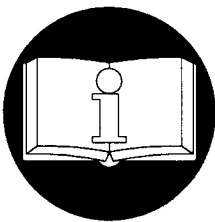


INSTALLATION, OPERATION AND MAINTENANCE MANUAL

AIR POWERED MAN-RIDING WINCH LS1000RLP SERIES

Model LS1000RLP-L (Lever control)
LS1000RLP-PH (Remote control)



READ THIS MANUAL BEFORE USING THESE PRODUCTS. This manual contains important safety, installation and maintenance information. Make this manual available to all persons responsible for the operation, installation and maintenance of these products.

⚠ WARNING

"Regarding man-riding winches, it is the responsibility of the owner or user of the winch to determine whether the winch conforms with local regulations for personnel use"

Always operate, inspect and maintain this winch in accordance with European Security Rules and any other applicable safety codes and regulations.

Refer all communications to the nearest IR Material Handling Products Office or Distributor.

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This manual provides important information for all personnel involved with the safe installation, operation and proper maintenance of this product. Even if you feel you are familiar with this or similar equipment, you should read and understand this manual before operating the product.

Training must be done by a qualified person to any personnel involved with an air powered man-riding winch.

Danger, Warning, Caution and Notice

Throughout this manual there are steps and procedures which, if not followed, may result in an injury. The following signal words are used to identify the level of potential hazard.

⚠ DANGER Danger is used to indicate the presence of a hazard which *will* cause *severe* personal injury, death, or substantial property damage if the warning is ignored.

⚠ WARNING Warning is used to indicate the presence of a hazard which *can* cause *severe* personal injury, death, or substantial property damage if the warning is ignored.

⚠ CAUTION Caution is used to indicate the presence of a hazard which *will* or *can* cause *minor* personal injury or property damage if the warning is ignored.

NOTICE Notice is used to notify people of installation, operation, or maintenance information which is important but not hazard-related.

The use of a winch to lower, lift or suspend personnel should be permitted only when other means of reaching the worksite, such as ladders, stairways, aerial (bucket-type) lifts or scaffolds, are not feasible because of site conditions.

Presently Man-Riding winches are available built to specifications published by **Det Norske Veritas** : Winches are type approved and/or certified by Det norske Veritas (DNV) to meet Norwegian Maritime Directorate (NMD) or Norwegian Petroleum Directorate (NPD) requirements.

In furnishing customers Man-Riding winches, Ingersoll-Rand does not warrant the suitability of these winches for any particular use. It is the owner and user's responsibility to determine the suitability of a Man-Riding winch for a particular application. Further, it is the owner and user's responsibility to check and satisfy all local, state, federal and country requirements pertaining to the lifting and

⚠ WARNING

- Many agencies require additional redundant safety devices on winches that Ingersoll-Rand does not furnish. Additional devices are often required to bring the system up to elevator code standards.

Winches manufactured by Ingersoll-Rand as approved Man-Riders to DEn and/or NMD/NPD requirements are furnished with limitations ; approval for use in Man-Riding applications automatically terminates for any of the following reasons :

1. Winch does not meet other applicable codes or standards.
2. Winch is not part of an approved system.
3. Winch is not properly maintained in a safe working condition with all parts intact and properly adjusted.
4. Winch is used in applications not approved by codes and regulations, or applications inconsistent with manufacturer's operating and maintenance manual.
5. Changes in DEn or NMD/NPD standards or regulations after Ingersoll-Rand's initial shipment of the product.
6. More than one winch is used to attach to a common load.
7. Winch design or functions are altered or changed in any manner from the purchased original without prior approval by Ingersoll Rand.

⚠ WARNING

- **Be sure to check all regulations, local and country, that may apply to the use of a winch or winch system for lifting and lowering people before using a Man-Riding winch.**
- 8. The personnel platform shall be designed by a properly qualified engineer competent in this area.

⚠ CAUTION

- **MAN-LIFTING with this winch is STRICTLY LIMITED to off-shore marine applications specifically approved by maritime regulatory bodies. Regulatory bodies, not manufacturer, have determined suitable use. DO NOT USE FOR MAN-LIFTING applications not specifically approved by regulatory bodies.**

This manual has been produced by **Ingersoll-Rand** to provide dealers, mechanics, operators and company personnel with the information required to install and operate the products described herein.

It is extremely important that mechanics and operators be familiar with the servicing procedures of these products, or like or similar products, and are physically capable of conducting the procedures. These personnel shall have a general working knowledge that includes:

1. Proper and safe use and application of common mechanics' hand tools as well as special **Ingersoll-**

2. Safety procedures, precautions and work habits established by accepted industry standard.

Ingersoll-Rand can not know of, nor provide all the procedures by which product operation or repairs may be conducted and the hazards and/or results each method. If operation or maintenance procedures not specifically

recommended by the manufacturer are conducted, it must be ensured that product safety is not endangered by the actions taken. If unsure of an operation or maintenance procedure or step, personnel should place the product in a safe condition and contact supervisors and/or the factory for technical assistance.

SAFE OPERATING INSTRUCTIONS

WARNING

Failure to follow these rules will result in termination of all applicable warranties. Ingersoll-Rand assumes no liability for any loss or damage resulting from operation of Man-Riding winches if these operating instructions are not followed.

1. Winch operator must be in vocal contact and in a position to always see the personnel to be lifted or must use communication equipment.
2. Personnel operating the winch or being transferred are to have sufficient instruction/training concerning that operation before any movement takes place.
3. Lifting and lowering of personnel should be carried out above the open sea whenever possible. All personnel should wear life jackets approved by appropriate regulatory agency and a standby vessel should be in the vicinity of the transfer.
4. Use of a winch to transport personnel (lifting and/or lowering) should only take place when other means of accomplishing this work are not practical.
5. The winch installation must be specially arranged and accepted for personnel handling.
6. Prior to any personnel movement, the entire system should be inspected by the person in charge. It is that individual's responsibility to instruct and appoint the winch operator.
7. The lifting apparatus shall be inspected and certified for personnel lifting prior to use.
8. Do not operate without a surveyor's site approval.
9. Never lift a load greater than the rated capacity of the winch. Refer to "SPECIFICATIONS" section for applicable utility and winch capacity ratings.
10. Do not operate without testing. (See « Inspection and Testing » procedures).
11. Do not operate winch in a damaged condition.
12. Do not operate winch that has not been properly maintained or equipped.
13. Do not attach winch to unsafe foundation. All bolts and foundations for winch attachment should have a higher load carrying capacity than the wire rope on the winch.
14. Do not operate winch with any personnel near the line of force or capable of coming into contact with moving parts.
15. All signs and warning notices must be posted permanently on the winch.
16. Make sure the wire rope is properly anchored to the winch drum. Always maintain three or more wraps of wire rope on the drum.
17. Never leave a suspended load unattended.
18. Wire rope must spool off drum from the top away from the operator.

WARNING LABELS AND TAGS

The maximal lifting rated capacity of the winch is marked on the winch.

Each winch is supplied from the factory with the warning labels shown. Sample of additional labels required are shown else where in this manual. If the label is not attached to your unit, order a new label and install it.

INGERSOLL-RAND		INGERSOLL-RAND	
MATERIAL HANDLING		EQUIPEMENTS DE PRODUCTION S.A.	
DIVISION SAMIIA		Av. Salengro-59450 Sin le noble-France	
		Fax: (33) 27.93.08.00	
MODEL: XXXXXXXXXX			
CODE: XXXXXXXX	SERIAL NBR.: XX/XX/XX		
LOAD CAPACITY (S.W.L.): XX Kg AT 1 st LAYER OF Ø13 MM ROPE			
FULL LOAD HOISTING SPEED AT MID DRUM WITH 6.3BAR: X M/MN			
WORKING PRESSURE: 5 TO 7 BAR	YR OF MANUF.: XXXX		

**MAN-RIDING WINCH
WARNING**

Failure to follow these warnings may result in death, severe injury or property damage:

Do not operate this winch before reading operation and maintenance manual.

It is responsibility of the owner or user to determine whether the winch conforms with local regulations for personnel use.

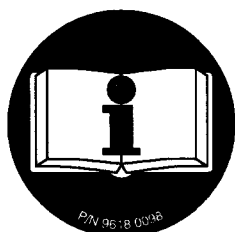
Do not lift more than rated load.

Do not allow less than three wraps of wire rope to remain on drum at all time.

Do not operate a damaged or malfunctioning winch.

Do not remove or obscure warning labels..

**INGERSOLL-RAND
MATERIAL HANDLING**



- Read the installation and operation manual before using the winch

WARNING

Winch shall not be used where there is a risk of entanglement

INGERSOLL-RAND
MATERIAL HANDLING

NOTICE

MAN-RIDING AIR WINCH

MAN-LIFTING with this winch is STRICTLY LIMITED to off-shore marine applications specifically approved by maritime regulatory bodies. Regulatory bodies, not the manufacturer, have determined suitable use

SPECIFICATIONS

Description

The « Man-riding » winches have been designed and built for the « oil and offshore » industry and more specifically to conform with specifications asked for the Norwegian Oil Ministry and the British Department of Energy.

There are no norms for the use of « Man-riding » except those currently demanded by the offshore industry. Thus it is the responsibility of the user to determine the adaptability of this equipment for specific use and to ensure that it conforms to any rules which may be applicable.

« Man-riding » winches application and limitations:

To be used as Man-Riding Winches.

Classified for use according to FEM/I Regulations:

Class4 , strain 2, group 4M

Design temperature TD = -10 degrees C

Ambient air temperature between the design temperature and 40° C

On request, the winch is supplied with a traceability list for the main load parts which are under load together with a DNV "Type Approval Certificate":

Construction :

LS1000LP series winches have 4 assemblies designed for the most difficult tasks

- A engine block.
- A brake-control reducer block within the drum.
- A frame construction mainly of two strutted flanges.
- A drum.

Motor : Air motor with two directions of rotation

Reducer : rotary gear system with gears of specially treated high grade steel mounted on roller bearings.

This mechanism is enclosed within the winch drum forming the oil sump.

Internal Brake : Multidisks brake in a oil bath ensuring constant control of the load when lowering. It works by decompression thus ensuring automatic function of the brake in case of air failure. This brake ensures a constant level of braking and is unaffected by exterior conditions.

External Brake : direct on to a large drum ensuring constant control of the load while lifting or lowering. It works by decompression thus ensuring automatic function of the brake in case of air failure.

Drum : made of cast iron fixing by a wedged box.

Drum Guard: made of steel fixing by screw on the distance part of winch.

Frame : made of two strutted flanges.

Chassis skid : made of welded steel with 4 x 18 diameter fixing holes and 4x40 diameter holes for handling.

Control : 2 types of control are available these controls allow any speed variation determined by the operator.

- Direct lever control on winch with automatic return to neutral position , both brakes applied.
- Remote pendant control: Provides for remote winch control at distances up to 20 meters away from the winch. The pendant control throttle is a 2 lever movable control station.

Anti-spin device : a free wheel within the multidisc brake. This prevents any slippage of the drum during the release of the air-compressed overload device.

OPTIONAL FEATURES

Main air emergency stop device: The emergency stop device is located at the air inlet on local control models or on the pendant of remote control models.

Upper and lower limits switches : This device limits the winch to running within two points.

Emergency lowering system : The winch is fitted with an emergency inlet which is connected to a secondary power source (supplied on site by the user).

This secondary power source must be as a minimum able to open the brakes for emergency lowering. This secondary power source can be pressurized nitrogen bottles.

Overload protection device: The working principle is based on the detection of the difference of pressure between the air inlet and the air outlet.

Slack wire device: The slack wire system is intended to detect a slack of the wire rope coming out of the winch drum and then stop the winch

Assisting spooling device: Helps for a better winding of the rope at no load condition.

WARNING

- This overload protection device is factory set at 130% maximum of the SWL at rated layer (Refer to SPECIFICATION section).

General Specifications

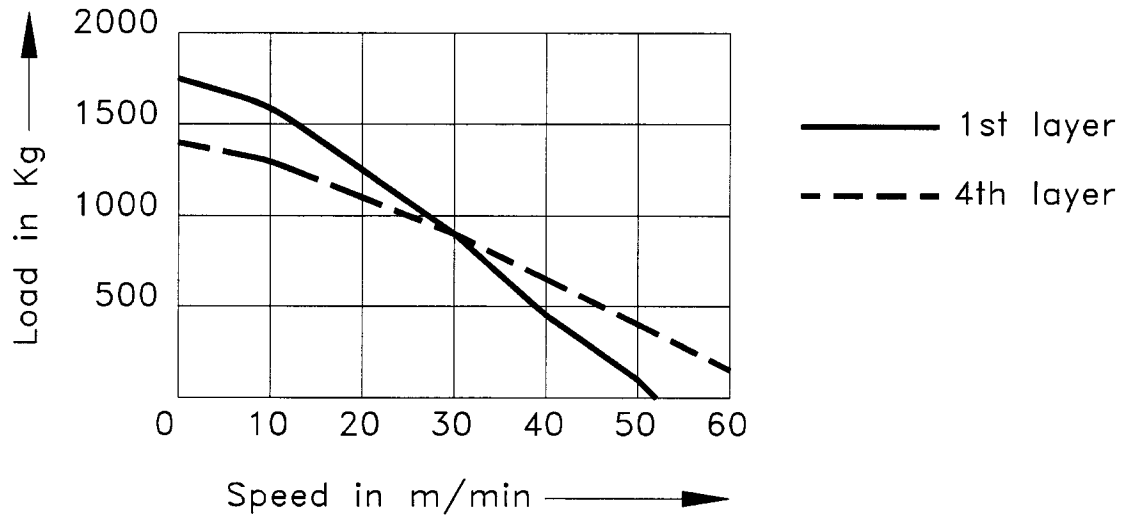
Model No	Rated Operating Air Pressure	Air Consumption at rated Load	Full Drum Rated Capacity Lifting	Max. Drum Line Speed	Motor Power	Recommended Wire Rope Size Lifting Ratio (10:1)
	bar	cu.m/min	kg	m/min	HP	mm
LS1000RLP	6.3	7	1000	24	6	13

Model No	Drum Barrel Diameter	Drum Flange Diameter	Motor Port Inlet Size
	mm	mm	inches
LS1000RLP	273	442	1 1/4 BSP

Winch Wire Rope Storage capacities (meter)

Model		LS1000RLP
Drum Length		485
Wire Rope Diameter		13mm
cumulative rope capacity		Meter
Rating limit	1 st layer	31
	2 nd layer	65
	3 rd layer	102
	4 th layer	142
	5 th layer	185
	6 th layer	230

Performance curve at 6.3 bar (90 PSI)



(Dwg.D6150113)

Model Code Explanation

Example: LS1000 R LP - PH 2M - S

Winch model

LS1000 = 1000kg

Power Source

R = Air

Personnel Lift (LP)

Includes std features i.e
second auto brake with skid and drum guard
Sandblast preparation and primer with Offshore paint

Control

L = Lever control

PH = pendant control

Control Distance

2M = 2 meters (std)

xM = specify length

Options

S = Upper and lower limit switches

U = Main Air Emergency stop valve

R = Press roller (Assisting Spooling Device)

V = Overload protection

E = Pre equipped emergency lowering device

Y = Slack wire system

13 = Grooved drum for 13mm rope

Accessories available on request

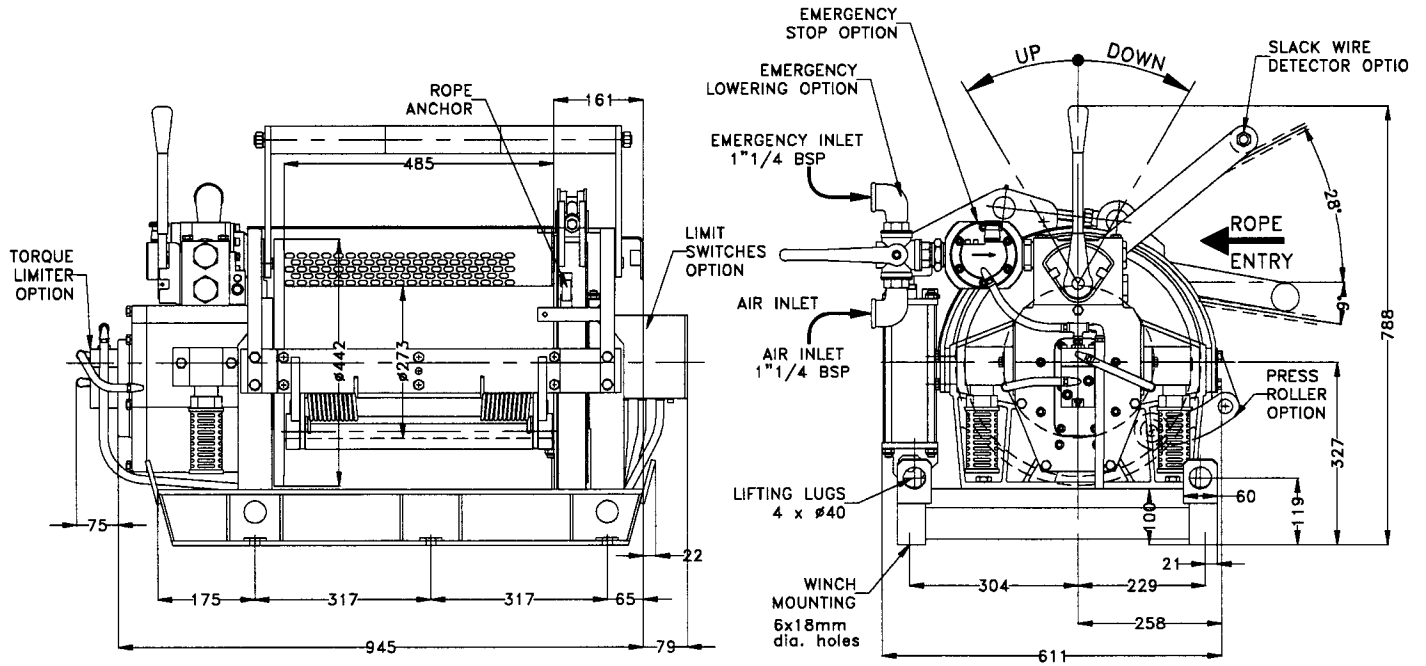
- filter/oiler and pressure regulators.

Documentation available on request

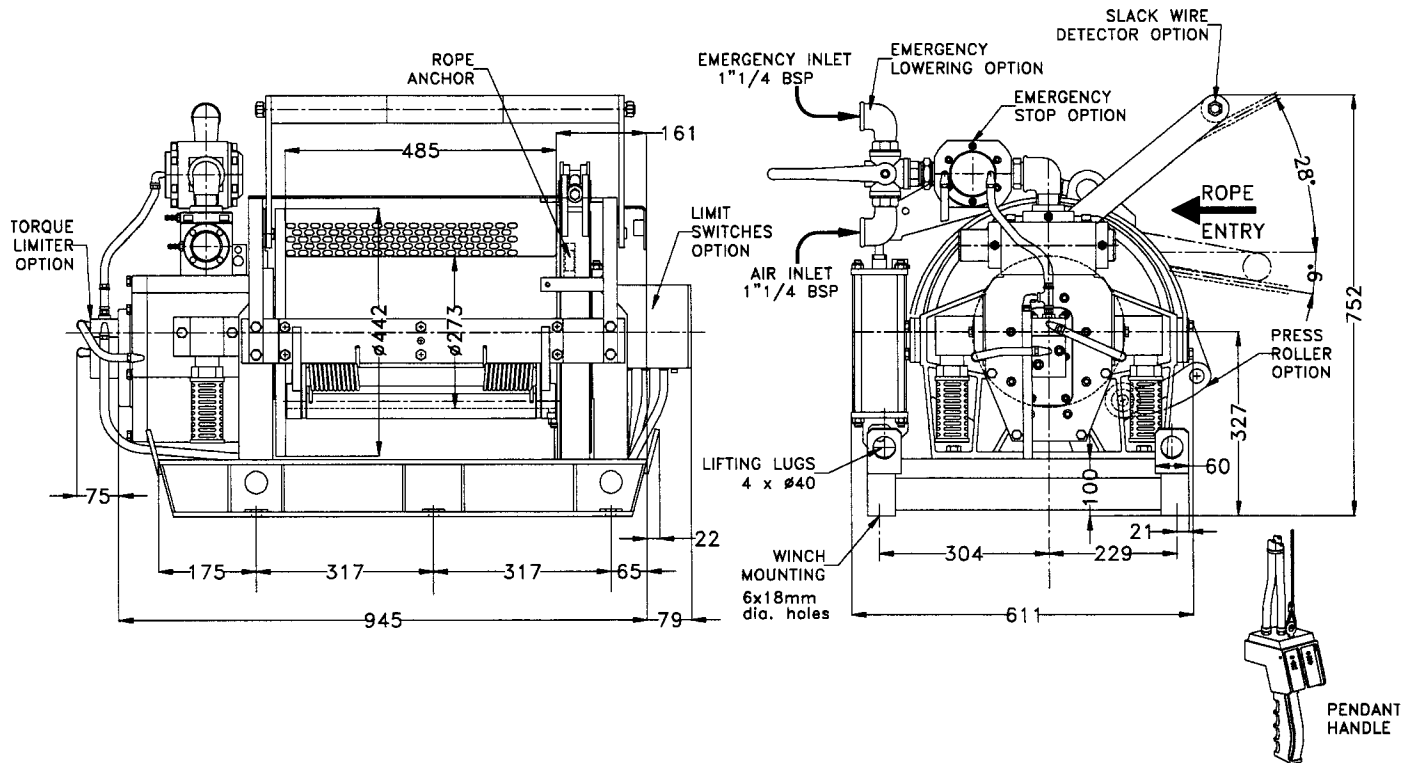
- Material traceability certificates according to DIN 50049.
- Witness test by third party.

GENERAL ARRANGEMENTS DRAWING

LS1000RLP-L SERIES (Dwg.D6150027)



LS1000RLP-PH SERIES (Dwg.D6150051)



INSTALLATION

Prior to installing the winch, carefully inspect it for possible shipping damage. Winches are supplied fully lubricated from the factory. Refer to "LUBRICATION" section for recommended oils.

⚠ CAUTION

- Owner and users are advised to examine specific, local or other regulations which may apply to a particular type of use for this product before installing or putting it to use.

Mounting

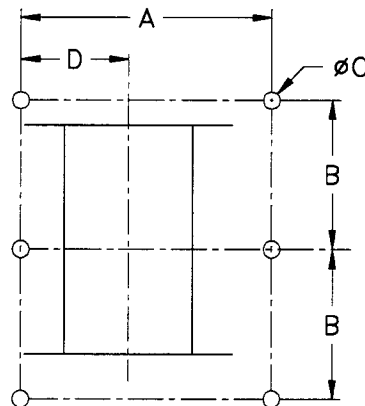
Refer to Dwg.D6150001 and table 1.

Care must be taken when moving, positioning or mounting the winch. In most cases, lifting lugs have been provided to assist in handling the winch. If the lug locations are not appropriate for your specific installation, methods great care should be taken to ensure that the winch, when lifted, will be properly balanced. Determine the weight of your winch by referring to the "SPECIFICATIONS" section. Lift the winch 3 to 4 inches (75 to 100 mm) off the ground. Verify winch is balanced and secure before continuing lift.

⚠ WARNING

- Winch frame material is not suitable for welding. The winches must only be mounted by bolting to a suitable foundation. Do not attempt to mount the winch by welding to a foundation structure
- 1) Ensure the winch is positioned in a manner that allows for proper spooling of the wire rope onto the drum. When installed correctly, the direction of lift is counterclockwise as viewed from the motor end of the winch (clockwise from outboard end of the winch).
 - 2) Mount the winch so the axis of the drum is horizontal. If the winch is to be mounted in an inverted position or if the winch axis will be tilted more than 10° from horizontal, contact your distributor or the nearest service repair center for additional installation information.
 - 3) The winch mounting surface must be flat and of sufficient strength to handle the rated load plus the weight of the winch and attached equipment. An inadequate foundation may cause distortion or twisting of the winch end covers and spacers resulting in winch damage.
 - Make sure the mounting surface is flat to within 1/16 inch (2 mm). Shim if necessary.
 - 4) Recommended mounting bolts: 5/8 inch (16mm) Grade 8 (class 8.8) or better. Use self-locking nuts or nuts with lockwashers. Refer to Table 1 and Dwg.D6150105 for mounting dimensions information.
 - 5) Ensure the winch is correctly grounded to the personal lifting system before using.

Winch Bolt Hole mounting Dimensions



(Dwg.D6150105)

Table 1
Bolt Hole Dimensions

Winch Model	Drum Length	Dimensions			
		A	B	C	D
	mm	mm	mm	mm	mm
LS150RLP	485	533	317	18	229

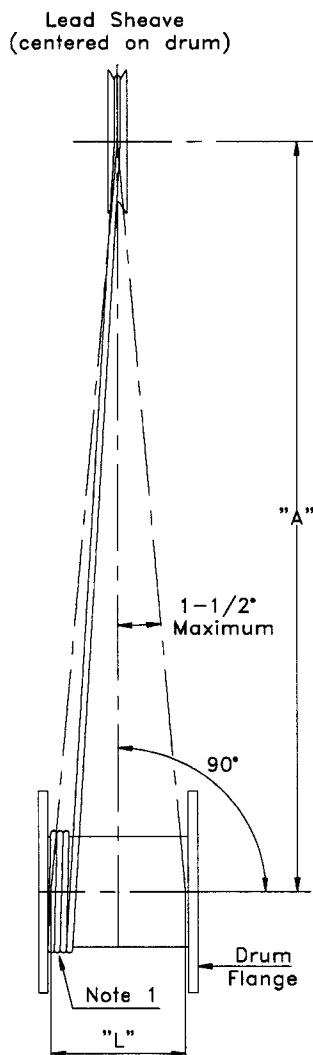
6. If 5/8 inch (16mm) Grade 8 mounting bolts are used, tighten evenly and torque to 150 ft.lbs (203 Nm) for dry thread fasteners; If the fasteners are plated, lubricated or a thread locking compound is used, torque to 99 ft. lbs. 134 Nm).
7. Maintain a fleet angle between the sheave and winch of no more than 1-1/2 degrees. The Lead sheave must be on a center line with the drum at a minimum distance (Refer Dwg.D6150058).
8. Do not weld to any part of the winch.

Wire rope

CAUTION

- Maintain a minimum of 3 tight wraps of wire rope on the drum at all time.(Refer to Dwg.D6150058).

Wire Rope and Drum Diagram



(Dwg.D6150058)

Notes:

1. Maintain a minimum of 3 tight wraps of wire rope on drum at all times.
2. Ensure wire rope does not exceed top rated layer requirement. Refer to "SPECIFICATIONS" section.
3. Maintain a minimum of "A" distance between sheave axle and drum.

"L" = (drum length - 1X rope diameter)

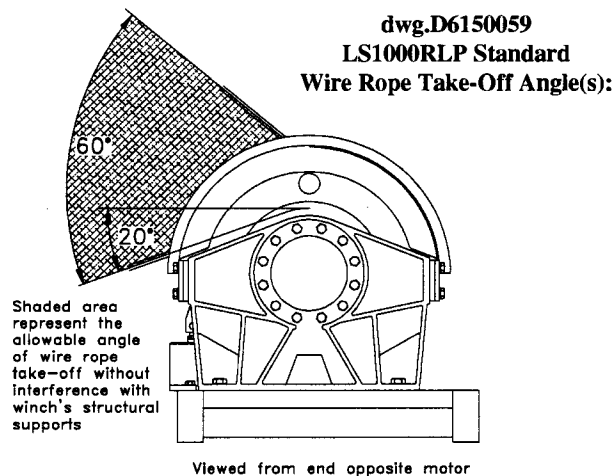
"A" = $\frac{0.5 \times L}{\text{tg } 1-1/2^\circ}$ (LS1000RLP series "A" = 9.5 m)

Standard Winch

Install the winch such that the wire rope, when at the take-off angle limits shown in dwg.D6150059 and D6150107 does not contact the mounting surface.

CAUTION

- Exceeding the wire rope take-off angles will cause the wire rope to come into contact with the winch frame supports resulting in damage to the wire rope and winch.



Wire Rope Selection

Consult a reputable wire rope manufacturer or distributor for assistance in selecting the appropriate type and size of wire rope and, where necessary, a protective coating. Use a wire rope which provides an adequate safety factor to handle the actual working load and meets all applicable industry trade association, state and local regulations.

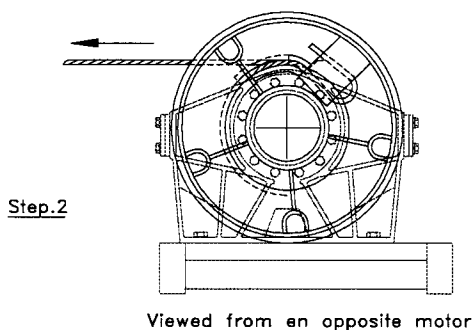
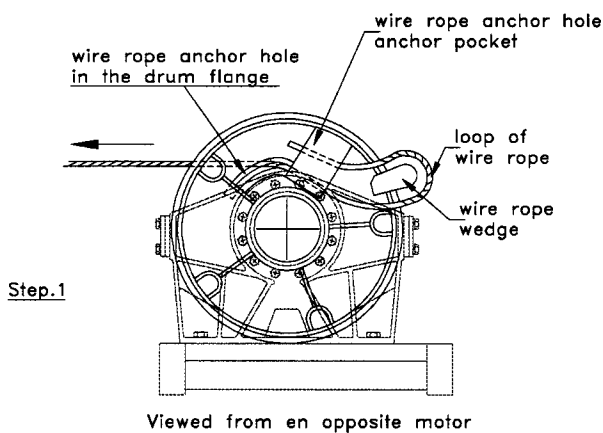
When considering wire rope requirements the actual working load must include not only the static or dead load but also loads resulting from acceleration, retardation and shock load. Consideration must also be given to the size of the winch wire rope drum, sheaves and method of reeving. Refer to "SPECIFICATIONS" section for recommended wire rope size. Wire rope construction must be 6x19 IWRC or 6x37 IWRC right lay to permit correct installation of wire rope anchor.

For man-riding applications a minimum of 10:1 wire rope design factor is required with an 18:1 wire rope to drum diameter ratio.

Installing Wire Rope

(Refer to Dwg D61500106)

1. Cut wire rope to length and fuse end to prevent fraying of strands in accordance with the wire rope manufacturer's instructions.
2. Feed the end of the wire rope into the wire rope anchor hole in the flange drum and pull through approximately three feet (1 m) of wire rope.
3. Forming a large loop with the wire rope, insert the end back into the top of the anchor hole.
4. Place the wire rope wedge into the wire rope anchor pocket in the drum. Install the wedge such that the wire rope will wrap around the wedge as shown in dwg.
5. Pull the wire rope into position in the drum anchor pocket. Ensure the wire rope is installed below the edge of the drum flange diameter. A copper drift or similar tool may be required to fully insert wire rope and wedge into the anchor pocket.

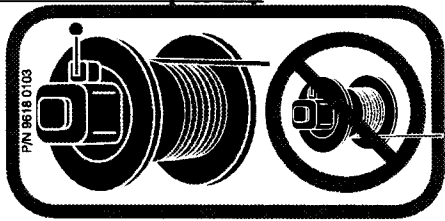


(Dwg.D6150106)



- Make sure the first wrap of wire rope is tight and lays flush against the drum flange.
- Ensure the correct wire rope anchor is used.
- Install the wire rope to come off the drum in only the direction indicated by the label attached to the winch.

Label for horizontal rope entry



Wire Rope Spooling

To compensate for uneven spooling and decrease in line pull capacity as the drum fills up, use as short a wire rope as practical. When rewinding apply tension to the end of the wire rope to eliminate line slack. This helps achieve level winding and tight spooling.

Safe Wire Rope Handling Procedures

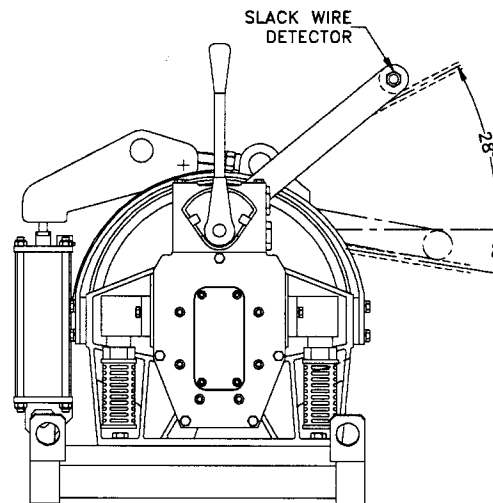
1. Always use gloves when handling wire rope.
2. Never use wire rope which is frayed or kinked.
3. Never use wire rope as a sling.
4. Always ensure wire rope is correctly spooled and first layer is tight against the drum.

Slack Wire Device option (Refer to Dwg D6150107)

Function: The slack wire system is intended to detect a slack of the wire rope coming out of the winch drum and then stop the winch

Description:

When lowering, in the event of slack, the slack wire device arm will go down by its own weight and activate a pneumatic switch which stops the pilot air lowering signal to the motor. The winch is then stopped with both brakes applied.



(Dwg.D6150107)



- Make sure the rope is properly wound on the drum.
- The rope must pass underneath the rollers when coming out of the drum, so that when a tension is applied on the end of the wire rope, the slack wire device arm is lifted.

Rigging

Make sure all wire rope blocks, tackle and fastenings have sufficient safety margin to handle the required load under all conditions. Do not allow wire rope to contact sharp edges or make sharp bends which will cause damage to wire rope, use a sheave. Refer to wire rope manufacturers handbook for proper sizing, use and care of wire rope.

Safe Installation Procedures

1. Do not use wire rope as a ground (earth) for welding.
2. Do not attach a welding electrode to winch or wire rope.
3. Never run the wire rope over a sharp edge. Use a

4. When a lead sheave is used, it must be aligned with the center of the drum. The nominal thread of the lead sheave must be at least 20 times the diameter of the wire rope.
5. Always maintain at least three full tight of wire rope on the drum.

Pneumatic Limit Switches

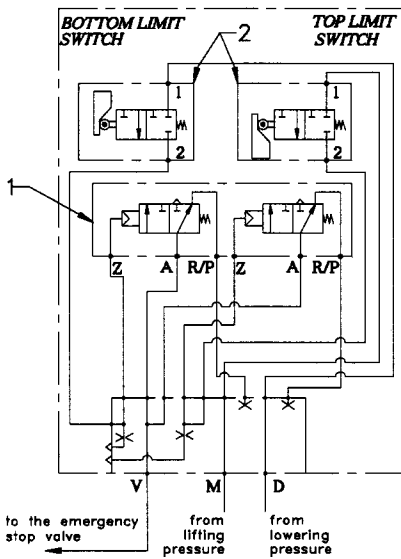
Function: This device limits the winch to running within two points. The upper and lower positions can be adjusted. It also allows a guarantee of the 3 "dead" safety windings on the drum and stop the winch when the highest and lowest position are reached.



The adjustment of the top (upper) limit switch must be done at a minimum safety distance of 2 meters from the return sheave block or from the highest point the manrider can reach

(Refer to Dwg.D6150054)

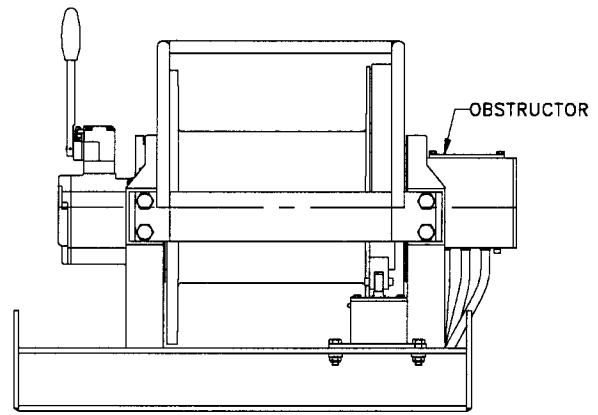
- Description: Two air control valve with roller levers (item 2) are controlled by a gear mechanism pilot 2 air control valve compressed air controlled (item 1) which close the emergency stop valve. The whole system is protected in a metallic box, mounted on the rear bearing. The gear is activated by drum rotation.



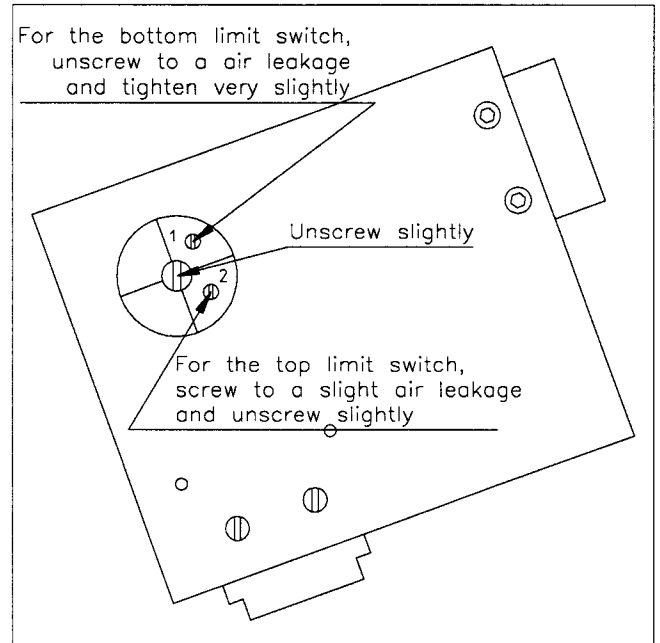
(dwg.D6150054)

Adjustment:(Refer to dwg.D6150097)

- Remove the lid from the top and loosen the central screw.
- To limit the stroke on the upward direction (adjustment of the top limit) adjust screw n°2
- To limit the stroke on the downward direction (adjustment of the bottom limit) adjust screw n°1
- Then tighten the central screw to secure the above adjustments.



(Dwg.D6150096)



(Dwg.D6150097)

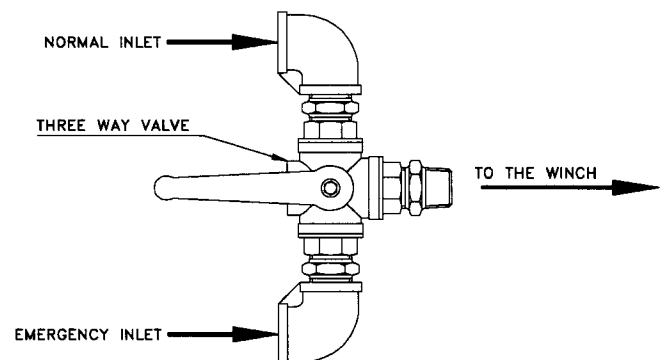
Label located in Limit switches box

Emergency lowering device

Function: This device allows the person to be lifting to the shortest way to safety in case of normal air supply failure.

Description:

- In the event of supply failure, operate the three way valve from normal air supply to the emergency inlet
- Open the emergency power source. Ensure that downstream pressure is 5 to 7 bar.
- Operate the winch slowly to open the brakes for lower the person the shortest way to safety.



NOTE: For the emergency power source, a 50 litres nitrogen bottles can be used.

⚠ WARNING

- **After each use of emergency lowering device, return the three valve to the main air inlet and check the secondary power source is in proper working condition and able to fulfil its task.**

Air System

The air supply must be clean, lubricated and free from moisture. A minimum of 6.3 bar/630 kpa (90psig) at the winch motor is required during operation to provide rated winch performance.

Air Lines

The inside diameter of the winch air supply lines must not be less than the size recommended in the "SPECIFICATIONS" section. Before making final connections to winch inlet, all air supply lines should be purged with clean, moisture free air or nitrogen. Supply lines should be as short and straight as installation conditions will permit. Long transmission lines and excessive use of fittings, elbows, tees, globe valves, etc, cause a reduction in pressure due to restrictions and surface friction in the lines.

Air Line lubricator

Always use an line lubricator with these motors. Use a lubricator having an inlet and outlet at least as large as the air hose size.

NOTICE

- **Shut off air supply before filling air line lubricator.**

The air line lubricator should be replenished daily.

1. LS1000RLP winch: set lubricator to provide 2 to 3 drops per minute of ISO VG 32 (SAE 10) oil.

Air line filter

The air line strainer/filter should be installed as close before the lubricator, to prevent dirt from entering the valve and motor. The strainer/filter should provide 20 microns minimum filtration and a moisture trap. Clean the strainer/filter periodically to maintain its operating efficiency.

Moisture in Air Lines

Quality of air to the winch motor including condensate content is a primary factor in determining the length of time between service overhauls. Moisture traps can help to eliminate moisture. Other methods, such as an air receiver which collects moisture before it reaches the motor or an aftercooler at the compressor that cools the air prior to distribution through the supply lines are also helpful.

Muffler

Make sure mufflers are installed in winch exhaust ports and are functioning correctly.

Motor

For optimum performance and maximum durability of parts, provide an air supply of 90 PSI (6.3 bar/630 kpa) at the flow recommended in the "SPECIFICATIONS" section, as measured at the motor inlet. The winch should be installed as near as possible to the compressor or air receiver.

Usage log

We would recommend that a usage log is kept by the user for reference.

Initial Operating Checks

Winches are tested for proper operation prior to leaving the factory. Before the winch is placed into service the following initial operating checks should be performed.

1. When first running the motor some light oil should be injected into the inlet connection to allow good lubrication.
2. When first operating the winch it is recommended that the motor be driven slowly in both directions for a few minutes.

For winches that have been in storage the following start-up procedures are required.

1. Give the winch an inspection conforming to the requirements of "Winches Not in Regular Use" in the "INSPECTION" section.
2. Pour a small amount of 10W oil in the motor air inlet port.
3. Operate the motor for 10 seconds in both directions to flush out any impurities.
4. The winch is now ready to work.

OPERATION

The four most important aspects of winch operation are :

1. Follow all safety instructions when operating the winch.
2. Allow only people trained in safety and operation of the winch to operate the winch
3. Subject each winch to a regular inspection and maintenance procedure.
4. Be aware of the winch capacity and weight of load at all times.

WARNING

- As regard manriding winches, it is the responsibility of the owner or user of the winch to determine whether the winch conforms with local regulations for personnel use.

Overload Device

An overload device is required on all man-riding winches. The overload device is integrated into the winch air motor and prevents the winch from lifting a load greater than the overload value listed in the specifications chart. If an overload is detected, inlet supply air is stopped and the winch will not operate. If the overload device is activated the load must be lowered and reduced. Alternative methods should be used to accomplish the task. To lower the load reset the winch by pressing "ON" button of the emergency stop device and operate the winch control for wire rope payout.

Winch Controls

The spring loaded, motor mounted, live air manual throttle control valve is supplied as a standard feature on the winch. Optional remote throttle controls may be available on some models. The throttle controls provide operator control of the motor speed and direction of the drum rotation.

CAUTION

- To avoid damage to the rigging, the structure supporting the rigging and the winch, do not use the wire rope with multi reeving arrangement.

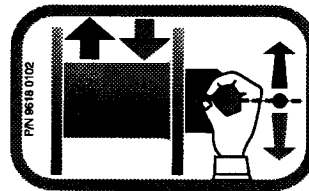
To ensure smooth operation of the winch avoid sudden movements of the control valve. Sudden movement of the control valve may activate the overload device. If this occurs reset the winch by pressing the "ON" button of the emergency stop device and smoothly action the control valve.

Ensure the winch is not overloaded.

Winch with horizontal rope entry (standard feature)

When viewed from the air motor, move the control throttle handle to the right (clockwise) to pay out wire rope and to the left (counterclockwise) to haul in wire rope. Refer to the attached label.

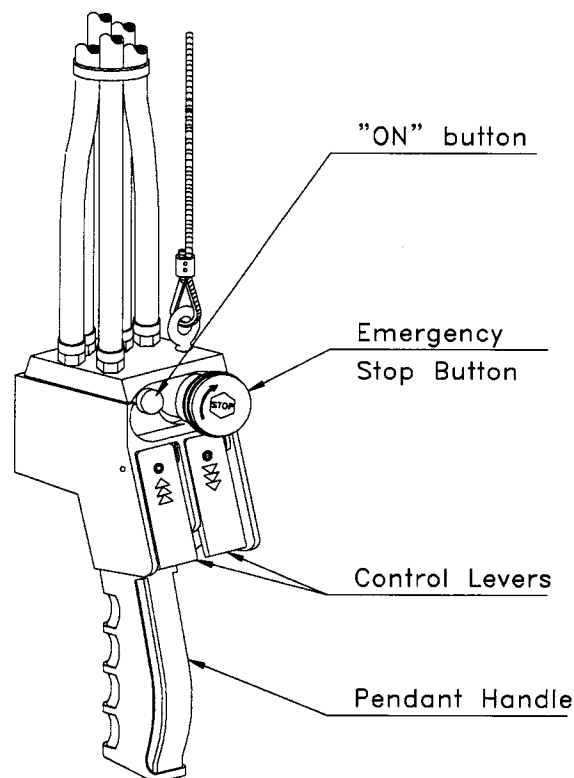
Label for horizontal rope entry



Remote control Pendant

(Refer to Dwg D5770025)

Provide for remote winch control at distance up to 20 meters (66 ft) away from the winch motor. Pilot air hoses connect the pendant to the winch motor provide winch operation. The pendant control throttle is a two lever movable control station. Direction of winch drum rotation is determined by the pendant control lever depressed.



(Dwg.D5770025)

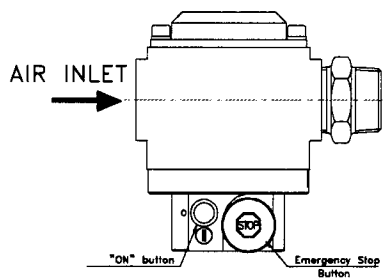
Emergency Stop Device

The emergency stop device is located at the air inlet of the winch on local control models, or on the pendant of remote control models. When activated, winch drum rotation will immediately cease.

1. To start winch operation press "ON" button.
2. To operate winch, action the control valve.
3. In the event of an emergency all winch operation can be stopped by pushing the emergency stop button. This will prevent air from reaching the winch motor which will stop any movement.

The "ON" button must be pushed to restart the winch after the "Emergency Stop" button has been used.

Emergency stop device for LS1000RLP models with lever control (Dwg.D6170009)



Adjustment

For LS1000RLP series
Refer to (dwg.D6150108)

Checking dimensions:

X = 18 mm

Y = 2361.5mm

Z = 1.5mm

Winch Brakes

Automatic discs brake

The automatic disc brake is a spring applied, air released brake. When the winch is in the neutral or haul-in positions the brake air is vented and the brake spring reapplies the brake. The springs, acting on the pressure plate, compress the brake friction and separator plates and engage the brake to prevent drum rotation in the payout direction.

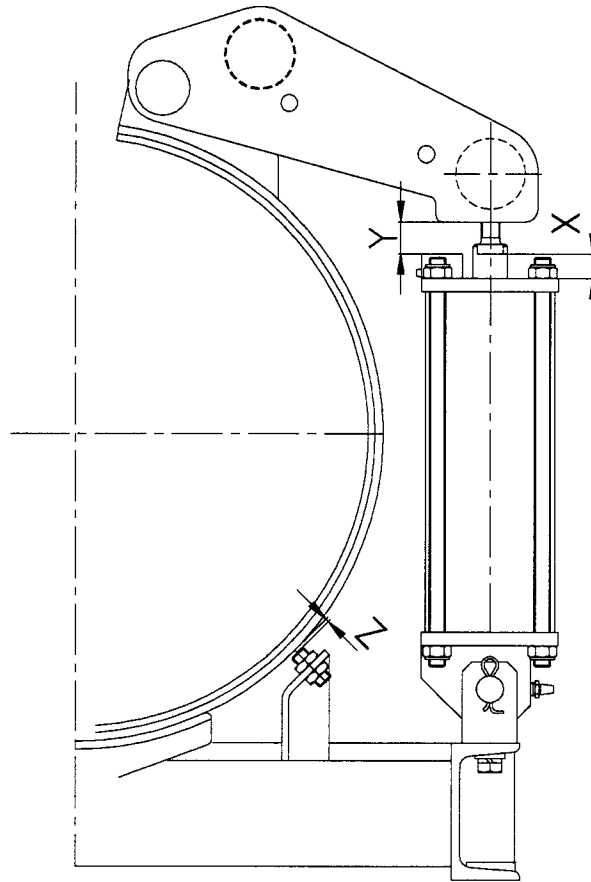
Adjustment

No disc brake adjustment is required.

Automatic Drum Brake

The automatic drum brake is a spring applied, air released, externally mounted brake which uses an air actuated, spring loaded cylinder to automatically disengage the brake when the motor is operated in either the haul-in or payout directions. Air pressure directed to the cylinder overcomes spring pressure to release the brake and allow the drum to rotate.

When the control valve is placed in the neutral position, the air in the cylinder is vented allowing spring tension to automatically engage the brake and prevent drum rotation.



(Dwg.D6150108)

⚠ WARNING

- **All new, altered or modified equipment should be inspected and tested by personnel instructed in safety, operation and maintenance of this equipment to ensure safe operation at rated specifications before placing equipment in service.**
- **Never use a winch when inspection indicates it is damaged.**

Frequent and periodic inspections should be performed on equipment in regular service. Frequent inspections are visual examinations performed by operators or service personnel during routine winch operation. Periodic inspections are thorough inspections performed by personnel trained in inspection of the winch. Inspection intervals depend upon the nature of the critical components of the equipment and the severity of usage.

Careful inspection on a regular basis will reveal potentially dangerous conditions while still in the early stages, allowing corrective action to be taken before the condition becomes dangerous.

Deficiencies revealed through inspection, or noted during operation, must be reported to an appointed person. A determination must be made as to whether a deficiency constitutes a safety hazard before resuming operation of the winch.

Records and Reports

Some form of inspection record must be maintained for each winch, listing all points requiring periodic inspection. A written report should be made monthly on the condition of the critical parts of each winch. These reports should be dated, signed by the person who performed the inspection, and kept on file where they are readily available for review.

Wire Rope Reports

Records should be maintained as part of a long-range wire rope inspection program. Records should include the condition of wire rope removed from service. Accurate records will establish a relationship between visual observations noted during frequent inspections and the actual condition of wire rope as determined by periodic inspections.

Frequent Inspection

On equipment in continuous service, frequent inspection should be made by operators at the beginning of each shift. In addition, visual inspections should be conducted during regular operation for indication of damage or evidence of malfunction (such as abnormal noises).

1. **WINCH.** Prior to operation, visually inspect winch housings, controls, brakes and drum for indications of damage. Do not operate the winch unless the wire rope feeds into the drum smoothly. Any discrepancies noted must be reviewed and inspected further by authorized personnel instructed in the operation, safety and maintenance of this winch.
2. **WIRE ROPE.** Visually inspect all wire rope which can be expected to be in use during the day's operations. Inspect for wear and damage indicated by

distortion of wire rope such as kicking, "birdcaging", core protrusion, main strand displacement, corrosion, broken or cut strands. If damage is evident, do not operate winch until the discrepancies have been reviewed and inspected further by personnel instructed in the operation, safety and maintenance of this winch.

NOTICE

- **The full extent of wire rope wear cannot be determined by visual inspection. At any indication of wear inspect the wire rope in accordance with instructions in "Periodic Inspection."**
3. **AIR SYSTEM.** Visually inspect all connections, fittings, hoses and components for indication of air leaks. Repair any leaks or damage. Check and clean filters if equipped. Check lubricator operation.
 4. **CONTROLS.** During operation of winch, verify response to control is quick and smooth. If winch responds slowly or movement is unsatisfactory, do not operate winch until all problems have been corrected.
 5. **BRAKES.** During winch operation test brakes. Brakes must hold load without slipping. Automatic brakes must release when winch motor throttle is operated. If brakes do not hold load, or do not release properly, the brakes must be adjusted or repaired.
 6. **WIRE ROPE REEVING.** Check reeving and ensure wire rope is properly secured to the drum.
 7. **LUBRICATION.** Refer to the "LUBRICATION" section for recommended procedures and lubricants.

Periodic Inspection

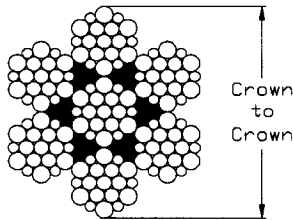
Frequency of periodic inspection primarily depends on the severity of usage :

NORMAL	HEAVY	SEVERE
yearly	semi-annually	quarterly

Disassembly may be required for **HEAVY** or **SEVERE** usage. Keep accumulative written records of periodic inspections to provide a basis for continuing evaluation. Inspect all items listed in "Frequent Inspection". Also inspect the following :

1. **FRAME and UPRIGHT.** Check for deformed, or cracked or corroded main components. If external evidence indicates the need for additional inspection return winch to your nearest Ingersoll-Rand service repair center.
2. **FASTENERS.** Check retainer rings , split pins, capscrews, nuts, and other fasteners on winch, including mounting bolts. Replace if missing or damaged and tighten if loose.
3. **DRUM AND SHEAVES.** Check for cracks, wear or damage. Replace if necessary.
4. **WIRE ROPE.** In addition to Frequent Inspection requirements, also inspect for the following:

- a) Build-up of dirt and corrosion. Clean with steam or a stiff wire brush to remove dirt and corrosion if necessary.
- b) Loose or damaged end connection. Replace if loose or damaged
- c) Check wire rope anchor is secure in drum.
- d) Verify wire rope diameter. Measure the diameter of the wire rope from crown-to-crown throughout the life of the rope. Recording of the actual diameter should only be done with the wire rope under equivalent loading and in the same operating section as accomplished during previous inspections. If the actual diameter of the wire rope has decreased more than 0.4 mm (1/64inch) a thorough examination of the wire rope should be conducted by an experienced inspector to determine the suitability of the wire rope to remain in service. (Refer to Dwg.D6310012).



(Dwg.D6310012)

5. **ALL COMPONENTS.** Externally inspect for wear, damage, distortion, deformation and cleanliness. Clean, replace or lubricate as required.

6. **BRAKE.** Test brake to ensure proper operation. Brake must hold a 125% rated load with full drum without slipping; If poor operation or visual damage, return winch to a authorized service center for repair; Check all brake surfaces for wear, deformation or foreign deposits. If brake lining thickness appears to be worn, contaminated or damaged brake band should be replaced. Clean and replace components as necessary.
7. **FOUNDATION OR SUPPORTING STRUCTURE.** Check for distortion, wear and continued ability to support winch and rated load. Ensure winch is firmly mounted and that fasteners are in good condition and tight.
8. **LABELS AND TAGS.** Check for presence and legibility of labels. Replace if damaged or missing.

Winches Not in Regular Use

1. Equipment which has been idle for a period of one month or more, but less than six months, shall be given an inspection conforming to the requirements of "Frequent Inspection" before being placed into service.
2. Equipment which has been idle for a period of over six months shall be given a complete inspection conforming with the requirements of "Periodic Inspection" before being placed into service.
3. Standby equipment shall be inspected at least semi-annually in accordance with the requirements of "Frequent Inspection". In abnormal operating conditions equipment should be inspected at shorter intervals.

To ensure continued satisfactory operation of the winch, all points requiring lubrication must be serviced with the correct lubricant at the proper time interval as indicated for each assembly; Correct lubrication is one of the most important factors in maintaining efficient operation.

The lubrication intervals recommended in this manual are based on intermittent operation of the winch eight hours each day, five days per week. If the winch is operated almost continuously or more than the eight hours each day, more frequent lubricant types and change intervals are based on operation in an environment relatively free of dust, moisture, and corrosive fumes. Use only those lubricants recommended. Other lubricants may affect the performance of the winch. Failure to observe this precaution may result in damage to the winch and/or its associated components.

INTERVAL	LUBRICATION CHECKS
Start of each shift	Check flow and level of air line lubricator when operating winch at maximum motor speed. Check Muffler and clean them if necessary.
Monthly	Inspect and clean or replace air line filter.
	Lubricate components supplied by grease fittings.
Half-Yearly	Change muffler
Yearly (Contact your nearest I.R distributor)	Replace grease in winch gear case.
	The winch must be disassembly to drain and refill the oil.

Note: Interval are based on winch operation in a normal environment as described in the "INSPECTION" section. In "Heavy' or 'Severe' operating conditions adjust lubrication intervals accordingly.

General Lubrication

Winches are supplied from the factory filled with oil.

Wire Rope

Follow the wire rope manufacturer's instructions. At a minimum, observe the following guidelines:

- Clean with a brush or steam to remove dirt, rock dust or other foreign material on the surface of the wire rope.

⚠ CAUTION

- Do not use an acid-based solvent .Only use cleaning fluid specified by the wire rope manufacturer.
- Apply a wire rope lubricant, Ingersoll-Rand LUBRI-LINK-GREEN or SAE 30W oil.
 - Brush, drip or spray lubricant weekly, or more frequently, depending on severity of service.

Reduction Gear Assembly

Replace the oil in the reduction housing at least once every year. If the winch is used at a normal frequency, the oil in the reduction housing is suitable for one years operation without changing. However, when the winch is used at a high frequency, the oil may need to be changed on a more frequent basis.

To ensure correct performance, highest efficiency and long life, it is essential that the lubricating oil be maintained at the correct level. The recommended grade of oil must be used at all times since the use of unsuitable oil may result in excessive temperature rise, loss of efficiency and possible damage of the gears.

The reduction gear assembly is filled and shipped with oil from the factory. Use only high quality lubricants in the reduction gear assembly such as high grade EP type oil or their equivalents.

Oil capacity of the gear box:

- LS1000RLP : 3 L

Reduction gear Recommended Lubricant :

Temperature	Recommended Viscosity
Below 0° C (32° F)	ISO VG 68
0° - 27° C (32° - 80° F)	ISO VG 100
Above 27° C (80° F)	ISO VG 150

Seals and Bearings

If winch is disassembled, clean all parts thoroughly and coat bearings and seals with clean grease. Use sufficient grease to provide a good protective coat.

Recommended grease

Temperature	type grease
- 30° to 10° C (-20° to 50° F)	EP 1 multipurpose lithium based grease
30° to 120° C (-1° - 49° F)	EP 2 multipurpose lithium based grease

⚠ WARNING

- Never perform maintenance on the winch while it is supporting a load.
- Before performing maintenance, hit control tags : **DANGER - DO NOT OPERATE - EQUIPMENT BEING REPAIRED.**
- Only allow service personnel trained in safety and maintenance on this winch to perform maintenance.
- After performing any maintenance on the winch, test winch to 125% of its rated capacity before returning to service.
- Shut off air system and depressurize air lines before performing any maintenance.
- Do not use Trichloroethylene to clean parts.

Maintenance Intervals

The Maintenance Interval chart is based on intermittent operation of the winch eight hours a day, five days a week. If winch operation exceeds eight hours a day, or use is under **HEAVY** or **SEVERE** conditions, more frequent maintenance should be performed. Refer to 'Periodic Inspection' in the "INSTALLATION AND OPERATION MANUAL" for interval guidance.

INTERVAL	MAINTENANCE
Start of each shift	Make a thorough visual inspection of the winch for damage. Do not operate the winch if damaged.
(Operator or Maintenance Personnel)	Operate the winch at low RPM in both directions. Winch must operate smoothly without sticking, binding or abnormal noises. Check the operation of the brake.
Yearly	Inspect the brake disc. Clean or replace parts as required.
(Maintenance Personnel)	Inspect the winch gearing, shafts and bearings for wear and damage. Repair or replace as necessary.
	Check all the supporting members, including the foundation, fasteners, nuts, sheave and riggings, etc. for indications of damage or wear. Repair or replace as required.

Adjustment

Limit Switches (If Existing)

(Refer to Dwg.D6150025)

- Remove the 4 screws (304) and washer (305) to remove the cover plate (303) from the box (301).
- Unscrew the central screw.
- To limit the length in the upward direction (Adjustment of the top limit) , unscrew the adjusting screw 2.
- Also to limit the length in the lowering direction (Adjustment of the bottom limit) , unscrew the adjusting screw 1.
- Then tighten the central screw to secure the above adjustments

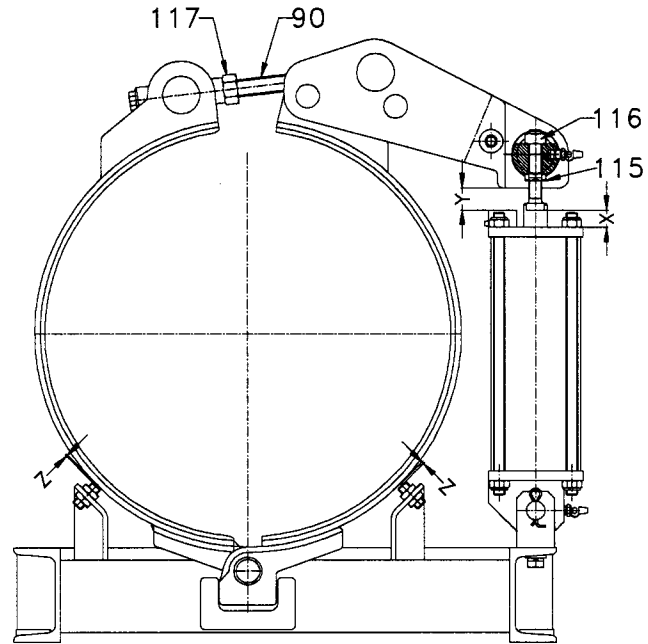
Direct Brake band on drum

(Refer to Dwg.D6150108 below)

Y=23±1.5mm : this adjusting is done by using the adjusting screw (90) and of the clamping of the nut (117) at the couple of 10mdaN.

X=18mm : this adjusting is done by the slightly guidance of the brake jackscrew in the lowering direction and by blocking the nuts (116) and (115).

Z=1.5mm : Clearance of both half brake band



(Dwg.D6150109)

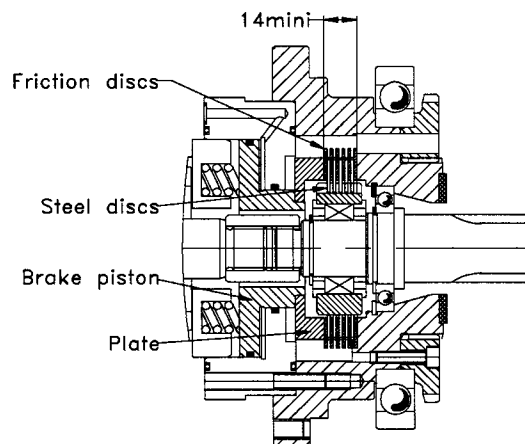
Internal Brake

(Refer to Dwg.D6180034)

No brake adjustment is required.

Use the following procedure to remove the brake.

1. Disconnect and tag the air lines.
2. Set the winch in a vertical position with the motor end up.
3. Remove the motor.
4. Remove the coupling sleeve (75), plate (82), and discs (72 and 73).



(Dwg.D6150112)

The friction discs have 0.2mm deep groove on each side. Replace the friction discs if the grooves are no longer visible.

Measure total brake and steel plate stack up. Check that

GENERAL DISASSEMBLY PROCEDURES

The following instructions provide the necessary information to disassemble, inspect, repair, and assemble the winch. Refer to the winch assembly drawing provided in the Parts Section.

If a winch is being completely disassembled for any reason, follow the order of the topics as they are presented.

It is recommended that all maintenance work on the winch be performed on a bench.

In the process of disassembling the winch, observe the following :

1. Never disassemble the winch any further than is necessary to accomplish the needed repair. A good part can be damaged during the course of disassembly.
2. Never use excessive force when removing parts. Tapping gently around the perimeter of a cover or housing with a soft hammer, for example, is sufficient to break the seal.
3. Do not heat a part with a flame to free it for removal, unless the part being heated is already worn or damaged beyond repair and no additional damage will occur to other parts.

In general, the winch is designed to permit easy disassembly and assembly. The use of heat or excessive force should not be required.

4. Keep the work area as clean as practical, to prevent dirt and other foreign matter from getting into bearings or other moving parts.
5. All seals and 'O' rings should be discarded once they have been removed. New seals and 'O' rings should be used when assembling the winch.
6. When grasping a part in a vise, always use leather-covered or copper-covered vise jaws to protect the surface of the part and help prevent distortion. This is particularly true of threaded members and housings.
7. Do not remove any part which is press fit in or on a subassembly unless the removal of that part is necessary for repairs or replacement.

DISASSEMBLY INSTRUCTIONS

Direct Brake on Drum Disassembly

(Refer to Dwg.D6150066)

1. Brake Cylinder ass'y disassembly.

- 1.1. Stripping down of the whole of brake cylinder.
 - Release nut (117).
 - Unscrew the adjustment screw (114,118).
 - Remove nut (116).
 - Disconnect the hose of the brake cylinder.
 - Remove one pin (109) and expel the axle (83) to remove the cylinder ass'y.
- 1.2. Stripping down of the whole of brake cylinder.
 - Remove 2 to the 4 tension pieces (88).
 - Assembly 2 screw rods M12 Lg400mm with nuts M12 in lieu of them.
 - Remove the 2 others screws rods.
 - Decompress spring (81).
 - Remove cylinder nose (86).
 - Remove spring (81).
 - Drain oil from cylinder casing (89).
 - Strip down the whole of the cylinder rod (87), piston (108) and sill washer (85).

- Expel cylinder casing (89) from cylinder bottom (92).

2. Band brake ass'y disassembly.

- 2.1. Stripping down of the winch from skid frame.
 - Strip down the whole of brake cylinder (see 1.1).
 - Disconnect limit switch hoses if the winch is fatted with any.
 - Disconnect hoses.
 - Remove fixing screws on winch.
 - Strip down the winch from skid frame (80).
- 2.2. Stripping down of the whole of the both half brake bands.
 - Open the brake band unscrewing the setting screw (90).
 - Strip down the whole of the both half brakes bands (101) and (102) from the winch.
- 2.3. Disassembly of the whole of the both half brake bands
 - Remove brake band axle (82).
 - Remove nut (117) from setting screw (90)
 - Remove distance ring (100).
 - Remove setting screw (90).
 - Remove smooth wheel (95).
 - Remove screws (120).
 - Remove sprocket wheel (95).
 - Remove smooth wheel (98).
 - Remove the both half levers (93) and (99)

Winch disassembly

(Refer to Dwg.D6150034)

1. Multiple brake disc disassembly

- Disconnect the control valve and motor hoses.
- Remove the air control valve ass'y.
- Remove the air motor ass'y (140) (See « Air motor disassembly » instruction.
- Remove centring ring (63) and springs (65).
- Remove 'O' ring (4) and (7).
- Strip down the whole of brake housing (59), piston (66) and distance ring (12).
- Remove 'O' ring (7).
- Strip down coupling sleeve (64).
- Remove retainer ring (62)
- Strip down the whole of free wheel (51,52,60)
- Strip down brake discs (54) and (55)

2. Gear block disassembly

- Remove the air control valve ass'y and motor.
- Remove multiple brake discs ass'y (see front paragraph).
- Remove screws (30), lockwashers (31) and distance pieces(28).
- Remove screws (37) and lockwashers (31) and remove front flange (23).
- Remove screws (56) and strip down the stop (57).
- Extract the whole of front bearing (58), rolling bearing (8) and ring gear support (14). (use extraction equipment Code :M6151300).
- Remove screws (48) to remove ring gear support (14).
- Remove front bearing (58) and joint (6).
- Remove retainer rings (50) and (42).
- Strip down the driving pinion (41) and bearing (49).
- Expel the seal ring (53) from rolling bearing (58).

- Remove retainer ring (10) and extract bearing (11) from rolling bearing (8).
- Remove ring gear (47) and retainer ring (13).
- Strip down the whole of planetary support (44) with planet gears (40).
- Push up pins (18).
- Extract planet axle (19) and remove planet gears (40), needles bearings (15), spacer (39), thrust bearings (16) and thrust washers (17).
- Remove ring gear (43), claw of positive clutch (38) and retainer ring (20).

3. Rear side of winch disassembly

- Remove screws (30), lockwashers (31) and distance pieces (28).
- Remove screws (37) and lockwashers (31) and remove rear flange (23)
- Strip down the whole of rear bearing (26) and blind washer (27).
- Remove joint (24).
- Extract bearing (24).
- Remove seal ring (29).

GEAR MOTOR DISASSEMBLY

(Refer to Dwg.D6160003)

1 Motor ass'y disassembly

- Position several block of wood on the work bench and stand the winch in a vertical position with the motor end up.
- Remove the pipes (146,173) with an extractor.
- Remove screws (159) with lockwashers (160).
- Remove the motor ass'y from the motor housing (141) with the 'O'Ring (154).
- Remove screw (162)
- Remove the motor housing (141).

2 Motor block disassembly

- Remove screws (166) from the front plate (145).
- Strip down the front plate (145) (use the 2 extraction holes M10).
- Remove screws (174) and remove flange cage (172).
- Remove retainer ring (168) to remove joint support (148), 'O' ring (156), seal ring (153).
- Remove screw (163) and washer (164) and extract bearings (152).
- Remove screws (166) from the rear plate (142).
- Strip down the motor housing (143) (use the 2 extraction holes M10).
- Remove screws (165) and strip down the cover (144) from the rear plate (142) and remove 'O' rings (155).
- Immobilize the drive gear (149) and iddle gear (150) with a rod between the teeth and remove nuts (169).
- Remove the drive gear (149) and iddle gear (150).

LEVER CONTROL VALVE DISASSEMBLY

(Refer to Dwg. D6170010)

1. Remove screws (141) and lockwashers (137) to remove the control valve assembly from the motor housing.
2. Remove the joint (127) and 'O'Ring (147).
3. Tap out the pin (135).
4. Extract the control lever ass'y (123, 130, 143)).
5. Remove screws (140), (142) and lockwashers (138).
6. Remove bracket stop (121)

7. Remove 'O' ring (144), (145) and guiding ring (128).
8. Remove the spring (129).

NOTICE

- **Localize the mounting position of the rotary valve in the valve housing.**
8. Pull out the rotary valve (131).
 9. Remove plug (125) to remove spring (134) and air strangler (126).
 10. Remove screws (139) to remove rear end cover (122), 'O' rings (144), (146).
 11. Unscrew the air strangler (124) to remove 'O' ring 148.

EMERGENCY STOP VALVE DISASSEMBLY.

(Refer to Dwg.D6170012)

1. Unscrew emergency stop button (271).
2. Remove screws (261) and washer (262) to remove the cover (259) with the spring (260).
3. Remove the 'O' ring (263) from the cover (259).
4. Remove the screw (254) to remove the spool (251) with protector (252).
5. Unscrew the shuttle valve stop (272) to remove ball (256).
6. Remove the 'O' ring (253) from shuttle valve stop (272) and spool (251).
7. Remove screws (261) and washer (262) to remove the cover (269) and the 'O' ring (253).
8. Remove the diaphragm (276).
9. Immobilize the valve cone (268) by its hole with a rod in one of two orifices of the body (273) and remove the screw (267).
10. Remove the valve cones (268,264) with seal rings (265) and distance ring (274) with the washers (266).
11. Remove plugs (258) with springs (257) and balls (256).
12. Remove the screw (278) to remove nozzle (277).

PENDANT CONTROL VALVE DISASSEMBLY

(Refer to Dwg. D6170014)

1. Remove screws (405) and lockwashers (406) to remove the control valve assembly from the motor housing.
2. Remove 'O' ring (416)
3. Remove screws (403) and lockwashers (404) to remove the cover (425), (410) and main feed line (407).
4. Remove joint (420) and (408).
5. Strip down valve assembly (422,423,424,401,402)
6. Remove the cylinder liner (421) and 'o' rings (409) if necessary.
7. For disassembly valve ass'y, remove screw (423).
8. Remove screws (413) and lockwashers (404) to remove selector module (419).
9. Unscrew the flap (418) to remove 'o' ring (417).

TORQUE LIMITER ASS'Y DISASSEMBLY

(Refer to Dwg.D6360003)

1. Disconnect hoses
2. Remove screws (219) to remove the torque limiter

3. Remove the screw (210) and the joint (211).
4. Remove the plug (214) to remove nozzle (213).
5. Remove the 4 screws (216) to remove the body (217).
6. Remove the valve cone (215) from the body (217).
7. Remove the nut (207) and washer (208) to remove diaphragm (209) from the valve cone (215).
8. Remove spring (206), spring receiver (205) and ball (204).
9. Remove nut (203), usit-ring (201) and screw (202) from cover (218) if necessary.

PHS2E Pendant control disassembly.

(Refer to Dwg.D5790027)and (Dwg.D5790028)

1. Disconnect hoses from the pendant ass'y
2. Remove the fittings (2)
3. Remove the lifting eye (1) if necessary.
4. Tap out the pin (16) to remove the levers (18).
5. If necessary, remove the setscrews (17).
6. Remove the setscrews (9) to remove the valve cone (4).
7. Remove the protector (11) and 'O'rings (5),(10) from the valve (4).
8. Remove the plugs (8) to remove the spring (7) with ball (6).

For pendant with emergency stop

9. Unscrew the emergency stop button (19).
10. Unscrew the valve (20) to remove ball (6) and 'O'rings (10) if necessary.
11. Remove the retainer ring (15) to remove the exhaust washer (14).

CLEANING, INSPECTION and REPAIR

Use the following procedures to clean, inspect, and repair the components of the winch.

Cleaning

CAUTION

- A bearing that appears loose or rotates roughly must be replaced. Failure to observe this precaution will result in bearing and/or winch component damage.

Clean all winch component parts in solvent (except for the brake friction disc). The use of a stiff bristle brush will facilitate the removal of accumulated dirt and sediments in the drum and reduction assembly. Dry each part using low pressure, filtered compressed air. Clean the brake friction disc using a wire brush or emery cloth. Do not wash the brake friction disc in liquid. If the brake friction discs are oil soaked, they must be replaced.

Inspection

All disassembled parts should be inspected to determine their fitness for continued use. Pay particular attention to the following :

Winch.

1. Inspect all gears for worn, cracked, or broken teeth.
2. Inspect all bushings for wear, scoring, or galling.
3. Inspect all bearings for play, distorted races, pitting and roller or ball wear or damage. Inspect bearings for freedom of rotation.

4. Inspect shafts for ridges caused by wear. If ridges caused by wear are apparent on shafts, replace the shaft. Inspect all surfaces on which oil seal lips seat. These surfaces must be very smooth to prevent damage to the seal lip.
5. Inspect all threaded items and replace those having damaged threads.
6. Inspect the brake stationary plates and friction disc for oil. If the friction discs have become oil-soaked, replace them. If the stationary plates have become glazed, sand them lightly using fine emery cloth and a flat surface as backing. Inspect the remaining brake parts for warpage or other damage, and replace damaged parts as necessary. Replace the input pinion shaft oil seal.

Internal Brake.

The friction discs have 0.2mm deep groove on each side. Replace the friction discs if the grooves are no longer visible.

Measure total brake and steel plate stack up. Check that measurement is not below 14mm.

External Brake band

1. Inspect all the axles. All external diameter damage require their replacement
2. Inspect the brake bands
 - nominal thickness of linings = 5 mm
 - Minimum thickness = 2 mm

If this dimension is lower, change the brake bands (101) and (102)

3. Inspect brake cylinder joints and the internal diameter surface condition of wrapper cylinder - replace them if necessary.
4. Check the spring condition (81) - If after a large period of use an important diminution of its efficiency is established, replace.
(F theoretical = 100 daN under deflection f = 76 mm)

Repair

Actual repairs are limited to the removal of small burrs and other minor surface imperfections from gears and shafts. Use a fine stone or emery cloth for this work. Do not use steel wool.

1. Worn or damaged parts must be replaced. Refer to the applicable Parts Listing for specific replacement parts information.
2. Inspect all remaining parts for evidence of damage. Replace or repair any part which is in questionable condition.
3. Smooth out all nicks, burrs, or galled spots on shafts, bores, pins, or bushings.
4. Examine all gear teeth carefully, and remove nicks or burrs.
5. Polish the edges of all shaft shoulders to remove small nicks which may have been caused during handling.
6. Remove all nicks and burrs caused by lockwashers.
7. Replace all gaskets, oil seals, and 'O' rings any time the winch is disassembled for repair.

ASSEMBLY INSTRUCTIONS

LEVER CONTROL VALVE ASSEMBLY

(Refer to Dwg. D6170010)

The assembly of control valve has to be carried out in the opposite direction to the one used for disassembly.

NOTICE

- Lubricate all 'O' rings to assembly
- lubricate rotary valve (131)
- Screws (140) and (139) will be fixed and tightened with LOCTITE 243
- Sealing of plugs (133) and (125) will by LOCTITE 577

PENDANT CONTROL VALVE ASSEMBLY

(Refer to Dwg. D6170014)

The assembly of control valve has to be carried out in the opposite direction to the one used for disassembly.

NOTICE

- Lubricate all 'O' rings (153) to assembly
- lubricate sleeve valve (422)

AIR GEAR MOTOR ASSEMBLY

(Refer to Dwg. D6160003)

The assembly of motor block has to be carried out in the opposite direction to the one used for disassembly.

NOTICE

- Screws (163) and (166) will be fixed and tightened with LOCTITE 243 and the screws cap (169).
- Lubricate the seal ring (153) when fixing to the motor axle
- After final assembly of motor block, except for cover (144), position rotor bearings by tightening the rotor axles with a nylon mallet, then reposition cover (144).
- Check that motor thus reassembled works with no friction ; in order to do that rotate the rotor motor by hand, clock wise and anti-clockwise.
- In order to enable easy assembly of the motor block into the crankcase (141), please ensure that the pin between the rear plat and the motor block is positioned only after the pinion of motor has been engaged into the grooves of the motor sleeve.

WINCH ASSEMBLY

Brake discs Assembly

(Refer to Dwg. D6180034)

Reassembly will have to be carried out in the opposite direction to the one used for disassembly

NOTICE

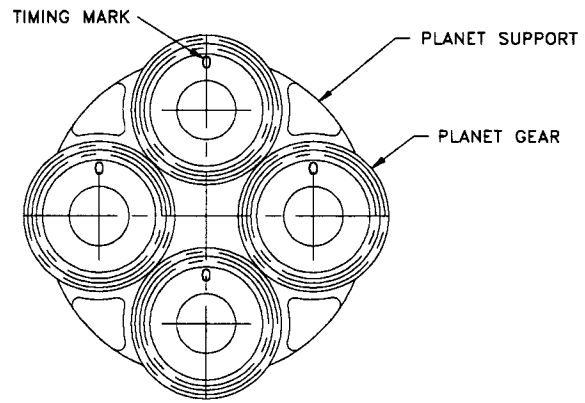
Direction of assembly of the free wheel : external ring (51) blocked in rotation with free rotation of gear (41) in counterclockwise (side view of motor).

- Use LOCTITE 601 for introduction of ring (12) on piston (66).

Gear Assembly

The assembly of motor block has to be carried out in the opposite direction to the one used for disassembly.

Position each assembled planetary gear in the planet support (44). with the timing mark (as shown on drawing Dwg. D6310013).and carefully install planet axles (19).



(Dwg.D6310002)

CAUTION

- For assembly of planet gears, each planet gear must be positioned with the timing mark as shown on drawing D6310013

NOTICE

- Screws (48) and (56) will be fixed and tightened with LOCTITE 243
- Screws (59), from front flange (23), will have to be tightened with 4.83 mdaN torque.
- Screws (30), from distance ring (28), will have to be tightened with 4.83 mdaN torque only after winch has been put on skid frame..

Rear side of winch Assembly

(Refer to Dwg. D6180034)

Reassembly will have to be carried out in the opposite direction to the one used for disassembly

NOTICE

- Screws (59), from front flange (23), will have to be tightened with 4.83 mdaN torque.
- Screws (30), from distance ring (28), will have to be tightened with 4.83 mdaN torque only after winch has been put on skid frame..

DIRECT BRAKE ON DRUM ASSEMBLY

1. Assembly of the brake cylinder

(Refer to Dwg. D6150066).

The assembly of brake cylinder has to be carried out in the opposite direction to the one used for disassembly.

NOTICE

- Sealing between cylinder casing (89) and cylinder bottom (92) will be made by joint of 'SILICOMET'
- Before closing the brake cylinder, full in the spring housing with oil SP150 type : level H=30mm and stock brake cylinder in vertical position for the following operations
- Grease the inside of the seal ring (107)
- Nuts (112) will be tightened with 4.5mdaN torque
- Sealing of all nipples will by LOCTITE 577

2. Assembly of band brake

(Refer to Dwg .D6150087).

The assembly of brake cylinder has to be carried out in the opposite direction to the one used for disassembly.

NOTICE

- Grease all axles
- Screws (120) will be fixed and tightened with LOCTITE 243 and with 6.8mdaN torque, only after light tensioning of brake cylinder.
- Stop screws (118) before the mounting of the winch on this skid frame.

Accessories installation (If existing)

1. Install the emergency stop valve (Refer to Dwg.D6170012)
2. Install the torque limiter ass'y (Refer to Dwg.D6360003)
3. Install the limit switches ass'y (Refer to Dwg.D6150025).
4. Slack Wire system ass'y (Refer to Dwg.D6150010)
5. Press Roller ass'y (Refer to Dwg.D6150056).
6. Connect all air hoses as described in Air powered Drawing D6150028 or D6150075.

TESTS

Testing

Operational Tests

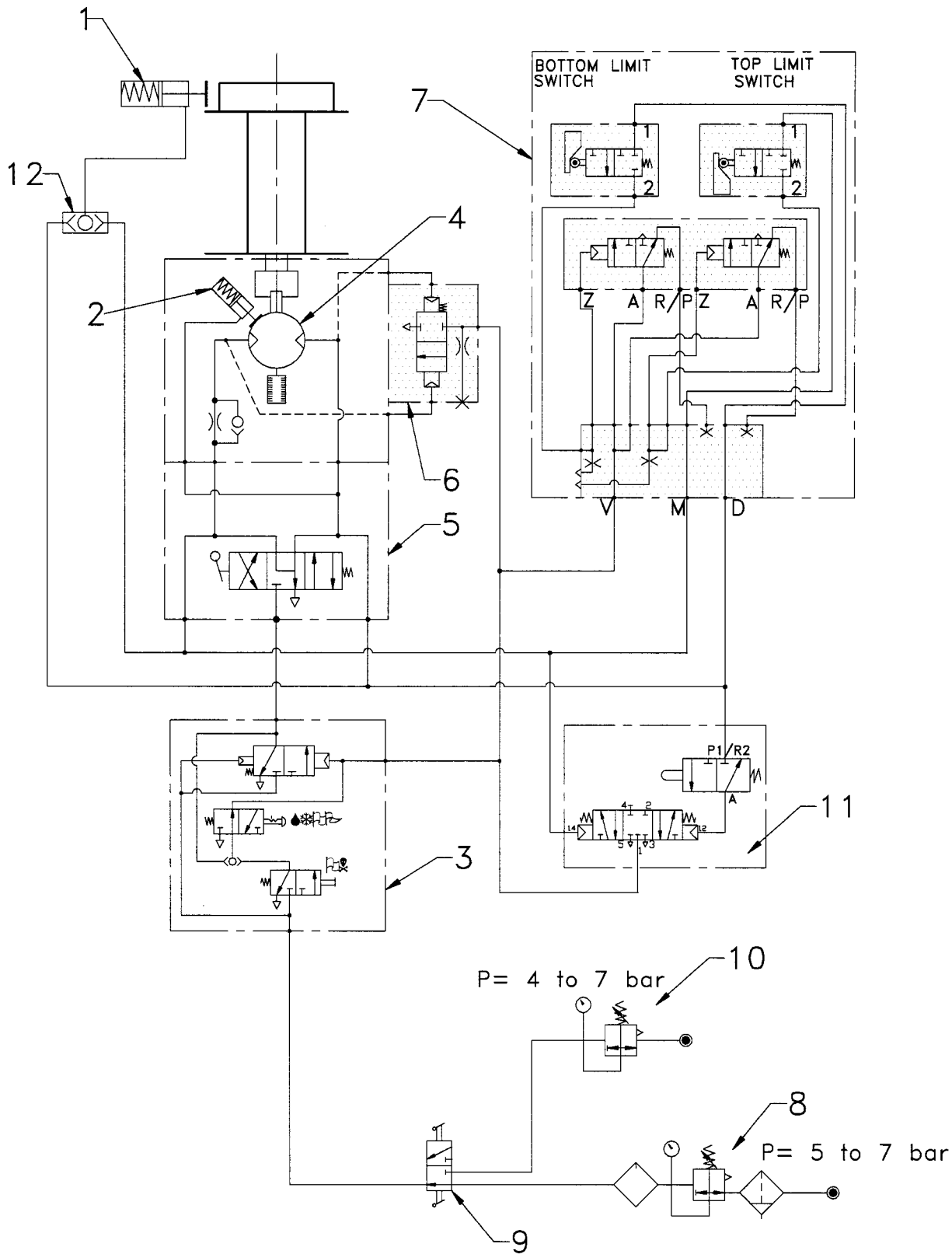
Prior to initial use, all new, altered or repaired winches shall be tested to ensure proper operation.

- 1 Operate winch in both directions with no load.
- 2 Check operation of free wheel and brake.
- 3 Check operation of limit switches and other safety devices when provided.
- 4 Check all winch mounting bolts are secure.

Load Test

Prior to initial use, all new, extensively repaired, or altered winches shall be load tested by or under the direction of a person trained in the operation and service of this winch and a written report furnished confirming the rating of the winch. Test loads shall be more than 125 % of the rated line pull.

AIR CONNECTION DRAWING FOR LEVER CONTROL VERSION

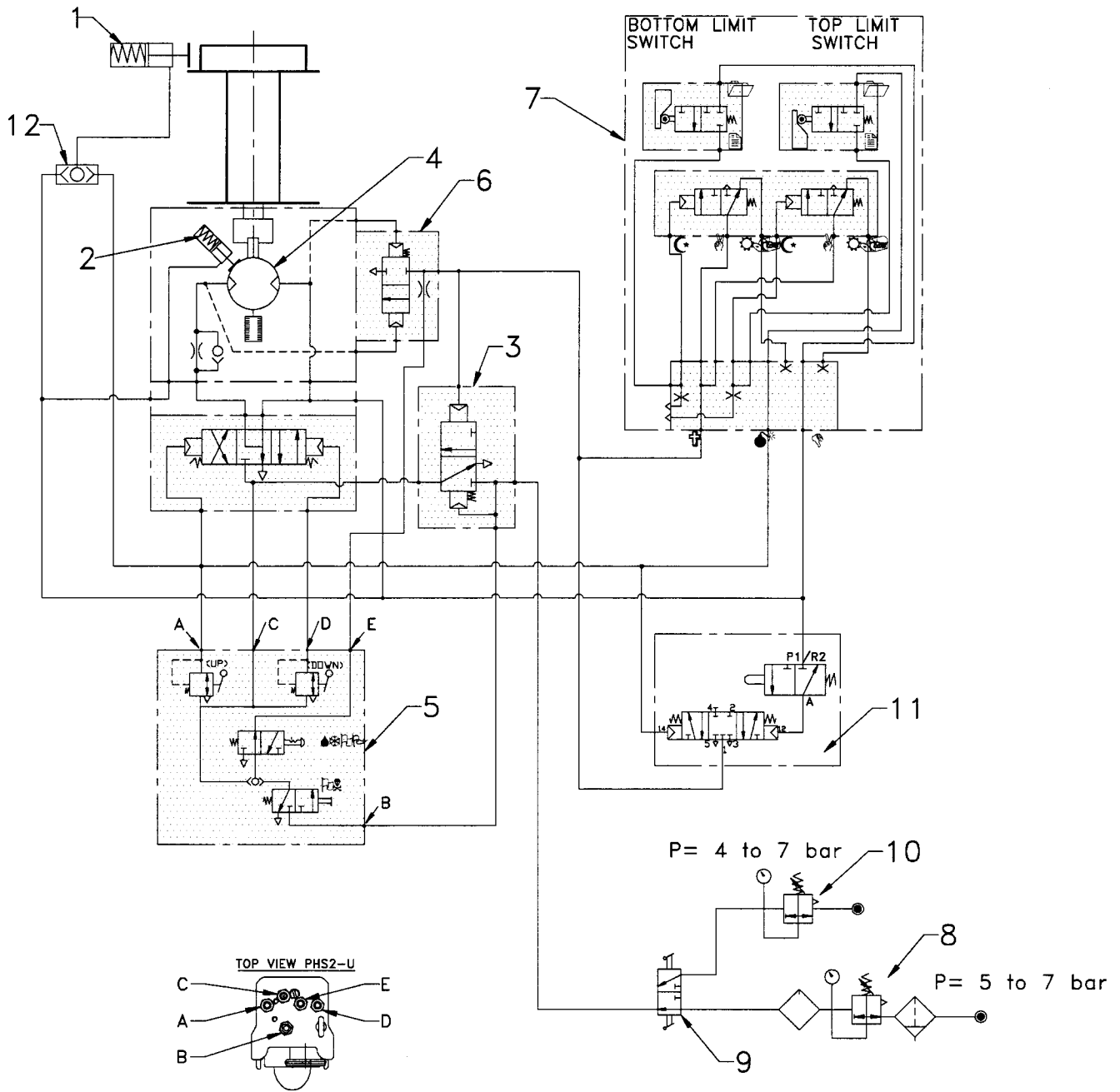


(Dwg.D6150031)

IDENTIFICATION OF COMPONENTS

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Direct band brake on drum 2. Multidisc brake on shaft motor 3. Emergency stop valve 4. Air-powered motor. 5. Lever Control Valve Up/Down. 6. Torque limiter | <ol style="list-style-type: none"> 7. Air limit switches. 8. FRL block $\text{Ø}3/4''$ G. 9. Three Way Valve
(normal inlet/emergency inlet selection). 10. Secondary Power Source. 11. Slack Wire System |
|---|--|

AIR CONNECTION DRAWING FOR PENDANT CONTROL VERSION



(Dwg.D6150048)

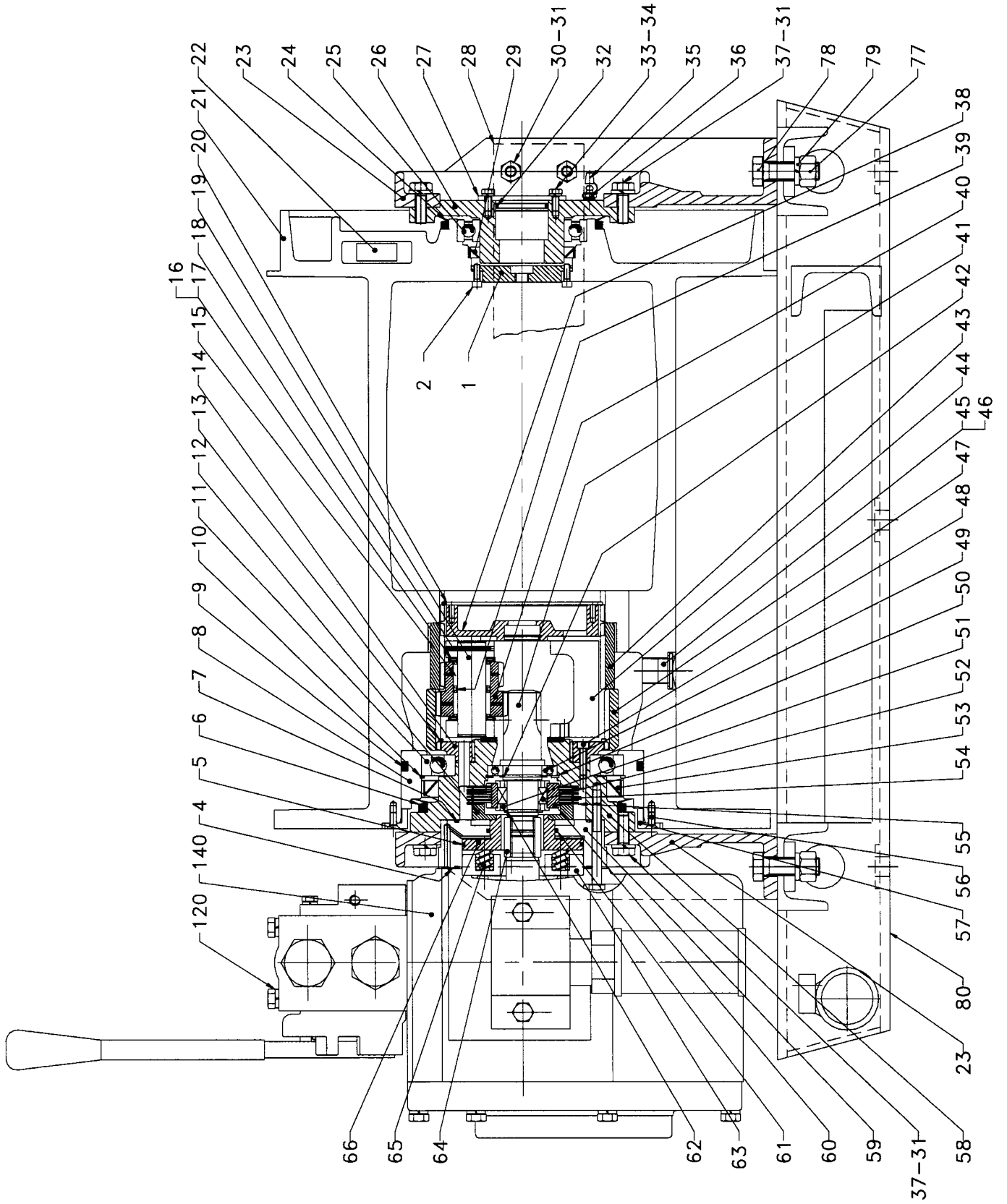
IDENTIFICATION OF COMPONENTS

- | | |
|---|--|
| <ol style="list-style-type: none"> 1. Direct band brake on drum 2. Multidisc brake on shaft motor 3. Emergency stop valve 4. Air-powered motor. 5. Lever Control Valve. 6. Torque limiter | <ol style="list-style-type: none"> 7. Air limit switches. 8. FRL block Ø3/4" G. 9. Three Way Valve. 10. Secondary Power Source. 11. Slack Wire Device |
|---|--|

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WINCH ASSEMBLY DRAWING



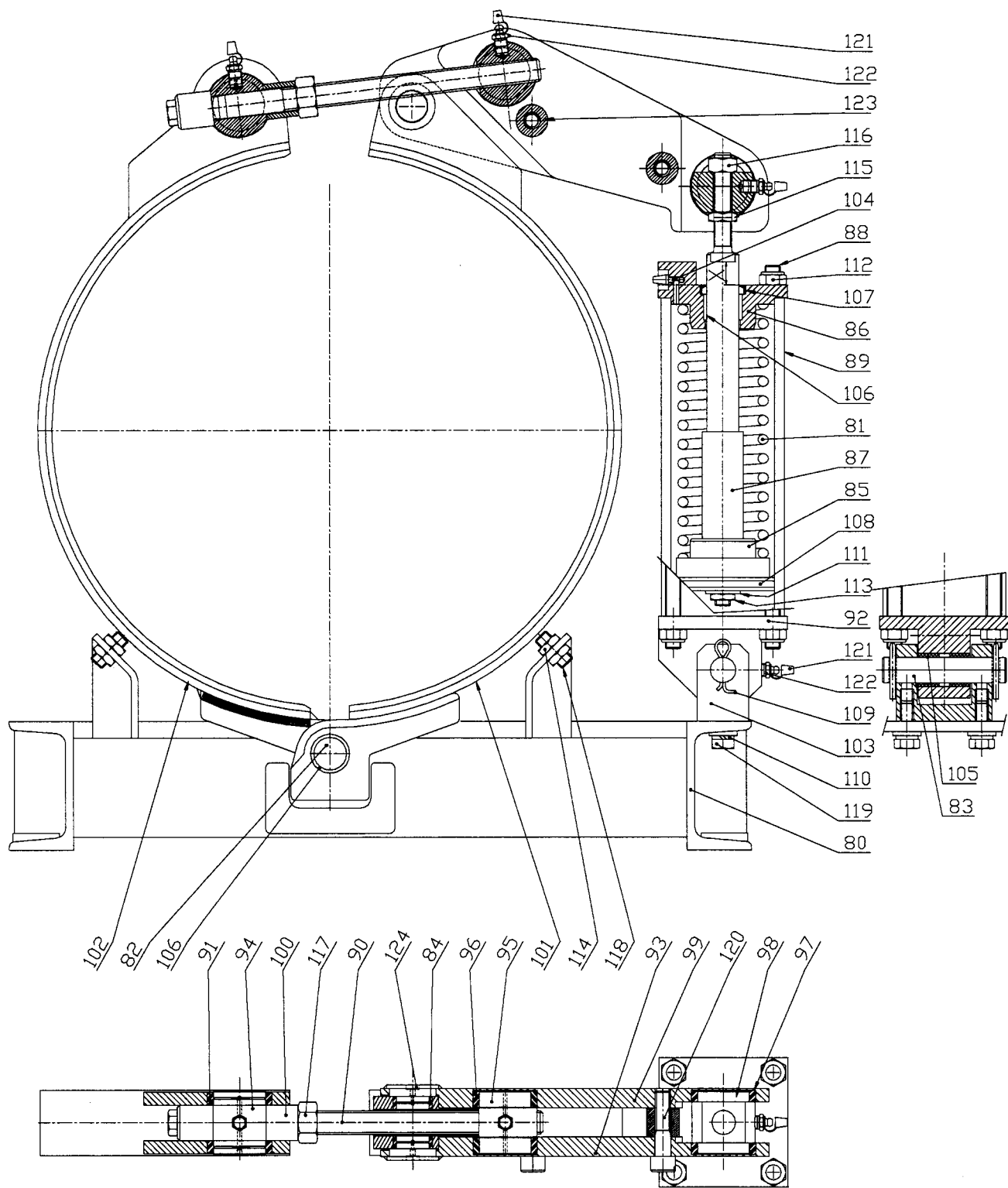
WINCH ASSEMBLY PART LIST

ITEM NO	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
1	Washer	1	96150147
2	Screw	4	41308406
• 4	'O' ring	1	58212529
• 5	'O' ring	1	58210929
• 6	V Ring	1	58405831
• 7	'O' ring	2	58216929
8	Rolling Bearing	1	96150044
• 9	'O' ring	1	58217929
10	Retainer Ring	1	47853932
11	Bearing	1	50800024
12	Spacer	1	96150045
13	Retainer Ring	1	47836832
14	Ring gear support	1	96150043
15	Needle Bearing	8	56503324
16	Needle Stop	8	56054225
17	Thrust Washer	8	57312632
18	Pin	4	46504220
19	Planet Axle	4	95738019
20	Retainer Ring	1	47847832
21	Drum	1	96157052
22	Wedge	1	96150009
23	Flange	2	96157002
• 24	V Ring	1	58404831
25	Bearing	1	50050015
26	Rear Bearing	1	96158049
27	Blind Washer	1	96190013
28	Spacer	2	96150050
• 29	Sealing Ring	1	58000830
30	Screw	8	41021001
31	Washer	32	45201010
• 32	'O' ring	1	58224229
33	Screw	3	41020301
34	Washer	3	45201006
35	Plug	1	61017128
36	Geaser	1	67301727
37	Screw	24	41020401

ITEM NO	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
38	Claw of Position Cluth	1	35730001
39	Spacer	4	95730021
40	Planet Gear	4	95730018
41	Driving Pinion	1	96158019
42	Retainer Ring	1	47700035
43	57 Teeth-ring Gear	1	95730056
44	Planet Support	1	96150023
• 45	Plug	2	65160932
• 46	Joint	2	58408031
47	60 Teeth-ring Gear	1	95730055
48	Screw	4	41301006
49	Bearing	1	50800007
50	Retainer Ring	1	47703062
51	Eccentric ring	2	96190017
52	Free Wheel	1	55965932
• 53	Sealing Ring	1	58019230
54	Steel Disc	5	63060032
55	Friction Disc	6	63059932
56	Screw	6	41104503
57	Stop	1	96150051
58	Front Bearing	1	96158042
59	Brake Housing	1	96150011
60	External Ring (free wheel)	1	96190018
• 61	'O' ring	1	58222929
62	Retainer Ring	1	47700028
63	Eccentric Ring	1	96150012
64	Connecting Ring	1	96158124
65	Spring	6	69167132
66	Piston	1	96150013
77	Nut	4	43006011
78	Screw	4	41003901
79	Split Washer	4	45201016
80	Skid Frame	1	96158038
120	Air Control Valve	1	76170008
140	Air Gear Motor	1	-

• Recommended Spares Parts

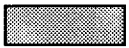
BRAKE BAND ASSEMBLY DRAWING



(Dwg: D6150066)

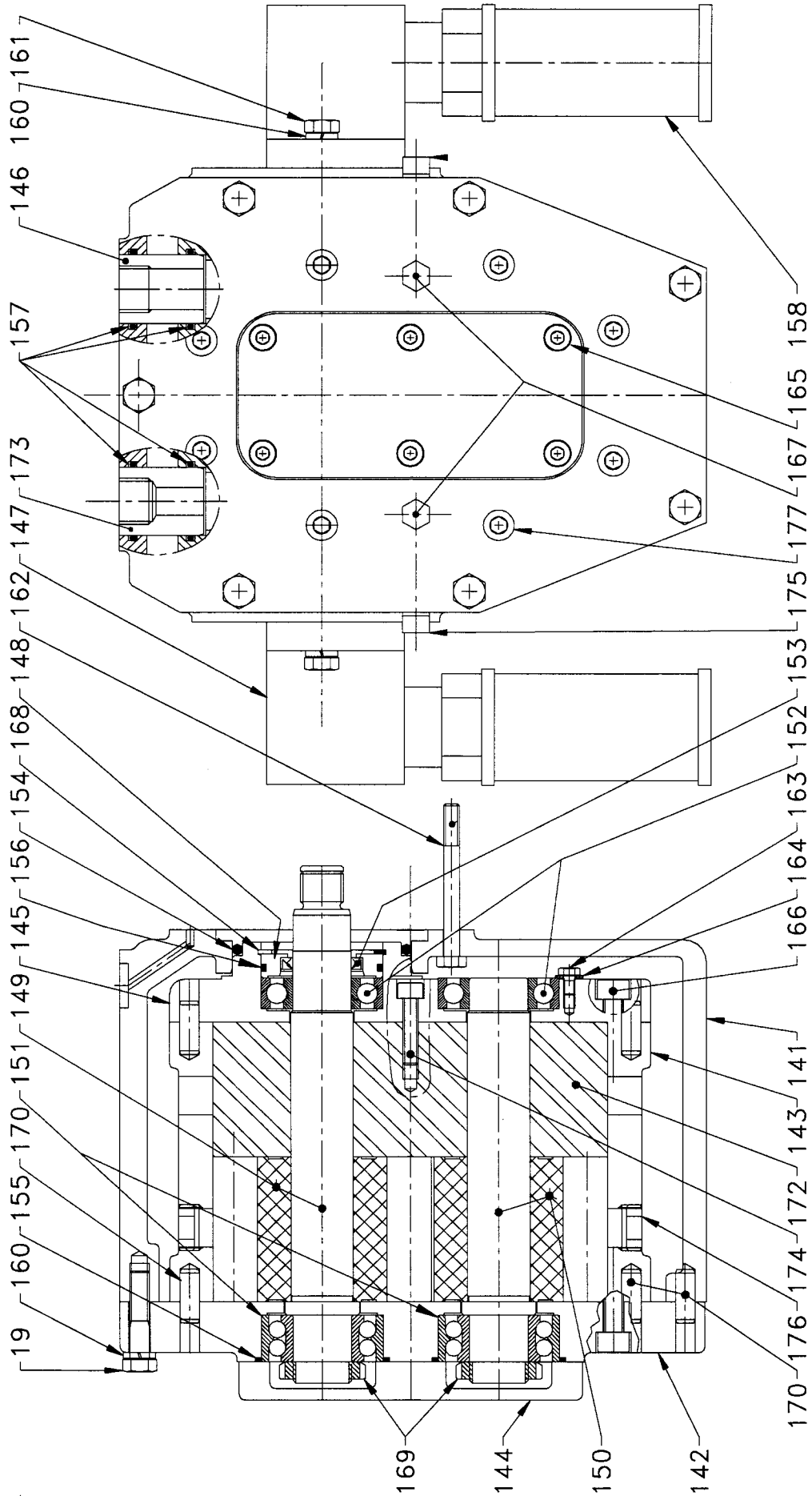
BRAKE BAND ASSEMBLY PART LIST

ITEM NO	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
80	Skid Frame	1	96158038
81	Spring	1	94300046
82	Brake Band Axle	1	95397022
83	Cover Axle	1	95398024
84	Ring	2	95390048
85	Sill Washer	1	95390053
86	Cylinder Nose	1	95390054
87	Cylinder Rod	1	95397055
88	Tension Piece	4	95398057
89	Cylinder Casing	1	95390058
90	Setting Screw	1	96157276
91	Ring	2	96150284
92	Cover	1	95390087
93	Half Lever	1	96158275
94	Clapet	1	96157279
95	Screwed Sprocket Wheel	1	96157280
96	Ring	2	96150282
97	Ring	2	96150283
98	Smooth Wheel	1	96157281
99	Half Lever	1	96158274
100	Distance Ring	1	96150035
101	Half Brake Band	1	96158036
102	Half Brake Band	1	96158277
103	Cover	1	96150057
104	Muffler	1	68489232
105	Self-Lubricating Ring	2	59104526
106	Self-Lubricating Ring	2	59105426
• 107	Sealing Ring	1	58105830
108	Piston	1	58110730
109	Split Pin	2	46301119
110	Split Washer	2	45201010
111	Flat Washer	1	45000112
112	Lock nut	8	43706311
113	Thin Nut	1	43200112
114	Thin Nut	4	43202112
115	Thin Nut	1	43202312
116	Nut	1	43005811
117	Nut	1	43005911
118	Screw	2	42004207
119	Screw	2	41020401
120	Screw	2	41324206
121	Plug	3	61017128
122	Greaser	3	67301727
123	Spacer	2	96150286
124	Greaser	2	67102627
	Pneumatic brake cylinder Assembly		76158093



Recommended Spares Parts

AIR GEAR MOTOR ASSEMBLY DRAWING



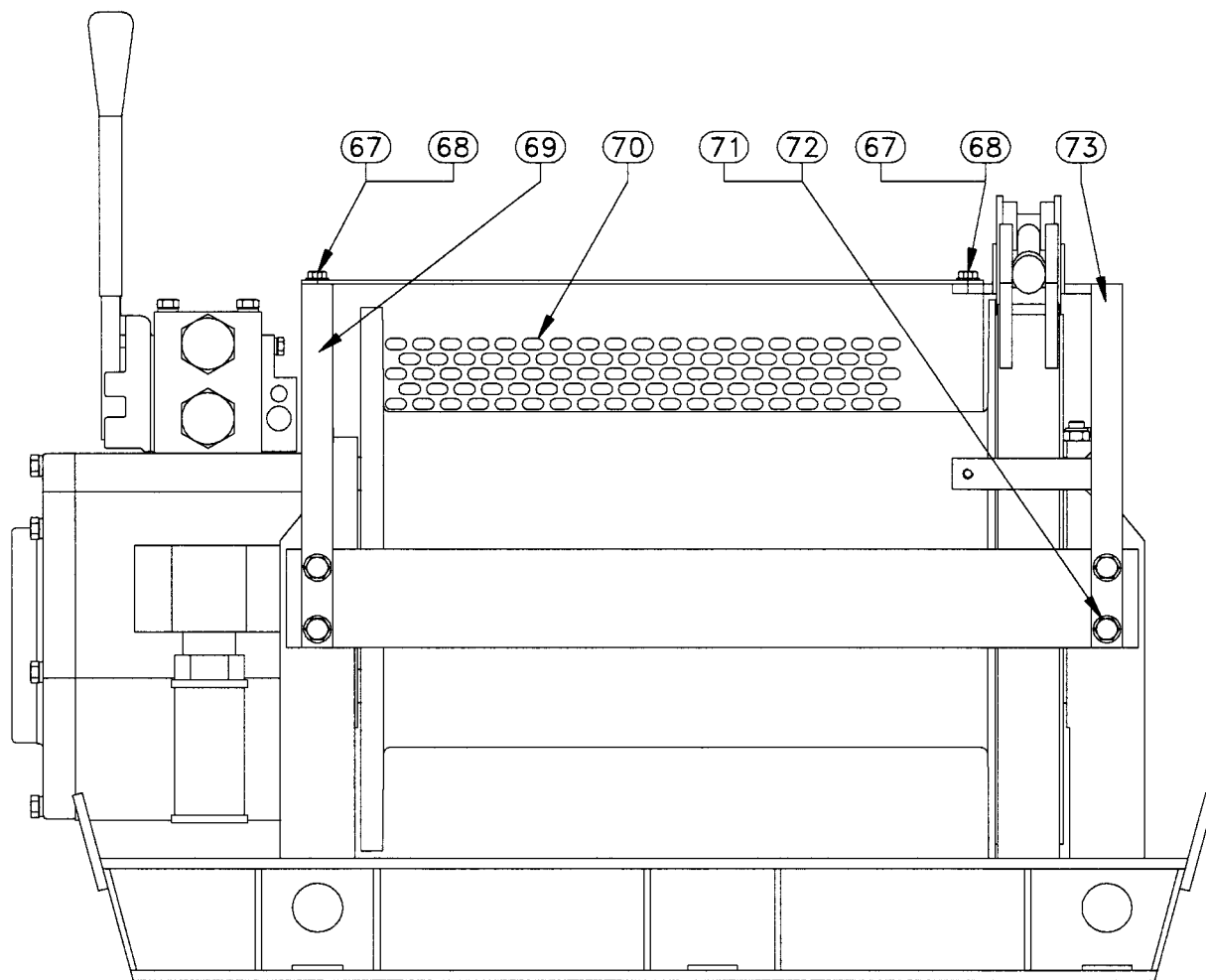
(Dwg: D6160003)

AIR GEAR MOTOR ASSEMBLY PART LIST

ITEM NO	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
140	Air gear motor ass'y (incl's item 141 through 177)	1	
141	Motor Casing	1	96160001
142	Rear end Cover	1	96160002
143	Motor Housing	1	96160003
144	Cover	1	96160004
145	Front end Cover	1	96160015
146	Pipe	1	96160006
147	Flange	2	96160007
148	Joint Support	1	96160008
149	Motor Rotor	1	96160012
150	Repulsion Rotor	1	96160013
151	Ball Bearing	2	50600006
152	Ball Bearing	2	50180906
• 153	Sealing Ring	1	58013430
• 154	O'Ring	1	58208529
• 155	O'Ring	2	58210429
• 156	O'Ring	1	58224329
• 157	O'Ring	4	58200929
158	Muffler	2	68466832
159	Screw	7	41020901
160	Split Washer	11	45201010
161	Screw	4	41020401
162	Screw	12	41016701
163	Screw	1	41007601
164	Flat Washer	1	45000106
165	Screw	6	41324906
166	Screw	8	41302806
167	Plug	2	65125832
168	Retainer Ring	1	47703062
169	Nut	2	57000006
170	Pin	5	46000816
172	Flange Cage	1	96160014
173	Pipe	1	96160016
174	Screw	2	41304506
175	Plug	2	65164532
176	Exhaust Washer	2	96160018
177	Screw	8	41323506

• Recommended Spares Parts

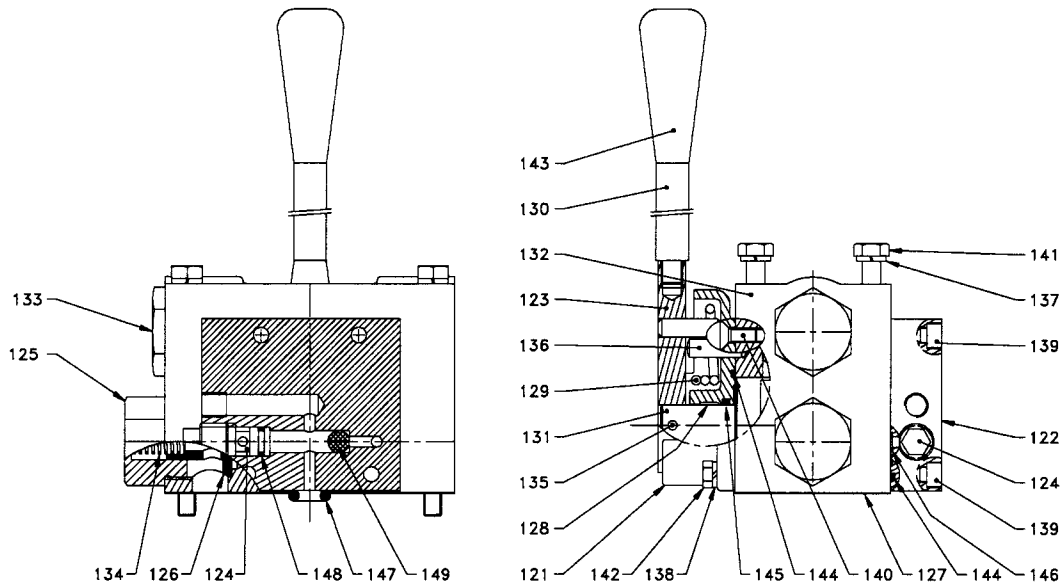
DRUM GUARD KIT DRAWING AND PARTS LIST



(Dwg. D6150036)

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
67	Screw	4	41019201
68	Washer	4	45001108
69	Bow	1	96150305
70	Drum Guard	1	96150306
71	Screw	8	41020401
72	Washer	8	45001110
73	Bow (Brake band side)	1	96150304

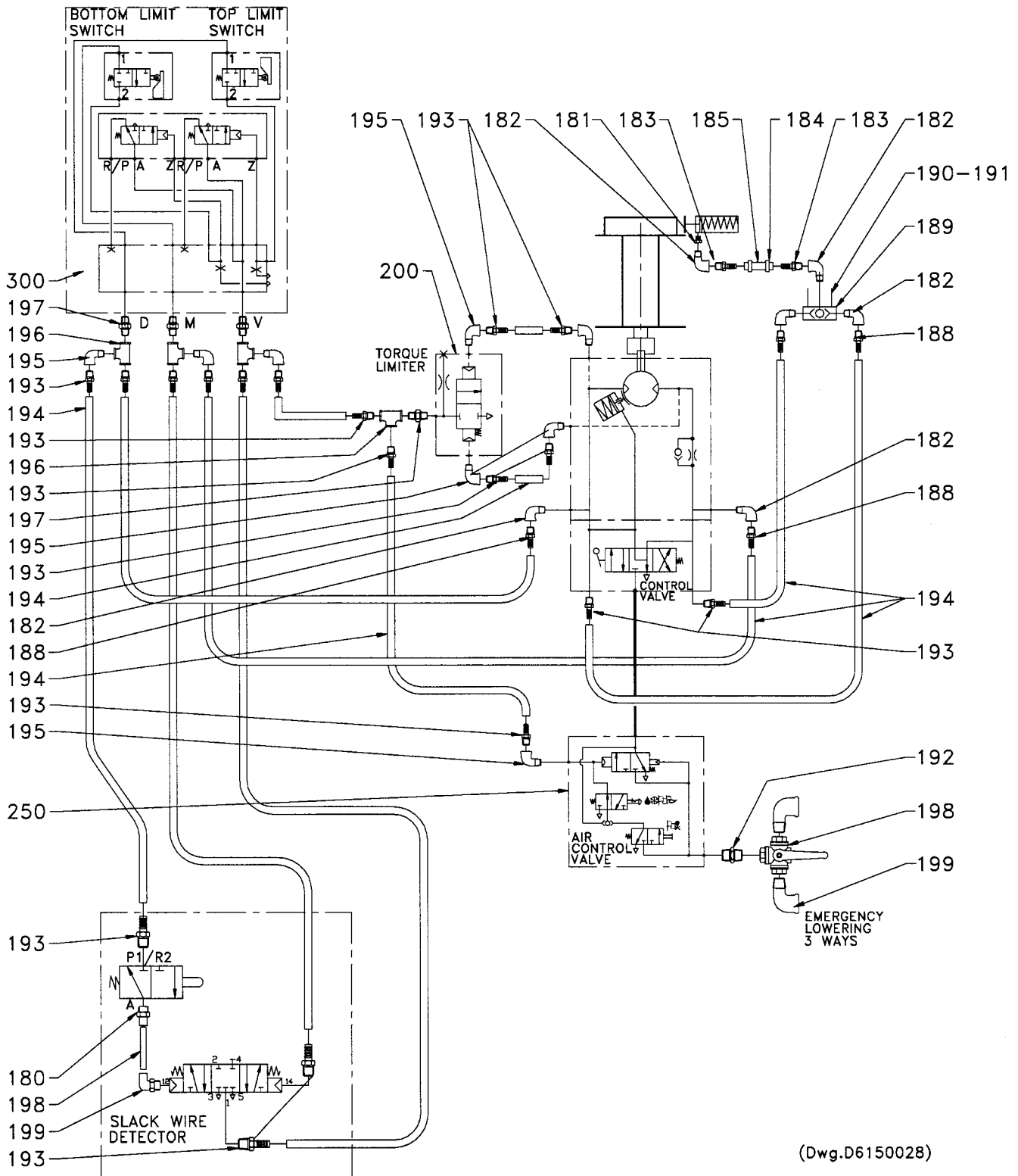
LEVER CONTROL VALVE ASSEMBLY DRAWING AND PARTS LIST



(Dwg..D6170010)

ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
120	Lever control valve ass'y (incl's item 121 through 148)	1	76170008
121	Front End Cover	1	96170003
122	Rear End Cover	1	96170004
123	Stop	1	96170005
124	Air Strangler	1	96170044
125	Plug	1	96170043
126	Air Strangler	1	96170042
¥ 127	Gasket	1	96170010
128	Guiding Ring	1	96170011
129	Return Spring	1	96170028
130	Lever	1	96170029
131	Rotary Valve	1	96170030
132	Body	1	9617-0031
133	Plug	1	65137132
134	Spring	1	69167032
135	Split Pin	1	46502020
136	Pin	1	46001916
137	Split Washer	4	45201010
138	Split Washer	2	45201008
139	Screw	4	41325006
140	Screw	2	41105203
141	Screw	4	41021201
142	Screw	2	41020501
143	Operating Handle	1	57426232
¥ 144	'O' Ring	2	58204729
¥ 145	'O' Ring	1	58224429
¥ 146	'O' Ring	2	58212529
¥ 147	'O' Ring	1	58227729
¥ 148	'O' Ring	1	58200329
149	Ball	1	69401725

AIR POWERED ACCESSORIES DRAWING FOR LEVER CONTROL VERSION



(Dwg.D6150028)

AIR POWERED ACCESSORIES PART LIST FOR LEVER CONTROL VERSION

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
181	Reducing Nipple	1	61308428
182	Elbow 1/4	4	68235832
183	Fitting 1/4	2	61635732
184	Clamp collar	6	61130132
185	Hose dia.8	m	68055332
188	Fitting 1/4	2	61629732
189	Circuit selector	1	67709232
190	Split Washer	2	45201005
191	Screw	2	41021001
193	Fitting 1/8	2	51029 + 68237528
194	Hose	m	68024232

Winches with torque limiter and emergency stop valve

Add the following parts on standard winch.

193	Fitting 1/8	6	51029 + 68237528
194	Hose	m	68024232
195	Elbow 1/8	6	68280132
200	Torque Limiter (incl's item 184 ; 193 ; 194 ; 195)	1	36360001
250	Emergency stop valve	1	76170018

Winches with limit switches

Add the following parts on standard winch.

182	Elbow 1/4	2	68235832
184	Clamp collar	6	61130132
188	Fitting 1/4	2	61629732
193	Fitting 1/8	1	51029 + 68237528
194	Hose	4 m	68024232
196	Tee 1/8	1	61394532
197	Nipple 1/8	1	61385232
300	Limit switches ass'y	1	36150087

Winches with Slack Wire Detector

Add the following parts on standard winch.

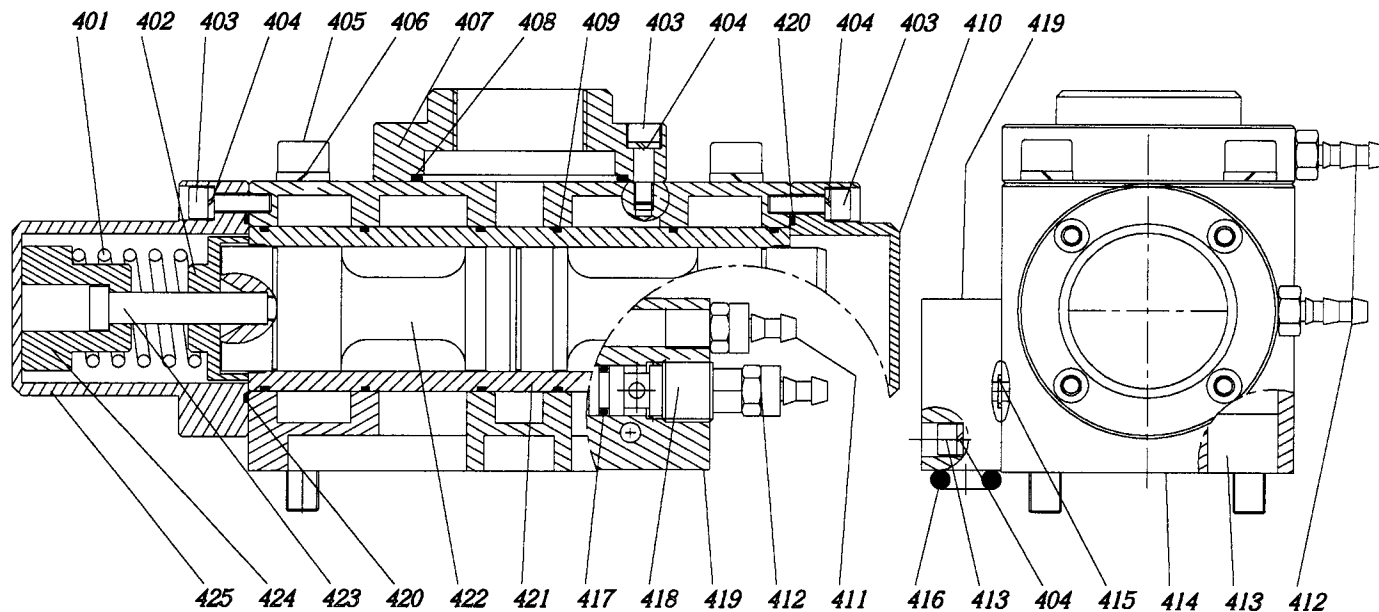
180	Fitting	1	68246128
186	Hose dia.4	m	58255977
187	Elbow	1	58253824
193	Fitting 1/8	6	51029 + 68237528
194	Hose	m	68024232
195	Elbow 1/8	3	68280132
196	Tee 1/8	3	61394532
197	Nipple 1/8	3	61385232

Winches with Emergency Lowering 3 Ways

Add the following parts on standard winch.

192	Nipple	3	61320628
198	Valve	1	61633541
199	Elbow	2	68218928

TWO LEVER PENDANT CONTROL VALVE ASSEMBLY DRAWING



(Dwg.D6170014)

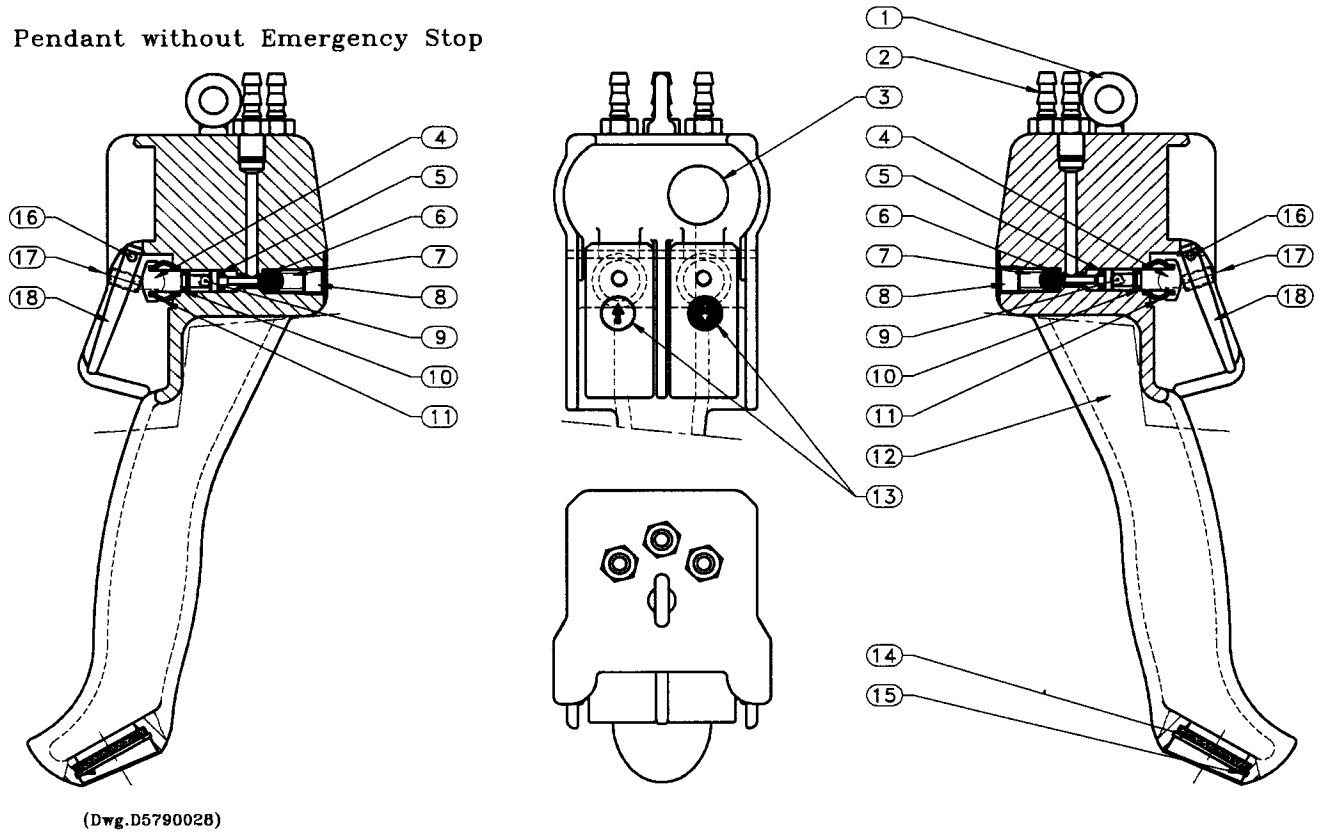
ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
400	Pendant control valve ass'y (incl's item 401 through 425)	1	76170041
401	Spring	1	69129841
402	End Stop	1	96170105
403	Screw	14	41322206
404	Lockwasher	14	45201006
405	Screw	4	41330706
406	Lockwasher	4	45201010
407	Main feed line	1	96170107
¥ 408	O'Ring	1	58228029
¥ 409	O'Ring	6	58236429
410	Cover	1(*)	96170109
411	Fitting 1/4"G	1	61629732
412	Fitting 1/8"G	4	61652632
413	Washer	2(*)	96170110
414	Control Valve Body	1	96170103
¥ 415	O'Ring	2	58212529
¥ 416	O'Ring	1	58227729
¥ 417	O'Ring	1	58200329
418	Flap	1	96170044
419	Selector module	1	96170108
¥ 420	O'Ring	2	58235729
421	Cylinder liner	1	96170101
422	Sleeve Valve	1	96170102
423	Screw	1	65280532
424	Limit stop	1	96170106
425	Cover	1	96170104

• Recommended Spares Parts

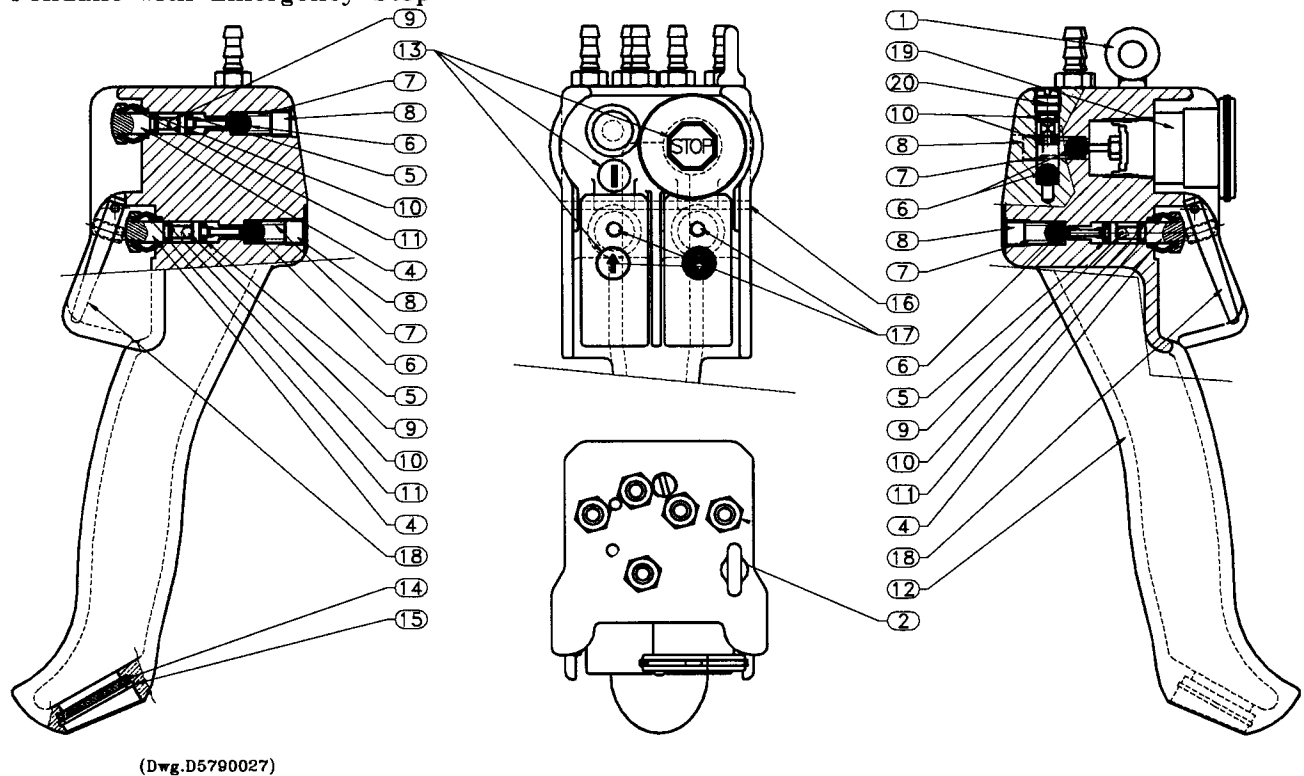
(*) Parts mounted on the same side

TWO LEVER PENDANT ASSEMBLY DRAWING

Pendant without Emergency Stop



Pendant with Emergency Stop

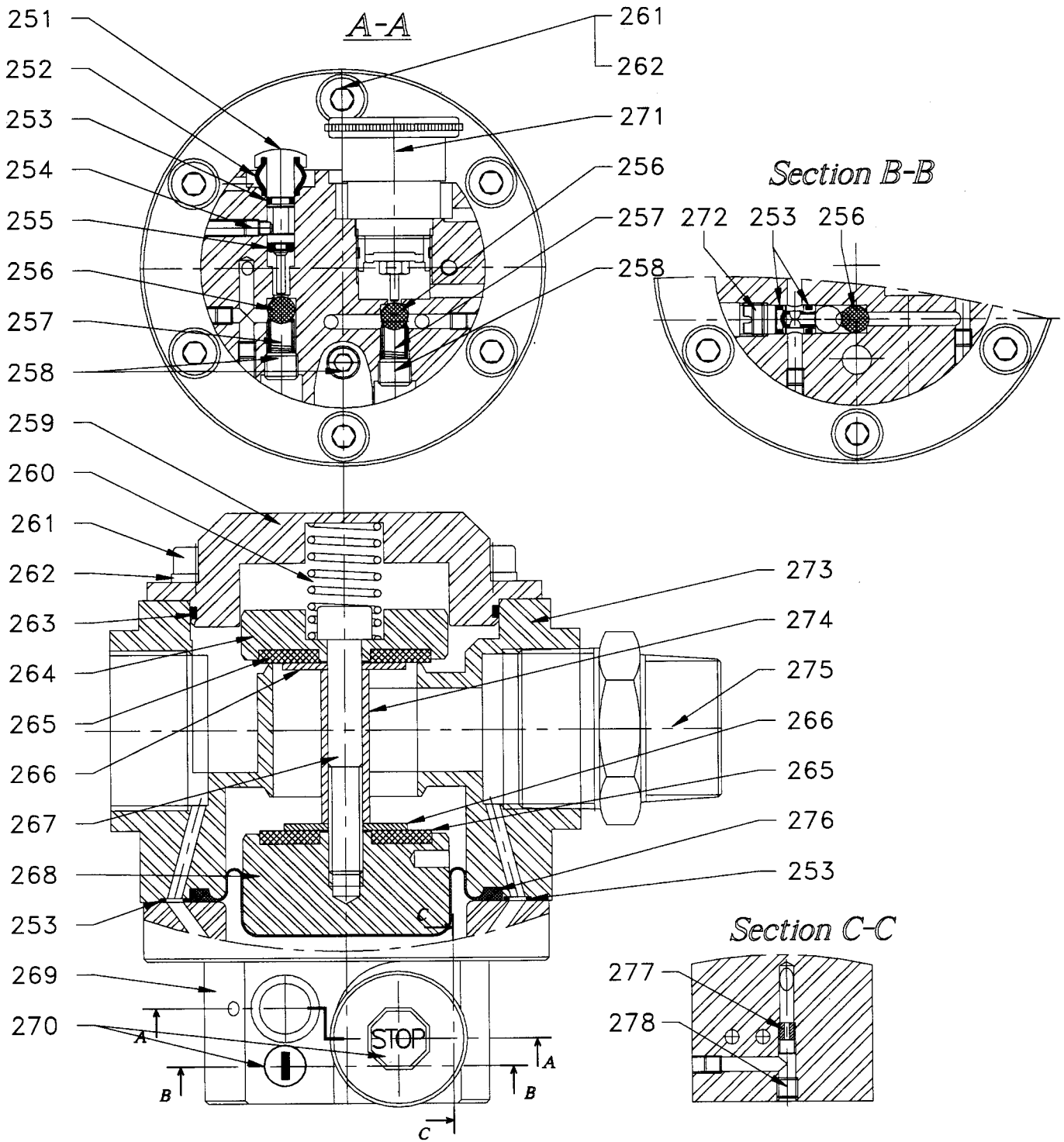


TWO LEVER PENDANT ASSEMBLY PART LIST

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PARTS NO.				
			Without E-Stop			With E-Stop	
	Pendant Assembly	1	PHS2E 38559233	PHS2E-R 38559316	PHS2E-F 38559357	PHS2E-U 38559258	PHS2E-RU 38559332
1	Lifting Eye	1	64222332				
2	Fitting	3(5)	61652632				
3	Plug	1	65129541			---	
4	Valve	2(3)	95790104				
• 5	'O' Ring	2(3)	58235329				
• 6	Ball	2(5)	69401625				
7	Spring	2(4)	69128541				
8	Plug	2(4)	65107741				
9	Screw	2(3)	42008307				
• 10	'O' Ring	2(5)	58209229				
11	Protector	2(3)	95790107				
12	Pendant Handle	1	95790129	95790131	95790132	95790116	95790130
13	Label Kit	1	95790111				
14	Exhaust Washer	1	67600303				
15	Retainer Ring	1	47713030				
16	Pin	1	95790040				
17	Screw	2	42006207				
18	Lever	2	95790122				
19	Emergency Stop Valve	1	---			95790108	
20	Plug	1	---			95790106	
*	Label:"Read the Manual"	1	96180098				
*	Label:"Do Not Use Lifting Personnel"	1	96180100				

• Recommended Spares Parts

EMERGENCY STOP VALVE ASSEMBLY DRAWING



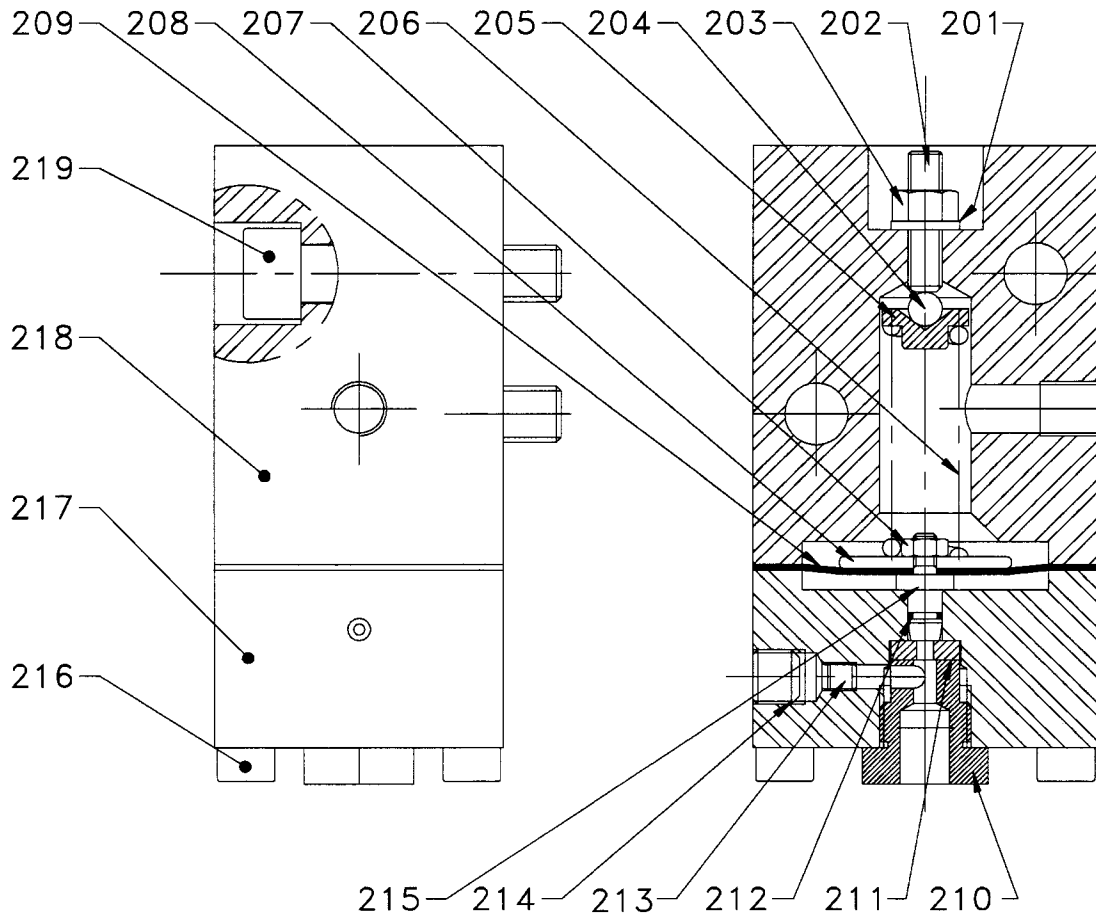
(Dwg.D6170012)

EMERGENCY STOP VALVE ASSEMBLY PART LIST

ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
250	Emergency Stop Valve Ass'y (incl's item 251 through 278).	1	76170020
251	Spool	1	95790104
• 252	Protector	1	95790107
• 253	'O' ring	5	58209229
254	Screw	1	42008307
• 255	'O' ring	1	58235329
256	Ball	3	69401625
257	Spring	2	69128541
258	Plug	3	65107741
259	Cover	1	96170073
260	Spring	1	69120141
261	Screw	12	41321806
262	Lockwasher	12	45201008
• 263	'O' ring	1	58216129
264	Valve cone	1	96170075
• 265	Joint	2	96170076
266	Washer	2	45700010
267	Screw	1	41329406
268	Valve cone	1	96170078
269	Cover	1	96170111
270	Label Kit	1	95790111
271	Emergency Stop Bottom	1	95790108
272	Obturator	1	95790106
273	Boby	1	96170072
274	Spacer	1	96170077
275	Nipple	1	61320628
• 276	Diaphram	1	67720041
277	Nozzle	1	96170071
278	Screw	1	42007807

• Recommended Spares Parts.

TORQUE LIMITER ASSEMBLY DRAWING AND PARTS LIST

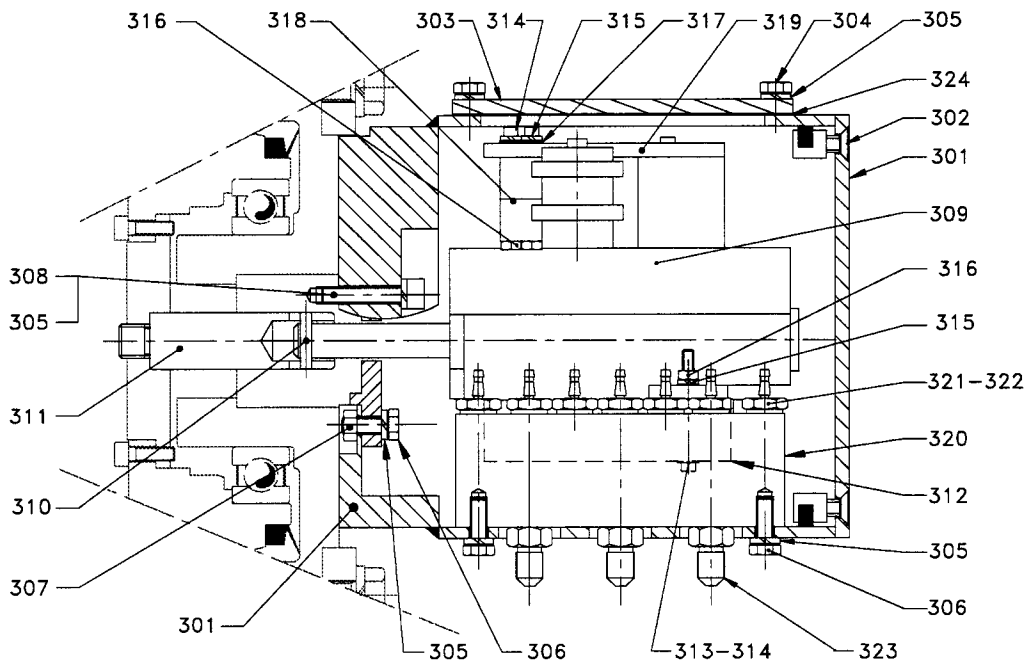


(Dwg. D6360003)

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
200	Torque limiter ass'y (incl's item 201 through 219)	1	76360003
✓ 201	Usit Ring	1	58404531
202	Screw	1	42007107
203	Nut	1	43707611
204	Ball	1	69400125
205	Spring Seat	1	96360023
206	Spring	1	69159432
207	Nut	1	43001111
208	Washer	1	96360019
✓ 209	Diaphragm	1	96360020
210	Screw	1	96360018
✓ 211	Joint	1	96360021
✓ 212	'O' Ring	1	58222329
213	Nozzle	1	96170071
214	Plug	1	65107741
215	Valve	1	96360017
216	Screw	4	41327406
217	Body	1	96360025
218	Cover	1	96360024
219	Screw	2	4132-3206

• Recommended Spares Parts

LIMIT SWITCHES ASSEMBLY DRAWING AND PARTS LIST

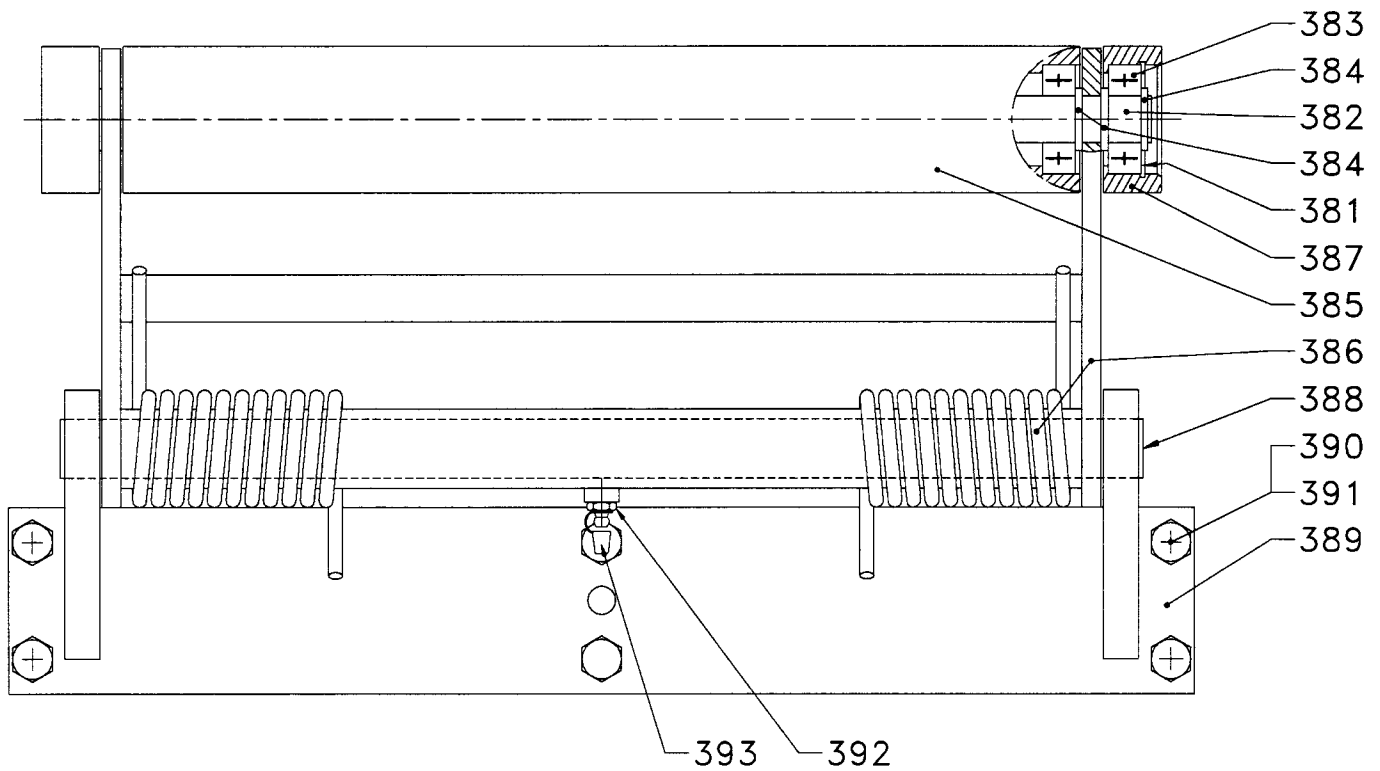


(Dwg.D6150025)

ITEM NO	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
300	Limit Switches Kit ass'y (incl's item 301 through 323)	1	76150087
301	Box with cover (incl's item 302)	1	96150254
302	Screw	4	41104503
303	Cover plate	1	96150261
304	Screw	4	41019301
305	Split Washer	11	45201006
306	Screw	5	41322601
307	Nut	3	43006211
308	Screw	2	41322306
309	Limit switch (incl's item 110)	1	95060150
310	Pin	1	46503420
311	Connecting Axle	1	96150258
312	Control Valve	1	68523441
313	Flat Washer	2	45001105
314	Screw	3	41331406
315	Split Washer	3	45201004
316	Nut	3	43001111
317	Flat Washer	4	45001104
318	Control Valve	2	68523641
319	Control Valve Support	1	96150255
320	Connection Bloc	1	96150256
321	Fitting	10	61694932
322	Hose	1m	68094832
323	Fitting	3	68237528
• 219	Paper Joint	1	96150431
*	Label V M D	1	96150427

•	Recommended Spares Parts
*	Not Illustrated

PRESS ROLLER DRAWING AND PART LIST

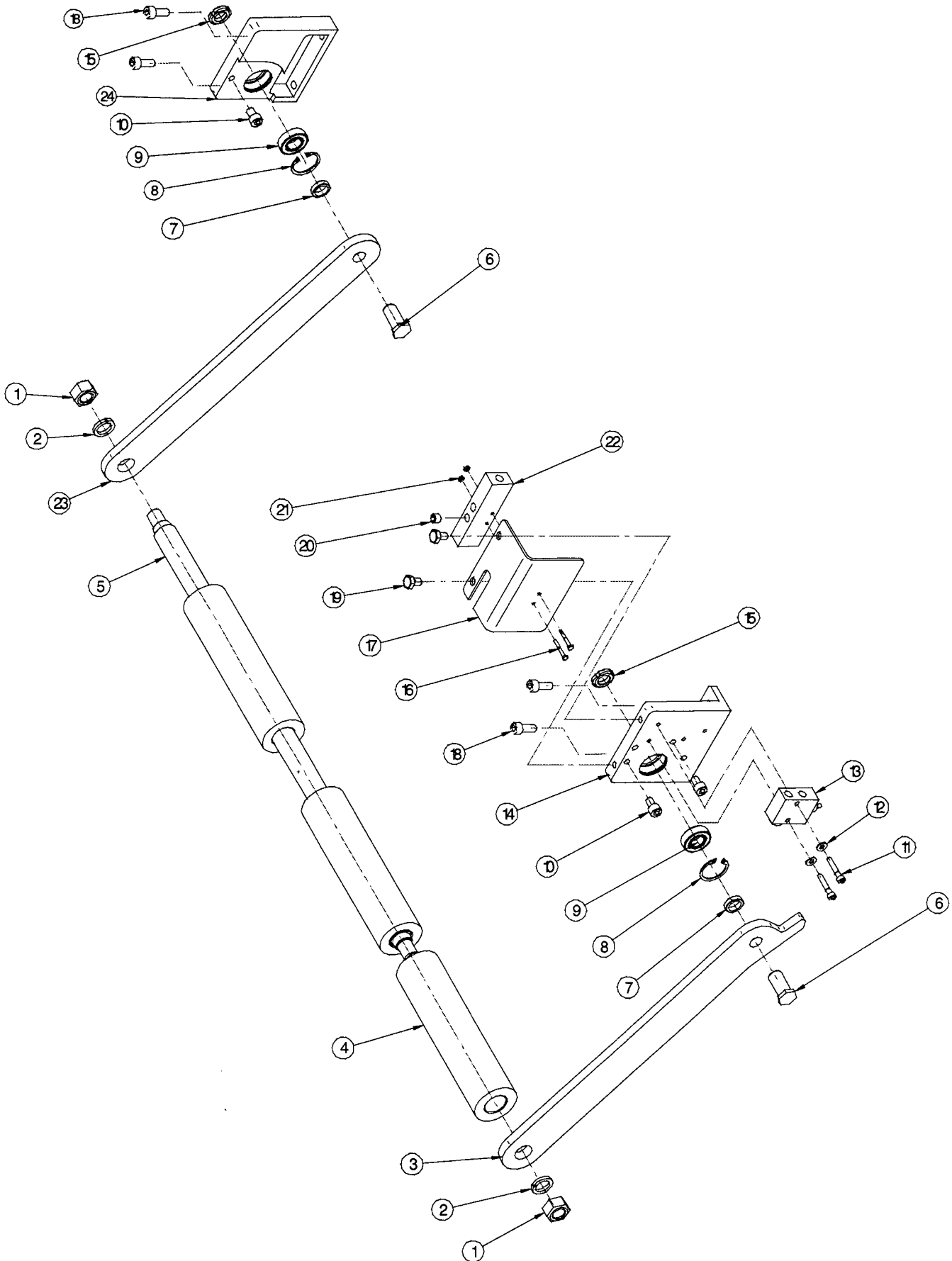


(Dwg.D6150110)

ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
	Press Roller Ass'y (Incl's Item 381 throught 391)		76150044
381	Retainer Ring	2	47703047
382	Roller Axle	1	96150091
383	Bearing	4	50150004
384	Spacer	6	95060135
385	Main Roller	1	96150096
386	Rollers Arm with Springs	1	96150092
387	Side Roller	2	95130130
388	Axle	1	96150090
389	Spacer	1	96150088
390	Screw	4	41020701
391	Lockwasher	4	45201010
392	Greaser	1	67301727
393	Plug	1	61017128

Recommended Spares Parts

SLACK WIRE SYSTEM ASSEMBLY DRAWING



SLACK WIRE SYSTEM ASSEMBLY PART LIST

ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
1	Nut	2	43006011
2	Lockwasher	2	45201016
3	Lever	1	96150449
4	Roller	3	96150456
5	Roller Axle	1	96150455
6	Axle	2	96150457
7	Spacer	2	96150458
8	Retainer Ring	2	47703032
9	Bearing	2	50050002
10	Screw	3	41325606
11	Screw	2	41322106
12	Washer	2	45001105
13	Control Valve	1	68552732
14	Support	1	96150453
15	Nut	2	57000002
16	Screw	2	41019101
17	Protector	1	96150465
18	Screw	4	41321806
19	Screw	2	41019201
20	Plug	1	65107741
21	Nut	2	43005611
22	Control Valve	1	68528141
23	Lever	1	96150451
24	Support	1	96150463

• Recommended Spares Parts.

PARTS ORDERING INFORMATION

The use of replacement parts other than INGERSOLL-RAND Matériel Handling will invalidate the Company's warranty.

For your convenience and future reference it is recommended that the following information be recorded.

Winch Model Number

Winch Serial Number

Date Purchased

When ordering replacement parts, please specify the following:

1. Complete model number and serial number as it appears on the nameplate.
2. Part number and part description as shown in this manual.
3. Quantity required.

The nameplate is located on the winch rear and cover.

NOTICE

- **Continuing improvement and advancement of design may cause changes to this winch which are not included in this manual. Manuals are periodically revised to incorporate changes. Always**

check the manual edition number on the front cover for the latest issue.

Return Goods Policy

INGERSOLL-RAND will not accept returned goods for warranty or service unless prior arrangements have been provided from the location the goods were purchased.

When the life of the winch has expired, it is recommended that the winch be disassembled, degreased and parts separated as to materials so that they may be recycled.

For additional information contact :

Ingersoll-Rand Equipement de Production

111 avenue Roger Salengro

59450 Sin-le-Noble - France

Phone: (33) 3 27.93.08.08

Fax: (33) 3 27.93.08.00

NOTICE

- **Mineral based oils are recyclable, however, some oils such as glycols may be extremely toxic and must be identified and disposed of at an approved waste or disposal site in accordance with all local, state and federal laws and regulations.**

HOIST AND WINCH LIMITED WARRANTY

See our general conditions of sales mentioned on our proposal, acknowledgement receipt, invoice.

INGERSOLL-RAND guarantees the equipment sold and supplied by itself against any defect or flaw in manufacture or operation under the conditions and within the limits hereafter.

- the guarantee is only valid if the customer has satisfied the general obligations of the present contract and, in particular, of settlement.
- the guarantee is strictly limited to **INGERSOLL-RAND** equipment. It does not extend to supplies and accessories which are not of its manufacture.
- the guarantee does not extend to assemblies or machines in which **INGERSOLL-RAND** equipment is incorporated and in particular to the performances of these assemblies or machines.
- when **INGERSOLL-RAND** equipment is incorporated into one or other assembly or machine by the customer, he alone is responsible for the adaptation, the choice and the suitability of the **INGERSOLL-RAND** equipment, **INGERSOLL-RAND**'s diagrams, surveys and layouts being given only for guidance, unless there is a special stipulation in the acceptance of order, defined in the acknowledgement of receipt.
- **INGERSOLL-RAND** does not guarantee components and accessories it does not sell.

Defects in fitting, adaptation, design, connection and running of the assembly or part of the assembly put together by the customer are not covered by the guarantee. **INGERSOLL-RAND** equipment and material as well as the assemblies or machines set up by the customer or by a third party are assumed to be operated and used under the sole control of the customer or third party.

- The duration of the guarantee is for 6 months from the start up of the equipment by the customer. The start up must be made at the latest three months after dispatch of the equipment or its being made available.
- **INGERSOLL-RAND** has the right to demand from its customer proof of the date of start up.
- The guarantee period is reduced to half if the equipment is used day and night.
- The length of guarantee is neither prolonged nor interrupted by either amicable or litigious claims by the customer.
- At the expiry of this period, the guarantee ceases incontestably.
- The obligations of the **INGERSOLL-RAND** guarantee will only come into effect if the customer proves that the defect or flaw appeared during normal operating conditions for this type of

material, or in the course of normal use as specified by **INGERSOLL-RAND**.

- It does not apply in the event of user's mistake, negligence, imprudence, faulty superintendence or maintenance, inattention to the instructions or directions for use of low quality lubricants. **INGERSOLL-RAND** liability is disclaimed for all damage brought about by loss or leaks of oil.
- No guarantee applies either for fortuitous incidents or force major, or for wear, replacements or repairs caused by normal use of the equipment.
- The guarantee is restricted to reconditioning in **INGERSOLL-RAND**'s premises at its expense and as soon as possible the equipment and parts recognised as faulty by its technical or after sales services, which are sent carriage paid and packing free, without there being any claim for damage arising, such as injury to personnel, damage to property other than that covered by the present contract, loss of possession, of production, commercial detriment or loss of profit.
- During the guarantee period, the cost of labour for dismantling and reassembling equipment outside **INGERSOLL-RAND**'s premises, the cost of moving faulty, replaced or repaired equipment and the travelling and living expenses of its engineers **INGERSOLL-RAND** are covered exclusively by the customer.
- In order to obtain the advantages of the guarantee, the customer must advise **INGERSOLL-RAND** without delay and in writing of the defects and flaws in his equipment of which he is complained and furnish proof of their genuine nature. He must give **INGERSOLL-RAND** or its agents or technicians every facility to verify the defects or flaws and to put them right.
- The guarantee does not apply if the equipment is returned to **INGERSOLL-RAND** in a condition other than in which it broke down or if the seal has been removed, or if it has been dismantled, repaired or modified by a third party, or by the user or the customer.
- After having been duly informed of the defect or flaw in its equipment, **INGERSOLL-RAND** will put it right as quickly as possible, reserving the right, in certain cases, to modify the whole or part of the equipment so as to meet its obligations.
- The customer agrees that **INGERSOLL-RAND** will not be responsible for damage in the event that the customer has not fulfilled one or other of the obligations set out above.
- Parts replaced free of charge remain the property of **INGERSOLL-RAND**.
- The guarantee does not apply to wearing parts.

IMPORTANT NOTICE

It is our policy to promote safe delivery of all orders. This shipment has been thoroughly checked, packed and inspected before leaving our plant and receipt for it in good condition has been received from the carrier. Any loss or damage which occurs to this shipment while enroute is not due to any action or conduct of the manufacturer.

VISIBLE LOSS OR DAMAGE

If any of the goods called for on the bill of lading or express receipt are damaged or the quantity is short, do not accept them until the freight or express agent makes an appropriate notation on your freight bill or express receipt.

CONCEALED LOSS OR DAMAGE

When a shipment has been delivered to you in apparent good condition, but upon opening the crate or container, loss or damage has taken place while in transit, notify the carrier's agent immediately.

DAMAGE CLAIMS

You must file claims for damage with the carrier. It is the transportation company's responsibility to reimburse you for repair or replacement of goods damaged in shipment. Claims for loss or damage in shipment must not be deducted from the Ingersoll-Rand invoice, nor should payment of Ingersoll-Rand invoice be withheld awaiting adjustment of such claims as the carrier guarantees safe delivery. You may return products damaged in shipment to us for repair, which services will be for your account and form your basis for claim against the carrier

United States Office Locations**For Order Entry and Order Status :**

Ingersoll-Rand Distribution Center
P.O. Box 618
510 Hester Drive
White House, TN 37188
Phone: (615) 672-0321
Telex: 786573
Fax: (615) 672-0801

For Technical Support:

Ingersoll-Rand Material Handling
P.O. Box 24046
2724 Sixth Avenue South
Seattle, WA 98124-0046
Phone: (206) 624-0466
Telex: 328795
Fax: (206) 624-6265

Regional Sales Offices

Atlanta, GA
111 Ingersoll-Rand Drive
Chamblee, GA 30341
Phone: (404) 936-6230

Detroit, MI
23192 Commerce Drive
Farmington Hills, MI 48335
Phone: (313) 476-6677
Fax: (313) 476-6670

Houston, TX
Suite 150
2500 East T.C. Jester
Houston, TX 77008
Phone: (713) 864-3700

Los Angeles, CA
5533 East Olympic Blvd.
Los Angeles, CA 90022
Phone: (213) 725-2826

Milwaukee, WI
12311 W Silver Sping Dr.
Milwaukee, WI 53225
Phone: (414) 461-0973

Philadelphia, PA
P.O. Box 425
900E. 8th Ave., Suite 103
King of Prussia, PA 19406
Phone: (215) 337-5930

International

Offices and distributors in principal cities throughout the world. Contact the nearest **Ingersoll-Rand** office for the name and address of the distributor in your country or write/faxto:

Ingersoll-Rand Material Handling
P.O. Box 24046
2724 Sixth Avenue South
Seattle, WA 98124-0046 USA
Phone: (206) 624-0466
Telex: 328795
Fax: (206) 624-6265

Canada National Sales Office Regional Warehouse Toronto, Ontario
51 Worcester Road
Rexdale, Ontario M9W 4K2
Phone: (416) 675-5611
Fax: (416) 675-6920
Order Desk
Fax: (416) 674-6549

Regional Sales Offices

Calgary, Alberta
333 11th Avenue S.W.
Calgary, Alberta T2R 0C7
Phone: (403) 261-8652

Edmonton, Alberta
1340 Weber Center
5555 Calgary Trail N.W.
Edmonton, Alberta T6H 5G8
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Fax: (403) 437-3145

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Kirkland, Quebec H9H 4S3
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Fax: (514) 695-0963

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Richmond, B.C. V7C 5C7
Phone: (604) 278-0459
Fax: (604) 278-2519

Latin America Operations Ingersoll-Rand Production Equipment Group
730 N.W. 107 Avenue Suite 300, Miami, FL 33172-3107
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Telex: 441617TLS UI
Fax: (305) 559-7505

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111, avenue Roger Salengro
59450 Sin le Noble, France
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Asia - Pacific Operations Ingersoll-Rand (Japan) Ltd.
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