PV Module Equipment

npcgroup. net

Maintenance Manual

LAYUP CONVEYOR LINE

NCV-100x200-2

CV-1012-267

NPC Incorporated

Upon receipt of the product and prior to initial operation,
read these instructions thoroughly, and retain for future reference.

Thank you for your selecting our product.

Please keep this manual handy for future reference.

Contents

MEMO

1. For Safe and Appropriate Use of This Machine

Before using this machine, read “Safety Instructions” stated in this chapter and fully understand each article in order to ensure safe and appropriate use of this machine. If you have any question, feel free to contact us. Thank you.

1-1. Comprehensive Safety Instructions

(1) Carefully read **Operation Manual / Maintenance Manual** and the **manuals of parts and devices** in order to operate the machine safely and appropriately in all events such as installation, operation and maintenance.

(2) Assign **a person responsible for the machine management** in order to ensure overall safety and appropriate operation of the machine.

(3) In consideration of the workers’ safety and health, the person responsible for the machine management should prepare “**Safe Working Procedures**” in accordance with the manuals and equip necessary protective gears on the shop floor. The person in charge should train the workers so that they become safety-conscious enough to wear personal protective gears and abide by “Safe Working Procedures”.

(4) The machine should be handled only by the workers who have been trained fully to get necessary **knowledge and skills**.

(5) Workers should follow **Operation Manual / Maintenance Manual and “Safe Working Procedures**.” They should wear work clothes and cap, not leaving shirt, necktie, long hairs and such untucked, and should not wear accessories which may hinder the work such as big earrings and a pendant. And use necessary **personal protective equipment** such as protective gloves, protective shoes, and protective glasses in order to ensure safe and appropriate work.

(6) When a third party other than the person responsible for the machine management and the operator in charge needs to access the machine, he or she should be under supervision of the person responsible for the machine management. **Minimize third party’s access to the machine**.

(7) Use the machine **only for the originally intended purpose** and **within its specifications**. The operator must not do the work which is intended to be done by the machine (material arrangement and spreading in the equipment, material loading/unloading on the conveyor, etc.) by the hand.

(8) Retrofits may affect the safety aspect of the machine. **In any case of retrofit to the machine, surely advise us on it in writing**. Do not modify or disassemble based on your own independent judgment. It may result in fire, electric shock, or injury. We assume no responsibility whatsoever for any damages resulting from modification or disassembly.

1-2. Warning Signs

The following warning signs are used in our manuals to ensure safe and appropriate use of this machine and to prevent accidents when the workers are engaged in installation, operation, maintenance, and any other handling of this machine. The workers should be familiar with each sign's meanings (what hazards, how hazardous, and how to avoid them) to operate the machine accordingly. These signs are also labeled on the machine. Beware each of them. Also pay attention to signs other than listed below if any label is attached on the machine or parts.

Warning Sign	Description
	**Electric Shock** Electric shock or burn is possible. Mishandling by neglecting this warning may bring death or serious injury to the workers or significant damage to the machine. Turn power off, in principle, before installation and maintenance.
	**Pinching / Crushing** The machine has hazards such as pinching, crushing unless the instructions are observed, which may bring death or serious injury to the workers or significant damage to the machine. Beware of protruding parts or moving elements. Turn off the main breaker and the primary air supply to the machine and release the residual pressure in principle, before installation and maintenance. Then, lock a handle(s) that cuts off energy supply using a padlock(s) to prevent careless energy supply. When energy supply is indispensable for the work, do it in manual mode with extra care.
	**Entanglement** The machine has hazards such as entanglement, drawing-in, or trapping unless the instructions are observed, which may bring death or serious injury to the workers or significant damage to the machine. Beware of protruding parts or moving elements. Turn off the main breaker and the primary air supply to the machine and release the residual pressure in principle, before installation and maintenance. Then, lock a handle(s) that cuts off energy supply using a padlock(s) to prevent careless energy supply. When energy supply is indispensable for the work, do it in manual mode with extra care.
	**Cutting / Severing** The machine has hazards such as severing, cutting, and shearing unless the instructions are observed, which may bring death or serious injury to the workers or significant damage to the machine. Beware of protruding parts or moving elements with sharp blades or edges. Turn off the main breaker and the primary air supply to the machine and release the residual pressure in principle, before installation and maintenance. Then, lock a handle(s) that cuts off energy supply using a padlock(s) to prevent careless energy supply. When energy supply is indispensable for the work, do it in manual mode with extra care.

	**High Temperature** Even after turning off the main breaker, some objects may remain hot. Mishandling by neglecting this warning may cause serious injury. Handle them only after making sure they are cool enough.
	**Rotating Objects** The machine has rotating parts. Mishandling by neglecting this warning may bring serious injury to the workers or heavy damage to the machine. Turn off the main breaker and the primary air supply to the machine and release the residual pressure in principle, before installation and maintenance in the periphery of rotating objects. Then, lock a handle(s) that cuts off energy supply using a padlock(s) to prevent careless energy supply. When energy supply is indispensable for the work, do it in manual mode with extra care.
	**Explosion** There are always possibilities of explosion of the xenon lamp, and flying debris may seriously hurt the workers. When opening the xenon lamp storage unit or handling a lamp, wear personal protective equipment such as a protective mask and/or protective gloves beforehand anticipating contingencies.
	**Laser** Observe the following instructions. Otherwise, injury to the human body (eyes and skin) may result. ➢ Do not direct the laser beam to a person. ➢ Do not disassemble the unit. ➢ Do not look directly into the laser beam.
	**Other Warnings / Attentions** The machine has other various hazards such as stabbing or puncture, impact, friction or abrasion unless the instructions are observed, which may bring death or serious injury to the workers or significant damage to the machine. Beware of protruding parts and moving elements. Turn off the main breaker and the primary air supply to the machine and release the residual pressure in principle, before installation and maintenance. Then, lock a handle(s) that cuts off energy supply using a padlock(s) to prevent careless energy supply. When energy supply is indispensable for the work, do it in manual mode with extra care.

	**Prohibition (Do not step on)** Do not step on the machine. Use a stepladder to climb the machine. Careless step on the piping or the chain may cause damage or distortion, which may result in poor performance.
	**Instructions Related to Performance and Reliability of Machine** In order not to impair the machine's performance or reliability, follow the instructions accompanying the symbol in the manuals.

1-3. Installation

(1) Specify hazard zone in the periphery of the machine and mark it on the floor. Prevent unnecessary approach during operation.

(2) The primary electric hook-up shall be done by a qualified electrician. Malconnection may cause not only machine damage but also injury accidents.

(3) Protect and take care of the cables and hoses.

(4) For sufficient air supply, make sure that the primary air regulator reads 0.5-0.6MPa.

(5) Take measures of the labeling, the protective equipment, etc. according to regulations when the chemical is used.

1-4. Operation

(1) Avoid fire use in the periphery of the machine and secure the safety in the area before and during operation.

(2) Before operation, make sure that all the safety doors and lower covers are closed, that all the screw-fixed panels and safety fences are in place, and that all the safety devices are functional. During operation, never conduct dangerous deeds such as inadvertently opening a safety door, opening a lower cover, or entering the area covered by area sensors' detection.

(3) When finding a damaged work, surely switch to manual mode and then clean up. When cleaning inside the machine, be careful of dangerous objects such as heating plates, cutters, and protruding parts. Before resuming the operation, completely remove the debris.

(4) Finding a damaged part, surely turn off the main breaker and the primary air supply to the machine and release the residual pressure, then revamp or replace the parts soon. Be very careful of objects such as heating plates, cutters and protruding parts.

(5) When there are plural workers in the machine periphery, unexpected movement of the machine may cause injury accidents. Exchange signals one another, pay attention to all workers' safety.

(6) To avoid electric leak or electric shock, keep the machine away from water. Also never operate it wet-handed.

(7) At the end of operation, turn off the main breaker without fail.

(8) Never touch hot objects like heating plates, which may remain hot regardless of on/off status of the heaters or the main breaker. The products just after thermally processed may be very hot, too. Also avoid touching barehanded potentially hot parts and devices such as the xenon lamp and the pump. Well ventilate the area and wait until they get cool enough to handle.

(9) When a xenon lamp, a laser device and the kind are used, be careful not to directly look at the beam from them.

(10) Keep the machine periphery tidy to prevent workers from falling and slipping. Do not stamp on cables or hoses. And never put anything on them.

(11) Well ventilate the working area and avoid inhaling the gas exhausted from the vacuum pump, the gas or smoke that emanates from heating units, and the dust discharged in the process.

(12) To avoid damage to the machine, never point at the display screen with sharp-pointed objects such as a pencil and a cutter.

(13) All the parameters and the prescribed values of the programmable logic controller (PLC) should be managed and recorded by the person responsible for the machine management. After editing the parameters and the values of the system, double check if the newly entered values are correct.

1-5. Maintenance

(1) Turn off the main breaker and the primary air supply to the machine and release the residual pressure in principle, before installation and maintenance. Before maintenance of pneumatic or hydraulic devices, surely release the residual air. When any pressure is left, unexpected motions may take place during maintenance work. Then, lock a handle(s) that cuts off energy supply using a padlock(s) to prevent careless energy supply. When energy supply is indispensable for the work, do it in manual mode with extra care.

(2) Avoid fire use and secure the safety in the periphery of the machine.

(3) When finding any damage of the machine or a damaged part, repair or replace the parts soon. Be careful of dangerous objects such as heating plates, cutters and protruding parts.

(4) After opening a lower cover or removing a screw-fixed cover for maintenance, double-check they are closed or fixed before resuming the operation.

(5) When there are plural workers in the machine periphery, unexpected movement of the machine may cause injury accidents. Exchange signals one another, pay attention to all workers' safety.

(6) For fear of electric leak and electric shock, keep the machine away from water. And never operate it wet-handed.

(7) Keep the machine periphery tidy to prevent workers from falling and slipping. Do not stamp on cables or hoses. And never put anything on them.

(8) Never touch hot objects like heating plates, which may remain hot regardless of on/off status of the heaters or the main breaker. Also avoid touching barehanded potentially hot parts and devices such as the xenon lamp and the pump. Well ventilate the area and wait until they get cool enough to handle.

(9) The xenon lamp may explode during lamp replacing and/or optical part maintenance. Be careful with the lamp. Be sure to wear an adequate face mask, long-sleeved jacket and protective gloves beforehand.

(10) The person responsible for the machine management should list up all the periodic inspections and make certain that all the inspections are carried out properly to grasp the machine conditions.

(11) In order to prevent other workers from operating the machine during maintenance work, post visible notices around the machine to let them know that the machine is under maintenance.

(12) To avoid damaging the machine, use only appropriate tools for maintenance.

2. Periodic Inspection

This is the inspection list for each unit. Refer to the following for each maintenance details.

2-1. Daily Inspection

No.	Check point	Description
1	Primary Air Pressure	Make sure air supply pressure at the regulator reads around 0.5Mpa to 0.6Mpa. Cylinders may seize up if the pressure over 0.7Mpa is kept supplied to them. Check air filters and mist separator as well.
2	Conveyor・ Moving Element	Keep each conveyor clean in order to prevent work from getting damaged. Also make sure that the moving unit is clean. Check the moving unit for any obstacle to prevent the machine from getting damaged or operating improperly.
3	Work Sensor	Check work sensors installed in conveyors for any foreign particles or smears. They may make it hard for driving units to complete homing or even worse, resulting in mal-movements.
4	Motor	Make sure that there is no obstacles on motor.
5	Whole Machine	Clean up all equipment. Use vacuum cleaner for inside the control panel and under the frame. Do not use air blower. Using air blower may cause to damage PLC unit.

2-2. Weekly Inspection

No.	Check point	Description
1	Appearance Check	Clean the places which normally can not be handled. Check the appearance for any trouble.

2-3. Monthly Inspection

No.	Check Point	Description
1	Cleaning of Moving Element	Clean each moving element.
2	Coupling	Check the shaft is fixed firmly.
3	Operation Panel Ventilator Filter	Check and clean the filter. Replace it if necessary.

2-4. Others

NO.	Check Point	Description
1	Cylinder Sensor and Connecter Connection	Check that the cylinder sensors and connectors are firmly fixed. Tighten them if necessary.
2	Sprocket and Chain Traverse Unit	Check the tension of the chain. Tight the tension when it is loosened.

MEMO

3. Details of Inspection & Parts Replacement

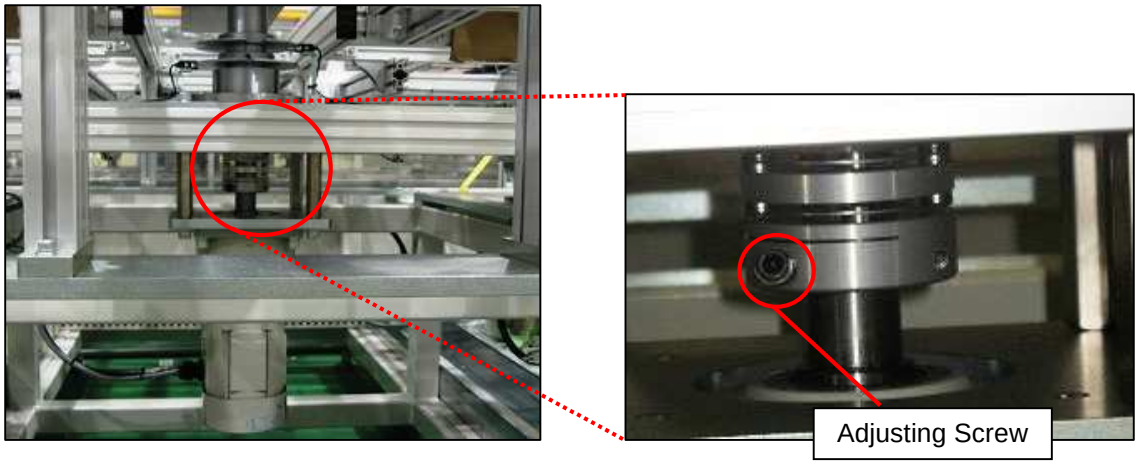
***Pictures used in this section may not be the same as your machine.**

3-1. Coupling

The coupling is used for moving elements. Check that the shaft is firmly fixed.

3-1-1. Rotating Unit of Turntable

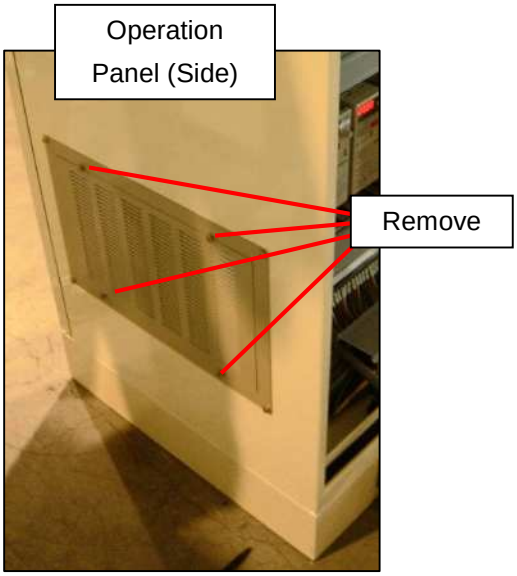
(1) Verify that the adjusting screw fixing the shaft is not loose.



Under Turntable

3-2. Operation Panel Air Ventilation Filter Replacement

Cycle	When dust accumulates. When cleaning is not enough to remove dust
Replacement	Remove the cover of the ventilation filter. There is a filter inside.



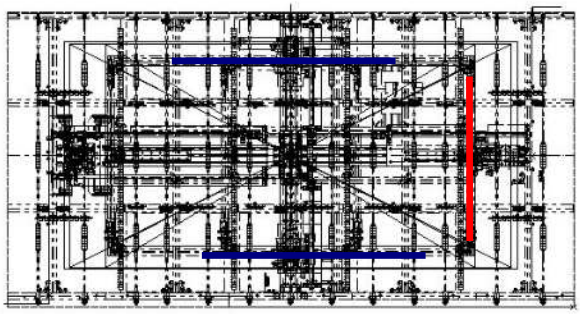
3-3. Pin Alignment

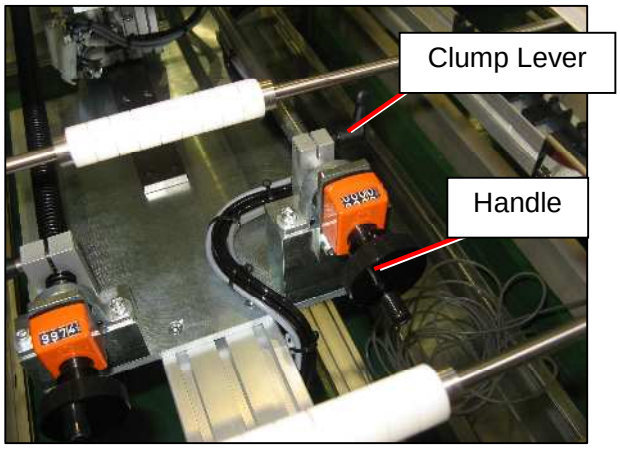
In case of changing glass size, stopper pins must be adjusted to two sections(Red and Blue) are shown in figure below..

3-3-1. Alignment

Follow the instruction below for adjustment of the stoppers.

(1) Loosen the clamp lever.
(2) Move the alignment stoppers to maximum position when the size of the glass is bigger.
(3) Switch to [Manual Mode]. Touch [Block1CONV.4-8] → [Rear Up] buttons to move the stopper up.
(4) Set the glass.
(5) Adjust the alignment stopper for the size of glass. From upstream of the conveyor, right handle adjust the side stopper(Blue line), and left handle adjust the back stopper(Red Line).

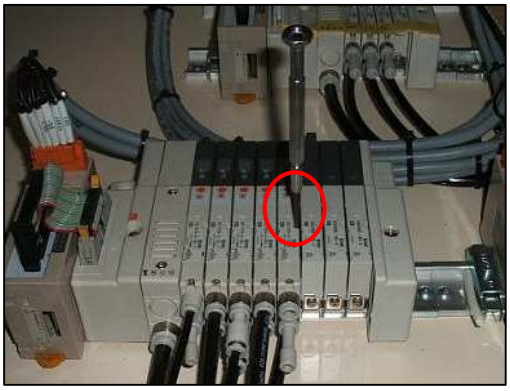


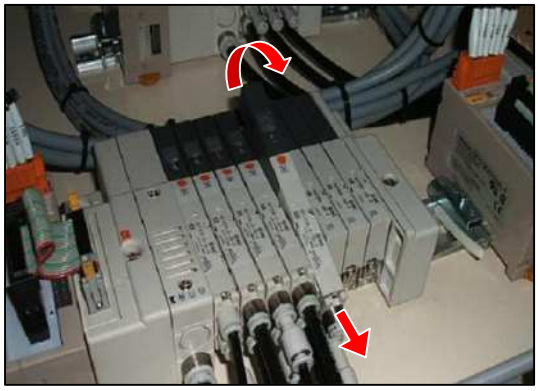


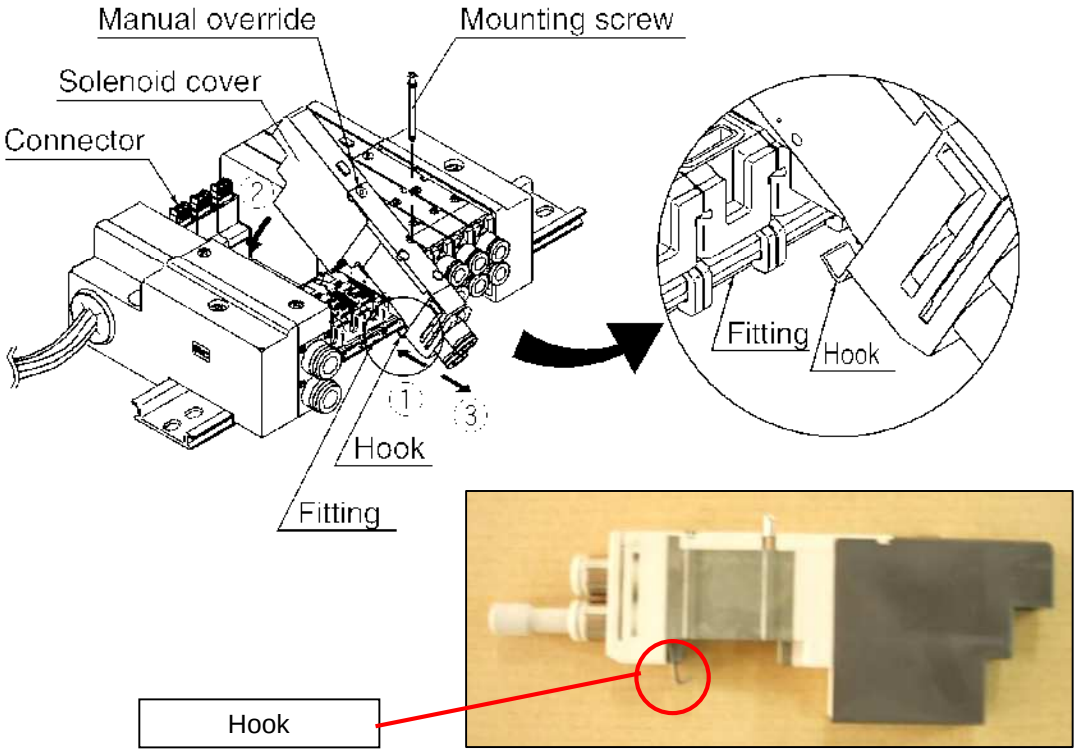
(6) Touch each alignment stopper button to adjust the position on [Block1CONV.4-8] screen. Examine to decide the position for alignment.
(7) Confirm the correct position for glass alignment.
(8) If it's OK with the position. Tight the clamp lever.

3-4. Solenoid Valve

3-4-1. SQ Series







3-4-1-1. Replacement

(1) Stop the air supply to the machine, and release the residual .

(2) Loosen the one valve mounting screw.
When if it is difficult to loosen the screw, loosen it while pressing the valve gently on the area near the manual override. Be careful not to push the solenoid cover.

(3) Lift the valve from the connector side (solenoid cover side) and remove it by sliding it in the direction of arrow ③ of figure below.

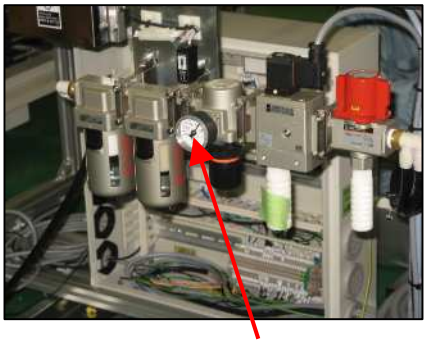
(4) Insert the hook of the new valve into the fitting on the manifold block (①), and then push the valve down into place (②).

(5) Tighten the mounting screw with the appropriate tightening torque.
(SQ1000 series: 0.17~0.23N·m、SQ2000 series: 0.25~0.35N·m)

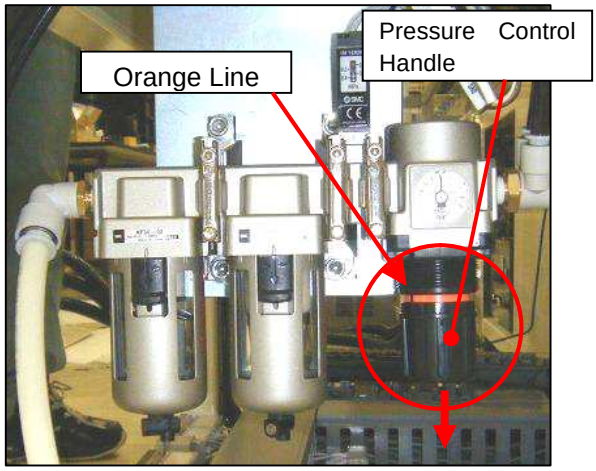
3-5. Air Pressure

3-5-1. Check

Before starting the operation, check the primary side air regulator at the lower side of the machine. The primary air should be sufficiently supplied with a prescribed pressure **around 0.5MPa to 0.6MPa**.
When it exceeds 0.7 MPa, the cylinder may get damaged.



Regulator pressure gauge



(1) Pull down the pressure control handle to unlock. An orange line appears when pulling down the handle.
(2) Turn the pressure control handle checking the pressure gauge, until it reaches around **0.5MPa to 0.6MPa.**
(3) When pressure reaches the specified range, lock by pushing up the handle.

3-6. Air Filter and Mist Separator

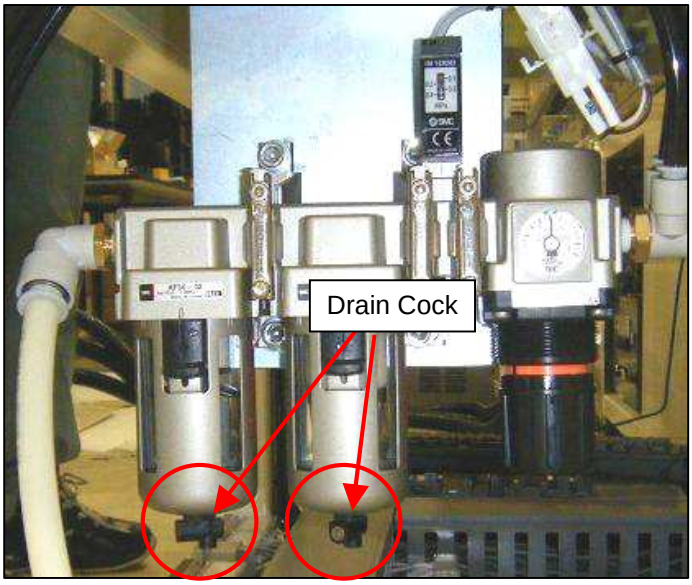
3-6-1. Draining

Frequently drain the accumulated moisture and oil content from the air combination.

⚠	**Electrical Shock Hazard!** **Surely stop the electrical and pneumatic power supply and release the residual pressure before draining. Use a bucket to prevent the drain splash, or any moisture left on the electrical devices nearby can cause electrical shock when currency is applied.**

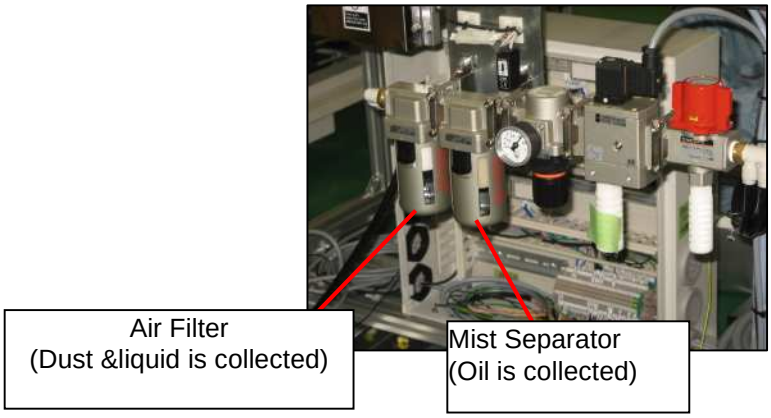
Drain accumulated moisture and oil content from the air combination.

(1) Pinch the pin on the drain cock at the bottom of the case to drain.
(2) Release the pin completing draining.



3-6-2. Elements for Air Filter

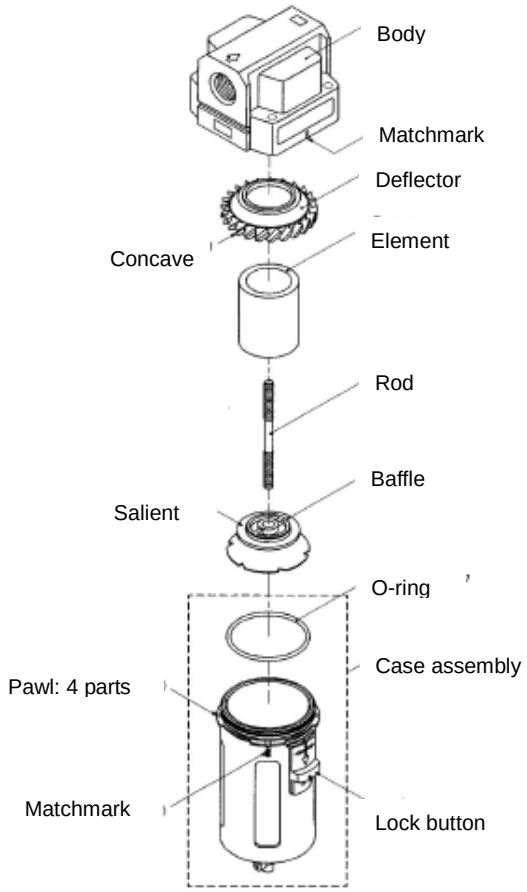
The elements in the air filter and the mist separator need to be replaced every two years. Refer to the following pages for replacement procedures.



	**Before replacement, verify that there is no pressure left in the case. If any is left, unexpected movement of the machine may hurt the operator.**

3-6-2-1. Replacement

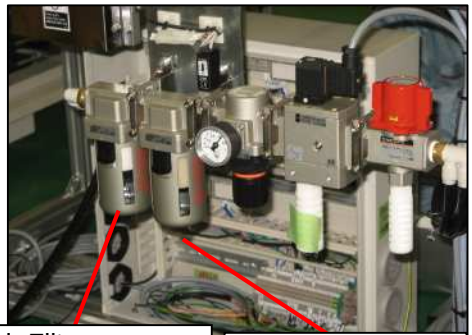
(1) To remove the case assembly, push the lock button down, hold the case assembly and then turn the case assembly by 45 degrees in either direction.
(2) Turn the baffle by hand to remove the baffle, the element and the deflector in a lump.
(3) Mount the deflector with its concave side down.
(4) Place a new element on the deflector's concave portion.
(5) Mount the baffle with its salient side up and fasten it.
(6) Insert the case assembly into the body with the matchmark of the case assembly meets the matchmark of the body. Turn it by 45 degrees in either direction until the lock button clicks. Make sure that the lock button is lifted up and locked.



AF 30 / 40

3-6-3. Element for Mist Separator

The elements in the air filter and the mist separator need to be replaced every two years. Refer to the following pages for replacement procedures.



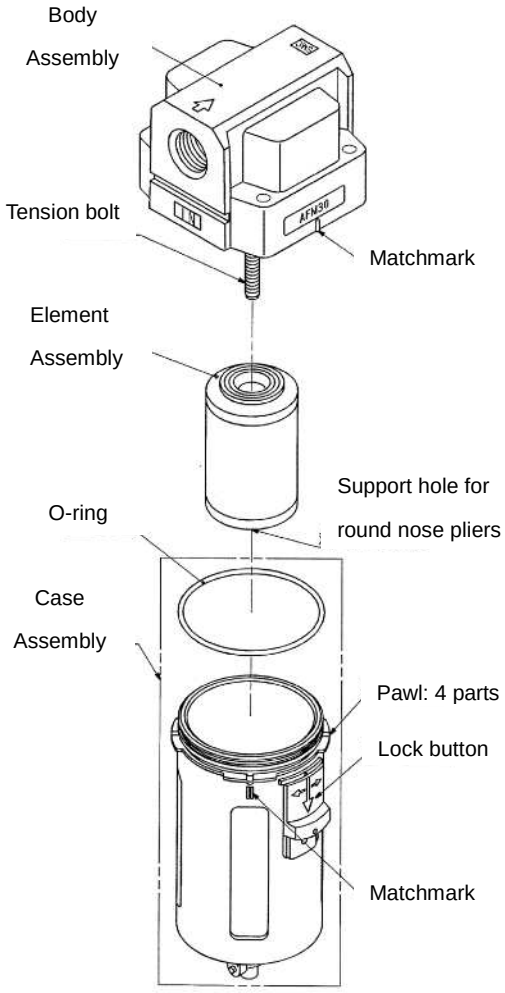
Air Filter
(Dust &liquid is collected)

Mist Separator
(Oil is collected)

⚠	**Before replacement, verify that there is no pressure left in the case. When any is left, unexpected movement of the machine may hurt the operator.**

3-6-3-1. Element Replacement

(1) To remove the case assembly, push the lock button down, hold the case assembly and then turn the case assembly by 45 degrees in either direction.
(2) Change the elements using round-nose pliers.
(3) Insert the case assembly into the body with the matchmark of the case assembly meets the matchmark of the body.
(4) Turn it by 45 degrees in either direction until the lock button clicks. Verify that the lock button is lifted up and locked.



Detail drawing

4. How to Identify the Parts

A machine is composed of mechanical parts and electrical parts. The mechanical parts are shown on the mechanical drawing, and the electrical parts are shown on the electrical drawing.
Among those parts, the parts which will be possibly changed are listed in the mechanical and the electrical lists, color-coded as consumable parts (those may be changed during the warranty period, which is one or two years, or those estimated to be changed earlier) and recommended parts (those estimated to be changed within five years). The following section describes how to specify the model, name, and the manufacturer of the used parts in case of machine failure.

4-1. Mechanical Parts

(1) Check the part number and group number.
In the mechanical drawing, part number is contained to specify the parts. The group number is indicated on the bottom right of the drawing. Check the last five digits of the group number.
In some cases, group number and part number are shown together in a balloon like 700-00 N006
In this case, the group number is “700-00”, NOT the number on the bottom right.

(2) Specify the model, name, and the manufacturer of the parts from the mechanical parts list with previously checked group number and part number.
The line where the group number and the part number match shows the detail of the appropriate part.

4-2. Electrical Parts

The electrical parts are NOT sorted by the group number. The group numbers of all the parts are indicated “900-00” in the electrical parts list.
Instead, specify the part with the device number. The device number is labeled on the electrical part of the machine. Specify the line where the device number matches.
Alternatively, the part can be specified with the device number shown on the electrical drawing.

In the following pages, the specific examples of specifying mechanical and electrical parts are given.

- An example of specifying the mechanical part

  <Vacuum pad>

  (1) At first, check the group number and the part number of the vacuum pad in the mechanical drawing. The part number is indicated “N09” in Figure 1 and the group number is indicated “030-00” in Figure 2.

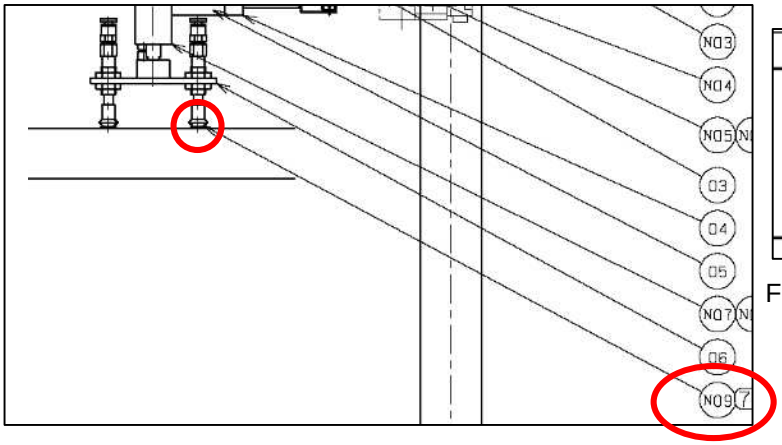


Figure 1: mechanical drawing (detail)

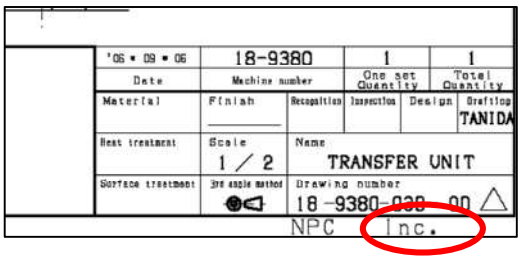


Figure 2: mechanical drawing (bottom left)

(2) Specify the part from the mechanical parts list, using previously checked group number and the part number. Look for the line where the group number is “030-00” and the part number is “N009”. The detail of the vacuum pad is shown in the line of list number 16, which is redlined in the mechanical parts list shown below.

.

list no.	group no.	part no.	type	品
1	020-00	N001	4LB45N-2	リニアヘッド
2	020-00	N002	4IK25GN-SWM	電磁ブレーキ付モーター
3	020-00	N003	CDM2L32-250-C73	エアシリンダ
4	020-00	N005	RB2015S	ショックアブソーバ
5	020-00	N006	SSR20XW2UU+640L	LMガイド
6	020-00	N007	SM13GUU	スライドブッシュ
7	020-00	N011	EE-SX872P	フォトマイクロセンサ
8	020-00	N012	E3T-ST14	光電スイッチ
9	020-00	N013	E39-S63	スリット
10	020-00	N017	AS1001F-06	スピードコントローラ(インライン)
11	020-00	N018	AS2201F-01-06S	スピードコントローラ(エルボ)
12	030-00	N005	KR45H20A+440L5E-1XX0	LMガイドアクチュエータ
13	030-00	N006	SGMAS-02ACA21	サーボモータ
14	030-00	N007	CXSL15-30R-Z73	デュアルロッドシリンダ
15	030-00	N008	AS1301F-M5-04	スピードコントローラ(ユニバーサル
16	030-00	N009	ZPT08BSJ6-04-A8	吸着パッド
17	040-00	N001	KR45H20A+440L5E-1XX0	LMガイドアクチュエータ
18	040-00	N002	SGMAS-02ACA21	サーボモータ

Figure 3: mechanical parts list (detail)

- An example of specifying the electrical parts
  <Emergency stop button>

1. At first, check the device number of the electrical part. The device number is labeled on the electrical part of the machine body, as shown in Figure 4. The device number of the emergency stop button is indicated “-52EBS1” in Figure 4.
2. Specify the part from the electrical parts list, using previously checked device number. Look for the line where the device number (symbol number) is “-52EBS1”. The detail of the emergency stop button is shown in the line of list number 42, which is redlined in the electrical parts list shown below.

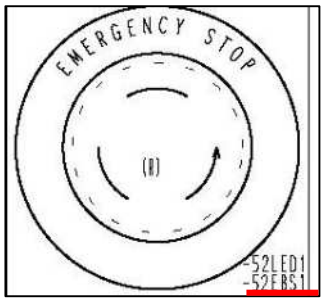


Figure 4: electrical drawing (detail)

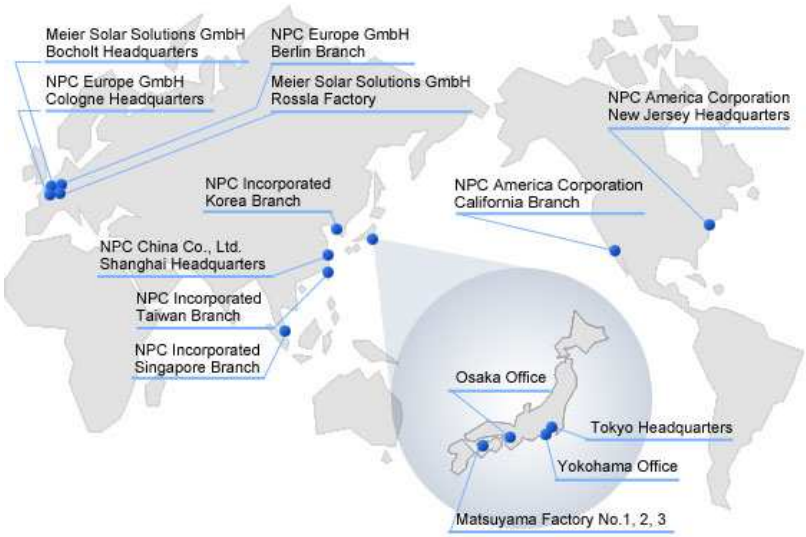
list no.	symbol no.	group no.	part no.	type	品名
1	-3DRV1S -4DRV1S -43DRV01S	900-00	N003	SGDS-02A12A	サーボパック
2	-20SIG1	900-00	N004	LOUT-24-3 R-Y-G	タワーライト
3	-4DRV2S	900-00	N005	SGDS-04A12A	サーボパック
4	-11PLC	900-00	N006	CJ1G-CPU45H	CPUユニット
5		900-00	N007	CJ1W-PA205R	電源ユニット
6	-11PLC	900-00	N008	CJ1W-NCF71	位置制御ユニット
7	-11PLC	900-00	N009	CJ1W-ID232	DC入力ユニット
8	-11PLC	900-00	N010	CJ1W-ID262	DC入力ユニット
9	-11PLC	900-00	N011	CJ1W-OD232	トランジスタ出力ユニット
10	-11PLC	900-00	N012	CJ1W-OD262	トランジスタ出力ユニット
11	-11PLC	900-00	N013	CJ1W-SRM21	CompoBus/Sユニット
12	00-(00),(06)	900-00	N014	SRT2-ID08-1	リモートI/Oターミナル
13	00-(04),(08),(10),(12),(14)	900-00	N016	SRT2-ID16T-1	リモートI/Oターミナル
14	00-(02),(03),(08),(10)	900-00	N017	SRT2-OD08-1	リモートI/Oターミナル
		900-00	N018		ートI/Oターミナル
		900-00			パワーサプライ
		900-00			
35	-19MC1 -58MC1 -58MC2			SC-0/GT 1a コイルDC24	
36	-1LED1		N050	AH164-ZTWM3	表示灯
37	-29COS00 -67COS10 -67COS10	900-00	N053	AR22JR-2A11A	キー付セレクタスイッチ
38	-12BS1 -27BS01 -27BS02	900-00	N055	AH164-TLG11E3	照光式押しボタンスイッチ
39	-12BS2 -27BS03	900-00	N056	AH164-TLR11E3	照光式押しボタンスイッチ
40	-27BS00	900-00	N057	AH164-TLS11E3	照光式押しボタンスイッチ
41	-27BS04 -27BS05	900-00	N058	AH164-TLY11E3	照光式押しボタンスイッチ
42	-13EBS2 -52EBS1 -52EBS2	900-00	N059	AR22VOR-12E3R	照光式非常停止用押しボタンスイッチ
43	-33BZ06	900-00	N060	AH164-TX2BE	ブザー
44	-29BS01 -67BS11 -67BS111	900-00	N064	AR22E0L-10E3G	照光式押しボタンスイッチ
45	-14SFC1 -16SFC1 -17SFC1 -55SFC1	900-00	N065	G9SA-301 DC24V	セーフティリレーユニット
46	-12AXR1	900-00	N066	LY-4N DC24V	パイパワーリレー
47	CIMR-J7AA20P10	900-00	N069	CIMR-J7AA20P10	インバータ
48	-1FLT1	900-00	N070	3SUP-HL75-ER-6	ノイズフィルター

Figure 5: electrical parts list (detail)

MEMO

5. Contact

Network



Don't hesitate to contact us for any questions and inquiries.

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