

**INSTRUCTION MANUAL
FOR
SCREW TYPE DRY VACUUM PUMP
(UDS Series)**

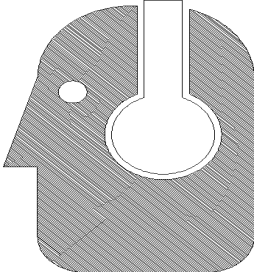
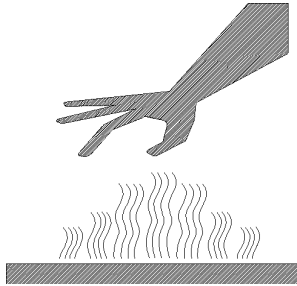
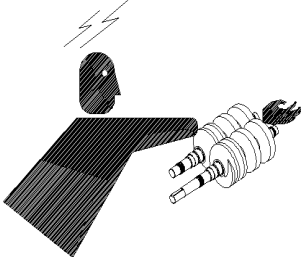
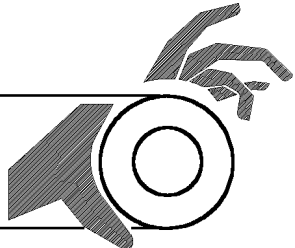


U.S. VACUUM PUMPS LLC

Rev. Sep. 2013

SAFETY INSTRUCTIONS

1. Do not operate before reading the enclosed instruction manual.
2. Use adequate protection warning and safety equipment necessary to protect against hazards involved in installation and operation of this equipment.

WARNING CAUTION	ON	WARNING	WARNING
			
Hearing Protection Required	Do not touch hot surfaces	Keep body and clothing away from machine openings	Do not operate without guards in place

NOTICE

The above safety instruction tags were attached to your unit prior to shipment. Do not remove, paint-over, or obscure in any manner.

Failure to heed these warnings could result in serious bodily injury to the personnel operating and maintaining this equipment.

SAFETY

1. Avoid excessive weight due to the pipings flanged to the pumps.
2. Do not operate the pump without coupling guard. Also, the starting with a wrong rotating direction could damage the pump.
3. Never operate the pump with suction side open to air.
4. Do not carry any maintenance while the pump is connected to the motor.

Table of Contents

ORDER	PAGE
1. GENERAL CONSTRUCTION	
1.1 GENERAL	4
1.2 CONSTRUCTION	4
1.3 SPECIFICATION	5
1.4 PIPING PROGRAM	6
1.5 PURGES	6
2. HANDLING PROCEDURE	
2.1 ASSEMBLY OF PIPING	8
2.2 PIPING WORK	8
2.3 LINKAGE	9
2.4 PREPARATION FOR OPERATION	9
2.5 OPERATION	9
2.6 STOPPING	10
2.7 LUBRICATION	10
3. MAINTENANCE AND INSPECTION	
3.1 GENERAL	11
3.2 PERIODICAL INSPECTION	11
3.3 GUARANTEE	19
4. TROUBLE SHOOTING	20
5. VACUUM SYSTEM CHECK LIST	21
6. SPARE PARTS	22
7. PARTS ASSEMBLY DRAWING	

PREFACE

This INSTRUCTION MANUAL describes instructions and precautions to be observed in handling and maintenance of UDS SCREW TYPE DRY VACUUM PUMP. It is strongly recommended that those who wish to operate or maintenance UDS DRY VACUUM PUMP to read this manual carefully before operation for proper operation, maintenance and long pump life.

1. GENERAL CONSTRUCTION

1.1 General

This Dry Vacuum pump discharge the inhaled gas under pressure by use of two screw rotors, having a profile comprising plurality of curves, i.e. Archimedean curve, Quimby curve and arc, which rotate smoothly with a certain clearance maintained between each other and inside wall of the casing.

The inhaled gas to be fed under pressure is smoothly pressurized against the pressure gas on the discharge side. The pump is so constructed as to allow no oil to be mixed in the discharge gas. The power of motor is transmitted to the main Screw shaft through a coupling device, and further to the driven Screw shaft through a timing gear.

1.2 Construction

● Screw Shaft

The Screw shaft is made of high grade spheroidal graphite cast steel, and precision machined through numerical control by a special machine. It has a perfect dynamic balance testing after the Screw is machined.

● Timing Gear

The timing gear is the most important part of the screw vacuum pump, and it is necessary for turning the Screws with a certain clearance kept from each other. The tooth surface is heat cured, and then polished with a special high precision tooth-polishing machine for lowering of noise.

● Bearing

The bearing on fixed side is an angular contact ball bearing and that on expansion side is a roller bearing of heavy load capacity. These bearings have been selected as to stand high speed and heavy load service and to assure the accurate keeping of the clearances between gears and between Screws.

● Shaft Seal

The shaft seals consist of Triple Lip Seals & slingers on Suction side, Bellows type Mech. Seal on Discharge side. These Seals prevent oil from Front End Plate to inside of Casing. Front End Cover side of drive shaft is sealed by an Oil seal.

● Oil Level Gauge

Oil Level Gauge is located at Front End Cover. Oil should be supplied to the top level of Red mark. If the oil level is too low, Gear, Bearing and Mechanical Seal will be damaged as a result of improper lubrication. So, when pump is not in use, be sure to check the oil level and contamination, and then, refill or change the oil when needed. The oil is splashed over by rotation of timing gear and lubricates bearings and Mechanical seals.

1.3 Specification

Model		UDS - 75VP	USD - 18VP	UDS - 25VP	UDS - 500VP
Displacement(50Hz/60Hz)	m3/hr	110/130	250/300	330/400	660/800
	CFM	64.7 / 76.5	147.1 / 176.5	194.2 / 235.4	388.5 / 470.8
	ℓ/min	1833 / 2167	4167 / 5000	5500 / 6667	11000 / 13333
Ultimate pressure					
without Gas Ballast	Torr	0.03 / 0.01	0.01 / 0.0075	0.01 / 0.0075	0.01 / 0.0075
	mbar	0.04 / 0.013	0.013 / 0.01	0.013 / 0.01	0.013 / 0.01
	Pa	4.0 / 1.33	1.33 / 1.0	1.33 / 1.0	1.33 / 1.0
with Gas Ballast	Torr	0.1 / 0.03	0.05 / 0.01	0.05 / 0.01	0.05 / 0.01
	mbar	0.133 / 0.4	0.067 / 0.013	0.067 / 0.013	0.067 / 0.013
	Pa	13.3 / 4.0	6.67 / 1.33	6.67 / 1.33	6.67 / 1.33
Motor power(50Hz/60Hz)					
Power Requirement	kW	3.7	7.5	11	15
Power Consumption	kW	1.8/3.0	5.0/6.0	7.0/8.6	10.2/12.8
Rotation(50Hz/60Hz)	rpm	2,900/3,500	2,900/3,500	2,900/3,500	2,900/3,500
Process Connection					
Inlet Connection	JIS(ANSI)	40A(1 ½")	50A(2")	65A(2 ½")	100A(4")
Outlet Connection	JIS(ANSI)	40A(1 ½")	40A(1 ½")	50A(2")	65A(2 ½")
Cooling water					
Max. Supply Pressure	Barg	7	7	7	7
Pressure Drop	Bar	1.0	1.0	1.0	1.0
Flow Rate	Liter/min	5~10	10~15	10~15	15~20
Lubricant					
Gear Oil Type		Shell T-46	Shell T-46	Shell T-46	Shell T-46
Gear Oil Capacity	Liter	1	1	1.2	2
Bearing Grease Type		Mobil 1	Mobil 1	Mobil 1	Mobil 1
Grease Capacity	gram	25 x 2 = 50	35 x 2 = 70	40 x 2 = 80	65 x 2 = 130
Seal Type					
Suction(Rear)		Triple Lip Seal			
Discharge(Front)		Lip Seal & Mechanical Seal			
Seal Purge Gas					
Supply Pressure	Barg	0.5~1	0.5~1	0.5~1	0.5~1
Flow Rate	Liter/min	5~15	5~15	5~20	5~20
Weight(Bare Shaft)	kg	190	290	370	580

Note (1) Above listed amount of oil is only for reference, and surplus is available.

It should be noted that fluorine and mineral type of oil are available. For shipping, we supply pure gear oil.

(2) Above listed amount of Cooling Water is based on water temperature 20°C. So, the amount of water be vary when using After Cooler. Please check with Vendor's approved drawing.

1.4 PURGES

● Sealing Purge

This sealing purge is optional. If necessary such as explosive gases, high corrosive gases or customer required this purge is performed during the operation and intended to pressurize the front end cover with Inert gas like N₂ so that the process gas or fluid can not enter into the timing gear set and bearings. You can use either one of two plugs provided on the top of Front End Cover for this sealing purge connection.

The purge pressure is 0.5 ~ 1.5 Kg/cm²G and the leak rate for our Mech. seal is bellow 3cc/Hr. Also our Mech. seal can seal pressure up to 3Kg/cm²G.

● Cleanin g Purge

This purge is required to clean inside the pump before stopping the pump.

Before stop the pump, purge N₂ gas, steam or cleaning agent for 20 to 30 minutes after closing the main valve on suction side to clean sticky process materials or process gases. This purge is especially important when pumping corrosive / toxic gases or sticky materials like resin and etc.

● Pump Steam Flushing

After each process, run the pump for 10 ~ 20 minutes without load after close main suction V/V(Dry run, Cleaning purge). This is to remove & clean process gases / condensed vapors from the pump which are build up inside the pump during the process. These process materials build up inside the pump can be reason of pump overload when restart the pump for next process.

Also, when restart the pump after a certain period later, these process materials can cause pump seizure or overload on the pump.

In this case, flush steam inside the pump & Screws with following procedure instead of rotating the pump with force.

* Steam Flushing Method(after pump operation)

(1) Process materials that require Steam flushing : Oligomer, Monomer, Polymer, Resin, etc.

(2) Steam pressure : approx. 1 Kg/cm²G

(3) Flushing Procedure

- ① Close Suction V/V, Open discharge V/V or Silencer / Separator's Drain V/V
- ② Inject Steam for 1 ~ 10 minutes(the injecting time varies with process material) through pump suction line or through a plug in suction flange
- ③ Try to rotate shaft(Pully or Coupling) with hand to see whether the pump rotate smoothly or not(**This time, be careful not to start the motor**)
- ④ If the pump move smoothly, stop injecting steam.

Then, start motor and check the pump run normal or not.

(4) If not satisfied with above procedures, repeat the procedures 2 ~ 3 times more.

2. HANDLING PROCEDURE

2.1 Assembly of Piping

● Location

- (1) Mount the Pump on a clean, flat & level surface of sufficient rigidity. If it should be installed outdoor, check motor, V-Belt and other parts are for outdoor service.
- (2) There should be enough space for maintenance like disassembly, reassembly and periodical inspection, etc.

● Foundation

- (1) The foundation concrete should have an adequate pressure bearing area, in consideration of the weight of the pump and a withstanding pressure of the soil, because it could be subsided or inclined if the soil is weak. The mix ratio of the concrete is 1-cement, 2-sand and 4-gravel.
- (2) In order to embed anchor bolts in the concrete, the foundation must have holes of good size, and its surface should be as even as possible.
- (3) Upon confirmation that the concrete has been hardened, proceed with assembly of piping.

● Installation

- (1) Mount the pump horizontally and center it.
- (2) Place the pump on the foundation, and support the base frame equally by inserting a choke liner between the pump and the foundation surface so that the bed will be made horizontal and also a space for grouting the cement mortar is obtained between the foundation surface and the bed.
- (3) Put anchor bolts in place on the bed preliminarily, set nuts on the full head of bolts, and leave them pendulous in the bolt holes.
At this time, if the bed is supported locally, it could be deformed, notwithstanding its strength. Choke liners stricken here and they will help support it properly.
- (4) Assure the level by using a level meter: Check the levelness on the machined surface.
The levelness should be limited to 0.5mm in any one meter.
- (5) Grout the cement mortar made up from 1-cement and 2-sand in the space under the bed and in anchor bolt holes, and keep for few days. Upon hardening of the mortar, tighten the nuts for anchor bolts.
At this time, take care not to tighten them one sidedly.

2.2 Piping Work

● Main Piping

- (1) Clean inside of suction and discharge pipe to be free from rust, dust and foreign matters, and place a strainer of 40 mesh on or over suction side (All the pumps shipped from our shop are equipped with this mesh filters at suction port).
- (2) It is advisable to install expansion joint on the suction side as well as the discharge side of the pump. Also, provide supports for piping so that no excessive load to be imposed on the pump.
- (3) In case, Silencer is provided on discharge side, install it as near opening as possible.
- (4) Be sure to install a Non-return Valve adjacent to the suction or discharge opening so that the pump will not turn reversely. If installation of the Non-return Valve is a problem for service of the pump, install a gate valve instead, and assure to shut off prior to stopping the pump.
- (5) In case, the risk of condensate gas being collected on the pump discharge pipe, set a recovery tank under the pump, and then the condensate gas and water will be collected during operation and be discharged by opening of drain valve.
- (6) Drain receiver should be installed under the drain valve to collect those discharged.

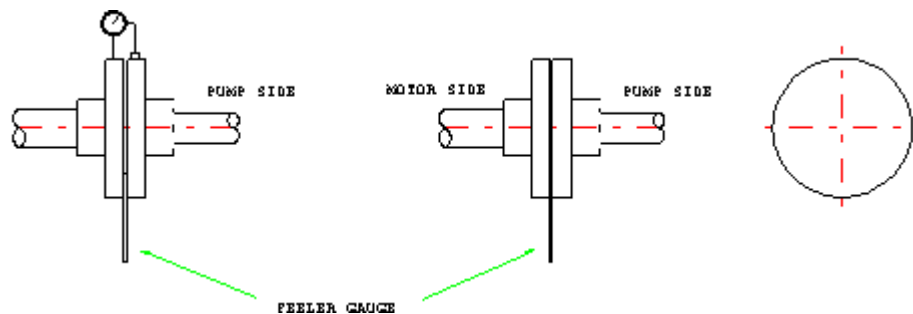
● Cooling water piping

For VPS Screw type Dry Vacuum pumps(P Series), cooling water piping is required to cool Front End Cover, Front End Plate & Casing. This piping should be assembled with reference to the piping diagram and the outline drawing as otherwise supplied.

* If Water Jacket type Silencer or After Cooler is installed, this Silencer / After Cooler also require Cooling water piping.

2.3 Linkage

● Coupling Drive



Align coupling by using Dial Gauge. The concentricity should be as follows.

Class of Motor	On Side of Coupling	Class of Motor	At End of Coupling
M180 (ML5-180L) and Under	Less than 0.05	M132M (ML5-132M) and Under	Less than 0.1
M200M (ML5-200M) and Above	Less than 0.08	M160M (ML5-160M) and Above	Less than 0.18

2.4 Preparation for Operation

- (1) Remove dust from Vacuum pump and Piping.
- (2) Check all suction and discharge connections are properly tightened and all the piping properly supported. Also check cooling water piping, too.
- (3) Clean the pipings thoroughly not to permit welding slags and chips be left inside.
- (4) Supply oil upto the red point of the oil gauge. If oil runs short, gear and bearing can seize, and if oil is too much, the temperature will rise excessively, and can be cause of gear noise or some effect on other parts. So, keep the oil level be on the top of red point always.
- (5) Let cooling water flow as specified in 1.3 chart.

2.5 Operation

- (1) Open suction V/V, and turn on the power under no load condition to check rotating direction. At this time, start up instantly.
- (2) Run the pump under no load condition for 20-30 minutes to check any abnormal vibration or heat. In case of any abnormality, stop operation and search for the cause. In most case, the cause is improper installation or failure of centering. Some times, it may be improper lubrication.

- (3) Run the pump for 2 - 3 hours under normal load condition and check the temperature and vibration of each parts.
- (4) During operation, pay attention to indication of Ampere Meter. If any abnormality found, stop the pump immediately and check the cause. Often, the cause is interference between Screw or between the periphery of Screw and the inner surface of casing. All pumps we supplied are passed break in operation. However, full care will be still necessary after the pump is disassembled and reassembled at site.

*** Caution during Operation ***

- (1) Insure incoming gas temperature does not exceed 110F or pump seizing can occur
- (2) Do not operate the pump *continuously* above 130mmHg (Torr) or over heating can occur
- (3) Check temperature of bearing & lubricant and indication of Ampere Meter & cooling water regularly.
- (4) Keep operation within designated specifications.

2.6 Stopping

- (1) Shut off suction side main V/V.
- (2) If any corrosive gas has been inhaled, introduce the atmosphere from suction side for 20-30 minutes before stopping to clean inside of pump.
- (3) Stop the pump by turning off the motor.
- (4) Shut off cooling water.

If freezing is anticipated, discharge water by opening of Drain Valves.

2.7 Lubrication

Lubricants to be used must be good and high-grade petroleum products containing oxidation inhibitor, rust preventive, extreme-pressure additive, etc. (Do not use any lubricant which contains any element of water, sulfate resin or tar.)

Turbine oil (ISO 46) readily obtainable in the market will generally satisfy these requirements.

The following brands are recommended for use as lubricants for gear and bearing.

- Lubricant : Shell, Turbo T 46
Regal, R & O 46
BP, Energol THHT 46 / THB46
Mobil, DTE oil medium or, equivalent.
 - Special application : Fomblin, 25/6

- Grease : Mobil 1
Exmo 101
G 40M (SHINETSU)
JFE 552 (KLUBER)
Arcanol L74V (FAG)
 - Special application : RT-15 (Fomblin)
Barrierta L55/2 (KLUBER)

3. MAINTENANCE AND INSPECTION

3.1 General

- (1) During operation, the temperature will rise corresponding to the compression ratio due to compression heat. However, if the temperature rise is local and the outside coating scorched, it is abnormal. It may be because of the improper Cooling water supply or Cooling water cut-off, interference of Screw with casing or the pump has sucked in some foreign material. Therefore, stop the operation immediately to check the condition.
In some case, the Screws and the casings might have corroded through a long time operation, which will make the clearance between these parts larger and return discharge gas to suction side in large quantities, the pumping capacity of the pump becomes decrease than it was initially planned as a result. In such cases, the air quantity will be decreased in due course. Then, stop the pump and take measurements of the clearances for any consideration of corrective action to take.
- (2) Abnormalities can be noted immediately by making routine checks on bearing temperature, vibration or noise. Therefore, utmost care should be necessary for daily inspection.
- (3) Interference between Screws or between Screw and casing can be noted by listening to any sound through stethoscope applied against the casing. So, make checks from time to time.
- (4) In winter, in cold regions, whenever the pump is stopped, let cooling water drained. Freezing of water could damage the jacket.

3.2 Periodical Inspection

● Daily

- ① Oil-Level Gauge : Excess or short lubricant can damage gears and bearings.
- ② Check that the amount of cooling water is adequate.
- ③ Check the temperatures of Grease cover and Front End Cover.
Use of a suitable thermometer or a surface thermometer will be convenient.
- ④ Check the suction and discharge pressures. To check these pressures, make sure that the operation of the pump is within plan specifications.
- ⑤ Check a load on the motor.
Be noted that an increase in the motor load indicates some kind of abnormality.

● Monthly

- ① Check tension of V-belt.
- ② Check lubricant color. (If, Oil color is dark, replace lubricant).
- ③ Check Oil level. If Oil disappear severely, check Mech. Seal.

● Quarterly

Check Cooling water flow & color. If something wrong, clean water jackets and water piping.
Check grease in the Rear End Cover. Refill grease, if necessary.

● Every 6 Months

- ① Check pipe supports for the pump.
- ② Replace lubricant in the Front End Cover.
- ③ Replace grease in the Rear End Cover.

● Yearly

- ① Check Mech. seals
- ② Check inner surface of Screws and casings.
Disassemble the piping on suction side to check the inner surface of Screws and casings.
- ③ Check the gears - Remove the Front End Cover to check the gear.

SCREW VACUUM PUMP MAINTENANCE AND CHECK LIST

No.	Item	Check Point	Daily	Monthly	3~6 Month	Yearly
1	Ampere of Motor	Any Change? Ampere as specified?	☺			
2	Rotation	Is rotation smooth and correct?	☺			
3	Suction and Discharge Pressure	Are those pressures as specified?	☺			
4	Noise and Vibration	Any abnormal sound or vibration?	☺			
5	Temperature	Any excessive oil temperature rise on Bearing and other parts?	☺			
6	Oil amount of Front End cover	Is Oil at proper level?	☺			
7	Water contamination on Front End cover	Clean or not ?	☺			
8	Oil Leak	Oil not leaked?	☺			
9	Lubricant Replacement	All Oil & Grease in Front end cover & Grease cover to be replaced.			☺	
10	Amount and pressure of Cooling Water for Pump Casing	The amount as specified? The pressure not too high?	☺			
11	Suction and Discharge pipe	Is there any Scale?			☺	
12	Cleaning and Dry run at stop	Before stopping the pump after each batch, close the main V/V on suction and run for 20~30min. while purging N ₂ or air.				
13	Check Inside of Casing and Screw	Any rust or flaw found?				☺
14	Mech. seal, Lip Seal, Oil Seal, Bearing, O-ring, Slip Sleeve, Speedi Sleeve, Packing, V-Belt/Coupling,	Replace when need.				☺

3.3 Guarantee

- (1) The Guarantee period is one(1) year after delivery, provided that any trouble to be covered under this guarantee clause is arisen from defective material, workmanship or shop assembly which should be attributable to the vendor.
- (2) Should any trouble attributable to the vendor occur, the above guarantee period will be extended by the time required for the resolution or elimination of such trouble of defect.
- (3) The guarantee under this clause shall be exempted in the following cases.
 - ① Troubles resulting from any cause beyond the control of the vendor, including natural Disasters or Fires.
 - ② Troubles due to operation outside of design parameters, e.g. high temperature gases.
 - ③ Troubles related to any modification done without approval of the vendor.
 - ④ Troubles resulting from mis-operation(in the opinion of the vendor's service engineer).
 - ⑤ Troubles due to improper maintenance
 - ⑥ The performance of this Dry vacuum pump could be down in a short time, depending upon the nature or amount of gas or dust inhaled.

Especially, routine maintenance checks specified in the instruction manual are very important in case the service condition is severe.

Even with proper maintenance and checks, an overhaul may become still necessary at certain intervals, i.e. every 3months or 6 months. (with user's cost). Special considerations are required for certain services such as Semiconductor processes or chemical industries in which handles corrosive / toxic gas, or solids can be inhaled.

4. TROUBLE SHOOTING

PROBLEM	CAUSE	SOLUTION
Insufficient Air quantity	<ul style="list-style-type: none"> · Filter is clogged · Too much Clearance 	<ul style="list-style-type: none"> · Clean or Change FILTER · Check Clearance
Overload on Electric Motor	<ul style="list-style-type: none"> · Filter is clogged · Foreign matter are caught in. · Pressure loss in Piping is increased (increase in Suction pressure) · Interference between Screws. · Interference between Screw and Casing · Discharge line is clogged 	<ul style="list-style-type: none"> · Clean or Change Filter · Adjust or Replace the Screw and Casing · Check the pressure difference between Inlet and Outlet · Adjust improper Screw clearance. · Adjust Timing Gear · Make the Side Clearance larger / Make the clearance between Screw & Casing larger. · Drain & clean Discharge line
Overheat	<ul style="list-style-type: none"> · Excessive lubricant in Front End Cover · Vacuum Pump inlet temperature high · Too much Compression ratio · Interference between Screw and Casing · Problem with Cooling water flow 	<ul style="list-style-type: none"> · Check Oil level · Check suction & discharge pressure · Search for the cause of interference · Clean Cooling water line
Knocking	<ul style="list-style-type: none"> · Interrelated position between Timing Gear and Screw is incorrect · Improper assembly · Abnormal rise in pressure · Damage on gear due to overload or improper lubrication 	<ul style="list-style-type: none"> · Reposition · Reassemble · Search for the cause · Replace Timing Gear
Bearing or Gear damaged /Shaft broken	<ul style="list-style-type: none"> · Improper lubricant · Lubricant runs short · Overload 	<ul style="list-style-type: none"> · Change lubricant · Refill lubricant · Replace the Shaft

* If the troubles are not resolved by the above-mentioned actions, the cause may possibly be located in Pump operation condition. In such case, please contact us with the following information.

1. Model Name & Number, Serial Number, Application, etc.
2. Information of Piping (Valves, Strainer, Number of Bends, etc.)

5. VACUUM SYSTEM CHECK LIST

	CHECK POINT	CHECK
Before Operation	Open Cooling water supply valve. Is it flow properly ?	
	Close Vacuum suction line	
	Open Discharge line	
	Check lubricant color and level. Is it acceptable ?	
	Check Belt Tension(for V-belt type only)	
	Run Vacuum pump for few minute before open the Suction line	
During Operation	Check Vacuum level in full vacuum. Is it normal ?	
	Check Electric condition(Voltage & Amperage) in full vacuum. Is it acceptable ?	
	Any abnormal noise ?	
	Check operation temperature. Is it normal ?	
	Check lubricant color and level. Is it acceptable ?	
Stopping	Run Vacuum pump for few minute after closing Suction line	
	If foreign material is introduced inside of Vacuum pump, clean it with cleaning agent.	
	Discharge cooling water from vacuum pump if the pump is stopped for long time	
	Make sure that Suction & Discharge line is closed	
	Make sure Power supply is cut off	

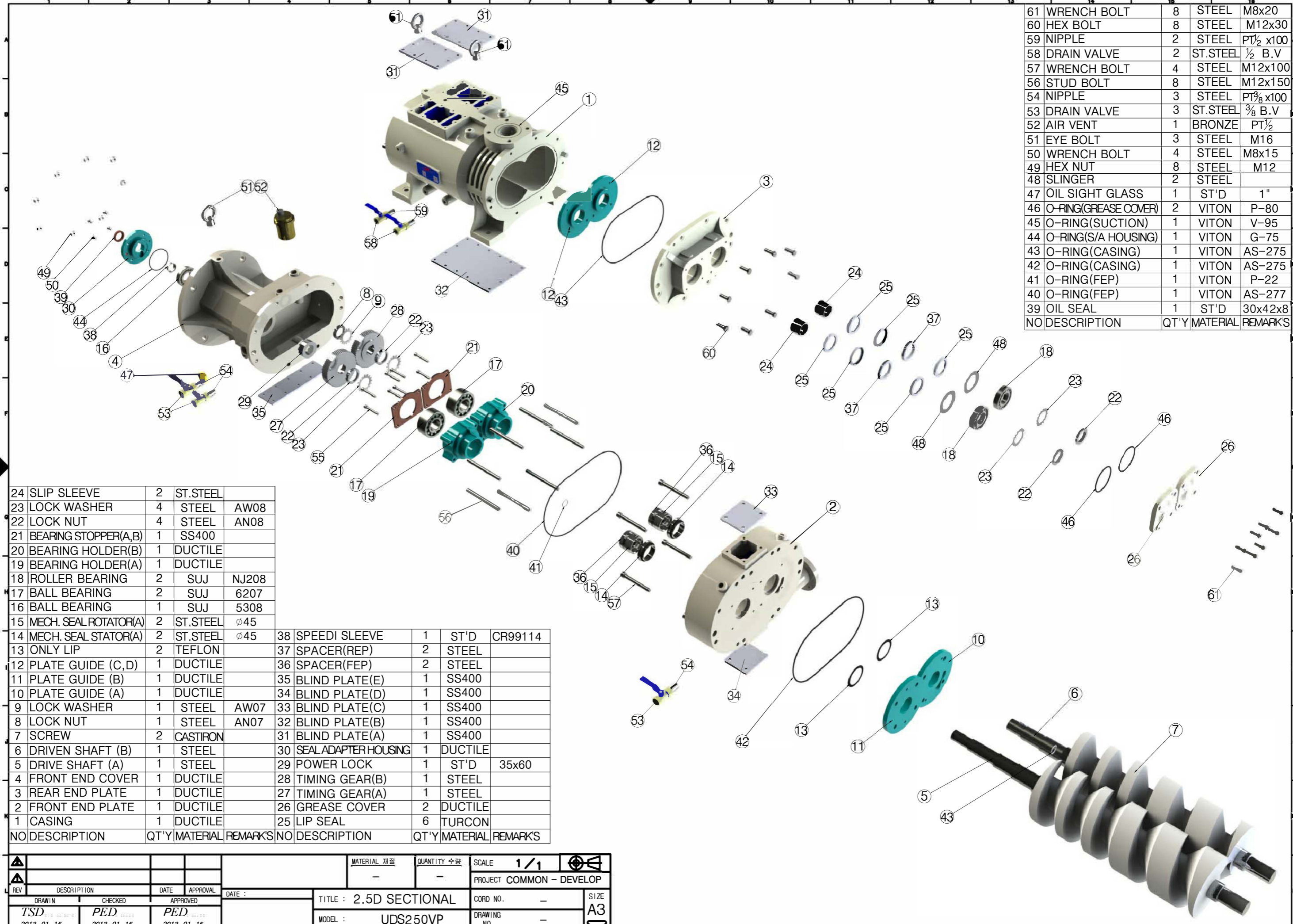
6. SPARE PARTS LIST

The following lists are recommended spare parts for normal overhaul and include all seals, bearings and other miscellaneous parts, which are not normally reusable after disassembly.
They may be ordered as a "kit" by Repair Kit number or by individual part number.

(Unit : each)

Model Description	Quantity	
	UDS 180, 250, 500	UDS-75
Only Lip	2	-
Lip Seal	4	4
Speedi sleeve	1	1
Mechanical seal	2	2
Oil seal	1	1
single ball bearing	1	1
Angular contact ball bearing	2	2
Roller ball bearing	2	2
Slip sleeve	2	2
O-ring	1	1
O-ring	1	1
O-ring	1	1
O-ring	1	1
O-ring	1	1
O-ring	1	-
O-ring	1	-
Oil site glass	PF 1"	PF 3/8

* Timing Gears are not included in the repair kit and must be ordered separately.



61	WRENCH BOLT	8	STEEL	M8x20
60	HEX BOLT	8	STEEL	M12x30
59	NIPPLE	2	STEEL	PT $\frac{1}{2}$ x100
58	DRAIN VALVE	2	ST.STEEL	$\frac{1}{2}$ B.V
57	WRENCH BOLT	4	STEEL	M12x100
56	STUD BOLT	8	STEEL	M12x150
54	NIPPLE	3	STEEL	PT $\frac{3}{8}$ x100
53	DRAIN VALVE	3	ST.STEEL	$\frac{3}{8}$ B.V
52	AIR VENT	1	BRONZE	PT $\frac{1}{2}$
51	EYE BOLT	3	STEEL	M16
50	WRENCH BOLT	4	STEEL	M8x15
49	HEX NUT	8	STEEL	M12
48	SLINGER	2	STEEL	
47	OIL SIGHT GLASS	1	ST'D	1"
46	O-RING(GREASE COVER)	2	VITON	P-80
45	O-RING(SUCTION)	1	VITON	V-95
44	O-RING(S/A HOUSING)	1	VITON	G-75
43	O-RING(CASING)	1	VITON	AS-275
42	O-RING(CASING)	1	VITON	AS-275
41	O-RING(FEP)	1	VITON	P-22
40	O-RING(FEP)	1	VITON	AS-277
39	OIL SEAL	1	ST'D	30x42x8
NO	DESCRIPTION	QT'Y	MATERIAL	REMARKS

24	SLIP SLEEVE	2	ST.STEEL	
23	LOCK WASHER	4	STEEL	AW08
22	LOCK NUT	4	STEEL	AN08
21	BEARING STOPPER(A,B)	1	SS400	
20	BEARING HOLDER(B)	1	DUCTILE	
19	BEARING HOLDER(A)	1	DUCTILE	
18	ROLLER BEARING	2	SUJ	NJ208
17	BALL BEARING	2	SUJ	6207
16	BALL BEARING	1	SUJ	5308
15	MECH. SEAL ROTATOR(A)	2	ST.STEEL	ϕ 45
14	MECH. SEAL STATOR(A)	2	ST.STEEL	ϕ 45
13	ONLY LIP	2	TEFLON	
12	PLATE GUIDE (C,D)	1	DUCTILE	
11	PLATE GUIDE (B)	1	DUCTILE	
10	PLATE GUIDE (A)	1	DUCTILE	
9	LOCK WASHER	1	STEEL	AW07
8	LOCK NUT	1	STEEL	AN07
7	SCREW	2	CASTIRON	
6	DRIVEN SHAFT (B)	1	STEEL	
5	DRIVE SHAFT (A)	1	STEEL	
4	FRONT END COVER	1	DUCTILE	
3	REAR END PLATE	1	DUCTILE	
2	FRONT END PLATE	1	DUCTILE	
1	CASING	1	DUCTILE	
NO	DESCRIPTION	QT'Y	MATERIAL	REMARKS

38	SPEEDI SLEEVE	1	ST'D	CR99114
37	SPACER(REP)	2	STEEL	
36	SPACER(FEP)	2	STEEL	
35	BLIND PLATE(E)	1	SS400	
34	BLIND PLATE(D)	1	SS400	
33	BLIND PLATE(C)	1	SS400	
32	BLIND PLATE(B)	1	SS400	
31	BLIND PLATE(A)	1	SS400	
30	SEAL ADAPTER HOUSING	1	DUCTILE	
29	POWER LOCK	1	ST'D	35x60
28	TIMING GEAR(B)	1	STEEL	
27	TIMING GEAR(A)	1	STEEL	
26	GREASE COVER	2	DUCTILE	
25	LIP SEAL	6	TURCON	
NO	DESCRIPTION	QT'Y	MATERIAL	REMARKS

MATERIAL 재질		QUANTITY 수량		SCALE 1/1	PROJECT COMMON - DEVELOP	
REV	DESCRIPTION	DATE	APPROVAL	DATE	TITLE : 2.5D SECTIONAL	CORD NO. -
TSD	PED	PED			MODEL : UDS250VP	SIZE A3
2013. 01. 15	2013. 01. 15	2013. 01. 15				