PY-R1006/R1012 QUICK MANUAL

THANK YOU FOR CHOOSING PIOTRONICS Marine Radar

Disclaimer:

In support of the company's policy of continuous product improvement, the information contained in this manual is subject to change without any prior notice.

Scope of Supply

1. Display Unit
2. Antenna Radiator (PY-R1006 with Radome 60cm or PY-R1012 with Open array 120cm)
3. Display bracket

   2 Knob bolts

   4 TA5x16 desktop mounting screws

   4 Rubber gaskets (DIA 4cm*Thickness 3mm)
4. Display Screen Protector
5. Quick Manual
6. Standard spare parts and installation materials:

   1 Power cable 2.5m and an antenna cable 12m

   1 NMEA-1 with 5pins connector

   1 NMEA-2 with 6pins connector

   1 VGA display with 7pins connector

   1 Upgrade cable with 4pins connector

   1 RS-422 and external alarm switch with 8pins

   4 PA4x29 embedded installation screws

   4 PM4x40 mounting screws

   4 M10 mounting screws

3 6A fuses for 24/32V DC Power supply

3 10A fuses for 12V DC Power supply

EXTRA accessories for PY-R1012

(installation materials come with the parts and not all in one pack)

1 Rubber sheet

1 Waterproof rubber o-ring

1 Tube of anti-corrosive sealant

4 12x60 hexagon bolts

4 12x50 hexagon bolts

4 Seal washers

4 8x30 combination hexagon screws

12 M12 nuts

12 Seal washers

8 Spring washers

SAFETY INSTRUCTIONS

"DANGER", "WARNING" and "CAUTION" notices throughout this manual. It is the responsibility of the operator and the installer of the equipment to read, understand and follows these notices. If you have any questions regarding these safety instructions, please contact an PIOTRONICS agent or dealer.

WARNING

	**Do not open the equipment.** Hazardous voltage which can cause electrical shock, burn or serious injury exists inside the equipment. Only qualified personnel should work inside the equipment.
	**Wear a safety belt and hard hat when working on the antenna unit.** Serious injury or death can result if someone falls from the radar antenna mast.

	**Stay away from transmitting antenna.** The radar antenna emits microwave radiation which can be dangerous to the human body, particularly the eyes. Never look at the antenna radiator or near it from a distance of less than 1m when the radar is in operation.
	**The radar power MUST TURN OFF before qualified personnel services the antenna unit. Post a warning sign near the switch indicating it should not be turned on while the antenna unit is being serviced.** Prevent the potential risk of someone being struck by the rotating antenna and exposure to the Radio Frequency radiation hazard.
Do not disassemble or modify the equipment. Fire, electrical shock or serious injury can result.	
Turn off the power immediately if water leaks into the equipment or the equipment is emitting smoke or fire. Continued use of the equipment can cause fire or electrical shock.	

Do not place liquid-filled containers on top of the equipment.

Fire or electrical shock can result if liquid spills into the equipment.

Electronic aids are not substitute for basic navigation principles and common sense. The navigator must check all the supporting aids available to determine position, and should not rely on the one navigation device for the navigation of the ship.

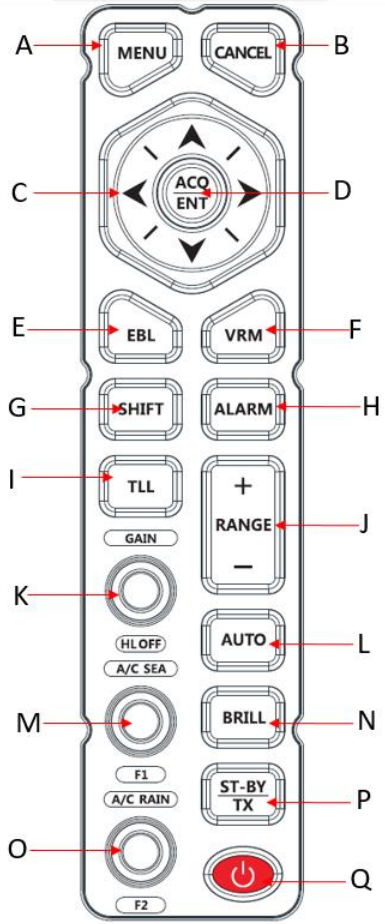
The data from ARPA and AIS are intended for reference purposes only.

Check all available navigation aids to confirm target movement.

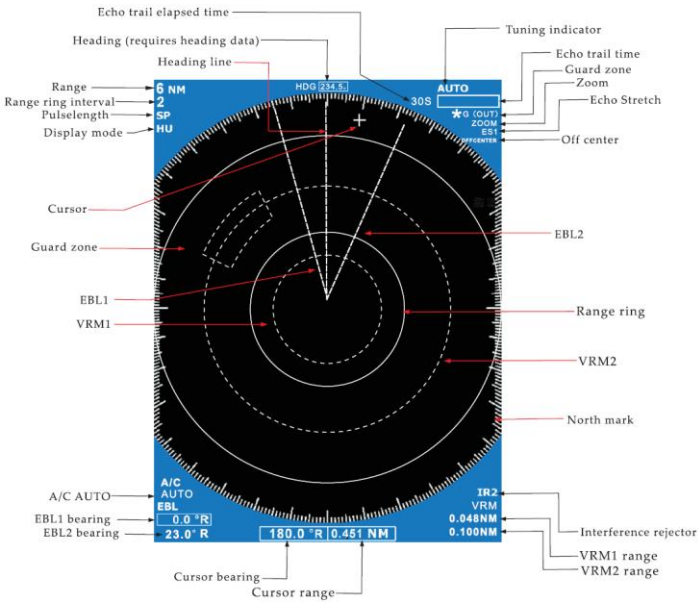
CAUTION
Use the proper fuse. Use of a wrong fuse can result in fire or permanent equipment damage.
Do not use the equipment for other than its intended purpose. Personal injury can result if the equipment is used as a chair or stepping stool, etc.
Do not place objects on top of the equipment. The equipment can overheat or personal injury can result if the object falls.

A	**MENU**	**Open/close the menu**
B	**CANCEL**	**Exit menu**
C	**OMNIPAD**	**Select the menu items and options.** **Move the cursor**
D	**ACQ/ENT**	**1) Acquires the target selected with the omnipad** **2) Registers selection on menus**

E	EBL	Measure the bearing to a target
F	VRM	Measure the range to a target
G	SHIFT	Adjust display, off center the display
H	ALARM	Sets guard zone area, which checks for targets in guard zone set area
I	TLL	Outputs target position data
J	RANGE	Set radar range
K	GAIN HL OFF	Control：Adjust sensitivity. Switch: Temporarily erases heading line (and north mark if displayed)
L	AUTO	Automatically reduces sea and rain clutters
M	A/C SEA F1	Control：Reduces sea clutter Switch: Change background color
N	BRILL	Adjusts display brightness
O	A/C RAIN F2	Control：Reduces rain clutter Switch: Change echo color
P	ST-BY/TX	Sets radar to stand-by; transmits radar pulse
Q	POWER	Turns power on/off


A
MENU
CANCEL
B
C
ACQ
ENT
D
E
EBL
VRM
F
G
SHIFT
ALARM
H
I
TLL
+
RANGE
J
−
GAIN
K
HL OFF
A/C SEA
AUTO
L
M
BRILL
N
F1
A/C RAIN
ST-BY
TX
P
O
Q
F2

Display Indication and markers



SPECIFICATION OF PY-R1006/PY-R1012(R1018)

DISPLAY UNIT

1. **PY-RD1000 Display**

   10-inch LED backlight, 32-bit TFT Color LCD Display

2. **Range scale(nm)**

Range:0.125, 0.25, 0.5, 0.75, 1, 1.5,2, 3, 4, 6, 8, 12, 16, 24, 36, 48**, 64**, 72**

No. of Rings：0.625, 0.125, 0.125, 0.25, 0.25, 0.5, 0.5, 1, 1, 2, 2, 3, 4, 6, 12

3. **Echo Trail**

Interval: 15s, 30s, 1min, 3min, 6min, 15min, 30min or continuous

4. **Interface (NEMA 0183 format) --: any talker (menu selection) input**

APB, BWC, BWR, DBK, DBS, DBT, DPT, GGA, GLC, GLL, GTD, HGD, HDW, HDT, MDA, MTW, RMA, RMB, RMC, TVG, VHW, XTE

5. **AIS Display**

Acquisition: AIS vessels or ATON

Tracking: Auto

Display: Vessel Name, MMSI, call sign, Range/Bearing, L/L, Speed/ Course, ROT, CPA/TCPA (AIS data input required)

6. **Target Tracking Function**

Acquisition: 20 manual or 10 auto + 10 manual

Tracking: Auto

Display: Speed, Course, Range/Bearing and CPA/TCPA

7. **Waterproofing**

Display unit waterproof level: IPX5

ANTENNA RADIATOR

1. **TYPE:**

   PY-RS0006: 55cm hybrid array

   PY-RS0012: 120cm hybrid array

   PY-RS0018: 180cm hybrid array (to be continued)

2. **Length and Rotation speed:**

   PY-R1006: Radome 60cm (PY-RS006) 24RPM

   PY-R1012: Open array 120cm (PY-RS012) 24RPM

3. Wind load: Relative wind 100 knots (51.5m/s)

4. **Beam width:**

   PY-RS0006: Horizontal: 4 ° Vertical: 25 °

   PY-RS0012: Horizontal: 1.9 °Vertical: 22 °

5. **Side lobe:**

   Within±20° off main lobe； less than-18dB

   Outside±20° off main lobe； less than-23dB

Radio Frequency Transceiver

1. **Transmitting tube:**

   MSF1421B or MAF1421B

2. **Frequency:**

   9410MHz±30MHz (X-band)

3. **Peak output power:**

   PY-R1006: 4kW nominal

   PY-R1012: 6kW nominal

4. **Pulse length & pulse repetition rate:**

   0.08uS/2100Hz(0.125, 0.25, 0.5, 0.75, 1, 1.5*nm)

   0.3uS/1200Hz(1.5*, 2, 3nm)

   0.8uS/600Hz(3*, 4, ,6, 8, 12, 16, 24, 36, 48**, 64**nm)

   *Pulse length & PRR for 1.5 and 3nm range can be selected in menu

   **PY-R1012

5. **I.F:**

   60MHz

   Bandwidth: Tx pulse length 25MHz (0.08uS/ 0.3uS) Tx pulse length 3MHz (0.8uS)

6. **Mixer and Local Oscillator:**

   Microware Integrated Circuit (MIC)

7. **Noise Figure**

   10dB nominal

Other information

1. **Temperature：**

   -25℃ to +70℃ (Antenna unit)

   -10℃ to +50℃ (Display unit)

2. **Humidity：**

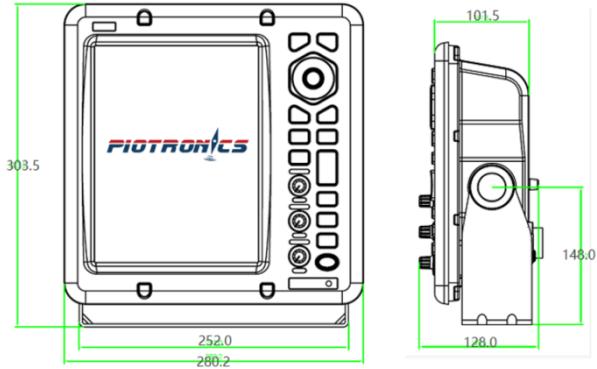
   Relative humidity 93% or less at +40℃

3. **Power supply & power consumption：**

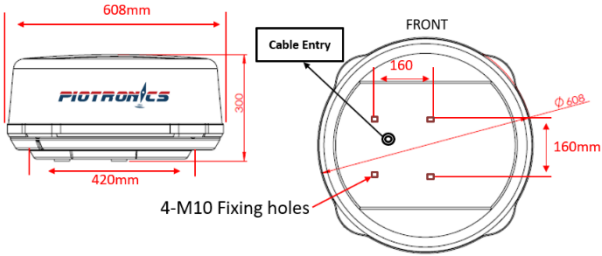
   10.5VDC to 40 VDC, 60W (30W in economy mode)

Products dimension

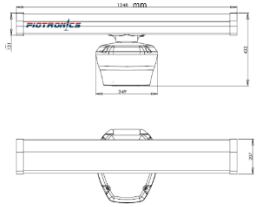
Display (PY-RD1000)

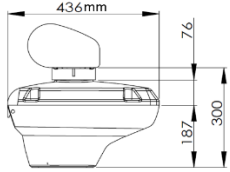


ANTENNA RADIATOR(PY-RS0006)



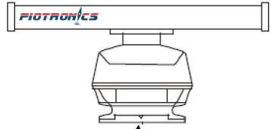
ANTENNA RADIATOR(PY-RS0012)





ANTENNA RADIATOR(PY-RS0006)

ANTENNA RADIATOR(PY-RS0012)



Antenna Cable
12meter

Display Unit PY-RD1000

Power cable 3 meter

10.5VDC to 40VDC

Installation

This section provides the necessary procedures for installation

- Sitting, mounting for both of the display unit and antenna unit
- Setting up connection of the signal cable and the power cable
- Establishing the ground
- Checking the installation
- Making adjustments

A. Siting and mounting consideration for antenna unit installation

✓ The antenna unit is generally installed either **on top of the wheelhouse** or **on the radar mast on a suitable platform**. Locate the antenna unit where there is as far as possible with good all-round view, and no part of the ship's superstructure or rigging intercepting the scanning beam. Any obstruction will cause shadow and blind sectors. For instance, a mast, with a diameter considerably less than the width of the radiator will only cause a small blind sector, but a horizontal spreader or cross trees in the same horizontal plane as the antenna unit would be a much more

serious obstruction; you would need to place the antenna unit well above or below it.

- ✓ It is rarely possible to place the antenna unit where a completely clear view in all direction is available. Thus, you should determine the angular width and relative bearing of any shadow sectors for their influence on the radar at the first opportunity after fitting. (The method of determining blind and shadow sectors appears later in this chapter.)

- ✓ If you have a radio direction finder on your boat, relocate its antenna. Clear the antenna unit to prevent interference to the direction finder. A separation of more than two meters is recommended.

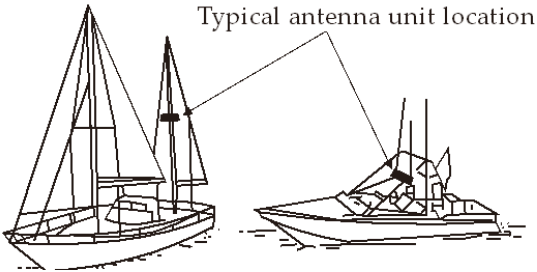
- ✓ To lessen the chance of picking up electrical interference, avoid routing the signal cable near other onboard electrical equipment. Also avoid running the cable in parallel with power cables.

- ✓ The compass safe distance should be observed to prevent deviation of the magnetic compass.

	Standard Compass	Steering Compass
Antenna unit	130cm	95cm

Display unit	80cm	60cm

B. **<u>Mounting of PY-RS0006 radome antenna unit</u>**

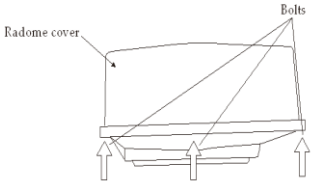


1. Open the antenna unit packing box carefully.

2. Unbolt the four bolts at the base of the radome to remove the radome cover, and get your installation materials ready to install.

3. Drill holes in the antenna mounting platform in accordance with the previous removal of the base mounting map.

Note：the hole is arranged in parallel with the centerline of the ship.



4. Loosen the antenna cover and the base of the 4 screws, carefully remove the cover.

5. Remove the cable clamping plate by unfastening four screws and removing a gasket.

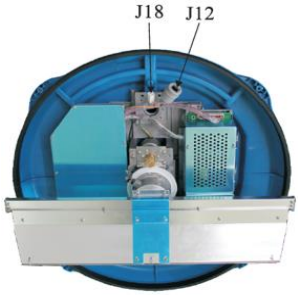
6. Pass the cable through the hole at the bottom of the radome base.

7. Secure the cable with the cable clamping plate and gasket. Ground the shield and vinyl wire by one of the screws of the cable clamping plate.

8. Connect the wire to

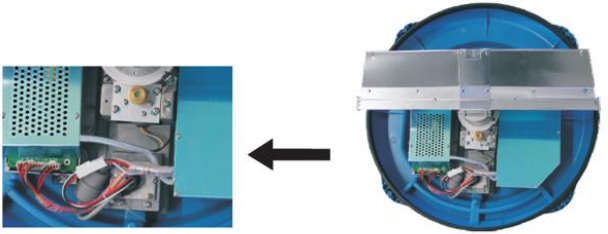
a) 4-pin connector to J18

b) RJ45 connector to J12



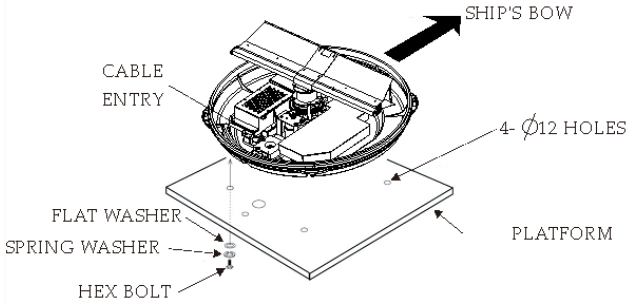
Connect J18 & J12

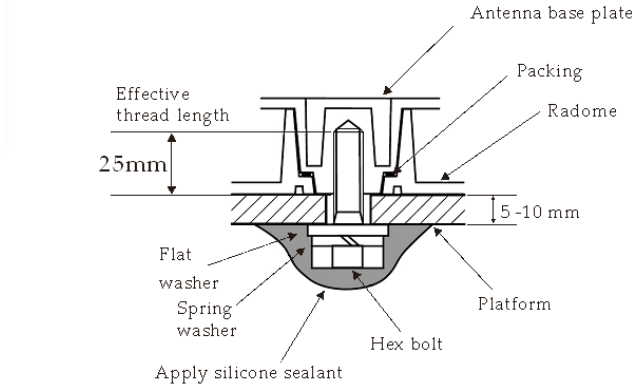
9. Fix the shield cover, do not pitch the cable



Antenna Cable Wiring

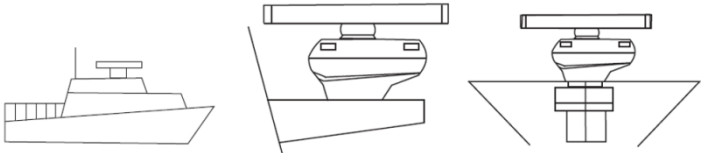
10. Loosely fasten the radome fixing bolts. You will tighten them after confirming the unit is working normally.





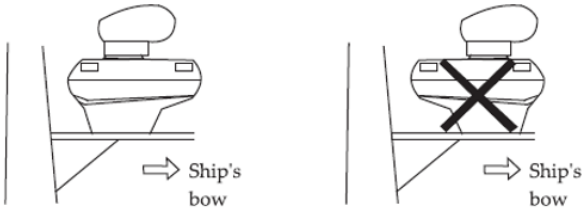
How to fasten the radome base to the mounting platform

C. Mounting of PY-RS0012 open-array antenna unit



Typical antenna unit mounting locations

1. Drill four fixing bolt holes (13 mm dia.), in the mounting platform, following the outline drawing.
2. Detach the antenna housing cover from the antenna by loosening four fixing blots. The antenna housing cover fitted with the transceiver module can be stored in a convenient place until the wiring to the antenna unit is done.
3. Place the antenna housing on the mounting platform and orient it to ship's bow as shown in the below:



How to orient the antenna unit

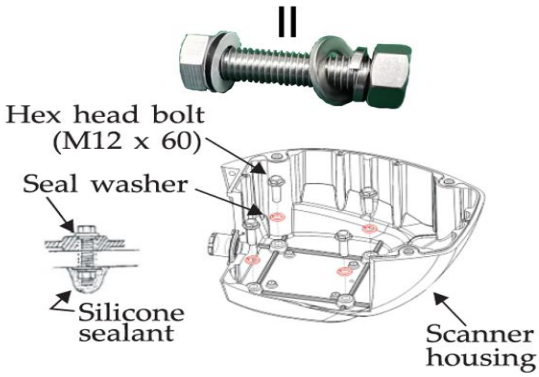
4. Sequentially Insert FOUR M12x60 hex head bolts and seal washer together from inside the antenna housing. Put a rubber sheet in between the scanner housing and mounting

platform in result to water resistant. At the end, use flat washer, spring washer and nuts to fasten the antenna housing and rubber sheet to the mounting platform.

Notes: tighten the bolts by their nuts to prevent damage to the seal washer. Do not turn the bolt to secure the antenna housing.

How to mount the antenna housing

Hex bolt / seal washer/ flat washer/spring washer/ nut



Connections for open-array antenna:

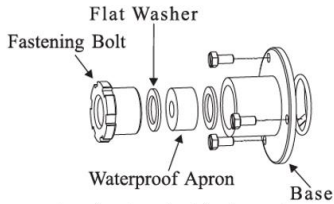
Only one signal cable runs from the display to the antenna

unit. Make the hole for passing the cable through the bulkhead or deck at least 20 millimeters diameter. In order to minimize the chance of picking up electrical interference, avoid routing the signal cable near other onboard electrical equipment, and avoid running the cable in parallel with power cables.

Pass the cable through the hole and apply sealing compound around the hole for waterproofing.

The instruments for connecting the signal cable to the antenna unit is as follows:

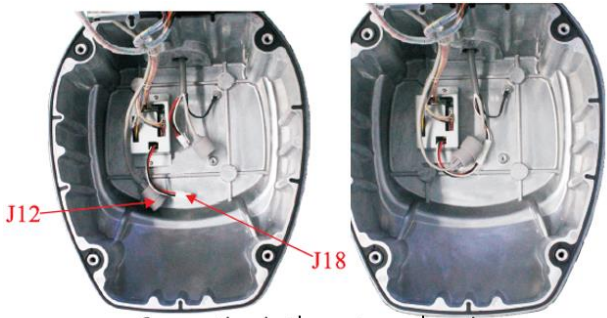
1. Through a pipe or waterproof cable gland fitted on the wheelhouse top or bulkhead.
2. Unfasten the fastening bolts at the rear of the scanner tail to remove the cable gland assembly (waterproof Apron and flat washer).
3. Pass the signal cable sequentially through the fastening bolt, the washer, waterproof apron and another washer then through the mounting hole into the base of the antenna inside (removed from



Passing the signal cable through the antenna housing

step2)

4. Tighten the screws
5. Plug in the RJ45 network of the signal cable to the corresponding RJ45 socket J12;
6. Connect the 4-core plug of the signal cable to the corresponding 4 core socket J18



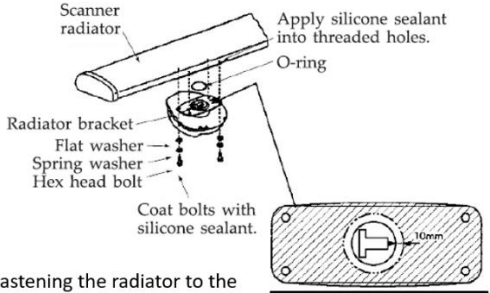
Connection in the antenna housing

7. Cover the antenna cover and check the waterproof apron.

Installation of waveguide:

8. Unpack the scanner radiator and take out the all packing fitter from antenna.
9. Install the waterproof rubber O-ring
10. To check the position of the antenna base guide, and to

load the antenna waveguide port with the alignment as shown as follows:



Fastening the radiator to the radiator bracket

Note: Apply anticorrosive sealant to hatched areas, antenna bracket for PY-RS0012 type radiator

11. Open the antenna cover and check the internal connection of signal cable is correct.
12. The grounding of the earth wire in the signal cable to the chassis.
13. Loosely fasten the cover screws. You will tighten them after confirming the unit is working normally.

D. <u>Display unit installation</u>

✓ Provide adequate space behind and around the unit to permit circulation of air and to provide convenient access to the rear connectors.

- ✓ Even though the unit is sunlight viewable but to avoid over heat on the unit, please keep the display unit out of direct sunlight or at least shaded.

- ✓ Better to place the display unit in a way where is viewable and touchable while the operator in a facing the direction of the bow position but where there is no danger of salt or freshwater spray or immersion.

- ✓ Make sure you have enough space for both to get to the connectors behind the unit and to allow you easily to loosen or tighten the mounting knobs. Besides, make sure you keep at least a foot to allow “service loop” of cables behind the unit to be able to pulled forward for servicing or removal of the connector.

- ✓ Again, the compass safe distance of 80cm (standard compass) and 60cm (steering compass) should be observed to prevent deviation of the magnetic compass.

E. <u>Mounting your display</u>

The display unit is designed to be mounted on a desktop or embedded bulkhead.

1. Using the hanger as a template, mark screw locations in the mounting location.

2. Fix the hanger to the mounting location with 4 screws (supplied).

3. Install the display unit in the hanger with the knob bolts to fit and tighten the display unit

F. Exchange of Fuse if you are using 24/32V Power supply

The power cable comes with a 10Afuse in the fuse holder. This fuse is used for a 12V DC power supply. If you are using 24V/32V DC power supply, please remember to replace the fuse with the 6A fuse (supplied) to the fuse holder.

G. Checking the installation

After completing all the installation, it is good to recheck all the installation instruments and confirm all steps were correctly completed.

Read manual carefully, free to download FULL MANUAL from PIOTRONICS website if you need more details

H. Making Adjustments

This section covers adjustments of the radar after the installation

is done

You will need to do:

- Tune/video adjustment
- Enter antenna height
- Heading alignment
- Adjust sweep timing
- Adjust main bang suppression
- Setting a blanking area

These adjustments are done through the radar installation Menu.

Installation setup menu

Preparation

1. Turn off the radar. While pressing and holding down the **[GAIN]** control press the **[POWER]** key.
2. Release **[GAIN]** control knob when you see “PIOTRONICS” logo and wait for the standby to finish countdown.

3. Press the **[MENU]** key, and select “FUNCTION MENU” by using the omnipad, and pressing **[ACQ/ENTER]** key.

4. Select “INSTALLATION SETUP”.
   Press the **[ACQ/ENTER]** key to open the installation setup menu.

5. Press the **[ST BY/TX]** key to transmit.

6. Select Tune/video adjustment and press the **[ACQ/ENTER]** key.

7. The unit automatically adjusts, displaying the following message “【Tune/video Auto Adjustment】now under correction” Return to installation setup menu after the correction”

8. When adjustment is completed, the message disappears.

The waves suppress range Settings：

Wave suppression curve will vary with the height of the antenna to the waterline difference, choose the appropriate scope of wave suppression to adapt to different height of the ship that can optimize the waves.

1. In the “Installation menu”, select “STC range” on the menu.

2. Use the direction key and choose the setting suited for the current scope of antenna height wave suppression, 1 means (10~ 15 meters), 2 means (6~ 10 meters), 3 means (3~ 6 meters), 4 means

(1~ 3 meters).

3. To complete, set the setting with the ACQ/ENT key.

Aligning heading (Adjustment sector：0~359.90)

After your antenna unit mounted, the accuracy of the Heading line should be checked, turn the vessel to align to a small and obvious target, and see if the heading line shown by the radar has passes the target center (zero degrees).

In practice, you may probably observe some small error and appear on the display, the following adjustment will compensate for this error.

1. Identify a suitable target (for example, ship or buoy) at a range between 0. 125 to 0. 25 nautical miles, preferably near the heading mark. To lessen error, keep echoes in the outer half of the picture by changing the range. Moreover, be sure the zoom and off-center functions are off.

2. Select “HEADING ALIGNMENT” on the installation setup menu and press the **[ACQ/ENTER]** key. There will be a message appears on the display “[Heading Alignment] Set EBL1 to center of target dead ahead and press ENTER Correction 5.3<Press MENU for inst setup>

3. Use the omnipad to shift the line 1 point to the center of the

target and press the **[ACQ/ENTER]** key.

4. As the final test, move the boat towards a small buoy as a target and confirm that the buoy shows up passes the target center (zero degrees).

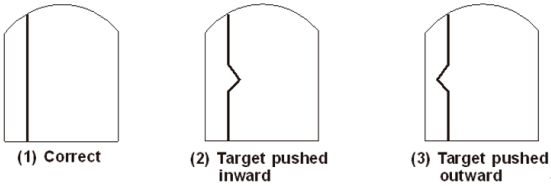
Adjusting sweep timing (Adjustment range：0.000~4.266nm)

1. Transmit on the shortest range and confirm that the **[GAIN]** and **[STC]** controls are properly adjusted.

2. Visually select a target which forms straight line (harbor wall, straight pier).

3. Select “SWEEP TIMING ADJUSTMENT” on the installation setup menu and press the **[ACQ/ENTER]** key. The message appears as “[Sweep Timing Adjustment] Use omnipad to Straighten target and press ENTER key. Correction 0.000 <Press MENU for inst setup>

4. Use the omnipad to straighten the target selected at NO.2, and then press the **[ACQ/ENTER]** key.



How to adjust correct sweep timing

Adjusting MBS (Main Bang Suppression) (Adjustment：0.00~0.25)

Main bang (black hole), which appears at the display center on short ranges, can be suppressed as follows.

1. Transmit on long range about 10 minutes.
2. Adjust the gain to show a small amount of noise on the display.
3. Change to the 0. 125 nautical mile range.
4. Select “MBS ADJUSTMENT” on the installation setup menu.
5. Press the **[ACQ/ENTER]** key. The following message appears “[MBS Adjustment Set Value by omnipad and press Enter Key Correction 000 <Press MENU for ins setup]
6. Use omnipad to suppress main bang (between 0 and 25) until the black hold on the display center has disappears, then Press the **[ACQ/ENTER]** key.

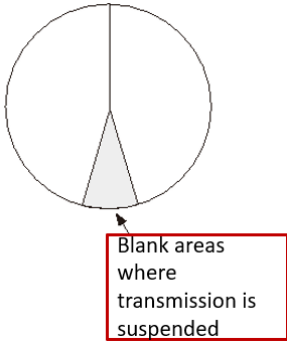
Setting a blanking area

If the antenna is installed at a close distance to the wheelhouse, the radar can be set not to transmit within certain area. No echoes appear in the "blanking areas" that being set.

1. Select "DEAD SECTOR" and Press the **[ENTER]** key.

2. Use the omnipad to enter staring point of the area that wanting to set as blanking area and Press the **[ENTER]** key.

3. Use the omnipad to enter ending point of the area Press the **[ENTER]** key.



This area can be turned on/off on the OTHER MENU. NOTE: This setting should be done after other adjustment are finished.

Things to do after all adjustments are finished:

- ✓ Make sure all antenna screws are fastened
- ✓ Make sure waterproof sealing component is applied to antenna screws

- ✓ Make sure all cables are fixed securely

I. CONNECTIONS

Connect the power cable to the power port on the rear side of the display unit.

Connect the signal cable to port on the rear side of the display unit.

Run a ground wire (supplied) between the ground terminal on the rear side of the display unit and the ship's superstructure.

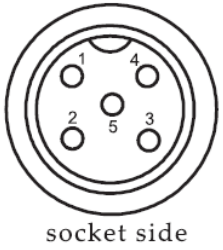
Navigation aid, video sounder connection

If your navigation aid can output data in IEC61162 (NMEA0183) data format, your vessel's position in latitude and longitude, the range and bearing to waypoint, speed and course may be input to this radar, and be seen on the screen.

Furthermore, if your sounder unit can output depth in IEC61162 (NMEA0183) data format, then depth data can be displayed on the radar screen as well.

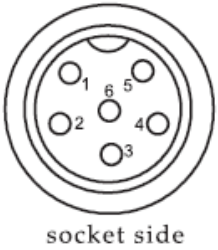
1. NMEA1 (5 pins connector): Use for AIS

PIN No.	Function
1	GND
2	3.3V
3	NMEA1 Input+
4	NMEA1 Input-
5	Not used



2. NMEA2 (6 pins connector): Use for other navigation device

PIN No.	Function
1	NMEA2+
2	NMEA2-
3	+12V
4	NMEA3+
5	NMEA3-
6	GND

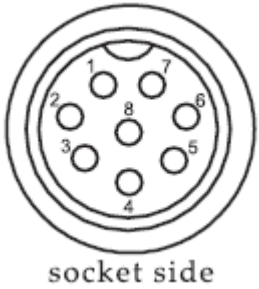


3. VGA display (7 pins connector): Currently not in use, optional.

4. UPGRADE (4 pins connector): used to upgrade the interface and firmware. You will need to use a special upgrade cable.

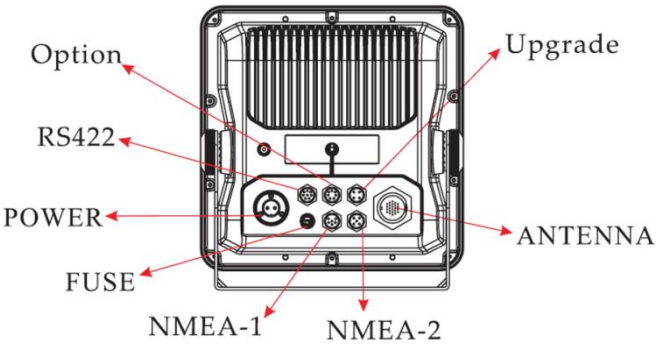
5. RS-422 and External Alarm Switch (8 pins connector):

PIN No.	Function
1	Not Use
2	OUTPUT+
3	OUTPUT-
4	INPUT+
5	INPUT-
6	GND
7	EX-ALARM SWITCH(+12V)
8	Not Use



socket side

PY-R1006/PY-R1012
Display connectors on the rear of the unit



CAUTION	
In the absence of the ground wire, ungrounded equipment might emit or receive electromagnetic interference or cause electrical shock	Replace the fuse to 6A for 24/32V DC power supply