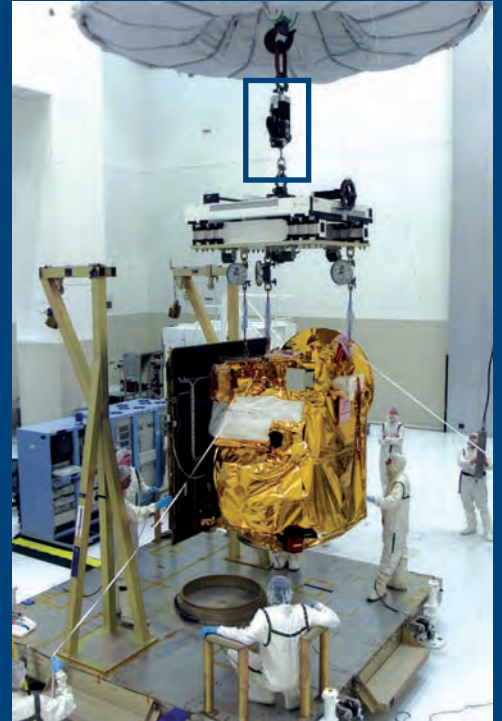


Hydra Set[®]

*Precision
Load Positioner*



The Gold Standard

for Positioning

Valuable Loads,

Up to 300 tons (272,400 kg)

To Within 0.001" (0.025mm)



*The more valuable your
heavy load the more you need*

the Hydra Set



DEL MAR AVIONICS[®]

Avoid Damage to Your Sensitive Loads

Mate, Demate with Precision to within 0.001 inch (0.025mm)

Precise control over heavy loads being moved, mated or demated by a crane, has always been difficult. Workers beneath the crane face the dangers from sudden crane starts and stops, which result in up and down oscillation during the critical stages of mating and demating. Often, this can result in damage to both the load and support fixtures, or worse, place the workers at risk.

And that's where the value of the Hydra Set Load Positioner from Del Mar Avionics comes in. Placed between the load and the crane or hoist, the Hydra Set Load Positioner eliminates these problems, and ensures users against unforeseen damage to critical components. Loads up to 300 tons (272,400kg) can be moved safely and reliably—with precision to within 0.001 inch (0.025mm).

Since 1965, Del Mar Avionics has supplied thousands of Hydra Set Precision Load Positioners for a variety of applications in rugged environments and industries worldwide.

Hydra Set Load Positioners Give You Peace of Mind

- Once the load is moved to within several inches of its final position, the Hydra Set Positioner lets you ease the load onto its support fixture.

- Weight readouts are accurate to within one half of one percent of full scale, traceable to the National Institute of Standards and Technology.

- Eliminates oscillations produced by sudden starts and stops in crane cables, chains or slings. Also eliminates the need to jog the load into position, saving wear on crane brakes.

Safe and Reliable

- A fail-safe loadlocking system provides back-up during power failures or sudden loss of pneumatics. (Pneumatic and Electro-hydraulic models only).

- Five-to-One mechanical Design Safety Factor; proof tested to twice rated capacity.

- Built-in Load Scale indicates binding or galling of load by registering a change in the weight readout. Also serves as a crane scale to prevent overloading crane, slings, etc. in conformance with industry and OSHA requirements.

Operating Flexibility and Simplicity

- Four methods of operation: manual, pneumatic, electro-hydraulic

- Choose from 13 standard models, with capacities from 1/2-ton to 300 tons (or rated in kilograms).
- In just minutes, your crew can be trained to operate. Pull the up handle to raise the load; pull the down handle to lower it.

Five Important Advantages of the Hydra Set Precision Load Positioner

- Eliminates risk of damage
- Creates a safer work environment
- Cuts labor costs
- Saves time
- Improves productivity

Aerospace

Satellite loading and positioning
Aerospace components assembly and test/vertical stabilizer assembly

Commercial Aviation

Component assembly
Landing gear, horizontal stabilizer assembly
Engine installation and removal
Component load testing

Nuclear and Fossil Fuel Power Generating Plants

Turbine teardown and rebuild
Construction
Fuel rod replacements
Transformer placements
Turbine bearing changes

Heavy Industry

Mill roll changes
Bearing inspection
Tool and mold changes
Machinery loading



◀ (Cover Caption) Knowing that one wrong move can result in a million-dollar mistake, workers at the Kennedy Space Center rely upon the Hydra Set Precision Load Positioner to directly mate NASA's Mars Orbiter onto an assembly dolly. The 8,000-pound spacecraft, built at Lockheed Martin's Denver Facility, launched in 2001.

▲ Del Mar Avionics employees gather with two 250-ton Hydra Set Precision Load Positioner Systems being readied for shipment to overseas nuclear power plants.



Nuclear Power & Fossil Fuel Plants

The Del Mar Avionics Hydra Set® Precision Load Positioner has become an important industrial aid for moving valuable loads in the power generation industry around the world. Used in conjunction with a crane or hoist, loads of up to 300 tons (272,400 kg) can be moved, mated, and demated with precision placement to within .001 inch (0.025 mm), regardless of dimensions.

Over four decades of proven performance ensure our customers of product protection from unforeseen damage to critical, expensive components. The Hydra Set Load Positioner never lets them down. In the manual mode, binding or galling of critical or blind parts is indicated instantly on the integral load scale, so that linear travel can be stopped immediately. With the remote controller accessory, and on all electro-hydraulic units, the zero-weight balance mode freezes all movement automatically upon encountering even the slightest resistance, so that any obstacle can be removed before damage occurs.

▲ Above, a Hydra Set Precision Load Positioner assists in the placement of sensitive nuclear reactor components. Hydra Set Positioners have been used at the Palo Verde Nuclear Site in Arizona, the Westinghouse/Hanford Engineering FFTF Project in Washington, Baltimore Gas & Electric Clavert Cliffs 1 and 2, and several other nuclear power sites around the world.

▼ Safe, delicate placement of America's Space Shuttle on the Boeing 747 Transporter is accomplished with three (3) Hydra Set Precision Load Positioners. Micro-inching precision capability will continue to be used by NASA well into the 21st century for loading, mating and demating critical components.

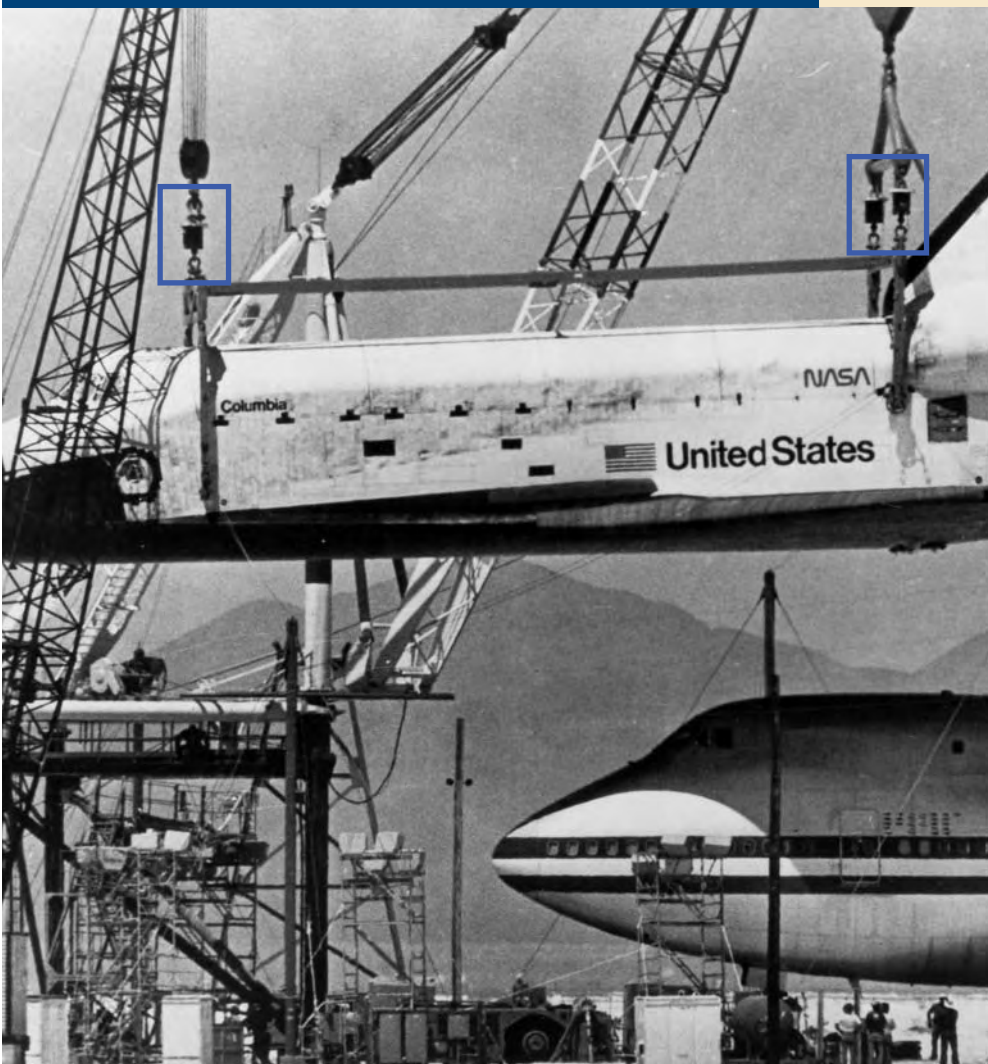
Applications:

1

Commercial Aviation & Aerospace

Mating and demating critical components accurately is absolutely essential in the commercial aviation and aerospace industries. The Hydra Set® Precision Load Positioner assures manufacturers the micro-inching precision they demand: to within .001 inch (0.025mm).

During assembly and testing of aircraft components, satellites and associated space hardware, the Hydra Set Load Positioner eliminates binding or galling that can damage these expensive, critical parts. Final positioning is accomplished quickly, gently and with the confidence of fail-safe operation.

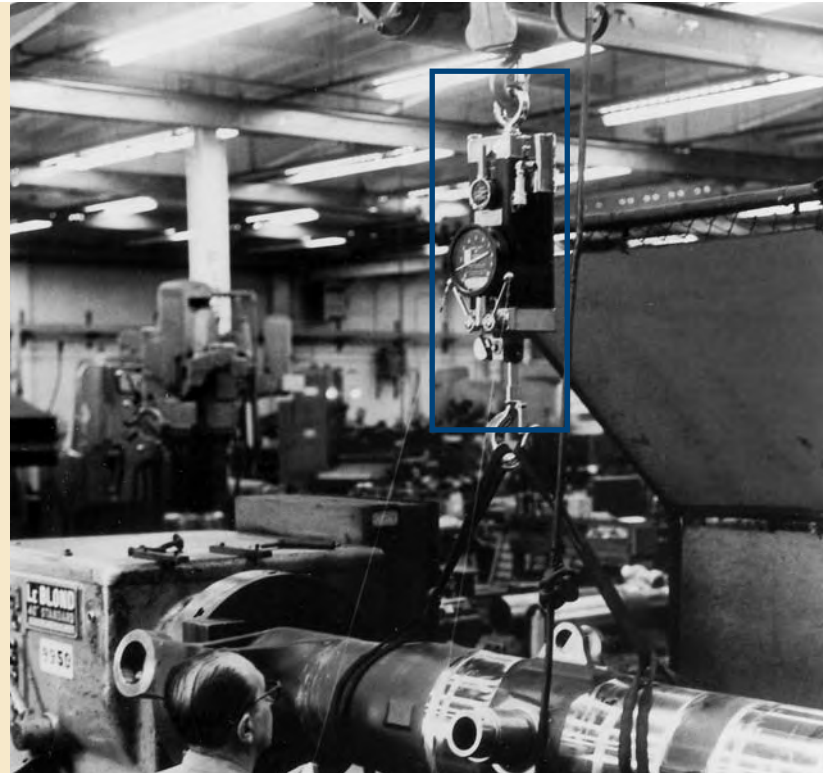


General Industry

When the job calls for heavy, valuable objects to be moved, mated or demated, and with exacting precision placement, the missing link between the crane or hoist and the load is the Del Mar Avionics Hydra Set® Precision Load Positioner.

Micro-inching precision to within .001 inch (0.025mm) by either simple manual maneuvering, or optional automatic remote control, is guaranteed with complete safety. Hang-up or binding of critical parts is indicated instantly on the built-in load scale.

Critical placement of expensive, heavy loads is accomplished using the Hydra Set Load Positioner's unique micro-inching capability to raise and lower loads to within .001 inch. By simply attaching the appropriate model to your crane or hoist, and lowering the load to within inches of the final position, the Hydra Set system will complete the job.



Applications:

2

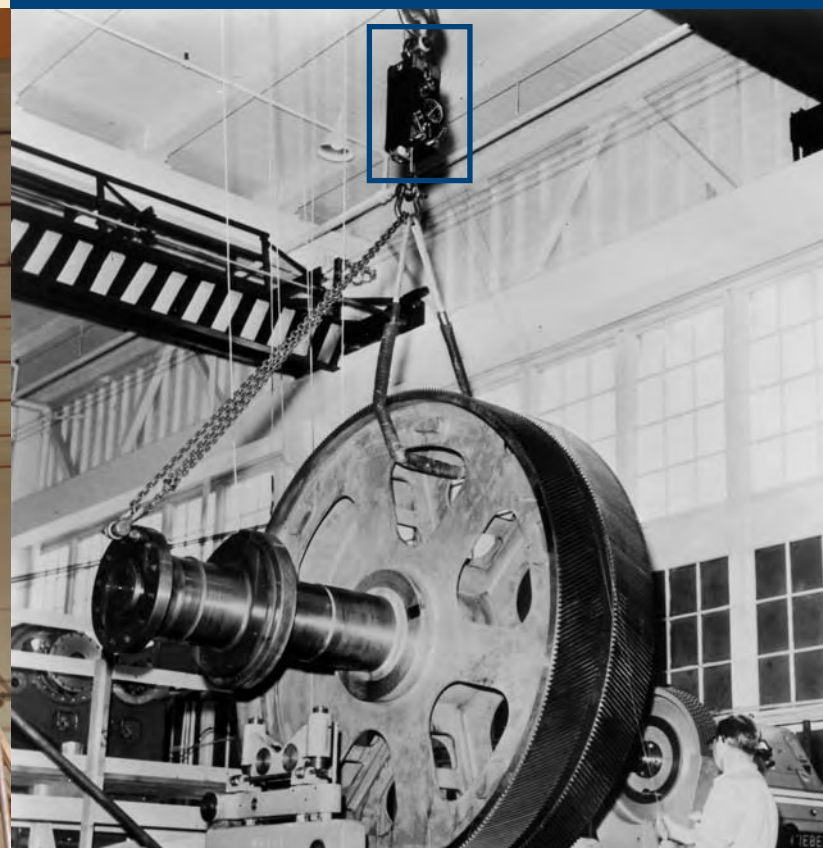
Dynamically tested to twice its rated capacity, and accurate to within one half of one percent of full scale (traceable to the National Institute of Standards and Technology), the Hydra Set system prevents damage resulting from unforeseen impact collision.

Half-ton to 300-ton load capacities enable the Hydra Set Load Positioner to move anything from a small gear to a large auxiliary generator with complete safety and precision.

▲ *Absolute confidence is mandatory when positioning an expensive load like this. The Hydra Set Load Positioner ensures safe and precise placement in a fraction of the time required by other methods.*

▲ *(Lower Left Photo) Inspection, maintenance and repair are no longer time-consuming and costly. Turbine components are easier to inspect with the Hydra Set Load Positioner micro-inching precision.*

▼ *Using the Hydra Set system to place this \$750,000 gear, bottom photo, into final position gives an added measure of assurance to the crane operator that unforeseen joggling, binding or galling will be avoided, thus preventing damage to an expensive component.*



Load Cell

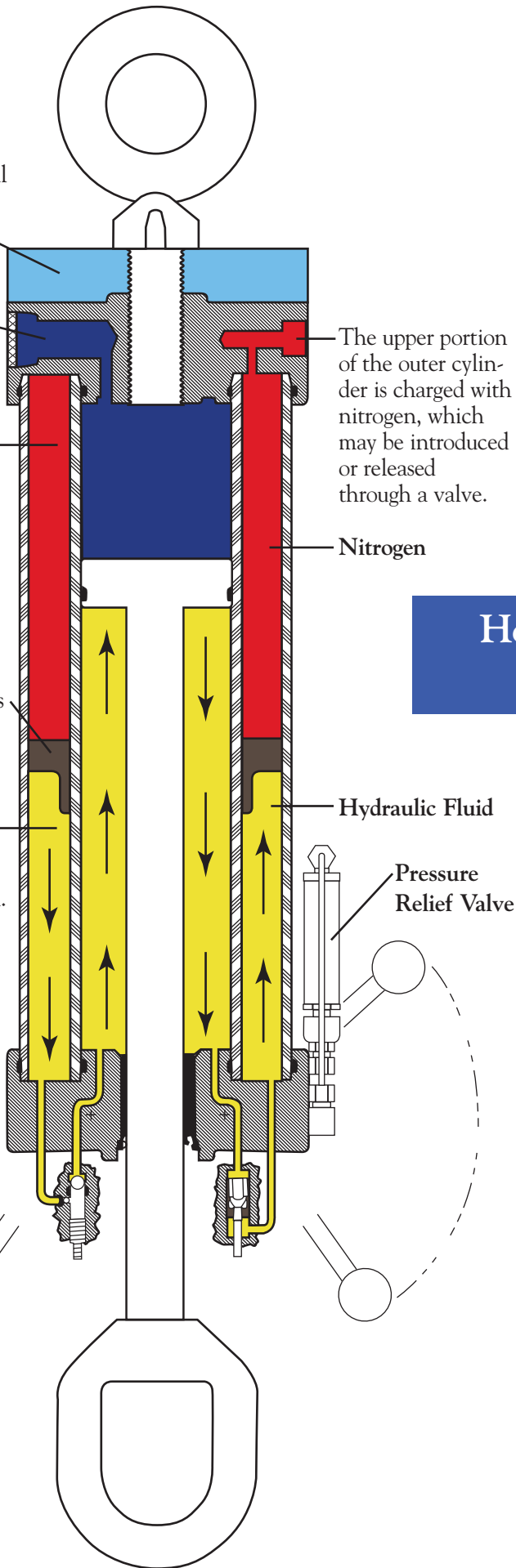
An electronic tension-measuring device, with automatic temperature compensation, which relays stable, instantaneous, accurate load weight data to the digital weight display.

To avoid a vacuum, the upper portion of the inner cylinder is vented to atmosphere.

The Hydra Set is precharged with nitrogen to maintain constant back pressure (or constant prime) on the pump. Also serves to retract the lower connector when the load is removed.

A separator ring provides a moving seal between the hydraulic fluid and the nitrogen.

Arrows shown indicate up movement. During down movement, the flow direction is reversed.



How the Hydra Set® Load Positioner Works

3

▲ Up Movement

Occurs when hydraulic fluid, pumped from the outer cylinder, forces the piston upward.

▼ Down Movement

Occurs when hydraulic fluid is transferred to the outer cylinder due to the weight load.

Upper Connector
Connected to the crane hook or hoist lifting line, the Hydra Set Positioner has an ultimate design strength of five times rated capacity.

Load Cell
An electronic tension-measuring device, with automatic temperature compensation, which relays stable, instantaneous, accurate load weight data to the digital weight display.

Return Force Dial
Indicates return force in pounds, allowing the Hydra Set Precision Load Positioner piston rod to retract automatically after the load has been positioned.

Down Valve Handle
Operation allows the load to descend slowly and smoothly. Accuracy of descent is controlled to within .001 inch (0.025mm). Both up and down spring-loaded handles automatically return to the closed position when released.

Piston Rod
Standard models allow maximum stroke of 12 inches (30.5cm). Special-length strokes are available upon request. Rod automatically retracts to closed position when load is released.

Quality Construction

Only the finest quality materials are used in construction.

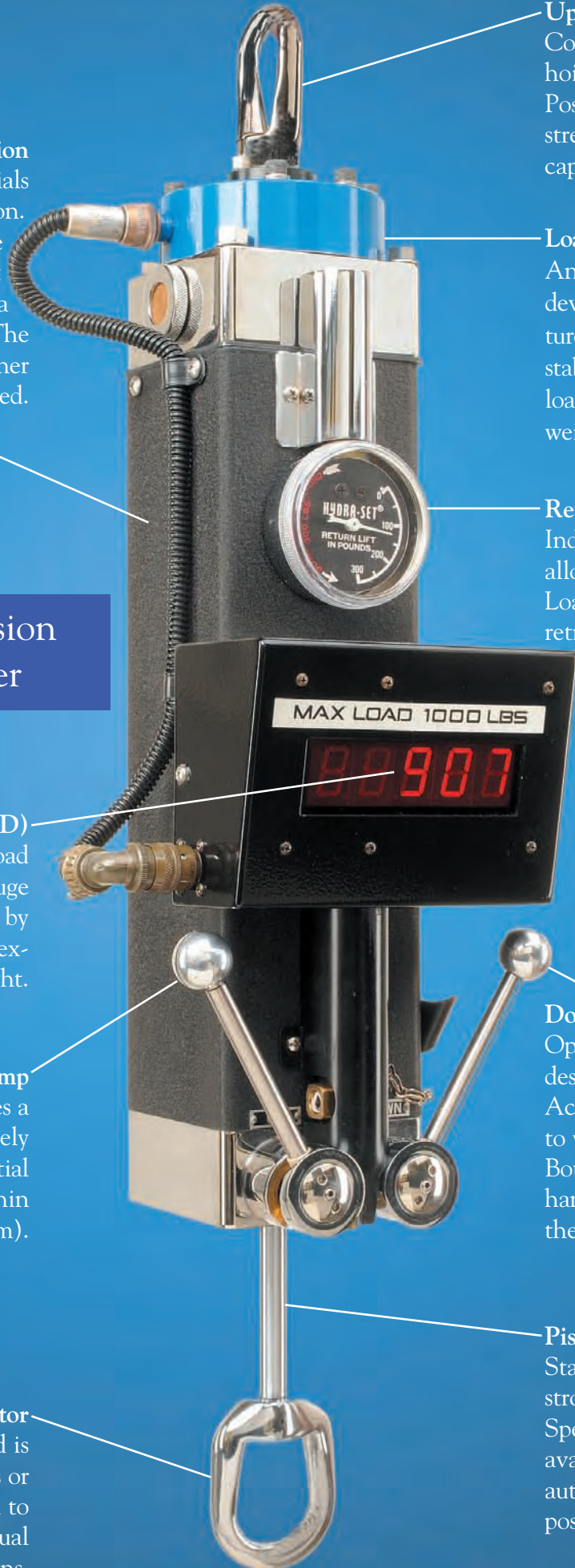
Most models are finished in black instrument crackle for long life and a pleasing appearance. The Hydra Set Load Positioner is NASA qualified.

**Hydra Set® Precision
4 Load Positioner**

Light Emitting Diode (LED)
Displays the weight of the load lifted. Also acts as a strain gauge under known load conditions by instantly indicating any unexpected loss or gain of weight.

Up Pump
One complete stroke raises a suspended load approximately .005 inch (0.126mm). Partial strokes provide control to within .001 inch (0.025mm).

Lower Connector
This is where the load is attached. Special eyes or hooks can be furnished to meet individual specifications.





Hydra Set® Precision Load Positioner

Since 1965, the Hydra Set Precision Load Positioner from Del Mar Avionics® has provided the aerospace, aviation, power generation and other heavy industries with a proven means to allow critical loads, suspended from a crane or hoist, to be mated or demated, raised or lowered, with excursions to within 0.001 inch (0.025 mm).

During a typical placement, the load is lowered by the crane or hoist to a safe distance from its intended resting position. Then, the operator engages the Hydra Set Load Positioner for final and reliable incremental placement to ensure safety to the load and surrounding critical components. Any impediment encountered during the mating/demating process is sensed, immediately halting the load from any further movement. Other Hydra Set models, including those which are manually operated or remotely controlled, require physical connection between the operator and the Hydra Set Load Positioner.

▲ The Spitzer Infrared Telescope in final assembly at Lockheed-Martin Space Systems Co. utilizing a Model "B" (2 1/2-ton capacity) Hydra Set Load Positioner

▼ Operator with remote Hand-Held Unit maintains complete and safe control over the load at all times.

Hand-Held Unit Displays

8



MENU Mode



OPERATE Mode



OPERATE Mode showing
E-STOP for Radio Timeout



OPERATE Mode
E-STOP
Button Pushed



Clear EMERGENCY
STOP



SETUP Mode No. 1

Helpful Messages Assist the Operator

The user may select from a number of operating options to suit a particular task or working environment, such as choosing operating modes, selecting data logging (optional), tare-set options, time and date, and units of measurement.

Specifications

● Method of Operation

The Hydra Set® Precision Load Positioner may be operated by one of four basic methods. Models O through F may be operated manually up to 50 feet away by manipulating the up pump or down valve handles via up and down lanyards. Models O through FS may also be fitted with the optional CCI-400 Remote Controller accessory for precise pneumatic (nitrogen gas) operation from up to 100 feet away from the Hydra Set®

● Operating Note

Optimum performance is achieved when the load to be raised or lowered is mid-range of the capacity of the unit to be selected. Avoid operating with loads at less than 20 percent of the total capacity of the unit selected.

Model	Capacity		Overall Length Retracted		Standard Lowering stroke		Net Weight		Shipping Weight (Approx.)	
O-LC	1/2 ton	453.6 kg	25.2 in	64.0 cm	12 in	30.5 cm	44 lb	20 kg	88 lb	48 kg
A-LC	1 ton	907.2 kg	29.5 in	74.9 cm	12 in	30.5 cm	89 lb	40 kg	250 lb	114 kg
B-LC	2 1/2 ton	2,268.0 kg	29.5 in	74.9 cm	12 in	30.5 cm	89 lb	40 kg	250 lb	114 kg
C-LC	5 ton	4,535.9 kg	31.7 in	80.5 cm	12 in	30.5 cm	109 lb	50 kg	250 lb	114 kg
D-LC	10 ton	9,071.9 kg	36.0 in	91.4 cm	12 in	30.5 cm	218 lb	99 kg	435 lb	198 kg
E-LC	20 ton	18,143.7 kg	46.1 in	117.1 cm	12 in	30.5 cm	538 lb	244 kg	750 lb	340 kg
ES-LC	25 ton	22,679.6 kg	46.1 in	117.1 cm	12 in	30.5 cm	538 lb	244 kg	750 lb	340 kg
F-LC	50 ton	45,359.2 kg	50.8 in	141.7 cm	12 in	30.5 cm	1193 lb	541 kg	1350 lb	615 kg
FS-LC	55 ton	49,896.0 kg	50.8 in	141.7 cm	12 in	30.5 cm	1193 lb	541 kg	1350 lb	615 kg
DHS-75	75 ton	68,038.9 kg	72 1/2 in	184.2 cm	12 in	30.5 cm	1800 lb	816.5 kg	2300 lb	1043.3 kg
DHS-150	150 ton	136,077.7 kg	90.0 in	228.6 cm	12 in	30.5 cm	4000 lb	1814.4 kg	4800 lb	2177.2 kg
DHS-250	250 ton	226,296.2 kg	90.0 in	228.6 cm	12 in	30.5 cm	4600 lb	2086.5 kg	5500 lb	2494.8 kg
DHS-300	300 ton	272,400.0 kg	90.0 in	228.6 cm	12 in	30.5 cm	4600 lb	2086.5 kg	5500 lb	2494.8 kg

Standard models (O thru D) are furnished with an eye-type upper connector and a 'D'-shaped lower connector. Standard models E, ES and F are furnished with 'D'-shaped upper/lower connectors. Standard DHS models (75 thru 300-ton) are furnished with a shackle-type upper connector and a safety hook lower connector.

Pneumatic Remote Control

- Increases versatility of the Hydra Set by providing pneumatic remote operation, up to 100 feet (30.5 meters) away from a load being positioned.
- Increases utility by providing a zero-weight, balanced load operation that cannot be achieved with manual operation. Load stops automatically if a pre-determined resistance is met, allowing the operator to align, mate or demate on surfaces without risk of damaging them.

Electronic Remote Control Digital Weight Display

Electronically indicates weight of load in pounds or kilograms.

Electronic Remote Digital Linear Travel Display

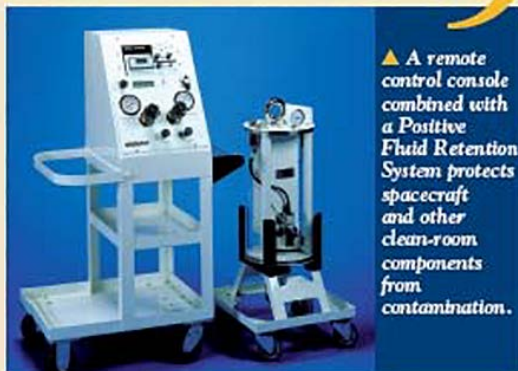
Electronically indicates linear travel of piston rod and lower connector.

Positive Fluid Retention System (PFRS)

Some Hydra Set models may be configured to ensure positive retention of fluids via encapsulation and pressurization of the unit. Combined with a remote

Accessories

9



▲ A remote control console combined with a Positive Fluid Retention System protects spacecraft and other clean-room components from contamination.

control console (pictured above), the PFRS is used in clean room environments to protect spacecraft or other critical components from contamination.

Hook Rotation

The load can be rotated 360° in either direction in a plane perpendicular to linear travel by manipulation of the hook rotation control on the remote control console (available as an option on Models DHS-250 and DHS-300 only).

Custom Engineering

Hydra Set Precision Load Positioners are available with special eyes, hooks, connectors, longer or shorter stroke lengths and other variables. Ask us about special requirements.