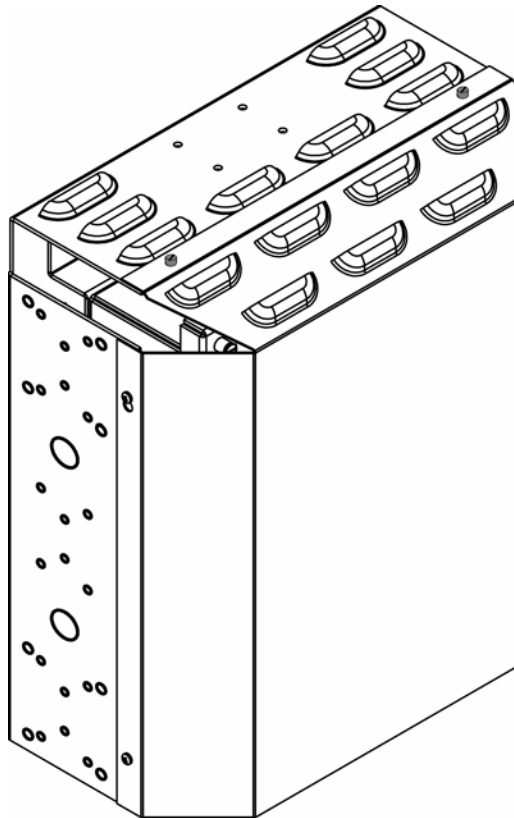


VIVATO®

Wi-Fi Where You Need It



VA2210/2410 802.11 Outdoor Microcell Installation Supplement

P/N 720-01777-03

Supplement to the VA2200 and VA2410 User Guides. Please refer to the User Guide on the product's CD-ROM for information on configuring that Microcell.

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Safety Information

You must heed any and all safety precautions and warnings in this document or indicated on the Vivato Outdoor Microcell whenever you are operating or servicing this product. Failure to comply with all precautions and warnings found in this document violates the design, manufacture, and intended use requirements of the product. Vivato, Inc. assumes no liability for the operator's failure to obey these warnings and cautions.

The person installing the Vivato Outdoor Microcell must be qualified by Vivato, Inc. or by a Vivato authorized reseller.

This product must only be serviced by qualified Vivato personnel or its certified agent.

Power Supply: The Microcell includes a pre-installed direct current (DC) power supply. Do not attempt to use a substitute power supply unless it has been approved by Vivato for use with this product.

Do not operate this product in an explosive atmosphere or in the presence of flammable gases or fumes, or in the presence of unshielded blasting caps.

To protect against fire, replace any fuses in the product with those of the same voltage, current rating, and type. Never short-circuit fuse holders or use modified fuses.

Keep away from energized circuits. Only qualified Vivato service personnel or its certified agent may remove the outer covers of the product. Hazardous voltages may be present any time a cover is removed, even if the product is not turned on.

Do not operate this product if damage is indicated. Refer servicing or repair to qualified Vivato personnel or its certified agent.

Do not service or adjust this product by yourself. It is recommended that someone else is present who can render first aid in the event that electrical shock or other injury occurs.

Do not substitute any parts or modify the product. Any unauthorized changes to the product could result in compromising the safety features or the correct operation of the product. Refer any service or repair to authorized Vivato personnel or its certified agent.

Maintenance

There are no user serviceable components or adjustments in Vivato equipment.

The normal course of care and maintenance for electrical equipment should be followed for all Vivato equipment. The following should be performed on a semi-annual basis:

1. Inspection of housing for signs of external damage, such as a torn radome, dented or breached housing, or other external damage.
2. Inspection of mounting hardware for missing fasteners, loose fasteners, excessive corrosion, or changes in mounting orientation.
3. Inspection of ventilation holes for blockage.

4. Inspection of cables for proper stress/strain relief and drip loop (if required).
5. Inspection of cables for any signs of fraying, wear, or damage.

Any of the above conditions could lead to failure or reduced performance and should be rectified as soon as possible.

Operation With Antennas Not Included With The Microcell

The antennas listed in the following table have been tested with the Vivato Outdoor Microcells and comply with FCC Part 15 rules.

FCC Part 15, paragraph 15.204 (c) 4, addresses the use of other antennas than those specifically used during compliance testing of the Microcell. Generally stated, antennas of the same type (omni, Yagi, patch) and of the same or lower gain for that type of approved antenna may be substituted in place of those used during compliance testing. Please refer to that FCC document for the full text of the ruling.

Antenna connections on the Microcell are RP-TNC (f) jacks. Therefore, antenna leads must be terminated with an RP-TNC (m) plug connector. Be sure to specify this type of connector when ordering antennas and any extension cables and adapters that may be needed to reach from the antenna's mounting point to the connectors on the bottom of the electrical enclosure. See [Figure 6— Example Antenna Mounting](#) on page 16.




Table 1— Tested Antennas

Pattern	Gain (dBi)	Polarization
Omni	11	Vertical
Omni	8.5	Horizontal
Panel	8.5	Horizontal/Vertical
Yagi	10	Horizontal/Vertical

Conventions Used in This Document

The following conventions are used in this document:

Table 2 — Document Conventions

Convention Format	What it Indicates
Important 	This symbol identifies critical information concerning Microcell operation. Failure to comply with this information may degrade or prevent Wi-Fi operation.
Caution 	This symbol identifies information that must be complied with to keep the Wi-Fi Microcell from being damaged.
Warning 	This symbol identifies information that must be complied with to reduce the possibility of electrical shock or other injury.

Contact Information

For customer support:

For technical support, contact your Vivato reseller or visit the Vivato Customer Support website.

Go to www.vivato.net and select the **Customer Support** link. Enter the required information for setting up a user account. A support password is e-mailed to you (typically within one business day) after validating the information. You can then search the online knowledge base for information by clicking on “**Find Answers / Questions**”. You can also access the latest firmware downloads and user documents from the support site.

To provide feedback on our documentation:

Feedback on the documentation shipped with the Vivato Microcell is greatly appreciated, and will always be reviewed by our Technical Publications department. Please send your suggestions to manuals_feedback@vivato.com.

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VA2210/2410 Installation

The Vivato VA2210 and VA2410 Outdoor Microcells are two-radio unlicensed (FCC Part 15) wireless devices operating in the 2.4 GHz Industrial/Scientific/Instrumentation (ISM) band, providing network connections to client devices operating in IEEE 802.11b mode (VA2210) and IEEE 802.11b/g mode (VA2410).

The Microcell allows point-to-multipoint packet transmission to client devices through a variety of user-supplied antennas, such as those listed in "**Tested Antennas**" on page 4.

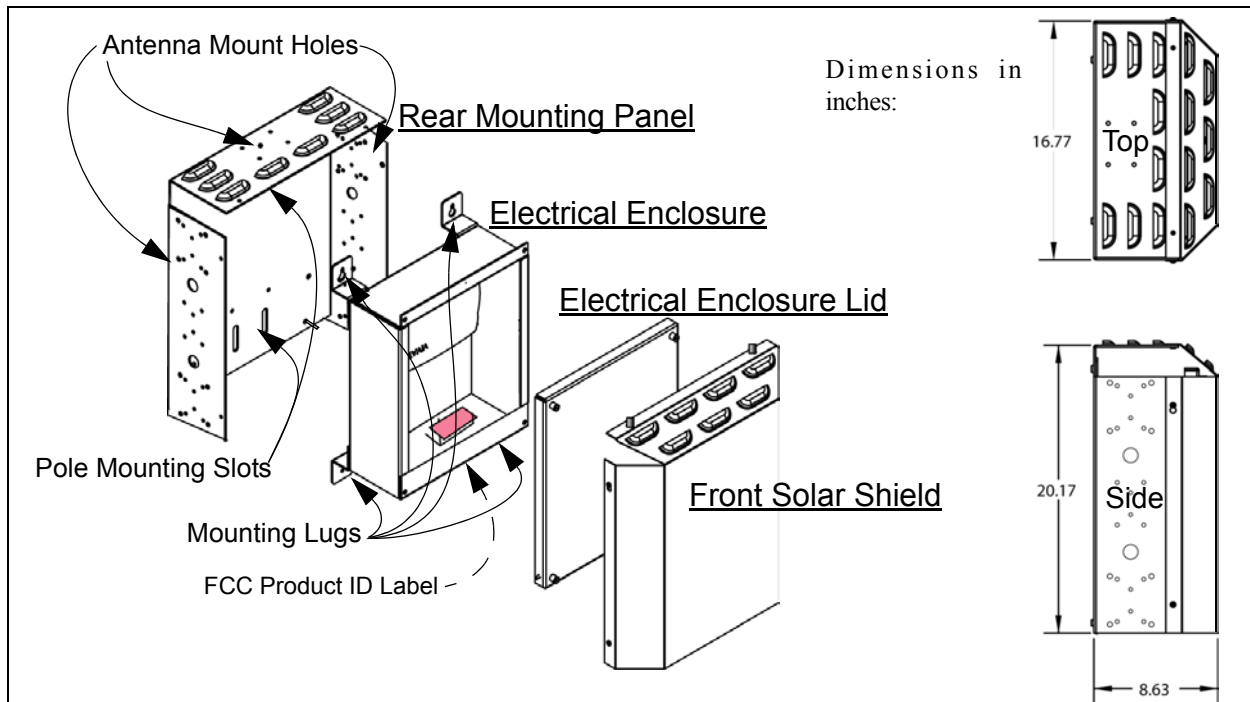
The two radios have a higher transmit power than most conventional access points. (Refer to each product's specification sheet for details.) When used with directional high-gain antennas, this allows greater flexibility in the applications that the VA2210 and VA2410 can support, including high bit rate network coverage to larger spaces requiring Wi-Fi coverage while also providing a wireless distribution system (WDS) link to another Vivato Microcell or Base Station.

Refer to the VA2200/VA2210 or VA2410 User Guide for information on configuring the Microcell to provide Wi-Fi operation with Wi-Fi clients and to configure WDS links.

Product Description

The VA2210 and VA2410 Microcells consist of a Vivato 802.11b or 802.11b/g Wi-Fi AP/Bridge enclosed in a NEMA-4X rated case. The case provides protection from moisture, dirt, insects, and other foreign matter, and also provides temperature controls to operate in an extended temperature range.

The enclosure is comprised of four main pieces: rear mounting panel, electrical enclosure, electrical enclosure lid, and front solar shield. All four pieces must be installed to ensure environmental protection.



The rear mounting panel has both slots and holes to allow a variety of mounting hardware to be used. The slots allow mounting clamps to be routed through them and around a mast (pole) behind the enclosure. The holes can be used to directly thread screws or bolts into other types of user-supplied mounts or a hard surface.

Holes are also provided on both sides of the rear mounting panel for mounting antennas. The hole patterns correspond to that used for readily available MAXRAD mounts, as indicated in the figure below:

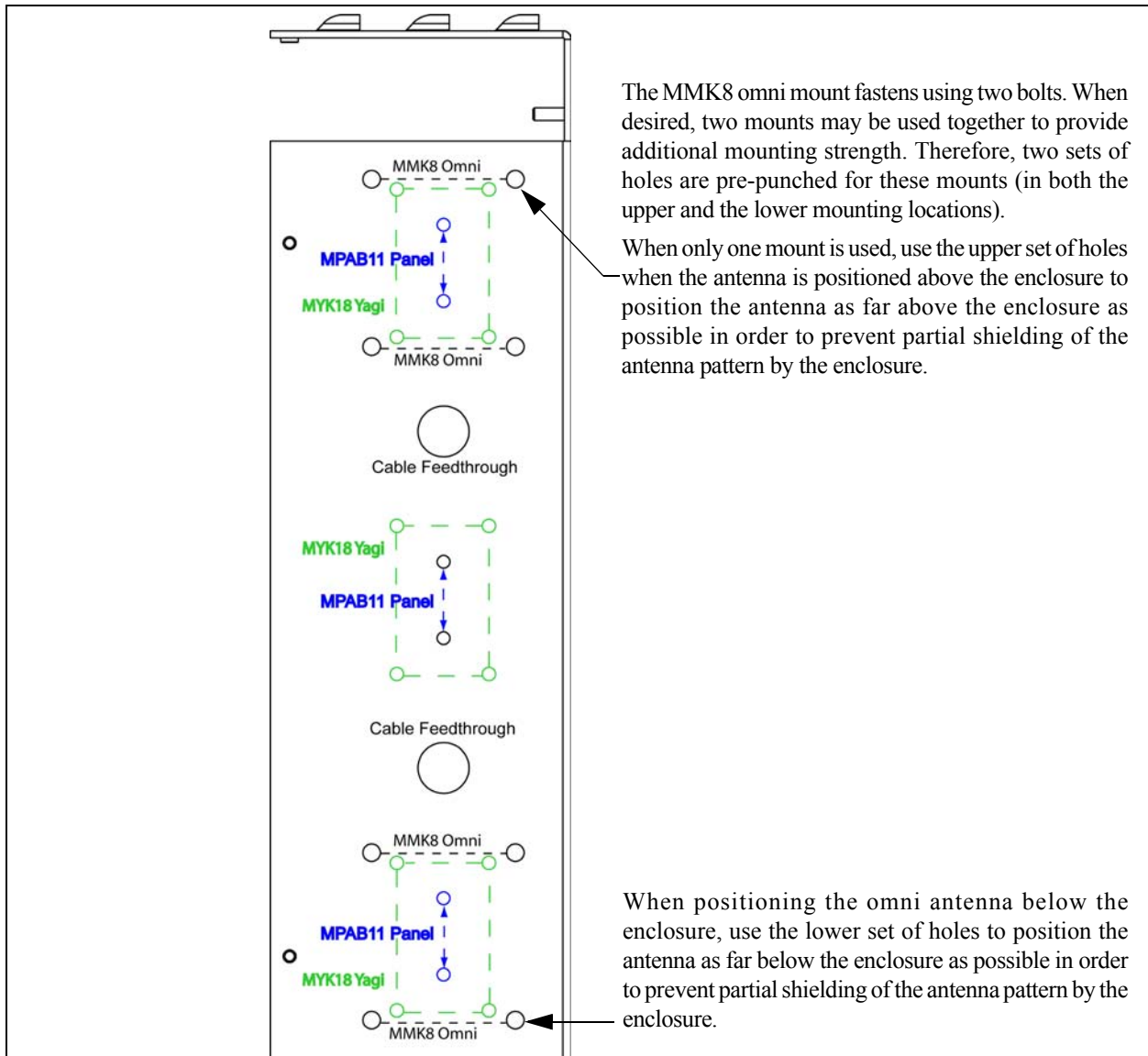


Figure 1— Pre-Punched Mounting Locations for MAXRAD Antenna Mounts

Four threaded inserts are used with nuts and captive star washers to mount the electrical enclosure to the rear mounting panel. The rear mounting panel also functions as a solar shield for the top, back, and sides of the enclosure to help prevent over heating.

The electrical enclosure contains all of the electronics. Power and data are routed through the knock-outs for 1" conduit at the bottom of the enclosure. After mounting the rear mounting panel to a pole or a hard surface, the electrical enclosure is fastened to the rear mounting panel using the threaded inserts in the rear mounting panel.

The electrical enclosure lid is held in place with self-retained slotted fasteners that thread into the electrical enclosure, compressing the enclosure's neoprene seal.

The front solar shield is fastened to the rear mounting panel using two screws on each side and the top of the panel. The shield helps to prevent excessive heat buildup in the electrical enclosure by shading the front of the enclosure and providing an airspace for convective cooling.

Surge Suppression

Refer to the product label on the underside of the electrical enclosure to verify which product you are installing.

Caution



No AC power surge suppression is included with the VA2210 or VA2410 Microcell. The product warranty does not cover damage to the Microcell caused by voltage transients or surges, including those caused by unstable power line voltages, lightning, or static electricity buildup or discharge. Therefore, the installer is solely responsible for providing adequate external AC power surge suppression equipment to prevent damage to the Microcell.

If the Microcell is mounted directly to a building and AC power is furnished from inside the building, class B3/C1 AC surge suppression may be sufficient. If the Microcell is mounted on a light pole, communications tower, mast, or other exposed structure, class C3 AC surge suppression should be used.

VA2410 Data Surge Suppression

Note: *Data and antenna surge suppression for the VA2210 are not available from Vivato, but must be supplied by the user and installed along with external AC surge suppression to protect the Microcell and allow warranty coverage.*

The VA2410 has pre-installed surge suppression devices to help protect the Microcell from voltage surges through the data (network and serial) and antenna connections.

Ethernet and serial data cables are connected to the surge suppression assembly through RJ-45 connectors. One connection uses an RJ-45 to DB-9(f) adapter for serial data. The adapter does not come pre-wired, and must be configured by the installer to provide a null modem connection using the type of Ethernet cable being used (straight-through or crossover). See [Table 1—RJ-45 to DB-9\(f\) Adapter Wiring](#) on page 14. A ribbon cable connects the output of the surge suppression assembly to the Microcell's DB-9 connector.

The surge suppression assembly has two RJ-45 Ethernet data inputs and outputs. The correct input connector to use is J13, and the correct output connector (which is pre-connected to the Microcell) is J12.

Power Connections and Requirements

Power and data cabling to the VA2210/2410 must be routed through the two 1” conduit knockouts in the bottom of the electrical enclosure (as shown in [Figure 3—VA2410 Power and Data Connections on page 12](#)).

The installer is solely responsible for understanding and following all applicable building and electrical codes regarding the installation of this device.

Warning

Power to the VA2210/2410 must be supplied through a 15 ampere circuit breaker in order to provide a power disconnect for servicing the VA2210/2410 and to prevent fire or electrical shock if damage or electrical failure occurs.

Power Requirements

Refer to the product label on the underside of the electrical enclosure for the specific power requirements for the product that you are installing.

Caution

The VA2210A and VA2410 use 120 volt AC operation only, and the VA2210B is for 220 volt operation only. Be sure to provide the correct voltage for the model that you are installing.

Power Connections

A terminal strip provides connections for 12 to 18 AWG copper wire to line, neutral, and ground. Strip insulated conductors approximately 0.2” (5 mm) and insert the exposed conductors under their appropriate terminal screws. Using a small flat-bladed screwdriver (such as Stanley™ 1016 or Excelite™ R184), tighten the screws to 5 in-lbs. (.57 Nm) and verify that the conductors are secured. See [Figure 3—VA2410 Power and Data Connections](#).

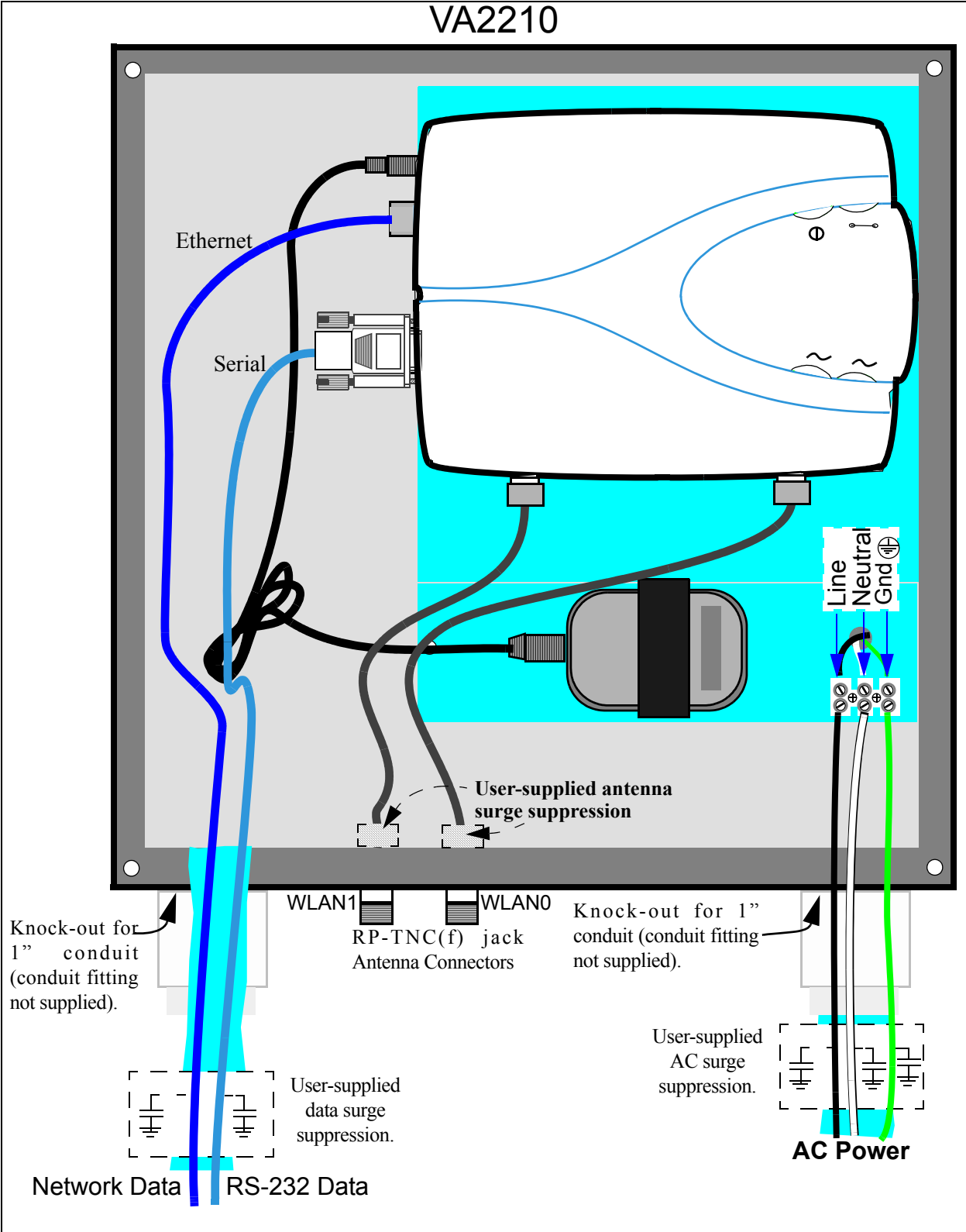


Figure 2— VA2210 Power and Data Connections

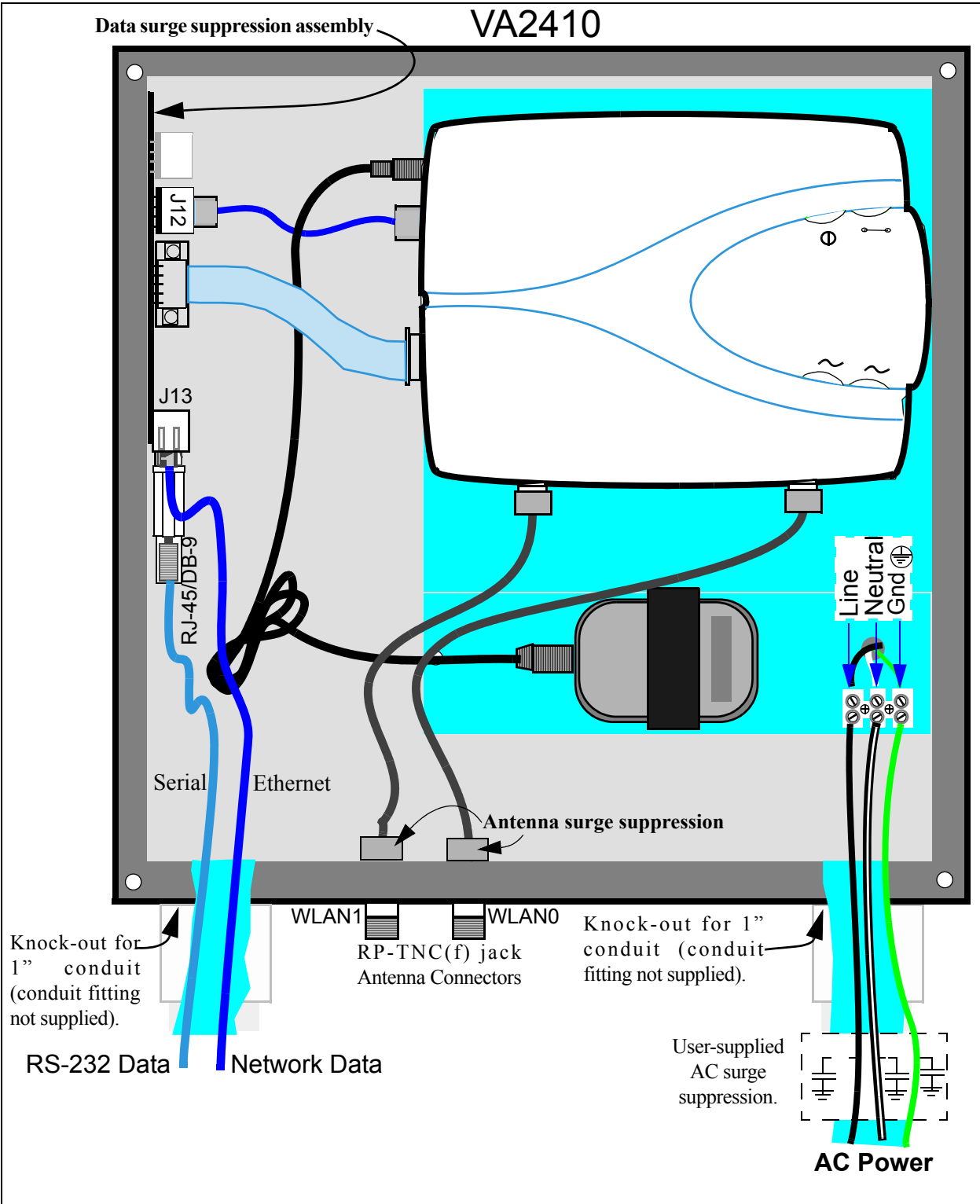


Figure 3— VA2410 Power and Data Connections

Data Connections

The Microcell has a single Ethernet RJ-45 port that can be used for a wired backhaul connection. The default configuration bridges network traffic between the two wireless interfaces and the Ethernet port. The Microcell can also use a wireless distribution system (WDS) connection to provide a wireless backhaul connection to wireless clients, eliminating the need for the wired backhaul.

See the product's User Guide for information on configuring the Microcell.

The RS-232 serial port on the Microcell can be used with a terminal emulator to configure the Microcell using its command line interface (CLI) on the VA2210; a CLI is not available on the VA2410. This method does not require the IP address of the Microcell to be entered in order to access the CLI. Common terminal emulators such as Microsoft® Hyperterminal™ and the freeware software “Tera Term Pro™ “ can be used.

The VA2210's CLI can also be accessed using a secure shell (SSH) connection through the RJ-45 port. However, this type of connection requires the administrator to know the IP address of the Microcell in order to gain access to the CLI.

The VA2410 can *only* be configured using its built-in VivatoVision™ web interface and an HTTPS connection to the RJ-45 (Ethernet) port; the VA2210 also has a VivatoVision web interface for configuration in addition to its CLI. Configuration via HTTPS also requires the IP address of the Microcell to be known.

If an error is made during a firmware update or while configuring the IP settings of the Microcell, the IP address may be accidentally overwritten with an unknown address. This would make it very difficult to access the CLI and correct the problem using an SSH connection. Therefore, it is highly recommended that a connection to the RS-232 port be provided to a terminal server that can be used to remotely access the Microcell in the case of a corrupted configuration.

The serial connection is typically run using a CAT-5 cable with RJ-45 ends and an RJ-45 to DB-9 adapter at the Microcell. This type of cable provides the necessary electrical characteristics needed for the serial communications signal, and can also be used as a backup backhaul cable if the CAT-5 cable to the Ethernet port becomes damaged.

RJ-45 to DB-9(f) Adapter Wiring

Two RJ-45 to DB-9 adapters are shipped with the outdoor Microcell, and are user configurable to provide a null modem connection to the serial port using either a standard or a crossover CAT-5 cable. The adapters are configured by inserting the DB-9 connection's pins into the appropriate holes.

Note: After connector pins are pushed into the DB-9 connector block, they can only be repositioned by using a special tool to remove them from their previous location. This tool is not supplied.

With a null modem connection, the Transmit Data and Receive Data lines, and the Request to Send and Clear to Send lines, are reversed on one of the connections. This can be done either by using a crossover CAT-5 cable and wiring both adapters identically, or by using a straight through CAT-5 cable and wiring the two adapters differently. Using a straight through CAT-5 cable for the serial connection provides a "backup" cable in case one of the network CAT-5

cables to the Microcell develops a problem. Therefore, it may be best to use the straight through cable instead of using a crossover cable.

Table 1—RJ-45 to DB-9(f) Adapter Wiring

VA2210 Serial Adapter			Terminal Serial Adapter		
RJ-45 Pin #	DB-9 #	Signal	RJ-45 Pin #	DB-9 #	Signal
4	5	Common (Gnd)	4	5	Common (Gnd)
5	2	Receive Data	5	3	Transmit Data
6	3	Transmit Data	6	2	Receive Data
7	8	Clear to Send	7	7	Request to Send
8	7	Request to Send	8	8	Clear to Send

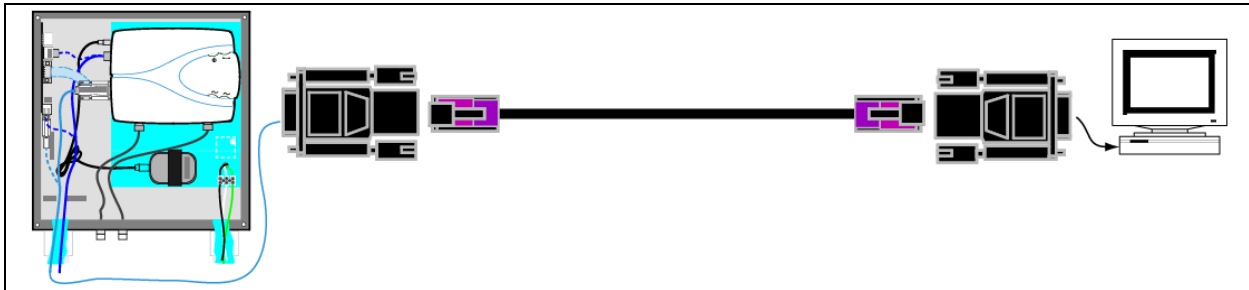


Figure 4— Creating the Serial Data Connection Using RJ-45 to DB-9 Adapters

Mounting the Outdoor Microcell

The outdoor Microcell is designed to allow mounting to a variety of poles, masts, and hard surfaces. Due to the great variety of mounting situations, the user must supply any required mounting hardware.

The general procedure for mounting the outdoor Microcell is as follows:

- Step 1.** The unit is shipped assembled. Remove the 6 screws that retain the front solar shield to the rear mounting panel and remove the shield.
- Step 2.** Fully loosen the four captive screws on the electrical enclosure's lid and remove the lid.
- Step 3.** Remove the four nuts securing the electrical enclosure to the rear panel and remove the enclosure.
- Step 4.** Verify that your antenna brackets will fasten to the sides of the rear mounting panel using the existing antenna mounting holes. If the provided holes do not align with your antenna's mounts, carefully drill holes with the correct spacing and size into the rear mounting panel. *Never drill into the electrical enclosure, as this could compromise the enclosure's ability to prevent the entrance of moisture into the electrical assemblies!*

Step 5. Using the mounting slots or holes in the rear mounting panel, fasten the panel to the intended mast or wall. Be sure to use fasteners and/or brackets of sufficient size and type in order to prevent the product from working loose or breaking the fasteners due to vibration and stress from wind, snow and ice loading, and other type of physical stress. A professional engineer should be consulted to ensure the proper design of the mounting system that is used.

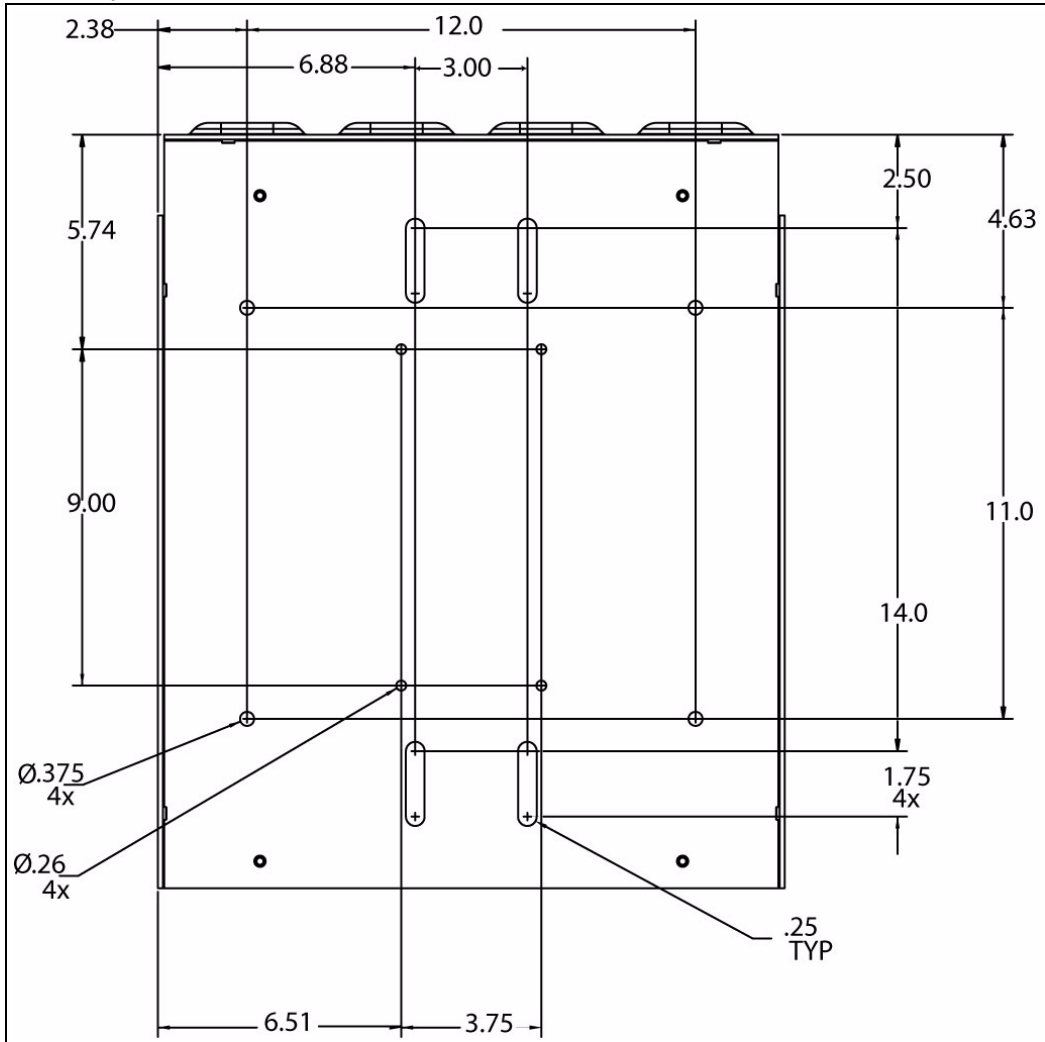


Figure 5—Rear Mounting Panel Dimensions (In Inches)

Step 6. Mount the antennas to the rear mounting panel, passing the antenna leads through the cable feed-throughs (as shown in [Figure 6—Example Antenna Mounting](#)).

Step 7. Loosely thread two mounting nuts onto the upper rear panel studs, leaving enough space between the nuts and the rear panel to allow the electrical enclosure's mounting lugs to slide behind them.

- Step 8.** Place the electrical enclosure's mounting lugs over the four mounting studs on the rear mounting panel and slide the enclosure down so that the studs are seated fully into the slots on the lugs.
- Step 9.** Install the lower nuts and firmly tighten all four mounting nuts.
- Step 10.** Using standard electrical practices and local codes, furnish power and data cabling through the appropriate type of conduit to the user-supplied surge suppressors and then to the electrical enclosure. See "[VA2210 Power and Data Connections](#)" on page 11 or "[VA2410 Power and Data Connections](#)" on page 12.
- Step 11.** When installing a VA2210, install antenna surge suppressors. The suppressors should be installed inside the enclosure and in series with the antenna leads to the Microcell. Surge suppressors should use RP-TNC(m) plug and RP-TNC(f) jack fittings in order to use the existing bulkhead and antenna cable fittings.
- Step 12.** Firmly thread the antenna's cables to the RP-TNC(f) jacks on the bottom of the electrical enclosure. The use of an approved antenna connector sealant is highly recommended in order to help reduce the chances of corrosion in some environments.
- Step 13.** Attach the electrical enclosure's lid, being careful not to pinch any cables or wires. The lid is attached using 4 captive screws. Push the screws in and thread clockwise until firmly seated. Do not overtighten.
- Step 14.** Attach the front solar shield to the electrical enclosure using the 6 supplied screws. The screws fasten into threaded inserts in the sides and top of the rear mounting panel.

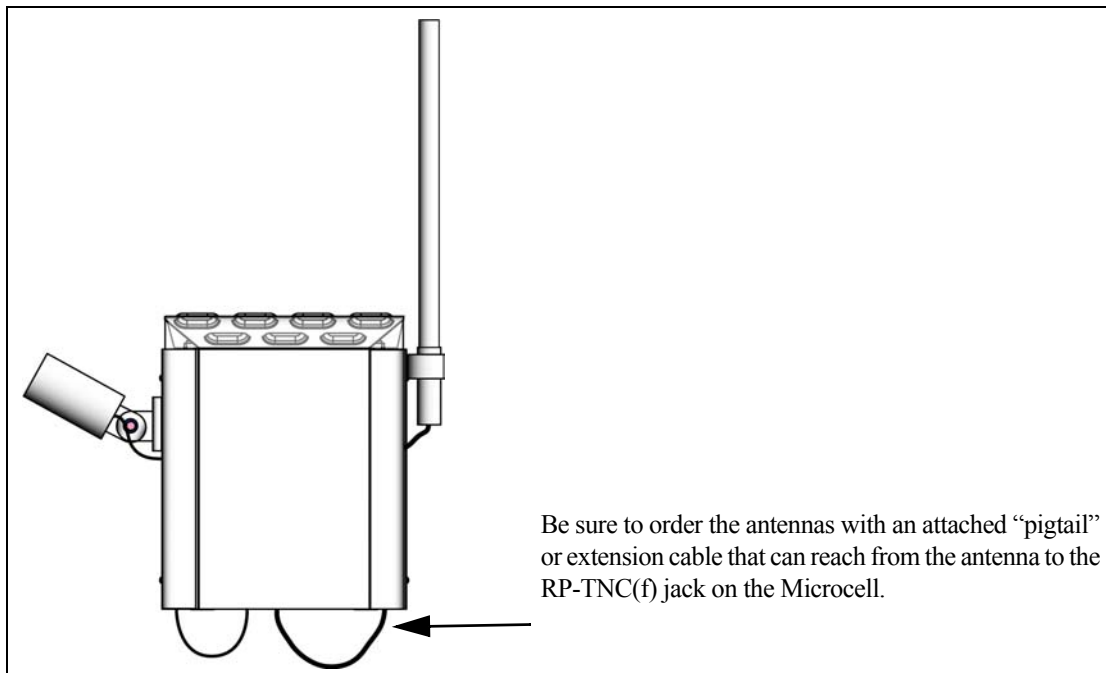


Figure 6— Example Antenna Mounting

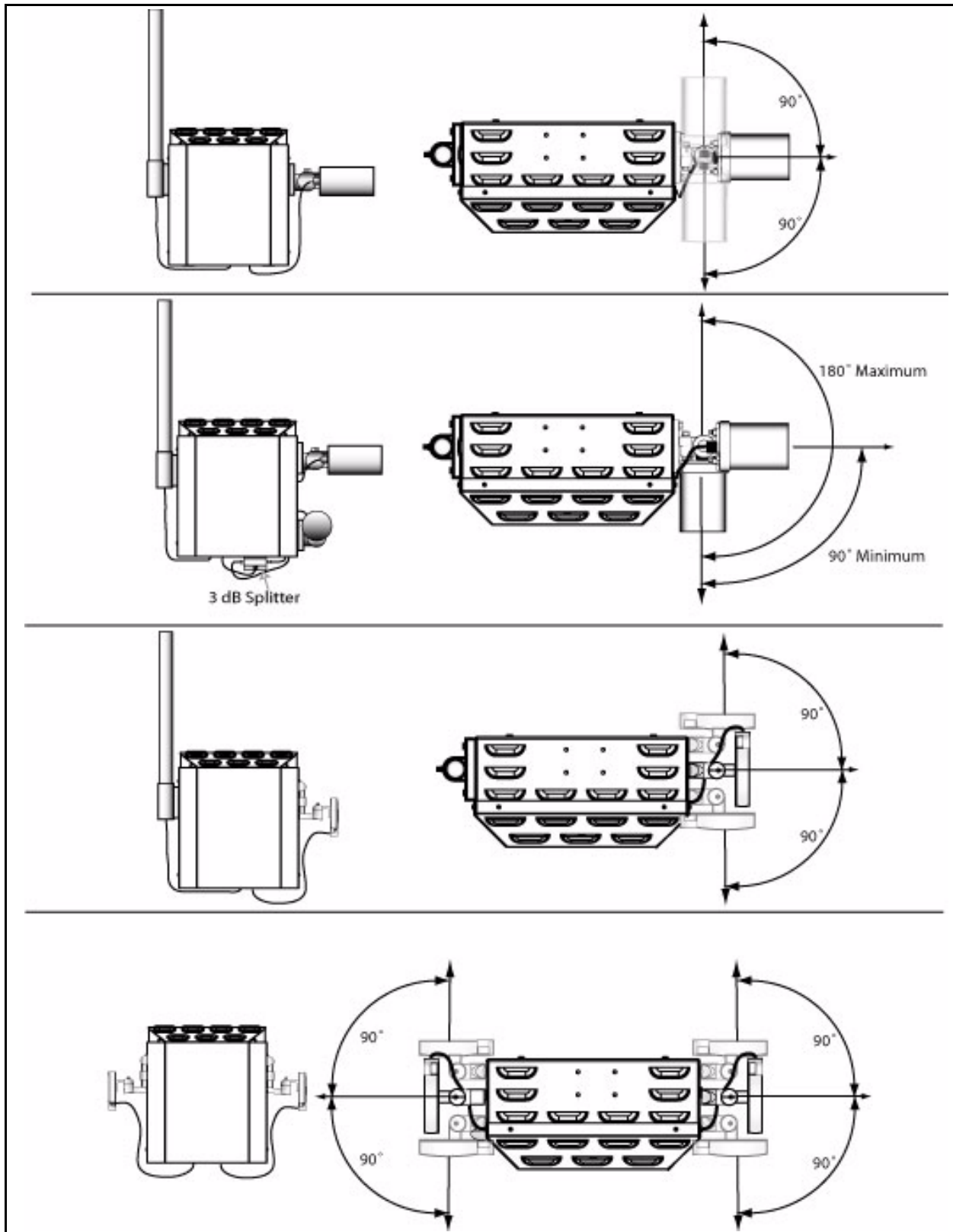


Figure 7— Example Antenna Configurations

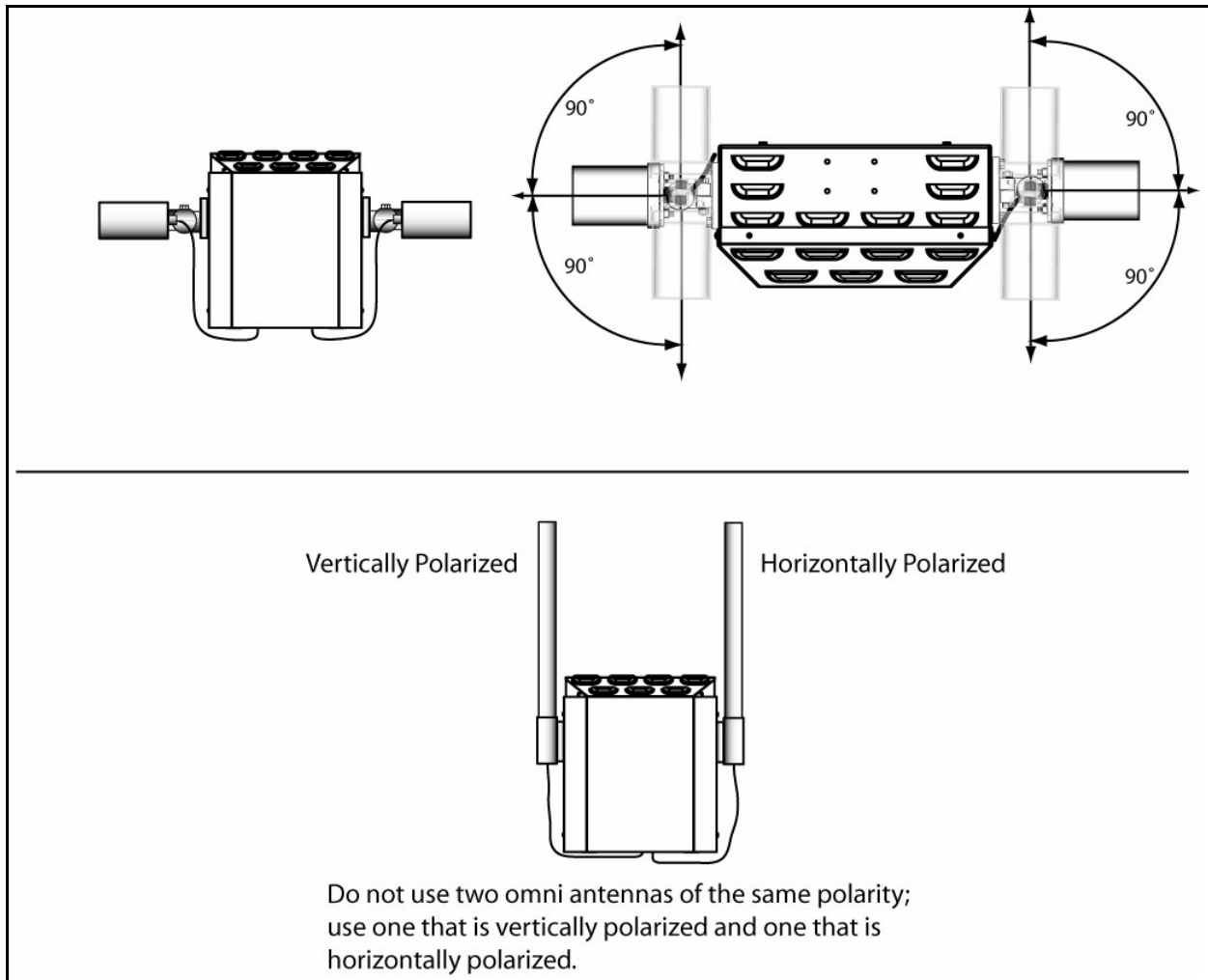


Figure 8— Example Antenna Configurations (continued)