



## Model RM

### Rod End In-line Tension Load Cell



#### DESCRIPTION

Model RM, with male threads, is a high output rod end load cell designed to be mounted inline to the load axis to measure tension. The outputs for these load cells are  $\pm 5$  Vdc or 10 Vdc, or 4 mA to 20 mA (two wire) all calibrated in tension. The mounting thread configurations and the all welded stainless steel construction make these tension load cells ideal for a variety of rugged field applications as well as in the laboratory.

The optional high output signal offers resistance to electrical noise as well as additional signal resolution. Additional options include an internal buffered shunt calibration circuit for ease of setup with an associated indicator, and a variety of thread selections, including metric sizes.

#### FEATURES

- 2000 lb to 200000 lb range
- Male/male threads
- Stainless steel, all-welded construction
- 0 Vdc to 5 Vdc or 4 mA to 20 mA outputs
- Up to 0.15 % linearity
- CE approved<sup>10</sup>

# Model RM

## PERFORMANCE SPECIFICATIONS

Characteristic	Measure
Load ranges <sup>11</sup>	2000 lb to 200000 lb <sup>1</sup>
Linearity 100 lb to 1000 lb	±0.2 % full scale
Linearity 2000 lb to 50000 lb	±0.15 % full scale
Linearity 75000 lb to 20000 lb	±0.2 % full scale
Hysteresis 100 lb to 1000 lb	±0.2 % full scale
Hysteresis 2000 lb to 50000 lb	±0.15 % full scale
Hysteresis 75000 lb to 20000 lb	±0.2 % full scale
Non-repeatability	± 0.05 % full scale
Output (tolerance)	2 mV/V
Operation	Tension
Resolution	Infinite

## ENVIRONMENTAL SPECIFICATIONS

Characteristic	Measure
Temperature, operating	-54 °C to 121 °C [-65 °F to 250 °F]
Temperature, compensated	15 °C to 71 °C [60 °F to 160 °F]
Temperature effect, zero	0.005 % full scale/°F
Temperature effect, span	0.005 % full scale/°F

## ELECTRICAL SPECIFICATIONS

Characteristic	Measure
Strain gage type	Bonded foil
Excitation (calibration)	10 Vdc
Excitation (acceptable)	Up to 15 Vdc or Vac
Insulation resistance	5000 mOhm @ 50 Vdc
Bridge resistance (tolerance)	350 ohm
Zero balance (tolerance)	±1% full scale
Shunt calibration data	Included
Electrical termination (std) 2000 lb to 50000 lb	PTIH-10-6P or equivalent (hermetic stainless)
Electrical termination (std) 75000 lb to 200000 lb	MS3102E-14S-6P or equivalent
Mating connector (not included) 2000 lb to 50000 lb	PT06A-10-6S or equivalent (AA111)
Mating connector (not included) 75000 lb to 200000 lb	MS3106A-14S-6S or equivalent (AA121)

## MECHANICAL SPECIFICATIONS

Characteristic	Measure
Maximum allowable load	150 % FS <sup>1</sup>
Weight	See table
Material	Stainless steel
Deflection full scale	See table
Natural frequency	See table

## RANGE CODES

Range Code	Available ranges	Range Code	Available ranges
DL	2000 lb	EL	20000 lb
DN	3000 lb	EN	30000 lb
DP	4000 lb	EP	50000 lb
DR	5000 lb	ER	75000 lb
DT	75000 lb	ET	100000 lb
DV	10000 lb	FJ	150000 lb
EJ	15000 lb	FL	200000 lb

## WIRING CODES

Connector	Unamplified (Std.)
A	(+) excitation
B	(+) excitation
C	(-) excitation
D	(-) excitation
E	(-) output
F	(+) output

## DEFLECTIONS AND RINGING FREQUENCIES

Capacity (lb)	Deflection at full scale mm [in]	Ringling frequency (Hz)	Weight kg [lb]
2000	0,076 [0.003]	5000	0,45 [1.0]
3000	0,076 [0.003]	5000	0,45 [1.0]
4000	0,076 [0.003]	5100	0,45 [1.0]
5000	0,076 [0.003]	5200	0,45 [1.0]
7500	0,102 [0.004]	7500	0,68 [1.5]
10000	0,102 [0.004]	7600	0,68 [1.5]
15000	0,127 [0.005]	8000	0,68 [1.5]
20000	0,127 [0.005]	9800	0,68 [1.5]
30000	0,127 [0.005]	8000	1,90 [4.2]
50000	0,127 [0.005]	8200	1,90 [4.2]
75000 to 100000	0,152 [0.006]	5000	7,34 [16.5]
150000 to 200000	0,178 [0.007]	4200	16,01 [35.3]

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## INTERNAL AMPLIFIERS

Amplifier specifications	Voltage output: Option 2b	Voltage output: Option 2c	Voltage output: Option 2t	Current three-wire: Option 2j	Current two-wire: Option 2k	Intrinsically safe amp: Option 2n (2N)***
Output signal	±5 V	0 V to 5 V or ±5 V @ 45 mA	0 V to 10 V or ±10 V @ 45 mA	4 mA to 20 mA	4 mA to 20 mA	4 mA to 20 mA
Input power (voltage)	±15 V or 26 Vdc to 32 Vdc	18 Vdc to 28 Vdc	15 Vdc to 28 Vdc	22 Vdc to 32 Vdc	15 Vdc to 40 Vdc	9 Vdc to 28 Vdc
Input power (current)	45 mA	40 mA	40 mA	65 mA	4 mA to 28 mA	4 mA to 24 mA
Freq. resp (amp)	3000 Hz	3000 Hz	3000 Hz	2500 Hz	300 Hz	2000 Hz
Power supply rej.	60 db	60 db	60 db	60 db	60 db	60 db
Operating temp.	-20 °F to 185 °F	-20 °F to 185 °F	-20 °F to 185 °F	0 °F to 185 °F	0 °F to 185 °F	-20 °F to 185 °F
Reverse voltage protection	Yes	Yes	Yes	Yes	Yes	Yes
Short cir. protection	Momentary	Momentary	Momentary	Yes	Yes	Yes
Wiring code: connector (std) <sup>5</sup>	A (+) Supply B Output common C Supply return D (+) Output E Shunt cal 1 F Shunt cal 2	A (+) Supply B Output common** C Supply return ** D (+) Output E Shunt cal 1 F Shunt cal 2	A (+) Supply B Output common** C Supply return** D (+) Output E Shunt cal 1 F Shunt cal 2	A (+) Supply B Output common** C Supply return** D (+) Output E Shunt cal 1 F Shunt cal 2	A (+) Supply B No connection C No connection D (+) Output E Case ground F No connection	A (+) Supply B No connection C No connection D (+) Output E Case ground F No connection
Wiring code: cable <sup>5,6,7</sup>	R (+) Supply Bl Output common G Supply return W (+) Output B Shunt cal 1 Br Shunt cal 2	R (+) Supply Bl Output common* G Supply return* W (+) Output B Shunt cal 1 Br Shunt cal 2	R (+) Supply Bl Output common* G Supply return* W (+) Output B Shunt cal 1 Br Shunt cal 2	R (+) Supply Bl Output common* G Supply return* W (+) Output B Shunt cal 1 Br Shunt cal 2	R (+) Supply Bl (+) Output W Case ground	R (+) Supply Bl (+) Output W Case ground

\* Black and green wires are internally connected.

\*\* Pins B and C are internally connected.

\*\*\* See our Web site for the most up-to-date information regarding intrinsically safe approvals, ref. #008-0547-00.



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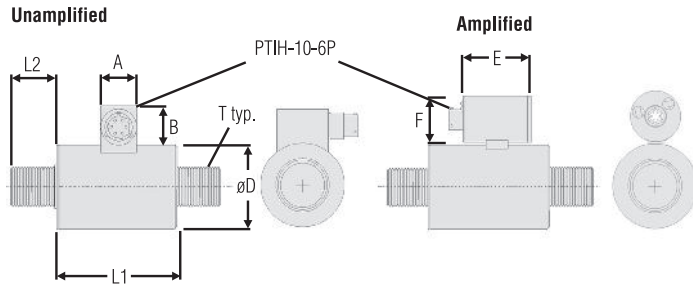
## OPTION CODES

	<b>Many range/option combinations are available in our quick-ship and fast-track manufacture programs. Please see <a href="http://sensing.honeywell.com/TMsensor-ship">http://sensing.honeywell.com/TMsensor-ship</a> for updated listings.</b>	
<b>Load ranges</b>	2K, 3K, 4K, 5K, 7.5K, 10K, 15K, 20K, 30K, 50K, 75K, 100K, 150K, 200K	
<b>Temperature compensation</b>	1a. 60 °F to 160 °F 1b. 30 °F to 130 °F 1c. 0 °F to 185 °F 1d. -20 °F to 130 °F 1e. -20 °F to 200 °F 1f. 70 °F to 250 °F	1g. 70 °F to 325 °F <sup>8</sup> 1h. 70 °F to 400 °F <sup>8</sup> 1i. -65 °F to 250 °F <sup>8</sup> 1j. 0 °C to 50 °C 1k. -20 °C to 85 °C 1m. -25 °C to 110 °C
<b>Internal amplifiers</b>	2u. Unamplified, mV/V output 2b. 4 wire, ±5 Vdc output 2c. 0 Vdc to 5 Vdc 2j. 4 mA to 20 mA (three-wire) output	2k. 4 mA to 20 mA (two-wire) <sup>12</sup> 2n (2N) 4 mA to 20 mA (two-wire) intrinsically safe <sup>12</sup> 2t. 0 Vdc to 10 Vdc output
<b>Internal amp enhancements</b>	3a. Input/output isolation <sup>7</sup> 3d. Remote buffered shunt calibration	
<b>Electrical termination</b>	6a. Bendix PTIH-10-6P (or equivalent) 6-pin, (max. 250 °F) (ranges 50000 lb and below) 6b. MS connector MS3102E-14S-6P (mates with MS3106E-14S-6), (max. 160 °F) (ranges above 50000 lb) <sup>6</sup> 6e. Integral cable: Teflon 6f. Integral cable: PVC	6g. Integral cable: Neoprene 6h. Integral cable: Silicone 6i. Integral underwater cable 6j. 1/2-14 conduit fitting with 5 ft of 4 conductor PVC cable 6q. Integral cable: Polyurethane 6v. Phoenix connector on end of cable
<b>Shunt calibration</b>	8a. Precision internal resistor <sup>8</sup>	
<b>Bridge type</b>	11a. Square bridge <sup>8</sup> 11b. Symmetrical bridge <sup>8</sup> 11c. Square and symmetrical bridge <sup>8</sup> 31a. Dual bridge	
<b>Bridge resistance</b>	12b. 5000 ohm (foil) (max. 250 °F)	
<b>Zero and span adjustment</b>	14a. No access to zero and span adjustment	
<b>Electrical connector orientation</b>	15a. Horizontal electrical exit port orientation 15b. Vertical electrical exit port orientation 15c. Radial electrical exit port orientation 15d. Connector on end of cable	
<b>Shock and vibration</b>	44a. Shock and vibration resistance	
<b>Interfaces</b>	53e. Signature calibration <sup>9</sup> 53t. TEDS IEEE 1451.4 module <sup>9</sup>	

# Rod End In-Line Tension Load Cell

## MOUNTING DIMENSIONS

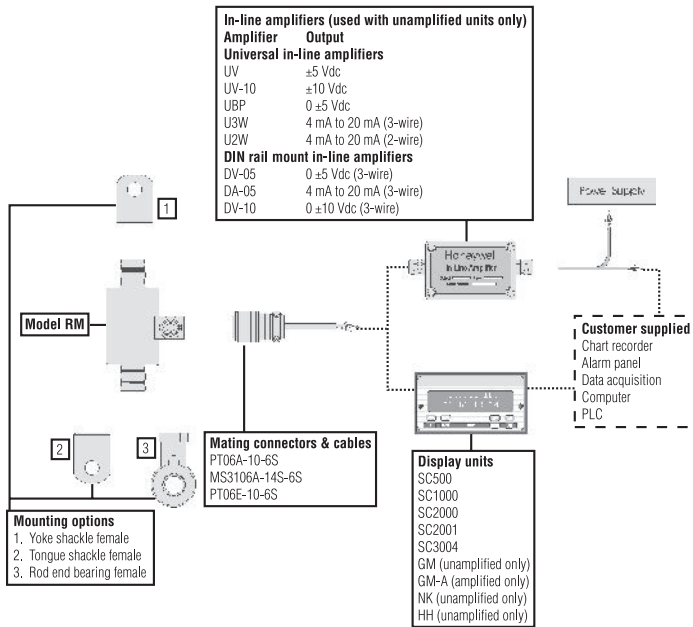
Order code (Unamp/Amp)	D mm [in]	L1 mm [in]	Unamplified only			Amplified only	
			A mm [in]	B mm [in]	L2 mm [in]	E mm [in]	F mm [in]
AL413/AL613	38,1 [1.50]	66,4 [2.60]	19,05 [0.75]	20,82 [0.82]	see below	49,53 [1.95]	38,1 [1.50]
AL415/AL615	44,45 [1.75]	66,4 [2.60]	19,05 [0.75]	20,82 [0.82]	see below	49,53 [1.95]	38,1 [1.50]
AL417/AL617	63,5 [2.50]	77,47 [3.05]	19,05 [0.75]	20,82 [0.82]	see below	49,53 [1.95]	38,1 [1.50]



## THREAD SIZES AND OPTION CODES

	13a	13b	13c	13d	13e
<b>Range (lb)</b>	<b>1/2-20 UNF</b>	<b>3/4-16 UNF</b>	<b>7/8-14 UNF</b>	<b>1-14 UNF</b>	<b>1 1/2-12 UNF</b>
2000 to 5000	AL413	AL413	AL413		
7500 to 15000		AL415	AL415	AL415	AL417
20000			AL415	AL415	AL417
30000 to 50000					AL417
L2 mm [in]	24,13 [0.95]	24,13 [0.95]	24,13 [0.95]	31,75 [1.25]	38,1 [1.50]

## TYPICAL SYSTEM DIAGRAM



## NON-STANDARD RANGES - ORDER CODE AL411

Range (lb)	Thread type	D mm [in]	L1 mm [in]	L2 mm [in]
75000 to 100000	2 1/2-12 UNF	88,9 [3.50]	101,6 [4.00]	76,2 [3.00]
150000 to 200000	3 1/2-8 UNF	114,3 [4.50]	127 [5.00]	101,6 [4.00]

## 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 for long term use and structural integrity. All structurally critical applications (overhead loading, etc.) should always be designed with safety redundant load paths.
3. Interconnecting shunt cal. 1 terminal with shunt cal. 2 terminal provides 50 % (unamplified units), 75 % (4 mA to 20 mA three-wire units) or 80 % (voltage amplified units) of full scale output for quick calibration. Shunt calibration comes standard with internal amplifier option 2a, 2b, 2c, 2t and 2j.
4. O=Orange; Y=Yellow; B=Blue; Bl=Black; R=Red; Br=Brown; W=White; G=Green. Color specifying cable and number or letter specifying connector.
5. No mating connector necessary for cable option.
6. Cannot use with options 1c, 1e, 1f, 1g, 1h, or 1i.
7. Only available with option 2b or 2c.
8. Not available with amplified option.
9. Consult factory for TEDS availability with amplified models.
10. Termination dependent; consult factory.
11. This unit calibrated to Imperial (non-Metric) units.
12. 5000 ohm bridge required.



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