Hanwha Vision

# NETWORK CAMERA

## User Manual

XNV-6081RE/XNV-8081RE
XND-6081REV/XND-8081REV

CE

# Network Camera
User Manual

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❖ **Design and specifications are subject to change without prior notice.**

❖ **The initial administrator ID is "admin" and the password should be set when logging in for the first time.**
**Please change your password every three months to safely protect personal information and to prevent the damage of the information theft.**
**Please, take note that it's a user's responsibility for the security and any other problems caused by mismanaging a password.**

## IMPORTANT SAFETY INSTRUCTIONS

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this apparatus near water.
6. Clean the contaminated area on the product surface with a soft, dry cloth or a damp cloth.
   (Do not use a detergent or cosmetic products that contain alcohol, solvents or surfactants or oil constituents as they may deform or cause damage to the product.)
7. Do not block any ventilation openings, Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus.
11. Only use attachments/ accessories specified by the manufacturer.
12. Use only with the cart, stand, tripod, bracket, or table specified by the manufacturer, or sold with the apparatus. When a cart is used, use caution when moving the cart/ apparatus combination to avoid injury from tip-over.

13. Unplug this apparatus during lighting storms or when unused for long periods of time.
14. Refer all servicing to qualified service personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the apparatus, the apparatus has been exposed to rain or moisture, does not operate normally, or has been dropped.
15. This product is intended to be supplied by a Listed Power Supply Unit marked "Class 2" or "LPS" and rated from PoE(53V), 0.48 A. (XNV-6081RE/XND-6081REV)
16. This product is intended to be supplied by a Listed Power Supply Unit marked "Class 2" or "LPS" and rated from PoE(53V), 0.48 A. (XNV-8081RE/XND-8081REV)
17. This product is intended to be supplied by isolation power.
18. If you use excessive force when installing the product, the camera may be damaged and malfunction.
    If you forcibly install the product using non-compliant tools, the product may be damaged.
19. Do not install the product in a place where chemical substances or oil mist exists or may be generated. As edible oils such as soybean oil may damage or warp the product, do not install the product in the kitchen or near the kitchen table.
    This may cause damage to the product.
20. When installing the product, be careful not to allow the surface of the product to be stained with chemical substance.
    Some chemical solvents such as cleaner or adhesives may cause serious damage to the product's surface.
21. If you install/disassemble the product in a manner that has not been recommended, the production functions/ performance may not be guaranteed.
    Install the product by referring to "Installation & connection" in the user manual.
22. Installing or using the product in water can cause serious damage to the product.
23. Although a rapid change in temperature could cause frost inside the dome, there will be no problem with the video.

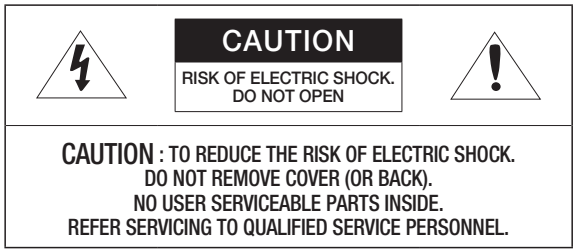
## WARNING

TO REDUCE THE RISK OF FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS PRODUCT TO RAIN OR MOISTURE. DO NOT INSERT ANY METALLIC OBJECT THROUGH THE VENTILATION GRILLS OR OTHER OPENNINGS ON THE EQUIPMENT.

Apparatus shall not be exposed to dripping or splashing and that no objects filled with liquids, such as vases, shall be placed on the apparatus.

To prevent injury, this apparatus must be securely attached to the Wall/ceiling in accordance with the installation instructions.

## CAUTION




## EXPLANATION OF GRAPHICAL SYMBOLS

The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

## Class I construction

An apparatus with CLASS I construction shall be connected to a MAINS socket outlet with a protective earthing connection.

## Battery

Batteries(battery pack or batteries installed) shall not be exposed to excessive heat such as sunshine, fire or the like.

The battery cannot be replaced.

## Disconnection Device

Disconnect the main plug from the apparatus, if it's defected. And please call a repair man in your location.

**When used outside of the U.S., it may be used HAR code with fittings of an approved agency is employed.**

## CAUTION

RISK OF EXPLOSION IF BATTERY IS REPLACED BY AN INCORRECT TYPE.
DISPOSE OF USED BATTERIES ACCORDING TO THE INSTRUCTIONS.

## ATTENTION

IL Y A RISQUE D'EXPLOSION SI LA BATTERIE EST REMPLACÉE PAR UNE BATTERIE DE TYPE INCORRECT.
METTRE AU REBUT LES BATTERIES USAGÉES CONFORMÉMENT AUX INSTRUCTIONS.

## CAUTION

These servicing instructions are for use by qualified service personnel only.
To reduce the risk of electric shock do not perform any servicing other than that contained in the operating instructions unless you are qualified to do so.

Please use the input power with just one camera and other devices must not be connected.

**The ITE is to be connected only to PoE networks without routing to the outside plant.**

**The wired LAN hub providing power over the Ethernet (PoE) in accordance with IEEE 802.3at shall be a UL Listed device with the output evaluated as a Limited Power Source as defined in UL60950-1.**

**Unit is intended for installation in a Network Environment 0 as defined in IEC TR 62102. As such, associated Ethernet wiring shall be limited to inside the building.**

Please read the following recommended safety precautions carefully.

- Do not place this apparatus on an uneven surface.
- Do not install on a surface where it is exposed to direct sunlight, near heating equipment or heavy cold area.
- Do not place this apparatus near conductive material.
- Do not attempt to service this apparatus yourself.
- Do not place a glass of water on the product.
- Do not install near any magnetic sources.
- Do not block any ventilation openings.
- Do not place heavy items on the product.
- Please wear protective gloves when installing/removing the camera.
  The high temperature of the product surface may cause a burn.

User's Manual is a guidance book for how to use the products.

The meaning of the symbols are shown below.

- Reference : In case of providing information for helping of product's usages
- Notice : If there's any possibility to occur any damages for the goods and human caused by not following the instruction

※ Please read this manual for the safety before using of goods and keep it in the safe place.

We do not guarantee the quality of third-party products (e.g. lenses, accessories) that you separately purchase.

Use properly grounded STP (shielded twisted pair) cables to connect the products.

In particular installation environments, there might be interference in radio communications. When interference of electromagnetic waves occurs between the product and radio communication device, it is recommended to keep a certain distance between the two or change the direction of the receiving antenna.

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## RECOMMENDED PC SPECIFICATIONS

- CPU : Intel(R) Core(TM) i7 3.4 GHz or higher
- RAM : 8G or higher
- Supported OS : MS Windows 8.1, 10, Mac OS X 10.13
- Recommended browser: Google Chrome
- Supported browsers: MS Explorer11, MS Edge, Mozilla Firefox (Window 64bit only), Apple Safari (Mac OSX only)
- VGA : PCIe 256MB GDDR3 video graphics card or higher

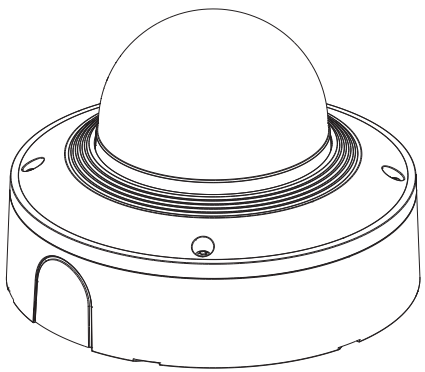
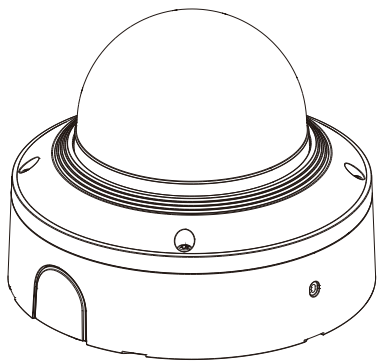
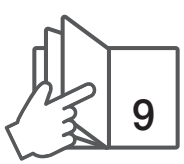
※ Some functions may be restricted even in supported browsers.

## RECOMMENDED MICRO SD/SDHC/SDXC MEMORY CARD SPECIFICATIONS

- Recommended capacity : 16GB to 256GB (MLC type)
- Recommended Manufacturers : SanDisk, Transcend
- Product Type : High endurance
- The compatibility varies depending on the card manufacturers and types.

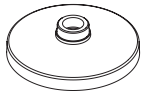
## NAS RECOMMENDED SPECS

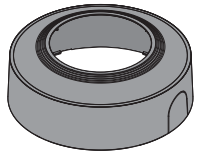
- Recommended capacity : 200GB or higher is recommended.
- For this camera, you are recommended to use a NAS with the following manufacturer's specs.
  Recommended products : QNAP NAS, Synology NAS

| Outdoor Vandal Dome Camera<br>XNV-6081RE/XNV-8081RE | Indoor Dome Camera<br>XND-6081REV/XND-8081REV |
| --- | --- |
|  |  |
|  | |

## OPTIONAL ACCESSORIES FOR INSTALLATION

You can purchase appropriate optional accessories available.

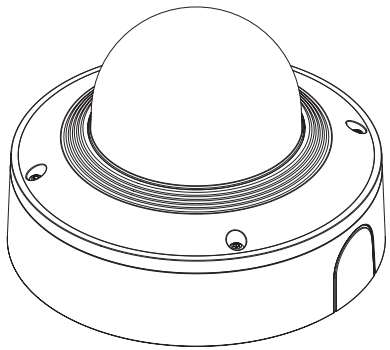




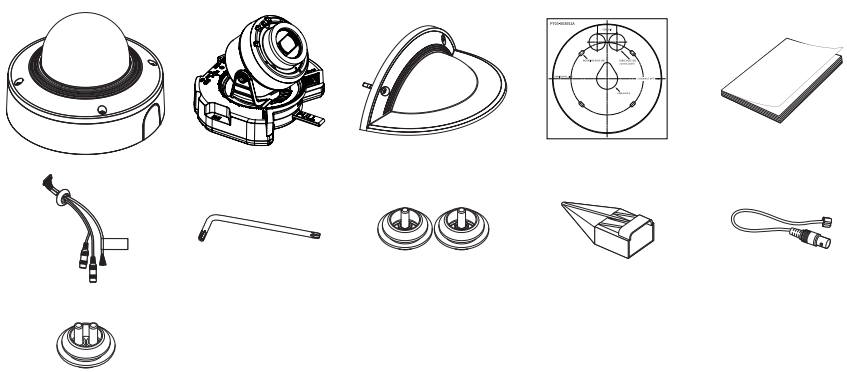
| Model name | Hanging Mount | Skin Cover | All |
|---|---|---|---|
| XNV-6081RE/XNV-8081RE | SBP-187HMW | SBC-180B (Black) | SBP-300LMW (Parapet Mount)<br>SBP-300CMW (Ceiling Mount)<br>SBP-300WMW (Wall Mount)<br>SBP-300WMW1 (Wall Mount)<br>SBP-300NBW (Instalation Box)<br>SBP-300BW (Wall Mount Base)<br>SBP-300PMW (Pole Mount)<br>SBP-300KMW (Corner Mount) |
| XND-6081REV/XND-8081REV | SBP-167HMW | SBC-160B (Black) | |

## WHAT'S INCLUDED

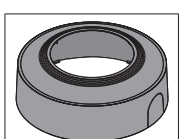
As for each sales country, accessories are not the same.



<XNV-6081RE/XNV-8081RE>

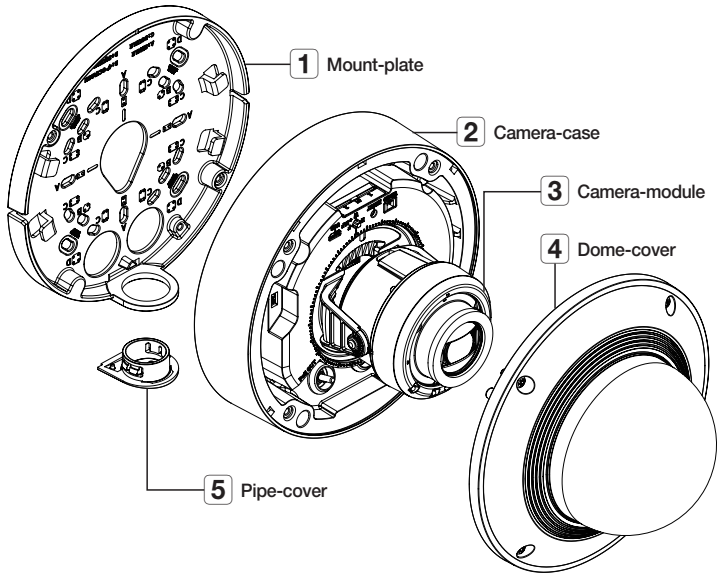


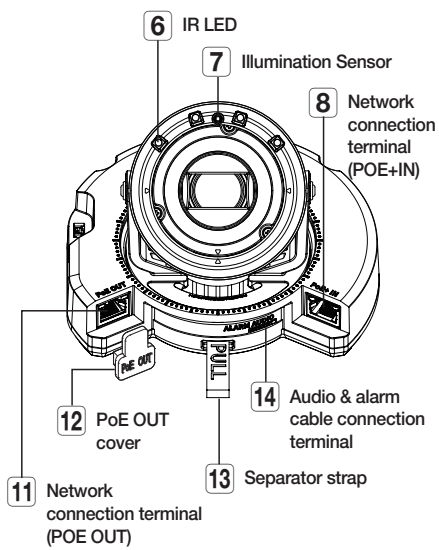
Option (not included)

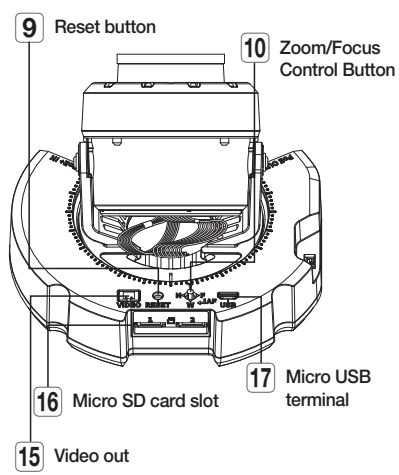


SBC-180B
(Color : Black)

## AT A GLANCE



## INSTALLATION

- This camera is waterproof and in compliance with the IP67 / IP6K9K spec, but the jack connected to the external cable is not. You are recommended to install this product below the edge of eaves to prevent the cable from being externally exposed.

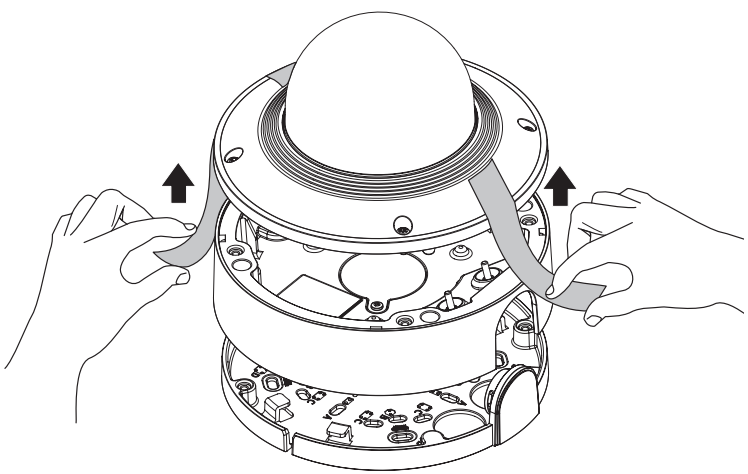
### Precautions before installation

Ensure you read out the following instructions before installing the camera:

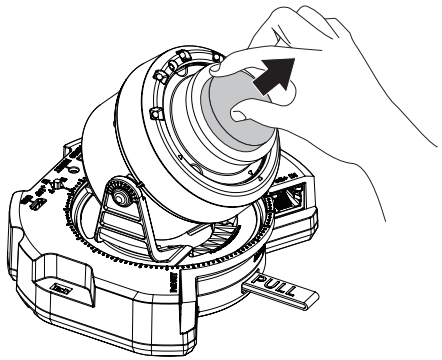
- Select an installation site that can hold at least 5 times the camera's weight.
- Stuck-in or peeled-off cables can cause damage to the product or a fire.
- For safety purposes, keep anyone else away from the installation site. And put aside personal belongings from the site, just in case.
- If the product is installed with excessive force, it may cause damage to the camera due to malfunction. Forcing assembly using non-compliant tools may damage the product.

### Removal

**1.** Peel off the tape fixing the camera case.

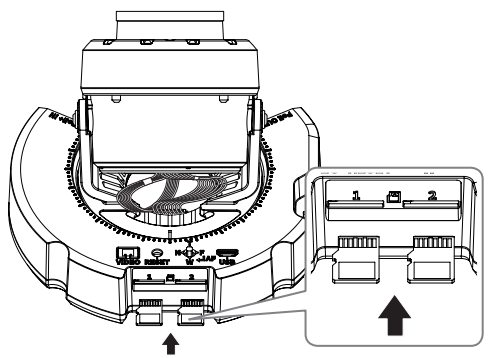


**2.** Take off the cushion protecting the camera lens.




### Inserting a Micro SD Memory Card

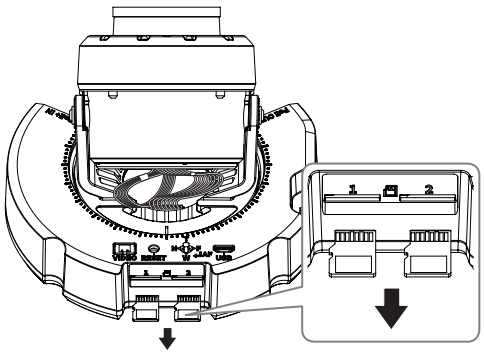
Slide the Micro SD card into the Micro SD slot on the camera module in the direction of the arrow.



- Before installing the camera, the Micro SD memory card should be inserted while the power source and the body are separated.
- Do not forcefully insert it in the reverse direction. It might damage your Micro SD memory card and your product.
- When it rains or the humidity is high, insertion or ejection of a Micro SD card is not recommended.
- When installing/removing the Micro SD memory card, make sure you put the product body on a flat ground before working on it in order to prevent accidents due to loss or drop of any parts.

## Removing a Micro SD Memory Card

Gently press down on the exposed end of the memory card as shown in the diagram to eject the memory card from the slot.

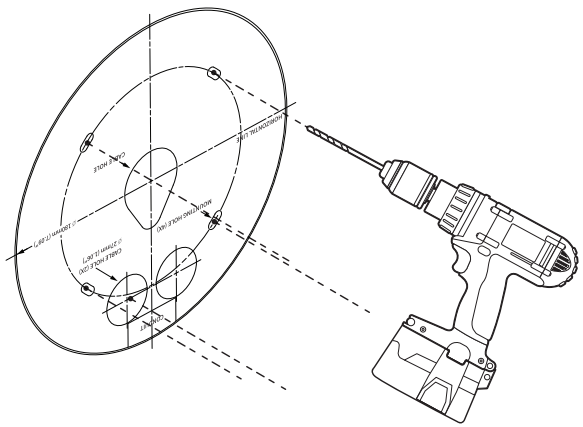


- Before removing the Micro SD memory card, in <**Storage**>, set the device to <**Off**> and press the [**Apply**] button and turn the camera off.
- If you turn off the camera or remove the Micro SD memory card that contains data from the product, the data may be lost or damaged.

## Installation (mount plate)

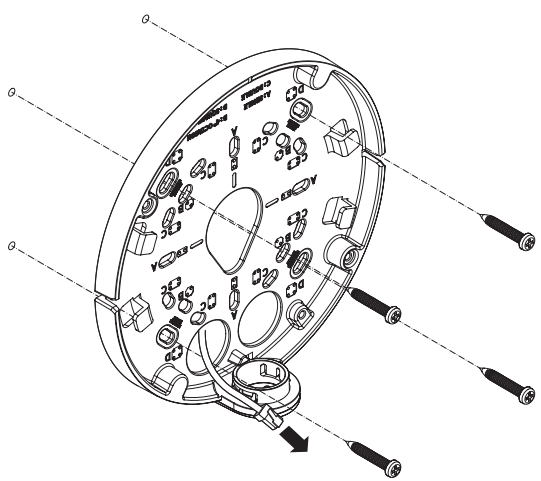
**[Directly installing on wall/ceiling]**

**1-1.** Attach the installation template on the desired surface and drill holes for screws and cables.



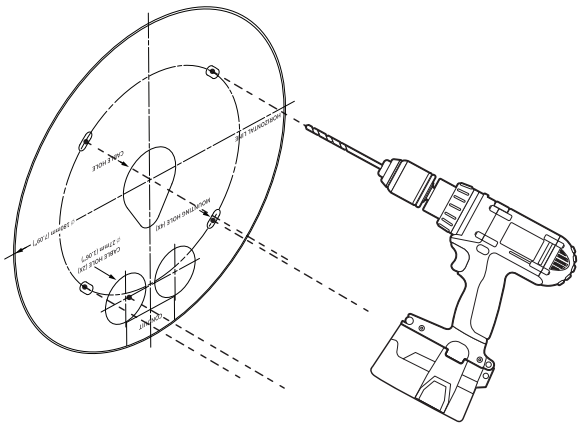
**1-2.** Fix the mount plate using appropriate screws.

**1-3.** Pull out necessary cables among LAN/audio & alarm cables through the hole in the mount plate.

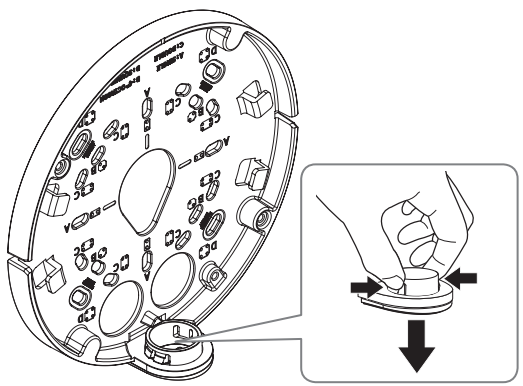


**[Installing using pipe]**

**2-1.** Attach the installation template and drill holes for screws and cables.



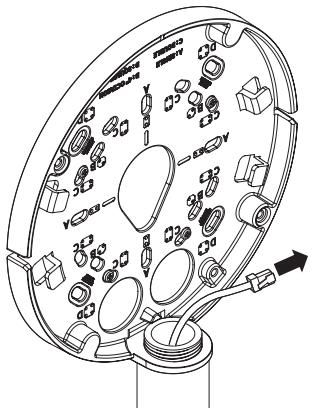
**2-2.** Separate the pipe cover of the mount plate by pressing its sides.



**2-3.** Place the pipe on the mount plate.

**2-4.** Fix the mount plate using appropriate screws.

**2-5.** Pull out necessary cables among LAN/audio & alarm cables through the pipe.



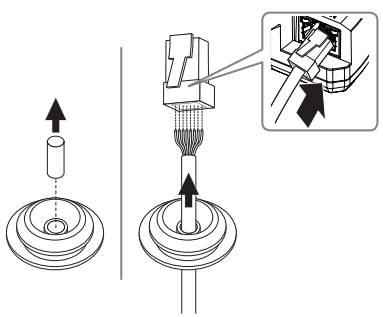
## Installation (camera case)

- Use a cable bush compliant with the LAN cable to be connected.
  - Camera main: use a cable with the diameter of Ø5 to 6.5
  - IP66 1-hole bush: use a cable with the diameter of Ø5 to 8.5
  - 2-hole bush: use a cable with the diameter of Ø4.5 to 5.5

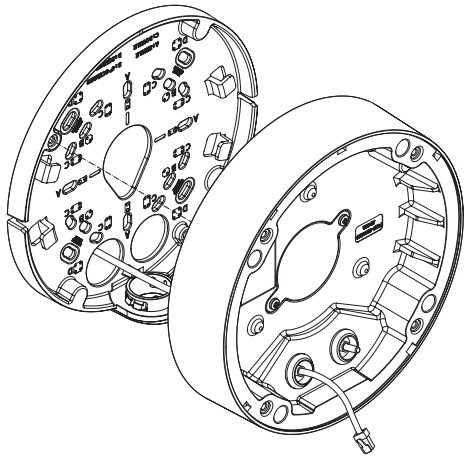
**[Installing LAN cable] (When using only one CAM)**

**1-1.** Pull off the extruded parts of the bush to be used.

**1-2.** Route the LAN cable through the bush and connect the LAN connector.



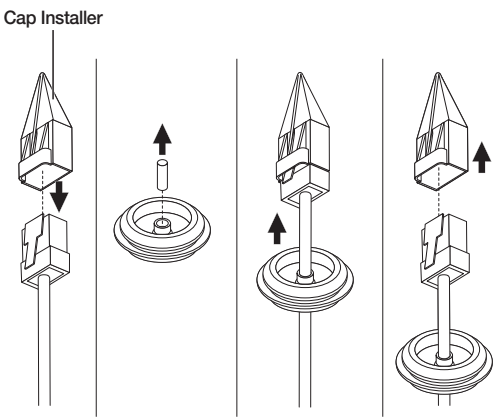
**1-3.** Mount the bush to the camera case.



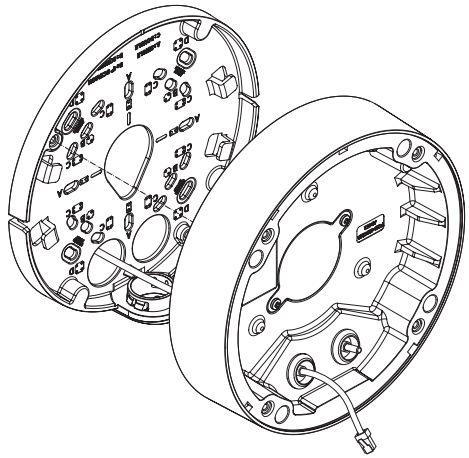
**[Installing the LAN cable] (IP66) (When using only one CAM)**

**2-1.** Pull off the extruded part of the 1-hole bush provided.

**2-2.** Use the cap installer to pass through the RJ45 cable.

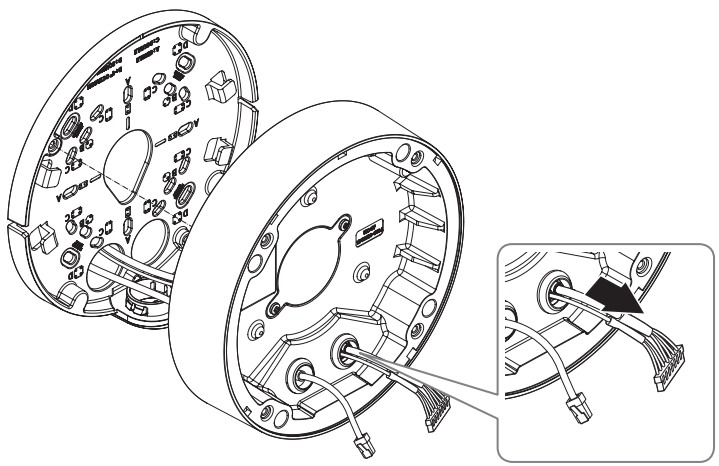



**2-3.** Mount the bush to the camera case.



**[Installing audio & alarm cables] (When using only one CAM)**

**3.** Mount the bush of the provided audio & alarm cables to the camera case.

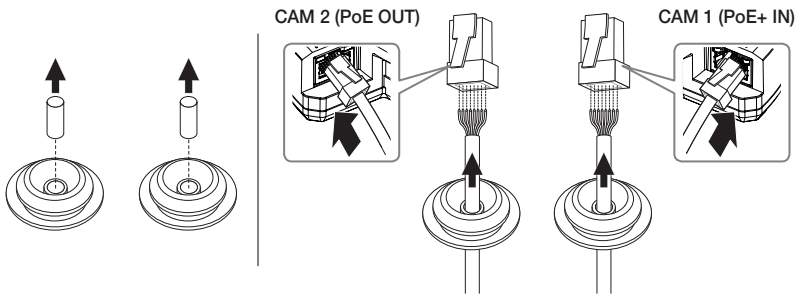


**[Installing LAN cables] (When using CAM 1 and CAM 2)**

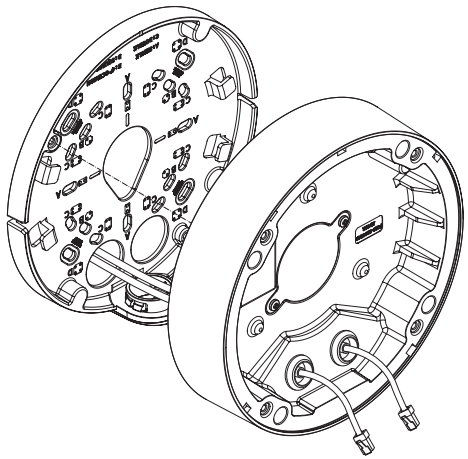
**4-1.** Pull off the extruded parts of the bush to be used.

**4-2.** Route the LAN cable for CAM 1 through the bush and connect the LAN connector. (PoE+ IN)

**4-3.** Route the LAN cable for CAM 2 through the bush and connect the LAN connector. (PoE OUT)



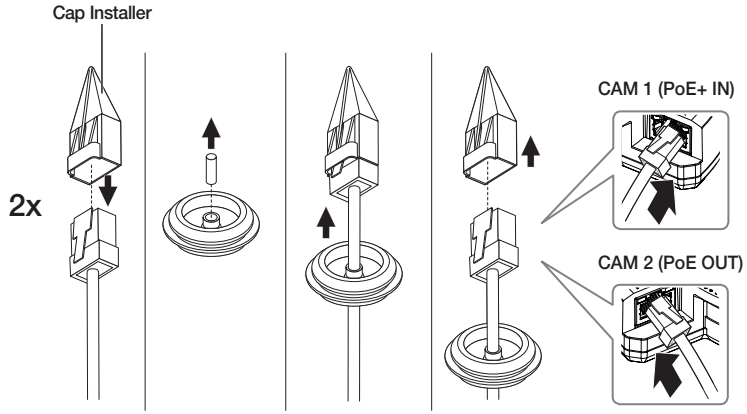

**4-4.** Mount the bush to the camera case.



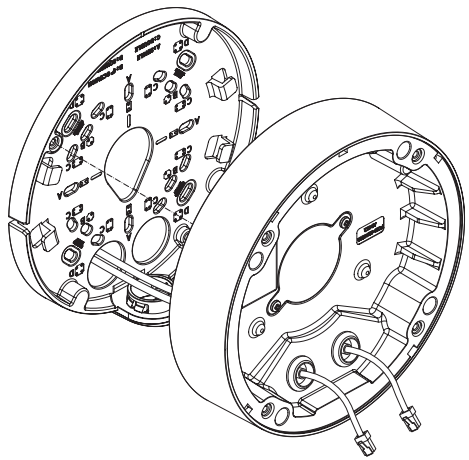
**[Installing the LAN cables] (IP66) (When using CAM 1 and CAM 2)**

**5-1.** Pull off the extruded part of the 1-hole bush provided.

**5-2.** Use the cap installer to pass through the RJ45 cable. (CAM 1&2)




**5-3.** Mount the bush to the camera case.

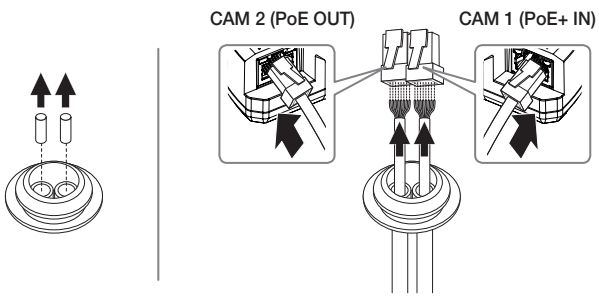


**[Installing audio & alarm cables] (When using CAM 1 and CAM 2)**

**6-1.** Pull off the extruded part of the 2-hole bush provided.

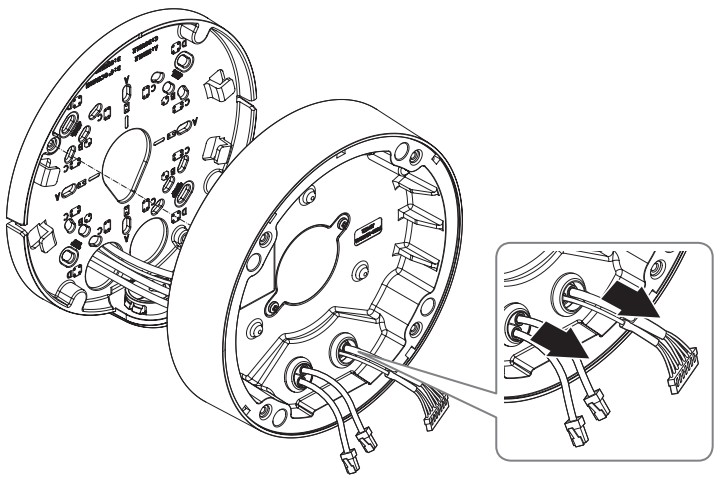
**6-2.** Route the LAN cables through the two holes in the bush and connect the LAN connector.

▪ 2-hole bushes cannot use any cap installers.

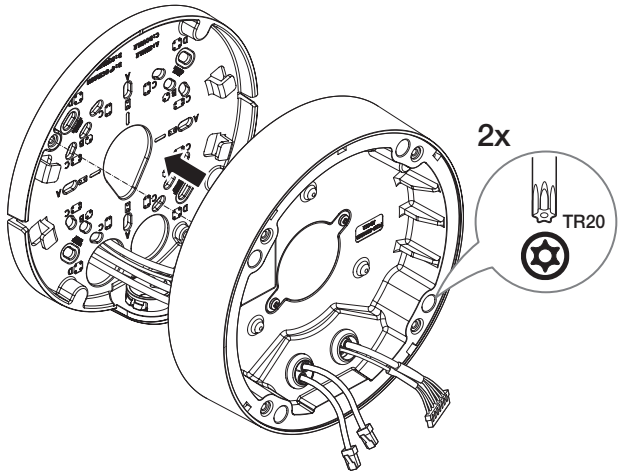



**6-3.** Mount the 2-hole bush to the camera case.

**6-4.** Mount the bush of the provided audio & alarm cables to the camera case.



**7.** Join the mount plate with the camera case.

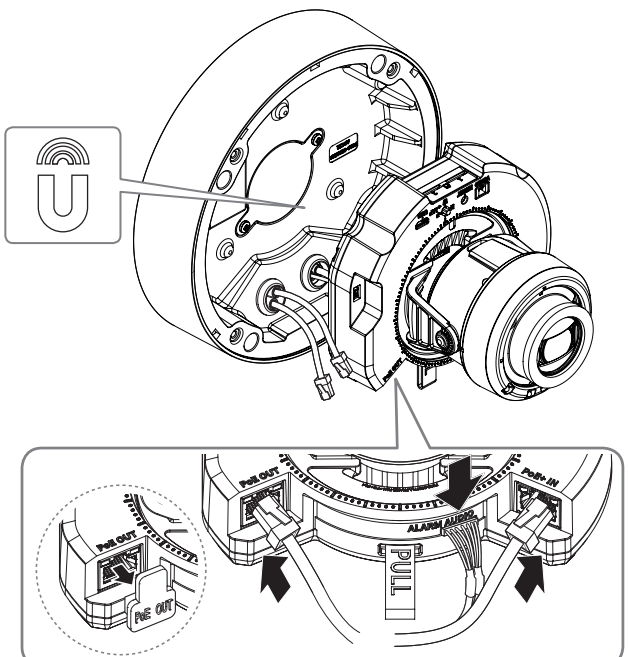


## Installing the camera module

- To use CAM 1 & 2, the LAN cable for CAM 1 must be connected first.

1. To connect CAM 2, remove the PoE OUT cover first.
2. Connect the LAN/audio & alarm cables to the camera module terminal.
3. Attach the camera module to the case.

- When installing it, don't let your fingers stuck in between the camera module and the case.
- A magnet is embedded at the bottom of the module
- Take caution not to allow any foreign objects between the attaching surfaces.



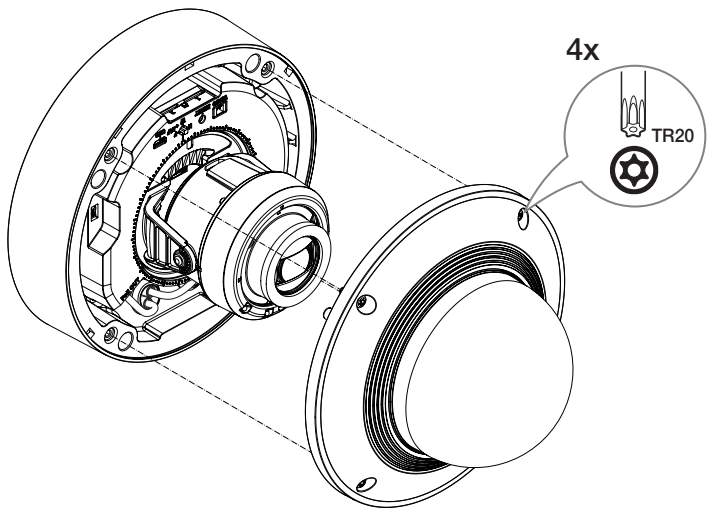

4. Adjust the lens to the desired direction with reference to "**Adjusting the monitoring direction for the camera**" section. (page 26)

## Assembling the dome cover

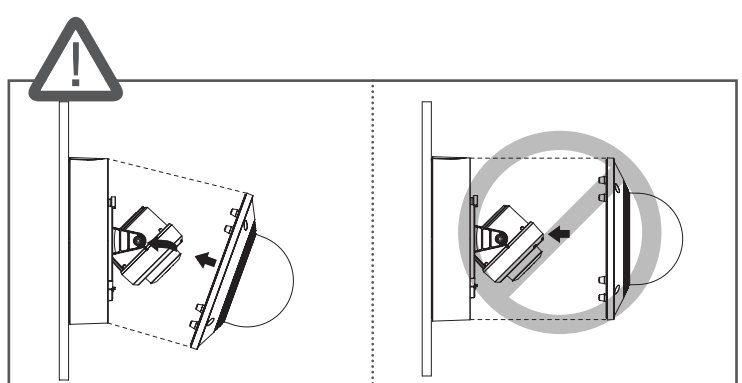
**[Directly installing on wall/ceiling]**

1. Assemble the dome cover.

- Make sure to firmly tighten the fastening screws so that there is no water damage issue.

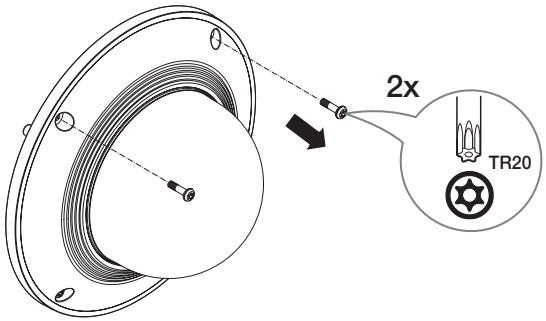



- Be careful not to alter the monitoring direction of your camera.



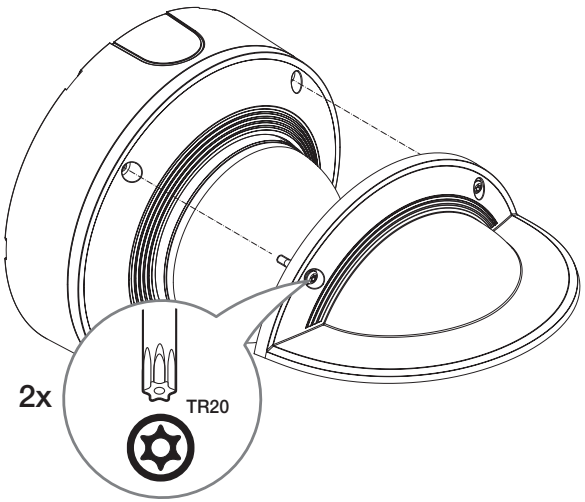
**[Using Weather cap]**

1. Remove the screws from the dome cover.




2. Assemble the dome cover.
3. Mount the weather cap to the dome cover and fasten the screws.

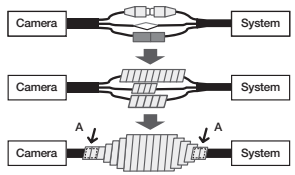
- Make sure to firmly tighten the fastening screws so that there is no water damage issue.




## Outdoor installation

When you install it outside of the building, please waterproof it with waterproof butyl rubber tape (can be purchased in stores) so that water does not leak from the gap of the cable connected to the outside.

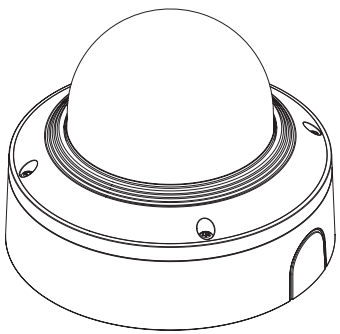
1. Connect the I/O and LAN cables.
2. Wrap the black cable jacket (Area A) and the cable connection area with waterproof (butyl rubber) tape so that more than half of the butyl rubber tape is overlapped.



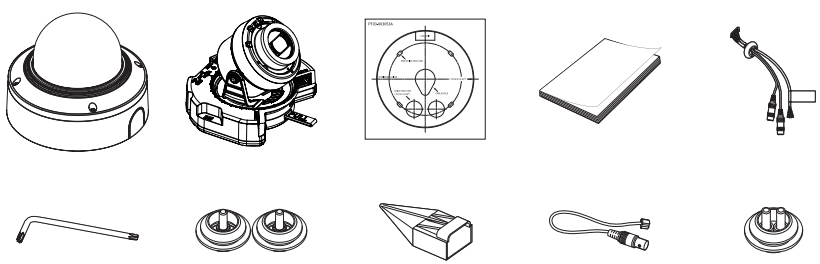

- If the cable jacket is not waterproofed properly, then it can directly cause leakage. Make sure to protect the cable with a dense layer of taping.
- Waterproof butyl tape is made of butyl rubber that can be stretched to twice its normal length.

## WHAT'S INCLUDED

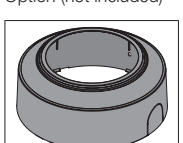
As for each sales country, accessories are not the same.



<XND-6081REV/XND-8081REV>

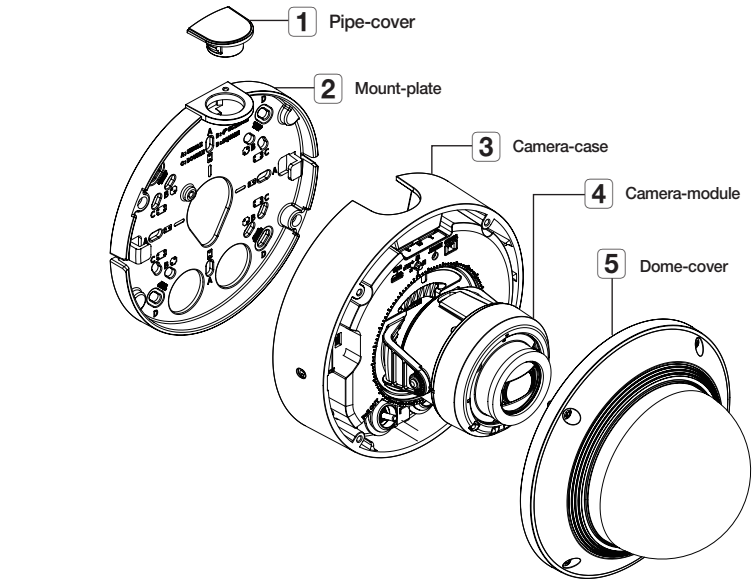


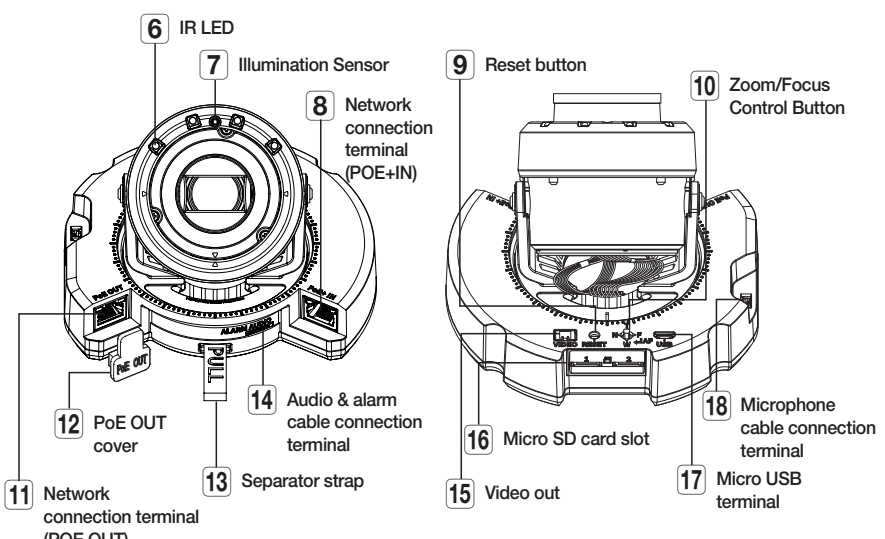
Option (not included)



SBC-160B
(Color : Black)

## AT A GLANCE



# INSTALLATION

- This camera is waterproof and in compliance with the IP52 spec, but the jack connected to the external cable is not. You are recommended to install this product below the edge of eaves to prevent the cable from being externally exposed.

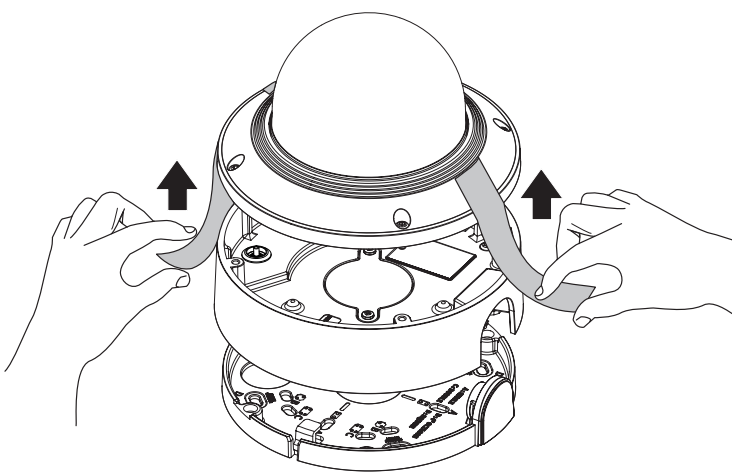
## Precautions before installation

Ensure you read out the following instructions before installing the camera:

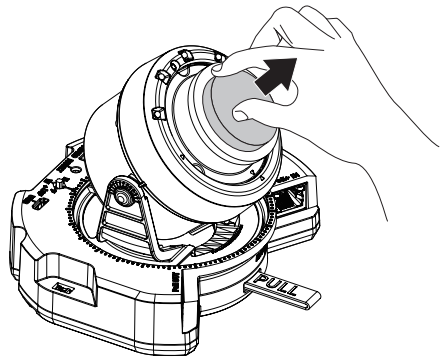
- Select an installation site that can hold at least 5 times the camera's weight.
- Stuck-in or peeled-off cables can cause damage to the product or a fire.
- For safety purposes, keep anyone else away from the installation site. And put aside personal belongings from the site, just in case.
- If the product is installed with excessive force, it may cause damage to the camera due to malfunction. Forcing assembly using non-compliant tools may damage the product.

## Removal

**1.** Peel off the tape fixing the camera case.

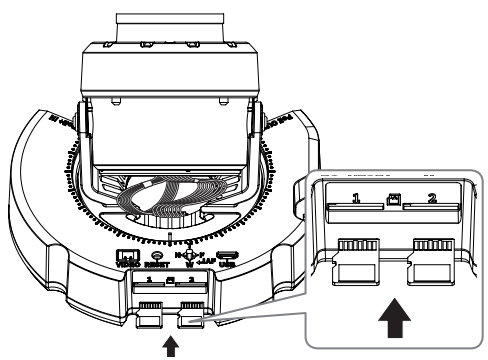


**2.** Take off the cushion protecting the camera lens.




## Inserting a Micro SD Memory Card

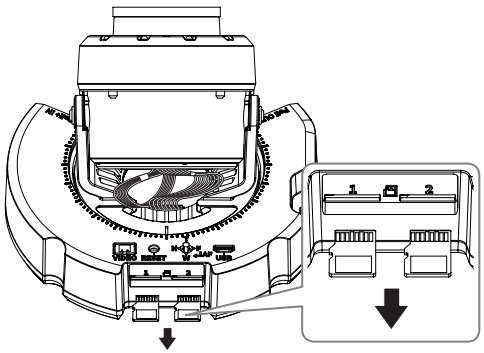
Slide the Micro SD card into the Micro SD slot on the camera module in the direction of the arrow.



- Before installing the camera, the Micro SD memory card should be inserted while the power source and the body are separated.
- Do not forcefully insert it in the reverse direction. It might damage your Micro SD memory card and your product.
- When it rains or the humidity is high, insertion or ejection of a Micro SD card is not recommended.
- When installing/removing the Micro SD memory card, make sure you put the product body on a flat ground before working on it in order to prevent accidents due to loss or drop of any parts.

## Removing a Micro SD Memory Card

Gently press down on the exposed end of the memory card as shown in the diagram to eject the memory card from the slot.

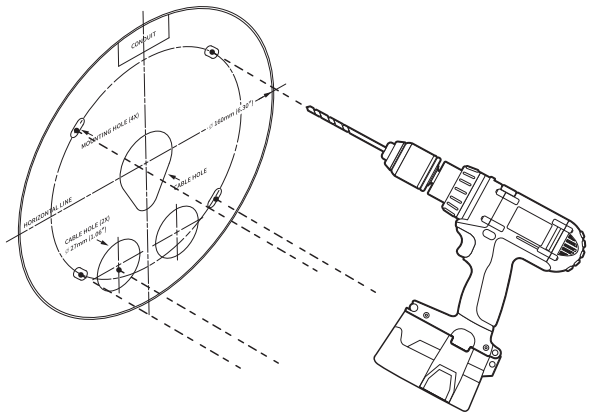


- Before removing the Micro SD memory card, in <**Storage**>, set the device to <**Off**> and press the [**Apply**] button and turn the camera off.
- If you turn off the camera or remove the Micro SD memory card that contains data from the product, the data may be lost or damaged.

## Installation (mount plate)

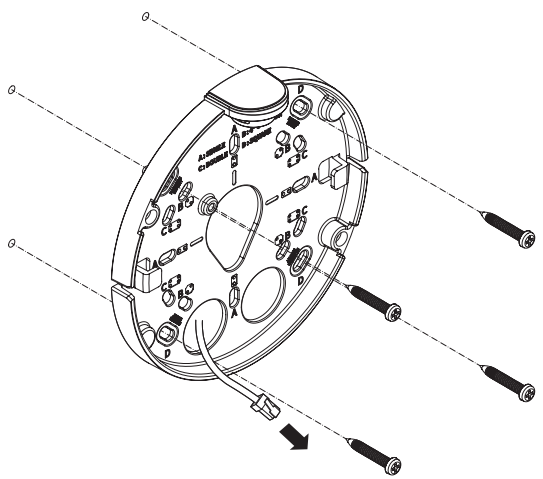
**[Directly installing on wall/ceiling]**

**1-1.** Attach the installation template on the desired surface and drill holes for screws and cables.



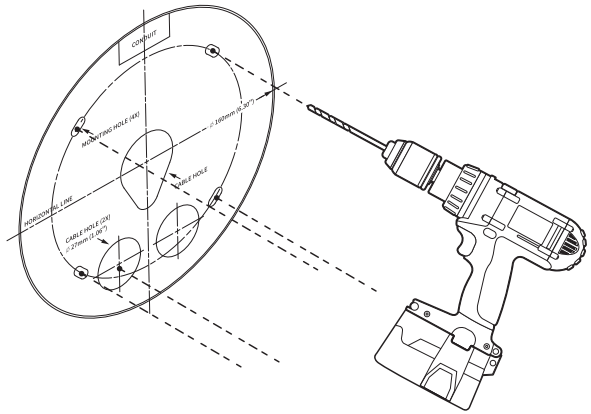

**1-2.** Fix the mount plate using appropriate screws.

**1-3.** Pull out necessary cables among LAN/audio & alarm cables through the hole in the mount plate.

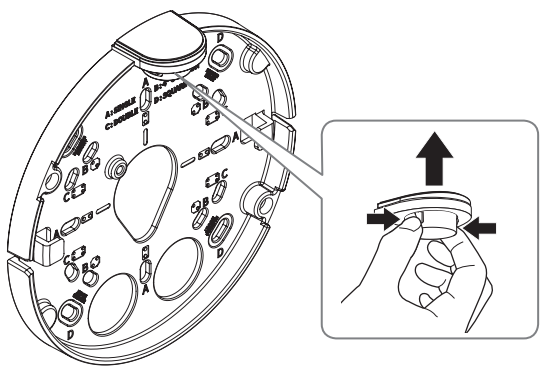


**[Installing using pipe]**

**2-1.** Attach the installation template and drill holes for screws and cables.



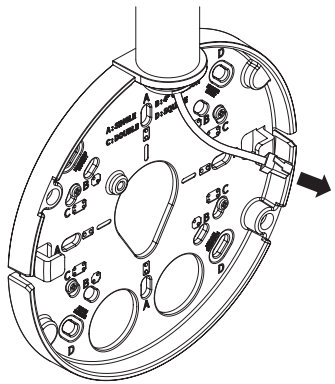

**2-2.** Separate the pipe cover of the mount plate by pressing its sides.



**2-3.** Place the pipe on the mount plate.

**2-4.** Fix the mount plate using appropriate screws.

**2-5.** Pull out necessary cables among LAN/audio & alarm cables through the pipe.



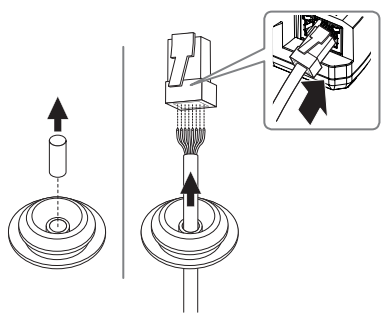
## Installation (camera case)

- Use a cable bush compliant with the LAN cable to be connected.
  - Camera main: use a cable with the diameter of Ø5 to 6.5
  - IP66 1-hole bush: use a cable with the diameter of Ø5 to 8.5
  - 2-hole bush: use a cable with the diameter of Ø4.5 to 5.5

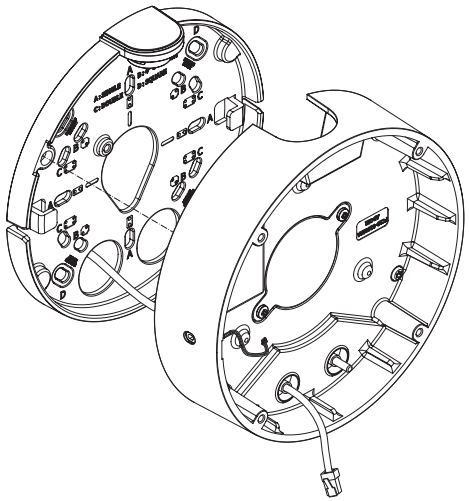
**[Installing LAN cable] (When using only one CAM)**

**1-1.** Pull off the extruded parts of the bush to be used.

**1-2.** Route the LAN cable through the bush and connect the LAN connector.



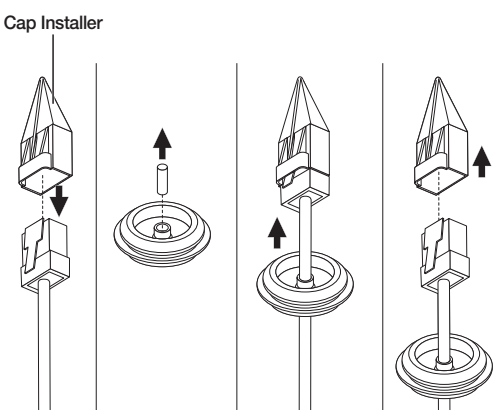
**1-3.** Mount the bush to the camera case.



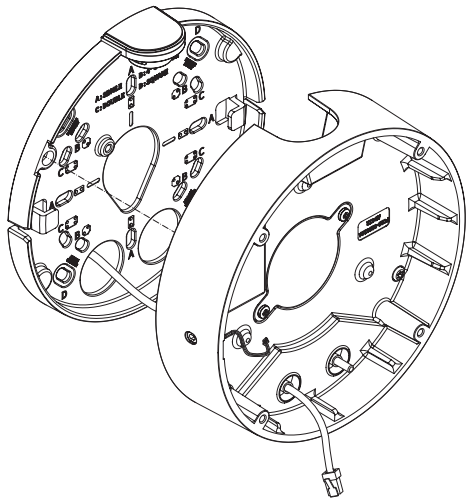
**[Installing the LAN cable] (When using only one CAM)**

**2-1.** Pull off the extruded part of the 1-hole bush provided.

**2-2.** Use the cap installer to pass through the RJ45 cable.

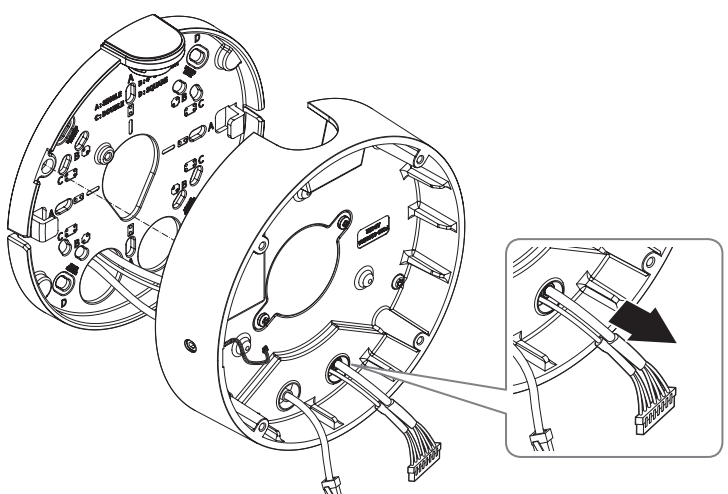



**2-3.** Mount the bush to the camera case.



**[Installing audio & alarm cables] (When using only one CAM)**

**3.** Mount the bush of the provided audio & alarm cables to the camera case.

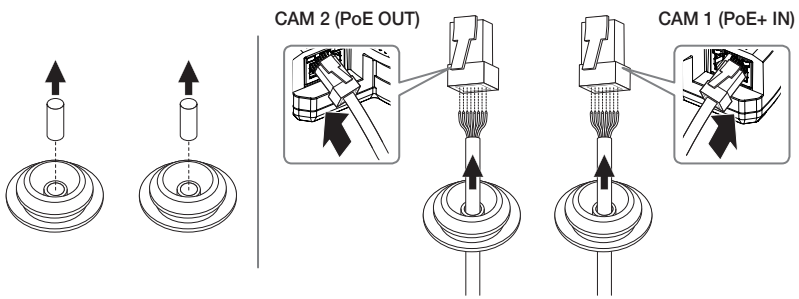


**[Installing LAN cables] (When using CAM 1 and CAM 2)**

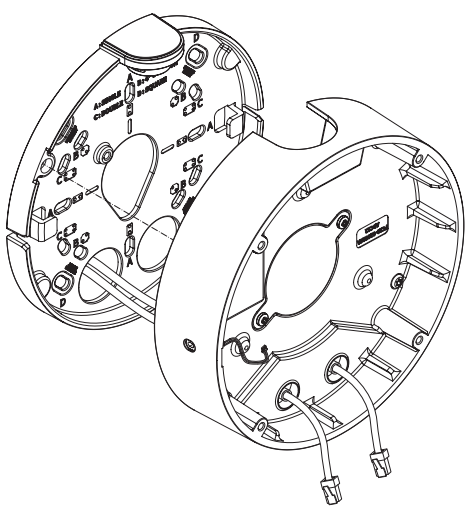
**4-1.** Pull off the extruded parts of the bush to be used.

**4-2.** Route the LAN cable for CAM 1 through the bush and connect the LAN connector. (PoE+ IN)

**4-3.** Route the LAN cable for CAM 2 through the bush and connect the LAN connector. (PoE OUT)



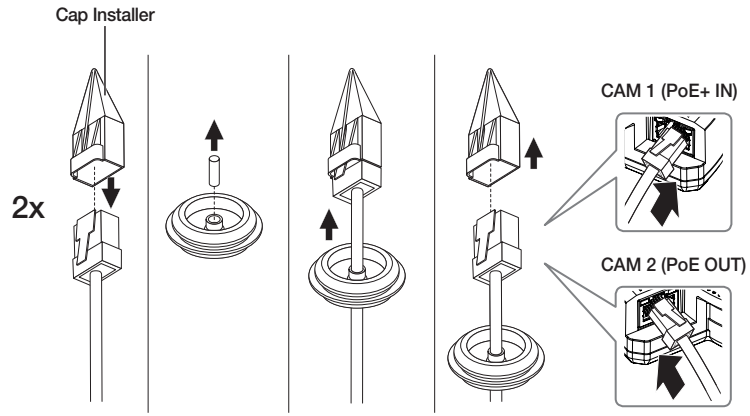

**4-4.** Mount the bush to the camera case.



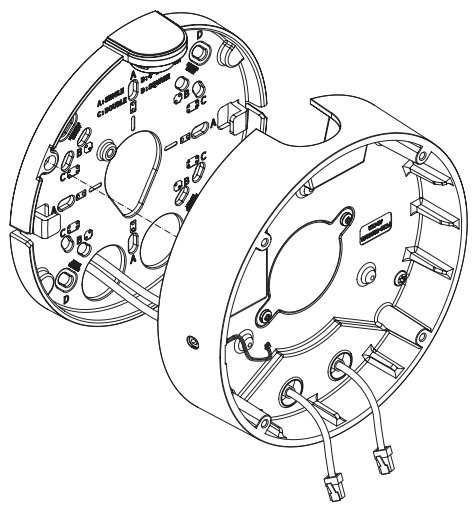
**[Installing the LAN cables] (When using CAM 1 and CAM 2)**

**5-1.** Pull off the extruded part of the 1-hole bush provided.

**5-2.** Use the cap installer to pass through the RJ45 cable. (CAM 1&2)




**5-3.** Mount the bush to the camera case.

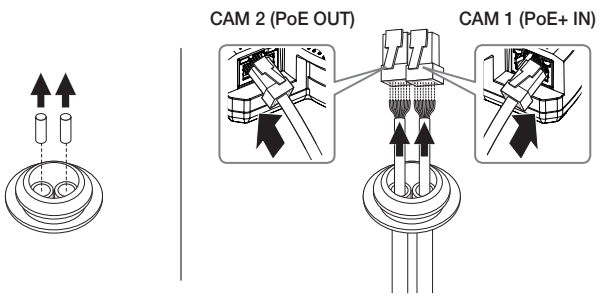


**[Installing audio & alarm cables] (When using CAM 1 and CAM 2)**

**6-1.** Pull off the extruded part of the 2-hole bush provided.

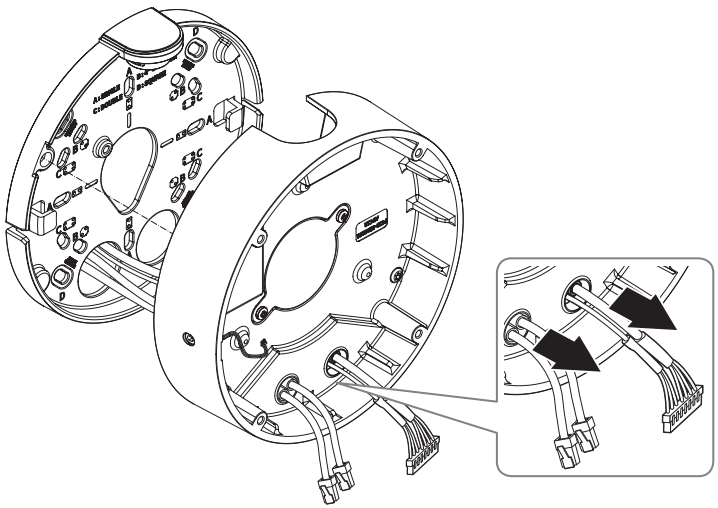
**6-2.** Route the LAN cables through the two holes in the bush and connect the LAN connector.

- 2-hole bushes cannot use any cap installers.

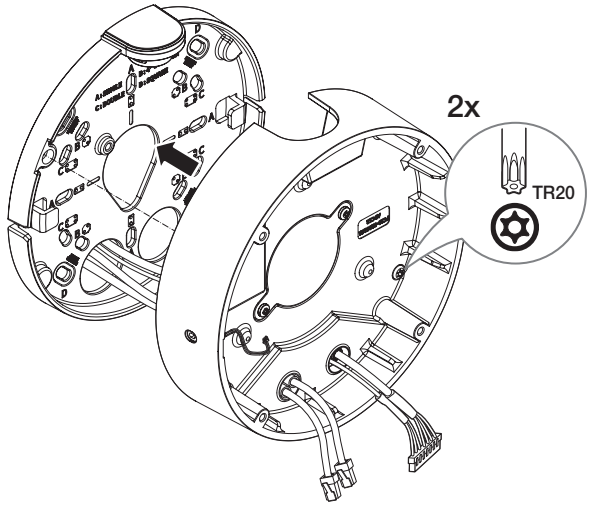



**6-3.** Mount the 2-hole bush to the camera case.

**6-4.** Mount the bush of the provided audio & alarm cables to the camera case.



**7.** Join the mount plate with the camera case.



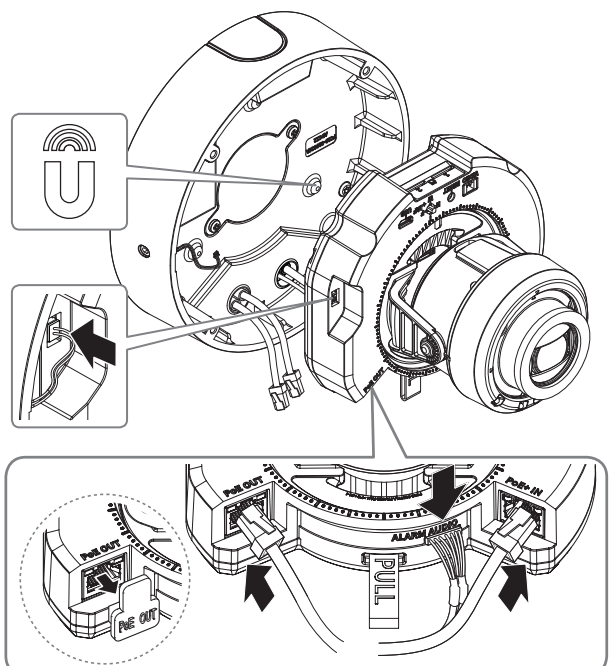
## Installing the camera module

- To use CAM 1 & 2, the LAN cable for CAM 1 must be connected first.

1. To connect CAM 2, remove the PoE OUT cover first.
2. Connect the LAN/audio & alarm cables to the camera module terminal.
3. Attach the camera module to the case.

- When installing it, don't let your fingers stuck in between the camera module and the case.
- A magnet is embedded at the bottom of the module
- Take caution not to allow any foreign objects between the attaching surfaces.

4. Connect the microphone cable to the camera module.



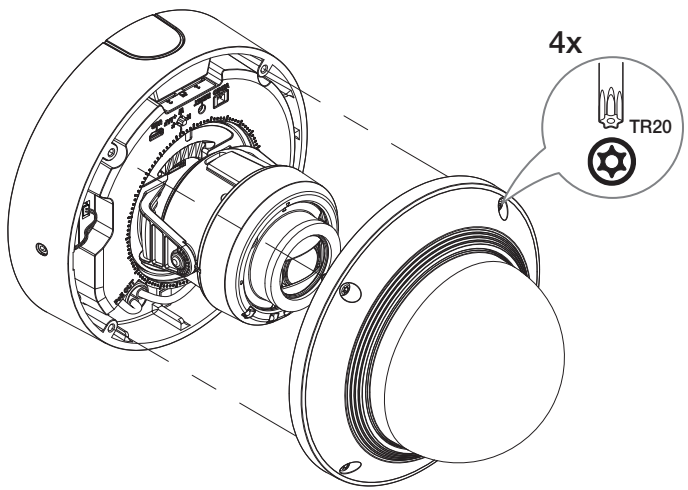

5. Adjust the lens to the desired direction with reference to "**Adjusting the monitoring direction for the camera**" section. (page 26)

## Assembling the dome cover

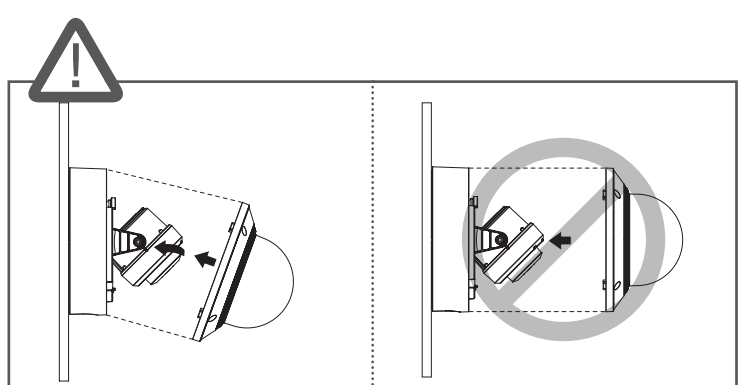
**[Directly installing on wall/ceiling]**

1. Assemble the dome cover.

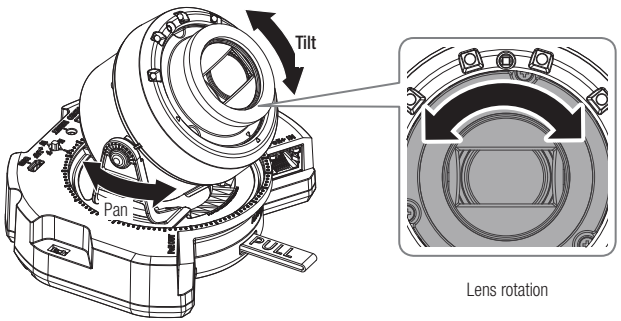
- Make sure to firmly tighten the fastening screws so that there is no water damage issue.




- Be careful not to alter the monitoring direction of your camera.



## ADJUSTING THE MONITORING DIRECTION FOR THE CAMERA




Lens rotation

▪ **Adjusting the monitoring direction**

You can adjust the camera direction only when the camera is fixed on the ceiling.
At this time, rotating the main body of the camera in the left and right direction is called PAN, and adjusting the angle of the camera is called TILT.

- The pan angle is 0˚ – 360˚.
- The tilt angle is -45˚ – 85˚.
- The rotation angle is 0˚ – 355˚.

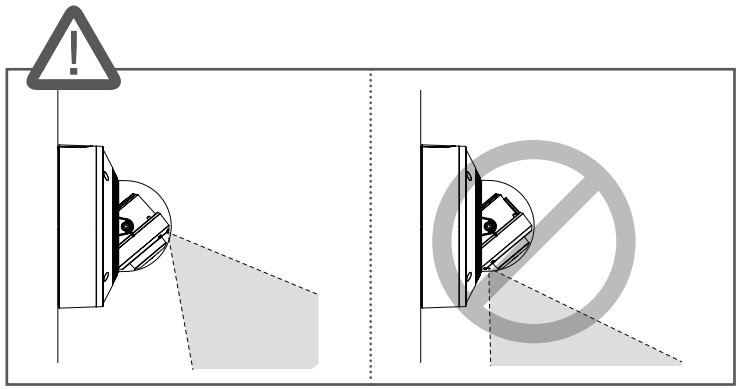
▪ In 75˚ or more tilt angle, a blockage of view or burred image may occur in some part of the screen depending on the zoom magnification.

▪ Do not forcefully rotate or press the focus/zoom lens. Otherwise, the focus might not work properly due to motor failure.

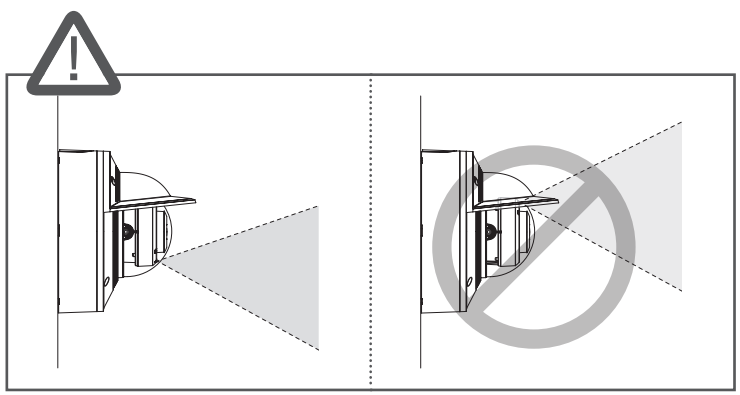
▪ **Methods of adjustment**

1. Adjust the pan angle taking account of the direction to monitor.
2. Adjust the horizontal angle so that the video does not flip when rotated.
3. Adjust the tilt angle toward the direction to monitor.

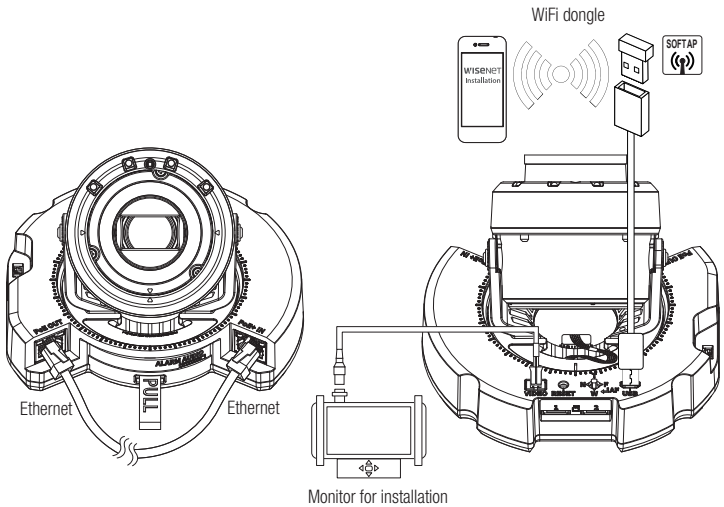
▪ Adjust the direction of IR LEDs not to hinder their view by an instrument.



▪ Adjust the direction of IR LEDs not to hinder their view by a weather cap (if any).



## CONNECTING WITH OTHER DEVICE



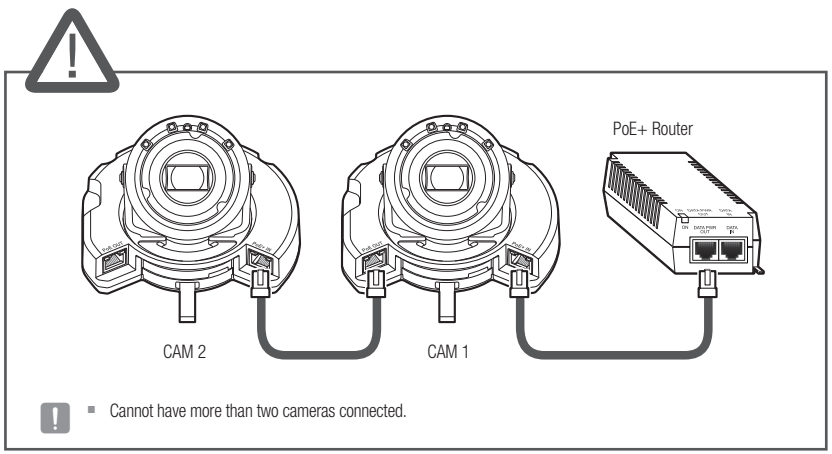

- The VIDEO out terminal of the product is provided for easier installation, and is not recommended for monitoring purposes.
- The Micro USB out terminal of the product is provided for easier installation, and is not recommended for monitoring purposes.

### Powering and networking

Connect the PoE+ router with the PoE+ IN terminal of the camera.

You can use the PoE OUT terminal to install an additional PoE camera.

- Connect to a PoE (Power over Ethernet) enabled router's PoE connector.
- Use PoE+ that is compliant with the IEEE 802.3at protocols.
- We recommend you to connect a PoE camera that complies with the supported specifications for the PoE OUT terminal. Please note that only one additional camera can be installed.




- Cannot have more than two cameras connected.

### Network Cable Specification

| Item | PoE+IN (CAM 1) | PoE OUT (CAM 2) |
|---|---|---|
| Connector | RJ-45(10/100BASE-T) | RJ-45(10/100BASE-T) |
| Ethernet | 10/100BASE-T | 10/100BASE-T |
| Cable | Category 5e | Category 5e |
| Max Distance | 100 m | 80 m |
| PoE Support | IEEE 802.3at | Max 12.95 W |

## Connecting WiFi

### Camera Setup

1. Connect OTG adapter (5-pin) and WiFi dongle to the micro USB terminal.

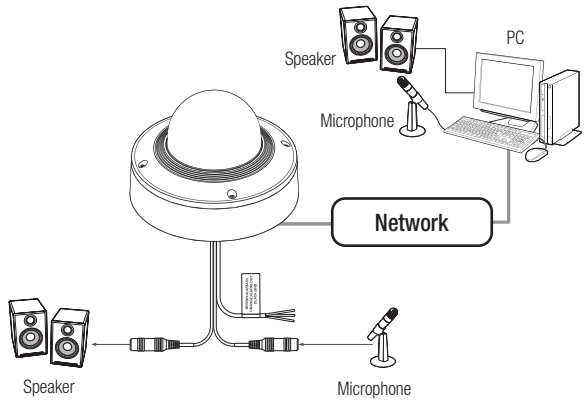
### Smartphone Setup

1. Install the Wisenet Installation application.
2. Select the camera SSID after turning on the WiFi.
3. Run the Wisenet Installation application.
4. When you log in to the camera, the video will be connected.
   - The video will be played without being logged in during the initial connection.
5. You can adjust angle of view while watching the video through smartphone.

### Recommended dongle manufacturer

| Manufacturer | Model |
|---|---|
| NETIS | WF2123 n300 |
| EDIMAX | EW-7811Un |
| IP Time | N100mini |
| TP-LINK | TL-WN823N V1 |
| ASUS | USB-N13 |
| NETGEAR | WNA3100M |

## Connecting to Audio Input/Output




1. Connect the AUDIO IN port of the camera with the microphone or LINE OUT port of the amplifier that the microphone is connected to.

   - You can use the internal microphone of the camera without an external microphone connection (only applicable for XND-6081REV/XND-8081REV).

2. Connect the AUDIO OUT port of the camera with the speaker or LINE IN port of the amplifier that the speaker is connected to.
3. Check the specifications for audio input.

- **Audio Codec**
  - Audio In : G.711 PCM (Bit Rate: 64kbps / Sampling Frequency: 8kHz), G.726 ADPCM (Bit Rate: 16Kbps, 24Kbps, 32Kbps, 40Kbps / Sampling Frequency: 8kHz), AAC (Bit Rate: 48Kbps / Sampling Frequency: 16kHz)
  - Audio Out : G.711 PCM (Bit Rate: 64kbps / Sampling Frequency: 8kHz)
- **Full duplex Audio**
- **Audio in (XND-6081REV/XND-8081REV)** : Selectable (microphone/Line-in/Built-in microphone), Supported voltage: 2.5VDC (4mA), Input impedance: 2K Ohm
- **Audio in (XNV-6081RE/XNV-8081RE)** : Selectable (microphone/Line-in), Supported voltage: 2.5VDC (4mA), Input impedance: 2K Ohm
- **Audio out** : Line-out (3.5mm mono jack), Maximum output: 1Vms
- **Line out impedance** : 600Ω

▪ In the case you access the web viewer and select an external microphone as the audio input sources in <**Video & Audio**> - <**Audio setup**>, the following specifications are recommended:

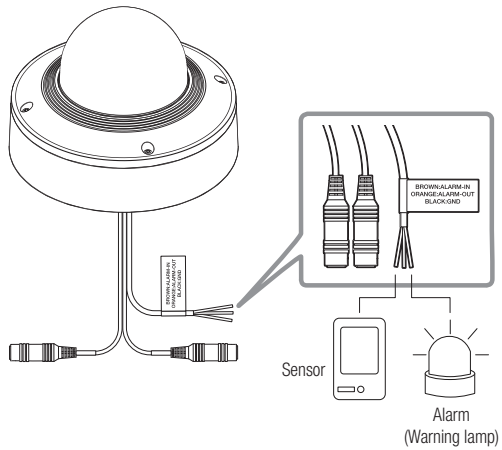
- Frequency range: 40-16,000 Hz
- Impedance: 1,500 Ω
- Sensitivity: -40±3 dB (7.1-14.1 mV)

▪ In any of the following cases, sound classification performance may be degraded or malfunction:

- If gunshot sounds are heard continuously in a short interval (e.g. machine gun sound) rather than a one-time gunshot sound
- If the noise is too loud for the noise and the target sound to be distinguished
- If two or more of different sounds are registered simultaneously
- If the sound classification is applied while using the noise removal function in a quiet place
- If the source of clapping sounds or screams is close to the camera (within 1 meter)
- If a sound that does not belong to any of the sound classification categories (airplanes sound, siren sound, etc.) is loudly heard all of sudden
- If external microphone does not meet the recommended specifications

## Connecting to the I/O port box

Connect the Alarm I/O cable to the corresponding port of the port box.



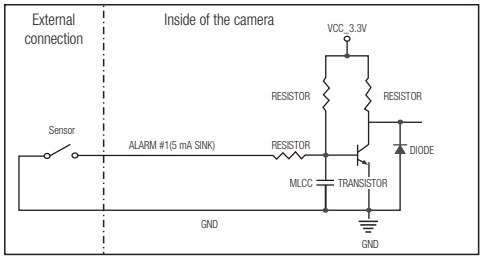

- ALARM #1 : Used to connect the alarm input sensor or external day/night sensor.
- ALARM #2 : Used to connect the alarm output signal.
- GND : Common port for alarm in/output signal.

▪ If devices (e.g., flashing light and siren) that exceed the voltage and current specifications are connected by using the open collector method, it may cause malfunction.
Refer to the "**Alarm Out Wiring Diagram**" when connecting devices that exceed the voltage and current specifications.
(Page 30)

## To connect the external sensor

Connect one strand of each signal line (2-strand) of the sensors to the [**ALARM #1**] port, and connect the other strand to the [**GND**] port.

### Alarm In Wiring Diagram



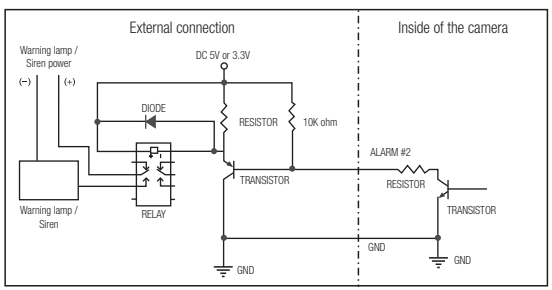

### To connect the alarm out

If devices (e.g., flashing light and siren) that exceed the voltage and current specifications are connected by using the open collector method, it may cause malfunction.

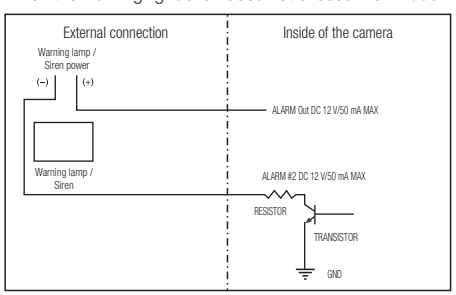
Refer to the alarm out connection diagram below when connecting devices that exceed the voltage and current specifications.

### Alarm Out Wiring Diagram

When the warning light/siren exceeds DC12V/50mA




When the warning light/siren does not exceed DC12V/50mA

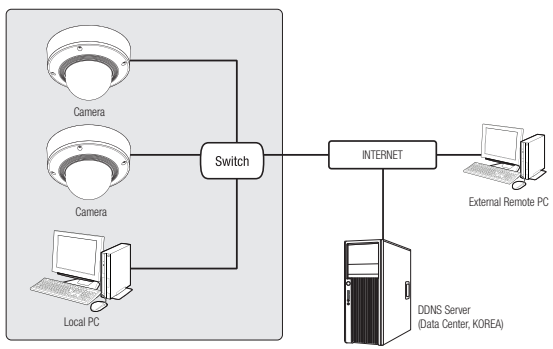


You can set up the network settings according to your network configurations.

## CONNECTING THE CAMERA DIRECTLY TO LOCAL AREA NETWORKING

### Connecting to the camera from a local PC in the LAN

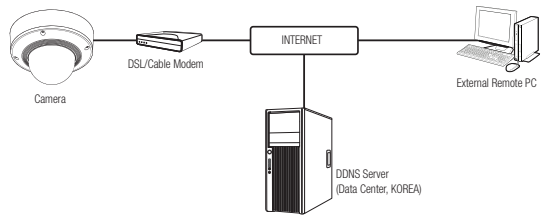
1. Launch an Internet browser on the local PC.
2. Enter the IP address of the camera in the address bar of the browser.




<Local Network>

- A remote PC in an external Internet out of the LAN network may not be able to connect to the camera installed in the intranet if the port-forwarding is not properly set or a firewall is set.
  In this case, to resolve the problem, contact your network administrator.
- By factory default, the IP address will be assigned from the DHCP server automatically.
  If there is no DHCP server available, the IP address will be set to 192.168.1.100.
  To change the IP address, use the Device Manager.
  For further details on Device Manager use, refer to "**Using Device Manager**". (Page 32)

## CONNECTING THE CAMERA DIRECTLY TO A DHCP BASED DSL/CABLE MODEM




1. Connect the user PC directly with the network camera.
2. Run the Device Manager and change the IP address of the camera so that you can use the web browser on your desktop to connect to the Internet.
3. Use the Internet browser to connect to the web viewer.
4. Move to [**Setup**] page.
5. Move to [**Network**] – [**DDNS**] and configure the DDNS settings.
6. Move to [**Basic**] – [**IP & Port**], and set the IP type to [**DHCP**].
7. Connect the camera, which was removed from your PC, directly to the modem.
8. Restart the camera.

- For information on how to set DDNS, refer to the online help of Web Viewer.
- For information on how to set the IP format, refer to the online help of Web Viewer.

## USING DEVICE MANAGER

- Device manager program can be downloaded from <**Support**>-<**Online Tool**> menu at Hanwha Vision website (https://www.HanwhaVision.com).
- More instructions of Device Manager can be found at <**Help**> menu of the main page.

## AUTOMATICALLY SEARCHING CAMERA

If a camera is connected to the same network of the PC where device manager is installed, you can find network camera by using search function.

1. Click <**Search**> at the main page of device manager.
2. Check the camera from the list.
   - Check MAC address at the sticker attached to the camera.

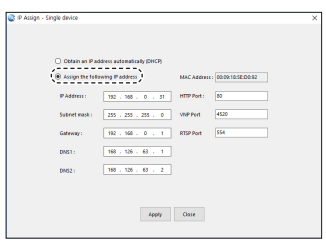
## CONFIGURING IP ADDRESS

If you want to change camera network setting, <**Login OK**> sign must be displayed at <**Status**>. Click <**Authentication**> at the main page to log in.

### Configuring Static IP

Manually insert and configure IP address & port information.

1. Click the camera from the list that you want the change the IP setting.
2. Click <**IP Assign**> at the main page of device manager.
3. Select <**Assign the following IP address**>.
   - IP information of the camera will be displayed as previously set.
4. Fill in IP & Port related categories.



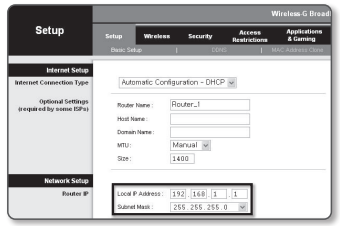

#### If not using a Broadband Router

For setting <**IP Address**>, <**Subnet Mask**>, and <**Gateway**>, contact your network administrator.

- HTTP Port : Used to access the camera using the Internet browser, defaulted to 80.
- RTSP Port: A port that controls real-time streaming. The initial value is 554.

#### If using a Broadband Router

- IP Address : Enter an address falling in the IP range provided by the Broadband Router.
  ex) 192.168.1.2~254, 192.168.0.2~254,
  192.168.XXX.2~254
- Subnet Mask : The <**Subnet Mask**> of the Broadband Router will be the <**Subnet Mask**> of the camera.
- Gateway : The <**Local IP Address**> of the Broadband Router will be the <**Gateway**> of the camera.




- The settings may differ depending on the connected Broadband Router model. For more information, refer to the user manual of the applicable router.
- For more information about port forwarding of the broadband router, refer to "**Port Range Forward (Port Mapping) Setup**". (Page 34)

#### If the Broadband Router has more than one camera connected

Configure the IP related settings and the Port related settings distinctly with each other.

ex)

| Category | | Camera #1 | Camera #2 |
|---|---|---|---|
| **IP related settings** | IP Address<br>Subnet Mask<br>Gateway | 192.168.1.100<br>255.255.255.0<br>192.168.1.1 | 192.168.1.101<br>255.255.255.0<br>192.168.1.1 |
| **Port related settings** | HTTP Port<br>RTSP Port | 8080<br>554 | 8081<br>555 |

- If the <**HTTP Port**> is set other than 80, you must provide the <**Port**> number in the address bar of the Internet browser before you can access the camera.
  ex) http://IP address : HTTP Port
  http://192.168.1.100:8080

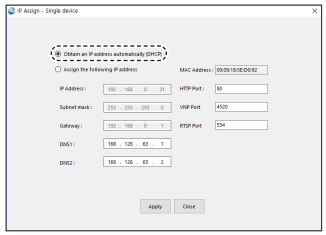
5. Click [**Apply**] Button.
6. If the success message is displayed, click [**OK**].

### Configuring Dynamic IP

Receive IP address from DHCP

- Example of the Dynamic IP environment
  - If a Broadband Router, with cameras connected, is assigned an IP address by the DHCP server
  - If connecting the camera directly to modem using the DHCP protocols
  - If IPs are assigned by the internal DHCP server via the LAN

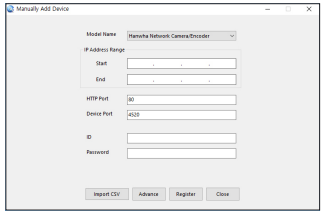
1. Click the camera from the list that you want to change the IP setting.
2. Click <**IP Assign**> at the main page of device manager.
3. Select <**Obtain an IP address automatically (DHCP)**>.
4. Click [**Apply**] button.
5. If the success message is displayed, click [**OK**].




## MANUALLY REGISTERING CAMERA

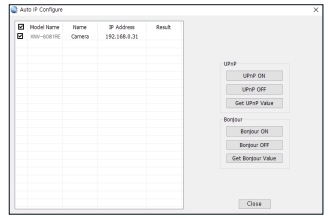
If the camera cannot be found using search function, the camera can be registered remotely by manually inserting IP information, if the camera is connected to external network.

1. Click <**Add Devices**> - <**Manually Add Device**> at the main page of device manager.
2. Insert the range of IP address that you search.
3. Select the <**Model Name**> of the camera that you register, and insert HTTP port, ID, and password.
4. Click [**Register**] button.
5. Check if camera is registered.
   - Check MAC address at the sticker attached to the camera.




## AUTOMATICALLY CONFIGURING IP

1. Click the camera from the list that you want to automatically configure the IP.
2. Click < **+** > at the main page of device manager.
   - Equipment Setting menu appears.
3. At the menu, click <**Auto IP Configure**>.
4. Click [**Close**] button.

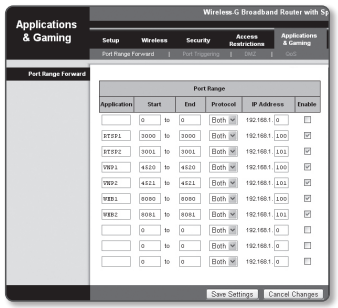


## PORT RANGE FORWARD (PORT MAPPING) SETUP

If you have installed a Broadband Router with a camera connected, you must set the port range forwarding on the Broadband Router so that a remote PC can access the camera in it.

### Manual Port Range Forwarding

1. From the Setup menu of the Broadband Router, select <**Applications & Gaming**> - <**Port Range Forward**>.
   For setting the port range forward for a third-party Broadband Router, refer to the user guide of that Broadband Router.
2. Select <**TCP**> and <**UDP Port**> for each connected camera to the Broadband Router.
   The number of each port to be configured to the IP router should be set according to the port number designated in <**Setup**> - <**Basic**> - <**IP & Port**> on the camera web viewer.
3. When done, click [**Save Settings**].
   Your settings will be saved.

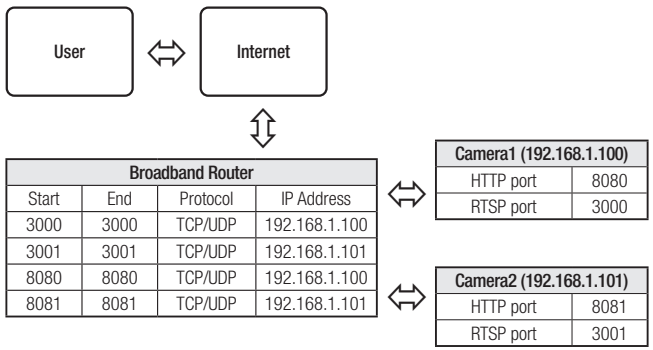



- Port forwarding setting is an example of setting CISCO IP router.
- The settings may differ depending on the connected Broadband Router model.
  For more information, refer to the user manual of the applicable router.

### Setting up Port Range Forward for several network cameras

- You can set a rule of Port Forwarding on the Broadband Router device through its configuration web page.
- A user can change each port using the camera setting screen.

When Camera1 and Camera2 are connected to a router :




| Broadband Router | | | |
|---|---|---|---|
| Start | End | Protocol | IP Address |
| 3000 | 3000 | TCP/UDP | 192.168.1.100 |
| 3001 | 3001 | TCP/UDP | 192.168.1.101 |
| 8080 | 8080 | TCP/UDP | 192.168.1.100 |
| 8081 | 8081 | TCP/UDP | 192.168.1.101 |

| Camera1 (192.168.1.100) | |
|---|---|
| HTTP port | 8080 |
| RTSP port | 3000 |

| Camera2 (192.168.1.101) | |
|---|---|
| HTTP port | 8081 |
| RTSP port | 3001 |

- Port forwarding can be done without additional router setup if the router supports the UPnP (Universal Plug and Play) function. After connecting the network camera, select the checkbox from the menu <**Quick connect**> in <**DDNS**> in "**Settings** -> **Network** -> **DDNS**".

## CONNECTING TO THE CAMERA FROM A SHARED LOCAL PC

1. Run device manager.
   It will scan for connected cameras and display them as a list.
2. Double-click a camera to access.
   The Internet browser starts and connects to the camera.

▪ Access to the camera can also be gained by typing the camera's IP address in the address bar of the Internet browser.

## CONNECTING TO THE CAMERA FROM A REMOTE PC VIA THE INTERNET

On a remote computer that is not in the Broadband Router's network cluster is not allowed, users can access cameras within a Broadband Router's network by using the camera's DDNS URL.

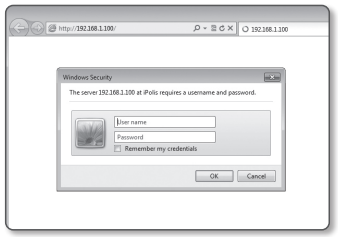
1. Before you can access a camera in the Broadband Router network, you should have set the port range forward for the Broadband Router.
2. From the remote PC, launch the Internet browser and type the DDNS URL address of the camera, or the IP address of the Broadband Router in the address bar.
   ex) http://ddns.hanwha-security.com/ID

▪ To use DDNS, sign up at the DDNS homepage (http://ddns.hanwha-security.com) and register the product at [**My DDNS**]> [**Register Product**].

## CONNECTING TO THE CAMERA

### Normally, you would

1. Launch the Internet browser.
2. Type the IP address of the camera in the address bar.
   ex) • IP address (IPv4) : 192.168.1.100 ➞ http://192.168.1.100
   - the Login dialog should appear.
   • IP address (IPv6) : 2001:230:abcd: ffff:0000:0000:ffff:1111 ➞ http://[2001:230:abcd:ffff:0000:0000:ffff:1111] - the Login dialog should appear.




### If the HTTP port is other than 80

1. Launch the Internet browser.
2. Type the IP address and HTTP port number of the camera in the address bar.
   ex) IP address : 192.168.1.100:HTTP Port number(8080)
   ➞ http://192.168.1.100:8080 - the Login dialog should appear.

### Using URL

1. Launch the Internet browser.
2. Type the DDNS URL of the camera in the address bar.
   ex) URL address : http://ddns.hanwha-security.com/ID
   - the Login dialog should appear.

▪ Network connection is disabled in the LAN only environment.

### Connecting via UPnP

1. Run the client or operating system in support of the UPnP protocol.
2. Click the camera name for search.
   In the Windows operating system, click the camera name searched from the network menu.
   - The login window is displayed.

### Connecting via Bonjour

1. Run the client or operating system in support of the Bonjour protocol.
2. Click the camera name for search.
   In the Mac operating system, click the camera name searched from the Bonjour tab of Safari.
   - The login window is displayed.

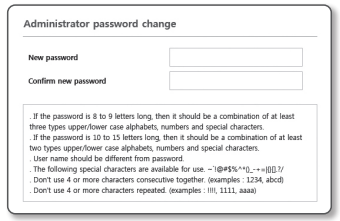
### To check the DDNS address

If the camera is connected directly to a DHCP-based cable modem or DSL modem, the IP address will change each time it tries to connect to the ISP (the company you subscribed to).
If this is the case, you will not be informed of the IP address changed by DDNS.

Once you register a dynamic IP-based device with the DDNS server, you can easily check the changed IP when you try to access the device.
To register your device to the <**DDNS**> server, visit http://ddns.hanwha-security.com and register your device first, and then set the Web Viewer's <**Network**> - <**DDNS**> to <**DDNS**>, as well as providing <**Product ID**> that had been used for DDNS registration.

## PASSWORD SETTING

When you access the product for the first time, you must register the login password.

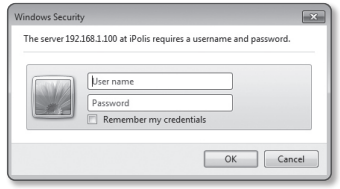



- For a new password with 8 to 9 digits, you must use at least 3 of the following: uppercase/lowercase letters, numbers and special characters. For a password with 10 to 15 digits, you must use at least 2 types of those mentioned.
  - Special characters that are allowed. : ~`!@#$%^*()_-+=|{}[].?/
- For higher security, you are not recommended to repeat the same characters or consecutive keyboard inputs for your passwords.
- If you lost your password, you can press the [**RESET**] button to initialize the product. So, don't lose your password by using a memo pad or memorizing it.

## LOGIN

Whenever you access the camera, the login window appears.
Enter the User ID and password to access the camera.

1. Enter "**admin**" in the <**User name**> input box.
   The administrator ID, "**admin**", is fixed and can not be changed.
2. Enter the password in the <**Password**> input field.
3. Click [**OK**].
   If you have logged in successfully, you will the Live Viewer screen.




- When you access the camera web viewer, pay special attention to the security by checking whether the image data is encrypted.

- If you check the "**Remember my credentials**" option when your input is done, in future you will be logged in automatically without being prompted to enter the login information.
- You will experience the best video quality if the screen size is 100%. Reducing the ratio may cut the image on the borders.

## CAMERA WEB VIEWER SETUP

1. Click the [**Setup (** ⚙ **)**] icon.
2. The Settings window appears.
3. You can configure settings for the camera's basic information, video, audio, network, event, analysis, and system over the network.
4. Click <**Help (** ? **)**> to view detailed descriptions of each function.

## TROUBLESHOOTING

| PROBLEM | SOLUTION |
|---|---|
| When an Windows 10 user accesses the web viewer through Chrome or Firefox, the sound volume of microphone changes periodically. | • This is what happens when microphone driver has been set to Realtek driver. Install the High Definition Audio device (Windows Default Driver) or the third party driver as the microphone driver. |
| What are the specifications for WAVE files necessary to play audio at the time of an event? | • Sampling rate of 48,000 KHz or less is recommended.<br>• For bits per sample (bps), up to 8/16 bit is recommended.<br>• Only PCM encoding format is supported. |
| No video is displayed when accessing the plug-in free webviewer on Safari via HTTPS. | • On the authentication popup window prompted when initially accessing https, click "View Authentication Certificate" and select the "Always trust when connecting to the designated webviewer IP" check box.<br>• If the webviewer continues failing to display a video after you select "Next" on the message window below, press the command key + Q to exit the Safari browser, access again and follow the procedures stated above. |
| I can't access the camera from a web browser. | • Check to make sure that the camera's Network settings are appropriate.<br>• Check to make sure that all network cables have been connected properly.<br>• If connected using DHCP, verify that the camera is able to acquire dynamic IP addresses without any problem.<br>• If the camera is connected to a Broadband Router, verify that port forwarding is properly configured. |
| Viewer got disconnected during monitoring. | • Connected Viewers become disconnected upon any change to camera or network configurations.<br>• Check all network connections. |
| The camera connected to the network is not detected in the Device Manager program. | • Turn off the firewall settings on your PC and then search the camera again. |
| Images overlap. | • Check whether two or more cameras are set to a single multicast address instead of different addresses. If a single address is used for multiple cameras, the images may overlap. |
| No image appears. | • If the transmission method is set to multicast, check whether there is a router that supports multicast in the LAN the camera is connected to. |

| PROBLEM | SOLUTION |
|---|---|
| Voice is not recorded even though audio input settings are configured. | • You must enable the <Audio In> check box in <Basic> - <Video Profile>. |
| <Motion detection> of <Analytics> is set to <Enable>, but no notification e-mail reaches me even when an analysis event had occurred. | • Verify the settings in the following sequence:<br>A. Check <Data & Time> settings.<br>B. The <Motion detection> should be set to <Enable>.<br>C. Check if the <E-mail> option of <Event setup> menu is checked to use. |
| No signal is found at the Alarm Output port even when an intelligent video analysis event is generated. | • Check alarm output port settings. |
| Cannot record into the Micro SD memory card. | • Check if the memory card is defective. |
| Micro SD memory card is inserted but the camera does not operate properly. | • Check if the memory card is inserted in the proper direction. Operation of memory card that is formatted by other devices is not guaranteed with this camera unit<br>• Format the memory card again in <Setup> → <Event> → <Storage> menu. |
| Cannot record in the NAS. | • Confirm that the information registered in the NAS is correct. |
| It reports that NAS setting has failed. | • Confirm that the IP address of the NAS is valid.<br>• Confirm that the ID/password of the NAS is valid.<br>• Confirm that you can access the folder designated as the default folder using the ID of the NAS.<br>• Confirm that the NAS SMB/CIFS items are unchecked.<br>• Confirm that the NAS IP address and the camera IP address are in the same format.<br>ex) The NAS & camera subnet mask initial value is 255.255.255.0.<br>If the IP address is 192.168.20.32 then the NAS IP address should be in the range of 192.168.20.1~192.168.20.255.<br>• Check whether you tried to access as another user without formatting the default folder saved or used.<br>• Confirm that you used recommended NAS equipment. |
| When registering my cameras on NVR, I often discover that CAM1 and CAM2 are not properly installed. What should I do in this case? | • Manual input is recommended for this camera when registering on NVR.<br>• If you want to register your camera in NVR PnP mode, connect CAM1 (PoE Extender camera) to the NVR first, and then connect CAM2 (other Hanwha network camera) to the PoE OUT port of CAM1. After that, auto search CAM2 or use the manual input to register them. |

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|---|---|---|
| Base Kernel | GPL 2.0 | |
| Busybox | GPL 2.0 | http://www.busybox.net/downloads/snapshots |
| iproute2-4.3.0 | GPL 2.0 | |
| iptables-1.4.21 | GPL 2.0 | http://ftp.netfilter.org/pub/iptables |
| ethtool-4.2 | GPL 2.0 | |
| mtd-1.5.2 | GPL 2.0 | ftp://ftp.infradead.org/pub/mtd-utils |
| mii-diag-2.11 | GPL 2.0 | |
| rp-pppoe-3.11 | GPL 2.0 | http://www.roaringpenguin.com/pppoe/ |
| wpa_supplicant-2.5 | GPL 2.0 | |
| bash-4.3.30 | GPL 3.0 | |
| zeroconf | GPL 2.0 | |

## LGPL SW

| Component Name | License | URL |
|---|---|---|
| gLibc | LGPL 2.0 | |
| Inetutils | LGPL 3.0 | |
| neon-0.29.6 | LGPL 2.0 | http://www.webdav.org/neon/ |

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It appears that the arithmetic coding option of the JPEG spec is covered by patents owned by IBM, AT&T, and Mitsubishi. Hence arithmetic coding cannot legally be used without obtaining one or more licenses. For this reason, support for arithmetic coding has been removed from the free JPEG software. (Since arithmetic coding provides only a marginal gain over the unpatented Huffman mode, it is unlikely that very many implementations will support it.) So far as we are aware, there are no patent restrictions on the remaining code.

The IJG distribution formerly included code to read and write GIF files. To avoid entanglement with the Unisys LZW patent, GIF reading support has been removed altogether, and the GIF writer has been simplified to produce "uncompressed GIFs". This technique does not use the LZW algorithm; the resulting GIF files are larger than usual, but are readable by all standard GIF decoders.

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**T-License [License Agreement for Source Code of T-Kernel]**

established by T-Engine Forum
on January 23, 2004
revised on June 17, 2004
revised on December 21, 2006
revised on March 24, 2009

**Article 1. Scope of License Agreement**

**1.** This License Agreement sets forth copyrights and the terms and conditions of use applicable to the source code of T-Kernel distributed by T-Engine Forum and any derivative work created therefrom.

**Article 2. Definition**

**1.** "T-Kernel" means a real-time operating system controlled and distributed by T-Engine Forum on behalf of the copyright holder thereof.

**2.** "Source Code" means a source program, including related comments and documentations, for the T-Kernel and the Ported Source Code defined in Article 2.8 which is registered with T-Engine Forum.

**3.** "Hardware-dependent Part" means the part of the Source Code which depends on hardware and needs to be changed when the Source Code is ported and operated on the target hardware, and is designated and separated as such part.

**4.** "Compiler-dependent Part" means the part of the Source Code which depends on compiler and needs to be changed when the Source Code is ported and operated on the target hardware, and is designated and separated as such part.

**5.** "Header File" means the part of the Source Code which contains definitions necessary to develop application programs.

**6.** "T-Engine Hardware" means the hardware which is manufactured in accordance with the T-Engine Hardware specifications or the µT-Engine Hardware specifications issued by T-Engine Forum, and registered with T-Engine Forum.

**7.** "Similar Hardware to T-Engine Hardware" means any hardware (including software which emulates hardware) other than that defined in Article 2.6 above, on which the T-Kernel can be operated.

**8.** "Ported Source Code" means a source program produced from the Source Code by modifying only its Hardwaredependent Part and/or Compiler-dependent Part to enable it to be operated on the T-Engine Hardware or the Similar Hardware to T-Engine Hardware. The Ported Source Code which is registered with T-Engine Forum shall be included in the Source Code.

**9.** "Modified Source Code" means a source program modified from the Source Code for the purpose of improving its performance, increasing or decreasing its function, and the like. The Ported Source Code shall not be included in the Modified Source Code.

**10.** "Binary Code" means an executable code form which is created by compiling programs, which include all or part of the Source Code or the Modified Source Code.

**11.** "Derivative Work" means the Modified Source Code or the Binary Code.

**12.** "Embedded Product" means any product which operates with executable code form of the Source Code, the Modified Source Code or the Binary Code loaded on its hardware.

**13.** "End User" means a consumer who uses the Embedded Product.

**14.** "System Developer" means any person who develops the Embedded Product by itself or has a third party develop the same, and provides, whether with or without payment, the End User with the Embedded Product.

**15.** "Distributor of Modification" means any person who produces the Modified Source Code and, whether with or without payment, distributes the same to any third party.

**16.** "Patch for Modification" means a difference, program, system, or the like in order to create the Modified Source Code from the Source Code or the Binary Code thereof.

**17.** "Vicarious Execution of Patch Processing" means vicarious execution service to create the Modified Source Code applying the Patch for Modification to the Source Code or the Binary Code thereof.

**18.** "Source Code User" means a person who uses the Source Code.

**19.** "Distribution" means any of the following acts:

1. to transmit a work to a large number of specific persons through the Internet communication, broadcasting, and the like;

2. to transmit a work to the general public through the Internet communication, broadcasting, and the like automatically in response to a request from the public; and

3. to distribute a copy of a work to the general public or a large number of specific persons.

**Article 3. Copyright**

**1.** The copyrights of the Source Code shall be owned by Ken Sakamura.

**Article 4. License of Source Code**

**1.** As provided for in this Article, T-Engine Forum shall provide, and grant a license to use, the Source Code free of charge to any person who has taken the necessary procedure for registration as prescribed by T-Engine Forum and agreed to the T-License.

**2.** The Source Code shall be distributed exclusively by T-Engine Forum. Any person who obtains the Source Code under Article 4.1 above shall not make any re-Distribution of the Source Code.

**3.** In accordance with the license granted under Article 4.1 above, the Source Code User may perform the following acts:

1. to copy and/or modify the Source Code provided by T-Engine Forum hereunder for its own research, development and the like.

2. to run the Source Code provided by T-Engine Forum hereunder for its own research, development and the like.

3. to run the Source Code modified in accordance with the provision of Article 4.3 (1) above for its own research, development and the like.

4. to distribute the Binary Code created from the Source Code provided by T-Engine Forum hereunder or from the Source Code modified in accordance with the provision of Article 4.3 (1) above.

**4.** In accordance with the license granted under Article 4.1 above, the System Developer may perform the following acts:

1. to perform any and all acts set forth in the Article 4.3 above.

2. to develop and manufacture the Embedded Product containing the Binary Code, and, whether with or without payment, provide the End User with the same and make the Binary Code available to the End User on the Embedded Product.

**5.** The Source Code User and the System Developer shall be obligated to give a notice that the Source Code is used, in such a way as separately specified by T-Engine Forum, when they use the Source Code or the Binary Code, or make the Binary Code available for the End User on the Embedded Product.

**Article 5. Distribution of Modified Source Code**

**1.** Any of A- members of T-Engine Forum may become the Distributor of Modification by obtaining the approval of T-Engine Forum through the registration procedure as prescribed by the Forum provided that only the department of the A- member which has taken the registration procedure may distribute the Modified Source Code in such a way as provided for in this Article as long as it holds the Amembership.

**2.** The Distributor of Modification may create the Modified Source Code based on the Source Code provided by T-Engine Forum and the Patch for Modification to be applied to create such Modified Source Code from the Source Code.

**3.** The Distributor of Modification shall, prior to the distribution, inform T-Engine Forum of and register a name and description of the Modified Source Code in such a way as specified by T-Engine Forum.

**4.** The Distributor of Modification shall determine the name of the Modified Source Code subject to the rules separately established by T-Engine Forum and publish an appropriate notice as required by the rules on the Patch for Modification and the Modified Source Code.

**5.** The Distributor of Modification may distribute the Modified Source Code to a third party, whether with or without payment, provided that the Distributor of Modification shall take the necessary measures to prohibit the third party from making the re-Distribution of the Modified Source Code.

**6.** Developer with the Patch for Modification. Provided, however, that the Distributor of Modification shall be obligated to confirm that the System Developer is the Source Code User duly licensed under Article 4.1.

**7.** The Distributor of Modification may perform the Vicarious Execution of Patch Processing for the System Developer.

**8.** The System Developer shall not distribute the Modified Source Code in further modified form to any third party as a stand-alone software product.

**9.** The System Developer may, under the same obligation as imposed in Article 4.5, make the Embedded Product available for the End User through use of the Patch for Modification distributed by the Distributor of Modification or the Derivative Works obtained through the Vicarious Execution of Patch Processing.

**Article 6. Distribution and Registration of the Ported Source Code**

**1.** The Source Code User and the System Developer may, whether with or without charge, distribute to any third party only the following parts of the Ported Source Code on the T-Engine Hardware or the Similar Hardware to T-Engine Hardware:

1. The Hardware-dependent Part and/or Compiler-dependent Part; provided that the Source Code User and the System Developer shall inform T-Engine Forum of, and T-Engine Forum may publish, a method for distributing said Part(s) to third parties.

2. The Header File; provided that the Header File shall be distributed together with the Binary Code of the Ported Source Code.

**2.** Any member of T-Engine Forum may request T-Engine Forum to register and distribute, as an original source code for T-Kernel, the Ported Source Code on the T-Engine Hardware or the Similar Hardware to T-Engine Hardware.

**3.** Any member of T-Engine Forum who requests the distribution mentioned in the preceding paragraph shall accede to the following conditions:

1. The member shall confirm that the object hardware is the T-Engine Hardware or the Similar Hardware to T-Engine Hardware.

2. The member shall provide T-Engine Forum with a complete set of operational environment for the object hardware and T-Kernel free of charge when requesting the distribution.

3. The member shall submit test results of the Ported Source Code to T-Engine Forum when requesting the distribution.

**4.** In the event that T-Engine Forum accepts the request mentioned in Article 6.2, T-Engine Forum shall register and distribute the Ported Source Code as the Source Code for T-Kernel. Provided, however, that the Ported Source Code may be treated in the same way as the Modified Source Code until the time of registration hereunder.

**5.** The provision set forth in Article 3 shall apply to the Ported Source Code registered in accordance with this Article.

**Article 7. Use for Other Purpose**

**1.** Any use of the Source Code, the Modified Source Code or the Ported Source Code other than those stipulated in Articles 4, 5 and 6 shall be subject to the prior approval of T-Engine Forum.

**Article 8. Limited Warranty**

**1.** T-Engine Forum and the copyright holder of the Source Code warrant that the Source Code does not infringe third party's copyrights. Provided, however, that T-Engine Forum and the copyright holder of the Source Code make no warranty as to the Hardware-dependent Part and/or Compiler- dependent Part set forth in Article 6.2 in the Ported Source Code by any third party.

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**1.** Neither T-Engine Forum nor the copyright holder of the Source Code shall be liable for any damages (including, but not limited to, damages resulting from loss of profit, business interruption, loss of business information or any other pecuniary damage) arising out of use or impossibility of use of the Source Code, even if T-Engine Forum and the copyright holder have been informed of the possibility of such damages.

**Article 10. Breach of Agreement**

**1.** In case that T-Engine Forum considers that this License Agreement is breached or that the popularization of T-Kernel is obstructed, T-Engine Forum shall take measures to correct such breach or such obstruction, take measures on the ground of copyright infringement, or take any other necessary measures against the breaching person or the obstructing person, regardless of whether or not the said person is a member of T-Engine Forum.

**2.** In case of breach of this License Agreement by a member of T-Engine Forum, T-Engine Forum may take appropriate measures against the member; for example, the member is disqualified from membership, depending on what kind of breach has been committed by it.

**3.** Any legal dispute which may arise in relation to any breach of this License Agreement shall be subject to the exclusive jurisdiction of the Tokyo District Court.

**Article 11. Governing Law and Language**

**1.** This License Agreement shall be governed by and interpreted under the laws of Japan.

**2.** This License Agreement is executed in both Japanese text and English text provided that the Japanese text shall govern the interpretation and performance of this License Agreement.

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Julian Seward, jseward@bzip.org

bzip2/libbzip2 version 1.0.5 of 10 December 2007

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Iperf performance test

Mark Gates

Ajay Tirumala

Jim Ferguson

Jon Dugan

Feng Qin

Kevin Gibbs

John Estabrook

National Laboratory for Applied Network Research

National Center for Supercomputing Applications

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Jean-loup Gailly Mark Adler

jloup@gzip.org madler@alumni.caltech.edu

The data format used by the zlib library is described by RFCs (Request for Comments) 1950 to 1952 in the files http://www.ietf.org/rfc/rfc1950.txt (zlib format), rfc1951.txt (deflate format) and rfc1952.txt (gzip format).

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### Correct Disposal of This Product (Waste Electrical & Electronic Equipment)

(Applicable in the European Union and other European countries with separate collection systems)

This marking on the product, accessories or literature indicates that the product and its electronic accessories (e.g. charger, headset, USB cable) should not be disposed of with other household waste at the end of their working life. To prevent possible harm to the environment or human health from uncontrolled waste disposal, please separate these items from other types of waste and recycle them responsibly to promote the sustainable reuse of material resources.
Household users should contact either the retailer where they purchased this product, or their local government office, for details of where and how they can take these items for environmentally safe recycling.
Business users should contact their supplier and check the terms and conditions of the purchase contract. This product and its electronic accessories should not be mixed with other commercial wastes for disposal.

### Correct disposal of batteries in this product

(Applicable in the European Union and other European countries with separate battery return systems.)

This marking on the battery, manual or packaging indicates that the batteries in this product should not be disposed of with other household waste at the end of their working life. Where marked, the chemical symbols Hg, Cd or Pb indicate that the battery contains mercury, cadmium or lead above the reference levels in EC Directive 2006/66. If batteries are not properly disposed of, these substances can cause harm to human health or the environment.
To protect natural resources and to promote material reuse, please separate batteries from other types of waste and recycle them through your local, free battery return system.

Hanwha
Vision