Power Genius XL
User Manual

rev 10.

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FCC STATEMENT

CAUTION: The users manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.”

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

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

0. Important notice

WARNING!

This amplifier has been configured to operate in your country according to your nation's regulations. It will operate on frequencies which are not allowed for public use. You are required to have a valid amateur radio license of an appropriate class from your government to have the privileges to operate on amateur radio frequencies.

Except those actions which have been described in this user manual, no other manipulations to the amplifier are allowed. The unit must only be opened and/or serviced by a qualified technician.

If you have any questions due to misunderstanding, translation errors and alike, please contact the appropriate party for further information.

Radio frequency energy (RF) from transmitters can interact with some electronic devices, such as cardiac peacemakers and defibrillators.. Please refer to the implanted peacemaker or defibrillator manufacturer's instructions with respect to precautions to be taken in the vicinity of a radio amateur transmitter. If any interaction or interference with a peacemaker or implanted defibrillator is suspected, **STOP** transmitting immediately.

! - WARNING!
▲- Caution
i – Information

! – This unit is NOT A TOY. It must not be handled by children nor placed/operated within reach of children.

! – Do not leave packing material for this unit unattended. It may be harmful to children if misused.

! – This unit contains small parts that could be a choking hazard to small children. Do not leave accessories unattended.

! – Do not operate this unit in potentially explosive environments.

! – Never attempt to insert wires or any tools into the interior of this unit during operation. This may cause fire or electric shock.

! – This unit must only be operated with the electrical power described in the User Manual. Doing otherwise may cause a fire, injury or electrical shock.

! – Never connect or disconnect antennas while in TRANSMIT mode. This may cause electrical shock or RF burns to your skin and damage to the unit.

! – This unit generates Radio Frequency (RF) energy. Use caution and observe proper safety practices regarding your system configuration. When attached to an antenna, this amplifier is capable of generating RF electromagnetic field which require evaluation according to your national law to provide any necessary isolation or

protection required, with respect to human exposure!

▲- This unit must only be opened and/or serviced by a qualified technician. Opening the unit may void the manufacturer's warranty.

▲- Do not operate this unit in areas of extreme humidity.

▲- Avoid operating this amplifier in direct sunlight or other areas of extreme heat, excessive vibration, or mechanical force.

▲- If this unit is intended for use in commercial applications, special safety regulations and cautions may apply to prevent accidents.

▲- If any defect, abnormal result, or other observations occur that are not covered by this User Manual; immediately cease operation and contact the manufacturer or local distributor for operational advice or repair of the unit.

i – No other physical modification of this amplifier is allowed. Any other use or modification (including software changes that affect operational characteristics) will void the manufacturer's warranty.

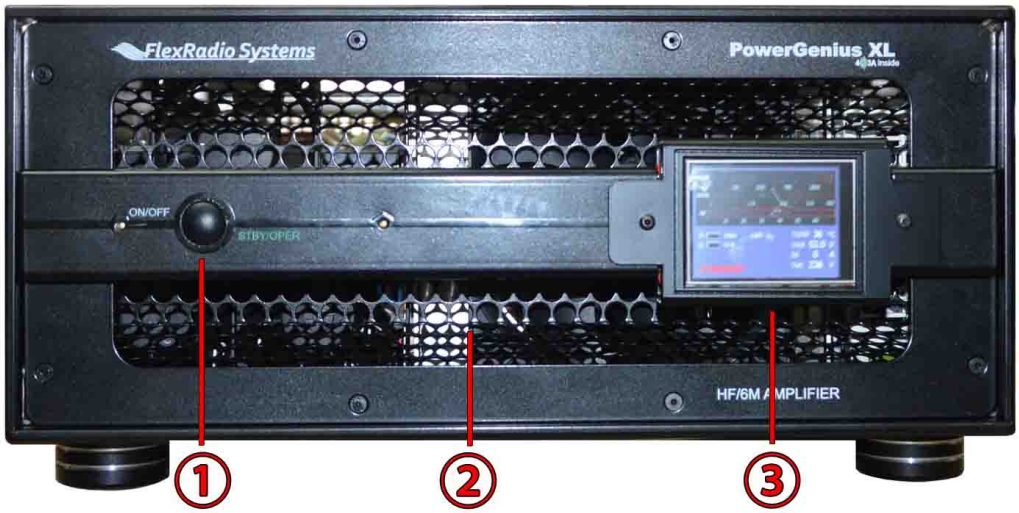
i – Ensure proper ventilation around the amplifier; This includes 30 cm clearance in front and back.

i – Please study the complete User Manual. This document contains important information regarding the safe operation of this unit. If you have any questions, please contact the manufacturer or local distributor for further information.

1. Unpacking

To be written when we know more about packaging.

1.1. Front Panel



The front panel is designed to intuitive and uncluttered. It consists of two elements:

1	Standby / Operate button.
2	RGB LED Backlight
3	LCD Touchscreen Display

Pressing the STBY/OPER button toggles between standby and operate modes.
The LCD Touchscreen Display shows all the important data for monitoring during operation.

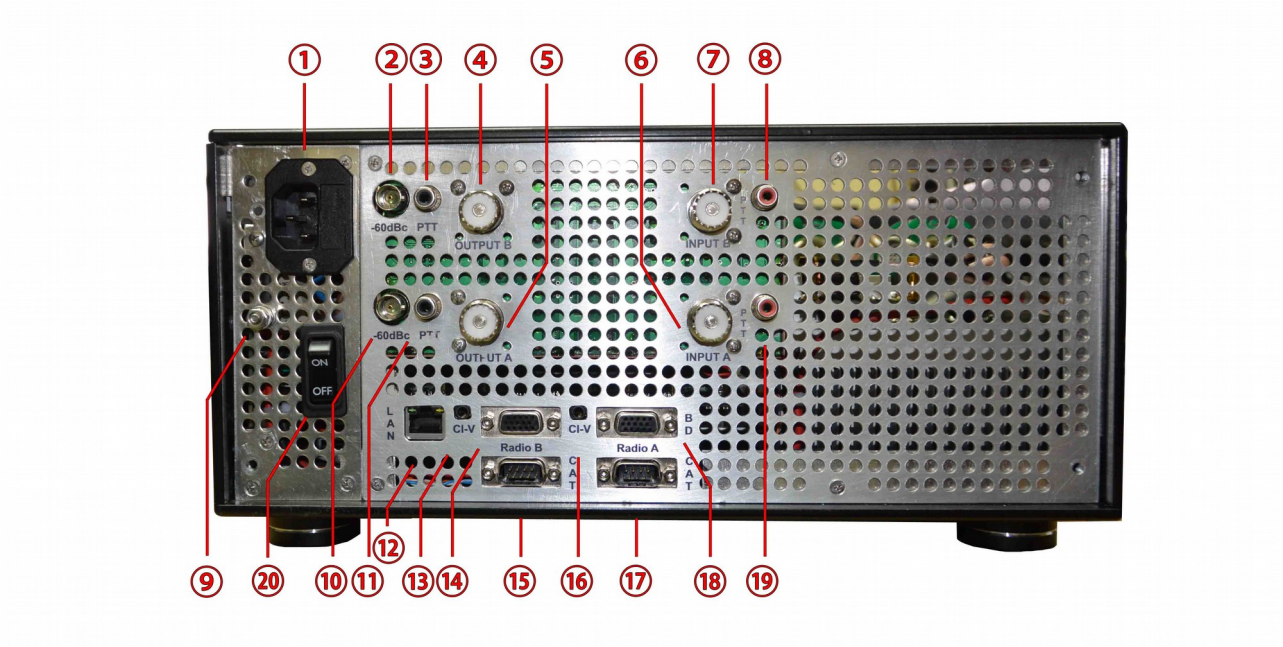
The RGB LED backlight shows operation states:

- Stand By mode is indicated by a yellow color.
- Operate mode is indicated by a green color.
- Transmitting is indicated by a red color.
- Firmware Upgrade mode is indicated by a magenta color.

More details on the display elements and different states in follow separate chapters on these subjects.

1.2. Back Panel

The connectors are logically divided into two groups, A and B, for respective radios.

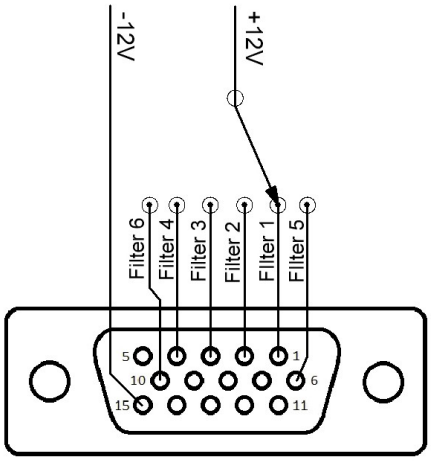


1	**AC Power input:** standard 120V or 220V AC used to power the amplifier.
2	**RF Precorrector B output:** -60dBc output signal, for connecting to a radio precorrector. (if radio has one)
3	**PTT output B:** standard RCA connector. It outputs GND as a PTT signal. Can be configured to +12V by internal jumper. Pins are isolated with optocouplers.
4	**RF output B:** standard PL259 type connector for connecting your antenna.
5	**RF output A:** standard PL259 type connector for connecting your antenna.
6	**RF input A:** standard PL259 type connector for connecting your transceiver.
7	**RF input B:** standard PL259 type connector for connecting your transceiver.
8	**PTT input B:** standard RCA connector. It expects GND as a PTT signal. Can be configured to +12V by internal jumper.
9	**Chassis Ground:** #8 Thumb screw
10	**RF Precorrector A output:** -60dBc output signal, for connecting to a radio precorrector. (if radio has one)
11	**PTT output A:** standard RCA connector. It outputs GND as a PTT signal. Can be configured to +12V by internal jumper. Pins are isolated with optocouplers.
12	**Ethernet connector –** Not in use. Reserved for a future upgrade.
13	**CI-V input B:** standard 3.5mm stereo connector for ICOM radio band data. Pins are isolated with optocouplers.
14	**BCD/PTP input B:** standard female DB15 connector for radio band data. Pins are isolated with optocouplers.
15	**CAT input B:** standard male DB9 type connector for radio CAT connection. Pins are isolated with optocouplers.
16	**CI-V input A:** standard 3.5mm stereo connector for ICOM radio band data. Pins are isolated with optocouplers.
17	**CAT input A:** standard male DB9 type connector for radio CAT connection. Pins are isolated with optocouplers.
18	**BCD/PTP input A:** standard female DB15 connector for radio band data. Pins are isolated with optocouplers.
19	**PTT input A:** standard RCA connector. It expects GND as a PTT signal. Can be configured to +12V by internal jumper. Pins are isolated with optocouplers.
20	**Power Switch:** Turn the amplifier ON or OFF.

1.3. BCD/PTP connector pinout

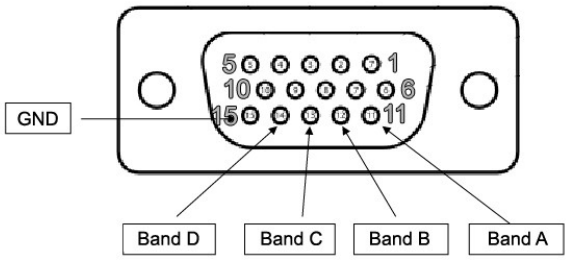
PTP input – Uses PTP signal (+12V) to select the proper filter. Pins are isolated with optocouplers.

Pin 1	Filter for 1,8 to 2 MHz
Pin 2	Filter for 3.5 to 4 MHz
Pin 3	Filter for 5 to 7.5 MHz
Pin 4 or 5	Filter for 10 to 14.5 MHz
Pin 7 or 8 or 9	Filter for 18 to 29.5 MHz
Pin 10	Filter for 50 to 52 MHz



BCD input – Uses BCD signal (+12V) signal to select the proper filter. Pins are isolated with optocouplers.

BCD inputs are designed for a direct connection to a band decoder used by radios such as YAESU and Elecraft.



Filter No.	1	2	3	4	4	5	5	5	5	6	NA
Band	160m	80m	40m	30m	20m	17m	15m	12m	10m	6m	None
Frequency	1.8	3.5	7	10	14	18	21	24	28	50	NA
Band A **Band B** **Band C** **Band D**	H L L L	L H L L	H H L L	L L H L	H L H L	L H H L	H H H L	L L L H	H L L H	L H L H	L L L L
Hex Code	1	2	3	4	5	6	7	8	9	A	0

2. Using with Radios

This chapter covers connecting your Power Genius XL with various popular radios.

2.1. FlexRadio Series 6000

Not possible in the current version. Will be released in the future as an upgrade.

2.2. Yaesu

Yaesu radios are connected using the CAT (RS232) port on the amplifier.

Use straight female to female DB9 cable.

Connection is the same for all standard Yaesu radio models.

All pins on on the CAT connector are isolated by optocouplers.

You can use either Radio A or Radio B CAT connector on your PG XL.

2.3. Elecraft

Elecraft radios are connected to the BCD (band decoder) port on the PG XL.

Use straight male to male DB15 cable.

Connection is the same for all standard Elecraft radio models.

All pins on on the BCD connector are isolated by optocouplers.

You can use either Radio A or Radio B BCD connector on your PG XL.

Other radios

Universally, you can get band data from radios in one of two ways:

A) Getting data from BCD / PTP protocol
   Connect your radio or band decoder to the BCD/PTP port on the amplifier.
   This connection requires no additional configuration and works automatically.
   The BCD/PTP connection has the highest priority, and will ignore other connections if they exist.

B) Getting data from CAT protocol
   Connect your radio to the CAT (RS232) port on the amplifier.
   Configure the CAT protocol details using the PG XL Windows app.

3. Turning ON

Place your Power Genius XL on a flat stable surface.

Make sure your Power Genius XL amplifier has at least 30cm of space in front and in the back to insure adequate cooling.

Follow these steps before powering your Power Genius XL:

1) Connect the radio to the RF INPUT on the PG XL. (A or B port)
2) Connect the antenna to the corresponding RF OUTPUT on PG XL.
3) Connect the radios PTT to the corresponding PTT input connector on PG XL.
4) Connect the radios band data to PG XL. This can be done in one of 3 ways, depending on the exact model of the radio you will be using:

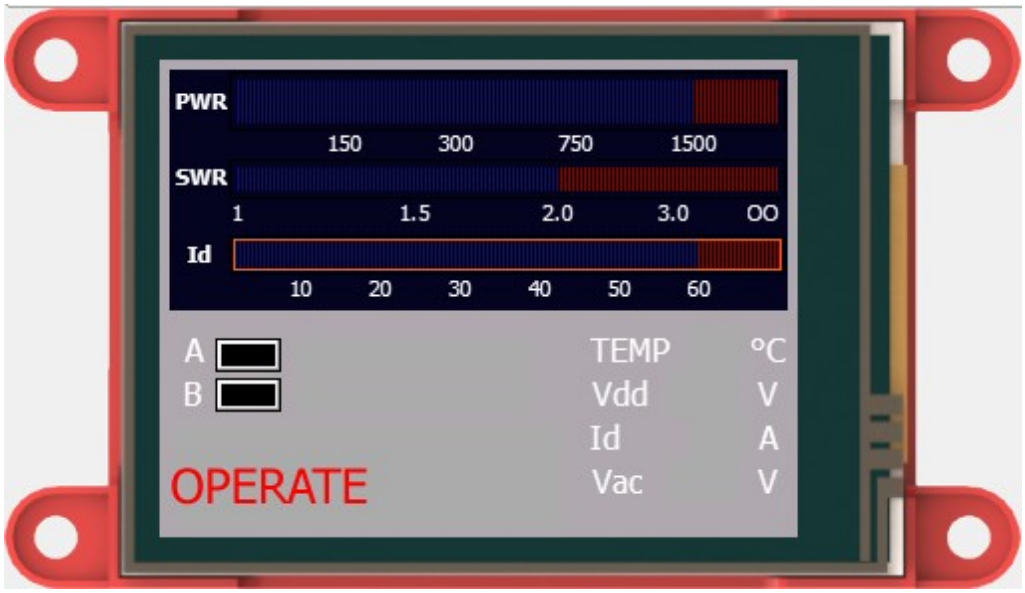
   (a) Using a band decoder (BCD or PTP protocol, depending on the radio you are using).
   This connection requires no additional configuration and works automatically.
   The BCD/PTP connection has the highest priority, and will ignore other connections if they exist.
   (b) Using RS232 for connecting radios CAT information. (Kenwood, Yaesu, Elecraft, ICOM 7800)
   Configure the CAT protocol details using the PG XL Windows app.
   (c) CI-V connection for older ICOM radios.
   Configure the CI-V protocol details using the PG XL Windows app.

After connecting everything use the supplied power cable to connect PG XL to the power outlet.

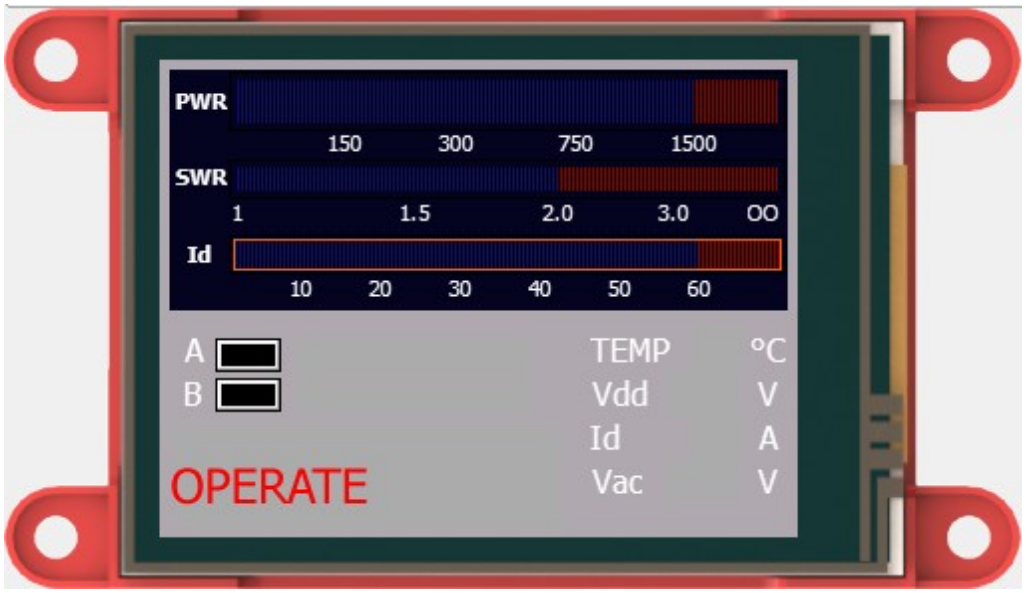
Upon powering up, the display will show the loading screen, and the device will go to stand by mode.

Before transmitting:

1) Press the OPERATE button front panel.
   This will activate the operate mode, and measuring bars will appear on the display. You can also see the OPERATE label in the bottom left corner of the screen.

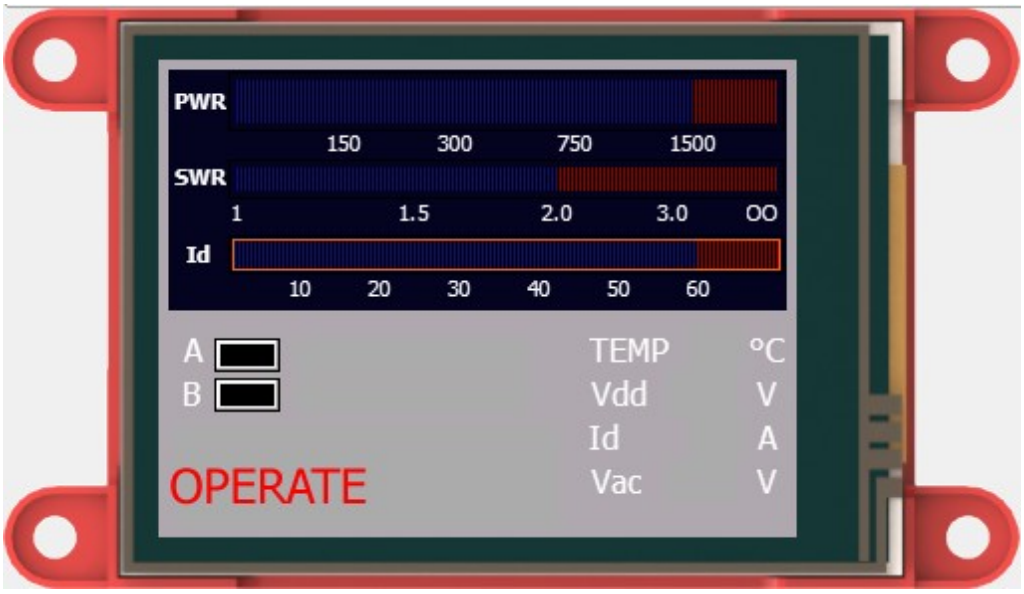


2) Verify the band data is being read correctly by looking at the main display on PG XL. The band data is marked in red on the picture below.



If everything is ok, you start using the amplifier.

3.1. Front Display overview



3.1.1. STBY/OPER

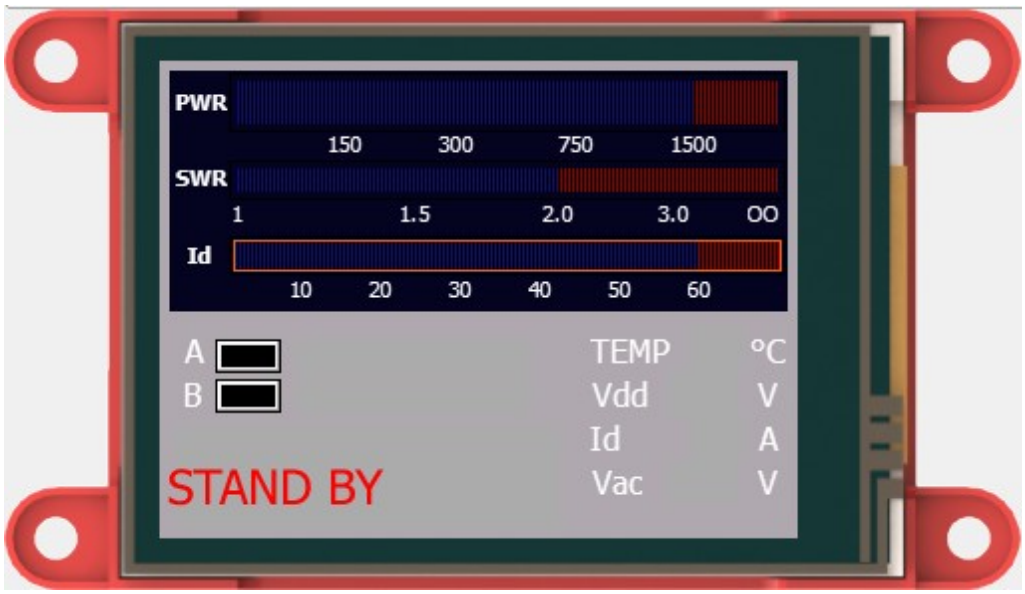
Pressing the STBY/OPER button will toggle between stand by and operate modes. \

The difference between these two modes is that:

- In STBY mode the PTT connection line is disabled.
- In OPER mode the PTT connection line is enabled.

The “STAND BY” label in the lower left corner of the display indicates the current mode is stand by.

Yellow LED backlight is another indication that you are in stand by mode.



Press the button again to go into operate mode.

The “OPERATE” label in the lower left corner of the display indicates the amplifier is in operate mode.

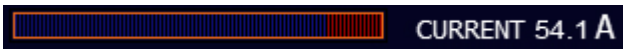
Green LED backlight is another indication that you are in operate mode.

3.1.2. Band verification

The red LED will glow on the currently active radio.

You can always see the selected bands for radio A and B.

3.1.3. Vdd and Id verification



The bar ranges from 0 to 60 amps.
Normal VDD ranges are from 41V to 51V.

VDD is automatically controlled depending on temperature control and efficiency.

3.1.5. Temperature

TEMP 42 C

You can read your current operating temperature here.
Fans are controlled automatically by the firmware.

Optimal operation is below 60 °C.
Above 60 °C firmware will begin decreasing power to protect the amplifier from permanent damage.
If temperature exceeds 85° C the amplifier will go into alarm mode to prevent transmitting before the temperature drops.

3.1.6. Power

The entire power bar range is from 0 to 2000W.
The red section is above 1500W.

3.1.7. SWR

Maximum allowed working SWR is 1:3.
Firmware will enable the power derating algorithm when SWR is between 1:1.5 and 1:3.
Above 1:3 SWR the amplifier will go to alarm mode, preventing transmitting.

3.2. Backlight modes

3.2.1. Stand By Mode – Yellow backlight

The yellow backlight indicates the amplifier is in **STAND BY** mode.

In order to activate the operate mode, click the STBY/OPER button on the front panel.

3.2.2. Operate Mode – Green backlight

The green backlight indicates the amplifier is in **OPERATE** mode.

Tapping the green operate button on the touch screen display will activate stand by mode.

3.2.3. TX Mode – Red backlight

The red backlight indicates the amplifier is in **TX** mode.

4.1. MEffA overview

ME*ff*A™ stands for **M**aximum **Eff**iciency **A**lgorithm.

For single tone modes (CW, RTTY), ME*ff*A sets dynamic real time output device drain voltage and current yielding maximum efficiency for output power in real time reducing heat dissipation for efficiency up to 75%.

Up to 65% head dissipation reduction efficiency with excellent IMD characteristics for SSB.

5. Power derating with temperature increase

5.1. Power derating overview

APC regulates output power in case of difficulties in amplifier operation. When high VSWR is detected, APC proportionately reduces output power to safe level allowing continued operation
When VSWR exceeds high limit, APC switches amp to STBY (RF input bypassed directly to output) mode.
When APC detects increased heat sink temperature, it will reduce output power only if the MEffA™ system can't contain it within allowed limits; when the amplifier cools to a safe 60 degrees C, APC will return amp back to full power

5.2. Reducing maximum voltage with temprature

The firmware constantly monitors Vdc levels on the LDMOS.
In case of very high temperatures the firmware will reduce power and with that heat dissipation and protect the unit.
When the temperature returns to normal, the power levels are turned back up..3. Monitoring

6. Alarms

6.1. High SWR alarm

Release PTT to dismiss the alarm message.

6.2. Id alarm

6.3. Fan failure alarm

6.4. Power supply failure alarm

6.5. Forbidden band

Amplifier operation is disabled in the range of 26 to 28MHz.

PG XL has a built in frequency counter. In the case the drive signal is within 26 to 28MHz range, operation is blocked by disabling PTT and inhibiting the RF amplifier section.

6.6. Internal error

In case the display module looses communication with the main processor. Try rebooting the amplifier.