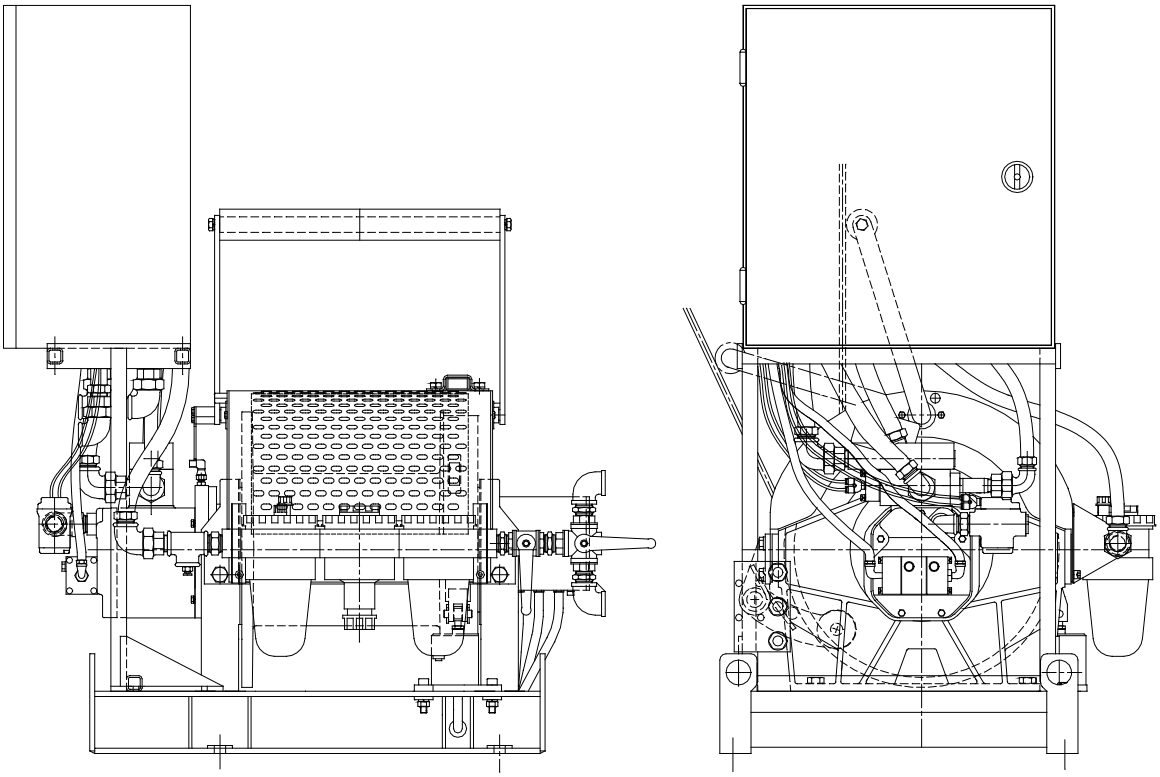
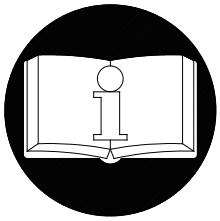
PARTS, OPERATION AND MAINTENANCE MANUAL

AIR POWERED MAN-RIDING WINCH LS150RLP-DP5M-F





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

⚠ WARNING

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

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

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

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Edition 9
MAY 2005
38585444

Ingersoll-Rand

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

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

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

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

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

Safety Summary

⚠ WARNING

- **The LS150RLP-DP5M-F Man-Rinding 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.**

⚠ **WARNING**

- **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.

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.

Winches Series	Nominal thread diameter of sheave (mm)	SWL for Sheave(T)
LS150RLP-DP5M-F	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.**

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.

On every air powered man-riding winch a sheet is clinched as this model :

Each winch is supplied from the factory with the warning label 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.

⚠ WARNING

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

MAN-RIDING WINCH WARNING
Failure to follow these warnings may result in death, severe injury or property damage: Do not operate this winch before reading operation and maintenance manual. It is responsibility of the owner or user to determine whether the winch conforms with local repulations for personnel use. Do not lift more than rated load. Do not allow less than three wraps of wire rope to remain on drum at all time. Do not operate a damaged or malfunctioning winch. Do not remove or obscure warning labels..
INGERSOLL-RAND MATERIAL HANDLING

WARNING

THE WHOLE EQUIPMENT IS DELIVERED WITH

5 METERS OF HOSE

Do not modify the lenght without informing "INGERSOLL RAND"

WARNING

- NEVER ACTIVATED THE BALANCING SYSTEM WHEN THERE IS NO LOAD.

BALANCING POINT ADJUSTMENT PROCEDURE:

select STANDARD WINCH mode

(Green indicator will come on to indicate standard winch mode working)

I) **PERSON MUST HAVE THE SAFETY HARNESS FITTED.**

II) **ADJUST PRESSURE REGULATOR KNOB TO APPROX 1 BAR.**

III) **RAISE MAN 0.5 METER ABOVE FLOOR WITH MAIN CONTROL LEVER**

select balancing mode

(Green indicator will come on to indicate balancing mode working)

SLOWLY ADJUST PRESSURE REGULATOR KNOB TO OBTAIN BALANCING POINT.

– CLOCKWISE WILL INCREASE PRESSURE AND TEND TO LOWER MAN.

– ANTICLOCKWISE WILL DECREASE PRESSURE AND THE ABILITY TO LOWER MAN

(At this point it is recommended than additionnal person is present to increase the load when required for balancing purposes)

USE CONTROL LEVER TO RAISE PERSON TO WORKING POSITION

WHEN JOB IS COMPLETED, AND PERSON IS BACK ON THE FLOOR, SELECT STANDARD MODE BEFORE TAKING THE SAFETY HARNESS OFF

IMPORTANT

- THE BALANCING MODE MUST ALWAYS BE SELECTED WHEN LIFTING A PERSON TO WORKING POSITION.

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 , stain 2, group 4M

Design temperature TD = -10 degrees C

Ambient air temperature between the design temperature and 40° C

The winch is supplied with a traceability list for the main load parts

Construction and standard features:

LS150LP DP5M-F 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 : Friction multi disc (without oil) 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 : Direct lever control on winch with automatic return to neutral position , both brakes applied.

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 as standard with an emergency inlet which is connected to a secondary power source (suppliers by other).

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.

Sandblasting and offshore paint (290 microns).

Filter regulator lubricator.

⚠ WARNING

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

General Specifications

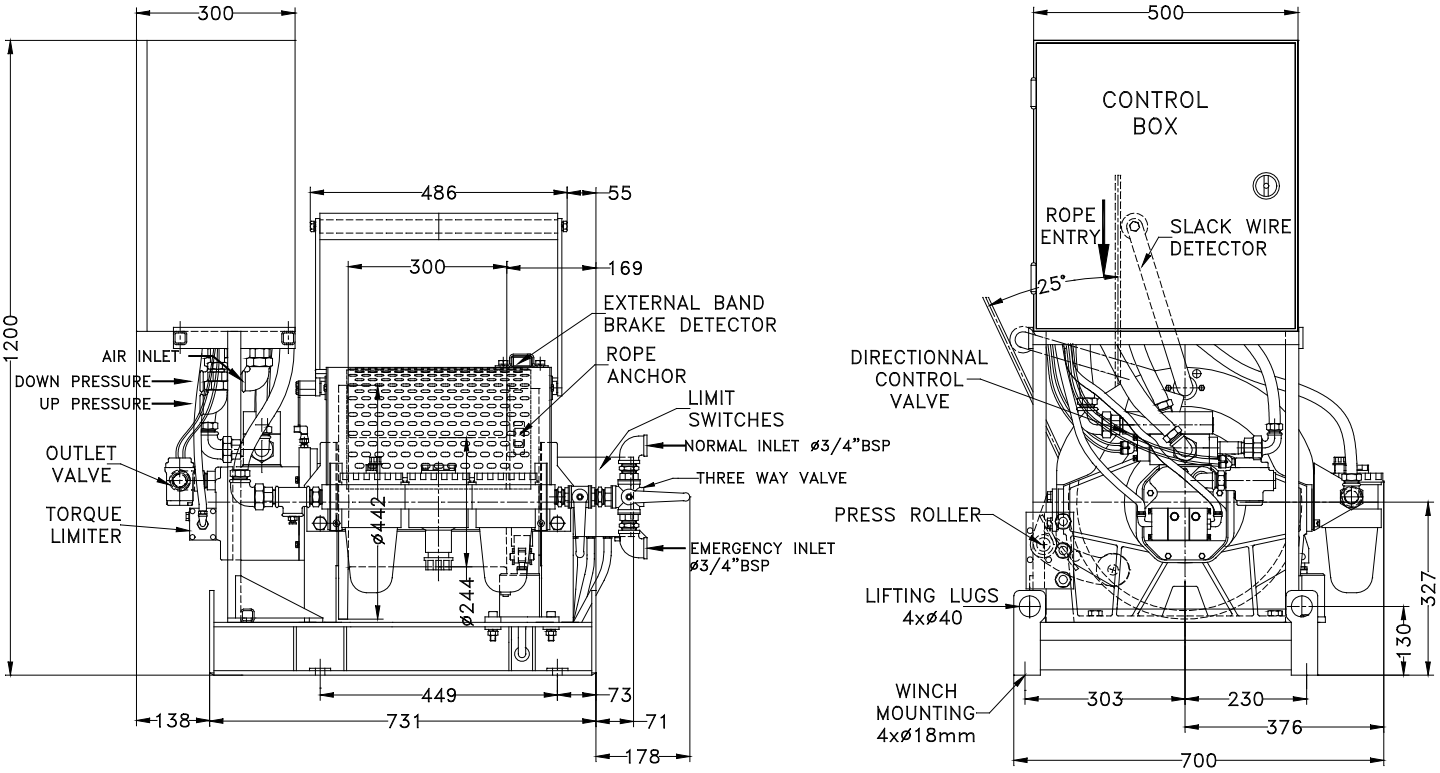
Model No	Rated Operating Air Pressure	Air Consumption at rated Load	Full Drum Rated Capacity Lifting	Mid Drum Line Speed	Maximum Wire Rope Size	Recommended Wire Rope Size Lifting Ratio (10:1)
	bar	cu.m/min	kg	m/min	mm	mm
LS150RLP	5.8	3	150	29	14	10

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 5.8 bar operating pressure.
4. Maximum Foundation Anchor Shear Force at One Capscrew, value based on use of recommended fastener grade and size.

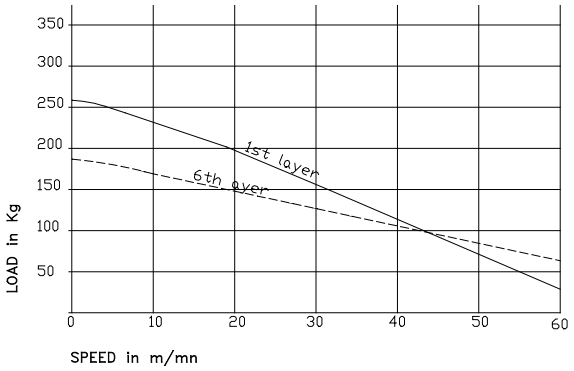
LS150RLP-DP5M-F
(Dwg D6150126)



Specifications & Drum capacity

Rated working load (metric ton) (1)		0.15
Motor Power (hp)		4
Working pressure (bar)		5.8
Average hoisting speed (m/min) (2)		0 to 30
air consumption (m^3/min)		0 to 3
Weight without rope (kg)		300
Rope diameter (mm)		10
Breaking load (metric ton)		1.5
Rope grade (kg/mm^2)		180
cumulative rope capacity (m)	1st layer	22
	2nd layer	46
	3rd layer	71
	4th layer	99
	5th layer	128
Rating limit	6th layer	159
	7th layer	192
	8th layer	226

Performance curve at 5.8 bar (82 PSI)



⚠ WARNING

The static pressure on the console is factory set to 5.8 bar maxi; to ensure a correct performance, a dynamic pressure of 5.2 bar minimum is necessary.

INSTALLATION

Prior to installing the winch, carefully inspect it for possible shipping damage.
Winches are supplied fully lubricated from the factory. Check oil levels and adjust as necessary before operating winch. 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.**

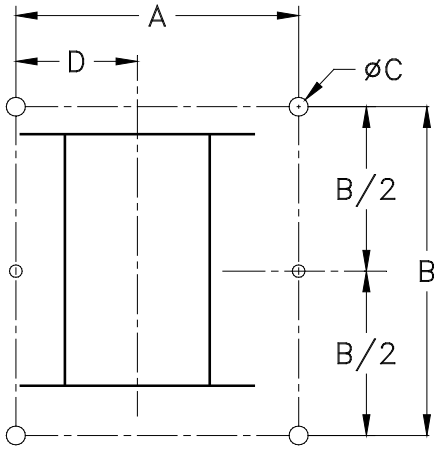
Mounting
Refer to Dwg.D6150001 and table 1.
Care must be taken when moving, positioning or mounting the winch. In most cases, lifting lugs have been provided to assist in handling the winch. If the lug locations are not appropriate for your specific installation, methods great care should be taken to 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

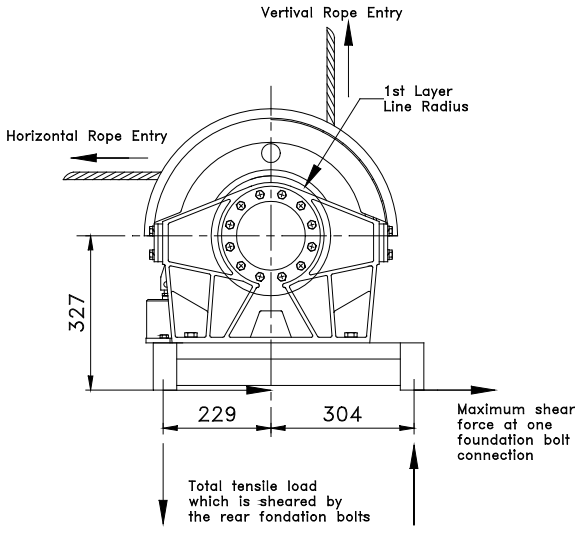


(Dwg.D6150001)

Table 1
Bolt Hole Dimensions

Winch Model	Drum Length	Dimensions		
		B	C	D
	mm	mm	mm	mm
LS150RLP-DP5M-F	300	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		
Maximum Shear Force at One Foundation Bolt Connection	lbf	194
	N	870
Maximum Tensile force Shared by Rear Foundation Bolts	lbf	254
	N	1140

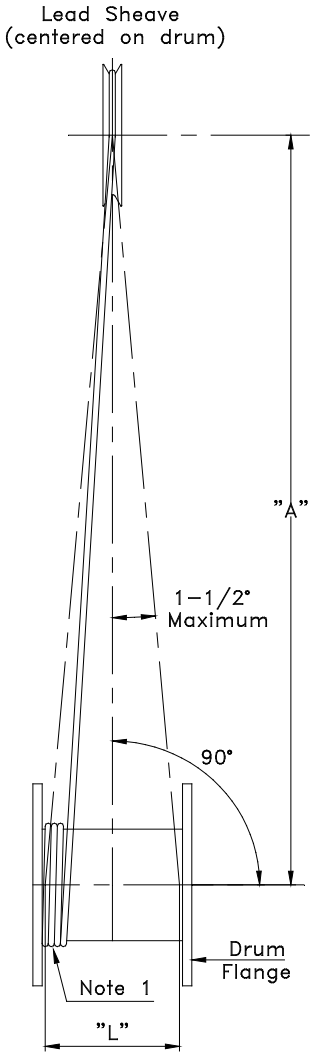
6. If 5/8 inch (16mm) Grade 8 mounting bolts are used, tighten evenly and torque to 150 ft.lbs (203 Nm) for dry thread fasteners; If the fasteners are plated, lubricated or a thread locking compound is used, torque to 99 ft. lbs. 134 Nm).
7. Maintain a fleet angle between the sheave and winch of no more 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 and Open Frame (Face) Winch

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

⚠ CAUTION

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

Wire Rope Selection

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

When considering wire rope requirements the actual working load must include not only the static or dead load but also loads resulting from acceleration, retardation and shock load. Consideration must also be given to the size of the winch wire rope drum, sheaves and method of reeving.

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

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

Installation of the control console

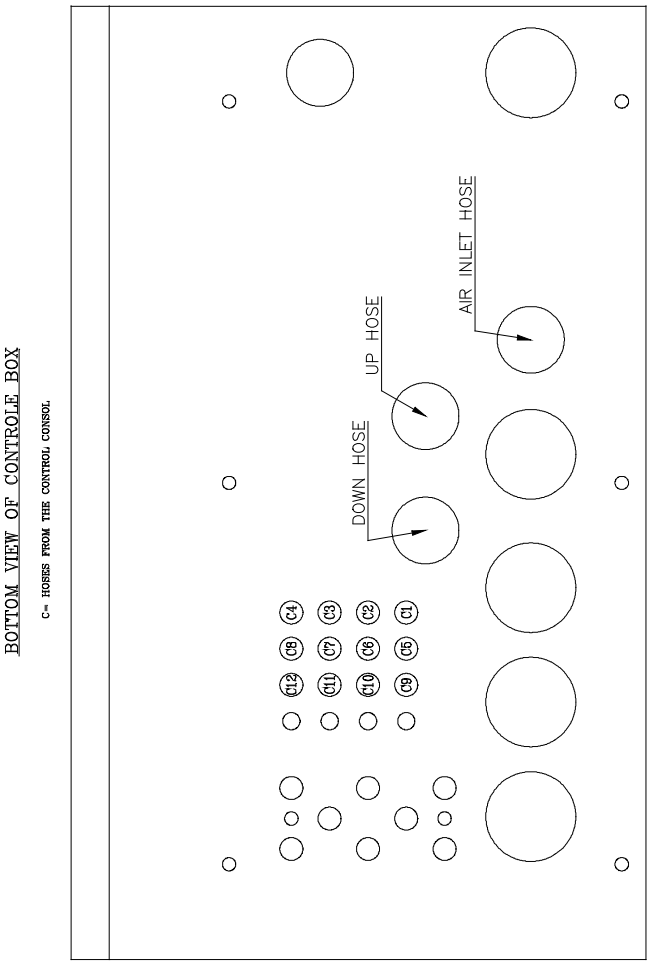
There are four holes of 13 in diameter to attach the console.

⚠ WARNING

The position of the control console is very important for the safety of the person attached to the harness. The operator must be able to see the person at any time.

Connection of the control console to the winch

To connect the supply hoses to the control console, unions are placed so as to avoid any possible reversal during ass'y. To connect the supply hoses to the control box on the winch, refer to the marking with color codes (blue, white, no color).
Twelve pipes numbered from 1 to 12 must also be connected to the control box. The connection must be performed as specified on the documents enclosed in the control box (ref:01.01.07). The bottom view of the control box is enclosed in these documents.



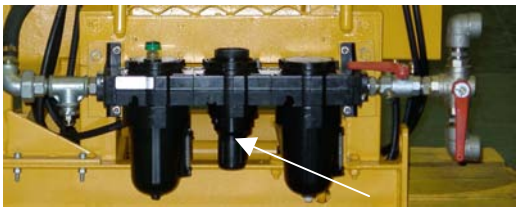
(Dwg.D6150095)

⚠ WARNING

The winches and control console are matched components, their identification plates bear the same serial number. Under no circumstances you may change the console without having a complete test of the winch-console ass'y performed by persons

Test and adjustment procedure

1. Supply compressed air to the apparatus.
2. Make sure the emergency stop button is unlocked.(**C**)
3. Make sure the standard mode is selected. (**H**)
4. Press button “on”(**F**)
5. Static pressure – 5.5 0/+0.3 (**B**)



adjust the mano-relief valve of the filter-regulator –lubricator if necessary, then lock it or seal it. For correct performance, a dynamic pressure of 5.2 bar mini. is necessary.

6. Check of the standard mode

set the button mode to the standard position,

Indicator lights

-------	Green	-------	-------
(**A**)	(**D**)	(**G**)	(**I**)

press button « on »,

Indicator lights

-Green	Green	-------	-------
(**A**)	(**D**)	(**G**)	(**I**)

Press the emergency stop button

Indicator lights

-------	Green	-------	-------
(**A**)	(**D**)	(**G**)	(**I**)

Power shut-off (manometer on left side of console is to 0 + warning device is heard for a brief moment)

Set the Mode button to the « balancing » position (**H**)
The « failure » indicator light comes on
Set the button back to the « standard » mode
The « failure » indicator light goes off
The « standard » mode is validated

7. CHECK OF NO LOAD SPEED

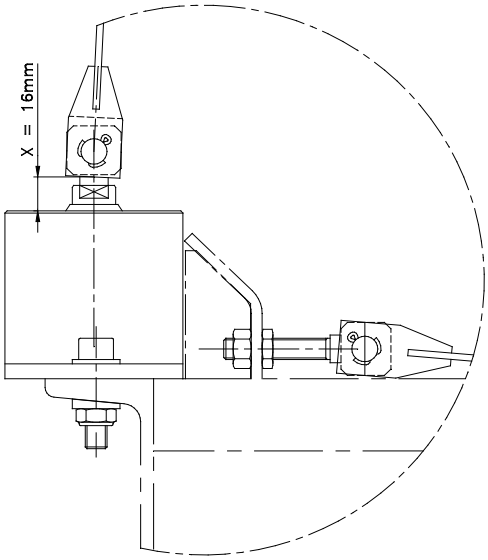
Speed in the lifting direction to 65 m/mn mini.
Speed in the lowering direction to 45 m/mn mini.

8. BRAKE BAND ADJUSTMENT

- Stop the air intake or press button AU
- Refer to (dwg.D6150003)

Checking dimensions:

X = 16 mm



Dwg.D6150003)

9. PROCEDURE FOR AJDUSTMENT IN « BALANCING » MODE

Prevent rotation of the drum by inserting a bar in the holes on drum sides

Switch to the « balancing » mode (**H**)

Adjust the pressure in the lowering direction (**J**) (**K**)

- regulator on right side of the console: 1 ± 0.1 bar

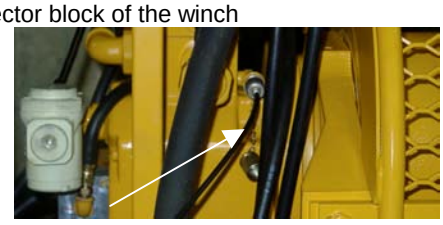
Fully tighten the screw of the regulator of the safety valve

M

L

located at the bottom to the right of the control box (**L**)

Connect a manometer to the socket to the rear of the connector block of the winch



Adjust the pressure in the lifting direction: 2.2 0/+ 0.1 bar (regulator on the side to the top and to the right of the control box), secure the palnut (**M**)

Adjust the regulator (**L**)of the safety valve until the pressure in the lifting direction drops to: 2.10/+0.1 bar, secure the palnut

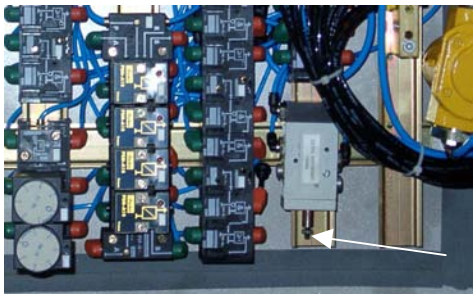
Adjustment of the interlock of the sequencer ass'y

always in « balancing » mode, largely loosen the interlock screw

tighten again this screw until you have a high level on test point A (Test point A ,see page 24) .

tighten again six turns and then secure the palnut

try several times the following actions:



switch to standard mode and switch again to balancing mode: the « failure » indicator light must go off.

Check of the « balancing » mode

Switch the « mode » button to « balancing » mode (**H**)

Indicator lights

Green- ------- ------ Green
(**A**) (**D**) (**G**) (**I**)

Red (a few seconds)

Press button A-U : warning device is heard

Winch control with the lever operated control valve

switch to standard mode (**H**)
remove the bar
raise the cable
hang a load of 100 daN
raise the load to 50 cm above floor
switch the button to « balancing » mode(**H**)

operate the control lever in the spooling direction (pulled out lever)

Indicator lights

Green- ------- ------- Green
(**A**) (**D**) (**G**) (**I**)

Set back to neutral

Indicator lights

Green- ------- ------- Green
(**A**) (**D**) (**G**) (**I**)

Red + warning device is heard for a few seconds

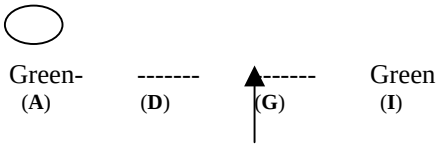
operate the control lever in the rolling-out direction (pushed lever)

Indicator lights

Green- ------- ------- Green
(**A**) (**D**) (**G**) (**I**)

Set back to neutral

Indicator light



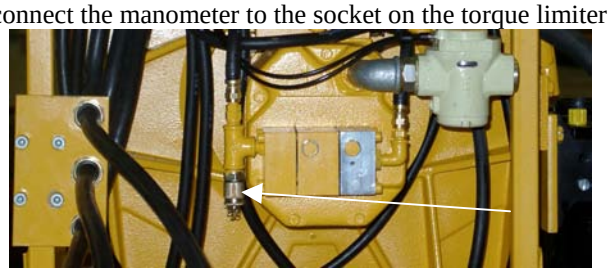
Red + warning device is heard for a few seconds

10. CHECK OF SLACK

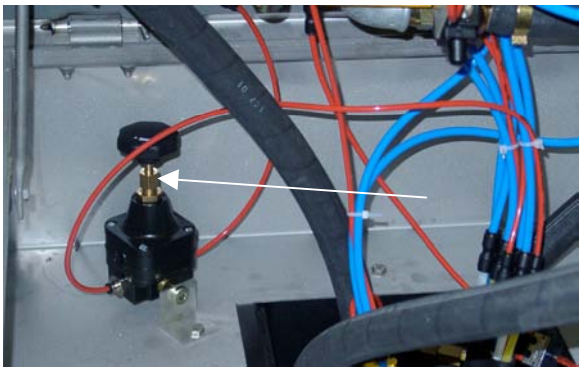
operate the control level in the lowering direction
as soon as slack rope is detected:
in standard mode: the winch stops
in « balancing » mode: the winch automatically switches to balancing mode

11. ADJUSTMENT OF PILOT TORQUE LIMITER IN THE « BALANCING » MODE

switch to the « balancing » mode (**H**)
connect the manometer to the socket on the torque limiter



- adjust the pressure regulator placed outside the control console until reaching a pressure of 2.8 +0.2/-0.2 bar



Test of the torque limiter
hang a load of 100 daN to the cable
attach the end of the cable to a fixed point and operate the control lever in the lifting direction
the winch automatically switches to the « balancing » mode at a speed of 20 ±2 m/mn
check that the cable tension is low

12. ADJUSTMENT OF THE PILOT TORQUE LIMITER IN THE STANDARD MODE

adjust the pressure regulator placed in the control box (on top, to the left) until reaching a pressure of 3.2 -0.2/+0.2 bar

Test of the torque limiter
It must be possible to lift a load of 200 daN on 1st layer
The torque limiter prevents lifting of a load of 260 daN on 1st layer: it automatically switches to the « balancing » mode.
do a fine adjustment if necessary (secure the palnut)

13. PROCEDURE FOR ADJUSTMENT OF MECHANICAL STOPS

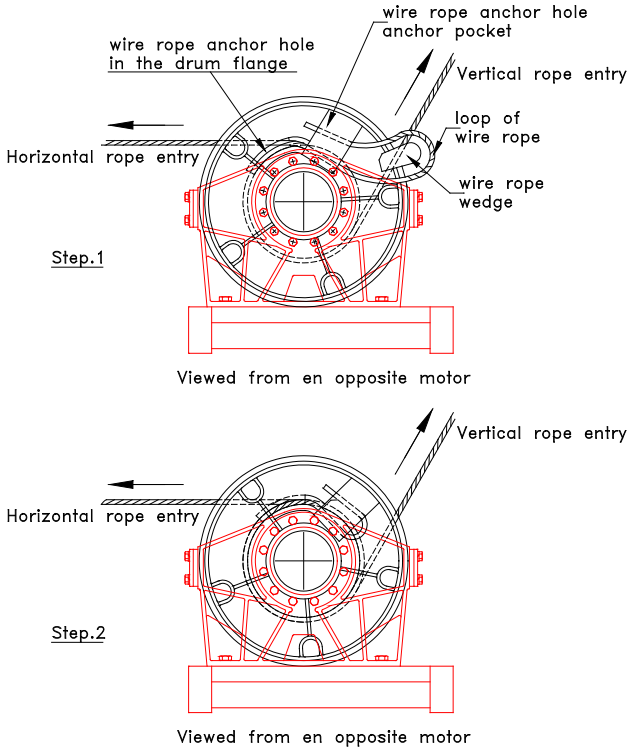
Follow the instuctions of the paragrah : Ajustement page 15

Conduct the tests now, follow the instructions of test sheet No. 189 (supplied with the apparatus).

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.
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.

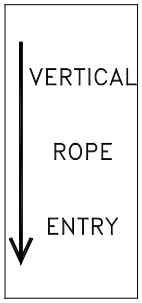


(Dwg.D6150065)

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 vertical rope entry



Wire Rope Spooling

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

Safe Wire Rope Handling Procedures

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

Slack Wire Device (Refer to Dwg D6150131)

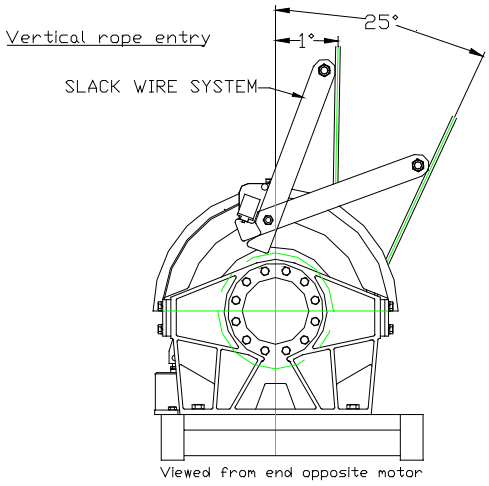
Function: The slack wire system is intended to detect a slack of the wire rope coming out of the winch drum and then stop the winch

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 on winch by I.R as standard.

The slack wire system allows rope take-off angles of 25° max. above horizontal axle and 15° max below horizontal axle.



(Dwg.D6150097)

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 a minimum safety distance of 2 meters from the return sheave block or from the highest point the manrider can reach.

Pneumatic limit switches are supplied as standard by IR on the LS150RLP-DP5M-F winch.

Description:

A small reducer directly related to the drum actuates two pneumatic cam distributors.

The mechanical stop ass'y operates in two ways following the winch is used in “standard” mode or in “balancing” mode.

- In “standard” mode, the two cam distributors will stop the engine supply in the required direction.
- In “balancing” mode, the mechanical stop system will stop the engine supply in the required direction but it automatically switches back to the “balancing” mode even if a person operates the control lever..

The whole system is protected in a metallic box, mounted on the rear bearing. The gear is activated by drum rotation.

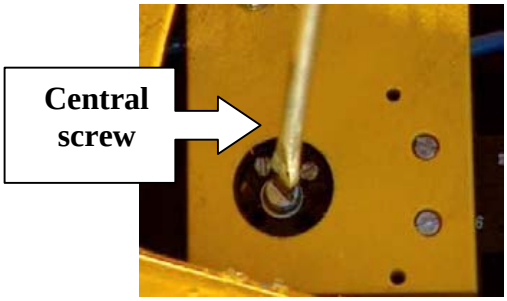
Adjustment:

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

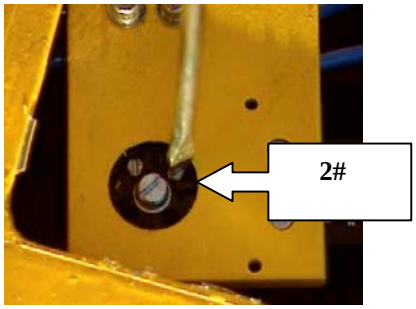
Set the UPPER LIMIT SETTING as follows;

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

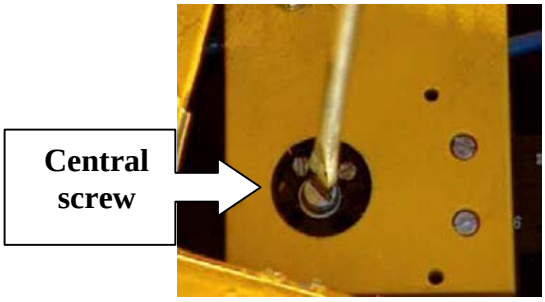
2. Loosen the central screw



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.



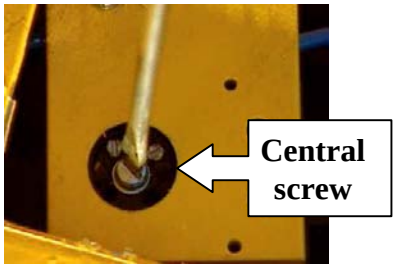
5. If you need to raise the upper limit, loosen the central screw, turn screw 2 anti-clockwise several turns, lift the test load until the winch stops automatically at the upper limit. Tighten the central screw. The winch is now operable again

6. 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. The winch is now operable again

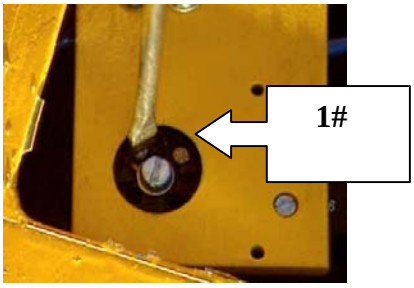
Set the LOWER LIMIT SETTING as follows;

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

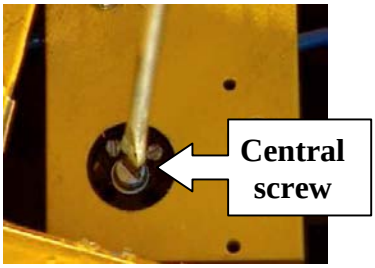
2. Loosen the central screw



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.

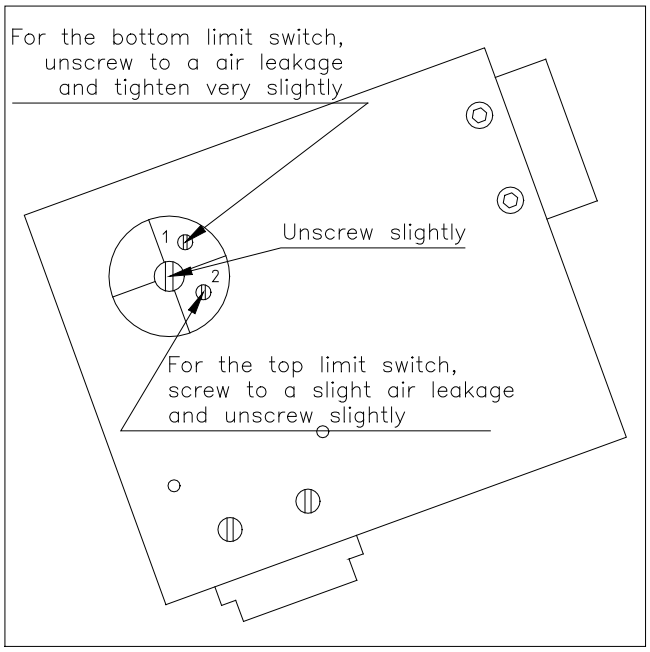


5. If you need to lower the lower limit, loosen the central screw, turn screw 1# clockwise several turns, lower the test load until the winch stops automatically at the lower limit. Tighten the central screw. The winch is now operable again

6. 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. The winch is now operable again

Once the limits have been set :-

Refit the box cover and seal



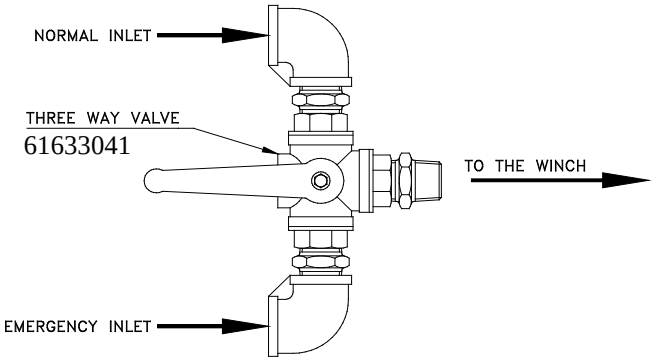
(Dwg.D6150096) **Label located in Limit switches box**

Emergency lowering device

Function: This device allows the person to lifting be 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, the 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 bar/600 kpa (85psig) 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-DP5M-F 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, motor and pneumatic components. 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:67730941)

A second air filter (filtration to 5 microns) is installed in the control box. (ref:68657341)

It is imperative that the air supplied to the control box be dry and clean: regularly bleed the filter.

NOTICE

In order to guarantee a good functionning of the winch at a minimum ambiant temperature of –10° C, it is imperative to ensure that the dew point of the air network is –10°C at the maximum.

Check and adapt your air network accordingly.

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.

Motor

For optimum performance the winch should be installed as near as possible to the compressor or air receiver, since the dynamic pressure must not be inferior to 5.2 bar.

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 asmall 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 :

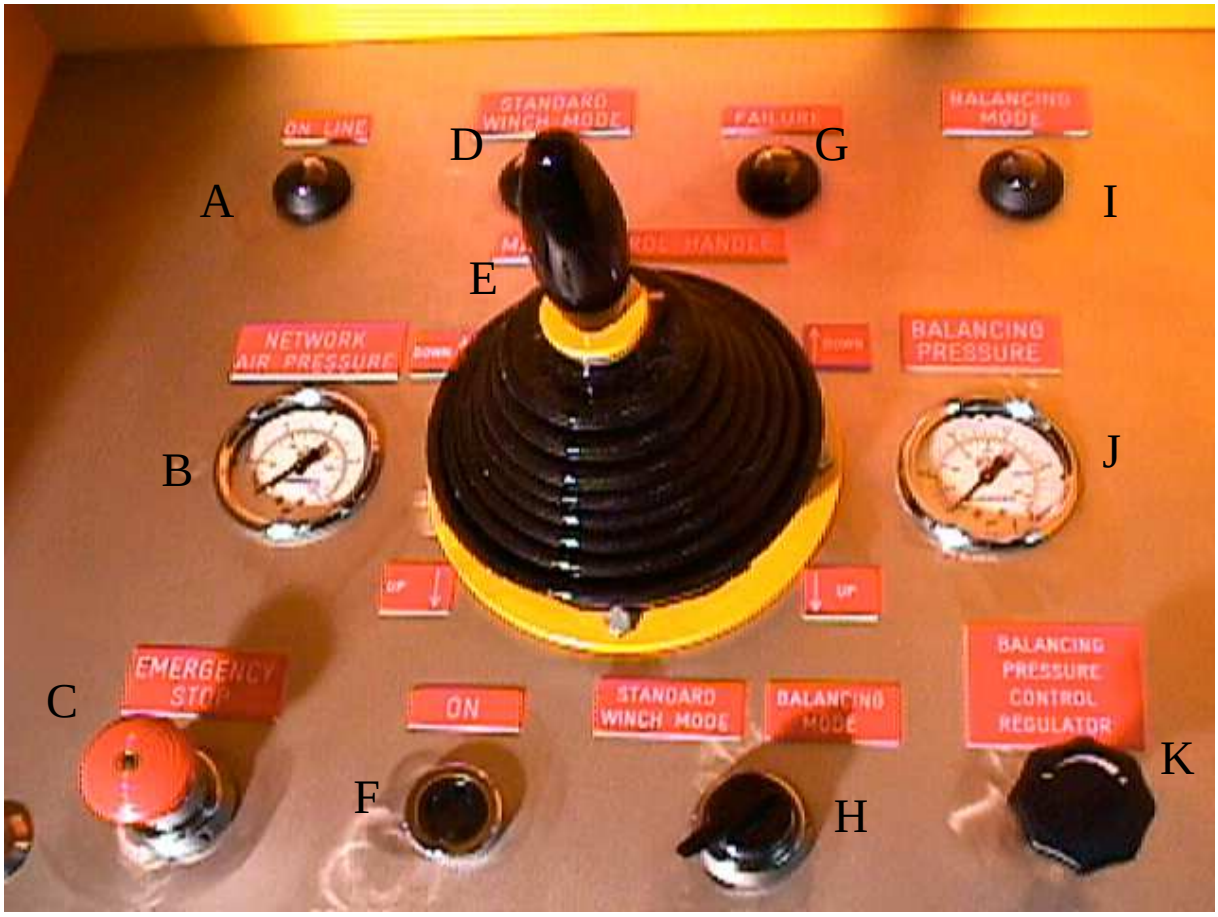
1. Follow all safety instructions when operating the winch.
2. Allow only people trained in safety and operation of the winch to operate the winch
3. Subject each winch to a regular inspection and maintenance procedure.
4. Be aware of the winch capacity and weight of load at all times.

⚠ 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.**

Winch Control

Description of the control console



A : On Line indicator light

This indicator light is green when the « ON » button is actuated,
the compressed air is available, the console is operational.

B : Network Air Pressure Gauge

* Indicate the static pressure preset to 5.5 0/+0.3
* For correct performance, a dynamic pressure of 5.2 bar mini. is necessary.
* Indicate the null pressure when the button « ON » is not actuated or when the emergency stop button is actuated

C : Emergency Stop Button

If this button is actuated in « standard » mode, the compressed air supply is stopped.
If this button is actuated in « balancing » mode, a warning device is heard.

D : Standard Winch Mode indicator light

This indicator light is green when the « standard » mode is selected.

E : Main control lever

To spool the cable, pull out the lever.
To roll out the cable, push the lever.
Move the lever slowly and progressively.

F : On Button

When this button is actuated, air is supplied to the pilot circuit and to the power circuit; the console is thus operational.
This button is disabled in the « balancing » mode; make sure the « standard » mode is selected.

G : Failure indicator light

⚠ DANGER

It is prohibited to use the apparatus when this indicator light is red.

First, the operator must ensure that the lifted person is safe and then he can repair the failure.

When selecting a mode or even permanently, the control box monitors those organs which might be dangerous to the lifted person such as:

Brake opening through the band detector.

The connection distributor that switches the winch controls either to the « standard » mode or to the « balancing » mode.

The safety valve that enables rapid air escape from the engine in case of an overload in «balancing» mode but that must be inactive in «standard» mode.

The torque limiter that is calibrated differently according to the selected mode.

The emergency stop which must be in the correct position according to the selected mode.

When an anomaly is detected, a red indicator light comes on on the control box which automatically start the warning device. **The indicator light also becomes red for a short while when selecting a mode, this is normal and will last only during the time necessary to check the parameters. The same goes in « balancing » mode, when the operator actuates the control lever.**

When a failure is detected in « balancing » mode, it is necessary to switch to the « standard » mode, even if the anomaly has been solved.

H : Seletor Switch –Standard Winch Mode or Balancing Mode

Button used for mode selection.

⚠ WARNING

The balancing mode must always be selected when lifting a person to working position.

I : Balancing Mode indicator light

The indicator light is green when the « balancing » mode is selected, even if this mode is validated after testing the control box and after the red indicator light « failure » went off.

J : Balancing Pressure gauge

It indicates the air pressure supplied in the lowering direction in order to balance the person in the « balancing » mode.

K : Balancing Pressure Control Regulator

It enables adjusting the supplied air pressure in the lowering direction in order to balance the person in the « balancing » mode.

For information, a pressure of 1.5 bar is necessary to balance an equipped person of approx. 100 daN.

(1 bar is necessary for 150 daN).

1. Select Standard Winch mode .

(Green indicator will come on to indicate standard winch mode working)

2. Person must have the safety harness fitted.

3. Adjust pressure regulator knob to approx 1 bar.

4. Raise man 0.5 meter above floor with main control lever

5. Select balancing mode

Green indicator will come on to indicate balancing mode working)

6. Slowly adjust pressure regulator knob to obtain balancing point.

- **Clockwise will increase pressure and tend to lower man.**
- **Anticlockwise will decrease pressure and the ability to lower man**

(At this point it is recommended than additionnal person is present to increase the load when required for balancing purposes)

7. Use control lever to raise person to working position

8. When job is completed, and person is back on the floor, select standard mode before taking the safety harness off

⚠ WARNING

Never activated the balancing system when there is no load.

<u>BALANCING POINT ADJUSTMENT PROCEDURE</u>:

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 , the winch automatically switches to the "balancing mode whatever the operating mode, "standard" or "balancing".

⚠ CAUTION

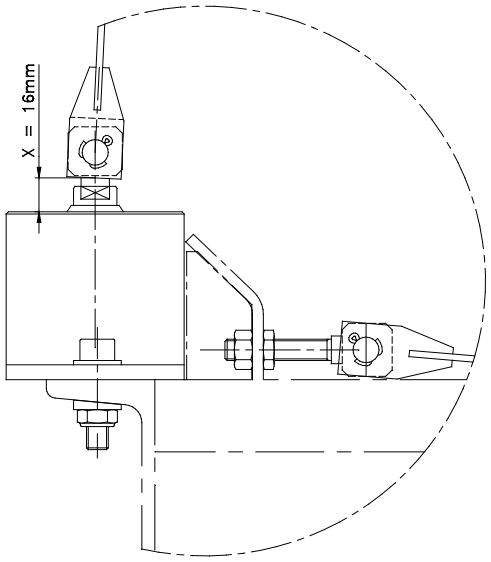
- **To avoid damage to the rigging, the structure supporting the rigging and the winch, do not use the wire rope with multi reeving arrangement.**

Winch Brakes
Automatic discs brake
The automatic discs brakes 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 brakes frictions 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
Refer to (dwg.D6150003)
Checking dimensions:
X = 16 mm



Dwg.D6150003)

TROUBLESHOOTING

This section provides basic troubleshooting information. Determinations of specific causes to problems are best identified by thorough inspections performed by personnel instructed in safety, operation and maintenance of this equipment. The chart below provides a brief guide to common winch problems, probable causes and solutions.

PROBLEM	CAUSE	SOLUTION
Winch will not turn.	No air supply to winch.	Check air supply line connection and hoses.
	Emergency stop activated.	Twist and release E.stop button to de-activate.
	Winch in balance mode.	Turn operations switch to standard mode and check operation.
	Air supply choked.	Bleed excessive oil out of air line using small bleed valve next to the lubricator.
Immediate Failure light in Standard Mode.	Band Brake detector open.	Free detector, lubricate and rest back on band brake.
	Sequencer stuck in failure mode.	Locate four point sequencer (bottom left centre on logic board) and use manual buttons on sides to switch to standard mode (standard is second stage on sequencer).
Immediate Failure light in Standard Mode.	Torque limiter failure.	1. Check air connections for signs of damage or leaking. Re-tighten connections. 2. Remove assembly, strip down, grease, re-assemble and re-fit. Check operation.
Immediate Failure light in Balance mode.	Brake is not fully open.	1. Re-set balancing pressures within the system to achieve 2.2/2.1 bar settings (refer to set up procedure). 2. Air supply leaking. Check connections to brake and pipework for kinks.
	Brake is open but brake detector has not registered.	Lift brake detector by hand. If failure is removed contact IR for adjustment procedure.

PROBLEM	CAUSE	SOLUTION
Winch will not lift SWL.	Torque limiter pressures are set wrong.	Follow pressure adjustment procedures of the torque limiter in both standard and balance modes (refer to set up procedure).
	Torque limiter has seized or is sticking.	Remove, disassemble, lubricate, re-build and install.
	Wire rope is tangled or spooled badly onto drum causing extra effort required on winch for lift.	Pay rope off drum until spooling is correct the haul back on.
Winch will not lift or stops at same point.	Torque limiter fault.	See previous solutions.
	Drum has reached upper limit switch.	Remove cover to limit switches and adjust upper limit accordingly (screw no. 2). Refer to altering limits section in manual. SEE SAFETY NOTES AT END.
Winch will not lower or stops at same point.	Drum has reached lower limit switch.	Remove cover to limit switches and adjust upper limit accordingly (screw no. 1). Refer to altering limits section in manual. SEE SAFETY NOTES AT END.
	Slack arm detector is stuck or not registering.	Remove slack arm and undo the two Allen screws on the detector. Grease, free switch and internal spring then re-assemble. SEE SAFETY NOTES AT END.
	Brake has locked. Lower load by raising pressure in balance mode.	Remove motor and gearbox, prove air pilot supply line clear. Also check selector stop ball valve in the motor is free.
Balance mode not functioning correctly.	Rope paying out when man should be balanced.	Balancing pressure on console too high. Adjust to a good balancing point. Refer to Balancing point adjustment procedure. SEE SAFETY NOTES AT END.

PROBLEM	CAUSE	SOLUTION
Balance mode not functioning correctly.	Rope only paying out under extreme pressure.	1. Balancing pressure too low. Adjust to a good balancing point. 2. Balancing pressures within the system are wrong. Re-set balancing pressures to achieve 2.2/2.1 bar settings. Refer to set up procedure.
	Load is balanced, but rope will not pay out under extra pressure.	Directional control valve shuttle is being restricted. Remove part, strip down, grease and re-assemble (replace seals if necessary).
	Time delay drop when moving in balancing is excessive.	1. Adjust roller switches under control handle (within the console) until acceptable drop is achieved. 2. Air pilot supply line to brake is blocked. Remove motor and gearbox and clear lines. Also check selector stop ball valve is free.
Winch will not switch between standard and balance modes.	Fault on the operations switch (on the console).	Remove switch, strip part and clean. Re-assemble component and re-fit to console. If problem still persists replace switch with a new one.
Winch pays out with handle in neutral when in standard mode.	External band brake not tight enough.	Check 16mm spacing between brake cylinder and piston eye. Adjust to achieve correct clearance.
	External band brake worn.	Check band for signs of wear. Lining on band should be 2-5 mm in thickness. If band lining is below 2mm replace with a new one.
	External brake cylinder losing pressure.	Check connections for air leaks and replace 0-ring on piston if necessary.
	Internal brake discs worn.	Remove motor and gearbox. Strip gearbox and check condition of brake discs – replace if necessary. Check condition of brake piston and springs, again replace if necessary

0. **PROBLEM**	**CAUSE**	**SOLUTION**
Winch shows failure light when switching between standard and balance modes.	Directional control valve is not functioning correctly.	Remove valve (located on top of motor). Strip component and free parts, grease, re-assemble and re-fit to winch.
	Timers within the control box are set wrong.	Locate timers (bottom left corner of logic panel). Top timer should read between O-A. Bottom timer should read D. Re-set as required.
Rope is spooling badly onto drum.	Winch is not in line within tolerance of that to the sheave.	1. Make sure there is a minimum distance of 5.5m from the centre of the drum to the sheave. 2. Align winch so it is central to the sheave to within 1.5 degrees as required in the manual.
Excessive oil present within control box.	Drip flow on lubricator set incorrectly.	1. Bleed off oil using bleed screw located at the side of the lubricator. 2. Reduce drip flow to 2-3 drops per minute when winch is running at full speed.

SAFETY NOTE

The following safety notes MUST be followed when undertaking any maintenance or troubleshooting work on the winch:

1. Always disconnect the air supply to the winch before starting work.
2. Never carry out work on the winch whilst it is supporting a load.
3. Never attempt to set the limit switches with a man in the belt. Always use a weight and check settings in both modes at least twice before using the winch for a manriding operation.
4. Do not remove the slack arm whilst there is a load on the winch. Bring load to the floor and turn off air if work on the slack arm must be undertaken.
5. After carrying out maintenance work on the brakes always do full SWL checks with weights before using winch for manriding operations.
6. If in any doubt contact Ingersoll-Rand before carrying out work on the unit.

Refer to air schematic 00-12-03 2/3

Trouleshooting Terminology :

The following terminology used thoughout the troubleshooting section is explained below .

High Level required :

It often describes an input required at high level in this section.

A high level input can be determined by locating the small brass pins situated on the green and hose inputs on a command cell.

The pins can be easily pressed by hond.If once pressed these pins offer resistance and come back to the original position when pressure is released this point is at a high level.

Low Level required :

Checking for low is level is the same procedure as checking for a high level.

However when the pin is put under pressure this should offer no resistance ond once pressed will not return to its original position.

If this happens this point is at a low level

Numbered References :

The numbered references throughout the troubleshooting section refer to the numbered hoses which can be located at the front of the logic command board.

These hoses can then is turn be traced from the connection panel to the individual command cells.

Exchange of Command Block :

To cure some faults a command block may need to be exchanged.

This system uses THREE different types of command blocks.Never disconnect more than one block at a time to avoid error in replacement.

It is also critical these blocks be replaced with a like component.The type of command block can be determined by the symbol on the front of it.

Start up failure

Indicator's status

On Line	Standard winch mode	Failure	Balancing mode
Off	On	Off	Off

Check the on information at the input 18 if not present check hoses between input 18 and on button.

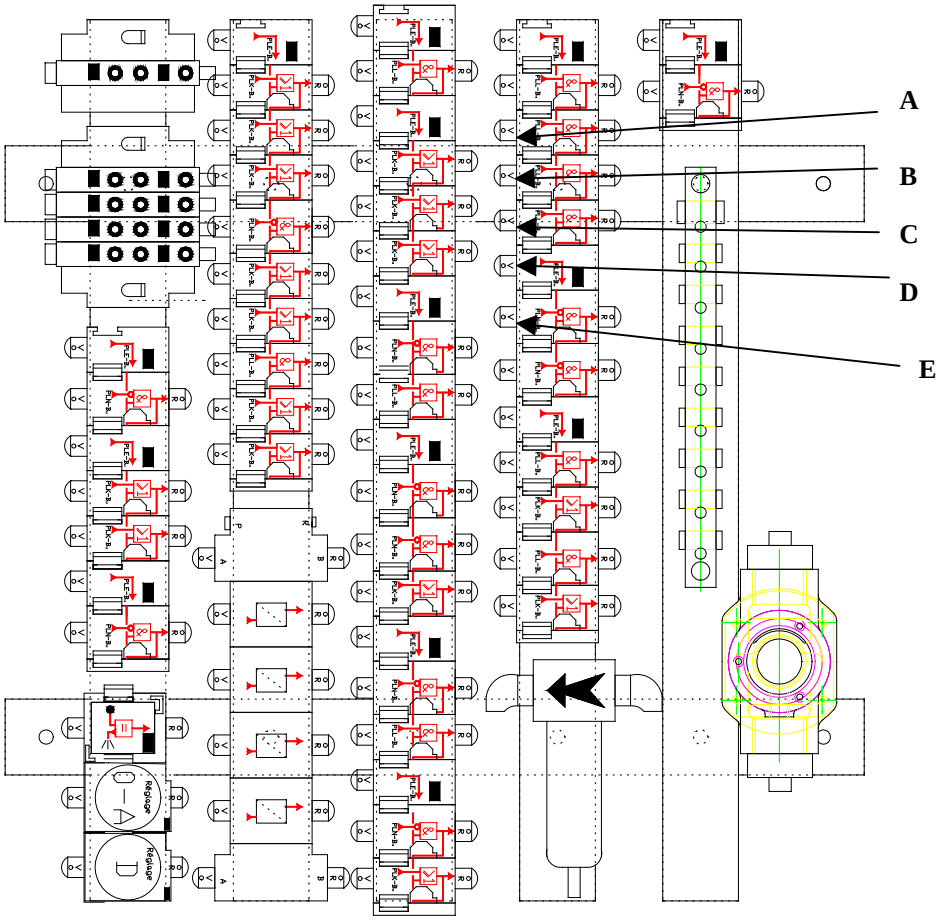
Check the on information at the output 19,if not present exchange the complete board

Standard mode failure

Indicator's status

On Line	Standard winch mode	Failure	Balancing mode
On	On	On	Off

Check test point A B C D E



A, B, C, D and E points must be high level for satisfactory operation.

Point A at a low level:

Check the input 14 high level required

If the level is high use the interlock adjustment procedure, if the adjustment don't correct the problem exchange the complete board.
If the input 14 is at a low-level check the output 23 a high level is required
If the level is high check the hoses between output 23 and exhaust valve.
If the level is low check the input 24 high level is required
If the level is high exchange the complete board.
If the level is low check the output 13 a high level is required
If the level is high check the hoses between output 13 input 24and exhaust valve.
If the level is low exchange the complete board.

Point B at a low level:
exchange the complete board

Point C at a low level:
Check the input 15 high level required
If the level is high exchange the complete board.
If the level is low check the hose between Directional control valve and the input 15.

Point D at a low level:
Exchange the complete board.

Point E at a low level:
Check the input 8 low level required

If the level is high check the hose between the brake detector and the input 8 check the detector.
If the level is low exchange the complete board.

Standard mode problems without failure signal

Indicator's status

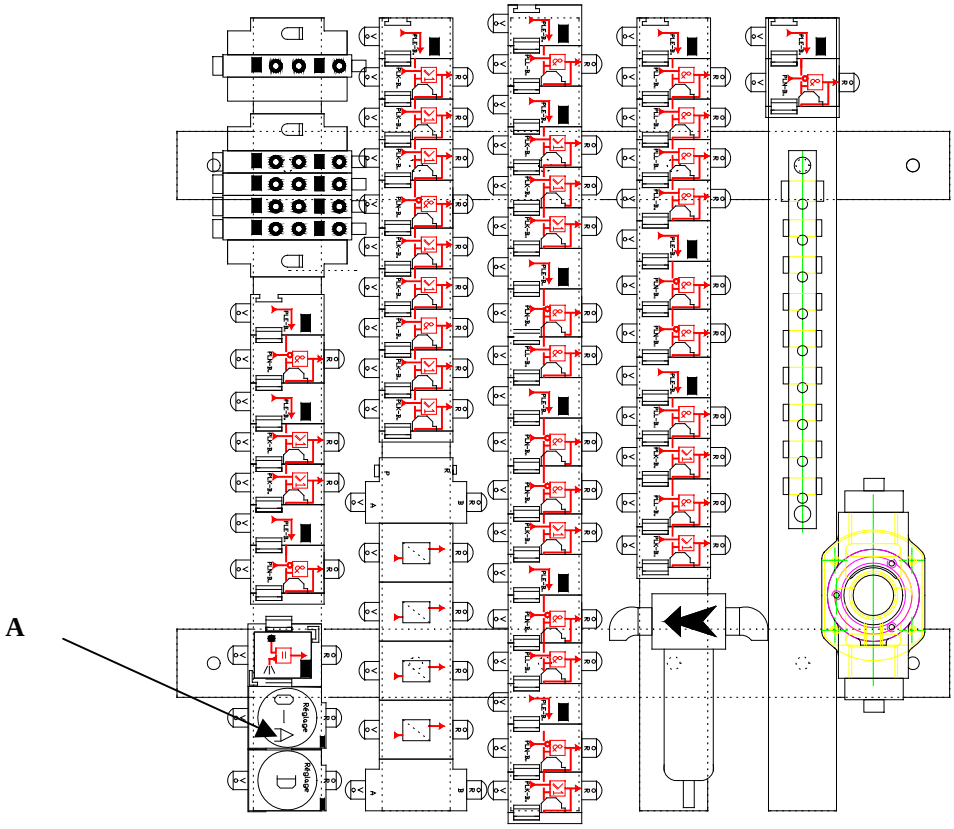
On Line	Standard winch mode	Failure	Balancing mode
On	On	Off	Off

Check the output signal 16, each time you move the main control handle you have a pulse of about 1second.

No pulse:

1- Check limit switches : slack and bottom input 12 (high) top input 10 (high)
2- Check up 11 and down 12 inputs, high when moved

If these inputs are right verify setting of the timer A, set between the 0 and A.



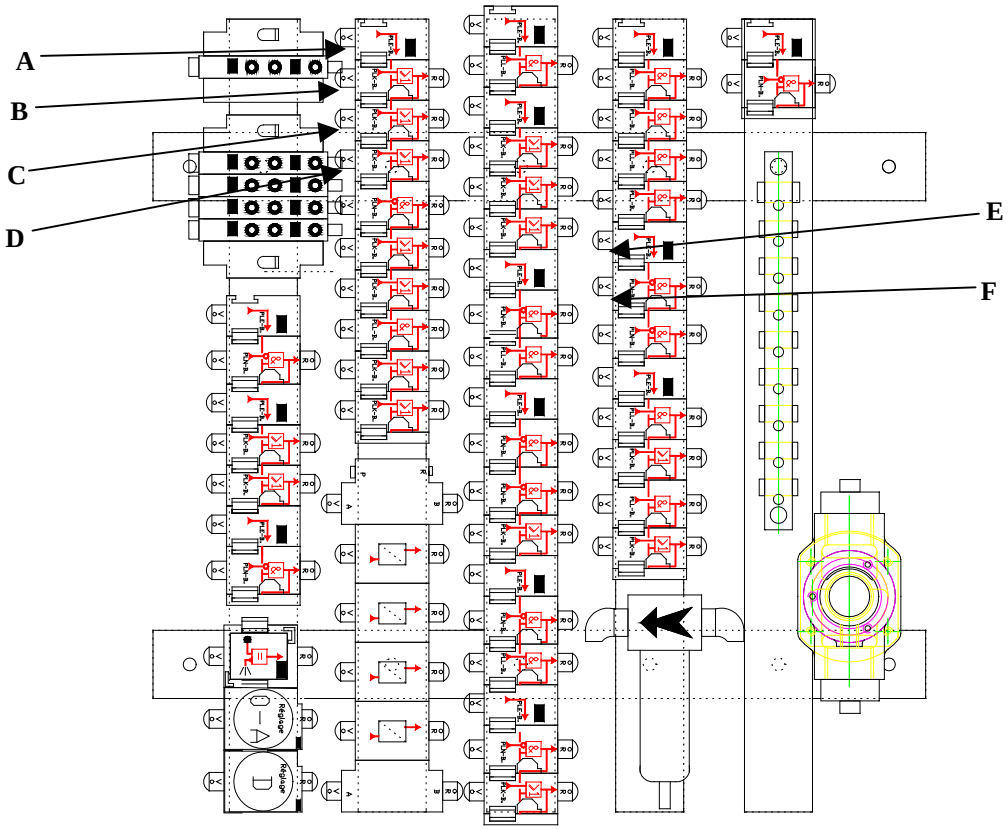
If right exchange the complete board.

Floating mode failure

Indicator's status

On Line	Standard winch mode	Failure	Balancing mode
Off	Off	On	Off

Check test point A B C D E F



Check points A B C D F must be at a low level
Check point E must be at a high level for 10 seconds after switching to the floating mode after this time it will be at a low level.

Point A at a high level:
Check the input 19 high level required
If the level is high exchange the complete board.
If the input 19 is at a low level check the hose between input 19 and the emergency stop

Point B at a high level:
Exchange the complete board

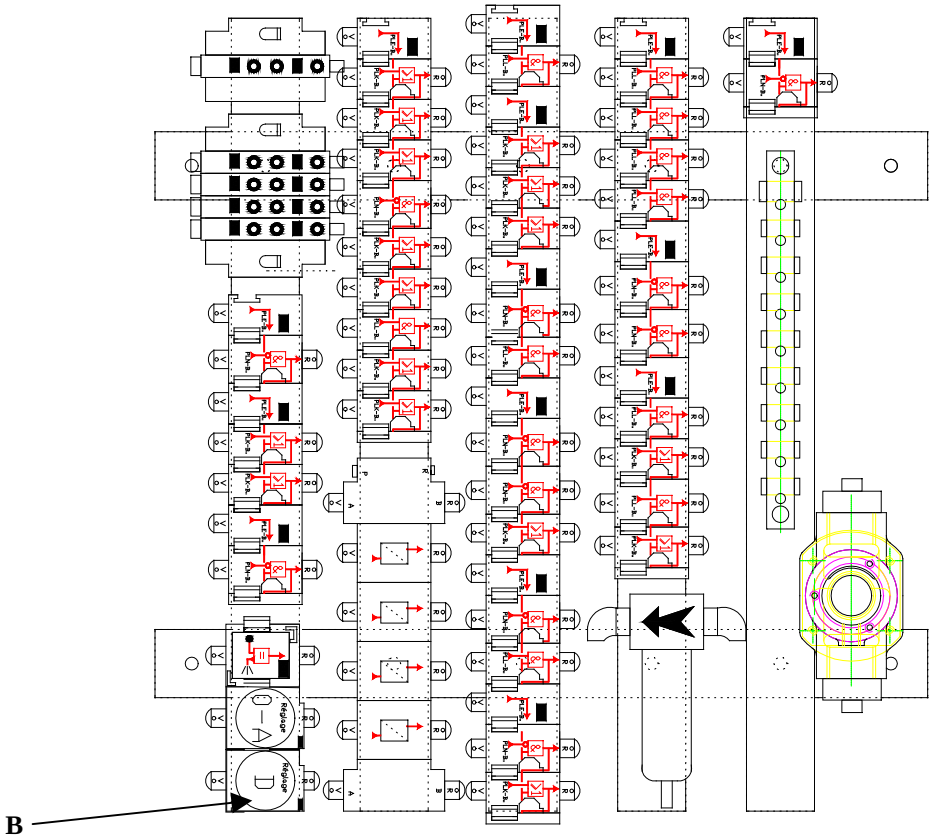
Point C at a high level:
Check the input 14 a level of about 2 bar is required

If the level is 2 bar use the interlock adjustment procedure; if the adjustment don't correct the problem exchange the complete board .
If the input 14 is at a high level check the output 23 a low level is required
If the level is low check the hoses between output 23 and exhaust valve.
If the level is high check the input 24 low level is required
If the level is low exchange the complete board .
If the level is high check the output 13 a low level is required
If the level is low check the hose between plug 13,24 and exhaust valve.
If the level is high exchange the complete board.

Point D at a high level:
Check the input 15 low level required

If the level is low exchange the complete board
If the level is high check the output 13 a low level is required.
If the level is low check the hoses between output 13 and connection distributor.
If the level is high exchange the complete board.

When switching to balancing mode you must have a high level at point E for A minimum of 10 seconds if not :
Verify setting of the timer B, set to D



If right exchange the complete board.

Point F at a high level:
Check the input 8 high level is required

If the level is low check the hose between the brake detector and the input 15 .

If the level is high exchange the complete board.

No switching between the two mode

Check input 11 and 12 low level is required

If high level check hoses between inputs 11 and 12 and main control detectors, check detectors
If low level check inputs 4 and 5:
In standard mode 4 is low 5 is high
In floating mode 4 is high 5 is low
If right exchange the complete board

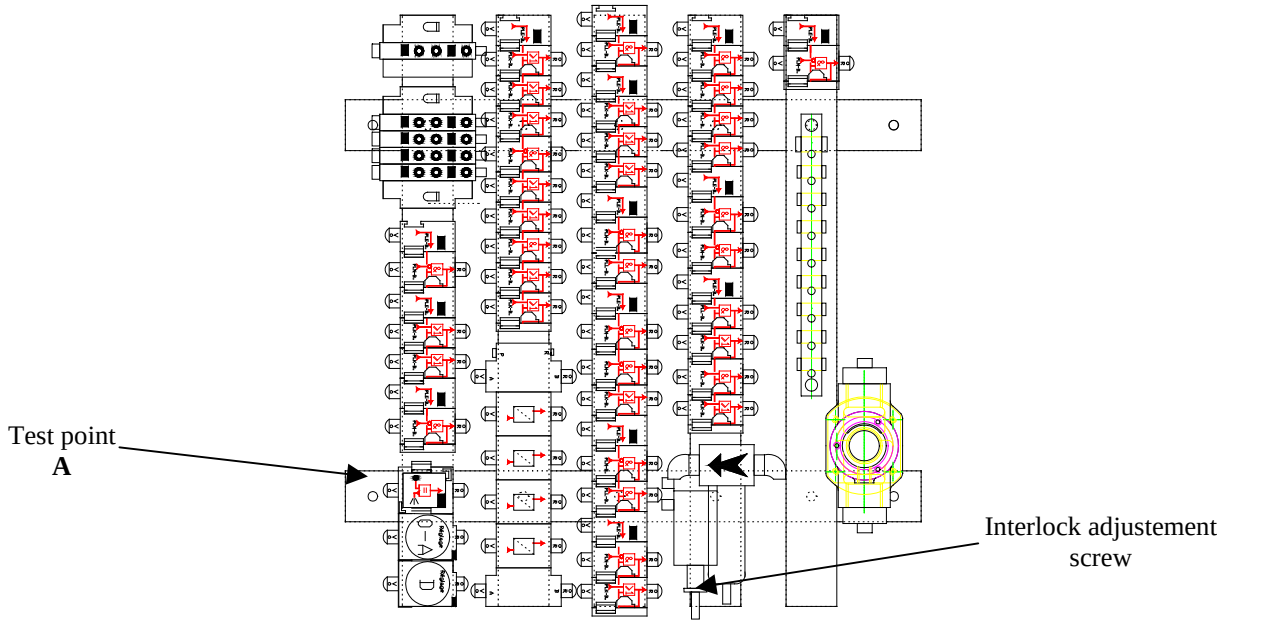
Interlock adjustment procedure

The purpose of the interlock is to detect which mode (standard or balance) the winch is operating in. It does this by reading the operating pressure in the system as both modes operate at different pressures.

Balancing mode operates at 2.1 bar, this is achieved in the set up procedure for the winch. The interlock should be re-set following the instructions below each time the balancing pressures are re-set.

In Balancing Mode:

After setting the balancing pressure, go to the interlock and first loosen off the locking nut – you may have to support both the grub screw and connecting shaft to stop all from turning.
Once this is loose, turn the grub screw as far as possible, without taking the screw completely out (if the screw does come out take care not to lose the spring from inside the interlock).
The Failure light will come on and whistle will sound when the screw is out.
Now turn the grub screw back in very slowly until you hear a slight exhaust from test point A and the failure light goes out.
At this point wind the grub screw in another full SIX turns then lock this in place with the locking nut. The interlock is now set.



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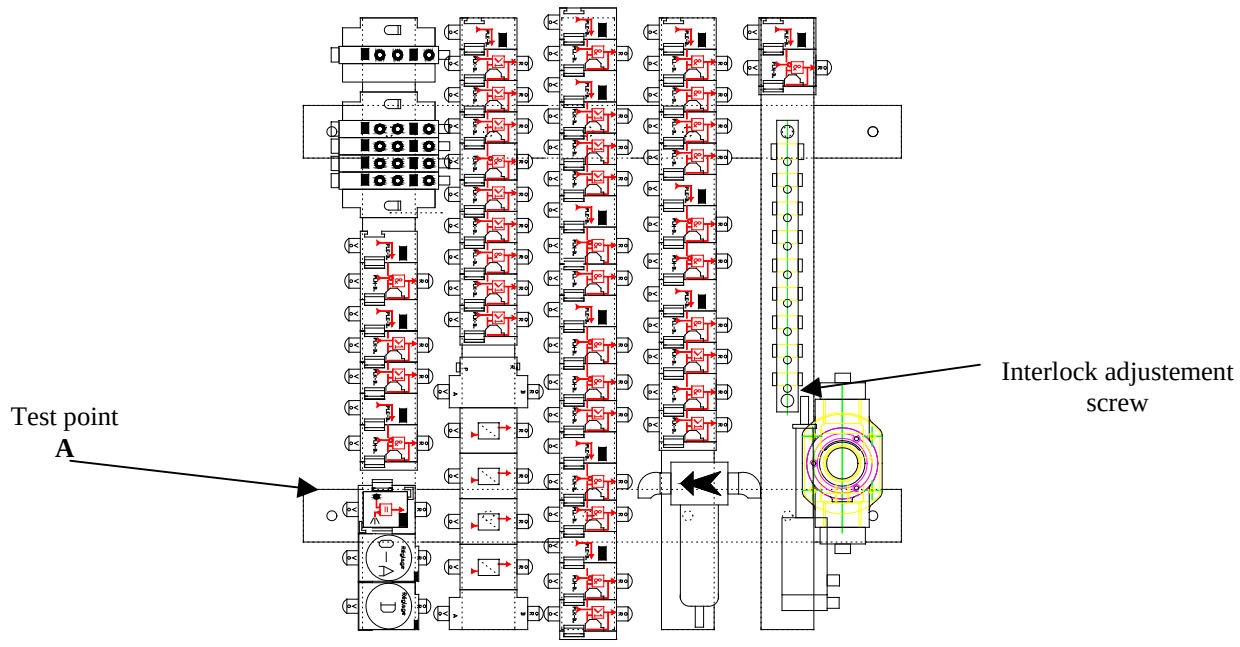


⚠ WARNING

- **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.

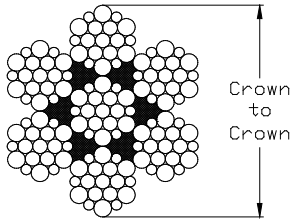
Periodic Inspection
Frequency of periodic inspection primarily depends on the severity of usage :

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 120% 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. Check oil and all lubrication levels prior to operating winch.

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 every three 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.
Oil capacity :

- LS150RLP –DP5M-F : 0,12 l

Reduction gear Recommended Lubricant :
SYNTHETIC OIL MOBIL SHC 626

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

Recommended grease

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

⚠ WARNING

- **Never perform maintenance on the winch while it is supporting a load.**
- **Before performing maintenance, hit control tags : DANGER - DO NOT OPERATE - EQUIPMENT BEING REPAIRED.**
- **Only allow service personnel trained in safety and maintenance on this winch to perform maintenance.**
- **After performing any maintenance on the winch, test winch to 120% 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.**

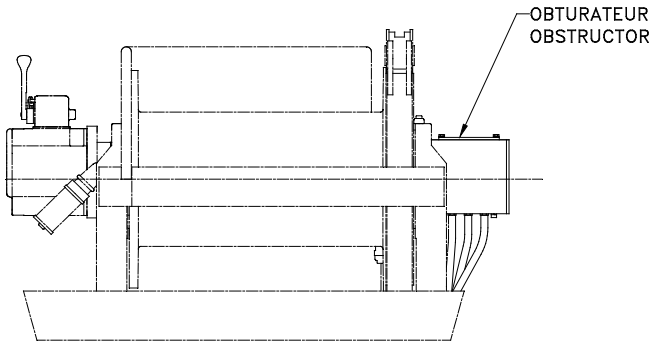
Maintenance Intervals
The Maintenance Interval chart is based on intermittent operation of the winch eight hours a day, five days a week. If winch operation exceeds eight hours a day, or use is under **HEAVY** or **SEVERE** conditions, more frequent maintenance should be performed. Refer to 'Periodic 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

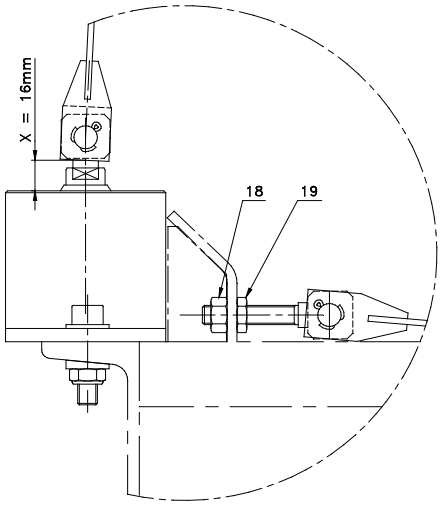
Follow the instuctions of the paragrah : Ajustement page 15



(Dwg.D6150029)

Direct Brake band on drum
(Refer to Dwg.D6150003 below)

- X = 16 mm : This dimension is adjusted with the nut (18) and secured with the conternut (19).



(Dwg.D6150003)

Internal Brake

No brake adjustment is required.
Each year, or following an intervention on the winch, it is imperative that a dynamic test be conducted on the internal brake only, at a nominal load of 120%.
To do so, follow this procedure:

- Disconnect the bank brake hose
- Blank the union that remains on the flanged union (in relation to the internal brake, see item 65 on Dwg D6150128).
- Supply the band brake with compressed air (3 bar mini.)
- Slowly lift a load of 240 daN.
- Release the control level to the neutral position.

If the load slips, replace the brake discs.

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

External Band Brake Detector disassembly
(Refer to Dwg.D6150103)

- Remove the screws (381,387) and split washer (380).
- Remove the valve support (382).
- Remove the screws (388) split washer (389)and nuts (390).
- Remove the valve (386).

Slack Wire System disassembly
(Refer to Dwg.D6150131)

- Remove the screws (352) with split washer (353).
- Remove the slack wire system
- Remove the nuts (375) with swasher (374).
- Remove the valve control (361).
- Remove the nuts (377) with swasher (376).
- Remove the nuts (365) with swasher (366).
- Remove the levers (367, 368) roller axle (350) rollers (351).and distance ring (371).
- Remove the retainer ring (372).
- Remove the axle (370) and bearing (369).

Filter regulator lubricator disassembly

- Deconnect all air hoses
- Remove the four screws

Drum Guard disassembly

- Remove the four screws

Limit Switches disassembly
(Refer to Dwg.D6150130)

1. Remove the screws (222) and cover
2. Remove the screws (229) and split washer (211).
3. Strip down the limit switches.
4. Deconnect all air hoses
5. Remove the screws (212) split washer (211) and nut (232).
6. Remove limit switch (221).
7. Remove the screws and the control valve support (224).
8. Remove the control valves (228).
9. Remove the screws (212) with split washers (211)
10. Remove the connection bloc (216).
11. Remove elbow (217).

Press Roller Disassembly
(Refer to Dwg.D6150056)

1. Remove the screws (390) with split washer (391) .
2. Remove the press roller
3. If necessary, uncrimp the axle (392) and remove the distance rings (394), side roller (397), main roller (395).
4. Remove the ball bearings (393).

Direct Brake on Drum Disassembly
(Refer to Dwg.D6150088)

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
   - 2.4. Remove the screws (13) with split washer (14) and strip down the cylinder body's (18) and the cylinder bottom (22).
   - 2.5. Strip down the piston (19) and the spring (20) and remove the joints (12) and 'O'Ring (21)
     and guide ring (17).

Winch disassembly
(Refer to Dwg.D6150128)

1. Mark the hoses to avoid connection errors.
2. Disconnect all the hoses from the connection distributor, the torque limiter and the flanged union (supply orifice of the band brake).
3. Remove the connection distributor
   - Disconnect the supply hoses (winch standard and balancing).
   - Remove the screws (197)
   - Remove the distributor (Refer to the related Disassembly chapter)
4. Remove the torque limiter (57)
   - Remove the screws (179) (Refer to the related Disassembly chapter).
5. Remove the air motor
   - Remove the screws (151)

- Remove the motor and be careful not to damage the seal ring mounted on the flanged union (Refer to the related Disassembly chapter).

6. Remove the four screws (109) and remove the brake gear assembly (62) and set to one side for further disassembly if needed.
7. Remove nut (51), washer (52) and screws (54) to disassembly winch from skid frame
8. Stand the winch in a vertical position with the motor side up.
9. Remove screws (56) and washers (38) to remove distance piece (41)
10. Remove screws (37) and washers (38) to remove front flange (54).
11. Strip down screws (68) and remove stop (67)
    Remove front bearing ass'y
    If necessary,
    - Remove circlip (45) and (47)
    - Expel bearing (48) from rolling bearing (46) and front bearing (66)
    - Remove joint (49)
12. Remove pinion (44) and toothed wheel (43)
13. Remove the drum (71).
    - Remove the circlip (42) , the joint (32) from the drum.
    - If necessary, remove the screw (40) to remove the washer (39).
14. Disassembly of rear side of winch.
    - Remove screws (37) and washers (38) to remove the rear bearing (34) from rear flange
    - Remove ball bearing (33) from the rear bearing (34).

Brake Gear disassembly

(Refer to Dwg.D6150083)

Refer to Winch disassembly section to begin brake gear (62) disassembly.

1. Stand the reduction gear assembly in a vertical position so the output shaft (85) is down.
2. Remove the 'O'ring (108).
3. Remove the screws (107).
4. Remove the flange (112) and 'O'ring (110).and springs(103).
5. Remove the washer (102) and the brake discs (97,98).
6. Remove the coupling sleeve (104).
7. Supply compressed air through the supply hole in the housing of the brake piston (100) so as to remove it.
8. Remove the 'O' rings (99,101).
9. Remove the retainer ring (84).
10. Put a drain pan under the ass'y to collect the oil from the reducer.
11. Hold the reducer by the casing (91) and knock on the output shaft with the mallet to separate the casing (91) from the brake body (111).
12. Remove the planet pinion cage ass'y and the input shaft.
13. After removing the axes from the planet pinions (88), remove the planet pinions (92), the needle roller cage (89) and the spacer (90).
14. Remove the circlip (106) and remove the input shaft (116).
15. Remove the circlip (113) and the bearing (115).
16. Remove the annulus (93), the felt seal (114), the pins (95), the bearing (94) and the ring seal (105).
17. Remove the outer circlip (86) and then remove the bearing (87) and the output annulus (81).
18. Remove the bearings (81, 83) and the ring seal (82).

Air Gear Motor Disassembly .

(Refer to. Dwg. D6180084)

1. Remove the screws (114) and lock washers (143) to remove the motor ass'y from the motor housing.
2. Remove the 'O' ring (137).
3. Remove screws (150).
4. Remove the motor cover (143) and gasket (152). If necessary, remove bearings (145,148), spool front stop (147) and pins (138).
5. Immobilize the motor rotors with an axle between the teeth and remove nuts (131,136).
6. Remove the drive gear (135) and the idle gear (149) remove the retainer ring (146) and internal ring.

⚠ CAUTION

Take all necessary precautions to avoid damaging the rotors. Use a mallet to disengage the rotors

7. Remove the screw (133) and the washer (132).
8. Remove ball bearings (130,134).
9. Remove the selector stop (153),ball (154) and 'O' rings (155).

Torque limiter ass'y disassembly

(Refer to Dwg.D6360089)

1. Disconnect hoses
2. Remove screws (179) with usit ring (181) to remove the torque limiter ass'y from the motor.
3. Remove 'O'rings (180 and 178) if necessary.
4. Remove the screw (176) and the joint (177).
5. Remove the 4 screws (161) to remove the cover (162).
6. Remove the valve (165) and. 'O' ring (163).
7. Remove the spacing piece (170) ,washer(167) and the diaphragm (166).
8. Remove the 4 screws (161) to remove the cover (175).
9. Remove the valve (174) , the'O' ring (173) and the spring (171).
10. Remove the nut (172) and washer (167) to remove diaphram (166) .

Directional control valve ass'y disassembly

(Refer to Dwg.D6150090)

After disconnecting the hoses and pipes and after removing the screws (197), remove the connection distributor

1. Remove the cover (205) and the plug (202).
2. Remove the screw (192) the washer (193).and the cover (190)
3. Remove the plug (202) , the joint (199).and the spring (200).
4. Insert a drift punch in the hole of the rack (196) to prevent its rotation and release the screw (191
5. Remove the washer (194) and the diaphragm (195).
6. Remove the piston (196).
7. Remove the screw (203).
8. Remove the spacing piece (201).
9. If necessary ,remove the joint (199).

Control valve disassembly

(Refer to Dwg.D6150104)

1. Deconnect all air hoses.
2. Remove the screws (625) with split washer (626).
3. Remove the valve assembly and base plate (632) from the support (622).

4. Remove the screw (634) with split washer (610).
5. Remove the angle bracket (614) and directional valves (606) from the base plate (632).
6. Remove the 'O' ring (630).
7. Remove the screw (628)
8. Carefully slide out the rotary valve (629) with stop(629), spring (637) and control lever (618) (check the position of this rotary valve.
9. Tap out pin (636) and extract the control lever (618)
10. Remove the stop (629), spring (637) and 'O' ring (627).

Cleaning, Inspection and Repair

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

Cleaning

⚠ CAUTION

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

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

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

Winch.
1. Inspect all gears for worn, cracked, or broken teeth.
2. Inspect all bushings for wear, scoring, or galling.
3. Inspect all bearings for play, 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.
6. Inspect the brake stationary plates and friction discs for oil. If the friction discs have become oil-soaked, replace them. If the stationary plates have become glazed, sand them lightly using fine emery cloth and a flat surface as backing. Inspect the remaining brake parts for warpage or other damage, and replace damaged parts as necessary. Replace the input pinion shaft oil seal.

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 .

3. Inspect brake cylinder joints and the internal diameter surface condition of wrapper cylinder - replace them if necessary.
4. Check the spring condition - 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.

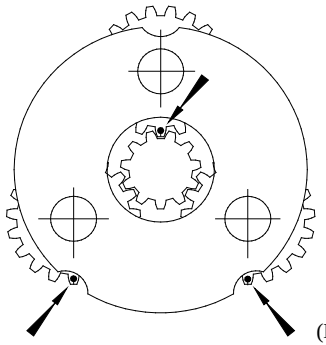
11. Worn or damaged parts must be replaced. Refer to the applicable Parts Listing for specific replacement parts information.
12. Inspect all remaining parts for evidence of damage. Replace or repair any part which is in questionable condition.
13. Smooth out all nicks, burrs, or galled spots on shafts,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

Assembly Instructions

Air Gear Motor Assembly
(Refer to Dwg. D6150084)
1. Install .the selector stop (153),ball (154) and 'O' ring (155) in the motor housing.
2. Lubricate ball bearings (130 ,134) with grade 2 grease and install are in the motor housing (141). .
3. Install screw (133) with washer (132).
4. Install internal ring of bearing and retainer ring (146) on the drive gear (135).
5. Install the rotors set in in the motor housing (141).
6. Immobilize the motor rotors with an axle between the teeth and install nuts (131,136) secured with Loctite®243.
7. Install Bearing (145,148) , joints (147) and pin (138) in the motor cover (142).
8. Install the motor cover (142) on motor housing. Ensure pins (138) are fully aligned and engaged. Install the screw (150) secured with Loctite®243
9. Check that the 'O ' ring (137) is correctly installing in the motor housing (140).
10. Install the motor ass'y with gasket (152) in the motor housing and secure with screws (144) and split washers (143).
11. Check to ensure motor turns smoothly in both directions.

Brake Gear Assembly
(Refer to Dwg. D6150083)
1. Install oil seal (82) in the bore of the gear housing (91) so seal lip is toward the planet assembly side.
2. Press bearings (81 and 83) into the gear housing (91).
3. Install retainer ring (84) on the output shaft (85) and press output shaft into the gear housing.
4. Install ring gear (80) and bearing (87) on output shaft and secure in position with retainer ring (86).

5. Press bearing (115) onto the sun gear (116) and locate with retainer ring (113). Install sun gear (116) with bearing (115) in the planet support (117) and secure with retainer ring (106).
6. Install two bearings (89) with a spacer (90) between in the bore of each planetary gear (92).
7. Position each assembled planetary gear in the planet support (117). with the timing mark (as shown on drawing Dwg. D6310013).and carefully install planet axles (88).



(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 planetary gear assembly and ring gear (93) in the gear housing (91).
9. Install Ball bearing (94) on the planet support (117).
10. Place the reduction gear assembly in a vertical position with the planetary gear end up.

Fill the gear assembly with clean oil **SYNTHETIC OIL MOBIL SHC 626**

- Capacity of gear box : 0,12 Litres

11. Install oil seal (105) and pins(95) in the brake body (111) (so seal lip is toward planetary gear side).
12. Install cylinder piston (100) with 'O'Rings (99,101).
13. Install the friction discs (97) , steel discs (98) and coupling sleeve (104) (strictly obey the position of these discs).
14. Install washer (102) on the brake piston (100). Supply compressed air through the supply hole of the housing of the brake piston (100) to ensure that the piston moves correctly (do the operation several times).
15. Install oil seal (105) (seal lip is toward air gear motor side).and retainer ring (106) in the flange (112).
16. Install the pins (96),'O' ring (110) (hold the seal in its housing by applying a small quantity of grease) and the springs (103) (hold the springs in their housings by applying a small quantity of grease) on the flange (112).
17. Install flange (112) on the brake body. Install the screw (107) secured with Loctite®243 ,this screws will have to be tightened to torque 15 Nm
18. Install the 'O' ring (108) .

Winch Assembly

(Refer to Dwg. D6150128)

1. Assembly of rear side of winch.
2. Install the rear bearing (34) in the rear flange (54) and secure with screw (37) and split washer (38) It will have to be tightened with 4.83 mkg torque.
3. Position the rear flange on several block of wood with the rear flange (54) .
4. Check that the washer (39) is installed in the drum.
5. Install bearing (33) and joint (32) on the drum (71).
6. Install the drum ass'y onto the rear bearing (34) with the band brake (1).
7. Install circlip (42) , Toothed wheel (41) in the drum (56).
8. Install bearing (48) in the ring (46) and secure with circlip (47).
9. Install joint (49) and the bearing with ring ass'y on the front bearing (66).
10. Install front bearing ass'y and the stop ring (67) in the drum (71)
11. Install screws (68) secured with Loctite®243.
12. Install front flange (54) with screws (37) and split washer (38). It will have to be tightened with 4.83 mkg torque
13. Assembly of winch on the skid frame (Refer to Dwg.D6150128)
    - 13.1. Install the two distance part (41) with screws (56) and washer (38) on the winch. The screws (56) will have to be tightened to torque 4,83 mkg only after winch has been put on skid frame
    - 13.2. Install the winch on the skid frame (50) and secure with screw (53), split washer (52) and nuts (51).
14. Install the pinion (44) with screw (69) and nut (70) on the output shaft (85)
15. Install brake gear assembly (62) with screw (109) secured with blue Loctite ® 243 ,this screws will have to be tightened to torque 15 Nm
16. Install the pins (138) and gasket (139) on the motor housing (140).

⚠ CAUTION

When installing the motor on reducer-brake, be careful not to damage the lip of the ring seal (105) (Refer to Dwg. D6150083)

Direct brake on Drum Assembly

(Refer to Dwg .D6150088).

1. Assembly of the brake cylinder
    - 1.1. Install 'O'Ring (21) on the piston (19)
    - 1.2. Install joint (12),guide ring (17) in the cylinder cover (15).
    - 1.3. Install muffler (16) on the cylinder body's (18)
    - 1.4. Install cylinder body's(18), piston (19) and spring (20) on the cylinder cover (15).
    - 1.5. Install the cylinder bottom (22) and secure with screw (13) and split washer (14).
    - 1.6. Install the eyelet screw (4) on the piston (19).
    - 1.7. Install the cylinder ass'y (5) with screws (9) and locknut (10) on the skid frame.

2. Assembly of band brake
    - 2.1. install the band brake on the cylinder ass'y (5) with axle (3) and pin (2)
    - 2.2. Install the second eyelet screw (4) on the other end of band brake with axle (3) and pin (2).
    - 2.3. Intall the eyelet screw in the fixed point with nuts (6-7)
    - 2.4. Adjust the brake band ass'y (see adjustment section)

Contol Valve Assembly

- Lubricate and install ‘O’ ring (627) on rotary valve (629).
- Lubricate and carefully install rotary valve in valve housing (620).
- Lubricate and install spring (637) on rotary valve.Ensure pins (638) are intalled in valve housing (620) and control lever (618) , or pin (644), screw (645), washer (610) for new version.
  Fixed pins (638) and (644) with Loctite 601 and secure screw (178) with Loctite 243
- Install bracket stop (619).Apply a small amount of LOCTITE® 243 to threads of screws (628) and install.
- Install control lever (618) on rotary valve and align pin hole .Install pin (638) to secure control lever.
- Lubricate and install ‘O’ ring s (630) on base plate (632).
- Install the angle bracket (614) with the screw (634) and split washer (610).
- Install the directionnal valve (606) on the angle bracket with the screw (611) and split washer (612).
- Install the control valve and the base plate on the consol with the scews (625) and split washer (626).
- Install the lever and bellows (641).

Accessories Assembly

There is no particular difficulties as regards the installation of accessories. Follow the disassembly procedure in the reverse order. Refer to the related chapters. This concerns

- the torque limiter ass'y (Refer to Dwg.D6150089)
- the limit switches ass'y (Refer to Dwg.D6150130).
- the slack wire system ass'y (Refer to Dwg.D6150131)
- the press roller ass'y (Refer to Dwg.D6150056).
- the external band brake detector ass’y (Refer to Dwg.D 6150103) .

TESTS

Testing

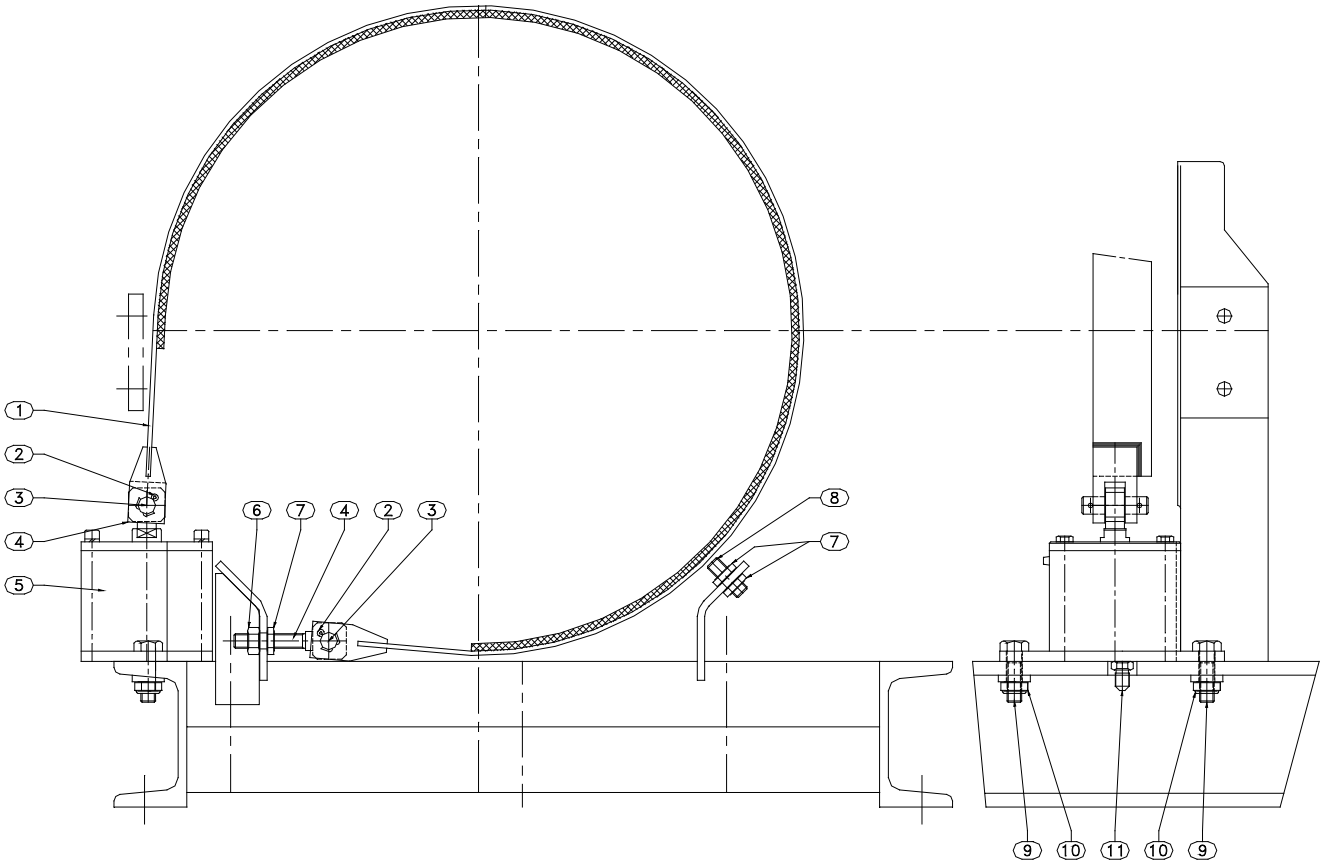
Operational Tests

Prior to initial use, all new, altered or repaired winches shall be tested to ensure proper operation.
Conduct the tests as per procedure 12, chapter:
Test and adjustment procedure.

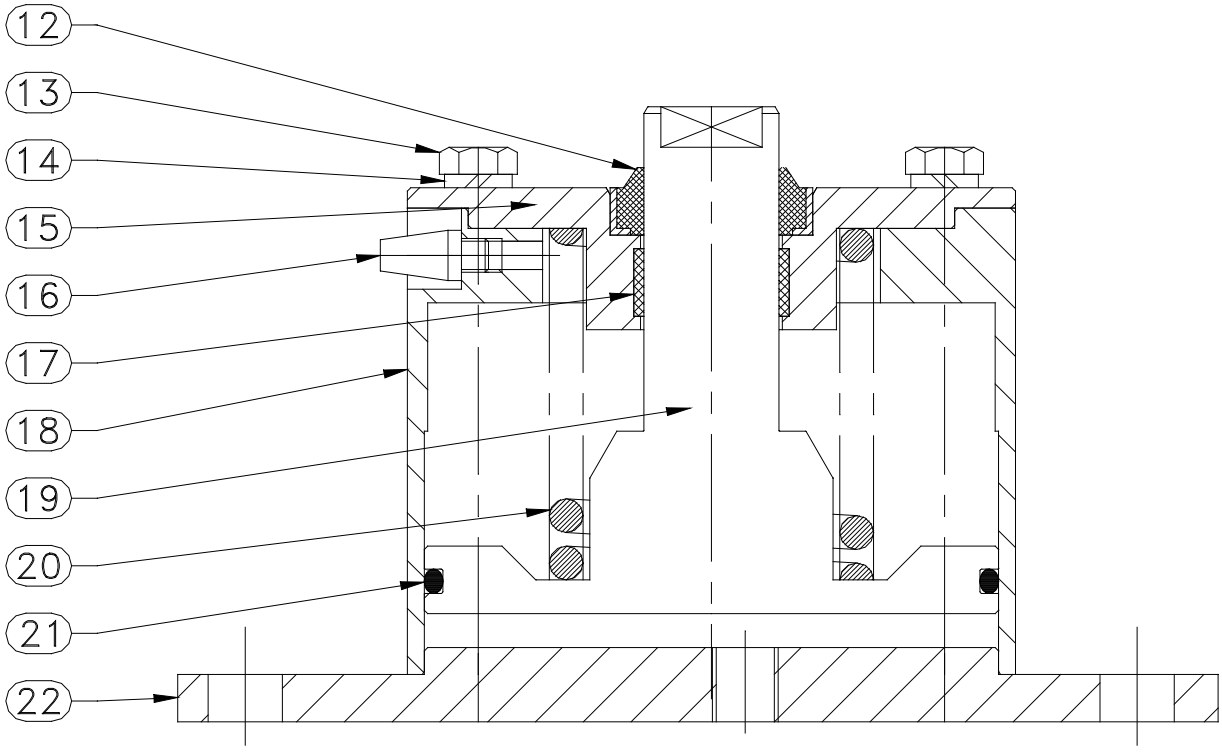
Load Test

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 120 % of the rated line pull.

EXTERNAL BAND BRAKE AND CYLINDER DRAWING



(Dwg.D6150087)



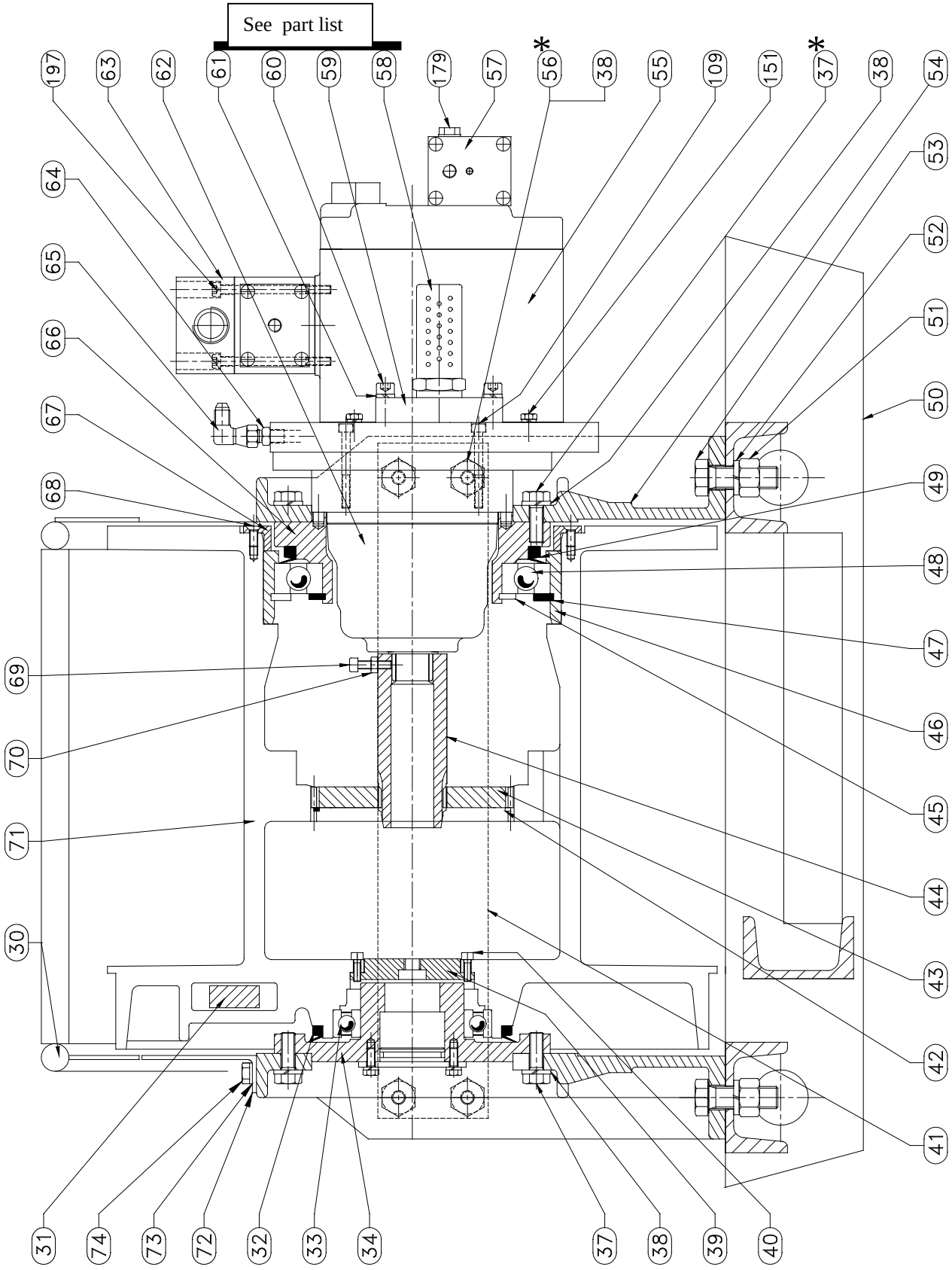
(Dwg.D6150088)

EXTERNAL BAND BRAKE AND CYLINDER PART LIST

ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
• 1	Brake band	1	9615-7174
• 2	Pin	4	4630-2019
3	Axle	2	9615-7175
4	Eyelet screw	2	9615-7272
5	Cylinder Ass'y (incl's item 12 through 22)	1	7615-8353
6	Nut	1	4300-6911
• 7	Nut	2	4320-2112
8	Screw	1	4200-4207
9	Screw	2	4102-2701
10	Locknut	2	4300-8011
11	Fitting	1	51029 + 6823-7528
• 12	Joint	1	5801-6730
13	Screw	4	4102-1301
14	Split Washer	4	4520-1006
15	Cylinder cover's	1	9615-0434
16	Muffler	1	6848-9232
18	Cylinder body's	1	9615-0433
19	Piston	1	9615-7350
20	Spring	1	6919-8132
• 21	'O' Ring	1	5822-3029
22	Cylinder Bottom	1	9615-0352

• Recommended Spares Parts

WINCH ASSEMBLY DRAWING



(Dwg.D6150128)

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

WINCH ASSEMBLY PART LIST

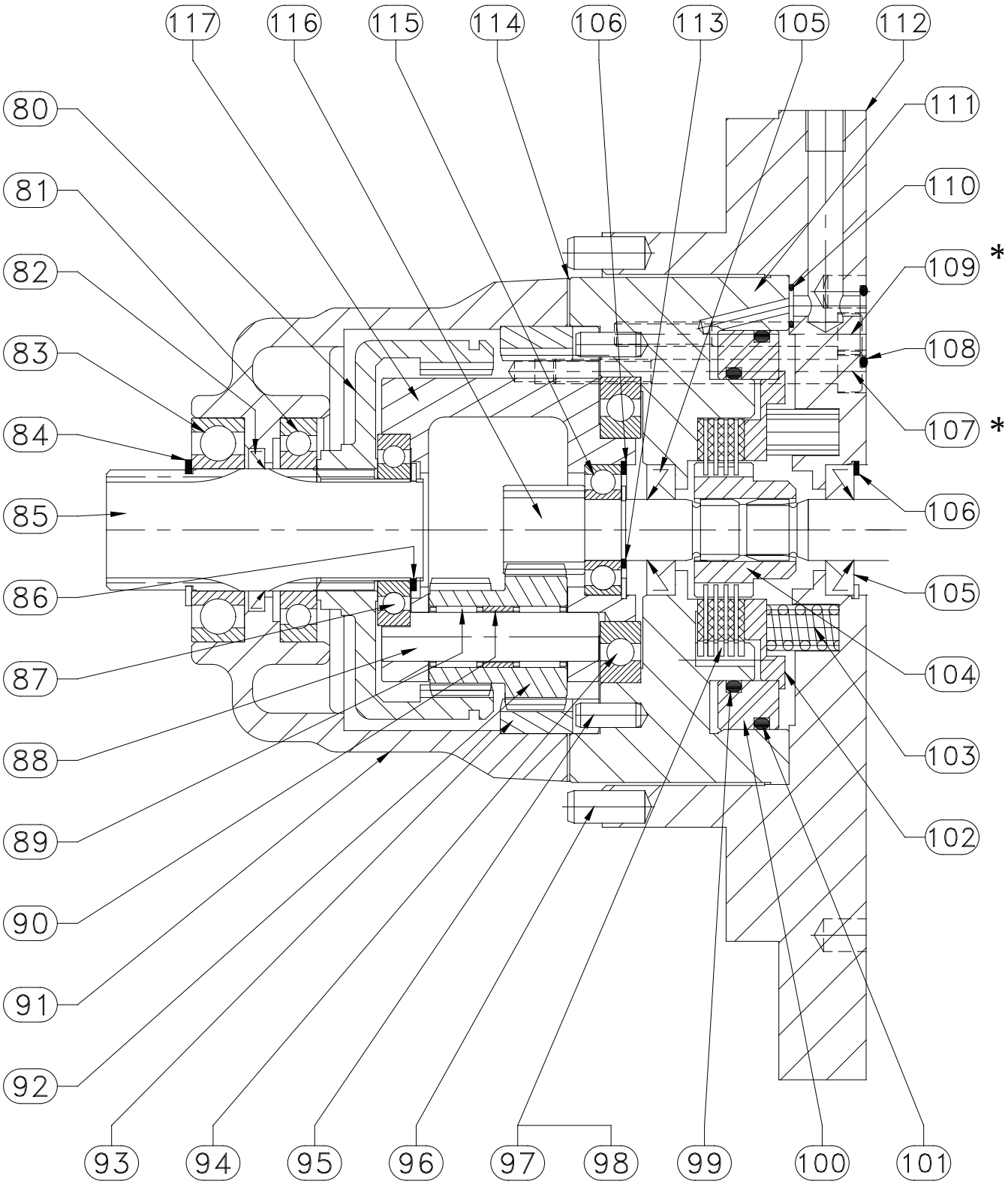
ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
30	Drum Guard	1	9615-0201
31	Wedge	1	9615-0117
• 32	Joint	1	5840-4831
33	Ball Bearing	1	5005-0015
34	Rear Bearing	1	9615-8049
37	Screw	15	4102-0401
38	Split Washer	23	4520-1010
39	Washer	1	9615-0147
40	Cap screw	4	4130-8706
41	Distance Ring	2	9615-0591
42	Expensive Ring	1	4784-7832
43	Toothed wheel	1	9615-0249
44	Pinion	1	9615-7248
45	Circlip for Shaft	1	4770-0130
46	Ring	1	9615-0247
47	Circlip for Bore	1	4770-3200
48	Ball Bearing	1	5080-0026
• 49	Joint	1	5840-5831
50	Skid Frame	1	9615-8354
51	Nut	4	4300-7911
52	Split Washer	4	4520-1016
53	Screw	4	4102-2601
54	Flange	2	9615-7002
55	Air Gear Motor ass'y	1	7615-0362
56	Screw	10	4102-0801
57	Torque limiter ass'y	1	7636-0045
58 *	Mufler	2	6849-0632
59 *	Flange	2	9615-0342
60 *	Cap screw	4	4132-5006
61 *	Split Washer	4	4520-1008
62	Brake Gear ass'y	1	7615-0363
63	Air pilot valve ass'y	1	7615-0384
64	Fitting	1	6823-7528
65	Elbow	1	6814-4128
66	Front Bearing	1	9615-7246
67	Stop	1	9615-0051
68	Screw	6	4110-4503
69	Screw	1	4131-2206
70	Nut	1	4300-6211
71	Drum	1	9615-7001
72	Protector	1	96150569
73	Screw	2	41020501
74	Lockwasher	2	45201008
• 109	Cap screw	4	4132-2506
151	Screw	4	4102-0301
179	Screw	2	9636-0022
197	Cap screw	4	4133-1306

* Only for four units Serial Numbers 010135,010271,010261,010301

• Recommended Spares Parts

BRAKE GEAR ASSEMBLY DRAWING

(Dwg.D6150083)



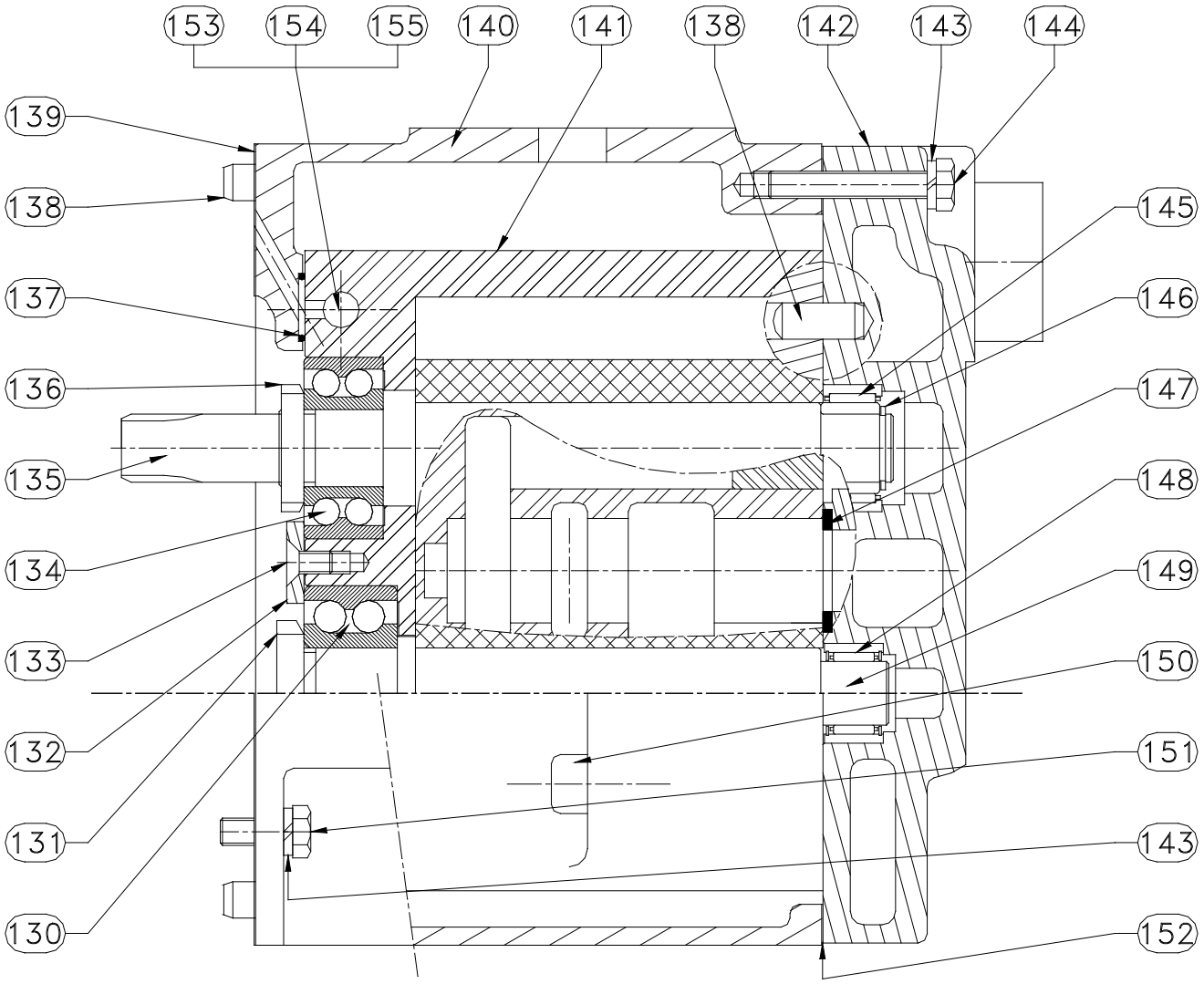
* secured with Loctite ®243
this screws will have to be tightened to torque 15 Nm

BRAKE GEAR ASSEMBLY PART LIST

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
80	Ouput annular gear	1	9609-0094
81	Ball Bearing	1	5080-0006
• 82	Sealing Ring	1	5801-7530
83	Ball Bearing	1	5005-0006
• 84	Circlip for Shaft	1	4770-0029
85	Output Shaft	1	9618-7061
• 86	Circlip	1	4780-2139
87	Ball Bearing	1	5080-0005
88	Planet Axle	3	9609-0039
89	Needle Bearing	6	5650-1513
90	Spacer	3	9609-0095
91	Gear housing	1	9618-0005
92	Planet Gear	3	9609-0096
93	Ring Gear	1	9609-0038
94	Ball Bearing	1	5080-0009
• 95	Pin	2	4600-1116
• 96	Pin	2	4600-0416
• 97	Friction disc	5	6302-8241
• 98	Steel disc	4	6302-8341
• 99	'O' Ring	1	5823-5129
100	Brake piston	1	9618-0126
• 101	'O' Ring	1	5823-5229
102	Washer	1	9615-0479
103	Spring	4	6916-5532
104	Coupling sleeve	1	9618-0128
• 105	Sealing ring	2	5802-0330
• 106	Circlip for Bore	2	4770-3032
107	Cap screw	4	4133-1306
• 108	'O'Ring	1	5821-8129
• 109	Cap screw	4	4132-2506
• 110	'O'Ring	1	5821-2529
111	Brake body	1	9615-0359
112	Flange	1	9615-0341
113	Circlip for shaft	1	4770-0015
• 114	Paper Joint	1	9618-0042
115	Ball Bearing	1	5000-0002
116	Shaft Spindle	1	9615-7360
117	Planet Support	1	9618-0041

• Recommended Spares Parts

AIR GEAR MOTOR ASSEMBLY DRAWING AND PART LIST



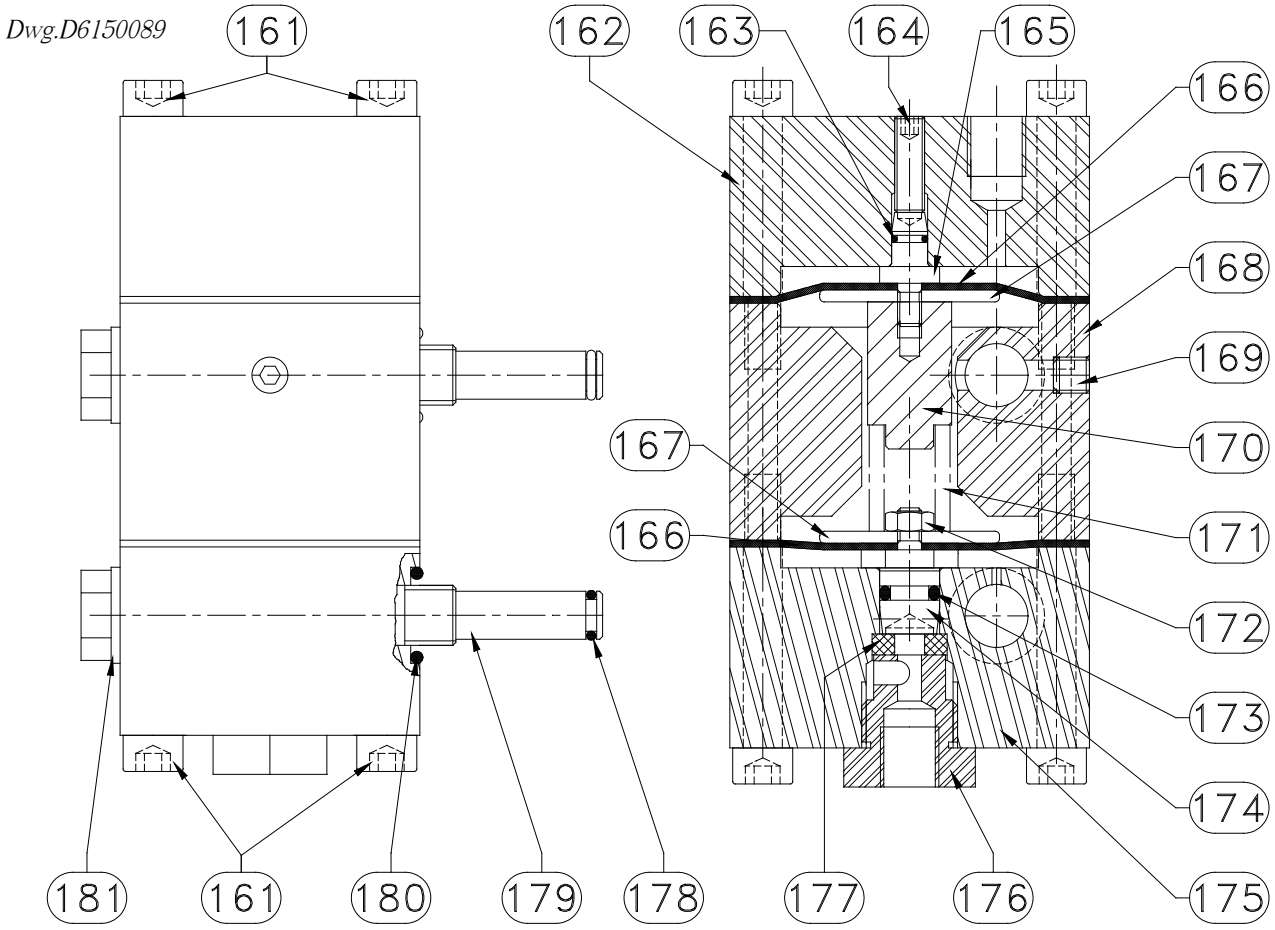
(Dwg.D6150084)

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
130	Ball Bearing	1	5060-0004
131	Slotted nut	1	5700-0004
132	Washer	1	9631-0054
133	Screw	1	4110-3403
134	Ball Bearing	1	5060-0003
135	Drive gear	1	9620-0094
136	Slotted nut	1	5700-0003
• 137	'O'Ring	1	5822-1729
• 138	Pin	6	4600-0416
• 139	Paper joint	1	9631-0045
140	Motor Housing	1	9631-0078
141	Motor Housing	1	9615-0361
142	Motor Cover	1	9615-0344
143	Split Washer	9	4520-1006
144	Screw	5	4101-9001

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
145	Needle bearing	1	5646-2813
• 146	Shaft segment	1	4783-6732
• 147	Spool front stop	2	9620-0069
148	Needle bearing	1	5649-2213
149	Idle gear	1	9620-0095
150	Cap screw	4	4132-1506
151	Screw	4	4102-0301
• 152	Paper joint	1	9631-0118
153	Selector stop	1	9609-0223
154	Ball	1	6940-1625
• 155	'O'Ring	1	5821-2229

• Recommended Spares Parts

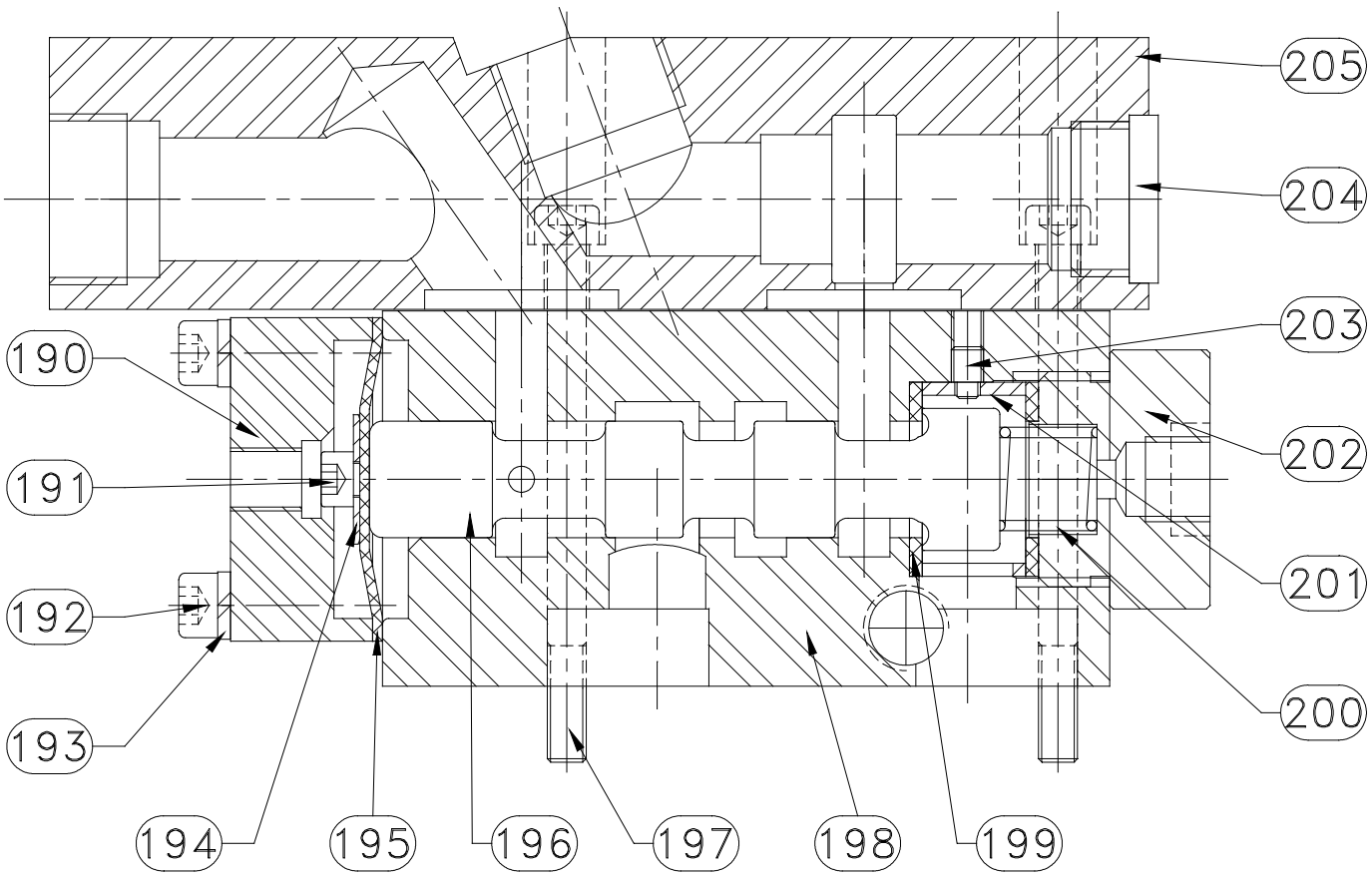
TORQUE LIMITER ASSEMBLY DRAWING AND PART LIST



ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
160	Torque limiter ass'y (incl's item 201 through 221)	-	7636-0043
161	Cap screw	8	4132-7406
162	Cover	1	9636-0041
• 163	'O'ring	1	5822-2329
164	Screw	1	4200-7307
165	Valve	1	9636-0017
• 166	Diaphragm	2	9636-0020
167	Washer	2	9636-0019
168	Body	1	9636-0038
169	Screw	1	4200-7807
170	Spacing piece	1	9636-0044
171	Compression spring	1	6915-4541
172	Nut	1	4300-1111
• 173	'O'ring	1	5821-4029
174	Valve	1	9636-0040
175	Cover	1	9636-0039
176	Screw	1	9636-0018
• 177	Joint	1	9636-0042
• 178	'O'ring	2	5820-9229
179	Screw	2	9636-0022
• 180	'O'ring	2	5821-0729
• 181	Joint Usit-ring	2	5840-9731

• Recommended Spares Parts

DIRECTIONAL CONTROL VALVE ASSEMBLY DRAWING AND PART LIST



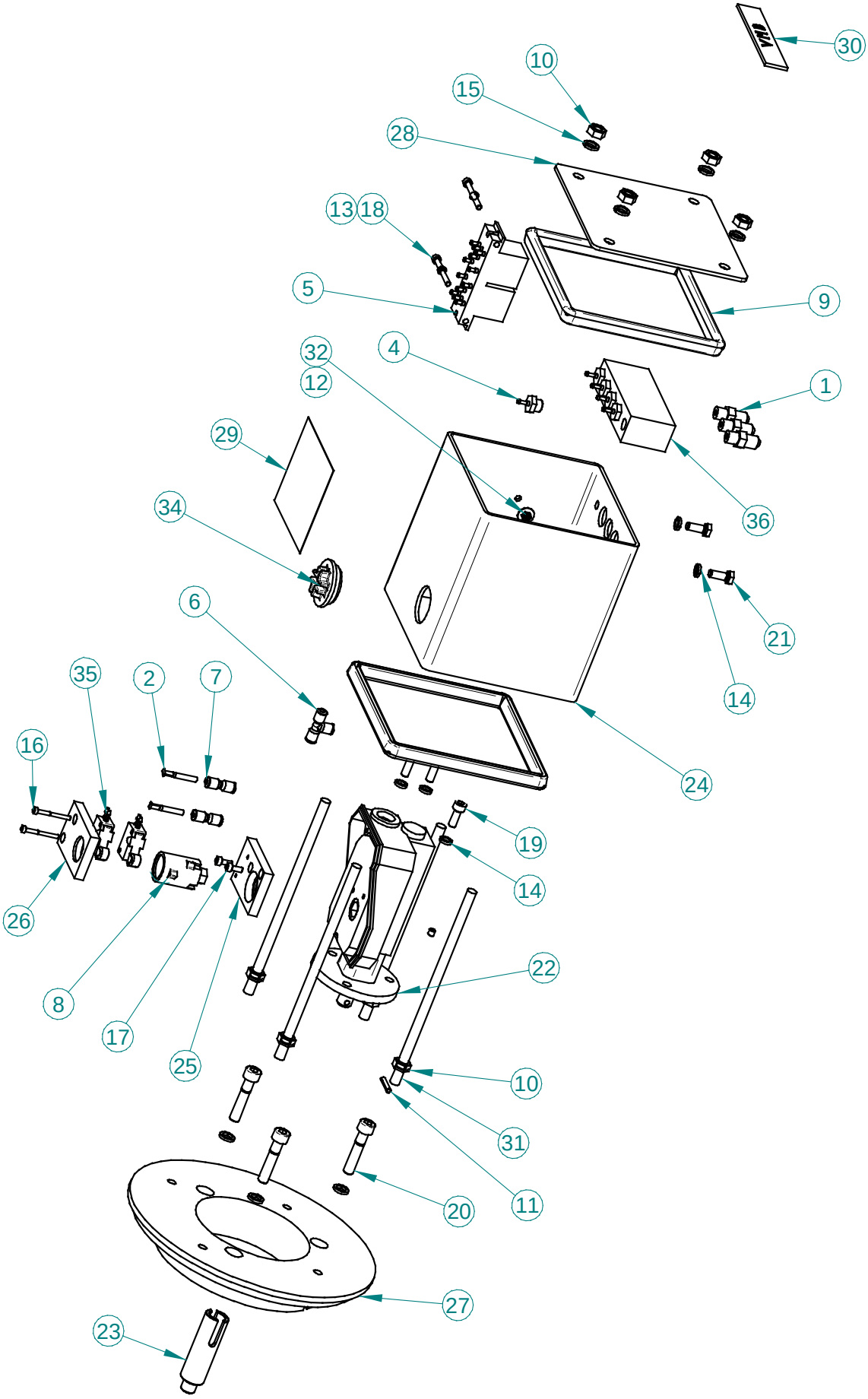
D6150090.dwg

ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
190	Cover	1	9615-0378
191	Cap screw	1	4132-6306
192	Cap screw	4	4132-2306
193	Split washer	4	4520-1006
194	Washer	1	4570-0005
195	Diaphragm	1	9636-0020
196	Piston	1	9615-0376
197	Cap screw	4	4133-1306
198	Directional control valve body's	1	9615-0377
199	Joint	2	9615-0383
200	Spring	1	6915-8732
201	Spacing piece	1	9615-0382
202	Plug	1	9615-0375
203	Scew	1	4200-8307
204	Plug	1	6516-0932
205	Cover	1	9615-0374

- tommended Spares Parts

LIMIT SWITCHES AS SEMBLY DRAWING

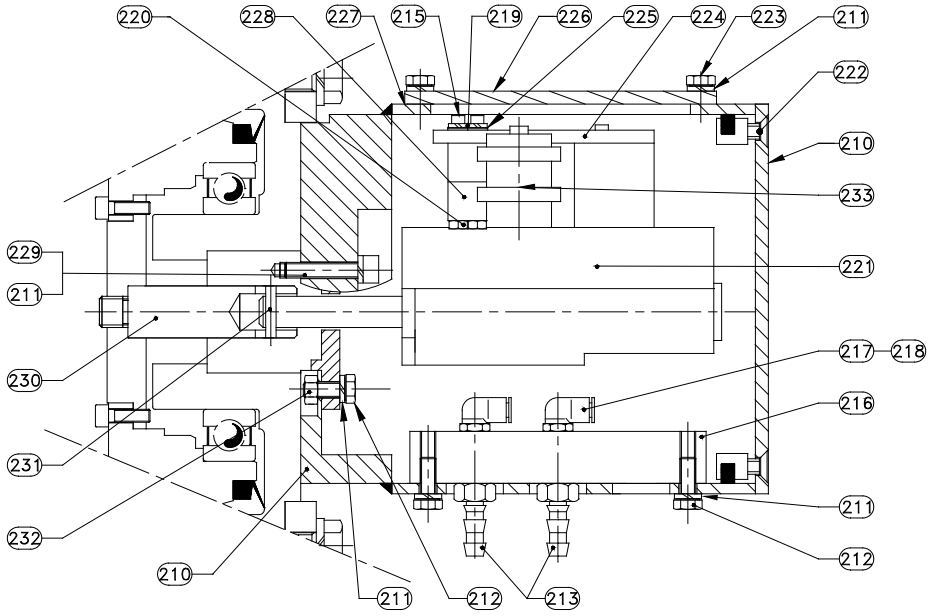
Valid for winches with serial number from : 00.00.00 (Year-Month-Chornological Nbr)



LIMIT SWITCHES A SSEMBLY PARTS LIST

ITEM N°	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
1	Fitting	3	68237528
2	Plug	2	61045628
4	Fitting	5	61694932
5	Control Valve	1	68523441
6	Tee Hose Union	1	58255860
7	Hose union	2	58257163
8	Cam assembly	1	96150561
9	Seal	2	69761541
10	Nut	9	43003511
11	Pin	1	46503420
12	Washer	2	45001104
13	Washer	2	45201004
14	Split Washer	5	45201006
15	Lockwasher	11	45201008
16	Screw	2	41332006
17	Screw	2	41313606
18	Screw	2	41331406
19	Screw	3	41322606
20	Screw	3	41326706
21	Screw	2	41020301
22	Limit switch reducer	1	95060150
23	Connecting shaft	1	96150258
24	Casing	1	96150553
25	Control valve support (down)	1	96150555
26	Control valve support (up)	1	96150556
27	Flange	1	96150557
28	Cover	1	96150566
29	Label	1	96150462
30	Label V.M.D	1	96150427
31	Threaded rod	4	09990008
32	Nut	2	43001111
33	Hose	1	68094832
34	Plug	1	61019728
35	Control Valve	2	68558741
36	Connection bloc	1	96150558

OLD LIMIT SWITCHES ASSEMBLY DRAWING AND PARTS LIST



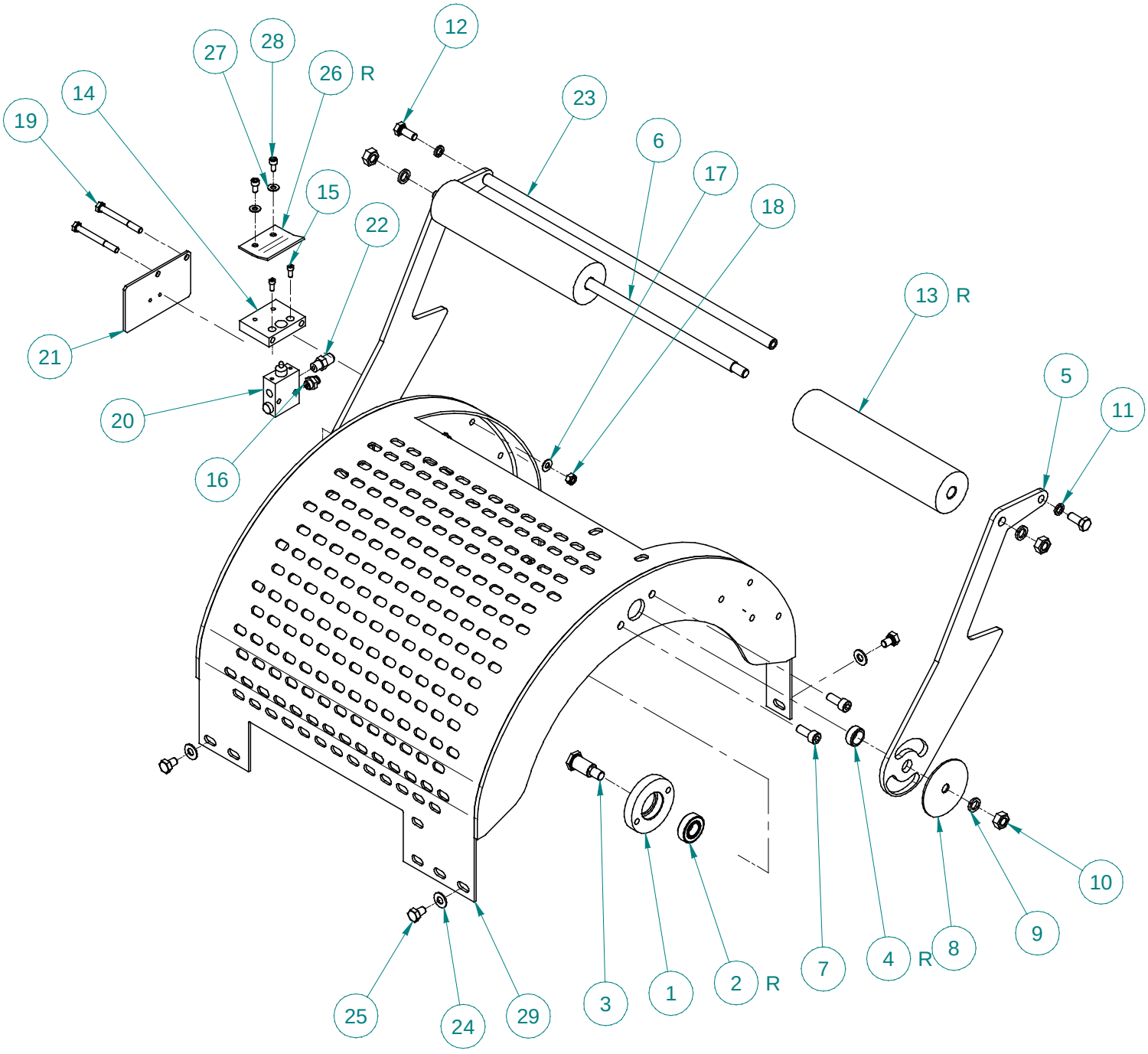
(Dwg D6150130)

ITEM NO	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
210	Box	1	9615-0254
211	Split Washer	13	4520-1006
212	Cap screw	5	4132-2606
213	Fitting	2	51029 + 68237528
215	Cap screw	2	4133-1406
216	Connection Bloc	1	9615-0386
217	Elbow	2	3199 04 10
218	Hose	1m	6804-5328
219	Split Washer	2	4520-1004
220	Nut	2	4300-1111
221	Limit switch	1	9506-0150
222	Screw	4	4110-4503
223	Screw	4	4102-0301
224	Control Valve Support	1	9615-0255
225	Flat Washer	4	4500-1104
226	Cover plate	1	9615-0261
• 227	Paper joint	1	9615-0431
228	Control Valve	2	6852-3641
229	Cap screw	2	4132-2306
230	Connecting Axle	1	9615-0258
• 231	Pin	1	4650-3420
232	Nut	3	4300-6211
233	Cam assembly	1	96150561

• Recommended Spares Parts

SLACK WIRE SYSTEM WITH DRUM GUARD ASSEMBLY DRAWING

Valid for winches with serial number from : 05-05-01(Year-Month-Chornological Nbr)



(Dwg.36150533)

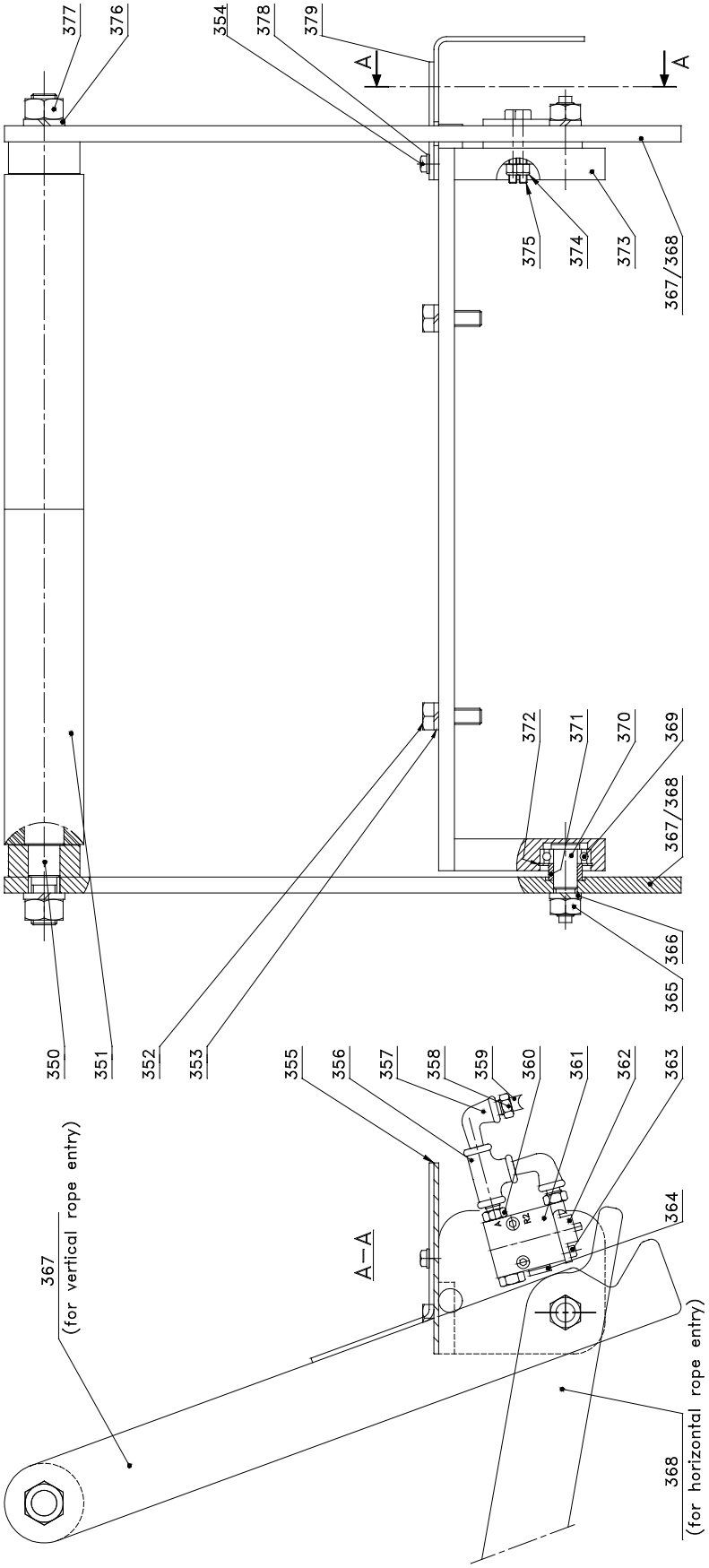
SLACK WIRE SYSTEM WITH DRUM GUARD ASSEMBLY PART LIST

ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
1	Support Bearing	2	96150613
2	Ball Bearing	2	50050002
3	Axle	2	96150588
4	Spacer	2	96150615
5	Slack Arm	2	96150505
6	Axle Roller	1	96150503
7	Screw	4	41321806
8	Washer	2	96150612
9	Lock Washer	4	45201010
10	Nut	4	43006911
11	Lockwasher	2	45201008
12	Screw	2	41020501
13	Roller	2	96150504
14	Valve Support	1	96150589
15	Screw	2	41316506
16	Fitting	1	68246128
17	Washer	2	45001106
18	Nut	2	43707611
19	Screw	2	41021101
20	Control Valve with direct control	1	68552732
21	Workpiece Guard	1	96150593
22	Fitting	1	68237528
23	Axle	1	96150614
24	Flat Washer	4	45001108
25	Screw	4	41019201
26	Protector	1	96150883
27	Washer	2	45001105
28	Screw	2	41326306
29	Drum Guard	1	96150796

R Recommended spares Parts

OLD SLACK WIRE SYSTEM DRAWING

This slack wire system assembly was used on winches with serial number up to 05 05 01. (Year-Month-Chornological Nbr)



(Dwg.D6150131)

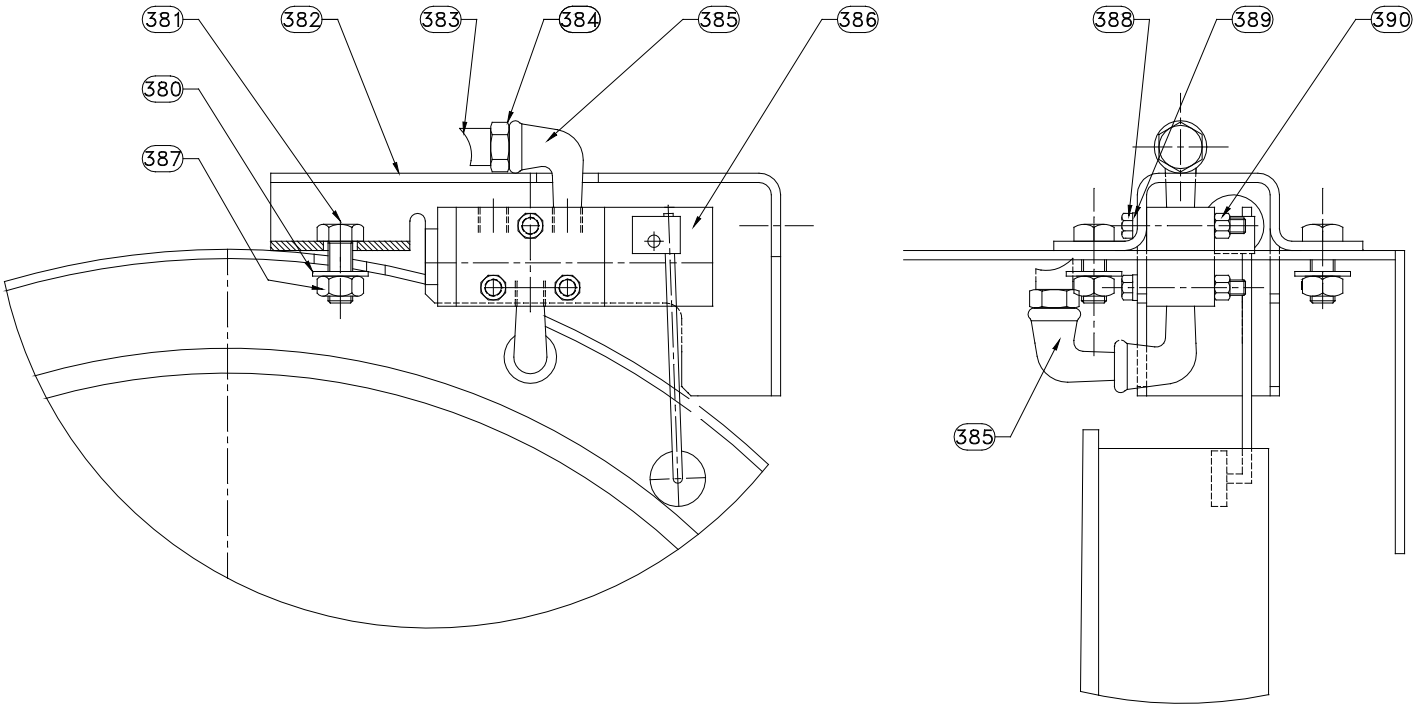
OLD SLACK WIRE SYSTEM PART LIST

ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
-	Slack Wire System ass'y	1	36150422
350	Roller Axle	1	96150196
351	Roller	2	96150197
352	Screw	2	41020401
353	Lockwasher	2	45201010
354	Screw	2	41010601
355	Protector	1	96150297
356	Tee 1/8	1	61394532
357	Elbow 1/8	2	68280132
358	Fitting 1/8	5	51029+68237528
359	Hose	2m	50923
360	Nipple 1/8	1	61385232
361	Valve Control	1	68552732
362	Stop	1	96150200
363	Screw	2	41316506
364	Plug	2	65107741
365	Nut	2	43003611
366	Lockwasher	2	45201012
367	Lever	1	96150293
368	Lever	1	96150194
369	Bearing	2	50050002
370	Axle	2	96150198
• 371	Distance Ring	2	96150199
• 372	Retainer ring	2	47703032
373	Support	1	96150193
374	Nut	2	43707211
375	Screw	2	41326006
376	Lockwasher	2	45201016
377	Nut	2	43006011
378	Lockwasher	2	450001106
379	Protector	1	96150582

• Recommended Spares Parts

EXTERNAL BAND BRAKE DETECTOR DRAWING AND PARTS LIST

This band brake detector assembly was used on winches with serial number up to 02-06-01. (Year-Month-Chornological Nbr)



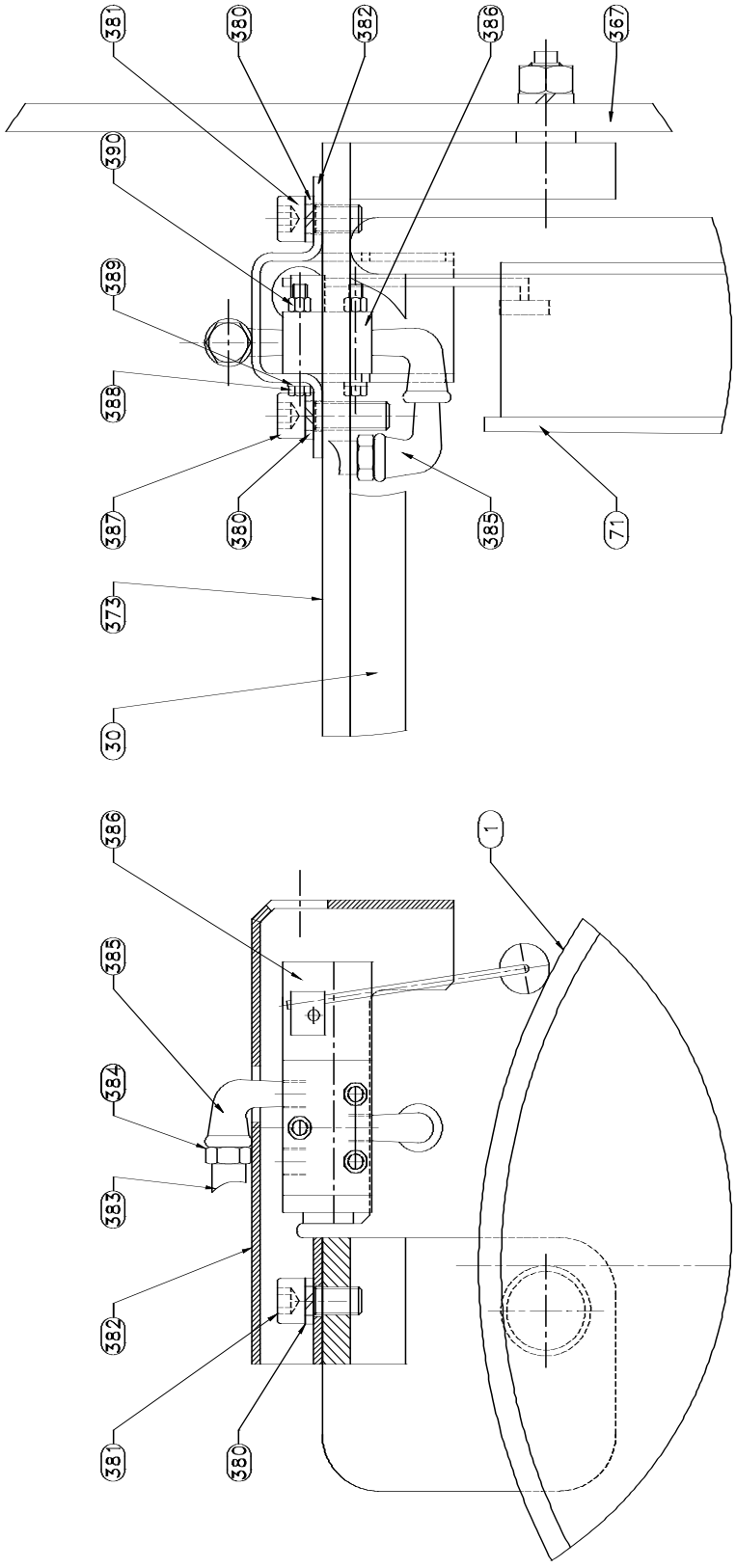
(Dwg.D6150166)

ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
380	Washer	2	45011008
381	Screw	2	41025001
382	Valve support	1	96150539
383	Hose	2m	50923
384	Fitting 1/8	2	51029+68237528
385	Elbow 1/8	3	6828-0132
386	Valve	1	6855-2241
387	Nut	2	43003511
388	Screw	3	4102-1001
389	Washer	3	4500-1105
390	Nut	3	4370-7211

• Recommended Spares Parts

OLD EXTERNAL BAND BRAKE DETECTOR DRAWING

This band brake detector assembly was used on winches with serial number up to 02-06-01. (Year-Month-Chornological Nbr)



Dwg.D6150103

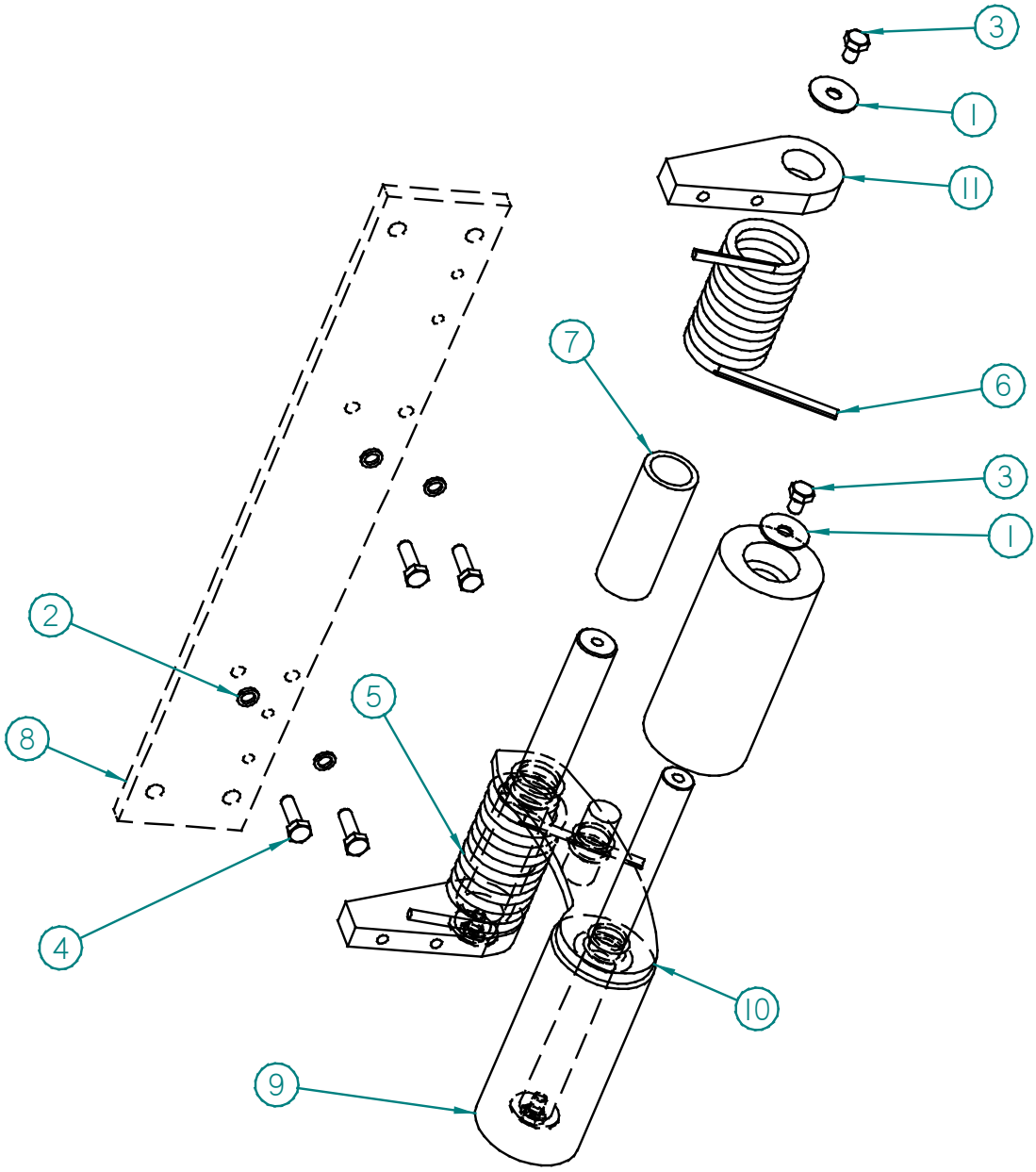
OLD EXTERNAL BAND BRAKE DETECTOR PART LIST

ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
380	Lockwasher	2	4520-1010
381	Cap screw	1	4132-3606
382	Valve support	1	9615-0395
383	Hose	2m	50923
384	Fitting 1/8	2	51029+68237528
385	Elbow 1/8	3	6828-0132
386	Valve	1	6855-2241
387	Cap screw	1	4132-3506
388	Screw	3	4102-1001
389	Washer	3	4500-1105
390	Nut	3	4370-7211
1	Brake band (external brake band item's)	1	9615-7174
30	Drum guard (winch assembly item's)	1	9615-0201
71	Drum (winch assembly item's)	1	9615-7001
367	Lever (option slack wire system item's)	1	9615-0293
373	Support (option slack wire system item's)	1	9615-0193

• Recommended Spares Parts

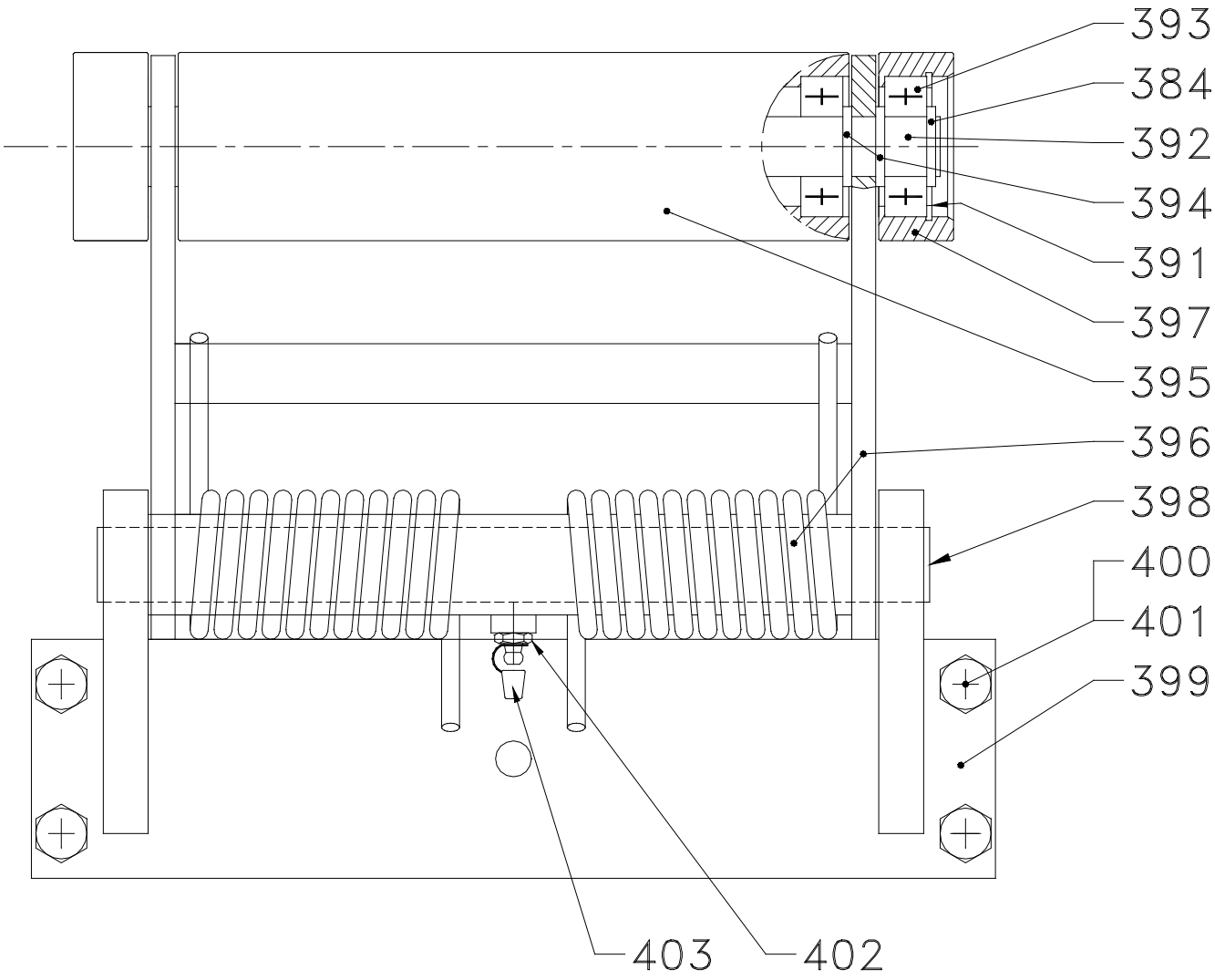
PRESS ROLLER DRAWING AND PART LIST

Valid for winches with serial number from : 03-01-01 (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 PART LIST



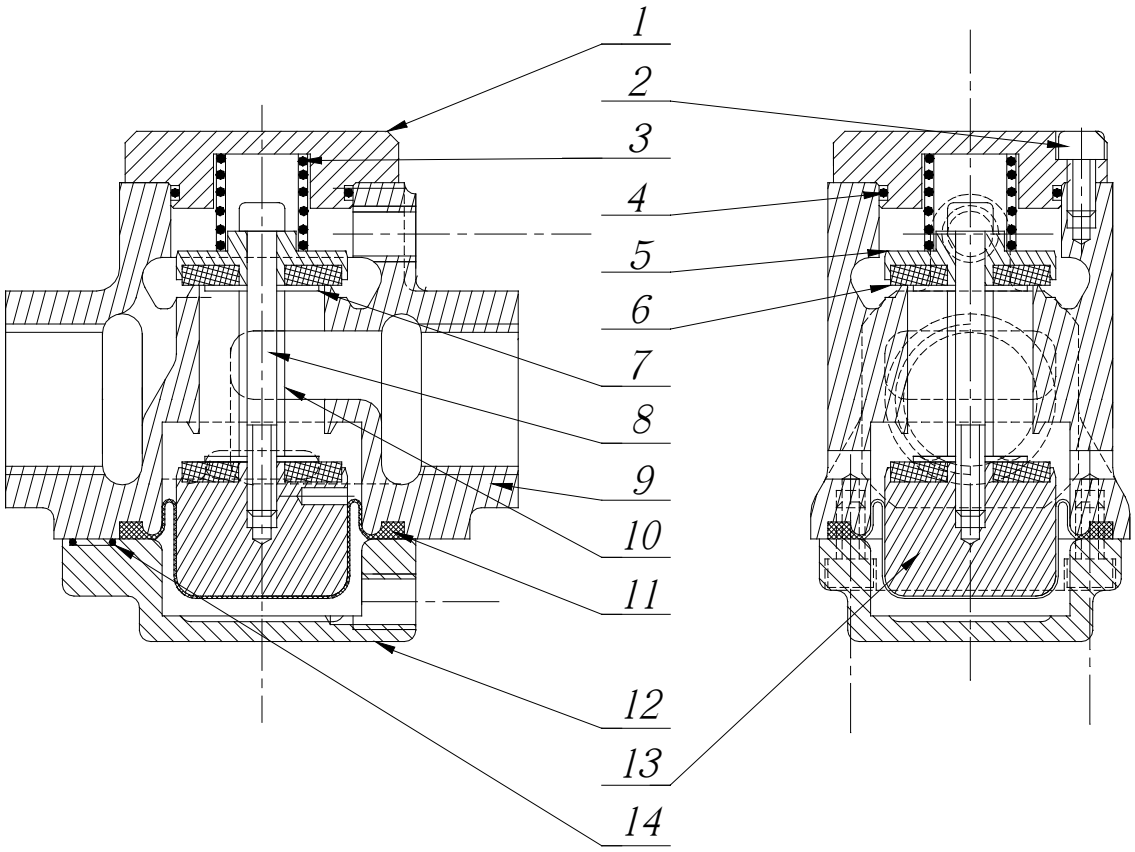
(Dwg.D6150056)

ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
390	Press roller Ass'y (Incl's Item 381 throught 391)	1	7615-0044
• 391	Circlip for Bore	2	4770-3047
392	Roller Axle	1	9615-0091
393	Ball Bearing	4	5015-0004
• 394	Distance Ring	6	9506-0135
395	Main Roller	1	9615-0089
396	Rollers Arm with Springs	1	9615-0087
397	Side Roller	2	9513-0130
398	Axle	1	9615-0090
399	Distance Piece	1	9615-0088
400	Screw	4	4102-0701
401	Split Washer	4	4520-1010
402	Greaser	1	67301727
403	Plug	1	61017128

• Recommended Spares Parts

SHUT-OFF VALVE 3/4 DRAWING AND PART LIST

Rep. 709 (see page 68)



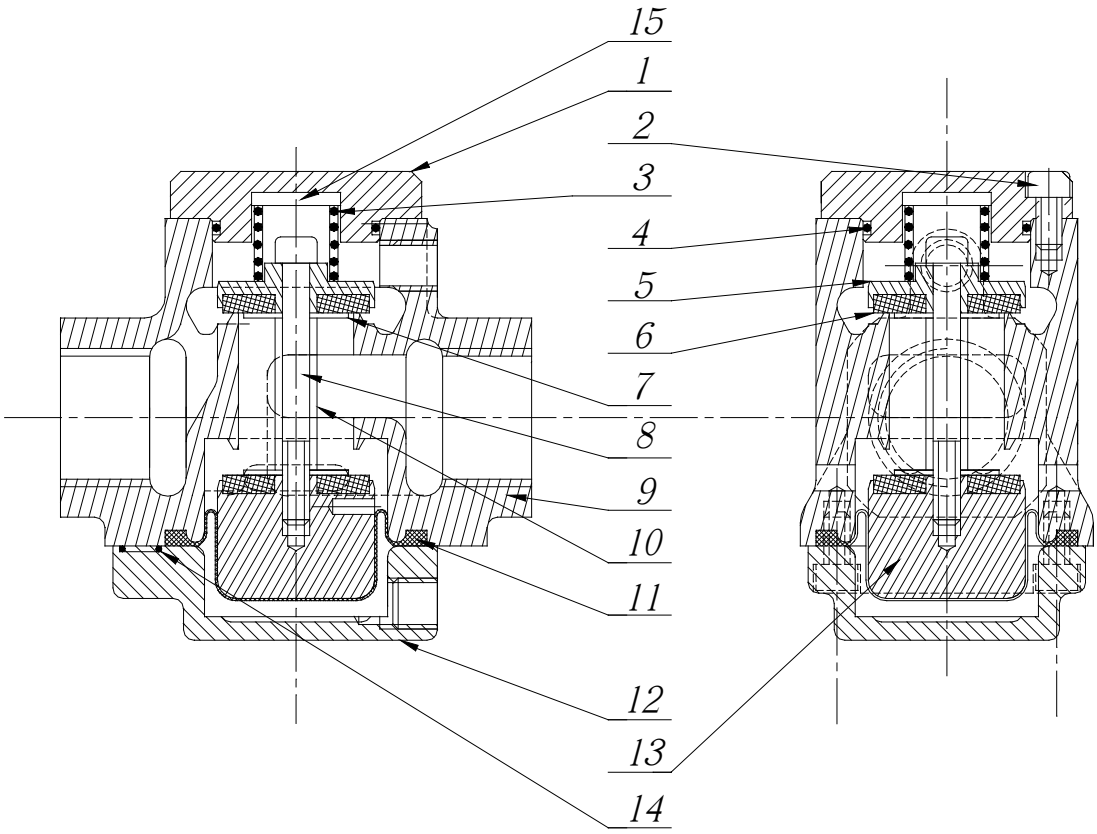
(Dwg.D6170136)

ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
0	Shut off valve 3/4 Ass'y (Incl's Item 1 throught 14)	1	7617-0120
1	Cover	1	9617-0059
2	Screw	7	4132-6306
3	Spring	1	6915-8732
• 4	'O'ring	1	5821-4829
5	Valve cone	1	9617-0053
• 6	Joint	2	9617-0056
7	Washer	2	4570-0005
8	Screw	1	4132-6106
9	Body	1	9617-0061
10	Distance ring	1	9617-0055
11	Diaphram	1	6771-6341
12	Cover	1	9617-0052
13	Valve cone	1	9617-0054
• 14	'O'ring	1	5821-4829

• Recommended Spares Parts

SHUT-OFF VALVE 3/4 DRAWING AND PART LIST

Rep. 708 (see page 68)



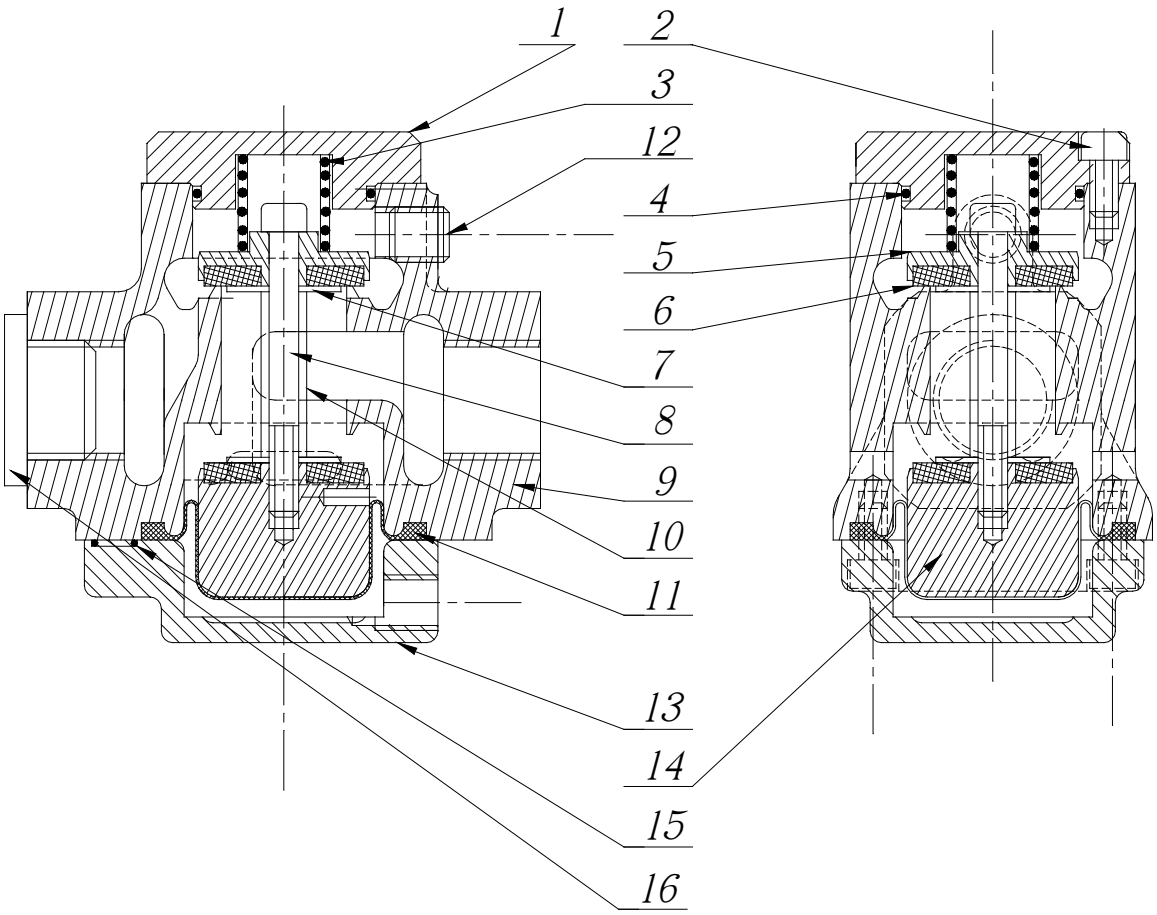
(Dwg.D6170137)

ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
0	Shut off valve 3/4 Ass'y (Incl's Item 1 throught 14)	1	7617-0121
1	Cover	1	9617-0059
2	Screw	7	4132-6306
3	Spring	1	6915-8732
• 4	'O'ring	1	5821-4829
5	Valve cone	1	9617-0053
• 6	Joint	2	9617-0056
7	Washer	2	4570-0005
8	Screw	1	4132-6106
9	Body	1	9617-0061
10	Distance ring	1	9617-0055
11	Diaphram	1	6771-6341
12	Cover	1	9617-0052
13	Valve cone	1	9617-0054
• 14	'O'ring	1	5821-4829
15	Distance ring	1	9615-0441

• Recommended Spares Parts

OUTLET VALVE DRAWING AND PART LIST

Rep. 713 (see page 69)



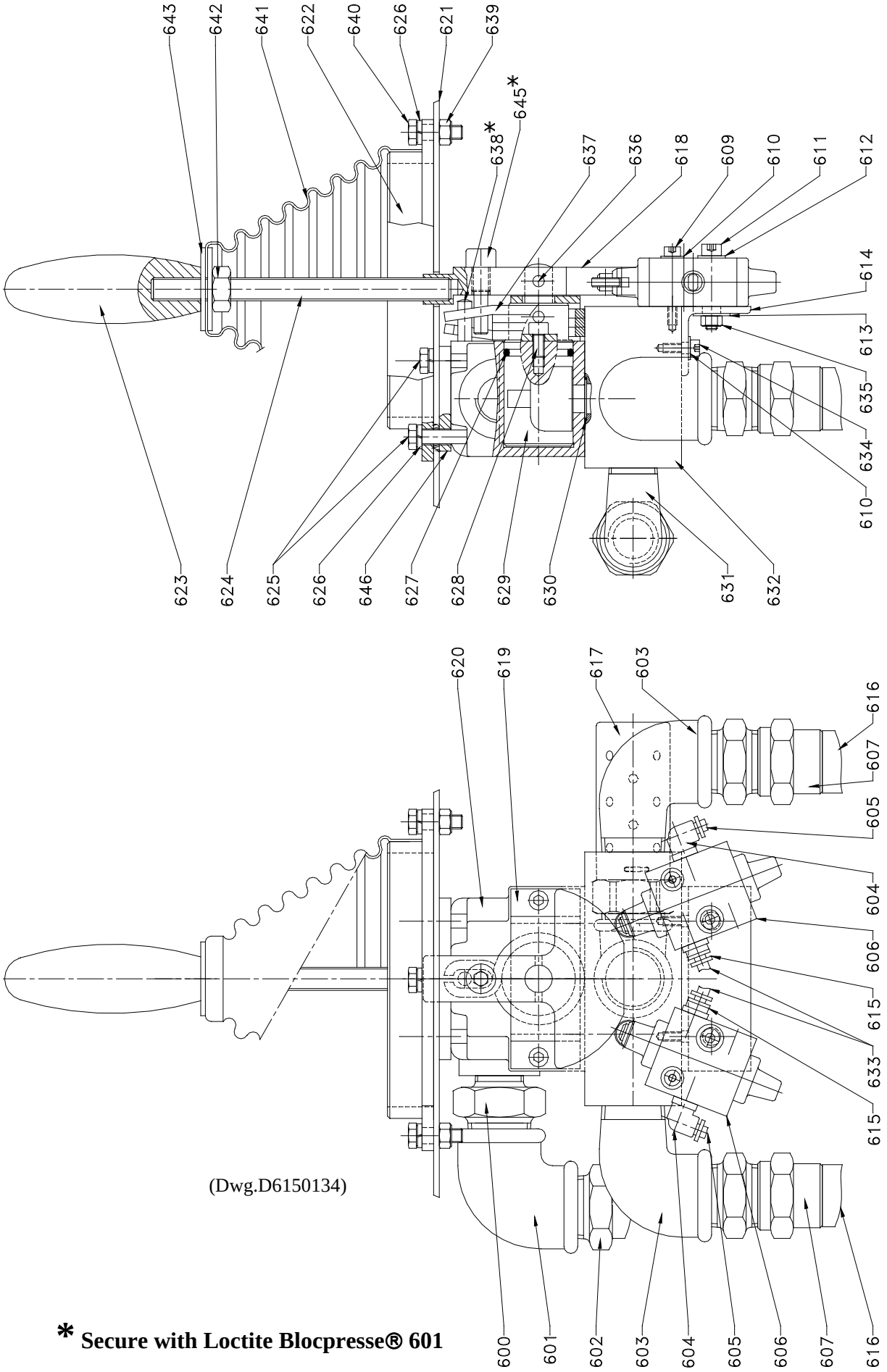
(Dwg.D6170138)

ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
0	Outlet valve Ass'y (Incl's Item 1 throught 14)	1	7617-0122
1	Cover	1	9617-0059
2	Screw	7	4132-6306
3	Spring	1	6915-8732
• 4	'O'ring	1	5821-4829
5	Valve cone	1	9617-0053
• 6	Joint	2	9617-0056
7	Washer	2	4570-0005
8	Screw	1	4132-6106
9	Body	1	9617-0061
10	Distance ring	1	9617-0055
11	Diaphram	1	6771-6341
12	Plug	1	6771-6341
13	Cover	1	9617-0052
14	Valve cone	1	9617-0054
• 15	'O'ring	1	5821-4829
16	Plug	1	6511-1141

• Recommended Spares Parts

LEVER CONTROL VALVE ASSEMBLY DRAWING

Valid for winches with serial number from : 02-02-53 (Year-Month-Chornological Nbr)



(Dwg.D6150134)

*** Secure with Loctite Blocpresse® 601**

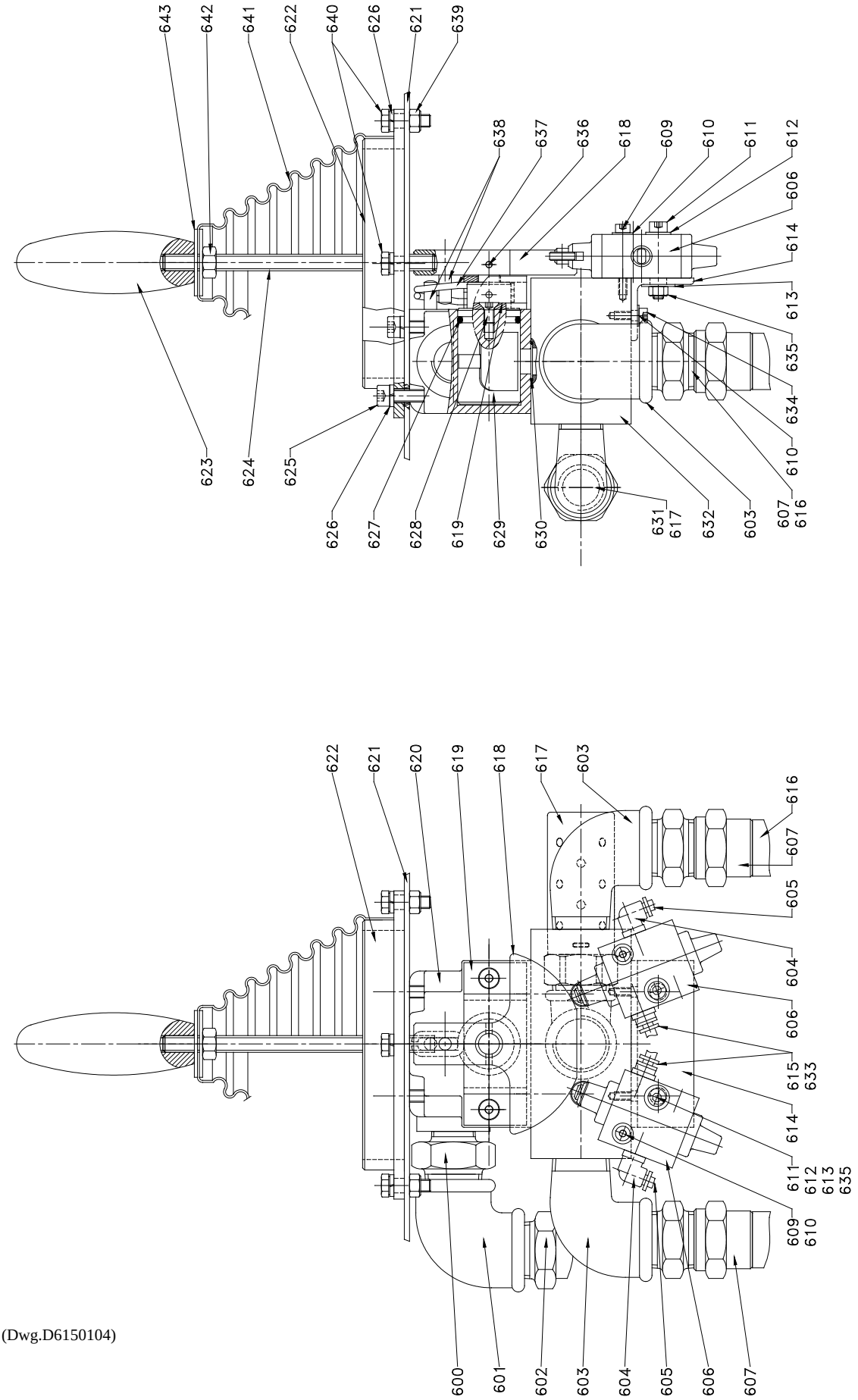
LEVER CONTROL VALVE ASSEMBLY PART LIST

ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
0	Lever control valve Ass'y (Incl's Item 600 throught 646)	1	76150-587
600	Nipple 1/2-3/4	1	6133-1032
601	Female elbow 3/4	1	6133-1232
602	Fitting 3/4	1	6164-5232
603	Elbow 3/4	2	6133-0932
604	Elbow 1/8	2	6814-3628
605	Pipe	m	6804-5428
606	Directional valve	2	6855-3441
607	Sleeve	2	6104-5128
609	Cap screw	2	4131-1006
610	Washer	4	4500-0104
611	Cap screw	2	4132-2106
612	Washer	2	4500-0105
613	Washer	2	4570-0005
614	Angle bracket	1	9615-0423
615	Fitting	2	6824-6128
616	Hose	5m	1681-0656
617	Muffler	1	6849-7432
618	Control lever	1	9615-0584
619	Stop	1	9618-0214
620	Valve housing	1	9618-0213
621	Consol	1	9615-0416
622	Lever control valve support	1	9615-0368
623	Handle	1	5742-6232
624	lever	1	9615-0595
625	Screw	4	4102-1301
626	Split washer	7	4520-1006
• 627	'O'ring	1	5821-7629
628	Screw	2	4132-6306
629	Rotary valve	1	9618-0212
631	Elbow 1/2	1	6133-0832
632	Base plate	1	9615-0583
633	Pipe	m	102U-04-01
634	Cap screw	2	4131-3606
635	Stop nut	2	4370-7211
636	Pin	1	4650-5220
637	Spring	1	9264-0010
638	Pin	1	4600-1616
639	Stop nut	3	4370-7611
640	Screw	3	4102-0301
641	Bellows with clamping collar	1	6895-2341
642	Nut	1	4300-3511
643	Washer	2	4570-1008
645	Screw	1	9615-0625
646	Spacer	1	9615-0585

• Recommended Spares Parts

OLD LEVER CONTROL VALVE ASSEMBLY DRAWING

This lever control valve assembly was used on winches with serial number up to 02-02-52 (Year-Month-Chornological Nbr)



(Dwg.D6150104)

OLD LEVER CONTROL VALVE ASSEMBLY PART LIST

ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
0	Lever control valve Ass'y (Incl's Item 600 throught 643)	1	76150-366
600	Nipple 1/2-3/4	1	6133-1032
601	Female elbow 3/4	1	6133-1232
602	Fitting 3/4	1	6164-5232
603	Elbow 3/4	2	6133-0932
604	Elbow 1/8	2	6814-3628
605	Pipe	m	6804-5428
606	Directional valve	2	6855-3441
607	Sleeve	2	6104-5128
609	Cap screw	2	4131-1006
610	Washer	4	4500-0104
611	Cap screw	2	4132-2106
612	Washer	2	4500-0105
613	Washer	2	4570-0005
614	Angle bracket	1	9615-0423
615	Fitting	3	6824-6128
616	Hose	5m	1681-0656
617	Muffler	1	6849-7432
618	Control lever	1	9615-0406
619	Stop	1	9618-0034
620	Valve housing	1	9618-0145
621	Consol	1	9615-0416
622	Lever control valve support	1	9615-0368
623	Handle	1	5742-6232
624	Axle	1	9615-0394
625	Cap screw	4	4132-2506
626	Split washer	7	4520-1006
• 627	'O'ring	1	5821-7629
628	Screw	2	4110-5103
629	Rotary valve	1	9618-0146
• 630	'O'ring	3	5822-0929
631	Elbow 1/2	1	6133-0832
632	Base plate	1	9618-0110
633	Pipe	m	102U-04-01
634	Cap screw	2	4131-3606
635	Stop nut	2	4370-7211
• 636	Pin	1	4650-7220
637	Spring	1	9618-0035
• 638	Straight pin	2	4600-1216
639	Stop nut	3	4370-7611
640	Screw	3	4102-0301
641	Bellows with clamping collar	1	6895-2341
642	Nut	1	4300-3511
643	Washer	2	4570-1008

• Recommended Spares Parts

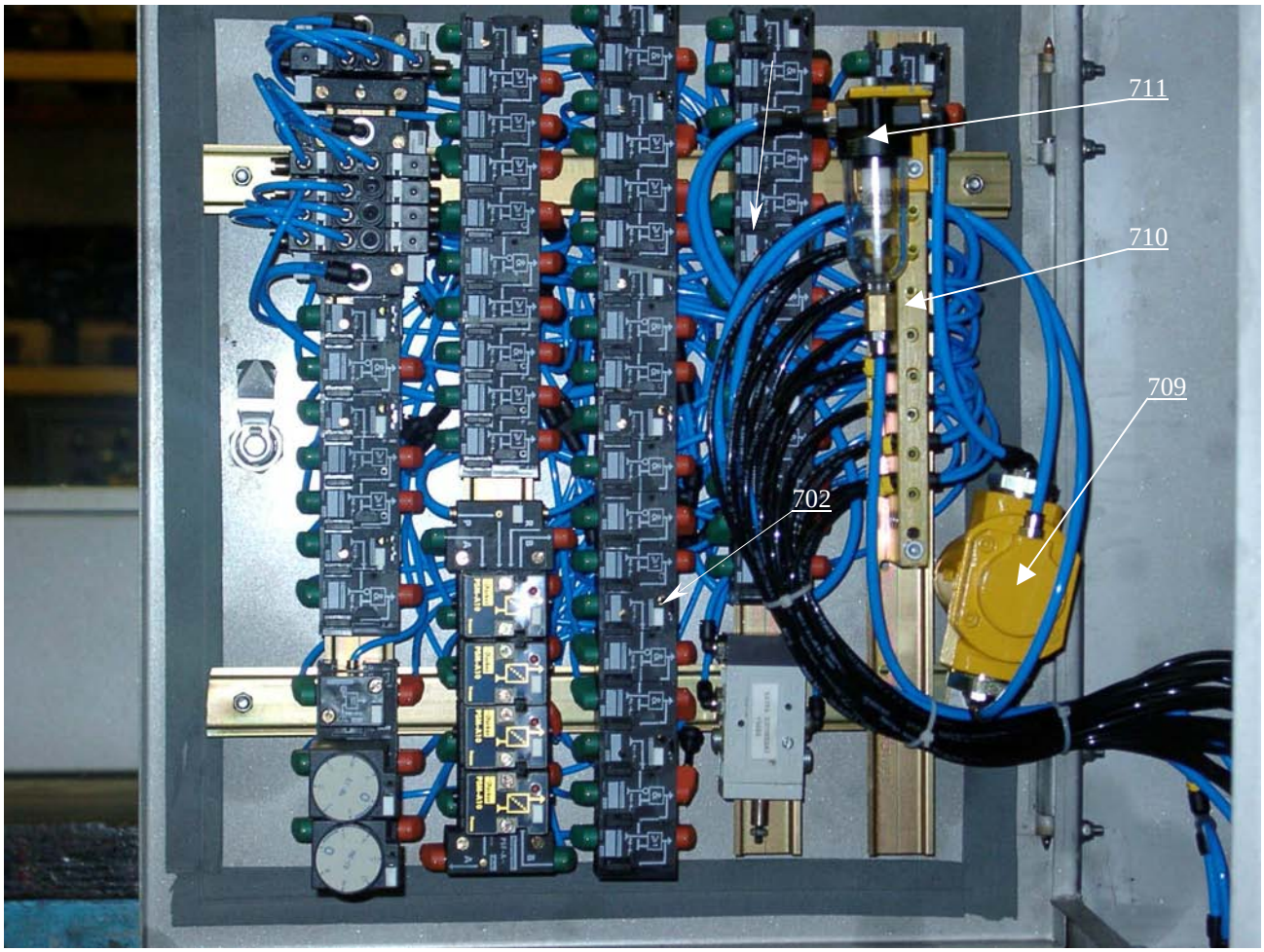
CONTROL CONSOL VIEW AND PART LIST

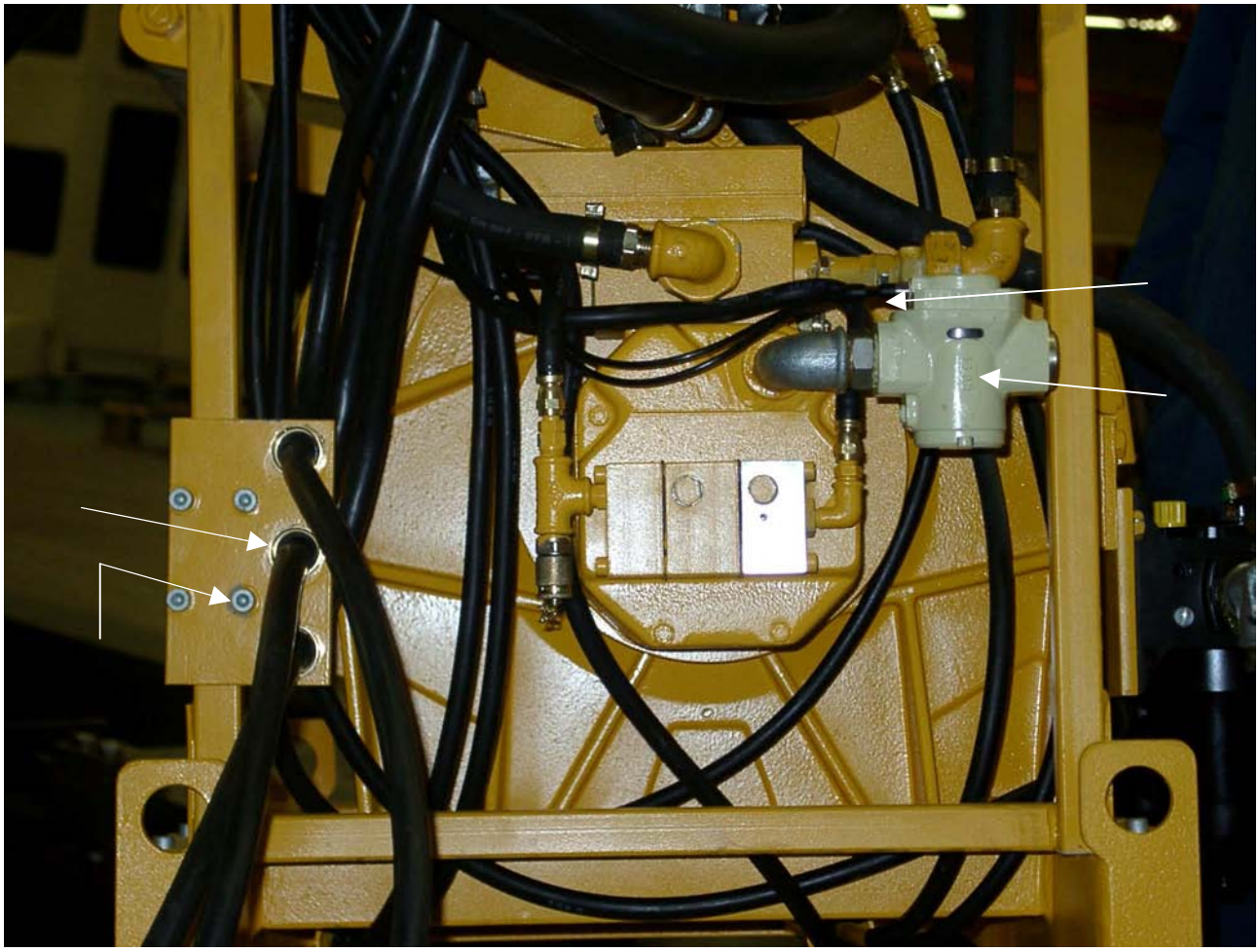
ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
410	Pneumatic green light	3	6093-2841
411	Pneumatic red light	1	6093-2941
412	Lever control valve ass'y	1	7615-0587
412	Old Lever control valve ass'y	1	7615-0366
413	Pressure gauge 0-10bar	1	6775-0241
414	Pressure gauge 0-2,5bar	1	6775-0341
415	Directional valve	1	6853-1241
416	Directional valve	1	6853-1441
417	Directional valve	1	6855-0041
418	Pressure regulator	2	6775-0141

• Recommended Spares Parts

CONTROL BOX AND SEQUENCER VIEW

SEQUENCER AND WINCH ASSEMBLY VIEW





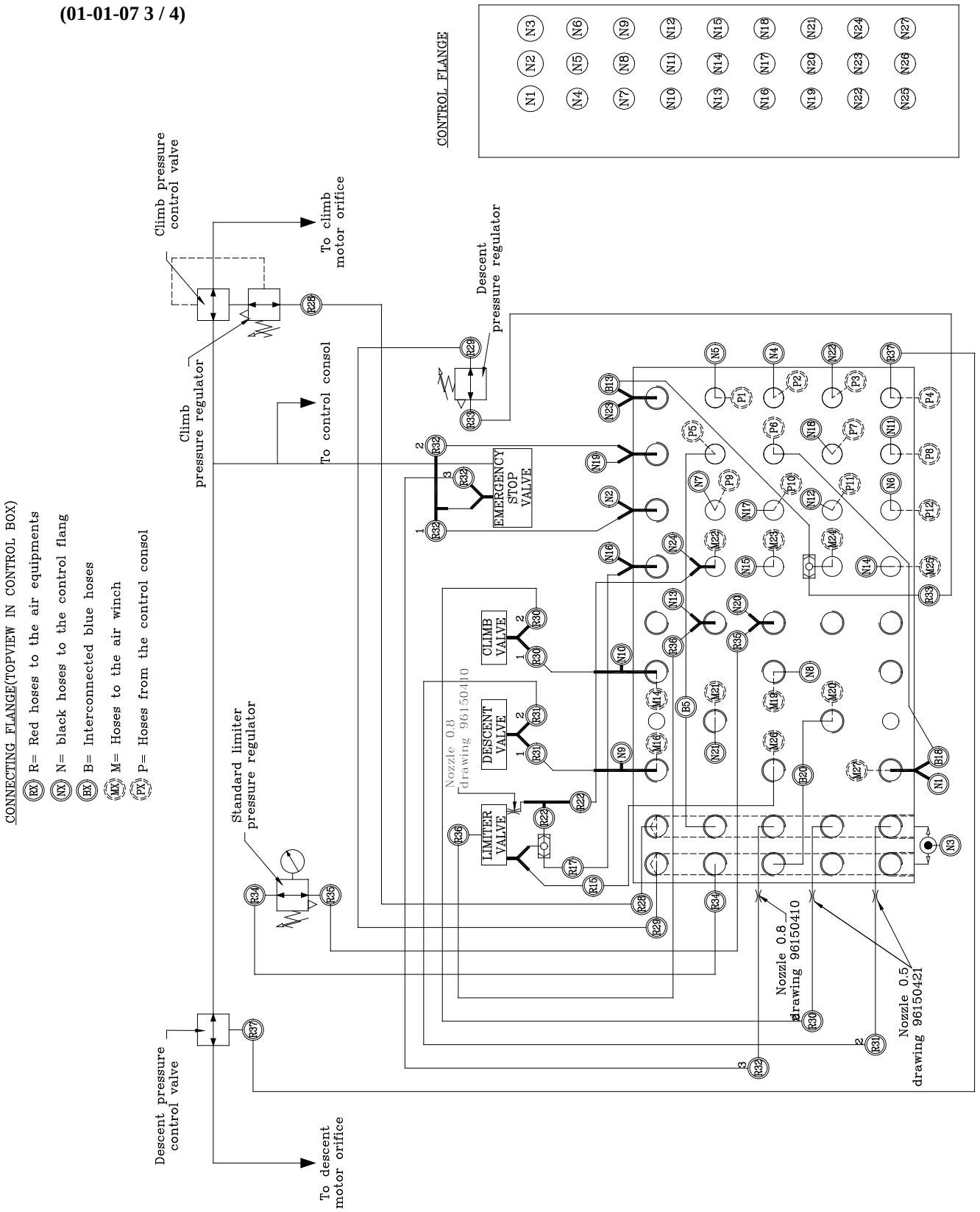
CONTROL BOX AND SEQUENCER PART LIST

ITEM NO	DESCRIPTION OF PART	TOTAL QTY	PART NUMBER
700	Sequencer ass'y	1	7615-0390
701	Control box ass'y	1	7615-0415
702	Connecting flange	1	9615-0408
703	Pressure gauge	1	6773-1632
704	High precision pressure regulator	1	6775-0141
705	Regulator 3/4	2	6773-0541
706	Servo pressure regulator 1/4	1	6773-0741
707	Pressure regulator 1/4	1	6773-0841
708	Shut-off valve 3/4	1	7617-0121
709	Shut-off valve 3/4	4	7617-0120
710	Control flange	1	9615-0411
711	Air filter	1	6865-7341
712	Check valve	1	6380-1741
713	Outlet valve	1	7617-0122
714	Y fitting 1/8	2	6824-5928
715	Support	1	9615-0562
716	Plate	1	9615-0563
717	Stuffing box	3	6095-7032
718	Screw	4	4132-5106
719	Nut	4	4300-3511
720	Lockwasher	4	4520-1008

- Recommended Spares Parts

CONNECTING FLANGE PIPING AND HOSES LEGEND

(01-01-07 3 / 4)

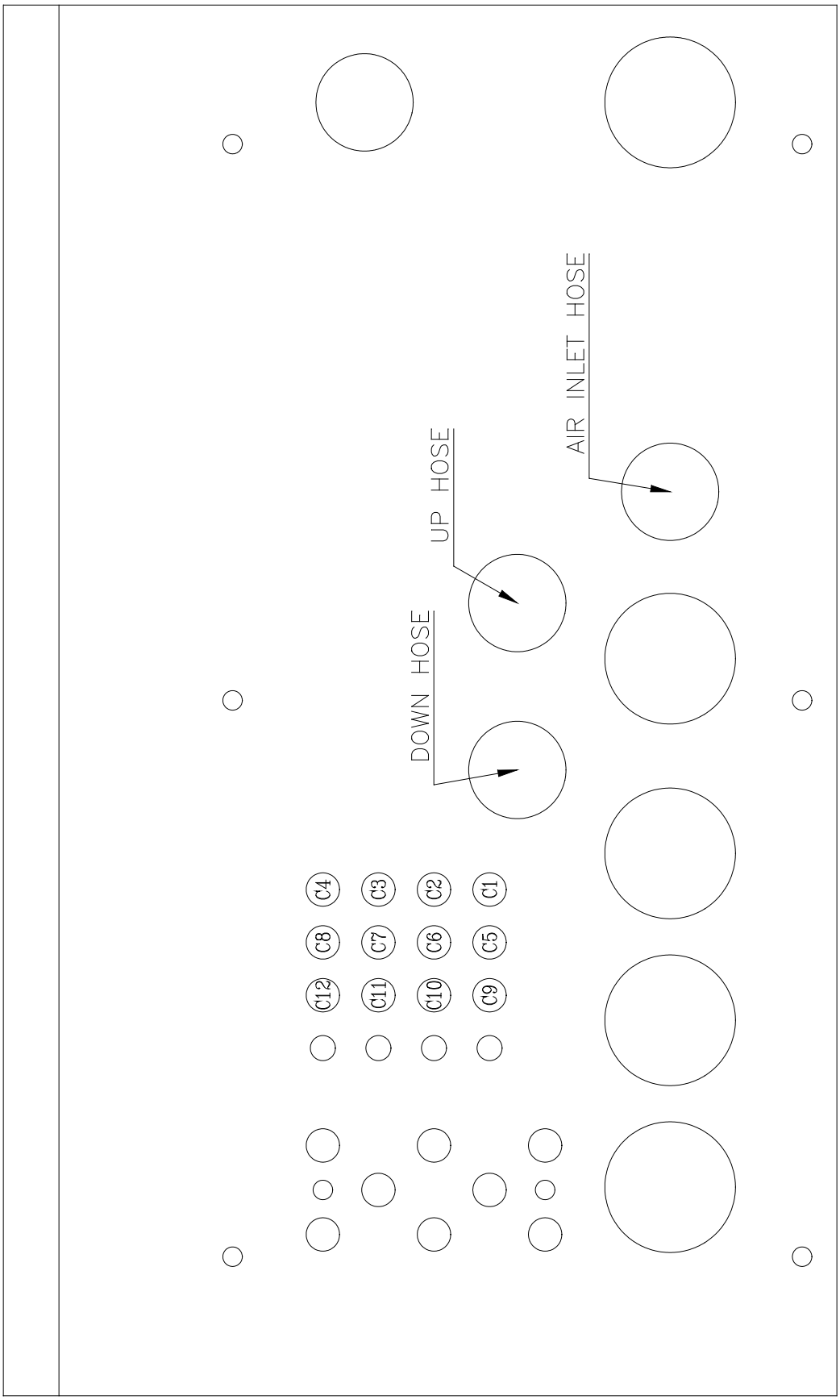


CONNECTING FLANGE PIPING AND HOSES LEGEND

(01-01-07 4/4)

BOTTOM VIEW OF CONTROLE BOX

C= HOSES FROM THE CONTROL CONSOL



CONNECTING FLANGE LEGEND

B= Interconnected blue hoses **(01-01-07 1/4)**
M=Hoses to the air winch
P= Hoses from the control consol
R= Red hoses to air equipments

P1 : Standard mode info
P2 : Balancing mode info
P3 : L2r : signal to floating torque limiter (port r)
P4 : signal to lowering pressure valve
P5-B5 : downstream connection to emergency valve
P6 : upstream connection to emergency valve
P7 : connection to pilot pressure of emergency stop valve
P8 : UP
P9 : failure indicator light
P10 : Warning buzzer
P11 : DOWN
P12: floating indicator light
B13 : VeA : port A of exhaust valve
M14 : FH : top limit switch
R15 : Ve, Dc : exhaust valve, directional valve
M16 : FB + S : bottom limit switch + slack
R17 : RESET
B18 : piloting pressure
M19 : DFR : brake detection
M20-B20 : ADFR : brake detection supply
M21 : L2a : port A of torque limiter control valve floating
M22-R22 : Dc : signal to directional control valve
M23 :E Dc : directional control valve inlet
M24 : Ve : signal to exhaust valve
M25 : EVe : exhaust valve inlet
M26 : torque limiter exhaust
M27 : piloting pressure
R28 : signal to pressure regulator lifting side
R29 : signal to exhaust valve pressure regulator
R30 : signal to lifting valve
R31 : signal to lowering valve
R32 : signal to main air shut off valve
R33 : lowering regulator
R34 : standard limiter regulating inlet
R35 : standard limiter regulating outlet
R36 : torque limiter supply
R37 : lowering pressure-regulating valve

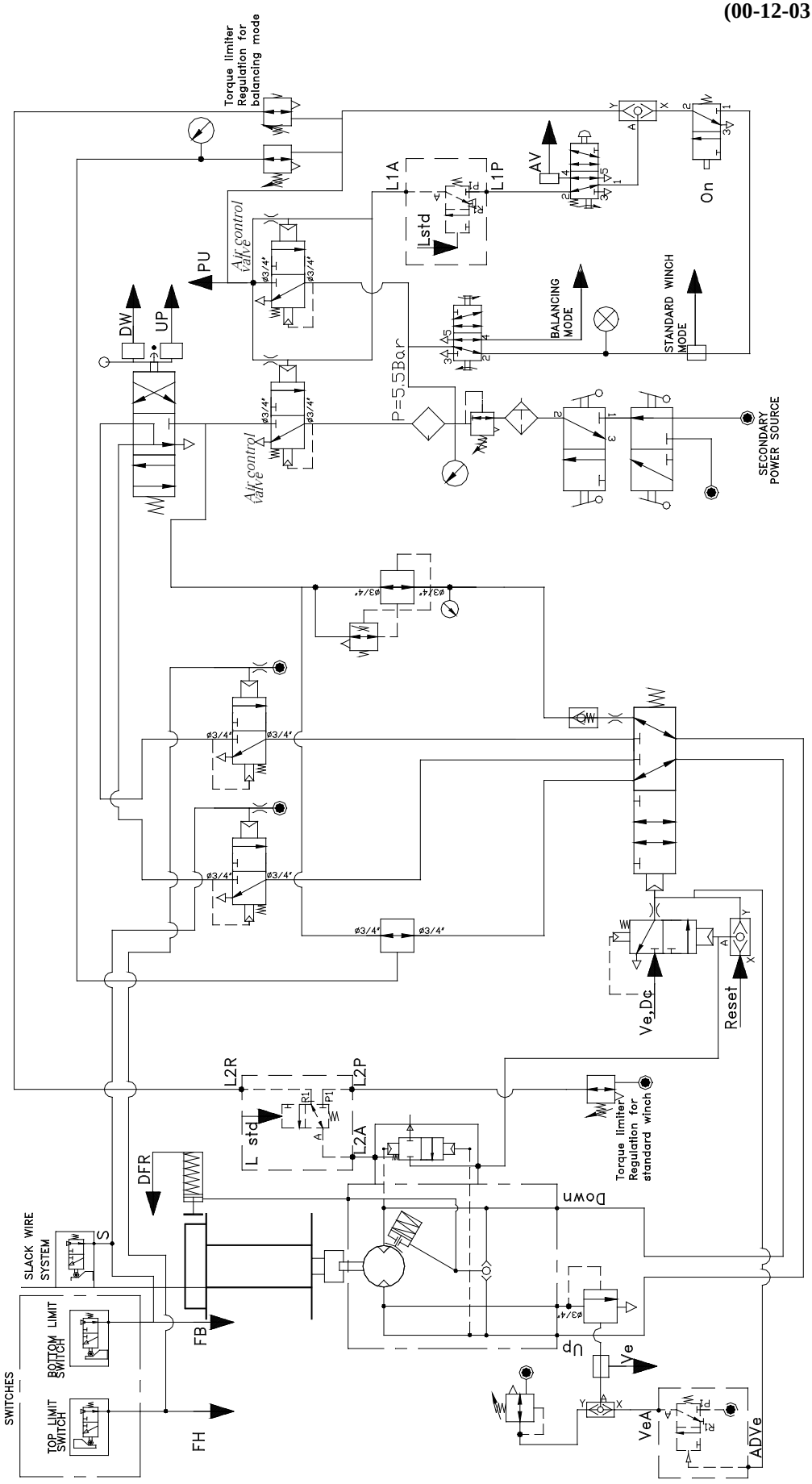
CONTROL FLANGE LEGEND

(01-01-07 2/4)

N1 : PA : inlet pressure
N2 : PP : piloting pressure
N3 : PU : working pressure
N4 : FLT : floating mode
N5 : STD : standard mode
N6 : VF : floating indicator light
N7 : VA : failure indicator light
N8 : DFR : brake detector
N9 : FB : bottom limit switch
N10 : FH : top limit switch
N11 : UP : lifting
N12 : DW : lowering
N13 : OUTLET Ve, Dc : exhaust valve outlet, directional valve outlet
N14 : INLET Ve : exhaust valve inlet
N15 : INLET Dc : directional valve inlet
N16 : RESET
N17 : AV : warning buzzer
N18 : INLET L1p : emergency stop valve inlet (port p)
N19 : OUTLET L1a : emergency stop valve outlet (port a)
N20 : INLET L2p : floating torque limiter inlet (port p)
N21 : OUTLET L2a : floating torque limiter outlet (port a)
N22 : INLET L2r : floating torque limiter inlet (port r)
N23 : OUTLET VeA : exhaust valve outlet (port a)
N24 : ADVe : exhaust valve supply

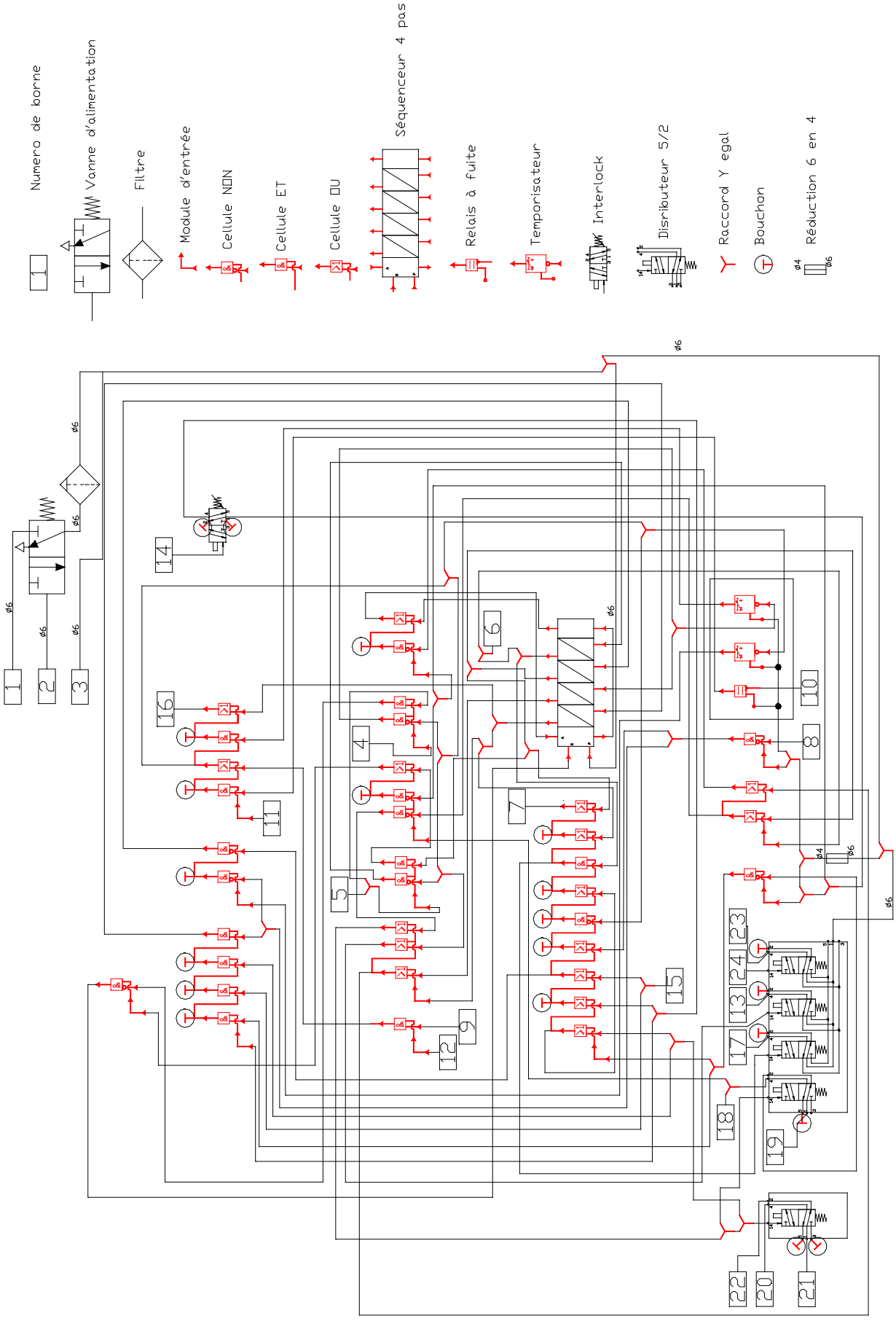
AIR SCHEMATIC

(00-12-03 1/3)



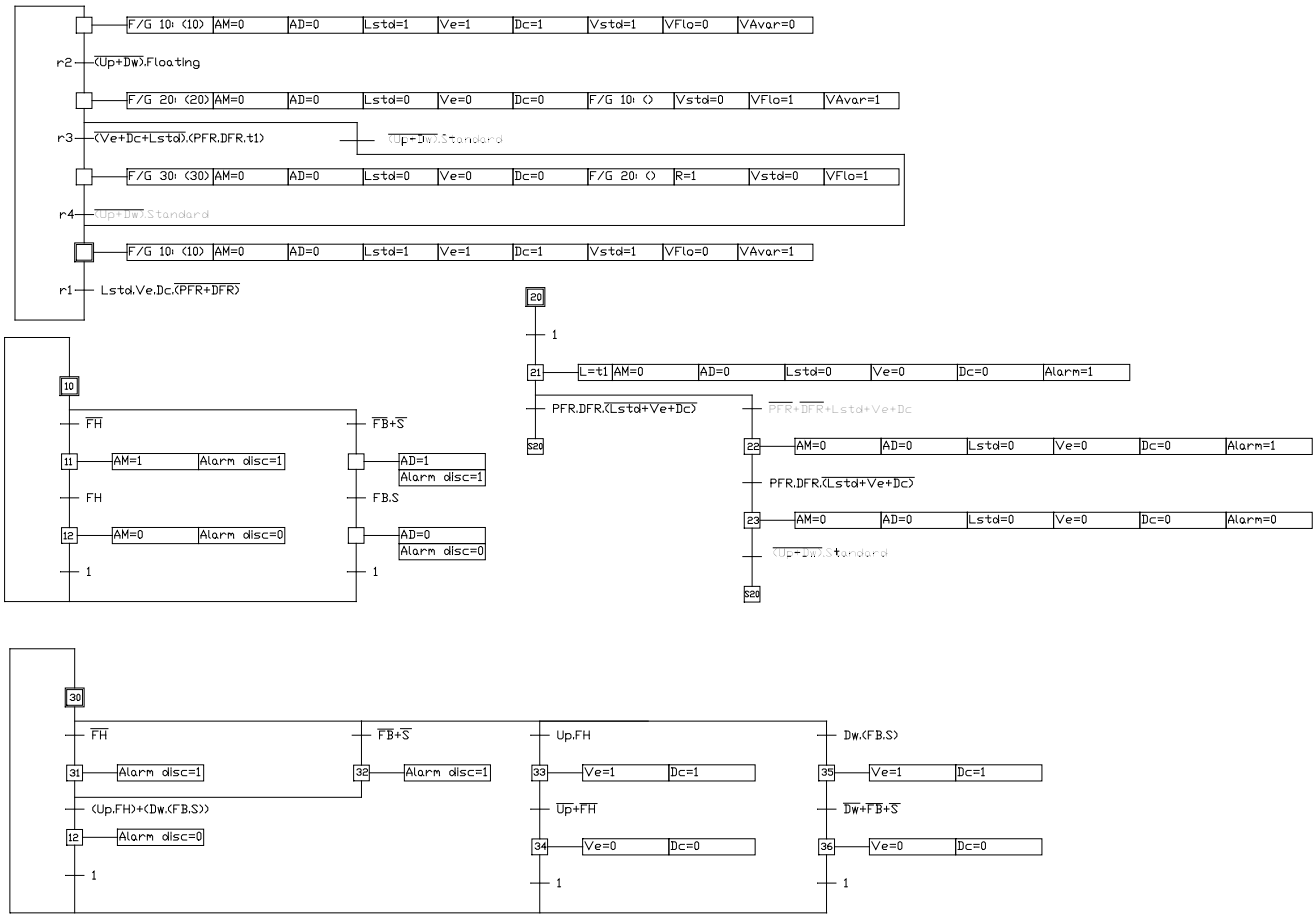
AIR SCHEMATIC

(00-12-03 2/3)



AIR LOGIC SCHEMATIC

(00-12-03 3/3)



Variables

Up at 1 when the lever is move up

Dw at 1 when the lever is move down

Floating at 1 when the selector is on floating

Ve at 1 when the exhaust valve is neutralized

Dc at 1 when pilot valve is in standard mode

Lstd at 1 when the torque limiter is in standard

PFR at 1 when brakes are air supply

DFR at 1 when the brake band is open

Standard at 1 when the selector is on standard

FH à 1 when the top limit switch isn't activated

FB à 1 when the bottom limit switch isn't activated

S at 1 when the rope is tightened

AU Emergency stop in standard cut off the air supply valve in floating release the alarm in continuous (managing by the"hard")

Output

AM at 1 stop the motor rotation in winding

AD at 1 stop the motor rotation in unwinding

Vstd standard mode indicator at 1 light

Ve at 1 neutralize the exhaust valve

Dc at 1 activate the pilot valve in standard mode

Lstd at 1 activate the torque limiter in standard mode

VFlo floating indicator at 1 light

Alarm at 1 continuous alarm

Vavar faillure indicator at 1 light

Alarm disc at 1 discontinuous alarm

R at 1 activate the continue control of parameters in floating mode

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

United States Office Locations

For Order Entry and Order Status :

Ingersoll-Rand Distribution Center
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White House, TN 37188
Phone: (615) 672-0321
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Fax: (615) 672-0801

For Technical Support:

Ingersoll-Rand Material Handling
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Telex: 328795
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Philadelphia, PA
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King of Prussia, PA 19406
Phone: (215) 337-5930

International

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

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Seattle, WA 98124-0046
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Telex: 328795
Fax: (206) 624-6265

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