Spellman®
High Voltage Electronics Corporation

SPX User's Guide:

SPX160
SPX200
SPX300

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TABLE OF CONTENTS

TABLE OF FIGURES 10
1.0 DOCUMENT REVISION 12
2.0 SCOPE 13
3.0 FRONT PANEL FUNCTIONAL DESCRIPTION 13
3.1 PRE-WARNING INDICATOR 13
3.2 FRONT PANEL INTERLOCK 13
3.3 X-RAY ON INDICATOR 13
3.4 INTERLOCK INDICATOR 13
3.5 X-RAY ON BUTTON 14
3.6 X-RAY OFF BUTTON 14
3.7 KEY CONTROL 14
3.8 USB PORT (Not Used) 14
3.9 ETHERNET PORT 14
3.10 RS-232 PORT 14
3.11 BUZZER 14
3.12 ROTARY DIAL 14
3.13 VFD DISPLAY 14
4.0 MENU SYSTEM FUNCTIONAL DESCRIPTION 15
4.1 WELCOME SCREEN 15
4.2 HOME SCREEN 16
4.2.1 HOME SCREEN USER COMMANDS (SET POINTS) 16
4.2.1.1 KV 16
4.2.1.2 MA 17
4.2.1.3 EXPOSURE TIME 17
4.2.2 HOME SCREEN OPERATION (X-RAY EXPOSURE) 18
4.2.3 HOME SCREEN USER STATUS (ACTUAL) 19
4.2.3.1 KV 19
4.2.3.2 MA 19
4.2.3.3 EXPOSURE TIME 19
4.2.4 HOME SCREEN NAVIGATION 19
4.2.4.1 SETTINGS 19
4.2.4.2 OPTIONS 19
4.2.4.3 STATUS 19
4.3 SETTINGS SCREEN 20
4.3.1 SETTINGS SCREEN NAVIGATION 21
4.3.1.1 SEASONING 21
4.3.1.2 TECHNIQUES 21
4.3.1.3 SETUP 21
4.3.1.4 USER CONFIG 21
4.3.1.5 INFO 21
4.3.1.6 ADMIN 21
4.3.1.7 BACK 21
4.3.1.8 HOME 21
4.4 OPTIONS SCREEN 22

4.4.1 OPTIONS SCREEN USER OPTIONS 22
4.4.1.1 CLEAR FAULTS 22
4.4.1.2 SCREEN TURN OFF TIME 22
4.4.1.3 SCREEN SAVER 22
4.4.2 OPTIONS SCREEN NAVIGATION 23
4.4.2.1 BACK 23
4.4.2.2 HOME 23
4.5 STATUS SCREEN 24
4.5.1 STATUS SCREEN USER OPTIONS 25
4.5.1.1 CLEAR FAULTS 25
4.5.2 STATUS SCREEN NAVIGATION 25
4.5.2.1 BACK 25
4.5.2.2 HOME 25
4.6 SEASONING SCREEN (MAIN) 26
4.6.1 SEASONING SCREEN (MAIN) USER OPTIONS 31
4.6.1.1 CREATE PROFILE 31
4.6.1.2 LAUNCH PROFILE 31
4.6.2 SEASONING SCREEN (MAIN) NAVIGATION 31
4.6.2.1 BACK 31
4.6.2.2 HOME 31
4.7 SEASONING SCREEN (CREATE PROFILE) 32
4.7.1 SEASONING SCREEN (CREATE PROFILE) USER STATUS 33
4.7.1.1 CUSTOM PROFILE NUMBER 33
4.7.2 SEASONING SCREEN (CREATE PROFILE) USER OPTIONS 33
4.7.2.1 STEP # 33
4.7.2.2 KV 33
4.7.2.3 MA 33
4.7.2.4 EXPOSURE TIME (M) 34
4.7.2.5 STEP → 34
4.7.2.6 STEP ← 34
4.7.2.7 SAVE 34
4.7.3 SEASONING SCREEN (CREATE PROFILE) NAVIGATION 34
4.7.3.1 BACK 34
4.7.3.2 HOME 34
4.8 SEASONING SCREEN (LAUNCH PROFILE) 35
4.8.1 SEASONING SCREEN (LAUNCH PROFILE) NAVIGATION 37
4.8.1.1 4 TO 8 HOURS 37
4.8.1.2 8 TO 16 HOURS 37
4.8.1.3 16 HR TO 7 DY 37
4.8.1.4 7 TO 30 DAYS 37
4.8.1.5 OVER 30 DAYS 37
4.8.1.6 CUSTOM 37
4.8.1.7 New Tube 37
4.8.1.8 BACK 37
4.8.1.9 HOME 37
4.9 SEASONING SCREEN (LAUNCH 4 TO 8 HOURS) 38

4.9.1 SEASONING SCREEN (LAUNCH 4 TO 8 HOURS) USER OPTIONS 39
4.9.1.1 STEP → 39
4.9.1.2 STEP ← 39
4.9.1.3 START 39
4.9.2 SEASONING SCREEN (LAUNCH 4 TO 8 HOURS) NAVIGATION 40
4.9.2.1 BACK 40
4.9.2.2 HOME 40
4.10 SEASONING SCREEN (LAUNCH 8 TO 16 HOURS) 41
4.10.1 SEASONING SCREEN (LAUNCH 8 TO 16 HOURS) USER OPTIONS 42
4.10.1.1 STEP → 42
4.10.1.2 STEP ← 42
4.10.1.3 START 42
4.10.2 SEASONING SCREEN (LAUNCH 8 TO 16 HOURS) NAVIGATION 43
4.10.2.1 BACK 43
4.10.2.2 HOME 43
4.11 SEASONING SCREEN (LAUNCH 16 HOURS TO 7 DAYS) 44
4.11.1 SEASONING SCREEN (LAUNCH 16 HOURS TO 7 DAYS) USER OPTIONS . 45
4.11.1.1 STEP → 45
4.11.1.2 STEP ← 45
4.11.1.3 START 45
4.11.2 SEASONING SCREEN (LAUNCH 16 HOURS TO 7 DAYS) NAVIGATION 46
4.11.2.1 BACK 46
4.11.2.2 HOME 46
4.12 SEASONING SCREEN (LAUNCH 7 TO 30 DAYS) 47
4.12.1 SEASONING SCREEN (LAUNCH 7 TO 30 DAYS) USER OPTIONS 48
4.12.1.1 STEP → 48
4.12.1.2 STEP ← 48
4.12.1.3 START 48
4.12.2 SEASONING SCREEN (LAUNCH 7 TO 30 DAYS) NAVIGATION 49
4.12.2.1 BACK 49
4.12.2.2 HOME 49
4.13 SEASONING SCREEN (LAUNCH OVER 30 DAYS) 50
4.13.1 SEASONING SCREEN (LAUNCH OVER 30 DAYS) USER OPTIONS 51
4.13.1.1 STEP → 51
4.13.1.2 STEP ← 51
4.13.1.3 START 51
4.13.2 SEASONING SCREEN (LAUNCH OVER 30 DAYS) NAVIGATION 52
4.13.2.1 BACK 52
4.13.2.2 HOME 52
4.14 SEASONING SCREEN (LAUNCH CUSTOM) 53
4.14.1 SEASONING SCREEN (LAUNCH CUSTOM) USER STATUS 54
4.14.1.1 CUSTOM SEASONING PROFILE NUMBER 54
4.14.1.2 STEP# 54
4.14.1.3 KV 54
4.14.1.4 MA 54
4.14.1.5 TIME (M) 54

4.14.1.6 KV FEEDBACK 54
4.14.1.7 MA FEEDBACK 54
4.14.2 SEASONING SCREEN (LAUNCH CUSTOM) USER OPTIONS 55
4.14.2.1 START 55
4.14.3 SEASONING SCREEN (LAUNCH CUSTOM) NAVIGATION 55
4.14.3.1 BACK 55
4.14.3.2 HOME 55
4.15 SEASONING SCREEN PAUSE FUNCTION 56
4.16 TECHNIQUES MAIN MENU SCREEN 57
4.16.1 TECHNIQUES MAIN MENU SCREEN NAVIGATION 61
4.16.1.1 CREATE 61
4.16.1.2 OPEN 61
4.16.1.3 ERASE 61
4.16.1.4 BACK 61
4.16.1.5 HOME 61
4.17 TECHNIQUES CREATE SCREEN 62
4.17.1 TECHNIQUES CREATE SCREEN USER STATUS 63
4.17.1.1 CREATE TECHNIQUE NUMBER 63
4.17.2 TECHNIQUES CREATE SCREEN USER OPTIONS 64
4.17.2.1 KV 64
4.17.2.2 MA 64
4.17.2.3 EXPOSURE TIME 64
4.17.2.4 SAVE 64
4.17.3 TECHNIQUES CREATE SCREEN NAVIGATION 65
4.17.3.1 BACK 65
4.17.3.2 HOME 65
4.18 TECHNIQUES OPEN SCREEN 66
4.19 SETUP SCREEN 67
4.19.1 SETUP SCREEN USER STATUS 67
4.19.1.1 IP ADDRESS 67
4.19.1.2 SUBNET MASK 67
4.19.1.3 GATEWAY 67
4.19.2 SETUP SCREEN NAVIGATION 68
4.19.2.1 BACK 68
4.19.2.2 HOME 68
4.20 USER CONFIG SCREEN 69
4.20.1 USER CONFIG SCREEN USER OPTIONS 70
4.20.1.1 OV 70
4.20.1.2 UV 70
4.20.1.3 OC 70
4.20.1.4 UC 70
4.20.1.5 PREWARNING AUDIO 70
4.20.1.6 X-RAY ON WARNING 70
4.20.1.7 EXP COUNT DIR 70
4.20.1.8 TIMER MODE 71
4.20.1.9 PREWARNIG TIME 71

4.20.2 USER CONFIG SCREEN NAVIGATION 71
4.20.2.1 BACK 71
4.20.2.2 HOME 71
4.21 INFO SCREEN 72
4.21.1 INFO SCREEN STATUS 73
4.21.1.1 UNIT MODEL NUMBER 73
4.21.1.2 FPGA PART NUMBER 73
4.21.1.3 FIRMWARE PART NUMBER 73
4.21.1.4 MAC ADDRESS 73
4.21.1.5 HARDWARE REV 73
4.21.2 INFO SCREEN NAVIGATION 73
4.21.2.1 BACK 73
4.21.2.2 HOME 73
5.0 SPX GUI FUNCTIONAL DESCRIPTION 74
5.1 SPX GUI INSTALLATION 74
5.2 STARTING THE LPX GUI 77
5.2.1 SPX GUI EULA SCREEN 78
5.2.2 SPX GUI COMMUNICATIONS SETTINGS SCREEN 79
5.3 OPERATING THE SPX GUI 81
5.3.1 SPX GUI LAYOUT 82
5.3.2 SPX GUI MENU BAR 83
5.3.2.1 FILE MENU 83
5.3.2.1.1 EXIT 83
5.3.2.2 TOOLS MENU 84
5.3.2.2.1 VARIOUS CONTROLS 84
5.3.2.2.1.1 CLICK TO DISABLE AUTO UPDATE MODE / CLICK TO RE-ENABLE AUTO UPDATE MODE 84
5.3.2.2.1.2 RE-START GUI 84
5.3.2.2.1.3 CHANGE FIRMWARE BAUD RATE 84
5.3.2.2.2 ONE SHOT SETUP 85
5.3.2.2.2.1 OPEN “ONE SHOT” PROFILE 85
5.3.2.2.2.2 CREATE “ONE SHOT” PROFILE 85
5.3.2.3 HELP MENU 87
5.3.2.3.1.1 ABOUT 87
5.3.3 SPX GUI MAIN POWER SUPPLY CONTROLS 88
5.3.3.1 SPX GUI MAIN POWER SUPPLY CONTROLS DESCRIPTION 88
5.3.4 SPX GUI COMMUNICATIONS STATUS BAR 89
5.3.4.1 SPX GUI COMMUNICATIONS STATUS BAR DESCRIPTION 89
5.3.5 SPX GUI MAIN CONTROL SCREEN 90
5.3.5.1 SPX GUI MAIN CONTROL SCREEN DESCRIPTION 91
5.3.5.1.1 SYSTEM STATUS BOX 91
5.3.5.1.1.1 PT INTERLOCK INDICATOR 91
5.3.5.1.1.2 EXTERNAL INTERLOCK INDICATOR 91
5.3.5.1.1.3 COOLER INTERLOCK INDICATOR 91
5.3.5.1.1.4 HV INV READY INDICATOR 91
5.3.5.1.1.5 PRE-WARNING INDICATOR 91

5.3.5.1.1.6 X-RAY ON INDICATOR 91
5.3.5.1.1.7 WARM UP REQUIRED INDICATOR 91
5.3.5.1.1.8 FILAMENT ENABLED INDICATOR 91
5.3.5.1.1.9 SAVE ONE SHOT SETTINGS BUTTON 91
5.3.5.2 SYSTEM CONTROLS BOX 92
5.3.5.2.1 KV CONTROL 92
5.3.5.2.2 MA CONTROL 92
5.3.5.2.3 EXPOSURE TIME CONTROL 92
5.3.6 SPX GUI STATUS SCREEN 93
5.3.6.1 SPX GUI STATUS SCREEN DESCRIPTION 93
5.3.6.1.1 TRANSFORMER OC FAULT INDICATOR 93
5.3.6.1.2 LVPS -15V FAULT INDICATOR 93
5.3.6.1.3 LVPS +15V FAULT INDICATOR 93
5.3.6.1.4 WATCH DOG FAULT INDICATOR 94
5.3.6.1.5 TUBE HEAD X RAY ON LAMP FAULT INDICATOR 94
5.3.6.1.6 PREWARN LAMP FAULT INDICATOR 94
5.3.6.1.7 COOLER SELECT INDICATOR 94
5.3.6.1.8 DC RAIL FAULT INDICATOR 94
5.3.6.1.9 AC LINE FAULT INDICATOR 94
5.3.6.1.10 OVERTEMP FAULT INDICATOR 94
5.3.6.1.11 POWER ON INDICATOR 94
5.3.6.1.12 POWER SUPPLY READY INDICATOR 94
5.3.6.1.13 FILAMENT ENABLED INDICATOR 94
5.3.6.1.14 X-RAY ON INDICATOR 94
5.3.6.1.15 POWER SUPPLY FAULT INDICATOR 94
5.3.6.1.16 PT INTERLOCK FAULT INDICATOR 95
5.3.6.1.17 OV FAULT INDICATOR 95
5.3.6.1.18 UV FAULT INDICATOR 95
5.3.6.1.19 OC FAULT INDICATOR 95
5.3.6.1.20 UC FAULT INDICATOR 95
5.3.6.1.21 OVER POWER FAULT INDICATOR 95
5.3.6.1.22 FILAMENT REGULATION FAULT INDICATOR 95
5.3.6.1.23 INVERTER FAULT INDICATOR 95
5.3.6.1.24 INVERTER OT FAULT INDICATOR 95
5.3.6.1.25 COOLER INTERLOCK FAULT INDICATOR 95
5.3.6.1.26 FP X RAY ON LAMP FAULT INDICATOR 95
5.3.6.1.27 ARC FAULT INDICATOR 95
5.3.6.1.28 EXT INTERLOCK FAULT INDICATOR 95
5.3.7 SPX GUI ERROR LOGGER SCREEN 96
5.3.7.1 SPX GUI ERROR LOGGER SCREEN DESCRIPTION 96
5.3.7.1.1 DATA LOG TEXT BOX 96
5.3.7.1.2 CLICK HERE TO CLEAR ERROR LOGGER 96
5.3.8 SPX GUI MISC INFO SCREEN 97
5.3.8.1 SPX GUI MISC INFO SCREEN DESCRIPTION 98
5.3.8.1.1 DAC SCALINGS 98
5.3.8.1.1.1 KV SCALINGS 98

5.3.8.1.1.2 MA SCALINGS 98
5.3.8.1.1.3 FILAMENT SCALINGS 98
5.3.8.1.1.4 PREHEAT SCALINGS 98
5.3.8.1.2 A/D SCALINGS 98
5.3.8.1.2.1 KV SCALINGS 98
5.3.8.1.2.2 MA SCALINGS 98
5.3.8.1.2.3 FILAMENT SCALINGS 98
5.3.8.1.2.4 PREHEAT SCALINGS 98
5.3.8.1.3 SYSTEM VOLTAGES 99
5.3.8.1.3.1 +15 V SUPPLY 99
5.3.8.1.3.2 -15 V SUPPLY 99
5.3.8.1.3.3 KV MON 99
5.3.8.1.3.4 AC LINE 99
5.3.8.1.3.5 DC RAIL 99
5.3.8.1.4 FILAMENT READING 99
5.3.8.1.4.1 FILAMENT FEED BACK 99
5.3.8.1.5 TEMPERATURE 99
5.3.8.1.6 SYSTEM INFORMATION 100
5.3.8.1.6.1 DSP PART NUMBER 100
5.3.8.1.6.2 DSP BUILD NUMBER 100
5.3.8.1.6.3 FPGA PART NUMBER 100
5.3.8.1.6.4 FPGA BUILD NUMBER 100
5.3.9 SPX GUI COMS SCREEN 101
5.3.9.1 SPX GUI COMS SCREEN DESCRIPTION 101
5.3.9.1.1 SERIAL PORT CONFIGURATION 101
5.3.9.1.1.1 RS-232 COMMUNICATIONS 101
5.3.9.1.1.2 SELECT A COM PORT 101
5.3.9.1.1.3 SELECT A BAUD RATE 102
5.3.9.1.1.4 DATA BITS 102
5.3.9.1.1.5 PARITY 102
5.3.9.1.1.6 STOP BITS 102
5.3.9.1.1.7 CLICK HERE TO SAVE THESE SETTINGS 102
5.3.9.1.2 USB CONFIGURATION (Not available) 102
5.3.9.1.2.1 USB COMMUNICATIONS (Not available) 102
5.3.9.1.3 ETHERNET CONFIGURATION 103
5.3.9.1.3.1 ETHERNET COMMUNICATIONS 103
5.3.9.1.3.2 PORT NUMBER 103
5.3.9.1.3.3 IP ADDRESS 103
5.3.9.1.3.4 CLICK HERE TO SAVE THESE SETTINGS 103
5.3.9.1.4 COMMUNICATION WATCHDOG SETTING 103
5.3.9.1.4.1 DISABLE 103
5.3.9.1.4.2 TIMEOUT IN SECONDS 103
5.3.9.1.4.3 CLICK HERE TO SAVE THESE SETTINGS 103
6.0 SPX QUICK START GUIDE 104
6.1 ESTABLISHING COMMUNICATIONS BETWEEN THE LPX GUI AND THE UNIT 104

6.2 CONNECTING USING SERIAL 105
6.2.1 SERIAL PORT CONFIGURATION DESCRIPTION 105
6.2.1.1 RS-232 COMMUNICATIONS 105
6.2.1.2 SELECT A COM PORT 105
6.2.1.3 SELECT A BAUD RATE 105
6.2.1.4 DATA BITS 105
6.2.1.5 PARITY 105
6.2.1.6 STOP BITS 105
6.2.1.7 CLICK HERE TO SAVE THESE SETTINGS 105
6.3 CONNECTING USING USB 106
6.3.1 USB COMMUNICATIONS 106
6.4 CONNECTING USING ETHERNET 107
6.4.1 CONFIGURING A PC FOR AN ETHERNET CONNECTION 107
6.4.2 CONFIGURING THE UNIT FOR AN ETHERNET CONNECTION 110
6.4.2.1 ETHERNET COMMUNICATIONS 110
6.4.2.2 PORT NUMBER 110
6.4.2.3 IP ADDRESS 110
6.4.2.4 CLICK HERE TO SAVE THESE SETTINGS 110
6.4.2.5 COMMUNICATION WATCHDOG SETTINGS 110
6.4.2.6 DISABLE 110
6.4.2.7 TIMEOUT IN SECONDS 110
6.4.2.8 CLICK HERE TO SAVE THESE SETTINGS 110
6.5 SPX GUI COMMUNICATIONS STATUS BAR 111
6.5.1 SPX GUI COMMUNICATIONS STATUS BAR DESCRIPTION 111

TABLE OF FIGURES

FIGURE 3-1: SPX FRONT PANEL LAYOUT 13
FIGURE 4-1: SPX WELCOME SCREEN 15
FIGURE 4-2: SPX HOME SCREEN 16
FIGURE 4-3: SPX MAIN SCREEN, PAUSED EXPOSURE 18
FIGURE 4-4: SPX SETTINGS SCREEN 20
FIGURE 4-5: SPX OPTIONS SCREEN 22
FIGURE 4-6: SPX STATUS SCREEN, NORMAL OPERATION 24
FIGURE 4-7: SPX STATUS SCREEN, FAULT CONDITION 25
FIGURE 4-8: SPX SEASONING MAIN MENU 26
FIGURE 4-9: SPX SEASONING MAIN MENU (CREATE PROFILE NUMBER FIELD HIGHLIGHTED) 27
FIGURE 4-10: SPX SEASONING MENU, CREATE PROFILE SCREEN 32
FIGURE 4-11: SPX SEASONING MENU, LAUNCH PROFILE SCREEN 35
FIGURE 4-12: SPX SEASONING MENU, LAUNCH PROFILE SCREEN (CUSTOM NUMBER FIELD HIGHLIGHTED) 36
FIGURE 4-13: SPX SEASONING MENU, LAUNCH 4 TO 8 HOURS SCREEN 38
FIGURE 4-14: SPX SEASONING MENU, LAUNCH 4 TO 8 HOURS SCREEN WITH FURTHER STEPS SHOWN 39
FIGURE 4-15: SPX SEASONING MENU, LAUNCH 8 TO 16 HOURS SCREEN 41
FIGURE 4-16: SPX SEASONING MENU, LAUNCH 8 TO 16 HOURS SCREEN WITH FURTHER STEPS SHOWN 42
FIGURE 4-17: SPX SEASONING MENU, LAUNCH 16 HOURS TO 7 DAYS SCREEN 44
FIGURE 4-18: SPX SEASONING MENU, LAUNCH 16 HOURS TO 7 DAYS SCREEN WITH FURTHER STEPS SHOWN 45
FIGURE 4-19: SPX SEASONING MENU, LAUNCH 7 TO 30 DAYS SCREEN 47
FIGURE 4-20: SPX SEASONING MENU, LAUNCH 7 TO 30 DAYS SCREEN WITH FURTHER STEPS SHOWN 48
FIGURE 4-21: SPX SEASONING MENU, LAUNCH OVER 30 DAYS SCREEN 50
FIGURE 4-22: SPX SEASONING MENU, LAUNCH OVER 30 DAYS SCREEN WITH FURTHER STEPS SHOWN 51
FIGURE 4-23: SPX SEASONING MENU, LAUNCH CUSTOM SCREEN 53
FIGURE 4-24: SPX SEASONING SESSION, PAUSED 56
FIGURE 4-25: SPX TECHNIQUES MENU 57
FIGURE 4-26: SPX TECHNIQUES MAIN MENU SCREEN WITH CREATE TECHNIQUE NUMBER FIELD HIGHLIGHTED 58
FIGURE 4-27: LPX TECHNIQUES MAIN MENU SCREEN WITH OPEN TECHNIQUE NUMBER FIELD HIGHLIGHTED 59
FIGURE 4-28: SPX TECHNIQUES MAIN MENU SCREEN WITH ERASE TECHNIQUES NUMBER FIELD HIGHLIGHTED 60
FIGURE 4-29: SPX TECHNIQUES CREATE SCREEN 62
FIGURE 4-30: SPX TECHNIQUES CREATE SCREEN WITH SAVE ACKNOWLEDGEMENT MESSAGE 63
FIGURE 4-31: SPX SETUP SCREEN 67

FIGURE 4-32: SPX USER CONFIG SCREEN 69
FIGURE 4-33: SPX INFO SCREEN 72
FIGURE 5-1: SPX GUI INSTALLATION FILES EXAMPLE 74
FIGURE 5-2: SPX GUI INSTALLATION OPTIONS SCREEN 75
FIGURE 5-3: SPX GUI INSTALLATION FOLDER SCREEN 75
FIGURE 5-4: SPX GUI INSTALLATION COMPLETE SCREEN 76
FIGURE 5-5: SPX GUI PROGRAM ICON 77
FIGURE 5-6: SPX GUI EULA SCREEN 78
FIGURE 5-7: SPX GUI COMMUNICATIONS SETTINGS SCREEN 79
FIGURE 5-8: SPX GUI COMMUNICATIONS TERMINATED MESSAGE 79
FIGURE 5-9: SPX GUI COMMUNICATIONS SETTINGS MESSAGE 80
FIGURE 5-11: SPX GUI MAIN CONTROL SCREEN AT STARTUP 81
FIGURE 5-12: SPX GUI LAYOUT 82
FIGURE 5-13: SPX GUI MENU BAR, FILE MENU, EXIT SELECTION 83
FIGURE 5-14: SPX GUI MENU BAR, TOOLS MENU 84
FIGURE 5-15: SPX GUI MENU BAR, TOOLS MENU, VARIOUS CONTROL SUB-MENU 84
FIGURE 5-16: SPX GUI MENU BAR, TOOLS MENU, ONE SHOT SETUP SUB-MENU 85
FIGURE 5-17: SPX GUI MENU BAR, TOOLS MENU, ONE SHOT SETUP SUB-MENU, CREATE "ONE SHOT" PROFILE RESULTS 86
FIGURE 5-18: SPX GUI MENU BAR, HELP MENU 87
FIGURE 5-19: SPX GUI MENU BAR, HELP MENU, ABOUT POP-UP SCREEN 87
FIGURE 5-20: SPX GUI MAIN POWER SUPPLY CONTROLS SECTION 88
FIGURE 5-21: SPX GUI COMMUNICATIONS STATUS BAR 89
FIGURE 5-22: SPX GUI MAIN CONTROL SCREEN 90
FIGURE 5-23: SPX GUI STATUS SCREEN 93
FIGURE 5-24: SPX GUI DATA LOGGER SCREEN 96
FIGURE 5-25: SPX GUI MISC INFO SCREEN 97
FIGURE 5-27: SPX GUI COMS SCREEN 101
FIGURE 6-1: SPX GUI COMS SCREEN 104
FIGURE 6-2: PC NETWORK CONNECTIONS SCREEN 107
FIGURE 6-3: PC NETWORK CONNECTIONS SCREEN WITH MENU 107
FIGURE 6-4: PC LOCAL AREA CONNECTION SCREEN 108
FIGURE 6-5: PC IPV4 PROPERTIES SCREEN 109
FIGURE 6-6: SPX GUI COMMUNICATIONS STATUS BAR 111

1.0 DOCUMENT REVISION

Suite Release Date	Changes made to document
8/23/2016	• Document created, version 0.0.1
4/17/2017	• Added X-Ray on and off controls to GUI forms. • (Not Available)
1/17/18	• Updated FP photo to include interlock switch

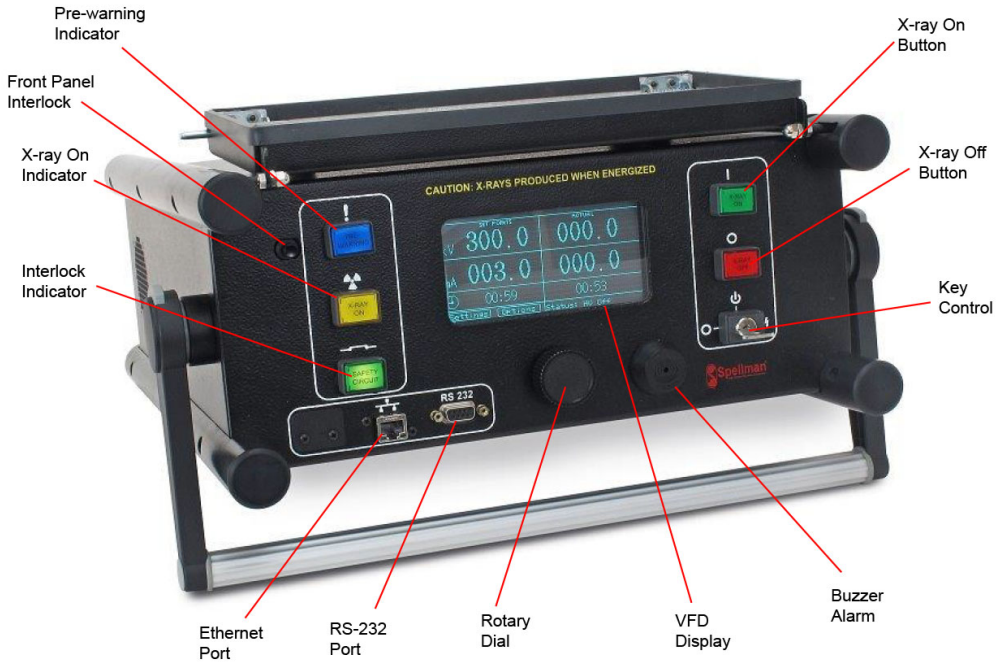
2.0 SCOPE

This document applies to the user interface on the SPX next generation controller.

3.0 FRONT PANEL FUNCTIONAL DESCRIPTION

The front panel is the primary user interface for the SPX system. The front panel includes a key switch, two buttons, 3 indicators, a buzzer, a command dial, and a VFD display. There are also two ports for communications with a PC.

Figure 3-1: SPX Front Panel Layout



3.1 PRE-WARNING INDICATOR

This blue indicator will be lit during the pre-warning time of an exposure.

3.2 FRONT PANEL INTERLOCK

Inhibits X-ray generation when front cover is in place.

3.3 X-RAY ON INDICATOR

This yellow indicator will be lit during the exposure time.

3.4 INTERLOCK INDICATOR

This green indicator will be lit indicating all safety interlocks have been closed.

3.5 X-RAY ON BUTTON

This green push button is used to initiate an exposure.

3.6 X-RAY OFF BUTTON

This red push button is used to terminate an exposure in manual mode.

3.7 KEY CONTROL

The key control has three positions:

O Power off position: The system is turned off.

⏻ Power on: The system is powered on.

ϟ Energized: The inverter is energized, and the system is ready to turn high voltage on.

3.8 USB PORT (Not Available)

This port can be used for USB communications with a PC. A Micro B USB connector is required for the port.

3.9 ETHERNET PORT

This port can be used for Ethernet communications with a PC.

3.10 RS-232 PORT

This port can be used for serial communications with a PC.

3.11 BUZZER

This buzzer can be used to audibly indicate when an exposure is about to take place. The buzzer can be configured to beep once per second during pre-warning time, to beep continuously during pre-warning time, or be disabled altogether.

3.12 ROTARY DIAL

This is the primary user control for the SPX menu system. Turning the dial will change which item is highlighted on the screen, and pressing the dial will select that item.

3.13 VFD DISPLAY

The VFD display is the primary display for system status and for controlling the system using the menu commands.

4.0 MENU SYSTEM FUNCTIONAL DESCRIPTION

This is a description of the SPX menu system. Any menu screen can be accessed by selecting the Home button from any screen.

If there are any current system faults, then after the Welcome screen the Status screen will be displayed and cannot be changed until the faults are cleared.

4.1 WELCOME SCREEN

This is the Welcome screen for the SPX system. It is displayed when the system is first powered on.

Figure 4-1: SPX Welcome Screen

The system will automatically display the Seasoning Menu, Launch Profile screen after the Welcome screen has been displayed, or the Status screen if there are any system faults.

NOTE: If there are any system faults, the Status screen will remain displayed until all faults are cleared.

4.2 HOME SCREEN

The Home screen is displayed by selecting the Home button on any screen. The Home screen is used to access all menus in the SPX system. It can be also used to run custom exposures, and opening a saved technique will bring the user to this screen as well.

Figure 4-2: SPX Home Screen

4.2.1 HOME SCREEN USER COMMANDS (SET POINTS)

4.2.1.1 KV

This field can be used to set the kV programming value, in increments of 0.1kV. Valid values are from 0.0 to 300.0 kV. The maximum kV value is determined by the model number (160 kV for SPX160, 200kV for SPX200, and 300kV for SPX300).

To enter a kV value:

1. Slowly turn the dial to highlight the kV field.
2. Press the dial once to enter voltage value.
3. Turn the dial till you reach the desired kV.
4. Press the dial one more time to save the setting.

4.2.1.2 MA

This field can be used to set the mA programming value, in increments of 0.1mA. Valid values are from 0.0 to 10.0 mA. The maximum mA value is determined by the model number (5mA for SPX160, 10mA for SPX200, and 10mA for SPX300). The maximum mA value will also be limited by the kV setting and the maximum power rating for each unit (800W for SPX160, 900W for SPX200, and 900W for SPX300).

To enter a mA value:

1. Slowly turn the dial to highlight the mA field.
2. Press the dial once to enter current value.
3. Turn the dial till you reach the desired mA.
4. Press the dial one more time to save the setting.

4.2.1.3 EXPOSURE TIME

This field can be used to set the exposure time for timed mode, in increments of 1s. The format of the value is in minutes and seconds, *MM:SS*. Valid values are from 0:00 to 99:59. The exposure time is unlimited if time set to 00:00. Operator attention required.

To enter a value for the exposure time:

1. Slowly turn the dial to highlight the time field.
2. Press the dial once to enter time in *MM*:*SS* format.
3. Turn the dial till you reach the desired time.
4. Press the dial one more time to save the setting.

4.2.2 HOME SCREEN OPERATION (X-RAY EXPOSURE)

An x-ray exposure can be initiated by pressing the X-ray On button while the key is the Energized position. The status will change from “HV Off” to “HV On”. If it is a timed exposure, the exposure time counter will either count down to zero or up from zero depending on the setting, and then terminate the exposure. If it is an untimed exposure, the exposure will continue until the x-ray off button is pressed, or the key is moved out of the Energized position.

An exposure can be paused by pressing the X-ray Off button after an exposure has begun. If it is a timed exposure, the exposure counter will freeze at the current value. The exposure can be resumed by pressing the X-ray On button, or canceled by moving the key out of the Energized position.

Figure 4-3: SPX Main Screen, Paused Exposure

4.2.3 HOME SCREEN USER STATUS (ACTUAL)

4.2.3.1 KV

This field displays the current kV feedback value, in increments of 0.1kV. Valid values are from 0.0 to 160.0 kV for SPX-160, 0.0 to 200KV for SPX-200 and 0.0 to 300KV for SPX-300.

4.2.3.2 MA

This field displays the current mA feedback value, in increments of 0.1mA. Valid values are from 0.0 to 5.0 mA for SPX-160, 0.0 to 10.0 mA for SPX-200 and SPX-300.

4.2.3.3 EXPOSURE TIME

This field displays the current exposure time for timed mode, in increments of 1s. The format of the value is in minutes and seconds, *MM:SS*. Valid values are from 00:00 to 99:59.

4.2.4 HOME SCREEN NAVIGATION

The following screens can be accessed from the Home screen

4.2.4.1 SETTINGS

Use this button to access the Settings menu.

4.2.4.2 OPTIONS

Use this button to access the Options menu.

4.2.4.3 STATUS

This will show the current status of either “HV Off” or “HV On”. This button is also used to access the Status menu.

4.3 SETTINGS SCREEN

The settings screen is the primary screen for all system settings that can be accessed by the user.

Figure 4-4: SPX Settings Screen

4.3.1 SETTINGS SCREEN NAVIGATION

The following screens can be accessed from the settings screen

4.3.1.1 SEASONING

Use this button to access the Seasoning menu.

4.3.1.2 TECHNIQUES

Use this button to access the Techniques menu.

4.3.1.3 SETUP

Use this button to access the Setup menu.

4.3.1.4 USER CONFIG

Use this button to access the User Config menu.

4.3.1.5 INFO

Use this button to access the Info menu.

4.3.1.6 ADMIN

Use this button to access the Admin menu.

4.3.1.7 BACK

Use this button to access the previous screen.

4.3.1.8 HOME

Use this button to go to the Home screen.

4.4 OPTIONS SCREEN

The options screen provides basic operational settings for the user.

Figure 4-5: SPX Options Screen

4.4.1 OPTIONS SCREEN USER OPTIONS

4.4.1.1 CLEAR FAULTS

Selecting this option will clear all latched system faults.

4.4.1.2 SCREEN TURN OFF TIME

This function is currently not enabled.

4.4.1.3 SCREEN SAVER

This function is currently not enabled.

4.4.2 OPTIONS SCREEN NAVIGATION

The following screens can be accessed from the Options screen

4.4.2.1 BACK

Use this button to access the previous screen.

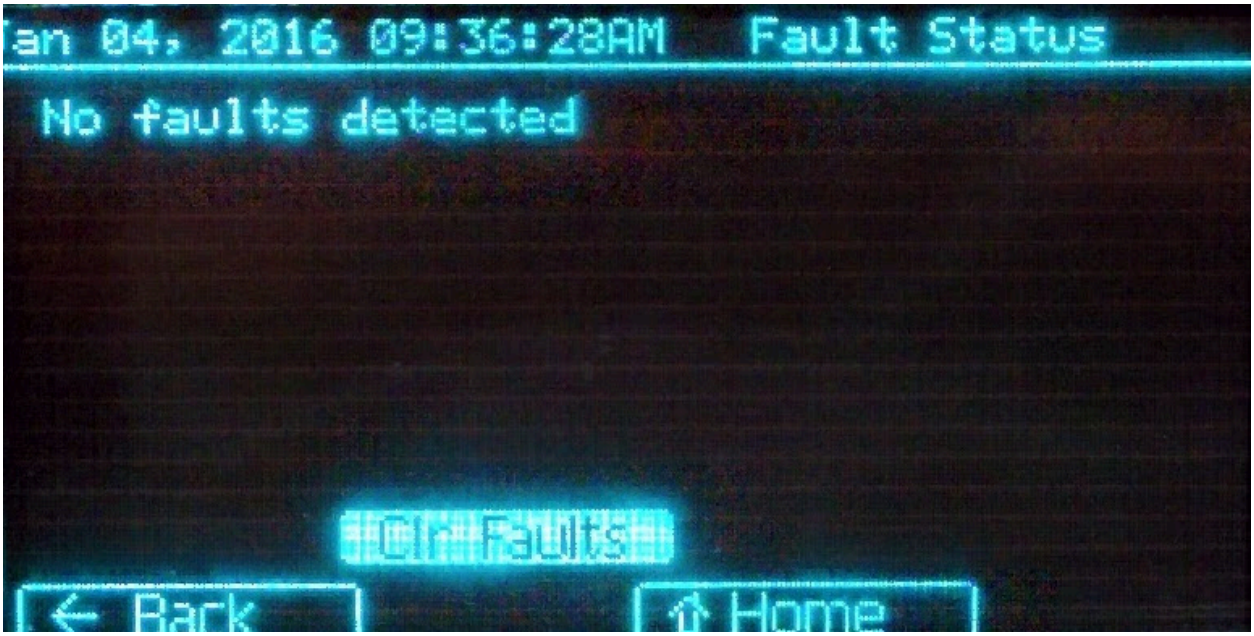
4.4.2.2 HOME

Use this button to go to the Home screen.

4.5 STATUS SCREEN

The status screen displays whether the system is operating normally or if there is a fault condition. Under normal operation, the message “No faults detected” will be displayed.

Figure 4-6: SPX Status Screen, Normal Operation



In the case of a fault condition, the status screen will specify which fault has been detected. This screen cannot be changed until the faults have been cleared.

Figure 4-7: SPX Status Screen, Fault Condition

4.5.1 STATUS SCREEN USER OPTIONS

4.5.1.1 CLEAR FAULTS

By pressing this button all latched system faults will be cleared.

4.5.2 STATUS SCREEN NAVIGATION

The following screens can be accessed from the Status screen

4.5.2.1 BACK

Use this button to access the previous screen.

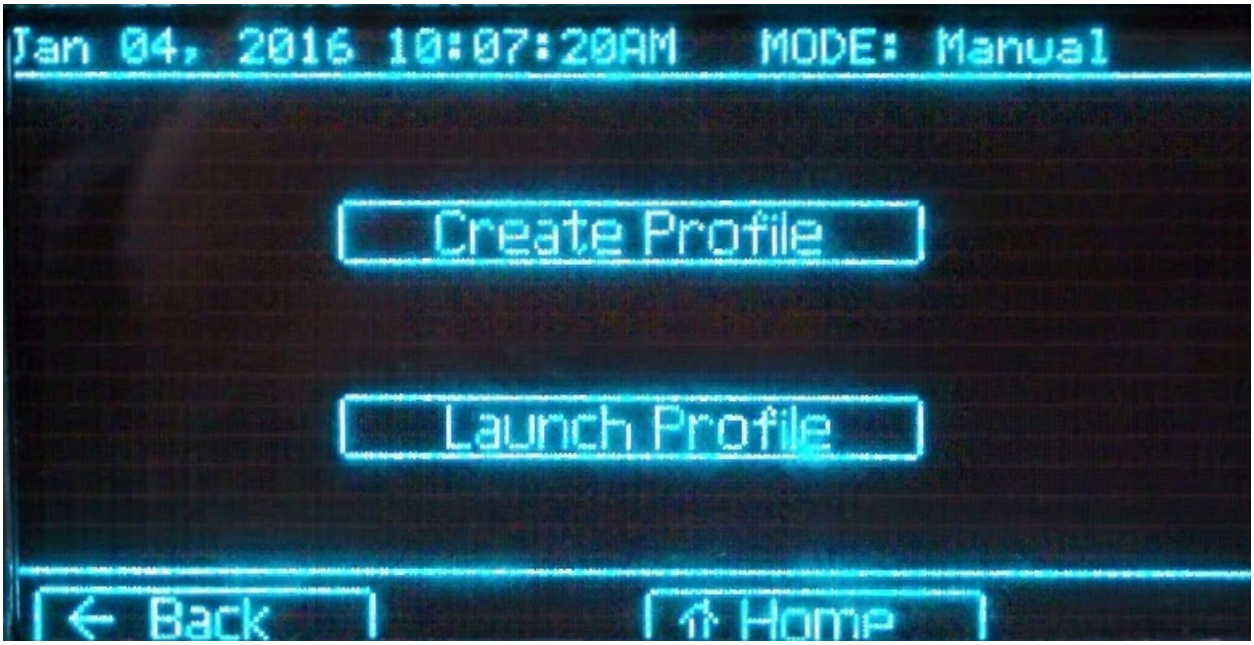
4.5.2.2 HOME

Use this button to go to the Home screen.

4.6 SEASONING SCREEN (MAIN)

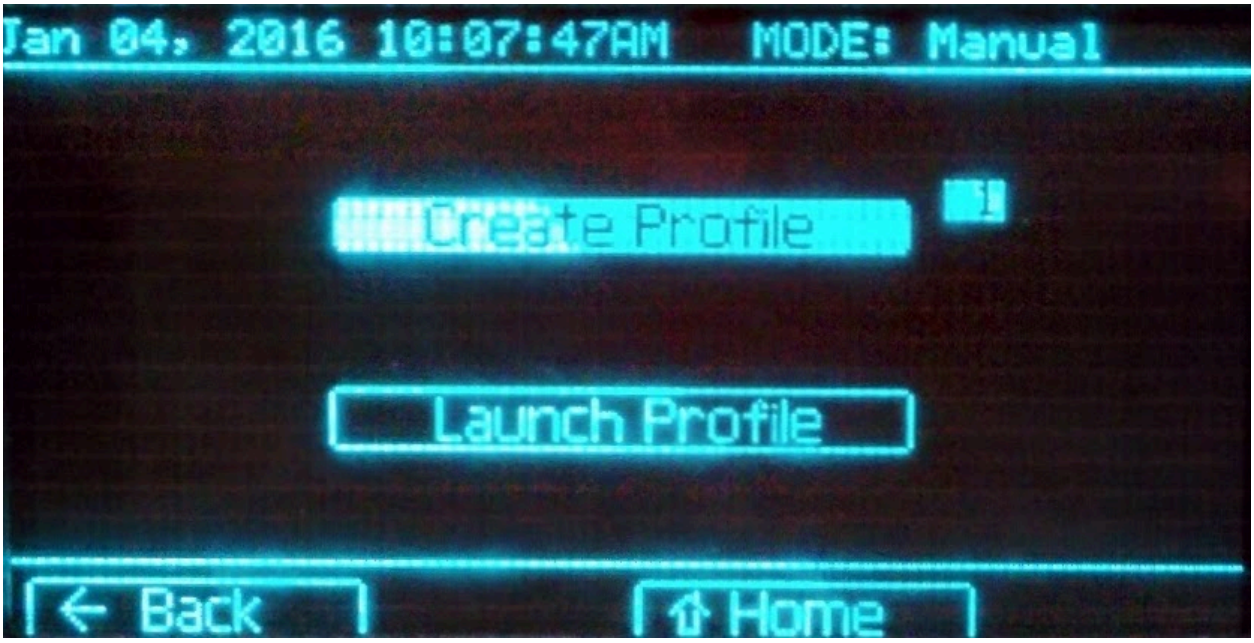
This is the main seasoning screen, which can be used to create a custom seasoning profile, or to launch a 4 To 8 Hours, 8 To 16 Hours, 16 Hours To 7 Days, 7 To 30 Days, Over 30 Days, New Tube or Custom seasoning profile.

Figure 4-8: SPX Seasoning Main Menu



When creating a custom profile, a number field will appear which can be used to select the number of the custom profile to create.

Figure 4-9: SPX Seasoning Main Menu (Create Profile Number Field Highlighted)



Seasoning “Auto-Warming” is important to preserve the x-ray tube. It is required whenever the tube is operated above 80 kV and four hours have elapsed since the x-ray tube was operated at the level required for the next exposure, or when operating a new tube having less than ten hours of operation. Tubes having been previously operated, but not run over 80 kV for 30 days or longer, must be treated as new tubes.

The following section outlines the steps to properly complete the x-ray tube warm-up sequence. Tables 1, 2 and 3 relate the tube’s inactive time to the required warm-up rate and must be used while performing the warm-up sequence.

Table 1: SPX160 X-ray Tube Warm-Up Instructions

Auto-Warm Modes	Auto-Warm Rate @ 5 mA
4 to 8 Hours	Starting at 80 kV, 1 minute at every 30 kV interval until desired kV level is attained.
8 to 16 Hours	Starting at 80 kV, 1 minute at every 20 kV interval until desired kV level is attained.
16 Hours to 7 Days	Starting at 80 kV, 1 minute at every 10 kV interval until desired kV level is attained.
7 to 30 Days	Starting at 80 kV, 1 minute at every 5 kV interval until desired kV level is attained.
Over 30 Days	Starting at 80 kV, 2 minutes at every 5 kV interval until desired kV level is attained.
New Tube (Warm Up Manually)	Start manually at 50 kV, 5 mA. Run for 5 minutes. Advance in 10 kV increments every 2 minutes after than to 100 kV. From 100 kV to 160 kV advance in 5 kV increments every 5 minutes. After reaching 160 kV, run for a minimum of 5 hours, with no ARCs.
If ARC Occurs (During Burn In)	If an ARC occurs warm the tube up using Over 30 Day Mode. After reaching 160 kV run for a minimum of 5 hours, with no ARCs.

Table 2: SPX200 X-ray Tube Warm-Up Instructions

Auto-Warm Modes	Auto-Warm Rate @ 5 mA
4 to 8 Hours	Starting at 80 kV, 1 minute at every 25 kV interval until desired kV level is attained.
8 to 16 Hours	Starting at 80 kV, 1 minute at every 20 kV interval until desired kV level is attained.
16 Hours to 7 Days	Starting at 80 kV, 1 minute at every 10 kV interval until desired kV level is attained.
7 to 30 Days	Starting at 80 kV, 1 minute at every 5 kV interval until desired kV level is attained.
Over 30 Days	Starting at 80 kV, 2 minutes at every 5 kV interval until desired kV level is attained.
New Tube (Warm Up Manually)	Start manually at 50 kV, 10 mA. Run for 5 minutes. Advance in 10 kV increments every 2 minutes after than to 100 kV. From 100 kV to 200 kV advance in 5 kV increments every 5 minutes. After reaching 200 kV, run for a minimum of 8 hours, with no ARCs.
If ARC Occurs (During Burn In)	If an ARC occurs warm the tube up using Over 30 Day Mode. After reaching 200 kV run for a minimum of 8 hours, with no ARCs.

Table 3: SPX300 X-ray Tube Warm-Up Instructions

Auto-Warm Modes	Auto-Warm Rate @ 5 mA
4 to 8 Hours	Starting at 100 kV, 1 minute at every 25 kV interval until desired kV level is attained.
8 to 16 Hours	Starting at 100 kV, 1 minute at every 20 kV interval until desired kV level is attained.
16 Hours to 7 Days	Starting at 100 kV, 1 minute at every 10 kV interval until desired kV level is attained.
7 to 30 Days	Starting at 100 kV, 1 minute at every 5 kV interval until desired kV level is attained.
Over 30 Days	Starting at 100 kV, 2 minutes at every 5 kV interval until desired kV level is attained.
New Tube (Warm Up Manually)	Start manually at 50 kV, 5 mA. Run for 5 minutes. Advance in 10 kV increments every 2 minutes after than to 150 kV. From 150 kV to 300 kV advance in 5 kV increments every 5 minutes. After reaching 300 kV, run for a minimum of 8 hours, with no ARCs.
If ARC Occurs (During Burn In)	If an ARC occurs warm the tube up using Over 30 Day Mode. After reaching 300 kV run for a minimum of 5 hours, with no ARCs.

4.6.1 SEASONING SCREEN (MAIN) USER OPTIONS

4.6.1.1 CREATE PROFILE

Selecting this field will bring up the Create Profile screen. The number of the profile to create must also be selected. To choose a profile by number, use the dial to highlight the number field and then press the dial to select the number. The maximum number of profiles that can be created is 20.

4.6.1.2 LAUNCH PROFILE

Selecting this field will bring up the Launch Profile screen.

4.6.2 SEASONING SCREEN (MAIN) NAVIGATION

The following screens can be accessed from the Seasoning (Main) screen.

4.6.2.1 BACK

Use this button to access the previous screen.

4.6.2.2 HOME

Use this button to go to the Home screen.

4.7 SEASONING SCREEN (CREATE PROFILE)

This is the seasoning screen that can be used to create a custom seasoning profile. The profile is defined in terms of steps and parameters (kV, mA, and exposure time values). All saved profiles are assigned a profile number. Saved profiles will be overwritten if the same number is chosen in the number field on the Seasoning Main Menu screen.

The maximum number of profiles that can be created is 20.

Figure 4-10: SPX Seasoning Menu, Create Profile Screen

4.7.1 SEASONING SCREEN (CREATE PROFILE) USER STATUS

4.7.1.1 CUSTOM PROFILE NUMBER

The custom profile number will be displayed in a header. If a different profile number is needed, use the “Back” button to return to the Seasoning (Main) screen and choose a different profile number in the number field.

4.7.2 SEASONING SCREEN (CREATE PROFILE) USER OPTIONS

A profile can be created by setting the kV, mA, and exposure time parameters for each step. By using the dial, the field can be selected by pressing it a single time. After the correct value has been dialed in, the value can be saved by pressing the dial again.

4.7.2.1 STEP

This field indicates the step number. The “Step →” and “Step ←” buttons are used to select the step to be configured. The maximum number of steps that a profile can contain is 50.

4.7.2.2 KV

This field is used to set the kV parameter for the selected step. kV values are entered in increments of 0.1kV. Valid values are from 0.0 to 300.0 kV. The maximum kV value is determined by the model number (160 kV for SPX160, 200kV for SPX200, and 300kV for SPX300).

To enter a kV value:

1. Slowly turn the dial to highlight the kV field.
2. Press the dial once to enter voltage value.
3. Turn the dial till you reach the desired kV.
4. Press the dial one more time to save the setting.

4.7.2.3 MA

This field is used to set the mA parameter for the selected step. mA values are entered in increments of 0.1mA. Valid values are from 0.0 to 10.0 mA. The maximum mA value is determined by the model number (5mA for SPX160, 10mA for SPX200, and 10mA for SPX300). The maximum mA value will also be limited by the kV setting and the maximum power rating for each unit (800W for SPX160, 900W for SPX200, and 900W for SPX300).

To enter a mA value:

1. Slowly turn the dial to highlight the mA field.
2. Press the dial once to enter current value.
3. Turn the dial till you reach the desired mA.
4. Press the dial one more time to save the setting.

4.7.2.4 EXPOSURE TIME (M)

This field is used to set the exposure time parameter for the selected step. Time is entered in increments of minutes. Valid values are from 0 minutes to 99 minutes.

To enter a value for the exposure time:

1. Slowly turn the dial to highlight the time field.
2. Press the dial once to enter time in *MM*:*SS* format.
3. Turn the dial till you reach the desired time.
4. Press the dial one more time to save the setting.

4.7.2.5 STEP →

This field is used to move to the next step to be configured. If the next highest numbered step exists, the active field will move there. If it does not exist, it will be created. The maximum number of steps that a profile can contain is 50.

4.7.2.6 STEP ←

This field is used to move to the previous step.

4.7.2.7 SAVE

This field is used to save the configured profile into the system memory under the selected profile number. The message “Custom seasoning profile #1 saved!” or equivalent will appear when the Save button is pressed. The custom profile can be recalled using the Launch Profile (Custom) menu, and selecting the desired profile number. The maximum number of profiles that can be saved is 20.

4.7.3 SEASONING SCREEN (CREATE PROFILE) NAVIGATION

The following screens can be accessed from the Seasoning (Create Profile) screen

4.7.3.1 BACK

Use this button to access the previous screen.

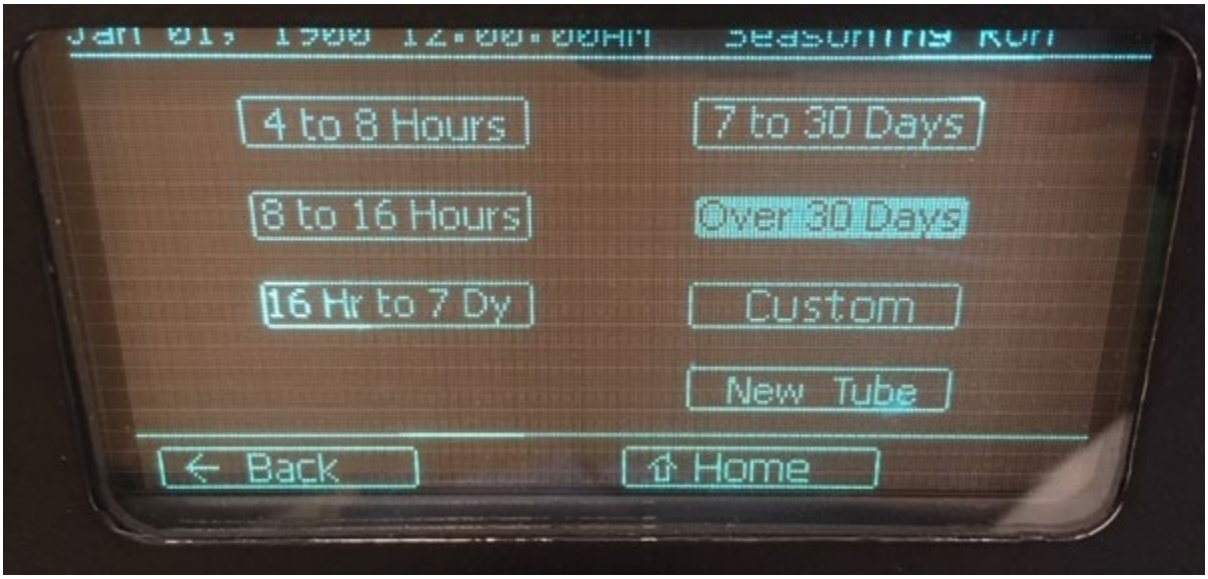
4.7.3.2 HOME

Use this button to go to the Home screen.

4.8 SEASONING SCREEN (LAUNCH PROFILE)

Selecting the “Launch Profile” button from the main Seasoning screen will bring up the following options: 4 to 8 Hours, 8 to 16 Hours, 16 Hours to 7 Days, 7 to 30 Days, Over 30 Days, Custom and New Tube. These buttons will select the desired seasoning profile.

Figure 4-11: SPX Seasoning Menu, Launch Profile Screen



If the Custom button is selected, a number field will appear to enable the user to select the desired saved custom seasoning profile. Only numbers with valid seasoning profiles can be selected.

Figure 4-12: SPX Seasoning Menu, Launch Profile Screen (Custom Number Field Highlighted)

4.8.1 SEASONING SCREEN (LAUNCH PROFILE) NAVIGATION

The following screens can be accessed from the Seasoning (Launch Profile) screen.

4.8.1.1 4 TO 8 HOURS

Use this button to access the Seasoning (Launch 4 To 8 Hours) screen.

4.8.1.2 8 TO 16 HOURS

Use this button to access the Seasoning (Launch 8 To 16 Hours) screen.

4.8.1.3 16 HR TO 7 DAYS

Use this button to access the Seasoning (Launch 16 Hours To 7 Days) Screen.

4.8.1.4 7 TO 30 DAYS

Use this button to access the Seasoning (Launch 7 To 30 Days) screen.

4.8.1.5 OVER 30 DAYS

Use this button to access the Seasoning (Launch Over 30 Days) screen.

4.8.1.6 CUSTOM

Use this button to access the Seasoning (Launch Custom) screen.

4.8.1.7 New Tube

Use this button to access the Seasoning (Launch screen.

4.8.1.8 BACK

Use this button to access the previous screen.

4.8.1.9 HOME

Use this button to go to the Home screen.

4.9 SEASONING SCREEN (LAUNCH 4 TO 8 HOURS)

Upon unit startup, the Launch 4 To 8 Hours Seasoning screen will be displayed directly after the Welcome screen, unless there are any system faults. Selecting the 4 To 8 Hours option from the Launch Profile menu will also provide access to this screen and the 4 To 8 Hours seasoning information. For each step in the profile, the kV, mA, and exposure time in minutes will be provided. 5 steps at a time will be displayed on each page. The kV and mA feedback values are also displayed.

Figure 4-13: SPX Seasoning Menu, Launch 4 To 8 Hours Screen

Selecting the “Step →” button will show the next page of steps in the seasoning profile.

Figure 4-14: SPX Seasoning Menu, Launch 4 To 8 Hours Screen with Further Steps Shown

4.9.1 SEASONING SCREEN (LAUNCH 4 TO 8 HOURS) USER OPTIONS

4.9.1.1 STEP →

View the next 5 steps in the seasoning profile.

4.9.1.2 STEP ←

View the previous 5 steps in the seasoning profile.

4.9.1.3 START

Launch the 4 To 8 Hours seasoning profile.

4.9.2 SEASONING SCREEN (LAUNCH 4 TO 8 HOURS) NAVIGATION

The following screens can be accessed from the Seasoning (Launch 4 To 8 Hours) screen.

4.9.2.1 BACK

Use this button to access the previous screen.

4.9.2.2 HOME

Use this button to go to the Home screen.

4.10 SEASONING SCREEN (LAUNCH 8 TO 16 HOURS)

Selecting the 8 To 16 Hours option from the Launch Profile menu will provide the 8 To 16 Hours seasoning information. For each step in the profile, the kV, mA, and exposure time in minutes will be provided. 5 steps at a time will be displayed on each page. The kV and mA feedback values are also displayed.

Figure 4-15: SPX Seasoning Menu, Launch 8 To 16 Hours Screen

Selecting the “Step →” button will show the next page of steps in the seasoning profile.

Figure 4-16: SPX Seasoning Menu, Launch 8 To 16 Hours Screen with Further Steps Shown

4.10.1 SEASONING SCREEN (LAUNCH 8 TO 16 HOURS) USER OPTIONS

4.10.1.1 STEP →

View the next 5 steps in the seasoning profile.

4.10.1.2 STEP ←

View the previous 5 steps in the seasoning profile.

4.10.1.3 START

Launch the 8 To 16 Hours seasoning profile.

4.10.2 SEASONING SCREEN (LAUNCH 8 TO 16 HOURS) NAVIGATION

The following screens can be accessed from the Seasoning (Launch 8 To 16 Hours) screen.

4.10.2.1 BACK

Use this button to access the previous screen.

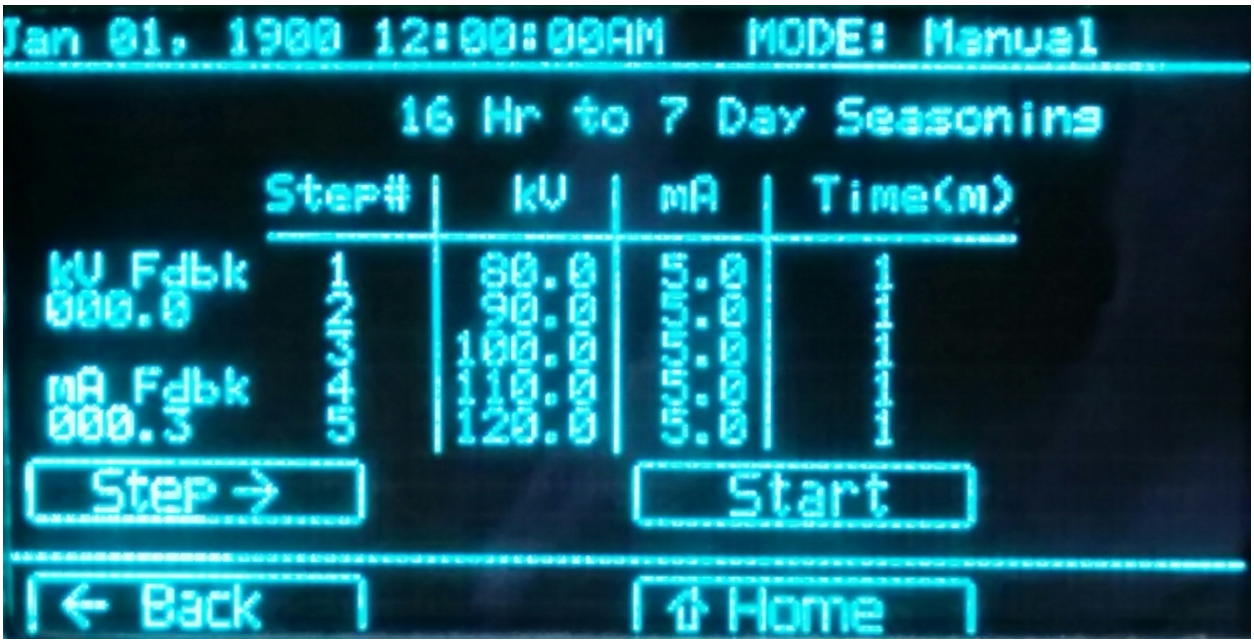
4.10.2.2 HOME

Use this button to go to the Home screen.

4.11 SEASONING SCREEN (LAUNCH 16 HOURS TO 7 DAYS)

Selecting the 16 Hours To 7 Days option from the Launch Profile menu will provide the 16 Hours To 7 Days seasoning information. For each step in the profile, the kV, mA, and exposure time in minutes will be provided. 5 steps at a time will be displayed on each page. The kV and mA feedback values are also displayed.

Figure 4-17: SPX Seasoning Menu, Launch 16 Hours To 7 Days Screen



Selecting the “Step →” button will show the next page of steps in the seasoning profile.

Figure 4-18: SPX Seasoning Menu, Launch 16 Hours To 7 Days Screen with Further Steps Shown

4.11.1 SEASONING SCREEN (LAUNCH 16 HOURS TO 7 DAYS) USER OPTIONS

4.11.1.1 STEP →

View the next 5 steps in the seasoning profile.

4.11.1.2 STEP ←

View the previous 5 steps in the seasoning profile.

4.11.1.3 START

Launch the 16 Hours To 7 Days seasoning profile.

4.11.2 SEASONING SCREEN (LAUNCH 16 HOURS TO 7 DAYS) NAVIGATION

The following screens can be accessed from the Seasoning (Launch 16 Hours To 7 Days) screen.

4.11.2.1 BACK

Use this button to access the previous screen.

4.11.2.2 HOME

Use this button to go to the Home screen.

4.12 SEASONING SCREEN (LAUNCH 7 TO 30 DAYS)

Selecting the 7 To 30 Days option from the Launch Profile menu will provide the 7 To 30 Days seasoning information. For each step in the profile, the kV, mA, and exposure time in minutes will be provided. 5 steps at a time will be displayed on each page. The kV and mA feedback values are also displayed.

Figure 4-19: SPX Seasoning Menu, Launch 7 To 30 Days Screen

Selecting the “Step →” button will show the next page of steps in the seasoning profile.

Figure 4-20: SPX Seasoning Menu, Launch 7 To 30 Days Screen with Further Steps Shown

4.12.1 SEASONING SCREEN (LAUNCH 7 TO 30 DAYS) USER OPTIONS

4.12.1.1 STEP →

View the next 5 steps in the seasoning profile.

4.12.1.2 STEP ←

View the previous 5 steps in the seasoning profile.

4.12.1.3 START

Launch the 7 To 30 Days seasoning profile.

4.12.2 SEASONING SCREEN (LAUNCH 7 TO 30 DAYS) NAVIGATION

The following screens can be accessed from the Seasoning (Launch 7 To 30 Days) screen.

4.12.2.1 BACK

Use this button to access the previous screen.

4.12.2.2 HOME

Use this button to go to the Home screen.

4.13 SEASONING SCREEN (LAUNCH OVER 30 DAYS)

Selecting the Over 30 Days option from the Launch Profile menu will provide the Ove 30 Days seasoning information. For each step in the profile, the kV, mA, and exposure time in minutes will be provided. 5 steps at a time will be displayed on each page. The kV and mA feedback values are also displayed.

Figure 4-21: SPX Seasoning Menu, Launch Over 30 Days Screen

Selecting the “Step →” button will show the next page of steps in the seasoning profile.

Figure 4-22: SPX Seasoning Menu, Launch Over 30 Days Screen with Further Steps Shown

4.13.1 SEASONING SCREEN (LAUNCH OVER 30 DAYS) USER OPTIONS

4.13.1.1 STEP →

View the next 5 steps in the seasoning profile.

4.13.1.2 STEP ←

View the previous 5 steps in the seasoning profile.

4.13.1.3 START

Launch the Ove 30 Days seasoning profile.

4.13.2 SEASONING SCREEN (LAUNCH OVER 30 DAYS) NAVIGATION

The following screens can be accessed from the Seasoning (Launch Over 30 Days) screen.

4.13.2.1 BACK

Use this button to access the previous screen.

4.13.2.2 HOME

Use this button to go to the Home screen.

4.14 SEASONING SCREEN (LAUNCH CUSTOM)

Selecting the Custom option from the Launch Profile menu will provide the custom seasoning information for the profile number selected. For each step in the profile, the kV, mA, and exposure time in minutes will be provided. 5 steps at a time will be displayed on each page.

Figure 4-23: SPX Seasoning Menu, Launch Custom Screen

4.14.1 SEASONING SCREEN (LAUNCH CUSTOM) USER STATUS

The following information is provided to the user on the Seasoning (Launch Custom) screen.

4.14.1.1 CUSTOM SEASONING PROFILE NUMBER

A heading will be displayed which will indicate which custom seasoning profile number has been selected to launch. To choose a different custom profile number, use the “Back” button to return to the Launch Profile menu and select a different saved custom profile number.

4.14.1.2 STEP#

This column indicates the profile steps in order.

4.14.1.3 KV

The kV setting for each step is displayed in this column.

4.14.1.4 MA

The mA setting for each step is displayed in this column.

4.14.1.5 TIME (M)

The exposure time for each step is displayed in this column.

4.14.1.6 KV FEEDBACK

This field displays the kV feedback value, in increments of 0.1kV. Valid values are from 0.0 to 300.0 kV. The maximum kV value is determined by the model number (160 kV for SPX160, 200kV for SPX200, and 300kV for SPX300).

4.14.1.7 MA FEEDBACK

This field displays the mA feedback value, in increments of 0.1mA. Valid values are from 0.0 to 10.0 mA. The maximum mA value is determined by the model number (5mA for SPX160, 10mA for SPX200, and 10mA for SPX300). The maximum mA value will also be limited by the kV setting and the maximum power rating for each unit (800W for SPX160, 900W for SPX200, and 900W for SPX300).

4.14.2 SEASONING SCREEN (LAUNCH CUSTOM) USER OPTIONS

4.14.2.1 START

Launch the custom seasoning profile.

4.14.3 SEASONING SCREEN (LAUNCH CUSTOM) NAVIGATION

The following screens can be accessed from the Seasoning (Launch Custom) screen.

4.14.3.1 BACK

Use this button to access the previous screen.

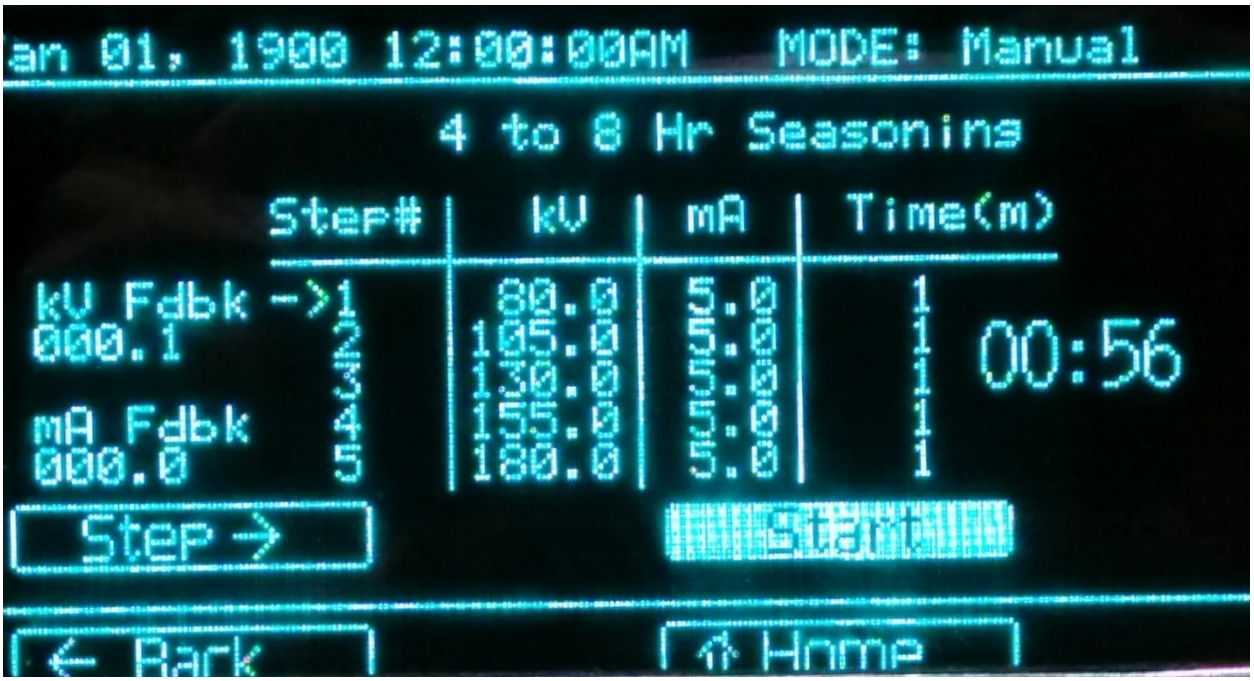
4.14.3.2 HOME

Use this button to go to the Home screen.

4.15 SEASONING SCREEN PAUSE FUNCTION

A seasoning session can be paused by pressing the X-ray Off button after a session has begun. The exposure counter and step indicator will freeze at the current value. The session can be resumed by pressing the X-ray On button, or canceled by moving the key out of the Energized position.

Figure 4-24: SPX Seasoning Session, Paused



4.16 TECHNIQUES MAIN MENU SCREEN

This is the main screen for creating, saving, and opening techniques.

Figure 4-25: SPX Techniques Menu

If a technique is to be created, a number field will appear which must be selected. This will be the number assigned to the new technique. If a tecnique with the number already exists, it will be overwritten. Valid values for the number field are from 1 to 200.

Figure 4-26: SPX Techniques Main Menu Screen with Create Technique Number Field Highlighted

If a technique is to be opened, a number field will appear which must be set. This will select the technique to open. Only valid technique numbers can be selected.

Figure 4-27: SPX Techniques Main Menu Screen with Open Technique Number Field Highlighted

If no valid technique exists for the number selected, the error message “No valid data for technique #” will appear. Valid values for the number field are from 1 to 200.

There is also an option to erase a saved technique. If a technique is to be erased, a number field will appear which must be set. This will select the technique to erase. Only valid technique numbers can be selected.

Figure 4-28: SPX Techniques Main Menu Screen with Erase Techniques Number Field Highlighted

4.16.1 TECHNIQUES MAIN MENU SCREEN NAVIGATION

The following screens can be accessed from the Techniques Main Menu screen.

4.16.1.1 CREATE

Use this button to access the Create Technique screen.

4.16.1.2 OPEN

Use this button to go to the Open Technique screen.

4.16.1.3 ERASE

Use this button to go to perform the erase the selected Technique.

4.16.1.4 BACK

Use this button to access the previous screen.

4.16.1.5 HOME

Use this button to go to the Home screen.

4.17 TECHNIQUES CREATE SCREEN

This is the screen used for creating techniques. The kV, mA, and exposure time parameters can be set by the user. The technique will be saved as the number chosen from the Techniques Main Menu screen.

Figure 4-29: SPX Techniques Create Screen

When the technique is saved, an acknowledgement message of “Technique # data saved!” will be displayed.

Figure 4-30: SPX Techniques Create Screen with Save Acknowledgement Message

4.17.1 TECHNIQUES CREATE SCREEN USER STATUS

4.17.1.1 CREATE TECHNIQUE NUMBER

A heading will be displayed indicating which technique number will be assigned to the created technique. This number is chosen at the Techniques Main Menu screen. If a different technique number is desired, use the “Back” button to return to the Techniques Main Menu screen and choose a different technique number in the number field.

4.17.2 TECHNIQUES CREATE SCREEN USER OPTIONS

4.17.2.1 KV

This field can be used to set the kV programming value, in increments of 0.1kV. Valid values are from 0.0 to 300.0 kV. The maximum kV value is determined by the model number (160 kV for SPX160, 200kV for SPX200, and 300kV for SPX300).

To enter a kV value:
1. Slowly turn the dial to highlight the kV field.
2. Press the dial once to enter voltage value.
3. Turn the dial till you reach the desired kV.
4. Press the dial one more time to save the setting.

4.17.2.2 MA

This field can be used to set the mA programming value, in increments of 0.1mA. Valid values are from 0.0 to 10.0 mA. The maximum mA value is determined by the model number (5mA for SPX160, 10mA for SPX200, and 10mA for SPX300). The maximum mA value will also be limited by the kV setting and the maximum power rating for each unit (800W for SPX160, 900W for SPX200, and 900W for SPX300).

To enter a mA value:
1. Slowly turn the dial to highlight the mA field.
2. Press the dial once to enter current value.
3. Turn the dial till you reach the desired mA.
4. Press the dial one more time to save the setting.

4.17.2.3 EXPOSURE TIME

This field can be used to set the exposure time for timed mode, in increments of 1s. The format of the value is in minutes and seconds, *MM:SS*. Valid values are from 0:00 to 99:59. The exposure time is unlimited if time set to 00:00. Operator attention required.

To enter a value for the exposure time:
1. Slowly turn the dial to highlight the time field.
2. Press the dial once to enter time in *MM*:*SS* format.
3. Turn the dial till you reach the desired time.
4. Press the dial one more time to save the setting.

4.17.2.4 SAVE

This button should be pressed to save the technique as the number selected from the Techniques Main Menu screen.

4.17.3 TECHNIQUES CREATE SCREEN NAVIGATION

4.17.3.1 BACK

Use this button to access the previous screen.

4.17.3.2 HOME

Use this button to go to the Home screen.

4.18 TECHNIQUES OPEN SCREEN

When the open technique option is used to launch a valid technique from the Techniques Main Menu screen, the system will load the values and return to the SPX Home Screen. Here, the exposure can be run by pressing the X-Ray On button, and paused by pressing the X-Ray Off button. The technique will run as a standard exposure.

4.19 SETUP SCREEN

The Setup screen will display basic Ethernet connectivity information about the SPX unit.

Figure 4-31: SPX Setup Screen

4.19.1 SETUP SCREEN USER STATUS

4.19.1.1 IP ADDRESS

The current IP address for the SPX unit is listed here.

4.19.1.2 SUBNET MASK

The current subnet mask for the SPX unit is listed here.

4.19.1.3 GATEWAY

The current gateway for the SPX unit is listed here.

4.19.2 SETUP SCREEN NAVIGATION

The following screens can be accessed from the Techniques Open screen.

4.19.2.1 BACK

Use this button to access the previous screen.

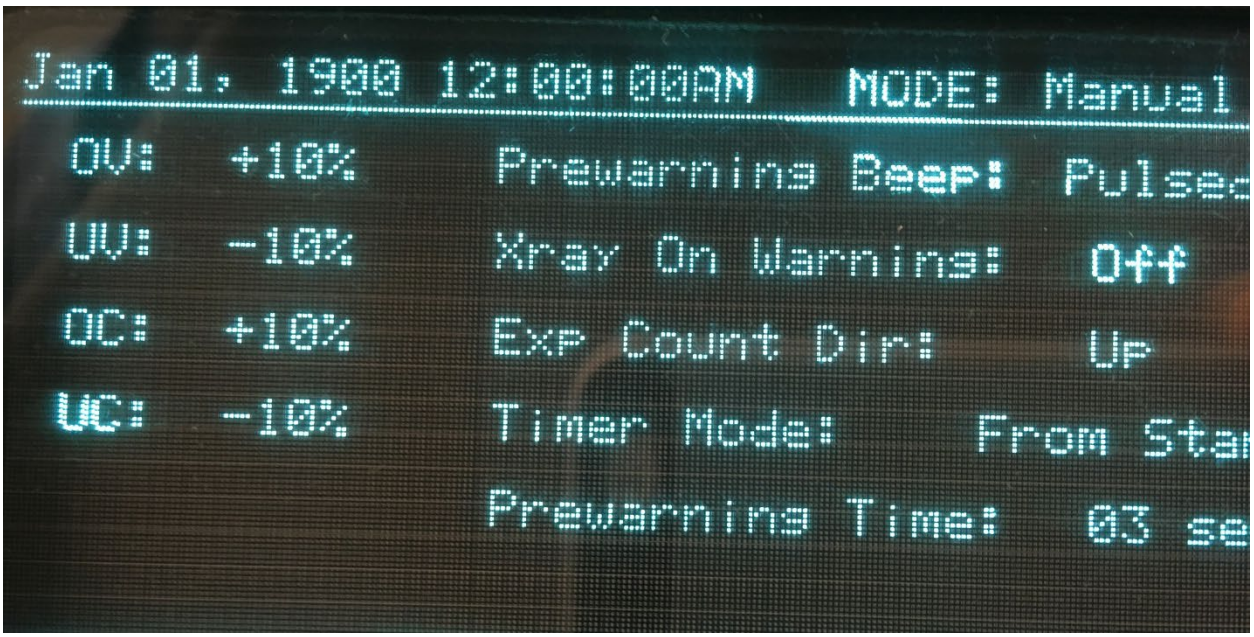
4.19.2.2 HOME

Use this button to go to the Home screen.

4.20 USER CONFIG SCREEN

The User Config screen can be used to set some operation parameters for the SPX system.

Figure 4-32: SPX User Config Screen



4.20.1 USER CONFIG SCREEN USER OPTIONS

4.20.1.1 OV

The over voltage threshold can be set using this field. The valid range of values is from +1% to +10%. The default value is +10% over the kV program value.

4.20.1.2 UV

The under voltage threshold can be set using this field. The valid range of values is from -1% to -10%. The default value is -10% below the kV program value.

4.20.1.3 OC

The over current threshold can be set using this field. The valid range of values is from -1% to -10%. The default value is +10% over the mA program value.

4.20.1.4 UC

The under current threshold can be set using this field. The valid range of values is from -1% to -10%. The default value is -10% below the mA program value.

4.20.1.5 PREWARNING AUDIO

The behavior of the buzzer during the pre-warning time can be configured here. The options are “Constant Beep” and “Pulsed Beep”. The default value is “Constant Beep”.

4.20.1.6 X-RAY ON WARNING

The behavior of the buzzer during the exposure time can be configured here. The options are “Off” and “On”. The default value is “On”.

4.20.1.7 EXP COUNT DIR

The direction of the exposure time counter can be configured here. The options are “Up” and “Down”. The default value is “Down”.

4.20.1.8 TIMER MODE

The function of the exposure timer counter can be configured here. The “From Stable” option will set the exposure counter to start counting from the point when the kV ramp is stable. The “From Start” option will set the exposure counter to start counting from the point when the kV ramp starts. The default value is “From Start”.

4.20.1.9 PREWARNIG TIME

The prewarning time can be configured from 0 to 60 seconds. This is the time the units waits before high voltage enable sequence starts.

4.20.2 USER CONFIG SCREEN NAVIGATION

The following screens can be accessed from the User Config screen.

4.20.2.1 BACK

Use this button to access the previous screen.

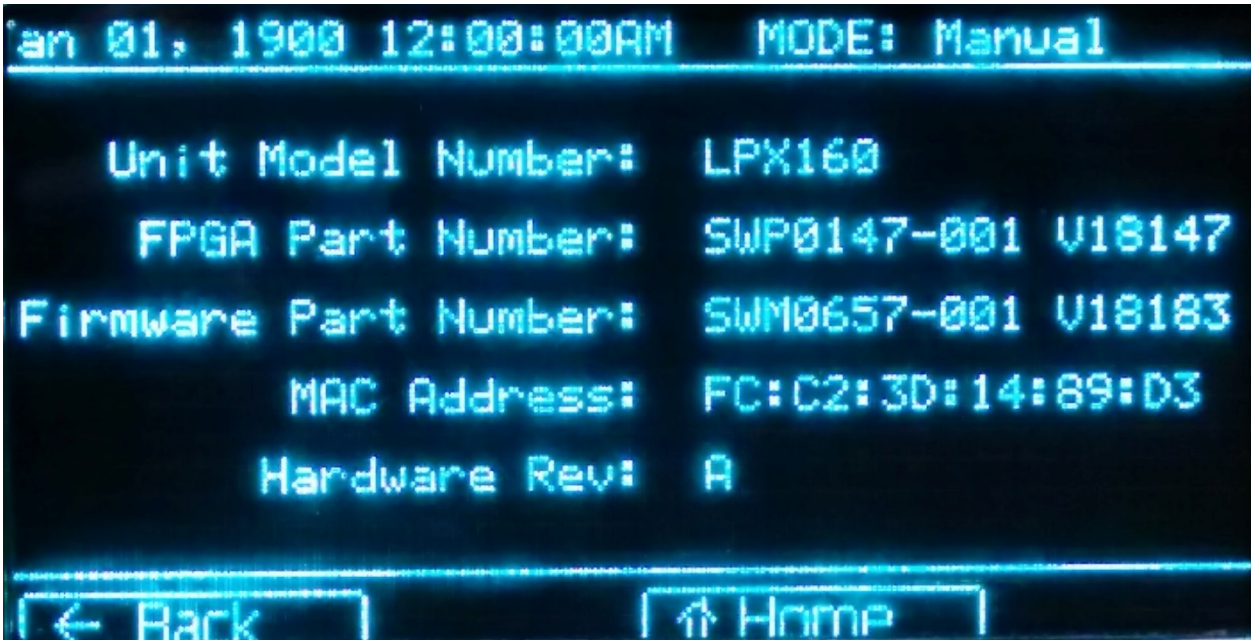
4.20.2.2 HOME

Use this button to go to the Home screen.

4.21 INFO SCREEN

The Info screen is used to display model information about a particular SPX system. This information can be used for diagnostic purposes.

Figure 4-33: SPX Info Screen



4.21.1 INFO SCREEN STATUS

4.21.1.1 UNIT MODEL NUMBER

This field returns the model number of the unit. Possible values are “SPX160”, “SPX200”, and “SPX300”.

4.21.1.2 FPGA PART NUMBER

This field returns revision information for the system FPGA.

4.21.1.3 FIRMWARE PART NUMBER

This field returns revision information for the system firmware.

4.21.1.4 MAC ADDRESS

This field returns the configured MAC address of the unit. The format of the number is *HH:HH:HH:HH:HH:HH*, where H represents a hexadecimal number.

4.21.1.5 HARDWARE REV

This field returns the hardware revision of the unit. Hardware revisions will have an alphabetical value (e.g. A).

4.21.2 INFO SCREEN NAVIGATION

The following screens can be accessed from the Info screen.

4.21.2.1 BACK

Use this button to access the previous screen.

4.21.2.2 HOME

Use this button to go to the Home screen.

5.0 SPX GUI FUNCTIONAL DESCRIPTION

The SPX Graphical User Interface (GUI) is a program that can control the SPX unit as an alternative to the front panel control. The GUI must be installed on a PC which is connected to the SPX unit through a serial, USB (not available), or Ethernet connection.

5.1 SPX GUI INSTALLATION

The following are instructions on installing the SPX GUI onto a Windows PC. Supported Windows operating systems are 32-bit and 64-bit Windows 7 and later operating systems.

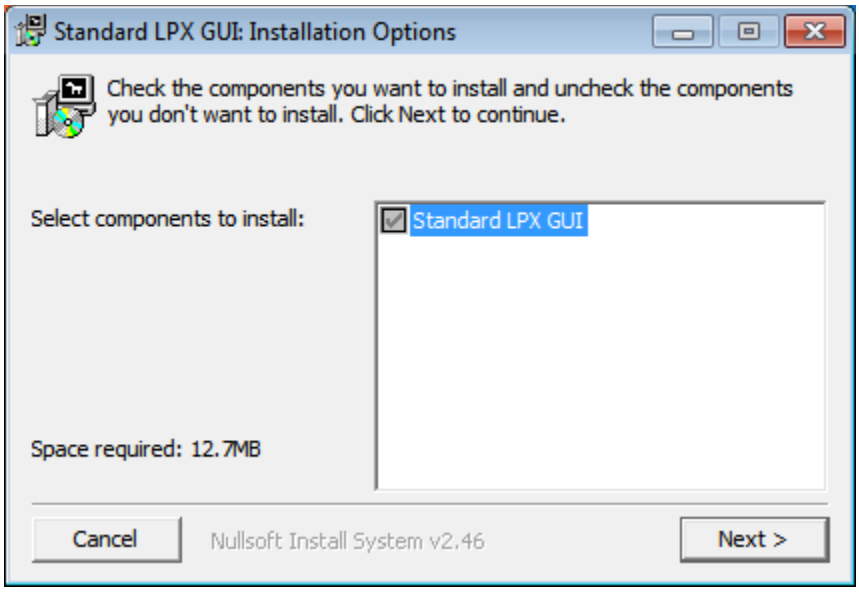
The SPX GUI installation file is distributed as a zipped file containing an executable program. Open this file using an unzip utility, and extract the executable to a temporary directory.

The executable will have the same name as the zipped file (e.g. D0193002_V18129.exe).

Figure 5-1: SPX GUI Installation Files Example

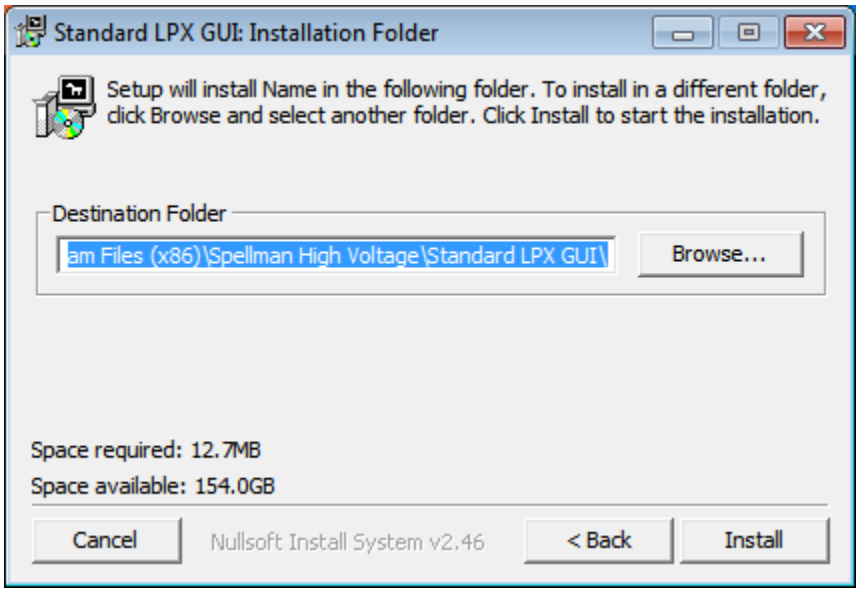
Clicking on the extracted executable file will start the installation process.

Figure 5-2: SPX GUI Installation Options Screen



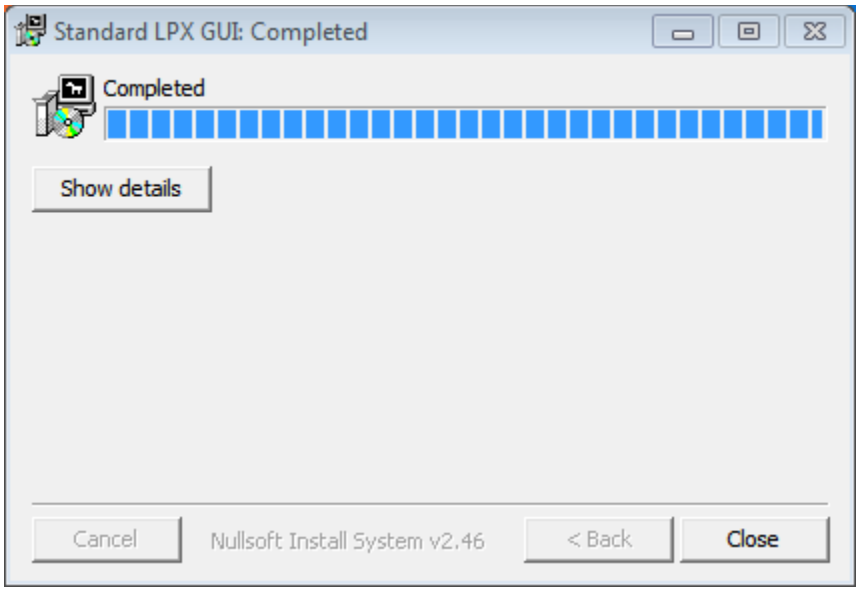
There are no installation options for this GUI, so click the “Next” button to continue to the next screen.

Figure 5-3: SPX GUI Installation Folder Screen



The default installation directory will be in the “C:\Program Files (X86)” directory. Click the “Browse” button to choose a different location, or the “Install” button to install the software.

Figure 5-4: SPX GUI Installation Complete Screen



If the install successfully completes, you will see the above Completed screen. Press the “Close” button to finish the installation process.

5.2 STARTING THE LPX GUI

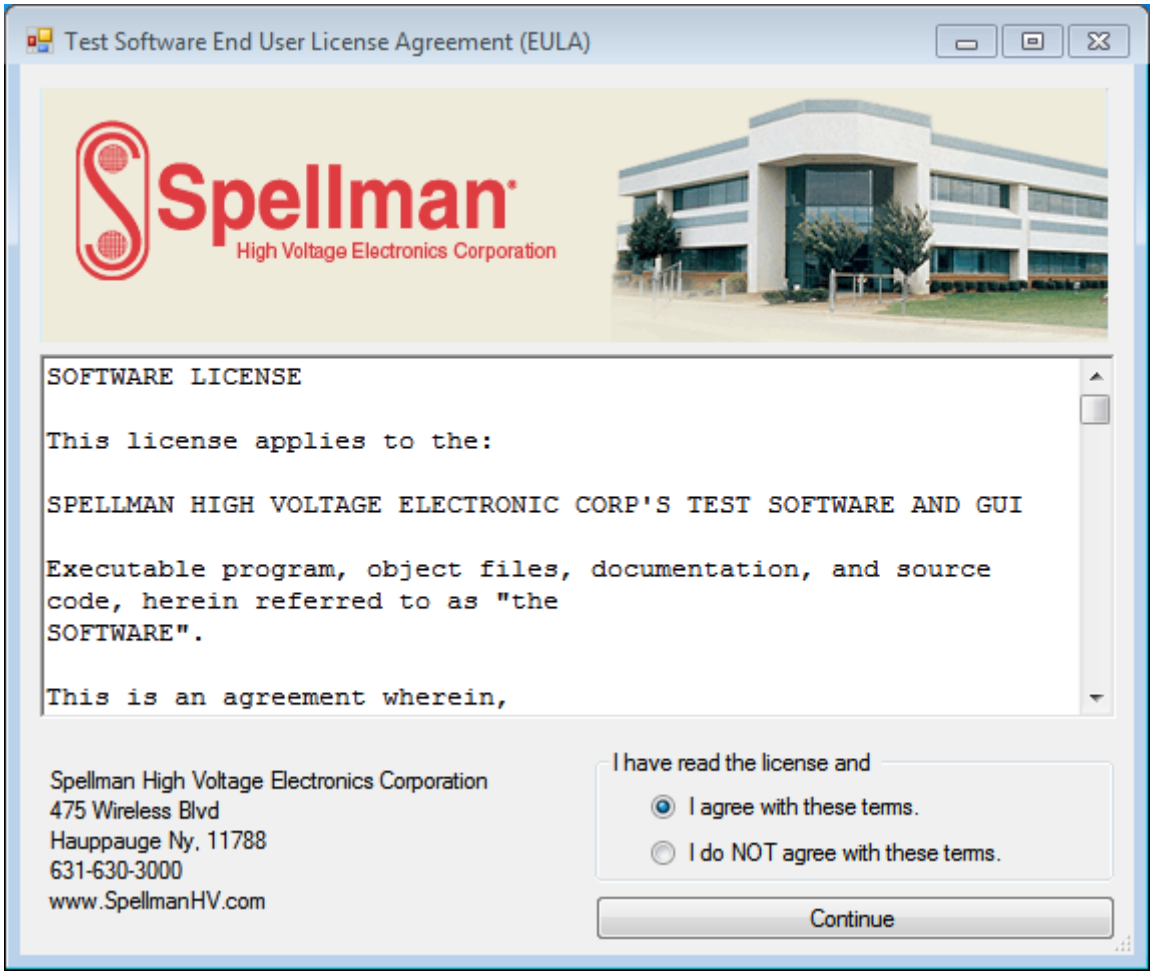
The SPX GUI executable can be located in the Start menu under the “Spellman High Voltage, Standard SPX GUI” folder. The GUI can also be created as a shortcut on the Desktop. Select the GUI icon to start the program.

Figure 5-5: SPX GUI Program Icon

5.2.1 SPX GUI EULA SCREEN

An End User License Agreement (EULA) screen will appear on GUI startup. Please read the agreement, select “I agree with these terms.” and press the “Continue” button.

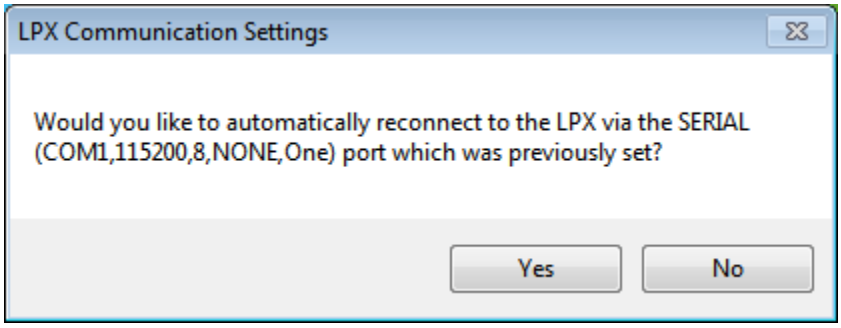
Figure 5-6: SPX GUI EULA Screen



5.2.2 SPX GUI COMMUNICATIONS SETTINGS SCREEN

After the EULA screen, the GUI will prompt the user if the previous connection settings should be used.

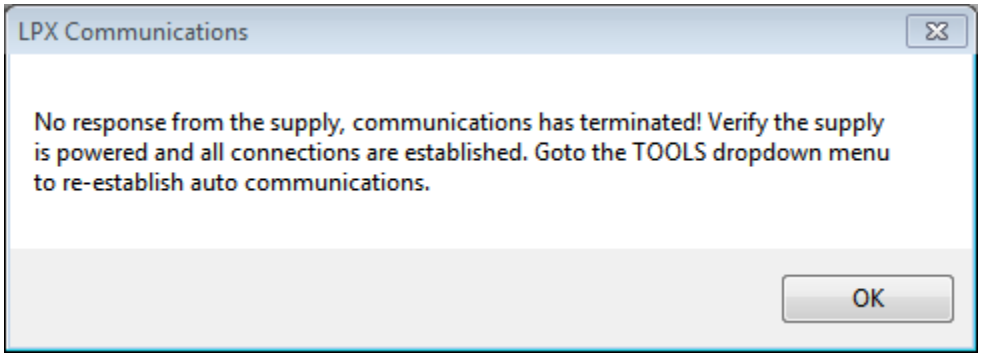
Figure 5-7: SPX GUI Communications Settings Screen



Click “Yes” If the previous connections setting is to be used. Click “No” to either not connect or to connect with different settings.

If “Yes” is selected but the GUI was unable to connect to the unit, a message will pop up informing the user to select different settings.

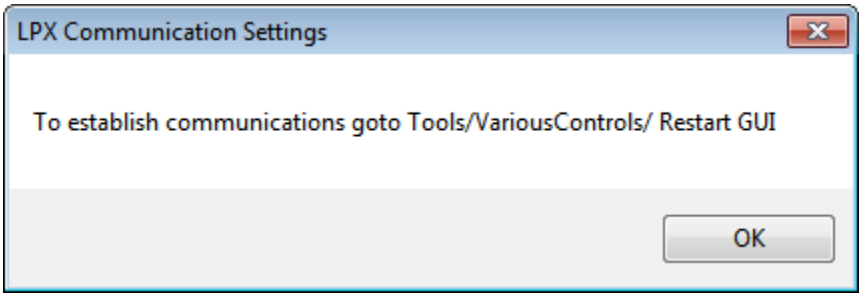
Figure 5-8: SPX GUI Communications Terminated Message



Otherwise, the GUI will open normally.

If “No” is selected, a message will pop up instructing the user how to connect to the unit at a later time.

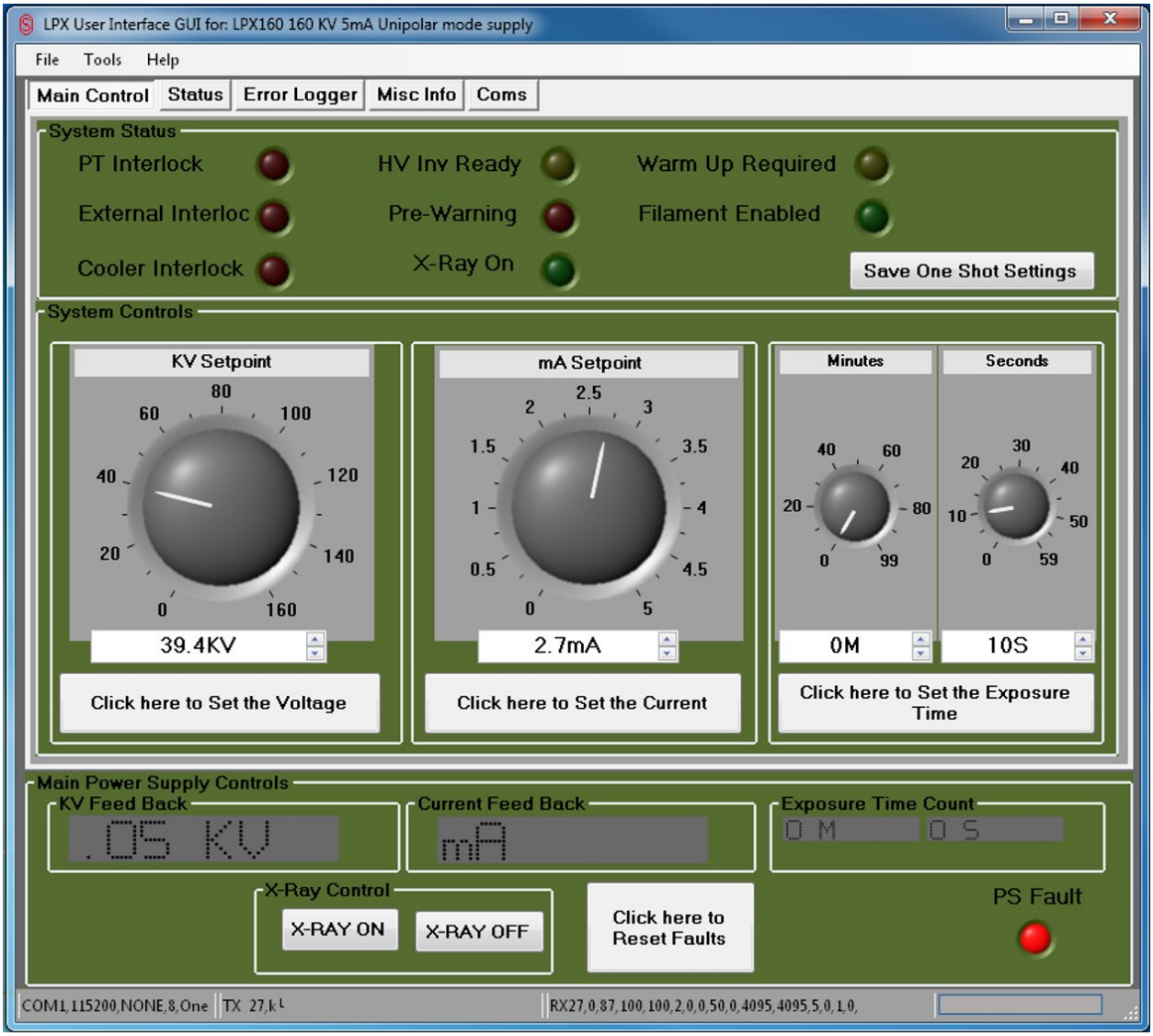
Figure 5-9: SPX GUI Communications Settings Message



5.3 OPERATING THE SPX GUI

This section will describe the operation of the SPX unit from the Graphical User Interface. Upon startup, the Main Control Screen will be displayed.

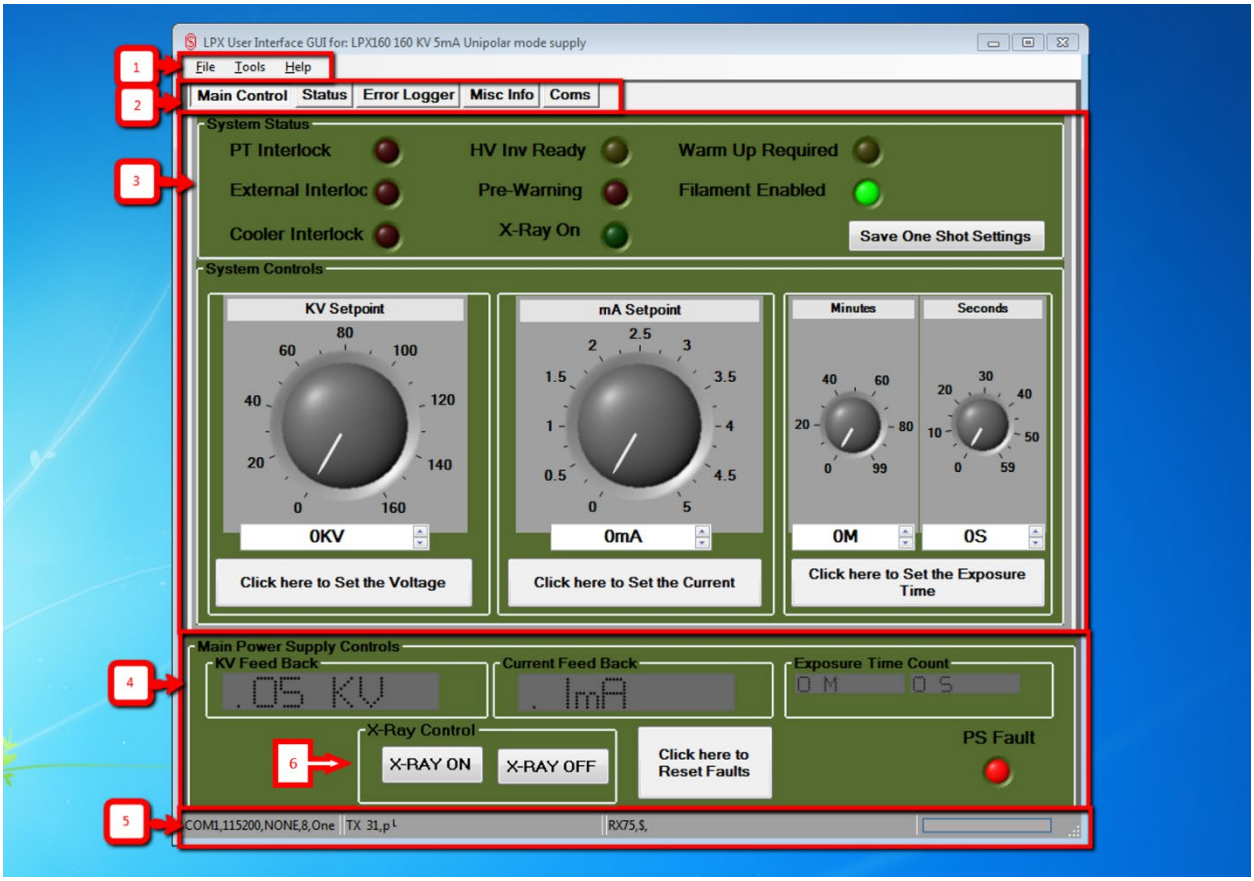
Figure 5-10: SPX GUI Main Control Screen at Startup



5.3.1 SPX GUI LAYOUT

The SPX GUI layout contains the following sections:

Figure 5-11: SPX GUI Layout



1. Menu bar: This section contains various controls and information available through pull-down menus. The menu bar is always visible.
2. Control window tab bar: These tabs select which Control window to display. The tabs are always visible.
3. Control window display section: This section will display the corresponding control window selected by the tabs. One control window can be displayed at a time.
4. Main Power Supply Controls section: This section contains some critical information and controls. This section is always visible.
5. Communication status bar: This section will display information related to the communications with the unit. This status is always visible.
6. X-Ray Control: When the unit is set to remote mode, the control buttons on this section can be used to turn high voltage on or off. (Not available)

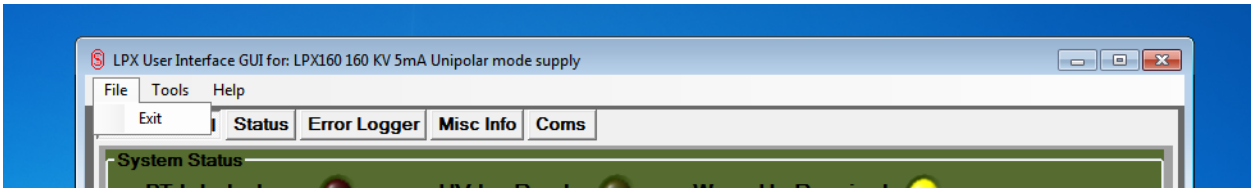
5.3.2 SPX GUI MENU BAR

The SPX GUI menu bar contains various controls and information available through pull-down menus.

5.3.2.1 FILE MENU

The following options can be selected from the File menu on the meu bar:

Figure 5-12: SPX GUI Menu Bar, File Menu, Exit Selection



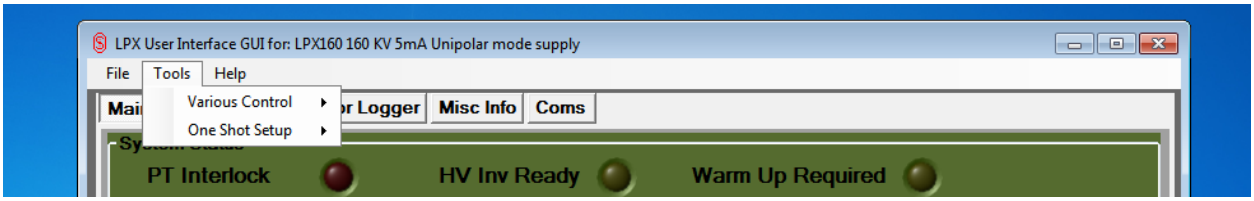
5.3.2.1.1 EXIT

Use this control to exit the SPX GUI program.

5.3.2.2 TOOLS MENU

The following options can be selected from the Tools menu on the menu bar:

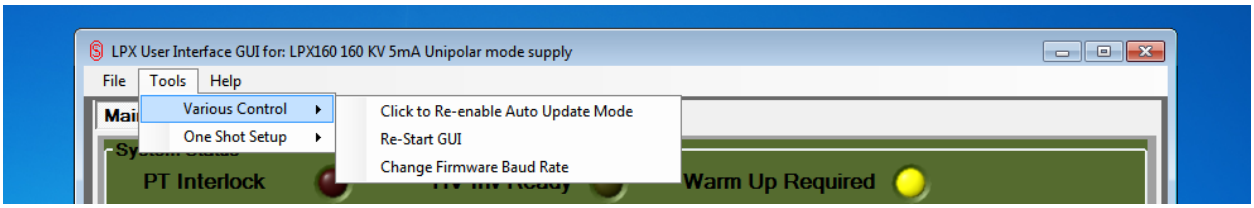
Figure 5-13: SPX GUI Menu Bar, Tools Menu



5.3.2.2.1 VARIOUS CONTROLS

The following options can be selected from the Various Controls sub-menu:

Figure 5-14: SPX GUI Menu Bar, Tools Menu, Various Control Sub-Menu



5.3.2.2.1.1 CLICK TO DISABLE AUTO UPDATE MODE / CLICK TO RE-ENABLE AUTO UPDATE MODE

Selecting this item will toggle off or on the auto-update mode of the communication with the unit. While in auto-update mode, the GUI will constantly polling the unit for status, and display the send and receive information in the GUI. When disabled, the unit will not update real-time information from the unit.

5.3.2.2.1.2 RE-START GUI

This item will restart the GUI in the case of a runtime error.

5.3.2.2.1.3 CHANGE FIRMWARE BAUD RATE

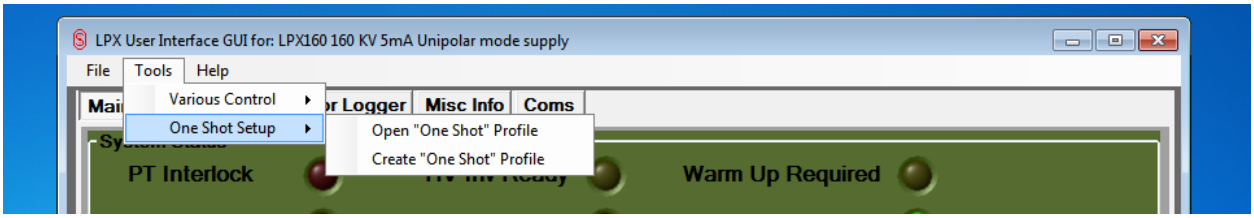
This item will change the baud rate the GUI uses to communicate with the unit in serial mode.

5.3.2.2.2 ONE SHOT SETUP

A one-shot technique is a saved configuration which can be created and stored as a text file to any drive and directory accessible by the GUI. The technique consists of one kV value, one mA value, and one exposure time value. The technique can then be opened at any later time, to save the user the process of entering the information manually.

Each one-shot technique should have a unique filename, and a .txt extension to indicate a text file format.

Figure 5-15: SPX GUI Menu Bar, Tools Menu, One Shot Setup Sub-Menu



5.3.2.2.2.1 OPEN “ONE SHOT” PROFILE

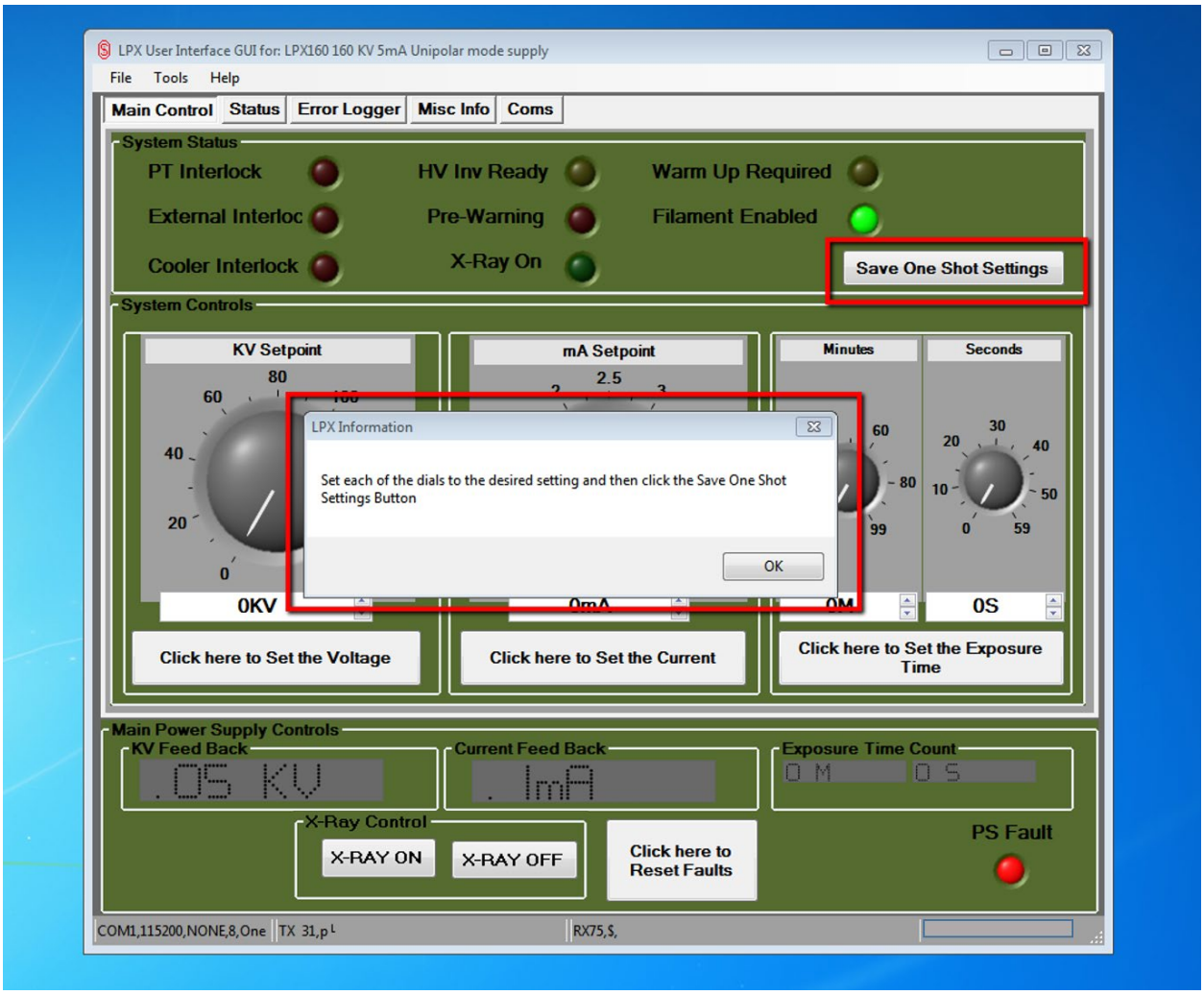
Selecting this item will pop up a directory browser where a valid one shot text file can be selected. Once opened, the kV, mA, and exposure time settings on the Main Control screen will automatically be set to the values located in the file.

5.3.2.2.2.2 CREATE “ONE SHOT” PROFILE

Selecting this item will pop up a message giving the user directions on how to create a profile, as well as a new button on the Main Control window labeled “Save One Shot Settings”.

To create a “One Shot” technique, click “OK” on the pop-up window and set the voltage, current, and exposure time values to the desired settings. Then, press the “Save One Shot Settings” button on the Main Control window. This will pop up a directory browser, where a text file can be saved into the desired location.

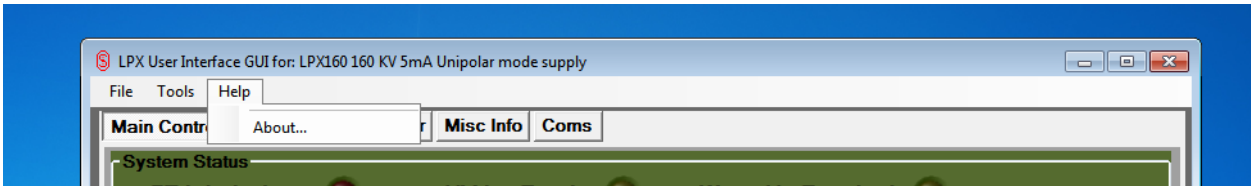
Figure 5-16: SPX GUI Menu Bar, Tools Menu, One Shot Setup Sub-Menu, Create "One Shot" Profile Results



5.3.2.3 HELP MENU

The Help menu can be selected from the menu bar.

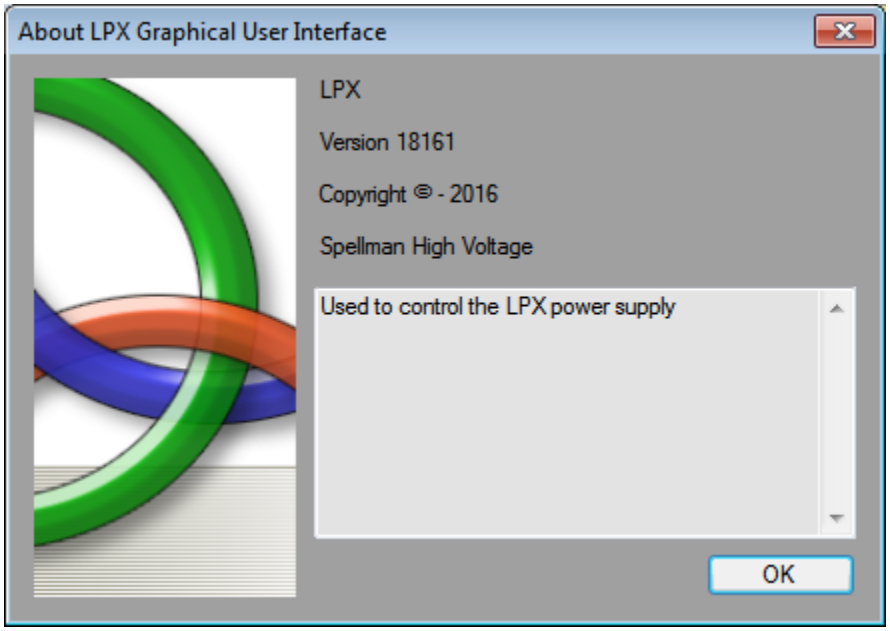
Figure 5-17: SPX GUI Menu Bar, Help Menu



5.3.2.3.1.1 ABOUT

Selecting “About” on the Help menu will pop up a basic information window about the GUI.

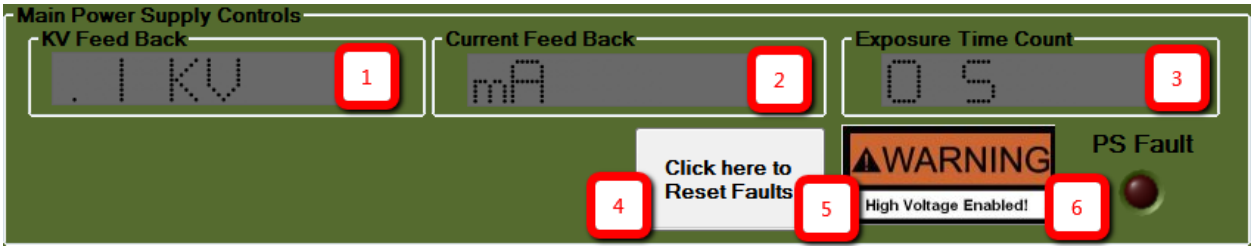
Figure 5-18: SPX GUI Menu Bar, Help Menu, About Pop-Up Screen



5.3.3 SPX GUI MAIN POWER SUPPLY CONTROLS

The Main Power Supply Controls are a group of controls and information which are visible from every tab in the GUI. These controls are always visible.

Figure 5-19: SPX GUI Main Power Supply Controls Section



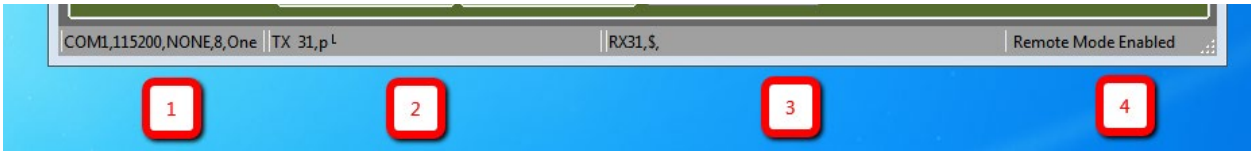
5.3.3.1 SPX GUI MAIN POWER SUPPLY CONTROLS DESCRIPTION

1. KV Feed Back: Displays the current reading of the kV feedback value, in increments of 0.1 kV.
2. Current Feed Back: Displays the current reading of the mA feedback value, in increments of 0.1 mA.
3. Exposure Time Count: Displays the count of the current exposure time, in seconds. Displays N/U if it is not being used or is not in timed mode.
4. Click here to Reset Faults: Pressing this button will reset any system faults. A message will also appear on the Error Logger text box on the Error Logger screen for each time the button is pressed, along with a timestamp.
5. High Voltage Enabled Warning Indicator: This symbol will appear when high voltage has been enabled on the unit.
6. PS Fault indicator: This indicator will light RED for any power supply fault that is detected by the system.

5.3.4 SPX GUI COMMUNICATIONS STATUS BAR

The status bar at the bottom of the GUI shows the current operating mode and communications status of the unit and GUI. This status bar is always visible.

Figure 5-20: SPX GUI Communications Status Bar



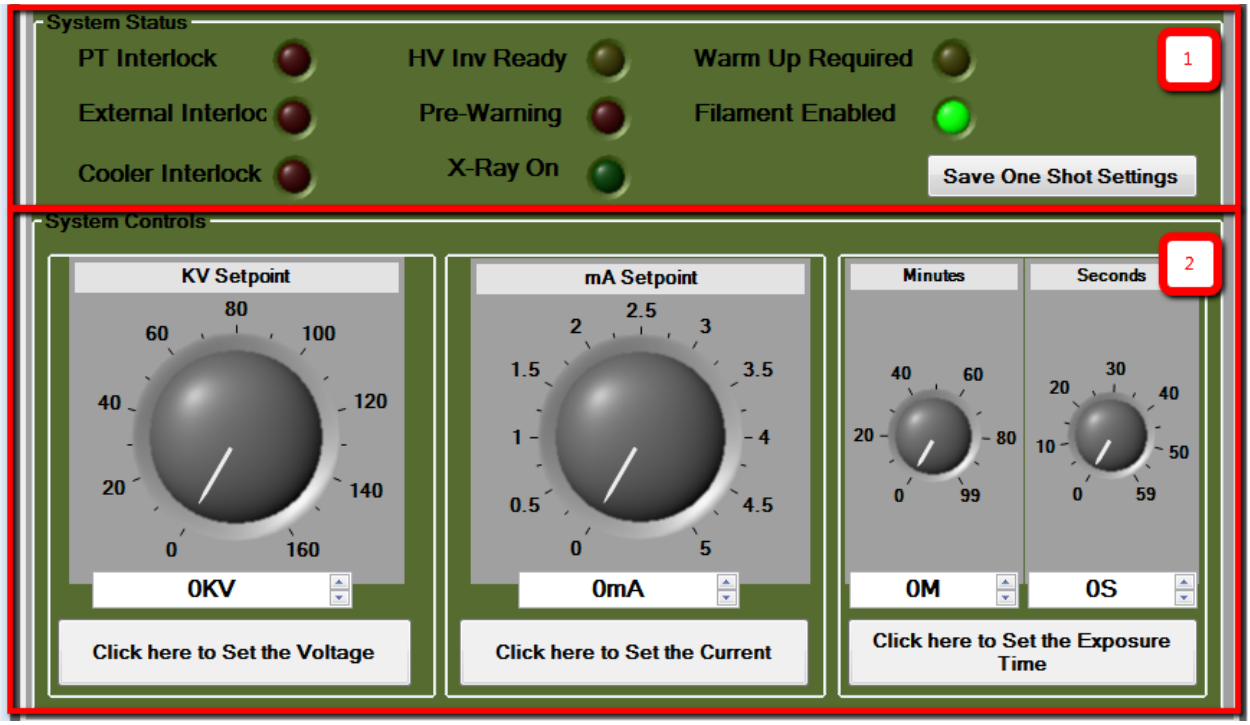
5.3.4.1 SPX GUI COMMUNICATIONS STATUS BAR DESCRIPTION

1. Connection settings: This box will display the current connection settings for communications with the unit. For a serial connection, the information shown is the serial port settings (COM port number, baud rate, parity bits, data bits, stop bits).
2. Transmission data: If Auto-Update Mode is enabled, this box will display the current ASCII transmission string being sent from the GUI to the unit. This box is meant for diagnostic purposes only.
3. Receive data: If Auto-Update Mode is enabled, this box will display the current ASCII receive string being sent from the unit to the GUI. This box is meant for diagnostics purposes only.
4. Remote Mode/Local Mode: This feature is not available on current version.

5.3.5 SPX GUI MAIN CONTROL SCREEN

The Main Control screen can be accessed by selecting the “Main Control” tab on the control window tab bar.

Figure 5-21: SPX GUI Main Control Screen



1. System Status box: This box contains indicators showing the current status of the system.
2. Systems Controls box: This box contains the controls for entering the kV, mA, and exposure time parameters for an exposure.

5.3.5.1 SPX GUI MAIN CONTROL SCREEN DESCRIPTION

5.3.5.1.1 SYSTEM STATUS BOX

5.3.5.1.1.1 PT INTERLOCK INDICATOR

This indicator will be lit red when the pressure/temperature head unit interlock is engaged.

5.3.5.1.1.2 EXTERNAL INTERLOCK INDICATOR

This indicator will be lit red when the external interlock is engaged.

5.3.5.1.1.3 COOLER INTERLOCK INDICATOR

This indicator will be lit red when the cooler head unit interlock is engaged.

5.3.5.1.1.4 HV INV READY INDICATOR

This indicator will be lit green when the high voltage inverter is ready for an exposure.

5.3.5.1.1.5 PRE-WARNING INDICATOR

This indicator will flash red during the pre-warning period before an exposure.

5.3.5.1.1.6 X-RAY ON INDICATOR

This indicator will be lit red during the exposure period.

5.3.5.1.1.7 WARM UP REQUIRED INDICATOR

This indicator will flash yellow to indicate that a warm-up period is required before operation of the unit.

5.3.5.1.1.8 FILAMENT ENABLED INDICATOR

This indicator will be lit green to indicate the filament is enabled.

5.3.5.1.1.9 SAVE ONE SHOT SETTINGS BUTTON

This button can be used to save a one shot setting.

5.3.5.2 SYSTEM CONTROLS BOX

5.3.5.2.1 KV CONTROL

This control will set the kV programming value for an exposure. The kV can be set in increments of 0.1kV. The value can be entered three ways: by using the dial, by using the up/down arrows in the text box, or by entering the number directly in the text box. The text box will display the value chosen. To save the value to the system, press the “Click here to Set the Voltage” button beneath the control.

5.3.5.2.2 MA CONTROL

This control will set the mA programming value for an exposure. The mA can be set in increments of 0.1 mA. The value can be entered three ways: by using the dial, by using the up/down arrows in the text box, or by entering the number directly in the text box. The text box will display the value chosen. To save the value to the system, press the “Click here to Set the Current” button beneath the control.

Note that the mA Control will be greyed out if the “Max mA” switch is set to “ON” in the Main Power Supply Controls box, indicating that the parameter will be set to the maximum mA value allowed.

5.3.5.2.3 EXPOSURE TIME CONTROL

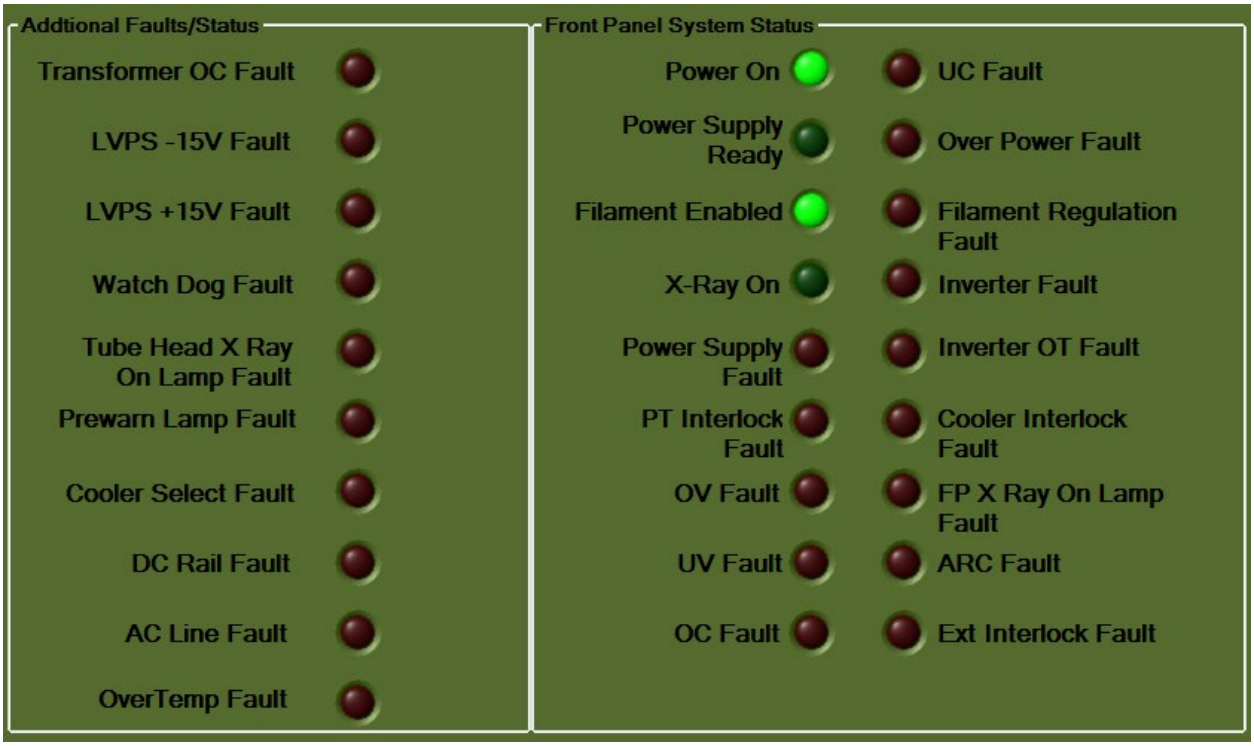
This control will set the exposure time value for an exposure. The exposure time is set using minutes and seconds controls.The exposure time can be set in increments of 1 second. The value can be entered three ways: by using the dials, by using the up/down arrows in the text boxes, or by entering the number directly in the text boxes. The text boxes will display the value chosen. To save the value to the system, press the “Click here to Set the Exposure Time” button beneath the control.

Note that the Exposure Time Control will be greyed out if the “Exposure Timer” switch is set to “OFF” in the Main Power Supply Controls box, indicating an untimed exposure.

5.3.6 SPX GUI STATUS SCREEN

The Status screen can be accessed by selecting the “Status” tab on the control window tab bar.

Figure 5-22: SPX GUI Status Screen



5.3.6.1 SPX GUI STATUS SCREEN DESCRIPTION

5.3.6.1.1 TRANSFORMER OC FAULT INDICATOR

This indicator will be lit red in the event of a transformer overcurrent fault.

5.3.6.1.2 LVPS -15V FAULT INDICATOR

This indicator will be lit red in the event of a -15V power supply over voltage or under voltage fault.

5.3.6.1.3 LVPS +15V FAULT INDICATOR

This indicator will be lit red in the event of a +15V power supply over voltage or under voltage fault.

5.3.6.1.4 WATCH DOG FAULT INDICATOR

This indicator will be lit red in the event of a firmware watchdog timeout fault.

5.3.6.1.5 TUBE HEAD X RAY ON LAMP FAULT INDICATOR

This indicator will be lit red in the event that a tube head x-ray on lamp fault.

5.3.6.1.6 PREWARN LAMP FAULT INDICATOR

This indicator will be lit red in the event of a front panel prewarning lamp fault.

5.3.6.1.7 COOLER SELECT INDICATOR

This indicator will be lit red in the event of a cooler select fault.

5.3.6.1.8 DC RAIL FAULT INDICATOR

This indicator will be lit red in the event of a DC rail fault.

5.3.6.1.9 AC LINE FAULT INDICATOR

This indicator will be lit red in the event of an AC line fault.

5.3.6.1.10 OVERTEMP FAULT INDICATOR

This indicator will be lit red in the event of an over temperature fault.

5.3.6.1.11 POWER ON INDICATOR

This indicator will be lit green to indicate the unit is powered on.

5.3.6.1.12 POWER SUPPLY READY INDICATOR

This indicator will be lit green to indicate the unit is ready to begin an exposure.

5.3.6.1.13 FILAMENT ENABLED INDICATOR

This indicator will be lit green to indicate the filament is enabled.

5.3.6.1.14 X-RAY ON INDICATOR

This indicator will be lit green to indicate x-rays are currently on.

5.3.6.1.15 POWER SUPPLY FAULT INDICATOR

This indicator will be lit red in the event of any system fault.

5.3.6.1.16 PT INTERLOCK FAULT INDICATOR

This indicator will be lit red in the event of a pressure/temperature interlock fault.

5.3.6.1.17 OV FAULT INDICATOR

This indicator will be lit red in the event of an over voltage fault.

5.3.6.1.18 UV FAULT INDICATOR

This indicator will be lit red in the event of an under voltage fault.

5.3.6.1.19 OC FAULT INDICATOR

This indicator will be lit red in the event of an over current fault.

5.3.6.1.20 UC FAULT INDICATOR

This indicator will be lit red in the event of an under current fault.

5.3.6.1.21 OVER POWER FAULT INDICATOR

This indicator will be lit red in the event of an over power fault.

5.3.6.1.22 FILAMENT REGULATION FAULT INDICATOR

This indicator will be lit red in the event of a filament regulation fault.

5.3.6.1.23 INVERTER FAULT INDICATOR

This indicator will be lit red in the event of an inverter fault.

5.3.6.1.24 INVERTER OT FAULT INDICATOR

This indicator will be lit red in the event of an inverter over temperature fault.

5.3.6.1.25 COOLER INTERLOCK FAULT INDICATOR

This indicator will be lit red in the event of a cooler interlock fault.

5.3.6.1.26 FP X RAY ON LAMP FAULT INDICATOR

This indicator will be lit red in the event of a front panel x-ray on lamp fault.

5.3.6.1.27 ARC FAULT INDICATOR

This indicator will be lit red in the event of an arc fault.

5.3.6.1.28 EXT INTERLOCK FAULT INDICATOR

This indicator will be lit red in the event of an external interlock fault.

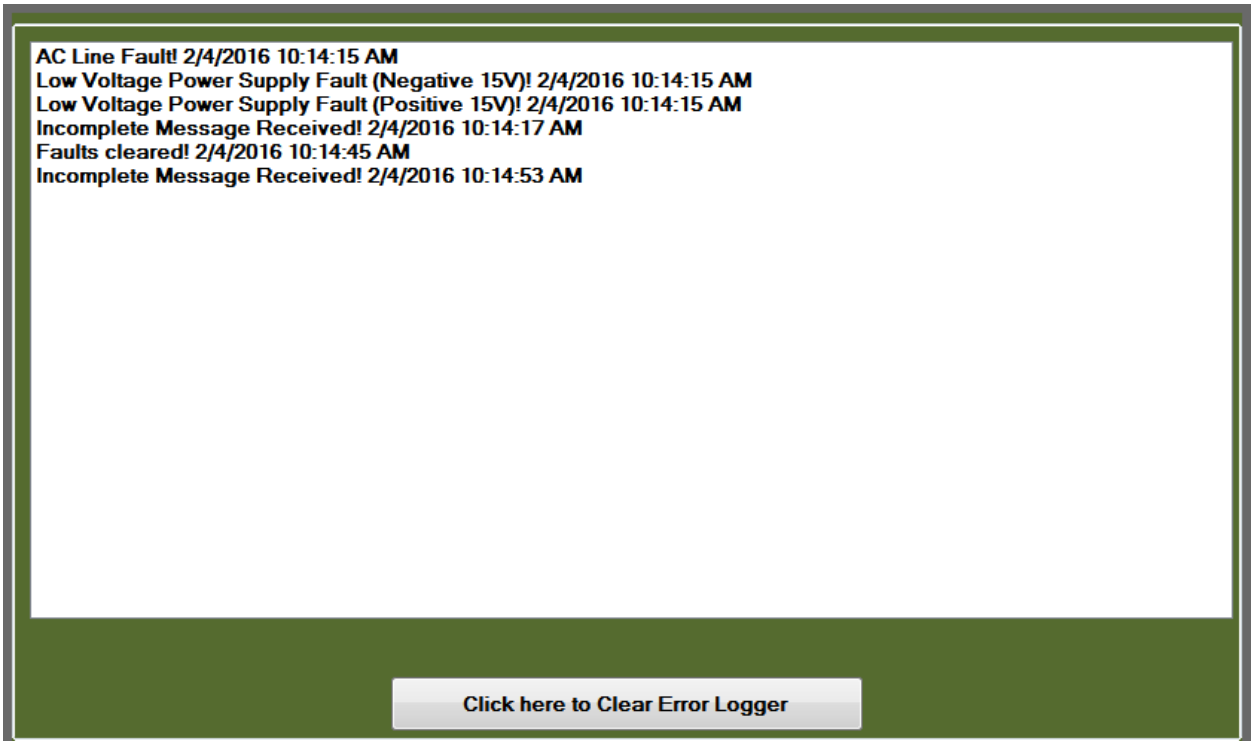
5.3.7 SPX GUI ERROR LOGGER SCREEN

The Error Logger screen can be accessed by selecting the “Error Logger” tab on the control window tab bar. This screen will update with messages related to the operation of the system. System faults, communication messages, and some user actions are displayed here, along with a timestamp indicating when they occurred.

When a new message is displayed, the LPX GUI will automatically change tabs to display the Error Logger screen.

The text from the Error Logger is also saved in an external file which is located in the install directory (e.g. `C:\Program Files (x86)\Spellman High Voltage\Standard LPX GUI\data_log.txt`).

Figure 5-23: SPX GUI Data Logger Screen



5.3.7.1 SPX GUI ERROR LOGGER SCREEN DESCRIPTION

5.3.7.1.1 DATA LOG TEXT BOX

This text box will update with messages related to the operation of the system. System faults, communication messages, and some user actions are displayed here, along with a timestamp indicating when they occurred.

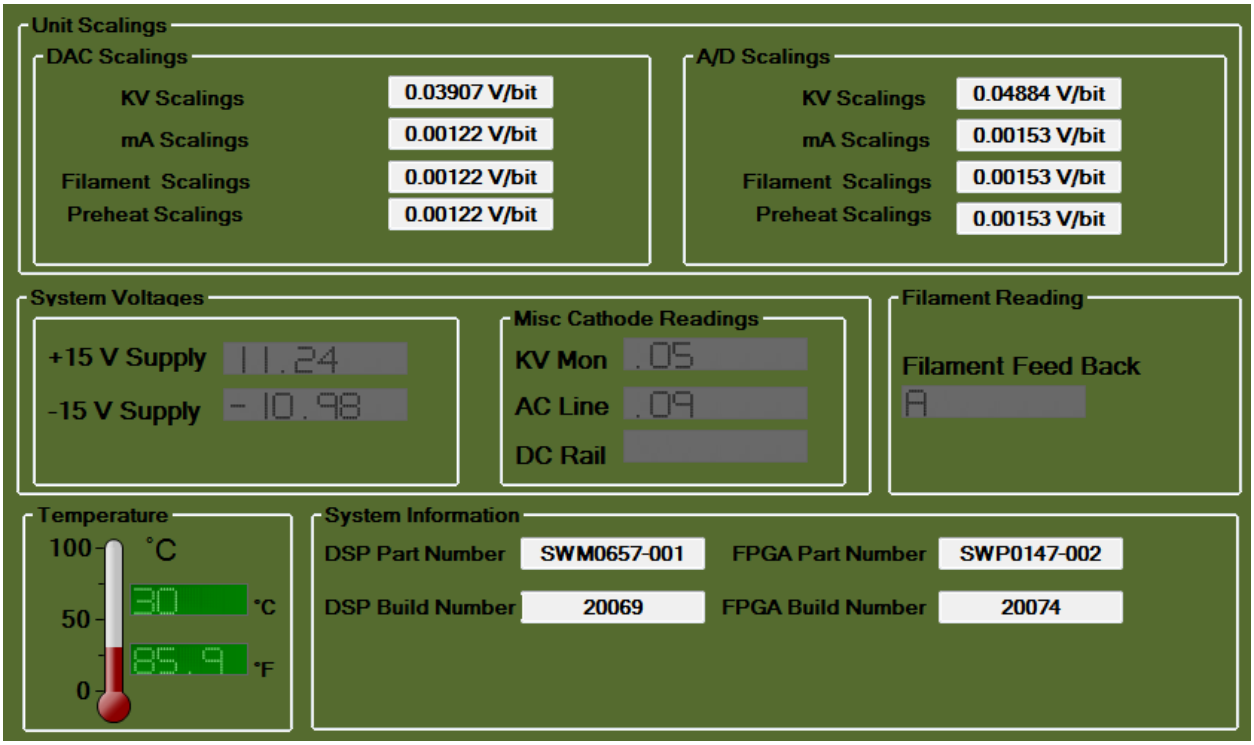
5.3.7.1.2 CLICK HERE TO CLEAR ERROR LOGGER

Clicking this button will clear all messages from the data log text box.

5.3.8 SPX GUI MISC INFO SCREEN

The Misc Info screen can be accessed by selecting the “Misc Info” tab on the control window tab bar. This screen contains various information about the system, which can be used for diagnostic purposes.

Figure 5-24: SPX GUI Misc Info Screen



5.3.8.1 SPX GUI MISC INFO SCREEN DESCRIPTION

5.3.8.1.1 DAC SCALINGS

This text box displays the scaling for the D/A converters used on the control board.

5.3.8.1.1.1 KV SCALINGS

Displays the programmed kV DAC scaling in V/bit.

5.3.8.1.1.2 MA SCALINGS

Displays the programmed mA DAC scaling in V/bit.

5.3.8.1.1.3 FILAMENT SCALINGS

Displays the programmed filament DAC scaling in V/bit

5.3.8.1.1.4 PREHEAT SCALINGS

Displays the programmed filament preheat DAC scaling in V/bit

5.3.8.1.2 A/D SCALINGS

This text box displays the scaling for the A/D converters used on the control board.

5.3.8.1.2.1 KV SCALINGS

Displays the feedback kV A/D scaling in V/bit.

5.3.8.1.2.2 MA SCALINGS

Displays the feedback mA A/D scaling in V/bit.

5.3.8.1.2.3 FILAMENT SCALINGS

Displays the feedback filament A/D scaling in V/bit.

5.3.8.1.2.4 PREHEAT SCALINGS

Display the feedback filament preheat A/D scaling in V/bit.

5.3.8.1.3 SYSTEM VOLTAGES

This text box displays the current readings of various system voltages.

5.3.8.1.3.1 +15 V SUPPLY

Displays the reading of the +15V power supply.

5.3.8.1.3.2 -15 V SUPPLY

Displays the reading of the -15V power supply.

5.3.8.1.3.3 KV MON

Displays the reading of the kV monitor.

5.3.8.1.3.4 AC LINE

Displays the reading of the AC line voltage.

5.3.8.1.3.5 DC RAIL

Displays the reading of the DC rail voltage.

5.3.8.1.4 FILAMENT READING

5.3.8.1.4.1 FILAMENT FEED BACK

Displays the reading of the filament feedback.

5.3.8.1.5 TEMPERATURE

Displays the reading of the system control board temperature, in °C and °F.

5.3.8.1.6 SYSTEM INFORMATION

This text box displays build information for the system control firmware. It can be used for diagnostics purposes.

5.3.8.1.6.1 DSP PART NUMBER

Displays the part number for the system control DSP, in format *SWM*#####-###, where # represents a digit.

5.3.8.1.6.2 DSP BUILD NUMBER

Displays the part number for the system control DSP, in format #####, where # represents a digit.

5.3.8.1.6.3 FPGA PART NUMBER

Displays the part number for the system control FPGA, in format *SWP*#####-###, where # represents a digit.

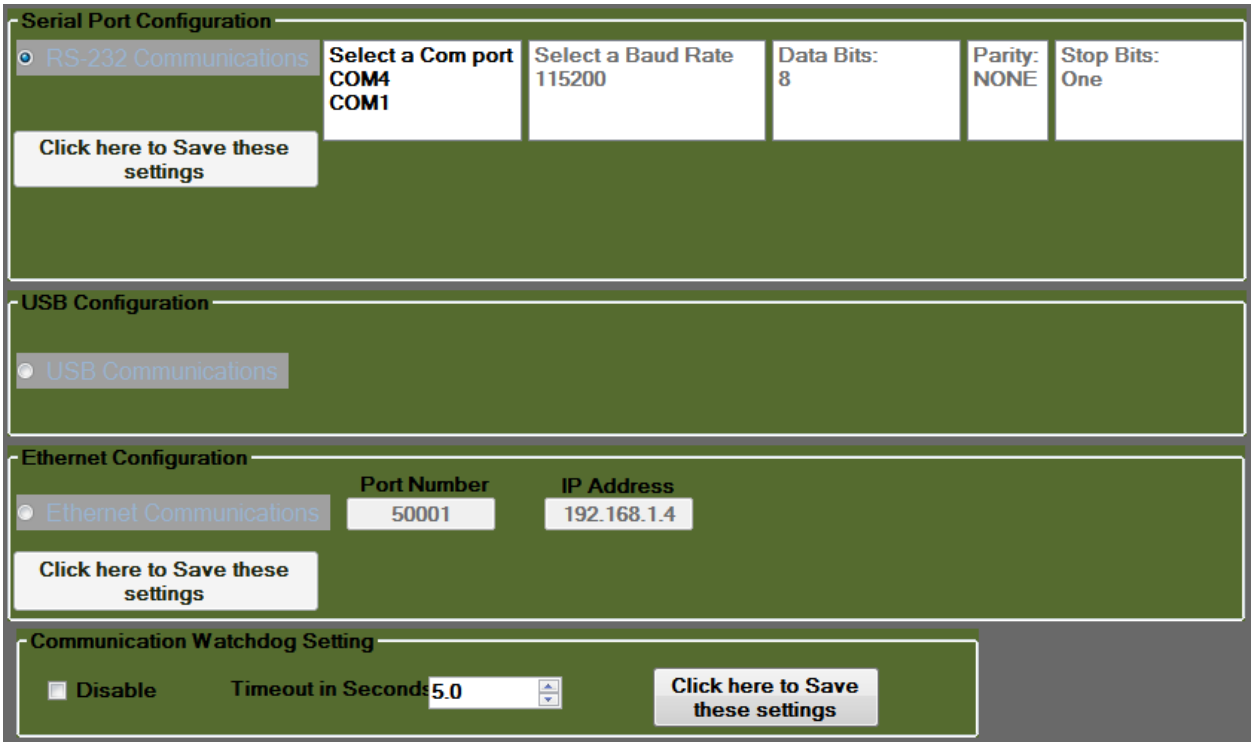
5.3.8.1.6.4 FPGA BUILD NUMBER

Displays the part number for the system control FPGA, in format #####, where # represents a digit.

5.3.9 SPX GUI COMS SCREEN

This screen can be accessed by selecting the “Coms” tab on the control window tab bar. It is used to configure the communications between the GUI and the unit.

Figure 5-25: SPX GUI Coms Screen



5.3.9.1 SPX GUI COMS SCREEN DESCRIPTION

5.3.9.1.1 SERIAL PORT CONFIGURATION

This section is used to configure a serial port connection with the unit.

5.3.9.1.1.1 RS-232 COMMUNICATIONS

Select this radial button to configure a serial port connection with the unit. If this button is not selected, the serial settings boxes will be grayed out.

5.3.9.1.1.2 SELECT A COM PORT

This box will display all available COM ports on a PC. Select the COM port which is assigned to the serial port.

5.3.9.1.1.3 SELECT A BAUD RATE

This box will list baud rates options for the serial port. The default value of 115200 should be selected.

5.3.9.1.1.4 DATA BITS

This box lists the data bit options for the serial port. The default value of 8 should be selected.

5.3.9.1.1.5 PARITY

This box lists the parity options for the serial port. The default value of NONE should be selected.

5.3.9.1.1.6 STOP BITS

This box lists the stop bit options for the serial port. The default value of ONE should be selected.

5.3.9.1.1.7 CLICK HERE TO SAVE THESE SETTINGS

After all serial parameters have been chosen, click this button to save the parameters and establish the connection.

5.3.9.1.2 USB CONFIGURATION (Not available)

This section is used to configure a USB (Universal Serial Port) connection with the unit.

5.3.9.1.2.1 USB COMMUNICATIONS (Not available)

Select this radial button to configure and establish a USB port connection with the unit.

5.3.9.1.3 ETHERNET CONFIGURATION

This section is used to configure an Ethernet connection with the unit.

5.3.9.1.3.1 ETHERNET COMMUNICATIONS

Select this radial button to configure an Ethernet connection with the unit. If this button is not selected, the Ethernet settings boxes will be grayed out.

5.3.9.1.3.2 PORT NUMBER

Enter the port number to be used for an Ethernet connection. The default value should be used.

5.3.9.1.3.3 IP ADDRESS

Enter the IP address to be used for an Ethernet connection. The default value should be used.

5.3.9.1.3.4 CLICK HERE TO SAVE THESE SETTINGS

After all Ethernet parameters have been chosen, click this button to save the parameters and establish the connection.

5.3.9.1.4 COMMUNICATION WATCHDOG SETTING

This section is used to configure the communications watchdog between the GUI and the unit. Any watchdog violation will appear in the Error Logger screen.

5.3.9.1.4.1 DISABLE

Check this box to disable the communications watchdog between the GUI and the unit.

5.3.9.1.4.2 TIMEOUT IN SECONDS

Use the up/down arrows or enter the value directly for the number of seconds to use for the communications watchdog. Intervals are in seconds. The default value is 1 second.

5.3.9.1.4.3 CLICK HERE TO SAVE THESE SETTINGS

Click this button to save the communication watchdog settings.

6.0 SPX QUICK START GUIDE

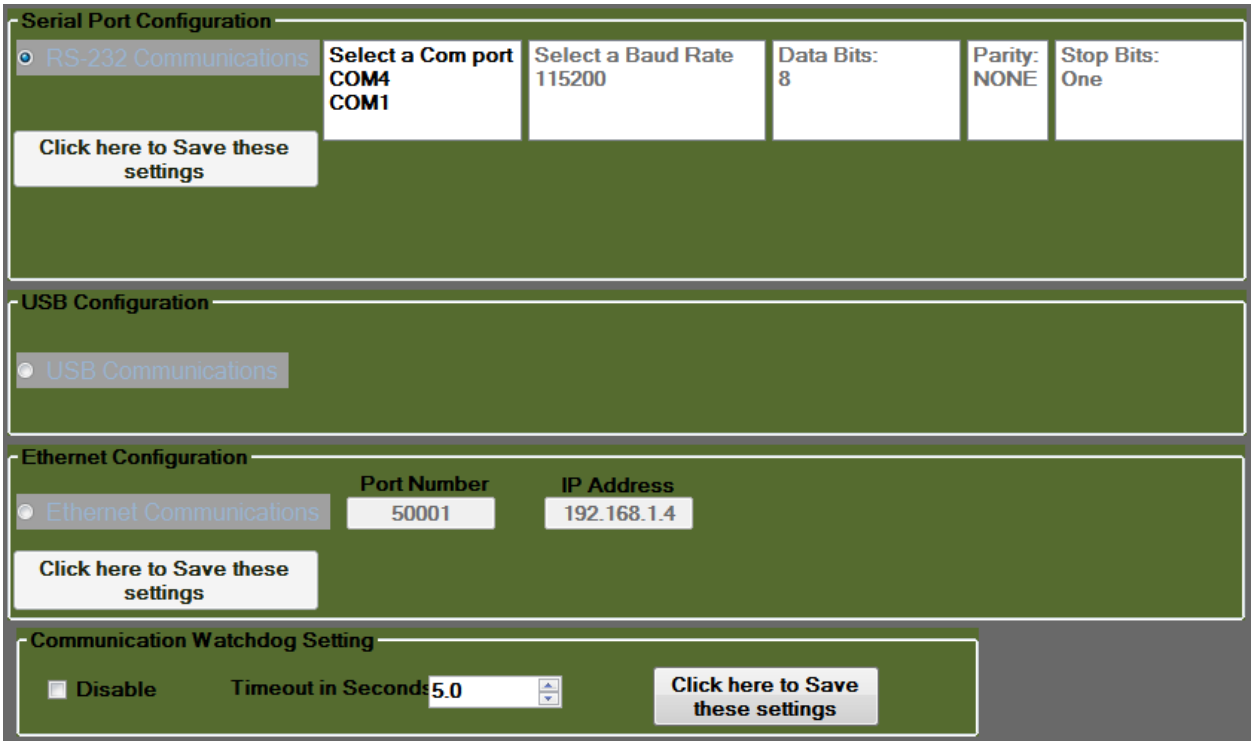
This provides a reference for the initial setup of controlling the unit with the SPX GUI.

6.1 ESTABLISHING COMMUNICATIONS BETWEEN THE LPX GUI AND THE UNIT

The first step in controlling the unit with the SPX GUI (Graphical User Interface) is to establish communications. Communications can be through a serial, USB, or Ethernet interface.

To establish communications, open the Coms tab on the GUI.

Figure 6-1: SPX GUI Coms Screen



6.2 CONNECTING USING SERIAL

6.2.1 SERIAL PORT CONFIGURATION DESCRIPTION

6.2.1.1 RS-232 COMMUNICATIONS

Select this radial button to configure a serial port connection with the unit. If this button is not selected, the serial settings boxes will be grayed out.

6.2.1.2 SELECT A COM PORT

This box will display all available COM ports on a PC. Select the COM port which is assigned to the serial port.

6.2.1.3 SELECT A BAUD RATE

This box will list baud rates options for the serial port. The default value of 115200 should be selected.

6.2.1.4 DATA BITS

This box lists the data bit options for the serial port. The default value of 8 should be selected.

6.2.1.5 PARITY

This box lists the parity options for the serial port. The default value of NONE should be selected.

6.2.1.6 STOP BITS

This box lists the stop bit options for the serial port. The default value of ONE should be selected.

6.2.1.7 CLICK HERE TO SAVE THESE SETTINGS

After all serial parameters have been chosen, click this button to save the parameters and establish the connection.

6.3 CONNECTING USING USB

This section is used to configure a USB (Universal Serial Port) connection with the unit.

6.3.1 USB COMMUNICATIONS

Select this radial button to configure and establish a USB port connection with the unit.

6.4 CONNECTING USING ETHERNET

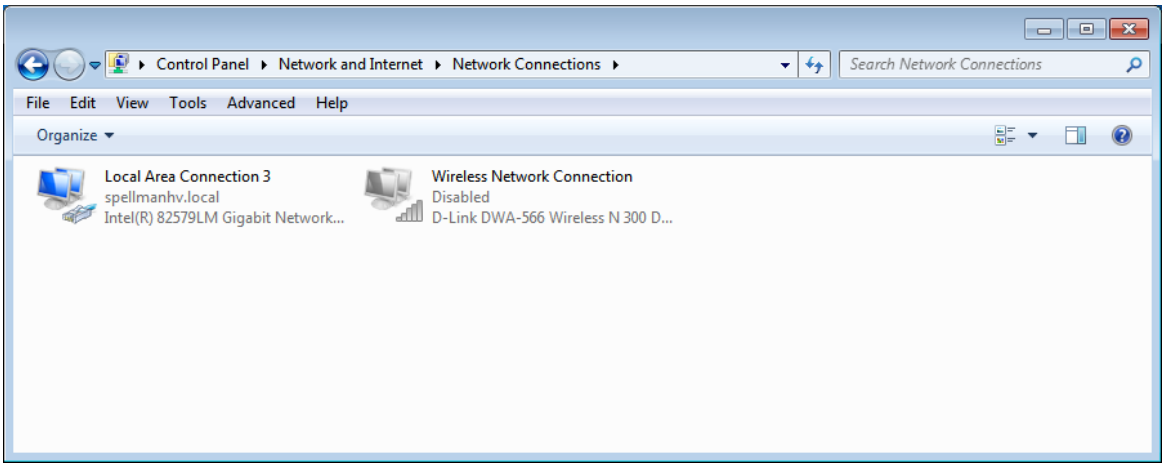
This section describes how to configure an Ethernet connection with the unit.

6.4.1 CONFIGURING A PC FOR AN ETHERNET CONNECTION

In order to connect to the unit from a PC using an Ethernet connection, the PC must be assigned a static IP address. The following steps can be taken to configure a PC for this.

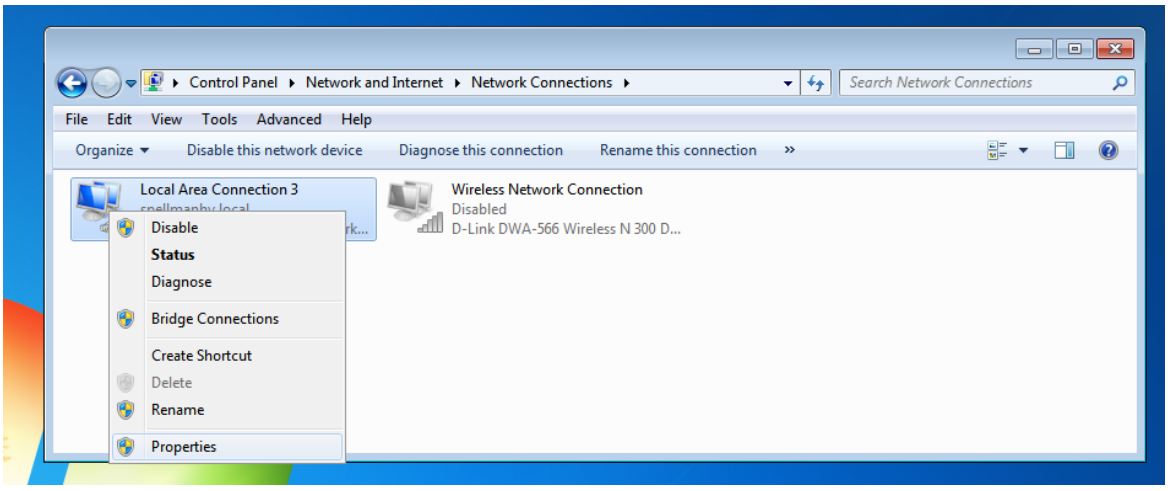
1. Open the Network Connctions windown of the PC

Figure 6-2: PC Network Connections Screen



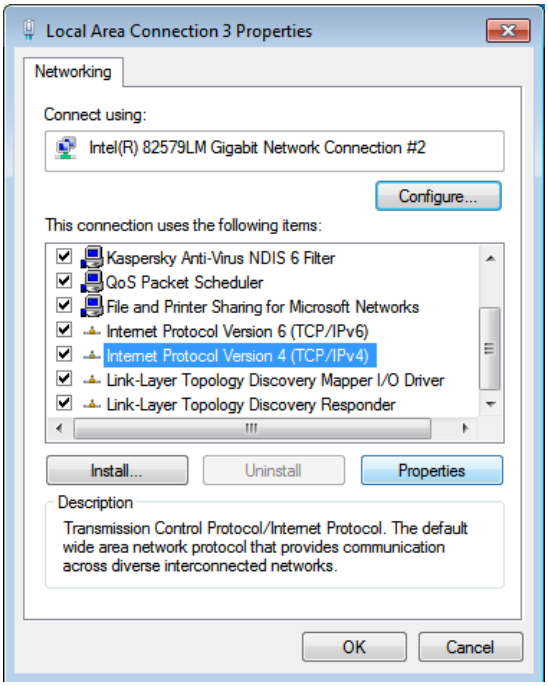
2. Right-click on the network adapter and select Properties.

Figure 6-3: PC Network Connections Screen with Menu



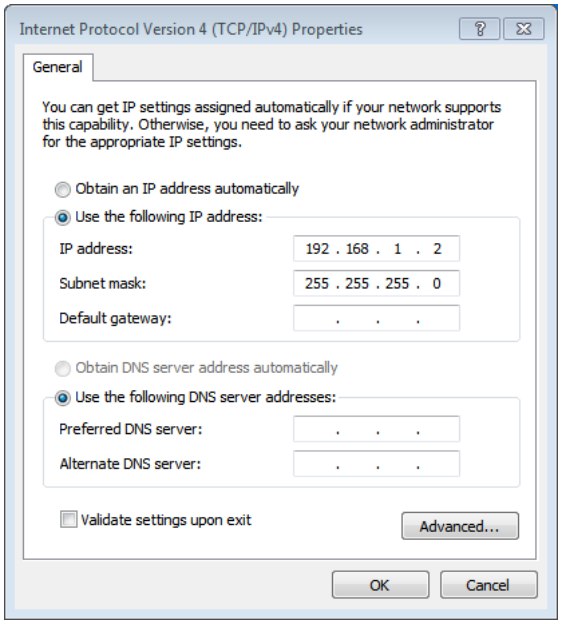
3. In the connection items box, select the item “Internet Protocol Version 4 (TCP/IPv4)” and then click the “Properties” button.

Figure 6-4: PC Local Area Connection Screen



4. Select the button “Use the following IP address:” and enter the following values:
   - for IP address, enter an address of “192.168.1.###”, where ### is a number other than 4 (e.g. 192.168.1.2), which is used by the unit.
   - for the Subnet mask, enter a value of “255.255.255.0”.

Figure 6-5: PC IPv4 Properties Screen



5. Click the “OK” button to save the changes.

6.4.2 CONFIGURING THE UNIT FOR AN ETHERNET CONNECTION

To configure the unit for an Ethernet connection, open the Coms screen of the LPX GUI.

6.4.2.1 ETHERNET COMMUNICATIONS

Select this radial button to configure an Ethernet connection with the unit. If this button is not selected, the Ethernet settings boxes will be grayed out.

6.4.2.2 PORT NUMBER

Enter the port number to be used for an Ethernet connection. The default value should be used.

6.4.2.3 IP ADDRESS

Enter the IP address to be used for an Ethernet connection. The default value should be used.

6.4.2.4 CLICK HERE TO SAVE THESE SETTINGS

After all Ethernet parameters have been chosen, click this button to save the parameters and establish the connection.

6.4.2.5 COMMUNICATION WATCHDOG SETTINGS

This section is used to configure the communications watchdog between the GUI and the unit. Any watchdog violation will appear in the Error Logger screen.

6.4.2.6 DISABLE

Check this box to disable the communications watchdog between the GUI and the unit.

6.4.2.7 TIMEOUT IN SECONDS

Use the up/down arrows or enter the value directly for the number of seconds to use for the communications watchdog. Intervals are in seconds. The default value is 1 second.

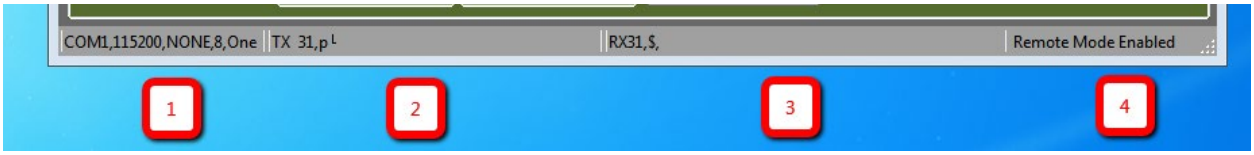
6.4.2.8 CLICK HERE TO SAVE THESE SETTINGS

Click this button to save the communication watchdog settings.

6.5 SPX GUI COMMUNICATIONS STATUS BAR

The status bar at the bottom of the GUI shows the current operating mode and communications status of the unit and GUI. This status bar is always visible

Figure 6-6: SPX GUI Communications Status Bar



6.5.1 SPX GUI COMMUNICATIONS STATUS BAR DESCRIPTION

1. Connection settings: This box will display the current connection settings for communications with the unit. For a serial connection, the information shown is the serial port settings (COM port number, baud rate, parity bits, data bits, stop bits).
2. Transmission data: If Auto-Update Mode is enabled, this box will display the current ASCII transmission string being sent from the GUI to the unit. This box is meant for diagnostic purposes only.
3. Receive data: If Auto-Update Mode is enabled, this box will display the current ASCII receive string being sent from the unit to the GUI. This box is meant for diagnostics purposes only.
4. Remote Mode/Local Mode: This feature is not available on current version.