



PowerMaster II



Digital RF Power & VSWR Measurement System

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Manufactured in the U.S.A.

INTRODUCTION

Thank you for purchasing the Array Solutions PowerMaster II RF Power/VSWR Indicator. The PowerMaster II represents a breakthrough in features for measurement of the performance of your transmitting system. Microprocessor control insures fast capture time and low power consumption. With the ability to monitor your VSWR and power levels at all times, you will know that your transmitter, RF source, and load, or antenna systems are operating effectively and safely. In addition, the power and VSWR relay alarms can quickly shut down your power amplifier system and alert you to the alarm condition. This places an additional layer of protection in your transmitting system to help preserve expensive tubes and finals. The PowerMaster II also features the ability to be monitored and controlled from a PC using the software downloadable from our website, and the unique ability to be monitored and controlled over a LAN or from the internet. PowerMaster II firmware

updates will be posted for download from the Array Solutions website as they become available. This means that the user can take full advantage of features or enhancements just by installing the firmware update. No need to return the meter to the factory for updates.

There are many features introduced in the PowerMaster II that have not been seen before – even in the original Power Master that was introduced back in 2005! We are very proud of our latest product and are interested in learning about your experiences with this meter. We also want to know if you have ideas about new features we can develop for the meter. We think you will agree that this is a totally new concept in an RF Wattmeter, and one that should extend its lifetime for a long time to come.

So, what's new in the Power Master II?

The Power Master II is a refinement of the original Power Master and is not a completely new model. After 5 years of success with the original, it was difficult to make changes since so much of the original meter is still appropriate and it works almost perfectly as it was originally envisioned. The new capabilities of the Power Master II enhance the capabilities of the original meter and don't remove any of the original capabilities whatsoever. There are four key differences and they are:

- 1) Larger LCD Display – lower energy use, larger and therefore somewhat easier to read, newest display technology*.
- 2) Support for two couplers** – two coupler input jacks on the back panel (see page 11)
- 3) USB Connectivity
- 4) New Menu Options (these will be covered later in this manual)

There is no difference in performance or accuracy – these defining features of the original are retained.

* The original Power Master was intended to use an LCD display, but at that time, LCD technology was not capable of meeting the requirements for speed and appearance. The new LCD units are fast enough and look even better than the older VFD technology in the original Power Master.

** The Power Master II can work with any type of coupler – 3kW, 10kW, VHF, UHF, QRP, etc. This is a new capability.

IF YOU HAVE PROBLEMS

We want you to be satisfied with your purchase. If you have any type of problem, please check the Trouble Shooting section of this manual. If your problem persists, call our Customer Service Department at

+1 214-954-7140. Please have the PowerMaster and this manual at hand when you call.

Write your new PowerMaster serial number and calibration data for your coupler here (see coupler cover)

Serial Number _____

Date of purchase _____

Coupler Calibration Table

Forward Power 30MHz	<input type="text"/>
Reverse Power 30 MHz	<input type="text"/>
Forward Power 50 MHz	<input type="text"/>
Reverse Power 50 MHz	<input type="text"/>



Federal Communications Commission (FCC) Statement

Note: This equipment has been tested and found to comply with the limits for Class B digital devices, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult a qualified radio/TV technician for help.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. Array Solutions is not responsible for any radio or television interference caused by using other than recommended cables or connectors or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interferences, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Responsible Party: Array Solutions, Telephone 1(214) 954-7140

Industry Canada Compliance Statement

This Class B digital apparatus meets the requirements of the Canadian Interference-Causing Equipment Regulations.

Avis de conformité à la réglementation d'Industrie Canada

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

PowerMaster RF Wattmeter Series

PowerMaster II RF Wattmeter

www.arrayolutions.com

Rev 4.1 - February 23, 2017

European Union Declaration of Conformity

Council Directive --- 89/336/EEC; EMC Directive

Standards: EN 55022 Class B
EN61000-4-2
EN61000-4-3



TYPE OF EQUIPMENT: ITE
EQUIPMENT CLASS: B

WE, THE UNDERSIGNED, HEREBY DECLARE THAT THE EQUIPMENT SPECIFIED ABOVE
CONFORMS TO THE ABOVE STANDARDS PER 89/336/EEC:

Array Solutions Date of testing March 1, 2012

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UNPACKING AND SETUP

INITIAL SETUP

Unpack the PowerMaster II. The package should contain:

- One Power Master II Display – Black enclosure
- One RF Coupler – Gold colored box with connectors (3 kW or 10 kW) [VHF couplers are different]
- One shielded interconnect cable for the coupler and display enclosure – 6 feet long (attached to VHF/UHF)
- One DC 2.1mm coaxial plug power cable – 6 feet long (**We recommend using a separate PS for this cable, not your TXCVR's**)
- This Manual

Please note that we do not ship a software CD ROM with the PowerMaster II. Please go to the Array Solutions website and download the latest version of the software for your PowerMaster II. .

If anything is missing, give us a call and we'll remedy the problem.

The PowerMaster consists of two major components: The Display and the RF Coupler. The RF Coupler is installed between the output of your transmitter and your antenna (or antenna tuner input). A six-foot (1.8m) cable is provided for connection between the Display and the Directional Coupler. You may use a longer cable if you wish (consult the Special Applications section later in this manual).

- **The PowerMaster uses a standard 2.1mm coaxial power plug, center pin is + V.**
- **Make sure your power source can supply at least 500 mA of current. (800 mA min for the original Power Master)**
- **Please do not use a cheap “wall wart”. These devices are usually not regulated and may cause RFI.**

Quick Setup

If you are currently using a wattmeter in your setup, you have everything you need for a test. If you are not using a wattmeter, then you will need a suitable coaxial jumper to connect the RF Coupler to your transmitter.

Connect the RF Coupler as follows:

SOURCE - connects to your transmitter (or amplifier output)

LOAD - connects to your antenna (or antenna tuner input)

For the 3 or 10 kW HF* PowerMaster, plug the ¼” connector into the Directional Coupler and the opposite end into the Coupler 1 jack on the back of the display. Supply 12 V DC power by connecting a standard 2.1 mm coaxial plug to the DC jack in the back of the Display Enclosure. The center pin is “+” 12 V DC, which is connected to the white stripe cable. (See page 10 for display rear panel details).

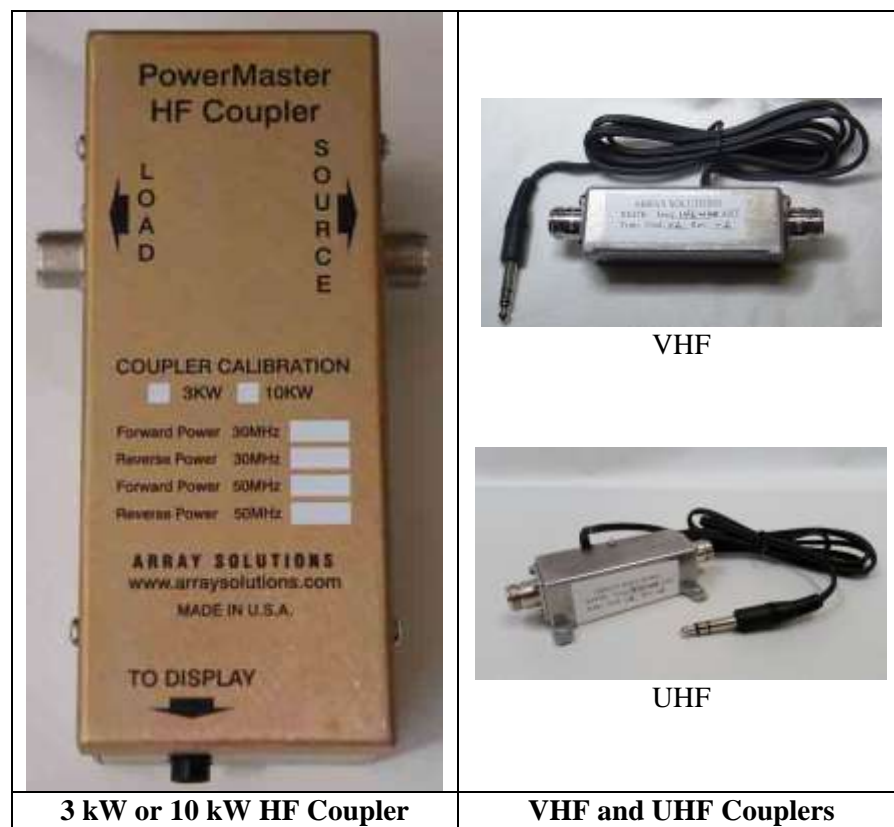
Connect your 12 volt DC power source. **NOTE: It is recommended that a separate power supply is used to power the unit. Using the same power supply connected to the transceiver may cause RFI and malfunction.** You should observe that the display illuminates and the firmware version number will be displayed initially, then the unit will display the operational mode screen as in the image on the cover of this manual. You are now ready for a test.

Simply use your normal procedure to transmit. The PowerMaster will give you an instant indication of your power and VSWR.

If the PowerMaster is functioning with a display of your forward power and VSWR number with a bar graph to indicate relative power, you may now proceed to program it from the front panel buttons or the control software.

If you are having other problems, refer to the Trouble Shooting section of this manual.

*Note: VHF and UHF Couplers have their connection cord permanently attached to the coupler. Insert the plug from the loose end of the coupler cord into either Coupler 1 or Coupler 2 jack on the rear panel of the display. (See Page 10 for details).



INSTALLATION DETAILS – DISPLAY AND COUPLER LOCATION

The Display Enclosure is designed to be either table-top or 19-inch rack mounted with the optional rack mounting plates. You can mount one or two meters side by side in a standard 19-inch rack with the available mounting plates in a 2U high space. If using the Display Enclosure as a table top or shelf mount, simply place it into a position that is easily seen, but be careful not to place it on top of an amplifier in a way that it blocks the cooling vents of your amplifier. Choose a suitable location for the Directional Coupler and mount it as well. We suggest mounting it with a coaxial adapter right at the output of your transmitter or amplifier. Be sure that you mount the Directional Coupler close enough to the Display so that the supplied cable can reach. If you require a longer cable, any shielded ¼” “Stereo” jumper cable will suffice. If you use a longer cable, test it for accuracy and RF immunity.

Connect a 12-15 V DC power supply cable with 2.1mm plug to the Display. The center pin is the “+” side of the DC power plug. Wire your cable to a clean DC power source. Remember that some switch-mode power supplies or cheap “wall warts” are RF noisy. The Display is protected against polarity reversal with a fuse, but the fuse will need to be replaced if you connect it wrong. Spare fuses are not supplied. **NOTE: We recommend the use of a separate power supply for the unit and not the same PS feeding your transceiver, to avoid RFI and potential malfunction of the PowerMaster II.**

DIRECTIONAL COUPLER WIRING - Since the purpose of the PowerMaster is to provide an indication of the match of your antenna system to your transmitter, it is critical that the Directional Coupler be installed as the first element after the antenna jack on your transmitter or amplifier and before an antenna tuner. Connect from your transmitter

antenna jack to the SOURCE connector on the Directional Coupler.

The standard Directional Coupler comes with SO-239 connectors. You can order optional “N” connectors or 7/16 DIN connectors for higher power operation.

If you are using an amplifier, install the Directional Coupler on the output of your amplifier. Connect the cable that goes to your antenna system to the LOAD jack on the Coupler..

Turn on the power to the Display. You should initially see the firmware version number displayed, and then the PowerMaster will go to its normal operational state.

Note that the display will become dimmer after 2 minutes of not sensing power, and completely dark (sleep) after 10 minutes of not sensing power. This feature allows you to keep the meter on all the time and not reduce the lifetime of the display as well as save energy. The meter uses very little energy when in “sleep” mode but remains ready to measure power instantly for you. If you want, you may disconnect or turn off the DC power supply to the Power Master II to completely shut it down. There is no harm to the Power Master II unit either way.

USING THE POWERMASTER II – Front Panel Controls - General Operation

In addition to the large (4x1”) LCD display, VSWR and Power Alarm LEDs, there are two buttons on the front of the PowerMaster II: “Menu” and “Mode Select.”

These buttons are used to select the operational mode and to program the meters’ many functions such as VSWR Alarm, Power Monitor Alarm, Auto Ranging Bar Graph Scales, etc.

The following discussion shows you how to operate the meter. As we add more features, you will be able to download more options for your meter from the Array Solutions Website. You are invited to join the **Array Solutions User’s Group** which can be found on the Array Solutions website.

Operation Menus - A tour of how to operate your Power Master II



After Power-Up the meter enters the Normal Operation Mode – see upper left character for mode selection

Push the mode select button to scroll through the 5 modes of operation:

- F – Fast release of peak hold, ~0.2 second
- M – Medium retention of peak hold, ~1 second
- S – Slow release of peak hold, ~2 seconds
- L - Long peak hold - ~5 seconds
- V – Reflected Power is displayed on the Bar Graph – see next image

Peak power in digits is always displayed in the upper right corner and SWR is displayed in the middle of the upper line of the display (V _._)



VSWR Bar graph Mode

Used to allow easy adjustment of a tuner for minimum VSWR. In this mode, the bar graph is displaying reflected power. Reduce the amount of deflection (or “dip”) for minimum VSWR. (Original Power Master Image)

Note: The VSWR is still displayed in digits here in the middle of the top row – in this photo the SWR is 1.33:1, displayed as (V 1.33).

Note: Along with the image directly above, some of the illustrations in this manual are of the original Power Master and where it is not critical, we have not used photos of the Power Master II. In these cases, the menus and displays shown are virtually identical in both the Power Master and the Power Master II.

The Power Master II Rear Panel



From left to right the connectors are:

Coupler 1 input

Coupler 2 input

Power Monitor Alarm Connection (1/8" phone jack)

2.1 mm coaxial DC input connector (12 to 15 V DC @ 500 mA typ.)

PTT In (From your radio)

PTT Out (To your amplifier)

RS232* You may use this if you have an RS232 connector on your computer

USB* USB Mini B connector to connect to a USB port on your computer

*Note: You may not use both the RS232 and USB connections at the same time. Only connect one to your computer. The RS-232 port is disabled by the firmware when the USB port is active.

To go from one menu to the next, push the MENU button.



Coupler Type (Coupler 1 shown)

Push the mode select button to select the type of coupler connected to Coupler 1 input:

- 3KW
- 10KW
- VHF-1
- VHF-2
- UHF
- QRP-HF

Note: If Coupler 2 was active, you would see the same options for Coupler 2. More on couplers selection later.



VSWR Alarm Limit Menu (C1 – Coupler 1)

Push the mode select button to select the VSWR alarm trip point:

Off	
1.5	
2.0	
2.5	
3.0	

Push the mode select button to reset the VSWR alarm and LED



Alarm Polarity Menu

(This option only displays if VSWR Alarm Limit is set ON)

Select by pushing the mode select button:

- ALARM OPENS Relay
- ALARM CLOSES Relay

This applies to the PTT/ALC relay only – not the Power Monitor relay.



Low Power Alarm Menu

Push the mode select button to choose trip point in watts:

- Off
- 5
- 50
- 100
- 250
- 500
- 1,000
- 2,000

Note: the 10 kW coupler will show higher ranges; VHF, UHF and QRP couplers will show lower ranges

If the peak power remains below this setting for a few seconds the power alarm LED will light and the power monitor relay will actuate. Push the mode select button to reset the alarm and LED



High Power Alarm Menu

Push the mode select button to choose trip point in watts*:

- Off
- 175
- 225
- 700
- 1,100
- 1,600
- 2,600
- 3,000



Note:
The yellow
POWER
ALARM LED
will flash on and
off

*(See the note about ranges for other couplers in the Low Power Alarm Menu on the previous page).

If the peak power exceeds this setting the power alarm LED will flash and the power monitor relay will cycle on and off. If the "Alarm Trips Amp", next menu, option is selected then the VSWR alarm LED will also flash and the PTT/ALC relay will actuate but will not cycle. Push the mode select button to reset the alarm and LED



Auto Alarm Reset Menu

This will automatically reset the both the VSWR and Power Alarms or if "Off" will force a manual reset only.

Select by pushing the mode select button:

- Off
- 1 second
- 2 seconds
- 5 seconds



Show Call Text Menu

Select with mode select button:

Yes

No

This will display your call letters or any other text you programmed into the meter via the software application program. You must use the software to program the call text.



Bargraph Ranges Menu

Select with mode select button:

3 kW Coupler				10 kW Coupler		
50	250	1000		100	500	2500
100	500	1250		200	2500	5000
200	1000	1700		400	2000	10000
1000	2000	3000		1000	5000	10000

	<p><u>Forward & Reverse Power Trim Menu</u></p> <p>This is where you enter the numbers written on the coupler into the meter to make it read accurately.</p> <p>Select with mode select button to scroll from: 0%, then 1% thru 15% then -15% down to -1% and back to 0 (zero)</p> <p>Set the Forward Power Trim factor to the settings indicated on your coupler for HF (30 MHz setting) or if you will be using 50 MHz, you should use the setting in the calibration table for 50 MHz.</p>
	<p>Pushing the menu button again takes us to the next menu.</p> <p>Set the Reverse Power Trim factor in the same manner as the forward power trim.</p> <p>Some couplers have the same trim factor for both HF and 50 MHz.</p>

		<p><u>Power Display Menu</u></p> <p>There are new options in the Power Master II. Select with mode select button:</p> <ul style="list-style-type: none"> Net Power (Forward Power – Reverse Power) Forward Power only (Reverse power is not subtracted) Rev & Fwd (Shows both Forward and Reverse power in digits) [new!] <p>Select your preferred method to display power on the digital power readout and bar graph. See the different display formats for 1328 W forward, 26.9 reverse and 1.33 SWR depending on the selected display mode.</p>

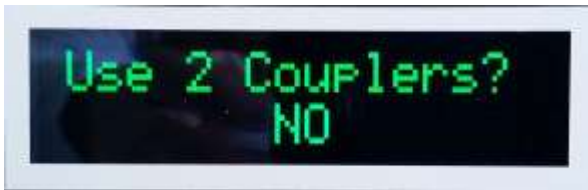


RS232 Port / USB Virtual Port Baud Rate Menu

Select with mode select button:

- 9,600
- 19,200
- 38,400

It is recommended to use the highest speed available.

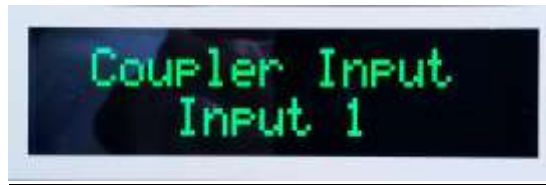


Use 2 Couplers? Menu

Select with mode select button:

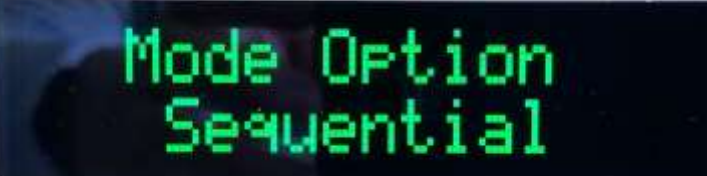
- No – Use one coupler (Optional: with two identical couplers – see page 22 for details)
- Yes – Use any two couplers.

This changes the first menu you will see when pressing the Menu Button to the “Coupler Input Menu” where you select either Coupler 1 or Coupler 2. Press MODE SELECT to switch from Coupler Input 1 to Coupler Input 2. The next menu resumes as normal where you can define the coupler type (See Page 12). Note: The unique settings for each coupler are stored in the Power Master II’s non-volatile memory.





Mode Option
Toggle



Mode Option
Sequential



Return to Mode
Mode M

Mode Option Toggle / Sequential

This is a new feature of the Power Master II which is primarily of benefit to users of manual antenna tuners.

Before implementation of this option, one would have to sequentially step through all 5 modes of operation each time one would want to switch from a normal mode (forward) to VSWR mode (reflected power bar graph) which makes the adjustment of a tuner very short work.

In operation, when in Toggle Mode, Pressing the MODE SELECT button will “toggle” directly from your preferred forward mode to “V” mode and back again. With a manual tuner, this feature is incredibly useful and a real time saver.

This menu is only enabled if you have the Menu Option set to “Toggle”

The Mode Option Toggle feature allows you to identify a preferred Forward Mode (Return to Mode) in this menu. M is shown selected here. ([M]edium retention of peak hold, ~1 second)

You can select any of the four Forward Modes when in this menu: F, M, S or L (see page 10 for details).

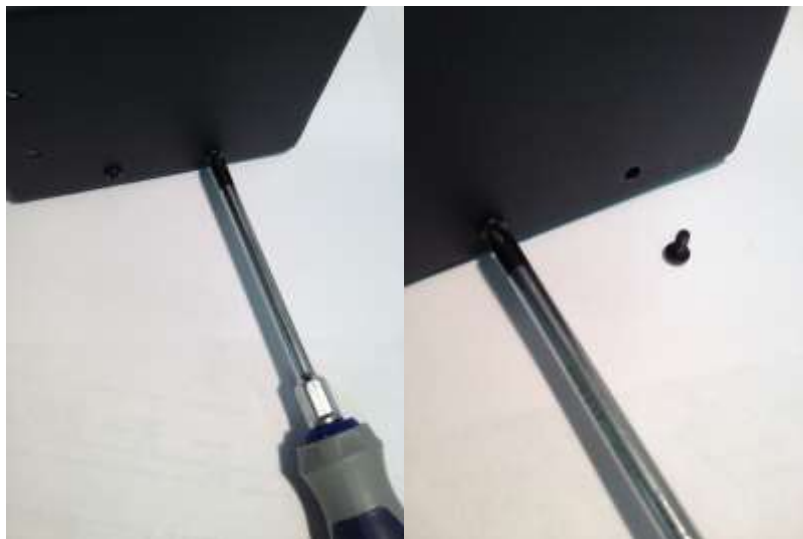
Using two identical couplers.

With two identical couplers (3 kW & 3 kW) (10 kW & 10 kW) etc., you can connect the two couplers to the Power Master II and be able to read the power from either one automatically without switching between them.

The Power Master II wattmeter has the ability to have two couplers connected to it, and it has provision to allow switching very easily between the two couplers through only two button presses on the front panel.

When operating SO2R, you do not want to have to toggle from one coupler to another. We make matched couplers available for SO2R users and due to the nature of these couplers being high impedance devices, we can actually connect the two coupler inputs in parallel and instead of toggling between the two couplers, they will both be connected and active at the same time.

The first step is to disconnect all connections to the rear panel of your Power Master II and remove the two #6-32 philips screws on either side of the cabinet.



Then locate JP1 on the right side of the board.



JP1 is supplied with two “dip” jumpers as shown above.



Move the two jumpers so that they match the pattern above

After moving the jumpers as shown above, carefully place the cover back on the meter and reinstall the 4 screws (2 on either side).

At this point what you have done is connected the two coupler input jacks together as if they were one. So, we need to program the meter as if you only have one coupler – not two! This will allow you to transmit through either coupler and the meter will display that transmitter’s output instantly without any switching. If you transmit on both at the same time, whichever one is at a higher power level will be shown.

Other useful aspects of the PowerMaster II:

VSWR is not displayed if the forward power is less than 1 watt with a 3 kW coupler or 2 watts with a 10 kW coupler.

VSWR alarm function is disabled if the forward power is less than 10 Watts in Forward modes or less than 50 Watts in V (Reflected) mode. (20 & 100 Watts respectively for a 10 kW coupler).

The minimum displayed power is 0.5 watt. The maximum displayed power is 3030 Watts (3 kW HF coupler).

Under 100 Watts the meter will display power in tenths of a watt. Under 10 watts, the meter will display in hundredths of a watt.

The call sign/message which you can program into the display can be up to 16 characters long. You must connect to a computer to program your callsign.

The bar graph has 80 segments and auto ranges in 3 ranges.

Display will auto dim after 2 minutes and automatically turn off after 10 minutes if no power is detected.

REMOTE COUPLER MOUNTING, RFI and REMOTE SITE INSTALLATIONS

A remote mountable directional coupler vs. a Power/VSWR meter that is all in one box is ideal since the remote coupler can be placed very close to the amplifier or source output. The effects of coaxial transmission line losses are then minimized, and you get a more accurate reading of the status of your antenna and power being delivered. It also keeps possible RFI troublesome cables away from your transmitter, audio, data and CW circuits, therefore reducing the chance of RFI and distortion to your signal.

A Power/VSWR meter that requires you to run coax to it since it has no remote coupler means you have to mount the meter very close to your operating position. Since you're routing your coaxial cables through it, you are also bringing in possible RFI that can affect your audio, CW

tone, modulation, and also your PC. The PowerMaster eliminates this possible source of RFI since the signals passed to its display head are merely DC voltages from the remote coupler.

The remote mounting capability is perfect for multiple transmitter sites, remote power sensing for tuners, PA stages, broadcast towers, etc. The ability to have the meter report alarms via the relay closures or the software makes it a very flexible instrument for remote sites as well.

Remotely controlled radio applications over the internet should find this meter readily adaptable with the PRO application software.

DIRECTIONAL COUPLER CONNECTORS

- You may order the unit with SO-239 (standard) connectors, Type-N, or 7/16 DIN.
- The connectors are field replaceable if you should need to do so.

ACCURACY AND CALIBRATION

The PowerMaster II resolves 14 equivalent bits of analog to digital data. There are 8 sampling channels: 4 forward and 4 reverse. A calibration table is generated for each meter that resides in the processor's non-volatile memory for each of these channels. This allows the best accuracy possible over the auto ranging scales. This results in a display that has 4096 steps for each auto ranging scale.

Chose your bar graph scale so that it is the best choice of resolution for the power your equipment is running. For instance, if you have a 2,000 watt amplifier, chose the 2,500 watt bar graph scale. This will result in the bar graph displaying most of the graph at this power level. At the highest scale the meter will display a resolution of 2.4 watts, but when you're at exciter levels of 100 watts or less the auto range scale can display resolutions of 1 watt even though it is resolving .09 watts in the sampling circuit.

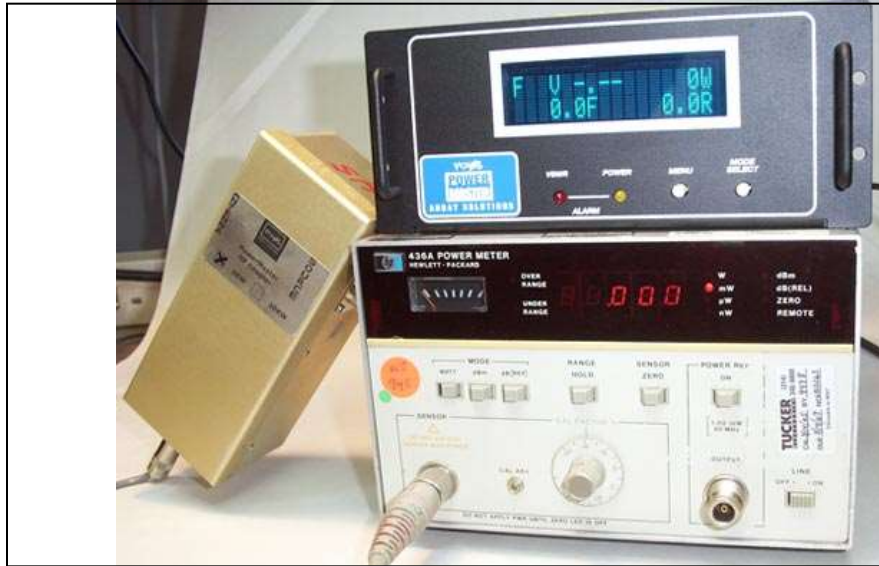
The Power Master coupler are calibrated in two segments: HF (1-30 MHz) and at 50.1 MHz. It has better than +/- 3% accuracy on our certified calibrated lab test equipment. We provide a calibration table on each directional coupler just like the calibrated sensors we use from our measurement system. The ability to program the

PowerMaster with this calibration "trim" data assures you that you have the best calibration possible with your meter. The data supplied has two ranges:

- 1 to 30 MHz – HF Range noted as 30MHz on the coupler sticker
- 50 MHz – 6 Meter Amateur Radio Band noted as 50 MHz on the coupler sticker

Program the Forward and Reverse Power trim settings in your meter to match your coupler for the frequencies you will use. We typically see +/- 3% accuracy at HF and even better at the 6 meter band.

If your application calls for better accuracy on a certain band, you can easily recalibrate the unit to suit your needs by adjusting the forward power and reverse power trim settings. In this case, you can enjoy enhanced accuracy since you have calibrated exactly to your test equipment. There are no potentiometers or variable capacitors in the coupler or the display enclosure to adjust. The calibration values are stored in non-volatile memory.



Test equipment used to calibrate and generate calibration tables

- HP-436A micro wattmeter calibrated and traceable to NIST
- HP wattmeter sensor with calibration traceable to NIST
- Bird 30 dB 2 kW calibrated attenuator traceable to NIST

Power Master II Menu Map

<p>Operation Mode Fast Medium Slow Long V</p> <p>Coupler Input (When "Use 2 Couplers?" = YES): Input 1 Input 2 (When selected, "Coupler 2 type" menu becomes available instead of "Coupler 1 type")</p> <p>Coupler 1 type: 3KW 10KW VHF-1 VHF-2 UHF QRP HF 20KW</p> <p>VSWR Alarm Limit: C1 Off C1 1.50 C1 2.00 C1 2.50 C1 3.00</p> <p>Low Power Alarm: C1 Off C1 5 C1 50 C1 100 C1 225 C1 500 C1 1000 C1 2000</p>	<p>High Power Alarm: C1 Off C1 175 C1 225 C1 700 C1 1100 C1 1600 C1 2600 C1 3000</p> <p>Auto Alarm Reset: Off 1 Seconds 2 Seconds 5 Seconds</p> <p>Show Call Text Yes No</p> <p>C1 Graph Ranges: 50 250 1000 100 500 1250 200 1000 1700 1000 2000 3000</p> <p>Forward Power Trim: From -15% to +15% in 1% steps</p> <p>Reverse Power Trim: From -15% to +15% in 1% steps</p> <p>Power Display: Forward Net (Fwd-Rev) Reverse & Forward</p>	<p>Baud Rate: 9600 19200 38400</p> <p>Use 2 Couplers?: Yes No</p> <p>Mode Option: Sequential Toggle</p> <p>Return to mode (Available when "Toggle" selected in "Mode Option"): F M L S</p>
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OPTIONS

- Software – Power Master Basic II is free and download-able from the Array Solutions website.
- Additional couplers – 3 kW, 10 kW, VHF, UHF and QRP couplers
- Firmware updates are announced on the web site and through the Array Solutions user group. Use the **Firmware Updater** program from our web site to update the flash memory in the meter.

IN CASE OF TROUBLE

The PowerMaster is well designed and should give you many years of trouble-free service. Most of the problems you will encounter usually occur during installation and startup. If the items below aren't sufficient to help you solve your problem, please give us a call.

Unit will not come on

Check power connections. Is the unit on? DC Polarity OK?

High VSWR displayed; no forward power displayed

Be sure that the SOURCE input to the Directional Coupler goes to your transmitter (or amplifier).

Be sure your interconnection cable is fully seated in both the display and coupler.

VSWR doesn't change when adjusting a tuner

Be sure that you have installed the Directional Coupler **AHEAD OF** the tuner. If your rig has an internal tuner, you should turn it off to make the most accurate measurements.

SPECIFICATIONS - *Specifications subject to change without notice. (Applies to 3 kW model, similar specs for 10 kW)*

Frequency Range	1 – 30 MHz, 50 - 54 MHz
Line Impedance	50 ohms nominal, <1.05 VSWR insertion
Insertion Loss	0.05 dB or less
Line Connections	SO-239 female (Type-N, and 7/16 DIN optional)
Power Ranges	1 to 3005 watts (3 kW HF) 1 to 9999 watts (10 kW HF) - Limited by VSWR to the limits of the connector
VSWR Range	1.00 to 99.00
Accuracy	< ±3% as measured against NIST traceable calibrated instruments (see accuracy section on how to achieve better accuracy)
Resolution	12 Bit A/D – 4 overlapping channels of auto ranging = 14 Bit effective resolution
Peak Power Capture Time	< 5 milliseconds
VSWR Alarm Relay Actuation time	< 30 milliseconds
Bar Graph Response	> 20 Hz
VSWR Alarm	Off, 1.5, 2.0, 2.5, 3.0 – relay programmable to open or close on trip
Low Power Monitor Alarm	Off, 5, 50, 100, 250, 500, 1000, 2000 watts - NC and NO relay contacts are available
High Power Monitor Alarm	Off, 175, 225, 700, 1100, 1600, 2600, 3000
Alarm Relay Contacts	0.5 A, 50 volts AC/DC
Control	Manual front panel (stand alone) or via RS232/USB – application software
Power Required	12 – 15 V DC at 300 mA
Temperature of Operation	-31°F to 122°F (-35°C to +50°C)
Regulatory Testing and Certification	Exceeds FCC Class B (tested) and CE - both emissive and conductive (tested) as well as EMP 4 kV and 8 kV on cables
Dimensions	Display 8 ¼” X 3 ½” “Face, 4 ¼” Deep Coupler 2 ¾” X 2 ¾” X 6 ½”
Shipping Weight	4 lb (1.8 kg) .

LIMITED WARRANTY

The PowerMaster is warranted by Array Solutions to be free of defects for two years from the date of purchase. **THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS.** In no event will Array Solutions be liable for consequential damages.

If you must return the unit to the factory, you must obtain authorization from the factory. Be sure to provide a copy of your original purchase receipt to validate your warranty. We will repair the PowerMaster during the warranty period at no charge. We will not honor the warranty if in our opinion the product has been damaged due to misuse or subjected to adverse environmental conditions. We might elect not to honor the warranty on units modified by you.

After the warranty has expired, you may return the unit to the factory for repair (after receiving authorization to do so). We will examine the unit for a fee of \$25 and give you a quote on the repair costs before any work will be done.

Any information you can provide regarding the problem you are having would be very helpful. Please be sure to give us a daytime telephone number in case our service technicians have any questions for you.

Please call for shipping instructions if you are returning the PowerMaster to us. Ship the unit (make sure it is insured) to:

Array Solutions
2611 North Belt Line Road
Suite # 109
Sunnyvale, TX 75182 USA

ATTN: Service
Phone 1(214)954-7140

Some states might allow you additional rights under this warranty.

Thank you very much for purchasing this product. Please give us your feedback.

The Array Solutions RF PowerMaster Team