IPUP T100L, EC100L

Instruction Manual

Date: 2006/12

IPUP T100L V3.4

EC100L V2.1

Dear Customers:

Thank you for purchasing IPUP T100L / EC100L dry vacuum pumps manufactured by TOYOTA INDUSTRIES CORPORATION. Please read through this manual for ensuring correct operation and handling and for ensuring a long service life.

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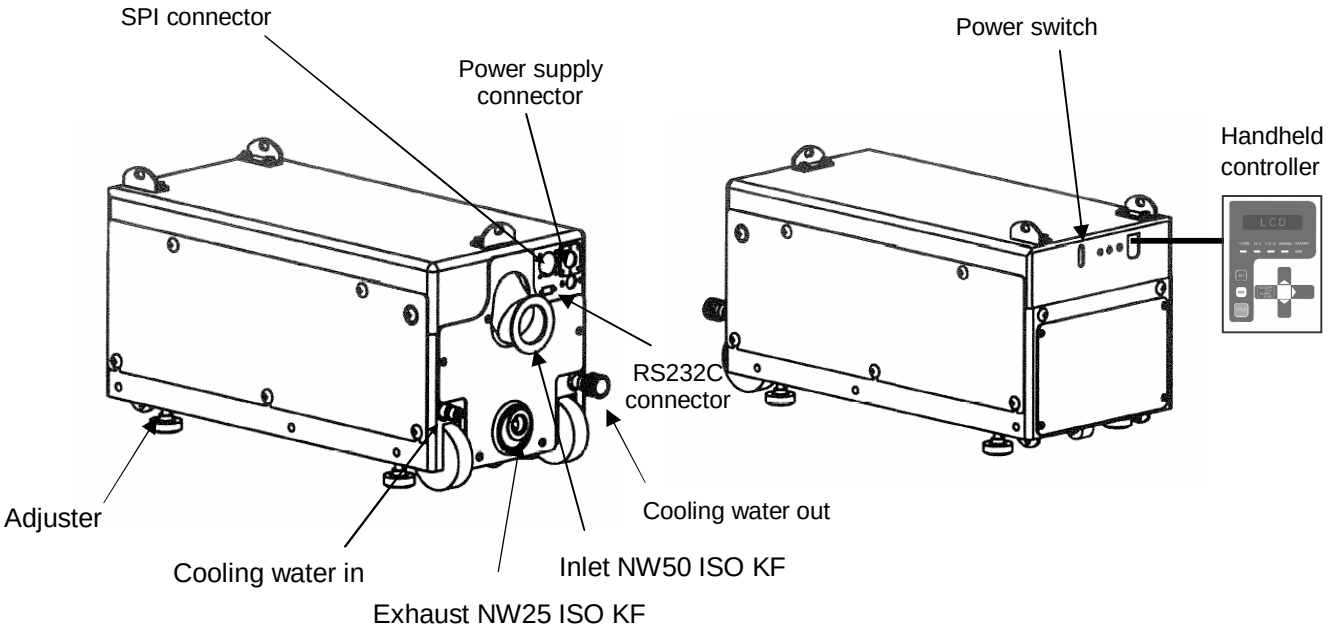
1. INTRODUCTION Page

1. INTRODUCTION

1-1. Scope

This manual covers the IPUP T100L, EC100L dry vacuum pump for semiconductor equipment.

These pumps are suitable for loadlock, transfer chamber and all other clean process.



1. INTRODUCTION

1-2. Description

The IPUP T100L / EC100L is a roots type vacuum pump that rotates a pair of synchronized, timing gears. The pump is driven by a 3-phase induction motor. Bearings and gears on the high pressure side are lubricated by fluoric type oil. Nitrogen is not required for shaft seals. Ceramic balls are used in the bearings on the low pressure side which are lubricated by fluoric type grease. The pump and motor are equipped with an indirect cooling system.

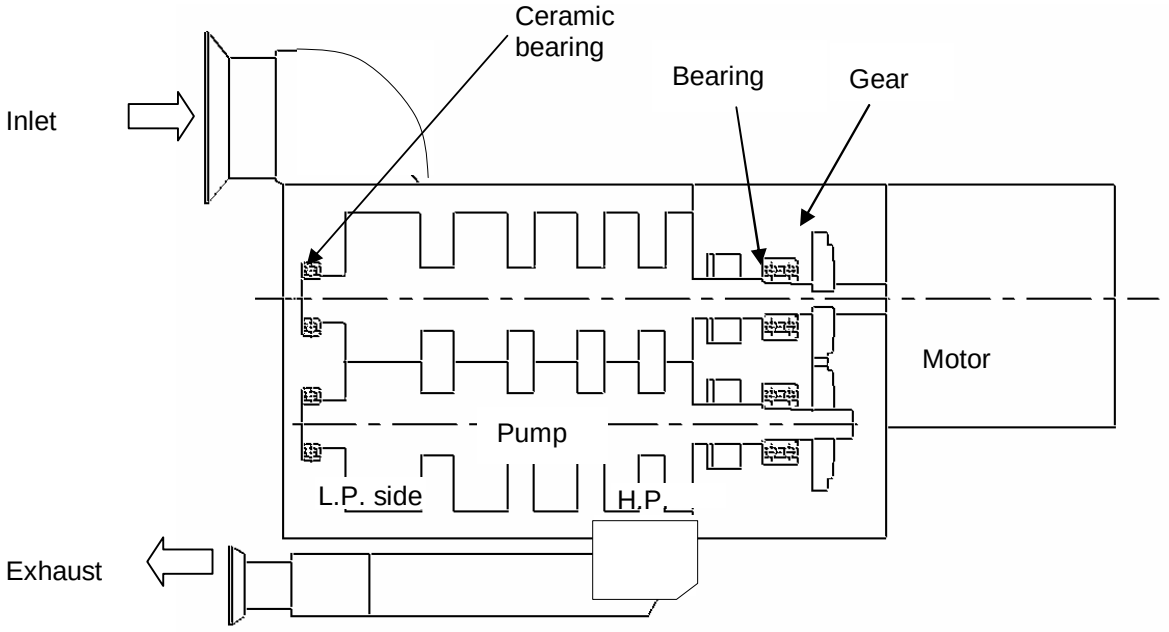
This product has following features including high reliability and low running cost in addition to low power consumption taking the global ecology into account and specifications that ensure customer satisfaction.

IPUP T100L V3.4 features:

- ATL listing
- Automatic restart in case of 1second power loss
- Low power consumption. (1.3 kW)
- RoHS Compliance

EC100L V2.1 features:

- ATL listing
- 0.55 kW, 58% reduced power consumption. (vs IPUP T100L V3.4)
- RoHS Compliance



1. INTRODUCTION

1-3. Technical Data

1-3-1. Technical data table

Item			Unit	IPUP T100L	EC100L
Dimensions and weight		Dimensions (LxHxW)	mm	590×300×280	590×300×280
		Weight	kg	105	104
		Maximum revolution (Default rpm setting)	r/min	5250	4650
		Peak pumping speed	m3/h	100	
			l/min	1670	
		Ultimate pressure (at Default rpm setting)	Pa	1.2	
			Torr	0.009	
		Power consumption at ultimate pressure	kW	1.3	0.55
Maximum continuous inlet pressure (at Default rpm setting)			MPa	6.67×10-3	
			Torr	50	
Noise level (at ultimate pressure)			dB(A)	<55	
Lubricant quantity			cm^3	110(1)	
Inlet flange				NW50	
Exhaust flange				NW25	
Environment		Ambient temperature	°C	15 to 30	
		Humidity	%	Max 90 (no condensation)	
UL classification		Pollution degree		2	
		Installation Category		II	
Utility	Cooling water	Connector	Inch	1/4	
		Type		Non-corrosive industrial water or treated soft water(2)	
		Flow Rate	L/min	Min. 1.5	
		Supply pressure	kPaG	Min300 Max700	
			Bar	Min3.0 Max7.0	
		Temperature	°C	10 to 25	
	Power supply	Number of phases		3	
		Input voltage	V	208(3)	
		Frequency	Hz	50/60	
		Full load current	A	12	
		Max. power capacity	kVA	4.6	

1) The lubricant is added to the appropriate level at the factory. Never change the lubricant level.
2) Cooling water should satisfy water quality standard of Japan Refrigeration and Air Conditioning Industry Association. Refer to “3-8-1characteristics of cooling water”
3) Voltage tolerance: ±10%

The above utilities are required for the pump. Be careful as performance and reliability are not guaranteed unless the requirements listed are satisfied.

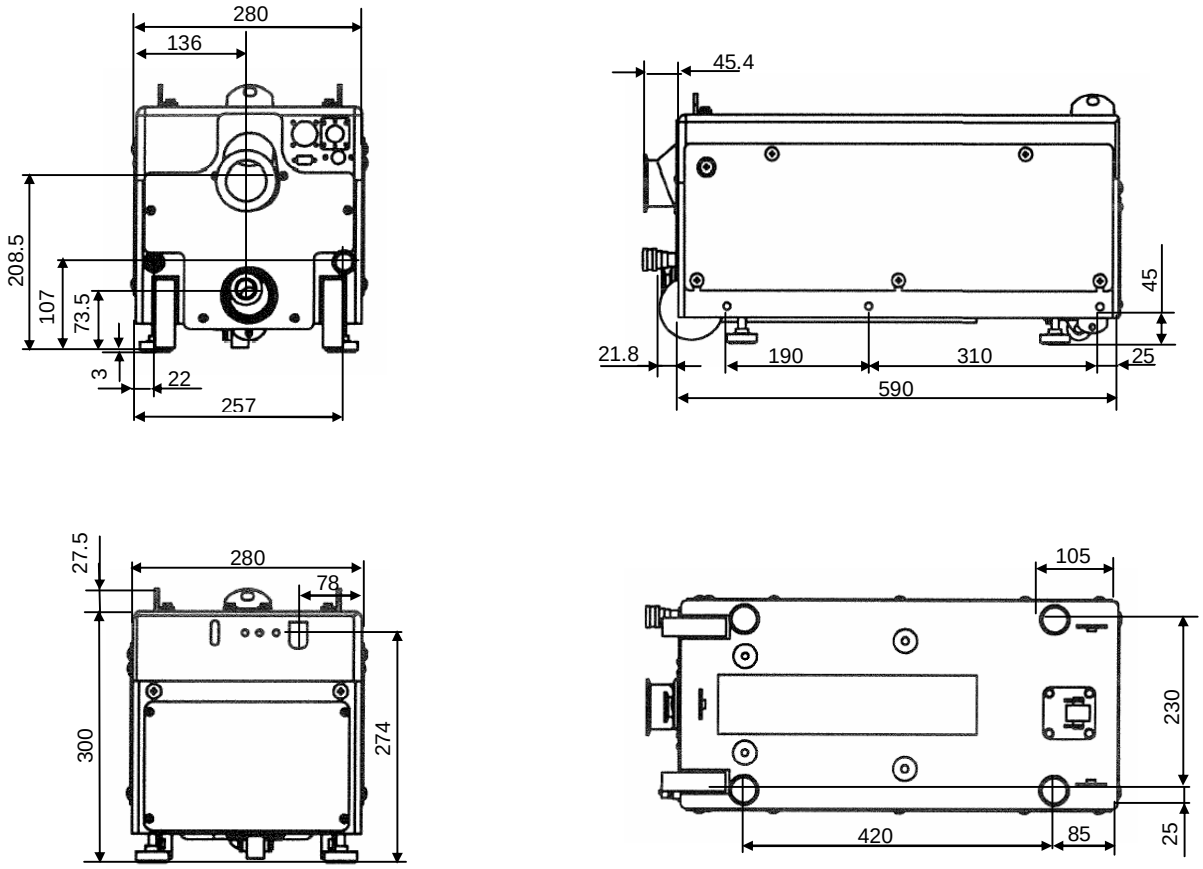
1. INTRODUCTION

1-3. Technical Data

1-3-2. Technical Data drawing

IPUP T100L Dimension Diagram

Unit: mm



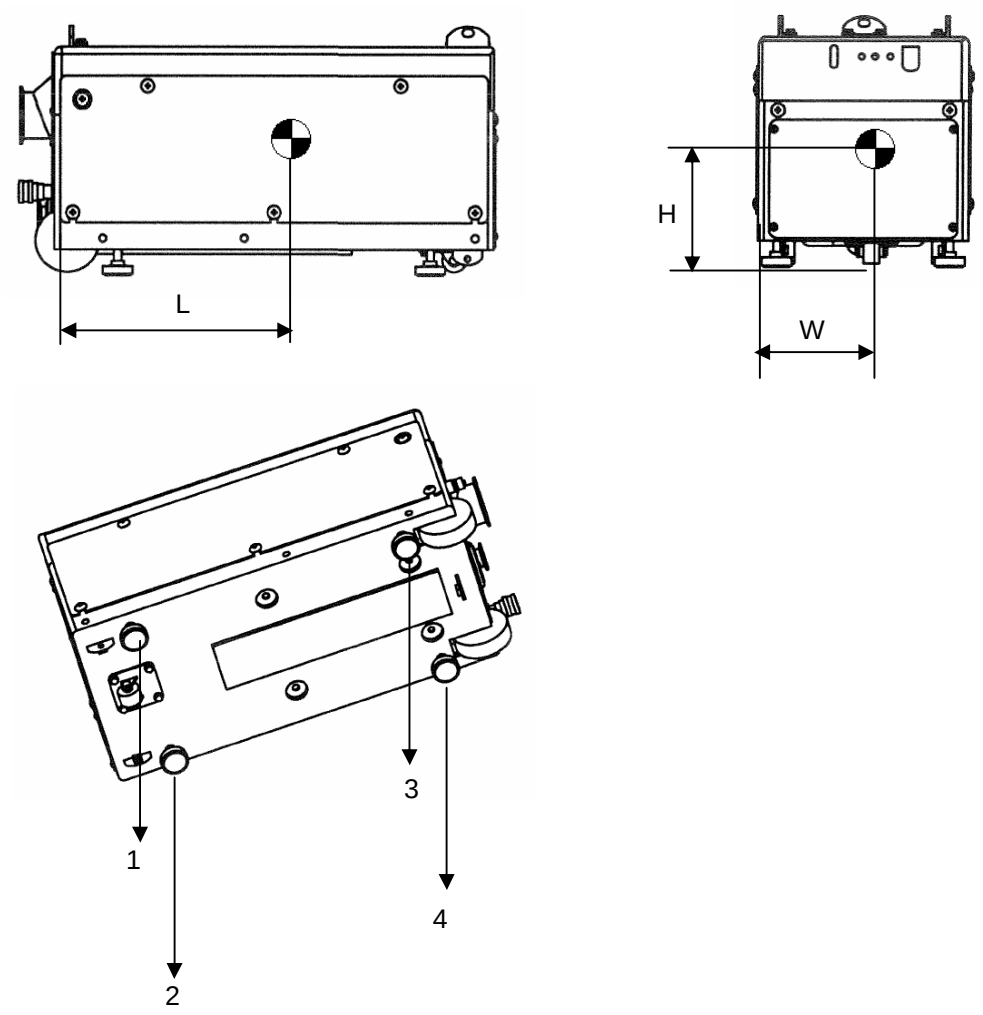
1. INTRODUCTION

1-3. Technical Data

1-3-2. Technical Data drawing (continued)

Position of IPUP T100L center of gravity

Unit: mm



Pump weight (kg)	Position of pump center of gravity		
	L (mm)	W (mm)	H (mm)
104	263	146	151

Weight distribution at adjusters			
1 (kg)	2(kg)	3 (kg)	4 (kg)
25.5	31.7	24.4	22.4

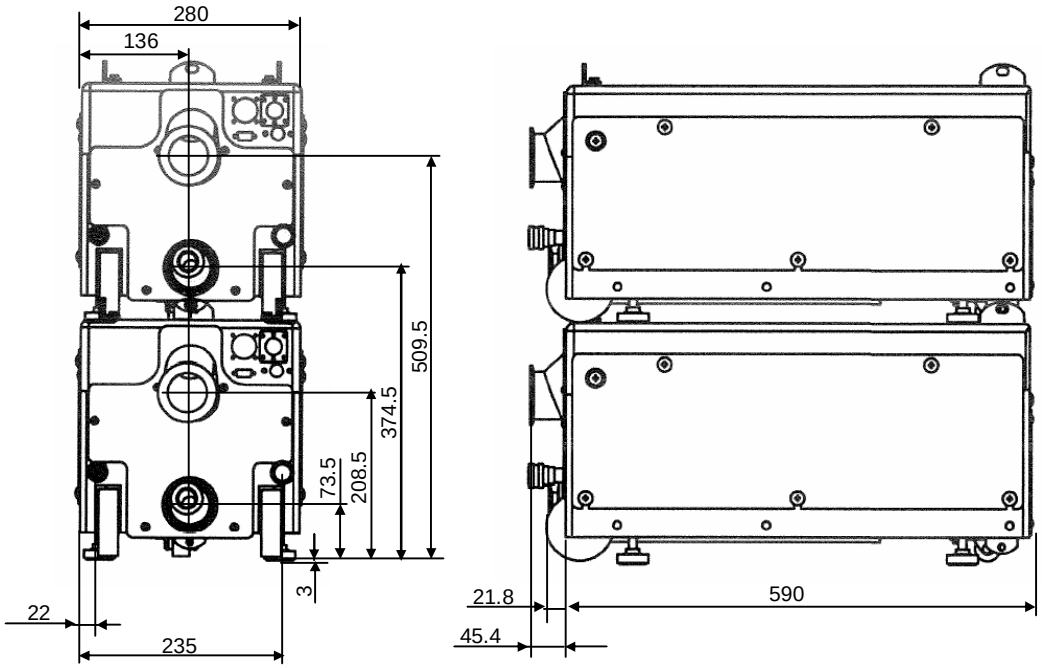
1. INTRODUCTION

1-3. Technical Data

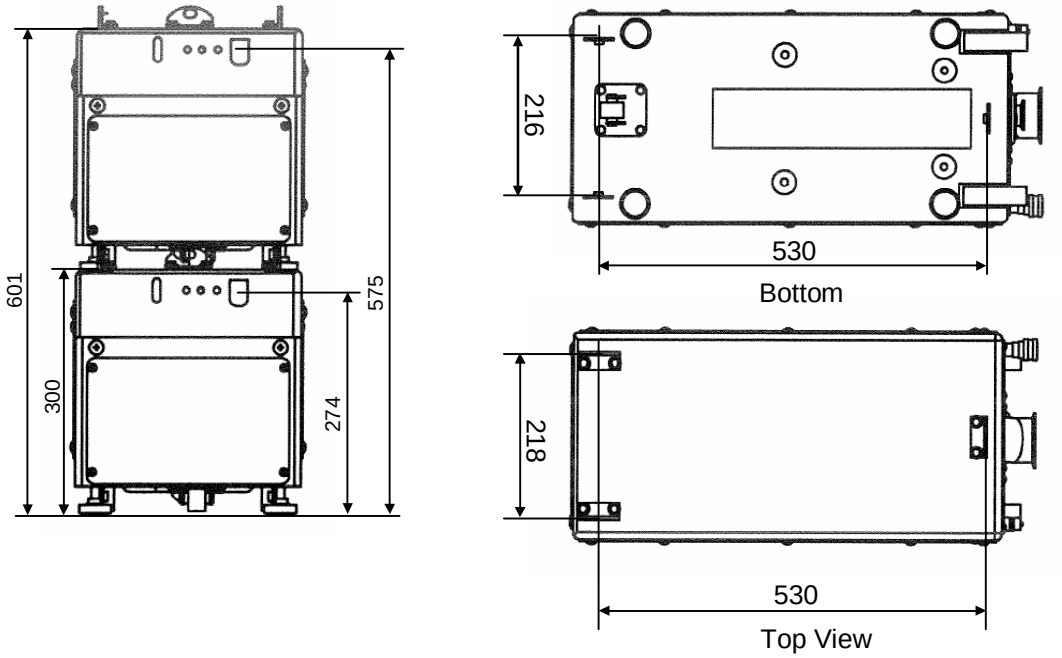
1-3-2. Technical Data drawing (continued)

Dimensions for two horizontally installed IPUP T100L pumps

Unit: mm



Positions of stacking brackets



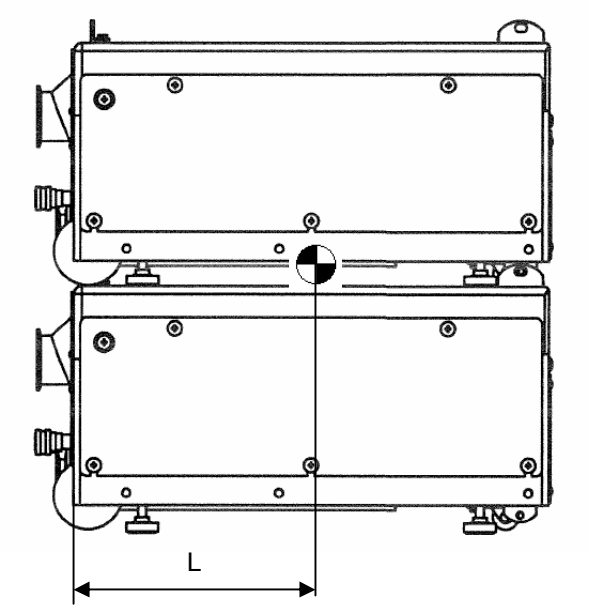
1. INTRODUCTION

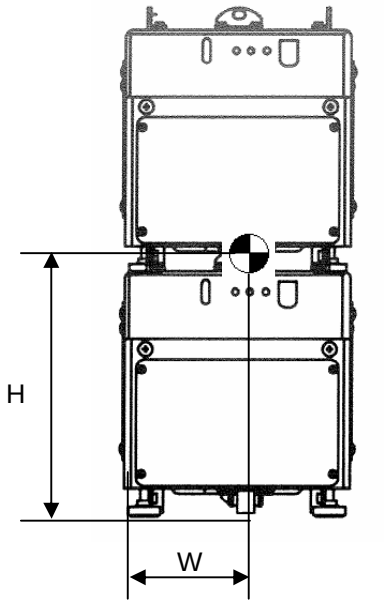
1-3. Technical Data

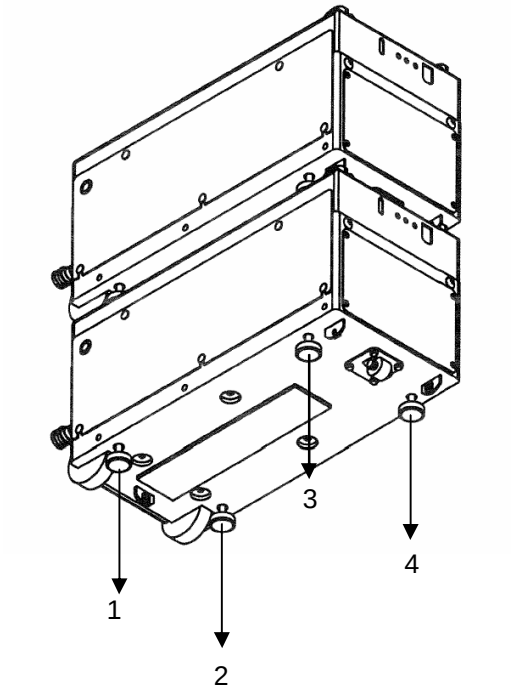
1-3-2. Technical Data drawing (continued)

Position of center of gravity for two horizontally installed IPUP T100L pumps

Unit: mm







Pump weight (kg)	Position of pump center of gravity		
	L (mm)	W (mm)	H (mm)
208	263	146	301

Weight distribution at adjusters			
1 (kg)	2 (kg)	3 (kg)	4 (kg)
51	63.4	48.8	44.8

1. INTRODUCTION

1-4. CE marking certificate

CE

EC DECLARATION OF CONFORMITY

We,

TOYOTA INDUSTRIES CORPORATION.
2-1, Toyoda-cho, Kariya-shi, Aichi-ken 448-8671, JAPAN

herewith declare, on our own responsibility that the vacuum pump listed below conforms to the relevant provisions.

Product Name: Vacuum Pump, Model: IPUP T100L,EC100L T100P, T600,T1000,T1200,T1800

Council Directives: Low Voltage: 73/23/EEC
EMC: 89/336/EEC, 92/31/EEC

Amendment Directive of above directives: 93/68/EEC

Applicable Standards: Low Voltage: SEMI S2-0200
EN61010-1:1993 + A2:1995
EMC: EN55011:1998;+A1:1999 +A2:2002(Group 1 Class A)
EN61000-6-4:2001

Shinya Yamamoto

Shinya Yamamoto, Manager
Engineering Department
Date: 2012 / 12 / 07

1. INTRODUCTION

1-5. SEMI S2 certificate

Global Semiconductor Safety Services

CERTIFICATE OF COMPLIANCE

To SEMI S2-0200 and S8-0999 Guidelines

February 7, 2007

Company Name & Location:	Toyota Industries Corporation 2-1, Toyota-Cho, Kariya-Shi Aichi-Ken, 448-8671 Japan
Place of Manufacturing:	Japan
Document Number:	200291F6
Model:	IPUP T100L V3.2 IPUP T100L V3.3 IPUP T100L V3.4 and EC100L V2.1
Investigated in accordance with:	SEMI S2-0200 / S8-0999

Paul Breder, Technical Manager

Andrew Giles, Technical Manager

Intertek Global Semiconductor Safety Services

2. SAFETY PRECAUTION Page

2. SAFETY PRECAUTION

2-1. General

A dangerous voltage for the human body is used inside the IPUP T100L / EC100L. Improper operation may possibly result in a serious accident. Thoroughly read this manual to prevent accidents before using the product.

2-2. Identified label symbols

Observe important safety precautions which are clearly identified by WARNING or CAUTION symbols.

Wear various protective gear when operating the product and comply with all warnings and dangers indicated by the following symbols.

 WARNING	A hazard that could cause injury or death if you don't follow the rules.
 WARNING	A hazard related to electrical that cause injury or death if you don't follow these rules.
 WARNING	A hazard related to temperature that causes injury or death if you don't follow these rules.
 CAUTION	A hazard that causes an accident resulting in injury or damage to the process.
	Refer to the references and follow the instructions.

2. SAFETY PRECAUTION

2-3. Safety Instruction

2-3-1. *Power supply*

IPUP T100L / EC100L are not provided with a 10000 AIC main circuit breaker. Supply power to the pump from process tool with a 15 A max main circuit breaker. (in US UL489, in Europe EN60947-2 approval)

Do not place pump where power-disconnecting devices become difficult to access.

2-3-2. EMO system

This product has no EMO device as it is designed as a built-in pump. The user is required to install an EMO unit within 10ft travel from the pump, which shuts off the power.

2-3-3. Safety sensors

The IPUP T100L / EC100L pumps have a number of safety sensors to detect overload, over-temperature of pump, over-temperature of motor, by these sensors.

Sensors	Function
Circuit protector	Overcurrent protection in case of overload
Thermistor for pump body	Measurement and monitoring of pump body temperature
Temperature switches for pump motor	Monitoring of motor over-temperature
Converter for pump	Overcurrent protection in case of overload

2. SAFETY PRECAUTION

2-4. Safety Precaution

Cautions related to safety are listed below.

The performance and safety of this product are guaranteed only when the pump is operated within the parameter ranges specified herein.


WARNING

The IPUP T100L / EC100L is designed for loadlock, transfer chamber and all other clean chambers. Never use the pump in processes using corrosive, explosive, poisonous or flammable gases.


WARNING

If any modification is made to the product by the customer, performance and safety are not guaranteed. In such cases, we will not be responsible for any failures.


WARNING

The circuit between the power supply connector and the main switch remains live even after power is turned off. An electric shock will occur if you touch the live area. Be sure to disconnect the power cable.


WARNING

Harmful voltage or current exists in the pump. When working with the cover open, be sure to turn the pump main switch off and disconnect the power cable to avoid getting an electric shock.


WARNING

After turning the power off, voltages of 60 VDC or more remain in internal parts such as the FC converter. When operating with cover open, wait 30 sec. after turning the power off. Also, wait 30 sec. when turning power on again.


WARNING

Only qualified, well-trained personnel can operate this product with its cover open for installation or other reasons.

2. SAFETY PRECAUTION

2-4. Safety Precaution (continued)


WARNING

As this pump is designed as a processing tool for other equipment, it does not have a lock - out / tag - out device.
The entire tool must comply with OSHA requirements for proper lock -out / tag -out during installation or maintenance.


WARNING

T100L does not need daily maintenance and daily cleaning. Never open the side panel to prevent electric shock or burn injury.


WARNING

Never move the IPUP T100L / EC100L while the pump is running.


WARNING

When operation is needed soon after stopping the pump, wear gloves and other protective gear as mechanical parts inside the cover and output piping are as hot as 70°C or more. Pay special attention when working.


CAUTION

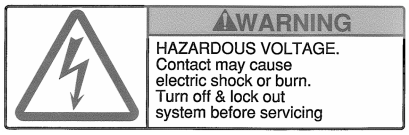
The oil level is adjusted at the factory before shipment. Never change the oil level.

Use shielded communication cables and connectors to prevent malfunctions caused by noise.

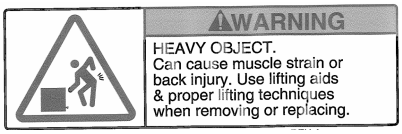
2. SAFETY PRECAUTION

2-4. Safety Precaution (continued)

The following warning labels are attached to the IPUP T100L / EC100L

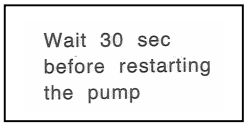


This is located on the side of the pump and indicates that an electric shock may occur if you touch live internal parts. Always turn the power off and disconnect the power cable before beginning work.

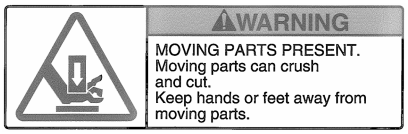


This is located on the upper face of the pump and indicates that attempts to lift it by hand may result in back injury. If it is necessary to lift the pump, use an appropriate device.

This is located on the rear face of the pump and indicates that some internal components become hot. Touching them with bare hands may result in burns. Wear gloves or other protective gear or wait until they have cooled down before beginning work.



This is below the main switch on the front face of the pump. It requires a 30 second wait after the switch is turned off and before the switch can be turned back on.



This is located on the upper face of EC100L pump and indicates your hand may be caught between the handle and enclosure. Before using or pulling the handle, check that the handle is firmly locked.

3. INSTALLATION Page

3. INSTALLATION

3-1. General

Only qualified, well-trained personnel can install this product.

When unpacking, confirm that the all parts listed in attached option list are included.

3-2. Unpacking Precaution

WARNING

When packed, the product weighs about 130kg.

Use an appropriate means of transportation and avoid lifting it by yourself.

CAUTION

Preventive measures must be taken not to incline the pump during transportation and setting in position. (required :usage within angles of 10 degrees with horizontal)

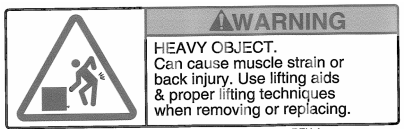
Before starting operation, pump inclination angle must be adjusted to be within angles of 2 degrees with horizontal.

If the pump has been damaged upon unpacking, notify the transportation company and have them take the necessary action, or your service representative, as the case may be needed. It is recommended that packing materials be kept as they may be needed in the future.

3. INSTALLATION

3-3. Moving procedure

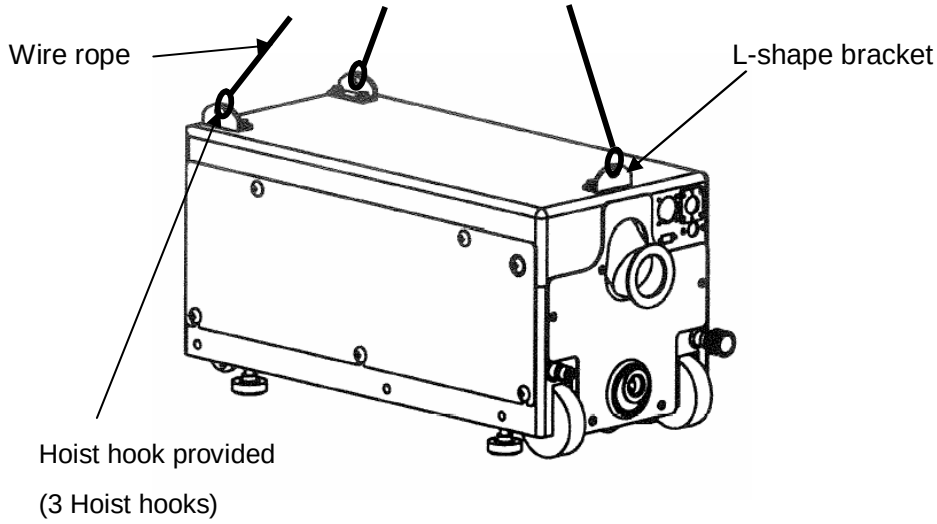
3-3-1. Hoisting the pump to move



The pump itself weighs about 104kg. Use a hoist or other appropriate device when lifting it up.

Using the L-shape brackets screwed to the upper surface of the enclosure, hoist the pump as follows:

1. Insert the hoist hooks provided in each L-shape bracket.
2. Prepare wire ropes and hook them to the hoist.
3. Lift the pump using a hoist.



WARNING

Use the hoist and wire ropes after confirmation that they are suitable for the load.

WARNING

Never work under a hoisted pump. Only authorized, qualified personnel are permitted to hoist the pump.

CAUTION

Preventive measures must be taken not to incline the pump during transportation.(required :usage within angles of 10 degrees with horizontal)

3. INSTALLATION

3-3. Moving procedure (continued)

3-3-2. Moving the pump

Use appropriate cart or moving equipment to move the pump. Make sure that all four adjusters on the pump are DOWN to prevent any sliding of the pump on the cart or moving equipment. Move the cart at a speed of 4 km/h or less.

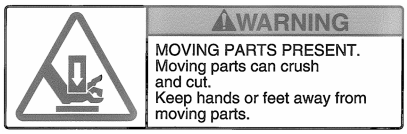
WARNING

Do not move hurriedly to prevent rolling over. Move at a speed of 4 km/h or less.

3. INSTALLATION

3-3. Moving procedure (continued)

3-3-2. Using the optional handle to move (continued)



Pay attention so as not to trap your hands between the optional handle and cover when using or stowing the optional handle.

Never use the optional handle for hoisting the pump.

Never sit down on the optional handle.

Only use the optional handle for pushing the pump.

Never move the pump while it is running.

Check that the optional handle is firmly locked before using it or after stowing it.

3. INSTALLATION

3-4. Installation Procedure

3-4-1. Installation precaution

Install the pump horizontally. Before starting operation, pump inclination angle must be adjusted to be within angles of 2 degrees with horizontal.
It cannot be operated at any angle or vertically.

Before using the pump, be sure to fix it firmly to either the floor or the equipment using earthquake protection equipment.

Install the pump on a hard and flat surface.

Install the pump in place using proper transportation device.

The pump performance will vary depending on the types of fittings and connectors used.

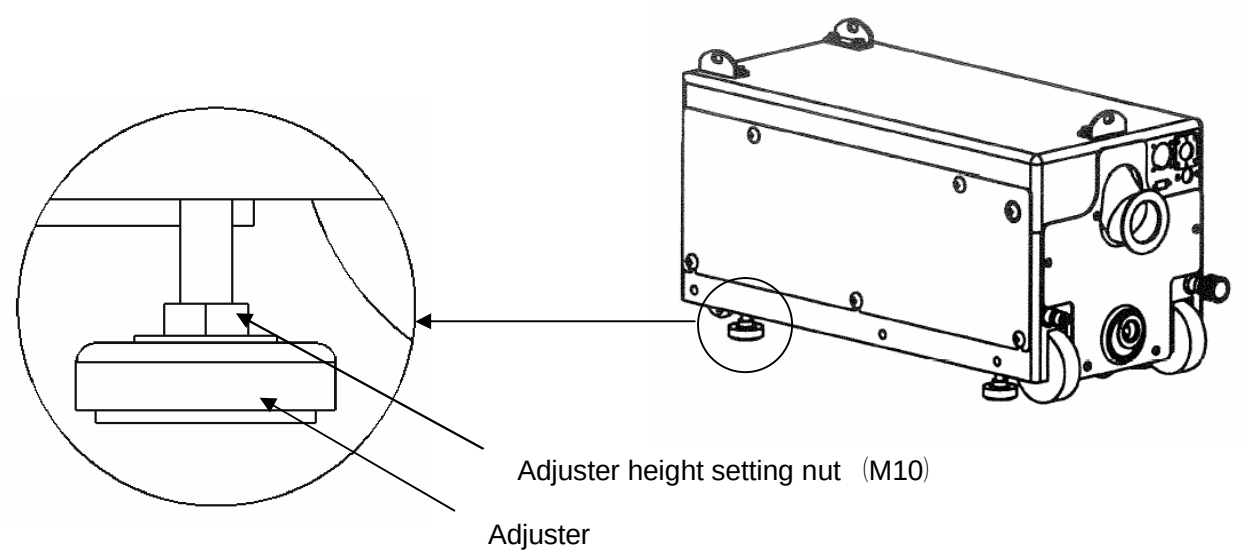
3. INSTALLATION

3-4. Installation Procedure (continued)

3-4-2. Pump positioning method

Four adjusters are provided on the bottom of pump. Carry out positioning by observing the following instructions:

1. Turn the adjusters clockwise to lower them using an M10 spanner or the like.
2. Lower them until they contact the floor firmly and the wheels and free caster are floating. Adjust them to make the pump parallel with the floor.



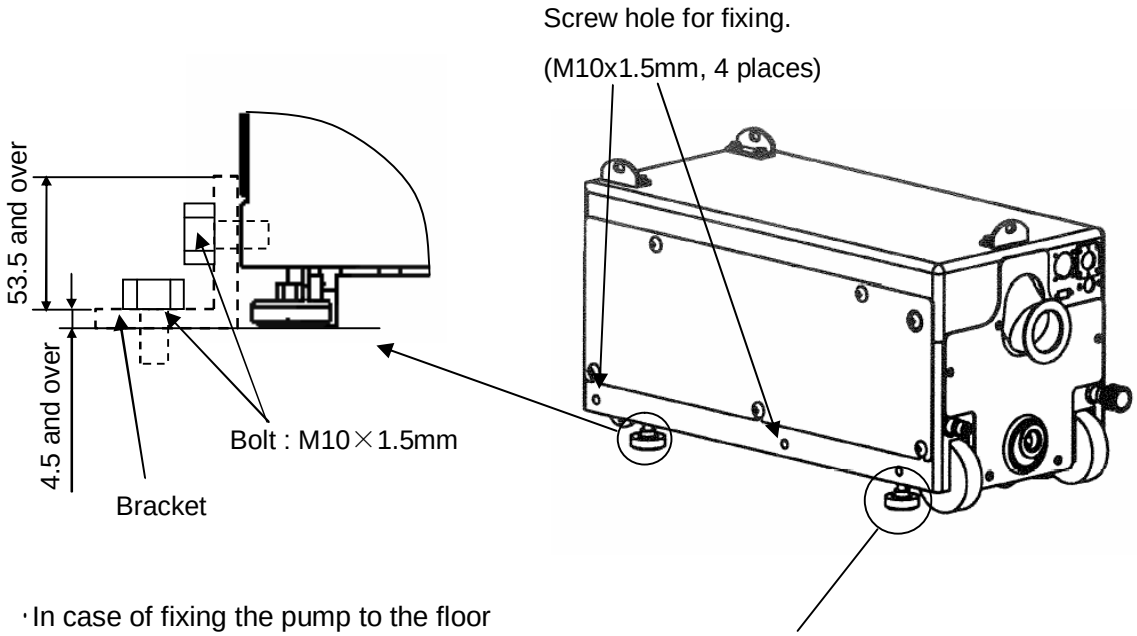
3. INSTALLATION

3-4. Installation Procedure (continued)

3-4-3. Method of fixation

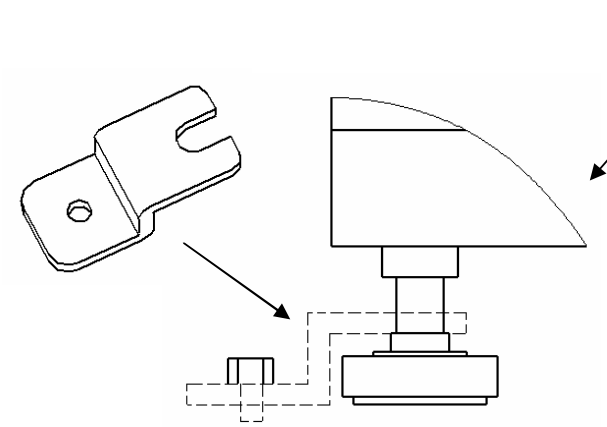
・In case of fixing the pump to the equipment

Fix the pump to the equipment using the bracket as shown in following figure.



・In case of fixing the pump to the floor

Fix the adjusters to the floor using the bracket as shown in following figure.



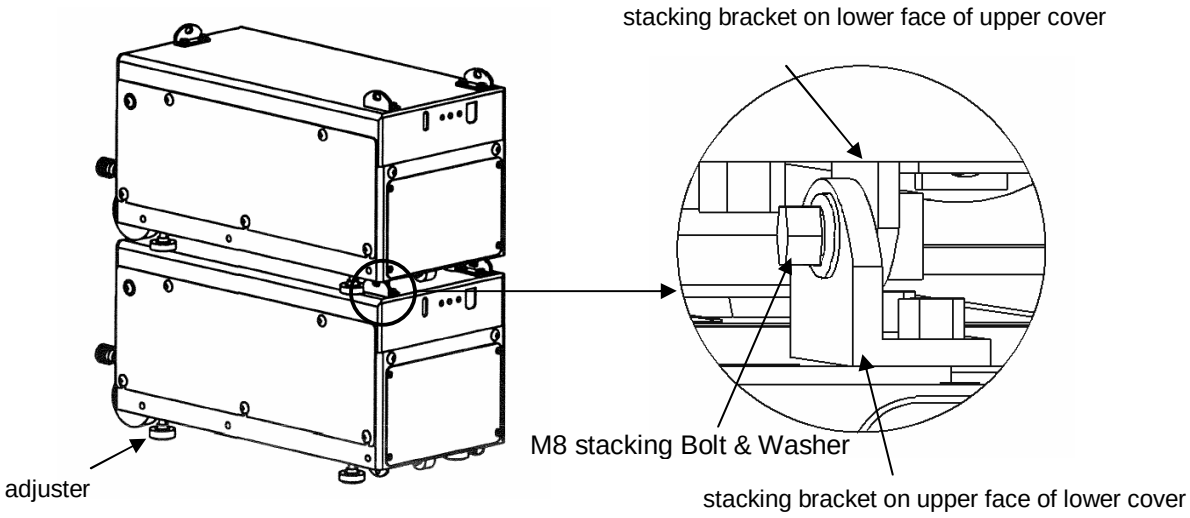
3. INSTALLATION

3-4. Installation Procedure (continued)

3-4-4. When using two vertically stacked pumps.

It is possible to operate two vertically stacked IPUP T100L / EC100L pumps. Observe the following instructions for stacking two pumps vertically.

1. Check that all three stacking brackets are fixed on the enclosure.
2. Place the lower pump on a hard and flat floor and fix firmly based on “3-4-2. Pump positioning method “.
3. Hoist up the upper pump and place it on top of the lower one.
4. Check that the holes of the three stacking brackets on the upper face of the lower pump are aligned with those on the upper pump. (Refer to the following figure.)
5. Firmly position the adjusters of the upper pump on the upper face of the lower pump.
6. Fix upper and lower pump stacking brackets with M8 stacking bolts in 3 places. Three stacking bolts are provided with every pump.



WARNING

Be sure to fix upper and lower pump in case of earthquake for vertically stacked pumps.

WARNING

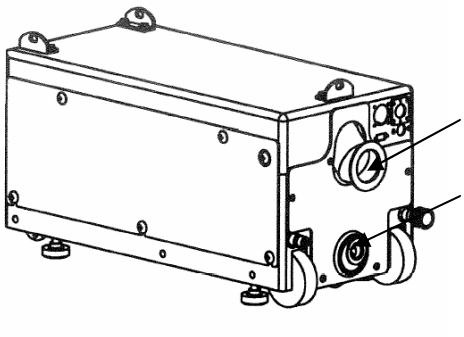
Never lift two vertically stacked pumps at once. The stacking brackets are only designed for a single pump.

3. INSTALLATION

3-5. Connection to the pumping circuit

Specifications for the vacuum pump inlet and outlet are as listed below;

- Inlet flange: NW50
- Exhaust flange: NW25



Connect the inlet flange to your vacuum line and the exhaust flange to your exhaust line with appropriate vacuum parts.

WARNING	Remove blank caps from the inlet and outlet of the pump. These protect the pump from contamination during transportation or storage. It is dangerous to leave them in when operating the pump.

WARNING	Check if the vacuum accessory connected to the pump inlet can withstand 0.1MPa negative pressure against the atmospheric pressure.

	Check for leakage after all pipes have been connected.

3. INSTALLATION

3-6. Electrical connection

3-6-1. Precaution

Connection of main power cable to the equipment must be performed by a qualified person.

With regard to the wiring method and careful study of power supply cord / cable is described in the NEC (National Electric Code) article 400. Consider your installation and usage.

Until all electrical connections are completed, keep the pump main switch OFF.

Electrical connections required for operation of internal parts are done at the factory before shipment.

An electronic circuit in the pump automatically corrects any power phase deviation.

3-6-2. Power source

For the power source, see the table below.

Item	Specifications
Number of phases	3
Voltage	208V (Voltage tolerance±10%)
Frequency	50/60 Hz
Rated current	12A
Max. power capacity	4.6 kVA
Cable outside diameter	AWG14/4 UL Style 2587/2501
Conductor diameter	2.08 mm^2 and over
Conductor material	Copper

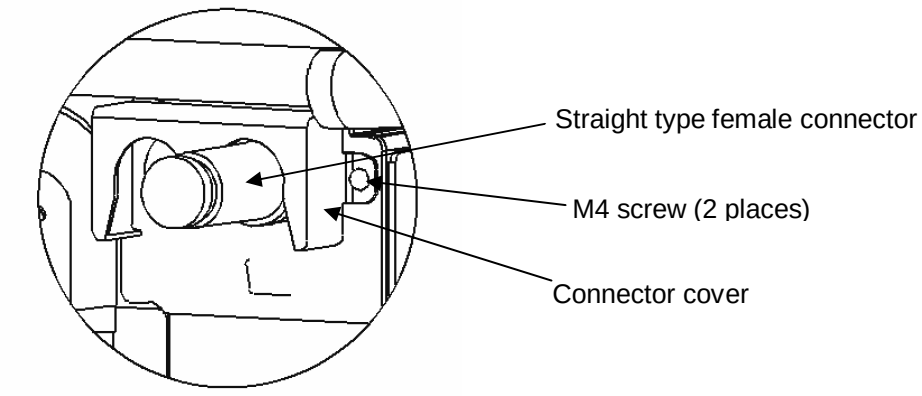
IPUP T100L will automatically restart to avoid system down when 1 second power loss occurs.

3. INSTALLATION

3-6. Electrical connection (Continued)

3-6-3. Electrical connection method

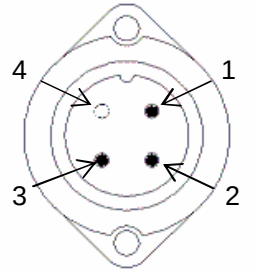
- The main power supply connector is located as shown below.



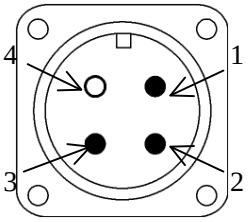
- Observe the following instructions when connecting the main power supply connector:

1. Connect the female connector to the main power supply connector on the pump rear panel and fix by turning the ferrule clockwise.
2. Fix the connector cover onto the cover using two M4 bolts.

T100L / EC100L(option)



EC100L



No	Phase
1	L1
2	L2
3	L3
4	GND

Power connector (male connector)

	T100L EC100L(option)	EC100L
Receptacle	Amphenol T3110-000	JL04V-2E18-10PE-B
Female Plug	Amphenol T3109-101	JL04V-6A18-10SE-EB Clamp for plug: JL04-18CK-13

3. INSTALLATION

3-7. Signal

3-7-1. Outline

The IPUP T100L / EC100L is designed as a built-in pump of the APPLIED MATERIALS equipment and controlled through the APPLIED MATERIALS SPI. The pump is able to be operated by an equipment through SPI interface as well as monitoring pump status.

1、 Starting and stopping of the IPUP T100L / EC100L

2、 Monitoring of dry contact output status (DC24V, 0.2A)

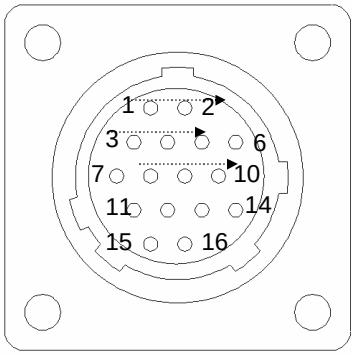
3、 Control of IPUP T100L / EC100L revolution

If you use the external monitoring output, you can install the monitoring system, and monitor the pump detail information. (The monitoring system is option.)

> WARNING
>
> Treat suitably according to signal output from the pump on equipment side.

3-7-2. SPI connector wiring

The SPI connector is located on the rear panel of the pump.



Front view (pin assignment)

	Maker Model No.
Receptacle	Tyco Electronics AMP CPC 206036-1
Female Plug	Tyco Electronics AMP CPC 206037-1

> WARNING
>
> Rated value of dry contact output of SPI is DC24V and 0.2A. If a voltage or current exceeding these values is supplied, the electronic circuits may be damaged.

3. INSTALLATION

3-7. Signal (continued)

3-7-3. SPI Pin assignmment

Function	Pin No.	Signal	Dry contact state	IN /OUT
Pump ON/OFF	1 2	COM Signal	• Pin 2 DC0V: Pump Off • Pin 2 DC24V Pump On	IN
Pump running	3 4	Signal COM	• Contact Closed: Pump On • Contact Open: Pump Off	OUT
DC24V Output (option)	5 6	+24V COM	• DC +24V is always on when pump has power and circuit protector for 24V is on. *	OUT
Warning	7 8	Signal COM	• Contact Closed: Normal • Contact Open: Warning	OUT
Hazard	9 10	Signal COM	• Contact Closed: Normal • Contact Open: Hazard	OUT
Jumper	11 12	Jumper		
Final valve interlock	13 14	Signal COM	• Contact Closed: Pump On • Contact Open: Pump Off	OUT
Rotation speed	15 16	Signal COM	• DC: 0V: 5250 rpm • DC: 10V: 1000 rpm	IN

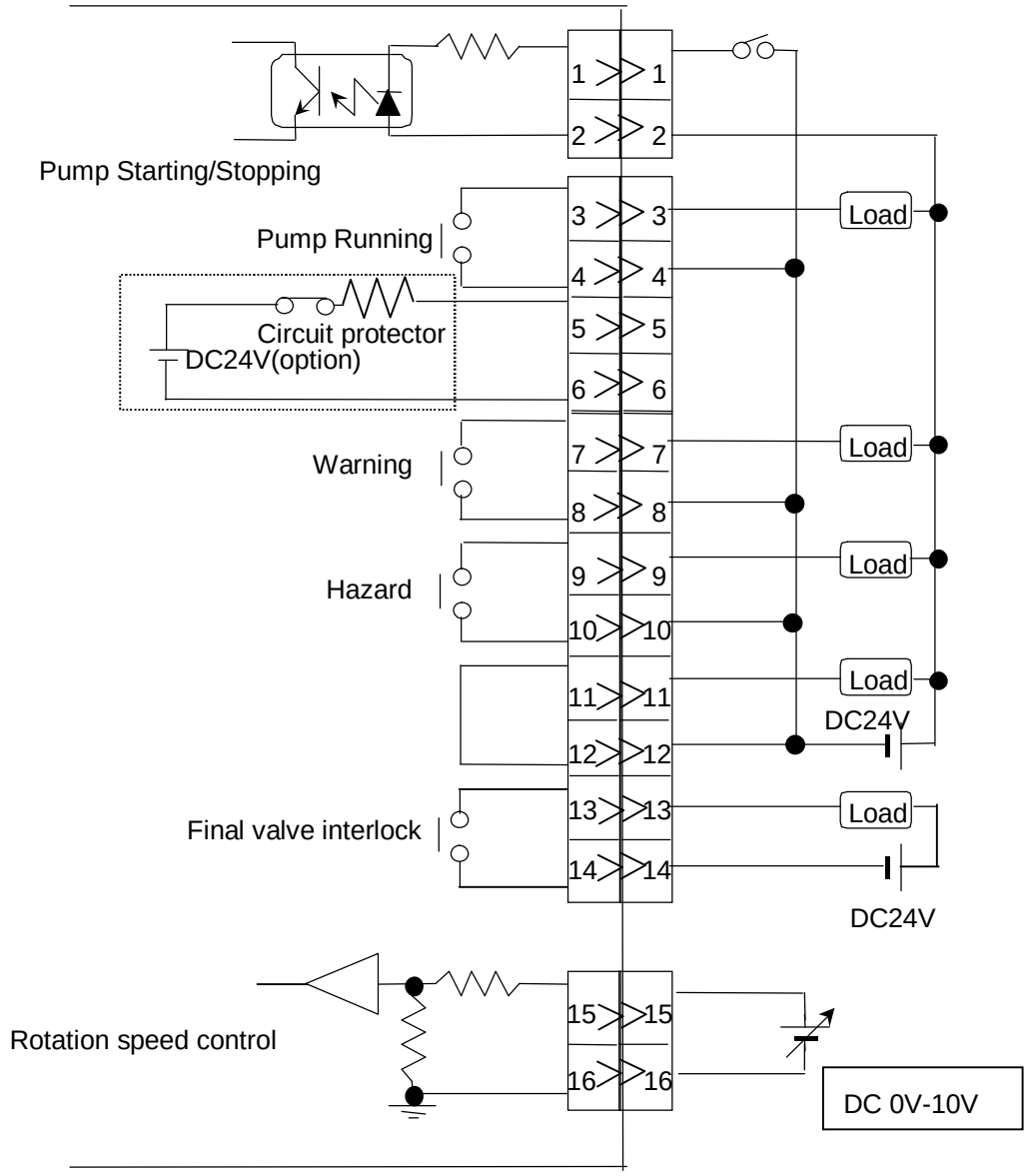
* DC+24V (option) can be utilized to operate the pump if process tool does not supply DC+24V to start or stop the pump.

Pump status	SPI contacts				
	3-4	7-8	9-10	11-12	13-14
Pump running	Close	Close	Close	Close	Close
Pump stopped	Open	Close	Close	Close	Open
Pump running + warning	Close	Open	Close	Close	Close
Pump stopped + hazard	Open	Close	Open	Close	Open
Power off	Open	Open	Open	Close	Open

3. INSTALLATION

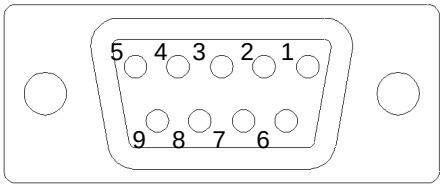
3-7. Signal (continued)

3-7-3. SPI Pin assignmment (continued)



3-7-4. External output for monitoring system

The RS232 connector is located on the rear panel of the pump for pump monitoring system. (The pump monitoring system is option.)



(As viewed from the rear panel)

3. INSTALLATION

3-8. Cooling water

3-8-1. Specification of cooling water

Use cooling water with the following characteristics in order to prevent clogging and corrosion of the IPUP T100L / EC100L cooling system.

Type	Non-corrosive industrial water or treated soft water
Flow rate	1.5L/min or more
Water temperature	10°C - 25°C
Pressure	300 - 700 kPaG (3.0 to 7.0 bar)
Pressure difference between inlet and outlet	0.2 MPa or more
Particle size	0.03 mm^2 or less
pH value	6.0 - 8.0
Electric conductivity	500 $\mu\ \Omega^{-1}$/cm or less
Chlorine ion Cl^-	80ppm or less
Sulfate ion SO_4^{2-}	200ppm or less
All iron Fe	0.3ppm or less
M alkalinity $CaCO_3$	75ppm or less
Total hardness $CaCO_3$	120ppm or less
Sulfur ion S^{2-}	None
Ammonium ion NH_4^+	None
Silica SiO_2	50ppm or less
Manganese	0.2ppm or less

WARNING

If water having the above particle size is not available, install a filter on the IN side of the cooling water circuit. At this time, pay attention so that the cooling water pressure does not drop below the specified range.

CAUTION

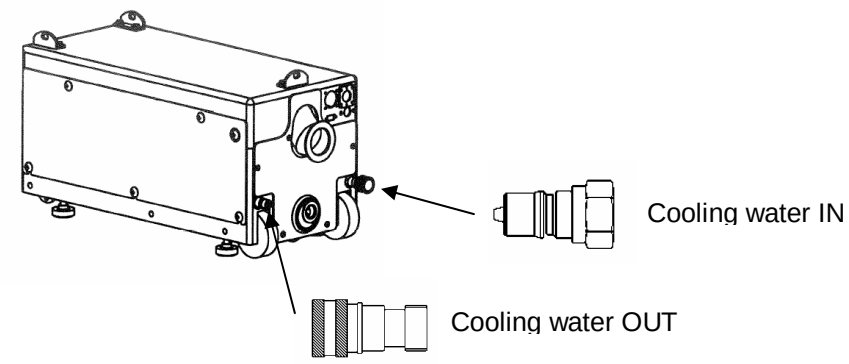
Do not let water flow until immediately before starting the pump. Opening the cooling water valve allows cooling water to flow through the electrical components and pump. If cooling water flows for a long time while the pump is stopped, condensation may occur in the electrical parts, causing short-circuiting.

3. INSTALLATION

3-8. Cooling water (continued)

3-8-2. Connection of cooling water

Cooling water connectors are located as shown below.



Part	Maker	Part number
Cooling water IN	Parker	SH2-62
Cooling water OUT	Parker	SH2-63

WARNING

When multiple pumps are used at a time, connect the cooling water piping in parallel. If connected in series, malfunctions may occur as the cooling water temperature of the downstream pump is high.

WARNING

Connect IN and OUT correctly. Otherwise, the pump will not be cooled down correctly, resulting in a problem.

CAUTION

The customer should wait until the pump cool down adequately after stopping the pump, when you remove the quick coupling.

Install the drain tray (850×450×10) under the pump in preparation for the cooling water leakage to comply with SEMI-S2-0200. Installing a water leak detector is recommended.

3. INSTALLATION

3-9. Operation condition setting

> ⚠ Set the operation condition of the pump for your process before using the pump. In case of using in improper condition, performance and safety are not guaranteed. In such cases, we will not be responsible for any failures.

3-9-1. Initial setting

	Setting method	Default
Pump rotation speed	Remote: External signal via SPI	-
	Local: Hand-held controller	5250rpm
Maintenance warning	Hand-held controller	18000Hr
Temperature indication unit	Hand-held controller	℃
Buzzer	Hand-held controller	On
Communication method	Hand-held controller	RS232
Monitoring ID	Hand-held controller	00

Refer to chapter 4 “Operation”, for the setting method of each item using the hand-held controller.

3-9-2. Setting items

1. Pump rotation speed

   The pump rotation speed can be changed using the hand-held controller.

   Ultimate pressure, pumping speed and power consumption, etc. will change according to pump rotation speed.

2. Maintenance warning

   The maintenance warning time can be changed using the hand-held controller

   Set the maintenance time to your intended use.

   The default value is 18,000 hours.

3. Temperature indication unit

   Temperature unit shown on Hand-held controller can be changed.

4. Buzzer

   The buzzer can be turned On or OFF, when alarm (warning or hazard) occurs.

3. INSTALLATION

3-9. Operation condition setting (Continued)

3-9-2. Setting items (continued)

5. Communication method

   Communication method of external monitoring output can be changed from RS232C to RS485. This is used on Dry Pump Monitoring System (option). When this option is not used, do not change initial setting.

6. Monitoring ID

   Monitoring ID is used on Dry Pump Monitoring System (option). When this option is not used, do not change initial setting.

3-10. Pump storage

1. Seal the Inlet and Exhaust as when it is shipped from the factory.
2. Fix the pump using adjusters.
3. Store at an ambient temperature of between −10°C and +60°C.
4. Store the pump under clean and dry conditions until it is needed.

WARNING

Never stack pumps vertically. Otherwise, they may fall down.

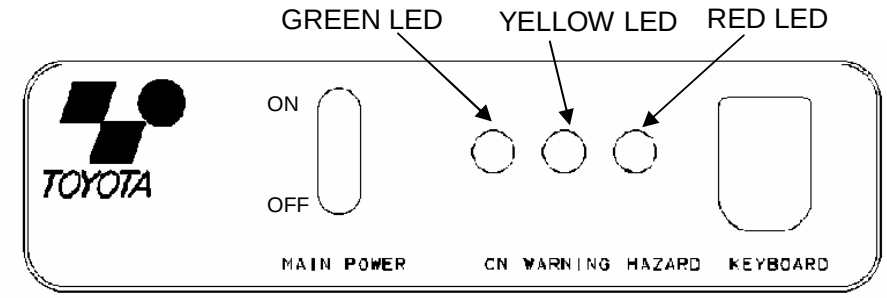
4. OPERATION Page

4. OPERATION

4-1. Indication

On the front panel there are indicator LEDs that display the pump operating status.

The indicator LEDs light up or go off according to the pump operating status when the pump main switch is ON.



Indicator LEDs and pump status

	LED	Hand-held Controller
Power ON	GREEN	Power
Pump Running	-	RUN
Warning When the pump is running with warning and intermittent buzzer sounds.	YELLOW	WARNING
Hazard When the pump stops due to hazard and buzzer sounds. The pump cannot be restarted until the hazard is resolved.	RED	HAZARD
LOCAL mode	-	LOCAL

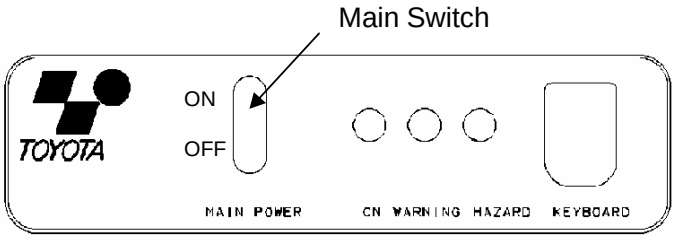
4. OPERATION

4-2. Main Switch

Power ON

The main power switch is located on the front panel as shown below.

- Turning this switch on (by pressing the 1 mark side) turns the green indicator LED light up.
- When the hand-held controller is in use, the POWER indicator LED light up.



> Do not use a sharp object to push the switch. A sharp object may damage the switch.

Power OFF

Make sure the pump has stopped.

- Turn the switch off (by pressing the 0 mark side).
- When the hand-held controller is in use, the POWER indicator LED light will go out.

> WARNING
> Make sure the main power switch on the pump is off and the cuircit breaker on your facility is off before unplugging the power connector.

> When turning on after turning off, wait 30 seconds so that the electricity of the DC capacitor in the converter can be discharged. Otherwise, the pump cannot start due to converter error (FC Alarm).

4. OPERATION

4-3. Operation Method

The pump has the following operation modes:

- Remote mode using the SPI of APPLIED MATERIALS.
- Local mode using the hand-held controller.

The following actions are possible in the remote mode using SPI:

- run and stop
- pump status monitoring
- changing the rotational speed

The following actions are possible in the local mode using the handheld controller:

- run and stop
- settings
- check alarm logs.
- buzzer stop (when hazard/warning occurs)
- alarm reset (when hazard/warning occurs)
- changing the rotational speed

Start of pump

1. The motor begins operation.
2. Input from the sensors are processed.
3. TotalRunHours count starts.
4. Power Consumption count starts.

Stop of pump

1. The motor stops operation （slow stop）
   During stopping, hand-held controller LED lights intermittently.
2. The data count stops.

4. OPERATION

4-4. Control by SPI

4-4-1. SPI connection

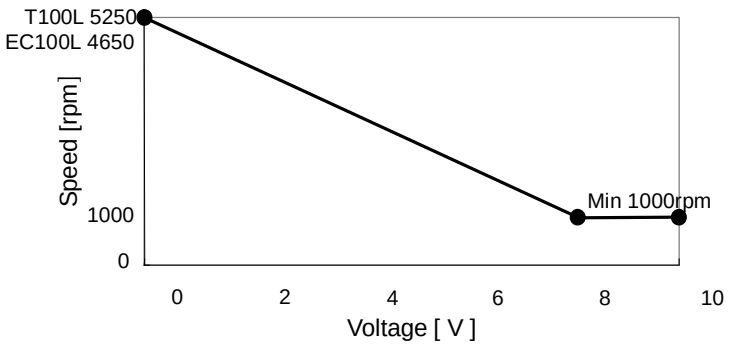
The SPI connector is located on the rear panel of the pump.

Connect and fix the SPI cable of the equipment to the SPI connector.

> CAUTION
>
> Rated value of dry contact output of SPI is DC24V and 0.2A. If a voltage or current exceeding these values is supplied, the electronic circuits may be damaged.

4-4-2. Adjustment before operation

- Apply 0 to 10VDC between SPI connector pins 15 and 16 to adjust the revolution.
- The pump revolution decreases as the voltage is increased between 0VDC (MAX rev) and 8VDC (1000rpm) while it remains constant at voltages between 8VDC and 10VDC (1000rpm).
- If no voltage is set between pins 15 and 16, the pump operates at the maximum revolution.



4-4-3. Pump running with SPI

Apply 24-VDC voltage between pins 1 and 2 to start the pump.

> CAUTION
>
> Alarm cannot be cleared through SPI when alarm is generated. Turn the pump main switch off / on to clear the Alarm (Wait 30 seconds when turning on after turning off.)

4. OPERATION

4-5. Control by Hand-held controller

4-5-1. Hand-held controller connection

Connect the connector of the hand-held controller provided to the connector identified as KEYBOARD on the front panel of the pump.

4-5-2. Key functions

Key	Explanation	Function
	SET key	•Pressing this key on parameter set screen enters currently selected parameter.
	RUN key	•Starts pump.
	STOP key	•Stops pump. •Pressing this key changes Operation mode in stop condition. (Remote→Local)
	Buzzer stop Alarm Reset key	•Stops warning buzzer. •Resets alarm.
	Menu Select key	•Goes to menu (Main, Detail, Setting). •Moves highlighted position to right in setting mode
	Parameter Select key	•Changes parameter to following or preceding one. •Changes digit at setting mode.

4-5-3. Operation by hand-held controller

Check if the pump is in the LOCAL mode.

Start of Pump: Press the RUN key on the hand-held controller.

Stop of Pump: Press the STOP key on the hand-held controller.

Alarm Reset: Press the BUZZER STOP/ALARM RESET key after the root cause of alarm is removed, then the buzzer will stop. Press it again, then alarm will be reset.


CAUTION

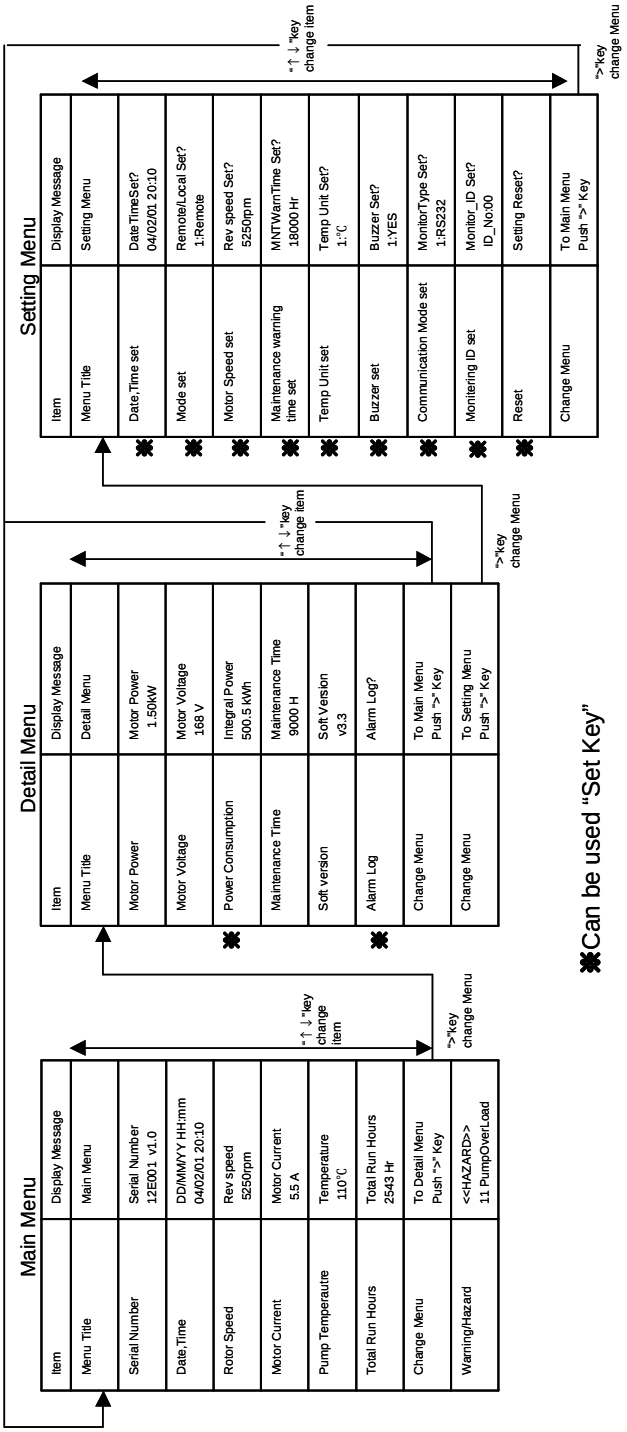
The pump will stop when pump is running in local mode and the hand-held controller is disconnected.

When the pump is running in local mode and receives the pump-on-signal through SPI pins 1/2 the mode automatically will be changed from local mode to remote mode.

4. OPERATION

4-5. Control by Hand-held controller(Continued)

4-5-4. Display Menu



4. OPERATION

4-6. Changing Operation Modes

> ⚠ Upon power ON, the pump is set to LOCAL mode.

4-6-1. Changing from local to remote mode

Method 1: Apply 24-VDC voltage between pins 1 and 2 of APPLIED MATERIALS SPI, which automatically causes transition to the remote mode.

Method 2: Select REMOTE on the hand-held controller.
The LOCAL indicator LED of the hand-held controller goes off.

Method 3: Disconnect the hand-held controller from the front panel connector, which automatically causes transition to the remote mode.

After transition to the remote mode, the pump operates according to the parameters for the remote mode.

> ⚠ When the hand-held controller is disconnected, the pump changes to remote mode, regardless of whether the pump is running or stopped.

4-6-2. Changing from remote to local mode

Stop pump by SPI control.

Chose alternative method from following two method.

Method 1:Select LOCAL on the hand-held controller display.

Method 2: Press the STOP key.

> ⚠ Changes from the handheld controller are not possible when the pump is running in remote mode.

- When the mode changes to local mode, the LOCAL indicator LED of the hand-held controller lights up.

4. OPERATION

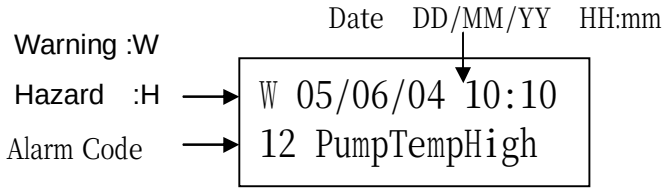
4-7. Setting

4-7-1. Alarm Log

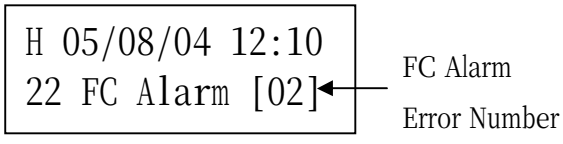
- Check the alarm log to investigate the root cause of the alarm when the alarm is generated.

How to check

NO.	Operation step	Key to be used	Indication
1	Go to Detail Menu	(refer to 4-5-4)	Detail Menu
2	Select “Alarm Log” using UP and DOWN keys.		Alarm Log?
3	Press SET key to enter Alarm Log.		W 05/08/04 10:10 12 PumpTempHigh
4	Press UP and DOWN key, show history of alarm.		W 15/06/04 02:20 11 PumpOverload
5	Press SET key to return mode.		Alarm Log?



When FC Alarm occurs, handheld controller displays FCAlarm Error Number.



Alarm log saves the last 30 warning and hazard events in its memory.

4. OPERATION

4-7. Setting (continued)

4-7-2. Updating Clock

It is necessary to adjust the pump clock to your local date and time to ensure correct maintenance schedule and alarm log before beginning operation.
Date and Time changing method:

NO.	Operation step	Key to be used	Indication
1	Go to Detail Menu	(refer to 4-5-4)	Detail Menu
2	Go to Setting Menu	(refer to 4-5-4)	Setting Menu
3	Select date parameter using UP and DOWN keys.		DateTimeSet? 01/07/01 13:25
4	Press SET key to enter setting mode.		DD/MM/YY HH:mm 01/07/01 13:25
5	Shift highlighted value to desired one using RIGHT key.		DD/MM/YY HH:mm 01/07/01 13:25
6	Change value using UP and DOWN keys.		DD/MM/YY HH:mm 01/07/01 14:25
7	Press SET key to complete setting.		DD/MM/YY HH:mm? 01/07/01 14:25

Indicated values are in the order of day, month and year.

4. OPERATION

4-7. Setting (continued)

4-7-3. REMOTE/LOCAL mode

•Use the hand-held controller to change mode.

NO.	Operation step	Key to be used	Indication
1	Go to Detail Menu	(refer to 4-5-4)	Detail Menu
2	Go to Setting Menu	(refer to 4-5-4)	Setting Menu
3	Select mode setting parameter using UP and DOWN keys.		Remote/Localset? 1:Remote
3	Press SET key to enter setting mode.		Remote/Localset? 1:Remote/2:Local
4	Change the mode using RIGHT key.		Remote/Localset? 1:Remote/2:Local
5	Press SET key to complete mode change.		Remote/Localset? 2:Local

4. OPERATION

4-7. Setting (continued)

4-7-4. Operation condition

4-7-4-1. Motor revolution

The pump rotational speed can be changed using the hand-held controller.

NO.	Operation step	Key to be used	Indication
1	Go to Detail Menu	(refer to 4-5-4)	Detail Menu
2	Go to Setting Menu	(refer to 4-5-4)	Setting Menu
3	Select revolution setting parameter using UP and DOWN keys.		Rev Speed Set? 5250rpm
4	Press SET key to enter input mode.		Rev Speed Set? 5250rpm
5	Shift highlighted value to desired one using RIGHT key.		Rev Speed Set? 5250rpm
6	Change using UP and DOWN keys.		Rev Speed Set? 5150rpm
7	Press SET key to complete change.		Rev Speed Set? 5150rpm

Setting range for IPUP T100L is from 1000rpm to 5250rpm.

Setting range for EC100L is from 1000rpm to 4650rpm.

4. OPERATION

4-7. Setting (continued)

4-7-4. Operation condition (continued)

4-7-4-2. Maintenance Warning Time

The maintenance warning time can be changed using the hand-held controller

NO.	Operation step	Key to be used	Indication
1	Go to Detail Menu	(refer to 4-5-4)	Detail Menu
2	Go to Setting Menu	(refer to 4-5-4)	Setting Menu
3	Select revolution setting parameter using UP and DOWN keys.		MNTWarnTime Set? 018000 Hr
4	Press SET key to enter input mode.		MNTWarnTime Set? 018000 Hr
5	Shift highlighted value to desired one using RIGHT key.		MNTWarnTime Set? 018000 Hr
6	Change using UP and DOWN keys.		MNTWarnTime Set? 118000 Hr
7	Press SET key to complete change.		MNTWarnTime Set? 118000 Hr

Setting range is 0 hour to 300000 hours.

> When the maintenance warning time is set to 0 Hr the maintenance warning will be disabled. (Regardless of pump running hours, the maintenance warning will not be generated.)

4. OPERATION

4-7. Setting (continued)

4-7-5. Other function

4-7-5-1. Buzzer

The buzzer can be turned On or OFF, when alarm (warning or hazard) occurs.

NO.	Operation step	Key to be used	Indication
1	Go to Detail Menu	(refer to 4-5-4)	Detail Menu
2	Go to Setting Menu	(refer to 4-5-4)	Setting Menu
3	Select revolution setting parameter using UP and DOWN keys.		Buzzer Setting? 1:Yes
4	Press SET key to enter input mode.		Buzzer Setting? 1:Yes/2:No
5	Change using RIGHT key.		Buzzer Setting? 1:Yes/2:No
6	Press SET key to complete change.		Buzzer Setting? 2:No

4. OPERATION

4-7. Setting (continued)

4-7-5. Other function(continued)

4-7-5-2. Temperature indication unit setting

Temperature unit shown on Hand-held controller can be changed.

NO.	Operation step	Key to be used	Indication
1	Go to Detail Menu	(refer to 4-5-4)	Detail Menu
2	Go to Setting Menu	(refer to 4-5-4)	Setting Menu
3	Select revolution setting parameter using UP and DOWN keys.		Temp Unit Set? 1: °C
4	Press SET key to enter input mode.		Temp Unit Set? 1: °C/2: °F
5	Change using RIGHT key.		Temp Unit Set? 1: °C/2: °F
6	Press SET key to complete change.		Temp Unit Set? 2: °F

4. OPERATION

4-7. Setting (continued)

4-7-5. Other function (continued)

4-7-5-3. Communication method

Communication method of external monitoring output can be changed from RS232C to RS485.

NO.	Operation step	Key to be used	Indication
1	Go to Detail Menu	(refer to 4-5-4)	Detail Menu
2	Go to Setting Menu	(refer to 4-5-4)	Setting Menu
3	Select revolution setting parameter using UP and DOWN keys.		MonitorType Set? 1: RS232
4	Press SET key to enter input mode.		MonitorType Set? 1: RS232/2:RS485
5	Change using RIGHT key.		MonitorType Set? 1: RS232/2:RS485
6	Press SET key to complete change.		MonitorType Set? 1: RS485

This is used on Dry Pump Monitoring System (option). When this option is not used, do not change initial setting.

4. OPERATION

4-7. Setting (continued)

4-7-5 . Other function (continued)

4-7-5-4. Monitoring ID

NO.	Operation step	Key to be used	Indication
1	Go to Detail Menu	(refer to 4-5-4)	Detail Menu
2	Go to Setting Menu	(refer to 4-5-4)	Setting Menu
3	Select revolution setting parameter using UP and DOWN keys.		Monitor_ID Set? ID_No:00
4	Press SET key to enter input mode.		Monitor_ID Set? ID_No:00
5	Change using RIGHT key.		Monitor_ID Set? ID_No:01
6	Press SET key to complete change.		Monitor_ID Set? ID_No:01

Monitoring ID is used on Dry Pump Monitoring System (option). When this option is not used , do not change initial setting.

4. OPERATION

4-7. Setting (continued)

4-7-5. Other function (continued)

4-7-5-5. Integral Power Consumption

Electrical energy consumption can be displayed during any period.

```
Integral Power
      XXXXX.X kWH
```

Automatic change for each 5 second

```
02/01/02 15:05→
      XXXXX.X kWH
```

The date/time when the measurement is started and electrical energy consumption is alternately displayed every 5 seconds.
Electrical energy consumption can be reset with the hand-held controller.

The electrical energy consumption can be reset.

NO.	Operation step	Key to be used	Indication
1	Go to Detail Menu	(refer to 4-5-4)	Detail Menu
3	Select revolution setting parameter using UP and DOWN keys.		Integral Power xxxxx.xkWh
4	Press SET key to enter input mode.		Integral Reset? 1:Yes/2:No
5	Change using RIGHT key.		Setting Reset? 1:Yes/2:No
6	Press SET key to complete change.		Setting Reset?

Integration of the electrical energy consumption is restarted when it is reset.

> ⚠ Converter output values are indicated and may vary from actual values.

4. OPERATION

4-7. Setting (continued)

4-7-5. . Other function (continued)

4-7-5-6. Setting reset

NO.	Operation step	Key to be used	Indication
1	Go to Detail Menu	(refer to 4-5-4)	Detail Menu
2	Go to Setting Menu	(refer to 4-5-4)	Setting Menu
3	Select revolution setting parameter using UP and DOWN keys.		Setting Reset?
4	Press SET key to enter input mode.		Setting Reset? 1:Yes/2:No
5	Change using RIGHT key.		Setting Reset? 1:Yes/2:No
6	Press SET key to complete change.		Setting Reset?

If “YES” is selected while “Setting Reset” is displayed, the following items return to the initial setting.

Motor speed	T100L:5250rpm
	EC100L:4650rpm
Temperature unit	°C
Buzzer	ON
Communication method	RS232
Monitoring ID	0

5. TROUBLESHOOTING Page

5. TROUBLESHOOTING

5-1. Pump does not start.

> ⚠ When turning on after turning off, wait 30 seconds so that the electricity of the DC capacitor in the converter can be discharged. Otherwise, the pump cannot start due to converter error (FC Alarm).

Problem	Possible Root Cause	Warning	Hazard	Troubleshooting
Green LED on the pump does not turn on.	Power failure	-	-	- Check input power voltage. - Check the pump main switch.
Nothing is displayed on the hand-held controller.	Power failure	-	-	- Check input power voltage. - Check the pump main switch.
	Bad connection	-	-	- Check the hand-held controller connection.
Pump does not start in remote mode.	Power failure	-	-	- Check input power voltage. - Check the pump main switch.
	Signal failure			- Check the signal cable. - Check if the signal voltage is 24 VDC between pin 1 and pin 2 in the SPI connector. - Resend the pump-on-signal more than 30 seconds after terminating the pump-on-signal.
	Pump status error	-	-	- Confirm that hazard is not generated.
Pump does not start in local mode.	Power failure	-	-	- Check input power voltage. - Check the pump main switch.
	Signal failure			- Check the hand-held controller connection. - Confirm that the run key is pushed correctly.
	Pump status error			- Check if the pump is in local mode. - Confirm that the pump-on-signal is not sent through the SPI. - Confirm that hazard is not generated.
Main switch trips.	Power failure	-	-	- Check input power voltage.

> ⚠ Pump does not start when the pump-on-signal is sent through the SPI before the pump main switch is turned on. Make sure the pump main switch is ON, terminate the pump-on-signal and resend the pump-on-signal after 30 seconds.

5. TROUBLESHOOTING

5-2. Error message

No.	Error Message	Error Description	Warning	Hazard	Troubleshooting
11	PumpOverLoad	Actual motor speed stays lower than setting speed for certain time.	○	○	- Check if air is not rushing in. (Leaking, Broken valve, e.t.c.) - Check if exhaust is not clogged.
12	PumpTempHigh	Pump temperature is higher than Alarm level.	-	○	- Check cooling water flow rate. - Check cooling water temperature. - Check if cooling water doesn't flow backwards.
13	PumpTempLow	Pump temperature is low under running condition for a long time.	○	-	- Check cooling water flow rate. - Check cooling water temperature is not too cold.
14	TempSensDown	Thermistor failure	○	○	- Contact your service representative for repair.
15	WaterShortage	Pump temperature stays higher than setting for long time. (Cannot control pump temperature)	○	-	- Check cooling water flow rate. - Check cooling water temperature. - Check if cooling water doesn't flow backwards.
21	FC Comm[**]	Communication failure between converter and CPU is generated.	○	-	- Check input power voltage. - Turn off the pump main switch, wait one minute and turn it on. - Check if there is not any electrical noise source around pump.
22	FC Alarm[**]	Converter error is generated.	-	○	Refer to following error numbers.
	FC Alarm[00] or FC Alarm[99]	Motor does not rotate after receiving pump run indication.	-	○	- Check input power voltage. - Turn off the pump main switch, wait 30 seconds and turn it on. - Check if there is not any electrical noise source around pump. - Check if motor is not overloaded. - Check cooling water flow rate.
	FC Alarm[01]	Under constant speed condition the converter input current exceeds over-current limit.	-	○	
	FC Alarm[02]	During acceleration the converter input current exceeds over-current limit.	-	○	
	FC Alarm[03]	During deceleration the converter input current exceeds over-current limit.	-	○	
	FC Alarm[04]	Converter input current exceeds over-current limit.	-	○	
	FC Alarm[05]	Converter internal DC voltage increases.	-	○	
	FC Alarm[06]	Module Temperature exceeds temperature limit.	-	○	- Check cooling water flow rate. - Check cooling water temperature. - Check if cooling water doesn't flow backwards.
	FC Alarm[07]	External forced trip signal is received.	-	○	- Check input power voltage. - Check if there is not any electrical noise source around pump.
	FC Alarm[08]	Converter output current exceeds the rated current.	-	○	- Check input power voltage. - Check if motor is not overloaded.
	FC Alarm[10]	Rotation speed exceeds the limit speed.	-	○	- Check input power voltage. - Turn off the pump main switch, wait 30 seconds and turn it on.
	FC Alarm[12]	Current output signal error.	-	○	- Check input power voltage. - Turn off the pump main switch, wait 30 seconds and turn it on. - Check if there is not any electrical noise source around pump.
	FC Alarm[13]	Converter parameter has changed.	-	○	
	FC Alarm[14]	Running signal is received when turning the power on or power failure or reset.	-	○	
	FC Alarm[16]	Communication failure happens more than setting.	-	○	

5. TROUBLESHOOTING

5-2. Error message (continued)

No.	Error Message	Error Description	Warning	Hazard	Troubleshooting
51	MainteTime	Total run hour exceeds setting.	○	-	- Contact your service representative for repair. - Change the maintenance warning time setting if you would like to continue running the pump.
90	Battery Low	RAM Error	○	-	- Need Battery replacement. Contact your service representative for repair.

5. TROUBLESHOOTING

5-3. Pump is running and no error messages are indicated.

Problem	Possible Root Cause	Warning	Hazard	Troubleshooting
Bad vacuum	Plumbing Problem	-	-	- Check foreline leakage. - Check if exhaust is not clogged. - Check the inlet o-ring screen.
	Rotational Speed	-	-	- Check if rotational speed is normal. - Remote mode; check the signal voltage between SPI pin 15 and 16 from your system. (0V for Max. speed) - Local mode; Check rotational speed setting with hand-held controller.
Cannot connect the coupler or nipple of cooling water	Connection	-	-	- Check the model of coupler and nipple.
	Temperature	-	-	- Wait until pump is cool enough.

6. MAINTENANCE Page

6. MAINTENANCE

6-1 General

The IPUP T100L / EC100L do not need daily maintenance or daily cleaning.

6-2 Overhaul Maintenance Intervals

- Overhaul Maintenance Time default setting is 18000 hours. When the maintenance time has expired, the system automatically notifies the operator of the WARNING information.
- When the item "Total Run Hour" on the hand-held controller exceeds "Maintenance Time", the pump should be returned to TOYOTA INDUSTRIES CORPORATION using the following procedure.

CAUTION

Only qualified, well-trained personnel can overhaul this product.

6. MAINTENANCE

6-3 Pump Removal & Return Procedure

Follow the Pump Removal & Return Procedure and take notice of appropriate precautions, when you need to remove and return the pump. If you do not, you can cause injury to people and damage to equipment.

Hazardous substances may be present in the pumps and piping. Use suitable protective gloves and clothing with a recommended respirator.

Before performing work, be sure to perform lockout/tagout procedures for the main disconnect device of the power supply with a lockout/tagout device in compliance with OSHA requirements.

Be sure to include chemical information for any chemicals used on the Application Form for returning the pump. If this information is not included, we may refuse to perform maintenance on the pump.

Preventive measures must be taken not to incline the pump during transportation. (required :usage within angles of 10 degrees with horizontal)

6. MAINTENANCE

6-3 Pump Removal & Return Procedure (Continued)

1. Only qualified, well-trained personnel can perform pump removal. Check the process gases which the pump has been exposed to. Use personal safety protective equipment as instructed in your company safety guideline.
2. Turn off and lockout the circuit breaker that supplies power to the pump. The circuit breaker is located on the process tool power supply rack.
3. Disconnect all facility connections from the pump.
4. Install seals in the inlet and outlet flanges of the pump with o-rings, blank caps and clamps/bolts.
5. Copy the Application Form for Returning pump on the next page and enter the necessary items.
6. Send the Application Form for Returning pump to your Service Representative by facsimile.
7. Put the original application in an envelope, attach the envelope to the packed pump and return it together with the pump.

6-4 Pump Disposal

If disposing of the pump (or if disposing of by-products generated in processing), please decontaminate to follow the regulations in effect in your area. If you have any questions about how to dispose of a part, (excluding the disposal of by-products generated in processing) please contact your service representative.

6. MAINTENANCE

6-5 Application Form for Pump Return

Customer
Co. name: _____
Division: _____
Name.: _____
Tel No.: _____
FAX No: _____
Title: _____

Process Information
Process: _____
Date of failure: _____

Pump Information
Model Name_____ Serial No.:_____
Reason: _____
_____

Chemical Information
- ♦Corrosive Yes ☐ No ☐
- ♦Flammable Yes ☐ No ☐
- ♦Explosive Yes ☐ No ☐
- ♦Radioactive Yes ☐ No ☐
- ♦Bio. active Yes ☐ No ☐
- ♦Others Yes ☐ No ☐

Special Note:
♦Are any polluting materials used?
Yes ☐ No ☐

Notice:
Enter all materials and byproducts used accurately without omissions.

Details of substances the returned pump was in contact with

No.	Substance	Chemical symbol	Handling precautions	Action against contact with body
1				
2				
3				
4				
5				

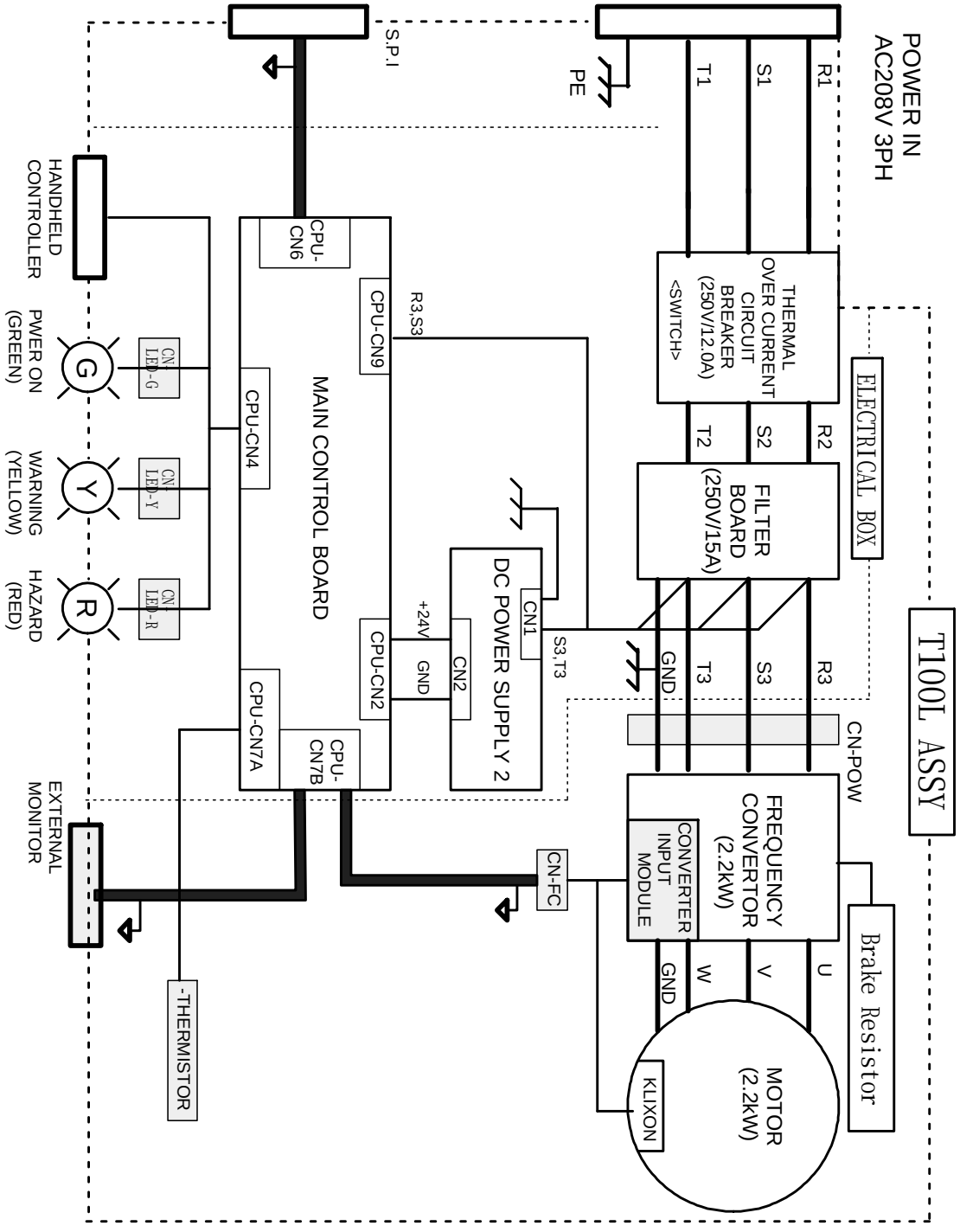
Covenant
I conducted an appropriate survey on the above subjects and entered the related information correctly without omitting anything. As for the product, the transportation procedure specified on the preceding page was strictly observed.

Date: _____ **Signature:** _____

7. APPENDIX Page

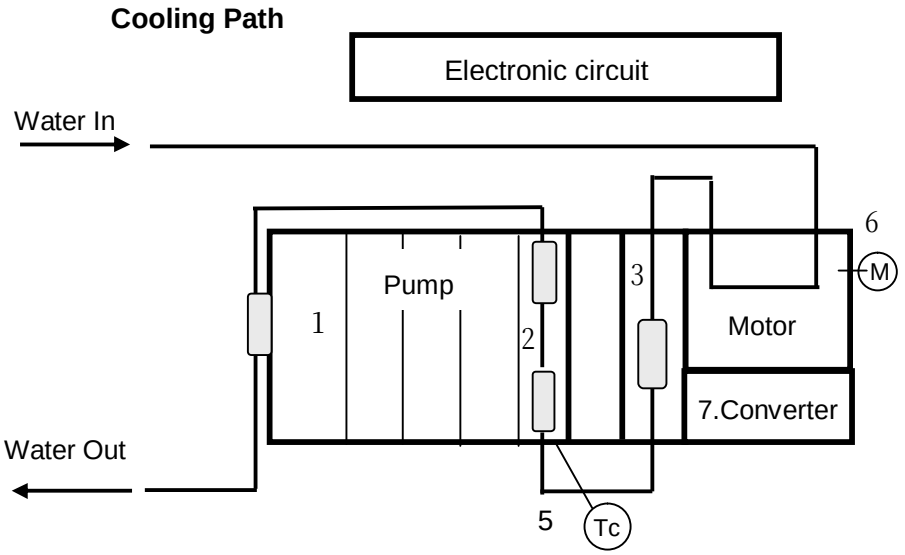
7. APPENDIX

7-1. Electrical Circuit Diagram



7. APPENDIX

7-2. Cooling Diagram



Tc Temperature sensor M Motor temperature sensor

Cooling plate (4 places)

	Part name		Part name
1	Pump low pressure area	5	Pump body temperature sensor
2	Pump high pressure area	6	Motor temperature sensor
3	Gear box	7	Converter
4	Indirect cooling plate (4 places)		

7. APPENDIX

7-3. Material Safety Data Sheet

7-3-1. Lubricant

製品安全データシート　Material Safety Data Sheet

FOMBLIN® SV-RP

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Ref : fom0403e

会社名	ソルベイ　ソレクシス株式会社
COMPANY	SOLVAY SOLEXIS K.K.
住所	〒107-0052 東京都港区赤坂 2-22-24 泉赤坂ビル 3F
ADDRESS	IZUMIAKASAKA-BLDG. 3F, 22-24, AKASAKA 2-CHOME, MINATO-KU, TOKYO 107-0052
担当部名	フッ素化学品部
DIVISION	OPERATIONS-FLUOROCHEMICAL
担当者名	杉谷　佳郎
NAME	YOSHIO SUGITANI
TEL	03-3224-7226
FAX	03-3224-7218

製造元
COMPANY IDENTIFICATION

会社名: Company:	SOLVAY SOLEXIS
住所: Address:	Viale Lombardia 20 20021 – Bollate (MI)
電話番号: Telephone Number:	02-3835-1
FAX 番号: Fax Number:	02-3835-2367

緊急時通話
Emergency Calls

電話番号: Telephone Number:	02-3835-1

1)物質の特定
COMPOUND IDENTIFICATION

製品名: Trade Name:	**FOMBLIN® SV-RP**
化学分類 Chemical Family:	パーフルオロポリエーテルをベースにした製品 Preparation based on perfluoropolyethers

2)組成 / 成分情報
COMPOSITION / INFORMATION ON INGREDIENTS

製品の性質
Composition of the preparation

パーフルオロポリエーテル
Perfluoropolyether
防錆添加剤
Antirust additive

7. APPENDIX

7-3. Material Safety Data Sheet(continued)

7-3-1. Lubricant (continued)

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EC 指示規則88/379(3 項セクション6) で報告された濃度以上において、暴露値のある物質やEC 指示規則67/548 によって危険と分類された物質

Substances with established exposure limits or classifiable as dangerous according to EC Directive 67/548 and following amendments, in concentration equal or higher than that reported in EC Directive 88/379 (item 3, sect. 6):

名前 Name	濃度 Conc.	CAS 番号 CAS N°	記号 Symbol	危険区分 Risk Phrases
なし none				

3)危険有害性
HAZARDS IDENTIFICATION

人体に対する有害性 **Adverse human health effects**	適正な作業衛生環境基準に従って、適正な取扱いをする場合、本製品には人体への危険性は認められない。 The product, when properly handled, according to the good working and hygienic practices, is not dangerous for the human health.
環境に対する影響 **Environmental effects**	適正な作業衛生環境基準に従って、適切な取扱いをする場合、本製品には環境への危険性は認められない。 The product, when properly handled, according to the good working and hygienic practices, is not dangerous for the environment.
物理的化学的危険性 **Physical and chemical hazards**	加熱や火災による熱分解により、有毒腐食性ガスが発生する場合、本製品は危険性がありうる。 Harmful effects in case of thermal decomposition, due to heating or fire, for the emission of toxic and corrosive gases.

4)応急措置
FIRST-AID MEASURES

暴露による下記症状
Symptomatology following exposure

眼球接触 Eye contact	充血 Redness
皮膚接触 Skin contact	皮膚の赤変 Redness
摂取 Ingestion	腹痛、吐き気、嘔吐 Abdominal pains, nausea, vomit.
吸入 Inhalation	なし Not applicable

応急措置
First Aid Measures

眼球接触 Eye contact	ふんだんな水で少なくとも 15 分間、目を洗い流す。 Wash with plenty of water for at least 15 minutes.
皮膚接触 Skin contact	水と石鹸でよく洗う。 Wash with water and soap.

7. APPENDIX

7-3. Material Safety Data Sheet(continued)

7-3-1. Lubricant (continued)

摂取 Ingestion	コップ数杯の水を飲ませる。 Give some glasses of water to drink. 嘔吐させる。 Induce vomiting. 痛みが継続する場合には、医師に相談する。 Seek medical advice in case of persistent pain.
吸入 Inhalation	なし Not applicable

5)火災時の措置
FIRE FIGHTING MEASURES

特別危険性 **Specific hazards**	本製品は、不燃性および不爆発性である。 The product is not flammable and not explosive. 本製品の加熱は、熱分解により有毒腐食性蒸気を発生する恐れがある。 The heating of the product may cause decomposition with emission of toxic and corrosive vapors.
特別事項 **Specific methods**	炎と安全な距離を保ち、風上にいる。 Stay upwind and at safety distance from flames. 製品が火に包まれた場合、安全な状態にすることが可能であれば、容器を移動させること。 In case of surrounding fire, remove the containers, when possible to do so in safe conditions. 引火した場合、散水して容器を冷やし続けること。 In case of fire keep containers cool by spraying with water.
消火剤 **Extinguishing media**	水、粉末、泡、化学消火剤、炭酸ガス Water, powders, foams, chemicals, CO_2.
消火時の保護具 **Protection of fire-fighters**	自給式呼吸器具 Self-contained breathing apparatus. 腐食性蒸気より皮膚や目を保護する防護服 Protective clothing for skin and eyes against corrosive vapors.

6)漏出時の措置
ACCIDENTAL RELEASE MEASURES

注意事項 **Personal precautions**	早急に漏出を止めて、安全な状態にする。 Stop the release as soon as possible, in safe conditions. 発火源や熱源と漏出した製品との接触を避ける。 Avoid the contact of the released product with glowing surfaces and flames. 漏出した製品が熱分解した場合に限り危険性がありうる。 Possible risk only in case of thermal decomposition of the released product.
環境対策 **Environmental precautions**	漏出した製品の下水路、地上水、地下水、土壌への放出を避ける。 Avoid the discharge of the released product in sewage systems, in surface and underground waters, in the soil.
洗浄方法 **Methods for cleaning up**	漏出した製品を土壌、砂、おが屑などで吸収し、適当な容器に回収して廃棄する。 Absorb the released liquid with earth, sand or sawdust and collect it in suitable containers for disposal.

7. APPENDIX

7-3. Material Safety Data Sheet(continued)

7-3-1. Lubricant (continued)

製品安全データシート　Material Safety Data Sheet

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7)取扱い及び保管
HANDLING AND STORAGE

取扱い
HANDLING

注意事項 **Precautions**	製品を分解温度以上に加熱しない。 Avoid heating the product above its decomposition temperature.
技術上の措置 **Technical measures**	作業所の換気を良くし、また、洗眼浴や非常シャワーなどの水道設備を完備する。 Provide working areas with adequate ventilation systems and with water-wash facilities (eye bath and emergency showers).

保管
STORAGE

保管条件 **Storage conditions**	熱源より遠ざける。 Keep away form heat sources. 可燃物、爆発物より遠ざける。 Keep away from combustible and explosive materials. 相溶性のない物質(10 項参照)より遠ざける Keep away from incompatible substances (see sect.10)
包装 **Packaging**	本製品は通常ポリエチレン容器に保管する。 Product usually stored in polyethylene containers.
包装材料として適するもの **Recommended materials**	プラスチック、ガラス、内面処理された金属容器 Plastic, glass, lined metal

8)暴露防止措置 / 保護具
EXPOSURE CONTROLS / PERSONAL PROTECTION

暴露限界値 **Exposure limits**	熱分解による副生成物の許容濃度限界値 (ACGIH 2003): Threshold limits of by-products from thermal decomposition (ACGIH 2003):		
フッ化水素 **HF**	TLV/CEILING	2.6 mg/mc	3 ppm
カルボニルフロライド **COF_2**	TLV/STEL	13.5 mg/mc	5 ppm
技術的措置 **Engineering Measures**	特に狭い場所では、適切な換気設備を確保する。 Ensure adequate ventilation, especially in confined areas.		

個人用保護具
PERSONAL PROTECTIVE EQUIPMENT

呼吸保護 **Respiratory protection**	火災の場合に自給式呼吸器具を使用し、通常使用時には必要ない。 Not necessary in normal use, self-contained breathing apparatus in case of fire.
目の保護 **Eye protection**	安全眼鏡 Safety goggles.
手の保護 **Hand protection**	ゴム製手袋 Rubber gloves.

7. APPENDIX

7-3. Material Safety Data Sheet(continued)

7-3-1. Lubricant (continued)

製品安全データシート　Material Safety Data Sheet

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皮膚と体の保護	作業着あるいはゴム製エプロン
Skin and body protection	Worksuit or rubber apron.
衛生上の措置	取扱い中には、飲食や喫煙をしない。
Hygiene measures	Do not drink, eat and smoke during handling.

9)物理的化学的性質
PHYSICAL AND CHEMICAL PROPERTIES

物理的状態:	液体
Physical state:	liquid
色:	無色
Color:	colorless
臭い:	無臭
Odor:	odorless
融点:	なし
Melting point:	not applicable
沸点:	
Boiling point:	> 270 ℃.
分解温度:	
Decomposition temperature:	> 290 ℃.
引火点:	不燃性
Flashpoint:	not flammable
爆発性:	不爆発性
Explosion properties:	not explosive
酸化性:	酸化性なし
Oxidizing properties:	not oxidizer
蒸気圧:	
Vapour pressure:	10^{-8} mmHg (20 ℃)
密度:	
Density:	1.85 ～ 1.93 g/ml
水への溶解性:	不溶
Solubility in water:	not soluble
有機溶剤への溶解性:	フッ素系溶剤に可溶
Solubility in organic solvents:	soluble in fluorinated solvents

10)安定性 / 反応性
STABILITY AND REACTIVITY

安定性:	通常の使用条件、保管状態において安定である。
Stability:	The product is stable in normal conditions of use and storage.
回避事項:	本製品を分解温度以上に加熱しない。
Conditions to avoid:	Avoid heating the product above decomposition temperature.
	火炎との接触を避ける。
	Avoid contact with flames.

7. APPENDIX

7-3. Material Safety Data Sheet(continued)

7-3-1. Lubricant (continued)

製品安全データシート　Material Safety Data Sheet

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回避物質 **Materials to avoid:**	100℃以上で本製品をルイス酸（$AlCl_3$, SbF_5,CoF_3）と接触させない。 Lewis acids ($AlCl_3$, SbF_5, CoF_3) above 100℃. 100℃以上で本製品の細かい粉末状のマグネシウム、アルミニウム、およびそれらの合金と接触させない。 Fine powdered magnesium, aluminium and their alloys above 100℃.
危険な分解生成物: **Hazardous decomposition products:**	本製品は分解すると、有毒腐食性のガス HF、COF_2などを発生することがあり、分解は金属によって促進される。 The product may decompose with emission of HF and COF_2, which are toxic and corrosive gases; metal promote the decomposition.

11)毒性情報
TOXICOLOGICAL INFORMATION

侵入経路 **Penetration routes**	液体製品の接触または摂取。 Contact or ingestion of the liquid product. 熱分解からのガスの吸入。 Inhalation of gases from thermal decomposition.

人体に対する有害性
Adverse effects for the Human Health
短期または長期におよぶ暴露後の遅延性および急性効果
Delayed and/or immediate effects after short and/or prolonged exposure:

急性毒性: Acute toxicity:	知見なし no known effect
局部作用 / 刺激性: Local effects / irritating power:	刺激性なし;分解生成物は皮膚や目や粘膜に強い刺激を与えることがある。 not irritant; decomposition products may cause severe irritation to skin, eyes and mucosae.
感作性: Sensitization:	知見なし no known effect
慢性毒性: Chronic toxicity:	知見なし no known effect
癌原性 Carcinogenicity:	本製品は、国立及び国際的な研究機関で、癌原性の可能性がある物質として記載されていない。 The product is not listed as potential carcinogen by National and International Agencies or Competent Authorities.
変異原性 Mutagenicity:	本製品は、国立及び国際的な研究機関で、変異原性の可能性がある物質として記載されていない。 The product is not listed as potential mutagenic by National and International Agencies or Competent Authorities.
生殖毒性 Reproduction toxicity:	本製品は、国立及び国際的な研究機関で、生殖毒性の可能性がある物質として記載されていない。 The product is not listed as potential reprotoxic agent by National and International Agencies or Competent Authorities.

毒性実験データ
Experimental toxicological data

経口毒性 LD_{50} — oral	> 2000 mg/Kg	ラット Species: rat

7. APPENDIX

7-3. Material Safety Data Sheet(continued)

7-3-1. Lubricant (continued)

製品安全データシート　Material Safety Data Sheet

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経皮毒性 LD_{50} – dermal	> 2000 mg/Kg	ラット Species: rat
慢性毒性 Chronic Toxicity	無毒性量 NOAEL = 1000 mg/kg/d. (oral, 28 d.)	ラット Species: rat
皮膚炎 Irritation – skin	刺激性なし non irritant	ウサギ Species: rabbit
目の炎症 – eye	刺激性なし non irritant	ウサギ Species: rabbit
感作性 Sensitization (skin)	感作性なし non sensitizing	モルモット Species: Guinea pig
変異原性 Mutagenicity	陰性(エイムス試験) Negative(Ames test)	Species:

12)環境情報
ECOLOGICAL INFORMATION

環境への影響
Environmental effects

– 拡散性: – Mobility:	データなし no available data	
– 残存性 / 分解性: – Persistence / degradability:	データなし no available data	
– 生物蓄積: – Bioaccumulation:	データなし no available data	
生態安定性データ **Ecostability data**	データなし no available data	
生態毒性データ **Ecotoxicity data**	データなし no available data	
–魚 LC_{50} – fish	水への最大溶解度以上 > max. solubility in water	ニジマス Species: rainbow trout
–甲殻類 EC_{50} – crustaceans	水への最大溶解度以上 > max. solubility in water	大ミジンコ Species: daphnia magna
–バクテリア IC_{50} – bacteria	水への最大溶解度以上 > max. solubility in water	シュードモナスプチダ Species: pseudomonas putida
注意事項 **EVALUATION**	本製品は、作業管理基準に従い、環境を汚染しないように使用する。 Use the product according to the good working practices, avoiding polluting the environment.	

13)廃棄上の注意
DISPOSAL CONSIDERATIONS

廃棄物の処理 **Waste treatment**	フッ素系化合物用に設計された高温ゴミ焼却炉を用いた熱分解設備へ廃製品を送る。 Send the waste product to thermal destruction, using high-temperature incinerators designed to burn fluorine compounds.

7. APPENDIX

7-3. Material Safety Data Sheet(continued)

7-3-1. Lubricant (continued)

製品安全データシート　Material Safety Data Sheet

FOMBLIN® SV-RP

日本語版整理番号：FV560-01　Page 8 of 9

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Ref : fom0403e

容器の取扱い **Packaging treatment**	可能な場合は、容器をよく洗って再使用する。 Reuse, when possible, the containers, after thorough washing. 使用済容器を各地方自治体の法規により認められた埋立業者に送る。 Send the waste containers to authorized landfills, according to local laws and regulations.

14)輸送情報
TRANSPORT INFORMATION

特別危険性 **Specific hazards**	製品は輸送上危険性はない。 Product not dangerous for transportation.
容器情報 **Packaging information**	製品は、通常各種容量のポリエチレン容器で出荷される(ドラム、タンク)。 Product usually shipped in polyethylene containers of different capacities (drums, tanks).

国際輸送分類
INTERNATIONAL TRANSPORT CLASSIFICATION

U.N.番号: U.N. Number:	指定なし not assigned
容器等級: Packaging group:	指定なし not assigned
陸上、鉄道、海上、航空輸送 Road, rail, sea, air-Transportation	該当せず。 not classified

15)取締規制情報
REGULATORY INFORMATION

EC 規則(指示 67/548 とその修正条項)
EC Regulations (Directive 67/548 and following amendments)

分類
Classification

分類: Classification type:	なし not required
危険等級: Hazard class:	なし none

ラベル情報
Labelling

製品名: Trade Name:	**FOMBLIN® SV-RP**
危険マーク: Hazard Symbol:	なし none
危険区分 Risk phrases (R)	なし none
安全区分 Safety phrases (S)	なし none

7. APPENDIX

7-3. Material Safety Data Sheet(continued)

7-3-1. Lubricant (continued)

製品安全データシート　Material Safety Data Sheet

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TSCA 規則
TSCA Status
全ての成分は、有毒物質規制法(TSCA)の化学目録 8(b)に登録済である。
All components are listed on the Toxic Substances Control Act — Section 8(b) Chemical Inventory
国際規則
International Regulations
全ての成分は、下記各国の化学目録に登録済である。:
All components are listed on the chemical inventories of the following countries:

16)その他の情報
OTHER INFORMATION
参考文献
BIBLIOGRAPHY
—内部データ
— internal data

この安全データシートは、指示規則 2001/58/EC に準拠し、作成したものである。
Safety Data Sheet according to Directive 2001/58/EC

本製品安全データシートに記載する情報は、安全のみを目的、対象としているものであり、公表の時点で、当社が知り、経験したすべての知見に基づき、誠実に提供されていますが、当社は、意図されている本来の用途以外に本製品を使用することにより発生する損害、その他、その支配の及ばない実際の使用条件などについては、如何なる責任をも有するものではない。
The information given in this safety data sheet is for safety purpose only. It is given in good faith and based on the best knowledge and experience of the company at the date of issuing.
The Company is not responsible for damages caused by the use of the product in applications for which it was not intended or for conditions of use outside its control.

この MSDS は、ソルベイ　ソレクシス社（イタリア）の安全データシートを翻訳したものです。
This MSDS is translated the MSDS of SOLVAY SOLEXIS S.p.A.

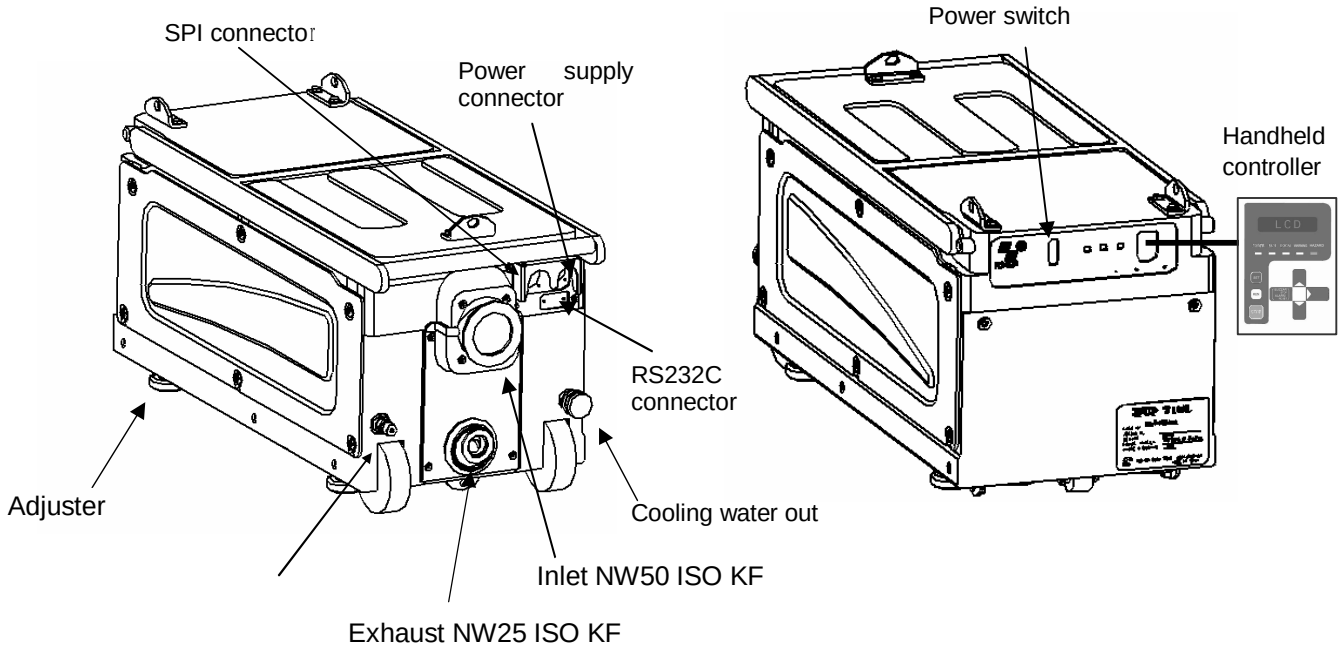
この安全データシートの英日両文に違いがある場合は、英文を優先適用する。
The English version of the Agreement shall be controlling in all respects.

8. EC100L V2.1 APPENDIX

8-1. Scope

This appendix covers the EC100L V2.1 dry vacuum pump for semiconductor equipment.

EC100L is suitable for loadlock, transfer chamber and all other clean process.



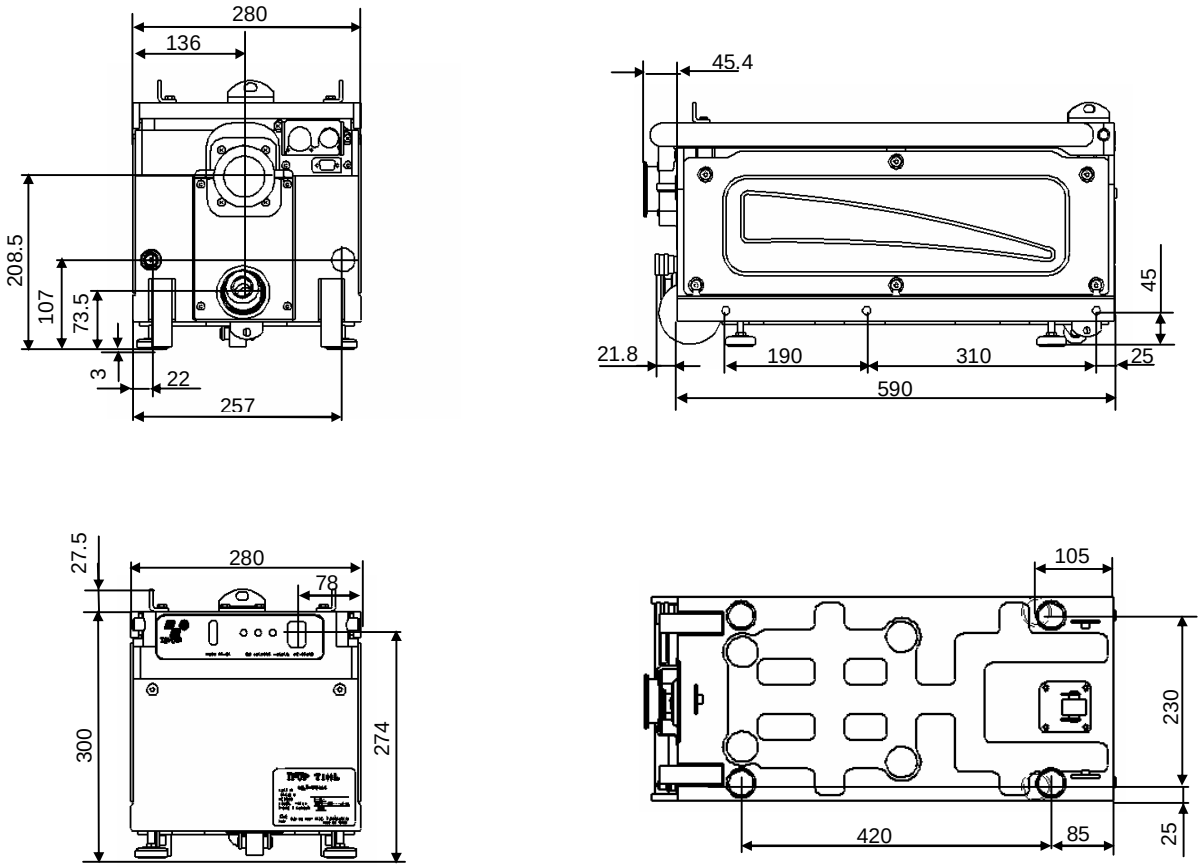
8. EC100L V2.1 APPENDIX

8-2. Technical Data

8-2-1. Technical Data drawing

EC100L Dimension Diagram

Unit: mm



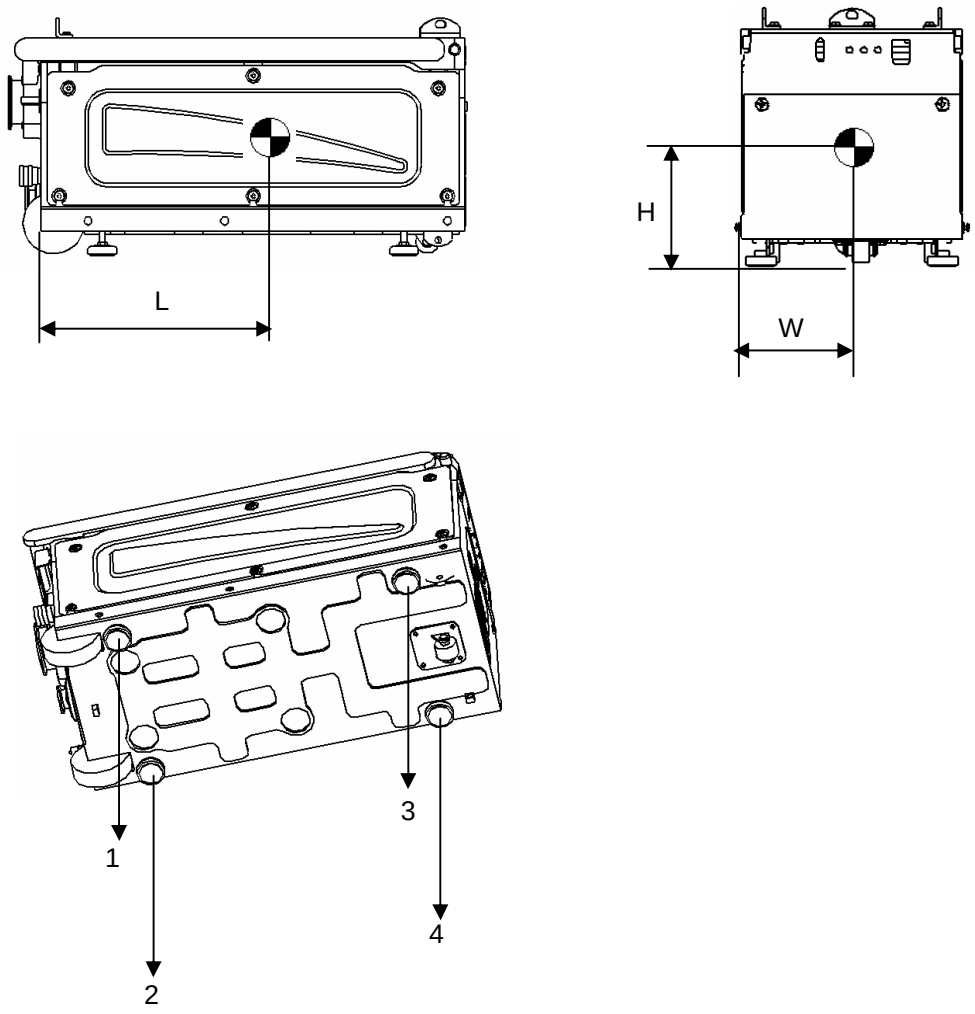
8. EC100L V2.1 APPENDIX

8-2. Technical Data

8-2-1. Technical Data drawing (continued)

Position of EC100L center of gravity

Unit: mm



Pump weight (kg)	Position of pump center of gravity		
	L (mm)	W (mm)	H (mm)
104	263	146	151

Weight distribution at adjusters			
1 (kg)	2(kg)	3 (kg)	4 (kg)
25.5	31.7	24.4	22.4

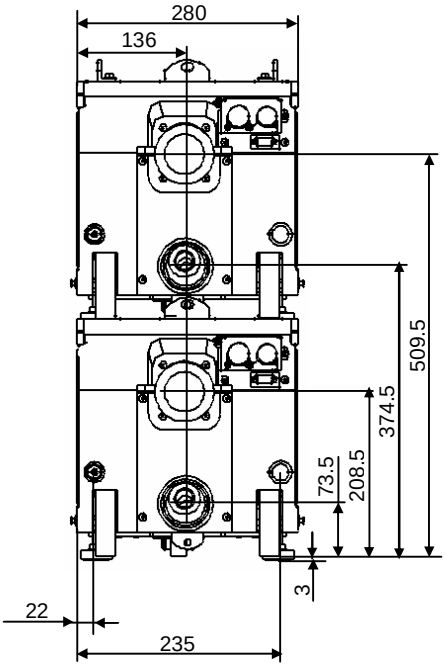
8. EC100L V2.1 APPENDIX

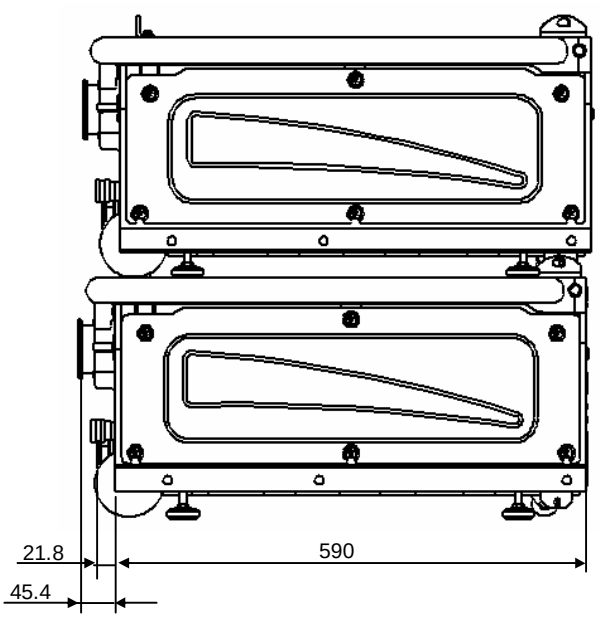
8-2. Technical Data

8-2-1. Technical Data drawing (continued)

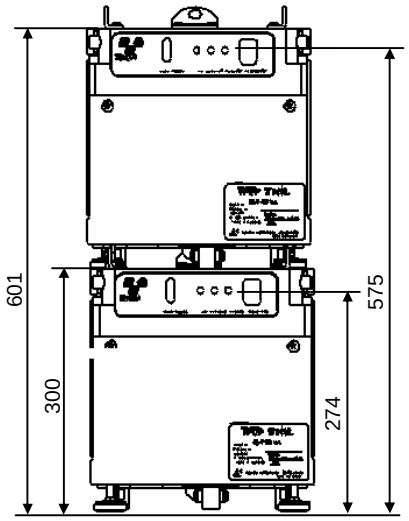
Dimensions for two horizontally installed EC100L pumps

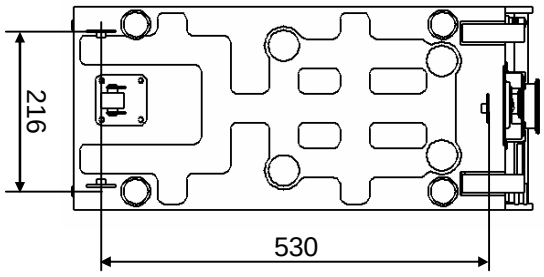
Unit:mm



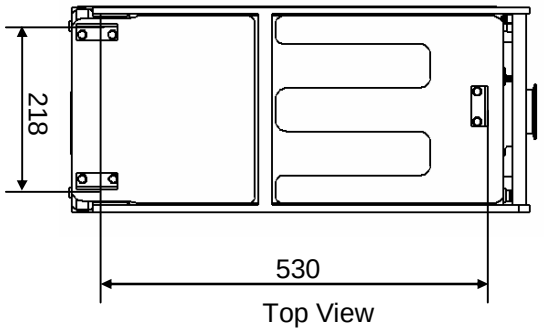


Positions of stacking brackets





Bottom



Top View

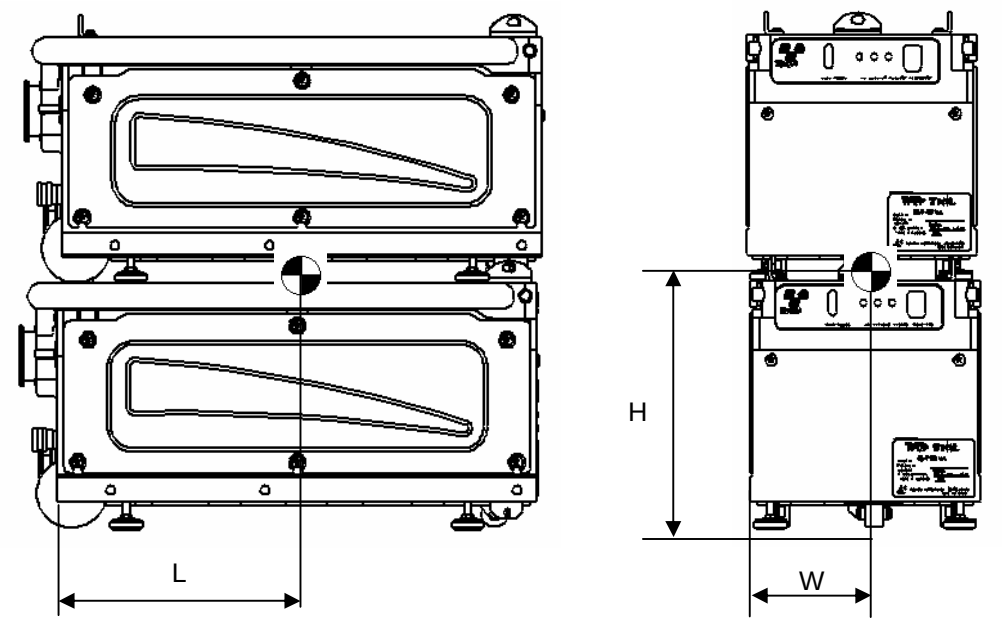
8. EC100L V2.1 APPENDIX

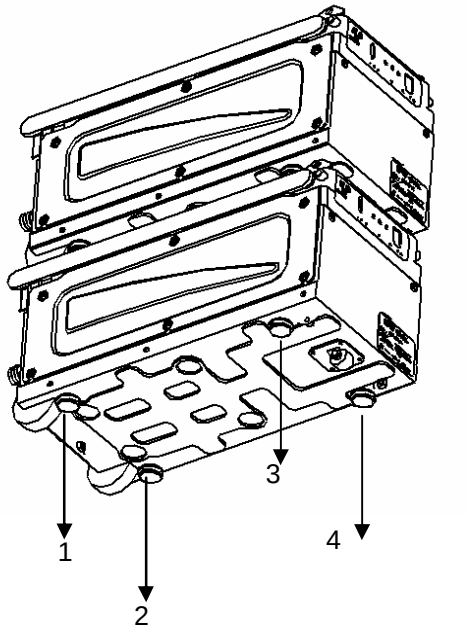
8-2. Technical Data

8-2-1. Technical Data drawing(continued)

Position of center of gravity for two horizontally installed EC100L pumps

Unit:mm





Pump weight (kg)	Position of pump center of gravity		
	L (mm)	W (mm)	H (mm)
208	263	146	301

Weight distribution at adjusters			
1 (kg)	2 (kg)	3 (kg)	4 (kg)
51	63.4	48.8	44.8

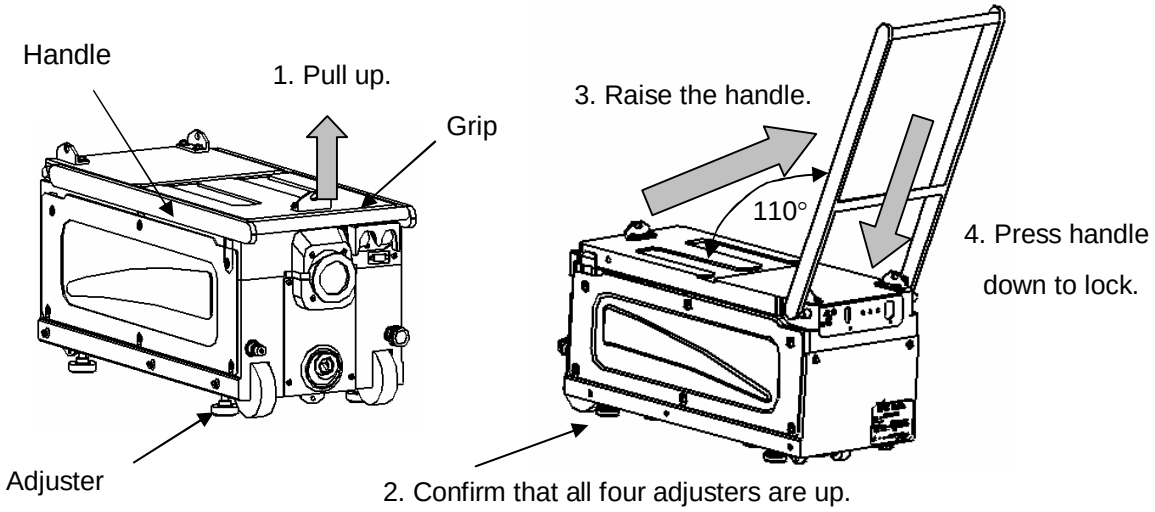
8. EC100L V2.1 APPENDIX

8-3. Moving procedure

8-3-1. Using handle to move

Two wheels and one free caster are provided on the bottom of the pump. Use the handle stowed in the upper surface of the pump for smooth movement. Observe the following procedure when using the handle stowed in the upper surface of the pump.

1. Grip the handle and pull it upwards to release the lock.
2. Confirm that all four adjusters are up.
3. Raise the handle toward the front panel while keeping hold of it.
4. Set the handle at about 110° and then press it down to lock it in position.
5. Pull the handle up to release it and return it to its original position.



WARNING	Do not move the pump hurriedly to prevent rolling over. Move the pump at a speed of 4 km/h or less.

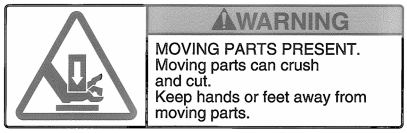
WARNING	Pay attention not to trap your feet or body when moving the pump.

WARNING	Confirm that all four adjusters on the bottom of pump are UP when moving.

8. EC100L V2.1 APPENDIX

8-3. Moving procedure

8-3-1. Using handle to move (continued)



Pay attention so as not to trap your hands between the handle and cover when using or stowing the handle.

Never use the handle for hoisting the pump.

Never sit down on the handle.

Only use the handle for pushing the pump.

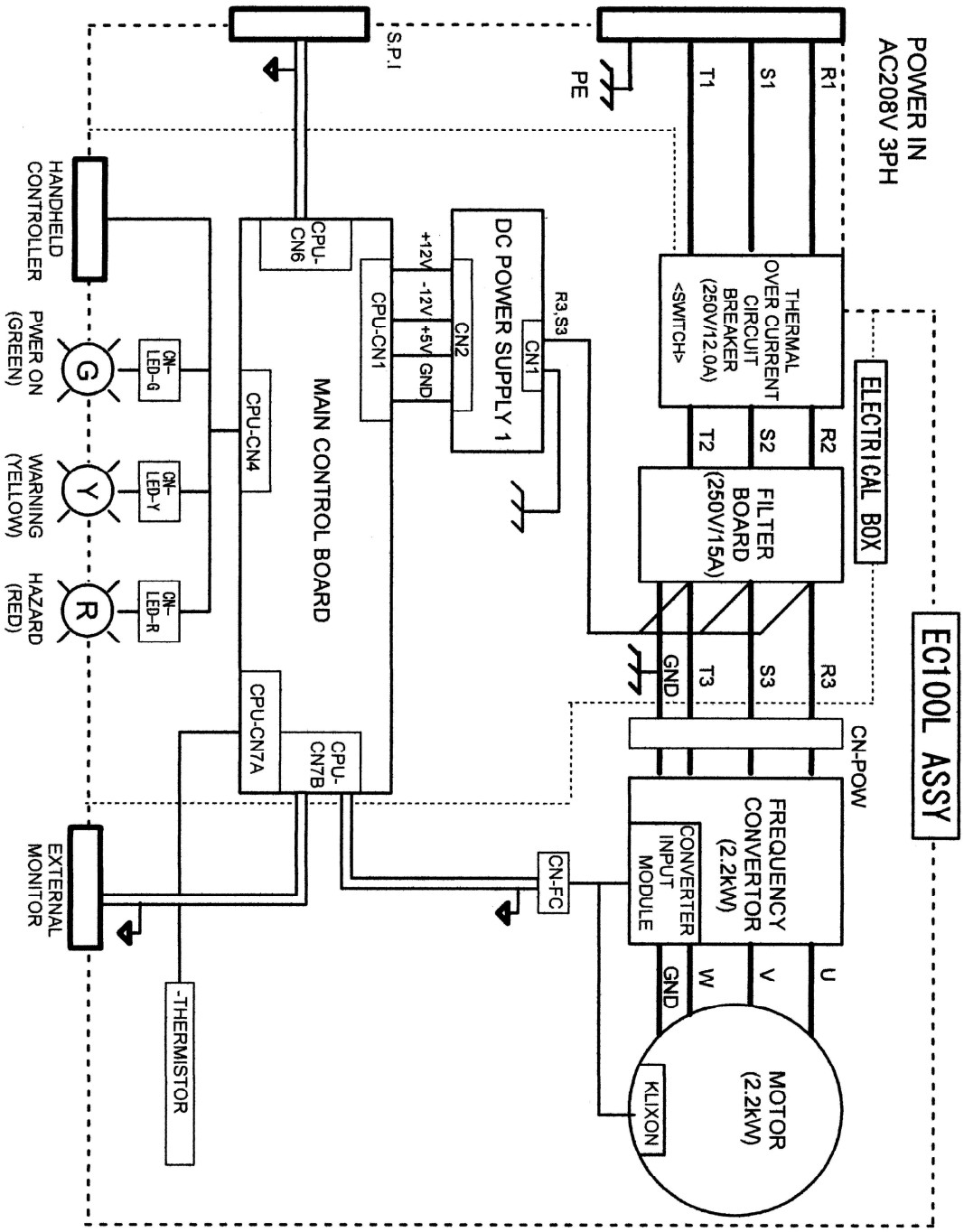
Never move the pump while it is running.

Check that the handle is firmly locked before using it or after stowing it.

Only use the handle for pushing the pump.

8. EC100L V2.1 APPENDIX

8-4. Electrical Circuit Diagram



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