THE BLACK LINE

BLK-PTZ12X High Resolution 12x Zoom Outdoor PTZ Camera User Manual

Products: BLK-PTZ12X

Please read this manual before using your camera, and always follow the instructions for safety and proper use. Save this manual for future reference.

REGULATORY NOTICE

FCC Information

FCC compliance: This equipment has been tested and found to comply with the limits for a digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

FCC Conditions

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.

2. This device must accept any interference received, including interference that may cause undesired operation.

$C \in$ This product and - if applicable - the supplied accessories too are marked with "CE" and comply therefore with the applicable harmonized European standards listed under the Low Voltage Directive 2006/95/EC, the EMC Directive 2004/108/EC.

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Safety Warnings and Cautions

⚠️ **WARNING**

Hazardous Voltage may be present: Special measures and precautions must be taken when using this device. Some potentials (voltages) on the device may present a hazard to the user. This device should only be used by those with knowledge and training in working with these types of devices that contain live circuits.

⚠️ **WARNING**

Power Supply Hazardous Voltage: AC voltages are present within the power supply assembly. This device must be connected to a UL approved, completely enclosed power supply, of the proper rated voltage and current. No user serviceable parts inside the power supply.

⚠️ **WARNING**

Connect only to a properly earth grounded outlet. To avoid shock, ensure that all AC wiring is not exposed and that the earth grounding is maintained. Ensure that any equipment to which this device will be attached is also connected to properly wired grounded receptacles and are approved medical devices.

⚠️ **WARNING**

Power Connect and Disconnect: The AC power supply cord is the main disconnect device to AC power. The socket outlet must be installed near the equipment and must be readily accessible.
Installation and Maintenance: Do not connect/disconnect any cables to or perform installation/maintenance on this device during an electrical storm.

⚠️ **WARNING**

Power Cord Requirements: The connector that plugs into the wall outlet must be a grounding-type male plug designed for use in your region. It must have certification marks showing certification by an agency in your region. The connector that plugs into the AC receptacle on the power supply must be an IEC 320, sheet C13, female connector. See the following website for more information http://kropla.com/electric2.htm.

⚠️ **WARNING**

Lithium Battery: This device contains a Lithium Battery. There is a risk of explosion if the battery is replaced by an incorrect type. Dispose of used batteries according to the vendor's instructions and in accordance with local environmental regulations.
Perchlorate Material: Special handling may apply. See www.dtsc.ca.gov/hazardouswaste/perchlorate. This notice is required by California Code of Regulations, Title 22, Division 4.5, Chapter 33: Best Management Practices for Perchlorate Materials. This device includes a battery which contains perchlorate material.

⚠ CAUTION

Management Practices for Perchlorate Materials. This device includes a battery which contains perchlorate material. *Electromagnetic Interference*: This equipment has not been tested for compliance with emissions limits of FCC and similar international regulations. This device is not, and may not be, offered for sale or lease, or sold, or leased until authorization from the United States FCC or its equivalent in other countries has been obtained. Use of this equipment in a residential location is prohibited. This equipment generates, uses and can radiate radio frequency energy which may result in harmful interference to radio communications. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment on and off, the user is required to take measures to eliminate the interference or discontinue the use of this equipment.

Warnings

- Use of the product only when in compliance with local electrical safety regulations.
- Use only the required power adapter. The standard power adapter is 24 Vac / 2 A.
- Do not connect additional devices to the power adapter. Doing so may over-heat the device and cause a fire hazard.
- Always make sure that the power adapter plug is fully inserted into the power socket.
- When the product is installed on a wall or ceiling, it must be securely attached.
- If the camera emits smoke, odors or noise power it off immediately and unplug the power cable. Contact the service center.
- If the camera does not work properly, please contact your dealer or the nearest service center. Never attempt to disassemble the camera yourself. (Your provider is not responsibility for problems caused by unauthorized repair or maintenance.)

Cautions

- Do not drop the dome or subject it to physical shock. Do not expose it to high levels of electromagnetic radiation.
- Do not install the camera on surfaces that are subject to vibrations or shock.
- Do not place the camera in extremely hot, cold (operating temperature range: -22 °F ~ 149 °F (-30 °C ~ +65°C)), dusty or damp locations. Fire or electrical shock can occur.
- Exposing the equipment to direct sunlight, low ventilation or heat sources such as heater or radiator should be avoided.
- Do not aim the camera at the sun or extra bright places. A blooming or smear may occur (which is not a malfunction however), and affect the longevity of CCD.
- Use the glove provided when opening the dome cover. Do not touch the dome cover; the acidic moisture on skin can erode the surface coating.
- Please use a soft and dry cloth when cleaning the inside and outside surfaces of the dome cover. Do not use alkaline detergents.

Preparation for Installation

- Basic requirements:
    — All the electronic operations must be compliant with local electrical safety regulations, fire prevention regulations and other related regulations.
    — Verify that all accessories are included with your shipment.
    — Make sure that the camera is suitable for the location and security requirements where it will be installed. If not, please contact the supplier.
    — Always use this product in accordance with the manufactures specifications and recommendations.
- Check installation space. Make sure the place have enough space to install the camera and its accessories.
- Check the intensity of conformation at the installation location. Please make sure that the ceilings or walls are strong enough to withstand four times the weight of camera and its accessories.
- Preparation of cables:
    — Choose video cable in accordance with the transmission distance. The video should meet the least demands as: 75Ω resistance; 100% copper core conducting wire; 95% weaving copper shield.
    — For RS-485 communication cable, please refer to Appendix B.
    — For 24 Vac power cabling, please refer to Appendix C.
- Keep packaging for possible future use. If a failure occurs, return the product to the factory with the original packaging. Shipment without the original packaging may damage the product and incur additional costs.

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SECTION 1
Introduction

The BLACK Line™ 650 TVL 12x zoom mini outdoor PTZ camera enables you to pan, tilt and zoom in on suspicious activity and capture high resolution video of wide areas such as parking lots, shopping malls and sports facilities.

The compact mini PTZ security camera features a 1/3" Sony® 960H CCD image sensor, 12x optical zoom, 16x digital zoom and delivers 650 TV lines of color resolution and 700 TV lines of black and white resolution for crisp, high resolution video. The camera is also equipped with enhanced imaging features such as digital wide dynamic range (D-WDR) and 3D digital noise reduction (3D-DNR) to reduce video noise, as well as true day/night (ICR) to capture sharp detailed images in both daytime and low-light nighttime conditions.

The BLACK PTZ camera also features 225 programmable presets, 8 patrols with up to 32 presets per patrol, selectable automatic gain control, plus a 360° endless pan range, -2° ~ +90° tilt range, 0.1° ~ 200° / second pan speed and 0.1° ~ 120° / second tilt speed. The camera has a wide operating temperature range of -22 °F ~ 149 °F that makes it ideal for capturing video in cold climates, and an IP66 weather-rated enclosure to withstand a variety of elements and weather conditions. The PTZ camera also features privacy zone masking and offers TVS 4,000 V lighting surge protection.

The PTZ camera features:

- 2 sensor inputs
- 1 alarm output
- 1 video output

1.1   Features

OSD (on-screen display)

The on-screen display is a text image superimposed on video. The text displays status information and configuration menus.

Self-adaptive Protocol

The camera is compatible with PELCO-D, PELCO-P, PRIVATE-Code, VICON and KALATEL-312 protocols, etc., and is capable of being self-adaptive to these protocols without selecting protocol by DIP switch settings.

Keyboard Control

The pan/tilt movement and zoom actions of camera can be controlled by the control keyboard, DVR, matrix, etc.

Limit Stops

The dome can be programmed to move within the limit stops (left/right, up/down) which are configurable by the control keyboard, DVR or client application software.

Scan Modes

The dome provides 5 scanning modes: pan scanning, tilt scanning, frame scanning, random scanning and panorama scanning. The scanning speed can be set by OSD menu from level 1 to 40, with the corresponding speed ranging from 1°/second to 40°/second.

Preset Freeze Frame

This feature freezes the scene on the monitor when moving to a preset. This allows for smooth transition from one preset scene to another and also guarantees that masked areas will not be revealed when moving to a preset.

Presets

Each of the user-definable presets can be programmed to use pan, tilt, camera settings and other settings. When a preset is called, the dome will automatically move to the defined position. The user can add, modify, delete and call each preset.

Label Display

The on-screen label of the azimuth/elevation, zoom and other operations can be setup by menus and displayed on the monitor.

Auto Flip

In manual tracking mode, when a target object moves directly beneath the dome, the dome will automatically rotate 90 degrees in the horizontal direction to maintain continuity of tracking.

Privacy Mask

The privacy mask allows the user to define areas of the field of view that cannot be seen by the operator of the camera. A masked area will move with pan and tilt functions and automatically adjust in size when the lens zoom changes.

3D Intelligent Positioning

The camera can be controlled with a mouse and the PRIVATE-Code protocol. Clicking a spot can direct the camera position the spot in the center of the image. When a rectangular area is selected with the left mouse button, the camera will move to its center and enlarge it. Right click the mouse to zoom in. The scroll wheel can control lens zoom. Mouse cursor movement can also control zoom effects.

Proportional Pan

Proportional pan automatically reduces or increases the pan and tilt speeds in proportion to the amount of zoom. At telephoto zoom settings, the pan and tilt speeds will be slower for a given amount of joystick deflection than at wide zoom settings. This keeps the image from moving too fast on the monitor when there is a large amount of zoom.

Auto Focus

Auto focus enables the camera to focus automatically to maintain clear video images.

DAY/NIGHT Auto-switch

The camera provides color images during the day. As light diminishes at night, it switches to night mode and delivers black and white images with high quality. You can also switch it to NIGHT mode manually to increase the sensitivity in low light conditions.

Slow Shutter

Slow shutter function extends the exposure time to accumulate more light when the light condition is low. Thus, the image can be brighter.

Backlight Compensation (BLC)

If the camera focuses on an object against strong backlight, the object will be too dark to be seen clearly. The BLC function can compensate light to the object in the front to make it clear, but this causes the over-exposure of the background where the light is strong.

Wide Dynamic Range (WDR)

The wide dynamic range function helps the camera provide clear images even under back light conditions. When there are both very bright and very dark areas simultaneously in the field of view, WDR balances the brightness level of the entire image and provide clear image detail.

White Balance

White balance is the white rendition function of the camera to adjust the color temperature according to the environment automatically. It can remove the unrealistic color casts in the image.

Patrol

The camera provides up to 8 patrols. In each patrol, you can specify the scanning track by a group of user-defined presets, with the scanning speed between two presets and the dwell time at the preset separately programmable.

Pattern

A pattern is a memorized, repeating series of pan, tilt, zoom, and preset functions that can be recalled with a command from a controller or automatically by a configured function (alarm, park, time task, or power-up). By default the focus and iris are in auto status during the preset is being memorized.

Power-off Memory

This feature causes the dome to resume its previous position or status after power is restored. By default setting, the dome supports the power-off memory capability with the dwell time of 3 minutes.

Alarm Response Action

The camera supports 2 alarm inputs which can be set to normally open (NO) or normally closed (NC). Upon having received the alarm input signal, the dome will automatically activate a user-defined action, which can be programmed to: preset 1-8, pattern 1-4, patrol 1-8, pan scan, tilt scan, random scan, frame scan, panoramic scan, color or black and white (B&W) mode. After the alarm is cleared, the dome is can resume its previous activity or position.

AUX Output

An auxiliary output is a configurable signal from the camera back box that can trigger another device to operate. The camera provides one auxiliary output. The auxiliary output type can be set to NO (normally open) or NC (normally closed). The alarm dwell time is also configurable.

Manchester Code Self-test

The camera supports Manchester code self-test for fault diagnostic. You can enable the Manchester code diagnosis function by setting DIP switches inside the camera. The corresponding fault code will be displayed on the screen (not available during park time) while adopting Manchester protocol.

Table 1. Descriptions of the Fault Code

Fault Code	Description
E0	Normal control
E1	Cable is disconnected
E2	Cable is connected and data can be normally received, but the address setting is incorrect
E3	Cable is connected and data can be normally received, but the command setting is incorrect
E4	Cable is connected and data can be normally received, but the settings of address and command are incorrect
E5	Cable is connected, but the received data does not comply with the requirements of Manchester code

Time Task

A time task is a preconfigured action that can be performed automatically at a specific date and time. The programmable actions include: preset 1-8, pattern 1-4, patrol 1-4, pan scan, tilt scan, random scan, frame scan, panorama scan, day/night mode or none.

Zone

A zone is a user-defined area. The dome provides eight zones, each with configurable label. If the dome has dwelled at a zone without receiving any command over 4 minutes, this feature will enable the dome to perform panorama scan within the zone.

Password

The dome features password protection to prevent unauthorized changes to the dome settings.

Camera Title

Title text is the label used to identify the camera viewed on the monitor. The title text can include up to 15 characters.

RS-485 Failure Diagnostics

In the presence of failure at the transmitting and receiving terminals of RS-485 communications, the camera is capable of performing self-test and detecting the fault results which will be displayed on the screen.

Soft Baud Rate

The communication baud rate of camera can be configured by the menu without need of DIP switch settings.

1.2 Accessories

The following accessories are available for the BLK-PTZ12X camera. Mounting bracket detail is shown below.

Model	Type
BLK-PTZCL	Ceiling Mount Bracket
BLK-PTZWBS	Short Arm Wall Bracket 4" PTZ
BLK-PTZWB	Wall Mount Bracket
BLK-PTZPM	Pole Mount PTZ Bracket
BLK-PTZCM	Corner Mount PTZ Bracket
BLK-PTZCNTRL	3D Joystick PTZ Controller (Pelco-P/D)

BLK-PTZCL: Ceiling Mount Bracket

The Ceiling Mount Bracket is suitable for outdoor ceiling mounting.

2.24"

0.39" dia. (4)

4.57" dia.

3.52" dia.
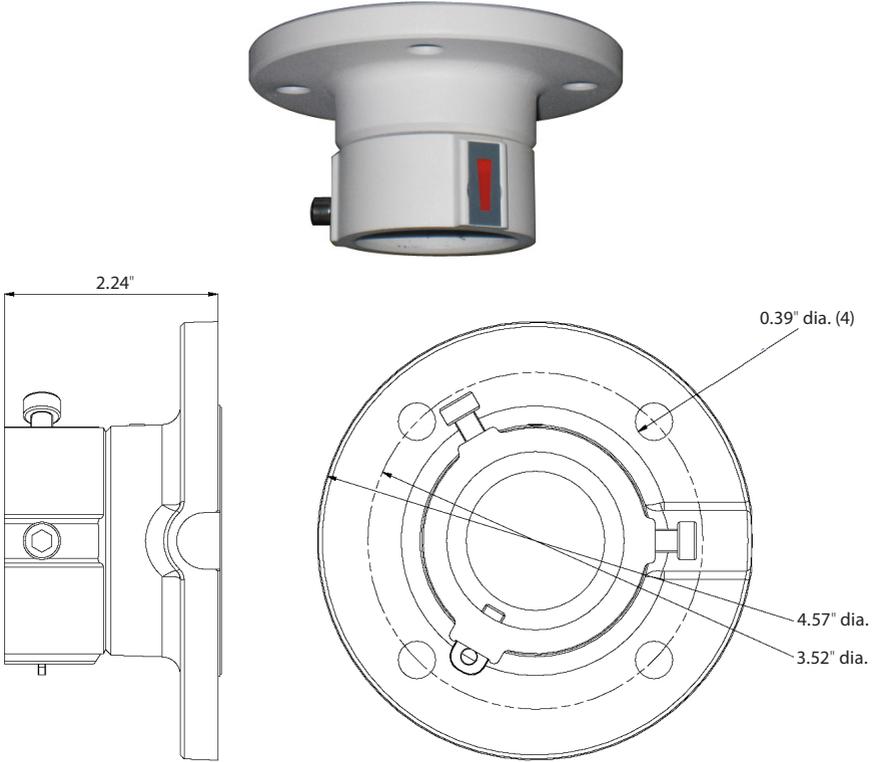
BLK-PTZWBS: Short Arm Wall mount bracket 4" PTZ

The Short Arm Wall Mount Bracket is suitable for outdoor wall mounting of the BLK-PTZ12X camera.

0.35" dia.

4.65"

5.71"

3.31"

4.33"

1.91" dia.
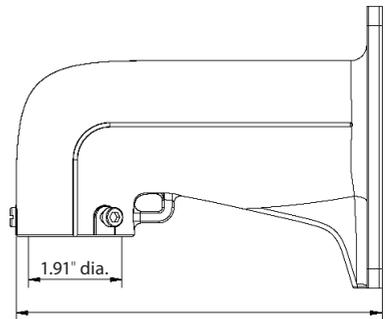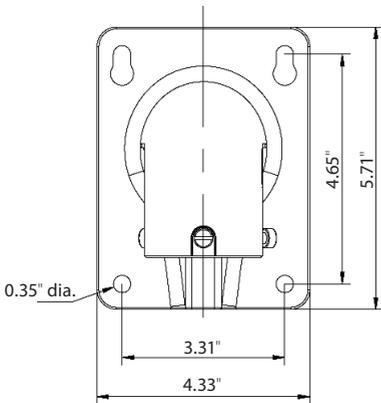
BLK-PTZWB: Wall Mount Bracket

The Wall Mount Bracket is suitable for indoor and outdoor wall mounting.

3.82"

2.95"

7.64"

6.30"

0.33" dia. (4)

12.2"

G 1.5"
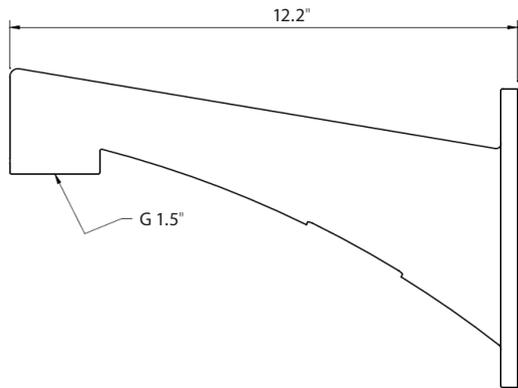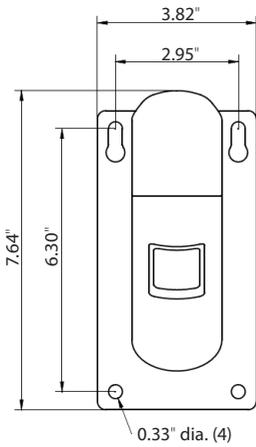
BLK-PTZPM: Pole Mount PTZ Bracket

The Pole Mount Bracket is suitable for outdoor pole mounting. The straps can attach to a 2.64" ~ 5.00" diameter pole.

3.94" dia.

5.63"   12.2"

7.64"

2.68"

2.68"

G 1.5"

4.61"

7.64"

BLK-PTZCM: Corner Mount PTZ Bracket

90°

6.96"

7.64"

16.52"

G 1.5"
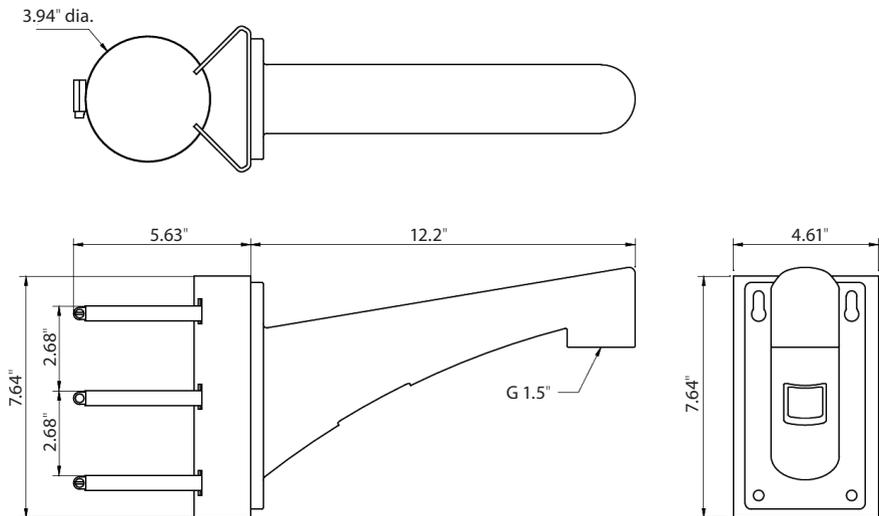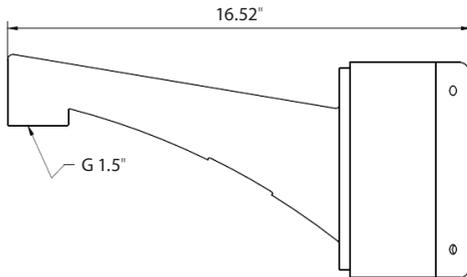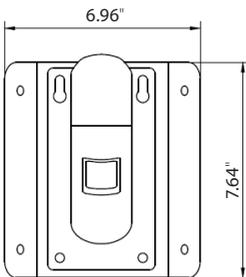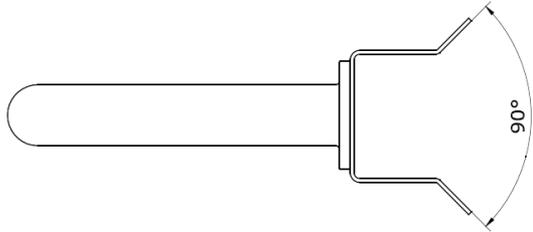
SECTION 2
Installation

Before you start, check the package contents and make sure that the device in the package is in good condition and all the assembly parts are included. Included are:

- AC power supply
- Installation guide (this user manual)

Mounting brackets are sold separately.

2.1   Camera wall mount installation

The camera can be wall mounted to any indoor or outdoor solid wall.

NOTE	• *The wall must be thick enough to mount the expansion screws.* • *The wall must be strong enough to withstand more than 4 times the weight of the dome and its accessories.*

1.   Prepare the mounting surface for the camera.

   a.   Obtain the best fasteners for attaching the camera wall mount bracket to the mounting surface. The fasteners must fit the wall mount bracket.

   b.   Position the wall mount bracket in the location where you want to install it, then use it as a guide to mark the location of the screw holes.
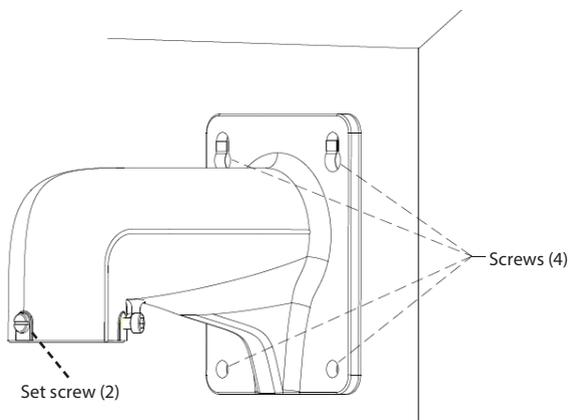
Wall mount installation

    c.   Drill four screw holes according to the screw holes on the wall mount.

    d.   Drill a 1-1/4" hole in the mounting surface between the mounting screws appropriate for the camera drop and interface cables.

2.   Secure the camera onto the wall mount bracket as shown below:

    a.   Route the camera drop cables through the wall mount bracket.

    b.   Rotate the connector of the camera housing onto the wall mount bracket.

    c.   Tighten the set screws with the hex wrench (supplied) to hold the two units together.
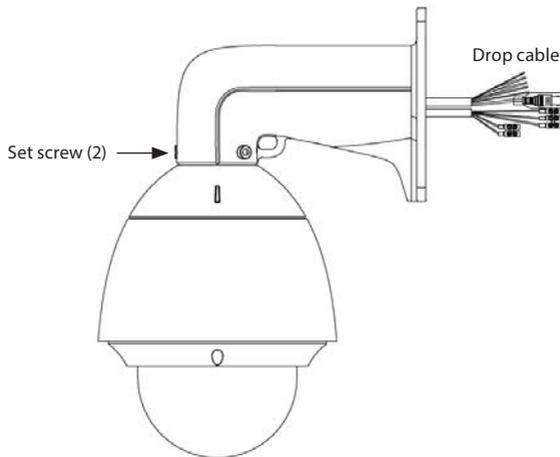
Secure the camera to the bracket

3.   Route the camera drop cables through the hole for them drilled in the mounting surface.

4.   Using four fasteners, secure the camera to the mounting surface.

5.   Remove the protective plastic film from the lower dome.

Screw (4)
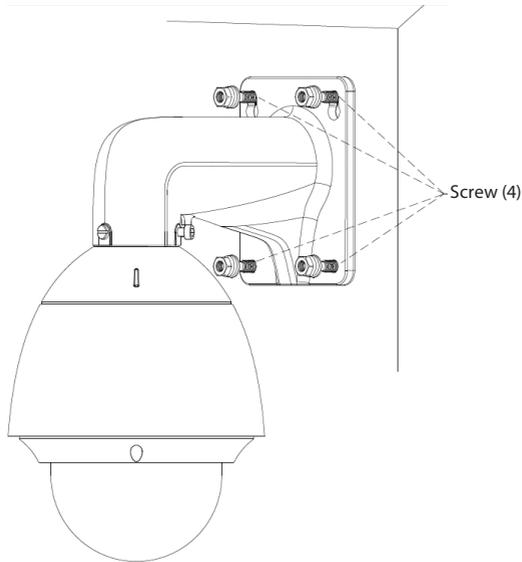
2.1.1 Connecting the cables

Before you start, remove power from the power supply cables before connect them to the camera power cables.

The cable interfaces of camera is shown below. The cables of RS-485 interface, power and ground, and alarm in/out are distinguished by different colors. Please refer to the labels in following figure for identification.

Connect the camera RS-485, power and alarm drop cables and terminals to your to site equipment as needed.

Label description:
Red   24 Vac
Brown   Ground
Black   24 Vac
Yellow   RS-485 −
Orange   RS-485 +

Orange   GND
Yellow   ALARM_IN2
Green   ALARM_IN1
Blue   ALARM_OUT1A −
White   ALARM_OUT1B

Labels

Video output
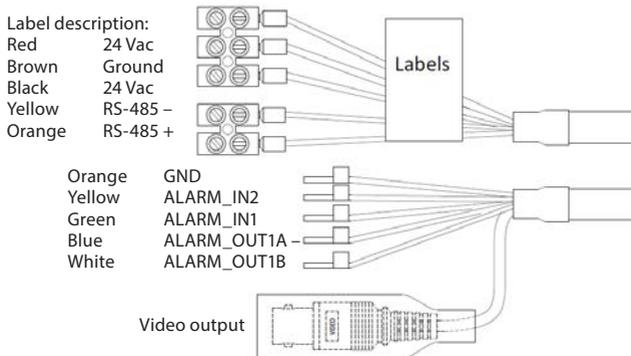
2.1.2 Alarm In/Out Connections

The camera can be connected with 2 alarm inputs (0~12 Vdc) and 1 alarm output. Refer to the following diagrams for the alarm output connections:

Alarm out connections
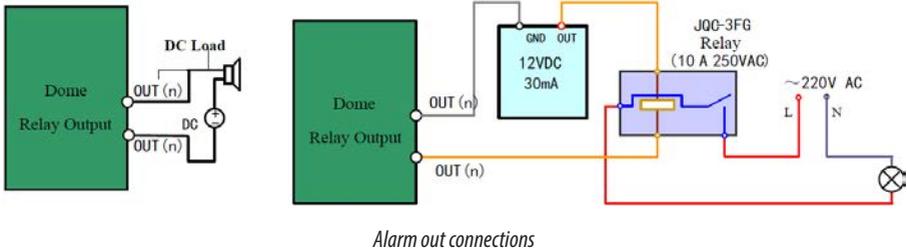
The alarm provides the relay output (no voltage), and the external power supply is required when it connects to the alarm device. With a DC power supply (left diagram), the input voltage must be no more than 12 Vdc, 30 mA. For AC power supply (right diagram), the external relay must be used to prevent damages to the camera and avoid risk of electric shock.

2.1.3 Set the DIP switches

DIP switches, located in the housing are used to setup the RS-485 network address (switches 1 - 5), baud rate (switches 6 - 7), and protocol (switches 8 - 9). These switches can also be setup manually or through the DVR PTZ interface.

DIP switch 10 provides RS-485 end-of-line termination and cannot be set using the DVR interface. If used, it must be set by opening the camera enclosure and manually setting the switch to ON.

Using the tables below, set the switches in accordance with the following:

- The default camera address is 0, the default baud rate is 2400, and the default status of the RS-485 network 120 Ω end-of-line terminator is OFF.
- The address of the devices (cameras) RS-485 network must each be different.
- The baud rate must be the same for each device on the RS-485 network.
- The DIP switches 1 - 9, used for setting the address, baud rate, and protocol of the RS-485 network, function logically in this way: ON=1 and OFF=0.
- The camera is self-adaptive to the Pelco-P, Pelco-D and Private-Code protocols. You don't have to set the DIP switches for these RS-485 control protocol.

To set the DIP switches manually, do the following:

1. Remove the lower dome cover from the camera by extracting the three screws.
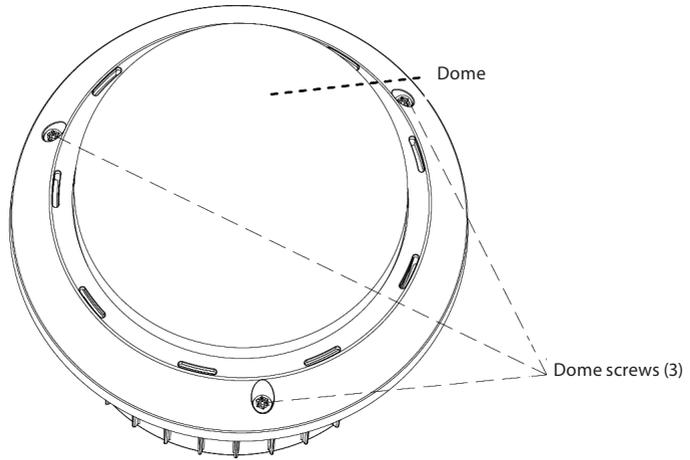
Remove lower dome

2.   Locate the DIP switches inside the housing.
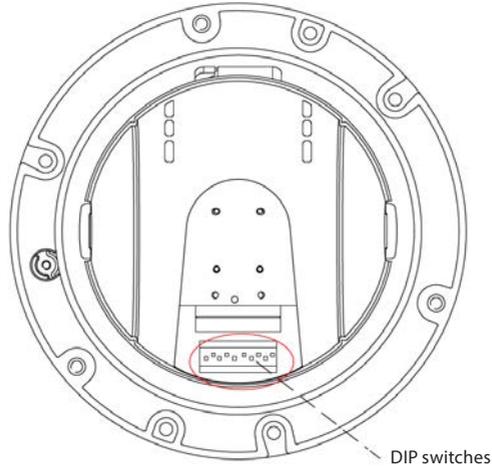
DIP switches

a.   Set the camera address to 0 .. 31 using switches 1 - 5 according to the table below.

Camera address	SW 1	SW 2	SW 3	SW 4	SW 5
0	OFF	OFF	OFF	OFF	OFF
1	ON	OFF	OFF	OFF	OFF
2	OFF	ON	OFF	OFF	OFF
3	ON	ON	OFF	OFF	OFF
4	OFF	OFF	ON	OFF	OFF
5	ON	OFF	ON	OFF	OFF
6	OFF	ON	ON	OFF	OFF
7	ON	ON	ON	OFF	OFF
8	OFF	OFF	OFF	ON	OFF
9	ON	OFF	OFF	ON	OFF
10	OFF	ON	OFF	ON	OFF
11	ON	ON	OFF	ON	OFF
12	OFF	OFF	ON	ON	OFF
13	ON	OFF	ON	ON	OFF
14	OFF	ON	ON	ON	OFF
15	ON	ON	ON	ON	OFF
16	OFF	OFF	OFF	OFF	ON
17	ON	OFF	OFF	OFF	ON
18	OFF	ON	OFF	OFF	ON
19	ON	ON	OFF	OFF	ON
20	OFF	OFF	ON	OFF	ON
21	ON	OFF	ON	OFF	ON
22	OFF	ON	ON	OFF	ON
23	ON	ON	ON	OFF	ON
24	OFF	OFF	OFF	ON	ON
25	ON	OFF	OFF	ON	ON
26	OFF	ON	OFF	ON	ON
27	ON	ON	OFF	ON	ON
28	OFF	OFF	ON	ON	ON
29	ON	OFF	ON	ON	ON
30	OFF	ON	ON	ON	ON
31	ON	ON	ON	ON	ON

b. Set switches 6 and 7 to match the RS-485 network baud rate according to the table below.

Baud rate	SW 6	SW 7
2400	OFF	OFF
4800	ON	OFF
9600	OFF	ON
19200	ON	ON

c. Set switches 8 and 9 for the preferred RS-485 network protocol according to the table below.

Protocol	SW 8	SW 9
Bosch Manchester	OFF	ON
AD Manchester	ON	ON
Protocol self-adaptive	Other combinations	

d. Switch 10 provides RS-485 end of line termination. Refer to Appendix B for guidance about when this switch should be ON.

3. Reattach the lower dome cover.

2.2 In-ceiling (recessed) mounting

Recessed mounting the BLK-PTX12X camera is possible when:

- The height above the ceiling is more than 10 inches.
- The ceiling is between .25 inches and 1.6 inches thick.
- The ceiling is strong enough to hold mor than 4 times the weight of the camera and its accessories.

NOTE	• *For cement ceiling mounting, use expansion screws to attach the back box. The mounting hole of the expansion pipe on he wall should align with the mounting hole on the mount.* • *For wooden ceiling mounting, use self-tapping screws to anchor the bracket.*

To recess mount the camera:

1. Drill holes in the ceiling.

a. Attach the drill template to the ceiling where you need to install the camera.

b. Cut a hole and drill screw holes according to the drill template. The hole cut for the camera module can be ± 0.1" of the template markings.
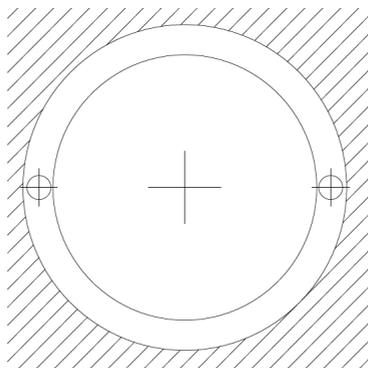
Drill template

2.   Dissemble the camera.

   a.   Loosen three screws as shown in the following figure.

   b.   Remove the lower dome.

Dome

Dome screws (3)
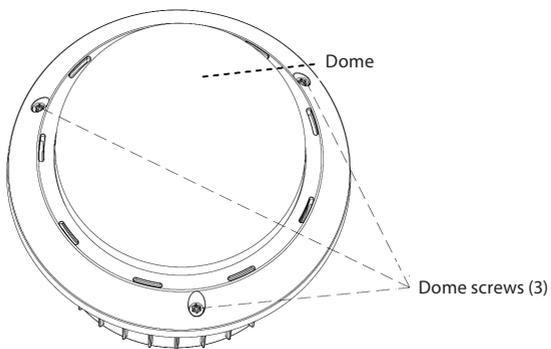
Remove lower dome

3.   Configure the DIP switches as needed. Refer to "2.1.3 Set the DIP switches" on page 14 for more information.

4.   Install the toggle bolts:

   a.   Remove the toggle from the toggle bolt.

   b.   Insert the bolts into the screw holes on the dome as shown below.
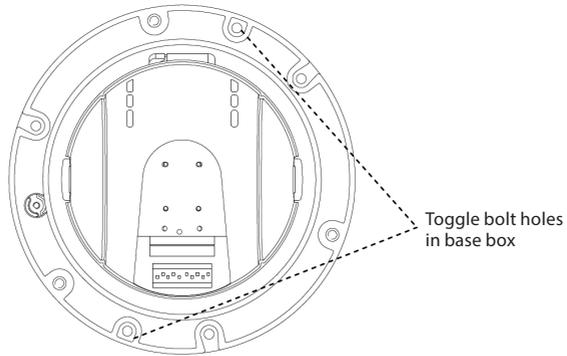
Toggle bolt holes in base box

Toggle bolt holes

    c.   Rotate the bolts through the screw holes.

    d.   Reinstall the toggles as shown below.
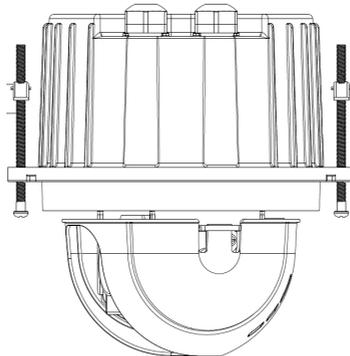
Install toggle bolts

5.   Align the toggle bolts with the screw holes on the ceiling.

6.   Push the dome to the mounting hole on the ceiling.

7.   Rotate the bolts again. The toggle will automatically rotate down to secure the dome to the ceiling.
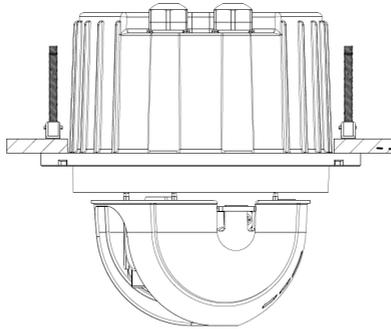
Install the camera in the ceiling

8.   Attach the lower dome to the camera.

9.   Secure the lower dome with three screws as shown below.
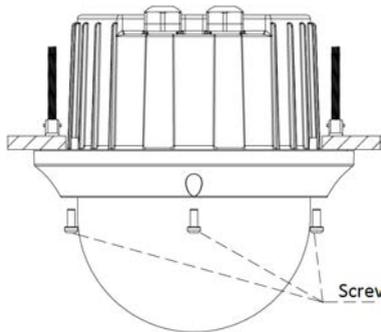
Install the lower dome

10.   Route the camera drop cables through the ceiling and connect them to RS-485, power and alarm interface cables. Refer to "2.1.1 Connecting the cables" on page 13 and "2.1.2 Alarm In/Out Connections" on page 14 for more information.

SECTION 3
Getting Started

3.1 Power-up initial display

After the power is applied, the camera will perform a series of self-tests including lens functions, the panning movement and tilting movement. After the power-up self-tests complete, the system information screen is displayed for 2 minutes on top of the live view screen. An example is shown below.

```
TYPE         DS- 2XX1-XXX
SN             000000000
ADDRESS                 0
COM FORMAT       2400,8,1
PROTOCOL        ADAPTIVE
VERSION            0. 00
HARDVERSI          0. 00
BUILD DATE      12 05 17
```

System information

Important information about the camera settings is shown in the system information display. See below.

System Information	Description
TYPE	The model of the camera
SN	The serial number of the camera.
ADDRESS	The default communication address of the camera.
COM FORMAT	The communication settings of the RS-485 interface: baud rate (4 digits), data bit (1 digit) and stop bit (1 digit).
PROTOCOL	Protocol configuration for communicating with other devices.
VERSION	The version of the firmware.
HARDVERSI	The version of the hardware.
BUILD DATE	The date when the software was compiled.

If the address of your camera is the same as another camera on the RS-485 network, one of them has to change. Also, if the communication parameters (COM FORMAT) are not the same as the settings on RS-485 network, they must be configured to match. Use the features with your control keyboard, DVR, or DVS to configure these parameters.

3.1.1 Basic operations

You can control the camera using a device such as a control keyboard, DVR, or DVS. In this and the following chapters, operation of the camera by the IE browser connected to a DVR will be used.

> **NOTE**   *Ensure that the communication settings and address for the camera are configured properly in the controlling device.*

Panning and tilting: Click the direction buttons to control the movement of the camera.

Zooming: Click the **ZOOM** in/out buttons to control the zooming.

Focusing: Click the **FOCUS+** and **FOCUS-** buttons to adjust the focus.

Iris: Click the **IRIS+** and **IRIS-** buttons to adjust the iris.

3.2   System-defined Presets

The camera system includes special functions that can be initiated by calling a preset number through a control device such as a DVS. These presets are fixed and cannot be edited. To call the system-defined presets remotely, you can choose the preset number from the list in the PTZ control panel. For instance, preset 99 is the **Start auto scan**. If you call preset 99, the camera starts the auto scan function. The table below lists the preset numbers and functions defined for the system.

Table 2. System-defined presets

Preset No.	Function	Preset No.	Function
33	Auto-flip	93	Set manual limit stops
34	Return to home position	94	Remote reboot
35	Patrol 1	95	Access main menu
36	Patrol 2	96	Stop scanning
37	Patrol 3	97	Start random scanning
38	Patrol 4	98	Start frame scanning
39	IR cut filter in	99	Start auto scanning
40	IR cut filter out	100	Start tilt scanning
41	Pattern 1	101	Start panorama scanning
42	Pattern 2	102	Patrol 5
43	Pattern 3	103	Patrol 6
44	Pattern 4	104	Patrol 7
92	Enable limit stops	105	Patrol 8

3.2.1 Manchester code control protocols

For Manchester code control protocol, the system-defined presets with special functions are shown as below.

Table 3. System-defined Presets of Manchester Code Control Protocol

Preset No.	Function	Preset No.	Function
65	Remote reboot	67	Auto-flip
66	Access main menu	70	Call Pattern 1
69	Stop programming pattern	71	Call Pattern 2
70	Set Pattern 1	72	Call Pattern 3
71	Set Pattern 2		
72	Set Pattern 3		

3.3 On Screen Displays

The camera supports following on screen displays:

Zoom: Identifies the amount of magnification. The format is ZXXX. where "XXX" is the zoom amount.

Direction: Displays panning and tilting direction, with the format of NEXXX TYYY, where "XXX" indicates the degrees in north east (NE) direction, and "YYY" indicates the degrees in tilt position.

Time: Support for time display.

Preset Title: Identifies preset being called.

SECTION 4
Using the OSD Menus

The menu structure of the on-screen display (OSD) is shown below.
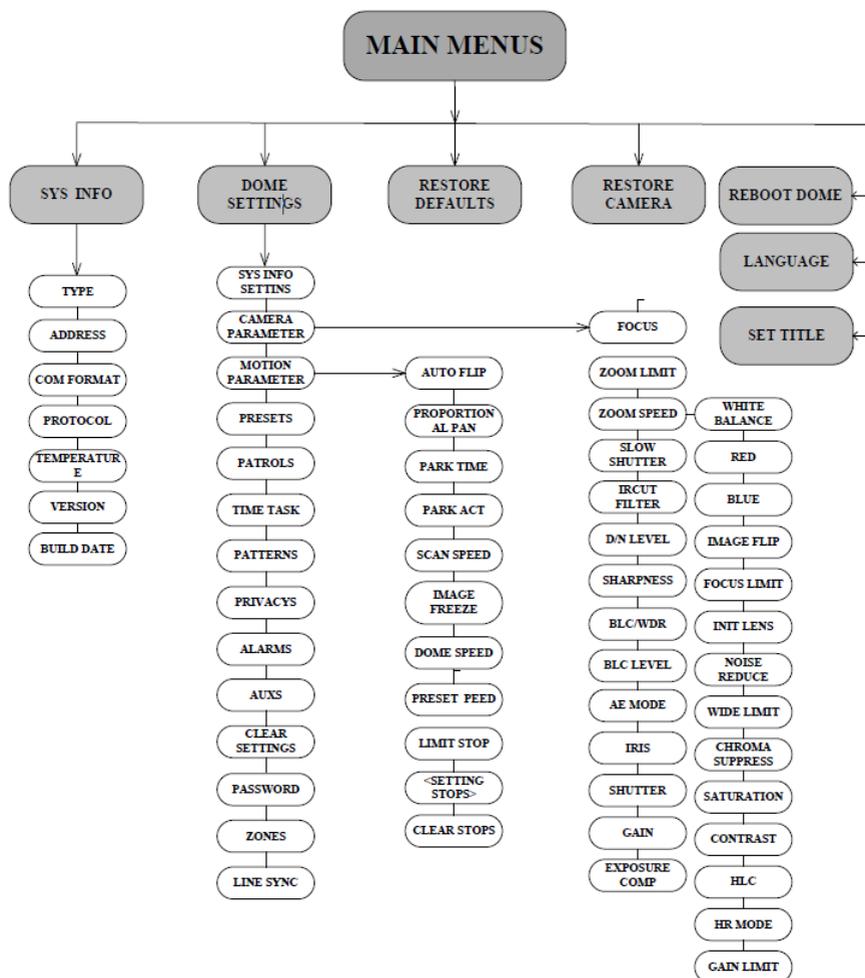
You can control the camera using the on-screen display menu remotely by connecting to a DVR or a DVS (encoder). Examples of entering camera menu include:

- Enter the menu by pressing buttons: **PTZ → REC → 9 → 5** on the front panel of the DVR.
- Enter the menu by pressing buttons: **CALL → 9 → 5 → ENTER** on the keyboard.
- Enter the menu via the IE browser of a DVR/DVS.

Menu operations via the IE browser of a DVR will be used for the example in this chapter.

4.1 Accessing and operating the menus

To open the **Main Menus**:

1. Connect the video and RS-485 cables from the camera to a DVR.

2. Access the DVR with an internet browser.

3. View the live video from the camera.

4. Call preset 95 from the preset list in the PTZ control panel of the DVR.


```
              MAIN MENUS
<SYS INFO>
<DOME SETTINGS>
<RSTORE DEFAULTS>
<RSTORE CAMERA>
<RSBOOT DOME>
LANGUAGE        ENGLISH
SET TITLE          OFF
EXIT
```
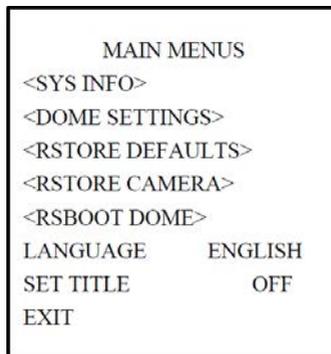
Main Menus

To move the cursor and operate the menu:

- **Move the cursor up/down**: On control panel of the live view interface of the DVR, click the **UP** and **DOWN** direction buttons or **FOCUS+** and **FOCUS-** buttons to move the cursor up and down in the menu.
- **Enter / Exit**: On control panel of the live view interface of the DVR:
  — Click **IRIS+** to enter a submenu
  — Move the cursor to **BACK** in the menu
  — Click **IRIS+** to return to the previous menu, or move the cursor to EXIT the menu and then click **IRIS+** to exit the menu.

- **Page up / page down**: There is no **RETURN** or **NEXT** menu items for turning a page up or down. On control panel of the live view interface of the DVR, you can click the left and right direction buttons to turn the page up or down.

To change the value of a parameter:

1. Move the cursor to the target item and then click **IRIS+**. The cursor (diamond mark) will change to be hollow.

2. Click the up/down or left/right buttons in the PTZ control panel to choose the value from the selectable value list.

3. Click **IRIS+** to confirm the change or click **IRIS-** to cancel and restore the original value. The diamond mark will change back to be stuffed or half stuffed icon.

4.2   Configuring System Information

4.2.1 Checking System Information

System information menu displays the current system information of the camera including the model, address, protocol, etc. The information shown on this submenu is similar to the system information shown after camera power-up.

To open the system information display menu, go to **MAIN MENUS → SYS INFO**

```
            SYS INFO
  TYPE          DS- 0XX0-000
  ADDRESS                  0
  COM FORMAT        0000,0,0
  PROTOCOL           XXXXX
  VERSION             0. 00
  HARDVERSION         0. 00
  BUILD DATE        12 08 09
          BACK    EXIT
```

System Information

NOTE   *The SYS INFO display is presented for Information only. It cannot be edited directly.*

4.2.2 Configuring system parameters

You can check and edit the system information including software address, baud rate, system time, etc. on the system information settings menu.

To enter the system information settings menu, go to **MAIN MENUS → DOME SETTINGS → SYS INFO SETTINGS**

```
        SYS INFO SETTINGS
SOFT ADDRESS              1
SOFT ADDR ACTIVE       OFF
SOFT BAUD               2400
SOFT BAUD ACTIVE      OFF
BROADCAST ADDRESS    ON
PELCO CHECKSUM        ON
SYS TIME
         BACK    EXIT
```

```
        SYS INFO SETTINGS
ZERO ANGLE
DISPLAY SETTINGS
FAN CONTROL            N/A
EIS FUNCTION           ON
EIS LEVEL               2
PRESET DFOCUS         OFF
PROTOCOL STATUS SET OFF
         BACK    EXIT
```

```
        SYS INFO SETTINGS
PROTOCOL SET   AUTO MATCH
485CHECK SET           AUTO




         BACK    EXIT
```
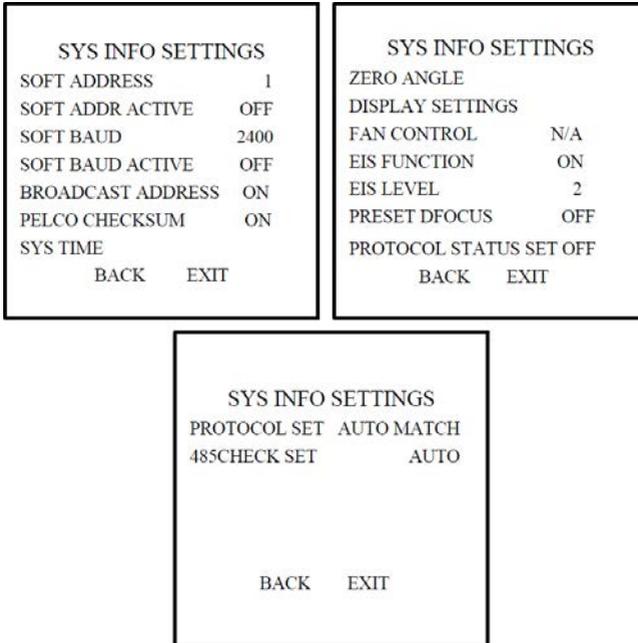
System Information settings

NOTE *Using an internet browser connected to a DVR, click the left and right direction buttons in the PTZ control panel to page up or page down when more than one page is available.*

Descriptions of system parameter configuration:

•   **Dome address settings**

   TASK 1: Set the soft address of the camera.

If the **SOFT ADDR ACTIVE** is set ON, the soft address is the valid address for connecting the camera. The **SOFT ADDRESS** ranges from 1 to 255.

If the **SOFT ADDR ACTIVE** is set as OFF, the hard address set by the DIP switch is the valid address of the camera.

TASK 2: Set the broadcast address of the camera.

When the **BROADCAST ADDRESS** is set to ON, the control devices with address 0 can control the camera remotely regardless of the address of the camera.

With this function on, a control device with address 0 can control all PTZ cameras connected to it. This function is usually used for debugging.

· **Soft baud rate settings**

If the **SOFT BAUD ACTIVE** is set to ON, the soft baud rate is the valid baud rate for the camera. You can select either 2400, 4800, 9600 or 19200.

If the **SOFT BAUD ACTIVE** is set to OFF, the baud rate is set by the SW2 DIP switches.

NOTE	After you enable or disable the soft baud rate, the camera will reboot automatically to activate the settings.

· **PELCO checksum**

If the camera uses PELCO-P or PELCO-D protocol, you can set the PELCO CHECKSUM to ON to improve the video quality.

· **System time configuration**

a.   Move the cursor to **SYSTEM TIME** using the direction buttons, then click **IRIS+** to open the menu.

b.   Click the left or right direction buttons to position the cursor on the specific item (year/month/day or hour/minute/second) of which you want to change the value.

c.   Click the up or down direction buttons to increase or decrease the value.

d.   Click **IRIS+** button to confirm and close the menu.

```
Y - M - D       07  01  18

H - M - S       15  33  25

DONE: OPEN
QUIT: CLOSE
```
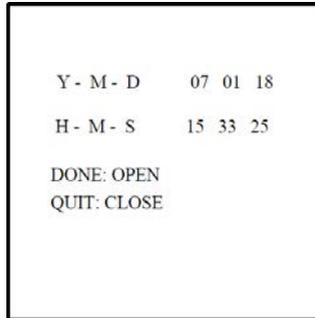
Set System Time

- **Zero angle (initial position) configuration.** You can define the initial position of the camera on the ZERO ANGLE submenu.

  a.   Move the cursor to **ZERO ANGLE** using the direction buttons, then click **IRIS+** to open the menu.

  b.   Click the left or right or up or down direction buttons to adjust the view angle.

  c.   Click **IRIS+** button to confirm and close the menu.

- **Fan parameter configuration.**

  You can set the **FAN CONTROL** to TEMP, ON or OFF.

- **EIS (Electronic Image Stabilization) configuration**

  You can set the **EIS FUNCTION** to ON or OFF.

- **Preset direct focus**

  You can set the preset direct focus function to ON or OF on the PRESET DFOCUS submenu.

- **Protocol settings**

  You can set the **PROTOCOL STATUS SET** to ON or OFF, and set the PROTOCOL SET to AUTO MATCH, PELCP-P, PELCO-D, Private-code, etc.

- **RS-485 checksum setting**

  You can set the **485CHECK SET** to ON or AUTO to improve the controlling effect.

4.3 Configuring Image Parameters

You can set the camera parameters including focus, shutter speed, iris, etc. Configuring image parameters for the camera includes several tasks (see below). To enter the camera parameters settings menu, go to **MAIN MENUS → DOME SETTINGS → CAMERA PARAMETER**

```
          CAMERA                        CAMERA
FOCUS              AF          BLC/WDR           OFF
ZOOM LIMIT         36          BLC LEVEL         N/A
ZOOM SPEED         HIGH        AE MODE           AUTO
SLOW SHUTTER       ON          IRIS              10
IRCUT FILTER       AUTO        SHUTTER           60
D/N LEVEL          HIGH        GAIN              1
SHARPNESS          9           EXPOSURE COMP     7
        BACK    EXIT                   BACK    EXIT


                    CAMERA
          WHITE BALANCE      AUTO
          RED                210
          BLUE               150
          IMAGE FLIP         OFF
          FOCUS LIMIT        1M
          INIT LENS          OFF
          NOISE REDUCE       LOW
                    BACK    EXIT
```

Camera settings

4.3.1 TASK 1. Configure the focus settings

• **Setting the focus mode**

    a.   Move the cursor to FOCUS using the direction buttons and click **IRIS+** to change the cursor to totally hollow.

    b.   Click the up and/or down direction buttons to select a focus mode:

        AF (Auto-focus): The lens remains in focus during PTZ movements.

        MF (Manual Focus): To adjust the focus manually with the **FOCUS+** and **FOCUS-** buttons.

        HAF (Half-auto Focus): The camera automatically focuses once after panning, tilting and zooming.

c.   Click **IRIS+** button to save the settings.

- **Setting the focus limit**. This function is used to limit the minimum focus distance. You can configure the focus limit to a longer distance when the target is at a distance to prevent the camera from focusing on the objects close to it; or configure the focus limit to a shorter distance when the target is near the camera to prevent it from focusing on objects father away. You can set the **FOCUS LIMIT** to 1CM, 30CM, 1M, 3M or AUTO.

4.3.2 TASK 2. Configure iris, gain and shutter speed

- **Setting the AE mode**. AE mode defines the priority of the iris, shutter and gain when the camera adjusts the brightness of the video. The options in AE MODE are as follows:

   AUTO: Auto iris, auto shutter and auto gain. The camera adjusts these values automatically responding to the lighting conditions. This is the default mode.

   HAUTO: You can adjust the video brightness with **IRIS+** and **IRIS-** when you select this mode.

   IRIS: Selects iris-priority mode to set the iris value manually. The shutter and gain values will be adjusted automatically according to the lighting conditions.

   SHUTTER: Select shutter-priority mode set the shutter value manually. The iris and gain values will be adjusted automatically according to the lighting conditions.

   MANUAL: Select this setting to adjust the shutter, iris and gain values manually.

- **Setting the iris value**. To adjust the iris size for light entering the lens, you can set the IRIS value manually according to light conditions. The iris value ranges from 0 (closed) to 17 (fully open).

- **Setting the gain**. The value of gain indicates the degree of amplification of the original light signal. You can set the value from 0 to 15.

- **Setting the shutter speed**. The speed of the electronic shutter controls the amount of light entering the lens in a unit of time (a second). You can manually configure the shutter speed for the camera, and you can also enable the slow shutter function for low lighting circumstances.

   a.   **Shutter speed**. If you set the SHUTTER value larger, the shutter speed is faster. The value indicates the inverse of the shutter speed (1/value seconds). At faster speeds, the amount of light entering the lens is less causing the image to be darker. You can set the shutter value to 1, 2, 4, 8, 15, 30, 50, 125, 180, 250, 500, 1000, 2000, 4000 or 10000.

   b.   **Slow shutter**. You can set the SLOW SHUTTER value to 0, 1, 2, 3, 4 and 5.

4.3.3 TASK 3. Configure the zoom settings

- **Setting the zoom limit**. Zoom limit is a user-defined limitation of the zoom amount.

    a. Move the cursor to ZOOM LIMIT using the direction buttons and click **IRIS+** to enter.

    b. Click the up or down direction buttons to choose the limit from 12, 24, 48, 96, and 192.

    c. Click **IRIS+** to confirm.

NOTE   *The ZOOM LIMIT value varies depending on the model of the camera.*

- **Setting the zoom speed**. You can define the zooming speed of the lens.

    a. Move the cursor to ZOOM SPEED using the direction buttons and click **IRIS+** to enter.

    b. Click the up or down direction buttons to choose the speed of HIGH, MEDIUM and LOW.

    c. Click **IRIS+** to confirm.

4.3.4 TASK 4. Set the INIT LENS

Use INIT LENS to trigger a spontaneous lens initiation for ensuring the normal operation.

4.3.5 TASK 5. Set the sharpness level

The sharpness function can increase the gain of the image and sharpen the edges of the picture to enhance details. You can set the SHARPNESS level from 0 to 15.

4.3.6 TASK 6: Set the Day/Night Mode

There are two parameters available for day/night mode configuration.

1. **IR cut filter**. This filter It can be configured as AUTO, DAY or NIGHT.

    AUTO: The camera switches automatically from Black and White mode (**NIGHT**) and Color mode (**DAY**) in response to lightening conditions (default).

    NIGHT (B/W): The IR cut filter will switch to NIGHT mode to increase the sensitivity in low light conditions.

DAY (Color): The IR cut filter will perform in DAY mode (normal lighting conditions).

NOTE   *You can also call preset **39** to set the IR cut filter mode to DAY mode and call preset **40** to set it as NIGHT mode.*

2.   **D/N level**. The D/N level is the switching sensitivity for AUTO mode. As a dividing line, IR cut filter switches between DAY and NIGHT when the light condition reaches the user-defined D/N level. Three levels are selectable: 0, 1 and 2.

4.3.7 TASK 7: Set the BLC function

You can set the BLC/WDR (backlight compensation / wide dynamic range) to ON or OFF to enable or disable the function.

```
              CAMERA
   BLC/WDR            OFF
   BLC LEVEL          N/A
   AE MODE            AUTO
   IRIS                10
   SHUTTER             60
   GAIN                 1
   EXPOSURE COMP        7
          BACK     EXIT
```

Camera settings - BLC/WDR

BLC LEVEL: You can manually adjust the backlight compensation level.

4.3.8 TASK 8: Configure the image quality parameters

```
              CAMERA
WIDE LIMIT           N/A
CHROMA SUPPRESS       2
SATURATION            3
CONTRAST              2
HLC                   0
HR MODE              OFF
GAIN LIMIT           15


         BACK    EXIT
```

Camera settings

Use the menu shown above to set the following parameters:

Chroma suppress: You can adjust the value of CHROMA SUPPRESS between 0, 1, 2 and 3 to suppress the color noises in low lighting environment. Higher setting values produce stronger chroma suppressing effects.

Saturation: The SATURATION value ranges from 0 to 7.

Contrast: adjust the image contrast on CONTRAST submenu between 0 and 7.

HLC: High Light Compensation (HLC) masks strong light sources that usually flare across a scene. This makes it possible to see the detail of the image that would normally be hidden. The value ranges from 0 to 3.

Resolution setting: you can set HR MODE as ON to adjust the resolution lower to avoid cross color of the image, or switch if OFF to disable the function. This mode enhances edges and produces higher definition images.

4.3.9 TASK 9: Configure the advanced settings.

- **Exposure compensation function**. Set the EXPOSURE COMP value from 0 to 14. The default value is 7.

- **White balance**. Set WHITE BALANCE mode to AUTO, INDOOR, OUTDOOR, SELFDEF (self-defined), ATW (auto-tracking) or HAUTO (half-auto).

    AUTO: In Auto mode, the camera adjusts the color balance according to the current color temperature.

    INDOOR, OUTDOOR: These modes are for indoor use and outdoor use respectively.

SELFDEF: In SELFDEF you can adjust the color temperature, the RED and BLUE values, manually.

ATW: In auto-tracking mode, white balance is adjusted continuously to accord with the color temperature of the scene illumination.

HAUTO: Selecting this mode, the viewed image retains color balance automatically according to the current color temperature.

— Digital noise reduction: To reduce the image noise, you can set the NOISE REDUCE function OFF, HIGH, MID or LOW.
— Image flip: If you turn the IMAGE FLIP function on, the image will be flipped. It is like the image in the mirror.
— Gain limit: You can set this function to limit the gain value. The GAIN LIMIT value ranges from 0 to 15.

4.3.10 Configuring Privacy Mask

Privacy mask enables you to cover specific areas on the live video to prevent these from appearing in live view and recorded video. The masked areas can move with the panning/tilting movements and automatically adjust their size when the lens zoom changes.

1. Open the privacy mask configuration submenu. Go to **MAIN MENUS → DOME SETTINGS → PRIVACYS**
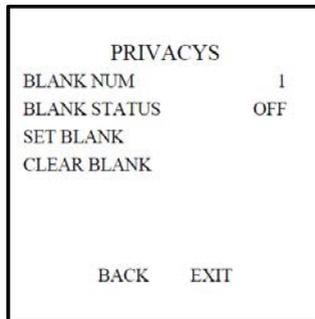

Privacys mask configuration menu

2. Choose the privacy mask number:

   a. Move the cursor to **BLANK NUM** and click **IRIS+** to open editing mode.

   b. Click the up and down direction buttons to select a mask number for configuration.

   c. Click **IRIS+** again to confirm and close the menu.

3. Configure the position and size of the privacy mask.

a. Move the cursor to **SET BLANK** and click **IRIS+** button to enter the editing mode as shown in the following figure. You can see a privacy mask on the live window.

ADJUST BLANK POS
FOCUS+SHIFT STATUS
SAVE: OPEN
QUIT: CLOSE
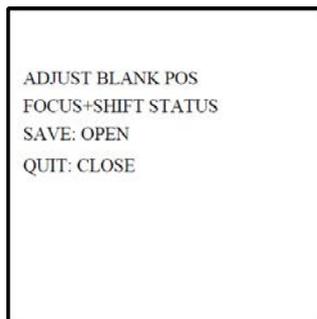
Set the Privacy Mask

b. When the *ADJUST BLANK POS* message appears, use the direction buttons to shift the position of the privacy mask.

c. When you click the **FOCUS+** button, the *ADJUST BLANK SIZE* message will appear. Click the up/down buttons to increase/decrease the height of the mask, and click right/left buttons to increase/decrease the width of the mask. Click **IRIS+** button to save the settings and return to the previous menu. The the mask will turn to gray.

d. To modify the mask, click **IRIS+** button to enter the **SET BLANK** menu, then click **IRIS+** button again to reconfigure the mask.

NOTE   *The tilt range for configuring the privacy masks is from 0° to 70°.*

4. **Enable or disable the privacy mask function**: Open the **BLANK STATUS** submenu, then click the up and down direction buttons to set it ON or OFF. If no privacy mask is configured, you cannot set the status as ON.

5. **Delete the privacy mask**: Open the **CLEAR BLANK** menu to delete the current privacy mask.

4.3.11   Configuring OSD settings

The on-screen display of the PTZ control information, viewing direction, etc. can be enabled or disabled.

Display the dome title

This feature is not provided.
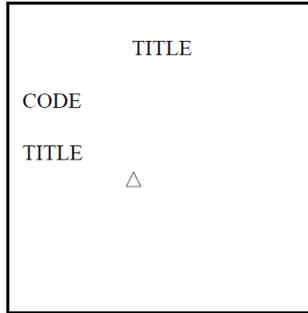
Set the camera Title

Display the PTZ movements, alarm, system time

You can enable or disable the on-screen display of PTZ movements, alarms, time, presets, etc., and configure the display time.

1. Open the display settings menu: Go to: **MAIN MENUS → DOME SETTINGS → SYS INFO SETTINGS → DISPLAY SETTINGS.**
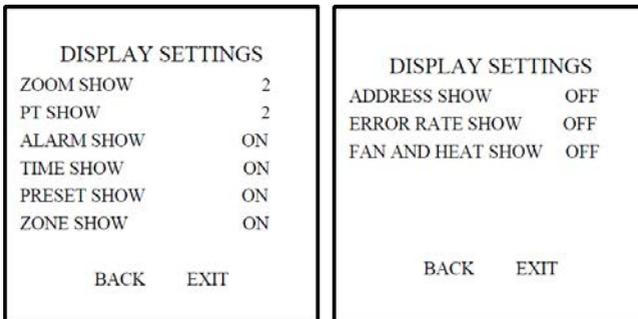
Display settings

2. Move the cursor to **DISPLAY SETTINGS** using the direction buttons and click **IRIS+** to enter.

3. Move the cursor to the target item and click **IRIS+** and click up/down direction buttons to choose each display mode as ON or OFF, and define each display time as 2 seconds, 5 seconds or 10 seconds.

4.   Click **IRIS+** button to confirm.

NOTE	*If you enable both ZOOM and PT OSD while calling a preset, the preset label will be displayed until the preset finishes.*

Display the viewing direction

The camera displays a viewing direction code when you manually rotate the camera. Codes are shown in the table below.

Display	N	NE	E	SE	S	SW	W	NW
Indication*	North	Northeast	East	Southeast	South	Southwest	West	Northwest

* The north direction refers to the 0º angle (initial position).

4.4   Configuring PTZ control parameters

You can configure panning, tilting and zooming movements, and configure PTZ control functions including presets, patrols, patterns, etc. for the camera.

4.4.1 Configuring PTZ parameters

Open the PTZ configuration menu. Go to **MAIN MENUS → DOME SETTINGS → MOTION PARAMETER**

```
            MOTION                          MOTION
AUTO FLIP           ON          PRESET SPEED         4
PROPORTIONAL PAN    OFF         LIMIT STOP           OFF
PARK TIME           5           <SETTING STOPS>
PARK ACT            NONE        CLEAR STOPS
SCAN SPEED          40
IMAGE FREEZE        OFF
DOME SPEED          MID
        BACK    EXIT                    BACK    EXIT
```

PTZ configuration menus

Descriptions of PTZ parameter configuration:

- **Auto-flip**. In manual tracking mode, when a target object moves directly beneath the camera, the camera automatically rotates 90 degrees horizontally (flips) for tracking. The default setting of AUTO-FLIP is ON for this camera model.

- **Proportional Panning**. When this function is enabled, the pan/tilt speed changes according to the amount of zoom. If using high zoom, the pan/tilt speed is slowed to keep the image from moving too fast on the live view display. You can set PROPORTIONAL PAN to ON or OFF to enable/disable the function. This function is enabled automatically while setting patterns.

Park time and actions

This feature allows the camera to start a predefined action (park action: scan, preset, pattern, etc.) automatically after a period of inactivity (park time).

You can set PARK TIME from 5 to 720 seconds and set the park action (PARK ACT) as preset 1 to 8, pattern 1 to 4, patrol 1 to 8, pan scan, tilt scan, random scan, frame scan, panoramic scan, day mode, night mode or none.

NOTE	*If a control signal is not received after the park time, no park actions is performed when either of these conditions exist:* • *In the process of performing dome actions by calling special presets* • *In the process of performing external alarm linked actions*

Image freeze

This feature enables the live view to switch directly from one scene defined by a preset to another, without showing the middle areas between these two, to ensure the surveillance efficiency. It can also reduce the use of bandwidth in a digital network system.

To enable this function, set IMAGE FREEZE to ON.

- **PTZ speed**. You can define the speed of the dome movements.

    a. **DOME SPEED**: the manual movement speed can be set to HIGH, MID or LOW.

    b. **SCAN SPEED**: scan speed defines the scan degree per second of a panning scan, tilting scan, frame scan, random scan and panoramic scan. Scan speed is adjustable from 1 to 40 degrees per second.

    c. **PRESET SPEED**: the speed of calling a preset can be set from level 1 to 8. The higher levels will call a preset faster.

- **Limit stops**. The camera can be programmed to move within the configurable limit stops (left/right, up/down). To set these limits:

    a. Move the cursor to LIMIT STOPS and click **IRIS+** to set it ON to enable this feature. Click **IRIS+** again to confirm.

    b. Move the cursor to **SETTING STOPS,** then **IRIS+**. The message **SET LEFT LIMIT** will appear.

    c. Click the direction buttons in the PTZ panel to configure the left limit stop. Click **IRIS+** to confirm.

    d.   Follow the steps above to configure the right, up and down limit stops on the menu. The new limit stops will overwrite the existed ones.

    e.   You can clear the defined limit stops. Click **IRIS+** to enter **CLEAR STOPS**, then click **IRIS+** again to clear the stops.
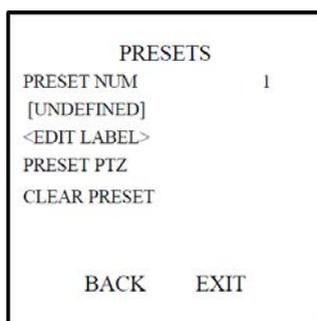
4.5   Configuring Presets

A preset is a predefined direction. For the defined preset, you can click the calling button to move the camera to that direction.

4.5.1 TASK 1: Set a preset

To set a preset direction:

1.   Open the preset configuration submenu: Go to **MAIN MENUS → DOME SETTINGS → PRESETS**

```
              PRESETS
PRESET NUM              1
  [UNDEFINED]
<EDIT LABEL>
PRESET PTZ
CLEAR PRESET


      BACK      EXIT
```

Presets configuration men

2.   Choose the preset number:

    a.   Move the cursor to PRESET NUM and click **IRIS+** to enter.

    b.   Click the up and down buttons to mark the preset number you want to edit. If the preset was defined, the preset label is listed under the number; if it has not been defined, the label **UNDEFINED** is shown under the number.

NOTE
- *You can set up to 254 presets for the camera.*
- *The system-defined presets are displayed on this submenu; they are not editable.*

3.   Edit the label of the preset.

```
LABEL          [PRESET 1 ]
 INS



ZOOM+DELETE CONTENTS
FOCUS+CHANGE CONTENTS
FOCUS-CHANGE MARKER
ROCKER CHOOSE CONTENTS
OPEN: SURE  CLOSE: BACK
```

Edit the Preset Label (1)

a.   Move the cursor to **EDIT LABEL** and click **IRIS+** to enter the edit mode.

b.   Click **FOCUS+** in the PTZ control panel to switch between different character lists: capital alphabet, lowercase alphabet, symbols and numbers. Click the up/down and left/right direction buttons to move the cursor to choose a a character to input.

c.   Click **FOCUS-** to position the cursor on the label where the character needs to be modified. Click **ZOOM IN** to delete it.

d.   Click **IRIS+** to enter the selected character from the list into the label.

e.   Click **FOCUS+** to exit the character lists and click **IRIS+** again to confirm and close the submenu.

```
LABEL          [PRESET 1   ]
  INS
LOWCASE[a  b  c  d  e  f  g  h  I  j]

ZOOM+DELETE CONTENTS
FOCUS+CHANGE CONTENTS
FOCUS-CHANGE MARKER
ROCKER CHOOSE CONTENTS
OPEN: SURE   CLOSE: BACK
```

Edit the Preset Labe (2)

4.   Set the preset position.

a.   Move the cursor to PRESET PTZ and click **IRIS+** to edit the preset position.

b.   Use the direction buttons to move the camera to find the desired scene/position, and then press **IRIS+** to confirm the settings and return to the previous menu, or press **IRIS-** to cancel.

NOTE   *The preset position settings are restricted by limit stops if they are defined.*

4.5.2 TASK 2: Clear the preset settings

To clear the preset setting, move the cursor to **CLEAR PRESET**, then click **IRIS+** to clear the settings of the preset.

4.5.3 TASK 3: Call the presets

Through a web browser connected to your DVR, select the preset number from the preset list in the control panel of the DVR, then click the icon to call the preset.

4.6   Configuring Patrols

A patrol is a memorized series of preset function. It can be set and previewed on the patrol settings interface.

4.6.1 TASK 1: Set a patrol

You can configure up to 8 patrol numbers.

1.   Open the patrol configuration submenu. Go to **MAIN MENUS → DOME SETTINGS → PATROLS**

2.   Choose the patrol number:

   a.   Move the cursor to **PATROLS NUM** and click **IRIS+** to enter edit mode.

   b.   Click the up and down direction buttons to select the number of the patrol which is to be configured.

   c.   Click **IRIS+** again to confirm and exit edit mode of this column.


```
              PATROLS
PATROL NUM              1
EDIT PATROL
PREVIEW
CLEAR PATH


        BACK    EXIT
```
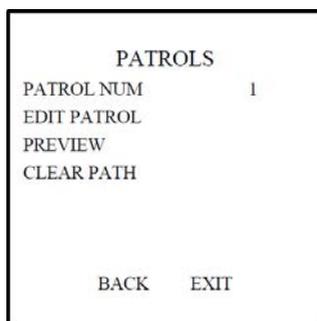
Patrol configuration menu

3.   To edit the patrol.

   a.   Move the cursor to **EDIT PATROL** and click **IRIS+** to enter edit mode.

NUM	PRESET	DWELL	SPEED
1	0	6	30
2	0	6	30
3	0	6	30
4	0	6	30
5	0	6	30
6	0	6	30
7	0	6	30
DONE: OPEN		QUIT:CLOSE	

Edit patrol

   b.   Click up/down direction buttons to position the preset to be edited.

   c.   Click left/right direction buttons to position the cursor to PRESET, DWELL TIME and SPEED of a preset. Click the up and down direction buttons to set each value.

NOTE	*The presets you set for a patrol should be the defined presets; dwell time (0-30 seconds) is the time that the camera pauses on the preset; speed is the patrol speed at which the camera switches between presets.*

   d.   Follow above steps to add other presets to the selected patrol. You can include up to 32 presets in sequence for a patrol.

   e.   Press **IRIS+** to save the current settings or press **IRIS-** to cancel and return to the previous menu.

4.6.2 TASK 2: Preview the patrol

To review a patrol, move the cursor to **PREVIEW**, then click **IRIS+** to preview the current patrol and enable the camera to scan among the presets.
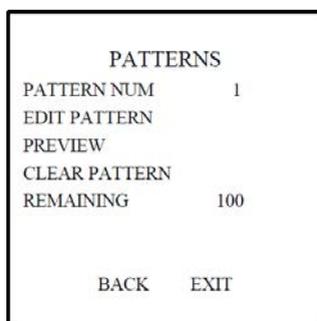
4.6.3 TASK 3: Delete a patrol

To delete a patrol, move the cursor to **CLEAR PATH**, then click **IRIS+** to delete the current patrol.

4.6.4 TASK 4: Call the defined patrol

To call a patrol, use a web browser connected to your DVR to select the corresponding preset number from the drop-down list in the control panel, then click the icon to call the related patrol. For example, you might call preset 35 to call patrol 1. Refer to "3.2 System-defined Presets" on page 22 to find the preset number for a patrol.

4.7 Configuring Patterns

A pattern is a memorized, repeatable series of panning, tilting, zooming and preset movements that can be recalled by a command or automatically performed by a configured function (alarm, park, time task, and power-up).

```
                  PATTERNS
PATTERN NUM          1
EDIT PATTERN
PREVIEW
CLEAR PATTERN
REMAINING            100


          BACK    EXIT
```

Patterns configuration menu

4.7.1 TASK 1: Set a pattern

You can configure up to 4 patterns. To set a pattern:

1. Open the PATTERNS submenu. Go to **MAIN MENUS** → **DOME SETTINGS** → **PATTERNS**

2. Choose the pattern number:

    a. Move the cursor to **PATTERN NUM** and click **IRIS+** to open the menu in edit mode.

    b. Click the up and down direction buttons to select the number of the pattern you want to configure.

    c. Click **IRIS+** again to confirm.

3. Edit the pattern.

    a. Move the cursor to **EDIT PATTERN** and click **IRIS+** to enter edit mode.

```
REMAIN MEMORY    100
DONE: OPEN
QUIT: CLOSE
```
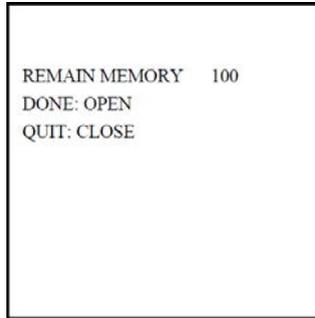
Edit pattern

b.   Click the PTZ control buttons and direction buttons to pan, tilt, or zoom in/out the camera to draw a movement path. The camera can automatically memorize the path you enter as a pattern.

c.   Click **IRIS+** again to save the pattern and close the menu.

NOTE	• *REMAIN MEMORY indicates the remaining memory of the camera for configuring patterns. When it reaches 0, no more patterns can be configured. You can also see the remaining memory shown under PATTERNS menu as REMAINING.* • *Panning/tilting movements and lens operations cannot be memorized simultaneously.*

4.7.2 TASK 2: Preview a pattern

To preview a pattern, open the PREVIEW menu to see the current pattern.

4.7.3 TASK 3: Delete patterns

If you delete the current pattern, the following pattern are deleted. For example, if pattern 2 is deleted, pattern 3 and pattern 4 will be deleted.

•   Delete a chosen pattern. Click **IRIS+** to enter **EDIT PATTERN** and you can see **DEL PATH ABOVE**. Click **IRIS+** to delete the pattern.
•   Clear all the patterns. Enter **CLEAR PATTERN** menu and click **IRIS+** to delete all the defined patterns.

4.7.4 TASK 4: Call the defined pattern.

You can select the corresponding preset number from the drop-down preset list in the control panel of the DVR through a web browser, and click the arrow to call the related pattern. For example, call preset 41 to call pattern 1. Refer to "3.2 System-defined Presets" on page 22 to find the corresponding preset number for each pattern.
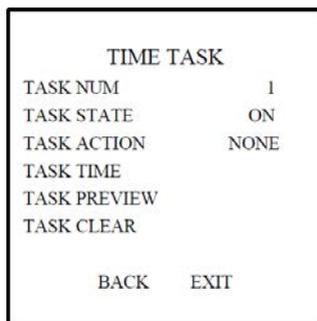
4.8   Configuring Time Tasks

A time task is a scheduled camera action configured to perform automatically at the specific time.

4.8.1 TASK 1: Set time tasks

You can configure up to 8 tasks. To configure a time task:

1.   Open the **TIME TASK** submenu: Go to **MAIN MENUS → DOME SETTINGS → TIME TASK**


```
              TIME TASK
TASK NUM               1
TASK STATE             ON
TASK ACTION            NONE
TASK TIME
TASK PREVIEW
TASK CLEAR

          BACK    EXIT
```

Time Task configuration menu

2.   Choose the task number.

    a.   Move the cursor to **TASK NUM** and click **IRIS+** to enter edit mode.

    b.   Click the up and down direction buttons to select the task number you want to configure.

    c.   Click **IRIS+** again to confirm and exit edit mode of this column.

3.   Set the task status.

    a.   Move the cursor to **TASK STATE** and click **IRIS+** to enter edit mode.

b.   Click the up and down direction buttons to set the task status to **ON**.

c.   Click **IRIS+** again to confirm and close the menu.

4.   Configure the task action.

a.   Move the cursor to **TASK ACTION** and click the **IRIS+** to enter edit mode.

b.   Click the up and down direction buttons to select the task action from preset 1 to 8, pattern 1 to 4, patrol 1 to 8, panning scan, tilting scan, random scan, frame scan, panoramic scan, day mode, night mode or none.

c.   Click **IRIS+** again to confirm and exit edit mode of this column.

5.   Set the task time.

a.   Move the cursor to **TASK TIME** and click **IRIS+** to enter edit mode.

b.   Click the left and right direction buttons to position the cursor to WEEK, START (H-M) and END (H-M).

c.   Click the up and down direction buttons to select the specific day and time. The weekday can be set to be from Monday to Sunday or Whole Week.

d.   Click **IRIS+** to confirm and close the menu.

```
WEEK              WHOLE WEEK

START(H-M)          00     00

END(H-M)            00     00

        DONE: OPEN
        QUIT: CLOSE
```

Set the Time Task

4.8.2 TASK 2: Preview the task

To preview a time task, move the cursor to **TASK PREVIEW**, then click **IRIS+** to view the time, action and status of the scheduled task.

NUM		TIME		ACTION	STATE
1 WHO	0 0	0 0		NONE	OFF
2 WHO	0 0	0 0		NONE	OFF
3 WHO	0 0	0 0		NONE	OFF
4 WHO	0 0	0 0		NONE	OFF
5 WHO	0 0	0 0		NONE	OFF
6 WHO	0 0	0 0		NONE	OFF
7 WHO	0 0	0 0		NONE	OFF
8 WHO	0 0	0 0		NONE	OFF

4.8.3 TASK 3: Delete the task.

To delete a task, move the cursor to **CLEAN TASK** and click **IRIS+** to delete the time and action of the current task.

4.9 Configuring Zones

ZONE submenu is used to divide a scene into different parts. You can define labels that are displayed on the screen, and also set the camera to scan in a zone automatically after a period of inactivity. You can configure up to 8 zones.

4.9.1 TASK 1: Set a zone.

1. Open the zone configuration submenu: Go to **MAIN MENUS → DOME SETTINGS → ZONES**

```
              ZONES
ZONE NUM              1
[UNDEFINED ]
EDIT LABEL
EDIT ZONE
ZONE STATUS        ON
SCAN STATUS        ON
CLEAR ZONE
        BACK    EXIT
```

Zone configuration menu

2. Choose the zone number:

   a. Move the cursor to **ZONE NUM**, then click **IRIS+** button to enter.

   b. Click the up and down buttons to choose the zone number to be configured.

3. Edit the label of the zone.

    a. Move the cursor to **EDIT LABEL** and click **IRIS+** to enter the edit mode.

    b. Click **FOCUS+** in the PTZ control panel to switch between different character lists: capital alphabet, lowercase alphabet, symbols and numbers. Click the up/down and left/right direction buttons to move the cursor to choose a character to input.

    c. Click **FOCUS-** to position the cursor on the label where the character needs to be modified. Click **ZOOM IN** to delete it.

    d. Click **IRIS+** to enter the selected character from the list into the label.

    e. Click **FOCUS+** to exit the character lists and click **IRIS+** again to confirm and close the submenu.

4. Configure the zone area.

    a. Move the cursor and click **IRIS+** button to enter EDIT ZONE submenu.

    b. You can see **SET LEFT LIMIT** on the screen. Click the direction buttons to set the left limit stop.

    c. Follow the prompts on the screen to set the right limit, up limit and down limit.

    d. Click **IRIS+** button to save the settings and close the menu.

5. Set the scan status. You can enable or disable the scanning in the zone. The ZONE STATUS is not editable. After editing a zone, it is automatically switched ON. If you delete the zone, it will switch OFF.

4.9.2 TASK 2: Clear the zone settings

Move the cursor to **CLEAR ZONE** and click **IRIS+** to clear all the settings of the current zone.

4.9.3 Clearing PTZ Control Settings

You can clear all user-defined PTZ control settings, including presets, patrols, patterns, zones and time tasks. You can also clear privacy masks on this menu. To clear control settings:

1. Open the CLEAR SETTINGS menu. Go to **MAIN MENUS → DOME SETTINGS → CLEAR SETTINGS**
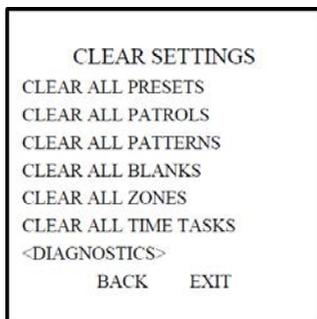
Clear Settings menu

2.   Click **IRIS+** on each submenu, such as CLEAR ALL PATTERNS. Click **IRIS+** again to confirm and close the menu.

4.9.4 Using the DIAGNOSTICS display

The DIAGNOSTICS display shows the self-diagnostics information of the camera, including the occurrence of high temperature, the highest temperature, the occurrence of low temperature, the lowest temperature, the occurrences of video loss, low voltage, dome reboot, panning loss, tilting loss and communication loss.

Panning loss and tilting loss refer to the failures of panning and tilting, for diagnosing the electric motor of the camera.

To open the **DIAGNOSTICS** display, go to **MAIN MENUS** → **DOME SETTINGS** → **CLEAR SETTINGS** → **DIAGNOSTICS**
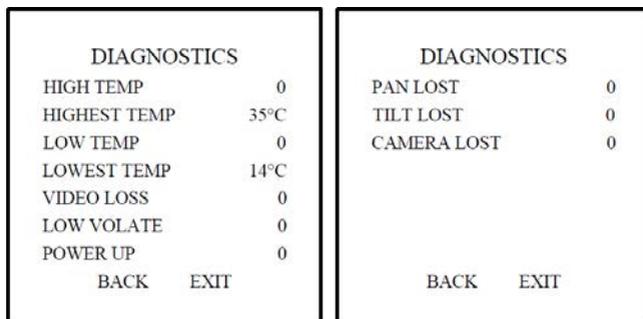
Self test diagnostics

4.10 Configuring and handling alarms

4.10.1 Configuring alarm input and linked actions

You can configure the camera to respond to alarm events with alarm linked actions, such as calling presets, patrols, patterns, scanning, etc. You can configure up to 7 alarm events.

1. Open the alarm configuration submenu. Go to **MAIN MENUS → DOME SETTINGS → ALARMS → ALARM SETTING**

```
          ALARM                       ALARM SETTING
ALARM RESUME        ON        ALARM NUM            1
ALARM SEQUENCE       5        PRIORITY          HIGH
ALARM REST DELAY     5        ALARM ACT         NONE
ALARM SETTING                 AUX               NONE
                              ALARM INPUT       OPEN


      BACK    EXIT                  BACK    EXIT
```
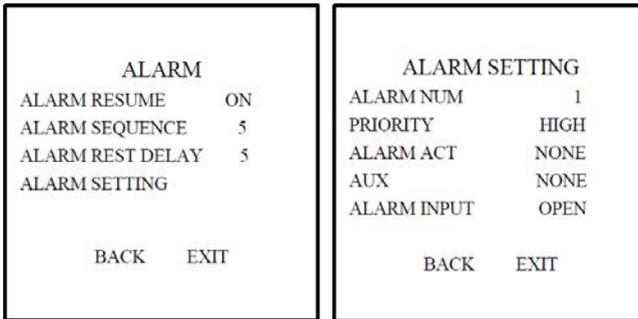
Alarm configuration menu

2. Choose the alarm number.

    a. Move the cursor to **ALARM NUM**, then click the **IRIS+** to enter edit mode.

    b. Click the up and down direction buttons to select the number of the alarm which is to be configured.

    c. Click **IRIS+** again to confirm and exit edit mode of this column.

3. Configure the alarm input.

    a. Move the cursor to **ALARM INPUT**, then click the **IRIS+** to enter edit mode.

    b. Click the up and down direction buttons to set the input status. You can configure it as **OPEN** (normally open), **CLOSE** (normally closed) or **OFF** (disable the alarm input).

    — **OPEN**. If you set the status as **OPEN**, alarm will be triggered by a high voltage level.
    — **CLOSE**. If you set the status as **CLOSE**, alarm will be triggered by low voltage level.
    — **OFF**. If you set the status as **OFF**, it will be triggered when this input channel is shut off.

    c. Click **IRIS+** again to confirm your selection.

4. Configure the alarm linkage action.

   You can specify the linked action when an alarm occurs. On the ALARM ACT submenu, you can set the alarm action as preset from 1 to 8, pattern from 1 to 4, patrol from 1 to 8, panning scan, tilting scan, random scan, frame scan, panoramic scan, day mode, night mode or none. You can also set the alarm output for the alarm. See "4.10.3 Configuring auxiliary alarm output" on page 53 for more information.

5. Configure alarm priority. Open the PRIORITY menu and set the alarm priority as HIGH, MID or LOW.

   If multiple alarms with different priorities are triggered at the same time, the dome only responds to the alarm with the highest priority. If multiple alarms with the same priority are triggered at the same time, then the dome will respond to each alarm according to the defined alarm sequence.

4.10.2 Configuring alarm parameters

You can set the alarm related parameters including the linkage action interval, alarm duration and dome activity resumption.

1. Open the alarm parameter configuration menu. Go to **MAIN MENUS → DOME SETTINGS → ALARMS → ALARM SETTING**

2. Configure the interval of the alarm sequence.

   When more than one alarm of the same priority occurs at the same time, the camera will respond to one alarm first and then respond to the next one after the user-defined interval. You can set the on ALARM SEQUENCE submenu from 1 to 200 seconds.

3. Configure the alarm rest delay.

   If there's a linkage action has already been triggered by an alarm input, the camera will only respond to the input from the same channel again after the user-defined reset delay time. This is the rest time that the camera considers an alarm to be active when it's physically cleared. You can set the ALARM REST DELAY from 0 to 300 seconds.

4. Resume the dome activity.

   You can set ALARM RESUME to ON to enable the camera to resume its previous activity after the triggered actions finished.

| NOTE | • If the camera is moving when a linkage action is triggered, it will stop at the current position and resume from this position after the linkage action finishes. |
| | • The camera can be configured to resume the PTZ positions, focus and iris value. |

4.10.3 Configuring auxiliary alarm output

An auxiliary output is a configurable alarm output interface on the camera back box which can connect and trigger another alarm device to operate. You can configure two auxiliary outputs.

1. Open the alarm auxiliary output configuration submenu (AUX). Go to **MAIN MENUS → DOME SETTINGS → AUX**

```
                 AUX
   AUX1                 CLOSE
   DWELL TIME               2
   AUX1                  OPEN
   DWELL TIME               0


             BACK    EXIT
```
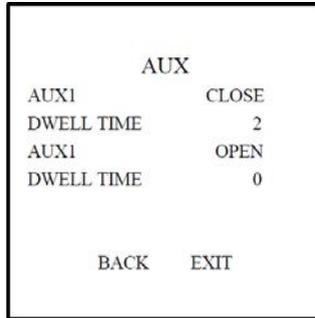
Configure AUX output

2. Click **IRIS+** to edit the status of the auxiliary outputs. You can set the alarm output type as OPEN (normally open) and CLOSE (normally closed).

3. Move the cursor to **DWELL TIME** to set the duration of the auxiliary output signal. The configurable rage is 0~60 seconds.

4. Link the auxiliary output to the configured alarm.

    a. Open **MAIN MENUS → DOME SETTINGS → ALARMS → ALARM SETTING**, then choose the alarm number that you want to link the auxiliary output to.

    b. Move the cursor to **AUX**, then click **IRIS+** to configure the auxiliary output to the alarm. You can choose NONE to disable auxiliary alarm outputs, choose 1 to active AUX 1, or choose 2 to active AUX 2.

4.11 Others

4.11.1 Line Synchronization

Line synchronization is used to choose the way the line is synchronized. If the LINE LOCK parameter is OFF, the synchronization mode is internal synchronization. When the LINE LOCK as ON, the synchronization mode is external synchronization. **NOTE**: This camera does not currently support external synchronization.
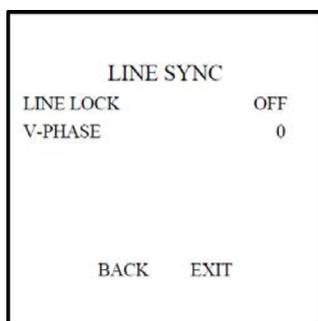
Line Sync

4.12 Setting the language of the menu

Open the **MAIN MENUS → LANGUAGE** menu to set the language of the on-screen display menu to either Chinese or English.

4.12.1 Configuring dome authentication

You can change and enable or disable the dome authentication password to prevent unauthorized changes to the dome settings. After you set and enable the password, you must enter the password when you call preset **95** to enter the menu.

1. Open the password modification submenu. Go to **MAIN MENUS → DOME SETTINGS → PASSWORD → EDIT PASSWORD**

2. Click **IRIS+** to enter edit mode.

3. Click the left/right buttons to move the cursor on the current password and click up/down or **FOCUS+** or **FOCUS-** buttons to choose the number.

4. Click the right direction button to move the cursor to **INPUT PW AGAIN**, then enter the password again.

5. Click **IRIS+** to save the changes and close the menu.

6. Open the **START USING** submenu and switch the status to **ON**, then click **IRIS+** to save.

```
PASSWORD
START USING          ON
EDIT PASSWORD



    BACK    EXIT
```

```
INPUT PW      1 2 3 4 5 6

INPUT PW AG 1 2 3 4 5 6


        DONE: OPEN
        QUIT: CLOSE
```
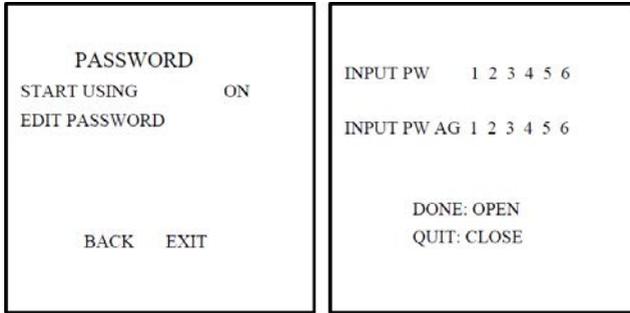
Set the password

4.12.2   Restoring default dome settings

You can reset all dome settings to factory default parameters as shown in the table below. Dome settings include mostly PTZ parameters, alarm parameters, and some system settings, for example, the dome address.

1.   Open the default dome settings menu. Go to **MAIN MENUS → RESTORE DEFAULTS**

2.   Click **IRIS+** to restore the dome settings to the values shown in the table below, or click **IRIS-** to exit.

Table 4. Default dome settings

Parameters	Default Value
Dome address	0
Baud rate	2400 bps
120Ω matching resistance	Off
Soft address	Off
Initial Position	Zero angle
Soft Baud rate	Off
Auto-focus	On
Zoom limit	Max. Optical Zoom
Zoom speed	High
Slow Shutter	0
IR cut filter	Auto
Backlight compensation	Off
AE mode	Auto

Parameters	Default Value
Exposure compensation	Off
White balance	Auto
Auto-flip	Off
Proportional pan	On
Park time	5 seconds
Park action	None
Scan speed	Level 28
Preset image freeze	Off
Limit stops	Off
Alarm resume	On
Alarm sequence	5 seconds
AUX1/AUX2	NO
Alarm display	On
Time display	Off
Zoom, Azimuth/elevation and preset label display	Display for 2 seconds

4.12.3   Restoring camera default settings

Camera settings include the image parameters, lens settings and display settings. To restore the default settings in the camera:

1.   Open the menu: **MAIN MENUS → RESTORE CAMERA**

2.   Click **IRIS+** to restore the camera settings to the default value; or click **IRIS-** to exit.

4.12.4   Rebooting the camera

Open the **MAIN MENUS → REBOOT DOME** menu, then click **IRIS+** to reboot the camera remotely.

SECTION 5
Specifications

Table 5. Table of Specifications

| Area	Parameter	Specification
Camera	Image sensor	1/3" Sony® 960H CCD
	Effective pixels	976(H)×494(V)
	Horizontal resolution	Color: 650 TVL B/W: 700 TVL
	Signal system	NTSC
	Minimum illumination	Color: 0.2 lux / (F1.6 AGC on) B/W: 0.02 lux / (F1.6 AGC on)
	White balance	Auto / ATW / Indoor / Outdoor / One push
	AGC	Auto / Manual
	S / N ratio	≥ 50 dB
	DNR	High / Medium / Low /Off
	BLC	On / Off
	Shutter time	1/60-1/10,000 second
	Day and Night	IR cut filter
	Digital zoom	16X
	Privacy Mask	8 privacy masks programmable; a maximum of 8 zones can be masked simultaneously on the same video screen
	Focus model	Auto / Semiautomatic / Manual
Lens	Focal length	3.8 ~ 45.6 mm, 12X
	Zoom speed	.2 degree / second (optical wide-tele)
	Angle of view	50.69 ~ 4.5 degree (wide-tele)
	Min. Working Distance	10 ~1500 mm (wide-tele)
	Aperture Range	F1.6 ~ F2.7
Pan and Tilt	Pan range	360° endless
	Pan speed	Pan manual speed: 0.1° -200°/ second, pan preset speed: 200°/ second
	Tilt Range	-2° ~ 90° (auto mirror)
	Tilt Speed	Tilt manual speed: 0.1°-120°/ second, tilt preset speed: 120°/ second
	Proportional zoom	Rotation speed can be adjusted automatically according To zoom multiples
	Number of preset	255
	Patrol	8 patrols, up to 32 presets per patrol

SECTION 5: SPECIFICATIONS

Area	Parameter	Specification
Pan and Tilt (cont.)	Pattern	4 patterns, with a total recording time not less than 10 minutes
	Power-off memory	Support
	Park action	Preset / Patrol / Pattern / Pan Scan / Tilt Scan / Random Scan / Frame scan / Panorama scan
	PTZ position display	On / Off
	Freeze Frame	Support
	Password protection	Support
	Zone scanning / display	Scanning within programmed zone, display zone title
	Camera Title	Programmable title display
	Compass	Support, north direction can be set
	Scheduled Task	Preset / Patrol / Pattern / Pan Scan / Tilt Scan / Random Scan / Frame Scan / Panorama Scan
	RS-485 communication diagnosis	Including failure information, such as wrong address, baud rate errors. Displayed on the video screen in text
	Manchester Code communication diagnosis	Including failure information, such as wrong address, baud rate errors. Displayed on the video screen in special characters
Alarms	Alarm input	2
	Alarm output	1 relay output, alarm response actions configurable
	Alarm action	Preset / Patrol / Pattern / Pan Scan / Tilt Scan / Random Scan / Frame Scan / Panorama Scan / Relay Output
Input / Output	Monitor output	1.0 Vp-p / 75 Ω, NTSC composite, BNC
General	Menu Language	English, Chinese
	RS-485 protocols	HIKVision, Pelco-P, Pelco-D, Self-adaptive
	Power	24 Vac (-A model) maximum 18 W
	Working Temperature / Humidity	-22 °F ~ -149 °F (-30 °C ~ -65 °C) (outdoor dome) / 14 °F ~ 122 °F (-10 °C ~ 50 °C) (indoor dome) 90% or less
	Protection Level	IP66 standard (outdoor dome) TVS 4,000 V lightning protection, surge protection
	Mounting	Various mounting modes optional
	Dimension	Φ7.08" × 9.43" (Φ180 × 239.5 mm) (outdoor) Φ6.50"×6.79 (Φ165×172.5 mm") (indoor) Φ6.50" × 6.57" (Φ165×167 mm) (in-ceiling)
	Weight (approx.)	4.41 lb (2 Kg) (outdoor) 2 Kg (4.41 lb) (indoor/in-ceiling)
	Mounting options	Ceiling Mount Bracket: BLK-PTZCL; Short Arm Wall Bracket 4" PTZ: BLK-PTZWBS; Wall Mount: BLK-PTZWB; Pole Mount PTZ Bracket: BLK-PTZPM; Corner Mount PTZ Bracket: BLK-PTZCM;

APPENDIX A
Lightning and Surge Protection

This product includes TVS plate lightning protection technology to prevent damage caused by a pulse signal that is below 3000 watts from sources such as lighting, surging, etc. Protection measures must be taken to ensure electrical safety.

- The distance between signal transmission line and high-voltage equipment or high-voltage cable is at least 50 m.
- Outdoor wiring should better be along the eaves as much as possible.
- In the open field, wiring should be buried underground in sealed steel pipe with one-point grounding. Overhead routing method is not acceptable.
- In regions with thunderstorms or where high induction voltage are present (such as high-voltage transformer substation), high power lightning protection apparatus and lightning conductor are necessary.
- The design for installation and wiring with lightning protection and grounding should be combined with the lightning protection consideration of the building, and conform to the relevant national and industry standards.
- The system should ensure equi-potential grounding. Grounding equipment must satisfy both system anti-jamming and electric safety. It must not allow short circuit and open circuit with the zero conductor of strong grid. When the system is singularly ground, the resistance must be no more than 4 Ω and the cross-sectional area of the grounding cable must be no less than 25 mm^2. For grounding instructions, refer to local electrical codes and this manual.
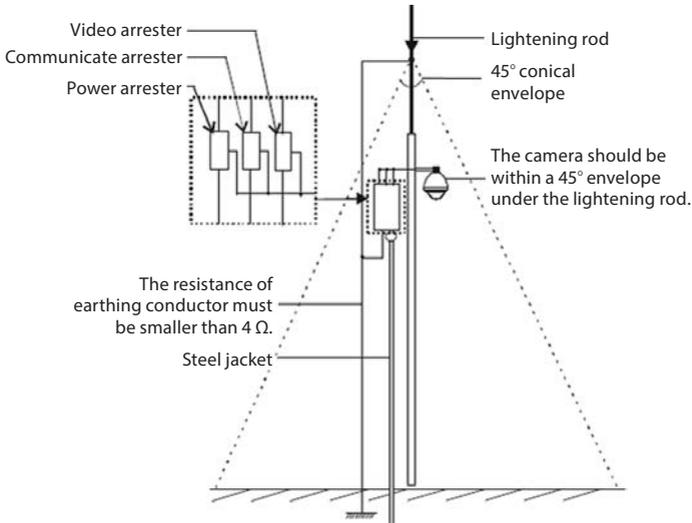
Lightning & Surge Protection

APPENDIX B
RS-485 Bus Connection

General Property of RS-485 Bus

RS-485 is a half-duplex communication bus that has a 120 Ω characteristic impendence. The maximum load ability is 32 payloads (including controller device and controlled device).

RS-485 Bus Transmission Distance

For 0.56 mm (24AWG) twisted-pair wire, the maximum transmission distance for different baud rates is shown as below:

Max. Distance of RS-485 transmission with 24AWG wire

Baud rate	Maximum distance
2400 bps	5900 ft (1800 m)
4800 bps	3900 ft (1200 m)
9600 bps	2600 ft (800 m)

The transmission distance is decreased for thinner cable, when the wire is exposed to strong electromagnetic interference. If many devices are installed on the bus, the transmission distance is increased.

Connection Methods

RS-485 industry bus standard requires a daisy-chain connection method between any devices, both sides have to connect a 120 Ω terminal resistance (see the diagram **Connection 1** below). The simplified connection method is shown as diagram 2; the distance of "**D**" should be short.
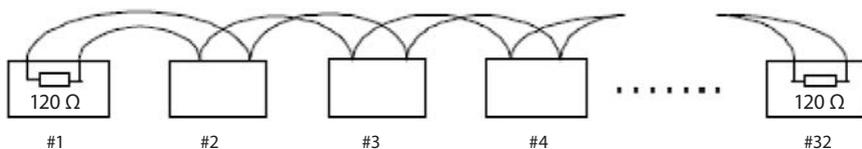
RS-485 Connection 1 diagram
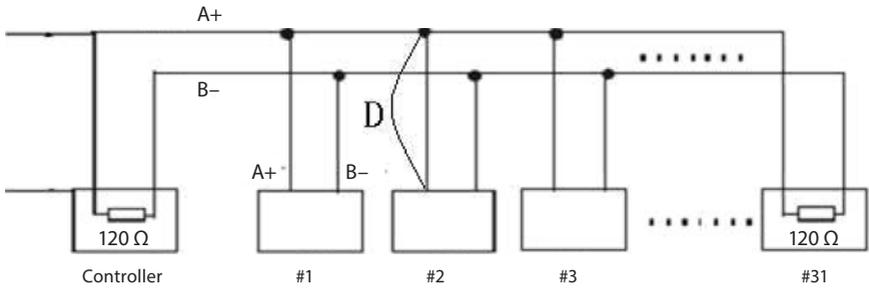
RS-485 Connection 2 diagram

Problems in the practical application - star-shaped architecture

Although the star-shape connection method is commonly used, it does not satisfy the requirement of the RS-485 industry. This architecture can lead to problems such as signal reflection, uncontrollable or self-running cameras, and anti-jamming inability with devices that are far away. In the star-shaped connection, the termination resistors are usually placed in the two devices that are farthest apart (see figures below).
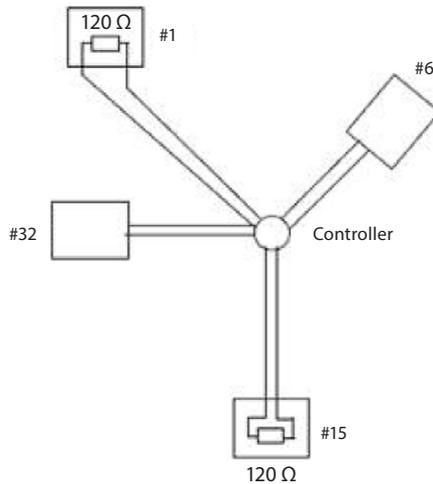
Star-shaped connection

Signal transmission in the star-shaped architecture can be greatly improved by adding an RS-485 distributor. This product effectively changes the star-shape connection to one that satisfies the requirement of the RS-485 industry standard. See the diagram below.
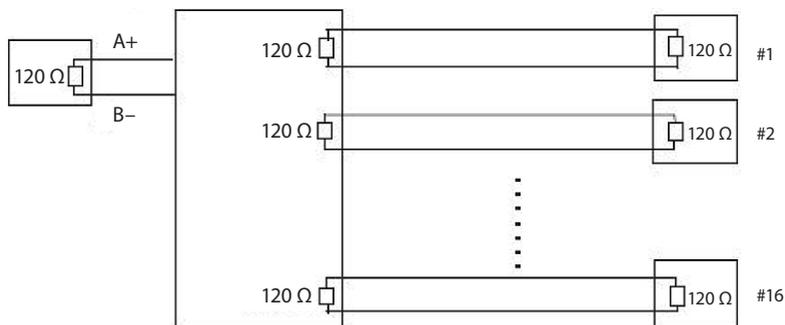
Star-shaped network with an RS-485 Distributor

FAQ of RS-485 Bus

Fault	Probable Cause	Solutions
The camera will perform a self check but cannot be controlled.	The address or baud rate is not configured appropriately in the camera or controller.	Configure the camera address and baud rate to match in the controller and the camera.
	RS-485 +/- are connected incorrectly.	Correct the RS-485 wiring connections.
	Wiring is disconnected	Fastening the wire
	RS-485 wire is broken	Change the RS-485 wires
The camera can be controlled but does not operate smoothly.	Loose wire connections	Fasten the RS-485 wires correctly
	One RS-485 wire is broken	Change or repair the broken wire
	Controller and camera are too far away	Add terminal matched resistance
	Too many devices are connected to the network	Add an RS-485 distributor.

APPENDIX C
24 Vac Wire Gauge and Transmission Distance

The following table shows the recommended maximum distance adopted for the different wire sizes when the 24 Vac voltage loss is less than 10%. For the AC driven device, the maximum voltage loss rate allowable is 10%. For example, for a device with the rating power of 80 VA which is installed 35 feet (10 m) from the transformer, the minimum wire gauge required is 0.8000 mm.

Distance feet(m) / Power (va) — Wire Gauge mm	0.8000	1.000	1.250	2.000
10	283 (86)	451 (137)	716 (218)	1811 (551)
20	141 (42)	225 (68)	358 (109)	905 (275)
30	94 (28)	150 (45)	238 (72)	603 (183)
40	70 (21)	112 (34)	179 (54)	452 (137)
50	56 (17)	90 (27)	143 (43)	362 (110)
60	47 (14)	75 (22)	119 (36)	301 (91)
70	40 (12)	64 (19)	102 (31)	258 (78)
80	35 (10)	56 (17)	89 (27)	226 (68)
90	31 (9)	50 (15)	79 (24)	201 (61)
100	28 (8)	45 (13)	71 (21)	181 (55)
110	25 (7)	41 (12)	65 (19)	164 (49)
120	23 (7)	37 (11)	59 (17)	150 (45)
130	21 (6)	34 (10)	55 (16)	139 (42)
140	20 (6)	32 (9)	51 (15)	129 (39)
150	18 (5)	30 (9)	47 (14)	120 (36)
160	17 (5)	28 (8)	44 (13)	113 (34)
170	16 (4)	26 (7)	42 (12)	106 (32)
180	15 (4)	25 (7)	39 (11)	100 (30)
190	14 (4)	23 (7)	37 (11)	95 (28)
200	14 (4)	22 (6)	35 (10)	90 (27)

Table of wire gauge standards

Bare Wire Gauge (mm)	American Wire Gage AWG	Cross-sectional Area of Bare Wire mm²
0.050	43	0.00196
0.060	42	0.00283
0.070	41	0.00385
0.080	40	0.00503
0.090	39	0.00636
0.100	38	0.00785
0.110	37	0.00950
0.130	36	0.01327
0.140	35	0.01539
0.160	34	0.02011
0.180	33	0.02545
0.200	32	0.03142
0.230	31	0.04115
0.250	30	0.04909
0.290	29	0.06605
0.330	28	0.08553
0.350	27	0.09621
0.400	26	0.1257
0.450	25	0.1602
0.560	24	0.2463
0.600	23	0.2827
0.710	22	0.3958
0.750	21	0.4417
0.800	20	0.5027
0.900	19	0.6362
1.000	18	0.7854
1.250	16	1.2266
1.500	15	1.7663
2.000	12	3.1420
2.500		4.9080.
3.00		7.0683