Tip Monitor (TMR-01)

Instruction Manual

Please read this instruction manual carefully, before using the device.

KYOKUTOH CO.,LTD.

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1. Preface

1-1. Safety Precaution

■ About the product

TMR-01 enables automatic production and is a product that makes OK/NG judgments by comparing the status of electrode tip after dressing with the threshold that has been set in advance. Do not use for purposes other than for the abovementioned purpose.

When using the product, use it together with the KYOKUTOH product's dresser.

Our company shall not be liable, in any case whatsoever, for cases in which the product has been used for other purposes or for malfunctions, repairs, accidents and troubles caused by use that doesn't comply with the instructions of this User Manual, incorrect installation method, incorrect maintenance, etc. so we seek for your understanding.

After reading this User Manual, it must be stored in a place where the product's usage and management methods can be checked at all times.

■ Description of signs

⚠ Warning	Be careful to follow directions as specified, as an error could lead to possible injury or death.
⚠ Caution	Be careful to follow direction as specified, as an error could lead to malfunction and serious damage.
🚫	This symbol indicates operations that should not be done.
①	This symbol indicates operation that should be done.

■ **Important precautions**

※ Please pay attention to the following details during use.

| ⚠ Warning	● **In case of entering the line, check if the power of the welding gun has been turned off or check the safety of the surrounding machines.** →It may cause severe casualties.
⚠ Caution	● **Power must be turned off during replacement of parts and maintenance.** →It may cause injury or malfunction. ● **Attach correctly by referring to the User Manual.** →In case it is not attached correctly, sufficient information cannot be obtained from the tip monitor so it would not be managed in good state in the welding process.

🚫	● **Do not dismantle or modify parts other than the consumable replacement parts.**
	→It may cause destruction, malfunction in the main unit and may cause accidents.
	● **Do not supply welding current when using the tip monitor.**
	→ It may cause destruction, malfunction in the main unit and may cause accidents.
	● **Power supply must be cut off to prevent malfunction during the following operations.**
	   (a) **Insertion/separation of SD card**
	   (b) **Insertion/separation of LAN cable**
	   (c) **Insertion/separation of HDMI cable**
	→ It may cause destruction, malfunction in the main unit and may cause accidents.

①	● **It must be fixed firmly on frames, etc. for use.** →If the main unit is not fixed properly, it may cause removal defect, malfunction and accidents. ● **In case alcohol, thinner, etc. have been used to repair the main unit, they should be wiped off thoroughly before use.** →Spatters on volatile lubricants may cause fire. ● **Avoid spatter in the connection cable.** →Spatters may cause the film of pipes to melt, leading to electrical short. ● **Spatters on the main unit should be removed regularly.** →If spatter builds up, it may cause abnormal operation. ● **Electrode immediately after dressing must be used to conduct camera settings.** →It may cause abnormality in the judgment result. ● **Program installation of NetFramework4.5.1 and above is required for the operation of each software.** →It may cause operation defect of software. ● **Do not set overlapping IP address in multiple units of tip monitor and PC.** → It may cause operation defect of software. ● **Program installation of Microsoft Office Excel is required when using the maintenance application.** →Operation couldn't be checked in software similar to Microsoft Office. It may cause operation defect of judgment software.

■ Other precautions

- In the case of Windows 11, a pop-up like the one below will be displayed each time the program is launched.
  If it appears, be sure to click "Allow access".
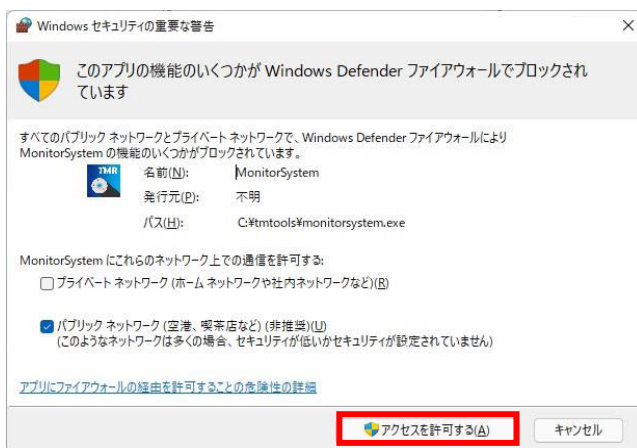
- When searching for the IP addressing with maintenance application and all display application, execute with the DHCP setting (setting for automatically acquiring IP address) OFF.

- After turning off the DHCP, set the IP address of the maintenance PC as "192.168.0.101" and set the IP addresses different from the IP address that has been set in each tip monitor.

※ "192.168.0.101" has been set in the tip monitor by default.
  Do not use this IP address for the setting to prevent overlapping.

- Maintenance application and all display application may not run in some cases due to anti-virus software.
  In case there is a problem, set such software as exceptions.

- If the remaining capacity of the SD card becomes less than 2GB, old data is automatically deleted until there is more than 4GB of space available.
  In case of using a 16GB SD card, the filming capacity is approximately 12GB.

- In a 16 GB card capacity calculated reversely from the filming image, approximately 80,000 filming can be made.
  If filming is made by exceeding approximately 80,000 times, data deletion begins within the SD card.

- Maximum number of filming in a day is approximately 5,000 times.
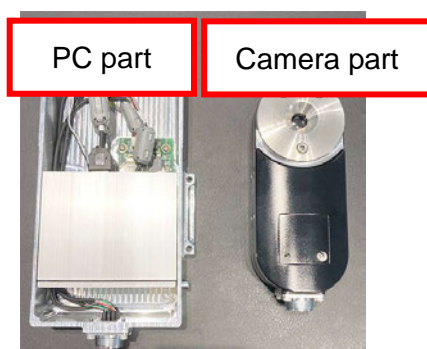 ※ Exceeding approximately 5,000 times of filming will cause errors.

- The clock built into this product has a monthly difference of about 30 seconds from the standard time. After the maintenance is over, adjust the time according to the guide.

- This product uses a single board computer in the PC section.
  Welding equipment carries high voltage and large current, which may cause malfunctions due to noise.
  To prevent malfunctions, be sure to ground the PC section properly before use.

<u>In case of operating based on procedures or methods that are not described in this Manual, our company shall not guarantee operations.</u>

2. Product Overview

■ Overview

● This product automatically judges the status of the electrode and gives the OK/NG judgment feedback to the robot.

● Using this product together with KYOKUTOH dresser is a prerequisite.

● Inspection and judgment results are recorded in the built-in SD card.

● Operations (inspection and judgment) can be executed with the product independently without having to connect to PC.

● PC is required for work preparation, setting changes, maintenance and data extraction.

● Please use Windows OS in the PC. (Refer to "3. Things to prepare")

● This product requires regular maintenance. (Refer to "15. Maintenance")

● If an external monitor is connected, real-time information such as inspection results can be displayed in the external monitor.

● This Manual uses the following terms for convenience.

■ Specification

Power		DC 24V
Power consumption		Approx. 920mA
Weight		Approx. 1.8 (kg) Camera part + Main part + cable
Environment for use	Waterproof	Use in environment where the product doesn't come in contact with water.
	Dustproof	Use in environment where there is no spatter, etc., if possible.
	Recommended range of operating temperature	-10℃～50℃
Operating time	Main unit's power ON → Communication signal ON	About 20～25 sec
	Filming instruction ON → Filming completion signal ON	About 5 sec
	Filming instruction OFF→ Filming completion signal OFF	About 10 msec

※ This product is a precision device. Install in a place where there is no water, dust, spatter, etc.

■ System overview
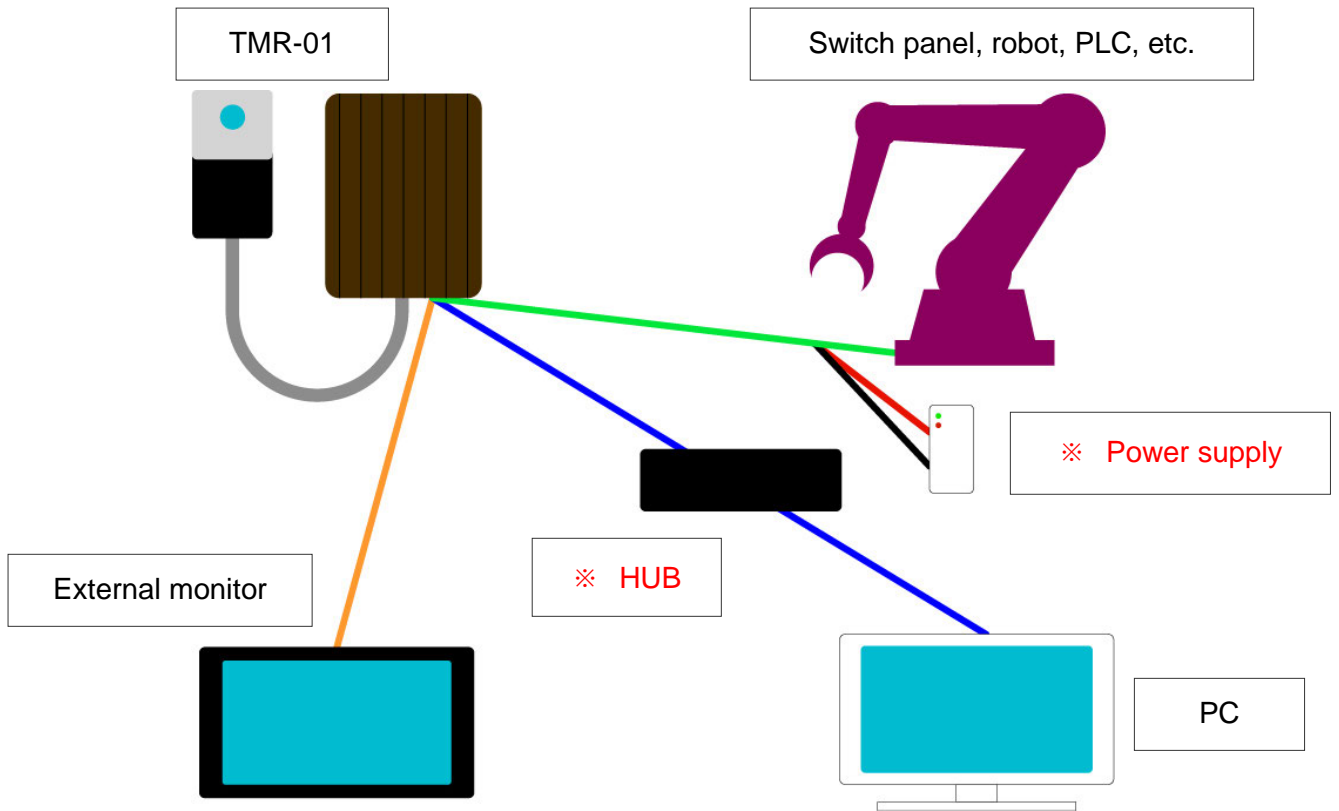
※ HUB is only required if you wish use to manage multiple units of TMR-01 in the same network.

※ Power supply is required in case power from the existing equipment cannot be used. (DC 24V)

※ External monitor is an optional installation. Install, when necessary.

● **Description of connection cables**

※ The colors of the cables below refer to the illustration above. They differ from the actual cable colors.

Orange: HDMI cable

※ The external monitor is not compulsory. Install, when necessary.

Blue: LAN cable

※ It is used for setting and maintenance.

※ HUB can be used to connect multiple units of TMR-01 to the PC. **(Up to 64 units per PC)**
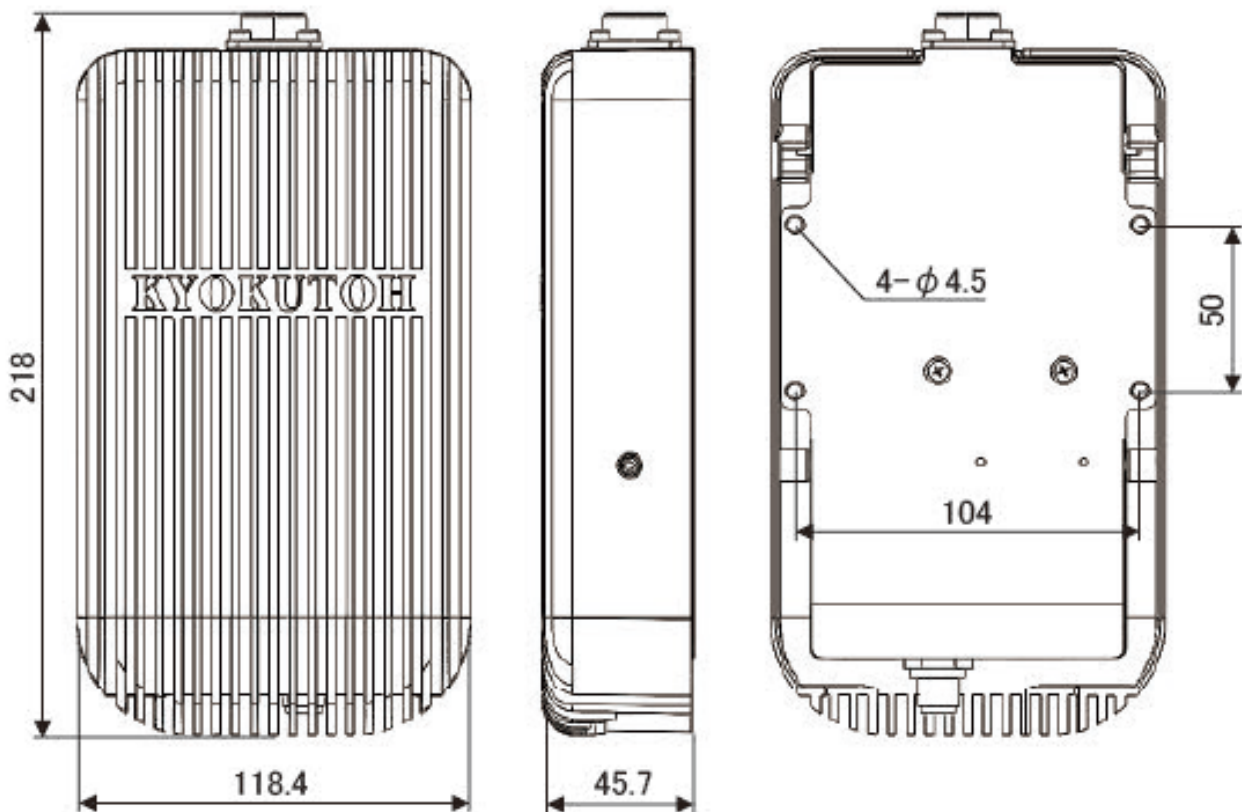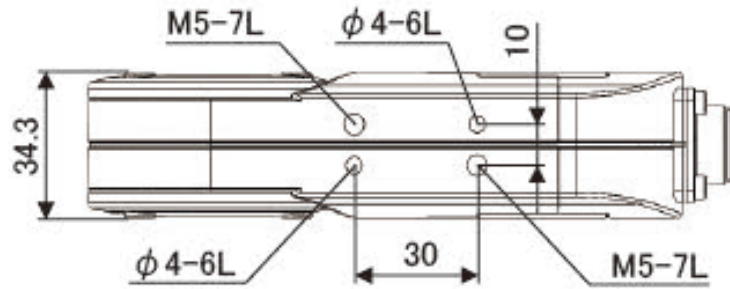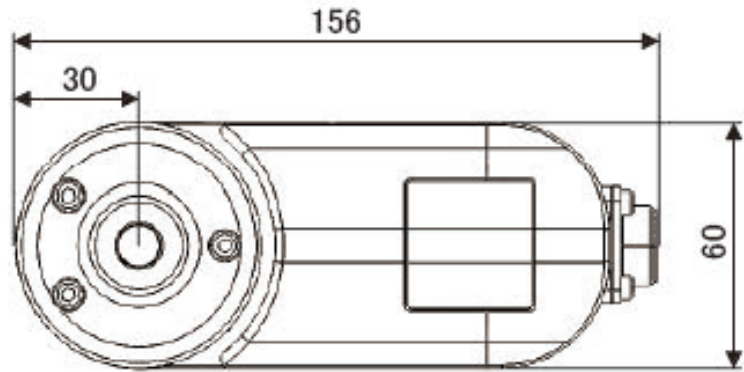
Green: M12 8pin cable

※ Includes signal line and feeding.

Red ＆ black: Divided from the M12 8pin cable

※ Use a power supply in case feeding from existing equipment is impossible.

■ Dimensions

Weight
Camera part: 620g
PC part: 930g

156
30
60

M5-7L   φ4-6L   10
34.3
φ4-6L   30   M5-7L

218

KYOKUTOH

118.4   45.7

4-φ4.5
50
104

3. Things to Prepare

■ **Products included**

Name	Qty.	Spec.	Remark
TMR-01 main unit	1		
microSD card	1	microSDHC　16GB	Mounted on the main unit upon shipping

※　TMR-01 can only recognize SDHC standard micro SD cards.
SDXC and SDUC cannot be recognized.

■ **Products to be prepared by the customer**

Name	Qty.	Spec.	Remark
PC for control	1	PC running on Windows OS 【Recommendation】 ●OS: Windows10 PRO 64bit ●NET FrameWork4.5.1 and above ●Display resolution: 1280*1000 and above ●To be equipped with LAN port	Some adaptors sold in the market that convert LAN to USB cannot be used. Therefore, PC equipped with LAN port is recommended.
M12 8pin cable	1	Refer to 【6. How to Install】 for pin map	Select "A-coded M12 round connector 8-pin" for the connector shape. ※Use 8pin 8core unsealed cables. 7pin + 1 sealed cable or 8pin + 1 sealed cable are unavailable.
LAN cable	1	CAT6 standard and above	Do not use internally made cables.
HUB	Optional		
HDMI cable	Optional	High Speed HDMI Cable standard and above	
Power supply	Optional	DC 24V 1.2A and above	Not necessary if power can be fed from other devices.
External monitor	Optional	Refer to the following page	

※　Must use Kyokutoh recommended M12 8 pin cable when using TMR-01.
If not, malfunction or failure may occur.
When extending the length of the cable, do not use the standard M12 cable, but attach the Kyokutoh recommended cable first, and then extend the cable with the standard 8-core cable.

■ About the resolution of external monitor

The display resolution displayed in the tip monitor is based on XGA (1024*768 resolution).

In case if displays with higher resolution, the screen is enlarged.

The screen solution is set as the table below depending on the horizontal resolution of the display.

As for the tip image, 336*336 pixels image acquired from the camera is enlarged.

Therefore, tip image may become blurred depending on the display size.

Horizontal resolution	Display resolution [Pixel]	Size of tip image	Display standard
Below 768	Can't be displayed (Some part in the screen will be displayed out of the range)		
768-below 960	1024*768	336*336	XGA
960-below 1200	1280*960	420*420	QVGA
1200-below 1536	1600*1200	525*525	UXGA
1536 and above	2048*1536	672*672	QXGA

[Restrictions]

● Only supports HDMI output. Conversion to other output formats is not supported.

● Connect the HDMI cable before operating the tip monitor.

　Display resolution may not be recognized accurately in some cases.

4. Part List

| No.	Name	Format
1	TMR PC main unit	TMR-PC
2	TMR cable	TMR-CAB
3	TMR camera main unit	TMR-CAM
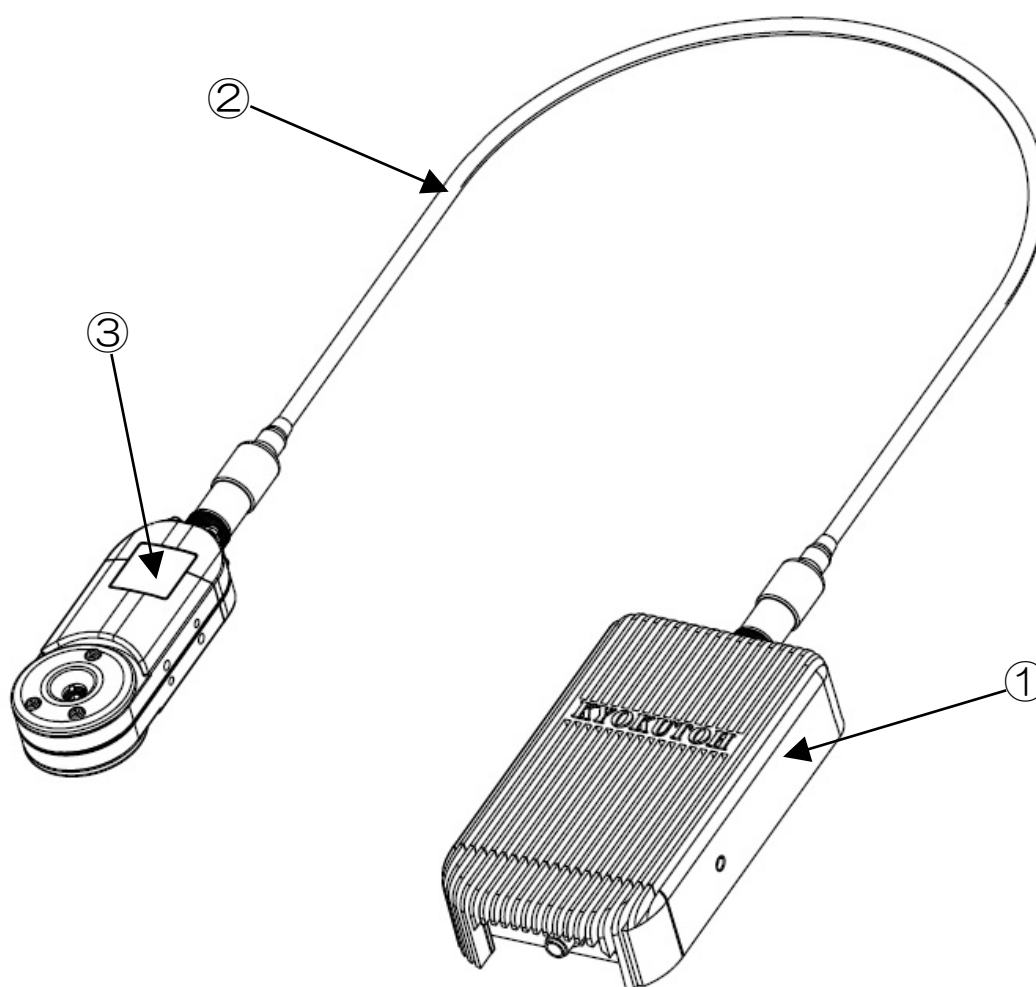
5. Start / Shutdown

■ Start

Apply DC 24V.

Once the operation of the tip monitor is completed, communication signal turns ON and the green LED of the tip monitor main unit turns on.

※ It takes approximately 20 seconds from power application to operation completion.

■ Shutdown using physical button

1. When the tip monitor is in standby (When filming completion signal is OFF and not in maintenance status), press the shutdown button of the main unit part for more than 5 seconds.
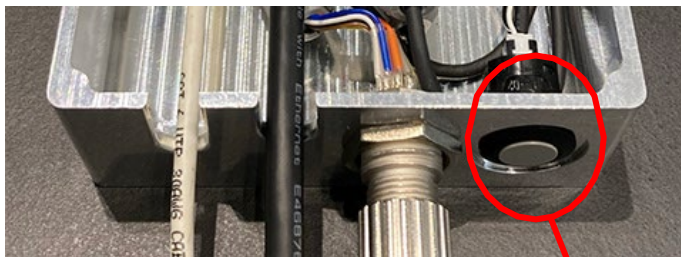

Shutdown button

2. Once shutdown is completed, communication signal turns OFF and the green LED of the tip monitor main unit turns off.

3. Check that shutdown is complete and stop the power supply to the tip monitor.
   Stopping the power supply before shutdown is complete may cause malfunction.

4. Once the cutoff of the power supply has been checked, each cable can be separated.

※ Shutdown can also be executed in the software "TipMaintenance.exe" and "Monitorsystem.exe".

■ Shutdown using software

◆ Shutdown from maintenance application

Click "Shutdown" from "Tip monitor operation" at the top of the main screen.

Then, shutdown begins when maintenance completion is clicked.
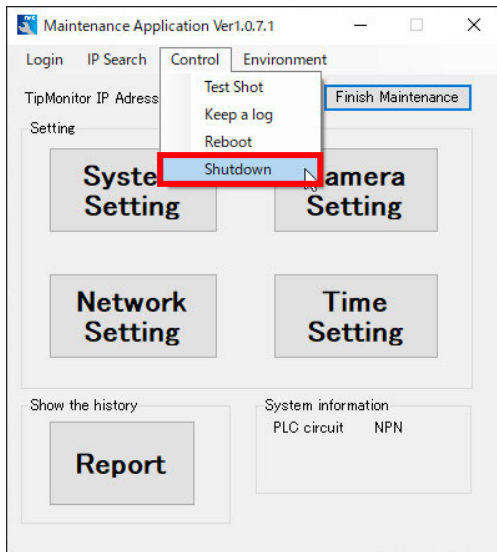
◆ Shutdown using all display application

If "Shutdown" is selected from "Tip monitor operation" at the top left side of the main screen, the selected tip monitor can be shut down. Shutdown is comprised of All and Individual and the following operations are executed respectively.

1. All shutdown: Shutdown instruction is executed regarding all the tip monitors that have been activated on the cell (Green ■).

2. Individual shutdown: If the cursor is placed on the individual tip monitor, the list of activated tip monitors that have been set on the cell (Green ■) drops down. If the tip monitor that you wish to shut down is clicked, shutdown is executed.

※ Displayed in the format of TM** [Display 1: Display 2: Robot name].
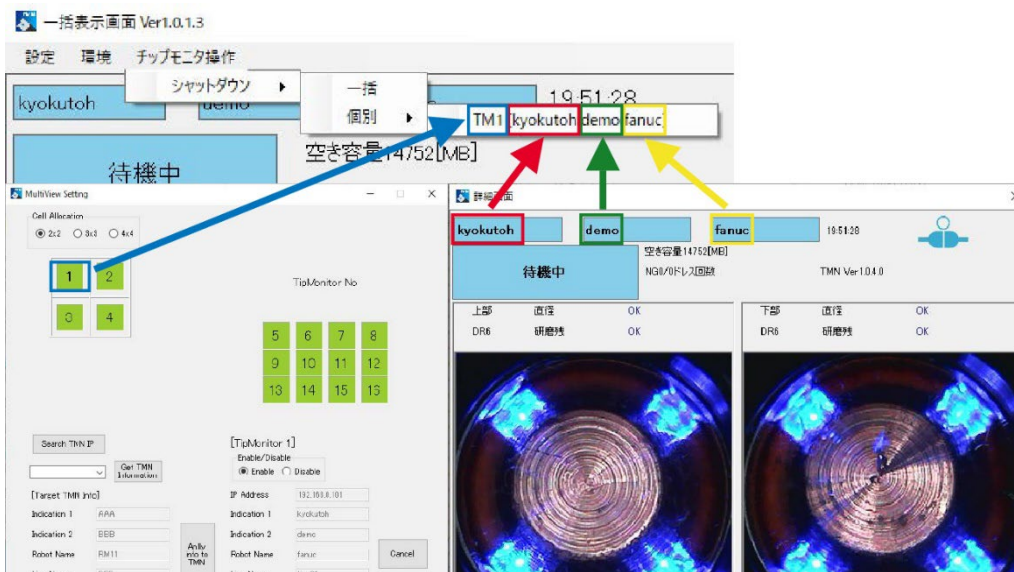
■ Error and error recovery

In case of malfunction in the SD card, camera, etc., the tip monitor turns to error status. In error status, the red LED of the tip monitor main unit flickers and error signal is displayed in the PLC. Details of error can be checked in the HDMI display or the all inspection result indication application. In case an error has been triggered, the error status can be reset if the shutdown button of the tip monitor main unit is pressed for a short period of time (less than 3 seconds). However, in case the cause of the error has not been resolved, it enters error status again.

※   The error signal indicates the following errors.
   ● RTC write/read error
   ● SD card connection error
   ● SD card write/read error
   ● Camera connection error
   ● Image shooting error
   ● Camera parameter setting error
   ● Software error

6. How to Install

⚠ Caution

- TMR-01 must be used together with KYOKUTOH's dresser. Electrode that has been dressed by dressers of other manufacturers may lead to inaccurate judgment.
- When mounting TMR-01, use an equalizer (floating mount) to prevent impact caused by gun pressurization.

※ It is not necessary in case of direct mounting on dresser for adaptors with a floating function.

- Check that various cables do not interfere with the robot and work.
  Do not install in places with water and spatters.
- Protect various cables with flexible conduits, etc.
- TMR-01 has A side and B side. Please be careful when installing.

■ **Installation example**
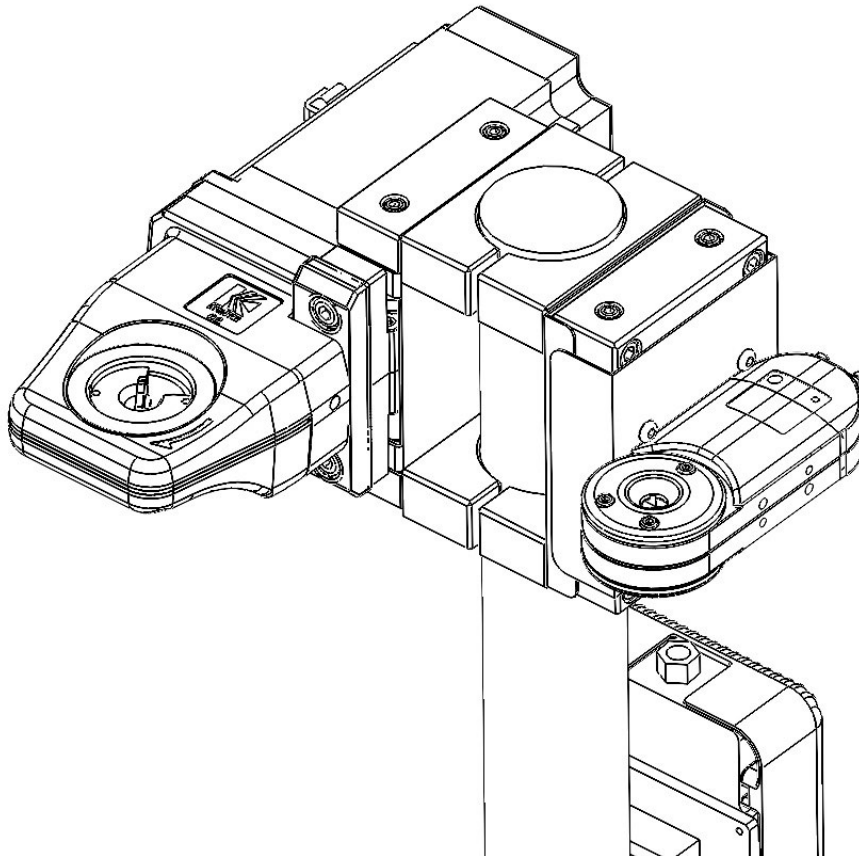
■ Connection (PC part)

To connect each cable, separate the cover and connect to the connector as below.

※ Power must be turned off for connection and do not insert/separate during operation.

※ Must use Kyokutoh recommended M12 8 pin cable. When extending the length of the cable, do not use the standard M12 cable, but attach the Kyokutoh recommended cable first, and then extend the cable with the standard 8-core cable.
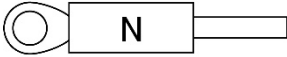
External monitor (HDMI cable)
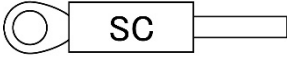
SD card

PC (LAN cable)

M12 8pin cable
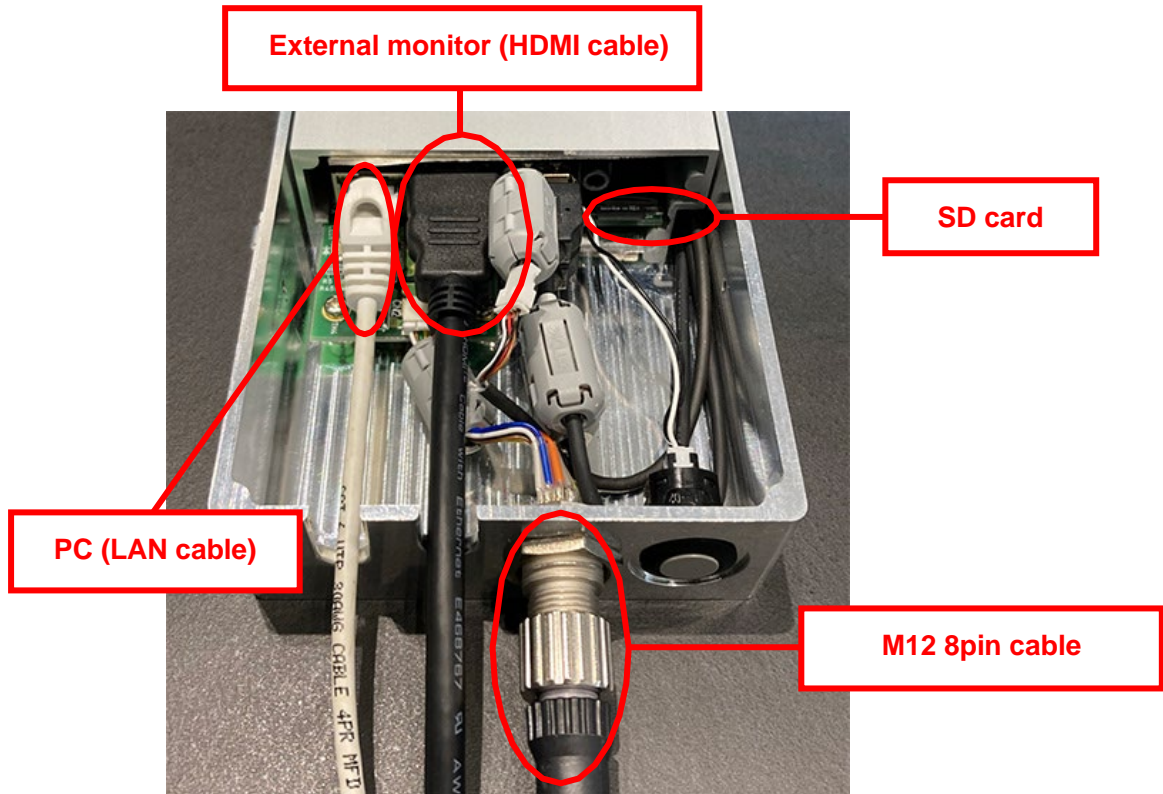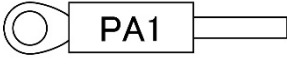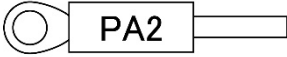
■ How to connect M12 cable

Tighten the screw according to the groove.

M12 8pin cable
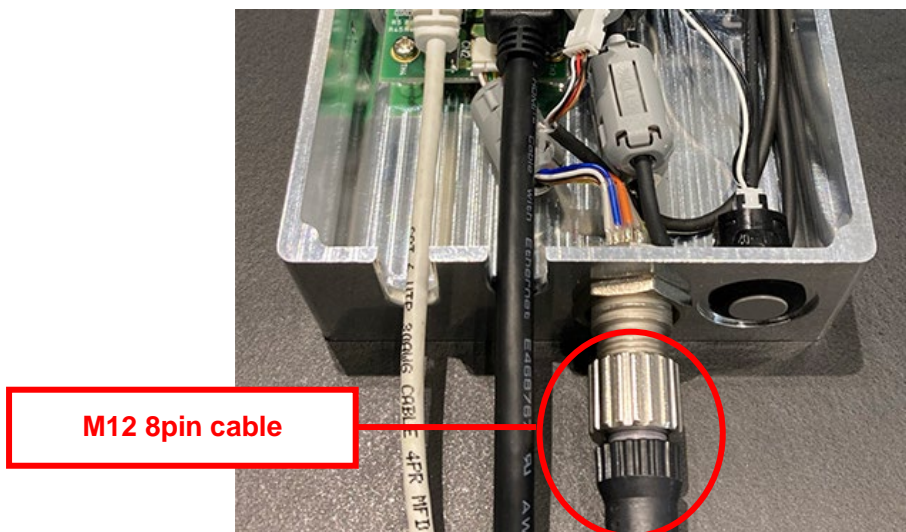
■ M12 cable wiring colors

P	24V	Power
N	0V	GND
PH	Filming instruction signal	Input: PLC_IF_IN0_N
EN	PC software operation signal	Output: PLC_IF_OUT_0
SC	Filming strobe	Output: PLC_IF_OUT_1
PA1	A-Side qualification signal	Output: PLC_IF_OUT_2
PA2	B-Side qualification signal	Output: PLC_IF_OUT_3
ER	Error signal	Output: PLC_IF_OUT_4

※ The error signal indicates the following errors.
- RTC write/read error
- SD card connection error
- SD card write/read error
- Camera connection error
- Image shooting error
- Camera parameter setting error
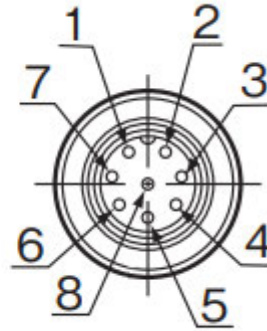- Software error

※ PA1 and PA2 will not be output unless both the diameter judgment and the black remaining judgment are OK.

<EX.>

The black residue of the A-side camera is NG → PA1 is OFF

B-side camera diameter is NG → PA2 is OFF

■ M12 cable pin map
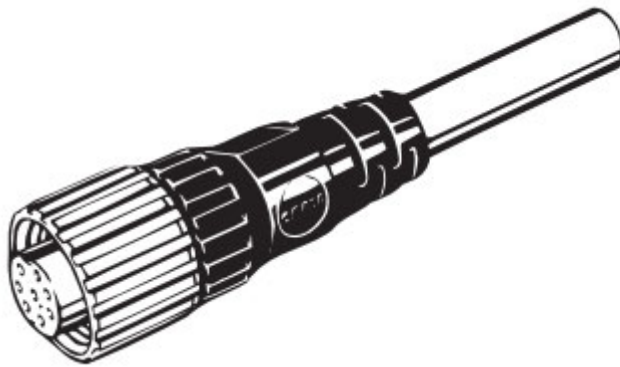
Pin No.	Input/output property	Description of function
1	Power	24V
2	GND	0V
3	Input	Filming instruction signal
4	Output	PC software operation signal (communication signal)
5	Output	Filming strobe
6	Output	A-Side qualification signal
7	Output	B-Side qualification signal
8	Output	Error signal

※ "A-coded M12 round connector 8-pin" shape.

※ Use 8pin 8core unsealed cables.
   7pin + 1 sealed cable or 8pin + 1 sealed cable are unavailable.

■ PLC I/F Connection

1. Simplified circuit diagram

- NPN

Simplified circuit diagram inside TMR

- PNP

Simplified circuit diagram inside TMR
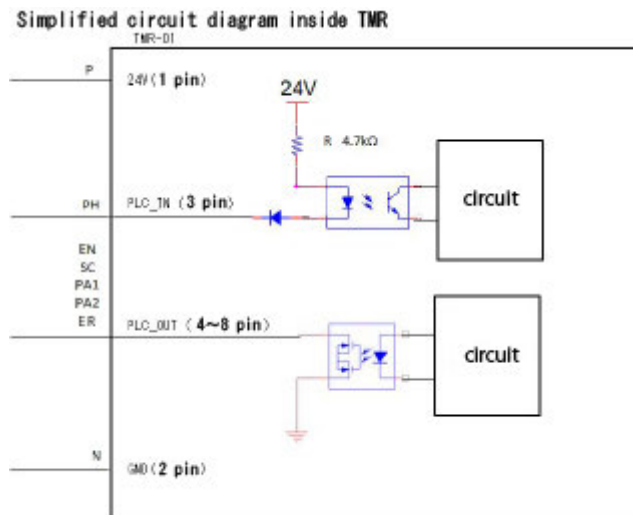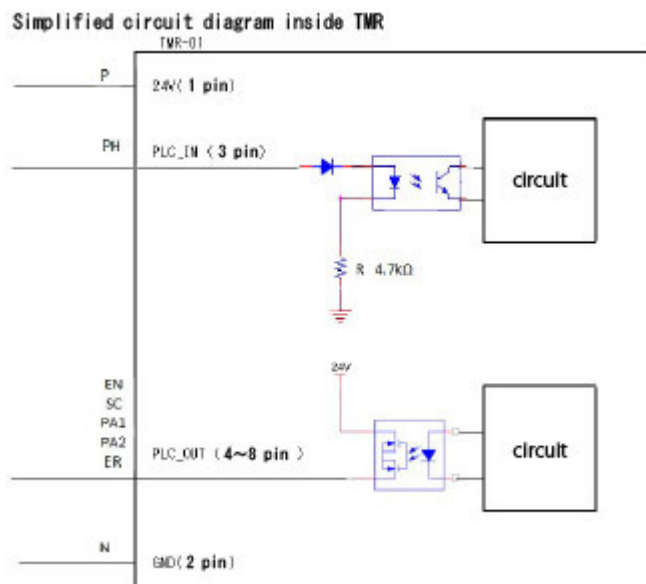
2. Internal wiring diagram

● PNP
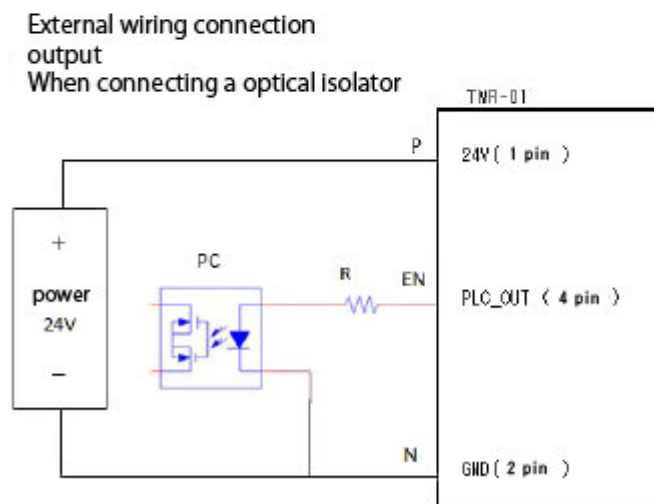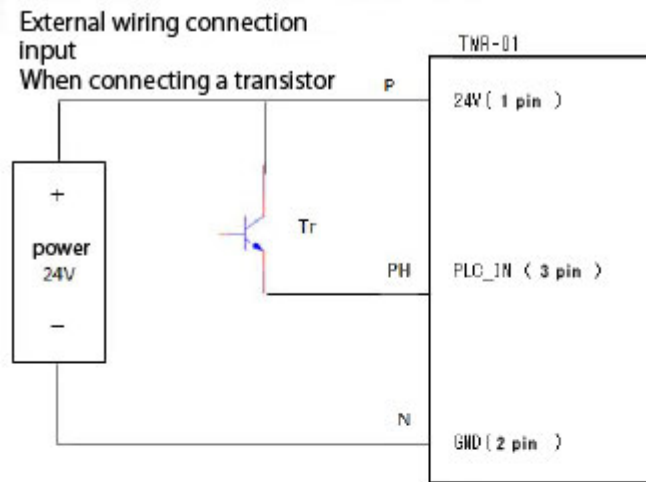
External wiring connection
input
When connecting a transistor

TNR-01

P   24V (1 pin)

power 24V

Tr

PH   PLC_IN (3 pin)

N   GND (2 pin)

External wiring connection
output
When connecting a optical isolator

TNR-01

P   24V (1 pin)

power 24V

PC

R   EN   PLC_OUT (4 pin)

N   GND (2 pin)

※Select the resistor "R" according to the characteristics of the optical isolator

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- NPN

External wiring connection
input
When connecting a transistor

TNR-01

P   24V(1 pin)

power
24V
+
−

PH   PLC_IN (3 pin)

Tr

N   GND(2 pin)

External wiring connection
output
When connecting a optical isolator

TNR-01

P   24V(1 pin)

power
24V
+
−

PC

EN   PLC_OUT (4 pin)

R

N   GND(2 pin)
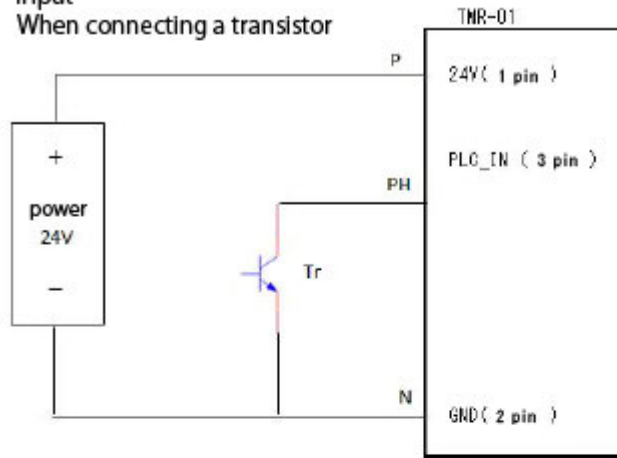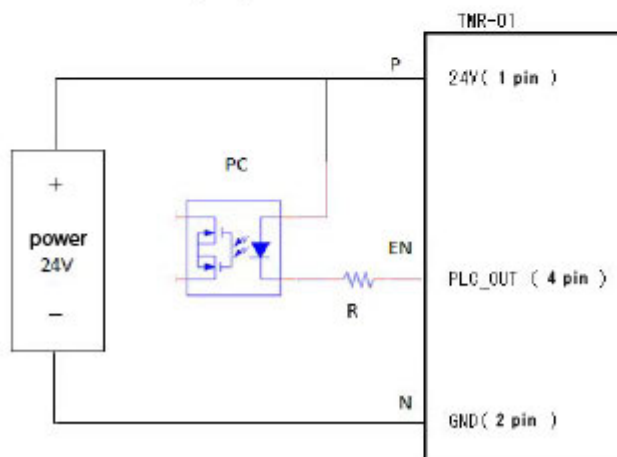
※Select the resistor "R" according to the characteristics of the optical isolator

■Grounding

The grounding cannot be done with the paint on the stand. Remove the paint from the stand and install the PC section.

⚠ Caution

※ Inadequate grounding may result in malfunction or failure of the unit. Be sure to follow this procedure.
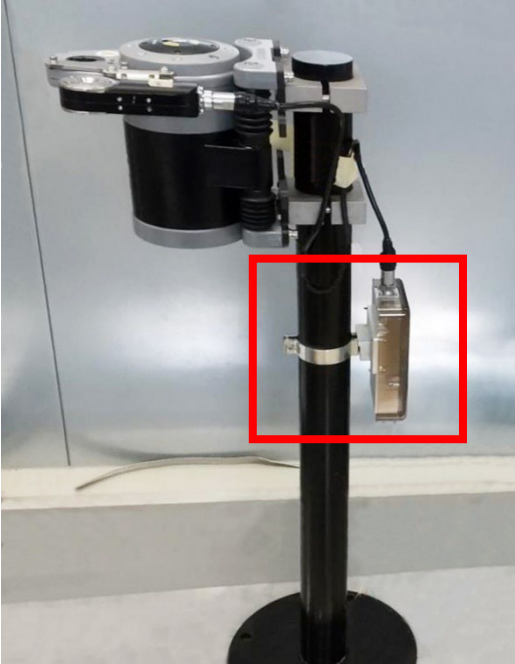
Enlarged view（ex. for module rounded stand）

Bracket attachment section

Anchor bolt attachment section

※ If the paint does not come off, attach it to the PC section with the following ground cable.
Recommendation：Electrical wire with 20A or under, 1.25sq or more.

7. Timing Chart

■ Signal output

1. Pressurization is applied to the electrode immediately after dressing.
2. Filming instruction signal is turned ON when communication signal is ON and filming completion signal is OFF.
3. Filming instruction signal is received to film and to process image and filming completion signal and judgment result (Inspection OK 1, Inspection OK 2) are sent out.
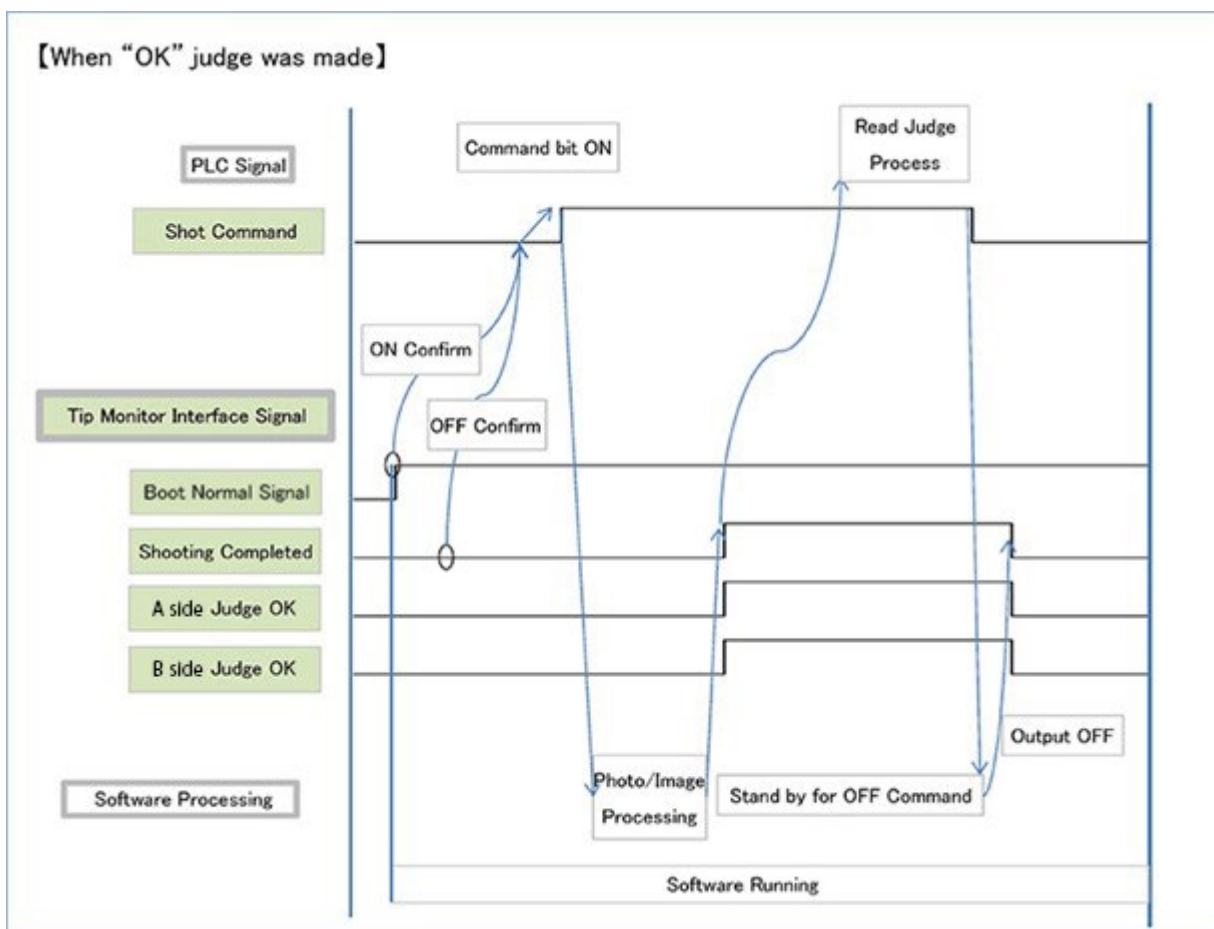4. Once filming completion signal is sent out, filming instruction signal is turned OFF.
5. Tip monitor detects filming completion signal OFF and filming completion signal and judgment result are turned OFF.
6. Pressurization of the electrode is opened.

【When "OK" judge was made】

※ Please allow at least 5 seconds between shots. If continuous shooting is performed within 5 seconds, problems such as not being able to shoot may occur.
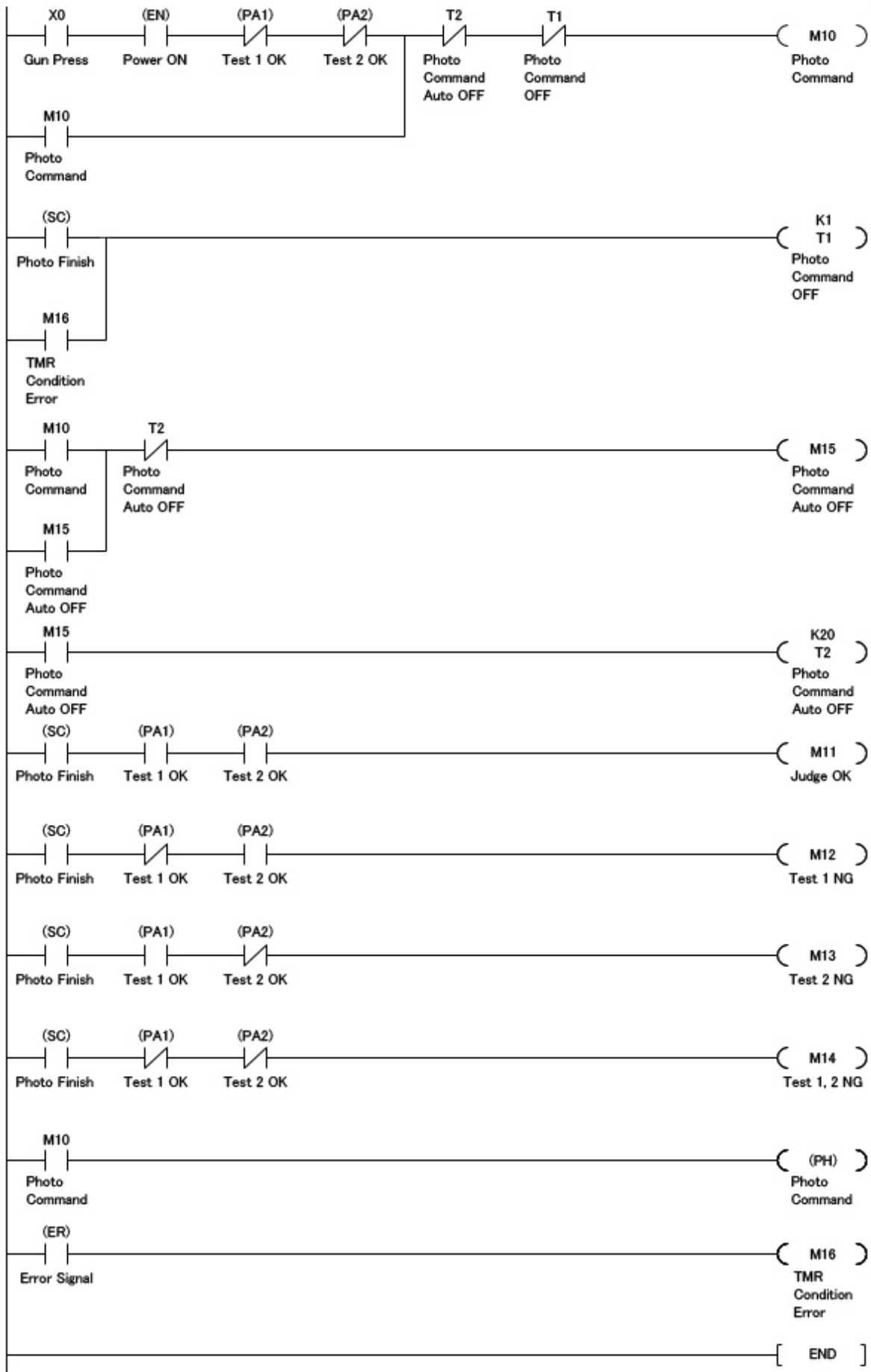
■ Output example

<In case of NG judgment>

- Camera 1's diameter or black residue NG → Inspection OK1 signal is OFF
- Camera 2's diameter or black residue NG → Inspection OK2 signal is OFF

※ Under any circumstances, signal completion signal turns ON upon completion of inspection.

■ Control example

```
   X0         (EN)        (PA1)       (PA2)       T2          T1
   ─┤├─────────┤├──────────┤/├─────────┤/├─────────┤/├─────────┤/├─────────────────( M10 )
 Gun Press   Power ON    Test 1 OK   Test 2 OK   Photo       Photo              Photo
                                                 Command     Command            Command
                                                 Auto OFF    OFF
   M10
   ─┤├──────────────────────────────────────────┘
 Photo
 Command


   (SC)                                                                            K1
   ─┤├──────┬──────────────────────────────────────────────────────────────────( T1 )
 Photo      │                                                                   Photo
 Finish     │                                                                   Command
            │                                                                   OFF
   M16      │
   ─┤├──────┘
 TMR
 Condition
 Error


   M10        T2                                                                    M15
   ─┤├─────────┤/├────────────────────────────────────────────────────────────( M15 )
 Photo       Photo                                                              Photo
 Command     Command                                                            Command
             Auto OFF                                                           Auto OFF
   M15
   ─┤├──────┘
 Photo
 Command
 Auto OFF

   M15                                                                             K20
   ─┤├─────────────────────────────────────────────────────────────────────────( T2 )
 Photo                                                                          Photo
 Command                                                                        Command
 Auto OFF                                                                       Auto OFF

   (SC)       (PA1)       (PA2)
   ─┤├─────────┤├──────────┤├──────────────────────────────────────────────────( M11 )
 Photo       Test 1 OK   Test 2 OK                                              Judge OK
 Finish


   (SC)       (PA1)       (PA2)
   ─┤├─────────┤/├──────────┤├──────────────────────────────────────────────────( M12 )
 Photo       Test 1 OK   Test 2 OK                                              Test 1 NG
 Finish


   (SC)       (PA1)       (PA2)
   ─┤├─────────┤├──────────┤/├──────────────────────────────────────────────────( M13 )
 Photo       Test 1 OK   Test 2 OK                                              Test 2 NG
 Finish


   (SC)       (PA1)       (PA2)
   ─┤├─────────┤/├──────────┤/├──────────────────────────────────────────────────( M14 )
 Photo       Test 1 OK   Test 2 OK                                              Test 1, 2 NG
 Finish


   M10
   ─┤├─────────────────────────────────────────────────────────────────────────( (PH) )
 Photo                                                                          Photo
 Command                                                                        Command

   (ER)
   ─┤├─────────────────────────────────────────────────────────────────────────( M16 )
 Error Signal                                                                   TMR
                                                                               Condition
                                                                               Error

                                                                              ─[ END ]─
```

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8. PC Settings

■ Before starting

The software of this product is comprised of 2 types of software below.

1.   Maintenance application (TipMaintenance.exe)

2.   All display application (MonitorSystem.exe)

※ ".NET FrameWork 4.5.1" and above must be installed for the operation of the software above.

■ Checking the version of .NET FrameWork

1.   Click the search window at the bottom left side of the screen and enter regedit to operate.
     Once the pop-up screen for user account control shows up, click "Yes" and proceed.

2.   HKEY_LOCAL_MACHINE¥SOFTWARE¥Microsoft¥NET Framework Setup
     Open the \NDP\v4\Full's key to check Release.
     (The number before and after the 6 digits displayed becomes the Release number)

3.   Check the version that corresponds to the Release number obtained from the previous clause
     in the Microsoft's site.
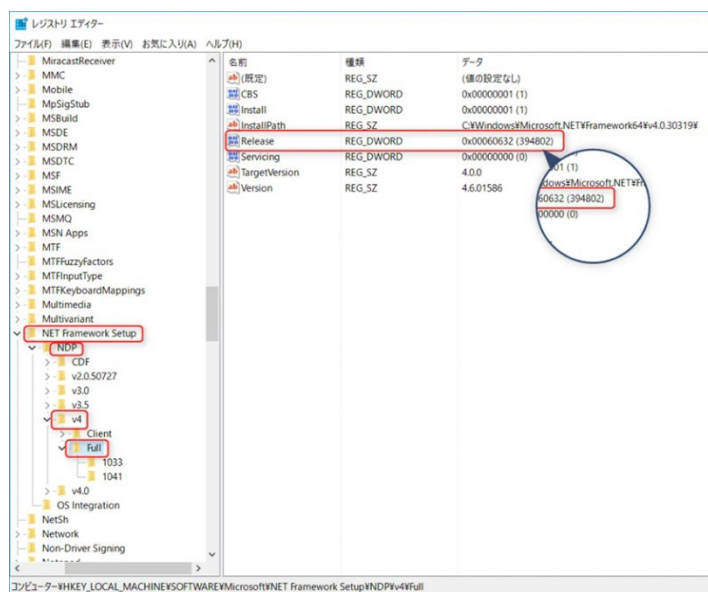
■Setting the IP address in the PC

【In case of Windows10】

Right click the Windows mark (bottom left side of the screen) → Settings → Network and Internet → Change adapter option→ Double click the adapter of wired LAN → Property → Internet Protocol Version (TCP/IPv4)

By clicking in the order of the above, the IP address setting screen appears so set according to the table below.

Item	Setting parameter
IP address	Set in the range from 192.168.0.102 to 192.168.0.254
Subnet mask	Set as 255.255.255.0
Default gateway	Set as 192.168.0.1
Preferred DNS server (Primary)	Setting is not required (Leave as blank)
Alternate DNS server (Secondary)	Setting is not required (Leave as blank)

※ TMR-01 has been set as "192.168.0.101" by default.
   Do not set as "192.168.0.101" to prevent overlapping.

※ Please set the IP address of TMR-01 to "192.168.0.101-254".
   Unexpected problems may occur.

■ Stop background software

Set so that Windows Update and software such as anti-virus software do not run in the background.
As for the setting method of anti-virus software, check the manual of the anti-virus software.

9. Installing Program

■ Before starting

Install the software after "7. PC settings" is complete.

■ How to install

1. Click "TMTools.msi and click "Execute admin authority".

※ TMTools.msi file can be executed from the USB memory as well.

※ For Windows 11, a Windows Defender popup will appear. Be sure to click "Allow access".

2. Click "Next" to continue.
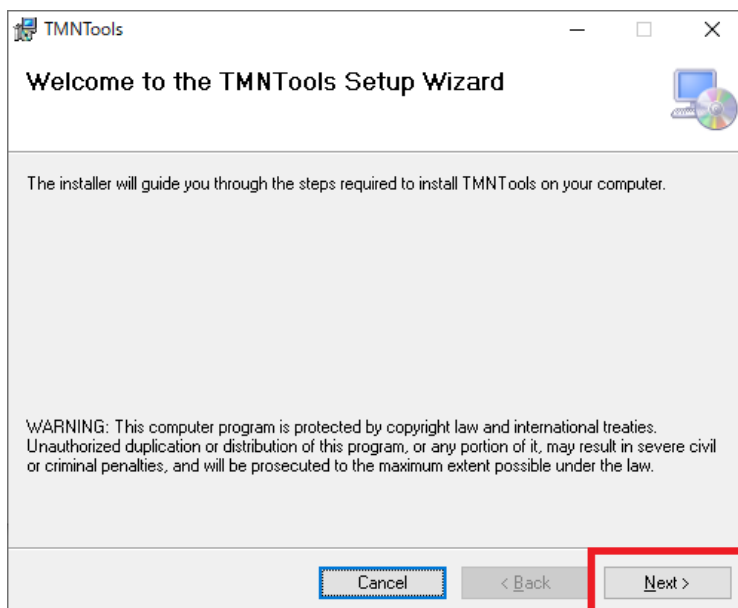
3. Click the "Browse…" button to determine the folder for executing the file required for TMR operation.

   After selecting a temporary folder, click the "Next" button.
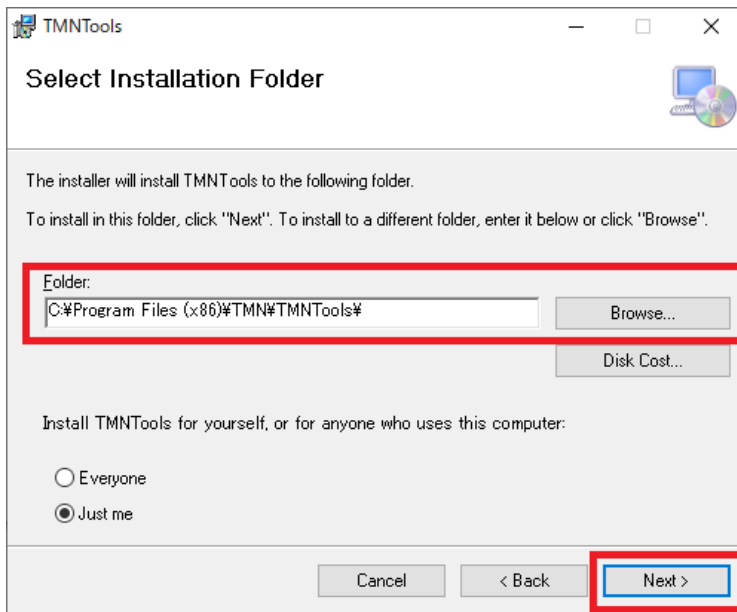
4. Once the following screen is displayed, click "Next" again.
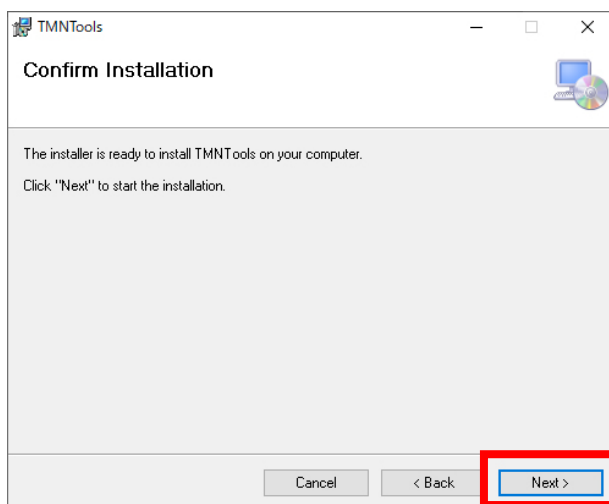
5. Once the program has been installed, click the "Close" button.
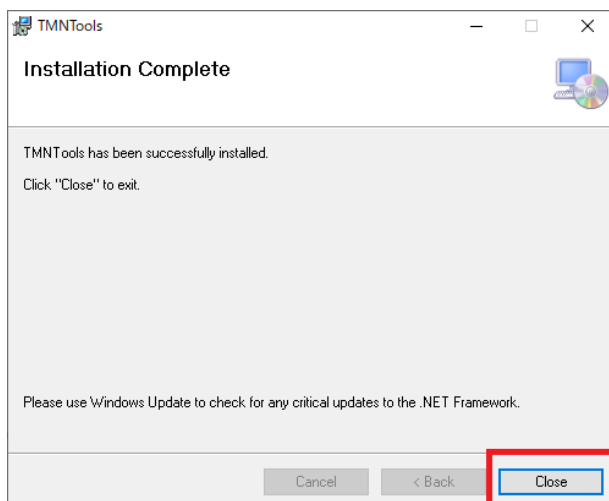
6. After installation, the "TMTools" folder will be created in the C drive.
   Confirm that the folder was created.
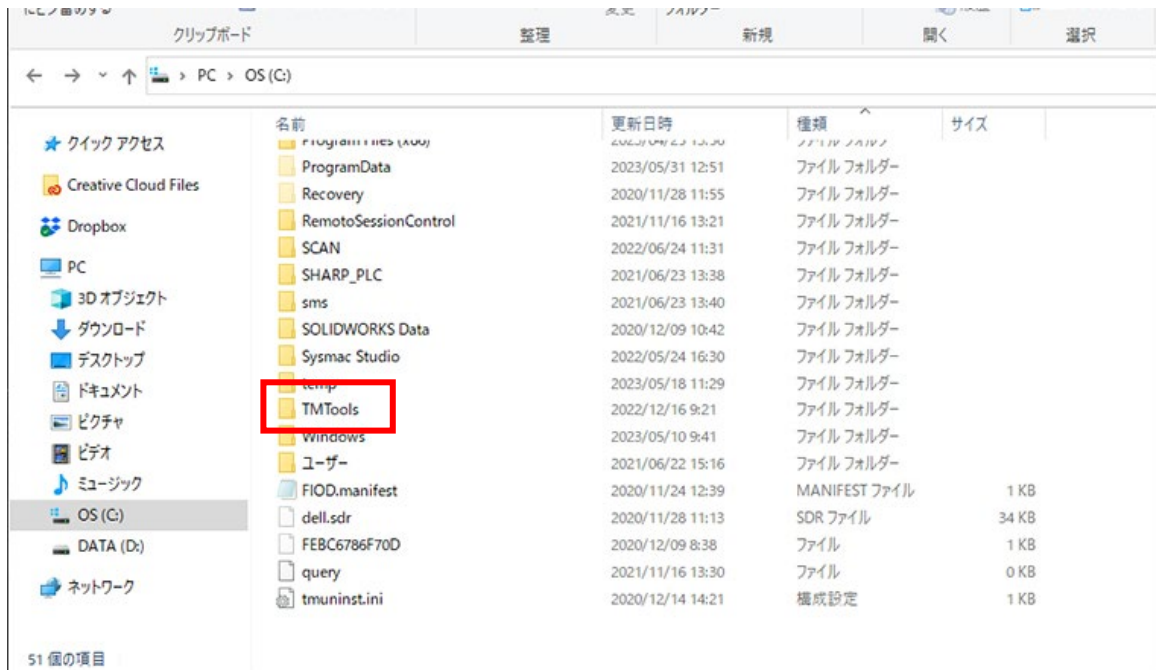
7. If necessary, copy the shortcuts of the maintenance software and monitoring software to the desktop, etc.
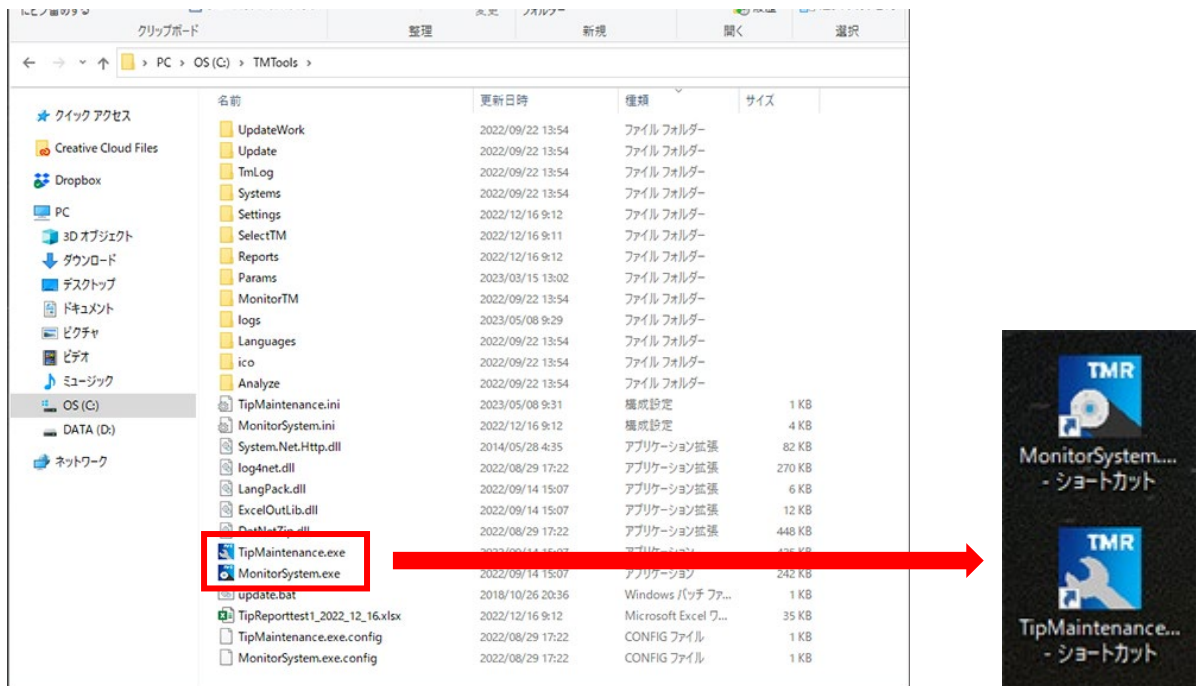
10. Deleting Program (Uninstall)

To delete this program in case the directory (storage folder) of the program installation has been set incorrectly, etc., deletion can be made in "Apps and Features" in the Control Panel.

It is registered as "TMTools" so select then delete.
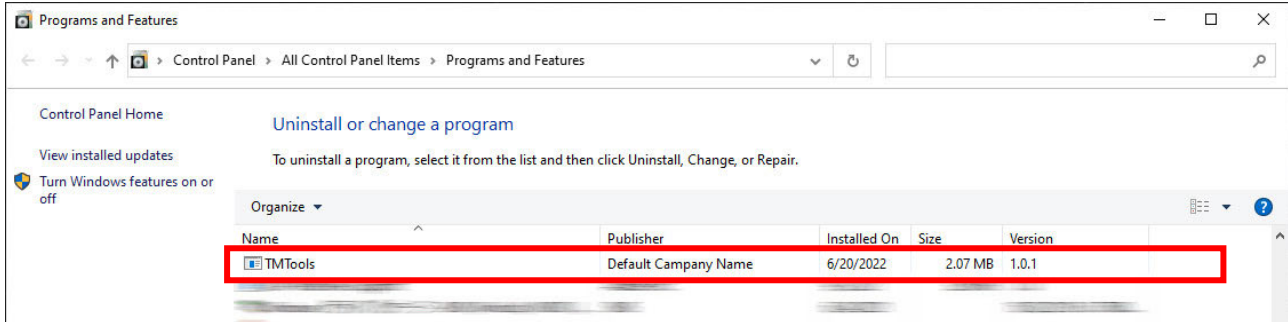
11. Setting

11-1. How to Operate

■ Before starting

Once the "TipMaintenance.exe" is executed, the maintenance application is executed. Once executed, various settings can be made for the tip monitor in the main screen below.

※ Upon initial operation, English is set as default language.

※ TMR cannot receive the shooting signal during maintenance, but it is not a problem.
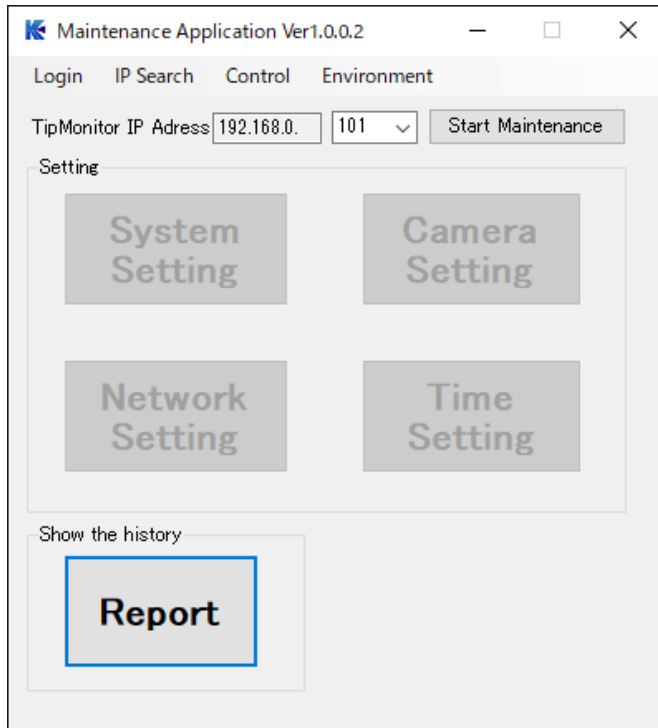
■ How to change the language

By selecting the "Language" in the "Environment" at the top right side of the main screen, language can be selected.

After selecting and reboot this software, the language is changed.

※ English is set by default.
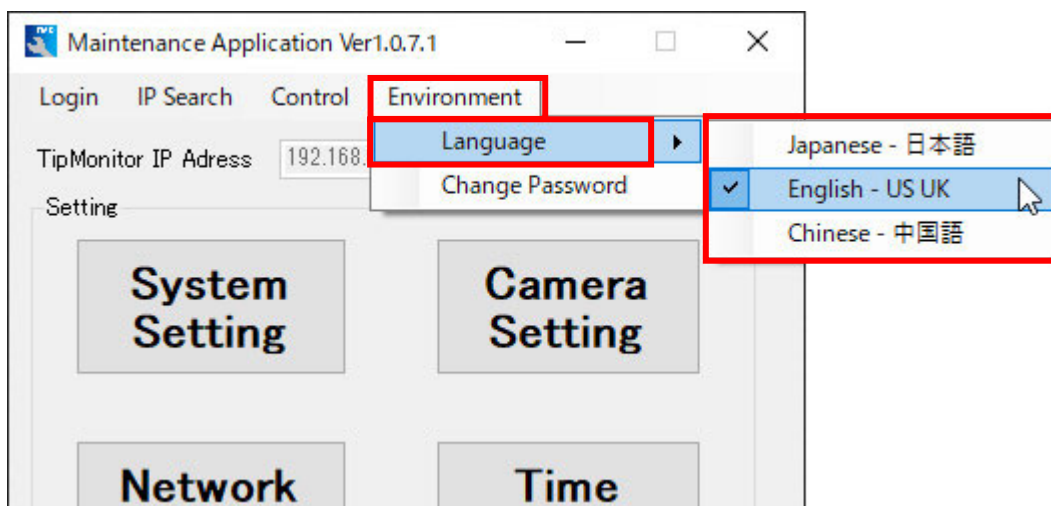
■ How to log in

If the "Log in" button at the top right side of the screen is clicked, a pop-up screen is displayed.

Enter the initial password "0000000" and click the "Execute" button to log in.

By logging in through this screen, system setting and camera setting can be made after maintenance begins.
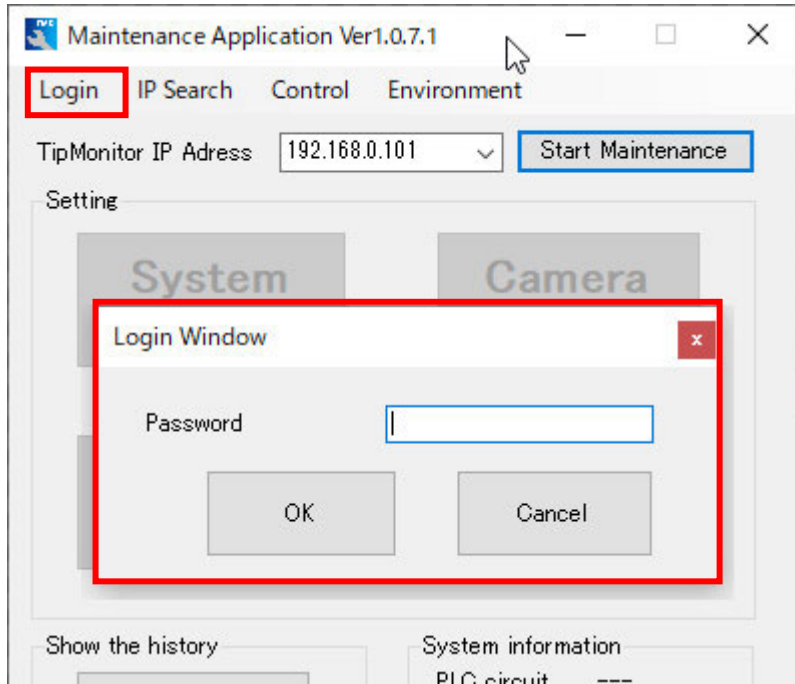
■ How to change the log in password

When changing the log in password, select "Change password" in the "Environment" button at the top right side of the screen.

After entering the current password displayed in the screen, set the new password to change.

The new password is applied after the application is executed.
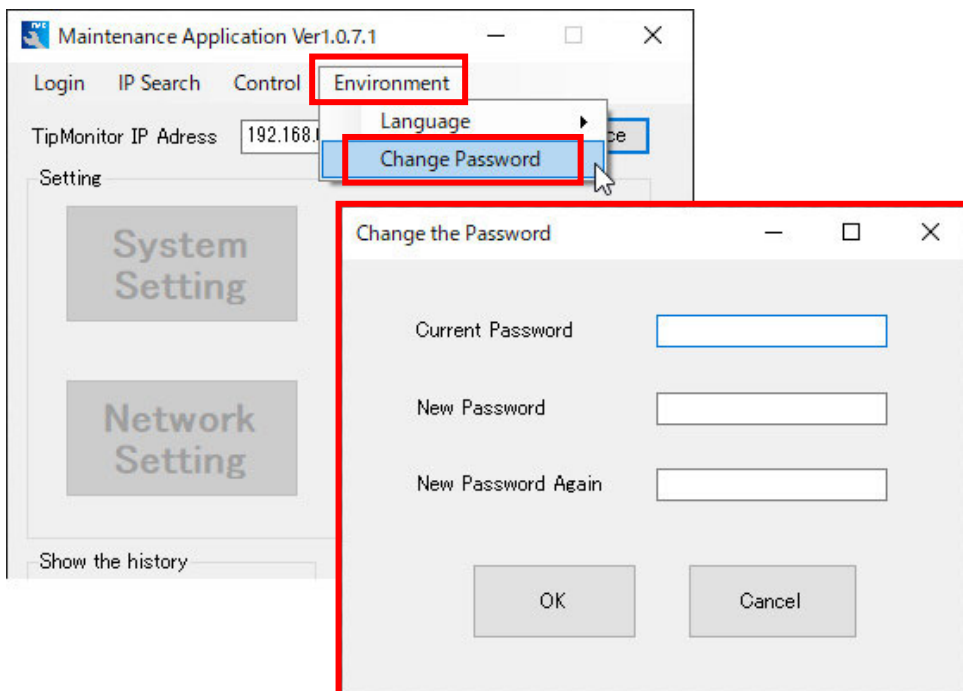
■ How to search for IP

Before starting maintenance, search for the IP address of the tip monitor that is connected.

After clicking the "IP search" button, enter the range of Start search and End search in the window that is displayed then click the Execute button.

The IP address that has been found in the search is added to the drop down list of the tip monitor's IP address.
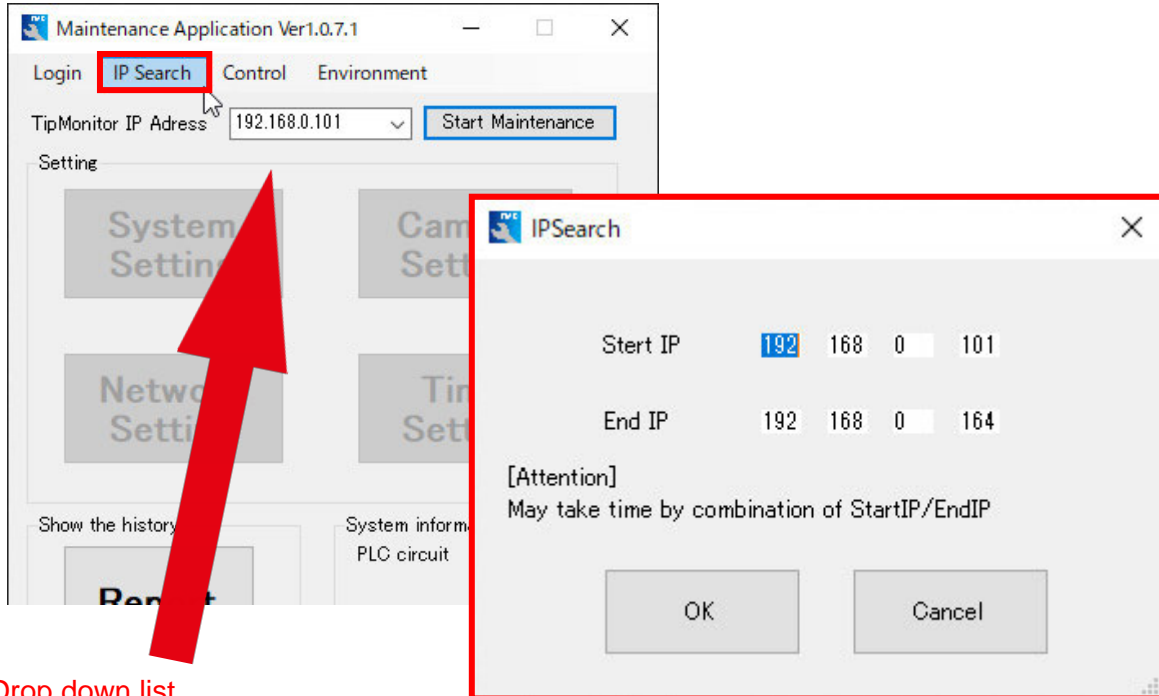
※　Drop down list

■ Start maintenance button

Select the IP address of the tip monitor for the setting that you wish to change in the tip monitor IP address field then click the "Start maintenance" button.

After successful connection, the button that has been greyed out (System settings, Camera settings, Network settings, Time settings) can be used.

After starting, this button becomes the "End maintenance" button and once clicked, the connection with the tip monitor ends.
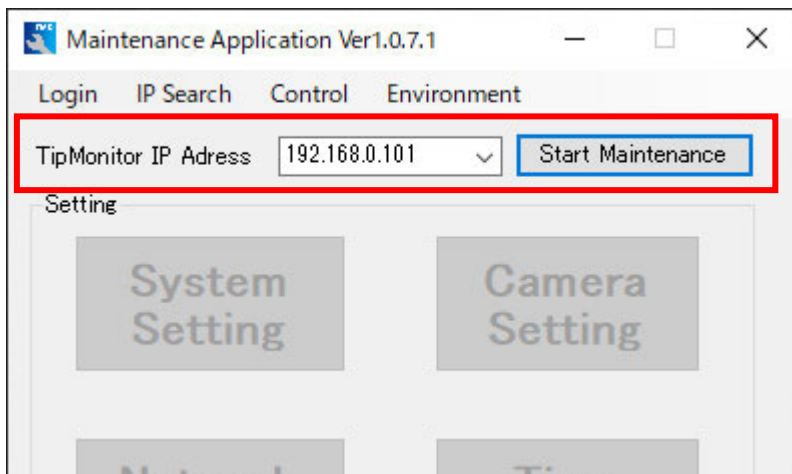
If the "System settings" of the main screen is clicked, the system setting screen is displayed.

【Example】
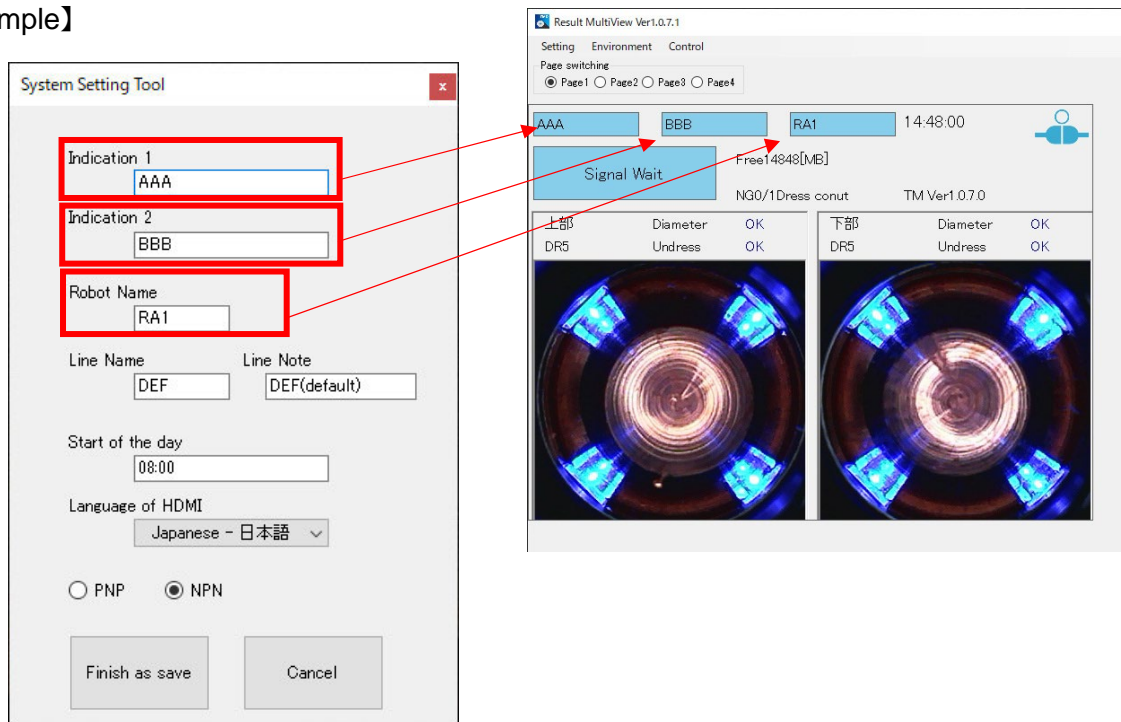
Set by referring to the table below regarding each item.

Item	Description
Indication 1	Enter the string to be displayed in the HDMI output display. (Red "rectangular display 1" in the figure above)
Indication 2	Enter the string to be displayed in the HDMI output display. (Red "rectangular display 2" in the figure above")
Robot name	Enter the string to be displayed in the HDMI output display. (Red "rectangular robot name" in the figure above)
Line name	Enter the name of line. (It is used in folder name, etc.)
Line note	Enter the name of line. (It is used in screen display, etc.)
Start of the day	Enter the operation start time of tip monitor of 1 day. (The inspection result after the time that has been entered is saved in the folder of the day)
Language of HDMI	Select the language displayed in the HDMI output display.
PNP/NPN	Select the circuit of PLC input/output.
Finish as save	Saves in the system parameter file and sets the parameter in the tip monitor. Once setting is complete, it returns to the main screen. ※ After this button is clicked and maintenance is complete, the tip monitor reboot automatically.
Cancel	Ends System settings and returns to the main screen.

Item	Description	Remark
Indication 1	Fullwidth less than 50 characters	Up to 10 letters can be displayed in the screen.
Indication 2	Fullwidth less than 50 characters	Up to 10 letters can be displayed in the screen.
Robot name	Fullwidth less than 50 characters Do not enter letters that cannot be used as file name	Up to 10 letters can be displayed in the screen.
Line name	Fullwidth less than 50 characters Do not enter letters that cannot be used as file name	Up to 10 letters can be displayed in the screen.
Line note	Fullwidth less than 50 characters Do not enter letters that cannot be used as file name	Up to 10 letters can be displayed in the screen.
Start of the day	Fullwidth less than 5 characters Time: hh:mm format	

11-3. Camera Setting

■ Before starting

Please execute the following settings after checking the status as below.

- Main unit has been installed in the line and positioning has been completed using the gun.
- Electrode immediately after dressing by the tip dresser in use has been used.
- Tip monitor main unit has been pressurized with electrode immediately after dressing.
- There are no foreign substances, such as dust inside.
- There is no shadow at the electrode tip part.

■ Order

1. Before executing the setting, grind using the tip dresser to be used and the electrode should maintain the pressurized status.

※ Recommended electrode force 1500N

2. If the "Camera setting" button is clicked in the maintenance software when logged in, the camera setting screen is displayed.

   When completing the setting, execute Order ① ~ ④ displayed on the left.

3. If "① Select Camera" is clicked, the current status is filmed and the screen is displayed as below.

※ Execute when cap tip is immediately after dressing and when tip monitor is being pressurized. If it is not in the correct status, error is triggered, leading to incomplete setting or inaccurate inspection result.
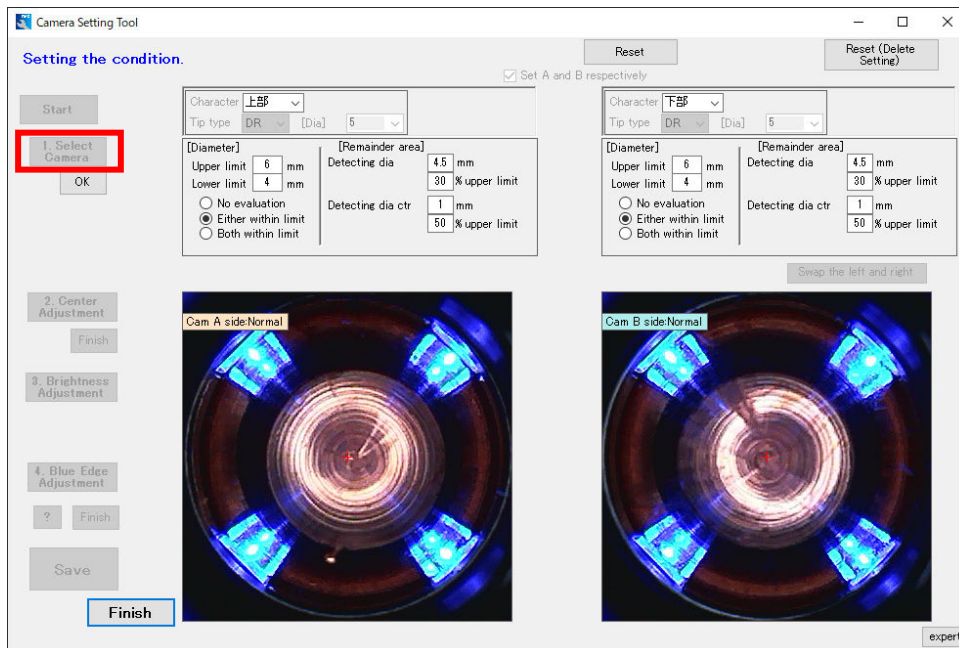
4. The "Set Left/Right (A/B) separately" field is used in case the cap tip is different.
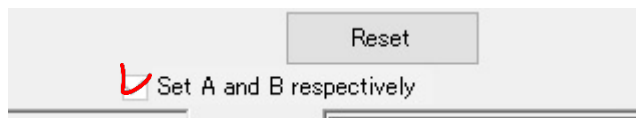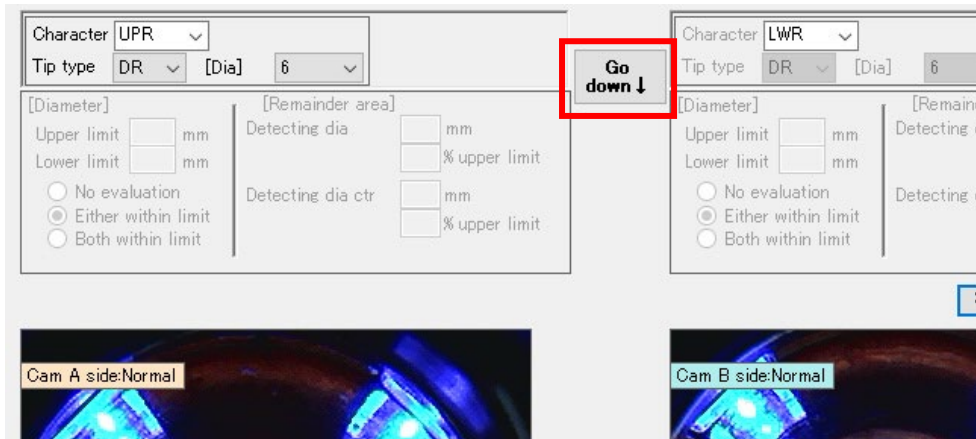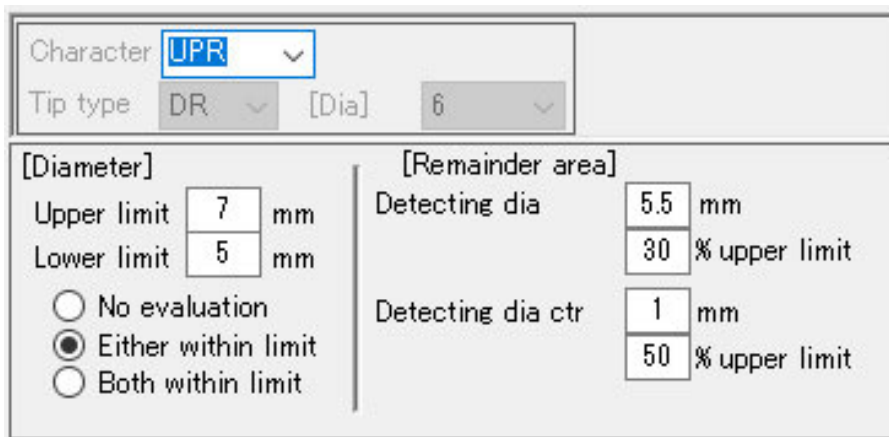

5. Select the string.
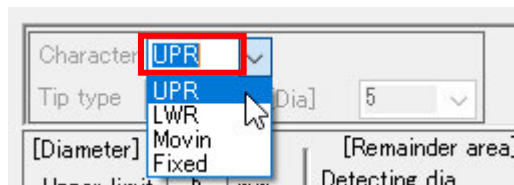
※ String is displayed as below in the monitor screen.

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6. Select electrode type and tip diameter.

7. Click "Go down".

Cam A side:Normal

Cam B side:Normal
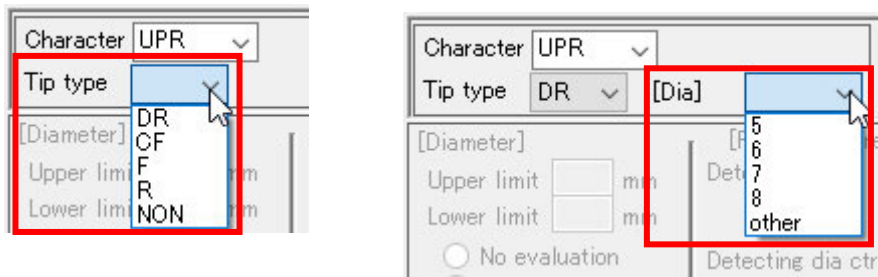
8. Enter each time of the Settings parameter.

| Character | UPR | | | |
| Tip type | DR | [Dia] | 6 | |

[Diameter]
Upper limit 7 mm
Lower limit 5 mm
○ No evaluation
◉ Either within limit
○ Both within limit

[Remainder area]
Detecting dia 5.5 mm
30 % upper limit
Detecting dia ctr 1 mm
50 % upper limit

※ When re-setting the electrode, return using the "Go back" button to make changes. At this time, the judgment parameter is initialized so attention is required.

※ As for the setting method of each parameter, refer to the following page.

※ For F mode and R mode, there is no diameter setting.

【Diameter setting】
- Max., min. setting of judgment: In case the result is within the range, it is judged as OK
- Select judgment pattern regarding the length of 2 directions that have been measured

    No judgment   : Diameter judgment is judged as OK at all times

    One side within limit : OK judgment in case only one side is within limit (default)

    All within limit: : OK judgment in case both sides are within limit

※The diameter is measured in two places.
(Reference: Green and orange in the figure below)
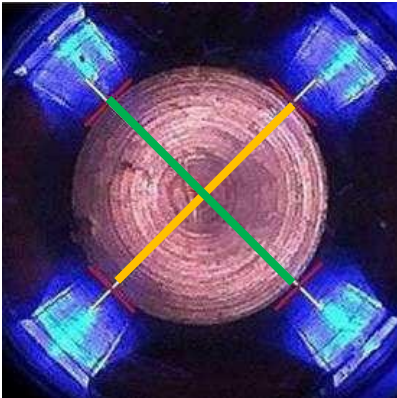
【Area setting of black area】
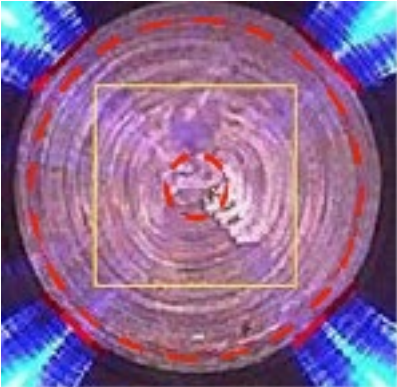
Circle indicated as dotted line on the outer side (Judgment made on the entire tip part..5.5mm in the case of this image)
- Diameter of black area: Designate range to judge the black area of the electrode tip part
- Judgment threshold of black area: Maximum ratio of black area acceptable within designated range

Circle indicated as dotted line on the inner side (Judgment made on the central part of the tip..1.0mm in the case of this image)
- Diameter of black area of the central part: Designate range to judge the black area at the center of the electrode tip part
- Judgment threshold of black area of the central part: Maximum ratio of black area accepted within designated range

9. Once the setting is complete, click "OK".
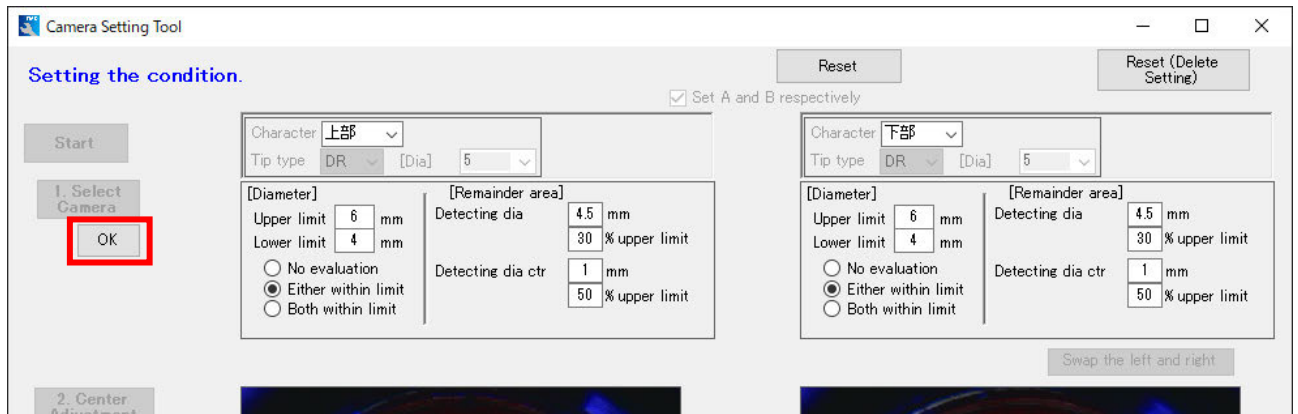
※ Once the confirmation message is displayed, click "yes" to proceed to the next time.
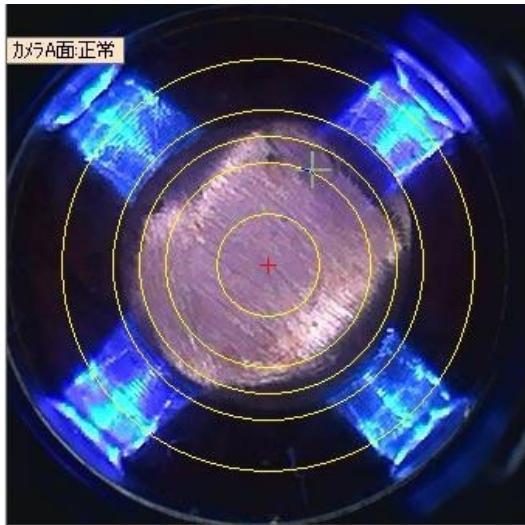
10. Click "② Center Adjustment".
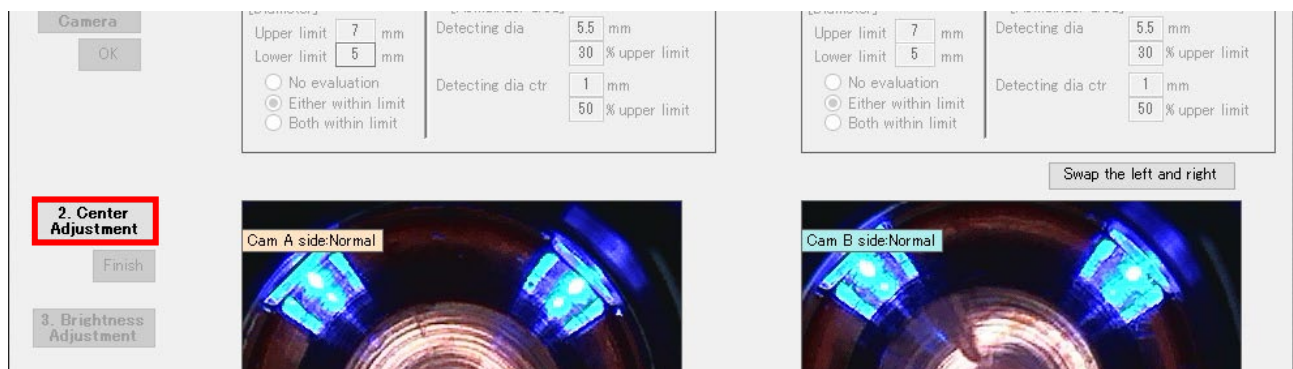
11. Adjust using the (a), (b) 2 methods below so that the center of the electrode tip part is positioned at the center (displayed in red cross).
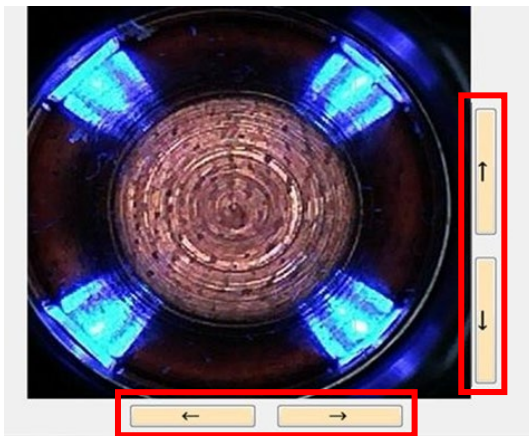
(a) Align the cursor to the center of the electrode tip and double click

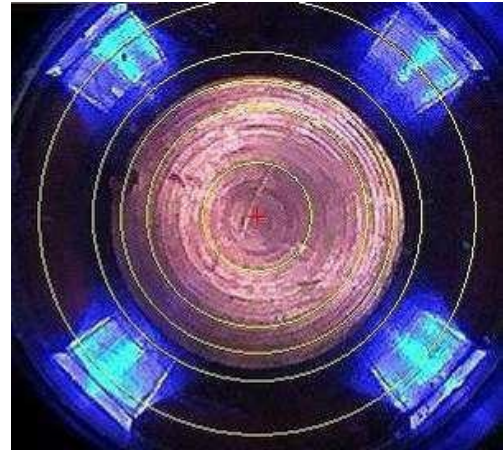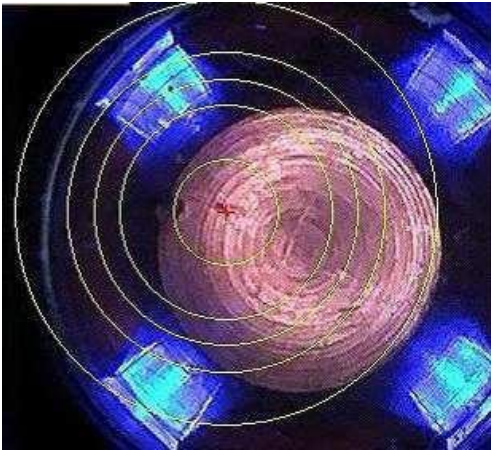※ If the mouse is placed on the image, the cursor is displayed.

(b) Click the arrow button outside the image.

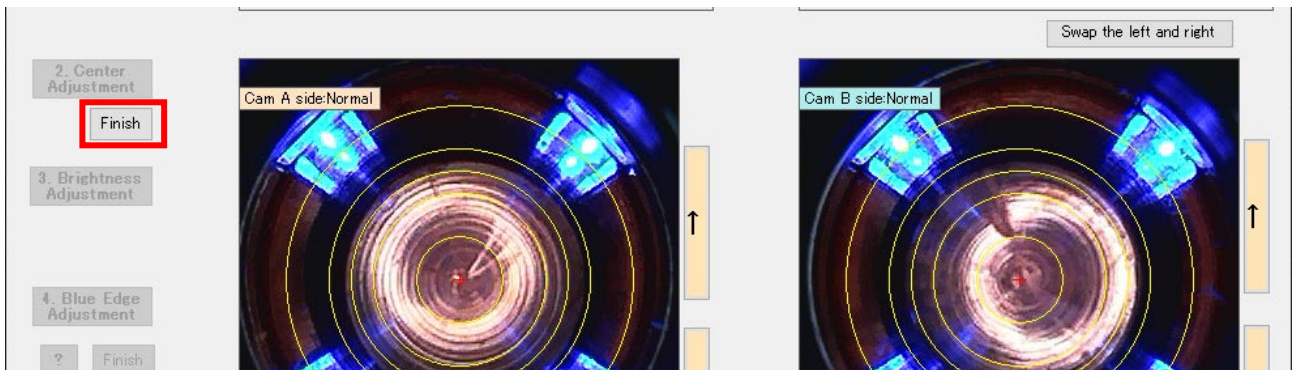※ It moves according to the direction of the arrow clicked.

【Example】

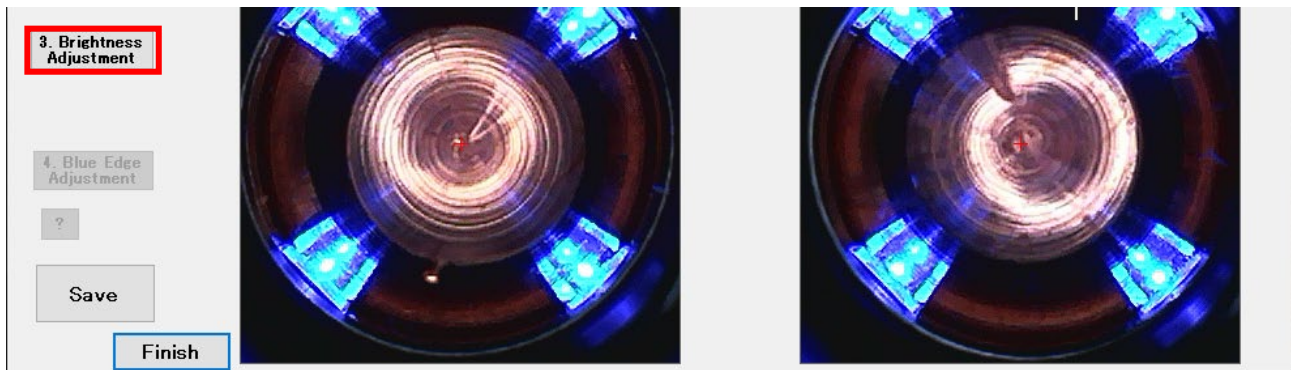**Before adjustment**

After adjustment

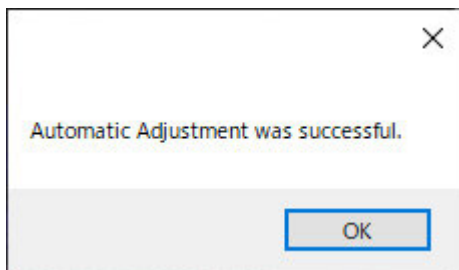12. Once the setting is complete, click "Finish".

13. Click "③ Brightness Adjustment".

    If this item is clicked, it is executed automatically.

※ Approximately 10 filming and adjustment repeat automatically.

【In case automatic adjustment is successful】
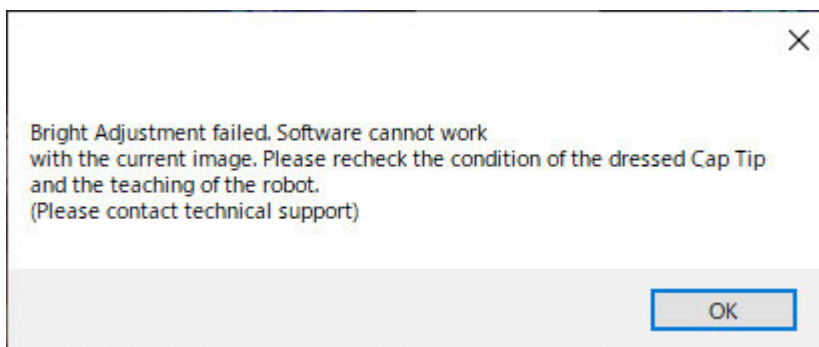

Once the screen above is displayed, click "OK".

【In case automatic adjustment has failed】

In case automatic adjustment has failed, an error message is displayed as below.
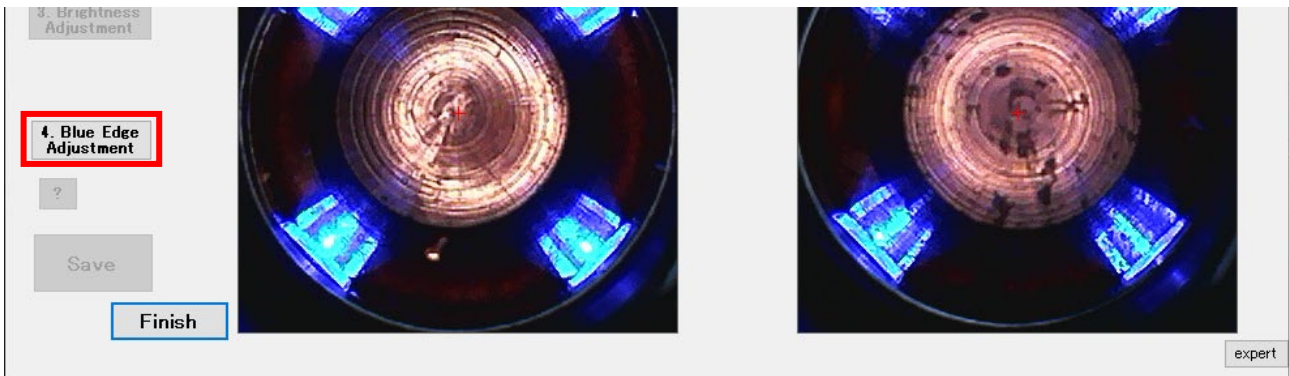
Click "OK" and check

● If this is the tip immediately after dressing.

● If dressing is executed correctly.

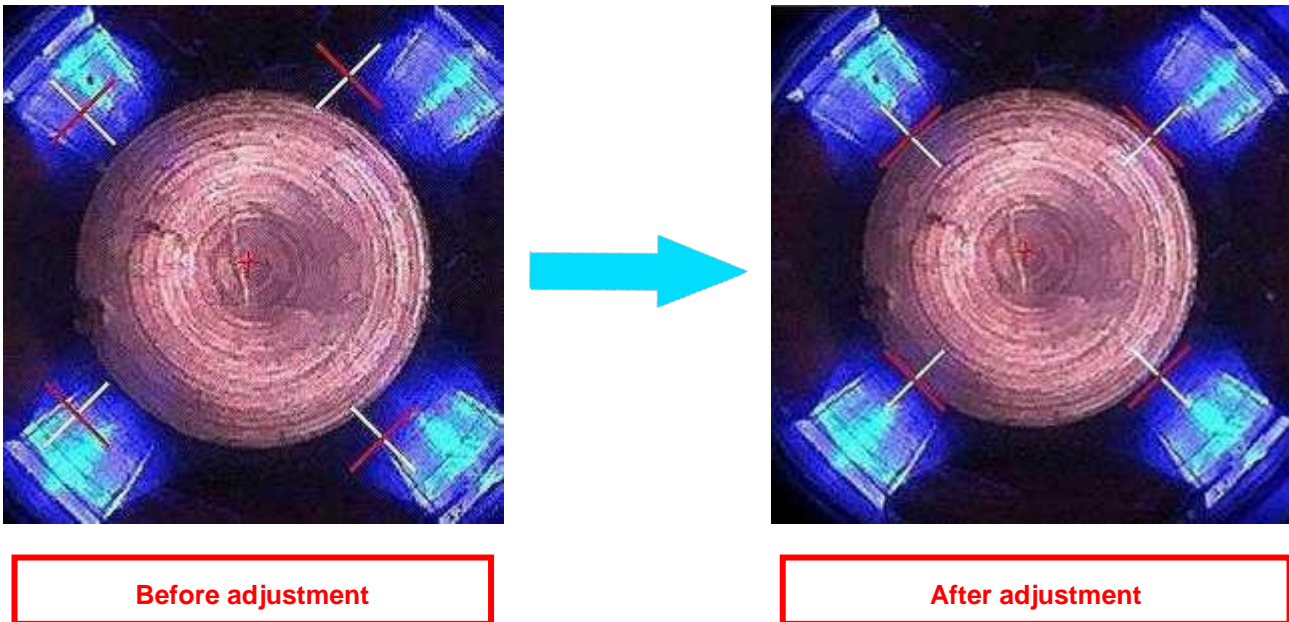● If there isn't a problem in teaching.

Check the above items then re-adjust.

14. Click "Blue Edge Adjustment".

15. Drag 4 markers displayed using the mouse and allocate to the boundary of the blue light and electrode tip part.

Before adjustment

After adjustment

16. Click "Save" and reflect the parameter in the camera.

17. Open the gun.

18. Click "Finish" to complete the Camera setting.

■ Description of function

If the "Network settings" button is clicked in the main screen, the tip monitor's IP address and subnet mask can be changed.

Set by ensuring that it doesn't overlap with other tip monitors and network devices.

※ Once you end the maintenance after setting this item and clicking the "Set to tip monitor" button, the tip monitor reboot automatically.

Button	Function
"Setting to the Tip Monitor"	Sets the IP address and subnet mask that have been entered to the tip monitor.
"Finish"	Ends Network settings and returns to the main screen.

■ Input restrictions

There are figures that cause problems when entered in the IP address and subnet mask.

※ Figures other than those indicated in the table below cannot be entered so attention is required.

※ Please avoid setting "192.168.0.101" to prevent IP duplication with the default TMR.

※ Please set the IP address of TMR-01 to "192.168.0.101-254". Unexpected problems may occur.

Type	Figures that can be entered
IP Address	IP address 4th octet is 101～254
Subnet Mask	Subnet mask 4th octet is 254, 252, 248, 240, 224, 192, 128 or 0

■ Default figures

| Item	Default
IP Address	192.168.0.101
Subnet Mask	255.255.255.0

11-5. Time Setting

By clicking the "Time settings" button in the main screen, the time of the tip monitor can be set.

Setting can be made with the "Set to tip monitor" button by setting one of "PC's current time" "Change to arbitrary HH.MM.SS".

"PC's current time": Sets the system time of the PC executing maintenance.

"Change to arbitrary HH.MM.SS": Sets arbitrary time to the tip monitor.

※ When this time is set, the time inside the tip monitor is changed but the time display within the external monitor that displays the HDMI is updated when the next inspection is executed for display.
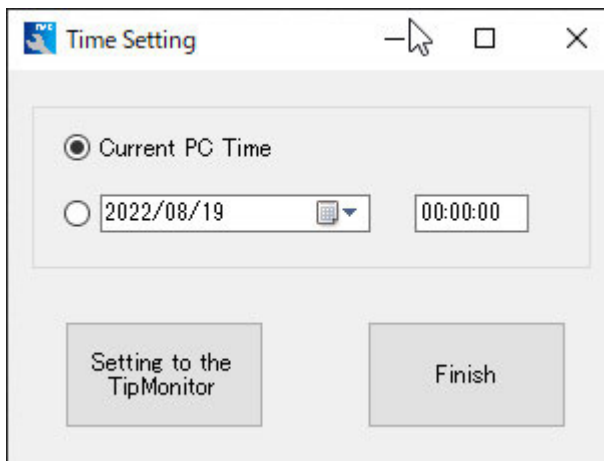
⚠ Caution

The clock built into this product has a monthly difference of about 30 seconds from the standard time. Correct the time when the maintenance software ends.

11-6. Report

The past inspection results can be checked with the "Report" button of the main screen.

Select the date that you wish to check and once the line name and robot name are designated, the results are displayed.

In addition, if the image displayed in the detailed link is clicked, the detailed description of the result is displayed.

■ Each element of the screen

	Element	Description
Designate date	Date (Drop down list)	Enter the date of the report to display.
	today -1 button	Designates the date 1 day ago.
	today -2 button	Designates the date 2 days ago.
display image		Selects whether to display images in the report.
Line Name		Designates the line name of the report to be displayed.
Robot Name		Designates the robot name of the report to be displayed.
"Show" button		Displays the details of the report according to date, line name, machine number, display option and time order.
in the time order		Displays the details of the report in the ascending order of time.
Prepare EXCEL		The detail of the report is created in Excel file.
Display option	start up	Selects whether to display the result of checking after operation.
	after dressing	Selects whether to display the result of record after dressing.
	event	Selects whether to display the result of events.
	average brightness	Selects whether to display the average brightness of each report.
	before dressing	Selects whether to display the result of checking before dressing.
	original record	Selects whether to display Diameter1-Center margin %
Information display field		Displays "No. of NGs/No. of dressing/No. of events" and other information.
Details of report		Displays the details of the report. If the cell of the [Detailed link] column is clicked, the detailed display screen is displayed.

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■ Each element of detailed display screen
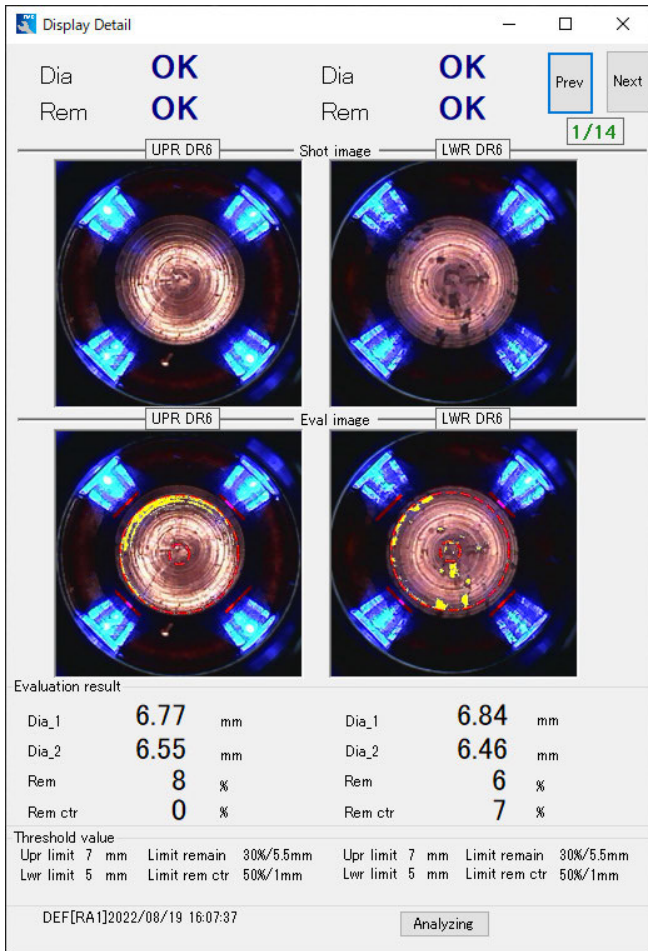
● **Judgment image**

Red line (near blue light)" indicates the location of tip diameter detection

(Blue edge detection part – 4 places)

※ It is not displayed in case detection can't be made.

Red line (outer): Inner part of the dotted line is the dressing residue detection part

Red line (inner): Inner part of the dotted line is the central residue detection part

● **Judgment result**

Diameter ①: Displays the length of the line connecting the upper left and bottom right of the edge detection part

Diameter ②: Displays the length of the line connecting the upper right and bottom left of the edge detection part

Dressing residue: Displays the ratio recognized as black among dressing reside detection part

Central dressing residue: Displays the ratio recognized as black among central dressing residue detection part

Element	Description
Evaluation result	Displays the judgment result of the diameter and dressing residue of A surface and B surface.
Previous button	Displays the details of 1 previous report.
Next button	Displays the details of 1 next report.
Display page	Displays the total number of reports and the current report number.
Shot image	For details, refer to the items indicated at the top right.
Eval image	For details, refer to the items indicated at the top right.
Evaluation result	For details, refer to the items indicated at the top right.
Threshold value	Displays the setting threshold used in the inspection judgment.
Information display field	Displays the robot name/inspection time, etc.
Analyzing button	Executes the interpretation tool. This button is displayed when connecting to the tip monitor. ※　Password is required to start processing.

※　"Analyzing tool" is a function that can be used under the support of the seller.

※　As for the tip in the figure above, tip that is not immediately after dressing was used.
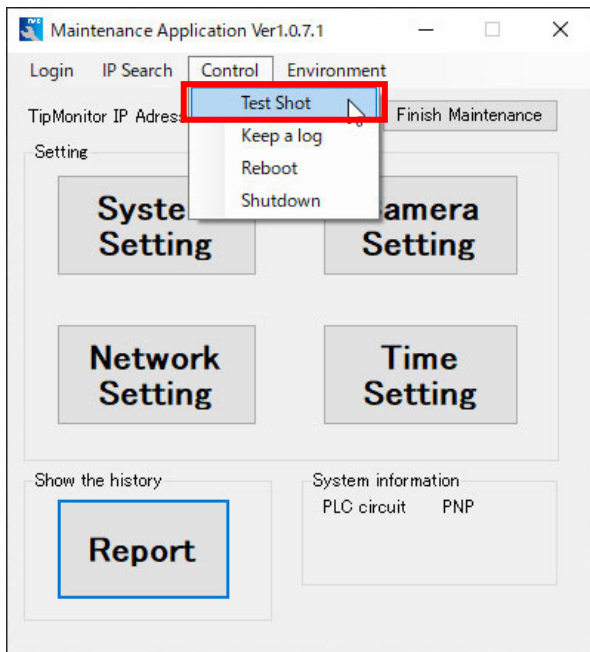
※　The diameter of the central dressing residue cannot be changed.

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12. Other Function

■ Test Shot

Test shot of the tip monitor can be done in the maintenance application.

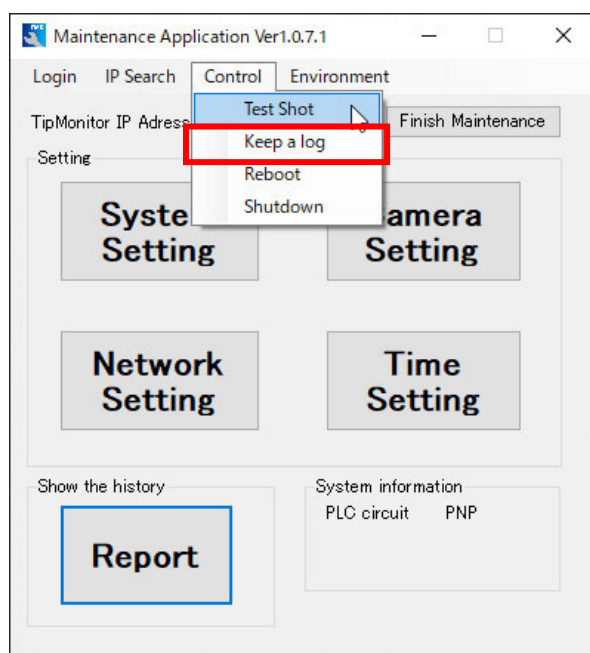If clicked, test filming begins.

■ Keep a log

Past operation logs of the tip monitor can be acquired through the maintenance application.

Click "Keep a log" in the "Control" at the top of the main screen.

※ Acquiring operation log is limited to the case in which maintenance PC is connected.
It is not saved in the built-in memory card.

Then, select the start date and end date displayed in window for selecting the acquisition period.
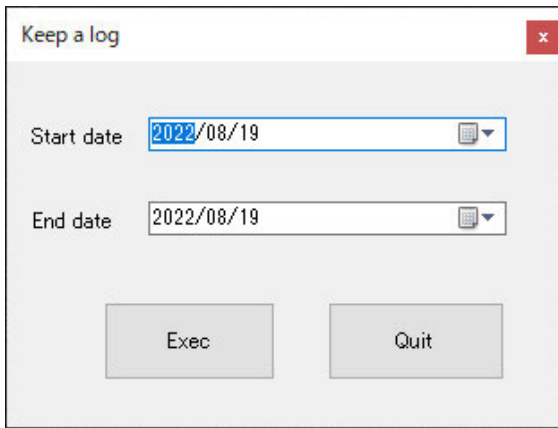
※ Log operation that has been acquired is saved within the "TmLog" folder in the same path as the "TipMaintenance.exe".
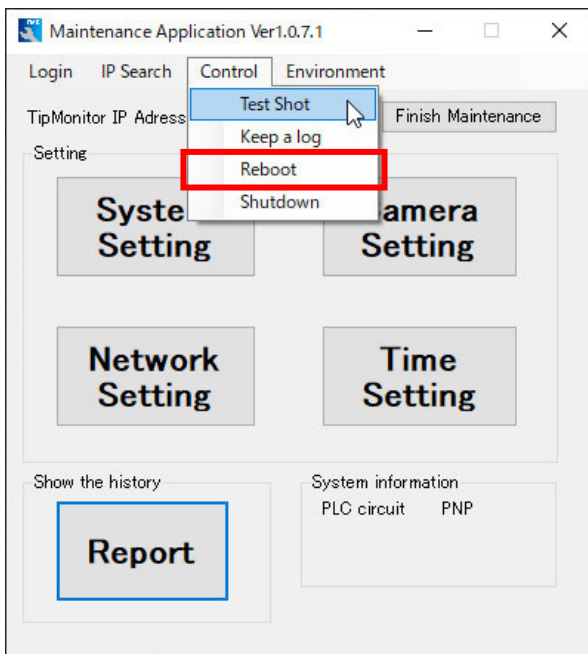
■ Reboot

Tip monitor can be reboot with the maintenance application.

Click "Reboot" in the "Tip monitor operation" at the top of the main screen.

If End maintenance is clicked, reboot is executed.

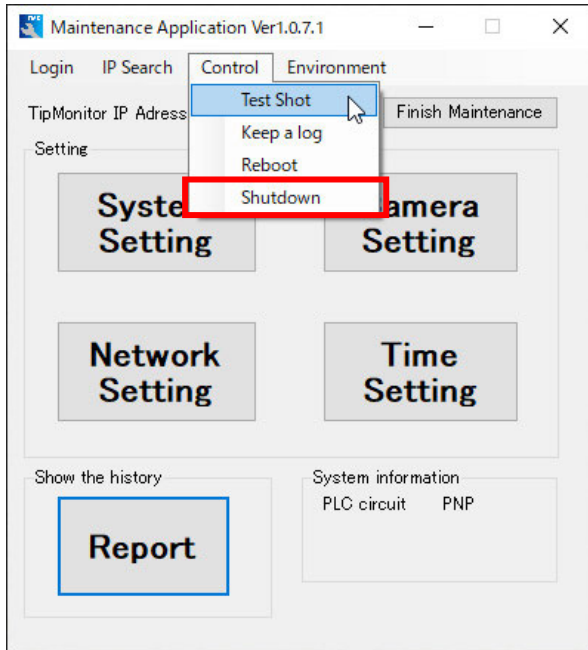※ For other methods of starting other, refer to "5. Start / Shutdown".

■ **Shutdown**

Tip monitor can be shut down with the maintenance application.

Click "Shutdown" in the "Tip monitor operation" at the top of the main screen.

If End maintenance is clicked, shut down is executed.

※　For detailed shutdown method, refer to "5. Start / Shutdown".

■ **Firmware update**

pattern 1

Firmware of the tip monitor can be updated with the maintenance application.

When updating the firmware, execute "update.bat" within the folder selected in "9 How to Install" execute the maintenance application.

※　In case it has been executed in the bat file above, "Updating" is displayed in the menu item of the main screen.
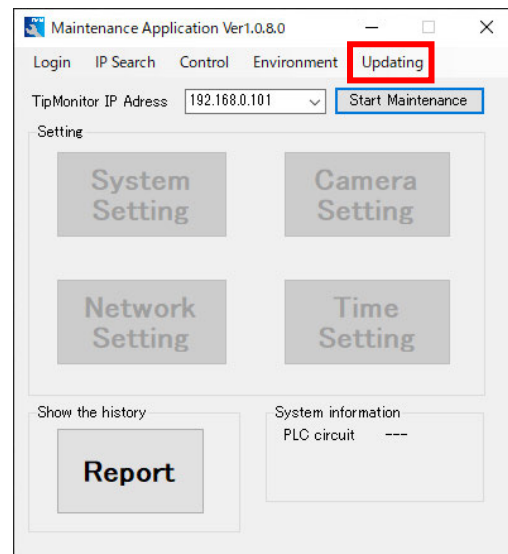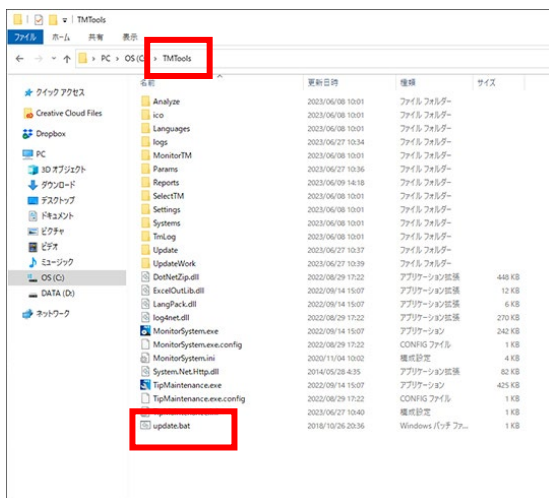
If the "Update" above is selected, a dialogue for selecting file is displayed.

Select the zip file containing the firmware update program distributed by our company.
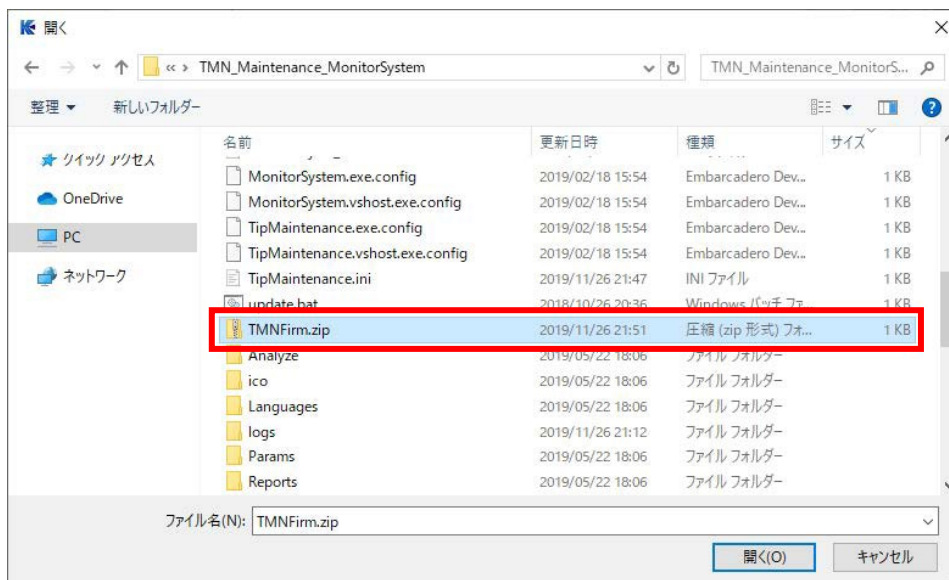
Once update is executed, the tip monitor reboot automatically.

※ Zip file name can be changed freely.

※ Regarding the firmware correction version, we will inform you from the product support page on our website or from our sales department.

pattern 2

When updating the software, download it from the product support page on our website, or execute "update.bat" in the folder given by our sales department to start the maintenance application.

When you start the file, the update will be completed automatically.

■Switching language

Language can be changed by clicking "Environment → Language" on the Maintenance Application or the MultiView Setting.

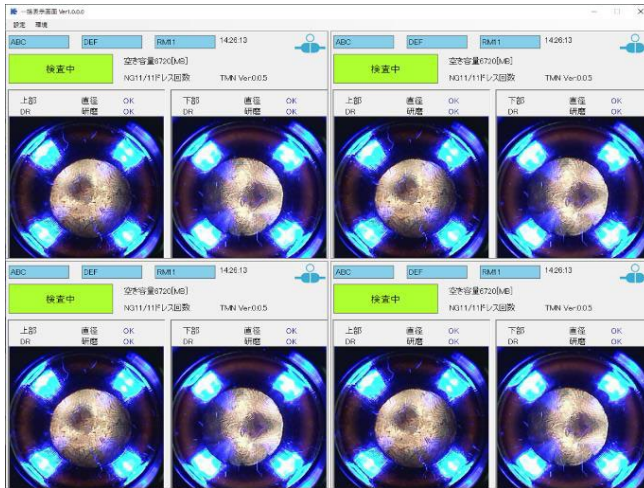The display language will change when the software is restarted.
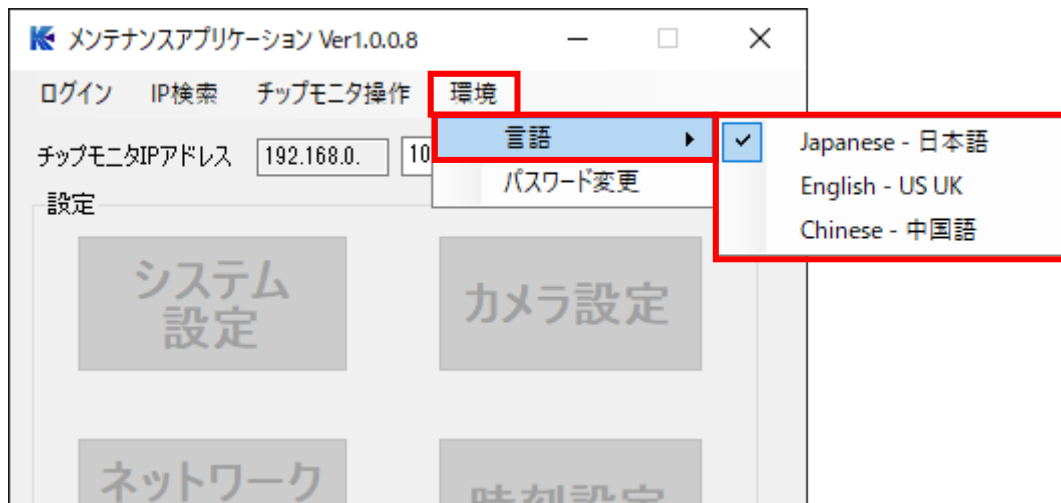
13. Batch Display Function

■ **Before starting**

If "Monitorsystem.exe" is executed, the All display application is executed.

■ **All display screen**

1. If Monitorsystem.exe is executed, the following screen is displayed.

※ The current status of the tip monitor that has been set in each cell is displayed.

2. If the image of each tip is displayed, it can be enlarged and displayed.

※ It may take time to display image and to reflect result.

■ Changing settings

The display screen can be set in the "Setting" at the top left side of the main screen.

The following setting can be changed in this screen.

Set appropriate according to the environment of use.

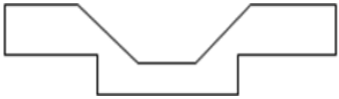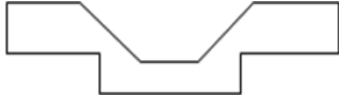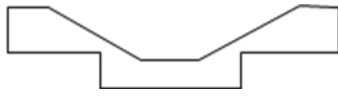| No.	Item	How to use
①	Cell Allocation	Select 2×2, 3×3, 4×4 for the number of cell displayed in the list. The number of cells displayed on the batch display function differs depending on the number of cells selected.
②	Positioning of result display	The position of the result display can be set by moving the tip monitor allocated on the right inside the cell using drag & drop.
③	IP search, connection	The IP address list of the tip monitor that can be used can be acquired with the "IP auto search" button. The acquired list is reflected in the drop down list at the bottom.
④	Target Tip Monitor info	Displays the information acquired from the tip monitor of the IP designated in ④.
⑤	Registration information display	Displays the list of information registered in the tip monitor number that has been selected currently.
⑥	Enable/Disable setting	Selects whether to display tip monitor number that has been selected with the radio button as result. Activated tip monitor number is displayed in green and deactivated tip monitor number is displayed in pink.
⑦	Apply info to Tip Monitor	Registers the device information displayed in ④ in the tip monitor number that has been selected.
⑧	Finish as save/Cancel	Saves and cancels before turning to the display screen.

14. Product Model

■ Example of TMR-01 format

Basic format		Upper pressurization plate		Lower pressurization plate
TMR-01	-	B	-	B
		C		C
		SP		SP

※ When using standard Pressure Plate for both upper and lower side, the model will be displayed TMR-01, not TMR-01-A-A.

■ Identification of pressurization plate

Ａ: Standard　　 Supports tip external diameter (φ13・φ16・19) tip diameter (φ5～8)/8Ｒ　shape

　　　　　　　　Supports tip external diameter (φ13・16)/flat shape

Ｂ: For φ13DR　 Supports tip external diameter (φ13) tip diameter (φ5～8)/6.5Ｒ　shape

Ｃ: CF120°　　　Supports tip external diameter (φ13・16・19) tip diameter (φ5～8) 120°

SP: Special type other than A, B, C

■ Pressurization plate setting

Sign	Format		Shape image
A	Standard (φ13-8R・φ16-8R φ19-9.5R / F)	TM01-KP-00A	
B	Standard (φ13-6.5R)	TM01-KP-00B	
C	For CF (CF 120°)	TM01-KP-00C	

■ Electrode support table

Tip diameter	Tip diameter	Shape	Pressurization plate supported
φ13	φ5～φ8	8R	A
φ16			
φ19		9.5R	
φ13	φ5～φ6	6.5R	B
φ13	φ5～φ8	CF120°	C
φ16			
φ19			
φ13	-	R20	A
φ16			
φ13	-	F	A
φ16			

※ In case of using electrode with shapes that doesn't belong to A, B, C, above, please contact the sales department of our company.

※ In case the tip shape is below R20, it may not be filmed properly. In case of using tips below R20, please contact the sales department of our company.

15. Maintenance

<u>This product requires regular maintenance.</u>

■ Replaceable parts

・Pressurization plate

In case deformation has occurred due to gun pressurization, it has to be replaced.

・Protection lens

In case deformation, blurring and scratches that affect judgment has occurred, it has to be replaced.

■ How to replace

1.　Remove the 3 cap bolts.

※　Cap bolts used in the pressurization plate are special bolts that have been processed to prevent loosening.

As they are parts that have to be re-used, ensure that they are not lost. In addition, do not replace with cap bolts sold in the market.
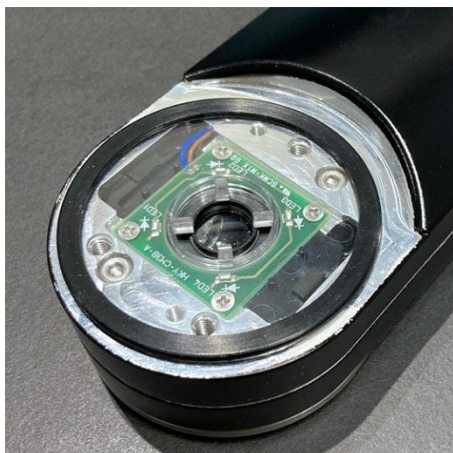
If lost, please contact the sales department of our company.


2.　Remove the pressurization plate.

※　Pressurization plate and protection lens are fastened together using bolts.

※　When dismantling, work with caution to prevent foreign substances or water from going inside.

3. Replace the protection lens O-ring.

※ Assembly is in the order of main unit → protection lens → O-ring → pressurization plate.

※ There is a gap at one side of the O-ring so pay attention to the direction and mount according to the edge of the protection lens.

O ring

Protection lens

Main unit
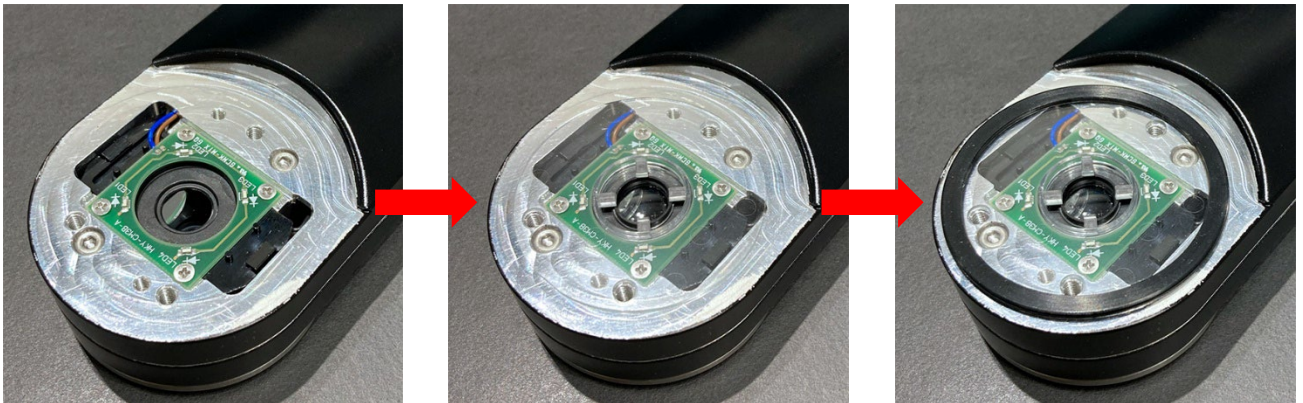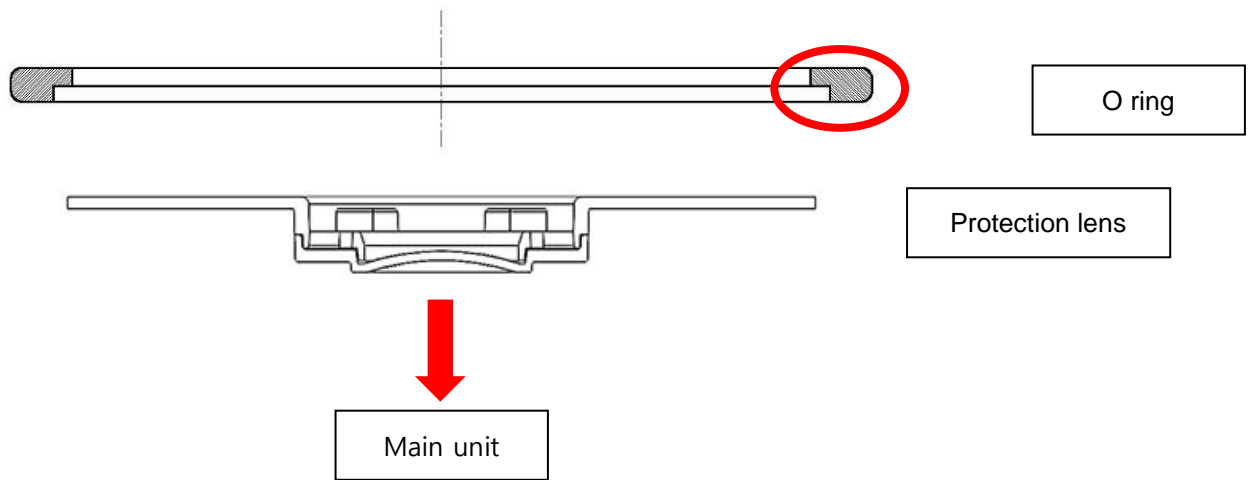
⚠ Caution

※ Protection lens has been made by assembling the 3 parts of the figure below using adhesive. Aging and applying strong power on the lens surface by mistake may cause it to dismantle as below.
Our company recommends the replacement of the protection lens for quality in case the protection lens has been dismantled.
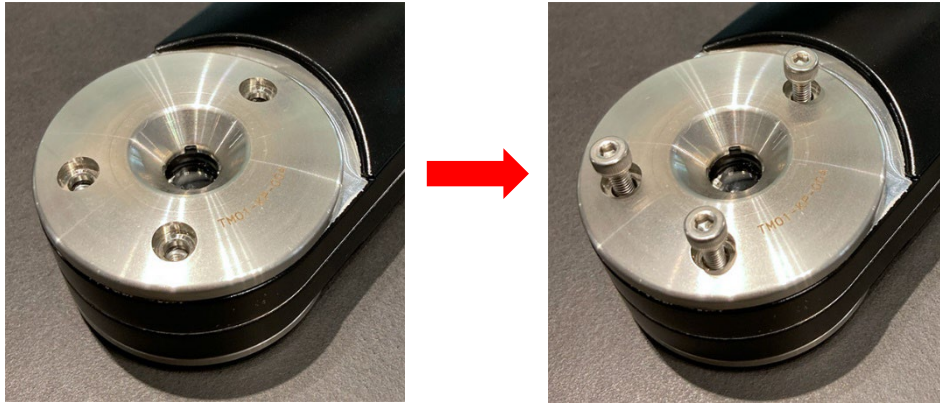
4. Mount the pressurization plate and fasten using bolts by re-using.

※ Fastening torque: 3.0 N・m

※ Cap bolts used in the pressurization plate are special bolts that have been processed to prevent loosening.

Do not replace with cap bolts sold in the market.

If lost, please contact the sales department of our company.

5. Complete

■ Daily management

If there are dust and water droplets, it may affect the judgment so remove them while ensuring that it doesn't scratch the protection lens.

※ Rubbing with excessive force causes scratches on the protection lens so removing using smooth things (cotton bud, etc.) is recommended.

※ Do not use grease removing spray, etc. on the protection lens.

⚠ Caution

Do not dismantle areas other than the pressurization plate above.

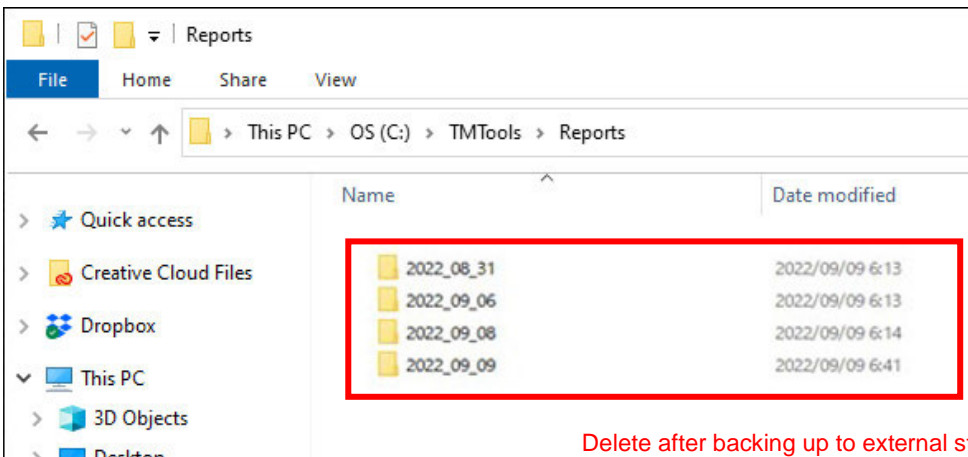**If dismantled, it is not subject to warranty.**

We seek for your understanding on this matter.

■ SD card capacity management

You can check the remaining capacity of the SD card on the batch display screen.

If the capacity of the SD card is low, remove the SD card from the main unit and use a PC to transfer (back up) or delete the data externally.


Delete after backing up to external storage

※ It is not possible to change the hierarchy or name of files created by TMR on the PC or SD card.

※ Failure to do so may cause system malfunction.

※ Arbitrarily created folders cannot be read by TMR-01.

If you need to create a backup folder in the SD card, giving a folder name other than half-width alphanumeric characters will cause system problems.

Please make sure to use half-width alphanumeric characters.
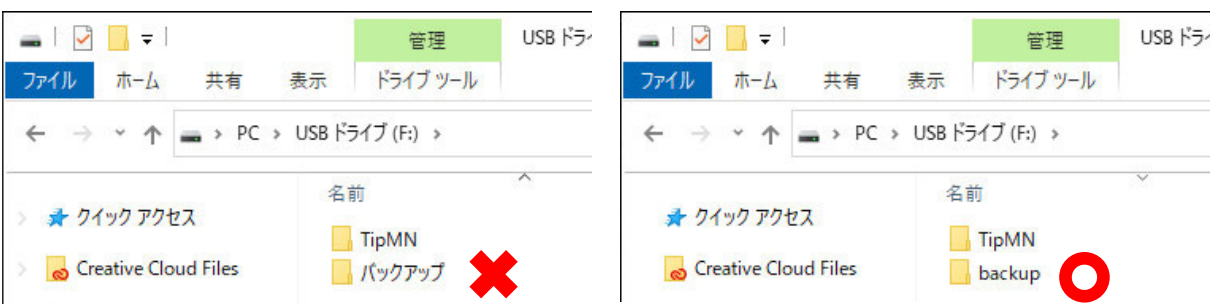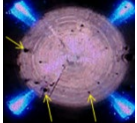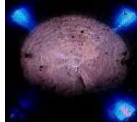
16. List of Consumption Parts

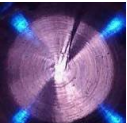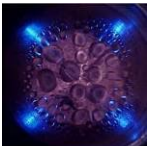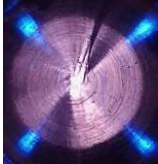|	
	Protection lens Model: TM01-SU-00A Number of units required: 1 set
	Pressurization plate Model: TM01-KP-*** Number of units required: 1 set
	Special O-ring Model: TM01-LE-201 Number of units required: 1 set

17. Troubleshooting

・This User Manual must be read before using the tip monitor.
・Please record the details in order to specify the root cause of troubles. (Type, date, venue)
・ In case the same error occurs repeatedly, it is probably due to a bigger cause. (Wearing of parts, etc.)

		Error	Cause of error	Countermeasure
(1)		The state of electrode is reasonable but the tip monitor makes dressing residue judgments.	● Lens is scratched. (Screen is partially displayed white)	● Replace the protection lens with new.
			● Spatter fixation. 	● Replace the protection lens with new.
			● Dust fixation. 	● Clean by ensuring that the protection lens is not scratched. In case the protection lens is scratched, place with new.
			● Tip fixation. 	● Remove the chips.
			● Tip is slanting. 	● Adjust teaching.
			● Water droplet fixation. 	● Remove water droplets.
			● Gun is released too fast.	● Set again by referring to 7 "Timing Chart".
			● Insufficient pressurization force.	● Adjust the setting parameter of the pressurization force. (Recommended pressure: 1500 N)

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	Error	Cause of error	Countermeasure
(2)	The state of electrode is reasonable but the tip monitor judges as diameter NG.	• Tip that has not been grinded was measured.	• In case it is not a tip that is immediately after dressing, the tip diameter cannot be detected properly. Measure immediately after dressing.
		• Flat tip was measured.	• The tip of a flat tip cannot be measured. Set the electrode setting as "F" in the 11-3 "Camera settings".
		• Tip diameter set with "Camera setting tool" and the tip diameter of the electrode to be measured are different.	• If the difference between the tip diameter that has been set and the tip diameter of the electrode is big, the measurement's margin of error becomes big. Set the tip diameter of the electrode setting again in 11-3 "Camera settings".
		• The type of electrode that is different from the electrode used for the setting in the "Camera setting tool" was used.	• Execute again after setting again in 11-3 "Camera settings" in the same type of electrode as the electrode used.
		• Tip is slanting. 	• The bigger the gradient of the electrode tip part, the bigger the measurement's margin of error. If possible, execute teaching so that the electrode is vertical to the main unit.
		• Gun is released too fast.	• Set again by referring to 7 "Timing Chart".
		• Insufficient pressurization force.	• Adjust the setting parameter of the pressurization force. (Recommended pressure: 1500Ｎ)

	Error	Cause of error	Countermeasure
(3)	It is "Judgment OK" in the PC but the "OK signal" is not received at the PLC side.	● Test filming" has been executed. ● Incorrect allocation of IO.	● During test filming, the signal of the judgment result regarding the PLC is not sent out. ● Check the wiring of the signal line again.

⚠ Caution

In case malfunction has occurred in the tip monitor main unit, do not dismantle and request for repair to the seller.

※ If dismantled, it is not subject to warranty. We seek for your understanding on this matter.

18. Warranty

(a) Target product

Products indicated in 14 "List of consumables" are not subject to warranty.

(b) Warranty period

The warranty period is 1 year from delivery to the place designated by your company.

(c) Warranty scope

In case of malfunction caused by our company's responsibility within the abovementioned warranty period, free replacement or repair is provided.

Even if replacement or repair has been made using substitute parts, the commencement date of the warranty period shall be the initial date of delivery of the target product.

However, the following malfunctions shall not be subject to warranty even during the warranty period.

- Malfunction caused by inappropriate conditions, environment, handling and usage method other than the details specified in the User Manual.
- Malfunction caused by dismantling other than the consumable area of the tip monitor.
- Malfunction caused by products other than those eligible, such as device or software design details of the client company.
- Malfunction of cases in which it is confirmed to have been avoidable if the consumables specified in the User Manual was maintained and replaced correctly.
- Malfunction caused by reasons that were unforeseen by the scientific or technological standards at the time of shipment from our company.
- Malfunction caused external factors that our company is not liable for, such as natural disaster and abnormal voltage.
- Secondary damages (damage in device, loss of opportunity, loss of profit, etc.) in the client company caused by malfunction of the target product and any damages shall not be covered by the warranty.

MEMO

Contact

Please contact us for inquiries in case problems, such as damage in product, problem in machine has occurred in our company's products.

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