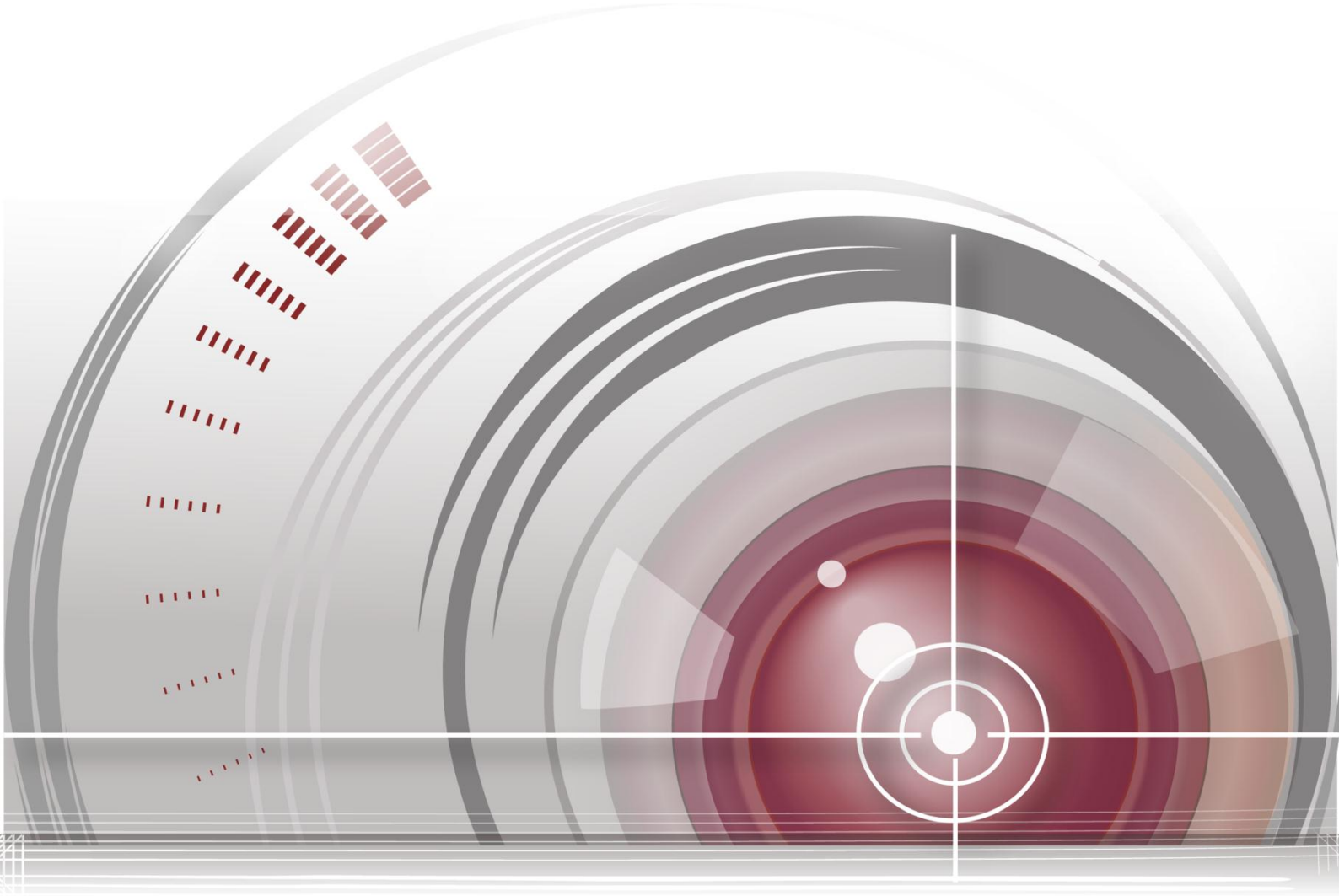

Network Speed Dome

Installation Manual

UD.6L0201A1835A02

Installation Manual

About this Manual

This Manual is applicable to 5-inch, 6.5-inch, 7-inch IR and 8-inch IR Network Speed Dome.

The Manual includes instructions for using and managing the product. Pictures, charts, images and all other information hereinafter are for description and explanation only. The information contained in the Manual is subject to change, without notice, due to firmware updates or other reasons. Please find the latest version in the company website.

Please use this user manual under the guidance of professionals.

Legal Disclaimer

REGARDING TO THE PRODUCT WITH INTERNET ACCESS, THE USE OF PRODUCT SHALL BE WHOLLY AT YOUR OWN RISKS. OUR COMPANY SHALL NOT TAKE ANY RESPONSIBILITES FOR ABNORMAL OPERATION, PRIVACY LEAKAGE OR OTHER DAMAGES RESULTING FROM CYBER ATTACK, HACKER ATTACK, VIRUS INSPECTION, OR OTHER INTERNET SECURITY RISKS; HOWEVER, OUR COMPANY WILL PROVIDE TIMELY TECHNICAL SUPPORT IF REQUIRED.

SURVEILLANCE LAWS VARY BY JURISDICTION. PLEASE CHECK ALL RELEVANT LAWS IN YOUR JURISDICTION BEFORE USING THIS PRODUCT IN ORDER TO ENSURE THAT YOUR USE CONFORMS THE APPLICABLE LAW. OUR COMPANY SHALL NOT BE LIABLE IN THE EVENT THAT THIS PRODUCT IS USED WITH ILLEGITIMATE PURPOSES.

IN THE EVENT OF ANY CONFLICTS BETWEEN THIS MANUAL AND THE APPLICABLE LAW, THE LATER PREVAILS.

Regulatory Information

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.

EU Conformity Statement

CE 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, the RoHS Directive 2011/65/EU.

2012/19/EU (WEEE directive): Products marked with this symbol cannot be disposed of as unsorted municipal waste in the European Union. For proper recycling, return this product to your local supplier upon the purchase of equivalent new equipment, or dispose of it at designated collection points. For more information see: www.recyclethis.info.

2006/66/EC (battery directive): This product contains a battery that cannot be disposed of as unsorted municipal waste in the European Union. See the product documentation for specific battery information. The battery is marked with this symbol, which may include lettering to indicate cadmium (Cd), lead (Pb), or mercury (Hg). For proper recycling, return the battery to your supplier or to a designated collection point. For more information see: www.recyclethis.info.

Industry Canada ICES-003 Compliance

This device meets the CAN ICES-3 (A)/NMB-3(A) standards requirements.

Safety Instruction

These instructions are intended to ensure that the user can use the product correctly to avoid danger or property loss.

The precaution measure is divided into 'Warnings' and 'Cautions':

Warnings: Serious injury or death may be caused if any of these warnings are neglected.

Cautions: Injury or equipment damage may be caused if any of these cautions are neglected.

	
Warnings Follow these safeguards to prevent serious injury or death.	**Cautions** Follow these precautions to prevent potential injury or material damage.

 **Warnings**

- All the electronic operation should be strictly compliance with the electrical safety regulations, fire prevention regulations and other related regulations in your local region.
- Please use the power adapter, which is provided by normal company. The power consumption cannot be less than the required value.
- Do not connect several devices to one power adapter as adapter overload may cause over-heat or fire hazard.
- Please make sure that the power has been disconnected before you wire, install or dismantle the speed dome.
- When the product is installed on wall or ceiling, the device shall be firmly fixed.
- If smoke, odors or noise rise from the device, turn off the power at once and unplug the power cable, and then please contact the service center.
- If the product does not work properly, please contact your dealer or the nearest service center. Never attempt to disassemble the speed dome yourself. (We shall not assume any responsibility for problems caused by unauthorized repair or maintenance.)
- Please do not look directly into the laser light within 6 meters because laser is hazardous to humans.

 **Cautions**

- Do not drop the dome or subject it to physical shock, and do not expose it to high electromagnetism radiation. Avoid the equipment installation on vibrations surface or places subject to shock (ignorance can cause equipment damage).
- Do not place the dome in extremely hot, cold, dusty or damp locations, otherwise fire or electrical shock will occur. Please refer to the product specification for device operating temperature.
- The dome cover for indoor use shall be kept from rain and moisture.

- Exposing the equipment to direct sun light, low ventilation or heat source such as heater or radiator is forbidden (ignorance can cause fire danger).
- Do not aim the speed dome at the sun or extra bright places. A blooming or smear may occur otherwise (which is not a malfunction however), and affecting the endurance of sensor at the same time.
- Please use the provided glove when open up the dome cover, avoid direct contact with the dome cover, because the acidic sweat of the fingers may erode the surface coating of the dome cover.
- Please use a soft and dry cloth when clean inside and outside surfaces of the dome cover, do not use alkaline detergents.
- Do not stare at infrared LED closely to avoid hurting your eyes when the infrared lights are on.
- Please keep all wrappers after unpack them for future use. In case of any failure occurred, you need to return the speed dome to the factory with the original wrapper. Transportation without the original wrapper may result in damage on the speed dome and lead to additional costs.
- Improper use or replacement of the battery may result in hazard of explosion. Replace with the same or equivalent type only. Dispose of used batteries according to the instructions provided by the battery manufacturer.

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Chapter 1 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.

NOTE Do not drag the waterproof cables as shown in Figure 1-1, otherwise the waterproof performance is affected.

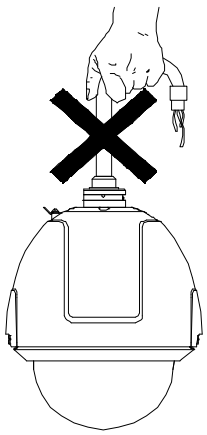

Figure 1-1 Do not Drag the Cables

1.1 Installation and Cabling

The wall mounting method for different speed domes can be categorized into four types, refer to the content below for the detailed instructions.

Type I refers to the 5-inch speed dome.

Type II refers to the 6.5-inch speed dome.

Type III refers to the 7-inch IR speed dome and 7-inch laser speed dome.

Type IV refers to the 8-inch IR speed dome and 8-inch laser speed dome.

The figures below are for reference only, please refer to the actual product.

1.1.1 Installing the Type I Speed Dome

Steps:

1. Loosen the two lock screws on the both side of the speed dome. Pull the lower dome to separate it from the back box as shown in Figure 1-2.

   NOTE Please do not remove the lock screws from the dome.

2. Remove the protective elements.

   For Separate 5-inch speed dome: Pull the camera module to separate it from the back box, as shown in Figure 1-3.

For Integrated 5-inch speed dome: Remove the protective foam, sticker and lens cover from the dome drive. As shown in Figure 1-4.

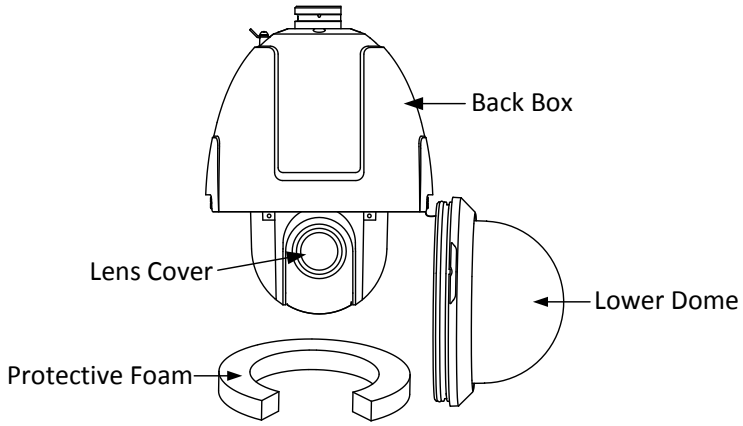

Figure 1-2 Remove the Lower Dome

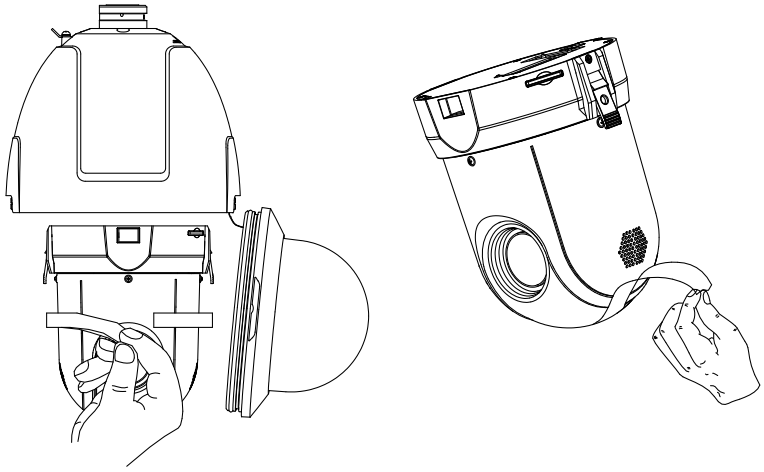

Figure 1-3 Remove the sticker for Integrated 5-inch speed dome

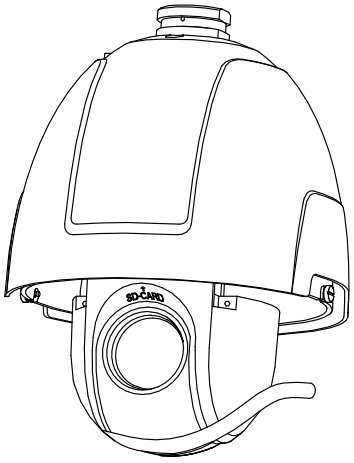

Figure 1-4 Remove the Sticker for Separate 5-inch speed dome

3. Install the micro SD card.
   The Micro SD card slot of network speed dome is shown in Figure 1-5.

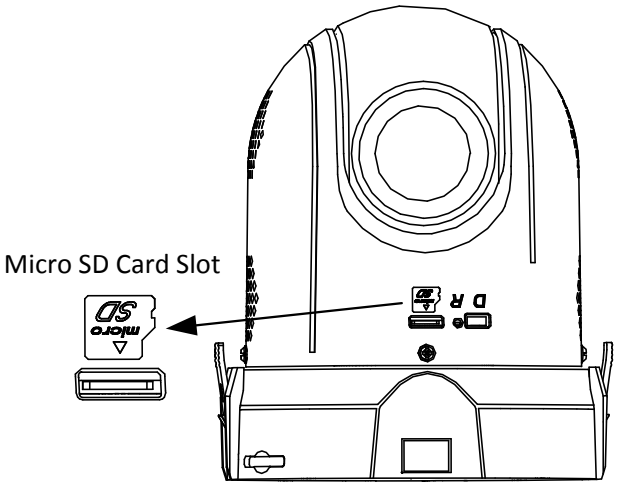

Figure 1-5 Micro SD Card Slot

4. Switch the Hi-PoE and PoE+ Modes.
   Power supply via Hi-PoE is supported by some speed dome series. The mode of PoE+ or Hi-PoE can be selected. Follow the steps below to switch the mode.
   Steps:
   1) Push the lock to open the base plate, and you can see the PCB on the plate.
   2) Press switch 1 to set the status as ON which represents that the mode of Hi-PoE is selected. As shown in Figure 1-6.

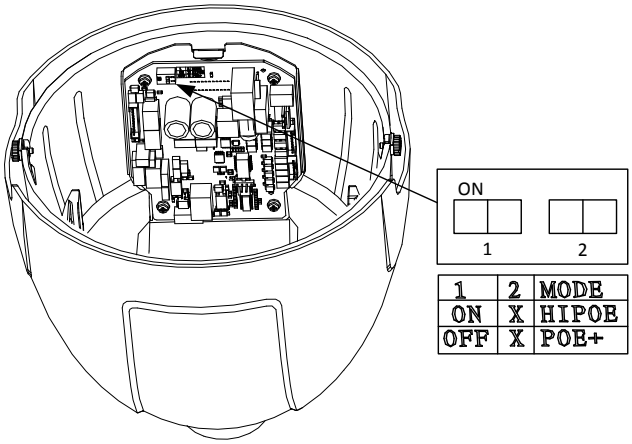

Figure 1-6 PoE+ and Hi-PoE Switch

NOTE

If you choose Hi-PoE, a Hi-PoE module must be connected. For Details, See ***1.3.2 Power over Hi-PoE***.

5. Align the cuts on the lower dome with the lock screws on the back box to reinstall the lower dome. Tighten the lock screws.
6. Secure the bracket to the wall with four screws.

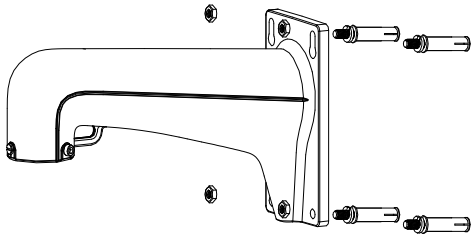

Figure 1-7 Install the Bracket

NOTE

- For cement wall, you need to use the expansion screw to fix the bracket. The mounting hole of the expansion pipe on the wall should align with the mounting hole on the bracket.
- For wooden wall, you can just use the self-tapping screw to fix the bracket.
- Please make sure that the wall is strong enough to withstand at least 8 times the weight of the dome and the bracket.

7. Install the speed dome to the bracket.
   1) Hang the safety rope to the speed dome and the hook on the bracket as shown in Figure 1-8.
   2) Route the cables of the speed dome through the bracket.
   3) Connect the corresponding cables. For the detailed information, please refer to section ***1.1.3 Connecting the Cables***.

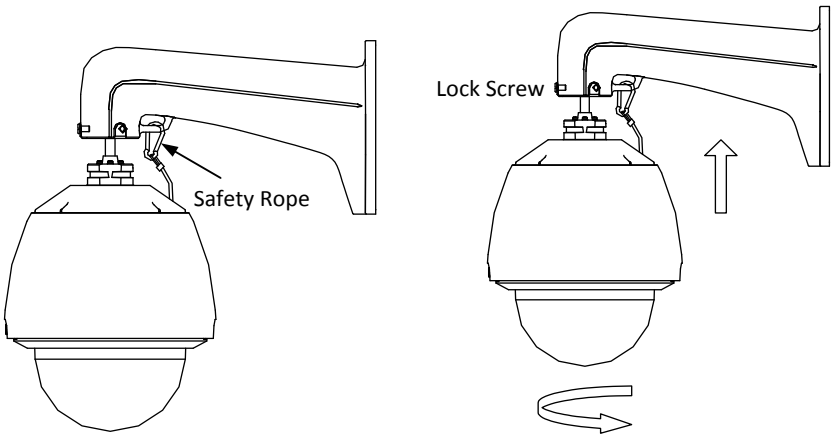

Figure 1-8 Install the Speed Dome

   4) Loosen the two lock screws on the bracket.
   5) Install the speed dome to the bracket. Rotate the speed dome clockwise tightly.
   6) Secure the two lock screws with the Allen wrench as shown in Figure 1-9.

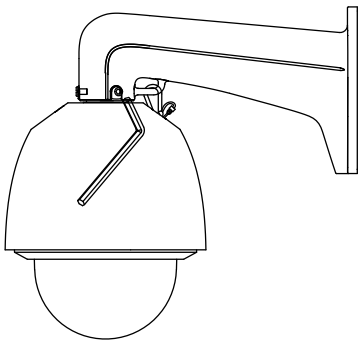

Figure 1-9 Secure the Speed Dome

NOTE

- The bracket in Figure 1-7 is the recommended bracket for this series of speed dome, and a pendent adapter is required if any other bracket is selected. See Figure 1-10.
- The dimension of pendant adapter is $G1\frac{1}{2}$.

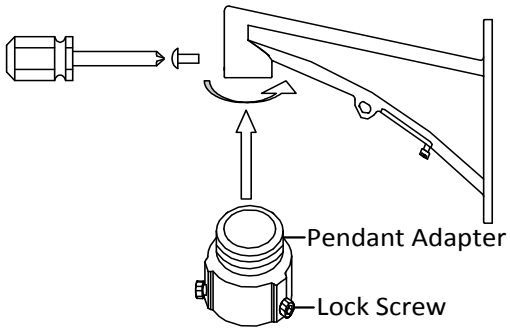

Figure 1-10 Pendent Adapter

1.1.2 Installing the Type II Speed Dome

NOTE The long-arm bracket is taken as the example for following mounting steps.

Steps:

1. Loosen the 4 lock screws on the flange of the speed dome; refer to the Figure 1-11.

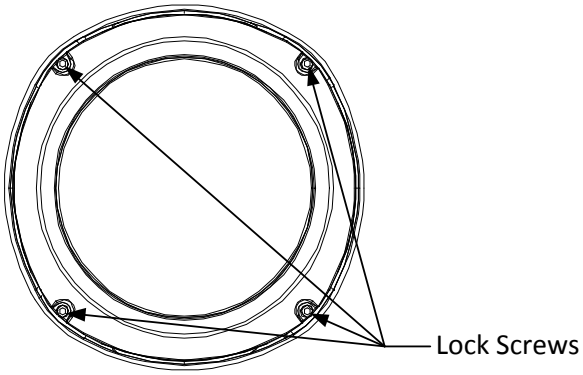

Figure 1-11 Loosen the Lock Screws

NOTE Please do not remove the lock screws from the dome.

2. Pull the lower dome to separate it from the back box, and remove the protective foam, sticker and lens cover from the dome drive.

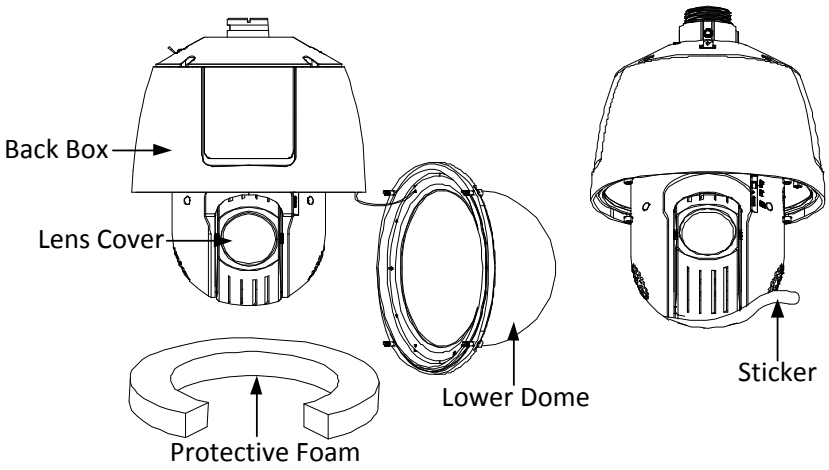

Figure 1-12 Remove the Protective Elements

3. Install the micro SD card of the speed dome.

NOTE 2 types of the 6.5-inch speed dome structure are provided, as shown in the following figures; please refer to the actual product for the location of the SD card slot.

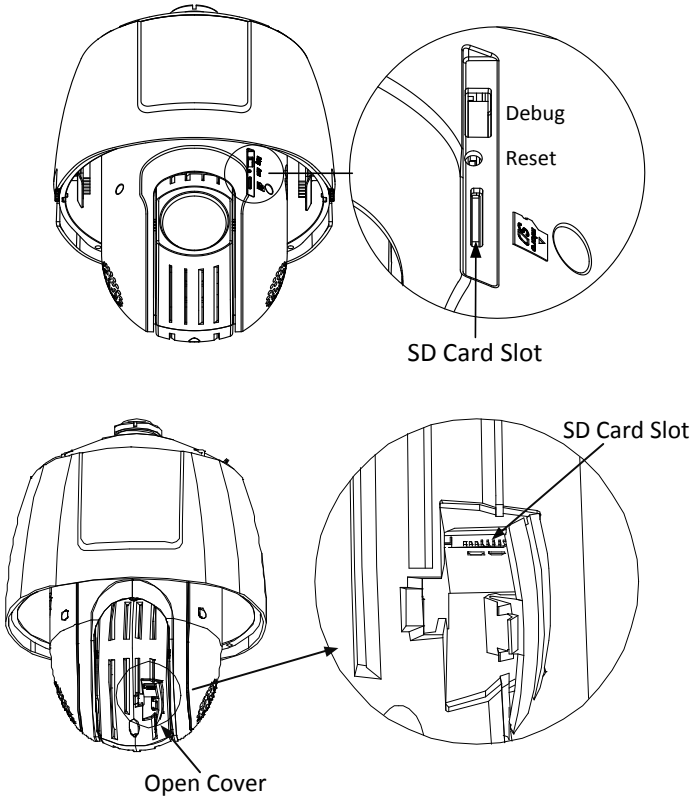

Figure 1-13 Install the SD Card

4. Align the cuts on the lower dome with the lock screws on the back box to reinstall the lower dome. Tighten the lock screws.
5. Drill 4 screw holes in the wall according to the holes of the bracket, and then insert M8 expansion screws into the mounting holes.
6. Attach the gasket then bracket to the wall by aligning the 4 screw holes of the bracket with expansion screws on the wall.

7. Secure the bracket with 4 hex nuts and washers

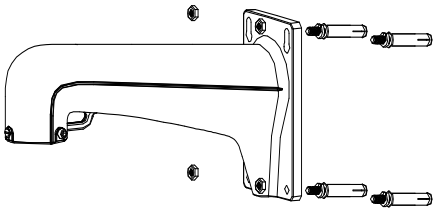

Figure 1-14 Secure the Bracket

8. Install the speed dome to the bracket.
   1) Hook the back box of the speed dome to the bracket with the safety rope. Route the cables through the bracket.
   2) Connect the corresponding cables.

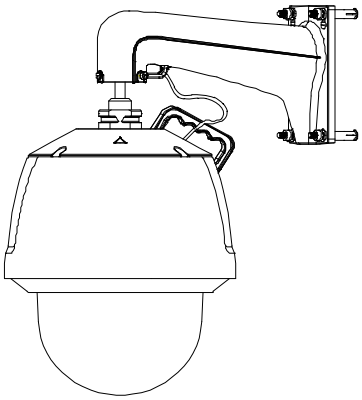

Figure 1-15 Hang the Safety Rope

   3) Loosen the two lock screws on the bracket.
   4) Install the speed dome to the bracket. Rotate the speed dome clockwise tightly.
   5) Secure the two lock screws with the Allen wrench.

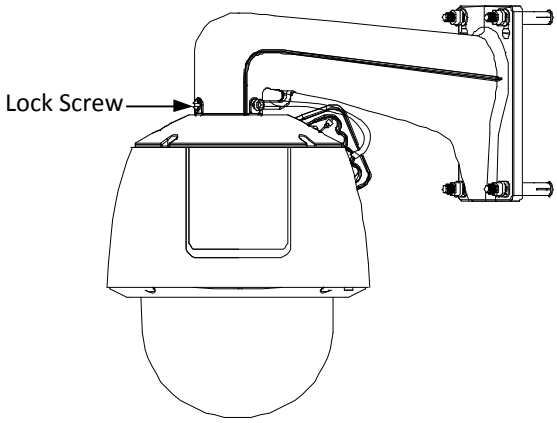

Figure 1-16 Mount the Dome

NOTE

- The bracket in Figure 1-14 is the recommended bracket for this series of speed dome, and a pendent adapter is required if any other bracket is selected.
- The dimension of pendant adapter is G1$\frac{1}{2}$.

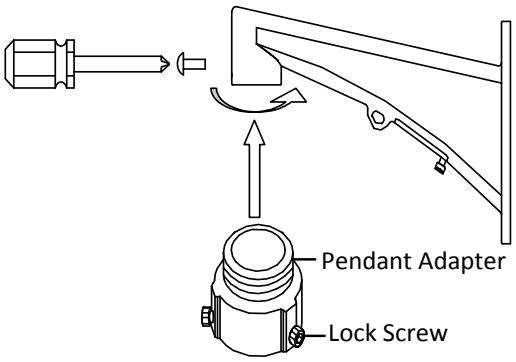

Figure 1-17 Pendent Adapter

1.1.3 Installing the Type III Speed Dome

Steps:

1. Remove the protective sticker as shown in Figure 1-18.

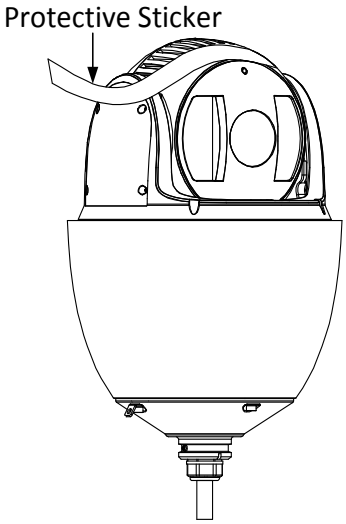

Figure 1-18 Protective Sticker

2. Remove the cover on the back of the speed dome as shown in Figure 1-19. Insert the SD card to the SD card slot and install the cover back.

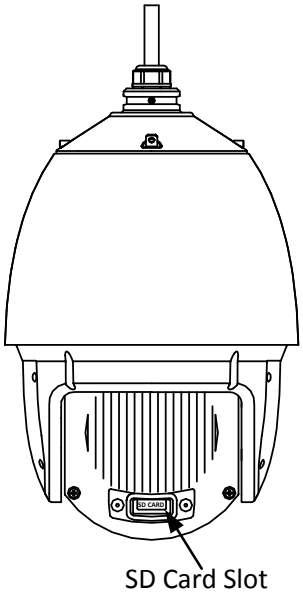

Figure 1-19 SD Card Slot

3. Secure the bracket to the wall with four screws. For details, see step 6 in the section ***1.1.1 Installing the Type I Speed*** Dome.

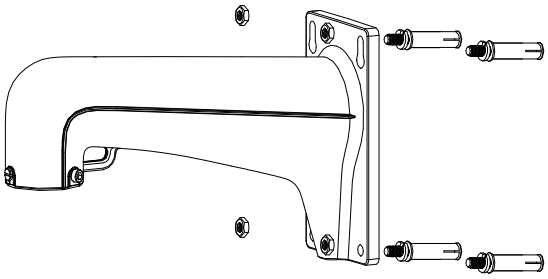

Figure 1-20 Install the Bracket

4. Install the speed dome to the bracket.
   1) Hang the safety rope to the speed dome and the hook on the bracket as shown in Figure 1-21.
   2) Route the cables of the speed dome through the bracket.
   3) Connect the corresponding cables. For the detailed information, please refer to section ***1.1.5 Connecting the Cables***.

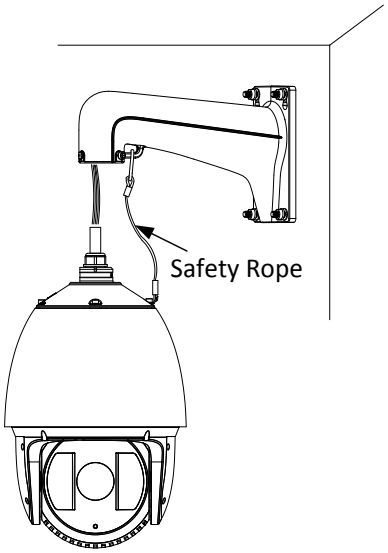

Figure 1-21 Install the Speed Dome

4) Loosen the two lock screws on the bracket.
5) Install the speed dome to the bracket. Rotate the speed dome clockwise tightly.
6) Secure the two lock screws with the Allen wrench as shown in Figure 1-22.

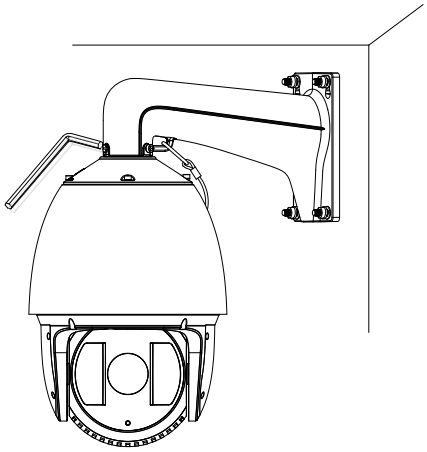

Figure 1-22 Secure the Speed Dome

5. Remove the protective film of the IR or laser light after you finish installing.

NOTE

- The bracket in Figure 1-13 is the recommended bracket for this series of speed dome, and a pendent adapter is required if any other bracket is selected. See Figure 1-23.
- The dimension of pendant adapter is G1$\frac{1}{2}$.

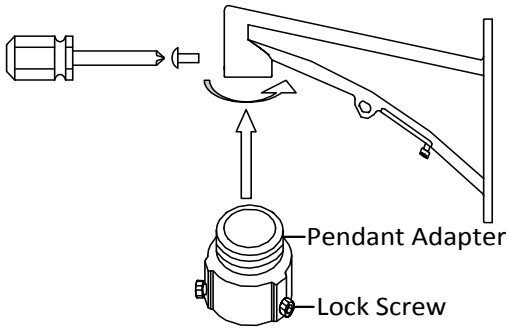

Figure 1-23 Pendent Adapter

1.1.4 Installing the Type IV Speed Dome

Steps:

1. Remove the protective sticker as shown in Figure 1-24.

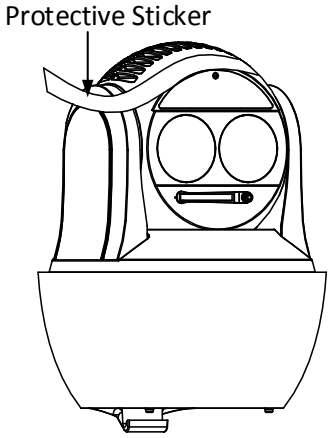

Figure 1-24 Remove Protective Sticker

2. Remove the cover on the back of the speed dome. Insert the SD card to the SD card slot and install the cover back.

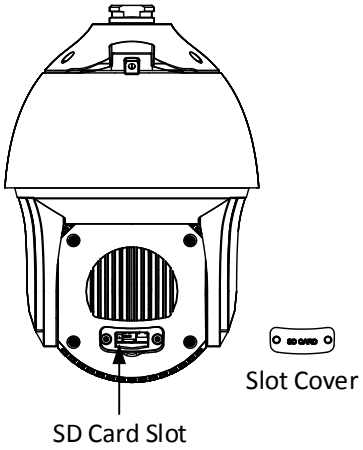

Figure 1-25 SD Card Slot

3. Secure the bracket with 4 hex nuts and washers.

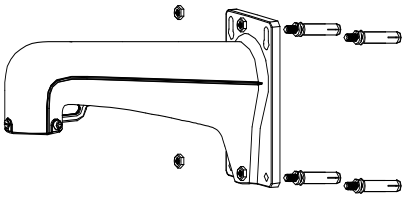

Figure 1-26 Secure the Bracket

4. Apply thread tape to the thread of the head cover and rotate the head cover to the bracket. Secure the head cover to the bracket with set screws (supplied).

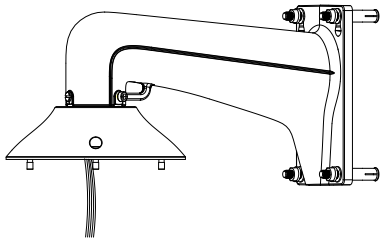

Figure 1-27 Secure the Head Cover

5. Buckle the handle to the safety rope.

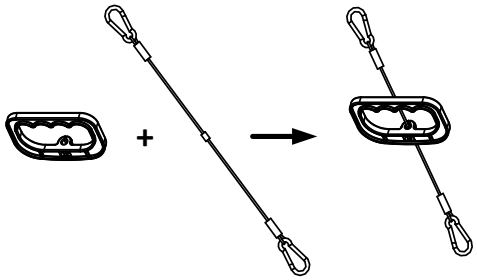

Figure 1-28 Buckle the Handle

6. Hook the two ends of the safety rope to the back box of the speed dome and the bracket respectively.
7. Hitch the speed dome onto the head cover with the hook on the back box.

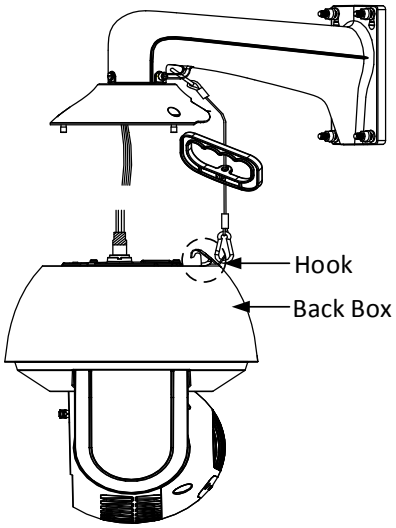

Figure 1-29 Hang the Speed Dome

8. Route the cables through the head cover and bracket.

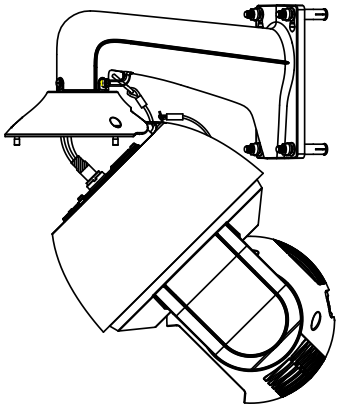

Figure 1-30 Route the Cables

9. Align the back box of the speed dome with the head cover. Use an Allen wrench to tighten the lock screws to secure the speed dome and the bracket.

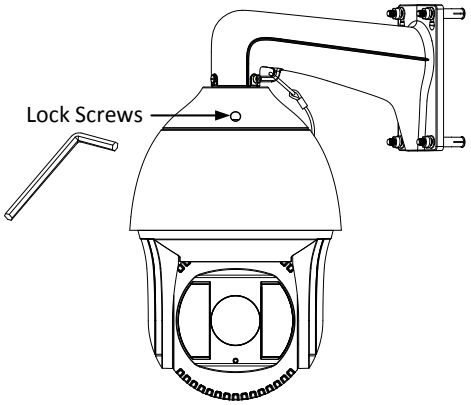

Figure 1-31 Secure the Speed Dome

10. Remove the protective film of the IR or laser light after you finish installing.

NOTE

- The bracket in Figure 1-26 is the recommended bracket for this series of speed dome, and a pendent adapter is required if any other bracket is selected.
- The dimension of pendant adapter is $G1\frac{1}{2}$.

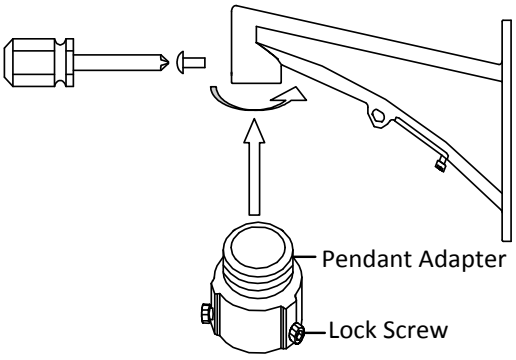

Figure 1-32 Pendent Adapter

1.1.5 Connecting the Cables

Before you start:

Please make sure the power of the dome is off before connecting the cables.

The cable interfaces of speed dome are shown in the Figure 1-33. Please refer to the following figure for connecting the cables.

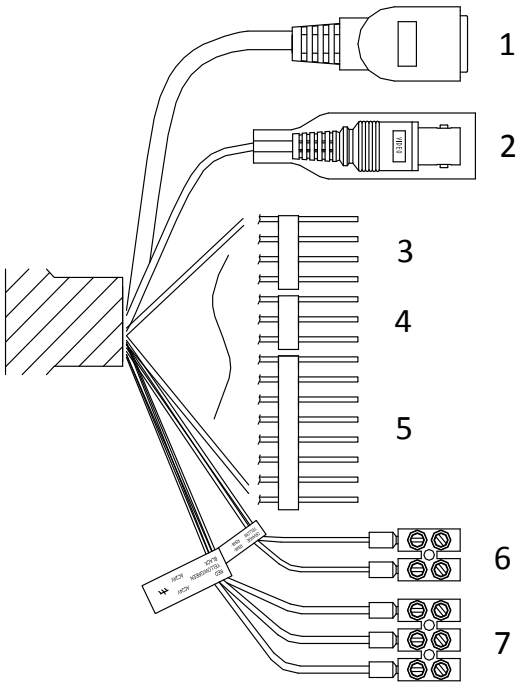

Figure 1-33 Cable of Network Speed Dome

Table 1-1 Descriptions of Cable Interface

No.	Description	No.	Description
1	Network Cable	2	Video Cable
3	Alarm Out	4	Audio Cable
5	Alarm In	6	RS-485
7	Power Cable		

1.2 Alarm Input and Output Connection

- The network speed dome can be connected with alarm inputs (0~5 VDC)
- Refer to the following diagrams for alarm output:

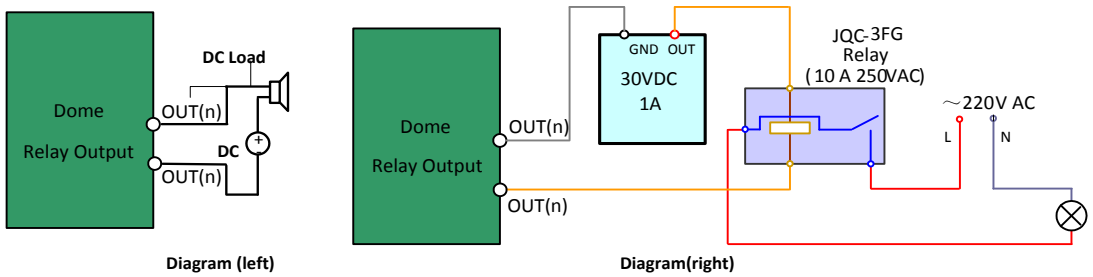

Figure 1-34 Alarm Out Connections

The alarm provides the relay output, and the external power supply is required when it connects to the alarm device.

- For DC power supply (left diagram), the input voltage must be no more than 30VDC, 1A.
- For AC power supply, the external relay must be used (right diagram) to prevent damages to the speed dome and avoid risk of electric shock.

1.3 Power Supply

1.3.1 Power Cable Requirement

When the speed dome uses standard AC power supply, the power cable should meet the demand. The formula of the cross-section S (mm^2) and the maximum transmission distance L (m) of the bare wire is as follows:

L=50*S (analog speed dome)

L=40*S (network speed dome)

Example:

For the analog speed dome, the cross-section of the cable is 1mm^2 and the transmission distance is less than 50m.

According to the ***Appendix 4 24VAC Wire Gauge Standards***, for example, the American wire gauge 18, the transmission distance should be 0.7854*50=39.27m.

1.3.2 Power over Hi-PoE

Power supply via Hi-PoE is supported by some speed dome series. The Hi-PoE module connection is shown below.

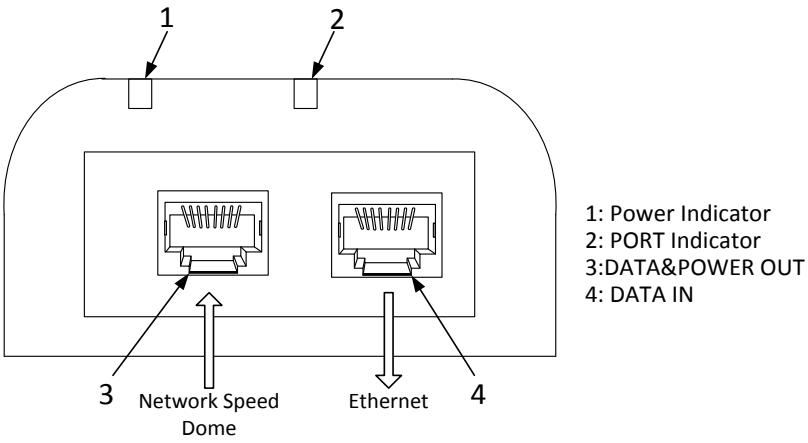

Figure 1-35 Hi-PoE Connection

Steps:

1. Connect the Hi-PoE module to the internet via the DATA IN interface with a network cable.
2. Connect the Hi-PoE module to the speed dome via the DATA & POWER OUT interface with a network cable.
3. Power on the Hi-PoE module.

NOTE Please power the Hi-PoE module according to its power supply parameters.

Chapter 2 Mounting Applications

Before you start:

- For cement wall, you need to use the expansion screw to fix the bracket. The mounting hole of the expansion pipe on the wall should align with the mounting hole on the bracket.
- For wooden wall, you can just use the self-tapping screw to fix the bracket.
- The wall must be thick enough to install the expansion screws.
- Please make sure that the wall is strong enough to withstand more than 8 times the weight of the dome and the bracket.

2.1 Wall Mounting Applications

2.1.1 Components

- **Bracket**

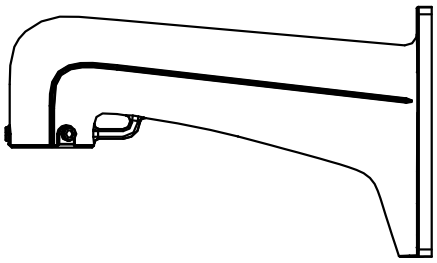

Figure 2-1 Bracket

- **Mounting Accessories**

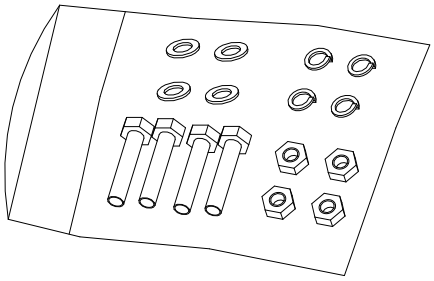

Figure 2-2 Nuts and Flat Washers

2.1.2 Wall Mounting

Steps:

1. Drill 4 screw holes in the wall according to the holes of the bracket, and then insert M6 expansion screws (not supplied) into the mounting holes.
2. Attach the gasket (not supplied) then bracket to the wall by aligning the 4 screw holes of the

bracket with expansion screws on the wall.

3. Secure the bracket with 4 hex nuts and washers.

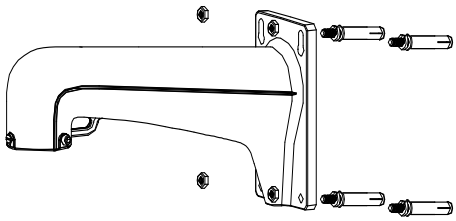

Figure 2-3 Drill Screw Holes

4. Install the speed dome to the bracket. Please refer to *Section* ***1.1 Installation and Cabling*** for installation details.

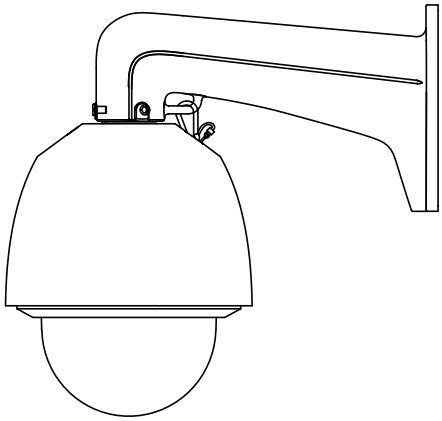

Figure 2-4 Finish the Installation

2.2 In-ceiling Mounting Applications

The in-ceiling mounting is only applicable to the indoor models of 5-inch speed dome.

2.2.1 Installation Conditions

Before you start:

The in-ceiling mounting is applicable to the indoor ceiling construction. The followings are the mandatory precondition for mounting:

- The height of the space above the ceiling must be more than 250mm.
- The thickness of the ceiling must ranges from 5 to 40mm.
- The ceiling must be strong enough to withstand more than 4 times the weight of the dome and its accessories.

2.2.2 In-ceiling Mounting

Steps:

1. Rotate the lower dome counterclockwise to separate it from the back box as shown in Figure

2-5.

2. Remove the protective lens cover, foam and sticker from the dome drive.
3. Attach lower dome to the back box, and rotate clockwise to secure it.

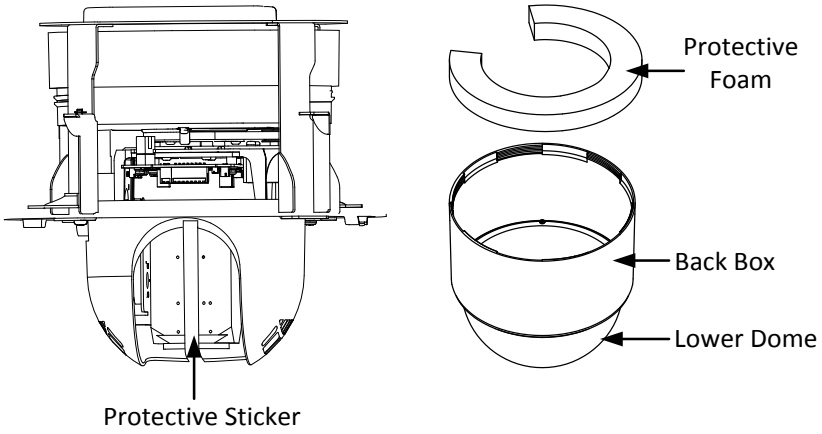

Figure 2-5 Remove the Protective Accessory

4. Drill a hole on the ceiling according to the drill template (supplied).

NOTE ±2mm of the diameter of the circle is tolerable.

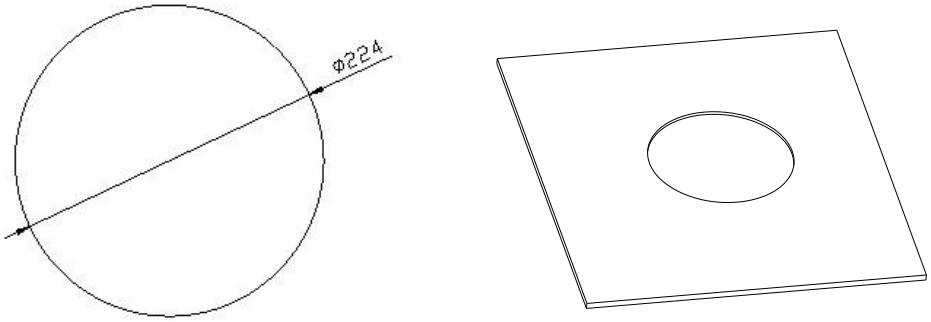

Figure 2-6 Draw and Cut Hole on the Ceiling

5. Connect the cables.

The cables have been connected to the corresponding interfaces. Connect the power cable and the red LED indicator turns on when the power is on.

NOTE Please turn the power off after checking the speed dome.

6. Install the speed dome.
   1) Loosen the two lock screws on both sides of the back box and make the locks in internal position, as shown in the Figure 2-7.

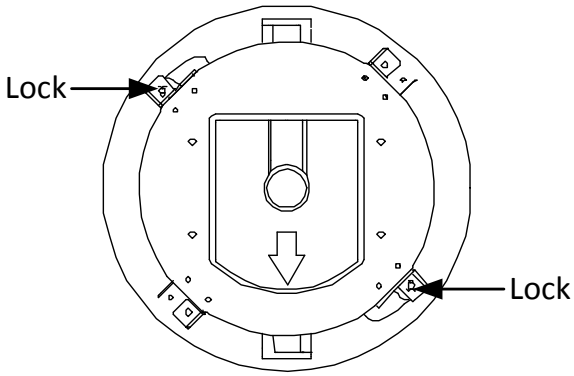

Figure 2-7 Locks and Lock Screws

2) Push the back box into the mounting hole in the ceiling
3) Tighten the lock screws with the screwdriver and the locks will automatically rotate outwards to secure the in-ceiling bracket to the ceiling.

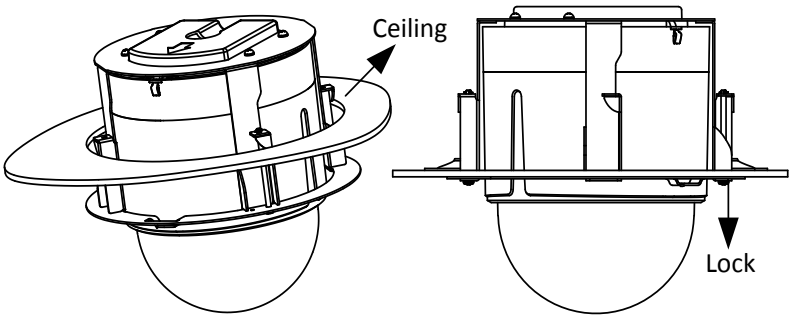

Figure 2-8 Install the back box

4) Install the flange.
   1) Attach the flange to the lower dome and align the triangular notch of the flange with the arrow label on the in-ceiling bracket.
   2) After firmly placing the flange to the ceiling, rotate the flange in the direction of arrow to secure the it in place.

NOTE

- Please remove the protective film on the lower dome after the installation is finished.
- In order to obtain clear video images, please wear the anti-static gloves when you install the speed dome.

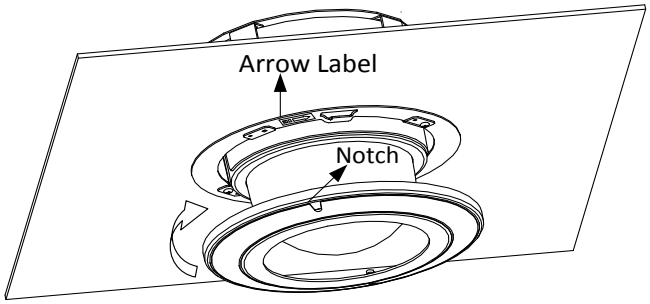

Figure 2-9 Install the Flange

2.3 Ceiling Mounting Applications

NOTE

The ceiling mounting is only applicable to the indoor models of 5-inch speed dome.

Before you start:

The ceiling mounting is applicable to the indoor/outdoor solid ceiling construction. The followings are the mandatory precondition for ceiling mounting:

- The thickness of the ceiling must ranges from 5 to 40mm.
- The ceiling must be strong enough to withstand more than 4 times the weight of the dome and its accessories.

2.3.1 Removing the In-ceiling Bracket

The speed dome is installed with an in-ceiling bracket by default. Before you mount the speed dome on the ceiling, you need to remove the in-ceiling bracket first.

Steps:

1. Loosen and remove the 4 screws as shown in the following figure (left). And remove the in-ceiling bracket as shown in the following figure (right).

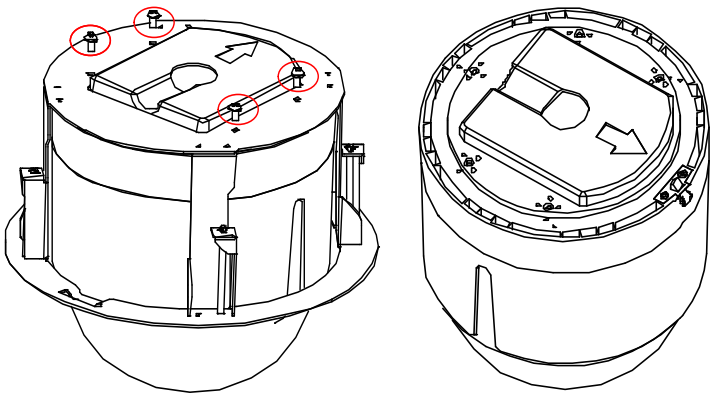

Figure 2-10 Remove the Bracket

2. Install 4 bolts to the screw holes as shown in Figure 2-11.

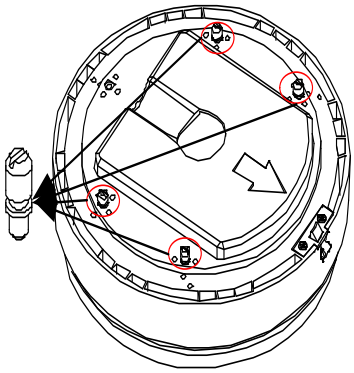

Figure 2-11 Install the Bolts

2.3.2 Wiring For Ceiling Mounting Applications

The cables of dome can be routed either from the top or the side of the back box, as shown in Figure 2-12. For the cables routed from the top of the back box, it is required to drill a cable hole in the ceiling.

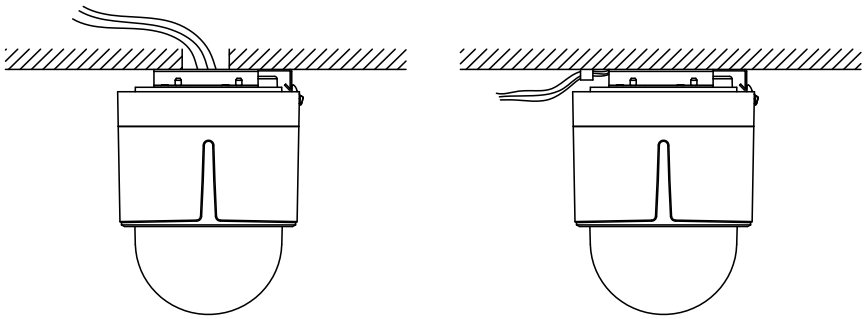

Figure 2-12 Cabling for Ceiling Mounting

2.3.3 Ceiling Mounting

Steps:

1. Rotate the lower dome counterclockwise to separate it from the back box. Refer to the Figure 2-5.
2. Remove the protective lens cover, foam and sticker from the dome drive.
3. Attach lower dome to the back box, and rotate clockwise to secure it.
4. Use the mounting base as a template to mark four screw holes onto the ceiling.
5. If you route cables from the top of the back box, mark the cable hole on the ceiling and drill a hole.

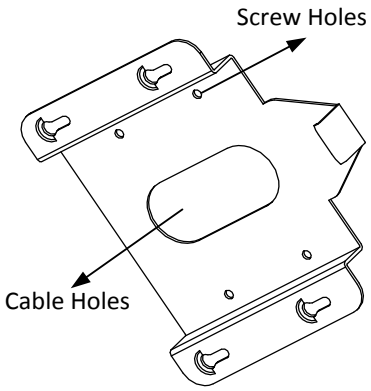

Figure 2-13 Mark the Screw Positions

6. Secure the mounting base to the ceiling with set screws.
   - If the speed dome is installed to the wooden wall, use the self-tapping screws to secure the mounting base.
   - If the dome is installed to the cement wall, drill three Φ5 mounting holes onto the wall according to the position of the holes, and then insert the cement screws into the holes and finally use self-tapping screws to secure the mounting base to the wall.

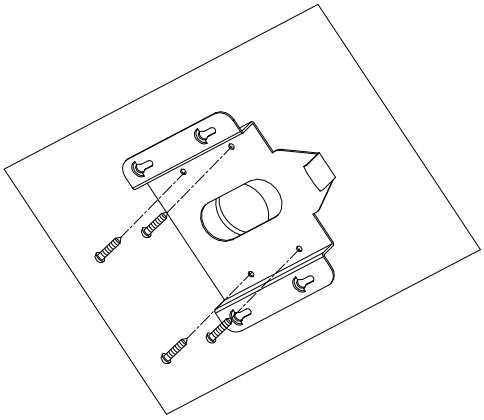

Figure 2-14 Secure the Mounting Base

7. Install the speed dome to the mounting base.
   1) Route the cables for the speed dome. Align the bottom of the speed dome with the mounting base.
   2) Line up the direction of arrow with the spring end of the mounting base.
   3) Push the speed dome upwards and then forwards in the direction of arrow. When the speed dome is placed in position, the spring will automatically snap into the lock clip firmly. Refer to the Figure 2-15.

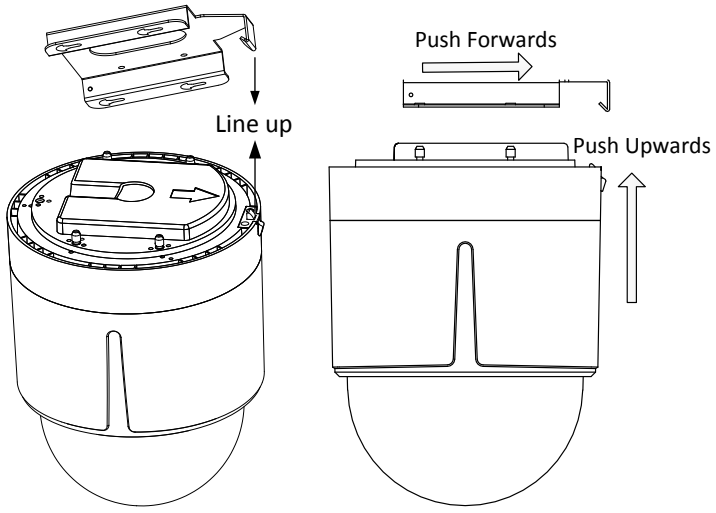

Figure 2-15 Attach the Back Box to the Mounting Base

NOTE

- Please remove the protective film on the lower dome after the installation is finished.
- Do not touch the bubble of the lower dome directly by hand. The image blurs otherwise.

Appendix

Appendix 1 Lightning & Surge Protection

This product adopts TVS plate lightning protection technology to avoid damage caused by pulse signal that is below 6000V, like instantaneous lighting stroke, surging, etc. According to the actual outdoor situation, necessary protection measures must be taken, besides ensuring the electrical safety.

- The distance between signal transmission wires and High-voltage equipment or high-voltage cable is at least 50m.
- Outdoor wiring should better be routed under eaves as much as possible.
- In the open field, wiring should be buried underground in sealed steel pipe, and the steel-pipe should be one-point grounding. Overhead routing method is forbidden.
- In strong thunderstorm area or high induction voltage areas (such as high-voltage transformer substation), high power lightning protection apparatus and lightning conductor are necessary to be added.
- The design of lightning protection and grounding of the outdoor devices and cables should be considered together with the lightning protection demand of buildings. It also must conform to the related national standards and industrial standards.
- The system should be equipotential grounded. The grounding equipment must conform to the demands of system anti-jamming and electrical safety both and it must not appear short circuit or mixed circuit with the zero conductor of strong grid. When the system is grounded alone, the resistance should be no more than 4Ω. The sectional area of the grounding cable should be no less than 25mm2. For grounding instructions, please refer to the Installation Manual of Speed Dome.

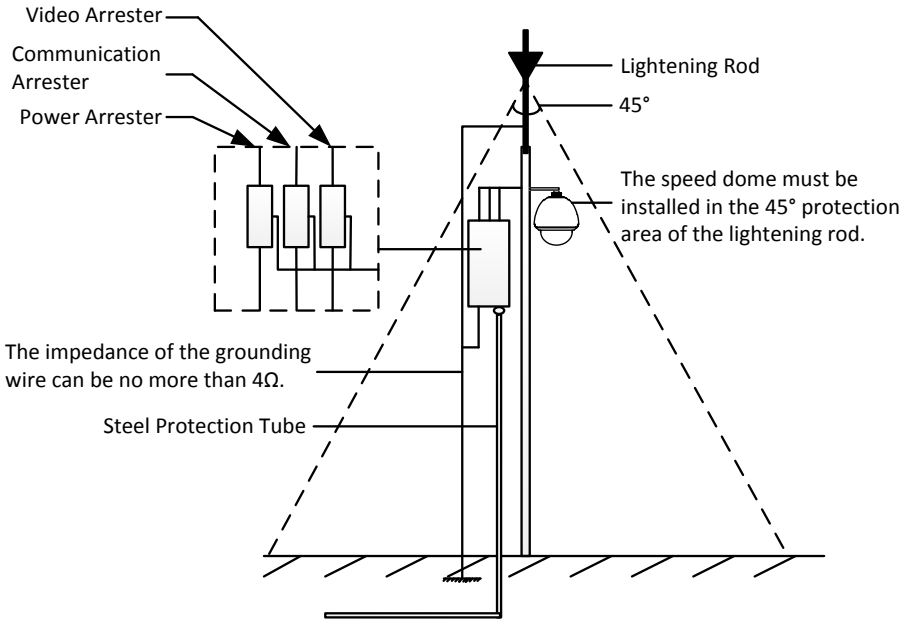

Figure A- 1 Lightning & Surge Protection

Appendix 2 Bubble Maintenance

The bubble is a transparent plastic. The dust, oil and finger print, etc. will cause scratch or image blur. Please refer to the following method to clean the bubble.

- Handling dust

Use oil free soft brush or blowing dust ball to clean the dust.

- Handling oil

Steps:

1. Wipe off the water-drop or oil by soft cloth and dry the bubble.
2. Use oil free cotton cloth to wipe the bubble with alcohol or detergent.
3. Change the cloth to wipe the bubble until the bubble is clean.

Appendix 3 RS485 Bus Connection

- General Property of RS485 Bus

According to RS485 industry bus standard, RS485 is a half-duplex communication bus which has 120Ω characteristic impendence; the maximum load ability is 32 payloads (including controller device and controlled device).

- RS485 Bus Transmission Distance

When using 0.56mm (24AWG) twisted-pair line, according to different baud rate, the maximum transmission distance theory table is shown below:

Max. Distance of RS485 Transmission	
Baud rate	**Max Distance**
2400BPS	1800m
4800BPS	1200m
9600BPS	800m

The transmission distance will be decreased if we use the thinner cable, or use this product under the strong electromagnetic interference situation, or there are lots of devices are added to the bus; on the contrary, the transmission distance will be increased.

- Connection Methods

  RS485 industry bus standard require daisy-chain connection method between any devices, both sides have to connect a 120Ω terminal resistance (show as Diagram 1), the simplified connection method is shown as diagram 2, but the distance of "D" should not be too long.

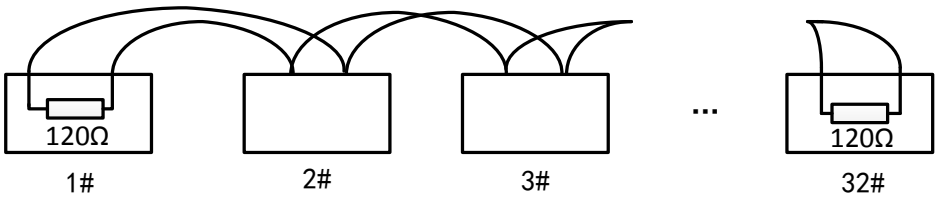

Figure A-2 RS485 Connection 1

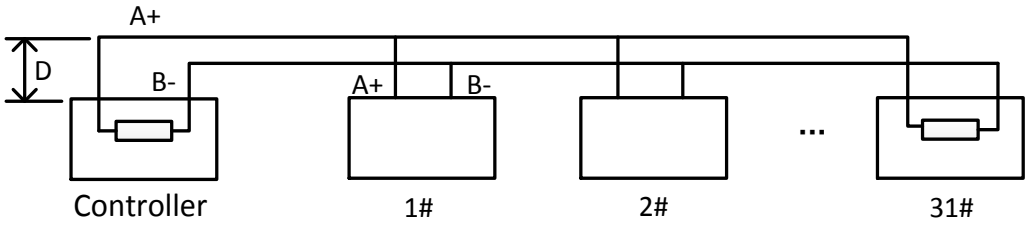

Figure A-3 RS485 Connection 2

- Problems in the Practical Application

Normally, users adopt star-shape connection method in construction, under this situation, the terminal resistors must be connected between two farthest devices (as Figure 4, 1# and 15#), but this connection method is not satisfy the requirement of the RS485 industry standard so that it will lead to some problems such as signal reflection, anti-jamming ability decline when the devices are faraway. At this time, the dome will be uncontrollable, or self-running, etc.

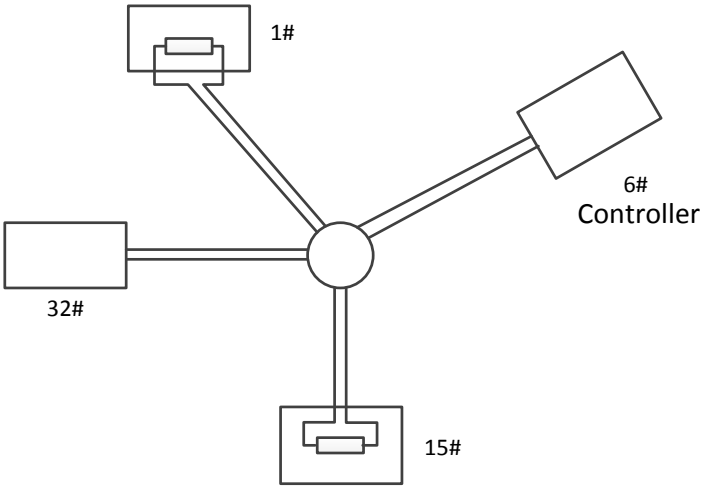

Figure A-4 Star Shape Connection

For such case, the best way is adding a RS485 distributor. This product can effectively change the star-shape connection to which satisfies the requirement of RS485 industry standard, in order to avoid those problems and improve the communication reliability. Show as figure 5.

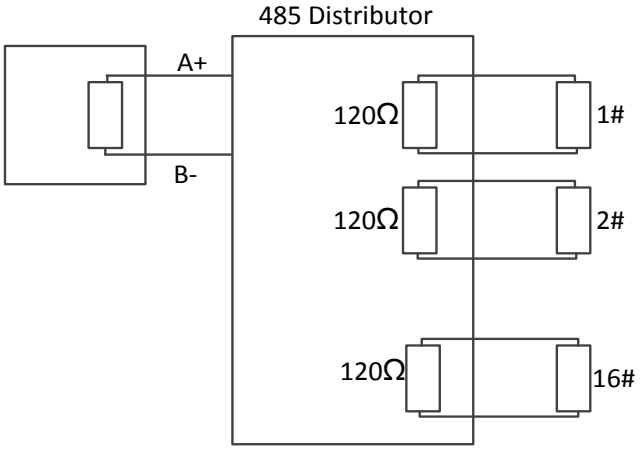

Figure A-5 RS485 Distributor

- Troubleshooting of RS485 communication

Problem	Possible Reasons	To Solve the Problem
The speed dome does the self-test action but cannot be controlled remotely.	1. The address or baud rate of the speed dome does not match with those of remote control device.	1. Adjust the address and baud rate of the remote control device to match with those of the speed dome.
	2. The wire RS485+ connects to the interface RS485- and wire RS485- connects to the interface RS485+.	2. Connect the wire RS485+ to the interface RS485+ and wire RS485- to the interface RS485-.
	3. The RS485 wire is disconnected.	3. Reconnect the RS485 wire tightly.
	4. RS485 wire is broken.	4. Change a RS485 wire.
The speed dome can	1. The connection is loose.	1. Reconnect the RS485 wire tightly.

Problem	Possible Reasons	To Solve the Problem
be controlled but not smoothly.	2. RS485+ or RS485-wire is broken.	2. Change a RS485 wire.
	3. The speed dome is too far away from the remote control device.	3. Add a terminal resistor.
	4. Too many speed domes are connected.	4. Add a RS485 distributor.

Appendix 4 12VDC Wire Gauge & Transmission Distance

The following table describes the recommended max. distance adopted for the certain wire gauge when the loss rate of 12VDC voltage is less than 15%. For the DC driven device, the maximum voltage loss rate is 15% allowable.

Wire Gauge (mm) / Distance (feet) / Power	0.800(20)	1.000(18)	1.250 (16)	2.000(12)
10	97(28)	153(44)	234(67)	617(176)
20	49(14)	77(22)	117(33)	308(88)
24	41(12)	64(18)	98(28)	257(73)
30	32(9)	51(15)	78(22)	206(59)
40	24(7)	38(11)	59(17)	154(44)
48	20(6)	32(9)	49(14)	128(37)
50	19(6)	31(9)	47(13)	123(35)
60	16(5)	26(7)	39(11)	103(29)
70	14(4)	22(6)	33(10)	88(25)
80	12(3)	19(5)	29(8)	77(22)
90	10.8(3.1)	17(5)	26(7)	69(20)
100	9.7(2.8)	15(4)	23(7)	62(18)
110	8.9(2.5)	14(4)	21(6)	56(16)
120	8.1(2.3)	13(4)	20(6)	51(15)
130	7.5(2.1)	11.8(3.4)	18(5)	47(14)
140	7(2)	11(3.1)	17(5)	44(13)
150	6.5(1.9)	10.2(2.9)	16(4)	41(12)
160	6.1(1.7)	9.6(2.7)	15(4)	39(11)
170	5.7(1.6)	9(2.6)	14(4)	36(10)
180	5.4(1.5)	8.5(2.4)	13(4)	34(10)

Appendix 5 24VAC Wire Gauge & Transmission Distance

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

Distance (feet) / Wire Gauge (mm) / Power (va)	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)

Appendix 6 Wire Gauge Standards

Bare Wire Gauge(mm)	American Wire Gauge AWG	British Wire Gauge SWG	Cross-sectional Area of Bare Wire(mm^2)
0.750	21		0.4417
0.800	20	21	0.5027
0.900	19	20	0.6362
1.000	18	19	0.7854
1.250	16	18	1.2266
1.500	15	17	1.7663
2.000	12	14	3.1420
2.500			4.9080
3.000			7.0683