Specializing in Your Requirements for

Amusement Industry

Position Sensors
Position Control Devices
Position Control Systems
Position Feedback Cylinders
1/2 Bore & Larger
Custom Engineering

Medical Industry

Aviation Industry

Animation Industry

Industrial Machines
Market Place

Marine Industry

Custom Actuator Products, Inc.

2500 Niagara Lane • Plymouth, MN  55447
Phone: (763) 525-0844 • Fax: (763) 525-0845
The CAP LRT is a uniquely designed, 3-wire, position sensing device manufactured in the USA that uses a simple resistive element and wiper to provide an analog output signal of a cylinder's position. The CAP LRT can be installed in a cylinder or used externally to meet your most demanding application. There are a number of LRT styles. The two primary family types are:

- The Mini-LRT for small bore / small rod cylinders
- The LRT for larger rod cylinders

Only the CAP Motion Control Division can provide these advantages.

- System electronics that can be connected through any end-cap port position to allow all cylinder mounting styles.
- An LRT that adds as little as 1" to the length of a standard cylinder.
- Stroke lengths to 120" available in 1/8" increments.
- Mini-LRT transducers that fit into piston rods as small as 5/16" diameter.
- Complete "Smart" cylinders in bore sizes from 1/2" and larger.
- Designs for every style cylinder; mobile, industrial, marine, hydraulic and pneumatic.
- Delivery on most transducers in 7 days or less.

Features Include:

- Slide-off piston wiper carriage.
- Solderless electronic pressure connectors. See page 7 for complete descriptions.
- Long life materials.
- All mounting accessories.
- Analog output that is not affected by temperature changes.

**Basic LRT/Cylinder Arrangement**

**Features Include:**

- Slide-off piston wiper carriage.
- Solderless electronic pressure connectors. See page 7 for complete descriptions.
- Long life materials.
- All mounting accessories.
- Analog output that is not affected by temperature changes.

**External Cylinder Position Feedback Devices**

**Standard LRT 7500 Series pictured**

**7500 LRT Specifications**

- **Fluids:** Hydraulic or Pneumatic (Must be non-water based)
- **Repeatability:** 0.001" (Dependent on stroke)
- **Life:** 500 Million Inches Travel
- **Non-Linearity:** 0.1% (48" Max.) 1% (120" Max.)
- **Max. Stroke:** 120"
- **Pressure Rating:** 5000 psi
- **Impedance Interface:** Greater than 250K Ohms
- **Temp:** Std 160°F Hi-Temp 300°F
- **Signal Output:** Analog
- **Excitation Voltage:** 5 to 50VDC
- **Resolution:** Essentially infinite
- **Wire leads:** 22 AWG Teflon®

**Standard MLRT 7316 Series pictured**

**7316 MLRT Specifications**

- **Fluids:** Hydraulic or Pneumatic
- **Repeatability:** 0.001" (Dependent on stroke)
- **Life:** 500 Million Inches Travel
- **Non-Linearity:** 1% (18" Max.)
- **Max. Stroke:** 18"
- **Pressure Rating:** 5000 psi
- **Impedance Interface:** Greater than 250K Ohms
- **Temp:** Std 160°F Hi-Temp 300°F
- **Signal Output:** Analog
- **Excitation Voltage:** 5 to 50VDC
- **Resolution:** Essentially infinite
- **Wire leads:** 26 AWG Teflon®

*SIGNAL OUTPUT—The Linear Resistance Transducer accepts a DC excitation voltage and provides a linear output. In and of itself, the LRT/MLRT does not provide a scaled output. There will be some dead zone at the retract end and some dead zone at the extend end. To receive a perfect 0-10 vdc or 4-20mA output, some control device must be introduced to the system such as the 5000 series units.*
Linear Resistance Transducers

Internal cylinder position feedback devices

**Model LRT 7500-XXY-CAP1**
Features a flange arrangement that is installed from the inside of the cylinder end cap by using a set screw. This method of installation eliminates the extension out the back of the cylinder. The flange head is .984 diameter with a length of 1.26 inches. The deadband is flexible but typically .240 inches. Unit is supplied with wiper, snap ring and flange O-ring/Back Up Seal. The electrical connection is three blunt end 22 AWG wires. The wire gauge is optional. This unit seals hydraulic pressure at the flange.

**Model LRT 7500-XXY-MSSW**
Features a flange arrangement that is installed from the inside of the cylinder end cap by using a set screw. Flange has 3/4 - 16 thread with "O" ring seal. Flange body extends 2 inches outside the cylinder face. There are several wiper options including .984" and 1.29" diameter. The null zone dimension is optional. The two standards are 1.50" and 2.00". This unit seals hydraulic pressure at the flange. The plug interface is the Custom Actuator BH series.

**Model LRT 7500-XXY-CAT**
Features a smaller flange than the MS style. Flange has 1/2-20 thread with "O" ring seal. Flange body extends only 1 inch outside the cylinder face. The null zone dimension is optional. The electrical connection is three blunt end 22 AWG wires. The wire gauge is optional. This unit seals hydraulic pressure at the flange.

**Model LRT 7500-XXY-TJB**
Features a flange arrangement that is installed from the inside of the cylinder and cap eliminating any extension outside the rear cylinder face. Flange has 1/2-20 thread with "O" ring seal. The electrical connection is three blunt end 22 AWG wires. The wire gauge is optional. This unit seals hydraulic pressure at the flange.

**Model LRT 7500-XXY-SUN**
Features a flange arrangement that is installed from the inside of the cylinder end cap by using a set screw. This method of installation eliminates the extension out the back of the cylinder. The flange head is .998 diameter with a flange length of only .93 inches. This unit requires a pressure connector on the surface of the cylinder as it does not seal pressure.

**Model MLRT 7316-XXY-NANO**
Features a flange arrangement that is installed from the inside of the cylinder end cap by using a set screw. The flange head is .998 diameter with a flange length of only .93 inches. This unit requires a pressure connector on the surface of the cylinder as it does not seal pressure.

**Ordering Information**
LRT 7500-XXY-BSW is a typical cap position sensor.
LRT is the family style. 7500 indicates the size of rod gundrill required to install the transducer. The XX is the whole inches of stroke. The Y is the fractional inches of stroke in 1/8" increments. The BI is the flange style for cylinder installation. The SW indicates the standard slide-off wiper arrangement. There are many options not shown here. Contact customer service for additional models, installation information, dimensional information and technical specifications. We are also available to assist you in your unique-project requirements.
XLRT Externally Mounted Transducers

Solderless electronic pressure connector
- Model #S/EPC-HYSQSN
- BH cable interface
- 5000 psi
- No solder connections required when installing LRT
- Unit is 1" square and is provided with 4 bolts

Solderless electronic pressure connector
- Model #S/EPC-HYSN-RECT
- BH cable interface
- 5000 psi
- No solder connections required when installing LRT
- Unit is 0.75" by 1.25" and is provided with 4 bolts

Solderless electronic pressure connector
- Model #S/EPC-HY
- BH cable interface
- 5000 psi
- No solder connections required when installing LRT
- Unit has 9/16- 18 thread

Solderless electronic pressure connector with conduit threads
- Model #S/EPC-HYC
- BH cable interface
- 5000 psi
- No solder connections required when installing LRT
- Unit has 9/16-18 thread

MLRT/EPC mini-interface cables
- 3-pin female
- 6', 15', and 20' lengths standard
- Interfaces with ECM and RCM model XLRT
- Order #MLR06, MLR15, MLR20
- Standard wire gauge is 22 AWG
- Additional lengths also available

Mini electronic pressure connector
- Miniature 3-pin connector interface
- Model #EPC-Mini
- NH cable interface
- 5000 psi
- Soldered connection to MLRT required
- Used for 1/2" bore smart cylinders
- Unit has NAE3 thread

Mini electronic pressure connector
- Model #EPC-Mini-SQ
- NH cable interface
- 5000 psi
- Soldered connection to MLRT required
- Used for 1/2" bore smart cylinders
- Unit has NAE3 thread

Mini electronic pressure connector
- Model #EPC-Mini
- NH cable interface
- 5000 psi
- Soldered connection to MLRT required
- Used on applications where pressure is sealed elsewhere

Mini electronic pressure connector waterproof
- Miniature 3-wire
- Used for all cylinder bore sizes
- Order #EPC3-Mini-H20
- 3-wires available for termination to electronics
- Can be ordered with strain relief
- Unit has NAE3 thread

LRT/EPC interface cables
- 3-pin female
- 6', 12' and 20' lengths standard
- Straight Order #EPC06, EPC12, EPC20
- Right Angle Order #EPC06L, EPC12L, EPC20L
- Standard wire gauge is 22 AWG
- Additional lengths also available

XLRT interface cable
- 3-pin female
- 6', 10', and 20' lengths standard
- Interfaces with ECM and RCM model XLRT
- Order #XL06, XL10, XL20
- Standard wire gauge is 22 AWG
- Available lengths also available

MLRT/EPC mini-interface cables
- 3-pin female
- 6', 15', and 20' lengths standard
- Straight Order #MLR06, MLR15, MLR20
- Right Angle Order #MLR06L, MLR15L, MLR20L
- Standard wire gauge is 24 AWG
- Additional lengths also available

Connectors Cables

Miniature External Mount XLRT
A specially designed linear resistance transducer for use where space is at a premium.

Features
- Ball coupling on rod to eliminate side loads
- Adjustable mounting feet
- Linearly better than 0.1%
- Strokes from 1" to 4"
- 3" square housing

Spherical Eye Mount XLRT
An external linear resistance transducer designed for more robust applications.

Features
- Spherical eyes both ends
- Wide angle of free movement ±12.5 degrees
- Linearity better than 0.1%
- Strokes from 3" to 30"
- 1.4" diameter housing

LRT interface cable
- 3-pin female
- 6', 10', and 20' lengths standard
- Interfaces with ECM and RCM model XLRT
- Order #XL06, XL10, XL20
- Standard wire gauge is 22 AWG
- Available lengths also available

Electronic pressure connector—waterproof
- Miniature 3-wire
- Used for all cylinder bore sizes
- Order #EPC3-Mini-H20
- 3-wires available for termination to electronics
- Can be ordered with strain relief
- Unit has NAE3 thread
SERIES 5000 Open Loop Control Devices

The Cyclon Series 5000 open loop controllers provide either an analog position output signal or two trip points when combined with a Custom Actuator Products Linear Position Transducer. The small size of the Series 5000 and simple electrical hook-up make this linear position motion control device very easy to install and operate. Each unit is provided with an Installation manual.

The Set Point model offers the advantage of infinitely adjustable, dual trip points anywhere along the stroke of the cylinder rather than only two fixed points as provided by end-of-stroke models. The set-point model is available with either 2-Trac, 2-relay or 2-transistor outputs. Control units are designed with either a single turn, set-point potentiometer or an optional multi-turn potentiometer for applications that require more resolution. Series 5000 also has a non-scalable, 0-10 Vdc analog output.

The Analog Position Indicator model offers you a scalable output that can be passed to a meter, PLC or other device. Standard outputs are -10 to +10 Vdc, 0 to +10 Vdc, and 4 to 20mA. A variety of AC and DC power input options are available. The system’s output is scalable over the stroke of the cylinder providing a full scale linear position output between two points. A unique feature of this control system provides for scaling between two selected points that do not need to be end-of-stroke.

The Scalable Analog Output Controller with Digital Meter provides convenient digital display of scaled output signal. Display can be either 0-10 Vdc or 4-20mA. Meter is 0.875” x 2.000”. To order indicate an “M” after the Standard Model code.

Series 5000-5012 and 5019-5029 Specifications

<table>
<thead>
<tr>
<th>ORDER NO.</th>
<th>OUTPUT SPECIFICATION - SET POINT</th>
<th>INPUT POWER</th>
</tr>
</thead>
<tbody>
<tr>
<td>5013</td>
<td>RELAY (2) 3 AMP @ 28VDC</td>
<td>110V 60Hz .1 AMP</td>
</tr>
<tr>
<td>5014</td>
<td>TRAC (2) 2 AMP (60-115VAC)</td>
<td>120Vac 60 Hz .1 AMP</td>
</tr>
<tr>
<td>5015</td>
<td>TRANS. (2) 10mA</td>
<td>12 or 24Vdc .1 AMP</td>
</tr>
</tbody>
</table>

OUTPUT SPECIFICATION - ANALOG OUTPUT:

- 0 to 10V, 1mA max. output current (10K ohm impedance MIN.)
- -10 to +10V, 1mA MAX. output current (10K ohm impedance MAX.)
- 4 to 20mA, into 500 ohm impedance MAX.

POWER INPUT REQUIREMENTS:

- AC (all units) 115V 60Hz .1 AMP
- DC (set-point systems) 15VDC 1 AMP
- DC (indicator systems) 15VDC and 15VDC 50mA each supply

ENCLOSURE DIMENSIONS:

- 3" H x 5.5" W x 4" D

MOUNTING HOLES: 3 9/16" x 2 7/8" ctc ctc 4 places

SHIPPING WEIGHT: WITH METER
- 2 lbs.
- 3 lbs.

INPUT FUSE: .250 AMP

ELECTRONICS TEMPERATURE OPERATING RANGE:

- 40° F to 130° F

Model 5013-5016 Specifications

<table>
<thead>
<tr>
<th>ORDER NO.</th>
<th>OUTPUT SPECIFICATION - SET POINT</th>
<th>INPUT POWER</th>
</tr>
</thead>
<tbody>
<tr>
<td>5013</td>
<td>RELAY (2) 5 AMP @ 115VAC</td>
<td>110V 60Hz .1 AMP</td>
</tr>
<tr>
<td>5014</td>
<td>TRAC (2) 2 AMP (60-115VAC)</td>
<td>120Vac 60 Hz .1 AMP</td>
</tr>
<tr>
<td>5015</td>
<td>TRANS. (2) 5mA</td>
<td>12 or 24Vdc .1 AMP</td>
</tr>
</tbody>
</table>

POWER INPUT REQUIREMENTS:

- AC (all units) 120Vac 60 Hz .1 AMP
- DC (Models) 12 or 24Vdc .1 AMP

ENCLOSURE DIMENSIONS:

- 1.31" H x 5.50" W x 3.25" D

SHIPPING WEIGHT: 12 lbs.

INPUT FUSE: 500 AMP

OUPUT SPECIFICATION - SET POINT:

RELAY (2) 3 AMP @ 28VDC

POWER INPUT REQUIREMENTS:

- AC (Models) 120Vac 60 Hz .1 AMP
- DC (Models) 12 or 24Vdc .1 AMP

INPUT FUSE: 500 AMP

ELECTRONICS TEMPERATURE OPERATING RANGE:

- 40° F to 130° F

IMPORTANT NOTE:

The series 5000 unit or similar device has 2 features that are important to the long life and accuracy of your feedback system.

1) It provides a regulated dc voltage to the LRT/MLRT and 2) It provides a high impedance interface of 1 Megaohm limiting the current draw through the wiper contacts.
SERIES 5030 Closed Loop Control

The CAP 5030 series signal tracking controllers (STC) are designed to provide accurate hydraulic or pneumatic, closed loop motion control. The STC requires a 4 to 20mA or a 0 to 10Vdc analog signal to track. A 0 to 10Vdc or 4 to 20mA analog signal is available for transmission to a PLC or other host device. The STC system includes a proportional valve and a position feedback cylinder to give you a complete closed loop package. Units can be ganged for multiple-axis applications.

The STC 5030 series is perfect for closing the loop from an output on a PLC or other host device where continuous position control and information is desired.

When ordering a complete closed-loop, signal tracking, internal position feedback transducer package, specify the following:

- Cylinder’s psi rating and mounting style
- STC 5030 series model number
- Proportional valve’s model number
- Cable length from smart cylinder to electronics.

SERIES 5030 Signal Tracking Controls

Easy to Install

Output : Offset (O)  Sets minimum stroke for positioned output
Output : Gain (G)  Sets maximum point for positioned output
Input : Offset (O)  Calibrates minimum point for transducer input
Input : Gain (G)  Calibrates maximum point for transducer input
PID : Integral (I)  Seeks target point in pneumatic systems
PID : Derivative (D)  Responds to acceleration and deceleration
PID : Gain (K)  Adjusts amount of cylinder response to input signal change

You program the CAP 5030 series by simply adjusting a set of 25-turn potentiometers. No computer programming knowledge is needed to operate the Series 5030 controller.

Simple to Program

Program Access Side

Example of Typical 5033 System Configuration

Series 5030 Ordering information

<table>
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</thead>
<tbody>
<tr>
<td>5030</td>
<td>9 to 36Vdc</td>
<td>0 to 10Vdc</td>
<td>0 to 10Vdc</td>
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<tr>
<td>5031</td>
<td>115Vac</td>
<td>0 to 10Vdc</td>
<td>0 to 10Vdc</td>
<td>H</td>
</tr>
<tr>
<td>5032</td>
<td>9 to 36Vdc</td>
<td>4 to 20mA</td>
<td>4 to 20mA</td>
<td>H</td>
</tr>
<tr>
<td>5033</td>
<td>115Vac</td>
<td>4 to 20mA</td>
<td>4 to 20mA</td>
<td>H</td>
</tr>
<tr>
<td>5034</td>
<td>9 to 36Vdc</td>
<td>0 to 10Vdc</td>
<td>4 to 20mA</td>
<td>H</td>
</tr>
<tr>
<td>5035</td>
<td>115Vac</td>
<td>0 to 10Vdc</td>
<td>4 to 20mA</td>
<td>H</td>
</tr>
<tr>
<td>5036</td>
<td>9 to 39Vdc</td>
<td>4 to 20mA</td>
<td>4 to 20mA</td>
<td>P</td>
</tr>
<tr>
<td>5037</td>
<td>115Vac</td>
<td>4 to 20mA</td>
<td>4 to 20mA</td>
<td>P</td>
</tr>
</tbody>
</table>

Hydraulic System Diagram

Series 5030 Controller

Program Access Side

Terminal Strip View for DC Model

Hydraulic System Diagram

Proportional Valves

Hydraulic 12Vdc
NG3-Mini Valve
DC0-NG6
DC5-NG10

Pneumatic 12Vdc
1/8”
3/8”
Custom Actuator Products, Inc.

Electronic Motion Control Division

• Linear Position Transducers
• Open Loop Control Modules
• Closed Loop Control Modules
• Custom Designed Products
• Position Transducers provided in any stroke increment desired
• Interface Cables
• Underwater Cables
• Electronic Pressure Connectors to 5000 psi

Cylinder Division

• Small Bore Cylinders 1/2" & greater
• Small Bore Position Feedback Cylinders 1/2" & greater
• Hydraulic Cylinders to 5000 psi
• Pneumatic Cylinders
• Stainless Steel Cylinders
• Aluminum Cylinders
• Welded Cylinders
• Titanium Cylinders
• Miniature Valve Pad Cylinders
• Custom Designed Cylinders

About Custom Actuator Products

Custom Actuator Products is based in Minneapolis, MN. We are innovators in electronic motion control devices. We are experts in miniature hydraulic & pneumatic positioning systems. Our products have been utilized in every market segment, including

• Military
• Medical
• Injection Molding
• Agriculture
• Automotive
• Marine
• Animation
• Off-Road Equipment

We design and manufacture our own family of linear position transducers. We design and manufacture our own family of control modules. We design and manufacture our own family of cylinders. All our primary products are designed and manufactured by CAP Personnel in the U.S.A.

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