Electro-Magnetic Separator

Model: CS type

INSTRUCTION MANUAL

Nippon Magnetics, Inc.

Contents

Preface/Cautions for Safety

Preface

Thank you very much for the purchase of our Electro-Magnetic Separator CS type. Please read this Instruction Manual beforehand in order to use it safely and correctly.

＜Cautions for Safety＞

DANGER

(1) Caution to magnetism

Please don't bring electronic cards, medical instruments, electronic instruments, precision instruments, etc. close to the Separator. There is a fear of loss of data and wrong operation because of magnetism.

(2) Caution to blow-off

Don't open connected parts of inlet and outlet while powdered material flows.

There is a fear of power entering into eyes and mouths.

When it enters, consult a doctor immediately.

(3) Caution to an electric shock

Don't open a cover of each terminal box.

There is a fear of an electric shock, which causes danger to Human bodies.

NOTICE

(1)Shock, vibration, inclination

Any shock, vibration, inclination, etc. given to electro-magnetic coil in Coil Case may cause a failure of insulation.

(2)Disassemble

Don't disassemble electro-magnetic coil in Coil Case as it has complicated wirings.

(3)Controller

Don't connect Separator to any others than our Controller.

If done, it would be a cause of damage to electro-magnetic coil.

1. Check upon receipt

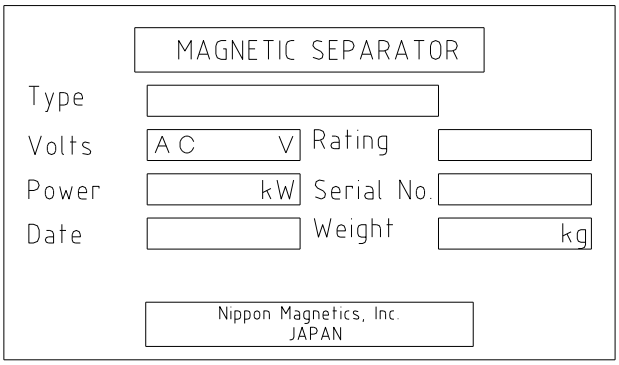
Upon receipt of the goods, please check the following points.
In case of any fault, please contact us.

1-1. Points to be checked:

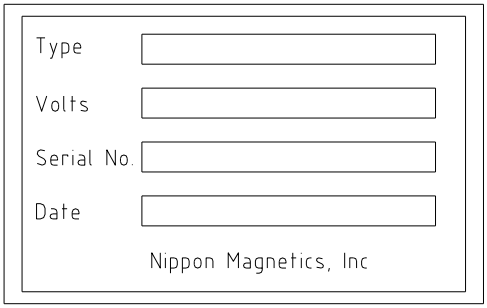
① Are all the items ordered delivered? (Electro-Magnetic Separator, Controller, Accessories)
② Are model and color of coating correct?
③ Is there any wrong description on the nameplate?
④ Are electric source and voltage correct?
⑤ Are there any damage and loosened bolts and nuts caused during transportation?

1-2. Description on Nameplate:

The following nameplate is attached on Controller.
For any inquiry to us, please give us Model and Manufacturing No. shown there.



On Separator (frame)



On Controller (Inside of Cover)

2. Purpose:

Electro-Magnetic Separator is to remove iron (magnetic objects) from liquid.

3. Specification & Performance:

3-1. What does Model No. mean?

CS meaning : Wet type Electro-Magnetic Separator
230 meaning: inner diameter of Screen Case
HHH meaning: Gauss

None: 3000 Gauss
H : 6000 Gauss
HH : 9000 Gauss
HHH : 12000 Gauss
X : 15000 Gauss

3-2. Specification:

* Separator

Coil Case	:	SS400
Filter case	:	SUS304
Filter	:	SUS430+SUS304
Connection	:	Flange
Others	:	Details shown on the drawings and Specification sheets

* Controller As per the wiring diagram.
* Insulation Oil :JIS C 2320-1-2
  (Nisseki-Mitsubishi Sekiyu No. 1 high pressure Insulation oil)
* Performance

Rating	:	Continuous (100%ED)
Efficiency	:	Please note beforehand that efficiency of volume to be handled and iron amount to be removed depends on various factors such as how much iron is mixed, particle size, moisture, etc.

3-3. Structure:

* Several donut-shape coils are positioned inside Coil Case, and Spacers are fitted between Coils for flow of cooling oil. These Coils create magnetic field in Filter Case, which magnetizes Filter.
* There is insulation oil inside Magnet Case. Though Magnet Case is not completely sealed, Air Breather on Case prevents dust to enter. Air Breather also controls expansion of Coils and insulation oil due to temperature rise.
* Natural cooling or forced cooling is applied to control temperature of Coils at a fixed level.

4. How to install

4-1. Preparation:

There are 4 holes (or 2 holes) for lifting.

Please ensure that lifting tools and devices are well maintained and inspected to prove good enough to handle heavy goods. When lifting up, please confirm that no one is under the Separator.

4-2. Installation:

* The installation place should be flat and level as much as possible. Place the Separator securely or fix it with bolts.
* The frame structure should be strong enough to support Separator. Ensure that there is a space enough to take out Filter upwards for cleaning.
* Electric wiring, water piping and air piping should be connected correctly as per the drawing.

※ As Coil Case has been filled with insulation oil, pay the best attention not to incline the Separator as much as possible.

For transportation, two Air Breathers on Coil Case (inside Controller) and Oil Cap (beside Oil Gauge) are taken off and Blind Caps (1B) should be put on instead. After finish of installation, take off 3 Blind Caps and mount Air Breathers and Oil Cap.

＜Please see each position below. ＞

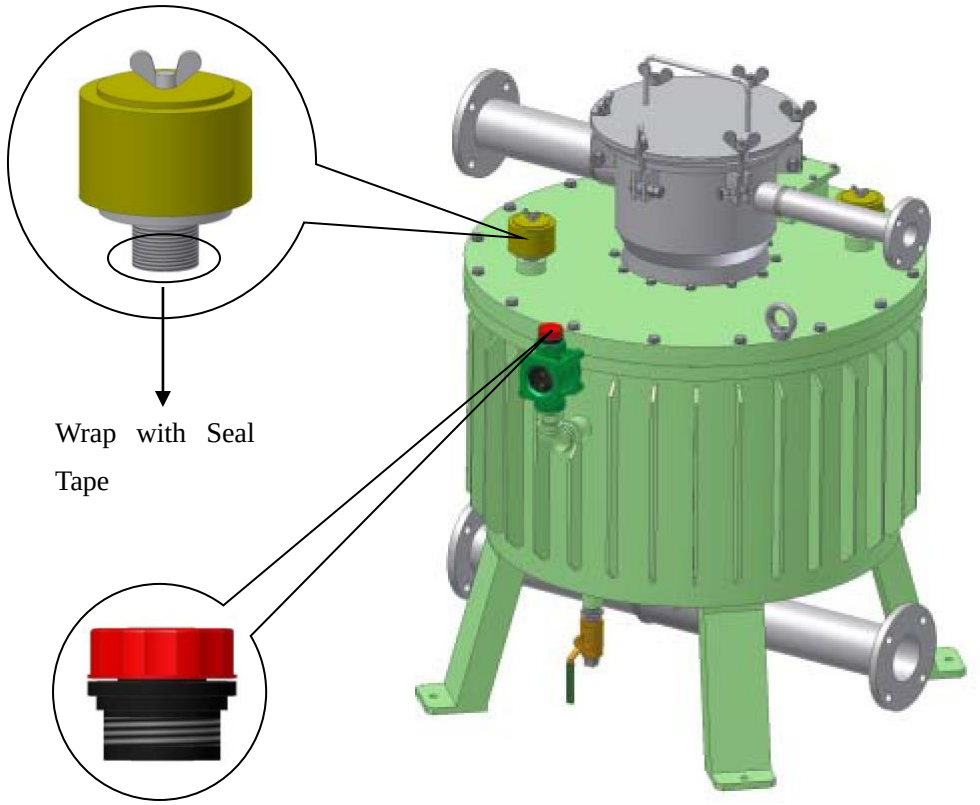


Fig. 4-1

5. Name and Role of each part

As the following shows the standard model, there may be differences from the Separator delivered to the customer.

For the delivered Separator, please see the relevant drawings.

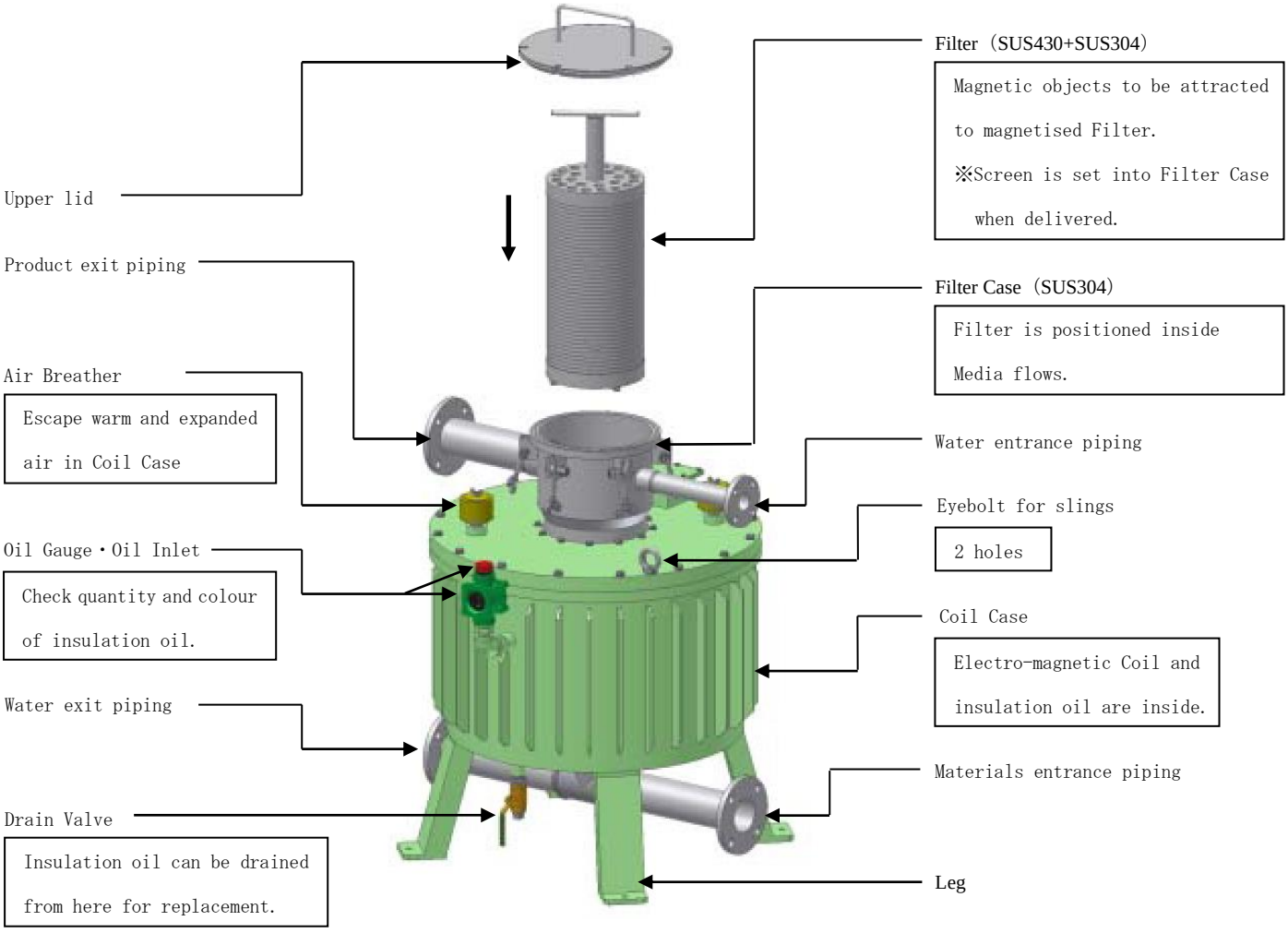


Fig.5-1

＜In case of Oil Pump and Oil Cooler installed＞

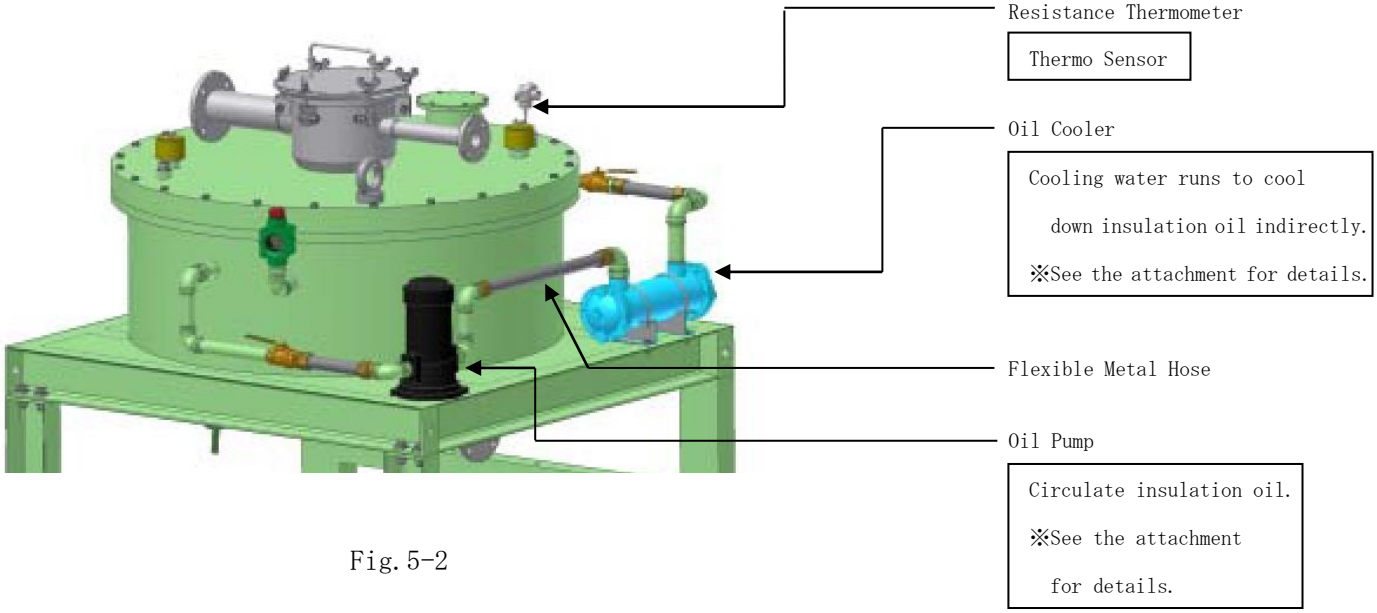


Fig.5-2

6. Insulation Oil

6-1. Inspection of Oil quantity and deterioration

Insulation oil is poured into Screen Case at delivery.

Insulation Oil: JIS C 2320 1-2 (No. 1 High Pressure Insulation Oil of Nisseki Mitsubishi)

Deterioration can be judged by the following Oil Colour (Fig. 6-1).

Replace insulation oil when the colour becomes over 5.5 level.

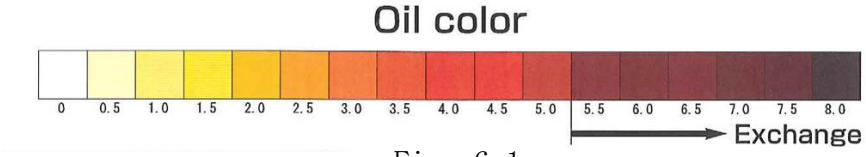


Fig. 6-1

＜Oil Gauge＞

Confirm that oil quantity is within the allowable level.

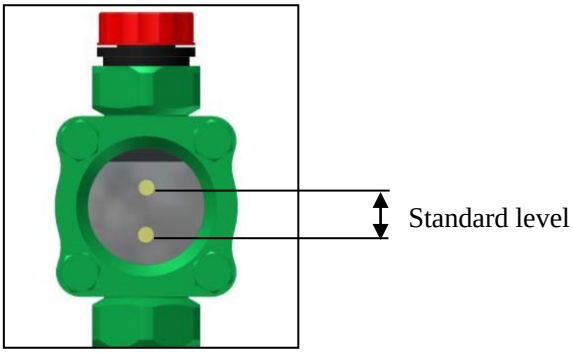


Fig. 6-2

6-2. Replacement of Insulation Oil

Please pay attention to use the same oil of the same maker. Mixture with different oil may cause chemical reaction.

(1) Drain deteriorated oil through Drain Valve.
(Operate Oil Pump to drain oil in Oil Cooler.)

(2) Pour Insulation Oil through Oil Inlet upto top level of Oil Gauge.
(Even though Separator is oiled, Cooler inside is not filled with oil.)

(3) Pouring oil into Cooler is to be done by operating Oil Pump.)

(4) Pour oil into Separator and Cooler. Fill Oil upto the required level of Separator's Oil Gauge, then replacement is over.

※ Don't drive Oil Pump idle over 30 seconds.

7. How to set Filter

Please wash and set parts.

（1）Assemble as per Fig. 7-1.

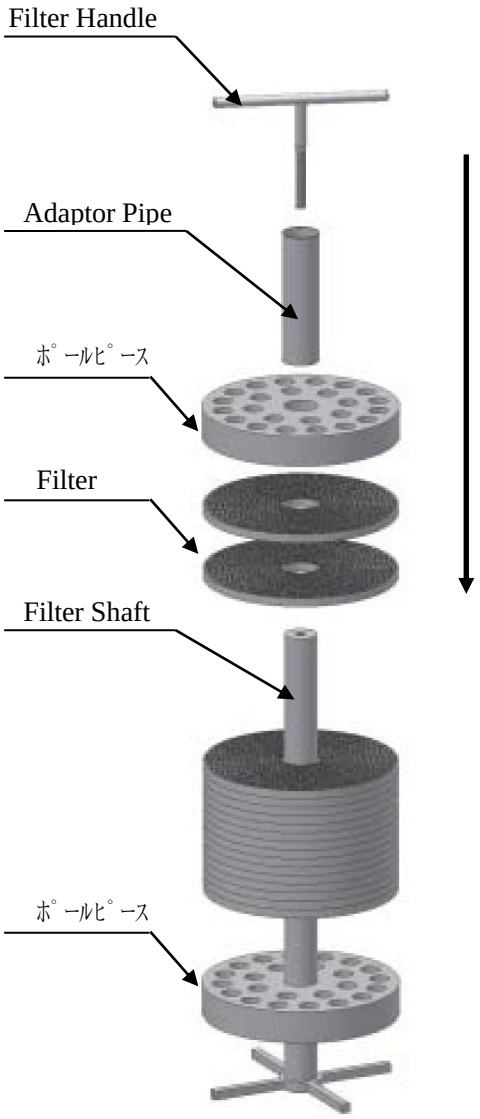


Fig. 7-1

（2）Insert the above into Filter Case slowly. Mount Inlet Flange after ensuring O-ring set.

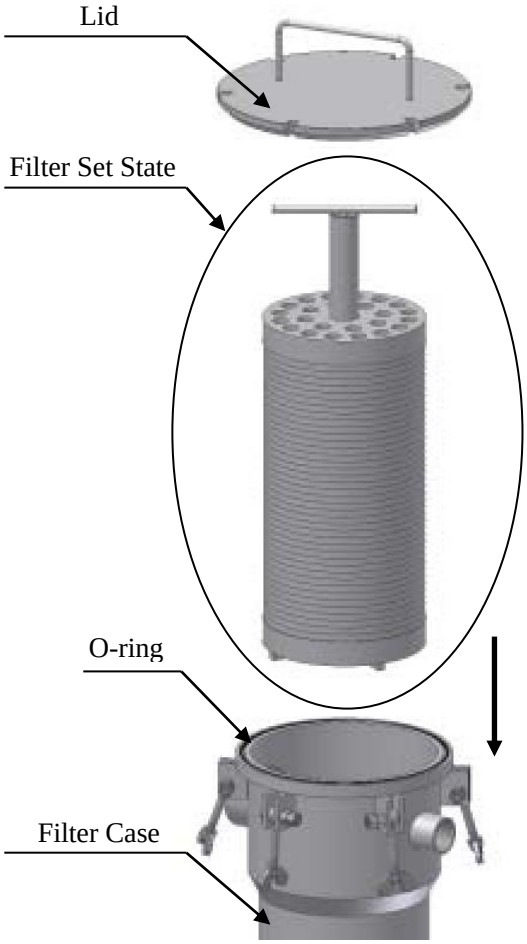


Fig. 7-2

※There is a case of no Pole Piece, which depends on the specification.

（3）Then, fasten Wing Nuts evenly.

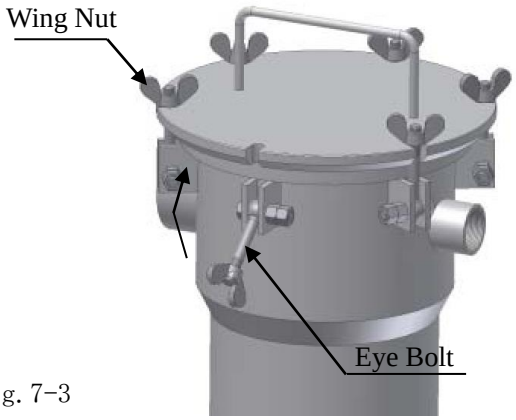


Fig. 7-3

Setting Filter is now complete.

8. Controller

8-1. In case of neither Oil Pump nor Oil cooler installed

Electro-Magnetic Separator is operated by Controller. As there may be difference between the actual Controller and the Fig. 8-1 and Fig. 8-2, please see the drawings provided For details of the actual Controller.

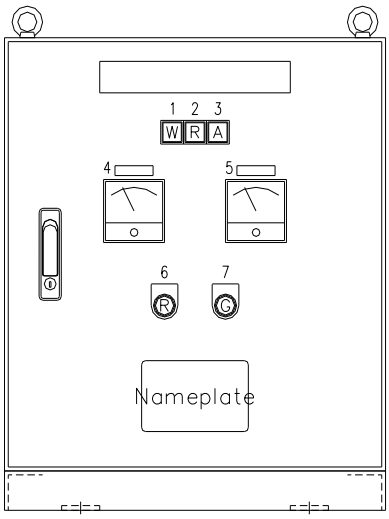


Fig.8-1

＜Control panel＞

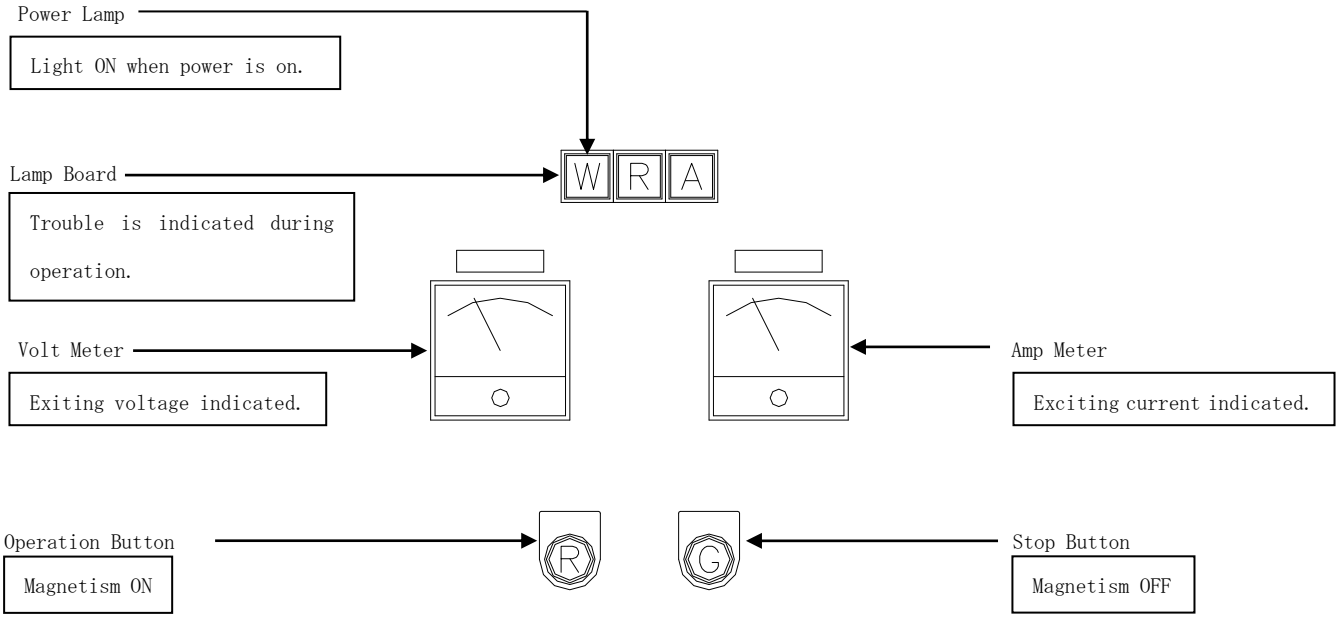


Fig.8-2

8-2. In case of Oil Pump and Oil Cooler installed

As there may be difference between the actual Controller and the Fig. 8-3 and Fig. 8-4, please see the drawings provided For details of the actual Controller.

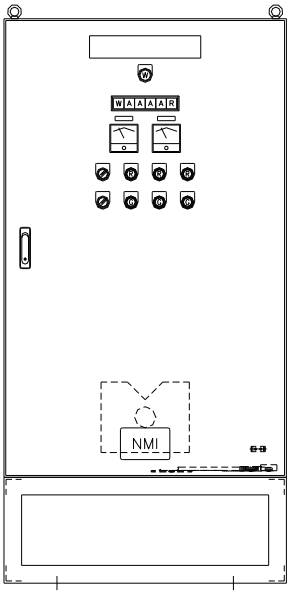


Fig. 8-3

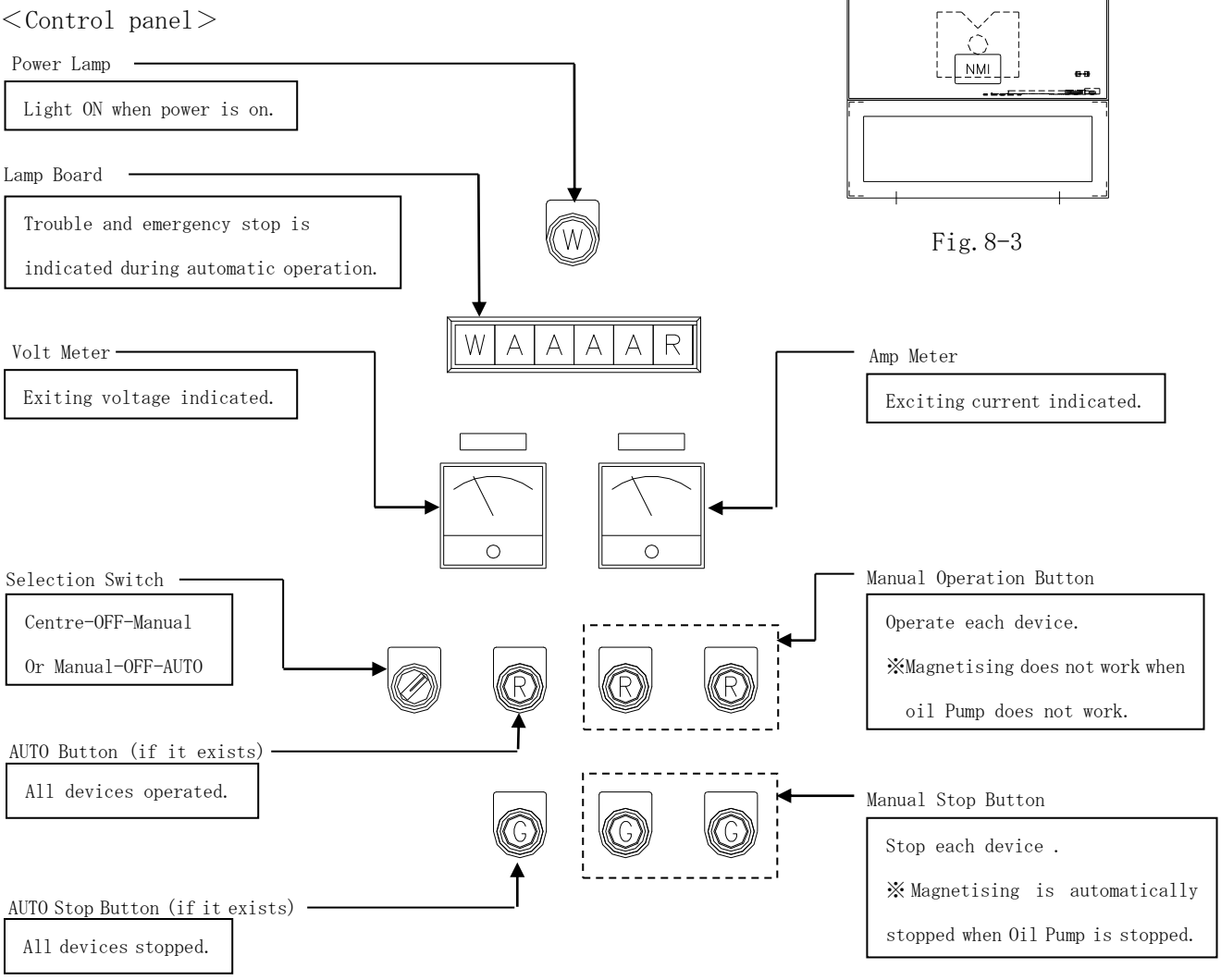


Fig. 8-4

9. Operation Manual

9-1. Preparation:

① All Breakers on Controller are to be turned ON.

② Turn Select Switch to Manual or Automatic.

9-2. Manual Operation:

① Turn Select Switch to Manual.

② Push Start/Stop Button to operate each device.
Before turn on Magnetising Button, turn on Oil Pump.
(Magnetising can be performed only when Oil Pump is working.)

③ When Select Switch is turned to OFF or Automatic, all devices stop.

9-3. Automatic Operation:

(1) In case Automatic/Stop Switch is on Controller:

① Turn Select Switch to Automatic.

② Push Automatic Button to start automatic operation.

(2) In case Automatic/Stop Switch is not on Controller:

① Turn Select Switch to Centre.

② Automatic operation starts with an operation signal from Controller or outside.

9-4. Setting of Timers on Controller

The quantity of the powder of iron adsorbing it is different by raw materials
When I treat raw materials than it is necessary, the efficiency turns worse.

・Please decide the best time after testing 5-minute-flow, 10-minute-flow and 30-minute-flow of the actual material.

※Please note that adhesion of much more iron objects will cause poor flow of material as well as less capacity of removal of iron objects.
Please take out Filter for cleaning occasionally as it gets cloggy with fur and impurities.

9-5. removal method of iron powder

① I close raw materials entrance (materials exit)
Close a valve of the raw materials entrance side then
I drift from the raw materials exit side, and, after last time, please close a valve of the raw materials exit side.
Please switch on the magnet off. I open a valve to wash it

② When there is many raw materials" makikomi", I can collect raw materials when I drain lavation with having made magnetization.
Because there is a threat that iron powder gets mixed, please distinguish it from the product.
(Powder and a product of the iron disintegrate well when I put air.)

③ In the raw materials that high raw materials are strong of the adhesive strength of the viscosity, please become beautiful after a work end
The raw materials which did not fall adhere to it, and an adsorption fall of the iron and the flow quantity of raw materials fall at the time of use on the next time
The filter extracts it after work and washes it.

9-6. Cautions:

* Coil's temperature rises during operation for a certain time. Once heating value and heat release become the same, however, Coil's temperature becomes stable.
* Electric current and voltage vary a little for a certain time. Once Coil's temperature becomes stable, they also become stable.
* Don't press Stop Button carelessly. Otherwise, iron powder will be mixed into the media.

10. Connection to Other Devices

Connection to Controller and other devices is to be done correctly, referring to the electric diagram.

10-1. Connection to Controller (in case of no Automatic ON/OFF Switch):

Operation Signal is to be connected to Terminal of Operation Signal on Controller to carry out automatic operation.
(Please see the drawing.)

11. Trial Operation (Check Sheet)

Table1. 11-1 Items to be checked before trial

No.	Item	Judgement standard	Result
1	Replace a blind plug on Coil Case by Air Breather.	2 pcs	
2	Inspect insulation oil for quantity and colour with Oil Gauge. (See Fig. 6-1.)	Quantity:within the llowable Level Color: under Level 5.0	
3	Cooling water piping (lower than 30℃, 25 L/min.)	Upper side: Outlet Lower side: Inlet	

Table. 11-2 Items to be checked for each device's operation

No.	Item	Judgement standard	Result
1	Press Magnetising Button to check voltage and current on Controller. (Trans-tap, Primary side :) Secondary side:)	DCV V±10% DCA A±10%	
2	Oil Pump's rotating direction (Fan's rotating direction shows Pump's direction.)	Rotating in the direction of an arrow on Cap	
3	Press Buttons in order of Oil Pump, Magnetising, and check operating noises.	No abnormal noises	

Table. 11-3 Items to be checked for linked operation

No.	Item	Judgement standard	Result
1	Press Automatic Button to confirm normal operation.	Press Automatic Button to confirm normal operation.	

12. Maintenance / Inspection

12-1. Periodical Inspection: Carry out each inspection as per the following list.

Table. 12-1 Periodical Inspection

Device		Electro-Magnetic Separator CS type										
Name		Inspection Item	Inspection Interval ● During stop ○ During operation							Judgement	Inspection Method	Judgement Standard
			Daily	Weekly	Monthly	Every 3 months	Every 6 months	Annually	Others			
Separator	Filter	Breakage, deformation					●				Sight	No breakage or bend
		Wear, damage					●				Sight	No remarkable wear
	Filter Shaft	Wear on Thread			●						Sight	Tightened with Nut correctly.
		Wear on Corn part of Shaft tip				●					Sight	Inserted into Screen Case without too much clearance
	Filter Case	Wear, damage						●			Sight	No remarkable wear damage
	Air Breather	Clogging						●			Sight	No harmful adhesion
	Insulation Oil	Deterioration						●			Colour sample	Under “5.0”
		Oil temperature				○					Thermometer	Under 60 ℃
	Coil	Exciting Current	○								Tester	See Drawings
		Exciting Voltage	○								Tester	See Drawings
		Coil Resistance						●			Tester	
		Insulation Resistance						●			Mega-Tester	Over 10MΩ
Cooling Device	Oil Pump	Leak						○			Sight	None
	Oil Cooler	Cooling water volume					○				Over 25L/min. at any spot you can measure.	
		Cooling water temperature					○				Thermometer	Inlet side: under 30℃
		Clogging					●				Sight	No harmful accumulating (in Water Vessel Cover)
Controller		Dirt inside Box						●			Sight	
		Damage on wiring						●			Sight	
		Broken Lamps						○			Sight	
		Loosening of Terminals						●			Check with Driver	
General Operation		Abnormal noise		○							Hear	No metallic noise

12-2. Filter washing

In case the material adhere to Filter due to insufficient cleaning done, less power of magnetizing iron objects, poor flow of material and clogging will be caused. In addition to periodical cleaning, please clean Filter after treating wet material and do even after long time of no use,

※Please take out Filter one by one and clean with high pressure washing machine. Though Filter is a consumable part, it can be used long with good maintenance and cleaning.

13. When magnetising force to remove iron becomes inferior

When you notice less removing efficiency, inspect at first if Separator operates normally. Items to be inspected are as per the following Table. 13-1.

※ When Separator operates in order, inspect the material, pre-process, etc. for any change.

Table. 13-1

Trouble	Cause	Countermeasure
Not magnetising	Cable cut	Check Cable and replace.
	Breaker OFF	Switch on Breaker
	No output at Secondary of Transformer	Inspect connection of Terminal and replace.
	Broken Rectifier	Replace
Magnetising, but too weak	Pole disconnected	Inspect wiring and Terminals.
	Broken Rectifier	Replace
	High temperature of cooling water, less flow rate	Supply water under 30℃ and 25L/min.
	①Sludge and fur in Cooler	Remove sludge and fur.
	②Oil Pump reversing	Set the right direction.
Decreased iron-removing capacity	③Filter、④Filter Case、⑤Filter Shaft	Replace.
	③Filter gets cloggy. (Material adheres to Filter.)	It washes one by one. Replace.

< Parts in trouble >

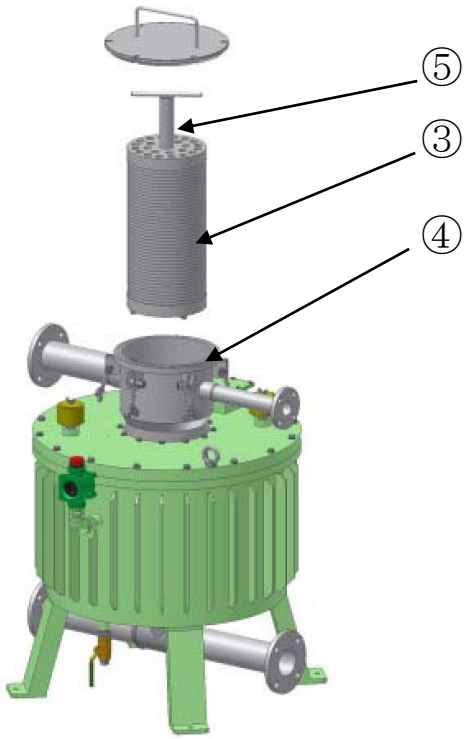


Fig. 13-1

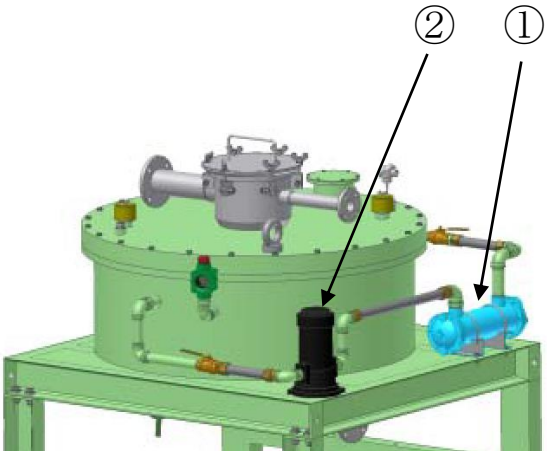


Fig. 13-2

14. Modification & Change

We are not liable to any result of modification, change and disassemble done without our approval. Disassemble is a very risky deed as it may damage the magnetic circuit properly designed and manufactured.

15. Guarantee

Guarantee period is one year after delivery. Within this period, any default will be rectified by repair or replace, but Secondary guarantee is exempted from our guarantee.

Default caused by handling of materials with high wear and corrosion or by use of other purpose is exempted from our guarantee.

16. Contact

Table. 18-1 Nippon Magnetics, Inc.

	Address	Phone Fax
Head Office & Factory	716-2 Soira, Kitadani Dazaifu, Fukuoka 818-0114 Japan	81-(0)92-922-7161 81-(0)92-922-7162
Tokyo Office	Tabata-Fukuda Bldg. 3F 1-7-3 Higashi-Tabata, Kita-ku Tokyo 114-0013 Japan	81-(0)3-3895-6271 81-(0)3-3895-8456
Osaka Office	Shin-Osaka-Ekimae Bldg. 3F 7-6-12 Nishi-Nakajima, Yodogawa-ku Osaka 532-0011 Japan	81-(0)6-6304-6668 81-(0)6-6304-6485

Oil Pump

Instruction Manual

Oil Pump

This Pump circulates Coil Case's insulation oil outside Coil Case, cooling it in Oil Cooler and retuning it to Coil Case.

(1) Maintenance & Inspection

a. Daily inspection

* Is there any abnormal vibration, noise, etc. at starting Oil Pump and during operation?

b. Regular Inspection

* Clean off dust, oil, etc. outside Oil Pump.

c. Maintenance of Bearing

* Bearing with grease sealed is used, hence no maintenance is required. In case of any abnormality, replace it.

* Bearing size is shown on the nameplate.

* For safety reason, it is recommended to replace Bearing every two to three years.

d. Maintenance of Mechanical Seal

* Mechanical Seal is expected to endure longer life of normal use. Wear and breakage, however, would be possibly caused by entering foreign objects.

* The following table shows when Mechanical Seal is to be replaced.

* See the below sketch how to install Mechanical Seal. Particularly, pay your keen attention to fit Retainer to prevent Spring from turning.

	Abnormality
Starting	Self-suction time becomes longer, and self-suction cannot be done at the worst.
Operation	Flow volume becomes low, and oil cannot be pumped up at the worst.
Stopping	Liquid leaks through Drain Hole.

Self-suction type (VKN04-09 model) Mechanical Seal

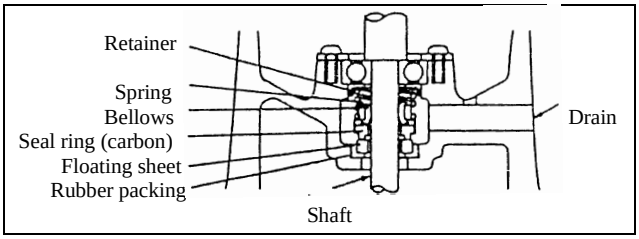


Fig. 1

Maintenance of Oil Seal

* VKS151AC is equipped with Oil Seal to prevent liquid from entering into Bearing. Oil Seal should be replaced at the time of replacing Bearing.

(2) Rotating Direction

At the time of starting (trail operation), confirm the rotating direction. As the maker's standard, VKN model, VKP model and VKS model rotate anti-clockwisewhen seeing from the upper side.

Inspection window of rotating direction

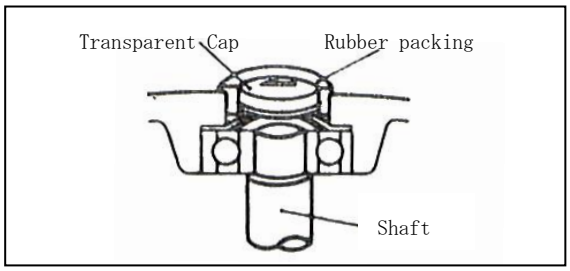


Fig. 2

(3) Trouble & Countermeasure

See the table of Trouble-Shooting (Table.1) in case of any trouble.

When repair and/or supply of spares are required, please contact our agents or our offices. Your inquiry is to come with the following details:

① Details shown on the nameplate (model, type, etc.)

② Trouble position and condition

③ Part name and required quantity

④ Term of use

Please don't hesitate to contact us for any other inquiry about the product.

Table.1 (Oil Pump - Trouble-Shooting)

Trouble		Possible Cause	Countermeasure
Motor does not turn.	No operating sound	Disconnection of connecting cables. Loose connection.	Inspect cables & connections.
		Blown Fuse. Tripping of thermal relay.	Replace Fuse. Inspect Thermal Relay.
		Disconnection of Stator winding.	Send to the factory for repair.
	Humming noise	Too low voltage.	Raise it to the rated voltage.
		Disconnection of cables. Loose connection.	Inspect cables & connections.
		Blown Fuse. Tripping of Thermal Relay.	Replace Fuse. Inspect Thermal Relay.
		Stator & Rotor are in contact due to the worn-out Bearing.	Send to the factory for repair.
		Foreign objects get into Impeller.	Remove foreign objects.
Motor turns.	Motor heated up and over current	Voltage becomes too low or too high.	Adjust it to the rated voltage.
		Unbalanced voltage.	Inspect the circuit.
		Disconnection, short-circuit & earth of Stator winding	Replace Fuse. Inspect Thermal Relay.
		Stator & Rotor are in contact due to the worn-out Bearing.	Send to the factory for repair.
		Fluid used has high viscosity.	Use the fluid of lower viscosity.
	Nothing pumped up	No priming.	Carry out priming.
		Suction inlet is over fluid level.	Adjust fluid level.
		Air sucked in from suction pipe.	Inspect suction pipe for air leak.
		Mechanical Seal worn out.	Replace it.
	Low pump flow	A little of air sucked in from suction pipe.	Inspect suction pipe for leak.
		Too many air bubbles contained in fluid used.	Eliminate bubbles or prevent air from entering.
		Motor rotates in reverse.	Reposition 2 of 3 terminals.
		Large loss of piping.	Re-design piping.
		Piping is clogged.	Remove clogging. Inspect connecting parts.
		Mechanical Seal worn out.	Replace it.
	Abnormal noise or vibration	Bearing worn out.	Replace Bearing.
		Motor operates in single phase.	Inspect the circuit.
	Water hammering	Hammering occurs at sudden close of Valve.	Install Pressure Buffer near Valve.

Water Cooling Oil Cooler

Instruction Manual

Water Cooling Oil Cooler

- Tube runs in Cooler. Water flows in Tube to cool insulation oil there.
- Arrange piping of cooling water to Oil Cooler with inlet at lower side and outlet at upper size.
- About 25 ltr/min. (lower than 30℃) is required for cooling water.
- In winter time, drain water to prevent freezing.
- Be careful for foreign objects not to enter in Tube of cooling water.
- Cleaning of Cooling Water Tube is recommended every 6 months (at least once a year). Maximum oil temperature is 80℃ (NBR O-ring).

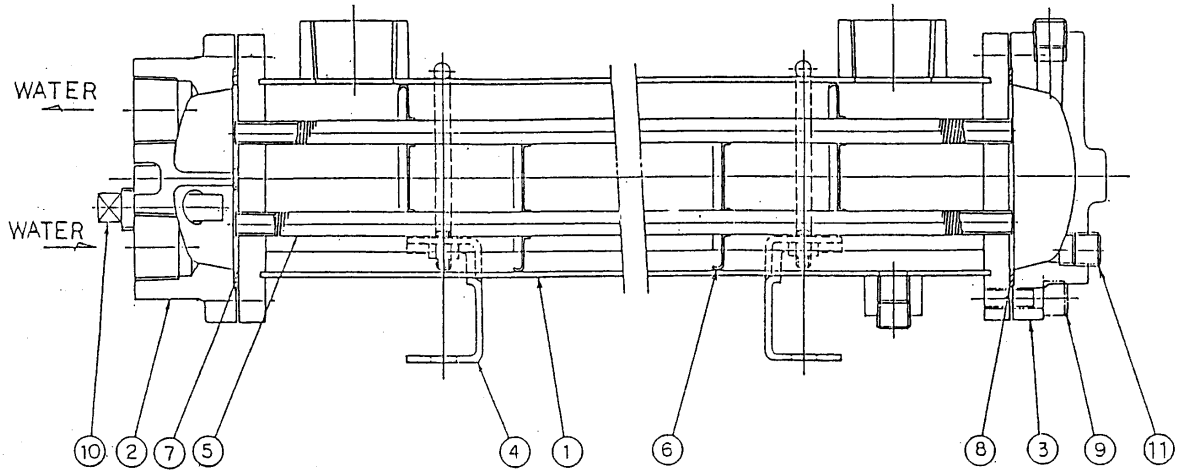


Fig.1

Parts list

No.	Description	No.	Description
1	Body	6	Baffle plate
2	Channel A	7	Packing
3	Channel B	8	Packing
4	Stand	9	Bolt
5	Fin tube	10	Zinc plug
		11	Plug