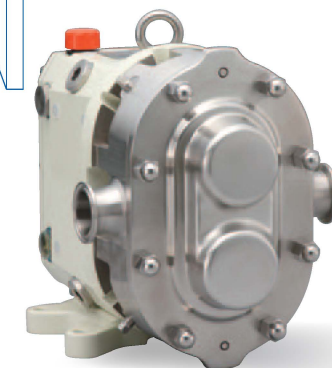
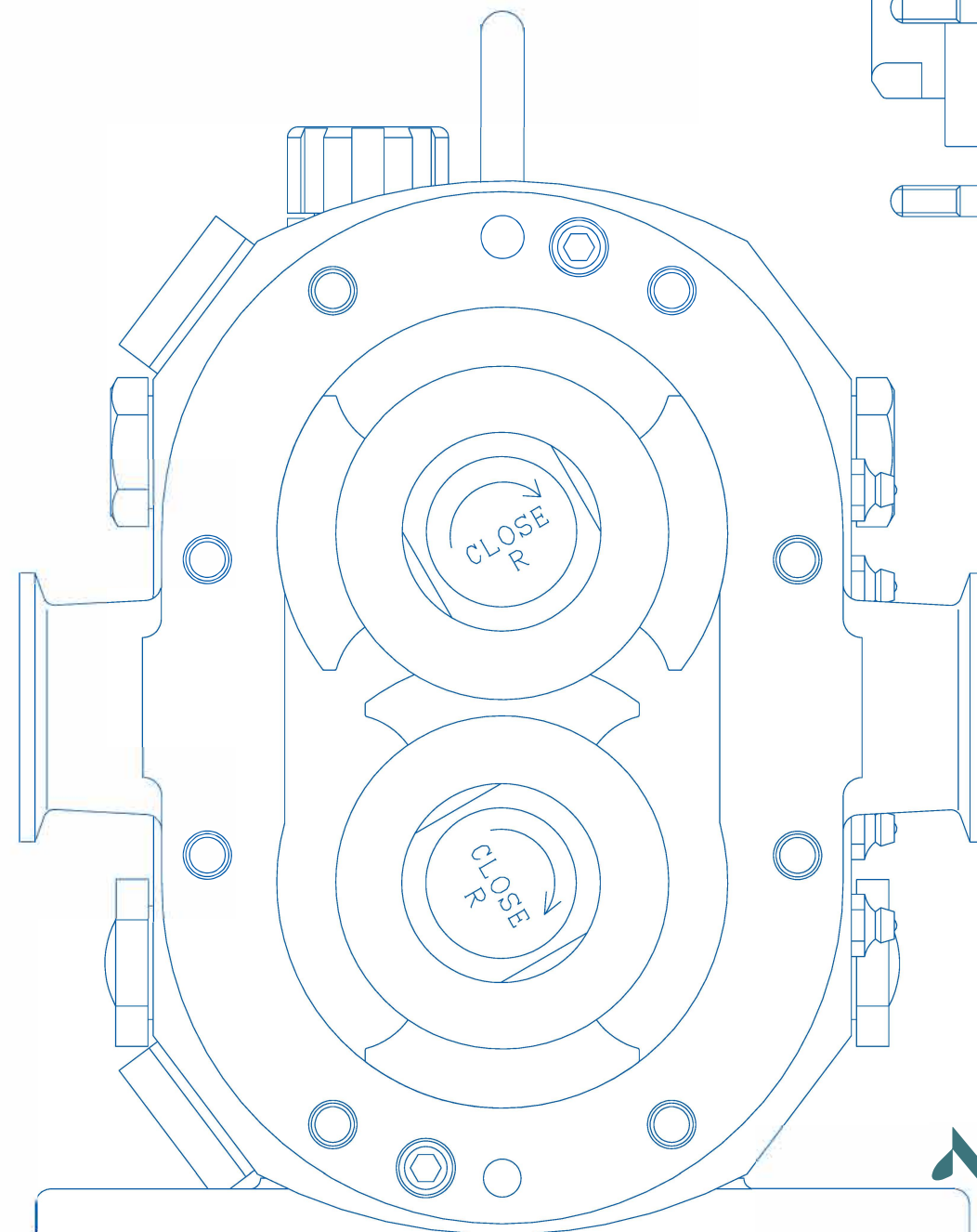
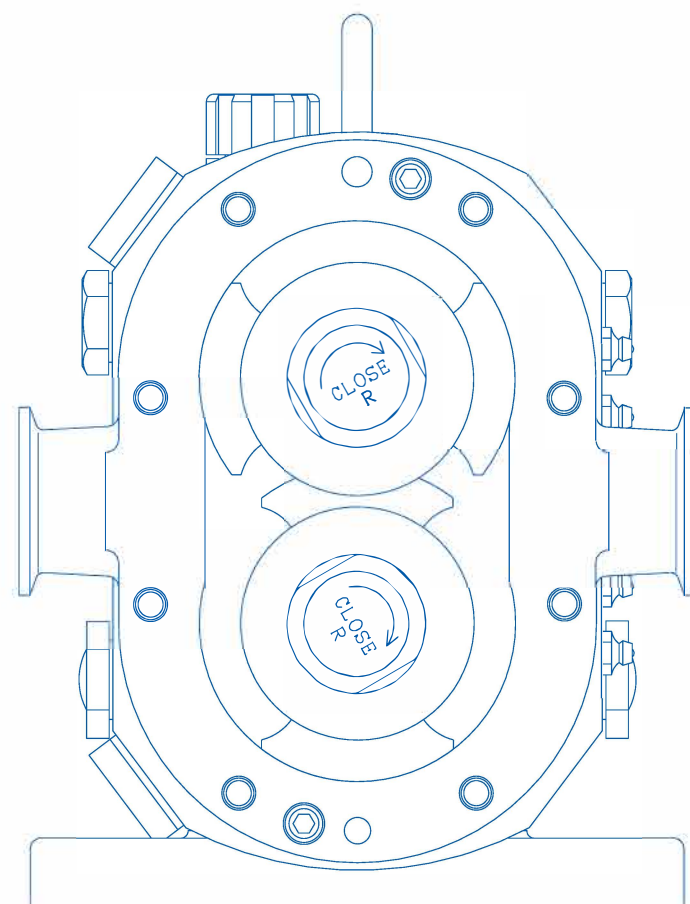


# ROTARY PISTON PUMP



In Deutschland vertreten durch:



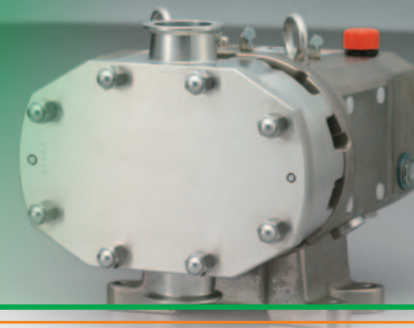
Authorized Distributor of  
INGERSOLL RAND ARO  
FLUIDMIX  
FLOWROX  
NAKAKIN

WP-ARO GmbH    Tel.: +49 6023 9643-70    info@wp-aro.de  
Philipp-Reis-Straße 2    Fax.: +49 6023 9643-77    www.wp-aro.de  
D-63755 Alzenau



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The contents of publishing  
may be changed without prior notice.





### 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

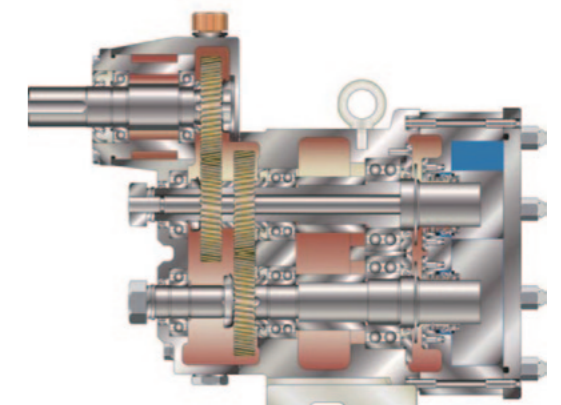


### Specifications

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



### Construction Diagram

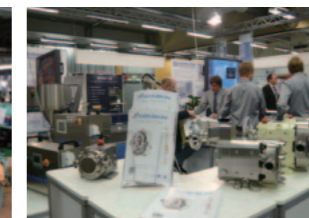


Structural Drawing p33

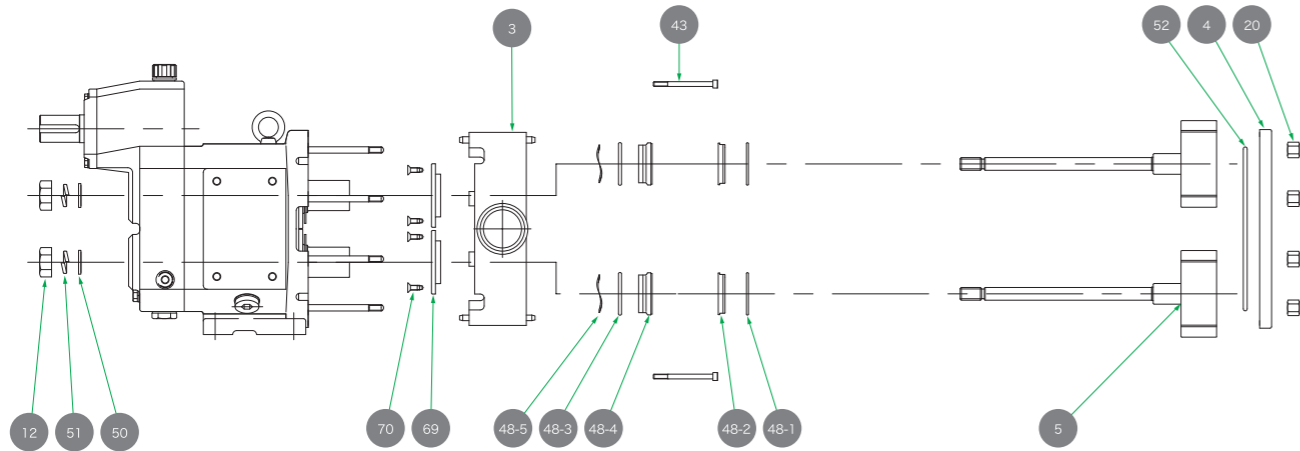
Codification Chart p34

Performance Curve p35

Dimensional Drawing p36

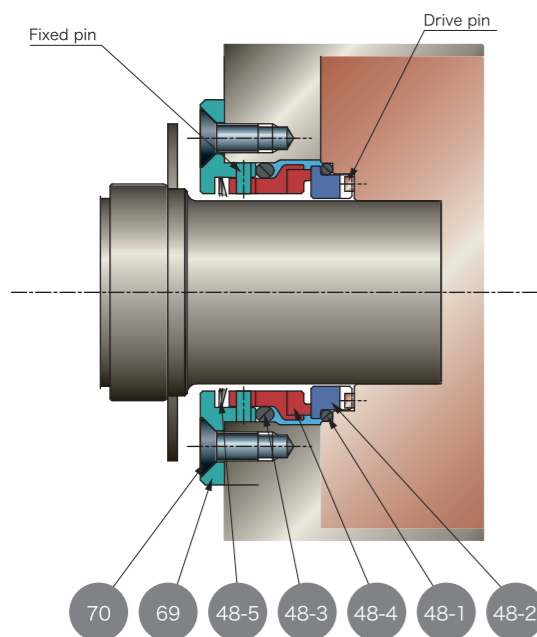


## Exploded view of components in contact with liquids



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

### 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	

### ② Pump Model

Model	Contents
SC	Super Clean Pump (Easiest Cleaning)

### 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)

### 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

JM/JC  
JMU  
SC  
AMXN

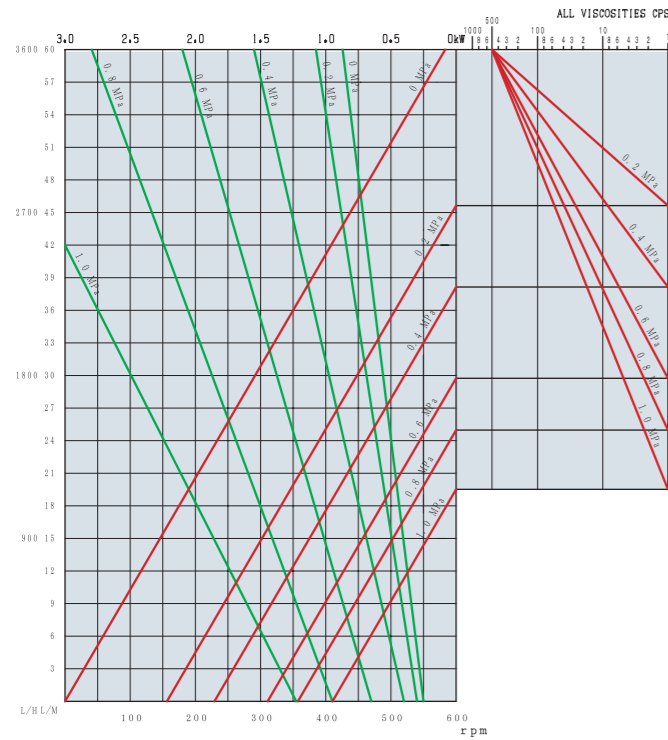


# SC Performance Curve

# SC Dimensional Drawing

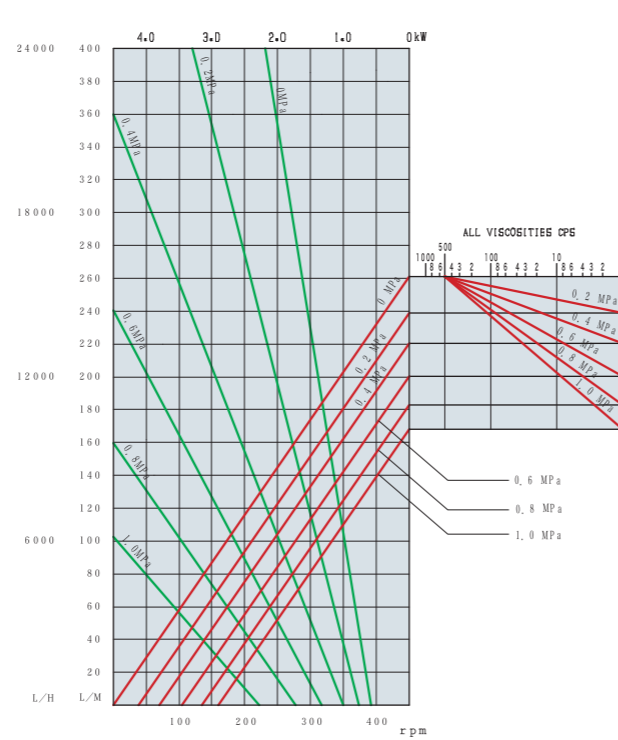
SC15

PORT SIZE 1.5"  
PRODUCT Water & Newtonian fluid



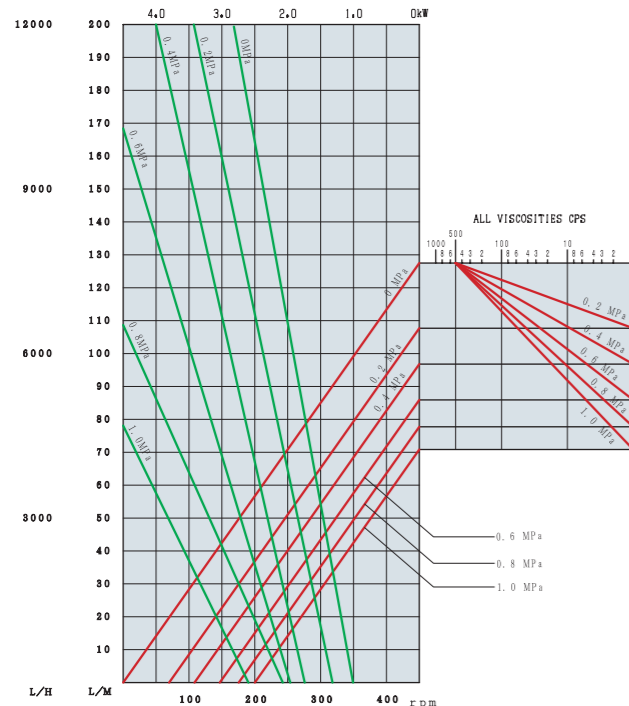
SC60

PORT SIZE 2"  
PRODUCT Water & Newtonian fluid



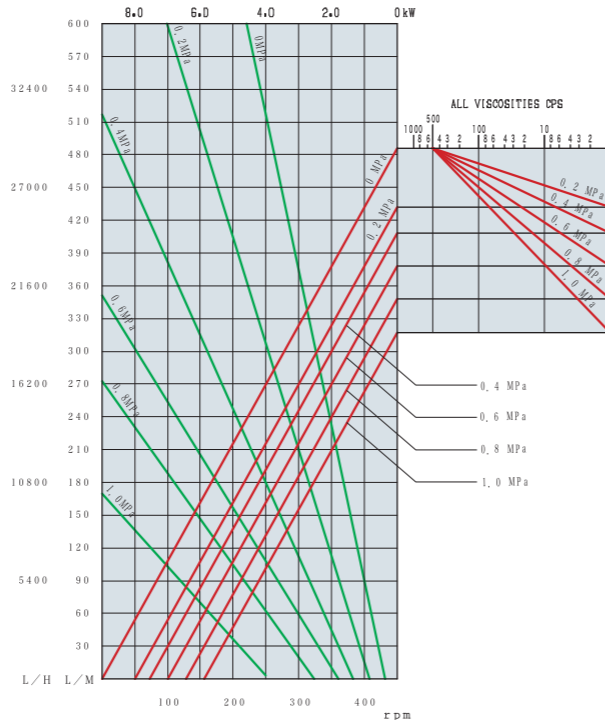
SC30

PORT SIZE 2"  
PRODUCT Water & Newtonian fluid



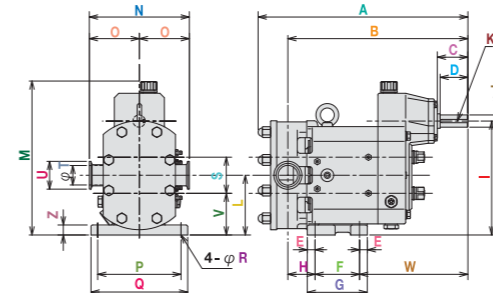
SC130

PORT SIZE 3"  
PRODUCT Water & Newtonian fluid



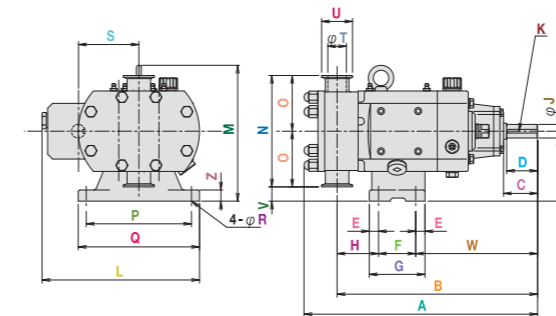
SC Series

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.



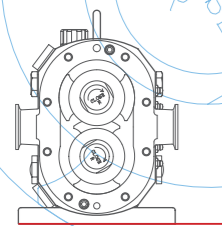
Having started as a foundry, Nakakin uses casting know-how to manage consistent manufacturing from parts production to product assembly. Nakakin is proud of its, highly skilled artisans and technicians, capable of precision adjustment and assembly. This precision can not be achieved using machinery.



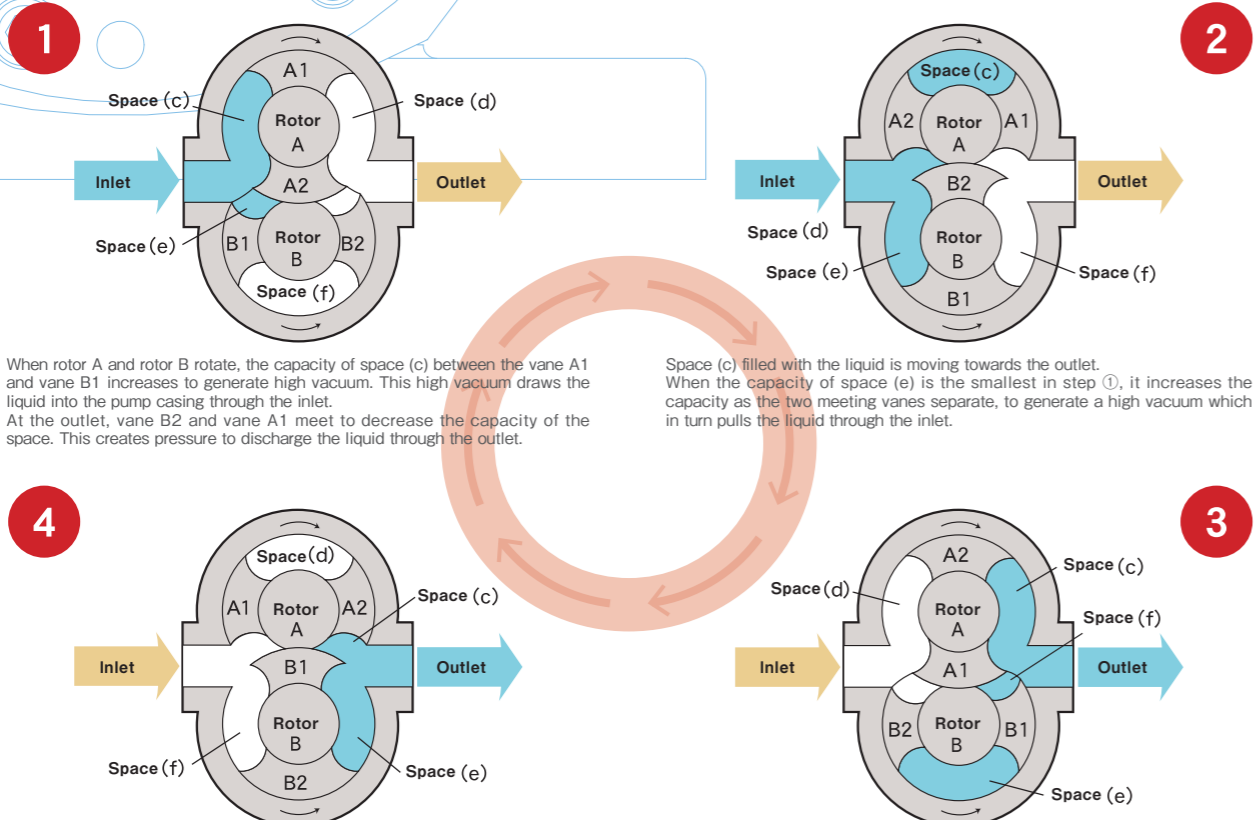
Nakakin products undergo as many as 100 inspection items and the tests are particular to the specifications of each pump. Only those pumps passing our stringent inspection and tests are delivered to customers. This ensures high performance and customer satisfaction.



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

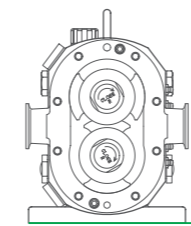


When rotor A and rotor B rotate, the capacity of space (c) between the vane A1 and vane B1 increases to generate high vacuum. This high vacuum draws the liquid into the pump casing through the inlet. At the outlet, vane B2 and vane A1 meet to decrease the capacity of the space. This creates pressure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

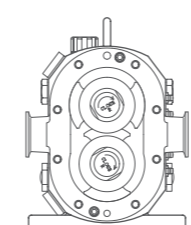
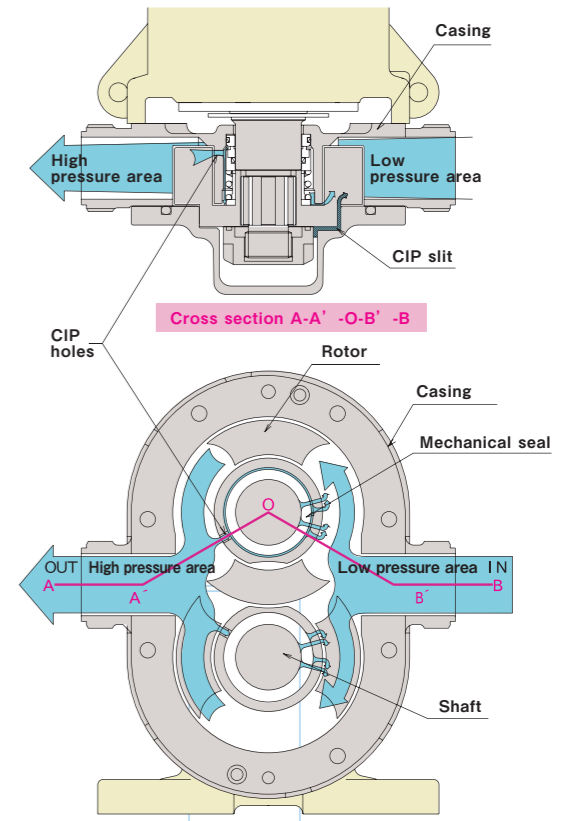
- The CIP JET function improves cleanliness inside the pump (portions in contact with liquid) during the clean-in-place (CIP) process. A sufficient amount of cleaning agent reaches inside the pump casing shafts, which are the most difficult parts to wash. This is why the CIP JET function alone cleans 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

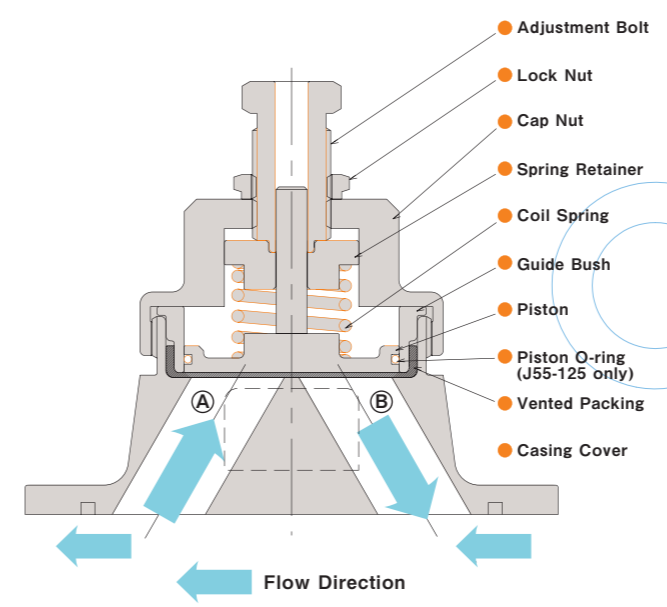
The CIP JET function uses a pressure difference that exists between the inlet and outlet of the pump. Pumps with the CIP JET function have four "CIP JET holes and slits".

### 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).

JM/JC  
JM/JC  
SC  
AMXN



# Company Profile

## Overview

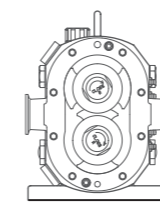
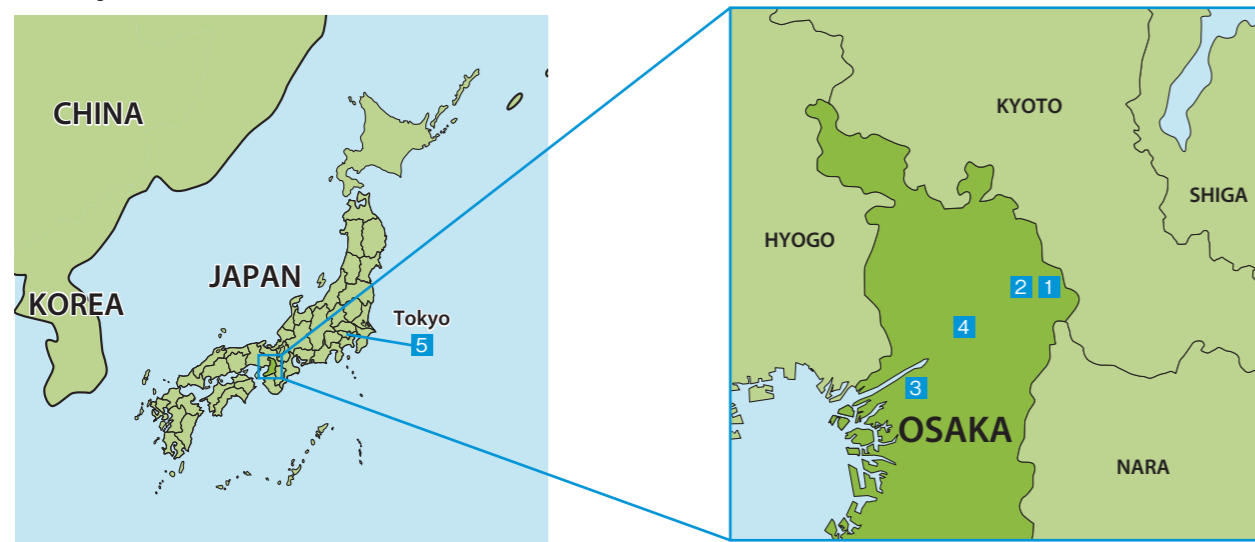
Company Name NAKAKIN CO., LTD  
 President Takuji Ehomoto  
 Established March 1964 (Founded in 1950)

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

JM/JO  
 JMU  
 SC  
 AMXN