



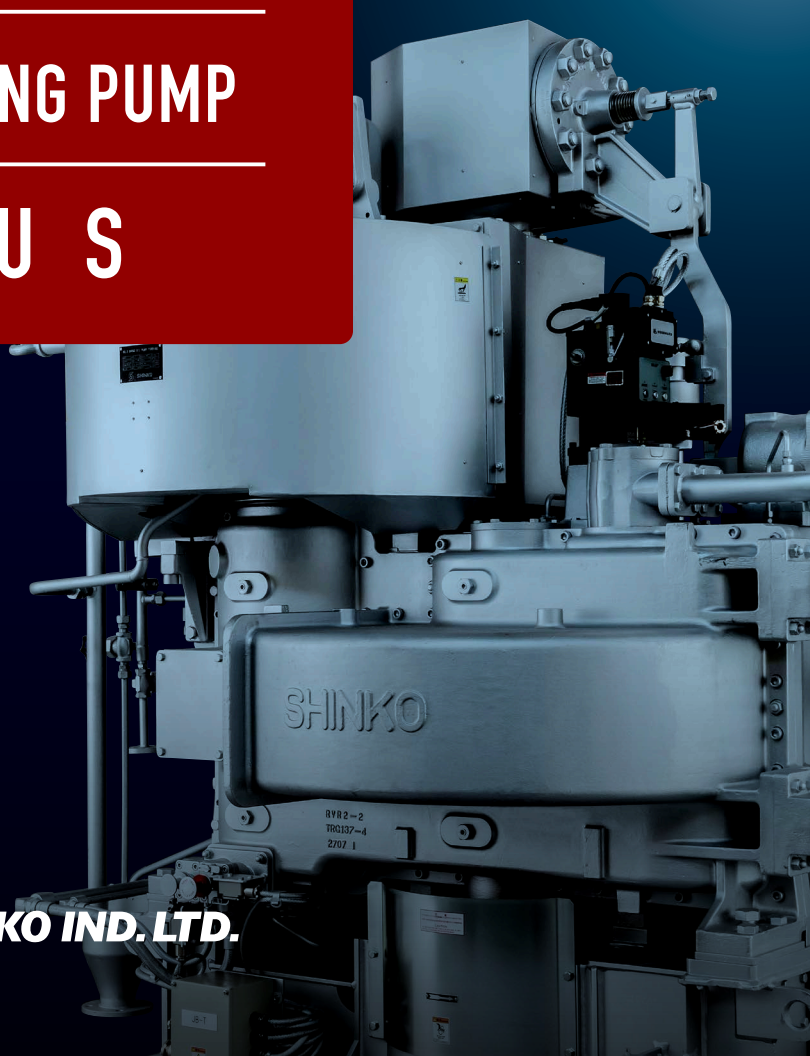
Equipment for

**TANKERS**

**CARGO OIL  
PUMP / TURBINE**

**STRIPPING PUMP**

**A U S**



 **SHINKO IND. LTD.**





# No. 1 in Global Market Shares of Cargo Oil Pumps and Drive Turbines for Crude Oil Tankers



With a global market share of over 80%, our company is the leading manufacturer of cargo oil pumps and drive turbines for crude oil tankers. Additionally, we are proud to have supplied a large number of power generator turbines and pumps used in ship engine rooms, receiving high praise from our customers all over the world.

We manufacture and sell cargo oil pumps and drive turbines as a set. For pre-shipment testing at our factory, we inspect our products under similar conditions as the inside of a ship. As a result, we are able to provide highly reliable products.

of cargo oil pumps and drive turbines for crude oil tankers. Additionally, we are proud to have supplied a large number of power generator turbines and pumps used in ship engine rooms, receiving high praise from our customers all over the world.

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# KV

Shinko centrifugal pumps have been designed and manufactured as cargo oil unloading pumps for oil tankers.

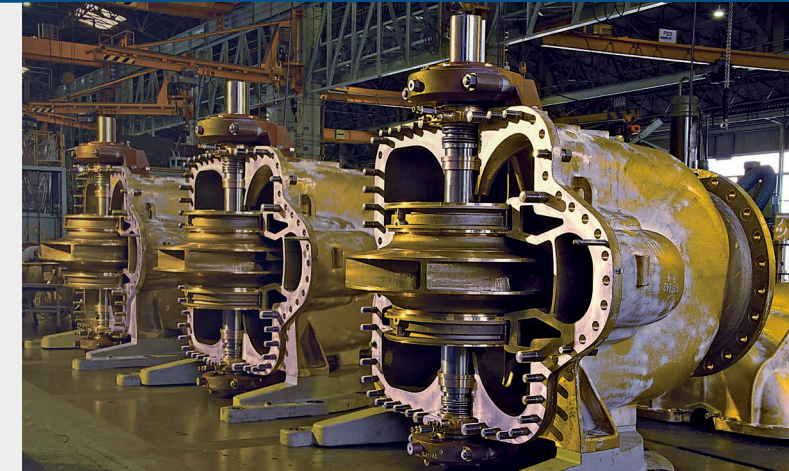
And, on the basis of our many years of experience and service, consideration has been given to the following points in our design.



# KV CARGO OIL PUMPS

## GENERAL CHARACTERISTICS

- 1 High efficiency
- 2 High performance under various suction conditions
- 3 Materials suitable for crude oil and product oil
- 4 Construction for minimizing vibration
- 5 Rigidity against external force

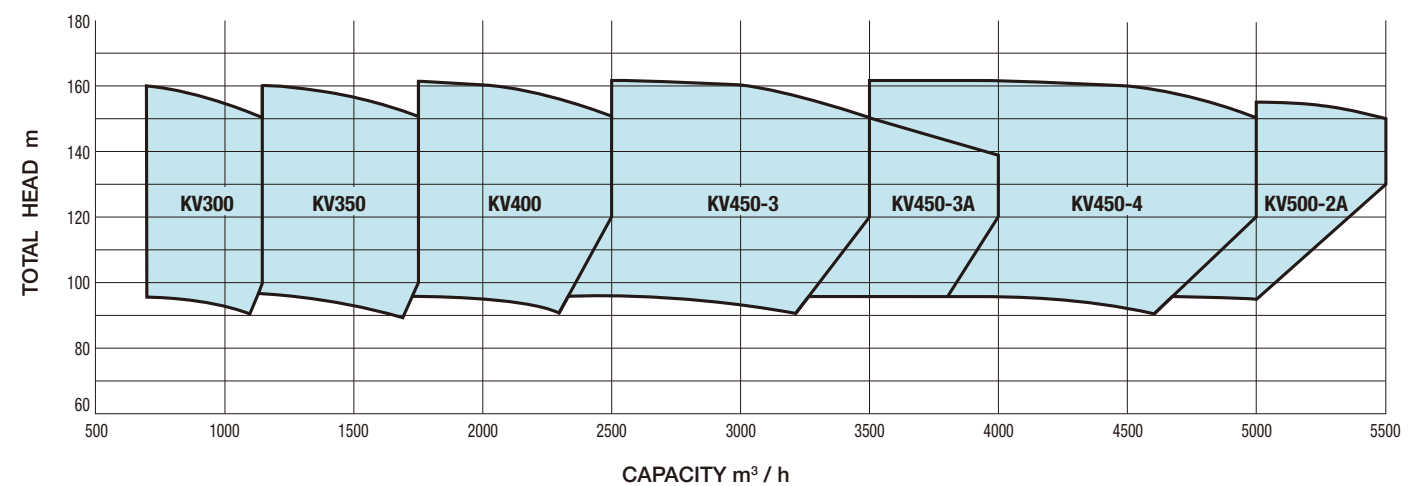


## SPECIFICATION

The vertical KV models are single-stage double suction cargo oil pumps. And, we have the following 7 standard models classified by capacity:

Item	Model	KV 300	KV 350	KV 400	KV 450-3	KV 450-3A	KV 450-4	KV 500-2A
Normal capacity	(m <sup>3</sup> /h)	1000	1500	2000 2500	3000 3500	3500 4000	4000 4500 5000	5500
Normal speed at total head 150m	(min <sup>-1</sup> )	1900	1910	1620 1650	1410 1450	1300 1300	1180 1190 1200	1200
Rotation		Counter-clockwise when viewed from coupling side						
Suction bore	(mm)	350	400	450	600	600	600	700
Discharge bore	(mm)	300	350	400	450	450	450	500
Weight (kg)	Pump (bronze casing)	1030	1300	1400	2400	2400	3000	3650
	Inter. shaft 2m, floating shaft 2m and bearing support	590	590	700	1050	1050	1300	1300
	Water in casing	200	300	450	850	850	1100	1600

## PERFORMANCE CHART



# CVL BALLAST PUMPS

## GENERAL CHARACTERISTICS

- 1 High efficiency
- 2 High performance under various suction conditions
- 3 Line bearings of special carbon are utilized in the lower side bearings to insure there is no leakage.

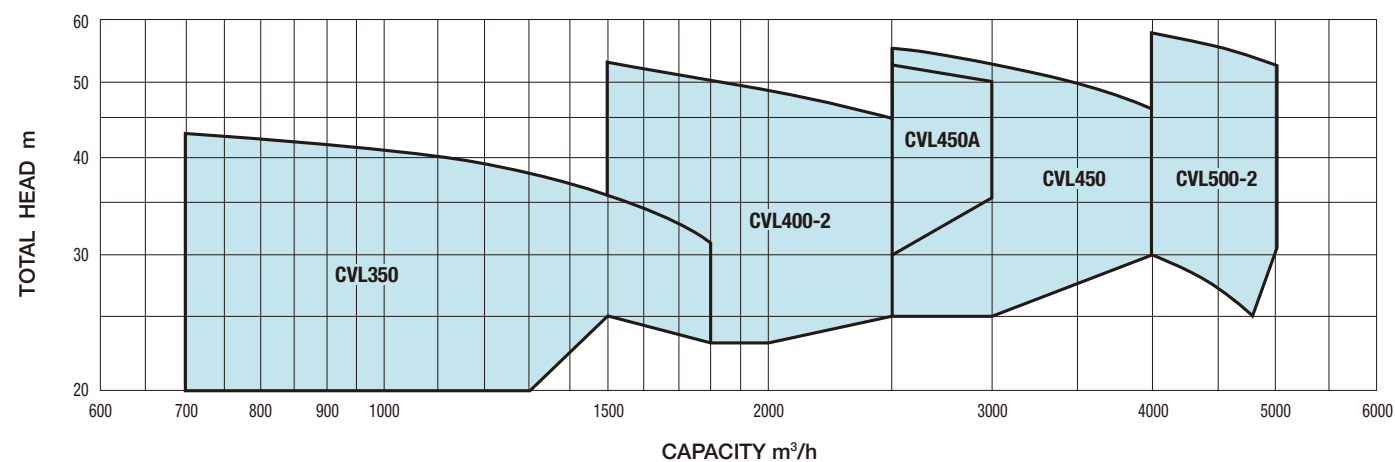


## SPECIFICATION

The vertical CVL models are single-stage, double suction ballast pumps with a line bearing. We have the following 5 standard models classified by capacity.

Item	Model	CVL 350	CVL 400-2	CVL 450A	CVL 450	CVL 500-2
Normal capacity		1000	2000	3000	3500	4500
	(m <sup>3</sup> /h)	1500	2500	3000	4000	5000
Normal speed	(min <sup>-1</sup> )	1200	1200	1200	1200	900 / 1050
Rotation		Counter-clockwise when viewed from coupling side				
Suction bore	(mm)	400	500	600	600	700
Discharge bore	(mm)	350	400	450	450	500
Weight (kg)	Pump (bronze casing)	800	1230	1600	2000	2600
	Inter. shaft 2m, floating shaft 2m and bearing support	530	590	640	640	980
	Water in casing	300	500	700	1400	2000

## PERFORMANCE CHART



## DEMENTION LIST

### KV

Dimensions : mm

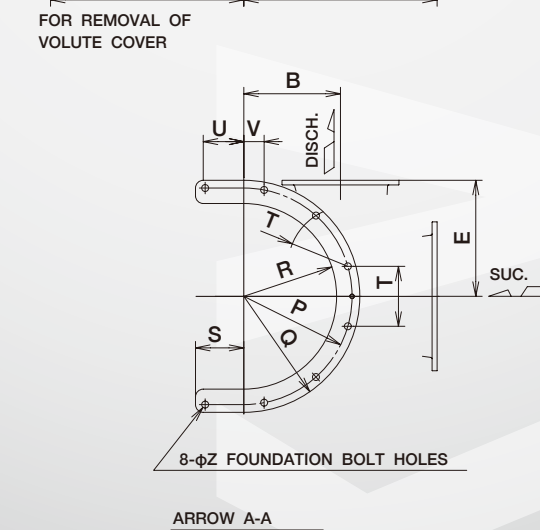
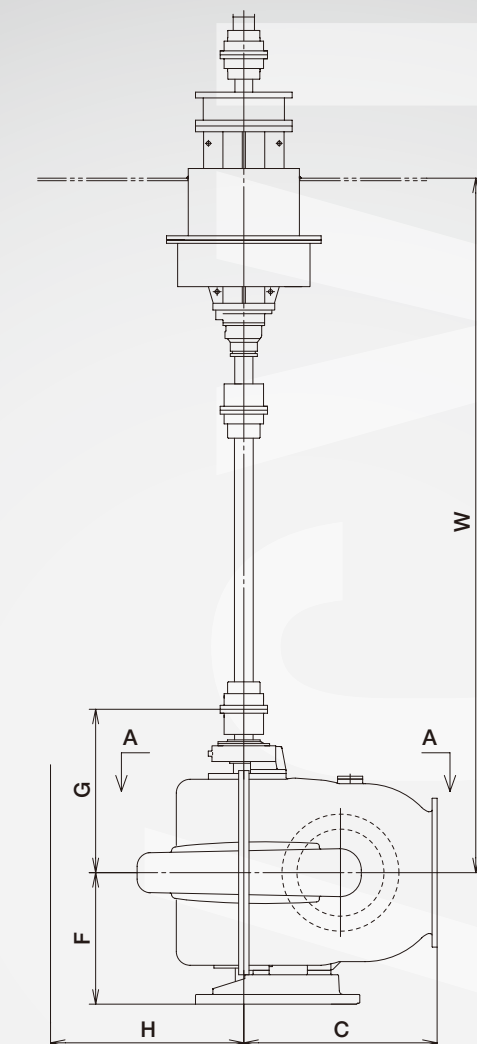
Model	KV 300	KV 350	KV 400	KV 450-3 KV 450-3A	KV 450-4	KV 500-2A
Bore	Suc.	350	400	450	600	700
	Disch.	300	350	400	450	500
B	350	400	500	600	650	650
C	700	800	850	1000	1100	1200
E	400	450	450	600	600	700
F	500	570	550	640	700	760
G	580	650	720	850	920	970
P	420	420	465	610	660	755
Q	450	450	500	650	700	800
R	360	360	390	530	580	680
S	150	150	200	300	320	400
T	230	230	255	340	370	430
U	120	120	170	250	275	335
V	80	80	80	90	95	95
Z	35	35	35	42	42	48
H min.	700	750	840	1080	1180	1310
W	min.	2550	2620	2710	3350	3570
	max.	3730	3800	4320	4950	5470

### CVL

Dimensions : mm

Model	CVL 350	CVL 400-2	CVL 450A	CVL 450	CVL 500-2	
Bore	Suc.	400	500	600	600	700
	Disch.	350	400	450	450	500
B	350	420	480	500	550	
C	700	860	920	1000	1150	
E	460	500	550	600	800	
F	645	660	610	680	750	
G	650	700	720	775	960	
P	420	465	560	560	660	
Q	450	500	600	600	700	
R	360	390	480	480	580	
S	150	200	250	250	320	
T	230	255	310	310	370	
U	120	170	200	200	275	
V	80	80	105	105	95	
Z	35	35	36	36	42	
H min.	650	800	900	1000	1100	
W	min.	2620	2670	3240	3265	3460
	max.	4300	4350	4700	4725	5260

### KV/CVL

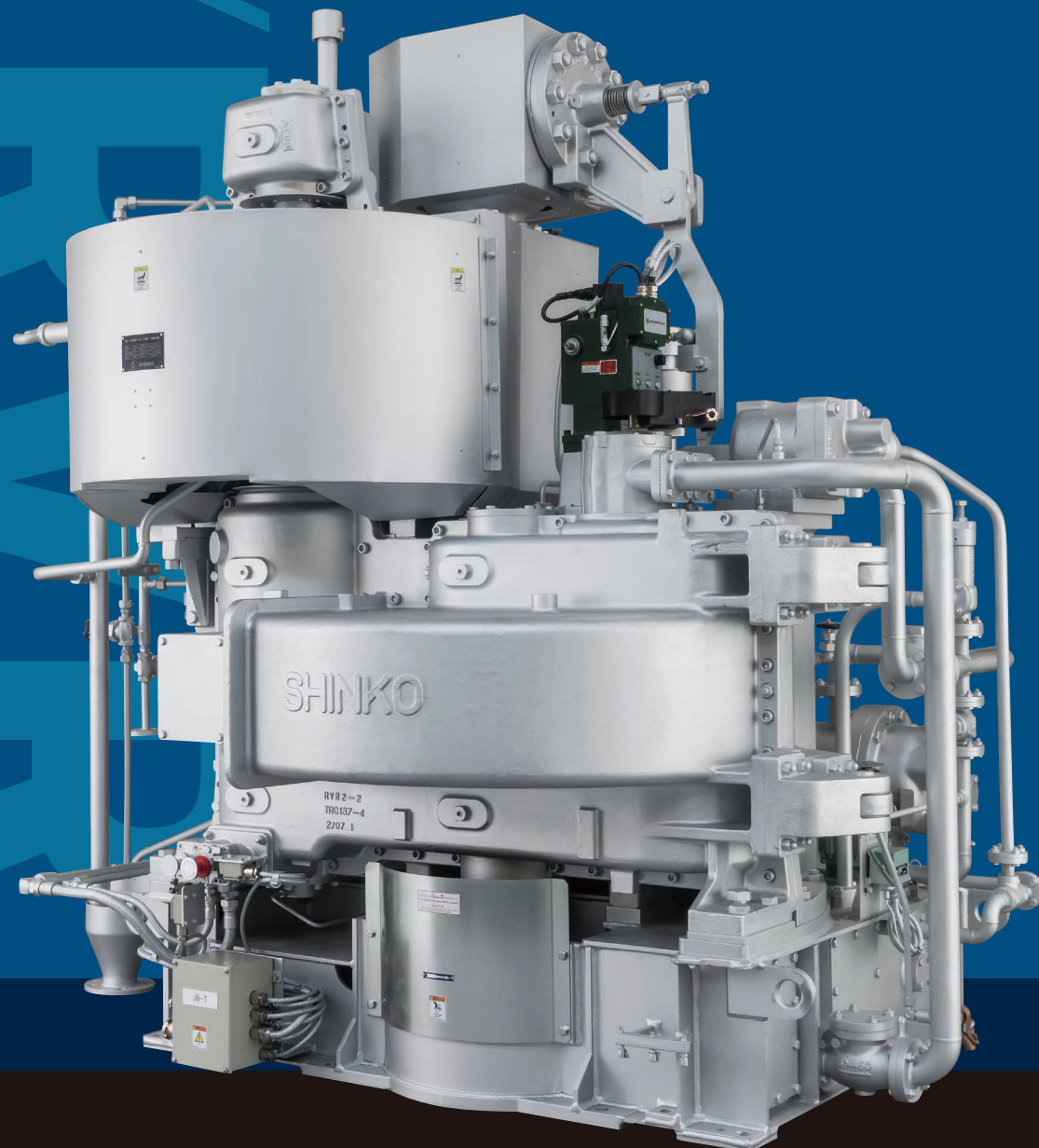




# RX

Shinko has manufactured many numbers of R type steam turbines since the development of our first cargo oil pump turbines and ballast pump turbines for oil tankers in 1960.

To this date, we have constantly focused on improving product quality, operation performance, and many other aspects.



# RX & RVR STEAM TURBINES

## GENERAL CHARACTERISTICS

- 1 Improving the efficiency of cargo oil pump turbines
- 2 Reducing fuel consumption



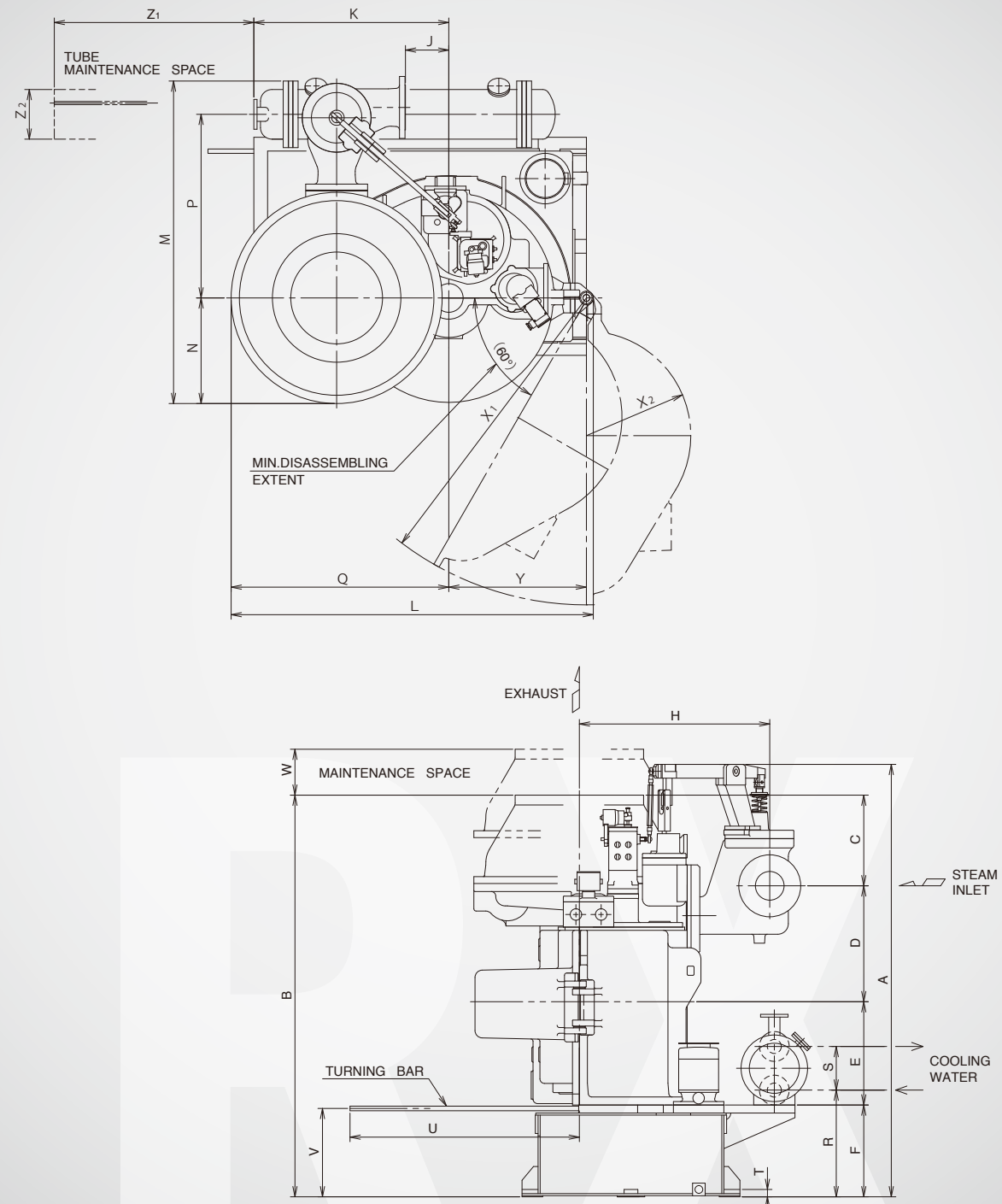
## SPECIFICATION

The vertical R models are Curtis single-stage or Rateau 3-stage steam turbines with a single reduction gear. We have the following 5 standard models classified by maximum output:

Item	Model	RX 0	RX 1	RX 2-2	RVR 1	RVR 2-2
<b>Type</b>		Curtis single-stage			Rateau 3-stage	
<b>Max. output</b>	(kW)	600	1300	1850	2000	4000
<b>Max. speed (turbine shaft)</b>	(min <sup>-1</sup> )	8500	7200	7200	7200	7200
<b>Max. reduction gear ratio</b>		6.45	6.65	6.06	6.11	7.17
<b>Inlet steam pressure</b>	(MPaG)	1.85				
<b>Inlet steam temperature</b>	(°C)	280				
<b>Exhaust steam</b>		-80kPa ~ 0.03MPaG				
<b>Rotation of output shaft</b>		Counter-Clockwise facing toward pump				
<b>Steam inlet bore</b>	(mm)	100	125	150	150	150
<b>Steam exhaust bore</b>	(mm)	300	400	500	500	600
<b>Lubrication system</b>		Forced lubrication (turbine oil ISO VG68)				
<b>Main LO pump</b>	(m <sup>3</sup> /h × MPaG)	5 × 0.1	8 × 0.1			
<b>Prim. LO pump</b>	(m <sup>3</sup> /h × MPaG)	7.2 × 0.04				
<b>LO tank</b>	(ℓ)	190	270	280	280	320
<b>LO cooler (S.W.)</b>	(m <sup>2</sup> )	3	4.8	5	5.7	7.3
<b>Cooling water required (S.W.)</b>	(m <sup>3</sup> /h)	8	15	15	15	20
<b>Speed regulating governor</b>		Woodward UG25+				
<b>Range of speed change</b>		Rated × 100 ~ 50%				
<b>Weight</b>	(kg)	2300	3500	4500	5500	6800



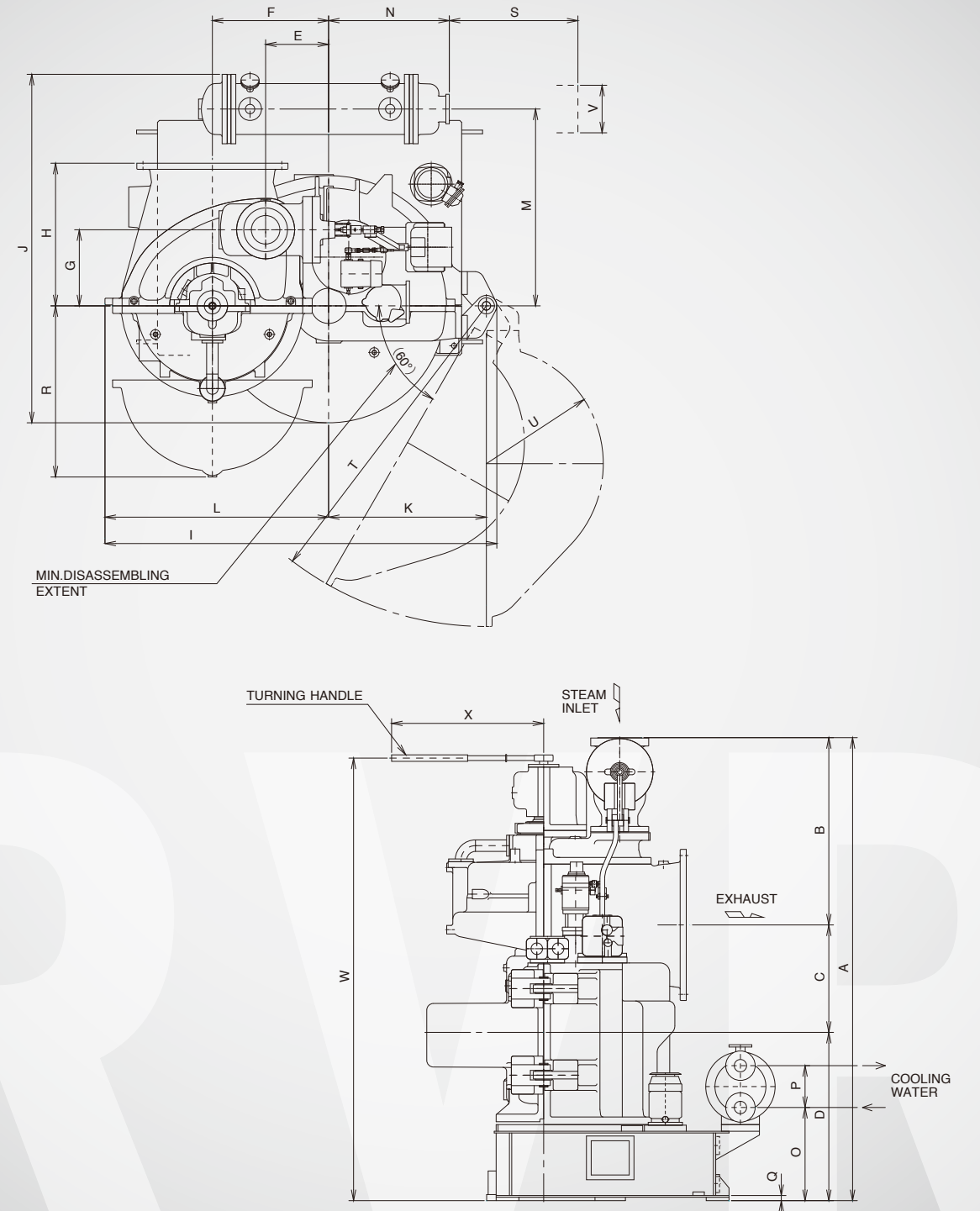
## RX



Dimensions : mm

Model	A	B	C	D	E	F	H	J	K	L	M	N	P	Q	R	S	T	U	V	W	X <sub>1</sub>	X <sub>2</sub>	Y	Z <sub>1</sub>	Z <sub>2</sub>
<b>RX 0</b>	1714	1500	280	455	405	360	600	107	830	1240	1207	382	680	676	425	190	32	1200	350	200	R1110	R385	530	650	200
<b>RX 1</b>	1890	1750	395	505	450	400	830	189	850	1580	1405	460	800	950	465	190	32	1200	385	200	R1338	R455	600	950	200
<b>RX 2-2</b>	1949	1780	405	495	480	400	830	255	970	1760	1527	532	850	1025	465	190	32	1200	360	200	R1540	R527	630	1150	200

## RVR



Dimensions : mm

Model	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
<b>RVR 1</b>	2420	920	620	880	233	513	400	650	1710	1527	680	988	880	630	465	190	14	810	1150	R1460	R510	200	2330	800
<b>RVR 2-2</b>	2435	985	565	885	331	611	400	750	2060	1833	830	1176	1035	635	490	220	27	900	850	R1690	R615	250	2330	800

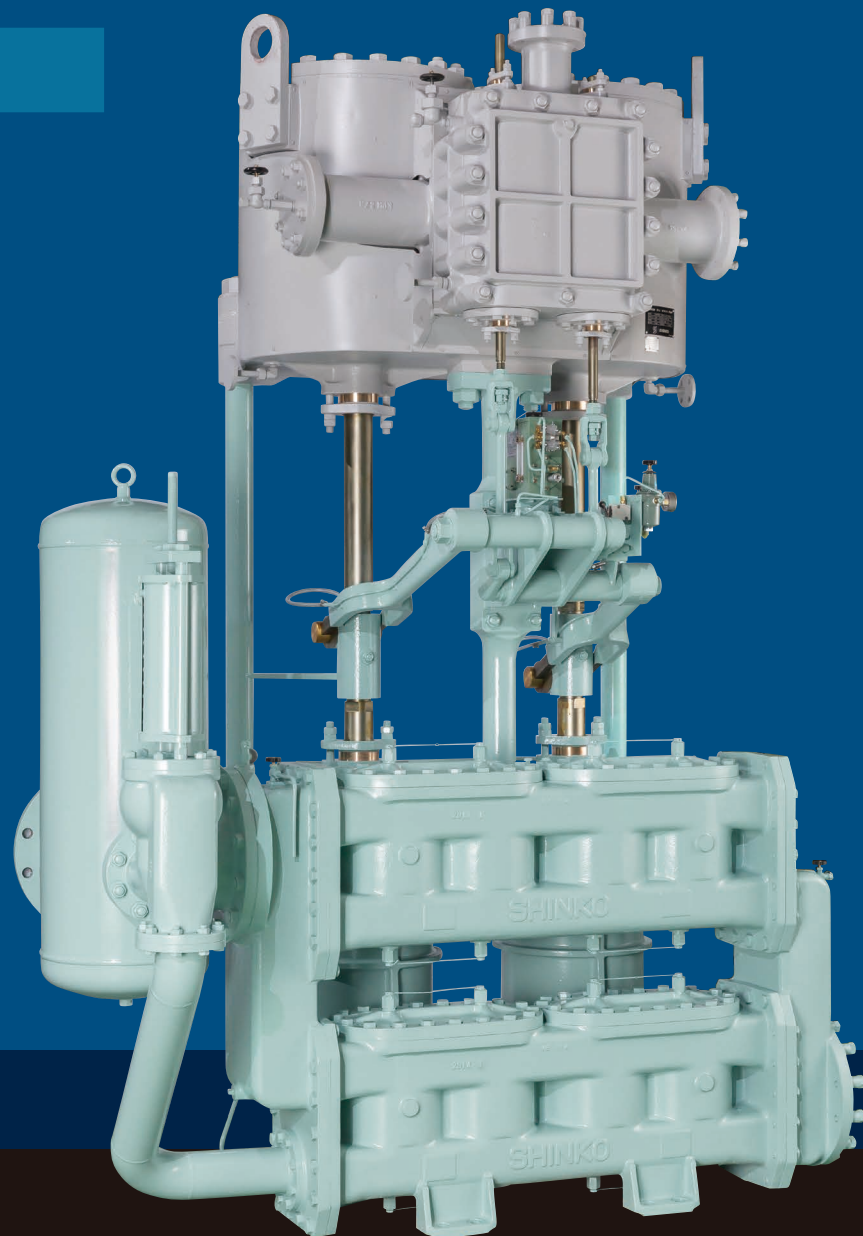


# KPH

## 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.



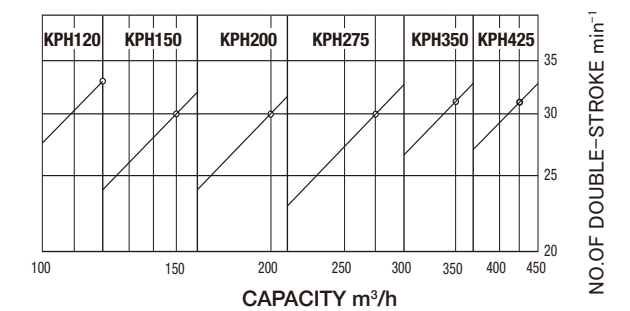
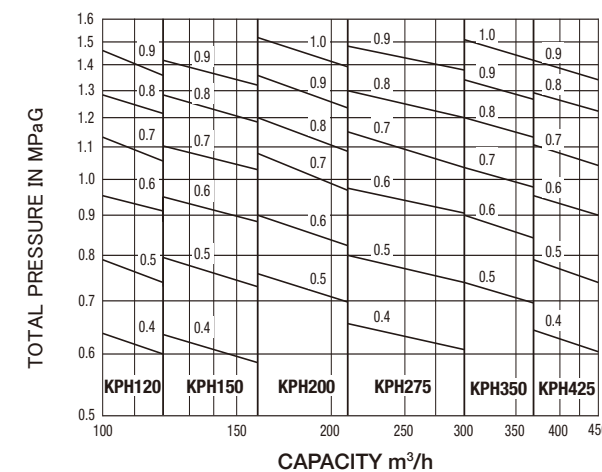
# KPH RECIPROCATING CARGO STRIPPING PUMPS

## SPECIFICATION

Item	Model	Model					
		KPH 120	KPH 150	KPH 200	KPH 275	KPH 350	KPH 425
Capacity(normal)	(m <sup>3</sup> /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 <sup>-1</sup> )	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).









# AUS

## AUTOMATIC UNLOADING SYSTEM

Shinko AUS automatic unloading systems have been developed to simplify the unloading of cargo from crude oil tankers and product carriers, and to reduce unloading time.



# AUS AUTOMATIC UNLOADING SYSTEM

## GENERAL CHARACTERISTICS

- 1 The anti-cavitation control operation
- 2 Unloading time can be reduced since the stripping work can be done by a large capacity cargo pump alone.
- 3 As stripping work can be performed automatically.
- 4 When applying this system to crude oil washing (COW), sludge control can be also performed.



## SPECIFICATION

Item	Model	Model						
		AUS 300	AUS 350	AUS 400	AUS 453	AUS 453A	AUS 454	AUS 502
Cargo pump model applied		KV 300	KV 350	KV 400	KV 450-3	KV 450-3A	KV 450-4	KV 500-2A
Separator (m <sup>3</sup> )		1.02	1.38	1.80	3.49	3.49	4.08	4.86
Discharge control valve		Pneumatic operated, non tight butterfly valve						
Loading air pressure (MPaG)		0.7						
Bore (mm)		300	350	400	450	500	500	550
Vacuum pump		Water ring type						
Model		NSW80 × 2sets				NSW100 × 2sets		
Maximum capacity (Nm <sup>3</sup> /h/set)		320				630		
Maximum vacuum (kPa)		-73						
Motor		22kW × 1200min <sup>-1</sup> × 2sets				37kW × 1200min <sup>-1</sup> × 2sets		
Sealing tank (m <sup>3</sup> )		0.21				0.29		
Gas extraction valve		Pneumatic operated, reverse action piston valve						
Loading air (MPaG)		0.6~0.7						
Bore (mm)		100				125		
Recirculation valve		Pneumatic operated, reverse action piston valve						
Loading air (MPaG)		0.6~0.7						
Bore (mm)		40				50		

Generally, the AUS 3002, 3502, 4002, 4532, 4532A, 4542 or 5022 are employed in product carriers, and are provided with one set of a vacuum pump unit for each cargo pump respectively. And the AUS 4532A/4542 is provided with one set of the NSW 80 vacuum pump unit instead of two sets of the NSW 100 vacuum pump units.



## CONTROL SYSTEM

This system has been installed to implement automatic cargo unloading with only cargo pumps to prevent not only cavitation but also gas and vapor intake.

The basic operation of this system is described as follows:

**1**

After starting the cargo pump, on the cargo control console:

- (1) The NOR/CLOSE selector, which acts on the gas extraction valve, is set to "NOR".
- (2) The control switch, which acts on the vacuum pumps, is set to "AUTO".
- (3) The AUTO/MANUAL selector, which acts on the discharge control valve, is set to "AUTO".

**2**

When approaching the final unloading stage, the cargo liquid level in the cargo tank lowers and part of the cargo becomes vapor, which accumulates in the upper portion of the separator, and the separator level begins to lower.

**3**

When the separator level lowers to 50%, the vacuum pumps start from an air signal sent from the level transmitter.

At the same time, the gas extraction valve is opened and the discharge control valve is throttled.

**4**

When the vapor is extracted by the vacuum pumps, the separator level rises again.

If the level rises to 70%, the gas extraction valve closes.

And, in 20 seconds, the vacuum pumps stop and the discharge control valve opens.

**5**

The above-mentioned unloading process is repeated many times so as to prevent the vapor from entering into the cargo pump when the vapor accumulates in the separator.

**6**

When the level in the cargo tank lowers further, a vortex takes place around the suction bell mouth and gas is taken in. This gas is separated from the cargo in the separator, and is accumulated at the upper portion of the separator, which is the same process as with the vapor.

**7**

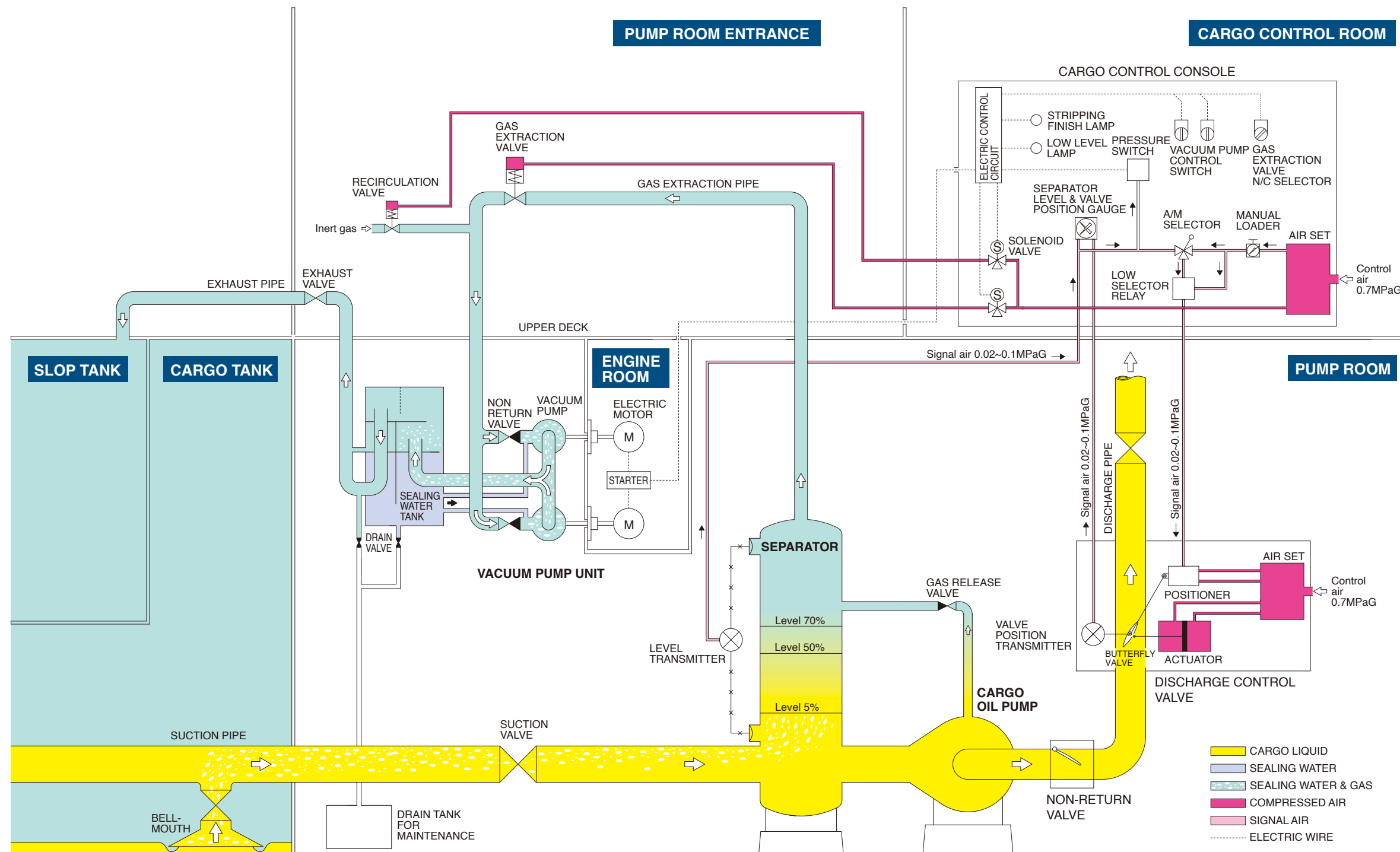
If the level in the cargo tank lowers much further, the liquid level around the bell mouth fluctuates heavily and a large amount of gas is taken in.

The separator level lowers substantially even if the two vacuum pumps continue to run simultaneously and the discharge control valve is at a very small opening degree.

If the separator level reaches 5%, the orange low level lamp on the console turns on to indicate that the unloading process has entered into the end of the stripping stage.

**8**

When this condition continues for about 3 minutes, the orange stripping finish lamp on the console flickers with a buzzing sound, which indicates the completion of the unloading work using this system.







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