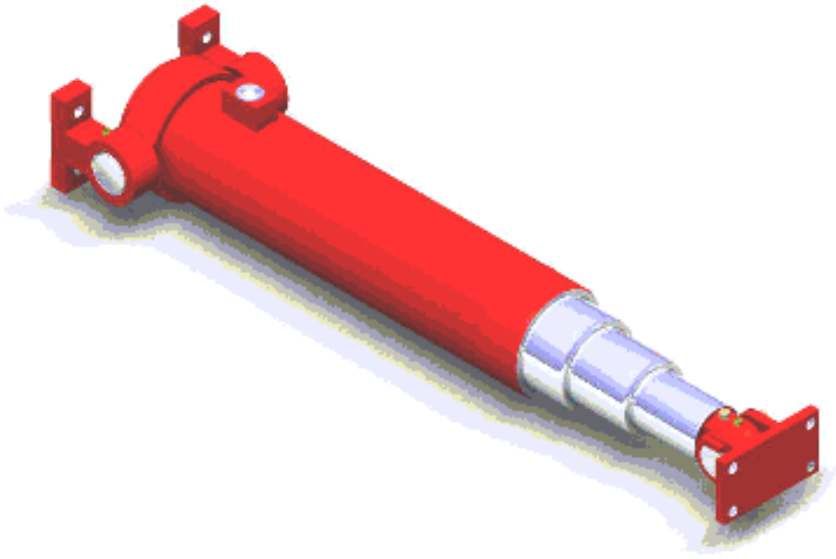
DELTA HYDRAULICS PTY LTD
MANUFACTURING HYDRAULIC ENGINEERS

DELHOIST
TELESCOPIC CYLINDERS

SINGLE-ACTING TELESCOPIC CYLINDER MANUAL



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INTRODUCTION

This manual provides instructions on how to handle your telescopic cylinder from the moment of receiving it, through installation and commissioning, and how to correctly maintain it for it's working life.

Applying these instructions as a minimum will ensure the maximum life of the telescopic hoist. Failure to apply these instructions may cause damage and therefore void the warranty.

RECEIPT INSPECTION

Upon receipt, the hoist should be inspected for damage. For example:

- Is the hoist dented or heavily marked?
- Are the stage hardchrome surfaces damaged?
- Are the stage wipers damaged?
- Are any components missing or damaged?
- Is the valving damaged? (if applicable)
- Are all components still installed correctly?
- Are there any oil leaks from the cylinder? (Plastic plugs may leak slightly)
- Does the supplied cylinder meet the order requirements?

In the case of damage during transit under FOB supply, it is the customer's responsibility to rectify any problems. In the case of a manufacturing fault detected during the warranty period, the supplier must be immediately contacted according to the Warranty Procedure. In the case of a design fault detected in or outside of the warranty period, the supplier must be immediately contacted.

HOIST IDENTIFICATION

Each hoist is fitted with an identification plate (ID plate) which states the part number and the serial number. This is located near the port on the outer stage. These numbers should be quoted in case of servicing or spare part needs.

STORAGE

Short term storage (up to 12 weeks)
The residual oil in the cylinder from testing during manufacture will prevent internal corrosion. The storage of the cylinder must be as follows:

- cylinder protected from damage, with stages retracted & ports plugged
- cylinder mounted in vertical orientation (if practical)
- in non-corrosive atmosphere
- ambient temperature -10 to 45°C, preferably not in direct sunlight

Long term storage (over 12 weeks)
The residual oil in the cylinder from testing during manufacture will not prevent internal corrosion for extended periods. In the case of long term storage, the storage of the cylinder must be as follows:

- cylinder filled with storage oil and all air bled out
- cylinder protected from damage, with rod retracted & ports plugged
- cylinder mounted in vertical orientation (if practical) with appropriate supports
- in non-corrosive atmosphere
- ambient temperature -10 to 45°C, preferably not in direct sunlight

At 12 month intervals the cylinder is to be cycled 5 times, the storage oil replaced and all air bled out. Following this the cylinder is to be returned to the storage condition as above. After 5 years in storage the cylinder is to be disassembled and inspected, and seals replaced according to their condition and life expectancy.

INSTALLATION REQUIREMENTS

The cylinder must always be handled in such a way so as to avoid damage, especially the types of damage as described in “Receipt Inspection”.

Mechanical Mounting of Cylinder

- The cylinder must clear the tray during all points of travel.
- All mount pin centrelines must be parallel to the tray pivot centreline, within 0.5mm over the width of the trunnion.
- For top mount type cylinders, the trunnion mount centreline and the top pivot pin centreline must be parallel within 0.25mm to each other.
- For suspension tube type cylinders, the trunnion mount centreline and the lifting bracket pin centreline must be parallel within 0.25mm to each other.
- For suspension tube type cylinders, dimensions ‘A’ and ‘B’ must be within 2mm of each other for adequate operation (refer to figure 1). This will require the hoist to be tilting towards the tray in applications where the tray pivot is low.
- The tray pivot must be square to the truck chassis in *both* directions.
- The cylinder must be located centrally on the truck chassis.
- Use high tensile bolts of the maximum size practicable for mounting holes. *Do not* drill out mounts to suit oversize bolts.
- Care must be taken if the hardchromed surface of the stages is exposed, as any damage to this surface will cause cylinder leakage.
- All hose connections to the cylinder must have enough length to allow for full cylinder movement and must not rub on any equipment during operation.
- The final stage must be extended by 20mm when the body is fully lowered. This prevents the body from riding on the hoist, which may cause damage.
- The primary limit on hoist life in truck applications is the wear caused by vibration of the hoist as the vehicle travels along the road. The cylinder stages are hardchromed, which extends life over a non-hardchrome hoist by approximately 5 times. To attain full life, it is recommended that body locks are fitted.

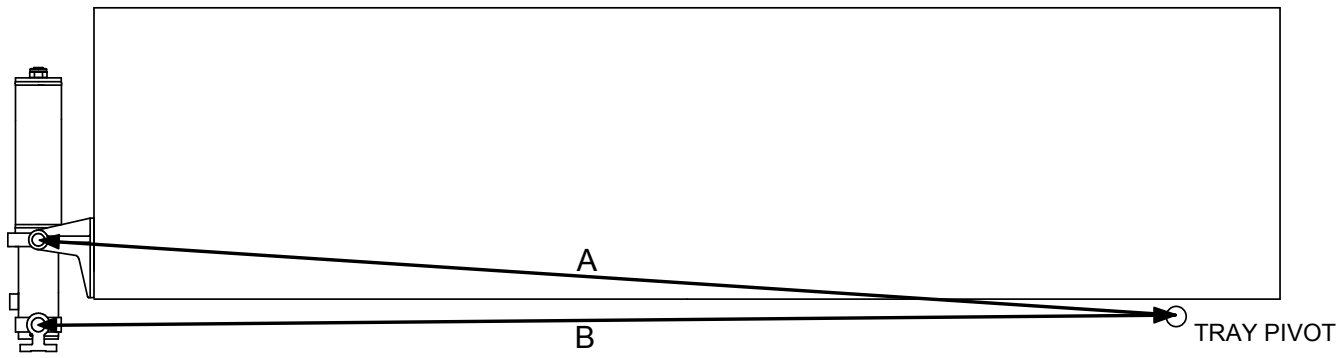

Figure 1: Suspension tube type cylinder mounting (dimensions to pin centrelines)

Hydraulic System Connection to Cylinder

- Basic hydraulic fitting skills are required for the fitting of the cylinder into the system. Standard hydraulic connections are described in figure 2.
- The cylinder must be assembled into the system in a dust free environment, to minimise contamination entering the ports.
- Oil cleanliness is of the utmost importance. *Do not* remove the port plug from the hoist until immediately prior to connection to the system. All elements of the system (hoses and tanks included) must be flushed with clean hydraulic fluid prior to connection to the other elements of the system. In addition the oil used to fill the system must be clean.
- All hydraulic fittings must be free from burrs and have smoothly finished threads. (Note that when screwing into aluminium some fittings and valves may cause a fine slither of aluminium ‘wire’ to enter into the system, so action must be taken to avoid contamination of the system in this way).

WARNINGS:

- Impact loads on the cylinder may cause damage to the cylinder.
- The cylinder must be protected from physical damage.
- The cylinder hardchrome surfaces must be protected from damage (note that some chemicals can damage the hardchrome surface eg. caustic).
- Do not weld directly on the cylinder without first seeking advice from the manufacturer.
- Do not weld near the cylinder so that the welding current passes through the cylinder, as this will damage the cylinder internally.
- The hose sizes and pressure ratings must be correct for the application.

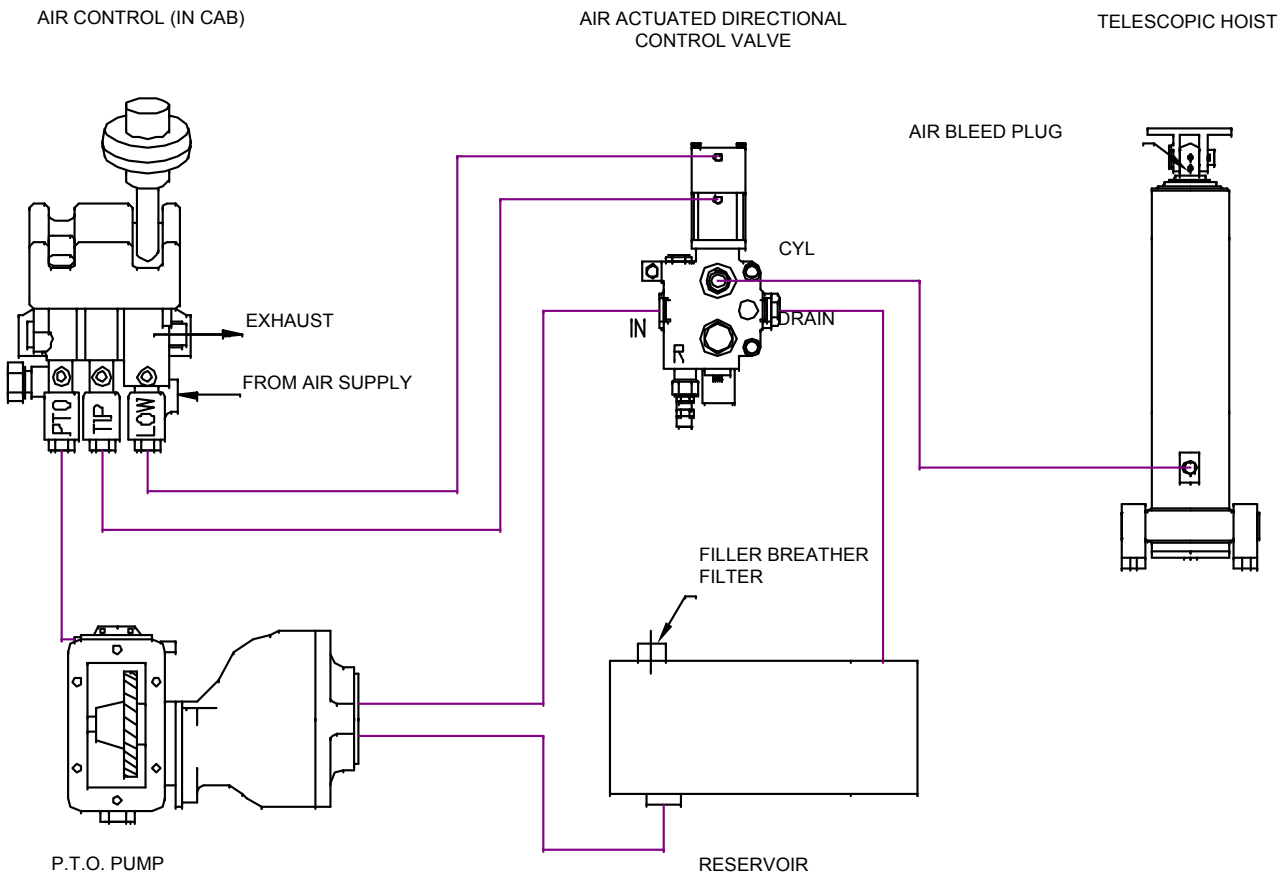

Figure 2: Standard hydraulic connections

OPERATING CONDITIONS

Oil Type
Mineral based hydraulic oil of ISO viscosity grade 32 or 46 is recommended.

Oil Cleanliness
A minimum fluid cleanliness level of ISO 20/18/15 is recommended, noting that other elements of the system may require a higher cleanliness level than this. Also refer to *Hydraulic System Connection to Cylinder* (page 4) regarding cleanliness.

Oil Pressure
The hydraulic system must be provided with relief valve protection, to ensure that the working pressure of the cylinder (as marked on the general assembly drawing, if applicable) is not exceeded. For standard hoists the maximum operating pressure is 2500psi, except for 87's and larger for which the maximum operating pressure is 2000psi. Exceeding the working pressure will lead to reduced cylinder life, seal extrusion or cylinder damage.

Oil Temperature
Standard hydraulic systems are designed to operate at a normal maximum oil temperature of 65°C, with the optimum oil temperature being 50 to 55°C. Exceeding this maximum operating

temperature continuously will reduce seal and oil life dramatically. In this case a heat exchanger should be fitted to the system.

Air Breathers
Good quality air breathers must be fitted to hydraulic systems at any openings to the atmosphere, to reduce contamination in the system.

Buckling Failure
Buckling failures are responsible for the most critical accidents that involve telescopic cylinders in the extended condition. Buckling can occur due to axial overloading or excessive lateral inclination of the hoist. These conditions can be caused by rapid acceleration or deceleration with the hoist at full extension and full load and lateral deflection due to misalignment.

OPERATING CONDITIONS

Stage Velocity
The hydraulic oil flow rate must be limited using the engine revs or otherwise so that each stage of the hoists linear velocity does not exceed 200mm/s.
Should the stages exceed this velocity internal damage will occur.

Hoist Lowering
When the truck body or load has been fully lowered the control valve must be returned to the neutral position to prevent oil from draining from the hoist.
If the hoist has been fully lowered with the control valve left in the lowering position, the bleeding procedure should be followed to prevent damage of the hoist due to the potential for air entering the cylinder.

COMMISSIONING

1. Bleed the cylinder according to the instructions in the next section.
2. Cycle the cylinder once slowly and check for adequate mechanical clearances, hose lengths etc. and general operation. This may be done in conjunction with the bleeding operation, above.
3. Cycle the cylinder 5 times with no load in the tray, checking for:
   - smooth operation
   - external leakage from cylinder (if leakage is found contact the supplier - do not attempt to correct the problem yourself as this will void the warranty). Refer to the warranty procedure.
   - general operation and condition of the cylinder.
4. Cycle the cylinder with the tray loaded and check as per step 3, above. In addition check that the relief valve settings are correct so that the cylinder will not be over pressurised.
5. If all is operating correctly, the cylinder is now ready for service. Inspect the cylinder regularly during the first 10 to 20 cycles in service. Ensure that the cylinder temperature does not exceed allowable levels.

BLEEDING

It is of particular importance to fully bleed the air from telescopic hoists, as failure to do so can result in reduced hoist life or damage to the hoist. This has been observed in the field, where telescopic hoists containing air in the oil have failed due to a phenomenon called *dieseling*.

Dieseling occurs when pressure spikes in the hydraulic system compress air in the oil, to a point where ignition occurs. This is the same mechanism by which a diesel engine operates. In a telescopic hoist, any air in the oil is held in the upper end of the annulus area, directly adjacent to the gland seals. If a pressure spike occurs, the seals can actually burn due to the ignition and then begin to leak.

The result of air being present in the hoist is obvious – reduced hoist life or damage. As such the following procedure must be followed to ensure that air is fully bled from the hoist.

Procedure

The bleed plug is located at the top of the hoist adjacent to the top pivot pin. For suspension tube type hoists it is located above the suspension tube nyloc nut. A 3/8” drive 5/8”AF socket or a tube type spanner is best for access.

1. Prior to the first operation of the hoist, loosen the bleed plug and pump oil into the hoist slowly, until oil appears at the bleed plug.
2. Shut off the oil supply and tighten the bleed plug.
3. Cycle the hoist to full extension and then to full retraction, two times.
4. With the hoist in the lowered position, loosen the bleed plug and slowly pump oil into the hoist. Continue until air bubbles no longer appear in the oil coming from the bleeder.
5. Shut off the oil supply and tighten the bleed plug.
6. The air is now bled from the hoist.

A bleeding kit is available (part no. 0001V0001) which has the following advantages:

- Allows recycling of oil by providing a facility to return oil from the bleed port to a clean receptacle.
- Reduces cleanup (ie. no oil spilt) & environmentally friendly.
- Allows more complete bleeding.

PERIODIC INSPECTION & MAINTENANCE

- For trucks in frequent use the mount pivots should be greased weekly. Inspect the hoist weekly for significant dust buildup indicating oil leakage.
- Check hardchrome surface for damage every 12 months. Surface should be free from dents and scratches.
- Check hoist seals by inspecting for leakage at stage ends and around the base every 12 months.
- The oil should be replaced every 12,000 hours of operation. The seal type used in these cylinders is expected to provide a minimum of 10,000 vehicle operating hours.

IN CASE OF FAILURE

If the cylinder is still in the warranty period, do not attempt to disassemble and fix the cylinder yourself, as this will void the warranty. Please refer to the Delta Hydraulics Warranty Policy for instruction on handling the situation of warranty claims.

Please note that it is far preferable for the hydraulic cylinder to be returned to the manufacturer for inspection, to determine the reason for failure. If this is not done, the investigation may not be complete and the possibility exists that the problem will re-occur.

If the cylinder is out of the warranty period, only experienced hydraulic fitters should disassemble and work on the cylinder. The reason for this is to avoid unnecessary damage to the cylinder.

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- ***DESIGN***
- ***MANUFACTURE***
- ***SALES***
- ***SERVICE***
- ***SPARE PARTS***