

Release Notes

Plus-X VSWR firmware version 1.0.24

Scope

This document describes the changes in Plus-X VSWR firmware from version 1.0.7 to version 1.0.24.

Changes from firmware version 1.0.11 to version 1.0.24

New Features and Enhancements

Power measurement samples are now qualified based on voltage limits:

The nominal output voltage range of the Precision RF sensor after removal of DC offset is 0 to 5 Volts DC. All meter inputs on the Plus-X VSWR are now tested against these limits during each measurement cycle. If after removal of DC offset a sample greater than 5.5 Volts DC is detected, the RF power value displayed on the Interlock Status page of the web interface is replaced with the words “Too High”. If the detected value after removal of offset is lower than – 0.1 Volts DC, the value displayed on the Interlock Status page is replaced with the words “Too Low”. If either the high or low limit is exceeded, a connected Arcturus or ARC Plus system will report the channel as “Offline” and any active AutoPilot® custom views will display the words “No Data” for that channel. VSWR calculation as well as VSWR and reflected power fault detection are disabled for any transmission line during the time that either the forward or reflected power sample for that transmission line exceeds one of the measurement limits.

Forward and reflected power measurements are now synchronized:

The input samples for each transmission line are now synchronized to ensure that VSWR calculations are based on closely aligned measurements of forward and reflected power.

Rolling average calculations have been enhanced to eliminate residual errors:

Rolling average calculations are employed to filter noise on forward and reflected power measurement samples. These calculations have been enhanced to eliminate accumulated errors that can occur due to rounding in floating point operations.

Fault conditions must now persist for three execution cycles:

VSWR or reflected power fault conditions must now persist for three program update cycles over a period of approximately 60 ms before fault detection is declared.

A priority-based hierarchy has been implemented for interlock control:

Priorities have been established for control of transmitter interlocks. The parameters that control interlock operation and the resulting actions are listed in the table below in priority order. If an action is in effect based on current system conditions, the occurrence of a higher priority event will take precedence, potentially changing the state of the interlock. For example, during maintenance mode (priority 3) interlocks are normally held in the closed state. However, an active cascade input signal (priority 2) indicates that a connected Plus-X VSWR unit, not in maintenance mode, has detected a fault requiring all interlocks to be opened. This higher

priority action will be implemented. The terminology in the table below is based on normally-closed interlock operation such that an open interlock results in the interruption of transmitter power.

Priority	Action	Description
1	Force off – Open interlocks	Force Off has been selected as the Interlock Control Mode for this transmission line on the Interlock Configuration page of the web interface.
2	Cascade input – Open interlocks	The cascade input signal, status input 16, to the Plus-X VSWR has been asserted (pulled low).
3	Maintenance mode – Close interlocks	The Plus-X VSWR is in maintenance mode due to activation of the front panel Maint button. The front panel Link LED flashes Red/Green when maintenance mode is active.
4	Force on – Close interlocks	Force On has been selected as the Interlock Control Mode for this transmission line on the Interlock Configuration page of the web interface.
5	Control together – Open interlocks	Control Together has been selected for Relay Control for this transmission line on the Interlock Configuration page of the web interface, and another transmission line on the same Plus-X VSWR unit has detected a fault, calling for all interlocks to open.
6	VSWR or reflected power fault – Open interlocks	A VSWR or reflected power fault has been detected on this transmission line.

The Interlock Open Delay can now be set in increments of 0.1 seconds:

The Interlock Open Delay on the Interlock Configuration web page can now be set to a value from 0 to 25.4 seconds in 0.1 second increments. The recommended setting for this parameter is 1.5 seconds. The default setting is 0 on first system power-up or when a master initialization is performed.

The cascade output relays are now disabled in Maintenance Mode:

The cascade output function is now disabled during Maintenance Mode, regardless of the setting for “Cascade Interlock Output” on the Interlock Configuration web page. The cascade relays will be placed in their inactive, released state whenever Maintenance Mode is activated. When Maintenance Mode is disengaged, the cascade relays will return to normal operation and will open or close as appropriate based on the system configuration and current conditions.

The Plus-X VSWR can now operate in Hybrid mode:

The Plus-X VSWR has been enhanced to include a Hybrid mode of operation which enables the system to switch automatically between VSWR and reflected power thresholds for interlock control. The mode can be selected independently for each transmission line. If forward power is at or above a user configurable Hybrid Threshold, interlocks will be controlled based on the calculated VSWR value. If the forward power drops below the Hybrid Threshold, interlock control will be based on the reflected power measurement.

A wizard has been added to calculate recommended values for “Minimum Forward Power for VSWR”:

The interlock configuration web page now includes a wizard to provide guidance in selecting a value for the minimum forward power required to enable VSWR calculation.

Plus-X VSWR configuration settings can now be saved and restored:

Users can now export Plus-X VSWR configuration data to a file that can be used to restore all settings and calibration values.

Forward power units now default to kW:

The forward power “Units” field on the interlock configuration page will now default to kW on first system power-up or when a master initialization is performed.

The Interlock Configuration page now performs input validation:

Live validation of input values is now performed as users configure the operating parameters of the Plus-X VSWR. An invalid entry is highlighted with a red box. The Save button is disabled (grayed out) until the user enters a valid setting. A message is displayed if local changes have been made on the web page that have not been saved to the unit.

Configuration settings are now continuously verified:

The Plus-X VSWR now performs a continuous background verification of in-memory configuration settings and restores setup data from a local checksum-protected backup file if an incorrect or corrupted configuration is detected.

Plus-X VSWR web pages are no longer cached:

Caching is now disabled for Plus-X VSWR web pages, ensuring that new web functionality is immediately available when firmware is updated.

CPU stack management has been enhanced:

The CPU stack has been increased in size and a stack monitor has been added to prevent data corruption that can result from a stack overflow.

Resolved Issues

The units label for "Minimum Forward Power for VSWR" is now properly displayed as Watts:

“Minimum Forward Power for VSWR” as configured on the Interlock Configuration web page is always interpreted by the system in units of Watts. The units label now correctly reflects this designation.

The Interlock Status web page now displays units for Forward and Reflected power measurements:

Units of Watts (W) or kilowatts (kW) are now displayed along with the current values of forward and reflected power on the Interlock Status web page.

Reflected power units now update properly in the calibration section of the web page:

The units label for reflected power in the calibration section of the Interlock Configuration web page now displays and updates properly.

Strike timing is now properly displayed on the Interlock Status web page:

The time-since-occurrence for each VSWR or reflected power strike is now properly displayed and updated on the Interlock Status web page.

Strikes are now properly retired when their time-since-occurrence exceeds the Lockout Window:

Strike 1 in a sequence of strikes is now properly eliminated when its time-since-occurrence exceeds the value for the Lockout Window as configured on the Interlock Configuration web page. If a second strike has been recorded, it is advanced to the Strike 1 position replacing the retired strike.

Default values are now displayed for all configuration values:

Default configuration values on the Interlock Configuration web page are now properly displayed on first system power-up or when a master initialization is performed.

The Plus-X channel subscription limit has been increased:

The number of channels that can be mapped to an Arcturus or ARC Plus system using the Plus-X protocol has been increased to enable simultaneous support of all external I/O as well as all internal control and monitoring functions of the Plus-X VSWR.

Changes from firmware version 1.0.9 to version 1.0.11

Resolved Issues

The analog to digital conversion module has been enhanced:

Enhancements have been made to the analog to digital conversion process, ensuring the accuracy of the input data.

Changes from firmware version 1.0.7 to version 1.0.9

New Features and Enhancements

The Plus-X VSWR now supports PRF-1 Precision RF Sensors with firmware version 1.02:

The Plus-X VSWR calibration process has been enhanced to support Precision RF Sensors running firmware version 1.02. This sensor firmware version provides a DC offset voltage to enable verification of power sensor operation when there is no RF power applied to the sensor. Precision RF Sensors running firmware version 1.01 are also supported.