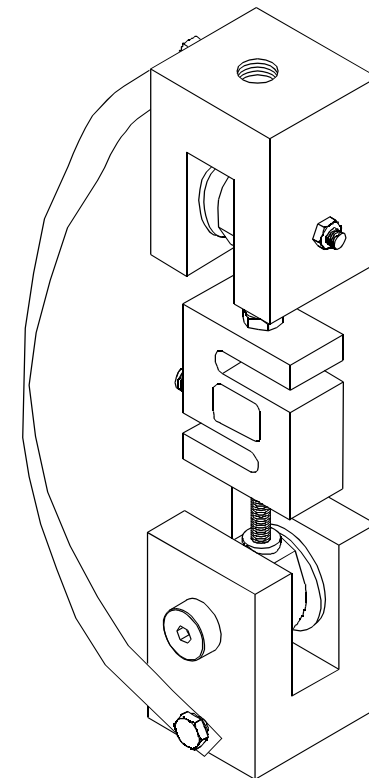


# **HARDY INSTRUMENTS**

A Subsidiary of Dynamic Instruments

## **INSTALLATION & MAINTENANCE MANUAL**



### **HI LPT SERIES LOAD POINT ASSEMBLY**



A Subsidiary of Dynamic Instruments

3860 Calle Fortunada  
92123-1825

San Diego, CA

Phone: 1-(800) 821-5831  
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# **NOTICE**

## **UNPACK WITH CARE**

WHEN UNPACKING, DO NOT DISCARD THE PACKING CASE OR ANY PACKING MATERIAL, UNTIL THE CONTENTS OF THE PACKING CASE ARE INSPECTED AND CAREFULLY COMPARED WITH THE SHIPPING DOCUMENTS.

IF ANYTHING IS UNSATISFACTORY, PLEASE NOTIFY HARDY INSTRUMENTS IMMEDIATELY BY CALLING OR FAXING:

Customer Support Manager  
HARDY INSTRUMENTS  
3860 Calle Fortunada  
San Diego, California 92123-1825

Phone: (800) 821-5831  
(858) 278-2900

FAX: (858) 278-6700

A RETURN AUTHORIZATION NUMBER IS REQUIRED BEFORE RETURNING ANY DAMAGED PRODUCT. CALL THE CUSTOMER SUPPORT DEPARTMENT TO GET THE NUMBER. YOUR COMPANY NAME, ADDRESS, TELEPHONE NUMBER, SERIAL NUMBER OF THE UNIT AND A BRIEF DESCRIPTION OF THE PROBLEM SHOULD BE READY WHEN CALLING.

IN CASE OF DAMAGE DUE TO SHIPPING, NOTIFY THE DELIVERING CARRIER IMMEDIATELY FOR AN INSPECTION.

Please print the unit serial number and model number for reference when ordering parts for the HI LPT Load Point Assembly.

Serial Number:

Model Number:

# INSTALLATION & MAINTENANCE MANUAL

SERIES HI LPT

LOAD POINT ASSEMBLY

TENSION S TYPE  
50 TO 10,000 LB. CAPACITY

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## GENERAL INFORMATION

The Hardy Instruments HI LPT Series Load Point Assembly is designed to provide accurate output in the most demanding applications. The load point assembly is used for suspending vessels and for mechanical scale conversions. The HI LPT consists of plated alloy steel mounting hardware with Teflon<sup>®</sup> insulation which electrically isolates its stainless steel load sensor from stray currents. A braided grounding strap provides an alternative path to ground.

The HI LPT load sensor is a stainless steel “S” type load cell. The “S” type load cell is sealed with a waterproofing compound and supplied with a minimum of twenty (20) feet of cable. The HI LPT is designed to resist angular effects and reduce moment sensitivity. The load point assembly comes standard with C2<sup>®</sup> Second Generation Calibration. This feature allows the load point, to be electronically calibrated without the use of test weights.

The mounting hardware consists of plated steel clevis mounts with nylon insulating washers, Teflon lined rod end ball joints, and a braided grounding strap. The mounting configuration provides for correct alignment of the load and protects the load sensor from stray currents. The HI LPT Series mounting hardware is available in plated alloy steel.

## UNPACKING

Do not remove the load sensor from its packaging until it is time for installation. Although the load sensor is designed for harsh environments, it is a precision instrument and should be treated as such. Often the load sensor will be shipped separately, so be sure that all the parts are received before trying to install the load point assembly.

## SPECIFICATIONS

Excitation (VDC) .....	10 Nom., Max. 15
Rated Output (mV/V) .....	3 ± 0.3
Zero Balance (Max.) .....	1% of Full Scale
Combined Error .....	0.03% of Full Scale
Non-Repeatability .....	0.01% of Full Scale
Creep (Max.) .....	0.03% of Load in 20 Minutes
Temperature Sensitivity (Max.)	
Output .....	0.0008% of load /°F
Zero .....	0.0015% of Full Scale/°F
Resistance	
EXC .....	390 ohms ± 30 ohms
SIG .....	350 ohms ± 3.5 ohms
Operating Temperature .....	-65°F to +200°F or -54°C to +93°C
Compensated Temperature .....	0°F to 150°F or -18°C to +65°C
Safe Overload .....	150% of Full Scale
Safe Side Load .....	100% of Full Scale

- ▶ If the sensor fails this test remove the ground wire and test with only the four live leads.
- ▶ If the sensor now passes the test an insulation problem in the cable is most likely.
- Replace the load sensor.

**ELECTRICAL TERMINATION CABLE COLOR CODES**

EXC+	Red
EXC-	Black
SHIELD	Orange
C2+	Gray
C2-	Violet
SIG+	Green
Sig-	White

**MODEL NUMBERS**

**Stainless Load Cell**

Model #	Capacity		Ship Wght.		Replacement Stainless Sensor
	lbs	kgs	lbs	kgs	
HI LPT50-32C	50	22.7	4	1.9	HI S01-50
HI LPT100-32C	100	45.4	4	1.9	HI S01-100
HI LPT200-32C	200	90.7	4	1.9	HI S01-200
HI LPT300-32C	300	136	4	1.9	HI S01-300
HI LPT500-32C	500	227	8	3.7	HI S01-500
HI LPT750-32C	750	340	8	3.7	HI S01-750
HI LPT1K-32C	1K	454	8	3.7	HI S01-1K
HI LPT1.5K-32C	1.5K	680	8	3.7	HI S01-1.5K
HI LPT2K-32C	2K	907	8	3.7	HI S01-2K
HI LPT3K-32C	3K	1,361	8	3.7	HI S01-3K
HI LPT5K-32C	5K	2,268	9	4.1	HI S01-5K
HI LPT10K-32C	10K	4,536	9	4.1	HI S01-10K

The load point assembly comes disassembled. Be sure that all the parts are contained in the shipment. Check to be sure that all parts of the mounting hardware have been received before installing.

Inspect the box and the load point assembly for any signs of damage that might occur during shipment. Since almost all of the load point assemblies are shipped F.O.B. our factory, such damage is normally the responsibility of the carrier and should be reported to them.

**SITE PREPARATION**

- Any welding should be done prior to installation of the load points.

**PRECAUTIONS**

- If the installation is frequently steam cleaned, place a protective cover over the weighing assembly.
- For the safest and most accurate installations, check rods should be used.
- for a single cell installation where liquids are being weighed, and there is no significant agitation or vibration, bumpers can be used to limit motion due to incidental contact with the vessel. (See Fig. 1)
- For single cell installation where solids are being weighed or liquids are moved due to stirring or mixing of the contents of the vessel, multiple check rods must be used.
- When installing four cells, the load carrying capacity of all four structural support beams must be identical. If one beam of the support structure sags, the load can be thrown onto the two adjacent cells and could possibly overload them.
- Never cut the load cell cable coming from the load point assembly. Coil excess cable and tie with a cable strap.
- Never bolt structures directly to a load sensor. Expansion and contraction inaccuracies will be introduced.
- All piping to and from the vessel should be flexibly connected and be horizontal to the vessel.

- Be extremely careful when pulling sensor cable through conduit. Electronic components are present at the end of the cable under the yellow C2 label.



### **WARNINGS**

- Vertical safety rods or chains should be used to prevent damage in the case of an overload failure. (See Fig. 2)
- When using vertical safety rods, make sure that the lower (load) bracket has an oversized hole so the rod does not interfere with the vertical movement of the vessel. (See Fig. 2)
- Always treat the load sensor as a precision instrument. Leave the load sensor in their packaging until it is time for their installation.
- NEVER CARRY OR SWING THE LOAD SENSORS BY THEIR CABLE.
- Never allow moisture to get into any interconnections.
- Make sure the structure that the vessel is suspended from, is designed and constructed of materials that will maintain the weight of the vessel and its load without sag or deflection of any kind.

### **ASSEMBLY PROCEDURES**

**NOTE:** *Make sure that the rod ends are threading into the threaded holes smoothly and easily before final assembly.*

The type of installation will govern the method of locating, attaching and assembling the parts of a load point. The following is a typical installation:

1. Check to be sure you have all the parts.

### 2. Bridge Resistance Test

**Problem:** Changes in Bridge Resistance

**Cause:** Failure of a compensating element, or by a broken or burned bridge wire. Often caused by an electrical transient like such as lightning.

**Remedy:**

- Use an Ohmmeter and measure the resistance between each pair of excitation and signal leads.
  - ▶ The excitation value should be 390 ohms  $\pm$  40 ohms.
  - ▶ The whole signal value should be 350 ohms  $\pm$  3.5 ohms.
  - ▶ Readings beyond those limits indicated above suggest damage and the load cell should be thoroughly inspected.

### 3. Resistance to Ground

**Problem:** Electrical Leakage creating an unstable output from the instrument.

**Cause:** Water contamination in the load sensor or cables.

**Remedy:**

- Tie together the load sensor excitation (2), signal (2) and ground (1) Wires.

*NOTE: Be careful NOT to include the two C2 wires.*

- Use a megohmmeter and measure the resistance between all five wires tied together and the load cell metal body.

- ▶ The reading should be 5000 megohms or more.

**WARNING**

**WHEN USING A MEGGER DO NOT EXCEED 50 VOLT RANGE.**

## TROUBLESHOOTING

1. Visually inspect each load point for physical damage. Look for distortion or cracks in all metal parts of the load point.
2. Check all welds to be sure that they are not cracked or have deep pot marks.
3. Check all cables to be sure that they have no cracks, cuts or frimps. Check for any abrasion on the cables.
4. Look for structural changes in the scale or supporting structures.
5. Look for the presence of moisture at all interconnects.

### Electrical Tests for Load Point Problems

#### 1. Zero Balance Test

Problem: Changes in the Zero Balance

Cause: Load Cell has been overloaded.

Remedy:

- Use a millivolt meter and measure the LPT output under “no load” conditions.
  - ▶ The reading should be less than 1% of the full scale output.

**NOTE:** *Sensors can shift up to about 10% of their full scale and still function correctly.*

- ▶ If the output has shifted more than 10%, replace the sensor.

Assumption: A 10VDC excitation on a sensor with a 3mV/V output sensitivity, a 1% shift in zero balance will yield a 0.3mV change from the specification.

2. Insert the ball joint of the rod ends (2) between the jaws of the mounting block (1).
3. Place a plastic washer (5) on each side of the ball joint (2) and align with the holes in the jaws of the mounting block (1).
4. Slide a shoulder bolt (6) through the outside hole in the mounting block (1), through the two plastic washers (5), through the ball joint (2) and out the other side. Fasten the shoulder bolt (6) to the clevis with a nylon lock nut (7).
5. Repeat steps 2 - 4 for the other rod end/mounting block assembly.
6. Thread the jam nuts (3) onto the threaded part of each rod end (2) about half way.
7. Thread the rod end/mounting block assemblies into both sides of the load sensor (9).
8. Mount the load point assemblies onto the vessel and vessel support assemblies. Make sure that the mounting blocks (1) are at right angles to each other. (See Assembly Drawing)

**NOTE:** *The load sensor should be installed with the proper orientation. (See Fig. 1)*

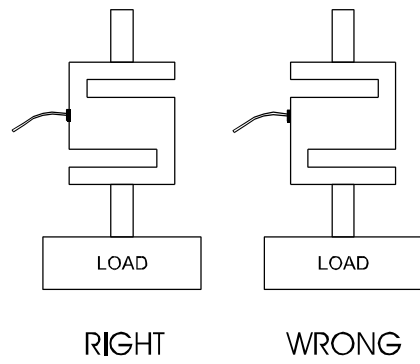
9. Make sure the vessel is completely level. Ideally the total weight should be shared equally by each load point assembly. (See Fig. 3, Fig. 4 & Fig. 5)
10. Install the grounding strap(8). Be sure all fasteners are tight.

### **WARNING**

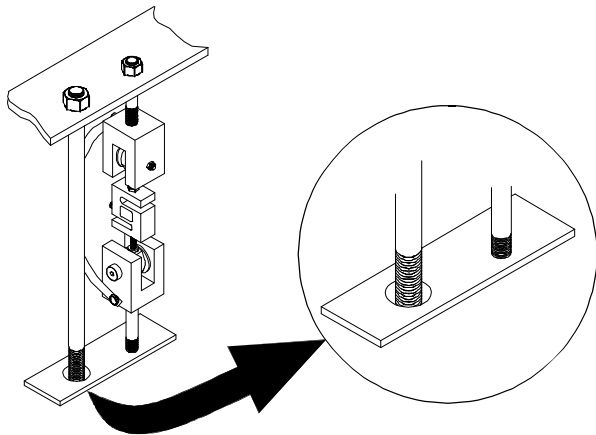
**THE LOAD SENSOR (9) MUST BE ORIENTED TO ALLOW THE CABLE TO EMERGE FROM THE “DEAD” OR FIXED END SO THAT IT DOES NOT AFFECT THE WEIGHING ACCURACY. (See Fig. 1)**

### **TYPICAL MOUNTING ARRANGEMENTS**

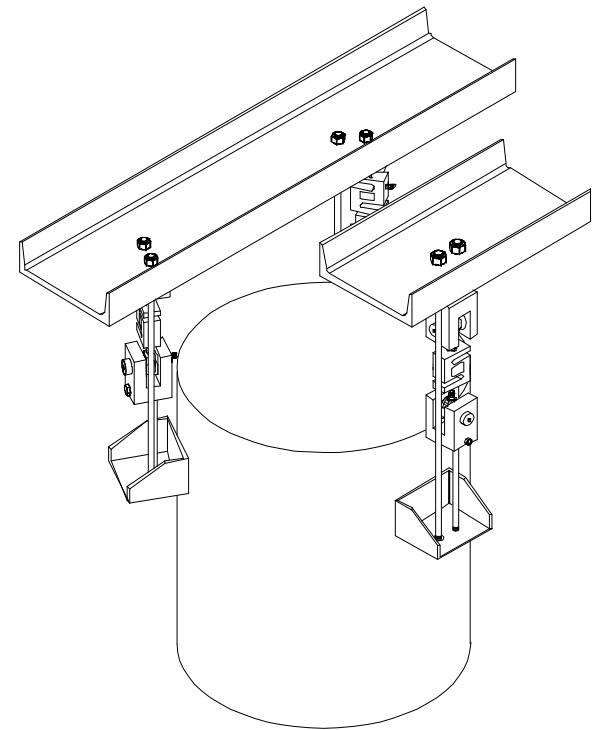
The HI-LPT Series, double ended shear beam load sensor is designed to permit thermal expansion of the vessel being weighted. (See Fig. 2) The following diagrams show load point placements.



**FIG. 1 LOAD SENSOR ORIENTATION**

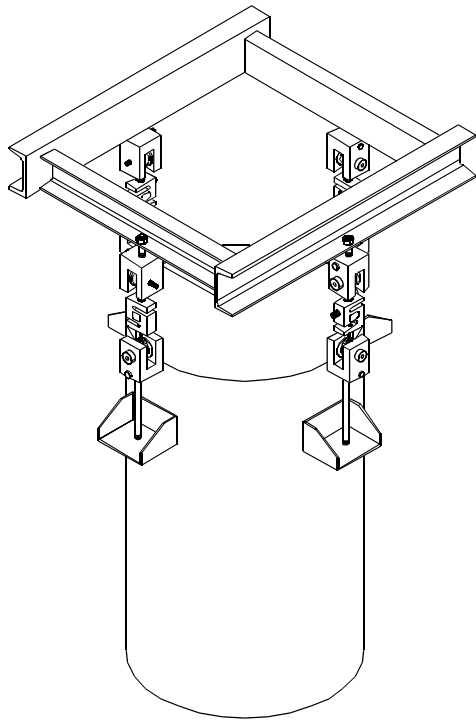


**FIG. 2 SPACE REQUIRED FOR SAFETY ROD**

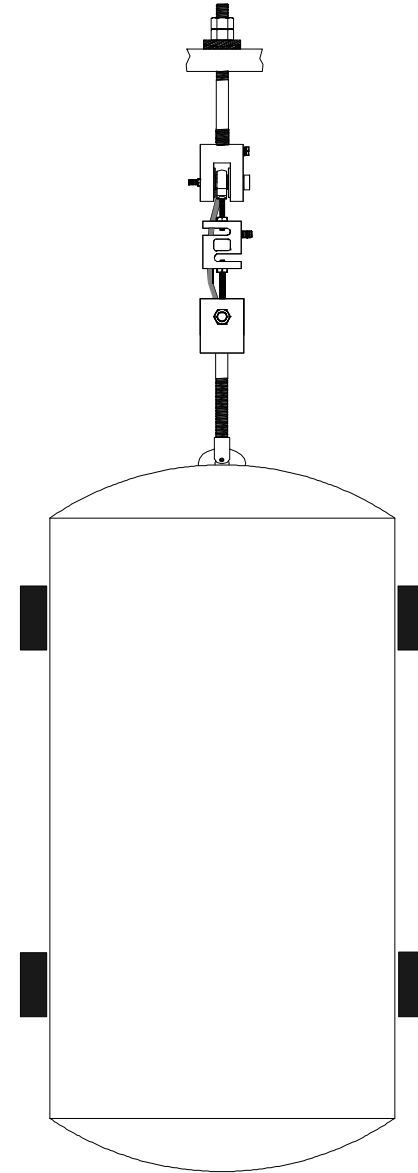


**FIG. 5 VERTICAL TANK - 3 LOAD CELLS**





**FIG. 4 VERTICAL TANK - 4 LOAD CELLS**



**FIG.3 VERTICAL TANK - SINGLE LOAD CELL**

## HI LPT PARTS LIST

### SERIES FROM 50 LBS. TO 300 LBS

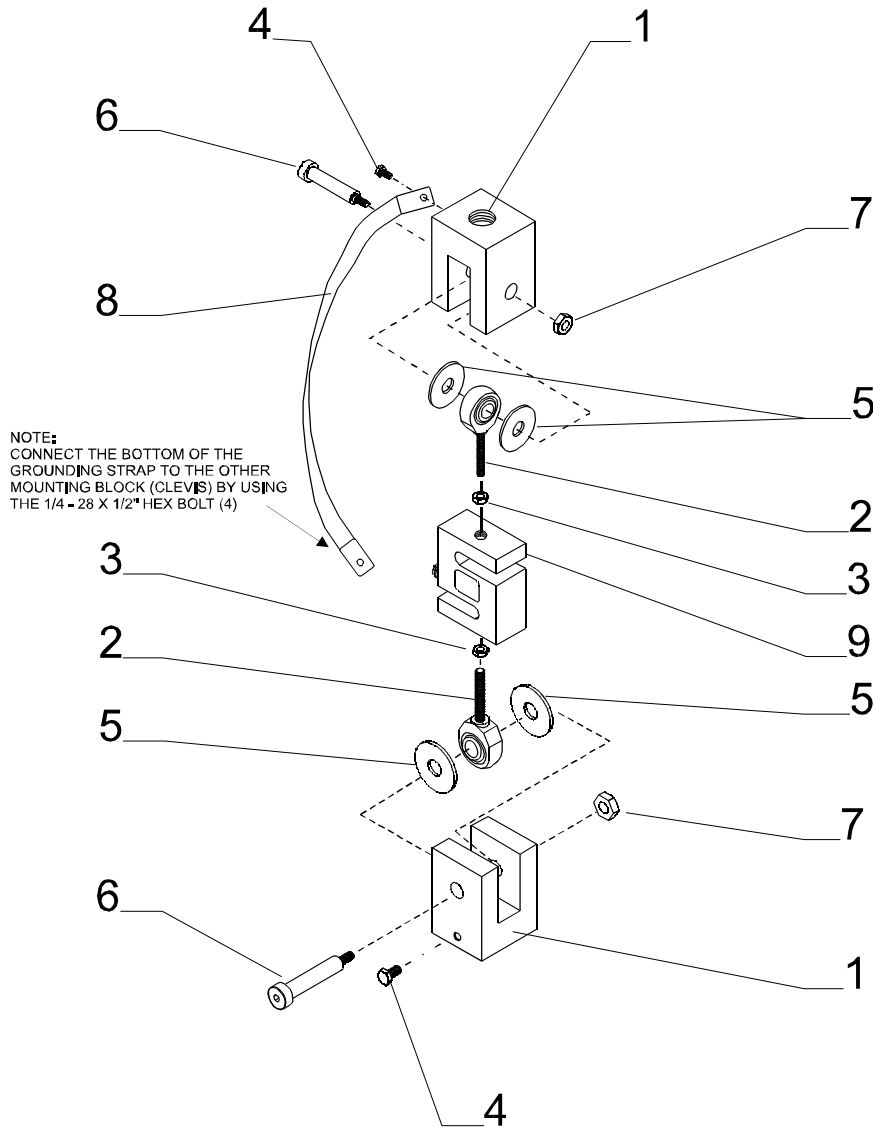
<u>ITEM</u>	<u>DESCRIPTION</u>	<u>QTY</u>
1	MOUNTING BLOCK (CLEVIS) .....	2
2	ROD ENDS (1/4 -28 X 1.875" L) .....	2
3	1/4 -28 JAM NUTS .....	2
4	1/4 -28 X 1/2" HEX BOLT .....	2
5	1/4" FLAT WASHER (PLASTIC) .....	4
6	1/4 X 1.75"L, SHOULDER BOLTS .....	2
7	#10 LOCK NUTS (NYLON) .....	2
8	BRAIDED GROUNDING STRAP 8" L .....	1
9	LOAD SENSOR .....	1

### SERIES FROM 500 LBS. TO 3,000 LBS

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>QTY</u>
1	MOUNTING BLOCK (CLEVIS) .....	2
2	ROD ENDS (1/2 -20 X 3.0" L) .....	2
3	1/2 -20 JAM NUTS .....	2
4	1/4 -28 X 1/2" HEX BOLT .....	2
5	1/2" FLAT WASHER (PLASTIC) .....	4
6	1/2 X 2.25"L, SHOULDER BOLTS .....	2
7	3/8 - 16 LOCK NUTS (NYLON) .....	2
8	BRAIDED GROUNDING STRAP 14" L .....	1
9	LOAD SENSOR .....	1

### SERIES FROM 5,000 LBS. TO 10,000 LBS

<u>ITEM</u>	<u>DESCRIPTION</u>	<u>QTY</u>
1	MOUNTING BLOCK (CLEVIS) .....	2
2	ROD ENDS (3/4 -16 X 3.75" L) .....	2
3	3/4 -16 JAM NUTS .....	2
4	1/4 -28 X 1/2" HEX BOLT .....	2
5	3/4" FLAT WASHER (PLASTIC) .....	4
6	3/4 X 2.25"L, SHOULDER BOLTS .....	2
7	5/8 - 11 LOCK NUTS (NYLON) .....	2
8	BRAIDED GROUNDING STRAP 14" L .....	1
9	LOAD SENSOR .....	1



**HI LPT ASSEMBLY DRAWING**