Instruction Manual

Full-Automatic VDF Coolant System with Gather-Up Conveyer

Model : NaxCS Ⅱ

Warning

- This apparatus is designed to filter a water-soluble grinding fluid, a wire-cut EDM (electric discharge machining) fluid, etc. Do not use this apparatus for any other purpose.
- Read this Instruction Manual carefully and understand the descriptions before operating this apparatus or performing maintenance/inspection work.
- Store this Instruction Manual carefully so that you can review it whenever operating this apparatus or performing maintenance/inspection work.

Contents

Attachments

Outline Drawing, Flow Chart, Control Panel Outline Drawing, Electrical Diagram, Timing Diagram, VDF Instruction Manual, Pump Instruction Manual

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1. Safety Precautions

In this Instruction Manual, safety precautions are divided into "Warning" and "Caution" according to level to allow you to use the product safely and properly and prevent harm and damage to the user and others in the area.

⚠ Warning	Failure to observe the indicated warning could result in death or serious injury of the user or others in the area. Understand the descriptions fully and follow the instructions without fail.
⚠ Caution	Failure to observe the indicated caution could result in impairment of the user or others in the area or property damage. Understand the descriptions fully and follow the instructions without fail.

The following symbols are also used with those shown above to allow for normal operation and prevent a reduction in the product life and failures. Be sure to follow the instructions.

⊘ Prohibited	Indicates what you must not do.
● Forced	Indicates what you are forced to do.

⚠ Warning

- ◆ Carry out wiring work properly according to the Technical Standards on Electrical Equipment and Indoor Wiring Regulations. Incorrect wiring work may result in electric shocks or fire.
- ◆ Before maintenance, inspection or part replacement, turn off the source power. Failure to do so may result in electric shocks, or personal injury due to accidental starting of the machine.
- ◆ Establish a ground securely. Failure to do so may result in electric shocks during a machine failure or short-circuit.
- ◆ Do not open the switch box or the motor terminal box unnecessarily. Doing so may result in electric shocks.
- ◆ Do not splash water on live parts. Doing so may result in a short circuit, electric shocks or a machine failure.

⚠ Caution

- ◆ This apparatus is designed to filter a water-soluble grinding fluid, a wire-cut EDM fluid, etc. Do not use this apparatus for any other purpose.
- ◆ Do not move or carry piping or equipment by hand. Doing so may result not only in property damage but also in personal injury.
- ◆ Do not touch the motor or pump during or immediately after operation. Doing so may result in burns due to high temperature.
- ◆ Do not cover the motor with a blanket or cloth. Doing so may result in ignition by overheating.

2. Introduction

2-1. This apparatus is a unit that uses VDF(Vortex Dynamic Filter) compatible with a water-soluble grinding fluid and a wire-cut EDM fluid. Consult us when using any fluid other than the above.
2-2. When any work material with a specific gravity of 2.5 or less is used, filtration efficiency decreases due to the property of VDF. Consult us when using any work material with a lower specific gravity.
2-3. Use the apparatus while the height from the coolant tank fluid level to the pump inlet port is within one meter.
2-4. Please note that the temperature of the liquid will rise along with the circulation of the fluid in the coolant tank.
2-5. Please note that the bubbles may appear in the coolant liquid circulating in the tank when stirred by the hose and air is discharged by the sludge container.

⚠ Caution

◆ This apparatus is designed to filter a water-soluble grinding fluid, a wire-cut EDM fluid, etc. Do not use this apparatus for any other purpose. Doing so may result in unexpected accidents or personal injury.

3. Unpacking Check

After receiving the apparatus, check the following:
1. Check that the product is as per order with the Delivery Specification.
2. Check that the product is not damaged and the bolts/nuts have not come loose during transport.
3. Check that accessories are all supplied.
4. In the case of any defective condition, contact your dealer by specifying the product model and serial number described on the nameplate.

4. Installation

4-1.Apparatus movement and carriage

When moving or carrying the apparatus, lift the stand with a forklift etc.
The apparatus is unstable since its center of gravity is high. Therefore, move or carry the apparatus carefully to prevent it from falling down.

⚠ Caution

◆ Do not move or carry the apparatus in an unstable condition. Doing so may result not only in apparatus damage but also in personal injury.

4-2.Installation

1) This apparatus is designed for inside installation. Install it above the working fluid tank or on the periphery of the tank of a machine tool.
2) Avoid the suction piping of the apparatus from sucking in fluid from sludge accumulated places, extremely contaminated tanks or places where sludge of more than 1mm is mixed.

3) Secure maintenance space as well as space for piping and wiring connections around this apparatus.

Avoid the suction piping of the apparatus from sucking in fluid from sludge accumulated places, extremely contaminated tanks or places where sludge of more than 1mm is mixed.

4-3.Piping

1) Suction piping

a) Connect a hose from the nipple for a hose measuring 32 mm in internal diameter.
b) Use the hose which is not crushed by negative pressure, such as a hose containing a coil, or a hose containing a steel wire.
c) Install piping in such a way as to avoid air suction and dead air space.
d) Avoid the suction piping from sucking in fluid from sludge accumulated places, extremely contaminated tanks or places where sludge of more than 1mm is mixed.
e) Install piping appropriate to the fluid temperature and fluid quality used.
f) Never close the gate valve at the suction port.

Use the hose which is not crushed by negative pressure, such as a hose containing a coil, or a hose containing a steel wire.

Prevent chips from mixing into the unit.

Never close the gate valve at the suction port.

2) Clean fluid return piping

a) Return a hose from the nipple for a hose measuring 32 mm in internal diameter to the working fluid tank and fix it in a submerged state.
b) Install piping appropriate to the fluid temperature and fluid quality used.

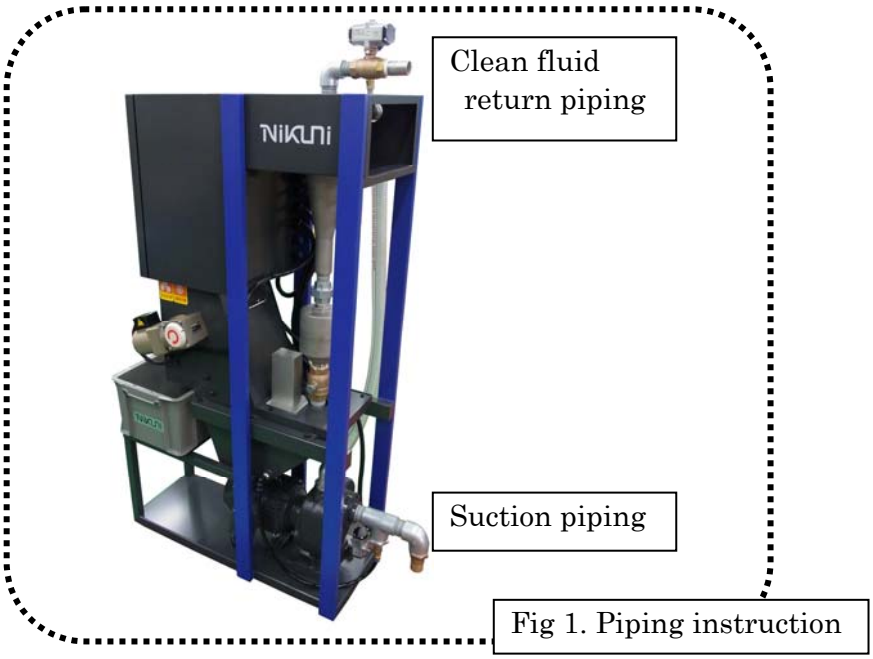


Fig 1. Piping instruction

Hose internal diameter compatibility table by model

Model	Suction piping	Clean fluid return piping
NaxCSⅡ-30LW-* NaxCSⅡ-50LW-*	hose measuring 32 mm in internal diameter	hose measuring 32 mm in internal diameter
NaxCSⅡ-70LW-* NaxCSⅡ-100LW-*	hose measuring 38 mm in internal diameter	hose measuring 32 mm in internal diameter

※ * to enter "5" in the 50Hz specification, in the 60Hz specification contains the "6".

4-4.Electric wiring

1) Carry out wiring work properly according to the Technical Standards on Electrical Equipment and Indoor Wiring Regulations. Improper wiring work or grounding by unqualified personnel is not only illegal but also very dangerous. Never perform such work.
2) Be sure to install an earth leakage breaker on the source power to prevent electric shock accidents.
3) Match the apparatus source voltage with the power supply voltage.
4) Use an electric wire with a cross-sectional area of 2 mm^2 or more for the power source.

4-5.Compressed air supply

1) Please connect the compressed air tube directly to the solenoid valve on the control panel. Supply compressed air within the 0.4 MPa to 1.0 MPa range.
Using air outside this range causes a failure or malfunction.

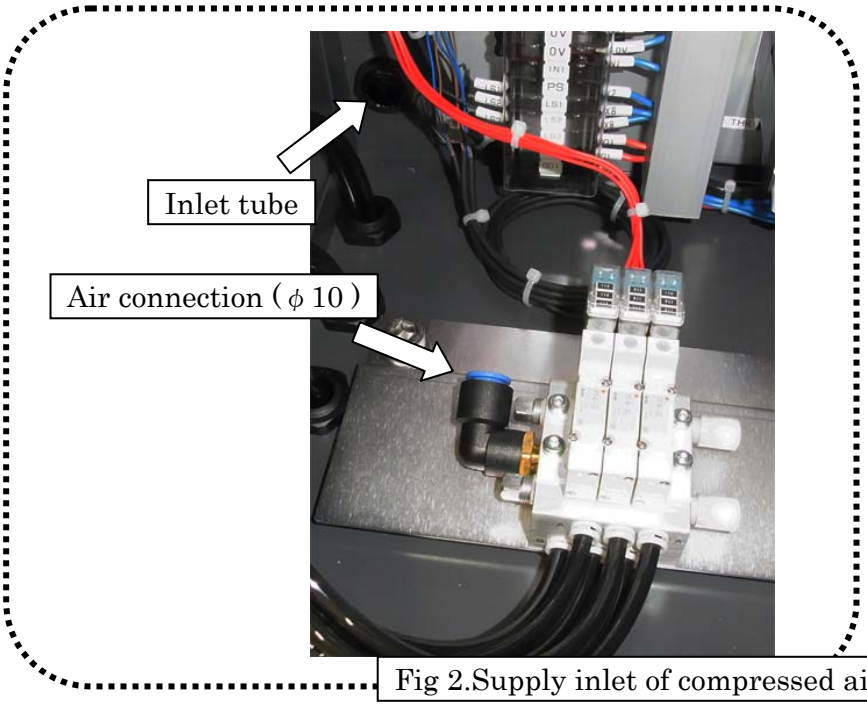


Fig 2.Supply inlet of compressed air

Warning

- Carry out wiring work properly according to the Technical Standards on Electrical Equipment and Indoor Wiring Regulations. Incorrect wiring work may result in electric shocks or fire.
- Before maintenance, inspection or part replacement, turn off the source power. Failure to do so may result in electric shocks, or personal injury due to accidental starting of the machine.
- Establish a ground securely. Failure to do so may result in electric shocks during a machine failure or short-circuit.
- Do not open the switch box or the motor terminal box unnecessarily. Doing so may result in electric shocks.
- Do not splash water on live parts. Doing so may result in a short circuit, electric shocks or a machine failure.

5. Operation

5-1.Operation preparation

1) Recheck that installation, wiring and piping are properly executed.
2) Feed fresh water or the working fluid used to the "UPPER LEVEL" of the FLOAT SWITCH (Approx 10～20L).
3) Turn the shaft lightly with a flat-blade screwdriver from the rear of the cyclone pump motor to check that movement is not slow or nonuniform.
4) Conduct priming through the priming inlet of the VDF supply pump. Remove the priming plug (1B), and keep pumping until either clear water or the processed liquid in use discharges from the inlet of the VDF supply pump before securing the plug.

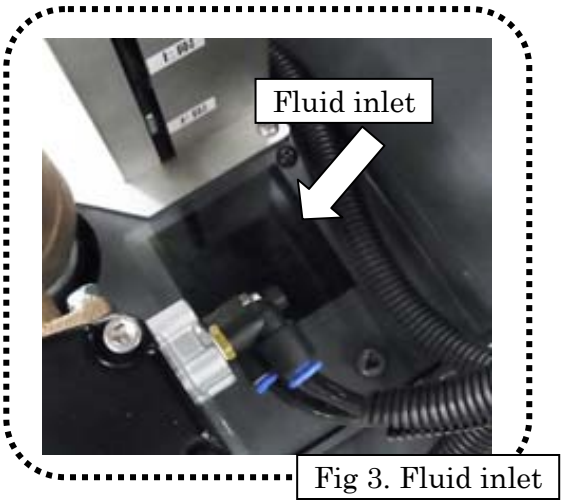


Fig 3. Fluid inlet

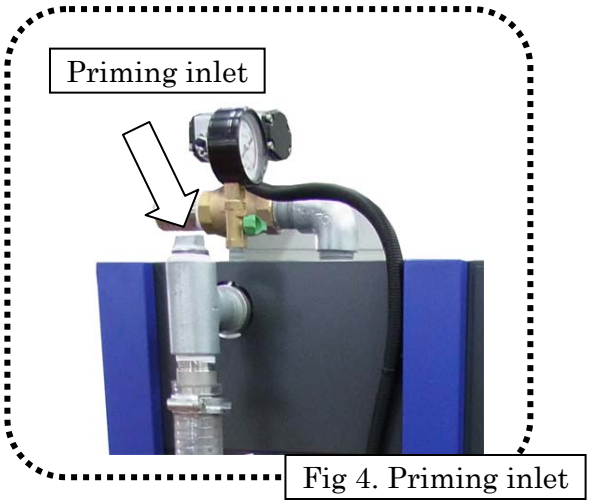


Fig 4. Priming inlet

5) Set the change-over switch CONVEVER (COS2) to AUTO.
6) Turn on the earth leakage circuit breaker, and set the "Conveyer Auto/Manual" on the control panel to Manual. Observe the conveyer motor and ensure that the direction of the conveyer belt is correct (axel direction must be clockwise). Upon confirmation, set COS2 to Auto, and ELB to OFF.

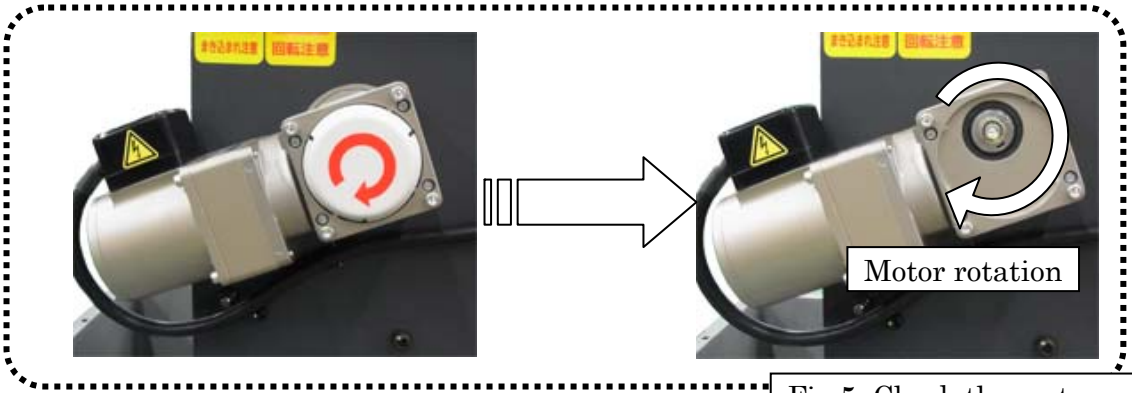


Fig 5. Check the motor rotation

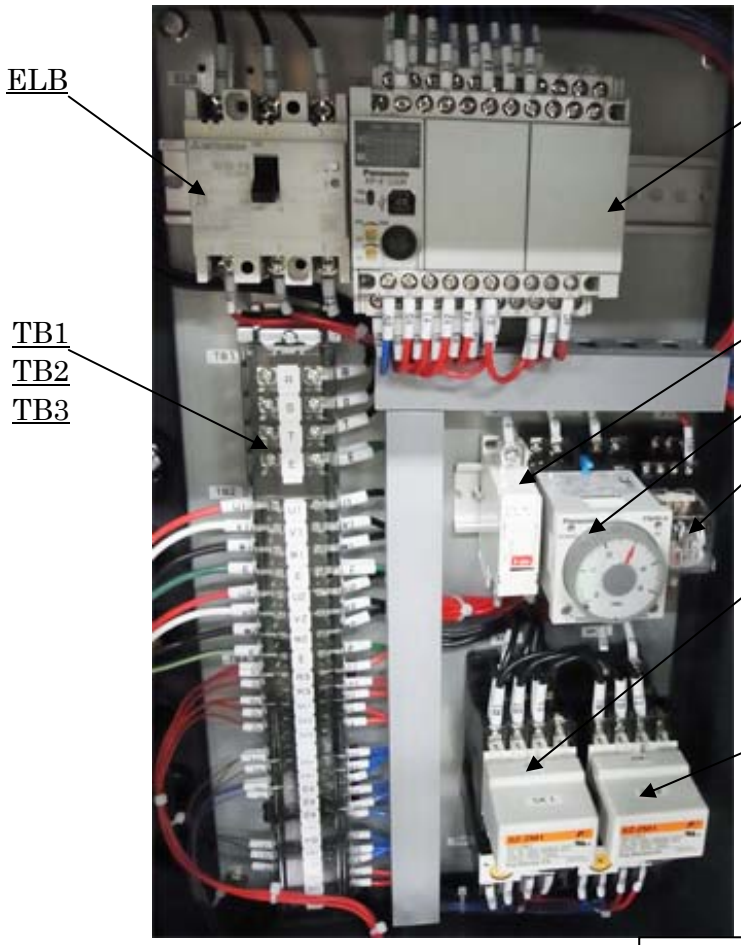


Fig 6. Equipment layout

Fig 7. Operating panel layout

7) Before reversing the rotation direction, turn off the power temporarily and interchange 2 out of 3 electric wires. Check the rotation direction by inching.
8) Check the valve for the pressure gauge to make sure it is closed.
9) Turn on the earth leakage circuit breaker, and set the "Turn On / Turn Off" switch to "Turn On".
10) Check that the fluid starts to flow from the clean fluid return piping. Then open the valve for pressure gauge and make sure that the pressure indicates 0.1 MPa or more. After check the pressure gauge indicator, close the valve for pressure gauge. After operation start, open AV2 to start fluid supply to the conveyer tank. When the fluid level reaches the upper limit, close AV2 and open AV3.

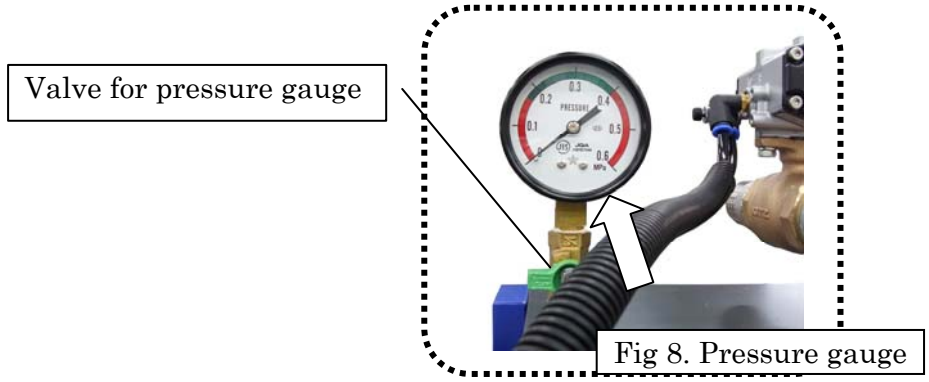


Fig 8. Pressure gauge

11) Check that there is no fluid leak from the piping.
12) Turn off the ELB to stop it.
Stopping COS1 enters a cycle stop and the pump stops after completion of one cycle.

Do not run the pump at idle (dry operation), since doing so causes a failure.
Do not run the pump by reversing the rotation direction, since doing so causes a failure.
It may cause damage to the pressure gauge if the valve opens continuously. Open the valve for the pressure gauge when only checking the pressure indicator.
Prime the pump with reliability. Insufficient priming may not pump fluid up.
After inspecting or cleaning the pump, tank, etc., be sure to prime the pump.

5-2. Setting of sedimentation timer.
- The sedimentation timer refers to the timer that sets the sludge sedimentation time in the conveyer tank. The following may tend to happen when determining the sedimentation time.
① When the T1 duration is long, the sedimentation time will become long, and the concentration in the sludge container will be high.
② When the T1 duration is short, the sedimentation time will become short, and the concentration in the sludge container will be low.

Fig 9. Timer

※ If you set the T1 time to "long", the concentration of the sludge container will become high, and the sludge may also accumulate in the pipe and the sludge container.

Preset value

Symbol	Name	Application	Installation Place	Initial Setting	Current Setting
T1	Timer	Precipitating Time setting	In operation panel	15 min	min

5-3.Operation

1) Recheck that installation, piping and wiring are properly executed.
2) Turn on the ELB. The power lamp (WL1) lights up.
3) In the case of COS1 operation or external operation signal ON, turn on IN1 and 0V. With the pump starting, operation starts.
4) Repeated automatic operation is performed by taking the pump operation filtration start, sludge discharge from the tank by the conveyer, tank supernatant discharge and sludge pot concentrate discharge as one cycle. Refer to the Timing Diagram to check operation.
5) The setting of the precipitation time timer can be changed with T1 in the operation panel. (Initial set value: 30 min.)
   If the sludge concentration in dirty fluid is high, the cyclone body or piping may be clogged with significantly accumulated sludge in a sludge pot. In that case, set the precipitation time timer (T1) for a shorter time.
6) Stopping COS1 or turning off the external operation signal makes pump operation (GL1) flash and enters a cycle stop. The pump stops and GL1 goes out after completion of one cycle. Turn off the power after a cycle stop has been completed. Turning off the power during a cycle stop causes piping clogging or a failure due to disabled sludge pot concentrate discharge.
7) Setting the change-over switch CONVEYER (COS2) to MANUAL moves the conveyer.

Do not run the pump at idle (dry operation), since doing so causes a failure.

Do not run the pump by reversing the rotation direction, since doing so causes a failure.

Turn off the power after a cycle stop has been completed.

Failure to do so may cause sludge pot clogging due to disabled sludge pot concentrate discharge.

5-4.Speed controller

As to control the operation time for the actuator valve "AV2" and "AV3", speed controller had been equipped to the "O-Port". It had been adjusted before shipping from factory. Do not change it, since doing so may cause failures to the equipment.

Fig 10. AV2、AV3

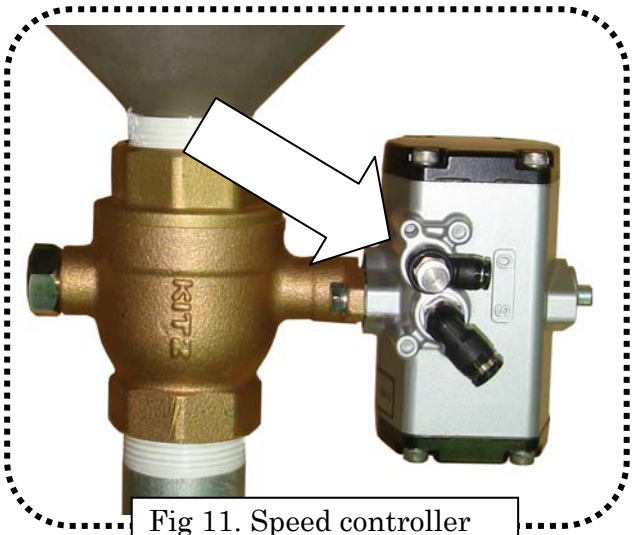


Fig 11. Speed controller

6. Maintenance and Inspection

6-1.Maintenance

Inspect this apparatus periodically to prevent troubles from occurring under the influence of the operating environment such as the temperature, humidity and dust or due to secular change or life of the part used.

Periodic Inspection Table

Inspection Item	Evaluation Standard	Frequency
Conveyer chain looseness	Not too loose	Within every 1 month
Supply pressure low *1	0.1 MPa or more	Within every 1 month
Conveyer operation	Normal operation	Within every 1 month
Water leak from pump mechanical seal	Leak rate: 10 cc/hr. or less	Within every 1 month
Motor bearing temperature	Room temperature: +40°C or 75°C or less	Within every 1 month
Wiring damage	No damage	Within every 1 month
Current value	Not to exceed rated current	Within every 1 month
Earth leakage breaker operation	Normal operation	Within every 1 month
Thermal relay operation	Normal operation	Within every 1 month
Indicator lamp indication	Normal indication	Within every 1 month
Timer set value	According to set value in attached table	Within every 1 month
Tightening of each bolt	Tightened securely	Within every 1 month
ADAPTER	Not worn out	Within every 1 month
AV2	Not worn out	Within every 1 month

*1: Open the valve for pressure gauge when only checking the pressure indicator.
It may cause damage to the pressure gauge by "water hammer" during the startup time or actuator switching operation if the valve opens continuously.

Warning

- Before performing an overhaul, turn off the source power and check that electric current is not passed. Failure to do so may result in personal injury due to accidental starting of the machine.
- Before performing control panel maintenance/inspection or part replacement, turn off the source power and check that electric current is not passed. Failure to do so may result in electric shocks.

6-2. Notes when stopping for a long term

1) The pump and piping might be damaged by freezing the liquid for a short stop period to say nothing of time when driving is stopped for a long term in winter etc.
Put out the liquids that exist in the tank and piping. Or, warm the liquid.
2) Do not generate rust at finished surface in the bearing etc.
Turn the axis edge of the pump motor once a month and move the conveyer.
3) Put out the liquids when you use the liquid that the conveyer chain and the conveyer might rust.

7. Troubleshooting

If there is any error, the “Error” LED lamp on the control panel will light up. Please refer to the “I/O Display LED” of the programmable controller on the control panel for details about the error. In the case of an error occurrence, find out the cause and take measures against it immediately.
To restart the apparatus, remove the cause and press the reset button (PBS2). If the error does not fall under any in the table below or a part is damaged, contact your dealer or us.

Indicator Lamp Name	Probable Cause	Remedy
Pump Overload (X4)	- Piping or VDF clogging - Malfunction of actuator valve - Overload operation of pump - Foreign matter caught in pump - Too large specific gravity or viscosity of fluid - Open-phase operation - Voltage reduction	- Clean it. - Replace the part. - Request the manufacturer to repair it. - Request the manufacturer to repair it. - Review the plan. - Repair or replace equipment. - Check the voltage.
Conveyer Overload (X5)	- Overload operation of motor - Open-phase operation - Voltage reduction - Foreign matter caught in conveyer - Rust on the chain - Scraper damage - Sludge scraping blade damage	- Request the manufacturer to repair it. - Repair or replace equipment. - Check the voltage. - Remove the foreign matter. - Replace the part. - Replace the part. - Replace the part.
Full capacity (Y9)	- Apparatus filled to capacity with cleaning fluid - Contamination of FLOAT SWITCH - FLOAT SWITCH breakdown	- Drain the cleaning fluid. - Clean the part. - Replace the part.
Full capacity alarm (Y9 blinking)	- The leakage due to wear in AV2. - Leakage from the pipe	- Replacement of AV2. - Retighten the piping. Replacement the piping.
Fluid discharge error (YA)	- Clogging of piping - Malfunction of actuator valve - Contamination of FLOAT SWITCH - FLOAT SWITCH breakdown	- Clean it. - Replace the part. - Clean the part. - Replace the part.
Pressure value	- Suction piping clogging - Worn impeller out - Refer to the pump instruction manual.	- Clean it. - Replace the part.

There is no influence in the sludge elimination factor even if the pressure gauge display becomes 0.15MPa or less. However, take note that clean flowing quantity decreases.

X : 0～F 16 points
Y : 0～D 14 points

Fig 12. PLC I/O Sisplay

Warning

- Before performing an overhaul, turn off the source power and check that electric current is not passed. Failure to do so may result in personal injury due to accidental starting of the machine.
- Before performing control panel maintenance/inspection or part replacement, turn off the source power and check that electric current is not passed. Failure to do so may result in electric shocks.

8. Replacement of ADAPTER

In order to prevent the abrasion of the actuator ball valve due to the strong circulation of the VDF, there is an adaptor inserted in the connection between the VDF and the sludge container. ADAPTER is worn out according to an operating condition. The protection effect over Ball valve with actuator (AV2) may be lost. It exchanges, when having worn ADAPTER out in the case of a scheduled inspection.

The order of "ADAPTER" is asked to our company.

The following tools are prepared for clearing work.

- Pipe wrench (range of use : 10 ～54mm)
- Motor wrench
- Adjustable wrench

In the case of clearing work, shut off the power of supply. Working gloves are worn so that it may not be injured.

8-1. Exchange method

1) Drain the liquid in the main part of a conveyer from the drain beforehand.
   Stop the supply of compressed air, and check whether the shaft of the actuator can be easily turned with a monkey wrench to ensure that the air in the unit is completely removed. Turn the shaft in the actuator portion of AV2, open a valve, and drain the liquid in a VDF and a Sludge-pot.
2) A union is removed and ADAPTER is taken out.
3) A union is fastened after putting new ADAPTER into a union.
4) Connect an air tube as the following "Solenoid valve - actuator connection table".
5) Supply the compressed air and turn off the power.
6) Resume operation and check that there is no liquid leak from piping.

Warning

- Put packing into a union and pipe it certainly.
  Otherwise, a possibility of causing a liquid leak is during operation.

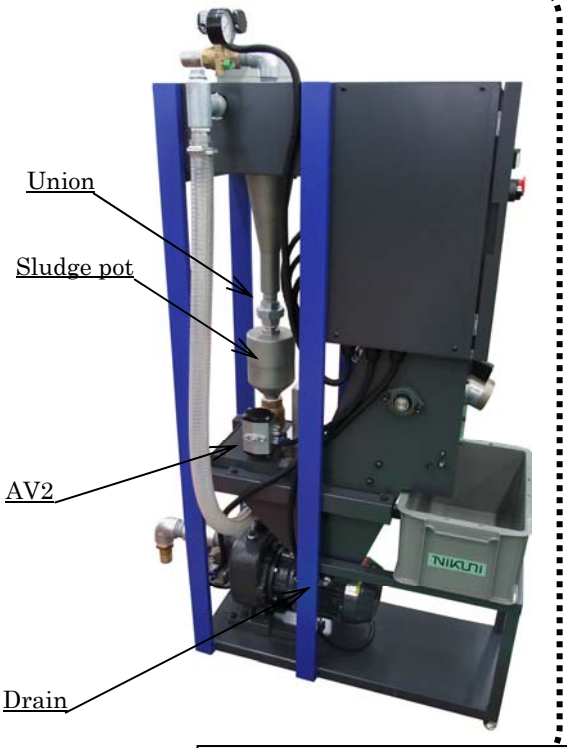


Fig 13. Equipment layout

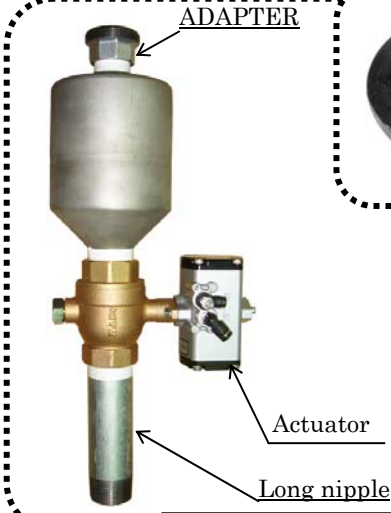


Fig 14. Replacement of ADAPTER

Fig 15. ADAPTER

Solenoid valve - actuator connection table

Actuator / Solenoid valve No.	AV1	
	O	S
SV1	A	B

Actuator / Solenoid valve No.	AV2	
	O	S
SV2	A	B

Actuator / Solenoid valve No.	AV3	
	O	S
SV3	A	B

9. Replacement of Ball valve with actuator (AV2)

Ball valve with actuator (AV2) is worn out according to an operating condition, and a liquid leak arises. When you do so, the RL light on the control panel would turn on, and the Y9 on the "I/O display LED" programmable controller would turn off. When such situation happens, the setting would change to AV2 exchange.

When a large amount of leakage occurs, the Y9 on the I/O display LED would turn back on, and the full tank alarm will be triggered.

The order of "AV2" is asked to our company.

The following tools are prepared for clearing work.

- Pipe wrench (range of use : 10 ～54mm)
- Motor wrench
- Adjustable wrench

In the case of clearing work, shut off the power of supply. Working gloves are worn so that it may not be injured.

9-1. Exchange method

1) Drain the liquid in the main part of a conveyer from the drain beforehand.
   Stop the supply of compressed air, and check whether the shaft of the actuator can be easily turned with a monkey wrench to ensure that the air in the unit is completely removed. Turn the shaft in the actuator portion of AV2, open a valve, and drain the liquid in a VDF and a sludge-pot.
2) Draw out the air tube linked to an actuator.
3) Remove AV2 and a long nipple after removing a union. Remove the sludge which has collected in the sludge-pot or the long nipple.
4) Attach a long nipple and new AV2 and connect a union. At this time, be sure to rewind a tape seal, pipe certainly. Put packing into a union and pipe it certainly.
5) Connect an air tube as the following "Solenoid valve - actuator connection table".
6) Supply the compressed air and turn off the power.
7) Resume operation and check that there is no liquid leak from piping.

Warning

◆ Be sure to roll a tape seal and to pipe certainly, when you pipe.
Put packing into a union and pipe it certainly.
Otherwise, a possibility of causing a liquid leak is during operation.

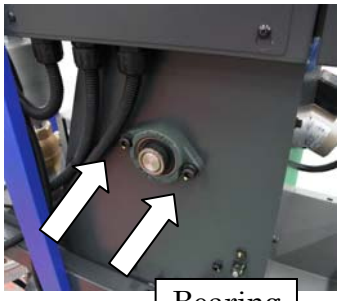
10. How to adjust conveyer

When the conveyer belt has been used for a long period of time, the conveyer chain may be stretched and become loose.
When that happens, do make adjustments in the following instructions
When making adjustments to the conveyer, please switch off the main power supply. Furthermore, exert extreme cautious and not to let anything get caught in the way of the conveyer chain or sprocket. The task has to be performed by more than two people.

① Please remove the cover of the sludge vent from the front of the conveyer.
② When inspecting at the sludge vent of the conveyer belt, you can see bearing on the left and a conveyer motor on the right. Please lightly loosen the respective fixed bolts (a total of six hexagonal bolts).
③ Lift up the shaft, lightly stretch the chain, and then tighten the fixed bolts of the bearing and conveyer motor.
④ Turn on the supplying power source, switch on the earth leakage circuit breaker, and set COS2 to manual, and the conveyer belt run. Check if the conveyer belt is moving smoothly.

Removed parts
Front cover : 1
Hexagon socket head screw : 4 本

Fig 16. Front cover



Bearing

Conveyer inside

Conveyer motor

Fig 17. Conveyer

Warning

- Before performing an overhaul, turn off the source power and check that electric current is not passed. Failure to do so may result in personal injury due to accidental starting of the machine.
- Please be careful not to let your hand or clothes get caught in the conveyer chain or sprocket.

11. Repair and Warranty

The table below shows the consumables in this apparatus. Refer to the pump manual of the separate attachment for the articles of consumption of the pump.

Consumables	Phenomenon	Indicator lamps
Ball valve with actuator (AV2)	・The increase in the amount of leaks with wear	Y9(Full) Blinking or lighting
Conveyer chain	・Extending of chain ・Rusting of chain	X5(Over load) Lighting
Hose	・Liquid leak ・Hardening	—
Solenoid valve	・Defective operation	—

For repair and maintenance of your purchased product, contact your dealer or us. We shall repair the product at no charge under the conditions shown below. However, the warranty of this product is limited to use within Japan.

1. The warranty term of this product shall be one year after the final acceptance.
2. Where the product becomes faulty or damaged due to a defect in our workmanship in spite of your normal use during the warranty term, we shall repair the faulty/damaged part of this product at no charge. In this case, we shall bear the expenses for repair parts and engineer dispatching but be exempted from other expenses.
3. However, the following failures/damages and consumables will be repaired or replaced at charge:
   1) Failures/damages occurring after the termination of the warranty term
   2) Failures/damages resulting from abnormal use or storage
   3) Failures/damages resulting from disasters or force meajure such as fire, natural disasters and acts of God
   4) Failures/damages occurring where a part is replaced by the user
   5) Failures/damages resulting from repair or modification by the user

   * Consumables refer to parts whose consumption and replacement are predicted from the beginning, such as the electric parts, packing, O-ring, mechanical seal, bearing, ball valve with actuator, solenoid valve, chain and hose.
4. We shall not compensate for various expenditures and other damages resulting from failures occurring during the use of this product. When any abnormal condition is detected during the use of this product, inspect it by referring to “7. Troubleshooting” to determine whether the product is faulty or not. In the case of a failure, contact us immediately. At that time, inform us of the product model and serial number described on the nameplate as well as the failure (error) conditions.

If you have any questions or comments about your purchased product, feel free to contact us.