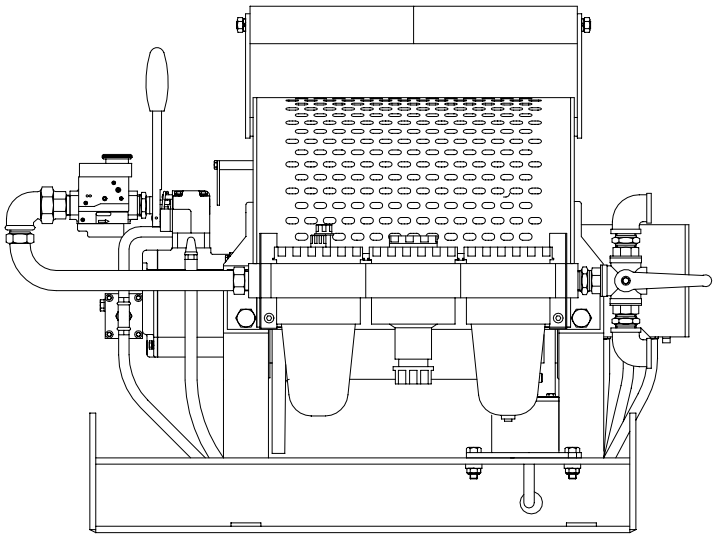
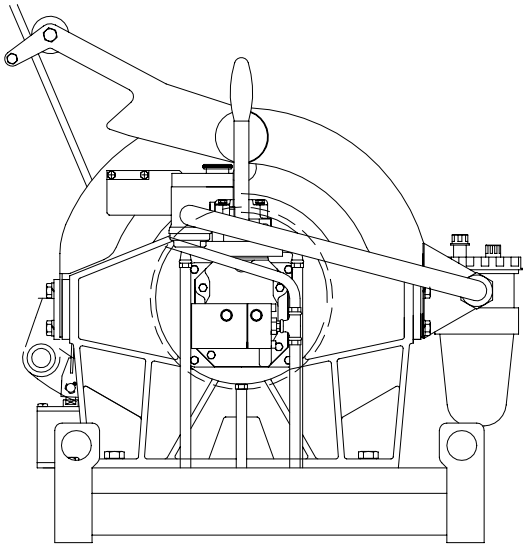
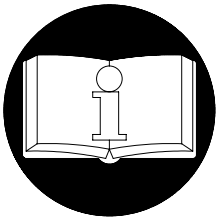
INSTALLATION, OPERATION AND MAINTENANCE MANUAL

AIR POWERED MAN-RIDING WINCH LS150RLP SERIES

Model LS150RLP-L (Lever control)
LS150RLP-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 installation, operation 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.

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EVOLUTION SHEET OF MANUAL

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SAFETY INFORMATION

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 a hazard. The following signal words are used to identify the level of potential hazard.

⚠ DANGER Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING Indicates an potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or property damage.

NOTICE Indicates information or a company policy that relates directly or indirectly to the safety of personnel or protection of property.

Safety Summary

⚠ WARNING

- **The LS150RLP Man-Riding winch SHALL BE USED for the lifting of persons ONLY by means of a safety harness, boatswains chair, etc...However, this winch SHALL NOT BE USED for the lifting of persons by means of a platform, basket or carrier.**
- **It is the owner's and user's responsibility to check and to conform to all regul ations (local, state, federal and country) that may apply to the use of the winch or winch system for lifting and lowering people before using a Man-riding winch for personnel movement.**
- **The carrier and load-attaching devices used in conjunction with these winches must provide an adequate safety factor to handle the rated load, plus the weight of the winch and attached equipment. This is the customer's responsibility. If in doubt, consult a registered structural engineer.**

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.

LS150RLP-…-E models are delivred as standard with a 'CE' package. They have positively passed the EC type examination by the DNV and are delivred with 'CE' mark.

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 lowering of persons.

Accessories: When the winch is used as part of a system, it's important that any accessories associated with the winch be in accordance with current regulations governing the application, including, but not only, the CE machinery directive requirements when applicable, with due care and attention being given to the environmental conditions in which the winches will operate.

Typical attachments associated with these winches, but not limited to, are WIRE ROPE, SHEAVE BLOCKS, SAFETY HARNESSES.

– Every such equipment shall be CE-marked and declared in conformity with the provisions of the machinery directive when applicable for the purpose of lifting persons. The assembler and the user bear the full responsibility that all the instructions of IR and of the manufacturer of the accessories are met, when using the IR winches in combination with any other such equipment.

When any of the above attachments are used we recommend that they be in accordance with the following guidelines.:
– wire rope construction 6x19 IWRC or 6x37 IWRC following NF ISO 2408
– For sheave block construction, a minimum of 10:1 SWL design factor is required with a 20:1 wire rope to nominal thread diameter ratio.

Winches Series	Nominal thread diameter of sheave (mm)	SWL for Sheave(T)
LS150RLP	200	1.5T

Rigging: It is the responsibility of the operator to exercise caution, use common sense and be familiar with proper rigging techniques.

⚠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-Rand** or recommended tools.
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

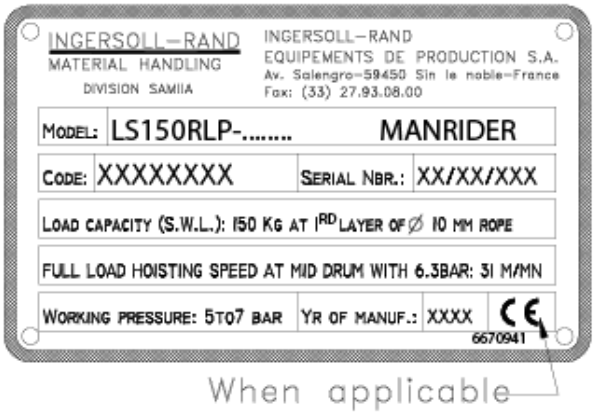
Failure to follow these rules will result in termination of all applicable warranties. Ingersoll-Rand assumes no liability for any loss or damage resulting from operation of Man-Riding winches if these operating instructions are not followed.

1. Winch shall not be used until an isolation ball valve is properly connected to the air inlet
2. Winch shall not be used until the emergency air inlet is properly connected to a secondary power source (see page 15).
3. Upper and lower limit switches fitted as standard must be properly adjusted before lifting a person.
4. The area around the person should be free of obstacles and moving objects. We recommended a minimum safety distance radius of 0,5m around the person to be lifted.
5. Working areas and controls area on the winch must be clearly visible by the operator. In case of operation at night, it's necessary to provide lightening to the working area or the operator must not use the winch.
6. The winch operator's working environment must be free from oil, dirt grease and any other substances or material which inhibits the safe operation of the winch. Sufficient floor space to avoid potential risk of falling and allow accessibility to the winch.
7. The winches are not allowed to be used or installed where there is a risk of entanglement.
8. Winch operator must be in vocal contact and in a position to always see the personnel to be lifted or must use communication equipment.
9. Personnel operating the winch or being transferred are to have sufficient instruction/training concerning that operation before any movement takes place.
10. 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.
11. 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.
12. The winch installation must be specially arranged and accepted for personnel handling.
13. 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.
14. The lifting apparatus shall be inspected and certified for personnel lifting prior to use.
15. Do not operate without a surveyor's site approval.
16. Never lift a load greater than the rated capacity of the winch. Refer to "SPECIFICATIONS" section for applicable utility and winch capacity ratings.
17. Do not operate without testing. (See « Inspection and Testing » procedures).
18. Do not operate winch in a damaged condition.
19. Do not operate winch that has not been properly maintained or equipped.
20. 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.
21. Do not operate winch with any personnel near the line of force or capable of coming into contact with moving parts.
22. All signs and warning notices must be posted permanently on the winch.
23. Make sure the wire rope is properly anchored to the winch drum. Always maintain three or more wraps of wire rope on the drum.
24. Ease the slack out of the wire rope when starting a lift. Do not jerk the load.
25. Never leave a suspended load unattended.
26. Never use the wire rope as a sling.
27. Do not leave a load suspended when winch is not in use.
28. Do not use limit switch settings to regulate the winch stopping points. Limit switches are designed as a backup to operator accidental over travel only.

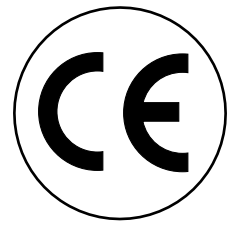
WARNING LABELS AND TAGS

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.



When applicable



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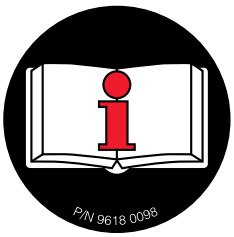
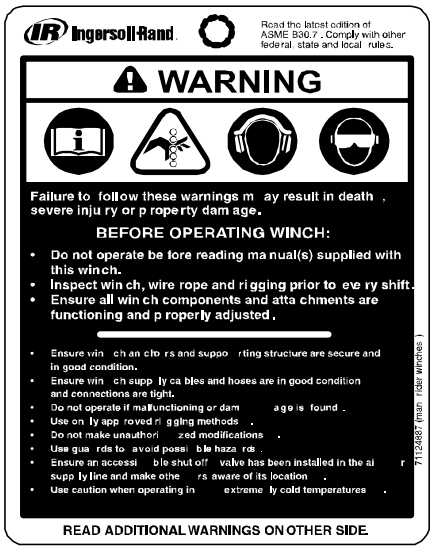
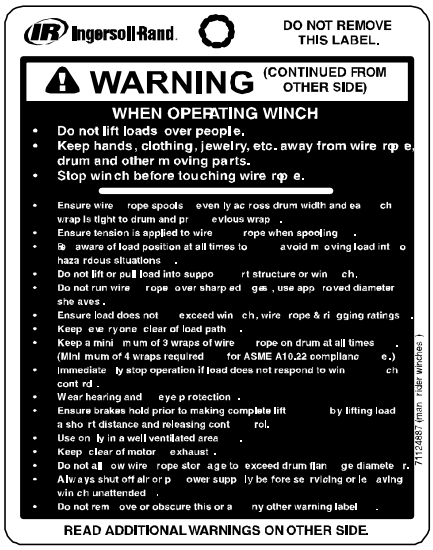


- **Read the installation and operation manual before using the winch**

WARNING

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





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MATERIAL HANDLING

NOTICE

***MAN-RIDING* AIR WINCH**

MAN-LIFTING with this winch is STRICLY 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":

- N°.S-2176 for the LS150RLP Series

Construction :
LS150LP series winches have 3 assemblies designed for the most difficult tasks

- A moto-reducer with brake.
- 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.
Internal Brake : Multidiscs 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.

OPTIONAL FEATURES
(Standard on 'CE' marked models)

Main air emergency stop device: As per EN 418 standard. 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.
Vertical rope entry.

⚠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	Mid Drum Line Speed	Motor Power	Recommended Wire Rope Size Lifting Ratio (10:1)
	bar	cu.m/min	kg	m/min	HP	mm
LS150RLP	6.3	2.2	150	30	2	10

Model No	Sound Pressure Level	Sound Power Lever	Winch Nominal Overload Setting (Last Layer)	Drum Barrel Diameter	Minimum Air Hose Size	Drum Flange Diameter	Motor Port Inlet Size	Maximum Foundation Anchor Shear Force At one Capscrew
	dBA	dBA	Kg	mm	inches	mm	inches	N
LS150RLP	89	103	200	244	1/2"	442	1/2"BSP	2880

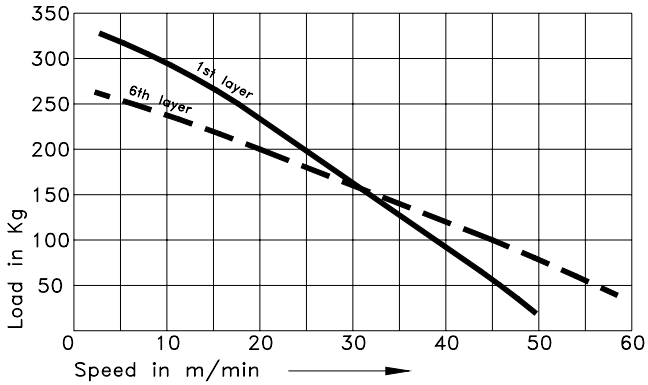
Notes:

1. Sound measurements have been made in accordance with ISO 11201, ISO 3744-3746 and ISO 4871 test specifications for sound from pneumatic equipment. Readings shown are based on the average noise level of each winch configuration, proportionate to the utilized time in a regular cycle.
2. Lpc (Peak Sound Pressure) does not exceed 130dB.
3. Performance based on 6.3 bar operating pressure.
4. Maximum Foundation Anchor Shear Force at One Capscrew, value based on use of recommended fastener grade and size.

Winch Wire Rope Storage capacities (feet/metres)

Model		**LS150RLP**	
Drum Length		11.8 inch	300 mm
Wire Rope Diameter		13/32 inch	10 mm
cumulative rope capacity		feet	metres
	1st layer	72	22
	2nd layer	151	46
	3rd layer	233	71
	4th layer	325	99
	5th layer	420	128
Rating limit	6th layer	521	159
	7th layer	630	192
	8th layer	741	226

Performance curve at 6.3 bar (90 PSI)



Model Code Explanation

Example: LS150 R LP - PH 2M - B - E

Winch model
LS150 = 150kg

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
Filer and oiler

Control
L = Lever control
PH = pendant control

Control Distance
2M = 2 meters (std)
xM = specify length

Options
B = Vertical rope entry (underwound configuration)
*S = Upper and lower limit switches
*U = Main Air Emergency stop valve
*R = Press roller (Assisting Spooling Device)
*V = Overload protection
*E = Pre equiped emergency lowering device
*Y = Slack wire system
10 = Grooved drum for 10mm rope

European Package
E = Compliance with the european Machinery Directive and includes
Main air emergency stop valve, Overload protection, Upper and lower limit switches,
Pre-equipped emergency lowering device, Slack wire detector, Assisting spooling device,

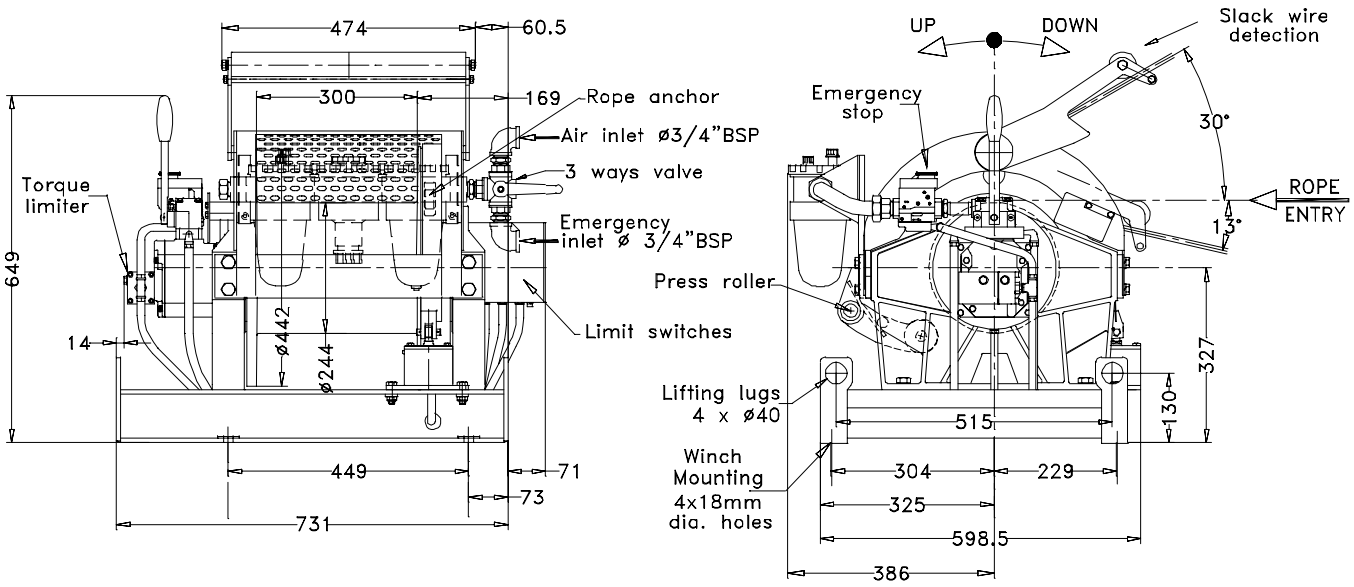
Documentation available on request

- Material traceability certificates according to DIN 50049.
- Copy of the EC type examination certificate by the DNV.
- Witness test by third party.

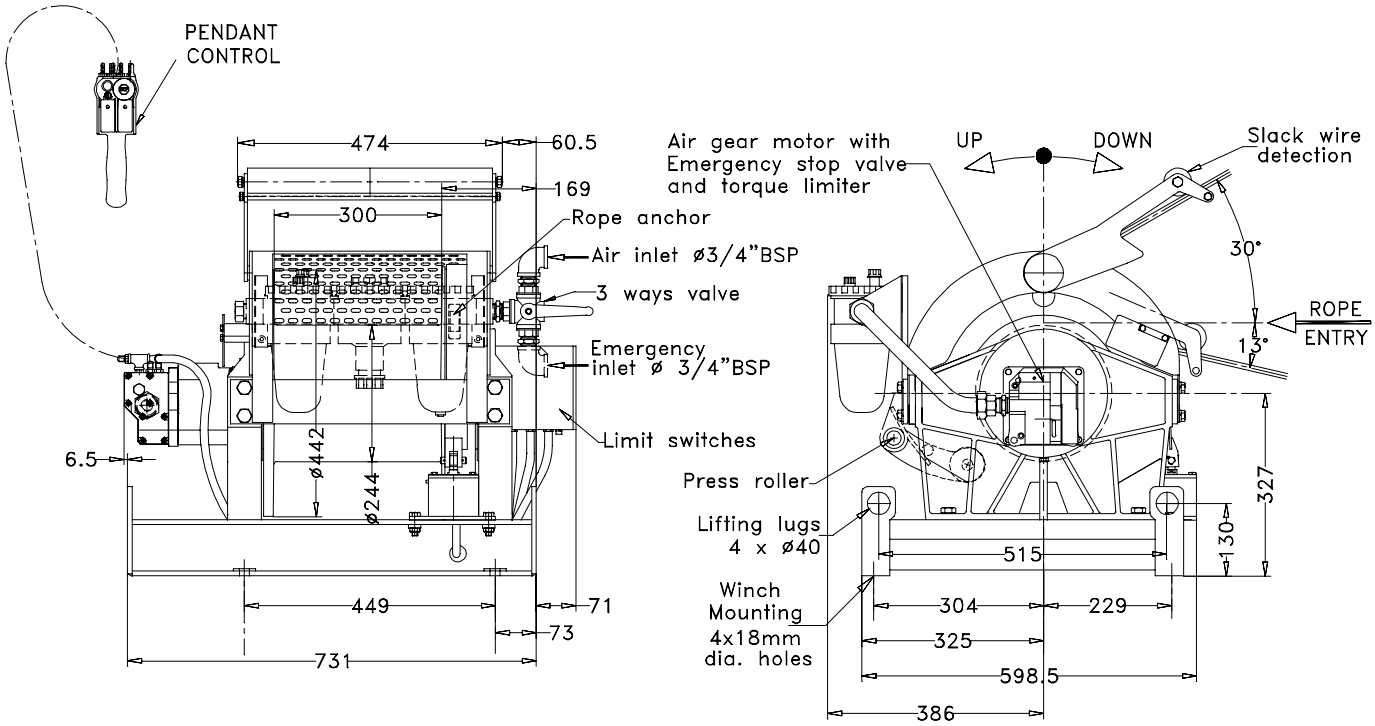
* Standard features included as standard in the ‘CE’ package

Winch with horizontal rope entry

LS150RLP-L SERIES (Dwg. D6150132B)

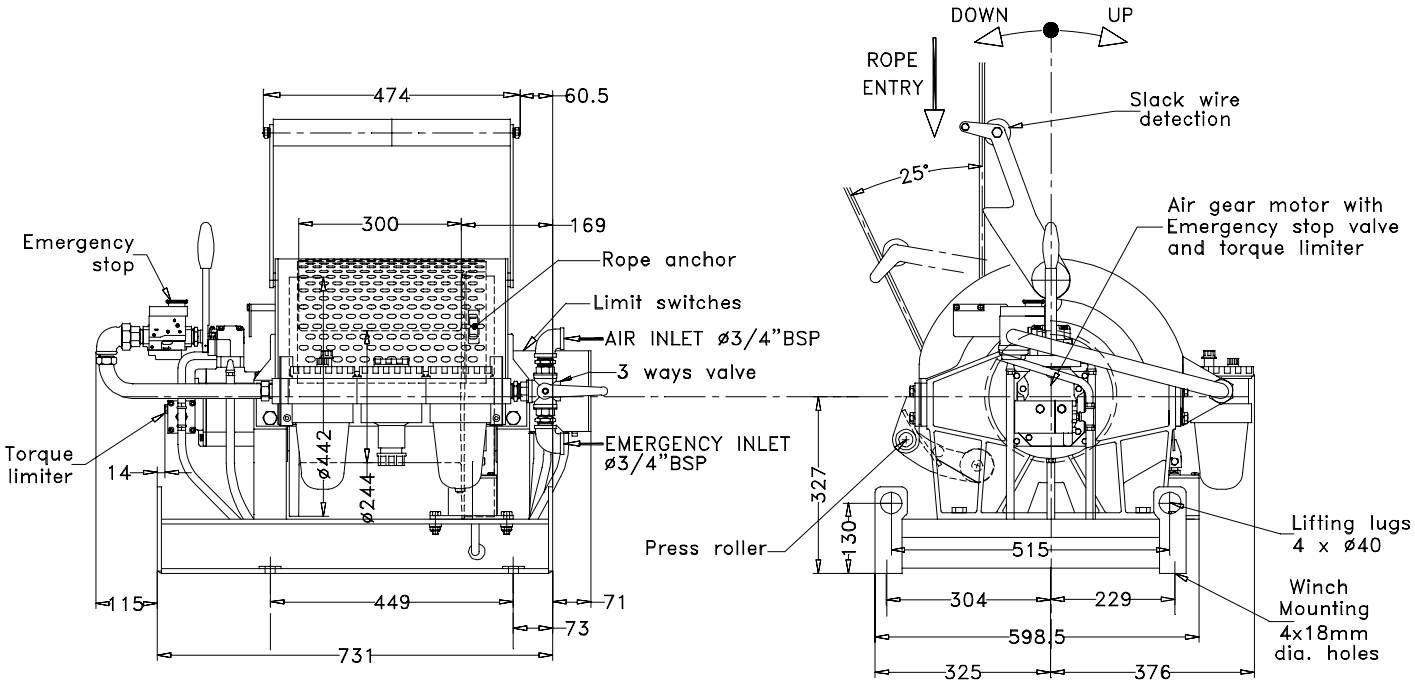


LS150RLP-PH SERIES (Dwg. D6150133C)

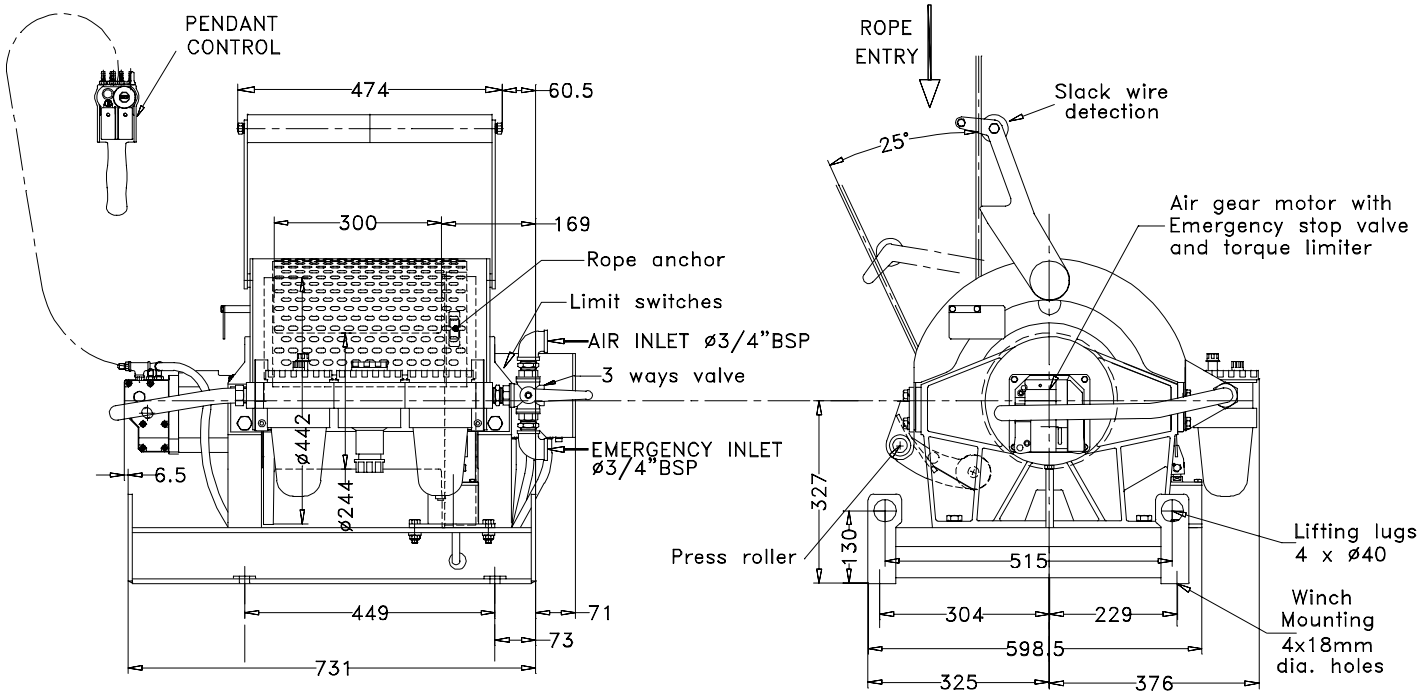


Winch with vertival rope entry (option code B)

LS150RLP-L-B SERIES (Dwg. D6150122C)



LS150RLP-PH-B SERIES (Dwg. D6150129C)



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.**

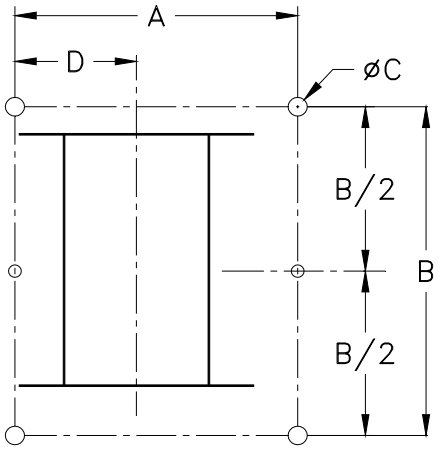
Mounting
Refer to Dwg. D6150001 and table 1.
Care must be taken when moving, positioning or mounting the winch. In most cases, lifting lugs have been provided to assist in handling the winch. If the lug locations are not appropriate for your specific installation, methods great care should be taken to 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.D6150001 for mounting dimensions information.
5) Ensure the winch is correctly grounded to the personal lifting system before using.

Winch Bolt Hole mounting Dimensions

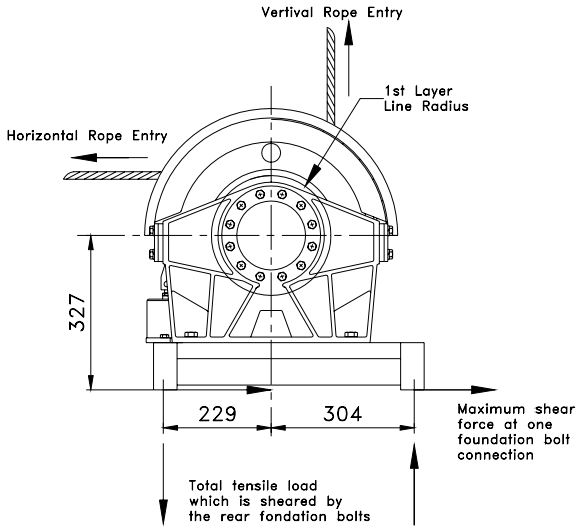


(Dwg. D6150001)

Table 1
Bolt Hole Dimensions

Winch Model	Drum Length	Dimensions			
		A	B	C	D
	mm	mm	mm	mm	mm
LS150RLP	300	533	449	18	229

MAN-RIDING Winches Foundation Bolt Forces



(Dwg.D6150063)

Table 2
Winch Foundation Bolt Forces
Calculated for 1st layer stall load

Force Acting on Bolt		LS150RLP Horizontal rope entry	LS150RLP Vertical rope entry
Maximum Shear Force at One Foundation Bolt Connection	lbf	254	194
	N	1140	870
Maximum Tensile force Shared by Rear Foundation Bolts	lbf	380	254
	N	1700	1140

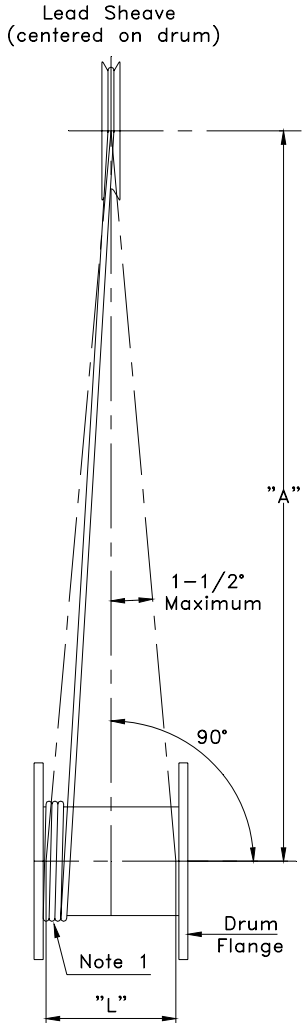
6. If 5/8 inch (16mm) Grade 8 mounting bolts are used, tighten evenly and torque to 150 ft.lbs (203 Nm) for dry thread fasteners; If the fasteners are plated, lubricated or a thread locking compound is used, torque to 99 ft. lbs. 134 Nm).
7. Maintain a fleet angle between the sheave and winch of no more 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" = $\frac{0.5 \times L}{\text{tg } 1\text{-}1/2°}$ (LS150RLP series "A" = 5.5 m)

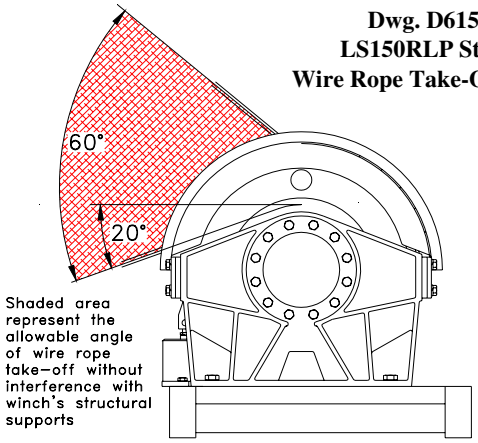
Standard Winch

Install the winch such that the wire rope, when at the take-off angle limits shown in dwg.D6150059 and D6150085 does not contact the mounting surface.

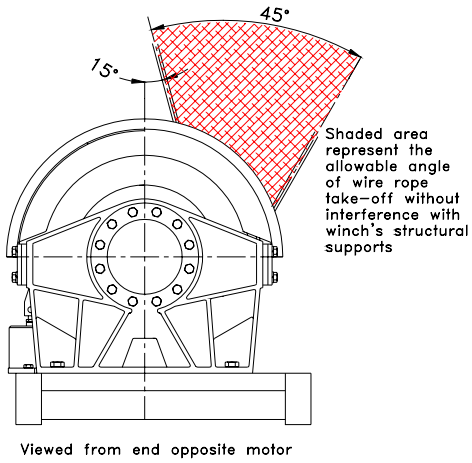
⚠ CAUTION

- **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.**

Dwg. D6150059
LS150RLP Standard
Wire Rope Take-Off Angle(s):



Dwg. D6150085
LS150RLP –B (vertical rope entry)
Wire Rope Take-Off Angle(s):



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.

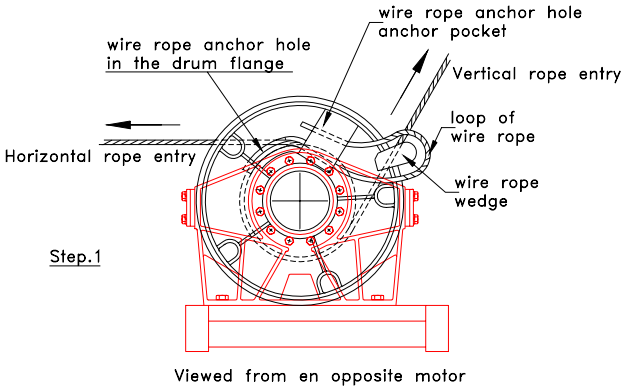
Refer to "SPECIFICATIONS" section for recommended wire rope size. Wire rope construction must be 6x19 IWRC or 6x37 IWRC right lay to permit correct installation of wire rope anchor.

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. D6150065)

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. D6150065.
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.

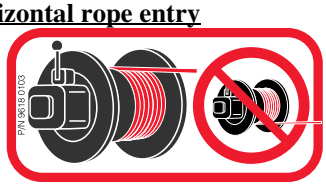


(Dwg. D6150065)

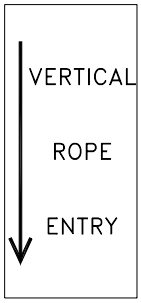
⚠ CAUTION

- **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



Label for vertical rope entry (Option code B)



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.

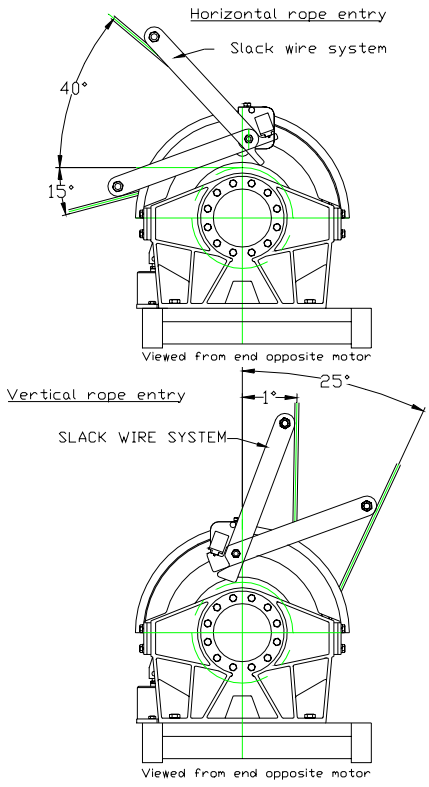
Slack Wire Device option (Refer to Dwg. D6150061)

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.

Slack wire device supplied as standard in ‘CE’ package.



(Dwg. D6150061)

⚠ CAUTION

- **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 correctly sized sheave.
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.

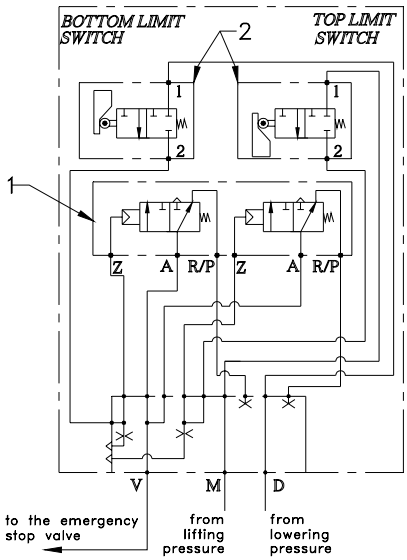
⚠ WARNING

- **The adjustment of the top (upper) limit switch must be done at the minimum safety distance of 2 metres from the return sheave block or from the highest point the manrider can reached.**

1. Pneumatic limit switches are supplied as standard in 'CE' package.

(Refer to Dwg. D6150054)

– Description: Two air control valve with roller levers (item 2) are controled 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:

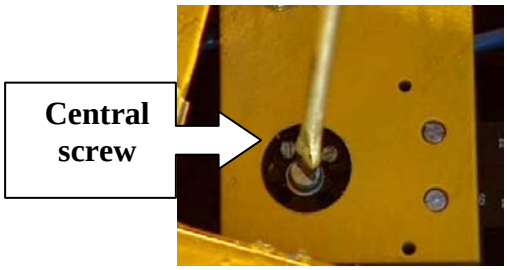
Install a test load to the wire rope for setting up purposes - **DO NOT USE A PERSON**

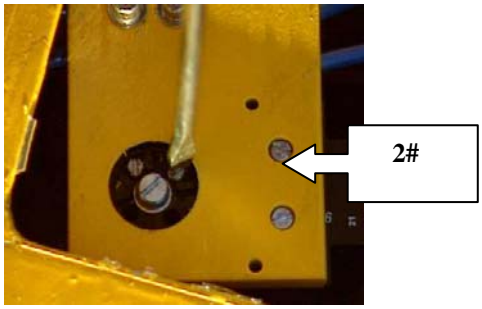
Set the UPPER LIMIT SETTING as follows;

1. Remove the cover from the Limit Switch Box to expose the adjusting screws.

2. Loosen the central screw

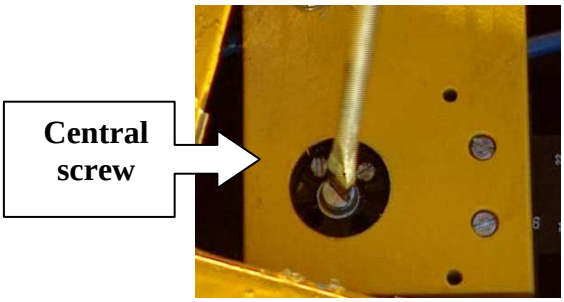
3. Lift the test load and at the same time turn Screw 2# clockwise until the winch stops automatically at the upper





limit.

4. Once the upper limit is set by adjusting Screw 2# tighten the central screw.



5. Push the GREEN start button to reset the main control valve. The winch is now operable again.

<u>If you need to raise the upper limit setting then go to step 6.</u>
<u>If you need to lower the upper limit setting then go to step7.</u>

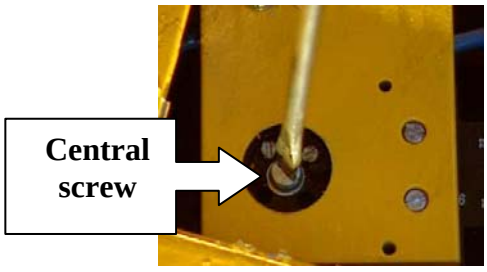
6. If you need to raise the upper limit, loosen the central screw, turn screw 2 anti-clockwise several turns, lift the test load until the winch stops automatically at the upper limit. Tighten the central screw and push the green start button to reset the main control valve. The winch is now operable again

7. If you need to lower the upper limit setting, lower the test load to a point below your required upper setting height. Loosen the central screw, lift the test load and at the same time turn screw 2# clockwise until the winch stops automatically at the new upper limit. Tighten the central screw and push the green start button to reset the main control valve. The winch is now operable again

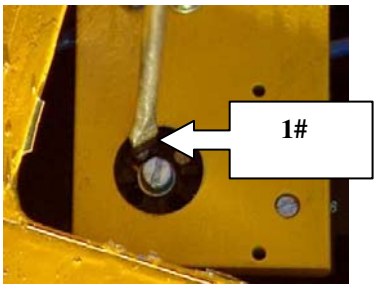
Set the LOWER LIMIT SETTING as follows;

1. Remove the cover from the Limit Switch Box to expose the adjusting screws.

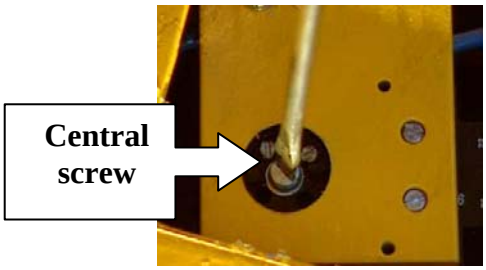
2. Loosen the central screw



3. Lower the test load and at the same time turn Screw 1# anti - clockwise until the winch stops automatically at the lower limit.



4. Once the lower limit is set by adjusting Screw 1# tighten the central screw.



5. Push the GREEN start button to reset the main control valve. The winch is now operable again.

<u>If you need to raise the lower limit setting then go to step 6.</u>
<u>If you need to lower the lower limit setting then go to step 7.</u>

6. If you need to lower the lower limit, loosen the central screw, turn screw 1# clockwise several turns, lower the test load until the winch stops automatically at the lower limit. Tighten the central screw and push the green start button to reset the main control valve. The winch is now operable again

7. If you need to raise the lower limit setting, raise the test load to a point above your required lower setting height. Loosen the central screw, lower the test load and at the same time turn screw 1# anti-clockwise until the winch stops automatically at the new lower limit. Tighten the central screw and push the green start button to reset the main control valve. The winch is now operable again

Once the limits have been set :

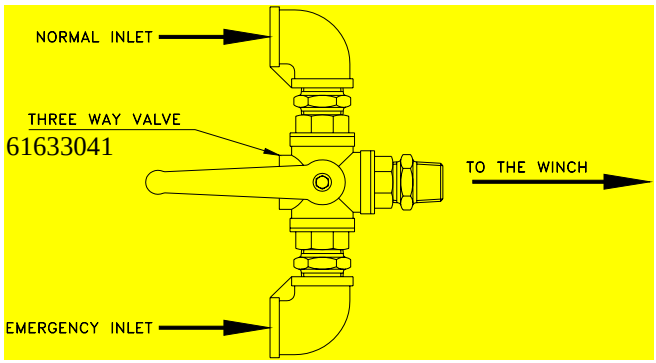
Refit the box cover and seal

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 emergencency 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. LS150RLP 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 40 microns minimum filtration, a moisture trap and a steam trap but check the strainer/filter periodically to maintain its operating efficiency.(ref:67756441)

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.

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.

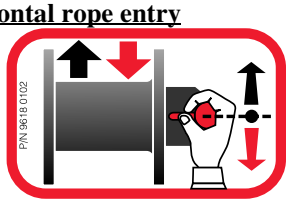
⚠CAUTION

- **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.

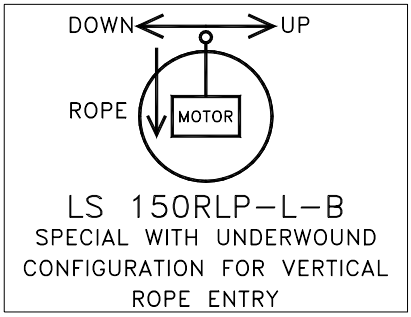
Winch with horizontal rope entry (standard feature)
When viewed from the air motor, move the control throttle handle to the right (clockwise) to pay out wire rope and to the left (counterclockwise) to haul in wire rope. Refer to the attached label.

Label for horizontal rope entry

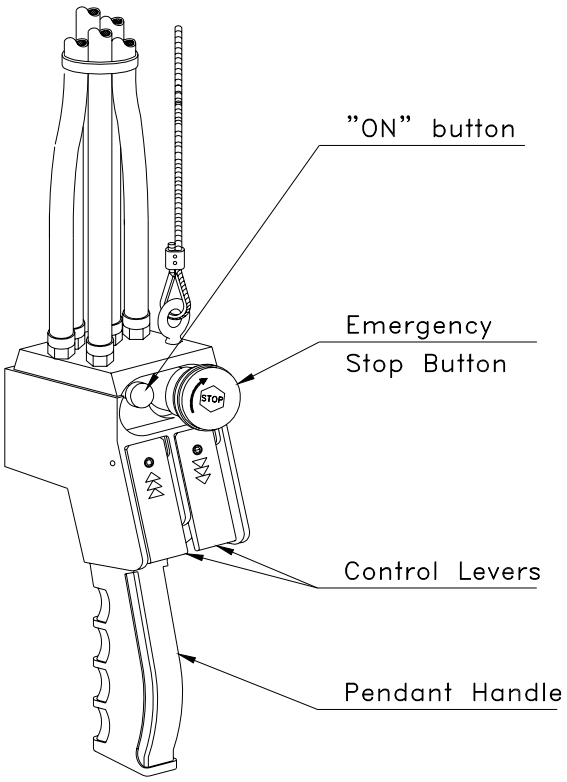


Winch with vertical rope entry (Option 'B')
When viewed from the air motor, move the control throttle to the left (counterclockwise) to pay out wire rope and the right (clockwise) to haul in wire rope.Refer to the attached label.

Label for vertical 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.



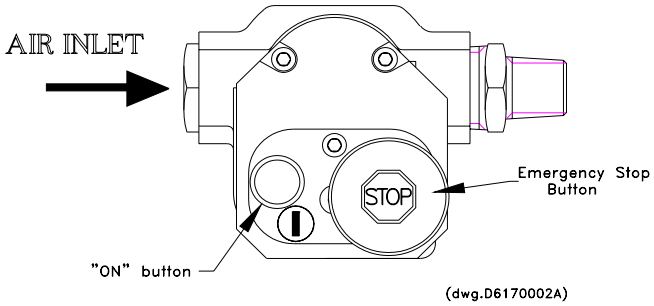
(Dwg. D5770025)

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 LS150RLP models with lever control (Dwg. D6170002)



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 reaapplies 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.

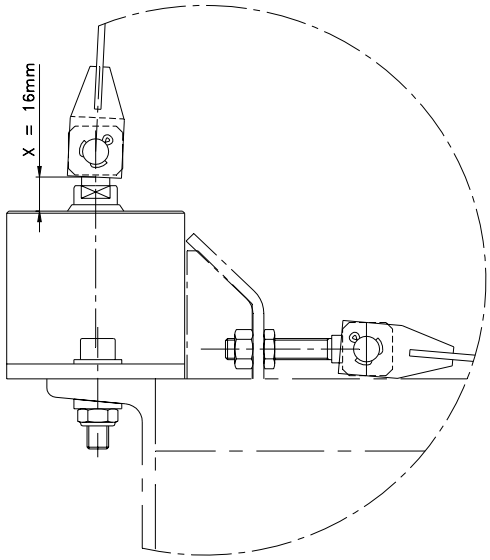
Adjustment

For LS150RLP series

Refer to (Dwg. D6150003)

Checking dimensions:

X = 16 mm



(Dwg. D6150003)

⚠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 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 relation ship 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.

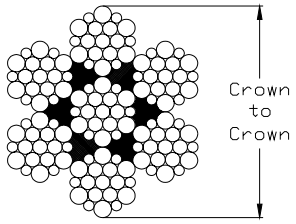
Periodic Inspection
Frequency of periodic inspection primarily depends on the severity of usage :

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.

LUBRICATION

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 neccessary.
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:

1. 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.**

2. Apply a wire rope lubricant, Ingersoll-Rand LUBRI-LINK-GREEN or SAE 30W oil.
3. 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:

- LS150RLP : 0,15 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 : WARNING - 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)

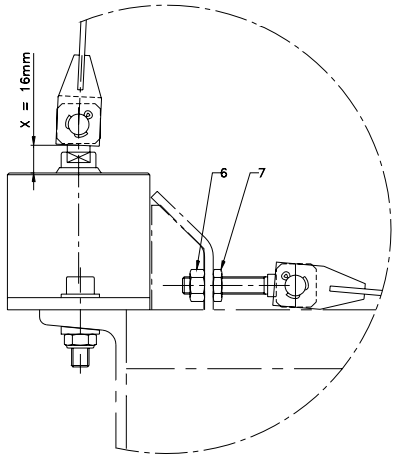
(Refer to Dwg.D6150025)

- 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. D6150003 below)

- X = 16 mm : This dimension is adjusted with the nut (6) and secured with the conternut (7).



(Dwg.D6150003)

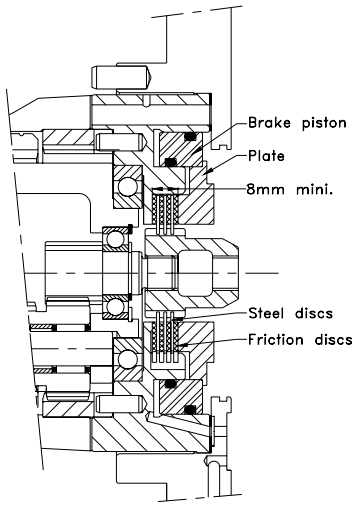
Internal Brake

(Refer to Dwg. D6180035)

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 four capscrews (107) with washer (108) which connect the air motor to the end bracket and remove the motor.
4. Remove the coupling sleeve (75), plate (82), and discs (72and 73).



(Dwg.D6150086)

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 minimum shown.

Motor Removal

Use the following procedure to remove the motor and refer to Dwg D6180020 and D6150035 (pages 29 et 31).

1. Disconnect and tag the air lines.
2. Remove the four screws (107) and washer (108) to remove the motor ass'y with the control valve.

3. Remove the 'O'ring (84) , the coupling sleeve (75) and the spring (79).

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.D6150087)

1. Disassembly of band brake
   - 1.1. Remove the nuts (6) on fixed point sides
   - 1.2. Remove the pin (2) and expel the axle (3)
   - 1.3. Remove the band brake (1)
2. Disassembly of the brake cylinder (5)
   - 2.1. Disconnect the hose of the the fitting (11).
   - 2.2. Remove the nuts (10) and the screw (9) to remove the brake cylinder ass'y from the skid frame.
   - 2.3. Remove the eyelet screw (4) from the piston

Brake Band Cylinder Disassembly
(Refer to Dwg. D6150088)

- 1.1. Remove the screws (13) with lockwasher (13) and strip down the cylinder bottom (18 and cover (15))
- 1.2. Strip down the piston (19) and the spring (20) and remove the joint (12) and 'O'Ring (21).

Winch Disassembly
(Refer to Dwg. D6150120)
Refer to Motor Removal section to remove motor ass'y from the winch.

1. Disconnect the External brake hose (35) of the fitting (57).
2. Remove nut (38), washer (37) and screws (36) to disassembly winch from skid frame
3. Stand the winch in a vertical position with the motor side up.
4. Remove the four screws (66) see (dwg D6180035) and remove the brake gear assembly (63) and set to one side for further disassembly if needed.
5. Remove screws (31) and washers (32) to remove spacer (42)
6. Remove screws (33) and washers (32) to remove front flange (29).
7. Strip down screws (27) and remove stop (28)
8. Remove front bearing ass'y
   - 8.1. If necessary,
     - Remove retainer ring (23) and (24)
     - Expel bearing (25) from bearing (39) and front bearing (30)
     - Remove joint (26)
9. Remove pinion (40) and ring gear (41)
10. Remove the drum (56).
    - 10.1. Remove the retainer ring (55) , the joint (51) from the drum.
    - 10.2. If necessary, remove the screw (53) to remove the washer (54).
11. Disassembly of rear side of winch.
    - 11.1. Remove screws (48) washers (49) blind washer (47) (If existing).
    - 11.2. Remove screws (31) and washers (32) to remove the rear bearing (44) from rear flange
    - 11.3. Remove bearing (50) from the rear bearing (44).

Brake Gear disassembly
(Refer to Dwg.D6180035)
Refer to Winch disassembly section to begin brake gear (63) disassembly.

1. Stand the reduction gear assembly in a vertical position so the output shaft (99) is down.
2. Remove washer (82).
3. Remove brake discs (72and73)) and cylinder piston (86).
4. Remove the screws (64).
5. Remove the flange (62) and 'O'ring (85).and papar joint (71).
6. Carefully drain the reduction gear oil into a suitable container.
7. Remove the bearing (60) from the gear housing (104) by tapping gently a soft hammer on the shaft spindle (98).
8. Remove paper joint (89).
9. If necessary remove bearing (87).and ring gear (67) from the bearing (60)
10. Remove the retainer ring (101) from the output shaft (99).

11. Remove planet wheel support ,output annular gear and shaft spindle assembly, by tapping gently with a soft hammer on the output shaft (99).
12. Remove bearings (102, 97) and oil seal (103) from gear housing (104).
13. Remove the retainer rings (68, 100), the shaft spindle (98) and bearing (70)
14. Push out planet axles (93) and remove planet wheel (90), bearings (92) and spacers (80).
15. Remove the retainer ring (94).
16. Remove the bearing (96) and output annular gear (69).

Air Gear Motor Disassembly (for Lever Control).
(Refer to. Dwg. D6180092)
Refer to motor removal section to remove the motor ass'y from the winch.

1. Remove the screws (113,118) and lockwashers (114) to remove the motor ass'y from the motor housing.
2. Remove screws (130).
3. Remove the motor cover (122). If necessary, remove bearings (123), 'O' ring (116) and pins (119).
4. Remove the motor housing (111) ; and the 'O' rings (129).
5. Immobilize the drive gear and iddle gear with an axle between the teeth and remove nuts (126).
6. Remove the drive gear (120) and idle gear (121) Remove the shaft segments (124) and internal ring.
7. Remove the screw (128) and the washer (127).
8. Remove bearings (125).

Lever Control Valve Disassembly
(Refer to Dwg. D6150006)

1. Remove screws (162) and lockwashers (163) to remove the control valve assembly from the motor housing.
2. Remove the adaptation plate (176) and 'O'Ring (174).
3. Extract the control lever (167).
4. Remove screws (164).
5. Remove bracket stop (170).
6. Remove the spring (173).

⚠ CAUTION

- **Localize the mounting position of the rotary valve in the valve housing.**

8. Pull out the rotary valve (166).
9. Remove 'O' ring (165) from the rotary valve (166).

Emergency Stop Valve Ass'y Disassembly.
(Refer to Dwg. D6170011)

1. Remove emergency stop button (262).
2. Remove the 3 screws (265) to remove the cover (276) with the spring (251).
3. Remove the 'O' ring (274) from the cover (276).
4. Remove the screw (254) to remove the spool (251) with protector (252).
5. Remove the shuttle valve stop (263) with ball (256).
6. Remove the 'O' ring (253) from shuttle valve stop (263) and spool (251).
7. Remove the cover (259) and the 'O' ring (253).
8. Remove the diaphragm (270).
9. Immobilize the valve cone (269) by its hole with a rod in one of two orifices of the body (260) and remove the screw (275).
10. Remove the valve cone (269,273) with seal ring (271) and distance ring (266) with the washer (272).
11. Remove plugs (258) with springs (257) and balls (256).
12. Remove the screw (268) to remove nozzle (267).

Torque Limiter Ass'y Disassembly
(Refer to Dwg. D6360004)

1. Disconnect hoses
2. Remove screws (212) with usit ring (211) to remove the torque limiter ass'y (200) from the motor.
3. Remove 'O' rings (215).
4. Remove the screw (221) and the seal ring (220).
5. Remove the plug (217) to remove nozzle (218).
6. Remove the 4 screws (214) to remove the body (213).
7. Remove the valve cone (216) from the body (213).
8. Remove the nut (207) and washer (208) to remove diaphram (209) from the valve cone (216).
9. Remove spring (206), spring receiver (205) and ball (204).
10. Remove nut (203), usit-ring (222) and screw (202) from cover (210) if necessary.

Motor with Overload and Emergency Stop Valve Disassembly (for Pendant Control).
(Refer to Dwg. D6150093)
Refer to motor removal section to remove the motor ass'y from the winch.

1. Remove the screws (160) to remove the motor ass'y from the motor housing (74).
2. Remove capscrew (130).
3. Remove the motor cover (122). If necessary, remove bearing (123) and stop (147) from the motor cover.
4. Remove the motor housing (11), slide valve (144) with spring (142) and stop (163).
5. Immobilize the drive gear and iddle gear with a rod between the teeth and remove nuts (126).
6. Remove the drive gear (120) and iddle gear (121) from the motor front plate (122).
7. Remove the screw (128) and washer (127) to remove bearings (125).
8. Emergengency stop valve disassembly.
   - 8.1. Remove screws (128) to remove the cover (151) with spring (162).
   - 8.2. Remove 'O'ring (152) from the cover (159).
   - 8.3. Remove screws (149,168) to remove the cover (159).
   - 8.4. Remove the diaphram (158).
   - 8.5. Immobilize the valve cone (157) by its hole with a rod in a orifice of the cover (165) and remove the screw (161).
   - 8.6. Remove the valve cone (153,157) with the joint (154) and the spacer (155) with the washer (156).
9. Overload valve disassembly.
   - 9.1. Remove the screw (131) and the seal ring (132).
   - 9.2. Remove the screws (149,168) to remove the cover (159).
   - 9.3. Remove the valve cone assembly (133,129,134,135,137).
   - 9.4. Remove the spring (136) , the spring receiver (137) and the ball (138).
   - 9.5. Remove the nut (140), the Usit-ring (139) and the screw (141).

PHS2E-U Pendant Control with Emergency Stop Button Disassembly.
(Refer to Dwg. D5790027)

1. Disconnect hoses from the pendant ass'y
2. Remove the fittings (402)
3. Remove the lifting eye (401) if necessary.
4. Tap out the pin (416) to remove the levers (418).
5. If necessary, remove the setscrews (417).
6. Remove the setscrews (409) to remove the valve cone (404).
7. Remove the protector (411) and 'O'rings (405,410) from the valve (404).
8. Remove the plugs (408) to remove the spring (407) with ball (406).
9. Remove the emergency stop button (419).
10. Remove the plug (420) to remove ball (406) and remove the 'O'ring (410) if necessary.
11. Remove the retainer ring (415) to remove the exhaust washer (414).

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.

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, distorded 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.

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 8mm.

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 band (1)

3. Inspect brake cylinder joints and the internal diameter surface condition of wrapper cylinder - replace them if necessary.
4. Check the spring condition (20) - If after a large period of use an important diminution of its efficiency is established, replace.
   (F theoretical = 75 daN under deflection f = 48 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. D6150006)

1. Lubricate and install 'O'Ring (165) on the rotary valve (166).
2. Lubricate and carefully install rotary valve (166) in the valve housing (161).
3. Lubricate and install spring (173) on rotary valve.
4. Ensure pins (172) are intalled in valve housing (161) and control lever (167) , or pin (177), screw (178), washer (179) for new version.
   Fixed pins (172) and (178) with Loctite 601 and secure screw (178) with Loctite 243
5. Install bracket stop (170).and install screws (164) secured with Loctite®243.
6. Install control handle (167) on the rotary valve and secure with pin (171).
7. Lubricate and install 'O'Ring (174) on the motor housing ,install the adaptation plate (176) with 'O'Ring (174) . Install the lever control valve ass'y (160) on the adaptation plate and secure with the screws (162) and lockwasher (163).

Air Gear Motor Assembly
(Refer to Dwgs. D6180092 and D6290093)

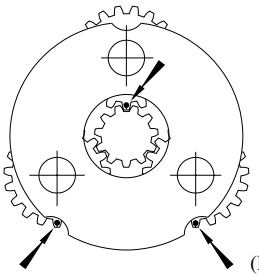
1. Lubricate ball bearings (125) with grade 2 grease and install is in the motor front plate (122).
2. Install screw (128) with washer (127).

3. Install internal ring of bearing (123) and shaft segments (124) on the rotor (120,121).
4. Install the rotors set in the front plate (122).
5. Immobilize the drive gear and iddle gear with an axle between the teeth and install nuts (126) secured with Loctite®243
6. Install the motor housing (111) on motor front plate (122) with 'O' rings (129).
7. Install Bearing (123) , 'O'Ring (116) and pin (119) in the motor cover (117or 165).
8. Install the motor cover (117or 165) on motor housing. Ensure pins (119) are fully aligned and engaged. Install the screw (130 or 160) secured with Loctite®243
9. Check that the 'O'ring (80), oil seal (77) and gaschet (78) are correctly installing in the motor housing (74).(refer to Dwg.D6180035).
10. Install the motor ass'y with gasket (112) in the motor housing and secure with screws (113,118or 160) and lockwashers (114).
11. Check to ensure motor turns smoothly in both directions.

Brake Gear Assembly

(Refer to Dwg. D6180035)

1. Install oil seal (103) in the bore of the gear housing (104) so seal lip is toward the planet assembly side.
2. Press bearings (102 and 97) into the gear housing (104).
3. Install retainer ring (101) on the output shaft (99) and press output shaft into the gear housing.
4. Install ring gear (95) and bearing (96) on output shaft and secure in position with retainer ring (94).
5. Press bearing (70) onto the sun gear (98) and locate with retainer ring (100). Install sun gear (98) with bearing (70) in the planet support (69) and secure with retainer ring (68).
6. Install two bearings (92) with a spacer (91) between in the bore of each planetary gear (90).
7. Position each assembled planetary gear in the planet support (69). with the timing mark (as shown on drawing Dwg. D6310013).and carefully install planet axles (93).



(Dwg.D6310013)

⚠ CAUTION

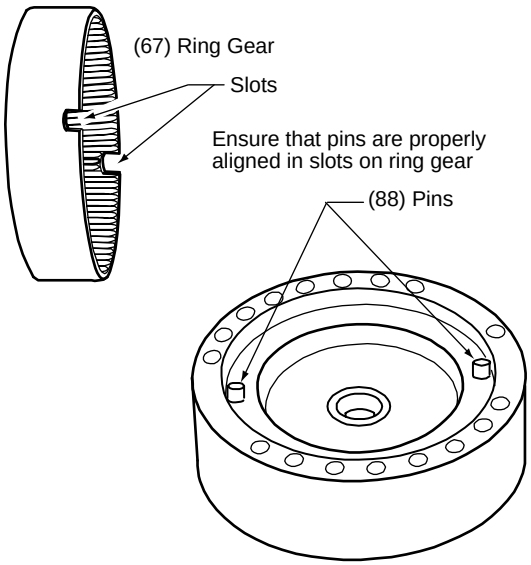
- **For assembly of planet gears, each planet gear must be positioned with the timing mark as shown on drawing D6310013**

8. Install planetery gear assembly and ring gear (67) in the gear housing (104).
9. Install Ball bearing (87) on the planet support (69).
10. Place the reduction gear assembly in a vertical position with the planetary gear end up.

Fill the gear assembly to within 1 in. (25 mm) of the top with clean oil SAE 80W90

- Kinematics viscosity 145mm^2/s at 40°C(104°F)
- Capacity of gear box : 0,04 gall (0,15 Litres)

11. Install the bearing (60) with pin (88) on the gear housing (104) with a new gasket (89). Check that dowel pins (88) line up. Ensure the ring gear (67) and sun gear (98) mesh with the planet gears (90). Check rotation of planetary gears.



(Dwg. MHP2667)

⚠ WARNING

- **Ring gear (67) has two slots to locate pins (88). Ensure that pins (88) are properly aligned and engaged in slots on ring gear (67). Refer to Dwg. MHP2667 and D6180035. Failure to correctly engage pins in ring gear (67) slots can cause winch to drop load. Before placing gear housing (105) over planetary assemblies, test to ensure ring gear (67) does not rotate freely.**

12. Install cylinder piston (86) with 'O'Rings (61,63).
13. Install coupling sleeve (75) on the shaft spindle (98)
14. Install brake discs (72 and 73) on the coupling sleeve (75) and washer (82).
15. Install flange (62) with 'O'Ring (85) and paper joint (71). Secure with screws (64) :secured with Loctite®243 and ,this screws will have to be tightened to torque 15 Nm.

Winch Assembly

(Refer to Dwg. D6150120)

1. Assembly of rear side of winch.
   - 1.1. Install the rear bearing (44) in the rear flange (29) and secure with screws (33) and lockwashers (32).
   - 1.2. If the winch is delivery without limit switches , install the blind washer (47) with screws (48) and lockwasher (49).
2. Position the rear flange on several block of wood with the rear bearing (44) up.
3. Check that the washer (54) is installed in the drum.
4. Install bearing (50) and joint (51) on the drum (52).
5. Install the drum ass'y on to the rear bearing

6. Install retainer ring (55) , ring gear (41) in the drum (56).
7. Install bearing (25) in the ring (39) and secure with retainer ring (24).
8. Install joint (26) and the bearing with ring ass'y on the front bearing (30).
9. Install front bearing ass'y and the stop ring (28) in the drum (56)
10. Install screws (27) secured with Loctite®243.
11. Install front flange (29) with screws (33) and lockwasher (32). It will have to be tightened with 4.83 mkg torque
12. Install pinion (40) on the brake gear assembly and secure with screw (59) and nut (58).
13. Install brake gear assembly (63) with screws (66) secured with blue Loctite ® 243 (Item NO seen on drawing D6180035) ,this screws will have to be tightened to torque 15 Nm.
14. Mount the motor housing ass'y with springs (79), paper joint (65).and 'O' ring (84).
    14.1. Check for correct assembly by compressing the springs and secure with screws (107) and lockwashers (108).
15. Assembly of winch on the skid frame (Refer to Dwg.D6150120)
    15.1. Install the two distance part (42) with screws (31) and lockwasher (32) on the winch. The screws (31) will have to be tightened to torque 4,83 mkg only after winch has been put on skid frame
    15.2. Install the winch on the skid frame (43) and secure with screw (36), lockwashers (37) and nuts (38).

Direct brake on Drum Assembly

1. Assembly of the brake cylinder

(Refer to Dwg .D6150088).

1.1. Install 'O'Ring (21) on the piston (19)
1.2. Install ring (17) and joint (12) in the cover (15).
1.3. Install piston (19) and spring (20) in the jack casing (18).
1.4. Close brake cylinder ass'y with screws (13) and lockwashers (14).
- before closing the brake cylinder, full in the spring housing will oil SP 150 type (about 25 ml)

2. Assembly of band brake

(Refer to Dwg .D6150087).

2.1. Install the eyelet screw (4) on the piston
2.2. Install the cylinder ass'y (5) with screws (9) and locknuts (10) on the skid frame.
2.3. install the band brake (1) on the cylinder ass'y (5) with axle (3) and pin (2)
2.4. Install the second eyelet screw (4) on the other end of band brake with axle 3) and pin (2).
2.5. Intall the eyelet screw in the fixed point with nuts (6-7)
2.6. Adjust the brake band ass'y (see adjustment section)

Accessories installation (If existing)

1. Install the emergency stop valve (Refer to Dwg.D6170011)
2. Install the torque limiter ass'y (Refer to Dwg.D6360004)
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 D6150067 or D6150075.

TESTS

Testing

Operational Tests

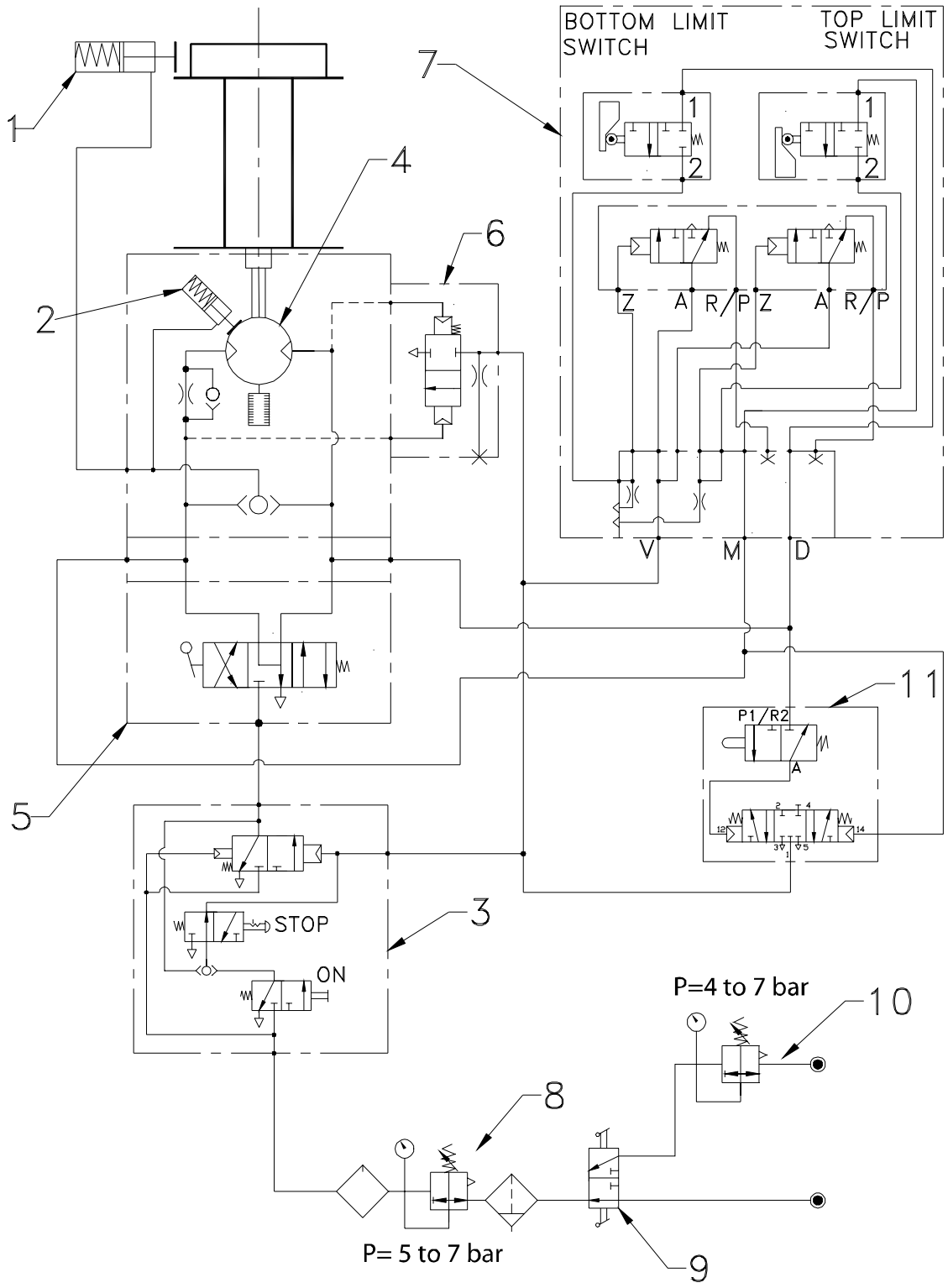
Prior to initial use, all new, altered or repaired winches shall be tested to ensure proper operation.

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

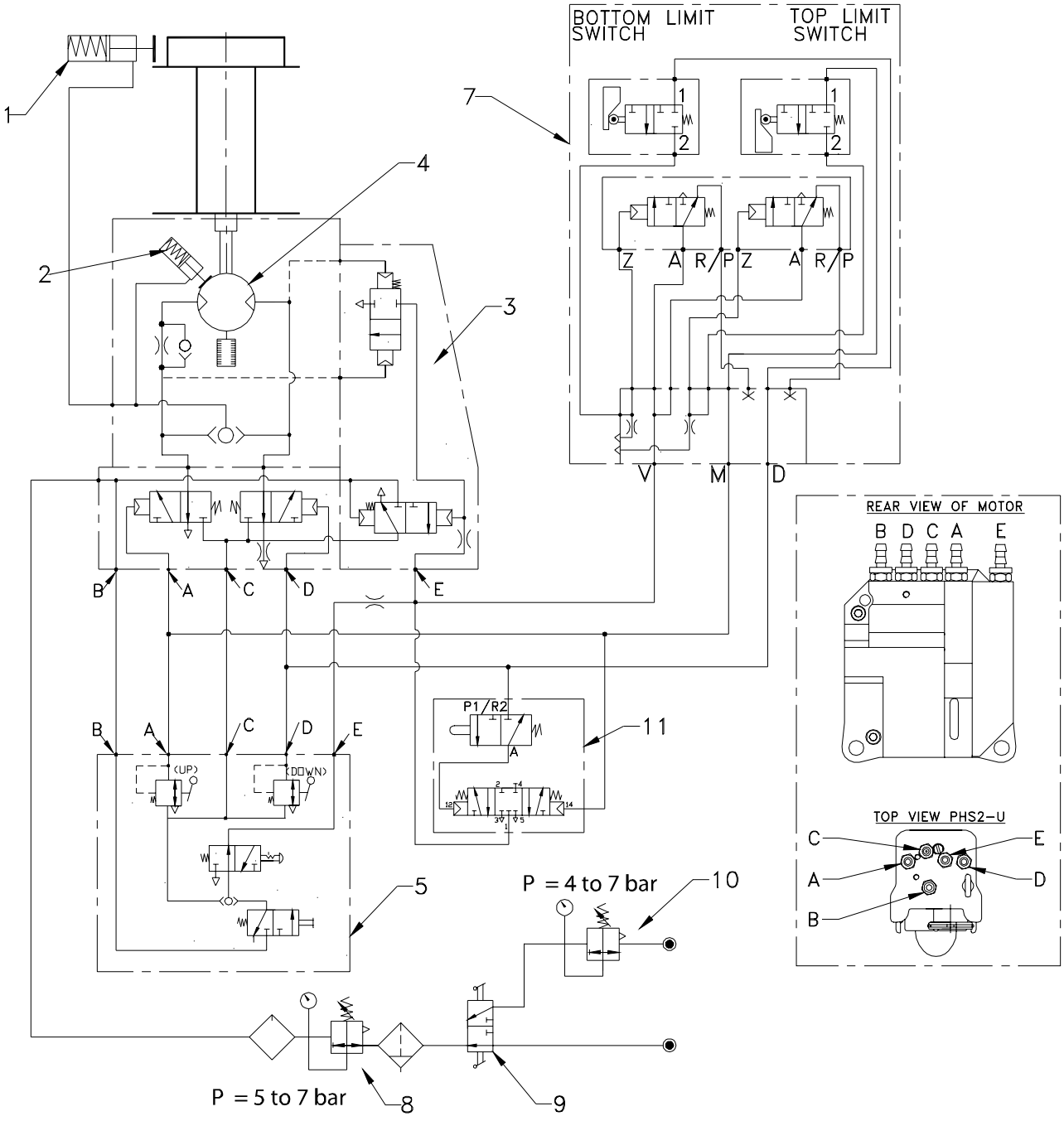


(Dwg. D6150050)

IDENTIFICATION OF COMPONENTS

1. Direct band brake on drum
2. Multidisc brake on shaft motor
3. Air Control Valve for Emergency stop
4. Air-powered motor.
5. Lever Control Valve Up/Down.
6. Torque limiter
7. Air limit switches.
8. FRL block ∅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 .D6150049)

IDENTIFICATION OF COMPONENTS

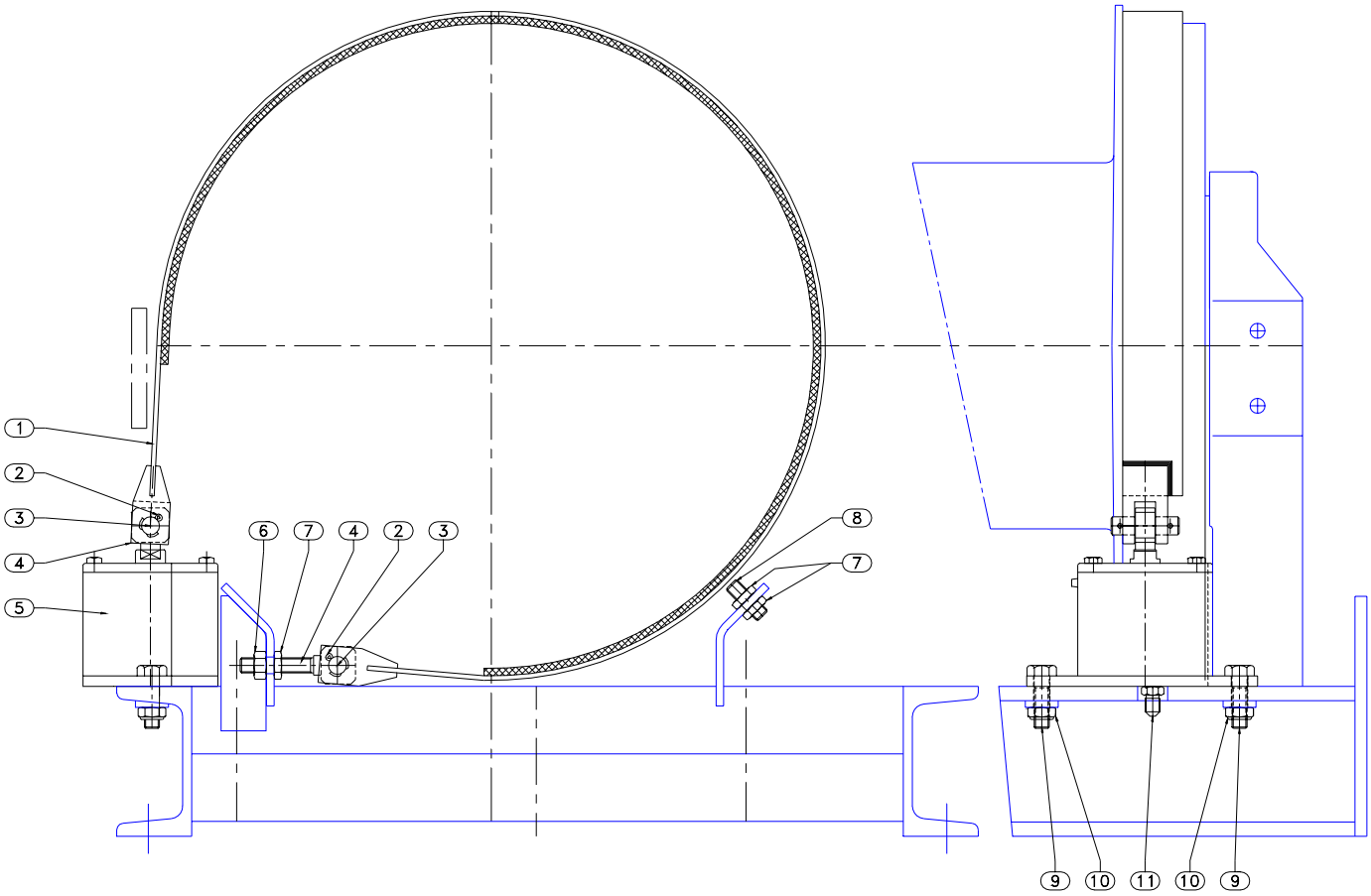
1. Direct band brake on drum
2. Multidisc brake on shaft motor
3. Air Control Valve with Emergency stop And torque limiter
4. Air-powered motor.
5. Lever Control Valve.
7. Air limit switches.
8. FRL block ∅3/4" G.
9. Three Way Valve.
10. Secondary Power Source.
11. Slack Wire Device

NOTES

INDEX TO DRAWING AND PARTS LISTS

PAGE NO.

EXTERNAL BAND BRAKE DRAWING AND PARTS LIST

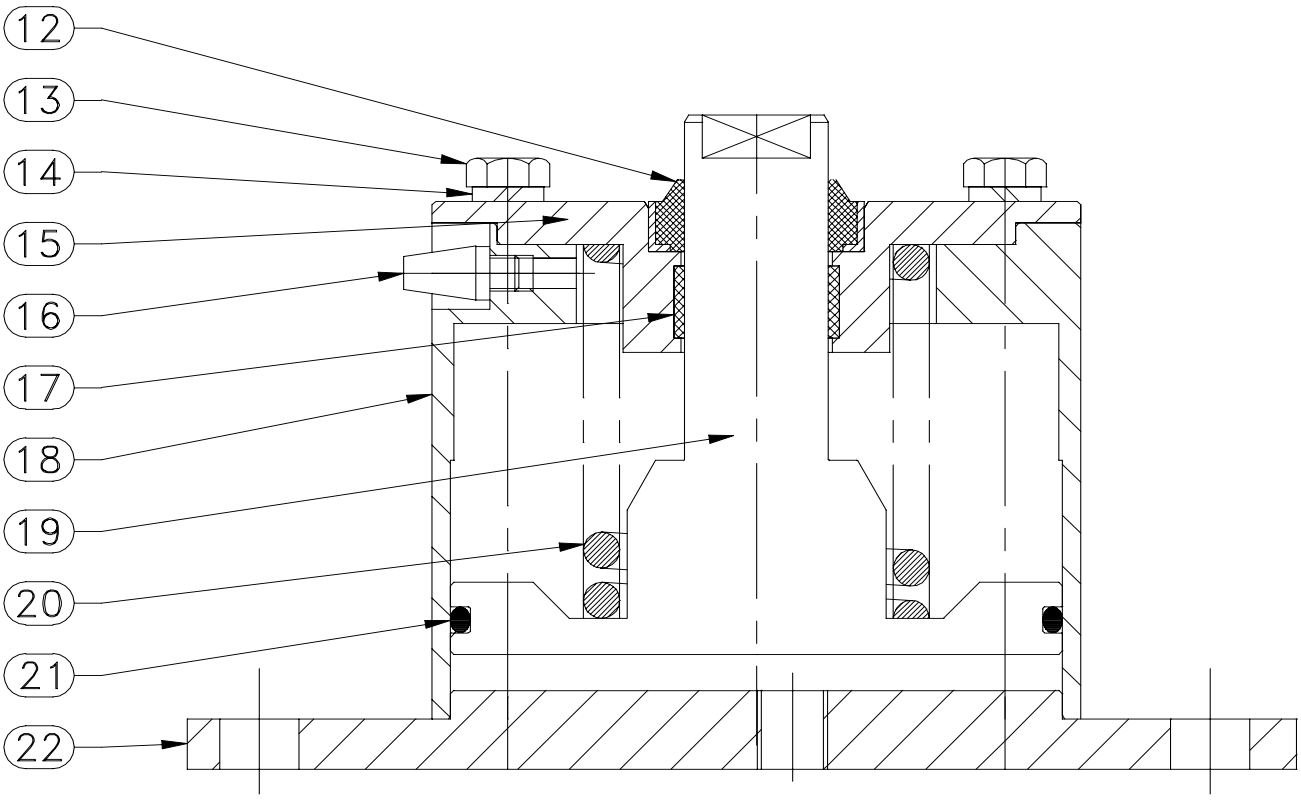


(Dwg. D6150087)

ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
1	Brake Band	1	96157174
2	Pin	2	46302019
3	Axle	2	96157175
4	Eyelet Scew	2	96157272
5	Brake Band Cylinder Ass'y **(After 01 March 2001)** Old Brake Band Cylinder Ass'y	1 1	76158353 76158104
6	Nut	1	43006911
7	Nut	3	43202112
8	Screw	1	42004207
9	Screw	2	41022701
10	Nut	2	43008011
11	Fitting	1	68237528

• Recommended Spares Parts

BRAKE BAND CYLINDER ASSEMBLY DRAWING AND PARTS LIST



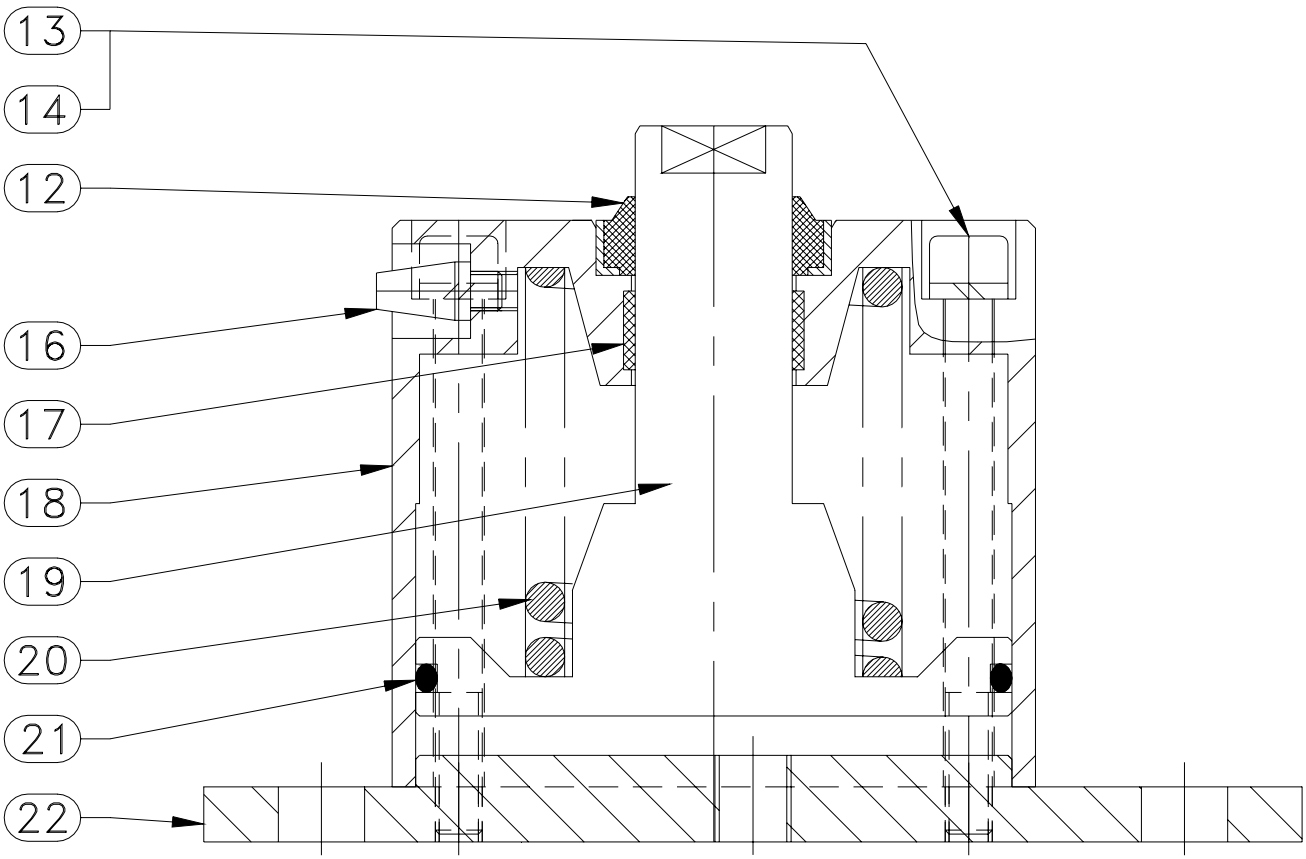
(Dwg. D6150088)

ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
	Brake Band Cylinder Ass'y		76158353
• 12	Joint	1	58016730
13	Screw	4	41021301
14	Lockwasher	4	45201006
15	Cover	1	96150434
16	Muffler	1	68489232
17	Ring	1	96150273
18	Jack Casing	1	96150433
19	Piston	1	96157350
20	Spring	1	69198132
• 21	Joint	1	58223029
22	Cylinder Bottom	1	96150352

• Recommended Spares Parts

OLD BRAKE BAND CYLINDER ASSEMBLY DRAWING AND PARTS LIST

This brake cylinder was used on winches with serial numbers up to 01 02 34.
(Year-Month-Chornological Nbr)

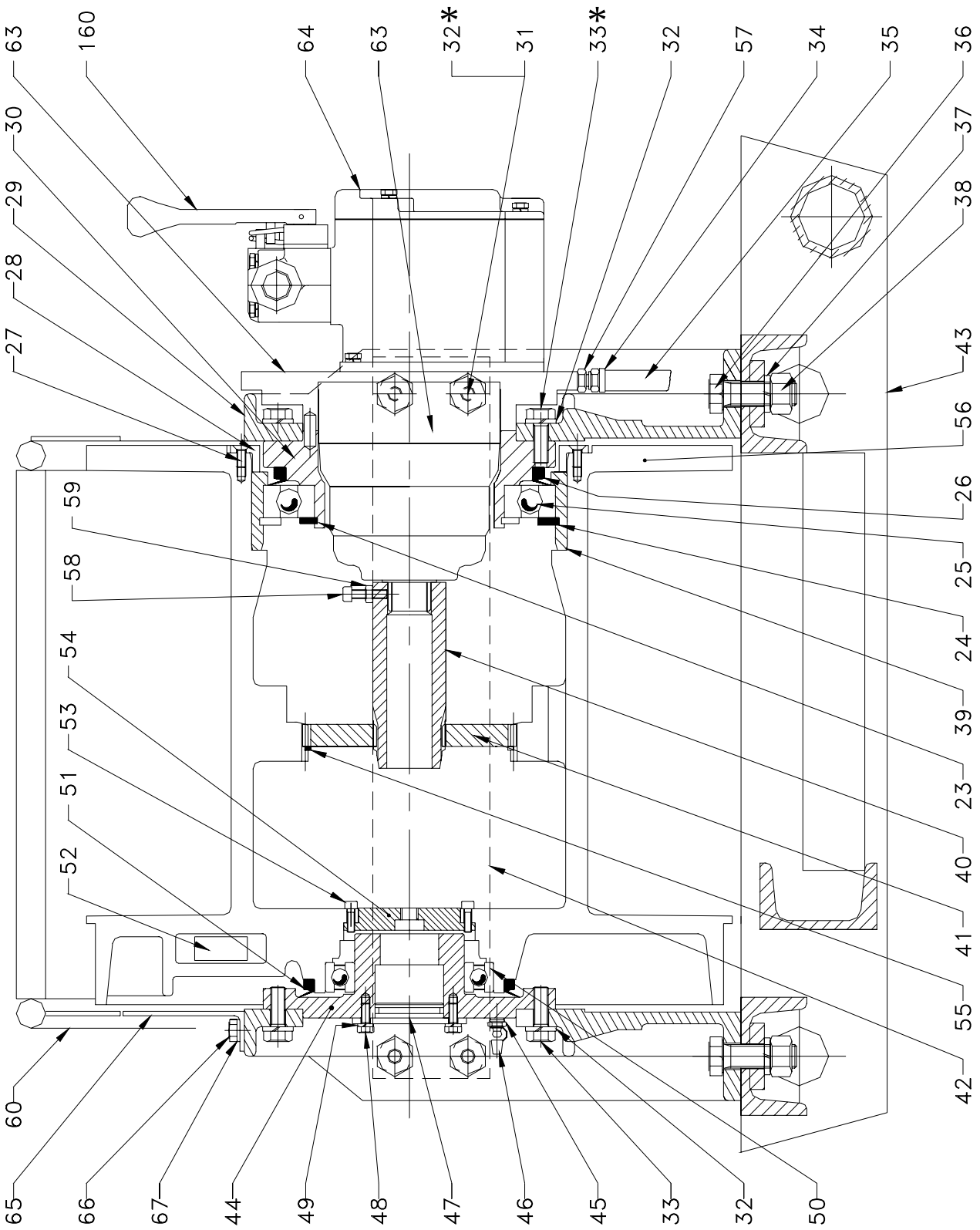


(Dwg. D6150101)

ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
	Brake Band Cylinder Ass'y		76158104
• 12	Joint	1	58016730
13	Screw	4	41322506
14	Lockwasher	4	45201006
16	Muffler	1	68489232
17	Ring	1	96150273
18	Jack Casing	1	96150271
19	Piston	1	96157270
20	Spring	1	69198132
• 21	Joint	1	58226129
22	Cylinder Bottom	1	96150269

• Recommended Spares Parts

WINCH ASSEMBLY DRAWING



(Dwg. D6150120)

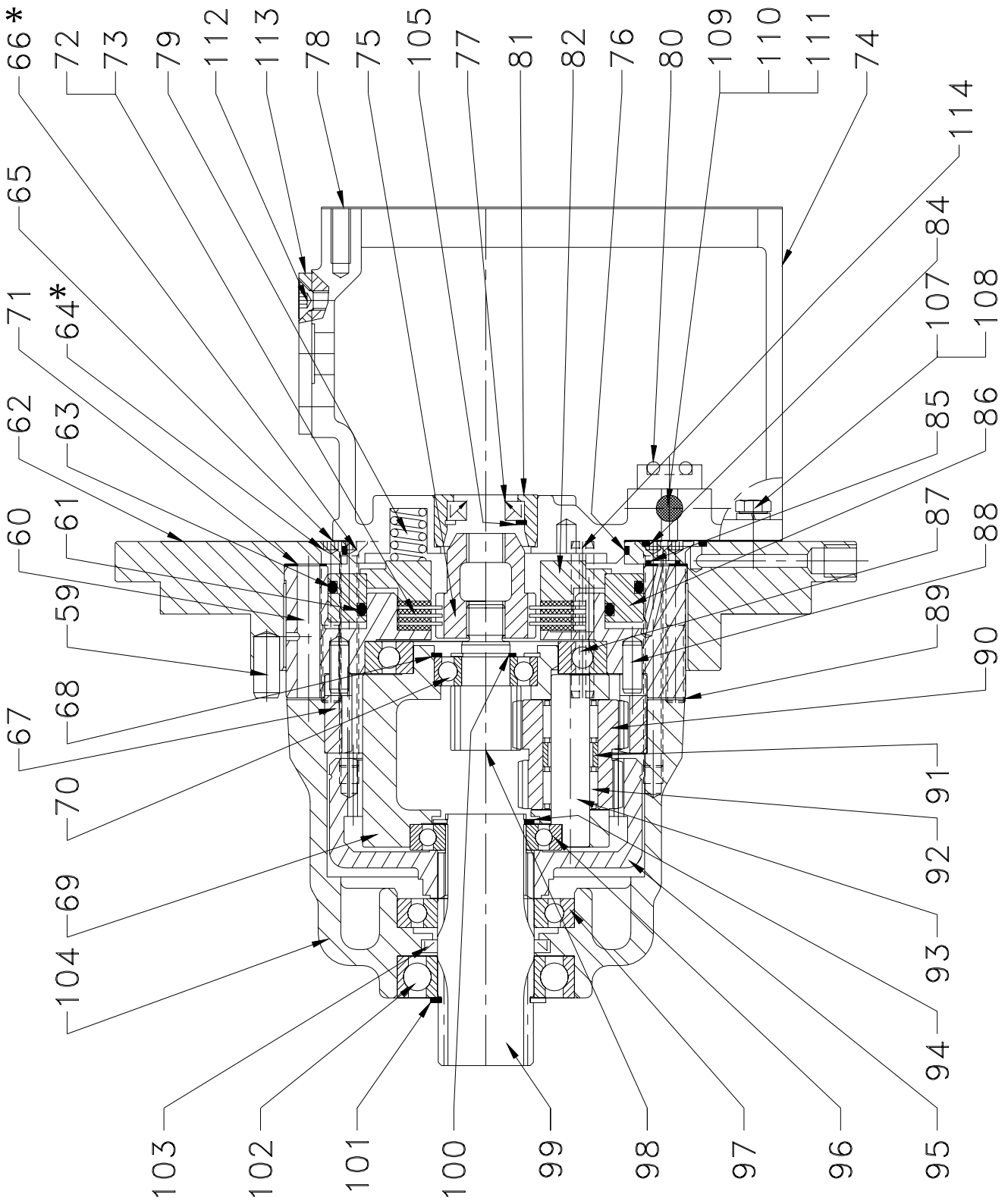
* This screws will have to be tightened to torque 4.83 mkg

WINCH ASSEMBLY PARTS LIST

ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
23	Retainer Ring	1	47700130
24	Retainer Ring	1	47703200
25	Bearing	1	50800026
• 26	Joint	1	58405831
27	Screw	6	41104503
28	Stop	1	96150051
29	Flange	2	96157002
30	Front Bearing	1	96157246
31	Screw	8	41020801
32	Lockwasher	23	45201010
33	Screw	15	41020401
34	Fitting	1	51029
35	External brake hose	0.67m	50923
36	Screw	4	41022601
37	Lockwasher	4	45201016
38	Nut	4	43007911
39	Ring	1	96150247
40	Pinion	1	96157248
41	Ring Gear	1	96150249
42	Spacer	2	96150591
43	Skid Frame	1	96158354
44	Rear Bearing	1	96158049
45	Greaser	1	67301727
46	Plug	1	61017128
47*	Blind Washer	1	96190013
48*	Screw	3	41020301
49*	Lockwasher	3	45201006
50	Bearing	1	50050015
• 51	Joint	1	58404831
52	Wedge	1	96150117
53	Screw	4	41308706
54	Washer	1	96150147
55	Retainer Ring	1	47847832
56	Standard Drum	1	96157001
	Grooved Drum (for a rope of 10 mm).	1	96157511
57	Fitting	1	68237528
58	Nut	1	43006211
59	Screw	1	41312206
60	Drum Guard **(Used on winches with serial number up to 02-06-01)**	1	96150201
	Drum Guard		**See page no. 55**
63	Brake Gear ass'y	1	-
64	Air Gear Motor for Lever Control	1	76180084
	Air Gear Motor for Pendant Control		76150103
	Protector **(Used on winches with serial number up to 02-06-01)**	1	96150569
65	Protector	1	96150635
66	Screw	2	41020501
67	Washer	2	45001008
	Lever Control Valve	1	76180112
160	Lever Control Valve (Winch with vertical rope entry)	1	76150317

•	Recommended Spares Parts
*	No required for Winch with Limits Switches

BRAKE GEAR ASSEMBLY DRAWING



(Dwg. D6180035)

* Secured with Loctite®243 this screws will have to be tightened to torque 15 Nm

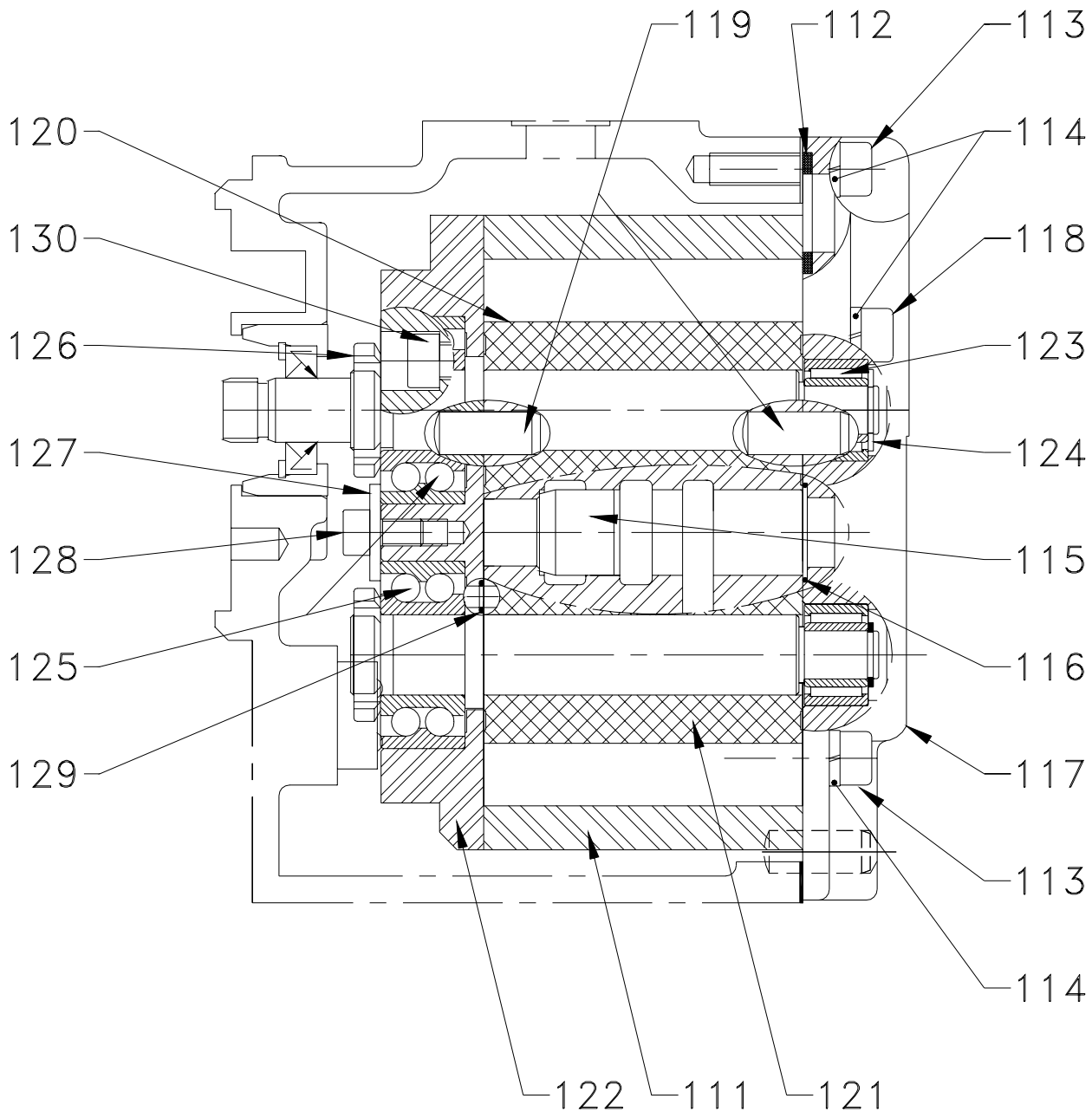
BRAKE GEAR ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
59	Pin	2	46000416
60	Bearing	1	96180124
• 61	'O' Ring	1	58235129
62	Flange	1	96150296
• 63	'O' Ring	1	58235229
64	Screw	4	41103903
• 65	Paper Joint	1	96180065
66	Screw	4	41103703
67	Ring Gear	1	96090038
68	Retainer Ring	1	47703032
69	Planetary Support	1	96180041
70	Bearing	1	50000002
• 71	Paper Joint	1	96180127
• 72	Steel Disc	3	63028341
• 73	Friction Disc	4	63028241
74	Motor Housing	1	96180015
75	Coupling Sleeve	1	96180155
• 76	'O' Ring	1	58236929
• 77	Oil Seal	1	58021530
• 78	Paper Joint	1	96180066
79	Spring	4	69165532
• 80	'O'Ring	2	58224929
81	Hoop for Tightness	1	96180150
82	Washer	1	96180154
• 84	'O'Ring	1	58218129
• 85	'O'Ring	1	58212529
86	Cylinder Piston	1	96180126

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
87	Bearing	1	50800009
88	Pin	2	46001116
• 89	Paper Joint	1	96180042
90	Planet Gear	3	96180045
91	Spacer	3	96090026
92	Bearing	6	56501713
93	Planet Axle	3	96090039
94	Retainer Ring	1	47802139
95	Ring Gear	1	96180044
96	earing	1	50800005
97	Bearing	1	50800006
98	Shaft Spindle	1	96187093
99	Output Shaft	1	96187061
100	Retainer Ring	1	47700015
101	Retainer Ring	1	47700029
102	Bearing	1	50050006
• 103	Oil Seal	1	58017530
104	Gear housing	1	96180005
105	Retainer Ring	1	47703024
107	Screw	4	41020301
108	Lockwasher	4	45201006
109	Shuttle Valve Stop	1	96090223
110	Ball	1	69401625
• 111	'O' Ring	1	58212229
112	Screw *	4	41103603
113	Cover *	1	96180036
114	Pin	2	46508420

•	Recommended Spares Parts
*	No required for lever Control

MOTOR FOR LEVER CONTROL ASSEMBLY DRAWING AND PARTS LIST



(Dwg. D6150092)

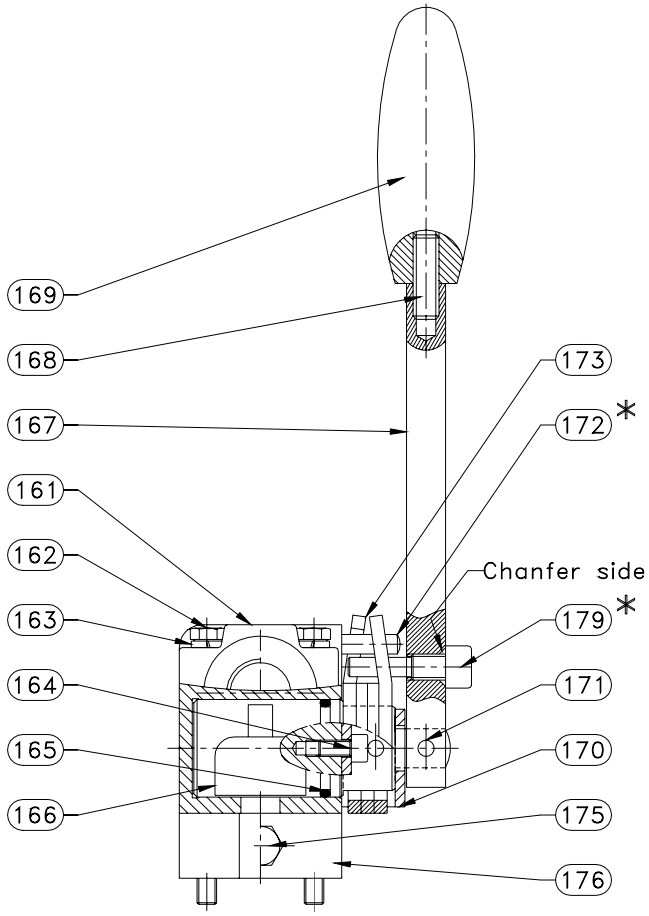
ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
	Air Gear Motor ass'y	-	76180084
111	Motor Housing	1	96180144
• 112	Gasket	1	96180030
113	Screw	3	41322206
114	Lockwasher	5	45201006
115	Stopper	1	96180037
• 116	'O'Ring	2	58220929
117	Motor Cover	1	96180115
118	Screw	2	41312206
119	Pin	6	46000416
120	Drive Gear	1	94240319

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
121	Idle Gear	1	96090030
122	Motor Flange	1	96090008
123	Needle Bearing	2	56461912
• 124	Shaft segment	2	47801339
125	Bearing	2	50600002
126	Locknut	2	57000002
127	Washer	1	96090032
128	Screw	1	41326306
• 129	'O'Ring	2	58222329
130	Screw	4	41331306

• Recommended Spares Parts

LEVER CONTROL VALVE ASSEMBLY DRAWING AND PARTS LIST

Valid for winches with serial number from : 02-06-01 (Year-Month-Chornological Nbr)



*** Secure with Loctite Blocpresse® 601**

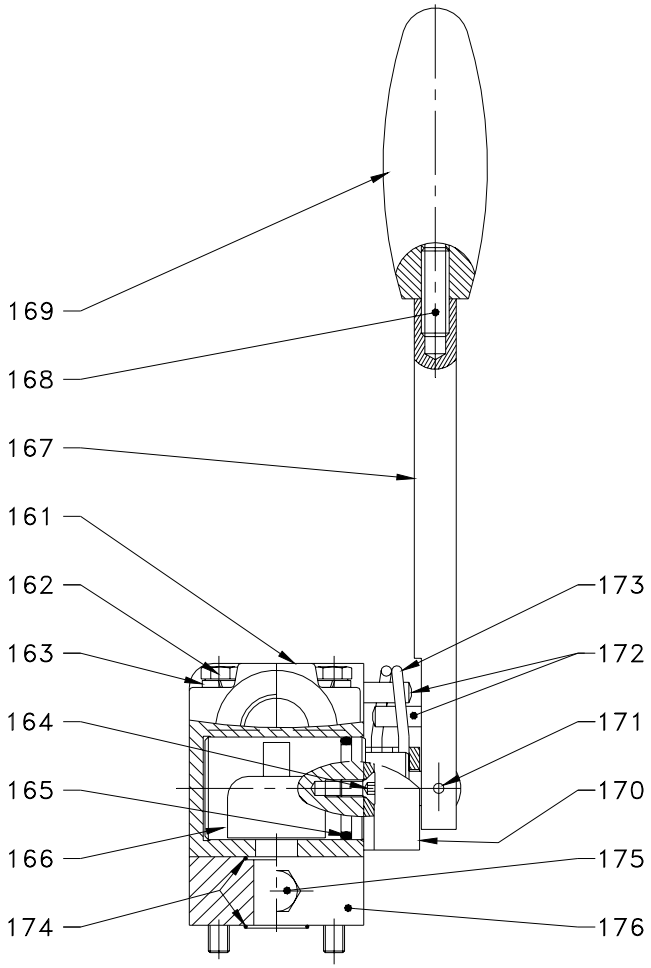
(Dwg. D6150134)

ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
160	Lever Control Valve ass'y (Horizontal rope entry) Lever Control Valve ass'y (Vertical rope entry)		76150582 76150583
161	Valve body (Horizontal rope entry) Valve body (Vertical rope entry)	1	96180213 96180217
162	Screw	4	41021301
163	Lockwasher	4	45201006
164	Screw	2	41326306
• 165	'O'Ring	1	58217629
166	Rotary valve (Horizontal rope entry) Rotary valve (Vertical rope entry)	1	96180212 96180216
167	Control Lever	1	96180211
168	Setscrew	1	42004607
169	Handle	1	57426232
170	Stop	1	96180214
171	Pin	1	46505220
172	Pin	1	46001616
173	Spring	1	92640010
175	Plug	2	65164532
176	Adaptation Plate	1	96180074
179	Screw	1	96150625

• Recommended Spares Parts

OLD LEVER CONTROL VALVE ASSEMBLY DRAWING AND PARTS LIST

(Dwg. D6150006)

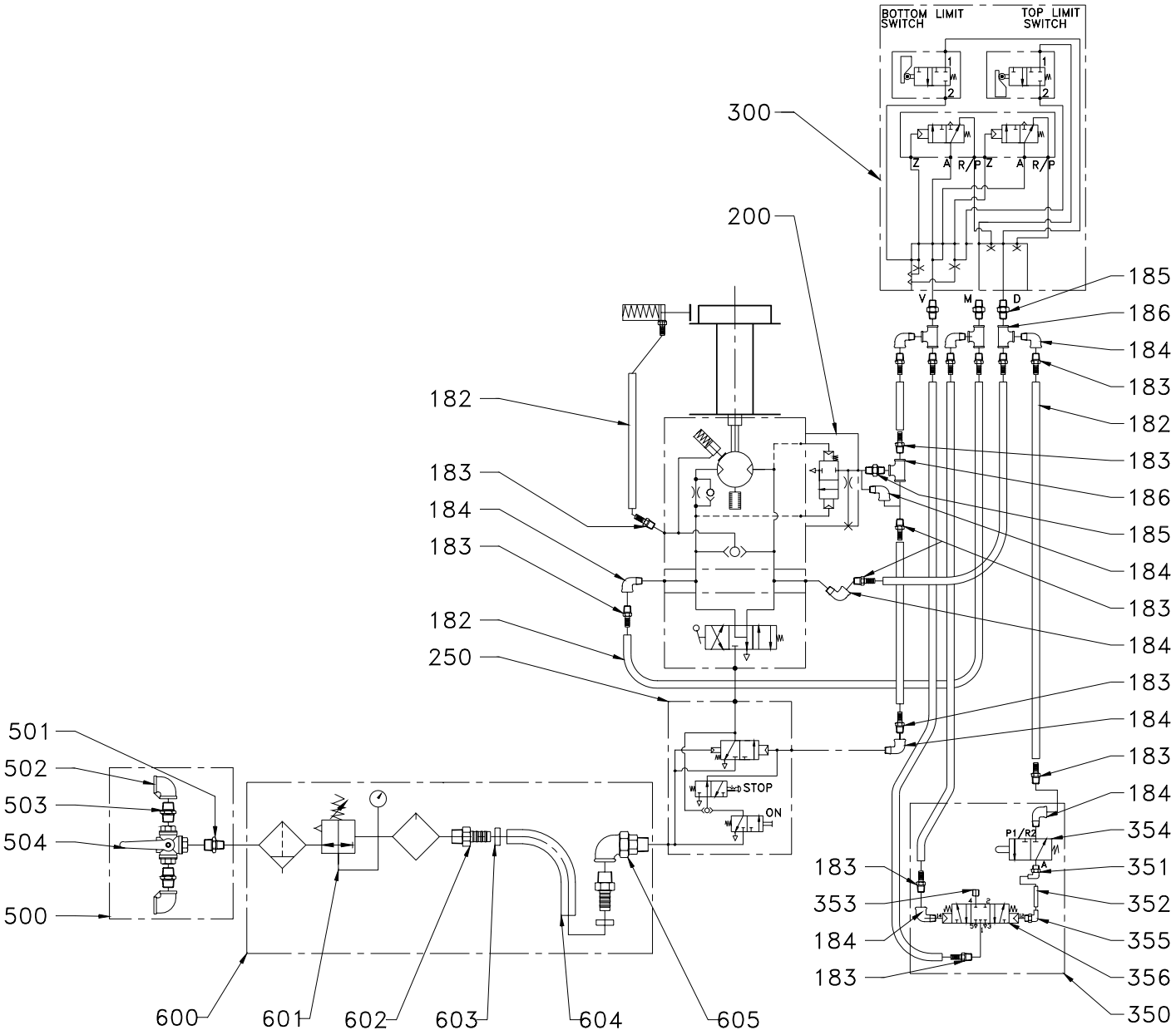


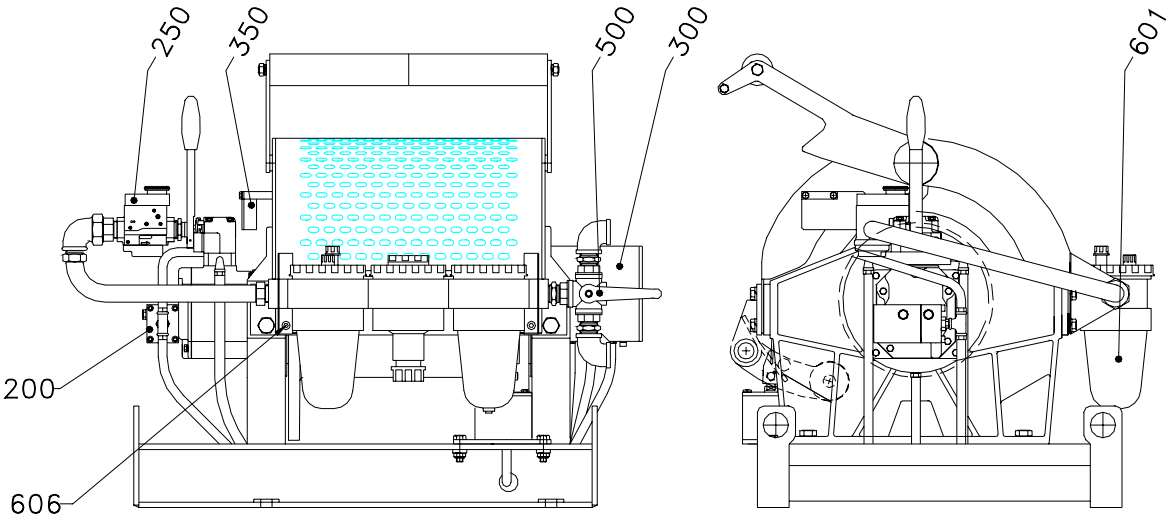
ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
160	Lever Control Valve ass'y (Horizontal rope entry) Lever Control Valve ass'y (Vertical rope entry)		76180112 76150317
161	Valve body (Horizontal rope entry) Valve body (Vertical rope entry)	1	96180145 96180032
162	Screw	4	41021301
163	Lockwasher	4	45201006
164	Screw	2	41105103
• 165	'O'Ring	1	58217629
166	Rotary valve (Horizontal rope entry) Rotary valve (Vertical rope entry)	1	96180146 96180174
167	Control Lever	1	96180147
168	Setscrew	1	42004607
169	Handle	1	57426232
170	Stop	1	96180034
171	Pin	2	46507220
172	Pin	2	46001216
173	Spring	1	96180035
• 174	'O'Ring	6	58220929
175	Plug	2	65164532
176	Adaptation Plate	1	96180074

• Recommended Spares Parts

AIR POWERED ACCESSORIES FOR LEVER CONTROL DRAWING

(Dwg. D6150067)





AIR POWERED ACCESSORIES FOR LEVER CONTROL PARTS LIST

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
182	Hose	m	50923
183	Fitting 1/8	4	51029 + 68237528
184	Elbow 1/8	2	68280132
200	Torque Limiter (incl's item 181 through 184)	1	76360007
250	Emergency Stop Valve Ass'y	1	76170017

Winches with limit switches

Add the following parts on winch.

300	Limit Switches	1	76150087
182	Hose	m	50923
183	Fitting 1/8	6	51029 + 68237528
184	Elbow 1/8	2	68280132
185	Nipple 1/8	1	61385232
186	Tee 1/8	1	61394532

Winches with Slack Wire System

Add the following parts on winch.

350	Slack Wire System	1	36150532
182	Hose	m	50923
183	Fitting 1/8	4	51029 + 68237528
184	Elbow 1/8	2	68280132
185	Nipple 1/8	2	61385232
186	Tee 1/8	2	61394532
351	Elbow	2	58253824
352	Hose dia.4	0.1m	68094832
353	Plug	1	65107741
354	Valve Control	1	68552732
356	Valve Control	1	68528141

Winches with Emergency Lowering 3 Ways

Add the following parts on winch.

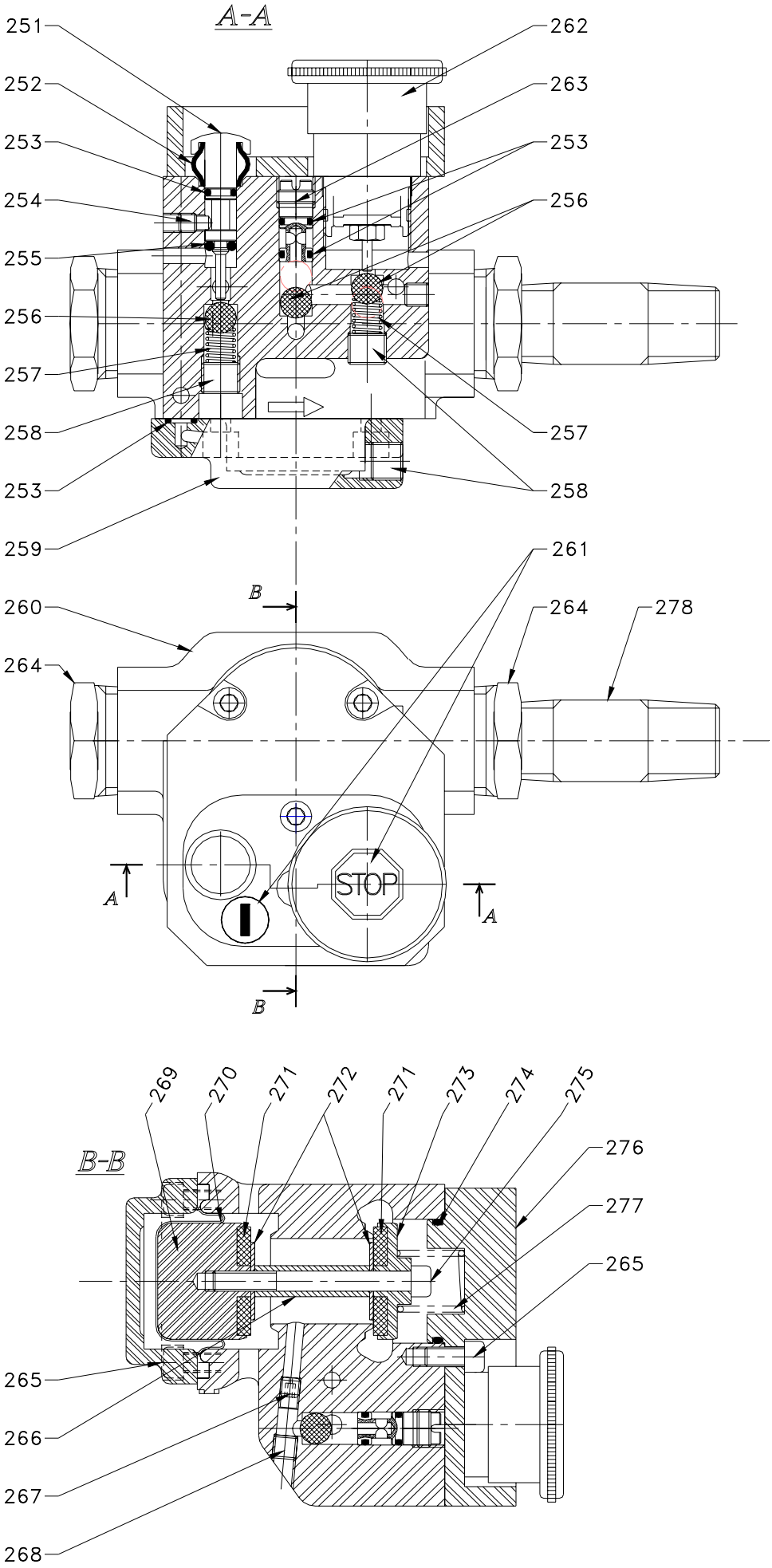
500	Emergency Lowreing	1	76150332
501	Nipple ½-3/4	1	61331032
502	Elbow 3/4	2	68133241
503	Nipple 3/4	2	61333141
504	Ball Valve	1	61633041

Winches with F-R-L Block

Add the following parts on winch.

600	F-R-L assembly	1	36150521
601	F-R-L Block	1	67730941
602	Fitting dia.3/4	2	61645232
603	Clamp Fitting	2	61154341
604	Hose dia.19	m	16810656
605	Elbow	1	68144632
606	Screw	2	41019201

EMERGENCY STOP VALVE ASSEMBLY DRAWING



(Dwg .D6170011

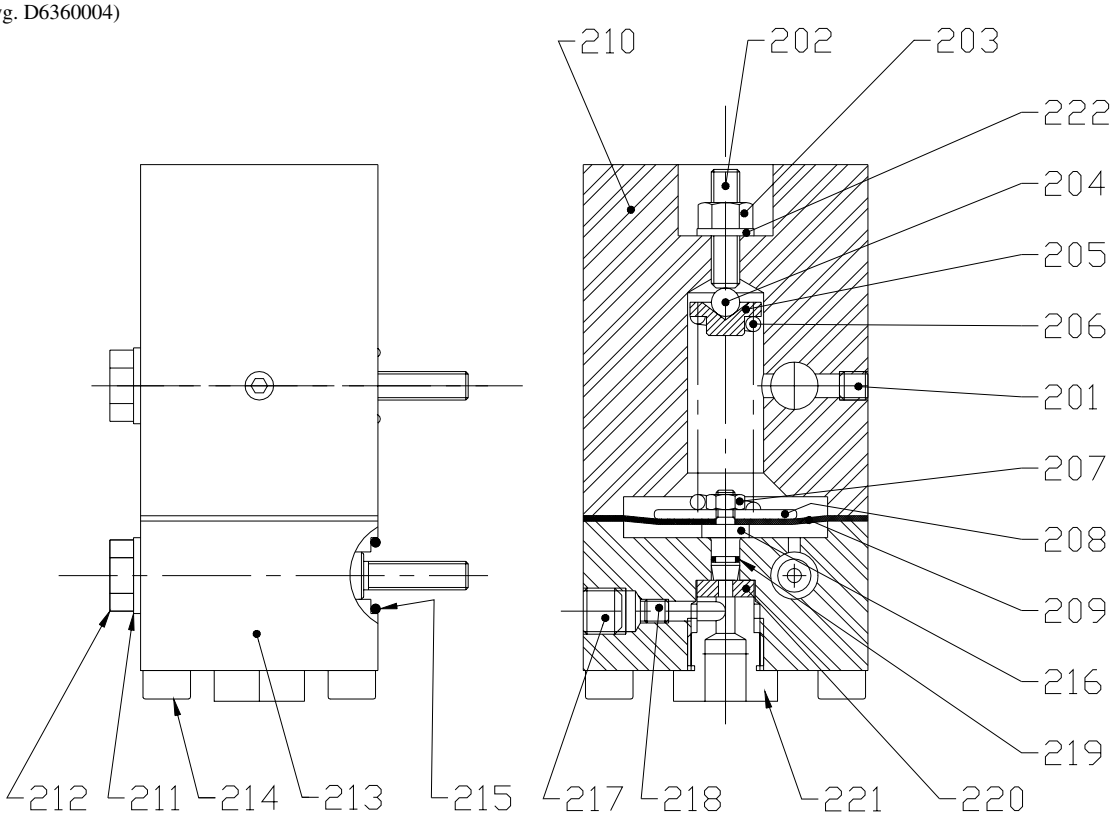
EMERGENCY STOP VALVE ASSEMBLY PARTS LIST

ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
250	Emergency stop Valve Ass'y (incl's item 251 through 278)		76170017
251	Spool	1	95790104
252	Protector	1	95790107
• 253	'O' Ring	4	58209229
254	Setscrew	1	42008307
• 255	'O' Ring	1	58235329
256	Ball	3	69401625
257	Spring	2	69128541
258	Plug	3	65107741
259	Cover	1	96170052
260	Body	1	96170098
261	Label Kit	1	95790111
262	Emergency Stop Button	1	95790108
263	Shuttle Valve Stop	1	95790106
264	Reducing Nipple	2	61344432
265	Screw	7	41326306
266	Spacer	1	96170055
267	Nozzle	1	96170071
268	Setscrew	1	42007807
269	Valve Cone	1	96170054
• 270	Diaphragm	1	67716341
271	Joint	2	96170056
272	Washer	2	45700005
273	Valve Cone	1	96170053
• 274	'O' Ring	1	58214829
275	Screw	1	41326106
276	Cover	1	96170099
277	Spring	1	69158732
278	Nipple	1	61330241

• Recommended Spares Parts

TORQUE LIMITER ASSEMBLY DRAWING AND PARTS LIST

(Dwg. D6360004)

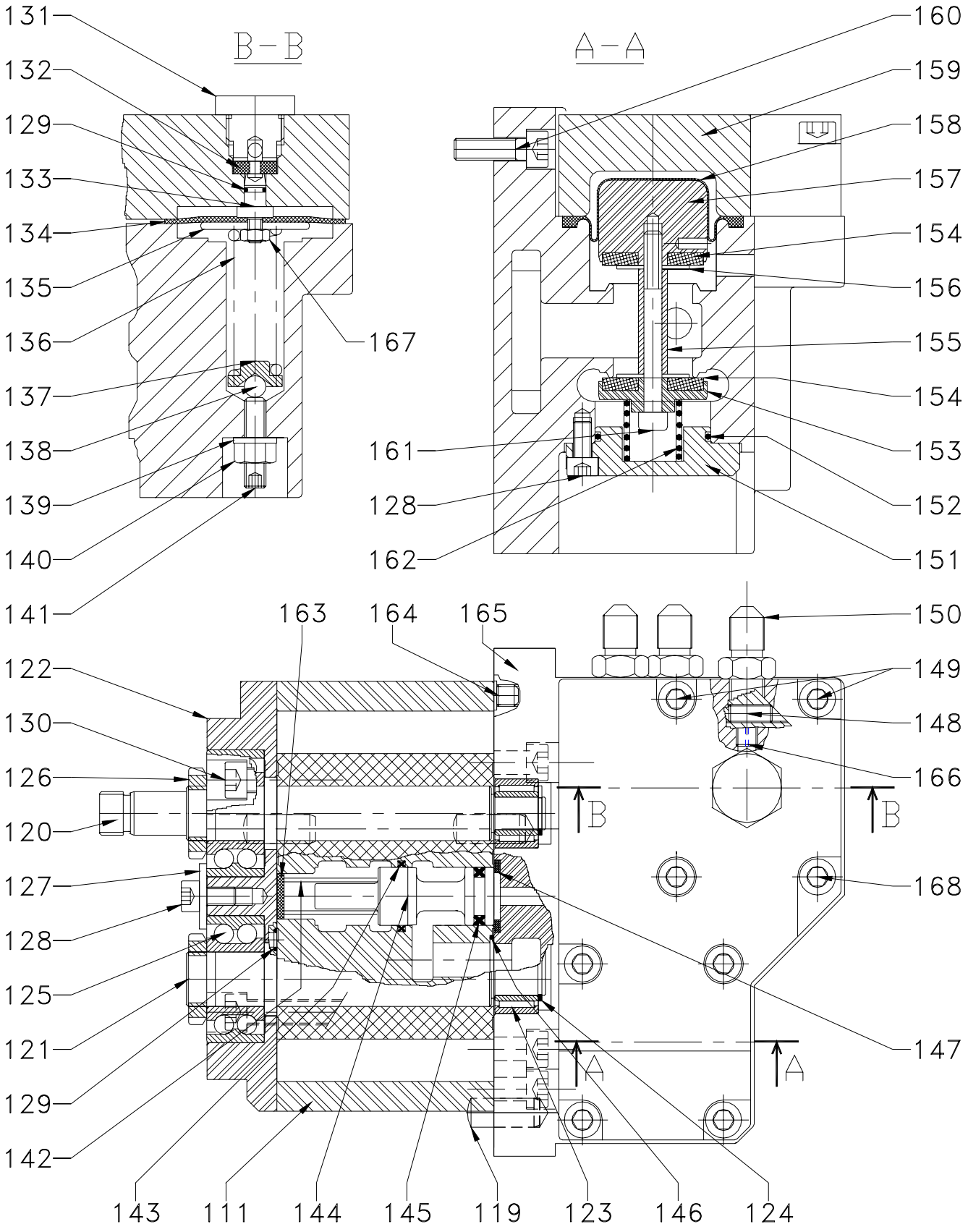


ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
200	Torque limiter ass'y (incl's item 201 through 221)	-	76360007
201	Screw	1	42007807
202	Screw	1	42007107
203	locknut	1	43707611
204	Ball	1	69400125
205	Spring Receiver	1	96360023
206	Spring	1	69159432
207	Nut	1	43001111
208	Washer	1	96360019
• 209	Diaphragm	1	96360020
210	Cover	1	96360015
• 211	Usit-ring	2	58409731
212	Screw	2	96360028
213	Body	1	96360016
214	Screw	4	41327406
• 215	'O'ring	2	58210729
216	Valve Cone	1	96360017
217	Plug	1	65107741
218	Nozzle	1	96170071
• 219	'O'ring	1	58222329
220	Seal Washer	1	96360021
221	Screw	1	96360018
• 212	Usit-Ring	1	58404531

• Recommended Spares Parts

MOTOR FOR PENDANT CONTROL ASSEMBLY DRAWING

Motor with Overload and Emergency Stop



(Dwg. D6150093)

MOTOR FOR LEVER CONTROL ASSEMBLY PARTS LIST

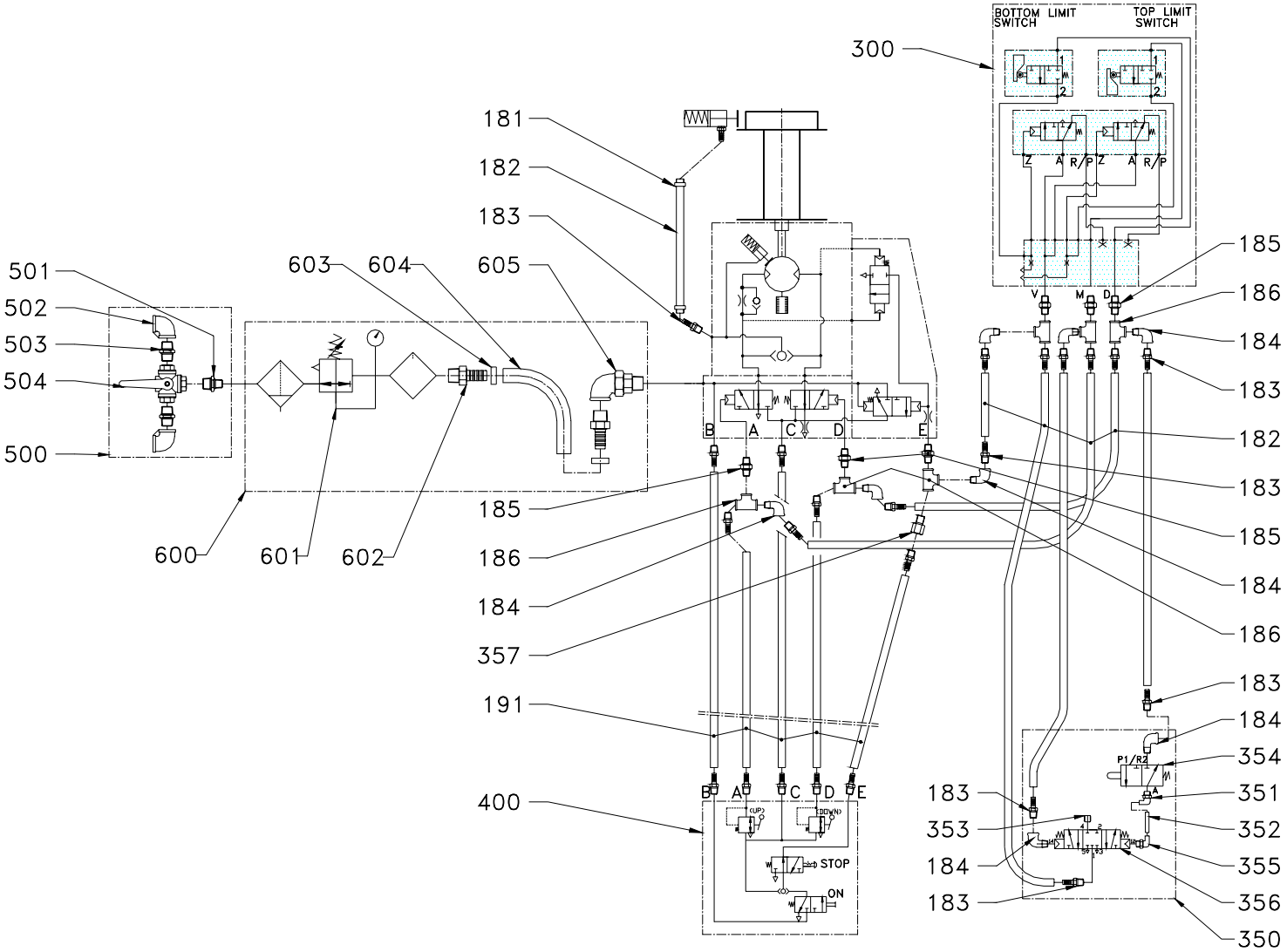
ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
	Air Gear Motor Ass'y		76150103
111	Motor Housing	1	96090007
119	Pin	6	58205029
120	Drive Gear	1	94240319
121	Idle Gear	1	5632-3225
122	Motor Flange	1	96090008
123	Needle Bearing	2	56461912
124	Retainer ring	2	47801339
125	Bearing	2	50600002
126	Locknut	2	57000002
127	Washer	1	96090032
128	Screw	4	41326306
• 129	'O' ring	3	58222329
130	Screw	4	41331306
131	Plug	1	96090269
132	Seal Washer	1	96360021
133	Valve Cone	1	96360017
• 134	Diaphragm	1	96360020
135	Washer	1	96360019
136	Spring	1	69159432
137	Spring Receiver	1	96360023
138	Ball	1	69400125
• 139	Usit Ring	1	58404531
140	Locknut	1	43707611
141	Screw	1	42007107
142	Spring	2	94240224

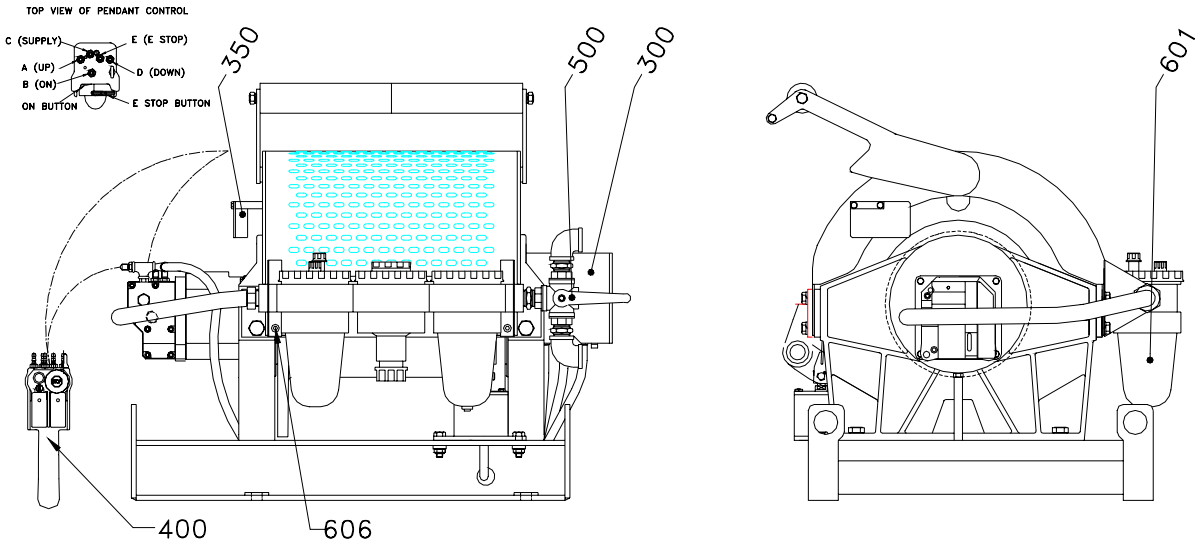
ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
• 143	Quag ring	2	58231229
144	Slide Valve	2	94240212
• 145	Quad Ring	2	58228929
• 146	'O' Ring	2	58205029
147	Stop	2	96090042
148	Screw	1	42008307
149	Screw	4	41322306
150	Fitting	5	68237528
151	Cover	1	96170081
• 152	'O' Ring	1	58214829
153	Valve Cone	1	96170053
154	Seal Washer	2	96170056
155	Spacer	1	96170055
156	Washer	2	45700005
157	Valve Cone	1	96170054
• 158	Diaphragm	1	67716341
159	Cover	1	94240312
160	Screw	4	41322206
161	Screw	1	41308206
162	Spring	1	69158732
163	Rear Stop	2	94120030
164	Screw	2	42007807
165	Motor Cover	1	94240320
166	Nozzle	1	96170071
167	Nut	1	43001111
168	Screw	2	41321406

• Recommended Spares Parts

AIR POWERED ACCESSORIES FOR PENDANT CONTROL DRAWING

(Dwg. D6150075)





AIR POWERED ACCESSORIES FOR PENDANT CONTROL PARTS LIST

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
182	Hose	m	50923
183	Fitting 1/8	12	51029 + 68237528
400	Pendant Control	1	75790093
191	Meter of Control Hose	m	35250003

Winches with limit switches

Add the following parts on winch.

300	Limit Switches	1	76150087
182	Hose	m	50923
183	Fitting 1/8	6	51029 + 68237528
184	Elbow 1/8	3	68280132
185	Nipple 1/8	3	61385232
186	Tee 1/8	3	61394532

Winches with Slack Wire System

Add the following parts on winch.

350	Slack Wire System	1	36150532
182	Hose	m	50923
183	Fitting 1/8	4	51029 + 68237528
184	Elbow 1/8	2	68280132
185	Nipple 1/8	2	61385232
186	Tee 1/8	2	61394532
351	Elbow	2	58253824
352	Hose dia.4	0.1m	68094832
353	Plug	1	65107741
354	Valve Control	1	68552732
356	Valve Control	1	68528141
357	Nozzle	1	96150265

Winches with Emergency Lowering 3 Ways

Add the following parts on winch.

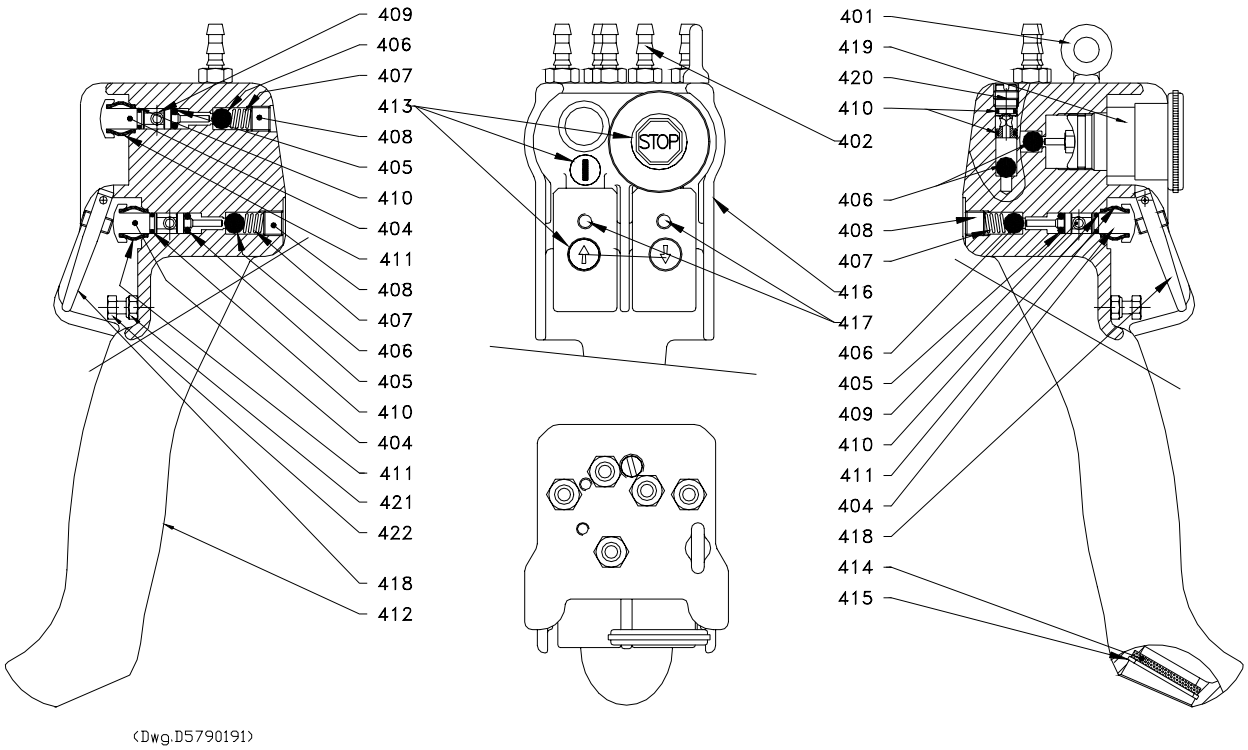
500	Emergency Lowreing	1	76150332
501	Nipple ½-3/4	1	61331032
502	Elbow 3/4	2	68133241
503	Nipple 3/4	2	61333141
504	Ball Valve	1	61633041

Winches with F-R-L Block

Add the following parts on winch.

600	F-R-L assembly	1	36150521
601	F-R-L Block	1	67730941
602	Fitting dia.3/4	2	61645232
603	Clamp Fitting	2	61154341
604	Hose dia.19	m	16810656
605	Elbow	1	68144632
606	Screw	2	41019201

TWO LEVER PENDANT ASSEMBLY DRAWING AND PARTS LIST

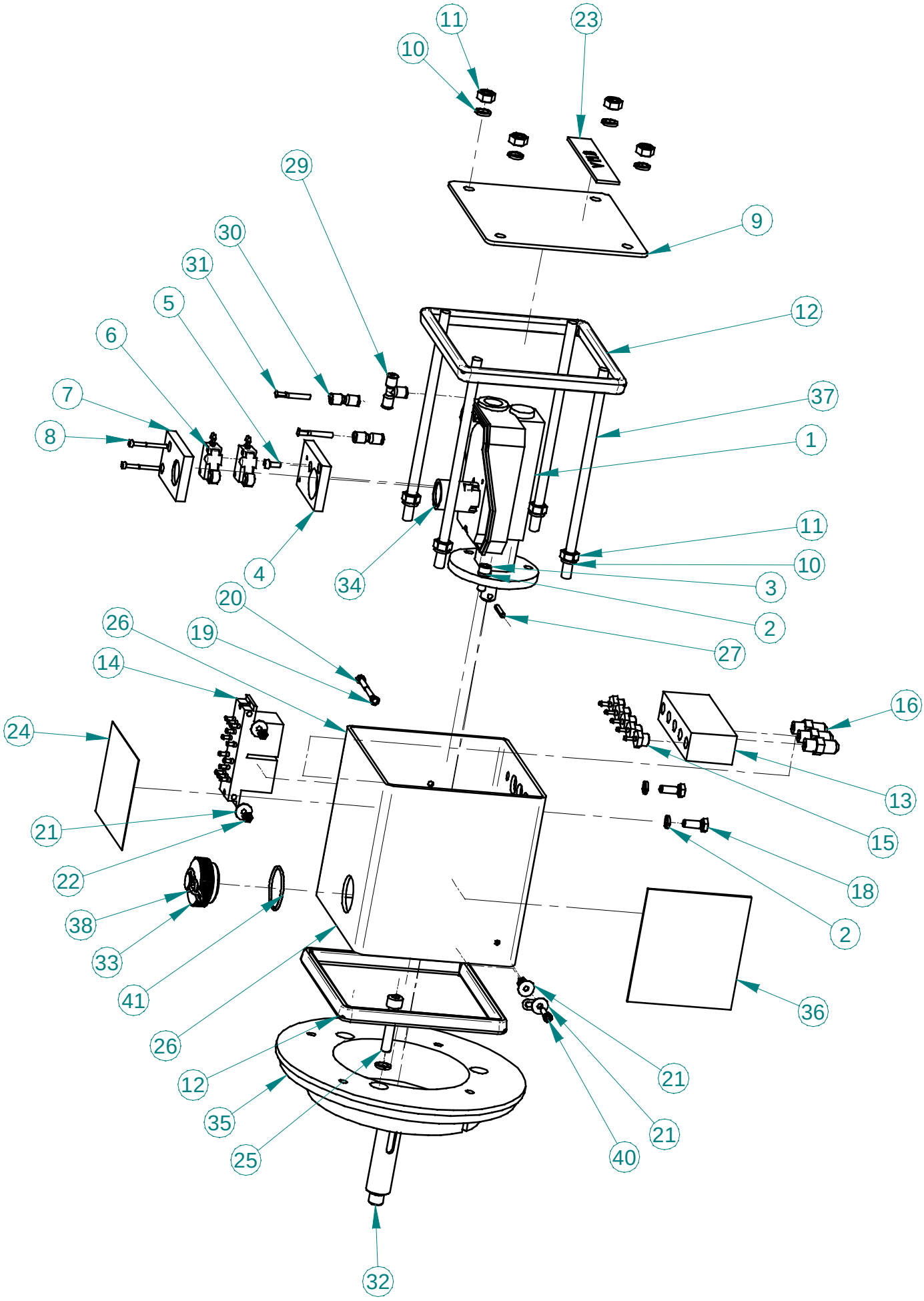


ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
	Pendant ass'y (incl's item 401 throught 420)		75790177
401	Lifting Eye	1	6422-2332
402	Fitting	5	51029 + 68237528
404	Valve	3	95790104
• 405	'O'Ring	3	58235329
• 406	Ball	5	69401625
407	Spring	4	69128541
408	Plug	4	65107741
409	Screw	3	42008307
• 410	'O'Ring	5	58209229
411	Protector	3	95790107
412	Pendant Body	1	95790179
413	Label Kit	1	95790111
414	Exaust washer	1	67600303
415	Retainer Ring	1	47713030
416	Pin	1	95790040
417	Screw	2	42006207
418	Lever	2	95790122
419	Emergency Stop Button	1	95790108
420	Plug	1	95790106
421	Screw	2	41019401
422	Plug	2	43705011

• Recommended Spares Parts

LIMIT SWITCHES AS SEMBLY DRAWING

Valid for winches with serial number from : 03-06-46 (Year-Month-Chornological Nbr)

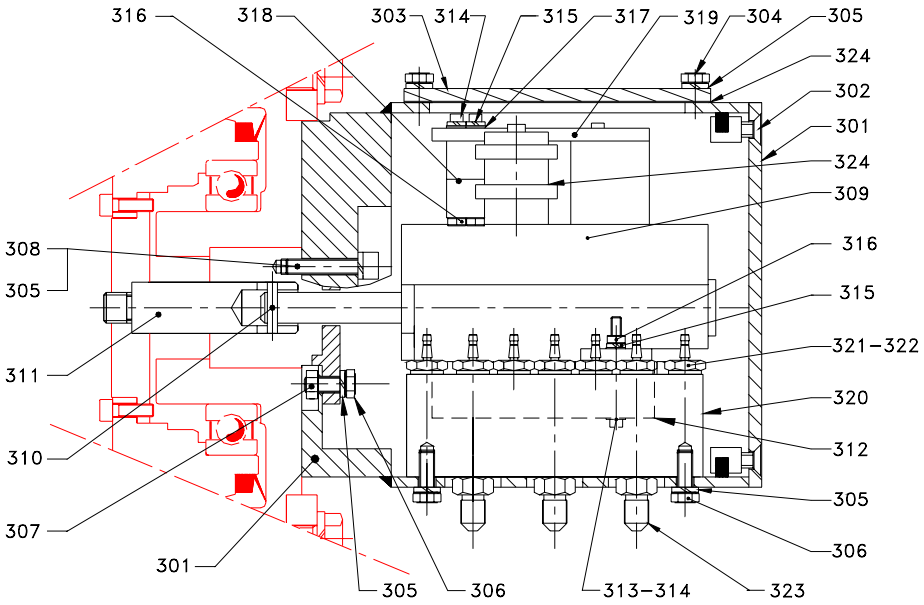


LIMIT SWITCHES A SSEMBLY PARTS LIST

LIMIT SWITCH ASSEMBLY PN 76150564 INCLUDED :

ITEM N°	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
1	Limit switch reducer	1	95060150
2	Washer	6	45201006
3	Screw	4	41322606
4	Control valve support (down)	1	96150555
5*	Screw	2	41313606
6	Control Valve	2	68558741
7	Control valve support (up)	1	96150556
8	Screw	2	41332006
9	Cover	1	96150566
10	Lockwasher	11	45201008
11	Nut	8	43003511
12	Seal	2	69761541
13	Connection bloc	1	96150558
14	Control Valve	1	68523441
15	Fitting	5	61694932
16	Fitting	3	68237528
17*	Chain	1	69033232
18	Screw	2	41020301
19	Washer	2	45201004
20	Screw	2	41331406
21	Washer	4	45001104
22	Nut	3	43001111
23	Label V.M.D	1	96150427
24	Label (adjustment procedure)	1	96150462
25	Screw	3	41326706
26	Casing	1	96150553
27	Pin	1	46503420
29	Tee Hose Union	1	58255860
30	Hose union	2	58257163
31	Plug	2	61045628
32	Connecting shaft	1	96150258
33	Plug	1	96150662
34	Cam assembly	1	96150561
35	Flange	1	96150557
36	Label (caution)	1	96150477
37	Threaded rod	4	96150670
38	Chain grip	1	94120206
40	Screw	1	41311906
41	"O" ring	1	58237529

OLD LIMIT SWITCHES ASSEMBLY DRAWING AND PARTS LIST



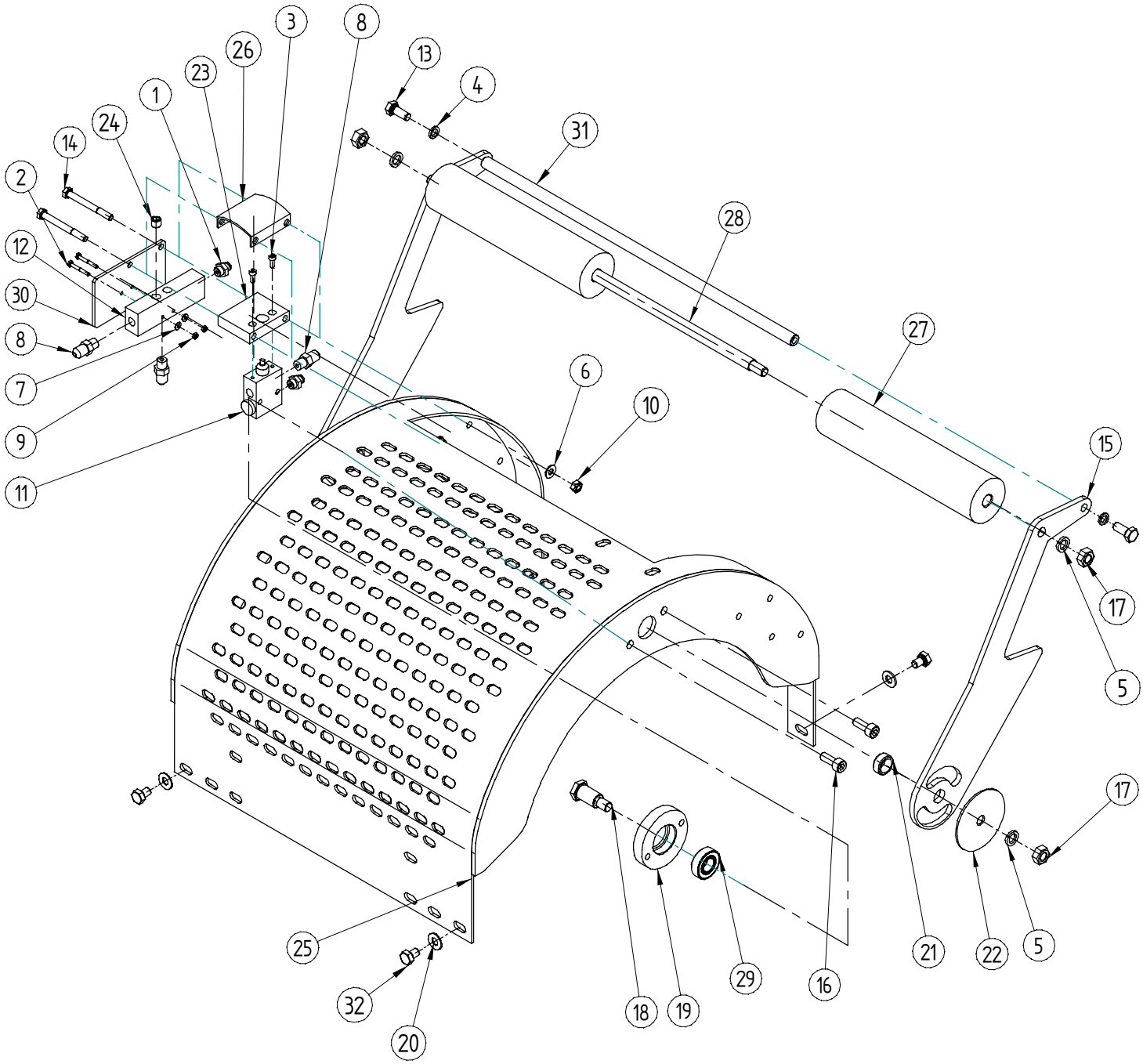
(Dwg. D6150121)

ITEM NO	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
300	Limit Switches Kit ass'y (incl's item 301 througth 323)	1	76150087
301	Box with cover (incl's item 302)	1	9615-0254
302	Screw	4	4110-4503
303	Cover plate	1	9615-0261
304	Screw	4	4101-9301
305	Split Washer	11	4520-1006
306	Screw	5	4132-2606
307	Nut	3	4300-6211
308	Screw	2	4132-2306
309	Limit switch (reducer)	1	9506-0150
310	Pin	1	4650-3420
311	Connecting Axle	1	9615-0258
312	Control Valve	1	6852-3441
313	Flat Washer	2	4500-1105
314	Screw	3	4133-1406
315	Split Washer	3	4520-1004
316	Nut	3	4300-1111
317	Flat Washer	4	4500-1104
318	Control Valve	2	6852-3641
319	Control Valve Support	1	9615-0255
320	Connection Bloc	1	9615-0256
321	Fitting	10	6169-4932
322	Hose	1m	6809-4832
323	Fitting	3	68237528
324	Cam assembly	1	96150561
• 219	Paper Joint	1	96150431
*	Label V M D	1	96150427

•	Recommended Spares Parts
*	Not Illustrated

SLACK WIRE SYSTEM WITH DRUM GUARD ASSEMBLY DRAWING

Valid for winches with serial number from : 02-06-01(Year-Month-Chornological Nbr)



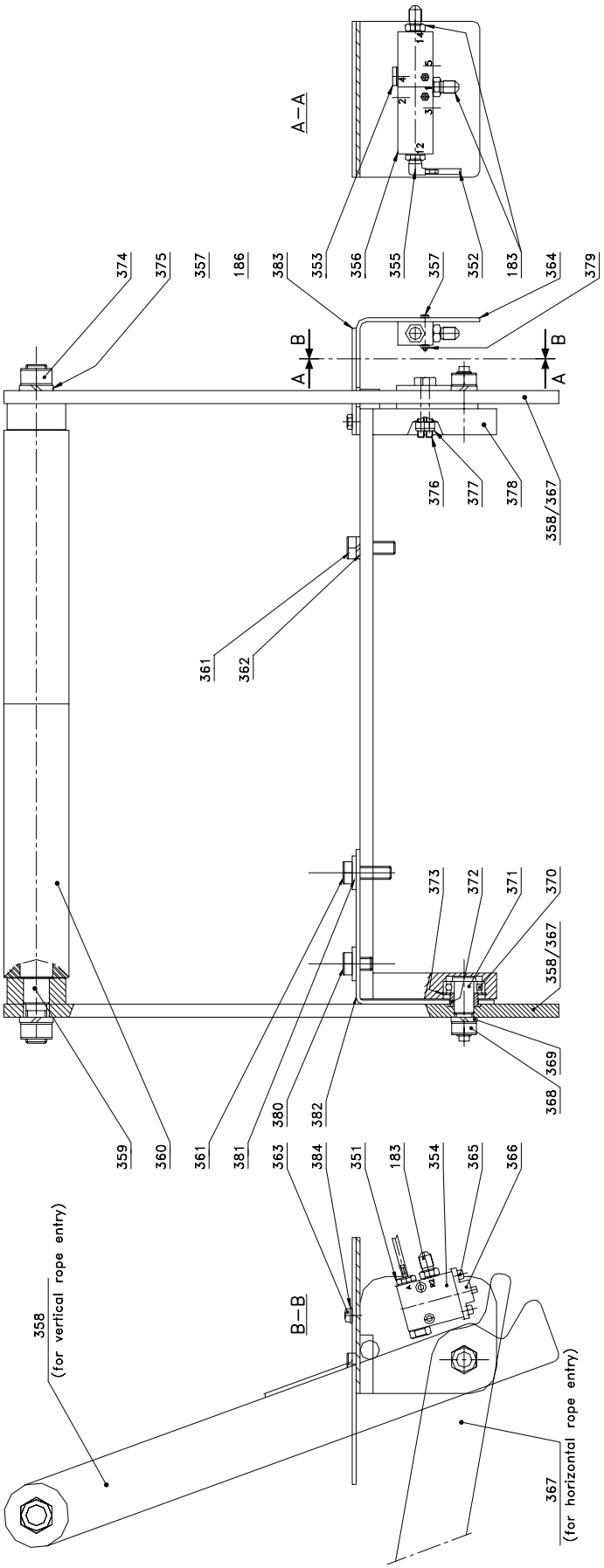
(36150532D)

SLACK WIRE SYSTEM WITH DRUM GUARD ASSEMBLY PARTS LIST

ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
	Slack Wire System with drum guard ass'y		76150532
1	Fitting	2	68246128
2	Screw	2	41019101
3	Screw	2	41313606
4	Lockwasher	2	45201008
5	Lockwasher	4	45201010
6	Washer	2	45000106
7	Washer	2	45000003
8	Fitting	3	03990298
9	Nut	2	43005611
10	Locknut	2	43707611
11	Valve Control	1	68528141
12	Valve Control	1	68528141
13	Screw	2	41020501
14	Screw	2	41021101
15	Lever	2	96150505
16	Screw	4	41321806
17	Nut	4	43006911
18	Axle	2	96150588
19	Bearing	2	96150613
20	Washer	4	45001108
21	Spacer	2	96150615
22	Washer	2	96150612
23	Valve Support	1	96150589
24	Plug	1	65107741
25	Drum Guard	1	96150509
26	Rubber Protector	1	96150629
27	Roller	2	96150504
28	Roller Axle	1	96150503
29	Bearing	2	50050002
30	Workpiece Guard	1	96150593
31	Axle	1	96150614
32	Screw	4	41019201

• Recommended spares Parts

OLD SLACK WIRE SYSTEM DRAWING



(Dwg. D6150124)

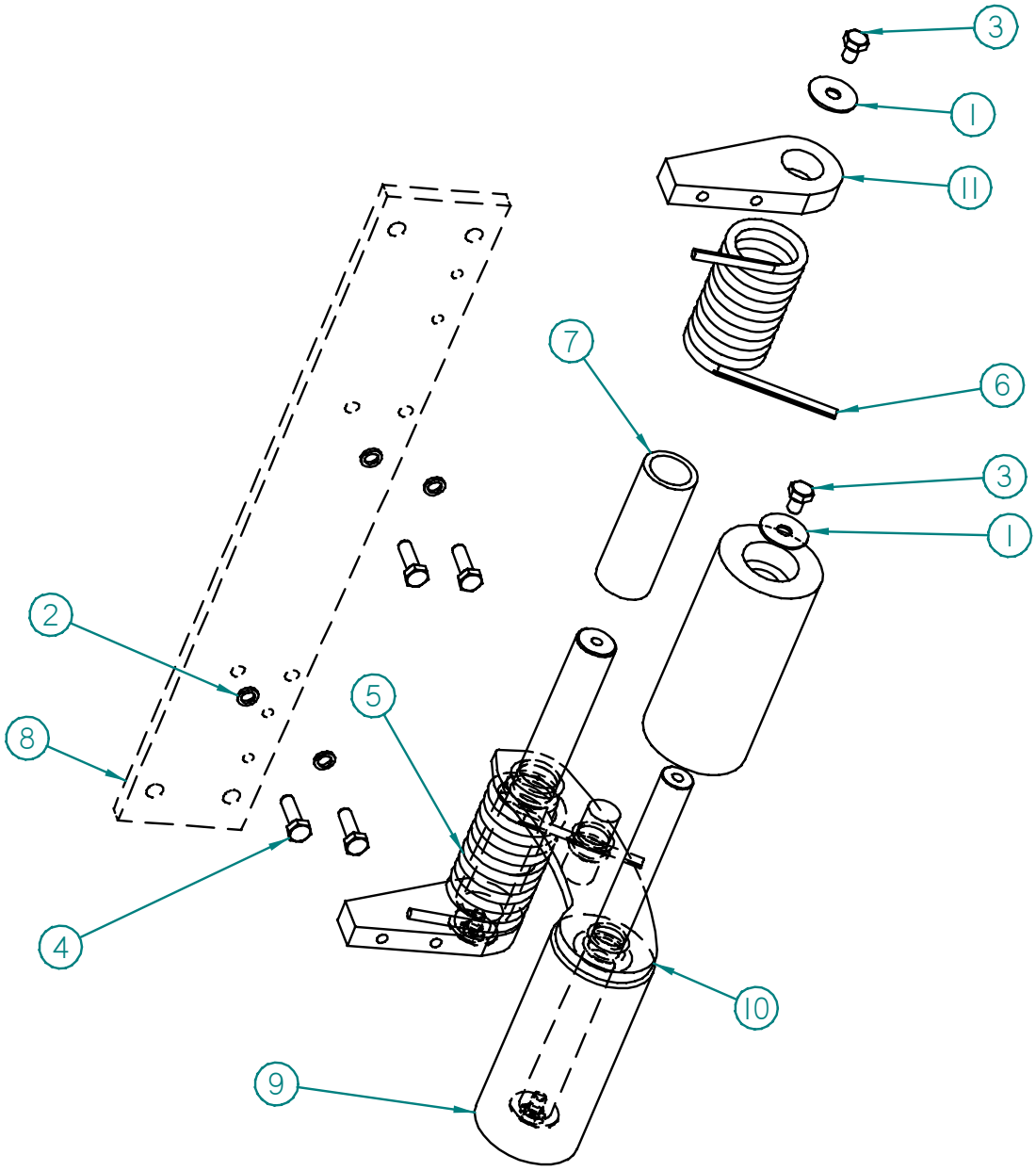
OLD SLACK WIRE SYSTEM PARTS LIST

ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
	Slack Wire System ass'y		76150101
183	Fitting 1/8	3	51029+68237528
184	Elbow 1/8	1	68280132
185	Nipple 1/8	3	61385232
186	Tee 1/8	3	61394532
351	Fitting	1	61694932
352	Hose	0.1m	68094832
353	Plug	1	65107741
354	Valve Control	1	68552732
355	Elbow	1	61320641
356	Valve Control	1	68528141
357	Screw	2	41019101
358	Lever	1	96150293
359	Roller Axle	1	96150196
360	Roller	2	96150196
361	Screw	2	41020401
362	Lockwasher	2	45201010
363	Screw	2	41010601
364	Protector	1	96150297
365	Screw	2	41316506
366	Stop	1	96150200
367	Lever	1	96150194
368	Nut	2	43003611
369	Lockwasher	2	45201012
370	Bearing	2	50050002
371	Axle	2	96150198
372	Distance Ring	2	96150199
373	Retainer ring	2	47703032
374	Nut	2	43006011
375	Lockwasher	2	45201016
376	Screw	4	41326001
377	Nut	4	43707211
378	Support	1	96150193
379	Nut	2	43005611
380	Screw	1	41004801
381	Lockwasher	2	45000110
382	Protector	1	96150576
383	Protector	1	96150577
384	Lockwasher	2	450001106

• Recommended spares Parts

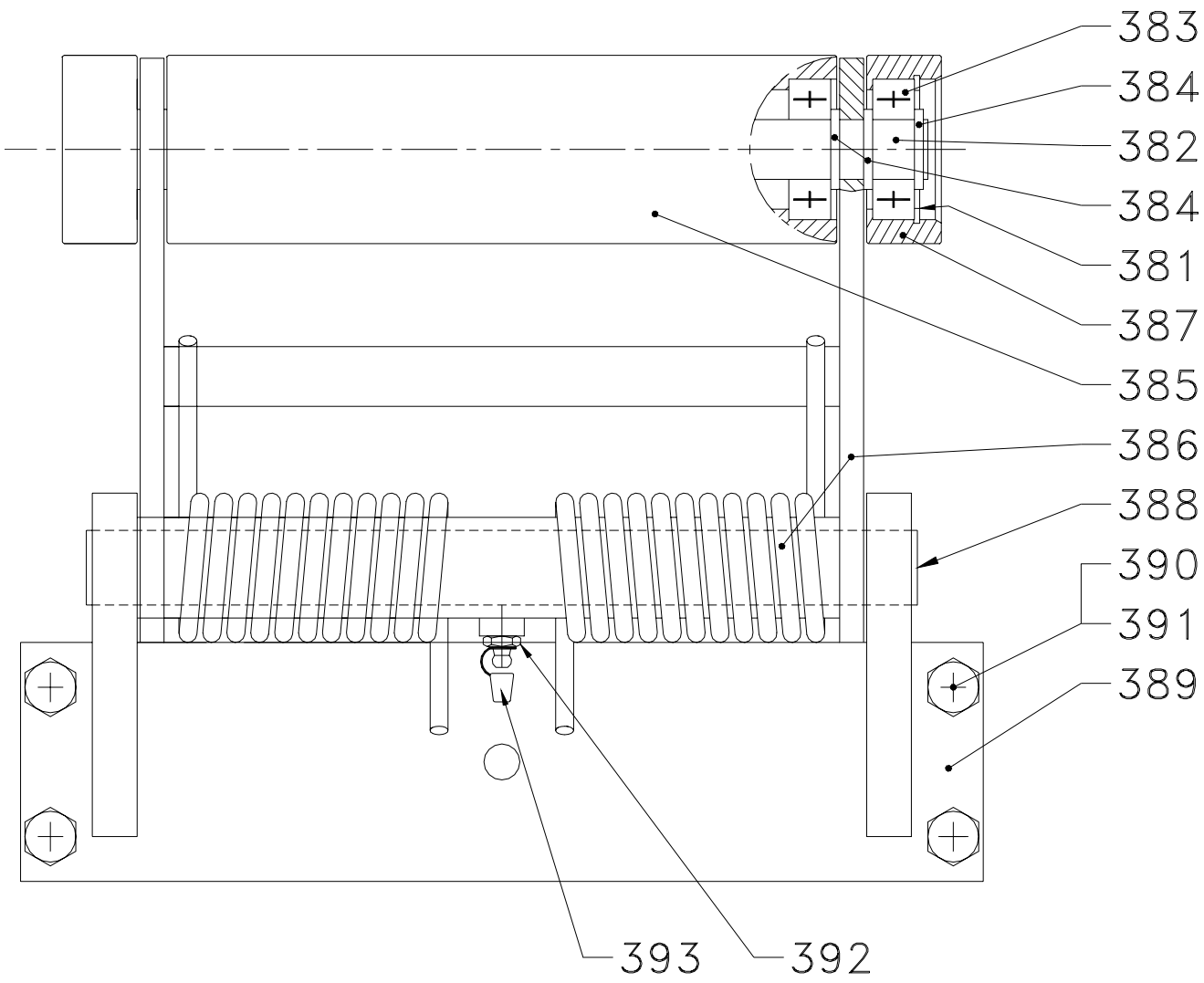
PRESS ROLLER DRAWING AND PARTS LIST

Valid for winches with serial number from : 03-01-14 (Year-Month-Chornological Nbr)



ITEM N°	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
1	Washer	4	45701008
2	Lockwasher	4	45201008
3	Screw	4	41019201
4	Screw	4	41006801
5	Right Spring	1	93200003
6	Left Spring	1	93200004
7	Tube	2	96150574
8	Spacer	1	96150591
9	Roller	2	96150620
10	Roller Arm	1	96150621
11	Frame	2	96150628

OLD PRESS ROLLER DRAWING AND PARTS LIST



(Dwg. D6150056)

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	96150089
386	Rollers Arm with Springs	1	96150087
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

NOTES

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NOTES

PARTS ORDERING INFORMATION

The use of replacement parts other than **INGERSOLL-RAND** Matérial 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 extend to supplies and accessories which are not of its manufacture.
- the guarantee does not extend to assemblies or machines in which **INGERSOLL-RAND** equipement 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 expire 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 superintencence 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 's engineers **INGERSOLL-RAND** are covered exclusively by the customer.
- In order to obtain the advantages of the guarantee, the customer must advice **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 or **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