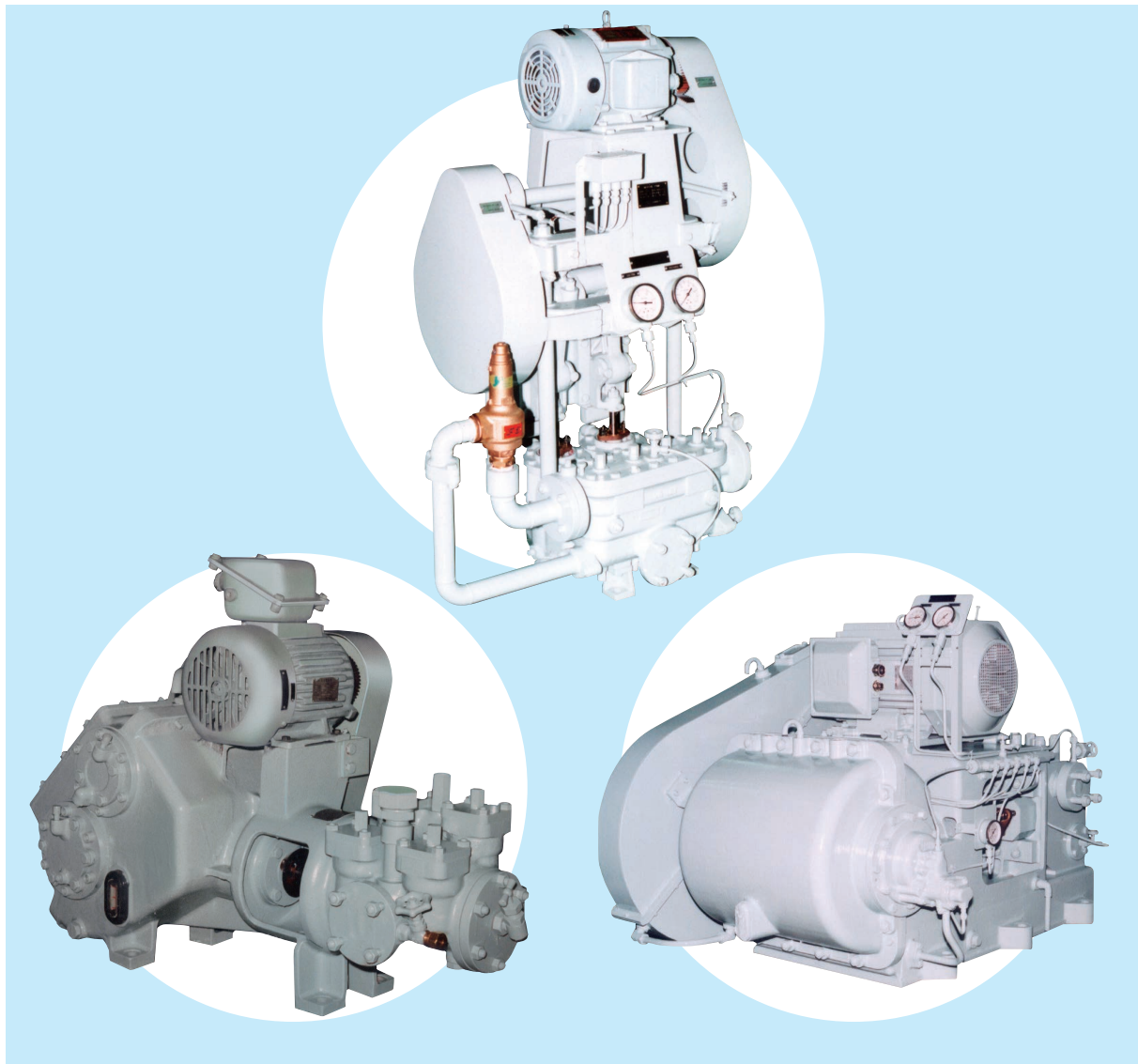


Shinko Marine Standard Motor-Driven Reciprocating Pumps



RECIPROCATING PUMPS

SHINKO IND. LTD.

Hiroshima Japan

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ENGINEERING DATA

Shinko marine motor-driven reciprocating pumps have been designed and manufactured in accordance with Marine Equipment Association's standards to provide high performance with the following operating conditions:

- Temperature : Maximum ambient temperature 50°C,
: Maximum handling liquid temperature 50°C
- List and rolling of the ship : 15 degrees horizontally, 10 degrees longitudinally, and 22.5 degrees for single-side rolling

DESIGN & FUNCTIONS

● BALL BEARINGS, ROLLER BEARINGS & LUBRICATION

The counter shaft and crank shaft are equipped with grease-lubricated self-aligning (23 type) ball bearings or roller bearings with a life-span of more than 60000 hours. They are equipped with a grease inlet and outlet as well as a grease nipple and relief nipple respectively. For the HPL pumps, sealed ball bearings (63 type) are used. For the HLX pumps, oil-lubricated roller bearings have been installed on the crank shaft. In the shop tests, consideration has been given so that the bearing temperature does not exceed the ambient temperature by 40°C or the liquid temperature by 20°C, whichever is higher, and also not exceed a total of 75°C in summer.

Name of part	Model	Lubrication
Counter shaft	VPS	Grease
	HPL	Grease sealed
Crank shaft	VPS	Grease
	HPL	Grease sealed
	HLX	Lube oil

● LUBRICATION

Oil-lubricated crosshead pin metals and crossheads with guides are used for the sliding surfaces of the crank pin metals. Oil is applied via a drip system to each oil cup from an oil box.

For the HPL pumps, an oil-splash system from an oil bath is used.

For the HLX pumps, a forced lubrication oil system is used where lube oil is supplied to the crankpin metals, crank shaft bearings, crossheads, and other parts through the incorporated LO pump.

● REDUCTION GEARING

Double stage reduction gearing has been equipped to transmit the power from the electric motor to the crank shaft. The gear is designed with consideration to material strength, noise, and other elements.

Item Model	1st stage				2nd stage			
	Pinion	Wheel	Lubrication	Gear	Pinion	Wheel	Lubrication	Gear
VPS	Lignite	Cast iron	N/A	Spur	Lignite	Cast iron	N/A	Spur
HPL	∕	∕	∕	∕	Carbon steel	∕	Oil bath	∕

A single stage reduction system with a roller chain has been installed in the HLX pump.

● AIR CHAMBER

An air chamber can be installed on the discharge side of the pump when the pump is used for operation without pulsation. The air chamber is not equipped when the pump is used as bilge, ballast pumps, or some other applications.

● PRESSURE GAUGE AND ROOT VALVE

To indicate pump suction and discharge pressure, gauges with a 75mm diameter are located on the gauge board. They are connected by 6 mm out-diameter copper pipes with gauge root valves on the pump side and gauge joints on the gauge side.

● AIR VENT VALVE

A screw hole with an air vent valve is located on the valve box cover to vent the air.

● ESCAPE VALVE

An escape valve has been equipped which is large enough to allow the discharge pressure rise limit to remain below 150% of the total pressure, when the discharge valve is completely closed. However, when the total pressure is below 0.5MPaG, the pressure rise limit is set below +0.25MPaG over the total pressure.

● LUBRICANT

Grease is used to lubricate the ball bearings on pumps, and oil is used for other portions that require lubrication.

NLGI No.2 (National Lubricating Grease Institute) is recommended for grease, and ISO VG68 (International Standard Organization) is recommended for oil. Other suitable brands for those lubricants are shown in the following table:

NAME OF COMPANY	GREASE	LUBRICATING OIL	GEAR OIL
IDEMITSU KOSAN	DAPHNE EPONEX SR-2	DAPHNE TURBINE OIL NO.68	DAPHNE SUPER GEAR OIL 680
EXXONMOBIL	MOBILUX EP2 MOBIL GREASE XHP 222	MOBILDT E OIL HEAVY MEDIUM	MOBIL GEAR 600XP680 MOBIL SHC 636
JXTG NIPPON OIL & ENERGY	EPNOC GREASE AP2	FBK TURBINE 68	BONNOC M 680
CALTEX OIL(FAMM)	MULTIFAK EP2	REGAL R&O 68	MEROPA LUBRICANT 680
KYGNUS SEKIYU	MP GREASE 2	KYGNUS TURBINE OIL S68	—
GULF OIL	GULFSEA HYPERBAR CS2	GULFSEA TURBINE OIL 68	GULFSEA GEAR OIL 680
BP OIL	BP ENERGREASE MP-MG2	PERFECTO T68	GR-XP 680
TEXACO OIL(FAMM)	MULTIFAK EP2	REGAL R&O 68	MEROPA LUBRICANT 680
CASTROL	SPHEEROL AP2 or EPL2	PERFECTO T68	CASTROL ALPHA SP 680
COSMO OIL	COSMO GREASE DAINAMAX NO.2	COSMO TURBINE SUPER 68	COSMO GEAR SE 680
SHOWA SHELL OIL SHELL OIL	Gadus S2 V220 2 Gadus S2 V220AD 2	TURBO OIL T68	Omala S2G 680
TOTAL	CERAN XM 220	PRESLIA 68	CARTER EP 680
CHEVRON(FAMM)	MULTIFAK EP2	REGAL R&O 68	MEROPA LUBRICANT 680
AGIP	AGIP GREASE MU EP2	AGIP OTE 68	AGIP BLASIA 680
LUKOIL MARINE	RENOLIT CXI 2	RENOLIN ETERNA 68	RENOLIN CLP 680

■ CUSTOMER OPTIONS

The SHINKO standard motor-driven reciprocating pumps have been designed and manufactured in accordance with the Japanese Marine Equipment Association's Standard as well as our specifications. However, the following items are open to be decided by customers during order specification:

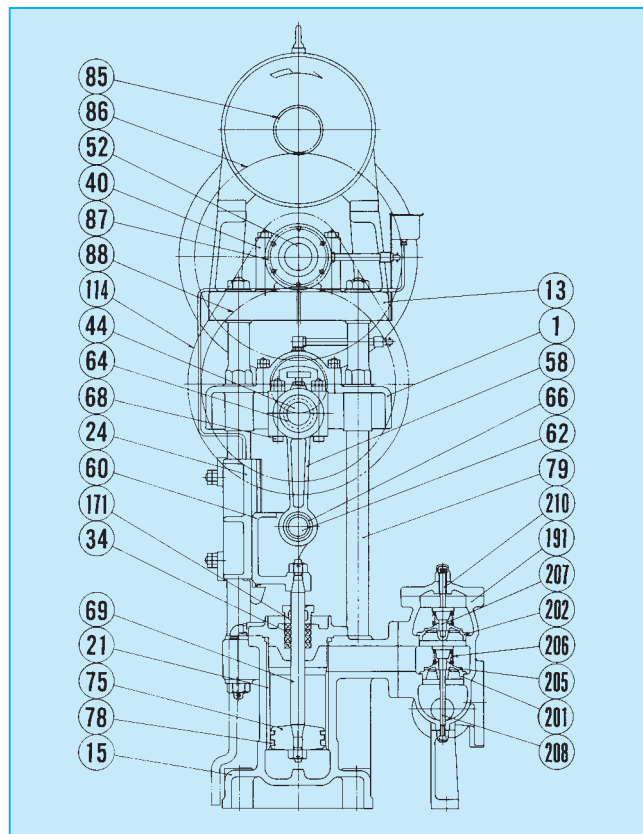
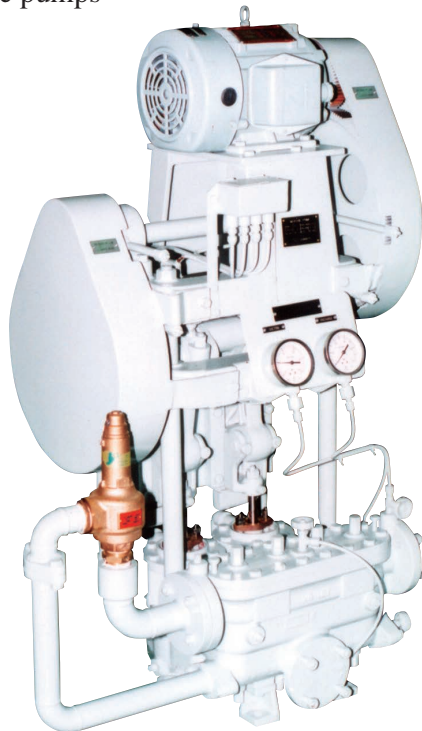
1. Pump name (the standard name available based on the SM standard)
2. Quantity
3. Specification (capacity, total head, kind & temperature of handling liquid, electric source, and frequency)
4. Type of spare parts (type 1 or type 2 based on the SM Standard)

Vertical duplex double acting MOTOR DRIVEN RECIPROCATING PUMPS

SHINKO VPS

● APPLICATIONS

Bilge pumps



● STANDARD MATERIALS

PART NO.	NAME OF PART	MATERIAL		REQ.NO. FOR 1PUMP	PART NO.	NAME OF PART	MATERIAL		REQ.NO. FOR 1PUMP
		NAME	JIS				NAME	JIS	
1	CRANK BED	CAST IRON	FC200	1	79	COLUMN	STEEL	SS400B	4
13	MOTOR BED	〃	〃	1	85	1ST STAGE PINION	LIGNITE		1
15	LIQUID CYLINDER	〃	〃	1	86	1ST STAGE WHEEL	CAST IRON	FC200	1
21	LIQUID CYLINDER LINER	STAINLESS STEEL	SCS13	2	87	2ND STAGE PINION	LIGNITE		1
24	GUIDE	CAST IRON	FC200	1	88	2ND STAGE WHEEL	CAST IRON	FC200	1
34	GLAND PACKING	SEMIMETALLIC		2SETS	114	GEAR COVER	STEEL	SS400P	2
40	BEARING HOUSING	CAST IRON	FC200	2	171	GLAND	BRONZE	CAC406	2
44	CRANK SHAFT	DUCTILE CAST IRON	FCD400	1	191	VALVE BOX	CAST IRON	FC200	1
50	BALL BEARING	SPECIAL STEEL		2	201	SUCTION VALVE SEAT	BRONZE	CAC406	4
52	COUNTER SHAFT	CARBON STEEL	S35C	1	202	DISCHARGE VALVE SEAT	〃	〃	4
57	BALL BEARING	SPECIAL STEEL		2	205	DISC VALVE	HIGH TENSION BRASS	C6782B	8
58	CONNECTING ROD	DUCTILE CAST IRON	FCD400	2SETS	206	VALVE SPRING	PHOSPHOR BRONZE	C5102W	8
60	CROSSHEAD	〃	〃	2	207	VALVE STEM	STAINLESS STEEL	SUS304	4
62	CROSSHEAD PIN	CARBON STEEL	S35C	2	208	SUC. VALVE SET SCREW STAY	〃	〃	4
64	CRANK PIN METAL	BRONZE	CAC604	2SETS	210	JACK BOLT	〃	〃	4
66	CROSSHEAD PIN METAL	〃	〃	2	241	ESCAPE VALVE BOX	BRONZE	CAC406	1
68	REAMER BOLT	STEEL	SS400B	4	243	VALVE	〃	〃	1
69	PISTON ROD	STAINLESS STEEL	SUS304	2	256	SPRING	STAINLESS STEEL	SUS304	1
75	PISTON	※	※	2					
78	PISTON RING	BAKELITE		4					

Note ※ VPS 5 STAINLESS STEEL (SUS304)
VPS 10~50 Ni-CAST IRON

● GENERAL CHARACTERISTICS

Item	Model	VPS 5	VPS 10	VPS 20	VPS 30	VPS 50
Capacity	(m ³ /h)	5	10	20	30	50
Total head	(m)	45				
Suction head	(m)	- 5				
Liquid cylinder bore	(mm)	80	100	120	125	160
Stroke length	(mm)	70	90	120	150	160
Number of double strokes (min ⁻¹)		76	76	76	76	74
Suction bore	(mm)	50	65	80	100	125
Discharge bore	(mm)	40	50	65	80	100
Ball bearings (counter shaft)		2 × 2306	2 × 2308	2 × 2309	2 × 2309	2 × 2310
Service life	(hr)	Above 60000				
Amount of grease filled	(g)	2 × 13	2 × 15	2 × 25	2 × 25	2 × 40
Ball bearings (crank shaft)		2 × 2309	2 × 2310	2 × 2310	2 × 2311	2 × 2312
Service life	(hr)	Above 60000				
Amount of grease filled	(g)	2 × 30	2 × 35	2 × 45	2 × 50	2 × 45
LO filled in oil box	(ℓ)	0.3	0.3	0.4	0.4	0.5
Weight (without motor) FC (BC) (kg)		300 (340)	420 (480)	570 (620)	700 (765)	1100 (1200)
Water filled in casing	(kg)	9	13	20	30	70

● MOTOR OUTPUT

Motor output is selected based on +25m over the total head in order to prevent the motor from overloading, even when the pump is started up with the discharged valve closed too long.

$$\text{Motor output} = \frac{Q \times (H + 25) \times 1.025}{270 \times 1.36 \times \eta} \quad \text{kW}$$

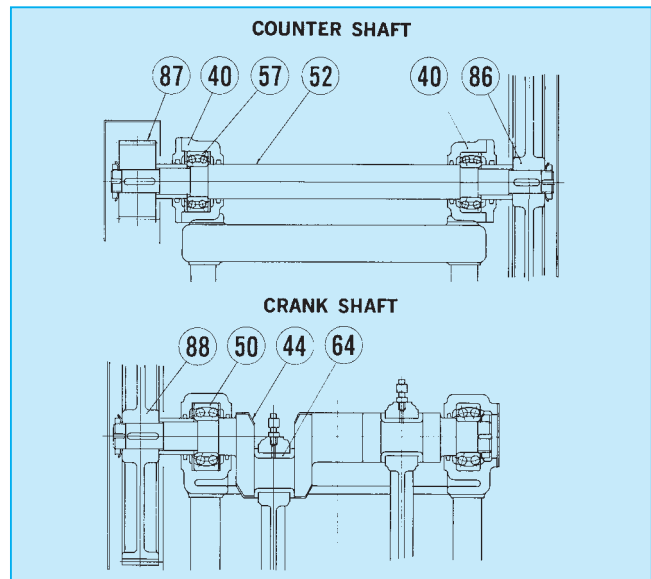
Q : Pump capacity m³ / h

H : Total head m

1.025 : Specific gravity of sea water

η : Pump efficiency %

The table below shows the output of each motor according to the total head:



Unit : m in head

Model	Capacity	Motor kW × min ⁻¹							
		1.5×1200	2.2×1200	3.7×1200	5.5×1200	7.5×1200	11×1200	11×900	15×900
VPS 5	5 m ³ /h	20~45							
VPS 10	10 m ³ /h		20~27	28~45					
VPS 20	20 m ³ /h				20~41	42~45			
VPS 30	30 m ³ /h					20~36	37~45		
VPS 50	50 m ³ /h							20~30	31~45

● PUMP EFFICIENCY

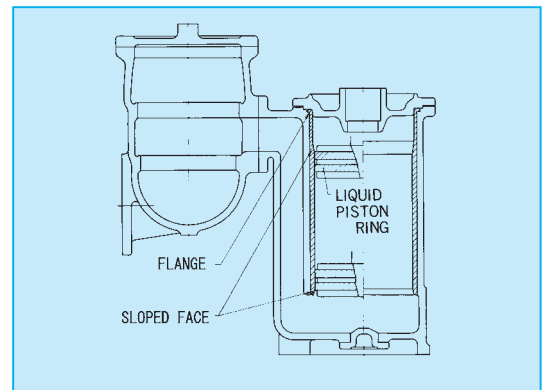
The larger the total head becomes, the higher the pump efficiency becomes, and vice versa.

The table on the right shows the average value of pump efficiency within 20~45m of total head.

Model	Cap. × TH m ³ /h m	Volumetric eff. η _v %	Pump eff. η %
VPS 5	5 × 45	85	65
VPS 10	10 × 45	87	66
VPS 20	20 × 45	90	67
VPS 30	30 × 45	92	68
VPS 50	50 × 45	93	70

● LIQUID CYLINDER & VALVE BOX

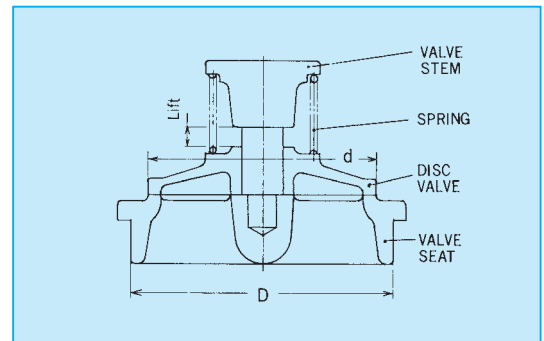
The liquid cylinder and valve box are cast separately and bolted together after being machined. The flanged liner is inserted inside the cylinder, and is topped by a cover where seat packing is placed between them. The liner has sloped faces formed on the upper and lower ends so the piston can be pulled out easily when worn down.



● PUMP VALVE

The suction and discharge pump valves with a disc are located in the valve box where these valves are secured with the bottom of the valve box and the cover.

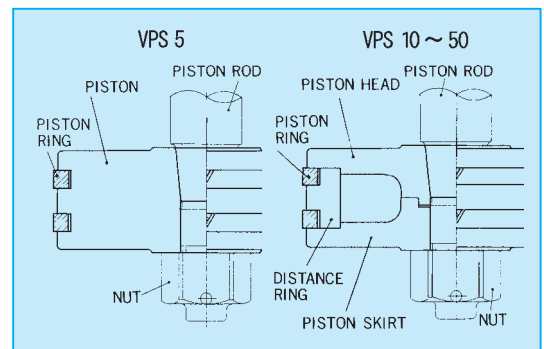
Model	D		d	No. of valve		Lift
	Suc.	Disch.		Suc.	Disch.	
	mm					
VPS 5	50	60	50	4	4	6
VPS 10	65	75	62	4	4	6
VPS 20	85	95	80	4	4	8
VPS 30	95	105	90	4	4	8
VPS 50	150	165	140	4	4	12



● LIQUID PISTON & PISTON RING

The liquid piston of the VPS5 consists of: one piston and two piston rings, and for the VPS10~50 alone: one head, one skirt, and one distance ring with two piston rings. They are attached with a piston rod and nuts.

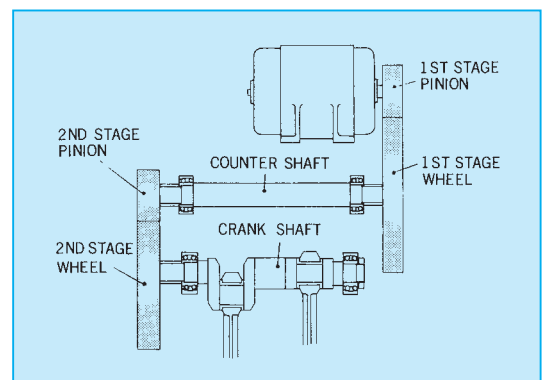
The piston rings, made of bakelite, are located at both ends to prevent leakage by means of being pushed against the cylinder wall from the liquid pressure.



● DOUBLE STAGE REDUCTION GEARING

The motor power is transmitted to the crank shaft through the double-stage reduction gearing.

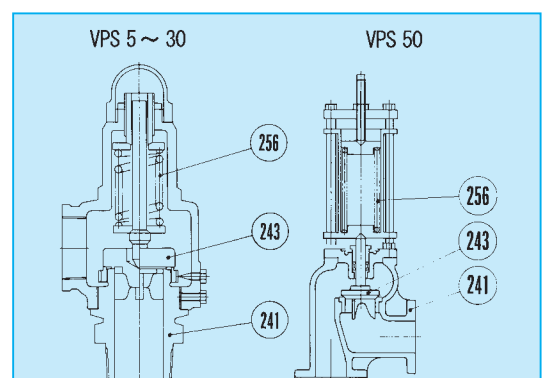
With silent and lubrication-free operation in mind, lignite has been used for both the 1st and 2nd stage pinions, and the spur gears are made of cast iron, which are shielded by the gear covers to prevent problems.



● ESCAPE VALVE

In order to prevent problems due to mishandling, an escape valve has been installed on the discharge side.

The capacity of the escape valve is chosen to allow the pressure rise limit to remain less than 0.25MPaG over the normal discharge pressure. The operating pressure can be set to 110% of the normal discharge pressure.

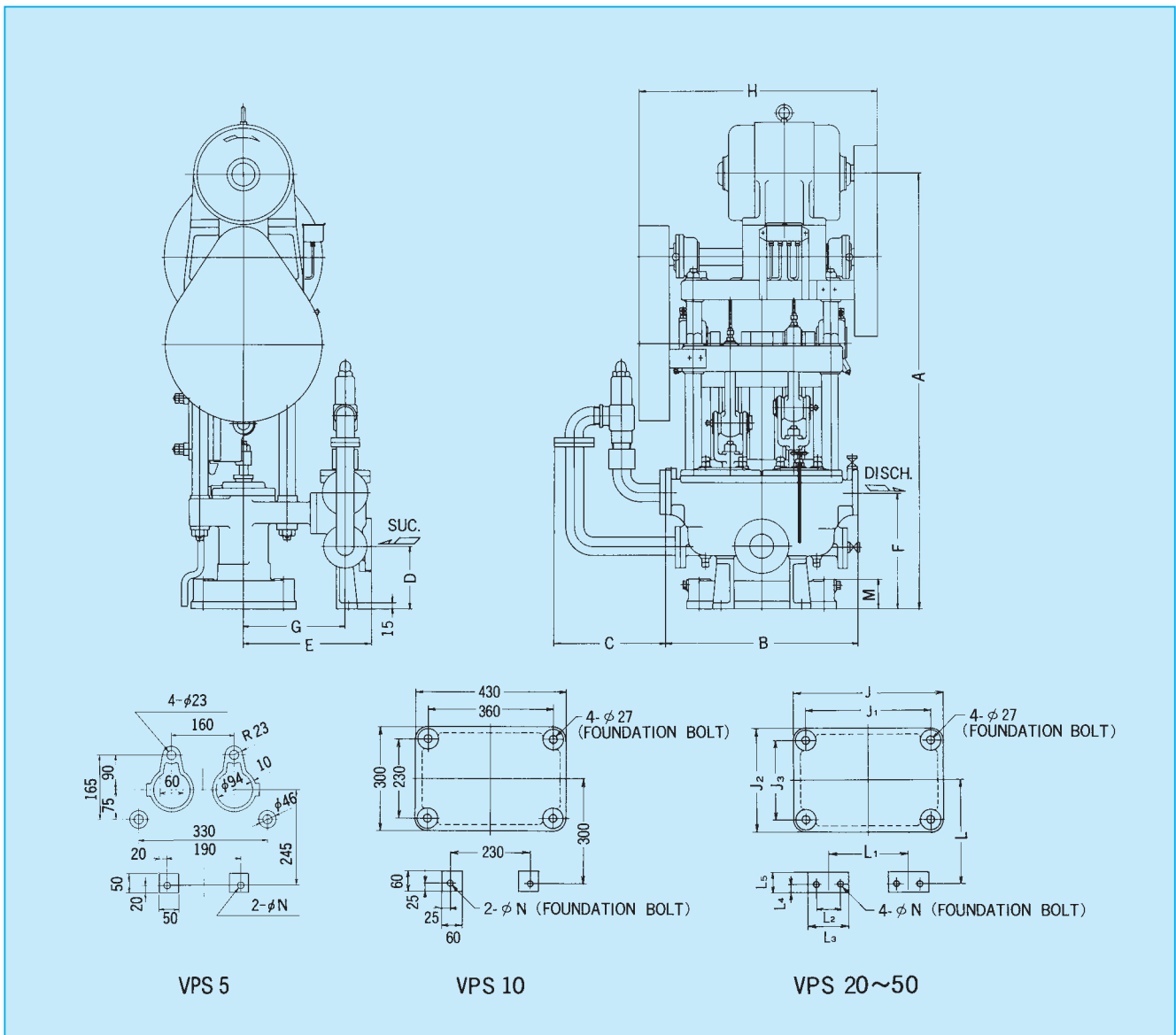


● **STANDARD ACCESSORIES [per pump]**

- Discharge pressure gauge1
- Suction compound gauge1
- Gauge board1
- Gauge root valve2
- Air vent valve.....1
- Grease nipple6
- Relief nipple4
- Oil box1
- Oil cup2
- Oil pan & bush2sets
- Drain pipe2sets

● **STANDARD SPARE PARTS [per ship]**

- Liquid piston ring1/set*
 - Complete set of suction valve1/set*
 - Complete set of discharge valve1/set*
 - Escape valve spring1/set*
 - Crank pin metal1/set*
 - Reamer bolt & nut1kit/set*
 - Crosshead pin metal.....1/set*
 - Ball bearing (counter shaft)1/set*
 - Ball bearing (crank shaft)1/set*
 - Gland packing1/set*
- (set* = all units of the same model and application)

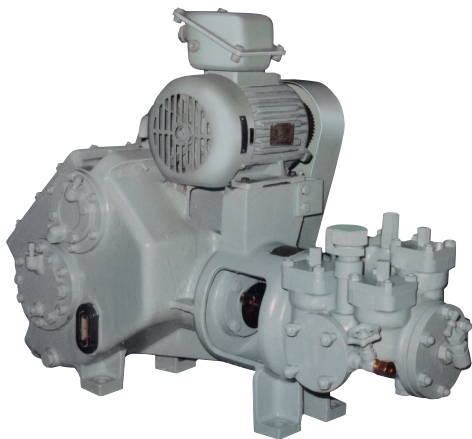


Dimensions : mm

Model	A	B	C	D	E	F	G	H	J	J ₁	J ₂	J ₃	L	L ₁	L ₂	L ₃	L ₄	L ₅	M	N
VPS 5	1059	450	280	85	300	235	235	600	—	—	—	—	—	—	—	—	—	—	35	19
VPS 10	1253	550	225	185	365	340	290	660	—	—	—	—	—	—	—	—	—	—	85	19
VPS 20	1422	650	290	220	390	390	305	730	470	400	320	250	310	250	60	100	25	57	85	19
VPS 30	1544	680	345	230	410	430	315	780	500	430	350	280	325	270	60	100	28	65	90	19
VPS 50	1650	1000	390	210	505	460	380	900	590	510	440	360	400	420	90	140	30	78	95	23

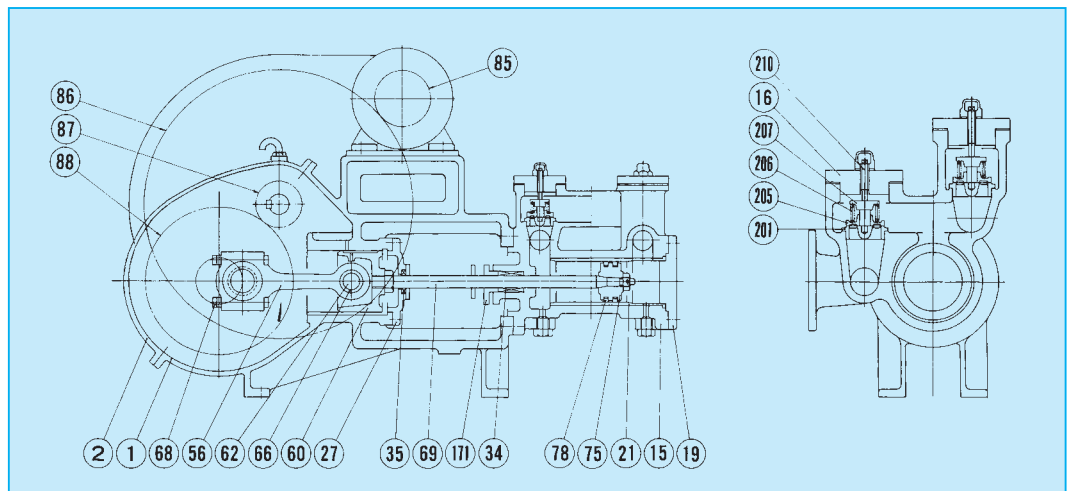
Horizontal simplex double acting MOTOR DRIVEN RECIPROCATING PUMPS

SHINKO
HPL



● APPLICATIONS

Bilge pumps

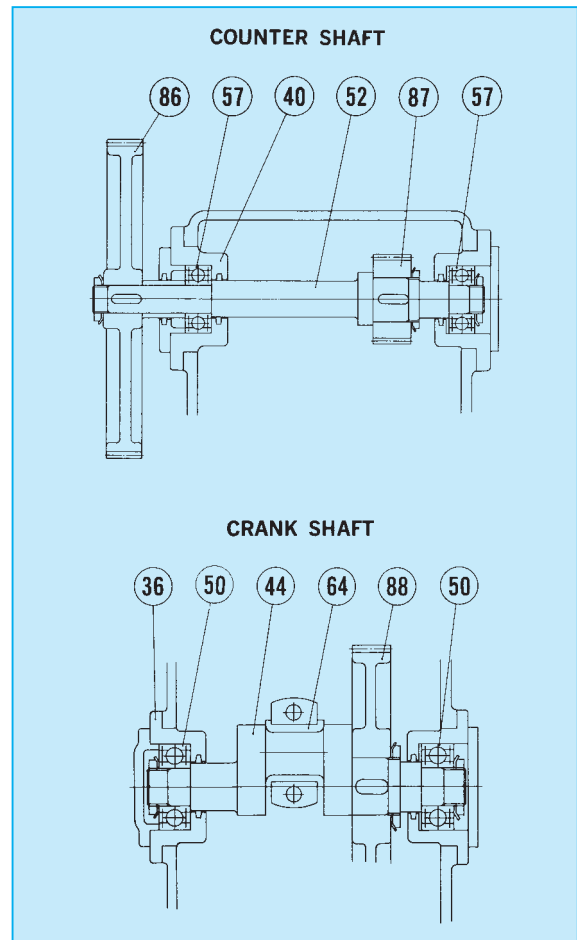


● STANDARD MATERIALS

PART NO.	NAME OF PART	MATERIAL		REQ.NO. FOR 1PUMP	PART NO.	NAME OF PART	MATERIAL		REQ.NO. FOR 1PUMP
		NAME	JIS				NAME	JIS	
1	CRANK CASE	CAST IRON	FC200	1	66	CROSSHEAD PIN METAL	BRONZE	CAC604	1
2	CRANK CASE COVER	〃	〃	1	68	REAMER BOLT	STEEL	SS400B	2
15	LIQUID CYLINDER	〃	〃	1	69	PISTON ROD	STAINLESS STEEL	SUS304	1
16	VALE BOX COVER	〃	〃	4	75	PISTON	〃	〃	1
19	LIQUID CYLINDER COVER	〃	〃	1	78	PISTON RING	BAKELITE		2
21	LIQUID CYLINDER LINER	STAINLESS STEEL	SCS13	1	85	1ST STAGE PINION	LIGNITE		1
27	CROSSHEAD COVER	CAST IRON	FC200	1	86	1ST STAGE WHEEL	CAST IRON	FC200	1
34	GLAND PACKING	SEMIMETALLIC		1SET	87	2ND STAGE PINION	CARBON STEEL	S45C	1
35	OIL SEAL	RUBBER		1	88	2ND STAGE WHEEL	CAST IRON	FC200	1
36	BEARING HOUSING	CAST IRON	FC200	2SETS	171	GLAND	BRONZE	CAC406	1
40	BEARING HOUSING	〃	〃	2SETS	201	VALVE SEAT	〃	〃	4
44	CRANK SHAFT	DUCTILE CAST IRON	FCD400	1	205	DISC VALVE	HIGH TENSION BRASS	C6782B	4
50	BALL BEARING	SPECIAL STEEL		2	206	VALVE SPRING	PHOSPHOR BRONZE	C5102W	4
52	COUNTER SHAFT	CARBON STEEL	S35C	1	207	VALVE STEM	STAINLESS STEEL	SUS304	4
56	CONNECTING ROD	DUCTILE CAST IRON	FCD400	1	210	JACK BOLT	〃	〃	4
57	BALL BEARING	SPECIAL STEEL		2	241	ESCAPE VALVE BOX	BRONZE	CAC406	1
60	CROSSHEAD	CAST IRON	FC200	1	243	VALVE	〃	〃	1
62	CROSSHEAD PIN	CARBON STEEL	S35C	1	256	SPRING	STAINLESS STEEL	SUS304	1
64	CRANK PIN METAL	BRONZE	CAC604	1SET					

● GENERAL CHARACTERISTICS

Item	Model	HPL 2
Capacity	(m ³ /h)	2
Total head	(m)	45
Suction head	(m)	- 5
Liquid cylinder bore	(mm)	72
Stroke length	(mm)	60
Number of double strokes	(min ⁻¹)	88
Suction bore	(mm)	40 (5k)
Discharge bore	(mm)	32 (5k)
Ball bearings (counter shaft)		2 × 6306VV
Service life	(hr)	20000
Ball bearings (crank shaft)		2 × 6308VV
Service life	(hr)	20000
LO filled in crank case	(ℓ)	6
Weight (without motor) FC (BC)	(kg)	190 (200)
Water filled in casing	(kg)	3



● MOTOR OUTPUT

Motor output is selected based on +25m over the total head in order to prevent the motor from overloading, even when the pump is started up with the discharged valve closed too long.

$$\text{Motor output} = \frac{Q \times (H + 25) \times 1.025}{270 \times 1.36 \times \eta} \quad \text{kW}$$

Q : Pump capacity m³/h

H : Total head m

1.025 : Specific gravity of sea water

η : Pump efficiency %

The table below shows the output of each motor according to the total head:

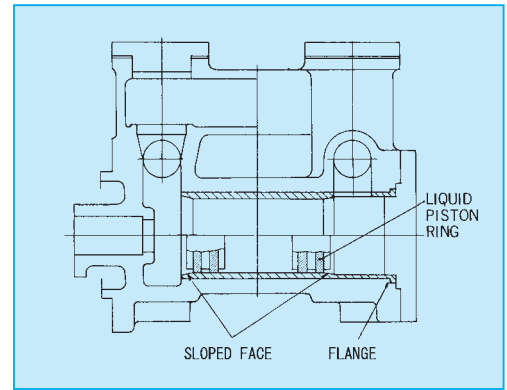
Motor	Capacity	Total head
0.75kW × 1200min ⁻¹	2 m ³ /h	20~42m
1.5 kW × 1200min ⁻¹	2 m ³ /h	43~45m

● PUMP EFFICIENCY

The larger the total head becomes, the higher the pump efficiency becomes, and vice versa. The table on the right shows the average value of pump efficiency within 20~45m of total head.

● LIQUID CYLINDER & VALVE BOX

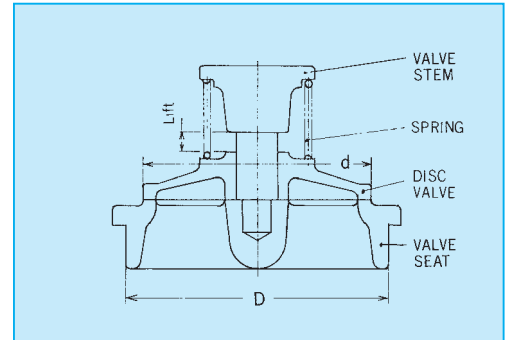
The liquid cylinder and valve box are formed of a single integrated casting unit. The flanged liner is inserted inside the cylinder, and is topped by a cover where seat packing is placed between them. The liner has sloped faces formed on the right and left sides so the piston can be pulled out easily when worn down.



● PUMP VALVE

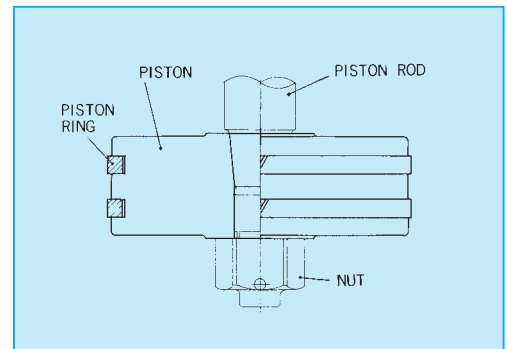
The suction and discharge pump valves with a disc are located in the valve boxes, and these valves are secured by a jack bolt through the cover.

Model	D		d	No. of valve		Lift
	Suc.	Disch.		Suc.	Disch.	
	mm					
HPL 2	50	60	50	2	2	6



● LIQUID PISTON & PISTON RING

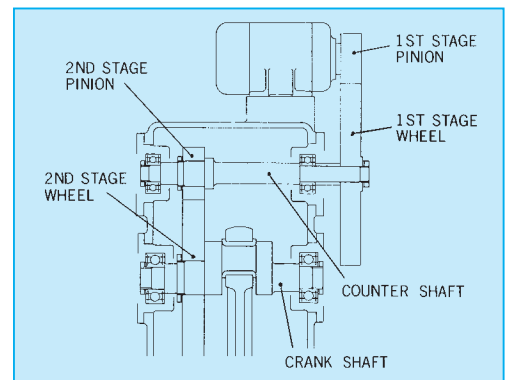
The liquid piston consists of one piston and two piston rings. The piston rings, made of bakelite, are located at both ends to prevent leakage by means of being pushed against the cylinder wall from the liquid pressure.



● DOUBLE STAGE REDUCTION GEARING

The motor power is transmitted to the crank shaft through the double stage reduction gearing.

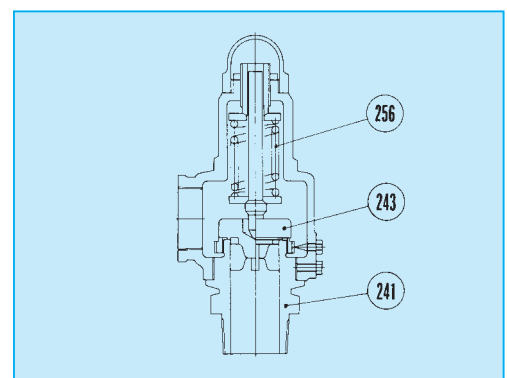
With silent and lubrication-free operation in mind, lignite has been used for the 1st stage pinion. The 2nd stage pinion and the wheel are built into the crank case using an oil bath lubrication system where the pinion is made of carbon steel.



● ESCAPE VALVE

In order to prevent problems due to mishandling, an escape valve has been installed on the discharge side.

The capacity of the escape valve is chosen to allow the pressure rise limit to remain less than 0.25MPaG over the normal discharge pressure. The operating pressure can be set to 110% of the normal discharge pressure.

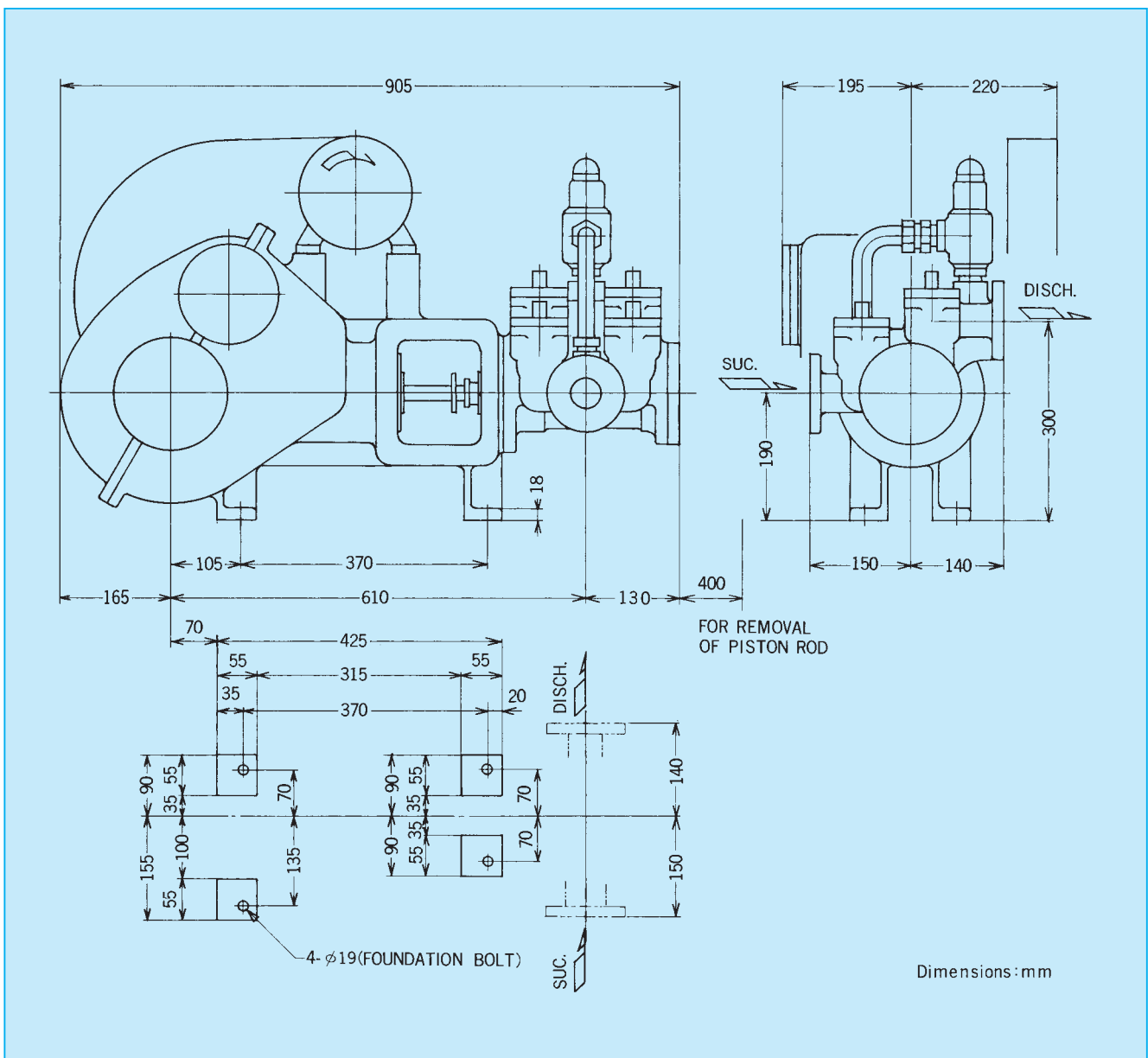


● **STANDARD ACCESSORIES [per pump]**

- Discharge pressure gauge1
- Suction compound gauge1
- Gauge board1
- Gauge root valve2
- Air vent valve.....1

● **STANDARD SPARE PARTS [per ship]**

- Liquid piston ring1/set*
 - Complete set of suction valve1/set*
 - Complete set of discharge valve1/set*
 - Escape valve spring1/set*
 - Crank pin metal1/set*
 - Reamer bolt & nut1kit/set*
 - Crosshead pin metal.....1/set*
 - Ball bearing (counter shaft)1/set*
 - Ball bearing (crank shaft)1/set*
 - Gland packing1/set*
- (set* = all units of the same model and application)

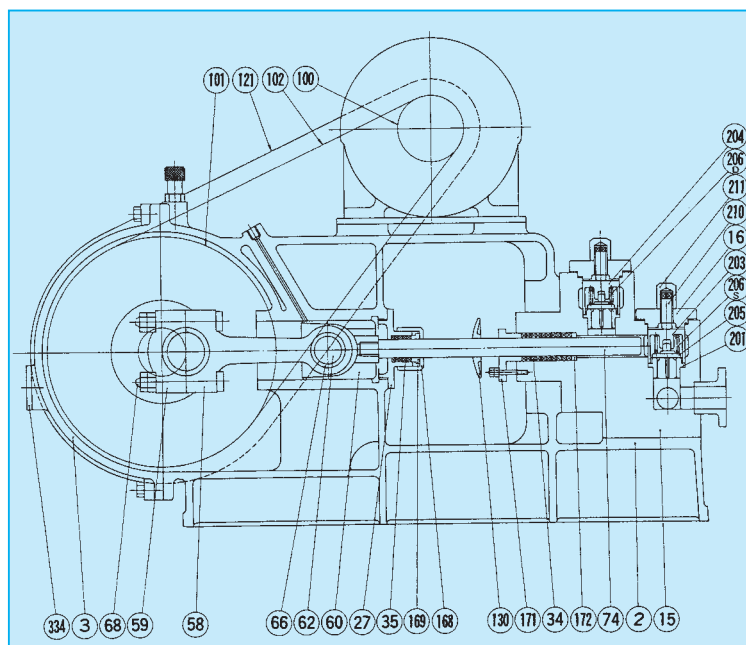
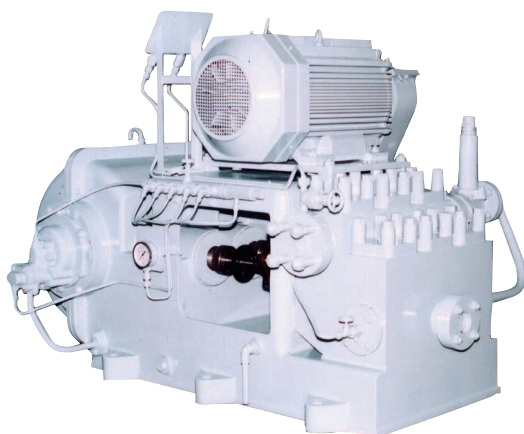


Horizontal triplex single acting MOTOR DRIVEN RECIPROCATING PUMPS

SHINKO
HLX

● APPLICATIONS

Cold start boiler feed pumps

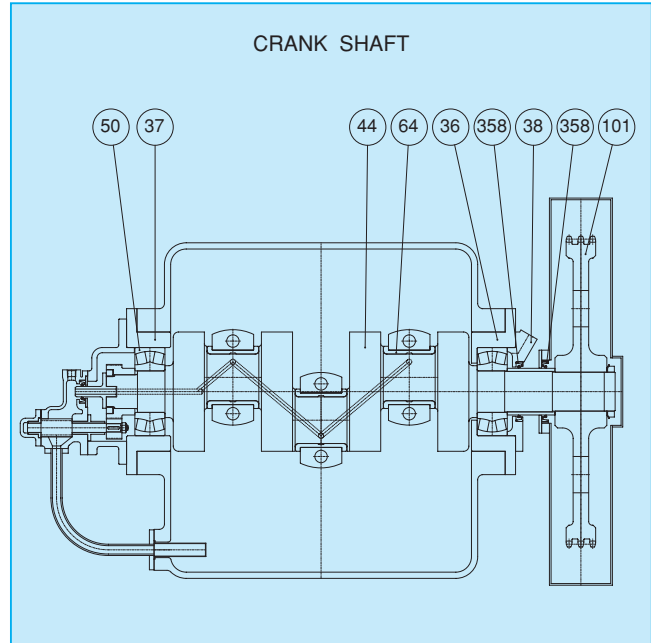


● STANDARD MATERIALS

PART NO.	NAME OF PART	MATERIAL		REQ.NO. FOR 1PUMP	PART NO.	NAME OF PART	MATERIAL		REQ.NO. FOR 1PUMP
		NAME	JIS				NAME	JIS	
2	CRANK CASE	CAST IRON	FC200	1	101	CHAIN WHEEL	CARBON STEEL	S35C	1
3	CRANK CASE COVER	∕	∕	1	102	ROLLER CHAIN	STEEL		1SET
15	LIQUID CYLINDER	FORGED STEEL	SF440	1	121	CHAIN CASE	∕	SS400	1
16	LIQUID CYLINDER TOP COVER	CARBON STEEL	S45C	6	130	OIL GUARD	RUBBER		3
27	STUFFING BOX	CAST IRON	FC200	3	168	GLAND CAP NUT	BRONZE	CAC403	3
34	GLAND PACKING	SEMIMETALLIC		3SETS	169	GLAND	∕	∕	3
35	GLAND PACKING	∕		3SETS	171	GLAND	∕	∕	3
36	BEARING BOX	CAST IRON	FC200	1	172	NECK BUSH	∕	∕	3
37	BEARING BOX	∕	∕	1	201	VALVE SEAT	STAINLESS STEEL	SUS304	6
38	BEARING BOX COVER	∕	∕	1	203	SUCTION VALVE GUARD	BRONZE	CAC403	3
44	CRANK SHAFT	CARBON STEEL	S45C	1	204	DELIVERY VALVE GUARD	∕	∕	3
50	ROLLER BEARING	SPECIAL STEEL		2	205	WING VALVE	STAINLESS STEEL	SUS420J2	6
58	CONNECTING ROD	FORGED STEEL	SF490	3	206S	SUC. VALVE SPRING	PHOSPHOR BRZ	C5102W	3
59	CONNECTING ROD CAP	∕	∕	3	206D	DEL. VALVE SPRING	∕	∕	3
60	CROSS HEAD	CAST IRON	FC250	3	210	JACK BOLT	STAINLESS STEEL	SUS304	6
62	CROSS HEAD PIN	CARBON STEEL	S35C	3	211	CAP NUT	∕	∕	6
64	CRANK PIN METAL	BRONZE	CAC604	3SETS	241	SAFETY VALVE VALVE BOX	CARBON STEEL	S45C	1
66	CROSS HEAD PIN METAL	∕	∕	3	243	VALVE BODY	STAINLESS STEEL	SUS420J2	1
68	REAMER BOLT	STEEL	SS400	6	256	SAFETY VALVE SPRING	SPRING STEEL	SUP6	1
74	PLUNGER	STAINLESS STEEL	SUS420J2	3	334	OIL LEVEL GAUGE	SYNTHETIC RESIN		1
100	CHAIN WHEEL	CARBON STEEL	S35C	1	358	PACKING RING	RUBBER		2

● GENERAL CHARACTERISTICS

Item	Model	HLX 3	HLX 6
Capacity	(m ³ /h)	3.0	6.0
Max. discharge pressure (MPaG)		12	
Plunger diameter	(mm)	35	40
Stroke length	(mm)	110	
Number of double strokes (min ⁻¹)		180	280
Motor speed	(min ⁻¹)	900	1200
Suction bore	(mm)	50	
Discharge bore	(mm)	40	
Roller bearings (crankshaft)		22316	
Service life	(hr)	20000	
LO filled in crank case	(ℓ)	60	
Weight (without motor)	(kg)	1650	



● MOTOR OUTPUT

Motor output is selected based on 1.5 times higher than the total head in order to prevent the motor from overloading, even when the pump is started up with the discharged valve closed too long.

$$\text{Motor output} = \frac{Q \times (1.5 \times P) \times 1.02}{270 \times 1.36 \times \eta} \quad \text{kW}$$

Q : Pump capacity m³/h
P : Total pressure MPaG
η : Pump efficiency %

The table below shows the output of each motor according to the total head:

		Unit : MPaG	
Model		HLX 3	HLX 6
Motor Capacity	kW × min ⁻¹	3 m ³ /h	6 m ³ /h
15 × 900		7~8	
18.5 × 900		8~9.9	
22 × 900		9.9~12	
30 × 1200			7~8.9
37 × 1200			8.9~11
45 × 1200			11~12

● PUMP EFFICIENCY

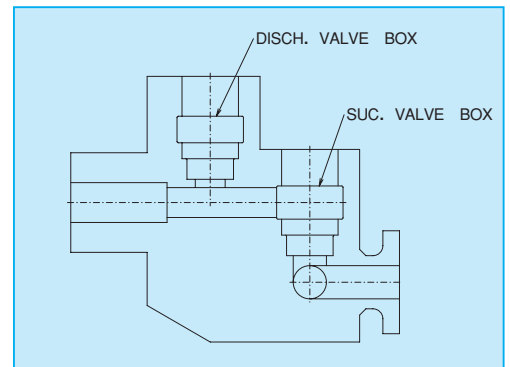
The larger the total head becomes, the higher the pump efficiency becomes, and vice versa.

The table on the right shows the average value of pump efficiency within 7~12MPaG of total head.

Model	Cap. × TP m ³ /h MPaG	Volumetric eff. η _v %	Pump eff. η %
HLX 3	3 × 12	78	70
HLX 6	6 × 12	89	74

● LIQUID CYLINDER & VALVE BOX

The liquid cylinder is made from forged steel with the valve boxes and suction/discharge ports bored into the block as a single unit.

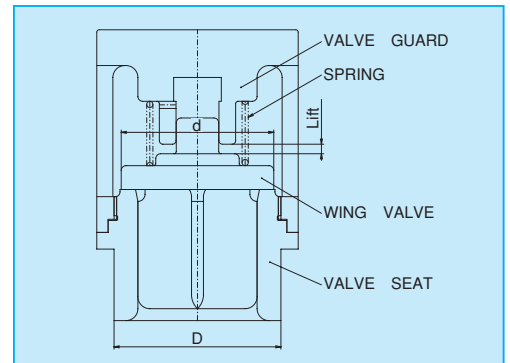


● PUMP VALVE

The suction and discharge pump valves are located in the valve boxes, and these valves are secured by a jack bolt through the cover.

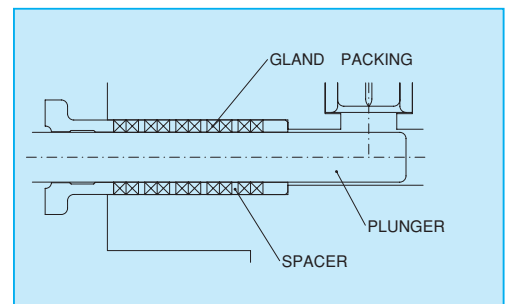
Model	D		d	No. of valve		Lift	
	Suc.	Disch.		Suc.	Disch.	Suc.	Disch.
	HLX 3,6	70		70	64	3	3

mm



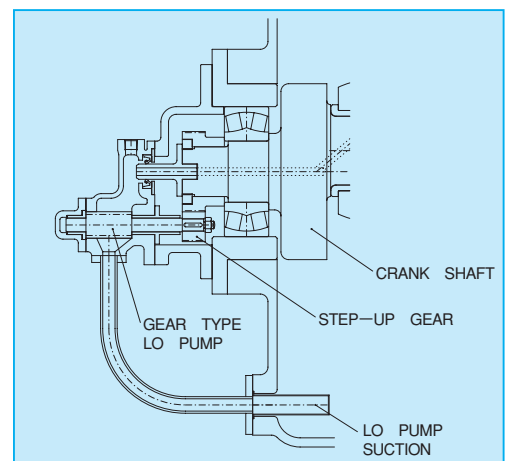
● PLUNGER & STUFFING BOX

The plunger is made of 13Cr stainless steel with high tensile strength. And, the gland packing in the stuffing box is suitable for high pressures.



● LUBRICATING SYSTEM

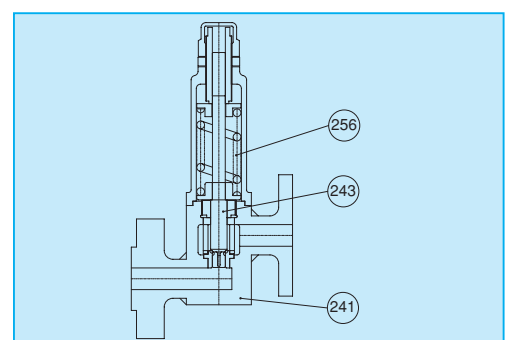
During pump operation, using a forced lubrication system, LO is supplied to the crank pin metals, crank shaft bearings, cross heads, and other components from the LO pump driven by the step-up gear positioned on the crank shaft end.



● ESCAPE VALVE

In order to prevent problems due to mishandling, an escape valve has been installed on the discharge side.

The capacity of the escape valve is chosen to allow the pressure rise limit to remain less than 150% over the normal discharge pressure. The operating pressure can be set to 110% of the normal discharge pressure.



● **STANDARD ACCESSORIES [per pump]**

- Discharge pressure gauge 1
- Suction compound gauge 1
- Dampener for pressure gauge 1
- Gauge board 1
- Forced lubricating system 1
- Oil strainer 1

● **STANDARD SPARE PARTS [per ship]**

- Complete set of suction valve 1/set*
 - Complete set of discharge valve 1/set*
 - Safety valve spring 1/set*
 - Crank pin metal 1/set*
 - Reamer bolt & nut 1kit/set*
 - Roller bearings 2/set*
 - Roller chain 1/set*
 - Gland packing 3/set*
 - Gland packing 3/set*
- (set* = all units of the same model and application)

