



NEW 2006

TSM Soldering System

AUTO SOLDER

HS04-3000

User's Manual

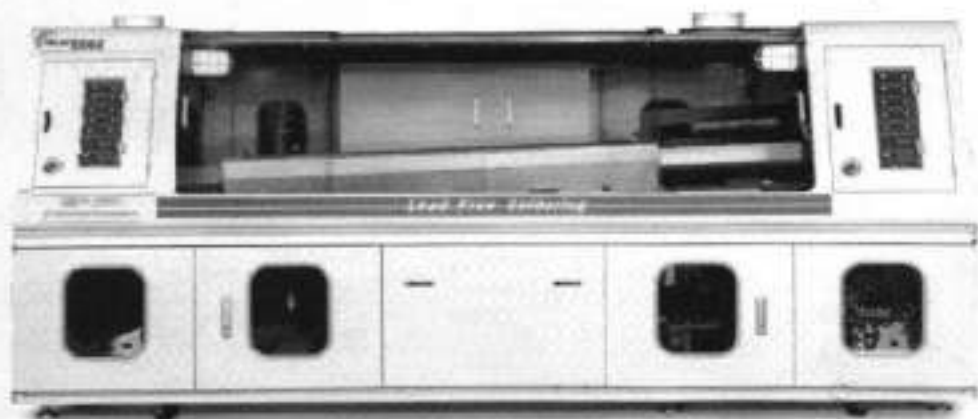


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1.0 Indication

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Complex Jungwang-dong, Shiheung-city,
Kyungki-do, Korea

Tel : +82-31- 499-4895

Fax : +82-31- 499-4898

1.2 Name Plate Identification

Non CE



TSM Co.,Ltd.(Total Soldering Machinery)

201.1DA.SHIHWA INDUSTRIAL COMPLEX.

#1240 JUNGWANG DONG,SHIHEUNG-CITY,

KYUNGKI-DO,KOREA 429-450

TEL:+ 82-31-499-4895/FAX+ 82-31-499-4898

MODEL HS-04-3000
VOLTAGE VAC
CURRENT A
FREQUENCY Hz
SERIAL NUMBER

CE



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TEL:+ 82-31-499-4895/FAX+ 82-31-499-4898

MACHINE NAME
MODEL HS-04-3000
POWER VAC
MACHINE WEIGHT KG
SERIAL NUMBER

※ Attach this plate to the lower left part at back
side of the machine

2.0 Overview

We appreciate very much your purchase of our Automatic Soldering System, HS-04-3000. This soldering system is designed in compliance with the international standard so that it may be applied to your equipment without problem.

We recommend that you read through this manual carefully before operating our HS-04-3000 in order to use it in a safe and right manner.

HS-04-3000 Auto Solder is of carrierless type and is specially designed for soldering PCBs comprised of chips and discrete components with superior soldering performance.

Our machine is safe and easy to operate by incorporating our special devices in it.

3.0 Specification

1. Equipment Specifications

- 1-1 Name: Auto Soldering M/C
- 1-2 Model: HS04-3000
- 1-3 Maximum applicable board width: 50 ~ 350mm
- 1-4 Applicable board thickness: 0.5mm ~ 2.0mm
- 1-5 Height of mounted part : 150mm or less from the upper part of board
- 1-6 Lead length: 10mm or less from the lower part of board
- 1-7 Board moving direction: L-F (Left →Right), R-F (Right→Left)
- 1-8 Board transportation speed: 50 ~ 3400mm/min
- 1-9 Equipment size: 3700(L) * 1450(W) * 1620(H)
- 1-10 Rail angle : 2 ~ 5° (Up and down movement by driving motor)

2.Board Movement

- 2-1 Hanger motor: 120W / 3ø 220V
- 2-2 Motor control method: Inverter control

3.Fluxer

- 3-1 Foaming method
- 3-2 Flux tube size: 30 * 18 * 344mm
- 3-3 Flux bath capacity: 15 ℓ
- 3-4 Foaming height: About 10mm MAX
- 3-5 Flux bath pull out: Drawer type
- 3-6 Flux bath height adjustment: Handle type
- 3-7 Spray fluxer (option)

4.Pre-Heater

4-1 Type: Air convection type using a plate heater

4-2 Heater capacity : Front-end : 1.5KW*6=9KW

After-end : 1.5KW*6=9KW

4-3 Temperature control method : - Digital Control (PID method)

- Independent control for the primary and Secondary process respectively

4-4 Temperature control range: Ambient temperature ~ 120℃

4-5 Maximum heating temperature: Ambient temperature ~ 350℃

4-6 Upper heat protection cover (material: SUS with glass window)

- Cover door slides open and close.

4-7 Length of heating zone: 1600mm

4-8 Blower fan motor: 300W 2P * 4EA

4-9 Blower control type: Inverter type

5.Solder Bath

- 2 Bath 2 nozzle distribution type (TSM's patent model)

5-1 Chip solder type: Turbulent distribution type (no nozzle clogging)

5-2 Solder capacity : Total : 400kg(LEAD FREE)

5-3 Heater capacity : 14.4kW

5-4 Temperature control: - Digital Control (PID method)

- SSR 75A (Automatic fan cooling when the heat sink is overheated)

5-5 Wave height: MAX 10mm

5-6 Nozzle cleaning: Removable nozzle type

5-7 Distribution motor : Of First and second distribution type. 400W 3ø 220V

5-8 Turbulent Shaft Motor : 220V 6W

5-9 Temperature control accuracy: Within $\pm 1^{\circ}\text{C}$ at 250℃

5-10 Motor control : Inverter control

5-11 Bath pulling : - Motor-driven type

- 220V 25W

5-12 Bath height control: - Motor-driven type 220V 60W

5-13 Nozzle plate driver: Automatic control of solder flow to the back of the nozzle
by gear drive

(Indispensable function in case of change in rail angle from 2
to 5° / TSM patent model)

6. Cooling Section

6-1 Rapid Cooling System(Optional) or Aircondition Cooling system(Optional)

7. Air Curtain

7-1 Fan model: JCL6042S

7-2 Type: Wide cross fan

7-3 Installing place: Between flux bath and pre-heater

7-4 Maximum Airflow: 2.2 m³/min

8. Hanger Cleaning Device

8-1 Type: Fixed brush / Cleaning solution supply: Air pump type

8-2 Cleaning solution: IPA

8-3 Solution supply pump : YD-5PT(Diaphragm-type air pump)

8-4 Brush Box : One-Touch removable type (Easy cleaning even when the hanger is
being driven)

8-5 Pump discharge: 5 l /min

8-6 Self priming: 1.5M

8-7 Operating air pressure: 2~5kg/cm²

9. Power Supply

9-1 Voltage: 3ø 220V or 380V 50/60Hz

9-2 Power consumption: 3ø 35KW

9-3 Current required: 220V 70A at first start up

10. Rail Drive

10-1 Rail slope control: - Variable from 2 to 5°

- Height control by driving motor at inlet and outlet

10-2 Rail height control motor: Inlet - 220V 60W

Outlet - 220V 60W

10-3 Rail material: Aluminium bar with extruded special cast-iron product (lower heat deformation and less wear)

10-4 Hanger: Precision casting (SUS) with 22mm or 33mm Teflon coating

10-5 Rail width control: Motor-driven type (220V 25W)

10-6 Input conveyor : chain or roller-driven type

10-7 Chain drive conveyor is installed under the PCB outlet to prevent PCB deflection

11. Air supply

11-1 Air pressure: 2~5kg/m²

12. Total equipment weight: 1,600kg

13. Others

The cover is so designed that a cylinder opens or closes it for easy maintenance.

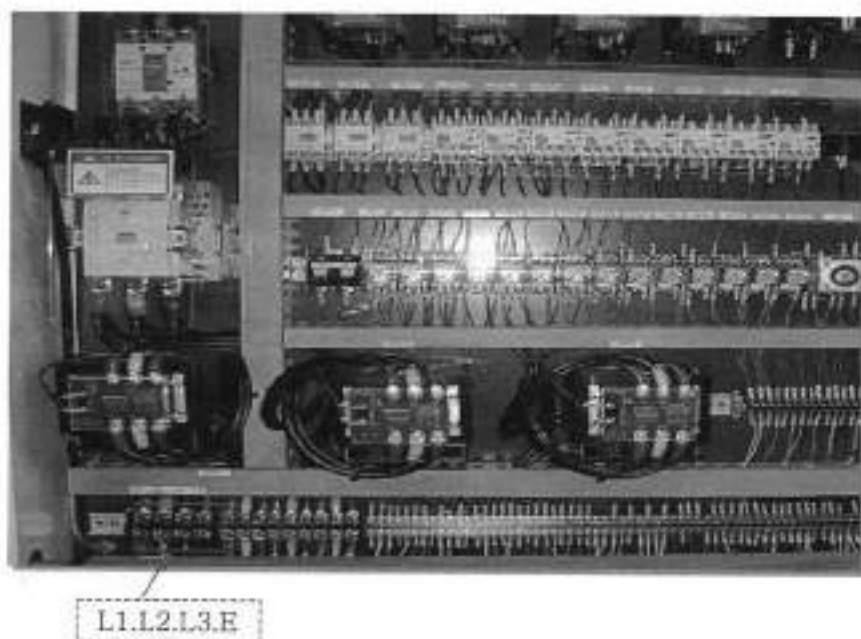
4.0 Installing the Machine

4.1 Installation

4.1.1 Supply Voltage

This machine can be used within the voltage fluctuates within $\pm 10\%$.

However, for better soldering and stable electric circuit, we recommend you to pay special attention in wiring the power terminal plate in the box in order to prevent any voltage drop of AC220V or 380V power line.



※ Guide for AC input power connection

Insert an electric wire of 38mm into a terminal (Ro, Yo, To ,G) and check if it is fixed firmly.

4.1.2 Installation Place

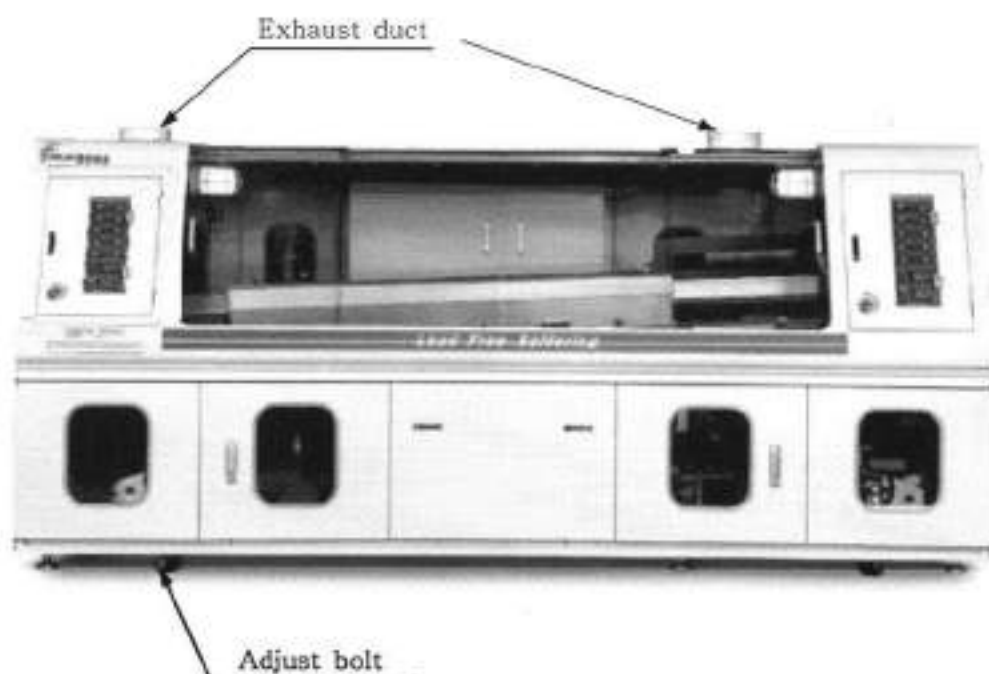
Install the Machine in a place where the temperature does not exceed 40℃.
Install the machine on a flat surface to avoid vibration or inclination.

4.1.2.1 Level Installation

Move the machine to the designated installation place using casters.

Turn the four screws at four corners of the machine among eight level control bolts until the casters are lift up and you can rotate them smoothly by hand. Then, carry out level adjustment using a level.

Be sure to use the level in the same direction. After levelling with four adjusting bolts, turn the remaining four ancillary adjusting bolts, paying attention not to move the bolt stand. Then, tighten the bolts with the lock nuts.



4.1.3 Air Supply

Install the air compressor in a less humid place if possible.

If there is condensate in the compressor tank, drain it completely.

And use a standard air hose for piping and tighten it with a hose clamp. Give more attention especially in hot and humid summer.

4.1.4 Air Vent

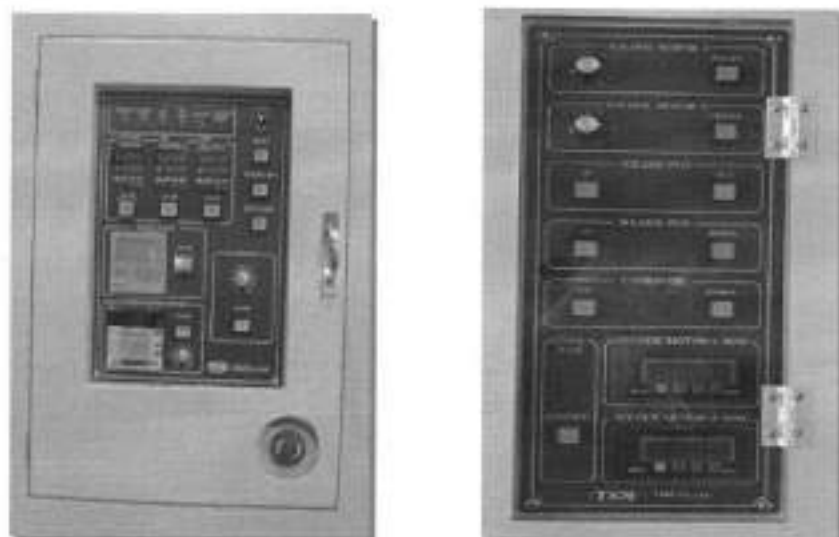
This Solder has two air vent duct of 250mm connected to the upper part of the machine, which vents out lead fumes and flux smell to the outdoor. Install the ducts separately.

※ Users shall prepare primary electric work, duct work, air piping, lead, and solutions.

※Caution

- 1) Flux gas and lead fumes generated from soldering process are very harmful to human. Please seal up all gaps around the duct with silicon or other sealers in order to prevent any outflow of gas or fume.
- 2) Install the gas and fume exhaust duct in compliance with local environment law.
- 3) Keep minimum airflow at 32m³/min and minimum wind pressure at 10mm H₂O in order to efficiently exhaust noxious gas from the Soldering M/C.

4.2 Control Panel



4.2.1 Power Lamp

When switching the breaker (ELB) of 200V 3-phase on, and the power lamp (neon lamp) will light up and the solder heater and pre-heater will be in standby mode. And the weekly timer display the time.

4.2.2 Solder Heater Switch

You can switch on or off the power for the heater with solder switch.

However, when the weekly timer is ON, you cannot turn on or off the heaters by hand.

4.2.3 Temperature Controller

Highly accurate temperature controller with digital display function adjusts the temperature automatically according to the preset temperature.

For more information, refer to the temperature controller manual.

4.2.4 Pre-Heater Control

- Pre-heaters in this Solder are divided into Pre-heater 1 and Pre-heater 2. They are a highly accurate temperature controller with digital display function and adjust the temperature automatically according to preset temperature.

For more information, refer to the temperature controller manual.

- Blower fan motor switch runs only when the pre-heater is ON.

4.2.5 Cooling Fan Switch (Use 100V down-transformer)

A fan located in the rear part of solder bath cools down soldered boards.

Set the switch (SW23) ON

4.2.6 Hanger Motor Switch

Set the switch (SW15) for the conveyor hanger moving motor ON and adjust the speed by changing the panel volume.

- ※ It is recommended to set the speed at 1000—3000mm/min according to the board state.

4.2.7 Solder Motor #1 Switch

Set the switch (SW1) for the 1st solder distribution motor ON and adjust the height of wave changing the VR1 of panel.

- ※ 1) The optimum wave height is 8 to 10mm for soldering chips.
(Use a stainless ruler for measurement.)
- 2) In order to solder the chips, exhaust flux gas from the parts by forming bent wave of it, and then solder the parts on the chip terminal.
- 3) To achieve optimum soldering, we recommend you to adjust the soldering condition while working with the board into which parts are inserted.

4.2.8 Solder Motor 2 Switch

Set the solder motor 2 switch (SW2) ON and adjust the height of wave by changing the volume of the panel.

※ 1) Adjust the height of solder wave to 8 ~10mm.

(Use a stainless ruler for measurement.)

2) To achieve optimum solder, we recommend you to adjust the condition working with the board into which parts are inserted.

4.2.9 Turbulent Shaft Motor Switch

Set the switch (SW8) for the turbulent shaft motor on and adjust the wave form by changing the panel volume.

Set the solder motor switch (SW1) ON before switching on the turbulent shaft motor.

4.3 Weekly Timer

When using this timer, plug in 220V power and set the weekly timer switch (SW.T1) ON.

You can set the ON or OFF time, as you want.

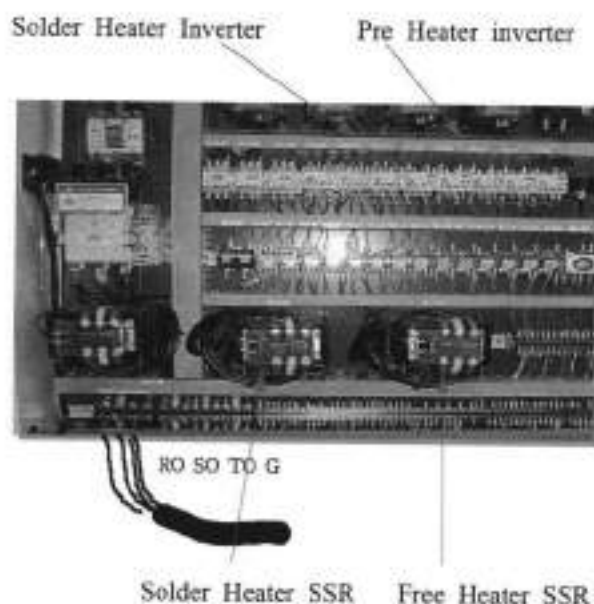
For the off-days of the week, do not save them in the memory.

With only 30 hours re-charging, this timer can back up the system for 100 hours.

【See the timer specifications attached to this manual.】

※Note: If you want to solder as soon as you start working, we recommend you to set "ON Time " to 2 hours before the scheduled operation considering the time necessary for solder to melt.

4.4 Electrical panel (terms)



* 220V 3-Phase Breaker (ELB103)

Main power switch for electric circuit on the main body of the machine.

* Fuse (CP-1)

A fuse to protect the 220V operation circuit.

* Fuse(CP-2)

A fuse to protect the 110V operation circuit. (Cooling Fan).

* Cooling Fan (BFM)

Controls the temperature inside the switchboard box.

* Down Transformer (DTR)

Reduces the voltage from 220V to 100V to drive the cooling fan.

* Relay (X1)

Relay for solder motor protection, which works when the temperature controller indicates that the motor has reached the preset value.

* Thermal Relay (OL 01)

Thermal relay for the first solder motor, which turns off the overheated motor.

* Thermal Relay (OL 02)

Thermal relay for the wave solder motor, which turns off the overheated motor.

* Control (INV)

- INV 1: Inverter to drive the first chip motor
- INV 2: Inverter to drive the second wave motor
- INV 3: Inverter to drive the blower fan motor
- INV 4: Inverter to drive the Conveyot motor

* Electronic Switch

The switches SS1 turn on and off the solder heater by the command of the control thermometer.

* Electronic Switch

- The switches SS2 turn on and off the pre-heater 1 by the command of the temperature controller of pre-heater.
- The switches SS3 turn on and off the pre-heater 2 by the command of the temperature controller of pre-heater.

5.0 Operating Procedure

(Switching-ON Procedure)

1. Check that all VRs on the panel are set to zero.
2. Switch on the power breaker. (Main S/W)
3. Check that the power lamp lights up.
4. Check that all switches are off.
5. Turn the solder heater switch ON. It takes about 2 hours for the heater to reach 250°C.
6. Turn the hanger motor switch ON.
 - In case of digital speed display type, adjust speed checking the meter.
7. Turn on the pre-heater switches 1 and 2.
 - Set the temperature as you want.
 - Do NOT turn on the heater switch when the hanger motor is not rotating.
8. Check if the Air curtain fan works before turning on the pre-heater switch 2.
9. Adjust the width of the conveyor PCB.
10. Turn ON the cooling fan switch and adjust the Airflow with the VR.
11. Check the flux quantity.
12. Open the Air cock.
13. Check that the air regulator is set properly. (2~3kg/cm²)
14. Adjust the speed controller, and after 3 or 5 minutes, check that the flux foams constantly.
15. Open the hanger cleaning pump cock and check that the pump provides cleaning solutions in normal condition.
16. Check that the solder temperature has reached the preset point.
17. Turn ON the turbulent shaft motor switches of solder motors 1 and 2.
18. Adjust the wave height to a proper level by turning the solder motor VR.
19. Adjust the wave condition of the turbulent shaft motor.
20. Start operations.

(Switching-OFF Procedure)

1. Turn OFF the pre-heater switches 1 and 2.
2. Set the solder motor VR 1 and 2 and the turbulent VR to zero.
3. Turn off the solder motor switches 1 and 2 and the turbulent motor switch.
4. Close the air cock.
5. Set the cooling fan VR to zero and turn off the cooling fan switch.
6. Set the hanger VR to zero and turn off the hanger switch.
7. Set the power breaker to OFF.

※ Caution

1. When using the weekly timer, do NOT turn off the power breaker as described in No. 7 of the OFF process.
2. When using the weekly timer, set the time switch to ON.
3. When using the day timer, the solder heater switch has the lamp function only, not the switch function.

6.0 Description of Parts

6.1 Air System

6.1.1 Air Cock

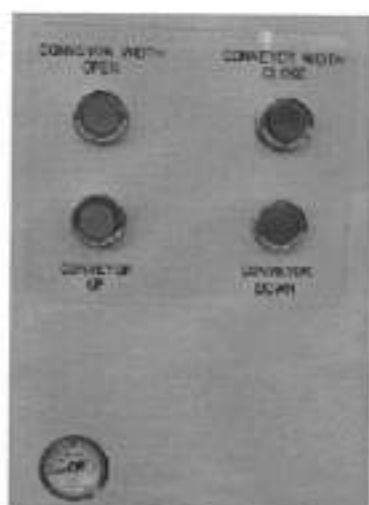
A cock, opened or closed by a lever, through which the air is supplied to the flux.

6.1.2 Air regulator

A valve that supplies air to the flux at constant pressure.

6.1.3 Air Speed Controller

A valve that finely controls the air flow to the flux. Connect an air hose to the hose nipple and turn the cock to OPEN. Adjust the air flow to 2~3kg/cm² with the regulator knob located in the lower part of regulator checking the pressure meter. Control the air flow to the flux with the air speed controller. Before starting operation, drain the condensate through a drain valve located at the lower part of the air filter.



AIR REGULATOR



AIR SPEED
CONTROLLER

6.2 Hanger Cleaning Device

Our hanger cleaning device has a self-priming diaphragm pump which enables the device to be driven by air.

This device starts running at the same time the air cock for flux foaming opens.

Close the cock in the main body of pump when you don't solder.

There are brush and filter for hanger cleaning in the cleaning box.

Clean the cleaning brush once a week at least.

※Caution

Use the I.P.A. (Iso Propyl Alcohol), cleaning solvent. Be sure to put on the rubber gloves when using the I.P.A.



view of Cleaning Section



6.3 Fluxer

A container made of stainless steel. If you put the flux tube into it and supply air to the flux tube through the nozzles on the cover, the flux foam spout out from the nozzle.

Open the air cock and adjust the air pressure to 2~3kg/cm² with the regulator and adjust the air flow with the air speed controller.

If you don't use the flux for a long time, take off the flux tube from the container and soak it in alcohol.

※ Caution

If you don't follow the above instructions and leave the flux tube in the container for a long time, the flux in the flux tube may become solid. If this occurs, do NOT impose high pressure suddenly to the tube, or the tube will be broken. First, impose low pressure slowly and raise it to the standard level when the flux foam is in good condition.

※ FLUXER



FLUX NOZZLE



DRAIN HOSE

6.4 Air Curtain

This Solder System has a fan between the flux bath and the pre-heater, which prevents gas from permeating into the pre-heater zone and heat generated from the pre-heater from permeating into the flux zone. The fan also performs a fire prevention function because the gas is highly inflammable.

Maximum airflow	50Hz	2.2 m ³ /min
	60Hz	2.8 m ³ /min

6.5 Pre-Heater

- The pre-heater facilitates the activity of the flux applied on the printer board so that it enables better soldering operation. We installed two pre-heater in HS01-3001 in order to control the temperature more freely.
- We installed a blower fan at the lower part of the heater to realize a hot air convection. Additionally, the heater is separated into two zones so that it can control the temperature according to the board type.

6.6 Cooling Fan

This fan cools down the board after soldering.

6.7 PCB Width Adjustment handle (Motor-driven type)

Turn the control handle to the right to widen the PCB width; turn it to the left to narrow (30~350mm).

6.8 Angle Adjustment Handle (On the side of inlet and outlet)

- Turn it to the right to go down the angle and turn it to the left to go up it. (0~5°, stroke 100mm)
- A motor automatically lift up or lower down the rails at inlet and outlet.
- A stop limit switch ensures safety.

input



output



6.9 Solder Bath Height Adjustment Handle (see the below picture)

Turn it to the right to increase the height and turn left to decrease it.
(Stroke 100mm)

- A motor enables the pot to go up and down automatically.
- A stop limit switch ensures safety.

6.10 Solder Bath Movement Handle (see the below picture)

- Turn it to the right to move the solder bath to the front of the machine; and turn it to the left to move the solder bath to the back of the machine.
- The pot In/Out motor enables the pot to go in and out automatically.

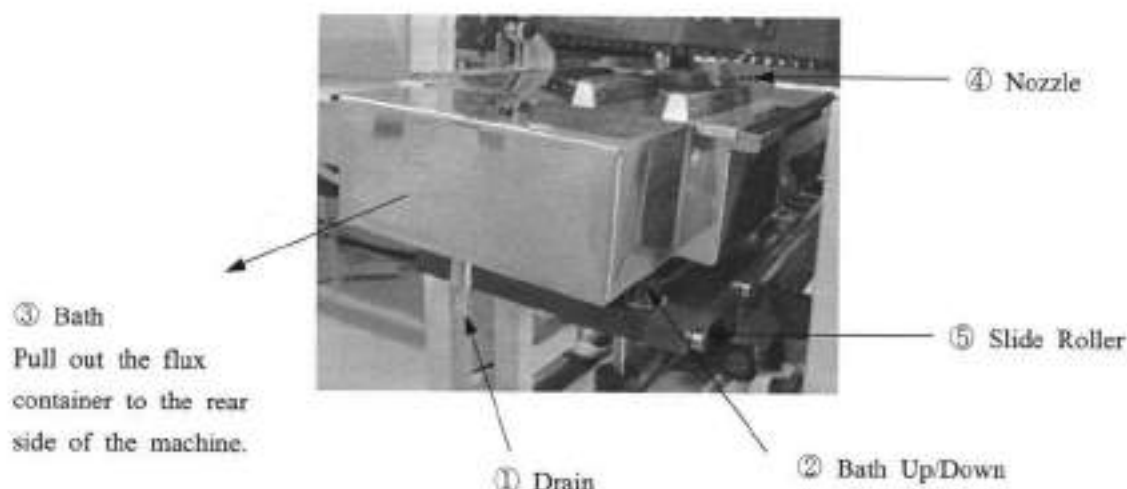


POT UP/DOWN
HANDLE

POT IN/OUT HANDLE

7.0 Disassembly and Adjustment (Maintenance)

7.1.1 Flux Bath



- 1) In order to take out the flux from the machine, use 'Drain Valve ①'.
- 2) Pull out the 'Bath ③' to the back of the machine.
(Slide Roller ⑤ enables you to pull the bath out smoothly.)
- 3) Take out the 'Nozzle④' to clean the flux tube.
- 4) Dismantle the Flux Foaming Tube in order to replace or clean it.
- 5) Use the Bath Up/Down Handle to adjust the height of assembled bath when putting it in the machine.
(Set the heights of the Wave Former and the Hanger to 10mm.)
- 6) Fill the container with flux up to the level 20mm below top.

※Caution

- 1) Use only I. P. A. as cleaning solvent.
- 2) Be sure to put on rubber gloves when overhauling. Be careful to keep your hands from touching flux or cleanser directly.
- 3) Flux and I.P.A. are flammable materials. Therefore, they must be used far apart from fire in a well-ventilated environment.

7.1.2 Foaming Check



- *Check the height of foaming is uniform.
- It is recommended to adjust the foam flow, 80% at inlet side and 20% at outlet side.

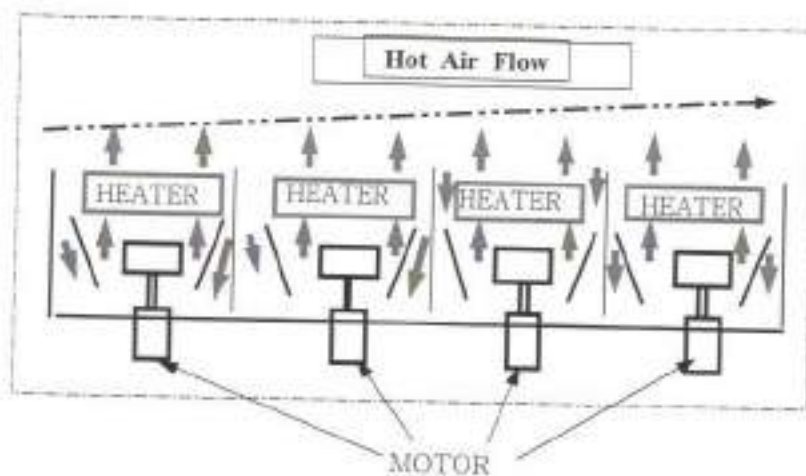
7. 2 Pre-Heater



①HEATER

②BLOWER
MOTOR

③MOTOR ASSY
FIXING BOLT



- The pre-heater design is of air convection type to achieve higher thermal efficiency.
- In order to clean, repair or replace the heater, open the back cover of the machine and pull the handle of 'Heater①', then it will be smoothly pulled out due to its drawer-like design.
- In order to replace 'Motor ②' , unfasten the 'Motor Assembly Fixing Bolts③', and the fan, and the motor assembly will be dismantled. Then, replace the motor.

7.3 Solder Bath



- It locates inside the solder tank with first and second nozzles attached on the upper part and an impeller box on the lower part.
- Inside the impeller box, there is a screw connected to the wave motor that rotates the screw. While rotating, the screw pushes out the solder toward the nozzle.
- You can move the solder bath to the rear side of the machine by only turning the handle or driving the motor.
- Fill the solder bath with the solder up to 10mm from the top when the solder bath motor stops.
- Take out the nozzle and clean the dross attached on the heater once a year.

7.3.1 Sub-Heater



- Switch the solder heater ON to supply power to the sub-heater.
- The sub-heaters are mounted on outside the solder bath at its inlet and outlet. When the solder melts inside the solder bath, carbide gases are generated due to some dross around the heater. The sub-heater prevents these gases from rushing out when the surface of the solder melts.
- When the sub-heater works, the surface of solder in the upper part of the solder bath melts first.
- *If the solder rushes out when solder melts first, it means the sub-heater is defective.
- If you find any problem in the sub-heater, take off the fixing cover and replace the sub-heater.

7.3.2 Instructions for Solder Bath Maintenance

- 1) As the temperature around the solder bath is very high ($\approx 240 \sim 250^{\circ}\text{C}$), keep off from the bath.
- 2) Remove solder dross around the solder bath nozzles at least once a day after soldering. As the removed dross is heavy-metal, it shall be stored and disposed separately.
- 3) Repair or clean the solder bath with the air handling unit and ventilation system turned on.
- 4) Open the drain cock and carefully drain the solder to a stainless steel container, as it is hot.

As the specific gravity of the solder made of Sn and Pb (63 : 37) is very high, keep the drained solder in the container less than 10kg too move it with ease.

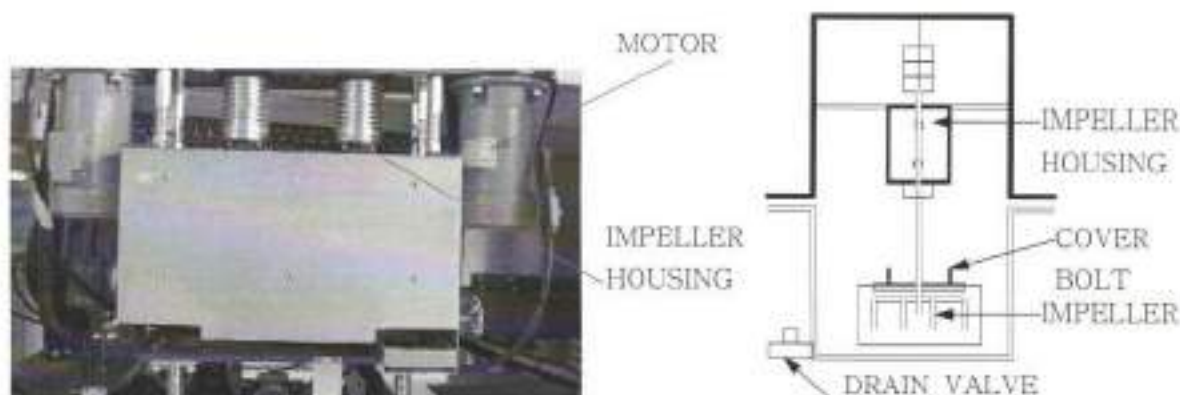
- 5) Before moving the drained melting solder mentioned in the above (4), cool it down completely.
- 6) When moving the solder bath toward the rear side of the machine, turn the rail angle adjusting handle UP and lift the rail by 50mm. Turn the solder bath rolling in/out handle described in Section 6.10.

(If you don't lift up the rail, the nozzle may be caught by the hanger when roll in or out the solder bath.)

7) Safety Equipments (Requirements)

- : ① Gloves
- ② Mask
- ③ Safety shoes and long-sleeved working uniform

7.4 Solder Bath Impeller



*Disassembling the Impeller Housing

- Separate the coupling for motor and impeller shaft.
- Drain the solder through the drain valve until you can see the impeller box cover bolt.
- Unfasten the impeller cover bolt and the bracket bolt fixed on the housing to take out the impeller housing.

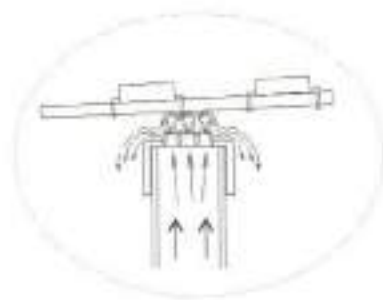
7.5. Instructions for Chip Nozzle Maintenance and Setup

1. You need to acquire the know-how for the installation and maintenance of the soldering system that solders the chips on the mounted board. We recommend you to read and understand the following instructions for installation and maintenance carefully for more effective operations.

2. Installing the turbulent shaft

- Keep the height of shaft(23) and nozzle(22) same. [Figure 3]
- It is optimum to set the shaft spacing at inlet(20) side and outlet(22) side to be 4 : 6 or 3 : 7, 3 respectively.

3. Wave Height Adjustment



- When soldering chip, the height of the wave is very important because you have to remove out the flux carbide gases around the chip before soldering. Set the wave height to be 8 to 10mm using a stainless ruler.
- Make the wave (b) uniform through out the nozzles. If there is dross between nozzles, the wave profile gets irregular and soldering cannot be done around.

4. Setting the height of PCB and solder bath [Figure 1]

- Move the board to put it on the upper part of the first nozzle.
- As described in the above article, turn the handle to lift the pot with waves of 8 to 10mm so that the solder contacts the board.

(At this time, while moving forward the board, lift the board up to the point where the solder does not overflow the board. If the height of PCB is low, it cannot be wet enough that some parts may not be soldered.

5. Fine Adjustment

Set the wave at the optimum state adjusting it finely to avoid the chips that are not soldered during continuous soldering process in accordance with the following instructions.

- [Figure 2] If you rotate the turbulent shaft motor(15), the wave profile will change into a, b or c as shown in the Figure 4. The best profile is c (Figure 4c).

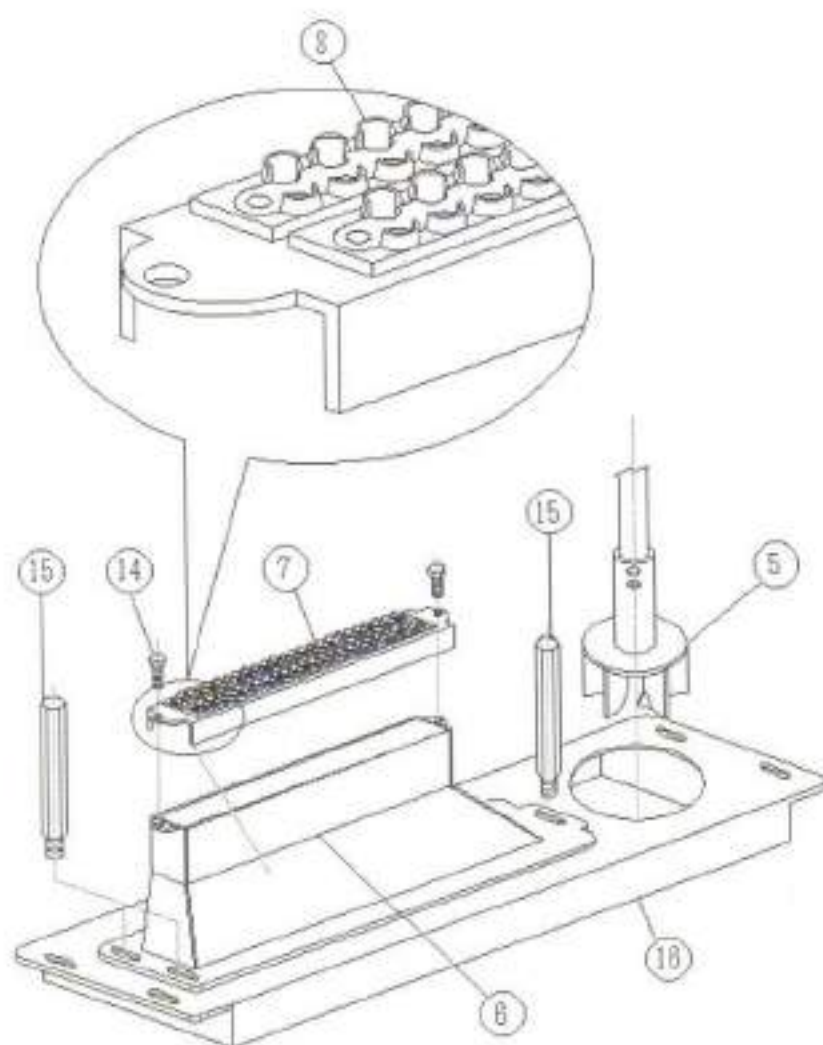
Wave profile when motor stops (Figure 4a)

If you turn the motor controller VR slowly, the wave profile changes from Figure 4b to 4c.

6. Chocolate Nozzle Cleaning [Figure 2]

- * When the Chocolate nozzle has dross in the holes ,
- The solder wave profile gets bad and some parts may not be soldered.

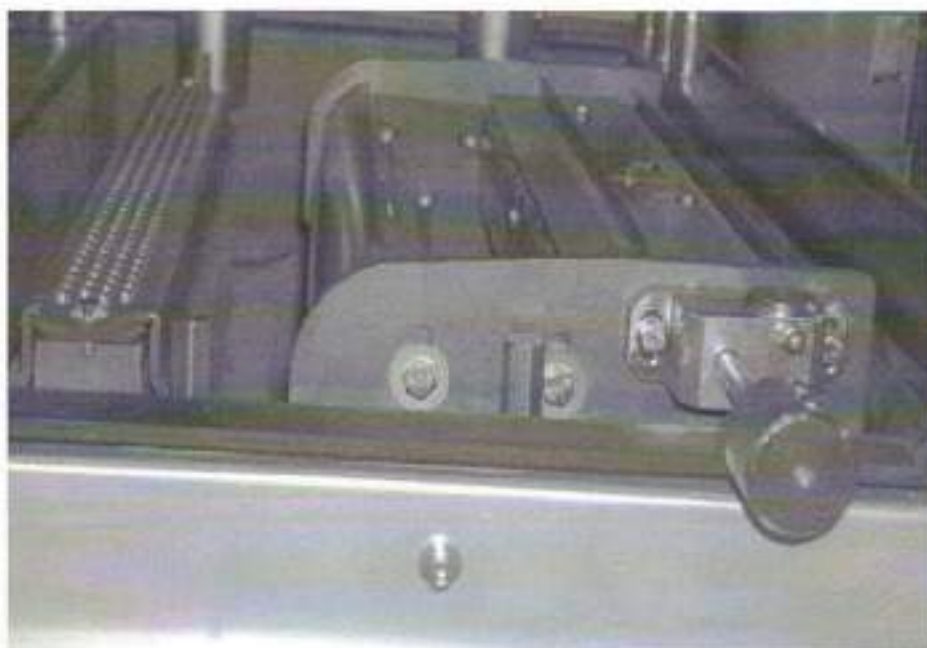
- * If oxide or flux(14) are attached on the holes of chocolate nozzle, the wave profile is not uniform and some parts may not be soldered. * Clean the holes of chocolate nozzle. If you don't:
 - the chocolate nozzle may not rotate;
 - the chocolate nozzle may be worn away more quickly; or
 - the chocolate nozzle may develop noise.
- * If there are lots of contaminants, release the bolts (14) and take it off and clean the chocolate nozzle with a brush.
- * If there are dross at nozzles, the wave profile may not be uniform. Dismantle and clean all nozzles. However, if not necessary, scrape the dross off the nozzle surface (8) with a stainless rod or ruler.
- * Put on mask and other safety equipments when cleaning.



7.6 Second Wave Nozzle Cleaning



- 1) When cleaning nozzles, lift up the hanger rail, turn the handle and pull out the bath toward the rear side of the machine.
- 2) Unfasten the bolt "A" and "B" and lift nozzles and pull them out. Remove dross (oxide) from inside and outside the nozzle and fix them again on the machine.
- 3) Clean nozzles twice a month.



7.7 Chain and Drive Shaft Housing

- 1) Disassembling housing on the inlet side
 - Ⓐ Disassemble 'Insert Conveyor(1)'.
 - Ⓑ Move the grease nipple chain (Connection Pin Chain ②) attached to the hanger chain to and under the grease nipple ⑤ attached to the front of housing.
 - Ⓒ Take away the connection pin from the 'Chain②' and lift the chain pin to separate the main pin.



7.7.1 Hanger & Hanger Chain Grease Injection

- Supply grease through the heat-resistant grease injector from the grease nipple attached to the conveyor chain.

You should be careful for safe operation while working with moving conveyor.

- Apply grease to the hangers and their guides. There is enough working space on the return side near upper part of solder bath. Apply a small quantity of heat-resistant grease to the back of hanger and to the place between chain and chain guide as well.

Use the brush end for your convenience.

8.0 MAINTENANCE SCHEDULE

Every 8 hours

- ☒ Cleaning of turbulent shaft
- ☒ Cleaning of the inside of nozzle
- ☒ Cleaning of primary and secondary wave formers
- ☒ Dedrossing of solder bath
- ☒ Checking of solder storage
- ☒ Checking of air pressure
- ☒ Checking of preheater running condition
- ☒ Checking of cross flow fan running condition
- ☒ Checking of hanger cleaning solvent level
- ☒ Checking of each chain tension

Every 48 hours

- ☒ Cleaning of mesh plate (Primary wave)
- ☒ Cleaning of mesh plate (Secondary wave)
- ☒ Cleaning of impeller shaft cover
- ☒ Cleaning of preheater reflecting plate
- ☒ Cleaning of mesh plate in the clean box

Every 200 hours

- ☒ Lubricating of impeller shaft with heat-resistance grease
- ☒ Cleaning of flux controller
- ☒ Cleaning of flux tank
- ☒ Cleaning of flux foaming tube with alcoholic solvent
- ☒ Cleaning of mesh tube in the strainer
- ☒ Lubricating of hanger chain with heat-resistance grease
- ☒ Lubricating of each chain with cup grease
- ☒ Lubricating of chain gear box with cup grease
- ☒ Lubricating of each driving unit with machine oil

Temperature Controller Adjusting Method

After indicating the power
"ON" is for 6 seconds

AIR REFLOW FACTORY SET VALUE : SDC 10

		S d C 1 0 2 0 1 0	-> Current Temp. -> Set Temp.	
PARA KEY press for 3 Sec	Switch to Parameter Mode	C t r L 2		
PARA KEY Press for 3 Sec	Switch to Setup Mode	C 0 1 0		
PARA KEY Press once	Each time it is pressed, it changes from C01 to C21.	C 0 1 0 C 0 2 0 C 0 3 0 C 0 4 3 C 0 9 0 C 1 0 0 400 C 1 1 0 C 1 2 0 0 0 0 C 1 4 0 0 0 1 C 1 5 0 0 0 4 C 1 6 0 C 1 7 0 C 1 8 0 C 2 1 0 C 2 2	0 = ℃ 1 = ℉ 0 = heating 1 = cooling 3 = K type SP Lower Limit SP Upper Limit Ready EVENT 1 EVENT 2	Operate ▲▼◀▶ keys for input. PV HIGHT ALARM
PARA KEY Press for 3 Sec.	Indicates Operation Mode	2 0 1 0		Do not touch a key for 1 minute after the "PARA" mode was switched to "operation" mode.

Temperature Controller Adjusting Method

SDC-10T6DTA01

Tuning Function

PARA KEY Press for 3 Sec	Switched from operation mode	20 10	-> Current Temp. -> Set Temp.
	to the parameter mode	C t r L 0	
		C t r L 2	Operate ▲▼◀ keys and input 2.
PARA KEY Press for 3 Sec		20 10	-> Current Temp. -> Set Temp.

Press each Para-Key once.
At 10:Stop,1 Start
CyCL: 2~10
pbIA: 0
Hy51: 5
dLY1: 0
FILt :0, Or1, 2

Return to operation mode

Alarm Output Control Function (Special Function)

PARA KEY press once	switched from operation mode	20 10	-> Current Temp. -> Set Temp.
	to range of alarm low temp.	E 1 L O 2 3 0	Input 230.
PARA KEY Press once	Range of the high temp. of alarm	E 1 H 1 2 0	Input 20.
PARA KEY Press once		20 10	-> Current Temp. -> Set Temp.

Input C14 0003 first.

Operate ▲▼◀ keys to input.

Return to operation mode

Temp. Deviation Calibration Function

PARA KEY press for 3 Sec.	Switched from operation mode	20 10	-> Current Temp. -> Set Temp.
	to parameter mode.	C t r L 2	
PARA KEY press once		P b 1 A 0	Input difference in value between the sensing temp. and the actual temp.
PARA KEY press for 3 Sec.	Indicates operation mode	20 10	-> Current Temp. -> Set Temp.

Operate ▲▼◀ keys for input.

Return to operation mode

Don not touch a key for 1 minute after the "PARA" mode was switched to "operation" mode.

Equipment Parameter & Setting

FUJI INVERTER FVR-C11S

KEYPAD PANEL

Part name and Functions

☆ digital monitor

Displays the various function codes and data values during program setting. During operation, it displays the output frequency, current, voltage, etc. If faults occur, the causes of the problem will be displayed as a code.

☆ program key

Normal mode or program setting mode select key. When the protective function is activated, this key is used to reset the fault.

☆ FUNCTION key(DATA KEY)

When normal mode, you may use this key to change the display unit(freq. and output current display) while operating, stopping and running. During the program setting mode, you may use this key to read, write a function code and the data.

☆ RUN KEY

Key for starting operation. LED(Green) ON at this time. If terminal control mode, it does not run.

☆ STOP KEY

Key for stopping operation. If terminal operation control, it does not run.

☆ UP/DOWN KEY

Key for frequency up and down. If program setting mode, it makes the functional code and data change.



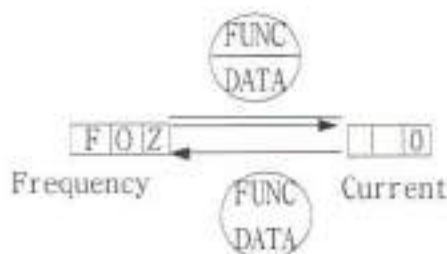
How to control key-panel

1) Monitor change

If normal mode, frequency and output current display is changed by pushing



key.



2) Run/stop

F 0 2 is : Push **RUN** to run inverter and push **STOP** to stop it.

3) Frequency change

F 0 2 is 0 : Push **UP** for frequency up and push **DOWN** for frequency down.

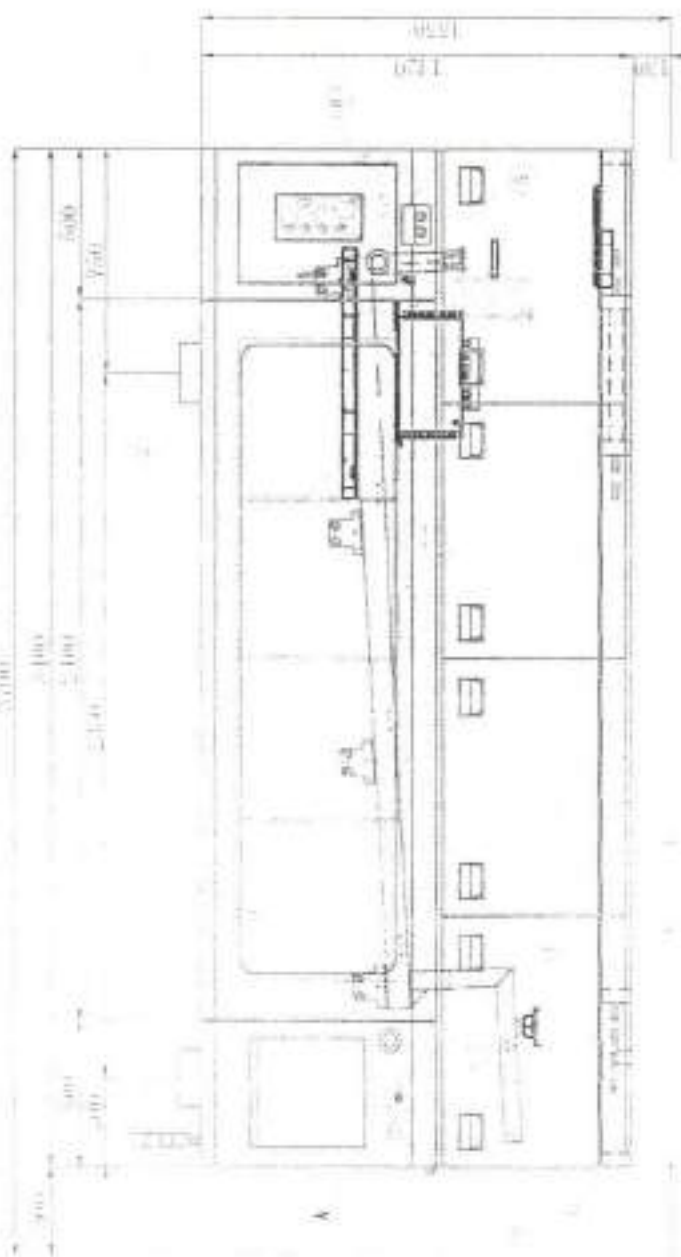
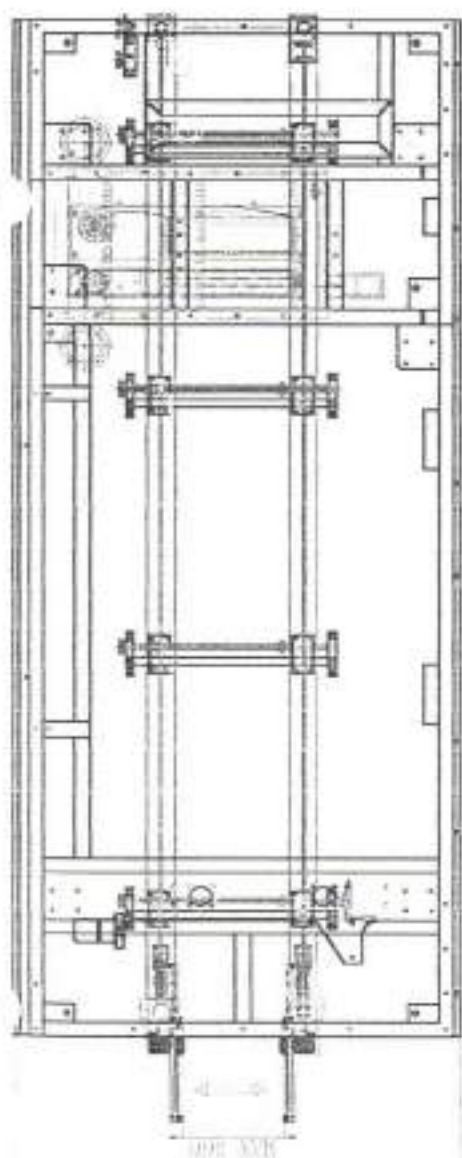
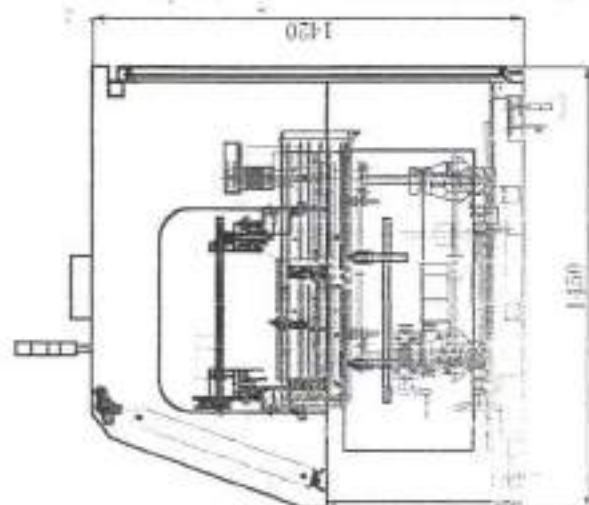
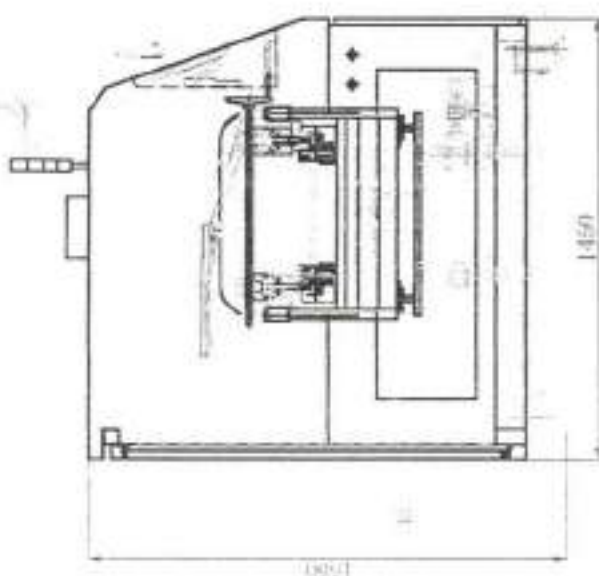
FUNCTION SETTINGS

The functions in the yellow boxes can be set while the inverter is running. Other functions must be set while the inverter is stopped.

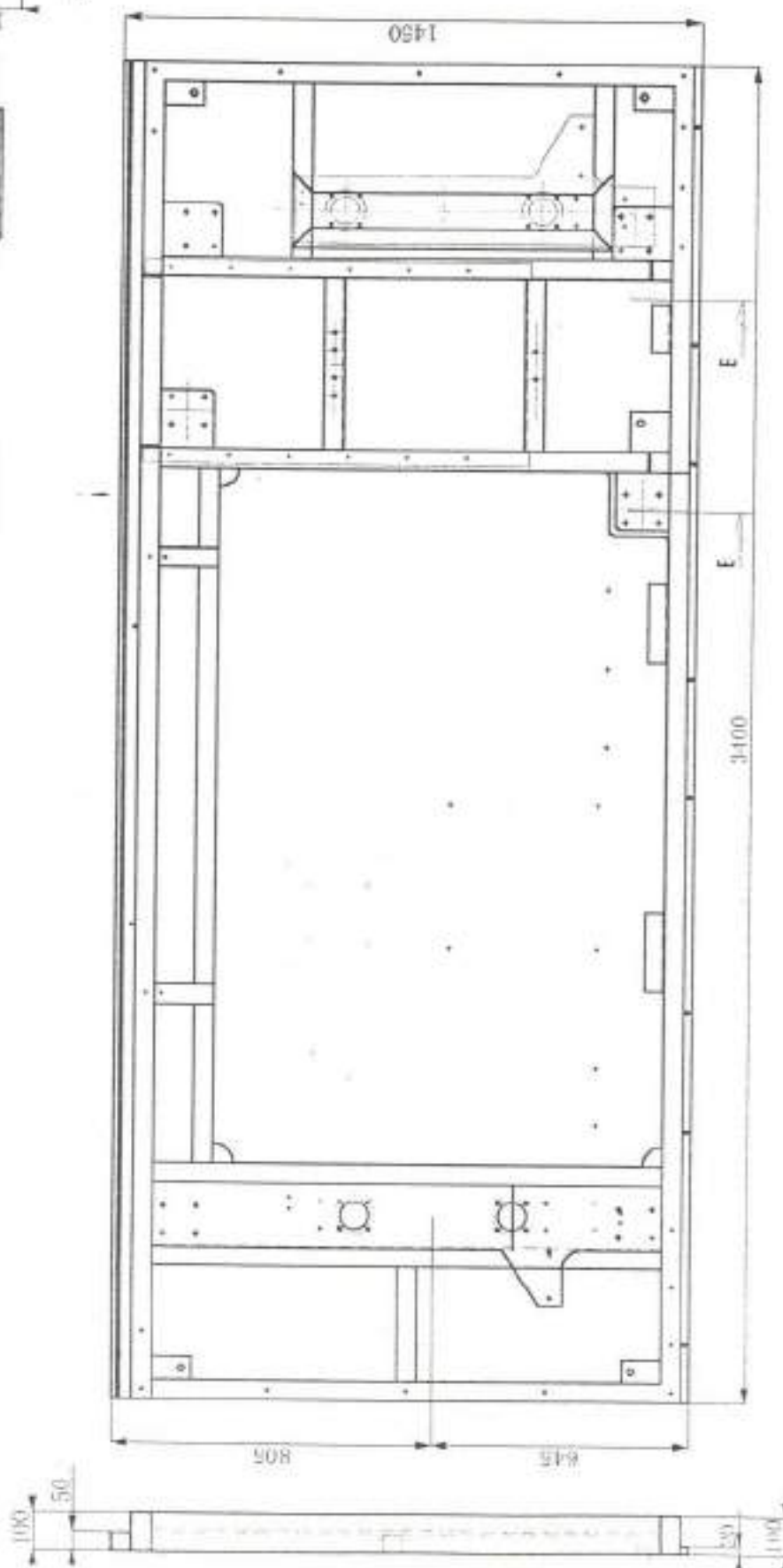
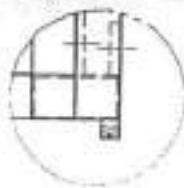
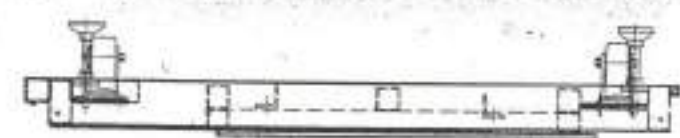
Fundamental Functions						
	FunctionSetting range		Unit	Min. unit	Factory setting	
	No.	Name				
Basic Function	F 0 0	Data protection	0: Data change enable 1: Data protection	-	-	0
	F 0 1	Frequency command	0: KEYPAD operation (▲ or ▼ key) 1: Voltage input (terminal 12) (0 to 10V DC, 0 to 5V DC) 2: Current input (terminal C1) (4 to 20mA DC) 3: Voltage and current input (terminals 12 and C1) 4: Analog input (Internal Potentiometer)	-	-	4
	F 0 2	Operation method	0: KEYPAD operation (RUN or STOP key) 1: FWD or REV command signal operation 2: KEYPAD operation (FWD) 3: KEYPAD operation (REV)	-	-	1
	F 0 3	Maximum frequency	50 to 120Hz	Hz	1	60
	F 0 4	Base frequency	25 to 120Hz	Hz	1	60
	F 0 5	Rated voltage	0 (Free) (Fixed)	-	-	0
	F 0 6	Maximum voltage	0 (Free) (Fixed)	-	-	0
	F 0 7	Acceleration time	0.0 (0.01s), 0.1 to 60.0 s	s	0.1	30
	F 0 8	Deceleration time	0.1 to 60.0 s	s	0.1	30
	F 0 9	Torque boost	0,1: for variable torque load 2 to 31: for constant torque load	-	1	13
	F 1 0	Electronic (Select) thermal overload relay	0: Inactive 1: Active (for 4-pole standard motor) 2: Active (for 4-pole inverter motor)	-	-	1
	F 1 1	(Level)	Approx. 20 to 135% of rated current	A	0.01	*1
	F 1 2	Thermal time constant	0.5 to 10.0 min	min	0.1	5.0
	F 1 4	Restart mode after momentary power failure	0: Inactive (Trip and alarm when power failure occurs.) 1: Inactive (Trip and alarm when power recovers.) 2: Active (Momentarily stops and restarts at output frequency from before power failure.) 3: Active (Momentarily stops and restarts at starting frequency.)	-	-	1
	F 1 5	Frequency (High)	0 to 120Hz	Hz	1	70
	F 1 6	limiter (Low)		Hz	1	0
	F 1 7	Gain (for frequency setting signal)	0: For 0 to +10V DC 1: For 0 to +5V DC	-	-	0
	F 1 8	Bias frequency	-120 to 120Hz	Hz	1	0
	F 2 0	(Starting freq.)	3Hz (Fixed)	Hz	-	3.0
	F 2 1	DC brake (Braking level)	0 to 100%	%	1	0
	F 2 2	(Braking time)	0.0 (DC brake inactive), 0.1 to 30.0s	s	0.1	0.0
	F 2 3	Starting frequency (Freq.)	1 to 6Hz	Hz	1	1
	F 2 4	(Holding time)	0.0 (Fixed)	-	-	0.0
	F 2 5	Stop frequency	1 to 6Hz	Hz	1	1
	F 2 6	Motor sound (Carrier freq.)	0 (0.75kHz), 1 to 15kHz	kHz	1	2
	F 2 7	(Sound tone)	0: Level 0 1: Level 1 2: Level 2 3: Level 3	-	-	0
	F 3 0	CFM (Voltage adjust)	0 to 200%	%	1	100
	F 3 1	(Function)	0: Output frequency 1: Output current 2: PID feedback value 3: DC link circuit voltage	-	-	0
	F 3 6	SGRY operation mode	0: The relay (30) excites on trip mode 1: The relay (30) excites on normal mode	-	-	0

*1 Typical value of Fuji standard 4-pole motor.

MODEL: HS04-3000C		DRAWING LIST	CHAGE	
DATE: 2004.08.17			ACTING CHIEF	
			CHIEF	
NO	DRAWING NO	TITLE	REMARK	
1	CE01/CE01A	HS04-3000C LAY OUT		
2	CE02	FRAME ASS'Y		
3	CE03	COVER ASS'Y		
4	CE04	OVEN ASS'Y		
5	CE05	PRE HEATER ASS'Y		
6	CE06	COOL FAN ASS'Y		
7	CE07	CONVEYOR ASS'Y		
8	CE08	ONE POT ASS'Y		
9	CE09	CLEANER ASS'Y		
10	CE10	FLUX ASS'Y		
11	CE11	INSERT ASS'Y		
12	CE12	AIR CIRCUIT		
13	CE13	SECURITY COVER		
14	CE14	AIR LINE ASS'Y		
15	CE15	AIR LINE CIRCUIT		
16	CE16	WARNING ASS'Y		
17	CE17	WARNING MARK		
18	CE18	COMPANY MARK		
19	CE19	TRANSPORTATION METHOD-1		
20	CE20	TRANSPORTATION METHOD-2		
21	CE21	DUCT INSTALL ASS'Y		
22	CE22	MAIN POWER CABLE/AIR IN		
23	CE23	MACHIN INSTALLATION		
24	CE24	MACHINE LEVEL FOOT		
25	CE25	SIGNAL TOWER INSTALL.		
26	CE26	COMPUTER CONNECTION	OPTION	
27	CE27	MACHINE FLOWCHART		
28	CE28	FRONT VIEW		
29	CE29	REAR VIEW		
30	CE30	ELECTRICAL SYMBOLS		
31	CE31	CONTROL RACK ASS'Y		
32	CE32	PACKING METHOD		
33	CE33	SENSOR POSITION		

[illegible]

John Wiley & Sons



TOLERANCE			TYPICAL TENSILE STRENGTH	TYPICAL ELONGATION AT BREAK	TYPICAL TENSILE MODULUS
STRETCHING FORCE	IN	MM			
0	30	±0.1	±0.1		
20	100	±0.2	±0.2		
35	160	±0.2	±0.2		
50	180	±0.2	±0.2		
100	190	±0.5	±0.5		
200	200	±0.5	±0.5		

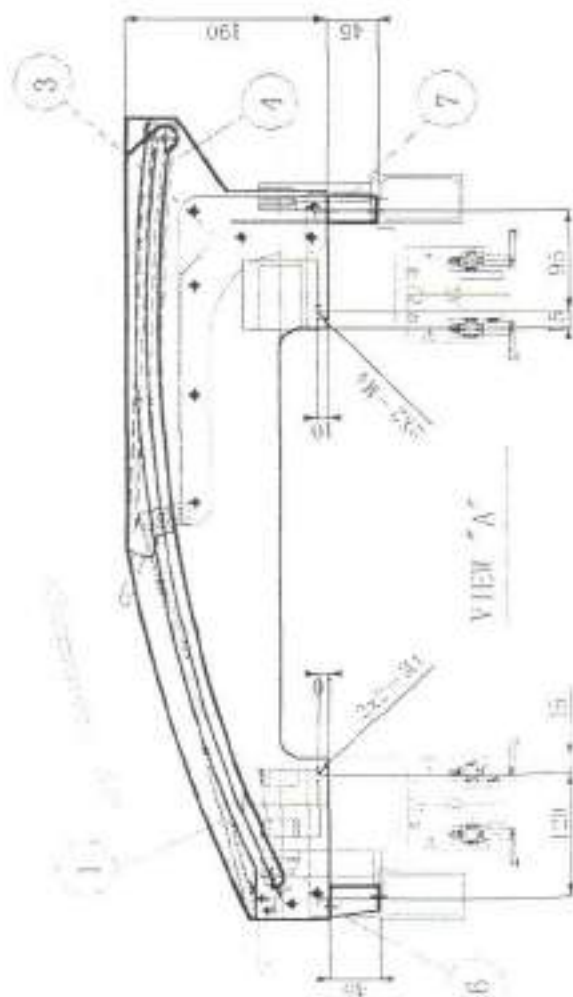
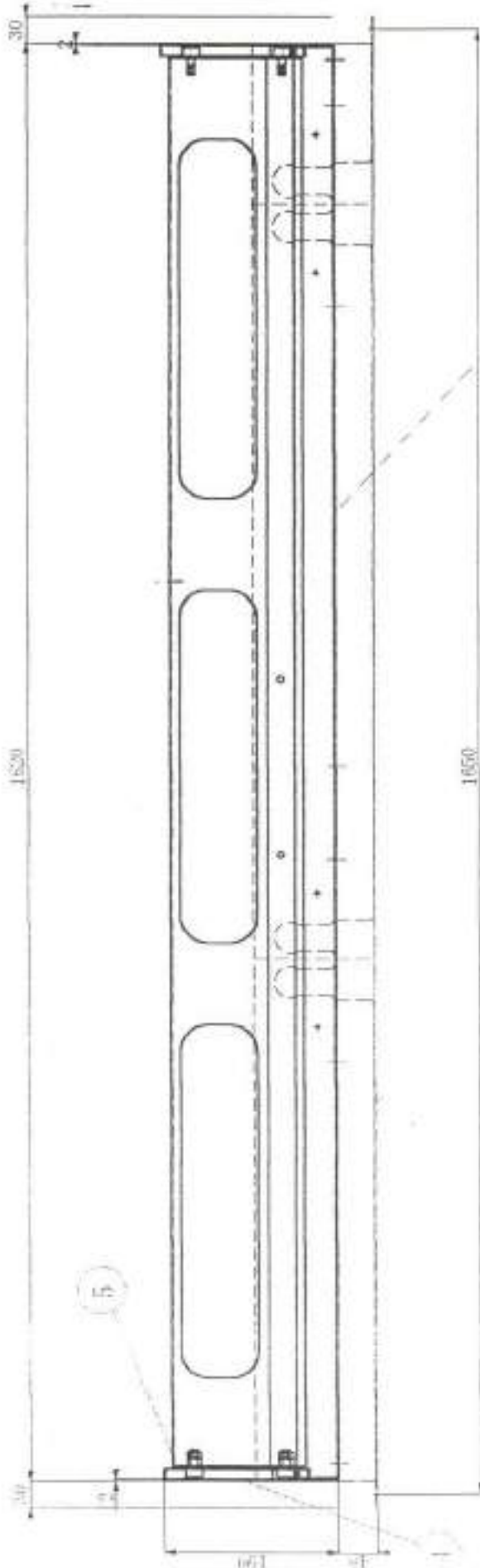
NO.	DATE	TIME	UNIT	PART NO.	QTY	REMARKS
			100			
			SCALE			
			COST			
			MODEL			
			TITLE			
			FORM (E - F)			
			NO.			
			DATE			
			TIME			
			UNIT			
			PART NO.			
			QTY			
			REMARKS			

BE USED SQUARE PIPE **

J. PINE INVEST.

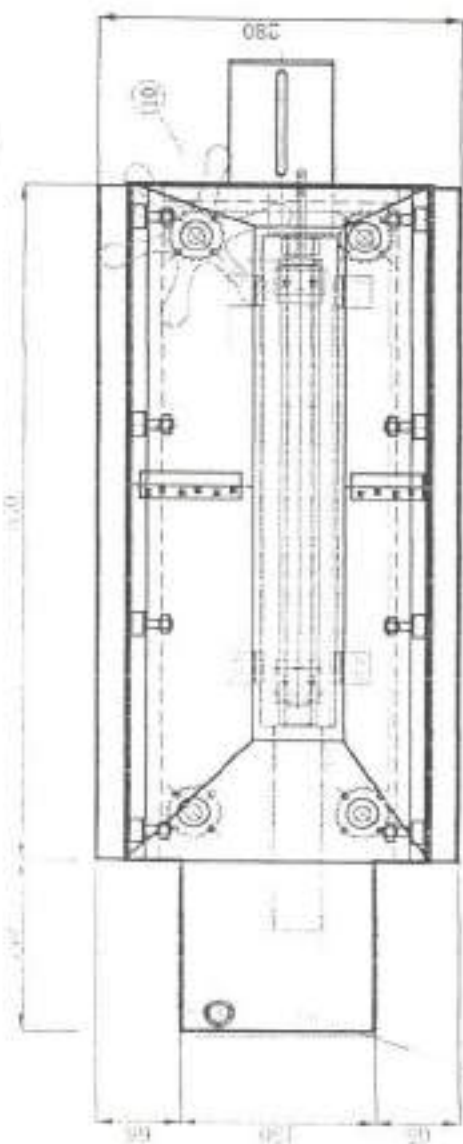
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1620

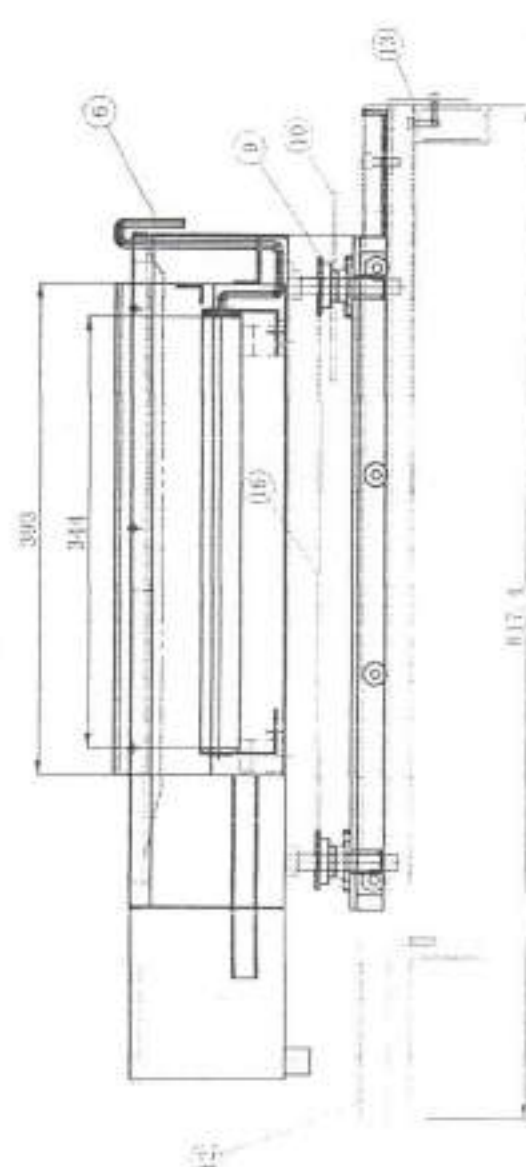
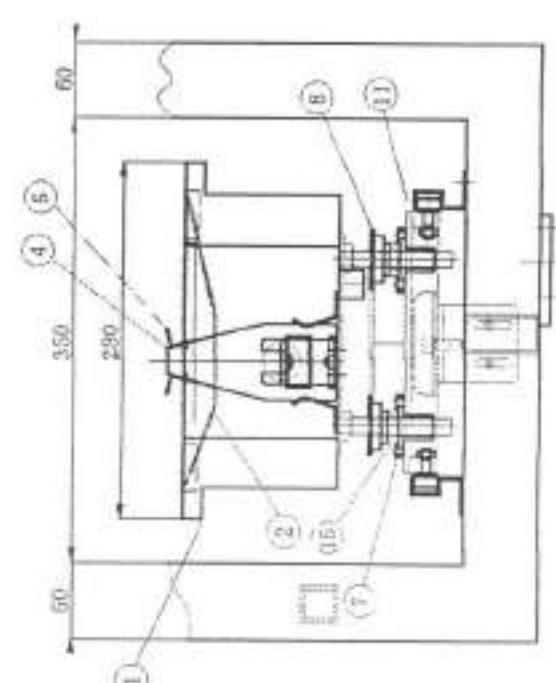


TOLERANCE		A		B		C		D		E		F		G		H		I		J		K		L		M		N		O		P		Q		R		S		T		U		V		W		X		Y		Z		AA		AB		AC		AD		AE		AF		AG		AH		AI		AJ		AK		AL		AM		AN		AO		AP		AQ		AR		AS		AT		AU		AV		AW		AX		AY		AZ		BA		BB		BC		BD		BE		BF		BG		BH		BI		BJ		BK		BL		BM		BN		BO		BP		BQ		BR		BS		BT		BU		BV		BW		BX		BY		BZ		CA		CB		CC		CD		CE		CF		CG		CH		CI		CJ		CK		CL		CM		CN		CO		CP		CQ		CR		CS		CT		CU		CV		CW		CX		CY		CZ		DA		DB		DC		DD		DE		DF		DG		DH		DI		DJ		DK		DL		DM		DN		DO		DP		DQ		DR		DS		DT		DU		DV		DW		DX		DY		DZ		EA		EB		EC		ED		EE		EF		EG		EH		EI		EJ		EK		EL		EM		EN		EO		EP		EQ		ER		ES		ET		EU		EV		EW		EX		EY		EZ		FA		FB		FC		FD		FE		FF		FG		FH		FI		FJ		FK		FL		FM		FN		FO		FP		FQ		FR		FS		FT		FU		FV		FW		FX		FY		FZ		GA		GB		GC		GD		GE		GF		GG		GH		GI		GJ		GK		GL		GM		GN		GO		GP		GQ		GR		GS		GT		GU		GV		GW		GX		GY		GZ		HA		HB		HC		HD		HE		HF		HG		HH		HI		HJ		HK		HL		HM		HN		HO		HP		HQ		HR		HS		HT		HU		HV		HW		HX		HY		HZ		IA		IB		IC		ID		IE		IF		IG		IH		II		IJ		IK		IL		IM		IN		IO		IP		IQ		IR		IS		IT		IU		IV		IW		IX		IY		IZ		JA		JB		JC		JD		JE		JF		JG		JH		JI		JJ		JK		JL		JM		JN		JO		JP		JQ		JR		JS		JT		JU		JV		JW		JX		JY		JZ		KA		KB		KC		KD		KE		KF		KG		KH		KI		KJ		KL		KM		KN		KO		KP		KQ		KR		KS		KT		KU		KV		KW		KX		KY		KZ		LA		LB		LC		LD		LE		LF		LG		LH		LI		LJ		LK		LM		LN		LO		LP		LQ		LR		LS		LT		LU		LV		LW		LX		LY		LZ		MA		MB		MC		MD		ME		MF		MG		MH		MI		MJ		MK		ML		MM		MN		MO		MP		MQ		MR		MS		MT		MU		MV		MW		MX		MY		MZ		NA		NB		NC		ND		NE		NF		NG		NH		NI		NJ		NK		NL		NM		NN		NO		NP		NQ		NR		NS		NT		NU		NV		NW		NX		NY		NZ		OA		OB		OC		OD		OE		OF		OG		OH		OI		OJ		OK		OL		OM		ON		OO		OP		OQ		OR		OS		OT		OU		OV		OW		OX		OY		OZ		PA		PB		PC		PD		PE		PF		PG		PH		PI		PJ		PK		PL		PM		PN		PO		PP		PQ		PR		PS		PT		PU		PV		PW		PX		PY		PZ		QA		QB		QC		QD		QE		QF		QG		QH		QI		QJ		QK		QL		QM		QN		QO		QP		QQ		QR		QS		QT		QU		QV		QW		QX		QY		QZ		RA		RB		RC		RD		RE		RF		RG		RH		RI		RJ		RK		RL		RM		RN		RO		RP		RQ		RR		RS		RT		RU		RV		RW		RX		RY		RZ		SA		SB		SC		SD		SE		SF		SG		SH		SI		SJ		SK		SL		SM		SN		SO		SP		SQ		SR		SS		ST		SU		SV		SW		SX		SY		SZ		TA		TB		TC		TD		TE		TF		TG		TH		TI		TJ		TK		TL		TM		TN		TO		TP		TQ		TR		TS		TT		TU		TV		TW		TX		TY		TZ		UA		UB		UC		UD		UE		UF		UG		UH		UI		UJ		UK		UL		UM		UN		UO		UP		UQ		UR		US		UT		UU		UV		UW		UX		UY		UZ		VA		VB		VC		VD		VE		VF		VG		VH		VI		VJ		VK		VL		VM		VN		VO		VP		VQ		VR		VS		VT		VU		VV		VW		VX		VY		VZ		WA		WB		WC		WD		WE		WF		WG		WH		WI		WJ		WK		WL		WM		WN		WO		WP		WQ		WR		WS		WT		WU		WV		WW		WX		WY		WZ		XA		XB		XC		XD		XE		XF		XG		XH		XI		XJ		XK		XL		XM		XN		XO		XP		XQ		XR		XS		XT		XU		XV		XW		XX		XY		XZ		YA		YB		YC		YD		YE		YF		YG		YH		YI		YJ		YK		YL		YM		YN		YO		YP		YQ		YR		YS		YT		YU		YV		YW		YX		YY		YZ		ZA		ZB		ZC		ZD		ZE		ZF		ZG		ZH		ZI		ZJ		ZK		ZL		ZM		ZN		ZO		ZP		ZQ		ZR		ZS		ZT		ZU		ZV		ZW		ZX		ZY		ZZ	
7	W01106 1A	BEAR SUPPORT	1																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	</																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					

ITEM	ITEM NAME	REMARKS
1	W16001	FLUX CASE
2	W16002	FLUX COVER-1
3	W16003	FLUX COVER-2
4	W16004	FLUX NOZZLE
5	W16005	FLUX NOZZLE WING
6	W16006	FLUX BALPD
7	W16007	NUT HOLDING
8	W16008	SPROCKET-1
9	W16009	SPROCKET-2
10	W16010	LP/DOWN HANDLE
11	W16011	FLUX BASE
12	W16012	FLUX RAIL
13	W16013	FLUX STOPPER
14		CF19 BEARING
15		51102 TRUST BEARING
16		FS25 CHAIN



0.4

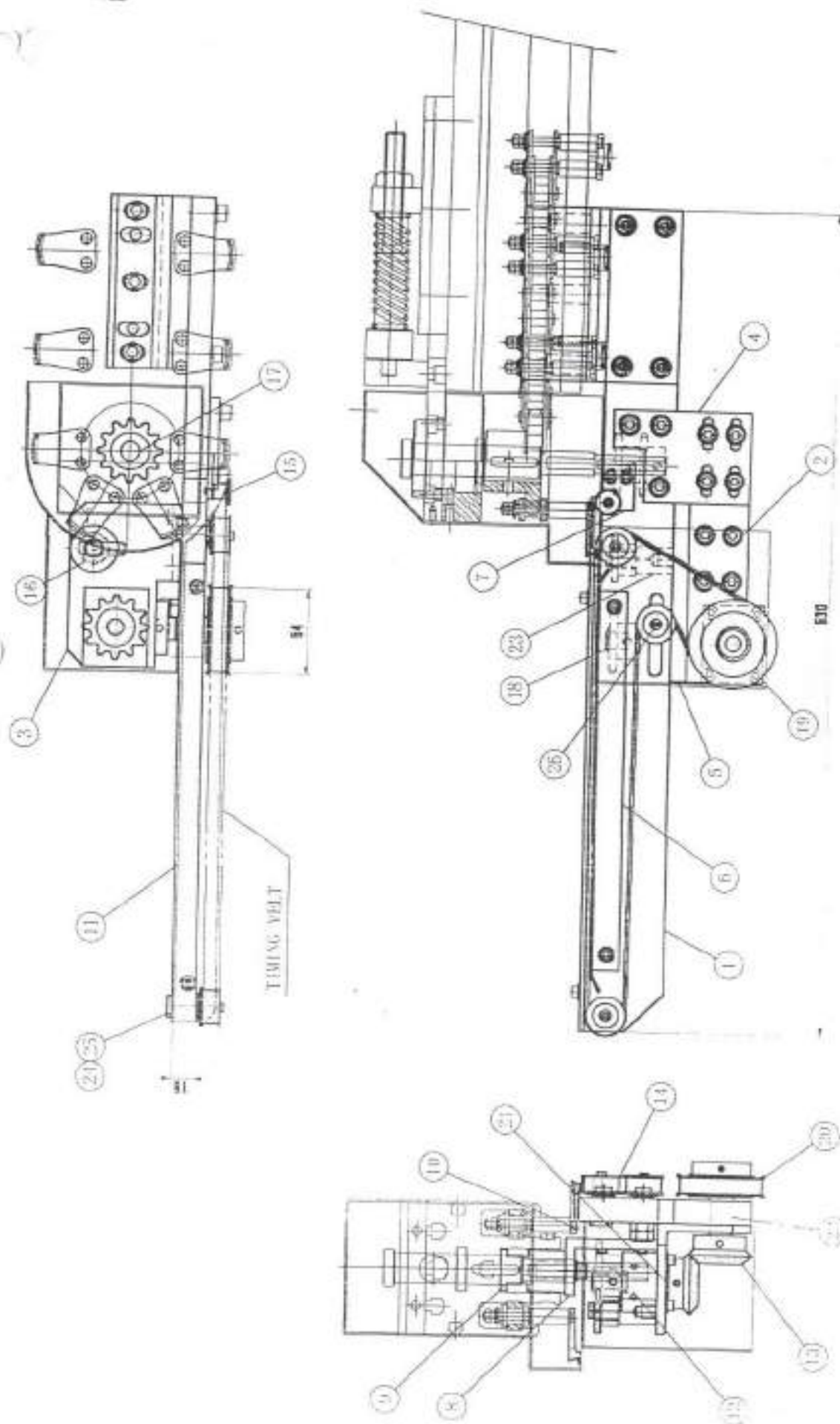


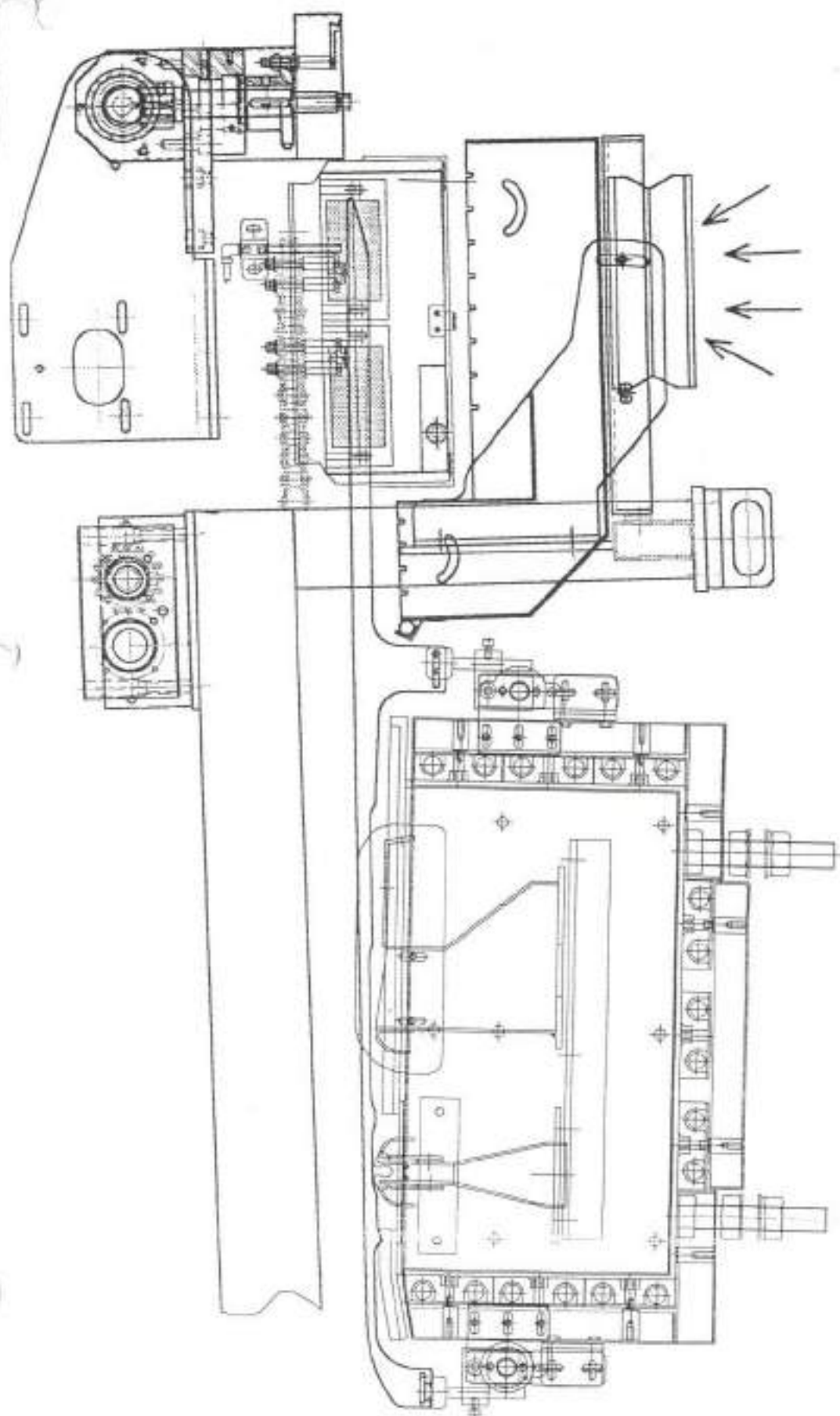
TOLERANCE		MATERIAL		REMARKS	
ITEMS	Δ	ITEMS	Δ	ITEMS	Δ
1-10	±0.1	11-15	±0.1	16-18	±0.1
19-20	±0.2	21-25	±0.2	26-30	±0.2
31-35	±0.3	36-40	±0.3	41-45	±0.3
46-50	±0.4	51-55	±0.4	56-60	±0.4
61-65	±0.5	66-70	±0.5	71-75	±0.5
76-80	±0.6	81-85	±0.6	86-90	±0.6
91-95	±0.7	96-100	±0.7	101-105	±0.7
106-110	±0.8	111-115	±0.8	116-120	±0.8
121-125	±0.9	126-130	±0.9	131-135	±0.9
136-140	±1.0	141-145	±1.0	146-150	±1.0
151-155	±1.1	156-160	±1.1	161-165	±1.1
166-170	±1.2	171-175	±1.2	176-180	±1.2
181-185	±1.3	186-190	±1.3	191-195	±1.3
196-200	±1.4	201-205	±1.4	206-210	±1.4
211-215	±1.5	216-220	±1.5	221-225	±1.5
226-230	±1.6	231-235	±1.6	236-240	±1.6
241-245	±1.7	246-250	±1.7	251-255	±1.7
256-260	±1.8	261-265	±1.8	266-270	±1.8
271-275	±1.9	276-280	±1.9	281-285	±1.9
286-290	±2.0	291-295	±2.0	296-300	±2.0
301-305	±2.1	306-310	±2.1	311-315	±2.1
316-320	±2.2	321-325	±2.2	326-330	±2.2
331-335	±2.3	336-340	±2.3	341-345	±2.3
346-350	±2.4	351-355	±2.4	356-360	±2.4
361-365	±2.5	366-370	±2.5	371-375	±2.5
376-380	±2.6	381-385	±2.6	386-390	±2.6
391-395	±2.7	396-400	±2.7	401-405	±2.7
406-410	±2.8	411-415	±2.8	416-420	±2.8
421-425	±2.9	426-430	±2.9	431-435	±2.9
436-440	±3.0	441-445	±3.0	446-450	±3.0
451-455	±3.1	456-460	±3.1	461-465	±3.1
466-470	±3.2	471-475	±3.2	476-480	±3.2
481-485	±3.3	486-490	±3.3	491-495	±3.3
496-500	±3.4	501-505	±3.4	506-510	±3.4
511-515	±3.5	516-520	±3.5	521-525	±3.5
526-530	±3.6	531-535	±3.6	536-540	±3.6
541-545	±3.7	546-550	±3.7	551-555	±3.7
556-560	±3.8	561-565	±3.8	566-570	±3.8
571-575	±3.9	576-580	±3.9	581-585	±3.9
586-590	±4.0	591-595	±4.0	596-600	±4.0
601-605	±4.1	606-610	±4.1	611-615	±4.1
616-620	±4.2	621-625	±4.2	626-630	±4.2
631-635	±4.3	636-640	±4.3	641-645	±4.3
646-650	±4.4	651-655	±4.4	656-660	±4.4
661-665	±4.5	666-670	±4.5	671-675	±4.5
676-680	±4.6	681-685	±4.6	686-690	±4.6
691-695	±4.7	696-700	±4.7	701-705	±4.7
706-710	±4.8	711-715	±4.8	716-720	±4.8
721-725	±4.9	726-730	±4.9	731-735	±4.9
736-740	±5.0	741-745	±5.0	746-750	±5.0
751-755	±5.1	756-760	±5.1	761-765	±5.1
766-770	±5.2	771-775	±5.2	776-780	±5.2
781-785	±5.3	786-790	±5.3	791-795	±5.3
796-800	±5.4	801-805	±5.4	806-810	±5.4
811-815	±5.5	816-820	±5.5	821-825	±5.5
826-830	±5.6	831-835	±5.6	836-840	±5.6
841-845	±5.7	846-850	±5.7	851-855	±5.7
856-860	±5.8	861-865	±5.8	866-870	±5.8
871-875	±5.9	876-880	±5.9	881-885	±5.9
886-890	±6.0	891-895	±6.0	896-900	±6.0
901-905	±6.1	906-910	±6.1	911-915	±6.1
916-920	±6.2	921-925	±6.2	926-930	±6.2
931-935	±6.3	936-940	±6.3	941-945	±6.3
946-950	±6.4	951-955	±6.4	956-960	±6.4
961-965	±6.5	966-970	±6.5	971-975	±6.5
976-980	±6.6	981-985	±6.6	986-990	±6.6
991-995	±6.7	996-1000	±6.7		

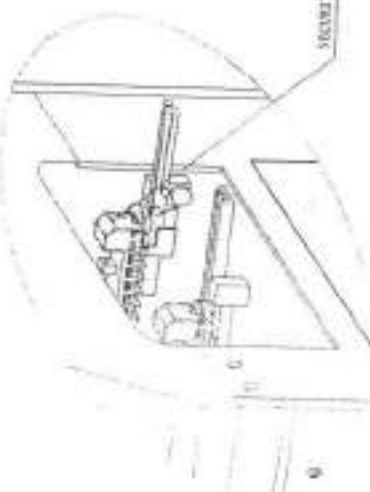
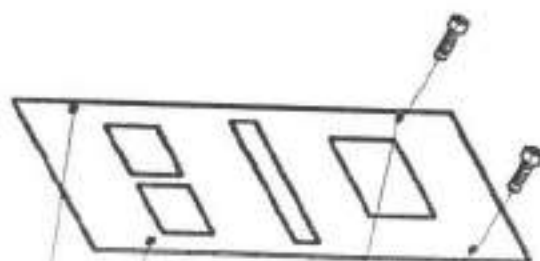
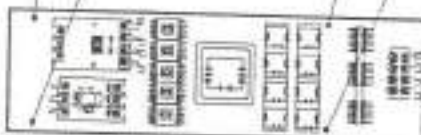
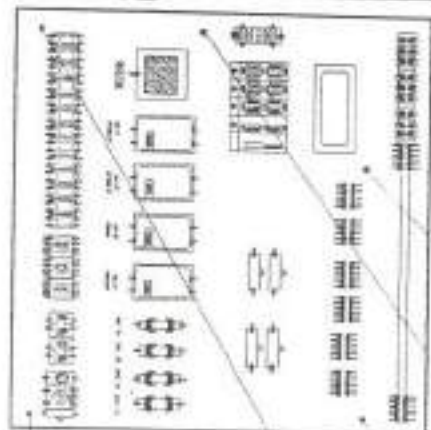


TSM CO. LTD.
Tokyo, Japan

CH10-W16000

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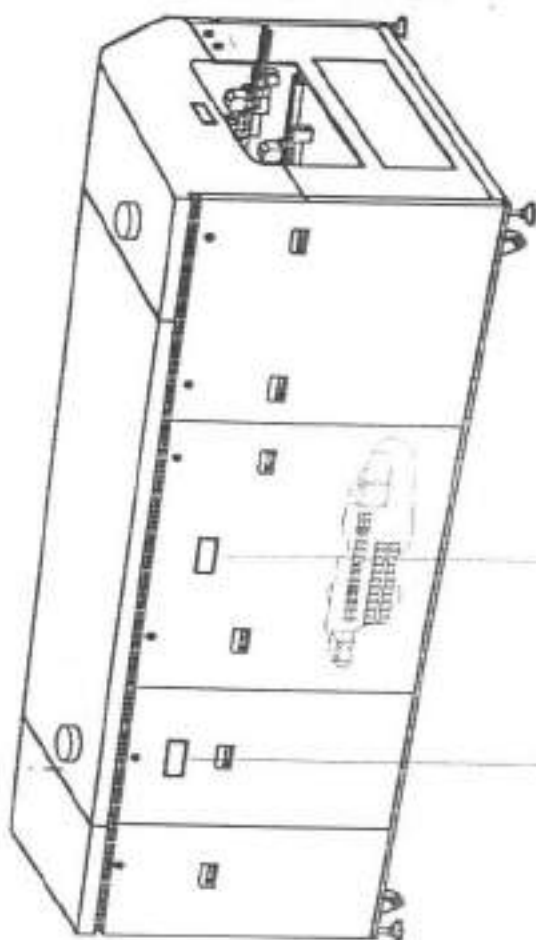
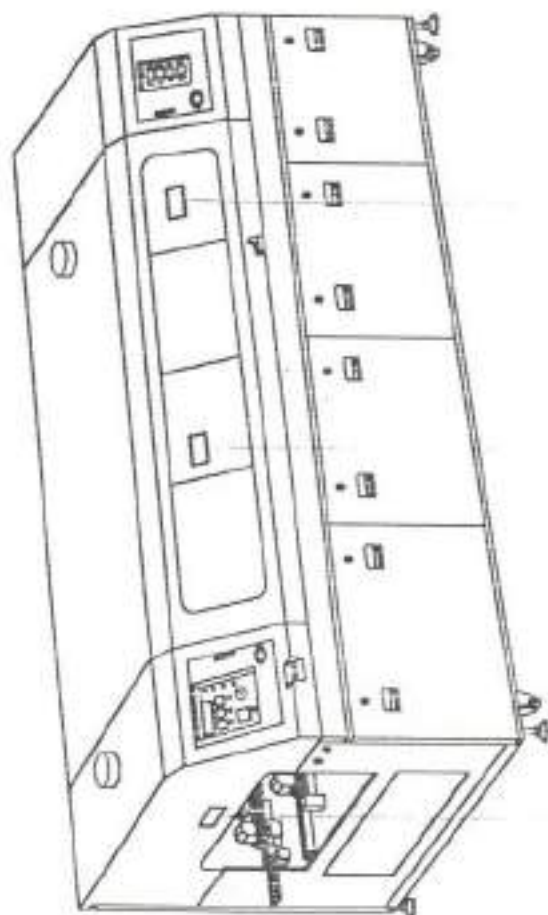


Transparency Acryl

NO.	DESCRIPTION	DATE	NAME	DRAWING	PART NAME	Q'TY	MATERIAL	REMARKS
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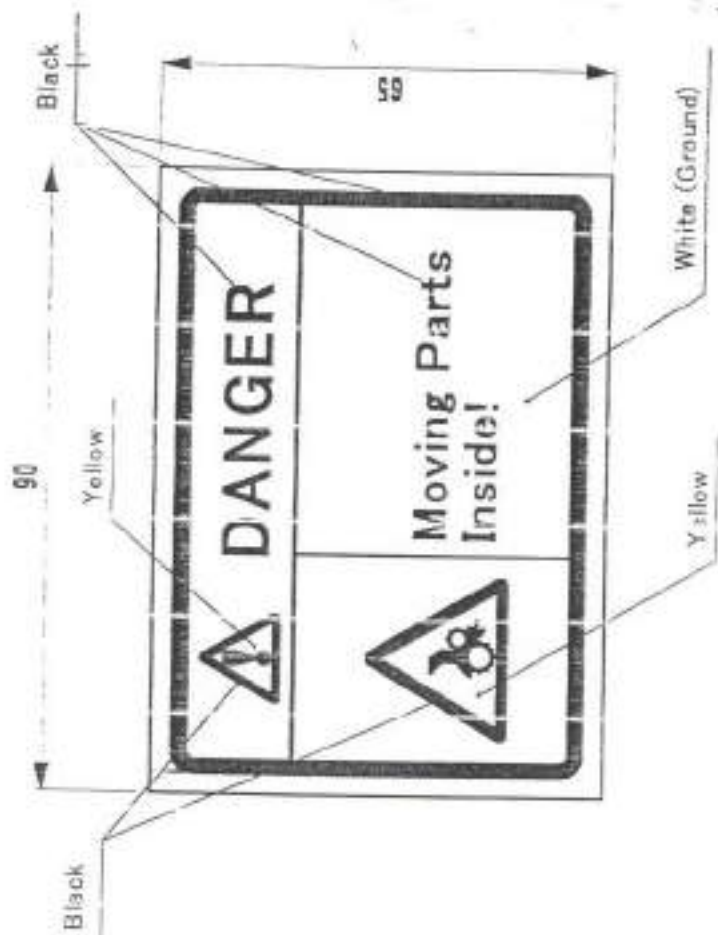
TSM CO. LTD.
TOTAL SECURITY MACHINERY

CE 13



	TSM CO., LTD.	PART NAME	QTY	MATERIAL	REMARKS
		DRAWING			
		DESIGNED		MODEL HS02/D1-2000	DATE 1987
		CHECKED		TITLE WARNING MARK ASS'Y	SHEET 01
		APPROVED		DWG NO.	
					CEILING-WARNING

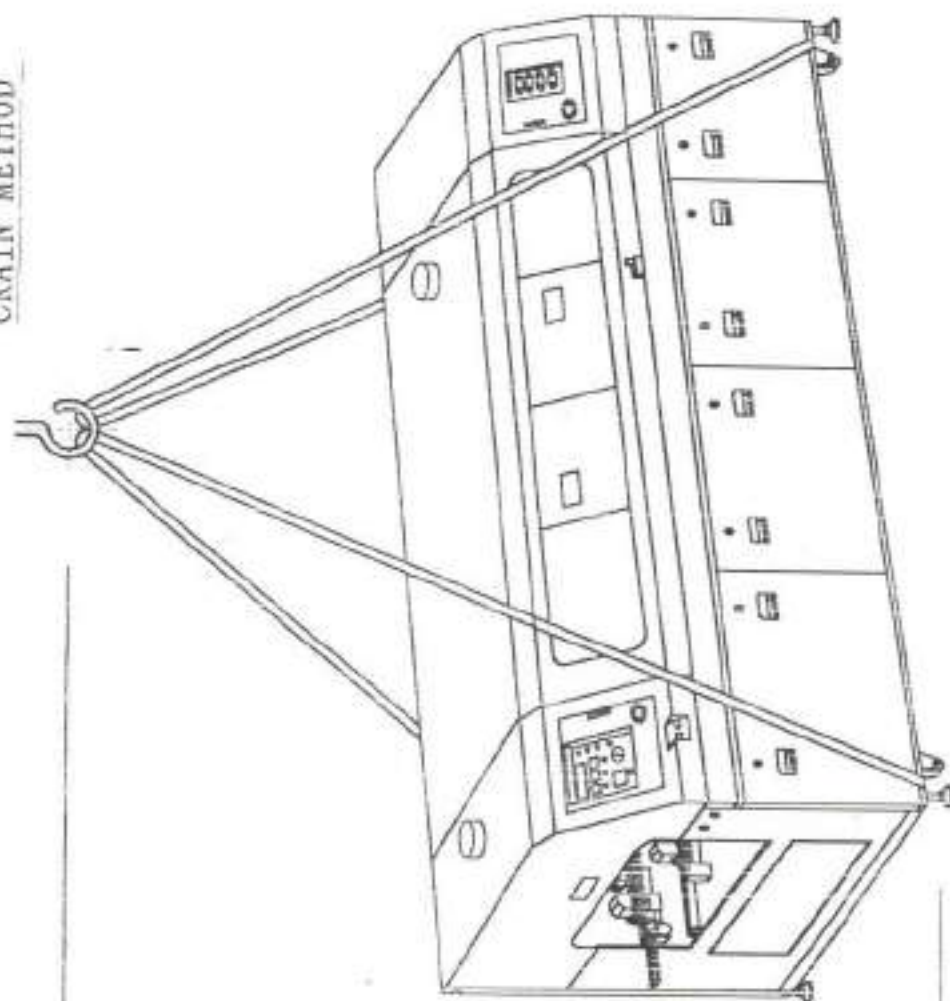
CELEST-WA-RENTING



REMARKS		PART NAME		MATERIAL	
NO.	DESCRIPTION	DATE	NAME	DESIGNED	BY
TSM CO., LTD.		TSM CO., LTD.			
TOTAL ORDER NO.		TOTAL ORDER NO.			
CHECKED		DATE		BY	
APPROVED		DATE		BY	
DRAWING		DATE		BY	
MODEL		DATE		BY	
T-FILE		DATE		BY	
WARNING MARK		DATE		BY	
DATE		DATE		DATE	
BY		BY		BY	

CE 17-WARNING MARK

CRAIN METHOD



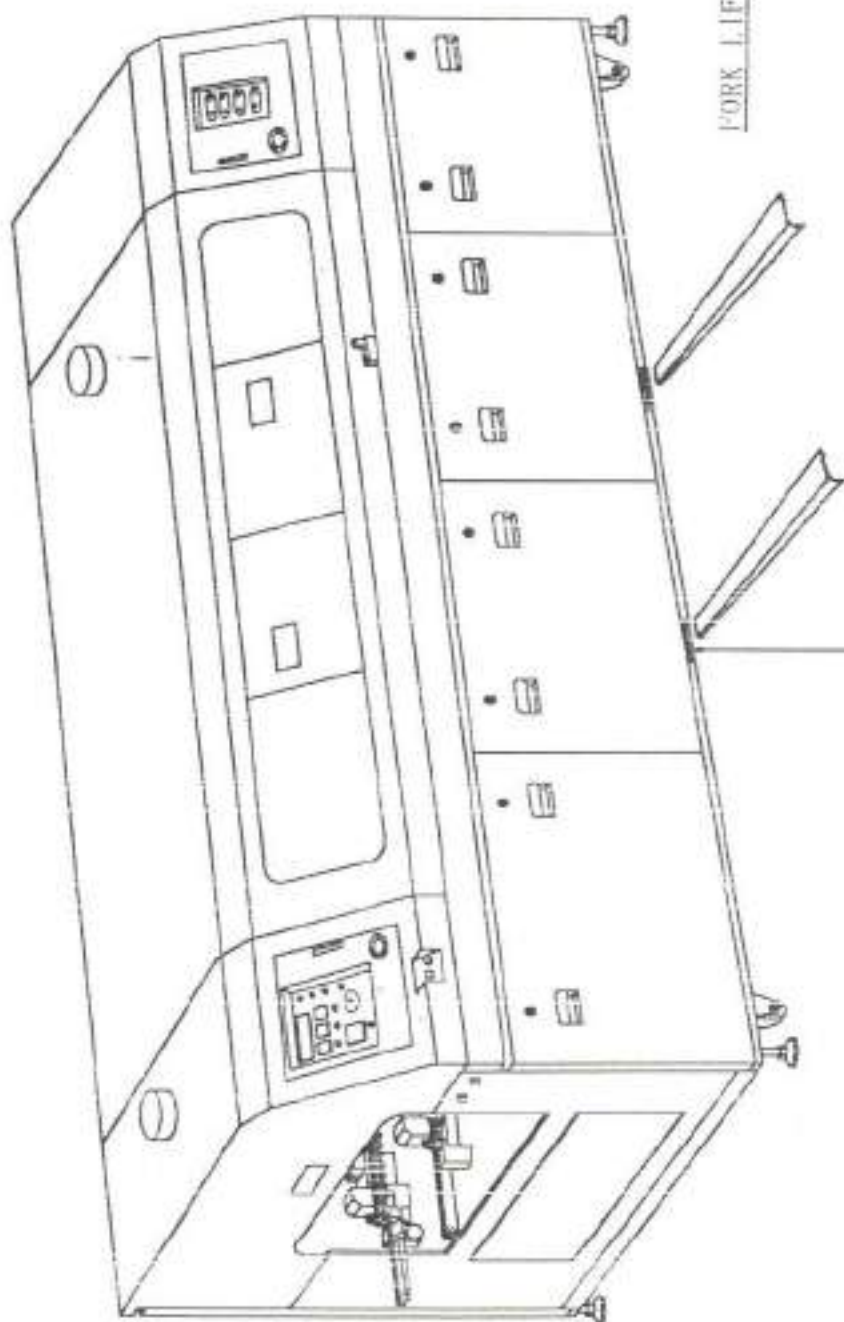
4.0 M

MACHINE WEIGHT: 2000KG

QTY	MATERIAL	REMARKS
MODEL	HS02/04-5000C	EX. 2. 100
TITLE	TRANSPORTATION METHOD-1	100
DATE	01.01.01	

QTY	MATERIAL	REMARKS
MODEL	HS02/04-5000C	EX. 2. 100
TITLE	TRANSPORTATION METHOD-1	100
DATE	01.01.01	

CF-10-



MACHINE WEIGHT: 2000KG

A				P41				QTY		MATERIAL		REMARKS	
A				RECEIVED				QTY		MATERIAL		REMARKS	
NO.		DESCRIPTION		DATE		NAME		QTY		MATERIAL		REMARKS	
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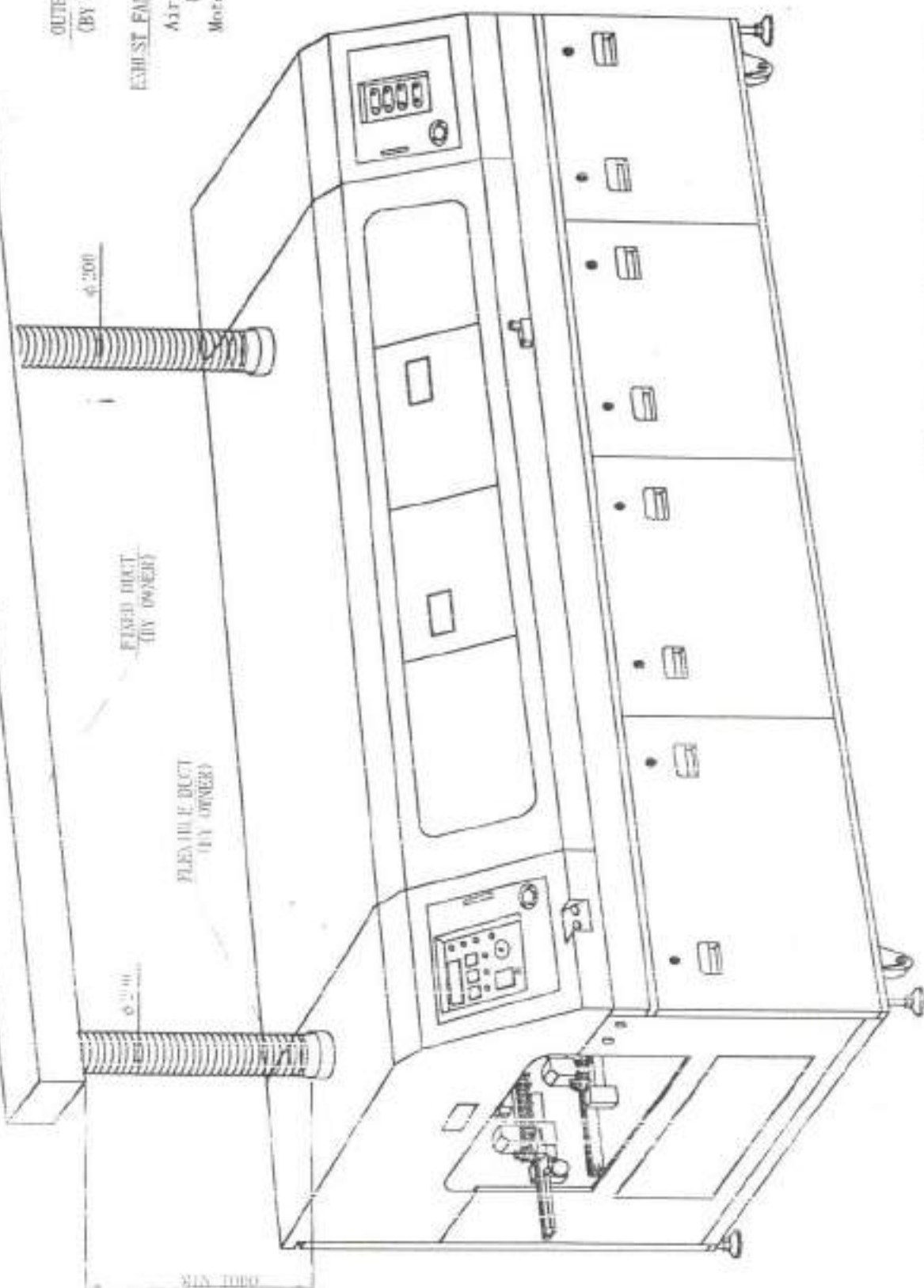
OUTER EXHUST FAN JOINT
(BY OTHER)

EXHIBIT FAN SPEC:

Air Volume : 120m²/min
Pressure : 250mmHg
Motor Output: ≥1.5kw

FIELD NO. _____
(BY OWNER)

(1) (1971)



INSTRUMENT NO.	DATE	NAME	METHOD	TEST LAB	MATERIAL	REMARKS
			RESISTANCE	WIREL	BSC-20M 300C	TSAR D/B
			FORCE	ANNE	TITLE	DICT INITIAL ASS'T
					ENG. NO.	

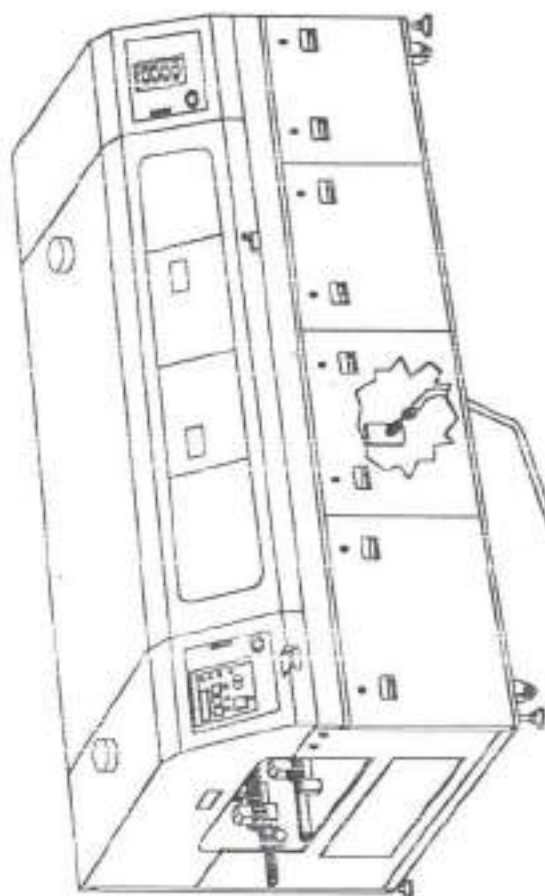
TSM CO., LTD.
16, KOSHIYAMA 4CHOME
CHUO-KU, TOKYO

CLD -DIRECT

ESM CO. LTD.

CE2-DUCT

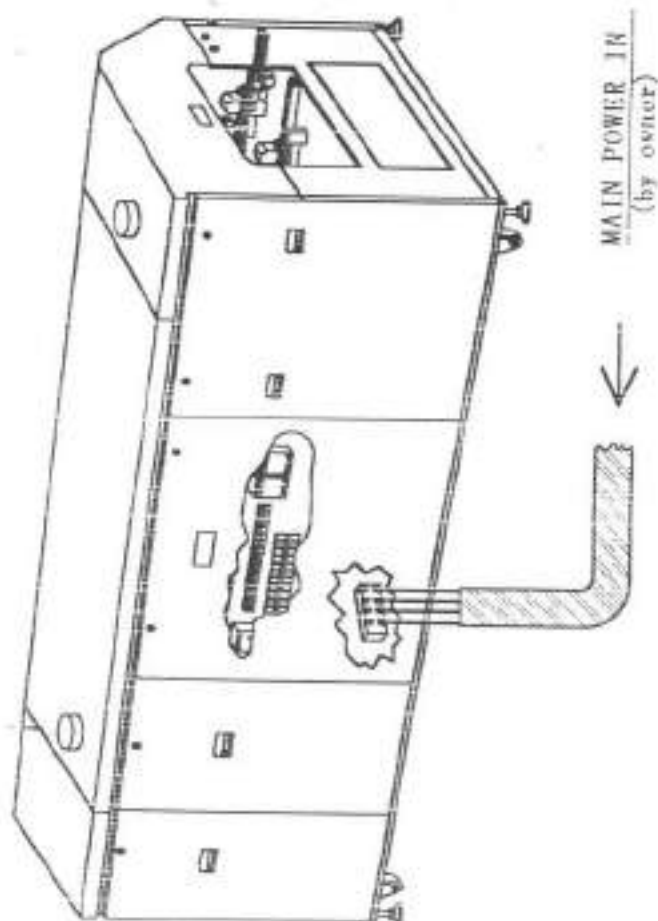
FRONT VIEW



AIR IN
(BY OWNER)

URETHAN. TUBE $\geq \phi 12$
INPUT AIR PRESSURE 5Kgf/cm²

REAR VIEW



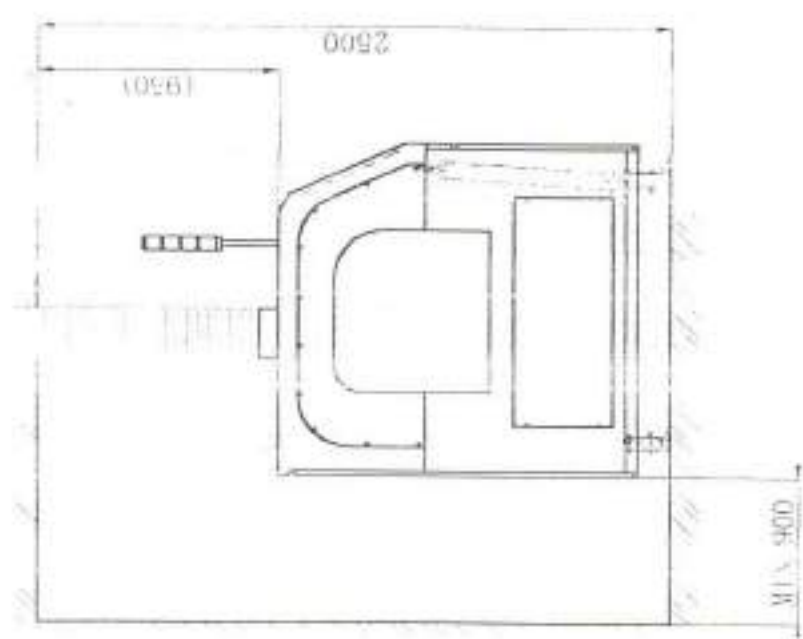
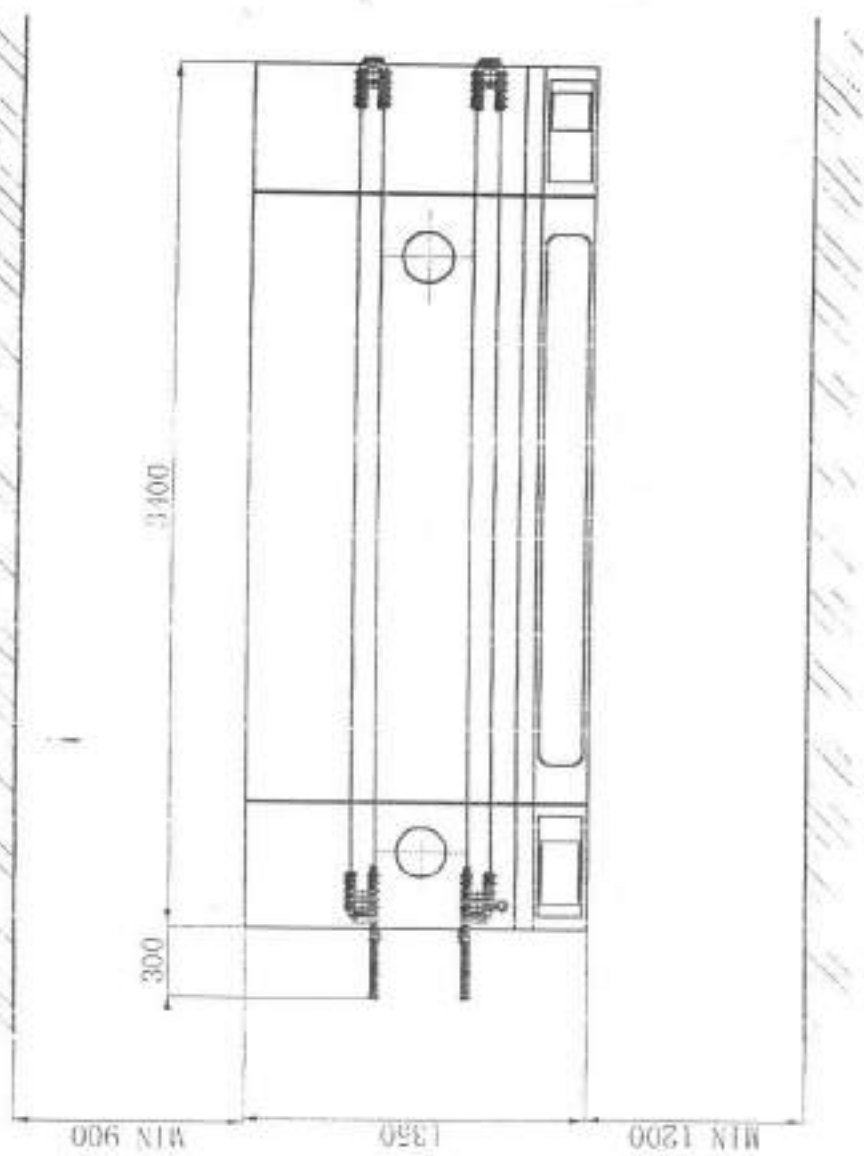
MAIN POWER IN
(by owner)

CABLE SPEC.

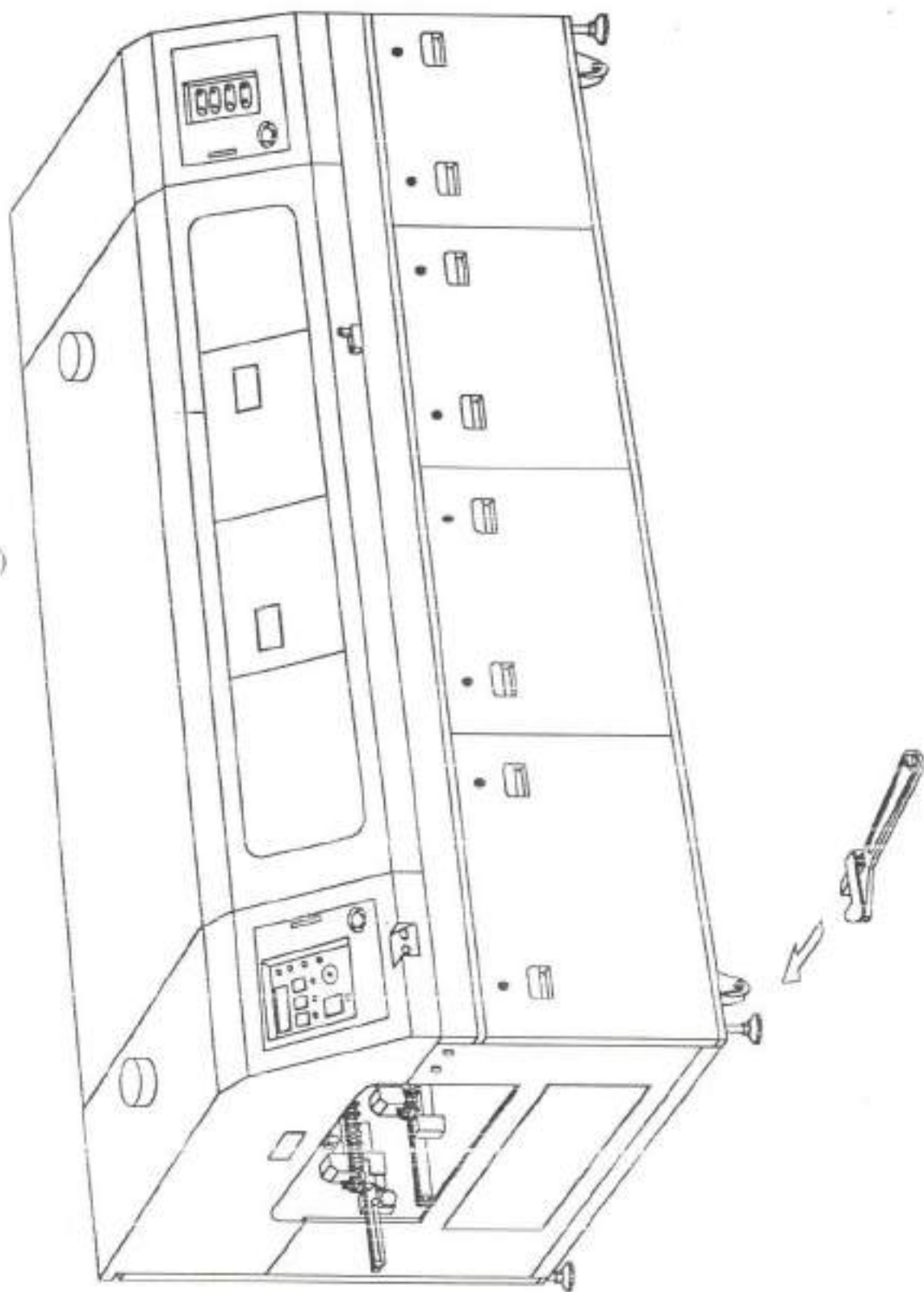
220V	50 mm ²	PE	25 mm ²
380V	30 mm ²	PE	16 mm ²

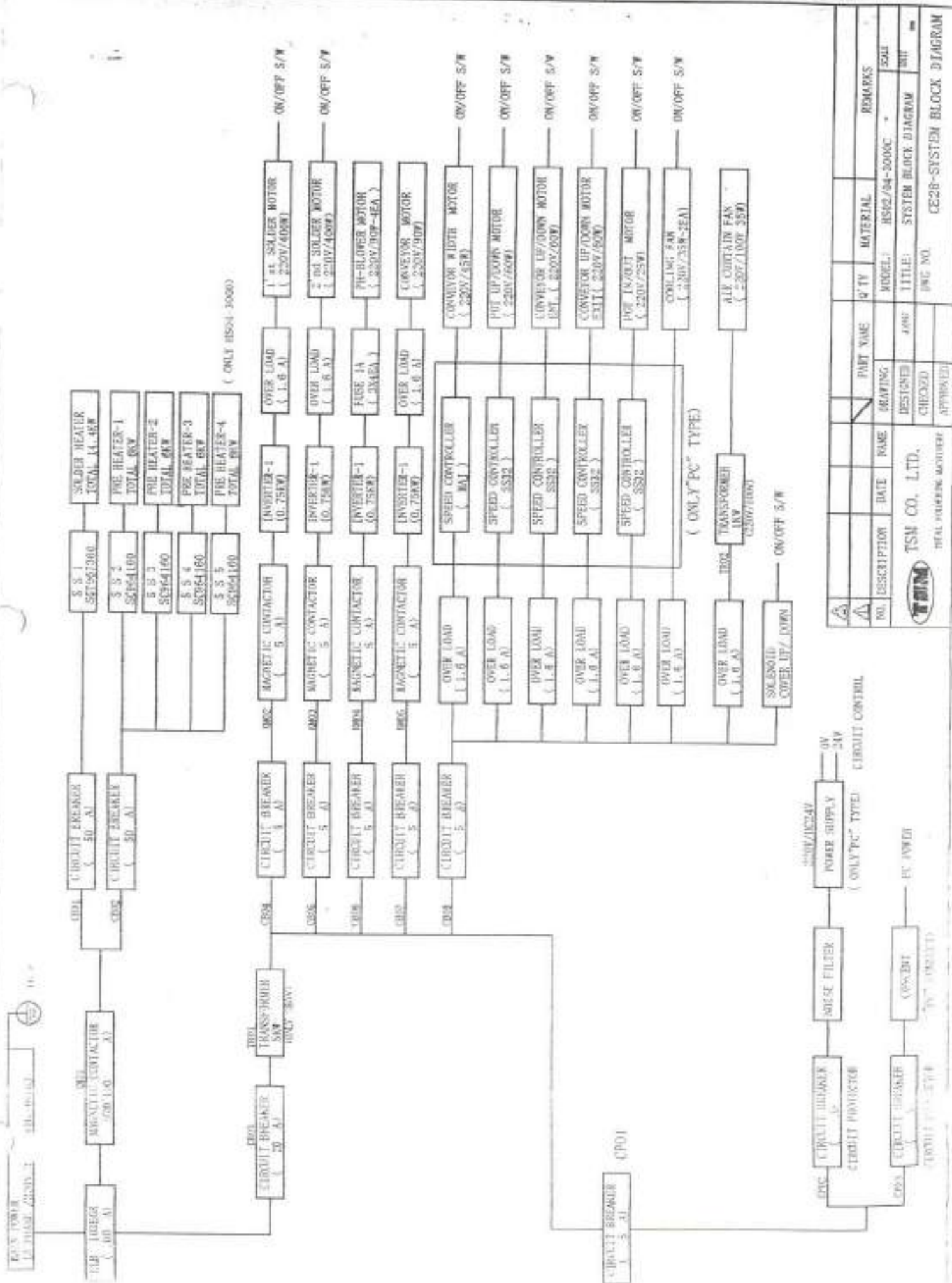
TSM CO., LTD.		TSM CO., LTD.		TSM CO., LTD.	
MODEL	CT-22-POWER/AIR IN	DATE	1982.04	REVISION	001
DESIGNER	Y. T. L.	CHECKER	Y. T. L.	APPROVER	Y. T. L.
NOTE: 1. THE CABLE SPEC. IS SUBJECT TO CHANGE WITHOUT NOTICE.					

CT-22-POWER/AIR IN



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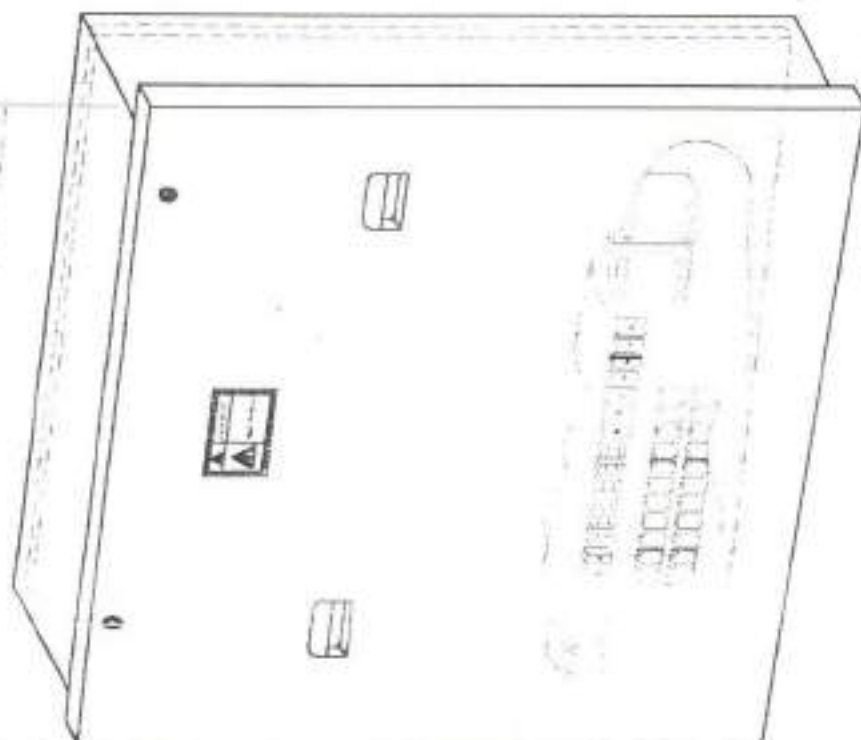
[illegible]



DESCRIPTION	SYMBOL	DESCRIPTION	SYMBOL
EARTH		RELAY CONTACT-A	
CONNECTION OF CONDUCTORS		RELAY CONTACT-B	
TERMINAL		MAGNET CONTACT-A	
CONSENT		MAGNET CONTACT-B	
CONNECTOR WITH PLUG PIN & SOCKET		TIMER CONTACT-A	
RELAY COIL		TIMER CONTACT-B	
MAGNETIC CONTACTOR COIL		LIMIT CONTACT-A	
TIMING RELAY COIL		LIMIT CONTACT-B	
TRANSISTOR		PUSH CONTACT-A	
NOISE FILTER		PUSH CONTACT-B	
FUSE		PRESSURE CONTACT-A	
HEATER		PRESSURE CONTACT-B	
MOTOR		EMERGENCY STOP	
FAN MOTOR		SENSOR(3 LINE TYPE) RD=RED, BU=BLUE, BL=BLACK	
TRANSFORMER		SENSOR(2 LINE TYPE) RD=RED, BL=BLACK	
CAPACITOR		LAMP	
CIRCUIT BREAKER		SOLENOID COIL	
CIRCUIT PROTECTOR		BUZZER	

[illegible]

1200

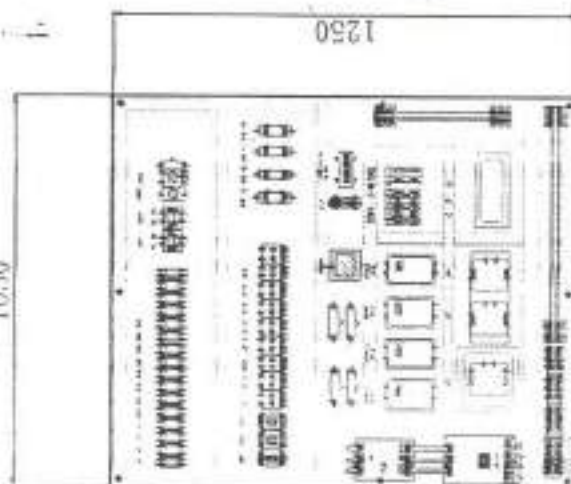


190

 RACK SIZE
 (OUTSIDE)

(IP 22)

1050

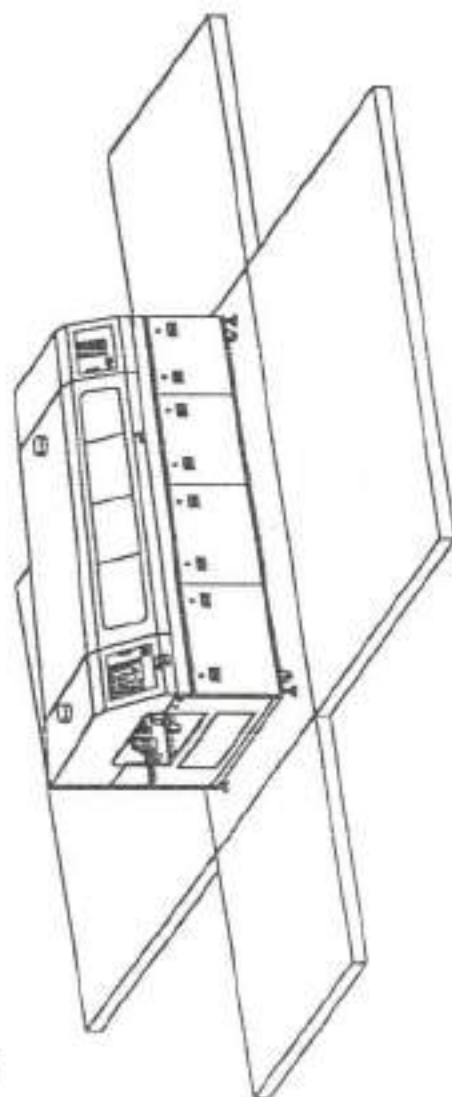
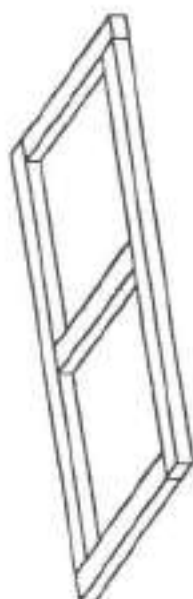
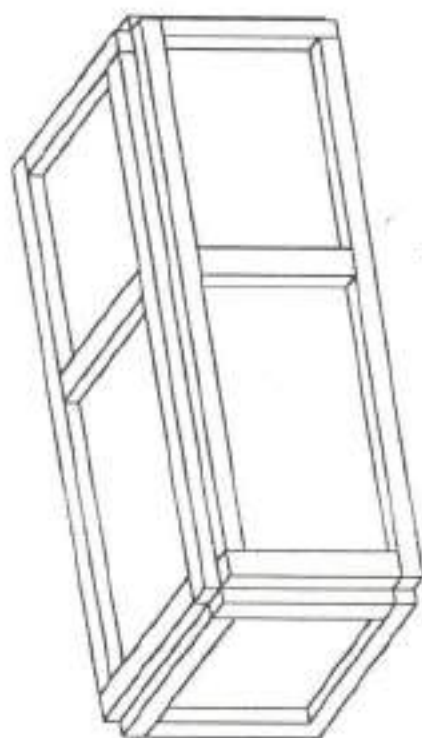


1250

 RACK SIZE
 (INSIDE)

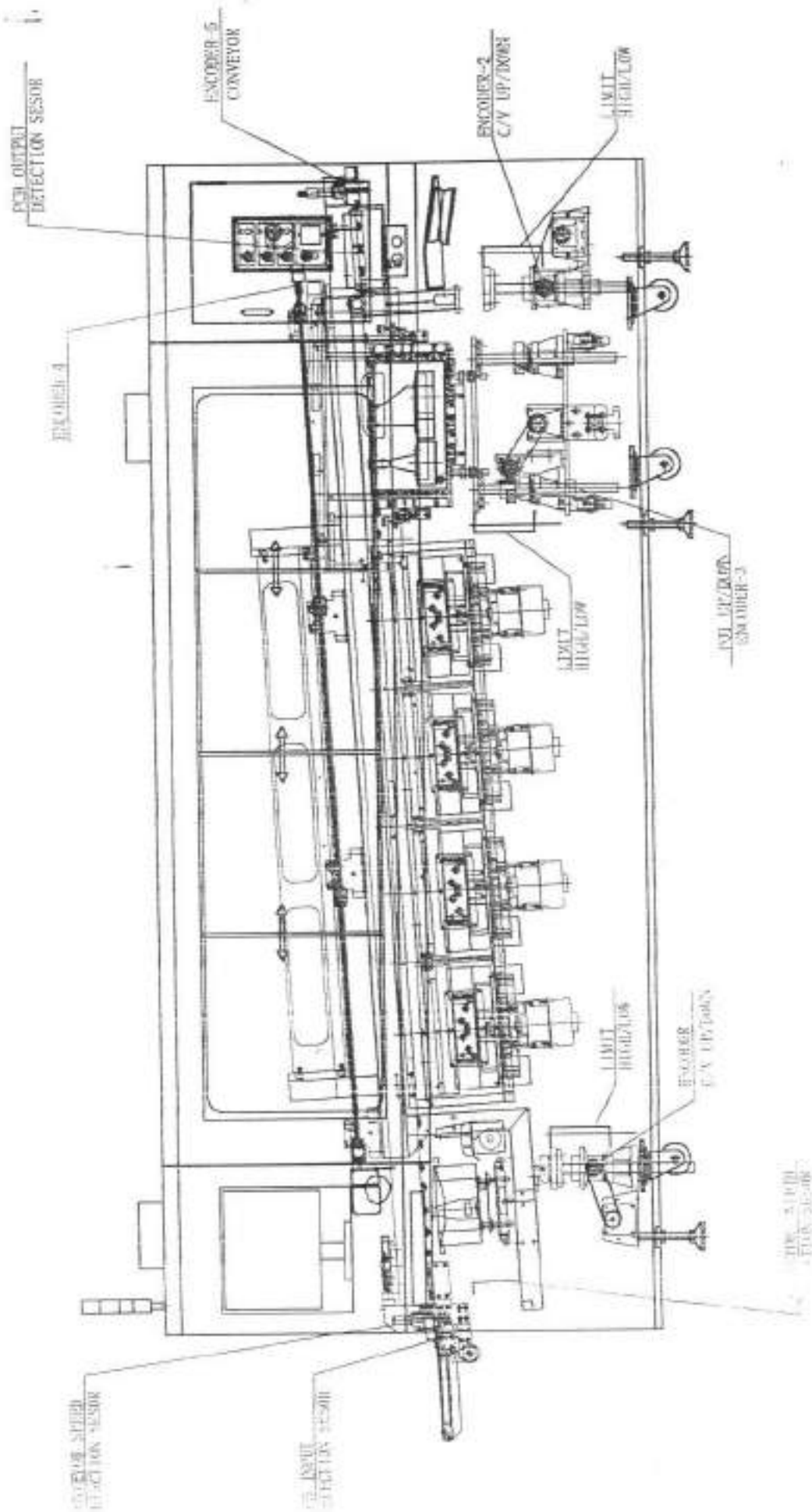
NO.	DESCRIPTION	DATE	NAME	PART NAME		Q'TY	MATERIAL	REMARKS	
				DRAWING	DESIGNED			SCALE	DATE
1							1SD2/04-300HC		1/2
							CONTROL RACK ASS'Y		001
							DMG. NO.		
TSM CO., LTD.									CE31
101 K. SHIBUYA-KU, TOKYO, JAPAN									
				APPROVED					





NO.	DESCRIPTION	DATE	NAME	DRAWING	PART NAME	QTY	MATERIAL	REMARKS
1	TSM CO., LTD.							
2	TSM CO., LTD.							
3	TSM CO., LTD.							
4	TSM CO., LTD.							
5	TSM CO., LTD.							
6	TSM CO., LTD.							
7	TSM CO., LTD.							
8	TSM CO., LTD.							
9	TSM CO., LTD.							
10	TSM CO., LTD.							
11	TSM CO., LTD.							
12	TSM CO., LTD.							
13	TSM CO., LTD.							
14	TSM CO., LTD.							
15	TSM CO., LTD.							
16	TSM CO., LTD.							
17	TSM CO., LTD.							
18	TSM CO., LTD.							
19	TSM CO., LTD.							
20	TSM CO., LTD.							
21	TSM CO., LTD.							
22	TSM CO., LTD.							
23	TSM CO., LTD.							
24	TSM CO., LTD.							
25	TSM CO., LTD.							
26	TSM CO., LTD.							
27	TSM CO., LTD.							
28	TSM CO., LTD.							
29	TSM CO., LTD.							
30	TSM CO., LTD.							
31	TSM CO., LTD.							
32	TSM CO., LTD.							
33	TSM CO., LTD.							
34	TSM CO., LTD.							
35	TSM CO., LTD.							
36	TSM CO., LTD.							
37	TSM CO., LTD.							
38	TSM CO., LTD.							
39	TSM CO., LTD.							
40	TSM CO., LTD.							
41	TSM CO., LTD.							
42	TSM CO., LTD.							
43	TSM CO., LTD.							
44	TSM CO., LTD.							
45	TSM CO., LTD.							
46	TSM CO., LTD.							
47	TSM CO., LTD.							
48	TSM CO., LTD.							
49	TSM CO., LTD.							
50	TSM CO., LTD.							
51	TSM CO., LTD.							
52	TSM CO., LTD.							
53	TSM CO., LTD.							
54	TSM CO., LTD.							
55	TSM CO., LTD.							
56	TSM CO., LTD.							
57	TSM CO., LTD.							
58	TSM CO., LTD.							
59	TSM CO., LTD.							
60	TSM CO., LTD.							
61	TSM CO., LTD.							
62	TSM CO., LTD.							
63	TSM CO., LTD.							
64	TSM CO., LTD.							
65	TSM CO., LTD.							
66	TSM CO., LTD.							
67	TSM CO., LTD.							
68	TSM CO., LTD.							
69	TSM CO., LTD.							
70	TSM CO., LTD.							
71	TSM CO., LTD.							
72	TSM CO., LTD.							
73	TSM CO., LTD.							
74	TSM CO., LTD.							
75	TSM CO., LTD.							
76	TSM CO., LTD.							
77	TSM CO., LTD.							
78	TSM CO., LTD.							
79	TSM CO., LTD.							
80	TSM CO., LTD.							
81	TSM CO., LTD.							
82	TSM CO., LTD.							
83	TSM CO., LTD.							
84	TSM CO., LTD.							
85	TSM CO., LTD.							
86	TSM CO., LTD.							
87	TSM CO., LTD.							
88	TSM CO., LTD.							
89	TSM CO., LTD.							
90	TSM CO., LTD.							
91	TSM CO., LTD.							
92	TSM CO., LTD.							
93	TSM CO., LTD.							
94	TSM CO., LTD.							
95	TSM CO., LTD.							
96	TSM CO., LTD.							
97	TSM CO., LTD.							
98	TSM CO., LTD.							
99	TSM CO., LTD.							
100	TSM CO., LTD.							

CE32-PACKING



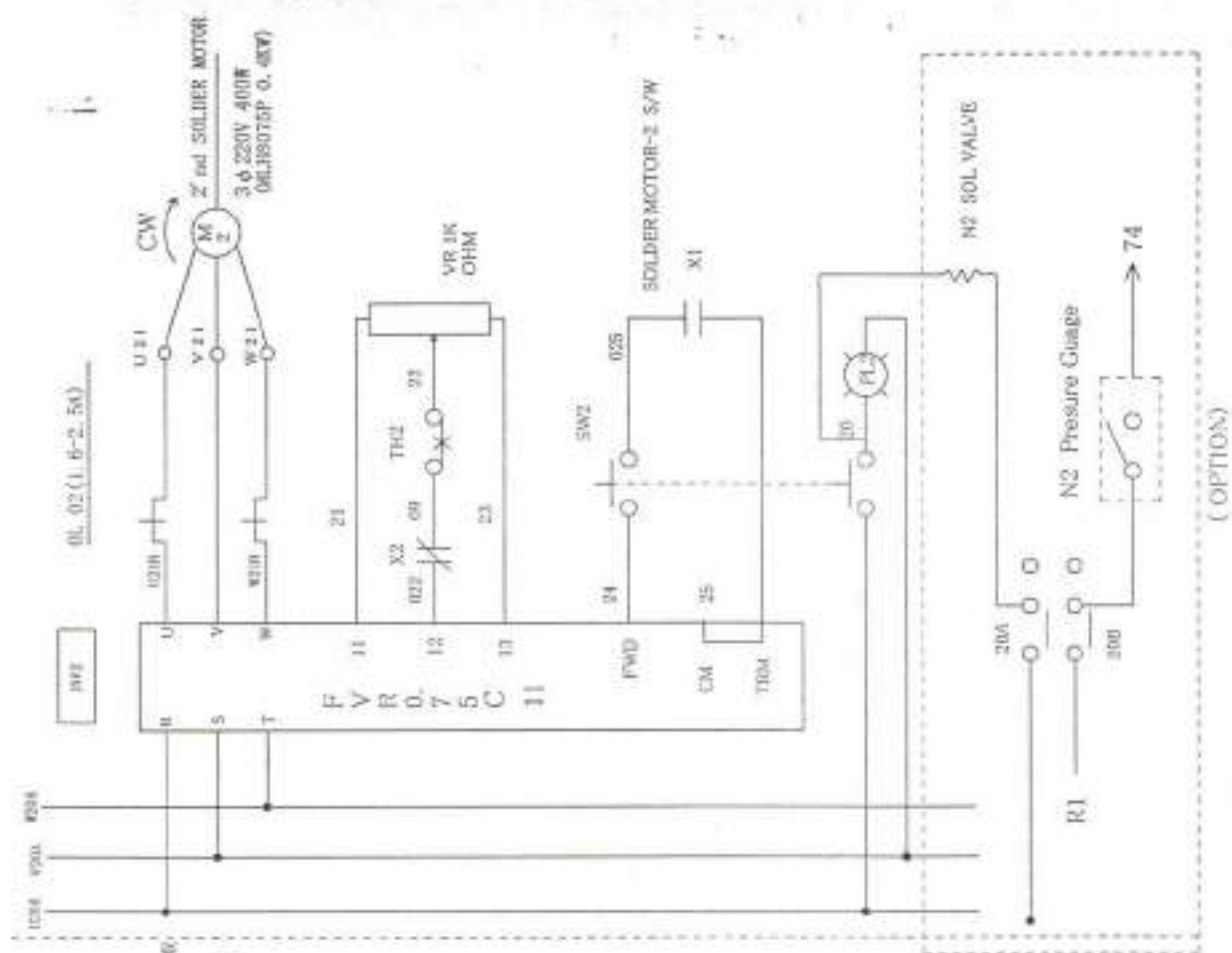
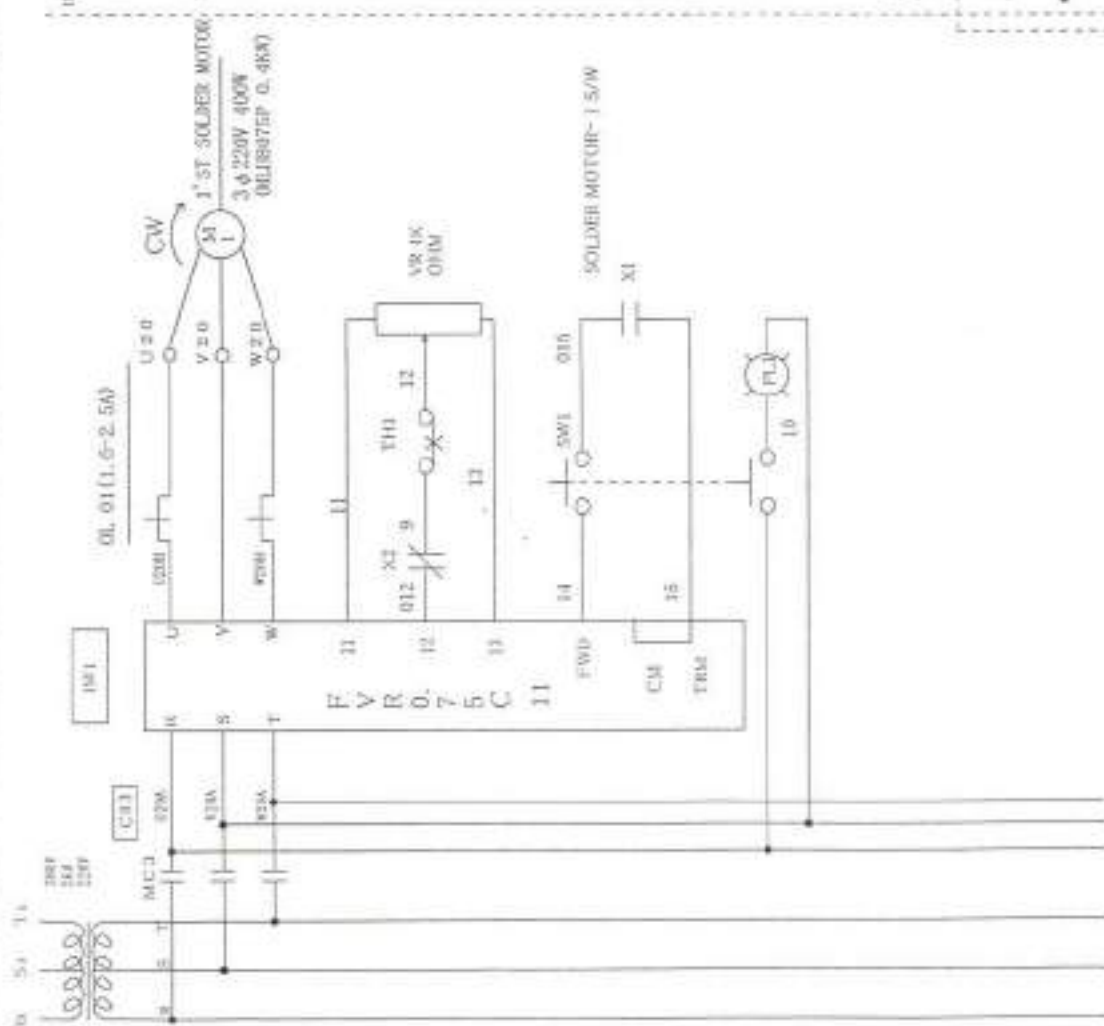
NO.	DESCRIPTION	DATE	NAME	PART NAME		QTY	MATERIAL	REMARKS	
				DRAWING	REV			DATE	BY
				DESIGNED	REV		MODEL: B002/04-2000C		
				CHECKED	REV		TITLE: SENSOR POSITION		
				APPROVED	REV		ENG. NO.		
									CE33-SENSOR POSITION



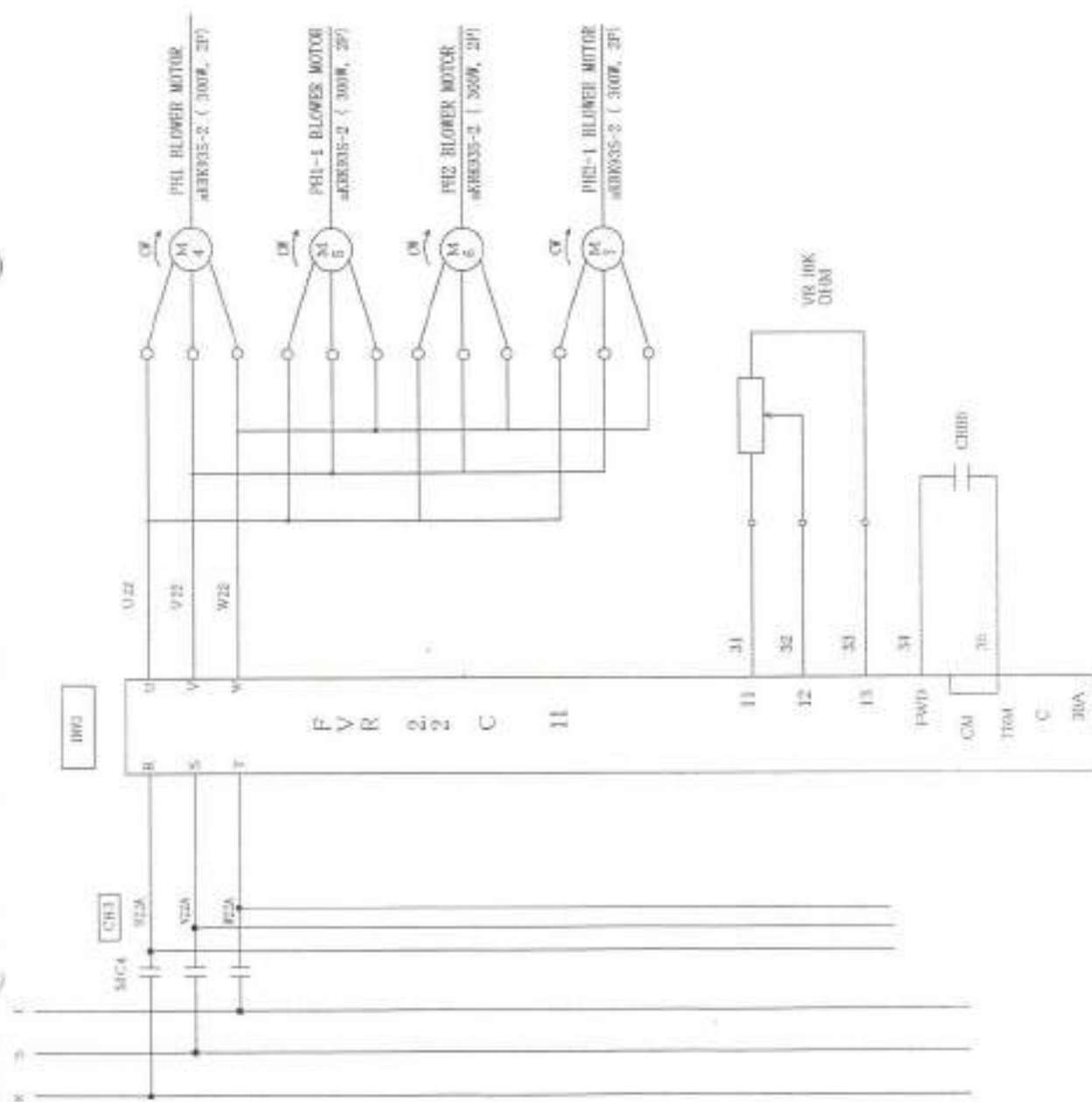
TSM CO. LTD.

TOTAL 3028183 8/20/00

	DISCRIPTION	PARTS NUMBER	MAKER	SIMBOL	Q.TY	REMARK
1	AUTO BREAKER	103 EGR 100A	L/G		1	
2	AUTO BREAKER	ABS33B 30A	L/G		1	
3	AUTO BREAKER	ABS32B 1POLE 5A	대륙		1	
4	AUTO BREAKER	ABS32B 2POLE 5A	대륙		1	
5	AUTO BREAKER	ABS32B 2POLE 3A	대륙		1	
6	MAGNETIC S/W	SC-6N 100A	L/G		1	
7	MAGNETIC S/W	GMC-12	L/G		2	
8	GTH-22	1.6~2.5A	L/G		8	
9	POWER SUPPLY	PN50024V 2.1A	파워텍		1	
10	SIGNAL TOWER	ST56-3,24v	신양		1	
11	EM S/W(30)	KH3046ER	카본		1	
12	감력부저	HY 606 DC24V	한영		1	
13	PUSH S/W	CR-251	한영		9	
14	RELAY-24V	HR-705-2PL	한국		9	
15	RELAY SOCKET	MY2	한국		9	
16	RELAY-24V	HR-705-4PL	한국		9	
17	RELAY SOCKET	MY4			32	
18	ID RELAY	4A	RAIN LINK		12	
19	SENSOR	PM-K54	NISE		1	
20	WEEKLY TIMER	H5S-A	OMRON		1	
21	VOLUME	103 10K			1	
22	VOLUME	102 1K			2	
23	PHOTO SENSOR	BM200-DDT	오토닉스		4	
24	ENCODER	E40S-200-3-2	오토닉스		1	
25	NOISE FILTER	6A	파워텍	N/F	2	
26	RPM METER	NP5Y4N	AUTONICS	RPM-METER	3	
27	근접센서	PR12-40N	AUTONICS	RPM-METER	12	
28	배지킬러(모터 정력)	CR AC250.0.1+120 5W	리드타	ROCO	2	
29	CONSENT	접지용220V			1	
30	FAN	80*80 220V			3	
31	LIMIT S/W	ZCN-PR508	한영		12	
32	PUSH SWITCH	CR251-1			1	
33	TRANS (220/110V)	WY21-100A	WOON YOUNG	TR100V	36	
34	RELAY BEND				1	
35	DOWN TRANS 380/220	WY3P-5KW	WOON YOUNG			



日期	作成年月日	单据	数量	单位	 TSM CO. LTD.	番 号 HSM-3000 車 种 電気園前	性能 4000	2/7 1-HS04-3000-02
	発行年月日							
	日 数							

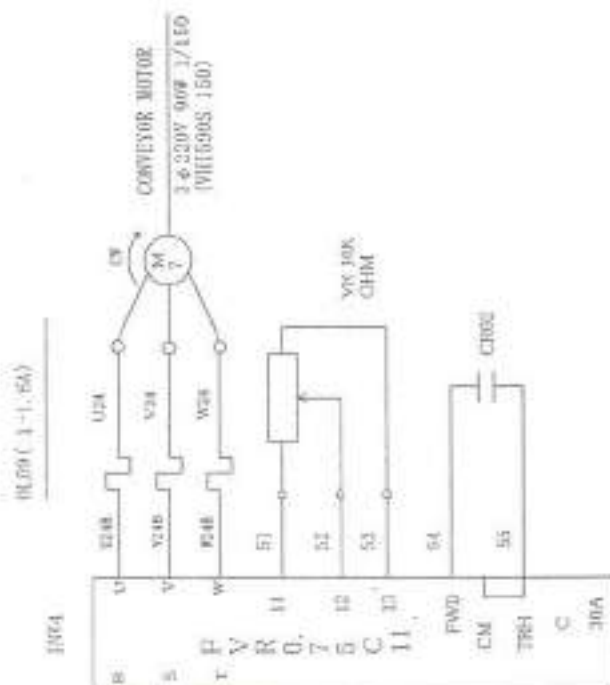


改	作成年月日	承認	設計	審査名	電氣図面	警備	3/7
正	発行年月日			表 種	HS04-3000	図 番	1-HS04-3000-03
	尺 寸						



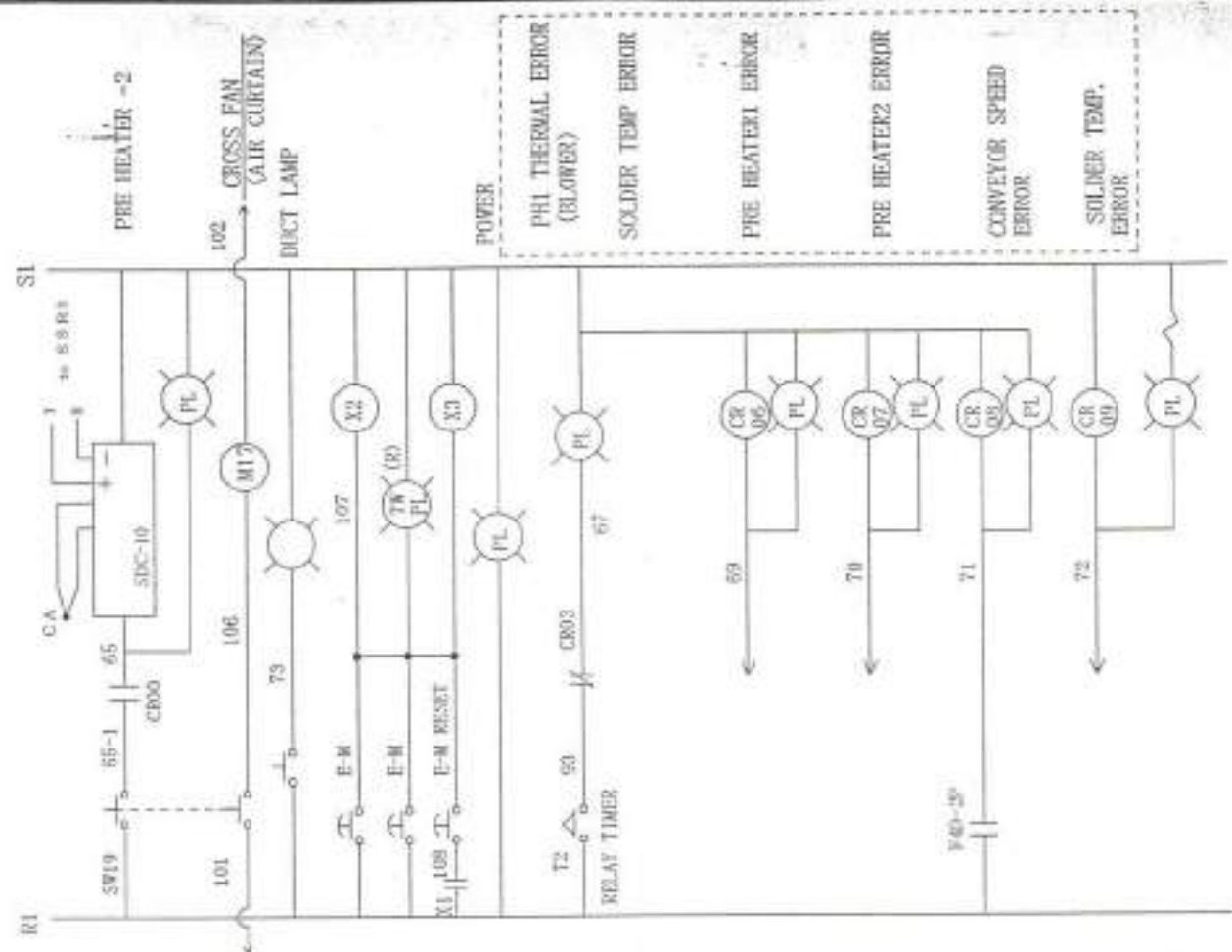
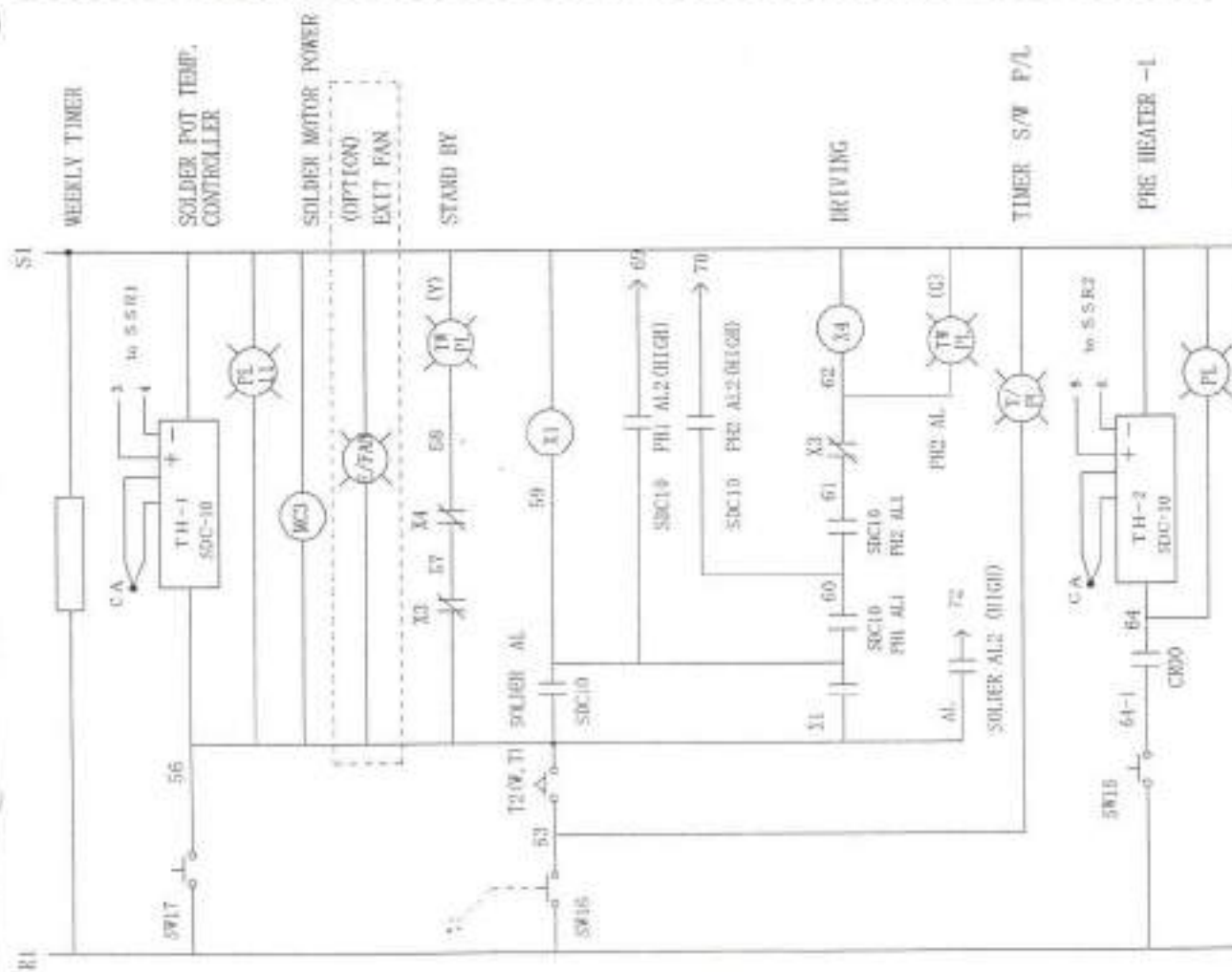
TSM CO. LTD.

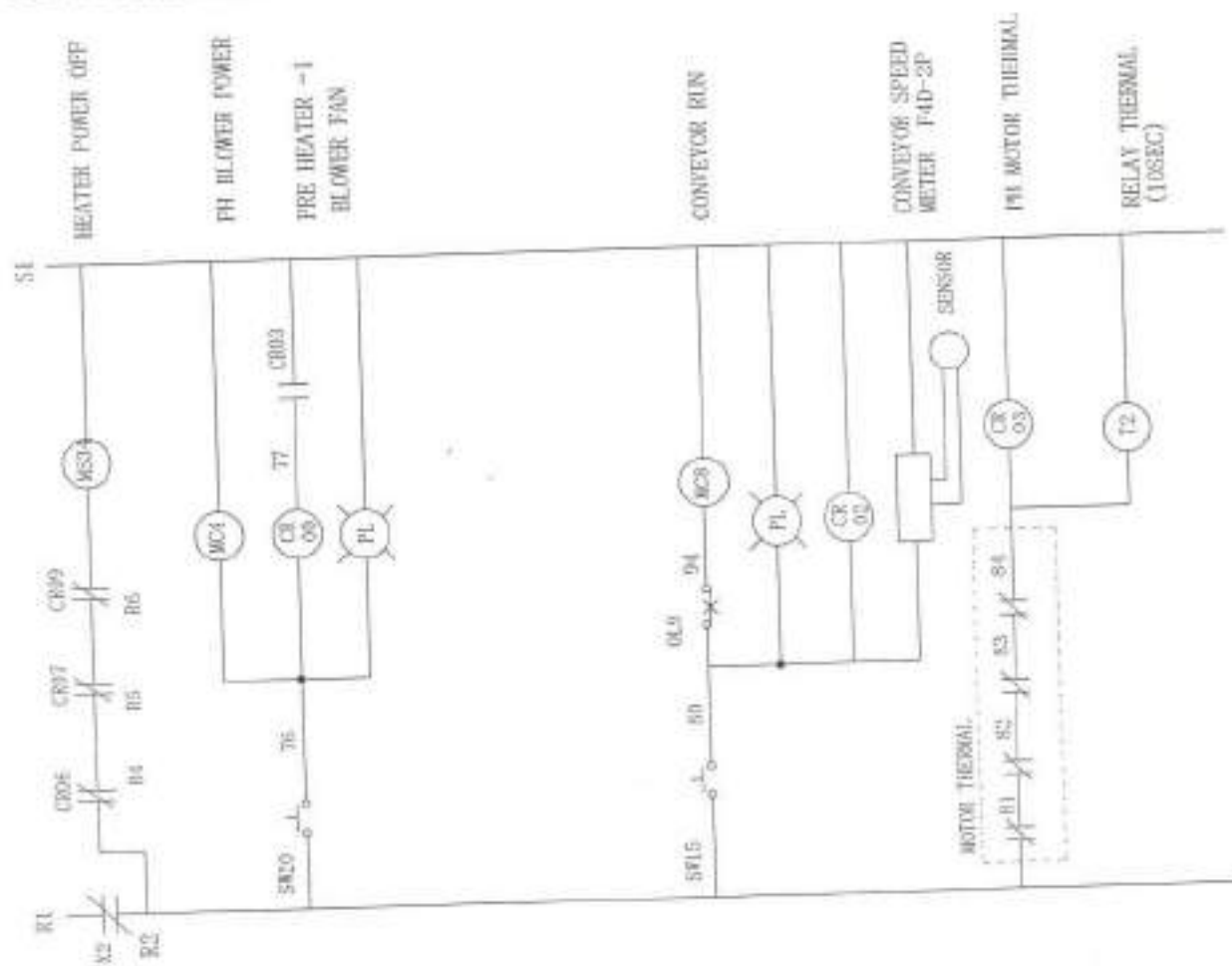
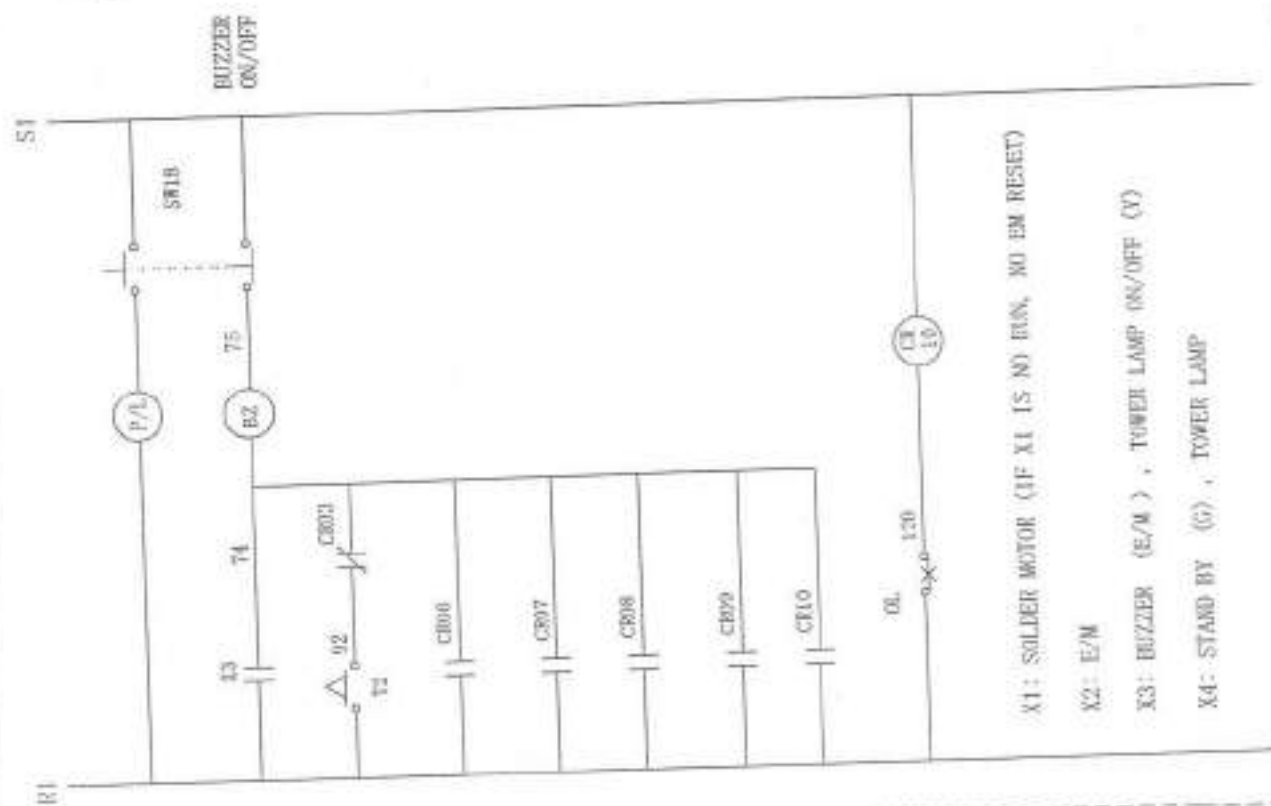
DATA INPUT OF SPEED METER



1. MD KEY PUSH (3 sec)
PARA 1
2. MD KEY PUSH (click)
start 99.9 → 04.0
3. MD KEY PUSH (5 sec)
PARA 2
4. MD KEY PUSH (click)
dot 00000 → 0000.0
5. MD KEY PUSH (click)
PSC.H 5.0000 → 1.0000
6. MD KEY PUSH (click)
PSC.Y 10.01 → 10.00

图	作成年月日	TSM CO. LTD.			書名	電氣図面	製	4/7
	発行年月日				冊	ISS04-3000	図	1-1504-3000-04
	頁 数							



[illegible]