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Operator's Manual

LD 200/300/400/500/600 SERIES LINEAR VARIABLE DISPLACEMENT TRANSDUCERS



One Omega Drive, Box 4047
Stamford, CT 06907-0047
(203) 359-1660 Telex: 996404 Cable: OMEGA FAX: (203) 359-7700



WARRANTY

OMEGA warrants this unit to be free of defects in materials and workmanship and to give satisfactory service for a period of 13 months from date of purchase. OMEGA Warranty adds an additional one (1) month grace period to the normal one (1) year product warranty to cover handling and shipping time. This ensures that our customers receive maximum coverage on each product. If the unit should malfunction, it must be returned to the factory for evaluation. Our Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective it will be repaired or replaced at no charge. However, this WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear or which are damaged by misuse are not warranted. Those include contact points, fuses, and triacs.

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Engineering Assistance: 1-800-872-9436 / 1-800-USA-WHEN

*In CT: (203) 359-1660

And International

CABLE: OMEGA EASYLINK: 62968934

TELEX: 996404 FAX: (203) 359-7700

Return Requests/Inquiries

Direct all warranty and repair requests/inquiries to OMEGA Customer Service Department, telephone number (203) 359-1660. BEFORE RETURNING ANY INSTRUMENT, PLEASE CONTACT THE OMEGA CUSTOMER SERVICE DEPARTMENT TO OBTAIN AN AUTHORIZED RETURN (AR) NUMBER. The designated AR number should then be marked on the outside of the return package.

To avoid processing delays, also please be sure to include:

1. Returnee's name, address, and phone number.
2. Model and Serial numbers.
3. Repair instructions.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. That way our customers get the latest in technology and engineering.

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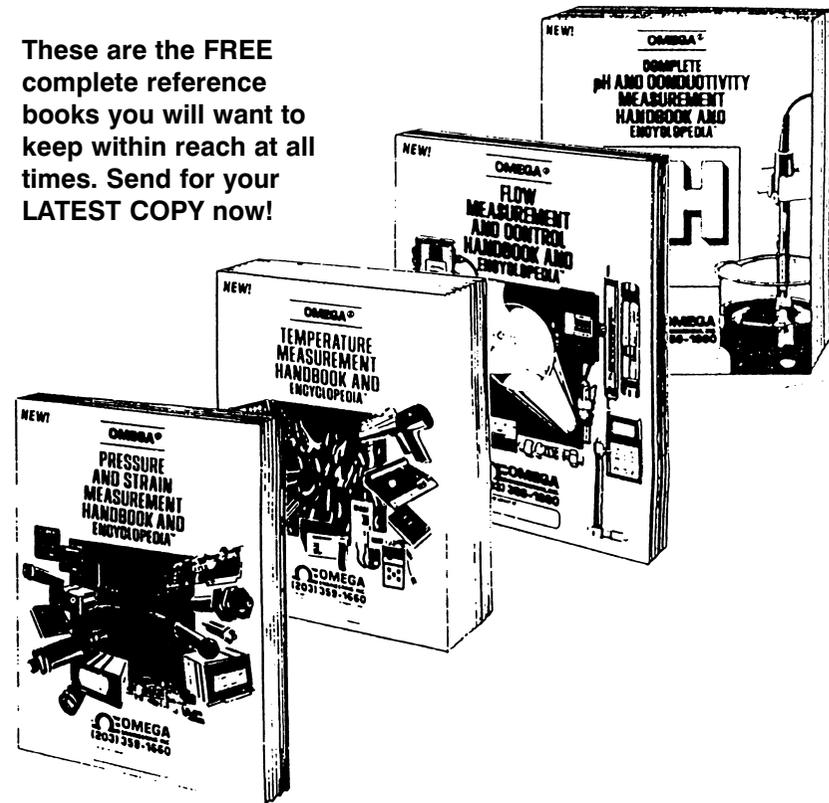
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NOTES

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LD200/300/400/500/600

**LINEAR VARIABLE
DISPLACEMENT
TRANSDUCERS**

NOTES

SECTION 1 DESCRIPTION

The Omega® LD200/300/400/500/600 series of linear variable displacement will measure a wide range of displacement. The following models are available:

| MODEL NO. | RANGE (mm) | FEATURES |
|--|--|--|
| LD200 - 1.25 2.5 5 7.5 10 | 1.25 2.5 5 7.5 10 | RUGGED - Designed for use on machine tools and vehicles where infinite resolution and high repeatability are very important characteristics. |
| LD300 - 15 25 50 100 150 250 300 | 15 25 50 100 150 250 300 | LONG STROKE AC - High accuracy and our longest stroke up to ±:12". Armatures are spring loaded up to 6" length. AC operation provides the highest accuracy and performance. |
| LD400 - 1 2.5 5 | 1 2.5 5 | MINIATURE DC - Supplied with delrin bearings these miniature transducers provide near frictionless motion to detect the smallest displacement. |
| LD500 - 1 2.5 5 | 1 2.5 5 | PRECISION GAUGING - Designed for industrial automation, these transducers have hardened steel shafts, O-ring seals and titanium push rods to give highly repeatable readings. |
| LD600 - 15 25 50 100 150 250 300 | 15 25 50 100 150 250 300 | LONG STROKE DC - These transducers include a custom hybrid IC which provides a mV/mm output. This enables extremely simple setup and operation with standard DC amplifiers. |

NOTES

SECTION 2 UNPACKING

Remove the Packing list and verify that all equipment has been received. If there are any questions about the shipment, please call OMEGA Customer Service Department at 1-800-622-2378.

Upon receipt of shipment, inspect the container and equipment for any signs of damage. Take particular note of any evidence of rough handling in transit. Immediately report any damage to the shipping agent.

NOTE

The carrier will not honor any claims unless all shipping material is saved for their examination. After examining and removing contents, save packing material and carton in the event reshipping is necessary.

SECTION 3 OPERATION

OMEGA'S® LD200/300/400/500/600 displacement transducers are essentially miniature transformers, have one primary winding, two symmetrically wound secondary coils, and an armature core that is free to move along the linear axis in precision bearing guides. A push rod connects the monitored component to the armature core, such that the displacement of that component moves the core off-center.

A voltage is applied across the primary winding and the EMF induced in the magnetic circuit produces corresponding voltages in the secondary windings, which are connected differentially to produce a zero output signal when the armature core is in its central position. When the core is displaced off center in either direction, the efficiency of transformation in the secondary winding on that side is increased and decreases in the other secondary coil. This results in a positive (+ve) voltage output signal when the core moves off center in one direction and a negative (-ve) voltage output in the other direction. The intensity of the output signal is directly proportional to the linear displacement of the core and, hence, of the monitored component.

SECTION 4 TRANSDUCER MOUNTING INFORMATION CLAMPING (DISPLACEMENT TRANSDUCERS)

The clamp should be non-metallic whenever possible. If a metal clamp is used, care should be taken to ensure that it is linear over the entire body of the transducer.

Mounting at one end of the transducer can give rise to non-linearity of five per cent (5%) or worse.

Where possible, all large metal parts should be at least six inches (6") from the transducers at all times to reduce their effect on the transducer.

PROBE TIPS (GAUGING TRANSDUCERS)

Care should be taken not to overtighten the probe tip of the transducer. The tip should be finger tight only and a thread locking compound used on tip to prevent movement. Any overtightening is likely to damage the internal mechanism of the transducer and cause poor repeatability. The tip used should be carefully selected to prevent excessive side pressure. The maximum step height that the tip is to climb should not exceed 0.3R of the tip.

PROBE CLAMPING (GAUGING TRANSDUCERS)

When clamping the probe, care should be taken not to exceed 50Kg point load at any point on the body of the transducer. Exceeding this may cause distortion of the case and result in damage to the internal components.

The most common method of clamping the transducer is to use a split collar or sleeve arrangement to spread the load over as large an area as possible.

CABLE OUTLET (ALL TRANSDUCERS)

Maximum Bend Radius for the cable should not be less than six inches (6") for long life. The cable should be reinforced with Spiroband or a protective sleeve where it is likely to sustain damage.

Support for the cable should be provided at the point where it exists for the transducer body whenever possible.

Continuous flexing of any part of the cable should be avoided.

SECTION 5 LVDT SELECTION FACTORS

Particular attention should be made to the following factors when selecting an LVDT for a specific application:

- Nominal transducer linear stroke (core displacement)
- Non-linearity
- Typical sensitivity
- Primary excitation requirements (voltage and frequency)
- Residual voltage at null core position
- Electrical terminations (wire leads, connector, cable length)
- Environment (temperature, humidity, vibration, etc.)
- Core dimensions and weight

SECTION 6 WIRING

The transducer cables are color coded. Connections should be made as indicated. Refer to Figure 1.

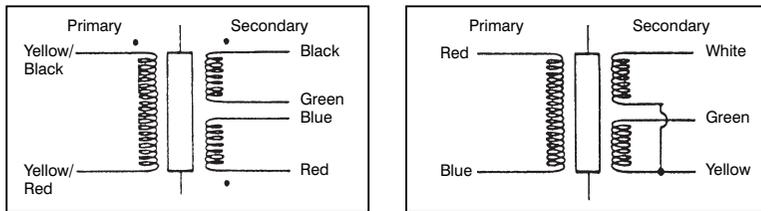


Figure 1. Wiring Diagram

SECTION 7

SPECIFICATIONS

| | LD200 | | | LD300 | | | LD400 | | | LD500 | | | LD600 | | | | | | | | | | |
|--------------------------------------|-------|-----|---|-------|----|----|-------|----|-----|-------|-----|-----|-------|-----|---|----|----|----|-----|-----|-----|-----|---|
| (RANGE ±MM) | 1.25 | 2.5 | 5 | 7.5 | 10 | 15 | 25 | 50 | 100 | 150 | 250 | 300 | 1 | 2.5 | 5 | 15 | 25 | 50 | 100 | 150 | 250 | 300 | |
| MECHANICAL CHARACTERISTICS | | | | | | | | | | | | | | | | | | | | | | | |
| ARMATURE GUIDANCE NONE | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| GUIDED | | | | | | | | | | | | | | | | | | | | | | | |
| BALL BEARING | | | | | | | | | | | | | | | | | | | | | | | |
| ARMATURE | | | | | | | | | | | | | | | | | | | | | | | |
| M2-6g | | | | | | | | | | | | | | | | | | | | | | | |
| CARRIER THREAD | | | | | | | | | | | | | | | | | | | | | | | |
| M3-6g | | | | | | | | | | | | | | | | | | | | | | | |
| M4-6g | | | | | | | | | | | | | | | | | | | | | | | |
| M5-6g | | | | | | | | | | | | | | | | | | | | | | | |
| OR 6-40 UNF | | | | | | | | | | | | | | | | | | | | | | | |
| ARMATURE TYPE | | | | | | | | | | | | | | | | | | | | | | | |
| THREADED CORE | | | | | | | | | | | | | | | | | | | | | | | |
| CAPTIVE ARMATURE | | | | | | | | | | | | | | | | | | | | | | | |
| SPRING ARMATURE | | | | | | | | | | | | | | | | | | | | | | | |
| 19mm | | | | | | | | | | | | | | | | | | | | | | | |
| 20mm | | | | | | | | | | | | | | | | | | | | | | | |
| 25mm | | | | | | | | | | | | | | | | | | | | | | | |
| ENVIRONMENTAL CONDITIONS | | | | | | | | | | | | | | | | | | | | | | | |
| MAX PRESSURE | | | | | | | | | | | | | | | | | | | | | | | |
| AMBIENT | | | | | | | | | | | | | | | | | | | | | | | |
| -20 to 80 | | | | | | | | | | | | | | | | | | | | | | | |
| TEMPERATURE °C | | | | | | | | | | | | | | | | | | | | | | | |
| -40 to 100 | | | | | | | | | | | | | | | | | | | | | | | |
| -55 to 150 | | | | | | | | | | | | | | | | | | | | | | | |
| ELECTRICAL CHARACTERISTICS | | | | | | | | | | | | | | | | | | | | | | | |
| EXCITATION VOLTAGE | | | | | | | | | | | | | | | | | | | | | | | |
| 10 - 24 Vdc | | | | | | | | | | | | | | | | | | | | | | | |
| 1 to 10 V RMS | | | | | | | | | | | | | | | | | | | | | | | |
| 5V RMS | | | | | | | | | | | | | | | | | | | | | | | |
| EXCITATION FREQUENCY | | | | | | | | | | | | | | | | | | | | | | | |
| 1 KHZ | | | | | | | | | | | | | | | | | | | | | | | |
| 2-5 KHZ | | | | | | | | | | | | | | | | | | | | | | | |
| 5 KHZ | | | | | | | | | | | | | | | | | | | | | | | |
| 10 KHZ | | | | | | | | | | | | | | | | | | | | | | | |
| LINEARITY | | | | | | | | | | | | | | | | | | | | | | | |
| TOTAL STROKE | | | | | | | | | | | | | | | | | | | | | | | |
| .25% | | | | | | | | | | | | | | | | | | | | | | | |
| .30% | | | | | | | | | | | | | | | | | | | | | | | |
| SIGNAL CONDITIONERS | | | | | | | | | | | | | | | | | | | | | | | |
| SENSITIVITY - SEE CALIBRATION SHEET | | | | | | | | | | | | | | | | | | | | | | | |
| ZERO BALANCE - SEE CALIBRATION SHEET | | | | | | | | | | | | | | | | | | | | | | | |
| A/C INPUT | | | | | | | | | | | | | | | | | | | | | | | |
| D/C INPUT | | | | | | | | | | | | | | | | | | | | | | | |
| D/C INPUT | | | | | | | | | | | | | | | | | | | | | | | |