

HR BLOWERS UK LTD

INSTALLATION & OPERATING MANUAL

1. RECEIPT OF GOODS.

- a. Inspect package/crate on arrival. If any damage is apparent, notify the carrier and report the problem to HR Blowers UK Ltd. If possible, take a photograph of the damaged area.
- b. In all cases, when the blower is removed from the packaging/crate, check the blower for any sign of physical damage and turn the input shaft gently to ensure it rotates freely. If in doubt, inform HR Blowers UK Ltd immediately and if possible, photograph any signs of physical damage.

2. LIFTING

- a. Every blower is supplied with lifting lugs which should only be used when lifting the bare shaft blower. This allows the blower to be lifted without distortion.
- b. If the blower is mounted on a baseplate, the blower lifting lugs must NOT be used as the increased strain from the extra weight of the baseplate may distort the blower casing and this is very likely to cause the impellers to touch each other or the casing, with catastrophic consequences when in operation. Either special lifting points should be fitted to the baseplate designed to enable it to be lifted without distortion, or it should be lifted by placing 2 equal slings, 1 under each end of the baseplate, lifting very carefully to avoid distortion.

3. BEFORE COMMENCING INSTALLATION

- a. All Installation, Operating and Maintenance Personnel must read this Manual and ensure that the Blower is installed and operated in accordance with the instructions contained therein.
- b. Check that the orientation of the blower is correct. It is supplied in accordance with the customers instructions as stated on the order. However, if it is necessary to change the orientation, the following should be taken into consideration:
 - i. The gear end casing oil trough must be positioned such that the lowest point of the gear is immersed in oil.
 - ii. For oil lubricated drive end blowers (as is normally the case on HR Size 4 Blowers) the lower shaft must have the oil slinger attached to it.
- c. Do not remove the inlet and outlet protection covers until installation actually commences.
- d. Once these covers have been removed, it is vital that there is no ingress of dirt or any other objects into the inlet or outlet ports at any time. The impellers must be free of any possible obstruction as the

blower is built to have very small clearances between the impellers and between the impellers and the casing.

- e. Ensure that it is NOT connected to the electrical supply in any way, including protection devices.

4. INSTALLATION

- a. All personnel should understand that all Positive Displacement Blowers are built to very fine tolerances but have definite clearances between the moving parts. It is absolutely vital that there should be no ingress of dirt or objects into the blower inlet or outlet as this would almost certainly result in a catastrophic failure.
- b. The Blower must be mounted on either a solid level foundation or on a baseplate accommodating the drive motor. The foundation/Baseplate must be level and structurally substantial to withstand vibration and to ensure no distortion of the blower when in operation.
 - i. Foundation Mounting: The blower must stand on the feet fitted to the blower and be bolted down with foundation bolts. The foundation bolts should be grouted in and allowed to set before installing the blower on them.
Once the blower is in position on the foundation bolts, the blower must be shimmed under the feet with steel shims to ensure it is level, and then tightened down evenly to ensure that there is no distortion to the blower casing whilst it is tightened down.
 - ii. Baseplate Mounting: When the blower is mounted on a baseplate with the drive motor, the complete baseplate must be carefully shimmed with steel shims when mounted on the foundation bolts to ensure it is level. The baseplate must be tightened down evenly such that there is no distortion to the baseplate or the blower.
- c. Once the blower is in position and the foundation bolts fully tightened, the blower should be gently rotated manually. It must rotate freely with no tight spots and the impellers must not make contact with each other or touch the casing. If there is a tight spot or the impellers will not rotate freely, the cause must be investigated and remedial action taken before continuing with the installation.

5. DRIVE ALIGNMENT

- a. The normal drive arrangement is either by direct coupling the blower to the drive motor through a flexible coupling or by driving pulleys fitted with a vee belt drive.
- b. Flexible Coupling. It is essential that the blower and drive are aligned accurately to avoid distortion to the blower casing. The flexible coupling should be fitted in accordance with the instructions supplied by the manufacturer.
- c. Vee Belt Drive: Taper lock bush type pulleys are recommended. If another type of pulley mounting is used, it must be carefully pressed on to the shaft to avoid damage to the bearing. DO NOT USE A HAMMER

TO FIT THE PULLEY. The pulley must be mounted as close as possible to the cover of the drive shaft bearing.

6. PIPING & INLET & DISCHARGE FILTER/SILENCERS

- a. Once the blower has been installed and bolted down onto its foundation, the piping can be connected. It is important that the pipework is installed such that the pipe flanges connect freely to the blower without any strain as this can cause distortion to the blower with catastrophic results. Also, the pipework must be clean internally and free from any dirt.
- b. Normally, the blower is fitted with a combined Inlet Filter/Silencer and an Exhaust Silencer, and all should be mounted as close as possible to the appropriate flange on the blower. As for the piping, the Inlet and Outlet Filters/Silencers must be installed without in any way putting strain on the blower or the piping connected to the blower.
- c. Ensure no dirt or objects penetrate internally within the system whilst installing and connecting up the flanges.
- d. When the blower has been installed and the pipework and filters/silencers have been fitted, the blower must be checked again manually that it rotates freely without tight spots or contact of moving parts. Any problems in this respect must be investigated and remedied immediately.
- e. Note; An Exhauster must be fitted with a Discharge Silencer.

7. LUBRICATION

- a. NOTE: All blowers are despatched from HR Blowers UK Ltd factory drained of all lubricating oil, so it is ESSENTIAL that the Gear Case (and the Drive End Case when the drive end is oil lubricated as is normally the case on the HR4 size) are filled with oil. Also, the drive end bearings MUST be greased, before start up.
- b. The gear end is oil lubricated on all models and also the drive end on the HR4 size, and the gear casing (and the drive end casing on the HR4 size) is fitted with either a blank oil level plug or a sight glass. If a plug is fitted, remove the plug, fill with oil in the filler plug until it is full up to the level plug level, and replace both the plugs. If a sight glass is fitted, fill with oil in the filler plug until the oil reaches the middle of the sight glass, then replace the filler plug. These instructions apply to both the gear end and the drive end on the HR4 size.
- c. DO NOT OVER FILL AS THIS WILL CAUSE THE GEARS TO OVER HEAT AND COULD RESULT IN DAMAGE.
- d. In the event that the casing is over filled, when a level plug is fitted, allow the excess oil to drain from the level plug and then tighten the level plug. In the case of a sight glass, loosen the drain plug to allow the excess oil to drain out and tighten the drain plug when the oil level reaches the middle of the sight glass.
- e. The oil level should be checked at least once a week or after every 100 hours of operation.

- f. The bearings at the drive end are normally grease lubricated, in which case apply grease to the grease nipples until it comes out of the release points which must be kept clear of dirt or paint at all times. Grease must be applied at 3 monthly intervals or every 500 hours in operation, whichever is the sooner.
- g. Consult Table 1 for the appropriate oil and grease to suit the climatic conditions prevailing at the site. Different oils may be necessary between summer and winter where there are large temperature differences, in which case the oil will need to be changed as the seasons change.

8. PROTECTION DEVICES

- a. Pressure Relief Valve. The most important protection unit is the Pressure Relief Valve and all blowers should be fitted with this to protect the blower against over pressure. On an Exhauster, a vacuum relief valve should be fitted to protect the Exhauster against excessive vacuum.
If other overload protection is fitted, such as an electrical current overload or a pressure overload switch, the Pressure Relief Valve need only pass the volume of air necessary to prevent surge during variable speed operation.
- b. Pressure Switch. A Pressure Operated Electrical Protection unit (or Vacuum Operated on an Exhauster machine) should always be fitted to shut down the blower (or Exhauster) in the event of a pressure overload at the outlet (or excessive vacuum on an Exhauster inlet). It should not be set at a higher pressure than 140mbar above the maximum allowable operating pressure as shown in Table 1.
- c. Current Overload. This will operate when the electrical current exceeds the maximum full load current, and should be set with a 2 second maximum delay.

9. INITIAL START UP PROCEDURE

- a. Before starting the blower for the first time, and also after it has been shut down for maintenance, the following initial checks should be made.
 - i. Check that the unit is isolated from the electrical supply.
 - ii. The blower and piping must be free internally from any dirt or objects.
 - iii. The blower must be securely mounted on the foundation/mounting bolts and they should be checked that they are properly and evenly tightened.
 - iv. The blower must be level and correctly aligned to the driving motor. If it is direct coupled, check that the coupling bolts are correctly tightened. For a vee belt drive, the units must be correctly aligned and the vee belts tensioned in accordance with the manufacturers recommendations.
 - v. The oil levels must be checked in accordance with 7. LUBRICATION above.

- vi. Check manually that the bower rotates freely and that there are no tight spots. If there are this must be investigated and rectified before proceeding further.
- vii. It is recommended that when the electricity is connected a check is made that power is also connected to all the appropriate safety and protection equipment.

10. STARTING THE BLOWER

- a. Check that the interior of the blower and the inlet and discharge piping is clean and that there has been no ingress of dirt or anything else.
- b. The oil levels must be checked and topped up if necessary. **DO NOT OVER FILL.** The drive end bearing grease nipples should be greased until the grease escapes from the grease release points.
- c. Check that the blower is level and correctly aligned with the drive. Ensure all the holding down bolts are firmly tightened. If a Vee belt drive arrangement is fitted, check that the belts are correctly tensioned. Also ensure that the inlet and outlet piping are correctly positioned such that they are not putting any load on the blower that could cause distortion of the blower casing.
- d. Manually rotate the impellers to check they rotate freely.
- e. If all the above are satisfactory, connect the electrical supply to the drive motor and protection equipment.
- f. Use the motor to briefly turn over the blower to check that the blower is rotating in the correct direction. If it is not, reverse the electric leads and check again.
- g. Once all the above checks have been carried out satisfactorily, start the blower and run for 15 minutes on no load. During this time check that the blower casing and bearing housings are not overheating. Under these conditions and over this period of time, heat should not be generated.
- h. If the above test is satisfactory, increase the load gradually to full load over a period of 30 minutes and then run it at full load for another hour. The blower must be monitored constantly throughout this period. If there is any sign of overheating or any other problem occurs, the blower must be shut down immediately and the fault diagnosed and rectified, otherwise serious damage could result.
- i. The blower should be regularly monitored for the first 2 days of operation.

11. ROUTINE MAINTENANCE

- a. Once in operation the oil level should be checked at least weekly, and the drive end bearings should also be greased at the same time. It is very important for safety reasons and for the blower, that when checking the oil level, the blower must be stopped for at least 15 minutes before checking the level to allow the oil to settle to its proper level. If the blower needs topping up the blower **MUST** be isolated from the electrical supply.

- b. The frequency of oil change will depend on several factors such as the number of hours in operation, changes in the climatic conditions and the load factor. Normally one would expect to change the oil annually unless the blower is subject to long periods of very heavy continuous load, in which case more frequent oil changes are recommended, such as 3 or 6 monthly or if the climatic conditions are such that the temperature change between summer and winter means that a different grade of oil should be used. See 7. LUBRICATION.
- c. For a belt drive installation, whilst checking the oil level, the belt tension should be checked and adjusted if necessary.
- d. It is important that the Inlet Filter element is cleaned regularly as if it becomes blocked and restricts the air flow to the blower, the blower could over heat. Cleaning should be undertaken in accordance with the Instructions supplied by the manufacturer of the filter.

12. OPERATING AND SAFETY

- a. The blower should be checked regularly whilst in operation.
 - i. Listen for any change in the noise emissions – this can indicate a problem is developing.
 - ii. Check that it is not overheating but **DO NOT TOUCH THE BLOWER CASING**, as this can rise to 100/150 deg.C in normal operation.
 - iii. If the level of vibration increases other than for a change in load, this should be investigated.
 - iv. Ensure all the protection devices are connected and functioning. Do not disconnect whilst the blower is running.
- b. Whenever working on the blower during a shutdown, such as for checking oil levels or other maintenance work, it is essential for safety reasons that the blower is isolated from the electrical supply before work on the blower commences.
- c. The oil levels must be checked at least weekly if the blower is running continuously, more frequently if it is running for long periods at a high load factor and/or at or near the maximum recommended speed. If there are frequent stop/starts, check the oil level every time before starting. The blower must be stopped to check the oil level and left to stand for 15 minutes minimum for the oil to settle before the level is checked. Failure to do this could result in a false low level reading being taken and the blower topped up unnecessarily, leading to over filling which could cause the bearings to overheat. If, after at least 15 minutes standing, the oil level is low, top up as necessary, **BUT DO NOT OVERFILL**.
- d. All personnel working close to the blower whilst it is running **MUST** wear suitable ear protection as all positive displacement blowers are noisy when operating.
- e. **NEVER** start the blower with the piping disconnected. In the very unlikely event that this is necessary, all personnel must keep well clear, especially clear of the inlet and outlet. A coarse screen cover should be bolted over the inlet to prevent the ingress of dirt.

- f. The area around the Pressure Relief Valve should be clearly marked to keep personnel clear at all times, in case it should discharge.
- g. All personnel involved in maintenance should be trained in lifting techniques. Many of the components within a blower are heavy and need lifting with care to protect both the personnel doing the work and the components.
- h. When maintenance work is to be undertaken,
 - i. The blower and the ancillaries, including the protection devices, must be isolated from the electrical supply.
 - ii. The inlet and outlet must be disconnected from the blower to eliminate the risk of any pressure difference within the system rotating the impellers whilst work is being carried out. The blower impellers rotating during maintenance work could cause very serious injury to the personnel working on the blower.

13. CONTACTS

If you require assistance or any additional information, please call HR Blowers UK Ltd at:-

Telephone No: 0044 (0)1484 691858

Fax No. 0044 (0)1484 680467

Email: sales@hrblowers.co.uk

Table 1 – Maximum allowable operating conditions (Standard Machines)

Blower Size	Max Operating Pressure		Speed		Max Temp Rise	Exhauster Inlet Vacuum milliBar Gauge
	milliBar Gauge with		Maximum	Mininimum at Maximum Pressure*		
	Relief Valve	Pressure Switch				
10	1000	1140	3485	1440	135	500
11	1000	1140	3485	1450	135	500
12	700	840	3485	1450	90	450
13	550	690	3485	1450	70	450
20	1000	1140	3260	1455	124	500
21	1000	1140	3260	1460	123	500
22	700	840	3260	1460	80	450
23	550	690	3260	1465	70	450
31	1000	1140	2720	1480	120	550
32	700	840	2720	1480	77	450
33	550	690	2720	1480	58	400
41	1000	1140	2080	1229	116	550
42	700	840	2080	1229	76	450
43	550	690	2080	1229	57	400
51	1000	1140	1550	850	135	550
52	700	840	1550	850	90	450
53	550	690	1550	850	70	400
61	1000	1140	1215	600	135	550
62	700	840	1215	600	90	450
63	550	690	1215	600	70	400
71	1000	1140	930	400	135	550
72	700	840	930	400	90	450
73	550	690	930	400	70	400

At Ambient conditions of 15 Degrees Centigrade and 1013mb Atmospheric.

Note! Minimum speed is given from Performance Chart. Blowers may not operate at maximum pressure at that speed. Check to see on the Performance Chart

FAULT FINDING

Trouble	Possible Cause	Remedy
Low Capacity	1. Blower Speed too low	Check Belt Drive for slippage, adjust if required Check speed and compare with Performance Chart
	2. Excessive Pressure	Check Inlet vacuum and discharge pressure and ensure protection valves set correctly and are operational
	3. Obstruction in pipes	Check pipes, filter, relief valves, isolation valves and silencer to ensure an open flow path
	4. Excessive Slip	Check internal clearances for excess wear, contact H R Blowers
Excessive Power	5. Blower Speed too high	Check speed and compare with Performance Chart
	6. Pressure too high	See 2 and 3 above
	7. Unbalanced or rubbing Impellers	Inspect outer case for hotspots. Check drive alignment Coupling and V-belt
	8. Blocked inlet filter	Change or clean
Excessive Heating	9. Incorrect or inadequate lubrication	Confirm correct oil specification and restore correct lubrication levels in Gear case
	10. Excessive pressure rise	See 2 and 3 above
	11. Drive mis-alignment	Check and re-align
	12. Blower speed too low	See 1 above

Vibration or Noisy Operation	13. Drive Mis-aligned	See 11
	14. Unbalanced or rubbing Impellers	See 7 and 19
	15. Worn Bearings & Gears	Replace bearings and gears. Contact HR Blowers UK Ltd
	16. Loose motor, blower or pipework	Check and re-tighten bolts where loose
Seizure	17. Pressure Overload	See 2 and 3
	18. Mis-alignment	See 11
	19. Build-up of foreign material	Clean off foreign material
Driveshaft Breakage	20. Excessive overhanging load	Change or repair unit. Check pulley dimensions. Re-align and tension. Change drive configuration.

PLEASE NOTE! UNAUTHORISED ATTEMPT AT EQUIPMENT REPAIR WOULD INVALIDATE MANUFACTURERS WARRANTY!

RECOMMENDED OILS AND GREASES

Supplier	Ambient Air Temp	Max Oil Temp	Gear Oil	Bearing Grease
Mobil Oil Co Ltd	-21 to +4	49	DTE Medium	Mobilpex 48
	0 to + 25	72	DTE Extra Heavy	Mobilplex 48
	+20 to +40	102	DTE HH	Mobilplex 48
Shell Oil Ltd	-21 to +4	49	Tellus 46	Alvania R3
	-1 to +27	72	Tellus 100	Alvania R3
	+18 to +40	102	Vitrea 460	Alvania R3
Esso Petroleum Co Ltd	-21 to +4	49	Teresso 46	Beacon 3
	-1 to +27	72	Teresso 100	Beacon 3
	+18 to +40	102	Teresso 460	Beacon 3
Texaco Ltd	-21 to +4	49	Regal R+O 46	Regal Multiflax Prem 3
	-1 to +27	72	Regal R+O 150	Regal Multiflax Prem 3
	+18 to +40	102	Regal 460	Regal Multiflax Prem 3
Elf Oil Ltd	-21 to +4	49	Olina 32	Multi 3
	-1 to +27	72	Olina 100	Multi 3
	+18 to +40	102	Movixa 460	Multi 3
BP Lubricants Ltd	-21 to +4	49	Energol HLP 36	Energrease LS3
	-1 to +27	72	Energol HLP 100	Energrease LS3
	+18 to +40	102	Energol CS 460	Energrease LS3
Burmah Castrol Ltd	-20 to +3	42	Hyspin AS 32	Spheerol AP3
	-3 to +22	67	Hyspin AWS 100	Spheerol AP3
	+17 to +40	102	Alpha ZN 460	Spheerol AP3
Chevron Oils Ltd	-21 to +4	49	OC Turbine Oil 46	Dura-Lith Grease 3
	-1 to +27	72	OC Turbine Oil 100	Dura-Lith Grease 3
	+18 to +40	102	OC Turbine Oil 460	Dura-Lith Grease 3
Amoco Oil Company	-21 to +4	49	Amoco AW46	Rykon Prem 3
	-1 to +27	72	American Ind Oil 150	Rykon Prem 3
	+18 to +40	102	American Ind Oil 460	Rykon Prem 3
Gulf Oil	-21 to +4	49	Hydasil 46	Gulf Crown 3
	-1 to +27	72	Hydasil 100	Gulf Crown 3
	+18 to +40	102	Harmony 460	Gulf Crown 3
Total Oil	-21 to +4	49	Azolla 46	Multis Special 3
	-1 to +27	72	Azolla 100	Multis Special 3
	+18 to +40	102	Azolla 460	Multis Special 3
Caltex	-21 to +4	49	Rando Oil 460	Regal Starfac Prem 3
	-1 to +27	72	Rando Oil 150	Regal Starfac Prem 3
	+18 to +40	102	Ursa Oil P460	Regal Starfac Prem 3
Millers Oils	-21 to +4	49	Millmax 46	Delta 3EP
	0 to +25	72	Millmax 100	Delta 3EP
	+20 to +40	102	Millube 460	Delta 3EP

If any oil from one of the major companies cannot be acquired, the oil and grease specification given below should be adhered to. Any reputable oil company should be able to supply a satisfactory oil based on these specifications.

Oil Specification

The oil used should be a straight mineral oil (Anti-wear, anti-rust, anti-foam and anti-oxydent additions are allowed but EP and any additives which emulsify are not allowed).

The oil should have a viscosity of not more than 2500 centistokes at the minimum ambient temperature (cold starting) and not less than 30 centistokes for the highest oil temperature reached on maximum load. When there are large seasonal variations in ambient temperature summer and winter grades will be required.

Grease Specification

A high quality No3 National Lubricating Grease, Institute mineral oil grease with a calcium complex or lithium base should be used.

NOTE! HR BLOWERS UK LTD CANNOT ACCEPT RESPONSIBILITY FOR ANY FAILURE CAUSED THROUGH LUBICATION NOT CONFIRMING TO THE SPECIFICATION

Approximate Gearcase Oil Capacities

Follow filling instructions in the installation and operating manual to obtain the correct oil level
For Guidance Only

Blower Type and Size	Approximate Gearcase Capacity	
Blower Type and Size	Approximate Gearcase Capacity	
HR Size 1	0.95 litres max !	0.57 litres min #
HR Size 2	1.52 litres max !	0.91 litres min #
HR Size 3	2.27 litres max !	1.10 litres min #
HR Size 4	3.98 litres max !	2.27 litres min #
HR Size 5	12.5 litres	
HR Size 6	24.43 litres	
HR Size 7	48.87 litres	
HRBV Vehicle Blowers	1.80 litres *	
Oil/Oil Type Blower	Gear End	Drive End
HR Size 4	3.98 litres max vertical flow	1.80 litres vertical flow
	2.27 litres min horizontal flow	0.90 litres horizontal flow
HRBV Vehicle Blowers Oil/Oil	1.80 litres *	0.60 litres vertical flow
		0.30 litres horizontal flow
* Due to differences in oil quantity for vertical and horizontal mounting these figures are only a guide		
! Max figures are for oil quantity with machine arranged for vertical flow		
# Min figures are for oil quantity with machine arranged for horizontal flow		

Handling for HR Blowers Size 1 – 4

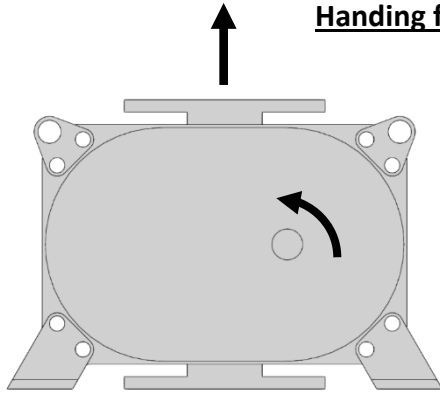


Figure 1 Standard Handling RC

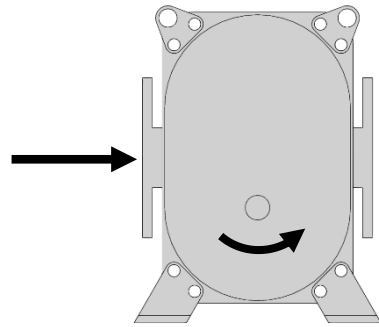


Figure 2 Standard Handling BC

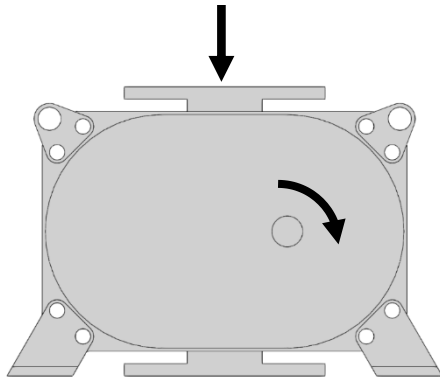


Figure 3 Standard Handling RC

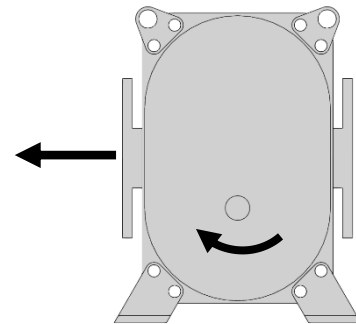


Figure 4 Standard Handling BC

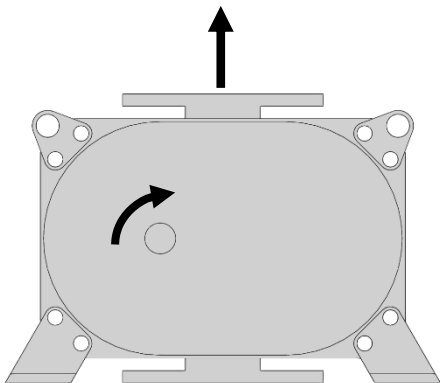


Figure 6 Non Standard Handling LC

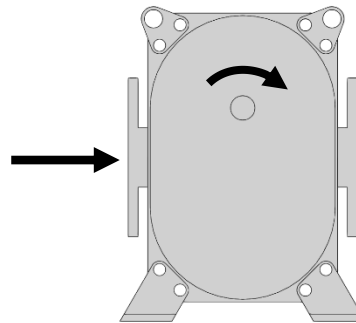


Figure 8 Non Standard Handling TC

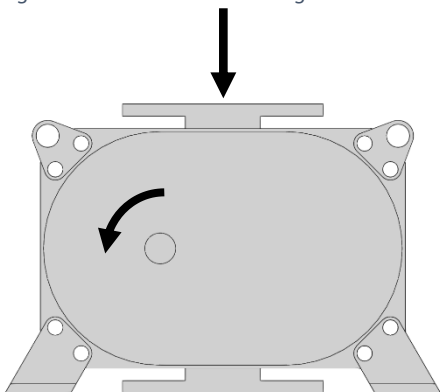


Figure 7 Non Standard Handling LC

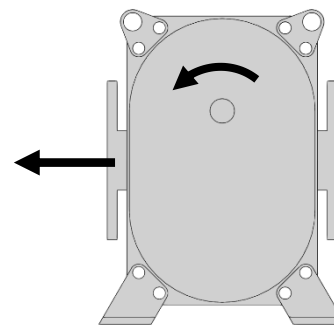
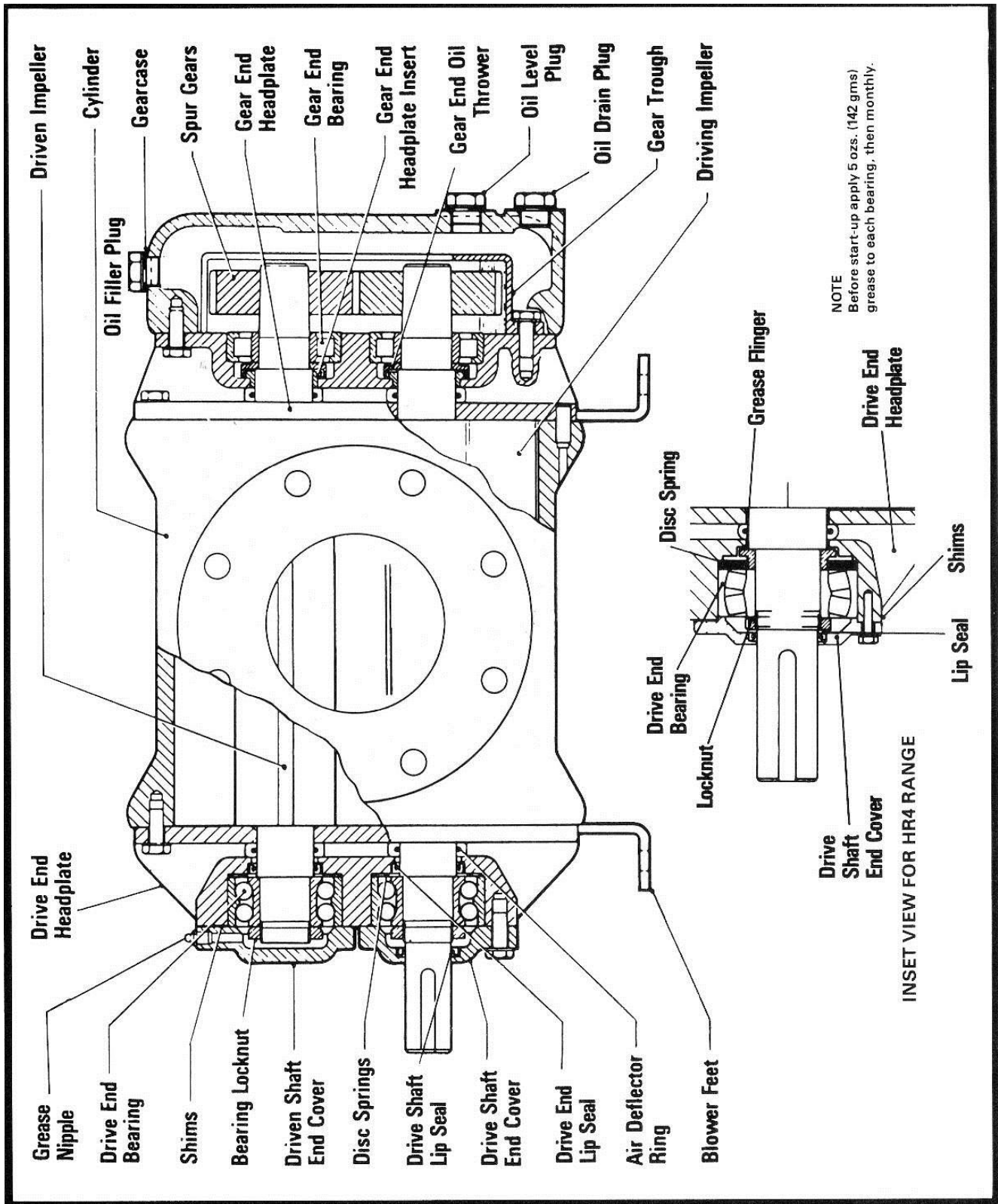


Figure 5 Non Standard Handling TC

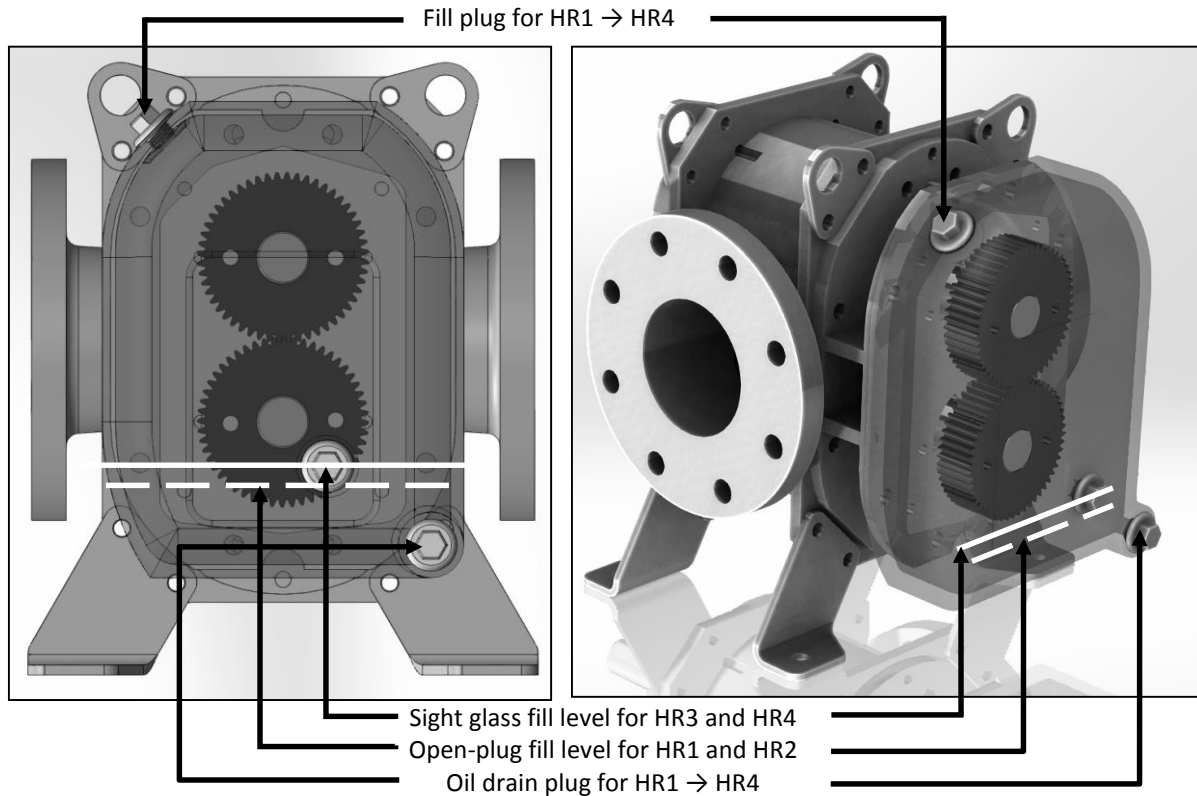


HR 1-4, Horizontal Flow

Illustrated below is a representative view of the gear end (non-drive end) of an HR style blower in a Horizontal Flow configuration.

The same approach applies to all the HR Range below a size 5. The Gear-Case has been made transparent in the image to allow visibility.

Additionally, the Gear Trough has been left off for simplicity.



HR1 → HR4 Drain Procedure

- 1.) Remove fill plug
- 2.) Remove drain plug
- 3.) Allow oil to drain, checking for particulates, discoloration or fouling

HR1 and HR2 Fill Procedure

- 1.) Fit drain plug
- 2.) Remove level plug
- 3.) Remove fill plug
- 4.) Add oil until level with bottom of level plug hole
- 5.) Allow to settle, clean off any excess oil from gear case and level plug hole
- 6.) Fit level and fill plugs

HR3 and HR4 Fill Procedure

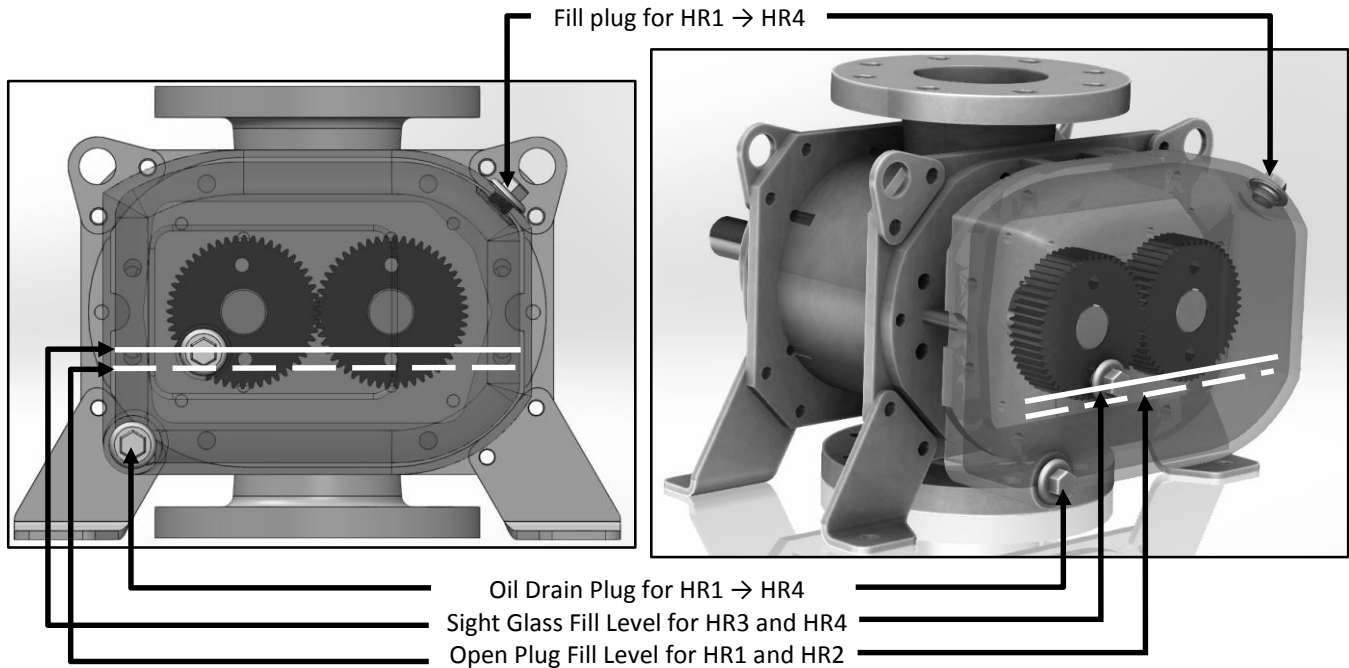
- 1.) Fit drain plug
- 2.) Remove fill plug
- 3.) Slowly add oil until level with red dot in level sight glass
- 4.) If oil level exceeds red dot on sight glass, loosen drain plug and allow small amount of oil to drain.
- 5.) Fit drain and fill plugs

HR 1-4, Vertical Flow

Illustrated below is a representative view of the gear end (non-drive end) of an HR style blower in a Vertical Flow configuration.

The same approach applies to all the HR Range below a size 5. The Gear-Case has been made transparent in the image to allow visibility.

Additionally, the Gear Trough has been left off for simplicity.



HR1 → HR4 Drain Procedure

- 1.) Remove fill plug
- 2.) Remove drain plug
- 3.) Allow oil to drain, checking for particulates, discoloration or fouling.

HR1 and HR2 Fill Procedure

- 1.) Fit drain plug
- 2.) Remove level plug
- 3.) Remove fill plug
- 4.) Add oil until level with bottom of level plug hole
- 5.) Allow to settle, clean off any excess oil from gear case and level plug hole
- 6.) Fit level and fill plugs

HR3 and HR4 Fill Procedure

- 1.) Fit drain plug
- 2.) Remove fill plug
- 3.) Slowly add oil until level with red dot in level sight glass
- 4.) If oil level exceeds red dot in sight glass, loosen drain port and allow small amount of oil to drain.
- 5.) Fit drain and fill plugs

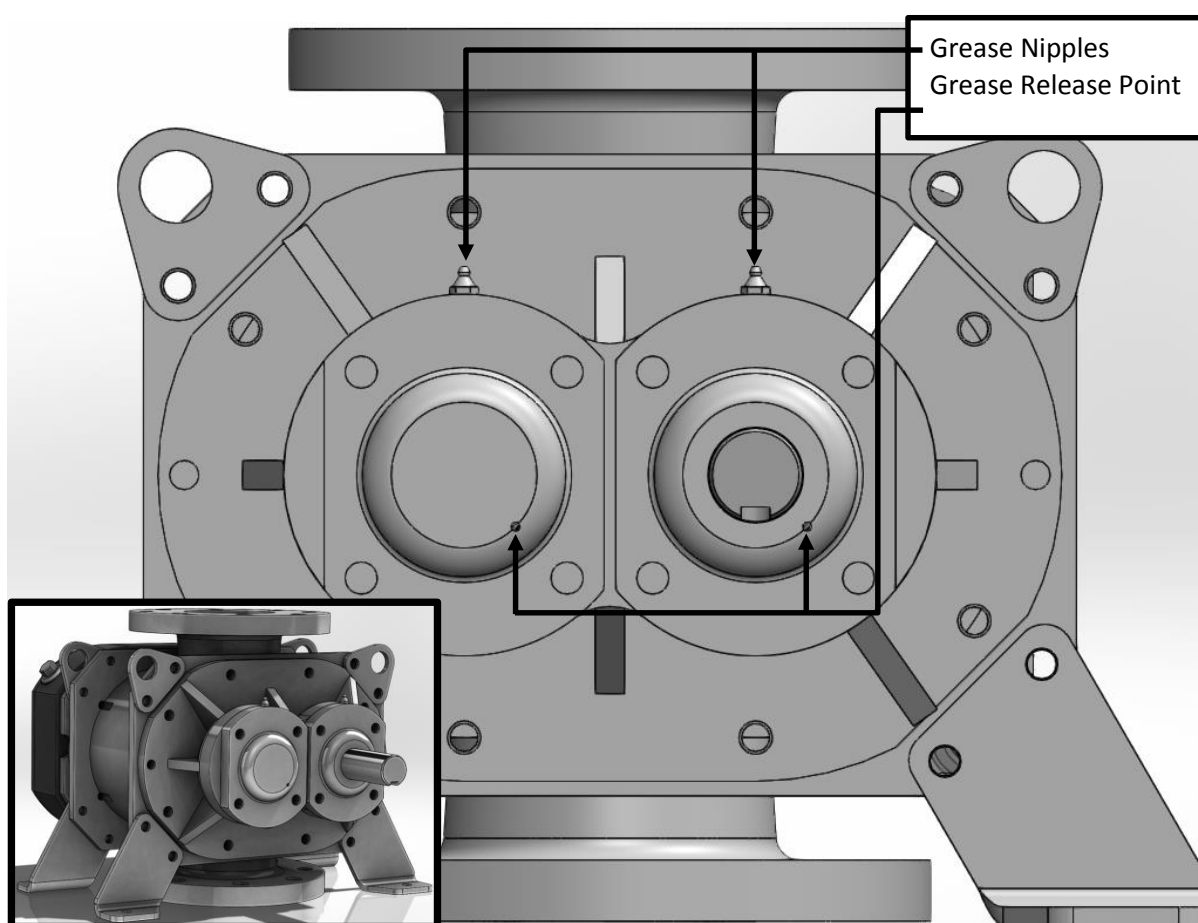
HR Oil – Grease Type Vertical Flow

Following the guidance of section 7,

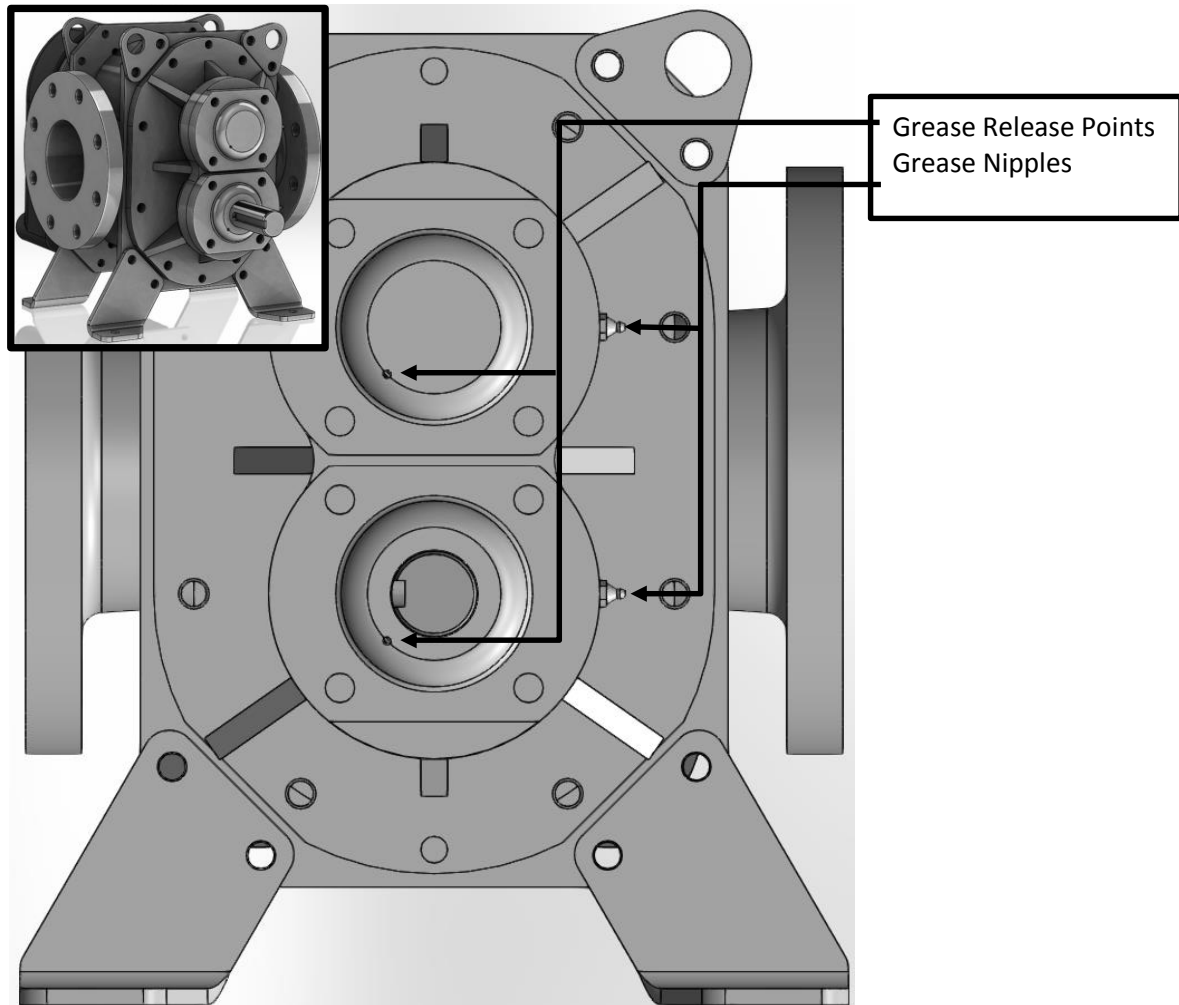
To lubricate the drive end of an Oil – Grease configured unit,

- 1.) Use the grease nipples to add grease until:
- 2.) Grease escapes from the grease release point.
- 3.) It is expected that after a units first few hours following re-greasing, additional grease will exit from the release hole. We recommend this is simply wiped away.
- 4.) If grease has hardened and is no longer the consistency of fresh grease, it is indicative of either too-infrequent re-greasing or the temperature rating of the grease being too low.

Please note:- If the blower is to be used with a non-standard handing (refer to the handing chart) the Grease Release Point should always be below the shaft axis. The covers can be rotated to a suitable position by removing the four retaining bolts. Great care must be taken to ensure that the shims are retained and are not fouled, as the blower will not rotate without them.

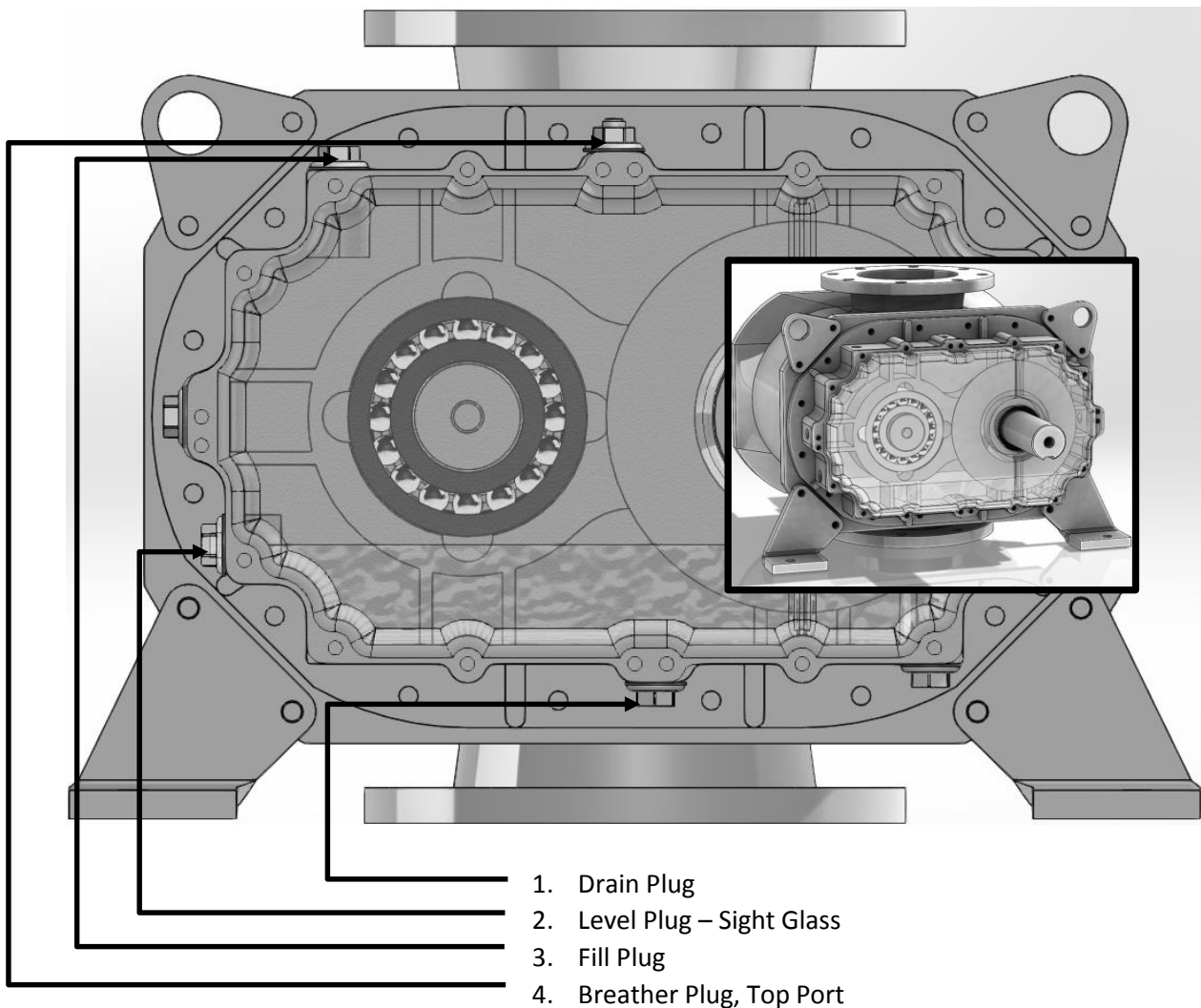


HR Oil – Grease Type Horizontal Flow



HR Oil-Oil Drive End Vertical Flow

Below is show a simplified version of the Drive End of an Oil-Oil type HR Series Blower.



Drive End Drain Procedure

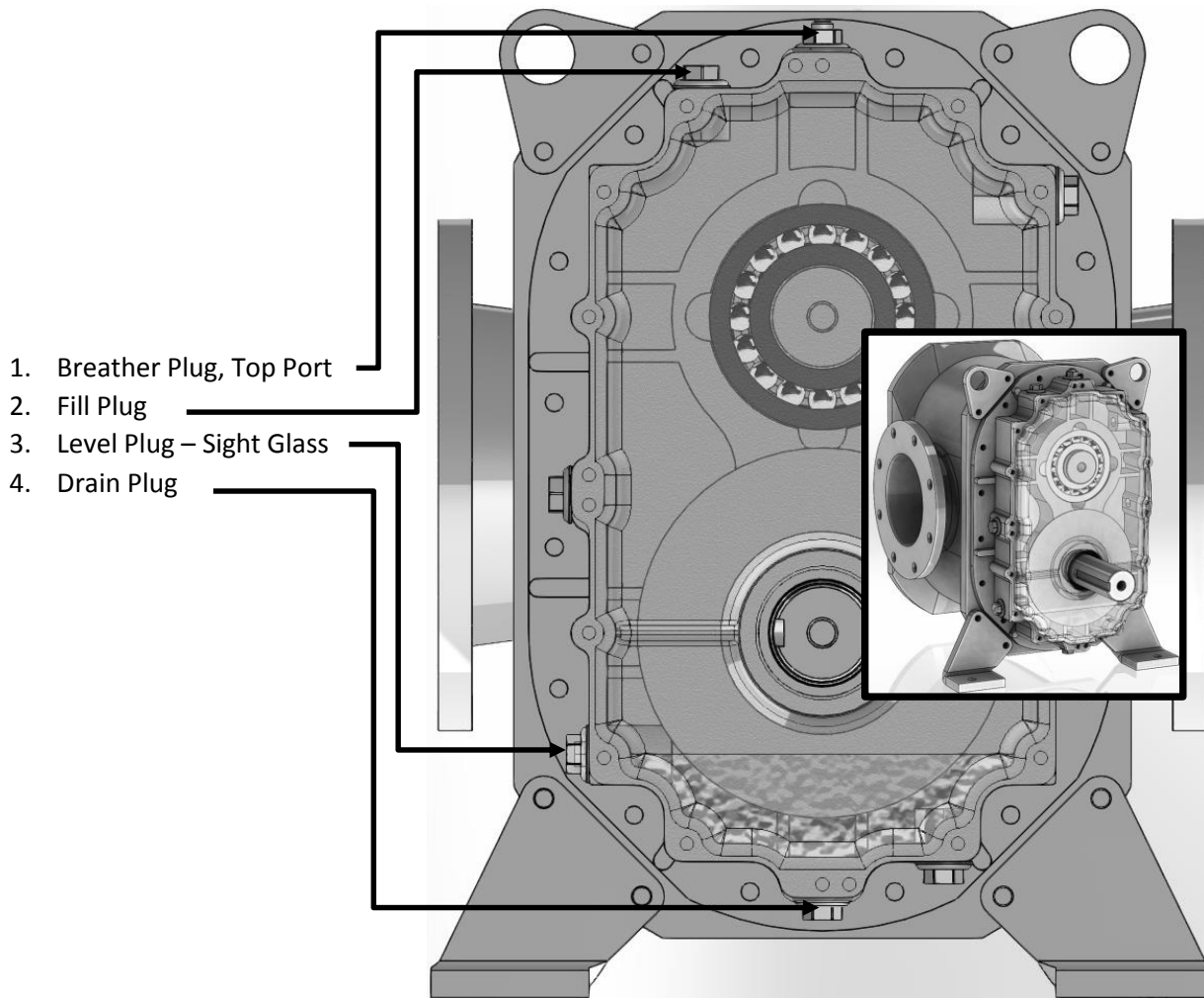
- 1.) Remove drain plug
- 2.) Allow oil to drain, checking for particulates, discoloration and fouling

Drive End Fill Procedure

- 1.) Fit drain plug
- 2.) Remove fill plug
- 3.) Slowly add oil until level with red dot in level sight glass
- 4.) If oil level exceeds the red dot level, loosen the drain plug and allow a small amount of oil to drain
- 5.) Fit drain and fill plug

HR Oil-Oil Drive End Horizontal Flow

Below is shown a simplified version of the Drive End of an Oil-Oil type HR Series Blower.



Drive End Drain Procedure

- 1.) Remove drain plug
- 2.) Allow oil to drain, checking for particulates, discoloration and fouling

Drive End Fill Procedure

- 1.) Fit drain plug
- 2.) Remove fill plug
- 3.) Slowly add oil until level with red dot in level port sight glass
- 4.) If oil level exceeds the red dot level, loosen the drain plug and allow a small amount of oil to drain
- 5.) Fit drain and fill plug