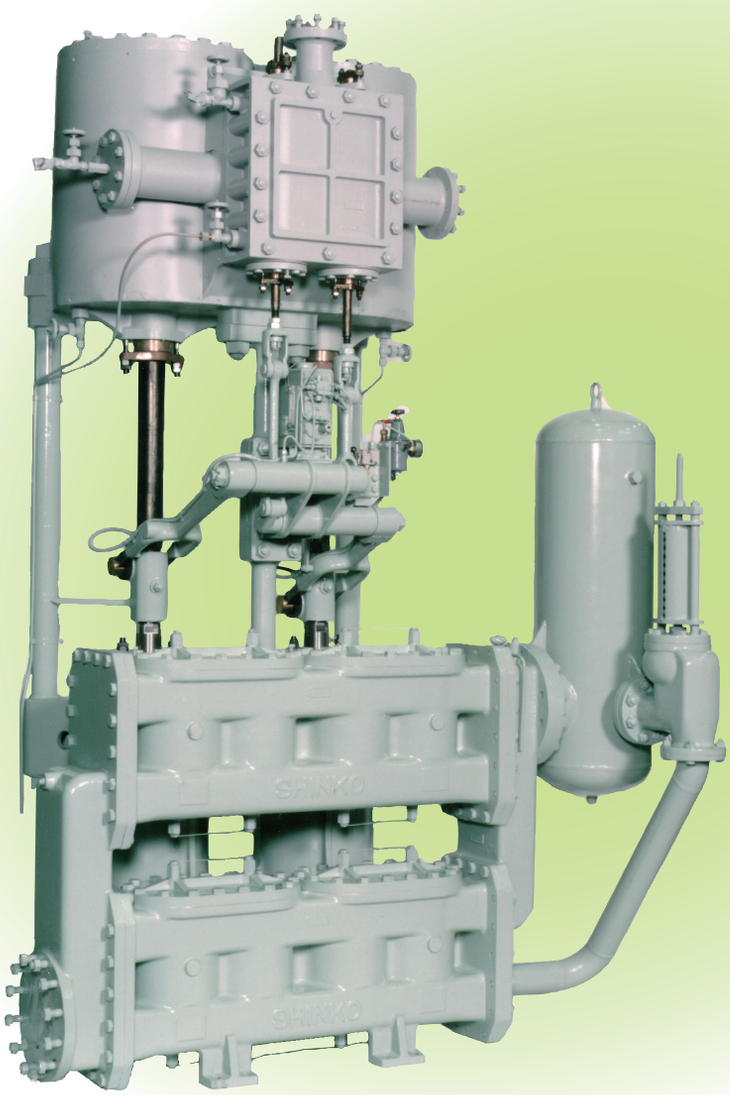
R-1002K

SHINKO

STEAM DRIVEN RECIPROCATING CARGO STRIPPING PUMPS

KPH



KPH

STEAM DRIVEN RECIPROCATING CARGO STRIPPING PUMPS

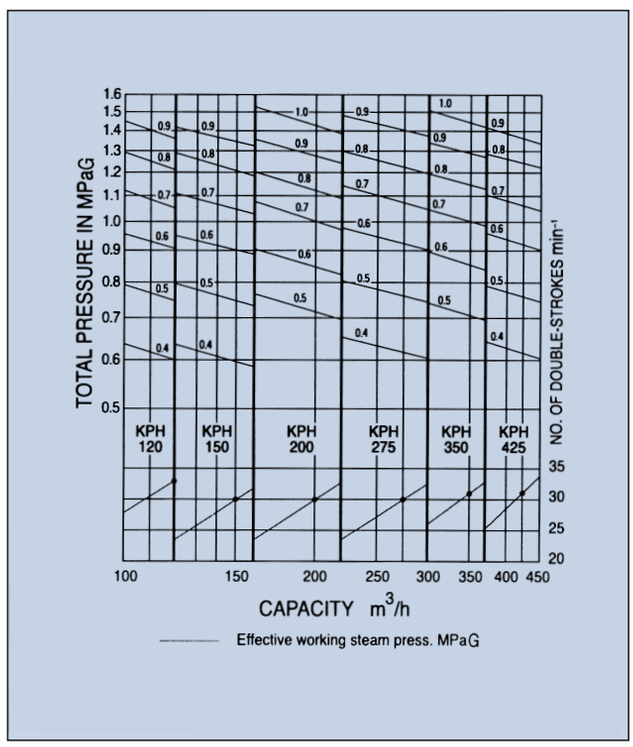
Shinko KPH steam driven reciprocating pumps are a vertical duplex double acting type, and have been designed and manufactured as cargo stripping pumps. The liquid cylinders have been constructed as to minimize the clearance of the passage area volume leading to the valve boxes so that the pumps can prevent gas from forming during the piston suction phase. In this way, consideration has been given to improve pump performance.

GENERAL CHARACTERISTICS

Item / Model		KPH 120	KPH 150	KPH 200	KPH 275	KPH 350	KPH 425
Capacity (normal)	(m^3/h)	120	150	200	275	350	425
Total pressure (max.)	(MPaG)	1.5					
Suction head	(m)	-5					
Working steam pressure	(MPaG)	1.2					
Exhaust steam pressure (max.)	(MPaG)	0.15					
Steam cylinder bore	(mm)	360	420	440	520	560	640
Liquid cylinder bore	(mm)	240	280	300	340	380	420
Stroke length	(mm)	380	380	460	460	460	460
No. of double stroke (nor.)	(min^{-1})	33	30	30	30	31	31
Suction bore	(mm)	150	200	200	250	300	300
Discharge bore	(mm)	125	150	200	250	250	300
Steam inlet bore	(mm)	65	65	65	80	80	100
Steam exhaust bore	(mm)	80	80	100	125	125	150
Weight : FC (BC)	(kg)	2625(2850)	3230(3500)	3580(3900)	4485(4900)	5880(6400)	8025(8800)
Water filled in casing	(kg)	210	270	350	405	530	640
Lub.oil filled in auto. lubricator	(ℓ)	2					

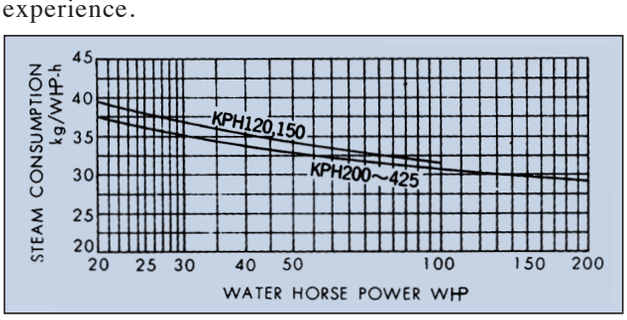
Pump Model Selection

Pump model selection is made by using the chart on the right according to the requirements of capacity, total head, and effective working steam pressure (steam chest pressure - exhaust steam pressure).



Steam Consumption

Small pumps are normally worse than large pumps in terms of steam consumption as well as the volumetric efficiency. And, when comparing the same size pumps, the larger the water horsepower is, the better the steam consumption is. The following chart shows average values based on our experience.



DESIGN & MATERIALS

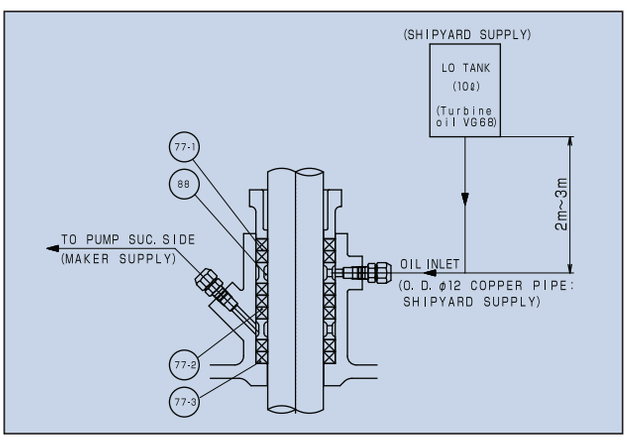
Construction and standard materials used are shown in the following sectional drawing and table.

In case that the pump is required to handle benzene, sodium hydroxide, toluene methanol, and other liquids of this type, the following materials are used instead of the standard ones:

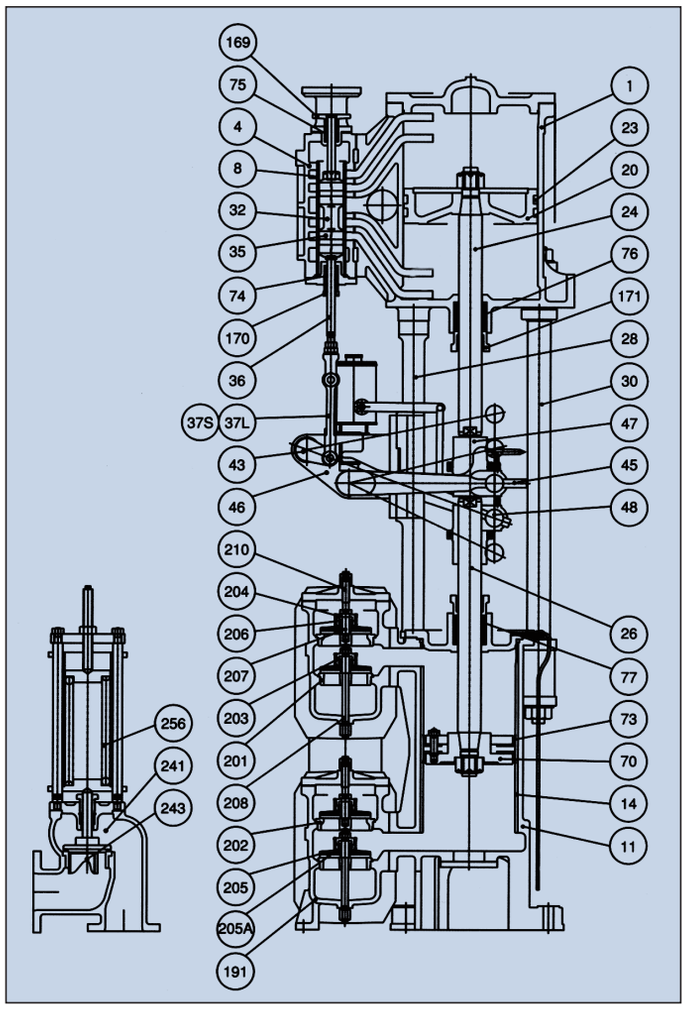
PN77 : Liquid piston rod gland packing=Teflon

PN206 : Valve spring=Stainless steel (SUS316)
(Sodium hydroxide only)

Also, an LO tank is also provided to lubricate the gland packing as shown below:



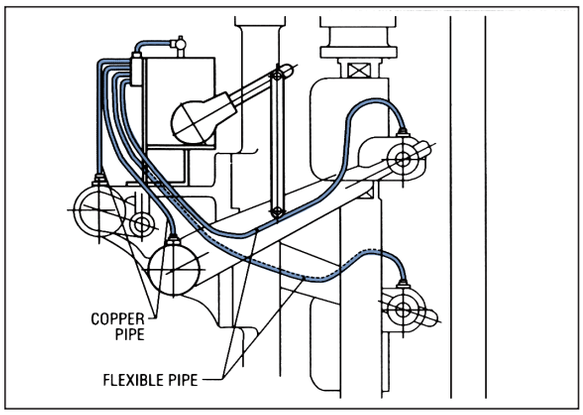
77-1,2,3	GLAND PACKING	TEFLON
88	SEALING RING	BRONZE



PART NO.	NAME OF PART	MATERIAL			REQ.NO. FOR 1 TURBINE	PART NO.	NAME OF PART	MATERIAL			REQ.NO. FOR 1 TURBINE
		NAME	JIS	ASTM EQUIVALENT				NAME	JIS	ASTM EQUIVALENT	
1	STEAM CYLINDER	CAST IRON	FC200	A48 NO.35	1	73	LIQUID PISTON RING	RUBBER IMPREGNATED CLOTH			4
4	STEAM CHEST	〃	〃	〃	1	74	VALVE ROD BOTTOM GLAND PACKING	CARBON FIBER			2SETS
8	STEAM CHEST LINER	SPECIAL CAST IRON			2	75	VALVE ROD TOP GLAND PACKING	〃			2SETS
11	LIQUID CYLINDER	CAST IRON	FC200	A48 NO.35	1	76	STEAM PISTON ROD GLAND PACKING	〃			2SETS
14	LIQUID CYLINDER LINER	STAINLESS STEEL	SCS13	A743 CF-8	2	77	LIQUID PISTON ROD GLAND PACKING	NON ASBESTOS			2SETS
20	STEAM PISTON	CAST IRON	FC200	A48 NO.35	2SETS	169	VALVE ROD TOP GLAND	BRONZE	CAC406	B584 C83600	2
23	STEAM PISTON RING	SPECIAL CAST IRON			4	170	VALVE ROD BOTTOM GLAND	〃	〃	〃	2
24	STEAM PISTON ROD	CARBON STEEL	S35C	AISI 1035	2	171	PISTON ROD GLAND	〃	〃	〃	4
26	LIQUID PISTON ROD	STAINLESS STEEL	SCPH32	A276 304	2	191	VALVE BOX	CAST IRON	FC200	A48 NO.35	2
28	FRONT COLUMN	DUCTILE CAST IRON	FCD400	A536 60•40•18	1	201	SUCTION VALVE SEAT	BRONZE	CAC406	B584 C83600	8
30	BACK COLUMN	STEEL	SS400	A283D	≦350 2 >350 4	202	DISCHARGE VALVE SEAT	〃	〃	〃	8
32	PISTON VALVE	CAST IRON	FC200	A48 NO.35	2	203	SUCTION VALVE GUARD	〃	〃	〃	8
35	PISTON VALVE RING	SPECIAL CAST IRON			8	204	DISCHARGE VALVE GUARD	〃	〃	〃	8
36	VALVE ROD	CARBON STEEL	S35C	AISI 1035	2	205	VALVE	〃	〃	〃	16
37L	LEFT SIDE VALVE ROD LINK	DUCTILE CAST IRON	FCD400	A536 60•40•18	1	205A	VALVE DISC	SYNTHETIC RESIN			16
37S	RIGHT SIDE VALVE ROD LINK	〃	〃	〃	1	206	VALVE SPRING	PHOSPHOR BRONZE	C5191W		16
43	ROCKING LEVER SPINDLE	〃	〃	〃	2	207	VALVE STEM	STAINLESS STEEL	SUS304	A276 304	8
45	ROCKING LEVER	〃	〃	〃	2	208	SUC. VALVE SET SCREW STAY	〃	〃	〃	8
46	CROSS STAND	STEEL	SS400	A283D	1	210	JACK BOLT	〃	〃	〃	8
47	CROSS HEAD	DUCTILE CAST IRON	FCD400	A536 60•40•18	2	241	ESCAPE VALVE BOX	CAST IRON	FC200	A48 NO.35	1
48	CROSS HEAD PIN	HIGH TENSION BRASS	C6782B		2	243	VALVE BODY	BRONZE	CAC406	B584 C83600	1
70	LIQUID PISTON	Ni-CAST IRON			2SETS	256	SPRING	SPRING STEEL	SUP6		1

● Automatic Lubrication

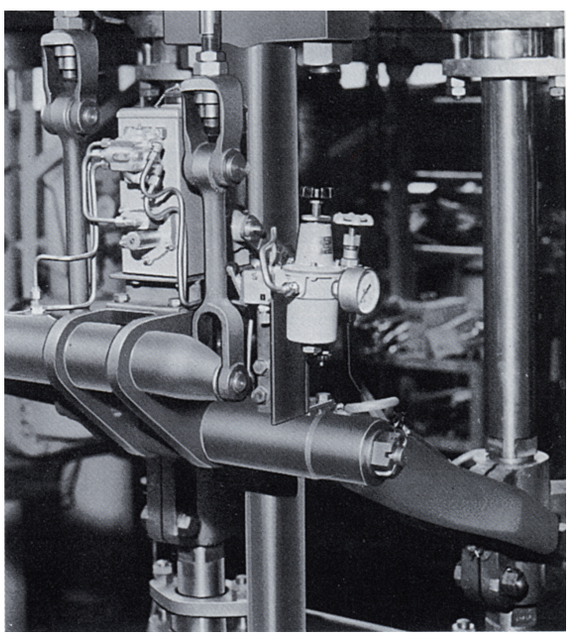
Lubricating oil is supplied via an automatic lubricator to a crosshead and pins, rocking lever spindles, and bushes.



■ REMOTE CONTROL SYSTEM [KSC] (Option)

The Shinko KSC remote control system has been developed to indicate the number of strokes of the cargo stripping pump in the cargo control room of the oil tankers, and also to remotely control the number of strokes according to variation in the pump loads for safe and efficient operation. Furthermore, this system indicates the number of strokes accurately even if the stroke length of the piston of pump is shortened due to sucking air or gas at the final stripping stage.
The system consists of the following instruments:

- Stroke transmitter
- Stroke converter
- Stroke counter
- Speed control equipment
  - Steam control valve
  - Speed setter



■ GENERAL CHARACTERISTICS

Item \ Model			KSC 65	KSC 80	KSC 100
Cargo stripping pump model applicated			KPH 120,150,200	KPH 275,350	KPH 425
Steam control valve	Type		Pneumatic operated diaphragm control valve		
	Bore	(mm)	65	80	100
Stroke transmitter	Type		Reciprocating 3 way valve		
	Air source	(MPaG)	0.6~0.9		
	Air outlet pressure	(MPaG)	0.14		
Stroke converter	Type		Electronic diaphragm type		
	Setting pressure	(MPaG)	Above 0.07: on		
	Power consumption	(mA)	Less 20		
Speed setter	Type		Spring load type with gauge		
	Air source	(MPaG)	0.6~0.9		
	Air outlet pressure	(MPaG)	0.02~0.1		
Stroke counter	Type		Digital counter type		
	Power source	(V)	AC 110 or 220		
	Contact point		1(Run), Option(High speed alarm), (4~20 signal)		

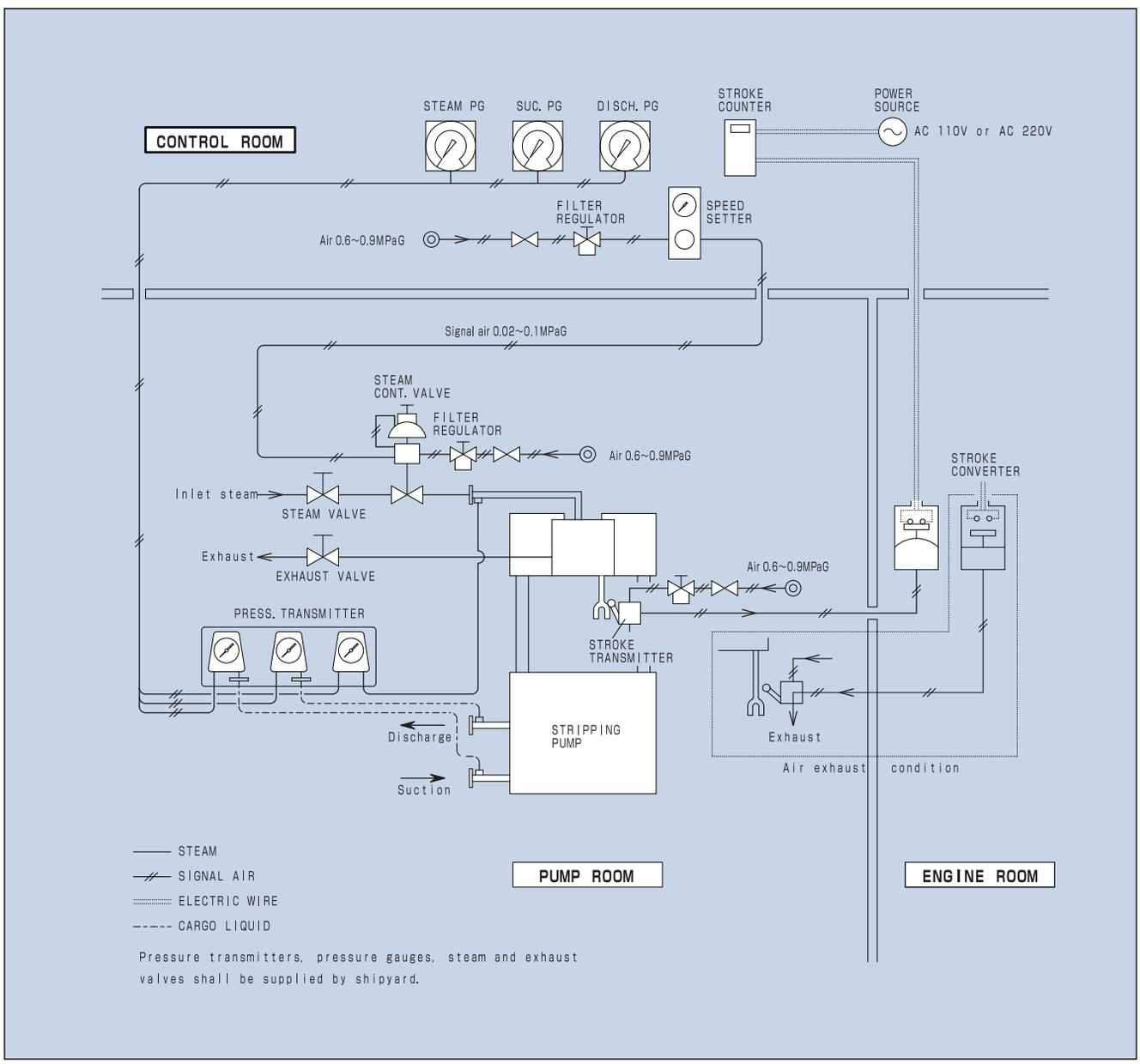
Operation

The KSC remote control system for the cargo stripping pumps is operated as follows:
First, the following preparation should be carried out locally before operating the pumps.

(1) Open the pump suction valves and discharge valves fully.
(2) Open the exhaust valve fully.
(3) Open the drain valves on the steam cylinder and the steam chest to draw out the drain water completely.
(4) Open the steam valve fully.

The next procedure is to be carried out in the cargo control room after verifying that the above-mentioned preparations have been completed.

(5) Control the speed setter so that the signal air pressure rises gradually, causing the steam control valve to open, permitting the pump to start.
(6) When the pump starts, the stroke transmitter actuates the stroke converter to supply and release the air with each stroke. The number of strokes is indicated on the stroke counter in the control room.
(7) To correspond to variation in the pump load, the rated number of strokes is always controlled and maintained by operating the speed setter.



Speed Setter

The speed setter consists of a pressure regulator and a pressure gauge, and is installed on the cargo control console.

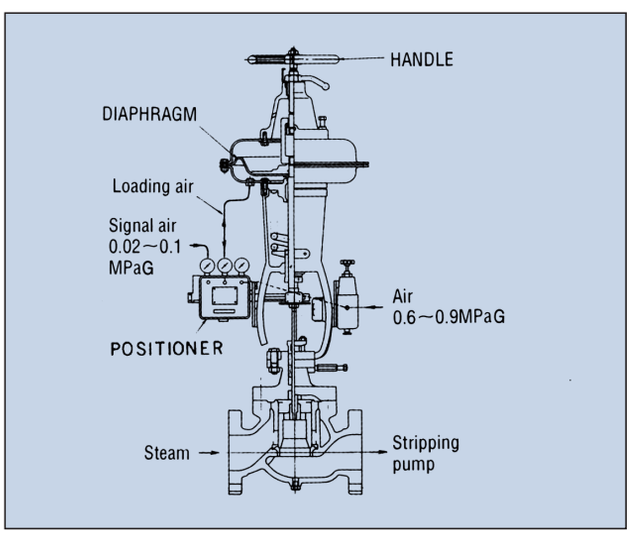
The filter regulator, positioned on the line in front of the speed setter, holds the air pressure at 0.14MpaG. And, the speed setter sends out an air pressure signal between 0.02~0.1MPaG. The air pressure signal regulated between 0.02 ~ 0.1 MPaG is sent to a positioner on the steam control valve by which the loading air is controlled.

Speed Control Valve

The steam control valve is installed on the steam inlet side of the pump.

The valve, which is controlled by the loading air acting on the diaphragm, adjusts the steam flow and controls the pump stroke number.

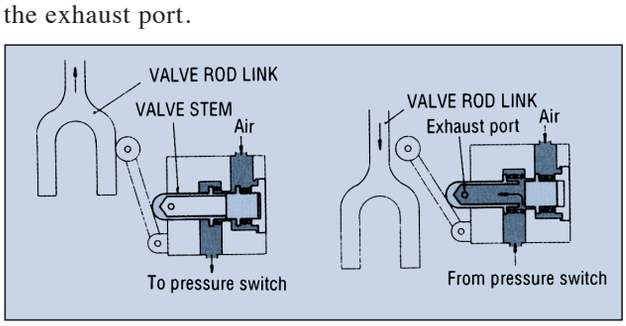
The valve is provided with a handle in order to be adjusted locally.



Stroke Transmitter

The stroke transmitter is located on the pump bracket where the valve stem oscillates left and right according to the up and down motions of the valve rod.

When the valve stem moves to the right, the air inlet and outlet are connected jointly, and air pressure is supplied to the pressure switch. When the stem moves to the left, the air pressure is released into the atmosphere through the exhaust port.



Stroke Converter

The stroke converter is an air leak free type having a semiconductive strain gauge stuck on a stainless steel diaphragm.

When the air pressure rises, the diaphragm is expanded, and the electric resistance of strain gauge varies. Accordingly, the stroke converter dispatches an ON-OFF signal through the electric circuit.

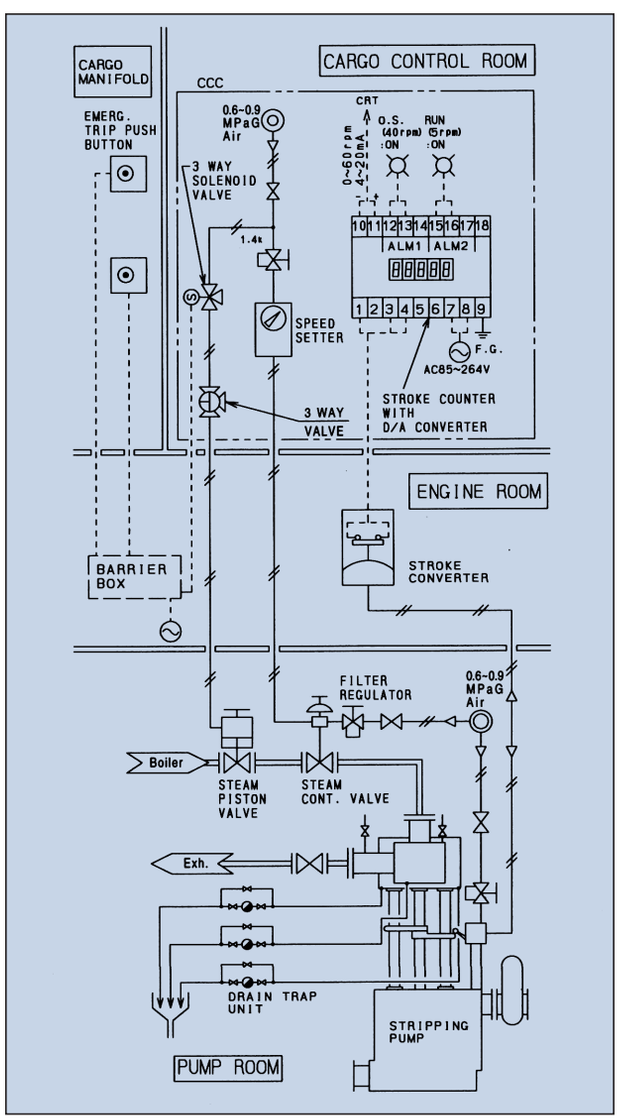
Stroke Counter

The stroke counter receives the ON-OFF signal from the stroke converter. And, the number of the strokes is indicated on the digital monitor.

The counter is provided with contacts to indicate the both RUNNING and HIGH SPEED ALARM.

Remote Start & Stop Device (Option)

The Shinko remote start and stop system for cargo stripping pump consists of drain trap units, a 3 way valve, and a pneumatic driven steam piston valve. A remote emergency trip can be installed by adding a 3 way solenoid valve.



ACCESSORIES

Standard

	Item	A Standard		B Standard		Remarks
		Type	Q'ty	Type	Q'ty	
Pump	Air vent valve		1		1	
	Steam drain valve with pipe		3sets		3sets	
	Pump drain pipe		2sets		2sets	
	Gauge root valve		2		2	
	Gauge board with press. gauges		1set		1set	
	Automatic lubricator with pipe		1set		1set	
	Air chamber and escape valve		1set		1set	
	Pump suc. & disch. press. remote indication (2 gauges)	air	1set	elect. (ia)	1set	
Control device	KSC control system 〔KSC〕 Control valve, speed setter & stroke counter device	air & elect.	1set	air & elect.	1set	
	Emerg. trip device at pump room			elect. (ia)	1	
	Emerg. trip device at manifold (2), pump room entrance (1)			〃	1set/ship	

Option

	Item					Remarks
Press. Indication	Inlet steam press. remote indication (1 gauge)	air	1set	elect. (ia)	1set	
	Exh. steam press. remote indication (1 gauge)	〃	1set	〃	1set	
	Cargo strip. eductor press. remote indication (3 gauges)	〃	1set/ship	〃	1set/ship	
	Cargo strip. eductor press. remote indication (3 gauges)	〃	2sets/ship	〃	2sets/ship	
	Remote stop at CCC	〃	1set	elect.	1set	

KSC SYSTEM ACCESSORIES

Option

	Item	A Standard & B Standard		Remarks
		Type	Q'ty	
Remote & stop system	Remote start & stop device			
	Drain trap unit	disc type	3sets	
	3 way valve	air	1set	
	Steam piston valve	〃	1set	
	3 way solenoid valve for emergency trip	〃	1set	
	Stroke counter with A/D converter & overspeed alarm contact	elect.	1set	4～20mA

Note elect.(ia) : Electric Intrinsically Safe Device(sensors, barriers, indicators, and etc. included.)

STANDARD SPARE PARTS [per ship]

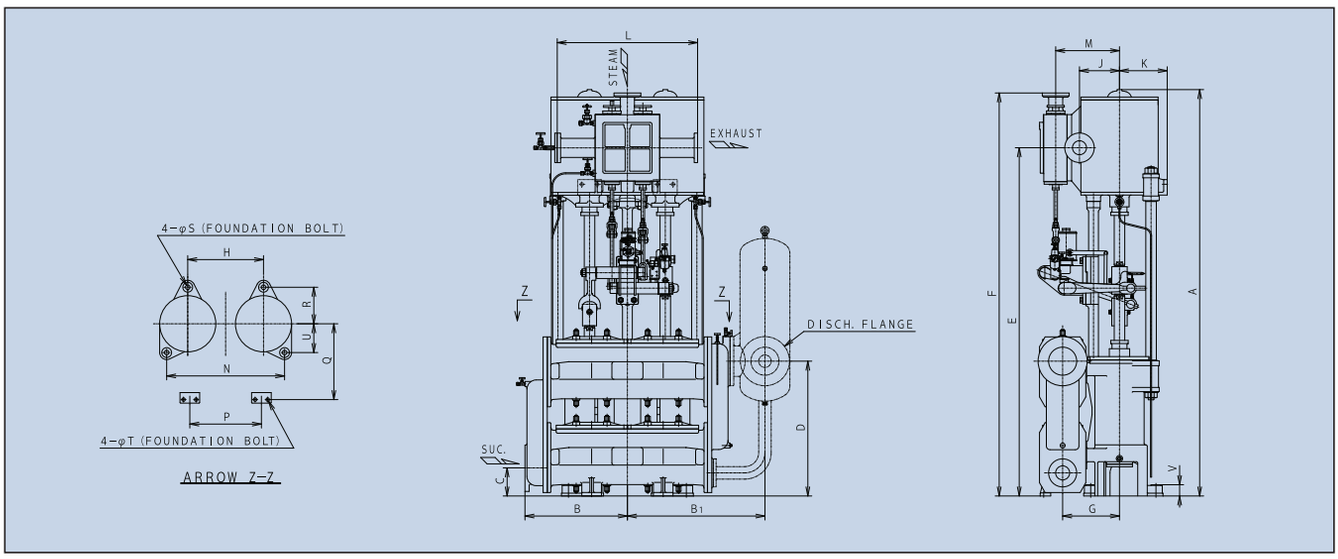
For KPH

Liquid piston ring ····· 1 for each cylinder/set*
Complete set of suction valve ····· 1/set*
Complete set of discharge valve ····· 1/set*
Escape valve spring ····· 1/set*
Steam piston ring ····· 1 for each cylinder/set*
Piston valve ring ····· 1 for each cylinder/set*
Gland packing for valve rod top····· 1/set*
Gland packing for valve rod bottom ····· 1/set*
Gland packing for steam piston rod ····· 1/set*
Gland packing for liquid piston rod ····· 1/set*

For KSC

Diaphragm for steam control valve ····· 1/set*
Diaphragm assembly for filter regulator ····· 2/set*

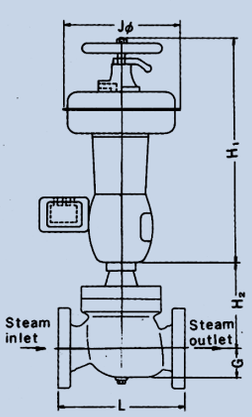
(set* = all units of the same model and application)



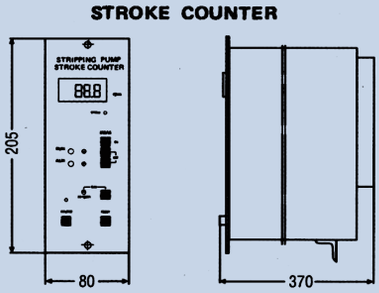
Dimensions : mm

Model	A	B	B_1	C	D	E	F	G	H	J	K	L	M	N	P	Q	R	S	T	U	V
KPH 120	2420	640	840	180	810	2040	2440	385	470	250	290	900	410	730	465	515	220	27	23	170	80
KPH 150	2535	670	900	200	840	2150	2570	400	520	270	330	980	440	780	475	535	250	33	25	195	80
KPH 200	2814	730	980	200	960	2400	2790	405	540	285	340	1000	455	840	510	540	260	33	25	205	80
KPH 275	2920	820	1090	250	950	2485	2925	480	640	345	400	1200	545	950	570	635	290	33	25	225	80
KPH 350	3024	885	1155	270	1040	2570	3030	530	700	365	420	1300	575	1050	620	710	310	39	27	245	80
KPH 425	3229	945	1305	280	1050	2760	3230	620	780	415	470	1650	660	1150	650	820	340	39	33	260	80

STEAM CONTROL VALVE

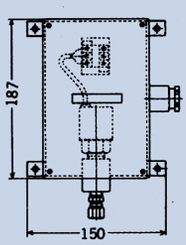


STROKE COUNTER

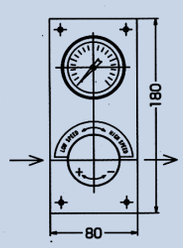


Bore	L	G	H_1	H_2	J	Wt kg
65	292	97	798	215	355	90
80	317	104	810	232	410	115
100	368	120	868	297	410	170

STROKE CONVERTER



SPEED SETTER



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