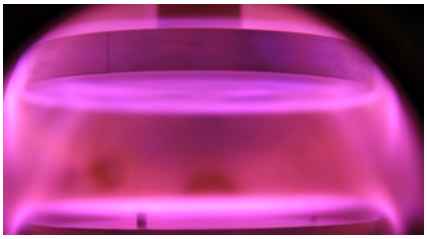
Manitou Systems Inc.

SERIES PB3™

INTEGRATED RF PLASMA POWER SYSTEMS



Cost effective RF systems to power plasma sources, magnetron sputter guns and, substrate bias electrodes

Deposition - Etching - Surface Modification

- Ideal to power small magnetron sputter cathodes for R&D
- Suited for educational demonstrations and training
- Used by leading manufacturers of small plasma systems
- Easy to integrate into any plasma system
- 100 and 300 watt - 13.56MHz models
- Analog signal user interface - common exciter I/O
- Manually adjusted impedance matching network
- RF output control by Forward power or DC bias voltage
- Fully protected against reflected power
- 19” Rack mount & “shoebox” form factor models
- CE compliant
- Forced air cooled electronics section

Series PB RF power systems offer a robust and economical method to power small magnetron sputtering guns, plasma etching electrodes and to provide RF bias to substrates. Our 100-watt models are typically used for RF substrate bias and to power 1” & 2” sputtering cathodes. The higher power 300-watt models complement larger sputter guns, ICP (induction coupled) plasma sources and parallel plate (capacitive) type electrodes.

PB3 RF Power System Specifications

General Description and common specifications

- Form factor

The main enclosure size (14.25” x 7” x 16”) and features remain the same for both models. A front panel overlay includes blue graphics on a white back ground. Models “-D” & “-MD” include a 19” wide / 4RU high, rack mount front panel. Model “-M” is housed in a shoebox type enclosure.

- Cooling

Forced air cooling (single fan) is employed to remove heat generated inside the cabinet. Exhaust air blows out on the right side vent. Ambient air is drawn in via vents located on the rear panel.

- Front panel controls

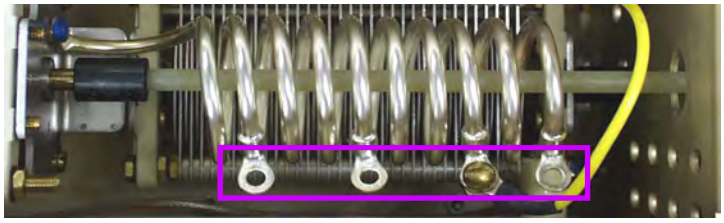
A 10-turn potentiometer with a locking knob controls the RF output power. An alternate action push button switch enables the user to manually turn the RF power ON and OFF. Red and green LEDs (located on this switch) announce Standby & RF ON conditions. Two velvet touch knobs control the manually adjusted impedance matching network (some models do not include the matching network).

- Internal impedance matching network

The internal (L topology) impedance matching network includes two high quality air-gap variable capacitors (488pF Series & 1Kpf Shunt) and a tapped series inductor (1.3, 1.0, 0.64 &, 0.25 uH taps). A fixed value shunt capacitor is included (but not connected). This matching circuit will match most plasma loads including small sputter guns & substrate stages. (Inductive loads will require optional “PI” topology.) The matching network input is a coaxial cable dongle (1/4 wavelength) with a type BNC male connector.

- Tapped series inductor

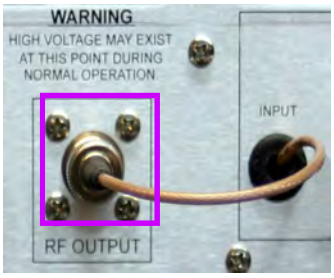
The series inductor includes user selectable taps to enable the circuit to match user specific plasma loads.

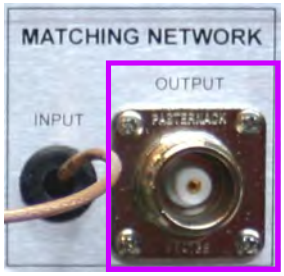


PB3 RF Power System Specifications

General Description and model common specifications

- RF Generator output — Type BNC-female 50 ohms resistive
- Matching network Input — Type BNC-male on a short dongle
- Plasma output connector — Type HN-female
- Interface connections — Analog I/O Type D-Sub 25-male 0>5VDC for metering Contact closures for interlock & RF On/Off control
  Common exciter I/O Type BNC-female
- AC Mains input — Type IEC 320/C-14 connector
  Voltage: 190 > 240 VAC 50/60 Hz Single phase
  Maximum current: 100 watt model / 3A 300 watt model / 5A

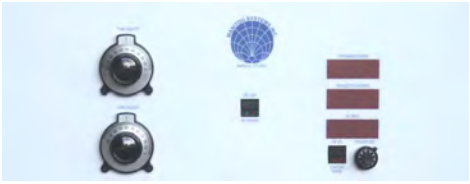




- Grounding — A dedicated grounding point is located on the rear of the chassis in addition to using the cabinet's bottom plate.
- Mounting points — All models include four 10-32 mounting points (PEM nuts) located on the bottom surface for secure mounting to a flat surface
- Environment — Install in a dry & well ventilated location with 90% max humidity (non-condensing) and 100 degrees F maximum ambient temperature
- Mounting orientation — Typically mounted horizontally on a flat surface or shelf.
- RF output power — Output power is continuously variable from ~2% > 100% with a +/- 0.5% stability.
- Reflected power tolerance — All models are factory pre-set to tolerate up to 50 watts of reflected power before Forward RF power fold back
- Output frequency — 13.56 MHz ± 100ppm
- Compliance — This product is compliant with CE standards
- Construction — The enclosure is constructed from passiviated aluminum sheet metal components. Silver plated RF conductors are used throughout.
- Accessories — Each unit is shipped with the following accessories:
  - AC Mains power cord with stripped wire ends
    The user supplies the mating plug
  - Two replacement fuses for AC Mains entry
  - Pre-wired D-Sub 25-female interface connector
    Interlock pins shorted for easy startup.
    User required to interface to a proper system interlock circuit.

- Weight — The typical shipping weight is 25 Lbs

PB3 RF Power System Specifications



Model PB3-D / MD with Digital Displays

- Mounting — Designed for electronics rack cabinet mounting. Includes a 19” rack panel x 4RU (7” tall) front panel.
- Front panel metering — Individual 3-digit meters (located on the right side) are provided to monitor Forward RF power, Reflected RF Power and, Developed DC bias.
- RF power control modes — This model includes a front panel mounted alternate action switch to select Forward RF power or DC Bias control. RF power control mode will enable the Forward RF to be continuously varied up to 100%. DC bias control model will enable the developed DC bias to be controlled up to 1000VDC (as long as the maximum RF power rating is not exceeded).
- Model PB3-D — This model includes all of the typical RF generator features. It does not include the internal impedance matching network and the front panel knobs. The knob holes are filled using plastic plugs (or covered if a special color overlay is purchased. It includes provisions for our model MTK remote impedance matching network to be used. (See image of typical 2-part PB3/MTK RF system)

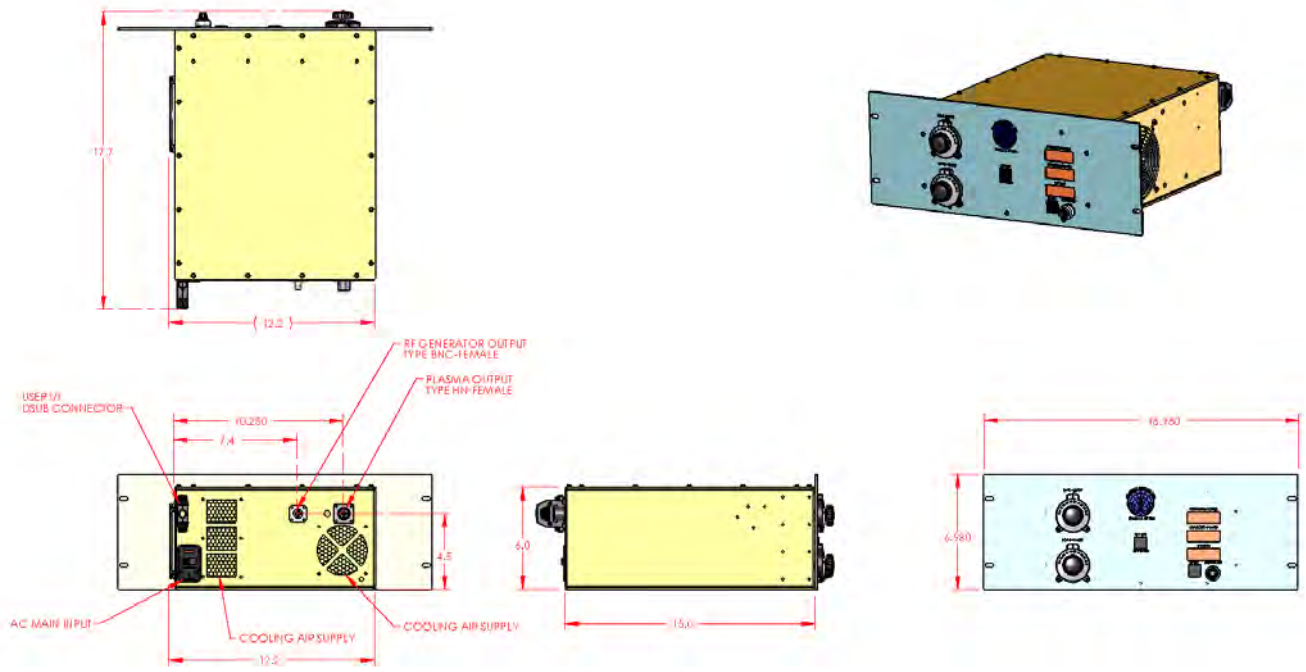
- Model PB3-MD-ICP — This model includes features such as a Pi topology matching circuit that enables it to be used with our Delta Glow RF plasma source products and other types of inductive plasma sources. The DC bias meter is not included with this model. Consult our Delta Glow product data sheet for additional information about this model.

Model PB3-M with an Analog Meter

- Mounting — Designed to sit on a shelf along side a vacuum chamber or inside of an OEM tabletop type plasma system.
- Front panel meter — A single analog meter is provided to monitor Forward and Reflected RF Power. Pressing and holding the momentary switch (located to the left of the meter) enables the meter to monitor Reflected power while the matching network is adjusted.
- RF power control mode — This model allows for ***only*** Forward RF power control. It can be continuously varied up to 100%.

PB3 RF Power System Specifications

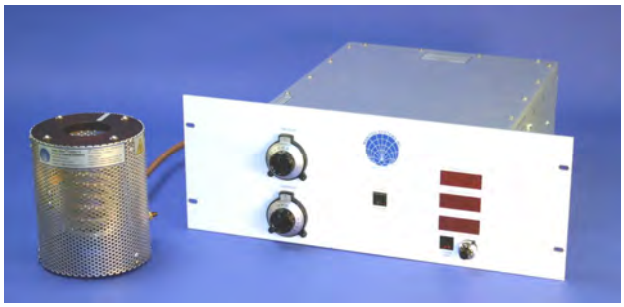
Model PB3-D / MD with Digital Displays - 19” Rack Mount



Model PB3-M with Analog Meter - Shoebox Style

Optional PB3 Models

Manitou Systems offers various configurations of the Series PB RF power system designed to complement our OEM customers in addition to complementing other Manitou Systems products including the Model MTK™ impedance matching network, Delta Glow™ RF plasma sources and RF biased substrate stages.



Order a Model PB3 RF Power System

Model PB3-M with an Analog Meter

• Model PB3-100-M 100 watts RF output	PN 00001782
• Model PB3-300-M 300 watts RF output	PN 04-140031-01

Model PB3-D with Digital Displays (No internal matching network)

• Model PB3-100-D 100 watts RF output	PN 00003068
• Model PB3-300-D 300 watts RF output	PN 04-140032-01

Model PB3-MD with Digital Displays

• Model PB3-100-MD 100 watts RF output	PN 04-140087-01
• Model PB3-300-MD 300 watts RF output	PN 04-140087-00

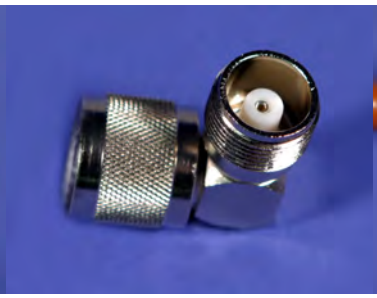
Remember to add one of the optional RF coaxial cables listed below to complete the package.

Order individual components and options

Coaxial cables to connect to the plasma

Type HN inline connector

Type HN 90 degree adapter



Type HN 90 degree connector

Type N-female inline connector

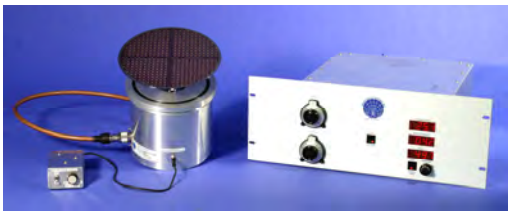
Type N-male connector

Type HN 90 degree connector + adapter

The connector types illustrated in these images are typically used on small magnetron sputter guns.

Manitou Systems offers complete cable solutions to connect your plasma load to the PB3 RF system. All cables use high temperature & high quality Teflon insulated cable. 90 degree connectors & adapters are also offered to enable complex installations.

Order cables and options



Coaxial cables to connect to the plasma

Below, you will find a list of the most common cable types we supply.
Just select the cable that mates with the coaxial connector on your sputter gun. The end that mates with the PB3 RF system is always a type HN.

Remember that the suggested maximum length is 48” however shorter ***IS*** better in this application. You can also use cables with a 90 degree connector as well as a 90 degree adapter to fit a complex installation.

If you do not see what you need, contact us and we can help !

- Coaxial cable 36” long, HN-male inline > N-male inline connectors — PN 15-700125-50
- Coaxial cable 36” long, HN-male inline > N-male 90° connectors — PN 00009385
- Coaxial cable 48” long, HN-male inline > N-male inline connectors — PN 00009387
- Coaxial cable 48” long, HN-male inline > N-male 90° connectors — PN 00009386
- Type N Male > Female 90 degree adapter — PN 00-503075-55
  (add to one end to enable a swivel for easy installation

- Coaxial cable 36” long, HN-male inline > HN-male inline connectors — PN 15-700124-76
- Coaxial cable 36” long, HN-male inline > HN-male 90° connectors — PN 00009380
- Coaxial cable 48” long, HN-male inline > HN-male inline connectors — PN 00004549
- Coaxial cable 48” long, HN-male inline > HN-male 90° connectors — PN 00009381
- Type HN Male > Female 90 degree adapter — PN 00-503075-56
  (add to one end to enable a swivel for easy installation

Optional components and features

Manitou Systems offers complementary components and accessories to enable an easier installation and better performing plasma system. Contact us for more information.

- Fixed shunt capacitors — Many capacitor values are stocked and available for field installation.
- OEM front panel overlays — Manitou Systems can manufacture the PB3 with a front panel that matches your system’s color scheme.
- Special RF output frequencies — We have the ability to supply fixed frequency versions in the 10 > 150 MHz range.

Manufactured in the USA

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