

SETUP GUIDE

MAXX DS200 series



Copyright © 2019 by **Maxx Digm, Inc**

All rights reserved. This manual or parts thereof may not be reproduced in any form, stored in any retrieval system, or transmitted in any form by any means—electronic, mechanical, photocopy, recording, or otherwise—without prior written permission of the publisher, except as provided by United States of America copyright law. For permission requests, write to the publisher, at "Attention: Permissions Coordinator," at the addresses below.

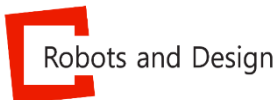


Maxx Digm, Inc

Address ▶ 3265 Kifer Road, Santa Clara, CA 95051

Tel ▶ 408-462-9608

E-mail ▶ info@maxxdigm.com



Robots and Design, Ltd.

Address ▶ Pangyo-ro 700, E-707, Seongnam-City, Gyunggi-do
Korea 13516

Tel ▶ +82-31-708-2684

Fax ▶ +82-31-706-9093

E-mail ▶ maxx@rnd.re.kr

Contents

I. Safety and safety policy	5
1.1 Safety	5
1.2 Safety policy	5
1.3 Precautions	6
<i>1.3.1 General precautions</i>	6
<i>1.3.2 Specific precautions</i>	7
1.4 Label	7
1.5 Handling and Using	8
II. Unpacking	9
<i>Package dimensions</i>	9
<i>Required tools</i>	9
<i>Disassemble the package</i>	10
III. Parts and functions	11
3.1 External and Internal parts	11
3.2 ATC (Auto Tool Changer)	12
3.3 Connection panel	13
IV. Accessories	14
4.1 Included Items	14
<i>Starter kit for milling tool</i>	14
<i>Calibration kit</i>	14
<i>Maintenance kit</i>	15
4.2 Required Items	16
4.2.1 <i>Vacuum Requirements</i>	16
4.2.2 <i>Compressor Requirements</i>	17
4.2.2.1 <i>Air limit sensor</i>	18
4.3 Installation area and peripheral condition	20
<i>Installation area</i>	20
<i>Ambient conditions</i>	20
4.4 Liquid Coolant (*DS200-4W / 4WA)	21
<i>Coolant tank</i>	21
4.5 Connecting cable	22
4.5.1 <i>Power</i>	22
4.5.2 <i>Network</i>	23

4.5.3 Remote PNC (Maxx Link)	24
A. Network Setting	24
B. Firewall	26
C. Operation Mode Installation	27
D. Removing the PNC Info	30
Linker program	31
4.5.4 Remote LAN for embedded PC	32
4.6 Spindle warm-up	35
When to perform spindle warm-up	35
Before performing spindle warm-up	35
Spindle warm-up procedure	36
Spindle warm-up schedule	38
WARNING	38
Daily startup	39
Spindle cleaning	39
4.7 Auto Calibration	39
V. Specification	40
5.1 Power rating and S/N	40
5.2 Coordinate	40
5.3 Drawings	42

I. Safety and safety policy

1.1 Safety

User's safety is not always guaranteed. It is highly recommended to follow all of the instructions included in this manual before operating the machine to maximize user's safety.

1.2 Safety policy

- (1) Never attempt to operate the machine if not trained by professionals.
- (2) Never attempt to operate the machine in wet locations.
- (3) Never attempt to open the machine's chamber door during its operation.
- (4) Turn off the power when the machine is not in use.
- (5) Turn off pneumatic supplier before separating pneumatic system.
- (6) The machine must be always able to perform emergency stop. Ensure the machine stops immediately after activating emergency stop.
- (7) Safety devices and warning signs must be placed visibly around operating area.

1.3 Precautions

1.3.1 General precautions

- (1) Do NOT operate the machine if not trained by professionals.
- (2) Do NOT attempt to install the machine under below conditions:
 - Wet locations.
 - Locations affected by pressure, temperature, humidity, ventilation, dust, salt, and ion.
 - Locations with slop, vibration or shock.
 - Locations where gases can accumulate and chemicals are stored.
- (3) Before operating the machine.
 - Check the frequency, voltage, allowable current, power consumption and compressed air.
 - Check ground connections.
 - Check the stability for all wired cable and cord connections.
- (4) While operating the machine.
 - Check the machine's condition often.
 - If an error occurs, perform emergency stop immediately.
- (5) Do NOT disassemble the machine. Contact the technical support team for further suggestion.
- (6) Maintenance
 - Perform periodic maintenance.
 - If the machine has not been operated for a prolonged period, run a performance test before actual using.
 - Use soft brush to wipe dust towards the vacuum hole located at the bottom of the chamber room (DS200-5Z) and clean the chamber room using proper liquid coolant (DS200-4WA).
 - Do NOT use corrosive detergent or alcohol.
- (7) Other



Refer to User's Manual for the machine handling or maintenance.

1.3.2 Specific precautions

- (1) The machine must be always able to perform emergency stop.
- (2) Do NOT use bare hands to interact with machine's components during its operation.
- (3) Do NOT open the door of machine in operation except for special circumstances.
- (4) Check if the machine stops immediately after performing emergency stop.
- (5) Turn off the power when the machine is not in use.
- (6) Turn off pneumatic supplier before separating pneumatic system.
- (7) Turn off the main power before checking inside the machine.
- (8) Perform periodic maintenance and inspection.
- (9) Conditions
 - Peripheral temperature range: 15°C ~ 38°C
 - Relative humidity: 30% ~ 75%
- (9) Moving and storing condition
 - Temperature range: 0°C ~ 45°C
 - Relative humidity: 10% ~ 80% (No condensation)
- (10) Working environment
 - Ventilate working space.
 - Only operate the machine when the user is aware of User's Manual or trained by professional user in order to prevent any accident.

1.4 Label

Label for DS200 series is shown as below:

Label	Description
	Crush Hazard – Do not open the door of machine during operation.
	Electrical shock – Be aware of electrical shock.

1.5 Handling and Using

This machine is a precise device. To achieve its best performance, ensure to observe the followings. Failure to do so may not only result in bad performance but also cause machine malfunction or breakdown.

This machine is a precise device

- Handle carefully, and never subject the machine to impacts or excessive force.
- Carefully clean away milling waste.
- Never attempt to exceed the recommended capacity or specifications.
- Never attempt to move the spindle unit or rotary axis unit by hand with undue force.
- Never attempt to perform any adjustment inside the machine except for locations specified in this manual

Install in recommended locations

- Install in a location that meets the specified conditions for temperature, relative humidity, and the like.
- Install in a quiet, stable location for better operating conditions.
- Install in indoor areas only.
- Never attempt to install in an environment where silicone substances (oil, grease, spray, etc.) are present. Doing so may cause poor switch contact or ionizer damage.

This machine becomes hot during its operation

- Never cover the ventilation holes with cloth or anything else.
- Install in well-ventilated locations.

This machine is capable of milling zirconia, wax, PMMA, PEEK, composite resin and metal.

- Never attempt to cut any material other than Zirconia, Wax, PMMA, PEEK, Composite resin and metal.

Milling burs must be carefully handled

- The tip of the milling bur is fragile and breakable upon dropping. Handle with care.

II. Unpacking

The machine will be delivered in the form of brown shipping package. Follow the below instructions to disassemble the package.

Package dimensions

- Size of packing
 - Approximately 800(W)x1100(H)x680(D)
- Weight of packing
 - Approximately 150kg (box + machine)
- Characteristic
 - Packed with corrugated paper
 - Can be transported by forklift
 - Includes approximately 50 bolts
 - Metal String
- Unpacking Precautions
 - At least 2 persons are needed.
 - More than 6m of working space is required.

Required tools



Electric drivers



Bolts and screw

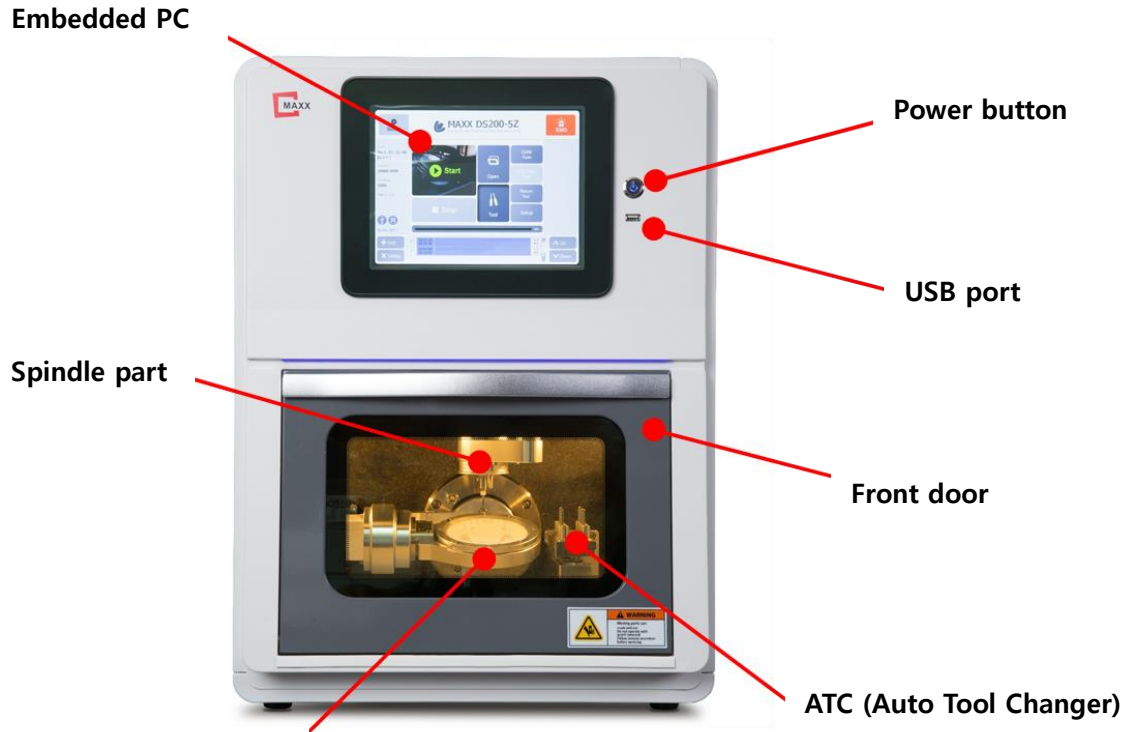
Disassemble the package

1. Untighten the box bolts and open the lid.
2. Remove the cover foams.
3. Pull the 4 walls upwards.
4. To pack the machine, follow the unpacking procedures in reverse.



III. Parts and functions

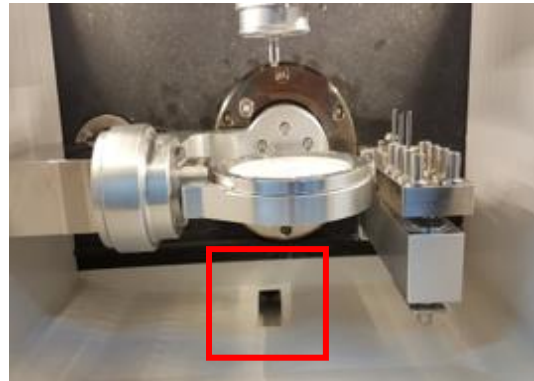
3.1 External and Internal parts



Securing material holder

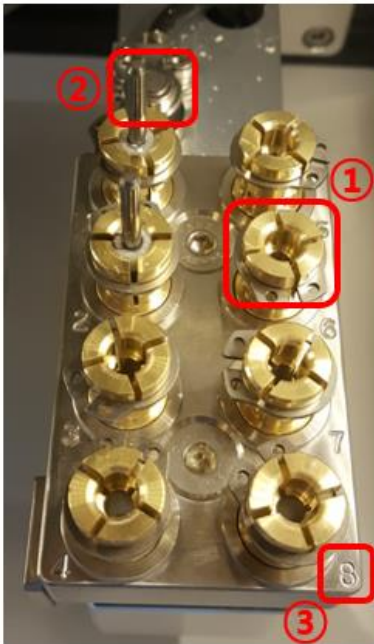


<DS200- 4W/4WA >
ATC cover for 4 axis and wet milling



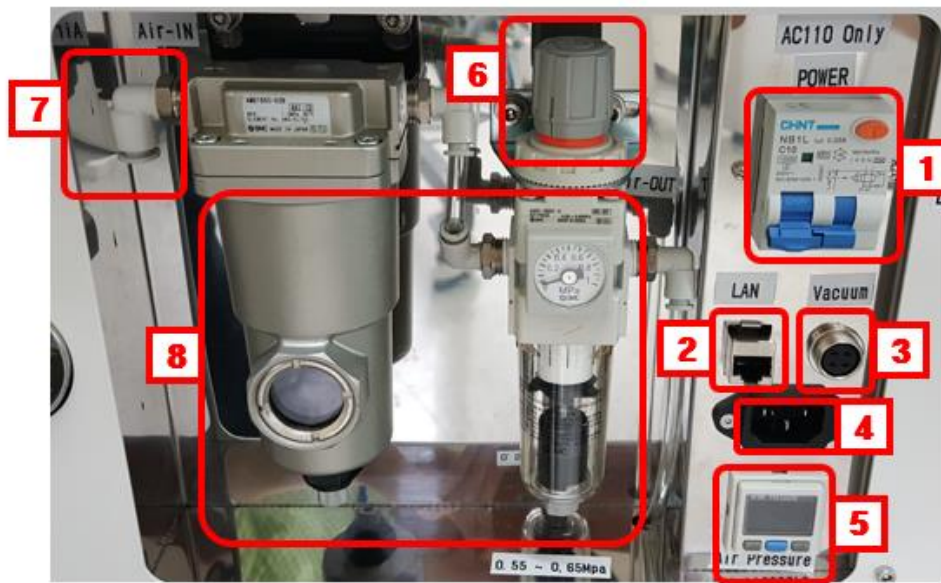
<DS200- 5Z>
Dust hole for 5 axis and dry milling

3.2 ATC (Auto Tool Changer)



1	Tool Holder (1~8) - Contain Tools
2	Push Limit Switch - A sensor which detects spindle position
3	Tool Sensor - A sensor which detects tool length and error
Other	ATC Cover (*4W and 4WA only) - Protective cover

3.3 Connection panel



1	Main Power Switch - Turn ON/OFF the machine
2	LAN Port - connect to PC and to dust collector
3	Vacuum Port - Connect to dust collector (5Z) and to coolant pump (4W&4WA)
4	Main Power Port - Supply power
5	Air pressure switch - Display air pressure and setting limitation
6	Air shut off valve - Shut off air supply
7	Air Connection Port - Supply air
8	Air Filter Regulator - Regulate compressed air

IV. Accessories

4.1 Included Items

		5Z	4W	4WA
1) Power cable	1 each	O	O	O
2) USB to LAN	1 each	O	O	O
3) Dust collector signal cable	1 each	O		
4) Coolant signal cable	1 each		O	O
5) Coolant tank assembly	1 each		O	O
6) Straining filter	1 each		O	O
7) Glass ceramic holder	1 each		O	
8) Abutment holder (R/D type)	1 each			O

Starter kit for milling tool

1) Ball end mill, Dia coated $\Phi 2.0$	3 each	O		
2) Ball end mill, Dia coated $\Phi 1.0$	3 each	O		
3) Ball end mill, Dia coated $\Phi 0.6$	3 each	O		
4) Ball end mill, Dia coated $\Phi 2.0$	3 each		O	
5) Tapered tool $\Phi 1.0$	3 each		O	
6) Ball end mill for metal $\Phi 3.0$	3 each			O
7) Ball end mill for metal $\Phi 2.0$	3 each			O
8) Ball end mill for metal $\Phi 1.5$	3 each			O

Calibration kit

1) Calibration disc $\Phi 98$	1 each	O	O	O
2) Calibration tool $\Phi 1.0$	1 each	O	O	O
3) Signal cable	1 each	O	O	O

Maintenance kit

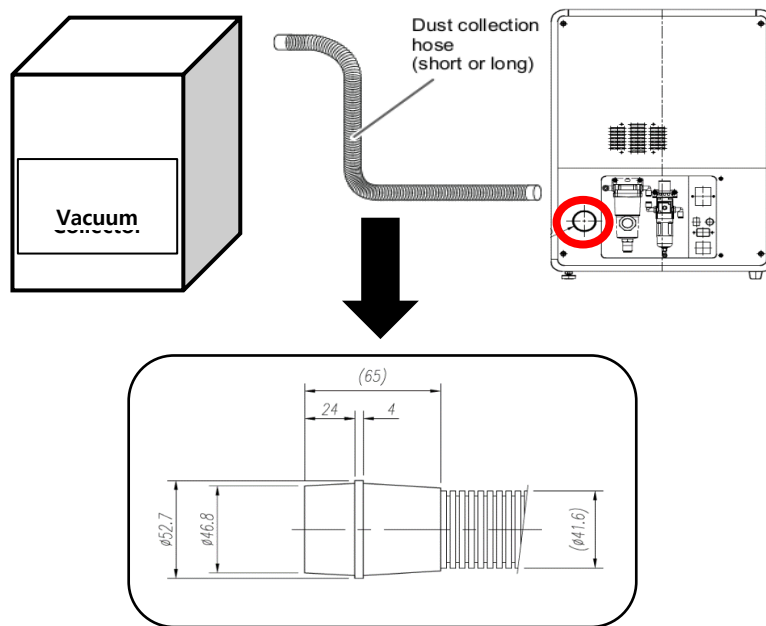
1) Socket wrench	1 each	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2) Spindle maintenance kit	1 each	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3) Bellows for chip splash prevention	1 each	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

4.2 Required Items

4.2.1 Vacuum Requirements

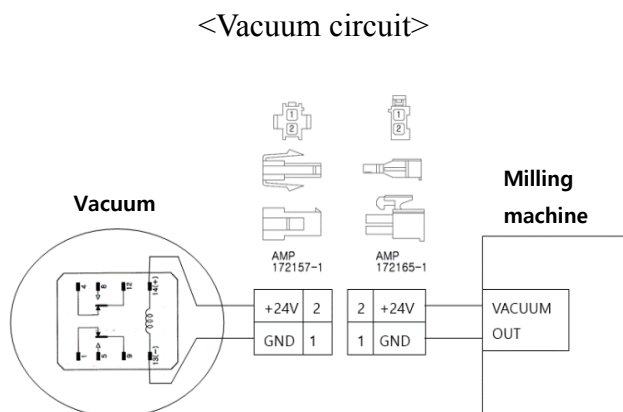
Vacuum must satisfy following specifications.

- ✓ Suction power 120 to 160m³/h
- ✓ Dust class: M
- ✓ HEPA-micro filter, Filter class: H12
- ✓ **DC24V power source**

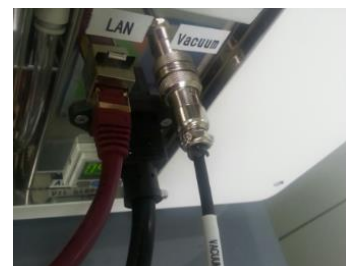


Refer to the below diagrams for vacuum cable connecting:

Connect vacuum cable to the vacuum socket at the back of the machine. DC24V is outputted from vacuum cable. **Only a dust collector that has the power source of DC24V may be used.**



<Cable>

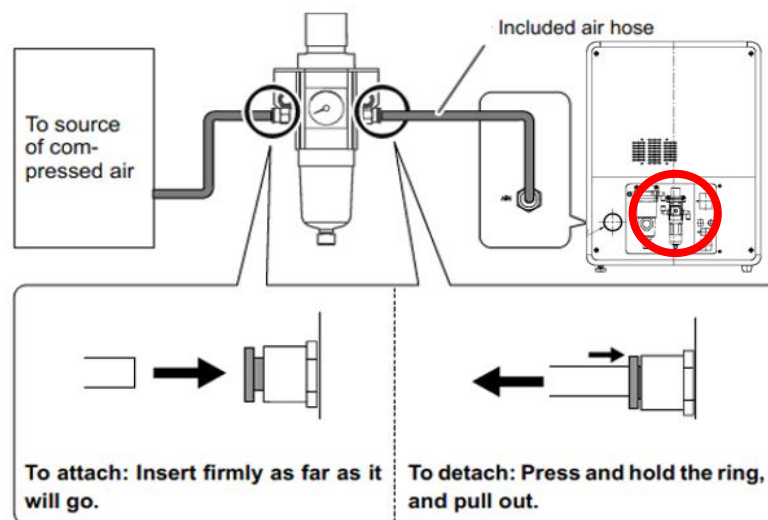


4.2.2 Compressor Requirements

Pneumatic air is needed to operate the machine and compressor must satisfy following specifications:










- Flow rate: 100 standard liters/min
- Pressure: min. 5.5bar / 102psi (DS200-5Z/4W), 6.5bar / 102psi (DS200-4WA)
- Compressed air quality according to ISO 8573-1:2010, class 1.4.2
 - ✓ Impurities: Solid particle size < 1 μm
 - ✓ Water content: Pressure condensation point < +3 $^{\circ}\text{C}$
 - ✓ Total oil content: < 0.1mg/m³









Refer to the diagrams below for compressor cable connecting:



4.2.2.1 Air limit sensor

Most of the time, DS200 models initially have their air limit set to 0.55 MPa when delivered. Usually, an error occurs when the pneumatic pressure is lower than this value. Follow the below diagrams for setting up the air limit sensor value.

	<p>① Press  for 3 seconds.</p>
	<p>② Press  once.</p>
	<p>③ Press  three times.</p>
	<p>④ Set value to 0.500 by pressing  or </p>

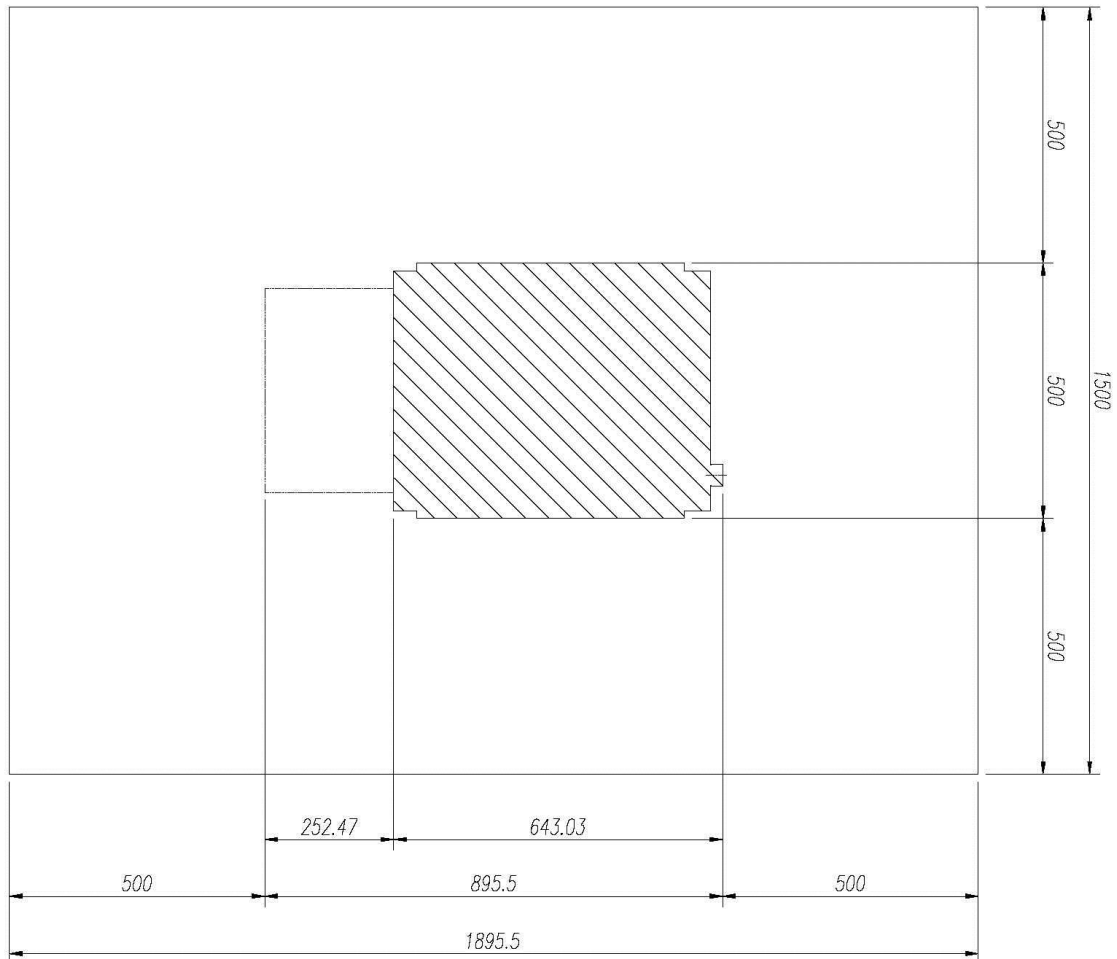
	<p>⑤ Press  once to move to next step.</p>
	<p>⑥ Set value to 0.000 by pressing  or </p>
	<p>⑦ Press  twice to go back to ③.</p> <p>⑧ Press  for 3 seconds to go back to initial screen ①.</p>

*SMC – Model: ISE30A

4.3 Installation area and peripheral condition

Installation area

- Ensure that at least the following amount of space is available
- The height of installation should be 2.0m or higher above the work floor.



Ambient conditions

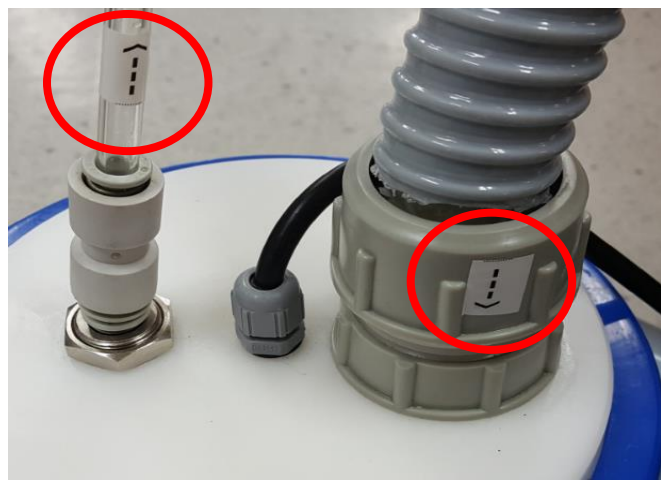
- Only for indoor use
- Pollution degree 2
- Air pressure: 700 hPa – 1,060 hPa
- Operating altitude: $\leq 3,000\text{m}$ above sea level
- Temperature range $15^{\circ}\text{C} \sim 38^{\circ}\text{C}$
- Humidity range 80% rel. up to 31°C , decreasing to 50% rel. up to 38°C

4.4 Liquid Coolant (*DS200-4W / 4WA)

Coolant prevents the overheat caused by the interaction between milling tools and workpiece.

Coolant tank

- Fill the coolant tank with water up to “water” marked line.
- Mix water and water-soluble coolant in the ratio of 8:2 (5~25% is recommended) by adding coolant on top of the water up to “coolant” marked line.
- Click M28 from “PNC Teaching” to operate the pump manually after refilling the coolant.

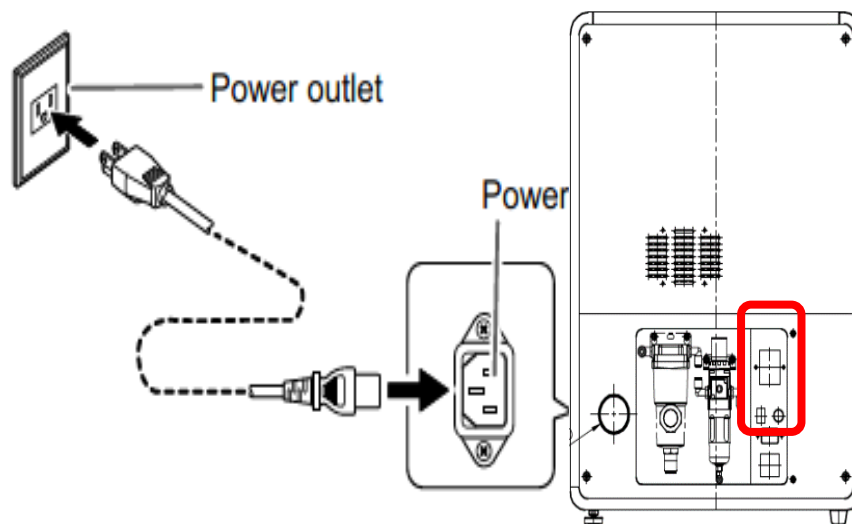


4.5 Connecting cable

4.5.1 Power

Connect power cable to power socket and outlet.

- Voltage is determined by the manufacturing factory
- Rated line voltage AC 110V or AC 220V
- Rated power frequency 60 Hz
- Rated current 10.0A
- Nominal power output 2.0KVA
- Permissible line voltage fluctuations $\pm 10\%$ of nominal voltage



4.5.2 Network

Setting up network allows the machine to function remotely without the need of removable disk.

- Remote PNC

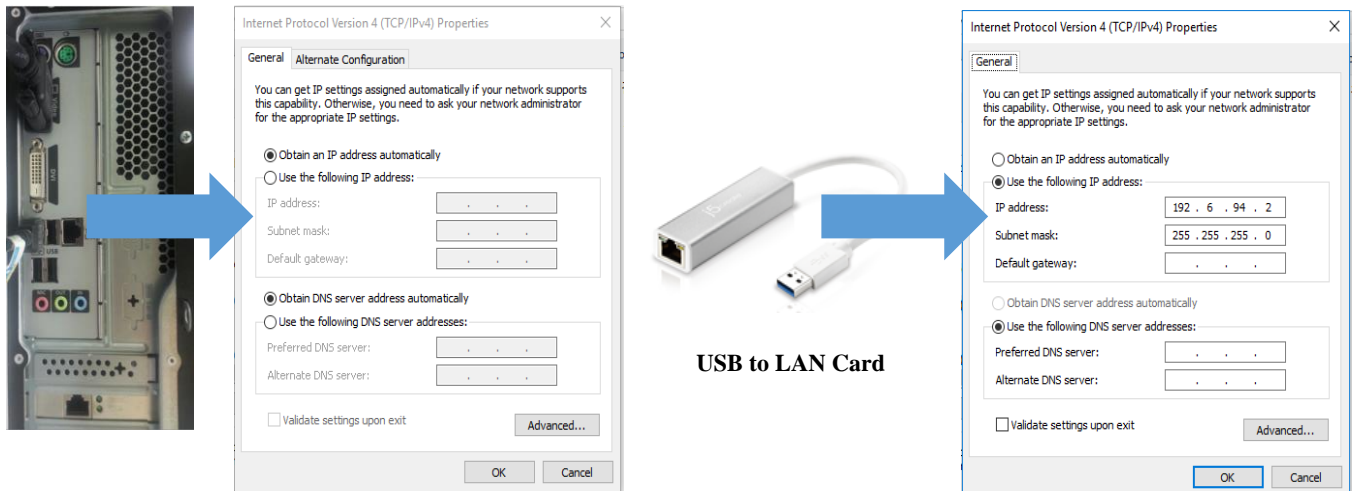


➤ to connect more than one machine and PC, use LAN hub.

- Necessary components to install Remote PNC

- 1) USB to LAN Card
- 2) LAN Cable 10M

- Setting LAN for CAD/CAM PC



LAN Port 1

Unfixed IP that connects to Internet

LAN Port 2

Fixed IP that connects RND machine

4.5.3 Remote PNC (Maxx Link)

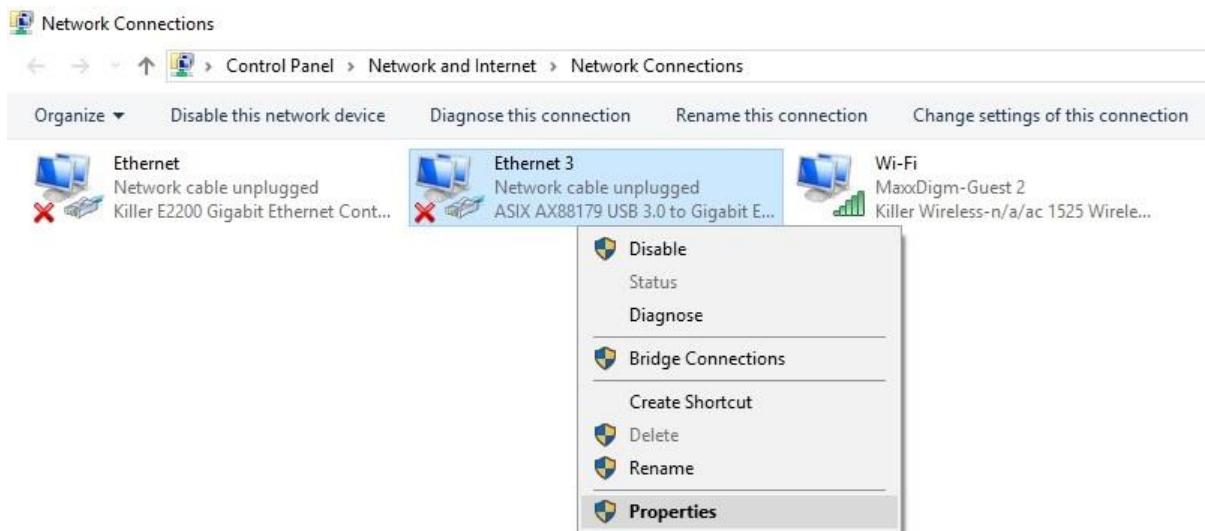
The embedded PC screen can be viewed and controlled directly from the connected PC via Maxx Link.

A. Network Setting

1. Control Panel > Network and Internet > Network and Sharing Center > **Change adapter settings**

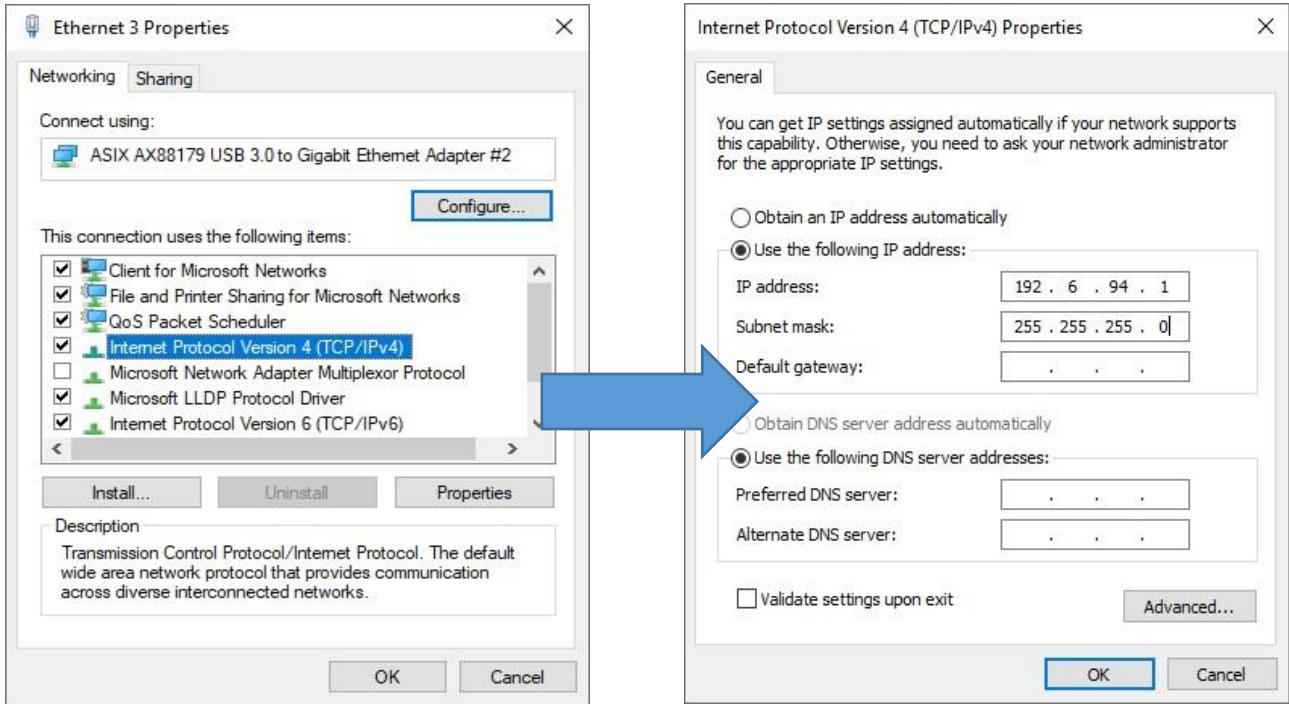


2. Right click on “Local area connection” and click “Properties”

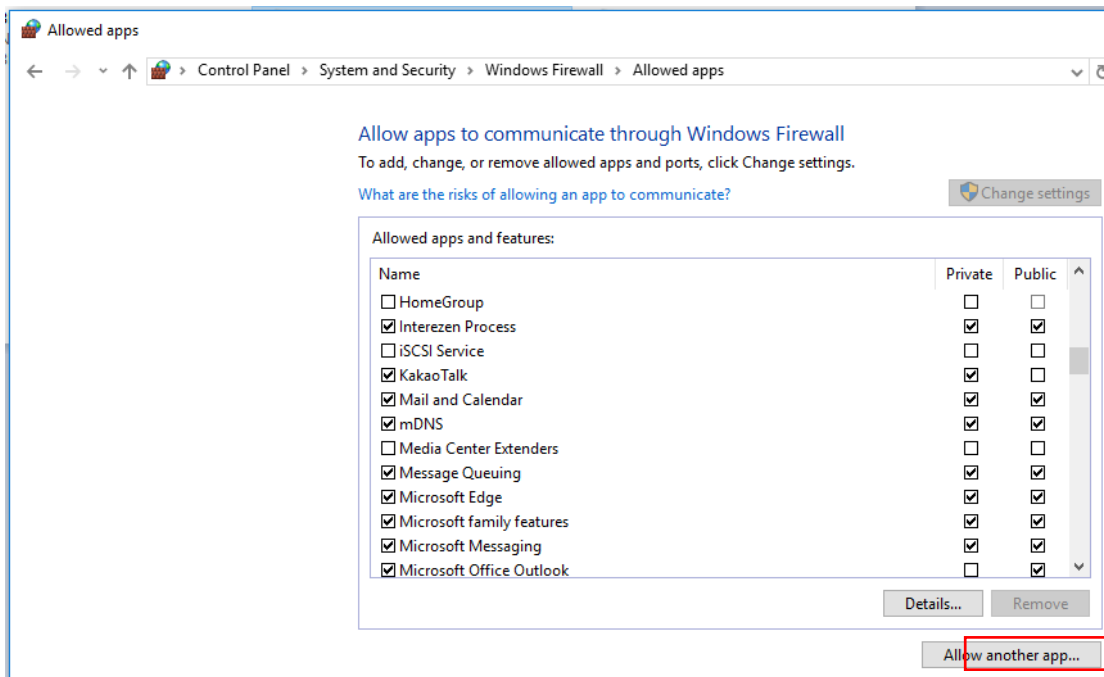


3. Click on “Internet Protocol Version 4 (TCP/IPv4)” and “Properties”.

Click “OK” after changing IP address as below.

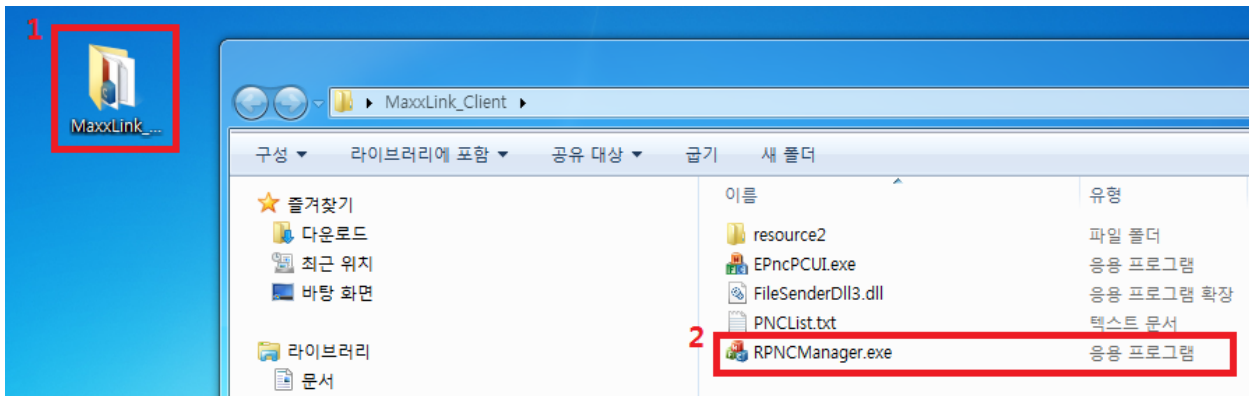


B. Firewall

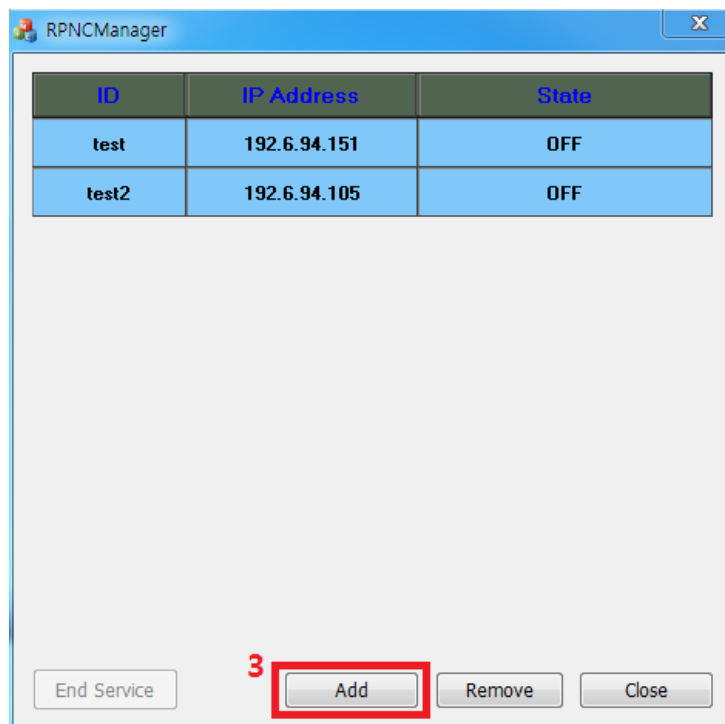


Click “Allow an app or feature through Windows Firewall” and “Allow another app” to add allowed apps.

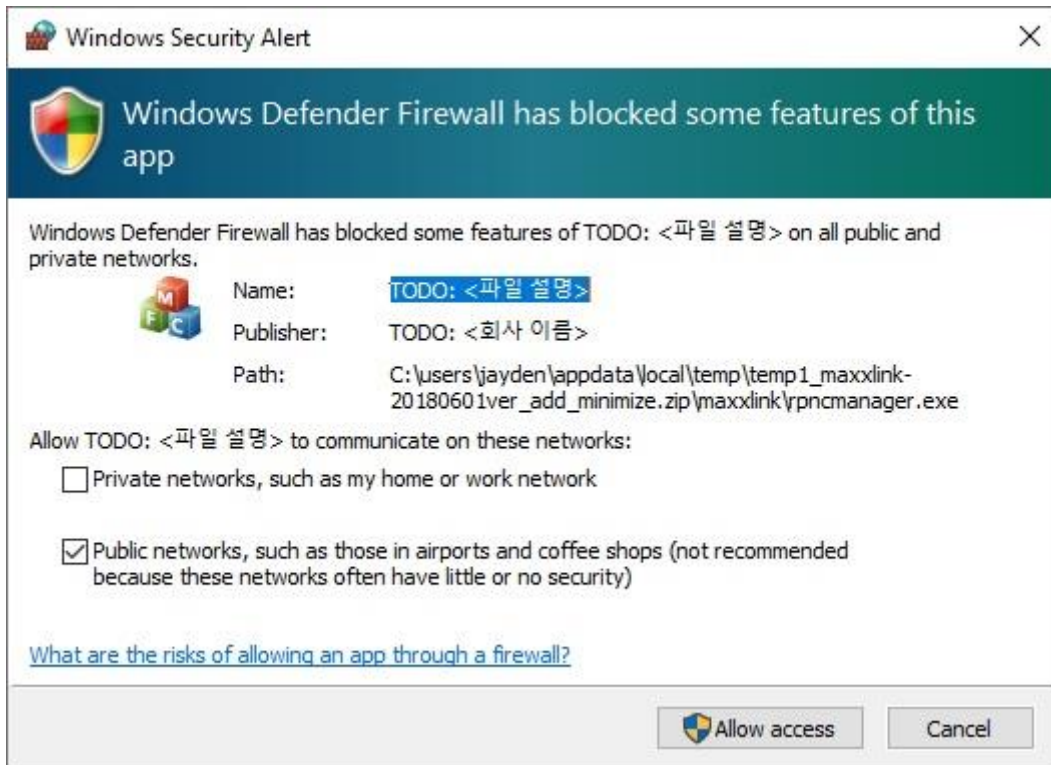
C. Operation Mode Installation



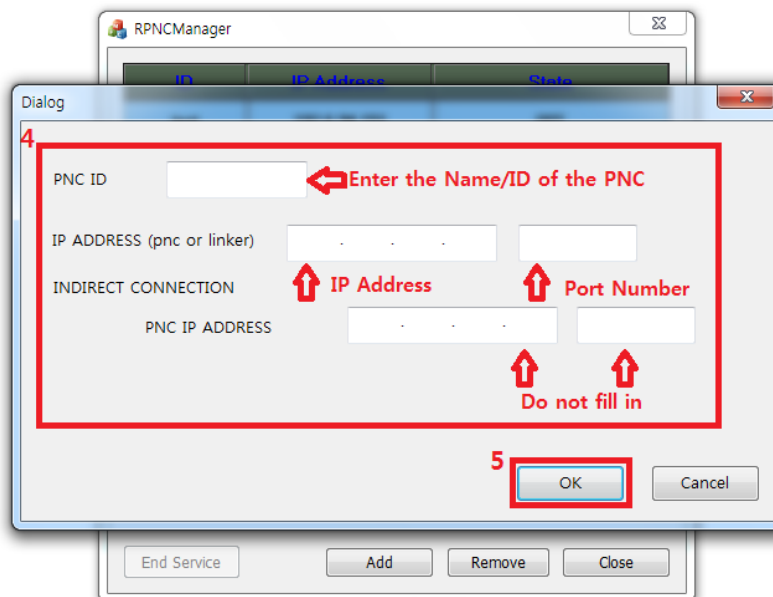
① Open RPNManager in MaxxLink_Client folder.



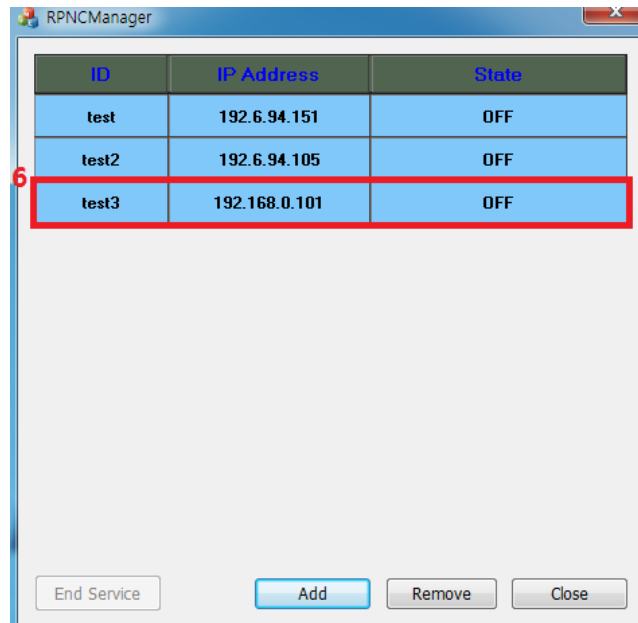
- ② Click “Add” button to add new PNC to the list.



- ③ Warning as above may appear when RPNC program is started. Click “Allow access” to continue. *If warning does not appear, you must change windows setting (*refer to firewall service part)



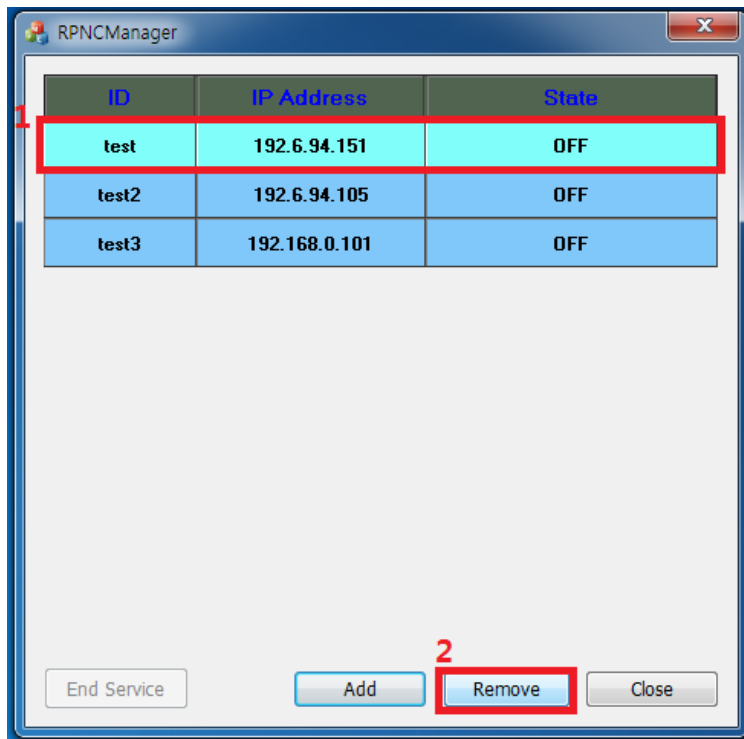
- ④ Enter IP address and port number of PNC machine.



- ⑤ Double click the ID to start the program.
To turn off the program, double click the ID again.

***List of ID is saved automatically when program is turned off.**

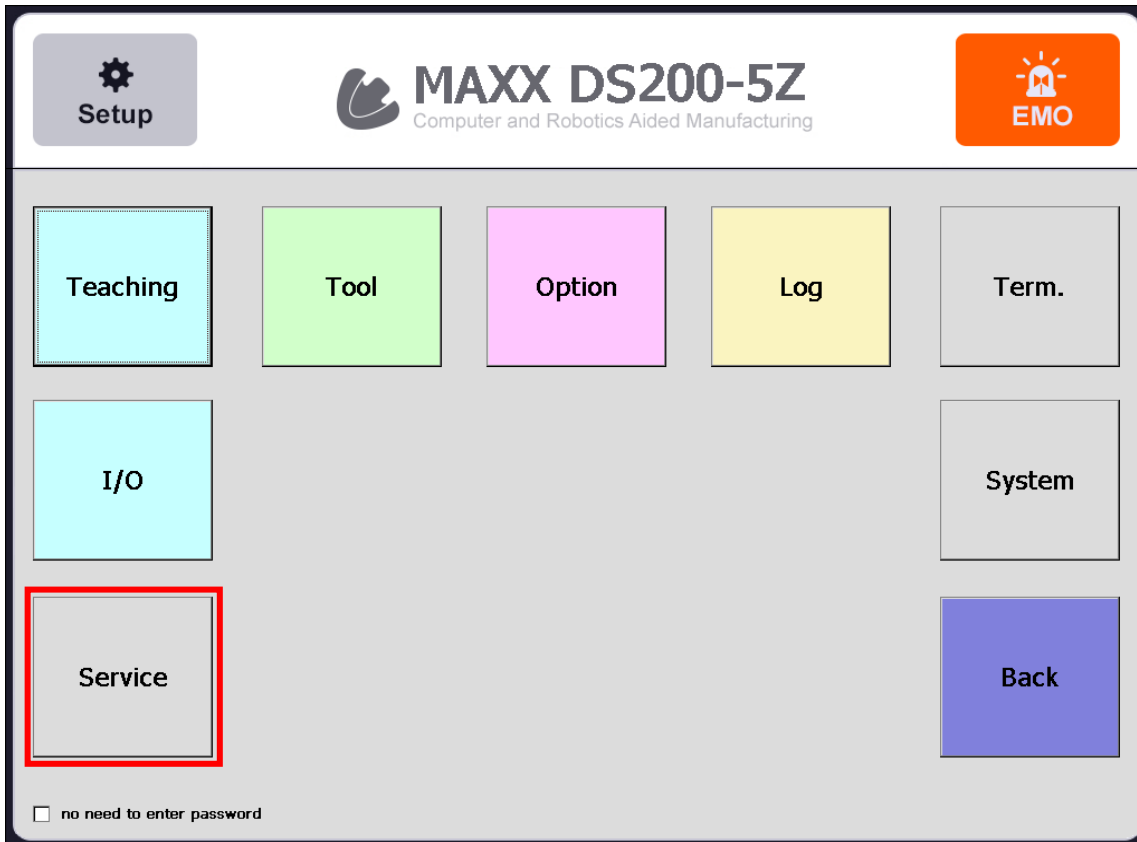
D. Removing the PNC Info



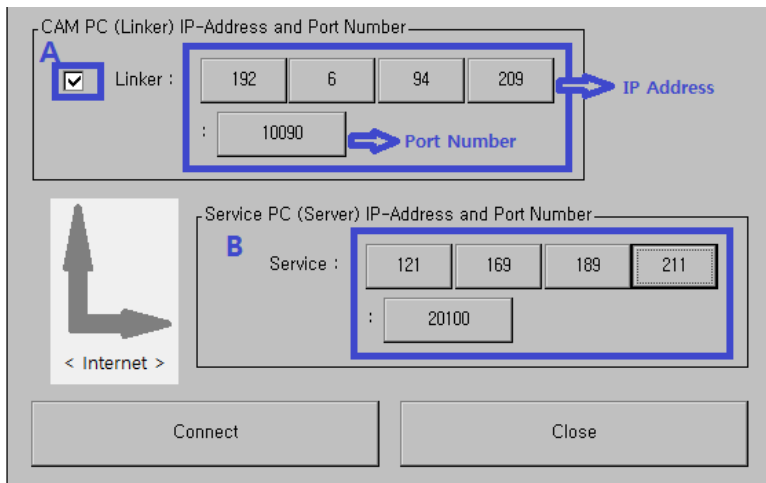
To remove PNC ID, click the ID and click “Remove”.

Linker program

The mode that connects with technicians remotely for services.



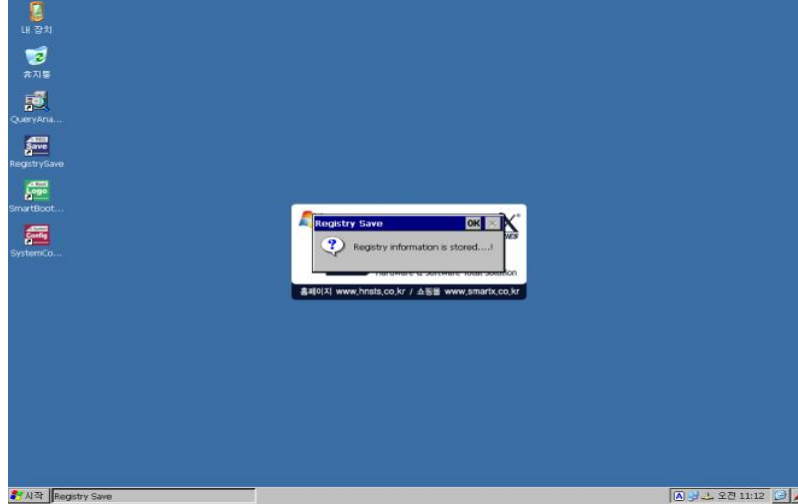
“Service” will initiate Maxx Link, a remote program operated by RND (*refer to user’s manual).



1. Click “Linker” and enter CAM PC (Linker), IP address and port number.
2. Enter IP address and port number of service PC. (IP address may be changed so double check the IP address with RND in advance).

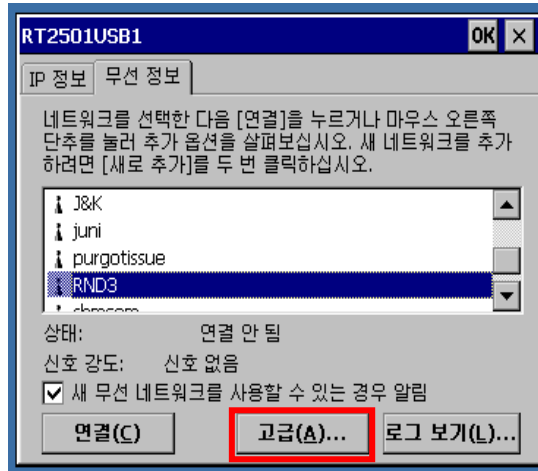
***Linker program must be executed before clicking “Connect”. Please follow below instruction to execute Linker program.**

4.5.4 Remote LAN for embedded PC

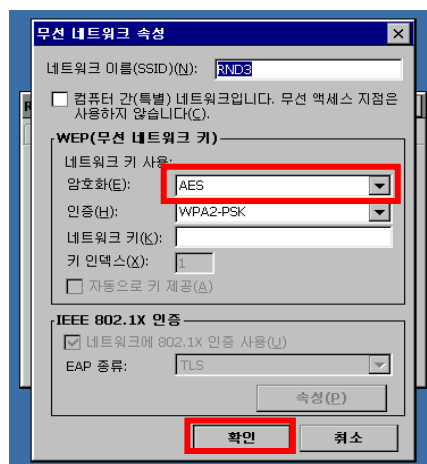


1. Boot embedded PC as debugging mode.

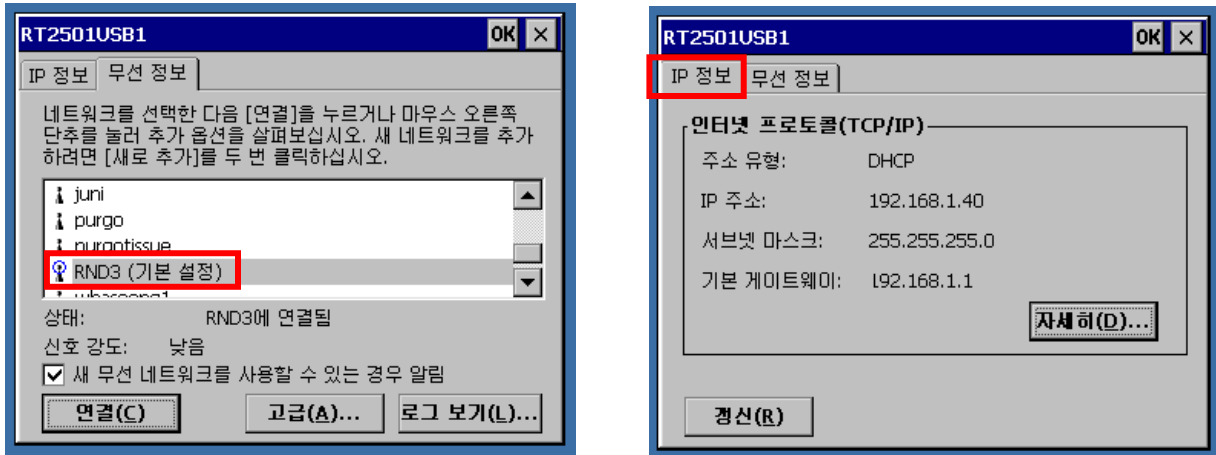
> To do so, take out SD card or turn off Dip-switch #1.



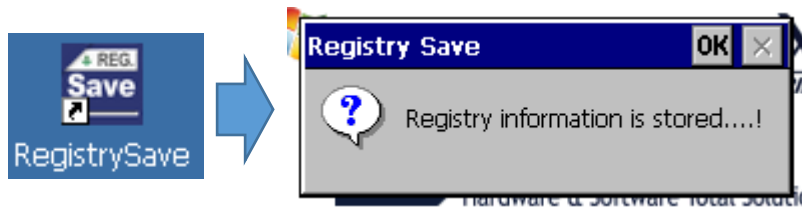
2. Above window appears when USB is connected. Select AP and click “Connect”.



3. When AP information appears, enter AP password and click “OK”.



4. If it is connected successfully, you can check the connection. You can check IP address at “IP information tab”.

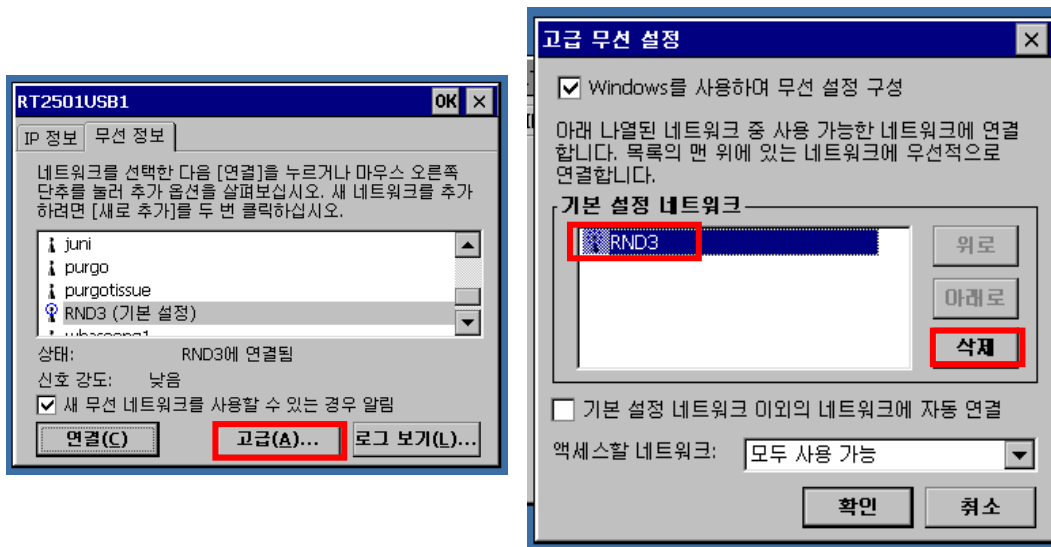


5. After connecting network, click on “RegistrySave” on desktop to save the changes.

If it is saved, notification window appears upon completion.

If it is not saved, remote LAN cannot be connected.

**** Removing remote LAN**



1. Click “properties”.
2. Click network and “delete”.
3. Save by clicking “Registry Save” as before.

4.6 Spindle warm-up

The process that stabilizes the spindle's rotation and preserves the grease lubrication on the bearings.

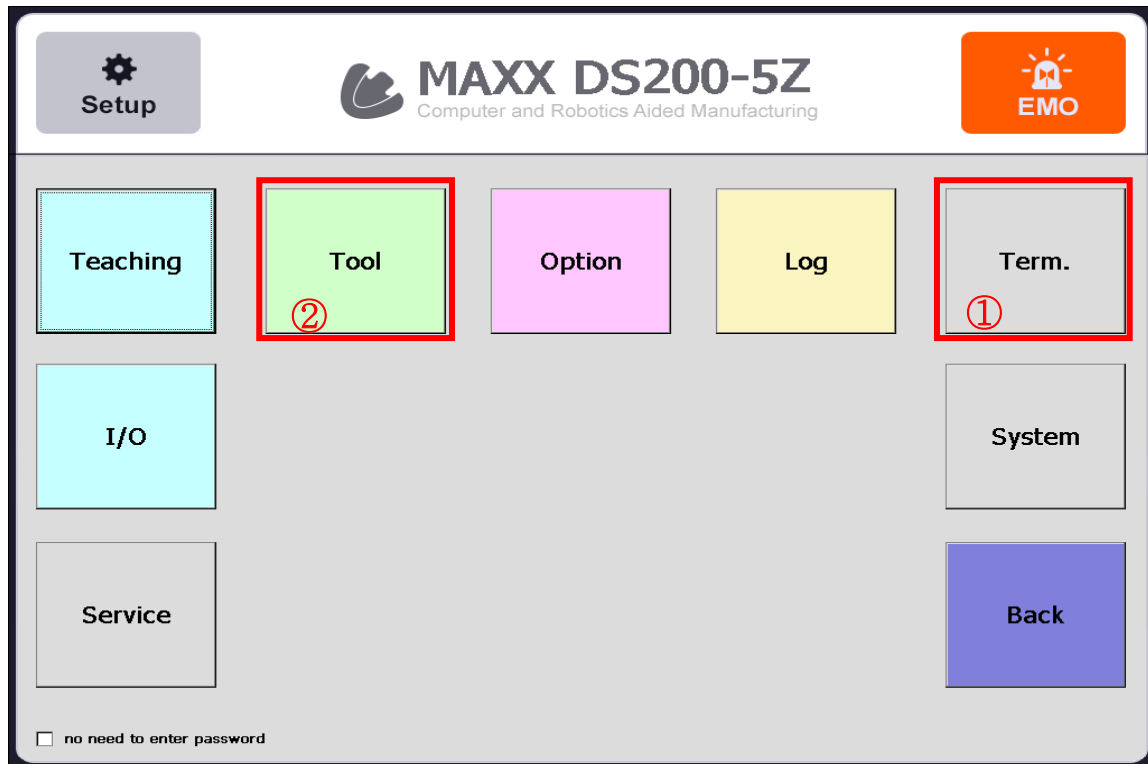
When to perform spindle warm-up

- After installing the machine
- When the spindle units are replaced
- When the machine was not used for a prolonged period
- Before using the machine in low room temperature

Before performing spindle warm-up

- Check if spindle RPM & Override value is changed correctly.
- Never attempt to perform spindle warm-up without clamped tool.
- Perform spindle warm-up by following below schedule.

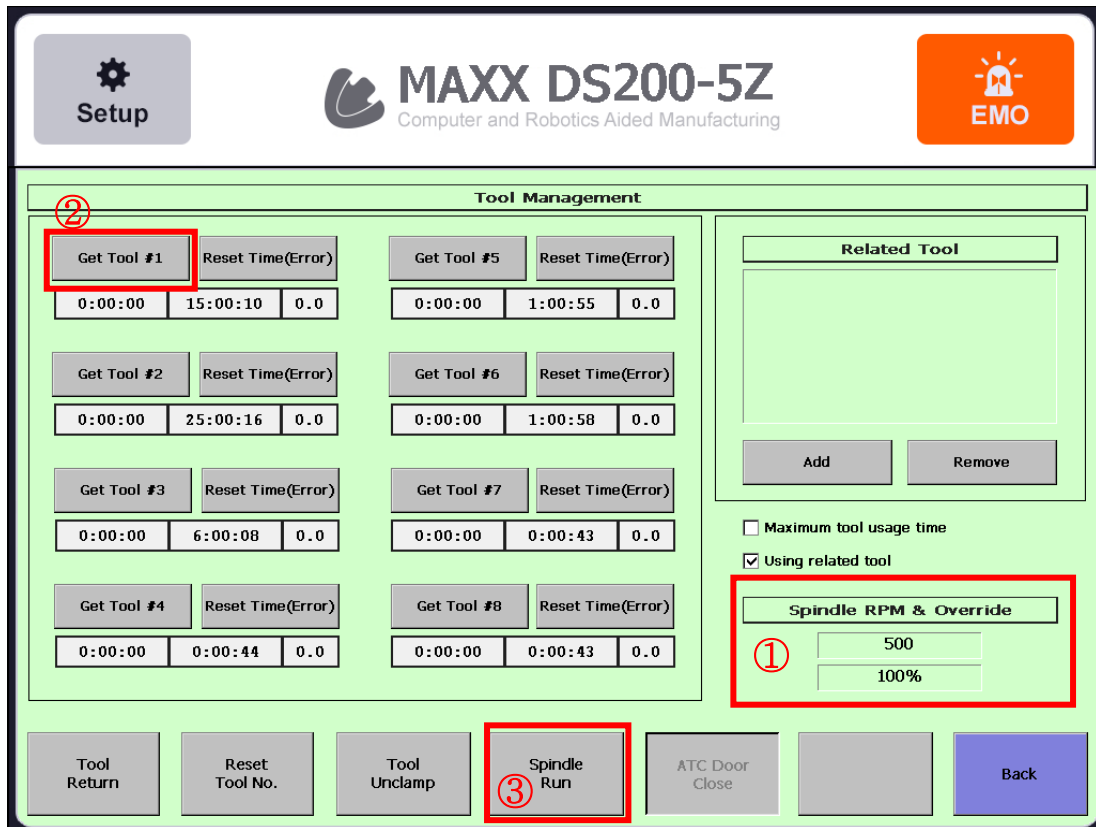
Spindle warm-up procedure



1. Click “Term.”

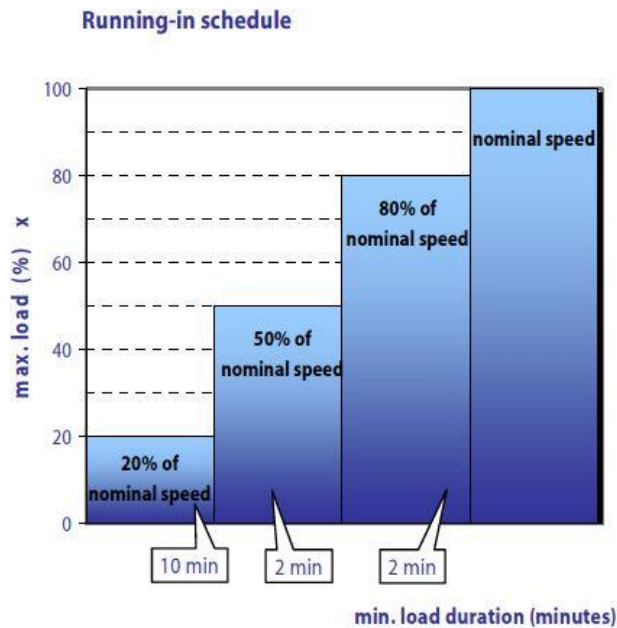


2. Enter RPM and click “SEND.”



3. Check RPM in “Tool” and click “Get Tool #1” then “Spindle Run.”

Spindle warm-up schedule



Step 1: Initialize the spindle by letting it run (with tool inserted) for approximately 10 minutes at the maximum speed at 20% of its rated speed.

Step 2: Allow the spindle to run for approximately 2 minutes at a maximum of 50% of its rated speed.

Step 3: Allow the spindle to run for approximately another 2 minutes at a maximum of 80% of its rated speed.

Step 4: The spindle is now ready for operation.

WARNING

- NEVER attempt to operate the spindle without inserted tool as this can result in:
 - ➔ The clamping system is damaged by the centrifugal forces
 - ➔ The clamping system becomes displaced
 - ➔ The balance of the spindle becomes adversely affected and the bearing will be damaged.
- NEVER attempt to exceed the maximum speed of the selected tool specified by the tool supplier. Always select the lowest specified speed for machining. Inappropriate speed selection could potentially destroy the spindle into fragments resulting in serious injury or even death.

Daily startup

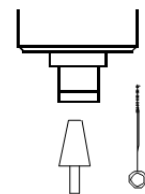
For daily startup, it is recommended to allow the spindle to run for approximately 2 minutes at a maximum of 50% of its rated speed to pre-heat and preserve the grease lubrication on the bearing.

Spindle cleaning

- To ensure that the spindle functions safely and accurately, all contacting surfaces of the spindle such as the mount for the spindle, the tool mount and the tool holder must be clean.
- Before each daily working session, check that all surfaces have been thoroughly cleaned and are free of dust, grease, coolant, residue from previous operations and metal particles and that there is no visible damage.
- Do not use compressed air, ultrasound or steam jets to clean the spindle. This can allow dirt to get into the bearings.



- If the spindle is equipped with sealing air, always turn this on when cleaning.
- Use only a clean, soft cloth or a clean, soft brush for cleaning.
- Clean the inner taper of the spindle shaft. The inner taper must be free of chips and impurities.
- Clean the tool taper with a clean, soft cloth or a clean, soft brush.
- Clean the collet and the collet mount with a clean, soft brush.
- Apply a light film of grease to the taper of the collet after cleaning to improve the slippage and the clamping force of the collet.
- **Only use** the collet grease from the service set. No other lubricating grease or oil may be used.

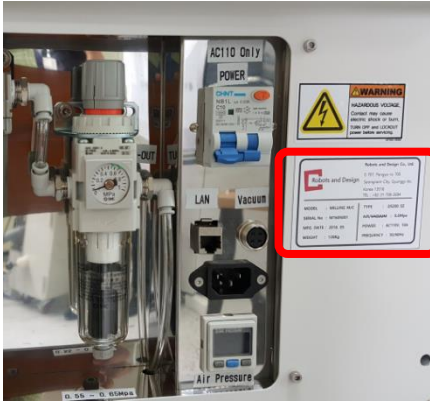



4.7 Auto Calibration

** Refer to USER GUIDE [4.3.4 Auto Calibration]

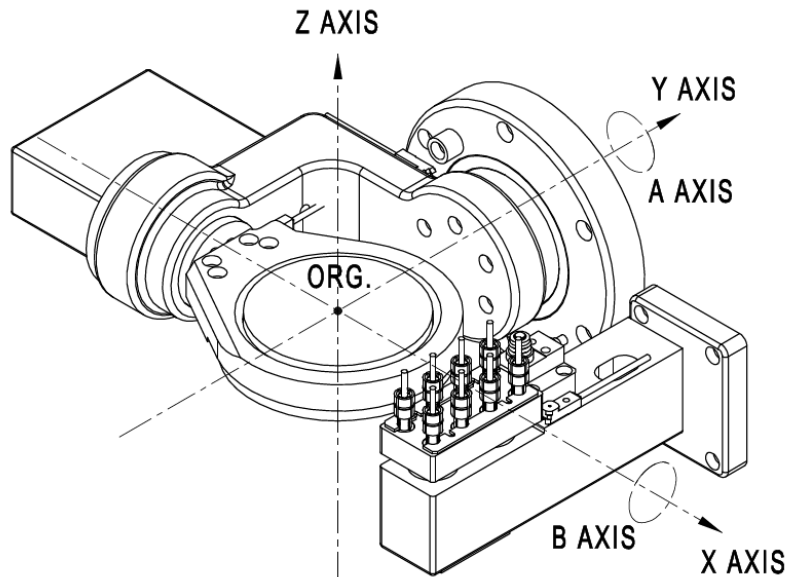
V. Specification

5.1 Power rating and S/N

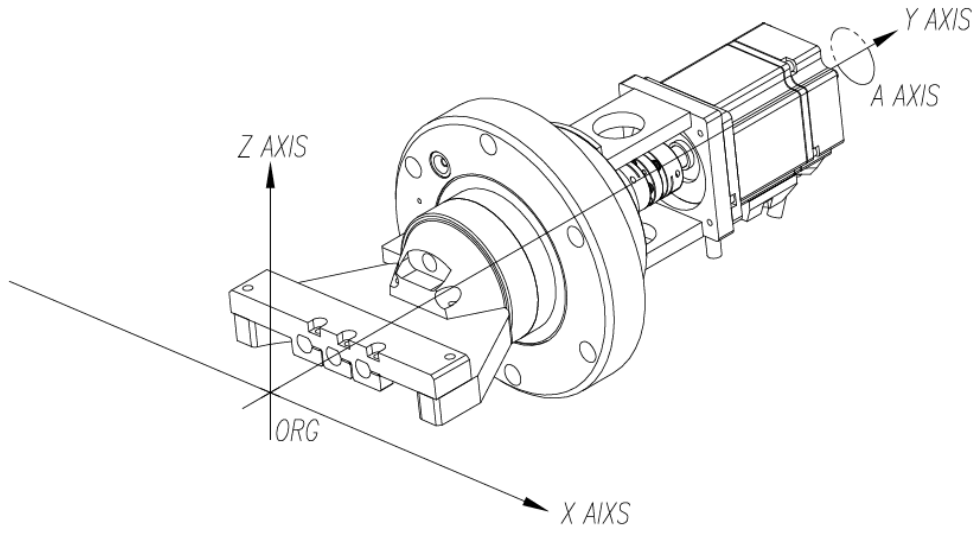


 Robots and Design		Robots and Design Co., Ltd. E-707, Pangyo-ro 700 Seongnam-City, Gyunggi-do, Korea 13516 TEL : +82-31-708-2684	
		MODEL : MILLING M/C SERIAL No : MS170502 MFG. DATE : 2017.05 WEIGHT : 150Kg	TYPE : DS200-5Z AIR/VACUUM : 0.6Mpa POWER : AC110V, 10A FREQUENCY : 50/60Hz

5.2 Coordinate

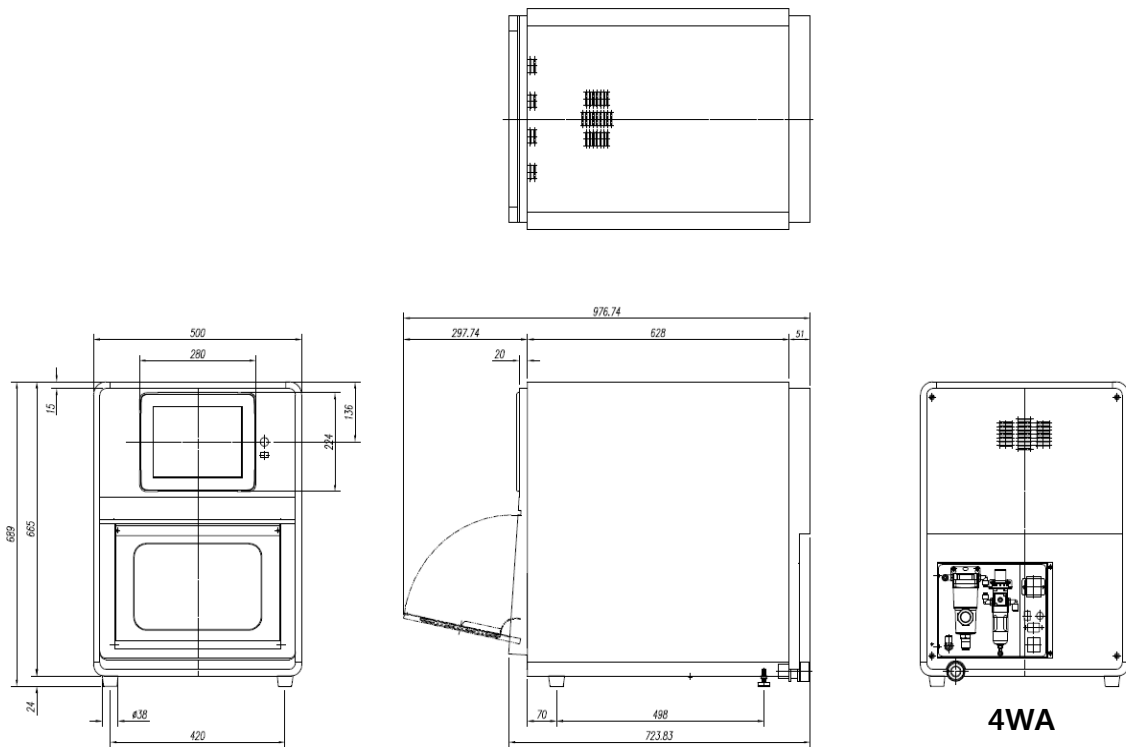
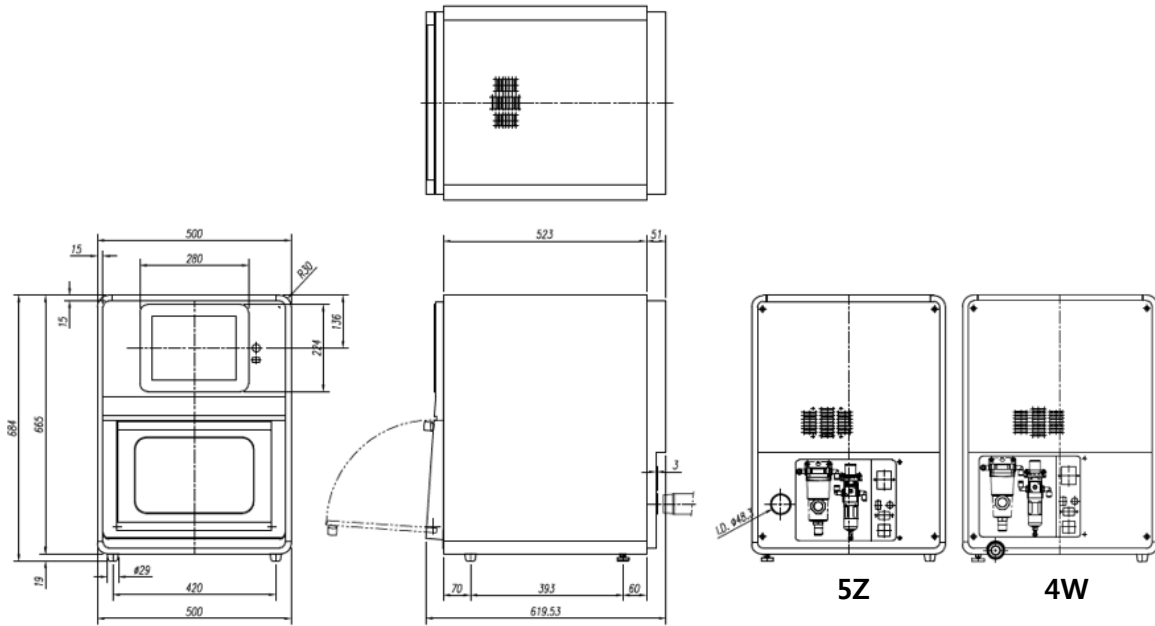


<DS200-5Z>



<DS200-4W / 4WA>

5.3 Drawings



5.4 Machine specification

ITEM	DS200-5Z	DS200-4W	DS200-4WA
No. of axis	5-axis	4-axis	
Size and weight	500W x 680D x 712H, Approx. 100kg		500W x 725D x 712H, Approx. 110kg
Controller and motor	Embedded PC (10.4" touch screen), AC servo motor		
Index operating ranges	A=±25deg, B=±180deg	A=0~180deg	
No. of tools and tool spec.	Shank diameter: 3mm, ATC 8 tools		Shank diameter: 6mm, ATC 8 tools
Spindle	BLDC motor, 500W, 60,000rpm		High frequency, 1.4KW Max 2.7KW, 60,000rpm
Blank material and size	Zirconia, wax, PMMA, ultimate, disc (Φ98) and hybrid ceramic	Glass ceramic, disc (Φ98), pin type material and hybrid ceramic	Custom abutment, disc(Φ98), zirconia, PMMA and hybrid ceramic
Cooling	Dry	Wet	
Utility	AC220/6A & Compressed air (6.5 bar)		