



# Multi Pad for NLX/iMD Installation Manual

***NAKANISHI INC.***

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## Revision History

Date	Purpose and version	Details
7. 2014	1st edition (Ver.1.00)	New

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## Installation manual for NLX BF and Varios170

### Introduction

The “Multi Pad” system is featured to integrate with a micromotor (NLX BF) and Multi Function Ultrasonic Scaler (Varios 170(OPTION)) in one system. This manual is for installation and setup of the Multi Pad and the micromotor (NLX BF). For installation of the Multi Function Ultrasonic Scaler (Varios 170(OPTION)), use the “Varios 170(OPTION) INSTALLATION MANUAL”.



### PRECAUTION NOTICE

- To avoid possible damage to the product, before installation.
  - Disconnect power
  - Discharge electric static
  - Make sure the connection of the pin connector is correct
- If the Multi Pad is not activated, or the power turns ON and OFF, check for a potential problem in the connection of cable connectors.
- When installing the motor cord, make sure the cord is safely and securely tied to the dental unit. When securing the cord, make sure the inside tubes are not squeezed. If the cord is secured too tight, the air and water system will not function properly. Use the metal portion of the cord when installing the motor cord.
- Do not bend the water tube and air tube.
- NLX nano only will be used in the Multi Pad. Confirm NLX BF's DIP switch for these motors.  
When settings are wrong, the motor cannot rotate in the most suitable state, and it causes the damage.

## 1. COMPONENTS

Check all the components before starting installation work.

### • Multi Pad Components

Classification	Description
Display unit	Multi Pad
Installation parts	Angle Plate
	M3 X 6 X 0.5 screw x 2
Manual	Multi Pad Operation Manual

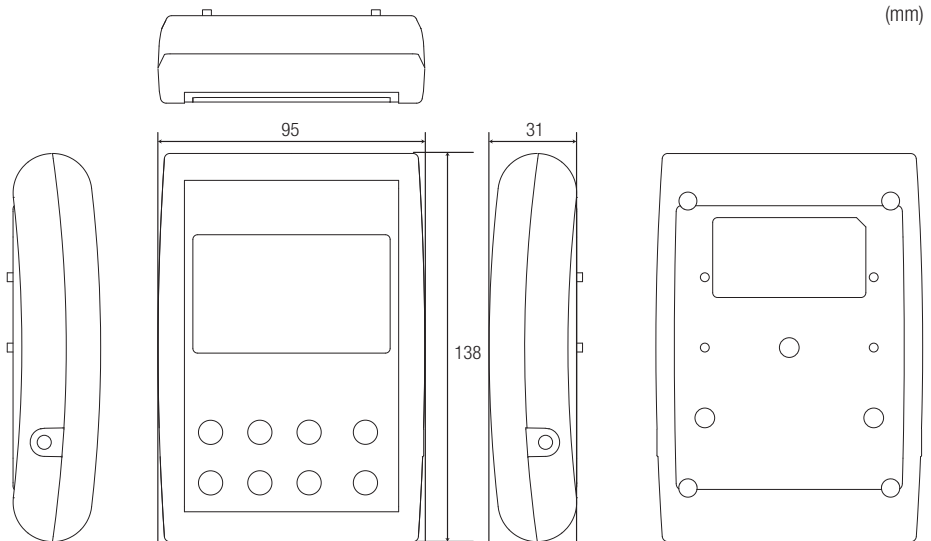
### • NLX BF Components

Classification	Description
Built-in module	NLX BF
	NLS-A ADP
Motor cord	nano CDB (L = 2200 mm)
Motor	NLX nano Motor

## 2. SPECIFICATION

### • Multi Pad

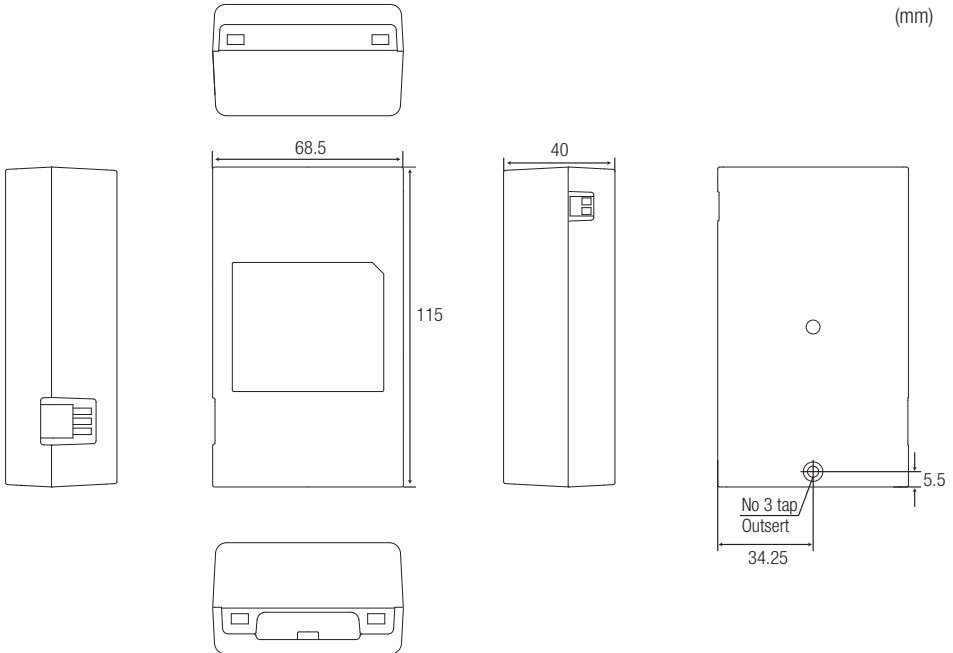
<b>Model</b>	Multi Pad
<b>Input voltage</b>	DC 12V
<b>Input current</b>	100 mA
<b>Max output power</b>	1.2 W
<b>Dimensions</b>	W95 x D138 x H31 mm
<b>Use Environment</b>	Temperature : +10 – 40 °C Humidity : 30 – 75 %
<b>Store Environment</b>	Temperature : -10 – 60 °C Humidity : 10 – 85 % Atmospheric pressure : 500 – 1060 hPa



For detailed installation instructions, refer to "3.Multi Pad INSTALLATION".

• NLX BF Control Board

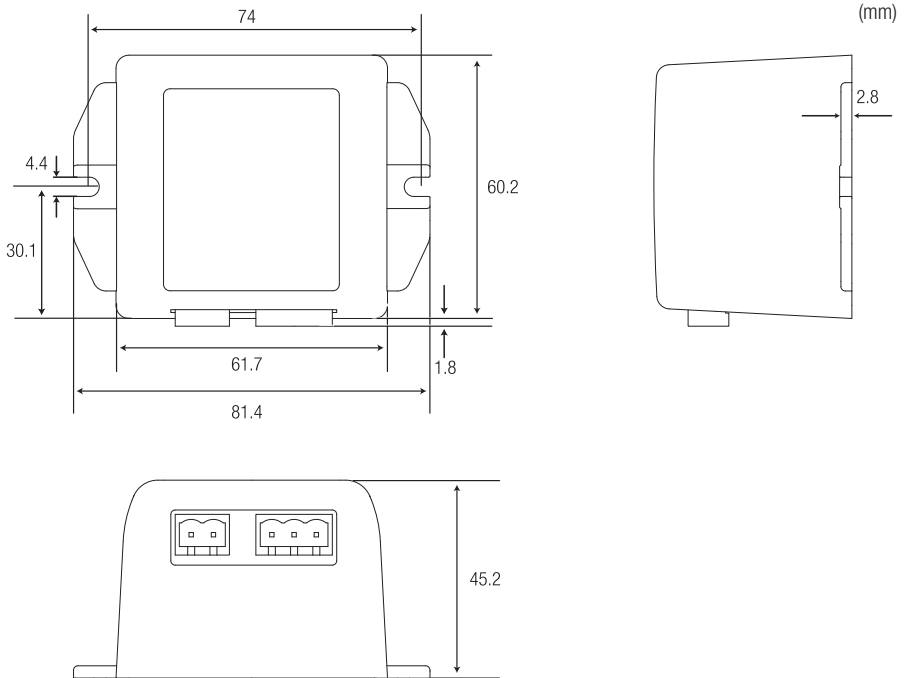
<b>Model</b>	NLX BF Control Board
<b>Input voltage</b>	DC 34V $\pm$ 10%
<b>Input current</b>	4 A
<b>Input power</b>	130W over
<b>Max output voltage</b>	29 Vp-p
<b>Max output (motor)</b>	62 W (Measuring condition : DC 36 V / 4A / 25,000 min <sup>-1</sup> )
<b>Motor speed range</b>	1,000 – 40,000 min <sup>-1</sup>
<b>Dimensions</b>	W68.5 x D115 x H40 mm (Size of exclusive case)
<b>Use Environment</b>	Temperature : + 10 – 40 °C Humidity : 30 – 75 %
<b>Transportation and Store Environment</b>	Temperature : – 10 – 60 °C Humidity : 10 – 85 % Atmospheric pressure : 500 – 1060 hPa
<b>External Electrical Power Source</b>	IEC60601–1 and Class II is required



For installing the NLX BF Control Board with your chair unit, use a screw, or use Velcro (Magic Fastener (1) and (2)).

• AC-DC Adapter Board

<b>Model</b>	AC – DC Adapter Board
<b>Input voltage</b>	AC 24 V $\pm$ 10 %
<b>Input power</b>	150 VA over
<b>Output voltage range</b>	DC 34 V $\pm$ 10 %
<b>Dimensions</b>	W81.4 x D60.2 x H45.2 mm (Size of exclusive case)
<b>External Electrical Power Source</b>	IEC60601-1 and Class II is required

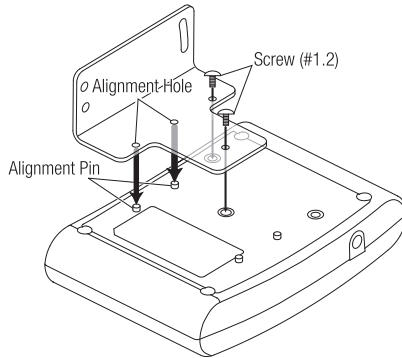
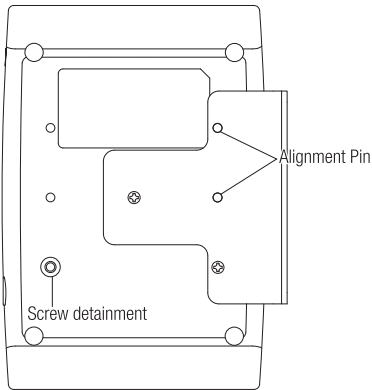


For installing the AC – DC Adapter Board with your chair unit, use the screws.

### 3. Multi Pad INSTALLATION

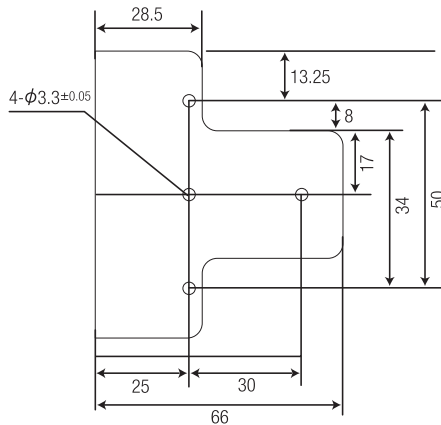
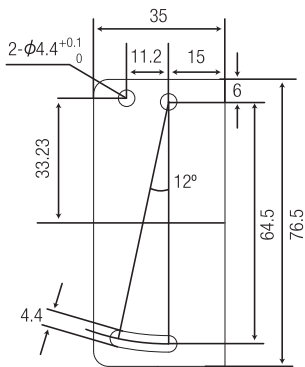
#### • Multi Pad bracket Installation and Mounting

To install the mounting bracket with the Multi Pad, first place and set the bracket along with Alignment Holes (#1 and #2) of the Multi Pad. Then secure using screws in the location as shown (left). Use own screws for installing the Multi Pad with your chair unit.



Install bracket in the right or left, direction convenient for your chair unit.

#### Dimensions of bracket



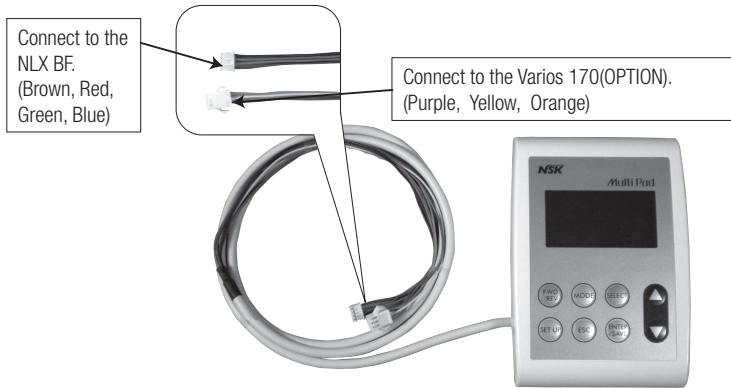
When installing the bracket with your chair unit, use the M3 screws. These screws are not included due to variation of the chair instruments.



## 4. Multi Pad CONNECTION

The Multi Pad has 2 connections as shown on the photos.

One is for connection with micromotor (NLX BF), the other one is for Ultrasonic Scaler (Varios 170 (OPTION)).



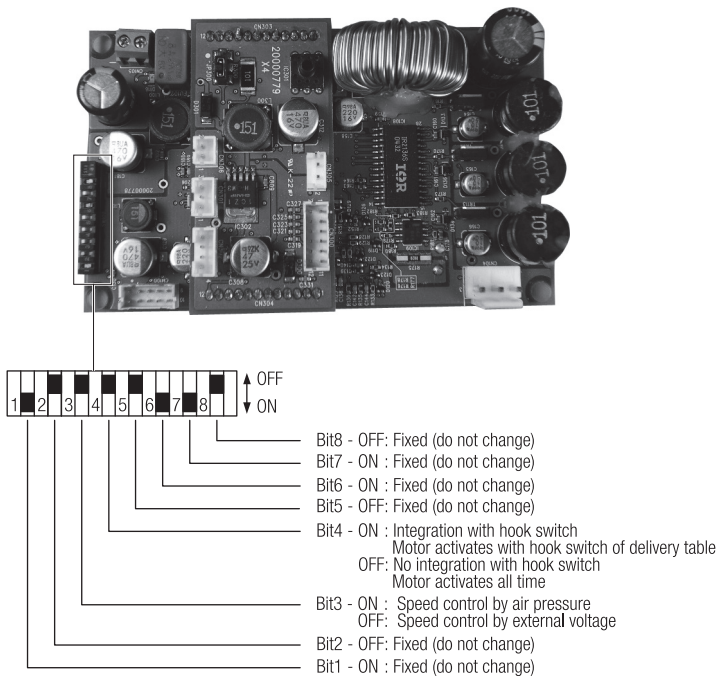
When not using the Varios 170(OPTION), bundle the cord for the Varios 170(OPTION) connection.

## 5. DIP SWITCH SETTING

### • NLX BF

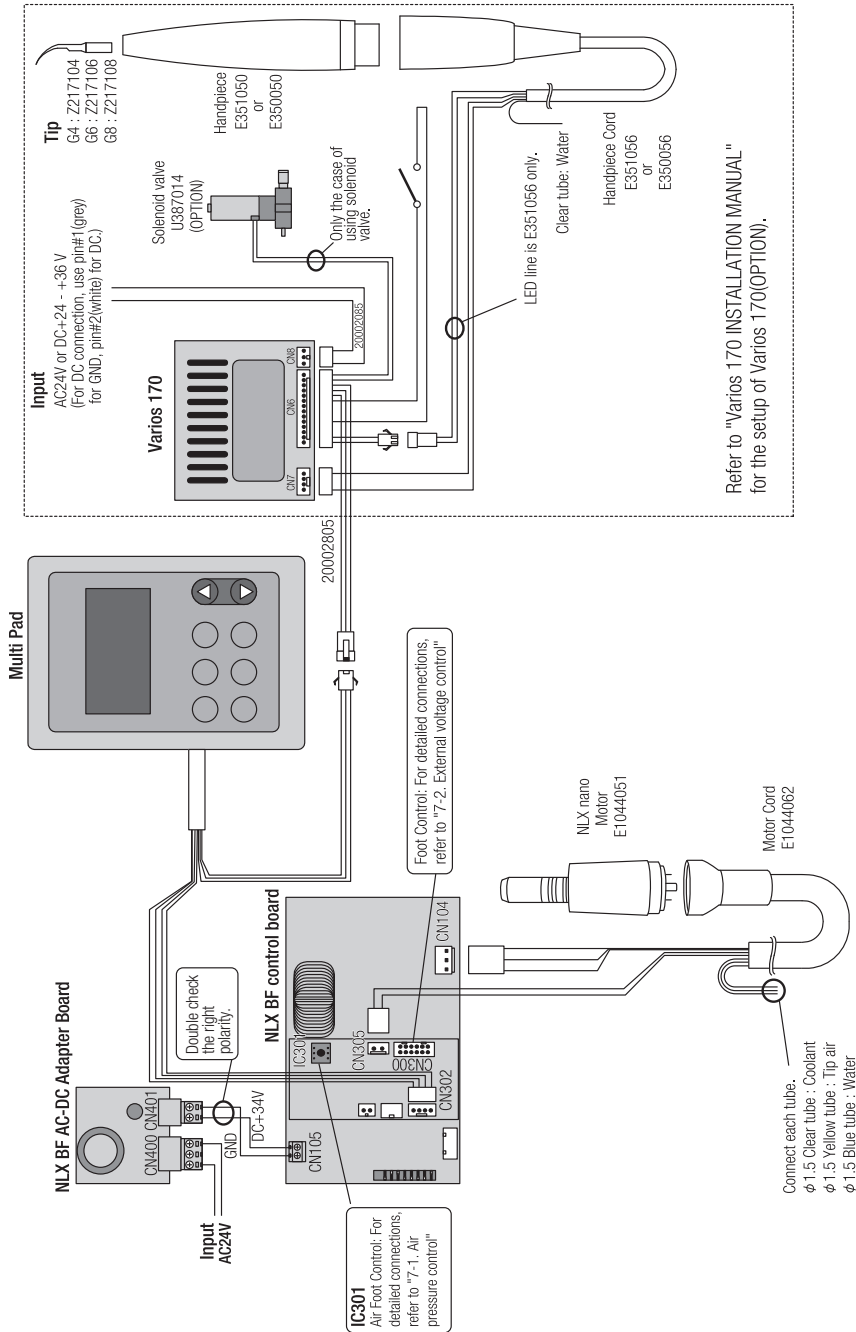
NLX BF has a 8 bits DIP switch.

Bit3 switch is for selection for motor speed control, either by external voltage or air pressure from the chair unit. For detailed settings for speed control, refer to "7. NLX BF SPEED CONTROL SETTINGS".



## 6. CORD CONNECTIONS

The connection of the Multi Pad and NLX BF (and Varios 170(OPTION)) is figured below.



## 7. NLX BF SPEED CONTROL SETTINGS

The NLX BF has two selection of motor speed control either by an air pressure or an external voltage.

### 7-1. AIR PRESSURE CONTROL

When you control NLX's motor speed by air, it is necessary to set Bit3 of the DIP switch to ON. Then connect air tube from Drive air to air pressure sensor (IC301) on the NLX BF as shown below.

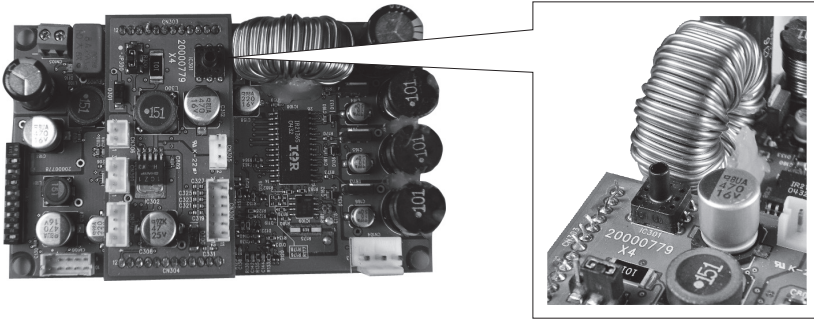


Fig.1

Put the Metal Tube Holder (Tube Retainer U427711) through tube (Fig.2-1). Make sure the holder is put in the direction shown below (Fig.2-2).

Then, mount the tube onto the sensor. After mounting the tube, move the tube holder over the sensor for secure holding.

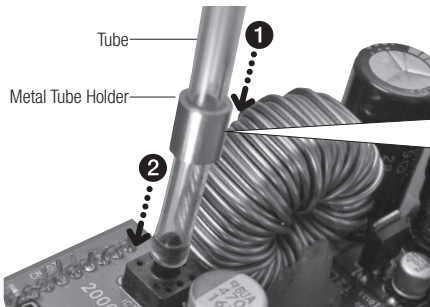
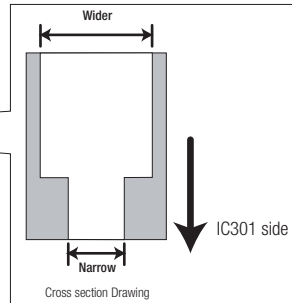


Fig.2-1

Metal Tube Holder cross section drawing



If the connection is loose, there is a risk of air leakage.

Fig.2-2

If you need to use either of  $\phi 2.5$  or  $\phi 1.5$  tube, use the tube relay (Mini Fitting U522300) included in the product (Fig3).

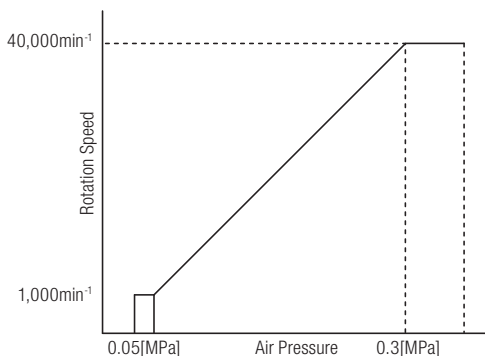


Fig.3

## Air pressure sensor

The default setting for air pressure and motor rotation speed is shown as the figure below. This setting can be changed with the Multi Pad.

For the air pressure adjustment, refer to the Multi Pad OPERATION MANUAL "9-1-5 [5.Air] : Calibration for air driven foot control".



### CAUTION

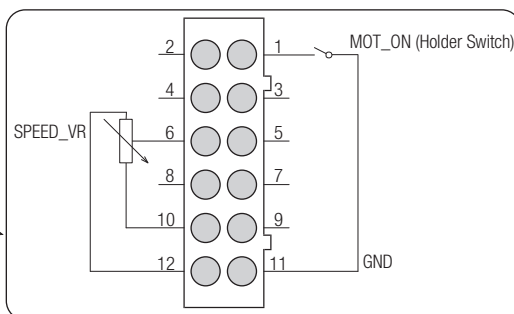
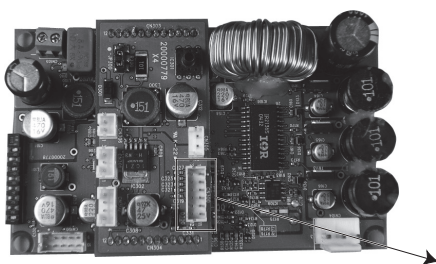
This product is an air pressure controlled electric motor system. Adjust the air pressure of the chair delivery unit to 0.392 MPa (4 kg/cm<sup>2</sup>) or less.

Always check moisture condensation from the delivery unit. If too much moisture in the air, the system may not deliver the designed performance. Remove the moisture.

## 7-2. EXTERNAL VOLTAGE CONTROL

CN300 of the NLX BF is a connection when controlling speed by your chair unit or external switch/potentiometer.

Connection cable for the CN300 is an optional. The part number for the cable is 20000903. Make sure to remove or terminate unused cables in order to avoid short-circuit. See the diagram below for details.



The transistor (open collector output type) can also be used instead of the switch and potentiometer.

When your chair unit is controlled by micromotor based, the motor speed control can also be adjusted by installing a DA converter, instead of potentiometer.

No.	Signal name	Function	Remarks
1	MOT_ON	Motor startup terminal If Bit4 of DIP switch is OFF, this switch is not necessary.	Switch close: on (motor startup) Switch open: off (motor stop)
6	SPEED_VR	Motor speed adjusting voltage input terminal	Variable within a range of DC 0V to + 5 V (refer to About "CN300 Circuit Details")
10	+5V	DC 5 V terminal *1	For potentiometer connection
11	GND	Ground terminal	—
12	GND	Ground terminal	—

\*1 : Terminal #10 of the CN300 is only used for connection of the potentiometer. Do not use the terminal for other purposes.

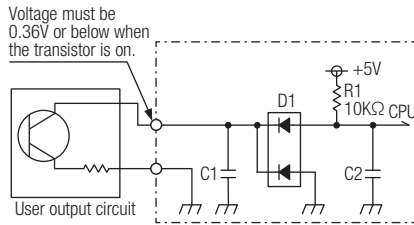
## About CN300 Circuit details

Input circuit of terminal #1, CN300:

Connect open–collector transistor or switch to this terminal #1.

Because 0.43 mA flows to this terminal #1, make sure to use only low current contact switches.

When selecting transistors, follow the specification below and choose an appropriate transistor.



Input Circuit of CN300 terminal #1

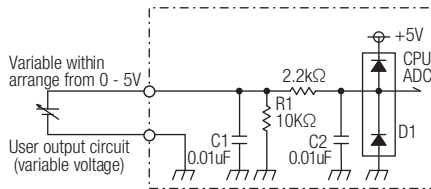
No.	Signal name	Input Voltage / Current	Input type	Remarks
1	MOT_ON	DC 5 V / 0.43 mA	Open collector input type	Pull-in voltage 0.36V max.

Input circuit of Terminal #6, CN300:

Input impedance of the terminal when receiving on external voltage. Input impedance has to be 10 kΩ.

When using the potentiometer, connect it to the terminal #10.

- The terminal #10 (+ 5 V) is used only for the potentiometer.
- Use 5 kΩ potentiometer for input impedance.



Input Circuit of CN300 terminal #6

No.	Signal name	Input Voltage / Current	Input type	Remarks
6	SPEED_AN	DC 0V to + 5 V	External voltage	Input impedance 10 kΩ
10	—	DC 5 V	—	Only for potentiometer

## 8. POWER SUPPLY CONNECTION

### The power of Multi Pad is sourced from the NLX BF.

The power connections for the NLX BF and Varios 170(OPTION) are needed separately. For the connection with Varios 170 (OPTION), refer to "Varios 170 INSTALLATION MANUAL".

#### • Power supply connection to the NLX BF

Use CN105 for connection with the AC–DC adaptor board CN401.

When you use DC + 34 V for the power source, you do not use the AC – DC adaptor board, and connect the power source to the connector (CN105) directly. The AC – DC adaptor board has a 5A fuse(Wickmann T5A 250V).

#### • Precaution Notice

- Cord connection must be done while the power is off.
- A surge may flow into the fuse which may result in the damages on the PC boards if the connection is made while the power is on.
- Select the right insulated transformer and the switching regulator in accordance with the IEC60601–1 standard because of no insulation of primary side in the AC – DC adaptor board.

AC–DC adaptor board CN400 (AC IN)

No.	Signal name	Function	Remarks
1	AC24_1	AC 24 V input terminal	AC 24 V $\pm$ 10 % / 150 VA over
2	–	Not used	–
3	AC24_2	AC 24 V input terminal	–

AC–DC adaptor board CN401 (DC OUT)

No.	Signal name	Function	Remarks
1	DC 34 V	DC 34 V output terminal	–
2	GND	Ground terminal	–

## 9. CAUTIONS WHEN INSTALLING TO DELIVERY TABLE

#### • Multi Pad

- Ensure correct location for installation of the Multi Pad. Do not install the Multi Pad near the chair/unit handle.
- Make a necessary angle adjustment of the Multi Pad for improved visibility.
- When connecting cord, allow extra length. Do not pull the cord tightly.

#### • NLX BF Control Board

- Ensure correct location for installation of the NLX BF. Avoid water and exposure to heat.
- You have 2 choices for installing the NLX BF using a screw or velcro(Magic Fastener(1),(2) (Z249150 and Z249151)) to fix the unit.
- Ensure mounting space is dry and not exposed to water or oil.
- Always keep label side of the NLX BF to the top, or 90 degrees angle for air ventilation. Do not keep label side of the NLX BF to the bottom or more than 90 degrees angle.
- The power supply must meet the IEC60601-1 requirement. Use the power supply for the double insulation type.

#### • Motor cord

- When connecting cord, allow extra length (service loop). Do not pull the cord tightly.
- Fix the cord securely by using cord holder/fixer inside the delivery table.

#### • AC–DC Adaptor Board

- Make sure to select the right spot to install the AC – DC Adaptor Board. Avoid the AC – DC Adaptor Board for water and space exposed to heat.
- To install the AC – DC Adaptor Board, use the screw.

#### • Varios 170(OPTION)

- Refer to "Varios 170 INSTALLATION MANUAL".

## Installation manual for iMD and Varios170

### Introduction

The "Multi Pad" system is featured to integrate with a micromotor (iMD) and Multi Function Ultrasonic Scaler (Varios 170(OPTION)) in one system. This manual is for installation and setup of the Multi Pad and the micromotor (iMD). For installation of the Multi Function Ultrasonic Scaler (Varios 170(OPTION)), use the "Varios 170(OPTION) INSTALLATION MANUAL".



### PRECAUTION NOTICE

- To avoid possible damage to the product, before installation.
  - Disconnect power
  - Discharge electric static
  - Make sure the connection of the pin connector is correct
- If the Multi Pad is not activated, or the power turns ON and OFF, check for a potential problem in the connection of cable connectors.
- When installing the motor cord, make sure the cord is safely and securely tied to the dental unit. When securing the cord, make sure the inside tubes are not squeezed. If the cord is secured too tight, the air and water system will not function properly. Use the metal portion of the cord when installing the motor cord.
- Do not bend the water tube and air tube.
- NBX motor only will be used in the Multi Pad. Confirm iMD's jumper settings for these motors.  
When settings are wrong, the motor cannot rotate in the most suitable state, and it causes the damage.

## 1. COMPONENTS

Check all the components before starting installation work.

### • Multi Pad Components

Classification	Description
Display unit	Multi Pad
Installation parts	Angle Plate
	M3 X 6 X 0.5 screw x 2
Manual	Multi Pad Operation Manual
Cable	Use for iMD (U1124056)

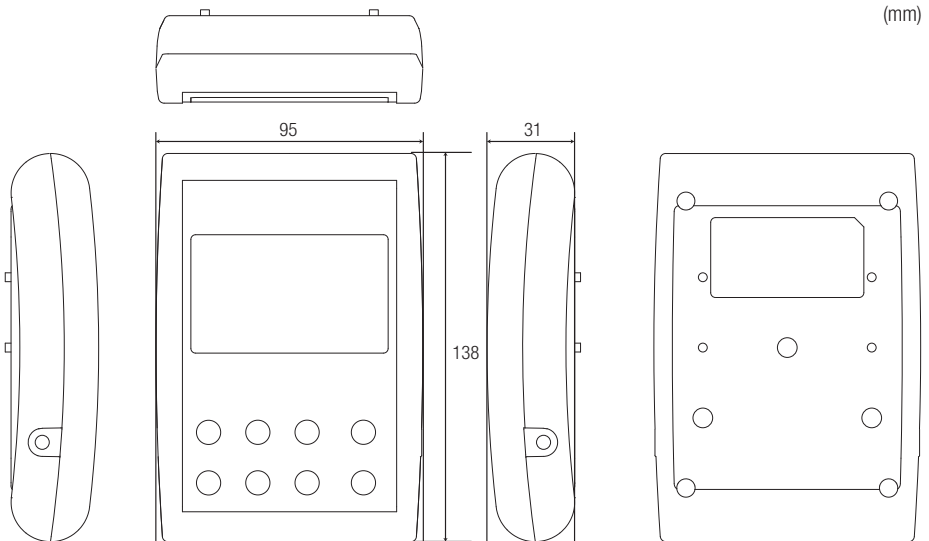
### • iMD Components

Classification	Description
Built-in module	iMD
Motor cord	NBX CDB (L=2200mm)
Motor	NBX Motor

## 2. SPECIFICATION

### • Multi Pad

<b>Model</b>	Multi Pad
<b>Input voltage</b>	DC 12 V
<b>Input current</b>	100 mA
<b>Max output power</b>	1.2 W
<b>Dimensions</b>	W95 x D138 x H31 mm
<b>Use Environment</b>	Temperature : + 10 – 40 °C Humidity : 30 – 75 %
<b>Store Environment</b>	Temperature : – 10 – 60 °C Humidity : 10 – 85 % Atmospheric pressure : 500 – 1060 hPa



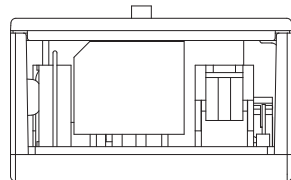
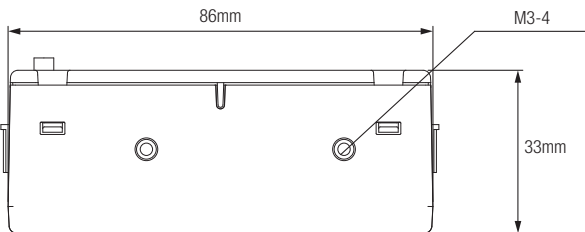
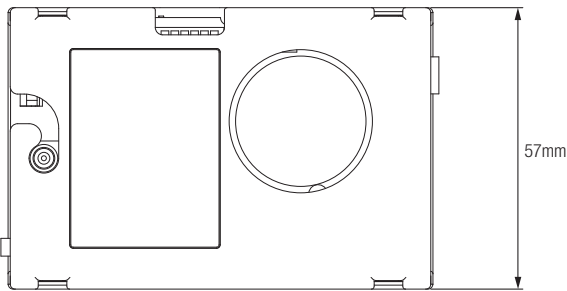
For detailed installation instructions, refer to "3.Multi Pad INSTALLATION".



• iMD Driver Board

<b>Model</b>	iMD Driver Board
<b>Input voltage</b>	AC24V $\pm$ 10 %
<b>Input current</b>	4 A
<b>Input power</b>	130W over
<b>Max output voltage</b>	28 Vp-p
<b>Max output (motor)</b>	46 W (Measuring condition : AC24V 4A 30,000 min <sup>-1</sup> )
<b>Motor speed range</b>	1,000 – 40,000 min <sup>-1</sup>
<b>Dimensions</b>	W86 x D57 x H33 mm (Size of exclusive case)
<b>Use Environment</b>	Temperature : 0 – 40 °C Humidity : 30 – 75 %
<b>Store Environment</b>	Temperature : – 10 – 60 °C Humidity : 10 – 85 % Atmospheric pressure : 500 – 1060 hPa
<b>External Electrical Power Source</b>	IEC60601–1 and Class II is required

(mm)

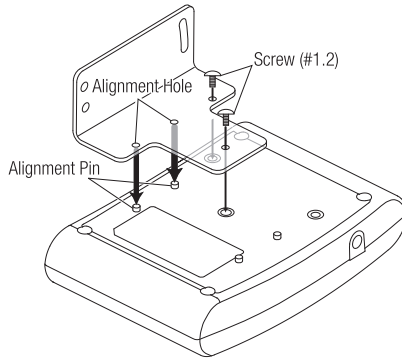
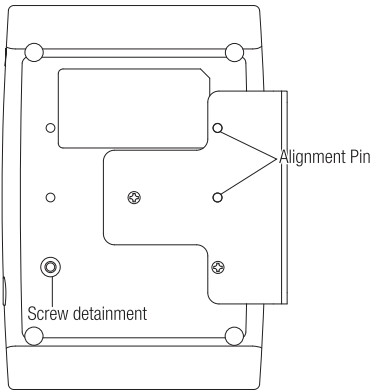


For installing the iMD Driver Board with your chair unit, use screws, or Velcro (Magic Fastener(1) and(2)).

### 3. Multi Pad INSTALLATION

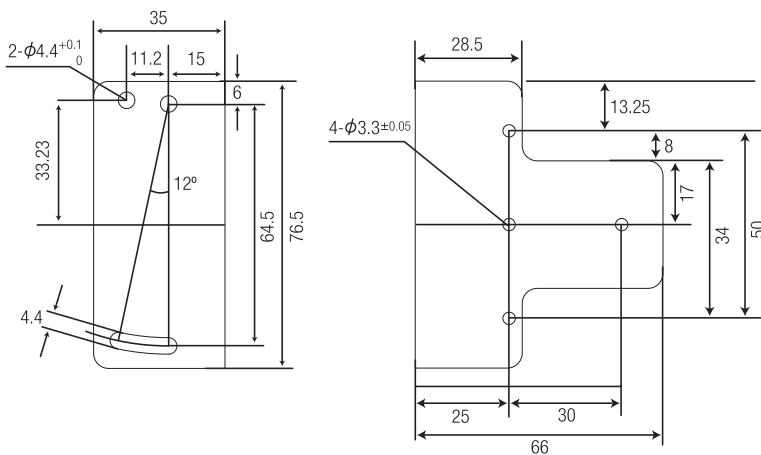
#### • Multi Pad bracket Installation and Mounting

To install the mounting bracket with the Multi Pad, first place and set the bracket along with Alignment Holes (#1 and #2) of the Multi Pad. Then secure using screws in the location as shown (left). Use own screws for installing the Multi Pad with your chair unit.



Install bracket in the right or left direction convenient for your chair unit.

#### Dimensions of bracket

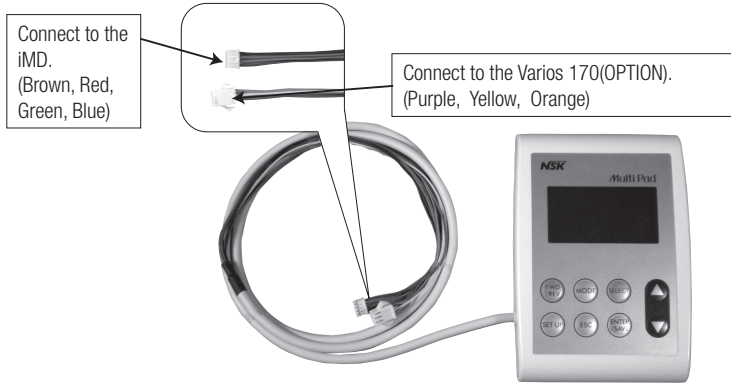


When installing the bracket with your chair unit, use the M3 screws. These screws are not included due to variation of the chair instruments.

## 4. Multi Pad CONNECTION

The Multi Pad has 2 connections as shown on the photos.

One is for connection with micromotor (iMD), the other one is for Ultrasonic Scaler (Varios 170 (OPTION)).



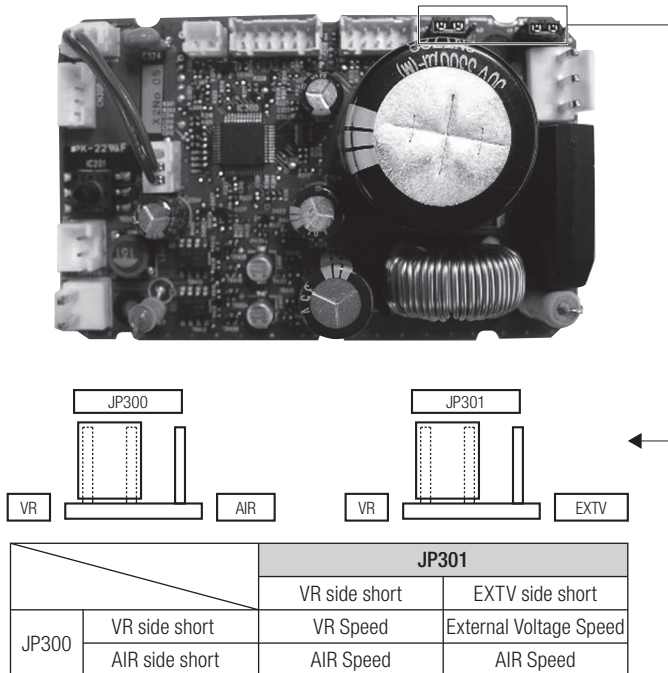
When not using the Varios 170(OPTION), bundle the cord for the Varios 170(OPTION) connection.

## 5. JUMPER SETTING

iMD has Jumpers (JP300 and JP301).

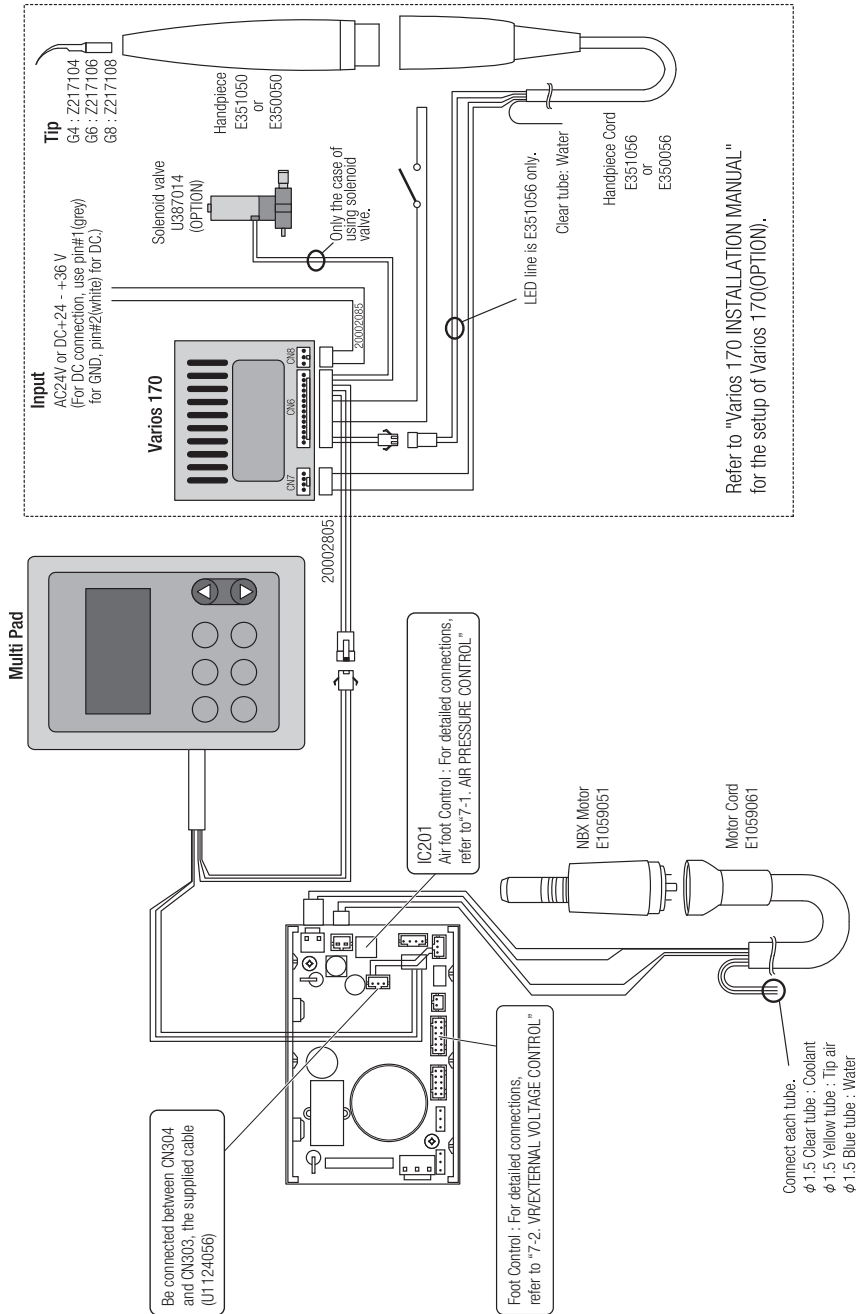
JP300 and JP301 are for selection for motor speed control as below.

For detailed setting for speed control, refer to "7. iMD SPEED CONTROL SETTINGS".



## 6. CORD CONNECTIONS

The connection of the Multi Pad and NBX (and Varios 170(OPTION)) is figured below.



## 7. IMD SPEED CONTROL SETTINGS

The iMD has two selections of motor speed control either by an air pressure or an external voltage.

### 7-1. AIR PRESSURE CONTROL

When you control iMD motor speed by air, it is necessary to set JP300 AIR side. Then connect air tube from Drive air to air pressure sensor (IC201) on the iMD as shown below.

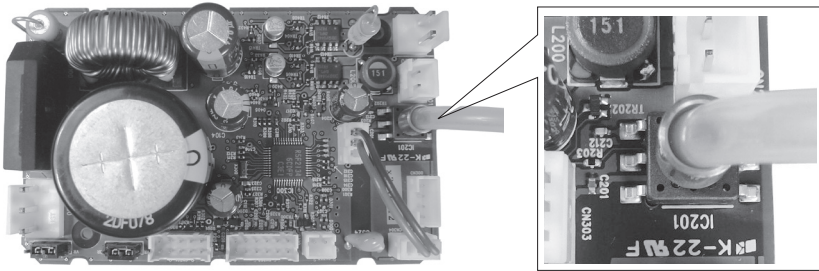
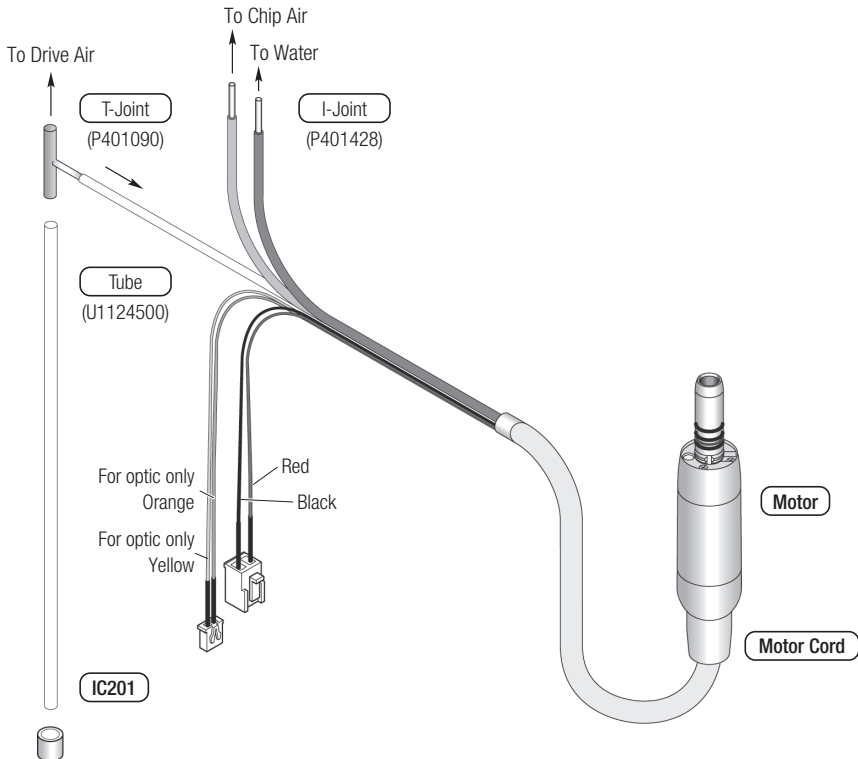


Fig.1

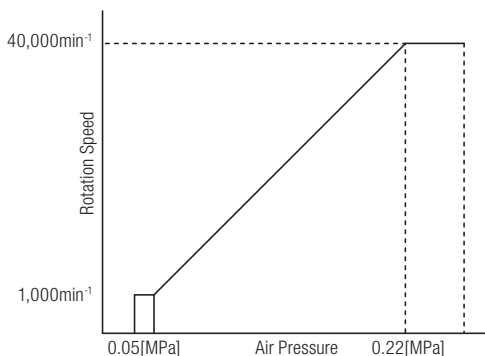
When connecting the drive air tube (clear) to the drive air fitting, use a T-connector to the drive air fitting, one end of the motor, and the remaining end to the air pressure sensor (IC201).



## Air pressure sensor

The default setting for air pressure and motor rotation speed is shown as the figure below. This setting can be changed with the Multi Pad.

For the air pressure adjustment, refer to the Multi Pad OPERATION MANUAL "9-1-5 [5.Air] : Calibration for air driven foot control".



### CAUTION

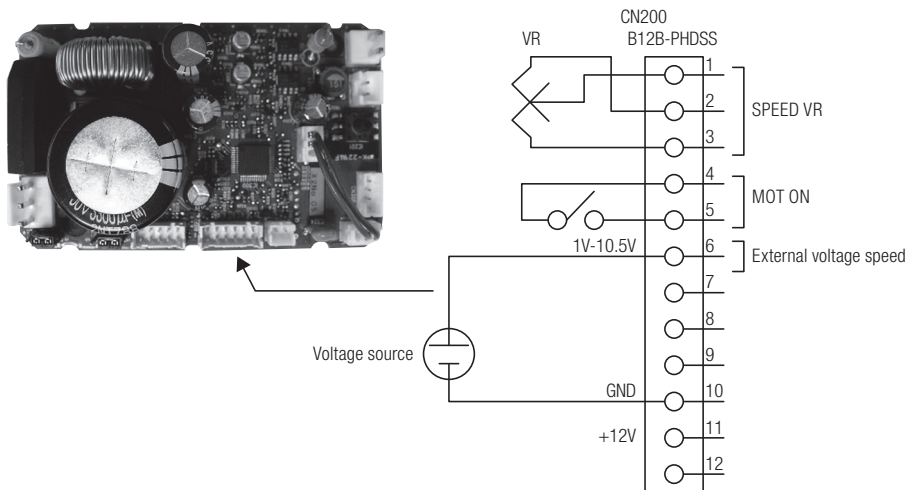
This product is an air pressure controlled electric motor system. Adjust the air pressure of the chair delivery unit to 0.392 MPa (4 kg/cm<sup>2</sup>) or less.

Always check moisture condensation from the delivery unit. If too much moisture in the air, the system may not deliver the designed performance. Remove the moisture.

## 7-2. VR / EXTERNAL VOLTAGE CONTROL

CN200 of the iMD is a connection when controlling speed by your chair unit or external switch/potentiometer.

Connection cable for CN200 is an optional. The part number for the cable is U1124054. Make sure to remove or terminate unused in order to avoid short-circuit.



No.	Signal name	Function	Remarks
1	VR-A	Terminal center of VR. Input voltage range 0V to 5V. Input impedance is 470KΩ.	Variable resistance is 10KΩ.
2	VR-B	Terminal low side of VR. Connected to GND.	
3	VR-C	Terminal high side of VR. Connected to output of Operational amplifier in board.	
4	MOT_ON	MOT_ON switch input.	Switch close : on (motor start up) Switch open : off (motor stop)
5	GND	Ground terminal.	-
6	VOLTAGE	External voltage speed input (1V-10.5V). Input impedance is 168KΩ.	1V = 1,000min <sup>-1</sup> 10.5V = 40,000min <sup>-1</sup>
10	GND	Ground terminal.	-

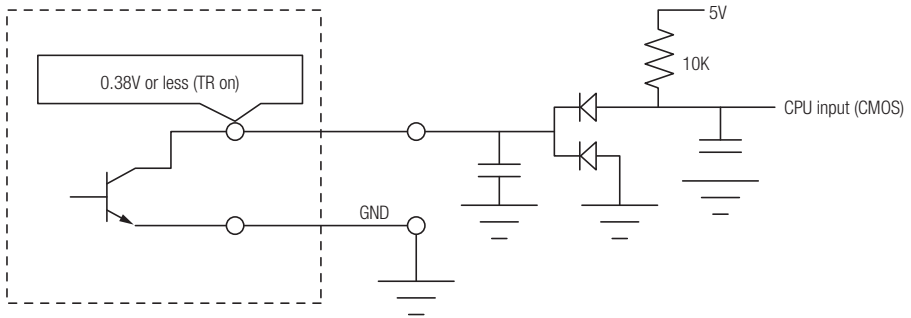
## About CN200 Circuit details

Input circuit of terminal #4, CN200:

Connect open-collector transistor or switch to this terminal #4.

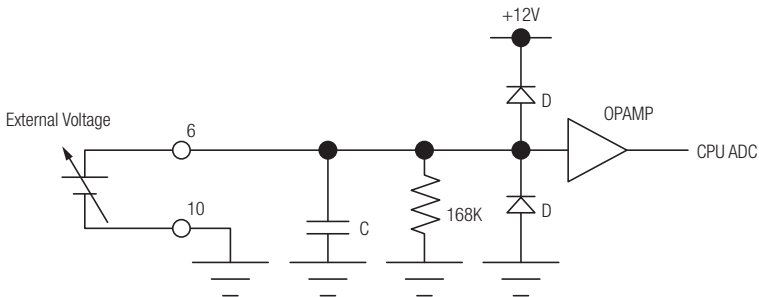
Because 0.43 mA flows to this terminal #4, make sure to use only low current contact switches.

When selecting transistors, follow the specification below and choose an appropriate transistor.



Input circuit of Terminal #6, CN200:

Input impedance of the terminal when receiving on external voltage. Input impedance has to be 168kΩ.

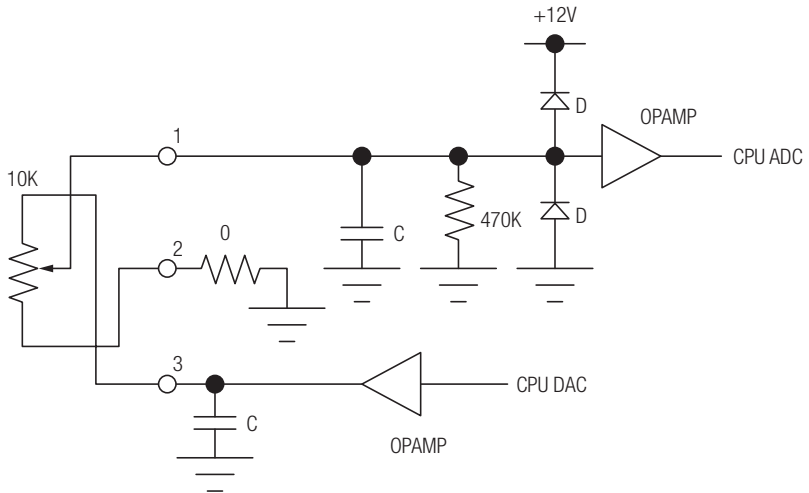


No	Signal name	Input Voltage / Current	Input type	Remarks
6	VOLTAGE	1.0V - 10.5V	External voltage	Input impedance 168 kΩ
10	GND	-	-	-

### Input circuit of terminal #1 #2 #3, CN200

Terminal No. 1, 2 and 3 are connected as shown in the figure below.

No. 2 terminal is connected to GND via a resistor of  $0\Omega$ .





## 8. POWER SUPPLY CONNECTION

### The power of Multi Pad is sourced from the iMD.

The power connections for the iMD and Varios 170(OPTION) are needed separately. For the connection with Varios 170 (OPTION), refer to "Varios 170 INSTALLATION MANUAL".

#### • Power supply connection to the iMD

Use CN100 for connection with power supply.

#### • Precaution Notice

- Cord connection must be done while the power is off.
- A surge may flow into the fuse which may result in the damages on the PC boards if the connection is made while the power is on.
- Select the right insulated transformer and the switching regulator in accordance with the IEC60601–1 standard because of no insulation of primary side in the AC – DC circuit.

CN100 (AC IN)

No.	Signal name	Function	Remarks
1	AC24_1	AC 24 V input terminal	AC 24 V $\pm$ 10 % / 120VA over
2	–	Not used	–
3	AC24_2	AC 24 V input terminal	–

## 9. CAUTIONS WHEN INSTALLING TO DELIVERY TABLE

#### • Multi Pad

- Ensure correct location for installation of the Multi Pad. Do not install the Multi Pad near the chair/unit handle.
- Make a necessary angle adjustment of the Multi Pad for improved visibility.
- When connecting cord, allow extra length. Do not pull the cord tightly.

#### • iMD Driver Board

- Ensure correct location for installation of the iMD. Avoid water and exposure to heat.
- You have 2 choices for installing the iMD using a screw or velcro(Magic Fastener(1),(2) (Z249150 and Z249151)) to fix the unit.
- Ensure mounting space is dry and not exposed to water or oil.
- Always keep label side of the iMD to the top, or 90 degrees angle for air ventilation. Do not keep label side of the iMD to the bottom or more than 90 degrees angle.
- The power supply must meet the IEC60601-1 requirement. Use the power supply for the double insulation type.

#### • Motor cord

- When connecting cord, allow extra length (service loop). Do not pull the cord tightly.
- Fix the cord securely by using cord holder/fixer inside the delivery table.

#### • Varios 170(OPTION)

- Refer to "Varios 170 INSTALLATION MANUAL".