



Technical Manual
CAPACITIVE LOAD CELL
TYPE MCL

Doc. Ref CD1048J



BS EN ISO 9001
Certificate No. FM13141



Affirmed by Declaration
of Conformity

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Index

1	INTRODUCTION	2
2	MECHANICAL INSTALLATION	3
3	ELECTRICAL INSTALLATION	4
3.1	Electrical Output	4
3.2	Output Noise	4
3.3	Considerations in the Configuration of Instrumentation	4
4	INSTALLATION & EMC INFORMATION	5
4.1	Installation Instructions	5
4.2	EMC Performance	5
4.3	Declaration of EMC Conformity	5
5	EFFECTS OF EXTRANEIOUS FORCES	6
6	GENERAL SPECIFICATION	6
7	MECHANICAL DRAWINGS	7
7.1	Frame size A	7
7.2	Frame size B	7
8	WARRANTY AND SERVICE	8

1 INTRODUCTION

The MCL range of miniature load cells is based upon our well-proven capacitive sensor technique which enables us to produce an amplified high quality load cell with a small size and a competitive price.

The capacitive sensing element measures the deflection of an internal load ring which is the principle used by calibration standards. The main advantage of this principle is that it is very resistant to the effects of off-axial loading. In addition to being very small, the MCL and particularly the low range unit have a very low mass to capacity ratio.

The conditioning electronics are internal so the appropriate DC supply to the load cell produces an output of $\pm 10V$ for the range of the load cell. The electronics are sealed inside the IP65 housing.

These tension/compression load cells are available as two different models:-

1. Frame size A with ranges $\pm 50N$, $\pm 100N$, $\pm 250N$, $\pm 500N$, $\pm 1kN$, $\pm 5kN$
2. Frame size B with ranges $\pm 10kN$, $\pm 15kN$, $\pm 25kN$, $\pm 50kN$.

2 MECHANICAL INSTALLATION

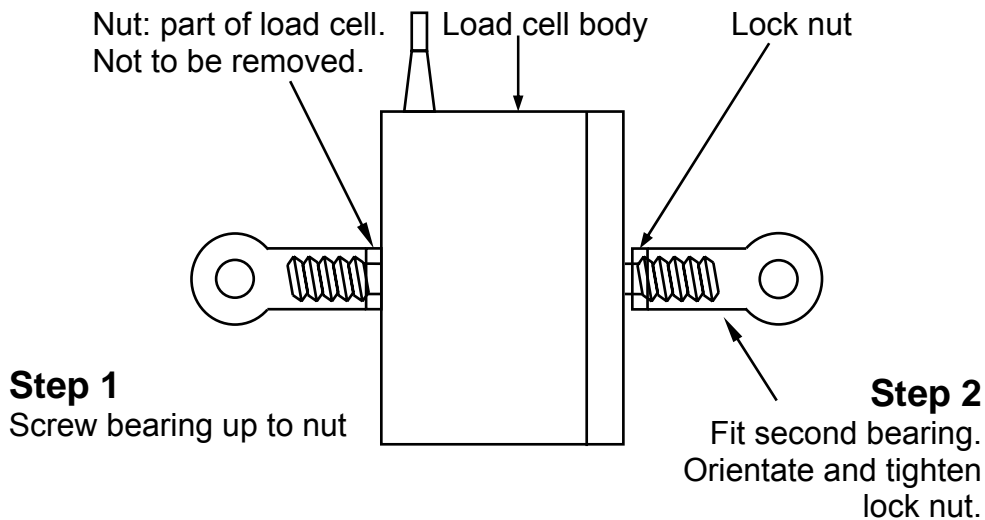
The construction of these load cells is based on a central load ring with deflecting diaphragms. The load ring assembly, diaphragm and electronic module are all contained in a housing. This outer housing provides environmental protection but is not very strong. When mounting these transducers, do **not** apply pressure or torque to the outer case. The load connection is made only to the threaded studs (male thread on frame A and female thread on frame B).

Do not apply torque or clamping load to the load cell body.

The load should be applied to the threaded studs.

If fitting rod-end bearings, use lock nuts. See example for frame size A below.

Fitting end bearings to frame size A transducers.



Frame Size A - Thread Sizes

The thread size can vary and the actual thread size is given by the stock code number:

MCL RRRR TT/LL

Where RRRR is the range in Newtons

TT is the thread size (M6 or M8)

LL is the thread length (13, 18 or 25 mm)

3 ELECTRICAL INSTALLATION

The frame size A is fitted with a 2m long, four-core cable and frame size B is fitted with a four-pin connector (mate supplied).

Frame Size A:	Core Colour	Connection
	Red	Positive Supply (+15V)
	Blue	Negative Supply (-15V)
	Black	Output common and supply 0V
	Yellow	Output
	Screen (sheild)	Ground

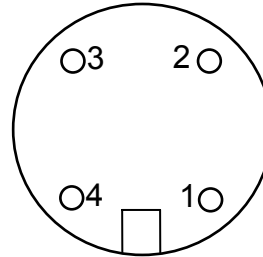
Note: Black (0V), screen/shield are connected to the body.

Frame Size B:	Pin Number	Connection
	1	Positive Supply (+15V)
	2	Negative Supply (-15V)
	3	Output
	4	Output common and supply 0V

Note: 4 (0V) is connected to the body.

Connector pin position:

View on solder pins at rear of free connector.



3.1 Electrical Output

These units have a $\pm 15V$ at 10mA supply and the output is $\pm 10V$; +10V for tension, -10V for compression. The output common is at supply 0 volts.

The output voltage should be measured with a 10k Ω load.

3.2 Output Noise

The noise content of the output signal is a limiting factor for the best resolution obtainable. The noise (output ripple, etc.) viewed on an oscilloscope is typically 5mV rms (15mV peak to peak), but when measured on a typical d.c. voltmeter (DMM) it gives 0.1mV average d.c.

This means that for non-dynamic load measurement the resolution limitation is 0.1mV which is 0.001% of full scale.

3.3 Considerations in the Configuration of Instrumentation

The following R.D.P. instruments are suitable for use with the MCL:-

- E725-DC1
- 611 (PD1498)
- S7CT (PD1499)
- E525 (SO23)
- E308

4 INSTALLATION & EMC INFORMATION

4.1 Installation Instructions

- 1) Where customer-provided cable is used, this should be screened and of good quality.
- 2) Where the transducer is connected to an instrument (e.g. an amplifier), the cable screen should be grounded at the instrument end.
- 3) Ensure any d.c. supply is of good quality and performance, e.g. supply well smoothed and stable.
- 4) Ensure cable(s) connecting to the transducer is/are routed away from electrically noisy cables (e.g. heavy power cables) and away from obviously powerful sources of electrical noise (e.g. electric motors, relays and solenoids).
- 5) The body of the transducer should be earthed. If the transducer fixing attachments do not provide a good earth, then an earth strap should be used.

4.2 EMC Performance

When subjected to radiated electromagnetic energy in the frequency range 80MHz to 1000MHz (as IEC801-3), an additional measuring error can occur at certain frequencies.

R.F. Field Strength	Typical Maximum Error
10V/m	2%
3V/m	0.2%

4.3 Declaration of EMC Conformity

DECLARATION OF CONFORMITY

RDP Electronics Ltd., Grove Street, Heath Town,
Wolverhampton, WV10 0PY, U.K.

We declare that the product detailed in the Technical Manual, when installed as instructed, performs in conformity with the Electromagnetic Compatibility Directive 89/336/EEC and as such are duly CE marked.

5 EFFECTS OF EXTRANEIOUS FORCES

Parameter	Maximum Allowed	Effect on Output (see note 3)
Torque	375Nm (frame size B) 16Nm (frame size A)	Less than 0.25%
Bending (see Note 1)	50% FS	Less than 1.5%
Sheer (see Note 2)	50% FS	Less than 3%
Total Extraneous Force	100% FS	Less than 3%

Note 1 This defines a moment equivalent to a force of 50% FS applied at 90° to the free end of the loading stud.

Note 2 This defines a force of 50% FS applied at 90° to the base of the loading stud.

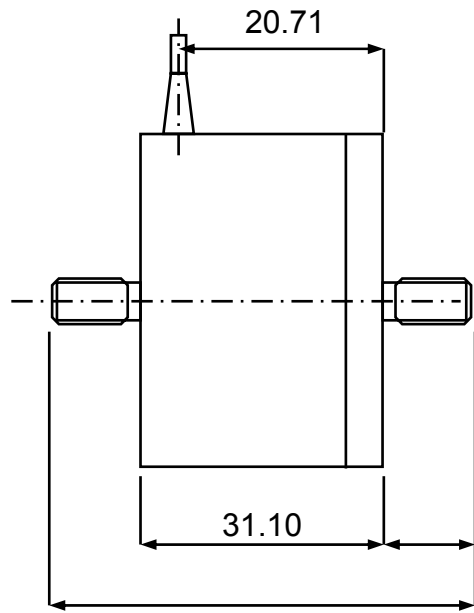
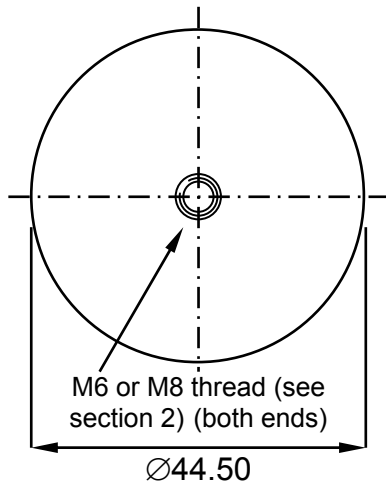
Note 3 The "effect on the output" refers to the error in the measured (axial) load signal when the maximum extraneous load is applied. The percentage is of the particular load cell full scale range.

6 GENERAL SPECIFICATION

Supply (3 wire)	±15V ±10% at 10mA
Output	±10V, ±2%
Minimum Load Resistance	3k ohm
Zero Force Output	0V ±0.3V (cell sizes up to 250N) 0V ±0.15V (cell sizes 500N upwards)
Linearity Error	±0.25% F.S. (±0.3% F.S. for ranges <500N)
Repeatability Error	±0.01% F.S.
Hysteresis	±0.05% maximum
Resolution	Limited by elec. noise o/p (typically 0.01% F.S.)
Output Ripple	Noise 5mV (rms) (10kHz to 30kHz) 0.1mV averaged dc
Frequency Response	100Hz (flat)
Temperature Coefficient	±0.02% F.S./°C
Operating Temperature	-25°C to +75°C
Storage Temperature	-40°C to +100°C
Deflection (FS)	50 microns
Overload Capacity (without damage)	100% over capacity (2 x F.S.)
Electrical Termination	Frame A: 2m screened cable Frame B: connector
Environmental Protection	IP65
Weight	Frame size A: 80g (excluding cable) Frame size B: 850g

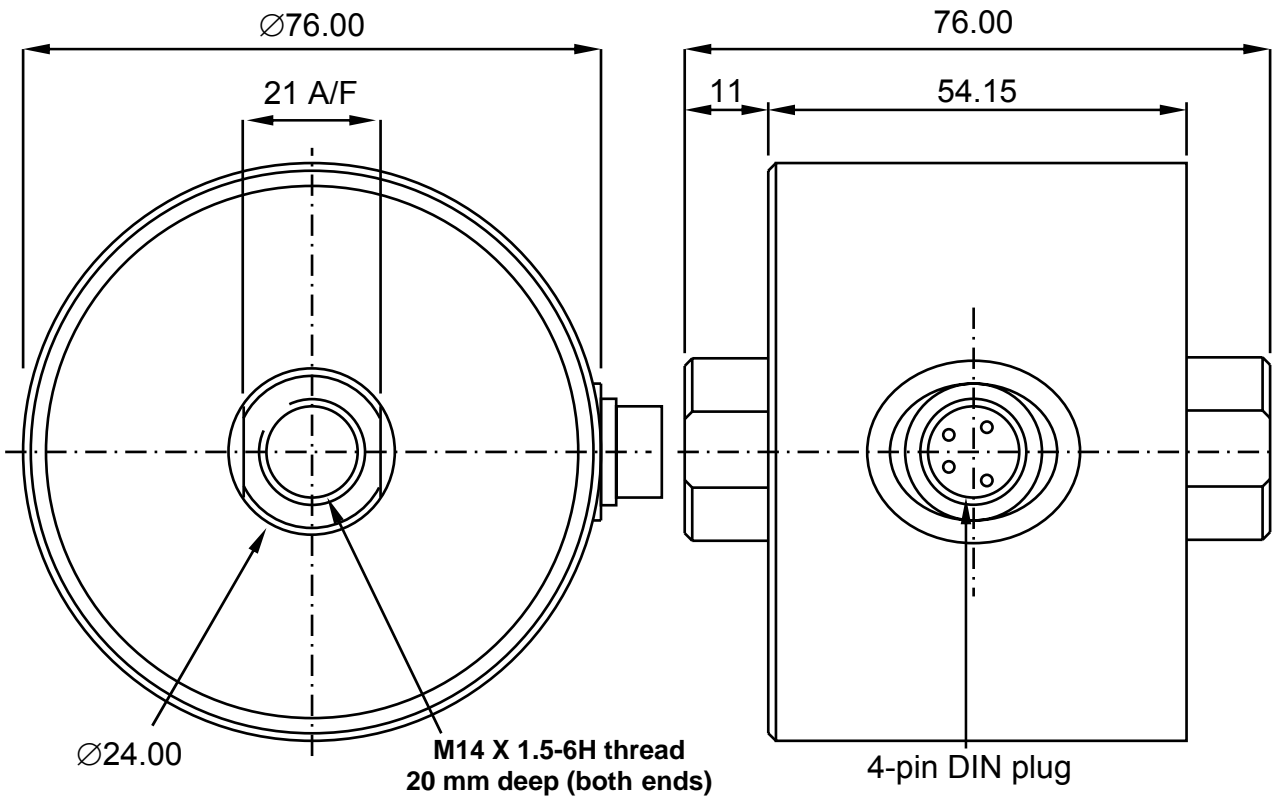
7 MECHANICAL DRAWINGS

7.1 Frame size A



For thread length, see section 2

7.2 Frame size B



Due to our policy of continual product development, we reserve the right to alter dimensions and specifications without notice. Dimensions are in mm.

8 WARRANTY AND SERVICE

WARRANTY.

R.D.P. Electronics products are warranted against defects in materials or workmanship. This warranty applies for one year from the date of delivery. We will repair or replace products that prove to be defective during the warranty period provided they are returned to R.D.P. Electronics.

This warranty is in lieu of all other warranties, expressed or implied, including the implied warranty of fitness for a particular purpose to the original purchaser or to any other person. R.D.P. Electronics shall not be liable for consequential damages of any kind.

If the instrument is to be returned to R.D.P. Electronics for repair under warranty, it is essential that the type and serial number be quoted, together with full details of any fault.

SERVICE.

We maintain comprehensive after-sales facilities and the instrument can, if necessary be returned to our factory for servicing.

Equipment returned to us for servicing, other than under warranty, must be accompanied by an official order as all repairs and investigations are subject to at least the minimum charge prevailing at the date of return.

The type and serial number of the instrument should always be quoted, together with full details of any fault and services required.

IMPORTANT NOTES.

1. No service work should be undertaken by the customer while the unit is under warranty except with the authorisation of RDP Electronics.
2. If the instrument is to be returned to R.D.P. Electronics for repair, (including repair under warranty) it is essential that it is suitably packed and that carriage is insured and prepaid. R.D.P. Electronics can accept no liability whatsoever for damage sustained during transit.
3. It is regretted that the above warranty only covers repairs carried out at our factory. Should the instrument have been incorporated into other equipment that requires our engineers to perform the repair on site, a charge will be made for the engineer's time to and from the site, plus any expenses incurred.

The aforementioned provisions do not extend the original warranty period of any product that has been either repaired or replaced by R.D.P. Electronics.

**THIS WARRANTY MAY BE NULL AND VOID SHOULD
THE CUSTOMER FAIL TO MEET OUR TERMS OF PAYMENT.**