

**Minimo**<sup>®</sup>  
**ONE**  
**S**ERIES  
**Ver. 2**

D.C. POWER PACK  
C2012/C2112/C2212  
OPERATION MANUAL

<D.C. POWER PACK C2212>

EN60745-1、EN60745-2-3

EN61000-6-4、EN61000-4-2、EN61000-4-3、EN61000-4-4

EN61000-4-5、EN61000-4-6、EN61000-4-8、EN61000-4-11

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## Introduction

### Thank you very much for purchasing Minimo ONE Series Ver. 2 D.C. Power Pack.

This product is the D.C. power pack for Minitor Handpieces. Read carefully this instruction manual before use. Also read carefully the instruction manuals of handpieces (Standard/Slender Rotary, Anglon, Recipron, and Mini Belt Sander) and of motors. Please keep this instruction manual near the power pack for any operators to refer to whenever operating this system. If you lose your instruction manual, download it from our website.

#### Cautions for handling and operation

- Read the precautions below to ensure safe use and handling. These precautions are intended to protect you and others around you. Read and follow them carefully to avoid injury, damage to the product or damage to property.
- Read carefully the instruction manual of this power pack, handpieces and foot switch.
- Keep this instruction manual near the power pack for any operators to refer to whenever operating this system.

#### ■ About Symbols

The symbols below have the following meanings.



This symbol denotes that an instruction must be obeyed at all times.



This symbol denotes that the action is prohibited.

#### ■ About Warning and Caution

Safety instructions are classified as Warning and Caution in accordance with the seriousness of the risk.



#### Warning

This indicates that incorrect operation presents significant danger of accident, resulting in death or serious injury to users.



#### Caution

This indicates that incorrect operation presents possibility of injury to users or damage to the unit.

#### Warning

- **Plug the power cord to a grounded outlet.**  
○ Failure to do so could result in electric shock, static electricity injury, network disturbance, noise breakout and/or etc.
- **If the power cord is damaged, replace it with a undamaged power cord (separately sold).**  
○ Failure to do so could result in fire and/or electric shock.
- **Do not plug in and out with wet hands.**  
○ Wet hands could result in electric shock.
- **Keep the main switch off when connecting handpieces with power pack.**  
○ Failure to do so could result in fire, electric shock, and/or failure.
- **Do not use a damaged curl cord.**  
○ Failure to do so could result in fire, electric shock, and/or failure.
- **Keep away from cutting fluids, water and/or oil mist.**  
○ Failure to do so could result in fire, electric shock, and/or failure.
- **Do not close the air holes on the top of the power pack.**  
○ Failure to do so could result in increasing temperature inside of the power pack, resulting in fire and/or failure.
- **Do not use the power pack with any input voltage except the voltage instructed by power pack.**  
○ Failure to do so could result in fire and/or electric shock.
- **Always wear safety glasses and a mask for dust.**  
○ Chips and/or dust left after grinding/polishing process could result in unexpected injury.

#### Warning

- **Do not start to run the handpiece while its collect chuck opens.**  
○ Failure to do so could cause the motor to be overheated, resulting in fire or failure.
- **Make sure whether or not the handpiece runs after switching on.**  
**If the handpiece does not run after switching on, stop using it.**  
○ Failure to do so could cause the motor to be overheated, resulting in fire or failure.
- **In case of abnormal noise, smoke, and/or bad smell, turn off the main power and unplug the power cord.**  
○ Failure to do so could result in fire and/or electric shock.
- **Do not modify and/or disassemble the power pack.**  
○ Failure to do so could result in fire, electric shock, and/or failure.  
○ Also this may have a significant impact on its safety and performance.
- **Always ask us for repair.**  
○ Failure to do so could result in fire, electric shock, and/or failure.  
○ Also this may have a significant impact on its safety and performance.

#### Caution

- **Do not pull the power cord when unplugging.**  
○ The damaged power cord could result in fire, electric shock, and/or failure.
- **Do not put heavy things on the power cord.**  
○ The damaged power cord may result in fire, electric shock, and/or failure.
- **Do not put the power cord near heater.**  
○ Failure to do so could result in fire, electric shock, and/or failure.
- **Use the power pack in a place without condensation.**  
○ Failure to do so could result in fire, electric shock, and/or failure.
- **Use in temperature between 0 - 40°C.**  
○ Failure to do so could result in malfunction and/or failure.
- **Do not use in a place near machines remarkably emitting electric noise.**  
○ Failure to do so could result in malfunction and/or failure.
- **For maintenance, unplug the power cord for safety.**  
○ Failure to do so could result in electric shock and/or failure.
- **Do not drop and/or hit.**  
○ Failure to do so could result in malfunction and/or failure.
- **Do not use in a place with corrosive gas such as chlorine gas, hydrogen sulfide, and/or sulfurous acid gas.**  
○ Failure to do so could result in fire, electric shock, and/or failure.
- **For disposal of this power pack, please follow your local city office or the shop where you purchased the product.**
- **Do not allow children to use this product. Also, keep away from children.**
- **When you leave the workshop, turn off the main switch, and unplug the power cord from the outlet for safety.**
- **Be careful for dust, oil, water not to enter the inside of the power pack.**  
**If entering, turn off the main switch and unplug the power cord. Then, ask us for repair.**  
○ Failure to do so could result in fire, electric shock, and/or failure.
- **When you replace a fuse, unplug the power cord for safety.**  
**Also, use the specified fuse to replace.**  
○ Failure to do so could result in electric shock and/or failure.

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## 1. Confirmation of this product

Please make sure of standard equipments and accessories inside.

**D.C. POWER PACK**  
 ◆C2012 ◆C2112 ◆C2212  
 (Any One)



**Power Cord**  
 ◆CA10 (AC100V)  
 ◆CA11 (AC115V)  
 ◆CA12 (AC230V)  
 (Any One)



**Rubber Cradle**  
 ◆RM11



**Fuse**  
 ◆PFU-2.0A(C2012/C2112)  
 ◆PFU-1.0A(C2212)



**Manual**  
 ◆IMW-C2012



AC Cord CA10/CA11/CA12(Any One)



Check the number in the underlined part

fig-2

POWER PACK & AC Cord are only included.  
 Except POWER PACK & AC Cord, please purchase individually.

fig-4.<System configuration table>

POWER PACK	Motor				Head								Clamp Head			Joint	
					H011	H021	H031	H041	H051	H211	H221	H231	H311	MX52	MX53	FX91	ET51
	One Series	Ver.2	Type	Max Speed [min <sup>-1</sup> ]	Standard	Slender	Heavy Duty	Long Slender	Air	Standard	Heavy Duty	Variable amplitude type	Standard	Heavy Duty	Clamp	Reduction Ratio Gear	
C2012 C2112 C2212	KV11H	KV112H	Ultrahigh	50,000	○	○			○								
	KV21H	KV212H	High	40,000	○	○											
	KM11H	KM112H		35,000	○	○			○								
	KM21H	KM212H		30,000	○	○	○	○						○	○	○	○
	KV21	KV212	Medium	25,000	○	○											
	KM11	KM112		20,000	○	○			○					○	○	○	○
	KM21	KM212		15,000	○	○				○	○	○		○	○	○	○
	KM21L	KM212L	Low	8,000	○	○				○	○	○		○	○	○	○
	KM11G	KM112G		Low gear	6,800	○	○							○	○	○	○

\*○ is possible combinations of Head joint

	One Series	Ver.2	Type	Max Speed [min <sup>-1</sup> ]	Max Torque [N·m]
C2012 C2112 C2212	RE11	RE112	Reciprocating File	—	3,500
	RE21	RE212	ting File	—	7,000
	BS31	BS312	Belt Sander	700	—

## 2. Equipment Features

- **Powerful Microcomputer Control**  
 In addition to the handpiece identification function, the microcomputer control can optimize the connected handpiece for its ideal torque (Ver. 2 handpieces only).
- **Handpiece Identification Function**  
 When you connect a hand piece with the powerpack, the powerpack identifies your handpiece model. Then, it optimally controls the handpiece and displays its own rotation speed on the front panel (Ver.2 handpieces only).
- **Two lines of the output terminal**  
 You can connect two handpieces with one power pack at same time.  
 You cannot rotate the two handpieces at same time.
- **New Feedback Circuit**  
 A feedback circuit extracting the maximum of motor's function is mounted on the powerpack. This enables to generate tough torque even in low rotation speed (Ver.2 Handpieces only).
- **External Input/Output Signal Control**  
 The DIN connector of a foot switch can be used to remote control the powerpack by external input. The remote control system is the standard function of this powerpack for turning ON/OFF of handpieces, setting rotation speed and direction, and selecting station to use.
- **Digital rotation Speed Display**  
 The setting rotation speed is displayed (estimated rotation speed from voltage) (Ver.2 handpieces only).
- **Error Code Display Function**  
 To warn abnormality of the powerpack and handpieces by displaying error codes.
- **LED Load Meter**  
 To display loaded condition on handpiece by eight LEDs.
- **Rotation Speed Maintaining System (Variable controller only)**  
 In case you use a variable type foot switch and would like to maintain the setting rotation speed, press ON/OFF switch on a powerpack. Then, the setting rotation speed is kept without using the foot switch.  
 In order to cancel this function, step on the foot switch again, or press the hand switch or ON/OFF switch.
- **Setup of Startup Time of Motor**  
 In the factory default setting, handpieces reach a maximum rotation speed in approx. 2.6 sec (normal mode). And, steps can shorten the time to 1.1 sec (fast mode).

## 3. Specifications

- **Input Voltage**  
 C 2 0 1 2    A C 1 0 0 V ± 5 %    5 0 / 6 0 H z ( C 2 0 1 2 )  
 C 2 1 1 2    A C 1 1 5 V ± 5 %    5 0 / 6 0 H z ( C 2 1 1 2 )  
 C 2 2 1 2    A C 2 3 0 V ± 5 %    5 0 / 6 0 H z ( C 2 2 1 2 )
- **Rated Input**  
 6 0 V A
- **Output Voltage**  
 D C 1 ~ 3 0 V
- **Safety System**  
 When the output current flows more than 1A continuously, the output current will be shut down within 3 seconds.  
 When the surface temperature of the power transistor in the POWER PACK rises over 100°C, the system will shutdown the output current.
- **Operating temperature and humidity range**  
 0 ~ 4 0 ° C    and    2 0 ~ 8 0 % (No condensation)
- **Dimensions**  
 1 4 4 ( W ) × 2 1 8 ( D ) × 1 1 6 ( H )
- **Weight**  
 2 . 5 k g (About)

## 5. Names and Functions of Each Component

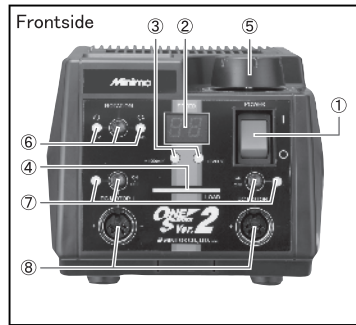


fig-5

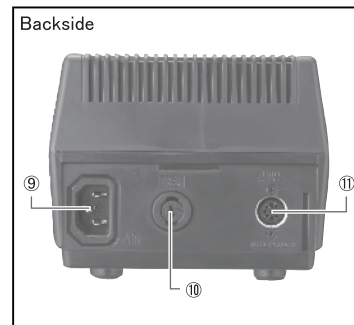


fig-6

### ① Main Switch

To perform ON/OFF of the main power source ( I : ON O : OFF)

### ② Display

To display setting rotation speed, motor rotating speed, rate of the maximum rotation speed, and error No. when any errors occur.

● In case that handpieces with the identification function (Minimo ONE Ver.2) are connected with power packs

Motor in stop ..... Displaying setting rotation speed with  $1/1000 \text{ min}^{-1}$  (※1)

Motor in operation ..... Displaying motor rotating speed with  $1/1000 \text{ min}^{-1}$

※1... The powerpack identifies the rotation speed range of each handpiece when the handpiece is connected with the powerpack.

Note: in case of use of angled head handpieces, the displayed rotation speed is different from the actual speed

(the actual rotation speed will be approx. 95% from the setting speed.)

● In case that a power pack is connected with Recipron and Belt Sander with the identification function, and handpieces without the identification function (RE112, RE212, BS312, not Minimo ONE Ver.2.)

Motor in stop ..... Displaying the ratio to the maximum rotation speed of the connected handpiece (※2)

Motor in operation ..... Displaying the ratio to the maximum rotation speed of the running handpiece

※2... Displayed values are integers from 10 to 99 and FL standing for FULL. (FL = 100)

(Example) A handpiece with the maximum rotation speed of  $20,000 \text{ min}^{-1}$

rotation speed displayed with "30" →  $20,000 \text{ min}^{-1} \times 0.30 = \text{Approx. } 6,000 \text{ min}^{-1}$

rotation speed displayed with "FL" →  $20,000 \text{ min}^{-1} \times 1.00 = \text{Approx. } 20,000 \text{ min}^{-1}$

※ In case that Recipron and/or Belt Sander is connected

(Example) Recipron (RE212)

rotation speed displayed with "30" →  $7,000 \text{ strokes/min} \times 0.30 = \text{Approx. } 2,100 \text{ strokes/min}$

(Example) Mini Belt Sander (BS312)

rotation speed displayed with "30" →  $700 \text{ m/min} \times 0.30 = \text{Approx. } 210 \text{ m/min}$

### ③ Discriminating Panel Light

● × 1000  $\text{min}^{-1}$  Light

This light is turned on when Minimo ONE Ver.2 handpieces are connected.

● LEVEL% Light

This light is turned on when handpieces except Minimo ONE Ver.2 are connected.

### ④ Load Light

Load light is turned on from left to right in direct ratio to electrical current flowing to a handpiece.

• Load light is turned off if the amount of electric current to a handpiece becomes low for five seconds.

※ In case that all the foot switch signals are used for the remote control, errors do not occur even when all the load lights are turned off, and the alarm signal from the foot switch socket will be off. For more detailed information, please refer on p. 11 for ⑥ in 8-3.

• Use a handpiece within the green lights.

• Overheat may occur due to the high temperature in powerpack if the orange light is on for a certain period of time.

• Overload system may be activated due to the overcurrent to a handpiece if the red light is on for a certain period of time.

### ⑤ Speed Controlling Knob

To set the rotation speed of a handpiece

### ⑥ Rotation Direction Changing Switch • Rotation Direction Light

To change the rotation direction of the selected handpiece, Rotation direction light of the selected rotation direction will be turned on.

◆ FWD. = Clockwise ◆ REV. = Counter-Clockwise

※ To change the rotation direction while a handpiece is in stop.

### ⑦ DC Motor On/Off Switch • DC Motor Output Light

To select the station to use and control On/Off of a handpiece

The DC motor output light illuminates green when the station to use is selected.

In case that the DC motor output light is off, press the DC motor On/Off switch and select the station to use. The DC motor output light becomes green.

Pressing the DC motor On/Off switch after selecting the station will run a handpiece and then pressing the switch again stop the handpiece.

※ Two handpieces do not run simultaneously. When the other handpiece needs to run, stop the running handpiece and then start the other handpiece.

The colors of the DC motor output light indicate the followings:

Light-Off - Station is not selected.

Green - Station is selected and handpiece is in stop.

Orange - Handpiece is in operation.

Red - Errors occur

### ⑧ DC Motor Socket

Sockets for the plug of a handpiece to be connected

### ⑨ AC Socket

Use the right cable for the right power pack

### ⑩ Fuse Holder

When replacing a fuse, unplug the AC code from the AC socket first.

Then use the flat-head screwdriver to remove the cover.

Please make sure to replace the equivalent fuse.



fig-7

**Caution** Please ask us to repair, if there is no clear reason such as electrical short circuit

### ⑪ Foot Switch Socket

The socket for the plug of foot switch

### ⑫ Buzzer Trimmer

To adjust volumes of switch operation sound, switch operation no-effect sound, warning sound before overload, and error sounds.

Use a Phillips head screwdriver to adjust the volumes. (Clockwise for volume up, counterclockwise for volume down)

◆ Error sounds

● Switch operation sound - one pip sound ● Switch operation no-effect sound - two pip sounds

● Warning sound before overload - intermittent pip sounds ● Error sounds - continuous pip sound

### ⑬ Tapped Hole for Fixing Power Pack

Powerpack has  $\phi 3.2 \text{ mm}$  holes under the rubber legs. In order to fix a powerpack, remove the rubber legs and use self-tapping screws (M4). Use the self-tapping screws (M4) with its insertion length under 15mm to the powerpack.

### ⑭ Carrying Handle

Retractable handle for carrying a power pack

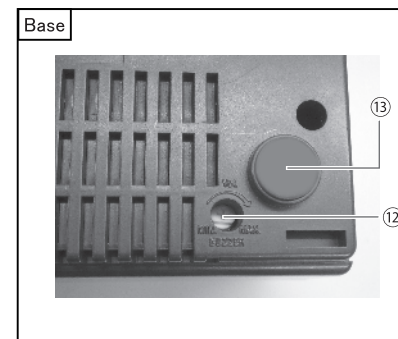


fig-8

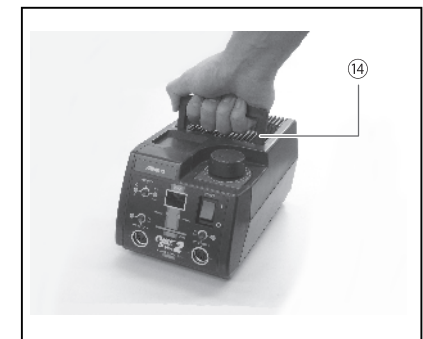


fig-9

■ Over load function when the motor is locked • Danger avoidance function

The overload function will operate if its collet chuck opens or the load is stable.

### ● Usual overload.

• Opened collet chuck. ⇒ Switch ON ⇒ Overload caution. (5 sec) ⇒ Overload(Stop)

### ● Over load in case that its collet chuck opens.

• Opened collet chuck. ⇒ Switch ON ⇒ 15 sec ⇒ Overload caution. (5 sec) ⇒ Overload(Stop)

### ● Trouble shooting in case that the danger avoidance function operates under constant load.

• A constant load process(15 sec). ⇒ Overload caution. ⇒ Set to no-load condition within 5 seconds. ⇒ Danger avoidance function is reset.

※ The time by the caution and the load displacement can be changed. Please ask to Minitor for changing.



## 6. Operating Procedure

### 6-1 Without Foot Switch

- (1) Always confirm that the AC power cord has been fully inserted into the socket of the power pack, and plug it in an outlet.
- (2) Fully connect the plug of the curl cord of a handpiece with the D.C. motor socket.
- (3) Turn the speed controlling knob all the way to the left (counter-clockwise). This is the minimum rotation speed.
- (4) Turn the main switch on (Power light will be on).  
※After the main switch is on, all the lights are also on. Follow the next step when all these lights become in normal.  
 ※Count-down numbers may be displayed until output voltage goes down to the certain level if you stop the running handpiece by the main switch. Error will be displayed if the output voltage does not go down within ten seconds. Turn off the main switch to cancel the error.
- (5) In case that the light of the station to use is off, press the main switch or the switch on the handpiece. Then the output light becomes green.
- (6) Select the rotation direction by the rotation changing switch (FWD. is standard)
- (7) Set the rotation speed by the speed controlling knob.  
※For safety, do not set the exceeded allowable maximum rotation speed of Sentan Tools to use.
- (8) Motor will start to run by pressing the hand switch or the DC Motor On/Off Switch on the powerpack.

**⚠ Caution** ■ You cannot rotate the two handpieces at same time.

- (9) Press hand switch or the DC Motor On/Off Switch on the powerpack again to stop the running motor.  
※In case errors occur, press the hand switch or the DC Motor On/Off Switch on the powerpack and then the errors will be canceled.  
 If the errors of the 90s occur, turn the main switch off to cancel.

#### Setup of Startup Time of Motor

In the factory default setting, handpieces reach a maximum rotation speed in approx. 2.6 sec (normal mode). And, the following steps can shorten the time to 1.1 sec (fast mode).

1. Turn on a power pack while pressing the rotation direction switch and DC motor 2 switch simultaneously.
2. "FA" is displayed on the rotation speed meter when in fast mode, while the normal mode shows "no" on the display.
3. Release the switches and set.

### 6-2 With Foot Switch

- (1) Put the foot switch plug into the foot switch socket on the back.  
※An error occurs if plug in and out while the main switch is on. In order to cancel the error, turn the main switch off.
- (2) Follow the same procedures from (1) ~ (7) of "Without Foot Switch".
- (3) Motor will start to run by pressing foot switch.
- (4) In order to stop the motor, turn the foot switch off.  
※In case that errors occur due to overload or something, turn the foot switch off and the errors are canceled.  
 If the errors of the 90s occur, turn the main switch off to cancel.

<With FS201 or FS211>

Use the speed controlling knob to control rotation speed

<With VC301>

Set the certain rotation speed by adjusting the speed controlling knob. This adjusted rotation speed will be the speed being generated by pressing the foot switch to the full. Adjustment of rotation speed within the setting speed is possible by controlling the foot switch.

◎Rotation Speed Maintaining Function

A certain rotation speed generated by the foot switch controlling can be maintained by pressing hand switch or the DC Motor On/Off Switch on the powerpack.

In order to cancel this function, press the hand switch or the DC Motor On/Off Switch on the powerpack again.

## 7. Troubleshooting

- In case that errors occur, the error information will be displayed on the front panel.
- This information is provided first by 「E.—」 showing error occurrence. Then, simple displays such as 「oL」 (Overload) appear on the front panel for its cause of the error. These information are alternately displayed.
- Pressing and holding the rotation direction changing switch during the error displays 「E.—」 and error No. alternately.
- In case errors occur, press the hand switch or the DC Motor On/Off Switch on the powerpack and then the errors will be canceled.  
 When using a foot switch, turn the foot switch off to cancel the error.  
 If the errors of the 90s occur, turn the main switch off to cancel.

fig-10. <Troubleshooting>

Error No.	Simple Display	Cause	Trouble	Error cancel / Corrective Action
11	Po	POWER PACK	Errors of the preset commands are detected.	Press the DC MOTOR ON/OFF switch of the currently using station or the hand switch.
12	Fo	Footswitch	Start signal has already come to the powerpack, when turning the main switch on.	Turn off the foot switch or external signal for start.
13	HP	Handpiece	Abnormal of motor model signal	Press the ON/OFF switch of the using station and the fully insert the plug of the handpiece.
16	oL	Over load	Over loaded by overcurrent to a motor	Press the ON/OFF switch of the using station or the hand switch.
17	oH	Heating	Overheated by increasing temperature in a powerpack	Press the ON/OFF switch of the using station or the hand switch and wait until the power pack temperature goes down. (※1)
19	Po	POWER PACK	Output voltage to the handpiece becomes too high.	Press the ON/OFF switch of the using station or the hand switch. Use the handpiece within the green lights of the load lights.
91	Fo	Footswitch	The plug of foot switch is plugged and unplugged.	Turn off the main switch. If you use the foot switch, fully insert the plug of foot switch and turn on the main switch.
92	Po	POWER PACK	Output voltage is too low.	Turn off the main switch and ask us for repair.
93	Po	POWER PACK	Output voltage is too high.	Turn off the main switch. Ask us for repair if the same error occurs although the main switch is turned ON again.
94	Po	POWER PACK	It takes more than 10 seconds to stop the handpiece.	Turn off the main switch. Slow down the rotation speed when you use heavy tools. Ask us for repair if the same error occurs although the main switch is turned ON again.
95	Po	POWER PACK	Output voltage is too high when the handpiece stops.	Turn off the main switch and ask us for repair.
96	Po	POWER PACK	Abnormal date of the power pack is detected.	Turn off the main switch and ask us for repair.
99	Po	POWER PACK	An error on a circuit is detected.	Turn off the main switch and ask us for repair.

(※1) In case of overheat, if the temperature in the power pack is high even after error is reset, the display shows the setting speed and 「oH」, which indicates the overheat. If the temperature in the power pack goes down, the display shows the setting speed only. So wait until 「oH」 disappears.

## 8. External Input/Output Control Signal Operation

You can do the following control with external input/output signal.

- Start /stop of the motor
- Rotation speed setting
- Rotation direction setting
- Station setting
- Alarm signal output

For use of the external input/output signal, refer to the following usage instructions, usage examples and foot switch signal circuitry of the power pack.

### 8-1 Controlling Only ON/OFF of Motor.

- ① Short-circuit the N08 pin of DIN8P plug and the Jack part which is the metal part of the plug, in the internal plug.
- ② Short-circuit the N02 and N03 pin in the internal plug.
- ③ Pull out the signal lines from the N03 and N05 pin. Connect these lines with the relay contact.

※The electric current at the contact is below 1mA.

- ④ The motor starts to run by connecting the contact which turns output ON.
- ⑤ The motor will stop by disconnecting the contact which turns output OFF.

※An error occurs for safety if the N03 and N05 pin are connected before the main switch is ON.

The error is canceled by disconnecting the N03 and N05 pin.

※Do not exceed the maximum acceptable speed of Sentan Tools.

※If errors occur by overload and others, they are canceled by turning the output off.

If the errors of the 90s occur, turn the main switch off and then turn it on again.

If errors are due to overheat in the powerpack, stop using the powerpack until the error display 「oH」 goes out.

The alarm signal is OFF while 「oH」 is displayed while the alarm signal is ON when the temperature decreases and 「oH」 is not displayed.

※Please use the handpiece within green lights of the LOAD lights.

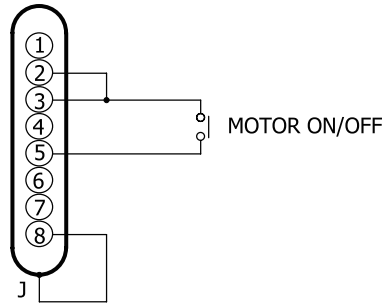


fig-11. Use of Relay Contact and Others

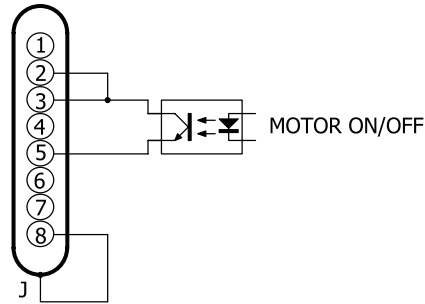


fig-12. Use of Photocoupler

### 8-2 Controlling ON/OFF and Rotation Speed of Motor.

- ① Short-circuit the N08 pin of DIN8P plug and the Jack part which is the metal part of the plug, in the internal plug.

- ② Pull out the signal lines from the N03 and N05 pin. Connect these lines with the relay contact
- ③ In order to control the rotation speed, pull out the signal lines from N02 pin and Jack part and apply the control voltage to the lines. For applying the control voltage, follow the following polarity. The setting rotation speed is displayed when the motor stops.

- N02 pin...+V control voltage +0.4V ~ +4V (Maximum voltage : +12V)
- Jack...GND

※The maximum speed is set by adding +4V or more to the control voltage, while the minimum speed is set below +0.4V. The setting rotation speed is proportional to the control voltage.

※As the power supply for the control voltage, use the +12V (Current capacity of 50mA or less) output from the N03pin to GND of Jack.

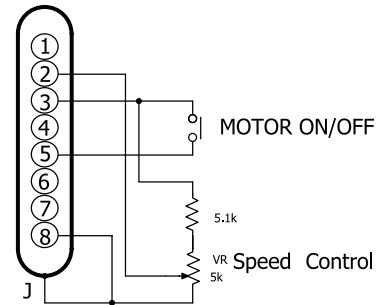


fig-13. Use of Volume (VR) for Setting Rotation

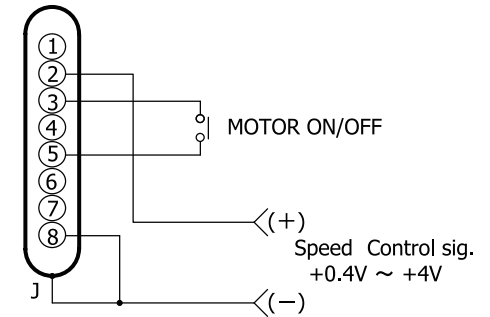


fig-14. Use of Voltage Signal for Setting Rotation Speed

### 8-3 Use of All Foot Switch Signals

- ① Short-circuit the NO8 pin of DIN8P plug and the Jack part which is the metal part of the plug, in the internal plug.
- ② In order to set rotation direction, connect the signal lines from NO3 and NO1 pin with the relay contact. In this setting, the rotation direction will be REV. (counter-clock wise). While, by opening the contact, the rotation will be FWD. (clock wise).
  - ※ Set the rotation direction 100ms before turning on the MOTOR ON/OFF signal.
- ③ You can set the station to use to D.C. Motor 2 when you connect the relay contact with the signal lines from NO3 pin and NO4 pin, or to D.C. Motor 1 when you open the contact.
  - ※ Set the station to use 100ms before turning on the MOTOR ON/OFF signal.
- ④ The motor starts to run by connecting the signal lines from NO3 and NO5 pin with relay contact, while the motor stops by opening the contact. If an error occurs while the motor is running, open the contact to cancel the error.
  - ※ If the errors of the 90s occur, turn off the main switch to cancel the error.
- ⑤ In order to control rotation speed, pull out signal lines from NO2 pin and Jack and apply control voltage to the lines. For applying the control voltage, follow the following polarity.
  - NO2 pin...+Vcontrol voltage +0.4V ~ +4V (MAX : +12V)
  - Jack...GND
  - ※ The maximum speed is set by adding +4V or more to the control voltage, while the minimum speed is set below +0.4V.
  - The setting rotation speed is proportional to control voltage.
  - ※ As the power supply for the control voltage, use the +12V (Current capacity of 50mA or less) output from the NO3 pin to GND of Jack.
- ⑥ The ALARM signal is normally ON as the photocoupler output is used for the ALARM signal. But it will be OFF with the following cases. (In Case of ALARM Signal Being OFF)
  - When an error occurs.
  - In case that the condition of low electric current volume (60mA and less) to the motor continues for 5 seconds when the motor ON/OFF signal is ON. All the LOAD lights will be off if the ALARM signal is OFF.
  - When the powerpack is overheated. In this case, the alarm signal will be back to ON when the temperature in the power pack goes down by stopping the motor.
  - ※ Note that the photocoupler output is used for the ALARM signal and has the polarity.
  - ※ Connect NO6 with +, and NO7 with -.
  - The maximum voltage to NO6 and NO7 pin is below 30V. And, set the electric current to the pins below 10mA.

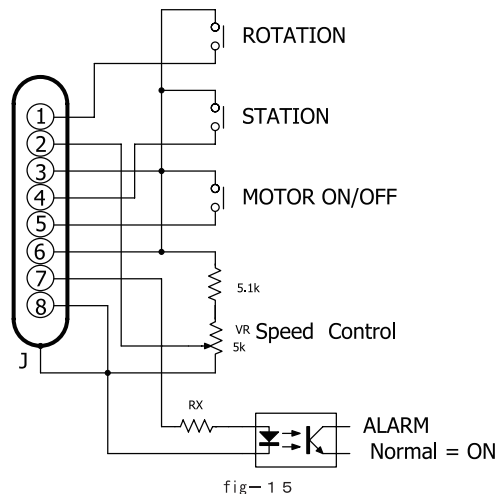


fig-15

※ For "RX" resistance, set its resistance value below 10mA of the ALARM output signal

(Foot Switch Socket Signal Description)

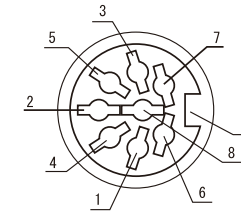
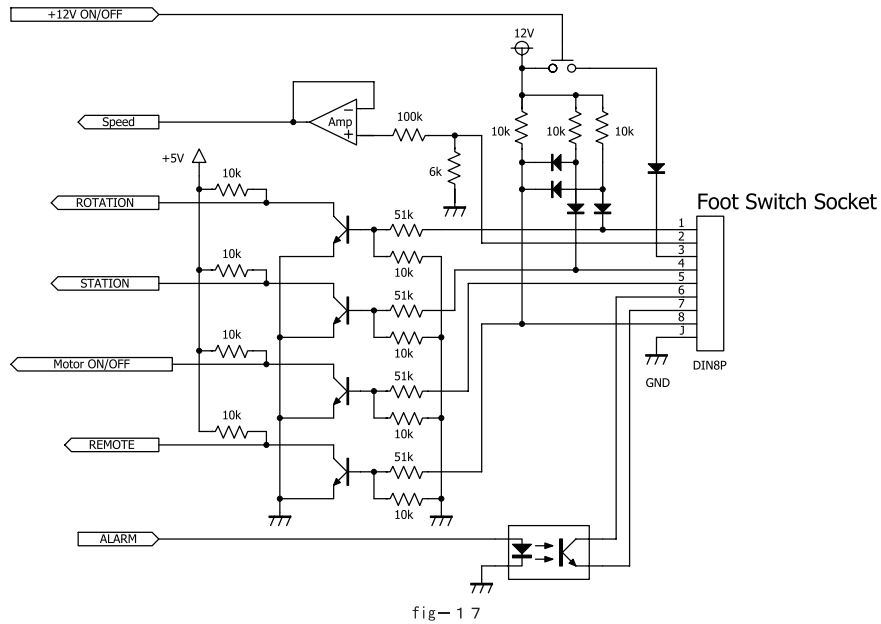


fig-16. Pin Number

[Pin Number]

- ① Rotation Direction Input Signal
  - To set rotation direction
  - Short-circuiting NO1 and NO3 pin, the rotation direction will be REV. Also, applying voltage between NO1 pin and Jack, the rotation direction will be REV.
  - Controllable voltage range: FWD ... 0V ~ +2V or OPEN  
REV ... +6V ~ +24V (MAX : 30V)
  - ※ Set the station to use 100ms before turning on the MOTOR ON/OFF signal.
- ② Speed Input Signal
  - To set rotation speed
  - Apply voltage between NO2 pin and J (Jack part).
  - Controllable voltage range : +0.4V ~ +4V (MAX +12V)
  - The maximum speed is set by adding +4V or more to the control voltage, while the minimum speed is set below +0.4V.
  - ※ In case of control by the external signal, set the speed controlling knob on the powerpack to the MAX side. The maximum rotation speed of 4V input will be limited by the position of the speed controlling knob.
  - ※ To set rotation speed by the speed controlling knob, short-circuit NO2 and NO3 pin.
- ③ +12V Power Output
  - This pin is possible to be used as a 12V power supply.
  - Available electric current : 50mA or less
  - ※ Do not apply external power supply voltage to this pin. It may result in failure.
- ④ Station Setting Input Signal
  - To set station to use
  - D.C. MOTOR2 is set by short-circuiting NO4 and NO3 pin. Also the D.C. MOTOR2 is set by applying voltage between NO4 pin and J.
  - Controllable voltage range: D.C. MOTOR 1 ... 0V ~ +2V or OPEN  
D.C. MOTOR 2 ... +6V ~ +24V (MAX : 30V)
  - ※ Set the station to use 100ms before turning on the MOTOR ON/OFF signal.
- ⑤ Motor ON/OFF Signal
  - The motor starts to run by short-circuiting NO5 and NO3 pin. Also the motor starts to run by applying voltage between NO5 and J.
  - Controlling voltage range : MOTOR ON...+6V ~ +24V (MAX : 30V)  
MOTOR OFF...0V ~ +1.5V or OPEN
  - Error will be canceled in the MOTOR OFF signal when 90s occur has occurred in the Handpiece during operation.
- ⑥ Alarm Signal Output
  - Photocoupler output
- ⑦ Alarm Signal Output
  - Photocoupler output
  - Normally NO6 and NO7 pin is ON. The following cases becomes OFF.
    - When an error occurs.
    - In case that the electric current to the motor becomes below 60mA when the motor is running.
    - When the powerpack is overheated.
  - ※ There is voltage polarity which is applied between collector (C) and emitter (E). Connect (C) with 「+」 and (E) with 「-」. The maximum voltage and available electric current volume that can flow between the collector and the emitter are followings.
    - Maximum usable voltage : 30V
    - Maximum usable current : 10mA or less
- ⑧ Remote Mode Setting
  - To control by the external signals, short-circuit NO8 pin and J.
- ⑨ GND
  - Ground of the input signal and +12V power supply. J indicates the metal part around the connector



## 9. Accessories

### Foot Switch cord length: 1.5m

#### FS201

◆ An ON/OFF type foot switch.  
When pressed the handpiece is on,  
when released the handpiece will stop.



Remote Control Plug  
RPG-8P

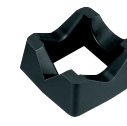


#### FS211 (2-mode changeover type)

◆ You can perform the ON/OFF switching either in mode A or B.  
◆ A-mode : Once you step on the foot switch, the ON state continues even if you take your foot off the switch; step on it for a second time, and it changes into the OFF state.  
B-mode : When pressed the handpiece is on, when released, the handpiece will stop.



Rubber Cradle  
RM11



#### VC301 (Variable type)

◆ You can perform the ON/OFF switching either in mode A or B.  
In addition to the ON/OFF switching, the speed control and (power control for the POLYTOR) action for the handpiece is provided depending on how far the pedal is depressed.



Fuse  
PFU-2.0A(C2012/C2112)  
PFU-1.0A(C2212)



## 10. Trouble Shooting

Condition	Investigation	Corrective action
Power is not ON.	Is an AC cord unplugged?	Please plug an AC cord.
	Is a fuse blown?	Please replace the equivalent fuse.
	Is a curl cord plugged into a power pack socket?	Please plug a curl cord into a socket of a power pack.
The handpiece does not work.	Do you leave the collet of handpiece open?	Please close the collet of the handpiece.
	Does a foot switch connect with a power pack?	You can use foot switch only.
Rotation speed is not displayed	Is an AC cord unplugged?	Please plug an AC cord.
	Is a fuse blown?	Please replace the equivalent fuse. If you do not find out a cause of the fuse blown, please ask us to repair it.
	A power pack is broken.	Please ask us to repair.

※If the symptom is not improved after corrective action, the handpiece might be defective. Please ask for repair.

※Any other troubles or obscure points, please contact our monitor dealer.

## 11. Maintenance and inspection

- Please check if there is some damage or not on the case and cord.
- Please check if there is accumulated dust, oil, water and so on or not.
- ※ Please maintain and inspect a power pack.

**Warning** ■ Neglecting maintenance and inspection, could result in accident and/or failure.