



DSPM RF Power Monitor Installation and Operation

Document 095623-000, Revision A
November 2011

dbSpectra, Inc.
1590 E. Highway 121 Business
Building A, Suite 100
Lewisville, Texas 75056
Phone: 469.322.0080
Fax: 469.322.0079
www.dbspectra.com

DSPM RF Power Monitor
Document 095623-000
© 2011 dbSpectra, Inc.
Released November 2011

Revision	Date
A	10/31/2011

Table of Contents

Section 1 Product Description	5
1.1 Electrical Specifications	6
1.2 Mechanical Specifications	6
1.3 Dimensions and Mounting	7
1.4 Main Display	8
1.5 External Input/PIN Connections.....	8
1.6 Radio and Antenna RF Connections	9
1.7 PIM (Passive Intermodulation) Performance	9
Section 2 Local Setup	10
2.1 System Setup	10
Set Defaults	10
Calibrate Sensor	10
Key/Ext Input.....	11
Alarm Timers.....	11
Relay Output	11
Key/Unkey Timers.....	11
2.2 Limit Setup.....	12
High Power Limits	12
Low Power Limits.....	12
SWR Limits	12
High Temp Limits	13
Low Temp Limits	13
Key/Unkey Timers.....	13
Power Supply Limits	13
External Input (if Autokey Active)	13
2.3 Network Setup	14
DHCP Enabled/Disabled	14
Section 3 Network Interface	15
Appendices	19
Appendix A Cellular Carriers.....	20
Appendix B Alarm Notification	21
Appendix C SNMP.....	22
Appendix D USB.....	24
Appendix E Telnet.....	26
Terms And Conditions Of Sale	27

Section 1 Product Description

The DSPM Series of RF Power Monitors combines RF power sensing, display, monitoring and remote access into one compact package.

- Ethernet network capabilities for remote setup, status and control.
- Web server for browser access, Telnet, and SNMP for M2M applications.
- Warning and alarm notification via email, SMS and SNMP traps.
- Backlit LCD displays equipment failures: forward and reflected power¹, VSWR, power supply voltage, temperature (external sensor included), alarm status, keyed/un-keyed timers (push to talk/PTT line input)
- LED indicators for alarms, power, Ethernet send/receive.
- Analog FM, digital FDMA, CDMA radio transmitter compatible.
- Continuous measurement of forward and reflected power.
- Limit values are stored in non-volatile memory.
- Versatile DC power to battery backed sites.

Power Alarm Ranges

A	0-10 W
1	0-100 W
3	0-350 W
5	0-500 W

Connector
N Type N
D 7/16 DIN

D S P M - - - -

Frequency Range

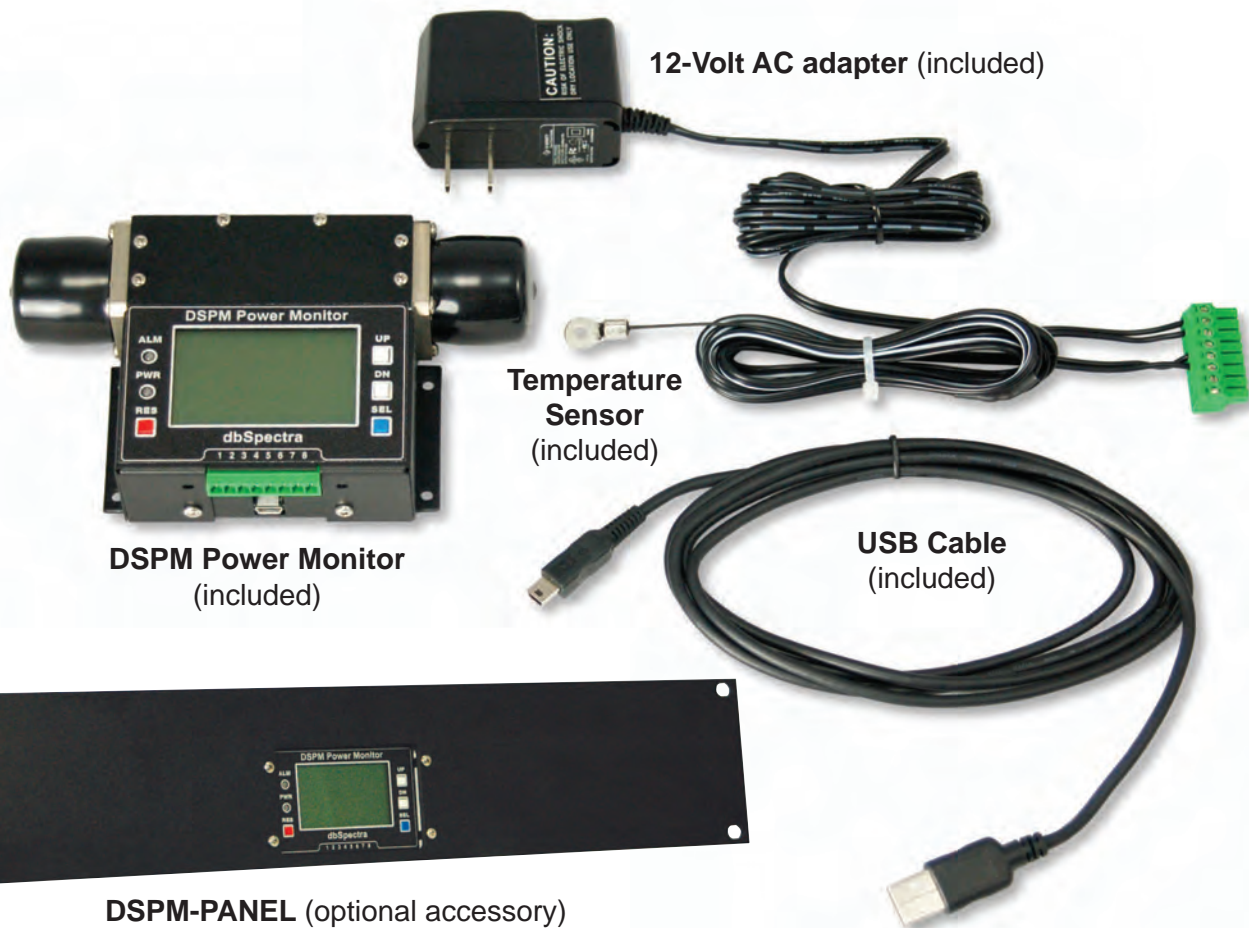
A	100-325 MHz
B	300-600 MHz
C	512-1000 MHz
D	1.8-2.7 GHz

Connector*

Female/Female	FF
Female/Male	FM
Male/Female	MF
Male/Male	MM**

*Left/right viewed from front
**NMM not available.

Product Naming Matrix
E.g., model number: DSPM3A-NFF



12-Volt AC adapter (included)

Temperature Sensor (included)

USB Cable (included)

DSPM Power Monitor (included)

DSPM-PANEL (optional accessory)

Single unit panel mount kit, 2 RU, 19-inch rack mount.
Not Included, must be purchased separately.

1. The monitor automatically assumes that the higher voltage represents forward power; reflected power is usually lower than forward power. Field calibrate forward and reflected power on system frequencies for best accuracy. Sensor can detect a wide frequency range, coupling will change over the band.

1.1 Electrical Specifications

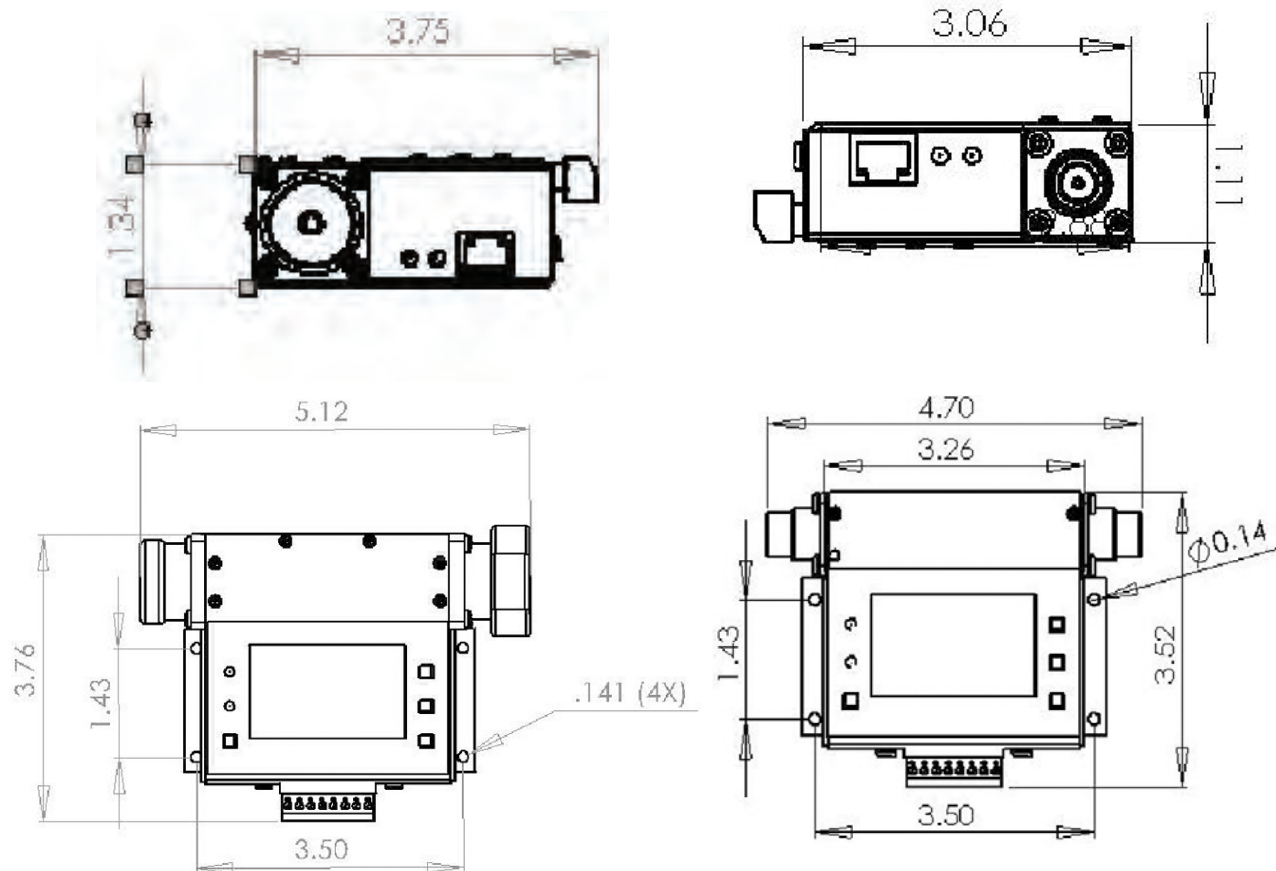
Frequency Range	100-325 MHz, 300-600 MHz, 512-1000 MHz, 1.8-2.7 GHz
Power Alarm Ranges (Watts)	0-500
Power Sensor	Bidirectional
Power Handling (Watts)	1000 maximum forward or reflective
Impedance (Ohms)	50
VSWR Alarm Range	1.0:1 to 24.9:1
Insertion Loss (dB)	<0.1
Sensor Passive IM (dBc)	-150 maximum
RF Power Resolution (Watts)	0.1, (0.01W for 0-10 W version)
Accuracy	2%, may require site calibration
Digital Input	One, pull to ground, PTT keyline
Output Relay	Form "C", 1 A @ 30 VDC
Temperature Range (Degrees)	-30 to +60 C, -20 to +60 C for LCD
Power Requirement	DC: 9 to 30 VDC < 1 Watt AC: 120 VAC, 50/60 Hz < 18 VA 12-Volt AC adapter is included or another DC source from 9-30 volts can be used.

1.2 Mechanical Specifications

Display	Backlit LCD
Mounting	Stand-alone or Cable
Construction / Finish	Steel / Black
RF Connectors	N or 7/16 DIN
USB Connector	USB-mini-B
Ethernet Connector	RJ-45 10/100, Base-T
Power, alarm out, PTT line in	8 port terminal block

1.3 Dimensions and Mounting

Connector	7/16 DIN	N
Width (in/cm)	5.12 / 13.0	4.70 / 11.94
Height (in/cm)	3.75 / 9.5	3.06 / 7.77
Depth (in/cm)	1.34 / 0.86	1.11 / 2.82
Net Weight (lb/kg)	1.5 / 0.68	1.5 / 0.68
Shipping Weight (lb/kg)	2.2 / 1.0	2.2 / 1.0

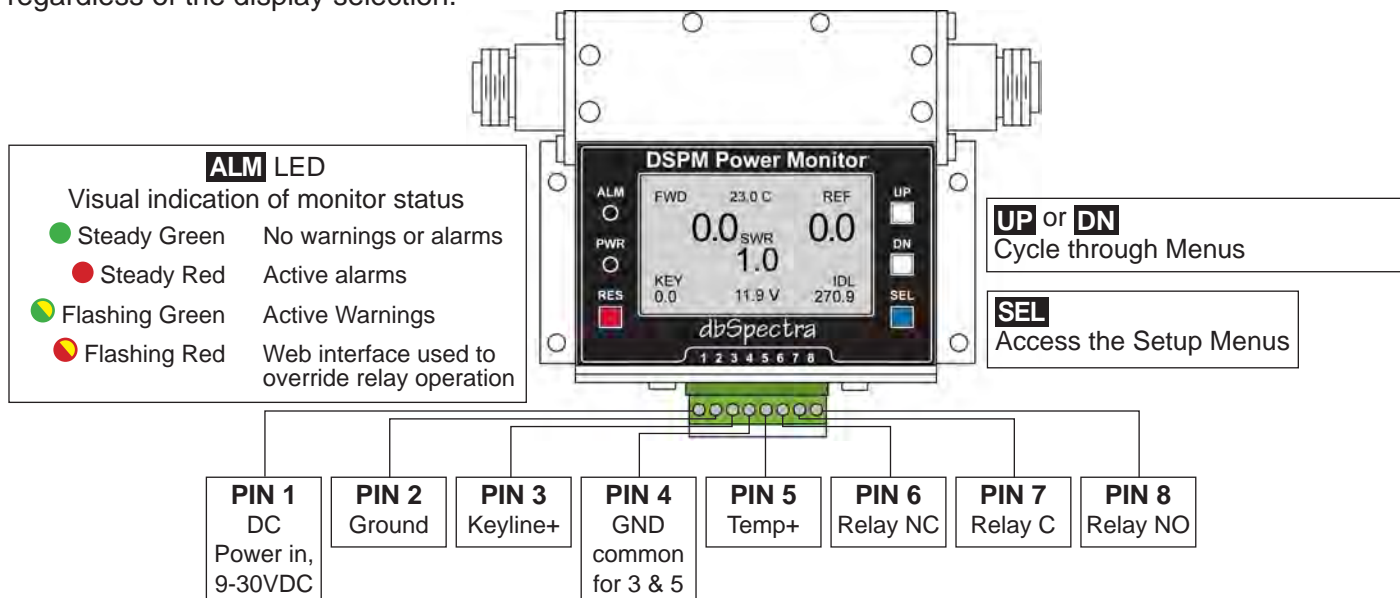


1.4 Main Display

The monitor has two basic display modes, status and setup. During normal operation the backlit LCD shows the Main Display. The Main Display shows forward and reflected power, Voltage Standing Wave Ratio (VSWR), power supply voltage, temperature (external sensor) and alarm status. If warnings or alarms are active, the parameter associated with it will be highlighted.

Front panel buttons are used for local and network setup and to adjust limits and clear alarms. Text menu setup and status are also available through the USB port and Telnet. USB and Telnet can be used with Hyperterminal (or similar).

If the monitor is left on any display for more than five minutes without a key press the display will automatically return to the main display. After one hour without key presses the display will change to screen saver mode and turn off the backlight. Pressing any button returns to the main display. All monitoring functions continue regardless of the display selection.



1.5 External Input/PIN Connections

Note: The power monitor may be powered on to limited testing and setup before making other connections. Be sure to power down the DSPM prior to making any other connections. Make all connections desired before plugging in the AC adaptor.

The striped lead on the supplied AC adaptor is positive and should be connected to PIN 1 on the monitor. The other wire should connect to PIN 2.

PIN 3/Keyline+ or push to talk (PTT) line can also be used as a general-purpose alarm input. In either case, it requires a pull-to-ground source, such as relay contacts or an open-collector transistor. Switching is at ≈ 1 Volt. Consult the manual for the radio equipment used to locate an appropriate key line (PTT) point.

PIN 5/Temperature sensor, supplied with monitor, is a negative temperature coefficient (NTC) thermistor type. Maximum current from this terminal is ≈ 300 microAmps. The thermistor is electrically isolated from the mounting ring and is not polarity sensitive. The supplied lead length is two meters, and can be cut shorter if desired. We do not recommend cutting the thin black leads at the sensor since they are somewhat delicate, but the larger diameter leads can easily be modified.

NO-NC, normally open or closed, functionality is reversed if NC is selected in software.

1.6 Radio and Antenna RF Connections

Be sure to power down all radio equipment and the DSPM before making RF connections to the DSPM. Using proper connectors and coaxial cable type, the radio equipment transmitter output port or transmitter combiner output port should be connected to the input port of the DSPM. The output port should be connected to the system antenna or, if used on the input to a transmitter combiner, the input port for the proper combiner channel.

Ensure RF connectors are properly tightened before reapplying power to equipment and proceeding with the DSPM setup.

Note: It is highly recommended that a proper antenna transmission line lightning protection device be installed and properly grounded at the facility entrance point on the antenna transmission line going to the DSPM (and other radio equipment). The radio equipment to which the DSPM is connected should also be properly grounded.

1.7 PIM (Passive Intermodulation) Performance

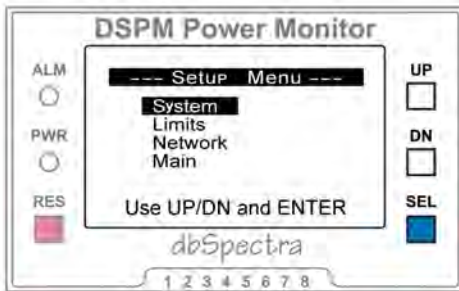
To achieve optimum PIM performance, the DSPM model with DIN connectors must be used in the installation. In addition the complete TX network must have DIN connectors throughout the complete TX network path.

Consult dbSpectra for jumper cables.

Section 2 Local Setup

Setting up the monitor through the Main Display.

2.1 System Setup



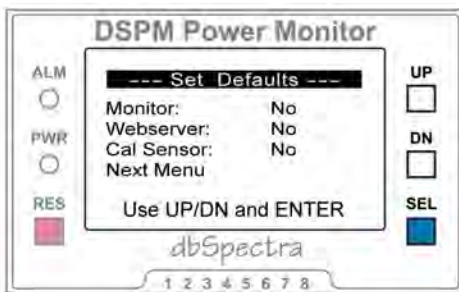
From the Main Display, press the **SEL** button to access the Setup Menu. From the Setup Menu, use **UP** and **DN** buttons to highlight **System**. Press **SEL**.

To change a sub-item value, use **UP** and **DN** buttons to highlight item. Press **SEL**.

Use **UP** and **DN** buttons to adjust settings. Press **SEL**.

Use the **UP** and **DN** buttons to select **Next Menu**. Press **SEL** to save.

Note: To change a value rapidly, press and hold **UP** or **DN** button. The value will increment or decrement at a faster rate.



Set Defaults

Reset **Monitor** and/or **Webserver** processors to default settings.

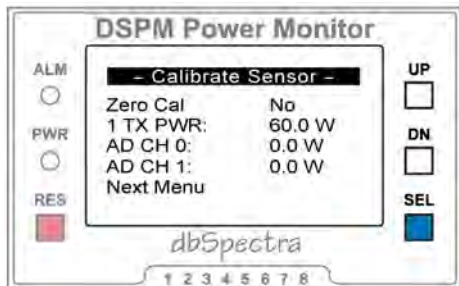
Use the **UP** and **DN** buttons to highlight **Monitor** or **Webserver**. Press **SEL**.

Use the **UP** and **DN** buttons to choose **Yes** or **No**. Press **SEL**.

Yes - reset to default settings

No - do not reset to default settings

Note: Monitor processes analog information and provides display and alarming. Webserver processes networking and USB operations. Selections will be applied when **Next Menu** is selected.



Calibrate Sensor

From **Set Defaults Menu** use the **UP** and **DN** buttons to highlight **Cal Sensor**. Press **SEL**.

Access **Calibrate Sensor** menu from **Set Defaults** menu by highlighting **Cal Sensor** setting to **Yes**. Press **SEL**.

Verify that the RF power source is un-keyed (no power). Connect an inline wattmeter in series with the monitor.

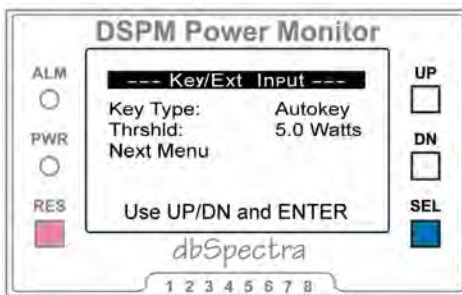
Change **Zero Cal** to **YES**, then press **SEL**.

This will store the zero sensor outputs as a zero power reference.

Note: Verify that no RF power is applied during **Zero Cal**.

Highlight the **1 TX PWR** value. Use the **UP** and **DN** buttons to set the value to something at or slightly above the normal single transmitter power value. This is used to compensate power readings in multi-carrier systems. For single carrier systems simply set this value to maximum.

Key the RF power source. **AD CH 0** and **AD CH 1** are the raw input readings. Use the **UP** and **DN** buttons to adjust the higher reading to match actual forward power, and the lower to reflected. **Note:** the monitor RF connections can also be reversed to calibrate reflected power if desired. In this case, the reverse detector becomes the forward detector.



Key/Ext Input

There are two methods to generate a keyline signal in the monitor.

First Method

Connect an external pull-to-ground keyline to the external input/PIN 3.

Use the **UP** and **DN** buttons to highlight **Key Type**. Press **SEL**.

Use the **UP** and **DN** buttons to choose **Keyline**. Press **SEL**.

Use the **UP** and **DN** buttons to highlight **Active**. Press **SEL**.

Use the **UP** and **DN** buttons to choose **High** or **Low**. Press **SEL**.

Second Method

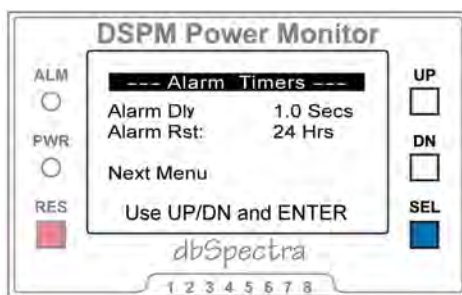
Allow monitor to assume key whenever forward power is at or above a threshold power level.

Use the **UP** and **DN** buttons to highlight **Key Type**. Press **SEL**.

Use the **UP** and **DN** buttons to choose **Autokey**. Press **SEL**.

Note: This can be used when an external keyline (PTT) is not available, or when the input needs to be used as a general-purpose alarm.

The disadvantage is that a dead PA may not be immediately apparent. However, On and Off timers have been provided to solve this (see under Limit Setup).

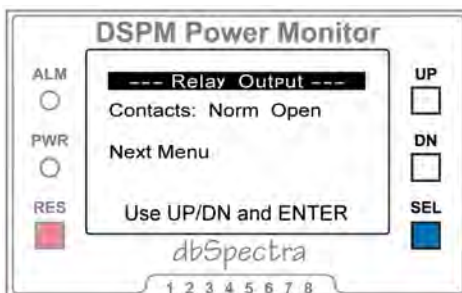


Alarm Timers

This is an overall delay, set in tenth-seconds, applied before any warning or alarm condition is considered valid. The warning or alarm condition must be present continuously for this period before action will be taken. This is provided to eliminate false alarms due to transient conditions, PA warm-up, etc. **Note:** When the keyline (PTT) input is used as a general purpose input it has a separate timer adjustable from seconds to hours.

Once an alarm has been generated, it will persist until either it has been cleared manually through the **RES** button, through the web interface, or until **Alarm Rst** hours have elapsed since the last occurrence.

Note: Alarm reset will extend as long as the alarm condition persists.



Relay Output

In normal operation the alarm relay is de-energized when there are no alarms, and NO-C-NC act per the pin definitions.

Selecting **Norm Closed** will cause the relay to be energized in the no alarm state. This can be used to detect a complete power loss to the monitor, since without power the relay will be de-energized. This setting will reverse the NO and NC pin definitions.

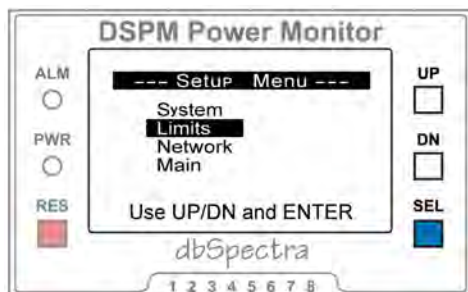


Key/Unkey Timers

Master key/unkey times are read only, and accumulate over the life of the monitor. User timers can be reset through the web or USB interface. For both, the monitor keeps track of the amount of time, in tenth-hours, that it is keyed or idle. Adding the two provides the total time that the monitor has been powered, or since the last user timer clear.

2.2 Limit Setup

Setting warning and alarm limit values for measured and calculated parameters. Exceeding a warning level will not activate the alarm relay, while exceeding an alarm level will. If enabled, both warnings and alarms can trigger email (or SMS) notification and SNMP traps (see Section 3, Network Interface). Unless disabled, the relay output will also be activated by alarms.



From the Main Display, press the **SEL** button to access the Setup Menu. From the Setup Menu, use **UP** and **DN** buttons to highlight **Limits**. Press **SEL**.

To change a sub-item value, use **UP** and **DN** buttons to highlight item. Press **SEL**.

Use **UP** and **DN** buttons to adjust settings. Press **SEL**.

Use the **UP** and **DN** buttons to select **Next Menu**. Press **SEL** to save.



High Power Limits

Set the high forward power warning and alarm levels.

To disable a high limit, set it to the maximum value.

This effectively removes the limit by ensuring that it cannot be exceeded.

Maximum values are determined by the power range

Model	Maximum Value
10 Watt	9.99 Watts
100 Watt	99.99 Watts
350 Watt	249.99 Watts
500 Watt	499.99 Watts



Low Power Limits

Set the low forward power warning and alarm limits.

To disable a low power limit, set it to the minimum value (0.0 Watts).



SWR Limits

Set the high VSWR warning and alarm limits.

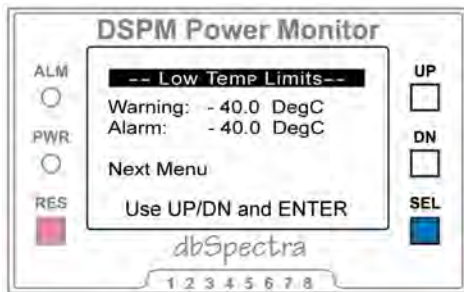
To disable a SWR limit, set it to the maximum allowed value (24.9:1).



High Temp Limits

Set the high temperature warning and alarm limits.

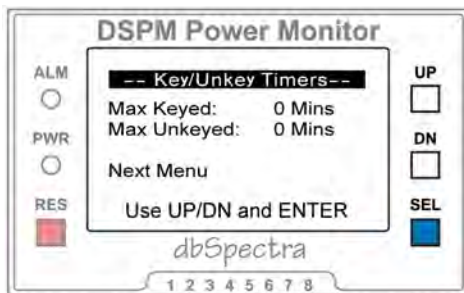
To disable a limit, set it to the maximum allowed value (+85 DegC).



Low Temp Limits

Set the low temperature warning and alarm limits.

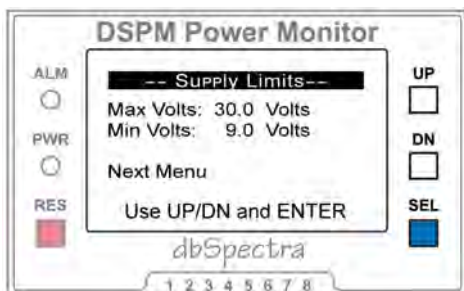
To disable a low temperature limit, set it to the minimum allowed value (-40 DegC).



Key/Unkey Timers

Set the maximum allowed times, in minutes, for the transmitter to be keyed or unkeyed continuously. On/Off timers generate alarms only, and will activate the relay (if not in manual mode).

To disable either limit, set it to zero.



Power Supply Limits

Set the high and low power supply warning levels. Supply limits will generate warnings only (and notifications if enabled) but will not activate the relay.

To disable a limit, set it to the maximum (40.0 Volts) or minimum (0.0 Volts) allowed value respectively.



External Input (if Autokey Active)

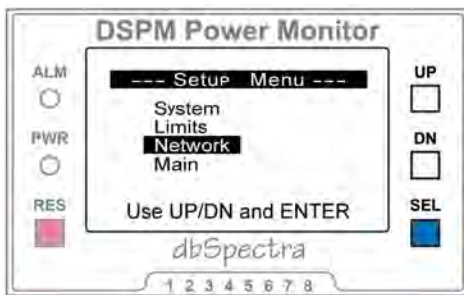
This item will only appear if the Key Type (see System Setup) is set to Autokey. The external input then becomes a general purpose alarm input. To set up, set the active state to High or Low as required. The input is internally pulled high, so typically the alarm state will be pull-to-ground (active low). Next, set whether this input should trigger a warning or an alarm notification. A warning will not activate the relay output, whereas an alarm will. Either can generate notifications if enabled.

Finally, set the delay interval. The external input uses a separate timer from parameter alarming. This allows the input to be used, for example, as a door open timer, where leaving a door open for too long triggers a warning. The delay timer interval can be set to either seconds or minutes.

2.3 Network Setup

Setting up the monitor remotely through the web interface or through the USB port. Remote programming requires a network connection and a web browser. This is not meant to be an exhaustive network setup screen, just a minimum to establish connectivity. This then will allow more detailed setup using a browser on a computing device.

The default setting is DHCP enabled, which will provide for an initial connection on most networks. The default hostname will be DSPM. In most systems the monitor can be accessed using the IP address by entering it into the browser's address window (ex. http://192.168.1.128).



From the Main Display, press the **SEL** button to access the Setup Menu. From the Setup Menu, use **UP** and **DN** buttons to highlight **Network**. Press **SEL**.

To change a sub-item value, use **UP** and **DN** buttons to highlight item. Press **SEL**.

Use **UP** and **DN** buttons to adjust settings. Press **SEL**.

Note: It is best to disconnect the Ethernet cable until Network Setup has been applied.



DHCP Enabled/Disabled

If enabled, DHCP allows the network processor to obtain an IP address, net mask, and name server settings automatically. Once set, the network settings menu will show these values. Any changes made will be over-ridden by the network router. Note that after connecting the Ethernet cable it can take from a few seconds to a minute to obtain an IP address, depending on the system.

IP Address

Set a fixed IP address for the monitor, when DHCP is disabled.

Use **UP** and **DN** buttons to highlight **IP**. Press **SEL**.

The monitor will sequentially highlight each field of the IP address.

Netmask

Set a fixed netmask for the monitor, when DHCP is disabled.

Use **UP** and **DN** buttons to highlight **Mask**. Press **SEL**.

The monitor will sequentially highlight each field of the netmask.

Web Server Port

The default port for the web server is 80. If blocked, forward to another port. Any port from 1 to 65535 can be set.

To adjust, use **UP** and **DN** buttons to highlight **Port**. Press **SEL**.

Save

Use **UP** and **DN** buttons to highlight **Save**. Press **SEL**.

Use **UP** and **DN** buttons to select **Yes**. Press **SEL**.

This will save the settings to the network processor and reboot the web server. It may take a few seconds to more than a minute for the network registration to complete.

Section 3 Network Interface

The network interface module is an independent sub-system communicating internally with the monitor module. It provides remote access to status and setup information, as well as remote alarm notifications. Externally, the monitor connects to an Ethernet network through the RJ45 jack.

The two LEDs incorporated into the Ethernet jack show network link (green) and activity (yellow). In addition, there are two LED indicators next to the jack. The one closest shows the module's processor status, while the other LED shows the status of the internal communications bus with the monitor module. Green indicates that the modules are operating normally, while red indicates a problem.

Status and setup for both the monitor and network modules are available through a series of web pages served by the network module, or through the USB port using a terminal emulative program such as Hyperterminal (or similar). Once the unit's IP address is assigned, a web browser (or Telnet program) can be used for access. By default DHCP is enabled, which allows the network router to assign the module an IP address. To see what this address is, navigate to the monitor's network display (see Section 2.3 Network Setup) or look on your router's list of device address assignments.

Once the IP address and port are known, the module can be accessed with a web browser. In the browser address window, enter `http://192.168.1.128` (substitute the actual address). If a port other than 80 is set, append it to the address with a colon (Ex, `http://192.168.1.128:1234`).



Pages are accessed through the menu buttons at the left of the page.

Current Status (index.htm)

This is the default page shown when initially accessing the web server. This page shows an overview of monitored parameters, alarm status and user key/unkey times. Actual values are continually updated to virtual real-time between the webserver and browser through AJAX. Warnings and alarms are indicated in parentheses next to the values. See Appendix C Warnings for a full list of warning and alarm character definitions.

Key State (PTT) shows the current keyed or unkeyed state of the monitor. Next to this is the amount of time since the last state change. Each state change restarts this timer at 0.

Alarm Status

This page contains the information on the main status page, plus a list of any active warnings or alarms, plus historical highs and lows for each parameter, and user key and unkey times. It also contains a button for clearing all warnings and alarms. This will also clear high/low values.

! The following menus have restricted access.
default username: admin
default password: aksol

Site Setup

Each site can be assigned a unique name and site ID number. These will be used to identify the site in warning and alarm notifications.

There are two global monitor setup values available from this page. They are System Alarm Delay and Alarm Reset Time. The relay's normal output state can be set as normally open or normally closed. Auto relay operation can also be over-riden and the relay manually set on or off. This feature is only available from the web interface. When the relay is in override (manual) mode the monitor's alarm LED will flash red.

When any site setup values are changed, "Save Site Setup" must be used to store the new values.

Master and user key/idle timers are shown at the bottom of this page. Master timers are the total accumulated key (PTT) and unkey times since the monitor was new, while user timers can be cleared (reset) using the "Clear User Timers" button.

External Input Setup

There is an input available on the monitor's power connector that can be used in one of two ways. If an external keyline is available, it can be connected and enabled here. It can then be used in an active-high or active-low mode.

If Autokey is used to internally key the monitor, the external input can be used as a general purpose warning or alarm input. It can have a separate delay period set, in seconds or minutes, before it will trip. For example, if this input is connected to a door sensor, it could be used to indicate entry to a facility (short delay) or as a "door left open" alarm (long delay). This can then generate either a warning or an alarm.



Limit Setup

Measured parameters can have both warning and alarm levels assigned. Exceptions are voltage, which generate warnings only, and On/Off timers, which generate alarms only. Both types will send notifications (if enabled), but only alarms will activate the monitor's alarm relay.

This page can be used to set levels for each type of warning/alarm. Once the desired values are entered, press "Save Limits" to activate them.

Notifications

Both warnings and alarms will generate remote notifications if email addresses are entered. This page allows setup of the email server, email recipients, and text message recipients. To disable email and/or SMS reporting, simply leave the recipient addresses blank.

A default mail server option is provided to assist in initial setup of the monitor. This will attempt to send messages through the AKSolutions server. This is not meant as a permanent solution, but is provided for convenience. Availability may not be maintained. Contact your system administrator for the correct settings for your mail server.

Note: "From" specifies the name that will appear in the From field of any email messages sent.

Email and SMS reporting are handled similarly, except that text messages are truncated to accommodate the general SMS limit of 110/160 characters. Email messages contain the sitename/sitenummer and IP address, as well as a snapshot of monitor conditions, while SMS messages contain only the sitename and an abbreviated list of warnings and alarms.

SMS messages make use of a cellular carrier's email-to-SMS portal. In most cases, the format for the text messaging service is `phonenumber@carrier.com`, and is specific to the particular cellular carrier. In order to set up text messages the carrier for a phone must be known, as well as the carrier's text to email address. See Appendix A for a list of some common carrier addresses; carriers may change addresses at any time.

Save Mail Settings must be used to store any changes. Send Test Email and Send Test SMS will also store any changes and generate test email and SMS notifications respectively.

Additional information can be found in Appendix B.

SNMP Setup

This allows configuration of the SNMP agent functionality in the monitor. Listen Port specifies the port that the monitor uses to "listen" for poll requests from the Network Management System (NMS).

Read and Write communities are used as part of poll request authentication from an NMS. Up to three of each can be assigned, maximum 8 characters each. Any community names that aren't needed should be left blank.

Traps are used to notify the NMS of warnings or alarms. Up to two NMS addresses can be assigned. Local Trap Send Port is the port used by the monitor to send traps from. Each trap receiver also has a setting for the IP address, port and community to send to.

Save SNMP Config must be used to save any changes on this page. Send Test Trap will also save any changes as well as send a test trap to enabled trap receivers.

Additional information on the SNMP agent can be found in Appendix C.

Network Setup

This allows setup of the network interface module for use on a network. Use care when changing since incorrect settings may cause the board to lose network connectivity. If this happens, it can only be corrected using the USB or LCD menus locally. Please refer to your local network administrator for the correct values. See Section 2.3 Network Setup for recovery options.

If DHCP is enabled, the network will automatically assign these values, and they will be shown in the grayed boxes. We recommend that on first use DHCP be enabled, letting the network fill in all of the network setups. If required, turning DHCP off will fix the monitor at a known IP address.

This page allows for changing the default username and password. If changed, and then forgotten, it will not be possible to access the setup pages for this monitor. In this case, the monitor can only be recovered by using the “set defaults” function locally.

The default hostname can also be changed. By setting a new hostname the monitor can be accessed by this name rather than the IP address. The format is `http://hostname`.

Telnet Port specifies the port to use for Telnet access to menus. The default is port 23.

Pressing the “Save Network Setup” button will cause the module to execute a reboot and apply the new settings. If the IP address or web server port changed it will also need to be changed in the browser.

Appendices

Appendix A Cellular Carriers

Carrier Email-SMS Addresses

Below is a list of some common cellular carrier's SMS portals.

AT&T	phonenumber@txt.att.net
Sprint	phonenumber@messaging.sprintpcs.com
T-Mobile	phonenumber@tmomail.net
Cingular	phonenumber@cingularme.com
Verizon	phonenumber@vtext.com
Nextel	phonenumber@messaging.nextel.com
Virgin Mobile	phonenumber@vmobl.com
US Cellular	phonenumber@email.uscc.net
SunCom	phonenumber@tms.suncom.com
Powertel	phonenumber@ptel.net
AllTel	phonenumber@message.alltel.com
Metro PCS	phonenumber@MyMetroPcs.com

Please note that these addresses may change without notice. You should consult your carrier's website for the most up-to-date information.

The monitor submits warning/alarm messages as if they were emails, in SMTP format. Messages are abbreviated so as to fit the general limit for SMS message size.

Appendix B Alarm Notification

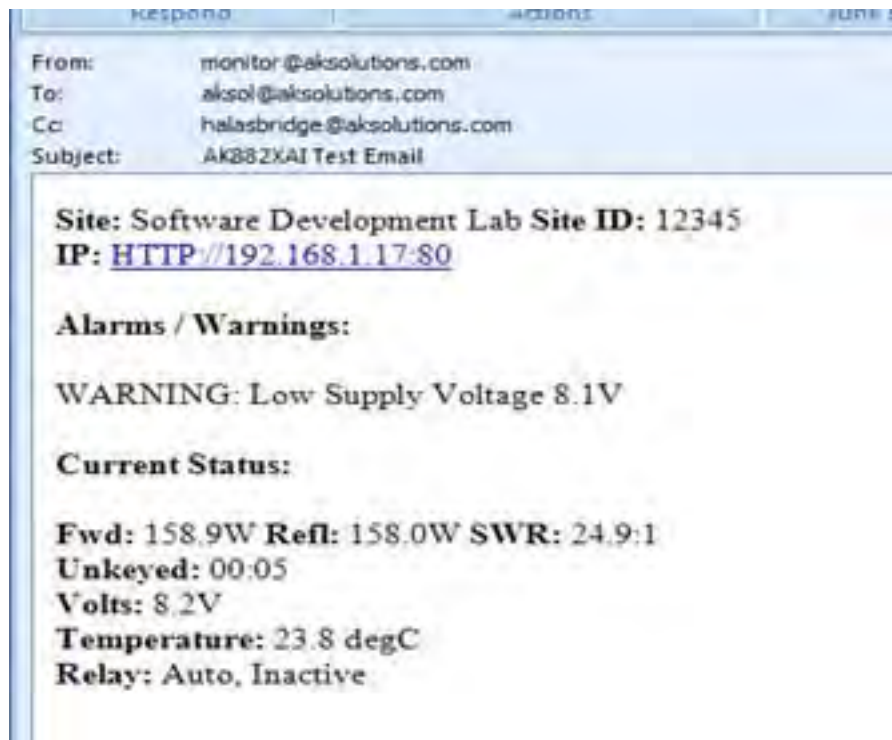
In addition to the alarm output relay, the monitor can send warning and alarm notifications via email and SMS. Both types make use of an SMTP email server. Contact your network administrator for the correct mail server settings.

Email

The DSPM monitor can send email warning and alarm notifications to up to four recipients. To disable reporting, simply leave the "To" and "CC" fields blank. **Note:** leaving the "To" field blank automatically disables reporting for that "CC".

Below is a sample email:

SMS



The DSPM monitor can also send warning and alarm notifications as text messages to up to four recipients. It does this by making use of a cellular carrier's email-to-SMS system, which is specific to the carrier. Messages are abbreviated to comply with most SMS restrictions.

To disable SMS reporting, simply leave the "To" fields blank.

Below is a sample text message:

FRM:monitor@aksolutions.com
SUBJ:AK883X Alarm
MSG:AKSolutions Test Site -- *OFF TIME ALM*

Appendix C SNMP

The network module includes an SNMP v2c agent, and supports up to two trap recipients. At present, any warning or alarm generates a single trap type. After the initial notification, the same alarm will not generate a new trap for Alarm Reset time, but new alarms will generate a new trap notification immediately.

Data types are specified in the DSPM.mib file, which can be downloaded from the monitor on the SNMP setup page or the dbSpectra website <http://www.dbspectra.com/resources/DSPM.zip>

Polled data is generally sent as type DisplayString, with units of measure appended. For example, forward power (OID 1.3.6.1.4.1.32762.3.1) is returned as "xx.x WATTS".

Warnings (OID 1.3.6.1.4.1.32762.3.7) and alarms (OID 1.3.6.1.4.1.32762.3.6) are represented by single strings, with upper-case characters for alarms and lower-case for warnings.

SNMP Alarms & Warnings		
Type	Alarm	Warning
High forward power	H	h
Low forward power	L	l
High VSWR	S	s
High Temperature	T	t
Low Temperature	T	t
High Volts	v	v
Low Volts	v	v
On Time Exceeded	N	
Off Time Exceeded	F	
External Input	*E	*e

Example Alarm string: LSE
 Example Warning string: htv
Note: if no alarms are active, the string will read "NONE" or "none".

*Type is user-set. Only one type will be reported

Data sent via trap are all type INTEGER.

Traps (in order)		
SITE_NUM	Site ID number	OID 1.3.6.1.4.1.32762.2.3
ALARMS	Bit-mapped current alarms	OID 1.3.6.1.4.1.32762.3.16
WARNINGS	Bit-mapped current warnings	OID 1.3.6.1.4.1.32762.3.17
FORWARD	10x the actual forward power value	OID 1.3.6.1.4.1.32762.3.11
REFLECTED	10x the actual reflected power value	OID 1.3.6.1.4.1.32762.3.12
VSWR	10x the actual swr value	OID 1.3.6.1.4.1.32762.3.13
TEMPERATURE	10x the actual temperature power value plus 400. This allows for a negative temperature to be sent as an unsigned integer. Sent value ≥ 400 : actual temperature (value – 400) / 10.0 Sent value < 400 : actual temperature $-((400 - \text{value}) / 10.0)$	OID 1.3.6.1.4.1.32762.3.14
VOLTS	10x the actual volts value	OID 1.3.6.1.4.1.32762.3.15

Both alarms and warnings use the same bit-map definitions, although not all types include both. For example, power alarms have both warning and alarm levels available, while voltage limits generate only warnings.

Bit Definitions	
0x0001	LOW POWER
0x0002	HIGH POWER
0x0004	HIGH VSWR
0x0008	LOW TEMPERATURE
0x0010	HIGH TEMPERATURE
0x0020	ON TIME EXCEEDED
0x0040	OFF TIME EXCEEDED
0x0080	EXTERNAL ALARM
0x0100	HIGH VOLTS
0x0200	LOW VOLTS

For example, an ALARM value of 5 means that both LOW POWER and HIGH VSWR alarms are active. A warning value of 16 indicates a HIGH TEMPERATURE warning.

Appendix D USB

The USB 2.0 port on the DSPM makes use of standard Windows drivers for emulating a serial channel.

The driver file, DSPM.inf, can be downloaded from the monitor on the network setup page of the dbSpectra website <http://www.dbspectra.com/resources/DSPM.zip>

The DSPM.inf driver file simply specifies which Windows system files to use, and does not install any additional files. By using the serial emulation drivers, the monitor simply appears to be a serial device, allowing Hyperterminal or similar terminal emulation software to be used.

When connected, access to status and setup is through a monitor-generated menu system. Initially, the Main Menu is displayed:

-- DSPM Main Menu --

1. Current Status
2. Network Setup
3. Site Setup
4. External Input Setup
5. Limit Setup
6. Notification Setup
7. SNMP Setup
8. Diagnostics

Selection is made using the number at the left of the screen, then pressing enter. In general, the line item number followed by enter is used to select that item's menu. Also, pressing <ESC> will step up one menu level.

-- Current Status --

Status gives a snapshot of current conditions

```
Master Key/Idle..451:22:58 / 533:14:12
User Key/Idle....20:50:51 / 94:51:41
Key State .....Idle
Forward .....46.6 Watts ()
Reflected .....1.9 Watts
SWR .....1.5 :1 ()
Temperature .....19.6 degC ()
Power Inp. ....12.2 Volts ()
Relay .....Inactive
C. Clear Alarms
M. Main Menu
```

C -- Clear Alarms

Any alarms or warnings are indicated next to their associated parameter within parentheses. Pressing "C", then enter will clear any active alarms. If the alarm condition is still present the alarm will re-occur.

Using "M" then enter, or <ESC> will return to the Main Menu.

-- Network Setup --

Network Setup through SNMP Setup are described in previous sections.

1. Network.....OFF
 2. Notifications.....OFF
 3. SNMP.....ON
 4. Telnet.....OFF
- M. Main Menu

-- SNMP --

For example, enabling SNMP diagnostics will display the following during trap generation:

Found trap notification
Get Timer Info

Check Trap 1 Enabled
Set up for trap send
SendNotification
State SM_PREPARE
Send Notification Waiting
SendNotification
State SM_NOTIFY_WAIT
ARP is resolved
SNMPsNotifyReady is ready
Open send success, move to var list
Send alarm flags
Send warning flags
Send forward power
Send reflected power
Send SWR
Send temperature
Send volts
Var list done, finish this trap

In the same manner, enabling diagnostics for Network, Notifications and Telnet will give similar progress messages. If not manually disabled, diagnostics will automatically turn off after 12 hours.

-- Diagnostics --

Allows specific functions to report progress or failure information as appropriate. This is intended for use in troubleshooting initial installations. To enable a function's diagnostic mode, select that function, thereby toggling between "OFF" and "ON".

Appendix E Telnet

Telnet allows a serial-like connection through a network. Most browsers support Telnet (possibly through add-ons or system functions). Hyperterminal can also be used by selecting TCP/IP Winsock, then entering the IP address of the monitor. By default, port 23 is used, but can be changed under Network Setup.

When connected, the monitor supplies the same menus as for USB, with an additional item from the Main Menu for disconnect. Functionality is identical to connecting through USB. Closing the connection in Hyperterminal will also close any Telnet sessions.

On connection, the Main Menu will be displayed:

AKSolutions Telnet Server 1.1

-- DSPM Main Menu --

1. Status
2. Network Setup
3. Site Setup
4. External Input Setup
5. Limit Setup
6. Notification Setup
7. SNMP Setup
8. Diagnostics
- X. Exit Telnet Session

TERMS AND CONDITIONS OF SALE

These Terms and Conditions of Sale ("Terms") govern the sale of Products and Services provided by dbSpectra, Inc. ("dbSpectra"). "Product" means any hardware or consumables sold under these Terms. "Service" means any standard support service to support Products or training. "Specifications" means technical information about Products published by dbSpectra and in effect on the date dbSpectra ships the order.

1. QUOTATIONS AND ORDERS

- a) All orders are subject to acceptance by dbSpectra. Orders are governed by the applicable trade term specified on the quotation or agreed to by dbSpectra as defined in Incoterms 2000.
- b) Only written quotations are valid and are acceptable within 30 days only, unless otherwise extended in writing. Quoted shipping costs are best estimates only.
- c) Prices exclude any applicable sales, value added or similar tax payable by Customer.
- d) Prices are subject to change without notice.
- e) All orders are subject to the approval of the dbSpectra Credit Department. If credit is not approved, shipment of the ordered Product can only be made with terms of Cash in Advance. No COD orders will be accepted. Credit card purchases are subject to prior authorization by the credit card company.
- f) Verbal orders are valid only at the prices stated on the most current price list in effect at the time of the order. An order becomes officially accepted when acknowledgement is forwarded to the Customer.
- g) Payment terms are stated in the quotation or acknowledgment documentation, and are subject to change if Customer's financial condition or payment record merits such change. dbSpectra may discontinue performance if Customer fails to pay any sum due, or fails to perform under this or any other dbSpectra agreement if, after ten (10) days written notice, the failure has not been cured.

2. SHIPMENTS AND DELIVERY

- a) All prices shown on the price list are EXW dbSpectra factory in Lewisville, Texas. Title to Products will pass to Customer upon shipment.
- b) Prices include domestic packaging. Export packaging, if requested, is an additional charge.
- c) Acceptance occurs upon delivery to Customer.
- d) Shipments are made freight prepaid and freight is billed subsequent to shipment unless otherwise specified by Customer.
- e) Customer's routing will be used when practicable. Shipments will be routed by dbSpectra's best judgment if the carrier specified by the Customer cannot be utilized. dbSpectra is not responsible for selecting lowest cost or fastest routing.
- f) dbSpectra will not be liable for contractual obligations due to delays in shipping.

3. CLAIMS AND RETURNS

- a) Claims for damaged or lost Product while the Product is in transit must be made immediately by the Customer against the carrier. UPS shipment claims for damage or loss of Product may be made by dbSpectra.
- b) Claims for shortages in Product shipment must be made within 30 days from date of shipment from dbSpectra's plant.
- c) Product returns are subject to dbSpectra approval and applicable charges.
- d) No Product returned to dbSpectra for any reason will be received or accepted by dbSpectra without written authorization. All shipping charges on returned Product must be prepaid by the Customer. In no event will dbSpectra be liable for consequential damages, installation costs or other cost of any nature as a result of the use of the Products manufactured by dbSpectra, whether used in accordance with instructions or not. dbSpectra will not be responsible for any Product returned without dbSpectra's prior written authorization or for Product shipped freight collect.
- e) If due, credit not exceeding 75% of the original price will be allowed on unused Product, provided it is returned prepaid in new condition within sixty (60) days of shipment. Credit is only issued to the original purchaser and not to any subsequent owner.
- f) All non-standard catalog items are considered SPECIAL and are NON-CANCELLABLE and NON-RETURNABLE.

4. WARRANTY

dbSpectra warrants that, at the time of shipment, the products furnished by dbSpectra are free from defects in material and workmanship. dbSpectra's obligation under this warranty is limited to replacement or repair of such products within one year from the date of shipment. No products will be accepted for replacement or repair without prior written approval. Replacement or repair (dbSpectra's option) will be made only after examination at dbSpectra's Lewisville, Texas plant shows defective material or workmanship that occurred at the time of manufacture. THIS WARRANTY IS THE ONLY WARRANTY MADE BY DBSPECTRA AND IS GIVEN EXPRESSLY AND IN PLACE OF ALL OTHER EXPRESS OR IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSES. DBSPECTRA IS NOT LIABLE FOR ANY OTHER DIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, INCLUDING WITHOUT LIMITATION, INSTALLATION COSTS, INCONVENIENCE, RENTAL OF REPLACEMENT EQUIPMENT, LOSS OF PROFITS OR OTHER COSTS OF ANY NATURE AS A RESULT OF THE USE OF THE PRODUCTS MANUFACTURED BY DBSPECTRA, WHETHER USED IN ACCORDANCE WITH INSTRUCTIONS OR NOT. Certain products may have EXTENDED LIMITED WARRANTY. Consult the Terms and Conditions printed in the current published price list.

5. LIMITATION OF LIABILITY AND REMEDIES

- a) In no event will dbSpectra or suppliers be liable for special, incidental, indirect or consequential damages (including downtime costs, loss of data, restoration costs, lost profits, or cost of cover) regardless of whether such claims are based on contract, tort, warranty or any other legal theory, even if advised of the possibility of such damages. This exclusion is independent of any remedy set forth in these Terms.
- b) To the extent that limitation of liability is permitted by law, dbSpectra's liability to Customer is limited to US \$1,000,000.
- c) The remedies in these Terms are Customer's sole and exclusive remedies.

6. GENERAL

- a) dbSpectra will store and use Customer's personal data in accordance with dbSpectra's Privacy Statement. dbSpectra will not sell, rent or lease Customer's personal data to others.
- b) dbSpectra reserves the right to modify equipment and change specifications without notice, provided the modification does not materially effect the performance of Product manufactured by dbSpectra.
- c) Disputes arising in connection with these Terms will be governed by the laws of the State of Texas.
- d) To the extent that any provision or a portion of any provision of these Terms is determined to be illegal or unenforceable, the remainder of these Terms will remain in full force and effect.
- e) The United Nations Convention on Contracts for the International Sale of Goods will not apply to these Terms.
- f) These Terms and any supplemental terms applicable to the order constitute the entire agreement between dbSpectra and Customer, and supersede any previous communications, representations or agreements between the parties, whether oral or written, regarding transactions hereunder. CUSTOMER'S ADDITIONAL OR DIFFERENT TERMS AND CONDITIONS WILL NOT APPLY.
- g) dbSpectra may assign or transfer any of its rights or obligations under these Terms upon notice in connection with a merger, reorganization, transfer, sale of assets or product lines, de-merger or spin-off transaction or change of control or ownership of dbSpectra, or its permitted successive assignees or transferees.



dbSpectra, Inc.
1590 E. Highway 121 Business
Building A, Suite 100
Lewisville, Texas 75056
Phone: 469.322.0080
Fax: 469.322.0079
www.dbspectra.com