

1 GENERAL DESCRIPTION

The NR60AQS/NR120AQS/NR200AQS are quad photoelectric detectors designed to activate an alarm output upon the detection of intruder through 4 pulsed infrared beams.

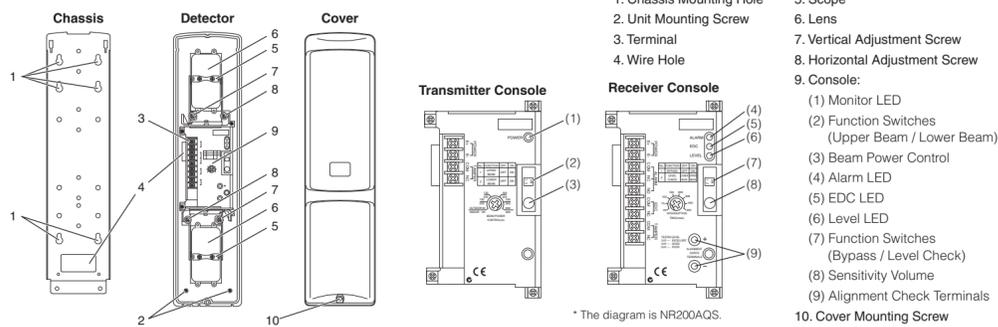
For stable operation, the NR60AQS/NR120AQS/NR200AQS are equipped with the following features:

- 100 Times Sensitivity Allowance**
Stable operation is maintained even if 99% of beam energy is lost 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 function allows selection of the appropriate beam intensity relative to the detection range to minimize the risk of reflection on the nearby walls and cross-talking with other detectors.
- Beam Interruption Time Control**
This feature can be used to change the beam interruption time to best fit the application.

2 SPECIFICATIONS

- Range (outdoors):** NR60AQS 60m (200ft), NR120AQS 120m (390ft), NR200AQS 200m (660ft)
- Power Supply:** 10.5 - 28.0VDC
- Current Draw (Max):** NR60AQS Transmitter:20mA, Receiver:70mA, NR120AQS Transmitter:25mA, Receiver:70mA, NR200AQS Transmitter:30mA, Receiver:70mA
- 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. Rated at 0.2A@30.0VDC.
- Tamper:** Normally closed tamper switch rated at 0.1A@30.0VDC
- Beam Interruption Time:** 40 - 500msec (adjustable)
- Optical Alignment:** ±90°Horizontally, ±10°Vertically
- 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, PC3A: Back-to-back Enclosure, BH12T: Heater

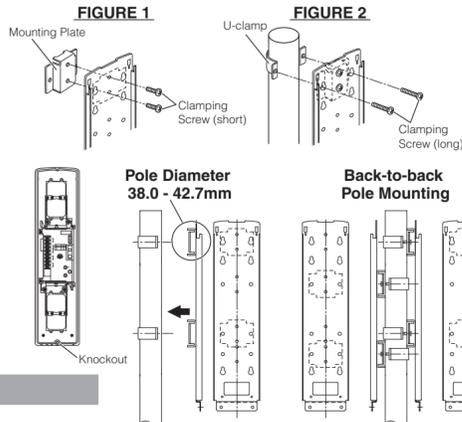
6 PARTS DESCRIPTION



8 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 the 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 hole, leaving enough wire to access the transmitter's terminal strip.
- Route wiring through the transmitter's wire hole.
- 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.
- Wire to the terminal strips. (Refer to the 7. WIRING)
- Keep more than 10mm space around the chassis as this detector is bigger than it.
- Use the knockout at the bottom of this detector for the surface wiring.

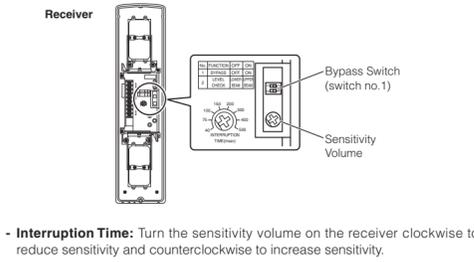


8.2 WALL MOUNTING

- 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 hole 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 hole of the transmitter. If surface mounting is used, knock-out the thin-wall wire hole 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.
- Wire to the terminal strips. (Refer to the 7. WIRING)

10 SETUP

- Bypass Switch:** 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.

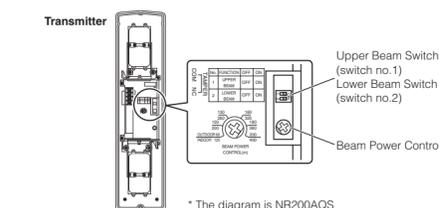
40msec	75 - 100msec	150 - 200msec	300msec	400 - 500msec

Note: For UL applications the interruption time shall not exceed 75msec.

- Beam Power Control:** Turn the volume on the transmitter clockwise to increase beam power and counterclockwise to decrease beam power. Refer to the following chart to set the volume based on the detection range (initial setting at maximum length).

Model	Volume Setting of Beam Power Control						
	Volume	20	30	40	50	55	60
NR60AQS	Range	<20m	20-30m	30-40m	40-50m	50-55m	55-60m
	Volume	40	60	80	100	110	120
NR120AQS	Range	<40m	40-60m	60-80m	80-100m	100-110m	110-120m
	Volume	60	100	130	160	180	200
NR200AQS	Range	<60m	60-100m	100-130m	130-160m	160-180m	180-200m

- Upper Beam Switch:** ON : The upper beam turns on. OFF : The upper beam turns off.
- Lower Beam Switch:** ON : The lower beam turns on. OFF : The lower beam turns off.



11 ALIGNMENT

There are two ways of optical module alignment: using the level LED and a voltmeter.

11.1 Alignment Using the Level LED

- Turn on only the Function switch 1 (Upper Beam) of the transmitter. The monitor LED flashes (5 times/sec).
- Turn on the Function switch 2 (Level Check) of the receiver.
- While looking into the scope at the center of the lens from a location 10 to 15 cm away, adjust the horizontal direction by rotating the turntable and the horizontal adjustment screw. Also, adjust the vertical direction by rotating the vertical adjustment screw. As shown in Scope View, adjust to locate the sensor of the receiver in the center of the viewing circle.
- Check the level LED of the receiver. When the level LED is off, the alignment is complete. If the level LED is not off, perform fine alignment of the transmitter and receiver using the horizontal and vertical adjustment screws. Repeat it until the level LED goes off.
- Turn on only the Function switch 2 (Lower Beam) of the transmitter.
- Turn off the Function switch 2 (Level Check) of the receiver.
- Perform lower beam alignment according to steps (3) and (4) above. When the level LED goes off, the alignment is complete.

* After finishing alignment, be sure to turn on the Function switches 1 and 2 of the transmitter to verify that the monitor LED lights up once every 3 sec.

11.2 Alignment Using a Voltmeter

- Insert the voltmeter leads into the alignment check terminals of the receiver. Set the voltmeter to the DC voltage mode.
- Adjust the upper and lower optical modules according to "11.1 Alignment Using the Level LED" so that the output value of the voltmeter reads 3.0V or higher.
- After finishing alignment, be sure to turn on the Function switches 1 and 2 of the transmitter to verify that the monitor LED lights up once every 3 sec.

Caution: After finishing alignment, be sure to turn on the Function switches 1 and 2 of the transmitter to verify that the monitor LED lights up once every 3 sec. Otherwise, normal detection cannot be performed, so be careful.

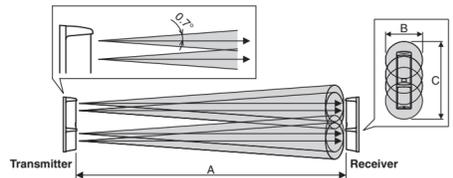
3 INSTALLATION CONSIDERATIONS

- 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 ±3° of its straight angle will cause false alarms.
- DO NOT** install either detector on movable surfaces or surfaces subject to vibrations or impact.
- DO NOT** install the detectors where they may be immersed in water, salt 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 NR60AQS/NR120AQS/NR200AQS are NONSTACKABLE detectors.
- DO NOT** disassemble or modify this detector.
- DO NOT** install this detector with power on.
- AVOID** extreme temperature and humidity.
- AVOID** magnets or any magnetized material.
- AVOID** the beam interference between other units when multiple units are installed as this beam spread angle is 1.4 degree.

5 BEAM SPREAD

The beam spread angle is ±0.7°. 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
100m	2.5m	2.7m
120m	3.0m	3.2m
140m	3.5m	3.7m
160m	4.0m	4.2m
180m	4.5m	4.7m
200m	5.0m	5.2m



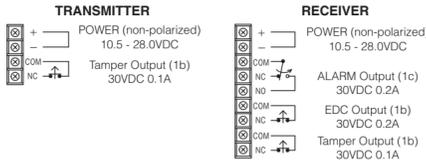
4 COMPONENTS

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

7 WIRING

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

7.1 TERMINALS



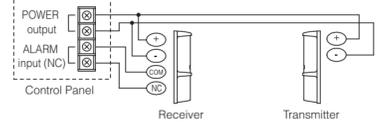
7.2 WIRING DISTANCE

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 distance specified in the table by the number of systems on the run (1 system = 1 transmitter & 1 receiver).

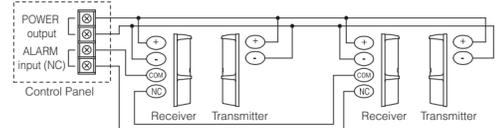
WIRE GAUGE	MAXIMUM DISTANCE (m)					
	NR60AQS		NR120AQS		NR200AQS	
	DC12V	DC24V	DC12V	DC24V	DC12V	DC24V
AWG22	120	1000	110	1000	110	980
AWG19	230	2100	220	2000	210	1900
AWG17	430	3900	410	3700	390	3500
AWG14	760	6800	720	6500	680	6100

7.3 WIRING ROUTE

1 set on the run



2 sets on the run

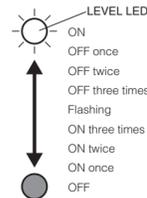


- Note: Tamper and EDC terminals should be connected to a 24-hour supervisory loop.
- Do not supply power until all wiring is completed.
- Power is to be provided by a UL Listed burglar alarm power supply or burglar alarm control panel.
- All wiring is to be in accordance with the National Electric Code, ANSI/NFPA 70.
- This system should be tested at least once a week to ensure proper function.
- Don't wire aerial.
- Use pipes for outdoor wiring.

9 SPECIAL FEATURES

9.1 LEVEL LED

One LED displays the amount of beams received during optical module adjustment. As more beam energy is received, the illumination time shortens as follows:
ON → OFF once → OFF twice → OFF three times → Flashing → ON three times → ON twice → ON once → OFF.
When the LED turns 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 or rain. There are two selective features in utilizing the Bypass switch at the receiver.

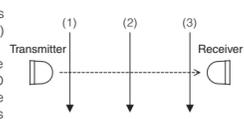
- BYPASS switch ===== OFF**
1) *In Poor Environmental Condition*
EDC LED will turn on and EDC signal will be provided through the normal closed relay output at the receiver. The alarm signal will then be generated by the further loss of the beam energy.
2) *When either optical module is blocked for 3 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 time, alarm LED turns on and alarm signal is generated. 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. With the further loss of beam energy, the alarm LED turns on but alarm signal is NOT generated (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 another 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 time, alarm LED turns on and alarm signal is generated. Even if the beams are blocked for more than 3 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. EDC feature has not been evaluated by UL.

12 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 control panel 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.

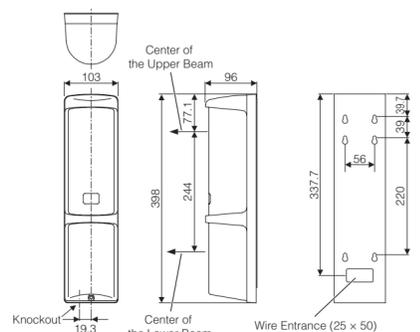
13 TROUBLESHOOTING GUIDE

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 range.
- The Level LED on the receiver is 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 covers.
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.
No alarm when beams are broken	Frost or dew.	Attach the optional heater BH12T.
	Inappropriate Beam Power Control level.	Readjust the control level.
	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.
EDC activation	Other beams are received by the receiver.	Adjust beams power of the transmitter. Change the installation site.
	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 BH12T.

14 DIMENSIONS



15 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.