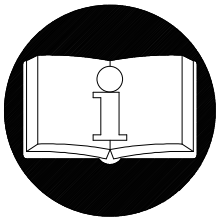
PARTS AND MAINTENANCE MANUAL
FOR
"LIFTSTAR" AND "PULLSTAR"
AIR WINCH MODEL

LS1500R & PS2400R SERIES



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

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 Security Rules and any other applicable safety codes and regulations.

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

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Ingersoll Rand

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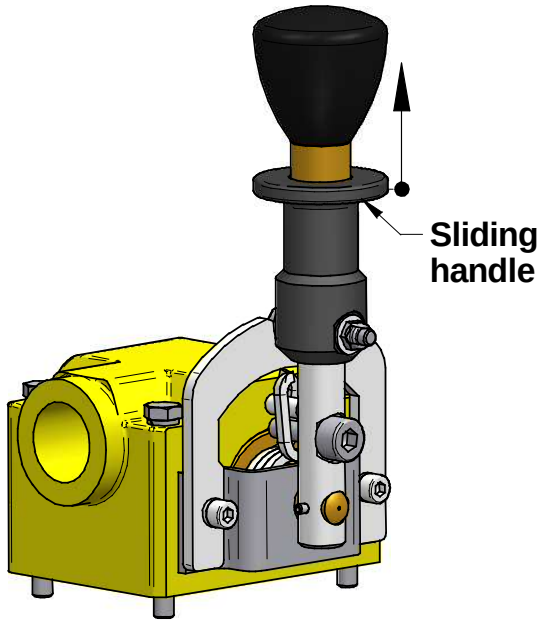
Winch Control

The throttle control lever sub-assembly has been changed by control lever with “Lift and Shift” System.
For used, the new control lever, lift sliding handle up to unlock control lever and shift control lever in desired direction.
When released, handle will return to the neutral position.
The sliding handle will drop down to engage and lock the control handle in place.

Note: The new throttle control lever ass’y can be assembled in lieu and place of the previous model.



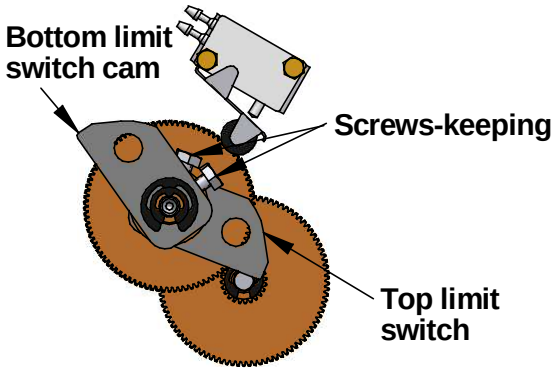
Limit switches

Lifting winches - CE models - only are equipped in standard with Top and Bottom limit switches.
The limit switch setting prevent winch wire rope payout and haul-in by stopping air flow to the winch motor when a set point has been reached.
Limit switches are not intended as the primary means of stopping winch operation.

WARNING

It is the owner’s and operator’s responsibility to adjust winch operating limits prior to using the winch.

Limit Switch Adjustment



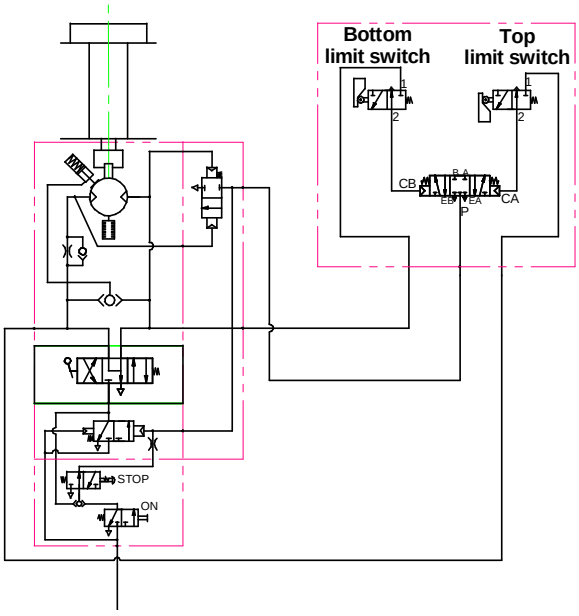
Refer to Dwg.D6510862

1. Remove access cover (16) from on limit switch ass’y.
2. Loosen screw (30) on one of the cams.
(Use a 7mm wrench)
3. Rotate cam until activates cutoff valve, causing system air to vent.
4. Hold cam adjustment screw in position and tighten screw.
5. Repeat same operations for the second cam.
6. If required, adjust payout limit switch. Test winch set points by operating winch through three complete cycles to ensure consistent limit switch operation within +/- 0.5m of set points.
7. Install access cover when final adjustments are complete.

NOTICE

Activate the shut off valve and operate the winch in opposite direction at slow speed during one turn when a top or bottom limit switch is actuated.

Pneumatic Scheme



MAINTENANCE

• Never perform maintenance on the winch while it is supporting a load.
• Before performing maintenance, tag controls:
DANGER - DO NOT OPERATE - EQUIPMENT BEING REPAIRED.
• Only allow service personnel trained in safety and maintenance on this winch to perform maintenance.
• After performing any maintenance on the winch, test winch to 125% of its rated capacity before returning to service. Testing to more than 125% of rated capacity may be required to comply with standards outside the USA.
• 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 each day, five days per week. If winch operation exceeds eight hours per day, or use is under HEAVY or SEVERE conditions, more frequent maintenance should be performed. Refer to 'Periodic Inspection' in the "INSPECTION" section for interval guidance.

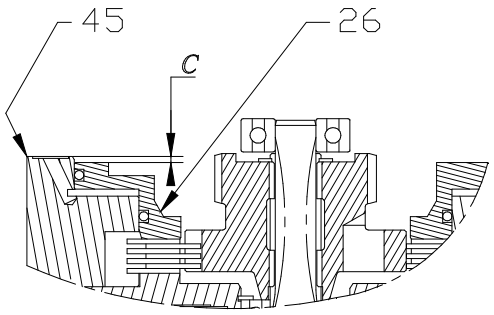
INTERVAL	MAINTENANCE
Start of each shift (Operator or Maintenance Personnel)	Make a thorough visual inspection of the winch for damage. Do not operate the winch if damaged.
	Operate the winch at low RPM in both directions. Winch must operate smoothly without sticking, binding or abnormal noises. Check the operation of the brake.
Yearly (Maintenance Personnel)	Inspect the brake disc. Clean or replace parts as required.
	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, sheaves and rigging, etc. for indications of damage or wear. Repair or replace as required.

Motor Removal
(Ref. Dwg. D6310041)
Use the following procedure to remove the motor.
1. Disconnect and tag the air lines.
2. Position several blocks of wood on the work bench and stand the winch in a vertical position with the motor end up. Make sure the weight of the winch does not rest on the free wheel handle (65) or cause damage to the free wheel parts
3. Remove the four capscrews (113) and lockwashers (114) which connect the air motor to the front end cover (30) and remove the motor assembly.

Brake
It is recommended that the brake assembly be removed for maintenance and inspection once each year.

Adjustment
No brake adjustment is required.

Inspection
If brake slippage occurs during tests prior to placing winch in service or during normal use of the winch, following the winch disassembly procedure until number 14.3 and check dimension « C » from the brake piston (26) to the gear box (45) as shown in Dwg. D6310032. If this dimension is greater than 0,12 in. (3 mm), the brake discs (21 and 22) must be replaced by following the winch disassembly procedure.



(Dwg. D6310032)

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 a clean dust free area. 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.
8. When removing ball bearings from shafts, it is best to use a bearing puller. When removing bearings from housings, drive out the bearing with a sleeve slightly smaller than the outside diameter of the bearing. The end of the sleeve or pipe which contacts the bearing must be square. Protect bearings from dirt by keeping them wrapped in clean cloths

Disassembly Instructions

Winch Disassembly

(ref.Dwg.D6310041)

1. Disconnect and tag the air lines.
2. Remove winch from its mounting and set in a clean work area on a sturdy work bench.
3. Position several blocks of wood on the work bench and stand the winch in a vertical position with the motor end down.
4. Remove the nuts (2) and lock washers (3).
5. Remove the rear end-cover (55).
   - 5.1. Extract the exhaust washers (60) and the rings (59).
   - 5.2. Pull bearing (58) from rear end cover (55)
6. Clutch control disassembly (PS SERIES)
   - 6.1. Unscrew the handle (65) and pull the plunger (61) to remove clutch axle (66), clutch (72) and the spring (69).
   - 6.2. If necessary remove retainer rings (62 and 63) to remove clutch (72) and bearing (71) from clutch axle (66)
   - 6.3. Remove screws (67), washer (68), plunger body (70) and the plunger (61)
7. Remove the drum (56) from the winch.
   - 7.1. Remove the spacer (64).Only for PS series.
   - 7.2. Remove the drum bushings (38) from the drum (56) if they require replacement.
8. Remove the oil drain plug (6) and return the winch to drain the oil from the gear casing.
9. Remove the four screws winch secure the motor (29) to the front end cover (30) and pull off the motor straightaway from the winch. For disassembly of the motor and the valve, follow the corresponding procedure.
10. Remove the gasket (31) and the 'O'ring (27) and drain the oil from the brake through the front end cover bore.
11. Remove the three nuts (2) and lock washers (3) and remove the three tie rod spacers (4).
12. Remove the output shaft (5) from the gearbox and brake assembly.
13. Disassembly of the front end-cover (30).
    - 13.1. Remove the screws (34).
    - 13.2. Remove the front end cover (30).
    - 13.3. Remove the retainer ring (32).
    - 13.4. Remove the oil seal (35).

NOTICE

- **The oil seal has been installed with loctite ® 460 on the backside of the seal.**

14. Disassembly of the brake piston.
    - 14.1. Remove the O'ring (25) and the gasket (33).
    - 14.2. Remove the springs (41).
    - 14.3. Remove the bearing (36).
    - 14.4. Extract the brake piston (26) by using low pressure compressed air in brake release port.
15. Disassembly of the gear box
    - 15.1. Remove screws (47) and lock washers (48).
    - 15.2. Extract the gear box cover by using jacking screws in the two M4 threaded holes.
    - 15.3. Press out the output shaft (5) and the output annular gear (50).
    - 15.4. Remove the bearings (51 and 53), oil seal (52) and the O'ring (9).
    - 15.5. Remove the bearing (10), spring washer (49) and the output annular gear (50).
    - 15.6. Remove the satellite support assembly.
    - 15.7. Push out the satellite axles (11).
    - 15.8. Remove the planet gear (15), bearing studs (12) and stop rings (13).
    - 15.9. Remove the needle bearings (14) and the spacers (16).

15.10. Disassembly of the fixed annular gear (19), friction discs (21 and steel steel discs (22) :
- compress the 'O'ring (20) by using the special tool M6313400.
- remove the retainer ring (17).
- push out the fixed annular gear (19).
- remove the 'O'ring (9).
- remove the pins (39).
- remove the 'O'ring (20).
- remove the friction discs (21) and steel discs (22).

15.11. Disassembly of the shaft spindle (18).
- remove the retainer ring (37).
- remove the gear wheel (43).
- push out the shaft spindle (18).

15.12. Remove the retainer ring (40).
15.13. Remove the bearing (44).

Lever Control Valve Disassembly
(ref. Dwg. D6310006 or D6310035)
1. Remove screws (130) and lock washers (131).
2. Remove the lever control valve assembly from the motor.
3. Tap out the pin (128).
4. Extract the control lever (121).
5. Remove screws (127) to remove stop (129).
6. Remove the return spring (124).
7. Pull out the rotary valve (126).

NOTICE

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

8. Remove the 'O'ring (125) from the rotary valve (126) if necessary.

Valve Disassembly Optional Remote Control
(ref. Dwg. D6310026)
1. Remove screws (143).
2. Remove the valve assembly from the motor.
3. Remove the cover (144) from the valve body (150).
4. Remove screws (141) and lock washers (142).
5. Remove the end caps (147) and the rear stops (148).
6. Remove the slide valves (149) and return spring (145).
   6.1. Remove the quad rings (151).
7. Remove the quad rings (146) from the valve body.

NOTICE

- **The cover (4) has been installed with Loctite ® instajoint No 574.**

Air Gear Motor Disassembly
(Ref. Dwg.D6310005)
Refer to control valve disassembly sections to remove lever or pendant control valve from motor
1. Remove the screws (81) and lock washers (82).
2. Remove the motor housing (112).
3. Remove the 'O'ring (110).
4. Remove the gasket (95).
5. Remove screws (109).
6. Remove the motor cover (84).
   - remove the 'O'rings (89) and pin (83).
   - remove the exhaust washer (87) and the plug (88).
   - remove the needle bearings (85 and 91) if they have to be changed.
7. Immobilise the motor rotors with a pin between the teeth and remove nuts (101 and 106).
8. Remove the motor rotors (93 and 94).
   - remove the shaft segment (86) and the internal ring.
9. Remove the screw (104) and the washer (103).
10. Remove ball bearings (100 and 107).
11. Remove the spacer (92).
12. Remove the stopper (108), the spring (102) and the rear stop (105).

'PHS2E and PHS2E-U Disassembly
(Ref.Dwg.D579028, D5790027)
1. Remove the fittings (2)
2. Remove the lifting eye(1).
3. Tap out the pin(16).to remove the levers(18).
4. If necessary remove the screws(17).
5. Remove the screws(9)
6. Remove the valves(4).
7. Remove the protector(11) and the 'O' rings(5),(10).
8. Remove the plugs(8).
9. Remove the springs(7) and balls(6).
10. Remove the emergency stop valve(19).
11. Remove the plug(20).
12. Remove the 'O' rings(10) and the ball(6).
13. Remove the retainer ring(15).
14. Remove the exaust washer(14).

NOTICE

Lubricate the valves(4).
Apply a small amount of Loctite ® 243 on the threads of screws(9).
Apply a small amount of Loctite ® 577 on the threads of plugs(8).

Shut-off Valve Disassembly
(Ref. Dwg.D6170004)
1. Remove the screw (202).
2. Remove the cover (201) with the spring (203).
3. Remove the 'O' ring (204) from the cover (201).
4. Remove the cover (213) and the 'O' ring (215).
5. Remove the diaphragm (211).
6. Immobilise the valve cone (214) by its hole with a rod in one of two orifices of the body (209) and remove the screw (208).
7. Remove the valve cone (205,214) with joints (206) and distance ring (210) with the washer (207).

Emergency Stop Valve Disassembly
(Ref. Dwg.D6170003)
Refer to air control valve disassembly to begin disassembly
8. Remove emergency stop button (179).
9. Remove the setscrews (175).
10. Remove the spools (178).
11. Pull on the shuttle valve stop (180) with ball (176).
12. Remove the 'O' ring (181) from shuttle valve stop (180) and spool (176).

Cleaning, Inspection and Repair

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

• **A bearing that appears loose or does not rotate smoothly 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. If drum bushings have been removed it may be necessary to carefully scrape old Loctite® from the drum bushing bore. Dry each part using low pressure, filtered compressed air. Clean the brake friction disc using a wire brush or emery cloth. Do not wash the brake friction disc in liquid. If the brake friction discs are oil soaked, they must be replaced.

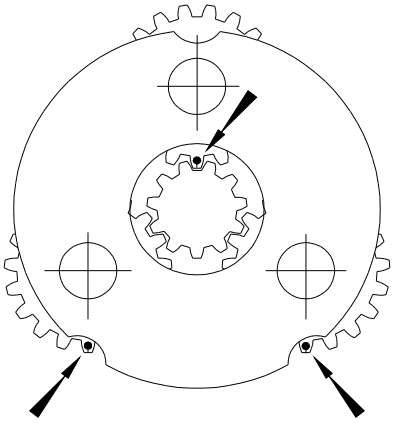
Inspection
All disassembled parts should be inspected to determine their fitness for continued use. Pay particular attention to the following:
1. Inspect all gears for worn, cracked, or broken teeth.
2. Inspect all bushings for wear, scoring or galling.
3. Inspect all bearings for play, distorted races, pitting and roller or ball wear or damage. Inspect bearings for freedom of freedom
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 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.
7. Smooth out all nicks, burrs, or galled spots on shafts, bores, pins or bushings.Examine all gear teeth carefully, and remove nicks or burrs.
8. Polish the edges of all shaft shoulders to remove small nicks which may have been caused during handling.
9. Remove all nicks and burrs caused by lockwashers.
10. Replace all gaskets, oil seals, and O'rings any time the winch is disassembled for repair.
11. Inspect drum bushings (47) for wear, if thickness is less than 0.039 in. (1 mm), replace drum bushings.
12. Inspect brake discs (21 and 22) for wear, if thickness less than 0.354 in. (9 mm), replace them.

Repair
Actual repairs are limited to the removal of small burrs and other minor surface imperfections from gears and shafts. Use a fine stone or emery cloth for this work. Do not use steel wool.
1. Worn or damaged parts must be replaced. Refer to the applicable Parts Listing for specific replacement parts information.
2. Inspect all remaining parts for evidence of damage. Replace or repair any part which is in questionable condition. 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.
7. Replace all gaskets, oil seals, and 'O' rings removed during winch disassembly.

Assembly Instructions

Winch Assembly
(Ref. Dwg. D6310041)
1. Gear box assembly.
   - 1.1. Assembly of the shaft spindle (18)
     - Install bearing (44) with the retainer ring (40)
     - Put the shaft spindle (18) in the bearing (4).Install the gear wheel (43) with the retainer ring (37)
   - 1.2. Assembly of the fixed annular gear (19).
     - Install the friction disc (21) and steel disc (22) in the gear box (45).
     - Install the 'O' ring (20) and the pin (39).
     - Install the 'O' ring (9) in the fixed annular gear (19) , install this ass'y in the gear box (45) and secure with the retainer ring (17).
   - 1.3. Install the needle bearings (14) and the spacer (16) in the planet (15).

1.4. Install the three planet ass'y , bearing studs (12) and stop rings (13) in the planet support (46).
1.5. Install the planet axle (11) and the bearing (10).
1.6. Install the planet support assembly.
1.7. After assembly of planet support (46) with the fixed annular gear (19) and the shaft spindle (18) , check for good indexing of planet gears and repeat the above operation if necessary.



(Dwg.D6310013)

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

1.8. Install the spring washer (49) and the output annular gear (50).
1.9. Assembly of the box cover
  – Install the oil seal (52) and the bearing (51 and 53).
  – Install the output shaft (5) with the retainer ring (54) in the gear box cover.
  – Install the 'O' ring (9).
  – Install the gear box cover ass'y and secure with screws (47) and washers (48).

2. Assembly of the brake piston
  2.1. Install the brake piston with the 'O' rings (23 and 25).
  2.2. Install bearing (36) , spring (41) and gasket (33).
3. Assembly of the front end cover.
  3.1. Clean the mounting front end cover (30) bore and apply a bead of Loctite No.460 on the backside of the oil seal (35).Install the oil seal.
  3.2. Install the retainer ring (32).
  3.3. Install the front end cover (30) and secure with screws (34).
4. Install the three tie rod spacer (4) with the nuts (2) and the washer (3).
5. Fill up the brake with oil.
6. Install the gasket (31) and the 'O' ring (27).
7. Install the motor ass'y and secure with the four screws.
8. Position the winch vertically with the motor end down.
9. Fill up the gear box with oil SAE 80W90
  – kinematics viscosity 145 mm²/s at 40°C(104°F)
  – capacity of gear box : 0.13 gall (0.5 Litres)
10. Drum assembly
  10.1. Scrape old Loctite from the drum bushing bore and apply a bead of Loctite N°406 on the smooth face of drum bushings (38).
  10.2. Install drum bushing in drum bushing bore by taking care to adjust the gaps of the drum bushing to 3.9 ins (100mm) do not allow any clearance between drum bushings and drum.
  10.3. Lubricate drum bushings with grease.
  10.4. Install the drum on the gear box assembly.
  10.5. Lift out the drum to check for good positioning of drum bushing
11. Clutch control assembly (PS SERIES)
  11.1. Install plunger body (70) and plunger (61) on the rear end cover (55) and secure with screw (67) and washer (68).
  11.2. Install bearing (71) on clutch axle (66) with retainer ring (65) and install the clutch (72) with the retainer ring (62).
  11.3. Pull the plunger (61) to introduce the clutch axle with the spring (69) into the plunger body (70) and install the handle (65).
12. Assembly of the rear end cover (55).
  12.1. Install bearing (58) on the rear cover.
  12.2. Install exhaust washers (69) with ring (59).
13. Install spacer (64) on the output shaft (PS SERIES). Install the rear end cover Ass'y on the three tie rod (4) and secure with lock washers (3) and nuts (2).

Lever Control Valve Assembly
(Ref. Dwg.D6310006 or D6310035)

1. Lubricate and install 'O' ring (125) on rotary valve (126).
2. Lubricate and carefully install rotary valve in valve housing (122).
3. Lubricate and install spring (124) on rotary valve. Ensure pin (123) is installed in valve housing (122).
4. Install stop (129). Apply a small amount of Loctite® 243 to threads of screws (127) and install.
5. Install control handle (121) on rotary valve and align pin hole. Install pin (128) to secure control handle.

&

Air Gear Motor Assembly

(Ref. Dwg. D6310005)

1. Install the stop (105) ,spring (102) and stopper (108).
2. Install the spacer (92).
3. Install the bearing (100 and 107) and secure with the screw (104) and washer (103).
4. Install the internal ring of the bearing (85) on the rotor
5. motor (84) and secure with the retainer ring (86).
6. Install the motors rotors with a pin between the teeth and secure with the nuts (101 and 106).
7. Install the pin (83) , the needle bearing (85 and 91) , the 'O' ring (89) , the exhaust washer (87) and the plug (88) in the motor cover.
8. install the motor ass'y on the motor cover with the screws (109)
9. Install the 'O' ring (110) and the gasket (95) in the motor housing (112).
10. Install the motor ass'y in the motor housing (112) and secure with the screws (81 and 82).

NOTICE

- **To correctly assemble the exhaust washer, spacers, valve and spring, carefully follow instructions:**
  - Take the motor body and put it in the same position as mounting on the winch and view from the backside of the motor body, stopper, spring, valve and the spacer must be mounted in the left bore. Check for good functioning of the valve.
  - The exhaust washer must be mounted on the same side as the valve in the right bore.
  - Before assembly lubricate bearing with grade 2 grease.
  - Install ball bearings so markings on bearing remain visible.
  - After assembly of the air motor, it must turn smoothly in both direction.
  - The screws (104 and 109) the nuts (101 and 106 must be secured with Loctite ® 243, secure the nuts with a centre punch.

PHS2E and PHS2E-U Assembly

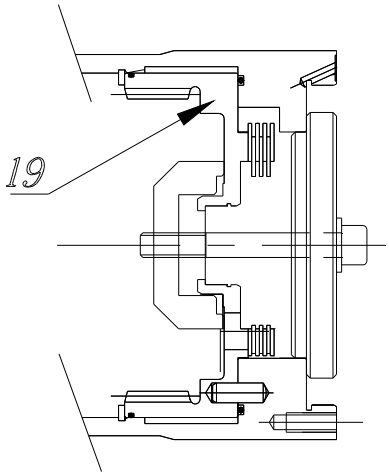
Assembly of the pendant control is the same as disassembly in opposite order.

Pendant Control Adjustment.

1. Connect the inlet of the pendant to 100 psi (7 bar) air supply.
2. Connect a manometer at the outlet of the lever to be adjusted.
3. Tighten the adjustment setscrew to obtain a pressure of 15 psi (1 bar) without action the lever.
4. Release the adjustment setscrew by a half turn (pressure must fall to zero).
5. Push the lever. Check that pressure reaches 93 +/- 7 psi (6.5 +/- 0.5 bar). Check that there is no leak at the exhaust.
6. Release the lever, exhaust must occur and result in rapid pressure reduction.
7. Repeat operations “6 and 7” from 2 to 3 times.
8. Disconnect the manometer. Check to ensure that there are no leaks when the lever is not activated.
9. Repeat the operations from 2 to 9 with each lever.

ACCESSORIES

Tooling installation M6313400
(Dwg.D6310031)



TEST

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

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

Load test
Prior to initial use, all new, extensively repaired, or altered winches shall be load tested by or under the direction of a person trained in the operation and service of this winch and a written report furnished confirming the rating of the winch.

– **For air winches LS series.**
The minimum load test for European countries are according to the chart below.If not found below you should use the tests recommended by the FEM.

The dynamic test shall be carried out with an overload coefficient ρ1 = 1,2 i.e. with a load equal to 120% of the safe working load. All motions shall be carefully operated in turn, without checking speeds of temperature rises in the motors.

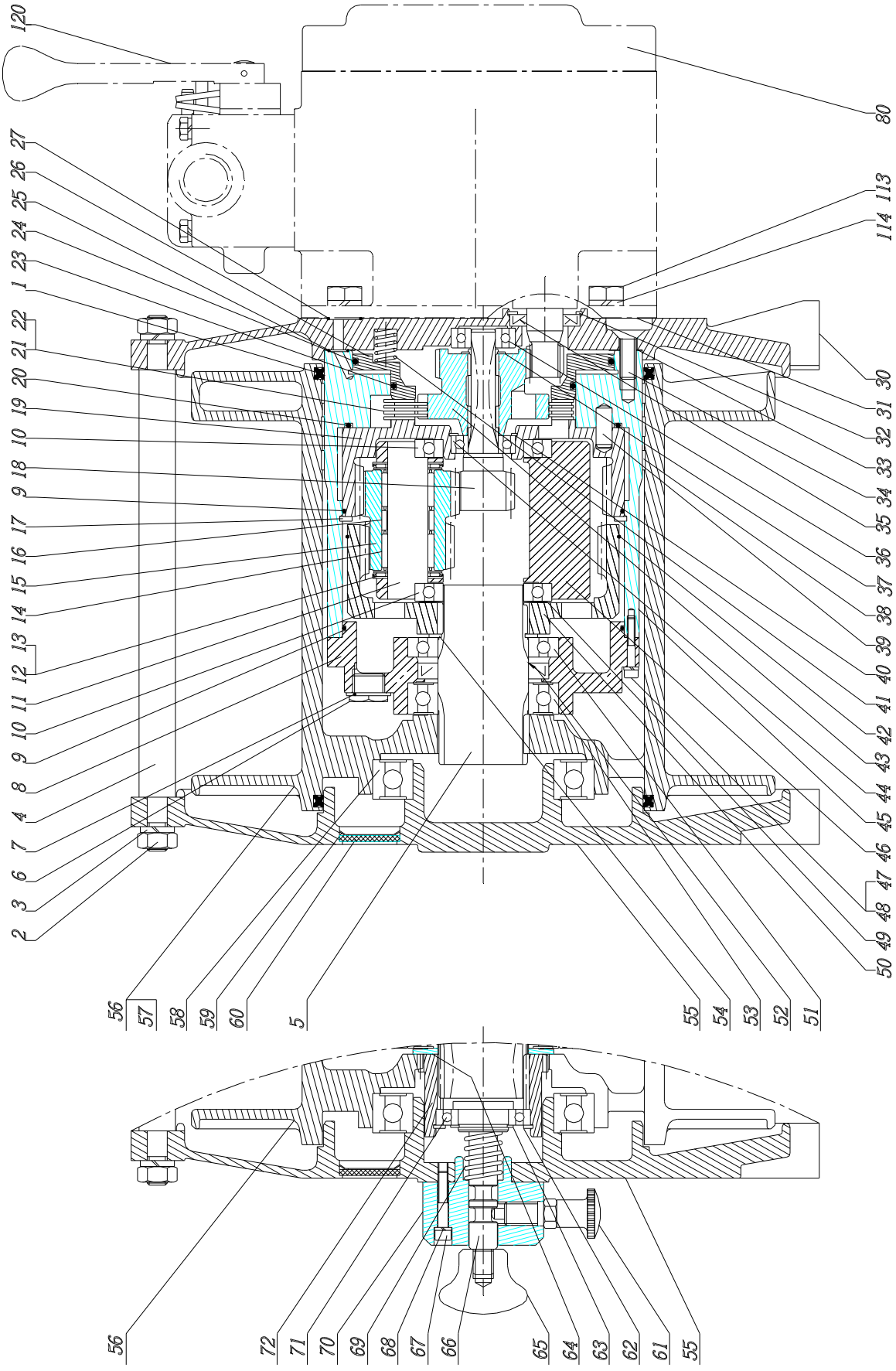
the static test shall be carried out with an overload coefficient ρ2 = 1,4 i.e. with a load equal to 140% of the safe working load.The test must be carried out under still conditions and consists in hoisting the safe working load to a small distance above the ground and then adding the required surplus without shock.

– **For air winches PS series.**
The dynamic test shall be carried out with the nominal line pull.

The static test shall be carried out with an overload coefficient ρ2 = 1,4 i.e. with a load equal to 140% of the safe working load.

NOTES

WINCH ASSEMBLY DRAWING



(Dwg. D6310041)

WINCH ASSEMBLY PART LIST

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
1	Quad-Ring	2	58231029
2	Nut	6	43000211
3	Lock washer	6	45200010
4	Tie rod spacer (short drum) Tie rod spacer (long drum)	3	96310008 96310052
5	Output shaft	1	96310026
• 6	Plug	2	65119732
7	Copper joint	2	58403431
8	Gear box cover	1	96310005
• 9	'O' ring	2	58231129
10	Bearing	2	50800008
11	Planet axle	3	96200060
12	Bearing stub	6	56053520
13	Stop ring	6	57319832
14	Needle bearing	6	56502620
15	Planet Gear	3	96200075
16	Spacer	3	96190024
• 17	Retainer ring	1	47847832
18	Shaft spindle	1	96310094
19	Fixed annular gear	1	96310096
• 20	'O' ring	1	58221829
21	Friction disc	4	63059932
22	Steel disc	3	63060032
• 23	'O' ring	1	58230929
• 24	'O' ring	1	58212829
• 25	'O' ring	1	58212529
26	Brake piston	1	96310093
• 27	'O' ring	1	58226629
30	Front end cover	1	96310091
• 31	Gasket	1	96310118
32	Retainer Ring	1	47703035
• 33	Gasket	1	96310097

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
34	Screw	6	41102203
• 35	Oil seal	1	58020030
36	Bearing	1	50100001
• 37	Retainer ring	1	47700015
38	Bushing	3	96310014
39	Pin	5	46000416
• 40	Retainer ring	1	47703032
41	Spring	11	69165532
• 42	'O' ring	1	58207129
43	Gear wheel	1	96310095
44	Bearing	1	50000002
45	Gear box	1	96310092
46	Satellite support	1	96200010
47	Screw	6	41311106
48	Lock washer	6	45200004
49	Spring washer	1	69172132
50	Output annular gear	1	96200031
51	Bearing	1	50800009
• 52	Oil seal	1	58012130
53	Bearing	1	50050009
54	Retainer Ring	1	47700045
55	Rear End Cover	1	96310003
56	Short Drum (180mm)	1	96310001
	Long Drum (360mm)	1	96310050
57	Wire rope wedge	1	96310023
58	Bearing	1	50050014
• 59	Ring	9	47800639
• 60	Exhaust washer	9	67600303
80	Air gear motor	1	-
113	screw	4	41000201
114	lock Washer	4	45200006
120	Air control valve	1	-
	Wedge	1	96310023

Winches with clutch control

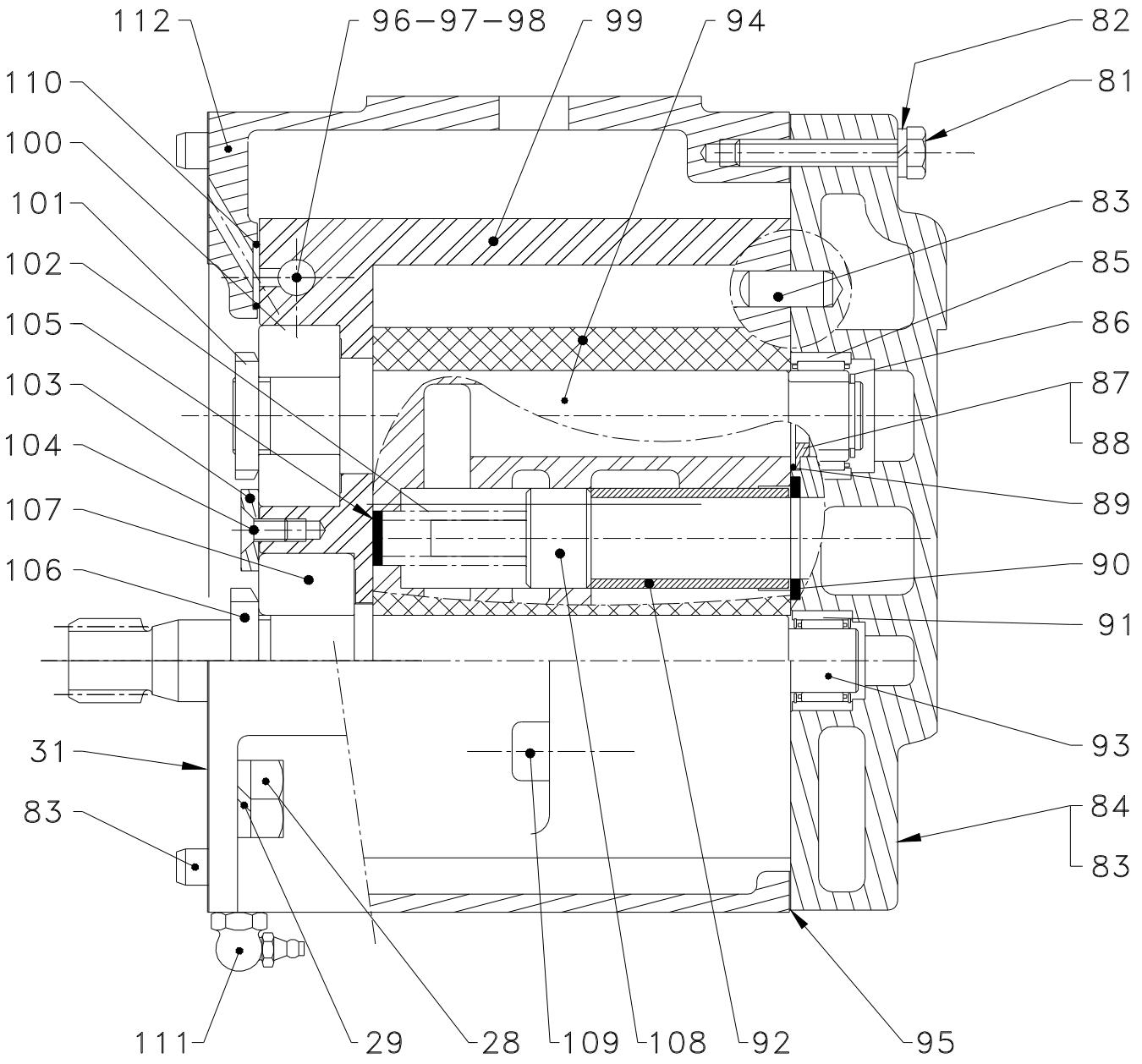
Substitute or add the following parts on winch with clutch control

55	Rear End Cover	1	96310027
56	Short Drum (180mm)	1	96310028
	Long Drum (360mm)		96310051
61	Plunger	1	66288132
62	Retainer Ring	1	47703047
63	Retainer Ring	1	47700025
64	Spacer	1	96310007
65	Handle	1	69566232

66	Clutch Axle (Short drum)	1	96310037
	Clutch Axle (long drum)		96310053
67	Screw	3	41307906
68	Washer	3	45200005
69	Spring	1	69188932
70	Body	1	96180060
71	Bearing	1	50800005
72	Clutch	1	96310029

• Recommended spare

AIR GEAR MOTOR ASSEMBLY DRAWING



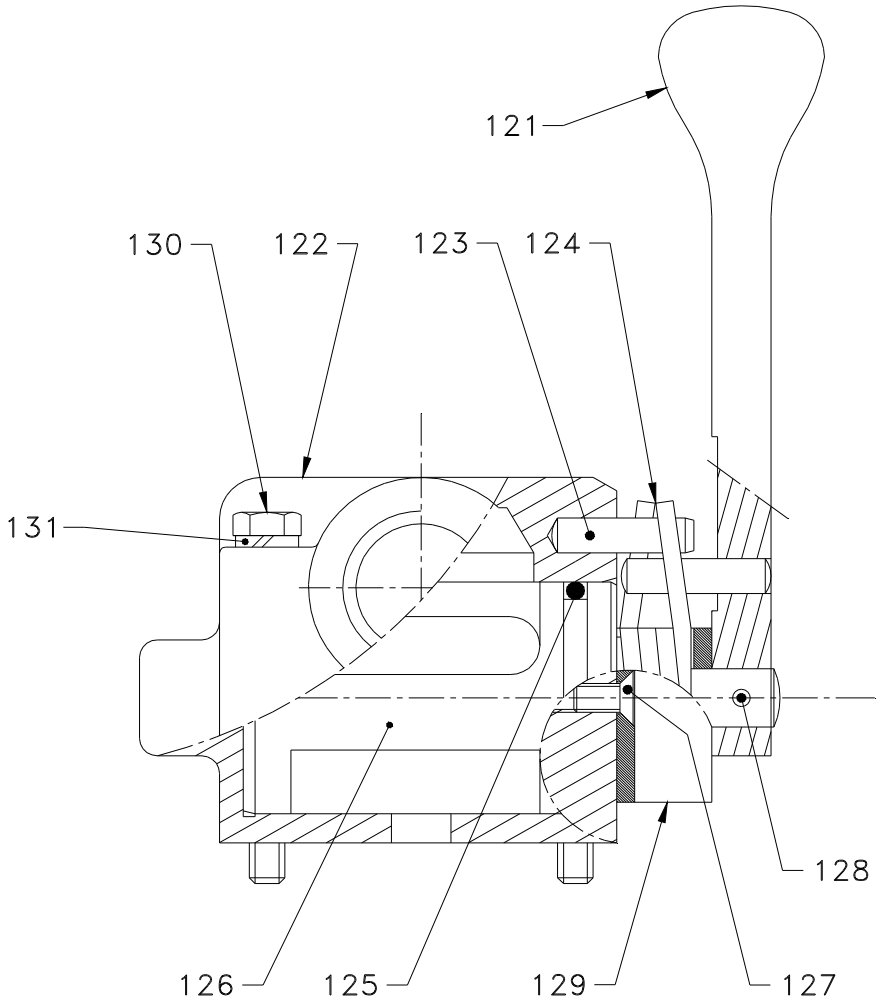
(Dwg. D6310005)

AIR GEAR MOTOR ASSEMBLY PART LIST

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
31	Gasket	1	96310118
80	Motor Ass'y (incl's item 31 & item 81 through 114)		76310012
81	Screw	5	41019001
82	Lock washer	7	45200006
83	Pin	4	46000416
84	Motor cover	1	96310042
85	Bearing	1	56462813
• 86	Shaft segment	1	47836732
87	Exhaust washer	1	96200045
88	Plug	1	96310049
• 89	'O' ring	2	58225929
90	Rear stop	2	96200069
91	Bearing	1	56492213
92	Spacer	1	96310018
93	Motor rotor	1	96200093
94	Repulsion rotor	1	96200026
• 95	Gasket	1	96310045
96	Selector stop	1	96090223
• 97	Ball	1	69401625
• 98	‘O’ring	1	58212229
99	Motor housing (incl's item 96, 97 and 98)	1	96200008
100	Bearing	1	50600003
• 101	Nut	1	57000003
102	Spring	1	69143932
103	Washer	1	96310054
104	Screw	1	41103403
105	Rear stop	1	94120030
• 106	Nut	1	57000004
107	Bearing	1	50600004
108	Stopper	1	96310017
109	Screw	4	41302206
• 110	‘O’ring	1	58221729
111	Greasing nipple	1	67102227
112	Motor housing	1	96310078
113	Screw	4	41000201
114	Lock Washer	4	45200006

• Recommended Spare

“OLD” LEVER CONTROL VALVE ASSEMBLY DRAWING AND PARTS LIST

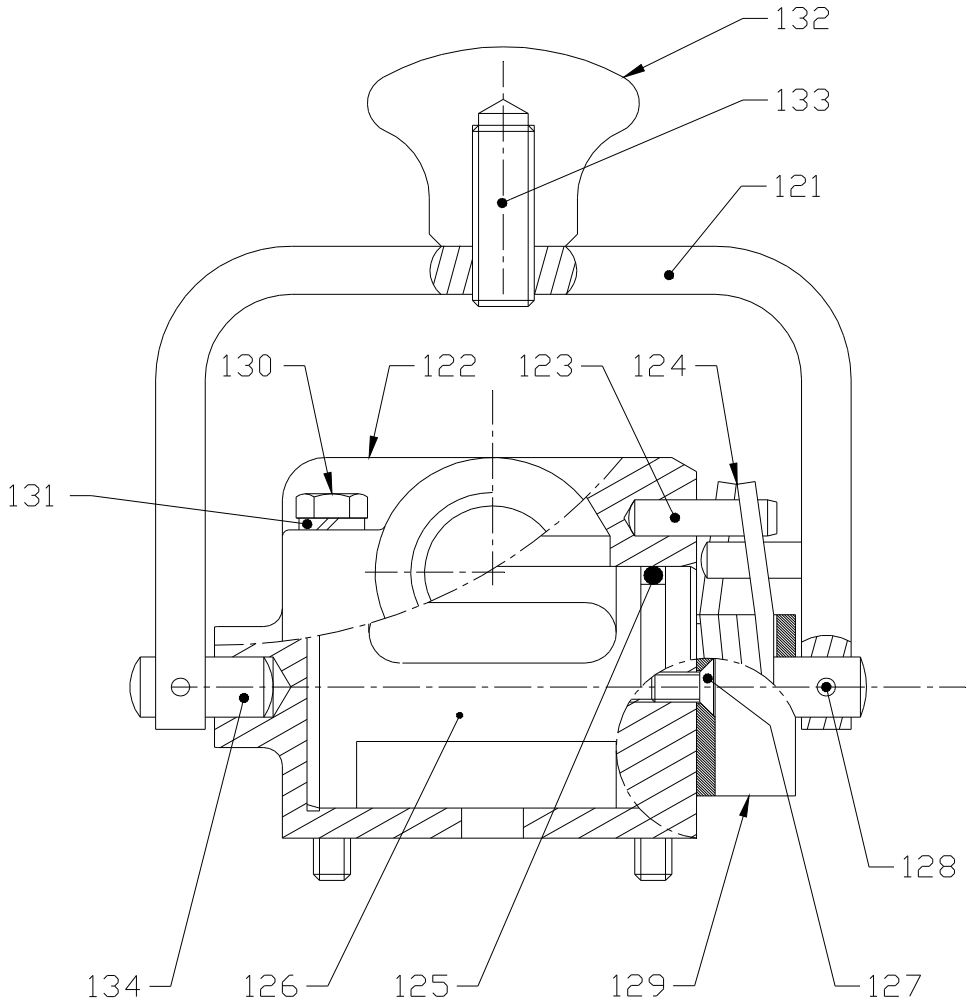


(Dwg. D6310006)

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
120	Control Valve Ass'y (incl's item 121 through 131)	1	76310011
121	Control lever	1	96180031
122	Valve housing	1	96310021
123	Pin	2	46001216
124	Return spring	1	96180035
• 125	‘O’ring	1	58210229
• 126	Rotary valve	1	96310022
127	Screw	2	41103403
128	Pin	1	46507220
129	Stop	1	96180034
130	Screw HM	4	41016601
131	Lock washer	4	45200006

• Recommended Spare

CONTROL VALVE ASSEMBLY DRAWING AND PARTS LIST



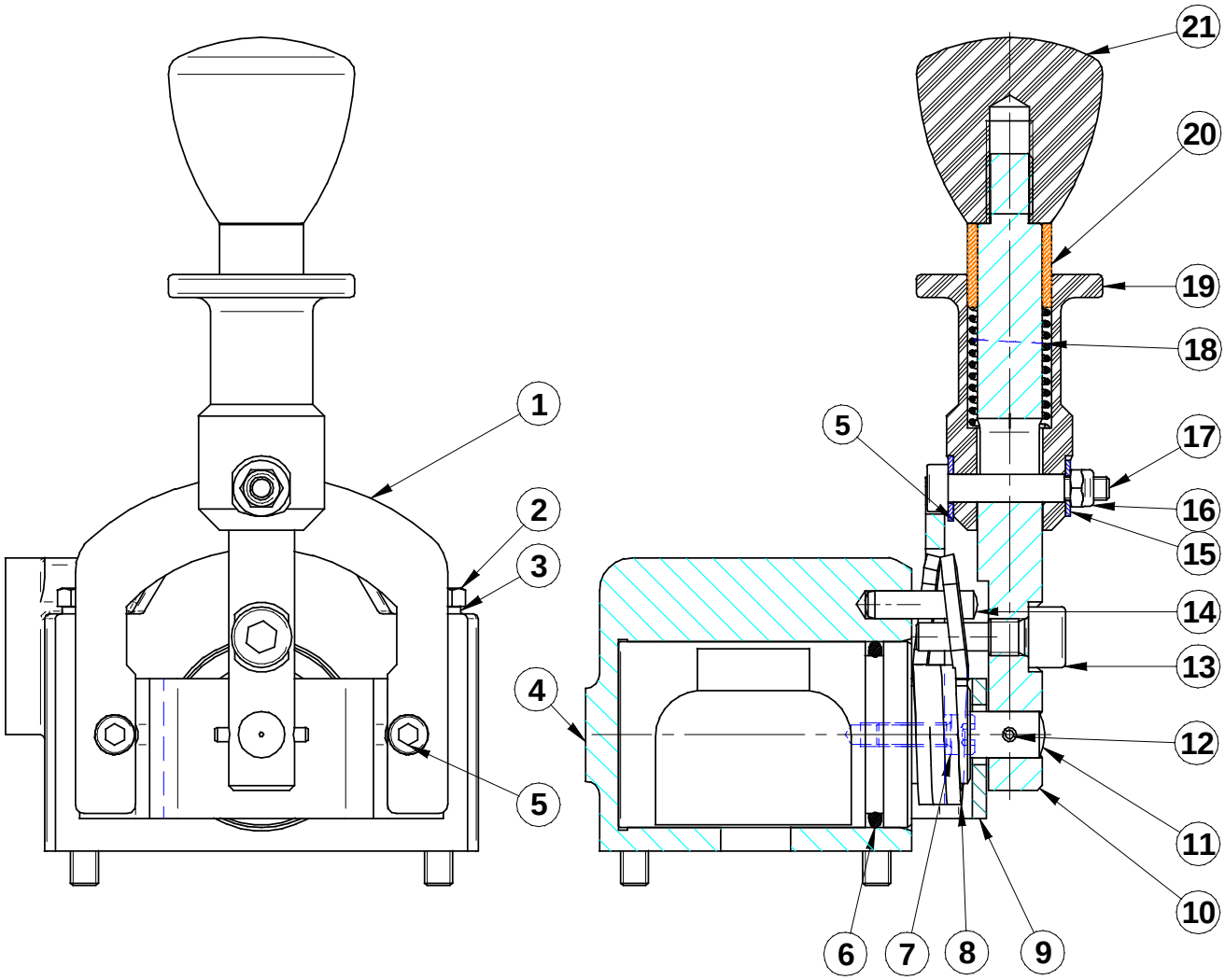
(Dwg. D6310035)

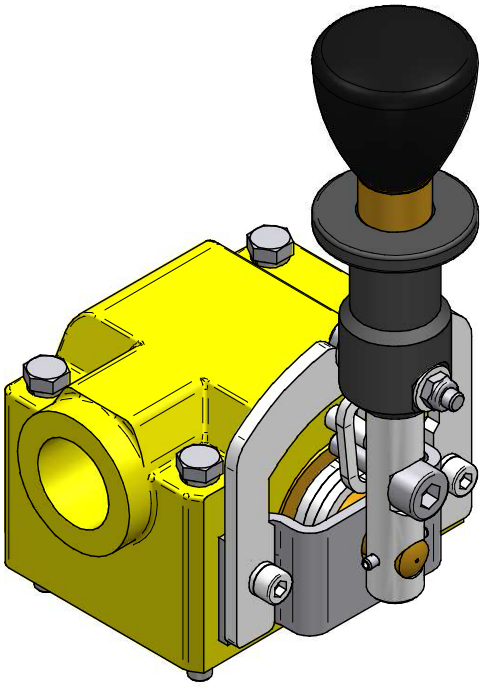
ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
119	Control Valve Ass'y (incl's item 121 through 134)	1	-
121	Control lever	1	96310056
122	Valve housing	1	96310058
123	Pin	2	46001216
124	Return spring	1	96180035
• 125	'O'ring	1	58210229
• 126	Rotary valve	1	96310022
127	Screw	2	41103403
128	Pin	2	46507220
129	Stop	1	96180034
130	Screw HM	4	41016601
131	Lock washer	4	45200006
132	Handle	1	69566232
133	Setscrew	1	42001507
134	Axle	1	96310057

• Recommended Spare

"NEW" LEVER CONTROL VALVE ASSEMBLY DRAWING

From 1st December 2009





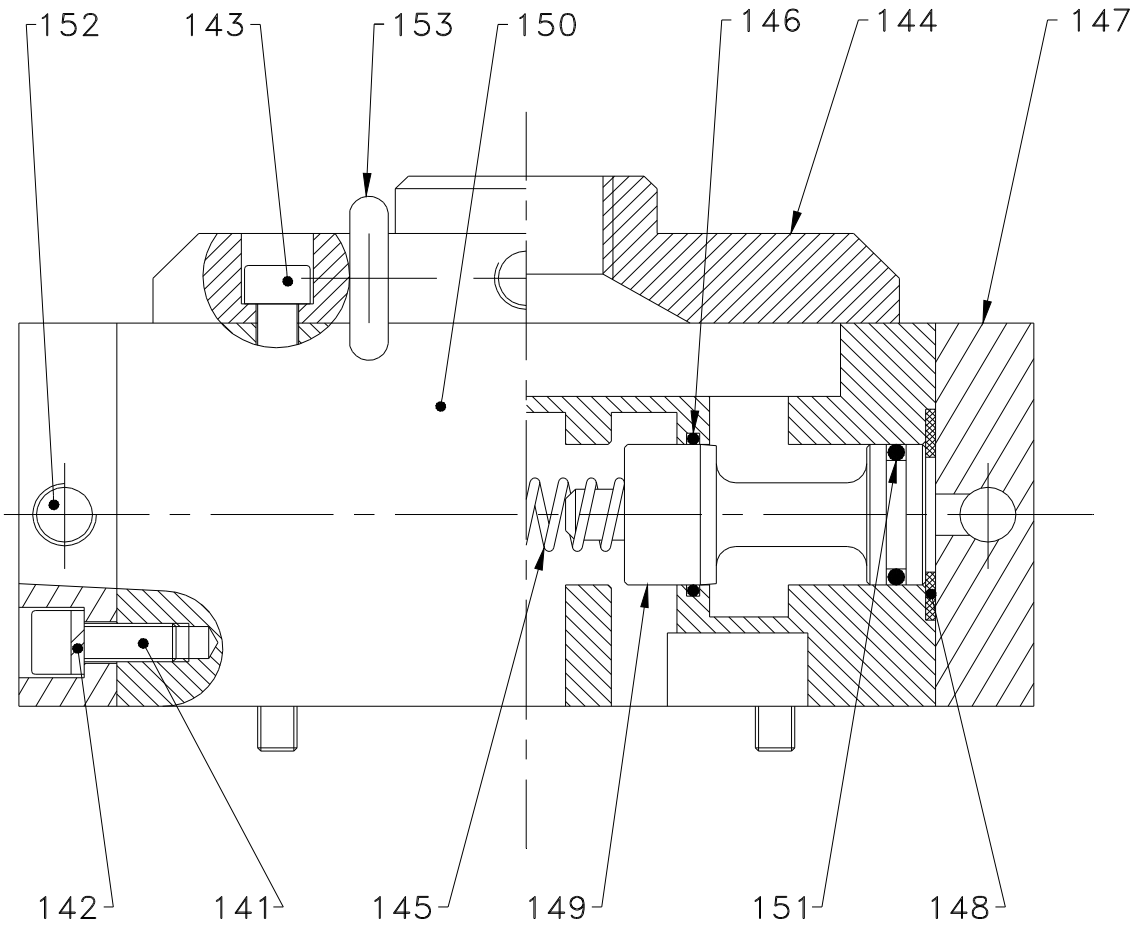
(Dwg.D6310863)

“NEW” LEVER CONTROL VALVE ASSEMBLY PARTS LIST

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER.
	Throttle control Lever Ass »y		76310340
1	Stop	1	96310337
2	Screw	4	41021101
3	Lockwasher	4	45201006
4	Valve Housing	1	96310021
5	Screw	2	41322906
6	‘O’ring	1	58210229
7	Lockwasher	2	45201005
9	Stop	1	96180034
10	Control Lever	1	96310338
11	Rotary Valve	1	96310122
12	Pin	1	46507220
13	Schoulder Screw	1	96310339
14	Pin	1	46001216
15	Washer	1	45001105
16	Locknut	1	43707211
17	Schoulder Screw	1	65204942
18	Spring	1	69104842
19	Sliding Handle	1	96442748
20	Bushing	1	59009626
21	Knob	1	69561841

NOTES

OPTIONAL VALVE ASSEMBLY DRAWING AND PARTS LIST



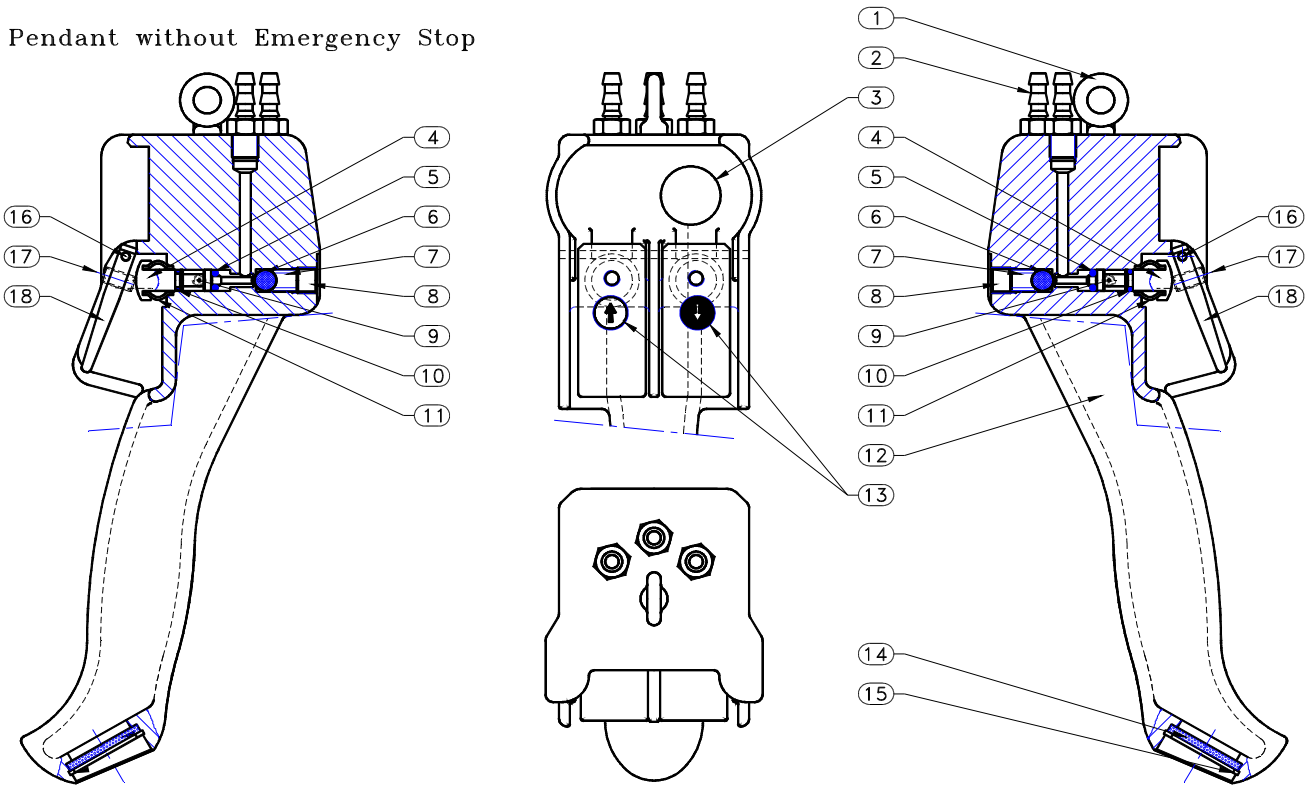
(Dwg. D6310026)

ITEM NO.	DESCRIPTION OF PART	TOTAL QTY	PART NO.
140	Pendant Control Valve Ass'y (incl's item 141 through 153)	1	76170010
141	Screw	8	41300206
142	Lock washer	8	45200006
143	Screw	4	41305906
144	Cover	1	96170050
145	Return spring	1	94120289
• 146	Quad ring	2	58232429
147	End cap	2	96170049
148	Read stop	2	94120031
149	Slide valve	2	96170047
150	Valve body	1	96170046
• 151	Quad ring	2	58229029
152	Fitting	3	61652632
153	Lifting Eye	1	64222332

• Recommended Spare

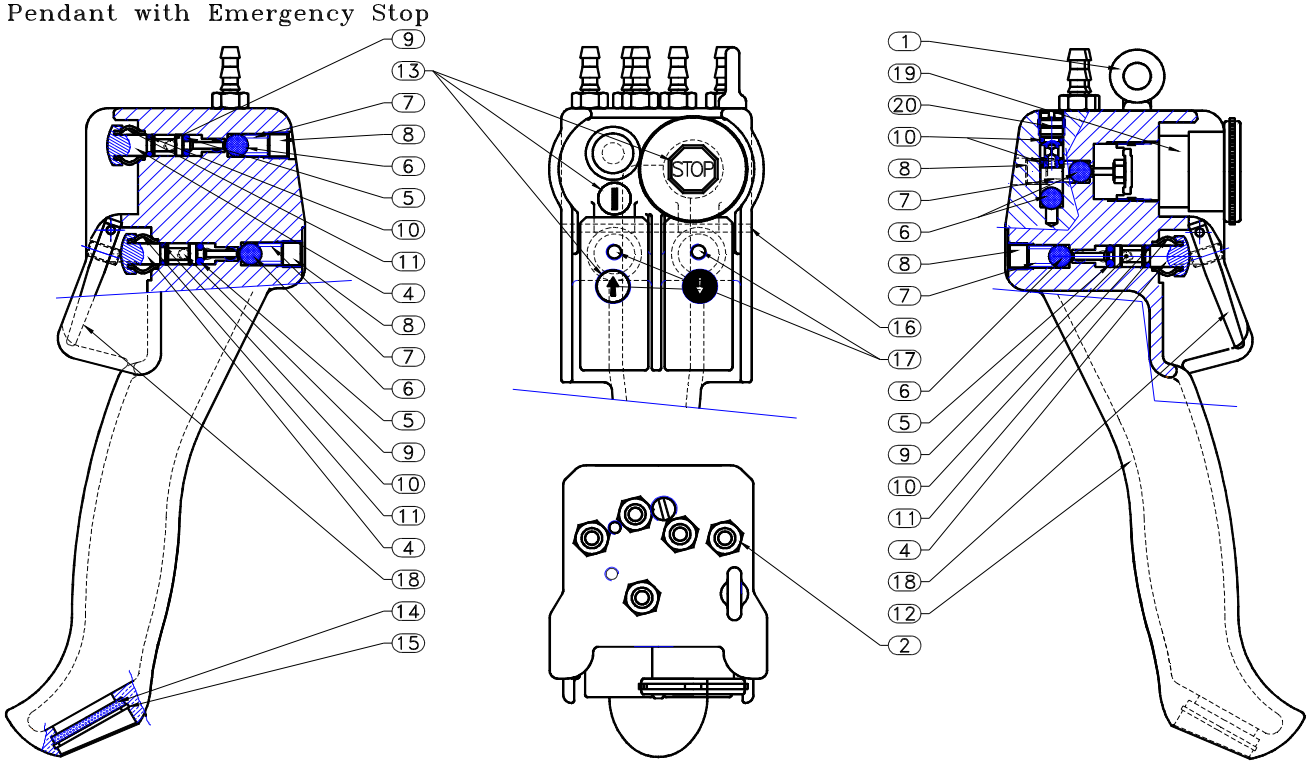
TWO LEVER PENDANT ASSEMBLY DRAWING

Pendant without Emergency Stop



(Dwg.D5790028)

Pendant with Emergency Stop



(Dwg.D5790027)

(Dwg.D5790002)

TWO LEVER PENDANT ASSEMBLY PARTS LIST

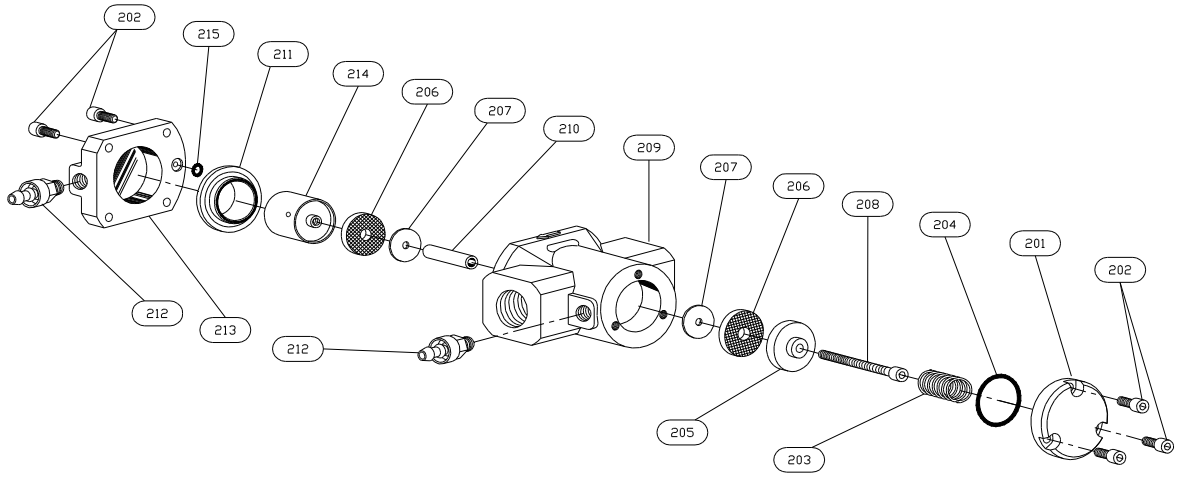
ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NO.				
			Without E-Stop			With E-Stop	
	Pendant Assembly	1	PHS2E 38559233	PHS2E-R 38559316	PHS2E-F 38559357	PHS2E-U 38559258	PHS2E-RU 38559332
1	Lifting Eye	1	6422-2332				
2	Fitting	3(5)	51029 + 68237528				
3	Plug	1	65129541			---	
4	Valve	2(3)	95790104				
• 5	'O' Ring	2(3)	58235329				
• 6	Ball	2(5)	69401625				
7	Spring	2(4)	69128541				
8	Plug	2(4)	65107741				
9	Screw	2(3)	42008307				
•.10	'O' Ring	2(5)	58209229				
11	Protector	2(3)	95790107				
12	Pendant Handle	1	95790129	95790131	95790132	95790116	95790130
13	Label Kit	1	95790111				
14	Exaust Washer	1	67600303				
15	Retainer Ring	1	47713030				
16	Pin	1	95790040				
17	Screw	2	42008607				
18	Lever	2	95790122				
19	Emergency Stop Valve	1	---			95790108	
20	Plug	1	---			95790106	
*	Label:"Read the Manual"	1	96180098				
*	Label:"Do Not Use Lifting Personnel"	1	96180100				

• Recommended Spare.

* Not Illustred

() Quantity Required for Pendants with Emergency Stop

SHUT-OFF VALVE ASSEMBLY DRAWING AND PARTS LIST

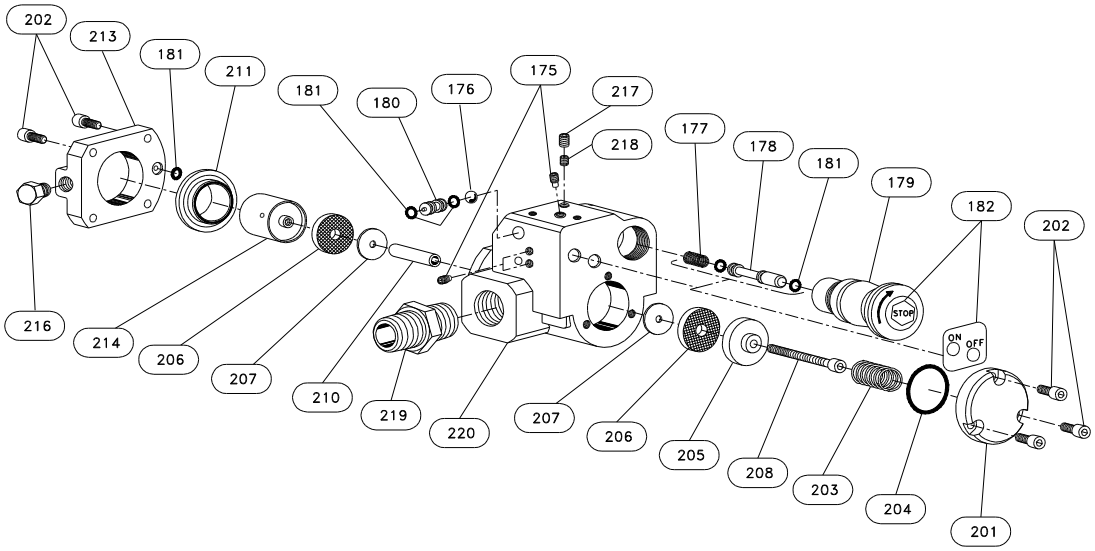


(Dwg.D6170004)

ITEM NO	DESIGNATION OF PART	QTY TOTAL	PART NUMBER
200	Shut-off Valve Assembly (incl's item 201 through 215)	1	76170016
201	Cover	1	96170059
202	Screw	7	41306706
203	Spring	1	69158732
• 204	'O' Ring	1	58214829
205	Valve Cone	1	96170053
• 206	Joint	2	96170056
207	Washer	2	45700005
208	Screw	1	41308206
209	Body	1	96170061
210	Distance Ring	1	96170055
• 211	Diaphragm	1	67716341
212	Fitting	2	61652632
213	Cover	1	96170052
214	Valve Cone	1	96170054
• 215	'O' Ring	1	58209229

•	Recommended Spare.

EMERGENCY STOP VALVE ASSEMBLY DRAWING AND PARTS LIST

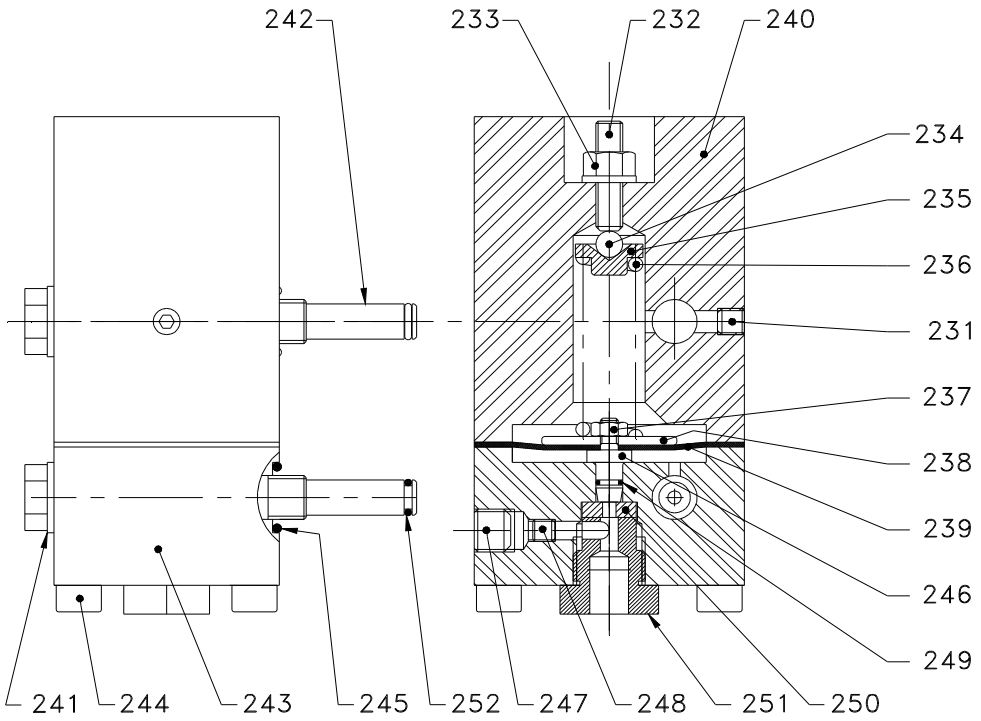


(Dwg.D6170003)

ITEM NO	DESIGNATION OF PART	QTY TOTAL	PART NUMBER
175	Setscrew	3	42008207
176	Ball	1	69401625
177	Spring	3	69113941
178	Spool	3	95790085
179	Emergency Stop Bottom	1	68598632
180	Shuttle Valve Stop	1	95790098
• 181	'O' Ring	9	58209229
182	Label Kit	1	95790099
201	Cover	1	96170059
202	Screw	7	41306706
203	Spring	1	69158732
• 204	'O' Ring	1	58214829
205	Valve Cone	1	96170053
• 206	Joint	2	96170056
207	Washer	2	45700005
208	Screw	1	41308206
210	Distance Ring	1	96170055
211	Diaphragm	1	67716341
213	Cover	1	96170052
214	Valve Cone	1	96170054
216	Plug	1	65107741
217	Setscrew	1	42007407
218	Nozzle	1	96170071
219	Nipple	1	61330732
220	Body	1	96170068
221	Emergency stop Valve Assembly (incl's item 175 through 220)	1	76170018

• Recommended Spare.

TORQUE LIMITOR ASSEMBLY DRAWING AND PARTS LIST

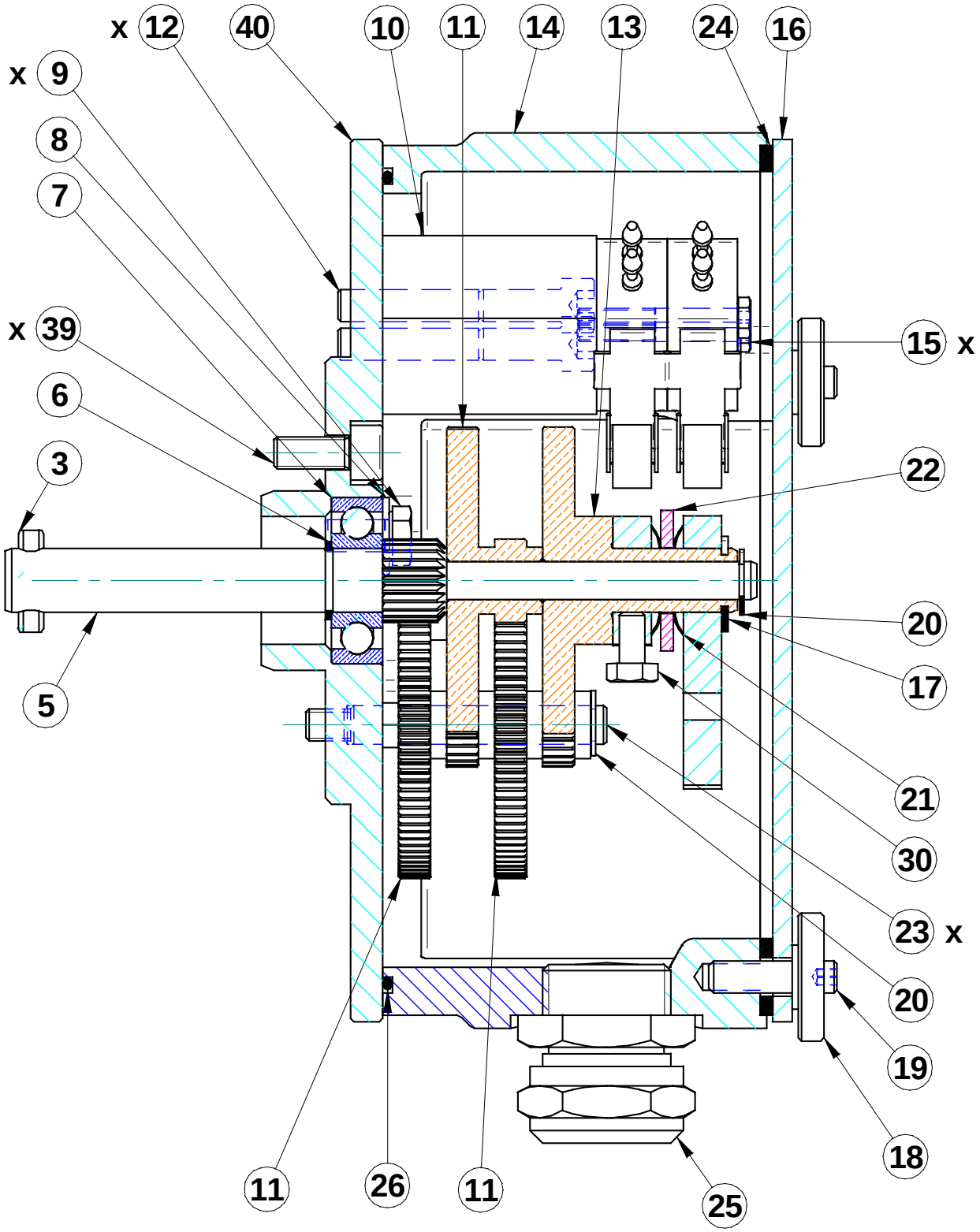


(Dwg.D6360005)

ITEM NO	DESIGNATION OF PART	QTY TOTAL	PART NUMBER
230	Torque limitor Ass'y	1	76360001
231	Screw	1	42007407
232	Screw	1	42001607
233	Nut	1	43007811
234	Ball	1	69400125
235	Spring Seat	1	96360023
• 236	Spring	1	69159432
237	Nut	1	43001111
238	Washer	1	96360019
• 239	Diaphragm	1	96360020
240	Cover	1	96360015
• 241	Usit-Ring	2	58409731
242	Screw	2	96360022
243	Body	1	96360016
244	Screw	4	41314906
• 245	'O'Ring	2	58210729
246	Valve	1	96360017
247	Plug	1	65172032
248	Nozzle	1	96170071
• 249	'O'Ring	1	58222329
250	Joint	1	96360021
251	Screw	1	96360018
• 252	'O'Ring	2	58209229

• Recommended Spare.

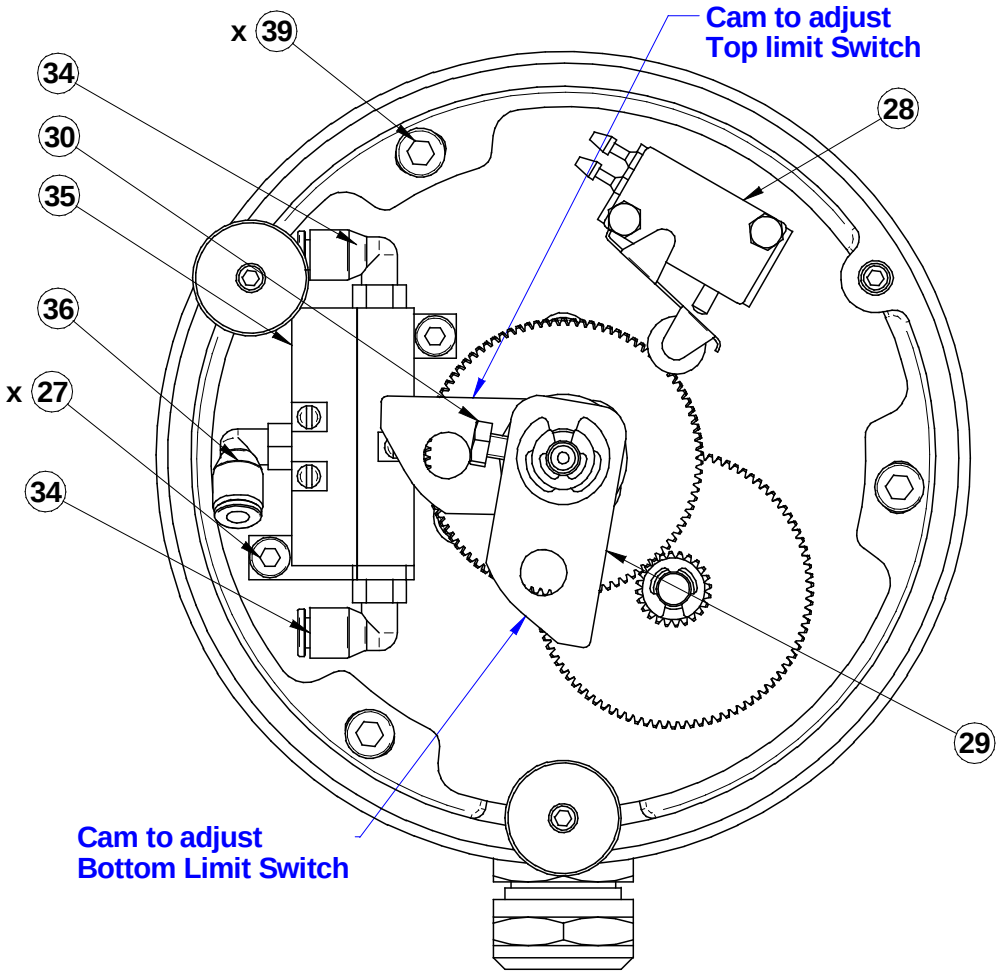
LIMIT SWITCHES ASSEMBLY DRAWING

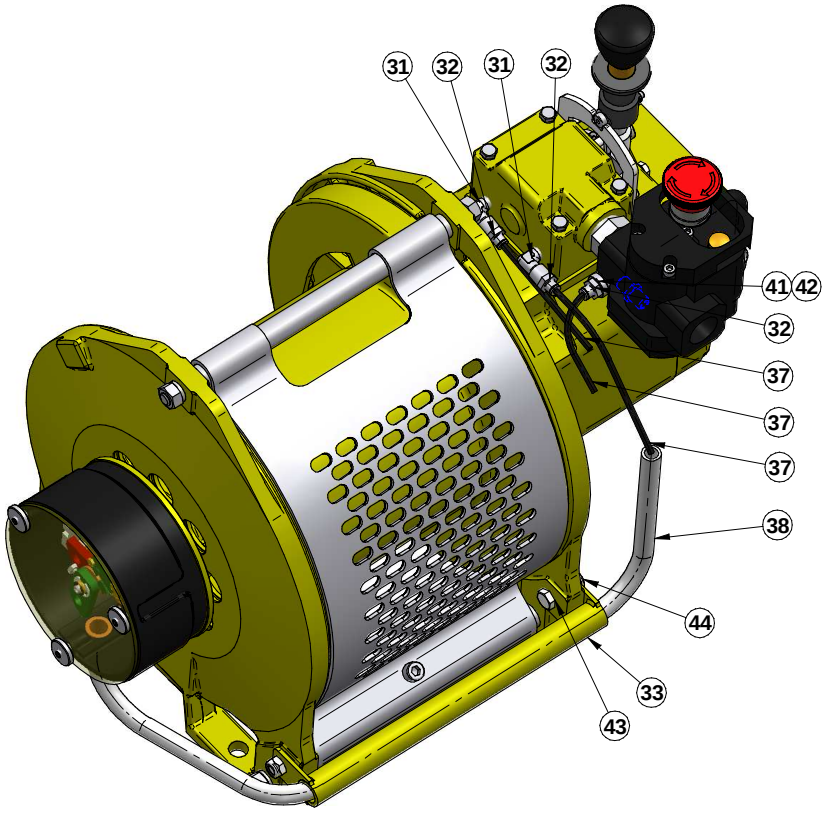


(Dwg.D6510862)

NOTE:
X: Screws securized with Loctite® 243 or equivalent on the threads

LIMIT SWITCHES ASSEMBLY DRAWING





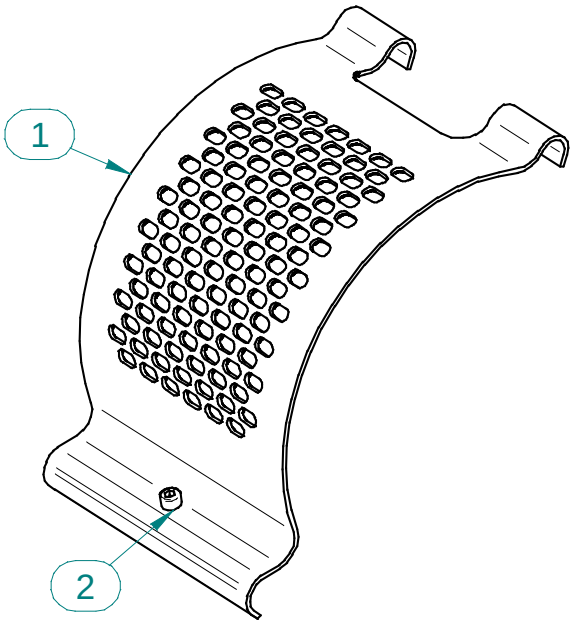
(Dwg.D6510862)

LIMIT SWITCHES PART LIST

ITEM NO.	DESCRIPTION OF PART	QTY TOTAL	PART NUMBER.
3	Pin	1	46508320
5	Sun Gear (Short drum)	1	96510015
	Sun Gear (Long drum)		96510014
6	Retainer ring	1	47801039
7	Bearing	1	50005000
8	Washer	1	45001105
9	Screw	1	41005101
10	Valve Support	1	96510007
11	Double Geared Pinion	3	96510017
12	Screw	2	41322706
13	Cams Support	1	96510008
14	Housing	1	96510001
15	Screw	2	41019101
16	Cover	1	96510002
17	Retainer Ring	1	47837241
18	Nut	3	43803742
19	Screw	3	42007707
20	Retainer Ring	2	47803342
21	Spring Washer	2	69103442
22	Washer	1	45001110
23	Axle	1	96510003
24	Gasket	1	96510012
25	Cable Glands	1	60903542
26	‘O’ring	1	58239129
27	Screw	2	41316506
28	Pneumatic Valve	2	68558741
29	Cam	2	96510004
30	Screw	2	41024401
31	Elbow	2	68280132
32	Fitting	3	68246128
33	Pipe (Short drum)	1	96510025
	Pipe (Long drum)		96510028
34	Elbow Fitting with nozzle	2	96510030
35	Air pilot Valve	1	68598841
	Valve Base	1	68598941
36	Elbow	1	68159828
37	Hose	(m)	1025U 04 01
38	Protective hose (Short Drum)	1	96510023
	Protective hose (Long Drum)		96510024
39	Screw	6	41316706
40	Flange	1	96510011
41	Tee	1	61394532
42	Nipple	1	61385232
43	Screw	2	41023401

44	Locknut	2	43706511

DRUM GUARD ASSEMBLY DRAWING AND PART LIST



ITEM NO	DESIGNATION OF PART	QTY TOTAL	PART NUMBER	
			SHORT DRUM	LONG DRUM
	Drum Guard Ass'y (Incl's item 1 and 2)	1	76310026	76310027
1	Drum Guard	1	96310038	96310065
2	Screw	1	41321806	41325006

NOTES

NOTES

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
Ingersoll-rand, Douai Operations
529, 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**'s 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 **INGERSOLL-RAND** 's engineers 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 enrolee 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 compagny's responsability to reimburse you for repair or replacement of good 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.

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