FMS Tension Control / Force Sensors

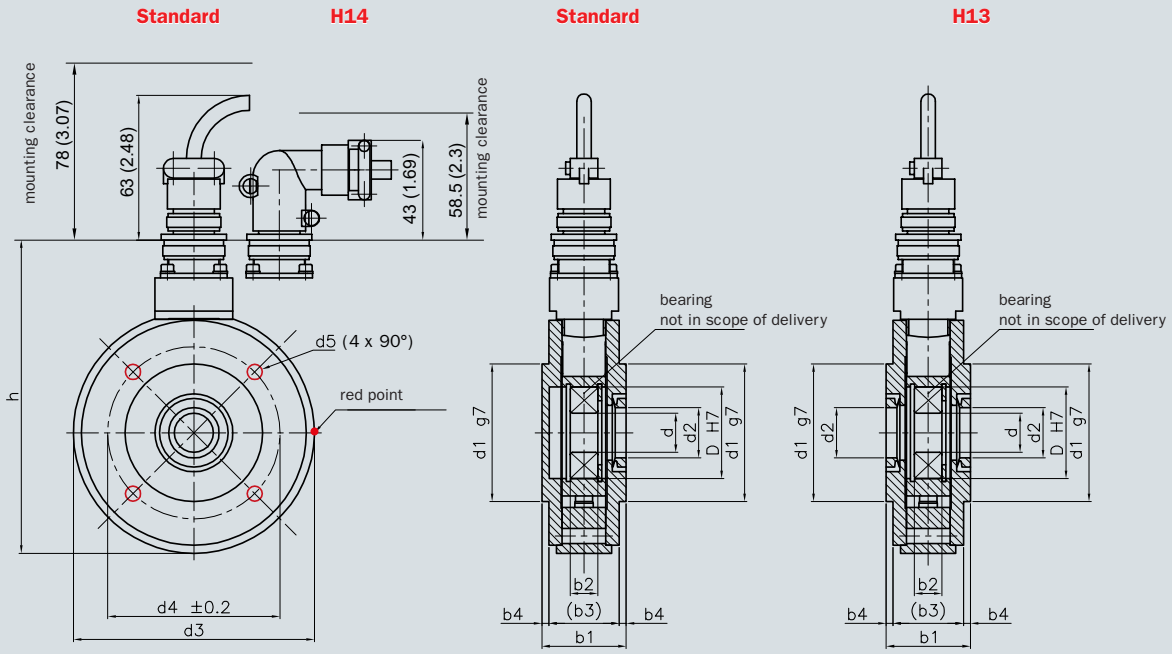
# AL-Series Aluminum force measuring bearing

- **Cost-effective solution with durable design**
  **Measuring body from high strength aluminum**
- **Drop-in replacement for sensors of other brands**
  **Flexible installation concept**
- **Precise performance even at low tension values**
  **Measuring range 30:1**
  **Accuracy class ±0.5%**
- **5 sizes covering a nominal force range of 50 to 3'000 N (11 to 674 lbf.)**
  **For a wide range of applications**

**AL-Series**
The Force Sensors of the AL-Series, designed for the measurement of tension on continuous material processing lines, include the bearing seat for life shaft rolls. This feature minimizes the space required at installation. The flexible installation options, including the standard 4-hole pitch circle and the optional 3-hole pitch circles, will allow for the straightforward replacement of existing flange style force sensors of other brands. With the superior performance of the AL-Series, accurate tension readings are obtained even with low web wrap angles and high roll weights.

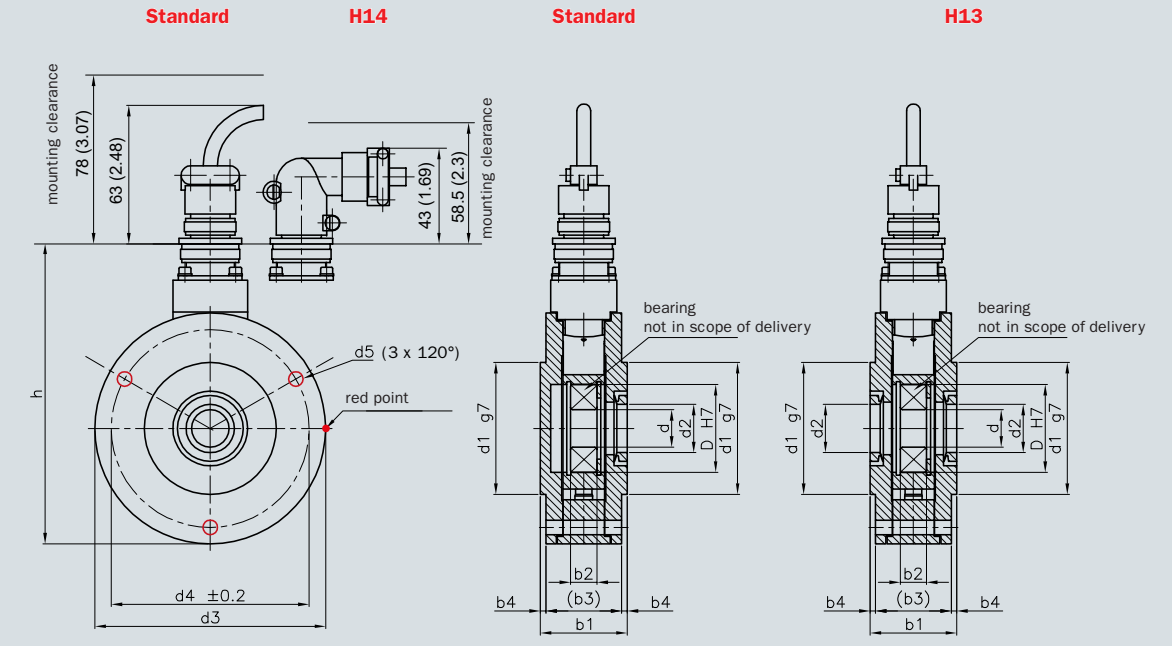
**Functional description**
The AL-Series force measuring sensor combines the bearing seat and the force sensor within the same housing, thus minimizing the required installation space. The substantial overload protection translates to eliminated/minimized calibration issues due to machine upset conditions. The movement of the bending beam, which is proportional to the applied force, is detected by strain gauges arranged in a full bridge circuit and then converted into an electrical signal. This simple measurement principle delivers precise results even with low material tension and small web wrap angles. The Red Point, as located on the sensor body, should be aligned with the direction of the resultant force due to web tension.

## **AL-Series** : Dimensions 4-hole pitch circle in mm (in.)




| **AL-Series** : Dimensions 4-hole pitch circle in mm (in.) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Size** | d1 | d2 | d3 | d4 | d5 | b1 | b2 | b3 | b4 | h |
| **AL203** | 60 (2.36) | 22 (0.87) | 105 (4.13) | 75 (2.95) | 6.6 (0.26) | 37 (1.46) | 12 (0.47) | 30.7 (1.21) | 3 (0.12) | 137 (5.39) |
| **AL204/205** | 70 (2.76) | 32 (1.26) | 125 (4.92) | 95 (3.74) | 6.6 (0.26) | 48 (1.89) | 15 (0.59) | 40 (1.57) | 4 (0.15) | 157 (6.18) |
| **AL307** | 100 (3.94) | 45 (1.77) | 186 (7.32) | 135 (5.31) | 9.0 (0.35) | 66 (2.60) | 21 (0.83) | 58 (2.28) | 4 (0.15) | 219 (8.62) |
| **AL308** | 100 (3.94) | 50 (1.97) | 186 (7.32) | 135 (5.31) | 9.0 (0.35) | 66 (2.60) | 18 (0.71) | 58 (2.28) | 4 (0.15) | 219 (8.62) |

## **AL-Series** : Dimensions 3-hole pitch circle (C-option) in mm (in.)




| **AL-Series** : Dimensions 3-hole pitch circle (C-option) in mm (in.) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Size** | d1 | d2 | d3 | d4 | d5 | b1 | b2 | b3 | b4 | h |
| **AL203.C01** | 60 (2.36) | 22 (0.87) | 105 (4.13) | 90 (3.53) | 6.6 (0.26) | 39.5 (1.56) | 12 (0.47) | 34.5 (1.36) | 2.5 (0.10) | 137 (5.39) |
| **AL204.C01**<br>**AL205.C01** | 70 (2.76) | 32 (1.26) | 125 (4.92) | 105 (4.13) | 6.6 (0.26) | 48 (1.89) | 15 (0.59) | 42 (1.63) | 3 (0.12) | 157 (6.18) |
| **AL307.C01**<br>**AL308.C01** | 100 (3.94) | 45 (1.77)<br>50 (1.97) | 186 (7.32) | 150 (5.90) | 9.0 (0.35) | 68 (2.68) | 21 (0.83)<br>18 (0.71 | 60 (2.36) | 4 (0.15) | 219 (8.62) |
| **AL307.C02**<br>**AL308.C02** | 100 (3.94) | 45 (1.77)<br>50 (1.97) | 186 (7.32) | 155 (6.10) | 9.0 (0.35) | 68 (2.68) | 21 (0.83)<br>18 (0.71 | 60 (2.36) | 4 (0.15) | 219 (8.62) |
| **AL307.C03**<br>**AL308.C03** | 100 (3.94) | 45 (1.77)<br>50 (1.97) | 186 (7.32) | 167 (6.57) | 9.0 (0.35) | 68 (2.68) | 21 (0.83<br>18 (0.71) | 60 (2.36) | 4 (0.15) | 219 (8.62) |

## **AL-Series** : Nominal forces, Deflection, Weight

| **Size**<br>Type | **Nominal force**<br>N, kN (lbf.) | | **Deflection**<br>mm (in.) | | **Weight**<br>kg (.lbs) | |
|---|---|---|---|---|---|---|
| **AL203** | 50, 125, 250, 500, 1000 | (11, 28, 56, 112, 225) | 0.15 | (0.0059) | 0.85 | (1.87) |
| **AL204** | 125, 200, 375, 750, 1500 | (28, 45, 84, 169, 337) | 0.2 | (0.0079) | 1.25 | (2.76) |
| **AL205** | 125, 200, 375, 750, 1500 | (28, 45, 84, 169, 337) | 0.2 | (0.0079) | 1.25 | (2.76) |
| **AL307** | 375, 750, 1500, 3000 | (84, 169, 337, 674) | 0.2 | (0.0079) | 3.75 | (8.27) |
| **AL308** | 375, 750, 1500, 3000 | (84, 169, 337, 674) | 0.2 | (0.0079) | 3.75 | (8.27) |

## **AL-Series** : Possible bearing types, available as accessories

| **Size** | **Bearing** | **d Shaft diameter** mm (in.) | | **D Outer diameter bearing** mm (in.) | | b2 | |
|---|---|---|---|---|---|---|---|
| **AL 203(.C01)** | 1203 | 17 | (0.67) | 40 | (1.57) | 12 | (0.47) |
| **AL 204(.C01)** | 1304 | 20 | (0.79) | 52 | (2.05) | 15 | (0.59) |
| **AL 205(.C01)** | 1205 | 25 | (0.98) | 52 | (2.05) | 15 | (0.59) |
| **AL 307(.C01/02/03)** | 1307 | 35 | (1.38) | 80 | (3.15) | 21 | (0.83) |
| **AL 308(.C01/02/03)** | 1208 | 40 | (1.57) | 80 | (3.15) | 18[1)] | (0.71) |

1) distance ring, in scope

## **AL-Series** : Technical data

| | |
|---|---|
| **Sensitivity** | 1.8 mV / V |
| **Tolerance of sensitivity** | < ±0.2 % |
| **Accuracy class** | ±0.5 % ($F_{Nom}$) |
| **Temperature coefficient** | ±0.1 % / 10 K |
| **Temperature range** | –10 °C to +60 °C (14 F to 140 F) |
| **Input resistance** | 350 Ω |
| **Power supply** | 1 to 10 VDC |
| **Overload protection** | 10 times nominal force $F_{Nom,}$ 5 times for larger nominal force |
| **Material main body** | high-strength aluminum |
| **Protection class** | IP 42 |
| **Electrical connection** | Male flange connector, amphenol, 4-pole |
| **Repeatability error** | 0.05 % |
| **Measuring range** | 30 : 1 |

## **AL-Series** : Order code

**AL 203 .250 .17 .C01 .H13.H14**

- Options
- Installation with 3 hole pattern
- Shaft diameter in mm
- Nominal force rating in N
- Size
- Series

## **AL-Series** : Options

| | |
|---|---|
| **H13** | open covers for both sides, additional scope of supply 1 pcs. V-ring |
| **H14** | right-angle connector in scope of supply, replaces straight connector |
| **H16** | temperature range up to 120°C (248°F) |
| **H19** | grease nipple |
| **H31** | for vacuum applications to 1E-7 hPa 1E-5 Torr, temperature range up to 120°C (248°F) |
| **C01** | 3 hole pattern (AL203 ø 90, AL204/AL205 ø 105, AL307/AL308 ø 150 mm) |
| **C02** | 3 hole pattern (AL307/AL308 ø 155 mm) |
| **C03** | 3 hole pattern (AL307/AL308 ø 167 mm) |

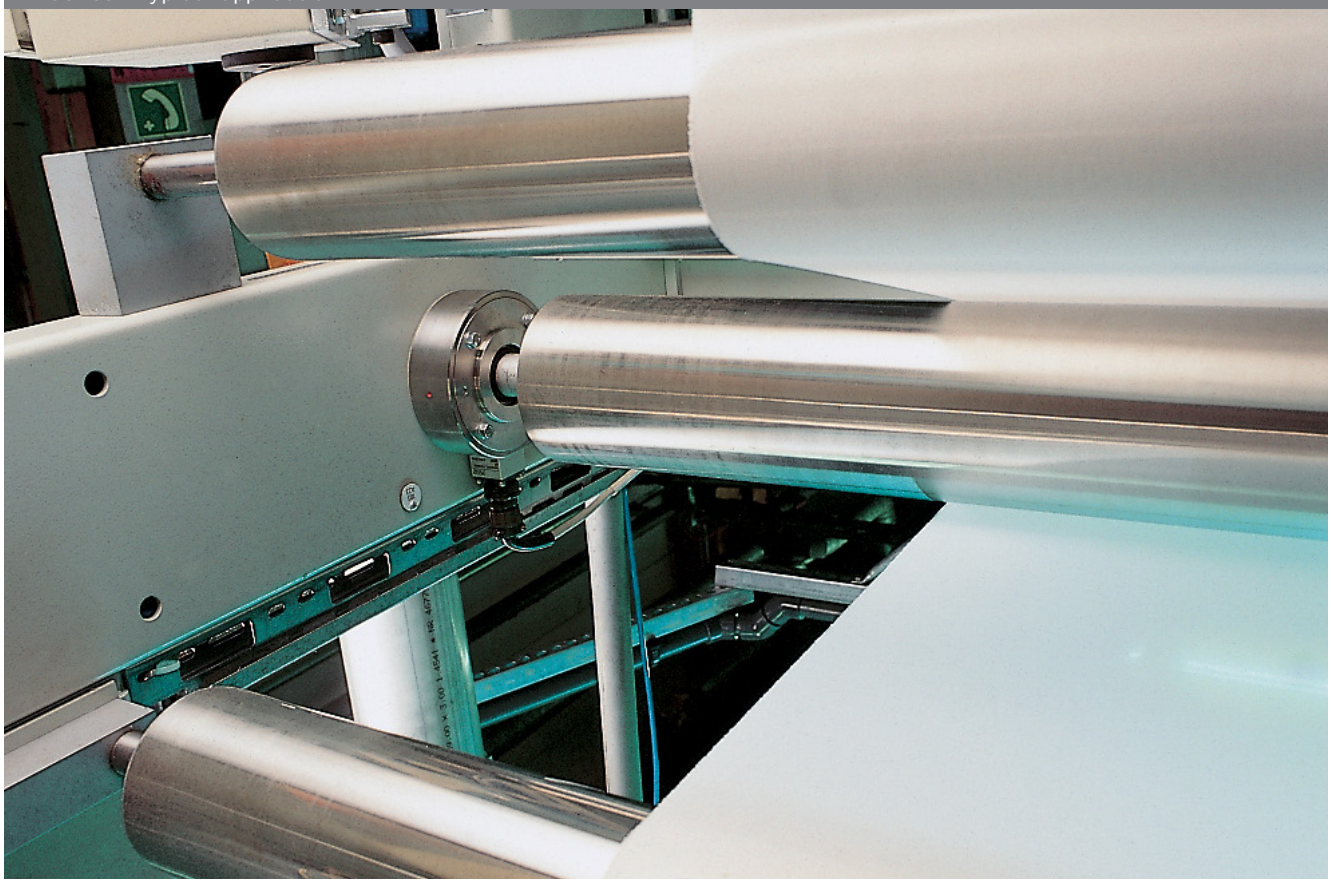
## **AL-Series** : Scope of supply

● force sensor ● straight connector (female) ● open cover ● closed cover ● V-Ring ● clip ring

## **AL-Series :** Accessories

● explosive areas ● installation bracket ● 1203 self-aligning ball bearing ● 1304 self-aligning ball bearing ● 1205 self-aligning ball bearing ● 1307 self-aligning ball bearing ● 1208 self-aligning ball bearing ● connector amphenol, 4-pole, straight ● connector amphenol, right angle ● cable, 1 m (3.25 ft.) without connector ● cable, 10 m (32.8 ft.) without connector ● cable, 5 m (16.4 ft.) without connector ● cable, 2 m (6.5 ft.) without connector

## **AL-Series** : Typical application



## **Other products** : Tension Control

| **Measuring Amplifiers** | **Tension Controllers** | **Intrinsically Safe Barrier** |
|---|---|---|
|  |  |  |

### About us

FMS Force Measuring Systems AG is the market leader in the field of web tension measurement, control and specialist for web guiding solutions. For the wire industry we are the only manufacturer offering a complete range of technologies for force measurement, data processing and radio transmission of signals.

Our in house developed products are used in the manufacturing industry, converting, metals, paper, textiles, as well as in cable and wire rope production. Utilising the latest technology, high quality components and a firm understanding of customer applications, FMS supports customers worldwide in the effort to maximize the productivity of their machines. Since 1993, our highly qualified employees have been creating high-end solutions for machine builders and plant operators. As an owner-managed company, we pride ourselves on being personal and approachable with the ability to make decisive moves fast.

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