DOGA®
ASSEMBLY
TECHNOLOGY

Instruction manual

BM SERIES CONTROLLER
ParaMon-Pro X

EN

60391-01/21

www.dogassembly.com

CONTENTS

Symbols 5
1. INFORMATION 6
1.1 IMPORTANT 6
1.2 Product reference 6
1.3 Product description 6
1.4 Standard packing items 7
1.5 Specifications 8
1.6 System overview 8
1.7 Dimensions and appearances 9
2. HOME 11
2.1 Operator mode 11
2.2 Administrator mode 12
3. NETWORK CONFIGURATION 13
3.1 Connect through internal AP 14
3.2 Connection through external AP 16
4. BM WIFI SETUP 18
4.1 Setup using ParaMon Air (PC) 18
4.1 Setup using ParaMon-Pro X 21
5. MEMBER TOOL MANAGEMENT 23
5.1 Register Member Tools 24
5.2 Deregister Member Tools 27
5.3 Modify member tool names 29
5.4 Check member tool status 30
6. STATUS BAR 32
7. SELECT TARGET TOOL 33
8. PARAMETER 35
8.1 Fastening 35
8.2 Advanced 40
8.2.1 Free reverse rotation 41
8.2.2 Thread tapping 41
8.2.3 Engaging torque detection 43
8.2.4 Angle after torque up 45
8.3 Controller 46
8.4 Multi-sequence 52
8.5 Network 54
9. MONITOR 55
9.1 Graph 56
9.2 I/O 58
9.3 Error 59
10. REMOTE 60
10.1 Output 60
10.2 Tool 61

11. SETTING....62
11.1 Operation....62
11.2 I/O....67
11.2.1 Input....68
11.2.2 Output....69
11.3 Log....70
11.4 Barcode - without job & BM integrated scanner....71
11.5 Network....73
11.6 Share....74
11.7 System....76
12. SYSTEM....77
12.1 Device info....77
12.2 Storage....78
12.3 Network....79
13. JOB MANAGER....80
13.1 Edit job & step....81
13.1.1 Fastening step....83
13.1.2 Input step....86
13.1.3 Output step....87
13.1.4 Delay step....88
13.1.5 Message step....89
13.2 Barcode....90
14. OPERATION....92
14.1 With job mode....93
14.1.1 Fastening step....94
14.1.2 Input step....96
14.1.3 Output step....97
14.1.4 Delay step....98
14.1.5 Message step....100
15. FILE BROWSER....101
16. FTP SERVER....103
16.1 Connection via WiFi....104
16.2 Connection via ethernet....105
17. BACKUP & RESTORE....106
17.1 ParaMon-Pro X....106
17.1.1 Backup....107
17.1.2 Restore....109
17.2 BM Parameters....110
17.2.1 Backup....111
17.2.2 Restore....112
18. SOFTWARE UPGRADE....113

19. MAINTENANCE 115
19.1 Maintenance 115
19.2 Troubleshooting 115
19.3 Spare parts 116
19.4 Hotline 116
19.4.1 For any questions about the use of the device 116
19.4.2 For any questions regarding troubleshooting 116
19.5 After-sales returns 117
19.5.1 Download the after-sales return form 117
19.5.2 Send your equipment 117
19.6 On-site repair 118
19.7 Warranty 118
20. SAFETY 119
20.1 General provisions 119
20.2 Contra-indications 119
21. STANDARDS 120
21.1 Importer details 120
21.2 Markings 120
21.3 Transport and storage 120
26.3.1 Transport 120
26.3.2 Storage 120
21.4 WEEE recycling and end of service life 121
26.4.1 Collection and recycling scheme 121
26.4.2 Collection points 121
22. APPENDICES 122
22.1 - Declaration of conformity 122
22.2 - Interface port DB44 pin out 122
22.3 - Backup data forwarding 123

REMARKS ABOUT THE MANUAL

Symbols

Information
This warning statement indicates important information (for example: damage to property), but no hazard.

Information
Information to view in your customer area on the www.doga.fr web site.

Caution
This warning statement indicates a low risk that may lead to minor or moderate injuries if not avoided.

Wear personal protection equipment
This symbol indicates the need to wear protective gloves.

Warning
This warning statement indicates a moderate risk that may lead to severe or fatal injuries if not avoided.

1. INFORMATION

1.1 IMPORTANT

The tool supplied with this manual may have been altered to meet specific needs.
If this is the case, when ordering a renewal or spare parts, please indicate the tool item code featured on the delivery document, or contact **DOGA** at **+33 1 30 66 41 41** indicating the approximate delivery date. You will then be sure to get the required tool and/or parts.

1.2 Product reference

Description	BM series controller
Type	ParaMon-Pro X

1.3 Product description

ParaMon-Pro X offers diverse features to help users use the BM tool more efficiently..
The features of ParaMon-Pro X are as follows:

- Dual-band (2.4 & 5GHz) WiFi, AP-mode only
- Able to connect up to 8 BM/MD tools
- Able to check and change parameter settings
- Displays fastening data in real time and saves them automatically
- Directly programs and visualizes assembly procedures
- Realtime graph monitoring (torque, speed, angle…)
- Remote tool control
- I/O port (input x 16 / output x 16)
- External display extension (HDMI)
- Supports barcode scanner
- Supports File Transfer Protocol (FTP) server
- Backup / restore

1.4 Standard packing items

	Quantity
ParaMon-Pro X Controller	X 1
Power Cord	X 1
WiFi USB adapter	X 1
Vesa wall mounting support	X 1
CE Declaration of Conformity	X 1

1.5 Specifications

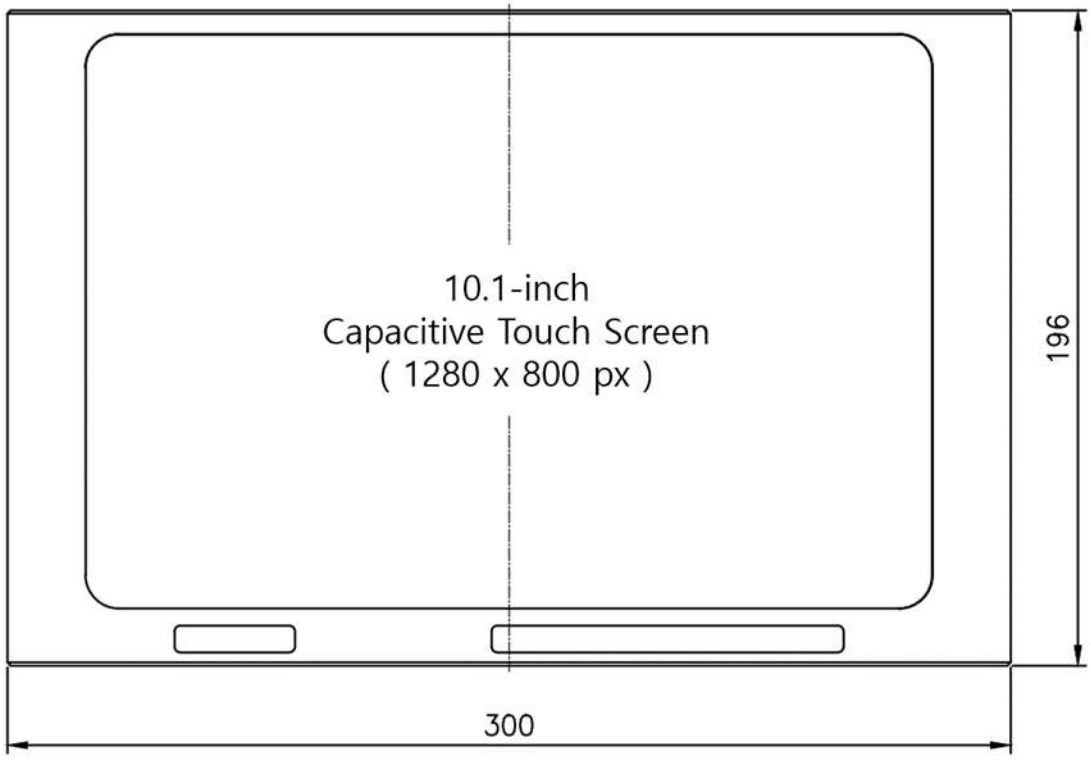
No.	Category	Specifications
1	Input Power	AC 100-240 V, 50/60Hz, 0.35A
2	Dimensions	300(W) x 196(H) x 80(D) mm
3	Weight	3.54 kg (including wall mount bracket)
4	Mounting	VESA 100 x 100 (wall mount bracket included)
5	Display	10.1-inch capacitive touchscreen (1280 x 800 px)
6	Extended Display	HDMI x 1 (duplicate)
7	Storage	On-board 8GB eMMC
8	Ethernet	Gigabit ethernet x 1
9	WiFi	Wireless USB adapter included 2.4GHz, 5GHz dual-band, IEEE 802.11 b/g/n/ac AP-mode only
10	Interface	USB 2.0 x 3 24V digital I/O (input x 16, output x 16) Micro-SD slot (up to 32GB)
11	Multi-Language	English, Translation in progress :French, German, Spanish,

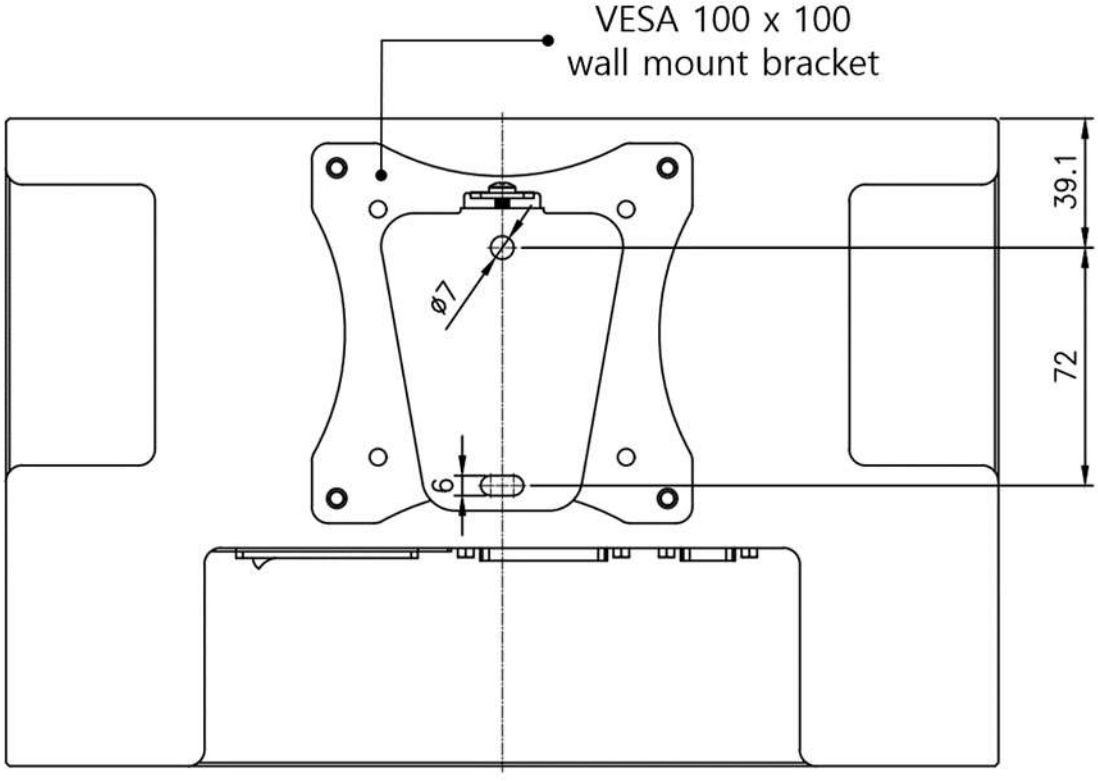
Cautions

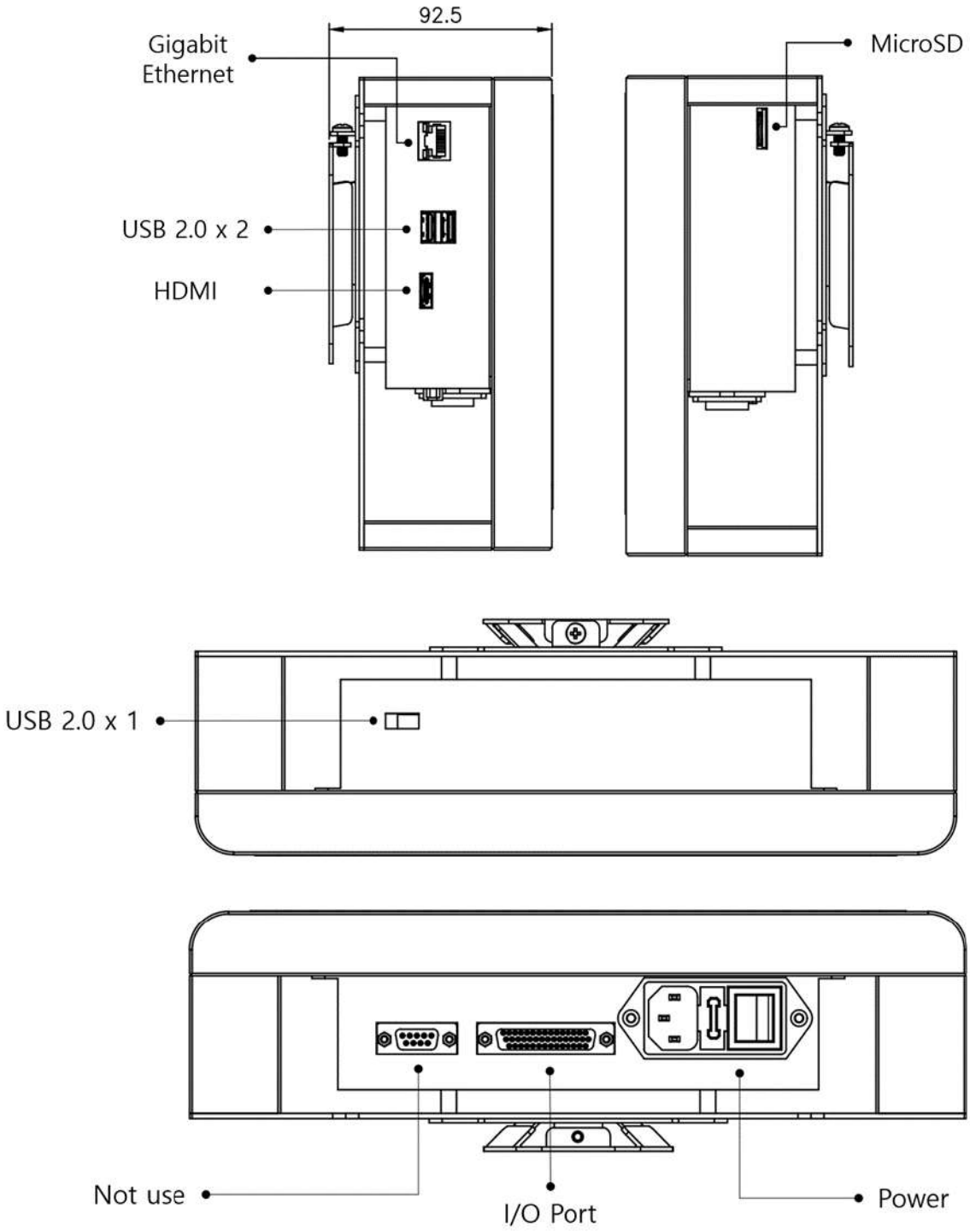
- Do NOT use any item other than the accompanying USB WiFi adapter.
- There is a possibility of signal interference while operating the equipment

1.6 System overview

1.7 Dimensions and appearances



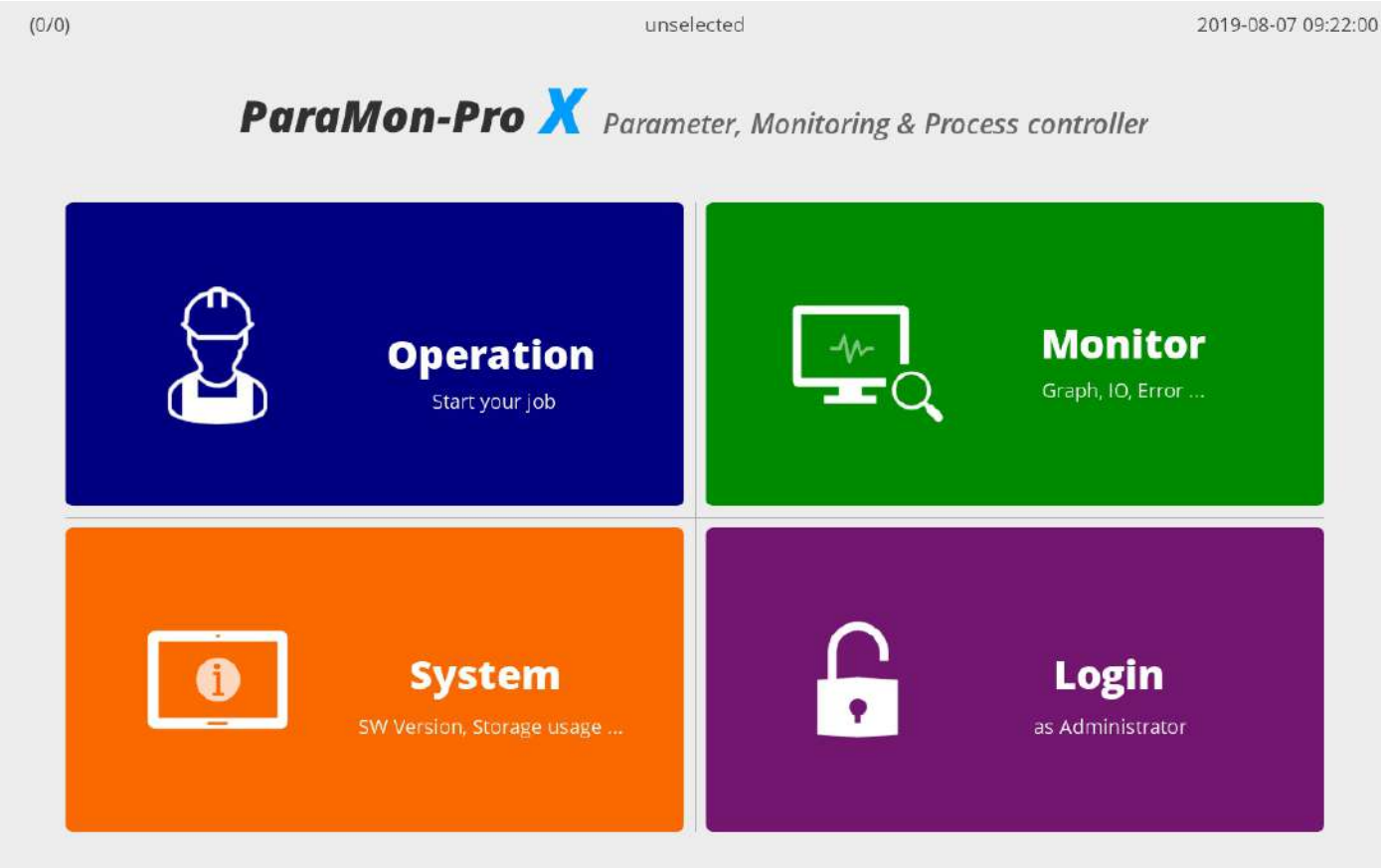



92.5
Gigabit Ethernet
MicroSD
USB 2.0 x 2
HDMI
USB 2.0 x 1
Not use
I/O Port
Power

2. HOME

2.1 Operator mode

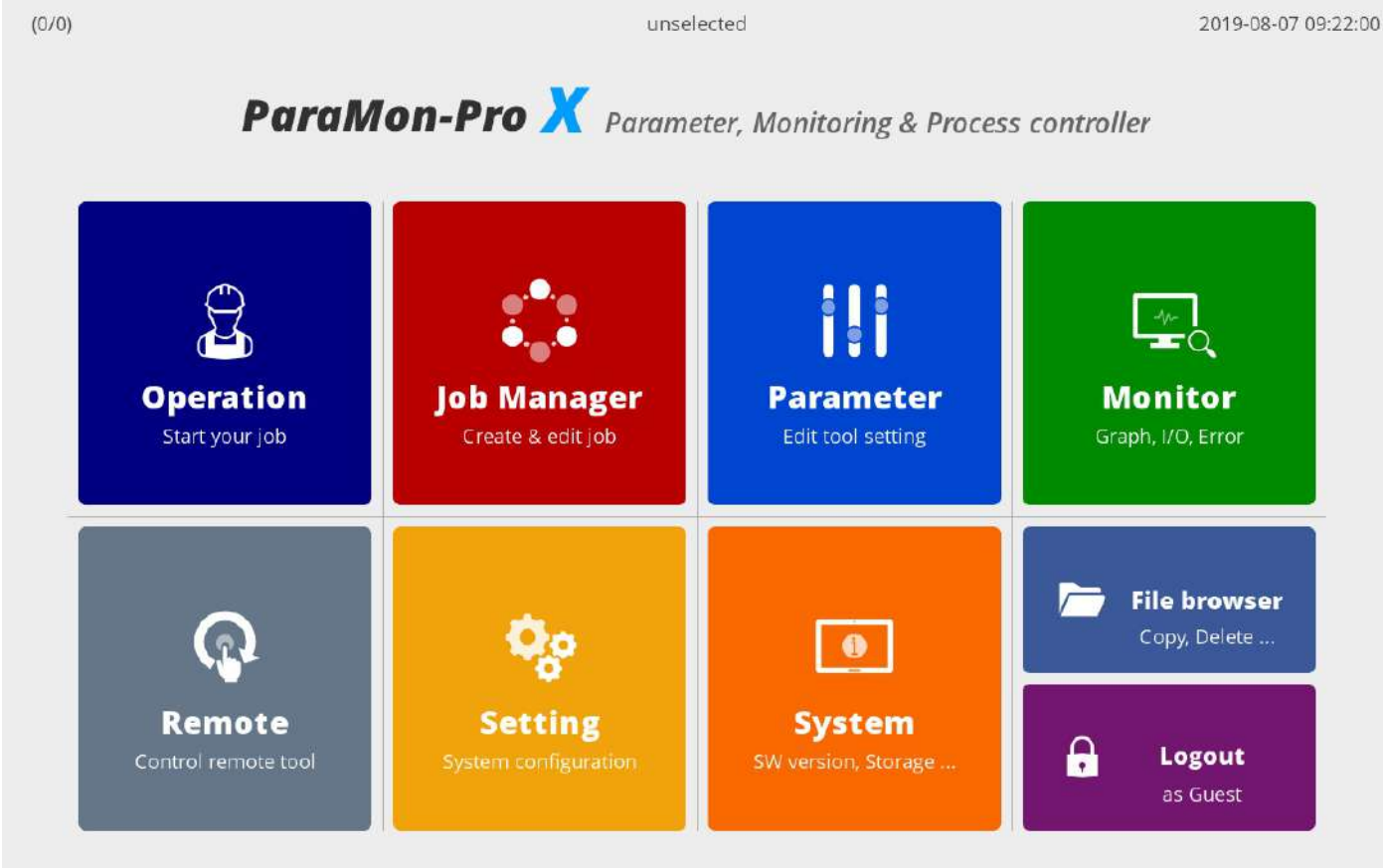
Operator can select one of 4 screen menu – Operation, Monitor, System and Login.
Login menu requires the password to move to administrator mode
There is no setting available in operator mode.



No.	Category	Description
1	Operation	Moves to the OPERATION page
2	Monitor	Moves to the MONITOR page
3	System	Moves to the SYSTEM page
4	Login	Enter the password and log into the Admin mode The default password is “0”. Password can be changed in Admin mode.

2.2 Administrator mode

All settings and job creation is available in admin mode only.



No.	Category	Description
1	Operation	Moves to the OPERATION page
2	Job Manager	Moves to the JOB MANAGER page
3	Parameter	Moves to the PARAMETER page
4	Monitor	Moves to the MONITOR page
5	Remote	Moves to the REMOTE page
6	Setting	Moves to the SETTING page
7	System	Moves to the SYSTEM page
8	File Browser	Moves to the FILE BROWSER page
9	Logout	Logs out from Administrator to Operator mode

3. NETWORK CONFIGURATION

For connection between ParaMon-Pro X and BM, a network can be configured as follows:

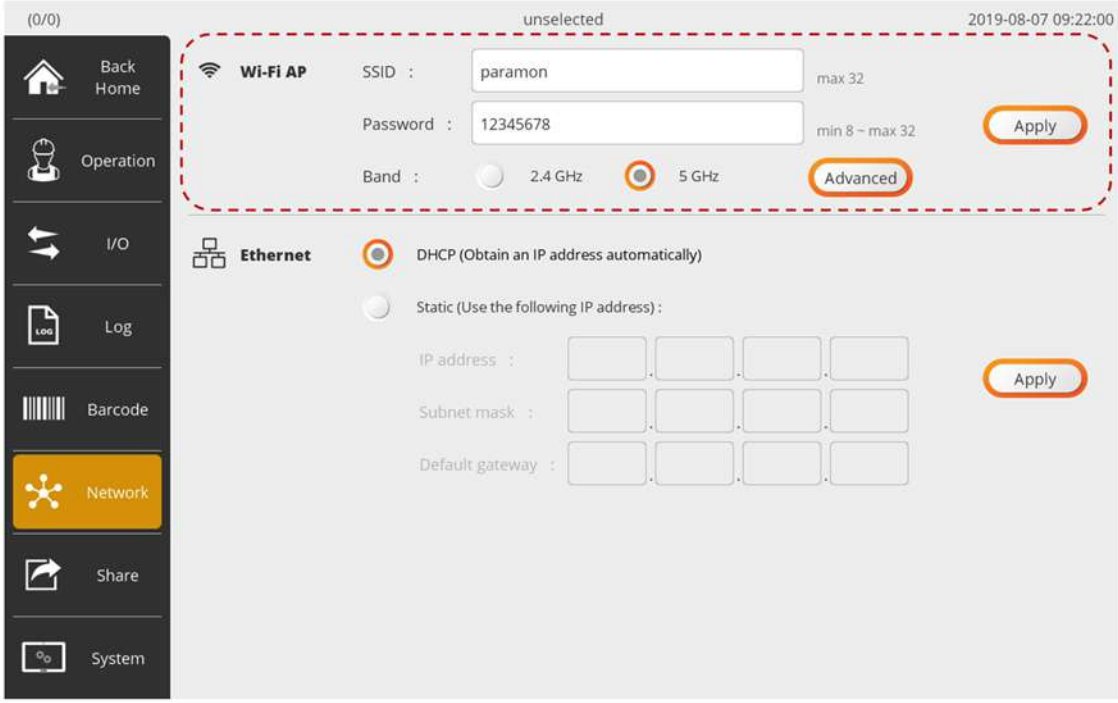
Category	Description
Connection through Internal AP	The most common type Through a USB WiFi adapter in ParaMon-Pro X, ParaMon-Pro X is operated in AP mode and connected to BM.
Connection through External AP	ParaMon-Pro X is connected to BM, using a separate AP. Can be used when wider WiFi coverage is needed or a particular feature provided by the AP is required

3.1 Connect through internal AP

The most common type.
Through a WiFi adapter in ParaMon-Pro X, ParaMon-Pro X is operated in AP mode and connected to BM. The WiFi module in ParaMon-Pro X is operated in AP mode only, not in Station mode.

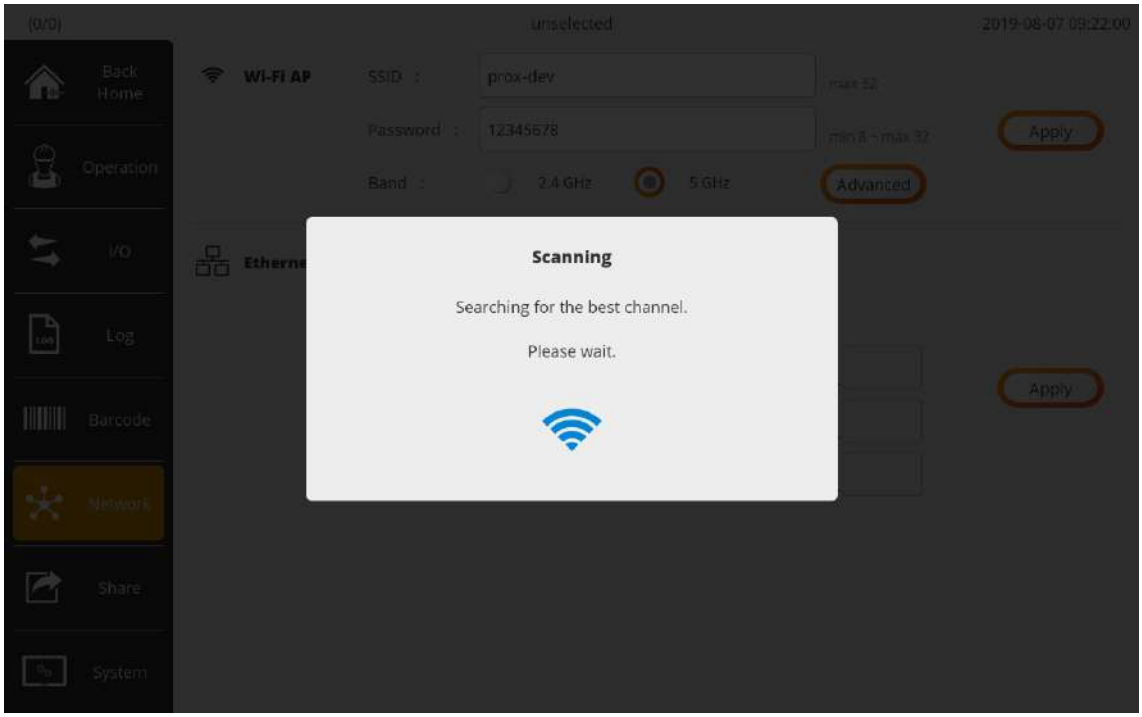
A. Log into the system in Admin mode. The default password is “0”.
B. Press [Setting].
C. Select the NETWORK tab on the left.
D. Set the SSID, password and band in WiFi settings. The default settings are as follows:

Category	Default Settings
SSID	Paramon
Password	12345678
Band	5 GHz

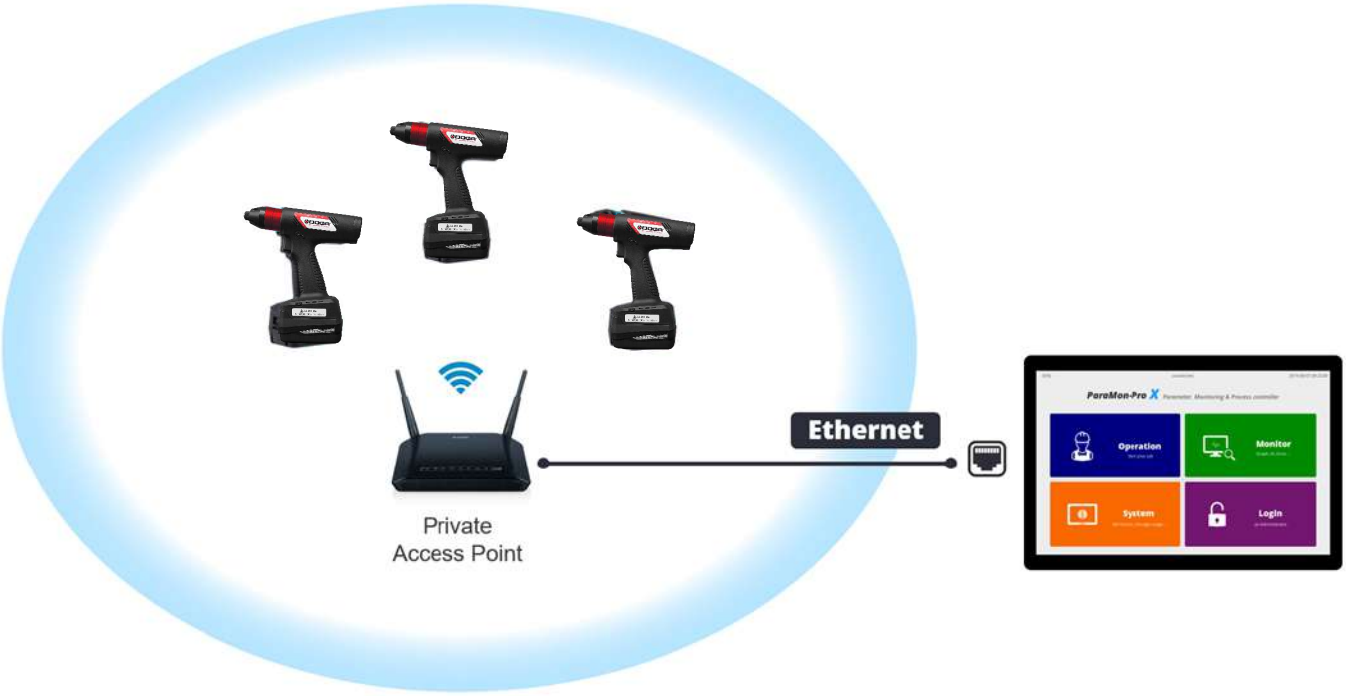


E. Press [Apply].

F. As shown in the figure below, WiFi is enabled after searching for the best channel.

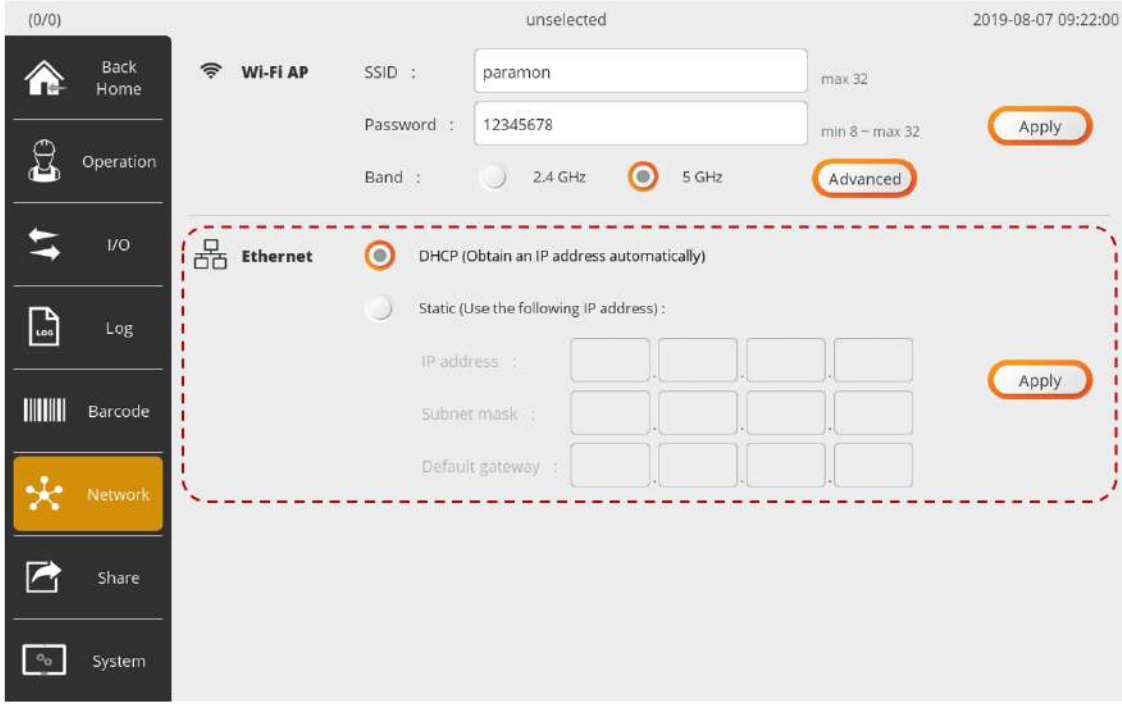


3.2 Connection through external AP

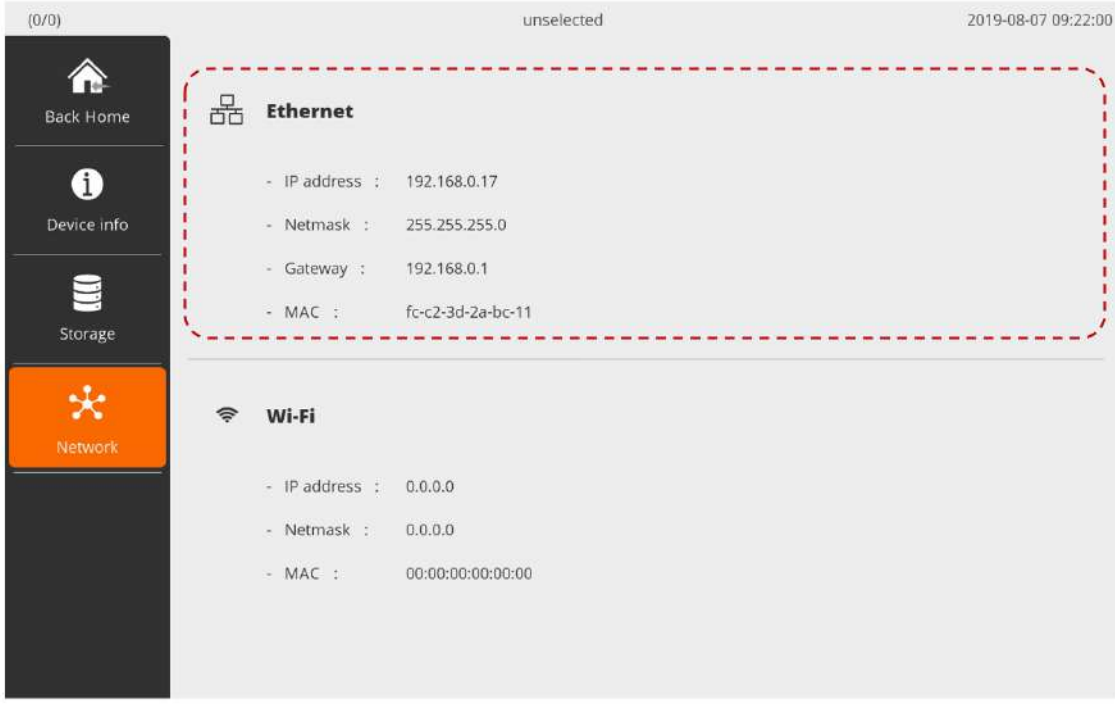


Connect ParaMon-Pro X and BM, using a separate AP.
This connection type can be used when wider WiFi coverage is needed or a particular feature by the AP is required.
The WiFi adapter in ParaMon-Pro X is not operated in Station mode.
Therefore, Ethernet wiring is needed for connection between ParaMon-Pro X and a separate AP.

A. Log into the system in Admin mode. The default password is “0”.
B. Press [Setting].
C. Select the NETWORK tab on the left.
D. Choose either DHCP or STATIC in the ETHERNET according to network configuration.
E. Press [Apply].

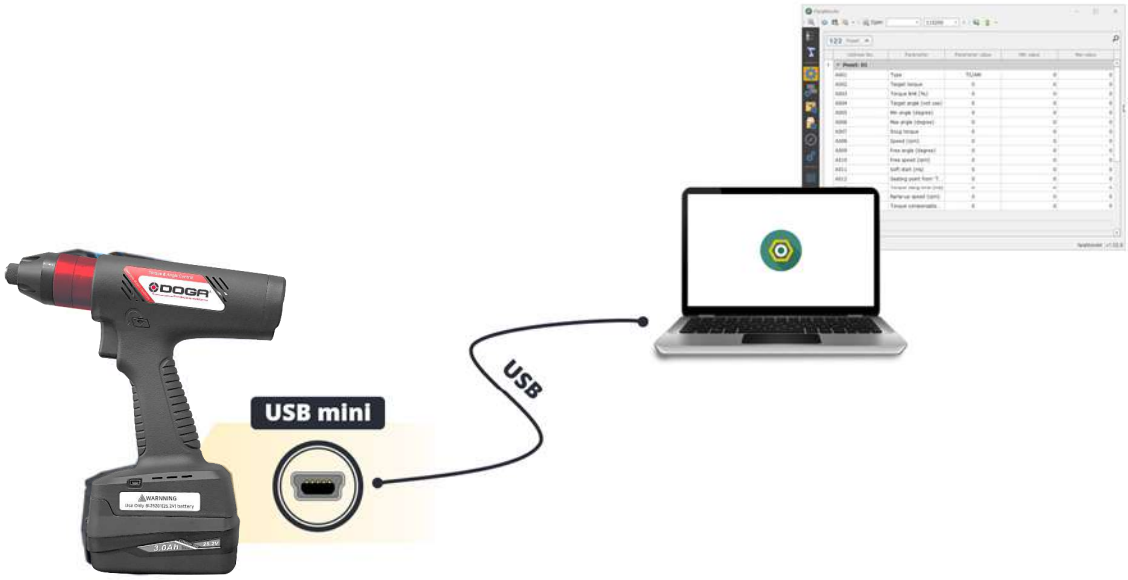


F. Check the IP address by the DHCP server in the following order: Home → System → Network.



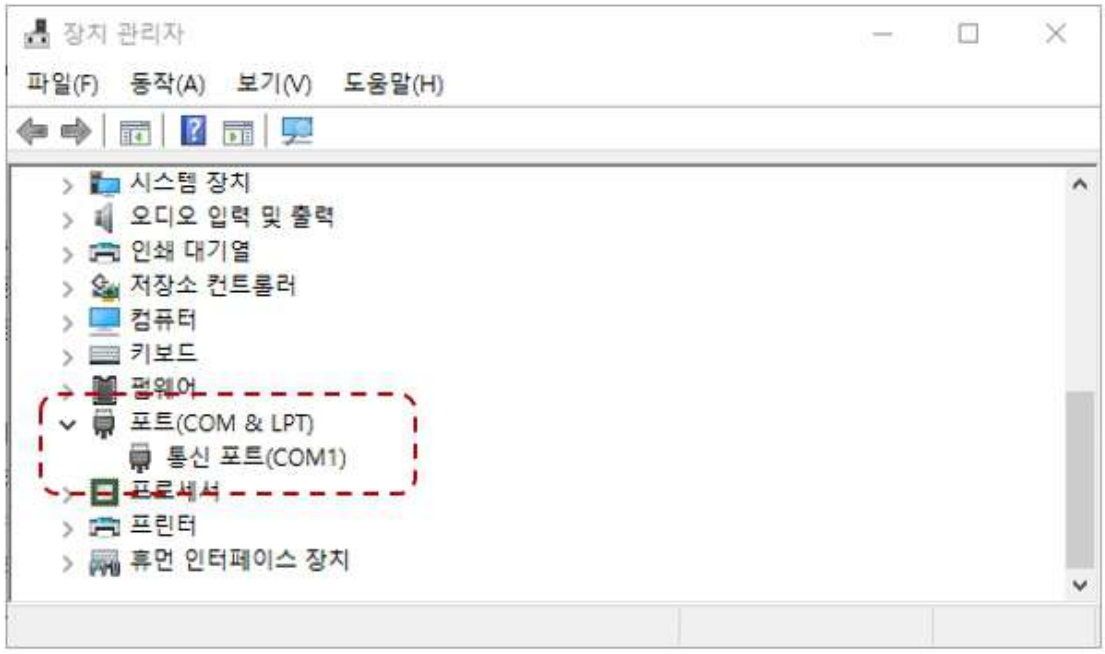
4. BM WIFI SETUP

4.1 Setup using ParaMon Air (PC)



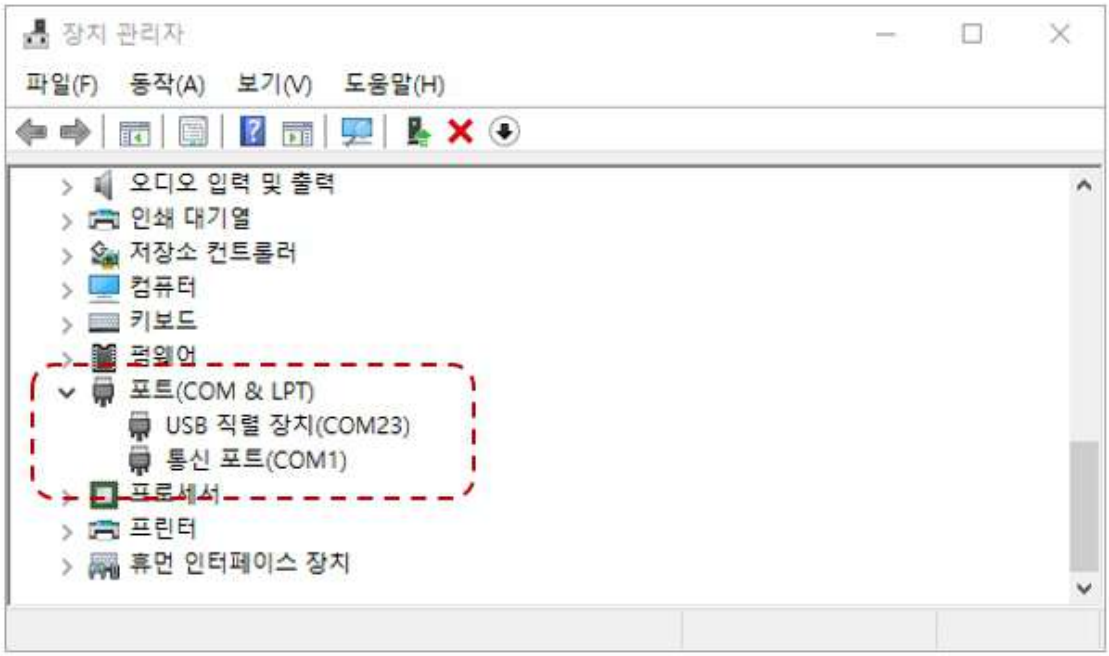
Depending on circumstances, there might be multiple COM ports in the PC.
Therefore, it is required to check the COM port numbers connected to the BM before starting the ParaMon Air.

A. Open the Device Manager in the Windows PC.
B. Check the COM & LPT category as shown below:



C.Connect the PC with the BM, using the accompanying USB cable.

D.Once the BM is connected properly, a new COM port appears in the COM & LPT category. The COM port number can vary depending on configuration.

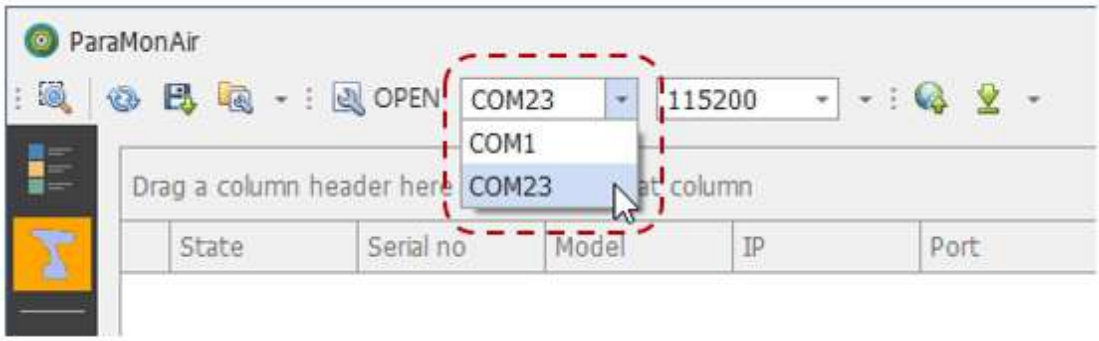


E. Start the ParaMon Air program.

F. Extend the COM Port List box as shown below:

G. Select the COM port number of BM confirmed in the device manager.

H. Press [OPEN] and start the connection.

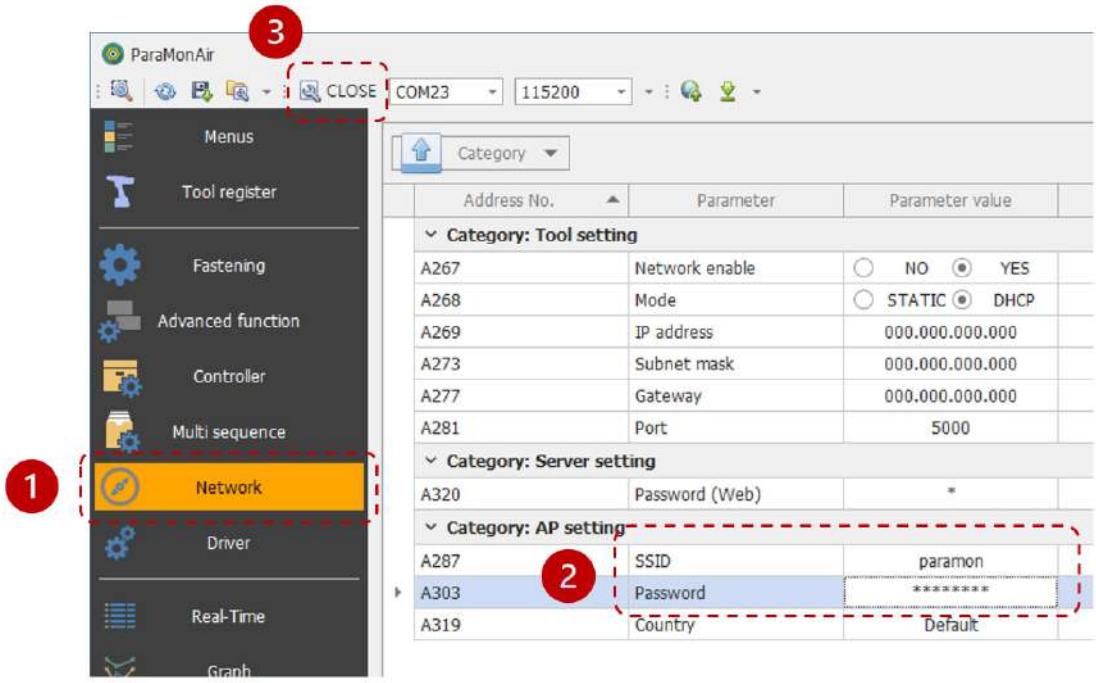


I.Once connected normally, the product's model No., serial No. and firmware version appear at the bottom as follows:

J. Select the NETWORK tab on the left.

K. Match the SSID and Password settings with ParaMon-Pro X.

L. Press [CLOSE] and finish the connection.



M. Remove the BM battery and cut off the power.

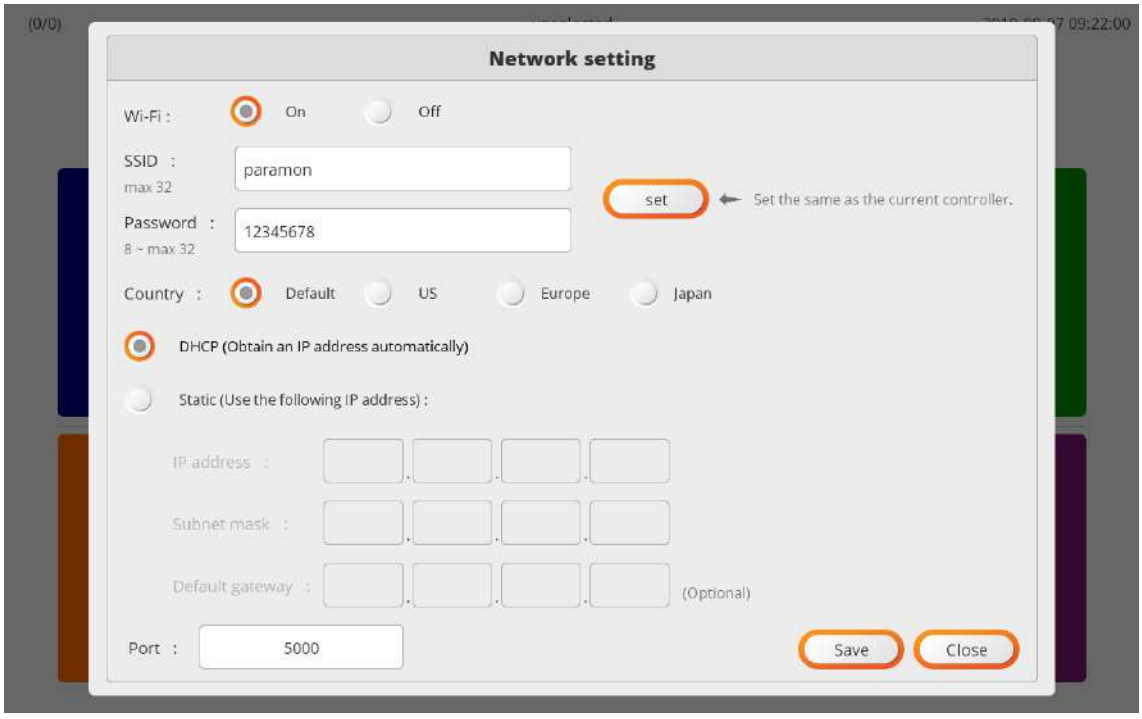
N. Connect the BM battery and turn on the power.

O. The BM's WiFi settings are done.

4.1 Setup using ParaMon-Pro X

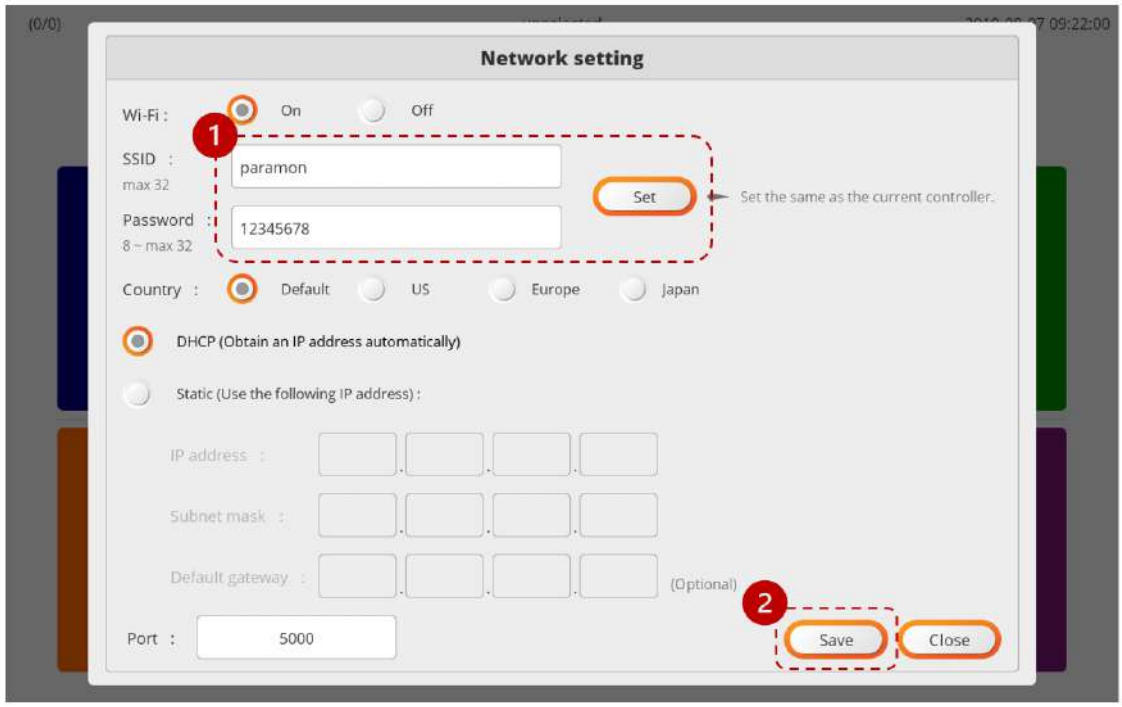
A. Connect ParaMon-Pro X with the BM, using the accompanying USB cable.

B. If successfully connected, the NETWORK SETTNG page appears automatically.



Connect the battery and switch on the BM.
Ensure to connect the USB cable after the system is successfully reset.
If switched on after the USB cable is connected when the system is OFF, or the USB cable is connected while the BM is being reset,
The NETWORK SETTING page may not appear on the screen.
If not, remove the battery and reassemble it.

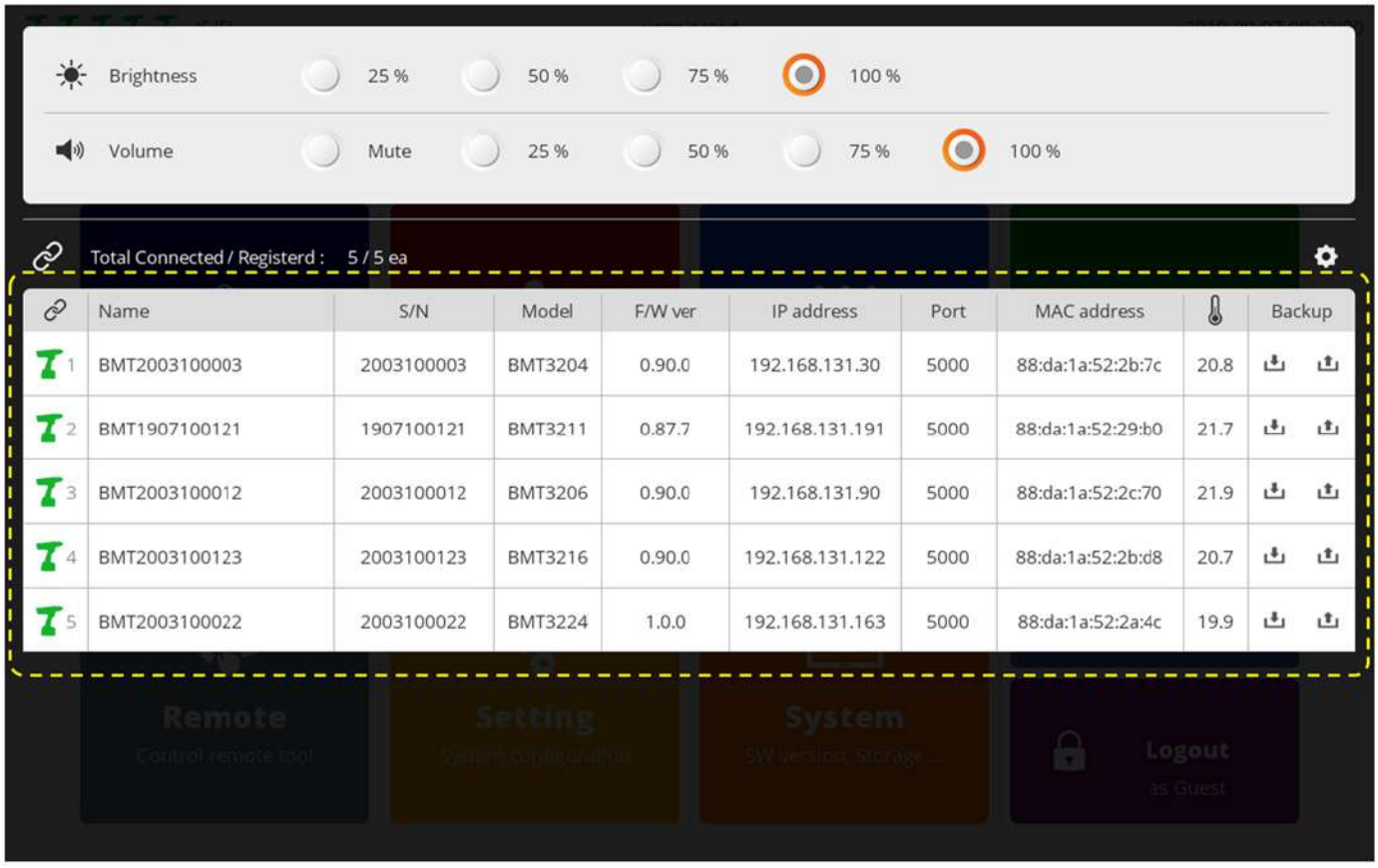
C. Select the text box and enter SSID and Password in person.
D. Press [SET]. Then, it is set with the SSID and Password from ParaMon-Pro X.
E. Press [Save].



F.Remove the BM battery and cut off the power.
G.Assemble the BM battery and switch on the power.
H.The BM WiFi settings are successfully done.

5. MEMBER TOOL MANAGEMENT

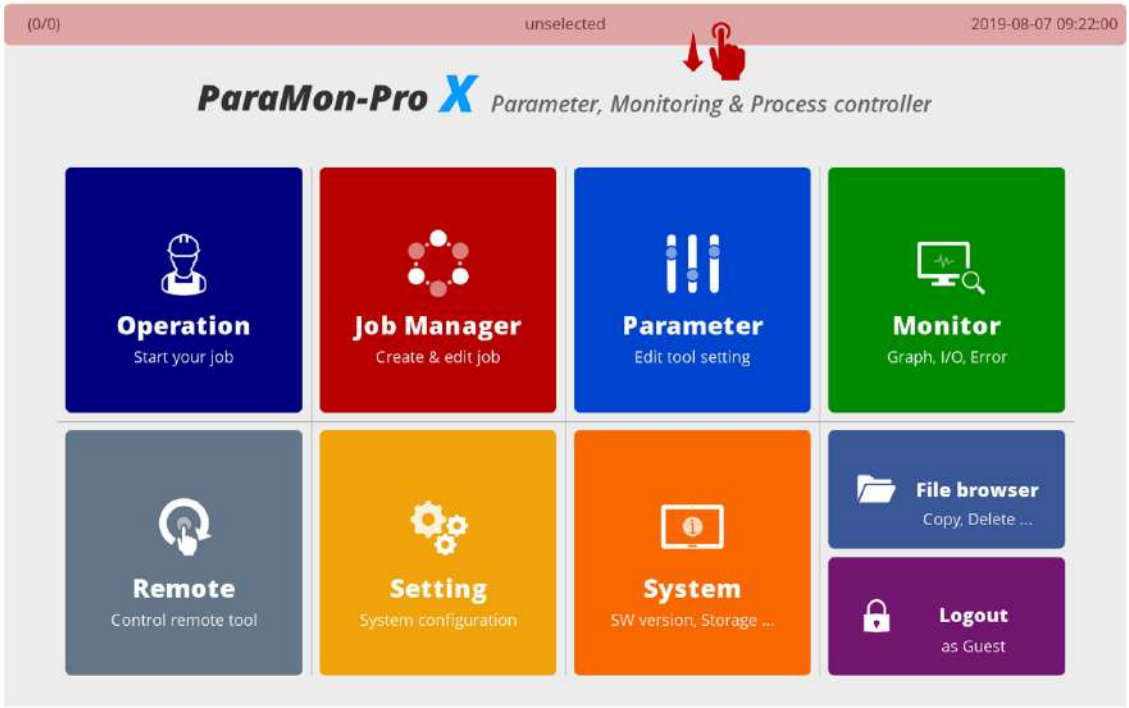
To use tools in ParaMon-Pro X, they should be registered as ‘Member Tools’.
Able to register up to 8 member tools
This section describes how to manage member tools.



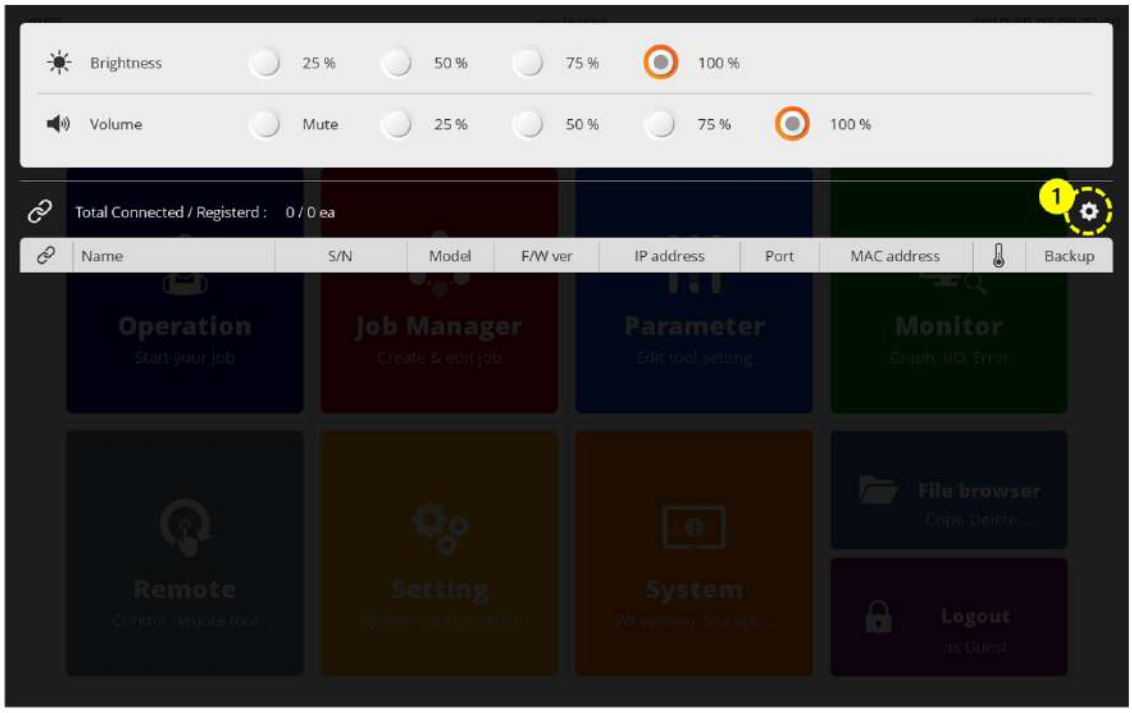
5.1 Register Member Tools

A.Press [Login] and log into the system. The default password is “0”.

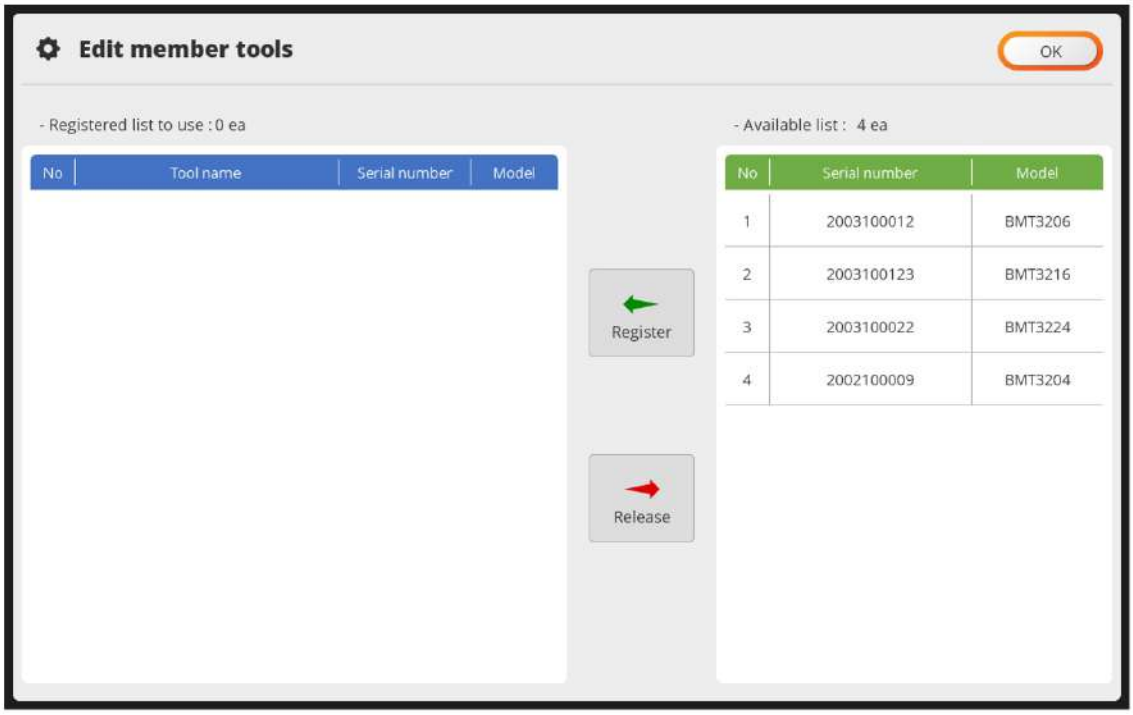
B.As shown in the figure, swipe from top to the bottom.



C.Select the EDIT icon for member tool registration.



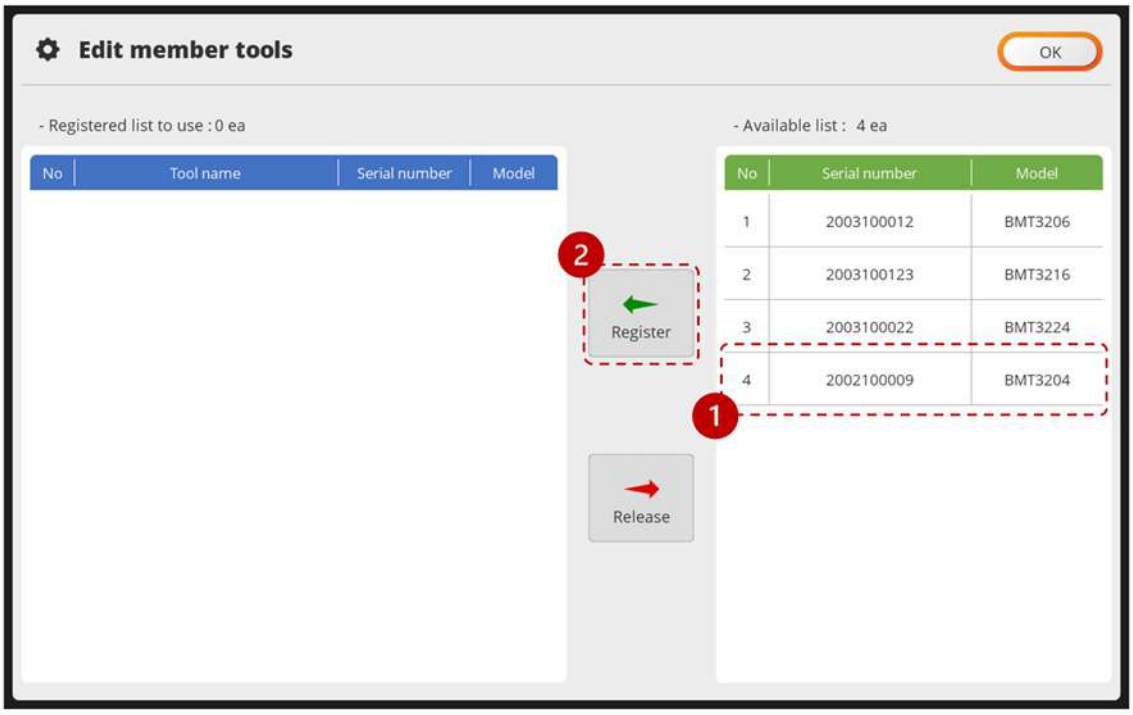
D. ParaMon-Pro X automatically searches all tools accessible on wired and wireless networks and displays target tools on the right table.



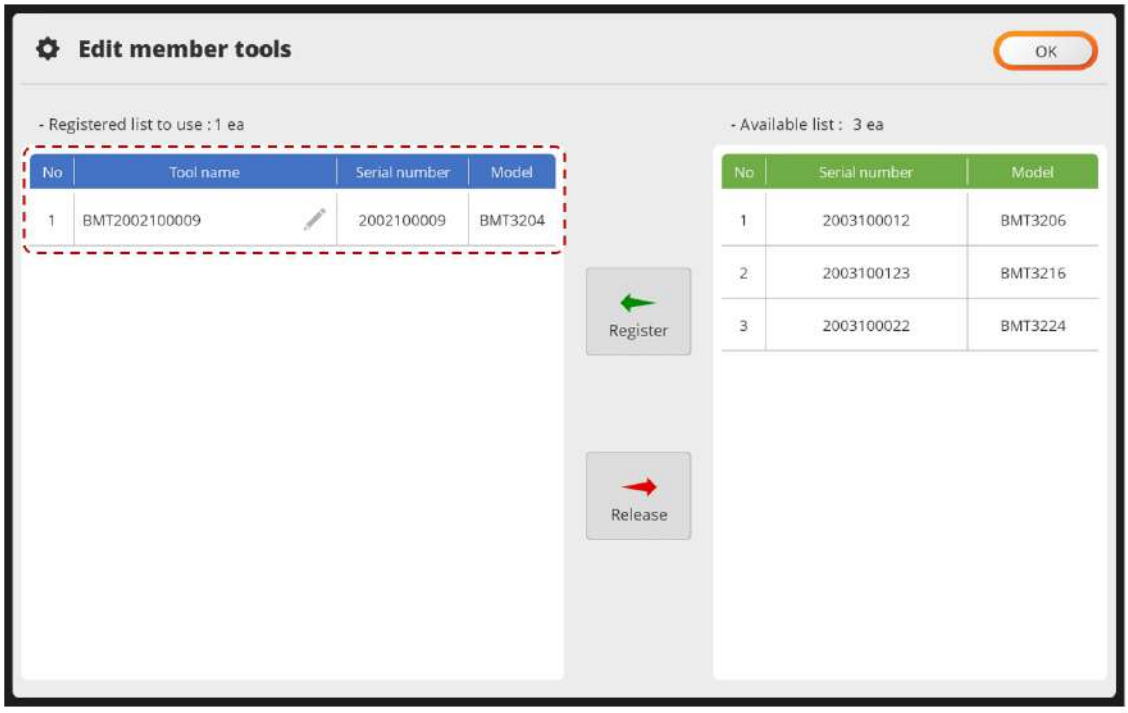
E. Check the model No. and serial number on the label or DRIVER INFORMATION page.

F. Select the tool matched by the model No. and serial number on the right table.

G. Press [Register] and register the selected tool on ParaMon-Pro X.



H. The tools on the right list move to the left, and the registration process is done.

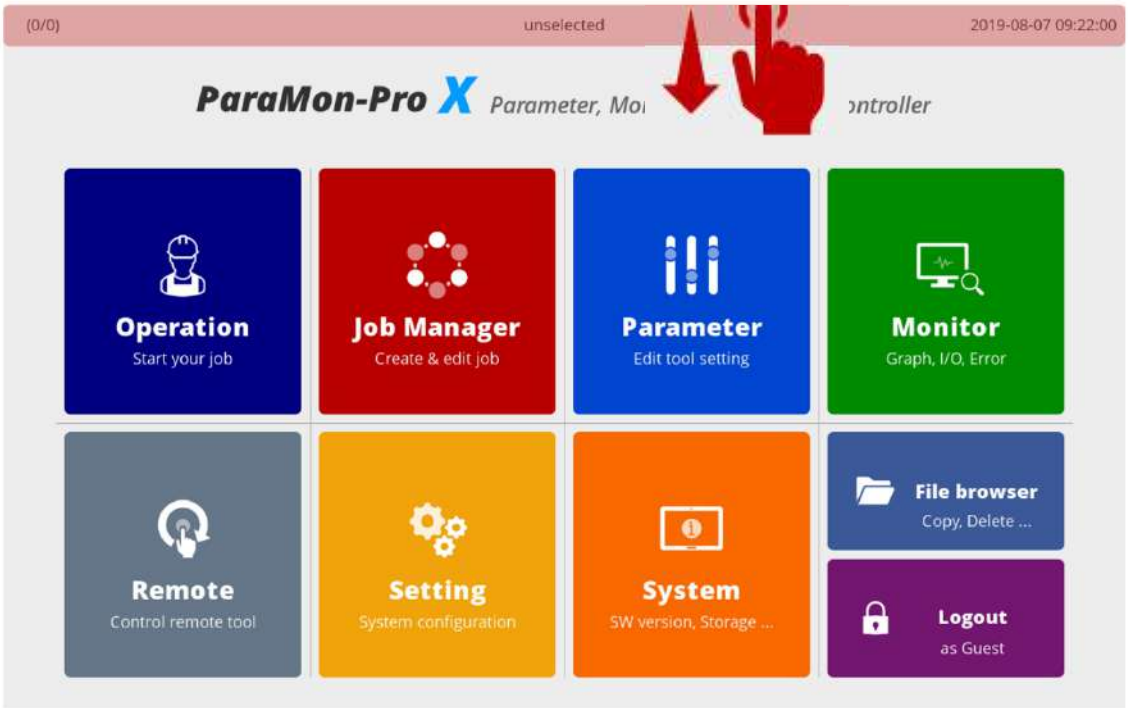


I. Press [OK] and end the settings.

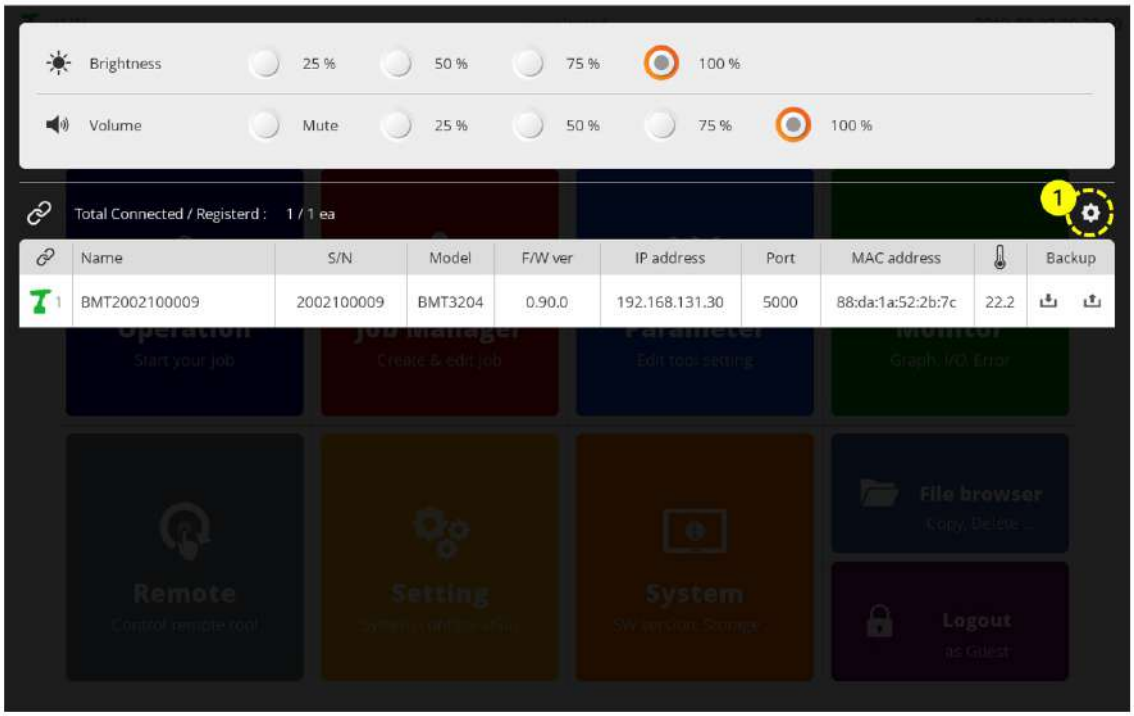
5.2 Deregister Member Tools

A.Press [Login] and log into the system. The default password is “0”.

B.As shown in the figure, swipe from top to the bottom.

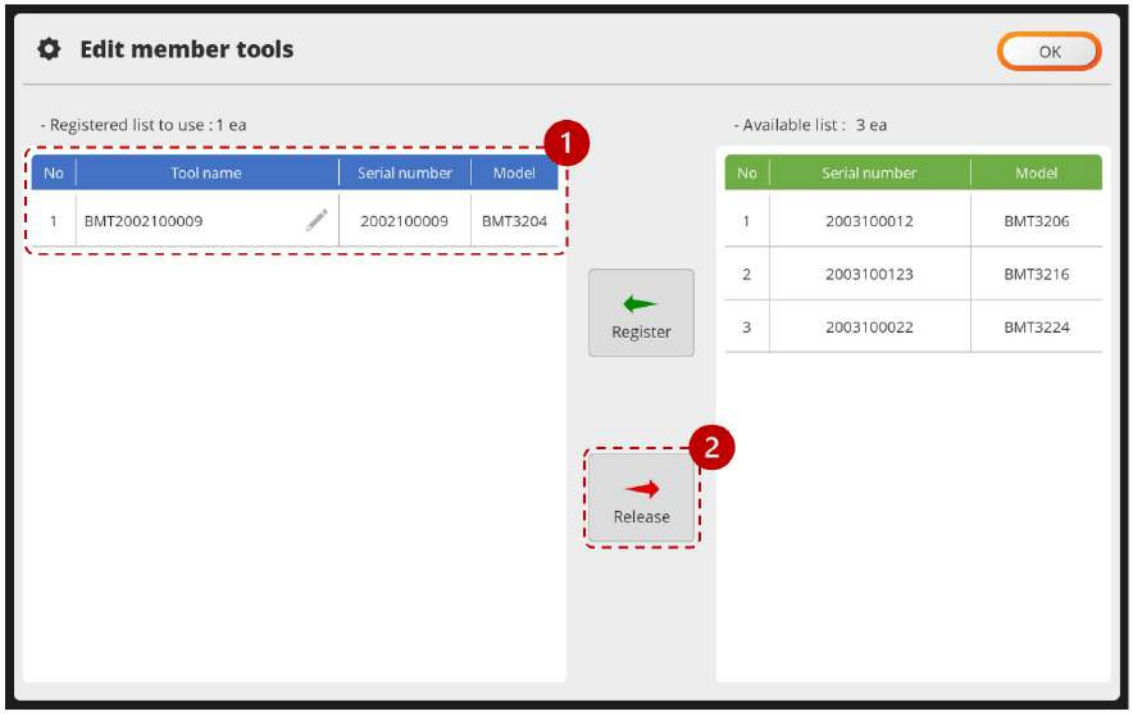


C.Select the EDIT icon for member tool registration.



D.Check the model No. and serial number on the label or DRIVER INFORMATION page.

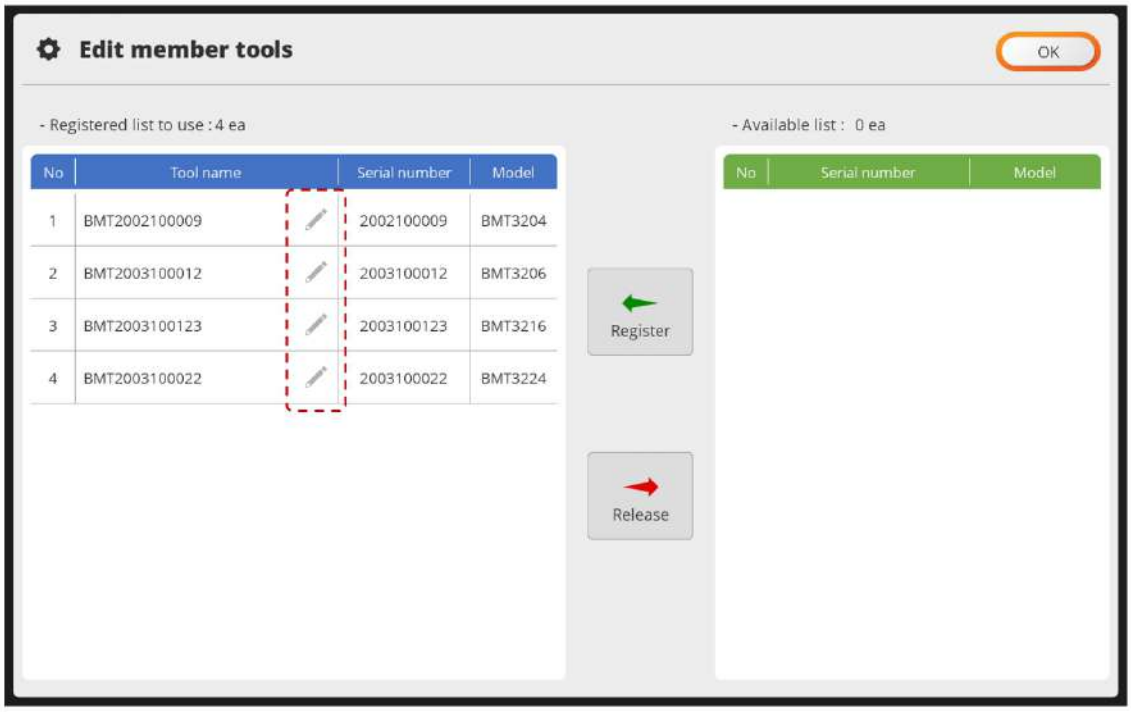
E.Select the tool matched by the model No. and serial number on the left table.
F.Press [Release].
G.Once the confirmation page pops up, press [OK] and deregister the tool from ParaMon-Pro X.



H.Press [OK] and end the settings.

5.3 Modify member tool names

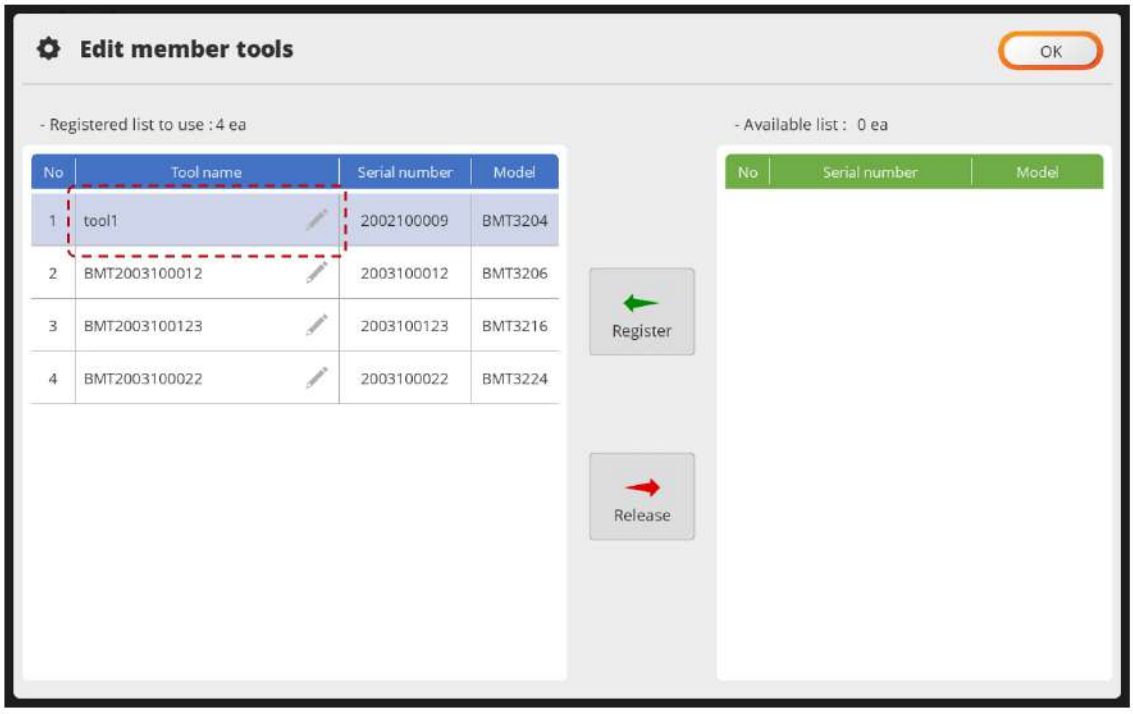
At member tool registration, tool names are basically formed in the following format: “Tool Type (BM, BMT, etc.) + Serial No.”. It is okay to use the default tool name, but it can be modified for the convenience of tool identification.



A.Select the EDIT icon.

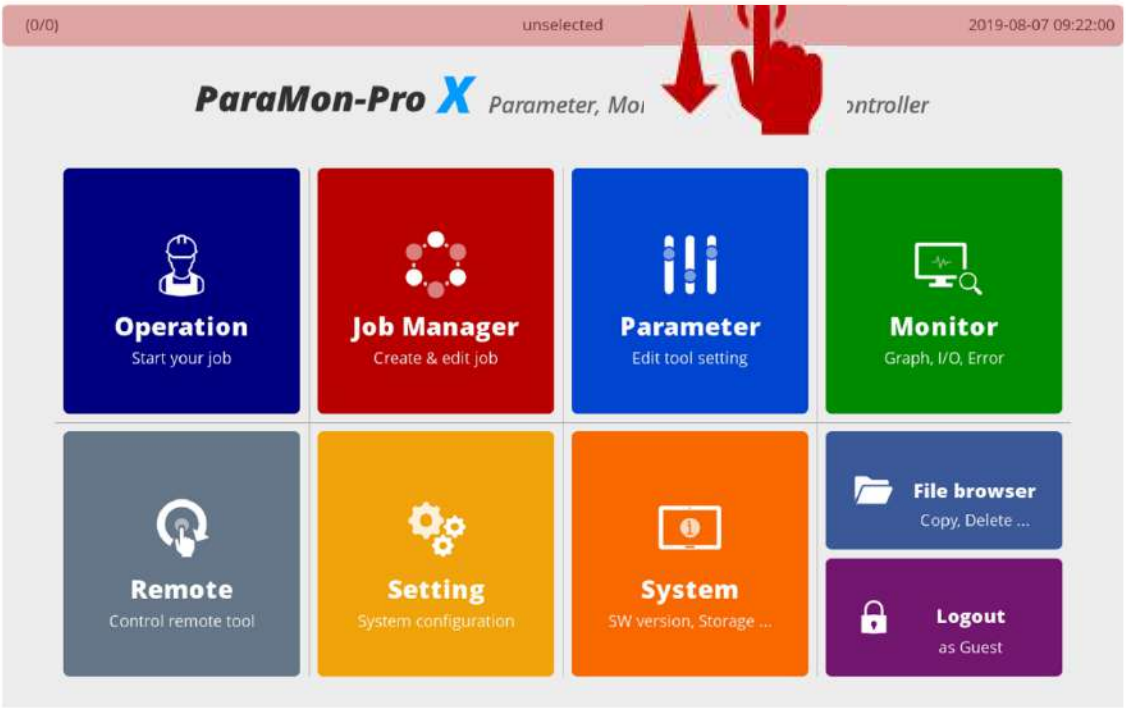
B.If a keyword pops up, enter the tool name and press [Enter].

C.Confirm the new tool name.

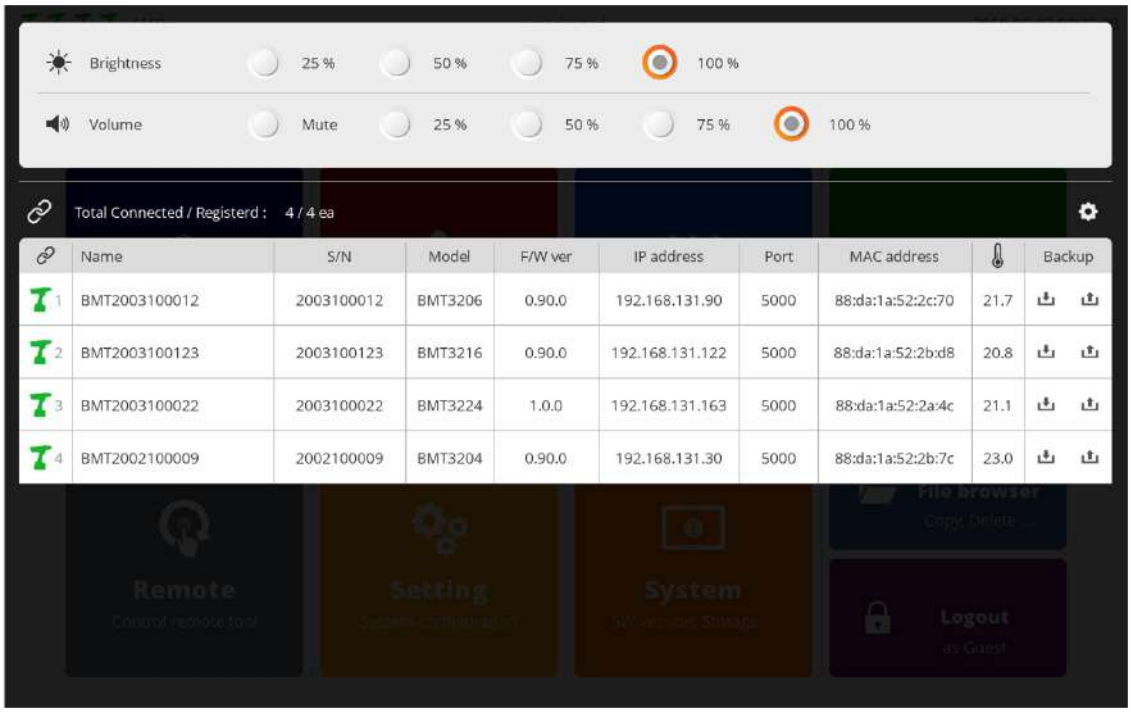


5.4 Check member tool status

A.As shown in the figure, swipe from top to the bottom.



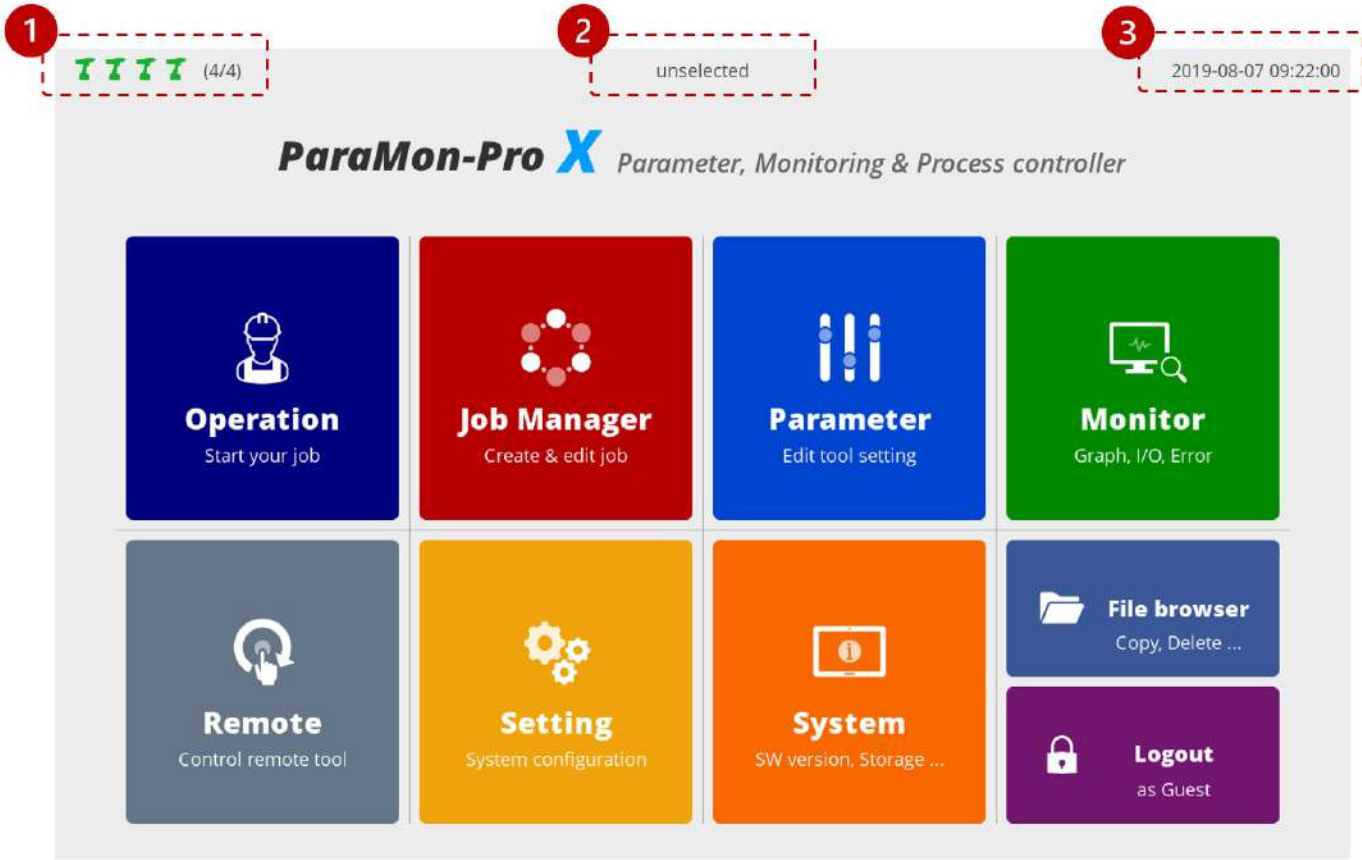
B.A list of the member tools currently registered on ParaMon-Pro X appears.



C.The member tool list includes the followings:

No.	Category	Description	
1	Status		Not connected yet
			Successfully connected
			Connection failed; required to reset the tool
			The tool occupied by the other ParaMon-Pro X
2	Name	Name	
3	S/N	Serial No.	
4	Model	Model No.	
5	F/W ver	Firmware version	
6	IP address	IP address	
7	Port	Modbus-TCP port number	
8	MAC address	MAC address	
9	Temperature	Realtime temperature	
10	Backup/Restore	BM parameter backup & restore For more information, refer to ‘16. Backup & Restore’.	

6. STATUS BAR



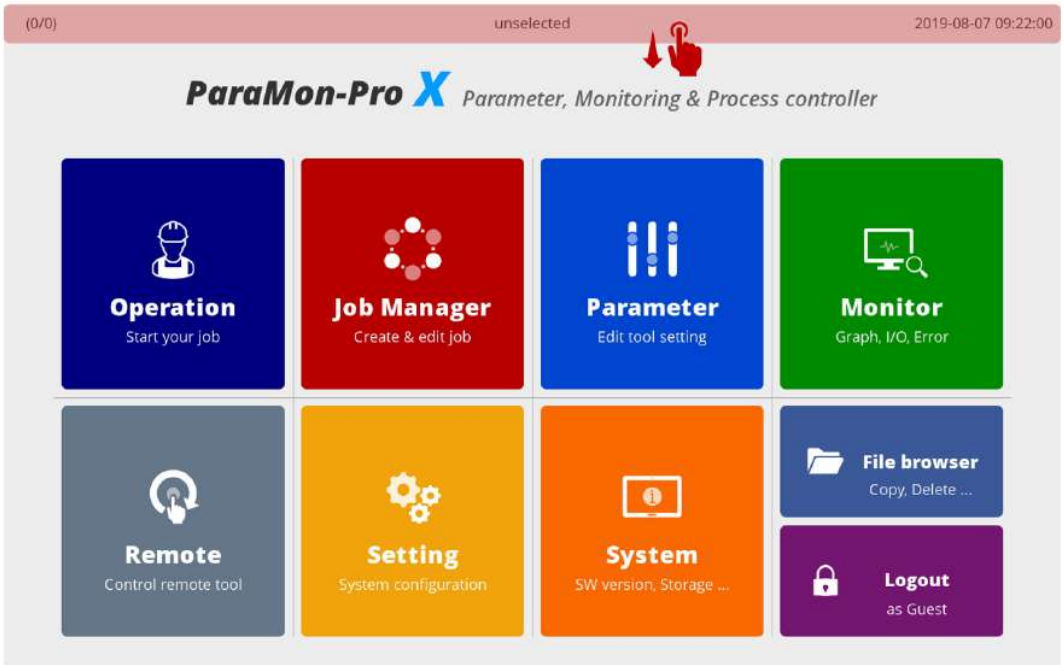
The Status Bar appears on top always and includes the followings:

No.	Description		
1	Member tool connection (X/Y) X: No. of tools connected Y: Total number of member tools		Not connected yet
			Successfully connected
			Connection failed; required to reset the tool
			The tool occupied by the other ParaMon-Pro X
2	Name of the target tool selected		
3	Date and present time		

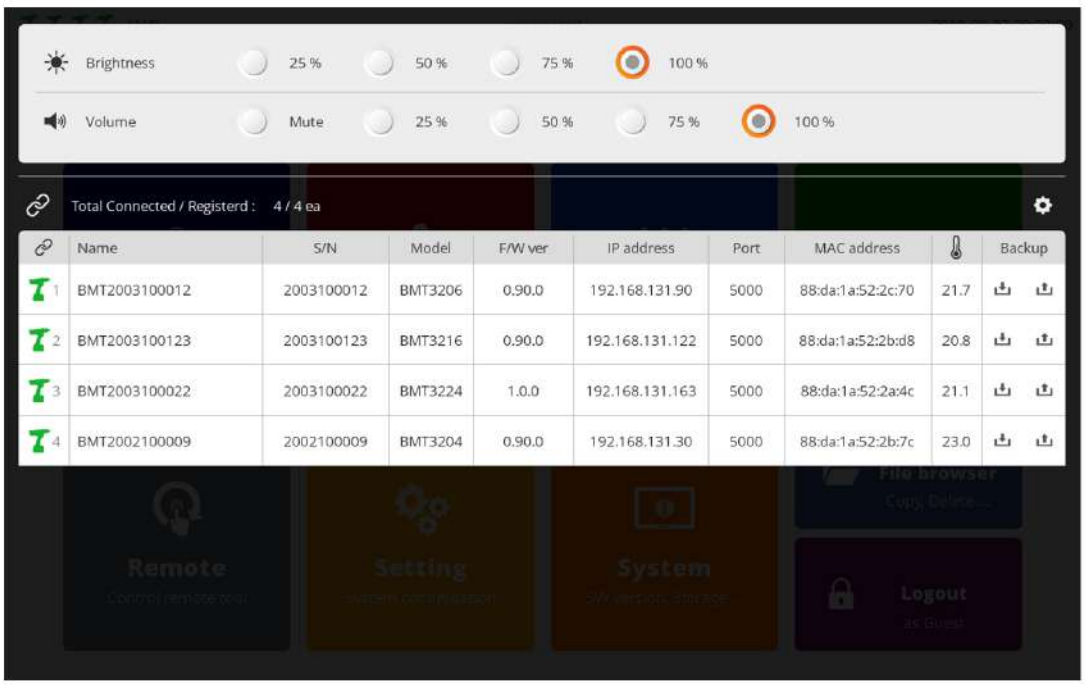
7. SELECT TARGET TOOL

Since ParaMon-Pro X registers and manages multiple member tools, it is required to specify a target tool on the menu for a certain tool such as Parameter, Monitor and Remote.
This section describes how to select a target tool.

A. As shown in the figure, swipe from top to the bottom.



B. A list of the member tools currently registered on ParaMon-Pro X appears.



C. If a target tool is selected on the member tool list, the system goes back to the previous page automatically.

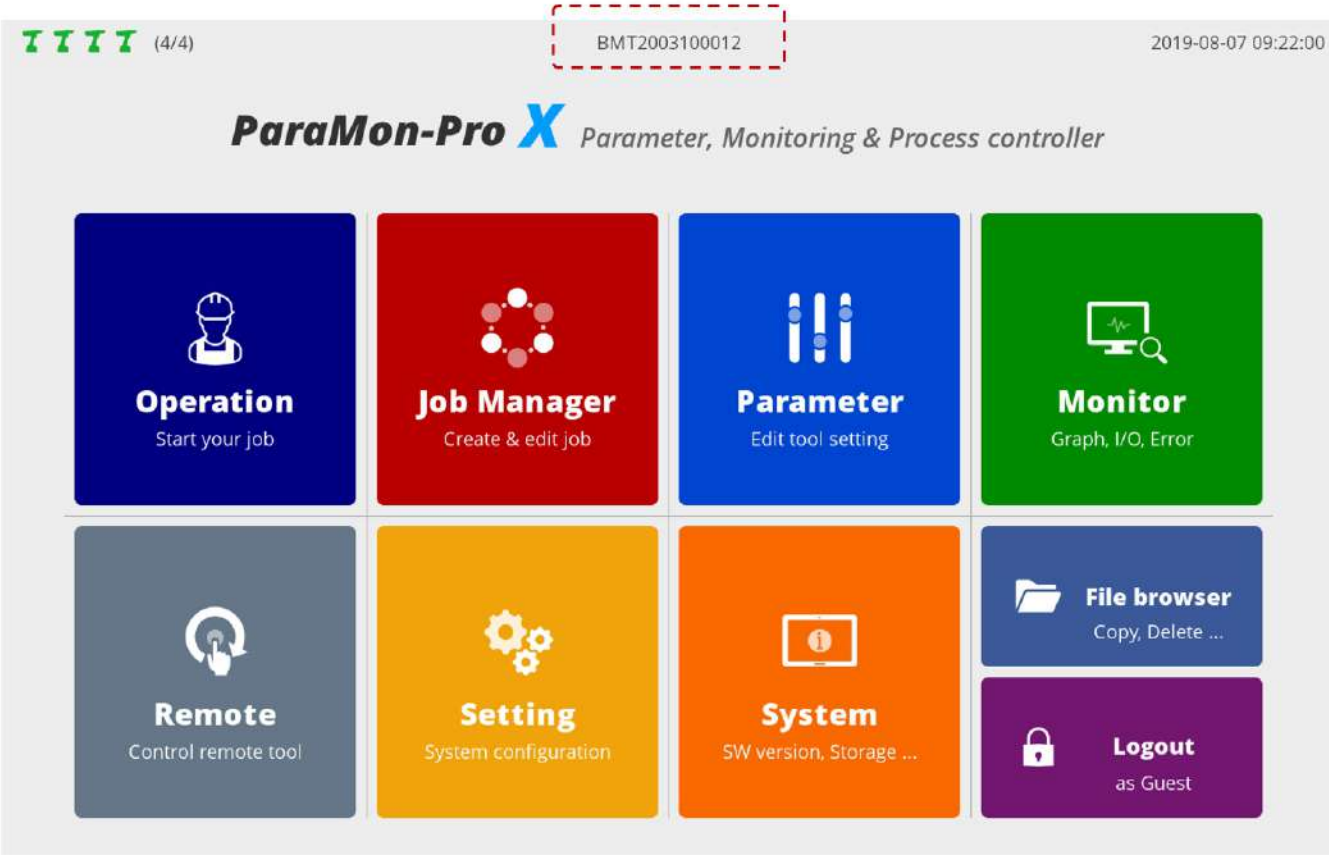
A target tool is selectable when the tool is normally connected ( ).
A target tool is not selectable if

The tool is not connected yet ( ),

The tool is improperly connected ( ), or

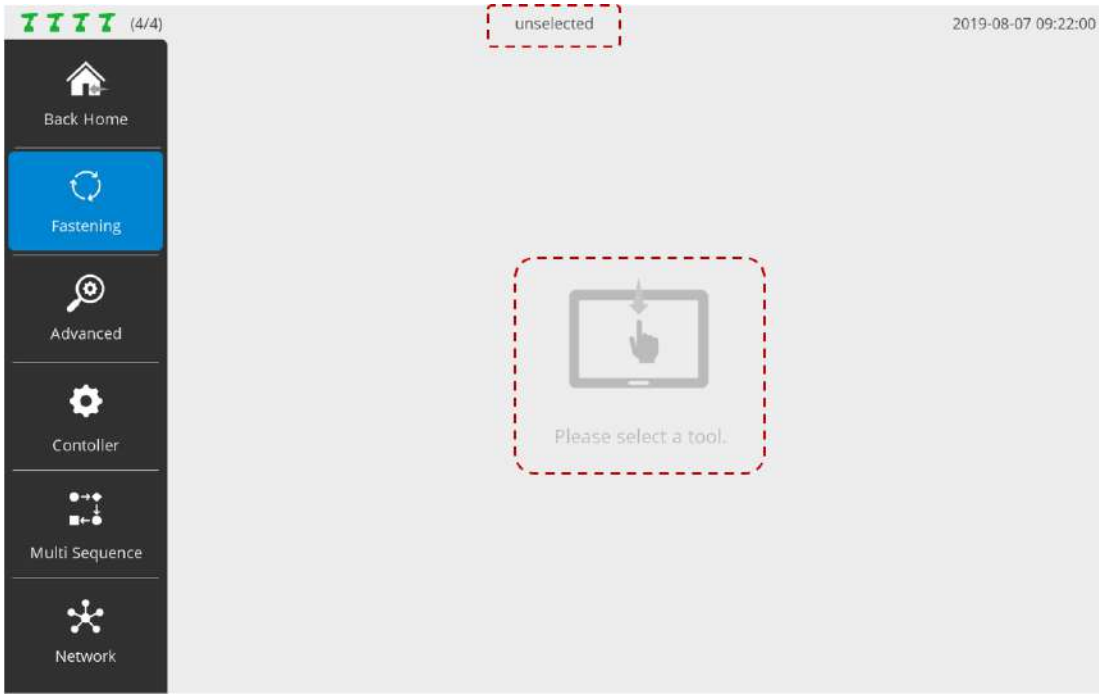
The tool is already occupied by the other ParaMon-Pro X ( ).

D. If the target tool is normally selected, its name appears on the status bar.



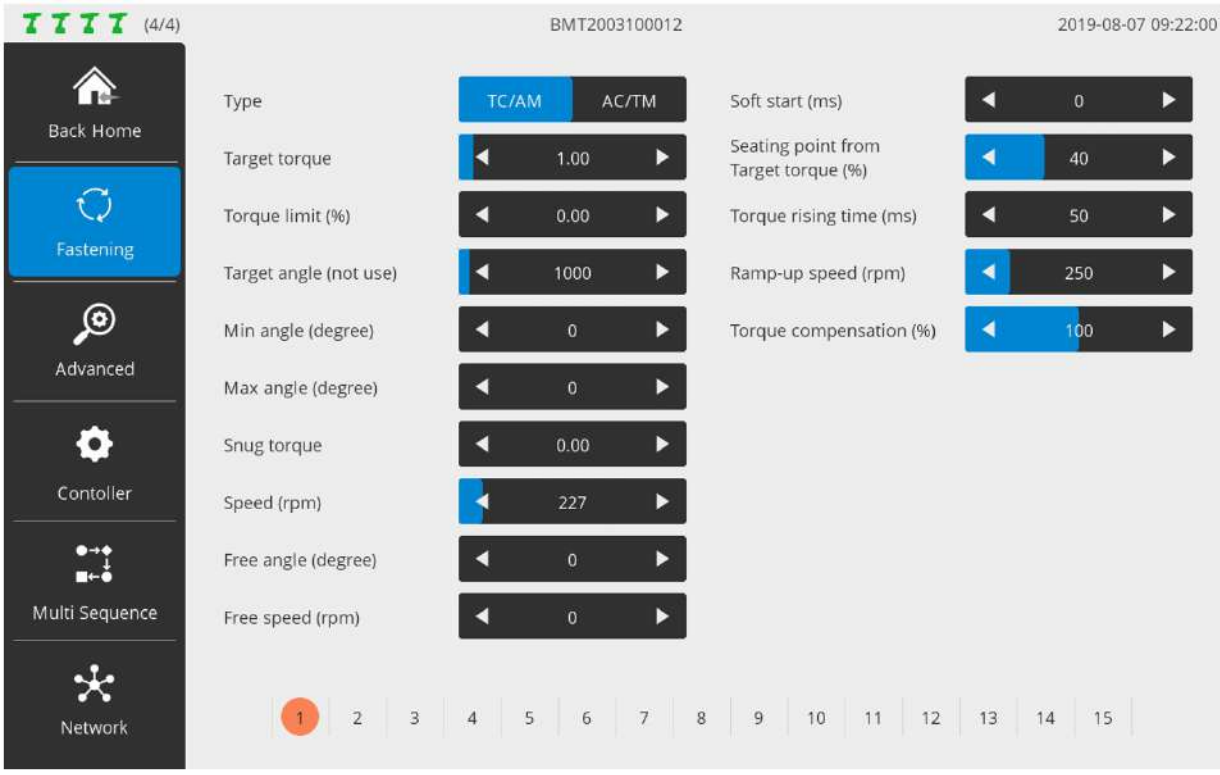
8. PARAMETER

Able to manage the parameters of all BM tools registered in ParaMon-Pro X
Unless a target tool is specified, the following page appears.
Refer to ‘7. Select Target tool’.



8.1 Fastening

The system supports a total of 15 preset groups, and each group includes the followings:



A.Type

TC/AM	Torque control / angle monitoring Torque values (TARGET) are critical in judging fastening (OK/NG) while angle values are sub-values.
AC/TM	Angle control / torque monitoring Angle values (TARGET) are critical in judging fastening (OK/NG) while torque values are sub-values.

B.Target torque / Max. torque

TC/AM	Target torque	Sets target torque values in TC/AM
AC/TM	Max. torque	Sets maximum torque tolerance in reaching target angle in AC/TM. If the torque exceeds the maximum torque in reaching the target angle, an error occurs right away.

C.Torque limit / Min. torque

TC/AM	Torque limit	Sets OK range in percentage based on target torque E.g.). In the case of 100.00 kgf.cm of target torque and 10% torque limit, '90.00-110.00 kgf.cm' is OK while other areas are NG.
AC/TM	Min. torque	Sets minimum torque tolerance in reaching target torque E.g.). In the case of 1,000 target angle and 1.00 kgf.cm of minimum torque, torque should be at its minimum level or higher even at a temporary situation while reaching the target angle.

D.Target angle

TC/AM	Target angle	Unused
AC/TM	Target angle	Sets the target angle

E.Min angle

Able to apply the minimum angle value in judging OK/NG.
Resulted in 'NG' if the angle is lower than the minimum level even after the target torque is reached in TC/AM mode.

F.Max angle

Able to apply the maximum angle value in judging OK/NG.
Resulted in 'NG' if the angle is greater than the maximum level even after the target torque is reached in TC/AM mode.

G.Snug torque

Sets the measurement point of angle values used in judging OK/NG.
'0' refers to 'Disabled'. Angle measurement begins as soon as the tool is operated.
If not '0', angle measurement starts as soon as the torque reaches the snug torque value.

Setting snug torque to a value other than '0'.
In other words, alteration of the angle measurement point means the application of angle values in judging OK/NG.
If the snug torque is not '0', therefore, both minimum and maximum angle values should be set together.

H.Speed (RPM)

Able to set tool speed in person
Not permitted to modify if the Controller → Auto Speed settings are 'ON'.
Able to modify if the Controller → Auto Speed settings are 'OFF'.

I.Free Angle & speed

If the free angle value is '0 (disabled)', the system is operated at ___ speed (RPM) until the seating point.
If the free angle value is not '0', the system is operated at free speed until the free angle. Since the free angle, it is run at ___ speed (RPM).

Mostly used to reduce fastening time.
In case of relatively long screws, fastening time can be reduced by setting free angle and speed to proper levels and increasing operating speed in the beginning when torque is relatively weak.
Recommended to set the free angle to a level lower than the overall angle by at least 2 turns (720°).

J.Soft Start (ms)

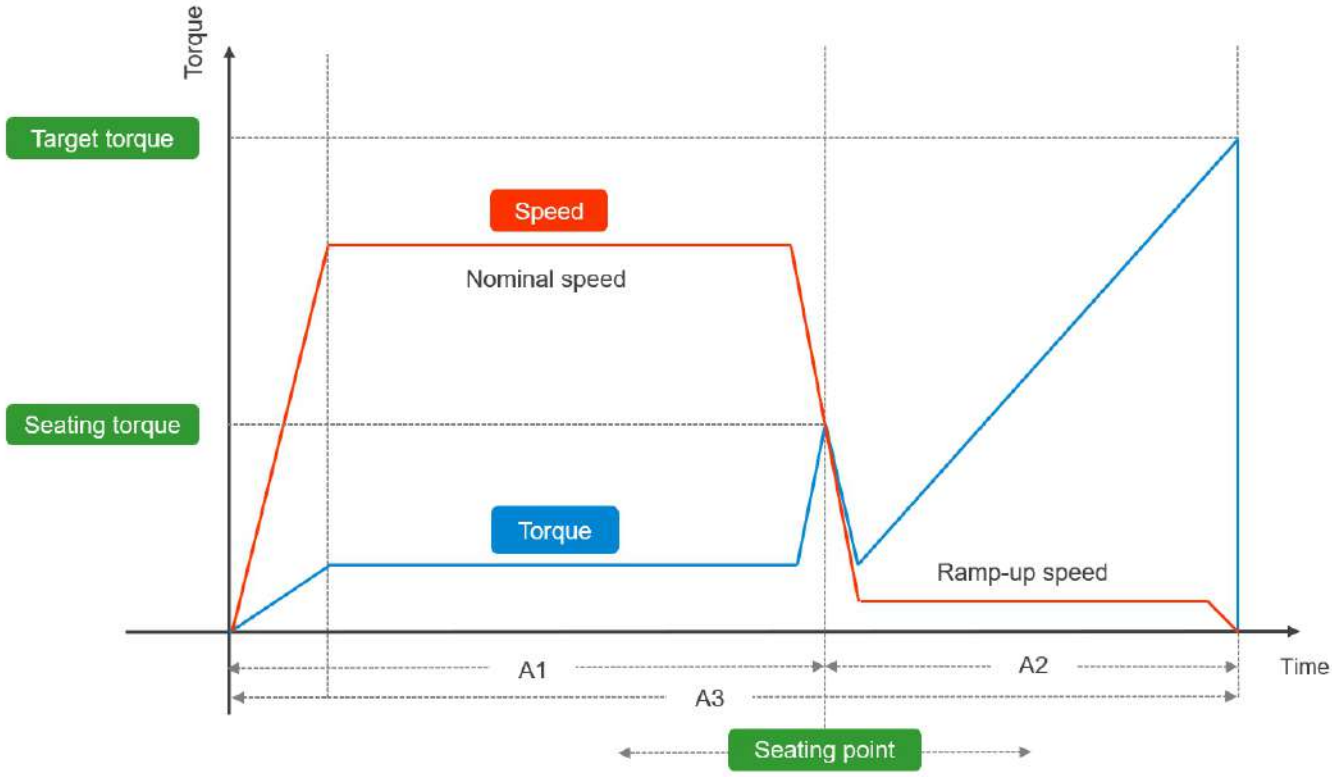
Able to adjust acceleration until the target speed is reached.
Able to set the time taken to reach target speed after the start of tool operation, using 'Controller → Acceleration (ms)'.
Here, 'Acceleration (ms)' refers to a value commonly applied to all presets.
Able to control acceleration by preset, using Soft start (ms) additionally.
In other words, total time taken to reach target speed can be obtained as follows: 'Controller → Acceleration (ms)' + 'Soft start (ms)'.

The above target speed can be interpreted differently depending on situations.
Unless free angle & speed is set, target speed is ___ (RPM).
If free angle & speed is set, target speed becomes 'free speed (RPM)'.

K.Seating point from target torque (%)

Modification not recommended for hard joint
Modified recommended for soft joint only

The part where target starts to increase when the screw head touches the surface of a target object is called 'seating point'.
For example, in the event of 10.00 kgf.cm of target torque and 40% in seating point from target torque, tool torque starts to increase. A seating point is detected when 4.00 kgf.cm is reached.
The figure below reveals correlations among torque, speed and seating:



Once a seating point is sensed, speed is adjusted to 'Ramp-up speed (RPM)', increasing torque.
As illustrated in the above graph, nominal speed before a seating point is usually higher than ramp-up speed after the seating point.
Therefore, the position of a seating point on the time axis is closely related with total fastening time.
In the graph, the left nominal speed, right ramp-up speed and total (A1+A2) areas are set to A1, A2 and A3 respectively.
As stated above, nominal speed in the A1 section is usually higher than ramp-up speed in the A2.
Therefore, total time (A3) increases when the A1 section is reduced by lowering the seating point from target torque (%) while it decreases if the A1 section is enlarged by increasing the seating point from target torque (%).
As a usual, the latter is more common than the former.

If tool speed drops to the ramp-up speed level, and total fastening time increases after a seating point is sensed before the screw head touches the surface of a target object in soft-joint environment, total fastening time can be reduced by moving the seating point to the right by increasing a seating point from target torque (%).

L.Torque rising time (ms)

In the above graph, a torque curve rebounds in a V shape after a seating point and rises up to the target torque.
Able to adjust the time taken to rise up to target torque after the V-shaped rebound, using ‘torque rising time (ms)’.

M.Ramp-up speed (RPM)

Sets operating speed in order for the torque to rise up to target level after a seating point.
The ramp-up speed adjustment brings similar results with the ‘seating point from target torque (%)’.
If ramp-up speed is reduced, the time in the A2 section rises, and total fastening time increases.
If ramp-up speed is increased, the time in the A2 section drops, and total fastening time decreases.

However, if ramp-up speed is set excessively to reduce fastening time, the rapidly spinning screw abruptly stops, and over torque (torque ripple) can take place due to inertia.

Therefore, if attempted to reduce total fastening time by adjusting the time in the A2 area, it is recommended to increase a seating point from target torque (%) instead of adjusting ramp-up speed.

N.Torque compensation (%)

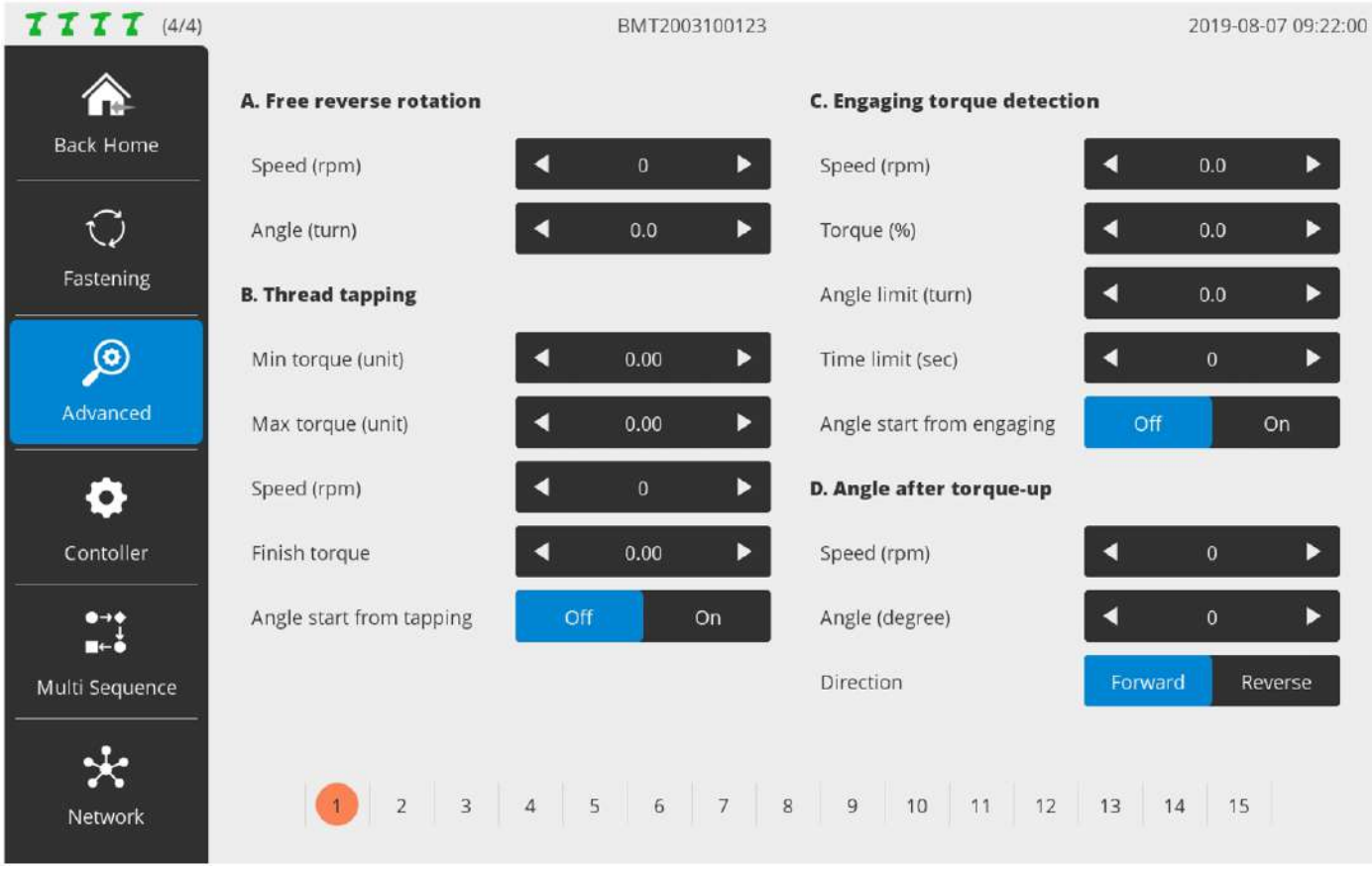
Depending on a vendor, various types of torque meters exist, and measurements can vary according to each vendor’s implementation mechanism.

For example, when target torque is 10.00 kgf.cm, it could be 9.5 kgf.cm in a torque meter.
In this case, it is required to select a base device for torque management.
Once a tool for torque management is set, no additional action is necessary.

If the criteria for torque management are set with a torque meter, it is able to calibrate the tool torque by setting ‘Controller → Torque calibration’ and ‘Torque compensation (%)’.
‘Controller → Torque calibration’ can be set within ±10% and applied to all presets.
‘Torque compensation(%)’ can be set within ±30% and applied by preset.

8.2 Advanced

‘Advanced’ is comprised of four possible features.
Each feature is implemented by a combination of multiple parameters. It provides 15 advanced presets and is paired with fastening preset.
Unless otherwise set, default values of ‘Advanced’ are ‘0 (disabled)’.

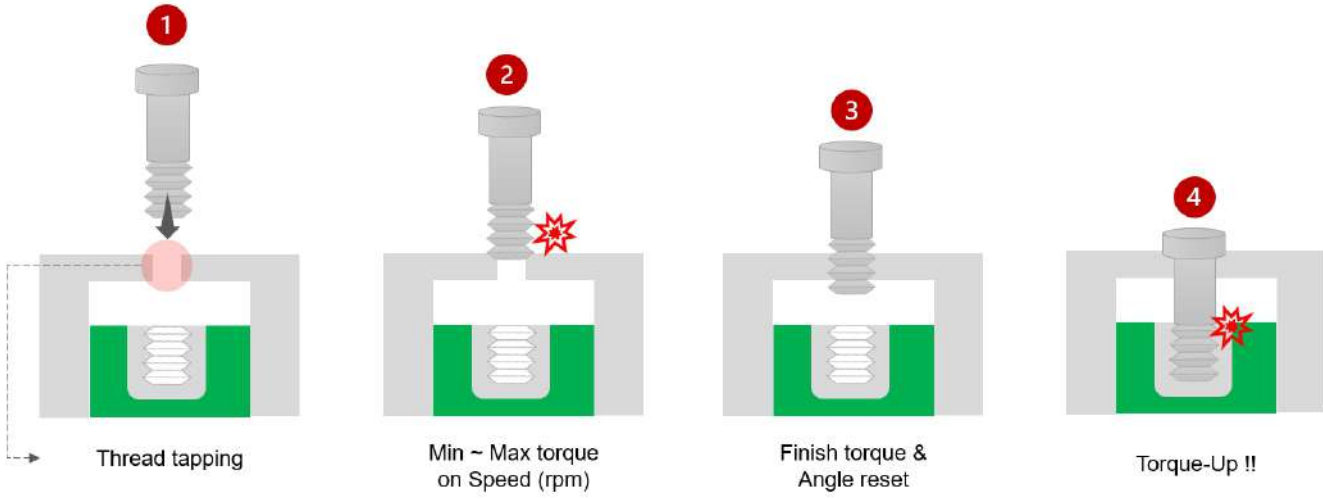


8.2.1 Free reverse rotation

Able to set reverse rotation up to 20 turns to make the bit spontaneously enter into a screw hole or fastened object hole before fastening the screw.

Speed (RPM)	Sets reverse speed
Angle (turn)	Sets reverse angle

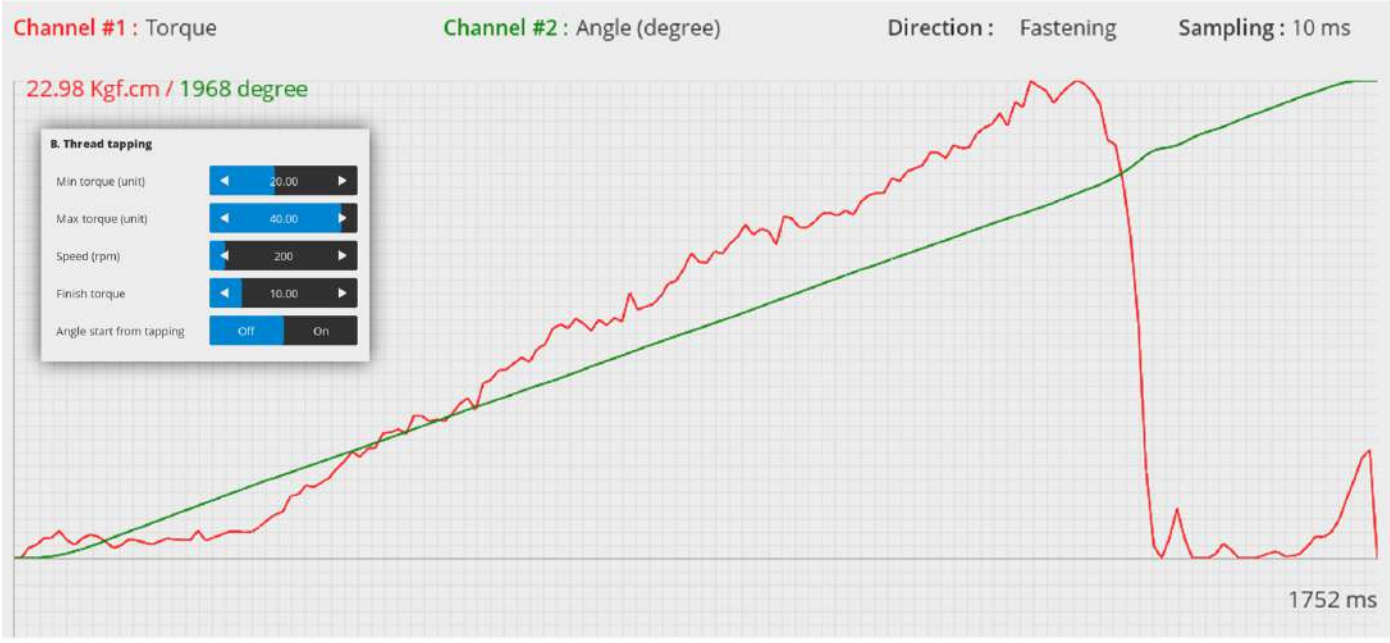
8.2.2 Thread tapping

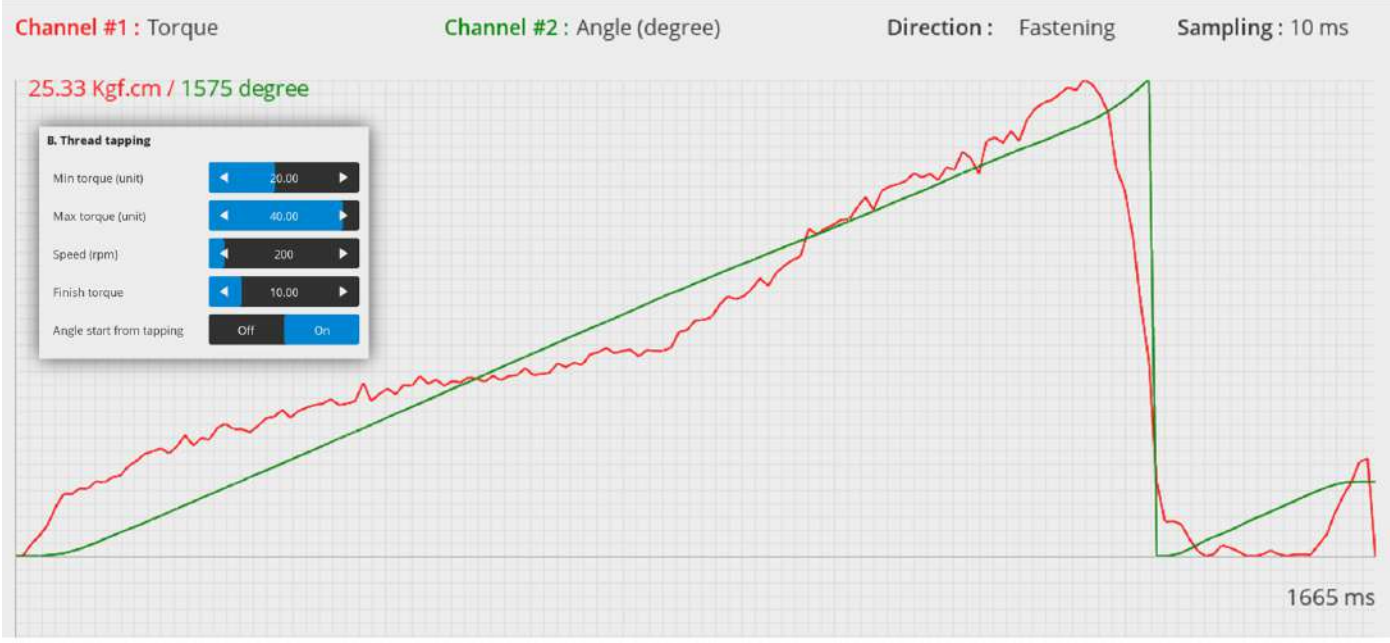


The figure above reveals the 4 steps of thread tapping.
It also illustrates how the five parameters in the thread tapping are utilized.

Step 1	If the screw is in the housing before reaching a hole, thread tapping can be used.
Step 2	If the fastening torque is greater than the torque when passing through the housing, the screw passes through the housing at the preset speed within min. – max. torque in the thread tapping.
Step 3	In general, torque drops rapidly when the screw passes through the housing. Then, torque is set to the finish torque level to detect the passing of the housing. If the angle start from tapping is ON, the angle is reset and starts from ‘0’ all over again when the finish torque is detected.
Step 4	The screw is fastened by the preset torque.

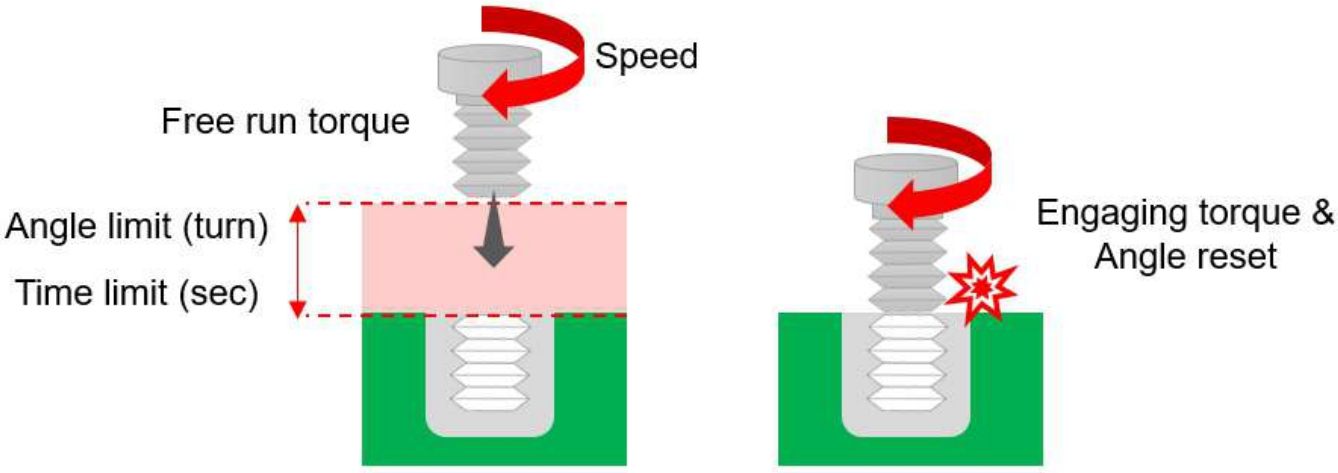
The figures below reveal graphs displayed after setting thread tapping in ParaMon-Pro X.
The torque-angle correlations can be checked depending on the status of angle start from tapping.





8.2.3 Engaging torque detection

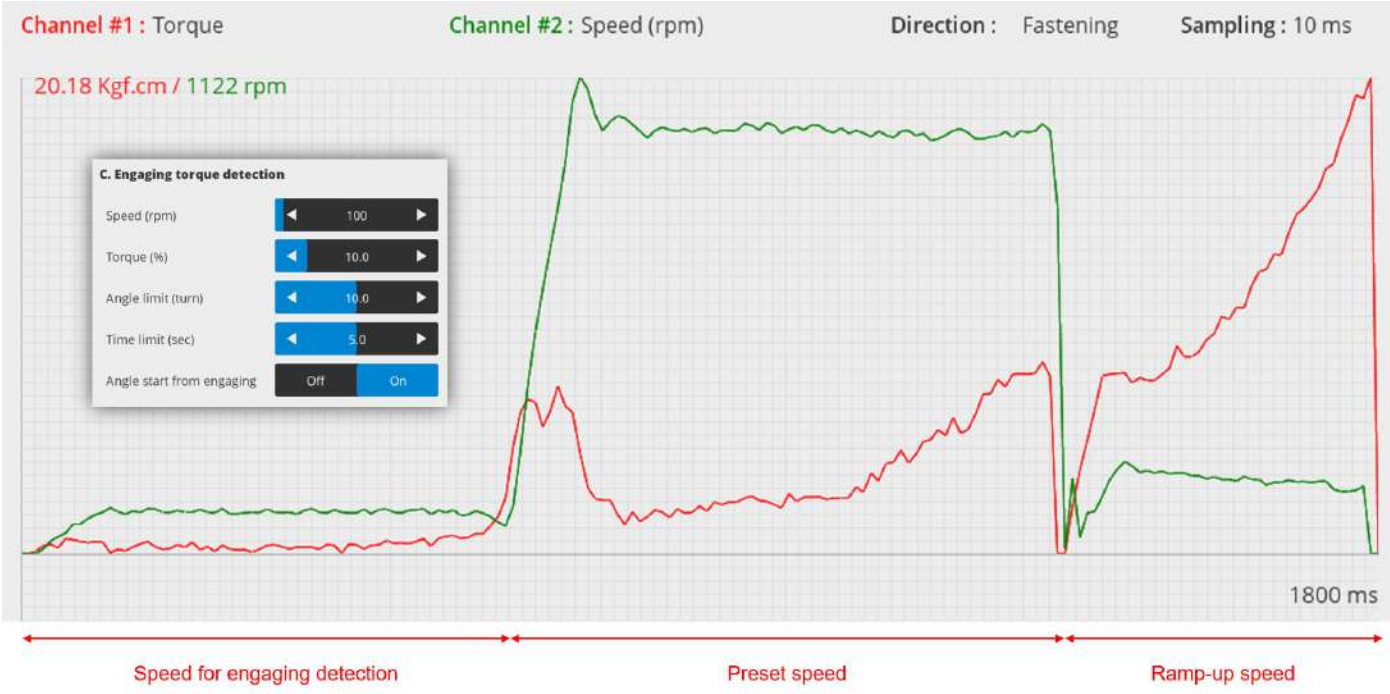
Able to detect a point where the screw is engaged with the screw groove by monitoring torque.
To use this feature, engaging torque when the tool is matched with the screw thread should be greater than free-run torque when the tool is activated in the air.



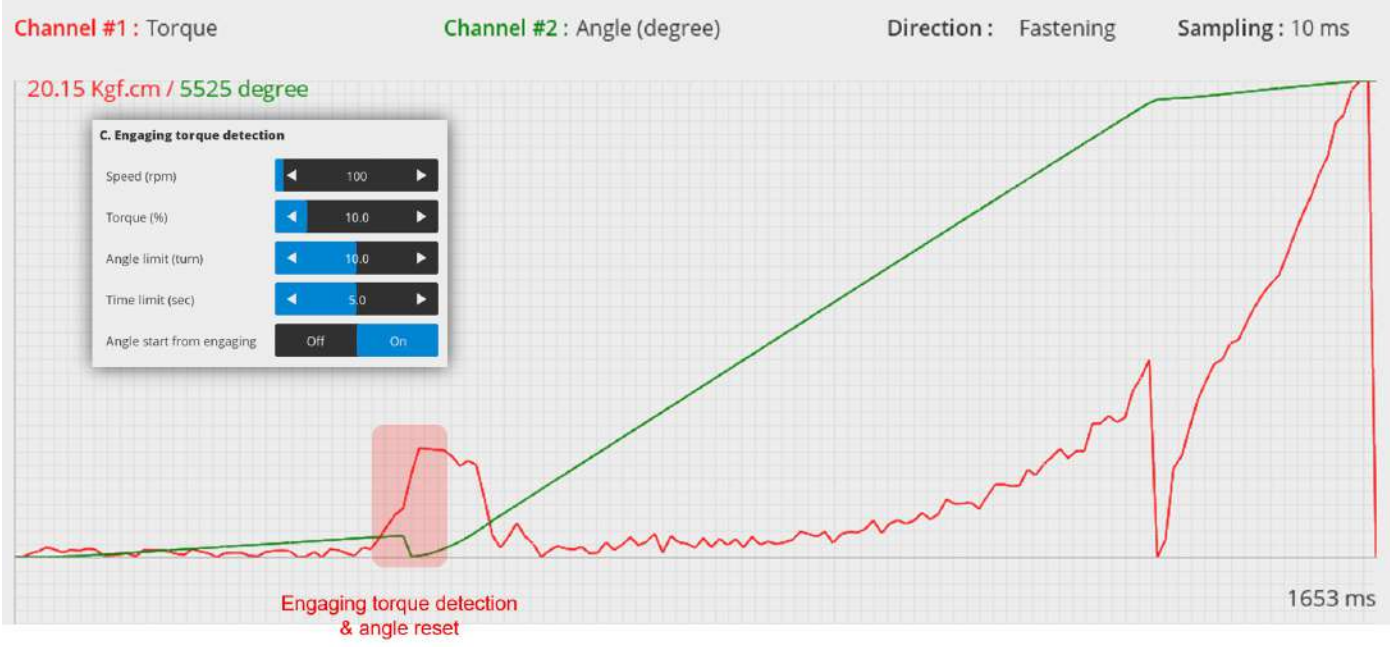
Speed (RPM)	Sets tool speed until the engaging torque is detected.
Torque (%)	Sets engaging torque in percentage (%) against the preset target torque up to 50%.
Angle Limit	Needed to detect engaging torque until the preset angle is reached after tool operation; an error occurs if the preset angle is exceeded.
Time Limit	Needed to detect engaging torque until the time limit is reached after tool operation; an error occurs if the time limit is exceeded.
Angle Start from Engaging	Able to set whether or not the angle is reset when engaging torque is detected.

The figure below reveals graphs displayed after setting engaging torque detection in ParaMon-Pro X.
It reveals torque-speed correlations and is able to check 3 speed steps with torque changes.

1.Advanced → Speed for engaging detection
2.Preset → Speed
3.Preset → Ramp-up speed



The figure below reveals torque-angle correlations.
It is able to confirm that angles can be reset as soon as engaging torque is detected if ‘angle start from engaging’ is ON.



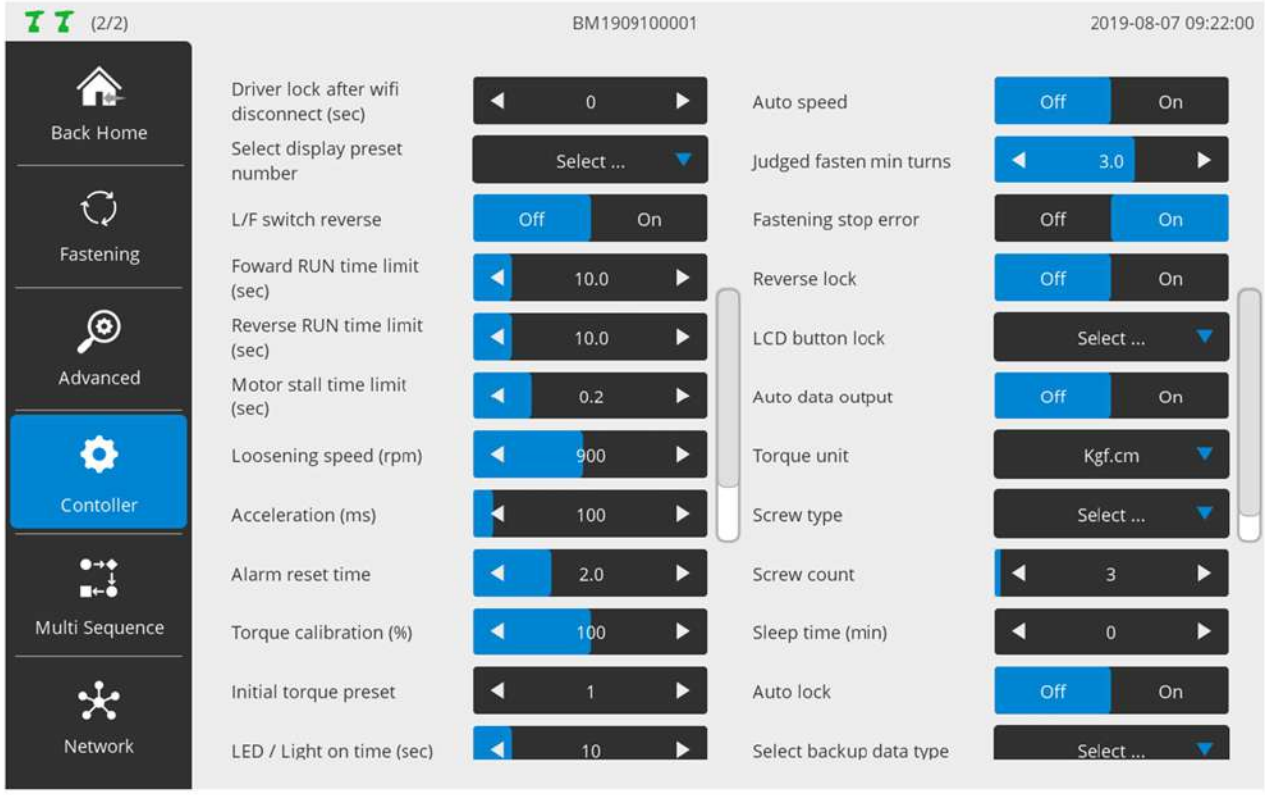
8.2.4 Angle after torque up

After ‘torque-up’ is sensed, an additional action can be set if necessary.

Speed (RPM)	After ‘torque-up’ is detected, it rotates at ____ speed by ___ angle in ___ direction.
Angle (degree)	
Direction	

E.g.
Screws are not fastened completely for next processing.
If needed to maintain a certain degree of fastening, it is able to keep the degree of fastening constant by spinning them reversely by 2 turns (720°) after torque-up detection.

8.3 Controller



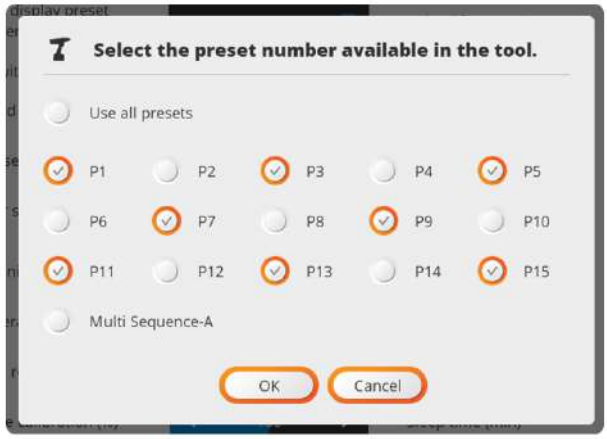
If necessary, the settings for the items in the controller can be adjusted.
However, it is recommended to use the default settings if possible.

A. Driver lock after WiFi disconnect (sec)

If WiFi is disconnected, the tool is automatically locked after the elapse of the preset time.

B. Select display preset number

The adjustment of the preset, using F3 (Preset DOWN) or F4 (Preset UP) button can be limited to the selection of particular presets only.



C. L/F Switch reverse

Able to set the Forward/Reverse switch settings inversely.

D. Forward RUN time limit (sec)

Limits forward operation time; an error occurs if exceeded.

E. Reverse RUN time limit (sec)

Limits reverse operation time; an error occurs if exceeded.

F. Motor Stall time limit (sec)

At reverse rotation, maximum hold time can be set in a stationary state.
The torque set in the Preset is applied equally for unscrewing as well as fastening.
For example, to unscrew the screws fastened with 10 kgf.cm, using 2 kgf.cm torque, the tool is unable to unscrew the screws and gets into a stationary state. Then, maximum hold time can be set.

G. Loosening speed (rpm)

Able to set reverse rotation speed.

H. Acceleration (ms)

Able to adjust acceleration to reach target speed from the start of operation.
For more information, refer to ‘8.1 Fastening → Soft Start’.

I. Alarm reset time

Clears alarm automatically after the elapse of the preset time.

J. Torque calibration (%)

Depending on a vendor, there are various types of torque meters. Measurements can differ according to each vendor’s implementation mechanism.
For example, when target torque is 10.00 kgf.cm, the torque meter can measure 9.5 kgf.cm.
In this case, it is required to select apparatus which can be the standard for torque management.

Once a tool is chosen for such torque management, no additional action is necessary.
If a torque meter is selected, on the contrary, it is able to calibrate the tool’s torque values by setting Torque Calibration and ‘Fastening → Torque Compensation’.
Torque calibration can be set within ±10% and commonly applied to overall preset.
‘Fastening → Torque Compensation’ can be set within ±30% and applied to the preset only.

K. Initial torque preset

Able to set default preset values at tool reset.
The numbers 1-15 respond to the preset numbers.
The numbers 16-17 respond to multi-sequences ‘A’ and ‘B’ respectively.

L. LED / Light on time (sec)

If the trigger is executed, LED light is turned ON over the preset period of time.

M. Driver model

Sets a driver model.

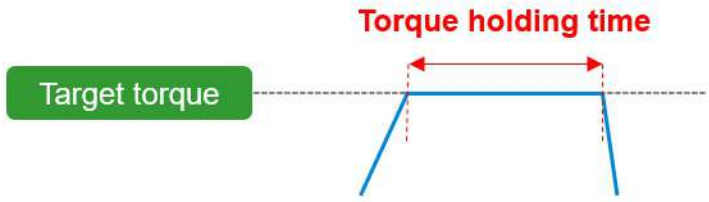
Do not randomly alter without discussion with the manufacturer.
Such unauthorized alteration may result in incorrect operation and system failure.

N. Controller parameter initialize

Enter '77' to reset all settings to the default settings.

O. Torque holding time (ms)

After reaching target torque, the force is kept for a while.
Excessive time setting can cause heating.



This function is not available in BMT lines.

P. Auto speed

According to target torque settings, proper speed is automatically set.
Recommended to use in ON state.
If AUTO Speed is turned OFF, and 'Preset → Speed' is set too high to reduce fastening time, the fast rotating screws can stop abruptly, and over torque (torque ripple) can occur due to inertia.

Q. Judged fasten min. turns

It becomes the gauge to judge if a user executes the trigger intentionally.
The default setting is '3.0 turns'.
It is reasonable to conclude that a user intentionally executed the trigger after 3.0 turns (1,080°).
For more information, refer to 'Fastening stop error'.

R. Fastening stop error

Unless 'Torque UP' is detected during 'Trigger ON – OFF', this feature decides if 'Fastening stop error' alarm should go off.

If 'ON', operating procedures are as follows:

1.Press the trigger for a while and release to start the tool.
2.If torque is increased after the process 1 above, 'Fastening stop error' does not occur.
3.Unless torque is increased after the process 1 above, check if the tool rotated up to the number of turns preset in 'Judged fasten min. turns'.
4.If greater than 'Judged fasten min. turns', the 'Fastening stop error' alarm goes off.
5.If rotated by less than 'Judged fasten min. turns', the fastening stop error does not occur.

S. Reverse lock

Decides if reverse rotation should be allowed.

If ON, it rotates in a forward direction only regardless of forward/reverse switch settings.

T. LCD button lock

Able to restrict the function keys and use them for three purposes:

Off	Permits the use of all keys without any functional restrictions
Lock Only F1	F1 is restricted. The restriction on F1 permits changes in preset No. However, changes in preset torque and speed are not allowed.
Lock All	Restricts the use of all keys except for alarm reset. Unable to modify all settings such as preset No., torque and speed. Used in situations which are strictly controlled by an external controller such as ParaMon-Pro X.

U. Auto data output

Not available when the BM is used together with ParaMon-Pro X.
Automatically turned off if the BM is connected to ParaMon-Pro X.
If set to 'ON' by force, communication between the BM and ParaMon-Pro X become abnormal.
Ensure to keep it OFF all the time when ParaMon-Pro X is used.

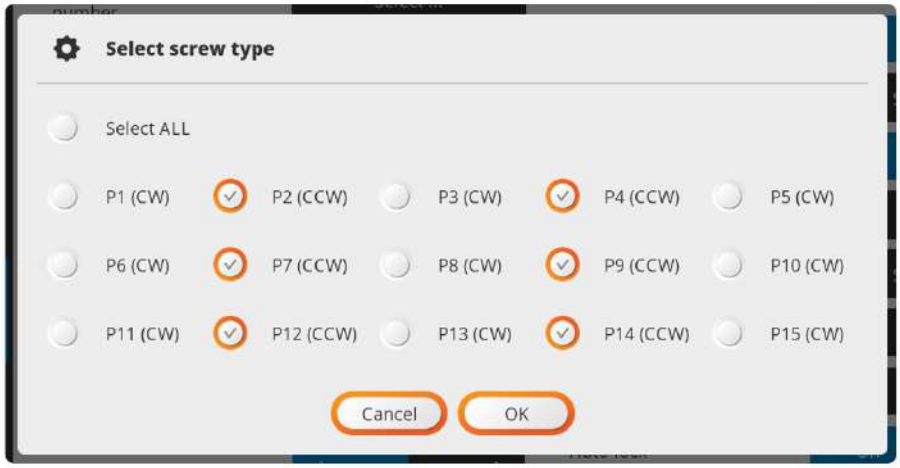
V. Torque unit

Sets a torque unit.

The tool is automatically reset when torque unit is being set.

W. Screw type

If the screw is fastened counterclockwise, it is able to set a screw-fastening direction by preset.



X. Screw ount

Able to set the number of screws and use for diverse purposes.

In case there are a total of 10 target screws, the screw count is set to ‘10’.

Whenever fastened, the screw count is reduced one by one (e.g., 10, 9, 8, …) and saved together with fastening data.

Able to check which screw has been fastened, using the count value.

Y. Sleep time (min.)

Able to set the system to go into sleep mode if left untouched for a certain period of time.

Able to turn off the sleep mode, using the trigger.

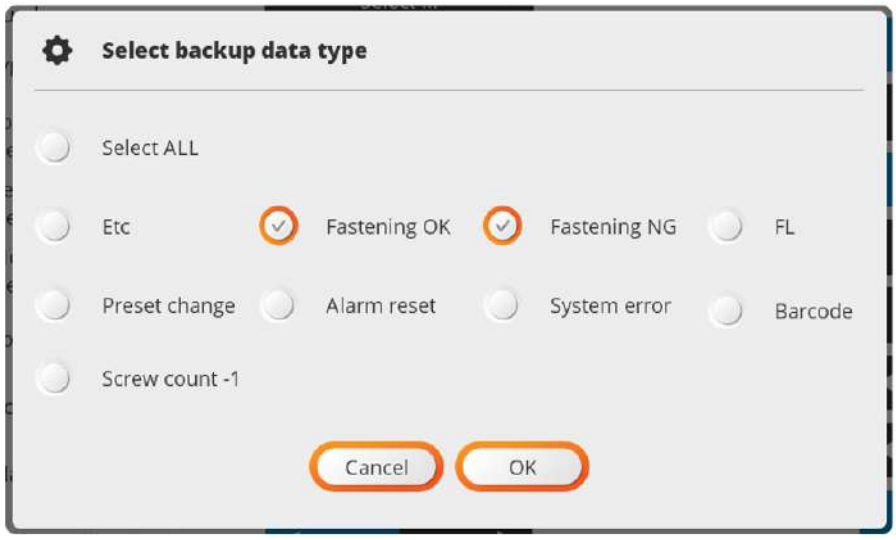
Z. Auto lock

Able to set the system to be locked automatically when the screw count is ‘0’.

AA. Select backup data type

The BM is able to back up event data (up to 65,000 events) in internal memory.
Such events saved in the internal memory are classified into various types.
If necessary, whether or not they are enabled is set by type, optimizing log data.
In addition, it is able to use the limited memory space more efficiently.

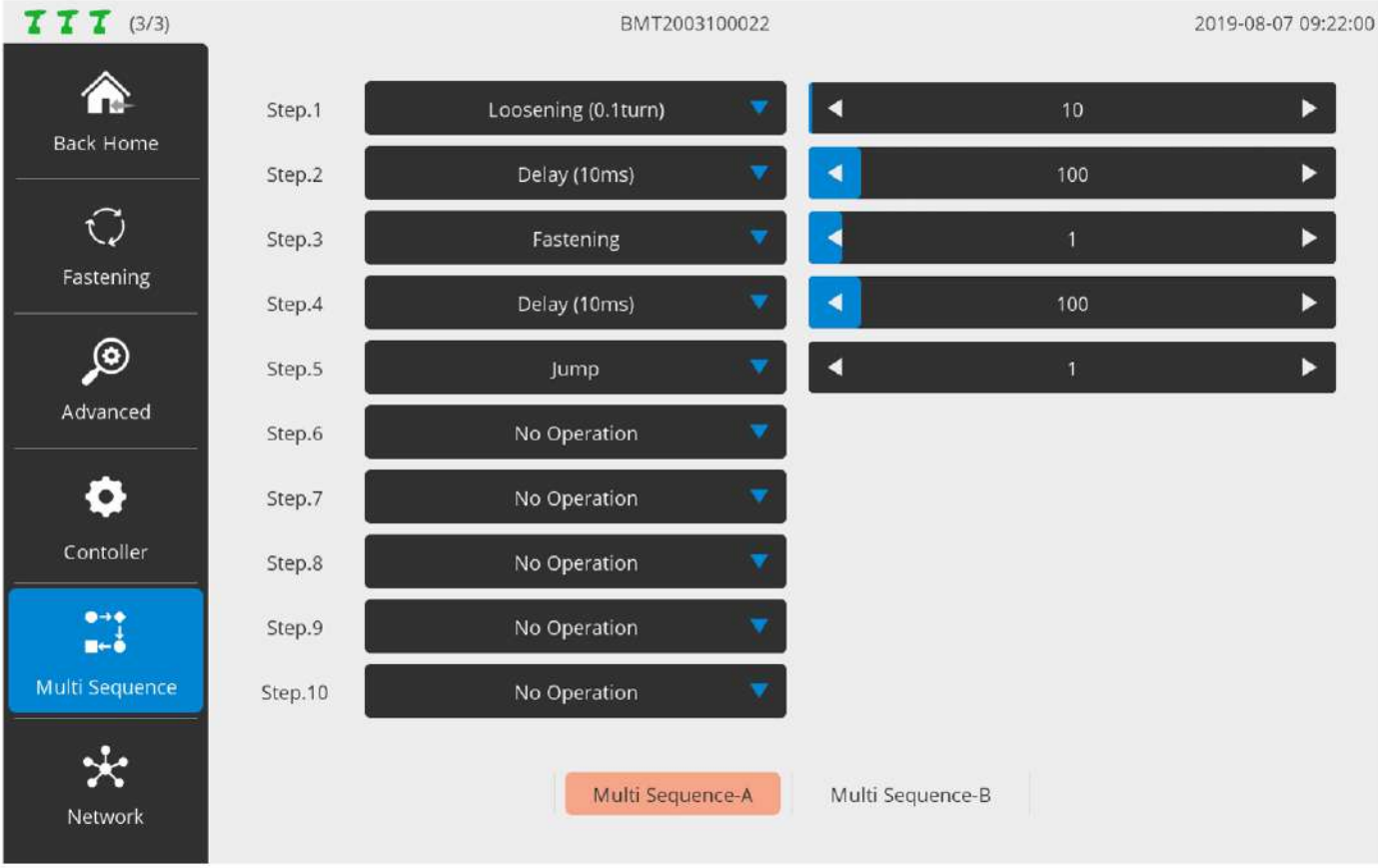
Etc.	Unable to confirm OK or NG during the trigger ON-OFF
Fastening OK	Fastening results not satisfying preset fastening conditions
Fastening NG	Fastening results not satisfying preset fastening conditions
FL	Change in forward/reverse switch (fastening / loosening)
Preset change	Preset changes
Alarm reset	Alarm cleared manually or automatically
System error	Violates preset conditions
Barcode	Gets scan data from the scanner-integrated BM
Screw count -1	Selects '-1' for a screw count in the BM



AB. Trigger start delay time

Able to restrict the use of the trigger from its execution to the preset time.
Able to prevent its excessive use.

8.4 Multi-sequence



Able to program fastening and loosening to a desired pattern in ‘Multi Sequence’.
Supports two different patterns (‘A’, ‘B’) and able to program up to 10 steps each.
Each step is comprised of a pair of command and parameter.

Command	Description	Parameter
No operation	Disables the step Finished when ‘No Operation’ is encountered during execution	None
Fastening	Fastens based on the preset	Sets the preset No. for fastening
End	Ends the execution	None
Delay (10ms)	Waits for the preset time	Sets delay time by 10m 100 = 1,000ms (1 sec.)
Select preset	Edits the PRESET to the set value Substitution by ‘Fastening’ recommended	Sets the target preset No.

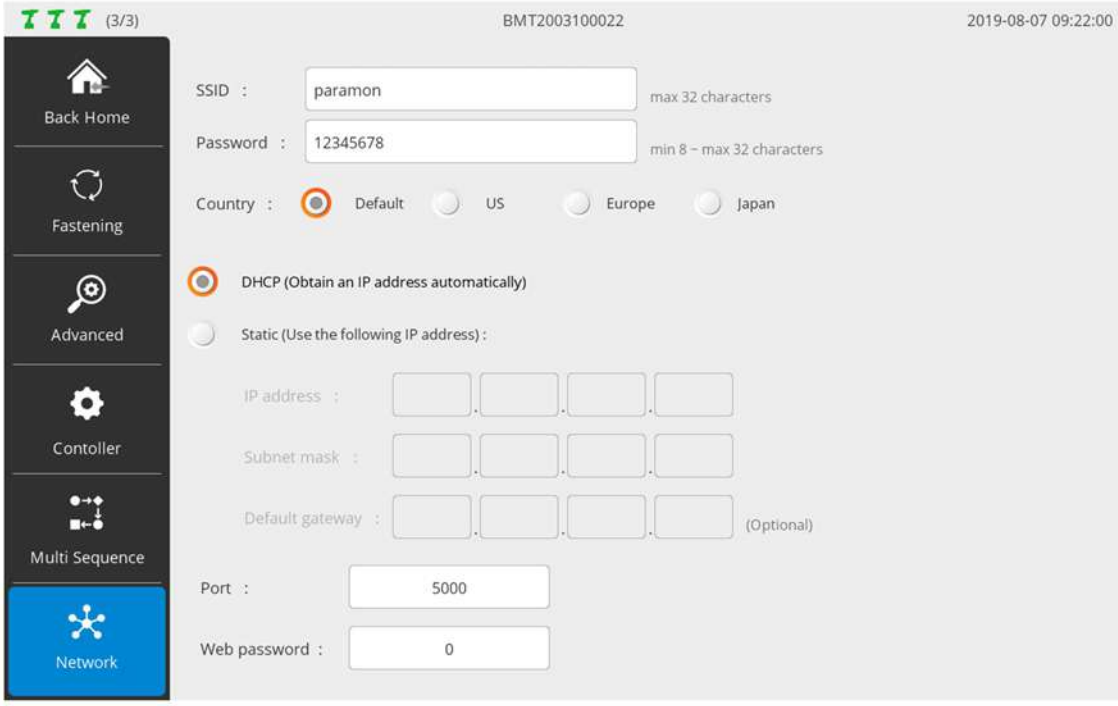
NO.	Command	Parameter
Loosening (0.1 turn)	Rotates reversely up to the number of preset turns	Sets the number of reverse turns by 0.1 turn 10 = 1 turn (360°)
Jump	Moves to the preset step No.	Sets the target step No.
Count Value = A	Each multi-sequence has a variable called ‘A’. Allocates the set value into the variable ‘A’ Variable ‘A’ commonly used in limiting the number of pattern executions	Sets positive integer to be allocated into the variable ‘A’
Sub if (A)	Each multi-sequence has a variable called ‘A’. Reduces ‘A’ value by ‘1’ if ‘Sub If’ is encountered. The next step is executed if ‘A’ is greater than ‘0’. If ‘A’ is ‘0’, the following step is executed.	None

Multi sequence (sample)

Repeat the pattern ‘2 reverse turns → hold (1 second) → fastening (Preset. 1) → hold (1 second)’ 10 times.

Step	Command	Parameter	Description
1	Count value = A	10	Allocates ‘10’ to the variable ‘A’
2	Loosening	20	Rotates 2 turns (720°) reversely
3	Delay	100	Holds 1 second
4	Fastening	1	Fastens (Preset. 1)
5	Delay	100	Holds 1 second
6	Sub if (A)	-	Reduces the variable ‘A’ by ‘1’ Moves to the Step 7 unless ‘0’ Moves to the Step 8 if ‘0’
7	Jump	2	Moves to the Step 2
8	End	-	Ends the execution

8.5 Network

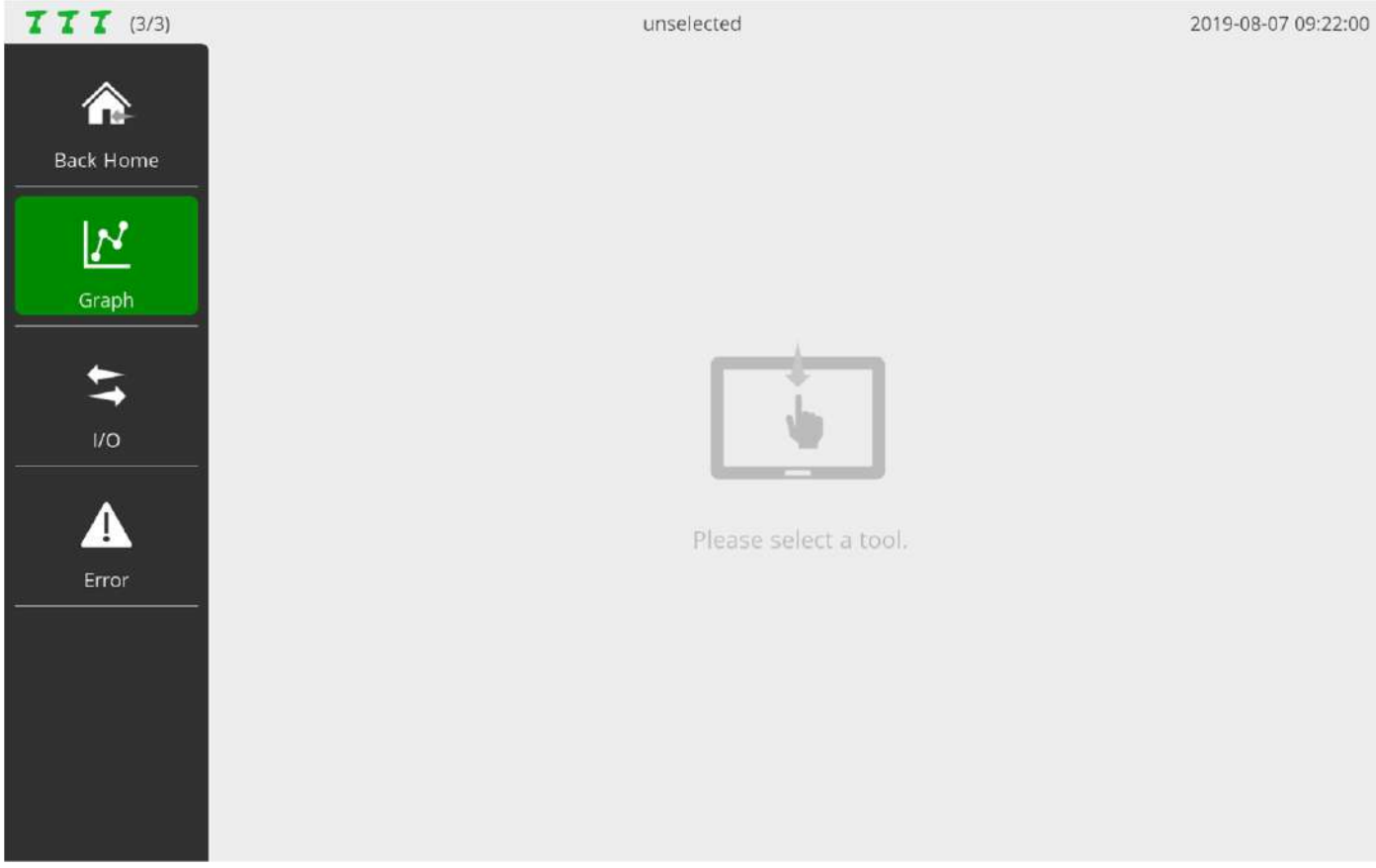


Able to set the WiFi network of the BM; needed to reset the system to apply the new settings

Category		Description
SSID		Enters the SSID of the target WiFi AP
Password		Enters the password of the target WiFi AP
Country		Sets an area 'Default' is recommended for general users
DHCP or static	DHCP	An IP address automatically allocated from the server
	Static	Sets an IP address manually When an IP address is manually set, set it according to the IP band of AP. If ParaMon-Pro X's internal AP is used, set the IP address in the range of 192.168.131.2-192.168.131.254. Set subnet mask and default gateway to 255.255.255.0 and 192.168.0.1 respectively. For the use of external AP, contact the network manager.
Port		BM's Modbus-TCP server port No. Recommended to use the default (5000)
Web password		A password used to get access to the BM's web server For more information about the web server, refer to the BM user manual.

9. MONITOR

Unless the target tool is specified, the following figure appears on the screen.
Refer to '7. Select target tool'.



9.1 Graph

It is able to check the target tool's fastening data in realtime graph.
In addition, it is possible to compare and analyze correlations between two different source data by providing a total of 2 channels and supporting 8 different source data by channel.
The source data selectable by channel are as follows:

Category	Description
Torque	Torque changes by time (ms)
Current (mA)	Current changes by time (ms)
Speed (RPM)	Speed changes by time (ms)
Angle (degree)	Angle changes by time (ms)
Speed command (RPM)	While the above speed represents the actual revolving speed of the tool, speed command refers to target speed to control. In other words, if speed and speed command are set and compared in two channels, it is able to compare and analyze if the tool is operated according to the desired speed.

Category	Description
Current command (mA)	While the above current represents the actual current consumption of the tool, current command refers to target current to control. In other words, if current and current command are set and compared in two channels, it is able to compare and analyze both actual and target current values.
Snug angle (degree)	Represents changes in snug angle by time (ms). For more information about snug angle, refer to '8.1 Fastening → Snug torque'.
Torque/angle	Applicable to channel 1 only In upper data sources, x-axis all represents time (ms). In torque and angle, x-axis is angle, representing torque changes by angle.
Disable	Applicable to channel 2 only; disables channel 2

A. Press [Setting] and set the graph output.
In the START state, the SETTING button is disabled.

Category	Description
Channel #1	Sets the source data of channel #1
Channel #2	Sets the source data of channel #2
Direction	Sets a direction of graph output
Sampling	Sets the sampling interval of source data Since a graph can represent up to 200 points per channel, precision increases as sampling interval decreases. However, time slot is reduced. The maximum time sloths by channel according to sampling settings are as follows: - 5ms x 200 = 1,000 ms (1 sec) - 10ms x 200 = 2,000 ms (2 sec) - 15ms x 200 = 3,000 ms (3 sec) - 30ms x 200 = 6,000 ms (6 sec) If operating time exceeds the above level, the latest data only appear.

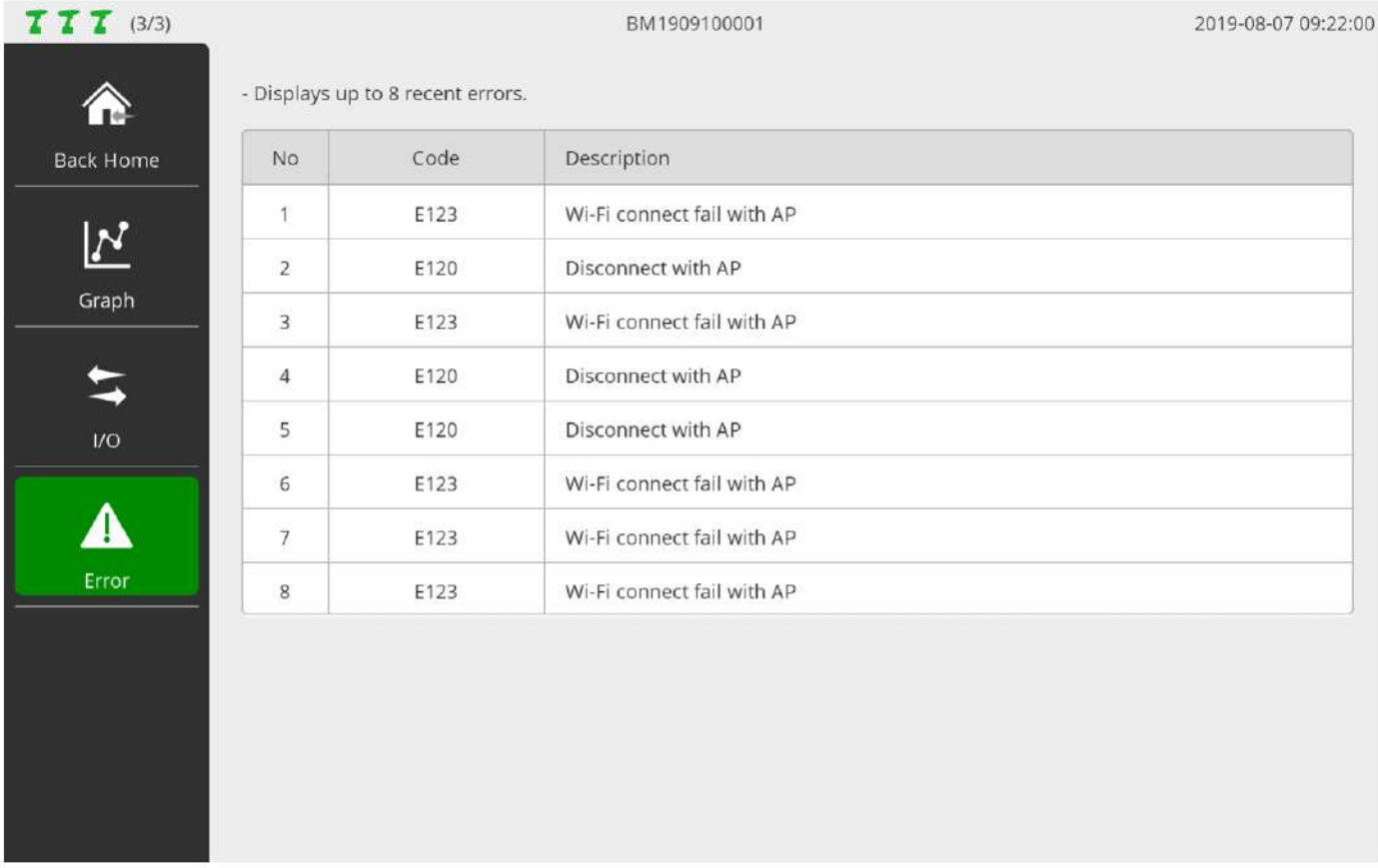
B. Press [Start] and enable graph output.
C. Press [Clear] and reset data output.

9.2 I/O

Able to check the current status of I/O port.

If system functions are allocated to the I/O port, function names also appear.

9.3 Error

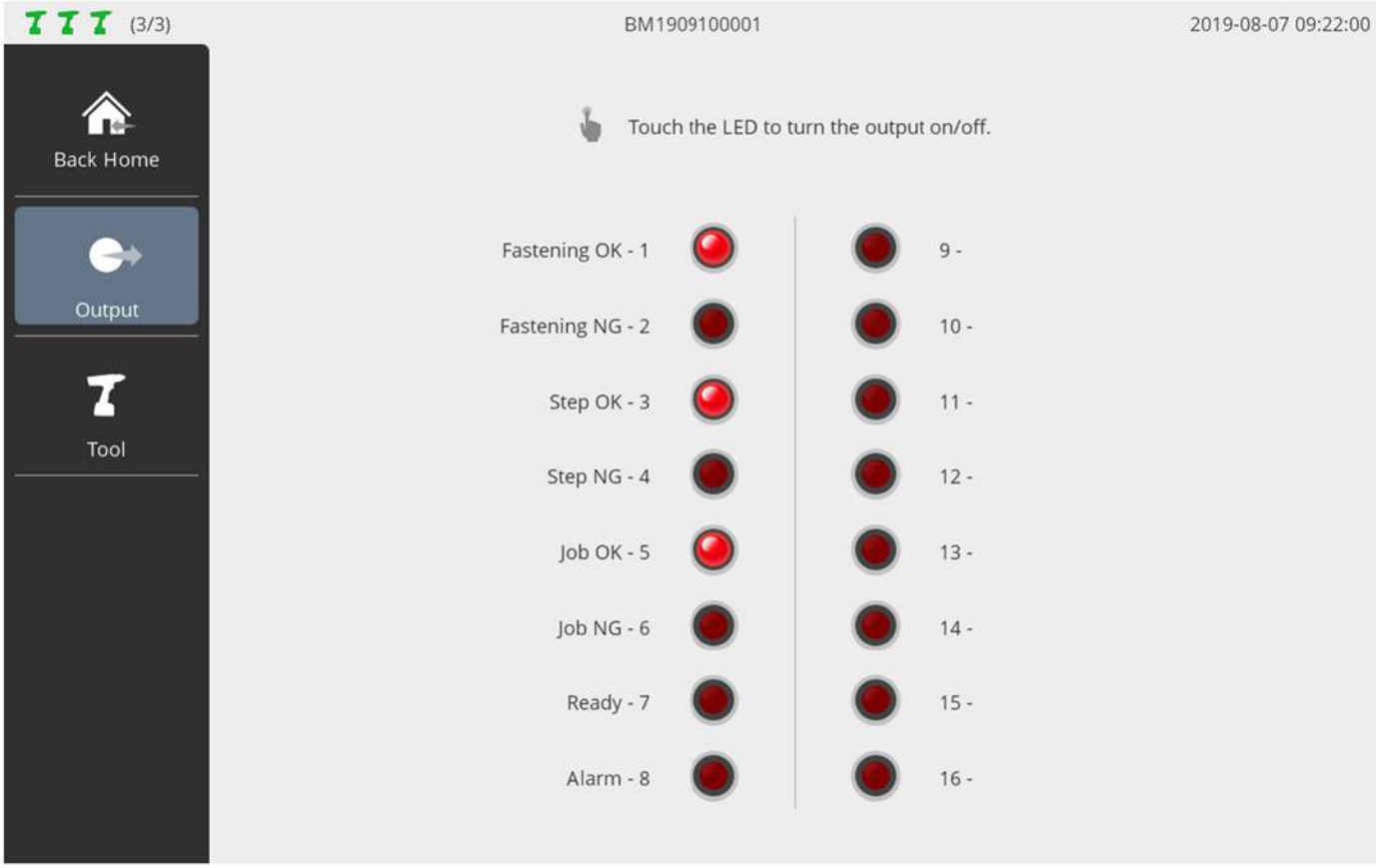


No	Code	Description
1	E123	Wi-Fi connect fail with AP
2	E120	Disconnect with AP
3	E123	Wi-Fi connect fail with AP
4	E120	Disconnect with AP
5	E120	Disconnect with AP
6	E123	Wi-Fi connect fail with AP
7	E123	Wi-Fi connect fail with AP
8	E123	Wi-Fi connect fail with AP

The latest 8 errors from the target tool appear.

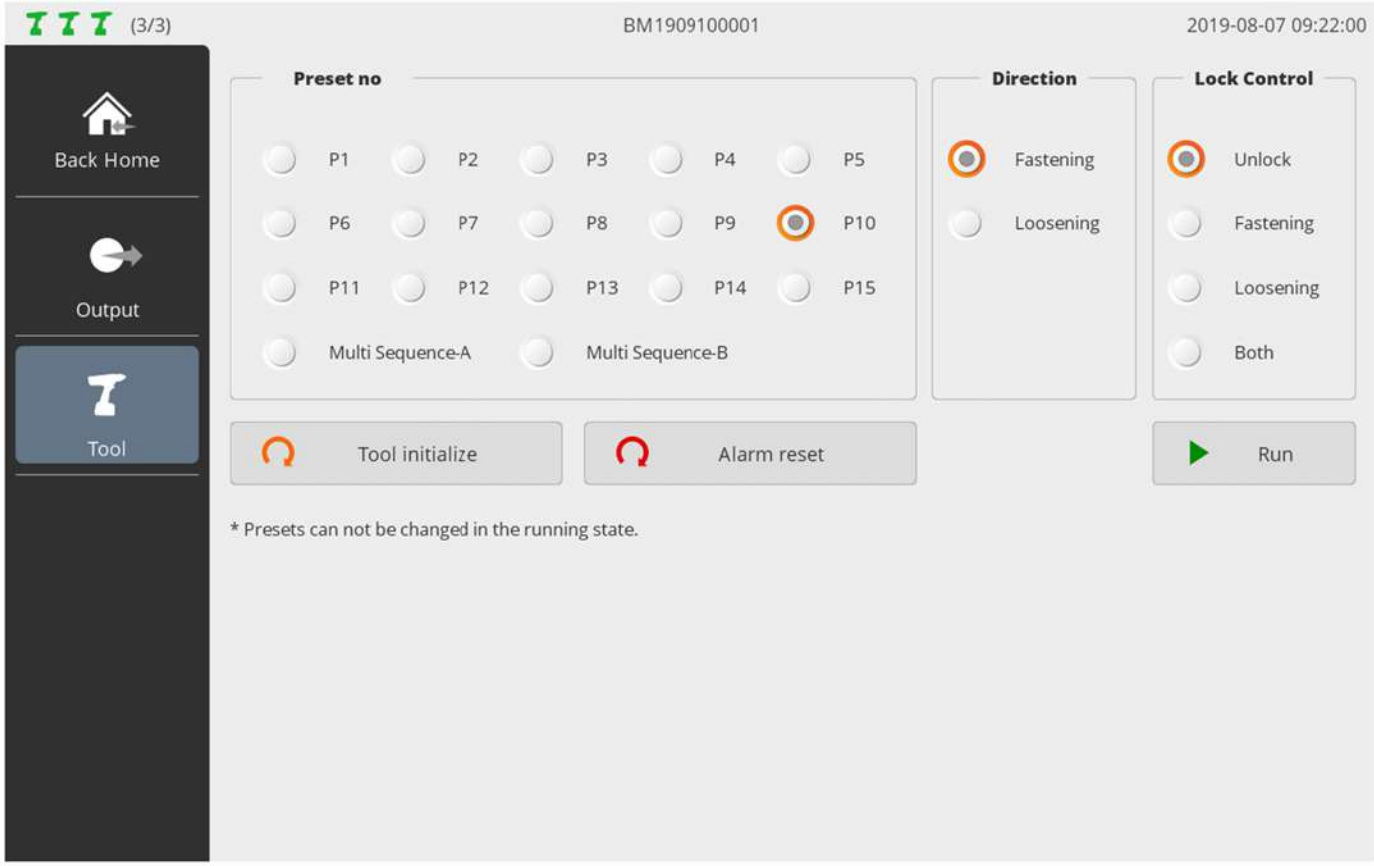
10. REMOTE

10.1 Output



Able to control the level of output port manually.
If system functions are allocated to the output port, function names also appear.
Useful in checking if properly wired after I/O wiring.

10.2 Tool

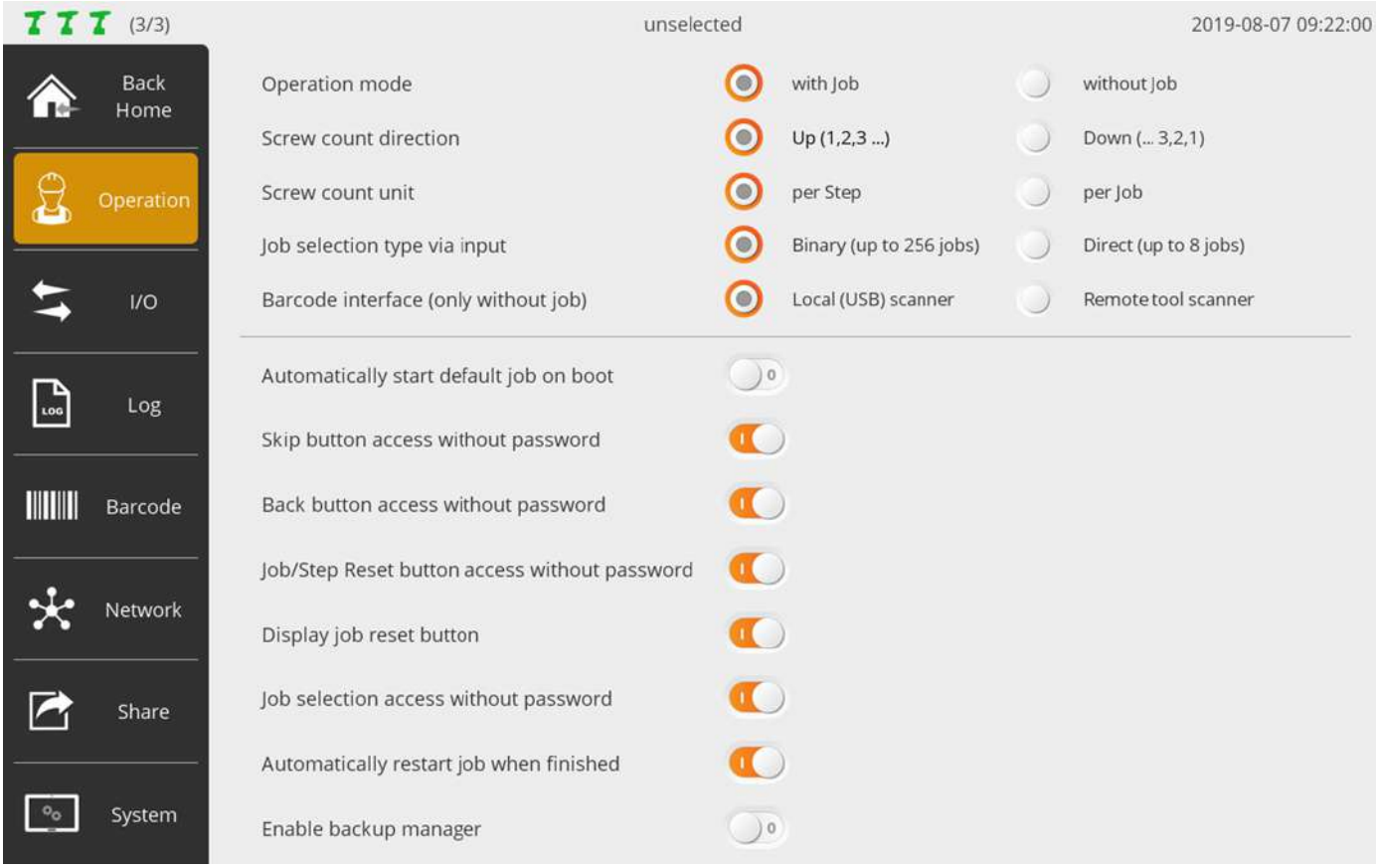


Able to control a target tool in the distance from ParaMon-Pro X.

Category	Description
Preset	Sets the preset of the target tool.
Direction	Sets a direction for remote control.
Lock control	Able to set the lock by direction if necessary . The tool may not function if locked in the direction settings.
Tool initialize	Reboots the target tool and resets all settings to a default state.
Alarm reset	Able to clear alarm manually.
Run/Stop	Operates/stops a target tool according to preset conditions.

11. SETTING

11.1 Operation



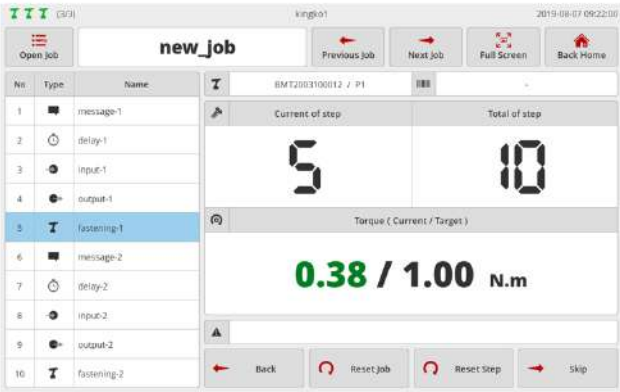
A. Operation mode

Whether or not the Assembly Process Control, one of the major features of ParaMon-Pro X, would be enabled is decided.

In ParaMon-Pro X, a single assembly process programmed by a user is called, ‘job’.

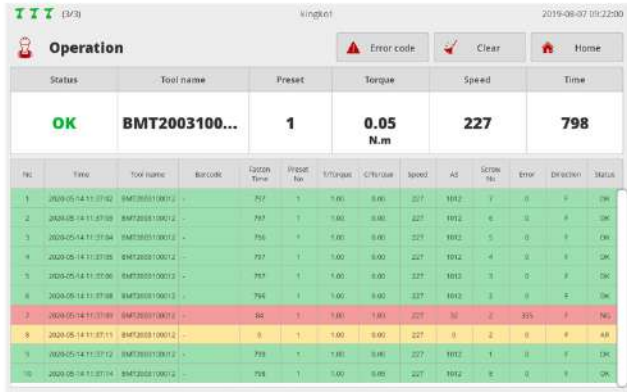
Depending on if the job is used, the mode is classified into ‘With job’ and ‘Without job’.

with job



vs

without job



Operation mode	With job	Without job
Feature	Uses the Process Control feature and runs according to the procedures programmed in the job. Visualizes the complicated assembly procedures of diverse products and targets to minimize assembly errors.	Does not uses the process control feature; able to use all tools randomly. Usually used to save fastening data.
Tools	Operates the tools selected in the fastening step only. Locked for all other tool; unable to use multiple tools simultaneously .	No restrictions on the use of tools. Able to use all tools randomly at the same time.
Code Scanner	Able to register a code and set jobs. The preset jobs are automatically loaded if the registered code is scanned.	Able to register a code and presets when the scanner-integrated BM is used. Automatically converted into the preset if the registered code is scanned.

B. Screw count direction

Enabled under ‘With job’ mode only.

Up (1,2,3 …)	The screw count increases from ‘0’ to total count. The screw count represents the number of fastened news.
Down (… 3,2,1)	The screw count decreases from total count to ‘0’. The screw count refers to the number of remaining screws.

C. Screw count unit

Enabled under ‘With job’ mode only.

Per step	Displays the screw count in ‘Fastening step’ unit.
Per job	Displays screw count in ‘Job’ unit.

D. Job selection type via input

Enabled under ‘With job’ mode only.

Able to load up to 8 jobs through external input.

Binary (up to 256 jobs)	Handles job input (8 jobs in total), using the binary scale. Job select 1 refers to the least significant bit (LSB) while Job select 8 represents the most significant bit (MSB). It ranges from 1 to 255, and the job for the Job No. is loaded.
Direct (up to 8 jobs)	Job select 1-8 is matched with job No. 1 in a one-to-one manner.

E. Barcode interface (only without job)

Enabled under ‘Without Job’ mode only.

In ParaMon-Pro X, the barcode scanner is divided into two different types depending on a connection method.

Local scanner	Represents a scanner directly connected to ParaMon-Pro X through USB Ignores ‘Remote Scanner’ if ‘Local Scanner’ is selected.
Remote scanner	Refers to the scanner integrated with the BM. Ignores ‘Local scanner’ if ‘Remote scanner’ is selected.

F. Automatically start default job on boot

Enabled under ‘With job’ mode only.

Able to set the system to make certain jobs executed automatically when ParaMon-ProX is reset.

G. Skip button access without password

Enabled under ‘With job’ mode only.

Able to set if a password would be asked when the SKIP button is pressed during job execution.

On	A password not asked.
Off	A password asked.

H. Back button access without password

Enabled under ‘With job’ mode only.

Able to set if a password would be asked when the BACK button is pressed during job execution.

On	A password not asked.
Off	A password asked.

I. Job/Step reset button access without password

Enabled under ‘With job’ mode only.

Able to set if a password would be asked when the RESET JOB or RESET STEP button is pressed during job execution.

On	A password not asked.
Off	A password asked.

J. Display job reset button

Enabled under ‘With job’ mode only.

Able to set if the RESET JOB button would appear on the job screen.

On	Displays the ‘Reset job’ button.
Off	Does not display the ‘Reset job’ button.

K. Job selection access without password

Enabled under ‘With job’ mode only.

Able to set if a password would be asked at job selection when a user touches the screen in person; job loading by external input (input, scanner, etc.) not applicable.

On	A password not asked.
Off	A password asked.

L. Automatically restart job when finished

Enabled under ‘With job’ mode only.

Able to set if the job would be automatically restarted when all job procedures are done.

On	Automatically restarts at the end of job process.
Off	Does not automatically restart at the end of job process.

M. Enable backup manager

The BM has ‘Backup memory’ to back up event data.

ParaMon-Pro X gets events from the BM’s backup memory in realtime.

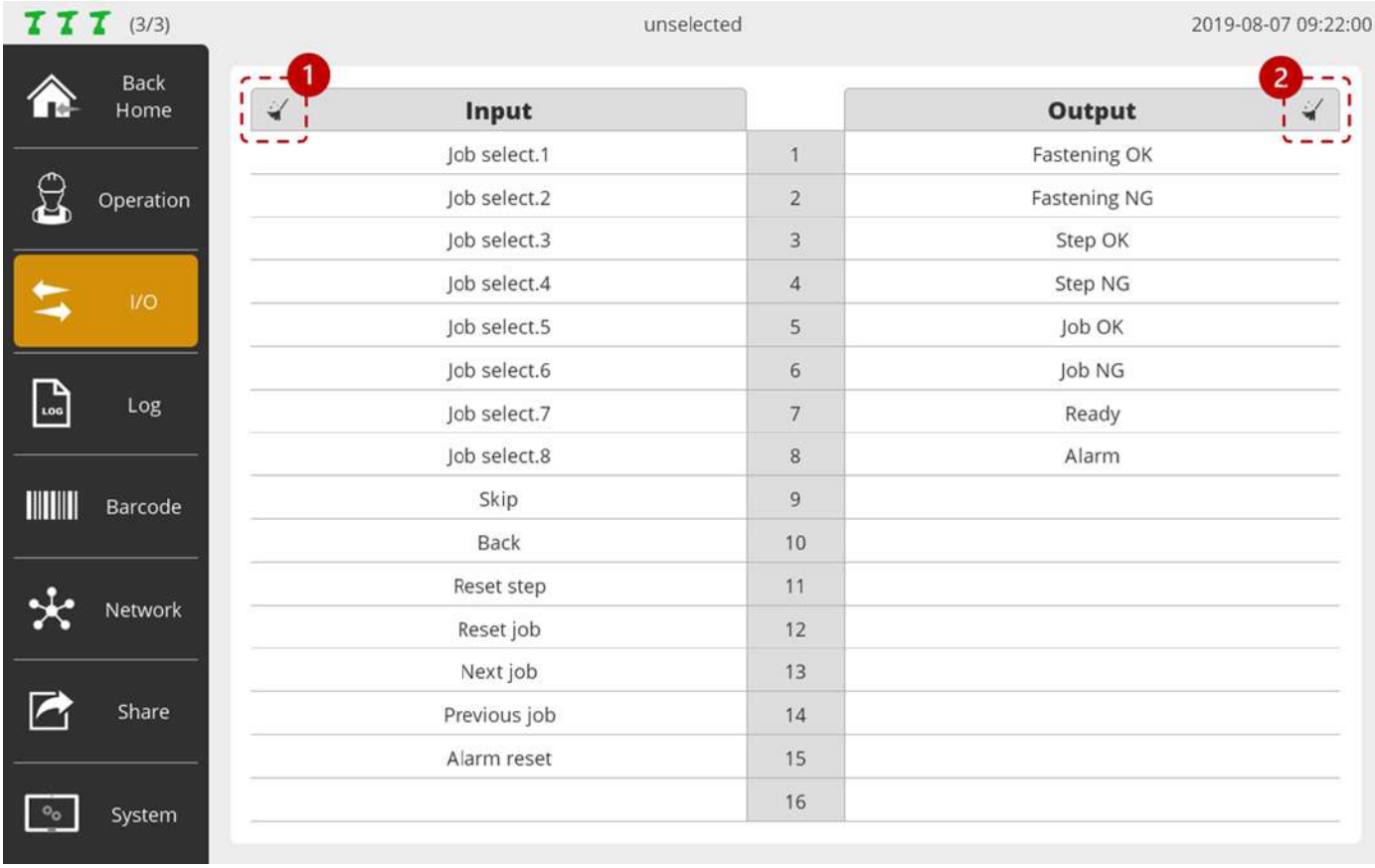
First, ParaMon-Pro X checks the status of backup memory before enabling the realtime event transfer of the BM.

If the backup memory is empty, realtime transfer is immediately enabled.

If data already exist in the backup memory, however, it is needed to decide if they would be received.

Off	Empties backup memory and enables realtime event transfer regardless of the existence of data.
On	Enables the backup manager if data already exist. The backup manager decides if they would be received by tool. Enables realtime event transfer after completing the process depending on settings.

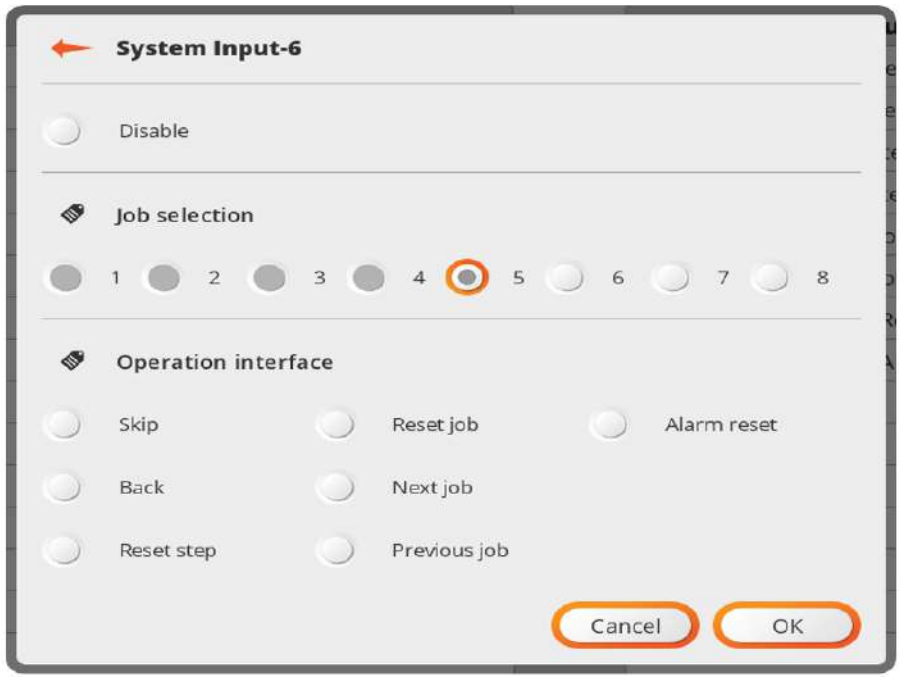
11.2 I/O



ParaMon-Pro X provides a total of 32 I/O ports (16 ports each) for the purpose of interlocking with external devices.
Able to allocate system functions pre-defined in input and output in 'Setting → I/O'.
Unable to use the ports allocated to the system function in input and output steps during job programming.

NO.	Category	Description
1	Input clear all	Clears all input port settings.
2	Output clear all	Clears all output port settings.

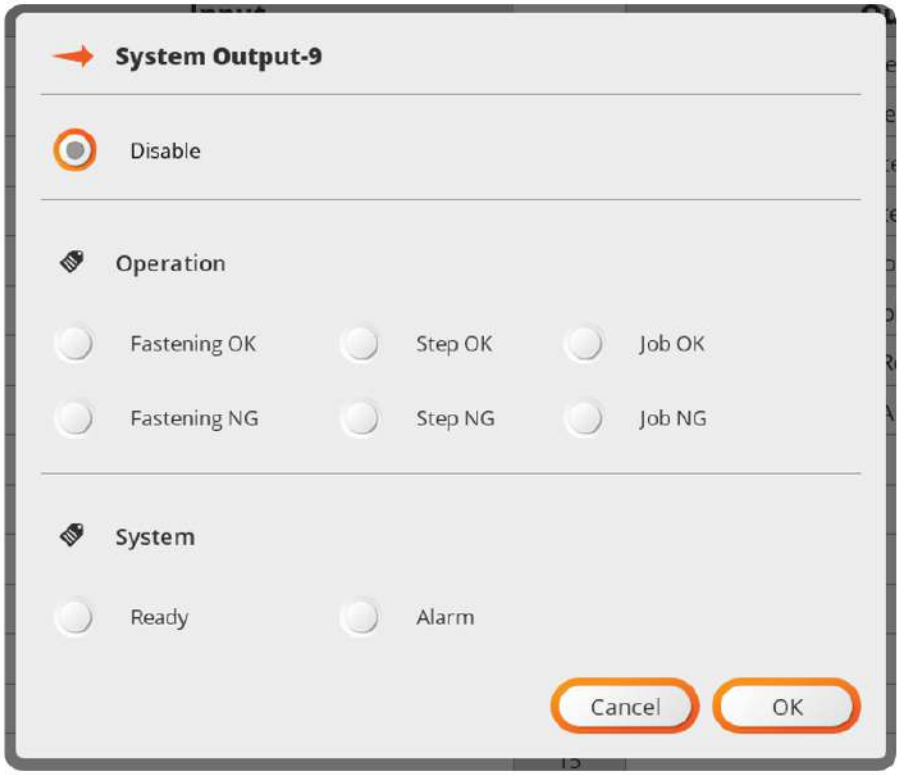
11.2.1 Input



Unlike output, input is not able to allocate system functions in a redundant manner.
The system functions already allocated to other parts are enabled as shown in the figure.

NO.	Category	Description
1	Job selection 1-8	Able to load jobs through external input under the 'With job' mode. For more information, refer to '11.1 Operation → D. Job selection type via input'.
2	Skip	Able to skip the next screw or move to the next step if necessary during job execution.
3	Back	Able to return back to the previous screw if necessary during job execution. Valid in the fastening step only; unable to return back to the previous step.
4	Reset step	Resets the current step.
5	Reset job	Resets the current job.
6	Next job	Executes the next job if it exists on the job list.
7	Previous job	Executes the previous job if it exists on the job list.
8	Alarm reset	Clears ParaMon-Pro X alarm.

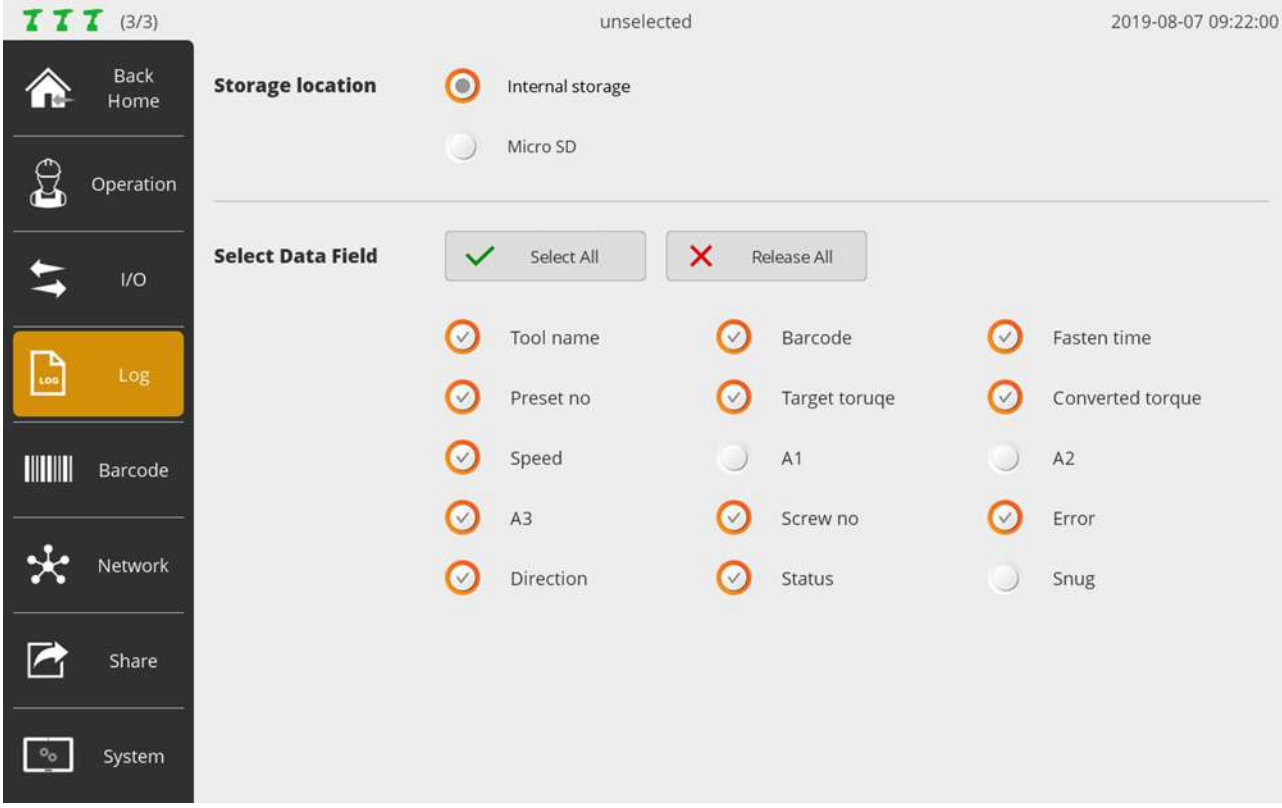
11.2.2 Output



Unlike input, output is able to allocate system functions in a redundant manner.

NO.	Category	Description
1	Fastening OK	Appears if the fastening results meet preset conditions.
2	Fastening NG	Appears if the fastening results do not meet preset conditions.
3	Step OK	Appears if the fastening procedures/results of all screws set in the fastening step are OK.
4	Step NG	Appears if the fastening procedures/results of the screws set in the fastening step are NG
5	Job OK	Appears if all fastening steps comprising jobs are OK.
6	Job NG	Appears if a fastening step comprising jobs is NG.
7	Ready	Appears in ‘ready-to-execute-job’ state.
8	Alarm	Appears when ParaMon-Pro X alarm goes off.

11.3 Log



A. Storage location

Sets a log file storage position.

B. Select data field

Enabled under 'Without job' mode only.

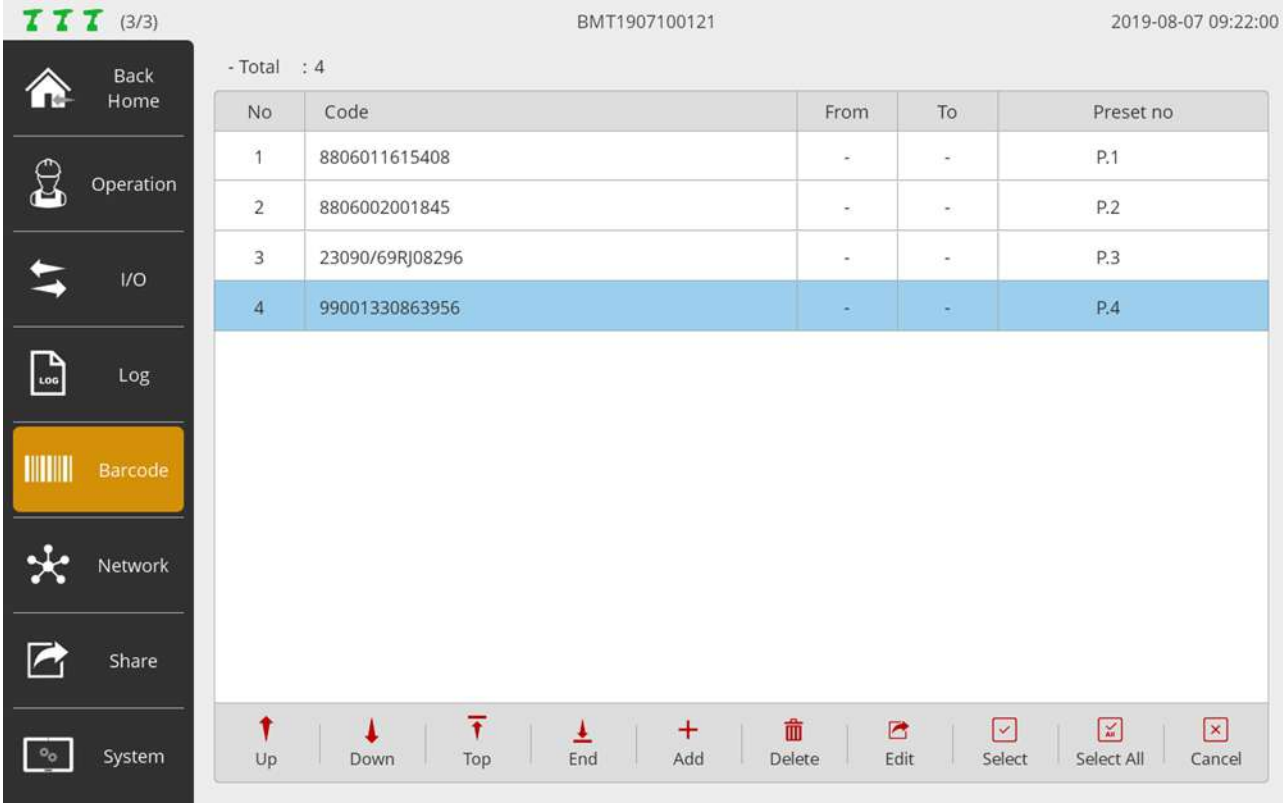
Able to select data which appear on the screen.

Saves all data in the log file regardless of settings.

No	Time	Tool name	Barcode	Fasten Time	Preset No	T/Torque	C/Torque	Speed	A1	A2	A3	Screw No	Error	Direction	Status	Snug
1	2020-05-28 14:16:08	BM1909100001	-	561	1	10.00	0.31	333	999	13	1012	1	0	F	OK	0
2	2020-05-28 14:16:10	BM1909100001	-	76	1	10.00	10.44	333	6	11	17	1	335	F	NG	0
3	2020-05-28 14:19:28	BM1909100001	-	0	1	10.00	0.00	900	0	0	0	5	0	L	FL	0

No	Time	Tool name	Fasten Time	Preset No	C/Torque	Speed	A3	Screw No	Error	Status
1	2020-05-28 14:16:08	BM1909100001	561	1	0.31	333	1012	1	0	OK
2	2020-05-28 14:16:10	BM1909100001	76	1	10.44	333	17	1	335	NG
3	2020-05-28 14:19:28	BM1909100001	0	1	0.00	900	0	5	0	F/L change

11.4 Barcode - without job & BM integrated scanner



Enabled under ‘Without job’ mode only.
Able to register a code for a change to certain preset by tool.
Available in the scanner-integrated BM only.

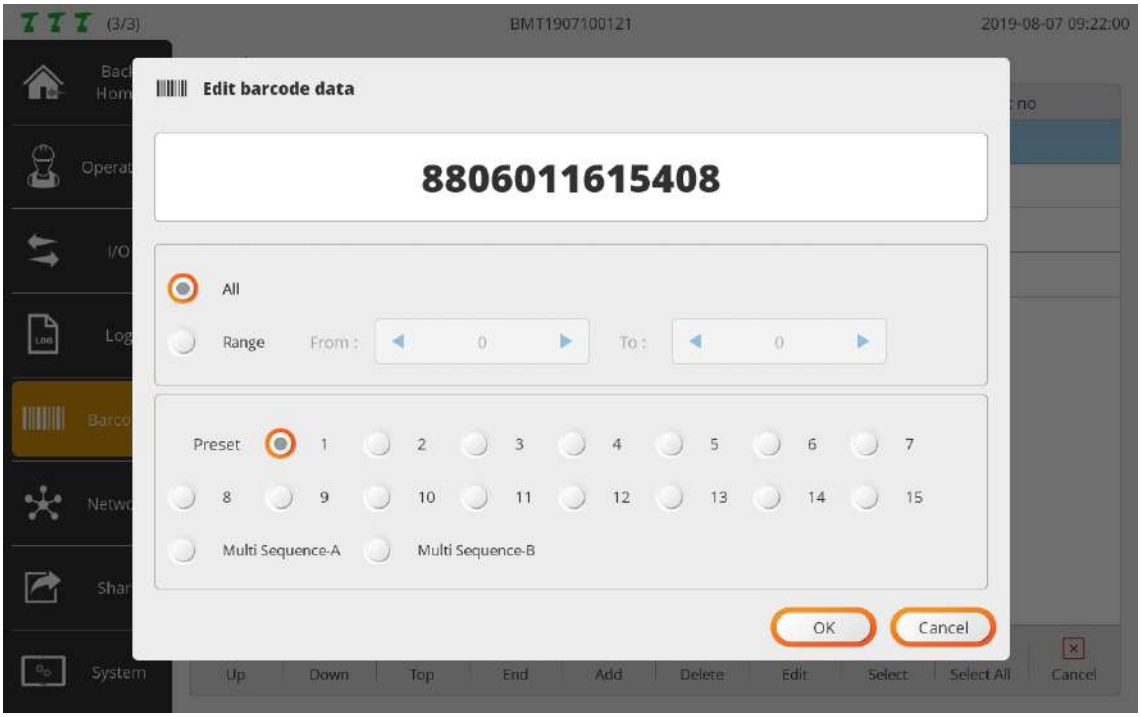
A. Code input

Select target tools for registration.

A scanner is enabled if the trigger is executed twice in a row.

If a code is scanned, the registration page along with the scanned code pops up.

If necessary, press [Add] and enter the code in person.



B. Valid code region settings

If ‘All’ is chosen, the code should be perfectly matched for change into the preset.

If ‘Range’ is selected, the region appears in red on the code.

If the region is partially matched, it changes to the preset.

Therefore, in the RANGE setting, even though the registered code and scanned code are not matched in terms of total length, it changes to the preset as long as the digit of the valid region is matched with the code.

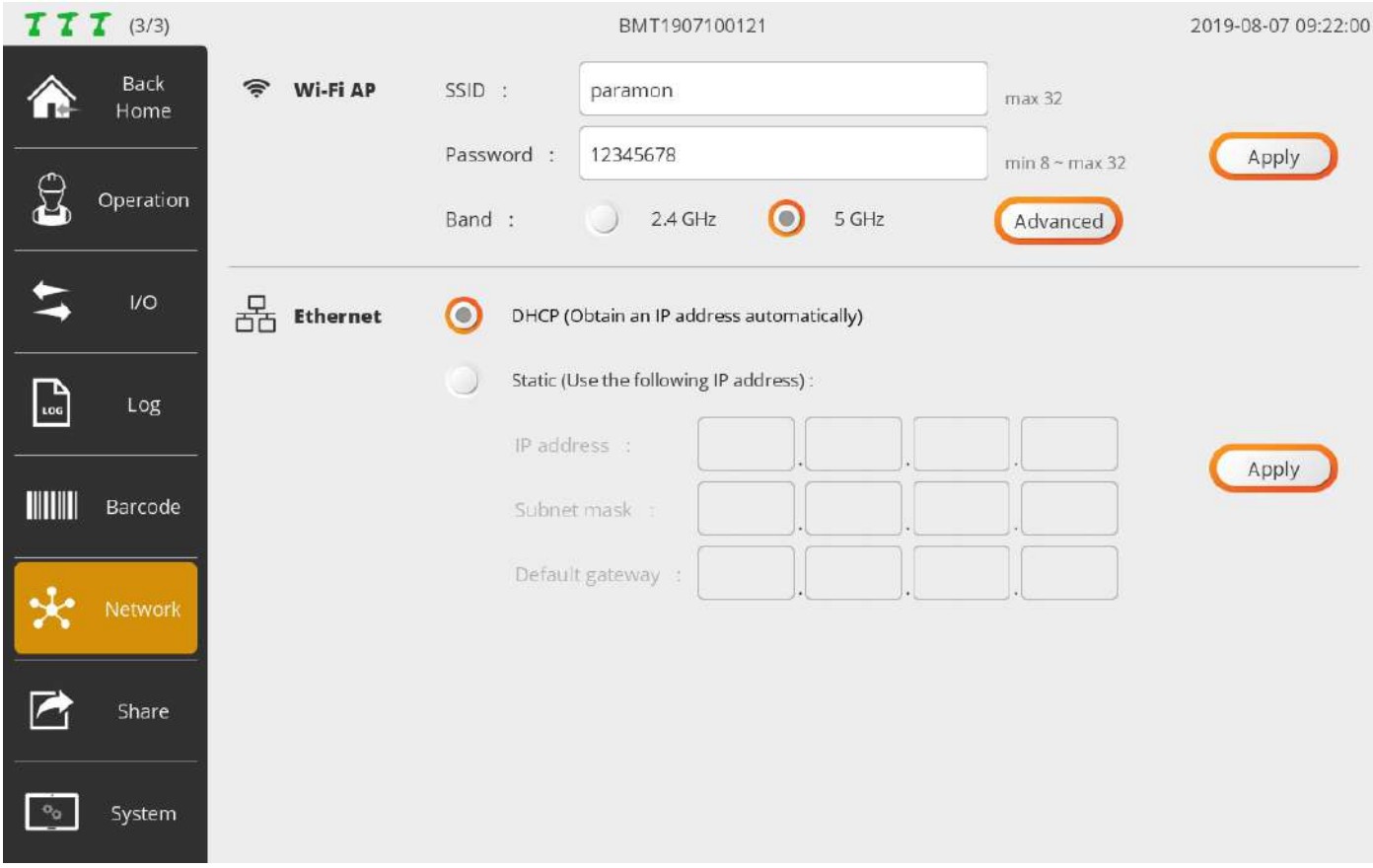
C. Preset settings

Selects target preset in which the valid regions of registered and scanned codes are matched.

D. Add to all tools (optional)

Check the ADD TO ALL TOOLS checkbox and register a code to all tools in ParaMon-Pro X.

11.5 Network



A.WiFi

Setting to run WiFi AP in ParaMon-Pro X.

After editing the settings, press [Apply].

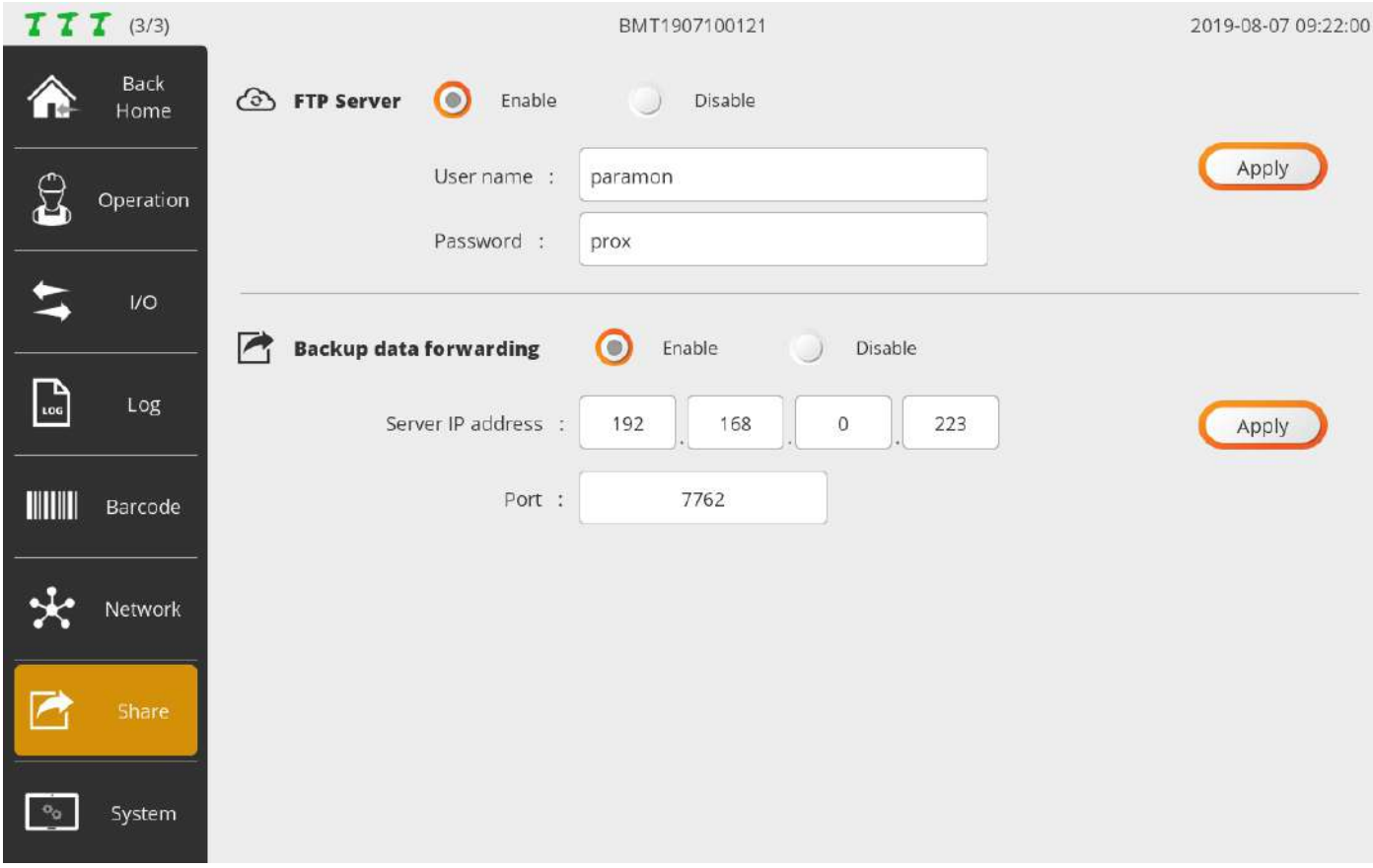
SSID	Enters the AP's SSID Up to 32 letters
Password	Enters the password of AP At least 8 characters long; able to enter up to 32 characters
Band	Selects the operating frequency of AP
Advanced	Able to set the AP frequency channels Recommended to use default settings

B.Ethernet

After editing settings, press [Apply].

DHCP	Automatically gets IP address from the server.
Static	Manually sets IP address. Reckless address settings cause network failure including abnormal operation. Ensure to contact the network manager before setting.

11.6 Share



A. FTP Server

After editing settings, press [Apply].

Enable/Disable	Sets if the FTP server is enabled or disabled.
Username	Sets the username to be used in logging into the FTP server.
Password	Sets the password to be used in logging into the FTP server.

Able to check the IP address needed to get access to the FTP server in ‘System → Network’.
For a method to log into the FTP server, refer to ‘16. FTP Server’.

B. Backup data forwarding

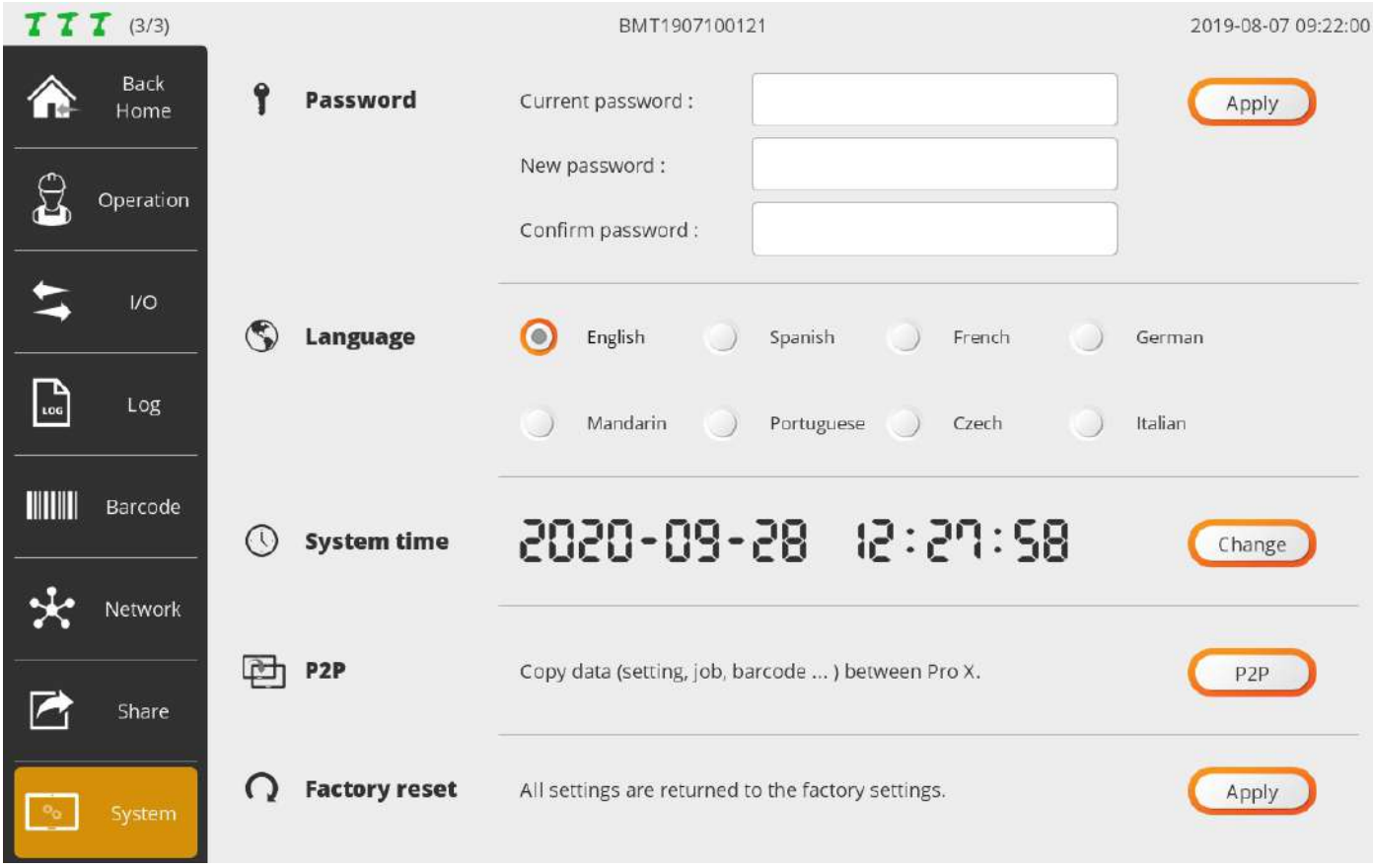
The backup data received from member tool is transferred to a separate external server connected via Ethernet.

After changing the settings, changed settings are updated only by pressing the button “Apply”.

Enable/Disable	Set enable to mirror backup data on ethernet port.
Server IP address	Set the IP address of the server to receive the backup data.
Port	Set the TCP port number of the server to receive backup data.

Please refer to section [20.Backup data forwarding] for data format passed to the server.

11.7 System



A. Password

Sets a password for ADMIN mode; the default setting is ‘0’.

B. Language

Currently supports ‘English’ only; other languages to be supported.

C. System time

Sets system time; able to set ‘min’; ‘sec’ is set to ‘0’.

D. P2P (Pro X to Pro X)

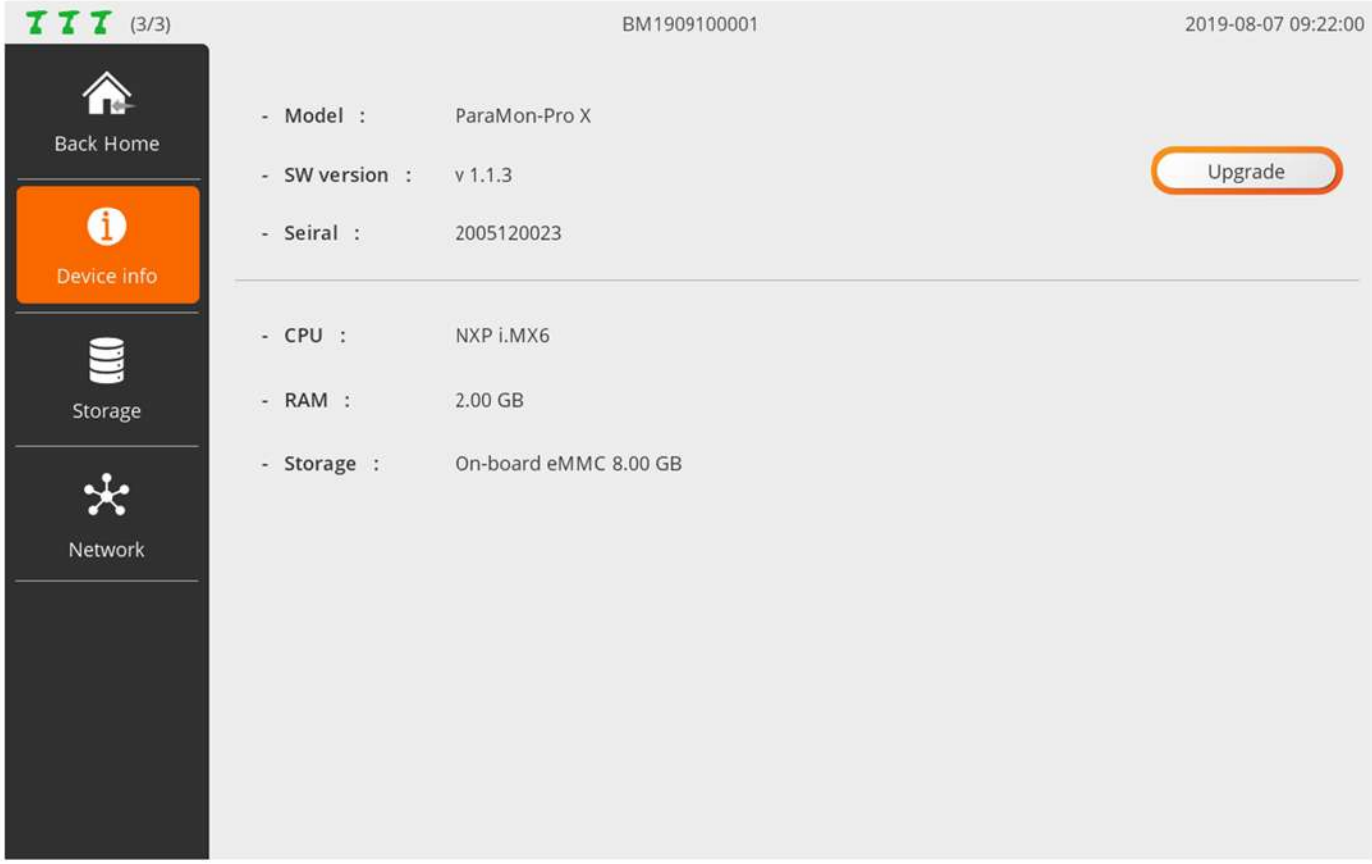
Able to back up current settings in ParaMon-Pro X and apply them to the other ParaMon-Pro X. Able to return back to the former settings if necessary after backing up all current settings. For more information, refer to ‘16. Backup & restore’.

E. Factory reset

Reset to a default state after all files in the repository are deleted.

12. SYSTEM

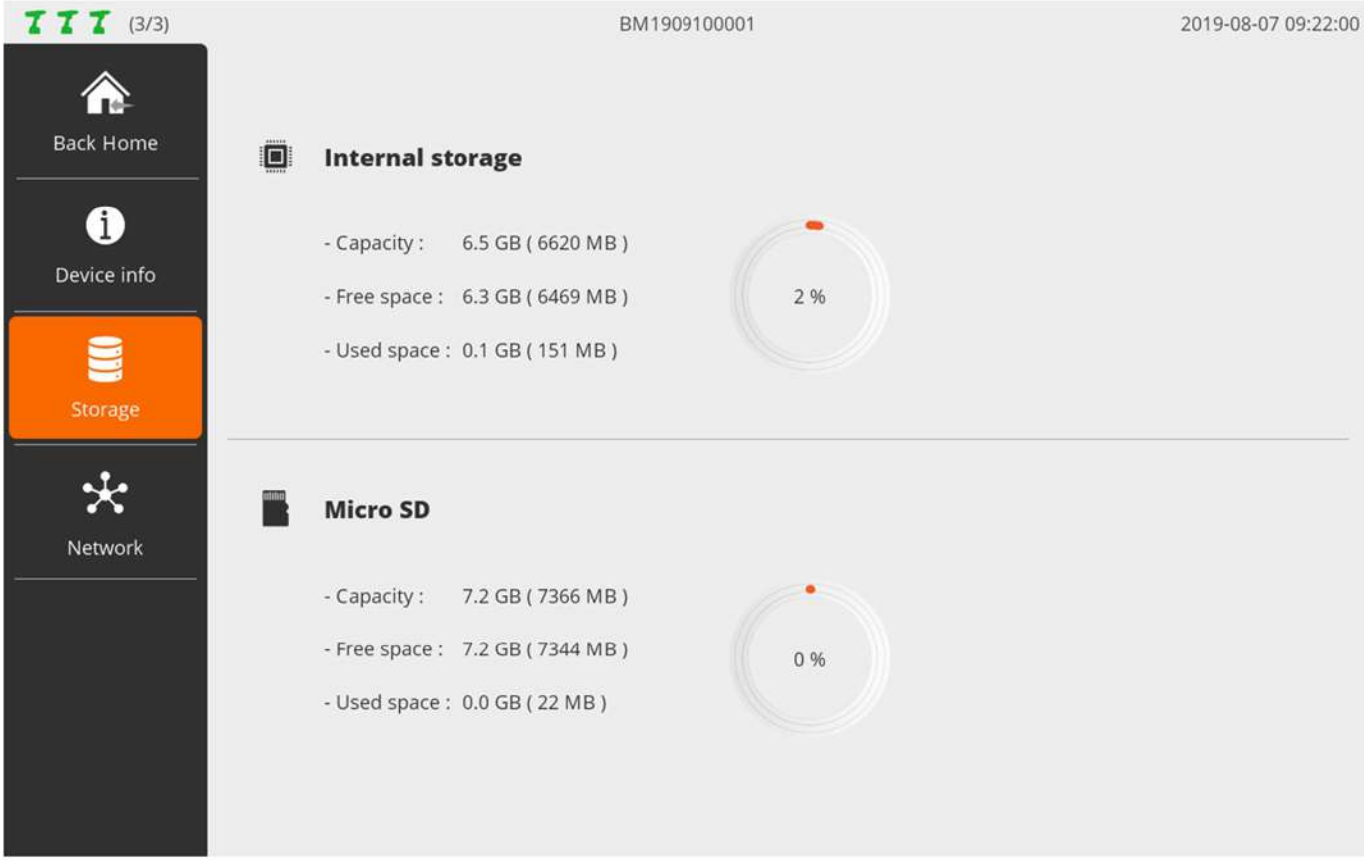
12.1 Device info



Able to check brief information of ParaMon-Pro X.

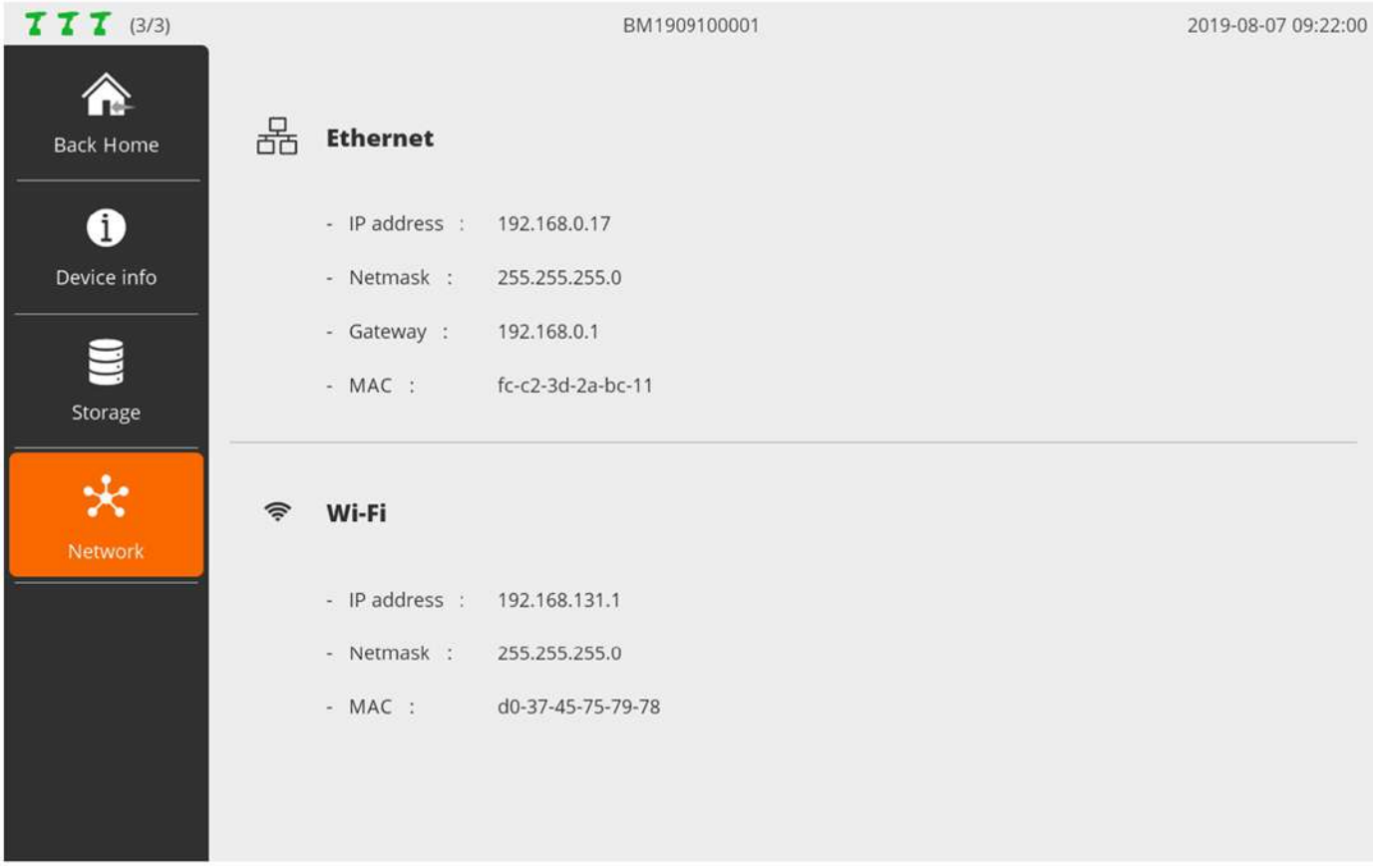
Able to check serial number and software version and includes a software upgrade feature.

12.2 Storage



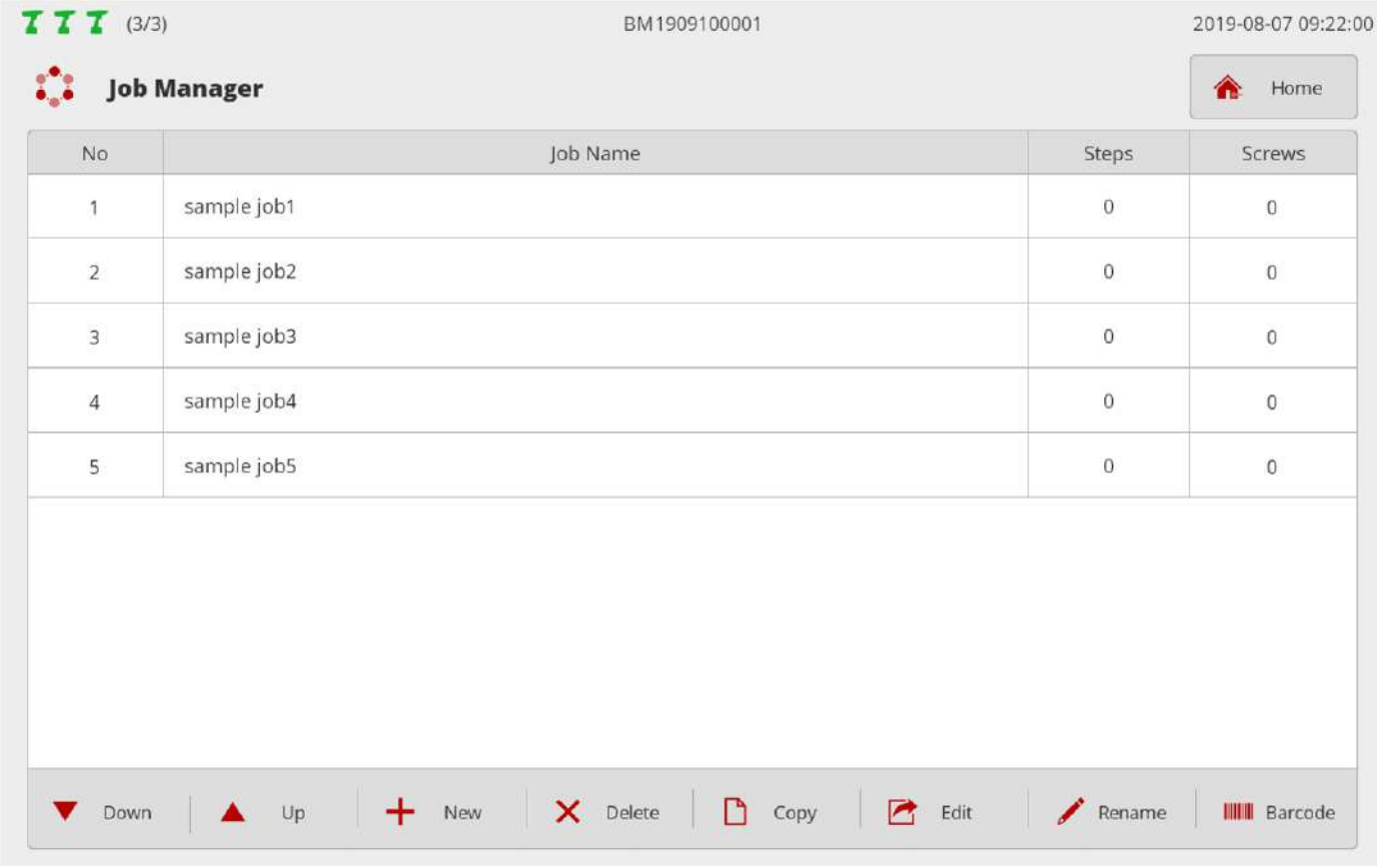
Internal storage	Able to check the space used and free space.
Micro SD	Able to examine if micro SD card is inserted and check the space used and free space.

12.3 Network



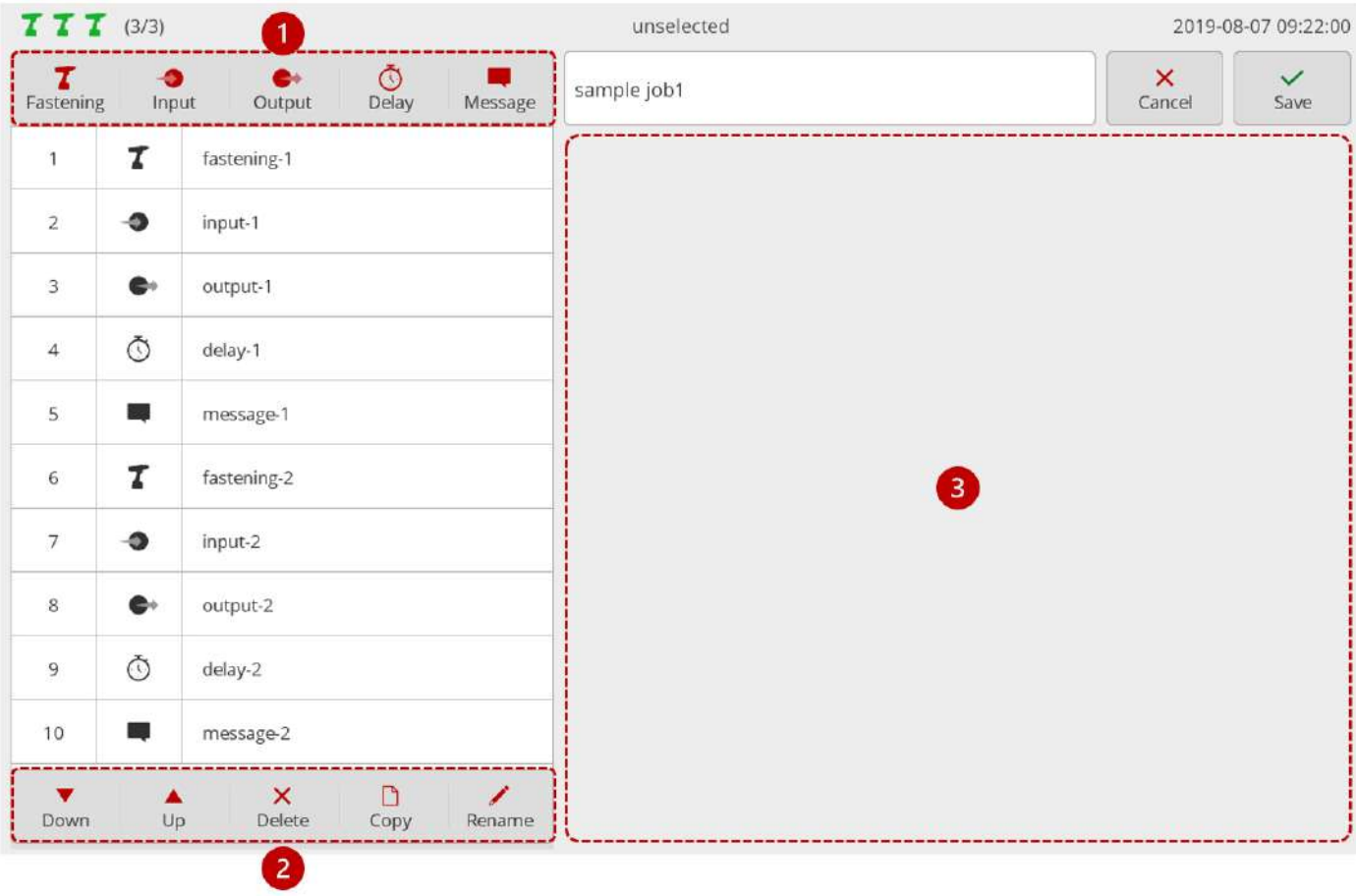
Ethernet	Displays the wired ethernet address.
WiFi	Displays wireless ethernet (WiFi) address.

13. JOB MANAGER



NO.	Category	Description
1	Down	Moves the selected job to the bottom by one column
2	Up	Moves the selected job to the top by one column
3	New	Creates a new job
4	Delete	Deletes the selected job
5	Copy	Copes the selected job and adds it as a new job
6	Edit	Edits the selected job
7	Rename	Renames the selected job
8	Barcode	Moves to the barcode registration page for job interlocking

13.1 Edit job & step



The biggest unit constituting the assembly process control is expressed by multiple sequential steps. Supports up to 1,000 jobs and able to add up to 255 steps per job.

1. Add step

Category	Description
Fastening	Adds a fastening procedure, using a member tool
Input	Enables various extensions, using a total of 16 input ports
Output	Enables various extensions, using a total of 16 output ports
Delay	Able to add delay time between steps under diverse methods
Message	Able to deliver instructions and cautions to operators

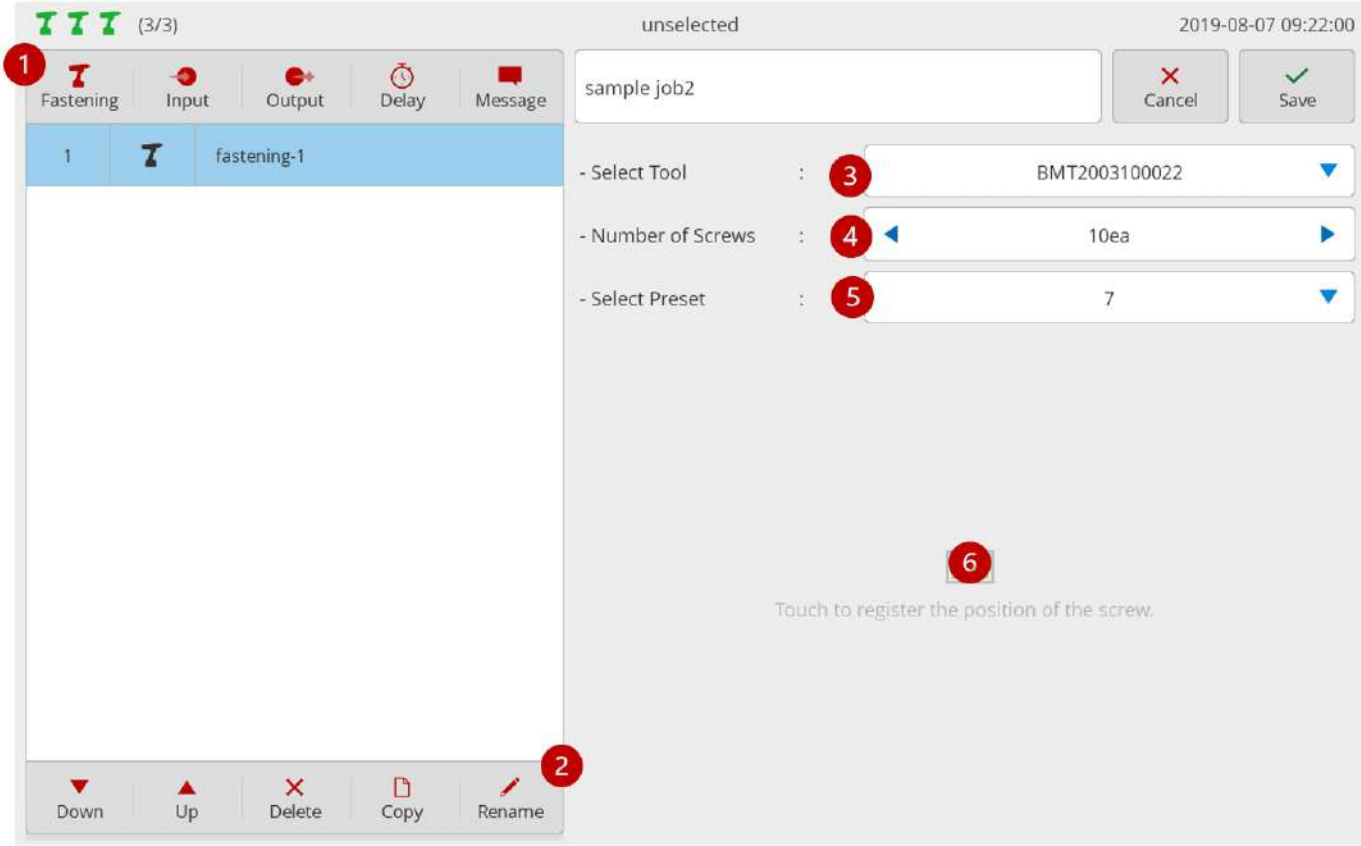
2. Edit step list

Category	Description
Down	Moves the selected step to the bottom by one column
Up	Moves the selected step to the top by one column
Delete	Deletes the selected step
Copy	Copies the selected step and adds it as a new step
Rename	Renames the selected step

3. Edit step data

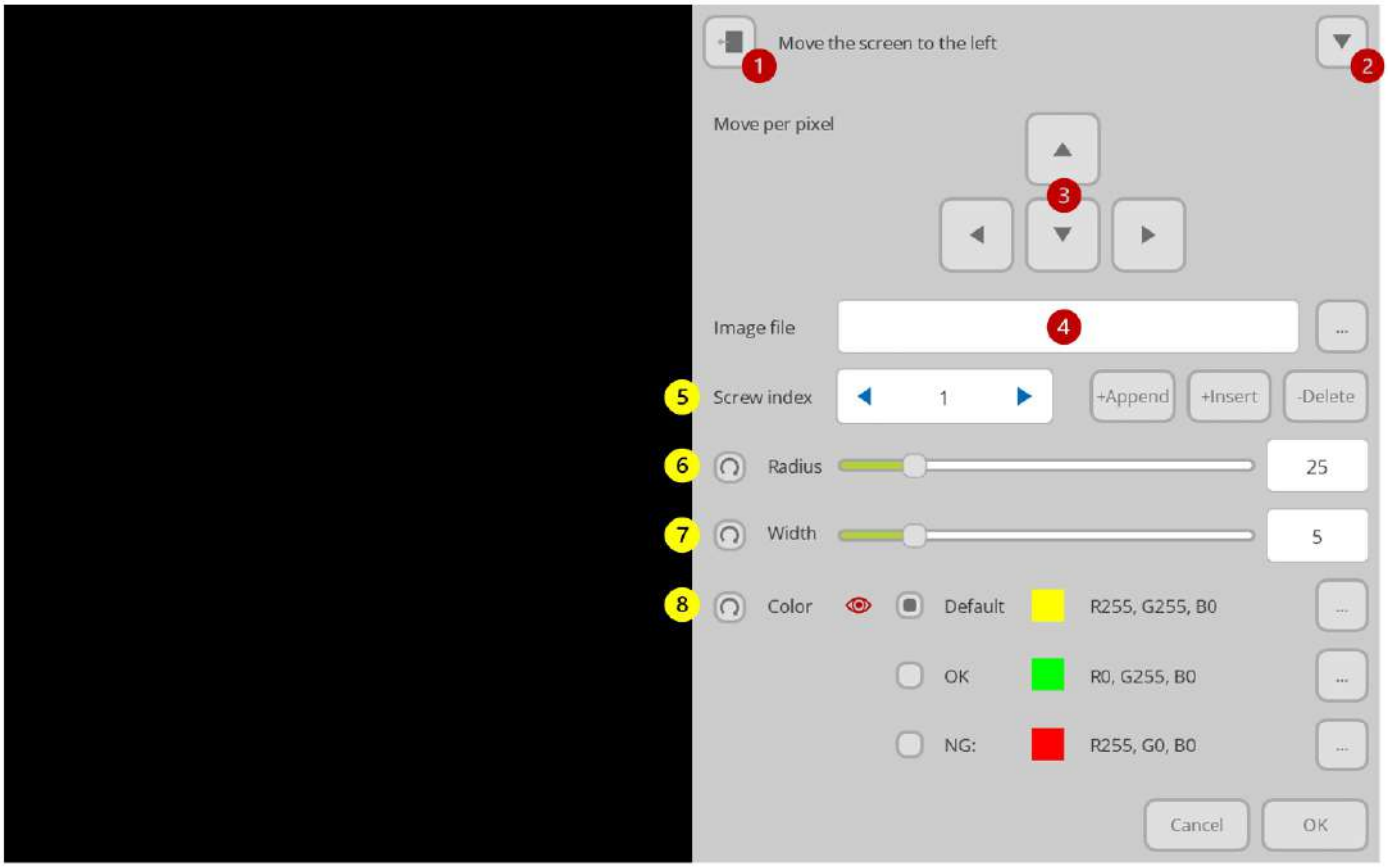
Displays the setting page according to the type of the selected step on the step list.

13.1.1 Fastening step

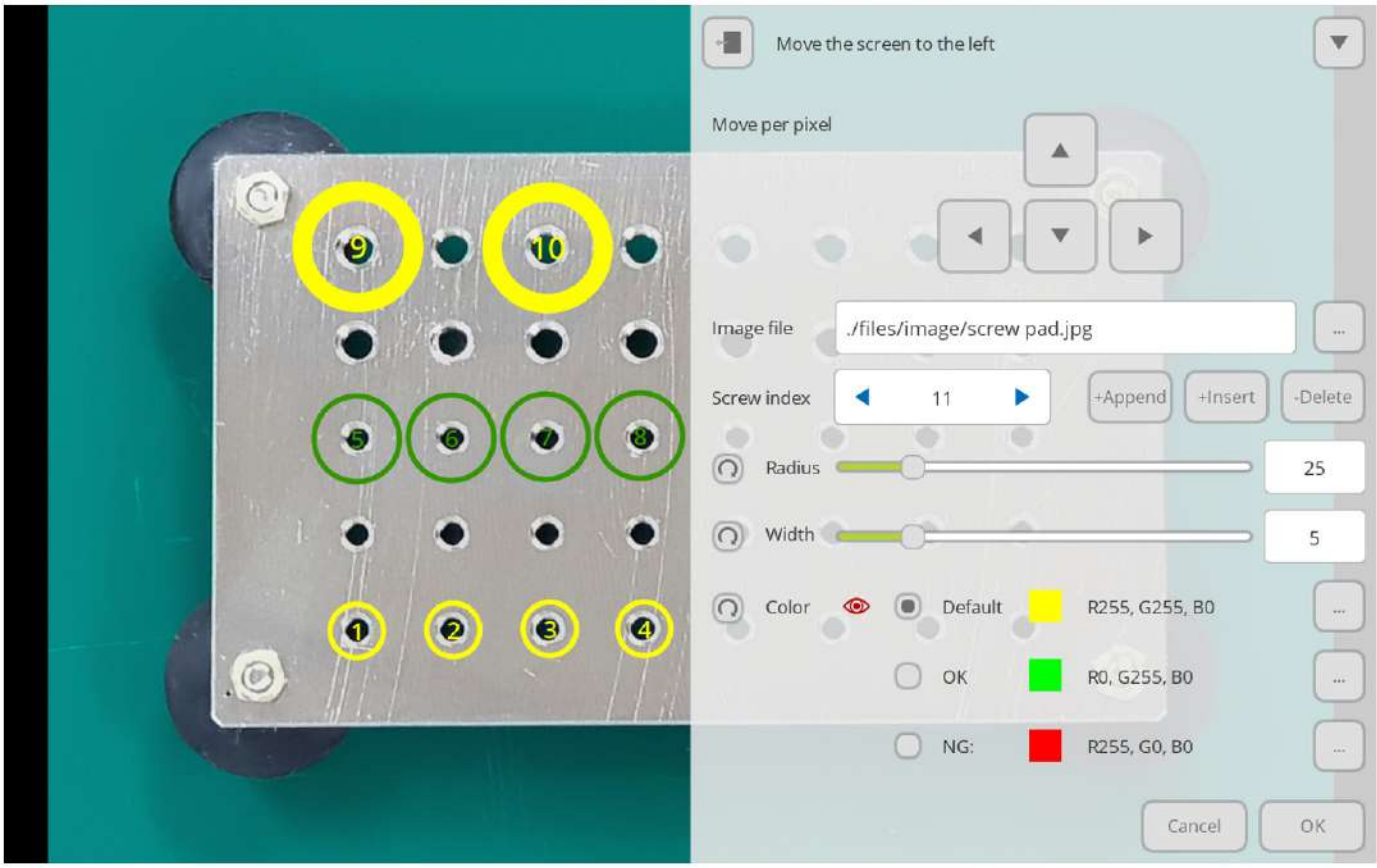


Fastening step supports up to 99 screws:

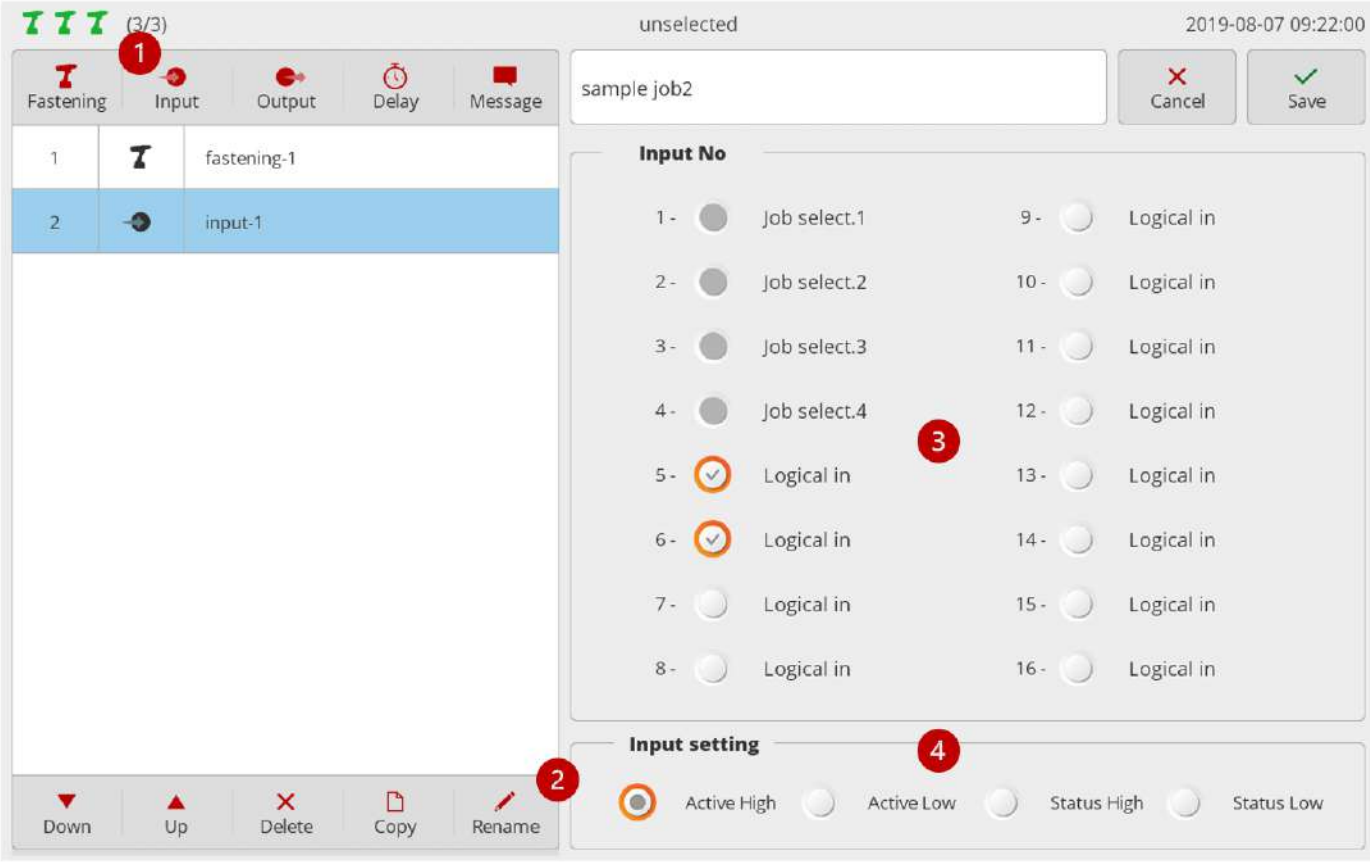
1. Press [Fastening].
   Then, a fastening step is added to the bottom of the step list.
   Then, a setup page appears on the right.
2. If necessary, press [Rename] and edit the step name.
3. Select a tool for fastening among the member tools.
4. Enter the number of screws to be fastened.
5. Select the preset to be used for fastening.
6. If necessary, register an image and specify the position of the screw.
   If the area is touched, a screw-positioning page pops up as follows:



No.	Description
1	If necessary, moves the screen to the left or right
2	Hides the screen to the bottom and views the entire image
3	Able to adjust a pixel unit at registration of screw position
4	Loads an image to be used in screw positioning
5	Sets the index number of the screws to be positioned +Append: adds a new screw to the end +Insert: adds a new screw to the current index position -Delete: deletes a screw in a current index position
6	Able to adjust the size of a circle which shows a screw position
7	Able to adjust the thickness of a circle which reveals a screw position
8	Able to change the color of a circle which shows a screw position Default: sets the color which is displayed in a hold state OK: sets the color which appears when normally fastened NG: sets the color which appears when abnormally fastened


Move the screen to the left
Move per pixel
Image file
./files/image/screw pad.jpg
Screw index
11
+Append
+Insert
-Delete
Radius
25
Width
5
Color
Default
R255, G255, B0
OK
R0, G255, B0
NG:
R255, G0, B0
Cancel
OK
9
10
5
6
7
8
1
2
3
4

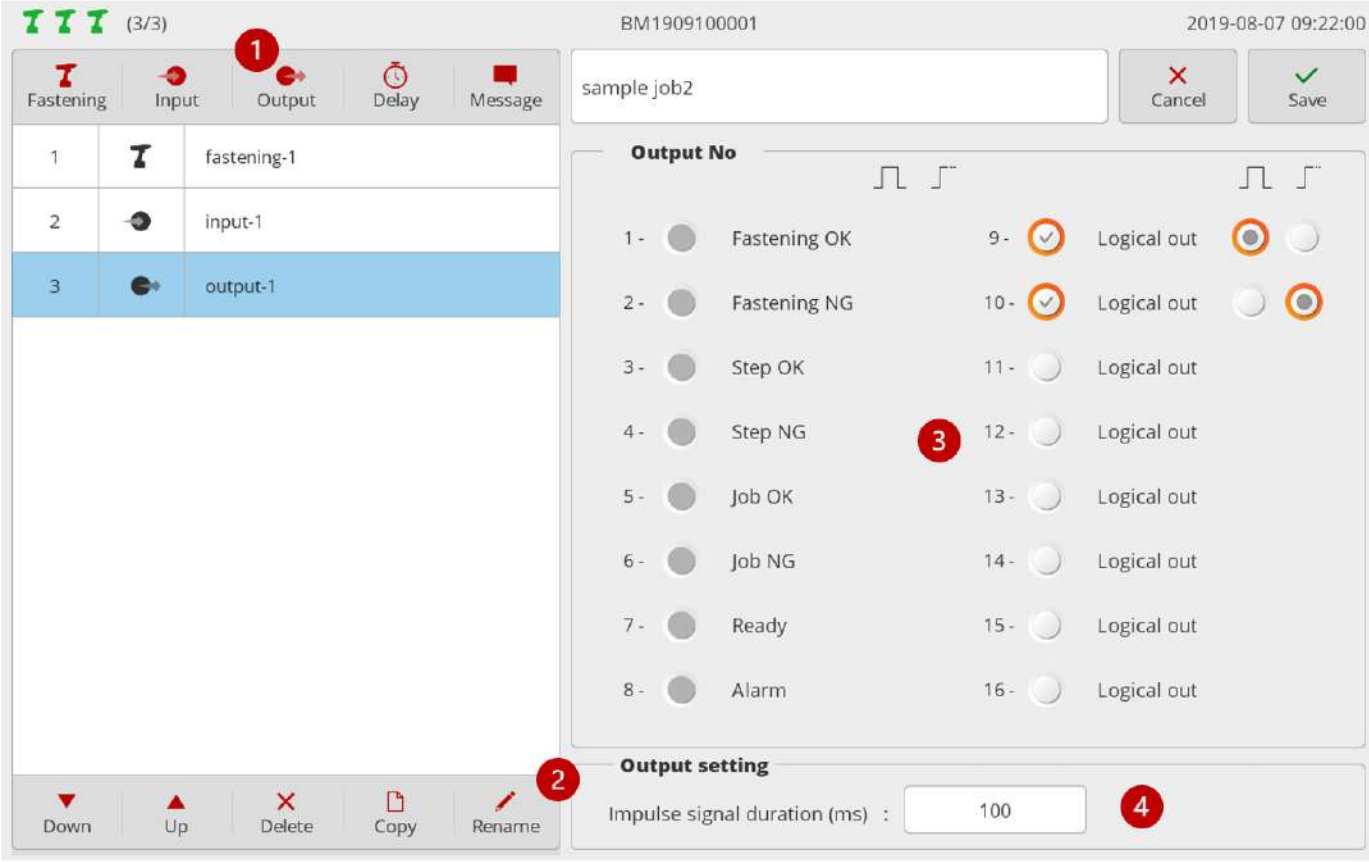
13.1.2 Input step



1. Press [Input].
   Then, an input step is added to the bottom of the step list.
   Then, a setup page appears on the right.
2. If necessary, press [Rename] and edit the step name.
3. Select the port to get signals.
   The ports with system functions are disabled and not selectable.
   If multiple ports are chosen, AND conditions apply.
4. Sets changes in input signal levels.
   Level change settings commonly apply to all ports.
   Settings by port are not supported.

Category	Description
Active High	Detects a level change from ‘0 (low)’ to ‘1 (high)’
Active Low	Detects a level change from ‘1 (high)’ to ‘0 (low)’
Status High	Checks ‘level 1 (high)’
Status Low	Checks ‘level 0 (low)’

13.1.3 Output step

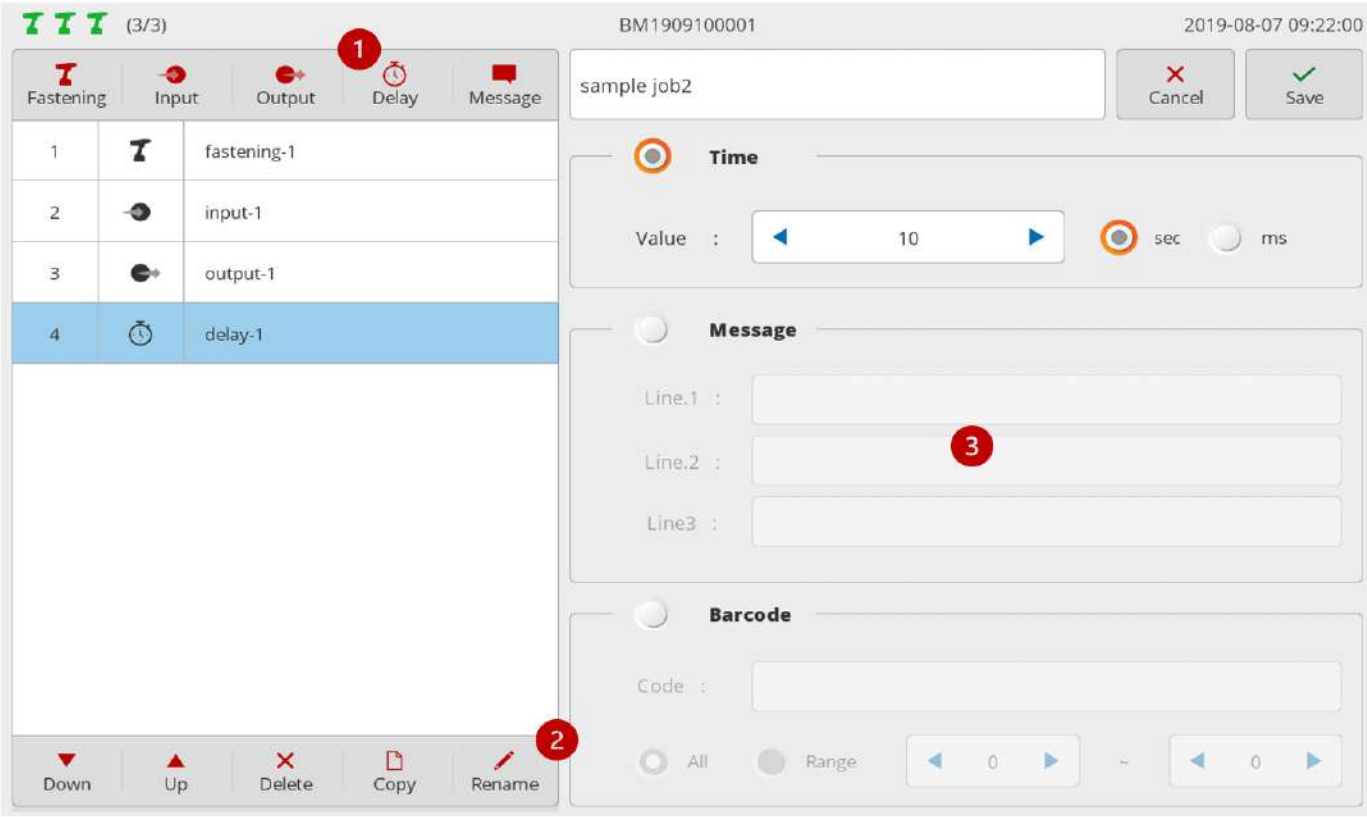


1. Press [Output].
   Then, an output step is added to the bottom of the step list.
   Then, a setup page appears on the right.
2. If necessary, press [Rename] and edit the step name.
3. Select the port to generate signals.
   The ports with system functions are disabled and not selectable.
   It is able to select the output type of a signal by port.

Category	Description
Impulse	Generates pulse signals up to the time preset in (4)
Continuous ON	Displays level 1 (high) signal Adds a separate output step and disables the port to alter the output to ‘0 (low)’

4. Set ‘hold-up time’ at level 1 (high) at pulse generation (0-5,000ms).

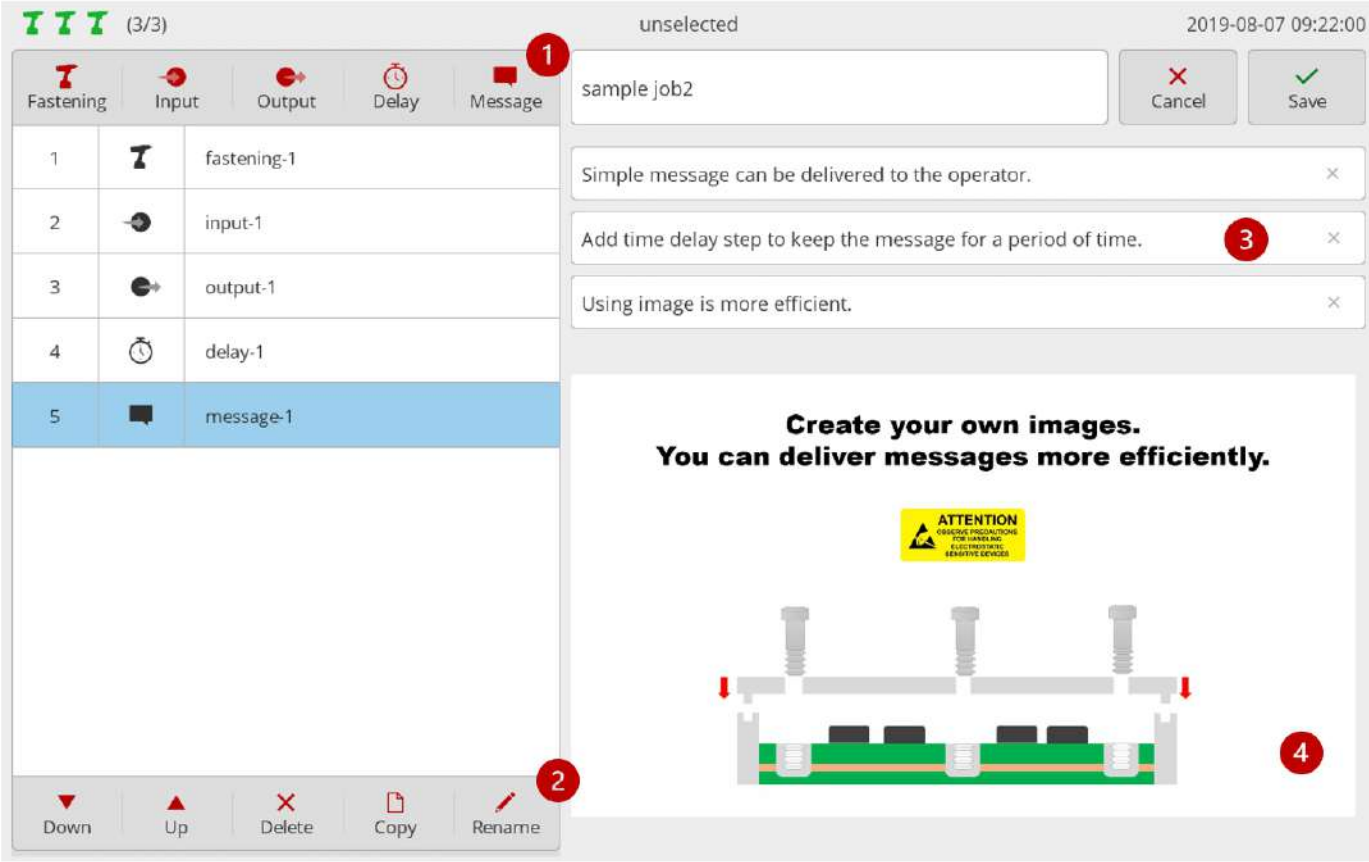
13.1.4 Delay step



1. Press [Delay].
   Then a delay step is added to the bottom of the step list.
   Then a setup page appears on the right.
2. If necessary press [Rename] and edit the step name.
3. Select a delay type.

Category	Description
Time	Stops the step process for a certain period of time; able to set up to 999 sec.
Message	Able to deliver a simple message to an operator. Moves to the next step if the operator reads the message and presses the OK button.
Barcode	Able to scan the barcode and move to the next step. Select and scan the barcode. Then it automatically appears on the top code. If necessary, select a text box and enter in person. Moves to the next step when the code is perfectly matched if 'All' is chosen. Moves to the next step when the region (From – To) is matched if 'Range' is selected. Moves to the next step if the number of digits and code values in a valid area are matched even through registered and scanned codes differ in terms of total length.

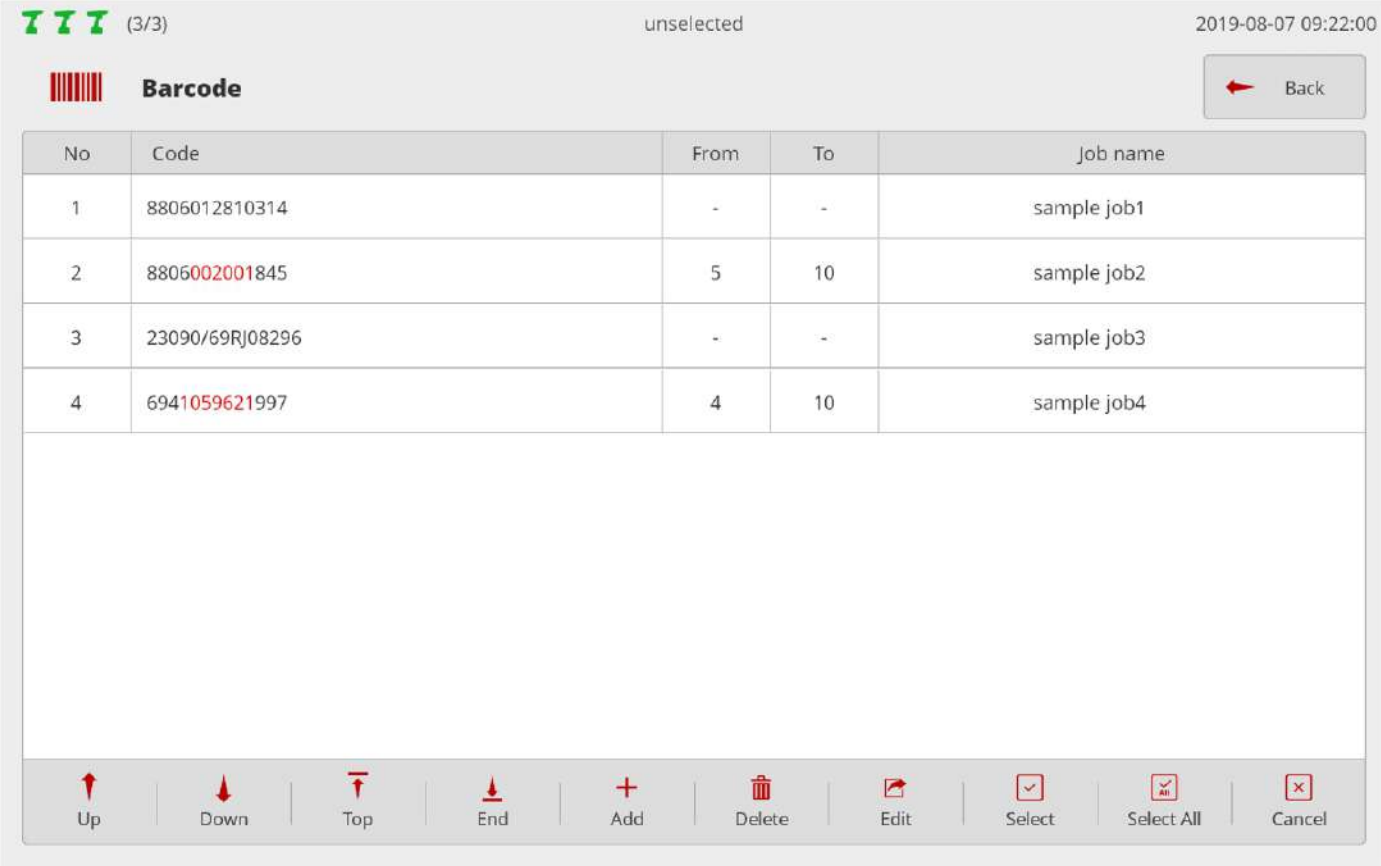
13.1.5 Message step



1. Press [Message].
   Then a message step is added to the bottom of the step list.
   Then a setup page appears on the right.
2. If necessary press [Rename] and edit the step name.
3. If necessary enter texts and send a simple message to an operator.
4. Able to register an image and send a more efficient message if necessary.
   If both image and text are registered, the image appears in full screen while the text is not visible.
   In terms of an image format JPG and PNG are supported.
   It supports resolutions up to 4096 x 4096.
   For optimization, however, ‘1280 x 800 (16:10)’ or ‘1280 x 720 (16:9)’ is recommended.

In general the message step should be programmed to display a message for a certain period of time by adding a barcode or timer delay step.
Without such delay step the message appears very shortly.

13.2 Barcode

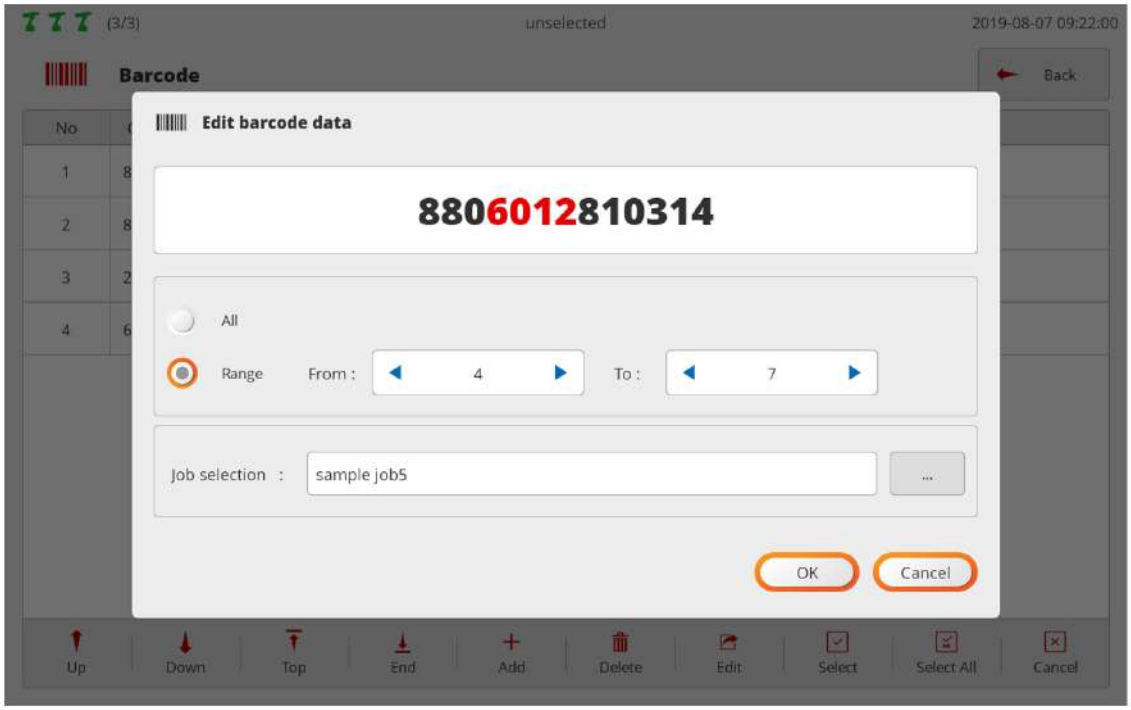


Registers a code and sets jobs to have them automatically loaded through code scanning.
Able to register the same code redundantly but executes items with small No. according to priority.
Able to load jobs through code scanning in the event that current jobs are absent.
Changes code information recorded in the log when code scanning is done during job execution.

Up	Moves the selected item to the top by one column
Down	Moves the selected item to the bottom by one column
Top	Moves the selected item to the top
End	Moves the selected item to the bottom
Add	Registers a new code
Delete	Deletes selected items

Edit	Edits selected items
Select	Changes a mode to select multiple items
Select all	Selects all items
Cancel	Ends a multiple item selection mode

1. If a code is scanned through USB Scanner or BM built-in scanner, the edit page appears as shown in the figure.
   If necessary press the ADD button, select a text box and annually enter in person.



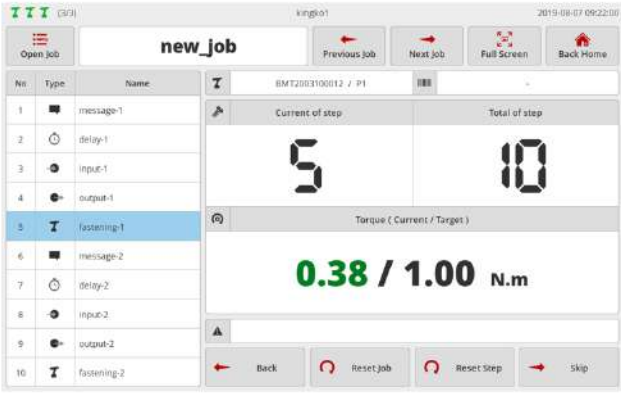
2. If ‘All’ is selected, jobs are loaded when codes are perfectly matched.
   If ‘Range’ is chosen, jobs are loaded when the region (From – To) is matched.
   Jobs are loaded if the number of digits and code values in a valid area are matched even through registered and scanned codes differ in terms of total length.

3. Able to set a job to be loaded when a code is scanned at ‘Job selection’.

14. OPERATION

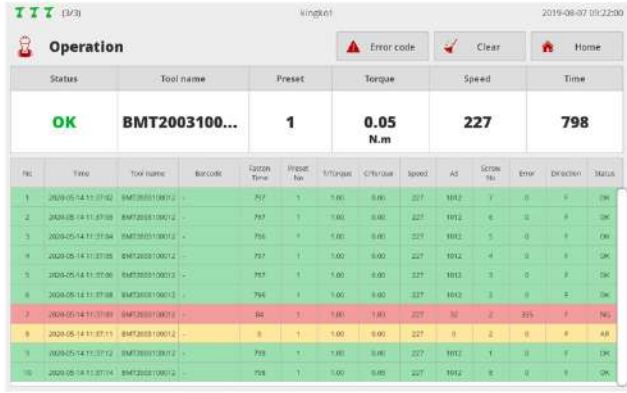
The operation page appears differently depending on operation mode settings (‘With job’ or ‘Without job’).

with job



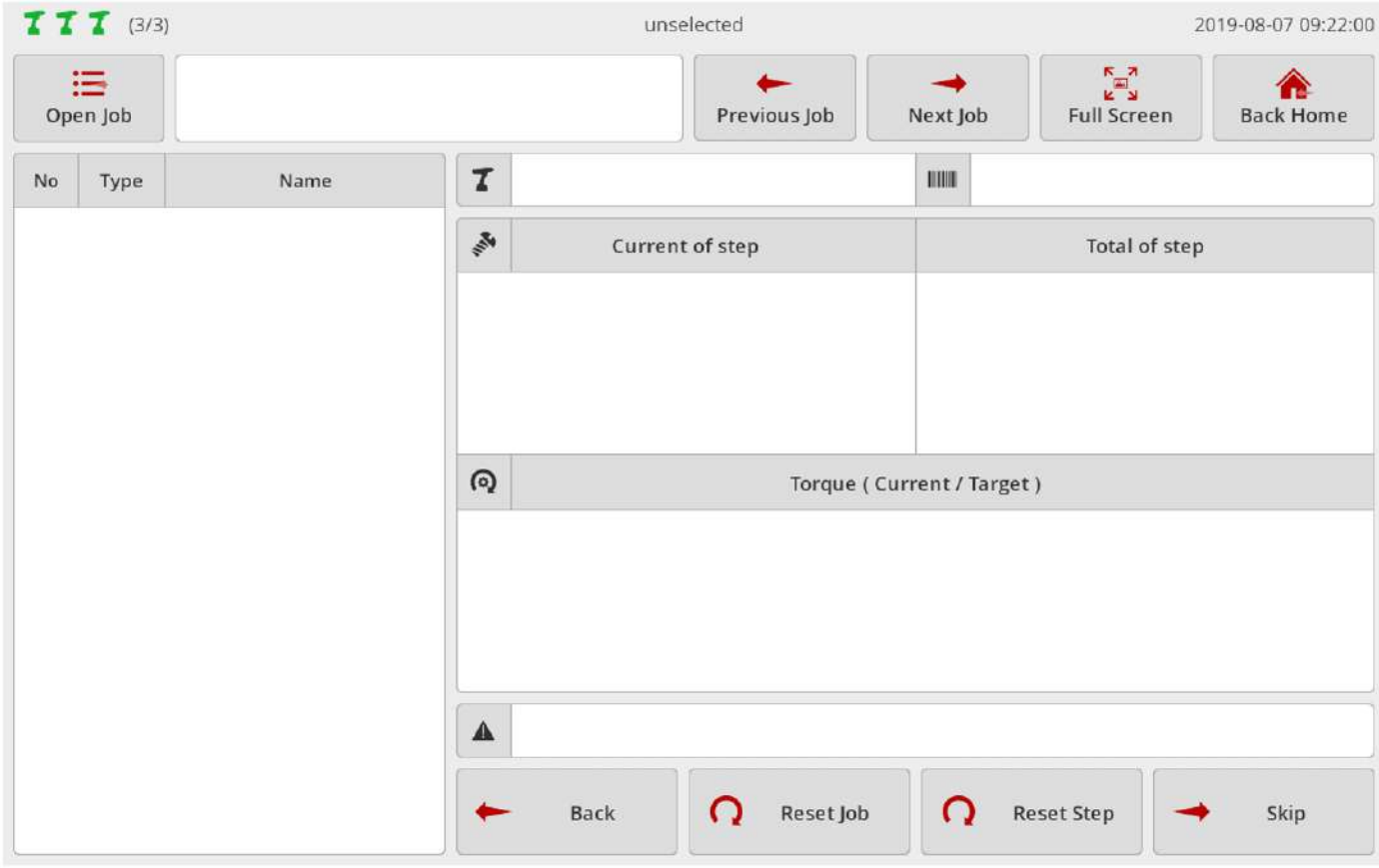
vs

without job



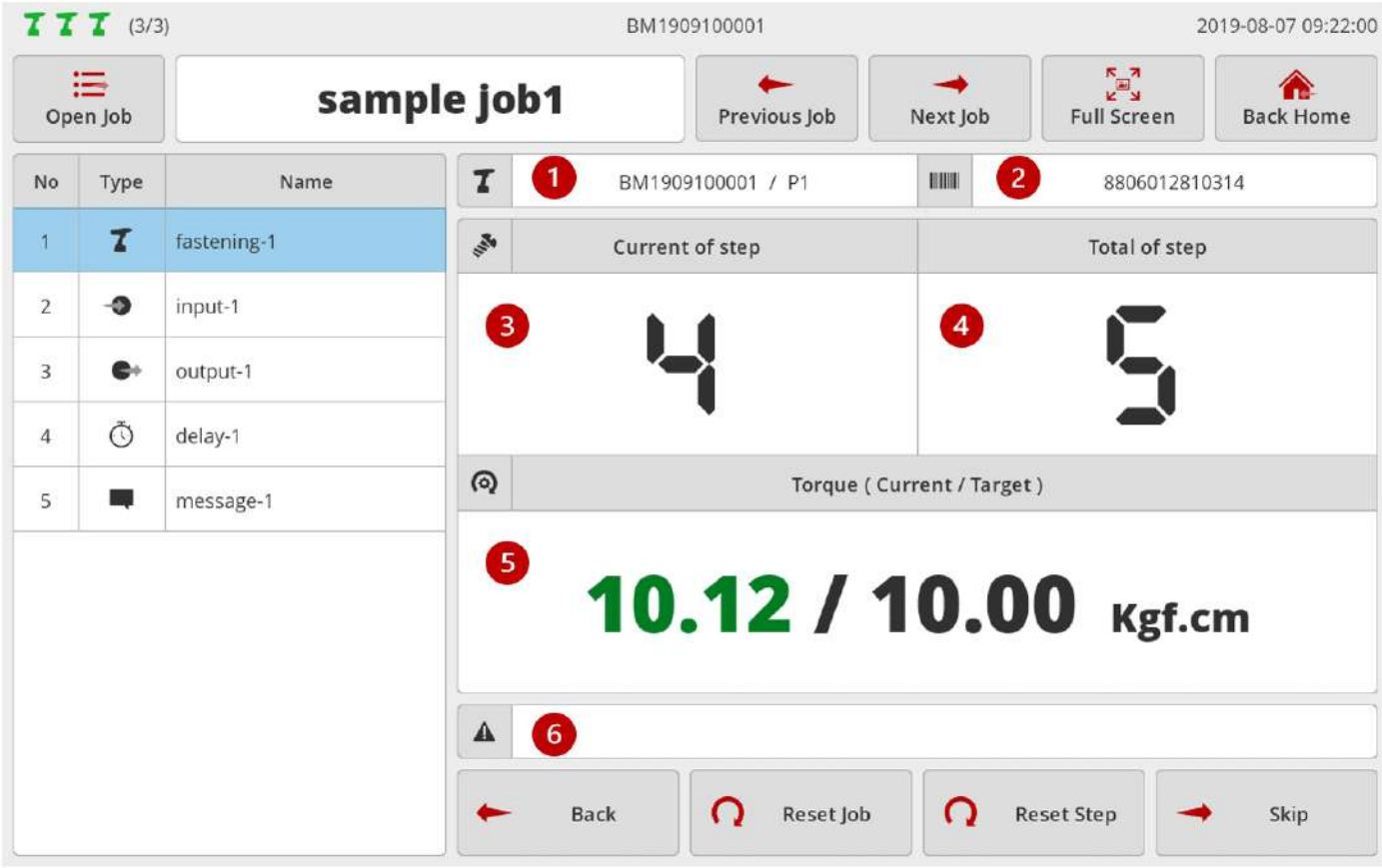
Operation Mode	With Job	Without Job
Feature	Uses process control and is operated according to the procedures programmed to a job. Used for the purpose of minimizing an assembly error by visualizing the complicated assembly procedures of diverse products.	Does not use process control and is able to utilize all tools randomly. Mostly used to save fastening data.
Tools	Operates the tools selected in the fastening step only; locked in all other tools; unable to use multiple tools simultaneously.	No restriction in using tools. Able to use all tools randomly at the same time.
Code scanner	Able to register a code and set jobs. Loads jobs automatically if the registered code is scanned.	Able to register a code and set the reset when a scanner-integrated BM is used. Automatically altered into the preset if the registered code is scanned.

14.1 With job mode



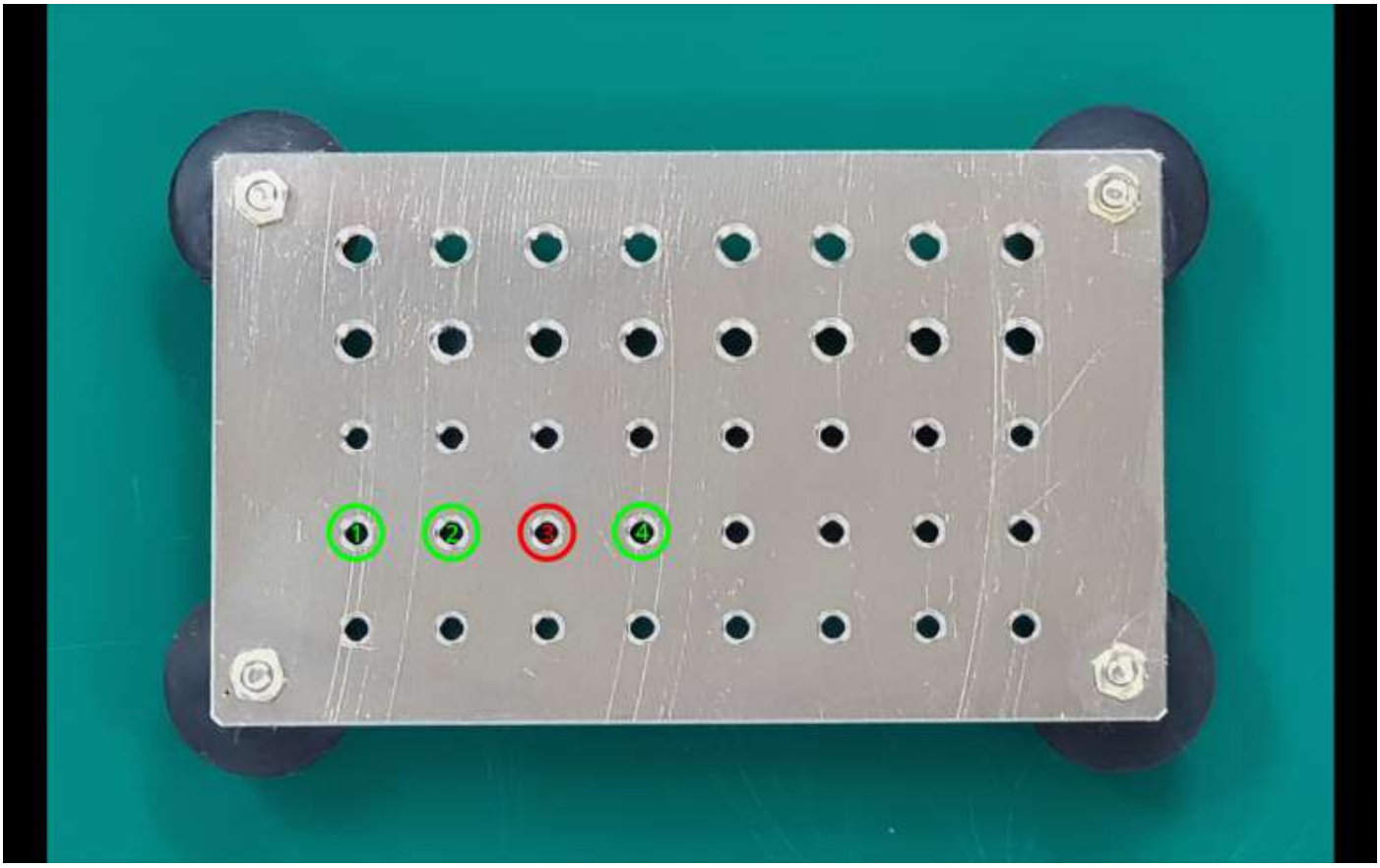
Category	Description
Open job	Selects a job from the job list and loads.
Previous job	Loads the previous job according to the sequence of the job list No.
Next job	Loads the next job according to the sequence of the job list No.
Full screen	Enables the full screen mode in the fastening or message step.
Back home	Moves back to HOME.
Back	Returns back to the previous screw in the fastening step; does not support the movement of the step.
Reset job	Resets current jobs.
Reset step	Resets current steps.
Skip	Moves to the next screw in the fastening step. Press the SKIP button on the last screw and move to the next step.

14.1.1 Fastening step

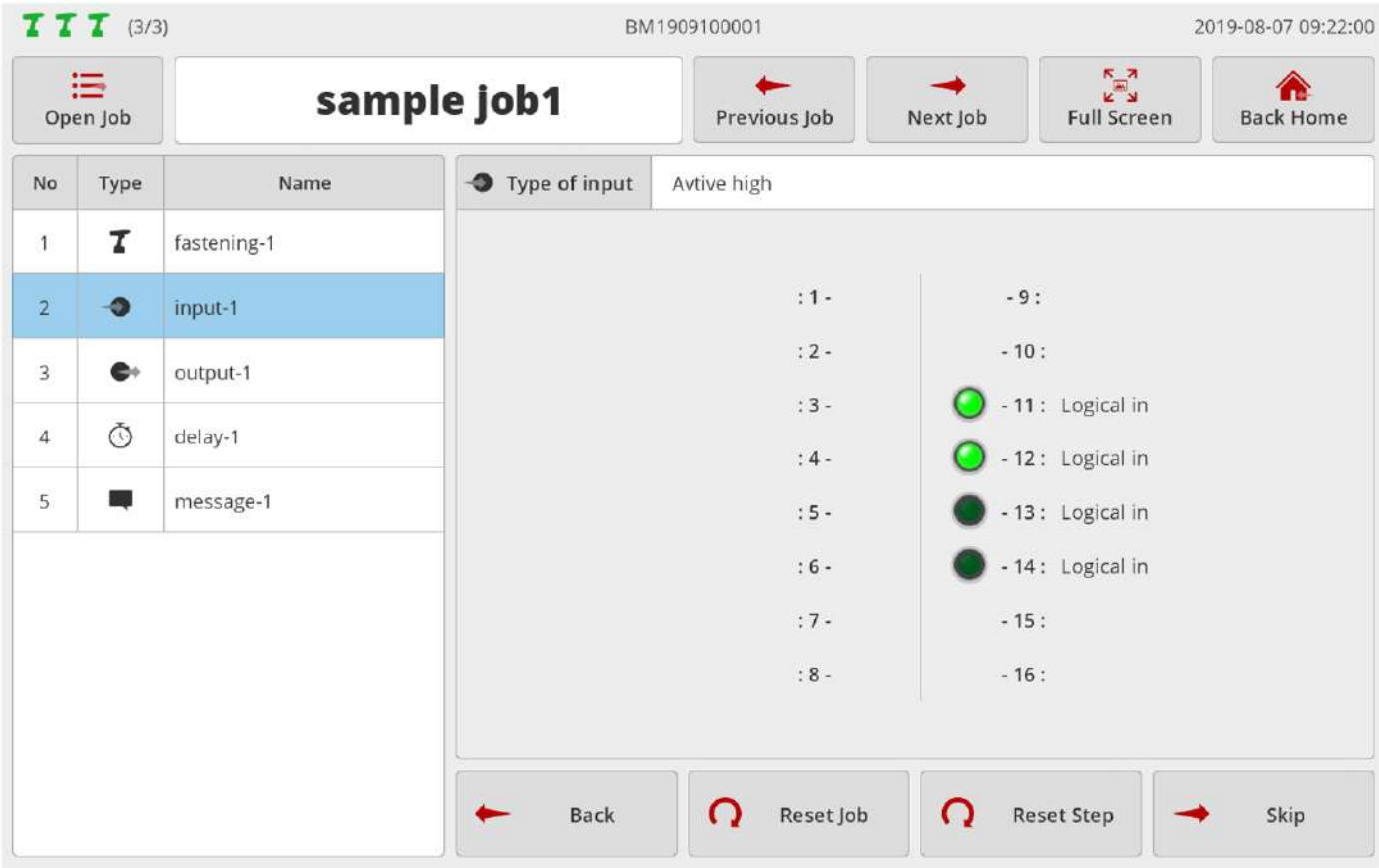


No.	Description
1	Displays the tool name and preset information in the fastening step.
2	Reveals the last scanned code information; the code is actually recorded in the log.
3	Shows a screw count according to the screw count direction settings.
4	Reveals a total number of screws according to the screw count unit settings.
5	Shows torque in ‘actual torque’ or ‘target torque’ format.
6	Displays an error code and error details in the event of ‘NG’.

If an image is registered in the fastening step, it is generated in full screen.
In terms of a fastening state, ‘OK’ or ‘NG’ is displayed by color depending on settings.
If touched in the full screen mode, it is turned off temporarily and switched to the count page.
To return back to the full screen mode, press the ‘Full screen’ button.

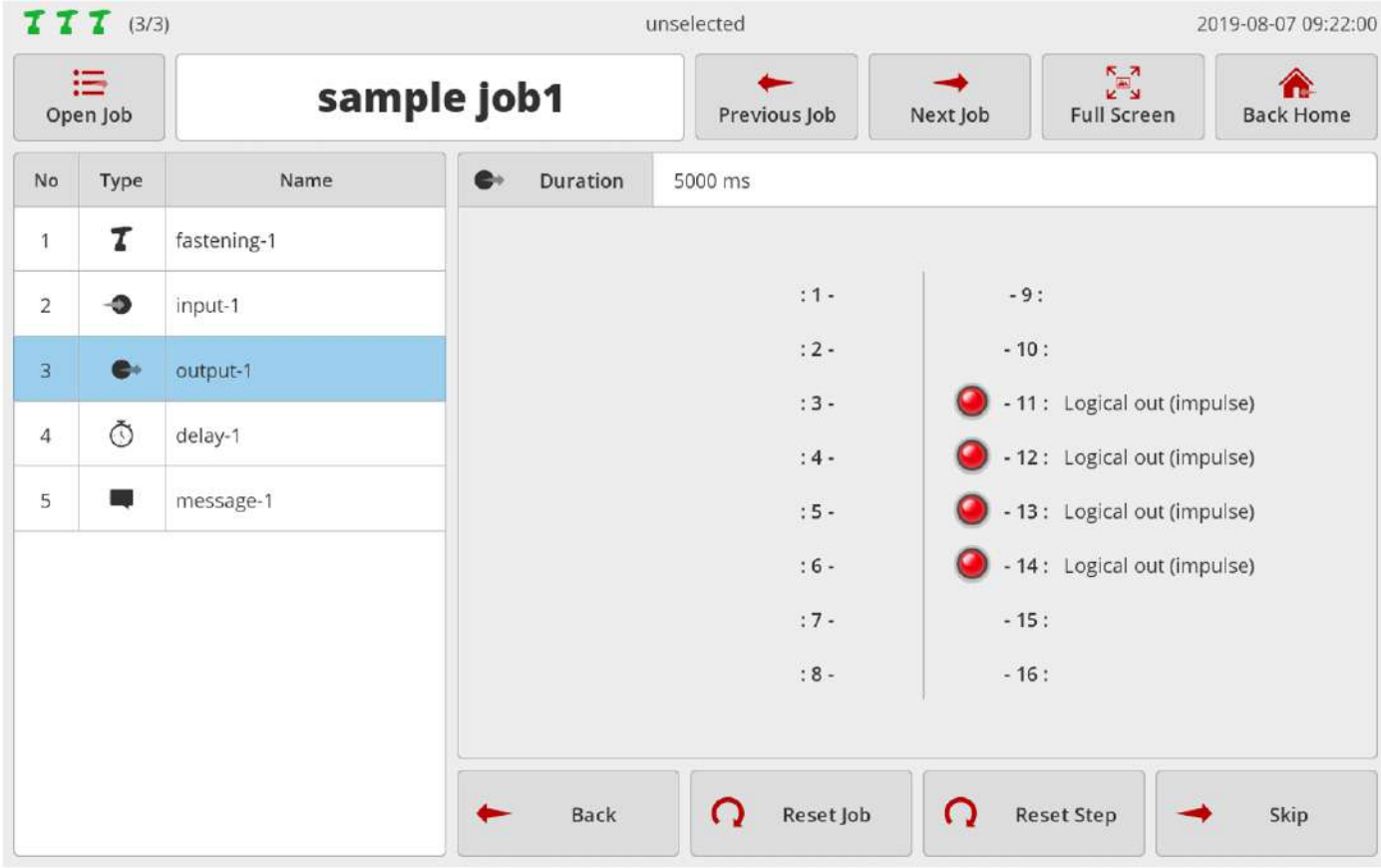


14.1.2 Input step



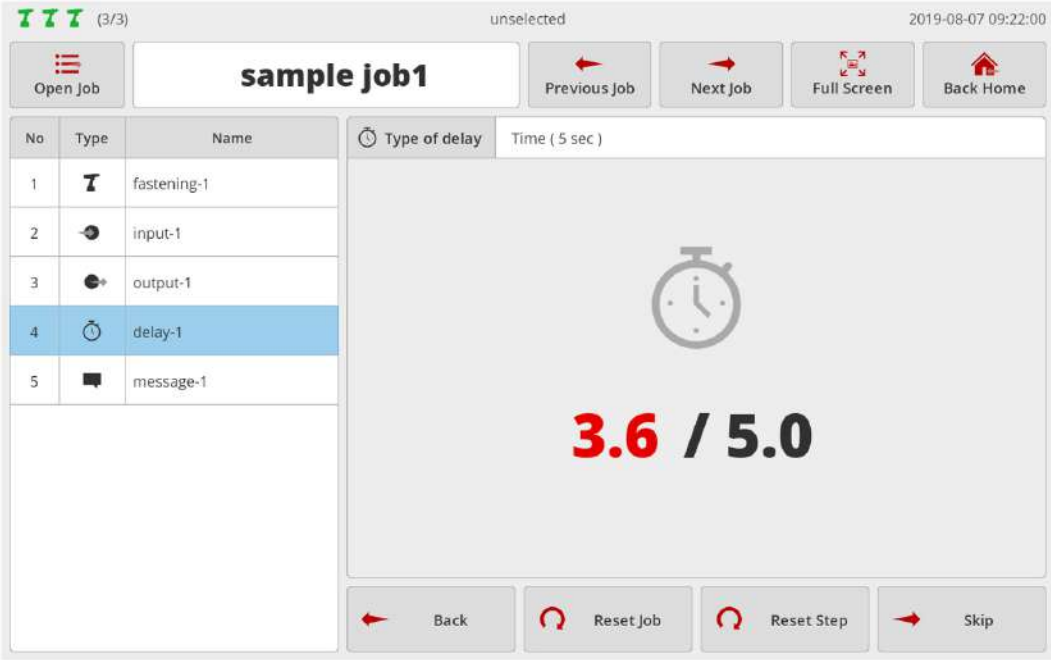
The above page appears when four inputs were programmed to ‘Active high’ in the input step.
LED light is turned on four enabled ports only.
LED light is turned on in input-sensed ports such as No.11 and No.12.
LED light is off in non-input ports such as No.13 and No.14.

14.1.3 Output step

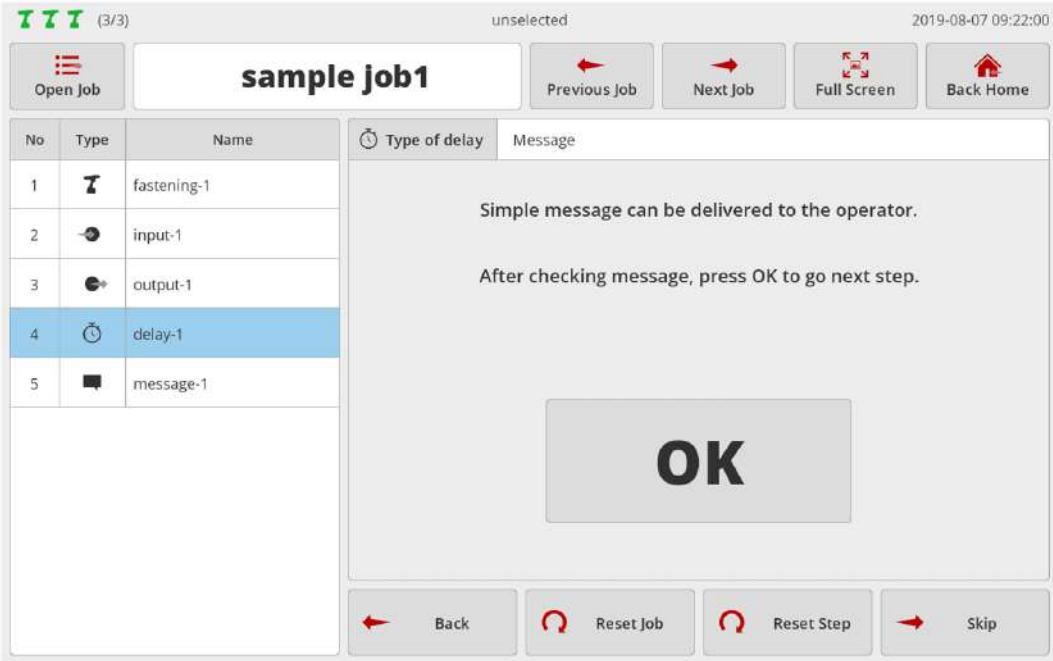


The above page appears when four inputs were programmed to ‘Impulse’ in the output step.
LED light is turned on four enabled ports only.

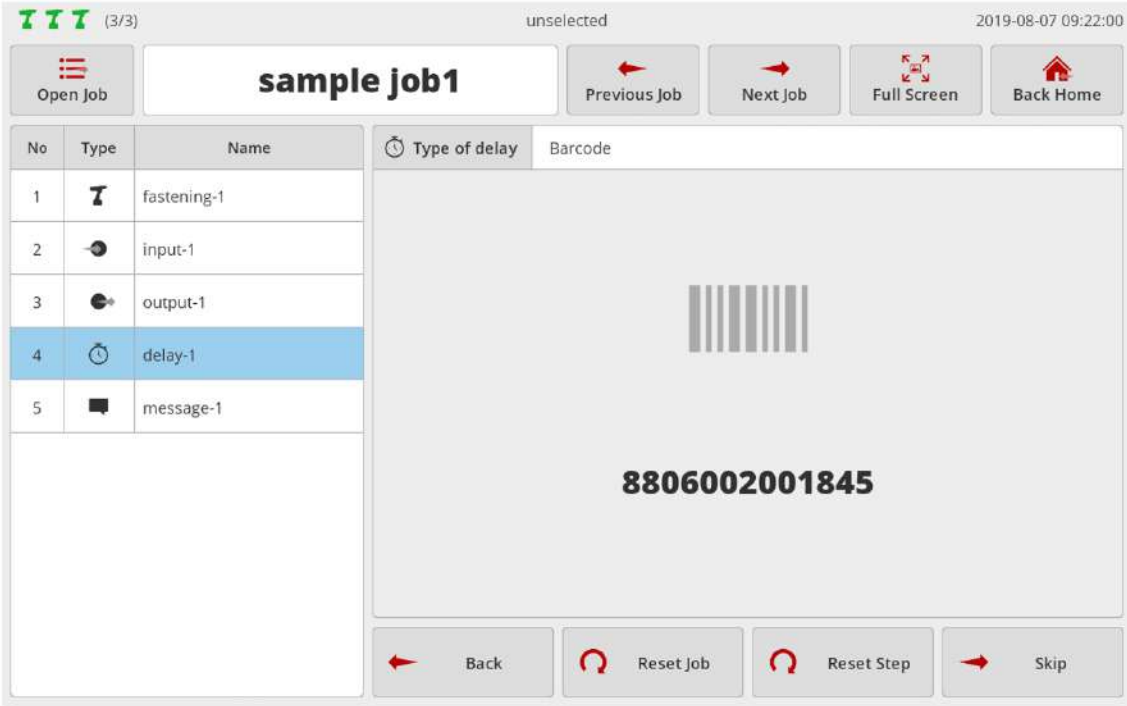
14.1.4 Delay step



The above page reveals the delay step set by the timer (5 sec.).
It is displayed in ‘elapsed / set time’ format.
Once the timer reaches the preset time, the page moves to the next step.
If the previous step is ‘Message step’, the timer is executed in the background, and the screen keeps displaying a message.



The above page shows the delay step set by the message.
Check the message and press [OK].
Then, it moves to the next step.

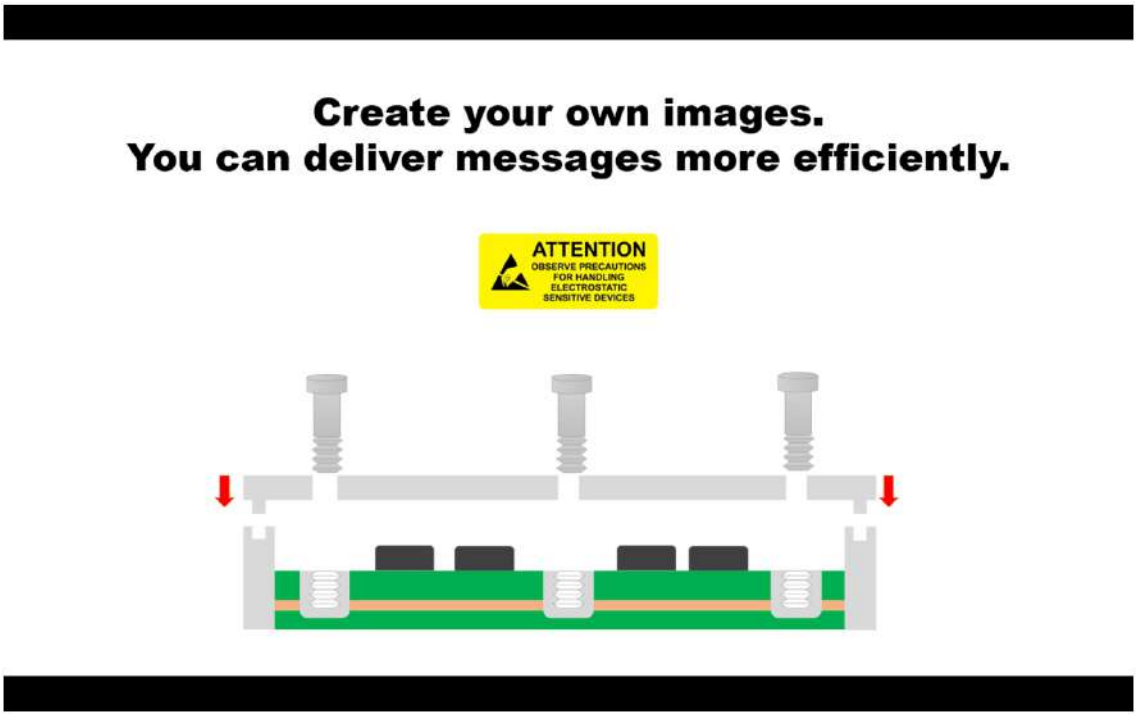


The above page reveals the delay step set by the barcode.

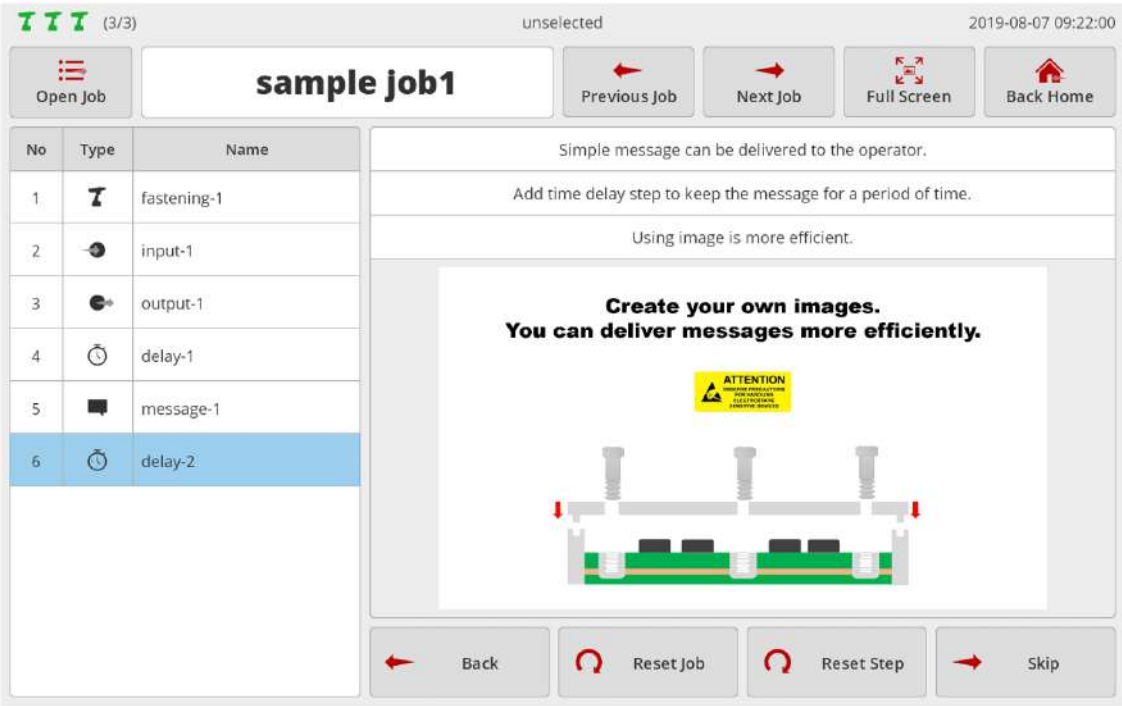
Once the code is scanned in USB scanner or BM built-in scanner, the page moves to the next step.

If the previous step is ‘Message step’, the delay is executed in the background, and the screen keeps displaying a message.

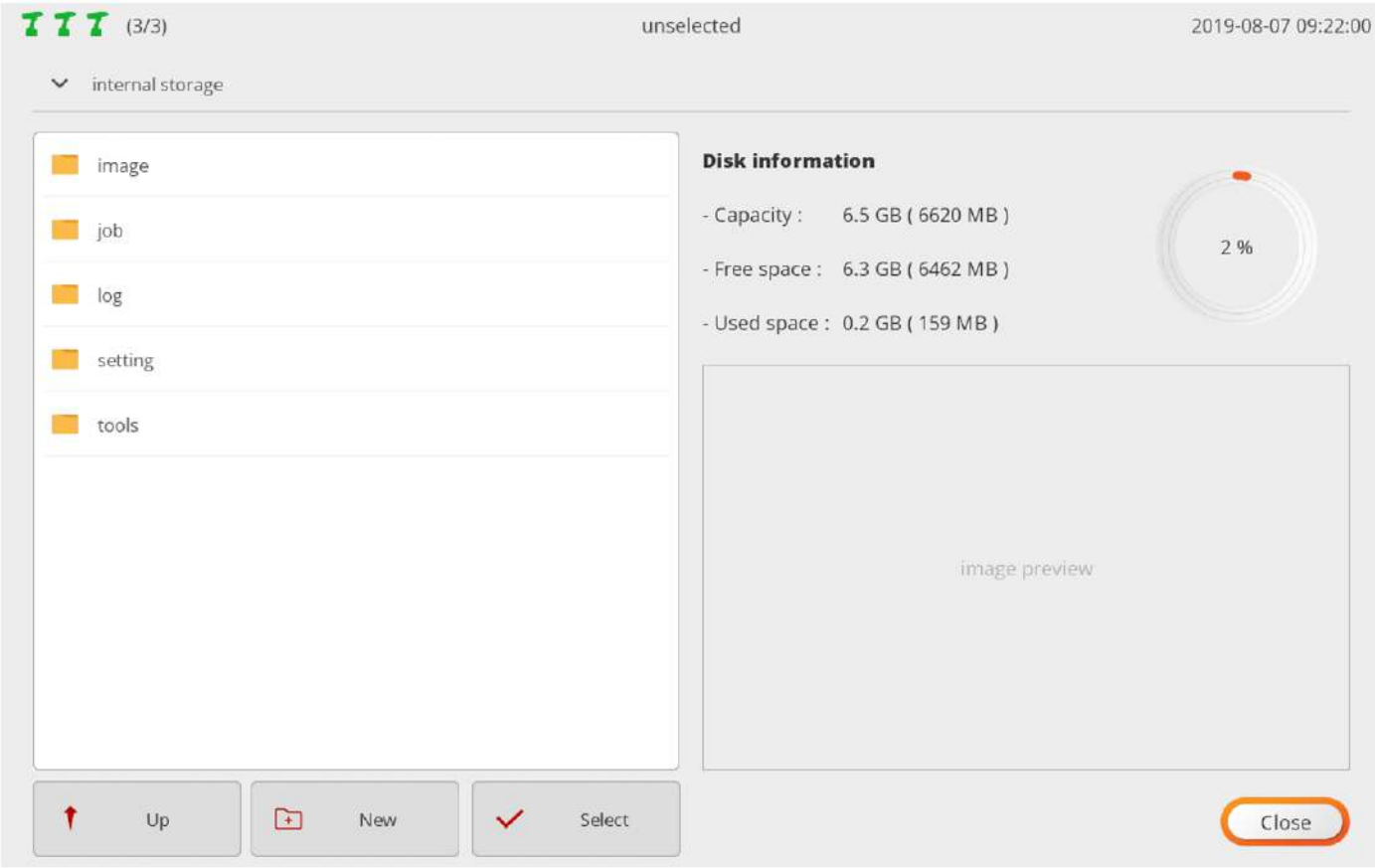
14.1.5 Message step



When setting the message step, if an image is already registered, it is displayed in full screen.
If touched in the full screen mode, it is turned off temporarily.
To return back to the full screen mode press the ‘Full screen’ button.



15. FILE BROWSER



Offers simple file browser features.

Available in various situations such as log file backup image file insertion and file move.

Supports external storage devices such as USB memory and Micro SD and able to select a storage device if the arrow is pressed.

Offers a preview feature at the right bottom if a JPG or PNG image file is selected.

The structure and purposes of the top-level internal storage folder are as follows:

Category	Description
Image	Stores image files used in fastening and message step.
Job	Stores job files programmed by a user.
Log	A space where log files are stored; owns a sub folder in order of year, month and day.
Setting	Stores preset files.
Tools	A folder is created by the name of the registered tool; stores related information .

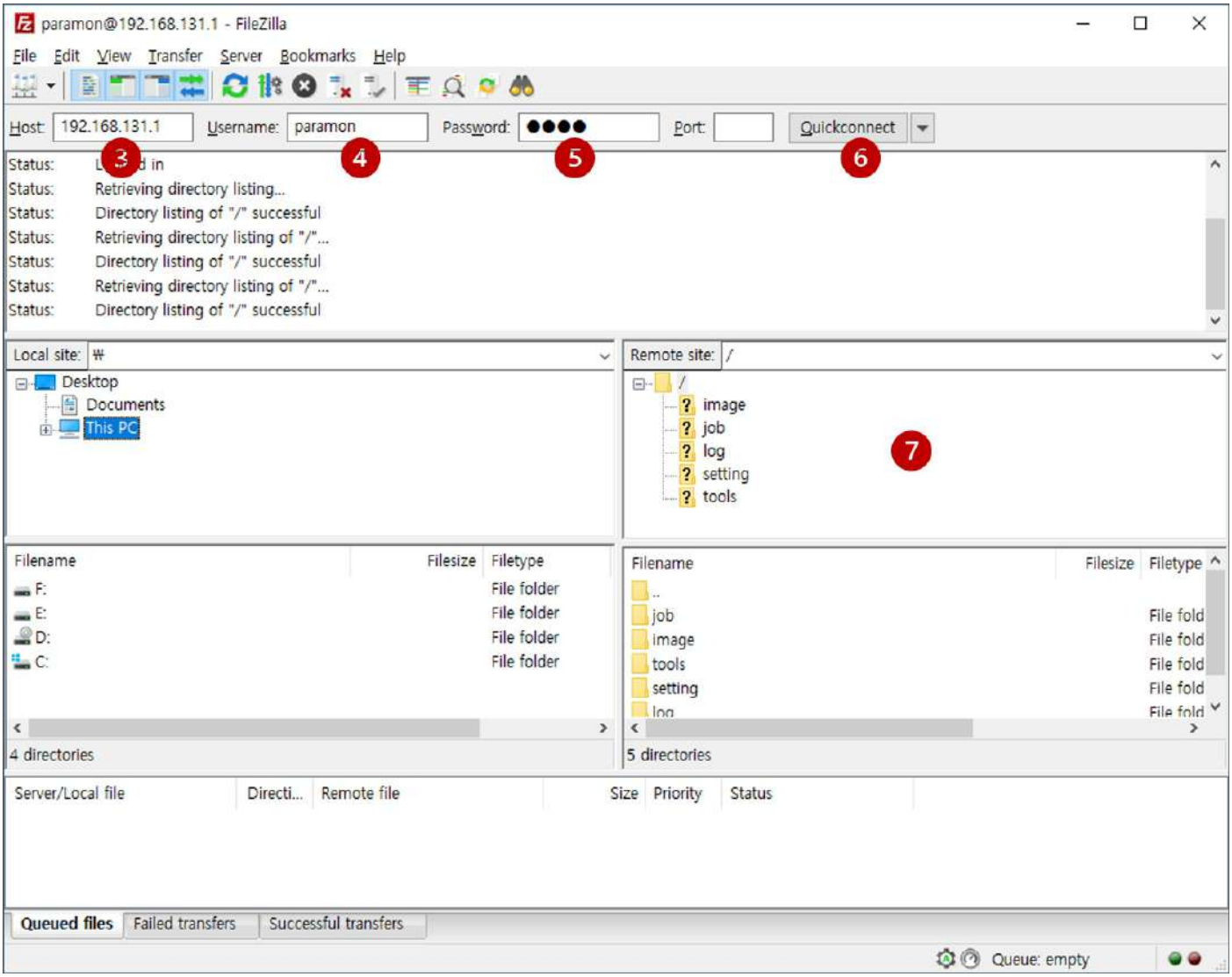
The menu provided by the file browser is as follows:

Category	Description
Up	Moves to the upper folder.
New	Creates a new folder in current position.
Select	Switches to the SELECT FILE mode.
Select all	Selects all files and folders in current position.
Cancel	Closes the SELECT FILE mode.
Delete	Deletes the selected files and folders.
Copy	Copies the selected files and folders.
Move	Moves the selected files and folders.
Rename	Renames the selected files and folders. Disabled if multiple files and folders are selected.
Paste	Pastes the files and folders chosen in copy/move.

16. FTP SERVER

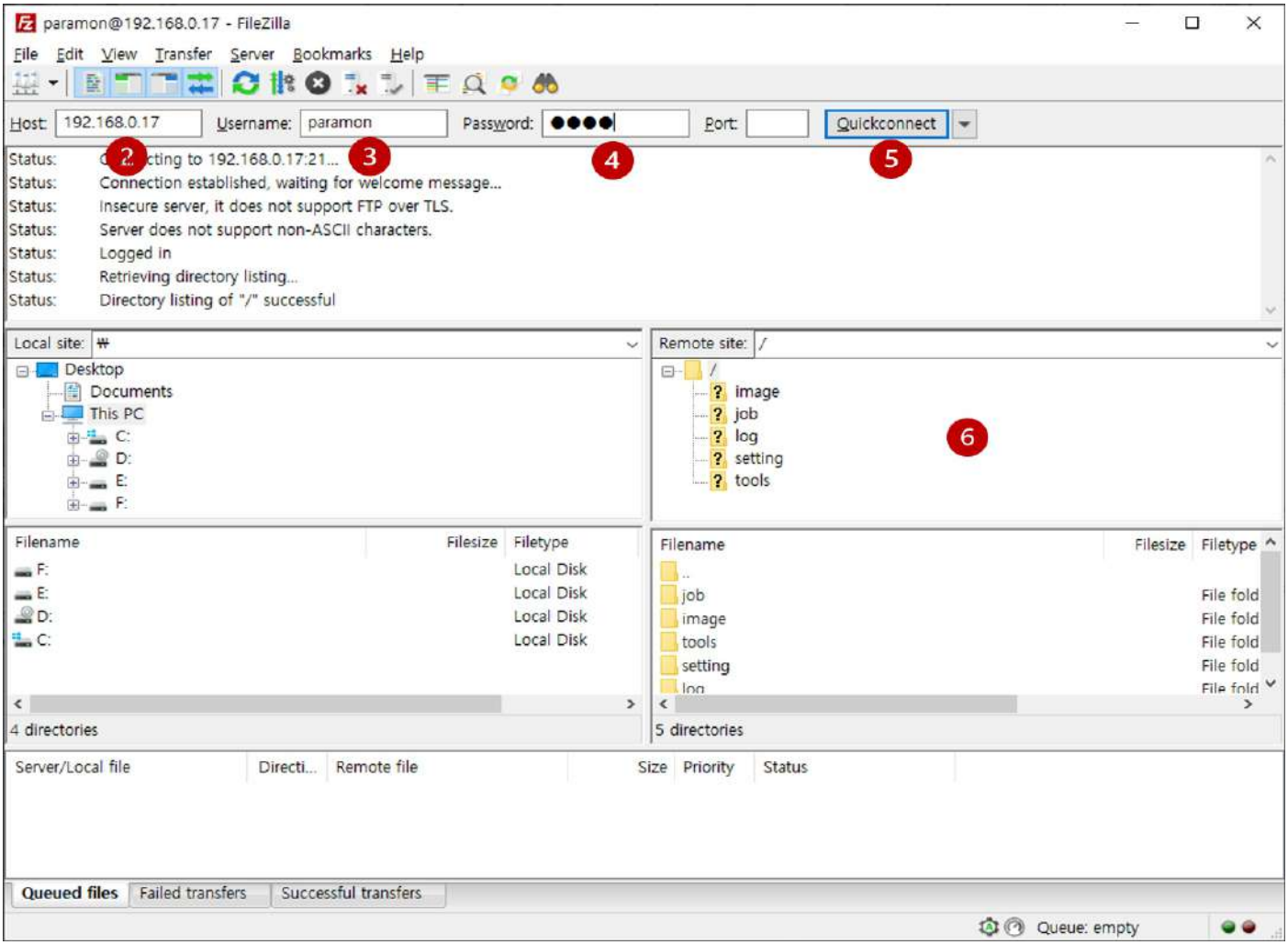
This section describes how to get access to the FTP server.
For the FTP client needed to get access to the FTP server, there are various types of programs.
This section uses the most widely used freeware 'Filezilla client'.
http://filezilla-project.org/

16.1 Connection via WiFi



1. Connect to ParaMon-Pro X AP in WiFi-connected PC.
2. Start the Filezilla Client.
3. Enter the WiFi IP address into the host.
   ParaMon-Pro X's WiFi always has '192.168.131.1' for address.
4. Enter the FTP server's username from 'Setting → Network'.
   The default value is 'paramon'.
5. Enter the FTP server's password from 'Setting → Network'.
   The default value is 'prox'.
6. Press [Quickconnect] and log into the FTP server.
7. Check ParaMon-Pro X's file system.

16.2 Connection via ethernet



1. Start the Filezilla Client.
2. Enter the ethernet IP address into the host.
   Check the ethernet IP address in ‘System → Network’.

3. Enter the FTP server’s username from ‘Setting → Network’. The default value is ‘paramon’.
4. Enter the FTP server’s password from ‘Setting → Network’. The default value is ‘prox’.
5. Press [Quickconnect] and log into the FTP server.
6. Check ParaMon-Pro X’s file system.

17. BACKUP & RESTORE

This section describes backup/restore procedures under two different categories: ParaMon-Pro X and BM.

17.1 ParaMon-Pro X

ParaMon-Pro X's backup and restore features can be available in two types:

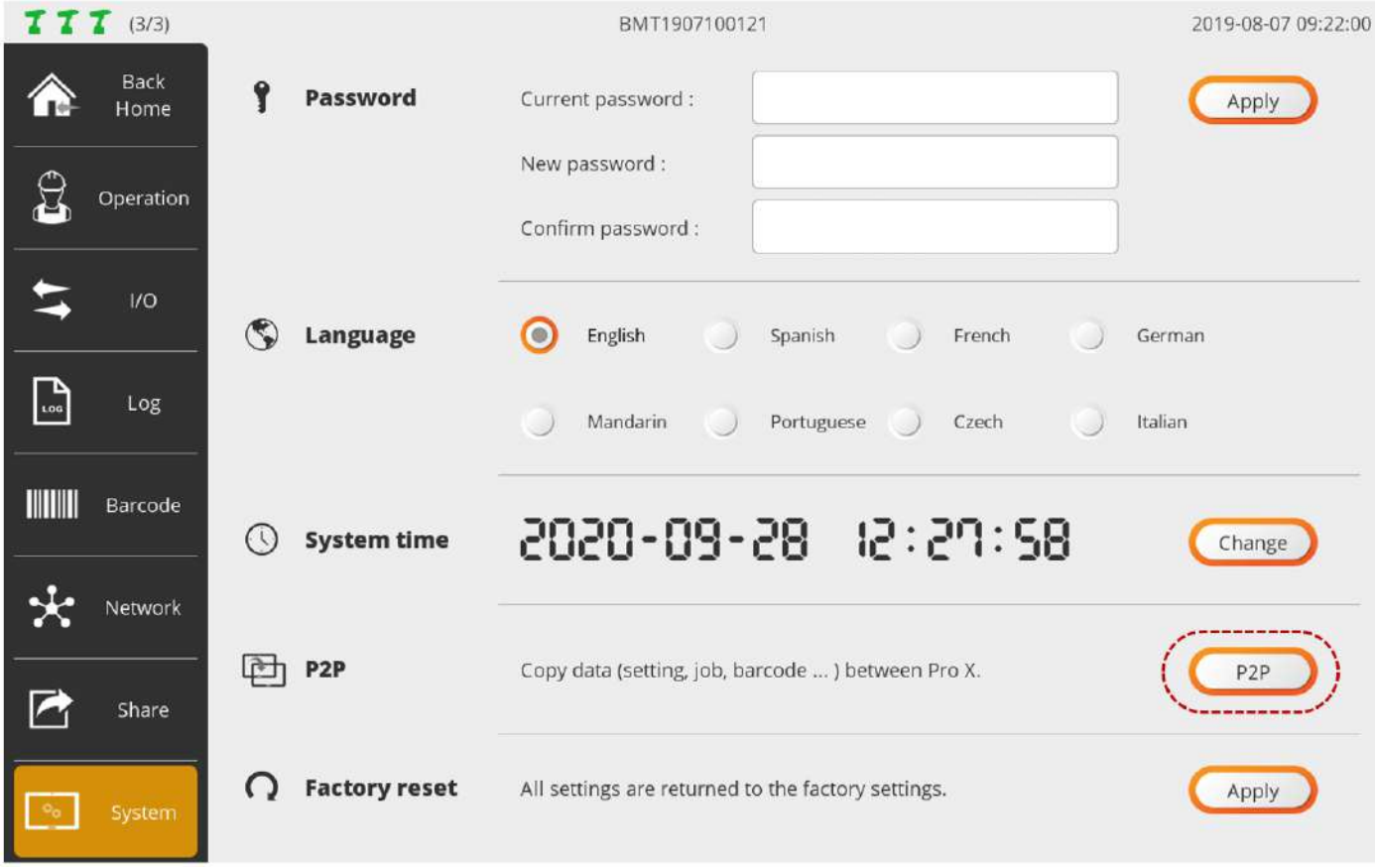
A. After backing up ParaMon-Pro X's current settings, the system can be restored to the current state if necessary.
At restoration, the file system is overwritten.
If a backup file is in the internal repository, it is also deleted.
Therefore, copy the backup to a separate external storage device.

B. After backing up ParaMon-Pro X's current settings, they can be applied to the other ParaMon-Pro X with the same configuration.
Since member tools registered in ParaMon-Pro X are managed with their own ID (MAC address), however, they are not automatically registered despite restoration.
Therefore, member tools should be registered separately.

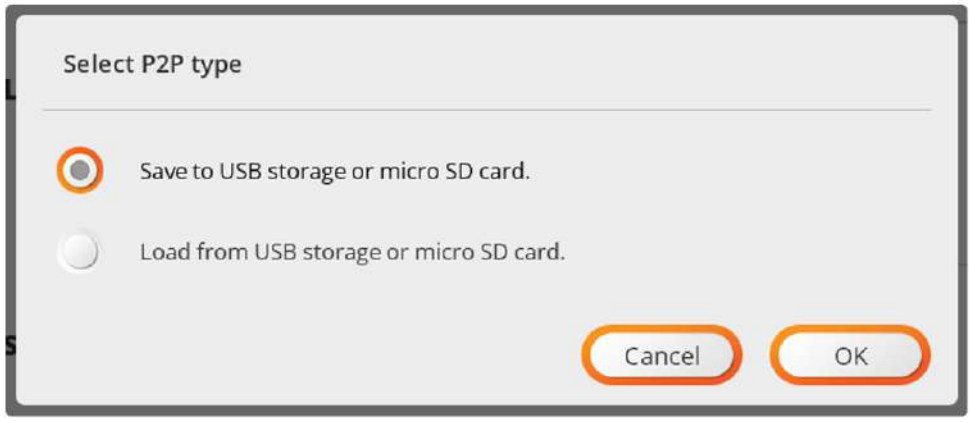
At job programming, the tools specified during the fastening step are identified by the tool name.
To execute the restored jobs without changes, therefore, member tools should be set under the same tool names at their registration.
If different ParaMon-Pro X units need to be backed up or restored, it is recommended to specify an easy-to-identify name in person instead of using the default tool name when registering a member tool.

17.1.1 Backup

A. Press [P2P] in ‘Setting → System’.



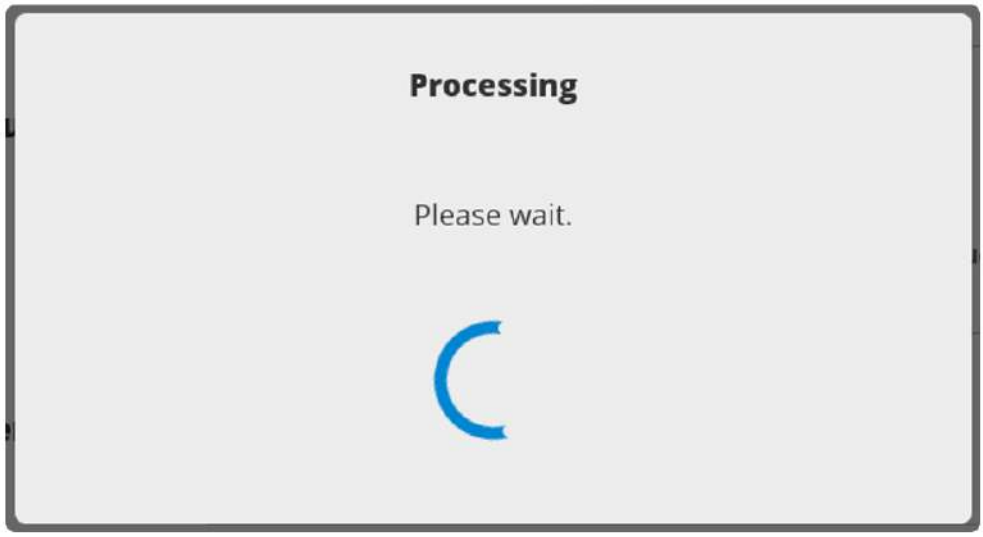
B. Select “Save …” and press [OK].



C. Set the backup storage position and filename and press [OK] for backup.
The filename is automatically created in 'ProX_YYYYMMDD.p2p' format.
It can be edited if necessary.

If stored by specifying an external storage device folder, it would take a relatively long time for backup.
It is recommended to store the backup in the internal repository and copy/move it to an external storage device, using '15. file browser'.

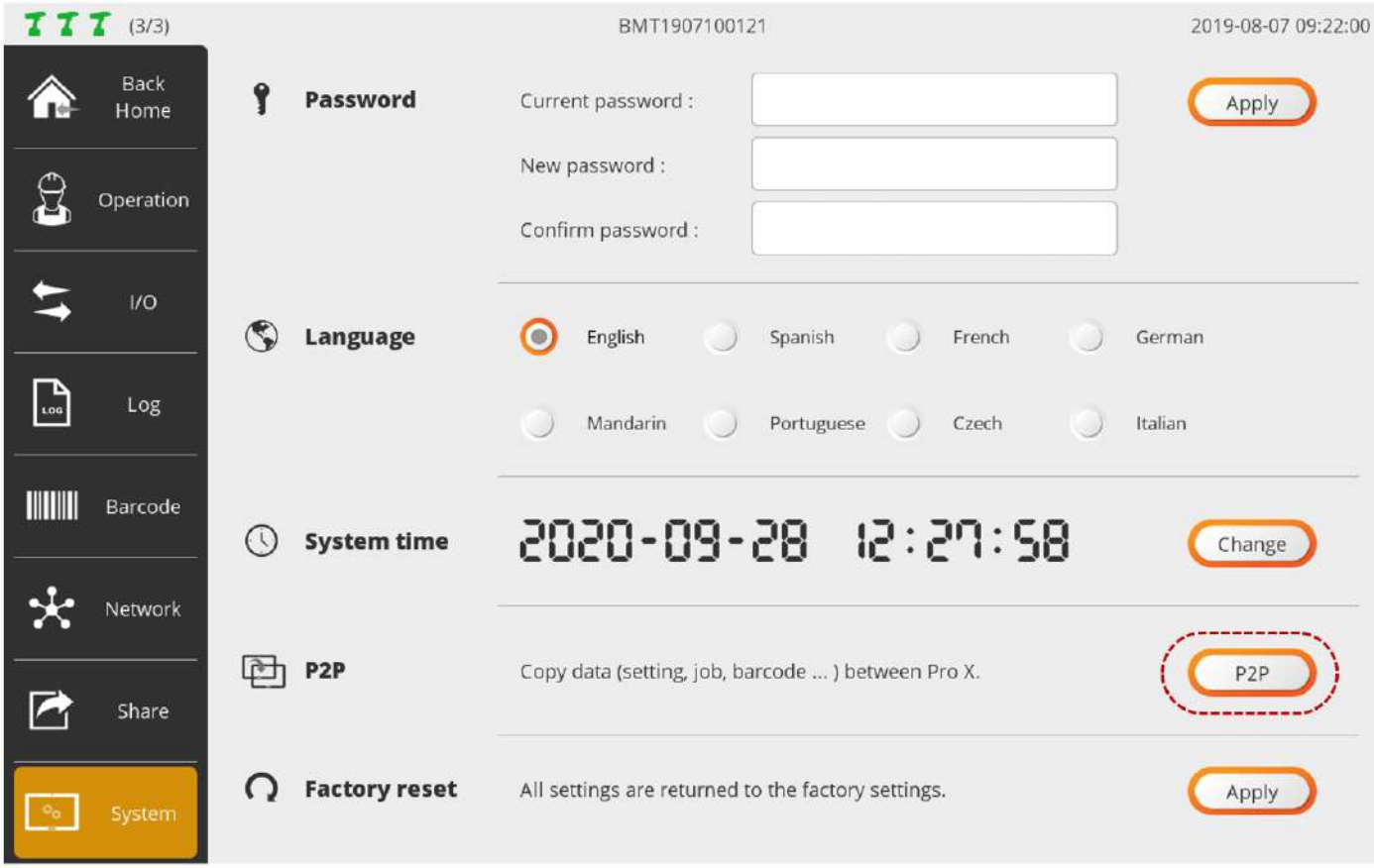
D. Wait until the backup processing is finished.



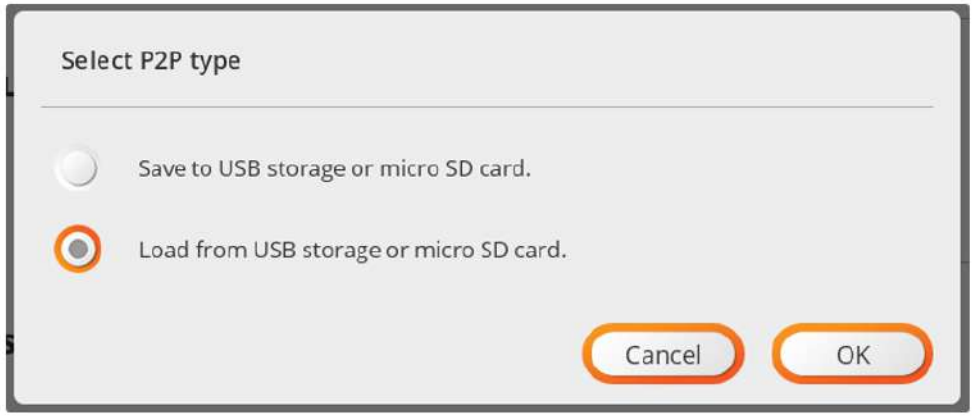
E. If the backup is stored in the internal repository as recommended, copy/move it to an external storage device, using '15. file browser'.

17.1.2 Restore

A. Press [P2P] in ‘Setting → System’.



B. Select “Load …” and press [OK].



C. Select the file and press [OK].

D. Press [OK] and restart the system.

17.2 BM Parameters

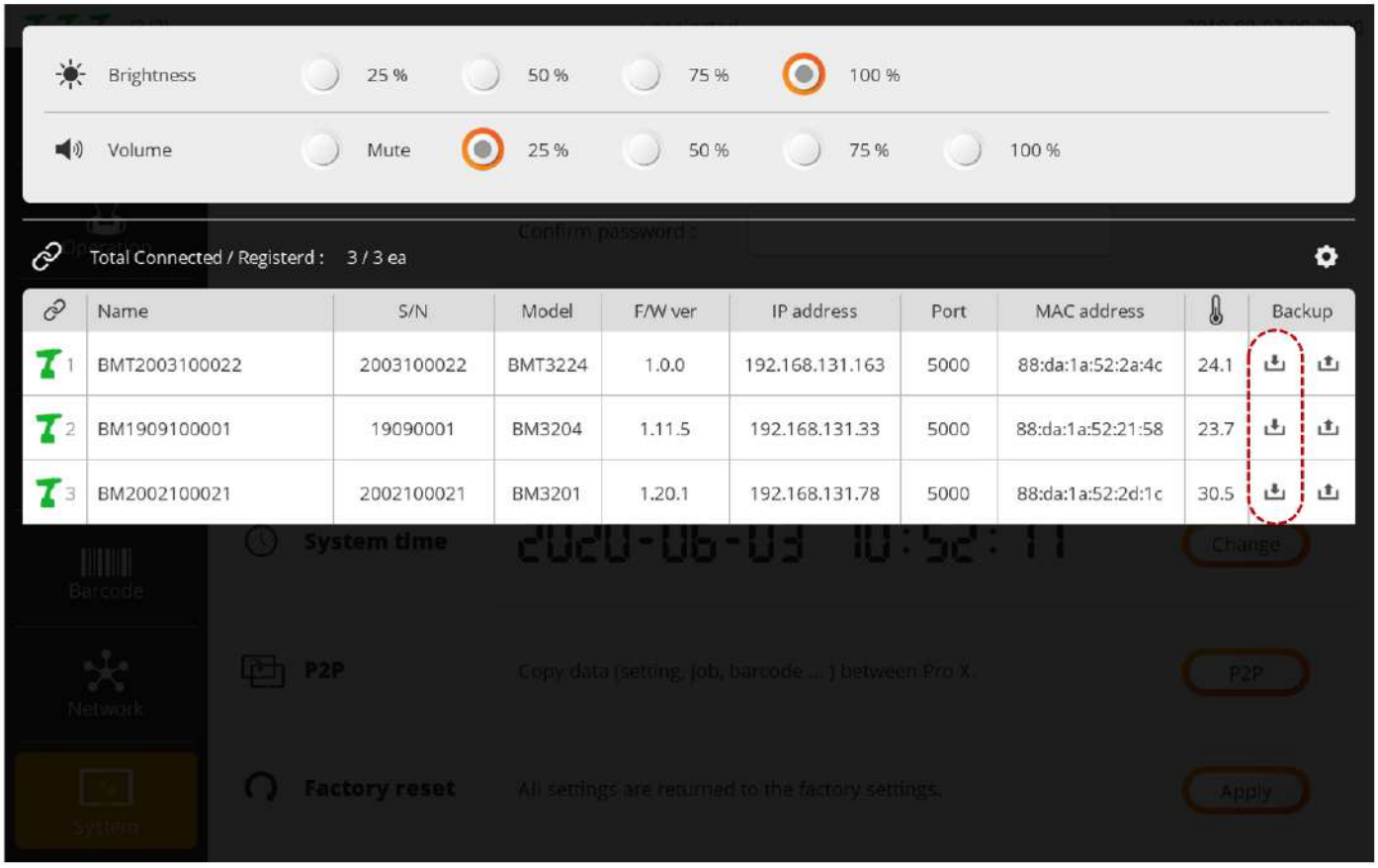
BM Parameter's backup and restore features can be available in two types:

A.After backing up BM's current parameter settings, the system can be restored to the current state if necessary. If BM parameter settings are edited frequently according to operating environments, it is able to edit them collectively, using backup/restore features.

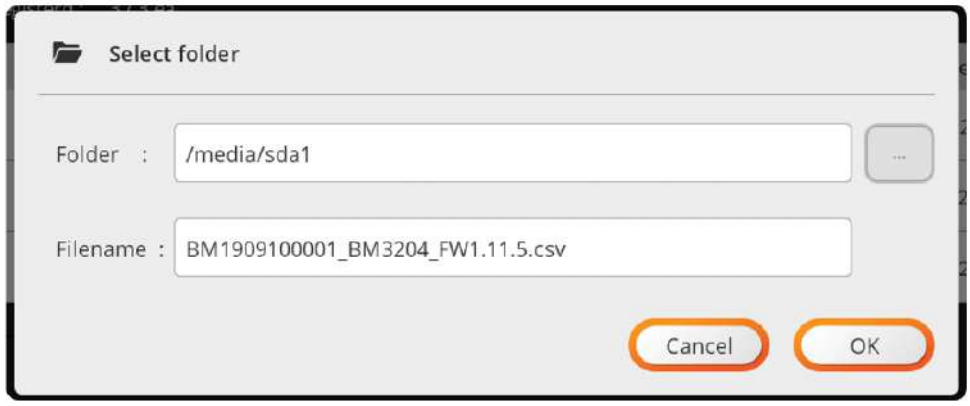
B.If used together with ParaMon-Pro X's backup/restore features, it is possible to perfectly copy all settings of the system comprised of multiple BM and ParaMon-Pro X units.

17.2.1 Backup

A. Press the 'Backup' icon of the target tool on the member tool list.

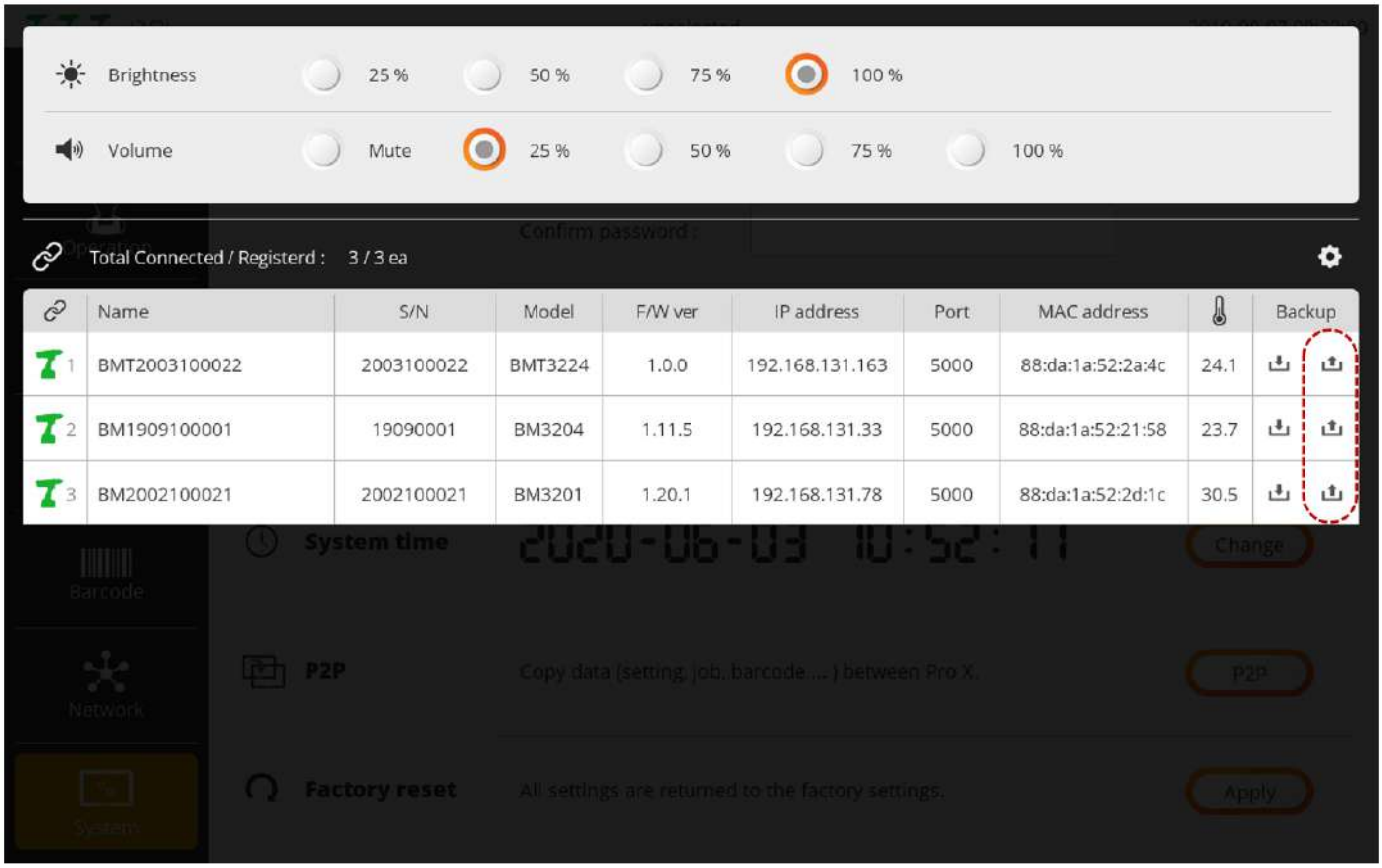


B. Set the backup storage position and filename and press [OK] for backup.
The filename is automatically created in 'Toolname_Model_Fwver.csv' format.
It can be edited if necessary.



17.2.2 Restore

A. Press the RESTORE icon of the target tool on the member tool list.



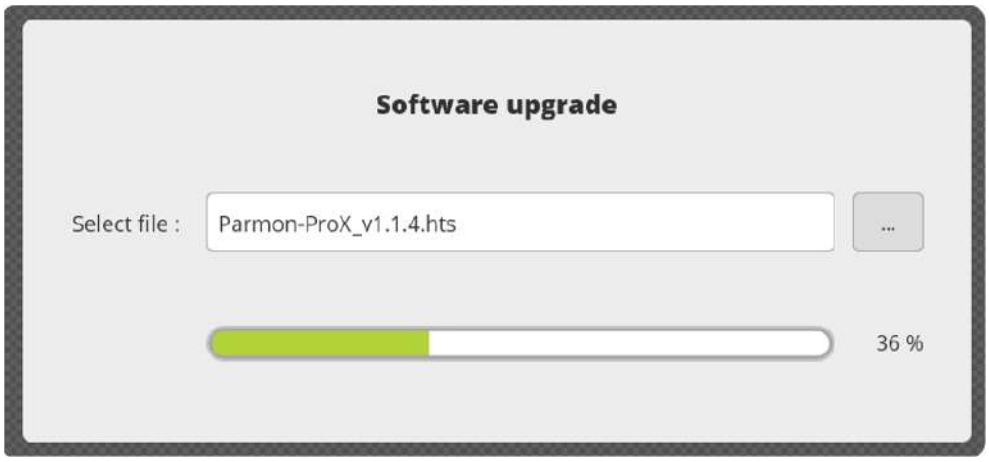
B. Select the file and press [OK].

18. SOFTWARE UPGRADE

A. Log into the system in ADMIN mode.
B. Select ‘System’ in the ADMIN menu.
C. Choose ‘Device info’ on the left.
D. Check the current software version and press [Upgrade].
E. Enter the password again.
F. Select the target file and press [Upgrade].

G. Once the confirmation page pops up, check the target file again and press [OK].

H. Wait until the process is completed.



I. Once the upgrade is successfully completed, the restart system message pops up.
Press [OK] and restart the system.

J. Once successfully reset, log into the system in ADMIN mode again.
K. Select ‘System’ in the ADMIN menu.
L. Choose ‘Device Info’ on the left.
M. Check if successfully upgraded by checking the software version.

19. MAINTENANCE

19.1 Maintenance

Periodic cleaning of the screen should be carried out regularly with a clean, soft, dry and lint-free cloth.

19.2 Troubleshooting

During manufacturing the proper functioning of the unit is checked multiple times.
However, if the unit malfunctions, troubleshoot it using this list.

Warning
All troubleshooting tasks requiring the opening of the box must be performed by DOGA or a company authorised by DOGA.

Problem	Solution
Controller is not booting (black screen)	Turn off and on the controller.
USB memory stick or micro SD card not listed	Please check that memory format is FAT32.
WiFi network interrupted	Check that WiFi adapter is well plugged on USB port. Eventually reboot controller.
Password is lost or forgotten	Please contact the DOGA After-Sales Department.
Screwdriver disconnected	Please check that tool is powered on and is within WiFi signal range.
Even after verification, the controller doesn't work correctly	Please contact the DOGA After-Sales Department.

If you cannot resolve a problem despite reading this manual, please contact the DOGA After-Sales Department.

My client area on www.doga.fr
Go to your client area on www.doga.fr, click "Your contacts", then select your specific **After-sales department contact** depending on the device type.

19.3 Spare parts

For any spare parts order, contact your DOGA technical sales representative.

My client area on www.doga.fr
Go to your client area on www.doga.fr,, click “Your contacts”, then select your specific **After-sales department contact** depending on the device type.

19.4 Hotline

19.4.1 For any questions about the use of the device

Please contact your Technical Salespeople.

My client area on www.doga.fr
Go to your client area on www.doga.fr,, click “Your contacts”, then select your **Technical Salespeople** depending on the device type.

19.4.2 For any questions regarding troubleshooting

Please contact your After-Sales contact.

My client area on www.doga.fr
Go to your client area on www.doga.fr,, click “Your contacts”, then select your specific **After-sales department contact** depending on the device type.

If our technician can remotely determine the origin of the fault, he will tell you what to do in order for you to repair it by yourself as much as possible.

19.5 After-sales returns

All material must be returned with an after-sales service return form, that you must complete and attach to your package.
The repair, maintenance or adjustment service can only start at the receipt of this form.

Information

Following this procedure allows you to quickly take charge of your request and reduces the troubleshooting costs.
DOGA reserve the right to apply a trade-in discount and to invoice, if applicable, the costs of repairing and packaging.

19.5.1 Download the after-sales return form

You can download the return form by following one of these links:

http://service.doga.fr/syst/dogatech.nsf/liste/00184

Information

You can use your own after-sales service return form as long as it contains all the information necessary to take care of your equipment.

19.5.2 Send your equipment

The returned package must be postage paid to the following addresses depending your transport mode:

Postal packages	Carrier packages
DOGA - Service SAV 8, avenue Gutenberg - CS 50510 78317 Maurepas Cedex FRANCE	DOGA - Service SAV 11, rue Lavoisier 78310 MAUREPAS FRANCE

19.6 On-site repair

Even though it seems convenient, on-site repair is seldom the best solution for transportable equipment.
The conditions in which the technician will work are worst than in our workshops and technician travel expenses are costly.

If you require an on-site intervention, please contact the After-sales department.

My client area on www.doga.fr
Go to your client area on www.doga.fr,, click “Your contacts”, then select your specific **After-sales contact** depending on the device type.

Our services will organize the intervention.

19.7 Warranty

DOGA guarantees all his products against any defect in parts or fabrication for a period of **12 months**.

To benefit from the parts and labor warranty, the following conditions must be respected:

- The ParaMon-Pro X must have been used in a professional use and in accordance with the normal conditions of use described in the instruction manual.
- The ParaMon-Pro X must not have suffered any damage from storage, maintenance or improper handling.
- The ParaMon-Pro X must not have been modified or repaired by unqualified persons.

20. SAFETY

20.1 General provisions

The instruction manual must be carefully stored in a known place and easily accessible to the potential users of the product.

Attention

Read this manual and have each operator read it carefully before installing, using or repairing.

Make absolutely sure that the operator has fully understood the rules of use and the meaning of any symbols affixed to the product.

Most accidents can be avoided by following the instruction manual.

These rules have been drafted with reference to the European Directives and their various amendments as well as standard rules product.

In each case, respect and comply the National Safety Standards.

Do not remove or damage the labels and annotations affixed to the product, more particularly those imposed by the law.

20.2 Contra-indications

Do not cover.

Do not immerse.

Do not expose to splashing liquids.

Do not use near to a heat source.

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21. STANDARDS

21.1 Importer details

Importer: DOGA
Adresse: ZA Pariwest
8 avenue Gutenberg CS 50510
78317 MAUREPAS CEDEX - FRANCE

21.2 Markings

BM Series Controller	Description
ParaMon-Pro X	Type
S/N MM/YYYY XXXX	Serial number month/year of production
DOGA	Name of the equipment manufacturer
100-230V 0.4A	Power input
CE	Equipment designed and manufactured in accordance with the requirements of European Directives 2014/35/UE and 2014/30/UE.

21.3 Transport and storage

Information
Your equipment can be damage if you store it or transport it improperly.
Observe the transport and storage information for your equipment.

26.3.1 Transport

Use a suitable container to transport the unit and protect it during shipment.

26.3.2 Storage

Respect the following guidelines before each storage:

- Turn off the DPC Touch V2 (unplug the power cable).
- Clean the tool according to the instruction manual (Maintenance chapter).
- Store it in a suitable container to protect it from dust and direct sunlight.
- Store it in a dry place at an ambient temperature, below 40°C.

21.4 WEEE recycling and end of service life

The symbol showing a crossed out trash container, when placed on an electric or electronic device, means that it should not be disposed of with household trash.

Collection solutions are as follows:

26.4.1 Collection and recycling scheme

In compliance with the French Environmental Code covering professsional Waste Electric and Electronic Equipment (WEEE) (art.R543-195 et seq.), DOGA is a member of ECOSYSTEM, an eco-organization approved by public authorities under the conditions defined by art R543-197.
You can also benefit from collection and recycling system proposed by ECOSYSTEM for WEEE originating from the professional equipment marketed by DOGA.
Further information on www.ecosystem.eco.

26.4.2 Collection points

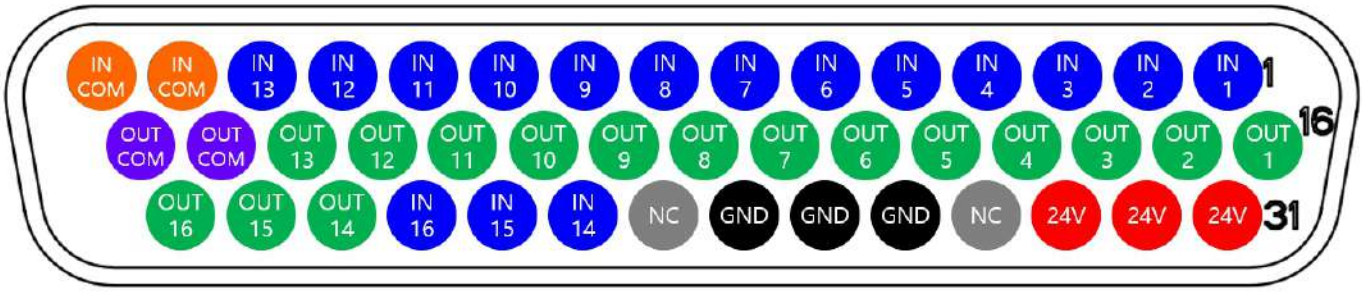
Free collection points for used electric or electronic devices are available near your company.
Your local authorities can provide their addresses.

22. APPENDICES

22.1 - Declaration of conformity

Description	Lien de téléchargement	QR code
EU declaration of conformity ParaMon-Pro X	http://service.doga.fr/syst/dogatech.nsf/liste/00283	

22.2 - Interface port DB44 pin out



ROW 1 (1~15)		ROW 2 (16~30)		ROW 3 (31~44)	
Pin no	Desc	Pin no	Desc	Pin no	Desc
1	Input 1	16	Output 1	31	+24V
2	Input 2	17	Output 2	32	+24V
3	Input 3	18	Output 3	33	+24V
4	Input 4	19	Output 4	34	NC
5	Input 5	20	Output 5	35	GND
6	Input 6	21	Output 6	36	GND
7	Input 7	22	Output 7	37	GND
8	Input 8	23	Output 8	38	NC
9	Input 9	24	Output 9	39	Input 14
10	Input 10	25	Output 10	40	Input 15
11	Input 11	26	Output 11	41	Input 16
12	Input 12	27	Output 12	42	Output 14
13	Input 13	28	Output 13	43	Output 15
14	Input COM	29	Output COM	44	Output 16
15	Input COM	30	Output COM		

22.3 - Backup data forwarding

Please refer to backup data forwarding function setting describe in [11.6. Share] section.
The backup data forwarding function forwards the backup data received from the member tools to the set external server.
The data format is based on the Modbus-TCP standard.
In general Modbus-TCP-based data communication always operates as a pair of request/response, but in backup data forwarding function, only response is unilaterally transmitted, and the data format is as follows.

Num of byte	Data	Description		
2	Transaction ID	MBAP (ModBus Application Header)		
2	Protocol ID			
2	Length			
1	Unit ID			
1	Function code	Fixed (0x04)		
1	Length	Counted from tool index to the end of the message.		
2	Tool index	Member tool index number (0~7)		
2	Event count no	Increased +1 per tool		
2	Fasten time	Fastening time		
2	Preset no	Preset number		
2	Target torque	Target torque (e.g. 1,000 = 10.00)		
2	Converted torque	Converted torque (e.g. 997 = 9.97)		
2	Speed	Speed (rpm)		
2	A1	Angle before the seating point.		
2	A2	Angle after the seating point.		
2	A3	Total angle (A1+A2)		
2	Screw no	Screw number		
2	Error	Error code		
2	Direction	0	Fastening	
		1	Loosening	
2	Status	Code	BM(T)	MD(T)
		0x00	Other	
		0x01	Fastening OK	
		0x02	Fastening NG (E330,332,333,334,335,336,337,338,339)	
		0x03	Fastening/Loosening change	
		0x04	Preset change	
		0x05	Alarm reset	
		0x06	Error (except fastening NG)	
		0x07	Barcode scan	-
		0x08	Screw count -1	-
2	Snug	Snug torque		
n (0~32)	Barcode	Barcode		

Download the ultimate version of this user manual
via the link below or via QR code:
http://service.doga.fr/syst/dogatech.nsf/liste/60391

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