



# Installation Manual

## NR60QS/110QS/160QS

### Photoelectric Detectors

#### 1.0 GENERAL DESCRIPTION

The NR60QS/110QS/160QS are quad photoelectric detectors designed to activate an alarm relay upon the detection of intruder through 4 pulsed infrared beams.

For stable operation, the NR60QS/110QS/160QS are equipped with the following features:

- 100 Times Sensitivity Allowance  
Stable operation is maintained even if 99% of beam energy is cut by rain, fog, frost, etc.
- Quad Beam Detection  
All four beams need to be blocked simultaneously to trigger an alarm, resulting less false alarms caused by birds and other small animals.
- Beam Power Control  
This option allows selection of the appropriate beam intensity relative to the detection range to minimize the risk of reflection on the nearby walls and cross-taking with other detectors.
- Beam Interruption Period Control  
This feature can be used to change the beam interruption period to best fit the application.

#### 2.0 SPECIFICATIONS

- **Range (outdoors):** NR60QS 60m (200ft)  
NR110QS 110m (360ft)  
NR160QS 160m (530ft)
- **Power Supply:** 10.5 - 28.0VDC
- **Current Draw (Max):** NR60QS 110mA (transmitter & receiver total)  
NR110QS 125mA (ditto)  
NR160QS 160mA (ditto)
- **Operating Temperature:** -25°C to 60°C (-13°F to 140°F)
- **Storing Temperature:** -30°C to 70°C (-22°F to 158°F)
- **Alarm Output:** Form "C" relay rated at 0.2A @30.0VDC
- **Environmental Discrimination Circuit (EDC):** Normally closed switch for connection to Normally Closed supervision circuit. Rated at 0.2A@30.0VDC.
- **Tamper:** Normally closed tamper switch rated at 0.1A@30.0VDC
- **Beam Interruption Period:** 50 - 500msec (adjustable)
- **Internal Pointability:** 180° horizontal, 20° vertical
- **Beam Power Control:** Equipped
- **Weight:** 2.4kg (transmitter & receiver total)
- **Options:**  
BP-1: 950mm Metal Pole 2 pcs., BP-2: 1,200mm Metal Pole 2 pcs., BP-3: Wall-mount Pole 2 pcs., PC1A: Water Resistant Enclosure, PC2A: Back to back Enclosure, BH24C: Heater

#### 3.0 INSTALLATION CONSIDERATIONS

- The beam path should be clear of objects.
- Install the transmitter and receiver within the maximum protection range of the model.
- **DO NOT** install the receivers where they will be facing an intense source of light (e.g. a rising or setting sun). A light entering the optical module within  $\pm 3^\circ$  of its straight angle will cause false alarms.
- **DO NOT** install either detector on movable surfaces or surfaces subject to vibrations.
- **DO NOT** install the detectors where they may be immersed in water or subject to dusts or corrosive liquids.
- **DO NOT** install the detectors where they are subject to strong electromagnetic noise.
- **DO NOT** use either detector with other photoelectric detector's receiver or transmitter.
- **DO NOT** stack the detectors. The NR60QS/110QS/160QS are NON-STACKABLE detectors.
- **AVOID** extreme temperature and humidity.
- **AVOID** magnets or any magnetized material.

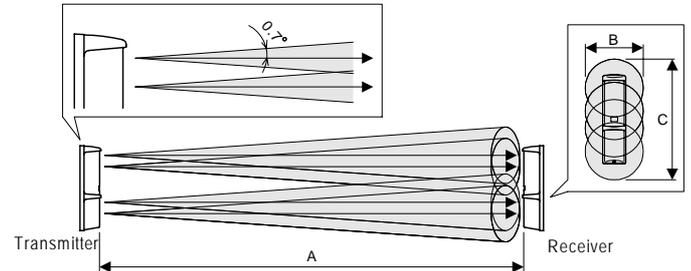
#### 4.0 COMPONENTS

Make sure the following components are included in the package:  
Transmitter: 1, Receiver: 1, Installation Manual: 1, Interruption Sheet: 2  
U-clamp: 4, Mounting Plate: 4, Clamping Screws (short): 8, Clamping Screws (long): 8, Chassis Mounting Screw: 8

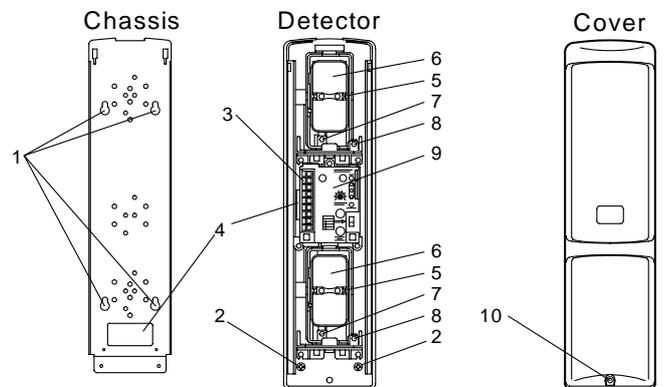
#### 5.0 BEAM SPREAD

The beam spread angle is  $\pm 0.7^\circ$ . Refer to the right table and the diagrams below to determine the installation conditions.

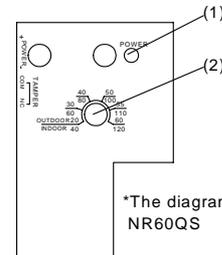
Distance (A)	Spread (B)	Spread (C)
20m	0.5m	0.8m
40m	1.0m	1.3m
60m	1.5m	1.8m
80m	2.0m	2.2m
110m	2.7m	3.0m
140m	3.5m	3.7m
160m	4.0m	4.2m



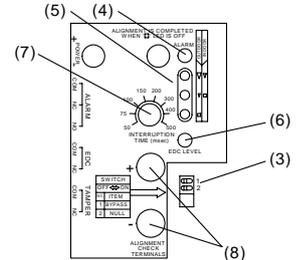
#### 6.0 PARTS DESCRIPTION



##### Transmitter Console



##### Receiver Console



1. Chassis Mounting Holes, 2. Unit Mounting Screws, 3. Terminals, 4. Wire Entrance, 5. Scope, 6. Optical Module, 7. Vertical Adjustment Screw, 8. Horizontal Adjustment Screw
9. Consoles:  
(1) Monitor LED, (2) Beam Power Control, (3) Bypass Switch, (4) Alarm LED, (5) Level Meter, (6) EDC LED, (7) Sensitivity Volume, (8) Alignment Check Terminals
10. Cover Mounting Screw

#### 7.0 WIRING

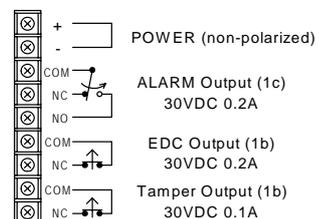
**Caution:** Only apply power after all connections have been made and inspected.

##### 7.1 TERMINALS

###### TRANSMITTER



###### RECEIVER



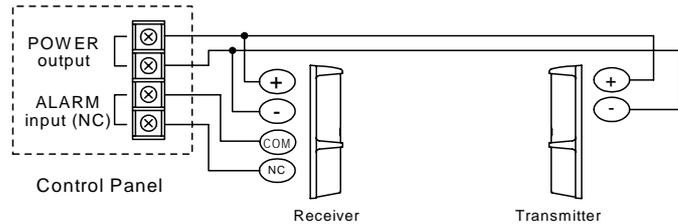
## 7.2 WIRING DISTANCE

Use the table below to determine the minimum wire gauge for a single sensor system (one transmitter and one receiver). The distances specified are between the power source and the last unit on the run. For multiple sensor systems, divide the wire distances specified in the table by the number of systems on the run (1 system = 1 transmitter & 1 receiver).

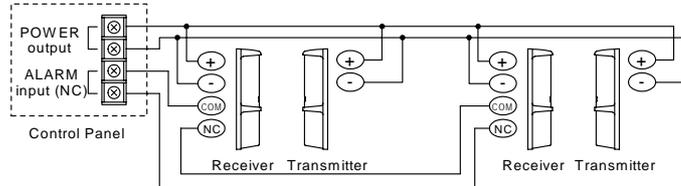
WIRE GAUGE	MAXIMUM LENGTH (m)					
	NR60QS		NR110QS		NR160QS	
	12VDC	24VDC	12VDC	24VDC	12VDC	24VDC
AWG22	90	820	80	730	60	610
AWG19	170	1600	150	1,420	130	1,200
AWG17	310	2900	280	2,580	240	2,180
AWG14	570	5150	500	4,570	420	3,860

## 7.3 WIRING ROUTE

1 set on the run



2 sets on the run



**Note:** Tamper and EDC terminals should be connected to a 24-hour supervisory loop.

## 8.0 MOUNTING

### 8.1 POLE MOUNTING

- Choose an appropriate mounting location for the system. Install the poles with a clear line-of-sight between the transmitter and receiver.
- Loosen the transmitter's cover mounting screw and remove the cover.
- Loosen the 2 unit mounting screws and remove the chassis by sliding it down against the unit.
- Attach the mounting plates to the chassis with the clamping screws (short) (see FIGURE 1).
- Firmly attach the chassis to the poles with the U-clamps and the screws (long) (see FIGURE 2). Make sure the transmitter is mounted in direct line-of-sight with the receiver.
- Route wiring through the chassis wire entrance, leaving enough wire to access the transmitter's terminal strip.
- Route wiring through the transmitter's wire entrance.
- Slide the transmitter onto the chassis. Tighten with the unit mounting screws.
- Repeat this mounting process for the receiver. Make sure it is mounted in direct line-of-sight with the transmitter.

FIGURE 1

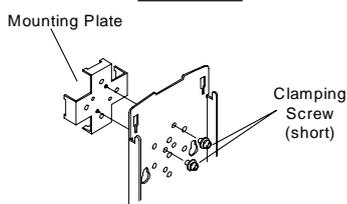
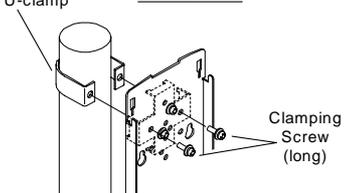
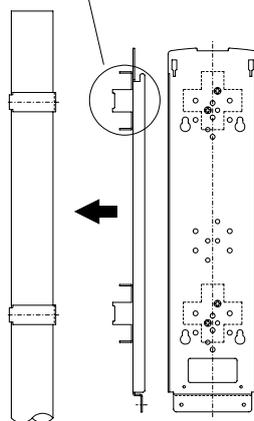


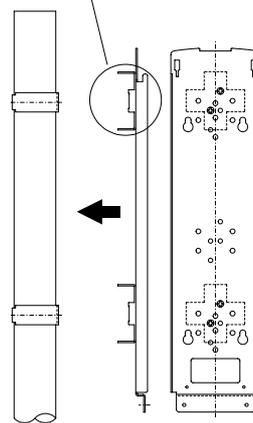
FIGURE 2



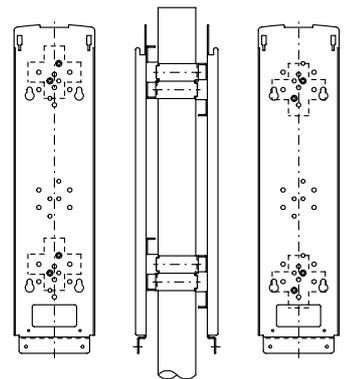
Pole Diameter  
38.10 - 40.64mm



Pole Diameter  
40.64 - 43.18mm

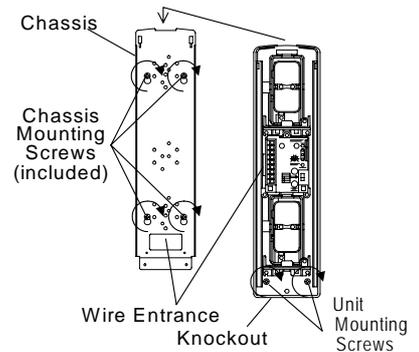


Back-to-back  
Pole Mounting



### 8.2 WALL MOUNTING

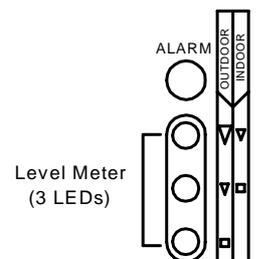
- Loosen the transmitter's cover mounting screw and remove the cover.
- Loosen the 2 unit mounting screws and remove the chassis by sliding it down against the unit.
- Route wiring through the wire entrance of the chassis. Leave enough wire to access the transmitter's terminal strip.
- Mount the chassis to the mounting surface with the chassis mounting screws.
- Route wiring through the wire entrance of the transmitter. If surface mounting is used, knock-out the thin-wall wire entrance at the bottom of the transmitter.
- Reattach the transmitter to the chassis.
- Repeat this mounting procedure for the receiver. Make sure it is mounted in direct line-of-sight with the transmitter.



## 9.0 SPECIAL FEATURES

### 9.1 LEVEL METER

Three LEDs display the amount of beams received. As more beam energy received, each LED status changes: ON => Flashes slowly => Flashes quickly => OFF. When all LEDs turn off, the alignment is complete.



### 9.2 EDC (Environmental Discrimination Circuit)

EDC sends EDC signal when it becomes difficult to maintain stable operation due to environmental disturbance like fog and rain. There are two selective features in utilizing the Bypass switch at the receiver unit. Hereunder, the condition where it is difficult to maintain stable operation for more than 3 seconds due to unfavorable environmental condition is defined as "Poor Environmental Condition":

- BYPASS switch =====> OFF

#### 1) In Poor Environmental Condition

EDC LED will turn on and EDC signal will be provided through the normal closed relay output at the receiver unit. The alarm signal will then be produced by the further loss of the beam energy.

#### 2) When either optical module is blocked for 3 seconds

EDC LED will turn on and EDC signal will be provided. No alarm output will be generated.

#### 3) When both optical modules are blocked for 3 seconds

After the specified interruption period, alarm LED turns on and alarm signal is produced. If beams are blocked for more than 3 seconds, EDC LED will turn on and EDC signal will be provided.

- BYPASS switch =====> ON

1) **In Poor Environmental Condition**

EDC LED will turn on and EDC signal will be provided through the normal closed relay output at the receiver unit. With the further loss of beam energy, the alarm LED turns on but alarm signal is **NOT** provided (alarm relay is automatically shunted).

2) **When either optical module is blocked for 3 seconds**

EDC LED will turn on and EDC signal will be provided. If one more optical module is blocked, alarm LED turns on but no alarm signal is generated.

3) **When both optical modules are blocked for 3 seconds**

After the specified interruption period, alarm LED turns on and alarm signal is provided. Even if the beams are blocked for more than 4 seconds, EDC LED will not turn on and EDC signal is not provided.

**Note:** It is extremely important to have the EDC connected to a trouble circuit. It is also important to check the system any time the EDC relay has been activated.

**9.3 BEAM INTERRUPTION TIME**

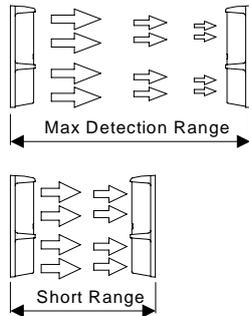
The beam interruption time defines the amount of time an intruder must be in the beam path before an alarm is signaled. For instance, if the interruption time is set at 100msec, the detector signals an alarm only if the beams are broken for more than 100msec.

**9.4 BEAM POWER CONTROL**

The beam strength is at optimal level if used at the maximum length (i.e. 60m for NR60QS).

If used for shorter distance, excess beam energy reaches the receiver, resulting in reflection on the nearby walls and cross-talking with other detectors.

Beam Power Control adjusts the amount of beam energy for optimal detection. Refer "10.0 SETUP" to set the beam power at the appropriate level.

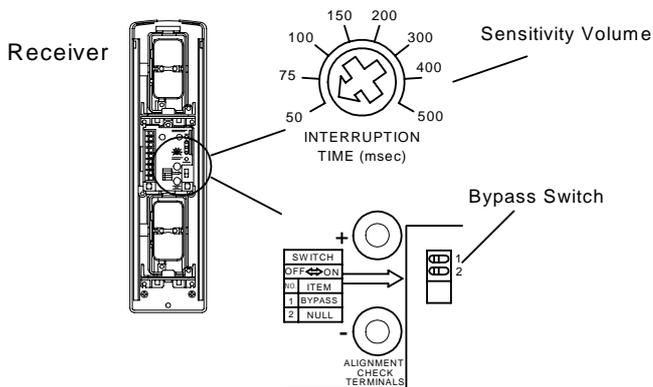


Beam energy decreases as it flies a long distance. For shorter range, more beam energy reaches the receiver.

**10.0 SETUP**

- **Bypass Switch:** (on the receiver)

ON: Bypass feature is activated  
OFF: Bypass feature is disabled.

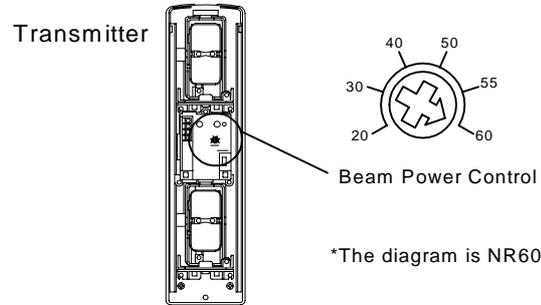


- **Interruption Time:** Turn the sensitivity volume on the receiver clockwise to reduce sensitivity and counterclockwise to increase sensitivity.

50msec  Running (4m/sec)	75 - 100msec  Jogging (2-3m/sec)	150 - 200msec  Walking (1-1.5m/sec)	300msec  Slow Walking (0.5-1m/sec)	400 - 500msec  Slow Moving (0.5m/sec or less)
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- **Beam Power Control:** Turn the volume on the transmitter clockwise to increase beam power and counterclockwise to reduce beam power. Refer to the following chart to set the volume based on the detection distance. (initial setting at maximum length).

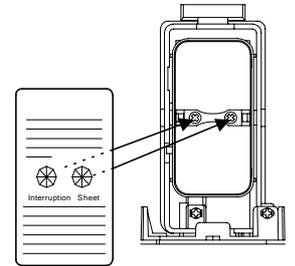
Model	Volume Setting of Beam Power Control						
NR60QS	Volume	20	30	40	50	55	60
	Range	<20m	20-30m	30-40m	40-50m	50-55m	55-60m
NR110QS	Volume	35	55	70	80	100	110
	Range	<35m	35-55m	55-70m	70-80m	80-100m	100-110m
NR160QS	Volume	50	80	100	120	140	160
	Range	<50m	50-80m	80-100m	100-120m	120-140m	140-160m



\*The diagram is NR60QS

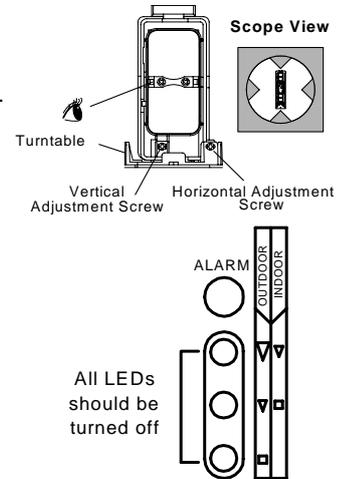
**11.0 ALIGNMENT**

- Apply power to the system.  
- Cover the lower optical module of both transmitter and receiver with the supplied Interruption Sheets.



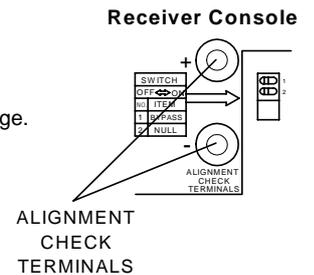
**11.1 Alignment by LEDs**

- Look into the upper scope of transmitter 10 - 15cm away from the optical module, and adjust the horizontal angle with the turntable.  
- Use horizontal and vertical adjustment screws to locate the receiver in the center of viewing circle.  
- Look at the alignment LEDs on the receiver to proceed with fine tuning. Adjust the upper (lower) optical module angle with a screwdriver. As more beam energy is received, each LED status changes:  
ON => Flashes slowly => Flashes quickly => OFF.  
- Continue fine tuning until all LEDs turn off.  
- Remove the interruption sheets from lower optical modules and then cover upper optical modules of both transmitter and receiver. Repeat the above process.  
- When all LEDs turn off, the alignment is complete. Remove the interruption sheets from the optical modules.



**11.2 Alignment Using Voltmeter**

- Insert tester leads into the alignment check terminals. Set the meter scale to 10.0VDC.  
- Adjust the optical modules with a screwdriver to obtain the maximum voltage. In an ideal environment, the tester value should read 3.0V or higher.

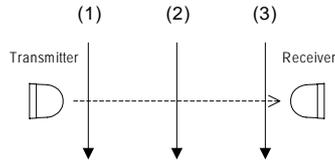


- **Caution:** Make sure to remove the interruption sheets and close the covers upon the completion of alignment.

## 12.0 TESTS

### 12.1 Walk Test

- Walk across the beam paths in three locations (1) (2) (3) between the detectors.
- Each time you cross the beam path, the alarm LED should turn on. Make sure the security controller receives an alarm signal.
- If the alarm LED does not turn on, the beam interruption time is set too slow or the other beams are reflected into the receiver.



### 12.2 EDC Test

- Block only the upper optical module of receiver for 3 seconds. Make sure the EDC LED on the receiver turns on.
- When the EDC LED is ON, block the lower optical module, too, and confirm the alarm LED on the receiver turns on.

- Block only the lower optical module of receiver for 3 seconds. Make sure the EDC LED on the receiver turns on. Make sure the control panel receives EDC signal from the receiver.
- Refer to "9.0 SPECIAL FEATURES" to make sure the bypass feature is activated.

### 12.3 Tamper Test

- Place the cover on the detector. Make sure the tamper input of control panel is in armed condition.
- Remove the cover from the detector. Make sure the tamper input of control panel receives alarm signal.

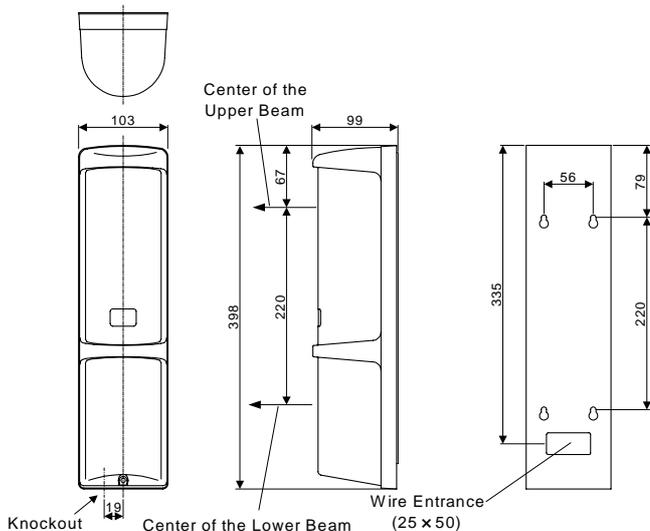
## 13.0 TROUBLESHOOTING GUIDE

In case of troubles, confirm the followings:

- The voltage for transmitter and receiver is between 10.5 - 28V.
- The monitor LED on the transmitter is ON.
- The alarm LED on receiver turns on when beams are blocked.
- The volume of Beam Power Control is appropriate for the set distance.
- All LEDs on the receiver are OFF.

PROBLEM	CAUSE	SOLUTION
Constant alarm output	Something is blocking the beams.	Remove the object(s).
	Optical modules or covers need cleaning.	Clean the optical modules and the cover.
False alarms	Unit misaligned.	Realign.
	Something is blocking the beams.	Remove the object(s).
	Beam interruption time is set too quick.	Decrease the sensitivity.
	Nearby electrical equipment is generating EMI or RFI.	Change the installation site.
	Wiring too close to power sources or power line.	Change the wiring route.
	Unstable installation site.	Fix the installation site.
	Frost or dew.	Attach the optional heater BH24C.
	Inappropriate Beam Power Control level.	Readjust the control level.
No alarm when beams are broken	Over the maximum protection range of the model.	Reinstall within the maximum range.
	Beams are reflected into the receiver.	Remove the reflective object or change the installation site.
	Beam interruption time is set too slow.	Increase the sensitivity.
	Not enough beam power.	Increase the beam power.
EDC activations	Beam interruption time is set too slow.	Increase the sensitivity.
	Something is blocking the beams.	Remove the object(s).
	Installed on unstable ground.	Fix the installation site.
	Frost on the cover.	Attach the optional heater BH24C.
	Inappropriate Beam Power Control level.	Readjust the control level.
	Over the maximum protection range of the model.	Reinstall within the maximum range.

## 14.0 DIMENSIONS



## 15.0 OTHER INFORMATION

- At least once a year, clean the optical modules and covers with a soft cloth, and perform walk testing to verify operation.
- The specifications are subject to change without prior notice.
- Being only a part of a complete system, we cannot accept responsibility for any damages or other consequences resulting from an intrusion.



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