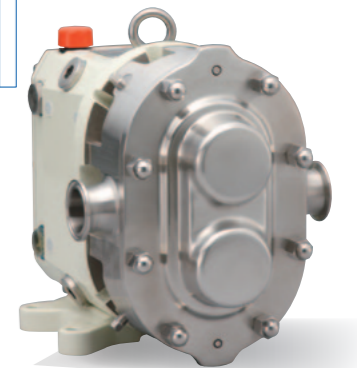
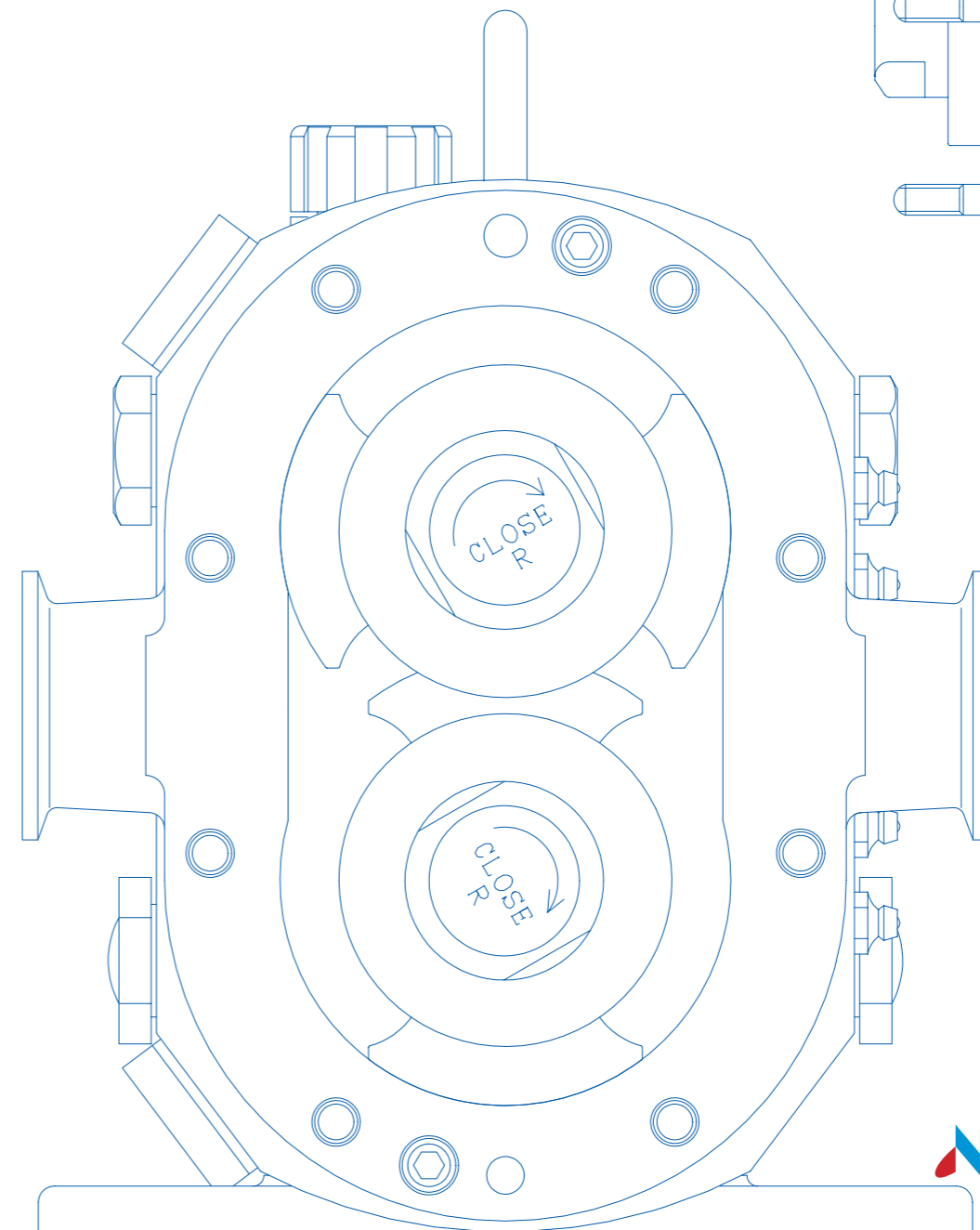
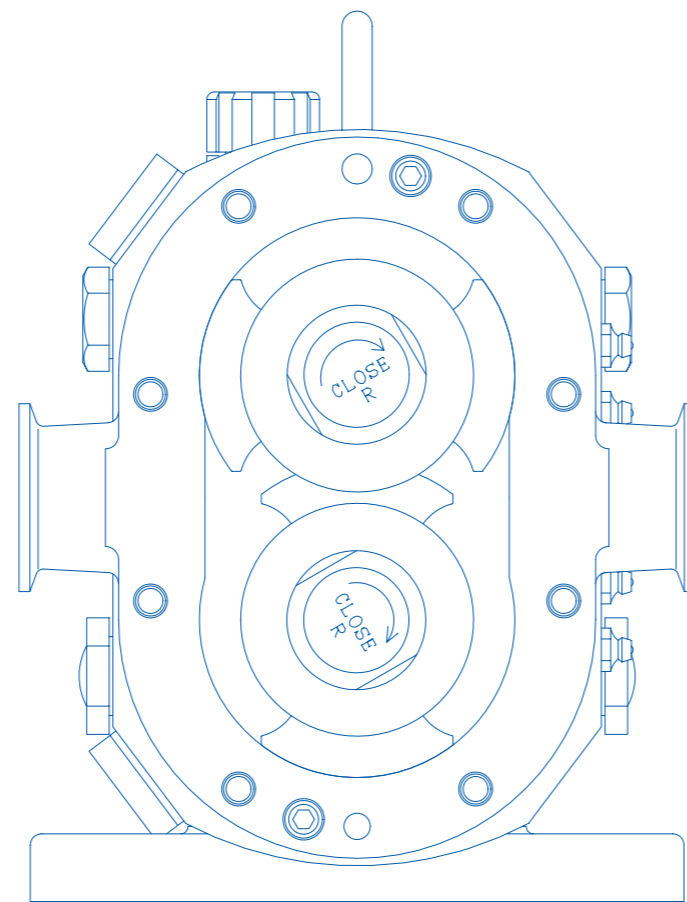


# ROTARY PISTON PUMP



Manufacture:  
**NAKAKIN CO.,LTD.**  
**PUMP DIVISION**

2-10-5 Kasuga Kitamachi Hirakata Osaka  
573-0137 Japan  
E-mail:pumpinfo@nakakin.co.jp  
www.nakakinpump.jp/e

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The contents of publishing  
may be changed without prior notice.

 **NAKAKIN**

# No.1 in Japan — One-Step Production. Nakakin expands to Europe, North America and world-wide!!

Since its founding in 1950, based on its die and casting technologies, Nakakin has worked actively in the automotive industry with firms such as Toyota and Mitsubishi Motors and so on. Nakakin supplies cast engine parts and develops and produces metal dies. Nakakin's technologies also produce quality pumps. Our unique one-step production ensures quality processing from primary raw-material cast products and parts production to pump assembly, performance testing, and direct shipping from our own factories. Valuing the suggestions and support of over 20,000 customers, Nakakin now accounts for Japan's largest rotary piston pump market share. Several hundreds of rotary piston pumps are sold in Germany and other European nations each year. Nakakin provides reliable quality products and services to customers in Europe, North America and world-wide.



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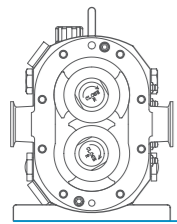
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JM/JO

JMU

SC

AMXN



# Special Features

## What makes Nakakin pumps special?

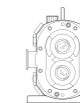
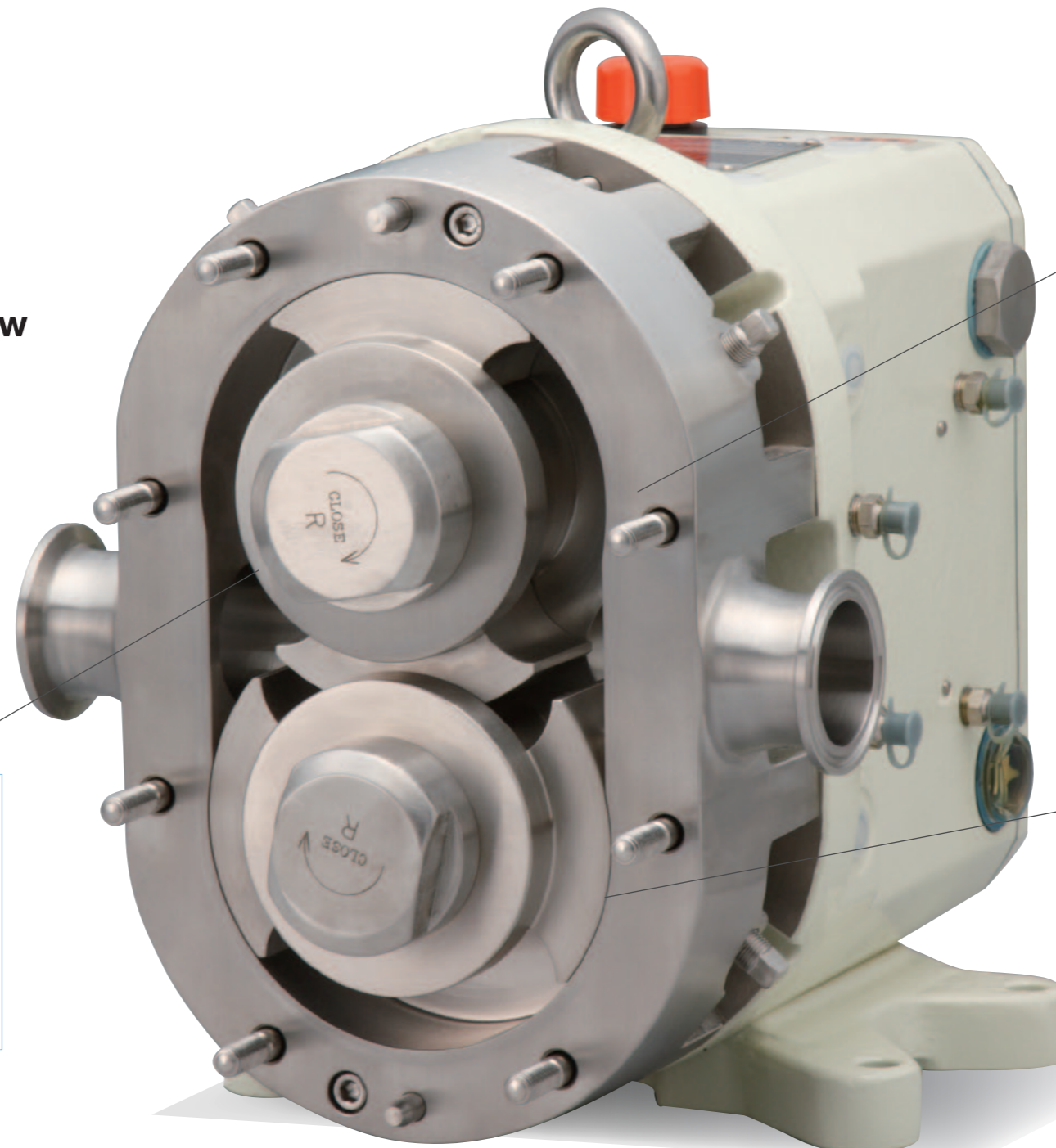


**With built in safety mechanism, Nakakin pumps offer excellent discharge capacity, suction and consistent volume flow not found in non-contact structure pumps.**

Nakakin covers all phases of product design, development, manufacture, and maintenance, done to produce high-quality high-performance pumps clearly incorporating customer needs. Certified by 3-A and European Hygiene Engineering and Design (EHEDG) and ensuring safety by performance-testing all pumps, Nakakin enjoys very high customer satisfaction.

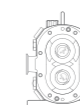
### Nakamura Metal No. 3

Years of carefully cultured technology have enabled Nakakin to develop a unique proprietary alloy — Nakamura Metal No.3. An original patented stainless-steel, Nakamura Metal No. 3 has less thermal expansion, achieving 70- $\mu$  clearance between the rotor and casing — the smallest in the industry. This minimum clearance contributes to high-performance discharge capacity, suction, and quantitative consistency unmatched by any competitor.



### Raw Material

In our foundry, Nakakin manufactures the major pump parts coming into contact with liquids — a practice only Nakakin provides. Nakakin's production starts with excellent engineers and artisans melting and pouring metal into molds to make raw parts. Nakakin's high-performance high-quality pumps are the result of Nakakin's corporate policy "Starting at ground level."



### Machining Accuracy and Assembly Precision

Nakakin inspects every single pump for accuracy. Undergoing approximately 100 inspection tests, including adjustment to the precision of one hundredth millimeter (10-micrometers), Nakakin pumps finish up in high-load operation testing to ensure safety. Extremely high machining accuracy and assembly precision helps reduce the number of parts needing adjustment, giving Nakakin pumps a superior, more durable life.



JM/JO

JMU

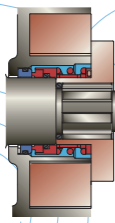
SC

AMXN

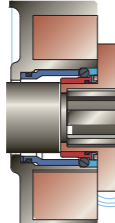
# Series

## JM/JO

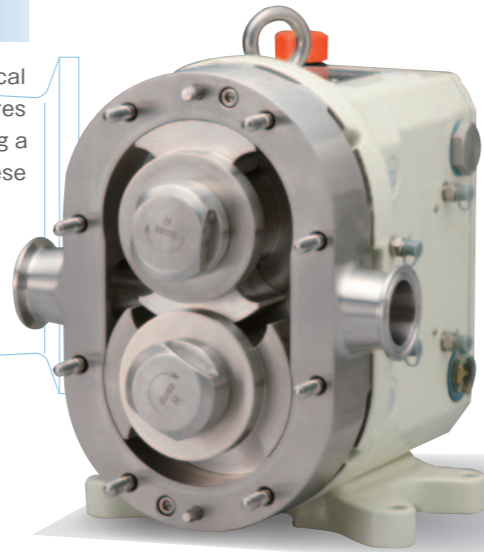
These models use inner seals, JM for mechanical sealing and JO for O-ring sealing. Simple structures making dismantling and reassembly easy and providing a long effective life with high performance make these models the most popular.



Mechanical Seal

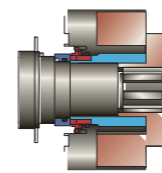


O-ring Seal

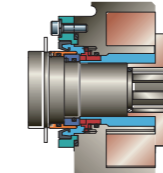


## JMU

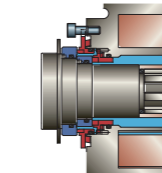
These models use outer mechanical sealing. Their simple structure makes dismantling and reassembly easy. Clients can select from single, quench, and tandem mechanisms. Designed to handle a wide variety of liquids, these models work especially well with corrosive and fiber-containing liquids.



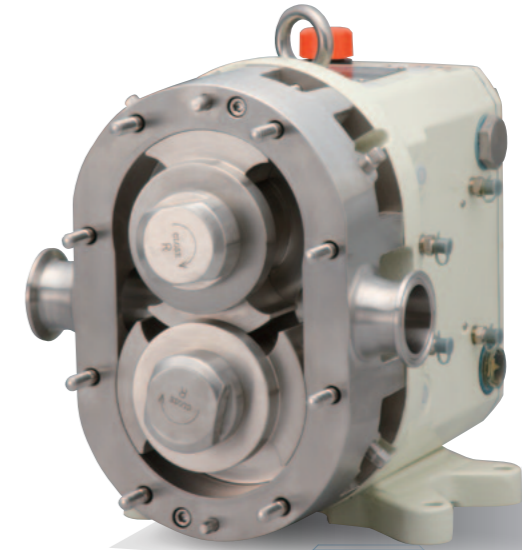
Single Mechanical Seal



Quenching Mechanical Seal



Tandem Mechanical Seal



# Supported by high quality and high performance, each of Nakakin's four pump types is unique.

A casting foundry combining Japan's technologies and excellence in Nakakin produces high quality and high performance rotary piston pumps. Our wide range of approaches to sealing includes using inside mechanical seals and outside mechanical seals to meet individual applications. Nakakin pumps are easy to clean, easy

to dismantle, and easy to reassemble.

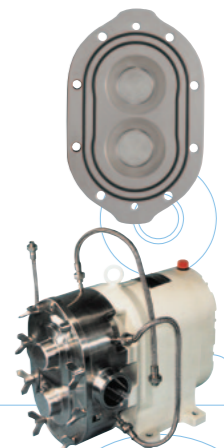
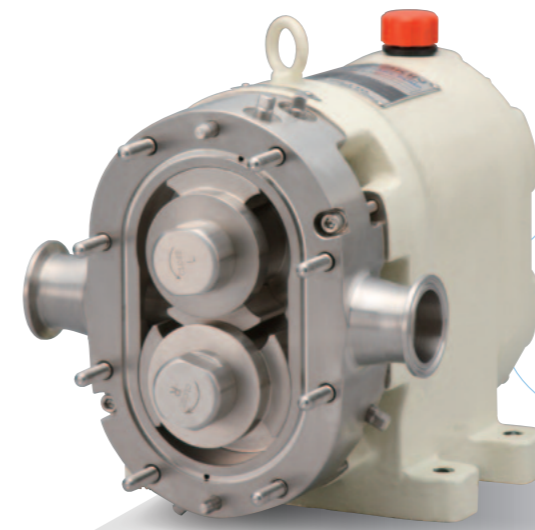
## SC

The SC type is specifically designed for cleaning and washing ease. Using a flat cover and eliminating bosses allows these pumps to provide effective washing and cleaning while leaving less liquid residue. The simple structure makes dismantling and reassembly easy.

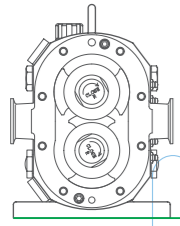


## AMXN

Designed for completely aseptic liquid distribution, these pumps isolate liquids completely from the atmosphere to ensure aseptic conditions. Distributing mediums such as sterilized water and steam, these models are suited to aseptic production lines of products requiring long-term preservation such as dairy products and medications.



JM/JO  
 JMU  
 SC  
 AMXN



# Industries

Japan's No.1 Rotary Piston Pump  
**NAKAKIN**

## With the motto "Suitable for all liquids", Nakakin leads the world market!!

Heeding customer comments and advice since 1950, Nakakin now has over 20,000 pump-using clients in industries including dairy products, food, beverages, and cosmetics. Due to our outstanding technology, Nakakin has secured an unrivalled market share.



Dairy

- Ice cream ● Cream ● Butter ● Margarine
- Cheese ● Evaporated milk ● Condensed milk ● Yoghurt



Foods

- Tomato paste ● Ketchup ● Sauce ● Yeast
- Bread dough ● Tofu ● Mayonnaise ● Baby food



Confectionery

- Sugar ● Honey ● Molasses ● Caramel syrup
- Bean paste ● Jam ● Marmalade ● Candy



Beverages

- Juice with pulp ● Concentrated juice ● Vegetable extracts ● Wine
- Coffee ● Green tea ● Sports drinks



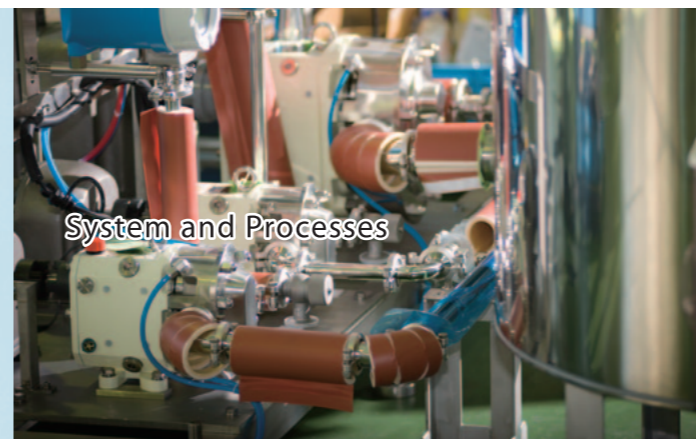
Cosmetics

- Lotion ● Shampoo ● Conditioner ● Skin cream
- Soap ● Emulsion ● Hair dye ● Toothpaste



Pharmaceuticals

- Artificial blood ● Artificial protein ● Liver oil ● Vitamin oil
- Pure water ● Essence ● Disinfectant ● Bottle



System and Processes

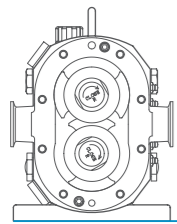
- Crystallisation ● Emulsifying ● Homogenising ● Metering
- Filling/Emptying ● Concentrating ● Drying ● Bottling



Other

- Paint ● Ink ● Petroleum ● Glue
- Emulsion ● Adhesives ● Detergents

JM/WF  
JMU  
SC  
AMXN



# Product Lineup

■ Vertical



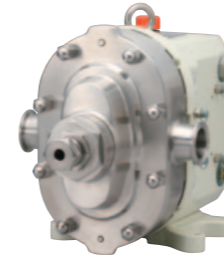
■ Rectangular Inlet



■ Jacket (Casing & Cover)



■ Vented Cover



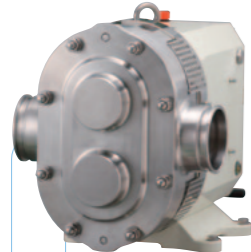
■ 3A



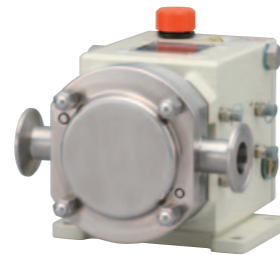
■ EHEDG



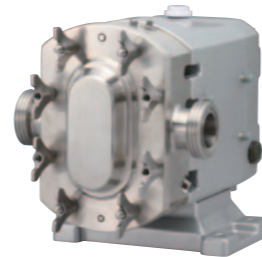
■ Big Pump  
(6s 1470L/min)



■ Mini Pump



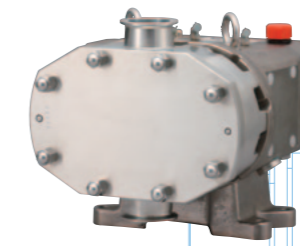
■ Customized Color



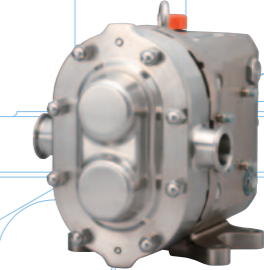
■ Buffing (Buff Finish)



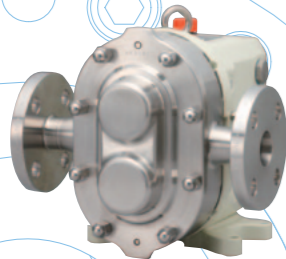
■ Nickel Coating



■ Super Nickel Coating



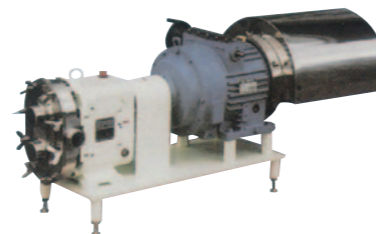
■ Pump  
with Flange Connection



■ Pump Unit



■ Unit  
with Variable Speed Changer



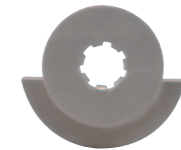
■ Unit with SUS Cover



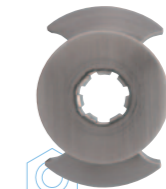
■ Unit Hopper  
for High Viscosity Liquids



■ Single Blade Rotor



■ Double Blade Rotor



## Only Nakakin's consistent one-step production provides all customer needs.

Continuously producing pumps best meeting customer needs, Nakakin's outstanding technology is widely recognized both in Japan and overseas. As this production system is flexible, please consult us about your particular needs and special requirements.

JM/JP

JMU

SC

AMXN



### Features and Benefits

#### Smallest Clearance

Special alloy "Nakamura Metal No.3" can make the smallest clearance between rotors and casing.

- Convey a constant volume of liquid.
- Self-priming
- Distribution of all levels of viscosity

#### Highest Degree of Cleanability

- Limited number of spaces within the pump for liquids to pool results in easy cleaning.
- Placed vertically with a CIP mechanism, this pump eliminates every last drop of liquid from the interior of the pump.
- Incredibly easy assembly /disassembly. Completely cleaned and sterilized with CIP & SIP processes. Standard: 95°C, High Temperature: 150°C

#### Maximum Discharge Pressure 1.0 MPa=10 bar

#### Special Features for SC

- Fixed Shaft Rotor . . . Disassembly / assembly is now a simple process. Because the shaft is fixed to the rotor, the rotor can be easily and accurately installed.
- Flat Head Rotor & Cover . . . The head of the rotor and the cover is flat. This dramatically minimises the spaces in which liquid pooling may occur.
- Super Clean Mechanical Seal . . . The mechanical seal is simple and compact in design. There are no O-ring grooves, which may trap liquids and this contributes to easy cleaning.
- Loosening the nut at the rear of the rotor unitized with the shaft enables easy disassembly, making it convenient for maintenance such as replacing mechanical seals.

#### Vertical and Horizontal

#### Double and Single Blade Rotors

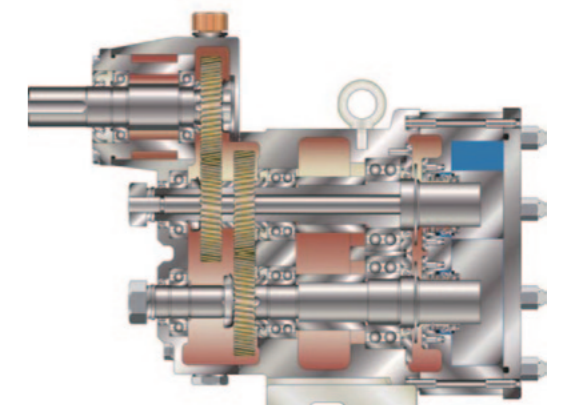


### Specifications

Size	Connection	Flow Rate
15	1.5s	70L/min
30	2s	125L/min
60	2s	240L/min
130	3s	480L/min



### Construction Diagram



Structural Drawing p33

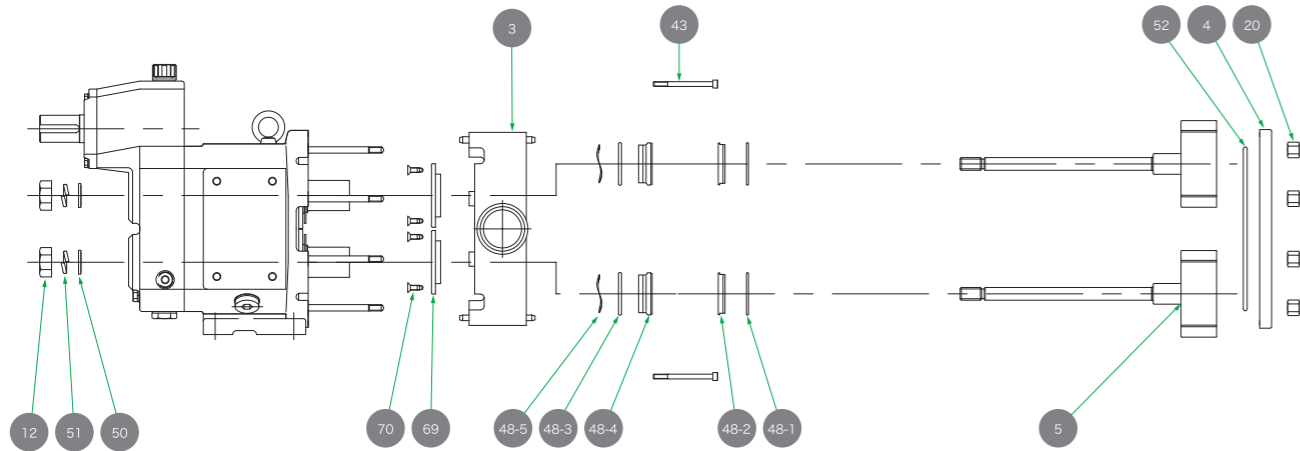
Codification Chart p34

Performance Curve p35

Dimensional Drawing p36

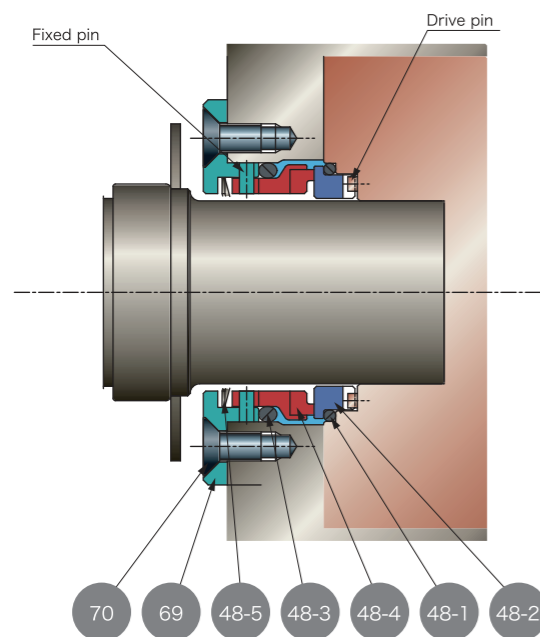


## Exploded view of components in contact with liquids



No.	Parts	No.	Parts
3	Casing	43	Cap bolt
4	Casing cover	50	Washer
5	Rotor	51	Spring washer
12	Nut	52	Cover O-ring
20	Hexagon cap nut		

## Mechanical Seal Structure



No.	Mechanical Seal
48-1	Mating ring O-ring
48-2	Mating ring
48-3	Primary ring O-ring
48-4	Primary ring
48-5	Wave spring
69	Mechanical seal retainer
70	Flathead screw for retainer

As an example

**C SC 15 T - VT - SM - Z**

① ② ③ ④ ⑤ ⑥ ⑦

- ① Kind of Option
- ② Pump Model
- ③ Pump Size
- ④ Material of Mechanical Seal
- ⑤ Material of O-ring
- ⑥ Connection
- ⑦ Installation Option

### ① Kind of Option

Mark	Contents
C	CIP JET Pump Type
D	Single Blade Rotor
F	Flushing Type
G	Jacket (Casing / Casing Cover)
HT	High Temperature Type (Max. 150°C)
K	Rectangular Port
Q	Quenching
S	Vacuum Type
V	Vertical Type
W	Tandem-Seal Type
T	Titanium Pump

### ② Pump Model

Model	Contents
SC	Super Clean Pump (Easiest Cleaning)

### ③ Pump Size

SC Series					
Size	Port	Max Speed (rpm)	Max Capacity (L/min)	Displacement (L/rev)	Max Pressure (bar)
15	1 1/2"	700	70	0.100	10
30	2"	450	125	0.277	10
60	2"	450	240	0.533	10
130	3"	450	480	1.066	10

### ④ Material of Mechanical Seal

Mark	Material
T	Tungsten Carbide & Tungsten Carbide
SS	Silicon Carbide & Silicon Carbide
SNT	Knife-Edge Silicon Carbide & Tungsten Carbide
TNT	Tungsten Carbide & Tungsten Carbide for Liquid Sugar
... Further Materials on Request	

### ⑤ Material of O-ring

Mark	Material
No Mark	NBR
VT	FKM
EP	EPDM
SI	Silicon
K	Kalrez
Y	PTFE

### ⑥ Connection

Mark	Contents
D	DIN11851
SM	SMS
DF	DIN Flange
TC	Tri-Clamp (ISO2852)
C	Clamp
F	Flange (Japanese Standard)
Z+Connection Mark	Different Port Size
... Further Connection Type on Request	

### ⑦ Installation Option

Mark	Contents
Z	Special Options (e.g.)
	- SUS316L/ Hastelloy (Wetted Materials)
	- SUS316/ SUS316L (Rotors)
	- Electrical Polish
CW	- Roughness of Surface (Ra ≤ 0.8)
	- Nickel Coating for Housing
CW	- Nickel Coating for Housing
	- Churning measure (e.g. Cream)

JM/JC  
 JM/JC  
 SC  
 AMXN

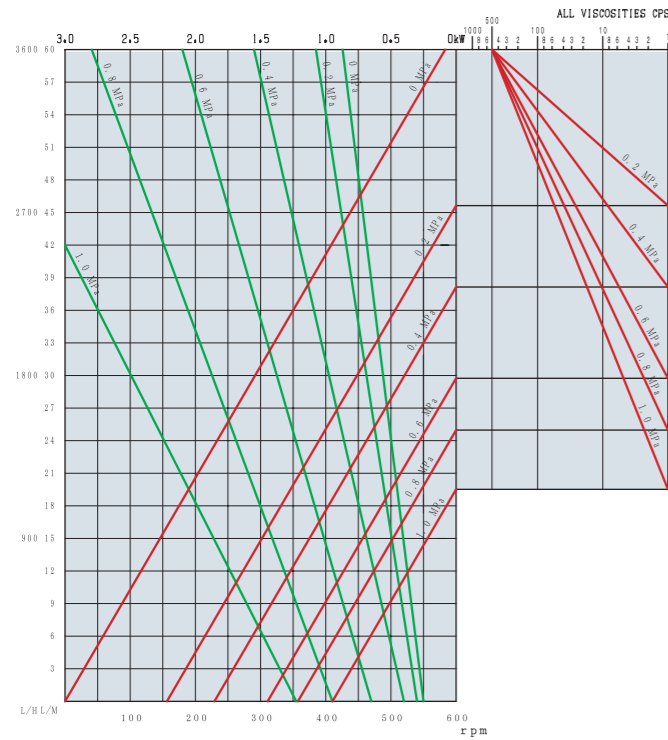


# SC Performance Curve

# SC Dimensional Drawing

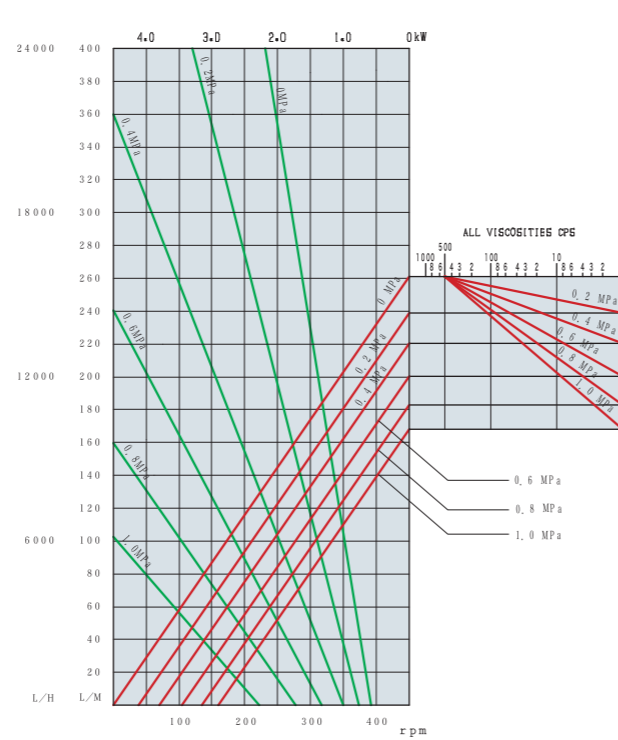
SC15

PORT SIZE 1.5"  
PRODUCT Water & Newtonian fluid



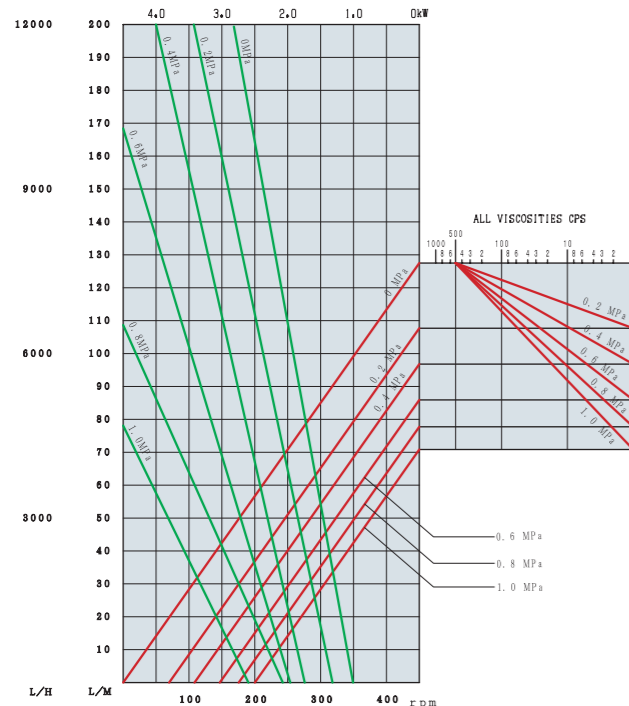
SC60

PORT SIZE 2"  
PRODUCT Water & Newtonian fluid



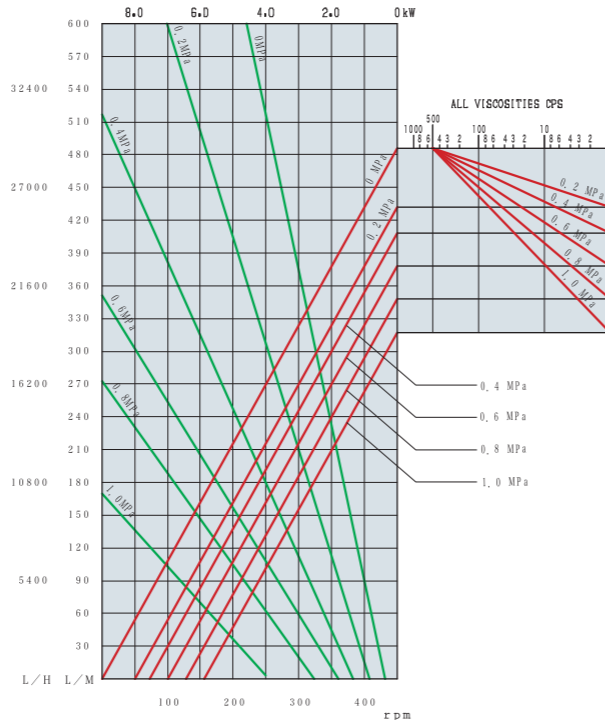
SC30

PORT SIZE 2"  
PRODUCT Water & Newtonian fluid



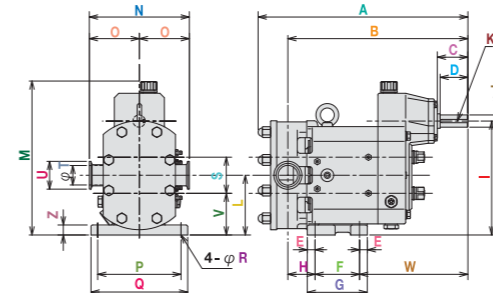
SC130

PORT SIZE 3"  
PRODUCT Water & Newtonian fluid



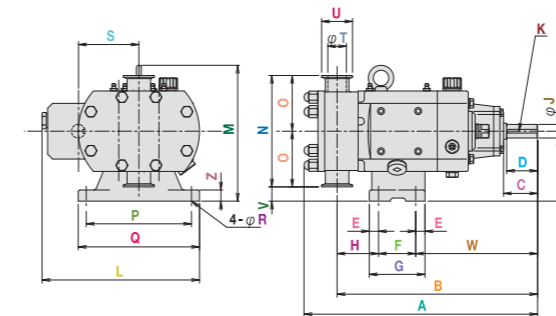
SC Series

Type Mark	SC15	SC30	SC60	SC130
A	377.5	477.5	547.5	577.5
B	324	380	470	485
C	55	56	65	65
D	50	50	60	60
E	14	15	20	20
F	80	99	115	115
G	108	129	155	155
H	49	60	80	80
I	205	259	358	358
J	22	34	45	45
K	Width 6	10	12	12
	Depth 3.5	5	5	5
L	107.5	133	185	185.5
M	276.5	340	459	459
N	180	217	270	270
O	90	108.5	135	135
P	150	174	230	230
Q	174	198	260	260
R	11	11	14	14
S	65	84	115	115
T	30	47	47	72
U	1.5s	2s	2s	3s
V	75	91	128	128
W	195	221	275	275
Z	18	20	23	23



VSC Series

Type Mark	VSC15	VSC30	VSC60	VSC130
A	377.5	477.5	547.5	577.5
B	324	380	470	485
C	55	56	65	65
D	50	50	60	60
E	15	15	20	20
F	60	75	125	125
G	90	105	165	165
H	67	84	70	85
I	113	140	150	150
J	22	34	45	45
K	Width 6	10	12	12
	Depth 3.5	5	5	5
L	254.5	296	407.5	407.5
M	219.5	251.5	300	300
N	180	217	270	270
O	90	108.5	135	135
P	170	196	280	280
Q	196	220	310	310
R	11	11	14	14
S	97.5	126	172.5	172.5
T	30	47	47	72
U	1.5s	2s	2s	3s
V	23	31.5	15	15
W	197	221	275	275
Z	18	20	23	23



※Actual performance may vary by application or product. ※Refer to page 20 for the interpretation of the chart.

※Size and weight may be changed without prior notice.

# One-step Manufacturing System

- Consult
- Manufacturing
- Quality Control
- Delivery & Support



Nakakin proposes semi custom made products that meet customers' specifications and requests. Nakakin offers not only the pump functions that best fit customers' products but also parts, materials and colors to suit customers' preferences.



Having started as a foundry, Nakakin uses casting know-how to manage consistent manufacturing from parts production to product assembly. Nakakin is proud of its, highly skilled artisans and technicians, capable of precision adjustment and assembly. This precision can not be achieved using machinery.

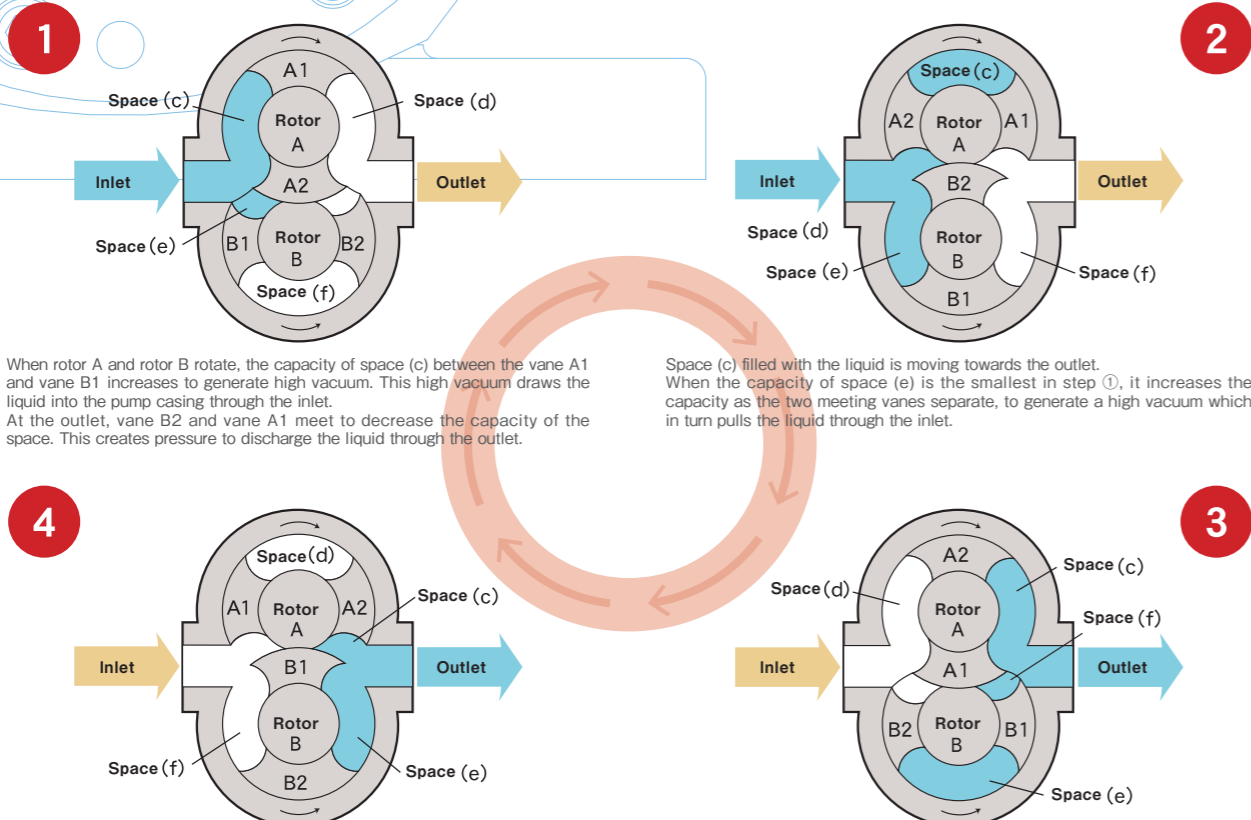


Nakakin products undergo as many as 100 inspection items and the tests are particular to the specifications of each pump. Only those pumps passing our stringent inspection and tests are delivered to customers. This ensures high performance and customer satisfaction.



Nakakin tailors its delivery and shipping to meet individual customer requirement. Nakakin offers a complete support system, supplying customer with consumable parts, maintenance and troubleshooting.

## Operating Principle

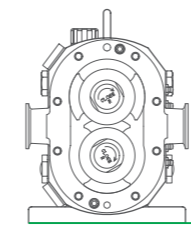


When rotor A and rotor B rotate, the capacity of space (c) between the vane A1 and vane B1 increases to generate high vacuum. This high vacuum draws the liquid into the pump casing through the inlet. At the outlet, vane B2 and vane A1 meet to decrease the capacity of the space. This creates pressure to discharge the liquid through the outlet.

Space (c) filled with the liquid is moving towards the outlet. When the capacity of space (e) is the smallest in step ①, it increases the capacity as the two meeting vanes separate, to generate a high vacuum which in turn pulls the liquid through the inlet.

With the two rotors in this position, the capacity of space (c) becomes the smallest. The pump returns to step ① to repeat the pumping cycle again.

When vane B1 and vane A2 meet, the capacity of space (c) decreases to generate pressure. This causes the liquid to be pumped out through the outlet. The capacity of space (d) increases when the two rotors rotate to separate the two vanes. This creates a vacuum to pull the liquid in.



# CIP JET Function

## What is CIP JET function?

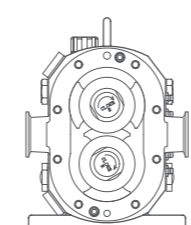
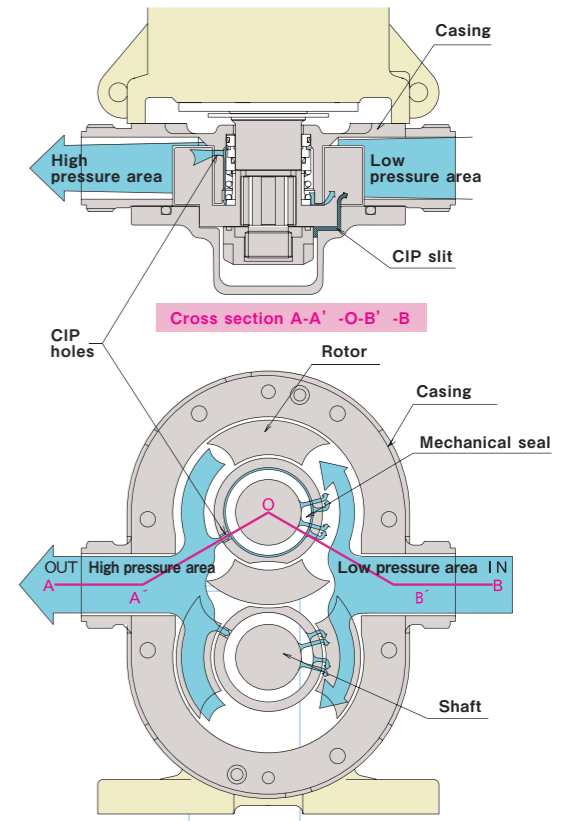
- The CIP JET function improves cleanliness inside the pump (portions in contact with liquid) during the clean-in-place (CIP) process. A sufficient amount of cleaning agent reaches inside the pump casing shafts, which are the most difficult parts to wash. This is why the CIP JET function alone cleans inside the pump without disassembling.
- Prevents liquid from changing its characteristics caused by liquid buildup. The inside profile of the pump casing shafts (portions in contact with a liquid) is designed to avoid liquid buildup. This reduces liquid degradation.

## Operating Principles

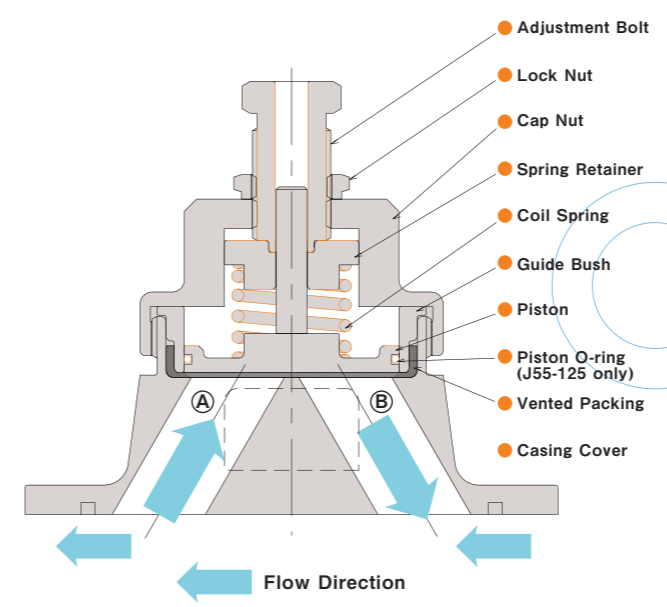
The CIP JET function uses a pressure difference that exists between the inlet and outlet of the pump. Pumps with the CIP JET function have four "CIP JET holes and slits".

### Operating sequence of CIP JET flow

- The rotors of a pump equipped with the CIP JET function turn.
  - A pressure difference is generated between the inlet (low pressure area) and the outlet (high pressure area).
  - The liquid is pushed back from the high pressure area (outlet) to the low pressure area (inlet) through the CIP JET holes and slits.
  - The suction motion of the pump generates a force that extracts the liquid at the low pressure area.
- Repeating steps (1) to (4), continues high pressure liquid flow.



# Vented Cover Function



## Advantages

The automatic pressure regulation protects the pump from failure and mechanical problems.

## Operating Principles

The "spring" and "piston" of the vented packing normally send pressure towards the portions of the pump that are in contact with the liquid. When the pressure inside the pump (or portions in contact with the liquid) becomes higher than the pressure exerted by the spring, the pressure difference pushes the vented packing up in the opposite direction from the portions in contact with the liquid. This causes the liquid to reverse its flow through bypasses A and B, suppressing the pressure increase inside the pump (portions in contact with the liquid).



# Company Profile

## Overview

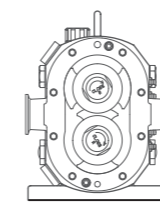
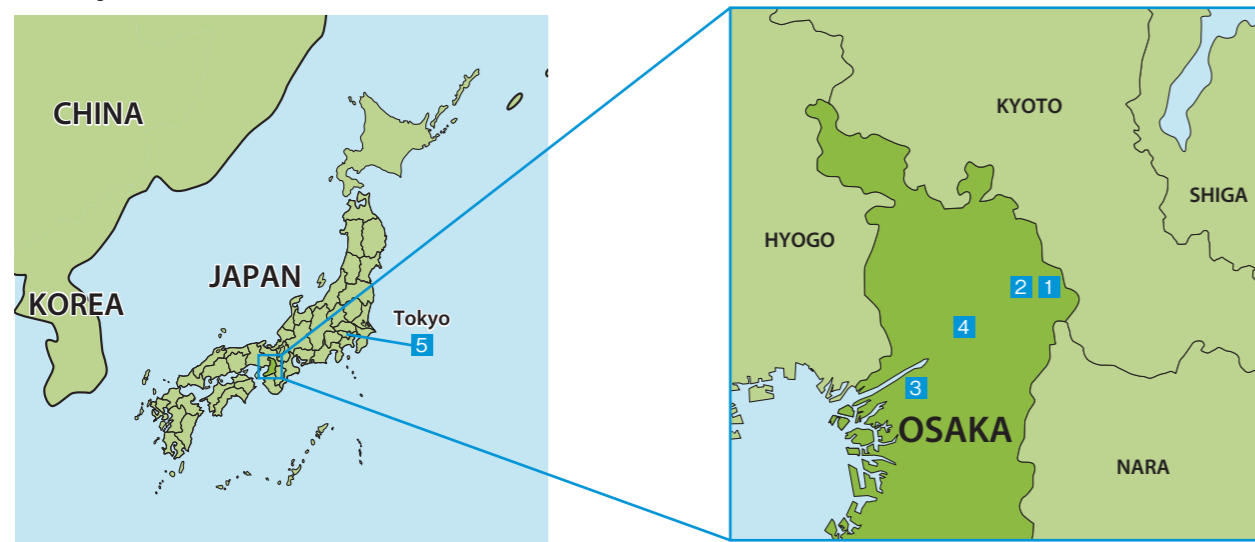
Company Name NAKAKIN CO., LTD  
 President Takuji Ehomoto  
 Established March 1964 (Founded in 1950)

Capital 84 million yen  
 Employees 450

## History

- |           |  |           |   |
|-----------|--|-----------|---|
| Sept.1950 | Nakamura Metals & Casting Co. was founded by Shigezo Nakamura, the father of Mitsuo Nakamura, the chairman. There were then two departments: pattern and metal mold making, and aluminum and copper alloy casting. | Sept.1986 | Nakamura Seiko was established in Nangoku City, Kochi Prefecture.   |
| Nov.1970  | The Metal Mold Division was moved to its newly built premises, Torikai Plant (Metal Mold Division)at Higashihitotsuya in Settsu City, Osaka Prefecture.  | May1989   | The Head Office Building was constructed in Yodogawa-ku, Osaka City.  |
| Dec.1972  | The business of Nakamura Metal Co., Ltd. was merged with the Yodogawa plant (Valve Division) of the Nakamura Metallic Industry Co., Ltd. and renamed.  | April1992 | The new Kasuga Plant was constructed in Kasuga-kitamachi, Hirakata City.  |
| April1973 | Rotary piston pumps were manufactured and sold at the Hirakata Plant for the first time under our own brand name. The Industrial Precision Machinery Division (Pump Division) was established.                     | April1993 | The company name was revised to Nakakin Co., Ltd.   |
| May1982   | The Tokyo pump Office (Industrial Precision Machinery Division) was opened.  | May1995   | Our overseas affiliated company, P.T.Nakakin Indonesia was established in Jakarta, Republic of Indonesia, as the first overseas production base. Its capital was 100% provided by Nakakin Co., Ltd. |
|           |  | Nov.2002  | Hirakata Plant and Kasuga Plant received ISO9001 certification.   |
|           |  | March2005 | Head Office and Hirakata Plant and Kasuga Plant received ISO14001 certification.  |
|           |  | Jan.2012  | The Europe office was opened in Germany.  |

## Map



# Technical Information

## Performance

- Flow rate up to 90,000 l/h
- Screw-type mounting foot for horizontal and vertical installation
- Flow Direction: Left↔Right : Up↔Down

## Product Viscosity

- Up to 300,000 mPas

## Materials

- Pump housing and cover: stainless steel (1.4571/AISI 316)
- Double blade rotors : Patented alloy

## Colors

- Munsell 7.5 GY 9/2
- RAL-lacquer coatings on request

## Mechanical Shaft Seal

- Carbon/Ceramics
- Tungsten Carbide
- Silicon Carbide
- Further materials on request

## Design

- Easy stock-keeping and spares inventory due to standardized sizes
- Operation pressure up to 15 bar
- Suction head up to 9 mWS

## Connections

- Male parts (DN), DIN 11851 (Standard)
- SMS
- Aseptic flanges DIN 11864-2
- Aseptic Screwed Connection DIN 11864-1
- Tri-clamp, ISO 2852
- Further connection types on request

## Sealing Material of O-Rings

- Viton
- EPDM
- Further materials on request

## Temperature Resistance

- Up to 95°C (Standard Model)
- Optional up to 150°C (High Temperature Model)

## JM • JO • JMU Series

Sizes	4	10	16	25	40	55	125	160	200	300
Max. rpm[ $\text{min}^{-1}$ ]	800	800	600	450	450	450	450	450	450	450
Max. Pressure[bar]	7	15	15	15	15	15	15	15	15	15
HP*1 Max. Pressure[bar]	-	15	15	15	15	15	15	15	15	15
Size of Connection [Inch/DN]	1/25	1.5/40	1.5/40	1.5/40	2/50	2/50	2.5/65	4/100	4/100	6/150
Max Feeding Capacity*2 [liter/minute]	20	40	60	100	135	270	410	710	930	1470
Max Feeding Capacity*2 [liter/hour]	1200	2400	3600	6000	8100	16200	24600	42600	55800	88200

\*1: HP = High Pressure Version \*2:Based on water without counter pressure,i.e. approx. 1 mPas/0 bar

JM JO JMU

## SC Series

Sizes	15	30	60	130
Max. rpm[ $\text{min}^{-1}$ ]	700	450	450	450
Max. Pressure[bar]	10	10	10	10
Size of Connection [Inch/DN]	1.5/40	2/50	2/50	3/6.5
Max Feeding Capacity*2 [liter/minute]	70	125	240	480
Max Feeding Capacity*2 [liter/hour]	4200	7500	14400	28800

\*2:Based on water without counter pressure,i.e. approx. 1 mPas/0 bar

## AMXN Series

Sizes	2400	3400	7000	10000	14000	24000
Max. rpm[ $\text{min}^{-1}$ ]	800	600	450	450	450	450
Max. Pressure[bar]	7	7	7	7	7	7
Size of Connection [Inch/DN]	1.5/40	1.5/40	2/50	2/50	2/50	3/65
Max Feeding Capacity*2 [liter/minute]	41	57	110	176	270	430
Max Feeding Capacity*2 [liter/hour]	2460	3420	6600	10560	16200	25800

\*2:Based on water without counter pressure,i.e. approx. 1 mPas/0 bar

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JMU

SC

AMXN