

bdi

**Broadcast Devices, Inc.
Technical Reference Manual**

DPS-100D GENERATION II RMS RF Power Monitor System

***Read this manual thoroughly before installing the
DPS-100D system***



Revision D1 AUG. 2020 – Firmware Versions \geq V5.1.2

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I. Introduction

The DPS-100D Power Monitor System is a completely self-contained RMS Power measurement system with accompanying RF transmission line section. The system is capable of measuring RF power in the forward and reflected directions simultaneously and can be configured for power levels from 1 watt to 1 megawatt from 50 MHz to 1 GHz RF transmission line section dependent. The reflected power sample can be configured to detect a threshold dependent on a high reflected power condition or VSWR condition. The unit can be programmed to open one or two relays upon sustained RF fault conditions. These relays can be used to interface to a transmitter to turn it off or for an external alarm if desired. Other key features include:

On board temperature sensor for line temperature indication

*External temperature sensor input for a second temperature sensor for any desired purpose

*External transmission line pressure sensor input for lbs/in.² indication reading

Interfaces to BDI SWP-200/206/300 Motorized Switch Controllers/Antenna Monitor Products/Remote Controls

On board web server for convenient remote display and control of parameters using HTML5

6 programmable general purpose inputs for web display of desired indications

Programmable relays for any – web accessible/configurable

RS232/485 serial and Canbus® interface formats supported

DPS-100D Generation II APP provided for use on Windows computers

SNMP v2 compatible – Interfaces directly to Burk, Davicom and Relio, Rohde & Schwarz remote control systems

V.D.C. voltage proportional to forward and reflected power available for interface to conventional remote control metering input

* requires separate sensors sold separately

II. Installation Considerations

IMPORTANT NOTE!

Prior to installation we highly recommend that network setup be performed with a computer connected directly to the DPS-100D LAN connector through the use of a standard Ethernet cable. This way settings can be checked for proper operation on the bench before installation at an RF site which can sometimes be noisy and if customer service is desired may be difficult due to poor cell phone coverage at a site or due to excessive noise. We suggest setup be performed in a quiet and comfortable location with good telephone service if customer support is desired. We also highly recommend that this setup be performed during normal business hours 9-5 P Monday thru Friday Eastern time if customer service is desired.

Planning the installation of the DPS-100D should include physical placement in the transmission line where power is to be measured. Three things should be considered and planned for:

1. The placement of the line section – Installation should be such that there is at least 6 inches of clearance to the top of the DPS-100D sensor chassis. The top of the chassis should be kept clear of obstructions as all cabling to and from the unit is done from the top of the chassis. Before installation the position of the line section should be determined such that the display is easily visible. The line section should be mounted paying attention the direction of RF flow.

2. Electrical power source – The DPS-100D is supplied with a modular switching power supply for standalone operation. The unit will operate from 100 – 240 VAC 50-60 Hertz. A six foot cord is supplied. If supplied with the SWP-200 motorized switch controller chassis, SWP-206 Antenna Monitor System or SWP-300 series remote control no external power supply is included because the SWP-200/300 series chassis phantom powers up to two DPS-100D sensors. An SWP-206 series antenna monitor can power up to 8 DPS-100D series power meters. The DPS-100D may

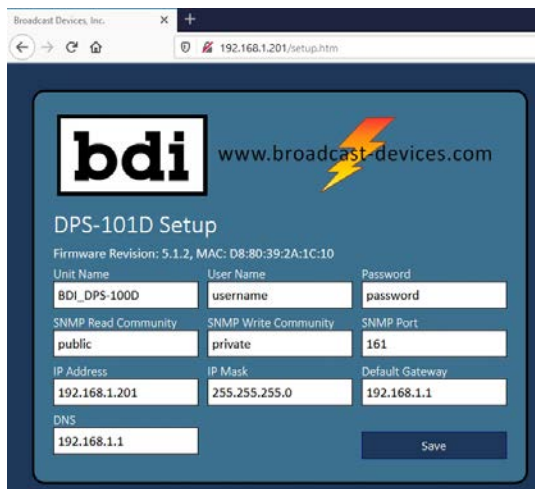
also be powered using phantom power over Ethernet. A PPOE injector kit is available from BDI. Do not use with a POE router as the unit will not power up. You must use a PPOE injector and the supplied power pack for proper operation. Contact the factory for availability.

3. Interface wiring – These include RJ45 cable connection to the web server and/or the serial interfaces, a DB15 connector for conventional remote control interface and a multi position Phoenix connector for GPI and external sensor interface. The external sensors are phantom powered by the DPS-100D chassis and simply plug in to their respective connector receptacles. Web connection is made to the jack marked LAN and serial/power connection can be made to an SWP series chassis through the connections marked RS485/CAN. Refer to the SWP series technical reference manual for further information about connection and setup with the SWP series controllers available from BDI.

Once all connections are made and the unit powered the DPS-100D is operational. Forward and reflected power along with temperature and pressure are displayed on the on board display along with any error flags that might exist.

III. Initial Setup

The initial setup of the DPS-100D consists of first logging into the system from a computer using a standard Ethernet cable. You must power cycle the unit initially as accessing the web page to make changes to the DPS-100 Setup screen can only be made for up to 5 minutes of power up. Once logged in the unit will remain in communications with the laptop indefinitely for a given connection session. Otherwise you will have access to the web page but no ability to make changes. This is done as a security measure to prevent unauthorized changes to the IP address and other critical parameters that allow access. Make a connection from the Ethernet jack on the computer and the DPS-100D Ethernet jack. From a browser enter <http://192.168.1.200> as the local IP address. This is factory default. Once you connect to the system you will see a screen looking like the figure below. It is recommended that after initial login the network settings are set up first then the email settings. After those two screens have been setup the rest of the screens can be set up in any order desired.



DPS-100D Generation II HTML5 Browser - Setup Screen

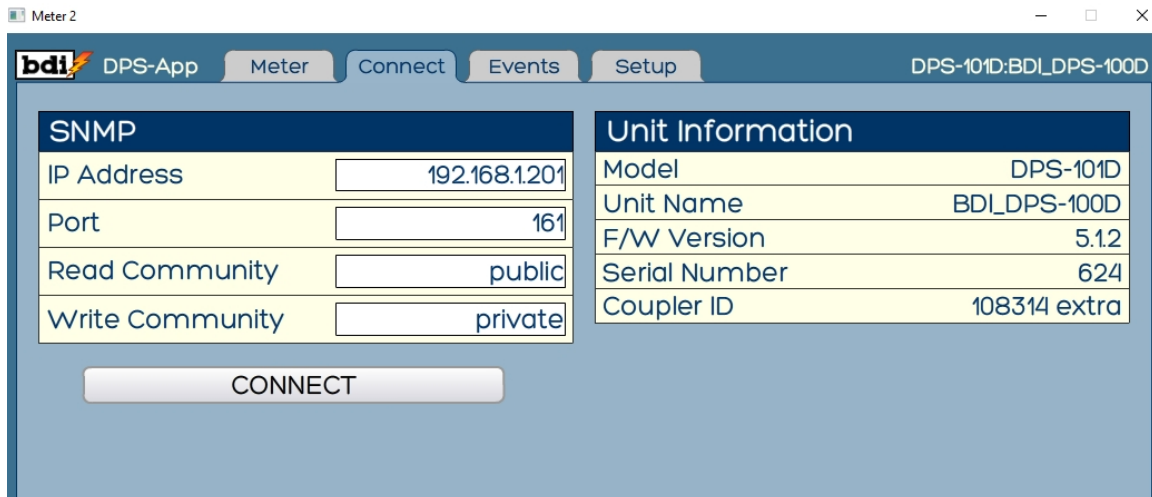
Log into the system by clicking on **login** and entering **username** – default and entering **password** – default. You can change the default unit name, user name, password, SNMP Read/Write community passwords, SNMP port, IP address, IP mask, default gateway and DNS.

IMPORTANT! : Take a screen shot of the changes and/or write them down.

After saving your information you must power cycle the unit and wait 5 seconds before restoring power. Failure to do this will cause not only the changes you made not to be saved but will keep the default information active. **You must power cycle the unit or will continue to have the factory default information stored.**

Once you have completed changing the IP address information and power cycled the unit you now can install the BDI DPS-100D Generation II software on your computer. The software can be found on the accompanying CD ROM supplied with the unit in the Technical Manuals folder and is found in the DPS-100D Generation II Power Meter sub folder. If you cannot locate the CD ROM the firmware is available for download from our web site's support page under software downloads. Simply unzip the file and start the BDIAPP.exe.

DPS-100D Connect tab allows you to connect to the meter with the APP and should be done first. Select the Connect Tab and enter the IP address, port, read and write communities you set.



After a successful connection the DPS-100D the screen above should appear in your browser window. The Unit information will be displayed showing the model number, unit name, firmware revision, RF sensor electronics serial number and the serial number of the directional coupler.

Network settings must be set correctly for external access to the DPS-100D and for email notification to work properly. Network settings should be set up before attempting email setup as testing email settings cannot be done without proper network setup. If you are not sure how to do this contact your network administrator for information about your particular network.

Once network settings have been made the DPS-100D should now be connected to a router which is connected to your network and login should be repeated through a router connection. This will verify that the networks settings are correct.

Additional Information Regarding Network Setup

The DPS-100D uses a static IP address to connect to the Internet directly or through a router. There are a number of considerations when making these connections. We will attempt to touch

on several topics which may or may not impact your installation. This information is intended to be a general guide but your specific situation may not necessarily be covered. It is suggested that your company IT department be consulted on the proper way to install this equipment within your own Intranet configuration.

The DPS-100D utilizes ports: 80, 1998 and 1999. When used behind a router your router needs to be configured to forward these ports on the internal IP address set up for the DPS-100D for access through the Internet. Some ISP's block certain ports and it may be necessary to have a specific port opened or by use of one of the methods described below. The DPS-100D resides behind a router with the "Default Server" of the router set to the address at which the DPS-100D is configured. This will route ALL incoming traffic to the DPS-100D

Methods to Connect to the Internet

Static IP address – ISP provided static IP address allows the DPS-100D to be connected directly to the Internet connection with or without the use of a router.

Routable IP address behind a router – ISP provided static IP address allows the DPS-100D to be connected to the Internet behind a router. Check with your router manufacturer and or your IT department to determine whether the router intended for use supports routable IP addresses.

Note: Some ISP's block Port 80. If your ISP blocks this port request that Port 80 be unblocked. Some ISP's may require additional fees to open Port 80.

VPN – Virtual private network allows the DPS-100D to be accessed on the local (private) network from offsite devices which are on a different network but are configured with a VPN client or on a network segment connected via VPN to the segment on which the DPS-100D resides. In this case the DPS-100D is accessed by its local network address.

DDNS service – This service is available for a nominal monthly fee that allows your IP address to be tracked and translated to any available, desired URL. Most router manufacturers support DDNS routing. Contact your router manufacturer's customer support department for instructions as to how to accomplish DDNS routing with your specific router.

Next, select the meter tab and you should see the meter tab shown below:

The screenshot shows the 'Meter' tab of the BDI DPS-100D application. The interface displays the following data:

- Frequency: 494.310 MHz
- Forward Power: 0.00W
- Reflected Power: 0.00W
- VSWR: 1.00:1
- Internal Temp: 97°F
- External Temp: -58°F
- Pressure: 0PSI

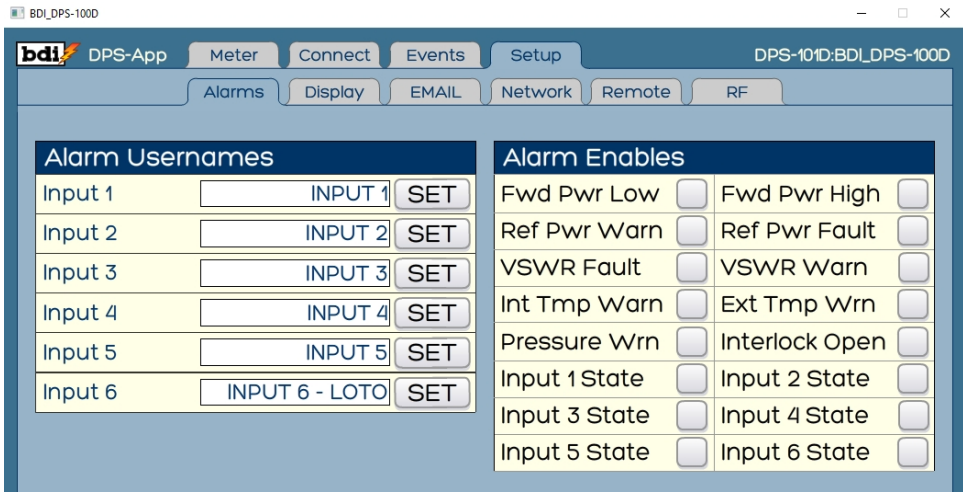
Set Points	GPI Status	Control
✓ Internal Temperature >= 150°F	⏏ INPUT 1	Transmitter <input type="button" value="ON"/> <input type="button" value="OFF"/>
✓ External Temperature >= 150°F	⏏ INPUT 2	
✗ Pressure < 2PSI	⏏ INPUT 3	3-Strike: 0 <input type="button" value="RESET"/>
✓ Forward Power >= 11.32W	⏏ INPUT 4	
✓ Forward Power <= 0.000W	⏏ INPUT 5	
✓ VSWR >= 15:1	⏏ INPUT 6 - LOTO	

Setup Tab – Configuration of unit for use

Select the setup tab to access the setup sub tabs that can be used to configure the DPS-100D power meter. From here navigate to the sub tabs for additional setup described next.

ALARMS TAB

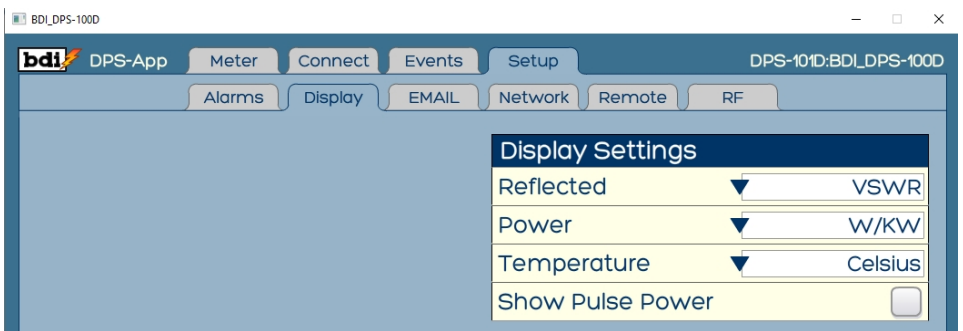
Upon selection of the Alarms tab you can configure the naming of the general purpose inputs that can be used for custom interlock groups or for general purpose. In addition, selection of the various parameters that will trigger an alarm condition can be configured.



Each alarm that is enabled will be used to trigger emails and can be used to close one or both of the two relays available. The input states under the “Alarm Enables” consistent with the “Inputs” under “Alarm Usernames”

DISPLAY TAB

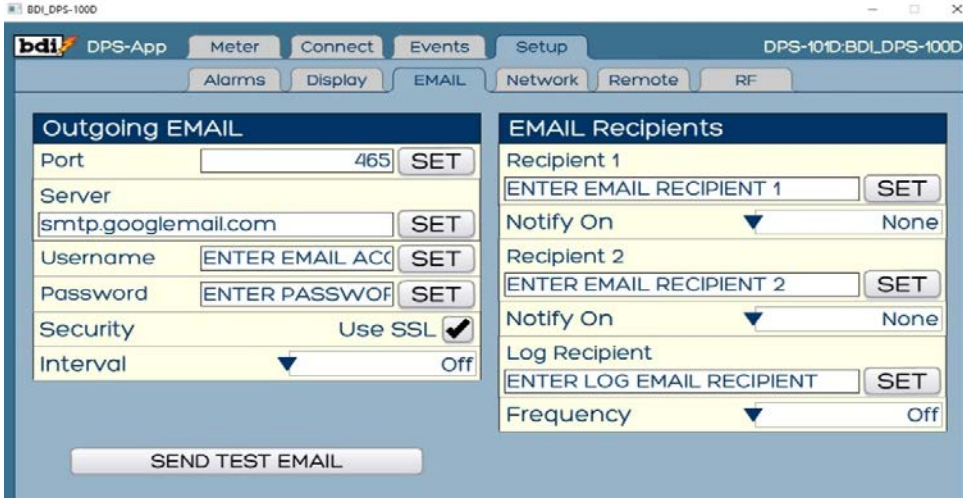
Use the Display tab to configure the manner in which the main display will show the reflected power, RF power indication, temperature and to show pulse power for non – CW type signals such as pulse radar applications.



Under “Reflected” choices include VSWR, Return loss in dB or Rho. For power indications the choices are Watts/Kilowatts or dBm. Temperature can be set to Celsius or Fahrenheit. Pulse power selection will display power in two ways. The true RMS power of the pulse wave will be displayed and the calculated pulse power based upon the RMS power and the preset parameters for duty cycle and pulse width will be shown. This indication is accurate for all repetitive pulse trains of constant amplitude and within the time parameters set.

EMAIL TAB

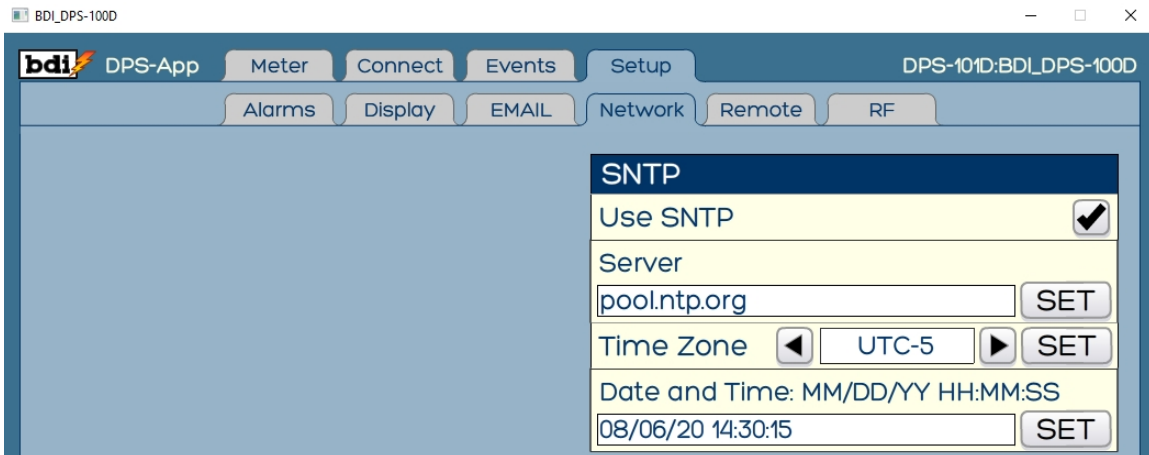
Select the Email tab to configure an outgoing Email server and up to three Email recipients for various types of messages.



Contact your IT department for Outgoing EMAIL configuration. Up to two email addresses can be configured to receive emails regarding faults, alarms/warnings or all messages. One email address can be configured for reception of logging if desired. Frequency of logs can be set as well or turned off as desired.

NETWORK TAB

The DPS-100D series power meter incorporates a battery backed up real time clock that can be synchronized with a network time protocol server. Use this tab to configure the desired server or if no server is available this feature can be disabled. Correct time and date can be set if no NTP server is available. In addition correct time zone can be adjusted for local area of operation. It is important to set this up so that the unit can keep accurate time for logging and alarm function documentation.



REMOTE TAB

The left-hand side of the remote tab allows for configuration of the 6 general purpose inputs for use in customer interlock paths that might exist at a facility. For each interlock group general purpose input 1-5 can be selected as desired to form a custom interlock group. Closures to

common on the selected inputs will close one or both of the relays for a positive interlock. Interruption of the common to any of the selected general purpose inputs will cause the interlock relay(s) to open. This can be useful at master antenna sites or any facility where multiple patch panels, lock out tag out switches, motorized switches or anything in the RF path that needs to be protected from RF exposure need to be interlocked. If you plan to use inputs 1-5 for indications only do not select those inputs or enable an interlock group with those inputs selected or erroneous interlock relay operation will occur.

The right-hand side of the remote tab allows for the configuration of various other I/O parameters of the DPS-100D meter:

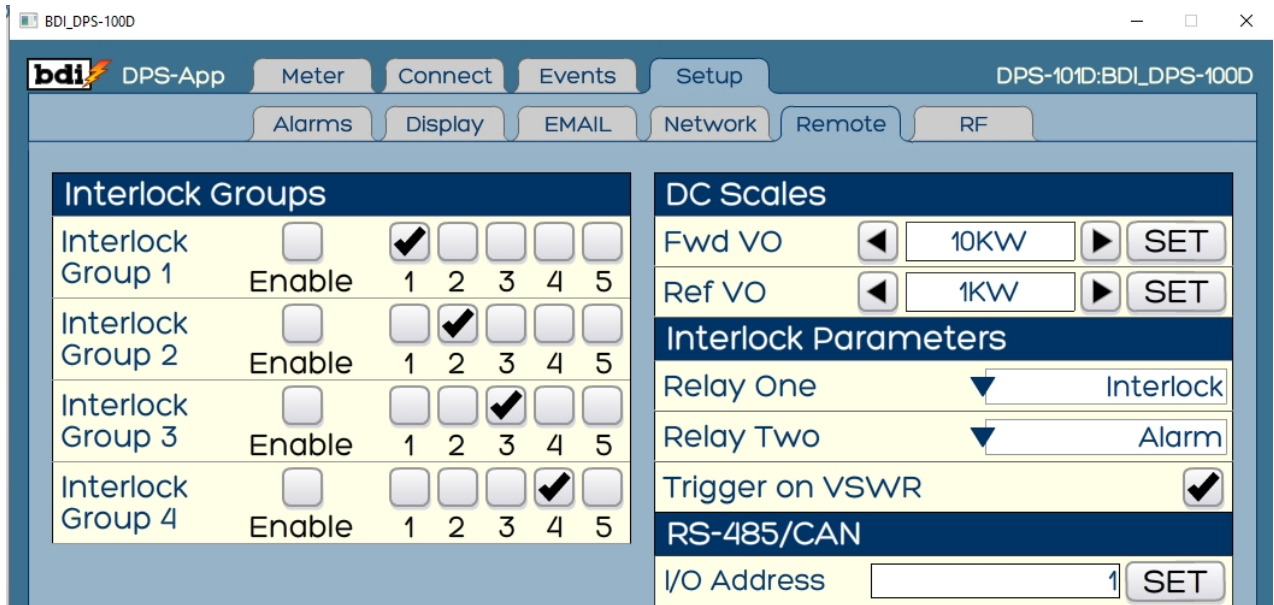
D.C. Scales – two D.C. outputs are available on the 15 position DSUB connector marked “Remote” that correspond to the forward and reflected power indications. These D.C. outputs along with common are provided for legacy remote control systems or for any analog display of the meter indications. Scaling of these parameters is performed by pull down selection.

Interlock Parameters – The two available sets of NC/C/NO relay contacts are also available via the 15 position DSUB connector marked “Remote”. Relay 1 can be configured for closure upon positive interlock closure or upon alarm/warning conditions. Relay 2 can be configured one or the other of these conditions and in addition can be configured for TX On/Off or RF presence. When selected for TX On/Off the relay will close upon pressing the TX ON button on the main page and the relay will open when TX Off is depressed. This can be handy for single transmitter site applications whereby simple control and monitoring of the transmitter is desired without a separate remote control. When configured for RF Presence the relay will energize and remain closed any time the RF level exceeds the level set up on the RF setup tab for which configuration is covered in the next section. This configuration can be useful in applications where RF safety programs must be adhered to where the presence of RF on a particular antenna or system must be known. BDI offers a separate RF Status panel that can be used in conjunction with up to 12 DPS-100D series power meters for showing RF presence. Contact the factory or your authorized dealer for more information about the BDI RFS-120 RF Safety Panel.

Trigger on VSWR – When selected the 3-Strike VSWR Protection System™ will trigger on the preset VSWR trigger point set on the RF setup tab covered in the next section. Deselecting this parameter allows the 3-Strike VSWR Protection System to be triggered by the reflected power threshold set on the RF setup tab.

RF Presence Threshold – This is the level of RF power that will energize Relay 2 if selected for RF Presence.

RS-485/CAN I/O ADDRESS – This parameter sets the address for accessory equipment that will recognize the DPS-100D series power meter. Accessory items include the BDI RMD-100 Remote Meter Display, the SWP-200 series motorized switch controller, the SWP-206 Antenna Monitor System and the SWP-300 series remote control systems available from BDI. Contact the factory or a BDI authorized dealer for more information about these products. This address must be set correctly for proper recognition by the accessory product. Factory default is address 1 when supplied with no other equipment or when only one DPS-100D series meter will be used with the accessory product. See the accessory product technical manuals for more information about address configuration for use with that product.



Remote Tab as discussed in the preceding section

RF TAB

The RF tab allows for the configuration of critical warning and fault set points that can provide email alerts and relay operation as per previous configuration covered earlier in this manual.

Forward Power Set Points – setting these set points will trigger warnings for high and low power levels as desired. Note: These levels are set in Watts. Ex. 10 KW would be entered as 10000

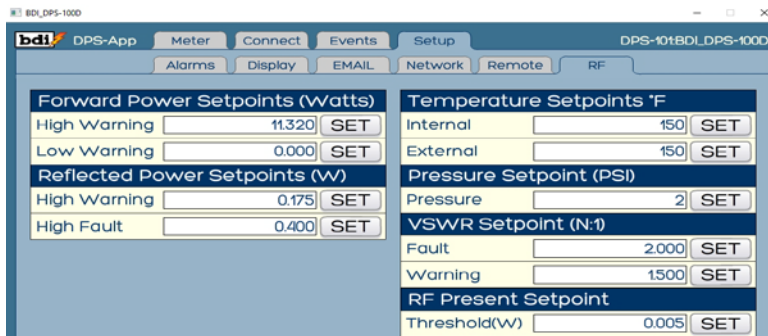
Reflected Power Set Points – setting these set points will trigger an alarm and/or a fault. If configured on the Remote Tab for reflected power exceeding the threshold set will cause relay 1 and or 2 to de energize with a fault condition.

Temperature Set Points – The internal temperature sensor measures the temperature of the electronics package as heated by normal use and by directional coupler temperature. Setting this threshold will trigger a warning and can will cause relay 1 and/or 2 to open upon this threshold being exceeded. The external temperature sensor corresponds to the optional BDI TMP-100 remote temperature sensor which plugs in to the top of the DPS-100D power meter chassis in the receptacle marked “TMP”. Phantom power for the sensor is provided by this connector as well. Threshold operation is identical to that described for the internal temperature sensor. This sensor is useful for monitoring the temperature of the room, of a filter, dummy load or for any measurement purpose.

Pressure Set Point (PSI) – setting of this parameter will cause a warning/alarm to be triggered when the transmission line pressure drops below the set threshold. This is particularly useful as an early warning alert of trouble with a leaking transmission line which can lead to bigger trouble if left unattended. Pressure indications are provided by the optional BDI PSW-100 0-15 PSI pressure sensor. This sensor is provided with a 25 ft. standard cable and suitable connector to plug into the receptacle marked “PRES” on top of the DPS-100D power meter chassis.

VSWR Set point (N:1) When set to trigger on VSWR on the Remote Tab – see previous section for this setting, VSWR trip points for a warning and then a fault can be set. A warning trigger will close Relay 1 or 2 if either of these relays is set to “alarm”. Each time the VSWR Fault threshold is exceeded Relay 1 or 2 set to “Fault” will momentarily open and reset. If the fault clears after the reset period the relay will remain closed. If the fault threshold is exceeded for at least 3 - 400 mS or a sustained period will open Relay 1 or 2 and will remain open until the fault is reset on the meter page of if connected to an SWP series controller when the front panel RED X key is depressed.

RF Present Set Point – This setting allows Relay 2 to close if set to RF Present. Please refer to the previous section of the Remote Tab settings for more information. When set to a specific RF threshold any time the threshold is exceeded Relay 2 will remain closed.



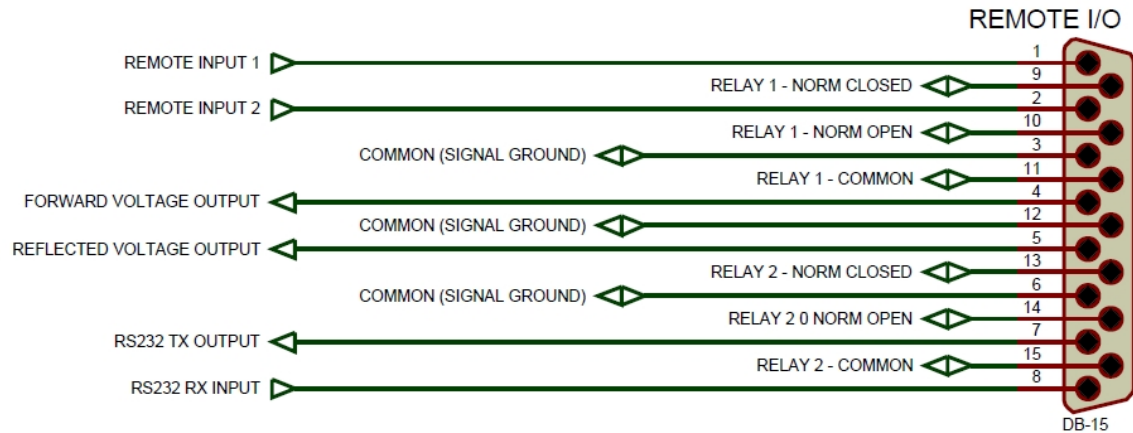
IV. External Connections

The DPS-100D has numerous connection points to external equipment listed below.

1. DB-15 Connector for remote control and relay connection
2. TB1 - 12 Position Phoenix Connector for General Purpose Input
3. TB2 & TB3 - 3 position Phoenix Connectors for external temperature and pressure sensor input
4. 3 - RJ45 Connectors 1- TCP/IP, 2 – RS485 Serial I/O
5. 1 – Coaxial Power Supply Connector for supplied Switching Power Supply

Each connector is described below

DB-15 Connector Pinout



Relay 1 – Programmable Relay. Relay 1 can be configured to provide an interlock closure or alarm closure upon triggered alarms. See Section H – Remote I/O.

Relay 2 – Programmable Relay. Relay 2 can be programmed to be a second interlock or alarm relay. See Section H – Remote I/O.

Alternately Relay 1 and 2 can be configured for momentary/latched ON/OFF see page 15 Remote Select option for a description of this operation and status

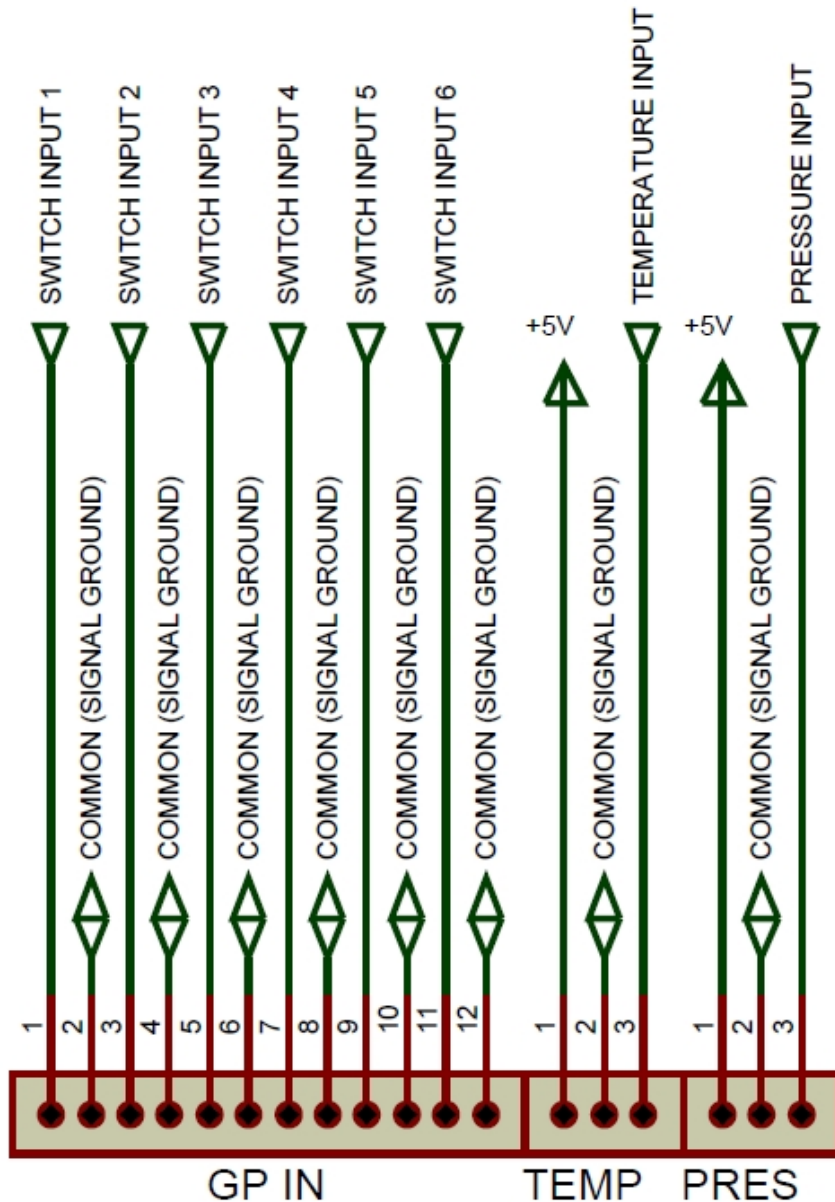
Forward & Reflected Voltage Outputs – Voltage outputs proportional to the forward and reflected power measurements is provided for interface to external meters or remote control systems. Output is 0-4V DC and can be scaled to provide a full scale output appropriate for the system being measured. See Section G – Remote I/O.

Remote Input 1 – A closure between this input and common will reset a 3-Strike Fault condition if present.

Remote Input 2 – Remote input status of TX ON/OFF Status Low level = TX ON

RS232 TX Output and RS232 RX Input – Currently Unused

Terminal Blocks TB1-TB3



BDI PN: 2150-8

DIGI-KEY PN: 277-1440-ND

PHOENIX PN: 1881422

BDI PN: 2150-2

DIGI-KEY PN: 277-1431-ND

PHOENIX PN: 1881338

TB1 – General Purpose Inputs 1-6

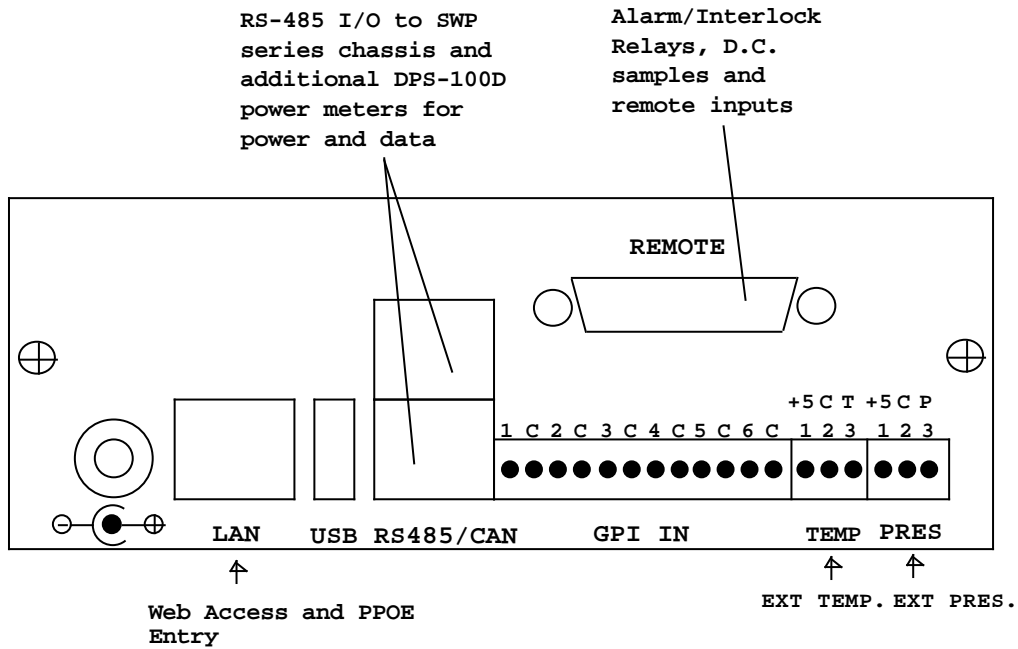
These connections are for the labeled external General Purpose Inputs used to set up interlock groups. Each GPI is internally pulled up to 3.3 VDC. An active low is expected at the respective input for an interlock connection to be recognized. If the respective GPI goes high it is an indication that an interlock string has been broken and this will cause K1 to open if the respective GPI is selected as part of an interlock group. Switch input #6 input pins 11/12 are factory default connected. Failure to have this connection made will not allow the interlock relay to close.

TB2 – 3 Position External Temperature Sensor Input

Broadcast Devices, Inc. offers the TMP-100 temperature sensor which is designed to plug in to TB2. The sensor is powered by the DPS-100D and can be attached anywhere temperature measurement is desired such as a filter cavity, transmission line or for ambient temperature measurement.

TB3 – 3 Position Pressure Sensor Input

Broadcast Devices, Inc. offers the PSW-100 Pressure Sensor which is designed to plug directly into TB3. The sensor is powered by the DPS-100D chassis and can be attached to any suitable gas block fitting available.



DPS-100D Chassis Top Connector Identification

V. Warranty

Broadcast Devices, Inc. products are warranted against failure due to faulty materials or workmanship for a period of one year from the date of shipment to the ultimate user. The warranty covers repair or replacement of defective parts at the factory, provided the unit has been returned prepaid by the user. All shipments to the factory shall have affixed to the outside of the container an R. A. number obtained from the factory. The above warranty is void if the unit has been modified by the user outside of any recommendations from the factory or if the unit has been abused or operated outside of its electrical or environmental specifications. If customer conducted field tests suggest that the unit may be faulty, whether or not the unit is in warranty, a full report of the difficulty should be sent to Broadcast Devices, Inc. factory customer service may suggest further tests or authorize return for factory evaluation. Email questions or trouble reports to:

Customer.Service@broadcast-devices.com

Tel.: (914) 737-5032

Fax. (914) 736-6916

Units sent to the factory should be well packed in the original packing if possible and shipped to Broadcast Devices, Inc. Check our web site main page for ship to address: www.broadcast-devices.com Remember to affix the R.A. number to the outside of the carton In addition please enclose a trouble report in the carton with complete contact information and return shipping information. Any packages received without such R.A. number will be refused. Note: freight collect shipments will also be refused. When the unit has been received, inspected and tested, the customer will receive a report of the findings along with a quotation for recommended repairs, which are found falling outside of the standard warranty. Units returned for in-warranty repairs which are found not to be defective will be subject to an evaluation and handling charge. In-warranty units will be repaired at no charge and returned via prepaid freight.

Out-of-warranty units needing repair require a purchase order and will be invoiced for parts, labor, and shipping charges.

When ordering replacement part, always specify A) Part number or Description, and Quantity; B) Date of Purchase, Where Purchased; C) Any Special Shipping Instructions. Always specify a street address, as shipping companies cannot deliver to a postal box.

Broadcast Devices, Inc. is not responsible for any other manufacturer's warranty on original equipment. Nor are we responsible for any failure, damage, or loss of property that may occur due to the installation or operation of our equipment outside of recommended specifications.

Broadcast Devices, Inc. may from time to time make changes to the materials used in the manufacture of its equipment and reserves the right to do so without further notice.

VI. Addendum

The following pages contain some helpful application notes intended for the user to get the maximum benefit from the investment in the DPS-100D power meter series. While planning your installation of the DPS-100D you may want to consider use of the following information. Of course if you have any questions about the DPS-100D operation or about any of these application notes please contact us by email: customer.support@broadcast-devices.com or by telephone: (914) 737-5032. We will be happy to assist you.



DPS-100D Application Note #1 Sending Text Message Alerts Using the DPS-100D

The DPS-100D is equipped with an SMTP client which is capable of sending email alerts based on a number of user configurable conditions. In many cases it might be desirable to have these alerts sent to one's cellphone as an SMS message. Fortunately most cellular carriers provide an email SMS gateway which allows an email to be sent to the gateway which is subsequently sent as a text message to the target phone.

In most cases the "To" field of the email should be populated as follows:

AAANNNNNN @ smsgateway

Where: AAA = 3 area code of the target cell phone
NNNNNNN = 7 digit telephone number of the phone
smsgateway = cellular carrier's SMS gateway

Some common US cellular carrier gateways are:

Verizon Wireless	@vtext.com
ATT	@txt.att.net
Sprint/Nextel	@messaging.nextel.com
Sprint PCS	@messaging.sprintpcs.com
T Mobile	@tmomail.net

Users should consult with their cellular carrier to obtain the correct address for their SMS gateway.

To configure the DPS-100D to send alerts as an SMS simply enter the number of the target phone followed by "@" and the SMS gateway into one of the EMAIL RECIPIENT fields on the EMAIL SETUP page of the DPS-100D browser interface.

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DPS-100D Application Note #2 Using Netbios Names with the DPS-100D

The DPS-100D supports Netbios name access. To access the DPS-100D using a Netbios name instead of an IP address the SENSOR NAME field must conform to the rules below and be unique on the local network.

The default sensor name is **BDI_DPS-100D** and is a legal Netbios name. It can be used in the browser URL window instead of the IP address:



If you have more than one DPS-100D or would like to use a name which reflects the station callsign or site you may do so as long as the name meets the following rules:

Names can be up to 15 characters including letters, numbers and the following special characters:

! @ # \$ % ^ & () - _ ' { } . ~

They may NOT contain any of the following characters:

\ * + = | : ; " ? < > ,

**To be a valid Netbios name it must NOT contain any space characters.
Netbios names are NOT case sensitive.**

If a Sensor Name is entered which is not a valid Netbios name it will be displayed in the SENSOR NAME field of DPS-100D GUI but they will NOT be able to access the sensor by typing the netbios name into the URL field of the browser.

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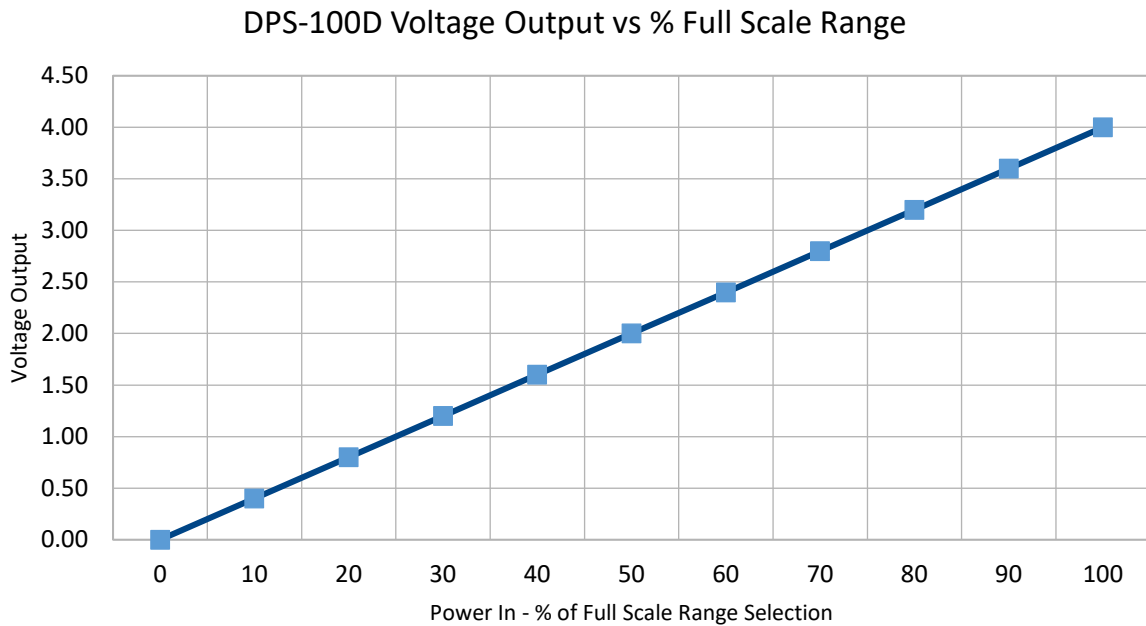


DPS-100D Application Note #3 DC Voltage Outputs

The DPS-100D provides voltage outputs which are proportional to the forward and reflected power being measured. The voltage output is 0 to 4.00V over a power input range of 0 to 100% of a “Full Scale” value selected by the user.

The transfer curve is therefore represented by the equation:

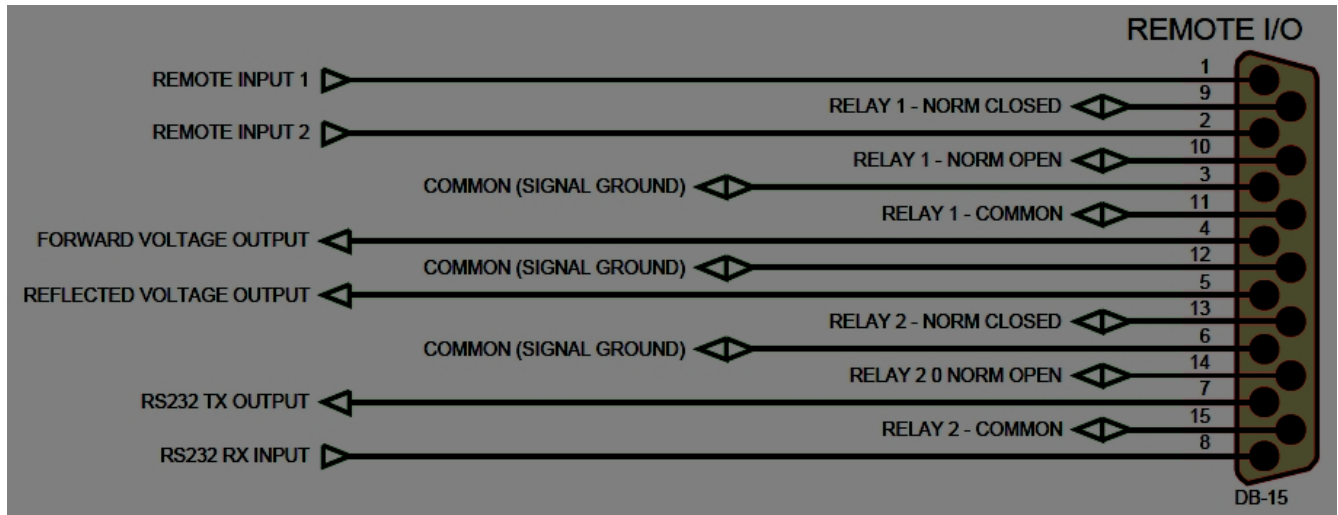
$$V_o = (P_{wr\ In} / \text{Full Scale Selection}) \times 4.00V$$



Full Scale Range Selections

1W	10W	100W	1KW	10KW	100KW
2.5W	25W	250W	2.5KW	25KW	250KW
5W	50W	500W	5KW	50KW	500KW

DPS-100D Remote Connector



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