Pro Duo Controller (PDC-100)

액체정량토출시스템 Since1994

PRECISION LIQUID DISPENSING TECHNOLOGY

Operation Manual

TAEHA Corporation

Contents

1   Safety Precautions

This manual is applied to products manufactured and sold by Taeha Corp.(here in after referred to as"our company"), therefore must not be used in partial or full copy without permission of our company.

This manual explains the specifications, installation, wiring, maintenance check, abnormal phenomena and measures to be taken for our products. When using this product, please read this manual carefully, pay enough attention to safety and handle it properly.

The safety precautions have been classified into danger and caution.

"**Danger**" means that dangerous situations can occur and death or serious injury
could result, if handled incorrectly.

"**Caution**" means that dangerous situations can occur if handled incorrectly.
Also, you may get serious injury or physical damage.

In addition, even if it is indicated as caution, it may lead to serious consequences depending on the situation. Since this is important for the safety of the user, please make sure you follow the instructions.

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Precautions against Electric Shock

Danger
1. This equipment is kept under high pressure for a while even after the main power supply is cut off. When performing a wiring work or inspection that touches all terminals of the terminal block, leave it for at least five minutes after shutting off the power before you start the work. 2. To prevent electric shock and malfunction, please provide Class 3 grounding (under 100Ω, wire diameter is thicker than 1.6mm). 3. Inspection and maintenance of this equipment must be performed by a qualified technician(specialist). 4. Do not inspec equipment with wet hands, when the floor is wet or if there is toomuch moisture. It may cause electric shock. 5. Be careful not to damage the cable, place heavy objects on it or fold it. In case it is damaged, it may cause electric shock.

Precautions aginst Fire

Danger
1. Do not install this equipment near inflammables, combustible organic solvents or vapors. The heat and electrical operation can case fire. 2. If this equipment malfunctions, disconnect the main power suply of the equipment. The high current may cause a fire.

Precautions against Wiring

Danger
1. Before conducting wiring work for maintenance etc., be sure to shut off all the external power supplies used by the equipment. 2. Failure to do so may result in electric shock or damage to the equipment. 3. To suppy power or operate the equipment after wiring, be sure to attach the covers inside and outside the equipement. Failure to do so may result in injury and electric shock.

Caution
1. Do not apply main power supply except for that of the voltage specified in this user manual. It may cause malfunction.
2. Make sure that terminal connections and wiring are correct. It may cause malfunction.
3. While the electric current is being applied, do not change the wiring or detach the connector. It may cause injury or equipment failure.
4. If the power wiring in the driving area is wrong, it may cause injury or damage to the equipment due to malfunction. Be careful.

Precautions on Installation

Caution
1. Do not install, store and use in places exposed to conductive dust, corrosive gas, flammable gas, high temperature, condensation, wind and rain, etc.
2. Exposure to direct sunlight for a long time will degrade accuracy of the equipment. Do not install, store or use in areas where there is direct sunlight.
3. When installing in an enclosed space, install a separate cooling fan to allow the outside air to flow in and out, in order to maintain the temperature around the equipment at 40℃ or less. Overheating may cause fire or other accidents.

Precaution on Use

Caution
1. Never modify this equipment. It may cause electric shock, injury, fire or breakdown.
2. Once you modify this equipment, it cannot be covered by our warranty for defects.
3. Before use, be sure to check that all covers are properly installed and verify if there is no foreign material inside the equipment. Depending on the circumstances, unexpected operation can occur and may result in injury.
4. If an alarm occurs during use, remove the cause of the alarm, check the safety and reuse it.

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	Danger
	1. When the equipment of our company is used including robots(multi-joint robot, rectangular coordinate robot, desktop robot), please be sure to install a safety net in the robot operation area, and never approach the operation area during operation. 2. Equipment of our company include driving and rotating parts. Install a safety net on the rotating parts and never approach it during operation.

Precautions for Maintenance and Inspection

	Caution
	1. When cleaning or repairing the equipment, be sure to turn off the power and check the internal power supply for complete dispensing, and then have it carried out by a qualified maintenance specialist. Maintenance by non-experts can cause breakdown. 2. If trhere is a breakdown of the equipment, donot disassemble the equipment. Please contact our customer support team. 3. If dust accumulates on the equipment, it may cause malfunction. Clean up the equipment periodically. When cleaning, please shut off the external power completely and check whether the equimnet has been fully dispensed. There is a danger of electric shock.

Precautions for Disposal

	Caution
	1. When this equipment is disposed of treat it as industrial waste.

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2   General Information

2.1   General Information

This user manual provides the user and the equipment maintenance specialist with essential information for operating the equipment. Therefore, it is strongly recommended that you should thoroughly understand this user manual.

In order to have easy access to this user manual, it must be placed where it can be easily seen, near the equipment.

2.2   Warranty

Except for a separate agreement and the following cases, the warranty period will be one year in the event of defects.

- Following -

1.   In case you modify the equipment without permission by Taeha Corp.
2.   If someone other thatn the technical support person of Taeha Corp. modifies the equipment or repairs the equipment without using the designated parts.
3.   If any spare parts other than those specified by Taeha Corp. have been used for the product.
4.   In case of intentional damage or damage due to consumer's fault.
5.   In case of natural disasters or fire

2.3   Technical Support

If necessary, Taeha Corp. will provide technical support service for the customer.

Please contact us by phone or fax.

Head office
Phone : +82(0)31 552 5300
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Phone : +82(0)54 463 0014
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Shenzhen branch office in China
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Fax : +86 755 2373 3519

Suzhou branch in China
Phone : +86 512 6251 2825
Fax : +86 512 6805 2921

2.4   Precautions

Danger
1. Be sure to use the designated power supply. The basic power of the equipment is designated as AC220V 50/60Hz. 2. Be sure to use the designated air pressure. The basic air pressure of the equipment is designated as 5kgf/cm^2. 3. Do not operate with wet hands. There is a risk of electric shock. 4. During the operation, do not turn off the power or shut down the air pressure unless the equipment is in danger/caution. Serious problems may arise with the use of equipment. 5. Contact us in case of severe errors in the equipment.

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3   Pro Duo Controller (PDC-100) Features

3.1   Features of PDC-100

This equipment is applied to equipment such as desktop robot, multi-joint robot, in-line system which apply resin by using dispenser, and it is a controller able to determine coating method and adjust the application amount.

◆   Two-component dispensing – With two-component dispensing controller, it is ideal for long-time, fixed volume dispensing.

- With installing of two-component dispenser exclusive software, precise and various works can be done.
- With color touch screen, it has good data recognition and it is easy to operate.
- With memory function for set memory(16ch), excellent compatibility with PC, PLC and other equipment.
- External interface function enables various tasks to be performed continuously.
- Setting an dchanging of data are intuitive and easy to operate.

◆   Major application examples

- Various sensors
- Solar cell panels
- Epoxy dispensing on auto parts
- Application of urethane to various filters

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3.2   Specification of PDC-100

Category	Specification	Remarks
Model	PDC-100	
Size(H x W x D)	240mm x 116mm x 230mm	
Input Power	AC 100~240V 50/60Hz	
Power Consumption	Max.75W	
Display	5.0" TFT LCD	Touch Type
Operation	Touch Panel, Button, Rotary Knob	
Operation Mode	Time / Steady / Purge / Ratio	
Operation Memory	15ch	
Operating Air Pressure	5kgf/cm² (Humidity under 5%)	Air Filter : 5μ
Pressure Regulation	0~5kgf/cm²	
Air In Port	One Touch Fitting PC(Ø6)	Air Hose
Air Out Port	One Touch Fitting PC(Ø6)	Air Hose
Motor Control	2 EA	
Liquid Indicator Sensor	OK	
External Control	OK	
Input Signal	Contact Input or NPN Open Collector Tr	
Dosing End Signal	NPN Open Collector Tr	
Dosing Connector	21004525-05	21004221-02
Motor Connector	21008525-02	21008223-01-001
Comm. Connector	DSUB 9Pin	RS-232, RS-485(Option)
Sensor Connector	STL950/10-5.0-V-GREEN Flow Meter (Option), Pressure (Option)	AK950/10-5.0-GREEN
Input Connector	STL950/10-5.0-V-GREEN	AK950/10-5.0-GREEN
Output Connector	STL950/10-5.0-V-GREEN	AK950/10-5.0-GREEN
Weight	3.6kg	
Operating Temperature	5℃ ~ 45℃	Avoid direct sunlight
Operating Humidity	10 ~ 85%RH	Without condensation
Operating Environment	Indoor, corrosive, flammable gas or liquid free, no conductive dust	
Vibration Resistant	Under 0.5G	G : Gravity Acceleration

Table 1. Pro Duo Controller(PDC-100) Specification

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4   Pro Duo Controller (PDC-100) – Name and function of each part

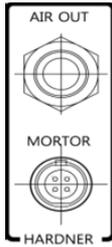### 4.1   PDC-100 Profile map and names of parts
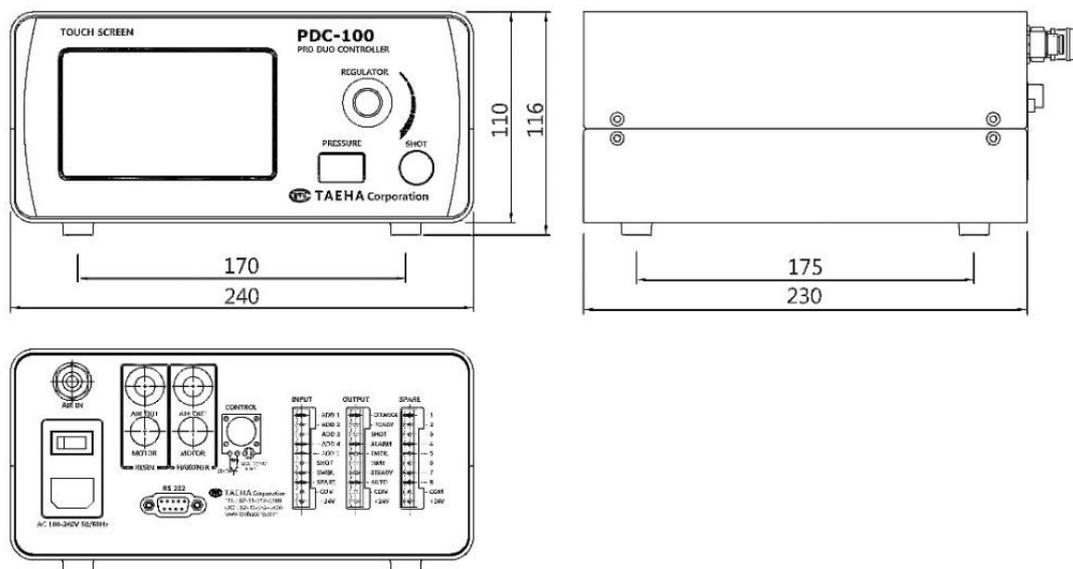
Figure 1. PDC-100
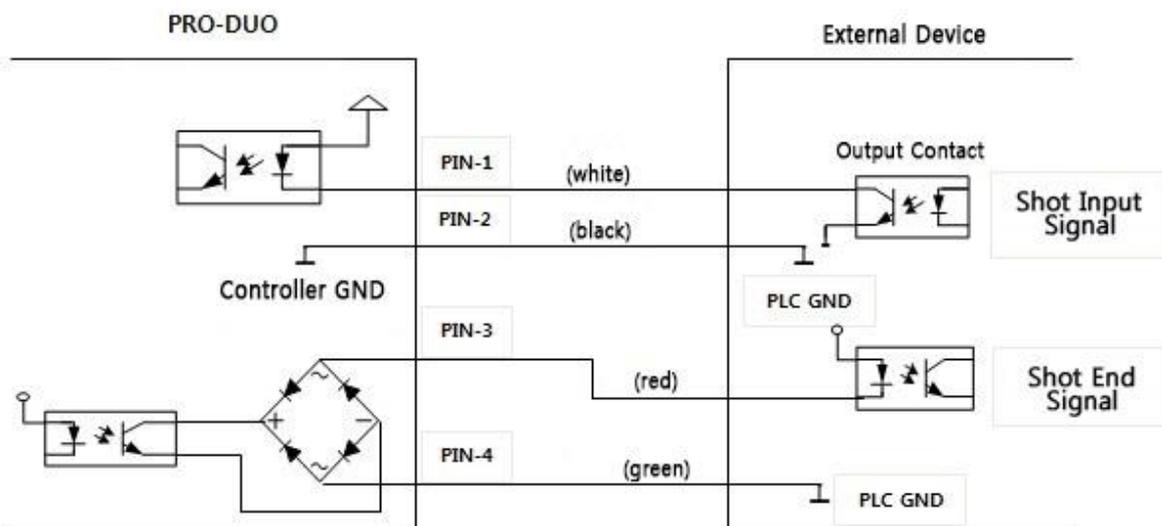
Names and Displays	Function and Descriptions
 <Touch Screen>	＊ In the operation mode for 2-liquid fixed-quantity dipensing operation, you can set the operation conditions such as shot time, mixing ratio, shot speed, program setting, and check the pump load factor and alarm
 <Regulator(Pressure Control)>	＊ Provide pressure to the Pro Duo Pump to ensure that the resin and hardner are smoothly supplied. ＊ Self-leveling pressure ay not be required for low viscosity.
 <Pressure>	＊ The pressure set in the regulator is displayed ＊ Unit : kgf/cm^2

\<Shot\>	✳ When turned ON, Pro Duo Pump is activated acoording to the set mode. ✳ The lamp will light up for as long as the driving time. ✳ It works the same as the 'Run' switch in the touch screen image.
AC 100-240V 50/60Hz **\<Combination Switch\>**	✳ Power Switch : Controller Power ON/OFF 기능
	✳ Fuse Holder : Glass tube, small, 3A (Including Spare 1ea)
	✳ AC Receptacle : Power Cord inlet AC 100~240V, 50/60Hz Free Volt Be sure to provide grounding.
AIR IN **\<Air In Port\>**	✳ Air in port for ∅6 air hose. ✳ Supply clean air with moisture removed(humidity under 5%).
AIR OUT MORTOR RESIN **\<Resin Air Output and Motor Connection Port\>**	✳ Connect the supplied auto-jointer(PH-H4) to the air out. ✳ From the motor cable, connect the cable connector(SN-10-10) with the 'Resin' mark.
AIR OUT MORTOR HARDNER **\<Hardner Air Output and Motor Connection Port\>**	✳ Connect the supplied auto-jointer(PH-H4) to the air out. ✳ From the motor cable, connect the cable connector(SN-10-10) with the 'Hardner' mark.
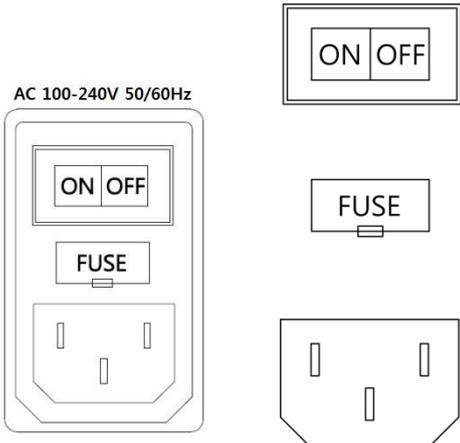
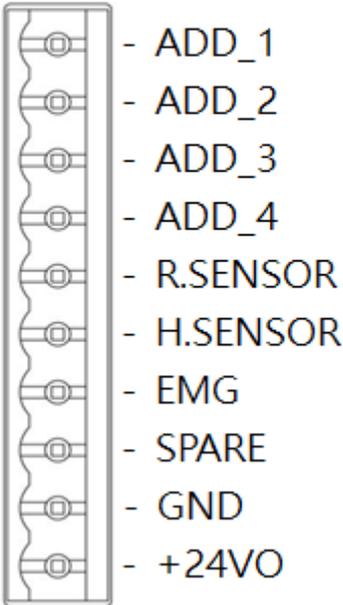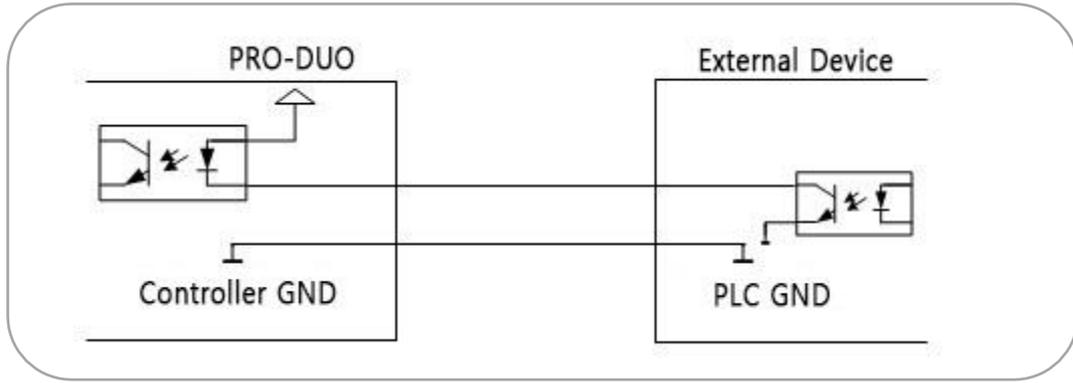2021/01/20   14/58

<Control>
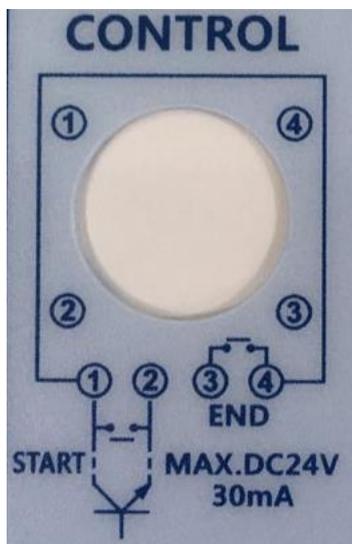
* Connection port of dispensing input signal and dispensing end signal.
* Circle 4pin connector is used, and it inputs dispensing start signal and outputs dispensing end signal from the outside.
* When controlling the dispensing operation from the host controller to the output contact,
  1) Be sure to connect GND and N24(com between the host controller and the controller.
  2) The operation completion signal is output with ON pulse for about 30ms after completion of dispensing. The operation completion signal is output only in the time mode
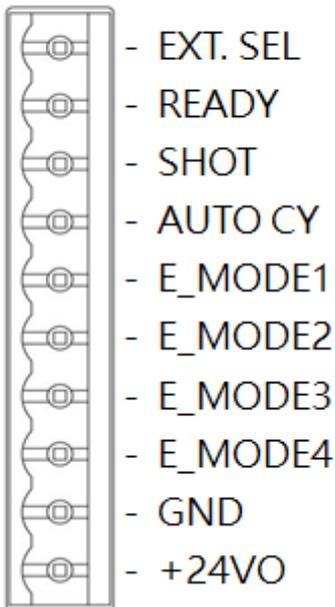

<Connection configuration of host controller and PDC-100>

|	
 \<COMM\>	② RX 232 ⑥ RS 485+ ③ TX 232 ⑦ RS 485- ⑤ GND ⑨ BOOT **\<COMM terminal pin configuration\>** * D_SUB 9Pin Connector RS-232 communication (②, ③, ⑤, ⑨) pins are used in Controller Firmware Upgrade and Debugging Mode. (User does not use it.) * D_SUB 9Pin Connector RS-485 communication (⑥, ⑦) pins are used for communication with the outside. (RS-485 communication MODBUS RTU protocol)
	* The input port receives input from an external device and controls the controller. 1. **ADD1 ~ ADD4** : Channel selection port, which alows you to change the channel frm an external device and to shot with preset shot conditions. It is composed of 16 channels. When changing channes, it is required to give a delay time of about 10ms or more. 2. **R.SENSOR** : Port to connect the resin remaining volume sensor. 3. **H.SENSOR** : Port to connect the hardner remaining volume sensor. 4. **EMG** : When this signal is received by an emergency stop signal from an external control device, the Controller stops all functions and outputs an emergency stop signal at the Output Port 5. **SPARE** : It is not usedas it is a port reserved for improvement of function. 6. **GND** :COMMON to match the DC power potential difference between the host controller and PDC-100. 7. **+24VO** : Use this when the use of internal powersupply of the controller is necessary. Note : +24V is the power output. When external power is connected, failure occurs. (Abnormal operation)

<Connection configuration of host controller and PDC-100>

OUTPUT

- EXT. SEL
- READY
- SHOT
- AUTO CY
- E_MODE1
- E_MODE2
- E_MODE3
- E_MODE4
- GND
- +24VO

✱ The output ort is used to transmit the status of the controller to the host controller.

1. **EXT.SEL** : Indicates to the external device whether external control mode is used or not. In external device, it is necessary to execute control(signal output) after confirming that external mode pin is ON.

2. **READY** : Outputs a signal when there is no abnormality in the controller and it is not in the process of dispensing. When controlling from the host controller, the READY signal should be monitored and when it is on, the shot signal should be output.

3. **SHOT** : Shows the dispensing status of dispenser. It is "ON(High)" when it is in operation an "OFF(Low)" when it is stopped.

4. **AUTO CY.** : Outputs a signal when the automatic purge function is activated.

5. **E_MODE1 ~ 4** : Outputs error status. Rfer to the following tabe for error list.

6. **GND** : COMMON to match the DC power potential difference between the host controller and PDC-100.

7. **+24VO** : Use this when the use of internal power supply of the cotroller is necessary. +24V is the power output. When external power is connected, failure occurs. (Abnormal operation)

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<Connection configuration of host controller and PDC-100>

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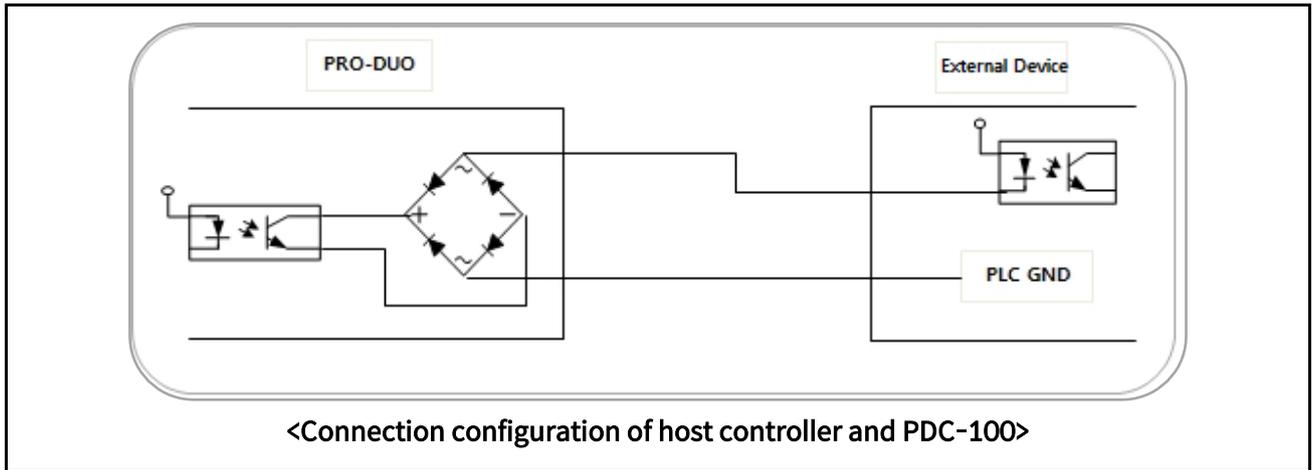
⚠️ # Cautions about alarm handling

1. The cable alarm and pressure alarm are automaticaly reset.
2. If cabe alarms are pressure alarms are not handled by the host controller, an inexplicable faulty dispensing will occur due to an automatic reset.
3. If a pressure alarm occurs and when the set pressure value is raised, the dispensing failure due to hardening can not be detected. If the frequency of the pressure alarm increases, it is necessary to check the piping and nozzle.
4. If cable alarms occur frequently, there may be problem with grounding of installation site, noise and so on. If it is not grounded, provide grounding. If the problem still occurs after grounding, replace the motor cable with a shielded cable.

</div>

SENSOR

- R_PRE
- H_PRE
- GND
- +5VO
- R_FLOW
- H_FLOW
- ADV1
- ADV2
- GND
- +24VO
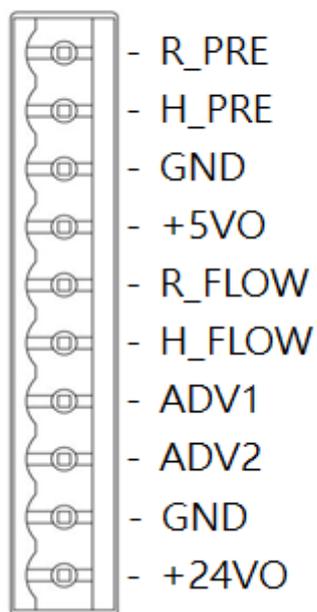
∗ Sensor port is used to connect the sensor used in Pro Pump.

1. R_PRE : Connect the resin pressure sensor.
2. H_PRE : Connect the hardner pressure sensor.
3. GND : Power supply for pressure sensor.(-)
   ➔ Never use for other uses.
4. +5VO : Powersuply for pressure sensor.(+)
   ➔ Never use for other uses.
5. R_FLOW : Connect the resin flow meter.
6. H_FLOW : Connect the hardner flow meter.
7. ADV1 : Connect the resin anti drip valve.
8. ADV2 : Connect the hardner anti drip vavle.
9. GND : Flowmeter power supply.(-)
   ➔ Never use for other uses.
10. +24VO : Flowmeter power supply.(+)
    ➔ Never use for other uses.

Table 2. Details of PDC-100

4.2   Time Chart

t1	Shot Signal Check Time (10ms)
t2	Shot Time
t3	End Time (30ms)

Table 3. Refer to PDC-100 Time Chart

4.2.1 Time Mode

1)   Pressure time < Dispensing time

Figure 2. Pressure Time < Dispensing Time
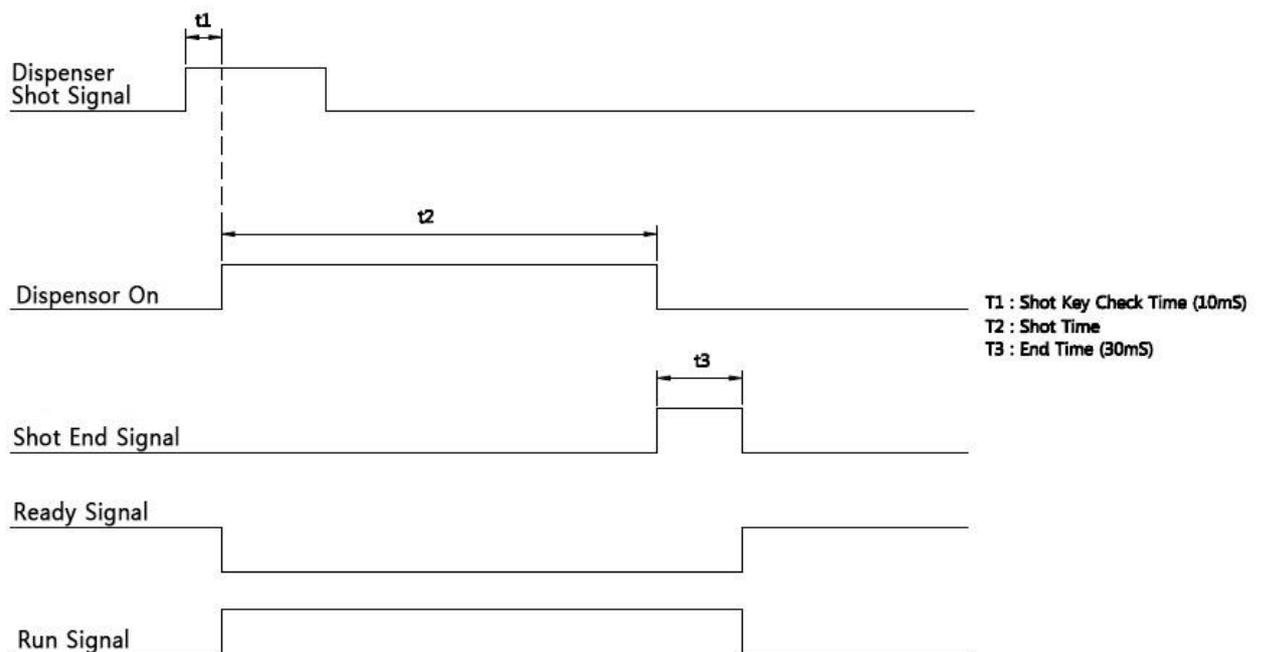
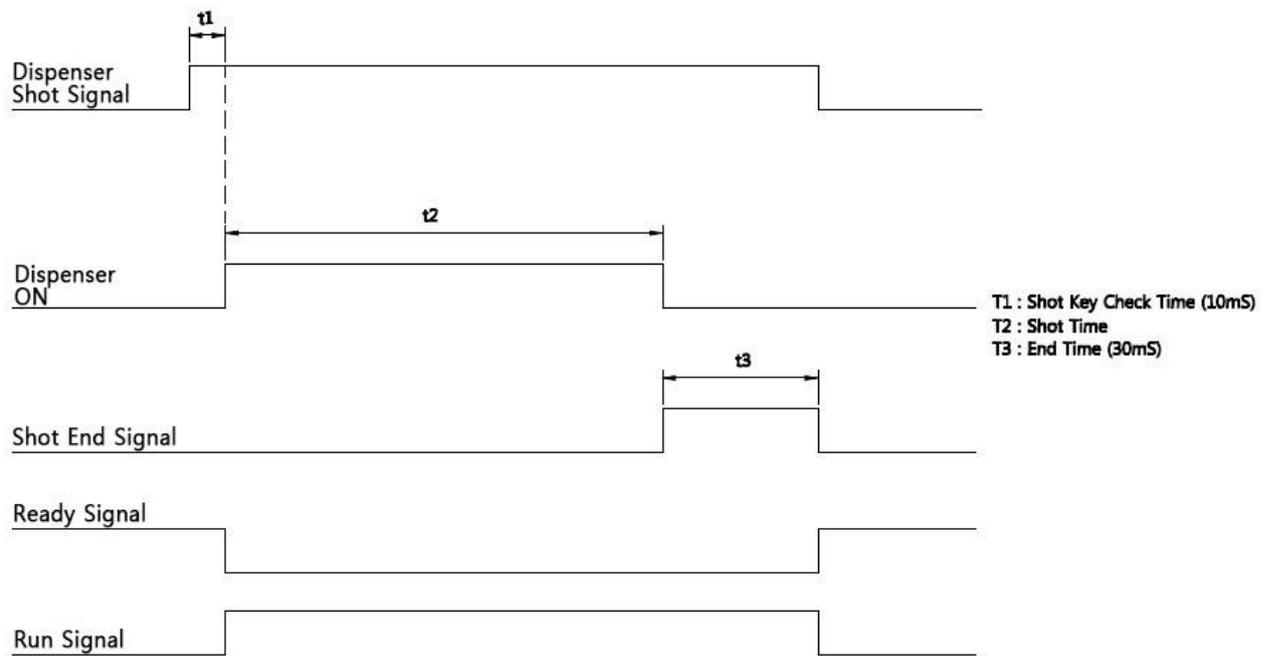2) Pressure Time > Dispensing Time

Figure 3. Pressure Time > Dispensing Time

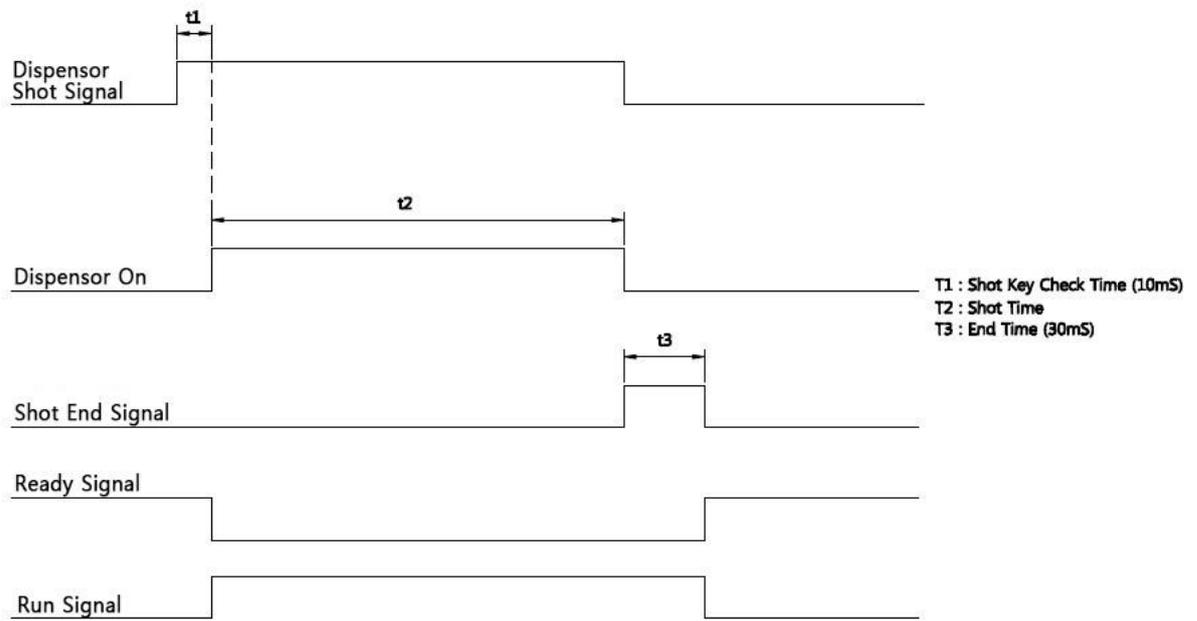## 4.2.2 Steady Mode

Figure 4. Steady Mode

5   Pro Duo Controller (PDC-100) Settings

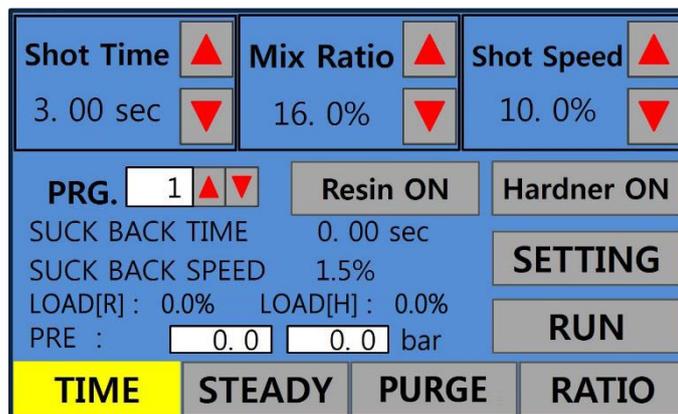## 5.1   Mode Setting

5.1.1 Time Mode

Figure 5. Time Mode Main Screen

In time mode, 1 pulse(one time) input signal is working for set dispensing time, and it is mainly used for potting. Dispensing input signal must be off during dispensing. If the signal remains on, dispensing is not possible until the dispensing input signal is turned off after disepensing for the set time.

The dispensing signal can be input by control connector which receives external dispensing signal, 'Run' button or shot switch.

In the time mode, dispensing end signal is generated after completion of dispensing.

Press the 'Stop' button when a forced stop is required during operation.
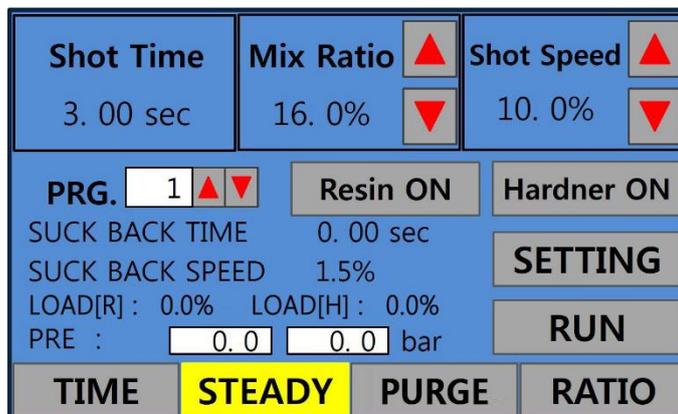
5.1.2 Steady Mode

Figure 6. Steady Mode Main Screen

Steady mode is only functioning during operation and is mainly used for line application, point dispensing and potting whitch is dispensing for the time set by the external controller.

The dispensing signal can be input by the control connector which receives the external dispensing signal or by the shot switch, and dispensing is done during ON state.

When you dispense sith the 'Run' button on the touch screen, it will continuously dispense until you press the 'Stop' button.

In steady mode, when the shot signal is turned on so that the dispensing time can be checked, the shot time is reset(zero setting) and the time stops when dispensing is stopped. Therefore, the actual shot time canbe measured.(Unit : sec)

If you input this shot time in time mode, you can easily set the fixed volume dispensing in time mode.
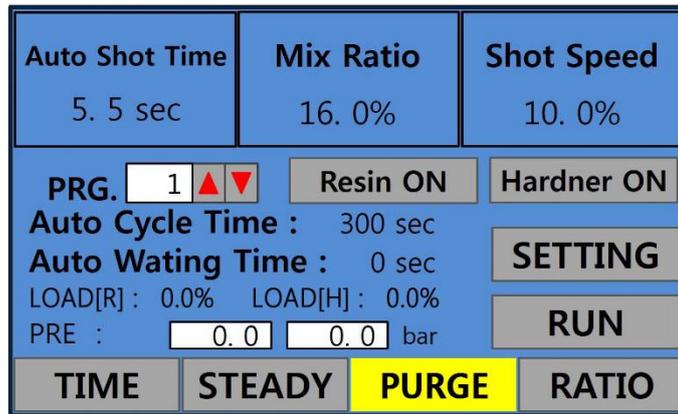
5.1.3 Purge mode

Figure 7. Purge mode Main Screen

The Purge mode is to prevent the mixer from hardening at the dormant time. The auto shot time and the auto cycle time must be set separately, and the auto shot time is displayed in real time.

In this case, the auto wating time refers to the elapsed time of the auto cycle time.

When the operation signl is given by 'Run' button, shot switch and external device, the Purge mode is executed and ifyou press 'Stop' button, it stops.

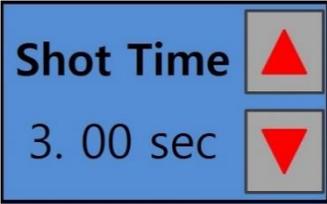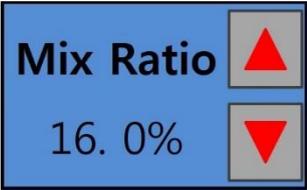### 5.1.4 Ratio Mode

Figure 8. Ratio Mode Main Screen

In ratio mode, you measure the proportion of the resin and hardner.

The mixing ratio should be designated as the average value of the data measured several times. If there is a change in the average valure and when switching mode, "Will you change the mixing ration?" is displayedon the screen.

If both resin and hardner are set ON, the simultaneous ratio can be measured. When you want to measure the individual ratio, set each material to ON.

5.2   Initial Screen

When the power is applied, the touch panel is turned on and the initial screen is displayed.

Figure 9. PDC-100 Initial Screen

Names and displays	Function and Description
	∗ Displays the shot time of the pump. ∗ It can be set by arrow(up/down) key. ∗ In steady mode, only the time when the pump is dispensed is displayed.
	∗ Set the percentage of hardner to 100% of the resin. (Volume ratio setting) ∗ It can be set by arrow(up/down) key. ∗ Calculation of volume ratio when weight ratio is given Volume ratio of harder $= \dfrac{(\text{Weight Ratio / Specific Gravity(hardner)})}{(\text{Weight Ratio / Specific Gravity(Resin)})} \times 100$ Ex> In case weight ratio 100:50, specific gravity of resin 1.16 and specific gravity of hardner 0.95 $\dfrac{50 / 0.95}{100 / 1.16} \times 100$ $=$ 61 (Hardner 61% for resin 100%) ∴ The mix ratio is entered 61%.

Shot Speed ▲ ▼ 10. 0%	✳ The shot volume per unit time is displayed. (Acting in synchronism with mixing ratio) ✳ It is expressed as a percentage, based on the maximum speed.
PRG. 1 ▲▼	✳ The shot conditions are stored in advance, called out and used when necessary. (Manual, external control is possible.) ✳ Displays the channel being applied.
SUCK BACK TIME 0. 00 sec SUCK BACK SPEED 1.5%	✳ **Suck Back Time** : Displays the time that the suck back was executed. ✳ **Suck Back Speed** : Displays the speed at which suck back is executed.
LOAD[R] : 0.0% LOAD[H] : 0.0%	✳ LOAD[R] : Display the pump load factor of the resin. ✳ LOAD[H] : Display the pump load factor of the hardener.
PRE : 0. 0 0. 0 bar	✳ The first data box shows the pressurd of raw material and the second data box shows the pressure of hardner.
RUN	✳ It is used when start dispensing.

Table 4. Detailed description of the initial screen

5.3   Setting Screen

If you select the setting on the right side of the initial screen, the screen will be displayed andyou can select the PDC-100 service condition.
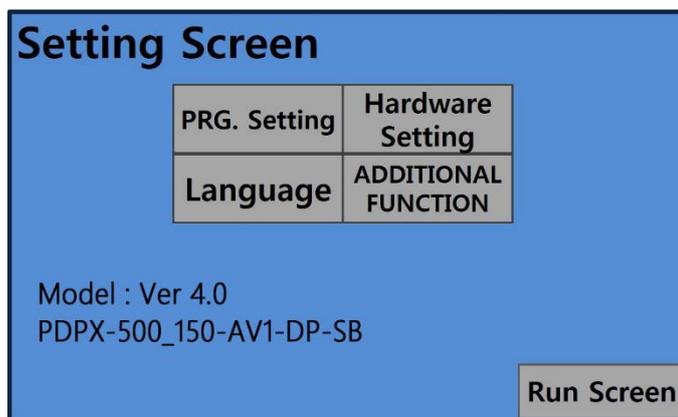

Figure 10. Setting Screen

1) PRG.Setting

   As the dispenser condition setting menu, you can set dispensing time, mix ratio, dispensing speed, suck back time and suck back speed. For details, refer to the PRG.Setting section.

2) Hardware Setting

   You can set whether to use dispensing control from external devices and whether to use remaining volume sensor. For details, refer to the external devices section.

3) Language

   You can set the language to be used when operating PDC-100. For more informatil, refer to the language setting section.

4) Additional Function

   Additional settings can be made depending on the options of th dispenser to be used.

   There are sub menus 'ADV(Same) setting', 'Auto purge setting', 'D.Press setting', 'Flow_M Setting' and 'IO_CHK'. For more information, refer to the additional function section
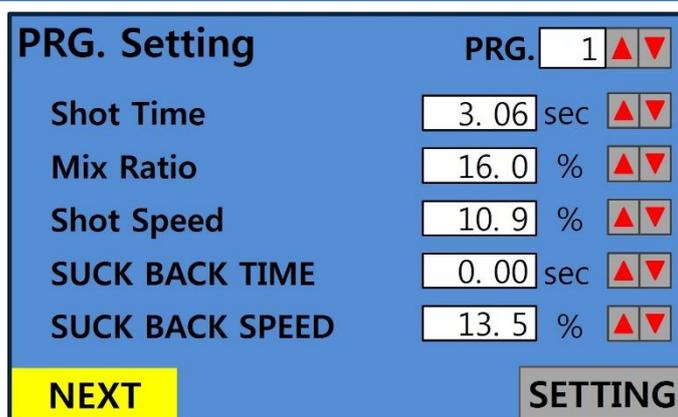
5.4   PRG. Setting

Figure 11. PRG.Setting Screen

If you select 'PRG.Setting' on the setting screen, the first screen appears.

Names and Displays	Function and Description
Shot Time 3. 06 sec ▲▼	∗ Indicates the time that the pump is driven. ∗ Time range : 0.00 ~ 999.99 sec (increased by 0.01 sec) ∗ You can set by arrow(up/down) key or by key pad to be displayed when data box is selected.
Mix Ratio 16. 0 % ▲▼	∗ Sets the hardner ratio for 100% of resin. (Set by volume ratio) ∗ Setting range : 1 ~ 120% (increased by 0.1%)
Shot Speed 10. 9 % ▲▼	∗ Displays the flow rate of resin and hardner pumps. ∗ Setting range : 0.0 ~ 100 % (increased by 0.1%) ∗ You can set by arrow(up/down) key or by key pad to be displayed when data box is selected.
SUCK BACK TIME 0. 00 sec ▲▼ **SUCK BACK SPEED** 13. 5 % ▲▼	∗ You can control the condensation at the nozzle end after dispensing. ∗ **Suck-back Time** : within 20% of dispensing time **Suck-back Speed** : Please set within 15% of dispensing speed.

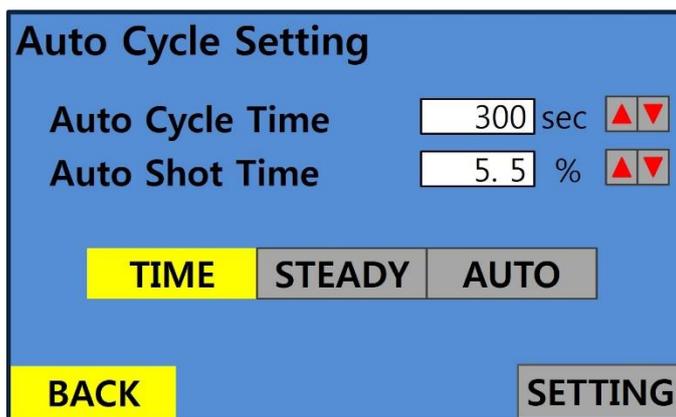**Table 5. Detailed descriptions of PRG.Setting**

5.5 Auto Cycle Setting

Figure 12. Auto Cycle Setting Screen

If you select the next on lower left in the PRG.Setting screen, the auto cycle setting screen is displayed.

Auto shot is a setting to prevent hardening by mixing of resin and hardner.

Set by user according to the type of material and mixer being used.

Names and Displays	Function and Description
	✳ Enter the time interval at which you want the auto dispensing to occur. The dispensing is executed once every set time.
	✳ Set the dispensing time to be executed every fixed time.
	✳ Purge mode dispensing is activated when Purge mode is selected.

Table 6. Detailed descriptions of Auto Cycle Setting
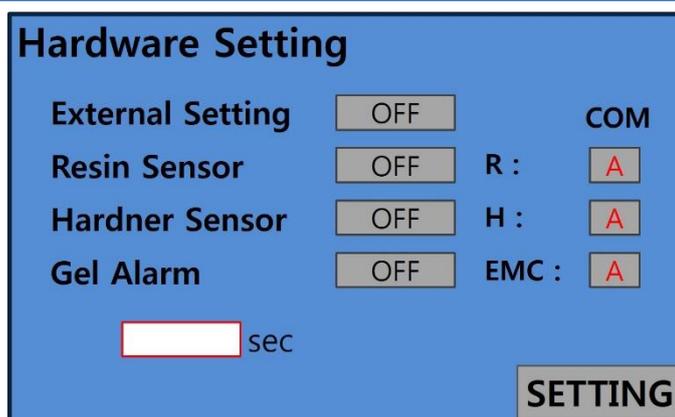
5.6   Hardware Setting

Figure 13. Hardware Setting Screen

If you select 'Hardware Setting' on the setting screen, the screen will be displayed and you can decide whether to use remaining volume sensor and pressure sensor.

Names and Displays	Function and Description
External Setting OFF	✳ It is used for dispenser control by the host controller after completion of dispensing setting. It is set to prevent the production of defective products caused by setting value change and/or random dispensing by the user other than the administrator. If you turn on the use of external program, you can not change the setting on controller. ✳ When the use of external program is set to ON, the dispensing condition setting on the main screen can not be done, and, therefore, use of external program must be set to OFF.
Resin Sensor OFF **Hardner Sensor** OFF	✳ Set the function to display the status when the remaining volume is low by checking the remaining volume of resin and hardner. ✳ In order to use this function, remaining volume sensor must be installed as an option.

Gel Alarm OFF ☐ sec	＊ When the hardning alarm is set to ON, the time value can be set by the time data box or by arrow(up/down) key. ＊ It can be used when a pressure sensor is installed.
COM R : B H : A EMC : A	＊ R : Resin Port ＊ H : Hardner Port ＊ EMC : Emergency Port ＊ Select the contact method of each port. There are 2 methods.(A : Normal Open / B : Normal Close)
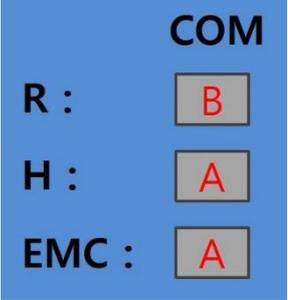
Table 7. Detailed description of the Hardware Setting

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5.7   Language Setting
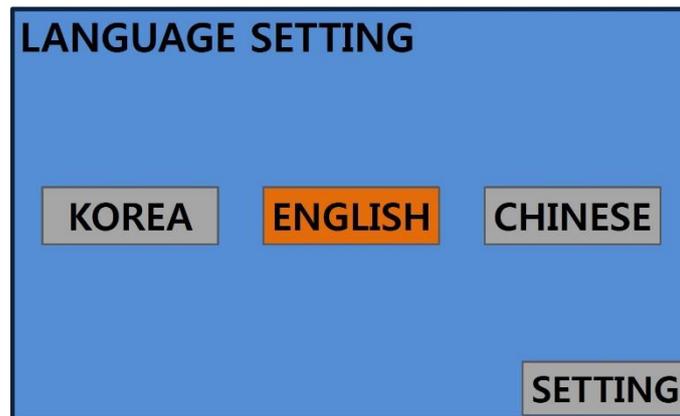
Figure 14.Language Setting Screen

In the language setting, selectthe language to be used when operating the Pro Duo Controller. You can set it in Korean, English, Chinese as needed.

5.8   Additional Function

Figure 15. Additional Function Screen

If you select additional function on the setting screen, the screen appears. The above screen is the screen where all settings are activated. There are sub menus 'ADV(Same) setting', 'Auto Purge Setting', 'D.Press & LOAD CHK', 'Flow_M Setting', 'IO_CHK' and 'Suck Back Setting'.

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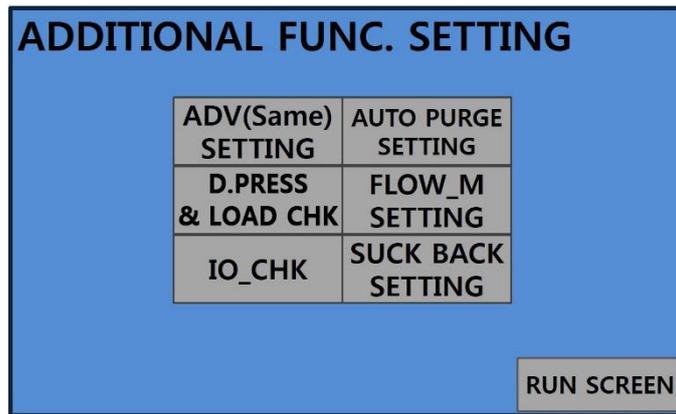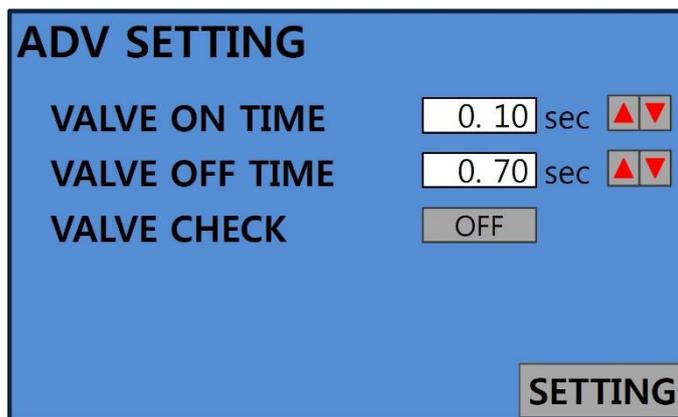### 5.8.1 ADV(Same) Setting

Figure 16. ADV Setting Screen

ADV setting isused to apply anti drip valve to resin and hardner, respectively, and is displayed.

In this case, the control solenoid can not be built in, so it is configured externally.

At thistime, the control ports used are I/O ports 7 and 8.(No.7 : resin, No.8 : hardner)

Names and Displays	Function and Description
	∗ **Valve On Time** : Set the start operating condition of dispenser. (Valve On -> On Time Delay -> Pump On) ∗ **Valve Off Time** : Set the stop operating condition of dispenser. (Pump Off -> Off Time Delay -> Valve Off)
	∗ Check whether the valve used for ADV works properly. ∗ You can check wiring and check whether the valve is abnormal.

Table 8. Detailed description of ADV Setting
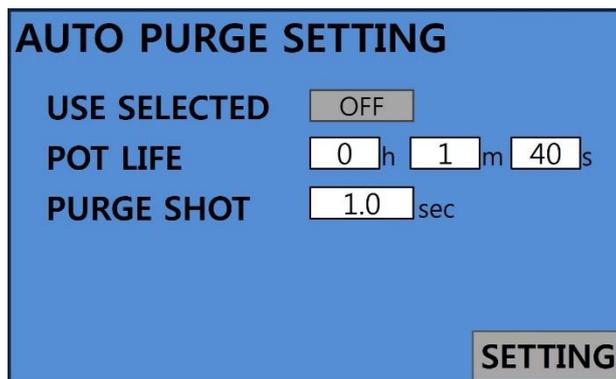
5.8.2 Auto Purge Setting

Figure 17. Auto Purge Setting Screen

Auto Purge Setting is set when there is a possibility of problem caused by hardening due to short time of hardening when quick hardening solution is applied.

If dispensing does not occur during a certain period of time(pot live), automatic purge is executed as much as the set value.

If you do not use the dispenser for a certain period of time, make sure that it is moved to the purge position and on standby.

It is a manual function and has the same function as the Purge mode.

 When the auto purge function is set, the auto dispensing function and hardening alarm function do not operate.

Names and Displays	Function and Description
USE SELECTED `OFF`	∗ Enable or disable the auto purge function.
POT LIFE `0` h `1` m `40` s	∗ Based on the pot life information of the material, set the appropriate unit time to run the auto purge function. ∗ Shot once every set time to prevent hardening.
PURGE SHOT `1.0` sec	∗ Set the dispensing time for auto purge shot.

Table 9. Detailed description of Auto Purge Setting
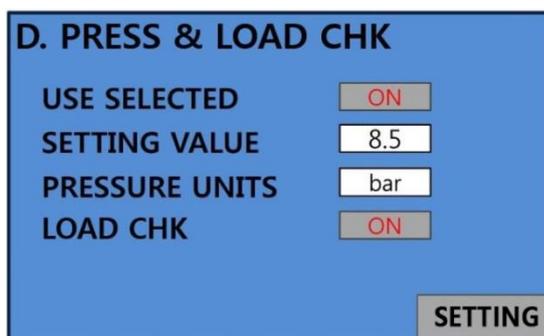
5.8.3 D.Press & Load check setting

Figure 18. D.Press Setting & load chk Screen

D.Press & LOAD CHK monitors the alarm by the pressure sensor (when applied to the pressure sensor) and the load factor of the pump to detect when there is a problem with the discharge due to the hardening of the dispensing tip during Dispenser shot. You can set the function. The setting screen is displayed as shown in <Fig. 18>.

For pressure sensor application, I/O ports 1 and 2 connect sensor data, port 3 connects power and port 4 connects GND.

Name and Displays	Function and Descriptions
USE SELECTED ON	∗ Select whether or not to use the alarmof the pressure sensor. ∗ If the dispensing pressure is measured higher than the setting pressure, an alarm occurs.
SETTING VALUE 8.5	∗ Set the standard setting pressure value. ∗ Since the set pressure dirrers depending on the dispensing condition and the viscosity of the solution, set it to about 20% higher than the normal pressure after normal dispensing. ∗ If the dispensing pressure is higher thatn the set pressure value during dispensing, an error will occurand you can use after checking the hardening codition anddispenser condition.
PRESSURE UNITS bar	∗ Set the unit of setting pressure value. ∗ Set the unit to be used from MPa or bar.

Table 10. Detailed description of D.Press Setting

5.8.4 Flow_M Setting

Flow_M Setting is used to measure mixing ratio and shot volume of resin and hardner by applying flowmeter. Make setting reference to the data sheet of flow sensor.

For flowmeter application, I/O ports 5 and 6 connector data, port 7 connects power and port 8 connects GND.
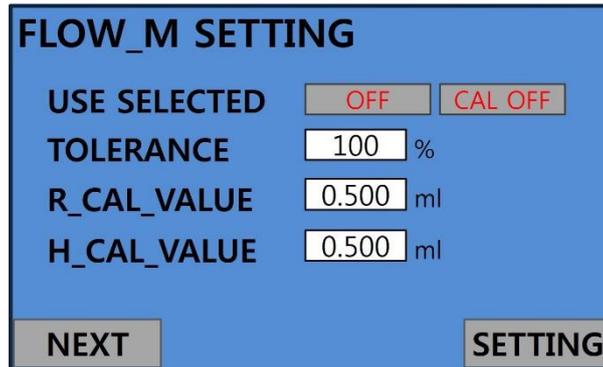

Figure 19. Flow_M Setting Screen
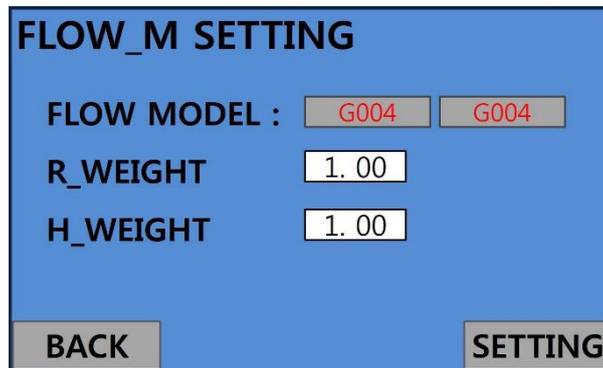
Figure 20. Flow_M Setting second screen

Names and Displays	Function and Description
USE SELECTED OFF CAL OFF	∗ When flowmeter is used as an option, it sets whether alarm is used when the value exceeds tolerance value. ∗ Set when calibrating the flow sensor.
TOLERANCE 100 %	∗ Set the tolerance range.
R_CAL_VALUE 0.500 ml **H_CAL_VALUE** 0.500 ml	∗ It is automatically saved as the average value obtained by repeated shot for several times. ∗ **R_Cal_Value** : It refers to resin calibration value. ∗ **H_Cal_Value** : It refers to hardner calibration value.
FLOW MODEL : G004 G004	∗ Select the typeof flowmeter.
R_WEIGHT 1. 00 **H_WEIGHT** 1. 00	∗ **R_Weight** : It refers to resin weight value. ∗ **H_Weight** : It refers to hardner weight value.

Table 11. Detailed description of Flow_M Setting

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5.8.5 IO_CHK

INPUT_CHECK

ADD1 :	OFF	R. SENSOR	OFF
ADD2 :	OFF	H. SENSOR	OFF
ADD3 :	OFF	EMG :	OFF
ADD4 :	OFF	SPARE :	OFF

NEXT   SETTING

Figure 21. Input_Check

OUTPUT_CHECK

EXT. SEL :	OFF	E. MODE1 :	OFF
READY :	OFF	E. MODE2 :	OFF
SHOT :	OFF	E. MODE3 :	OFF
AUTO. CY :	OFF	E. MODE4 :	OFF

NEXT   SETTING
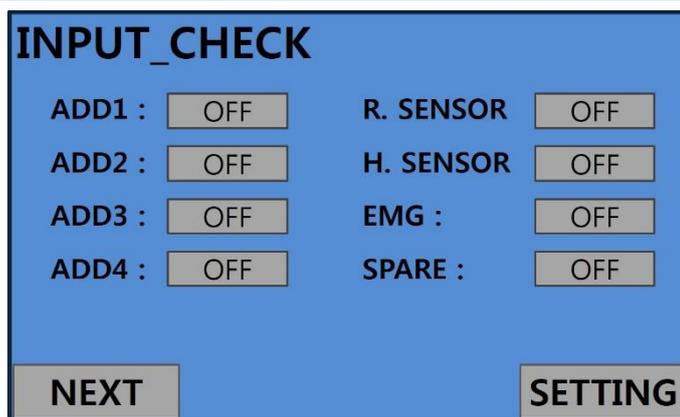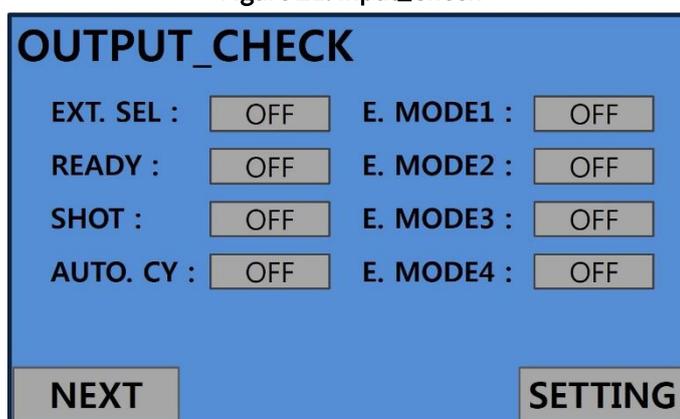
Figure 22. Output_Check

IO_CHK is a menu to check the status of the I/O contact points of the controller.

If you short the relevant port and com in 8 external ports of input port, ON is displayed.

In the output check, you can check the signal to transmit operation information to the host devices.

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Names and Displays	Function and Descriptions
ADD1 : OFF ADD2 : OFF ADD3 : OFF ADD4 : OFF <Channel Setting Table> | Channel	ADD1	ADD2	ADD3	ADD4 | 1	ON	OFF	OFF	OFF | 2	OFF	ON	OFF	OFF | 3	ON	ON	OFF	OFF | 4	OFF	OFF	ON	OFF | 5	ON	OFF	ON	OFF | 6	OFF	ON	ON	OFF | 7	ON	ON	ON	OFF | 8	OFF	OFF	OFF	ON | 9	ON	OFF	OFF	ON | 10	OFF	ON	OFF	ON | 11	ON	ON	OFF	ON | 12	OFF	OFF	ON	ON | 13	ON	OFF	ON	ON | 14	OFF	ON	ON	ON | 15	ON	ON	ON	ON | Keep Channel	OFF	OFF	OFF	OFF	∗ Applied when changing channels from outside. ∗ 15 channels are available. ∗ Select the external device mode in the controller to operate normally. (Setting screen -> External Device -> Hardware) ∗ When changing the channels, dispensing operation should be performed after maintaining the waiting time of about 100msec or more after changing I/O.
R. SENSOR OFF H. SENSOR OFF	∗ **R.Sensor** : Connect when using the resin remaining volume sensor. - Set whether to use and contacts on controller. ∗ **H.Sensor** :Connect when using hardner remaining volume sensor. - Set whether touse and contacts on controller.
EMG : OFF	∗ Enter the external emergency stop signal to stop the system. - This is the basic A contact point and sets the contact point status on the controller.
SPARE : OFF	∗ Connect sensor or switch according to user's purpose.

Table 12. Detailed description of input check

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Names and Displays	Function and Descriptions

EXT. SEL : `OFF`	＊ Set the use of external devices.
	＊ **External Mode** : Shot opertion is not possible from the controller.
	  - Only the setting keys on the screen will be activated.(shot condition setting)
	  - Shot signal is activated only be external signal.
	  - Change the channels from ADD1 to ADD4.
	＊ **Internal Mode** :Shot operation is posible from the controller.
	(Shot key, Run button, External signal)
	  - You can make settings on the main screen.
	  - External channel change(ADD~ADD4) is not possible.

READY : `OFF`	＊ The controller informs the host controller of the preparation for dispensing.
	  - ON : Shot ready OK
	  - OFF : Shot ready FAIL

SHOT : `OFF`	＊ It informs the host controller of the operation status of dispenser(pump.

AUTO. CY : `OFF`	＊ It informs the host controller of the status of the auto purge dispensing mode.
	＊ It informs the status when auto purge mode is set.
	  - ON : During auto purge dispensing or auto purge operation
	  - OFF : Purge mode dispensing or auto purge not operating

E. MODE1 : `OFF` **E. MODE2 :** `OFF` **E. MODE3 :** `OFF` **E. MODE4 :** `OFF`	＊ It informs the host controller of the alarm status. ＊ 2^4=16 displays of alarm status. ＊ Refer to the "Table 21. PDC-100 Error I/O" for alarm for each status.

Table 13. Detailed description of output check

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5.8.6 Suck Back Setting
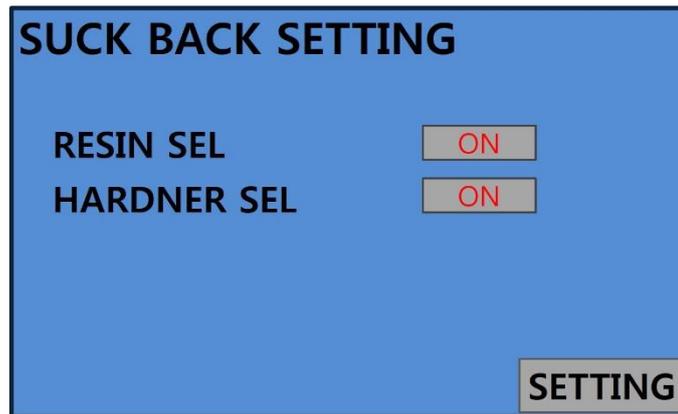
Figure 23. Suck back setting screen

In the suck back setting, you can set whether to use suck back in the resin or in the hardner pump, respectively.

Suck back speed applies the dispensing mixing ratio, and when the mixing ratio is significantly different, back flow to one direction may occur at the time of suction.

To solve this problem, add the suck back function and set whether to use it or not.

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5.9   Emergency Stop

In case of danger to operator's safety or in emergency situation, emergency stop button should be pressed.

The emergency stop button on this equipment operates as an emergency shutdown function.

The following operations are performed by the emergency stop button.

1) When robot is activated, it stops immediately. If it is stopped, it does not perform any further action.
2) Dispensing is stopped from the dispenser.
3) The buzzer sounds and the red warning light turns on.
4) Buttons for the operation of each component fail to function.
5) In addition, the internal function of the equipment is stopped.

After removing the causes of emergency stop and alarm, you can release the emergency stop button by turning it clockwise.

5.10 Modbus RTU communication

You can check the operation information of PDC-100 by Modbus RTU communication.

Table 14. Modbus RTU Connection and communication settings

Item	Description
Port	＊ PDC-100 rear COMM port ⑥RS485+, ⑦RS485- use (RS-485 2-Wire)
Communication setting	＊ Baud Rate : 38400bps ＊ Data Bits : 8bit ＊ Stop bits : 1bit ＊ Parity : None
Slave Address(ID)	＊ ID : 101, The administrator can make changes
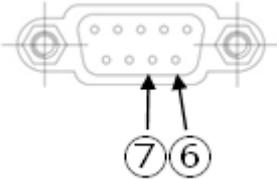
The PDC-100 operates on the mode bus RTU SLAVE and supports register address read operation (FC03).

Table 15 register map

주소		항목	RW	Func.	내용
0x500	1280	RUN/STOP	R	3	0: STOP, 1: RUN
0x501	1281	FAULT/NORMAL	R	3	0: NORMAL, 1: FAULT
0x502	1282	MODE	R	3	0: TIME, 1: STEADY, 2: AUTO CYSLE, 3: RATE
0x503	1283	RATIO(%)	R	3	Mixing ratio
0x504	1284	SPEED(%)	R	3	Shot speed
0x505	1285	Resin pressure	R	3	Resin pump pressure(x0.01), [bar]
0x506	1286	Resin load factor(%)	R	3	Resin pump motor load factor
0x507	1287	Hardener pressure	R	3	Hardener pump pressure(x0.01), [bar]
0x508	1288	Hardener load factor(%)	R	3	Hardener pump motor load factor
0x509	1289	Status word	R	3	Controller rear input connector 8-pin status (Sub 8bit)
0x50A	1290	Status word	R	3	Controller rear output connector 8-pin status (Sub 8bit)
0x50B	1291	Alarm word	R	3	Each bit represents an alarm condition
0x50C	1292	Alarm word	R	3	
0x50D	1293	Cumulative usage time of the motor	R	3	Cumulative usage time of the motor
0x50E	1294				
0x50F	1295	Cumulative usage time of the equipment	R	3	Cumulative usage time of the PDC-100
0x510	1296				
0x511	1297	VER	R	3	Firmware version. (EX> 40 means ver 4.0)
0x512	1298	HeartBeat	R	3	Normal when heart rate signal and numbers increase

Table 16. Address 1286(0x506) status word

bit	Name		Description
0	ADD1	External channel settings 1	Shows the current channel.
1	ADD2	External channel settings 2	
2	ADD3	External channel settings 3	
3	ADD4	External channel settings 4	
4	R.SENSOR	Resin remaining amount sensor	Insufficient amount of resin displays the input status of the sensor.
5	H.SENSOR	Hardener remaining amount sensor	Insufficient amount of hardener displays the input status of the sensor.
6	EMG	Emergency	Displays the status of the emergency stop signal of the external device.
7	SPARE	Spare	Displays the input status used as a backup.
8~15		Not use.	

Table 17. Address 1287(0x507) status word

bit	Name		Description
0	EXT. SEL	External control mode ON/OFF	Whether to use external control mode
1	READY	READY status	Shot ready status
2	SHOT	SHOT status	Shot status
3	AUTO CY	Auto cycle status	Auto purge status
4	E_MODE1	Error status 0	Identifies the type of error.
5	E_MODE2	Error status 1	
6	E_MODE3	Error status 2	
7	E_MODE4	Error status 3	
8~15		Not use	

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Table 18. Address 1289(0x509) alarm word

bit	Name	Description
0	Motor1_C	Resin cable error
1	Motor1_S	Resin pump error
2	Motor2_C	Hardener cable error
3	Motor2_S	Hardener pump error
4	Gel_Alarm	Harden error
5	R_Sensor	Resin remaining amount sensor error
6	H_Sensor	Hardener remaining amount sensor error
7	Emc	Emergency stop
8	R_Press	Resin pressure sensor error
9	H_Press	Hardener pressure sensor error
10	Mix_Rate	Mixing ratio error
11	R_Flow_Rate	Resin flow rate sensor error
12	H_Flow_Rate	Hardener flow rate sensor error
13	Motor1_CURR	Resin motor load fluctuation error
14	Motor2_CURR	Hardener motor load fluctuation error
15		Not use

- Modbus RTU communication packet description

  Read Holding Registers(Func03)

  It is used to read the register data of PDC-100.

Query

Slave Address (ID)	Function	Start Address		No. of Points		Error check (CRC16)	
		High	Low	High	Low	High	Low
1byte	1byte	1byte	1byte	1byte	1byte	1byte	1byte

Ex) All data request : 0x65 03 05 00 00 10 4c ee

Requests data from 0x0500 to 16 registers on the PDC-100.

A complete data request packet can be sent to the PDC-100 for communication testing with or without a response.

Response

Slave address	Function	Byte Count	Data		Data		⋯	Data		Error Check	
			Hi	Lo	Hi	Lo	⋯	Hi	Lo	Hi	Lo
1byte	1byte	1byte	1byte	1byte	1byte	1byte	⋯	1byte	1byte	1byte	1byte

Ex) Response : 0x65 03 20 **00 00 00 01 80 00 00 00 80 00 00 00 00 ff 00 00 00 05 00 00 00 00 01 a4 00 00 13 d6 00 28 00 16** 2f ac

Transfers data from 0x0500 to 16 registers.

Use the register map table to identify the data..

6   Maintenance

This equipment is composed of robot part responsible for motion operation, dispenser(Pro Duo Pump) responsible for dispensing and dispenser controller, so regular inspections are required.

A.   Make sure that there is enough material in the material supply area.

If the pump idles without material, the stator will be damaged due to overheating.

B.   If an abnormal sound occurs at the beginning of the operation or during the operation, stop the operation immediately and check for any abnormalities in the pump or drive unit.

In order to prevent malfunctions caused by various factors, please perform occasional(user-determined) and periodic (within a year) inspections.

	Danger
	Be sure to take necessary measures such as the manual mode of the equipment, emergency stop, power off, etc. before performing maintenance and inspection. If the power is not turned off, the sensor may detect a random object inside the equipment or inspector. It can cause an action. Do not perform the megger test(insulation resistance measurement). It may cause a malfunction.

As the functional usage time of the parts increases, aging may occur and it may cause the failure of the equipment. Check regularly to prevent problems and preserve the equipment, and if there's any abnormality, replace the parts.

6.1   Alarm display and Action

The pro pump system informs the user of the occurrence of alarms in the following ways when errors occur.

- ➢ Front Touch Panel
- ➢ System status I/O contact point output

The related alarm codes can be checked through the front touch panel.

Classification of abnormal phenoena is as follows :

- ➢ Alarms that may occur due to hardware protection or internal element breakage
- ➢ Alarms that may occur from incorrect settings when setting motion programs and points
- ➢ Alarms that may occur due to other mishandling, etc.

If an alarm occurs in the hardware protection system during operation, the output to the motor is cut off and the servo is turned off. In order to restart operation, it is necessary to remove the cause of alarm and then release it for normal operation.

Caution
Some alarms cannot be released even after reset. In this case, you must reboot(power on/off) after completing action for the relevant error.

6.2   Inspection and Measures

Inspections	Inspection Cycle	What to check and what to do	Remarks
Surounding Environment	Occasionally	Confirm that it meets the sage standard of the equipment.	
Power Supply	Occasionally	Check if the power is AC220V, 50/60Hz.	
Appearance of Equipment	Periodically	Check if the connection parts(connector, terminal block,etc.). are loose, and tightly fasten the loose parts.	
Cables	Periodically	Check if the cover is peeled or there is severe bending.	
Internal State of Equipment	Periodicaly	Manage the cleaning condition so that contamination by dust or coating liquied does not cause interference with operation of the equipment.	
Supplied Air	Occasionally	Check the piping connection, joints or if there is no leakage so that the supplied air maintains normal pressure.	
Purge Condition	Occasionally	If the equipment is stopped for more than 10 minutes, shot a certain volume depending on the set time so that hardening does not occur at the end of the valve.	
Robot	Occasionally	1) Check for abnormal vibration or abnormal noise. 2) Check for abnormal heat generation. 3) Check for abnormal vibration or abnormal noise on the bearing part.	
Other checks	Periodically	1) Fastening condition of the fixed parts and joints in the equipment 2) Joined and tightened condition of wiring 3) Arrangement condition around the equipment	

Table 19. PDC-100 Inspection and Measures

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6.3   Troble Shooting

Describes various symptoms and causes that can occur when using the equipment and how to take measures to fix them. If a problem occurs, take action according to the measures for each item, normalize it, then use the equipment.

Trouble	Possible Cause & Correction
If dispensing is not posible	1. Check the air supply in the tank. 2. Check the controller power supply. 3. Check whether the solution is there. 4. Check if there is liquid in the conduit line. 5. Check the connection of the air fitting. 6. Check the connection of the air fitting in the conduit line. 7. Check whether the nozzle is clogged. 8. Check whether the pump motor is operating.
If there is a change in the dispensing volume	1. Check if there is any change in the controller's setting value. 2. Check if there is any solidification of the solution in the chamber. 3. Check if there is any clogging in the needle. 4. Check if there is any air bubble in the conduit line and chamber. 5. Check if there is a change in the tank air supply pressure. 6. Check if there is a leak in the liquid connection fitting.
If there is a leak in the nozzle end during the stanby time after dispensing	1. Check if there is an abrasion in the rubber part of the stator. 2. Check if the tank air pressure has been set high. (The pressure setting for the tank air must be set to the extent that the fluid is transported to the pump chamber.) 3. Check if there is continuous operation of the pump drive motor.

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If the pump drive motor does not operate	1. Check the status of the motor cable connection. 2. Check the set value of the controller. 3. Check the power supply status. 4. Check if the liquid is solidified in the pump chamber.
If the liquid leaks out of the pump	1. Check if the o-ring between the chamber and seal block has been damaged. 2. Check the status of abrasion of the rotary seal in the seal block.
If an abnormal noise occurs while the pump is operating	1. Check if the bearing in the bearing block has been damaged. 2. Check the status of abrasion of the rotary seal in the seal block. 3. Check the condition of the motor reducer.
When the dispensed resin is not hardened	1. Make sure the mixing ratio is correct. 2. Check if the material volume in the tank is insufficient. 3. Check if there is sufficient material supply from the material supply equipment to the pump inlet. 4. Check if there is leakage while the pump is stopped. 5. If there is a drop of leak in about 10 seconts, replace the pump consumables. 6. Check for leakage or blockage in the mixer. 7. Check for leakage in the connections between the mixer and mix adapter. 8. Check if the inside of the mixer is hardened.
When the dispensing pressure of the material is higher than usual	1. Check for hardening or clogging of the mixer or nozzle. ➜ Replace the mixer or nozzle. 2. Check the mix adapter outlet for clogging. ➜ Disassemble and thoroughly clean the mix adapter.
Error Message **Emergency Stop**	Displayed at an emergency stop by an external device. Can be handled if you release the emergency button.
Error Message **Hardening Alarm**	Displayed when it is the set hardening time.

Error Message **Hardner Pump / Resin Pump Error**	Displayed when the pump connection is incorrect. Check the motor cable connection.
Error Message - Remaining volume **of hardner / resin**	Displayed when the volume of resin and hardner is insufficient. Fill up the insufficient resin and hardner.

Table 20. PDC-100 Trouble Shooting

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6.4   Part Replacement

As the functional usage time of the parts increases, aging may occur and it may cause the failure of the equipment. Check regularly to prevent problems and preserve the equipment, and if there's any abnormality, replace the parts.

6.5   PDC-100 Error I/O

Error Contents	E_MODE0	E_MODE1	E_MODE2	E_MODE3
EMERGENCY STOP	ON	OFF	OFF	OFF
RESIN PUMP ERROR1	OFF	ON	OFF	OFF
RESIN PUMP ERROR2 RESIN PUMP ERROR3	ON	ON	OFF	OFF
HARDNER PUMP ERROR1	OFF	OFF	ON	OFF
HARDNER PUMP ERROR2 HARDNER PUMP ERROR3	ON	OFF	ON	OFF
RESIN REMAIN AMOUNT	OFF	ON	ON	OFF
HARDNER REMAIN AMOUNT	ON	ON	ON	OFF
GEL ALARM	OFF	OFF	OFF	ON
MIX_RATE	ON	OFF	OFF	ON
RESING PRESS	OFF	ON	OFF	ON
HARDNER PRESS	ON	ON	OFF	ON
R_FLOW_RATE	OFF	OFF	ON	ON
H_FLOW_RATE	ON	OFF	ON	ON
NORMAL	ON	ON	ON	ON

Table 21. PDC-100 Error I/O

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6.6 PDC-100 Error Display

Screen Display	Name	Expected Causes	Measures
EMERGENCY	Emergency Stop	Occurs when the external emergency stop signal is input(EMER)	Use after the external emergency stop signal is released.
RESIN PUMP ERROR1	Resin Cable Error	Resin motor cable disconnection	Check resin cable / connector connection, use after change the cable.
RESIN PUMP ERROR2	Resin Pump Error	Other resin motor errors (motor settings, overcurrent, overload, overheat, low/over voltage)	1. static mixer, needle Dispensing load check (Pressure sensor 10bar under, pcp-015->15bar, 005 -> 20bar) 2. static mixer, needle curing check (shot after mixer, needle replacement) 3. Confirmation of hardening of the stator with backflow of material (pump disassembly, cleaning, re-dispensing, allowable shot pressure standard) 4. Confirm that the filler of high filler material is loaded in the stator (pump disassembly, cleaning, re-dispensing, allowable regular cleaning standards)
HARDNER PUMP ERROR1	Hardner Cable Error	Hardner motor cable disconnection	Check hardner cable / connector connection, use after change the cable.
HARDNER PUMP ERROR2	Hardner Pump Error	Other hardner motor errors (motor settings, overccurrent, overload, overheat, low/over voltage)	1. static mixer, needle Dispensing load check (Pressure sensor 10bar under, pcp-015->15bar, 005 -> 20bar) 2. static mixer, needle curing check (shot after mixer, needle replacement) 3. Confirmation of hardening of the stator with backflow of material (pump disassembly, cleaning, re-dispensing, allowable shot pressure standard) 4. Confirm that the filler of high filler material is loaded in the stator (pump disassembly, cleaning, re-dispensing, allowable regular cleaning standards)

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RESIN REMAIN AMOUNT	Resin remaining volume error	Occurs when the amount of resin is insufficient.	Replenish the insufficient resin. If the amount is sufficient, check the remaining volume sensor.
HARDNER REMAIN AMOUNT	Hardner remaining volume error	Occurs when the amount of hardner is insufficient.	Replensh the insufficient hardner. If the amount is sufficient, check the remaining volume sensor.
GEL ALARM	Hardening Alarm	Set hardening timeout. (external device setting – hardening alarm)	Dispense according to the set time so that hardening cannot occur.
MIX_RATE	Ratio Error	Occurs when the resin-based ratio setting fails.	Set the ratio based on the resin.
RESIN PRESS	Resin Pressure Error	Occurs when the current pressure is higer than the set pressure.	Check the mixer or nozzle for hardening or clogging. Check the pressure set point.(Check the D.Press Setting.)
HARDNER PRESS	Hardner Pressure Error	Occurs when the current pressure is higher than the set pressure.	Check the mixer or nozzle for hardening or clogging. Check the pressure set point.(Check the D.Press Setting.)
R_FLOW_RATE	Resin Flow Error	Occurs when resin flow rate value is out of calibration value	Run the flow rate calibration. Adjust tolerance.
H_FLOW_RATE	Hardner Flow Error	Occurs when hardner flow rate value is out of calibration value	Run the flow rate calibration. Adjust tolerance.
-	Normal State	-	-

Table 22. PDC-100 Error Display