

# Linear Transducers

Innovative Position Sensing Technology  
for Mobile Applications



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Hydraulic cylinder users are always looking for a more cost effective method of fitting linear transducers as deep hole drilling can be particularly expensive.

Now Rota, using patent applied for technology, have designed a linear transducer that can be simply mounted externally onto a standard carbon steel cylinder wall. The cylinder position is measured when a magnet, pre-fitted in the piston, is moved by hydraulic pressure.

Conventional steering cylinders can now be monitored by a linear transducer.

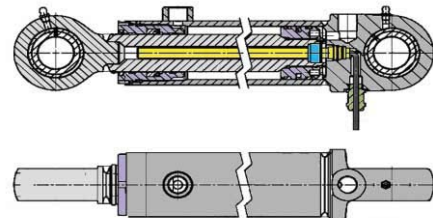
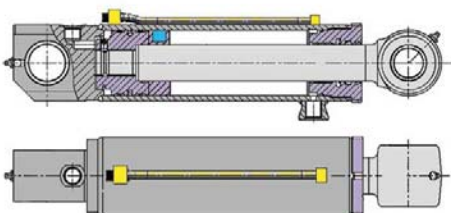
All our existing solid state Hall Effect linear transducers have improved accuracy options and reduced dead lengths for even easier fitting into short pin to pin length cylinders.

We also have a totally new combined linear & pressure transducer, capable of monitoring long strokes with working pressures up to 720 bar (10,500 psi).

A new explosive atmosphere, intrinsically safe, ATEX and IEC Ex approved linear transducer for surface and underground applications.

## Non-Contact, Absolute, Hall Effect Sensors

- LA/B series is the smallest active transducer on the market, using a "clip in" mounting it does not change the pin to pin dimension on existing cylinder designs
- Optional 5 VDC powered transducer gives 4.5 VDC output, allows customer to upgrade from resistive type transducers to non-contact Hall Effect without upgrading the mobile equipment electronics
- Submersible sensors capable of 6,000m ocean depths
- Sensors from 60mm up to 15m length, and working pressures of up to 720bar
- ATEX , IEC approved sensors for hazardous area applications
- Internal and External cylinder designs and Independent Mount.
- Dual circuit and radial versions
- All models give an absolute signal from inbuilt electronics



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# 2 Development

## Reed Switch Technology

Introduced Reed Switch technology in the early 90's for mining then into offshore and subsea engineering.

Reed switch technology has good vibration resistance and well sealed. With their low power input they are ideal for Intrinsically Safe and battery powered applications.

2 wire, 4 – 20 mA loop powered options.  
Reed switch technology is limited by 1.5mm resolution.

## Hall Effect Technology

The Hall Effect was introduced in the early 00's.

Simple and robust construction, proved to be very reliable.

Resolution improves > 10x compared to reed technology.

Very fast position update.

Current package size so small it does not increase the critical pin to pin dimension of most existing cylinder designs, opens the door to more applications.

Microprocessor based sensor allows great design flexibility.

High volume capability.

Automation drives down cost, improves quality.



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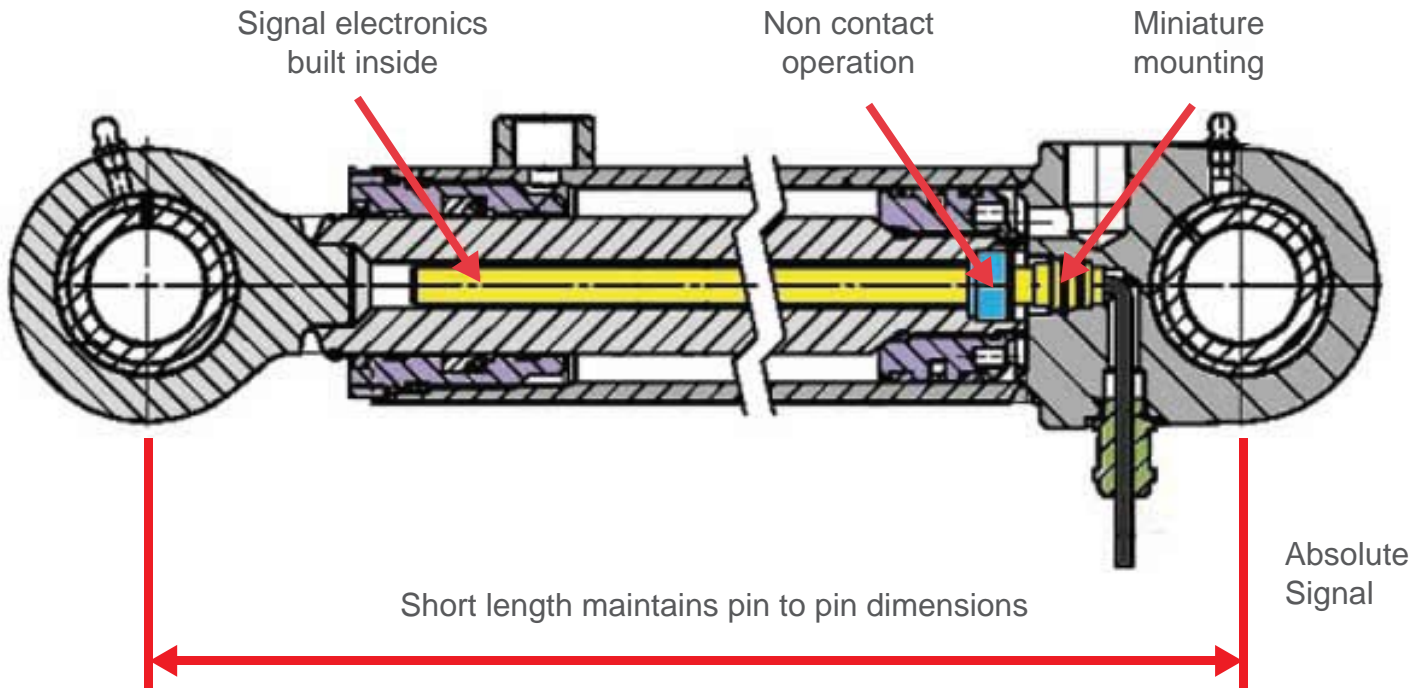
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# Integrated Transducer

## Overview



Analogue or digital outputs -  
High cycling and vibration life

## Mounting Options

Screw in heads



Quick mount connectors



Push fit / Grubscrew mounting



Pre assembled Connector



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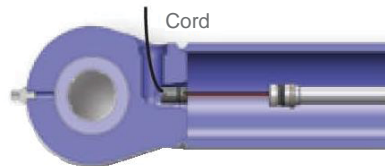


# Integrated Mounting

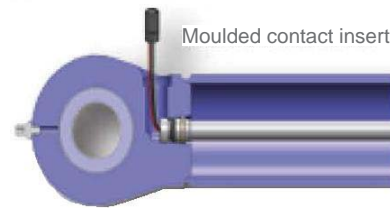
The LA Transducers use the latest version of even more compact electronics, all packaged in a very cost effective, high tensile aluminium enclosure rated to 325 bar (4750psi) operating pressure. Its cost effective design makes it ideal for replacing limit switches, brackets and the associated cables, potentiometers etc where the 5 volt supply option is ideal.

The LAC "clip-in" version is extremely compact and excellent for welded cylinders with eyes, clevises etc requiring no increase in the cylinder pin to pin mounting length. Together with the prewired M12 connector the "clip in" transducer design allows quick cost effective use in volume cylinder manufacture.

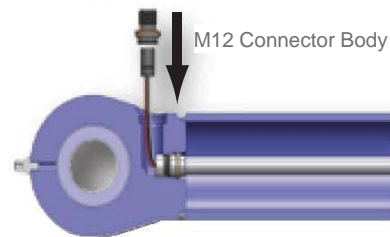
## Quick assembly M12 connector



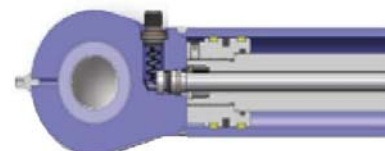
Attach a length of cord to the inserts 1.5mm holes, feed cord through the machined hole to pull the transducer through.



Pull the insert all the way through the cylinder, then push transducer into place until it clicks in.



Push the metal M12 body over the insert



Align connector and push into recess and secure into place with standard circlip



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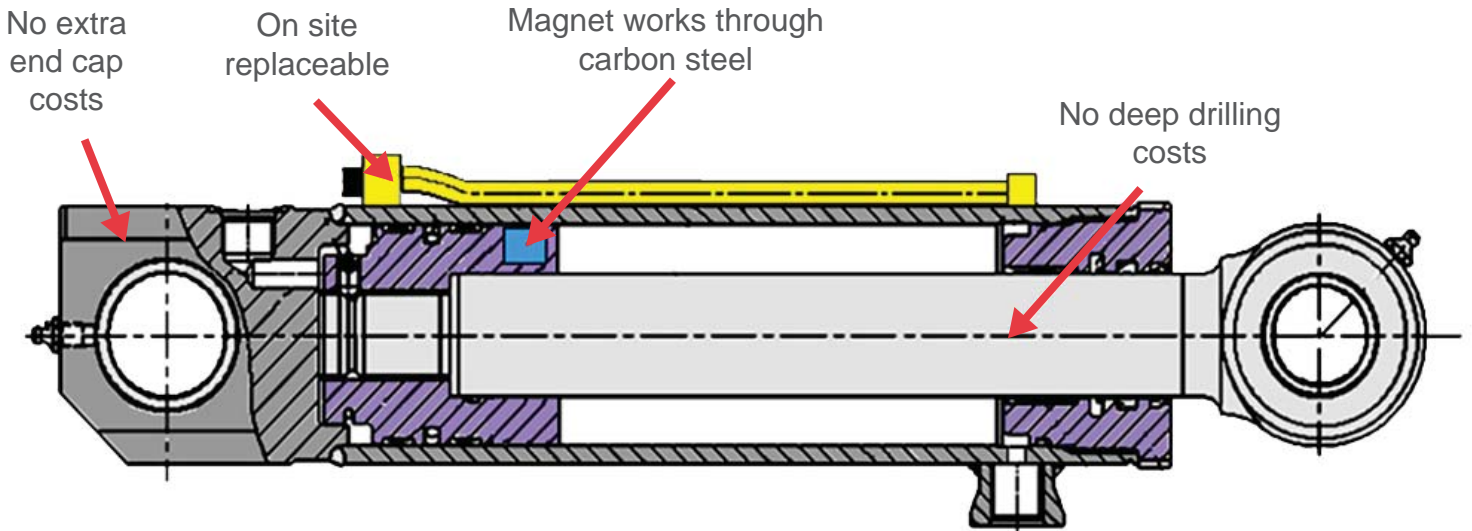


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# External mounted transducer



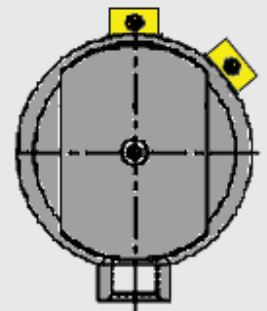
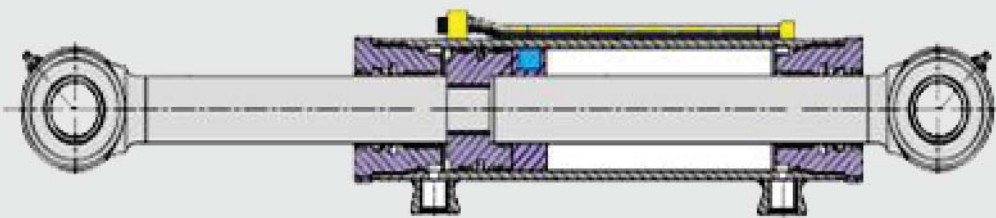
Maintains piston rod and end cap strength

Absolute non contact operation  
High cycling and vibration resistance

Steering Cylinders

Long Stroke Cylinders

Redundancy



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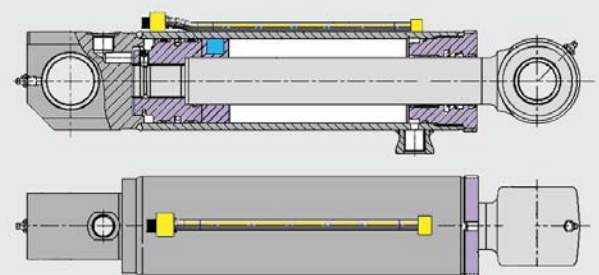


# External Mounting

Patent applied for technology, eliminates the need for a gun-drilled piston rod. A transducer is mounted on the cylinder barrel and detects the position of the cylinder's piston by sensing a magnetic field formed by a permanent magnet embedded in the piston. As the piston rod extends or retracts, the magnetic field propagates through the standard carbon steel cylinder wall to communicate with the linear transducer.

There are several advantages that stem from this technological approach:-

- The cost of achieving a smart cylinder is reduced by eliminating the need for gun-drilling the piston rod and end cap machining.
- Accuracy of the transducer is typically +/- 0.5mm (0.02 in) – which is more than adequate for most mobile equipment.
- The transducer is easily field replaceable.
- The cylinder is stronger, easier to assemble, install and service.
- The cylinders can be supplied with magnets already fitted, so that if the stroke sensing function is required, the transducer can be added at a later date.
- Full stroke monitoring of Steering cylinders.
- Two transducers can be used for redundancy on safety critical applications



No deep drilling

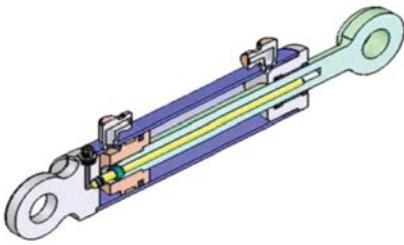
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### Model LA/LB

Internal mounting, Mobile equipment

10mm diameter

Strokes: LA - up to 2m  
LB - up to 3m

Pressure: LA - 325bar  
LB - 375bar

Temp up to: -40 to + 105C  
-40 to + 221F

Key Benefits: Low cost, compact



### Model LM

Internal mounting, Mobile equipment

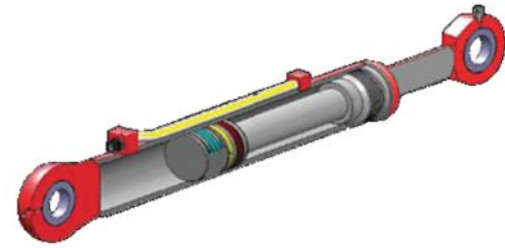
10mm diameter

Strokes: Up to 3m

Pressure: 375bar

Temp up to: -40 to + 105C  
-40 to + 221F

Key Benefits: Very compact, Robust



### Model ELA

Internal mounting, Mobile equipment

10mm diameter

Strokes: Very long  
Steering Cylinders

Key Benefits: Very low installation costs  
Field replaceable  
Dual redundant option

## Electrical

Outputs Voltage, Current, PWM & Digital  
5V input option

Resolutions: 0.5mm  
0.3mm

Resolutions: 0.5mm  
0.3mm

Resolutions: 1.0mm  
0.5mm

## Mechanical

Enclosure material:

- LA - Aluminium
- LB - St. Steel 304L

Mounting options:

- Clip in heads
- Screw in heads

Enclosure material:

- St. Steel 304L
- All welded design

Mounting options:

- Push in head
- Screw in heads

Enclosure material:

- Aluminium

Mounting options:

- Angled head
- Flat head
- Parallel offset head

Connectors or Cables  
Ingress Protection up to IP69

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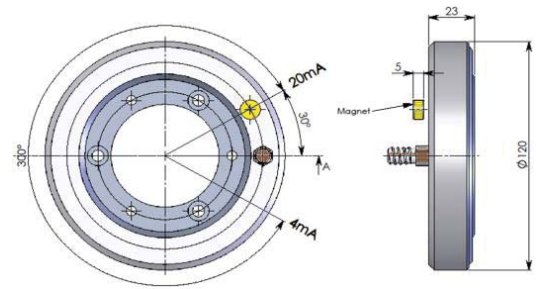
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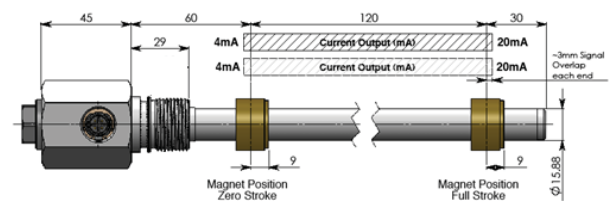


# Special Designs

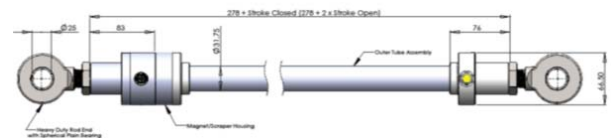
- Combination namur proximity switch and linear transducer in one package
- Combination linear position, pressure and temperature transducer
- Dual output transducers for redundancy
- Higher temperature capability – LT transducer rated up to 150° C
- Flexibility to handle special outputs
- 90° and 360° radial transducers
- Higher pressure ratings
- Long strokes
- ATEX, IEC or CSA certified for explosive atmospheres
- High ingress protection – subsea
- Special design mountings
- Higher resolutions



Radial



Dual circuit



Independant Mount



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