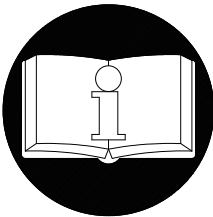
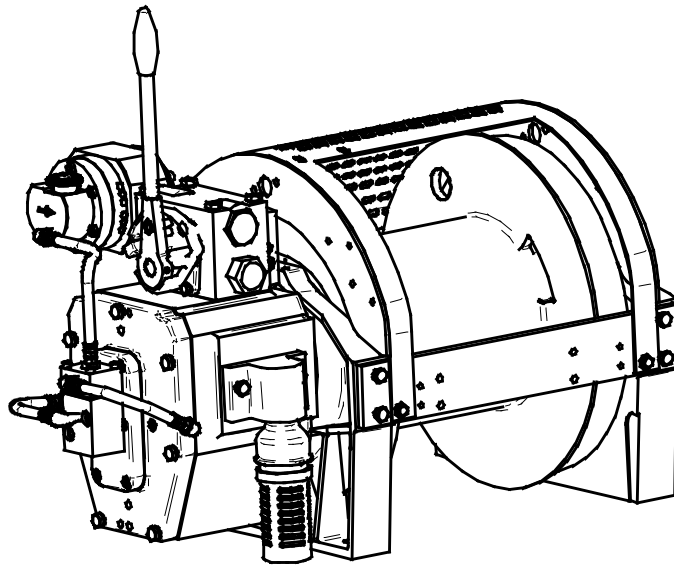


# PARTS, OPERATION AND MAINTENANCE MANUAL

For

## PNEUMATIC WINCHES LS2000R – PS4000R LS2000RGC – PS400RGC



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

### **⚠ WARNING**

Do not use this winch for lifting, supporting, or transporting people or lifting or supporting loads over people.

Always operate, inspect and maintain this winch in accordance with European or National Standards Safety Codes and any other applicable safety codes and regulations.

Refer all communications to the nearest Ingersoll-Rand Material Handling Office or Distributor.

Form SAM0217  
Edition 2  
September 2005



## 5ABLE OF CONTENTS

DESCRIPTION	PAGE NO.
<b>Safety Information</b>	
Danger, Warning, Caution and Notice.....	3
Safety, Summary .....	3
Safe Operating Instructions.....	4
<b>Specifications</b> .....	5-6
<b>Pneumatic Diagram</b> .....	7
<b>Installation</b> .....	8/9
<b>Operation</b> .....	10
<b>Lubrication</b> .....	10
<b>Inspection</b> .....	11
<b>Maintenance</b>	
Assembly Disassembly instructions.....	12
Winch Assembly / Disassembly .....	12
Multi discs Brake Assembly / Disassembly.....	12
Gear Box Assembly / Disassembly.....	13
Rear Bearing Assembly / Disassembly .....	13
Air gear Motor Assembly / Disassembly .....	13-14
Air Control Valve .....	14
Cleaning Inspection and Repair .....	14
Brake Adjustment .....	15
Overload Device .....	15
<b>Parts</b>	
2T Winch Assembly Drawing .....	16
2T Winch Assembly Parts List .....	17/18
Air Gear Motor Assembly Drawing.....	19
Air Gear Motor Assembly Parts List .....	20
Air Control Valve Assembly Drawing .....	21
Air Control Valve Assembly Parts List .....	22
Emergency stop Valve Drawing .....	23
Emergency stop Valve Parts List.....	24
Torque Limitor Drawing & Parts List.....	25
Drum Guard Drawing & Parts List.....	26
Pneumatic control valve Assembly Drawing .....	27
Pneumatic control valve Parts List.....	28
Haulage Kit for PS4000R Assembly drawing & Parts List .....	29
Part Ordering Information.....	
Warranty .....	
Ingersoll-Rand Offices.....	

## 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.

### Danger, Warning, Caution and Notice

Throughout this manual there are steps and procedures which, if not followed, may result in 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* 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* 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* 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

- **Do not use this winch or attached equipment for lifting, supporting, or transporting people or supporting loads over people.**
- **The supporting structures and load-attaching devices used in conjunction with this winch must provide and 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 qualified structural engineer.**

The National Safety Council, Accident Prevention Manual for Industrial Operations, Eighth Edition and other recognized safety sources make a common point.

Employees who work near cranes or assist in hooking on or arranging a load should be instructed to keep out from under the load. From a safety standpoint, one factor is paramount : conduct all lifting operations in such a manner that if there were an equipment failure, no personnel would be injured. This means keep out from under a raised load and keep out of the line of force of any load.

**Ingersoll-Rand** Material Handling winchs are manufactured in accordance with the latest FEM rules standards.

Generally the burden of compliance to most standards is with the user, not the manufacturer. Many requirements are not concerned or connected with the manufactured product but are, rather, connected with the final installation. It is the owner's and user's responsibility to determine the suitability of a product for any particular use. Check all applicable industry, trade association, federal, state and local regulations. Read all operating instructions and warnings before operation.

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

#### NOTICE

- **Ingersoll-Rand Replacement Parts are specifically designed to ensure optimum performance of your equipment. Use of other than genuine Ingersoll-Rand Material Handling parts may adversely affect safe operation and may invalidate the warranty.**

## SAFE OPERATING INSTRUCTIONS

The following warnings and operating instructions are intended to avoid unsafe operating practices which might lead to injury or property damage.

INGERSOLL-RAND recognizes that most companies who use winches safety program in force at their facility. In the event that some conflict exists between a rule set forth in this publication and a similar rule already set by an individual company, the more stringent of the two should take precedence.

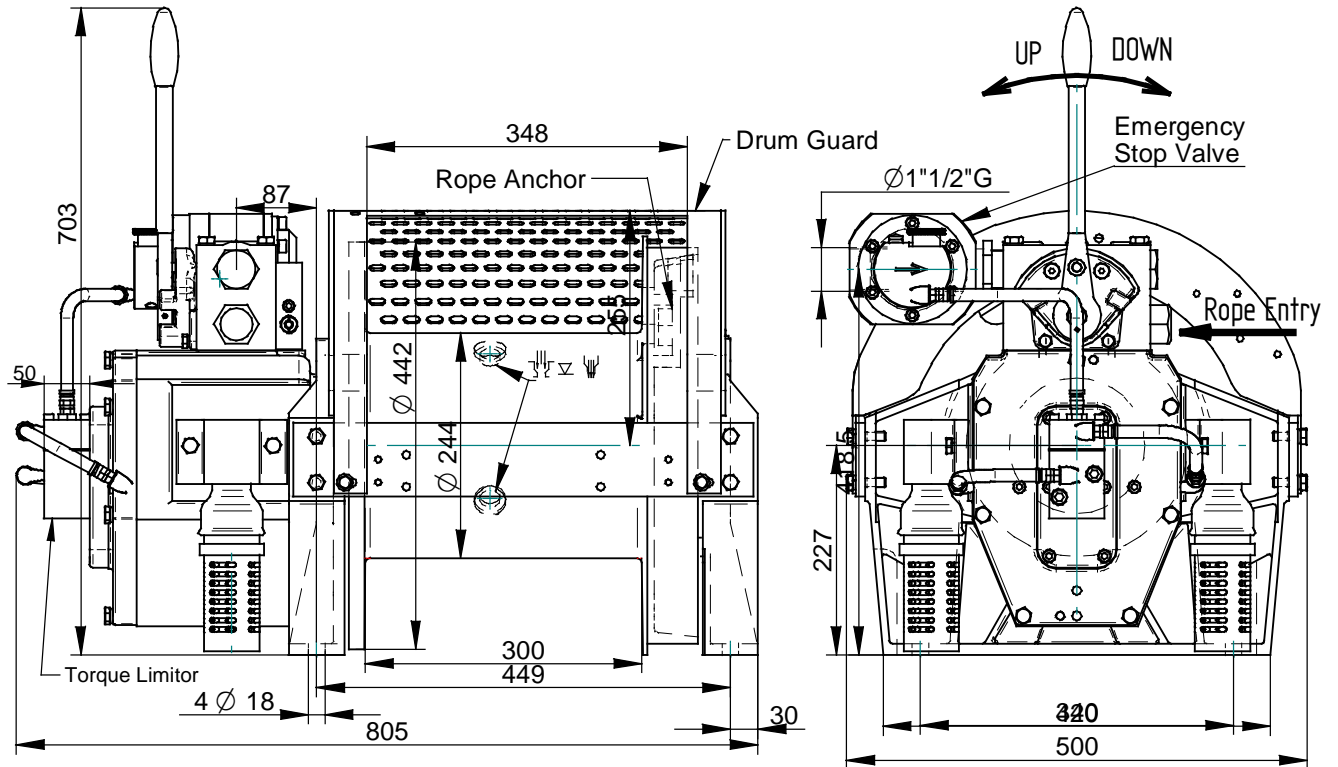
Safe Operating Instructions are provided to make an operator aware of dangerous practices to avoid and are not necessarily limited to the following list. Refer to specific sections in the manual for additional safety information.

Refer to the winch manual for additional precautions and instructions.

1. Only allow qualified people (trained in safety and operation) to operate the winch.
2. Only operate a winch if you are physically fit to do so.
3. When a "DO NOT OPERATE" sign is placed on the winch control, do not operate the winch until the sign has been removed by designated personnel.
4. Before each shift, the operator should inspect the winch for wear or damage.
5. Never use a winch that inspection indicates is defective.
6. Periodically, inspect the winch thoroughly and replace worn or damaged parts.
7. Lubricate the winch regularly.
8. Using the winch, only lift loads less than or equal to the lower rated capacity winch.
9. Never place your hand inside the throat area of a hook
10. Make sure all people are clear of the load path. Do not lift a load over people.
11. Never use the winch for lifting or lowering people, and never allow anyone to stand on a suspended load.
12. Do not swing a suspended load.
13. Never suspend a load for an extended period of time
14. Never leave a suspended load unattended.
15. Never use the winch rope as a sling.
16. Always rig the load properly and carefully.
17. Remove all loads before performing any maintenance.
18. After use, properly secure winch and all loads.

# SPECIFICATIONS

## PNEUMATIC WINCH



### TECHNICAL DATA

SPECIFICATIONS	LS2000R	PS4000R
Rated pressure (bar)	6.3	6.3
Nominal load SWL (KN)	20	40
Air consumption (m3/mn)	0 to 10	0 to 10
Gear ratio	76	76
Max. torque at drum (m.daN)	358	
Motor Power (Hp)	10	10
Weight of std model without rope (kg) ≅	230	230
Recommended rope diameter (mm)	11.5 / 13	13

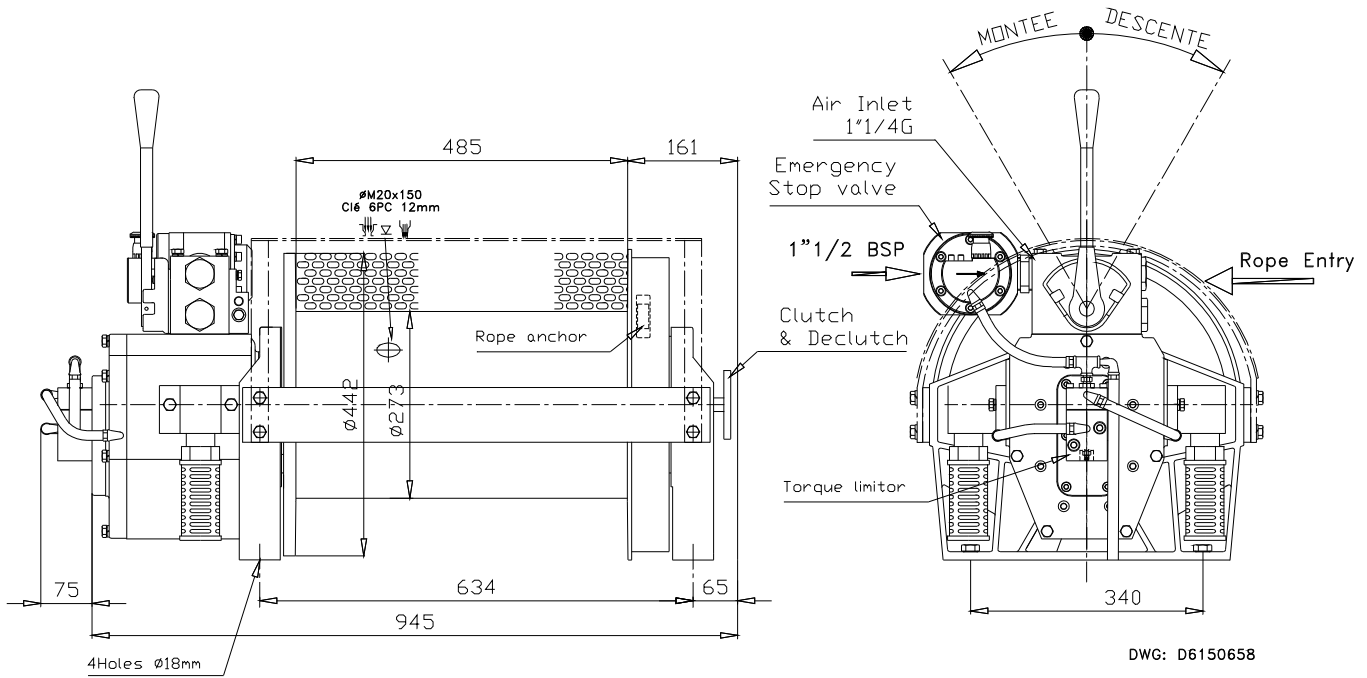
PERFORMANCE with Max torque and speed and rope Ø 1/2"					
Layer nbr	1	2	3	4	5
LS2000R Max load (kg)	2800	2540	2330	2150	2000
Max. speed (m/mn)	15.7	17.3	18.8	20.4	22
PS4000R Max. load (kg)	4000				
Max. speed (m/mn)	≅3				

CUMULATIVE ROPE CAPACITY							
Number of layers	1	2	3	4	5	6	7
Std width (m) with rope Ø 1/2"	15	34	56	79	103	130	158

Rating limit →

# SPECIFICATIONS

## PNEUMATIC WINCH



## TECHNICAL DATA

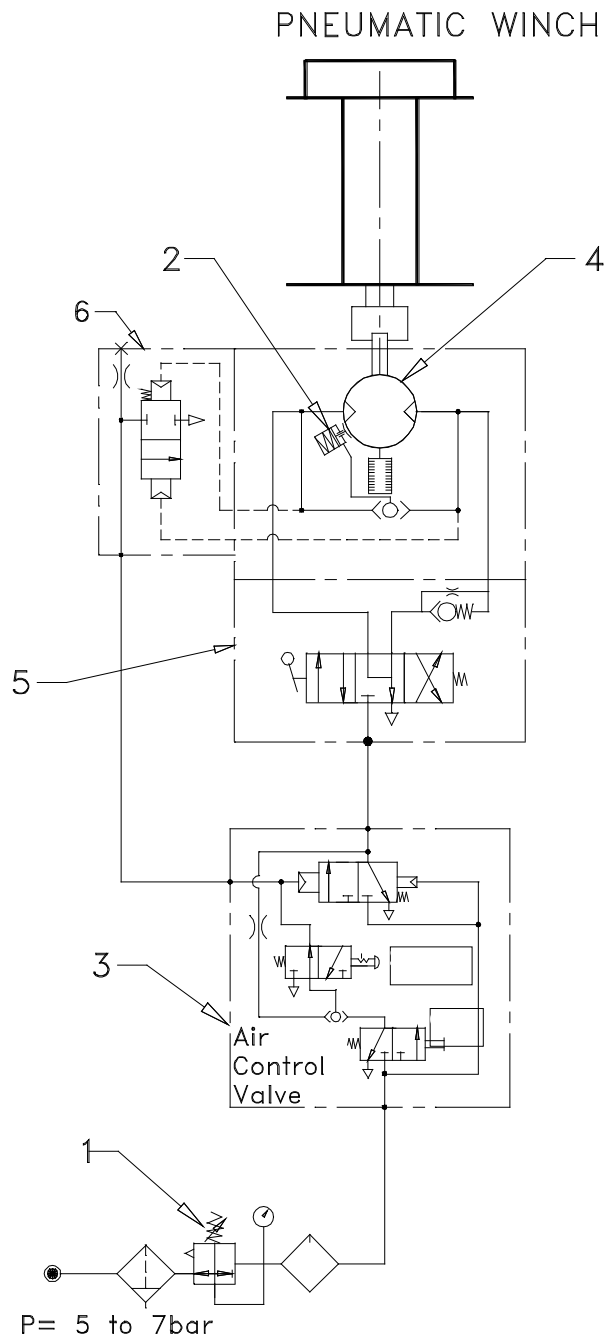
SPECIFICATIONS	LS2000RGC	PS4000RGC
Rated pressure (bar)	6.3	6.3
Nominal load SWL (KN)	20	40
Air consumption (m <sup>3</sup> /mn)	0 to 10	0 to 10
Gear ratio	76	76
Max. torque at drum (m.daN)	364	
Motor Power (Hp)	10	10
Weight of std model without rope (kg) $\cong$	270	270
Recommended rope diameter (mm)	11.5 / 13	13

PERFORMANCE with Max torque and speed and rope $\phi 1/2$ "					
Layer nbr	1	2	3	4	
LS2000R Max load (kg)	2540	2330	2150	2000	
Max. speed (m/mn)	17.3	18.8	20.4	22	
PS4000R Max. load (kg)	4000				
Max. speed (m/mn)	$\cong 3$				

CUMULATIVE ROPE CAPACITY							
Number of layers	1	2	3	4	5	6	
Std width (m) with rope $\phi 1/2$ "	22	49	78	110	144	181	

Rating limit  $\rightarrow$

# PNEUMATIC DIAGRAM



Dwg: D3620624

# 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.

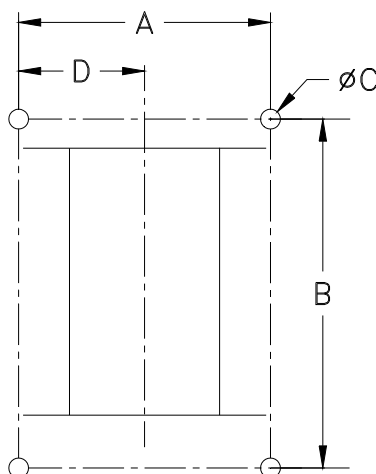
## ⚠ WARNING

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

## MOUNTING WINCH

Mounting 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.

1. 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.
2. Make sure the mounting surface is flat to within 1mm. Shim if necessary.
3. Mounting bolts must be Grade 8-8 or better. Use self-locking nuts or nuts with lockwashers.
4. 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 and for every 25mm of drum length be a least 0.5 meter from the drum.
5. Do not weld to any parts of the winch.
6. Foundation bolting dimensions: Refer to "SPECIFICATION" section for dimensions.



Dwg: D6150631

A= 340mm  
 B= Std = 449mm Version GC = 634  
 D= 340/2 = 170mm  
 Ø C = 18mm

## WIRE ROPE

### ⚠ CAUTION

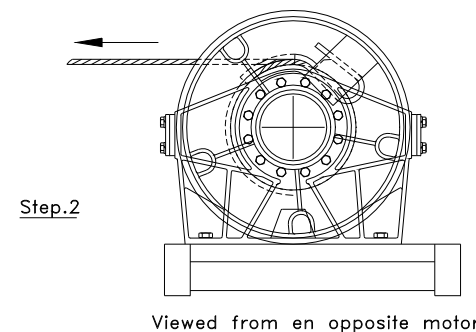
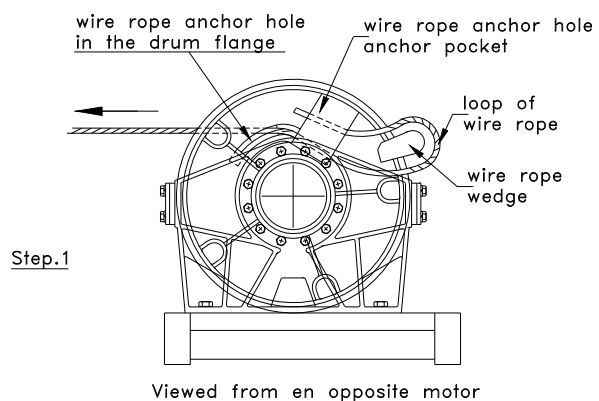
- Maintain at least 3 wraps of wire rope on the drum at all times.

### Wire Rope Selection

- Consult a reputable wire rope manufacturer 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 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.
- For winches used in lifting applications ensure that the rope top layer is at least a distance from the top of the drum flange equal to (2) times the diameter of the wire rope.
- As a general rule for lifting applications a minimum of 5:1 wire rope design factor is required with an 18:1 wire rope to drum diameter ratio.

### Installing Wire Rope

1. Cut wire rope to length in accordance with the wire rope manufacturer's instructions.
2. Feed the end of the wire rope into the rope anchor in the flange of the drum.
3. Wrap the end of the rope with wire a distance from the end equal to the wedge length plus 25mm. Forming a large loop with the rope, insert the end back into the top of the cable anchor.
4. Pull the wire rope into position in the drum anchor pocket.





## **⚠ CAUTION**

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

### **Wire Rope Spooling**

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

### **Safe Wire Rope Handling Procedures**

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

### **Safe Installation Procedures**

1. Do not use rope as a ground for welding.
2. Do not attach a welding electrode to winch or rope.
3. Never run the rope over a sharp edge. Use a correctly sized sheave.
4. Always maintain at least (3) full tight wraps of wire rope on the drum.

## **AIR SYSTEM**

The air supply must be clear, lubricated and free from moisture.

A minimum of 6.3 bar at the winch motor is required during operation to provide rated winch performances.

### **Air Lines**

The inside diameter of the winch air supply lines must not be smaller than 1" 1/2. The standard line diameter is 2". Before making final connections all air supply lines should be purged before connecting to system inlet.

#### **Air Inlet Port:**

- LS2000R & PS4000R With "CE" option.  
Port Diameter 1" 1/2 on the emergency stop valve.
- LS2000R & PS4000R Without "CE" option.  
Port diameter 1" 1/4 on the control valve.

### **Lubricator**

The air motor may be operated without lubrication. If an air line lubricator is used, it should be replenished daily with SAE 30W Grade ISO VG100 oil (minimum viscosity 135 Cst at 40°C).

-Set lubricator to provide 6 to 8 drops per minute of oil.

**-Maxi pressure Inlet to the filter is 10 bar.**

## **⚠ CAUTION**

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

## **MOTOR**

For optimum performances and maximum durability of parts provide an air supply of 6.3 bar at the flow recommended in the "SPECIFICATION" section, as measured at the motor inlet.

## **⚠ CAUTION**

- **Do not exceed the maximum specified operating pressure 6.3 bar. The winch overload valve will exhaust air if maximum pressure is exceeded**

### **Muffler**

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

## **OVERLOAD DEVICE**

The overload system is based on detection of the difference in air pressure between the inlet and outlet ports. It consists of a valve which is normally closed. The valve senses pressure at the motor inlet and outlet and compares the difference between the two pressures to the index value established by spring adjustment. A difference in pressure greater than the index value causes the emergency stop to be activated. Over load protection is adjusted at the factory to 120% of the SWL.

### **Main Air Shutt-off Valve**

The main air shutt-off valve is connected directly on the control valve. It is connected with the overload system.

## **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.

## OPERATION

The four most important aspects of winch operation are:

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

### **⚠ WARNING**

- **Winches are not designed or suitable for lifting, lowering or moving persons. Never lift loads over people.**

### **Overload Device**

An overload device is required on all winches with a rated capacity of over 1 metric ton used for lifting applications. The overload device prevents the winch from lifting a load greater than the calibration pressure.

### **Winch Control**

The manual control valve is mounted directly on a winch. Control valve is directly connected to the pneumatic motor by mean of (2) rigid tubes.

When viewed from the pneumatic motor, move the control lever to the left to haul in wire rope and to the right to pay out wire rope.

To ensure smooth operation of the winch avoid sudden movements of the control valve. Sudden movement of the

control valve may activate the overload device. If this occurs reset the winch by pressing the "ON" button of the emergency stop device and smoothly action the control valve. Ensure the winch is not overloaded.

### **Emergency Stop Device**

The emergency stop device is located at the air inlet of the winch on local control model. When activated winch drum rotation will immediately cease.

1. To start winch operation press the "ON" button.
2. To operate winch press "Haul-in" or "Payout" control lever.
3. In the event of an emergency all winch operation can be stopped by pushing the emergency stop button. This will prevent air from reaching the winch motor which will stop any movement.
4. The "ON" button must be pushed to restart the winch after the "Emergency Stop" button have been used.

### **Winch Brake**

Fail safe automatic brake opens by air pressure and return to neutral spring applied.

The brake is connected to the control valve by means of a tube.

## LUBRICATION

- Winches are supplied from the factory filled WITH oil.
- Check oil and all lubrication levels prior to operating winch.
- The gear and brake assemblies share a common oil bath.
- Fill and drain through plugs screwed into the drum.

Temperature -30°C to 0°C

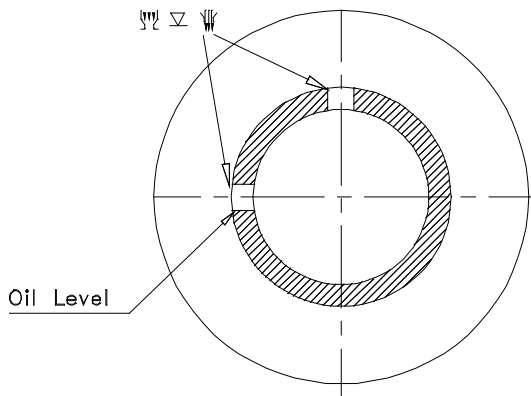
Use EP1 multipurpose lithium based grease.

Temperature 0°C to 40°C

Use EP2 multipurpose lithium based grease.

### **NOTICE**

- **Replace the oil in the reduction gear at least once every year.**
- **However when the winch is used at a high frequency the oil may need to be changed on a more frequent basis.**



- Capacity : Std = 3 L , Version GC = 7 L
- Recommended Reduction gear EP Oil:
  - Temperature below 0°C  
Use 75W ISO VG30 oil :
  - Temperature 0°C to 40°C  
Use 90W ISO VG150 oil :  
kinematic viscosity 145mm<sup>2</sup>/s at 40°C.
- Recommended Grease (seals bearings):

# INSPECTION

There are two types of inspection, the frequent inspection performed by the operator and periodic inspections performed by personnel trained in service and maintenance on this product. 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.

Any deficiency revealed through inspection 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 should be maintained for each winch, listing all points requiring periodic inspection. A written report should be made quarterly on the condition of the critical parts (e.g. bearings, gears, side plates support) 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 to authorized personnel.

## NOTICE

- **During assembly/disassembly visually inspect each component for distortion, wear and damage. Replace items indicating damage, distortion and/or excessive wear. Proper use, inspections and maintenance will increase the life and usefulness of your I-R equipment.**

## Frequent Inspection

On winch in continuous service, frequent inspection should be made at the beginning of each shift. In addition, visual inspections should be conducted during regular service for any damage or evidence of malfunction.

1. **OPERATION.** Operate the winch so that it unwinding a few feet (5 meters). During the few feet (5 meters) of unwinding, check for visual signs or abnormal noises which could indicate a problem. Check for smooth operation. Do not operate the winch until all problem have been corrected.
2. **PNEUMATIC SYSTEM.** Visually inspect all connections, fittings, hoses and components for indication of pneumatic leaks. Repair any leaks found.
3. **CONTROLS.** During operation of winch, verify winch response to pendant use is quick and smooth. If winch responds slowly or movement is unsatisfactory, do not operate the winch until all problems have been corrected.
4. **BRAKE.** During winch operation test brake. Brake must hold load without slipping. If brake do not hold load or do not release properly, the brake must be repaired.

## NOTICE

- **The brake of this winch is not adjusted.**

## Periodic Inspection

Frequency of periodic inspection depends on the severity of usage :

<b>NORMAL</b>	<b>HEAVY</b>	<b>SEVERE</b>
yearly	semi-annually	quarterly

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

1. **FASTENERS.** Check retainer rings, split pins, capscrew and nuts. Replace if missing or damaged and tighten if loose.
2. **ALL COMPONENTS.** Inspect for wear, damage, distortion, deformation and cleanliness. If external evidence indicates the need, disassemble. Check gears, shafts and bearings. Replace worn or damaged parts. Clean, lubricate and reassemble.
3. **SUPPORTING STRUCTURE.** Check for distortion, wear and continued ability to support load.
4. **SIDEPLATES.** Check side plates for spreading due to bending. Replace if spreading has occurred
5. **LABELS.** Check for presence and legibility. Replace if necessary.
6. **WIRE ROPE.** In addition to frequent inspection requirements, also inspect for the following:
  - Build-up of dirt and corrosion. Clean with steam or a stiff wire brush to remove dirt and corrosion if necessary.
  - Loose or damaged end connection. Replace if loose or damaged.
  - Check wire rope anchor is secure in drum.
  - Verify wire rope diameter. Measure the diameter of the rope from crown-to crown throughout the life of the rope. Recording of the actual diameter should only be done with the rope under equivalent loading and in same operating section as accomplished during previous inspections.

## Winchs Not in Regular Use

A winch which has been idle for a period of one month or more, but less than six months, shall be given an inspection conforming with the requirements of "Frequent Inspection".

A winch which has been idle for a period of over six months shall be given a complete inspection conforming with the requirements of "Periodic Inspection". Standby winchs shall be inspected at least semi-annually in accordance with the requirements of "Frequent Inspection". If abnormal operating conditions apply, winchs may require a more frequent inspection.

## MAINTENANCE

### **⚠ WARNING**

- Never perform maintenance on the winch while it is supporting a load. A falling load can cause injury or death of personnel and damage to property.
- Before starting maintenance, tag controls :  
**DANGER – DO NOT OPERATE EQUIPMENT BEING REPAIRED.**
- Only allow personnel trained to service this equipment to perform maintenance.
- Disconnect all power supply from winch prior to conducting maintenance.

### **NOTICE**

- Proper use, inspections and maintenance increase the life and usefulness of your I-R equipment. During assembly lubricate gears, nuts, capscrews and all machined threads with applicable lubricants. Use of antiseize compound and/or thread lubricant on capscrew and nut threaded areas will help prevent corrosion and allows for ease of disassembly of component.

## GENERAL ASSEMBLY / DISASSEMBLY INSTRUCTIONS

- 9 During assembly/disassembly steps for installation and/or repair visually inspect components for distortion, wear and damage. Replace any item indicating damage, distortion and/or excessive wear.
- 9 **Do not** disassemble further than required to accomplish repair. A good part can be damaged during the course of disassembly.
- 9 **Do not** use excessive force to remove or install parts. Use proper tools for the installation of press fit parts. During disassembly, use a soft hammer to tap around the outside of parts that are stuck together due to corrosion.
- 9 **Do not** use a flame to heat a part for ease in installation. During disassembly, only use flame to heat a part that is damaged beyond repair; use a procedure that will not result in damage to other parts; and, use this option only after all other reasonable measures have been attempted.
- 9 **Always** use leather or copper-covered vise jaws to protect threaded and machined surfaces of parts being placed in the vise.
- 9 When installing bearings, **only** press on the bearing race contacting the component to be installed into. For shafts, press on the inner bearing race; for housings, press on the outer bearing race.
- 9 **Do not** damage seating surfaces during gasket and 'O' ring removal. Use wood, plastic or brass removal tools to prevent scoring of machined sealing surfaces.
- 9 **Always** use only genuine **I-R** replacement parts. When ordering specify part number, part description, unit model and serial number.
- 9 **Do not** perform repairs to winchs in place. It is recommended that winchs be removed and repaired in a clean, safe work area.

## WINCH ASSEMBLY / DISASSEMBLY INSTRUCTIONS

(ref. Dwg. D6150629)

1. Unwind wire rope from the drum.
2. Remove drum guard.
3. Remove rope and the wedge (11).
4. Disconnect control valve to the air inlet.
5. Disconnect & Remove pneumatic hoses between the manual control valve and torque limiter.
6. (D6170010) Remove screws (141) and the manual control valve.
7. Remove the winch bolts mounting (8 bolts M16).

### **Multi Discs Brake**

(ref. Dwg. D6150629)

### **Multi Discs Brake disassembly**

#### **NOTICE**

- Brake dismounting doesn't need to empty the reducer block.
- Set and fix the winch on the rear flange.

Dwg: D6160001

1. Extract pipe (6) (Use tool with tapping M24).
2. Remove screws (19), and extract the motor unit (2 tapped holes M10).
3. Remove "O"Ring (14).

Dwg: D6150269

4. Carefully remove the motor housing screws (68) one half turn at a time each until spring (33) compression is relaxed.
5. Remove eccentric ring (13) and spring (33).
6. Remove leading socket (16).
7. Extract brake housing assy.
  - 7.1. Remove "O"Ring (44).
  - 7.2. Extract distance ring (15) to brake piston.
  - 7.3. Extract brake piston (14).
  - 7.4. Remove "O"Ring (63 - 64).
8. Remove friction discs (28) and steel discs (29).

### **Multi Discs Brake assembly**

Assembly of the brake unit is the same as disassembly in opposite order.

### **⚠ WARNING**

**Install friction and steel discs, beginning with a friction disc (28) and alternating with a steel disc (29), until the discs are used.**

- Lubricate 'O' rings (44-63-64).
- Secure brake housing screws (68) with Loctite® 243 on the threads.
- Torque brake screws (32) to 22 m.N.
- (D6170010) Torque control valve screws (141) to 44m.N.

## Gear Box

(ref. Dwg. D6150629)

### Gear Box disassembly

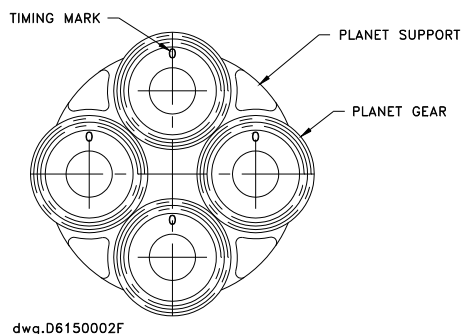
#### NOTICE

- Dismounting the rear bearing need to empty the reducer block. Remove plug (31) to drain the gear box.
- Set and fix the winch on the rear flange.

1. Disassemble brake unit as previously described.
2. (D6150630) Remove screw (101) and drum guard (102).
3. Remove screw (53) from the front side of spacers (22).
4. Remove screw (52) and front flange (8).
5. Remove screw (54) and stop cover (23).
6. Extract the front bearing (18) and support drum (20) assy (Use two eyebolts M10).
  - 6.1. Remove external retainer ring (69) and extract splined hub (10).
  - 6.2. Remove internal retainer ring (59) and extract driving pinion (9) and ball bearing (35).
  - 6.3. Remove screws (55), extract ring gear support (19).
  - 6.4. Extract support drum (20) and ball bearing (36).
    - 6.4.1. Extract oil seal (41).
    - 6.4.2. Remove internal retainer ring (62)
    - 6.4.3. Extract ball bearing (36).
    - 6.4.4. Remove "O" Ring (45).
7. Remove seal "V" Ring (49).
8. Extract ring gear (6) from drum.
  - 8.1. Remove retainer ring (60).
9. Using the 2 puller screws holes M10 provided in the planetary support (17) to extract planetary support unit from drum.
  - 9.1. Extract drive pin (58) completely through to the inside of the planetary support.
  - 9.2. Push out planet axles (4).
  - 9.3. Remove planet gears (3), needle bearings (38) and distance rings (5).
  - 9.4. Remove thrust rings (46), bearing (48).
10. Extract gear ring (7).
11. Remove claw of positive clutch (25).
  - 11.1. Remove retainer ring (61).

### Gear Unit Assembly

Assembly of the reduction gear unit is the same as disassembly in opposite order.



#### ⚠ WARNING

Time gears as shown in drawing D6150002. Using a separate ring gear tool to maintain gear position during installation of planetary assembly is helpful. Tap down until planetary assembly is fully seated.

- Lubricate 'O' rings (45).
- Lubricate oil seal (41) and "V" ring (49) with grease "EP2".
- Secure screws (55) with Loctite® 243 on the threads.
- Torque ring gear support screws (55) to 9 m.N.
- Torque oil seal cover screws (54) to 4 m.N.
- Torque side plate support screws (52) to 44 m.N.
- Torque spacer screws (53) to 44 m.N.

## Rear Bearing

(ref. Dwg. D6150629)

### Rear bearing disassembly

#### NOTICE

- Dismounting the rear bearing doesn't need to empty the reducer block.
- Set and fix the winch on the front flange.

1. Remove screw (53) from the rear side of spacers (22).
2. Remove screw (52) and rear flange (8).
  - 2.1. Remove screw (51).
  - 2.2. Remove blind washer (26).
  - 2.3. Remove "O" Ring (47).
3. Remove rear bearing (21).
4. Remove "V" ring (48).
5. Extract ball bearing (34).
6. Extract oil seal (40).

### Rear bearing Assembly

Assembly of the rear bearing unit is the same as disassembly in opposite order.

#### NOTICE

- Lubricate oil seal (40) and "V"ring (48) with grease "EP2".
- Lubricate 'O' rings (47).
- Torque side plate support screws (52) to 44 m.N.
- Torque spacer screw (53) to 44 m.N.

## AIR GEAR MOTOR ASSEMBLY / DISASSEMBLY INSTRUCTIONS

(ref. Dwg/ D6160001)

1. Disconnect control valve to the air inlet.
2. Disconnect & Remove pneumatic hoses between the manual control valve, brake housing and torque limiter.
3. (D6170010) Remove screws (141) and the manual control valve.

#### NOTICE

- Dismounting the air gear motor doesn't need to lay down the winch from its support.

### Air gear motor disassembly

1. Remove screw (19) and extract the rear end cover (2) (2 tapped holes M10).
  - 1.1. Remove screw (25) and the cover (4).
  - 1.2. Remove "O"Ring (15).
  - 1.3. Unlock nut (29) and extract the motor rotor (9) and the repulsion rotor (10).
  - 1.4. Extract ball bearings (11).

2. (D6320020) Remove external retainer ring (73).
3. Extract drive shaft (80).
4. Remove screw (26) and extract the front end cover (5).
  - 4.1. Remove internal retainer ring (28) and extract the oil seal support (8).
    - 4.1.1. Extract oil seal (13) and the "O" Ring (16).
    - 4.1.2. Extract ball bearing (12).
    - 4.1.3. Remove screw (23) and ball bearing (12).
5. Remove screw (21) and flanges (7).
  - 5.1. Unlock reducer sleeve (32).
    - 5.1.1. Unlock muffler (18).

### Air gear motor assembly

Assembly of the air gear motor unit is the same as disassembly in opposite order.

#### NOTICE

- Lubricate oil seal (13), ball bearings (12) and (11) and "O"Rings (14-15-16-17) with grease "EP2".
- Secure screws (25-23) and (26), with Loctite® 243 on the threads.
- Secure nuts (29) with Loctite® 243 on the threads.
- Assemble rear end cover (2) and motor housing (1) with Loctite® 574.
- Assemble flanges (7) and motor housing (1) with Loctite® 574.
- Torque screws (26) to 28 m.N.
- Torque cover screws (25) to 20 m.N.

### AIR CONTROL VALVE ASSEMBLY / DISASSEMBLY INSTRUCTIONS

(ref. Dwg/ D6170010)

1. Disconnect control valve to the air inlet.
2. Disconnect & Remove pneumatic hoses between the manual control valve, brake housing and torque limiter.

### Air control valve disassembly

1. Remove screw (141).
2. Remove screw (139), "O"Rings (144) and (146).
  - 2.1. Unscrew plug (124) and extract ball (149).
    - 2.1.1. Remove "O"Ring (148).
3. Remove pin (135) and lever (123).
  - 3.1. Remove lever (130) and handle (143).
4. Remove screw (142-140).
5. Remove front end cover (121).
  - 5.1. Extract spring (129).
  - 5.2. Remove bushing (128) and "O"Rings (144-145).
6. Extract rotary valve (131).
7. Unscrew plug (125).
  - 7.1. Extract stopper (126), spring (134).

### Air control valve assembly

Assembly of the air control valve unit is the same as disassembly in opposite order.

#### NOTICE

- Lubricate bushing (128), rotary valve (131) and "O"Rings with grease "EP2".
- Secure screws (139-140) with Loctite® 243 on the threads.

### CLEANING, INSPECTION AND REPAIR

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

#### CAUTION

- Bushings that rotate in the frame or are loose or worn must be replaced. Failure to observe this precaution will result in additional component damage.

Clean all winch component parts in solvent (except for the friction discs). If bushings have been removed, it may be necessary to carefully scrape old "LOCTITE®" from the bushing bores. Dry each part using low pressure, filtered compressed air.

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

1. Inspect all gears for worn, cracked or broken teeth.
2. Inspect all bushings for wear, scoring or galling.
3. Inspect shafts for ridges caused by wear. If ridges caused by wear are apparent on shafts, replace the shaft.
4. Inspect all threaded items and replace those having damaged threads.
5. Measure the thickness of the friction discs. Replace the friction discs if the grooves are no longer visible.

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.

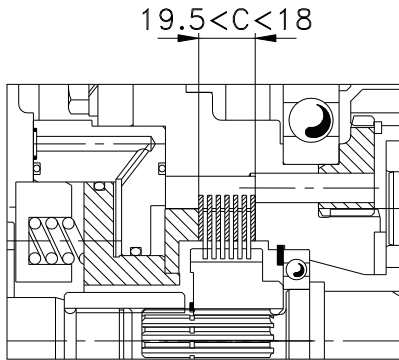
1. Worn or damaged parts must be replaced. Refer to the application Parts listing for specific replacement parts information.
2. Inspect all remaining parts for evidence of damage. Replace or repair any part which is in questionable condition. The cost of the part is often minor in comparison with the cost of redoing the job.
3. Smooth out all nicks, burrs or galled spots on shafts, bores, pins or bushings.
4. Examine all gear teeth carefully and remove nicks or burrs.
5. Polish the edges of all shaft shoulders to remove small nicks which may have been caused during handling.
6. Remove all nicks and burrs caused by lockwashers.

## Brake Adjustment

No brake adjustment is required.

Annual Maintenance is limited to:

1. A general cleaning.
2. The friction discs have a 0.2mm deep groove on each side. Replace the friction discs if the grooves are no longer visible.
3. Measure total brake and steel plate stack up. Check that measurement is not less than minimum shown.



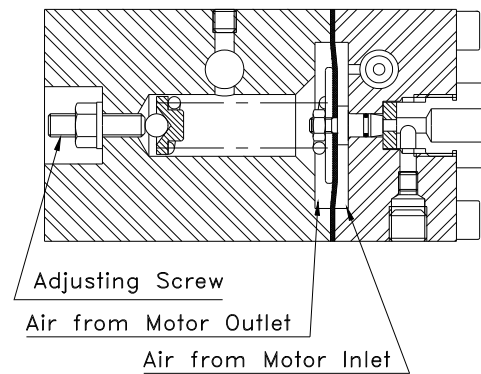
(Dwg.D6150629)

## Overload Device

1. Connect the winch to the air supply.
2. Release the locknut and turn the adjustment screw in order to increase or decrease the SWL (increase the SWL by tightening the adjustment screw). The adjustment must be made for an overload of 20% maximum of the SWL.
3. Tighten the locknut securing the adjustment screw.
4. Check winch operation at rated load. If necessary repeat the adjustment.

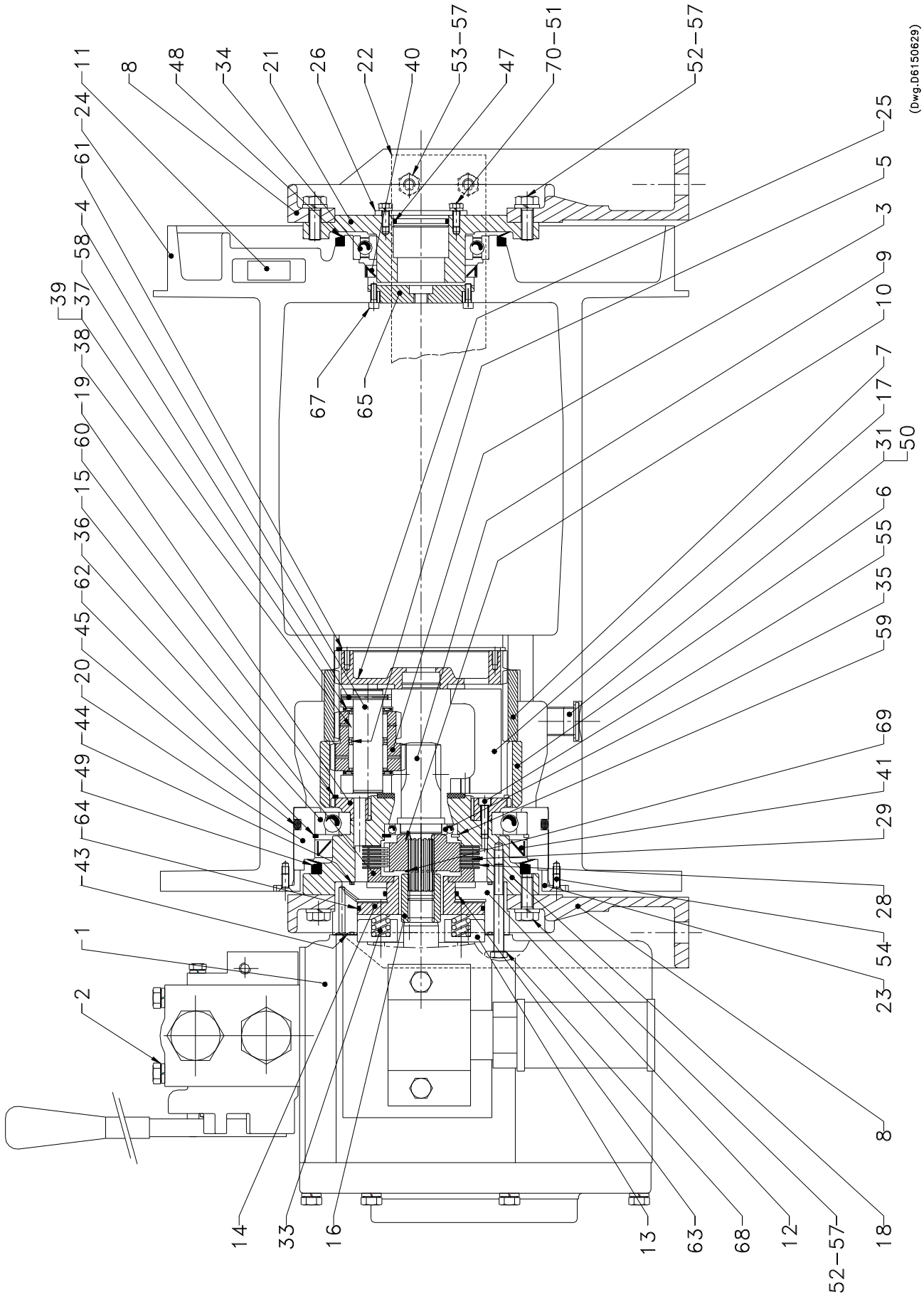
### NOTICE

- Do not change factory settings unless winch is tested and recertified at an authorized repair facility..



Dwg: D6360628

# 2 TON WINCH ASSEMBLY DRAWING



(Dwg.D6150629)



## 2 TON WINCH ASSEMBLY PARTS LIST

ITEM NO.	DESIGNATION	DESCRIPTION OF PART	TOTAL QTY	PART NO
1	Moteur pneumatique	Gear motor	1	76160000
2	Distributeur Pneumatique	Manual control valve	1	76170000
3	Satellite	Planet Gear	4	95730018
4	Axe de satellite	Planet axle	4	95730019
5	Entretoise	Distance ring	4	95730021
6	Couronne 60 dents	60 teeth-ring gear	1	95730055
7	Couronne 57 dents	57 teeth-ring gear	1	95730056
8	Flasque bati	Flange	2	96157002
9	Pignon moteur	Driving pinion	1	96150006
10	Manchon de liaison	Coupling Sleeve	1	96150007
11	Coin	Wedge	1	96150009
12	Corps de frein	B rake housing	1	96150011
13	Bague de centrage	Eccentry ring	1	96150012
14	Piston	Piston	1	96150013
15	Entretoise	Distance ring	1	96150014
16	Bague de liaison	Leading-socket	1	96150015
17	Porte satellite	Planet Support	1	96150023
18	Palier avant	Front bearing	1	96158042
19	Porte couronne	Ring gear support	1	96150043
20	Palier de roulement	Drum Support	1	96150044
21	Palier arrière	Rear bearing	1	96158049
22	Entretoise	Connecting Plate	2	96150591
	Entretoise GC	Long Connecting plate		96150050
23	Butée	Stop	1	96150051
24	Tambour	Drum	1	96157001
	Tambour GC	Long Drum		96150052
25	Sous ensemble clabot	Claw of positive cluth	1	35730001
26	Obturateur	Blind washer	1	96190013
28	Disque de friction	Friction disc	7	63059932
29	Disque acier	Steel disc	6	63060032
31	Bouchon M24x200	Plug	2	65160932
33	Ressort	Spring	9	69167132
34	Roulement a billes 6015-2RS	Ball bearing	1	50050015
35	Roulement a billes 16007	Ball bearing	1	50800007
36	Roulement a billes 16024	Ball bearing	1	50800024
37	Butée a aiguilles 25x42	Needle stop	8	56054225

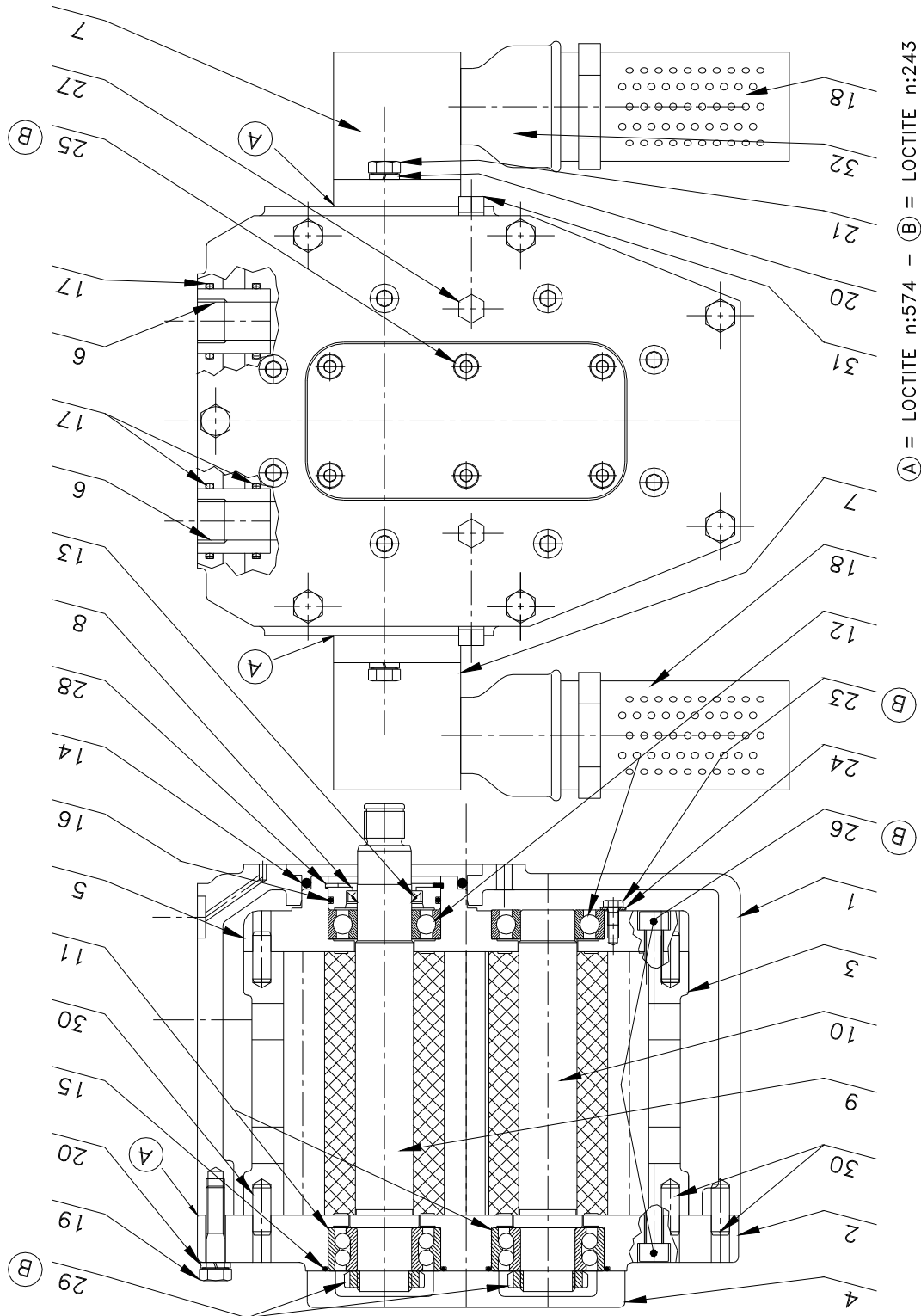
**Recommended spare**

## 2 TON WINCH ASSEMBLY PARTS LIST

ITEM NO.	DESIGNATION	DESCRIPTION OF PART	TOTAL QTY	PART NO
38	Cage a aiguilles K25x33x24	Needle cage	8	56503324
39	Contre plaque Ø25x42x0.8	Thrust washer	8	57312632
40	Bague d'étanchéité Ø75x95x10	Oil Seal	1	58000830
41	Bague d'étanchéité Ø150x180x15	Oil Seal	1	58019230
43	Joint torique Ø7.5x1.5	"O"ring	1	58212529
44	Joint torique Ø115x3	"O"ring	2	58216929
45	Joint torique R73	"O"ring	1	58217929
47	Joint torique Ø40x3	O'ring	1	58224229
48	Joint "V"-ring 130-A	"V"-ring	1	58404831
49	Joint "V"-ring 170-A	"V"-ring	1	58405831
50	Joint cuivre JC24	Copper joint	2	58408031
51	Vis HM6x16	Screw	3	41020301
52	Vis HM10x30	Screw	24	41000401
53	Vis HM10x30	Screw	8	41000401
54	Vis FHC/90 M6x16	Screw	6	41101603
55	Vis Chc M6x25	Screw	4	41312206
57	Rondelle Grower W10	Split washer	32	45201010
58	Goupille élastique Ø4x40	Elastic pin	4	46504220
59	Circlips intérieur I62	Circlips	1	47703062
60	Anneau expansif SB150	Expansive ring	1	47836832
61	Anneau exspansif SB140	Expansive ring	1	47847832
62	Anneau expansif SB180	Expansive ring	1	47853932
63	Joint torique Ø58x3	"O"ring	1	58222929
64	Joint torique Ø102x3	"O"ring	1	58210929
65	Bague de centrage FDC	Washer	1	96150147
67	Vis Chc M5x16	Screw	3	41308706
68	Vis HM8x60	Screw	12	70968M
69	Circlips extérieur E22	Circlips	1	47700022
70	Rondelle Grower W6	Split washer	3	45201006
	Cable Ø13mm+ crochet	Rope + hook		69790141

 **Recommended spare**

# AIR GEAR MOTOR ASSEMBLY DRAWING

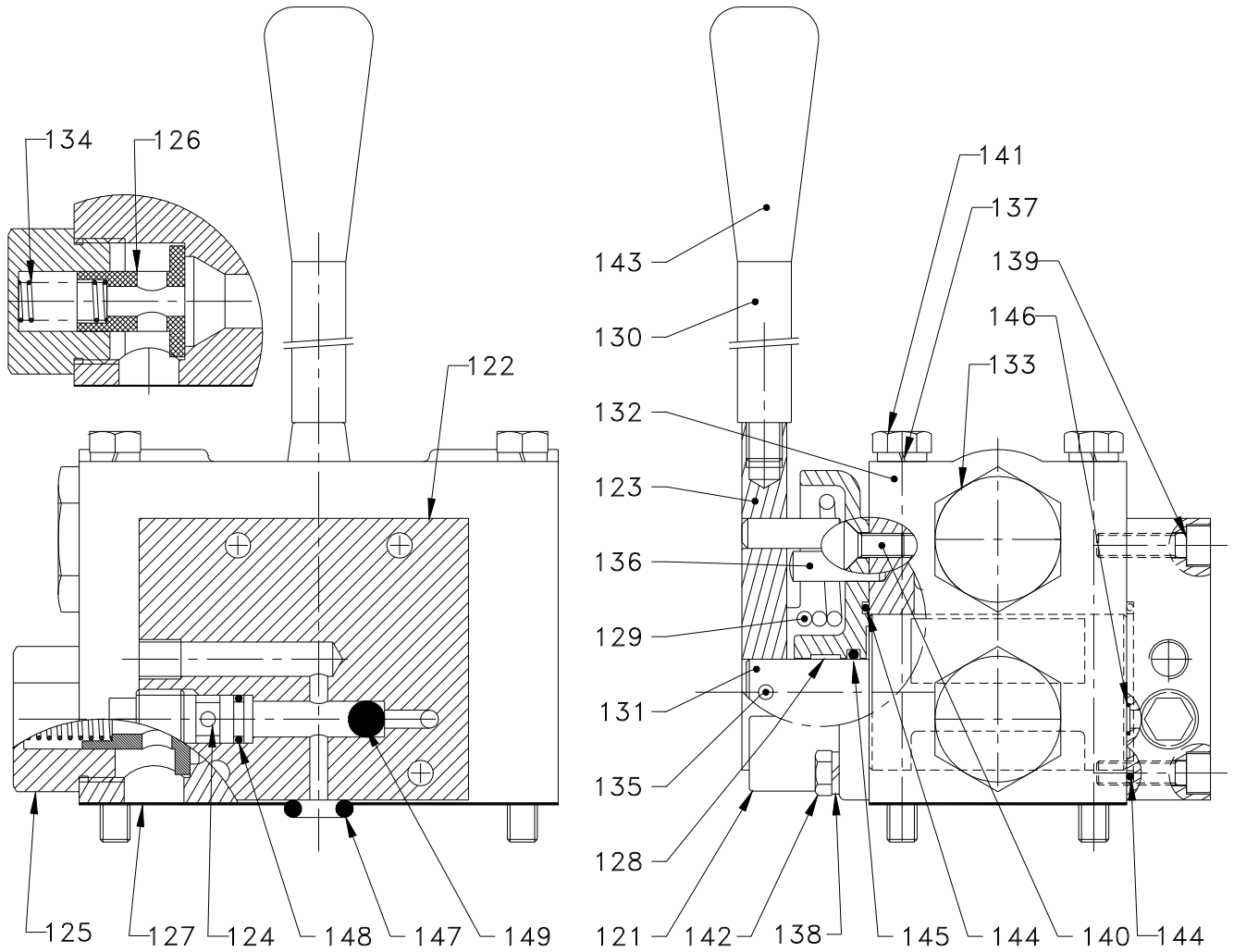


## AIR GEAR MOTOR ASSEMBLY PARTS LIST

ITEM NO.	DESIGNATION	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER
1	Carter Moteur	Motor Casing	1	96160001
2	Plaque Arrière	Rear end Cover	1	96160002
3	Corps Moteur	Motor Housing	1	96160003
4	Couvercle	Cover	1	96160004
5	Plaque Avant	Front end Cover	1	96160005
6	Tube	Pipe	2	96160006
7	Bride	Flange	2	96160007
8	Support de Joint	Joint Support	1	96160008
9	Rotor Moteur	Motor Rotor	1	96160009
10	Rotor repulsion	Repulsion Rotor	1	96160010
11	Roulement à Billes	Ball Bearing	2	50600006
12	Roulement à Billes	Ball Bearing	2	50180906
13	Bague d'étanchéité	Sealing Ring	1	58013430
• 14	Joint torique	'O' Ring	1	58208529
• 15	Joint torique	'O' Ring	2	58210429
• 16	Joint torique	'O' Ring	1	58224329
• 17	Joint torique	'O' Ring	4	58200929
18	Silencieux	Muffler	2	68483532
19	Vis H M10x45	Screw	7	41008801
20	Rondelle W10	Split Washer	11	45201010
21	vis HM10x30	Screw	4	41000401
23	Vis HM6x10	Screw	1	41007601
24	Rondelle plate M6	Flat Washer	1	45000106
25	Vis CHC8x25	Screw	6	41324906
26	Vis CHC10x30	Screw	16	41323506
27	Bouchon 1/4"	Plug	2	65125832
• 28	Circlips I62	Retainer Ring	1	47703062
29	Ecrou M30x1.5	Nut	2	57000006
30	Goupille 10x28	Pin	5	46000816
31	Bouchon 1/8"	Plug	2	65164532
32	Manchon réduit 1"1/4x2"	Reducer sleeve	2	61353528

• Pièce de rechange      Recommended spare part

# AIR CONTROL VALVE ASSEMBLY DRAWING



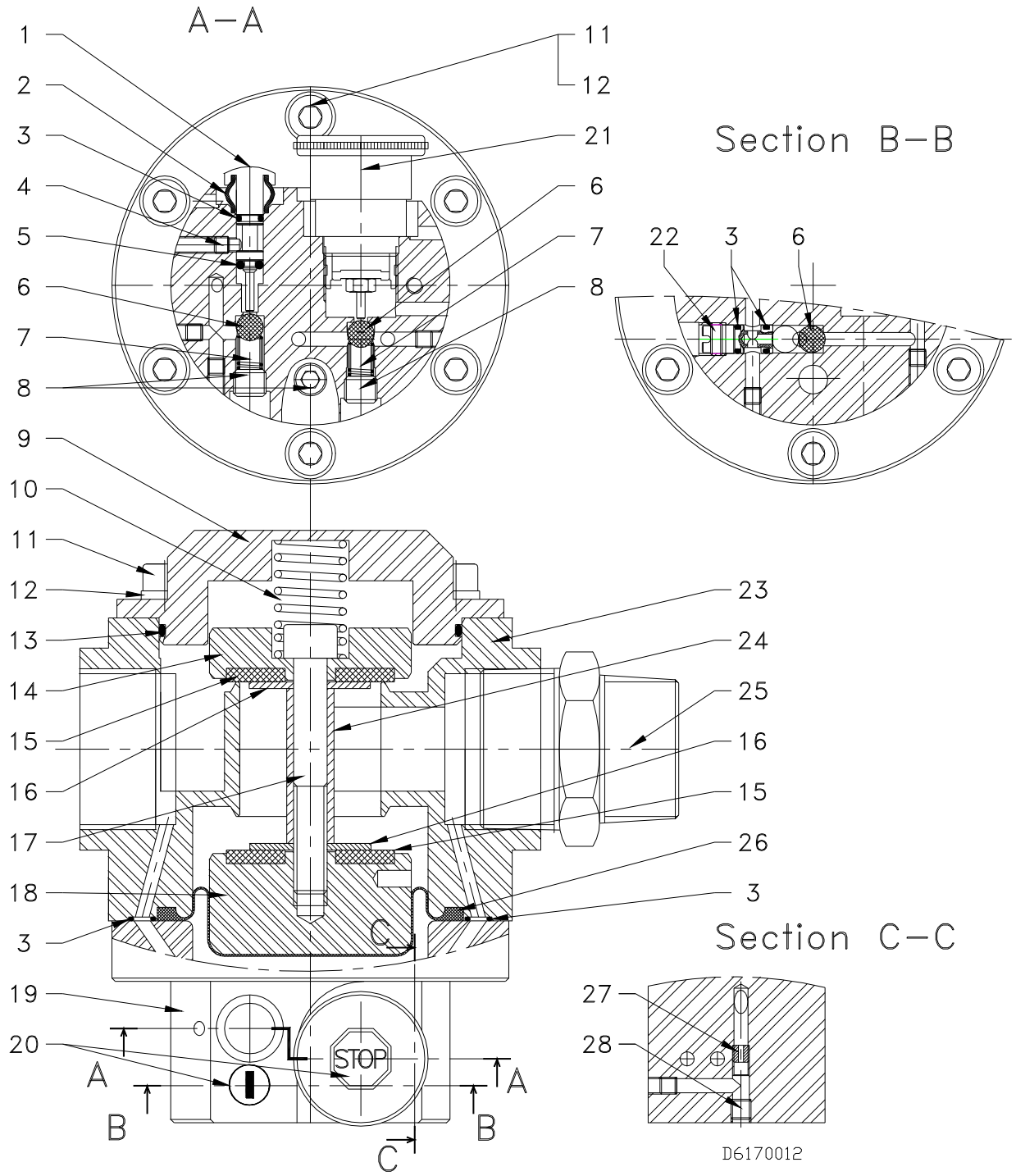
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## AIR CONTROL VALVE ASSEMBLY PARTS LIST

ITEM NO	DESIGNATION DES PIECES	DESCRIPTION OF PARTS	QTY QTE	PART NUMBER
121	Flasque avant	Front end cover	1	96170003
122	Flasque Arrière	Rear end Cover	1	96170004
123	Butée	Stop	1	96170005
124	Clapet	Stopper	1	96170007
125	Bouchon clapet	Plug	1	96170008
126	Clapet	Stopper	1	96170009
• 127	Joint	Joint	1	96170010
128	Bague de guidage	Guiding Ring	1	96170011
129	Ressort de rappel	Return ring	1	96170028
130	Levier	Lever	1	96170029
131	Carotte	Rotary Valve	1	96170030
132	Corps	Casing	1	96170031
133	Bouchon 1"1/4	Plug	1	65137132
134	Ressort	Spring	1	69167032
135	Goupille Elastique 5x50	Elastic Pin	1	46502020
136	Goupille 10x32	Pin	1	46001916
137	Rondelle W10	Split Washer	4	45201010
138	Rondelle W8	Split Washer	2	45201008
139	Vis CHC 8x30	Screw	4	41325006
140	Vis FHC 8x20	Screw	2	41105203
141	Vis H M10x130	Screw	4	41018101
142	Vis H M8x20	Screw	2	41002301
143	Poignée de manoeuvre	Handle	1	57426232
• 144	Joint Torique Ø54.2x3	"O" Ring	2	58204729
• 145	Joint Torique R17	"O" Ring	1	58224429
• 146	Joint Torique Ø7.5x1.5	"O" Ring	2	58212529
• 147	Joint Torique Ø10x1.5	"O" Ring	1	58227729
148	Bille	Ball	1	69401725

•   Pièce de rechange      Recommended spare part

# EMERGENCY STOP VALVE ASSEMBLY DRAWING PARTS LIST



## EMERGENCY STOP VALVE ASSEMBLY PARTS LIST

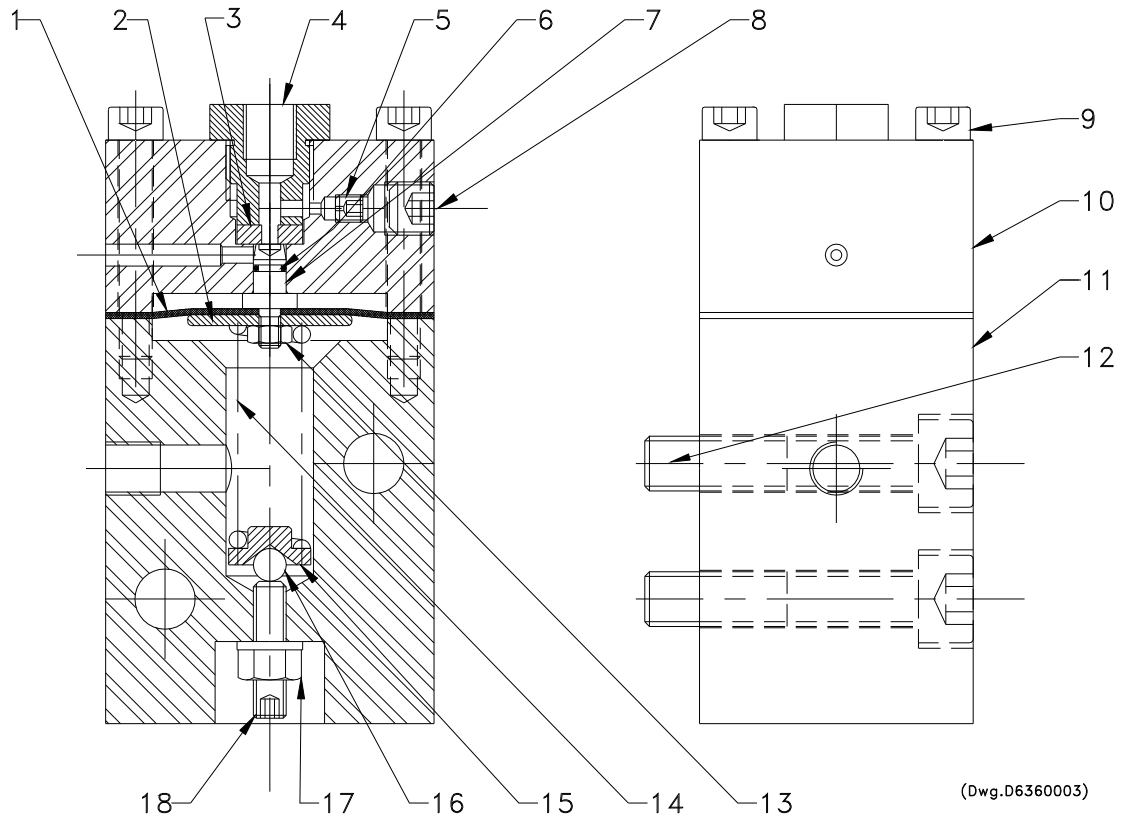
ITEM NO	DESIGNATION DES PIECES	DESCRIPTION OF PARTS	QTY QTE	PART NUMBER
1	Poussoir	Spool	1	95790104
2	Protecteur	Protector	1	95790107
• 3	Joint torique Ø 5x1.5	'O' ring	5	58209229
4	Vis	Screw	1	42008307
• 5	Joint torique Ø 3.3x2.4	'O' ring	1	58235329
6	Bille	Ball	3	69401625
7	Ressort	Spring	2	69128541
8	Bouchon 1/8"	Plug	3	65107741
9	Couvercle	Cover	1	96170073
10	Ressort	Spring	1	69120141
11	Vis CHC8X20	Screw	12	41321806
12	Rondelle frein W8	Lockwasher	12	45201008
• 13	Joint torique Ø 85x2.5	'O' ring	1	58216129
14	Clapet	Valve cone	1	96170075
15	Joint	Joint	2	96170076
16	Rondelle plate	Washer	2	45700010
17	Vis CHC10X70/32	Screw	1	41329406
18	Clapet	Valve cone	1	96170078
19	Couvercle	Cover	1	96170111
20	Autocollants	Label kit	1	95790111
21	Bouton d'arrêt d'urgence	Emergency stop bottom	1	95790108
22	Obturateur	Obturator	1	95790106
23	Corps	Body	1	96170072
24	Entretoise	Spacer	1	96170077
25	Mamelon	Nipple	1	61320628
26	Membrane	Diaphragm	1	67720041
27	Gicleur	Nozzle	1	96170071
28	Vis Hc6x6	Screw	1	42007807

• Pièce de Rechange Préconisée.

Recommended Spare.



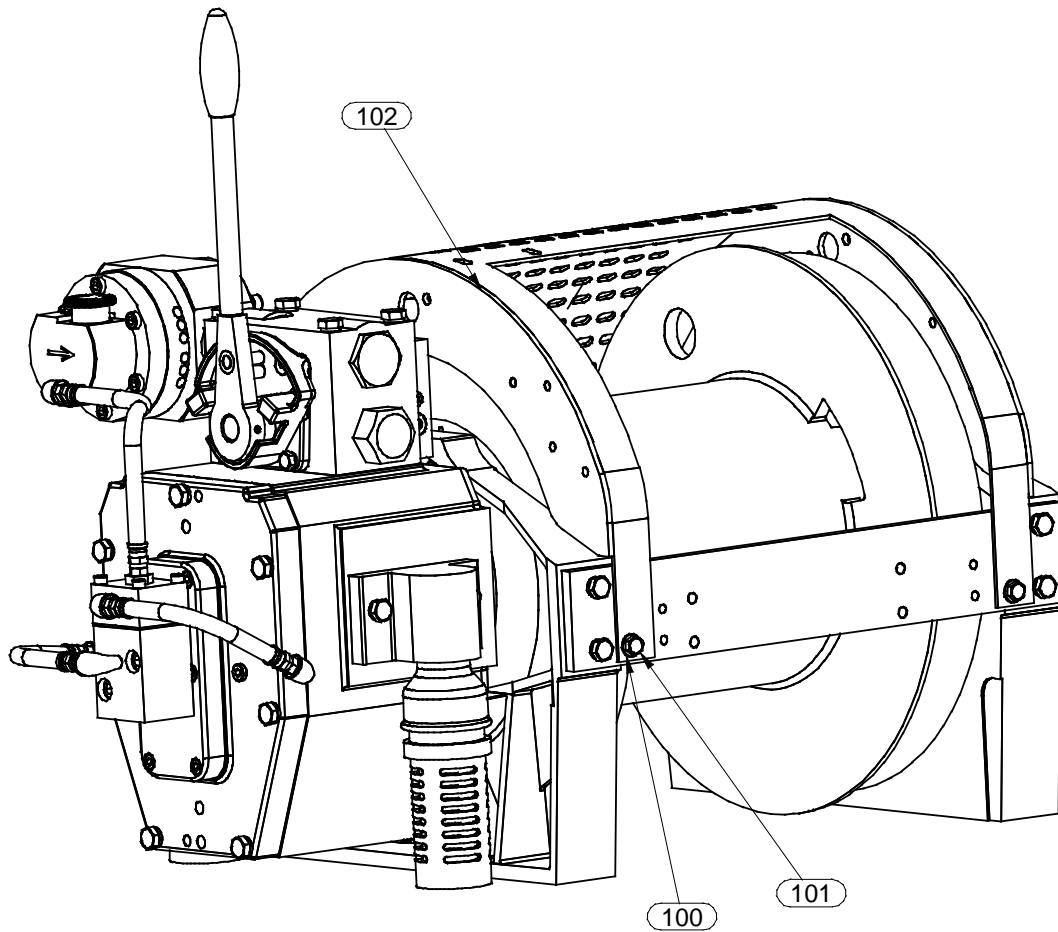
# TORQUE LIMITOR ASSEMBLY DRAWING & PARTS LIST



ITEM NO	DESIGNATION DES PIECES	DESCRIPTION OF PARTS	QTY QTE	PART NUMBER CODE
• 1	Membrane	Diaphragm	1	96360020
2	Rondelle	Washer	1	96360019
3	Joint	Gasket	1	96360021
4	Vis	Screw	1	96360018
5	Gicleur	Nozzle	1	96170071
• 6	Joint Torique Ø4x1	'O' Ring	1	58222329
7	Clapet	Valve	1	96360017
8	Bouchon 1/8"	Plug	1	65107741
9	Vis CHC6x40	Screw	4	41327406
10	Corps	Body	1	96360025
11	Couvercle	Cover	1	96360024
12	Vis CHC10x45	Screw	2	41323206
13	Ecrou M4	Nut	1	43001111
14	Ressort	Spring	1	69159432
15	Siège de ressort	Spring Seat	1	96360023
16	Bille	Ball	1	69400125
17	Ecrou d'étanchéité M6	Nut	1	43007611
18	Vis HC6x25	Screw	1	42007107

• Pièce de rechange      Recommended spare part

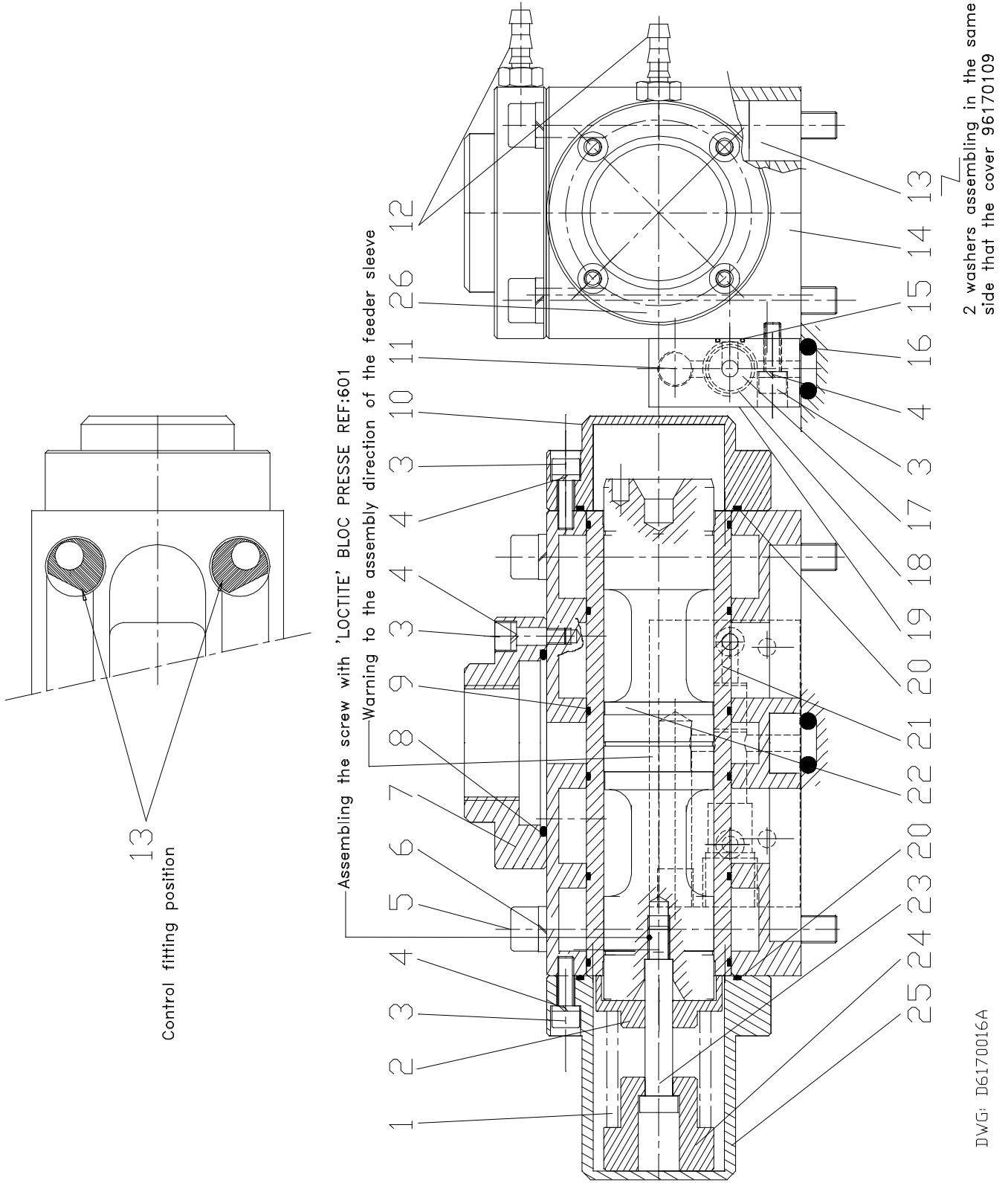
## DRUM GUARD ASSEMBLY DRAWING & PARTS LIST



Dwg: D6150630

Item N°	Description	Description of part	Total Qty	Part N°
100	Rondelle plate M8	Flat Washer	4	45001108
101	Vis HM8x12 - 8,8	Screw	4	41019201
102	Capot protecteur	Drum Guard	1	96150796

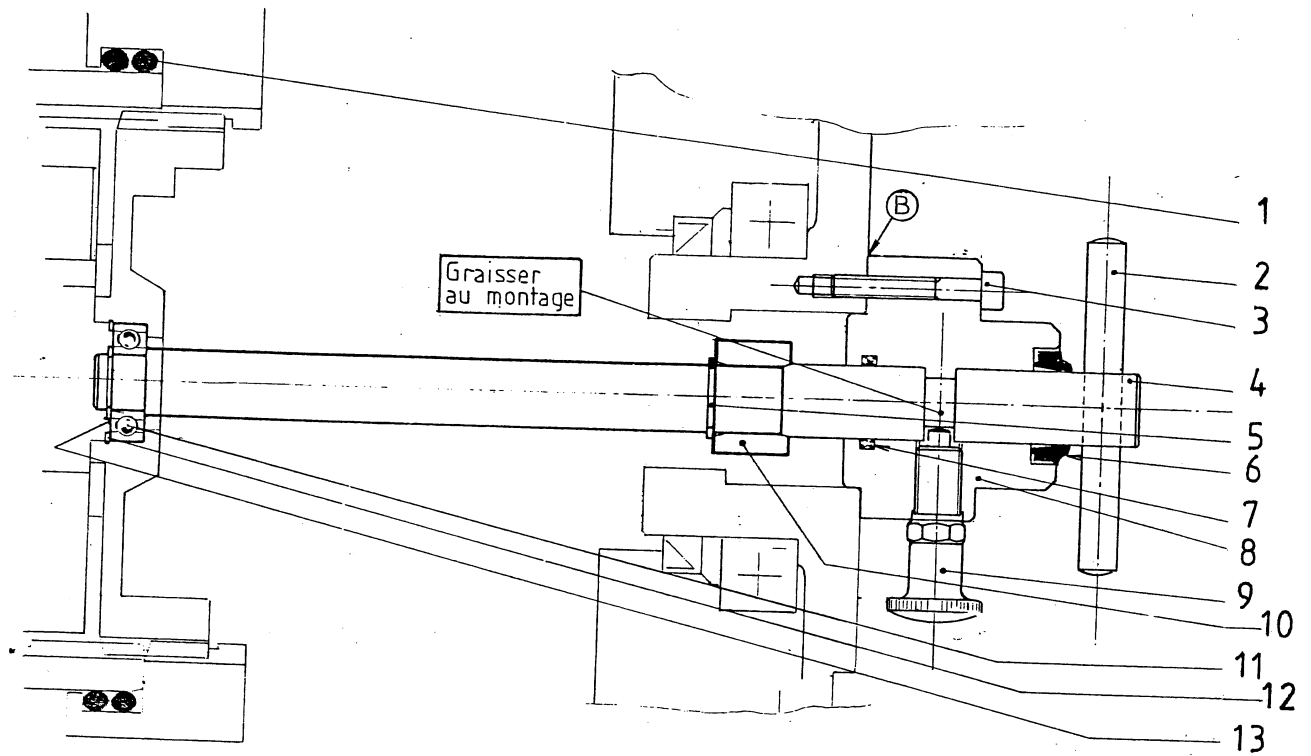
# PNEUMATIC CONTROL VALVE ASSEMBLY DRAWING



## PNEUMATIC CONTROL VALVE PARTS LIST

ITEM	DESIGNATION	DESCRIPTION	TOTAL	PART NO.
1	Ressort	Spring	1	69129841
2	Butée	Thrust ring	1	96170105
3	Vis CHc M6x20	Screw	14	41322206
4	Rondelle élastique W6	Lockwasher	14	45201006
5	Vis CHc 10M6x110	Screw	4	41330706
6	Rondelle élastique W10	Lockwasher	4	45201010
7	Collecteur d'air	Inlet flange	1	96170107
8	Joint torique 62x3	O ring	1	58228029
9	Joint torique 47x2	O ring	6	58236429
10	Couvercle	Cover	1	96170109
11	Bouchon ¼	Plug	1	65125832
12	About	Fitting	3	51029
			3	68237528
13	Rondelle	Ring	2	96170114
14	Corps de distributeur	Control valve body	1	96170103
15	Joint torique 7.5x1.5	O ring	2	58212529
16	Joint torique 10x6.5	O ring	6	58227729
17	Rouleau	Needle	1	69401525
18	Clapet	Spool	1	96170007
19	Bloc sélecteur	Shuttle valve	1	96170108
20	Joint torique 56x2	O ring	2	58235729
21	Chemise	Cylinder liner	1	96170101
22	Tiroir	Slide valve	1	96170102
23	Vis épaulée	Screw	1	65280532
24	Butée	Stop ring	1	96170106
25	Couvercle	Cover	1	96170104
26	Bouchon 1/4 "	Plug	2	65125832
	Recommended Spare Parts			

# HAULAGE KIT for PS400R ASSEMBLY DRAWING & PARTS LIST



Rep Item	Désignation	Qté. Qty.	CODE	
			STANDARD	GC
1	JOINT QUADRING	2	58229929	
2	GOUPILLE	1	46001516	
3	VIS CHc	3	41314906	
4	AXE DE CLABOT	1	96150060	96150146
5	CIRCLIPS E19	1	47700019	
6	JOINT RACLEUR	1	58016730	
7	JOINT TORIQUE	1	58200429	
8	OBTURATEUR	1	96150059	
9	VIS D'INDEXAGE	1	66288132	
10	BUTEE	1	96150120	
11	ROULEMENT A BILLE	1	50000002	
12	CIRCLIPS I32	1	47703032	
13	CIRCLIPS I15	1	47700015	

## PARTS ORDERING INFORMATION

The use of replacement parts other than **Ingersoll-Rand** Material Handling may result in decreased trolley performance, and may invalidate the Company's warranty. For prompt service and genuine **Ingersoll-Rand** Material Handling parts, provide your nearest Distributor with 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.

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

**Winch Model Number** .....

**Winch Serial Number** .....

**Date Purchased** .....

### Return Goods Policy

**Ingersoll-Rand** will not accept returned goods for warranty or service unless prior arrangements have been made and written authorization has been provided from the location the goods were purchased.

### NOTICE

- **Continuing improvement and advancement of design may cause changes to this trolley 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.**

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

For additional information contact :

**INGERSOLL-RAND** Material Handling  
529, avenue Roger Salengro  
59450 Sin-le-Noble - France  
Phone : (33) 27-93-08-08  
Fax : (33) 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** equipment is incorporated and in particular to the performances of these assemblies or machines.

- when **INGERSOLL-RAND** equipment is incorporated into one or other assembly or machine by the customer, he alone is responsible for the adaptation, the choice and the suitability of the **INGERSOLL-RAND** equipment, **INGERSOLL-RAND**'s diagrams, surveys and layouts being given only for guidance, unless there is a special stipulation in the acceptance of order, defined in the acknowledgement of receipt.

- **INGERSOLL-RAND** does not guarantee components and accessories it does not sell.

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

- The duration of the guarantee is for 6 months from the start up of the equipment by the customer. The start up must be made at the latest three months after dispatch of the equipment or its being made available.

- **INGERSOLL-RAND** has the right to demand from its customer proof of the date of start up.

- The guarantee period is reduced to half if the equipment is used day and night.

- The length of guarantee is neither prolonged nor interrupted by either amicable or litigious claims by the customer.

- At the expiry of this period, the guarantee ceases incontestably.

- The obligations of the **INGERSOLL-RAND** guarantee will only come into effect if the customer proves that the defect or flaw appeared during normal operating conditions for this type of

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

- It does not apply in the event of user's mistake, negligence, imprudence, faulty superintendence or maintenance, inattention to the instructions or directions for use of low quality lubricants.

**INGERSOLL-RAND** liability is disclaimed for all damage brought about by loss or leaks of oil.

- No guarantee applies either for fortuitous incidents or force major, or for wear, replacements or repairs caused by normal use of the equipment.

- The guarantee is restricted to reconditioning in **INGERSOLL-RAND**'s premises at its expense and as soon as possible the equipment and parts recognised as faulty by its technical or after sales services, which are sent carriage paid and packing free, without there being any claim for damage arising, such as injury to personnel, damage to property other than that covered by the present contract, loss of possession, of production, commercial detriment or loss of profit.

- During the guarantee period, the cost of labour for dismantling and reassembling equipment outside **INGERSOLL-RAND**'s premises, the cost of moving faulty, replaced or repaired equipment and the travelling and living expenses of 's engineers **INGERSOLL-RAND** are covered exclusively by the customer.

- In order to obtain the advantages of the guarantee, the customer must advise **INGERSOLL-RAND** without delay and in writing of the defects and flaws in his equipment of which he is complained and furnish proof of their genuine nature. He must give **INGERSOLL-RAND** or its agents or technicians every facility to verify the defects or flaws and to put them right.

- The guarantee does not apply if the equipment is returned to **INGERSOLL-RAND** in a condition other than in which it broke down or if the seal has been removed, or if it has been dismantled, repaired or modified by a third party, or by the user or the customer.

- After having been duly informed of the defect or flaw in its equipment, **INGERSOLL-RAND** will put it right as quickly as possible, reserving the right, in certain cases, to modify the whole or part of the equipment so as to meet its obligations.

- The customer agrees that **INGERSOLL-RAND** will not be responsible for damage in the event that the customer has not fulfilled one or other of the obligations set out above.

- Parts replaced free of charge remain the property of **INGERSOLL-RAND**.

- The guarantee does not apply to wearing parts.

**IMPORTANT NOTICE**

*It is our policy to promote safe delivery of all orders.*

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

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.

**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

## United States Office Locations

### For Order Entry, Order Status and Technical Support

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

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

**Web Site:**  
[www.ingersoll-rand.com](http://www.ingersoll-rand.com)

### Regional Sales Offices

**Chicago, IL**  
888 Industrial Drive  
Elmhurst, IL 60126  
Phone: (630) 530-3800  
Fax : (630) 530-3891

**Detroit, MI**  
23192 Commerce Drive  
Farmington Hills, MI 48335  
Phone: (248) 476-6677  
Fax: (248) 476-6670

**Houston, TX**  
450 Gears Road  
Suite 210  
Houston, TX 77067-4516  
Phone: (281) 872-6800  
Fax: (281) 872-6807

**Los Angeles, CA**  
11909 E. Telegraph Road  
Santa Fe Springs,  
CA 90670-0525  
Phone: (562) 948-4189  
Fax : (562) 948-1828

**Philadelphia, PA**  
P.O. Box 425  
900E. 8th Ave., Suite 103  
King of Prussia, PA 19406  
Phone: (610) 337-5930  
Fax: (610) 337-5912

## International Office Locations

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/fax to:

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

**Canada National Sales Office Regional Warehouse Toronto, Ontario**  
51 Worcester Road  
Rexdale, Ontario  
M9W 4K2  
Phone: (416) 213-4500  
Fax: (416) 213-4510  
**Order Desk**  
Fax: (416) 213-4506

**Regional Sales Offices Edmonton, Alberta**  
1430 Weber Center  
5555 Calgary Trail N.W.  
Edmonton, Alberta  
T6H 2P9  
Phone: (403) 438-5039  
Fax: (403) 437-3145

**Montreal, Quebec**  
3501 St. Charles Blvd.  
Kirkland, Quebec  
H9H 4S3  
Phone: (514) 695-9040  
Fax: (514) 695-0963

**British Columbia**  
1200 Cliveden Avenue  
Delta, B.C.  
V3M 6G4  
Phone: (604) 523-0803  
Fax: (604) 523-0801

**Latin America Operations Ingersoll-Rand Production Equipment Group**  
730 N.W. 107 Avenue  
Suite 300, Miami, FL USA  
33172-3107  
Phone: (305) 559-0500  
Fax: (305) 222-0864

**Europe, Middle East and Africa Ingersoll-Rand Material Handling Douai Operations**  
529, avenue Roger  
Salengro  
59450 Sin le Noble, France  
Phone: (33) 03-27-93-08-08  
Fax: (33) 03-27-93-08-00

**Asia Pacific Operations Ingersoll-Rand**  
Suite 1201-3 12/F  
Central Plaza  
18 Harbour Road  
Wanchai, Hong Kong  
Phone: (852) 9794 1673  
Fax: (852) 9794 7895

**Russia Ingersoll-Rand**  
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