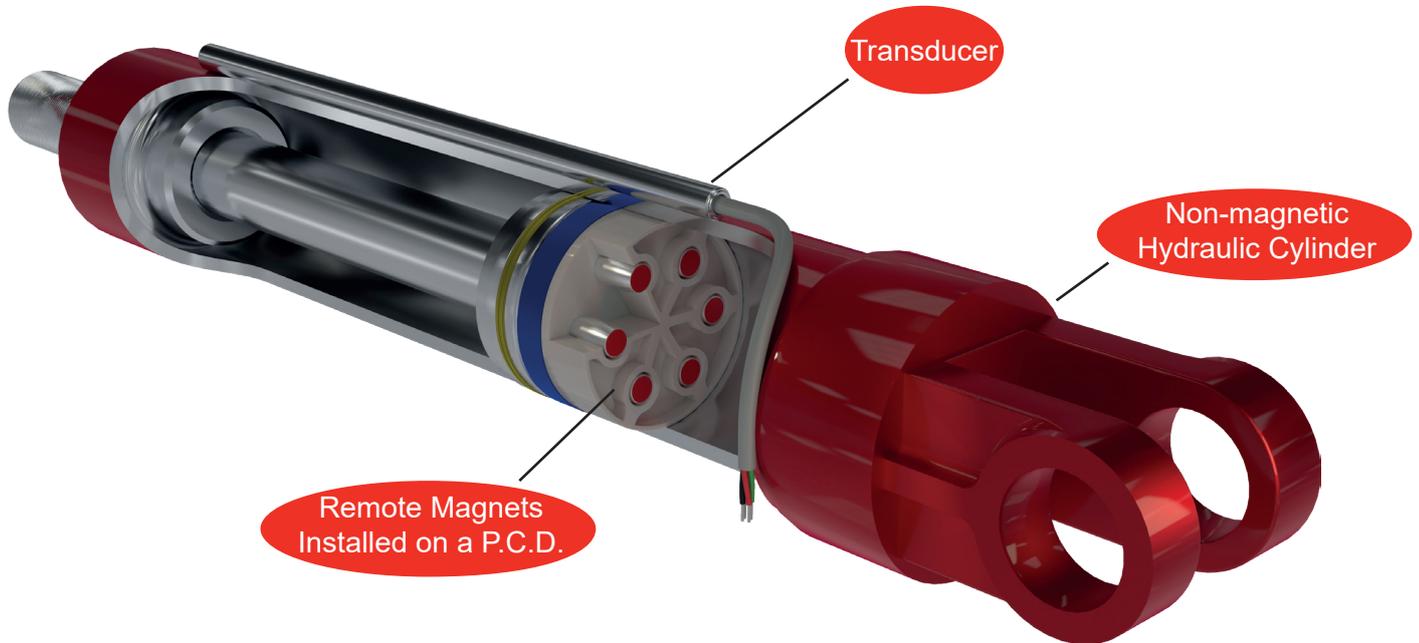


## Lightweight Linear Transducers for Ocean Yachting Applications



The LO series linear transducers are designed specifically for monitoring the position of yacht steering/control components, with magnets mounted either on a track or inside a non-magnetic piston in a hydraulic cylinder.

### BENEFITS

- Extensively used by America's Cup teams
- IP68 Rated to a depth of 3 metres for 28 days
- Industry leading random and sinusoidal vibration ratings - including resonant frequencies!
- Non-contact, zero-wear design with absolute signal
- 316 Stainless Steel or lightweight Titanium 3AL-2.5V (AMS 4945) sensor tube options
- Redundant options available with two entirely separate sensing circuits
- -30°C to +70°C operating temperature range

### COMMON APPLICATIONS

Common applications include, but are not limited to:

- Foil position monitoring
- Traveller car position monitoring
- Jib inhaul/outhall position monitoring
- Rudder rake angle monitoring
- Daggerboard position monitoring

Subject to reasonable modifications due to technical advances



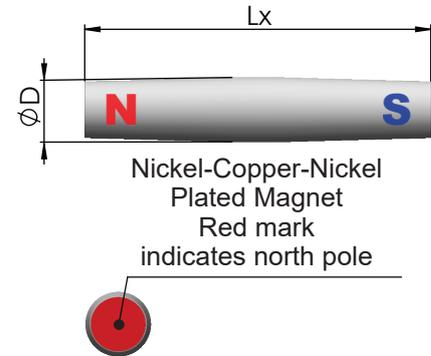
# REMOTE 'R' MAGNETS

LO sensors are designed to work with Rota's 'Remote' magnet series (shown below).

	ØD (mm)	Lx (mm)	Resolution (mm)	Optimum distance from centre-line of Transducer (mm)**
R1	5	13	0.2	10 ±0.5
R2	10	15	0.2*	22 ±3
R3	4.76	50.8	0.3*	19 ±3
R4	6.35	50.8	0.3*	22 ±3
R5	4.76	50.8	0.3*	15 ±3
R6	9.52	50.8	0.3*	26 ±4
R7	11.5	62	0.3*	45 ±4

\*For analogue strokes over 2m: R2 = 0.3mm, R3-R7 = 0.5mm

\*\*For increased distances please contact Rota regarding 'E' magnets



## MAGNET INSTALLATION

LO sensors will work with either a single remote magnet mounted at the distances shown in the table above, or multiple magnets mounted on a pitch circle diameter (P.C.D.).

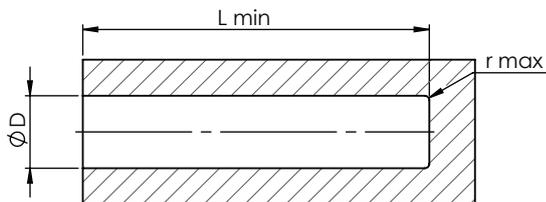
Magnets can be installed inside a non-magnetic hydraulic cylinder, or on any linear-moving non-magnetic component that meets the following criteria.

To achieve the above figures, the 'R' magnets must be housed in non-magnetic material, and magnetic fields in close proximity to transducer must be avoided. In addition there must be no magnetic bracket, fixture or structure within 20mm of the stroke sensing zone or within 40mm of the magnet.

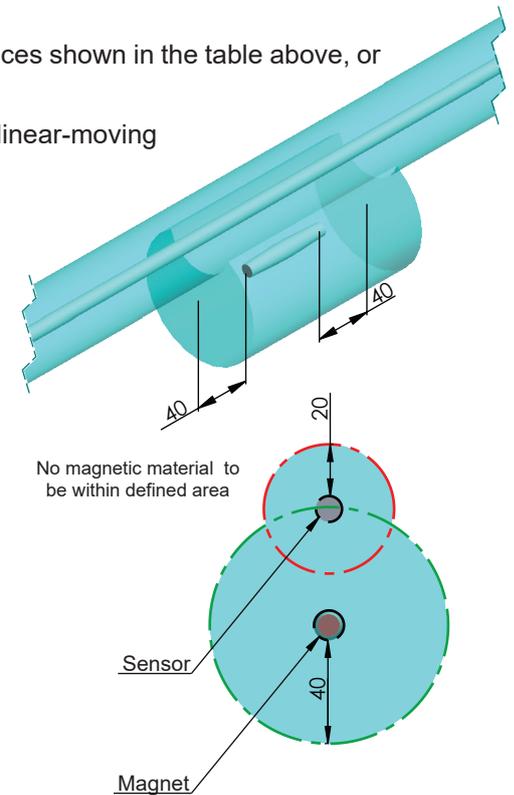
Correct magnet orientation is critical – North Pole of magnet (indicated with red mark) must be orientated towards connector/cable end of transducer. If the optimum distance between the magnet and the transducer is not maintained the signal will dropout.

Magnet operating temperature: -30 to +70°C (-40 to +158°F)

## MAGNET CAVITY MACHINING DETAILS



	ØD (mm)	L (mm)	r (mm)
R1	5.1/5.2	13	0.40
R2	10.1/10.2	15	0.85
R3	4.85/4.95	50.8	0.60
R4	6.45/6.55	50.8	0.60
R5	4.85/4.95	50.8	0.60
R6	9.6/9.7	50.8	0.60
R7	11.6/11.7	62	1.20



PRODUCTION NOTES  
 UNLESS OTHERWISE STATED  
 REMOVE ALL SHARP EDGES  
 MACHINED SURFACE TEXTURE TO BE  $\leq 1.6\mu\text{m Ra}$   
 TOLERANCE ON MACHINED DIMENSIONS  $\pm 0.25\text{ mm}$   
 TOLERANCE ON NON-MACHINED DIMENSIONS  $\pm 0.75\text{ mm}$   
 TOLERANCES ON ANGLES  $\pm 2\text{ DEGREES}$   
 ALL DIMENSIONS IN MILLIMETRES

Subject to reasonable modifications due to technical advances



# RELIABLE OPERATION TOUGH APPLICATION

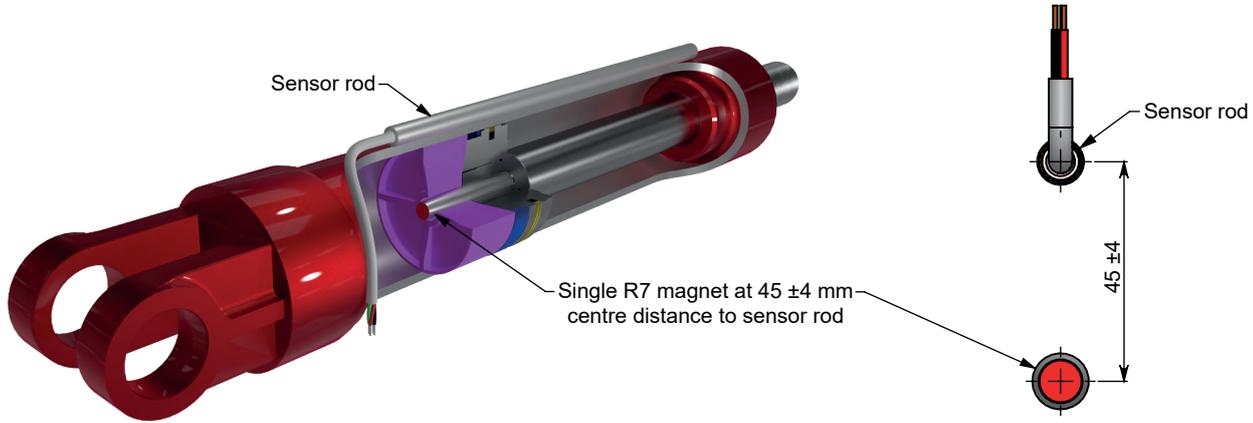
Rota Limited, Manchester UK

www.rota-ltd.com

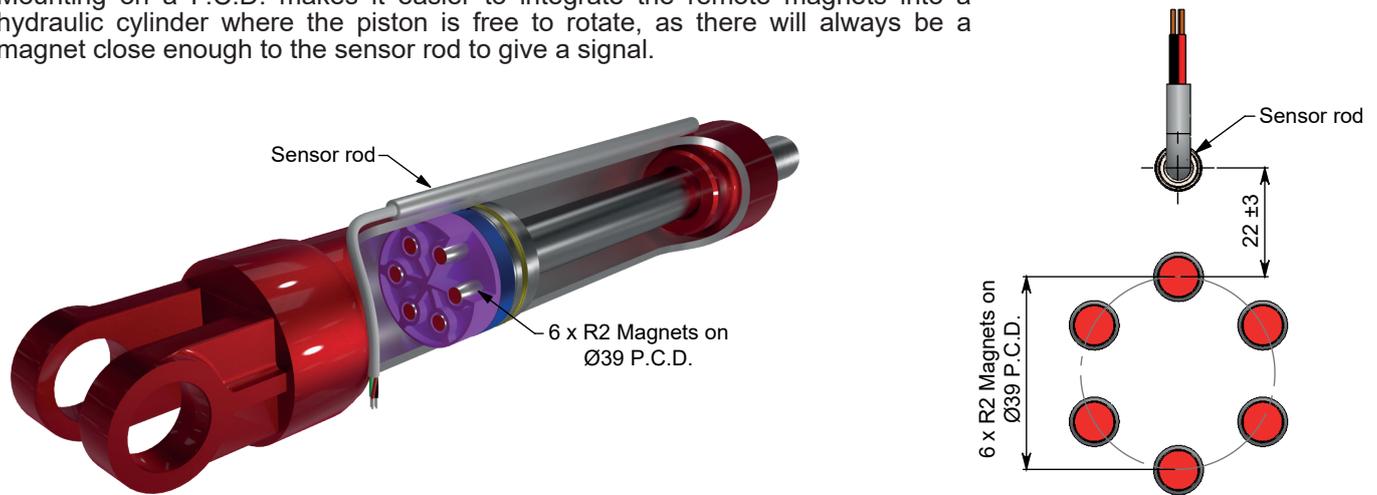
LO DS V1.02.01

The below examples show possible installations for a  $\text{Ø}63.5 \text{ mm}$  [2.5"] bore, 9.5 mm [3/8"] wall, non-magnetic cylinder.

Using a single magnet is ideal for situations where the magnet can be mounted at the required distance, and will not travel outside of the required distance tolerance.



Mounting on a P.C.D. makes it easier to integrate the remote magnets into a hydraulic cylinder where the piston is free to rotate, as there will always be a magnet close enough to the sensor rod to give a signal.



## CODING

If magnets are to be mounted on a PCD, please code magnets to indicate how many magnets are required.

E.g., a 6R3 code is 6 x R3 magnets mounted on a PCD.

Use only magnet code if just 1 magnet is required.

E.g., an R1 code indicates just one R1 magnet used.

Subject to reasonable modifications due to technical advances



# HOW TO ORDER

LO T F 1964 R1 0.2 G 3RT N 0.15 1234

## LO Series Transducer

### Optional

R = Redundant version - two entirely separate sensing circuits<sup>1</sup>

### Tube Option<sup>1</sup>

3 = 316 stainless steel  
T = Titanium 3AL-2.5V (AMS 4945)

### Mounting Option

F = Flat - no mounting configuration

### Stroke (mm)

Up to 6000 mm for LO3 or LOR3 type  
Up to 3250 mm for LOT or LORT type

### Optional

Number of remote magnets (when installed on a PCD)

### Magnet

	ØD (mm)	Length (mm)	Resolution (mm)	Optimum distance from centre-line of Transducer (mm)
R1 =	5	13	0.2	10 ±0.5*
R2 =	10	15	0.2**	22 ±3
R3 =	4.76	50.8	0.3**	19 ±3
R4 =	6.35	50.8	0.3**	22 ±3
R5 =	4.76	50.8	0.3**	15 ±3
R6 =	9.52	50.8	0.3**	26 ±4
R7 =	11.5	62	0.3**	45 ±4

\*Due to the centre distance required, R1 is not suitable for redundant sensors (LOR code)

\*\*For analogue strokes over 2m: R2 = 0.3mm, R3-R7 = 0.5mm

### Signal Resolution

0.2, 0.3, 0.5 mm

### Output Signal<sup>2</sup>

A = Current 4 to 20 mA (3 Wire)	(13 to 32 V Input)
B = Current 4 to 20 mA (3 Wire)	(10 to 18 V Input)
BU = Current 4 to 20 mA & Voltage 1.0 to 5.0 V	(10 to 30 V Input)
C = Voltage 0.5 to 3.5 V	(4 to 10 V Input)
F = Voltage 0.25 to 4.75 V	(9 to 32 V Input)
G = Voltage 0.5 to 4.5 V	(9 to 32 V Input)
H = Voltage 0.5 to 10.0 V	(13 to 32 V Input)
J = CANbus SAE J1939 - CCJ form to be completed*	
L = Voltage 0.5 to 4.5 V	(5 to 10 V Input)
O = CANopen - CCO form to be completed*	
P = P.W.M 550 Hz	(9 to 32 V Input)
T = Current 4 to 20 mA (2 Wire)	(11 to 28 V Input)
V = Voltage 0.5 to 5.0 V	(9 to 32 V Input)
Z = ISOBUS - CCZ form to be completed*	

\*Ask Rota for this form

(For CANbus Transducer Test Kit, order Rota part number LJ 2914)

## Unique Transducer Calibration Number

### Cable Length (m)

standard lengths:

0.15, 0.3, 0.4, 0.5, 1.0, 1.5, & 2.0 m

### Electrical Termination

N = PVC Cable - Unscreened

U = PUR Cable - Unscreened

### Optional - Number of Cables

Option for redundant version only (LOR code)

Blank = 1 cable (N cable only)

2 = 2 cables

### Optional - Connectors

2RT/2RC = Deutsch DT04-2P with Rota contacts

3RT/3RC = Deutsch DT04-3P with Rota contacts

4RT/4RC = Deutsch DT04-4P with Rota contacts

6RT/6RC = Deutsch DT04-6P with Rota contacts

2TM/2TC = Deutsch DTM04-2P

3TM/3TC = Deutsch DTM04-3P

4TM/4TC = Deutsch DTM04-4P

6TM/6TC = Deutsch DTM04-6P

2UP/2UC = AMP 282104-1

3UP/3UC = AMP 282105-1

4UP/4UC = AMP 282106-1

5UP/5UC = AMP 282107-1

6UP/6UC = AMP 282108-1

J = M12 Integral connector

4MH = Harness with M12 connector

5MH = Harness with M12 connector

4M9 = Harness with 90° M12 connector

5M9 = Harness with 90° M12 connector

### Optional<sup>3</sup>

R = Reversed Signal

1. Redundant version housed in 15.88 mm [5/8"] diameter tube, single output version housed in 9.53 mm [3/8"] diameter tube.

2. For redundant version, include two output codes, e.g. 0.3GG.

3. For redundant version, for one reversed signal include 'R' between the two outputs, e.g. 0.3GRG. For both signals reversed included R after each signal, e.g. 0.3GRGR.

Subject to reasonable modifications due to technical advances



# RELIABLE OPERATION TOUGH APPLICATION

Rota Limited, Manchester UK

www.rota-ltd.com

LO DS V1.04.01