

# Chapter 3

## Installation

### Introduction

This chapter contains unpacking, inspection and installation instructions for installing and powering up the WRH.

### Site Survey

Powerwave recommends that a site survey be performed prior to equipment ordering or installation. Performing a detailed site survey reduces or eliminates installation and turn-up delays. Pay particular attention to power plant capacity, cooling needs, floor space, and RF/DC cabling/breaker requirements. Cabinet dimensions, clearance dimensions, and weights are listed in Chapter 5.

### Unpacking and Inspection

This equipment has been operated, tested, and calibrated at the factory. Carefully open containers to remove equipment. Retain all packing material that can be reassembled in the event unit must be returned to the factory. Perform the following steps:

- Visually inspect equipment for damage that may have occurred during shipment. If possible, in the presence of the delivery person.
- Check for evidence of water damage, bent or warped chassis, loose screws or nuts, or extraneous packing material in connectors.

If equipment is damaged, file a claim with the carrier once the extent of any damage is assessed.

If equipment must be returned to factory, please contact factory for a Return Material Authorization (RMA). See Chapter 4.

### WRH Location

The WRH is designed with a weather proof outdoor cabinet that can be mounted without any kind of shelter from rain, snow or hail. The same unit can be installed indoors. A preferable site for the WRH is a location free of obstructions, easily accessible and allows for proper air-flow and ventilation.

If a WRH is installed outdoor and can be exposed to direct sunshine, it is essential that air can circulate around the WRH with no obstacle. The operating temperature must not exceed 131°F (55°C). A shelter can be used to shade the WRH from direct sunshine.

Never open a WRH when rain, snow, hail, high humidity or high winds are present unless some kind of temporary shelter can be erected. Limitations for very bad weather are found in the next section.

### Mounting

The WRH is easy to mount using the provided mounting bracket, which has 9/16-inch (14mm) holes for 3/8-inch (10mm) or 1/2-inch (12mm) fixing screws. Clamps with C-C measures of 3.5-inch (90mm), 5.3-inch (135mm), 5.7-inch (144mm), 8.1-inch (205mm), 9.8-inch (250mm), and 11.8-inch (300mm) can be used as well. The vertical C-C measure for these are 16.2-inch (411mm). There is a 9/16-inch (14mm) single hole in the middle of the mounting bracket, marked 'A' in the figure, which is intended for a locking screw to lock the bracket into place.

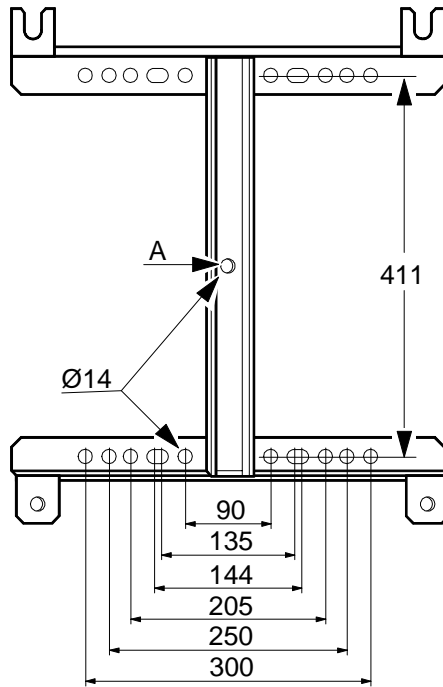


Figure 3-1 Mounting bracket

Normally, the WRH is mounted on a wall, pole, or mast. Figure 3-2 illustrates the installation of the mounting bracket on a wall using four fixing screws and a locking screw.

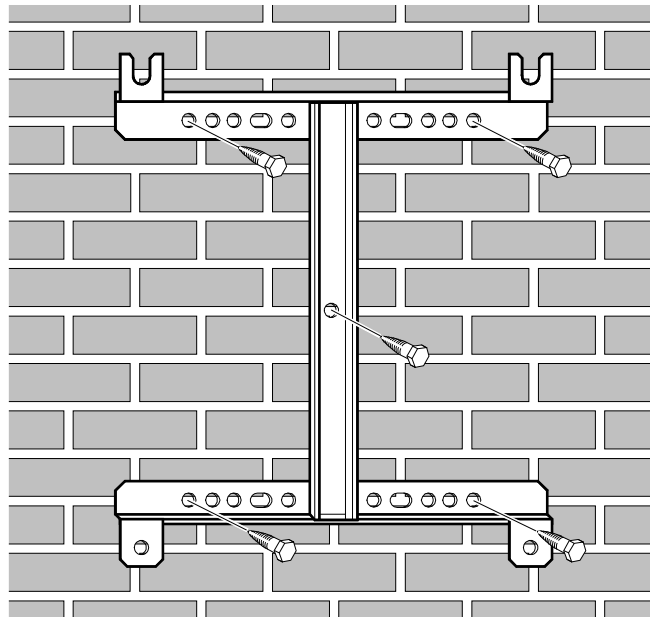


Figure 3-2 Mounting bracket installation on wall

Figure 3-3 illustrates the installation of the mounting bracket on a pole using two 5.7-inch (144mm) U-shaped clamps and a locking screw.

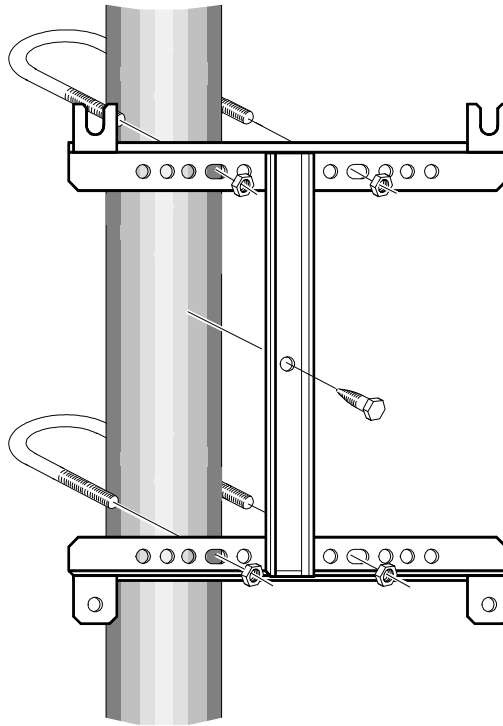


Figure 3-3 Attaching the bracket to a pole

Figure 3-4 illustrates a mast installation using two 11.8-inch (300mm) bar-shaped clamps and no locking screw.

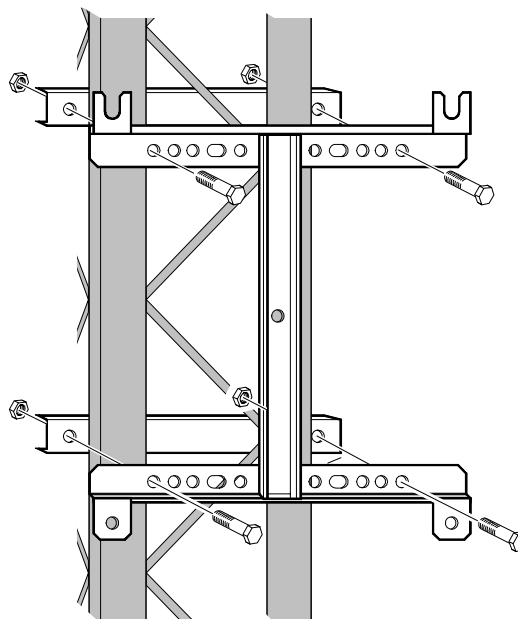


Figure 3-4 Attaching the bracket to a mast

After installing the mounting bracket, hang the WRH on the upper supports, as illustrated in Figure 3-5. Tighten the upper and lower mounting screws to secure it into place using the 6mm hex socket wrench. Locking cylinders, used to prevent unauthorized removal of the repeater, can be inserted and locked with a key after the lower screws have been tightened. Make sure the donor antenna, directed towards the BTS antenna, and the service antenna, directed towards the area to be covered by the WRH, are mounted and installed properly.

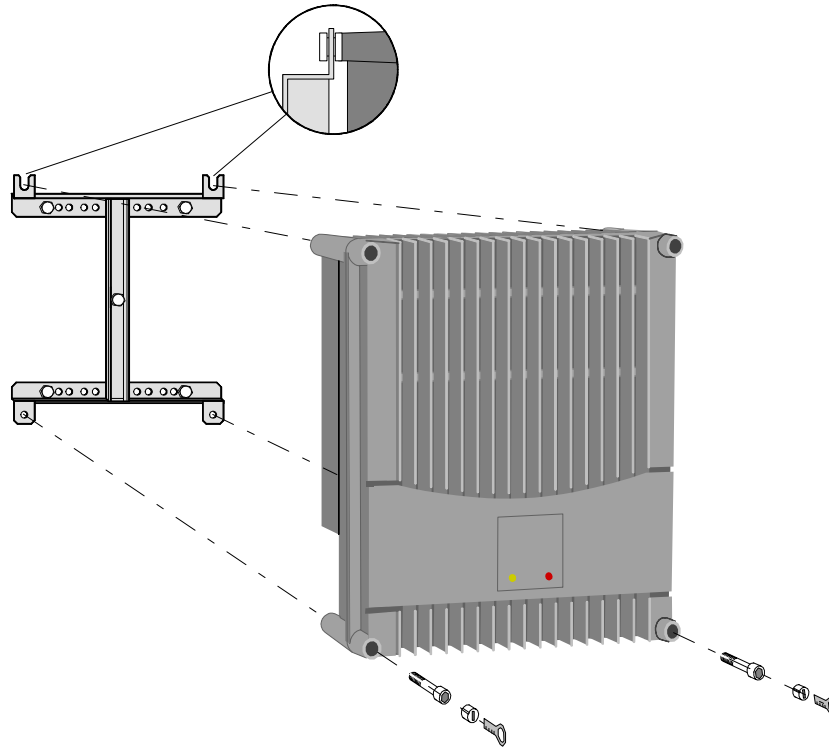


Figure 3-5 Attaching the WRH to the bracket

## Connections

This section describes general examples of how to connect the input and output ports on the WRH.

### Main Power and Grounding

Local regulations need to be followed for the main power connection. WRHs are approved in accordance with EN and UL/cUL regulations. This is, however, only valid if a classified power cord is used. For the WRH to meet these regulations you must select one of the following classified and approved cord types:

- EN – H 05 W5 - F HMR
- UL – AWM Style 2587
- CSA– AWM 1 A/B 11 A/B

For outdoor use, the power cord should meet at least IP65 encapsulation requirements. Do not turn the main power on until you are ready to commission the WRH



**WARNING:** For WRHs supplied from the main power source, the main outlet must be grounded.

## Fiber Optic and RF Connections

Fiber optic and RF cable connections should be verified both internally and externally before powering up the equipment. This section illustrates the general internal connections of the WRH and WRH-V. Verify these connections with the as-built drawings and documents for your specific system configuration. Table 3-1 lists the steps for external connections to the WRH.

Table 3-1 Cable Connection Procedure

Step	Action
1	Connect the service antenna coaxial cable to the left in the cabinet using an N-type male connector.
2	Connect the fiber optic cable from the OCM or BMU to the fiber optic cable demark on the FOU.
3	Connect station ground.
4	Mount the main power plug to the main power cord and connect it to the PSU.

## WRH

Figure 3-6 illustrates the cables and connections for a standard WRH.

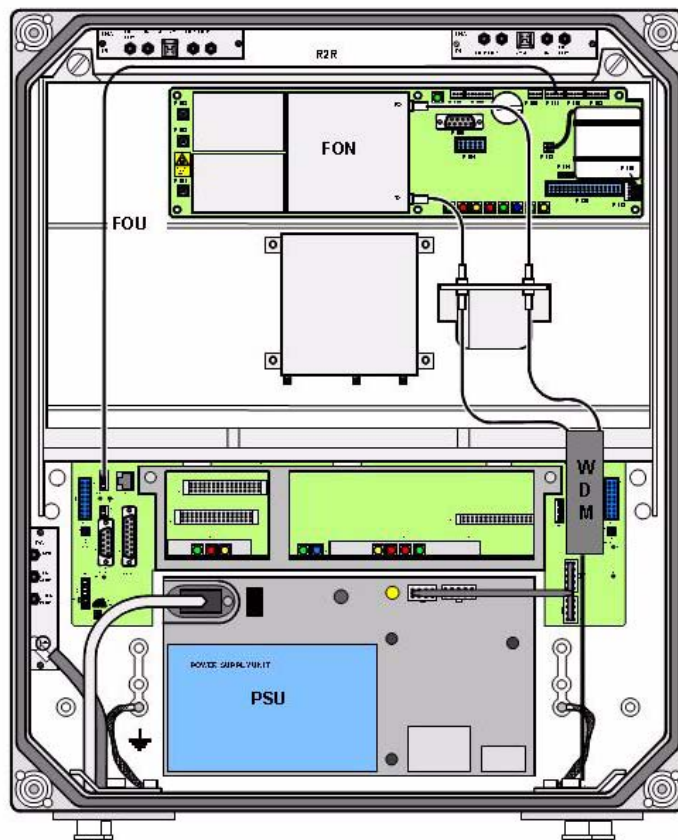


Figure 3-6 WRH Cable Connections

**WRH-V**

Figure 3-7 illustrates the cables and connections for the WRH-V.

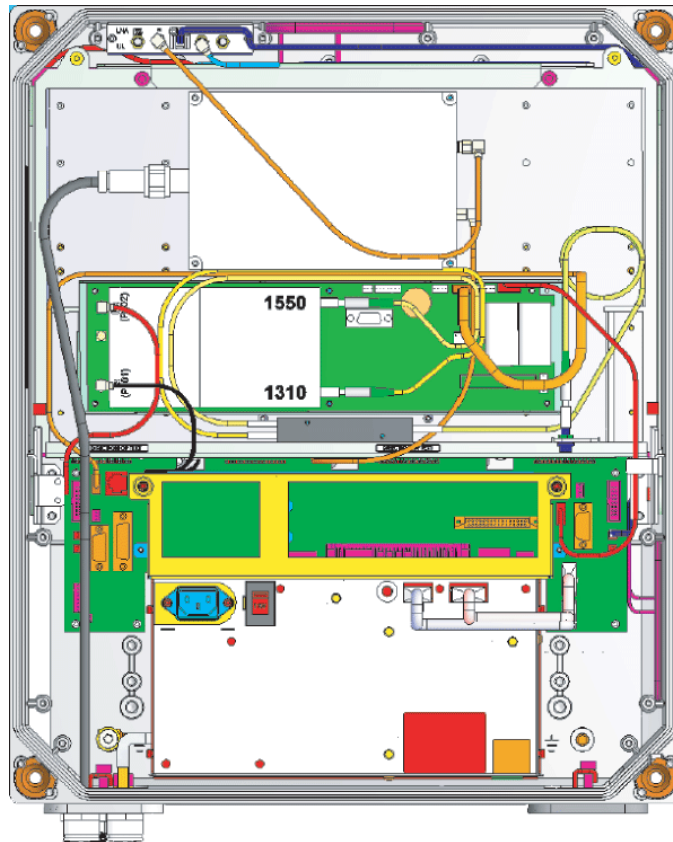


Figure 3-7 WRH-V Cable Connections

**Optional Connections****Alarms**

Alarm signals from external sensors are received by an ALI or RCI which forwards them to the CU. The RCI is used if the WRH has an RCU, otherwise the ALI is used. The software on the CU can activate acoustic or visual alarms or direct the alarm to the P33 alarm port for forwarding via an RCU to an OM-Online or OMS workstation. Alarms can also be handled by the FON. Alarms can be configured from an OM-Online or OMS workstation.

**External Alarm**

Burglary, fire or other external alarms can be handled by the WRH. External alarm sensors and alarm signals are connected to the P33 alarm port located to the left in the cabinet, as illustrated in Figure 3-8. The P33 alarm port is described in Chapter 2. The cable for this installation is taken through a strain relief bushing at the bottom of the WRH cabinet.

**Door Open Alarm**

A door open alarm can be configured and installed in the WRH. This is arranged with a door switch connected to P28, as illustrated in Figure 3-8.

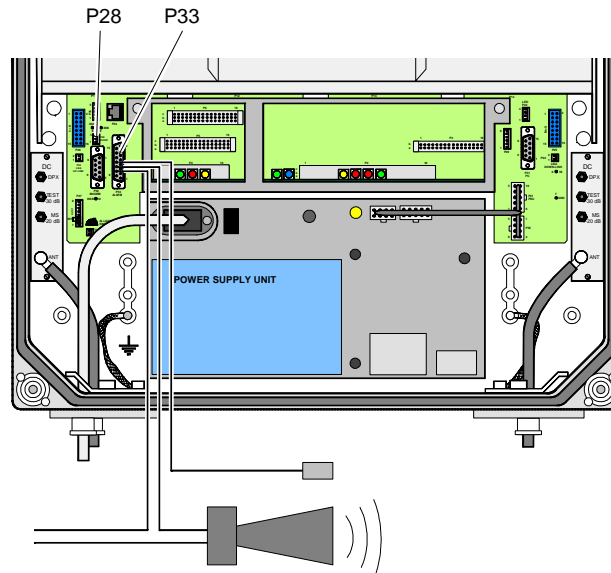


Figure 3-8 External alarm connection

### Fiber Link Interface (FLI)

The FLI feature makes it possible to interconnect WRHs. By using an RF distribution fiber network, no wire or other communication device is required.

### Main Power Breakdown Relay

To be able to distinguish PSU faults from power failure, a main power breakdown relay can be used. This relay is not included in the WRH. It has to be mounted outside the WRH cabinet. The relay intended for this purpose must fulfil the following specifications:

Closing time: Max. 30 milliseconds  
 Insulation coil/contact: Min. 4KV

A main power connected relay must also be in compliance with valid local regulations.

Table 3-2 Main Power Breakdown Relay Connection

Step	Action
1	Connect a current less closed relay contact to pin AI1 and AIC on the P33 alarm connector, see Figure 3-11. Alarm is initiated by short-circuiting pin AI1 and AIC in the P33 port.
2	Connect the relay coil. It must be supplied from the same fuse as the WRH
3	After commissioning, select Mains Breakdown in the alarm configuration window in OM-Online or OMS. Refer to the OM-Online User Manual

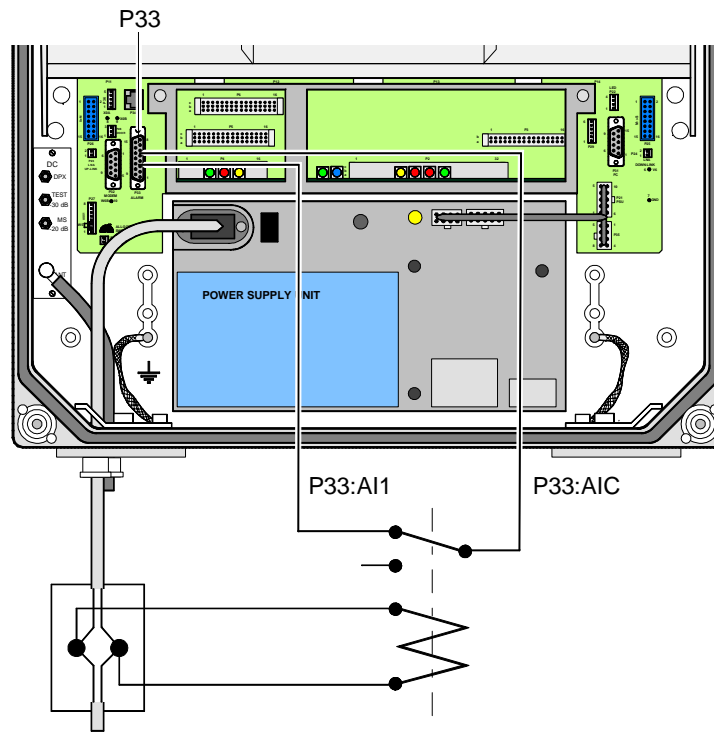


Figure 3-9 Main power breakdown relay connection

### 21-60 Volt DC PSU Installation

The 115/220 VAC PSU can be replaced with a 21 to 60 VDC DC PSU as described below.

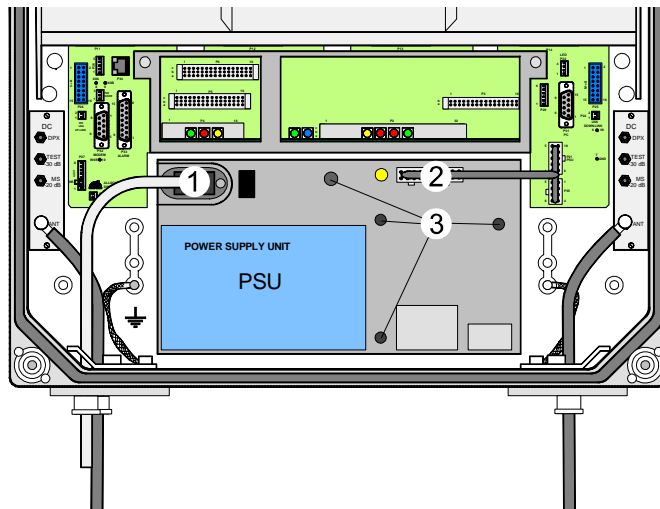


Figure 3-10 PSU Connections



Table 3-3 PSU Replacement Procedure

Step	Action
1	Disconnect main power
2	Remove the main power plug from the PSU ('1' in Figure 3-12)
3	Disconnect the power cable bundle connectors (2) on the PSU
4	Loosen the four fixing screws (3) using a 5mm Allen key and remove the PSU
6	Examine the removed PSU and identify the supply voltage for the WRH (13.5V or 27V)
7	Set the new PSU to the correct supply voltage by moving the jumper as illustrated on the PSU. This must be done before the PSU is mounted in the WRH
8	Mount the PSU with the four fixing screws (3)
9	Connect the PSU to the DIA PCBA (2) with a cable marked VE007 98/1. This cable must be used even if one connector will be left over at the DIA PCBA (previous versions of the DIA had only one connector)
10	Connect the DC power cable. The supplied cable should have a radiation limiter. The + pole should be connected to one of the left terminals in the PSU connector with the brown part of the DC cable. The – pole should be connected to one of the right terminals in the PSU connector with the blue part of the DC cable
11	Apply power and verify the yellow LED on the PSU lights

## Commissioning

Before proceeding, carefully read the Safety section and check all connections made during the installation. To fulfill the IP65 weather protective requirements, ensure cable strain relief bushings are properly tightened. Also, ensure gaskets at cable inlets and on the cabinet are properly fitted and not damaged.

A WRH can be configured locally with OM-Online by connecting a standard serial cable from the COM port on the PC to the P31 PC port (RS-232) located to the right in the cabinet (see Figure 3-14). The P31 PC port is described in Chapter 2. OM-Online is described in the OM-Online User Manual.

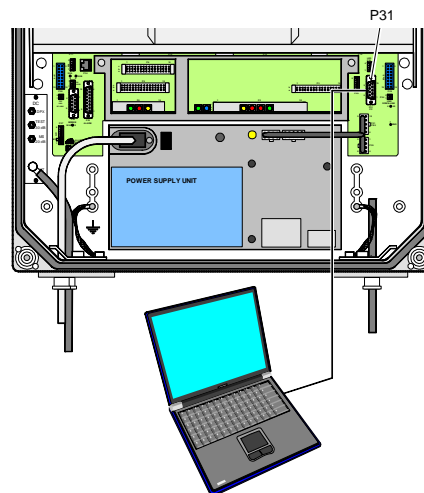


Figure 3-11 Connecting a PC for Local Access

**Initial Startup**

Table 3-4 Initial Startup Procedure

Step	Action
1	Turn the main power on
2	Check the Yellow LED on the power supply unit. It must be a steady on
3	Check the four CU PCBA LEDs. Refer to the CU PCBA section in Chapter 2 for the correct power up indications
4	Check the three ALI PCBA LEDs or the corresponding LEDs on the RCI PCBA. Refer to the ALI or RCI PCBA section in Chapter 2 for the correct power up indications. The LEDs follow the alarm relays.