The MAGPOWR CSR series is a cantilevered tension sensing roller that uses tension sensors embedded in the roller to provide a signal proportional to tension in any unwind, rewind or intermediate web processing application.

When installed in place of a standard machine idler roller, the CSR tension sensing roller delivers precise web tension measurement with low temperature drift due to a full Wheatstone bridge construction on each load cell inside the roller.

The CSR has a built-in amplifier and is available with or without an integrated display in the end of the roll. It is also available with or without an integrated RPM sensor.

### GENERAL SPECIFICATIONS

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product Name</strong></td>
<td>CSR Cantilevered Tension Sensing Roller</td>
</tr>
<tr>
<td><strong>Gage Resistance</strong></td>
<td>350 ohms nominal</td>
</tr>
<tr>
<td><strong>Excitation Voltage</strong></td>
<td>10 VDC maximum</td>
</tr>
<tr>
<td><strong>Output Signal</strong></td>
<td>2.1 mV/V, 21 mVDC maximum</td>
</tr>
<tr>
<td><strong>Deflection at Full Load</strong></td>
<td>0.15 mm to 0.17 mm (0.005 to 0.007 inch)</td>
</tr>
<tr>
<td><strong>Climate Class</strong></td>
<td>3K3 (EN60721)</td>
</tr>
<tr>
<td><strong>Certifications</strong></td>
<td>CE (EN61326–1)</td>
</tr>
<tr>
<td><strong>IP</strong></td>
<td>54</td>
</tr>
<tr>
<td><strong>Mating Cable</strong></td>
<td>CSRBL series with straight connector</td>
</tr>
<tr>
<td><strong>RPM Pulse Output Switch</strong></td>
<td>2 Pulses per revolution</td>
</tr>
<tr>
<td><strong>Load Ratings</strong></td>
<td>50, 100, 250, 500, 750, 1000, 2200 Newtons (11, 23, 56, 112, 169, 225, 495 pounds)</td>
</tr>
</tbody>
</table>

### KEY FEATURES

- Fast and easy installation
- Optional readout in end of roll
- Optional integrated RPM sensor
- Flange and stud mount
- Flange mount with through frame pigtail
- Several diameters available between 80 and 152 mm (3.15 to 6 inches)
- Roller materials in Aluminum, Steel and Stainless Steel
- Seven load ratings
- Lengths from 250 to 1000 mm (9.9 to 39.4 inches)
- Force measurement in positive or negative direction
- Optional integrated display offers display of actual tension on end of roller, weightless load cell calibration, 0 to 10 VDC output, digital filter of output and re-zero button
- Five times overload protection in both force directions
- Works as a stand-alone unit or with any MAGPOWR tension amplifier or tension control
Dimensions shown in mm (inches)

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>J</th>
</tr>
</thead>
<tbody>
<tr>
<td>80 (3.150)</td>
<td>53 (2.087)</td>
<td>37 (1.457)</td>
<td>12 (0.472)</td>
<td>130 (5.118)</td>
<td>110 (4.331)</td>
<td>10 (0.394)</td>
<td>85 (3.346)</td>
<td>M12, 30 DEEP</td>
</tr>
<tr>
<td>89 (3.500)</td>
<td>53 (2.087)</td>
<td>37 (1.457)</td>
<td>12 (0.472)</td>
<td>130 (5.118)</td>
<td>110 (4.331)</td>
<td>10 (0.394)</td>
<td>85 (3.346)</td>
<td>M12, 30 DEEP</td>
</tr>
<tr>
<td>102 (4.000)</td>
<td>58 (2.283)</td>
<td>37 (1.457)</td>
<td>12 (0.472)</td>
<td>140 (5.512)</td>
<td>120 (4.724)</td>
<td>10 (0.394)</td>
<td>100 (3.937)</td>
<td>M12, 30 DEEP</td>
</tr>
<tr>
<td>127 (5.000)</td>
<td>58 (2.283)</td>
<td>37 (1.457)</td>
<td>12 (0.472)</td>
<td>160 (6.299)</td>
<td>130 (5.118)</td>
<td>13 (0.512)</td>
<td>100 (3.937)</td>
<td>M16, 30 DEEP</td>
</tr>
<tr>
<td>152 (6.000)</td>
<td>73 (2.874)</td>
<td>37 (1.457)</td>
<td>12 (0.472)</td>
<td>160 (6.299)</td>
<td>130 (5.118)</td>
<td>13 (0.512)</td>
<td>100 (3.937)</td>
<td>M16, 30 DEEP</td>
</tr>
</tbody>
</table>

Note: For 80 mm diameter rollers of all styles, the electronics housing is external to the roller body. The housing has a diameter of 80 mm and extends out approximately 45.8 mm (1.80 inches).
MODEL NUMBERING KEY

The model number consists of the base model "29CSR" followed by optional alphanumeric characters.

29-CSR-AAAA-BBB-CCCC-D-EEE-F-GG-H-J

AAAA = Rated load in Newtons
BBB = Roller diameter in mm
CCCC = Roll face length in mm
D = Roller material
   A = Aluminum
   S = Steel
   K = Stainless steel
   Others are possible
EEE = Roller finish
   000 = No finish
   001 = Nickel plated
   002 = Hard coated Anodize
   Others are possible
F = Balancing option
   1 = G2.5 (standard)
   Others are possible
GG = Roller mounting
   S0 = Stud mount
   FW = Flange mount with connector on web side
   FP = Flange mount with 150 mm pigtail out shaft end
H = Tension Readout
   0 = No Display
   D = Display
J = RPM Sensor
   0 = No RPM Sensor
   R = RPM Sensor

SIZING

To size and select the correct load rating of the CSR, the total load on the sensing roll must be calculated. This load consists of the tension components in the sensing plane. Using the known maximum tension and angles as shown, apply the equation below to calculate the actual load.

\[ \text{LOAD} = 2T \cdot \sin \left( \frac{X}{2} \right) \cdot \cos Y \]

This is the total load, but since we need to be able to read tension transients, the "T" should be multiplied by 1.35 to add 35% measuring capability. The final equation for load rating required for the CSR is:

\[ L = 2.7T \cdot \sin \left( \frac{X}{2} \right) \cdot \cos Y \]

After calculating L, select a CSR with a load rating greater than L.

For example, if the maximum tension is 25 pounds, the angle Y is 0 degrees, the wrap angle is 90 degrees and the resultant force is away from the connector, the resulting CSR rating is:

\[ L = 2.7(25)(\sin(90/2)(\cos 0) \]
\[ L = 47.7 \text{ pounds (212.2 Newtons)} \]

Use CSR with 250 Newton rating (56 pounds)

T = web tension
X = web wrap angle
A = center line of sensing roller
R = resultant force direction from web tension that bisects the wrap angle
Y = angle between wrap angle midpoint (R) and the load cell center line (A)
Note: connector is always aligned with the center line of the sensing roller
L = calculated minimum force rating
CSR TENSION SENSING ROLLER

CABLES AND CONNECTORS

CSR WITH 90° CABLE

90° connector can not be used with flange mounted rollers with 127 or 152 mm diameters

CSR WITH PIGTAIL OPTION

Dimensions shown in mm (inches)

CSR WITH STRAIGHT CABLE

Dimensions shown in mm (inches)