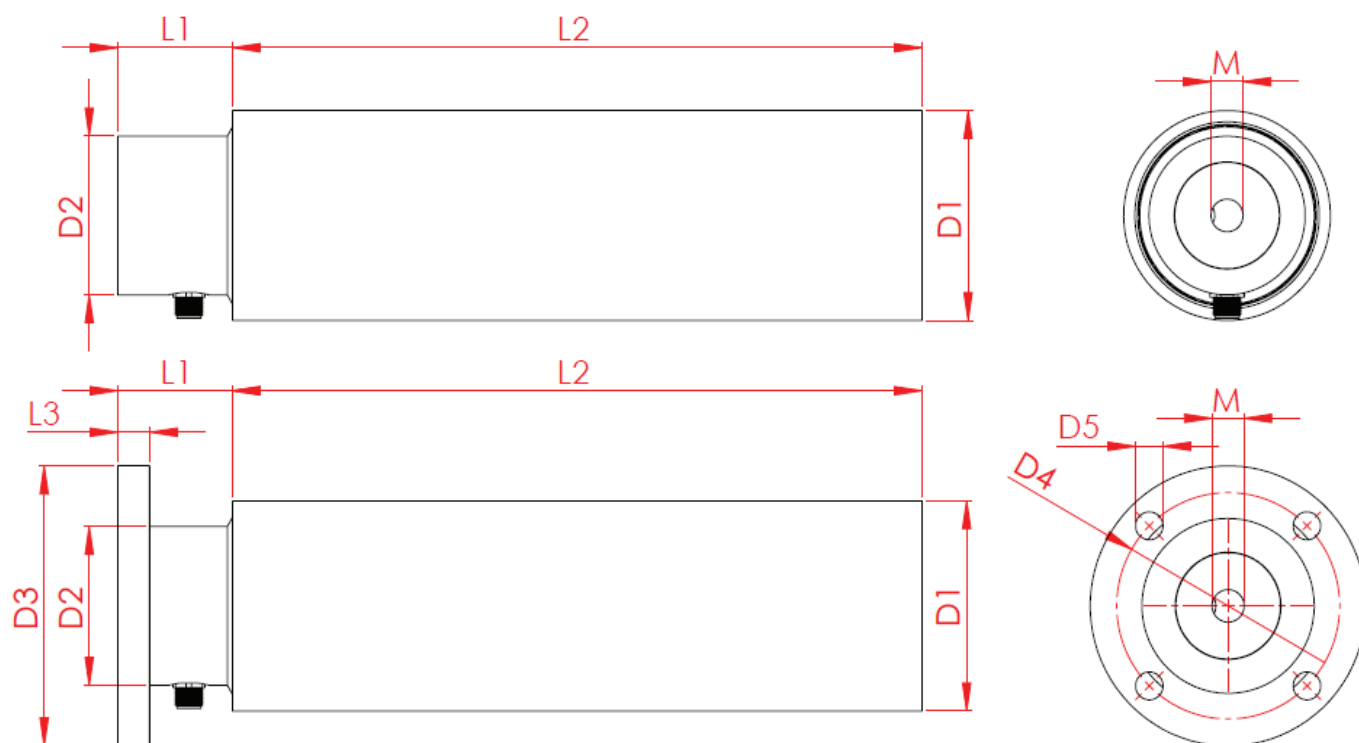


The BST Cantilever Load Cell Roller has two dual beams placed in each end of the roller and is designed to mount on the side of a machine frame or bracket. The dual load cell beam design reduces load cell deflection compared to traditional load cell designs. Lower deflection means fewer tracking and steering problems on your machine and greater accuracy in the control. The total tension reading is always accurate across the face of the roller, so once the load cell is calibrated, you can align the web anywhere along the face of the roller and the cantilevered load cell will accurately measure tension.

### **Advantages**

- Compact design easy to install
- Dual beam giving lowest possible deflection
- Choose between Semiconductor or Foil strain gauge
- Industry standard M12x1 connector. With turntable socket for L-plug
- Stud mount and flange mount standard versions
- Connector position available in 4 different positions relative to the load direction
- Overload ratings typical 200 – 500%
- As standard available in 50mm, 80mm, 90mm, 100mm and 120mm roller diameter
- Custom load cells and rollers made to your application

## Metric dimensions for ABL400 Cantilever Load Cell Roller



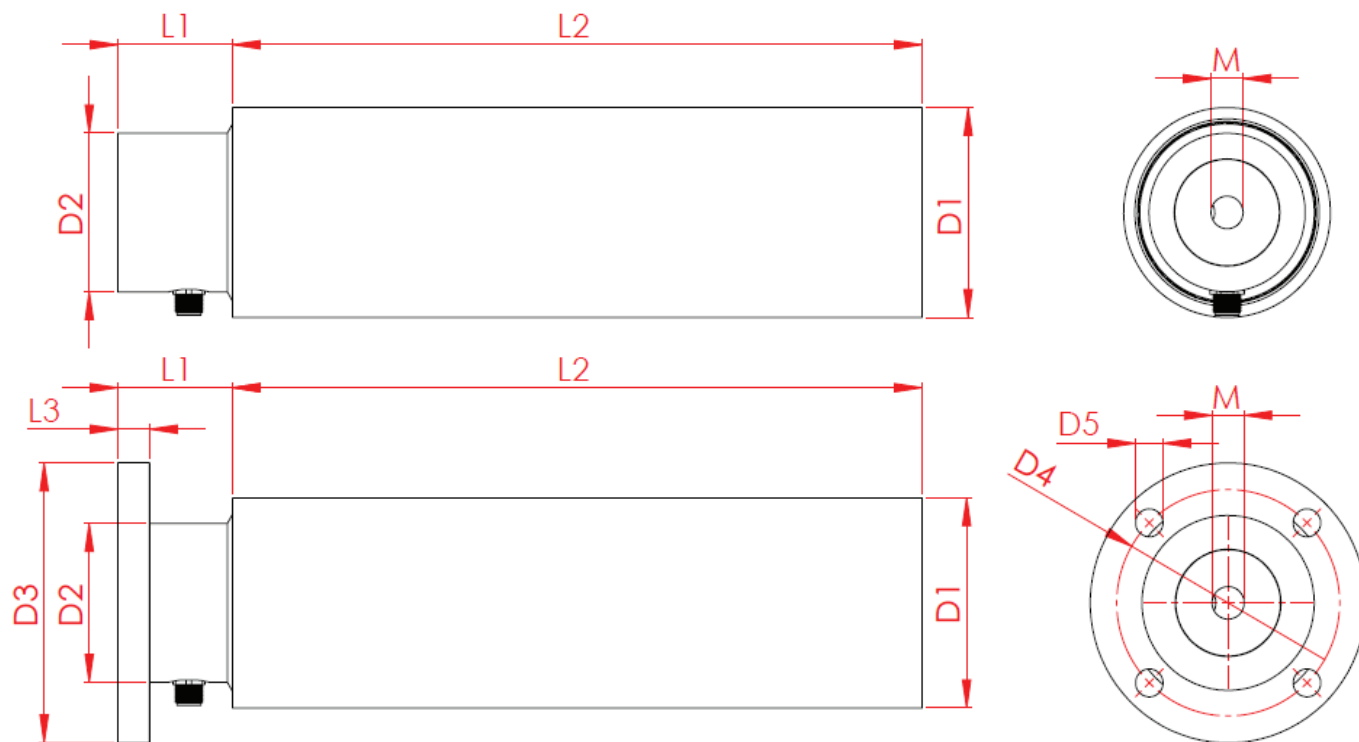
| Dimensions mm |    |     |     |     |     |    |    |           |    |          |
|---------------|----|-----|-----|-----|-----|----|----|-----------|----|----------|
| Type          |    | D1  | D2  | D3  | D4  | D5 | L1 | L2        | L3 | M        |
| ABL4050/ F    | mm | 50  | 45  | 74  | 58  | 7  | 40 | See below | 8  | M10 x 15 |
| ABL4080/ F    | mm | 80  | 68  | 120 | 97  | 12 | 50 | See below | 14 | M16 x 20 |
| ABL4090/ F    | mm | 90  | 68  | 120 | 97  | 12 | 50 | See below | 14 | M16 x 20 |
| ABL4100/ F    | mm | 100 | 68  | 120 | 97  | 12 | 50 | See below | 14 | M16 x 20 |
| ABL4120/ F    | mm | 120 | 110 | 164 | 138 | 14 | 60 | See below | 20 | M20 x 30 |

| Type       | L2 = standard length available in mm |     |     |     |     |     |     |     |     |     |     |     |     |       |
|------------|--------------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| ABL4050/ F | mm                                   | 150 | 200 | 250 | 300 | 350 | 400 |     |     |     |     |     |     |       |
| ABL4080/ F | mm                                   | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 |     |     |     |     |       |
| ABL4090/ F | mm                                   | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 |     |     |     |     |       |
| ABL4100/ F | mm                                   | 150 | 200 | 250 | 300 | 350 | 400 | 450 | 500 |     |     |     |     |       |
| ABL4120/ F | mm                                   |     |     |     | 300 |     | 400 |     | 500 | 600 | 700 | 800 | 900 | 1.000 |

Other dimensions available on request

| Load rating N |   |    |     |     |     |       |                                        |
|---------------|---|----|-----|-----|-----|-------|----------------------------------------|
| ABL4050/ F    | N | 50 | 125 | 250 |     |       | Roller > 300 mm = max load rating 125N |
| ABL4080/ F    | N |    | 125 | 250 | 500 | 1.000 | Roller > 400 mm = max load rating 500N |
| ABL4090/ F    | N |    | 125 | 250 | 500 | 1.000 | Roller > 400 mm = max load rating 500N |
| ABL4100/ F    | N |    | 125 | 250 | 500 | 1.000 | Roller > 400 mm = max load rating 500N |
| ABL4120/ F    | N |    |     | 250 | 500 | 1.000 | Roller > 800 mm = max load rating 500N |

## Imperial dimensions for ABL400 Cantilever Load Cell Roller



| Dimensions in Inches |    |      |      |      |      |      |      |           |      |            |
|----------------------|----|------|------|------|------|------|------|-----------|------|------------|
| Type                 |    | D1   | D2   | D3   | D4   | D5   | L1   | L2        | L3   | M          |
| ABL4050/ F           | in | 1.97 | 1.77 | 2.91 | 2.28 | 0.28 | 1.57 | See below | 0.31 | M10 x 0.59 |
| ABL4080/ F           | in | 3.15 | 2.68 | 4.72 | 3.82 | 0.47 | 1.97 | See below | 0.55 | M16 x 0.79 |
| ABL4090/ F           | in | 3.45 | 2.68 | 4.72 | 3.82 | 0.47 | 1.97 | See below | 0.55 | M16 x 0.79 |
| ABL4100/ F           | in | 3.94 | 2.68 | 4.72 | 3.82 | 0.47 | 1.97 | See below | 0.55 | M16 x 0.79 |
| ABL4120/ F           | in | 4.72 | 4.33 | 6.46 | 5.43 | 0.55 | 2.36 | See below | 0.79 | M20 x 1.18 |

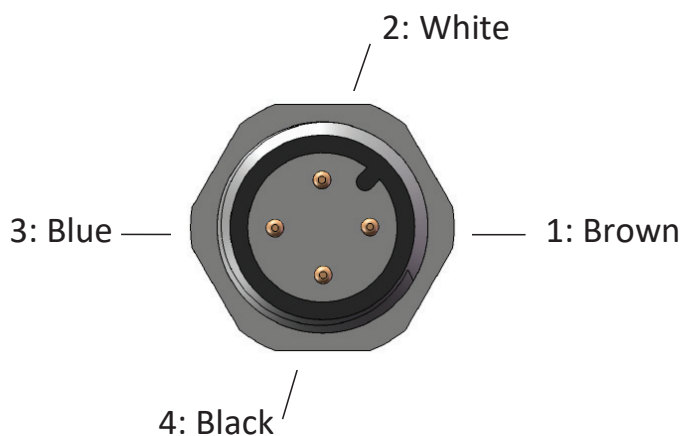
| Type       | L2 = standard length available in Inches |      |      |      |       |       |       |       |       |       |       |       |       |       |
|------------|------------------------------------------|------|------|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| ABL4050/ F | in                                       | 5.90 | 7.87 | 9.84 | 11.81 | 13.80 | 15.75 |       |       |       |       |       |       |       |
| ABL4080/ F | in                                       | 5.90 | 7.87 | 9.84 | 11.81 | 13.80 | 15.75 | 17.72 | 19.70 |       |       |       |       |       |
| ABL4090/ F | in                                       | 5.90 | 7.87 | 9.84 | 11.81 | 13.80 | 15.75 | 17.72 | 19.70 |       |       |       |       |       |
| ABL4100/ F | in                                       | 5.90 | 7.87 | 9.84 | 11.81 | 13.80 | 15.75 | 17.72 | 19.70 |       |       |       |       |       |
| ABL4120/ F | in                                       |      |      |      | 11.81 |       | 15.75 |       | 19.70 | 23.62 | 27.56 | 31.50 | 39.73 | 35.43 |

Other dimensions available on request

|            | Load rating in Lbs. |    |    |    |     |     |                                             |
|------------|---------------------|----|----|----|-----|-----|---------------------------------------------|
| ABL4050/ F | Lbs                 | 11 | 28 | 56 |     |     | Roller > 11.81 in = max load rating 28 Lbs  |
| ABL4080/ F | Lbs                 |    | 28 | 56 | 112 | 225 | Roller > 15.75 in = max load rating 112 Lbs |
| ABL4090/ F | Lbs                 |    | 28 | 56 | 112 | 225 | Roller > 15.75 in = max load rating 112 Lbs |
| ABL4100/ F | Lbs                 |    | 28 | 56 | 112 | 225 | Roller > 15.75 in = max load rating 112 Lbs |
| ABL4120/ F | Lbs                 |    |    | 56 | 112 | 225 | Roller > 31.50 in = max load rating 112 Lbs |

## Electrical connector:

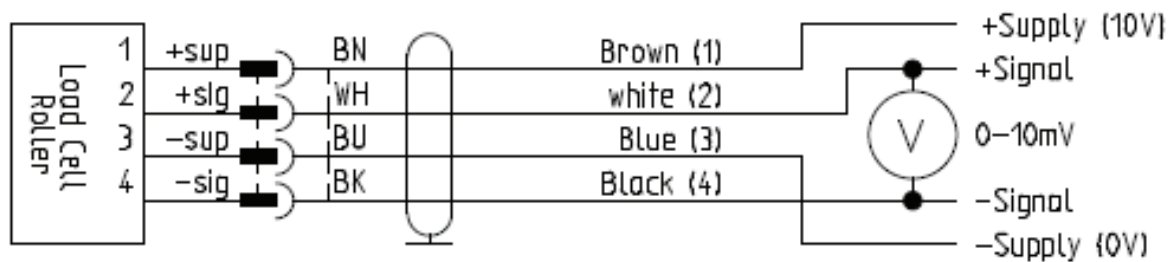
- M12 - 4 pin male, Code A, IEC61076-2-101



### Half bridge wiring diagram:



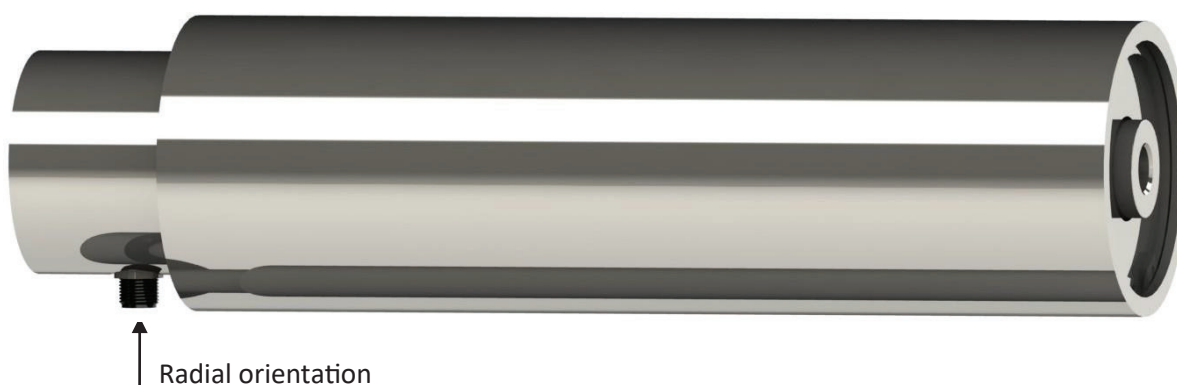
### Full bridge wiring diagram:



## Connector orientation and position:

All ABL400 series Load Cells come with an M12x1 standard connector. The connector position is always radial oriented, but available in different positions and if not mentioned on order the following standards will be used tension.

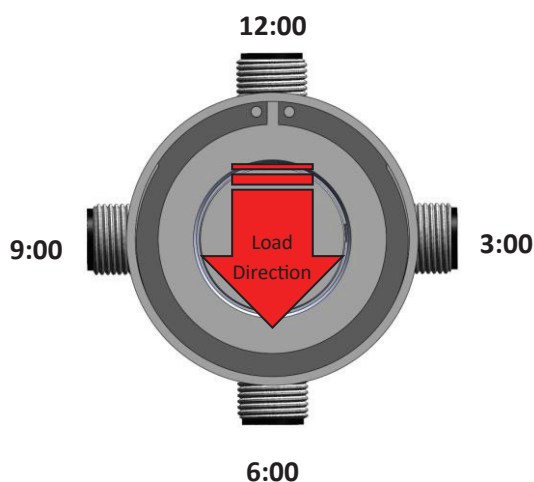
### Connector orientation:



### Connector position and load direction:

For the radial oriented connector there are 4 possible mounting positions named as 3:00 o'clock, 6:00 o'clock, 9:00 o'clock and 12:00 o'clock, please see illustration.

As standard the Load Cells come with the 6:00 o'clock connector position and load direction will be the same. The actual load direction is always shown on the label. Any other connector position has to be specified on order.



## Calculating the force sizing for ABL400 LoadCell:

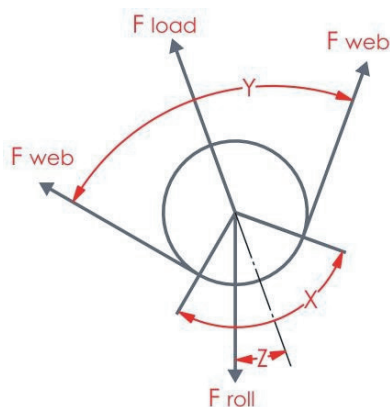
The correct Load Cell load rating for an application is determined by maximum web tension, web wrap angle around the roller, and mass of the roll.

The force  $F_{(roll)}$  from the mass  $m_{(roll)}$  of the roll, is determined as  $F_{(roll)} = m_{(roll)} \times 9.82 \text{ (N)}$

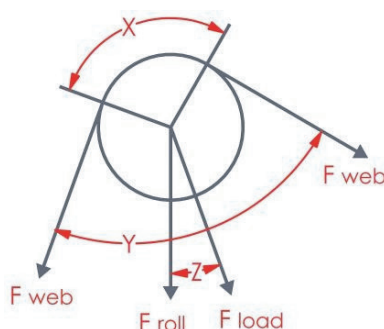
The force  $F_{(Load)}$ , from the web tension  $F_{(web)}$ , is determined as  $F_{(Load)} = 2 \times F_{(web)} \times \sin(X/2)$

To determine the load cell size the 2 forces must be added together

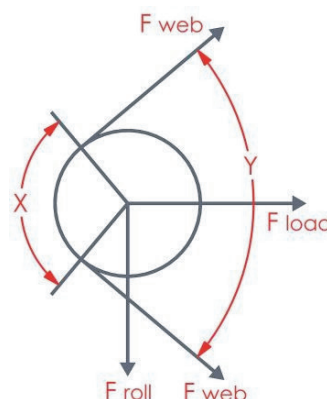
**Load direction upwards:**



**Load direction downwards:**



**Load direction Sideways:**



$$((\frac{1}{2} \times F_{(Load)} \times 1,5) - (\frac{1}{2} F_{(roll)} \times \cos(Z)))$$

$$((\frac{1}{2} \times F_{(Load)} \times 1,5) + (\frac{1}{2} F_{(roll)} \times \cos(Z)))$$

$$(\frac{1}{2} \times F_{(Load)} \times 1,5)$$

**Note: The minimum load cell size has to be  $> \frac{1}{2} \times F_{(roll)}$  and 1,5 = safety factor**

$m_{(roll)}$  = The mass of the roller in kg,  $F_{(web)}$  = Maximum web tension,  $Z$  = Angle between  $F_{(Load)}$  and vertical,  $X$  = Web wrap angle =  $180^\circ - Y^\circ$

| Roller weight |     | Aluminum    | Stainless Steel |  |
|---------------|-----|-------------|-----------------|--|
| ABL4050/ F    | Kg  | 0,012 kg/cm | 0,034 kg/cm     |  |
|               | Lbs | 0.068 lb/in | 0.190 lb/in     |  |
| ABL4080/ F    | Kg  | 0,032 kg/cm | 0,076 kg/cm     |  |
|               | Lbs | 0.179 lb/in | 0.425 lb/in     |  |
| ABL4090/ F    | Kg  | 0,053 kg/cm | 0,106 kg/cm     |  |
|               | Lbs | 0.297 lb/in | 0.596 lb/in     |  |
| ABL4100/ F    | Kg  | 0,061 kg/cm | 0,120 kg/cm     |  |
|               | Lbs | 0.341 lb/in | 0.672 lb/in     |  |
| ABL4120/ F    | Kg  | 0,073 Kg/cm | 0,130 kg/cm     |  |
|               | Lbs | 0.409 lb/in | 0.728 lb/in     |  |

### Specifications half bridge:

Max operating force relative to  $F_n$ .....150%  
 Force limit relative to  $F_n$ .....200%  
 Strain gauge resistance.....80 to 120 ohm  
 Strain gauge configuration.....half bridge  
 Supply.....5VDC  
 Nominal output.....50mV/V  
 Combined error relative to  $F_n$ .....< 0.5%  
 Temperature coefficient.....<0.4% / 10K  
 Operating temperature range.....(-4 to 185°F) -20 to +85°C  
 Deflection at  $F_n$ .....(< 0.0039") < 0.1 mm

### Specifications full bridge:

.....150%  
 .....200%  
 Foil gauge resistance.....350 ohm  
 Foil gauge configuration.....full bridge  
 .....10 VDC  
 .....1mV/V  
 .....< 0.5%  
 .....<0.4% / 10K  
 .....(-4 to 185°F) -20 to +85°C  
 .....(< 0.0039") < 0.1 mm