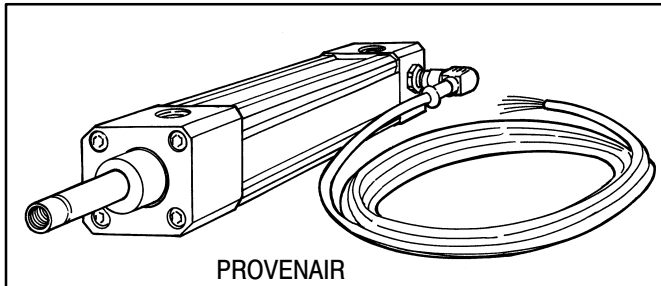


OPERATOR'S MANUAL

READ THIS MANUAL CAREFULLY BEFORE INSTALLING, OPERATING OR SERVICING.
KEEP THIS DOCUMENT FOR FUTURE REFERENCE

RELEASED: 11-13-98
REVISED : 6-21-10
(REV: 02)

PROVENAIR CYLINDER "TN" SERIES WITH "LRT" POSITION SENSING



TECHNICAL SPECIFICATIONS

PROVENAIR SERIES (1-1/2" - 4" bore) WITH LINEAR RESISTIVE TRANSDUCER

TYPE: NFPA Square head, medium bore sizes,
double-acting, medium to heavy duty.
PRESSURE RANGE: 2-250 PSIG (0-17 BAR)
BORE SIZES: 1-1/2", 2", 2-1/2", 3-1/4", 4"
STROKE: 2" to 24"
THRUST RANGE: 1-1/2" thru 4" Up to 2,513 lbs.
OPTIONS: Cushioned and non-cushioned, various mounts
CYLINDER PARTS MANUAL: Part No. 119999-30
STROKE: 24" (600mm) Max.
ROD DIAMETER: 5/8" or 1"
RESOLUTION: Infinite
LINEARITY: $\pm 1.0\%$ (or less) of full stroke
REPEATABILITY: 0.0001
SIGNAL: 0 - 30VDC
MAXIMUM SPEED: 50" / sec. pneumatic
20" / sec. hydraulic
NOMINAL RESISTANCE: 1 Kohm / stroke inch
TEMPERATURE: - 25°C to 100°C
MAGNETIC INTERFERENCE: None
INTERFACE: NEMA 4, Euro 12 mm, 5 pin

GENERAL DESCRIPTION

ARO Cylinders are pneumatic devices which convert compressed air into linear motion. Cylinders are used in light to heavy duty industrial applications such as: clamping, pushing or pulling motion, product assembly, stamping and tensioning.

Sensing function:

The Linear Resistive Transducer probe is completely inside the cylinder piston rod. There are no external parts (except the connector), therefore the Provenair LRT is NFPA interchangeable.

A floating contact, attached to the piston, moves along the resistive and collector strips on the probe as the cylinder reciprocates. The linear resistance directly proportions the output voltage, indicating the position of the contact.

Using a controller with an Analog card, cylinder position can be infinitely determined. Cylinder position can be controlled using a proportional valve.

Resolution is the smallest detectable position change measurable. The Provenair LRT is infinite, thus the Resolution is limited by the electronics used (a 12 bit, 4096-part controller would divide the stroke into 4096 parts. Using 10 VDC input voltage, the smallest detectable increment on a 10" stroke will be $10 \div 4096 = 2.4$ millivolt = 0.0024).

Linearity is the reference to the maximum deviation of the output voltage to a straight line.

Repeatability is the LRT ability to output the same voltage at each unique position every time.

WARNINGS AND PRECAUTIONS

WARNING EXCESSIVE AIR PRESSURE.

Do not exceed maximum working pressure which can result in serious injury or property damage. Use an air regulator to limit pressure to the cylinder.

WARNING PRESSURIZED CYLINDERS CAN CAUSE INJURY.

De-pressurize the system before cleaning, inspection, re-lubrication, servicing or disassembly to prevent injury from accidental cycling.

WARNING PINCH HAZARD. Keep clear of moving cylinders and fixtures to avoid injury.

CAUTION PROTECT THE TRANSDUCER FROM EXCESSIVE VOLTAGE OR SPIKES. Can cause improper transducer functioning.

SERVICE KITS / REPAIR PARTS

Selected parts are provided in kit form. The ARO Parts List / Service Instructions contain Repair Kit information and complete Service Parts information and are available upon request.

Refer to the Service Kit Directory for Valves and Cylinders Form 9326-M. Available from ARO.

AIR & LUBE REQUIREMENTS

AIR PRESSURE - Limited to 250 psig (17 bar) Max.

Install an air regulator to control the operating pressure, insure smooth operation and conserve energy.

Proper moisture removal and filtration of contaminants will promote good service life and operation.

LUBRICATION

ARO pneumatic cylinders are lubricated with Accrolube or Magnalube (Teflon based) grease at the factory. This lubrication should provide satisfactory operation and cycle life. The use of lubricated air can help to extend the cycle life.

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INSTALLATION

Cylinders must only be installed by a competent technician who understands the system requirements, mechanical principles and equipment involved.

NOTE: Improper alignment of the cylinder can cause excessive wear on the rod seals. Check rod alignment to the machine parts in both the retracted and extended positions.

- Install the Air Regulator as close as practical to the cylinder.
- Keep cylinder ports plugged or covered prior to assembly to prevent contamination which can contribute to premature failure.
- Use PTFE tape on the air fittings to prevent leakage.

OPERATION

Improper application, installation, service or maintenance of ARO Cylinders can cause bodily injury or shortened product life. Contact the factory for questions concerning special applications.

CYLINDERS MODELS WITH CUSHIONS

This feature can increase cylinder life, however, it should not be used exclusively to decelerate heavy loads. Cushioned cylinder models are equipped with adjustable needle valves in the head end for easy, precise adjustment of the cushion effect.

Theory of Operation: The cushion seal is a "floating" "O" ring which seals on a cushion boss, a part of the piston assembly. As the cushion boss enters the cushion "O" ring located in the head or cap, the main air exhaust flow is blocked and forced through a bypass passage containing the needle valve. The cushion effect is created by the resulting back pressure. The cushion needle is used to vary the restriction (back pressure) and control the degree of cushioning.

Upon application of the air in the opposite direction, the incoming air forces the "O" ring cushion seal towards the inside of the cylinder and acts as a check valve in the free flow direction. Incoming air flows around the O.D. of the seal, providing full flow to the piston face with little or no pressure drop for quick stroke reversal.

CUSHION ADJUSTMENT NEEDLE

- Turn **CLOCKWISE TO INCREASE** cushion effect.
- Turn **COUNTERCLOCKWISE TO DECREASE** cushion effect.

ADJUSTMENT NOTE: DO NOT ROTATE CUSHION ADJUSTMENT NEEDLE COMPLETELY CLOCKWISE; Complete shutoff of the cushion adjustment needle valve will prevent the cylinder from completely extending or retracting.

MAINTENANCE

Periodic cylinder maintenance should be performed to insure maximum service life.

- Clean the air filter/ regulator bowl regularly. Relieve system pressure, empty the contents of the bowl and clean or replace the filter element.
- Check the fluid level in the lubricator regularly, replenish with the appropriate air line lubricant.

SERVICE

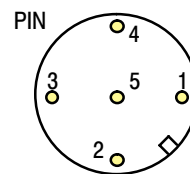
Disassembly and reassembly should be done in accordance with instructions provided in the service instructions.

- Metallic parts should be cleaned with denatured alcohol.
- Rubber parts should be cleaned with soap and water.
- Clean transducer parts with denatured alcohol.
- Cleaned parts should be rinsed and dried using low pressure air.
- Replace any parts which are worn or damaged. Selected parts and seals are available in repair kit form.
- Lubricate moving parts and seals.

NOTE: Do not attempt to grip the piston rod with pliers or wrenches which can cause scouring. Nicks or scratches on the piston rod will damage the rod seals.

Do not attempt to remove piston from piston rod, it must be replaced as an assembly.

CONNECTOR WIRING GUIDE

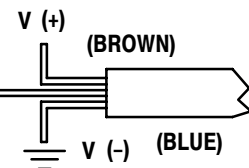


NEMA 4 12 mm Male Eurostyle

Pin 1	+ Input (Brown)
Pin 2	Not Used
Pin 3	Ground (Blue)
Pin 4	Signal (Black)
Pin 5	AGND

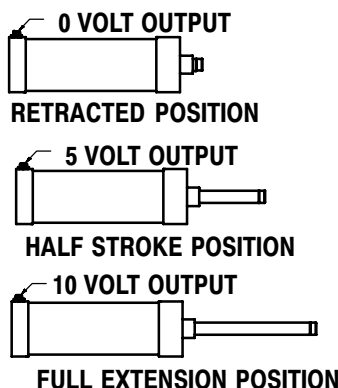
VIEW OF CABLE FROM CYLINDER

SIGNAL
OUTPUT
TO
PLC, PC
(BLACK)



EXAMPLE:

10 VDC SUPPLY, 8" STROKE CYLINDER



POSITION FORMULA

$$\text{Position in volts} = \frac{\text{Supply Voltage}}{\text{Stroke Length}} \times \text{Desired Length}$$

$$P_v = \frac{V_s}{L} * X$$

