

Maintenance & Inspection Manual

Chip Conveyor/Coolant Unit

(This manual includes the description for both floor type and scraper type)

For Safety

- Make sure that an experienced operator operates this machine. DO NOT operate this machine until an operator has read this manual completely and understands it thoroughly.
- Be sure to keep the manual close at hand for the operator to read it whenever necessary.
- Preserve this manual with care so that it may be referred to before using this machine.

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1 Introduction

Thank you very much for purchasing our Chip Conveyor, PD Filter or Coolant Unit.
Please read this manual carefully to ensure that you use these instruments properly.

This manual contains instructions for the operation of them. Be sure to read it carefully before using them. For instructions on the operation of the units attached to the tank, please read the operation manual for each unit.

If you do not follow the instructions in this manual, a serious accident may occur.



CAUTION

Improper operation of the tank may cause serious or fatal injury. Be sure to read this manual carefully before conducting operation, inspection or maintenance of Chip Conveyor, PD Filter or Coolant Unit.

- Keep this manual close to them so that all workers who operate or inspect them can read it whenever necessary.
- Use the tank only once you have understood how to operate them.
- Keep this manual at hand and refer to it often.

We categorize the damages and injuries due to improper operation of them into two levels; WARNING and CAUTION, and label the instructions according to the warning level in the manual. Below are the definitions and labels for the levels.



WARNING

Serious or fatal injury
Neglecting instructions may cause serious or fatal injury.



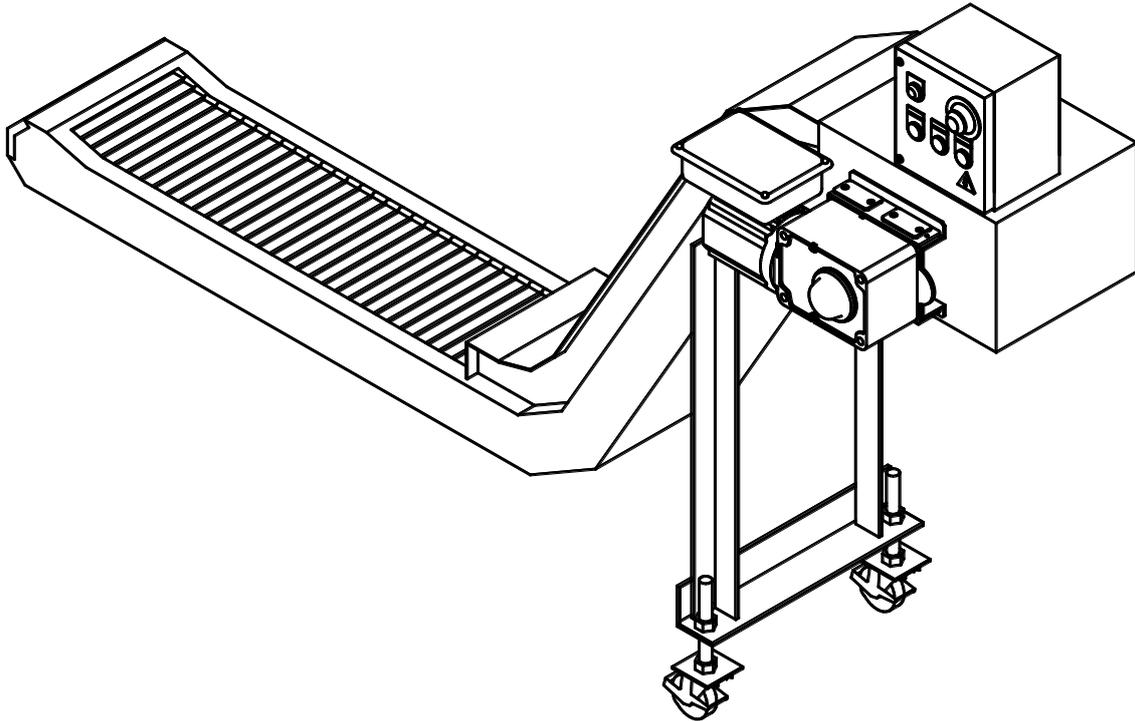
CAUTION

Damage to the unit
Neglecting instructions may cause bodily harm or damage to the unit or property.

Even if instructions are categorized as being in the CAUTION level, there is a risk of a serious accident if they are not followed. Both instructions contain important information. Be sure to follow the instructions.

2 Chip Conveyor

(This manual includes the description for both floor type and scraper type)



For Safety

- Make sure that an experienced operator operates this machine. DO NOT operate this machine until an operator has read this manual completely and understands it thoroughly.



WARNING

- DO NOT use this machine in an explosive environment.
It may cause explosion, fire, electrical shock, and injury or machine damage.
- Make sure that qualified personnel performs carriage, installation, wiring, operation, maintenance and inspection.
Explosion, fire, electrical shock, injury or machine damage may result.
- DO NOT work in a live wire state. Be sure to turn off the power when working.
There is a risk of electric shock.



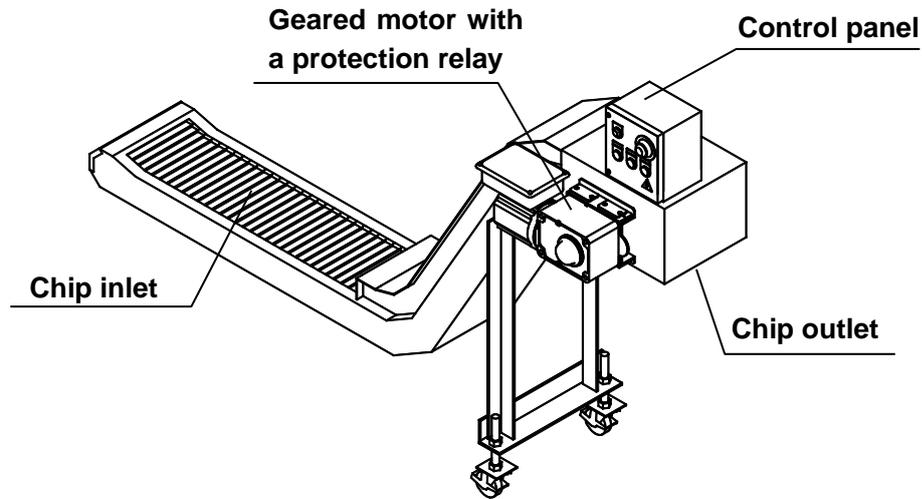
CAUTION

- Be sure to follow the specifications on the machine plate, the drawings, and the control panel assembly drawing. Electrical shock, injury or machine damage may result.
- DO NOT put a hand or a foot in the opening section of the chip conveyor such as the chip inlet or outlet. Electrical shock, injury or machine damage may result.
- DO NOT remove the machine plate.
- DO NOT modify the machine. We cannot take responsibility for modification.

2-1. Section Names

●Protection relay Type

(1) Outline Drawing



(2) Safety Device

This machine is provided with a safety device to prevent the conveyor from excessive torque. When excessive torque occurs, the protection relay into the geared motor outputs an abnormal signal. In this case, reboot it after looking into the cause of the overload and removing the cause of the overload.

A control panel is required to automatically stop with the protection relay.

(3) Protection relay Terminal Connection

When you control the conveyor, connect the terminals according to the following connection so that the safety unit works properly.

(A protection relay has an exclusive operating power supply terminal(L·N) to cope with the different voltage and inverter driving.)

1. Connection of the main power supply(U·V·W)

Please connect the wiring to terminal U·V·W of the protection relay(on substrate).

2. Connection of the operation power supply(L·N)

Please connect AC100~240V (for exclusive use of the operation)to an operation power supply terminal by all means. In the case of an authentic sample(200V grade motor), a tie line is connected.

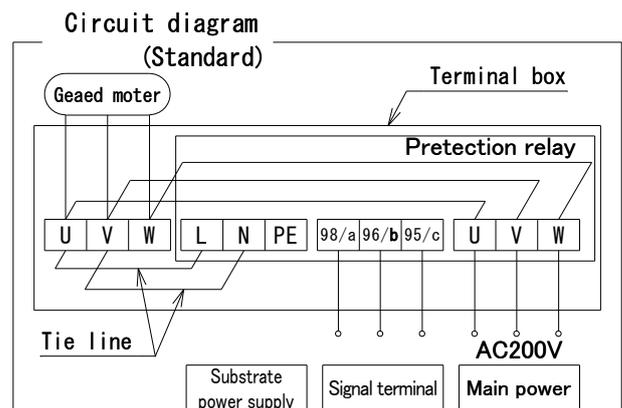
3. Connection of the signal output terminal(95/c·96/b·98/a)

When an electric current exceeds the setting because of electric overload, a signal appears. Please prepare for an electric circuit stopping the geared motor.

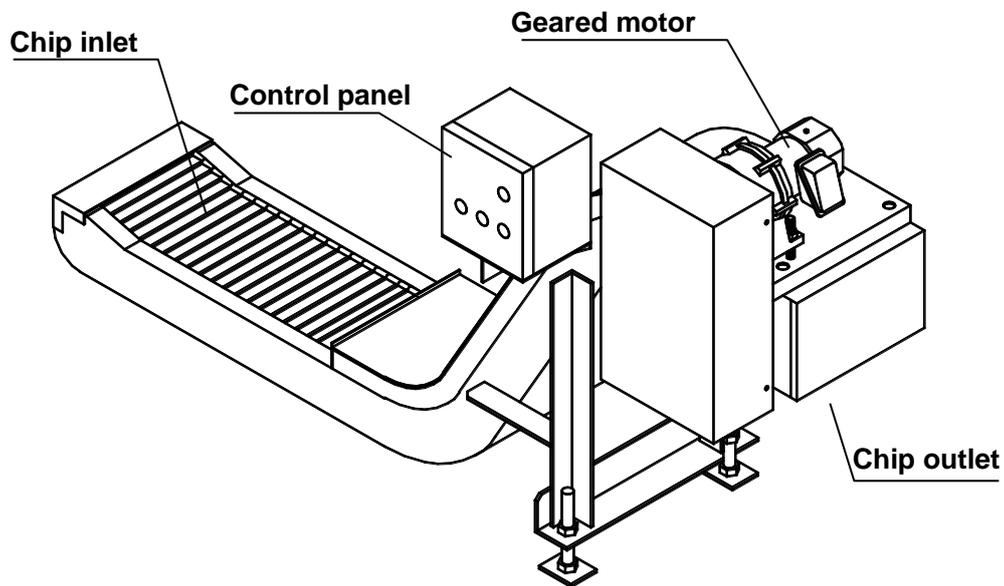
【Attention】

In the case of an authentic sample (200V grade motor), a connecting wire for operating power is connected.

After having removed a connecting wire connect AC100~240V (for exclusive use of the operation) to an operating power supply terminal by all means. When doing a insulation test of a moter, please contact US(HAKUSANKIKO CO.,Ltd) (If you need the detailed explanation, please read“ geared motor instruction manual”)



● Torque limiter Type
(1) Outline Drawing



(2) Safety Device

In order to protect the conveyor against an excessive torque this machine is provided a torque limiter. When the surplus torque has occurred to a conveyor, a torque limiter slips, and transmission of power is canceled in order to prevent a conveyor from being damaged. (Geared motor isn't stopped)

If you remove something that is the case of the surplus torque, a torque limiter returns automatically.

There is a torque limiter + limit switch and torque limiter + proximity switch as an option of the system to make a conveyor stop automatically when the surplus torque occurs.

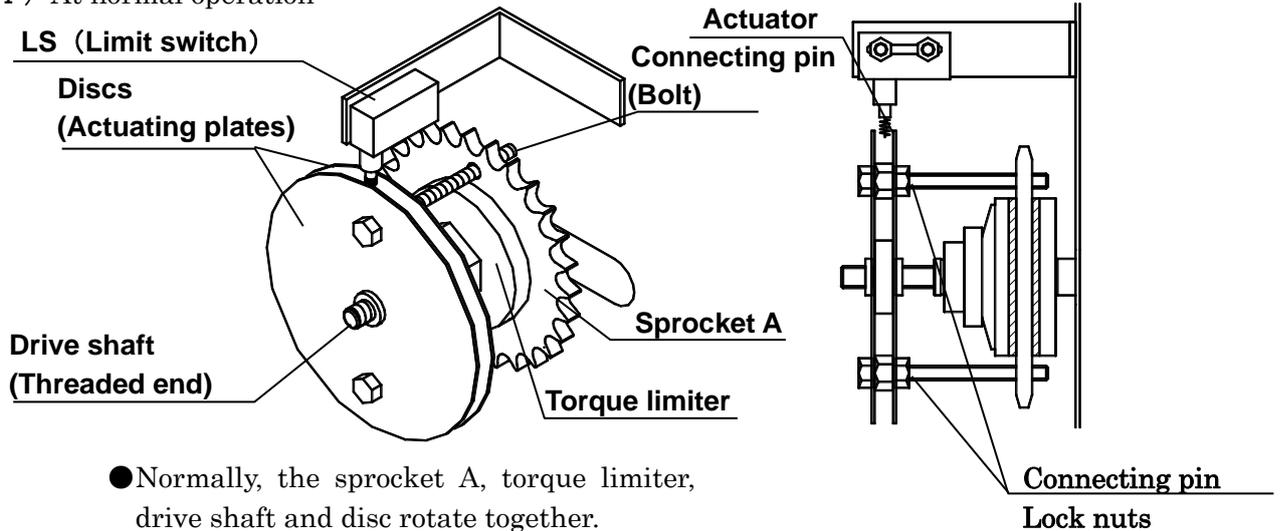
When making a conveyor stop automatically by an option, control board is needed separately.



- Turn off the conveyor and cut off the power supply, when removing the safety cover for safety device adjustment.
- You might get caught in the chain.

(2) - 1 Torque limiter Plus Limit switch Type

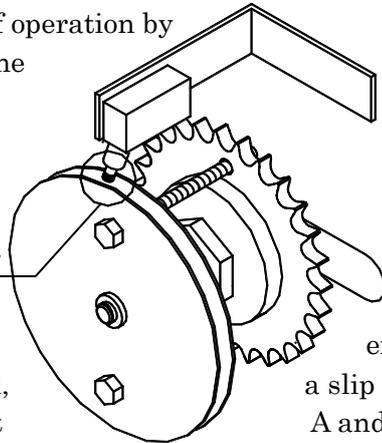
(I) At normal operation



● Normally, the sprocket A, torque limiter, drive shaft and disc rotate together.

(II) When an overload is generated
(Suspension of operation by a reaction of the limit switch)

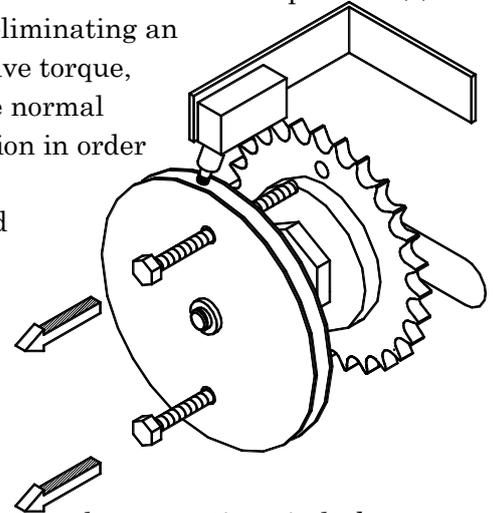
Discs come into contact with Actuator



- When an excessive torque is generated, a slip occurs between the sprocket A and torque limiter.
- When the torque limiter and drive shaft stop rotation and only the sprocket A and discs keep on rotating, the threaded end of the drive shaft causes the disc to move into contact with the actuator, and as a result, the geared motor stops.

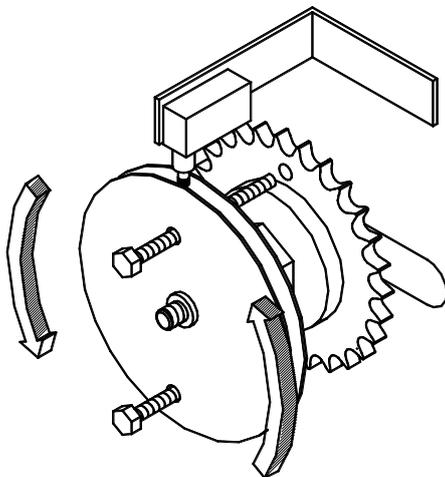
(II) Restoration of normal operation(a)

*After eliminating an excessive torque, restore normal operation in order of (3), (4) and (5).



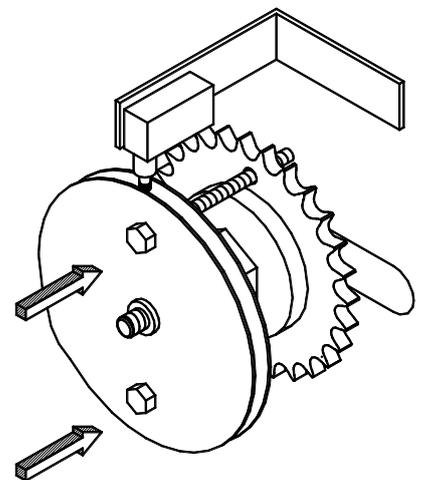
- Loosen the connecting pin lock nut and remove each connecting pin from the sprocket A.

(IV) Restoration of normal operation(b)



- Turn the disc counterclockwise until the actuator comes to the center position. (Clockwise depending on the model used)

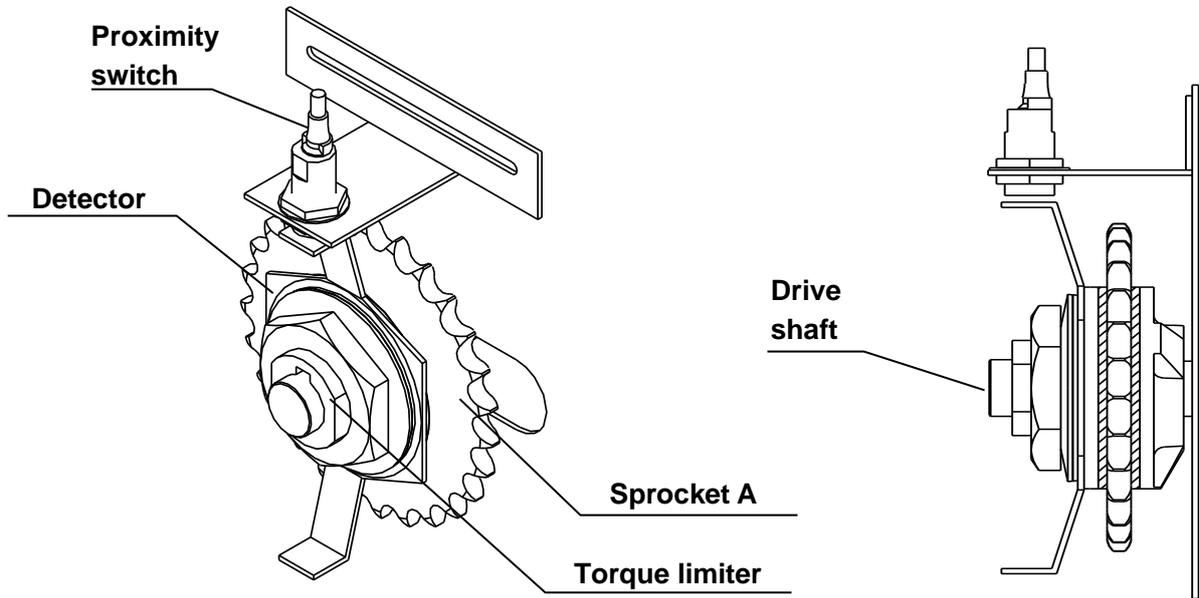
(V) Restoration of normal operation(c)



- After inserting the connecting pins into the sprocket A, Tighten the lock nuts.

(2) - 2 Torque limiter + Proximity switch Type

- At the time of normal operation, the sprocket A, torque limiter, drive shaft, and detector rotate together, and the detector causes the proximity switch to issue a signal at constant intervals.
- When the surplus torque occurs and a torque limiter slips, a signal from the proximity switch is disordered, and a motor stops automatically.
- When removing something that is the cause of the surplus torque, a torque limiter + proximity switch returns automatically.



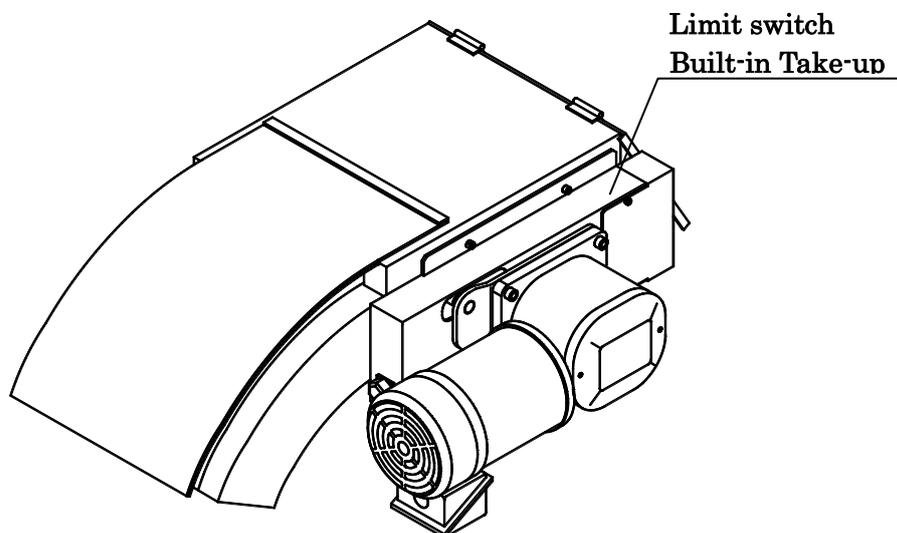
● Hollow shaft motor Torque arm + Limit switch Type

The hollow shaft motor torque arm + Limit switch type incorporates the safety device in the limit switch built-in take-up. When excessive torque occurs, the safety device outputs an abnormal signal.

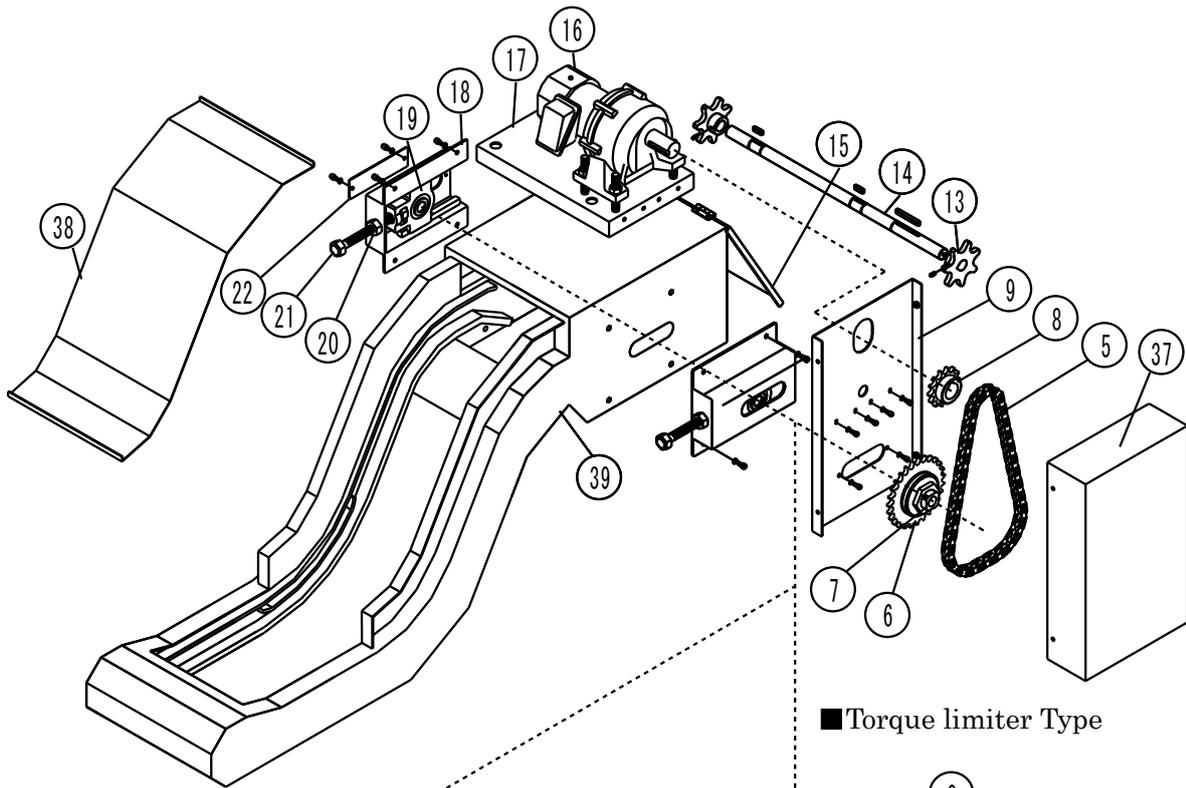
In this case, look into the cause of the overload and reverse the conveyor to eliminate something that is the cause of the overload

Reverse rotation automatically reverts the safety device.

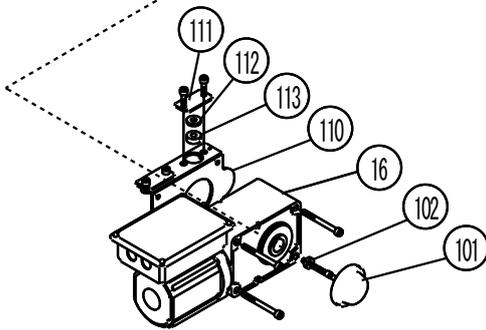
A control panel is required for the safety device to stop automatically.



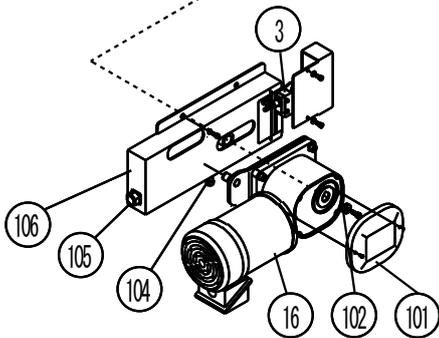
●Part name



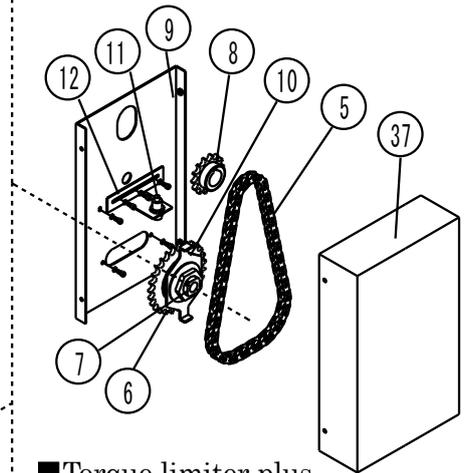
■ Torque limiter Type



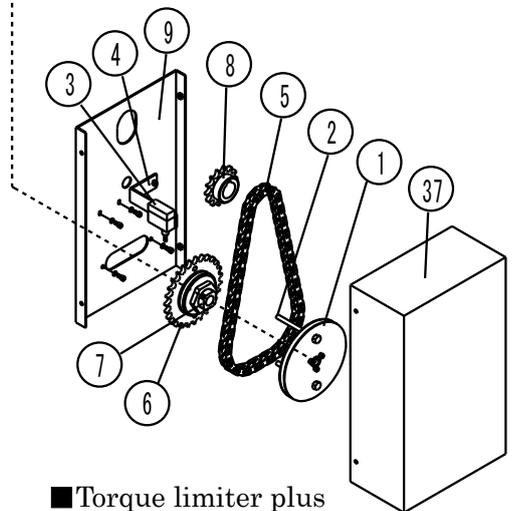
■ Geared motor with a Protection relay Type
Drive unit



■ Hollow shaft motor Torque arm plus Limit switch Type
Drive unit



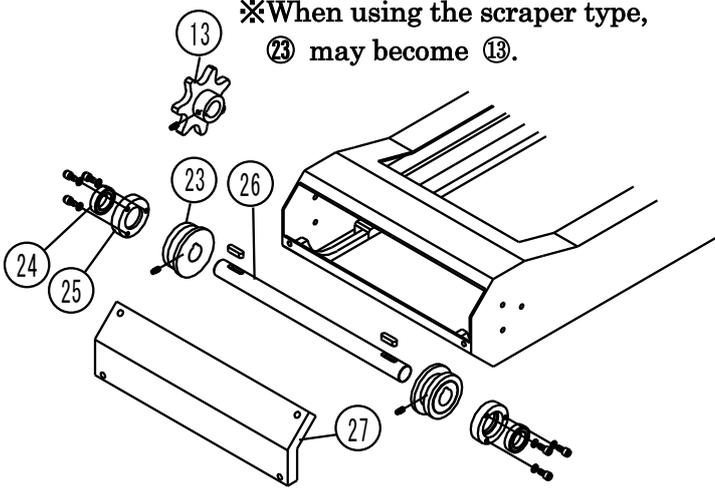
■ Torque limiter plus Proximity switch Type



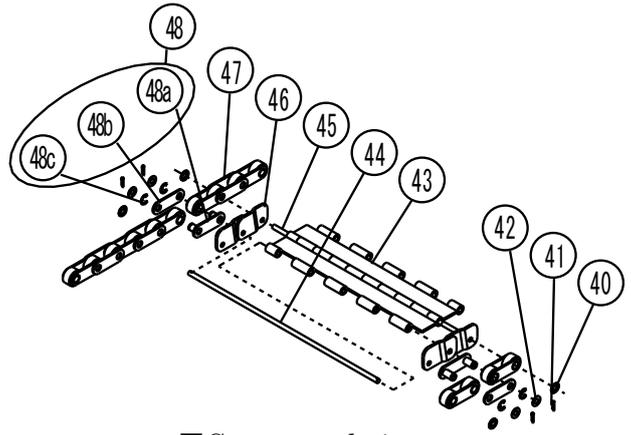
■ Torque limiter plus Limit switch Type

※When using the scraper type,

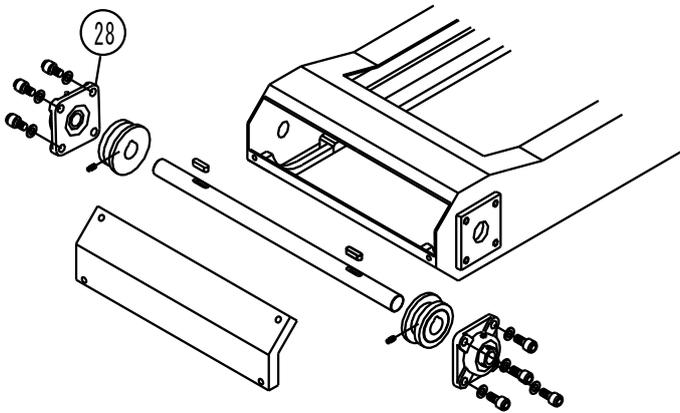
⑳ may become ㉓.



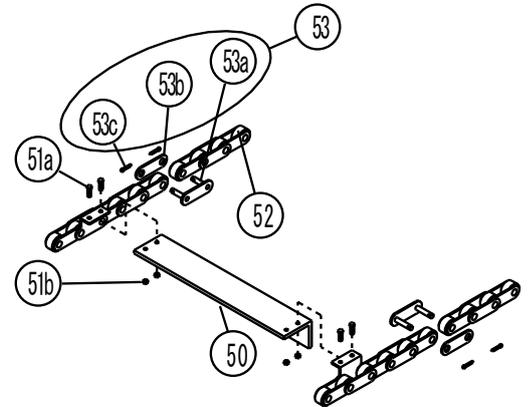
■ Bearing unit Type
Driven unit



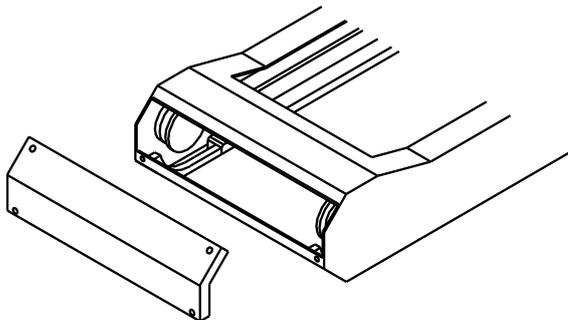
■ Conveyor chain
Floor Type



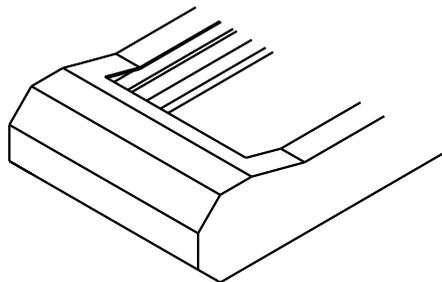
■ Square flange unit Type
Driven unit



■ Conveyor chain
Scraper Type



■ Pulley welding Type
Driven unit



■ Full circled welding Type
Driven unit

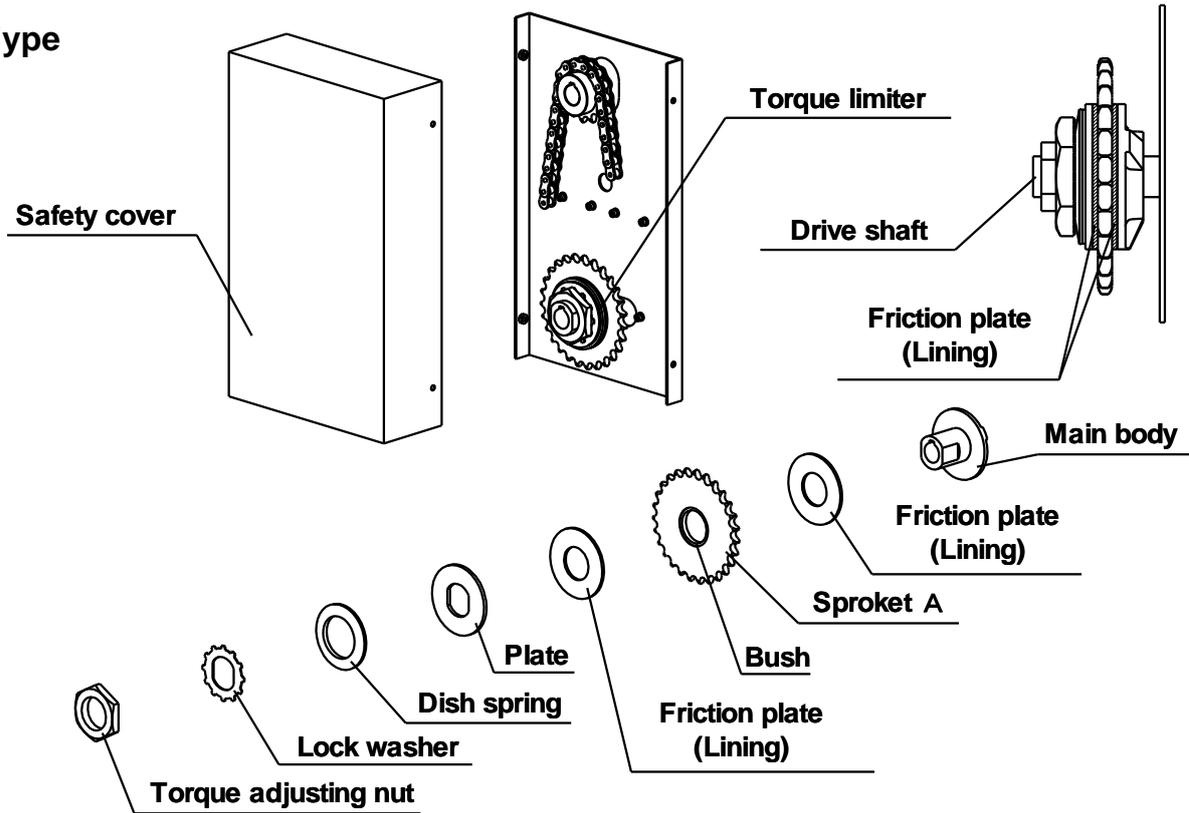
1 ····Discs(Actuating plates)
 2 ····Connecting pin(Bolt)
 3 ····LS (Limit switch)
 4 ····LS bracket
 5 ····Drive chain
 6 ····Sprocket A
 7 ····Torque limiter
 8 ····Sprocket B
 9 ····Safety plate
 1 0 ····Detector
 1 1 ····Proximity switch
 1 2 ····Proximity switch bracket
 1 3 ····Sprocket R
 1 4 ····Drive shaft
 1 5 ····Top cover
 1 6 ····Geared motor
 1 7 ····Motor base
 1 8 ····Take-up bracket
 1 9 ····Take-up unit
 2 0 ····Lock nut
 2 1 ····Tension bolt
 2 2 ····Bracket cover
 2 4 ····Bearing
 2 5 ····Housing
 2 6 ····Driven shaft
 2 7 ····Tail cover
 2 8 ····Square flange unit
 3 7 ····Safety cover
 3 8 ····Center cover
 3 9 ····Main frame
 4 0 ····Bush nut
 4 1 ····Split pin
 4 2 ····Washer
 4 3 ····Hinge plate
 4 4 ····Pin B
 4 5 ····Pin A
 4 6 ····Side plate
 4 7 ····Roller link
 4 7 ····Roller link
 4 8 ····Joint
 4 8 b ···Link plate
 4 8 c ···E-ring
 5 0 ····Scraper
 5 1 a ···Bolt (Scraper use)
 5 1 b ···Nut (Scraper use)
 5 2 ····Roller link (Scraper type)
 5 3 ····Joint (Scraper type)
 5 3 a ···Link (Scraper type)
 5 3 b ···Link plate (Scraper type)
 5 3 c ···Split pin (Scraper type)

1 0 1 ···End cover
 1 0 2 ···Spacer
 1 0 4 ···Lock nut b
 1 0 5 ···Tension bolt b
 1 0 6 ···LS Built-in Take-up
 1 1 0 ···Torque arm
 1 1 1 ···Cushion retainer
 1 1 2 ···Rubber washer
 1 1 3 ···Urethane cushion

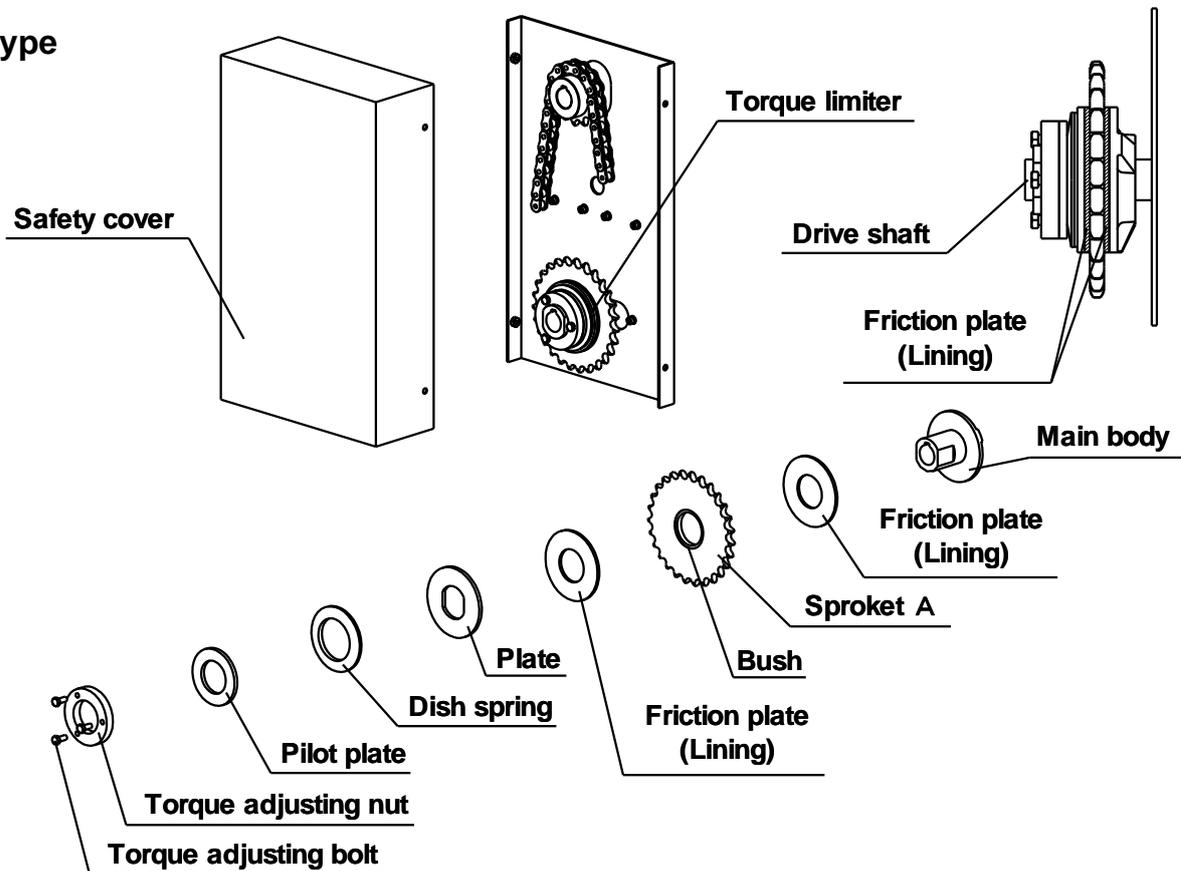
※Since this is a standard unit drawing,
 it may be slightly different from the actual
 machine. The machine is subject to technical
 modification without prior notice.

●Torque limiter Part name

50 Type



80 Type



2-2 Unpacking

Check the following after opening the package. If something is wrong or you find any problems, contact your sales agent.



CAUTION

- Check that the machine is the one you ordered. Installing the wrong machine may cause injury or machine damage.

- (1) Check the specifications on the machine plate to confirm your order.
- (2) Check that the machine has not been damaged during transportation.
- (3) Check that bolts and nuts are firmly tightened.
- (4) Check that all accessories you have ordered are included in the package.

2-3 Carriage



WARNING

- DO NOT go under the machine while it is being hoisted for carriage. A fatal accident may result if the machine falls.



CAUTION

- Take the greatest care to prevent this machine from dropping when carrying it. Be sure to use hoisting fittings if provided.
- However, DO NOT hoist the whole machine with hoisting fittings after installation. This may damage hoisting fittings or the machine, or cause injury due to the machine's fall.

2-4 Installation



CAUTION

- Attach a cover to the chip inlet of the chip conveyor to keep hands from entering during operation. Injury may result.
- DO NOT climb onto or hang from the chip conveyor. Injury may result.
- DO NOT put any obstacles which prevent ventilation around the geared motor. Burns due to overheating or fire may result.

2-5 Wiring



WARNING

- Perform wiring according to the electric equipment technical standards and wiring regulations.
Burns, electrical shock, fire or injury may result.
- Make sure that qualified personnel, such as an electrician, perform wiring.
Burns, electrical shock, fire or injury may result.
- Be sure to place the ground leakage breaker at the power source.
Burns, electrical shock, fire or injury may result.

- (1) Connect this machine to a power source of appropriate voltage.
- (2) Be sure to ground the machine.
- (3) Use IV or KIV wire with a rated cross section of more than 2 mm² or vinyl cable for wiring.
Please use a cable with a withstand voltage of 600v or more.
Our recommended cable is " MTW + H07V - K : NICHIGOH COMMUNICATION
ELECTRIC WIRE Co., Ltd. "

2-6 Operation



WARNING

- DO NOT operate the machine with the operation panel open.
Electrical shock may result.
- Be sure to turn OFF the machine when electric failure occurs.
When electricity recovers, the machine starts suddenly, which may result in electrical shock, injury or machine damage.
- DO NOT put a hand or foot in the opening section of the chip conveyor during operation.
Injury may result due to a hand or foot being caught in the machine.



CAUTION

- Stop the machine immediately when trouble occurs.
Electrical shock, injury or machine damage may result.
- DO NOT touch the machine during operation.
The geared motor becomes very hot, and may cause burns.
- DO NOT continue to feed the conveyor in reverse. The machine may be damaged.

- (1) Before turning on the machine, check the following
 1. That the wiring is correct.
 2. That the terminals are firmly connected.
 3. That grounding is properly performed.
- (2) When commissioning, check the following
 1. That no foreign matter is on the conveyor.
 2. That the conveyor's actual rotating direction matches the machine's arrow direction.
When they are different, turn off the machine and switch two of the three electric lines.
 3. Feed the conveyor more than one round by inching with a two-second interval to make sure that there are no abnormalities.
- (3) Check the following during operation
 1. There is no abnormal sound, vibration and heat.

2-7 Maintenance and Inspection



WARNING

- Be sure turn OFF the machine and cut OFF the power supply to the machine before maintenance, inspection, changing parts, adjustment, or repairing the machine. Fatal accidents may result.
- When performing maintenance or inspection, make sure to inform other workers who are concerned with the machine.
- DO NOT operate the machine without the cover after maintenance or inspection work. Serious accidents may result due to an operator's is being caught in machine.



CAUTION

- Make sure that only a specialist adjusts, fixes, disassembles or assembles the machine. Electrical shock or injury may result without knowledge of the machine.
- Be sure to wear a helmet, safety glasses, safety shoes, and gloves before adjusting, fixing, disassembling or assembling the machine. Injury may result.

(1) Daily inspection

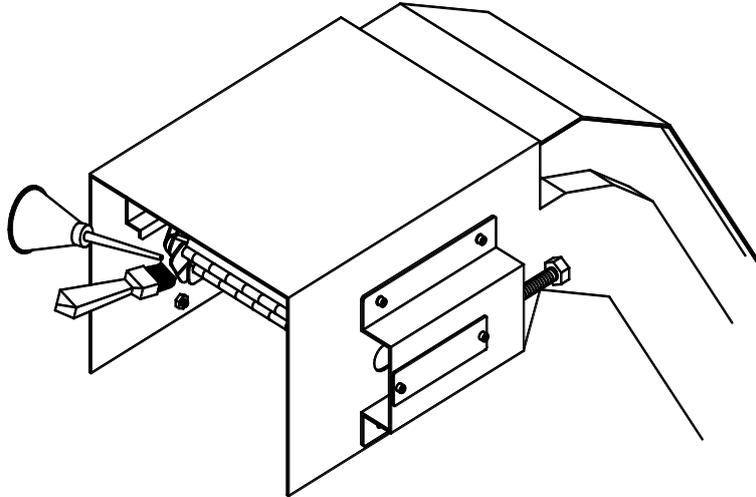
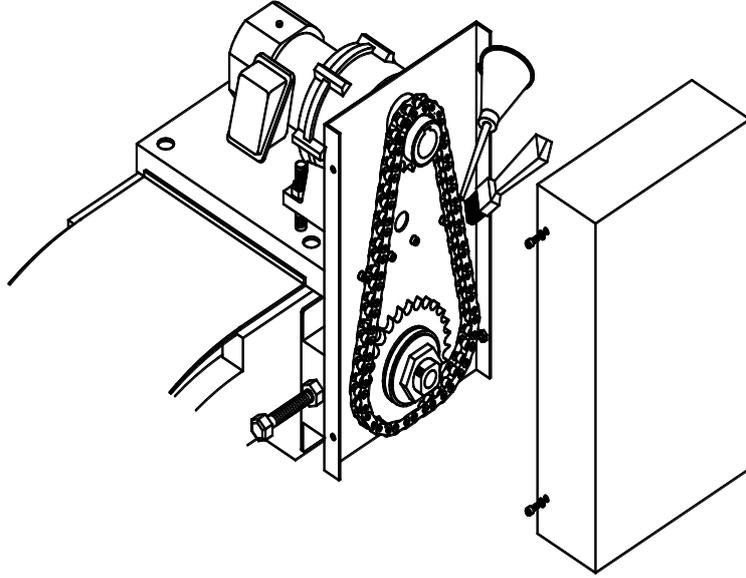
Check point	How to check	Description
Over currency	Ammeter	Currency is less than rated current specified on the specification plate.
Noise	Listen	Abnormal sound.
Vibration	Touch	Abnormal vibration.
Surface temperature	Touch	The geared motor surface temperature is less than 80°C.
Emergency button	Press the button	The emergency button stops the conveyor.

(2) Periodical inspection

Check point	frequency	Description
Conveyor chain tension	Monthly	Check the conveyor chain for looseness and tightness. Adjust the tension, referring to (4)
Drive chain lubrication	Every 6 months	Lubricate SAE30 Mobil oil or oil close to it or apply grease, referring to (3)
Conveyor chain lubrication	Every 3 months	Lubricate SAE30 Mobil oil or oil close to it or apply grease, referring to (3)
Bolts' looseness	Annually	Check bolts for looseness with a spanner or a wrench. if they are loose, tighten them.
Cleaning inside the conveyor	Every 6 months	Remove the tail cover, etc. for inspection and cleaning.
	Annually	Clean inside the conveyor referring to (5)

(3) Lubrication

1. The geared motor does not require lubrication since it is prelubricated.
2. Lubricate the conveyor chain and the drive chain with a brush or a lubricator.



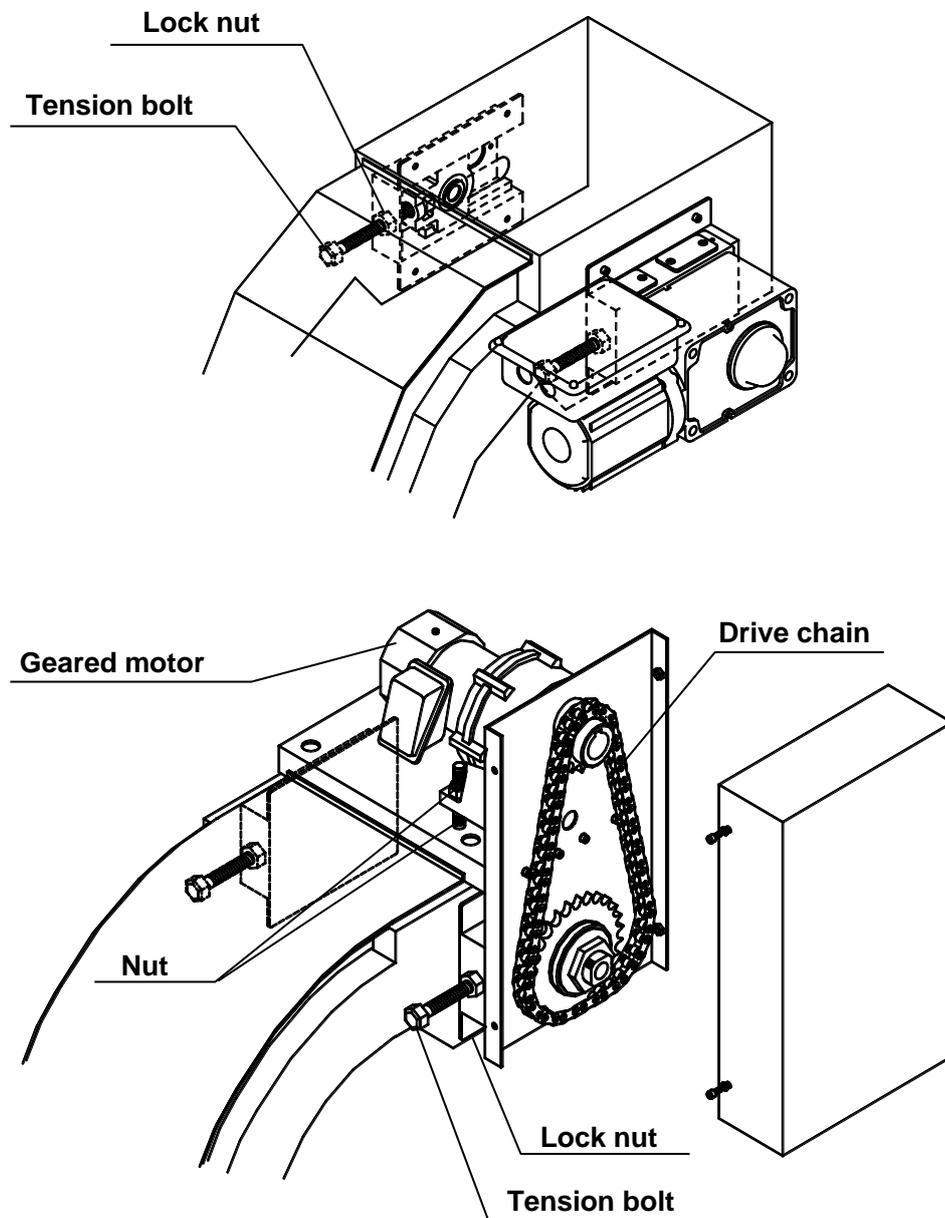
(4) Adjusting the conveyor chain tension

The conveyor loses its tension as it is used. Adjust the tension in the following procedure.

1. Loosen the nuts used to lock the geared motor and lower the motor position about 20mm to give some allowance to the drive chain.
2. Loosen the lock nuts of the take-up bracket.
3. Turn the tension bolt gradually to give an appropriate tension to the conveyor chain.
4. Tighten the lock nuts of the take-up bracket.
5. Lift the geared motor until the drive chain has an appropriate tension, and then, fix it firmly with the nuts.
6. When either limit switch or proximity switch is used for the safety device, move them as much as the tension bolts have been. (※1) (※2)

(※1) work is required only when using the torque limiter.

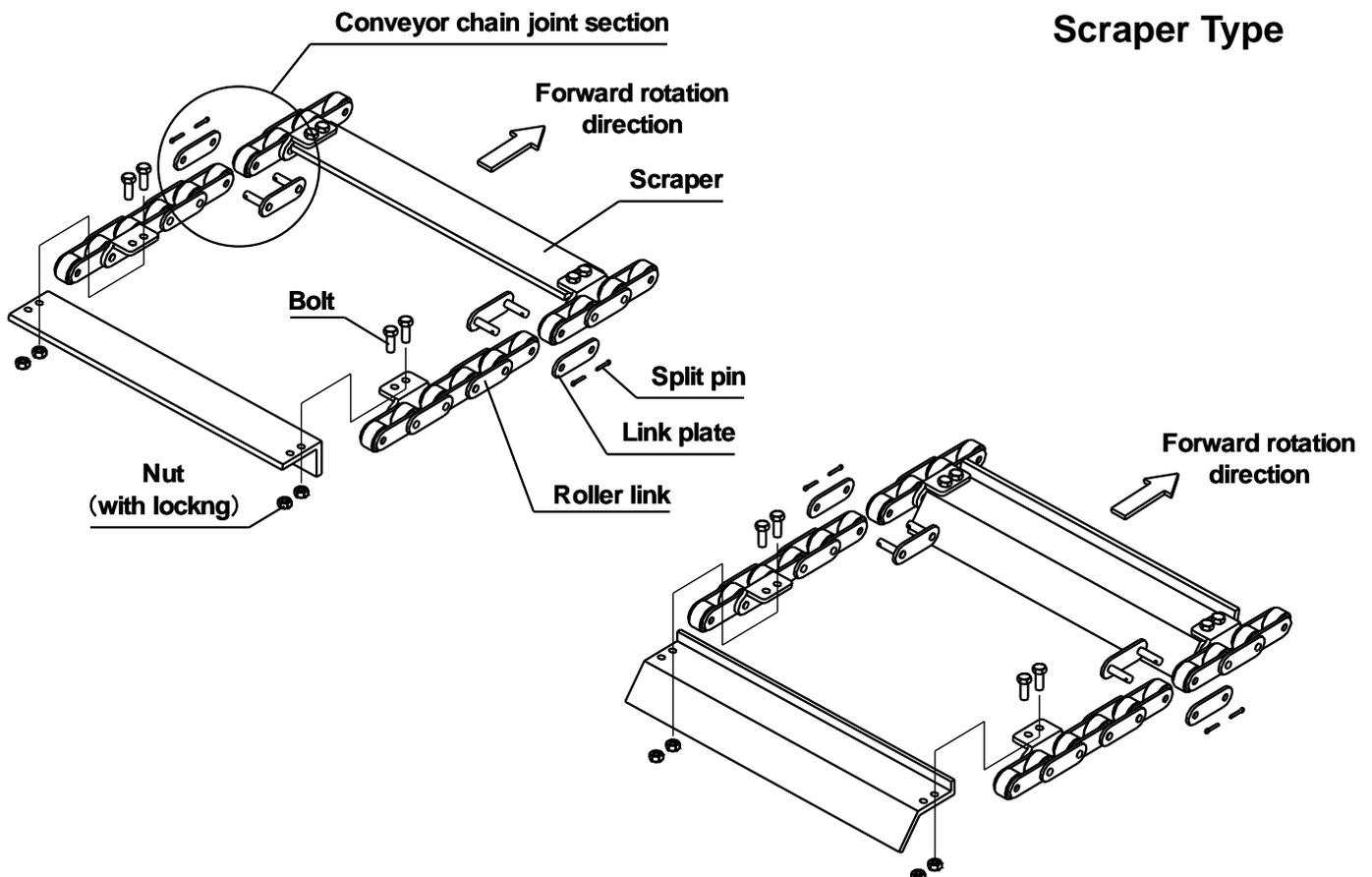
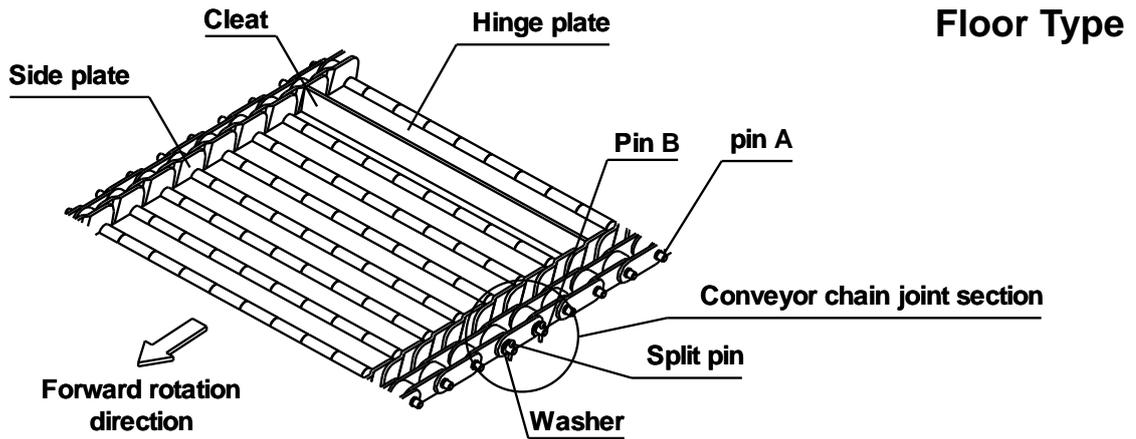
(※2) Refer to (2) - 1, (2) - 2

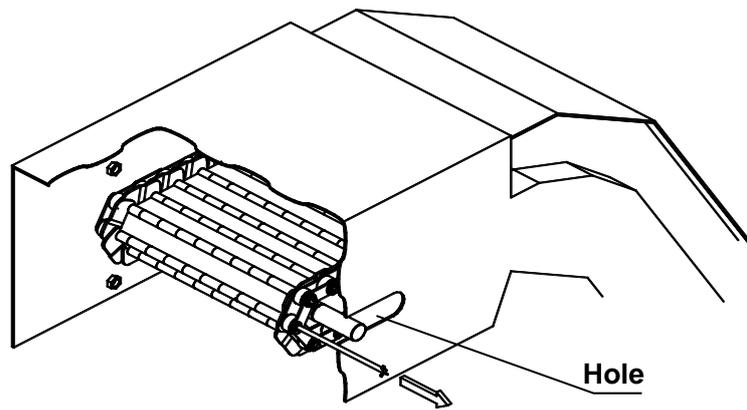


(5) Cleaning inside the conveyor

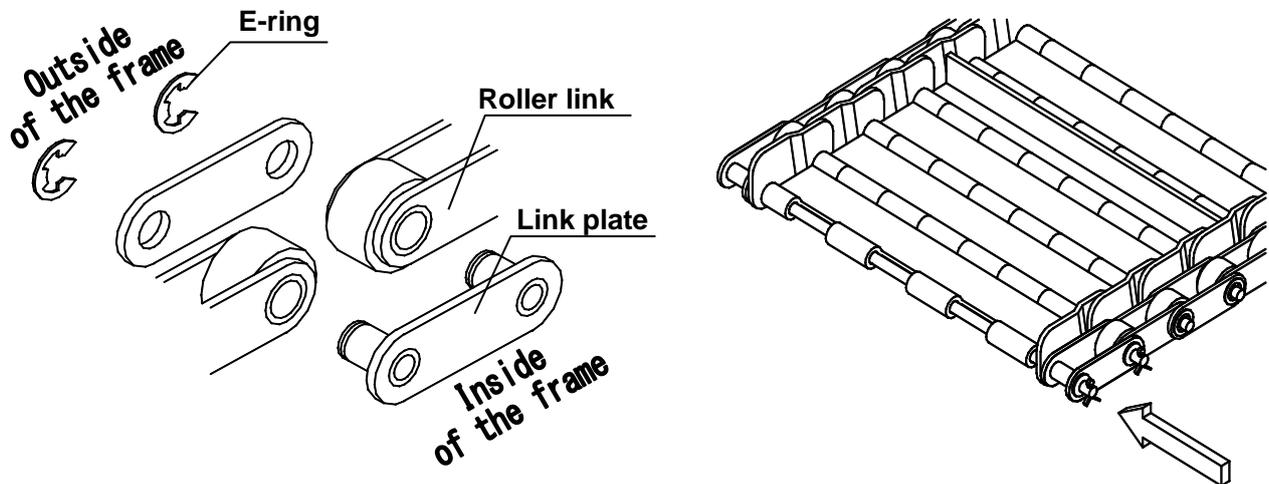
Clean inside the conveyor once a year. Following is the procedure for disassembling and assembling the hinge plate and the scraper when cleaning the conveyor.

1. Find the conveyor chain joint section. Feed the conveyor so that the joint section reaches the chip outlet. (where the split pin is seen through a slot.)
2. After loosening the lock nut, loosen the tension bolt fully. Refer to (4)
3. Remove one split pin from the pair of pin Bs on one side of the joint section. (Floor type)
Remove the split pin from the conveyor chain and remove the link on both sides.
(Scraper type)

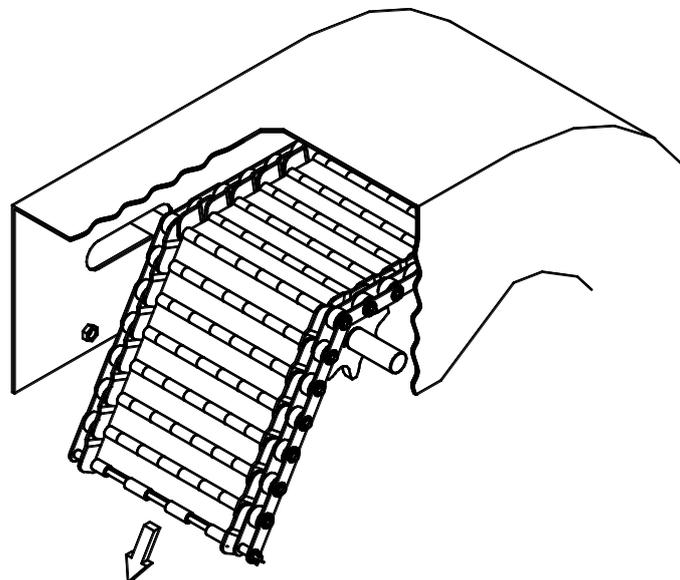




4. Pull out pin B to remove the side plate and hinge plate.(Floor type)
5. Remove the conveyor chain E-ring with pliers. Then remove the links on both sides of the coupling (Floor type)
6. Return pin B to its original position to fix the end of the conveyor chain. (Floor type)



7. Pull out the conveyor chain . (When replacing the hinge plate and scraper, attach a new conveyor chain to the old one to facilitate replacement.)
8. Reassemble the machine in the reverse order of disassembly.(Set the conveyor chain from the bottom. Pay attention to the direction of the side plate or the scraper.)



8 Troubleshooting

Trouble	Cause		Countermeasure
The conveyor does not start.	Electricity is not supplied.		Check for power failure, line breakage, and disconnection.
	The safety device is activated.		Press the reset button.
The conveyor stops.	Foreign matter is in the machine.		Remove the foreign matter by reversing the machine.
	Chips are in the machine.		Remove the chips by reversing the machine.
	A split pin (bush nut) is damaged or missing.		Replace the split pin (bush nut).
	The safety device is activated.		Reverse the machine to set it.
	A large amount of chips are loaded at one time.		Change to a certain amount of loaded at one time.
Others	Knocking	Conveyor chain has lost its tension.	Adjust the conveyor chain tension.
	Abnormal sound	Bearing malfunctions.	Replace the bearing and the take-up unit.
	Abnormal sound	The conveyor chain needs oil.	Lubricate
	Side plate damage	Foreign matter is in the machine.	Remove the foreign matter and replace the side plate.
	Hinge plate damage	A heavy object fell on the hinge plate.	Replace the hinge plate and pins.
	Scraper breakage	The Scraper is caught or wound by long chips.	Replace the scraper.

※Chips differ in forms and amount depending on the machining conditions and materials, and they might occur various troubles.

Please contact us if you have any problems or inquiries.

9 Disposal



CAUTION

- Dispose of the chip conveyor as general industrial waste.

10 Warranty

This machine is guaranteed for one year after delivery as long as it is installed in a designated way and operated with proper maintenance and inspections. Only the main unit is guaranteed to be repaired.

3 PD Filter

3-1 Outline

This machine is a scraper type chip conveyor with a PD filter.

Chips are scraped out of the machine and coolant flows to the clean tank through the screen mesh.

The PD filter is automatically washed by backwash of the coolant, enabling the filter to operate continuously.

3-2 Components

(1) Backwash Pump

Used for automatic washing of the screen mesh.

(2) PD (Polygon Drum) Filter PD

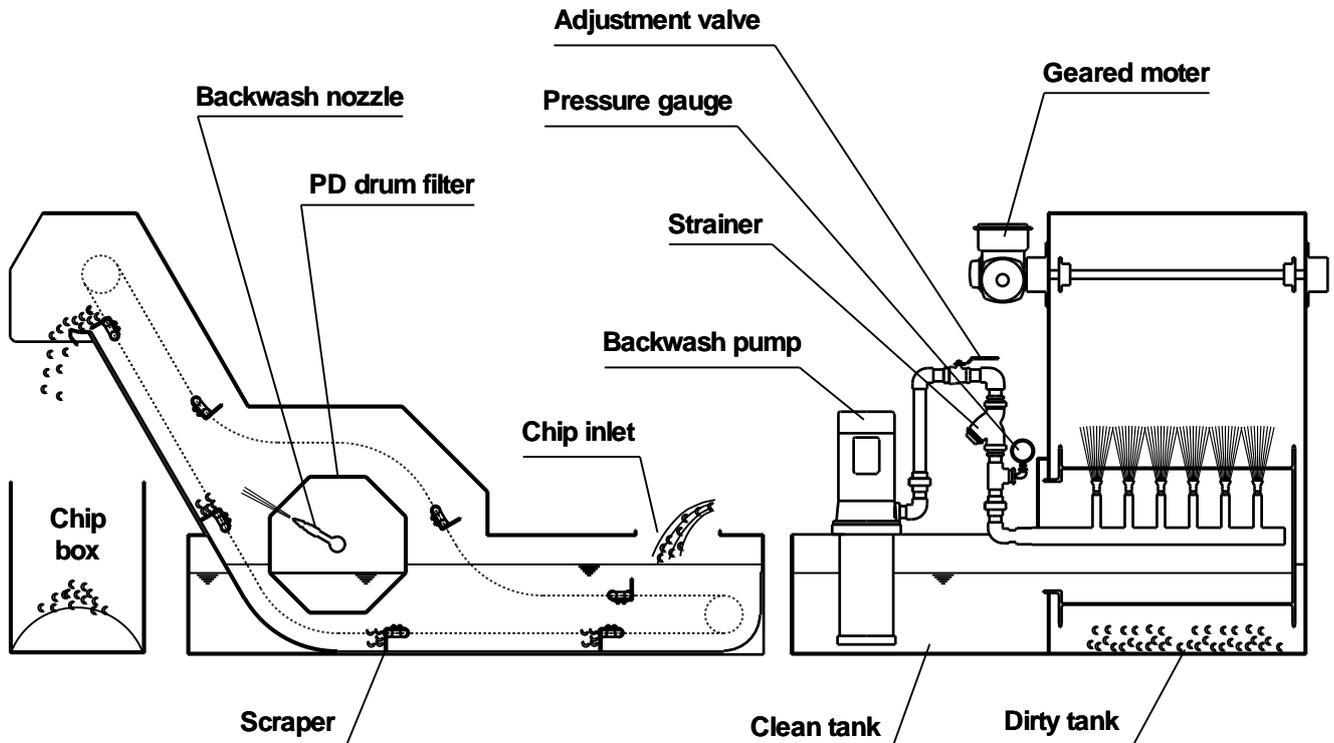
A screen mesh is attached to the octagonal drum. Only clean coolant filtered through the screen mesh is fed to the clean tank. The PD filter rotates by the conveyor chain drive.

(3) Strainer

Removes foreign substances in the backwash piping.

(4) Adjustment Valve

Adjusts the amount of backwash coolant.



3 - 3 Remarks for Use

(1) Transfer of chips

Chips accumulated on the bottom of the conveyor are scraped by the scraper and fed under the PD filter. When chips are larger than 50mm or $\phi 50\text{mm}$, they may be caught by the mesh.



CAUTION

- Loading of large chips over 50mm or $\phi 50\text{mm}$ or intensive loading of a large amount of chips may damage the screen mesh or cause overloading of the conveyor.

※Ability for transportation of the conveyor: In the case of a constant interval, fixed quantity

(2) Conveyor Operation

This conveyor should be used in the continuous operation mode.



CAUTION

- DO NOT operate the machine in the intermittent mode. It may cause clogging of the screen mesh and accumulation of chips on the conveyor because backwash cleaning of the screen mesh is conducted intermittently. This results in overloading of the conveyor and breakage of the screen mesh.

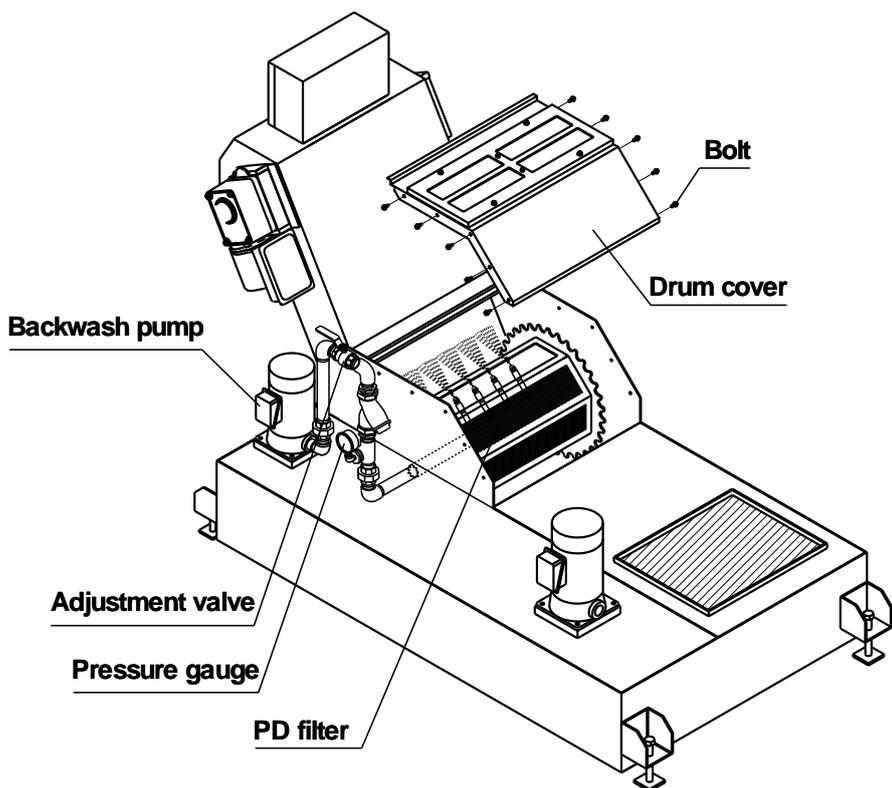
(3) Adjustment of Backwash Pump

Adjust the amount of the coolant for the backwash pump prior to machine operation so that the coolant discharged from the nozzle tip mixes with the adjoining coolant when it passes through the screen mesh. (The entire area of the screen mesh should be washed.)

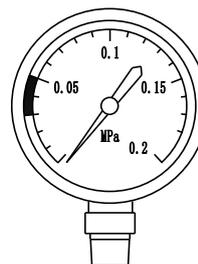
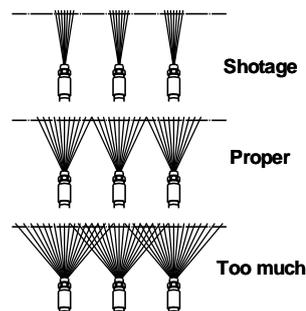


CAUTION

- A shortage of coolant may cause clogging of the screen mesh and an excessive amount of coolant may cause overflow or lathering.



■ Adjustment of the amount of the coolant



If there is a pressure gauge, operate the adjustment valve to adjust within the range of 0.03Mpa to 0.05Mpa.

※Too much coolant may cause bubbling.

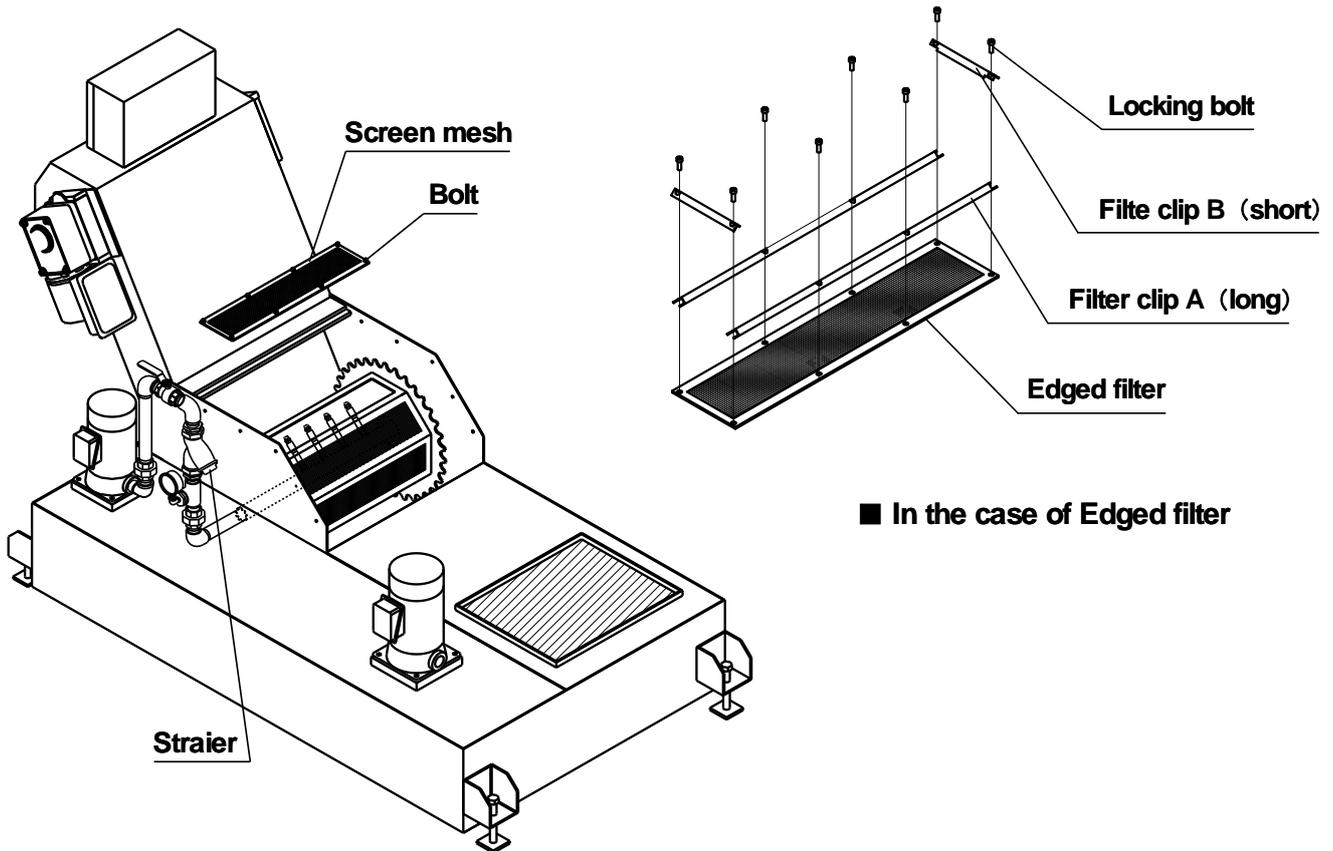
(4) Maintenance of the Screen Mesh

Even though it is cleaned by the backwash pump, the filter may become clogged because of conditions of use or wear and tear over the years. If the filter is not cleaned by backwash cleaning, dismantle the screen mesh and clean it by means of an air jet. In addition, if the filter wears out due to wear and tear over the years and accuracy decreases, it should be replaced.



WARNING

- When removing the screen mesh, be sure to confirm that the conveyor has been stopped. Otherwise, you may be caught by the chain or scraper.



(5) PD Filter Flow Rate

The PD filter's flow rate may change depending on the type of coolant and material of the chips.



CAUTION

- When an oil-based coolant of 15 cSt or equivalent is used: Flow rate decreases to 75% of that of water-soluble coolant.
- When an oil-based coolant of 30 cSt or equivalent is used: Flow rate decreases to 50% of that of water-soluble coolant.
- When the chip material is die cast: Flow rate decreases to 50% of that of iron and aluminum.
- If a large amount of coolant over the PD filter capacity is loaded, the dirty tank may overflow.

※Please contact us when changing the type or viscosity of the coolant, or the material of the chips.

3 - 4 INSPECTION ITEMS

- (1) Check that the coolant level is higher than level L prior to operation of the machine.
- (2) Check that the proper amount of coolant is used while the machine is in operation.
- (3) Clean the strainer regularly.



CAUTION

- Continuous operation of the machine with the strainer clogged may cause clogging of the nozzle.

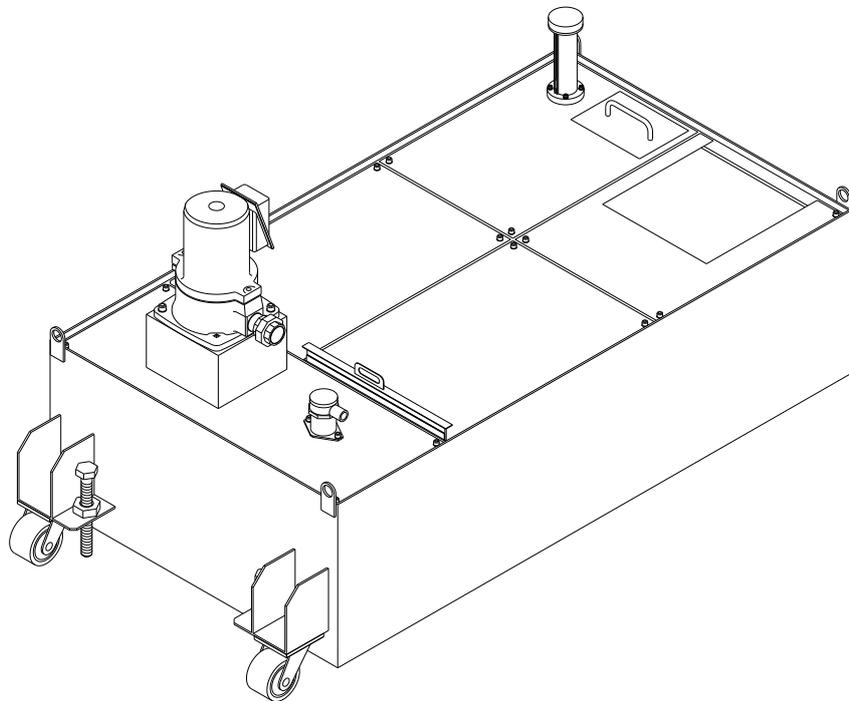
- (4) Check the screen mesh regularly whether there is not breakage.



CAUTION

- Continuous operation of the machine with the screen mesh damaged may decrease the effect of filtration. Replace the screen mesh immediately.

4 Coolant Tank



For Safety

- Only trained operators should operate the coolant tank. Read the safety instructions carefully and make sure you understand how to operate the tank before using it.

4 - 1 Outline

This tank filtrates coolant which flows from machining tools and returns it to the machining tools.

4 - 2 Transfer and Installation



WARNING

- When hoisting the tank for transfer, DO NOT enter the area under the tank.
- There is a risk of bodily injury due to falling of the unit.



WARNING

- When transferring the tank by hoisting it with a crane, be sure to hook the hoisting fittings attached to the unit.
- There is a risk of accident causing injury, or damage to the tank due to falling of the unit.



CAUTION

- If the tank is equipped with casters, use the casters only when the coolant tank is empty. Adjust the load of the tank using jack bolts or spacers so that all the load of the tank is not applied to the casters.
- The tank may be damaged due to overloading.

Install the tank so that the tank top (the plane where units are installed) is horizontal.

4 - 3 Operation and Adjustment

(1) Checking of the tank

The inside of the tank is cleaned, coated with rust preventive oil, and shipped.

Please check the cleaning condition before use.

* When using water-soluble coolant, please mix and insert Undiluted solut and water.

(2) Checking of the component units

- Operate the units to adjust them.

* Be sure to refer to the instruction manuals for the units.

- Check the pump for revolution direction. If the direction differs from that of the arrow, turn off the switch and change the connection of the lines on the terminal block of the motor.

- If there is a sensing switch, check that it operates properly.

- Check the filter for proper filtration.



WARNING

- When changing the lines on the terminal block, be sure to turn off the power switch to prevent an electric shock.
- There is a risk of electric shock.

4 - 4 Maintenance and Inspection



WARNING

- Be sure to turn off the power switch when conducting maintenance or inspection. A fatal accident may occur.
- Before conducting maintenance or inspection, be sure to inform the workers around the tank of the work to be conducted in advance.
- After removing a cover for inspection or maintenance, be sure to put it back in its place, and do not operate the tank without it. Operators may be injured.

(1) Daily Inspection

Inspection item	How to check	Description
Coolant level	Level gauge or visual inspection	Check that the coolant level is proper. If not, supply coolant.
Filter condition (including the filter element)	Visual inspection	Check that there is no clogging. If there is clogging, clean the filter or replace it.
Current overload	Ammeter	Check that the current is within the rated current.
Noise	Listening to the noise	Check there is no abnormal noise. If not, repair or replace the unit causing noise.
Vibration	Touching the unit to sense vibration	Check that there is no abnormal vibration. If there is abnormal vibration, repair or replace the unit causing vibration.

* Be sure to read the instruction manuals for the units provided by the manufacturers.

(2) Periodical Inspection

Inspection item	Inspection frequency	Description
Internal cleaning of tank	Once every six months	Remove chips and sludge in the tank.
Filter replacement	Irregular inspection	If the filter does not filtrate properly, replace it.

* Be sure to read the instruction manuals for the units provided by the manufacturers.

4 - 5 Warranty

We will warrant the tank for one year after delivery provided it is properly installed, operated and maintained by the customer according to the instruction manual. We will repair the tank free of charge provided any failures or malfunctions are caused by our faults within the period of warranty. We are not responsible for any trouble or malfunction due to improper operation of the tank by the customer, or for any secondary loss or damage to the material or products.

