# Spectrum Compact CE System Operating Manual

Instructions for Use of Model Number CE1304


TMD058 | REVISED 3/25

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All technical literature is available at: **www.promega.com/protocols/**

Visit the website to verify that you are using the most current version of this Technical Manual.

Email Promega Technical Services if you have questions on use of this system: **techserv@promega.com**

# Introduction 1

## 1.1 Spectrum Compact CE System Description

The Spectrum Compact CE System is an automated 4-capillary electrophoresis instrument designed for a wide range of sequencing and fragment analysis applications. It is compatible with existing fluorescently-labeled dideoxynucleotide triphosphate-based chain termination sequencing chemistries along with 4-, 5-, 6- and 8-dye-labeled STR kits available from Promega and other commercial vendors. Up to 32 samples may be run at a time.

The Spectrum Compact CE System is intended for:

**Sanger Sequencing**

- De novo sequencing
- NGS confirmation
- Resequencing
- Mutation detection
- Mitochondrial sequencing

**Fragment Analysis**

- Microsatellites
- PCR sizing
- STR genotyping
- SNP genotyping

The instrument is controlled through a graphical user interface on a touch screen panel. An external keyboard and mouse may also be used to control the software displayed on the touch screen panel; these may be connected directly to the instrument via USB ports. The Spectrum Compact Control Software provides a simple user interface with a clear display of useful features including run setup, consumables and capillary cartridge usage information, and system maintenance reminders. The Barcode Scanner is used to capture bar code information on consumables for easy exchange and tracking of instrument consumables. The instrument also offers the ability to monitor run progress and view results while analysis is in progress. Exported files are compatible with commercially available data analysis software such as GeneMarker®HID Software for Spectrum CE Systems, Mutation Surveyor®, GeneMapper® version 4.1 or greater, and GeneMapper® *ID*-X.


**Figure 1. Front of the Spectrum Compact CE System.** Front view showing touch screen panel, front door, status indicator and USB port. **The power switch and door handle are located on the right side of the instrument.**

**Note:** The Spectrum Compact CE System is not for medical diagnostic use.

Preloaded onto the Spectrum Compact CE System is the Spectrum Compact CE System Remote Access Software. This software enables the user to create/edit/review/delete strip IDs for sample strips, create/edit/review/delete protocols and assays, view analysis results, monitor a Spectrum Compact CE System run in progress as well as completed runs, and download completed runs using a web browser on a PC connected to the instrument either directly or over a lab network. See the *Spectrum Compact CE System Remote Access Software* #TMD064 for instructions for use.

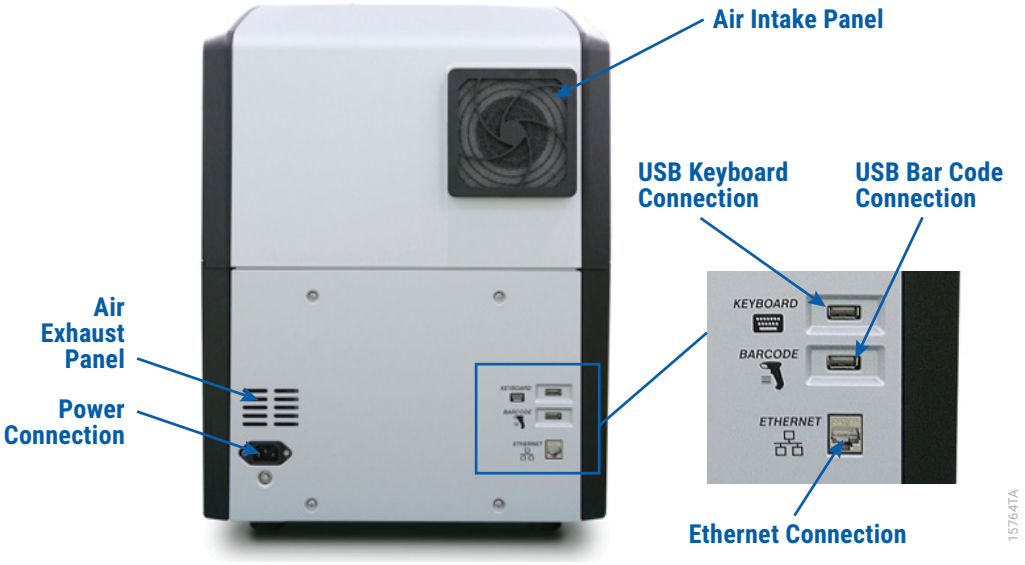



**Figure 2. Rear of the Spectrum Compact CE System.** The back of the Spectrum Compact CE System has an air intake panel, air exhaust panel, power connection, USB keyboard connection, USB barcode connection and Ethernet connection.

**Notes:**

a. Never use password-protected USB drives. If a USB drive is password protected, the USB icon may still become active upon connecting to the instrument, but when export is executed, the export will fail.

b. Do not perform keyboard operations and do not attach or remove the keyboard or barcode scanner while accessing the USB device. This may result in failure.

c. Do not connect cables other than a LAN cable to the Ethernet port. This may result in failure.

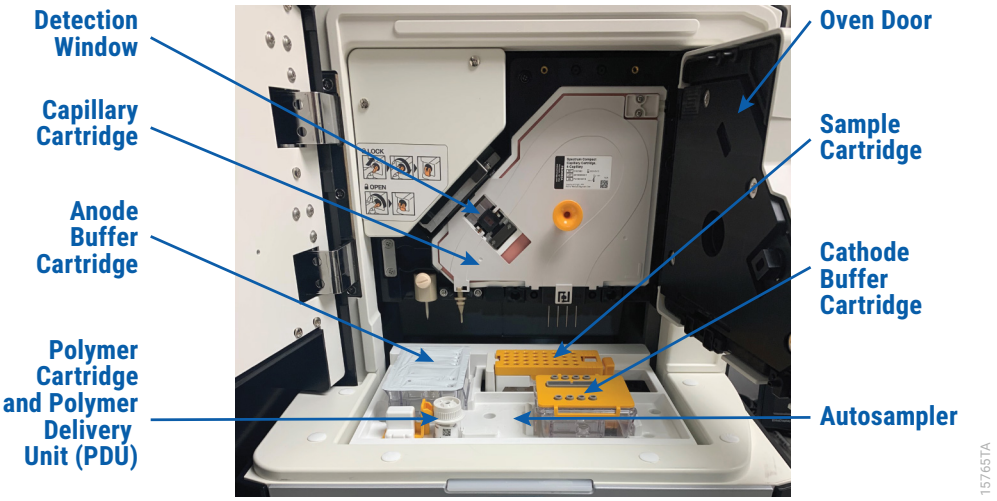



**Figure 3. Interior of the Spectrum Compact CE System.** The interior of the system provides access to key components. **Instructions for maintaining the buffer, polymer and capillary cartridges are provided in Section 3, Managing Consumables.**

| Component | Function |
|---|---|
| Oven | Maintains temperature around the capillary array during electrophoresis. |
| Capillary Cartridge | Contains the array of 4 capillaries (36cm), which enables electrophoretic separation of fluorescently labeled DNA fragments. |
| Detection Window | Area where fluorescence is detected. |
| Anode Buffer Cartridge (ABC) | Contains running buffer for electrophoresis. |
| Cathode Buffer Cartridge (CBC) | Contains running buffer for electrophoresis. |
| Sample Cartridge | Holds up to 4 × 8-well strip tubes containing samples. |
| Polymer Cartridge | Contains either Spectrum Compact Polymer4 or Spectrum Compact Polymer7, which is pumped via the Polymer Delivery Unit into the capillary cartridge for separation of fragments. |
| Autosampler | Houses the Sample Cartridge, ABC, CBC and Polymer Cartridge. Adjusts their position relative to the capillary cartridge during run cycles for proper injection and washes. |
| Polymer Delivery Unit (PDU) | Actuates plunger in Polymer Cartridge to deliver polymer to the capillary cartridge. |

## 1.2 Common Safety Precautions

- Follow all precautions labeled on the instrument and described in this manual.
- Do not use this instrument for anything other than its designed purpose.
- Do not perform any operations and maintenance other than those described in this manual.
- Only perform the maintenance activities described in the manual. Contact Technical Service for further maintenance and repair.
- Preventive Maintenance, provided by Promega service, is strongly recommended to ensure the safety and performance of the instrument. Contact Technical Service for further information.
- Never modify the instrument.
- Do not use any parts that are not specified by Promega.
- Customers should not attempt the initial unpacking upon delivery or relocation of the instrument.
- Keep in mind that the hazard warnings in the manuals or on the product cannot cover every possible case, as it is impossible to predict and evaluate all circumstances beforehand. Always be alert and use common sense.
- The guidance provided in this manual is intended to supplement, not supersede, the normal safety requirements prevailing in the user's country.

**WARNING:** This product can expose you to chemicals including Lead, which is known to the State of California to cause cancer, birth defects or other reproductive harm. For more information, go to: **www.P65Warnings.ca.gov**

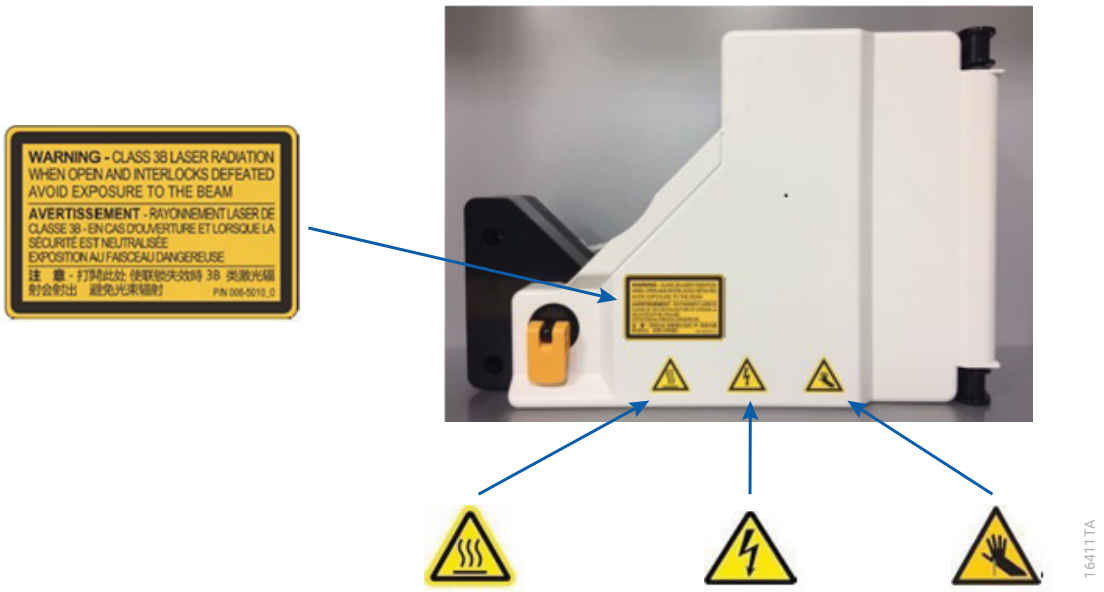
## 1.3 Safety Symbols and Marking

| | **Safety Symbols and Markings** |
|---|---|
|  | Warning. Risk of personal injury to the operator or a safety hazard to the instrument or surrounding area. |
|  | Danger. Hazardous voltage. Risk of electric shock. |
|  | Warning. Hot surface. Burn hazard. |
|  | Warning. Sharp objects inside. |
|  | This label indicates laser radiation is present. |

SYMBOLS KEY

| **Symbols** | **Explanation** | **Symbols** | **Explanation** |
|---|---|---|---|
|  | Catalog Number |  | Lot Number |
|  | Serial Number |  | Manufacturer |
|  | Date of Manufacture (Year-Month-Day) |  | Consult your local Promega Representative regarding instrument disposal WEEE Directive (European Community Directive 2012/19/EU on Waste Electrical and Electronic Equipment) |

## 1.4 Location of Instrument Safety Symbols on Oven Door




**Danger!** Hazardous voltage. Risk of electric shock.

Do not remove instrument panels. Do not touch internal parts or circuits while the instrument power is turned on. This may cause death or serious injury due to electric shock.

## 1.5 Spectrum Compact CE System Specifications

| | |
|---|---|
| Processing Time | 30–60 minutes, depending on application |
| Number of Samples | Up to 32 samples (4 × 8-well strip tubes) per run |
| Weight | 45kg (99lb) |
| Dimensions (W × D × H) | 15.75 × 23.62 × 23.62 inches (400 × 600 × 600mm) |
| Power Requirements | 100-240Vac, 50/60Hz, 260VA |
| Overvoltage Category | II |
| Pollution Degree | 2 |
| Ground | Grounding resistance 100Ω or less |

Leave at least 7.9 inches (200mm) at the right side of the instrument so that the power supply switch is easily accessible and 15.8 inches (400mm) at the left side to allow clearance for opening the instrument door. At least 3.9 inches (100mm) should be left at the back of the instrument to allow for easy connection/disconnection of power cable and USB connections at the rear of the instrument.

이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

This device has been evaluated for conformity for use in a business environment, and if used in a home environment, there is a risk of radio interference.

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**Important!** Power connectors

The Spectrum Compact CE System is delivered with a detachable power cord that meets the power requirements listed above. In areas where the supplied power is subject to voltage fluctuations exceeding ±10% of the nominal value, a power line regulator may be required. High or low voltages can adversely affect the electronic components of the instrument.

We recommend the use of an uninterruptible power source (UPS) for the Spectrum Compact CE System. At a minimum, the instrument should be connected through a surge suppressor.

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**Danger!** Hazardous voltage. Risk of electric shock.

Use properly configured and approved line cords for the voltage supply in your facility as specified by Promega. Incorrect connection of the power cord could result in fire or electrical shock.

Place instrument in a location so that the power cord is accessible and can be easily connected and disconnected.

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**Warning!** Sharp objects inside.

The electrode-end and capillary head-end of the capillary cartridge can lead to piercing injury. To avoid injury, do not touch the tip of the capillary cartridge.

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**Warning!** Sharp objects inside.

The tip of the anode electrode can lead to piercing injury. To avoid injury, do not touch the tip of the anode electrode.

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**Warning!** Physical injury hazard

Do not touch moving parts while operating the instrument. Disconnect power before performing maintenance on the instrument.

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## 1.6 General Warnings

### Handling

- Avoid pressing on the display monitor with excessive force. Otherwise, a malfunction may result.
- If there are contaminants such as fingerprints or water droplets on the display monitor, wipe them off lightly with a soft and dry cloth, or a soft damp cloth.
- The display monitor is made of glass. If the display monitor is broken, avoid direct contact with the shards of the glass. Otherwise, injury may result.
- The touch panel monitor may become inoperable after approximately 5 million touches at the same spot.

## Touchscreen

- Depending on the type of image displayed, bright pixels (pixels that are lit regardless of the specified color) or black pixels (pixels that do not represent the specified color) may be visible on the screen, or part of ruling lines or characters may appear missing.
- Missing pixels or constantly lit pixels on the liquid crystal display screen do not indicate an instrument malfunction.
- Depending on the image displayed, the screen may appear to flicker. Adjust your viewing angle to the screen to improve view.
- If the same image is displayed on the screen for a long time, a remnant of this image may remain even after the screen has changed. This will eventually fade and disappear.
- The temperature of the liquid crystal may rise after long and continuous use. This may lead to changes, irregularities or both in contrast. These effects will subside as the temperature falls.
- The screen may appear dark when the instrument is first turned on. Brightness will increase as time passes.
- Due to the multicolor imaging elements and the liquid crystal structure, the display on the screen may be difficult to view from an upward angle. Adjust your viewing angle to the screen to improve view.
- Small air bubbles or ring-shaped stripe patterns may be visible on the display monitor screen. They do not affect the operation of the instrument.

## Handling the instrument and peripheral devices

- Promega Corporation is not responsible for any loss or damage done to data or applications due to broken hardware.
- Static electricity has an adverse effect on the instrument and peripheral devices. Avoid using materials which can generate static electricity when operating the instrument, such as walking on a carpet or wearing a lap blanket.

# 1.7 Product Components

| PRODUCT | CAT.# |
|---|---|
| Spectrum Compact CE System | CE1304 |

Includes:

- Spectrum Compact CE System
- Spectrum Compact Control Software
- Spectrum Compact CE System Remote Access Software
- Spectrum Compact CE System Standard 1-Year Warranty

## 1.8 Reagents and Consumables

| Consumable | Cat.# | Storage and Handling | On-Instrument Storage |
|---|---|---|---|
| Spectrum Compact Buffer | CE2300 | +2°C to +10°C | 14 days, 80 injections or expiry date (Environmental temperature: 25°C or less) |
| Spectrum Compact Polymer4 | CE2304 | +2°C to +10°C | 14 days, 16 injections or expiry date (Environmental temperature: 25°C or less)<br>Compatible with software versions 6138000-## and 6138200-##. |
| Spectrum Compact Polymer4 | CE2404 | +2°C to +10°C | 14 days, 24 injections or expiry date (Environmental temperature: 25°C or less)<br>Compatible with software versions 6138200-##, 6138800-## and later.[1] |
| Spectrum Compact Polymer7 | CE2307 | +2°C to +10°C | 14 days, 16 injections or expiry date (Environmental temperature: 25°C or less)<br>Compatible with software versions 6138000-## and 6138200-##. |
| Spectrum Compact Polymer7 | CE2407 | +2°C to +10°C | 14 days, 24 injections or expiry date (Environmental temperature: 25°C or less)<br>Compatible only with Spectrum Compact software version 6138200-##.[2] |
| Spectrum Compact Polymer7 | CE2507 | +2°C to +10°C | 14 days, 24 injections or expiry date (Environmental temperature: 25°C or less)<br>Compatible only with Spectrum Compact software versions 6138800-## and later.[3] |
| Spectrum Compact Cathode Septa Mat | CE2301 | +15°C to +30°C | One-time use per CBC |
| Spectrum Compact Cathode Retainer | CE2302 | +15°C to +30°C | Not applicable |
| Spectrum Compact Strip Base & Retainer, 32-Well | CE2332 | +15°C to +30°C | Not applicable |
| Strip Septa Mat, 8-Well | CE2308 | +15°C to +30°C | One-time use per sample |
| Capillary Preservation Buffer | CE2399 | +2°C to +10°C | Not applicable; expiry date |
| Spectrum Compact Capillary Cartridge, 4-Capillary 36cm | CE2340 | +15°C to +30°C | 300 injections or expiry date<br>**Note:** Spectrum Compact software versions below 6138200-## will show a 200 injection limit but it can be used for 300 injections. |

Not for Medical Diagnostic Use.

[1]Not compatible with Spectrum Compact software version 6138000-##.

[2]Not compatible with Spectrum Compact software versions 6138000-## or 6138800-## and later.

[3]Compatible with Spectrum Compact software versions 6138800-## and later. Not compatible with 6138200-## and earlier.

Additional supplies and consumables are necessary for routine operation of the Spectrum Compact CE System. Contact Promega to order these additional supplies.

**Important!** Only use parts and devices specified by Promega Corporation

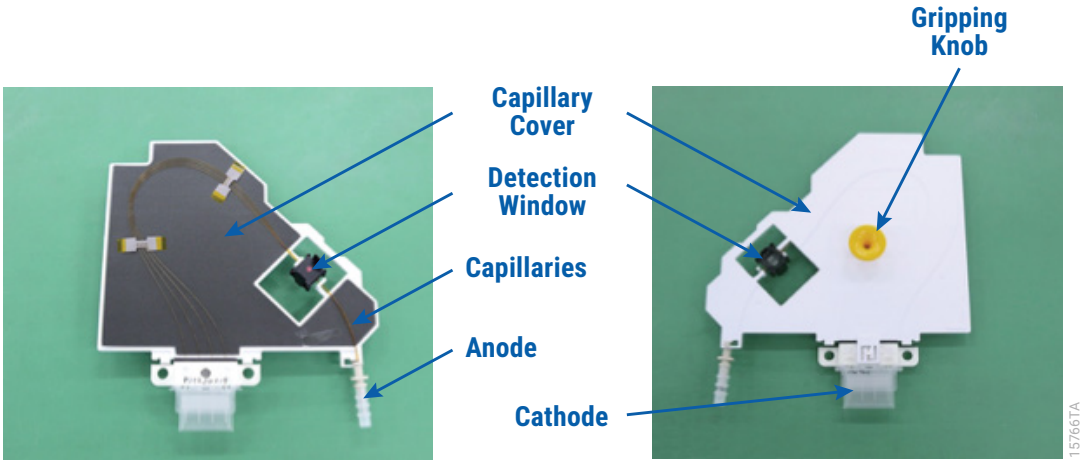


**Figure 4. Spectrum Compact Capillary Cartridge, 4-Capillary 36cm.** The interior is shown on the left and the exterior on the right. **Protective caps on anode and cathode end of array are shown. These may be filled with Capillary Preservation Buffer for long-term storage of used capillary cartridges.**

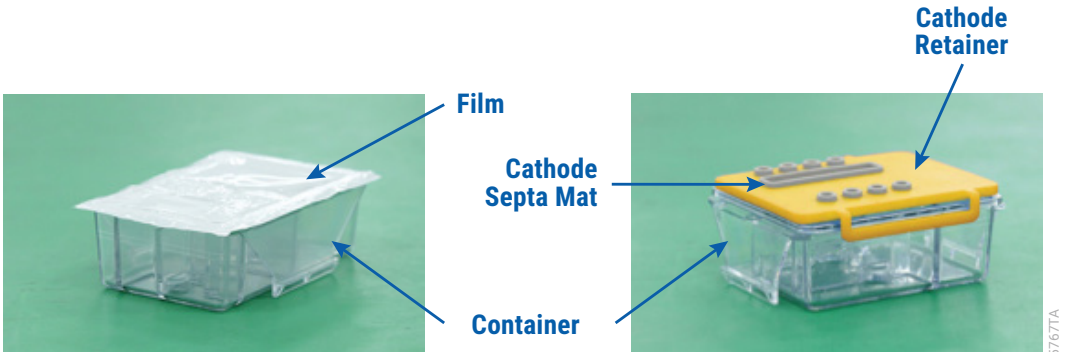


**Figure 5. Spectrum Compact Buffer Cartridges.** The anode buffer cartridge (ABC) is shown on the left and the cathode buffer cartridge (CBC) with septa mat and retainer on the right. **A clear protective seal must be peeled off the top of the CBC prior to placing the Spectrum Compact Cathode Septa Mat and Retainer onto the CBC. Do not remove the white seal from the top of the ABC.**

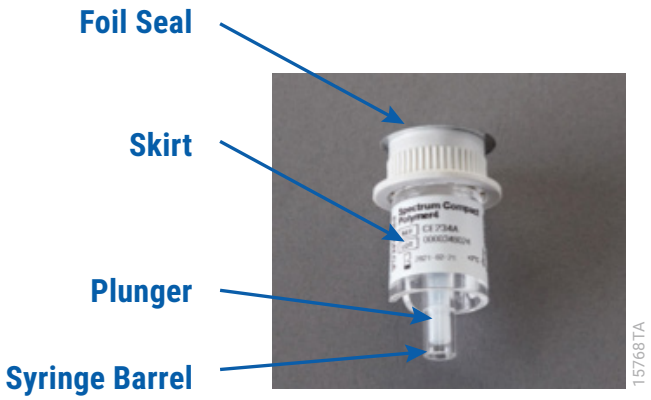


**Figure 6. Spectrum Compact Polymer Cartridge.** The foil seal must be peeled off the top of the Spectrum Compact Polymer Cartridge prior to placing it into the polymer delivery unit on the autosampler of the Spectrum Compact CE System.

## 1.9 Laser Safety

The Spectrum Compact CE System is a Class 1 laser product. The instrument has been tested and complies with standard IEC60825-1 Third Edition (2014), EN60825-:2014 + A11:2021. The Spectrum Compact CE System complies with 21 CFR 1040.10 and 1040.11.

The Spectrum Compact CE System uses a laser diode module categorized as a Class 3B laser beam.

The laser specifications are:

- Wavelength: 505nm
- Output power: 20mW (normal maximum), 64mW (maximum when failed)

To ensure safe laser operation:

- Do not remove the instrument protective panels or safety labels.
- Do not disable safety interlocks.
- Never look directly into the laser beam.
- Remove reflective objects such as jewelry and wristwatches.
- Wear proper eye protection and post a laser warning sign at the entrance to the laboratory if panels are removed for service.

**Warning!** This label indicates laser radiation is present.

Class 3B laser radiation when open and interlocks defeated. Avoid exposure to the beam.

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**Warning!** This label indicates laser radiation is present.

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

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**Warning!** This label indicates laser radiation is present.

The Barcode Scanner (Cat.# CE5300) that is used with the instrument to capture bar code information for samples and reagents is categorized as a Class 2 laser product. Class 2 lasers are low-power, visible-light lasers that can damage the eyes. Never look directly into the laser beam. The scanner is designed to prevent human access to harmful levels of laser light during normal operation, user maintenance or prescribed service operations.

Class 2 lasers can cause damage to eyes. Avoid looking into a Class 2 laser beam or pointing a Class 2 laser beam into another person's eyes.

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

## 1.10 Environmental Requirements

| | |
|---|---|
| Power Requirements | 100-240Vac, 50/60Hz, 260VA |
| Temperature During Transportation and Storage | –20°C to 60°C |
| Temperature During Operation | 15°C to 30°C with changes <±2°C/hour |
| Humidity During Transportation and Storage | 20% to 80%RH |
| Humidity During Operation | 20% to 80%RH |
| Operating Altitude | <2,000m |
| Pollution Degree | 2 |

The Spectrum Compact CE System is intended for indoor use only. To avoid shortening the expected lifespan of the instrument, the Spectrum Compact CE System must be installed in a location that meets the following criteria:

- Use a sturdy, level surface (no perceptible vibration).
- Avoid dusty areas.
- Choose a location that has good air circulation and is not exposed to direct sunlight.
- Use an uninterruptable power source (UPS) rated to support the power requirements above. Contact a Promega representative for a recommended UPS.
- Do not install in a location with large temperature variability or high humidity.
- Do not position the instrument so that it is difficult to unplug from the power source.
- Do not place next to heating or cooling sources.
- Do not use near flammable gases or liquids.
- Do not place near other electrically sensitive instruments.
- Do not use extension cords. Relocate the instrument, power receptacle and/or UPS to avoid using an extension cord.

## 1.11 Unpacking, Installing and Moving the Spectrum Compact CE System

A Promega representative must perform unpacking, installing and moving of the Spectrum Compact CE System. Performance of any of these activities by noncertified individuals may invalidate the product warranty or service contract terms.

## 1.12 Special Instructions

- Wipe up spills immediately.
- The Spectrum Compact CE System contains sensitive optical components and precision-aligned mechanical assemblies. Handle with care.
- Use caution when working with solvents, as they may damage the plastic case of the Spectrum Compact CE System.
- Do not expose the Spectrum Compact CE System to temperatures outside the specified range (see Section 1.10), because damage to the unit may occur that will not be covered under warranty.
- Changes or modifications to the instrument not expressly approved by Promega could void the warranty.
- Do not use this Spectrum Compact CE System for anything other than its intended use.
- Always disconnect the power before cleaning or performing routine instrument maintenance.
- Do not disassemble the Spectrum Compact CE System other than as specified in this operating manual for routine instrument maintenance and use.
- If the equipment is used in a manner other than that specified by Promega, the protection provided by the equipment may be impaired.
- Do not overfill strip wells, because this may lead to spills and/or instrument damage.

## 1.13 Electromagnetic Compatibility (EMC) Safety

Spectrum Compact CE System complies with the emission and immunity requirements prescribed by EMC standard IEC 61326-1:2012 (Group 1, class A, Basic environment).

If installed adjacent to other electrical and electronic equipment, they may adversely affect each other. Equipment operation and measurement results may be affected by noise from peripheral devices. Alternatively, noise from the device may affect the operation of peripheral devices and measurement results.

## 1.14 Chemical Safety

**Caution!** Chemical hazard

Formamide may be combustible at high temperature, and slightly flammable in presence of heat, sparks or open flames. Keep away from heat or sources of ignition. Refer to the Safety Data Sheet (SDS) provided by the manufacturer to handle the reagent.

Formamide is an irritant and a teratogen; avoid inhalation and contact with skin. Read the warning label, and take appropriate precautions when handling this substance. Always wear gloves and safety glasses when working with formamide.

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**Caution!** Chemical hazard

Before handling any chemicals, refer to the Safety Data Sheet (SDS) provided by the manufacturer and observe all relevant precautions in handling each chemical.

---

**Caution!** Chemical hazard

All chemicals in the instrument, including liquid in the lines, are potentially hazardous. Always determine what chemicals have been used in the instrument before changing reagents or instrument components. Wear appropriate protective equipment (e.g., protective clothing, gloves) when working on the instrument.

## 1.15 Disposal of Waste Solution and/or Instrument

- To dispose of the instrument, follow the local environmental protection regulations.
- Do not dispose of this instrument as unsorted municipal waste. Follow local municipal waste ordinances for proper disposal provisions to reduce the environmental impact of waste electrical and electronic equipment (WEEE). For European Union customers, Contact Promega Service for equipment pick-up and recycling.
- To dispose of waste solutions, read and understand the Safety Data Sheets (SDSs) provided by the manufacturers of the chemicals in the waste container.
- This instrument is equipped with a touch panel PC, which contains a lithium battery.
- Prior to instrument disposal, ensure that any important data has been archived.

## 1.16 Thermal Safety

**Warning!** Hot surface. Burn hazard.

The inside surface of the oven can reach a temperature of 70°C. Ensure that the oven is off before replacing the capillary cartridge. When replacing the capillary cartridge, grasp the yellow handle of the cartridge and do not touch the inside surface of the oven.

---

**Warning!** Hot surface. Burn hazard.

The oven remains hot after the instrument stops.

---

## 1.17 Protection Against Computer Viruses

The Spectrum Compact CE System comes installed with McAfee application control software (whitelist) as anti-virus software. Application “whitelisting” is the practice of specifying an index of approved software applications that are permitted to be present and active on a computer system. McAfee application control software will allow only those programs that are on the “whitelist” (i.e., approved list) of applications to run. No other applications will be allowed to run on the instrument panel PC. Thus there is no need for updates, since only the Spectrum Compact CE System applications will be on the approved list. If despite whitelisting the instrument becomes infected with a virus, contact Promega Technical Services.

# 1.18 RoHS Marking for China

Names and contents of hazardous substances contained in products.

| 部件名称 | 有害物质 | | | | | |
|---|---|---|---|---|---|---|
| | 铅（Pb） | 汞（Hg） | 镉（Cd） | 六价铬（Cr（Ⅵ）） | 多溴联苯（PBB） | 多溴二苯醚（PBDE） |
| 照射单元 | × | ○ | ○ | ○ | ○ | ○ |
| 检测单元 | × | ○ | ○ | ○ | ○ | ○ |
| 自动进样器 | × | ○ | ○ | ○ | ○ | ○ |
| 恒温组件 | × | ○ | ○ | ○ | ○ | ○ |
| 高压电源组件 | × | ○ | ○ | ○ | ○ | ○ |
| 线路板 | × | ○ | ○ | ○ | ○ | ○ |
| 架台 | × | ○ | ○ | ○ | ○ | ○ |
| 成套附属品 | × | ○ | ○ | ○ | ○ | ○ |
| 本表格依据SJ/T 11364的规定编制。<br>○：表示该有害物质在该部件所有均质材料中的含量均在GB/T 26572规定的限量要求以下。<br>×：表示该有害物质至少在该部件的某一均质材料中的含量超出GB/T 26572规定的限量要求。 | | | | | | |

SYMBOLS KEY

| **Symbols** | **Explanation** |
|---|---|
|  | RoHS Marking for China indication Environment Friendly Use Period of 10 years. |

# Operating the System 2

## 2.1 Turning On the Instrument

1. Confirm that the instrument is connected to an appropriate uninterruptible power supply (UPS) and is on a protected circuit.
2. Verify that the Instrument Door is closed.
3. Turn on the instrument by turning the power switch on the right side of the instrument to the up position.
4. Software launches automatically. During this time the status indicator flashes amber. After the software has successfully launched the status indicator changes to a steady green (no flashing).
5. Log in to the software by selecting the appropriate user name from the drop-down menu and entering the correct password (Figure 8).

   **Notes:**

   1. When the instrument is set with the normal security level (see Section 8.3), the login screen will be skipped. The main menu is displayed after the startup screen is closed.
   2. If you want to change the password, select **Change Password**. Enter a new password in the New Password and Re-enter New Password boxes on the Change Password screen.
   3. The window in Figure 7 may be displayed when the instrument is powered up after a new device (USB memory, keyboard, barcode scanner, etc.) is connected. If displayed, select the **X** on the window to close it. The instrument can then be used normally.

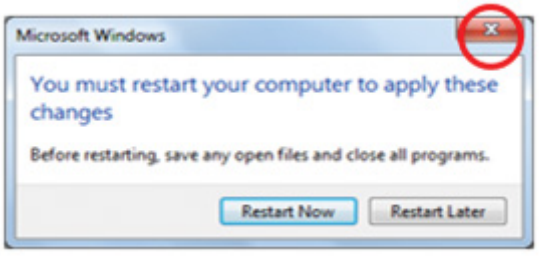



**Figure 7. Spectrum Compact CE System Software New Device window.**

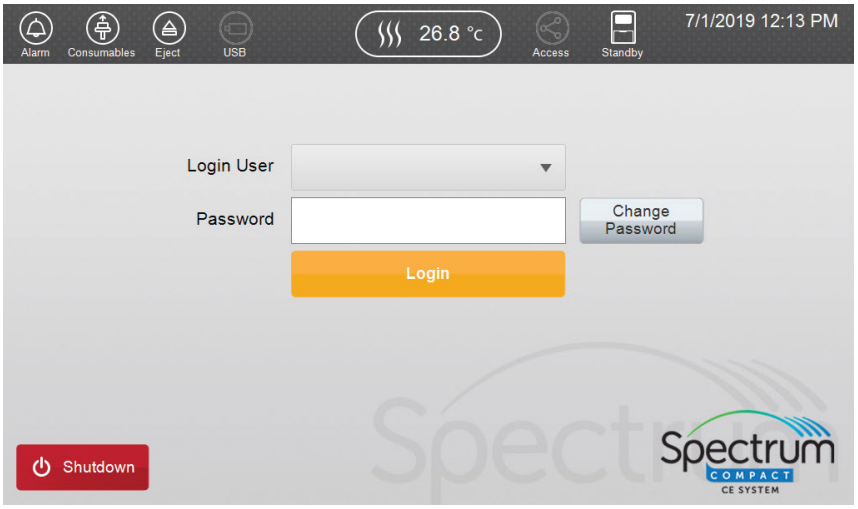



**Figure 8. Spectrum Compact CE System Software Login screen.**

The instrument status indicator indicates six states:

| State | Status |
|---|---|
| No light | Instrument is off |
| Flashing amber light | Instrument is initializing, door is open, or run failure |
| Steady green light | Power is on and in standby |
| Flashing green light | Power is on and instrument is in use (calibration, electrophoresis, etc.) |
| Flashing red light | Failed initialization or a critical error has occurred |
| Steady amber light | Instrument was shut down incorrectly |

**Important!**

If the software stalls, power OFF the instrument using the power switch at the right side and restart the instrument.

## 2.2 Navigating the Spectrum Compact Software

Upon launching and logging into the Spectrum Compact Control Software, the 'Main Menu' screen will be displayed (Figure 9). The 'Main Menu' screen provides access to the four workflow menus (Run, Review, Maintenance and Protocols) as well as status indicators. The screen is divided into three sections: Header, Main Menus and Footer.

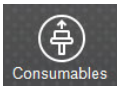

**Figure 9. Spectrum Compact CE System Software Main Menu screen.** The Header and Footer are fixed and remain available to the user across all menu screens. The navigation and informational icons displayed in these areas will vary depending on the specific workflow menu as well as selected security level.

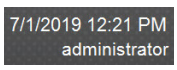
Within specific workflow menus, a navigation bar below the header will indicate the user's current location within the Spectrum Compact Control Software. In the example below (Figure 10), the navigation bar indicates the user has navigated to the 'Run List' screen within the Completed Runs screen.


**Figure 10. Spectrum Compact CE System Software 'Run List' bar.**

The Spectrum Compact Control Software contains several navigation and informational icons in the header. Each icon provides information about a specific function or component.

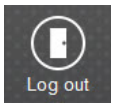
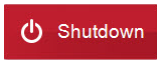
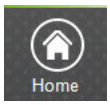
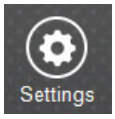
**Note:** The Screen Lock icon (see table below) in the header is only available under High Security level settings (see Section 8.3).

| Icon | Type | Function |
|---|---|---|
|   | Alarm | Displayed when an alarm has been triggered. This indicator also acts as a shortcut icon to the 'Alarm List' screen, which shows details of the alarm (see Section 9.2). |
|   | Consumables | Select this icon to open the 'Consumables' screen, which shows detailed information of each installed consumable and which consumables may need to be replaced. This icon will display a consumable status indicator (see Section 2.3) if any consumables need replacement. |

| Icon | Type | Function |
|---|---|---|
|  | Eject | Selecting this icon moves the autosampler forward to allow access to consumables and the sample cartridge. |
|  | USB | Displayed when a USB drive is connected to the instrument. Select the **USB** icon to safely remove the USB drive from the instrument. |
|  | Screen Lock | Locks the operation panel. To unlock, enter the appropriate user name and password.<br>**Note:** This function is only available under High Security level settings (see Section 8.3). When the screen is locked, only an administrator or user can unlock the screen using their login password. |
|  | Oven Temperature | Displays the oven temperature. Select the **Oven Temperature** icon to turn on the oven. The icon flashes while oven is heating up to 60°C.<br>**Notes:**<br>**1.** Selecting the **Oven Temperature** icon only allows preheating to 60°C. No other oven temperature can be set on this screen.<br>**2.** Selecting this icon when the oven is at 60°C temperature does not turn off the oven.<br>**3.** If samples are not run, the oven unit will turn off after 2 hours. |
|  | Network Access | Displayed when remote access user is logged on via the network. Select the **Network Access** icon to view the 'Network Access Users' screen that displays the ID of the user logged on remotely to the Spectrum Compact CE System. |
|  | Instrument Status | Displays the instrument status.<br>**Standby:** System is idle but ready to start a run.<br>**Run:** Injection is in process.<br>**Stop:** Instrument is in the process of stopping but is not idle (this is not the same as when the instrument stops due to an error).<br>**Open:** Front door or oven door is open.<br>**Recovery:** Initialization after closing door.<br>**Error:** An error is detected and the run has stopped.<br>**Critical:** Instrument trouble. |
|  | Date & Time, Login User Name | Displays the current date (month, day, year), time (12-hour clock format) and login user name. |

**Note:** Connecting some USB devices to the Spectrum Compact CE System may not activate the USB icon. In that case, remove the USB device without touching the USB icon.

The icons displayed in the footer provide several software shortcuts.

| Icon | Name | Function |
|---|---|---|
|  | Log out | Logs out the current user.<br>**Note:** This function is only available under High Security level settings (see Section 10). Displayed only on the 'Main Menu' screen under High Security level settings. |
|  | Shutdown | Shuts down the instrument.<br>**Note:** Displayed only on the 'Login' screen after logging out of the 'Main Menu' screen under High Security level settings, or on the 'Main Menu' screen under Normal Security level settings (see Section 10). |
|  | Home | Shortcut to Main Screen. |
|  | About | Displays the following sub menu (see Section 9):<br>• About |
|  | Settings | Displays the following sub menus (see Section 8):<br>• System Settings<br>• Network Settings<br>• Security Settings<br>  • User Rights[1]<br>• User Accounts<br>• Backup Settings<br>• File Name Convention<br>• Service[2] |

[1]The 'User Rights' screen is only accessible via **User Rights** on the 'Security Settings' screen (Section 8.3).

[2]When security level is set to Normal (Section 8.3), an additional button is visible on the 'Settings' screen called **Service**. This setting is for use by Promega service engineers.

## 2.3 Checking Consumable Status

Before starting a run on the Spectrum Compact CE System, ensure all consumables are installed and in sufficient supply. For best quality results, use unexpired reagents that are within the recommended use range (see Section 1.5). Refer to the 'Consumables' screen to determine if any consumables need to be replaced (Figure 11). To access the 'Consumables' screen, select **Consumables** in the Header.

The 'Consumables' screen displays information for the four consumables on the instrument: Polymer, Capillary Cartridge, and Anode and Cathode Buffers.


**Figure 11. Spectrum Compact CE System Consumables screen.** Usage count (number of injections), on-instrument expiration date and remaining injections are displayed on the 'Consumables' screen for each consumable as well as polymer type.

**Note:** Either a 16- or 24-injection polymer cartridge may be used with Spectrum Compact software version 6138200-## and later, but only a 16-injection cartridge may be used with Spectrum Compact software versions below 6138200-##. Installing a 24-injection polymer cartridge on software versions below 6138200-## will result in the following warning: "Cannot identify consumable. Read appropriate consumable bar code."

A consumable status indicator will appear on the icons of consumables that need attention. There are three indicators:

| Symbol | Description |
|---|---|
|  | Reaching consumable expiration date, on-instrument expiration date or injection limit for consumable. |
|  | Consumable expiration date, on-instrument expiration date or injection limit for conumable has passed. |
|  | Cannot perform a run because the maximum injection count was reached for the polymer. |

The following information can be accessed by touching the icon for each specific consumable:

- Type of consumable
- Material number
- Lot number
- Serial number
- Expiration date
- Initial installation date
- On-instrument expiration date
- Injection count

The expiration date, injection count maximum and on-instrument expiration date correspond to the recommended usage for each installed consumable. The status indicators will adjust to indicate when a consumable is reaching its expiration date, on-instrument expiration date or when it is past these dates, as well as when the recommended number of injections has been exceeded.

The only hard stop for the system is for the polymer. The software will not allow a run to proceed if the scheduled number of injections exceeds the remaining injections of the polymer, because this would damage the system. All other consumable warnings are advisory in nature and will not stop a run.

Consumables can be replaced individually or all at once. To replace an individual consumable, select the icon for the specific consumable. This will display the 'Installed Consumable Information' screen for the consumable (Figure 12). Selecting **Install** on this screen will launch the replacement wizard (see Section 3).

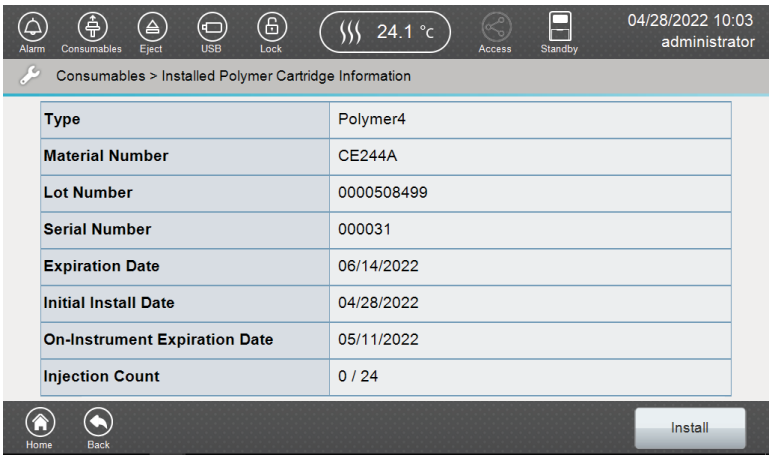



**Figure 12. Spectrum Compact CE System 'Installed Consumable Information' screen.**

## 2.4 Preparing the Sample Cartridge

Samples prepared in 8-well strip tubes are assembled into the strip base and retainer (Figure 13) to form the sample cartridge (Figure 14), which can be loaded onto the Spectrum Compact CE System. Samples are injected in groups of four, such that one 8-well strip tube can be used for two injections. Each 8-well strip tube corresponds to one lane (A, B, C or D) of the sample cartridge. Samples are injected in groups of four across a lane (not by column). For example, samples in well positions A1 through A4 in lane A are injected together, followed by samples in well positions A5 through A8 for the second injection. This pattern is then repeated for samples in lanes B, C and D. You can change the order of injections during run setup (see Section 5.6).

**Notes:**

a. Only use MicroAmp™ Optical 8-Tube Strips (0.2ml) (Applied Biosystems® Cat.# 4316567) as a source of 8-well strip tubes. Use of other 8-well strip tubes may affect performance or damage the Spectrum Compact CE System.

b. Wear gloves when handling consumables and sample cartridges.

| | | Wells | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Lane | A | Injection 1 | | | | Injection 2 | | | |
| | B | Injection 3 | | | | Injection 4 | | | |
| | C | Injection 5 | | | | Injection 6 | | | |
| | D | Injection 7 | | | | Injection 8 | | | |

To prepare the sample strip(s) for placement onto the instrument:

1. Place a Strip Septa Mat, 8-Well, over the wells of each 8-well strip tube containing the sample loading cocktail. Refer to the technical manual of the sequencing or fragment analysis kit for how to prepare the sample loading cocktail.

   **Notes:**

   a. Be sure the samples are positioned at the bottom of each well and are free of bubbles. Briefly centrifuge the sample 8-well strip tube(s) if needed.

   b. To prevent cross-contamination, do not reuse Strip Septa Mat, 8-Well. Always use a new Strip Septa Mat, 8-Well, for each 8-well strip tube.

2. Place the 8-well strip tube(s) with Strip Septa Mat, 8-Well into the strip base. When using less than four strips in the run, you can place the strips in any lane.

   **Note:** Lane names A to D and well numbers 1 to 8 are embossed on the strip base. Be sure to check the lane name when placing a sample 8-well strip tube into the strip base to make certain that the correct 8-well strip tube is in the correct lane.
   Additionally, well numbers 1 to 8 are embossed on each 8-well strip tube. When placing a sample 8-well strip tube into the strip base, be sure that the well numbers on each sample 8-well strip tube match those on the strip base.

3. To complete the strip assembly, place the retainer over the strip(s) in the strip base, aligning the lane names A to D and well numbers 1 to 8 on the retainer to those on the strip base and pressing until the retainer clicks into the strip base.

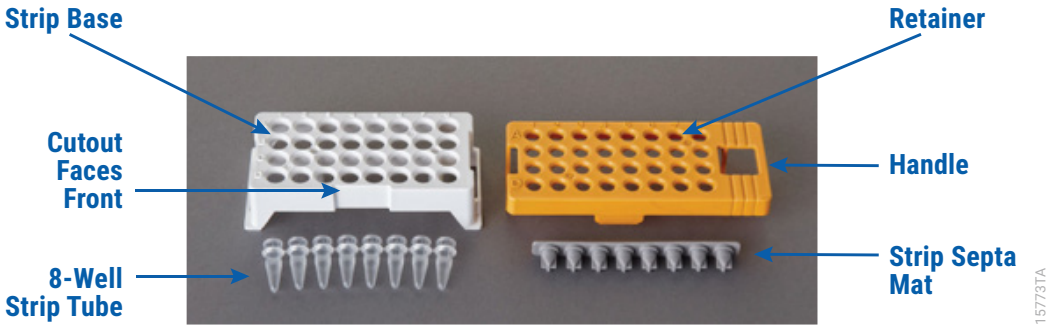



**Figure 13. Assembling the Spectrum Compact Strip Base and Retainer.**

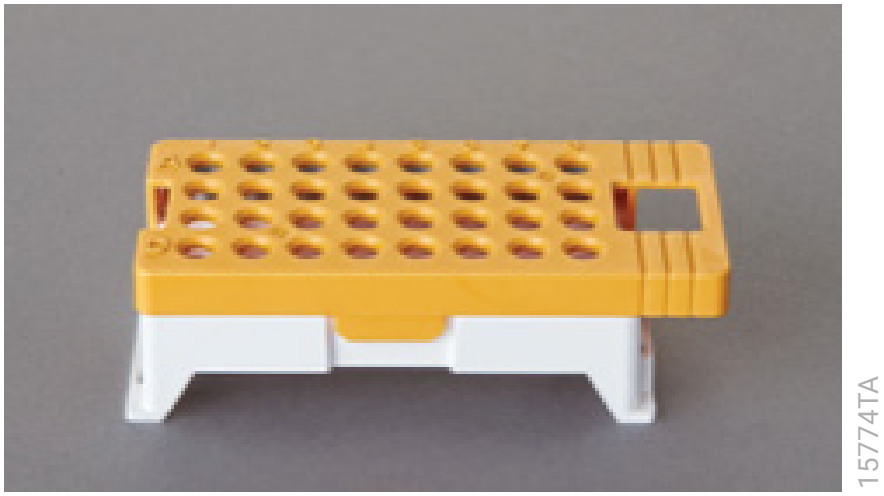
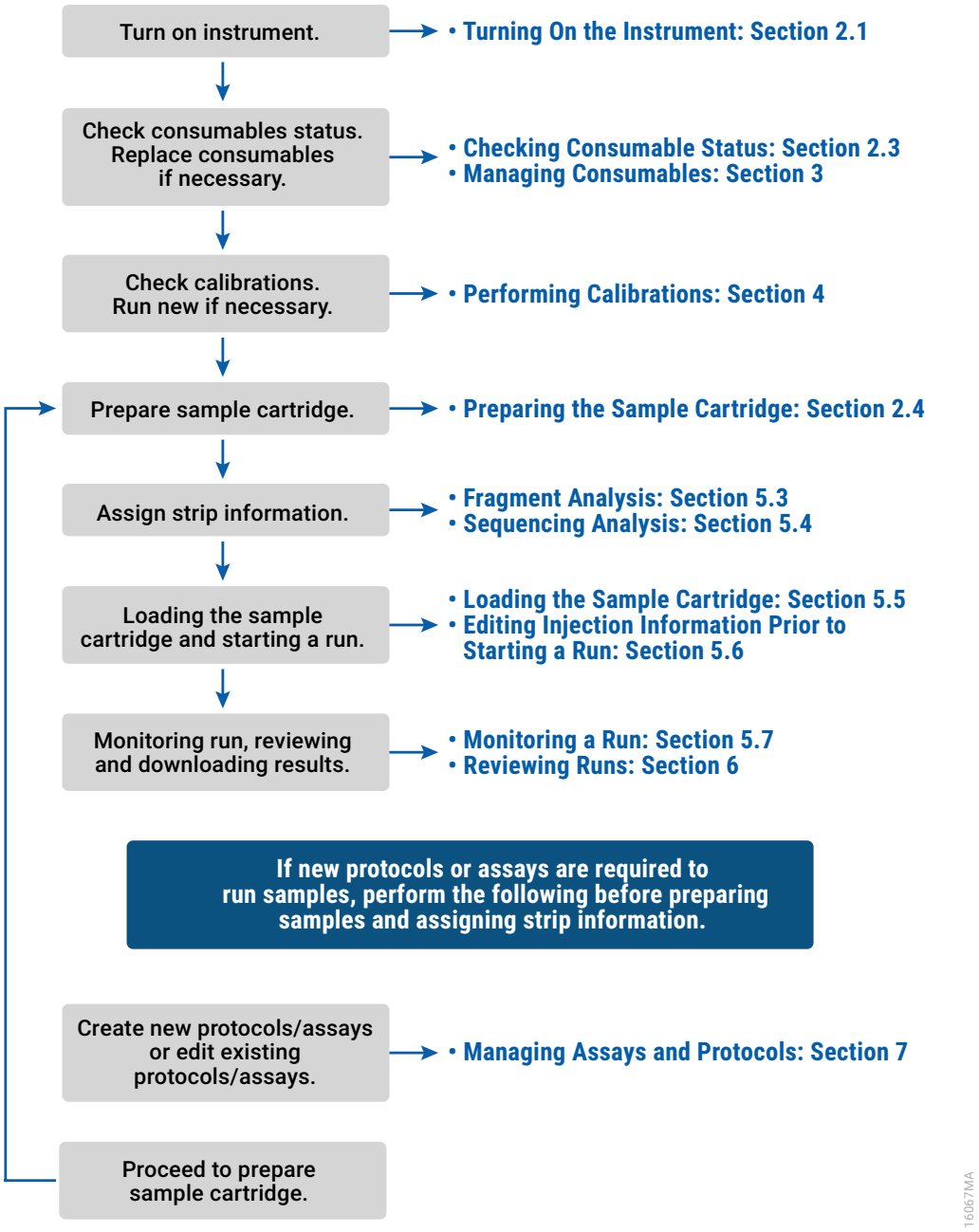



**Figure 14. Assembled Spectrum Compact Sample Cartridge.**

# 2.5 Spectrum Compact CE System Workflow

Operational workflow is shown with corresponding sections of the Spectrum Compact CE System Manual as reference for more detailed information.



# Managing Consumables 3

Managing consumables is done through **Consumables** in the header. Selecting **Consumables** displays the 'Consumables' screen (Figure 11), which shows the current status of the four consumables: Spectrum Compact Polymer (4 or 7), Spectrum Compact Capillary Cartridge, Spectrum Compact Anode Buffer Cartridge (ABC) and Spectrum Compact Cathode Buffer Cartridge (CBC) (see Section 2.3).

## 3.1 Maintenance Schedule for Consumables

| Consumable | Cat.# | On-Instrument Storage |
|---|---|---|
| Spectrum Compact Buffer | CE2300 | Once seal is pierced (anode) or removed (cathode), the anode and cathode buffers are stable for 14 days, 80 injections or until expiry date, whichever comes first. |
| Spectrum Compact Polymer4 | CE2304 | 14 days, 16 injections (64 wells) or until expiry date, whichever comes first. Compatible with Spectrum Compact software versions 6138000-## and 6138200-##. |
| Spectrum Compact Polymer4 | CE2404 | 14 days, 24 injections (96 wells) or until expiry date, whichever comes first. Compatible with Spectrum Compact software versions 6138200-##, 6138800-## and later.[1] |
| Spectrum Compact Polymer7 | CE2307 | 14 days, 16 injections (64 wells) or until expiry date, whichever comes first. Compatible with Spectrum Compact software versions 6138000-## and 6138200-##. |
| Spectrum Compact Polymer7 | CE2407 | 14 days, 24 injections (96 wells) or until expiry date, whichever comes first. Compatible only with Spectrum Compact software version 6138200-##.[2] |
| Spectrum Compact Polymer7 | CE2507 | 14 days, 24 injections (96 wells) or until expiry date, whichever comes first. Compatible only with Spectrum Compact software versions 6138800-## and later.[3] |
| Spectrum Compact Capillary Cartridge, 4-Capillary 36cm | CE2340 | 300 injections or expiry date, whichever comes first.[4] |

Consumables can be replaced individually, as needed, or all at once. Instructions are provided below for changing consumables one at a time and all at the same time.

[1]Not compatible with Spectrum Compact software version 6138000-##.

[2]Not compatible with Spectrum Compact software versions 6138000-## or 6138800-## and later.

[3]Compatible with Spectrum Compact software versions 6138800-## and later. Not compatible with 6138200-## and earlier.

[4]The injection limit for CE2340 will display as 200 injections on Spectrum Compact software version 6138000-##, but it can be used for 300 injections.

**Notes:**

a. The ABC and CBC should be replaced at the same time.

b. **Do not** install consumables on one Spectrum Compact CE System that have been previously installed on another instrument, as information about the previous usage will not transfer to the new Spectrum Compact CE System.

# 3.2 Changing Consumables One at a Time

## Installing the Anode Buffer

Change the anode buffer every 14 days or 80 injections to ensure optimal results. The anode buffer cartridge should be equilibrated to room temperature before installing on the Spectrum Compact CE System.

1. Clean the surface of the film with a lint-free tissue.

---

**Important!**

Do not peel the film off the cartridge.

---

2. Select **Anode Buffer** on the 'Consumables' screen (Figure 11). This will open the 'Installed Anode Cartridge Information' screen (Figure 15).

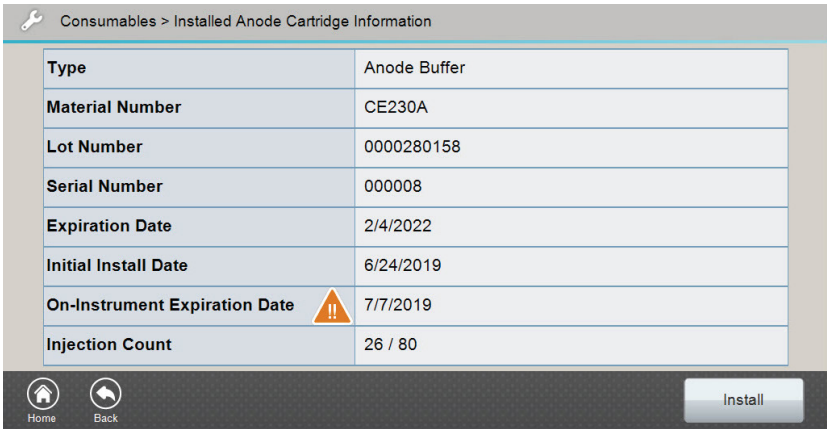



**Figure 15. 'Installed Anode Cartridge Information' screen.**

3. Select **Install** in the footer to start the replacement wizard. This will open the 'Anode Cartridge Barcode Scanning' screen (Figure 16).

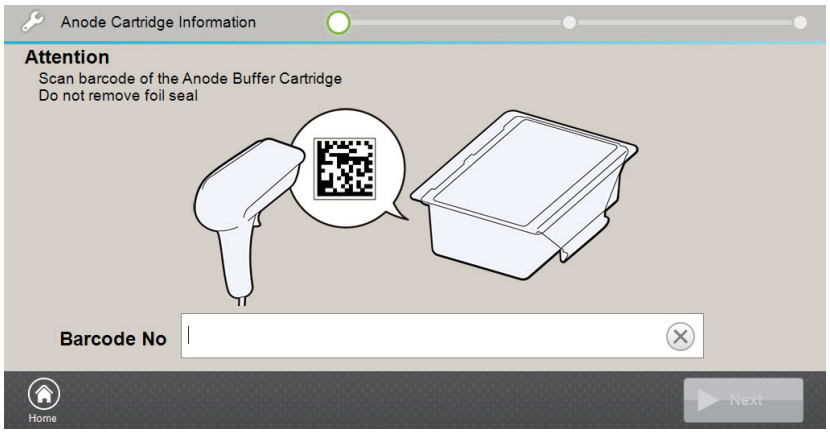



**Figure 16. Anode cartridge barcode scanning screen.**

4. Use the Barcode Scanner connected to the Spectrum CE Compact System to read the barcode label on the Spectrum Compact ABC. Information about the Spectrum Compact ABC being installed is displayed on the 'Anode Cartridge Information' screen (Figure 17).

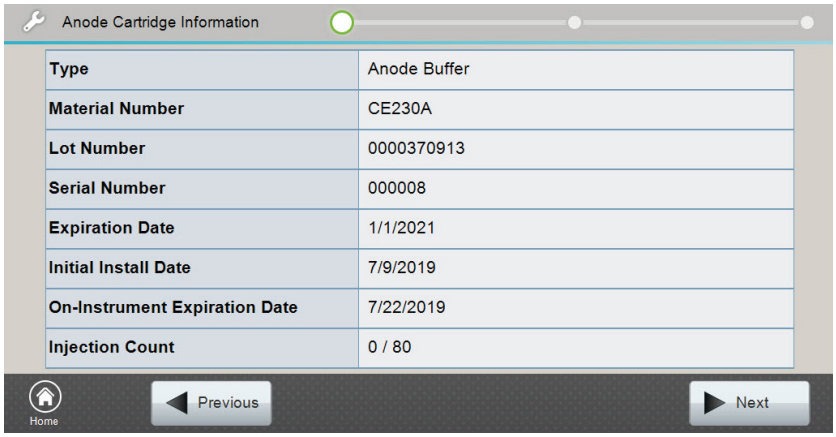



**Figure 17. 'Anode Cartridge Information' screen.**

5. Check the information displayed (e.g., confirm that the Spectrum Compact ABC is within its expiry date) and select **Next** on the lower right of the footer. Autosampler moves to front of instrument and status indicator flashes green. Do not open the instrument front door when status indicator flashes green. After autosampler has stopped moving, status indicator turns steady green and the 'Install the Cartridge' screen appears.

6. When the 'Install the Anode Buffer Cartridge' screen appears (Figure 18), open the front door of the instrument.

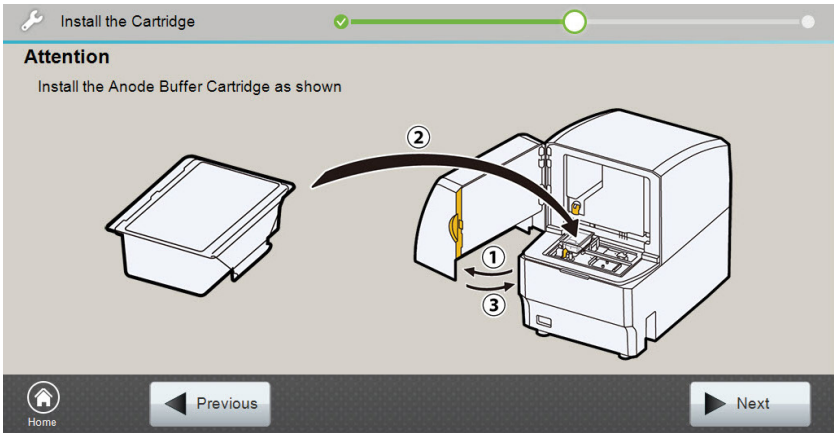



**Figure 18. 'Install the Anode Buffer Cartridge' screen.**

7. Remove the old Spectrum Compact ABC (if present) by pressing in on the clear locking tabs on either side of the old Spectrum Compact ABC and pulling up to detach it from the deck.
8. Mount the Spectrum Compact ABC on the deck by aligning the two holes on the bottom of the cartridge to the two circular posts protruding from the deck.

   **Note:** The holes and the posts are of two sizes (large and small diameter), such that the cartridge can only be inserted in one orientation.
9. Push the cartridge down until an audible click is heard and the cartridge is secured in place.
10. Close the front door and wait for the status indicator to stop flashing amber and turn steady green.
11. Select **Next** on the lower right of the footer of the 'Install the Anode Buffer Cartridge' screen.

12. Select **Finish** on the 'Installation Completed' screen (Figure 19).

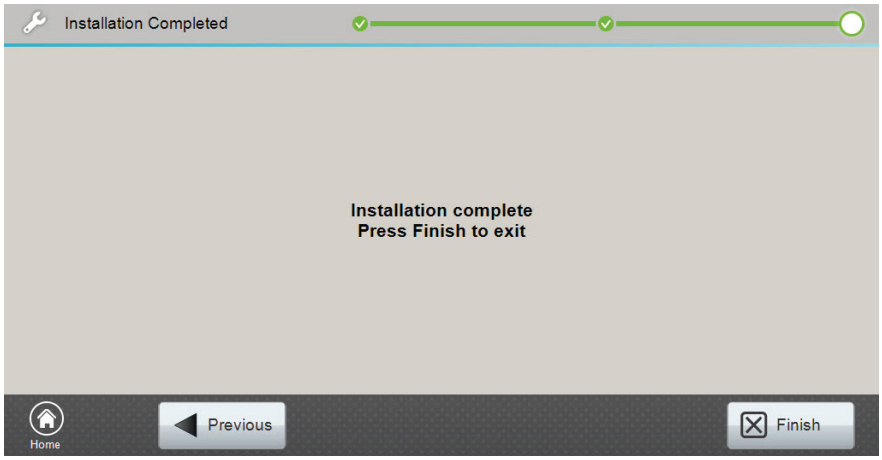



**Figure 19. 'Installation Completed' screen.**

**Note:** Until **Finish** is selected, the 'Installed Anode Cartridge Information' screen consumables status indicator (see Section 2.3) will continue to display the status of the old consumable.

## Installing the Cathode Buffer

Change the cathode buffer every 14 days or 80 injections to ensure optimal results. The cathode buffer cartridge should be equilibrated to room temperature before installing on the Spectrum Compact CE System.

1. Peel the seal from the top of the Spectrum Compact CBC.
2. Press the Spectrum Compact Cathode Septa Mat into the holes in the top of the Spectrum Compact CBC.

   **Note:** Use a new Spectrum Compact Cathode Septa Mat each time you install a new Spectrum Compact CBC.

3. Attach the retainer on top of the septa, making sure that the heads of the septa protrude through the holes in the retainer. Make certain that clips on the side of the retainer are fully engaged under the lip at the top of the Spectrum Compact CBC (Figure 20).

   **Notes:**

   a. Replace ABC and CBC at the same time.

   b. To prevent contamination, do not reuse the CBC septa. Use a new CBC septa.

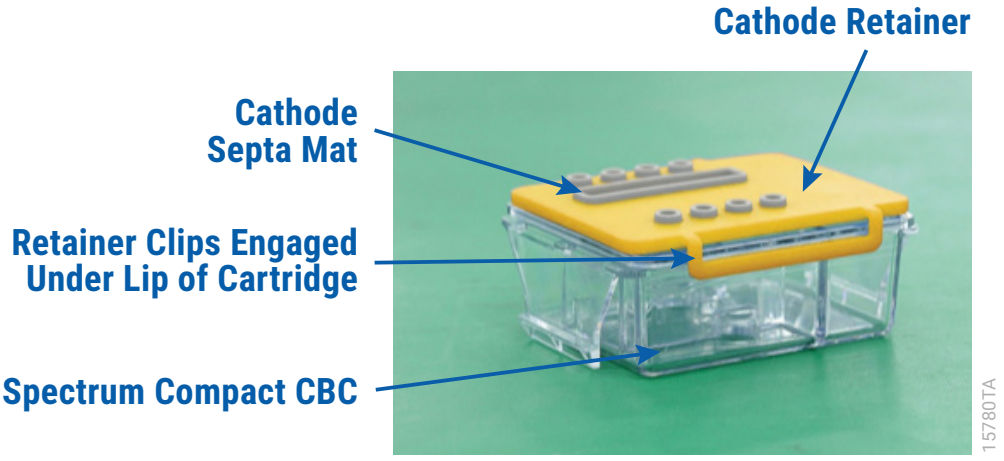



**Figure 20. Assembled Spectrum Compact CBC.**

4. Select **Cathode Buffer** on the 'Consumables' screen (Figure 11). This will open the 'Installed Cathode Cartridge Information' screen (Figure 21).

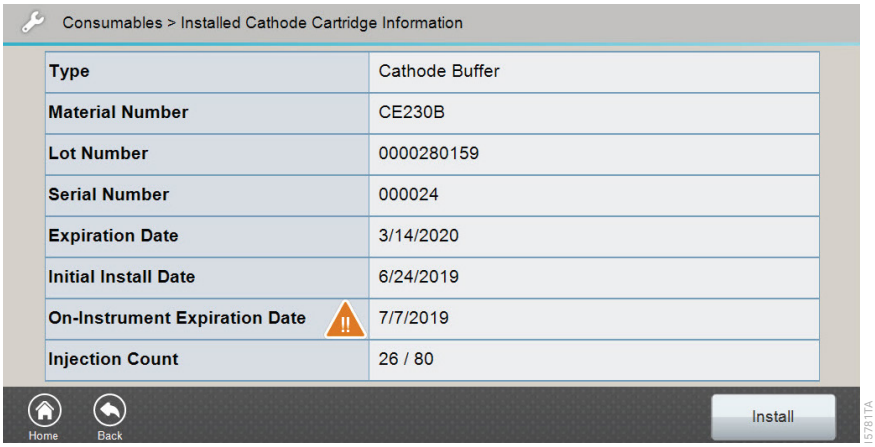



**Figure 21. 'Installed Cathode Cartridge Information' screen.**

5. Select **Install** in the footer to start the replacement wizard. This displays the 'Cathode Cartridge Barcode Scanning' screen (Figure 22).

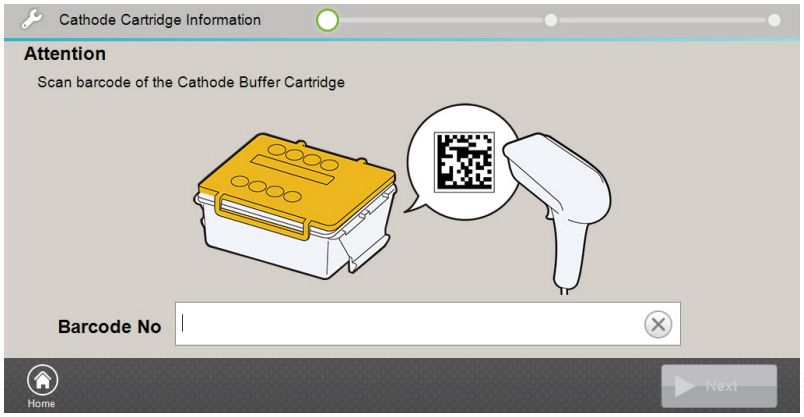



**Figure 22. 'Cathode Buffer Cartridge barcode scanning' screen.**

6. Use the Barcode Scanner connected to the Spectrum CE Compact System to read the barcode label on the Spectrum Compact CBC. After reading the bar code, information about the Spectrum Compact CBC being installed is displayed on the 'Cathode Cartridge Information' screen (Figure 23).

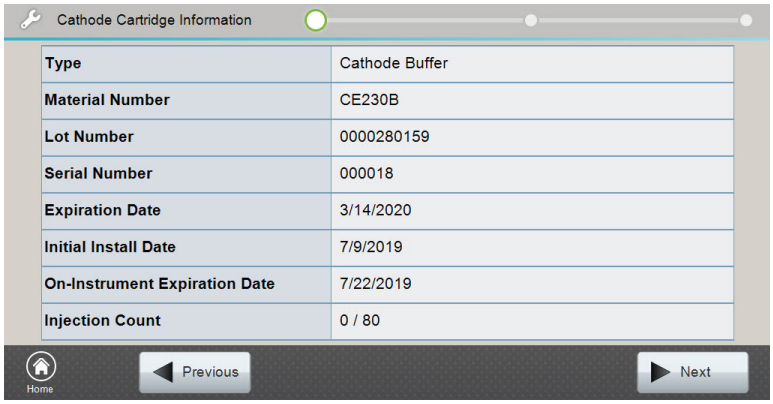



**Figure 23. 'Cathode Cartridge Information' screen.**

7. Check the information displayed (e.g., confirm that the Spectrum Compact CBC is within its expiry date) and select **Next** on the lower right of the footer. Autosampler moves to front of instrument and status indicator flashes green. Do not open the instrument front door when status indicator flashes green. After autosampler has stopped moving, status indicator turns steady green and the 'Install the Cartridge' screen appears.

8. When the 'Install the Cartridge' screen appears (Figure 24), open the front door of the instrument.
9. Remove the old Spectrum Compact CBC (if present) by pressing in on the locking tabs on either side of the old Spectrum Compact CBC and pulling up to detach it from the deck.

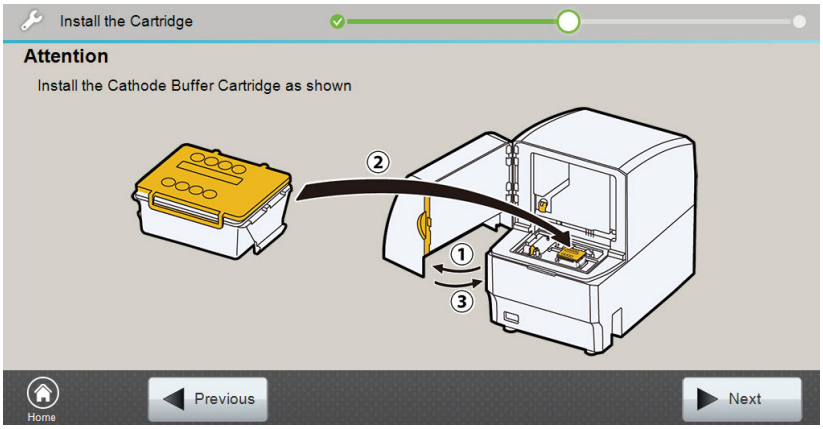



**Figure 24. 'Install the Cathode Buffer Cartridge' screen.**

10. Mount the Spectrum Compact CBC on the deck by aligning the two holes on the bottom of the cartridge to the two circular posts protruding from the deck.

    **Note:** The holes and the posts are of two sizes (large and small diameter), such that the cartridge can only be inserted in one orientation.
11. Push the cartridge down until an audible click is heard and the cartridge is secured in place.
12. Close the front door and wait for the status indicator to stop flashing amber and turn steady green.
13. Select **Next** on the lower right of the footer of the 'Place the Cartridge' screen.
14. Select **Finish** on the 'Installation Completed' screen (Figure 19).

    **Note:** Until **Finish** is selected, the 'Installed Cathode Cartridge Information' screen consumables status indicator (see Section 2.3) will continue to display the status of the old consumable.

## Installing the Polymer

Change the polymer cartridge every 14 days to ensure optimal results. The polymer cartridge must be changed after 16 (CE2304, CE2307) or 24 (CE2404, CE2407, CE2507) injections (maximal number of allowable injections per polymer cartridge). No washing or flushing of the capillary cartridge is required between polymer type changes (i.e., switching between Polymer4 and Polymer7).

Before beginning polymer cartridge replacement, peel off the foil seal from the top of the cartridge and equilibrate to room temperature for at least 30 minutes.

**Notes:**

a. Wear gloves when handling the polymer cartridge and be sure to hold by the cartridge skirt (Figure 6). Do not handle the cartridge by the syringe barrel as this may damage the cartridge.

b. Check for polymer leaks during polymer cartridge replacement. Do not loosen the cap of the polymer cartridge as the polymer may leak during a run. If you suspect a polymer leak, contact Promega Technical Services.

c. Make sure that there are no air bubbles or crystals inside the polymer cartridge. Do not to drop the polymer cartridge as this may introduce bubbles.

d. If you observe a precipitate, gently warm the polymer to dissolve the precipitate before use.

e. Do not loosen the cap of the polymer cartridge. The polymer may leak out, contaminating the system and affecting measurement accuracy.

1. Select **Polymer** on the 'Consumables' screen (Figure 11). This will open the 'Installed Polymer Cartridge Information' screen (Figure 25).

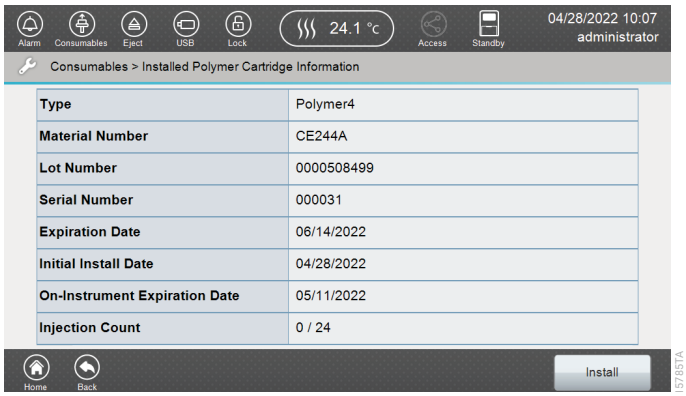



**Figure 25. 'Installed Polymer Cartridge Information' screen.**

2. Select **Install** in the footer to start the replacement wizard. This displays the 'Polymer Cartridge Barcode Scanning' screen (Figure 26).

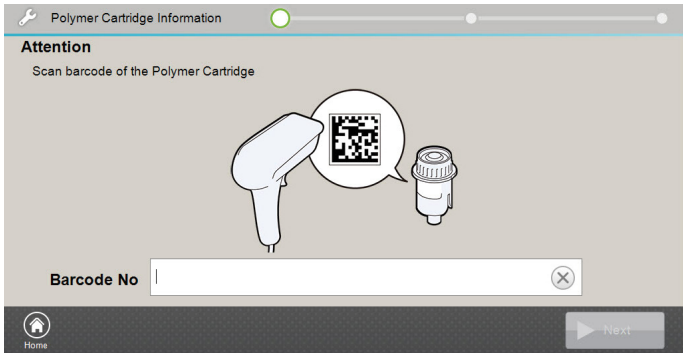



**Figure 26. 'Polymer Cartridge barcode scanning' screen.**

3. Using the Barcode Scanner, read the barcode label on the Spectrum Compact Polymer Cartridge. Information about the Spectrum Compact Polymer Cartridge being installed is displayed on the 'Polymer Cartridge Information' screen (Figure 27).

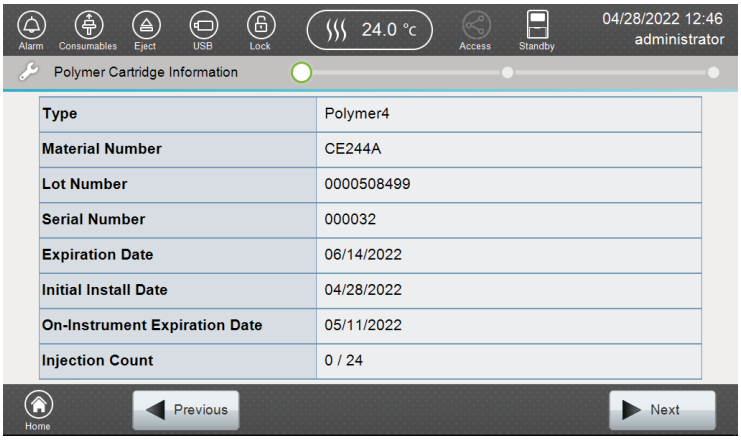



**Figure 27. 'Polymer Cartridge Information' screen.**

4. Check the information displayed (e.g., confirm that the Spectrum Compact Polymer is within its expiry date) and select **Next** on the lower right of the footer. Autosampler moves to front of instrument and status indicator flashes green. Do not open front door of instrument when status indicator flashes green. After autosampler has stopped moving, status indicator turns steady green and the 'Install the Cartridge' screen appears.
5. When the 'Install the Polymer Cartridge' screen appears (Figure 28), open the front door of the instrument.
6. Remove the old Spectrum Compact Polymer Cartridge (if present) by pulling the yellow locking latch to the left (Figure 29) and pulling up on the old Spectrum Compact Polymer Cartridge to detach it from the deck.

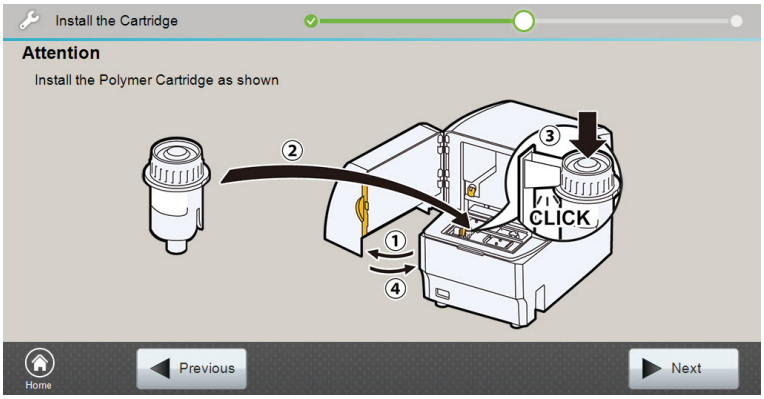



**Figure 28. 'Install the Polymer Cartridge' screen.**


**Figure 29. Removing old polymer cartridge.**

7. Mount the Spectrum Compact Polymer Cartridge on the deck by aligning the slot in the polymer cartridge skirt with the tab in circular deck depression of the polymer delivery unit (PDU) that receives the polymer cartridge (see triangle arrow on deck).
8. Push the cartridge down until the yellow locking latch on the left side of the PDU engages the top of the polymer cartridge with an audible click.
9. Close the front door and wait for the status indicator to stop flashing amber and turn steady green.
10. Select **Next** on the lower right of the footer of the 'Install the Polymer Cartridge' screen.
11. Select **Finish** on the 'Installation Completed' screen (Figure 19).

    **Note:** Until **Finish** is selected, the 'Installed Polymer Cartridge Information' screen consumables status indicator (see Section 2.3) will continue to display the status of the old consumable.

## Installing the Capillary Cartridge

Change the capillary cartridge every 300 injections or when expiry date is reached to ensure optimal results. Instructions provided here are for installation of a new capillary cartridge on an instrument without a current capillary cartridge installed or where the current capillary cartridge is going to be discarded. For instructions on changing a capillary cartridge where the current one will be stored for future use, see instructions for Uninstalling and Storing the Capillary Cartridge (Section 3.3).

**Note:** Be careful to not touch the detection window or the tips of the anode and cathode electrodes during installation of the capillary cartridge, because they are fragile.

1. Select **Capillary** on the 'Consumables' screen (Figure 11). This will open the 'Installed Capillary Cartridge Information' screen (Figure 30).

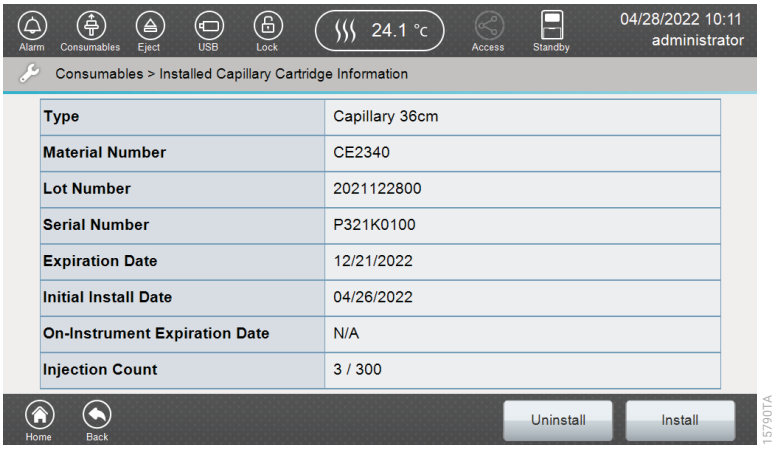



**Figure 30. 'Installed Capillary Cartridge Information' screen.**

2. Select **Install** in the footer to start the replacement wizard. This displays the 'Capillary Cartridge Barcode Scanning' screen (Figure 31).

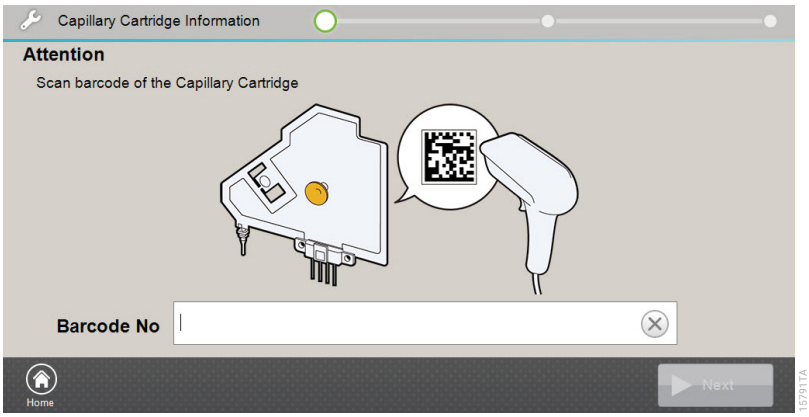



**Figure 31. 'Capillary Cartridge barcode scanning' screen.**

3. Using the Barcode Scanner, read the barcode label on the Spectrum Compact Capillary Cartridge. Information about the Spectrum Compact Capillary Cartridge being installed is displayed on the 'Capillary Cartridge Information' screen (Figure 32).

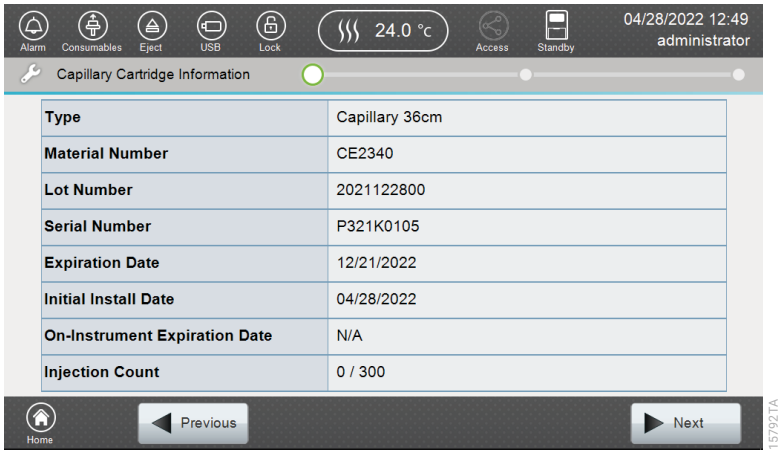



**Figure 32. 'Capillary Cartridge Information' screen.**

4. Check the information displayed (e.g., confirm that the Spectrum Compact Capillary Cartridge is within its expiry date) and select **Next** on the lower right of the footer. Autosampler moves to front of instrument and status indicator flashes green. Do not open front door of instrument when status indicator flashes green. After autosampler has stopped moving, status indicator turns steady green and the 'Install the Cartridge' screen appears.
5. When the 'Install the Capillary Cartridge' screen appears (Figure 33), open the front door of the instrument.

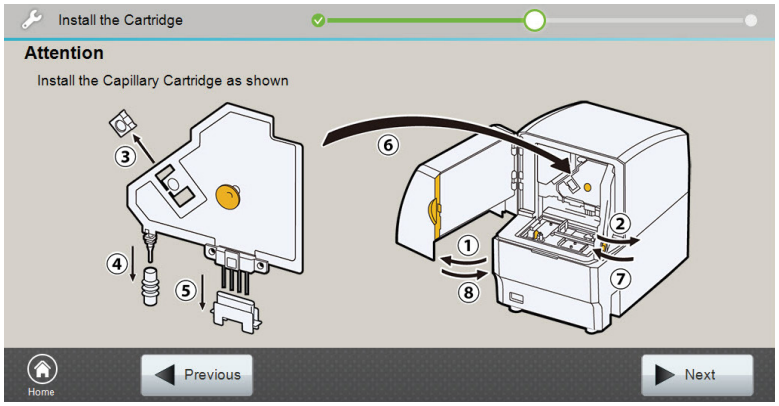



**Figure 33. 'Install the Capillary Cartridge' screen.**

6. Open the oven door by turning the yellow knob on the lower left corner of the oven door counterclockwise 180 degrees as depicted in the illustrations on the oven door (Figure 34). Remove the previously used capillary cartridge by pulling on the yellow gripping knob in the middle of the Spectrum Compact Capillary Cartridge. If the capillary cartridge currently installed on the instrument will be stored for future use, follow instructions for Uninstalling and Storing the Capillary Cartridge (see Section 3.3).

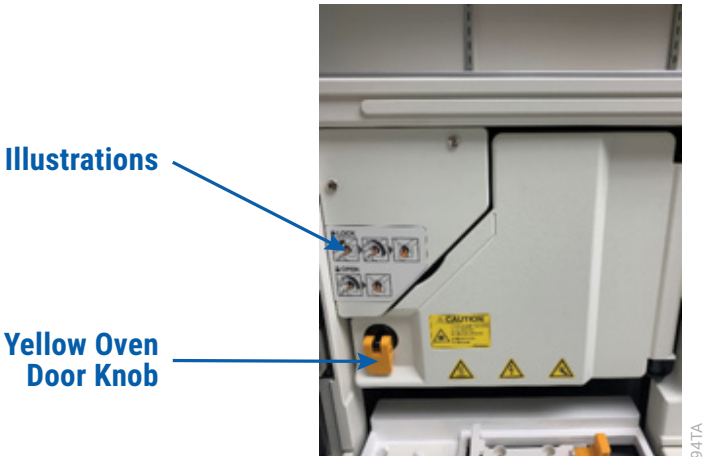



**Figure 34. Spectrum Compact yellow oven door knob.**

7. Remove the protective covers from the detection unit, anode and cathode (Figure 35). Save these if you intend to store the array outside of the instrument at a later date (see Section 3.3).

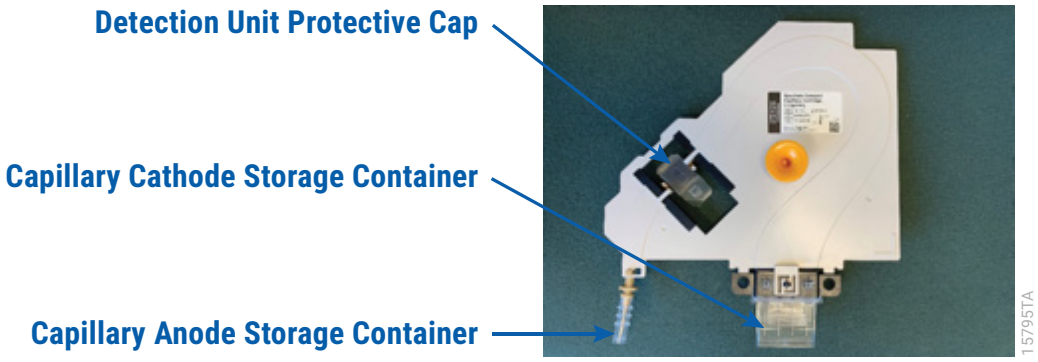



**Figure 35. Spectrum Compact Capillary Cartridge protective covers.**

8. While holding the Spectrum Compact Capillary Cartridge by its yellow gripping knob, insert into the cut-out section in the oven unit first, followed by the bottom edge of the cartridge into the positioning tab in the oven (Figure 36).

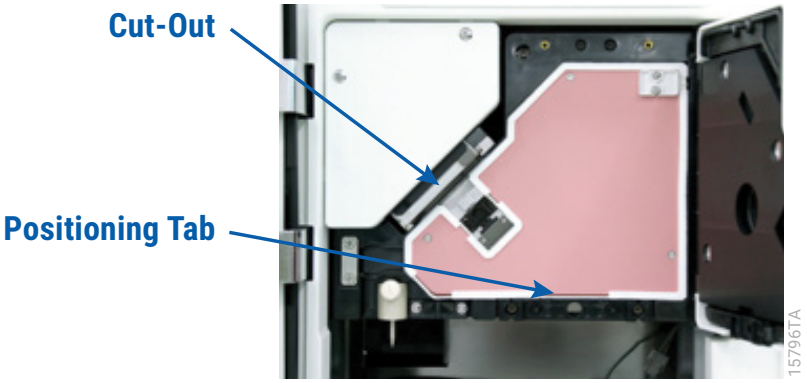



**Figure 36. Cut-out section and positioning tabs in oven.**

9. Push the detection unit into place in the detection window until it is locked in place (Figure 37).

   **Note:** Be sure to only push the frame of the detection unit. Do not touch the center of the detection unit.

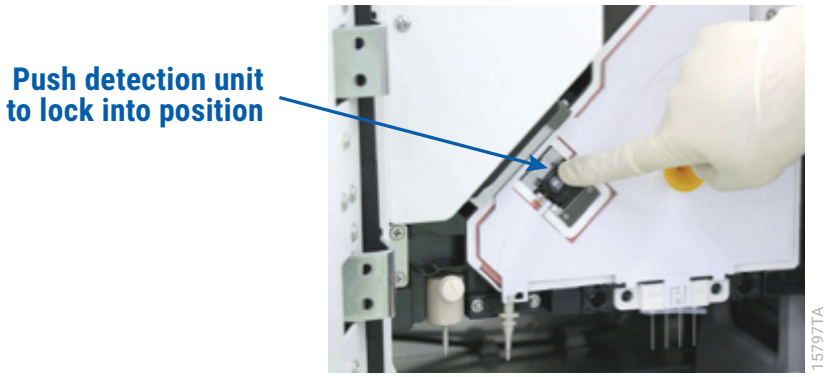



**Figure 37. Fixing detection unit in place.**

10. Close the oven door by turning the yellow knob on the lower left corner of the oven door clockwise 180 degrees as depicted on the illustrations on the oven door (Figure 34).
11. Close the front door and wait for the status indicator to stop flashing amber and turn steady green.
12. Select **Next** on the lower right of the footer of the 'Place the Cartridge' screen.

13. The Installation Completed screen for the Spectrum Compact Capillary Cartridge is displayed (Figure 38). This screen states that a spatial calibration must be performed prior to starting a run with the new Spectrum Compact Capillary Cartridge (see Section 4.1).

**Note:** Polymer filling of the new Spectrum Compact Capillary Cartridge is not performed at this step, but **must** be performed during the spatial calibration (see Section 4.1). If a polymer fill is not selected when performing a spatial calibration with a new Spectrum Compact Capillary Cartridge that has not been previously filled with polymer, the spatial calibration will fail.

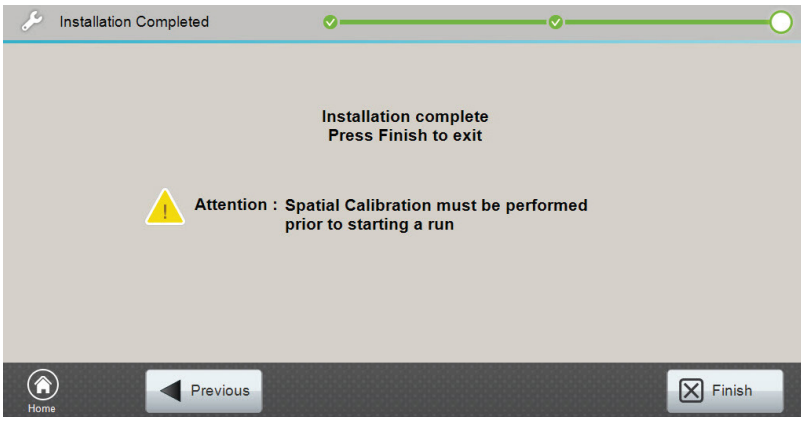



**Figure 38. 'Capillary Cartridge Installation Completed' screen.**

14. Select **Finish** on the 'Installation Completed' screen (Figure 38).

    **Note:** Until **Finish** is selected, the 'Installed Capillary Cartridge Information' screen consumables status indicator (see Section 2.3) will continue to display the status of the old consumble.

## 3.3 Uninstalling and Storing the Capillary Cartridge

It is possible to uninstall a capillary cartridge with less than 300 injections prior to its expiry date and store the capillary cartridge for future use. Instructions provided here are for uninstallation of a used capillary cartridge. These steps may be performed prior to installation of a new unused capillary cartridge or reinstallation of a used and stored capillary cartridge.

**Notes:**

a. Storage of the Spectrum Compact Capillary Cartridge requires Capillary Preservation Buffer (Cat.# CE2399).

b. The identity of the capillary cartridge being uninstalled is retained in the Spectrum Compact System Software. When the capillary cartridge is reinstalled, all information regarding number of injections and expiry date will repopulate when the cartridge's bar code is rescanned during the installation process. This information is stored on the instrument and will not be retained if the cartridge is installed on a different instrument.

c. Be careful to not touch the detection window or tips of the anode and cathode electrodes during installation of the capillary cartridge, because they are fragile.

d. If anode and/or cathode ends of capillary cartridge dry out during storage, performance may be affected. Always keep the anode and cathode ends of the capillary cartridge immersed in Capillary Preservation Buffer when storing off of the Spectrum Compact CE System.

1. Select **Capillary** on the 'Consumables' screen (Figure 11). This will open the 'Installed Capillary Cartridge Information' screen (Figure 30).
2. Select **Uninstall** in the footer to start the wizard. This displays the 'Polymer Filling' screen (Figure 39).
3. Select **Fill** to fill the capillary cartridge with polymer. The status indicator flashes green during polymer filling and returns to a steady green when complete, coincident with activation of **Next** on the right hand side of the footer of the `Polymer Filling' screen.

4 Select **Next**. A warning dialog stating `Autosampler is moving. Do Not open door' is displayed while the status indicator flashes green. The status indicator returns to steady green when the `Removing the Cartridge' screen is displayed (Figure 40).

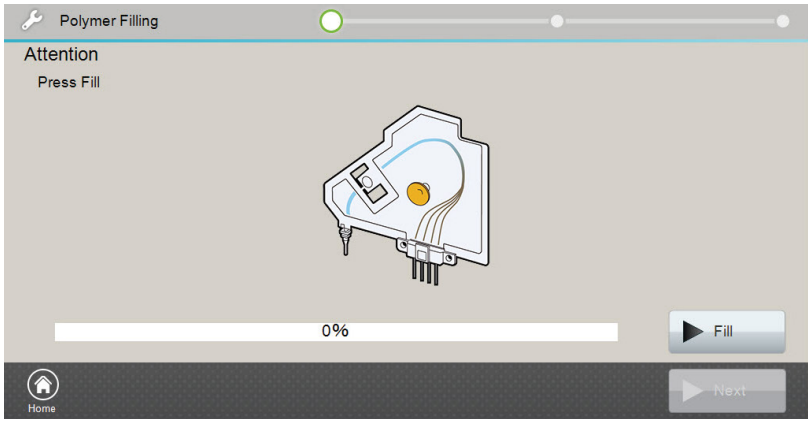



**Figure 39. 'Polymer Filling' screen.**

5. Open the instrument door when the 'Removing the Cartridge' screen is displayed (Figure 40).

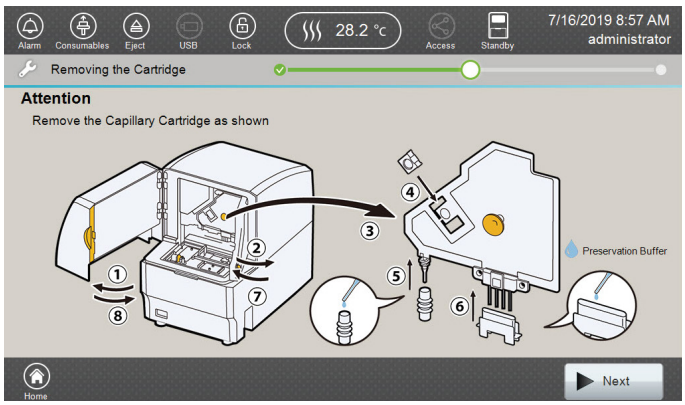



**Figure 40. 'Removing the Cartridge' screen.**

6. Turn the yellow rotary oven door knob counter-clockwise 180 degrees to open the oven door (Figure 34).
7. Pull out the detection unit to release it from its recess in the oven.

   **Note:** Be careful to not touch the window of the detection unit.

8. Hold the yellow gripping knob on the front of the Spectrum Compact Capillary Cartridge (Figure 41). Detach by lifting the bottom portion of the capillary cartridge out first, followed by the top left part by the detection unit, as indicated by Step 3 of Figure 40.


**Figure 41. Removing the capillary cartridge.**

9. Attach the detection unit cover on the detection unit as indicated in Step 4 of Figure 40.
10. Fill the capillary anode cover (Figure 35) with 400µl of Capillary Preservation Buffer. Slide the filled capillary anode cover onto the anode as indicated in Step 5 of Figure 40.
11. Fill the capillary cathode cover (Figure 35) with 4ml of Capillary Preservation Buffer. Attach the filled capillary cathode cover onto the cathode as indicated in Step 6 of Figure 40.
12. Store the uninstalled capillary cartridge upright at ambient temperature.

    **Notes:**

    a. Spectrum Compact Capillary Cartridges may be stored upright in its original packaging. Do not discard the packaging if you intend to store capillary cartridges off-instrument after partial use.

    b. Evaporation of the Capillary Preservation Buffer may occur with prolonged storage. We recommend replacing the Capillary Preservation Buffer periodically to prevent the cathode and anode ends from drying out.
13. Close the door of the oven unit and the front door of the instrument. The status indicator flashes amber while autosampler returns to home position, then returns to steady green. Select **Next** on the 'Removing the Cartridge' screen (Figure 40), followed by **Finish** on the subsequent 'Uninstall Completed' screen.
14. To install a new capillary cartridge, follow the instructions in Section 3.2 for "Installing the Capillary Cartridge".

# 3.4 Installing All Consumables at One Time

This section explains how to install all consumables at the same time.

1. Select **Install All Consumables** on the 'Consumables' screen (Figure 11).
2. Follow the on-screen instructions for the wizard, reading the barcode for each consumable with the Barcode Scanner when prompted. After selecting **Next** on the 'Capillary Cartridge Information' screen, a warning dialog stating 'Autosampler is moving. Do not open door' is displayed along with status indicator flashing green. Status indicator returns to steady green when the 'Install the Cartridge' screen is displayed (Figure 42).
3. When the 'Install the Cartridge' screen is displayed (Figure 42), open the front door. Then, install all consumables on the instrument. See Section 3.2, Changing Consumables One at a Time, for instructions on how to change each consumable.
4. After installing all consumables, close the front door of the instrument. Status indicator flashes amber while autosampler returns to home position, then returns to steady green. Select **Next** on the 'Install the Cartridge' screen (Figure 42).

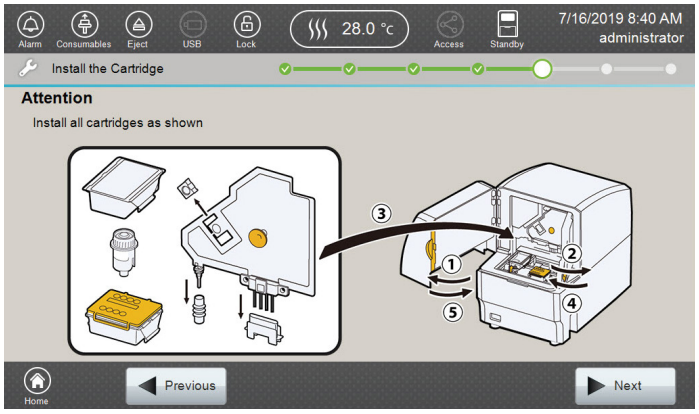



**Figure 42. 'Install All Cartridges' screen.**

5. Select **Fill** on the 'Polymer Filling' screen (Figure 39) to fill the capillary cartridge with polymer. The status indicator flashes green during polymer filling and returns to a steady green when complete, coincident with activation of **Next** on the right hand side of the footer of the `Polymer Filling' screen. Select **Next** when filling is complete.

   **Note:** If polymer filling of the new Spectrum Compact Capillary Cartridge is not performed at this step, it must be performed during the spatial calibration (see Section 4.1). If the Spectrum Compact Capillary Cartridge is not filled prior to performing a spatial calibration, the spatial calibration will fail.
6. Select **Finish** on the 'Installation Completed' screen (Figure 38).

# Performing Calibrations 4

## 4.1 Spatial Calibration

A spatial calibration defines the position of each capillary on the camera image. You must perform a spatial calibration after the installation of a capillary cartridge and before performing a spectral calibration. A spatial calibration is also required any time the oven door has been opened, the instrument has been moved or the polymer type has been changed.

### Performing a Spatial Calibration

**Caution!** The instrument door must remain closed throughout the duration of the spatial calibration. If the door is opened before the calibration is complete, the run will stop and the calibration will need to be repeated.

**Note:** You have the option to fill the capillary cartridge with polymer before the calibration run. If this option will be used, preheat the oven to facilitate capillary filling before beginning the spatial calibration by selecting **Oven Temperature** in the Header (Figure 43). If insufficient polymer remains to perform a fill of the capillary cartridge, an error message will be displayed, indicating the polymer cartridge should be replaced.

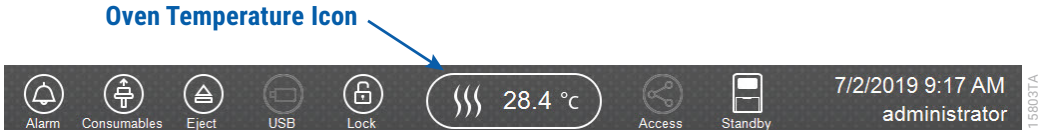



**Figure 43. Preheating oven.**

1. Select **Calibration** on the maintenance portion of the Spectrum Compact CE System Software 'Main Menu' screen (Figure 9) and select **Spatial Calibration** on the 'Maintenance Calibration' screen (Figure 44).

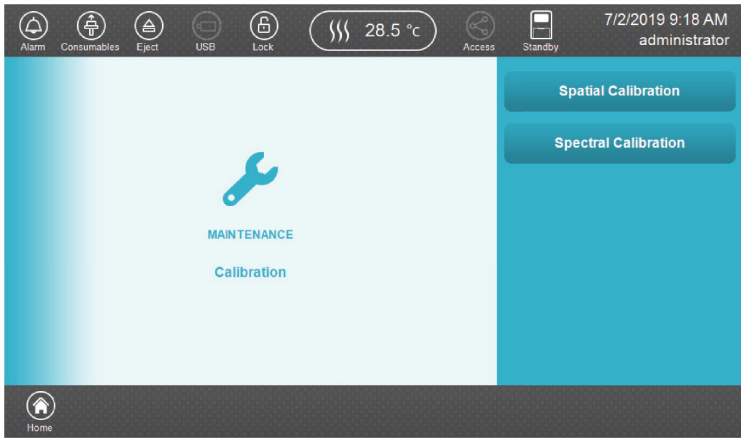



**Figure 44. 'Maintenance Calibration' screen.**

2. On the 'Spatial Calibration' screen (Figure 45), check the **Polymer Fill** box if the capillary cartridge needs to be filled with polymer prior to performing spatial calibration.

   **Notes:**

   a. If a new capillary cartridge has been installed, polymer fill is absolutely required if the capillary cartridge was not filled with polymer as part of the capillary cartridge installation process. The spatial calibration process will fail if there is no polymer in the capillary cartridge.

   b. No calibration date is displayed on the 'Spatial Calibration' screen unless you have previously performed a spatial calibration with the installed capillary cartridge.

3. Select **Run** at the bottom of the 'Spatial Calibration' screen (Figure 45) to start the spatial calibration run. During the calibration, an image of the spatial peaks for each capillary will be displayed. The progress bar below the header will show the run progress and reach 100% when the spatial calibration is complete (Figure 46).

4. The spatial calibration may be aborted before the calibration is completed. To abort the spatial calibration, select **Abort**. When the abort confirmation message is displayed, select **Yes** to stop the spatial calibration. Select **No** to allow the spatial calibration to continue.

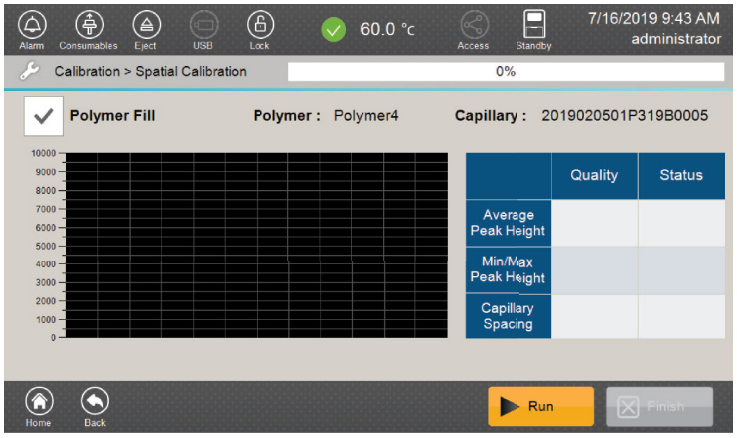



**Figure 45. 'Spatial Calibration' screen.**

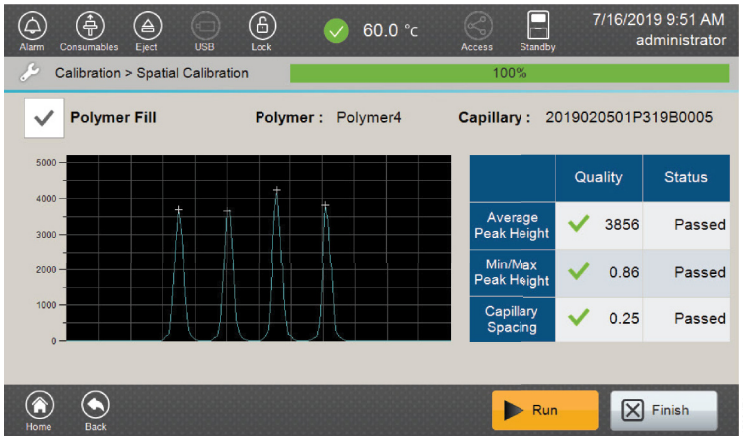



**Figure 46. Completed 'Spatial Calibration' screen.**

5. The software will perform quality checks and calculate the following values, which are displayed at the end of the spatial calibration run.

| Parameter | Description | Threshold |
|---|---|---|
| Average Peak Height | Average intensity value (in RFU) from the four capillaries | >2100 |
| Min/Max Peak Height | Relative standard deviation of intensity values (in RFU) across the four capillaries | >0.75 |
| Capillary Spacing | Difference between the maximum and minimum spacing values from the four capillaries. | <2 pixels |

## Reviewing a Spatial Calibration

Review the completed 'Spatial Calibration' screen (Figure 46).

1. Review the quality and status fields of the spatial calibration table.

| Result | Symbols | Description |
|---|---|---|
| Failed |  | Invalid result—does not meet the quality check thresholds<br>An error message will be displayed if:<br>• no peak(s) was (were) found.<br>• too many peaks were found.<br>• the result was off scale.<br>• too few peaks were found. |
| Passed |  | Valid result—meets the quality check thresholds |

2. If all conditions are marked as Passed, the spatial calibration was successful. If any conditions are marked as failed, the spatial calibration has failed and must be rerun. There is no option to select an active **Finish** as described below following a failed spatial calibration.

   **Note:** If the detection window is not locked firmly into place in the detection unit of the oven (Figure 37), the spatial calibration will fail.

3. After the results of the calibration have been verified, select **Finish** to open a confirmation window. Selecting **Yes** will apply the spatial calibration, exit the 'Spatial Calibration' screen and save a calibration report.

   **Notes:**

   a. The spatial calibration will not be saved and applied unless **Yes** is selected.

   b. Selecting **No** will return you to the 'Spatial Calibration' screen.

## 4.2 Spectral Calibration

A spectral calibration is required for each set of dyes that will be analyzed on the Spectrum Compact CE System (e.g., spectral calibration of the PowerPlex® 6C Matrix Standard for analysis of the PowerPlex® Fusion 6C System). This calibration allows spectral deconvolution of individual dyes by the data collection software. You should perform a spectral calibration after installing a capillary cartridge and performing a spatial calibration. In addition, separate spectral calibrations are required for Spectrum Compact Polymer4 and Polymer7. The Spectrum Compact CE Software contains pre-installed dye sets from which a spectral calibration can be initiated.

| Dye Set Name | Polymer Types | Color Chemistry |
|---|---|---|
| Promega 4-dye | 4 and 7 | 4 Color (Fluorescein, JOE, TMR and CXR) |
| Promega 5-dye | 4 and 7 | 5 Color (Fluorescein, JOE, TMR-ET, CXR-ET and WEN) |
| Promega 6-dye | 4 and 7 | 6 Color (FL-6C, JOE-6C, TMR-6C, CXR-6C, TOM-6C and WEN) |
| Promega 8-dye | 4 and 7 | 8 Color (FL-8C, JOE-8C, AQA-8C, TMR-8C, CXR-8C, TOM-8C, WEN-8C, CCO-8C) |
| T 5-dye | 4 and 7 | 5 Color (6-FAM™, VIC®, NED™, PET™ and LIZ®) |
| T 6-dye | 4 and 7 | 6 Color (6-FAM™, VIC®, NED™, SID, TAZ and LIZ®) |
| Q 5-dye | 4 and 7 | 5 Color (6-FAM™, BTG, BTY, BTR and BTO) |
| Q 6-dye | 4 and 7 | 6 Color (6-FAM™, BTG, BTY, BTR2, BTP and BTO) |
| Promega 4-dye sequencing | 7 | 4 color (dROneTen, dRSixG, dTMR, dCXR) |
| T 4-dye sequencing | 7 | 4 Color (dR110, dR6G, dTMR and dROX) |
| Filter1 4-dye | 4 and 7 | 4 Color (Fluorescein, JOE, TMR and CXR) |
| Filter2 5-dye | 4 and 7 | 5 Color (Fluorescein, JOE, TMR-ET, CXR-ET and WEN) |
| Filter3 4-dye | 4 and 7 | 4 Color (6-FAM™, HEX™, NED™ and ROX™) |
| Filter4 4-dye | 4 and 7 | 4 Color (6-FAM™, VIC®, NED™ and ROX™) |
| Filter5 4-dye | 4 and 7 | 4 Color (5-FAM™, JOE™, NED™ and ROX™) |
| Filter6 5-dye | 4 and 7 | 5 Color (6-FAM™, VIC®, NED™, PET™ and LIZ®) |

## Performing a Spectral Calibration

Before a spectral calibration run is started, ensure all consumables are installed and in sufficient supply (see Section 2.3). For best quality results, use unexpired reagents that are within the recommended use range (see Section 1.5). Select **Oven Temperature** in the Header ribbon (Figure 43) to preheat the oven to 60°C.

1. Follow the instructions in the appropriate Spectrum Compact Spectral Calibration Manual to prepare the spectral calibration samples for Promega chemistries.

   **Note:** For spectral calibration of kits from other vendors, follow the manufacturer's instructions.

2. Select **Calibration** on the maintenance portion of the Spectrum Compact CE System Software 'Main Menu' screen (Figure 9) and select **Spectral Calibration** on the 'Maintenance Calibration' screen (Figure 44).

3. Select the appropriate dye set from the 'Dye Set List' screen, and then select **Calibration** (Figure 47).

   **Notes:**

   : Scrolls up and down by one page.
   : Scrolls to first or last page.

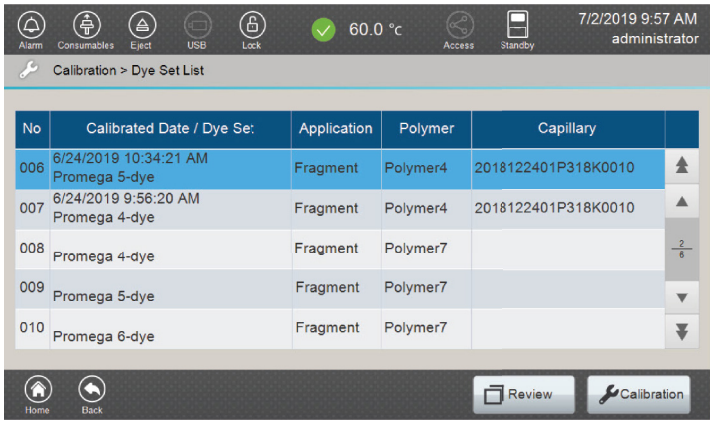



**Figure 47. 'Dye Set List' screen.**

**Notes:**

a. No calibration date is displayed in the Calibrated Dye/Dye Set column unless you have previously performed a spectral calibration for that dye set. To view the current calibration for a given dye set (one which has a calibration date associated with it), select the dye set in the table and then **Review**. See Reviewing a Spectral Calibration below for details on the information supplied on the review screen.

b. It is only possible to calibrate a dye set that is associated with the polymer type currently installed on the instrument. For example, if Spectrum Compact Polymer4 is installed, the software only allows you to calibrate a dye set that is associated with Polymer4.

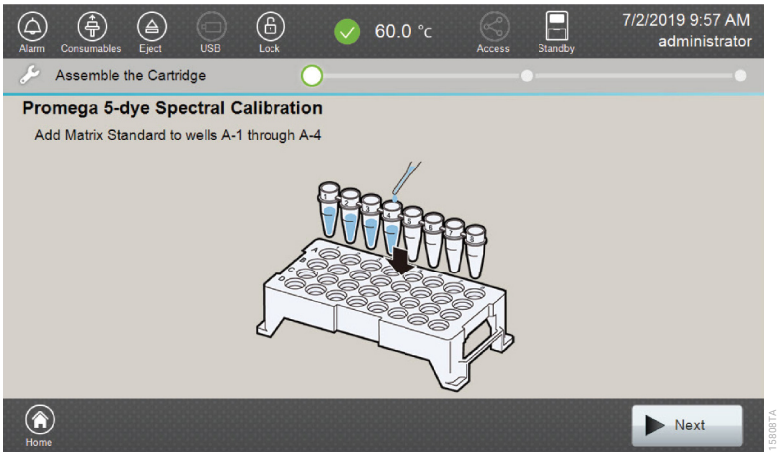



**Figure 48. 'Assemble the Cartridge' screen.**

4. Add spectral calibration samples to wells 1–4 of an 8-well strip tube, place a Strip Septa Mat, 8-Well, on the strip tube, and place into lane position A of the strip base, ensuring that spectral calibration sample containing wells are in position A1 to A4 as shown on the 'Assemble the Cartridge' screen (Figure 48).
5. Place the retainer over the strip(s) in the holder, aligning the lane names A to D and well numbers 1 to 8 on the retainer to those on the strip base and pressing until the retainer clicks into the strip base.
6. Select **Next**. A message window will open indicating that the autosampler is moving and telling the user to not open the door. In addition, the status indicator flashes green while the autosampler is moving. After autosampler movement is complete, the message window closes and the status indicator returns to a steady green.

   **Note:** Do not open the door while the autosampler is in motion.
7. Open the instrument door, and place the sample cartridge on the autosampler following the instructions displayed on the 'Install the Cartridge' screen (Figure 49). Press down on the yellow tab on the autosampler deck that locks the sample cartridge in place before placing the sample cartridge into position. Release the tab to lock the sample cartridge in place on the autosampler deck.

   **Note:** If you already placed the sample cartridge in the instrument, you can move to the 'Spectral Calibration' Screen by selecting **Next**.

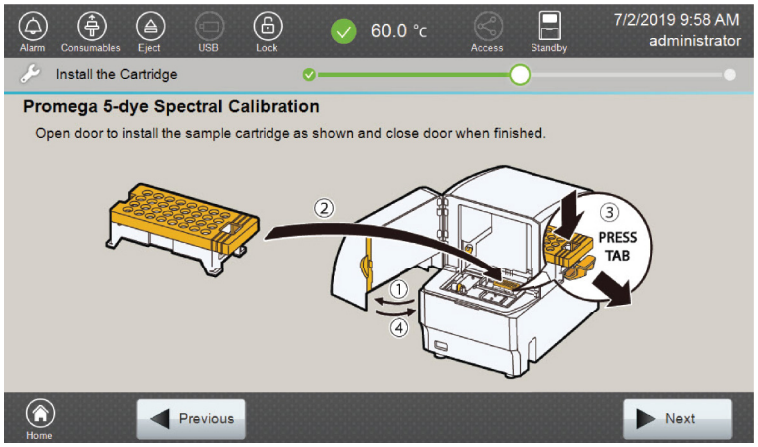



**Figure 49. 'Install the Cartridge' screen.**

8. When the sample cartridge is locked into place on the autosampler, close the instrument door and wait for the status indicator to stop flashing amber and turn steady green.

   **Note:** Do not open the door while the autosampler is in motion. Follow the instructions displayed on the screen.

9. After the autosampler has returned to its home position, the 'Spectral Calibration' screen will automatically be displayed (Figure 50). Select **Run** to start the spectral calibration. Spectral calibration runs take about 30 minutes, regardless of dye set or polymer type.

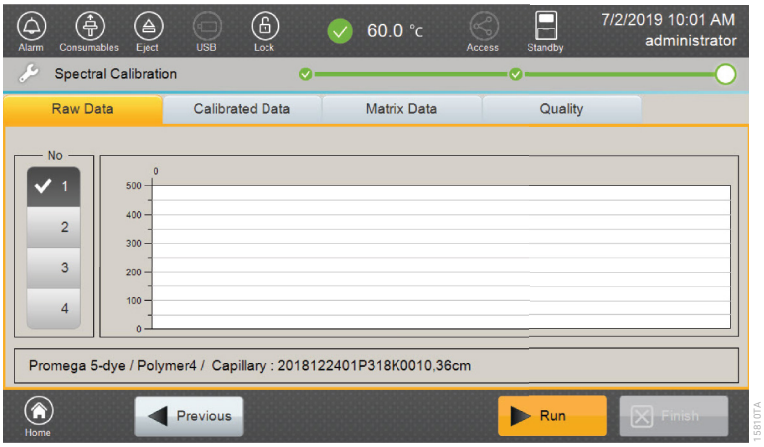



**Figure 50. 'Spectral Calibration' screen.**

10. During the calibration, an image of the spectral peaks in each capillary will be displayed on the 'Raw Data' tab. The progress bar below the header will show the run time remaining in minutes until the spectral calibration is complete.

    **Note:** The spectral calibration may be aborted before the calibration is completed. To abort the spectral calibration:

    a. Select **Abort**.
    b. When the abort confirmation message is displayed, select **Yes** to stop the calibration. Select **No** to allow the calibration to continue.

## Reviewing a Spectral Calibration

The completed spectral calibration can be reviewed from the 'Spectral Calibration' screen (Figure 50). There are four review tabs to choose from: Raw Data, Calibrated Data, Matrix Data and Quality.

**Note:** Do not select **Finish** until you have evaluated the quality of the spectral calibration data.

## 'Quality' Tab

1. Select the 'Quality' tab to review the quality value, condition number and status for each capillary (Figure 51).

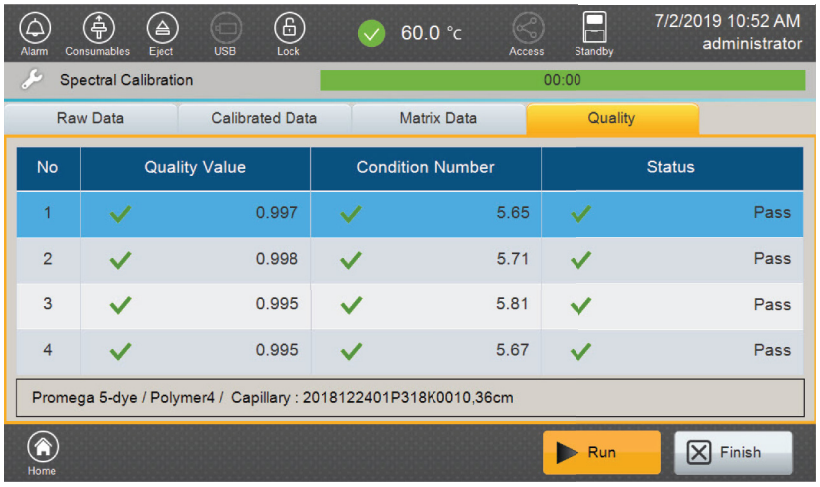



**Figure 51. Spectral calibration 'Quality' tab screen.**

| Result | Symbols | Description |
|---|---|---|
| Failed |  | Invalid result<br>An error message will be displayed if:<br>• Missing peak for at least one of the expected dye-labeled fragments.<br>• More dye-labeled peaks than expected for the matrix standard being run.<br>• The order in which dye-labeled fragments are detected is not that expected for the dye set used.<br>• Signal from dye-labeled fragments is off-scale. |
| Passed |  | Valid result |

2. Each capillary must meet the passing criteria for Quality Value and Condition Number. The default passing criteria set in the software are as follows.

**Sequencing Spectral Calibrations**

| Dye Set | Quality Value | Condition Number |
|---|---|---|
| T 4-dye sequencing | ≥0.95 | ≤5.5 |
| Promega 4-dye sequencing | ≥0.95 | ≤5.5 |

**Fragment Analysis Spectral Calibrations**

| Dye Set | Quality Value Minimum | Condition Number Maximum |
|---|---|---|
| Promega 4-dye | ≥0.95 | ≤8.5 |
| Promega 5-dye | ≥0.95 | ≤13.5 |
| Promega 6-dye | ≥0.95 | ≤8.5 |
| Promega 8-dye | ≥0.95 | ≤10 |
| T 5-dye | ≥0.95 | ≤13.5 |
| T 6-dye | ≥0.95 | ≤8.0 |
| Q 5-dye | ≥0.95 | ≤20.0 |
| Q 6-dye | ≥0.95 | ≤13.5 |
| Filter1 4-dye | ≥0.95 | ≤8.5 |
| Filter2 5-dye | ≥0.95 | ≤13.5 |
| Filter3 4-dye | ≥0.95 | ≤8.5 |
| Filter4 4-dye | ≥0.95 | ≤8.5 |
| Filter5 4-dye | ≥0.95 | ≤8.5 |
| Filter6 5-dye | ≥0.95 | ≤13.5 |

**Spectral Calibration Criteria Definitions.**

| | |
|---|---|
| **Quality Value** | This parameter describes the confidence with which fluorescent signal from any given dye can be separated from that contributed by the other fluorescent dyes present. The highest theoretical value is 1.0, with no signal from any given fluorescent dye contributing to signal from any of the other fluorescent dyes. |
| **Condition Number** | This parameter is a measure of the degree to which there is overlap in the spectral emission profiles of the dyes used in a given dye set. A theoretical ideal situation would be no overlap in emission profiles between dyes. This would result in a Condition Number of 1.0. As the extent of overlap increases, so does the condition number. Condition number is a function of the dyes used in a dye set, such that each dye set has a maximum acceptable condition number based on the dyes present in that dye set and the extent to which their spectral emission profiles are expected to overlap each other. |

3. If all capillaries are marked as “Passed”, the spectral calibration was successful. Proceed to the raw data review. If the data of a single capillary has failed to meet the criteria, the quality value and condition number from a specified neighboring capillary can be borrowed and applied to the failed capillary. If more than one capillary has failed to meet the criteria, the spectral calibration for the capillary cartridge will fail and must be repeated.

   **Note:** Review the data quality for each capillary in the ‘Raw Data’, ‘Calibrated Data’ and ‘Matrix Data’ tabs before allowing borrowing.

   The borrowing rule is indicated in the table below.

| | **Lender** | | | |
|---|---|---|---|---|
| **Borrower** | **1** | **2** | **3** | **4** |
| **1** | – | + | – | – |
| **2** | – | – | + | – |
| **3** | – | + | – | – |
| **4** | – | – | + | – |

+ : Available

– : Unavailable

4. To borrow spectral calibration data for a failed capillary, select **Borrowing** in the status column for the failed capillary.

5. The quality value and condition number from the borrowed capillary will now be displayed in the row for the previously failed capillary, and the status of that capillary will update to “Borrowed” with the number of the borrowed capillary indicated (Figure 52).

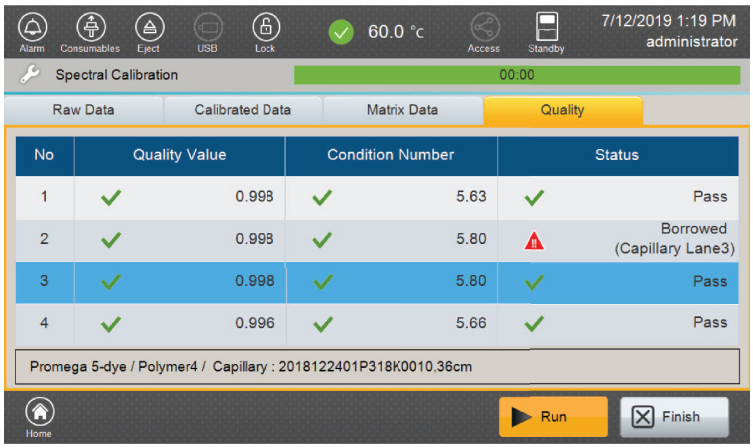



**Figure 52. Borrowed capillary quality data.**

## ‘Raw Data’ Tab

1. Select the ‘Raw Data’ tab to review the raw data for each capillary (Figure 53). Select a capillary to view from the list on the left side of the screen. Minimum peak height for a dye-labeled fragment to be considered by the algorithm is 500 Relative Fluorescence Units (RFU). Capillaries with peak heights less than this value will result in a failed spectral calibration on that capillary. Also ensure that peaks are not saturating (Maximum RFU value for raw data is 32767RFU). If peaks are saturating, dilute spectral calibration standards before repeating the spectral calibration.

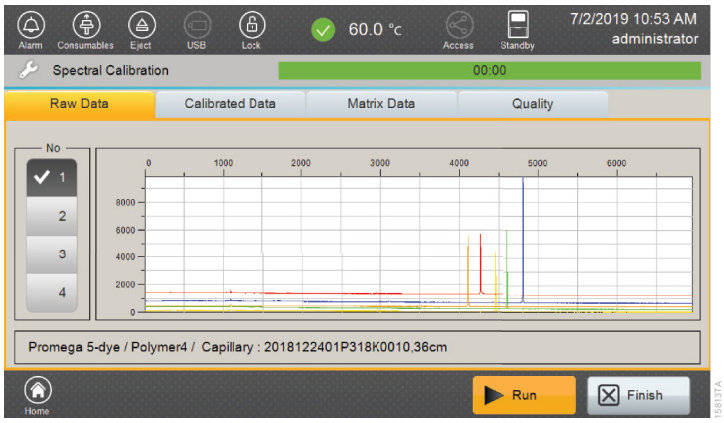



**Figure 53. Spectral calibration ‘Raw Data’ tab screen.**

2. After reviewing the raw data from all capillaries, proceed to the ‘Calibrated Data’ tab.

## ‘Calibrated Data’ Tab

1. Select the ’Calibrated Data’ tab to review the calibrated data for each capillary (Figure 54). Select a capillary to view from the list on the left side of the screen.

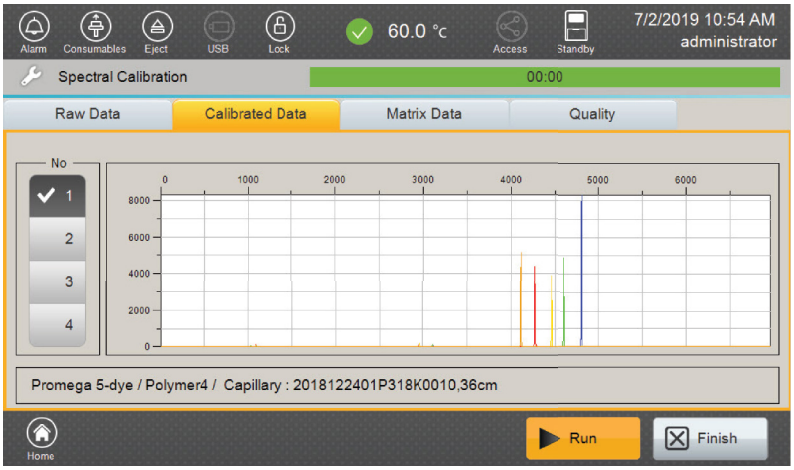



**Figure 54. Spectral calibration ‘Calibrated Data’ tab screen.**

2. After reviewing the calibrated data from all capillaries, proceed to the ‘Matrix Data’ tab for review.

## ‘Matrix Data’ Tab

1. Select the ‘Matrix Data’ tab to review the emission spectra for each capillary (Figure 55). Select a capillary to view form the list on the left side of the screen.

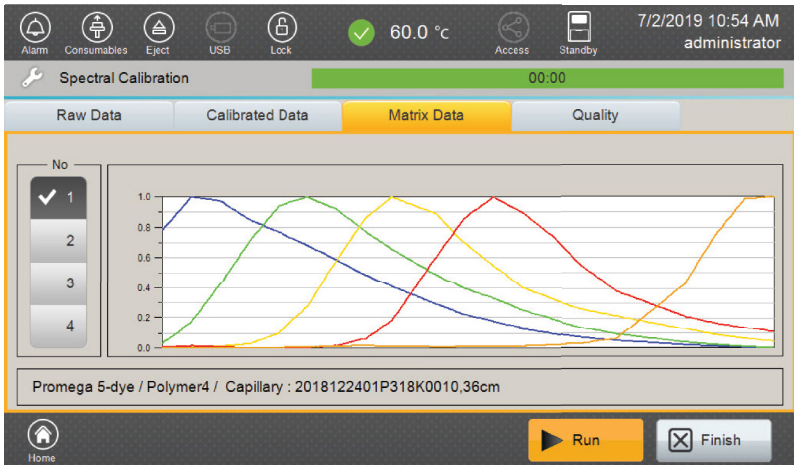



**Figure 55. Spectral calibration ‘Matrix Data’ tab screen.**

2. After the results of the calibration have been verified, selecting **Finish** will open a confirmation window. Selecting **Yes** on the confirmation window will apply the spectral calibration, exit the 'Spectral Calibration' screen, and save a calibration report.

   **Notes:**

   a. The spectral calibration will not be saved and applied unless **Yes** is selected.

   b. Selecting **No** will return you to the 'Spectral Calibration' screen.

   c. Selecting **Run** will rerun the spectral calibration.

# Performing a Run 5

The Spectrum Compact CE System is capable of both sequencing analysis and fragment analysis. The instructions for operating each application are very similar but will be described separately in this manual for ease of use (for fragment analysis see Section 5.3; for sequencing analysis see Section 5.4).

## 5.1 Preparing the Instrument

Before starting a run, ensure all consumables are installed and in sufficient supply for the intended run. For best results, use unexpired reagents that are within the recommended use range (see Section 1.5). Refer to the 'Consumables' screen to determine if any consumables need to be replaced. For consumables management, see Section 3, Managing Consumables.

Ensure that a spectral calibration has been performed for the required dye set and polymer type to be used (see Section 4.2). Select **Oven Temperature** in the Header (Figure 43 in Section 4.1) to preheat the oven to 60°C.

**Notes:**

a. We recommend you preheat the oven for at least 30 minutes prior to starting a run. The oven will automatically turn off after 2 hours if a run is not started.

b. Do not preheat the oven if you choose to run an assay with a migration temperature lower than 60°C. Oven can only be preheated to 60°C by selecting **Oven Temperature** in the Header, so preheating oven to 60°C will overheat capillary cartridge for assay to be run at a temperature lower than 60°C.

## 5.2 Preparing the Sample Cartridge

The sample setup process for the sample cartridge is the same for fragment and sequencing analysis. Samples prepared in 8-well strip tubes are assembled into the strip base and retainer to form the sample cartridge that is then loaded onto the instrument (see Section 2.4).

## 5.3 Fragment Analysis

1. Select **Fragment Analysis** from the 'Main Menu' screen (Figure 56).


**Figure 56. Spectrum Compact CE System Software 'Main Menu' screen.**

2. Enter a Run ID on the 'Set Run ID' screen (Figure 57). Select the **Run ID** box. This opens the 'Run ID' window, and a keypad will become active on the touch screen. Alternatively, the Run ID can be entered using a traditional keyboard if one is connected to the Spectrum Compact CE System. The following table lists rules for characters that can be used for a Run ID.

| | |
|---|---|
| **Acceptable Characters** | 1 to 50 characters |
| | Upper and lowercase alphabetic characters |
| | Numbers |
| | Symbols unless listed below |
| **Unacceptable Characters** | #%&{}\<>*?/$!'":@+`\|= and spaces |

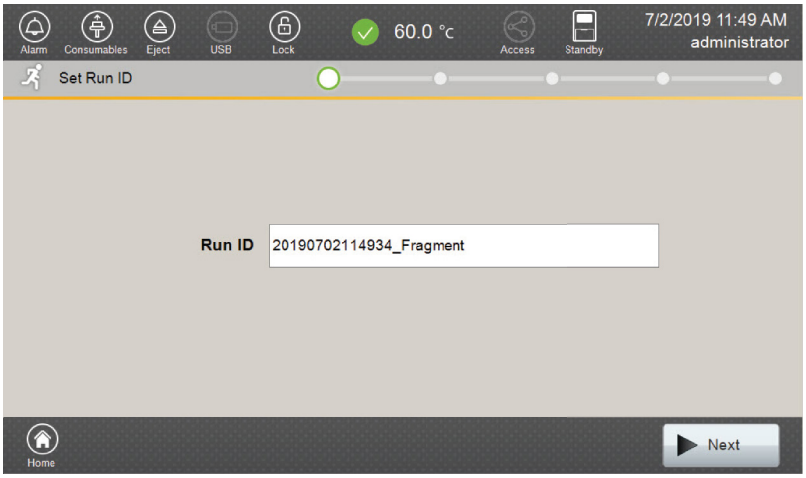



**Figure 57. 'Set Run ID' screen.**

3. Select **Next** to proceed to the message screen for placement of strips into the sample cartridge (Figure 58).
4. Follow the message screen for placement of strips into the sample cartridge (Figure 58).

   **Note:** Ensure that the correct strip tube is placed into the correct lane (A through D) on the strip base and that wells 1 to 8 of the strip tube are correctly aligned with well positions 1 to 8 on the strip base (see Section 2.4).
5. Select **Next** to access the 'Setup Strip Information' screen (Figure 59).

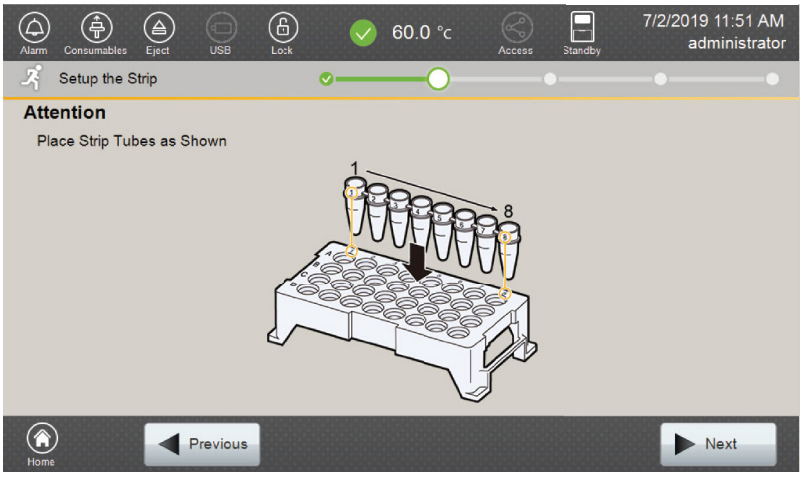



**Figure 58. 'Setup the Strip' screen.**

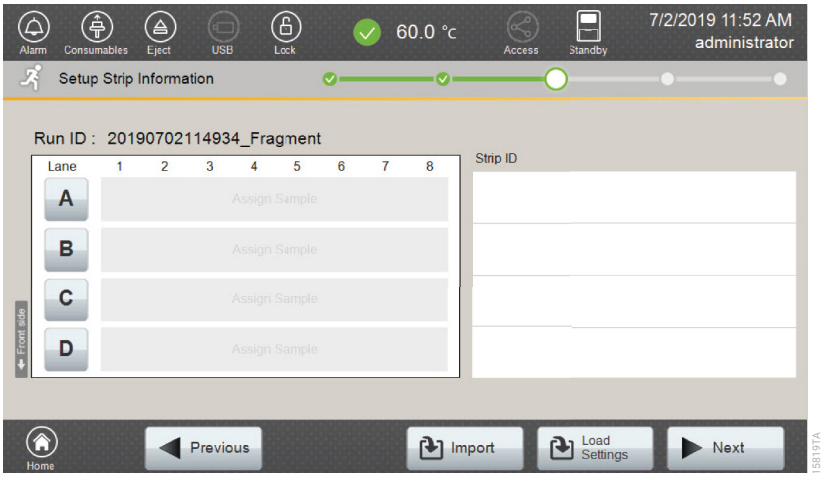



**Figure 59. 'Setup Strip Information' screen.**

**Notes:**

a. There are four methods for assigning samples. The information provided here in Section 5.3 is common for all four methods. Follow Section 5.3 first before proceeding to one of the four methods to assign strip information in Sections 5.3.1–5.3.4.

b. The 'Setup Strip Information' screen is divided into two sections: Sample information and Strip ID. You can enter sample names for samples in a strip by selecting the icon indicating the lane (A, B, C or D) that corresponds to your samples' strip position within the sample cartridge. This opens the 'Edit Strip Information' screen (Figure 60) for the selected lane.

## Assigning Sample Details to a New Strip ID

There are four methods to assign strip information. The four methods are:

- Creating new strip information
- Reusing run information from a list of completed runs
- Loading saved strip information
- Importing strip information

### 5.3.1 Creating New Strip Information

After selecting the desired lane (A, B, C or D) on the 'Setup Strip Information' screen (Figure 59), the 'Edit Strip Information' screen (Figure 60) displays fields for defining the Strip ID, run assay, sample name and sample type for that lane. Each well in the strip is represented along the left side of the screen. The first injection set of the strip (wells 1–4) is displayed on the screen. You can use the arrows on the right side of the screen to scroll to the second injection set (wells 5–8). Strip information can be manually entered into this screen as described below or loaded/imported from saved records (see Sections 5.3.3–5.3.4).

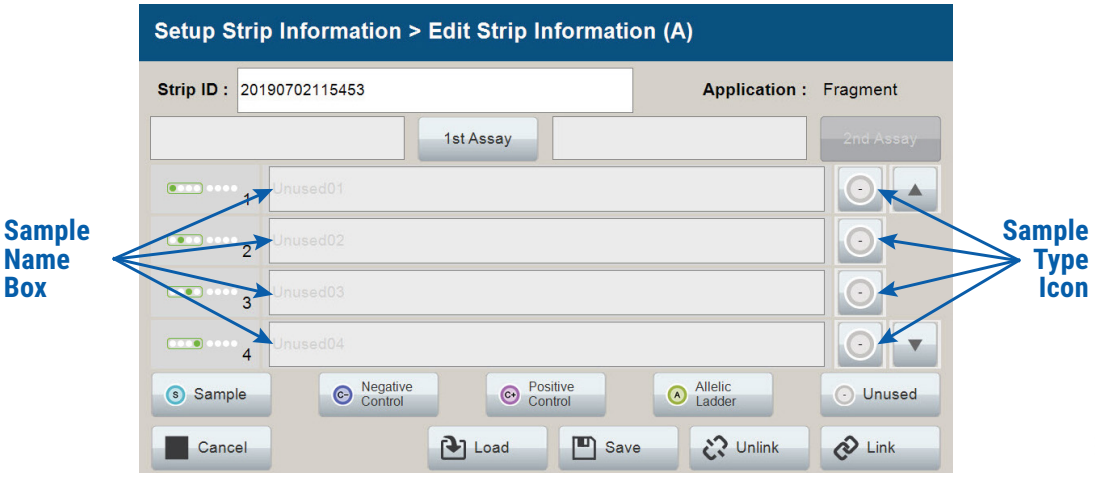



**Figure 60. 'Edit Strip Information' screen.**

1. A default Strip ID is displayed. If preferred, enter a Strip ID for the selected lane by selecting the **Strip ID** field. This opens the 'Set Strip ID' window, and a keypad will become active on the touch screen (Figure 61). Alternatively, the Strip ID can be entered using a traditional keyboard if one is connected to the Spectrum Compact CE System. Enter the appropriate Strip ID, and then select **OK** to exit and return to the 'Edit Strip Information' screen. The following table lists rules for characters that can be used for a Strip ID.

| | |
|---|---|
| **Acceptable Characters** | 1 to 30 characters |
| | Upper and lowercase alphabetic characters |
| | Numbers |
| | Symbols unless listed below |
| **Unacceptable Characters** | #%&{}\<>*?/$!'":@+`\|= and spaces |

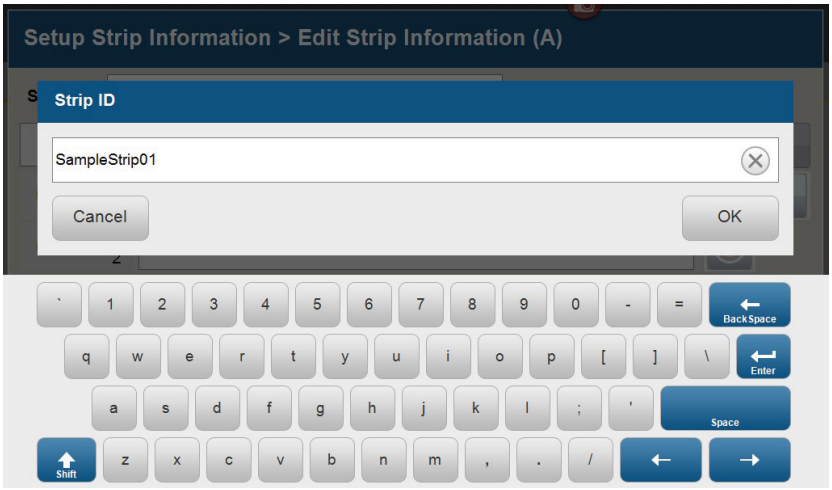



**Figure 61. 'Set Strip ID' window.**

2. Select a sample type on the 'Edit Strip Information' screen (Figure 62). Sample types must be selected for each well position before the **Sample Name** box becomes active for entry of sample name. Sample types available for fragment analysis are as follows.

| Symbol | Sample Type |
|---|---|
| | Sample |
| | Negative Control |
| | Positive Control |
| | Allelic Ladder |
| | Unused |

**Note:** A sample type other than "Unused" must be assigned to at least one well in each injection set. If all of the four wells in an injection set are assigned as "Unused", the injection set will not be run. If all eight wells in a strip are assigned as "Unused", a warning message will be displayed and no strip information will be assigned. Unused wells for any set of four wells being injected should contain formamide alone. Do not leave unused wells empty in an injection set.

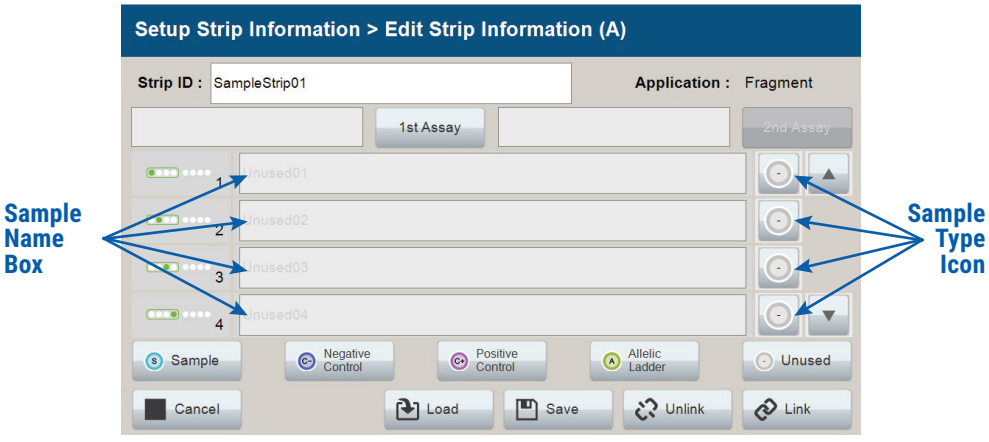



**Figure 62. Sample Type and Sample Name on 'Edit Strip Information' screen.**

3. To assign a sample type to a well, select the appropriate sample type button along the bottom of the 'Edit Strip Information' screen (Figure 62), and then select the **Sample Type** icon to the right of the sample name field for the desired well. This icon will then display the sample type selected for that well (Figure 63).
4. Enter a sample name for each well position by selecting the **Sample Name** box adjacent to the well number on the 'Edit Strip Information' screen (Figure 63). This opens the 'Set Sample Name' window, and a keypad will become active on the touch screen (Figure 64). Alternatively, the Sample Name can be entered using a traditional keyboard if one is connected to the Spectrum Compact CE System. Enter the appropriate sample name, and then select **OK** to exit and return to the 'Edit Strip Information' screen. The following table lists rules for characters that can be used for a sample name.

| | |
|---|---|
| **Acceptable Characters** | 1 to 50 characters |
| | Upper and lowercase alphabetic characters |
| | Numbers |
| | Symbols unless listed below |
| **Unacceptable Characters** | #%&{}\<>*?/$!'":@+`\|= and spaces |

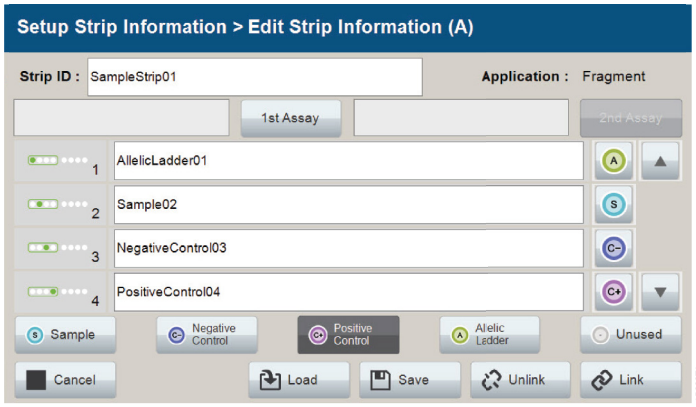



**Figure 63. Sample Name Entry on 'Edit Strip Information' screen.**

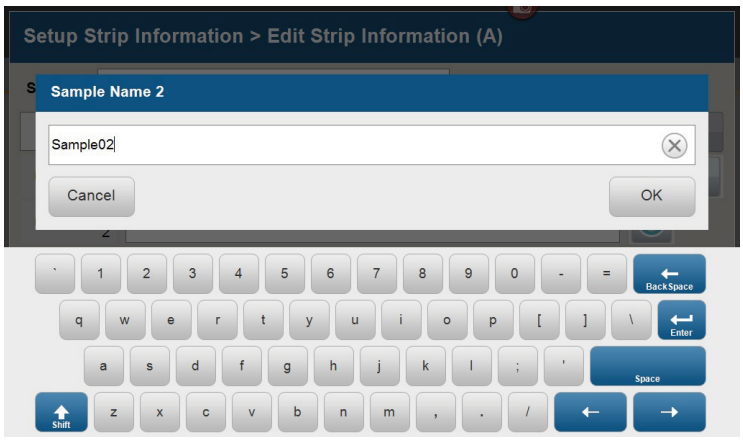



**Figure 64. 'Set Sample Name' window.**

5. The Spectrum Compact Control Software includes pre-loaded run assays for use with chemistries available from Promega and other commercial suppliers. To create a new assay or modify an existing assay, see Section 7. To assign a run assay to an injection set, select **1st Assay** on the right side of the 1st Assay field (Figure 63). This opens the 'Select Assay' window (Figure 65). Select an assay from the drop-down list using the scroll buttons to find the appropriate assay.

**Notes:**

: Scrolls up and down by one page.

: Scrolls up and down by five pages.

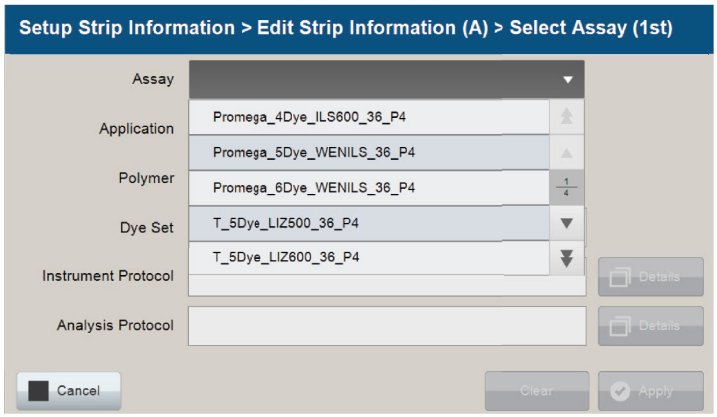



**Figure 65. 'Select Assay' window.**

6. You can verify the settings of the Instrument and Analysis Protocols associated with the assay chosen by selecting **Details** next to these fields (Figure 66). This will display a window showing the settings in these protocols but will not allow you to edit these settings (Figure 67 and Figure 68). To edit the Instrument Protocol or Analysis Protocol, see Section 7. When the assay information is confirmed, select **Apply** to return to the 'Edit Strip Information' screen.

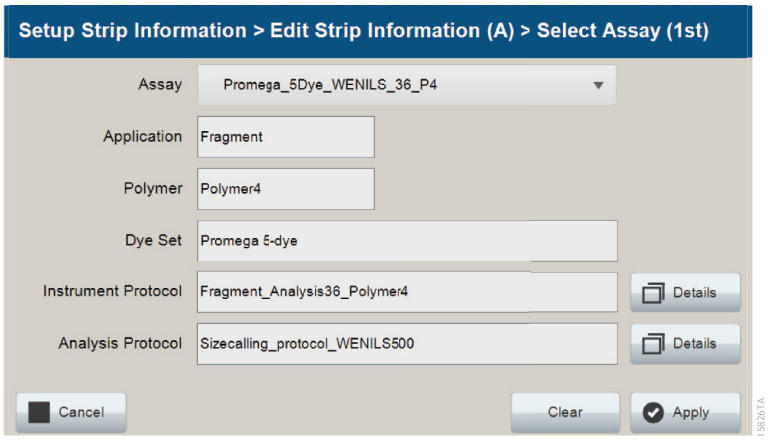



**Figure 66. Accessing Instrument and Analysis Protocols on 'Select Assay' window.**

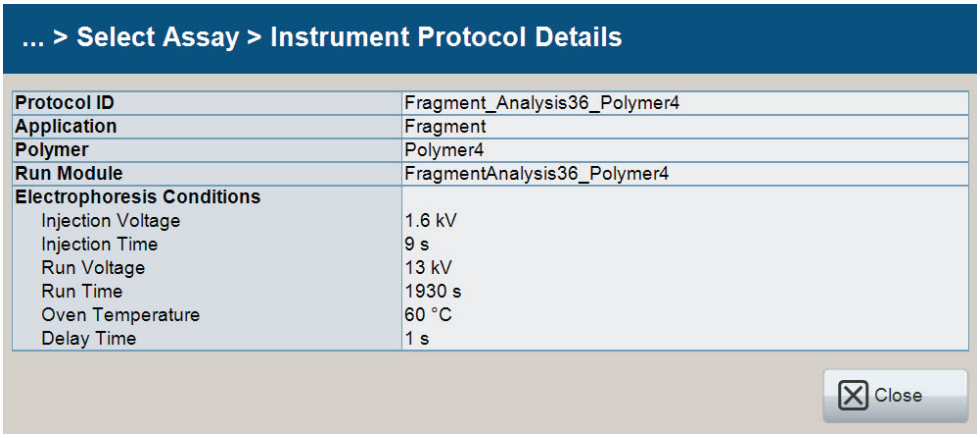



**Figure 67. 'Instrument Protocol Details' window.**

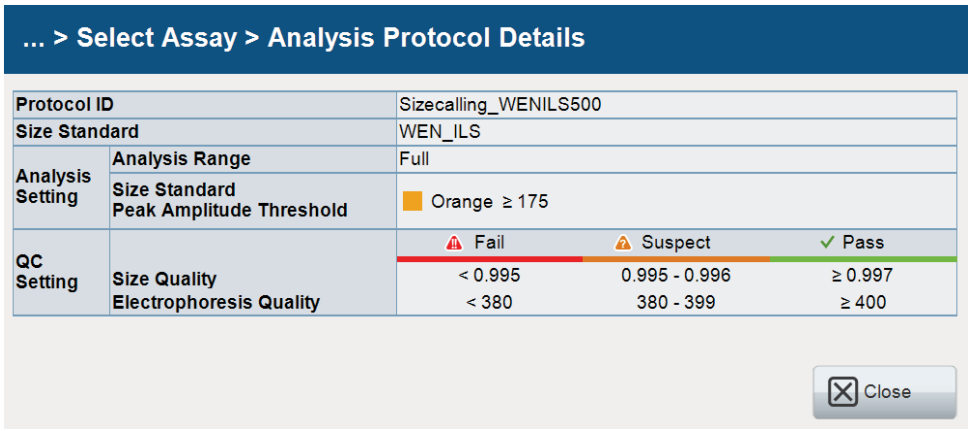



**Figure 68. 'Fragment Analysis Protocol Details' window.**

7. Repeat these steps for the 2nd Assay field if a second assay will be run for the strip. If not, leave this blank.

   **Note:** The assays available in the 2nd Assay field are filtered based on the dye set in the assay selected in the 1st Assay field. For example, if a 'Promega_5-dye' dye set-based assay is chosen in the 1st Assay field, then only assays using that same dye set are available as an option in the 2nd Assay field. In this way, it is possible to duplicate injections with the same assay conditions by choosing the same assay in the 2nd Assay field as that used in the 1st Assay field. It is also possible to run duplicate injections of the same assay conditions by using the **Duplicate** function of the 'Edit Injection List' screen (see
   Section 5.6).

8. When all information is entered and verified for the strip, select **Link** on the lower right corner of the 'Edit Strip Information' screen (Figure 69). This will link the strip to the run. If you want to save the Strip Information to use in future runs, save the information by selecting **Save** at the bottom of the 'Edit Strip Information' screen (Figure 69). This will save the strip information so that it can be loaded later into another run, as well as link the strip to the run (see Section 5.3.3).

**Notes:**

a. If you select **Unlink** without having previously selected **Save** at the bottom of the 'Edit Strip Information' screen, you will lose the Strip Information.

b. If you forget to assign an assay in the 'Edit Strip Information' screen, a warning window stating "Invalid Data Entered" will appear. Close this window, and assign an assay on the 'Edit Strip Information' screen before continuing.

c. No more than 500 strips may be saved on the system, or an error message may occur. Delete saved strips to proceed (see Section 5.3.3). Unless strip information will be frequently reused, we recommend selecting **Link** instead of **Save** when creating new strips.

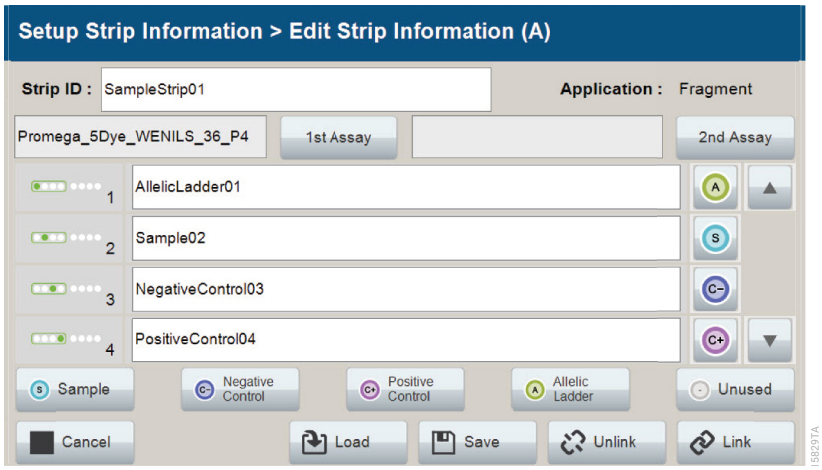



**Figure 69. Completed 'Edit Strip Information' screen.**

9. Repeat Steps 1–8 for additional lanes as necessary.

10. After all the required lanes have been set up, select **Next** on the 'Setup Strip Information' screen (Figure 70).

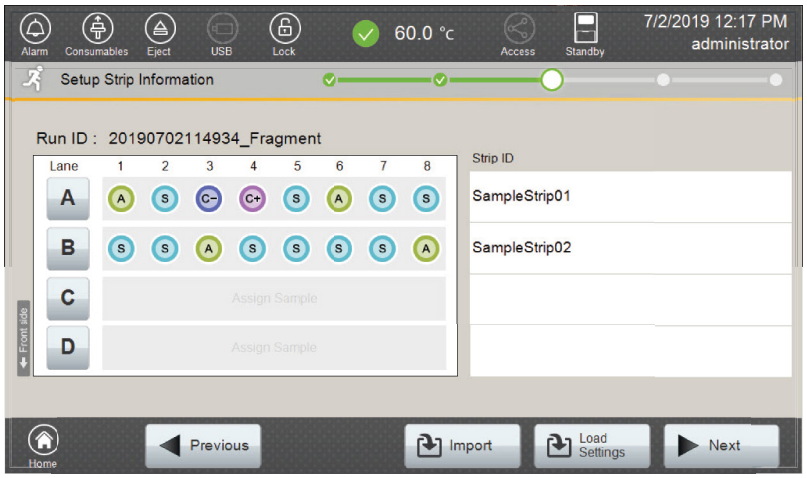



**Figure 70. Completed 'Setup Strip Information' screen.**

11. Proceed to Section 5.5.

## 5.3.2 Reusing Run Information

The Spectrum Compact Control Software allows reuse of information from a completed run. When this option is used, the strip information for all four lanes (A through D) of a previously completed run, is copied and displayed on the 'Setup Strip Information' screen (Figure 70).

**Note:** If any strip information has already been entered into any of the four lanes (A through D), this will overwrite that information and replace it with the information from the selected completed run.

1. Select **Load Settings** at the bottom of the 'Setup Strip Information' screen (Figure 71) to open the 'Select Completed Run' screen (Figure 72).

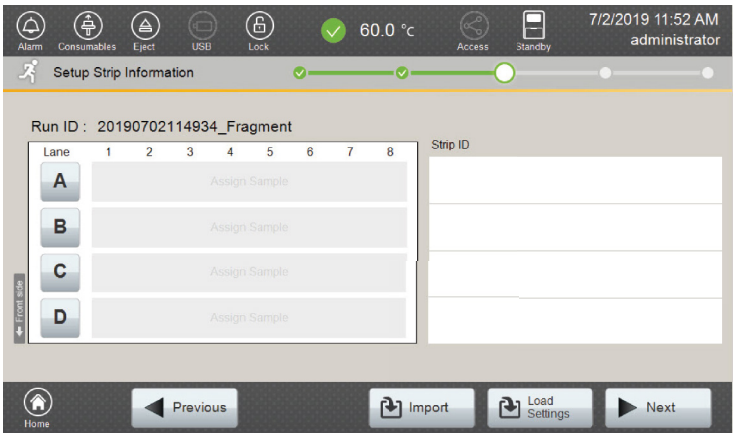



**Figure 71. 'Setup Strip Information' screen: Reusing a run.**

2. Select the desired run from the list on the left side of the screen (Figure 72), and then select **Apply**. This takes you back to the 'Setup Strip Information' screen showing the information from the selected run.

   **Notes:**

   a. You can sort the completed run list by the Date or ID header by touching the appropriate header.

   b. Ensure that the Run ID you created in Section 5.3 is different from the one selected from the list of completed runs in Figure 72.

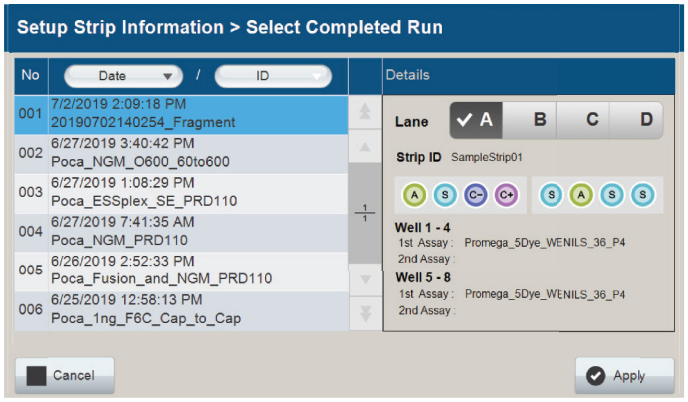



**Figure 72. 'Select Completed Run' screen.**

3. The completed run information is now applied to the new run.
4. Select **Next** on the 'Setup Strip Information' screen (Figure 71).
5. Proceed to Section 5.5.

### 5.3.3 Loading Saved Strip Information

The Spectrum Compact Control Software allows reuse of individual strip information saved previously (see Step 8 of Section 5.3.1) to assign to a specific lane (A, B, C or D) on the 'Edit Strip Information' screen (Figure 73).

1. After selecting the desired lane (A, B, C or D) on the 'Setup Strip Information' screen (Figure 59), select **Load** at the bottom of the 'Edit Strip Information' screen (Figure 73) to open the 'Load Strip Information' screen (Figure 74).

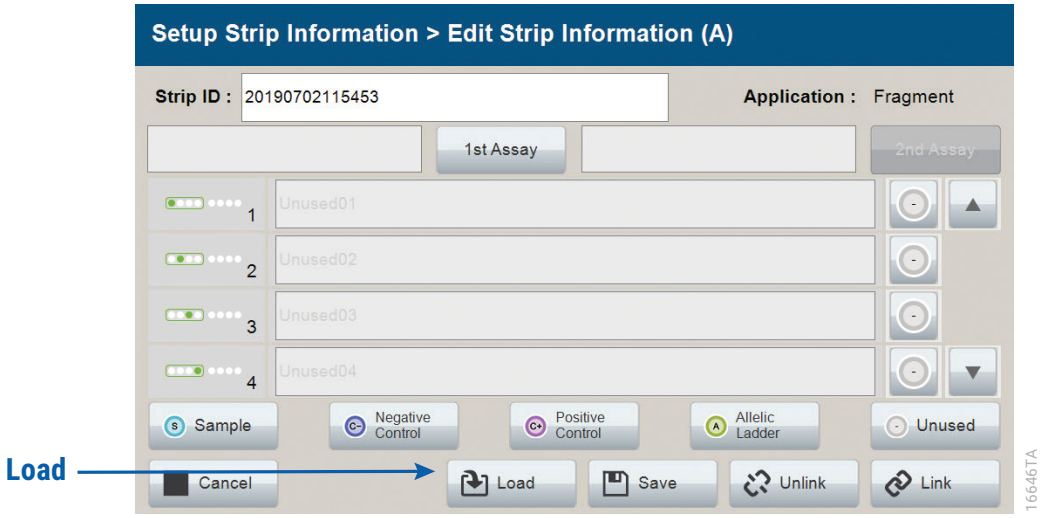



**Figure 73. 'Edit Strip Information' screen: Loading a previously saved Strip ID.**

2. Select the desired strip information from the list on the left side of the window, and then select **Apply**. This will return you to the 'Edit Strip Information' screen. The previously saved strip information is now applied to the new strip.

   **Notes:**

   a. You can sort the Load Strip Information list by ID or Date by touching the appropriate header.

   b. The same information from a saved Strip ID may be used multiple times within a run. Different Strip IDs may be assigned to multiple uses of the same Strip ID in a run by editing the Strip ID in the 'Edit Strip Information' screen.

   c. It is also possible to use the 'Load Strip Information' screen (Figure 74) to delete strips that are no longer required. Select the strip to be deleted from the list on the left side of the window, and then select **Delete**. A warning window asking "Are you sure you want to delete the strip?" will appear. Selecting **Yes** deletes the strip and takes you back to the 'Load Strip Information' screen. Selecting **No** closes the window and takes you back to the 'Load Strip Information' screen without deleting the strip.

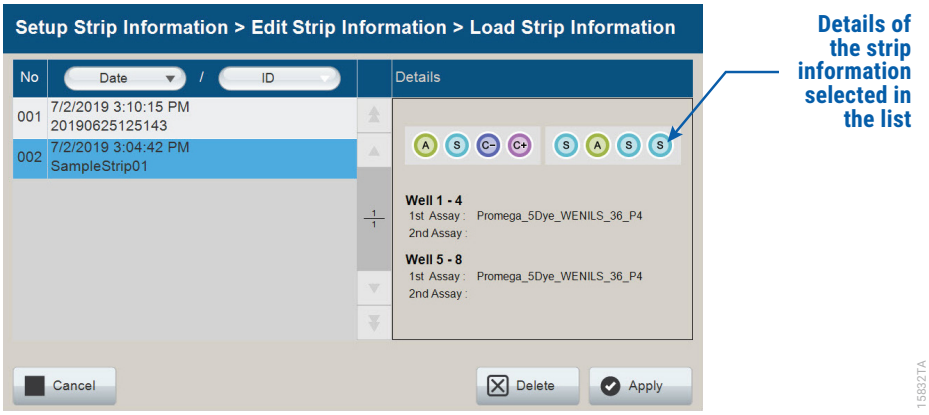



**Figure 74. 'Load Strip Information' screen.**

3. When all information is entered and verified for the strip, select **Link**.
4. Repeat Steps 1–3 for additional lanes as necessary.
5. Select **Next** on the 'Setup Strip Information' screen (Figure 71).
6. Proceed to Section 5.5.

### 5.3.4 Importing Saved Strip Information

The Spectrum Compact Control Software allows you to import strip information created as an .xml file on a personal computer using the 'Strip Setup Tool' (see Section 13). In this method, strip information is assigned separately to each lane.

1. Insert a USB drive into the USB connection port in the front of the instrument.
2. Select **Import** at the bottom of the 'Set Strip Information' screen (Figure 75) to open the 'Import Strip Information' screen (Figure 76).

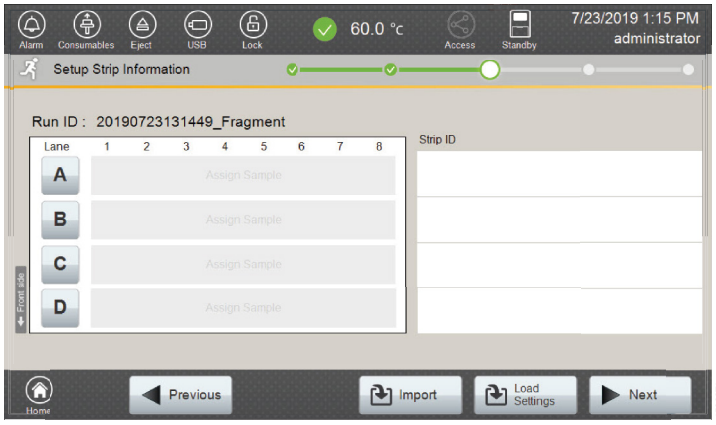



**Figure 75. 'Setup Strip Information' screen: Importing a strip.**

3. Select the desired 'Strip File' information from the list (Figure 76).

   **Notes:**

   a. You can sort the Import Strip Information list by Strip ID or Date by selecting the appropriate header.

   b. **Import** does not become active until a Strip File has been selected from the list.

   c. Only strips that match the currently installed polymer type will be displayed.

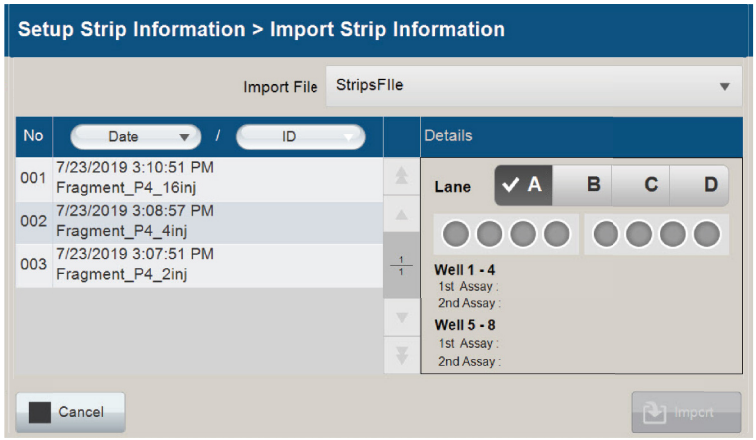



**Figure 76. 'Import Strip Information' screen.**

4. Once a Strip File has been selected, the Details for that strip are displayed on the right side of the screen (Figure 77).

5. Select the lane icon for each lane (A, B, C or D) to display the details of that lane/strip.

6. Select **Import** to import the selected Strip File information. This takes you back to the 'Setup Strip Information' screen showing the imported strip information.

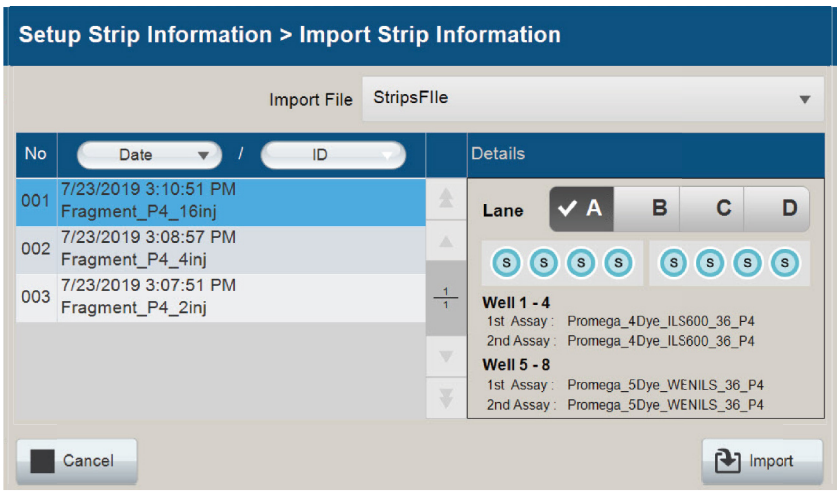



**Figure 77. 'Import Strip Information' screen: Strip details.**

7. Select **Next** on the 'Setup Strip Information' screen (Figure 71).

8. Proceed to Section 5.5.

# 5.4 Sequencing Analysis

Before beginning sequencing analysis, ensure that Spectrum Compact Polymer7 is currently installed by selecting **Consumables** in the header. Sequencing analysis can only be performed with Spectrum Compact Polymer7. If not installed, follow instructions in Section 3.2 to install a new Spectrum Compact Polymer7 Cartridge.

1. Select **Sequencing Analysis** from the 'Main Menu' screen (Figure 78).


**Figure 78. Spectrum Compact CE System Control Software 'Main Menu' screen.**

2. A default Run ID appears. If preferred, enter a new Run ID on the 'Set Run ID' screen (Figure 79). Select the 'Run ID' window. This opens the 'Set Run ID' screen, and a keypad will become active on the touch screen. Alternatively, the Run ID can be entered using a traditional keyboard if one is connected to the Spectrum Compact CE System. The following table lists rules for characters that can be used for a Run ID.

| | |
|---|---|
| **Acceptable Characters** | 1 to 50 characters |
| | Upper- and lowercase alphabetic characters |
| | Numbers |
| | Symbols unless listed below |
| **Unacceptable Characters** | #%&{}\<>*?/$!'":@+`\|= and spaces |

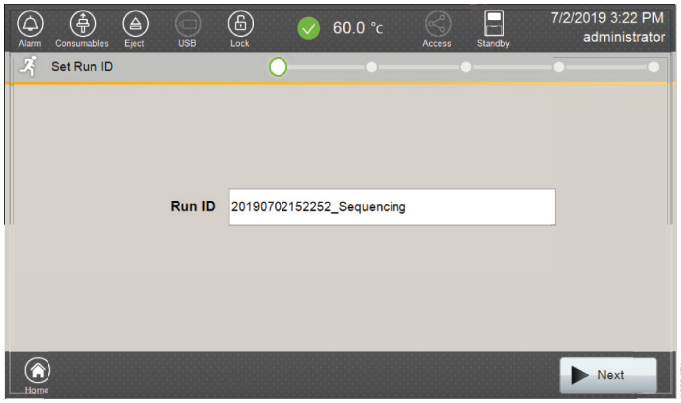



**Figure 79. 'Set Run ID' screen.**

3. Select **Next** to proceed to the message screen for placement of strips into the sample cartridge (Figure 80).
4. Follow the message screen for placement of strips into the sample cartridge (Figure 80), and then select **Next** to access the 'Setup Strip Information' screen (Figure 81).

   **Note:** Ensure that the correct strip tube is placed into the correct lane (A through D) on the strip base and that wells 1 to 8 of the strip tube are correctly aligned with well positions 1 to 8 on the strip base (see Section 2.4).

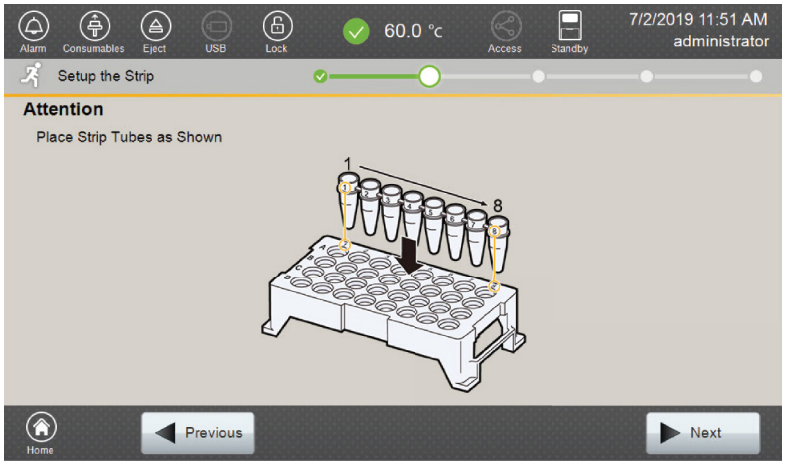



**Figure 80. 'Setup the Strip' screen.**

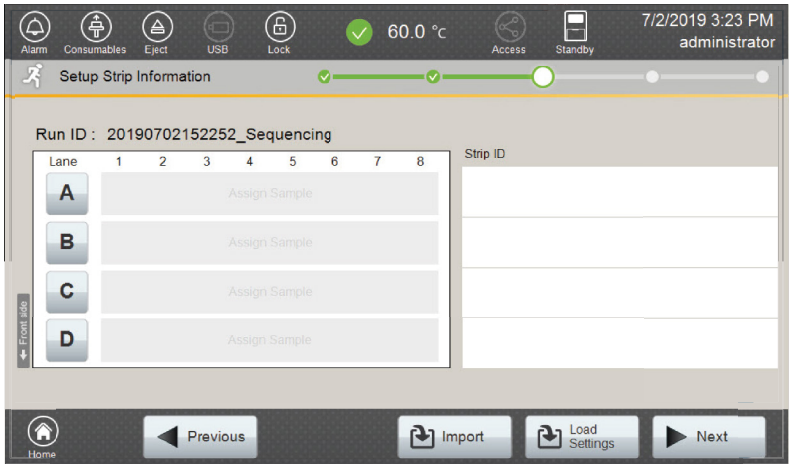



**Figure 81. 'Setup Strip Information' screen.**

**Notes:**

a. There are four methods for assigning samples. The information provided here in Section 5.4 is common for all four methods. Follow Section 5.4 first before proceeding to one of the four methods to assign strip information in Sections 5.4.1–5.4.2.

b. The 'Setup Strip Information' screen is divided into two sections: Sample Information and Strip ID. You can enter sample names for samples in a strip by selecting the icon indicating the lane (A, B, C or D), which corresponds to your samples' strip position within the sample cartridge. This opens the 'Edit Strip Information' screen (Figure 82) for the selected lane.

## Assigning Sample Details to a New Strip ID

There are four methods to assign strip information. The four methods are:

- Creating new strip information
- Reusing run information from a list of completed runs
- Loading saved strip information
- Importing strip information

### 5.4.1 Creating New Strip Information

After selecting the desired lane (A, B, C or D) on the 'Setup Strip Information' screen (Figure 81), the 'Edit Strip Information' screen (Figure 82) displays fields for defining the Strip ID, run assay, sample name and sample type for that lane. Each well in the strip is represented along the left side of the screen. The first injection set of the strip (wells 1–4) is displayed on the screen. You can use the arrows on the right side of the screen to scroll to the second injection set (wells 5–8). Strip Information can be manually entered into this screen as described below or loaded/ imported from saved records (see Sections 5.3.2–5.3.4).

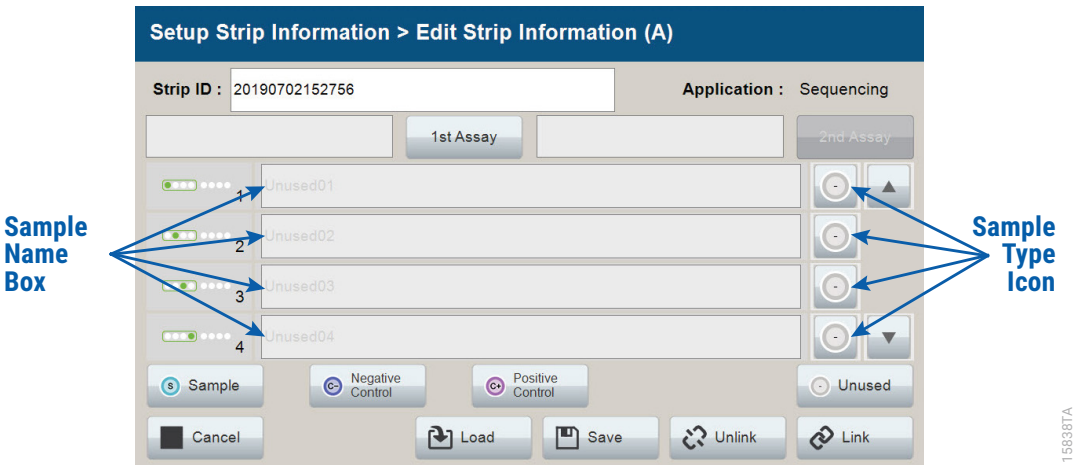



**Figure 82. 'Edit Strip Information' screen.**

1. A default Strip ID is displayed. If preferred, enter a new Strip ID for the selected lane by selecting the **Strip ID** box. This opens the 'Set Strip ID' window, and a keypad will become active on the touch screen (Figure 83). Alternatively, the Run ID can be entered using a traditional keyboard if one is connected to the Spectrum Compact CE System. Enter the appropriate Strip ID, and then select **OK** to exit and return to the 'Edit Strip Information' screen. The following table lists rules for characters that can be used for a Strip ID.

| | |
|---|---|
| **Acceptable Characters** | 1 to 30 characters |
| | Upper- and lowercase alphabetic characters |
| | Numbers |
| | Symbols unless listed below |
| **Unacceptable Characters** | #%&{}\<>*?/$!'":@+`\|= and spaces |

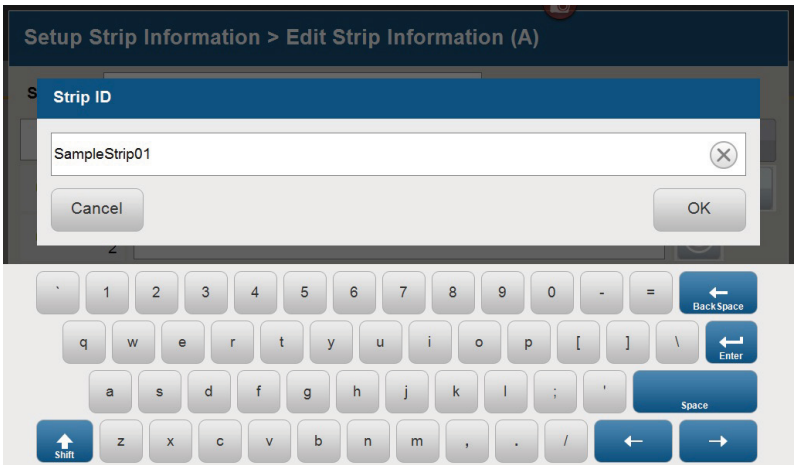



**Figure 83. 'Set Strip ID' window.**

2. Select a sample type on the 'Edit Strip Information' screen (Figure 84). Sample types must be selected for each well position before the **Sample Name** box becomes active for entry of sample name. Sample types available for sequencing analysis are listed in the following table.

| Sample Type Icon | Sample Type |
|---|---|
| | Sample |
| | Negative Control |
| | Positive Control |
| | Unused |

**Note:** A sample type other than "Unused" must be assigned to at least one well in each injection set. If all of the four wells in an injection set are assigned as "Unused", the injection set will not be run. If all eight wells in a strip are assigned as "Unused", a warning message will be displayed and no strip information will be assigned. Unused wells for any set of four wells being injected should contain formamide alone. Do not leave unused wells empty in an injection set.

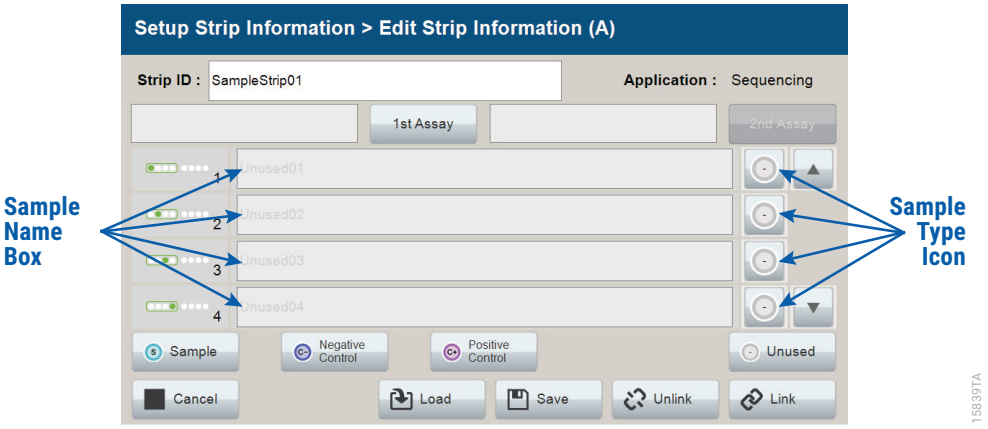



**Figure 84. Sample Type and Sample Name on 'Edit Strip Information' screen.**

3. To assign a sample type to a well, select the appropriate sample type along the bottom of the 'Edit Strip Information' screen (Figure 84), and then select the **Sample Type** icon to the right of the sample name field for the desired well. This icon will then display the sample type selected for that well (Figure 85).
4. Enter a sample name for each well position by selecting the **Sample Name** box adjacent to the well number on the 'Edit Strip Information' screen (Figure 85). This opens the 'Set Sample Name' window, and a keypad will become active on the touch screen (Figure 86). Alternatively, the Sample Name can be entered using a traditional keyboard if one is connected to the Spectrum Compact CE System. Enter the appropriate sample name, and then select **OK** to exit and return to the 'Edit Strip Information' screen. The following table lists rules for characters that can be used for a sample name.

| | |
|---|---|
| **Acceptable Characters** | 1 to 50 characters |
| | Upper- and lowercase alphabetic characters |
| | Numbers |
| | Symbols unless listed below |
| **Unacceptable Characters** | #%&{}\<>*?/$!'":@+`\|= and spaces |

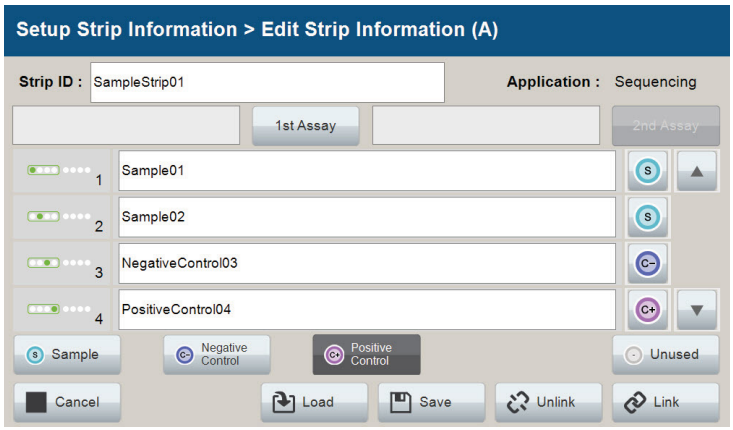



**Figure 85. Sample Name Entry on 'Edit Strip Information' screen.**

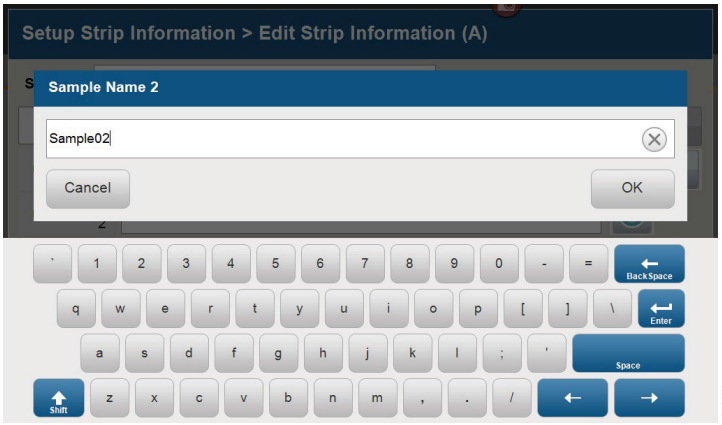



**Figure 86. 'Set Sample Name' window.**

5. The Spectrum Compact Control Software includes preloaded run assays for use with chemistries available from commercial suppliers. To create a new assay or modify an existing assay, see Section 7. To assign a run assay to an injection set, select **1st Assay** on the right side of the 1st Assay field (Figure 85). This opens the 'Select Assay' screen (Figure 87). Select an assay from the drop-down list using the scroll buttons to find the appropriate assay.

**Notes:**

: Scrolls up and down by one page.

: Scrolls up and down by five pages.

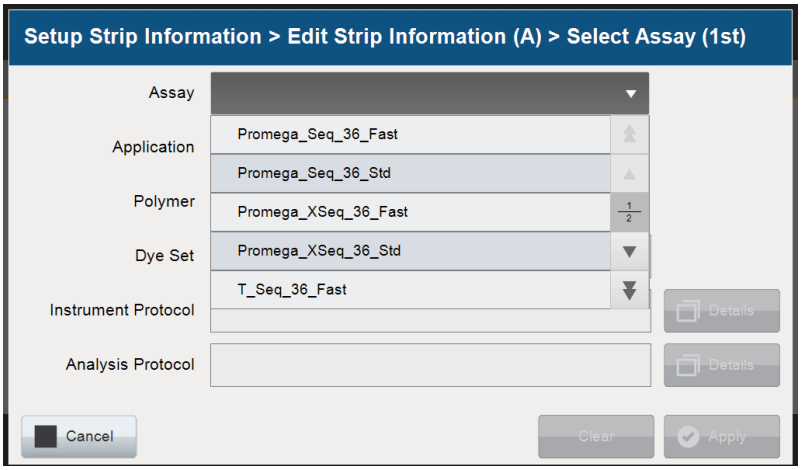



**Figure 87. 'Select Assay' screen.**

**Note:** Only select sequencing assays containing "XSeq" when using a bead-based purification method in which the beads remain at the bottom of the wells. These assays adjust the height of the deck during injection to keep the cathode end of the capillary cartridge above the level of the purification beads.

6. You can verify the settings of the Instrument and Analysis Protocols associated with the assay chosen by selecting **Details** next to these fields (Figure 88). This will display a window showing the settings in these protocols but will not allow you to edit these settings (Figure 89 and Figure 90). To edit the Instrument Protocol or Analysis Protocol, see Section 7. When the assay information is confirmed, select **Apply** to return to the 'Edit Strip Information' screen.

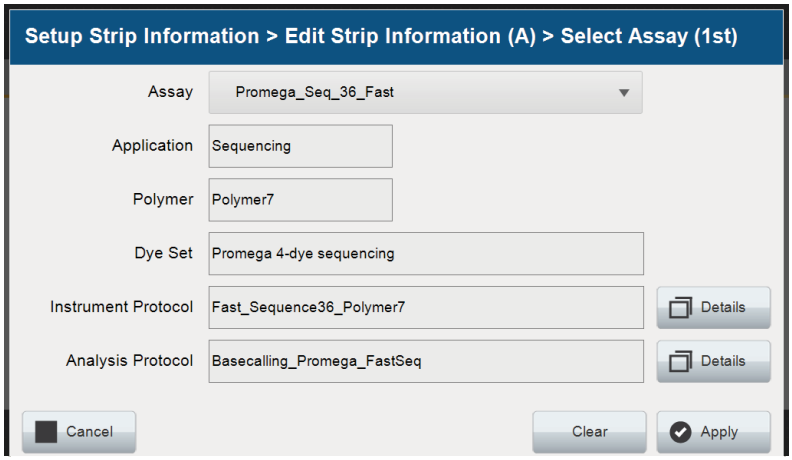



**Figure 88. Accessing Instrument and Analysis Protocols on 'Select Assay' screen.**

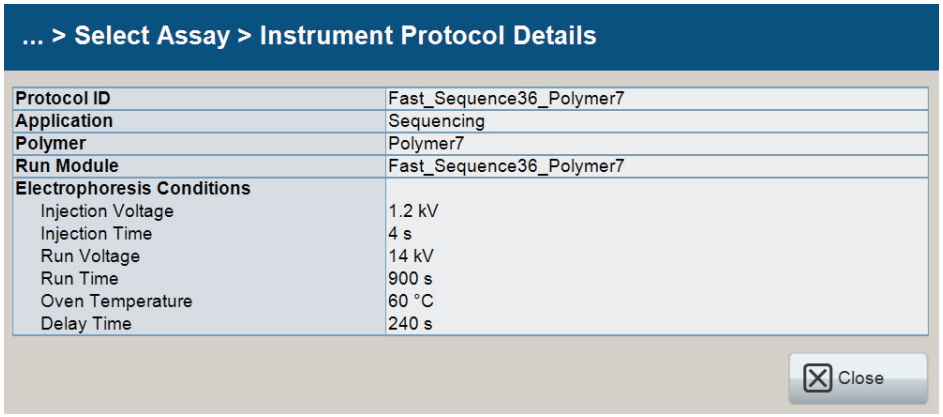



**Figure 89. 'Instrument Protocol Details' window.**

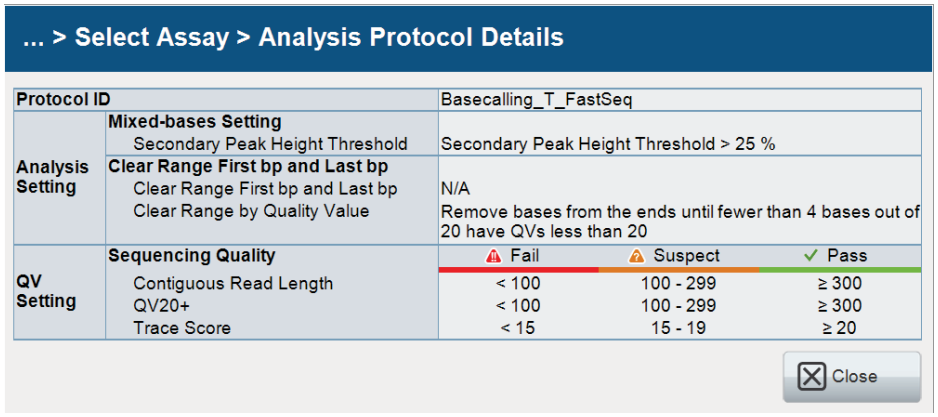



**Figure 90. Sequencing 'Analysis Protocol Details' window.**

7. Repeat these steps for the 2nd Assay field if a second assay will be run for the strip. If not, you can leave this blank.

   **Note:** The assays available in the 2nd Assay field are filtered based on the dye set in the assay selected in the 1st Assay field. For example, if a 'T 4-dye sequencing' dye set-based assay is chosen in the 1st Assay field, then only assays using that same dye set are available as an option in the 2nd Assay field. In this way, you can duplicate injections with the same assay conditions by choosing the same assay in the 2nd Assay field as that used in the 1st Assay field. you can also run duplicate injections of the same assay conditions by using the **Duplicate** function of the 'Edit Injection List' screen (see Section 5.6).

8. When all information is entered and verified for the strip, select **Link** on the lower right corner of the 'Edit Strip Information' screen (Figure 91). This will link the strip to the run. If you want to save the Strip Information to use in future runs, you will need to save the information by selecting **Save** at the bottom of the 'Edit Strip Information' screen (Figure 91). This will link the strip to the run but will also save that Strip ID so that it can be loaded later into another run (see Section 5.3.3).

   **Notes:**

   a. If you select **Unlink** without having previously selected **Save** at the bottom of the 'Edit Strip Information' screen, you will lose the Strip Information.

   b. If you forget to assign an assay in the 'Edit Strip Information' screen, a warning window stating "Invalid Data Entered" will appear. Close this window, and assign an assay on the 'Edit Strip Information' screen before continuing.

   c. No more than 500 strips may be saved on the system, or an error message may occur. Delete saved strips to proceed (see Section 5.3.3). Unless strip information will be frequently reused, we recommend selecting **Link** instead of **Save** when creating new strips.

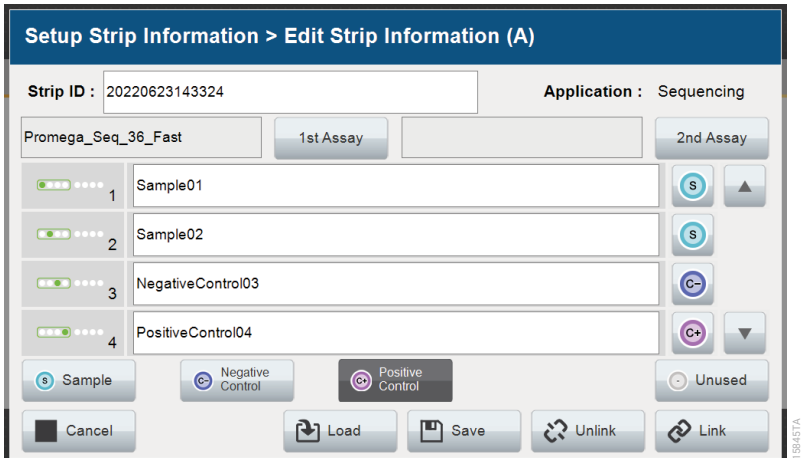



**Figure 91. Completed 'Edit Strip Information' screen.**

9. Repeat Steps 1–8 for additional lanes as necessary.

10. After all the required lanes have been set up, select **Next** on the 'Setup Strip Information' screen (Figure 92).

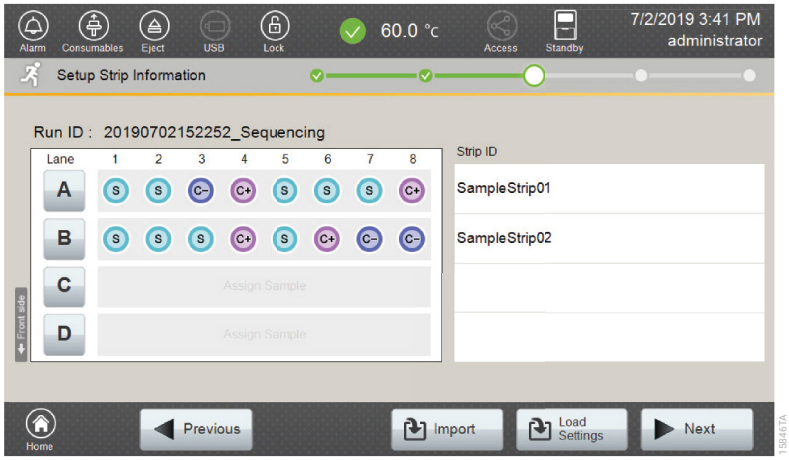



**Figure 92. Completed 'Setup Strip Information' screen.**

11. Proceed to Section 5.5.

### 5.4.2 Reusing/Loading/Importing Previous Run Information

There are three additional methods to assign strip information for a sequencing run.

- Reusing run information from a list of completed runs
- Loading saved strip information
- Importing strip information

These methods are the same as those described in Section 5.3 for fragment analysis. For information on how to use these methods, see Section 5.3.2, 5.3.3 or 5.3.4, as appropriate.

## 5.5 Loading the Sample Cartridge

1. After selecting **Next** on the 'Setup Strip Information' screen, a message window will open indicating that the autosampler is moving and telling you to not open the door. In addition, the status indicator flashes green while the autosampler is moving. After autosampler movement is complete, the message window closes and the status indicator returns to a steady green.

   **Note:** Do not open the door while the autosampler is in motion.

2. Open the instrument door, and then place the sample cartridge on the autosampler following the instructions displayed on the 'Install the Cartridge' screen (Figure 93). Press down on the yellow tab on the autosampler deck that locks the sample cartridge in place before placing sample cartridge into position. Release the tab to lock the sample cartridge in place on the autosampler deck.

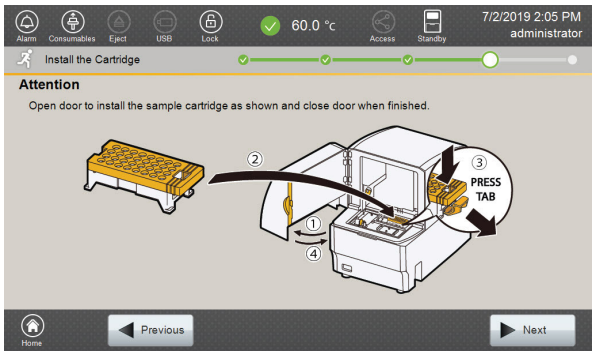



**Figure 93. 'Install the Cartridge' screen.**

3. When the sample cartridge is locked into place on the autosampler, close the instrument door and wait for the status indicator to stop flashing amber and turn steady green.

   **Note:** Do not open the door while the autosampler is in motion. Follow the instructions displayed on the screen.

4. After the autosampler has returned to its home position, the 'Edit Injection List' screen will be displayed (Figure 94). To edit the injection list, see Section 5.6.

5. Select **Run** to start the run. A confirmation message is displayed. Select **Yes** to start the run. Select **No** to return to the 'Edit Injection List' screen.

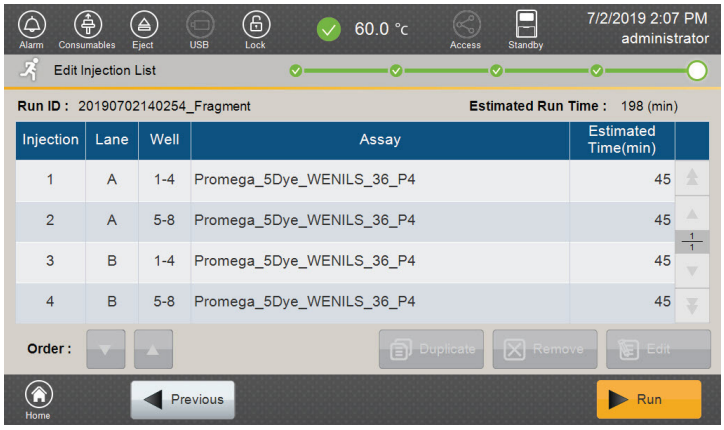



**Figure 94. 'Edit Injection List' screen.**

# 5.6 Editing Injection Information Prior to Starting a Run

The 'Edit Injection List' screen (Figure 94) allows users to change the run assay assigned to the linked strips prior to starting the run. You can also remove, duplicate or reorder injections from this screen. By default the injection list displays all scheduled injections in order by lane and well position. You can use the arrows on the right side of the screen to locate a specific injection.

## 5.6.1 Changing the Assigned Run Assay

1. Select the appropriate injection in the list (Figure 94), and then select **Edit** to open the 'Select Assay' window.
2. Select a different assay as needed. See Step 5 of Section 5.3.1, Fragment Analysis, or Section 5.4.1, Sequencing Analysis.
3. Select **Apply** in the 'Select Assay' window to assign the assay to the injection.

## 5.6.2 Removing an Injection from the Injection List

1. Select the appropriate injection in the list (Figure 94), and then select **Remove**.
2. Select **Yes** or **No** on the Confirmation Screen.

   **Note: Remove** does not become active when selecting an injection if there is only one injection in the run.

## 5.6.3 Duplicating an Injection in the Injection List

Select the appropriate injection in the list (Figure 94), and then select **Duplicate**. The duplicate injection is added to the bottom of the injection list.

**Note:** Duplicating injections from this screen adds scheduled injections to the bottom of the list. If the maximum use count of a polymer will be exceeded by adding these injections, the run will not be allowed to start.

## 5.6.4 Reordering Injections in the Injection List

1. Select the appropriate injection in the list, and then touch  or  at the bottom left of the 'Edit Injection List' screen (Figure 94) to change the order.
2. When all injection edits are complete, select **Run** to start the run.

# 5.7 Monitoring a Run

The ‘Monitor Run’ screens (Figure 95) are automatically displayed after a run is started. You can monitor the status of a run from one of the four tabs on the screen: Progress, Injection List, Monitor and Result. Information displayed on these screens is the same for fragment and sequencing analysis, except for the ‘Results’ screen.

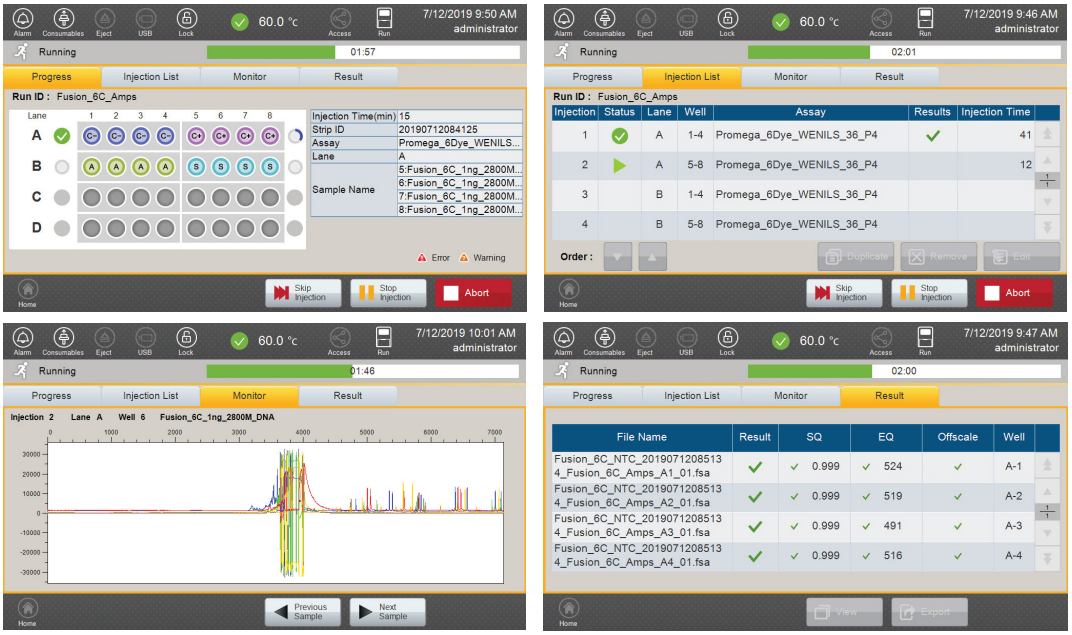



**Figure 95. ‘Monitor Run’ screens.**

**Note: Skip Injection** and **Stop Injection** do not become active in footer until the first injection of the run has started.

On the 'Monitor Run' screens, the injection progress, data evaluation, sample types and injection status are indicated by various symbols as shown in the following table.

| Symbol | Description | |
|---|---|---|
|  | Injection progress | Waiting for Injection |
|  | | Injection in Progress |
|  | | Injection in Progress (Nth time) |
|  | | Injection Completed (completed without an error) |
|  | | Injection Failed (an error has occurred) or Injection Aborted |
|  | | Injection Skipped |
|  | Data evaluation | **Note:** Green check mark only applied to samples with offscale data. For samples with data that is not offscale, this column is left blank. |
|  | | Failed Data Analysis [some evaluation item(s) failed] |
|  | | Questionable Data [some evaluation item(s) did not pass] |
|  | Sample type | Sample |
|  | | Negative Control |
|  | | Positive Control |
|  | | Allelic Ladder (Fragment only) |
|  | | Unused |
|  | Injection status | Injection in Progress |
|  | | Duplicated Injection |

### ‘Progress’ Tab

The ‘Progress’ tab displays the same information as the ‘Setup Strip Information’ screen of the setup process (see Sections 5.3 and 5.4) with some additional status information. The injection status for each assigned injection will update as the run progresses as displayed in this tab.

Selecting an injection set will display strip information details on the right side of the screen. Here, you can review the assigned strip information as well as the remaining injection time.

This tab also provides options in the footer for skipping or stopping an injection or aborting the run using the buttons at the bottom of the screen (Figure 96). Skipping an injection will immediately end the injection in progress and proceed to the next scheduled injection.

Stopping an injection will complete the injection in progress and then pause the run. **Skip Injection, Stop Injection** and **Abort** are greyed out after selecting **Stop Injection**. After completion of stopped injection, **Stop Injection** transitions to become **Resume** (Figure 97). The run will resume after you select **Resume**. Selecting **Abort** will immediately end the injection in progress and cancel all remaining scheduled injections of the run.

**Note:** When a run is aborted, the data from any completed injections of the aborted run remains saved.


**Figure 96. ‘Progress Tab’ footer.**


**Figure 97. ‘Progress Tab’ footer with Resume active.**

### 'Injection List' Tab

The 'Injection List' tab (Figure 98) displays the same information as the 'Edit Injection List' screen (Figure 94) of the setup process (see Section 5.5) with additional status information and the same footer buttons as on the 'Progress' tab. From the 'Injection List' tab it is possible to edit runs in the same manner as the setup process (see Section 5.6). The options to duplicate, reorder, remove or edit injection information depends on the status of an injection.

| Status | Injection Completed | Injection in Progress | Waiting for Injection |
|---|---|---|---|
| Duplication | o | o | o |
| Reorder | x | x | o |
| Removal | x | x | o |
| Editing | x | x | o |

o: Available
x: Unavailable

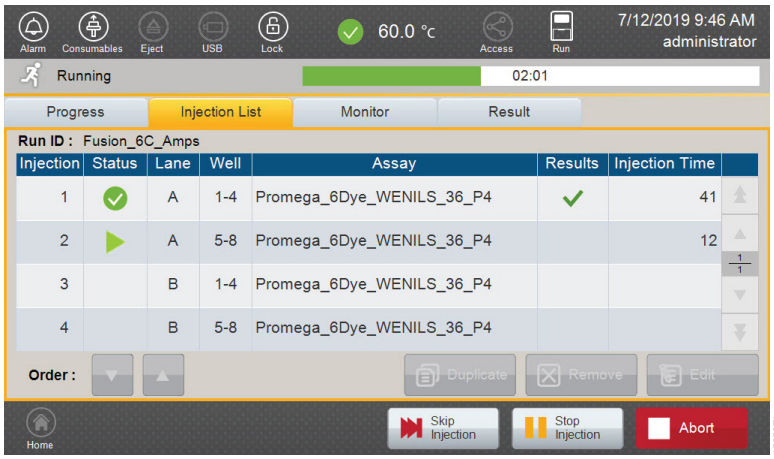



**Figure 98. 'Injection List' tab.**

**Notes**:

a. **Duplicate** only becomes active when one of the injections in the list is selected. **Remove**, **Edit** and **Order** only become active when injections in the list that have not been completed or are not in the process of being run are selected.

b. If the injection that you are currently editing is about to be processed, the run is paused. Selecting **Resume** after editing it will restart the run.

### ‘Monitor’ Tab

The ‘Monitor’ tab displays the real-time raw data electropherogram for the samples currently being run (Figure 99). Data are plotted in RFUs vs scan number (data points). The injection number, lane and well assignment, and sample name are displayed at the top of the electropherogram. You can use **Previous Sample** and **Next Sample** at the bottom of the screen to navigate through the samples of an injection.

**Note:** Only data from the current injection is displayed. To view data from previous completed injections from the run, touch the ‘Results’ tab.

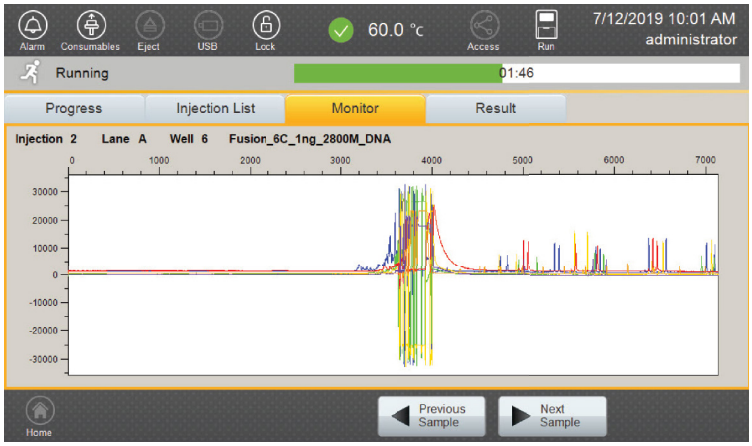



**Figure 99. ‘Monitor’ tab.**

The colors of the peak wavelengths differ between sequencing analysis and fragment analysis.

- Sequencing (4 colors): A/green, C/blue, G/black, T/red
- Fragment (4/5/6/8 colors): blue, green, yellow, red, orange (5-, 6- and 8-color), purple (6- and 8-color), aqua, brown (8-color)

**Note:** For easy visualization of sequencing analysis data, the yellow dye channel is displayed as black on the screen. For fragment analysis, the yellow dye channel is represented as yellow.

### ‘Result’ Tab

Results of completed injections can be viewed from the ‘Result’ tab of a current run and can be viewed at any time during the run. The following information is displayed for fragment and sequencing analysis.

| Analysis Type | Item | Description |
|---|---|---|
| Fragment | File Name | Name of saved data file |
| | Result | Overall evaluation (Pass/Suspect/Fail)<br>Displays the results of the initial analysis of the sizing quality (SQ) and electrophoresis quality (EQ). |
| | SQ | SQ is determined by comparing the fragment pattern observed for the size standard being used against that specified for the size standard in the Sizecalling Protocol (see Section 7.2.3). Values are from 0 to 1. Passing, suspect and failing specifications for SQ values are set in the Sizecalling protocol (see Section 7.2.3). |
| | EQ | EQ is the size (bases) at which the peak width at half maximal height is equal to the distance between two bases as calculated from the size standard.<br>**Note:** Accurate calculation of EQ by this method is dependent on using the same size standard in the sample that is specified in the assay used to run that sample. Failure to use the correct size standard can result in an erroneously failing EQ value. |
| | Offscale | Indicates whether or not sample contains offscale data (saturation). Green check mark indicates offscale data. For samples with data that is not offscale, this column is left blank. |
| | Well | Lane and well position of sample |
| Sequencing | File Name | Name of the saved data file |
| | Result | Overall data evaluation (Pass/Suspect/Fail)<br>Displays the lowest sequencing quality flag from the initial analysis of the Contiguous Read Length (CRL), Trace Score and QV20+ (see Section 7.1). |
| | CRL | Number of contiguous bases in the sequence that have an average quality value (QV) score ≥20 over a 21 base sliding window. |
| | QV20+ | Total number of bases with a QV score from the basecaller of at least 20 (i.e., base call accuracy of at least 99%). |
| | Trace Score | Average QV score across bases in clear range (as defined in basecalling protocol; see Section 7.2.2). |
| | Well | Lane and well position of sample |

Use the scroll buttons on the right side of the list to review the summary results for each sample in the run (Figure 100 and Figure 101).

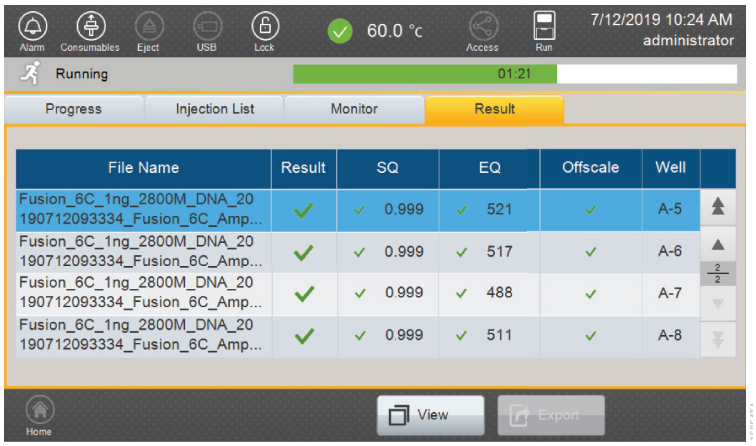



**Figure 100. Fragment Analysis 'Result' tab.**

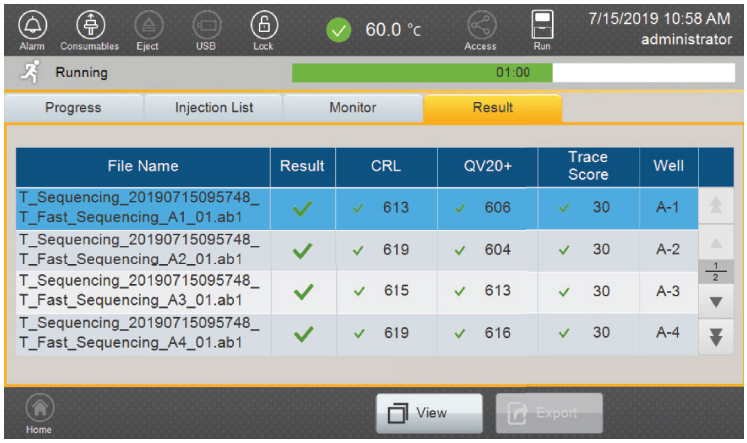



**Figure 101. Sequencing Analysis 'Result' tab.**

Raw or analyzed data for a sample can be viewed from the 'Result' tab. The process is similar for sequencing and fragment analysis data.

| Application | Data Type | Description |
|---|---|---|
| Fragment | Raw | Displays electropherogram peaks that have been spectrally separated, but the baselines have not been normalized. |
| | Analyzed | Primary analysis view displays electropherogram data with baseline normalization applied after the spectral separation. |
| Sequencing | Raw | Displays the electropherogram peaks prior to any mobility correction. |
| | Analyzed | Primary analysis view displays electropherogram data with mobility correction and after basecalling. |

1. Select the appropriate sample from the review table (Figure 100 and Figure 101), and then select **View** in the footer to open the 'Graph' screen.
2. The 'Graph' screen can be navigated using the icons on the screen. Some of these icons are only available in the analyzed data view.

| Icon | Description |
|---|---|
|  | Data Toggle Button; switch between raw data and analyzed fragment data |
|  | Data Toggle Button; switch between raw data and analyzed sequencing data |
|  | Switch Mode Button; switch between the zoom mode and color palette |
|  | Quick scroll to left |
|  | Scroll to left |
|  | Scroll to right |
|  | Quick scroll to right |
|  | Switch the zoom in/zoom out direction (X and Y axis together; X only; Y only) |
|  | Zoom in button |
|  | Zoom out button |
|  | Reset View button (after zooming) |
|  | Switch on or off the peak size labeling for the internal lane standard fragments |
|  | Increase peak signal button (analyzed sequencing data only; increases signal in Y axis without changing X axis) |
|  | Decrease peak signal button (analyzed sequencing data only; decreases signal in Y axis without changing X axis) |
|  | Resets peak signal to original height range after touching the increase or decrease peak signal button (analyzed sequencing data only; resets signal in Y axis without changing X axis) |
|  | Scroll up |
|  | Scroll down |
|  | Show/Hide Blue dye channel |
|  | Show/Hide Green dye channel |
|  | Show/Hide Yellow dye channel * Displayed only for fragment analysis |
|  | Show/Hide Red dye channel |
|  | Show/Hide Purple dye channel * Displayed only for fragment analysis |
|  | Show/Hide Orange dye channel * Displayed only for fragment analysis |
|  | Show/Hide Black dye channel * Displayed only for sequencing analysis |

| Icon | Description |
|---|---|
|  | Show/Hide Aqua dye channel * Displayed only for fragment analysis |
|  | Show/Hide Brown dye channel * Displayed only for fragment analysis |

3. The raw data electropherogram is the default view of the 'Graph' screen. To view the analyzed data electropherogram, select the data toggle button in the upper left corner of the screen to toggle between raw and analyzed views (Figure 102, Figure 103, Figure 104 and Figure 105).
4. **Zoom in** and **Zoom out** work to activate either function. Both functions are turned off initially. Selecting either button once activates that function. Selecting the same button again (or any other button on the screen) will deactivate that function.
5. When zooming in or out, first select the appropriate direction in which you wish to zoom by selecting the **Zoom in/Zoom out** direction button to toggle between the three zoom options (zoom in X and Y axis together, X axis only or Y axis only).
   **Note:** Selecting the **Zoom in/Zoom out** direction button after selecting either **Zoom in** or **Zoom out** will deactivate the previously activated zoom in or zoom out function.
6. Select either **Zoom in** or **Zoom out** as desired to activate that function.
7. Select the screen at the point where you wish to zoom in or zoom out. The more you select the same spot on the screen, the greater the zoom (in or out) at that point on the screen.
8. To return to the original unzoomed view, select **Reset View**.

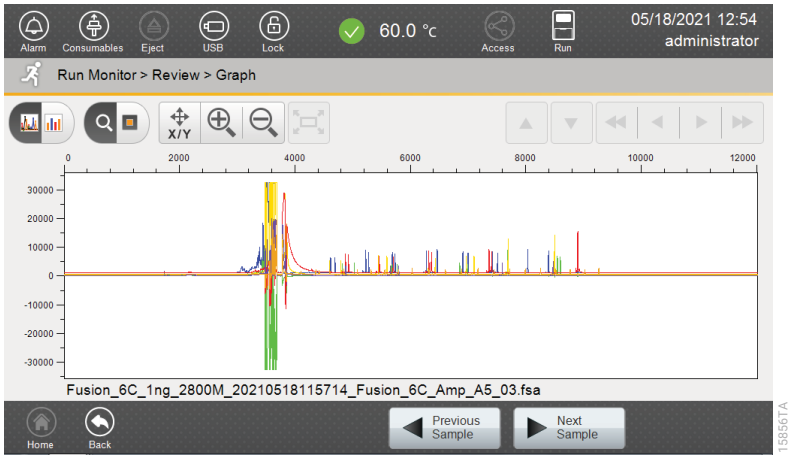



**Figure 102. Fragment Analysis 'Result' tab raw data.**

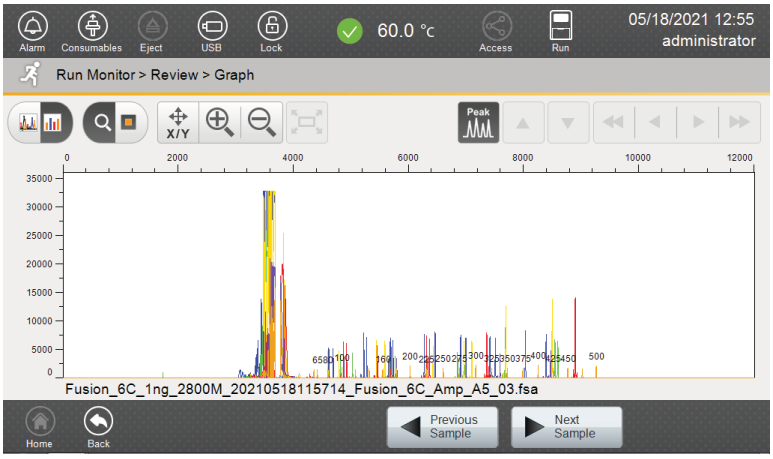



**Figure 103. Fragment Analysis 'Result' tab analyzed data.**

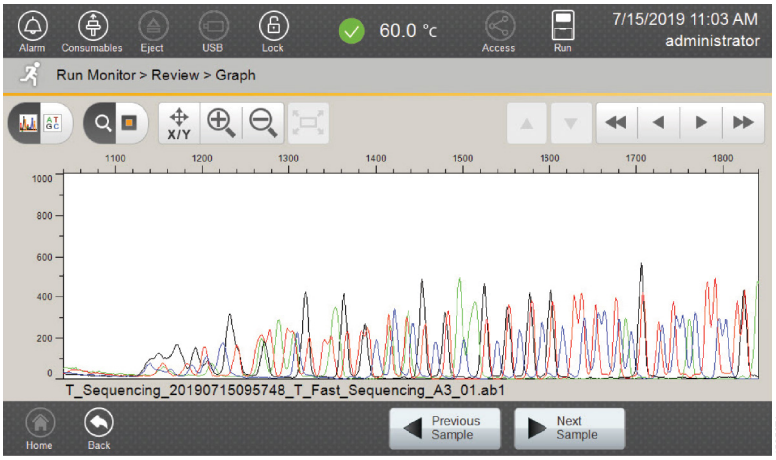



**Figure 104. Sequencing Analysis 'Result' tab raw data.**

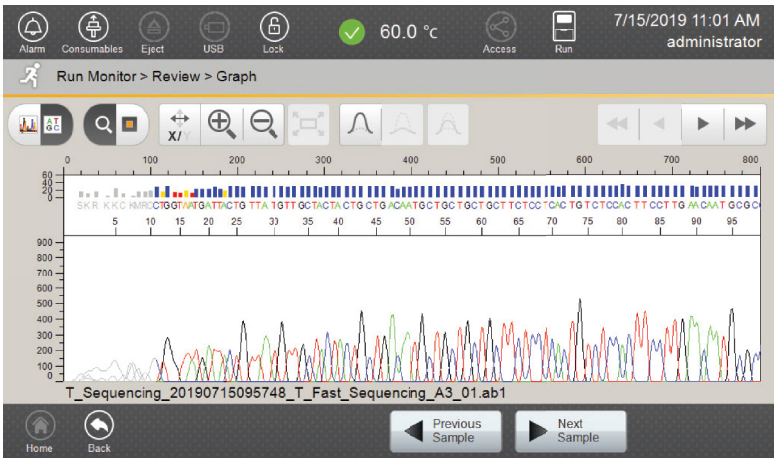



**Figure 105. Sequencing Analysis 'Result' tab analyzed data.**

9. You can use **Previous Sample** and **Next Sample** in the footer (Figure 102, Figure 103, Figure 104 and Figure 105) to navigate through the samples of a run. To return to the 'Result' tab, select **Back** in the footer.

# 5.8 Exporting Results from Current Run

After reviewing data from the 'Review' tab, you can export the primary analysis results of the whole run or selected samples in the run to a USB drive inserted into the storage USB port on the front of the instrument (Figure 1).

**Notes:**

a. When exporting selected samples, duplicate sample file names are not allowed during the export process, and it is not possible to change the file name of the exported data. If a file with the same name exists in the destination location for the saved data, a confirmation message will be displayed asking if it is OK to overwrite.

b. Run results can be exported when all injections of a run are complete or when a run is paused. If results are exported when a run is paused, only the completed injections will be available for export. When a run is still in progress, results from individual samples of completed injections within the ongoing run may be exported one at a time (see Section 5.8.1).

## 5.8.1 Exporting One Sample at a Time

1. From the 'Result' tab, select the specific sample from the displayed list (Figure 100 and Figure 101).
2. Select **Export** in the footer of the 'Result' tab screen. The sample file will be exported to the USB drive and stored in a folder named "Run".
3. Select **USB** in the header before removing the USB drive from the storage USB port.
4. When all results have been reviewed and/or exported, select **Close** to exit the 'Monitor Run' screen and return to the 'Main Menu' screen.

   **Note:** This step may be omitted if the run is still in progress so that the user can continue to monitor the rest of the injections from the run on the 'Monitor Run' screen.

## 5.8.2 Exporting Entire Run

1. At the end of the run, the 'Progress' tab displays **Export Run** in the footer (Figure 106). Select **Export Run** in the footer of the 'Progress' tab screen. The sample files will be exported to the USB drive and stored in a folder named "Run".
2. Select **USB** in the header before removing the USB drive from the storage USB port.
3. When all results have been reviewed and/or exported, select **Close** to exit the 'Monitor Run' screen and return to the 'Main Menu' screen.


**Figure 106. 'Progress' tab footer with Export Run button.**

# Reviewing Completed Runs 6

The ‘Run List’ screen contains a list of all completed runs saved to the Spectrum Compact Control Software. To access this screen, select **Run Results** on the ‘Main Menu’ screen (Figure 9).

## 6.1 Reviewing Run Results

The ‘Run List’ screen is divided into two main sections: Run List and Run Details (Figure 107).

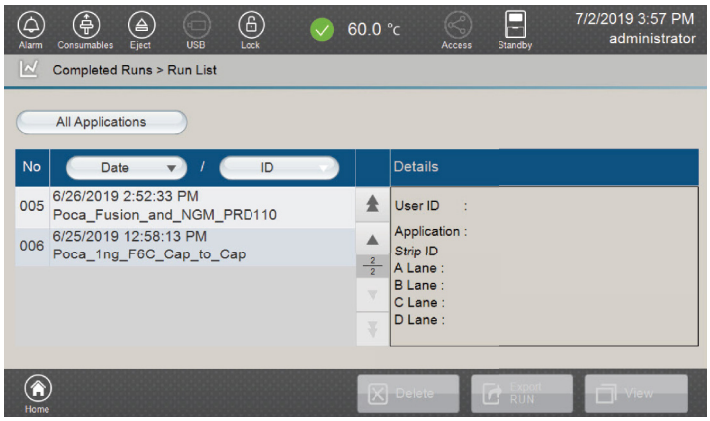



**Figure 107. ‘Run List’ screen.**

**Note: Delete**, **Export Run** and **View** do not become active until a run is selected in the ‘Run List’ screen.

The Run List can be filtered and sorted using the buttons at the top of the list.

| **Header** | **Function** |
|---|---|
| Filter (All Applications, Sequencing, Fragment) | Toggle to filter the Run List by selected type: sequencing, fragment or all applications |
| Date | Sorts the Run List by either ascending or descending order based on the Run Date |
| ID | Sorts the Run List by either ascending or descending order based on the Run ID |

The footer provides three options for run record management.

| Command | Function |
|---|---|
| Delete | Deletes the selected run |
| Export Run | Exports the selected run |
| View | Opens the 'Result View' screen for the selected run record |

1. Use the scroll buttons on the right side of the Run List to locate the completed run you wish to review.
2. Select the run in the Run List corresponding to the run you wish to review. This will display the run summary in the Run Details section of the 'Run List' screen.
3. Select **View** in the footer to view a list of samples in that run in the 'Result View' screen (Figure 108). **View** and **Export** do not become active until a sample is selected.

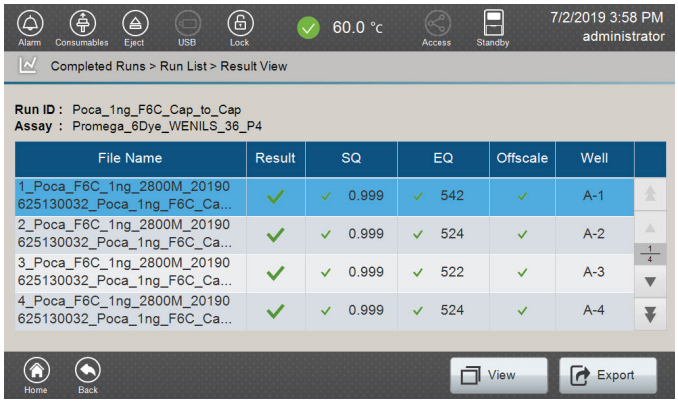



**Figure 108. 'Result View' screen.**

4. Use the scroll buttons on the right side of the sample list to locate the sample to review.
5. Select the sample in the File Name corresponding to the run you wish to review, and then select **View** in the footer to review the electropherogram data of the sample (Figure 109).

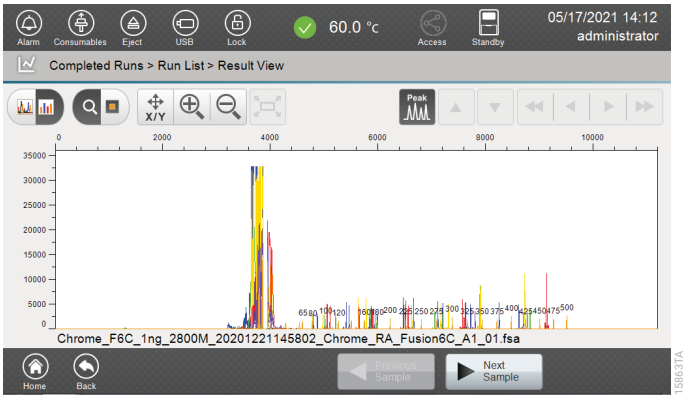



**Figure 109. Sample-specific 'Result View' screen.**

**Note:** Figure 109 has peak size labeling for the internal lane standard fragments turned on.

6. The electropherogram screen displays the raw and analyzed electropherogram data of the selected sample. See 'Result' Tab in Section 5.7, Monitoring a Run, for a description of the functions of the different screen icons/buttons.
7. Use **Previous Sample** and **Next Sample** in the footer to navigate through the samples of a run.
8. Use **Back** to return to the 'Result View' screen (Figure 108), which displays a list of all runs saved on the instrument.

# 6.2 Exporting Run Results

After reviewing data, you can export the primary analysis results of the entire run or selected samples in the run to a USB drive inserted into the storage USB port on the front of the instrument (Figure 1).

**Note:** Data may also be downloaded directly to a PC connected to the Spectrum Compact CE System using the Spectrum Compact CE System Remote Access Software (see *Spectrum Compact CE System Remote Access Software Technical Manual* #TMD064).

## 6.2.1 Exporting One Sample at a Time

**Note:** Duplicate sample file names are not allowed during the export process, and it is not possible to change the file name of the exported data. If a file with the same name exists in the destination location for the saved data, a confirmation message will be displayed asking if it is OK to overwrite.

1. From the 'Result View' screen (Figure 108), select the specific sample from the displayed list.
2. Select **Export** in the footer of the 'Result View' screen (Figure 108). The sample file will be exported to the USB drive and stored in a folder named "Run".
3. Select **USB** in the header before removing the USB drive from the storage USB port.

## 6.2.2 Exporting Entire Run

1. From the 'Run List' screen (Figure 107), select the desired run from the displayed list.
2. Select **Export Run** in the footer of the 'Run List' screen (Figure 107). The sample file will be exported to the USB drive and stored in a folder named "Run".
3. Select **USB** in the header before removing the USB drive from the storage USB port.

   **Notes:**

   a. For in-progress runs, if the run has been paused by selecting **Stop**, the results can be exported. Only results from completed injections in the paused run can be selected. It is not possible to export results from an injection canceled by selecting **Abort**.

   b. Results from an in-progress injection of a current run cannot be exported.

## 6.3 Deleting Run Results

After reviewing and exporting data, you can delete the entire run from the instrument by selecting the desired run name in the 'Run List' screen (Figure 107) and then selecting **Delete**. A warning window will appear asking if you are sure you want to delete the selected data. Select **Yes** to delete and **No** to cancel the deletion.

## 6.4 Reviewing Log Information

The Spectrum Compact Control Software logs alarm, consumables and operation information for the instrument. These logs can be accessed by selecting **Log**, which is located in the Review section of the 'Main Menu' screen (Figure 9) of the Spectrum Compact Control Software. There are three functions available in the 'Log' screen (Figure 110):

1. Alarm
2. Consumables
3. Operation

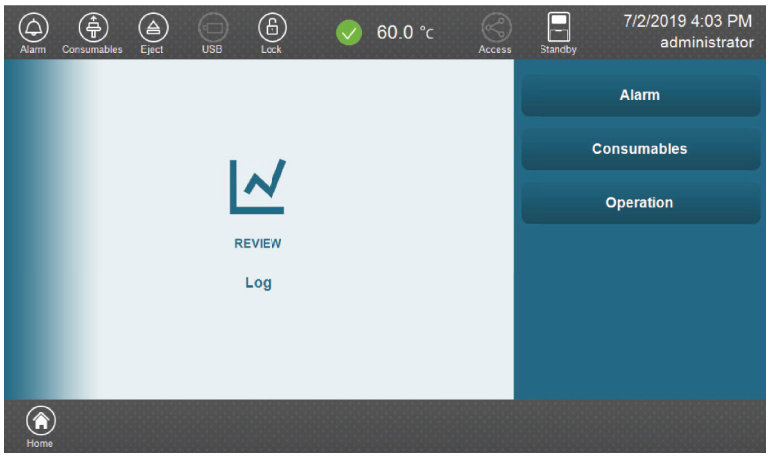



**Figure 110. 'Log' screen.**

### 6.4.1 Reviewing Alarm Logs

1. Select **Alarm** on the 'Log' screen (Figure 110) to open the 'Alarm Log' screen (Figure 111).

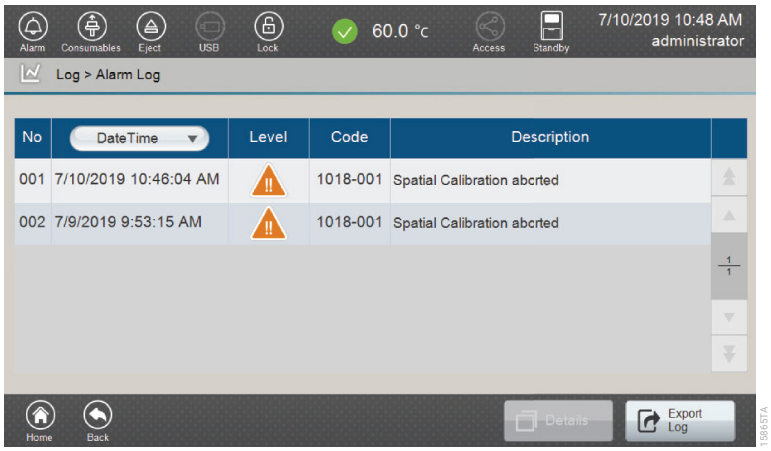



**Figure 111. 'Alarm Log' screen.**

2. Select the **DateTime** column of the 'Alarm Log' screen to sort logs by date in ascending or descending order (Figure 111).
3. Select a specific Alarm Log in the list followed by **Details** (becomes active after selecting an Alarm Log) at the bottom of the screen to review the details of that specific alarm (Figure 112).


**Figure 112. 'Alarm Detail' screen.**

The 'Alarm Detail' screen provides the following information:

| Information | Description | |
|---|---|---|
| Date/Time/Code | Date and time the alarm occurred and the alarm code (see Section 11 for error code list) | |
| Level |  | Critical Alarm—a severe condition, such as instrument malfunction, has occurred. |
| |  | Error Alarm—an error preventing electrophoresis has occurred. |
| |  | Warning—something needs attention, but the instrument will continue operation. |
| Details | Describes what caused the alarm. | |
| Recommended Action | Describes the recommended corrective action(s) to resolve the issue. | |

4. Check the information displayed in the Details and Recommended action section of the 'Alarm Detail' screen (Figure 112). Perform corrective measures required to address the information displayed. See Section 11 for a list of error codes and responses.
5. To view information for the previous or next alarm, select **Previous** or **Next**, respectively.
6. Select **Close** to return to the 'Alarm Log' screen.
7. Logs are saved to a folder called LogInfo on the USB drive.

## 6.4.2 Reviewing Consumables Logs

1. Select **Consumables** on the 'Log' screen (Figure 110) to open the 'Consumables Log' screen (Figure 113).

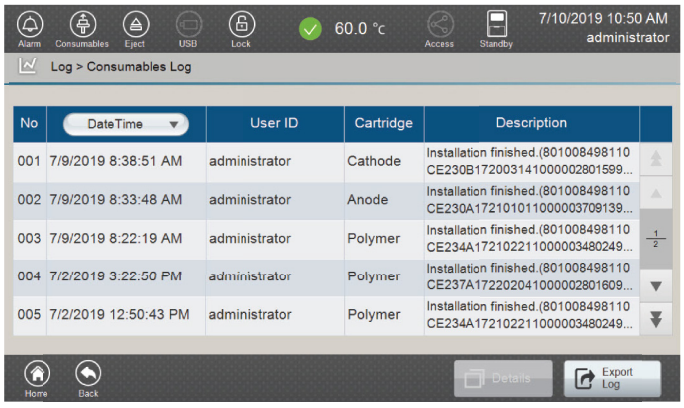



**Figure 113. 'Consumables Log' screen.**

2. Select the **DateTime** column of the 'Consumables Log' screen to sort logs by date (Figure 113).

3. Select a specific Consumables Log in the list followed by **Details** (becomes active after selecting a Consumables Log) at the bottom of the screen to review the details of that specific log (Figure 114).
4. Logs are saved to a folder called LogInfo on the USB drive.

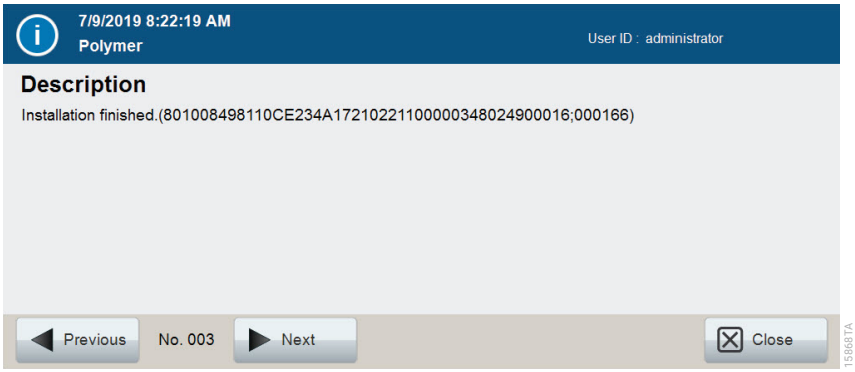



**Figure 114. 'Consumables Detail' screen.**

## 6.4.3 Reviewing Operation Logs

1. Select **Operation** on the 'Log' screen (Figure 110) to open the 'Operation Log' screen (Figure 115).

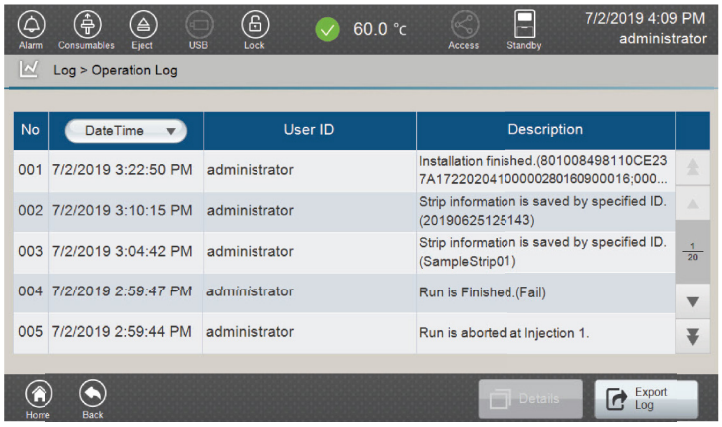



**Figure 115. 'Operation Log' screen.**

2. Select the **DateTime** column of the 'Operation Log' screen to sort logs by date in ascending or descending order (Figure 115).
3. Select a specific Operation Log in the list followed by **Details** (becomes active after selecting an Operation Log) at the bottom of the screen to review the details of that specific log (Figure 116).
4. Logs are saved to a folder called LogInfo on the USB drive.

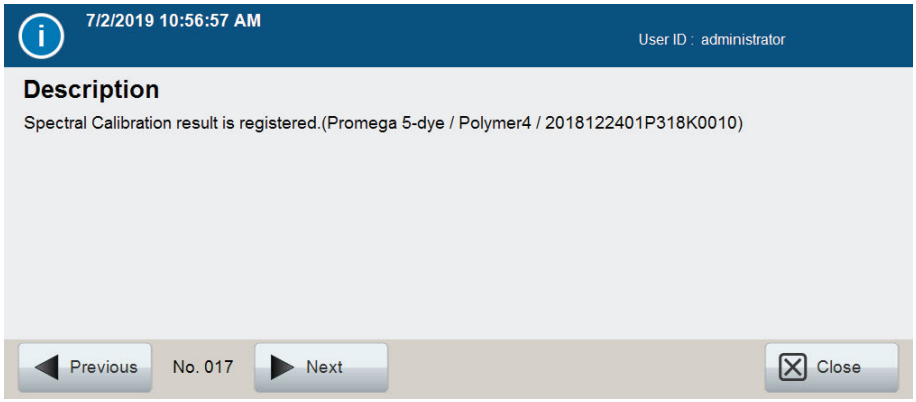



**Figure 116. 'Operation Detail' screen.**

### 6.4.4 Exporting All Log Info

1. Select either **Alarm**, **Consumable** or **Operation** on the 'Log' screen (Figure 110).
2. Select **Export** (without selecting a specific Alarm, Consumable or Operation log) to export all log information in one zipped file (i.e., not specific to a given Alarm, Consumable or Operation log) to a USB drive. Logs are saved to a folder called LogInfo on the USB drive.
3. Select **USB** in the header before removing the USB drive from the USB storage port.

# Managing Assays, Protocols and Dye Sets

# 7

Instrument assays and protocols are managed through the Protocols menu, which is accessed through the 'Main Menu' screen (Figure 9). The Protocol menu contains three submenus:

- New & Edit Protocols
- Import Protocols
- Export All Protocols

Assays or protocols can be created, edited, deleted or imported using these submenus.

Six types of assays, protocols and dye sets are used by the Spectrum Compact Control Software:

1. Assay
2. Instrument Protocol
3. Basecalling Protocol
4. Sizecalling Protocol
5. Size Standard Protocol
6. Dye Set

The Spectrum Compact CE System comes with a series of preloaded assays, protocols and dye sets of each type. Preloaded assays, protocols and dye sets are locked and cannot be edited or deleted. Users have the ability to define their own assays, protocols and dye sets, which can be edited or deleted. Both preloaded and user-created assays and protocols can be exported to an external storage device, such as a USB drive. Only user-created assays and protocols can be imported from an external storage device such as a USB drive into a Spectrum Compact CE System.

| Type | Description |
|---|---|
| Assay[1] | An assay is comprised of application type (sequencing or fragment), instrument protocol, polymer type, dye set and analysis protocol required for data collection. The analysis protocol used depends on the application as follows.<br>• Fragment: Sizecalling Protocol<br>• Sequencing: Basecalling Protocol |
| Instrument Protocol | Defines the instrument settings to be applied during a run. This includes: application type (sequencing or fragment), polymer type, injection conditions and electrophoresis conditions. |
| Basecalling Protocol | The initial analysis protocol required for sequencing applications. Defines parameters for assigning base calls to data peaks. |
| Sizecalling Protocol | The initial analysis protocol required for fragment applications. Defines the parameters for assigning size calls to data peaks. |
| Size Standard Protocol | Defines size of DNA fragments of known lengths. Used to generate a sizing curve by which unknown fragments are sized. |
| Dye Set | Create or edit new or existing dye sets. |

[1]Assays are created by associating a specific instrument protocol with a specific analysis protocol. If the instrument and analysis protocols are added from the library, a copy of these protocols is added to the assay, such that they can be modified within the created assay independently from the original items stored in the library. That is, changes made to the instrument and analysis protocol within the newly created assay do not affect the instrument and analysis protocols stored in the library.

# 7.1 General Settings and Protocol Security Symbols

Depending on the security setting (see Section 8), symbols on the protocol screens change automatically as shown in Section 7.1.1.

## 7.1.1 Protocol Security Symbols

| Protocol Type | | Security Setting | |
|---|---|---|---|
| | | High | Normal |
| Pre-loaded | |  |  |
| User-defined | Owner[1] |  | No symbol displayed |
| | Other than the owner | No symbol displayed | No symbol displayed |
| Lock status[2] | Locked |  | No symbol displayed |
| | Unlocked | No symbol displayed | No symbol displayed |

[1]User-defined protocols created by the individual logged into the system.
[2]Assays and protocols created under high-security settings by a user without administrative rights are locked from other users without administrative rights but not from users with administrative rights.

### 7.1.2 Filtering and Sorting in the List

The list of assays or protocols displayed in the assay and protocol lists can be filtered based on application type (all applications, fragment or sequencing) and library type (all libraries, pre-loaded or user-defined). By repeatedly selecting the appropriate button it is possible to toggle between filter options.

| **Default Filter Button Setting** | **Filter Setting Order** | **Lists Displaying Filter Button** |
|---|---|---|
| All Applications | 1. All Applications | Assay<br>Instrument Protocol |
| | 2. Sequencing | |
| | 3. Fragment | |
| All Libraries | 1. All Libraries | Assay<br>Instrument Protocol<br>Basecalling Protocol<br>Sizecalling Protocol<br>Size Standard Protocol<br>Dye Set |
| | 2. Pre-loaded | |
| | 3. User-Defined | |

Protocols may also be sorted alphanumerically (toggle between ascending and descending order by selecting the sort button) based on Date, ID, Run Module name or Size Standard name.

| **Sort Button** | **Sorting** | **Assays and Protocols with Sorting Function** |
|---|---|---|
| Date | By Date (Month/Day/Year) | Assay<br>Instrument Protocol<br>Basecalling Protocol<br>Sizecalling Protocol<br>Size Standard Protocol |
| ID | By ID | Assay<br>Instrument Protocol<br>Basecalling Protocol<br>Sizecalling Protocol<br>Size Standard Protocol |
| Run Module | By Run Module Name | Instrument Protocol |
| Size Standard | By Size Standard Name | Sizecalling Protocol<br>Size Standard Protocol |

### 7.1.3 Rules for Characters Used to Name Assays, Protocols and Dye Sets

The following table lists rules for characters that can be used when naming new assays and protocols.

| | |
|---|---|
| **Acceptable Characters** | 1 to 40 characters |
| | Upper and lowercase alphabetic characters |
| | Numbers |
| | Symbols unless listed below |
| **Unacceptable Characters** | #%&{}\<>*?/$!'":@+`\|= and spaces |

## 7.2 Creating Protocols, Assays and Dye Sets

Select **New & Edit Protocols** on the 'Main Menu' screen (Figure 9) to access the 'New & Edit Protocols' screen (Figure 117). Instrument, Basecalling, Sizecalling and Size Standard protocols and Dye Sets should be defined for appropriate applications prior to creating a new assay.

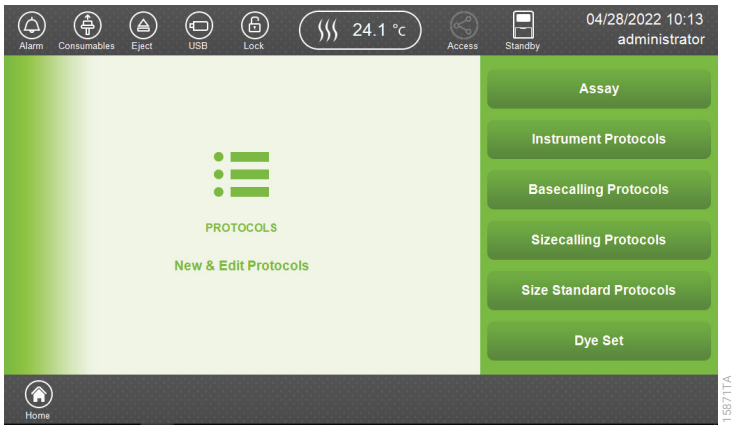



**Figure 117. 'New & Edit Protocols' screen.**

### 7.2.1 Creating a New Instrument Protocol

1. Select **Instrument Protocols** in the 'New & Edit Protocols' screen (Figure 117). This will open the 'Instrument Protocol List' screen (Figure 118).

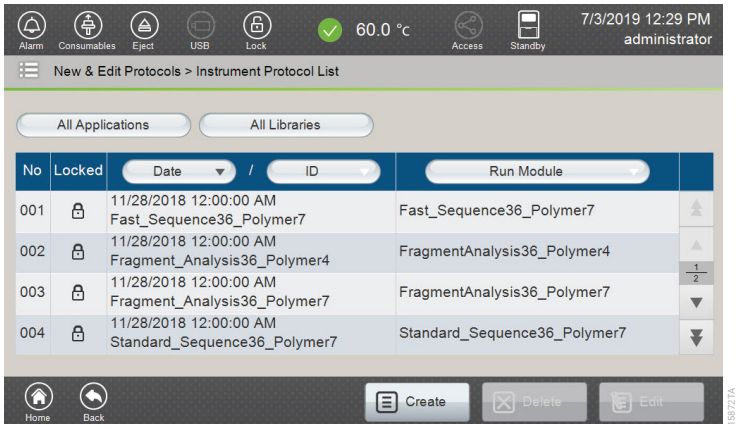



**Figure 118. 'Instrument Protocol List' screen.**

2. Select **Create** in the footer to open the 'New Instrument Protocol' screen (Figure 119).

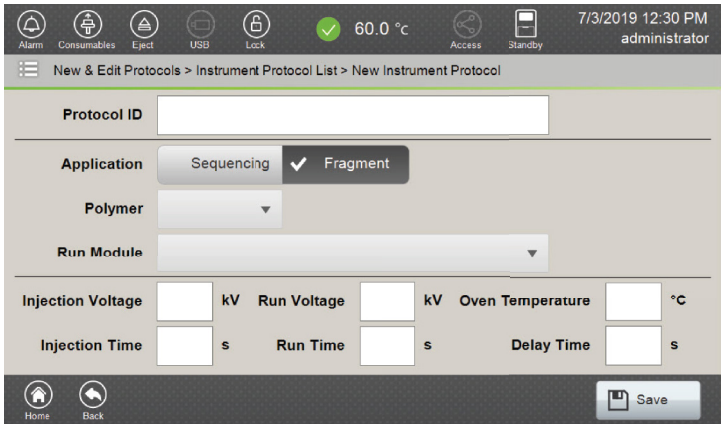



**Figure 119. 'New Instrument Protocol' screen.**

3. The 'New Instrument Protocol' screen displays the detailed parameters of the protocol.

| Parameter | Information | Minimum Value Allowed | Maximum Value Allowed |
|---|---|---|---|
| Protocol ID | Defines the protocol name | 1 Character | 40 Characters |
| Application Type | Defines whether the protocol is for Sequencing or Fragment analysis. | NA | NA |
| Polymer Type | Allows selection of Polymer4 or Polymer7 through drop-down box. | Assigned using the drop-down menu | Assigned using the drop-down menu |
| Run Module | Pre-loaded modules that specify run condition parameters (injection voltage, run voltage, oven temperature, injection time, run time and delay time). Each of these parameters can be edited from run module default value. | Assigned using the drop-down menu | Assigned using the drop-down menu |
| Injection Voltage (kV) | Defines the injection voltage | 1 | 15 |
| Run Voltage (kV) | Defines the voltage applied during electrophoresis | 1 | 18 |
| Oven Temperature (°C)[1] | Defines the target oven temperature setting for the protocol | 40 | 70 |
| Injection Time (sec) | Defines the injection duration | 1 | 600 |
| Run Time (sec) | Defines the time needed to complete the run and collect data from all labeled fragments | 300 | 7200 |
| Delay Time (sec) | Defines the time to delay data collection while fragments travel from the capillary tips to the detection window | 1 | 3600 |

[1] Changing the oven temperature in the protocol does not change the preheating temperature.

4. Enter a Protocol ID, and then select or enter the appropriate settings for the new instrument protocol.
5. Select **Save** to close the 'New Instrument Protocol' screen and return to the 'Instrument Protocol List' screen.

### 7.2.2 Creating a New Basecalling Protocol

1. Select **Basecalling Protocols** in the 'New & Edit Protocols' screen (Figure 117). This opens the 'Basecalling Protocol List' screen (Figure 120).

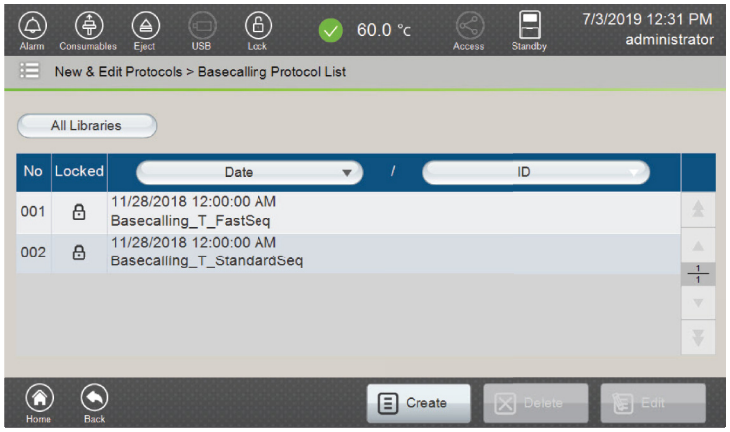



**Figure 120. 'Basecalling Protocol List' screen.**

2. Select **Create** in the footer to open the 'New Basecalling Protocol' screen (Figure 121). There are four tabs on the 'New Basecalling Protocol' screen.

| Tab | Description |
|---|---|
| Mixed Bases Setting | Checking the "Use Mixed Base Identification" box enables this function (Figure 121). If there are two peaks at the same position and the smaller intensity peak is greater than the Secondary Peak Height Threshold (height as a percentage of the major peak at the same position) set in the basecalling protocol, then the software will identify this peak as a mixed base.<br><br>Minimum and maximum values allowed for the Secondary Peak Height Threshold are 1% and 99%, respectively. |

| Tab | Description |
|---|---|
| Clear Range<br>First bp–Last bp | Checking the “Use Clear Range” box enables the user to define the first and last bp using the fields in the clear range diagram (Figure 123 and Figure 124).<br>**Note:** When creating a new Basecalling Protocol, the default setting for Clear Range First bp-Last bp is disabled (box unchecked).<br>When using the ‘Clear Range First bp–Last bp’ method in the basecalling protocol, the first bp position to be considered for analysis is set by entering the 5′ bp position in the ‘First bp’ field.<br>For the 3′ end point (last bp position to be considered for analysis), two last bp setting methods are available for setting the 3′ end of the clear range:<br>• Last bp: Enter the final base in the sequence to be considered for analysis (enter 3′ bp position in ‘Last bp’ field) (Figure 123).<br>• Bases to trim from 3′ end: Trims the specified number of bases from the 3′ end of the sequence run to determine the last bp to consider for analysis (enter number of bases to trim in ‘bp’ field) (Figure 124).<br>Minimum and maximum values allowed by software for ‘First bp’, ‘Last bp’ and ‘Bases to trim from 3′ end’ fields are 1bp and 1200bp, respectively. |
| Clear Range<br>Quality Value | Checking the “Use Quality Values” box defines the first and last bp using the quality value specified (Figure 125).<br>**Note:** When creating a new Basecalling Protocol, the default setting for Clear Range Quality Value is disabled (box unchecked).<br>The software creates a clear range by removing bases from the 5′ and 3′ end of the read based on QV values. In the resulting clear range, no sliding window of ‘bases out of’ (e.g., 30) will contain more than the specified number of bases (e.g., 4 in the ‘fewer than’ field) with a QV value below that set in the ‘have QVs less than’ field (e.g., 20) (Figure 125). Any sliding 30 base window in the first or last part of the sequence that does not meet these parameters is trimmed from these ends.<br>Minimum and maximum values allowed by software for ‘fewer than’ and ‘bases out of’ fields are 1bp and 1,200bp, respectively. The value entered in the ‘fewer than’ field must always be less than the ‘bases out of’ field.<br>Minimum and maximum values allowed by software in the ‘have QVs less than’ field are 1 and 60, respectively. |

| Tab | Description |
|---|---|
| Sequencing Quality | Defines the CRL, QV20+ and Trace Score values for passing and failing data (Figure 126). Data that fall between these values will be flagged as “Suspect” (data should be manually reviewed in ‘Result’ tab to determine whether or not it is acceptable to the user or requires reinjection). See ‘Result’ Tab in Section 5.7 for definition of CRL, QV20+ and Trace Score.<br><br>Minimum and maximum values allowed by software for CRL are 1bp and 800bp, respectively. The value entered in the ‘Fail’ field must always be less than the ‘Pass’ field.<br><br>Minimum and maximum values allowed by software for QV20+ are 1bp and 800bp, respectively. The value entered in the ‘Fail’ field must always be less than the ‘Pass’ field.<br><br>Minimum and maximum values allowed by software for Trace Score are 1 and 60, respectively. The value entered in the ‘Fail’ field must always be less than the ‘Pass’ field. |

3. Enter a Protocol ID, and then check the “Use Mixed Base Identification” box on the ‘Mixed-Bases Setting’ tab, if desired, followed by the Secondary Peak Height Threshold value (Figure 121).

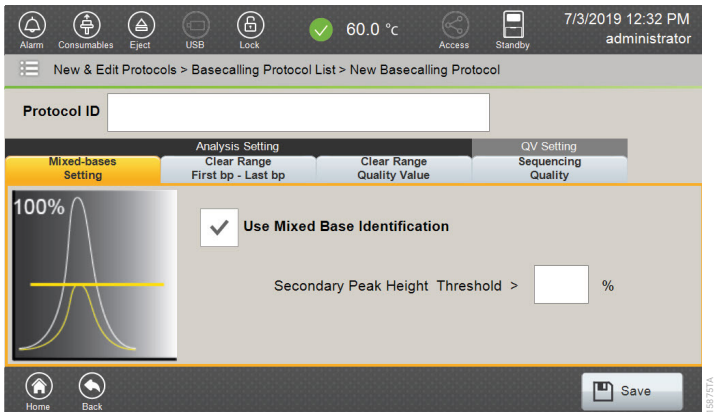



**Figure 121. ‘New Basecalling Protocol’ screen.**

4. Select the 'Clear Range First bp–Last bp' tab to reveal the options for setting the first and last base to consider for analysis (Figure 122).

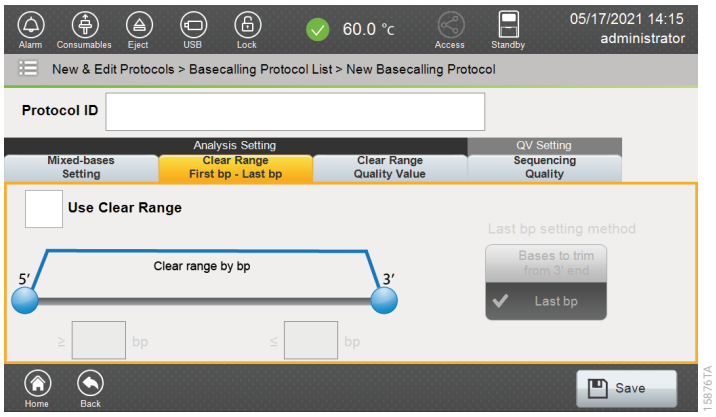



**Figure 122. 'Clear Range First bp–Last bp' tab.**

5. Check the "Use Clear Range" box to activate the buttons for choosing the setting for first and last base (Figure 123). When this is enabled, the first bp position to be considered for analysis is set by entering this value in the 'First bp' field. The default 3´ base setting is Last bp (e.g., if set to 700bp, any bases after the base pair number 700 will not be analyzed). Enter the desired values to specify the first and last bases of the sequence to consider for analysis.

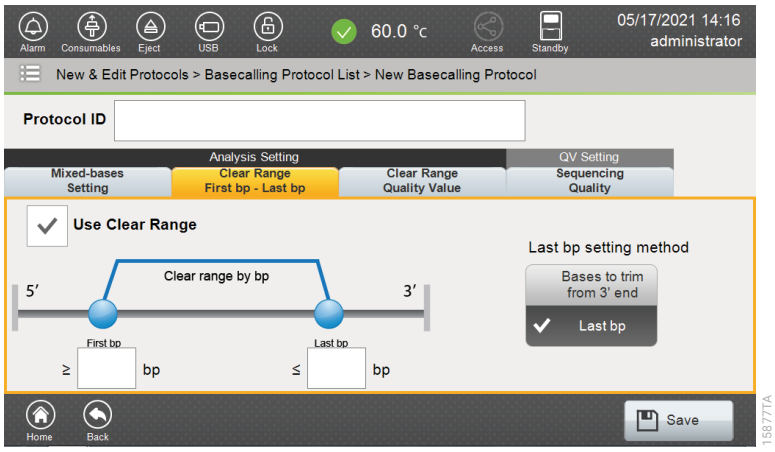



**Figure 123. 'Use Clear Range': Last bp view.**

6. Select **Bases to trim from 3´ end**. When this is enabled, the first bp position to be considered for analysis is set by entering this value in the 'First bp' field. The number of bases to trim from the 3´ end of the sequence is entered into the 'bp' field (Figure 124). Under this setting the last base considered for analysis would depend on the length of sequence obtained.

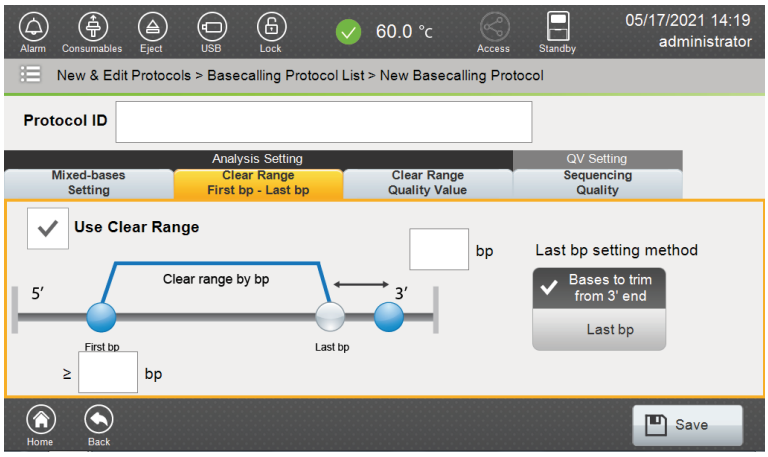



**Figure 124. 'Use Clear Range': Bases to trim from 3´ end view.**

7. Alternatively, the Clear range can be defined by quality value by selecting the "Clear Range Quality Value" tab and checking the "Use Quality Values" box (Figure 125). In the 'fewer than' field, enter the number of bases that can have a QV lower than that specified in the 'have QVs less than' field over a window size specified in the 'bases out of' field. For example, fewer than 4 bases out of a window size of 30 bases can have QVs less than 20 (equivalent to no more than 4 bases over a window size of 30 bases can have a QV less than 20).

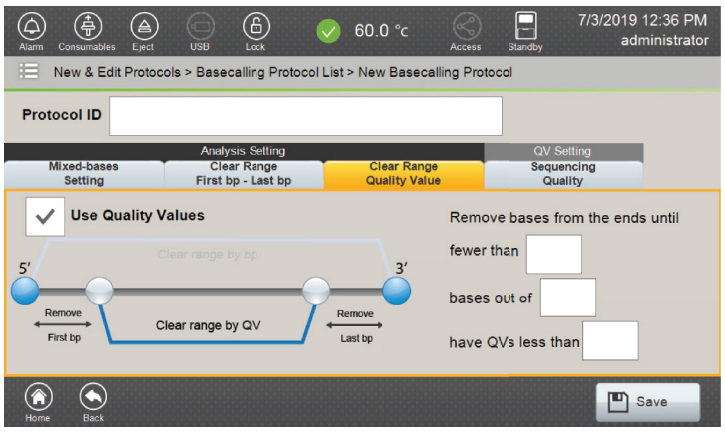



**Figure 125. 'Clear Range Quality Value' tab.**

8. Select the 'Sequencing Quality' tab to reveal the default settings for minimum passing and maximum failing CRL, QV20+ and Trace Score values (Figure 126). Select which parameters to use for assessing sequencing quality by checking the appropriate box to the left of the CRL, QV20+ and Trace Score parameters.

   **Notes:**

   a. Suspect CRL, QV20+ and Trace Score value ranges are defined by the minimum passing and maximum failing CRL, QV20+ and Trace Score values entered.

   b. It is not a requirement to select all three sequencing quality parameters. Any one or two parameters may be selected as well as all three.

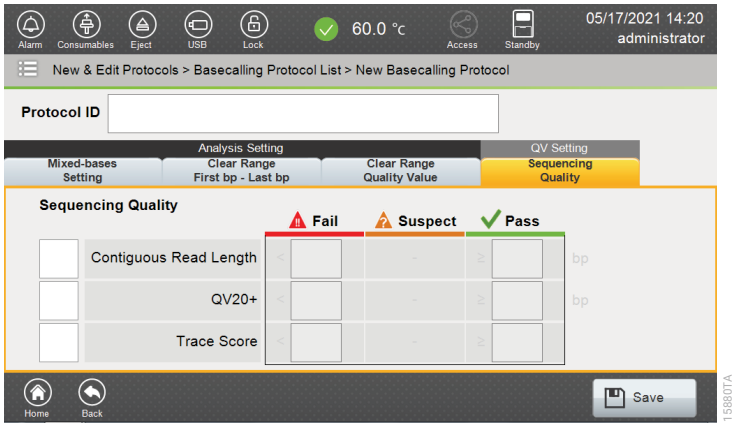



**Figure 126. 'Sequencing Quality' tab.**

9. Select **Save** to save the new basecalling protocol, close out of the 'New Basecalling Protocol' screen and return to the 'Basecalling Protocol List' screen.

## 7.2.3 Creating a New Sizecalling Protocol

1. Select **Sizecalling Protocols** in the 'New & Edit Protocols' screen (Figure 117). This opens the 'Sizecalling Protocol List' screen (Figure 127).

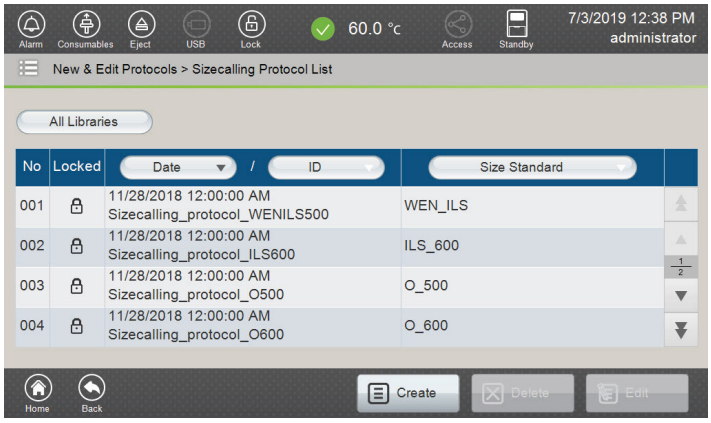



**Figure 127. 'Sizecalling Protocol List' screen.**

2. Select **Create** in the footer to open the 'New Sizecalling Protocol' screen (Figure 128). There are five tabs in the 'New Sizecalling Protocol' screen.

| Tab | Description |
|---|---|
| Size Standard | Defines the size standard (Figure 129) to use in the sizecalling protocol and specifies which peaks within the size standard are used by the sizecalling protocol when calculating sizing quality (SQ) and electrophoresis quality (EQ). See 'Result' Tab in Section 5.7 for definition of SQ and EQ.<br>**Note:** Size standard selected must match that used with samples. |
| Analysis Range | Defines the range in scan numbers/data points from which to process the data for peak detection.<br>• Full: Analyzes the entire range from beginning to end of the collection process, including the primer peak (Figure 130).<br>• Partial: Allows the user to define the start and end points of the analysis range in scan number/data points using the fields in the 'Analysis Range' tab (Figure 131). The data point range allowed by software for Start Point and Stop Point is 1 to 32767. The numerical value for Start Point must always be lower than the numerical value entered for Stop Point (Figure 131).<br>**Note:** Data points outside of the specified analysis range are not analyzed. Therefore, all of the size standard peaks expected for the Sizecalling Protocol used must fall within the start and stop points selected when choosing partial range; otherwise, a failing size quality will be obtained. |
| Peak Amplitude Threshold | Defines the minimum RFU value at which to size and call a peak. Peaks below this threshold will not be called, but peaks below the threshold will still be displayed (range allowed by software is 1RFU to 30,000RFU) (Figure 132). A threshold must be set for the dye channel used for the size standard. Peaks in the size standard must exceed the peak amplitude threshold value set in the Sizecalling Protocol in order for that peak to be considered in the sizecalling algorithm. If a peak or peaks in the size standard fall below the peak amplitude threshold, it may result in a reduced SQ and EQ value for that sample. Thresholds are generally set to be the same as those used for secondary analysis. |
| Size Quality | Defines the SQ values for passing and failing SQ data. Sizing data that fall between these values will be flagged as "Suspect" (data should be manually reviewed in 'Result' tab to determine whether or not it is acceptable to the user or requires reinjection). See 'Results' Tab in Section 5.7 for definition of SQ.<br>**Note:** Default values are supplied when creating a new sizecalling protocol but may be edited by the user. The SQ range allowed by the software is 0.001 to 1. The numerical value for 'Fail' must always be lower than the numerical value entered for 'Pass' (Figure 133). |

| Tab | Description |
|---|---|
| Electrophoresis Quality | Defines the EQ values (in bp) for passing and failing data. Sizing data that fall between these values will be flagged as 'Suspect' (data should be manually reviewed in 'Result' tab to determine whether or not it is acceptable to the user or requires reinjection).<br>See 'Result' Tab in Section 5.7 for definition of EQ.<br>**Note:** Default values are supplied when creating a new sizecalling protocol but may be edited by the user. The EQ range allowed by the software is 1 to 1,000. The numerical value for Fail must always be lower than the numerical value entered for Pass (Figure 134). |

3. Enter a Protocol ID, and then select a pre-existing Size Standard Protocol from the drop-down list in the 'Size Standard' tab (Figure 128).
4. Select **Detail** to review the parameters of the selected Size Standard protocol (Figure 129). Select **Close** to return to the 'New Sizecalling Protocol' screen.

   **Note:** To edit a Size Standard protocol, see Section 7.3.1.

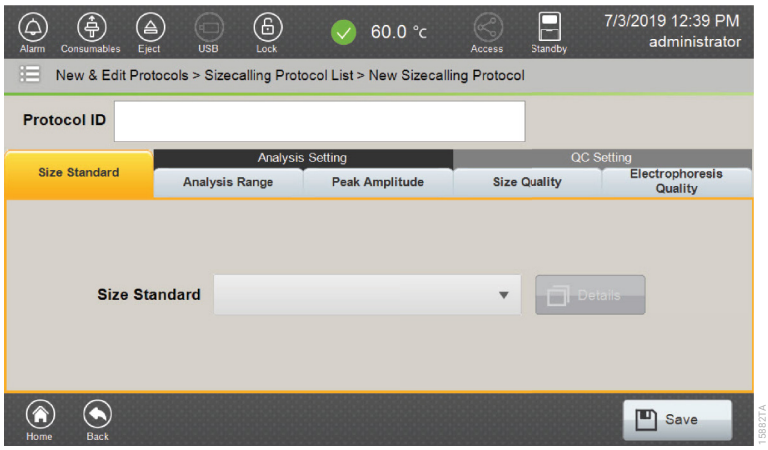



**Figure 128. 'New Sizecalling Protocol' screen.**

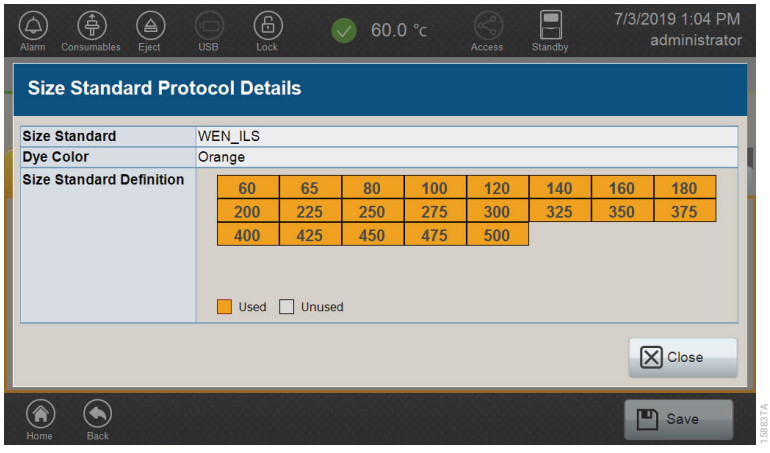



**Figure 129. 'Size Standard Protocol Details' from 'New Sizecalling Protocol' screen.**

5. Select the 'Analysis Range' tab to reveal the Analysis Range (Figure 130).

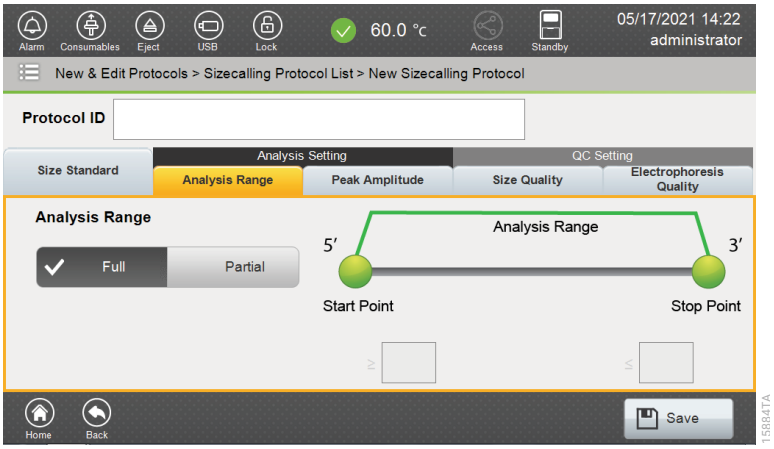



**Figure 130. Full 'Analysis Range' tab.**

6. The default setting is full range. Partial range analysis can be enabled by selecting **Partial**, at which time you are prompted to enter values in bases for the start and stop points for partial range analysis (Figure 131). Enter a Start Point, in data points, after the primer peak and before the first required size standard peak. Enter a Stop Point after the last required size standard fragment. View raw data from previous runs (see Section 6.1) to determine the appropriate start and stop points.

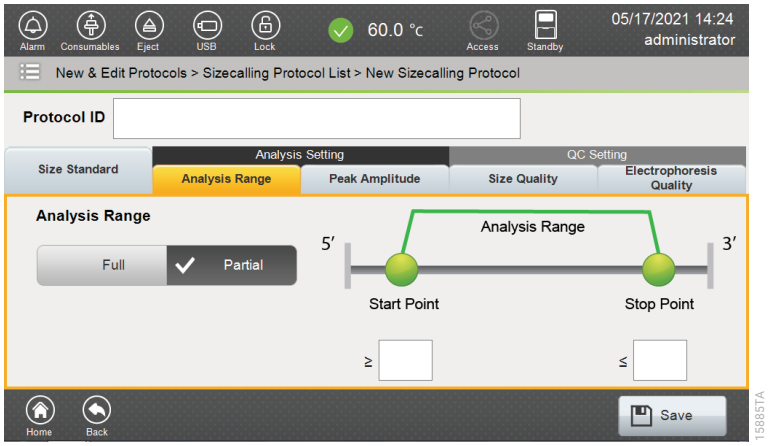



**Figure 131. Partial 'Analysis Range' view.**

7. Select the 'Peak Amplitude' tab to reveal the options for setting the size standard peak amplitude thresholds (Figure 132).

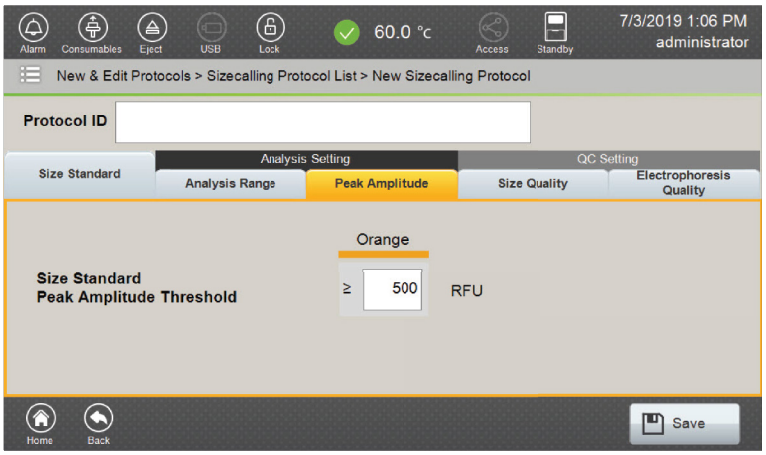



**Figure 132. 'Peak Amplitude' tab.**

8. Enter a Peak Amplitude Threshold value for the dye channel that contains the size standard. A Peak Amplitude Threshold value must be set for the dye channel that contains the size standard in order for the sizing quality (SQ) and electrophoresis quality (EQ) to be determined.

   **Note:** Peaks that fall below the peak amplitude thresholds will still be present and available for analysis in secondary analysis software.

9. Select the 'Size Quality' tab to reveal the default settings for minimum passing and maximum failing SQ values (Figure 133). These parameters can be changed when creating a new size calling protocol.

   **Note:** Suspect SQ value range is defined by the minimum passing and maximum failing SQ values entered.

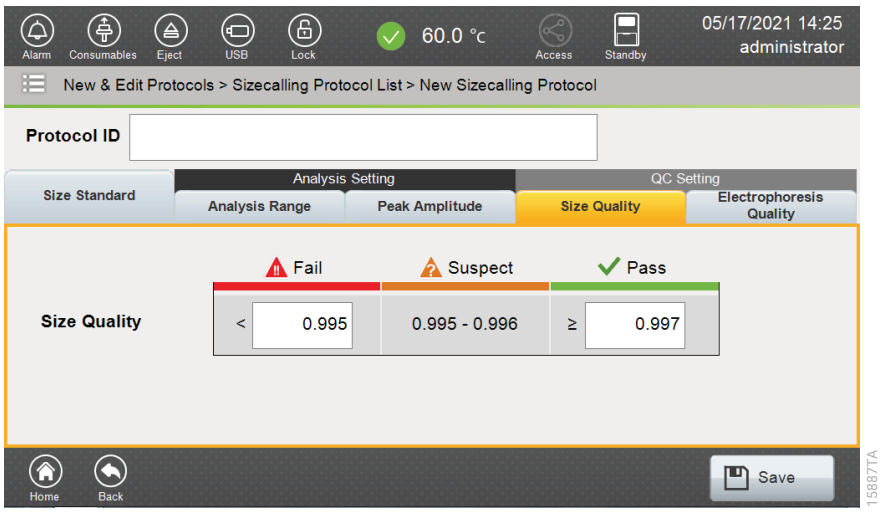



**Figure 133. 'Size Quality' tab.**

10. Select the 'Electrophoresis Quality' tab to reveal the default settings for minimum passing and maximum failing EQ values (Figure 134). These parameters can be changed when creating a new sizecalling protocol.

    **Note:** Suspect EQ value range is defined by the minimum passing and maximum failing EQ values entered.

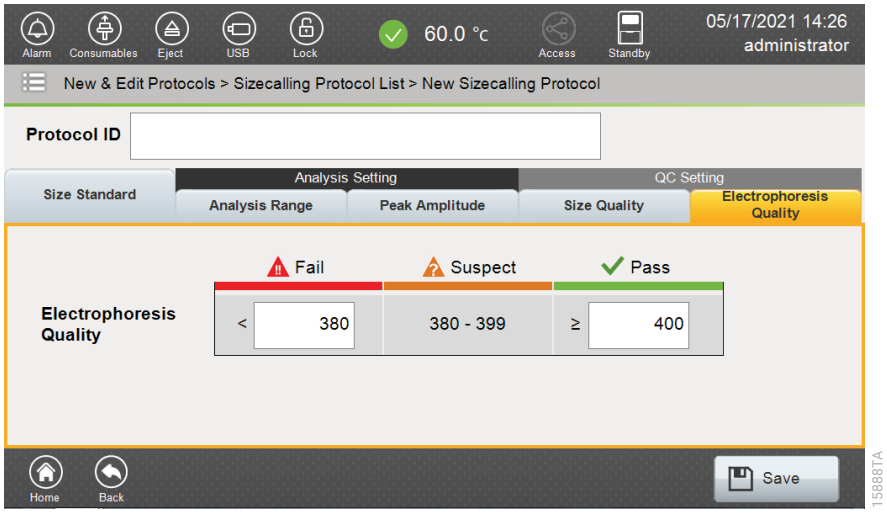



**Figure 134. 'Electrophoresis Quality' tab.**

11. Select **Save** to save the new sizecalling protocol, close out of the 'New Sizecalling Protocol' screen and return to the 'Sizecalling Protocol List' screen.

## 7.2.4 Creating a New Size Standard

**Note:** A new size standard protocol must be created for use with any new dye set that was created using the Custom Dye Template (see Section 7.2.6). This new size standard protocol must be in the same dye channel as that identified for the size standard in the newly created dye set.

1. Select **Size Standard Protocols** in the 'New & Edit Protocols' screen (Figure 117). This opens the 'Size Standard Protocol List' screen (Figure 135).

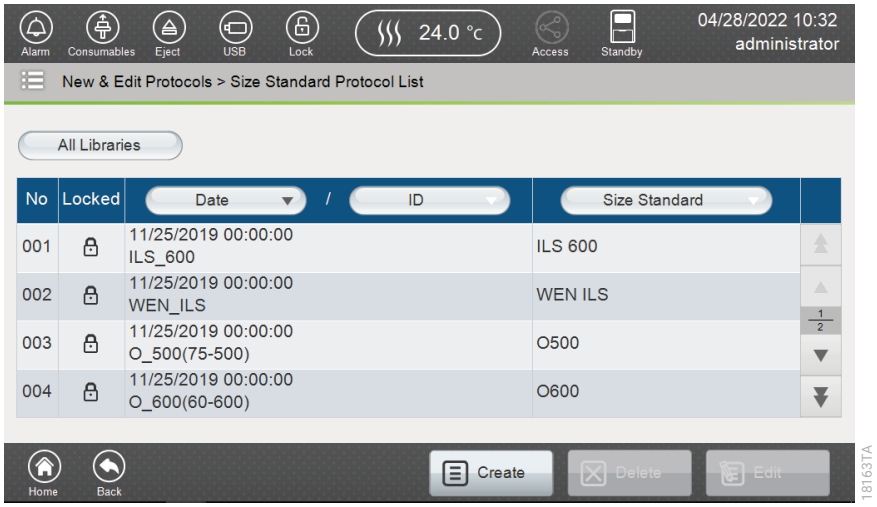



**Figure 135. 'Size Standard Protocol List' screen.**

2. Select **Create** in the footer of the 'Size Standard Protocol List' screen to open the 'New Size Standard Protocol' screen.
3. Enter a unique Size Standard ID, and then select either **Red** or **Orange** from the drop-down list for Dye Color (Figure 136).

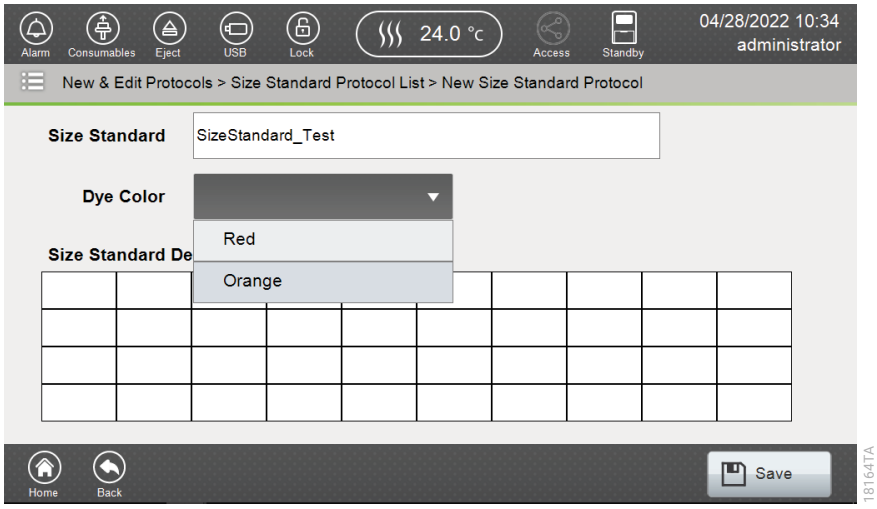



**Figure 136. 'New Size Standard Protocol' screen.**

4. Select the grid area of the 'Size Standard Definition' table (Figure 137).

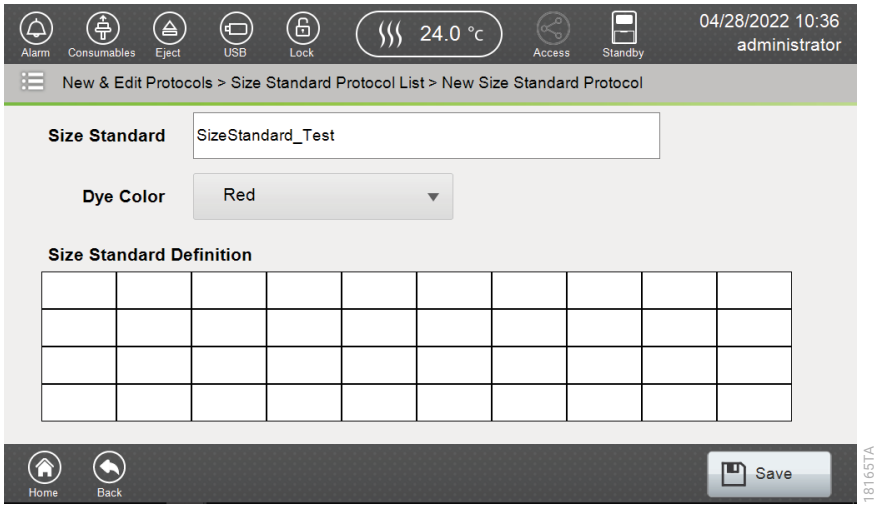



**Figure 137. 'New Size Standard Protocol' screen.**

5. A pop-up window will be displayed allowing the user to enter the size for the size standards (Figure 138). Each value needs to be separated with a comma (,). Select **OK** to close the window.

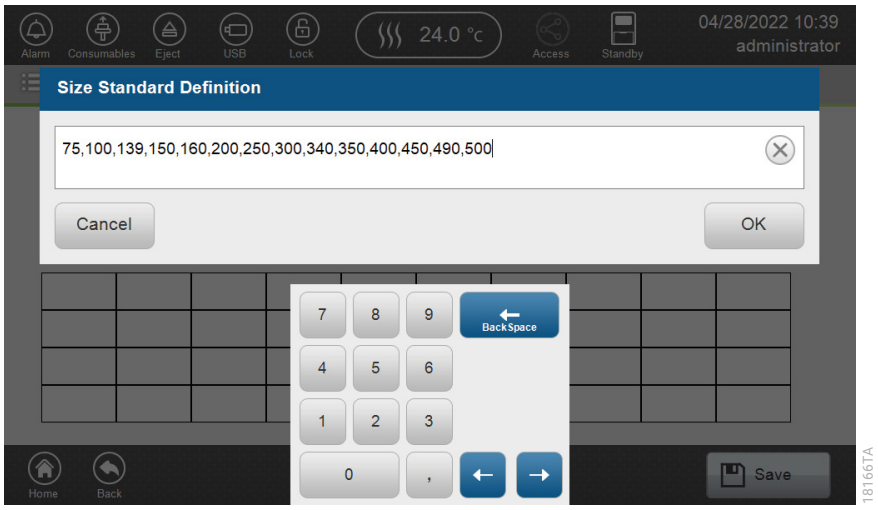



**Figure 138. 'Size Standard Definition' screen.**

**Note:** The Size Standard Protocol must have a minimum of four peaks defined. Non-uniform intervals between the size standard fragments are necessary. Uniform intervals between the size standard fragments may cause the software to misidentify the sample and noise peaks. For example:

Uniform intervals: 20, 40, 60, 80 bp (not recommended)

Non-uniform intervals: 20, 40, 80, 140 bp (recommended)

6. Confirm the sizes of the standards displayed on the 'New Size Standard Protocol' screen and select **Save** (Figure 139).

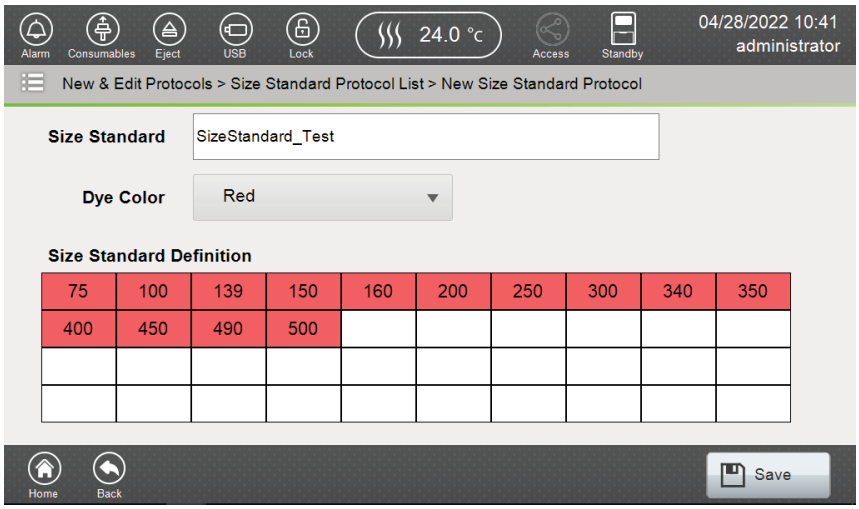



**Figure 139. 'Size Standard Definition' screen.**

7. A confirmation message window will be displayed. Select **Yes** to confirm the changes

## 7.2.5 Creating a New Assay

1. Select **Assay** in the 'New & Edit Protocols' screen (Figure 117). This opens the 'Assay List' screen (Figure 140).

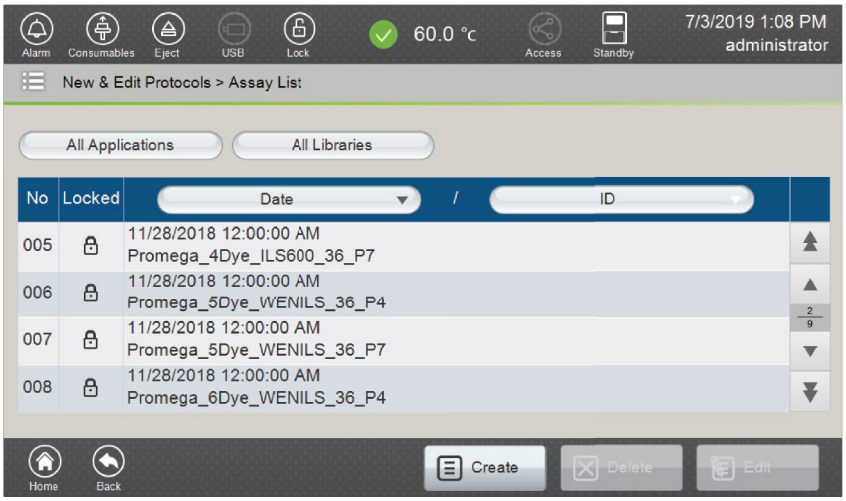



**Figure 140. 'Assay List' screen.**

2. Select **Create** in the footer to open the 'New Assay' screen (Figure 141).

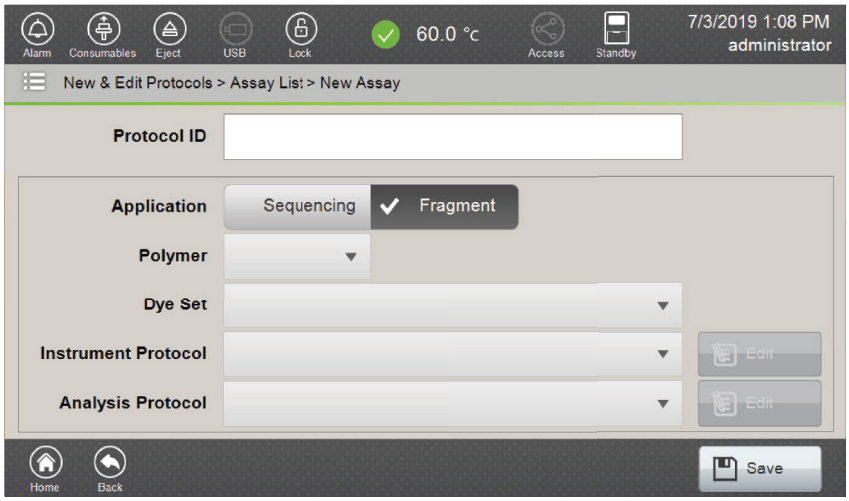



**Figure 141. 'New Assay' screen.**

3. The 'New Assay' screen displays the detailed parameters of the protocol.

| Parameter | Information |
|---|---|
| Protocol ID | Defines the protocol name. |
| Application Type | Defines whether the protocol is for Sequencing or Fragment analysis. |
| Polymer Type | Drop-down box allows you to select Polymer4 or Polymer7.[1] |
| Dye Set | Drop-down box allows you to select the appropriate dye set for the chemistry being run. |
| Instrument Protocol | Specifies the Instrument Protocol to be applied during data collection.<br>Edit opens the Edit Instrument Protocol screen (see Section 7.3.2). |
| Analysis Protocol | Specifies the Analysis Protocol to be appplied to the collected data:<br>• Basecalling Protocol for Sequencing analysis.<br>• Sizecalling Protocol for Fragment analysis.<br>Edit opens the Edit Analysis Protocol screen (see Section 7.3.2). |

[1]Only Polymer7 can be chosen for Sequencing analysis. Polymer4 is **not** allowed for sequencing analysis.

**Note:** Edits made to the Instrument or Analysis Protocol from the 'Edit Assay' screen do not change the parameters of those protocols stored in the library. Changes are only stored with the specific assay.

4. Enter a Protocol ID, and then select or enter the appropriate settings for the new assay.
5. Select **Save** to close the 'New Assay' screen and return to the 'Assay List' screen.

### 7.2.6 Creating a New Dye Set

A dye set for an assay can be selected from a preloaded Dye Set or by creating one. Dye sets may be created by selecting a dye set template based on a preloaded dye set (in which case, only Condition Number and Quality Value may be changed) or the Custom Dye Template. The Custom Dye Template does not have optimized binning but allows freedom to choose the following:

- Dye selection for spectral calibration
- Order of dyes in the spectral calibration standard
- If all or a subset of the dyes used in the spectral calibration are used in the samples run with that dye set.
- Condition Number and Quality Value
- Dye channel that will be used for size standard in samples run with that dye set.

**Note:** Custom matrix standards should meet all the following criteria:

- Size range: 60–300bp
- Peak height: ≥500RFU
- Peak height ratio (min/max): ≥¼ (or 25%) (For example, the peak height ratio is 25% when the maximum peak height is 4,000RFU and the minimum peak height is 1,000RFU).

**Notes:**

a. A preloaded dye set can be duplicated by creating a new dye set using that preloaded dye set as the template. A preloaded dye set cannot be duplicated by editing a preloaded dye set.

b. Fragment migration time is reduced by low ambient temperature and/or aged polymer (polymer close to its expiration date and/or that has been on the instrument for almost 14 days). If using large spectral calibration fragments (e.g., close to 300bp limit), not all fragments will be detected when run under these conditions. This will result in failing spectral calibration.

c. The Promega 8-dye dye set cannot be used as a template to create a new Dye Set.

1. Select **Dye Set** in the 'New & Edit Protocols' screen (Figure 117). This opens the 'Dye Set List' screen (Figure 142).

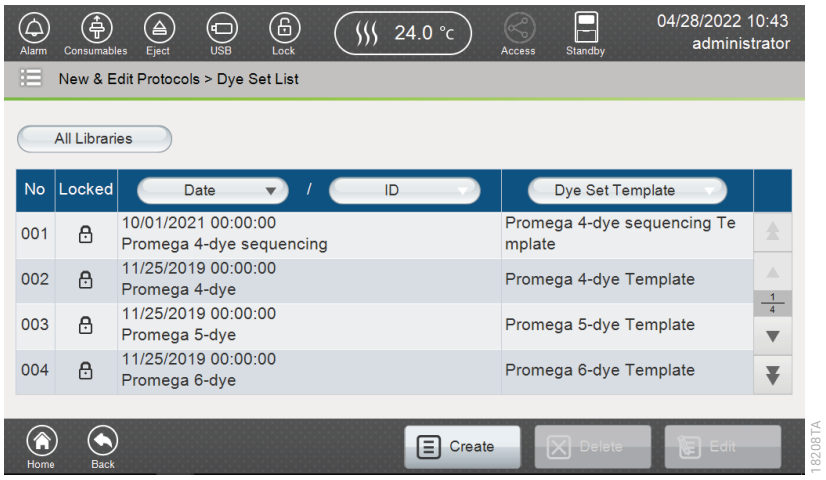



**Figure 142. 'Dye Set List' screen.**

2. Select **Create** in the footer of the 'Dye Set List' screen to open the 'New Dye Set' screen.
3. Enter a Dye Set ID and select the appropriate Application and Dye Set Template (Figure 143). Select **Edit**.

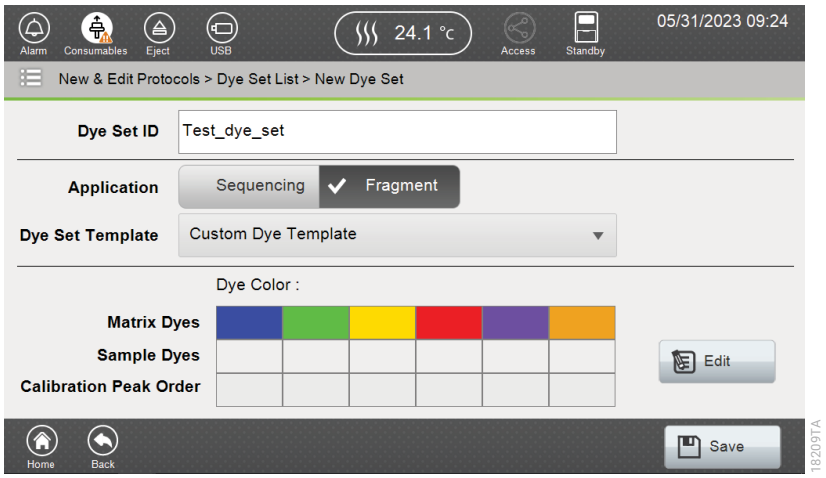



**Figure 143. 'New Dye Set' screen.**

**Note:** When the Custom Dye Template is selected from the 'Dye Set Template' drop-down box, you can custom select dyes and the dye detection order. When you select an existing dye set template, you can only edit the Condition Number and Quality Value.

4. Using the 'Dye Color' drop-down box, assign a dye color for the Size Standard (Figure 144).

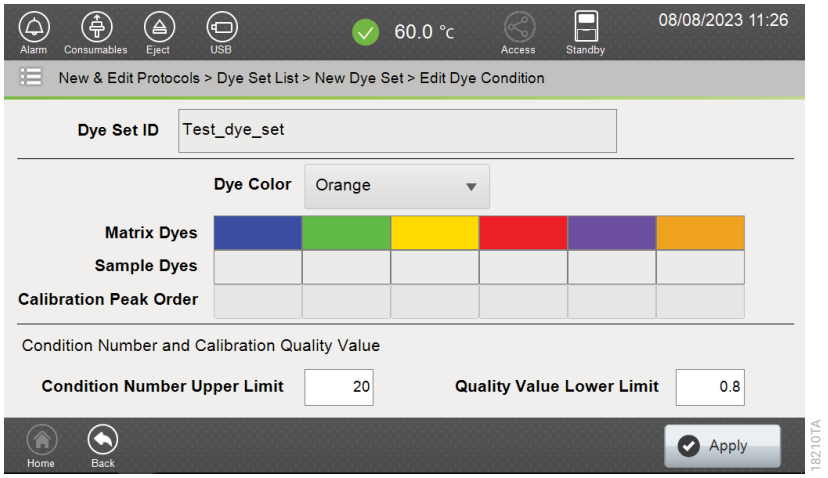



**Figure 144. 'Edit Dye Condition' screen.**

**Note:** When creating a new dye set using the Custom Dye Template, a new custom size standard must be created (see Section 7.2.4) in the dye channel selected for the size standard. Using one of the preloaded size standards with a new dye set created using the Custom Dye Template is not possible, even if the preloaded size standard is in the same dye channel as that selected for the size standard in the new dye set. Alternatively, if a new dye set is created using one of the preloaded dye set templates (e.g., Promega 5-Dye Template), then using a preloaded size standard (e.g., WEN ILS can be used with Promega 5-Dye) is possible as well as a new custom size standard (in the dye channel selected for the size standard in the new dye set).

5. Select the dyes used for Spectral Calibration on the Matrix Dyes row. This row shows the order that the dyes will appear in the 'Matrix Data' tab (Figure 55) and assigns a numerical value for each dye based on this order. In the example below, Blue = 1, Green = 2, Yellow = 3, Red = 4, Purple = 5 and Orange = 6. Select the dyes used for samples on the Sample Dyes row (Figure 145).

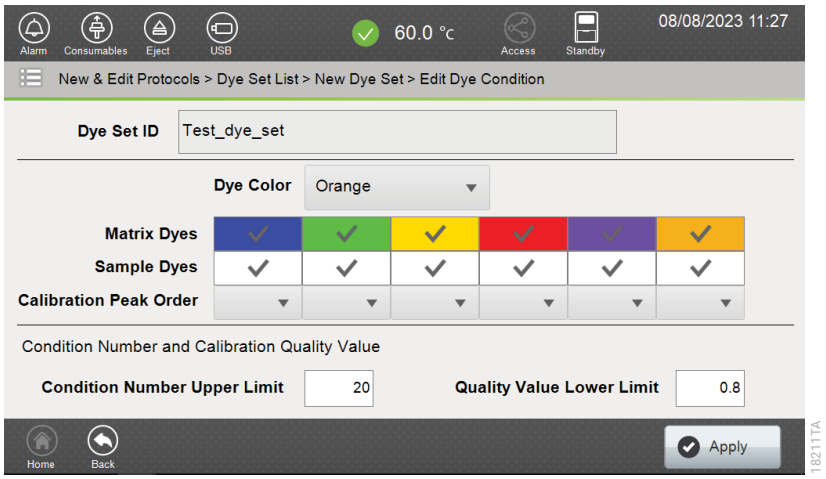



**Figure 145. Selecting the dyes in the 'Edit Dye Condition' screen.**

**Note:** The dye color selected for the Size Standard must be selected for the Matrix Dyes and Sample Dyes. All or a subset of the dyes selected for the Matrix Dyes may be selected as Sample Dyes.

6. Configure the dye order in Calibration Peak Order. The Calibration Peak Order correlates the position of the dyes as they pass the detector relative to the order shown in the Matrix Dyes row (Figure 145). In this example, as the orange dye is in the sixth position in the Matrix Dyes row, but is the first dye labeled spectral calibration fragment to pass the detector (Figure 146), then the number 6 is listed first in the Calibration Peak Order row (Figure 147), showing that orange (6) will be detected first. The red dye is listed fourth in the Matrix Dyes row and is the second peak to pass the detector during calibration, therefore 4 is listed in the second cell of the Calibration Peak Order row (Figure 147), showing that red (4) will be detected second. Continue assigning Calibration Peak Order using this convention.

   **Note:** If not all dyes are selected in the Matrix Dyes row, the numbering of the positions changes. For example, if 5 dyes are selected and only purple is omitted, the orange dye would be considered the fifth position, rather than the sixth position.

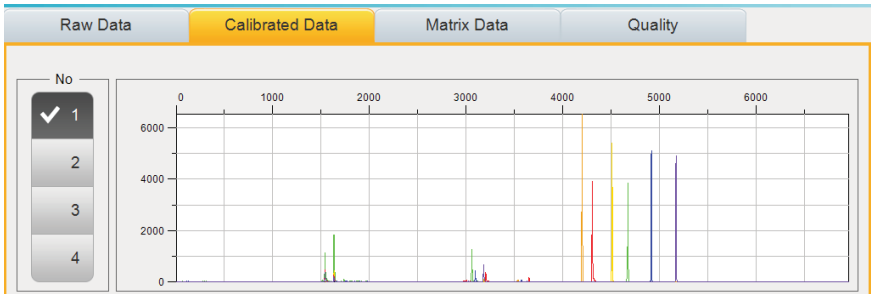



**Figure 146. Dye order detected in Spectral Calibration.**


**Figure 147. Configuring the dye detection order in the 'Edit Dye Condition' screen.**

7. Enter the values for Condition Number and Quality Value (Figure 148). Select **Apply**.

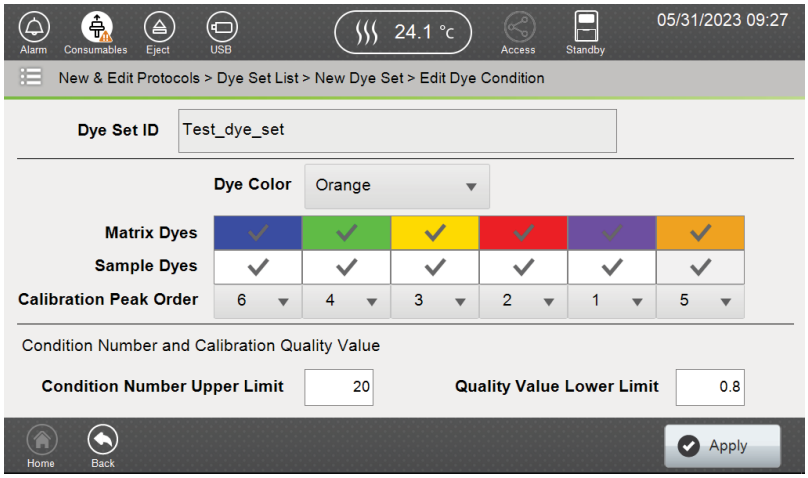



**Figure 148. Adding Condition Number and Quality Values to the 'Edit Dye Condition' screen.**

The following Table lists the Preloaded dye sets, Condition Numbers and Quality Values for Dye Sets.

| Application | Template | Condition Number Upper Limit | Quality Value Lower Limit |
|---|---|---|---|
| Fragment | Promega 4-dye | 8.5 | 0.95 |
| Fragment | Promega 5-dye | 13.5 | 0.95 |
| Fragment | Promega 6-dye | 8.5 | 0.95 |
| Fragment | Promega 8-dye | 10 | 0.95 |
| Fragment | AB 5-dye | 13.5 | 0.95 |
| Fragment | AB 6-dye | 8 | 0.95 |
| Fragment | Qiagen 5-dye | 20 | 0.95 |
| Fragment | Qiagen 6-dye | 13.5 | 0.95 |
| Fragment | Custom Dye | 20 | 0.80 |
| Sequencing | AB 4-dye sequencing | 5.5 | 0.95 |
| Sequencing | Promega 4-dye sequencing | 5.5 | 0.95 |

8. Confirm that the New Dye Set screen reflects the essential information for the custom dye set (Figure 149). Select **Save**.

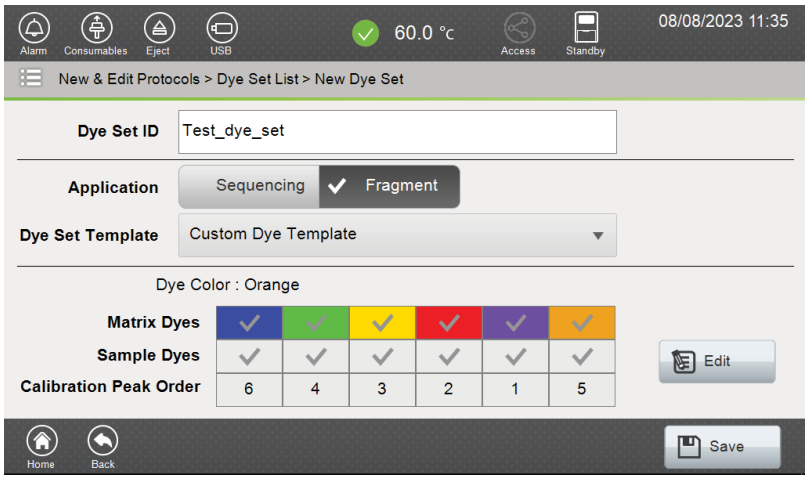



**Figure 149. Saving the custom dye set in the 'New Dye Set' screen.**

# 7.3 Editing Protocols, Assays and Dye Sets

Select **New & Edit Protocols** on the 'Main Menu' screen (Figure 9) to access the 'New & Edit Protocols' screen (Figure 117). Instrument, Basecalling, Sizecalling and Size Standard protocols, Assays and Dye Sets can be accessed and edited from here.

## 7.3.1 Editing Size Standard Protocol

1. Select **Size Standard Protocols** in the 'New & Edit Protocols' screen (Figure 117). This opens the 'Size Standard Protocol List' screen (Figure 150).

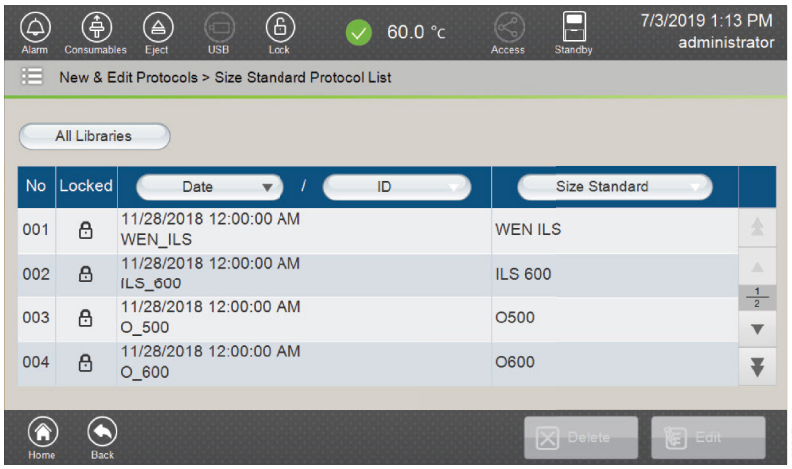



**Figure 150. 'Size Standard Protocol List' screen.**

2. Locate the desired Size Standard protocol in the list using scroll buttons on the right side of the list. Select the size standard you want to edit on the 'Size Standard Protocol List' screen (Figure 150). This will activate **Edit** and **Delete** in the footer (Figure 151).

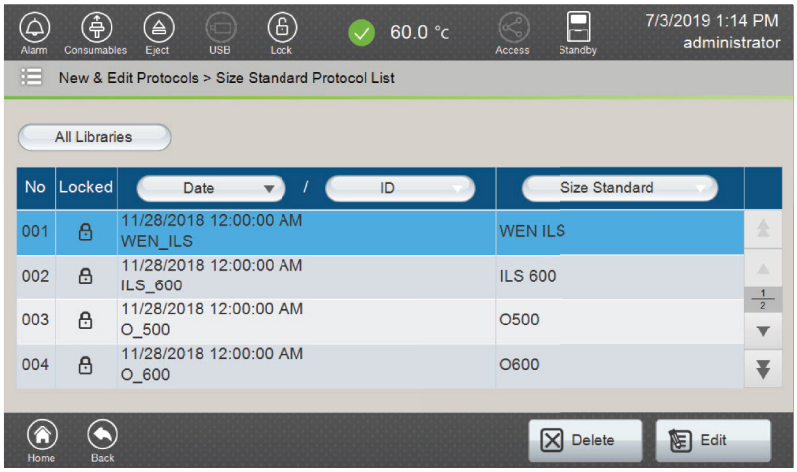



**Figure 151. 'Size Standard Protocol List' screen with selected Size Standard.**

3. Select **Edit** in the footer to open the 'Edit Size Standard Protocol' screen (Figure 152).

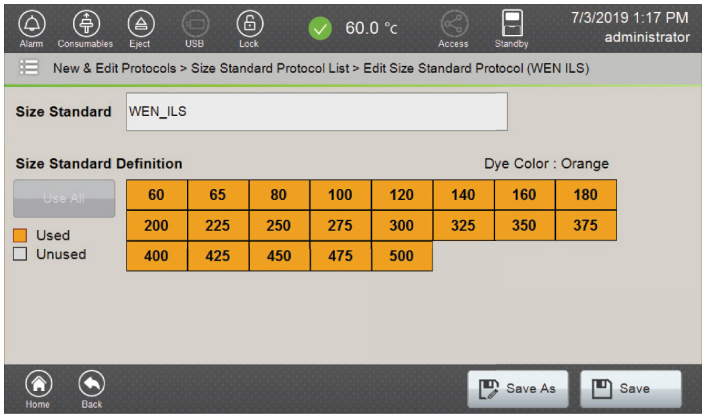



**Figure 152. 'Edit Size Standard Protocol' screen.**

4. Specific fragment sizes that are enabled for use by the software are indicated in orange or red, depending on the dye channel in which the size standard is located, whereas fragment sizes that are disabled for use are grayed out. The controls on the 'Edit Size Standard Protocol' screen are as follows.

| Setting | Description |
|---|---|
| Size Standard | Defines the size standard name |
| Dye Color | Specifies the dye channel containing the size standard fragments (not editable). |
| Size Standard Definition | Defines the fragment sizes to be used for creating a sizing curve (Orange or Red shading indicates the size is to be used. Gray shading indicates the size will not be used).<br>Individual sizes can be selected or deselected by selecting the corresponding size on the screen.<br>**Use All** —selects all listed sizes for use in sizecalling. |

5. Make the desired changes to the Size Standard Protocol by selecting the specific fragment size you wish to disable (grayed out) or use (orange or red), and then select **Save** in the footer to save the changes and overwrite the existing protocol (if it is not locked), or select **Save As** to save as a new protocol.
6. Enter a Size Standard Protocol name in the Size Standard name field that opens after selecting **Save As**. A keypad will become active on the touch screen. Alternatively, the new Size Standard Protocol name can be entered using a traditional keyboard if one is connected to the Spectrum Compact CE System. Select **OK** to exit. A warning window asking "Are you sure you want to create a new Protocol" appears. Selecting **Yes** completes the 'Save As' function and takes you back to the 'Size Standard Protocol List' screen. Selecting **No** closes the 'Save As' function and takes you back to the 'Edit Size Standard Protocol' screen.

### 7.3.2 Editing Instrument, Sizecalling and Basecalling Protocols, Assays and Dye Sets

Editing existing Instrument, Sizecalling and Basecalling protocols, Assays and Dye Sets is as stated in Section 7.2, and then referencing the appropriate section for creating new protocols and assays as shown.

| Edit Screen | Creating Assays and Protocol Section |
|---|---|
| Edit Instrument Protocol | 7.2.1 Creating a New Instrument Protocol |
| Edit Basecalling Protocol | 7.2.2 Creating a New Basecalling Protocol |
| Edit Sizecalling Protocol | 7.2.3 Creating a New Sizecalling Protocol |
| Edit Size Standard Protocol | 7.2.4 Creating a New Size Standard Protocol |
| Edit Assay | 7.2.5 Creating a New Assay |
| Edit Dye Sets | 7.2.6 Creating a New Dye Set |

## 7.4 Deleting Protocols, Assays and Dye Sets

1. Select **New & Edit Protocols** on the 'Main Menu' screen (Figure 9) to access the 'New & Edit Protocols' screen (Figure 117). Instrument, Basecalling, Sizecalling and Size Standard protocols, Assays and Dye Sets can be accessed and deleted from here after touching the appropriate section. Below is an example using the 'Size Standard Protocol' screen.

   **Note:** Preloaded protocols and assays cannot be deleted.

2. Select **Size Standard Protocols** in the 'New & Edit Protocols' screen (Figure 117). This opens the 'Size Standard Protocol List' screen (Figure 150).
3. Locate the desired Size Standard protocol in the list using scroll buttons on the right side of the list. Select the size standard you wish to delete on the 'Size Standard Protocol List' screen (Figure 150). This will activate **Edit** and **Delete** in the footer (Figure 151).
4. Select **Delete**. A warning window asking "Are you sure you want to delete the protocol?" will appear. Selecting **Yes** deletes the protocol and takes you back to the 'Size Standard Protocol List' screen. Selecting **No** closes the window and takes you back to the 'Size Standard Protocol List' screen without deleting the protocol.

## 7.5 Exporting and Importing Protocols and Assays

Instrument, Basecalling, Sizecalling and Size Standard protocols and Assays can be exported from one Spectrum Compact CE System and imported into another via a USB drive. All protocols are exported together in one .xml file. An example for exporting and importing Assays is shown in Sections 7.5.1 and 7.5.2.

**Notes:**

a. Only user-defined protocols can be exported from one instrument and imported into another.

b. Dye sets cannot be exported from one instrument to another.

### 7.5.1 Exporting Protocols and Assays

1. Select **Export All Protocols** on the 'Main Menu' screen (Figure 9) to access the 'Export All Protocols' screen (Figure 153). Enter a File Name for the exported protocols file by selecting the **File Name** field. This opens the 'File Name' window, and a keypad will become active on the touch screen. Alternatively, the File Name can be entered using a traditional keyboard if one is connected to the Spectrum Compact CE System. Enter the appropriate File Name, and then select **OK** to exit and return to the 'Export All Protocols' screen.

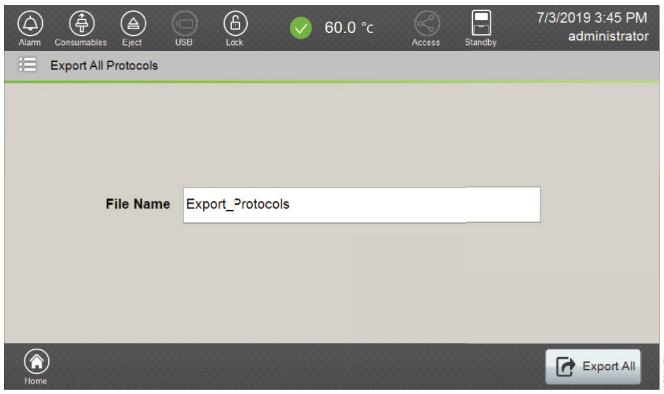



**Figure 153. 'Export All Protocols' screen.**

2. Insert a USB drive into the USB port in the front of the instrument.
3. Select **Export All** on the 'Export All Protocols' screen (Figure 153). A confirmation window will appear asking "Are you sure you want to export the protocols to the USB Device?" Select **Yes** to export the file, or select **No** to cancel out of the export process.
4. After completion of the export an information window will appear stating "Export completed successfully". Select **OK** followed by **USB** icon in the header before removing the USB drive from the storage USB port.

### 7.5.2 Importing Protocols and Assays

1. Select **Import Protocols** on the 'Main Menu' screen (Figure 9) to access the 'Import Protocols' screen (Figure 154).

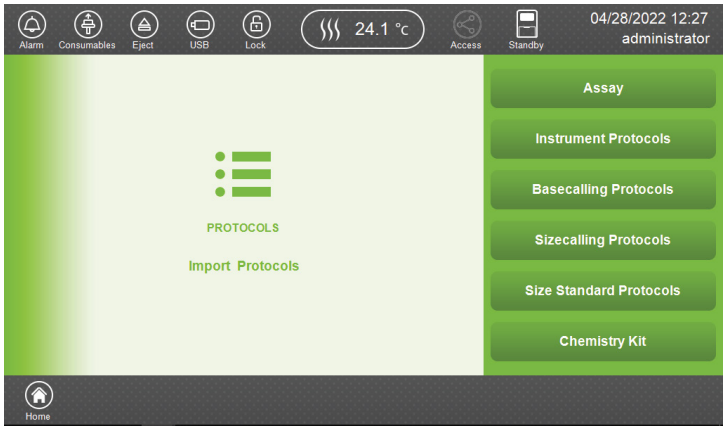



**Figure 154. 'Import Protocols' screen.**

2. Insert a USB drive containing the exported protocols file (see Section 7.5.1) into the USB port in the front of the instrument.
3. Select the appropriate protocol type on the 'Import Protocols' screen (Figure 154). This displays the 'Assay List' screen (Figure 155).

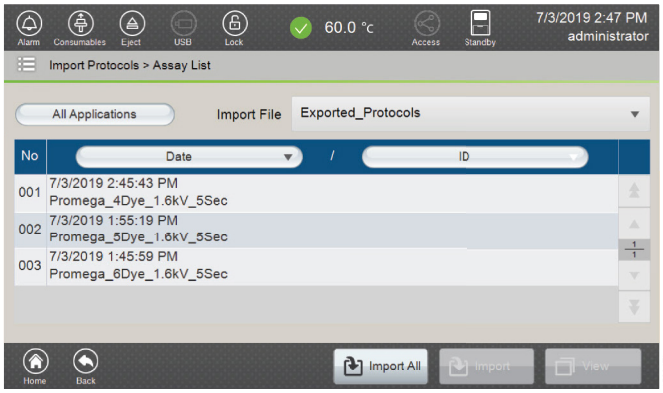



**Figure 155. 'Assay List' screen.**

4. Locate the desired protocol in the list using scroll buttons on the right side of the list. The filter and sort buttons may be used to aid in locating the protocol.
5. When the protocol is located, select it from the list, and then select **Import** in the footer.

   **Note:** While it is possible to view the details for the individual assay/protocol selected in Step 5 by selecting **View**, it cannot be edited from this path. To edit an imported protocol, follow the steps in Section 7.3 after the import is complete.
6. If an individual assay/protocol shares the same name as an existing protocol, a confirmation window will appear asking "Are you sure you want to overwrite?" Select **Yes** to proceed or **Cancel** to exit without importing.
7. Selecting **No** opens a 'Protocol ID' window and a keypad on the touch screen that allows the assay/protocol to be renamed prior to import. Alternatively, the new Protocol ID can be entered using a traditional keyboard if one is connected to the Spectrum Compact CE System. Enter the appropriate Protocol ID, and then select **OK**. A confirmation window will appear asking "Are you sure you want to import a new protocol?" Select **Yes** to proceed or **No** to exit without importing.
8. Alternatively, select **Import All** to import all the assays. A confirmation window will appear asking "Are you sure you want to import all protocols into the instrument?" Protocols that cannot be overwritten and protocols with invalid settings will skip import. Select **No** to exit the import and **Yes** to proceed with the import.
9. If an individual assay/protocol already exists, a confirmation window will appear asking "Are you sure you want to overwrite?" Select **OK** to overwrite or **Skip** to go to the next assay/protocol. Select **Cancel** to exit.

### 7.5.3 Chemistry Kit Add-on

The Chemistry Kit Add-on function allows the user to add Assays for new Chemistry Kits in the future.

1. Insert a USB drive that contains the Chemistry Add-on protocols in a sub-folder called ChemistryKit into the USB port on the front of the instrument.
2. Select **Import Protocols** on the Main Screen (Figure 156).


**Figure 156. 'Main' screen.**

3. Select **Chemistry Kit** to import the desired protocol (Figure 157). After this step, follow the procedure described in Section 7.5.2 Importing Protocols and Assays.

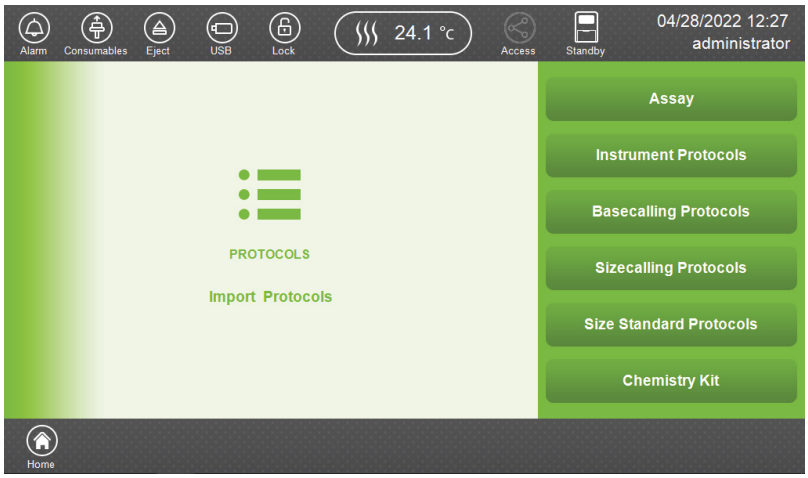



**Figure 157. 'Import Protocols' screen.**

# Managing Instrument Settings

# 8

Instrument settings are accessed through **Settings**, located in the footer on the 'Main Menu' screen (Figure 9) of the Spectrum Compact Control Software when logged in as an administrator (this button is not visible when logged in as a user). There are six types of instrument settings available in the Settings screen (Figure 158):

1. System Settings
2. Network Settings
3. Security Settings
4. User Account
5. Backup Settings
6. File Name Convention

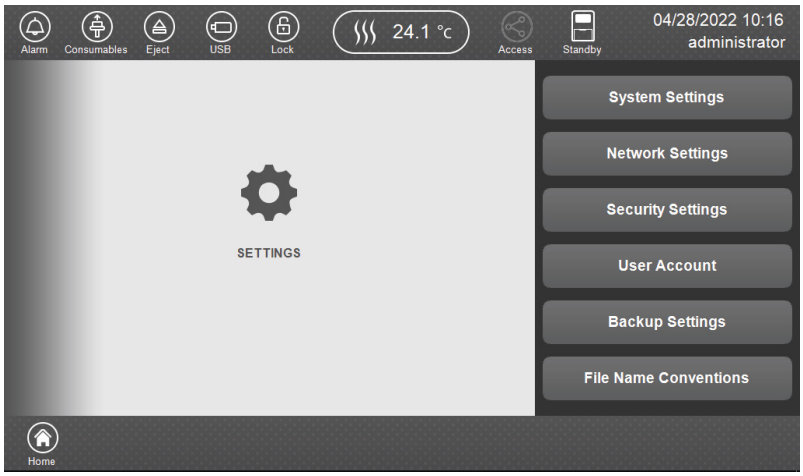



**Figure 158. 'Settings' screen.**

When the security level is set to High (Section 8.3), instrument settings are only accessible when logged in as an administrator. They are not accessible when logged in as a user. When security level is set to Normal (Section 8.3), all users have access to all instrument settings, but it is not possible to edit user rights as described in Section 8.3.1.

**Note:** When security level is set to Normal (Section 8.3), an additional button is visible on the 'Settings' screen called Service. This setting is for use by service engineers.

# 8.1 System Settings

The System Settings allow the user to edit the instrument name and to set the display of the decimal separator as a period (.) or a comma (,). The default setting is a period.

1. Select **System Settings** in the 'Settings' screen (Figure 158) to open the 'System Settings' screen (Figure 159).

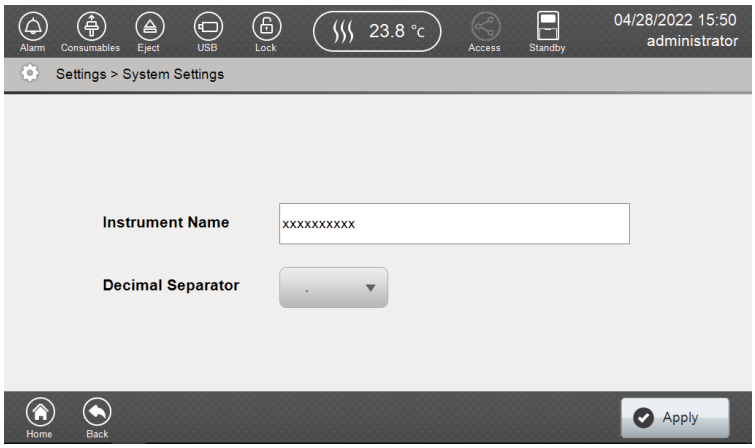



**Figure 159. 'System Settings' screen.**

2. Enter an instrument name in the provided field using up to 15 characters. Only single-byte alphanumeric characters and hyphens can be used.
3. Select "comma (,)" in the Decimal Separator drop-down box to change the default display of the setting from period to comma.
4. Select **Apply** in the footer to save the name and apply it to the System Settings.
5. A Confirmation message followed by an Information message will be displayed (Figure 160). Select **OK**. Restart the system to make the changes take effect.

   **Note:** When changing the Instrument Name, make sure the LAN cable is connected before you restart the system to enable the Remote Access function.

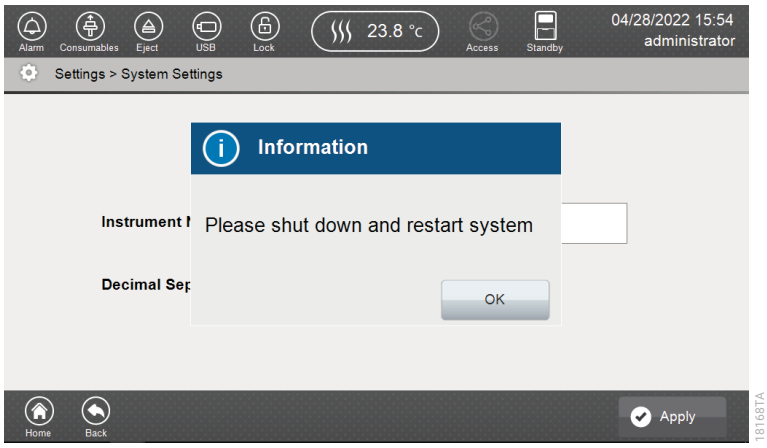



**Figure 160. 'Information' screen.**

# 8.2 Network Settings

Network Settings allows the user to edit the network settings for the instrument. There are two methods for connecting the instrument to an external computer.

1. Direct connection to external computer
2. Connection via Local Area Network (LAN)

## 8.2.1 Direct Connection to Computer

1. Connect an Ethernet cord from the instrument's Ethernet connection to the Ethernet connection of an external computer's network interface card.
2. Select **Network Settings** in the 'Settings' screen (Figure 158) to open the 'Network Settings' screen (Figure 161).

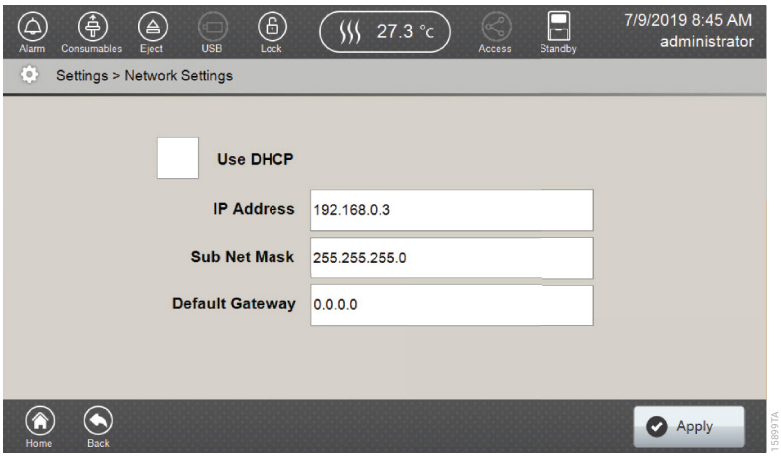



**Figure 161. 'Network Settings' screen.**

3. The 'Network Settings' screen displays the instrument's settings for the network. For the instrument and external computer to successfully communicate, the following network information is required.

| Setting | Description |
|---|---|
| Use DHCP | Ensure that this box is unchecked to enable the network settings fields if connecting directly to a computer [Default = Unchecked] |
| IP Address | The IP address assigned to the instrument |
| Sub Net Mask | The sub net mask assigned to the instrument, which should be the same as the external computer's sub net mask [Default = 255.255.255.0] |
| Default Gateway | The IP address of the default gateway [Default = 0.0.0.0] |

4. Select **Apply** in the footer to apply and save the Network Settings.

   **Note:** Refer to your IT administrator for configuring network settings on the Spectrum Compact CE System and external computer if applicable.

### 8.2.2 Connection via LAN

1. Connect an Ethernet cord from the instrument's Ethernet connection in the rear of the instrument to your network.
2. Select **Network Settings** in the 'Settings' screen (Figure 158) to open the 'Network Settings' screen (Figure 161).
3. Contact your IT administrator for the proper network information and configuration (see Section 8.2.1).
4. Select **Apply** in the footer to apply and save the Network Settings.

## 8.3 Security Settings

Security Settings allows the user to edit the instrument's security settings.

**Note:** The security level setting will affect the ability to view and edit the protocol settings (see Section 7).

1. Select **Security Settings** in the 'Settings' screen (Figure 158) to open the 'Security Settings' screen. The 'Security Settings' screen is different for High (Figure 162) and Normal (Figure 163) security levels.

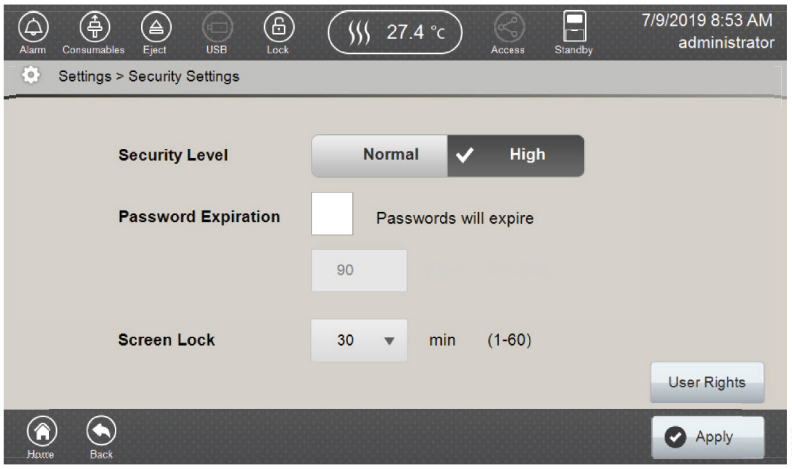



**Figure 162. High-level 'Security Settings' screen.**

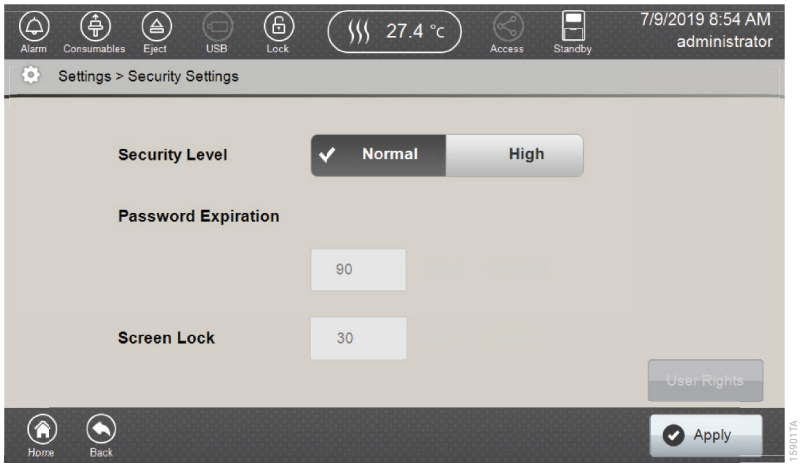



**Figure 163. Normal-level 'Security Settings' screen.**

2. Select the desired security level.

| Security Level | Available Security Settings |
|---|---|
| Normal | None—all users are logged in as Administrator. Password, screen lock and login functions are disabled. |
| High | All—password, screen lock and login functions are enabled. |

If High is selected, select the desired settings for Password expiration and screen lock.

| High-Level Settings | Description |
|---|---|
| Password Expiration | Check box to activate password expiration.<br>Select the number of days before expiration (10–180) from the drop-down list. |
| Screen Lock | Select the number of minutes (1–60) of idle time to engage the screen lock. |

3. Select **Apply** in the footer to apply and save the Security Setting.

   **Note: User Rights** in the bottom right corner provides a shortcut to the User Rights setting (see Section 8.3.1).

4. When switching between Normal and High security levels, after selecting **Apply** a confirmation window will appear asking "Are you sure you want to change the system settings?". Selecting **Yes** brings up an information window asking you to "Please shut down and restart the system". (See Section 10 for instructions on shutting down the system). Selecting **No** closes out the confirmation window and takes you back to the 'Security Settings' screen.

### 8.3.1 User Rights

Under the High security level, the User Rights setting allows the administrator to manage the access rights assigned to the User accounts (see Section 8.4). Changes made to user rights affect all User accounts.

**Notes:**

a. Changes made to user rights do not affect administrators.

b. Access rights granted to User accounts by the administrator only applies when the security level is High. With Normal security level selected, all users are treated as administrators and **User Rights** is not active.

c. Changes made to user rights by the administrator require that the administrator logs out and shuts down and restarts the system after the change, and before a user logs in. Changes to user rights will not be applied if the system is not shut down and restarted after the administrator logs out.

1. Select **User Rights** in the bottom right corner of the 'Security Settings' screen under the High security level (Figure 162) to open the 'User Rights' screen (Figure 164).

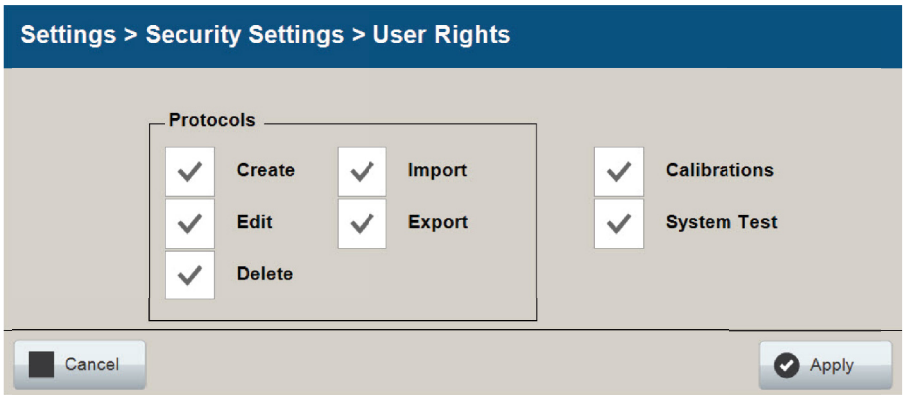



**Figure 164. 'User Rights' screen.**

2. There are seven rights that can be assigned to the User, five of which pertain to Protocols:

| Right | Description |
|---|---|
| Protocols | Allows management of protocols. Options include allowing users to Create, Edit, Delete, Import or Export protocols. |
| Calibrations | Allows performance of calibrations on the instrument. |
| System Test | Allows access to the System Test Results. |

**Notes:**

a. System Test should only be performed by a Promega service engineer.

b. Assays and protocols created under high-security settings by a user without administrative rights are locked from other users without administrative rights but not from users with administrative rights.

3. Select or enter the appropriate settings for the User.

4. Select **Apply** in the footer to apply and save the settings to the User Rights.
5. Log out as administrator, and then shut down and restart the system (see Section 10 for instructions on shutting down the system and Section 2.1 for starting the system) before logging in as a user. Shutdown and restart of the system is required for the changes in user rights to be enabled.

## 8.4 User Accounts

The User Account setting allows the user to create, edit or delete the user accounts associated with the instrument. New accounts may be created by the administrator under the High security level. Anyone may create a new account under the Normal security level. The User Rights function is disabled under Normal security level as all users are considered administrators (see Section 8.3.1).

**Note:** If User level is chosen for a new user account, the user's available functions will depend on the user rights selected in Section 8.3.1. A comparison of User and Administrator rights under High security is shown in the following table.

| **Function** | **User** | **Administrator** |
|---|---|---|
| Performing Run | Available | Available |
| Creating New Protocols | Depends on user's rights (Section 8.3.1) | Available |
| Editing Protocols | Depends on user's rights (Section 8.3.1) | Available |
| Deleting Protocols | Depends on user's rights (Section 8.3.1) | Available |
| Importing Protocols | Depends on user's rights (Section 8.3.1) | Available |
| Exporting Protocols | Depends on user's rights (Section 8.3.1) | Available |
| Calibration | Depends on user's rights (Section 8.3.1) | Available |
| System Tests | Depends on user's rights (Section 8.3.1) | Available |
| Backup | Unavailable | Available |
| Software Update | Unavailable | Available |
| Miscellaneous Settings[1] | Unavailable | Available |
| Consumables Exchange | Available | Available |
| Reviewing Result | Available | Available |
| System Log | Available | Available |

[1]Miscellaneous Setttings refers to:
- System Settings
- Network Settings
- Security Settings
- User Account
- User Rights
- File Name Conventions
- Adjusting Date and Time

### 8.4.1 Creating a New User Account

1. Select **User Account** in the 'Settings' screen (Figure 158) to open the 'User Account' screen (Figure 165).

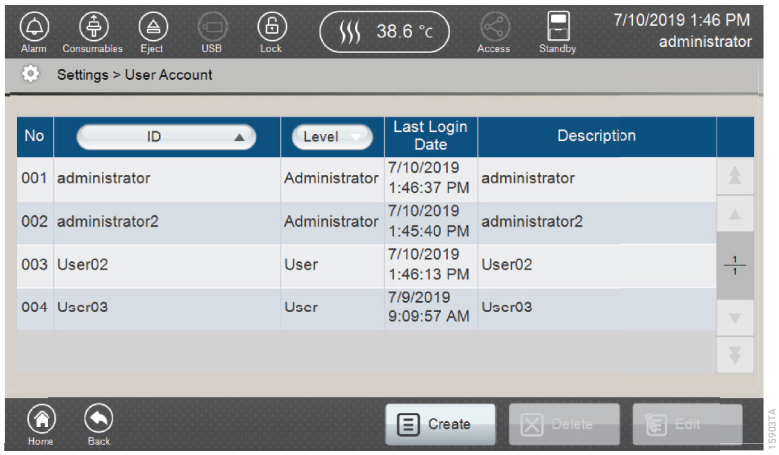



**Figure 165. 'User Account' screen.**

2. Select **Create** in the footer to open the 'New User Account' screen (Figure 166).

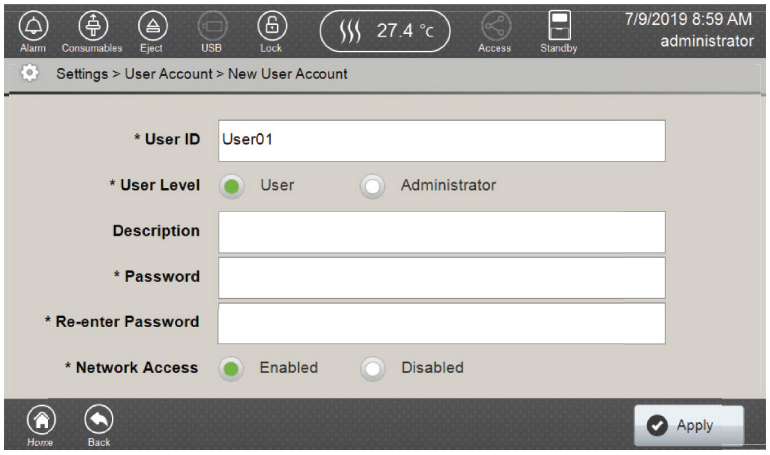



**Figure 166. 'New User Account' screen.** The 'New User Account' screen displays the available user settings.

**Note:** Items indicated with an asterisk are required.

| Setting | Description |
|---|---|
| User ID | Defines the login ID. Unacceptable characters for User ID are #%&{}\<>*?/$!'":@+`\|= and space |
| User Level | User—selecting this level allows customization of user rights (see Section 8.3.1)<br>Administrator |
| Description | Defines the user's name. Unacceptable characters for Description are #%&{}\<>*?/$!'":@+`\|= |
| Password | Defines the user's password for login |
| Re-enter Password | Confirms entered password |
| Network Access | Defines user's ability to access instrument via Spectrum Compact Remote Access Software |

Spectrum Compact CE System password requirements are as follows:

| Password Parameters | Description |
|---|---|
| Minimum length | 6 characters |
| Allowable characters[1] | a–z, A–Z, 0–9, ~^()=$@!#%&'-+_[ ]{ } |
| Suggested character combinations | [a–z, A–Z] or [a–z, 0–9] or [A–Z, 0–9] or [a–z, A–Z, 0–9] |
| Not allowed | Cannot be same as User ID |
| | Cannot be same as Description |
| | Cannot have been used for any of the three previous passwords |

[1] Same as Windows® file name restrictions

3. Select or enter the appropriate settings for the user.
4. Select **Apply** in the footer to apply and save the settings to the user account.

## 8.4.2 Editing a User Account

1. Select **User Account** in the 'Settings' screen (Figure 158) to open the 'User Account' screen (Figure 165).
2. Locate the desired user account using the scroll buttons on the right side of the list. The sort buttons (ID and Level) at the top of the list can be used to aid in locating the user account.

3. Select the user account from the list, and then select **Edit** in the footer to open the 'Edit User Account' screen (Figure 167).

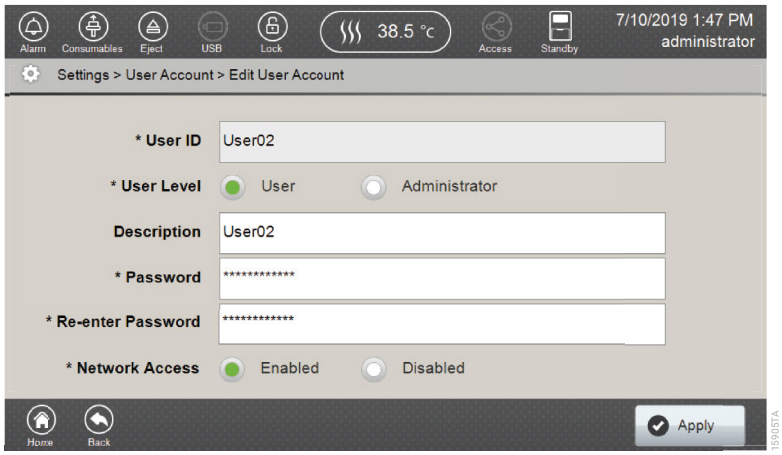



**Figure 167. 'Edit User Account' screen.**

4. Make the desired changes to the user account, and then select **Apply** in the footer to apply and save the changes.

### 8.4.3 Deleting a User Account

1. Select **User Account** in the 'Settings' screen (Figure 158) to open the 'User Account' screen (Figure 165).
2. Locate the desired user account using the scroll buttons on the right side of the list. The sort buttons (ID and Level) at the top of the list can be used to aid in locating the user account.
3. Select the user account from the list, and then select **Delete** in the footer.
4. Select **Yes** in the confirmation window to delete the account.

   **Note:** Administrators can delete user accounts at the User and Administrator level, but it is not possible to delete a user that is currently logged in.

## 8.5 Backup Settings

System backup occurs automatically when the Spectrum Compact CE System is shutdown if this function is enabled.

1. Select **Backup Settings** in the 'Settings' screen (Figure 143) to open the 'Backup Settings' screen (Figure 152).
2. Select **Enable** to activate the system backup or **Disable** to deactivate system backup, and then choose **Apply** (Figure 168).
3. After selecting Apply, a confirmation window will appear asking "Are you sure you want to change system settings?". Select **Yes**, to accept the change and **No** to revert to previous settings.

4. With System Backup enabled, the system is automatically backed up to a separate drive within the Spectrum Compact System every time the instrument is shutdown. System recovery can **only** be performed by a service engineer.

**Note:** Log files, IP addresses and instrument name are not included in the system backup.

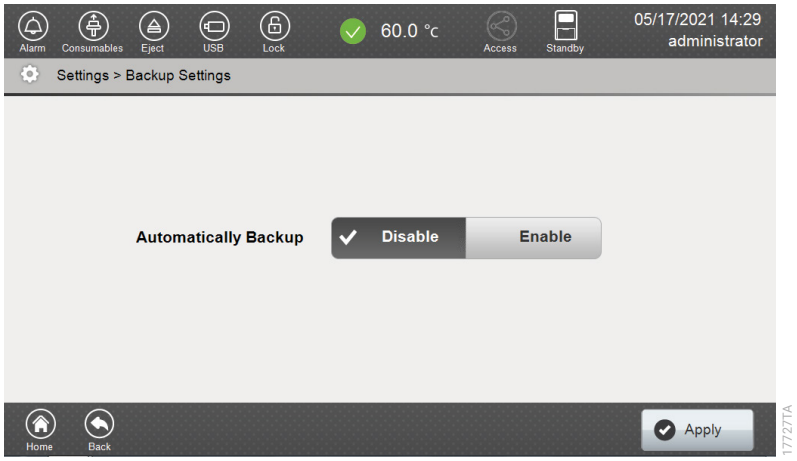



**Figure 168. 'Backup Settings' screen.**

## 8.6 File Name Conventions

File Name Conventions allows the user to edit global file name settings for either fragment or sequencing file names (i.e., fsa files created for fragment analysis and ab1 files created for sequencing analysis).

1. Select **File Name Conventions** in the 'Settings' screen (Figure 158).
2. Settings for Sequencing and Fragment analyses are displayed (Figure 169). Attributes enclosed within <> are separated by delimiters (_). Users can preview or edit file name conventions on this screen.

3. Select **Edit** to change File Name Conventions (Figure 169).

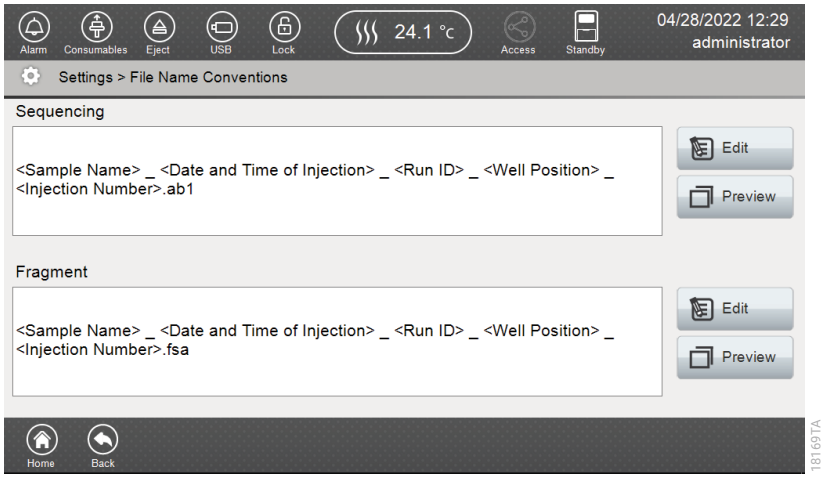



**Figure 169. 'File Name Conventions' screen.**

4. Select the row you intend to edit from the 'File Name Conventions List' screen (Figure 170). Select **Edit**.

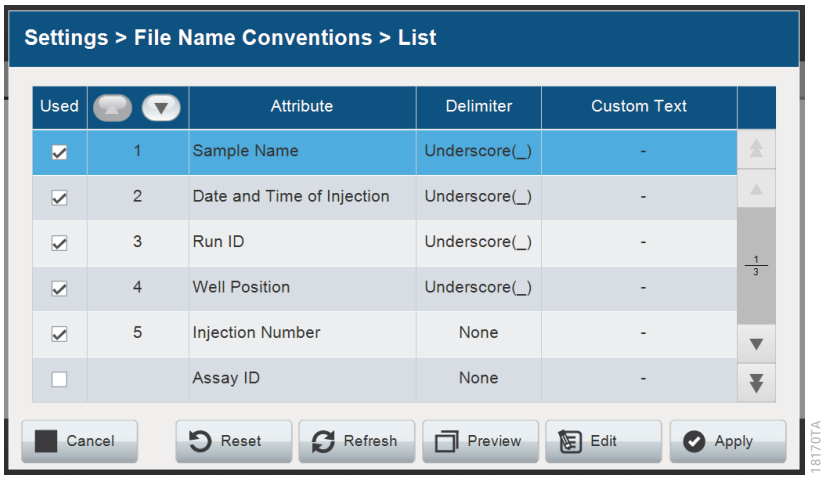



**Figure 170. 'File Name Conventions List' screen.**

The following table explains the features and rules for editing the information on the 'File Name Conventions List' screen.

| | |
|---|---|
| Used | Allows the user to select an attribute. An Order Number is automatically assigned to the attribute. |
| Order (▲ and ▼ buttons) | Allows the user to set the order of the attribute displayed in the file name. |
| Attribute | Displays the set attribute used in the file name. Table 1-2 lists the rules for creating attributes. |
| Delimiter | Allows the user to set a delimiter displayed in the file name. Acceptable characters for delimiters are "- ", "." or "_". It is not mandatory to specify a delimiter. |
| Custom Text | An arbitrary string of up to 30 alphanumeric characters can be entered for this attribute. Unacceptable characters such as #%&{}\<>*?/$!'":@+`\|= and space cannot be used. |
| Reset | Resets settings to initial settings. |
| Refresh | Sorts the items in the ascending order of set Order numbers. |
| Preview | Allows the user to view the edited attributes. |

The following table explains the Rules for characters when setting Attributes.

| Attribute | Description | Number of Characters | |
|---|---|---|---|
| | | Minimum | Maximum |
| Assay ID | ID of the assay used in the injection | 1 | 40 |
| Capillary Number | Capillary Number (1 to 4) | 1 | 1 |
| Custom Text | An arbitrary character string can be set. | 0 | 30 |
| Date of Run | Start date of the run (YYYYMMDD) | 8 | 8 |
| Injection Number | Injection Number (1 to 24) | 2 | 2 |
| Date and Time of Injection | Date and time when the injection started (YYYYMMDDHHMMSS, in 24-hour notation) | 14 | 14 |
| Instrument Name | Name of the instrument that executed the run | 1 | 15 |
| Polymer Type | Polymer Type (Polymer4/Polymer7) | 8 | 8 |
| Run ID | Run ID | 1 | 30 |
| Sample Name | Sample Name | 1 | 30 |
| Sample Type | Sample type | 6 | 15 |
| Strip ID | Strip ID used in the injection | 1 | 30 |
| Unique Time Stamp Integer | Specific time stamp (in milliseconds) | 13 | 13 |
| User ID | User ID | 0 | 28 |
| Well Position | Well position of the sample (A1 to A8, B1 to B8, C1 to C8, D1 to D8) | 2 | 2 |

**Note:** The file name can consist of up to 180 characters (including the file extension).

5. Select **Apply** after editing the necessary information for each attribute (Figure 171).

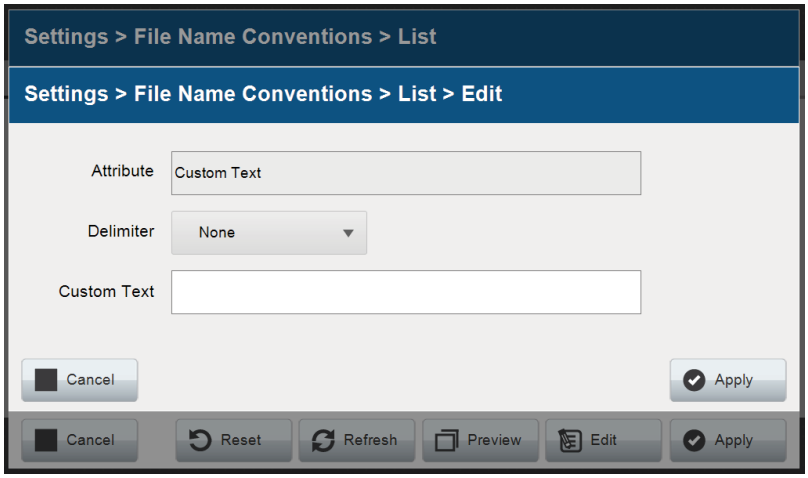



**Figure 171. 'Attribute Edit' screen.**

**Note:** You can only edit the Custom Text field when editing the Custom Text attribute.

6. Return to the 'File Name Conventions List' screen (Figure 172). Select **Apply**.


**Figure 172. 'File Name Conventions List' screen.**

7. After selecting **Apply**, a confirmation window will appear asking "Are you sure you want to change the File Name Conventions settings?". Select **Yes**, to accept the change and **No** to revert to previous settings.

8. Select **Preview** in the 'File Name Conventions' screen (Figure 173) to verify the edits made to the attributes.

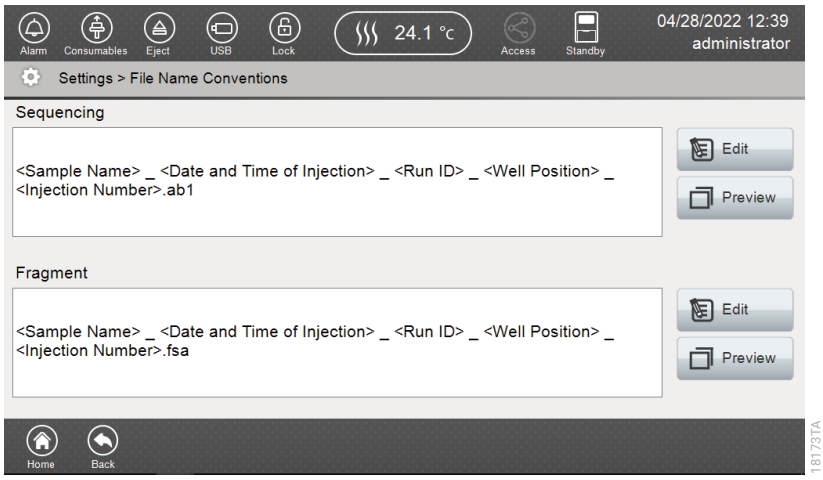



**Figure 173. 'File Name Conventions' screen.**

9. An example of the 'Preview' screen is shown in Figure 174.

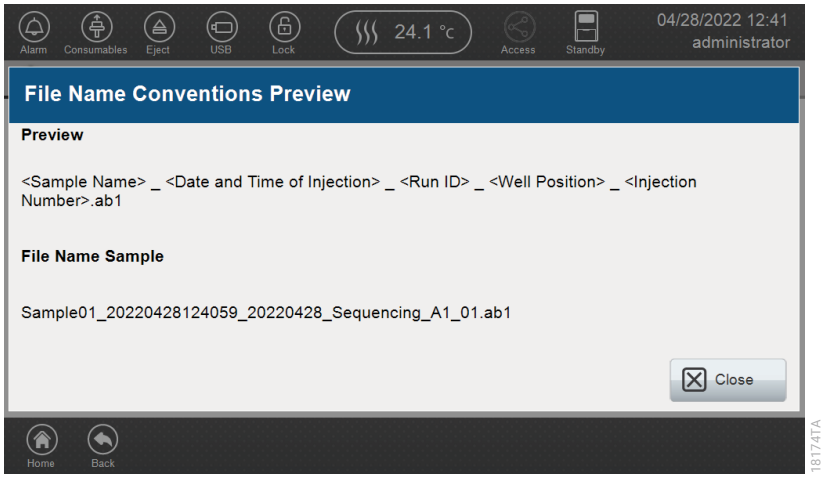



**Figure 174. 'Preview' screen.**

# 8.7 Adjusting Date and Time

When logged in as an Administrator (but not as a User), the date and time can be edited on the Spectrum Compact CE System.

1. Select date and time in the upper right hand corner of the 'Main Menu' screen (Figure 9) to open the 'Date and Time Settings' screen (Figure 153).
2. Change year, month, day, hours, and minutes on 'Date and Time Settings' screen, then select **Apply** (Figure 175).
3. After selecting Apply, a confirmation window will appear asking "Are you sure you want to change date and time?". Select **Yes** to accept change and **No** to revert to previous settings.

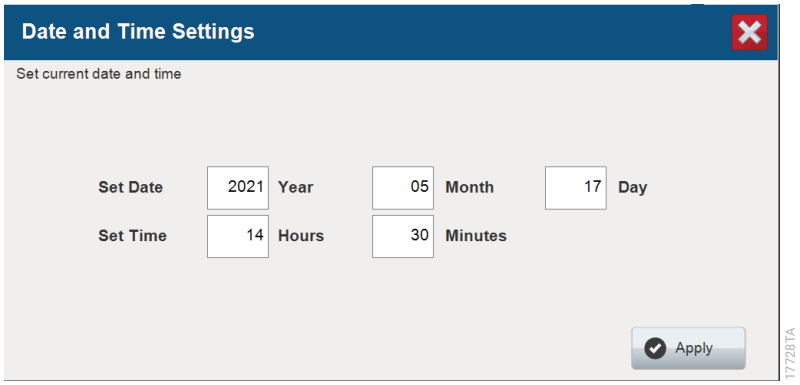



**Figure 175. 'Date and Time Settings' screen.**

# Instrument Information 9

## 9.1 System Information

Instrument information is accessed through **About**, located in the footer on the 'Main Menu' screen (Figure 9) of the Spectrum Compact Control Software. The About function is available on the 'About' screen (Figure 176).


**Figure 176. 'About' screen.**

Selecting **About** on the 'About' screen (Figure 176) displays the 'Instrument Information' screen (Figure 177), which contains the following instrument information:

1. Instrument Name
2. Serial Number
3. Product Name
4. Hardware Version
5. Instrument Software System Version
6. Remote Access Software Version
7. Instrument Software Checksum

**Note:** The instrument and remote access software versions can be updated from this screen.

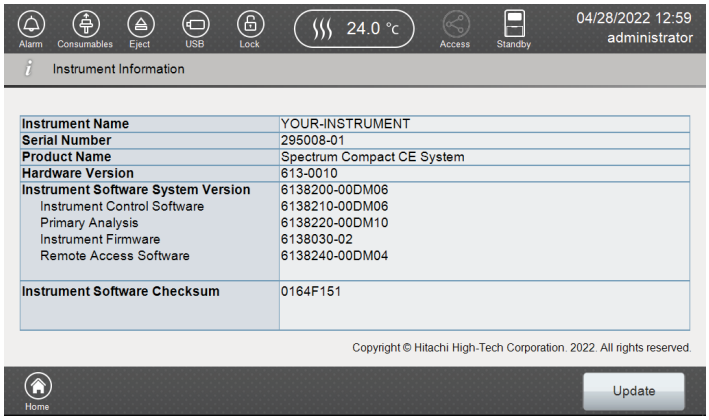



**Figure 177. 'Instrument Information' screen.**

## 9.2 Alarm List

The most recent instrument alarms (up to 200) are logged in the 'Alarm List' screen (Figure 178) of the Spectrum Compact Control Software.

1. Select **Alarm**, located in the header of the 'Main Menu' screen (Figure 9) of the Spectrum Compact Control Software to access the 'Alarm List' screen (Figure 178).

   **Note:** When the instrument is turned off or rebooted, the Alarm List is saved to an alarm log file. This file can be retrieved from the Alarm Log (see Section 6.4.1).

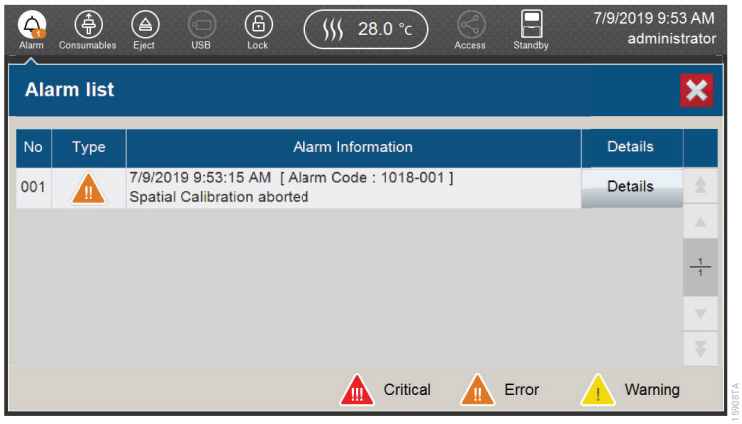



**Figure 178. 'Alarm List' screen.**

2. When there is a new alarm, an amber indicator appears on the **Alarm** icon with a white number indicating the number of new alarms. When selecting **Alarm**, the 'Alarm List' screen opens (Figure 178). Once you have reviewed the new alarm(s), the indicator on the **Alarm** icon goes away.

3. Select a specific Alarm in the list followed by **Details** to review the details of that specific alarm (Figure 179).

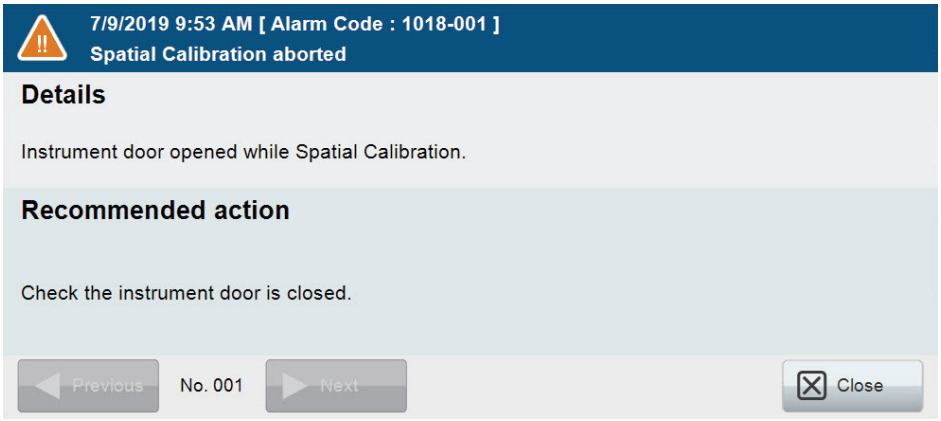



**Figure 179. 'Alarm Detail' screen.**

The 'Alarm Detail' screen provides the following information:

| Information | Description | |
|---|---|---|
| Date/Time/Code | Date and time the alarm occurred and the alarm code (see Section 11 for error code list) | |
| Type |  | Critical Alarm—a severe condition, such as instrument malfunction, has occurred. |
| |  | Error Alarm—an error preventing electrophoresis has occurred. |
| |  | Warning—something needs attention, but the instrument will continue operation. |
| Details | Describes what caused the alarm. | |
| Recommended Action | Describes the recommended corrective action(s) to resolve the issue. | |

4. Check the information displayed in the Details and Recommended Action section of the 'Alarm Detail' screen (Figure 179). Perform corrective measures required to address the information displayed. See Section 11 for a list of error codes and responses.
5. To view information for the previous or next alarm, select **Previous** or **Next**, respectively.
6. Select **Close** to return to the 'Alarm List' screen.

   **Note:** Shutting down the Spectrum Compact CE System (see Section 10) clears alarms from the 'Alarm List' screen.

# Shutting Down the Instrument 10

There are two levels of shutdown for the Spectrum Compact CE System:

1. Short-term shutdown
2. Long-term shutdown

## 10.1 Short-Term Shutdown

Short-term shutdown of the instrument, such as during a reboot of the system, can be performed under both Normal and High security levels.

### 10.1.1 Normal Security Level Shutdown

1. Select **Shutdown** in the footer of the 'Main Menu' screen (Figure 180) of the Spectrum Compact Control Software.


**Figure 180. 'Main Menu' screen (Normal security).**

2. Wait for the Shutting Down screen to disappear completely and a pointer will appear on the screen. After the pointer disappears, turn the instrument power switch to the Off position.


**Figure 181. Shutting Down and pointer display screens.**

## 10.1.2 High Security Level Shutdown

1. Select **Logout** in the footer of the 'Main Menu' screen (Figure 182) of the Spectrum Compact Control Software. A confirmation window will appear asking "Are you sure you want to log out?". Select **Yes** to proceed to 'Login' screen (Figure 183). Select **No** to return to the 'Main Menu' screen (Figure 182).


**Figure 182. 'Main Menu' screen (High security).**

2. Select **Shutdown** in the 'Login' screen (Figure 183).

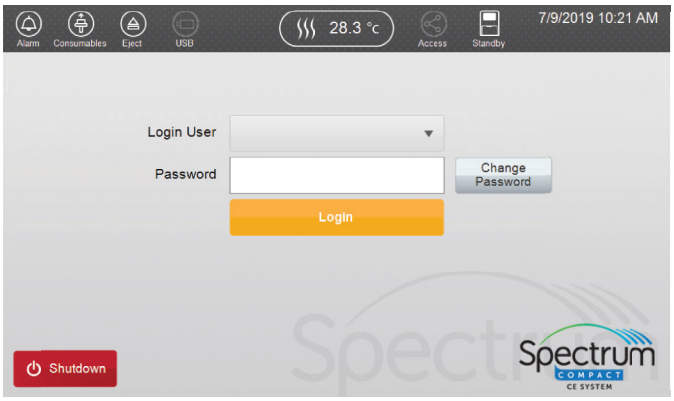



**Figure 183. 'Login' screen.**

3. When a Confirmation message is displayed, touch the **Yes** button. The following screen is displayed.


**Figure 184. Shutting Down and pointer display screens.**

4. Wait for the Shutting Down screen to disappear completely and a pointer will appear on the screen. After the pointer disappears, turn the instrument power switch to the Off position.

## 10.2 Long-Term Shutdown

The long-term shutdown procedure should be performed if the instrument will be out of use for more than 2 weeks. To shutdown the instrument for long-term storage, all consumables must be removed from the instrument.

1. Use the Uninstall wizard in the 'Installed Capillary Cartridge Information' screen to remove the Capillary Cartridge from the instrument (see Section 3.3).

   **Note:** To store the capillary cartridge for use at a later date, fill the capillaries with polymer by selecting **Fill** in the wizard. Then fill the capillary anode and cathode covers with Capillary Preservation Buffer and place them on the cartridge as described in Section 3.3. Store the uninstalled capillary cartridge upright at ambient temperature.

2. Select **Eject** in the header on the 'Main Menu' screen (Figure 9) of the Spectrum Compact Control Software to move the autosampler forward to access the consumables housed in the autosampler.

3. Remove the Spectrum Compact ABC by pressing in on the locking tabs on either side of the Spectrum Compact ABC and pulling up to detach it from the deck.

   **Note:** Discard opened and used Spectrum Compact ABC. Do not store for later use.

4. Remove the Spectrum Compact CBC by pressing in on the locking tabs on either side of the Spectrum Compact CBC and pulling up to detach it from the deck.

   **Note:** Discard opened and used Spectrum Compact CBC. Do not store for later use.

5. Remove the Polymer Cartridge by pulling the yellow locking catch to the left and pulling up on the cartridge (Figure 29). Unexpired Polymer Cartridges may be stored at 4°C for later use if injections remain.

   **Note:** The on-instrument expiration date will remain the same as it was at first installation upon reinstallation of the Polymer Cartridge.

6. Remove the sample cartridge by pushing down on the yellow tab on the autosampler deck that locks the sample cartridge in place and then lifting up on the sample cartridge.

7. Close the front door of the instrument, and wait for the status indicator to stop flashing amber and turn a steady green.

8. With the consumables and sample cartridge removed, shutdown the instrument software as described in Section 10.1.

# Error Messages 11

The following table is a list of error codes, their meaning and the appropriate response.

| Error Code | Error Message | Message Detail | Response |
|---|---|---|---|
| 1001 | System error (application) | Operational unit system error | Restart the instrument. If alarm persists, contact Technical Service with alarm code indicated. |
| 1002 | Communication error | Operational unit communication error | Restart the instrument. If alarm persists, contact Technical Service with alarm code indicated. |
| 1007 | Database access error | Database access has failed | Restart the instrument. If alarm persists, contact Technical Service with alarm code indicated. |
| 1013 | Shutdown status error | The system has not been properly shut down<br>Your operation may have been terminated | Confirm that the last run data is saved. |
| 1014 | File access error | File access has failed | Restart the instrument. If alarm persists, contact Technical Service with alarm code indicated. |
| 1015 | Drive access error | Drive access has failed | Restart the instrument. If alarm persists, contact Technical Service with alarm code indicated. |
| 1016 | Data collection error | System encountered an unexpected error while collecting the data | Restart the instrument. Rerun samples. If alarm persists, contact Technical Service with alarm code indicated. |

| Error Code | Error Message | Message Detail | Response |
|---|---|---|---|
| 1017 | Data collection error | System encountered an unexpected error while collecting the data | Restart the instrument.<br>Rerun samples.<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 1018 | Spatial Calibration aborted | Instrument door opened or error occurred while performing Spatial Calibration | Ensure that the instrument door is closed.<br>Check the instrument conditions. |
| 1019 | Spectral Calibration aborted | Instrument door opened or error occurred while performing Spectral Calibration | Ensure that the instrument door is closed.<br>Check the instrument conditions. |
| 1020 | Run aborted | Instrument door opened or error occurred while performing Run | Ensure that the instrument door is closed.<br>Check the instrument conditions. |
| 1021 | System Test aborted | Instrument door opened or error occurred while performing System Test | Ensure that the instrument door is closed.<br>Check the instrument conditions. |
| 1023 | Polymer delivery unit fill time warning | Fill time of Polymer delivery unit is too fast or slow | Check if the room temperature is within the range of 15–30℃.<br>Replace the Polymer cartridge and Capillary cartridge and restart the instrument, perform the Spatial calibrations(with Polymer Fill).<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 2001 | Primary analysis error | Timeout occurred during primary analysis | Restart the instrument.<br>Rerun sample.<br>If alarm persists, contact Technical Service with alarm code indicated. |

| Error Code | Error Message | Message Detail | Response |
|---|---|---|---|
| 3003 | Software error (application) | Script execution error detected | Restart the instrument. If alarm persists, contact Technical Service with alarm code indicated. |
| 3008 | Communication error | Ethernet communication error detected | CEU Ethernet communication error detected. |
| 3030 | Instrument power supply self-test error | Instrument power supply failed during initialization | Restart the instrument. If alarm persists, contact Technical Service with alarm code indicated. |
| 3031 | Laser self-test error | Laser failed during initialization | Restart the instrument. If alarm persists, contact Technical Service with alarm code indicated. |
| 3032 | CCD camera self-test error | CCD camera failed during initialization | Restart the instrument. If alarm persists, contact Technical Service with alarm code indicated. |
| 3033 | Instrument ambient temperature sensor self-test error | Instrument ambient temperature sensor failed during initialization | Restart the instrument. Check that the ambient temperature is in the allowable range of +15°C to +30°C (+60°F to + 85°F). If alarm persists, contact Technical Service with alarm code indicated. |
| 3034 | High voltage low current detected | Possible moisture in and around the septa, Cathode Buffer Cartridge, oven, or the autosampler caused arcing | Remove any liquid around the septa, Cathode Buffer Cartridge, oven and autosampler. Check the Anode electrode for damage. Contact Technical Service if damage or arcing is observed. |
| 3035 | High voltage self-test error | High voltage failed during initialization | Restart the instrument. If alarm persists, contact Technical Service with alarm code indicated. |

| Error Code | Error Message | Message Detail | Response |
|---|---|---|---|
| 3040 | Instrument initialization failed | Instrument error detected during initialization | Restart the instrument.<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 3099 | Software error (application) | Internal software error detected | Restart the instrument.<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 3111 | Oven temperature outside tolerance | Ambient temperature is too high or low | Ensure that the over door is closed properly.<br>Check that the ambient temperature is in the allowable range of +15°C to +30°C (+60°F to + 85°F). |
| 3112 | Oven high temperature error | Oven temperature exceeds the upper limit | Restart the instrument.<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 3115 | Oven temperature stabilization error | Oven temperature did not stabilize within the required time | Ensure that the over door is closed properly.<br>Check that the ambient temperature is in the allowable range of +15°C to +30°C (+60°F to + 85°F). |
| 3120 | Oven temperature sensor error | Oven temperature sensor has failed | Restart the instrument.<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 3199 | Oven internal processing error | Oven internal software error detected | Restart the instrument.<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 3211 | High voltage tolerance error | High voltage is unstable | Check Polymer, Anode, and Cathode levels and for the presence of bubbles.<br>Check Anode electrode for damage.<br>If alarm persists, contact Technical Service with alarm code. |

| Error Code | Error Message | Message Detail | Response |
|---|---|---|---|
| 3215 | High voltage stabilization error | High voltage did not stabilize within the required time | Check Polymer, Anode, and Cathode levels and for the presence of bubbles.<br>Check Anode electrode for damage.<br>If alarm persists, contact Technical Service with alarm code. |
| 3220 | High voltage arcing detected | Possible moisture in and around the septa, Cathode Buffer Cartridge, oven or the autosampler caused arcing | Remove any liquid around the septa, Cathode Buffer Cartridge, oven and autosampler.<br>Check the Anode electrode for damage.<br>Contact Technical Service if damaged or arcing is observed. |
| 3299 | High voltage internal processing error | High voltage internal software error detected | Restart the instrument.<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 3315 | Laser output power stabilization error | Laser power did not stabilize within the required time | Restart the instrument.<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 3320 | Laser output power is abnormal | Laser power is too low | Restart the instrument.<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 3321 | Laser warning detected | Laser is nearing the end of usable life | Contact Technical Service with alarm code indicated. |
| 3399 | Laser internal processing error | Laser internal software error detected | Restart the instrument.<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 3403 | Data collection timeout error | Data collection time exceeds sampling time and data collection has failed | Restart the instrument.<br>If alarm persists, contact Technical Service with alarm code indicated. |

| Error Code | Error Message | Message Detail | Response |
|---|---|---|---|
| 3404 | Data collection internal buffer overflow error | Rate of data collection exceeded the memory buffer capacity of the instrument | Contact Technical Service with alarm code indicated. |
| 3405 | Data error | Data binning pattern is inconsistent | Restart the instrument. If alarm persists, contact Technical Service with alarm code indicated. |
| 3420 | CCD camera temperature error | CCD camera temperature is abnormal | Check that the ambient temperature is in the allowable range of +15°C to +30°C (+60°F to + 85°F). If alarm persists, contact Technical Service with alarm code indicated. |
| 3421 | CCD camera temperature is too high | CCD camera temperature exceeds the upper limit | Restart the instrument. Check that the ambient temperature is in the allowable range of +15°C to +30°C (+60°F to + 85°F). If alarm persists, contact Technical Service with alarm code indicated. |
| 3422 | CCD camera temperature sensor error | CCD camera temperature sensor has failed | Restart the instrument. Check that the ambient temperature is in the allowable range of +15 to +30°C (+60 to + 85°F). If alarm persists, contact Technical Service with alarm code indicated. |
| 3431 | CCD camera controller error | CCD camera controller has failed | Restart the instrument. Check that the ambient temperature is in the allowable range of +15°C to +30°C (+60°F to + 85°F). If alarm persists, contact Technical Service with alarm code indicated. |

| Error Code | Error Message | Message Detail | Response |
|---|---|---|---|
| 3499 | CCD camera internal processing error | CCD internal software error detected | Restart the instrument.<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 3520 | Cartridge loading timeout error | Autosampler movement has failed | Make sure nothing is blocking the movement of the autosampler.<br>Check the anode electrode and capillary for damage.<br>Restart the instrument.<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 3521 | Autosampler home sensor error | Autosampler home sensor has failed | Restart the instrument.<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 3522 | Autosampler movement error | Autosampler movement is out of its movable range | Make sure nothing is blocking the movement of the autosampler.<br>Check the anode electrode and capillary for damage.<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 3523 | Autosampler controller communication error | Autosampler controller communication has failed | Make sure nothing is blocking the movement of the autosampler.<br>Check the anode electrode and capillary for damage.<br>Restart the instrument.<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 3599 | Autosampler internal processing error | Autosampler internal software error detected | Restart the instrument.<br>If alarm persists, contact Technical Service with alarm code indicated. |

| Error Code | Error Message | Message Detail | Response |
|---|---|---|---|
| 3620 | Polymer delivery unit home sensor error | Polymer delivery unit home sensor has failed | Restart the instrument.<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 3621 | Polymer delivery unit plunger timeout error | Plunger movement has failed | Check the Polymer Cartidge is installed correctly.<br>Restart the instrument.<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 3622 | Polymer delivery unit injection timeout error | Polymer injection has failed | Check the Polymer Cartidge is installed correctly.<br>Restart the instrument.<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 3623 | Polymer delivery unit compression timeout error | Polymer cartridge compression has failed | Check the Polymer Cartidge is installed correctly.<br>Restart the instrument.<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 3624 | Cartridge connection timeout error | Cartridge connection has failed | Check the Polymer Cartidge is installed correctly.<br>Restart the instrument.<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 3625 | Polymer leak detected | Polymer is leaking - check for evidence of leaks | Replace the polymer cartridge.<br>If alarm persists, Contact Technical Service with alarm code indicated. |

| Error Code | Error Message | Message Detail | Response |
|---|---|---|---|
| 3626 | Polymer volume is insufficient | Polymer volume is too low | Check the Polymer Cartidge volume.<br>Replace the Polymer Cartidge. |
| 3627 | Plunger movement error | Plunger movement is out of its movable range | Check the Polymer Cartidge is installed correctly.<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 3628 | Polymer delivery unit controller communication error | Polymer delivery unit controller communication has failed | Restart the instrument.<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 3699 | Polymer delivery unit internal processing error | Polymer delivery unit internal software error detected | Restart the instrument.<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 3705 | Interlock defeat switch has been disabled | Service maintenance mode has finished | Restart the instrument. |
| 3720 | Ambient temperature is out of operational range | Ambient temperature is too high or low | Check that the ambient temperature is in the allowable range of +15°C to +30°C (+60°F to + 85°F).<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 3721 | Instrument ambient temperature sensor error | Instrument ambient temperature sensor has failed | Restart the instrument.<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 3730 | Data transfer error | Data transfer has failed | Restart the instrument.<br>If alarm persists, contact Technical Service with alarm code indicated. |

| Error Code | Error Message | Message Detail | Response |
|---|---|---|---|
| 3811 | Detection heater temperature outside tolerance | Ambient temperature is too high or low | Ensure that the over door is closed properly.<br>Check that the ambient temperature is in the allowable range of +15°C to +30°C (+60°F to + 85°F). |
| 3812 | Detection heater high temperature error | Detection heater temperature exceeds the upper limit | Restart the instrument.<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 3815 | Detection heater stabilization error | Detection heater temperature did not stabilize within the required time | Ensure that the door is closed properly.<br>Check that the ambient temperature is in the allowable range of +15°C to +30°C (+60°F to + 85°F). |
| 3820 | Detection heater temperature sensor error | Detection heater temperature sensor has failed | Restart the instrument.<br>If alarm persists, contact Technical Service with alarm code indicated. |
| 3899 | Detection heater internal processing error | Detection heater internal software error detected | Restart the instrument.<br>If alarm persists, contact Technical Service with alarm code indicated. |

# Troubleshooting 12

For questions not addressed here, contact your local Promega Branch Office or Distributor.
Contact information available at: **www.promega.com**
Email: **genetic@promega.com**

## 12.1 Instrument

| Symptom | Causes and Comments |
|---|---|
| No response from the touch panel screen | Possible communication error. Shutdown instrument as indicated in Section 10. Restart instrument as described in Section 2.1. If this fails to restore the responsiveness to the touch screen, contact Promega Technical Services. |
| Unstable current | Inspect Spectrum Compact Polymer Cartridge for the presence of bubbles. If bubbles are present, replace polymer cartridge. Contact Promega Technical Services. |
| | Anode and/or cathode ends of capillary not completely submerged due to evaporation of buffers during a prolonged period of non-use of the Spectrum Compact CE System. |
| High run current | Old polymer (on instrument for more than 2 weeks) and polymer that is past its expiration date can have higher than normal current during electrophoresis and longer run times, especially for larger fragments. Replace with a Spectrum Compact Polymer Cartridge that is within its expiration date. |
| High voltage, low current | Check anode electrode to see if it is loose or damaged (bent or broken). If anode electrode is damaged contact Promega Technical Services. |
| | Aged buffer can cause this error because buffer volume decreased to less than the level required for electrophoresis. Replace both buffers if possible. |

| Symptom | Causes and Comments |
|---|---|
| Changing baseline during electrophoresis | Contaminants present in electrophoretic system. Replace with new Spectrum Compact Capillary, Polymer, ABC and CBC cartridges. |
| Poor quality data on Spectrum Compact Capillary Cartridge with less than 200 injections | Damage to a capillary or capillaries may result in polymer leakage. Check the Spectrum Compact Capillary Cartridge for evidence of polymer leakage (white crystals appearing somewhere along length of capillary). If damage is detected, replace the Spectrum Compact Capillary Cartridge. |
| | Old polymer (on instrument for more than 2 weeks) and/or polymer that is past its expiration date was used. Install a fresh Spectrum Compact Polymer Cartridge and reinject samples. Other symptoms of old polymer include higher than normal current during electrophoresis and longer run times, especially for larger fragments. |
| | Anode and/or cathode ends of capillary dried out due to evaporation of buffers during a prolonged period of non-use of the Spectrum Compact CE System. Discard the dried out Spectrum Compact Capillary Cartridge and replace with a new Spectrum Compact Capillary Cartridge. If instrument will not be used for an extended period of time (>2 weeks), uninstall the Spectrum Compact Capillary Cartridge and perform the long-term shutdown procedure as described in Section 10.2. |
| | Poor-quality formamide used with high conductivity. Prepare sample with fresh Hi-Di™ formamide. |
| Spikes in data | Ensure that the Spectrum Compact Polymer Cartridge is within the expiration date. If expired, replace with a fresh Spectrum Compact Polymer Cartridge. |
| | Inspect the Spectrum Compact Polymer Cartridge for the presence of bubbles. If bubbles are present, replace with a new polymer cartridge. Contact Promega Technical Services. |
| | Contaminants or crystals in Spectrum Compact Polymer Cartridge. Warm to room temperature before use. If you observe a precipitate, gently warm the Spectrum Compact Polymer Cartridge to dissolve the precipitate before use. For other contaminants, replace with a new Spectrum Compact Polymer Cartridge. |

## 12.2 Spatial Calibration

| Symptom | Causes and Comments |
|---|---|
| No peaks detected in any capillary or abnormal peak morphology for each capillary resulting in failing spatial calibration. | Spectrum Compact Capillary Cartridge not installed correctly. Reinstall Capillary Cartridge and perform a spatial calibration with a polymer fill as described in Section 4.1. Confirm that the array window is seated on the instrument. |
| | Spatial calibration performed on a new Spectrum Compact Capillary Cartridge without a polymer fill. Fill the Spectrum Compact Capillary Cartridge with polymer and perform a spatial calibration as described in Section 4.1. |
| | Damaged Spectrum Compact Capillary Cartridge. Inspect Capillary Cartridge for any damage or defects. If damage is observed, replace with an undamaged Spectrum Compact Capillary Cartridge. |

## 12.3 Spectral Calibration

| Symptom | Causes and Comments |
|---|---|
| No peaks detected in one or more dye channels for matrix standard | Incorrect matrix standard used for dye set. Confirm that the correct matrix standard was run with the correct dye set. |
| | Bubbles in the sample well. Centrifuge 8-well strip tube to remove air bubbles and repeat spectral calibration as per Section 4.2. |
| | Confirm that four wells of 8-well strip tube containing matrix standard have been loaded into Sample Cartridge in positions A1 through A4. If matrix standard containing wells are not in these positions, they will not be injected and no peaks will be detected. |
| | Poor-quality formamide used with high conductivity. Prepare sample with fresh Hi-Di™ formamide. |
| | Reboot the Spectrum Compact CE System. Ensure that the oven is preheated to 60°C prior to performing spectral calibration. |

| Symptom | Causes and Comments |
|---|---|
| No peaks detected in one or more dye channels for matrix standard (continued) | The cathode end of the Spectrum Compact Capillary Cartridge did not enter the sample, preventing electrokinetic injection of the matrix standard. Check the volume of sample. Volumes of sample as low as 9µl result in successful injection, but lower volumes will increase the likelihood for injection failures. If insufficient volume is present, increase the volume to >9µl and repeat spectral calibration. If volume is sufficient and no peaks are detected, contact Promega Technical Services. |
| | Confirm that the matrix standard was prepared correctly. Check the matrix standard, reagent expiration date and storage conditions. Refer to the Matrix Standard Instructions for Use for additional troubleshooting suggestions. |
| Spectral calibration fails | Check the Raw Data tab of the failed capillaries. Look for signs of low or high peak heights, incorrect dye order for matrix standard (may indicate incompatible dye set used for matrix standard), high baseline noise, spikes or unexpected additional peaks that migrate before the matrix standard peaks. |
| | Incorrect matrix standard used for dye set. Confirm that the correct matrix standard was run with the correct dye set. |
| | Peak present for matrix standard in raw data but too low for generation of a spectral calibration (less than 500RFU). Check the matrix standard, reagent expiration date and storage conditions. Refer to the Matrix Standard Instructions for Use for additional troubleshooting suggestions. |
| | Poor-quality formamide used with high conductivity. Prepare sample with fresh Hi-Di™ formamide. |
| | Unexpected peaks that migrate before the matrix standard peaks may indicate carryover from a previous injection. Replace Spectrum Compact ABC and CBC and the Spectrum Compact Cathode Septa mat to eliminate any potential sources of contamination from a previous injection. |
| | Confirm that the matrix standard was prepared correctly. Check the matrix standard, reagent expiration date and storage conditions. Refer to the Matrix Standard Instructions for Use for additional troubleshooting suggestions. |

| Symptom | Causes and Comments |
|---|---|
| Elevated spectral bleedthrough in one or more capillaries | If elevated spectral bleedthrough is observed in one or more capillaries after installing a new capillary cartridge, reinstall the capillary cartridge. Completely remove the capillary cartridge from the oven and reinstall as indicated in Section 3.2. Simply lift the capillary cartridge completely out of the oven by its yellow knob and reinstall immediately back in the oven. Repositioning the detection unit of the capillary cartridge into the detection window of the oven during reinstallation may improve spectral performance.<br><br>**Note:** It is necessary after uninstalling and reinstalling the capillary cartridge to perform a new spatial and spectral calibration before running samples. |

## 12.4 Sequencing Analysis

| Symptom | Causes and Comments |
|---|---|
| No peaks | Poor-quality formamide used with high conductivity. Prepare sample with fresh Hi-Di™ formamide. |
| | Sample loss during cleanup of sequencing sample. Repeat the sequencing reaction. |
| | Bubbles in the sample well. Centrifuge the 8-Well Strip Tube to remove air bubbles, and repeat the injection. |
| | Anode and/or cathode ends of capillary not completely submerged due to evaporation of buffers during a prolonged period of non-use of the Spectrum Compact CE System. |
| | Damaged Spectrum Compact Capillary Cartridge. Inspect Capillary Cartridge for any damage or defects. If damage is observed, replace the Spectrum Compact Capillary Cartridge. |
| | The cathode end of the Spectrum Compact Capillary Cartridge did not enter the sample, preventing electrokinetic injection of the sequencing sample. Check the volume of sample. Volumes of sample as low as 9µl result in successful injection, but lower volumes will increase the likelihood for injection failures. If insufficient volume is present, increase the volume to >9µl and repeat injection of the sequencing sample. If volume is sufficient and no peaks are detected, contact Promega Technical Services. Ensure the correct assay was used, because this can affect the height of the deck tray during injection. |
| | The sequencing reaction failed or was not sufficiently purified. Refer to the troubleshooting section of the manual of the sequencing kit being used. |
| Sequencing failed | Sample loss during cleanup of sequencing sample. If the sequencing standard control sample passed the quality checks, repeat the sample sequencing reaction. |
| | Incorrect run module, instrument protocol, or basecalling protocol used. Check run modules and protocols used, and repeat the run. |
| | An old spectral calibration or a spectral calibration with expired matrix standard was used. Perform a new spectral calibration using a matrix standard within its expiration date and re-inject the samples. |

| Symptom | Causes and Comments |
|---|---|
| Sequencing failed (continued) | Check the age of the spectral calibration being used. If old or generated on a previous array, generate a new spectral calibration using a new matrix standard that is within its expiration date. |
| | Expired reagents were used. Check that the anode and cathode buffers have been used for <80 injections. Check the expiration dates of all consumables. Replace expired consumables or consumables that are beyond their usage restrictions. |
| | Consumables were not equilibrated to room temperature. Ensure that consumables are allowed to come to room temperature before a run begins. Ensure the oven was preheated prior to the run. |
| | Artifacts or dye blobs present. Refer to the troubleshooting section of the manual of the sequencing kit being used. |
| | Poor resolution due to over-injected samples. If sample peak heights are too high either use less sample volume and/or reduce injection time. Alternatively, reamplify with less DNA (refer to the amplification troubleshooting section of the manual of the sequencing kit being used). |
| | Poor resolution due to old polymer (on instrument for more than 2 weeks) or polymer that has passed its expiration date. Install a fresh Spectrum Compact Polymer Cartridge, and reinject samples. Other symptoms of old polymer include higher than normal current during electrophoresis and longer run times, especially for larger fragments. |
| | A Spectrum Compact Capillary Cartridge with more than 300 injections was used. Use after this number of injections may result in poor resolution. Replace Spectrum Compact Capillary Cartridge, and reinject samples. |
| Insufficient number of bases collected when using the fast sequencing assay | Run time was too short. Increase the run time in the instrument protocol of the fast sequencing assay. Testing at Promega has shown that adding up to 2 minutes additional run time can result in longer reads. To edit the instrument protocol, see Section 7. |

| Symptom | Causes and Comments |
|---|---|
| Signal too high | Sample concentration was too high. Dilute the sample and/or repeat injection with a reduced injection time. |
| | Too much template was added to the sequencing reaction. Refer to the troubleshooting section of the manual of the sequencing kit being used. |
| Signal too low | Poor-quality formamide used with high conductivity. Prepare sample with fresh Hi-Di™ formamide. |
| | Sample loss during cleanup of sequencing sample. Repeat the sequencing reaction. |
| | Injection time or voltage was too low. If a custom assay was used, increase the injection time or voltage. |
| Poor signal and/or capillary to capillary signal variation | If low signal and/or high variation in signal from capillary to capillary is observed after installing a new capillary cartridge, reinstall the capillary cartridge. Completely remove the capillary cartridge from the oven and reinstall as indicated in Section 3.2 Simply lift the capillary cartridge completely out of the oven by its yellow knob and reinstall immediately back in the oven. Repositioning the detection unit of the capillary cartridge into the detection window of the oven during reinstallation can improve overall signal and reduce variation in signal from capillary to capillary.<br>**Note:** It is necessary after uninstalling and reinstalling the capillary cartridge to perform a new spatial and spectral calibration before running samples. |

## 12.5 Fragment Analysis

| Symptom | Causes and Comments |
|---|---|
| No peaks | Poor-quality formamide was used with high conductivity. Prepare sample with fresh Hi-Di™ formamide. |
| | Bubbles were present in the sample well. Centrifuge the 8-Well Strip Tube to remove air bubbles, and reinject the samples. |
| | If peaks are detected at the expected height for your internal lane standard, this indicates that injection is performing as expected, and the absence of sample peaks may be due to poor amplification with the fragment analysis kit. Refer to the amplification troubleshooting section of the manual of the fragment analysis kit being used. |
| | Damaged Spectrum Compact Capillary Cartridge. Inspect the Capillary Cartridge for any damage or defects. If damage is observed, replace with an undamaged Spectrum Compact Capillary Cartridge. |
| | The cathode end of the Spectrum Compact Capillary Cartridge did not enter the sample, preventing electrokinetic injection of the fragment analysis sample. Check the volume of sample. Volumes of sample as low as 9µl result in successful injection, but lower volumes will increase the likelihood for injection failures. If insufficient volume is present, increase such that the volume is above minimum required and repeat injection of fragment analysis sample. If volume is sufficient and no peaks are detected, contact Promega Technical Services. |
| | Anode and/or cathode ends of capillary not completely submerged due to evaporation of buffers during a prolonged period of non-use of the Spectrum Compact CE System. |

| Symptom | Causes and Comments |
|---|---|
| Peak intensity too high | If peaks are detected at expected height for your internal lane standard, this indicates that injection is performing as expected, but the high intensity peaks in your sample may be a result of over-amplification of template DNA with the fragment analysis kit. Refer to the amplification troubleshooting section of the manual of the fragment analysis kit being used. |
| | If internal lane standard peaks are of higher signal intensity than expected as well as those in your sample, then the injection voltage and/or time may be too high and/or that the volume of internal lane standard in the loading cocktail is too high. Ensure that the correct volume of internal lane standard and sample was added to the loading cocktail and reduce if volumes are too high. If volumes of internal lane standard and sample are correct, repeat injection with a reduced injection time. |
| Peak intensity too low | Poor-quality formamide used with high conductivity. Prepare sample with fresh Hi-Di™ formamide. |
| | Salt from the amplification reaction can compete with amplified DNA for electrokinetic injection. Adding too much volume of amplification reaction to the sample loading cocktail can reduce peak heights. If higher signal is desired, either reamplify your sample with more DNA (refer to the amplification troubleshooting of the fragment analysis kit being used) or repeat injection with an increased injection time. |
| Poor resolution | Samples were over-injected. If sample peak heights are too high, use less sample volume and/or reduce injection time. Alternatively, reamplify with less DNA (refer to the amplification troubleshooting section of the manual of the fragment analysis kit being used). |
| | Old polymer (on instrument for more than 2 weeks) and/or polymer that has passed its expiration date was used. Install a fresh Spectrum Compact Polymer Cartridge and reinject samples. Other symptoms of old polymer include higher than normal current during electrophoresis and longer run times, especially for larger fragments. |
| | Spectrum Compact Capillary Cartridge with more than 300 injections was used. Greater than 300 injections may result in poor resolution. Replace Spectrum Compact Capillary Cartridge and reinject samples. |

| Symptom | Causes and Comments |
|---|---|
| Poor signal and/or capillary to capillary signal variation | If low signal and/or high variation in signal from capillary to capillary is observed after installing a new capillary cartridge, reinstall the capillary cartridge. Completely remove the capillary cartridge from the oven and reinstall as indicated in Section 3.2. Simply lift the capillary cartridge completely out of the oven by its yellow knob and reinstall immediately back in the oven. Repositioning the detection unit of the capillary cartridge into the detection window of the oven during reinstallation can improve overall signal and reduce variation in signal from capillary to capillary.<br>**Note:** It is necessary after uninstalling and reinstalling the capillary cartridge to perform a new spatial and spectral calibration before running samples. |

# Protocol and Strip Setup Tools for Spectrum Compact 13

Two Excel® macro-enabled workbooks are provided that can be used to create .xml files on a computer that is not connected to the Spectrum Compact CE System. The following functions can be imported via a USB drive into the Spectrum Compact Control Software as described in Sections 5.3.4 and 7.5:

1. Assays and Protocols (Protocol Setup Tool for Spectrum Compact)
2. Strip Information (Strip Setup Tool for Spectrum Compact)

The workbook files can be downloaded at **www.promega.com/SpectrumWorkbooks**. Enter your contact information, and you will be directed to download a .zip file with the two workbooks. Save all files to an easily accessible location on your computer.

## 13.1 Recommended System Requirements

The following PC system requirements must be met for these tools to run:

1. Microsoft® Windows® 7/32 bit, 64bit or Windows® 10/64bit
2. Microsoft® Excel® 2016

## 13.2 Spreadsheet Installation

1. Copy each of the setup.exe applications to separate Strip Setup and Protocol Setup folders on your PC. The installation process for both tools is the same. Representative instructions for installing the Strip Setup Tool for Spectrum Compact are given below.

2. Run the setup.exe application by right clicking on the setup.exe application and “Run as administrator” to initiate installation. A warning screen may appear, depending on the operating system (Figure 185, example from Windows® 10 operating system). Select **More info** and then **Run Anyway** (Figure 186).

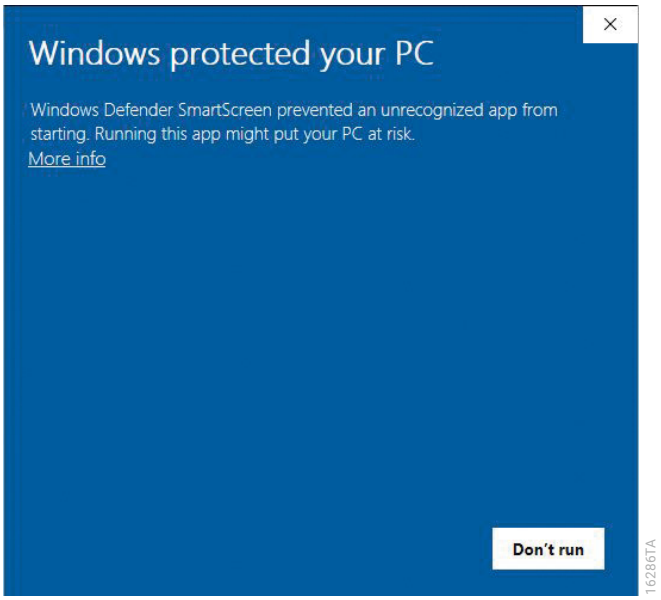



**Figure 185. Windows® 10 Warning Window.**

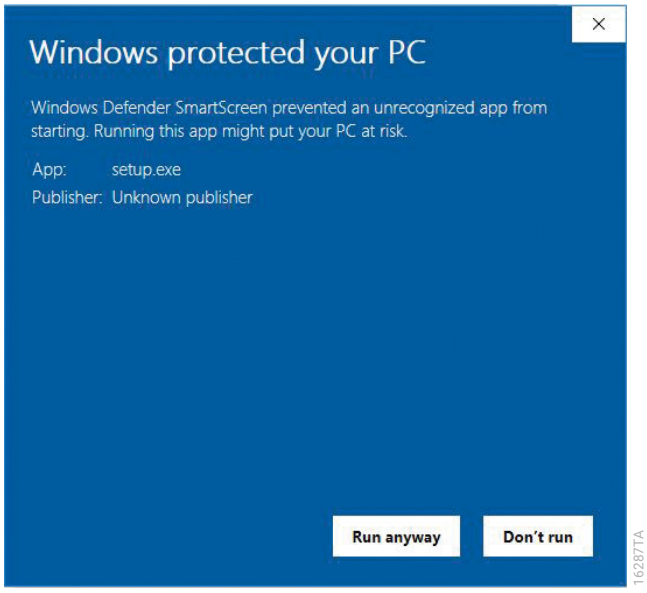



**Figure 186. Windows® 10 Warning Window: Run Anyway.**

3. The Strip Setup Tool for Spectrum Compact InstallShield Wizard window will be displayed (Figure 187). Select **Next**.

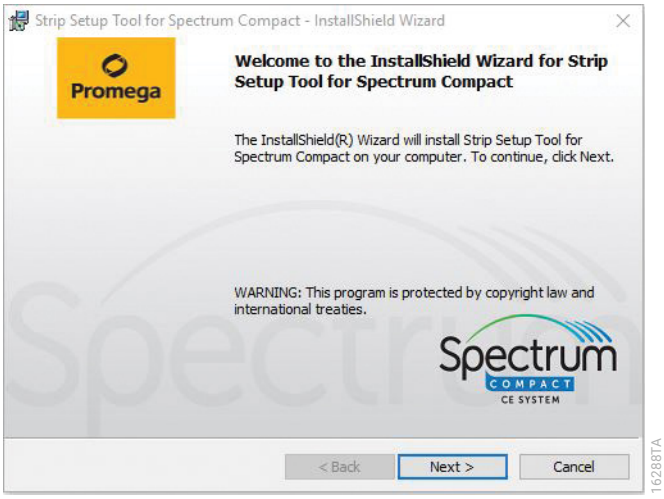



**Figure 187. InstallShield Wizard window.**

4. The Ready to Install the Program window appears (Figure 188). Select **Install**.


**Figure 188. Ready to Install the Program window.**

5. The InstallShield Wizard Completed window is displayed (Figure 189) upon successful installation of the tool. Select **Finish** to exit out of the InstallShield window.

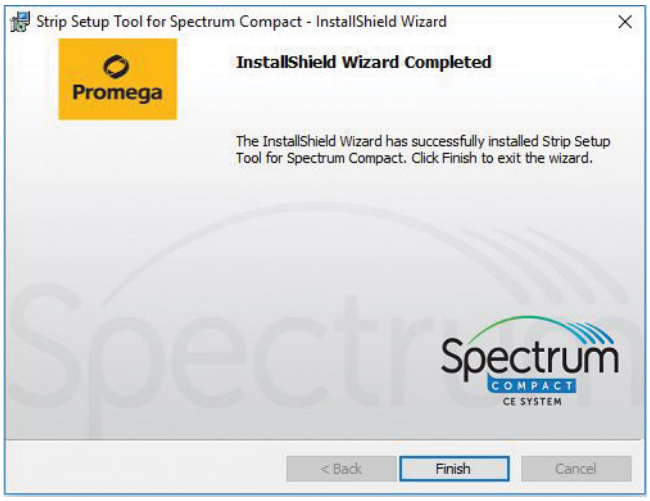



**Figure 189. Ready to Install the Program window.**

6. A shortcut to each tool is placed on your PC's desktop. Both tools are located on the PC's C drive in a folder called Compact CE.

   **Note:** Upon launching these tools a security warning ribbon may appear along the top of the screen stating that "Some active content has been disabled. Click for more details". Select **Enable Content** in this security warning ribbon to enable fully functionality of these tools.

## 13.3 Protocol Setup Tool for Spectrum Compact

The Protocol Setup Tool for Spectrum Compact is accessed by opening the 'Protocol Setup Tool for Spectrum Compact.xlsm' Excel® macro-enabled workbook. This tool enables user to create and edit the following assays and protocols:

1. Assay
2. Instrument Protocol
3. Basecalling Protocol
4. Sizecalling Protocol
5. Size Standard Protocol

Assays and protocols created or edited using this tool will be outputted as .xml files. These files can then be imported into the the Spectrum Compact Control Software as described in Section 7.5.2. In this way, the same assays and protocols may be installed on multiple Spectrum Compact CE Systems. In addition, assays and protocols exported from the Spectrum Compact Control Software (Section 7.5.1) can be opened using the Protocol Setup Tool for Spectrum Compact and user-defined protocols (but not preloaded protocols) may be edited in the Protocol Setup Tool for Spectrum Compact.

**Notes:**

a. Only user-defined protocols can be exported from one instrument and imported into another.

b. Preloaded protocols exported from the Spectrum Compact CE System Software (Section 7.5.1) are visible after importing into the Protocol Setup Tool for Spectrum Compact, but are greyed out and not available for editing. Instead, they may be duplicated to make a copy that can then be edited. Preloaded protocols are not available for import when the .xml file is subsequently imported into another Spectrum Compact Control Software as described in Section 7.5.2.

c. Multiple assays and protocols may be created and saved in one protocol .xml file. In this way, multiple assays and protocols can be made available on one protocol .xml file. These multiple assays and protocols are then available for individual import on the Spectrum Compact CE System (see Section 7.5).

## 13.4 Editing Existing Assays and Protocols

User-defined assays and protocols may be edited directly (i.e., without duplicating) or duplicated to create new assays and protocols via use of the duplicate function on each assay and protocol setup worksheet following import of a protocols .xml file into the Protocol Setup Tool for Spectrum Compact. This duplicate function essentially serves as a Save As function, instead of overwriting the parameters in the existing user-defined assay or protocol that is being used as a template to create a new assay or protocol. The following table lists rules for characters that can be used when naming new assays or protocols.

**Note:** Preloaded assays and protocols may be duplicated to serve as a template for the creation of new user-defined assays or protocols, but cannot be edited directly.

| | |
|---|---|
| **Acceptable Characters** | 1 to 40 characters |
| | Upper and lowercase alphabetic characters |
| | Numbers |
| | Symbols unless listed below |
| **Unacceptable Characters** | #%&{}\<>*?/$!'":@+`\|= and spaces |

### 13.4.1 Importing Protocol .xml File into Protocol Setup Tool for Spectrum Compact

1. Open the 'Protocol Setup Tool for Spectrum Compact.xlsm' Excel® macro-enabled workbook. The 'Main' worksheet will be displayed (Figure 190).

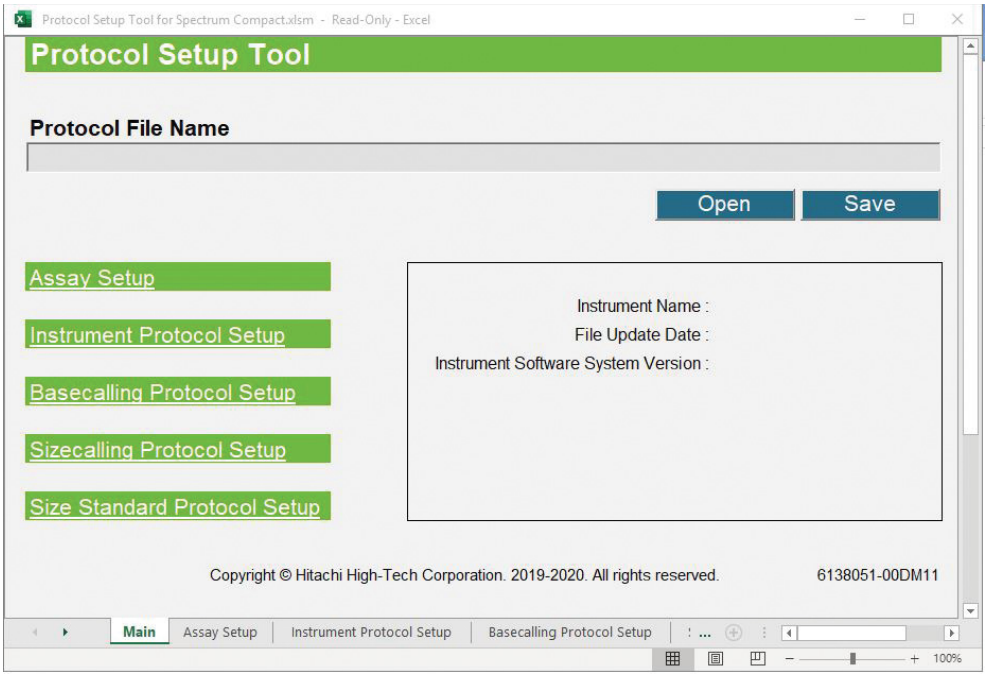



**Figure 190. Main worksheet of the Protocol Setup Tool for Spectrum Compact.**

2. Selecting **Open** brings up a browsing window (Figure 191) to allow you to navigate to the location of a protocols .xml file previously exported from a Spectrum Compact CE System (Section 7.5.1) and transferred via a USB drive to the PC.
3. Select the desired protocols .xml file and select **Open** on the browsing window (Figure 191).

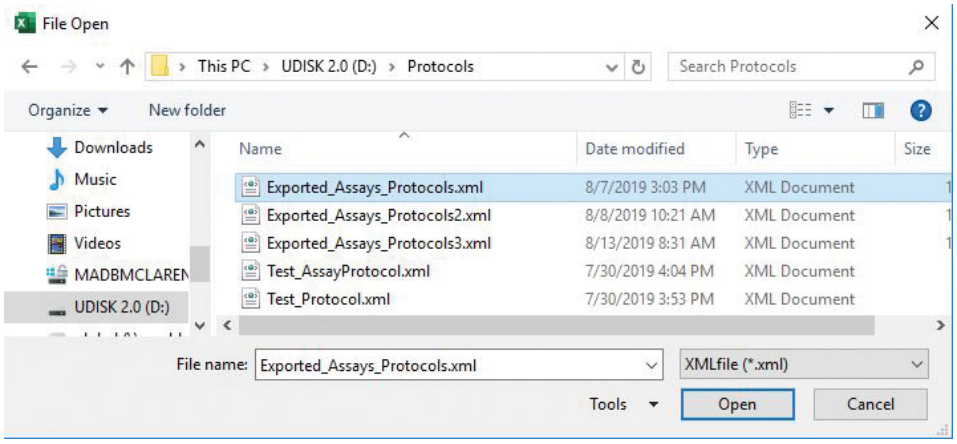
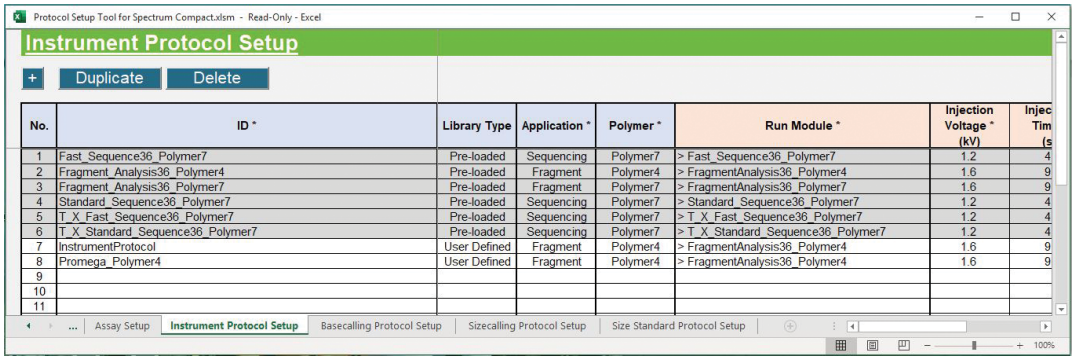



**Figure 191. Browsing window.**

4. A Microsoft® Excel® window will be displayed stating that the “Protocol file read complete”. Select **OK** to close this window. The file path of the imported protocol .xml file will appear in the Protocol File Name box of the Protocol Setup Tool for Spectrum Compact.
5. Information on individual protocols or assays can be accessed by either selecting **Setup** on the ‘Main’ worksheet or selecting the tab at the bottom for the appropriate setup worksheet (Figure 190).

## 13.4.2 Editing Imported Instrument Protocols

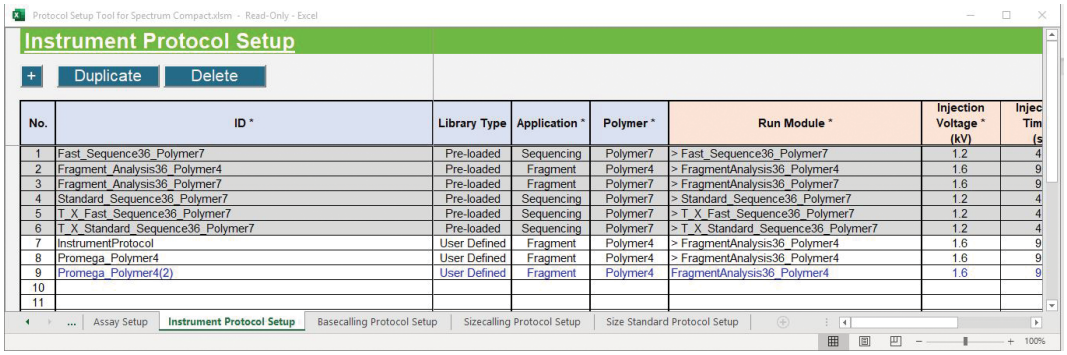
1. Open the ‘Instrument Protocol Setup’ worksheet by either selecting **Setup** on the Main worksheet or selecting the tab at the bottom for the appropriate setup worksheet (Figure 190).
2. Preloaded instrument protocols exported from the Spectrum Compact CE System Control Software are greyed out and not available for direct editing, but may be duplicated. The duplicated copy may be edited. User-defined instrument protocols are not greyed out and may be directly edited, or duplicated for editing to create a new instrument protocol (Figure 192).




| No. | ID * | Library Type | Application * | Polymer * | Run Module * | Injection Voltage * (kV) | Injec Tim (s |
|---|---|---|---|---|---|---|---|
| 1 | Fast_Sequence36_Polymer7 | Pre-loaded | Sequencing | Polymer7 | > Fast_Sequence36_Polymer7 | 1.2 | 4 |
| 2 | Fragment_Analysis36_Polymer4 | Pre-loaded | Fragment | Polymer4 | > FragmentAnalysis36_Polymer4 | 1.6 | 9 |
| 3 | Fragment_Analysis36_Polymer7 | Pre-loaded | Fragment | Polymer7 | > FragmentAnalysis36_Polymer7 | 1.6 | 9 |
| 4 | Standard_Sequence36_Polymer7 | Pre-loaded | Sequencing | Polymer7 | > Standard_Sequence36_Polymer7 | 1.2 | 4 |
| 5 | T_X_Fast_Sequence36_Polymer7 | Pre-loaded | Sequencing | Polymer7 | > T_X_Fast_Sequence36_Polymer7 | 1.2 | 4 |
| 6 | T_X_Standard_Sequence36_Polymer7 | Pre-loaded | Sequencing | Polymer7 | > T_X_Standard_Sequence36_Polymer7 | 1.2 | 4 |
| 7 | InstrumentProtocol | User Defined | Fragment | Polymer4 | > FragmentAnalysis36_Polymer4 | 1.6 | 9 |
| 8 | Promega_Polymer4 | User Defined | Fragment | Polymer4 | > FragmentAnalysis36_Polymer4 | 1.6 | 9 |
| 9 | | | | | | | |
| 10 | | | | | | | |
| 11 | | | | | | | |

**Figure 192. ‘Instrument Protocol Setup’ worksheet.**

3. Select the desired instrument protocol ID, and select **Duplicate** at the top of the ‘Instrument Protocol Setup’ worksheet if you are not planning to overwrite an existing user-defined protocol (Figure 192). The new instrument protocol will have the same name as the one that was duplicated, but with a numerical suffix (Figure 193).




| No. | ID * | Library Type | Application * | Polymer * | Run Module * | Injection Voltage * (kV) | Injec Tim (s |
|---|---|---|---|---|---|---|---|
| 1 | Fast_Sequence36_Polymer7 | Pre-loaded | Sequencing | Polymer7 | > Fast_Sequence36_Polymer7 | 1.2 | 4 |
| 2 | Fragment_Analysis36_Polymer4 | Pre-loaded | Fragment | Polymer4 | > FragmentAnalysis36_Polymer4 | 1.6 | 9 |
| 3 | Fragment_Analysis36_Polymer7 | Pre-loaded | Fragment | Polymer7 | > FragmentAnalysis36_Polymer7 | 1.6 | 9 |
| 4 | Standard_Sequence36_Polymer7 | Pre-loaded | Sequencing | Polymer7 | > Standard_Sequence36_Polymer7 | 1.2 | 4 |
| 5 | T_X_Fast_Sequence36_Polymer7 | Pre-loaded | Sequencing | Polymer7 | > T_X_Fast_Sequence36_Polymer7 | 1.2 | 4 |
| 6 | T_X_Standard_Sequence36_Polymer7 | Pre-loaded | Sequencing | Polymer7 | > T_X_Standard_Sequence36_Polymer7 | 1.2 | 4 |
| 7 | InstrumentProtocol | User Defined | Fragment | Polymer4 | > FragmentAnalysis36_Polymer4 | 1.6 | 9 |
| 8 | Promega_Polymer4 | User Defined | Fragment | Polymer4 | > FragmentAnalysis36_Polymer4 | 1.6 | 9 |
| 9 | Promega_Polymer4(2) | User Defined | Fragment | Polymer4 | FragmentAnalysis36_Polymer4 | 1.6 | 9 |
| 10 | | | | | | | |
| 11 | | | | | | | |

**Figure 193. ‘Instrument Protocol Setup’ worksheet with Duplicated Instrument Protocol.**

4. Select the cell with duplicated instrument protocol ID and rename as desired.

5. The 'Instrument Protocol Setup' worksheet is split into twelve columns as follows.

   **Note:** Use scroll bar at bottom of worksheet to scroll left to right across all columns.

| Column Header | Description | Minimum Value Allowed | Maximum Value Allowed |
|---|---|---|---|
| No. | Numbering order for instrument protocols | NA | NA |
| ID | Defines the protocol name | 1 Character | 40 Characters |
| Library Type | Defines whether injection protocol is 'Pre-Loaded' (grayed out) or 'User Defined' | NA | NA |
| Application | Defines whether the protocol is for Sequencing or Fragment Analysis | Assigned using drop-down menu | Assigned using drop-down menu |
| Polymer | Defines whether the protocol uses Polymer4 or Polymer7 | Assigned using drop-down menu | Assigned using drop-down menu |
| Run Module | Preloaded modules that specify run condition parameters (injection voltage, run voltage, oven temperature, injection time, run time and delay time) and on which the injection parameters for a given instrument protocol are based | Assigned using drop-down menu | Assigned using drop-down menu |
| Injection Voltage (kV) | Defines the injection voltage | 1 | 15 |
| Injection Time (s) | Defines the injection duration | 1 | 600 |
| Run Voltage (kV) | Defines the voltage applied during electrophoresis | 1 | 18 |
| Run Time (s) | Defines the time needed to complete the run and collect data from all labeled fragments | 300 | 7200 |
| Oven Temperature (°C) | Defines the target oven temperature setting for the protocol | 40 | 70 |
| Data Delay Time (s) | Defines the time to delay data collection while fragments travel from the capillary tips to the detection window | 1 | 3600 |

**Note:** A column header with an * symbol indicates that it is a required field. Failure to fill in these fields will prevent the protocol from being saved.

6. Select the appropriate settings for the new instrument protocol (see also Section 7.2.1 for information on instrument protocol settings).
7. Select the 'Main' worksheet tab followed by **Save** (Figure 190). A 'Save As' browse window appears. Browse to the location (e.g., a USB drive) where you wish to save the new protocol .xml file and save to a folder named Protocols within that location (if folder does not already exist, create a new folder with that name).

   **Notes:**

   a. To import the Protocol .xml files onto a Spectrum Compact CE System, they must be stored in a folder called Protocols on the USB drive. If they are stored in a different location on the USB drive, the Spectrum Compact Control Software will not be able to locate these files.

   b. Saving can be done after each protocol is edited or after all desired protocols have been edited.

   c. If there are any invalid data errors within the new protocol.xml file being saved, an error window will be displayed (Figure 194).

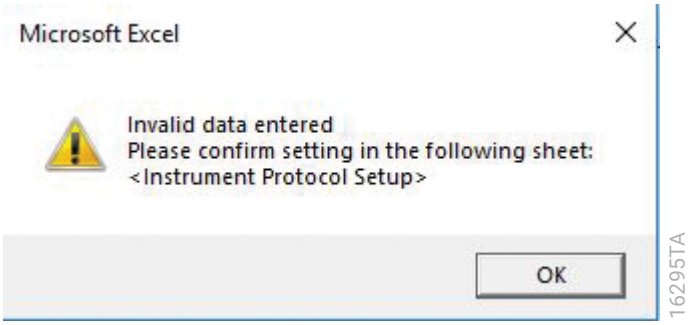



**Figure 194. Microsoft® Excel® Invalid Data Entry Error window.**

### 13.4.3 Editing Imported Basecalling Protocol

1. Open the 'Basecalling Protocol Setup' worksheet by either selecting **Setup** on the Main worksheet or selecting the tab at the bottom for the appropriate setup worksheet (Figure 190).
2. Preloaded basecalling protocols exported from the Spectrum Compact Control Software are greyed out and not available for direct editing, but may be duplicated and the duplicate copy edited. User-defined basecalling protocols are not greyed out and may be directly edited, or duplicated for editing to create a new basecalling protocol (Figure 195).

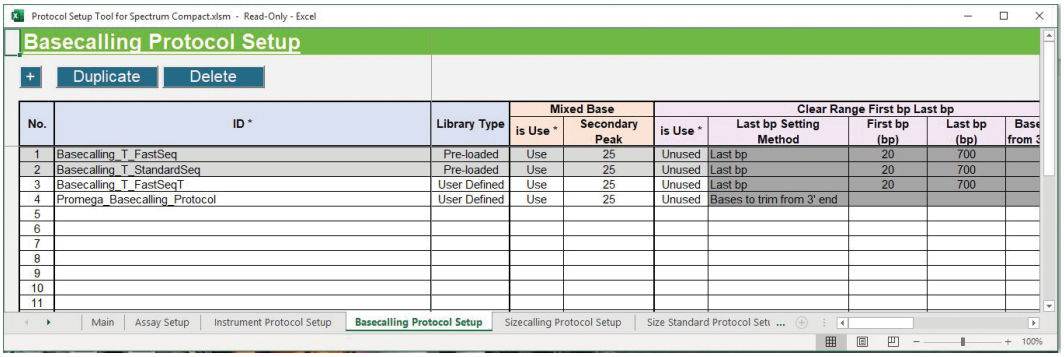



**Figure 195. 'Basecalling Protocol Setup' worksheet.**

3. Select the desired basecalling protocol ID, and select **Duplicate** at the top of the 'Basecalling Protocol Setup' worksheet if you are not planning to overwrite an existing user-defined protocol (Figure 195). The new basecalling protocol will have the same name as the one that was duplicated, but with a numerical suffix (Figure 196).

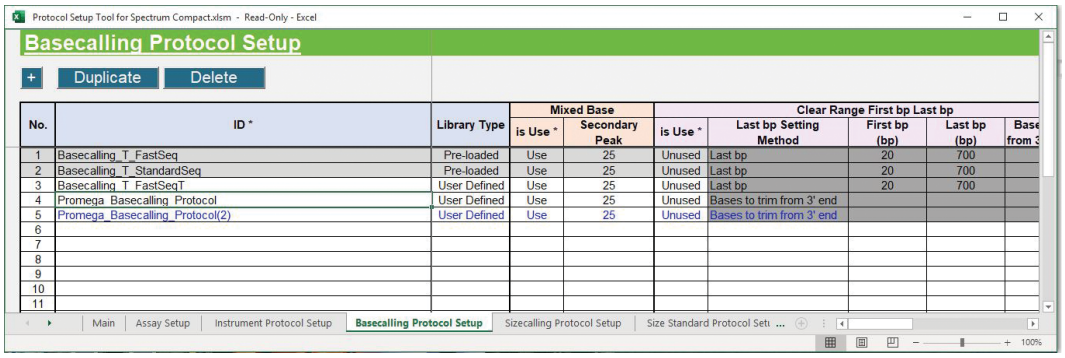



**Figure 196. 'Basecalling Protocol Setup' worksheet with duplicated Basecalling protocol.**

4. Select the cell with duplicated basecalling protocol ID and rename as desired.

5. The 'Basecalling Protocol Setup' worksheet is split into 23 columns as follows.

   **Note:** Use scroll bar at bottom of worksheet to scroll left to right across all columns.

| Column Header | Description | Minimum Value Allowed | Maximum Value Allowed |
|---|---|---|---|
| No. | Numbering order for basecalling protocols | NA | NA |
| ID | Defines the protocol name. | 1 Character | 40 Characters |
| Library Type | Defines whether basecalling protocol is Pre-Loaded (greyed out) or User Defined. | NA | NA |
| Mixed Base (is Use) | Defines whether the mixed base setting is enabled. See Section 7.2.2 for a description of the Mixed Base function. | Unused | Use |
| Mixed Base (Secondary Peak) | Defines minimum height of minor secondary peak as a percentage of the major peak at the same position before that peak is identified as a mixed base. | 1% | 99% |
| Clear Range First bp–Last bp (is Use) | Defines whether the basecalling protocol makes use of the clear range (by First bp–Last bp) setting. See Section 7.2.2 for a description of the 'Clear Range First bp–Last bp' function. | Unused | Use |
| Clear Range First bp–Last bp (Last bp Setting Method) | Defines whether the basecalling protocol that is using the clear range (by First bp–Last bp) setting is doing so by one of two methods:<br>• Last bp<br>• Base to trim from 3′ end<br><br>See Section 7.2.2 for a description of the 'Clear Range First bp–Last bp' function. | Last bp | Bases to trim from 3′ end |

| Column Header | Description | Minimum Value Allowed | Maximum Value Allowed |
|---|---|---|---|
| Clear Range First bp–Last bp [First bp (bp)] | Defines the first bp in the sequence to be considered for analysis.<br>**Note:** This value should be smaller than that chosen for the 3′ end point (last bp position to be considered for analysis). See Section 7.2.2 for a description of the 'Clear Range First bp–Last bp' function. | 1 | 1200 |
| Clear Range First bp–Last bp [Last bp (bp)] | Defi nes the last bp in the sequence to be considered for analysis when using the 'Last bp' method for setting the last bp to be considered for analysis.<br>**Note:** This value should be larger than that chosen for the first bp in the sequence to be considered for analysis. See Section 7.2.2 for a description of the 'Clear Range First bp–Last bp' function. | 1 | 1200 |
| Clear Range First bp–Last bp [Bases to trim from 3′ end (bp)] | Defines the number of bases to be removed from the 3′ end of the sequence when using the 'Bases to trim from 3′ end' method for setting the last bp to be considered for analysis.<br>**Note:** This value should not be so large as to result in trimming of bases back before the first bp being considered for analysis. See Section 7.2.2 for a description of the 'Clear Range First bp–Last bp' function. | 1 | 1200 |

| Column Header | Description | Minimum Value Allowed | Maximum Value Allowed |
|---|---|---|---|
| Clear Range Quality Value (is Use) | Defines whether the basecalling protocol makes use of the clear range (by Quality Value) setting. See Section 7.2.2 for a description of the the 'Clear Range Quality Value' function. | Unused | Use |
| Clear Range Quality Value [fewer than (bp)] | Defines the minimum number of bases that can have a Quality Value (QV) less than that set in the 'Have QVs less than' column. See Section 7.2.2 for a description of the 'Clear Range Quality Value' function. | 1 | 1200 |
| Clear Range Quality Value [bases out of (bp)] | Defines the sliding window of bases that cannot have more than the number of bases specified in the 'fewer than (bp)' column with a Quality Value (QV) less than that set in the 'Have QVs less than' column. See Section 7.2.2 for a description of the 'Clear Range Quality Value' function. | 1 | 1200 |
| Clear Range Quality Value (Have QVs less than) | Defines the minimum Quality Value (QV) above which data are considered of acceptable quality. See Section 7.2.2 for a description of the 'Clear Range Quality Value' function. | 1 | 60 |
| Sequencing Quality [Contiguous Read Length (bp)] (is Use) | Defines whether the basecalling protocol makes use of the Contiguous Read Length (CRL) parameter when evaluating sequencing quality. See Section 7.2.2 for a description of the 'Sequencing Quality' function. | Unused | Use |

| Column Header | Description | Minimum Value Allowed | Maximum Value Allowed |
|---|---|---|---|
| Sequencing Quality [Contiguous Read Length (bp)] (< Fail) | Defines the minimum CRL below which data are considered of unacceptable quality. See Section 7.2.2 for a description of the 'Sequencing Quality' function. | 1 | 800 |
| Sequencing Quality [Contiguous Read Length (bp)] (Pass ≤) | CRL values equal to or above this value are considered of acceptable quality. See Section 7.2.2 for a description of the 'Sequencing Quality' function. | 1 | 800 |
| Sequencing Quality [QV20+ (bp)] (is Use) | Defines whether the basecalling protocol makes use of the QV20+ parameter when evaluating sequencing quality. See Section 7.2.2 for a description of the 'Sequencing Quality' function. | Unused | Use |
| Sequencing Quality [QV20+ (bp)] (< Fail) | Defines the minimum QV20+ below which data are considered of unacceptable quality. See Section 7.2.2 for a description of the 'Sequencing Quality' function. | 1 | 800 |
| Sequencing Quality [QV20+ (bp)] (Pass ≤) | QV20+ values equal to or above this value are considered of acceptable quality. See Section 7.2.2 for a description of the 'Sequencing Quality' function. | 1 | 800 |
| Sequencing Quality (Trace Score) (is Use) | Defines whether the basecalling protocol makes use of the Trace Score parameter when evaluating sequencing quality. See Section 7.2.2 for a description of the 'Sequencing Quality' function. | Unused | Use |

| Column Header | Description | Minimum Value Allowed | Maximum Value Allowed |
|---|---|---|---|
| Sequencing Quality (Trace Score) (< Fail) | Defines the minimum Trace Score below which data are considered of unacceptable quality. See Section 7.2.2 for a description of the 'Sequencing Quality' function. | 1 | 60 |
| Sequencing Quality (Trace Score) (Pass ≤) | QV20+ values equal to or above this value are considered of acceptable quality. See Section 7.2.2 for a description of the 'Sequencing Quality' function. | 1 | 60 |

**Note:** A column header with an * symbol indicates that it is a required field. Failure to fill in these fields will prevent the protocol from being saved.

6. Select the appropriate settings for the new basecalling protocol (see also Section 7.2.2 for information on basecalling protocol settings).
7. Select the 'Main' worksheet tab followed by **Save** (Figure 190). A 'Save As' browse window appears. Browse to the location (e.g., a USB drive) where you wish to save the new protocol .xml file and save to a folder named Protocols within that location (if folder does not already exist, create a new folder with that name).

**Notes:**

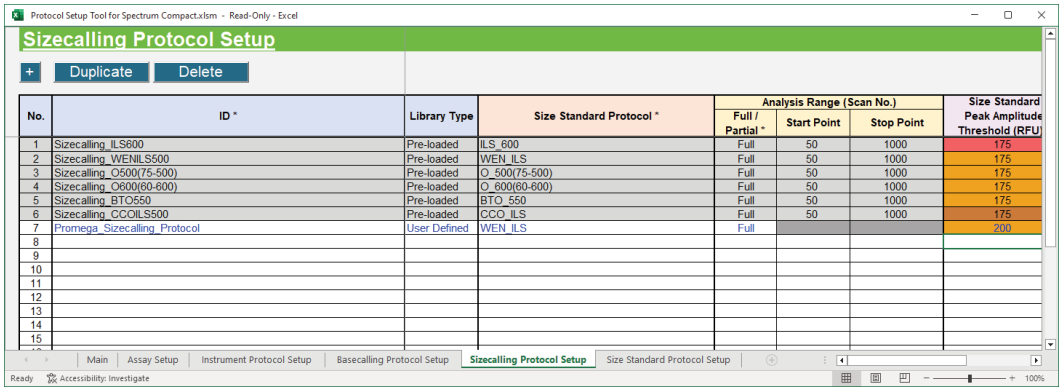
a. To import the Protocol .xml files onto a Spectrum Compact CE System, they must be stored in a folder called Protocols on the USB drive. If they are stored in a different location on the USB drive, the Spectrum Compact Control Software will not be able to locate these files.

b. Saving can be done after each protocol is edited or after all desired protocols have been edited.

c. If there are any invalid data errors within the new protocol.xml file being saved, an error window will be displayed similar to that shown in Figure 194, but specific for basecalling protocols.

### 13.4.4 Editing Imported Sizecalling Protocol

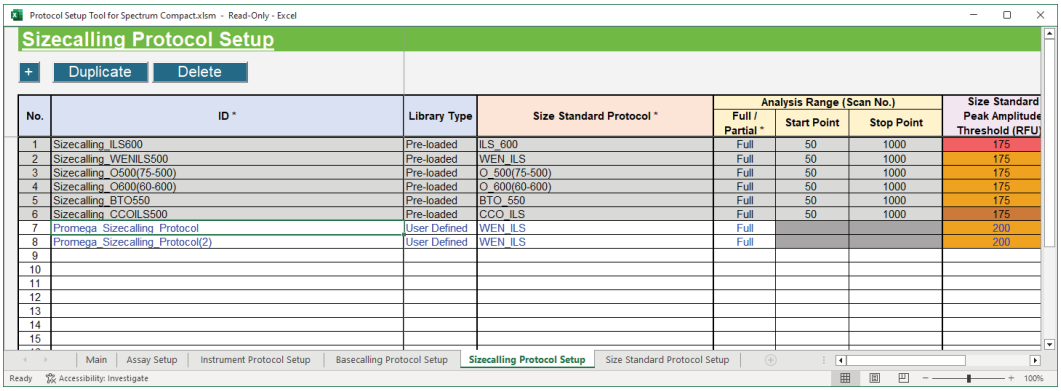
1. Open the 'Sizecalling Protocol Setup' worksheet by either selecting **Setup** on the Main worksheet or selecting the tab at the bottom for the appropriate setup worksheet (Figure 190).
2. Preloaded sizecalling protocols exported from the Spectrum Compact Control Software are greyed out and not available for direct editing, but may be duplicated and the duplicate copy edited. User-defined sizecalling protocols are not greyed out and may be directly edited, or duplicated for editing to create a new sizecalling protocol (Figure 197).




| No. | ID * | Library Type | Size Standard Protocol * | Analysis Range (Scan No.) | | | Size Standard Peak Amplitude Threshold (RFU) |
|---|---|---|---|---|---|---|---|
| | | | | Full / Partial * | Start Point | Stop Point | |
| 1 | Sizecalling_ILS600 | Pre-loaded | ILS_600 | Full | 50 | 1000 | 175 |
| 2 | Sizecalling_WENILS500 | Pre-loaded | WEN_ILS | Full | 50 | 1000 | 175 |
| 3 | Sizecalling_O500(75-500) | Pre-loaded | O_500(75-500) | Full | 50 | 1000 | 175 |
| 4 | Sizecalling_O600(60-600) | Pre-loaded | O_600(60-600) | Full | 50 | 1000 | 175 |
| 5 | Sizecalling_BTO550 | Pre-loaded | BTO_550 | Full | 50 | 1000 | 175 |
| 6 | Sizecalling_CCOILS500 | Pre-loaded | CCO_ILS | Full | 50 | 1000 | 175 |
| 7 | Promega_Sizecalling_Protocol | User Defined | WEN_ILS | Full | | | 200 |
| 8 | | | | | | | |
| 9 | | | | | | | |
| 10 | | | | | | | |
| 11 | | | | | | | |
| 12 | | | | | | | |
| 13 | | | | | | | |
| 14 | | | | | | | |
| 15 | | | | | | | |

**Figure 197. 'Sizecalling Protocol Setup' worksheet.**

3. Select the desired sizecalling protocol ID, and select **Duplicate** at the top of the 'Sizecalling Protocol Setup' worksheet if you are not planning to overwrite an existing user-defined protocol (Figure 197). The new sizecalling protocol will have the same name as the one that was duplicated, but with a numerical suffix (Figure 198).




| No. | ID * | Library Type | Size Standard Protocol * | Analysis Range (Scan No.) | | | Size Standard Peak Amplitude Threshold (RFU) |
|---|---|---|---|---|---|---|---|
| | | | | Full / Partial * | Start Point | Stop Point | |
| 1 | Sizecalling_ILS600 | Pre-loaded | ILS_600 | Full | 50 | 1000 | 175 |
| 2 | Sizecalling_WENILS500 | Pre-loaded | WEN_ILS | Full | 50 | 1000 | 175 |
| 3 | Sizecalling_O500(75-500) | Pre-loaded | O_500(75-500) | Full | 50 | 1000 | 175 |
| 4 | Sizecalling_O600(60-600) | Pre-loaded | O_600(60-600) | Full | 50 | 1000 | 175 |
| 5 | Sizecalling_BTO550 | Pre-loaded | BTO_550 | Full | 50 | 1000 | 175 |
| 6 | Sizecalling_CCOILS500 | Pre-loaded | CCO_ILS | Full | 50 | 1000 | 175 |
| 7 | Promega_Sizecalling_Protocol | User Defined | WEN_ILS | Full | | | 200 |
| 8 | Promega_Sizecalling_Protocol(2) | User Defined | WEN_ILS | Full | | | 200 |
| 9 | | | | | | | |
| 10 | | | | | | | |
| 11 | | | | | | | |
| 12 | | | | | | | |
| 13 | | | | | | | |
| 14 | | | | | | | |
| 15 | | | | | | | |

**Figure 198. 'Sizecalling Protocol Setup' worksheet with duplicated Sizecalling protocol**

4. Select the cell with duplicated sizecalling protocol ID and rename as desired.

5. The 'Sizecalling Protocol Setup' worksheet is split into twelve columns as follows.

   **Note:** Use scroll bar at bottom of worksheet to scroll left to right across all columns.

| Column Header | Description | Minimum Value Allowed | Maximum Value Allowed |
|---|---|---|---|
| No. | Numbering order for sizecalling protocols | NA | NA |
| ID | Defines the protocol name. | 1 Character | 40 Characters |
| Library Type | Defines whether sizecalling protocol is Pre-loaded (grayed out) or User Defined. | NA | NA |
| Size Standard Protocol | Defines the size standard used in the sizecalling protocol. Options for selecting a size standard in the pull down menu in this cell are limited to the size standard present on the 'Size Standard Protocol Setup' worksheet. | Assigned using drop-down menu | Assigned using drop-down menu |
| Analysis Range (Scan No.) (Full/ Partial) | Defines the range in scan number/data points from which to process the data for peak detection. Two options are available:<br>• Full<br>• Partial<br><br>See Section 7.2.3 for a description of the 'Analysis Range' function. | Partial | Full |
| Analysis Range (Scan No.)(Start Point) | Defines the start point for data analysis (scan number/data points) when partial analysis is chosen. See Section 7.2.3 for a description of the 'Analysis Range' function.<br>**Note:** Numerical value for Start Point should always be lower than the numerical value for Stop Point. | 0 | 32767 |

| Column Header | Description | Minimum Value Allowed | Maximum Value Allowed |
|---|---|---|---|
| Analysis Range (Scan No.) (Stop Point) | Defines the stop point for data analysis (scan number/data points) when partial analysis is chosen. See Section 7.2.3 for a description of the 'Analysis Range' function.<br>**Note:** Numerical value for Stop Point should always be higher than the numerical value for Start Point. | 0 | 32767 |
| Size Standard Peak Amplitude Threshold (RFU) | Defines the minimum RFU value at which to size and call a peak in the size standard dye channel. Peaks in the size standard must exceed the peak amplitude threshold value in order for that peak to be considered in the sizing algorithm. See Section 7.2.3 for a description of the 'Peak Amplitude Threshold' function. | 1 | 30000 |
| Size Quality(< Fail) | Defines the minimum Size Quality (SQ) value below which data are considered of unacceptable sizing quality. See Section 7.2.3 for a description of the 'Size Quality' function.<br>**Note:** This value should be smaller than that entered for Pass ≤. | 0.001 | 1 |
| Size Quality(Pass ≤) | SQ values equal to or above this value are considered of acceptable quality. See Section 7.2.3 for a description of the 'Size Quality' function.<br>**Note:** This value should be larger than that entered for < Fail. | 0.001 | 1 |

| Column Header | Description | Minimum Value Allowed | Maximum Value Allowed |
|---|---|---|---|
| Electrophoresis Quality(< Fail) | Defines the minimum Electrophoresis Quality (EQ) value (in bp) below which data are considered of unacceptable electrophoresis quality. See Section 7.2.3 for a description of the 'Electrophoresis Quality' function. **Note:** This value should be smaller than that entered for Pass ≤. | 1 | 1000 |
| Electrophoresis Quality(Pass ≤) | EQ values equal to or above this value are considered of acceptable quality. See Section 7.2.3 for a description of the 'Electrophoresis Quality' function. **Note:** This value should be larger than that entered for < Fail. | 1 | 1000 |

**Note:** A column header with an * symbol indicates that it is a required field. Failure to fill in these fields will prevent the protocol from being saved.

6. Select the appropriate settings for the new sizecalling protocol (see also Section 7.2.3 for information on sizecalling protocol settings).
7. Select the 'Main' worksheet tab followed by **Save** (Figure 190). A 'Save As' browse window appears. Browse to the location (e.g., a USB drive) where you wish to save the new protocol .xml file and save to a folder named Protocols within that location (if folder does not already exist, create a new folder with that name).

**Notes:**

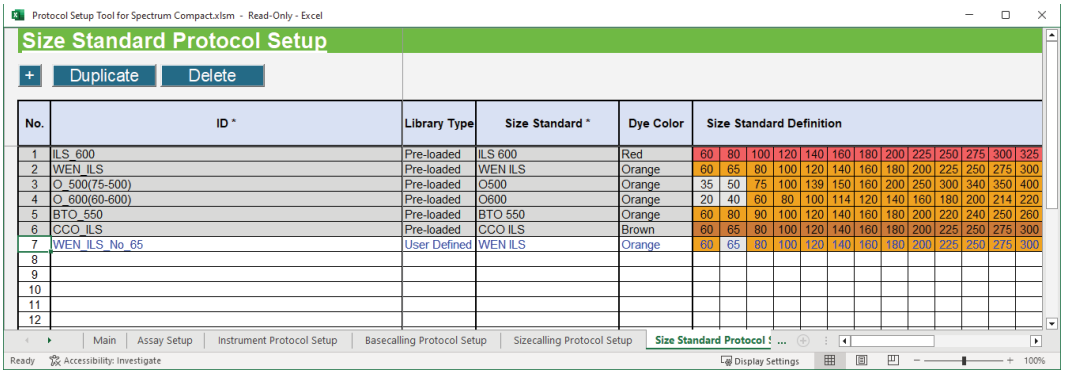
a. To import the Protocol .xml files onto a Spectrum Compact CE System, they must be stored in a folder called Protocols on the USB drive. If they are stored in a different location on the USB drive, the Spectrum Compact Control Software will not be able to locate these files.

b. Saving can be done after each protocol is edited or after all desired protocols have been edited.

c. If there are any invalid data errors within the new protocol.xml file being saved, an error window will be displayed similar to that shown in Figure 194, but specific for sizecalling protocols.

### 13.4.5 Editing Imported Size Standard Protocol

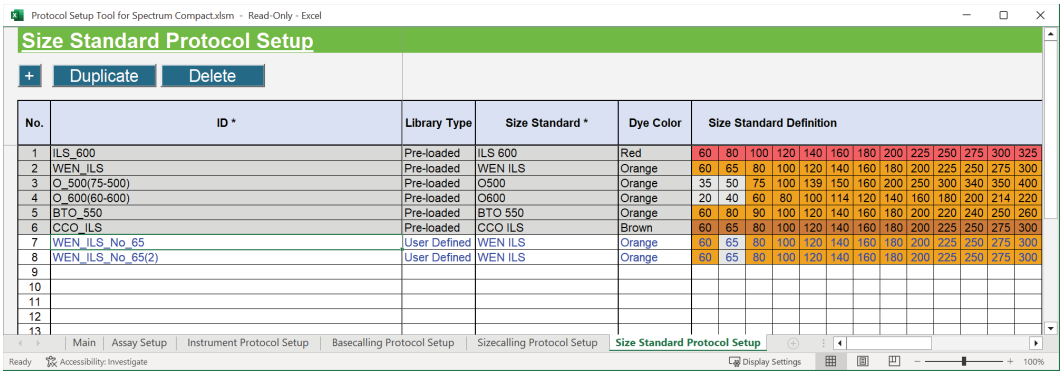
1. Open the 'Size Standard Protocol Setup' worksheet by either selecting **Setup** on the 'Main' worksheet or selecting the tab at the bottom for the appropriate setup worksheet (Figure 190).
2. Preloaded size standard protocols exported from the Spectrum Compact Control Software are greyed out and not available for direct editing, but may be duplicated and the duplicate copy edited. User-defined size standard protocols are not greyed out and may be directly edited, or duplicated for editing to create a new size standard protocol (Figure 199).




| No. | ID * | Library Type | Size Standard * | Dye Color | Size Standard Definition |
|---|---|---|---|---|---|
| 1 | ILS_600 | Pre-loaded | ILS 600 | Red | 60 80 100 120 140 160 180 200 225 250 275 300 325 |
| 2 | WEN_ILS | Pre-loaded | WEN ILS | Orange | 60 65 80 100 120 140 160 180 200 225 250 275 300 |
| 3 | O_500(75-500) | Pre-loaded | O500 | Orange | 35 50 75 100 139 150 160 200 250 300 340 350 400 |
| 4 | O_600(60-600) | Pre-loaded | O600 | Orange | 20 40 60 80 100 114 120 140 160 180 200 214 220 |
| 5 | BTO_550 | Pre-loaded | BTO 550 | Orange | 60 80 90 100 120 140 160 180 200 220 240 250 260 |
| 6 | CCO_ILS | Pre-loaded | CCO ILS | Brown | 60 65 80 100 120 140 160 180 200 225 250 275 300 |
| 7 | WEN_ILS_No_65 | User Defined | WEN ILS | Orange | 60 65 80 100 120 140 160 180 200 225 250 275 300 |
| 8 | | | | | |
| 9 | | | | | |
| 10 | | | | | |
| 11 | | | | | |
| 12 | | | | | |

**Figure 199. 'Size Standard Protocol' Setup worksheet.**

3. Select the desired size standard protocol ID, and select **Duplicate** at the top of the 'Size Standard Protocol Setup' worksheet if you are not planning to overwrite an existing user-defined protocol (Figure 199). The new size standard protocol will have the same name as the one that was duplicated, but with a numerical suffix (Figure 200).




| No. | ID * | Library Type | Size Standard * | Dye Color | Size Standard Definition |
|---|---|---|---|---|---|
| 1 | ILS_600 | Pre-loaded | ILS 600 | Red | 60 80 100 120 140 160 180 200 225 250 275 300 325 |
| 2 | WEN_ILS | Pre-loaded | WEN ILS | Orange | 60 65 80 100 120 140 160 180 200 225 250 275 300 |
| 3 | O_500(75-500) | Pre-loaded | O500 | Orange | 35 50 75 100 139 150 160 200 250 300 340 350 400 |
| 4 | O_600(60-600) | Pre-loaded | O600 | Orange | 20 40 60 80 100 114 120 140 160 180 200 214 220 |
| 5 | BTO_550 | Pre-loaded | BTO 550 | Orange | 60 80 90 100 120 140 160 180 200 220 240 250 260 |
| 6 | CCO_ILS | Pre-loaded | CCO ILS | Brown | 60 65 80 100 120 140 160 180 200 225 250 275 300 |
| 7 | WEN_ILS_No_65 | User Defined | WEN ILS | Orange | 60 65 80 100 120 140 160 180 200 225 250 275 300 |
| 8 | WEN_ILS_No_65(2) | User Defined | WEN ILS | Orange | 60 65 80 100 120 140 160 180 200 225 250 275 300 |
| 9 | | | | | |
| 10 | | | | | |
| 11 | | | | | |
| 12 | | | | | |
| 13 | | | | | |

**Figure 200. 'Size Standard Protocol' Setup worksheet with duplicated Size Standard Protocol.**

4. Select the cell with duplicated size standard protocol ID and rename as desired.

5. The 'Size Standard Protocol Setup' worksheet is split into six columns as follows.

   **Note:** Use scroll bar at bottom of worksheet to scroll left to right across all columns.

| Column Header | Description | Minimum Value Allowed | Maximum Value Allowed |
|---|---|---|---|
| No. | Numbering order for size standard protocols | NA | NA |
| ID | Defines the protocol name. | 1 Character | 40 Characters |
| Library Type | Defines whether the size standard protocol is Pre-loaded (grayed out) or User Defined. | NA | NA |
| Size Standard | Defines the pre-loaded size standard upon which the new size standard protocol is based. Options for selecting a size standard in the pull-down menu in this cell are limited to the pre-loaded size standard protocols present on the Spectrum Compact CE System.<br>**Note:** A new size standard protocol cannot be created without being based on the pre-loaded size standards. | Assigned using drop-down menu | Assigned using drop-down menu |
| Dye Color | Specifies the dye channel containing the size standard fragments (not editable). | NA | NA |
| Size Standard Definition | Defines the fragment sizes to be used for creating a sizing curve. Orange or red shading indicates the size is to be used. Gray shading indicates the size will not be used. Individual fragment sizes can be selected or deselected by selecting the corresponding cell on the screen.<br>**Note:** New fragment sizes cannot be created. | NA | NA |

**Note:** A column header with an * symbol indicates that it is a required field. Failure to fill in these fields will prevent the protocol from being saved.

6. Select the appropriate settings for the new size standard protocol (see also Section 7.3.1 for information on size standard protocol settings).
7. Select the 'Main' worksheet tab followed by **Save** (Figure 190). A 'Save As' browse window appears. Browse to the location (e.g., a USB drive) where you wish to save the new protocol .xml file and save to a folder named Protocols within that location (if folder does not already exist, create a new folder with that name).

**Notes:**

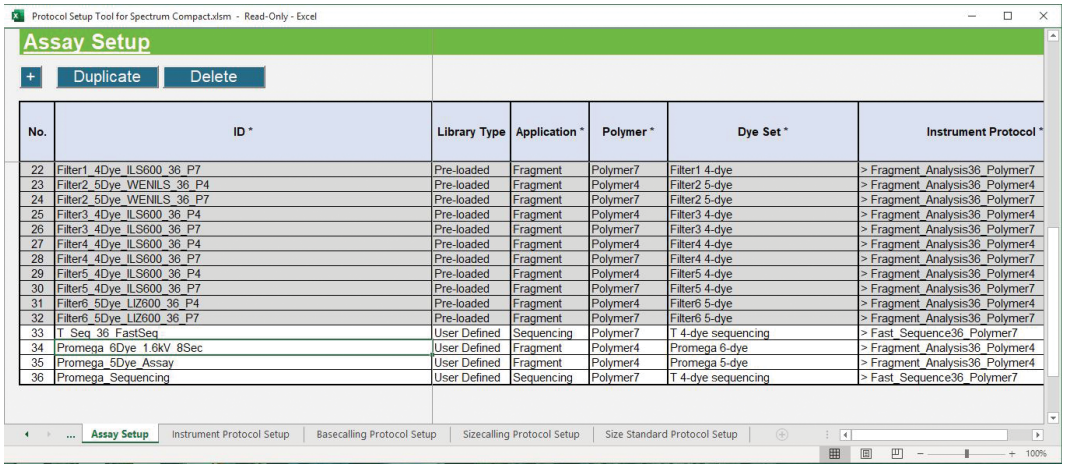
a. To import the Protocol .xml files onto a Spectrum Compact CE System, they must be stored in a folder called Protocols on the USB drive. If they are stored in a different location on the USB drive, the Spectrum Compact Control Software will not be able to locate these files.

b. Saving can be done after each protocol is edited or after all desired protocols have been edited.

c. If there are any invalid data errors within the new protocol.xml file being saved, an error window will be displayed similar to that shown in Figure 194, but specific for size standard protocols.

### 13.4.6 Editing Imported Assays

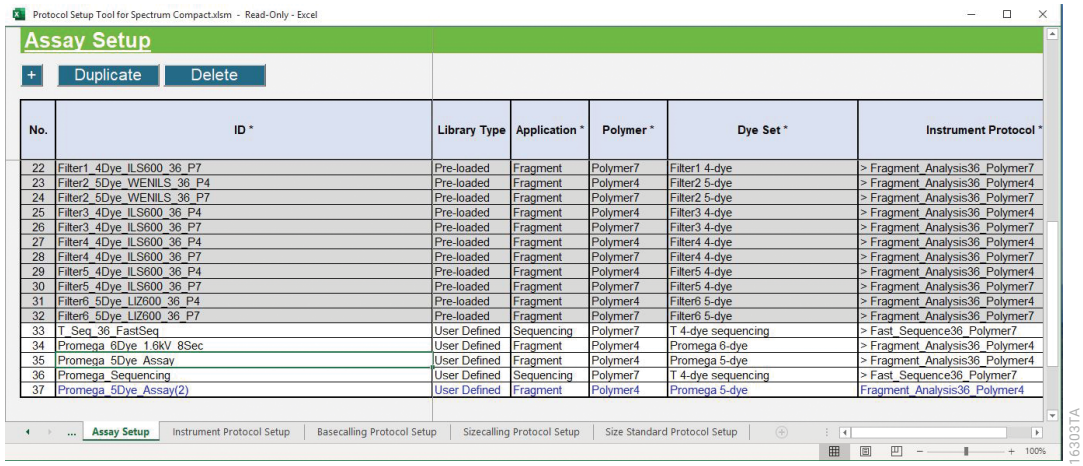
1. Open the 'Assay Setup' worksheet by either selecting **Setup** on the 'Main' worksheet or selecting the tab at the bottom for the appropriate setup worksheet (Figure 190).
2. Preloaded assays exported from the Spectrum Compact Control Software are greyed out and not available for direct editing, but may be duplicated and the duplicate copy edited. User-defined assays are not greyed out and may be directly edited, or duplicated for editing to create a new assay (Figure 201).




| No. | ID * | Library Type | Application * | Polymer * | Dye Set * | Instrument Protocol * |
|---|---|---|---|---|---|---|
| 22 | Filter1_4Dye_ILS600_36_P7 | Pre-loaded | Fragment | Polymer7 | Filter1 4-dye | > Fragment_Analysis36_Polymer7 |
| 23 | Filter2_5Dye_WENILS_36_P4 | Pre-loaded | Fragment | Polymer4 | Filter2 5-dye | > Fragment_Analysis36_Polymer4 |
| 24 | Filter2_5Dye_WENILS_36_P7 | Pre-loaded | Fragment | Polymer7 | Filter2 5-dye | > Fragment_Analysis36_Polymer7 |
| 25 | Filter3_4Dye_ILS600_36_P4 | Pre-loaded | Fragment | Polymer4 | Filter3 4-dye | > Fragment_Analysis36_Polymer4 |
| 26 | Filter3_4Dye_ILS600_36_P7 | Pre-loaded | Fragment | Polymer7 | Filter3 4-dye | > Fragment_Analysis36_Polymer7 |
| 27 | Filter4_4Dye_ILS600_36_P4 | Pre-loaded | Fragment | Polymer4 | Filter4 4-dye | > Fragment_Analysis36_Polymer4 |
| 28 | Filter4_4Dye_ILS600_36_P7 | Pre-loaded | Fragment | Polymer7 | Filter4 4-dye | > Fragment_Analysis36_Polymer7 |
| 29 | Filter5_4Dye_ILS600_36_P4 | Pre-loaded | Fragment | Polymer4 | Filter5 4-dye | > Fragment_Analysis36_Polymer4 |
| 30 | Filter5_4Dye_ILS600_36_P7 | Pre-loaded | Fragment | Polymer7 | Filter5 4-dye | > Fragment_Analysis36_Polymer7 |
| 31 | Filter6_5Dye_LIZ600_36_P4 | Pre-loaded | Fragment | Polymer4 | Filter6 5-dye | > Fragment_Analysis36_Polymer4 |
| 32 | Filter6_5Dye_LIZ600_36_P7 | Pre-loaded | Fragment | Polymer7 | Filter6 5-dye | > Fragment_Analysis36_Polymer7 |
| 33 | T_Seq_36_FastSeq | User Defined | Sequencing | Polymer7 | T 4-dye sequencing | > Fast_Sequence36_Polymer7 |
| 34 | Promega_6Dye_1.6kV_8Sec | User Defined | Fragment | Polymer4 | Promega 6-dye | > Fragment_Analysis36_Polymer4 |
| 35 | Promega_5Dye_Assay | User Defined | Fragment | Polymer4 | Promega 5-dye | > Fragment_Analysis36_Polymer4 |
| 36 | Promega_Sequencing | User Defined | Sequencing | Polymer7 | T 4-dye sequencing | > Fast_Sequence36_Polymer7 |

**Figure 201. 'Assay Setup' worksheet.**

3. Select the desired assay ID, and select **Duplicate** at the top of the 'Assay Setup' worksheet if you are not planning to overwrite an existing user-defined protocol (Figure 201). The new assay will have the same name as the one that was duplicated, but with a numerical suffix (Figure 202).




| No. | ID * | Library Type | Application * | Polymer * | Dye Set * | Instrument Protocol * |
|---|---|---|---|---|---|---|
| 22 | Filter1_4Dye_ILS600_36_P7 | Pre-loaded | Fragment | Polymer7 | Filter1 4-dye | > Fragment_Analysis36_Polymer7 |
| 23 | Filter2_5Dye_WENILS_36_P4 | Pre-loaded | Fragment | Polymer4 | Filter2 5-dye | > Fragment_Analysis36_Polymer4 |
| 24 | Filter2_5Dye_WENILS_36_P7 | Pre-loaded | Fragment | Polymer7 | Filter2 5-dye | > Fragment_Analysis36_Polymer7 |
| 25 | Filter3_4Dye_ILS600_36_P4 | Pre-loaded | Fragment | Polymer4 | Filter3 4-dye | > Fragment_Analysis36_Polymer4 |
| 26 | Filter3_4Dye_ILS600_36_P7 | Pre-loaded | Fragment | Polymer7 | Filter3 4-dye | > Fragment_Analysis36_Polymer7 |
| 27 | Filter4_4Dye_ILS600_36_P4 | Pre-loaded | Fragment | Polymer4 | Filter4 4-dye | > Fragment_Analysis36_Polymer4 |
| 28 | Filter4_4Dye_ILS600_36_P7 | Pre-loaded | Fragment | Polymer7 | Filter4 4-dye | > Fragment_Analysis36_Polymer7 |
| 29 | Filter5_4Dye_ILS600_36_P4 | Pre-loaded | Fragment | Polymer4 | Filter5 4-dye | > Fragment_Analysis36_Polymer4 |
| 30 | Filter5_4Dye_ILS600_36_P7 | Pre-loaded | Fragment | Polymer7 | Filter5 4-dye | > Fragment_Analysis36_Polymer7 |
| 31 | Filter6_5Dye_LIZ600_36_P4 | Pre-loaded | Fragment | Polymer4 | Filter6 5-dye | > Fragment_Analysis36_Polymer4 |
| 32 | Filter6_5Dye_LIZ600_36_P7 | Pre-loaded | Fragment | Polymer7 | Filter6 5-dye | > Fragment_Analysis36_Polymer7 |
| 33 | T_Seq_36_FastSeq | User Defined | Sequencing | Polymer7 | T 4-dye sequencing | > Fast_Sequence36_Polymer7 |
| 34 | Promega_6Dye_1.6kV_8Sec | User Defined | Fragment | Polymer4 | Promega 6-dye | > Fragment_Analysis36_Polymer4 |
| 35 | Promega_5Dye_Assay | User Defined | Fragment | Polymer4 | Promega 5-dye | > Fragment_Analysis36_Polymer4 |
| 36 | Promega_Sequencing | User Defined | Sequencing | Polymer7 | T 4-dye sequencing | > Fast_Sequence36_Polymer7 |
| 37 | Promega_5Dye_Assay(2) | User Defined | Fragment | Polymer4 | Promega 5-dye | Fragment_Analysis36_Polymer4 |

**Figure 202. 'Assay Setup' worksheet with duplicated assay.**

4. Select the cell with duplicated assay ID and rename as desired.
5. The 'Assay Setup' worksheet is split into nine columns as follows.

   **Note:** Use scroll bar at bottom of worksheet to scroll left to right across all columns.

| Column Header | Description | Minimum Value Allowed | Maximum Value Allowed |
|---|---|---|---|
| No. | Numbering order for assays. | NA | NA |
| ID | Defines the assay name. | 1 Character | 40 Characters |
| Library Type | Defines whether the size standard protocol is Pre-loaded (grayed out) or User Defined. | NA | NA |
| Application | Defines whether the assay is for Sequencing or Fragment analysis. | Assigned using drop-down menu | Assigned using drop-down menu |
| Polymer | Defines whether the protocol uses Polymer4 or Polymer7. | Assigned using drop-down menu | Assigned using drop-down menu |
| Dye Set | Drop-down box to select the appropriate dye set for the chemistry being run. | Assigned using drop-down menu | Assigned using drop-down menu |
| Instrument Protocol | Drop-down menu to specify the instrument protocol to be applied during data collection. | Assigned using drop-down menu | Assigned using drop-down menu |

| Column Header | Description | Minimum Value Allowed | Maximum Value Allowed |
|---|---|---|---|
| Basecalling Protocol | Drop-down menu to specify the basecalling protocol to be applied during data collection.<br>**Note:** The 'Basecalling Protocol' drop-down menu is only available for sequencing applications. The cell is grayed out if "Fragment" is chosen as the application type. | Assigned using drop-down menu | Assigned using drop-down menu |
| Sizecalling Protocol | Drop-down menu to specify the sizecalling protocol to be applied during data collection.<br>**Note:** The 'Sizecalling Protocol' drop-down menu is only available for fragment applications. The cell is grayed out if "Sequencing" is chosen as the application type. | Assigned using drop-down menu | Assigned using drop-down menu |

**Note:** A column header with an * symbol indicates that it is a required field. Failure to fill in these fields will prevent the assay from being saved.

6. Select the appropriate settings for the new assay (see also Section 7.2.5 for information on assay settings).
7. It is also possible to edit specific settings within the instrument, basecalling or sizecalling protocols selected for an assay. Select **Right Double Arrow** in the column header for the desired instrument, basecalling or sizecalling protocol to be edited within the assay (Figure 203).

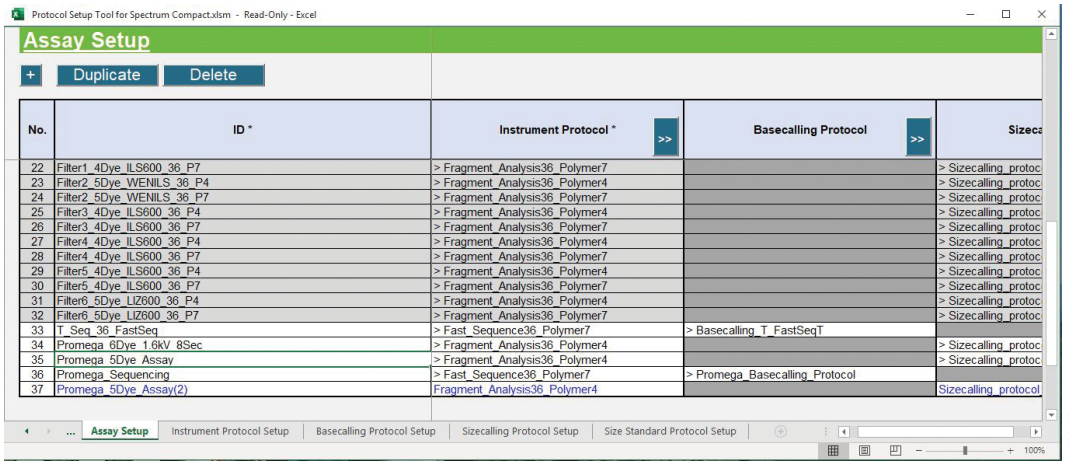



**Figure 203. 'Assay Setup' worksheet with Double Arrow button.**

8. This opens columns to the right containing the individual parameters that may be edited for that instrument, basecalling, or sizecalling protocol as described in Sections 13.4.2–13.4.4 (Figure 204).

   **Note: Right Double Arrow** becomes **Left Double Arrow** after it is selected. Selecting **Left Double Arrow** closes the detailed parameters columns for the instrument, basecalling, and sizecalling protocols.

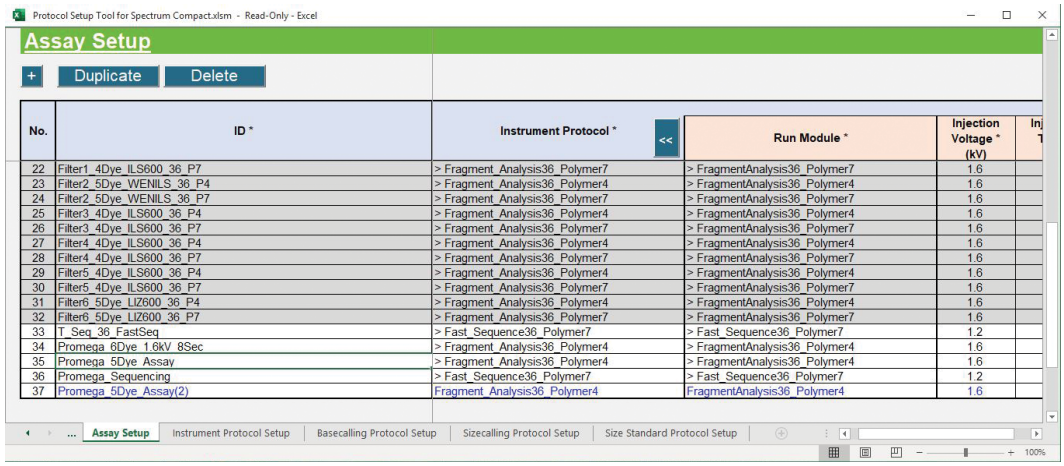



**Figure 204. 'Assay Setup' worksheet with Instrument Protocol parameters displayed.**

9. Selecting **Right Double Arrow** in the Sizecalling Protocol column header also enables **Right Double Arrow** in the Size Standard Protocol column header (Figure 205).

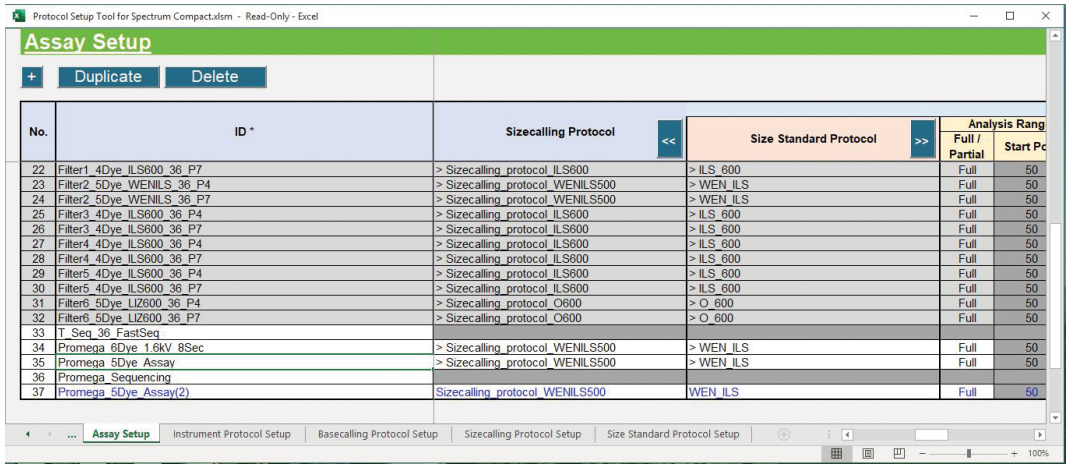



**Figure 205. 'Assay Setup' worksheet with Double Arrow button for Size Standard Protocol.**

10. Select **Right Double Arrow** in the Size Standard Protocol column header to display the individual size standard parameters (Figure 206) that may be edited as described in Section 13.4.5.

    **Note:** Edits made to the Instrument or Analysis (Basecalling or Sizecalling) Protocol within the 'Assay Setup' worksheet do not change the parameters of the parent instrument and analysis protocols originally associated with the new assay. Changes are only stored with respect to the new assay.

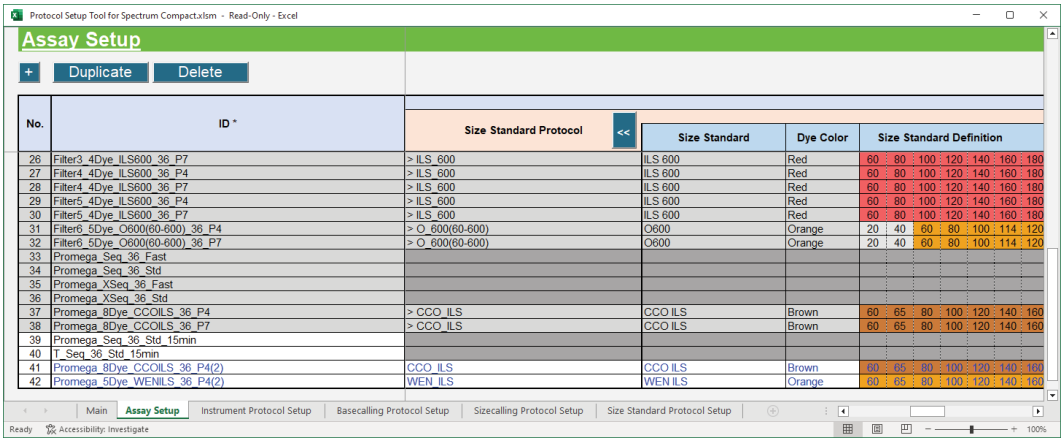



**Figure 206. Size Standard Protocol parameters displayed.**

11. Select the 'Main' worksheet tab followed by **Save** (Figure 190). A 'Save As' browse window appears. Browse to the location (e.g., a USB drive) where you wish to save the new protocol .xml file and save to a folder named Protocols within that location (if folder does not already exist, create a new folder with that name).

**Notes:**

a. To import the Protocol .xml files onto a Spectrum Compact CE System, they must be stored in a folder called Protocols on the USB drive. If they are stored in a different location on the USB drive, the Spectrum Compact Control Software will not be able to locate these files.

b. Saving can be done after each protocol is edited or after all desired protocols have been edited.

c. If there are any invalid data errors within the new protocol.xml file being saved (e.g., assay being saved with an invalid sizecalling protocol ID that does not exist in the 'Sizecalling Protocol Setup' worksheet), an error window will be displayed (Figure 194).

## 13.5 Creating New Assays and Protocols

User-defined assays and protocols may be created directly (i.e., without duplicating) with or without prior import of a protocols .xml file. The process for creating assays and protocols is essentially the same as that described for editing these methods in Sections 13.4.2–13.4.6. The main consideration when creating assays and protocols, especially without prior import of a protocol .xml file, is that certain fields in specific columns for different assay/protocol setup worksheets are predicated on completing prior protocols and/or selecting amplification and polymer type as described in the following table.

| **Worksheet** | **Column** | **Pull-Down Menu Display Requirement** | **Pull-Down Menu Content Options** |
|---|---|---|---|
| Assay Setup | Dye Set | • Application Type selected (fragment or sequencing) | Available Dye Set list corresponding to the Application Type selected. |
| | Instrument Protocol | • Application Type selected (fragment or sequencing)<br>• Polymer Type selected (Polymer4 or Polymer7)<br>• Instrument Protocol must have been created for the sample Application Type and Polymer Type selected for the assay | Any Protocol ID on the 'Instrument Protocol Setup' worksheet with the same Application Type and Polymer Type as that selected for the assay. |

| Worksheet | Column | Pull-Down Menu Display Requirement | Pull-Down Menu Content Options |
|---|---|---|---|
| Assay Setup (continued) | Run Module* | • Application Type selected (fragment or sequencing)<br>• Polymer Type selected (Polymer4 or Polymer7)<br>• Instrument Protocol (containing the Run Module) must have been created for the sample Application Type and Polymer Type selected for the assay | Run Module corresponding to the Instrument Protocol selected for the assay. |
| | Basecalling Protocol | • "Sequencing" selected as Application Type<br>• Basecalling Protocol must have been created | Any Protocol ID on the 'Basecalling Protocol Setup' worksheet. |
| | Sizecalling Protocol | • "Fragment" selected as Application Type<br>• Sizecalling Protocol must have been created | Any Protocol ID on the 'Sizecalling Protocol Setup' worksheet. |
| | Size Standard Protocol | • "Fragment" selected as Application Type<br>• Sizecalling Protocol must have been created | Any Protocol ID on the 'Size Standard Protocol Setup' worksheet. |
| Instrument Protocol Setup | Run Module* | • Application Type selected (fragment or sequencing)<br>• Polymer Type selected (Polymer4 or Polymer7) | Run Module corresponding to the Application Type and the Polymer Type selected for the instrument protocol. |
| Sizecalling Protocol Setup | Size Standard Protocol* | • Size Standard Protocol must have been created | Any Protocol ID on the 'Size Standard Protocol Setup' worksheet. |

*These columns are only available after selecting **Right Double Arrow** (see Section 13.4.6).

## 13.6 Deleting Assays and Protocols

User-defined assays and protocols may be deleted one protocol at a time within each worksheet.

1. Select cell containing the Protocol ID that you wish to delete.
2. Select **Delete** at the top of the protocol setup worksheet.
3. A warning window will appear asking 'Are you sure you want to delete the Protocol?'
4. Select **Yes** to delete the protocol.
5. Select **No** to cancel out of the deletion step.

## 13.7 Strip Setup Tool for Spectrum Compact

The 'Strip Setup Tool for Spectrum Compact' is accessed by opening the 'Strip Setup Tool for Spectrum Compact.xlsm' Excel® macro-enabled workbook. This tool enables the user to create and edit information for up to four strips (i.e., maximum number of strip for one run) in one .xml file that can then be imported into the Spectrum Compact Control Software as described in Section 5.3.4. The following table lists rules for characters that can be used for a Strip ID and Sample Name:

| | |
|---|---|
| **Acceptable Characters** | 1 to 30 characters |
| | Upper and lowercase alphabetic characters |
| | Numbers |
| | Symbols unless listed below |
| **Unacceptable Characters** | #%&{}\<>*?/$!'":@+`\|= and spaces |

**Notes:**

a. While only 30 characters may be used for a strip ID, up to 50 characters are allowed for individual sample names.

b. Multiple strips may be created and saved in one strip .xml file. In this way, multiple strips can be made available on one strip .xml file. These strips are then available for individual import when setting up a run on the Spectrum Compact CE System (see Section 5.3.4).

### 13.7.1 Opening Protocol .xml File within Strip Setup Tool for Spectrum Compact

To use the Strip Setup Tool for Spectrum Compact to create or edit a strip information .xml file, a protocol .xml file (created using the Protocol Setup Tool for Spectrum Compact and containing protocols and assays to be used in setting up the strip) must be opened within the Strip Setup Tool for Spectrum Compact.

1. Select **Open** on the right-hand side of the Protocol File Name box (Figure 207). This opens a browsing window. Browse to the location of the protocols .xml file created using the Protocols Setup Tool for Spectrum Compact and select **Open** (Figure 208). A Microsoft® Excel® window will appear stating “Protocol file read complete”.
2. Select **OK** to close out of this window. The protocol .xml file name is displayed at the top of the Strip Setup Tool for Spectrum Compact (Figure 209).

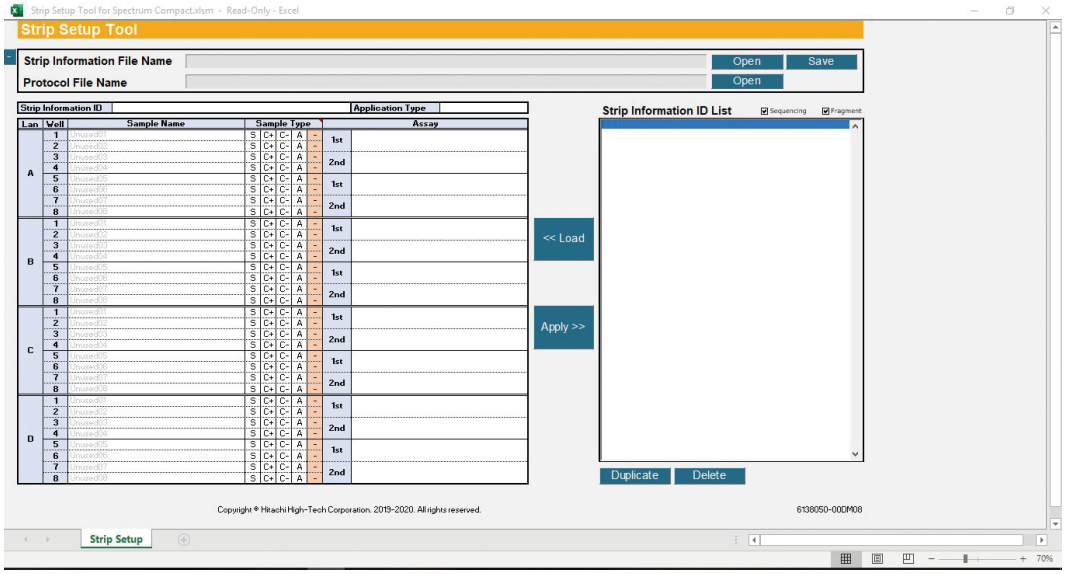



**Figure 207. Strip Setup Tool for Spectrum Compact.**

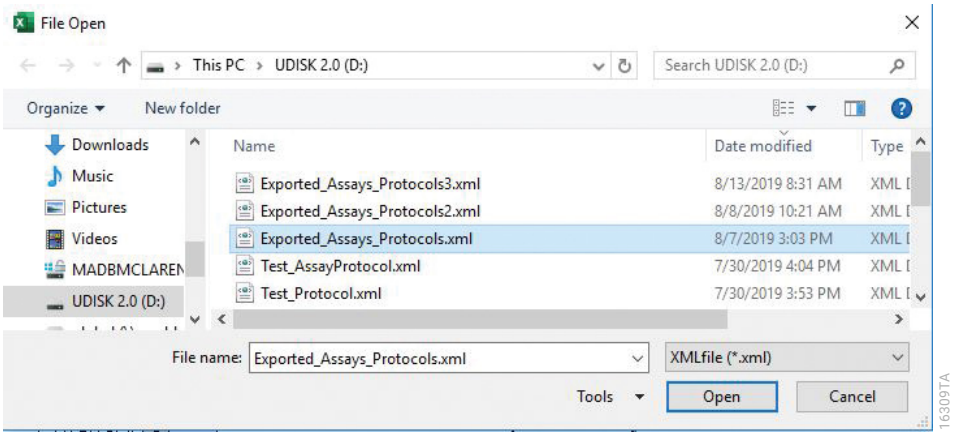



**Figure 208. Browsing window.**

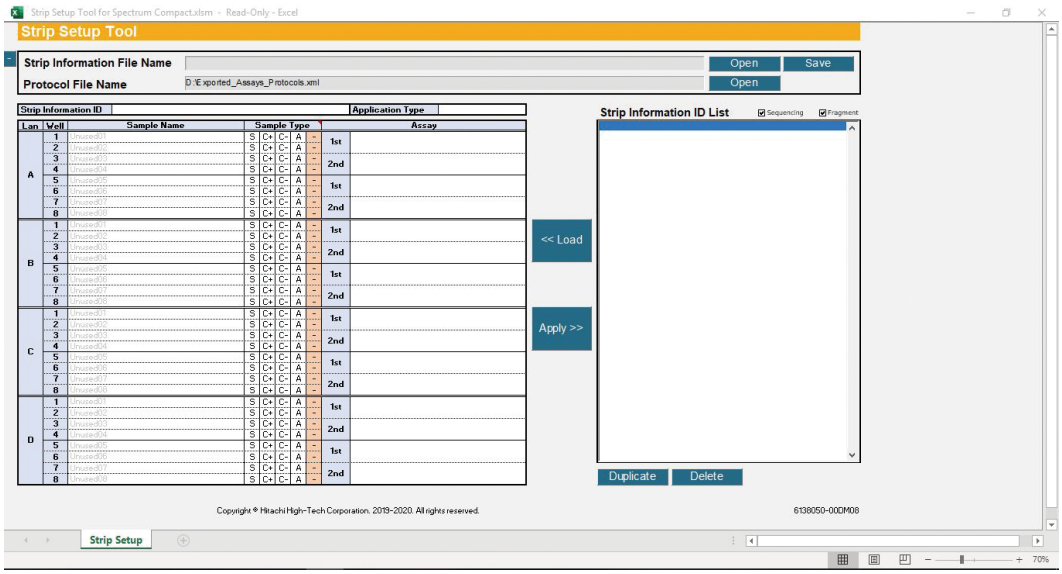



**Figure 209. Strip Setup Tool for Spectrum Compact with Protocol File Name selected**

## 13.7.2 Creating New Strip Information

1. Select the cell immediately to the right of the Strip Information ID cell and enter the new Strip Information ID (Figure 210).
2. Select the cell immediately to the right of the Application Type cell and use the pull-down menu to select the application type:
   - Sequencing-Polymer7
   - Fragment-Polymer4
   - Fragment-Polymer7
3. For each lane (i.e., strip), select a Sample Type for each well that will contain a sample by selecting that cell (Figure 210).
   - Select **S** for Sample
   - Select **C+** for Positive Control
   - Select **C-** for Negative Control
   - Select **A** for Allelic Ladder

**Notes:**

a. Sample type options vary depending on whether fragment or sequencing are chosen for application type. See Sections 5.3.1 and 5.4.1 for description of sample types available for fragment and sequencing analysis, respectively.

b. A sample type other than “Unused” must be assigned to at least one well in each injection set (wells 1–4 or wells 5–8). If all four wells in an injection set are assigned as “Unused”, the injection set will not be run. If all eight wells in a strip are assigned as “Unused”, a warning message will be displayed when trying to run on the Spectrum Compact CE System.

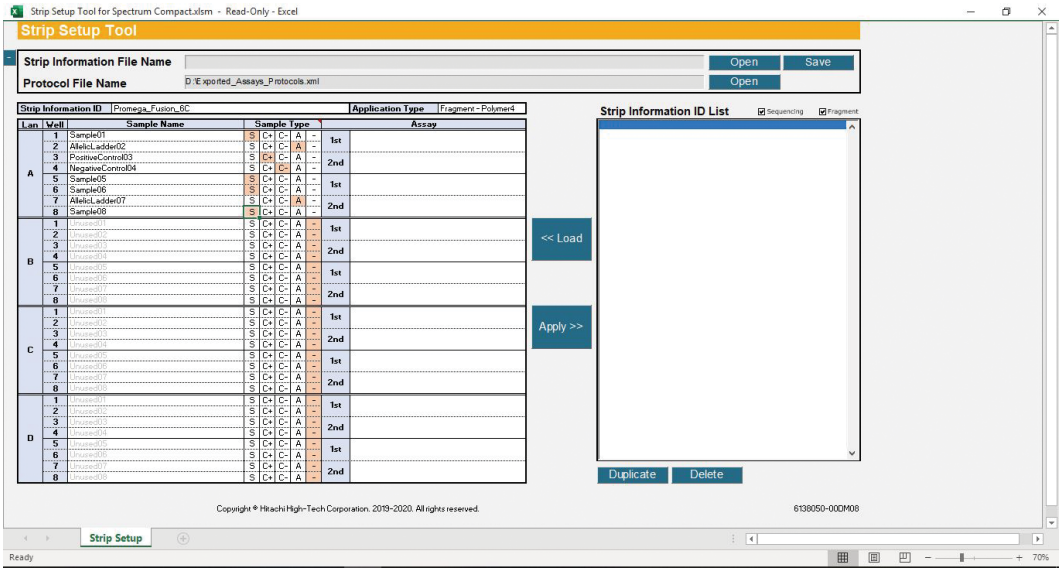



**Figure 210. Strip Setup Tool for Spectrum Compact with Sample Type selected.**

Enter a sample name for each well position by selecting the **Sample Name** cell adjacent to the well number and entering the sample name (Figure 211).

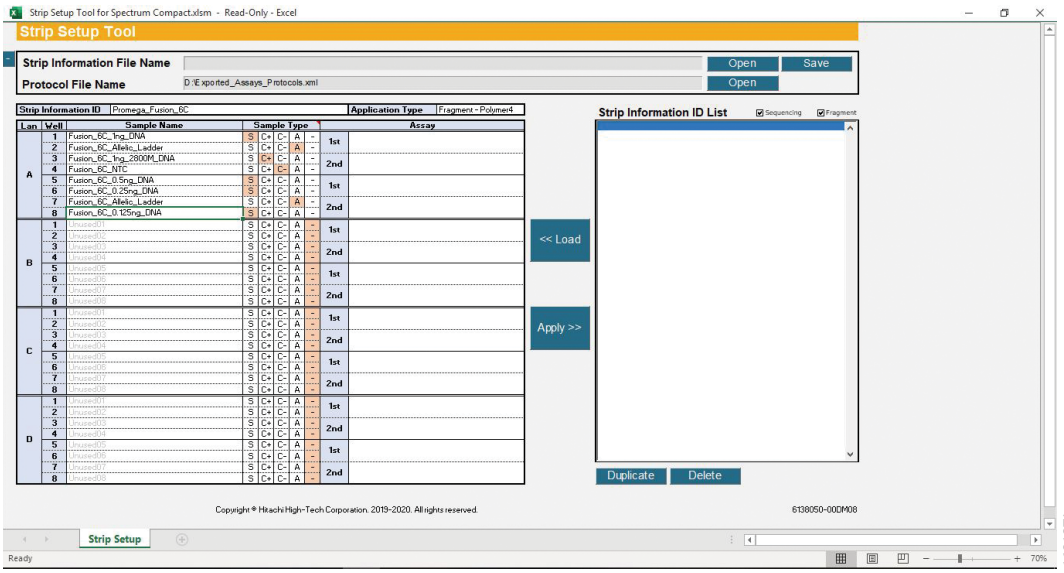



**Figure 211. Strip Setup Tool for Spectrum Compact with Sample Names entered.**

4. To assign an assay to an injection set (set of four wells), select the cell under the Assay column to the right of the cell labelled 1st. This will activate a pull-down menu (Figure 212). Select the desired assay from the available list. Repeat for all injection sets.

   **Note:** When entering sample names in the Strip Setup Tool for Spectrum Compact, copy and paste can be used as well as fill-down commands.

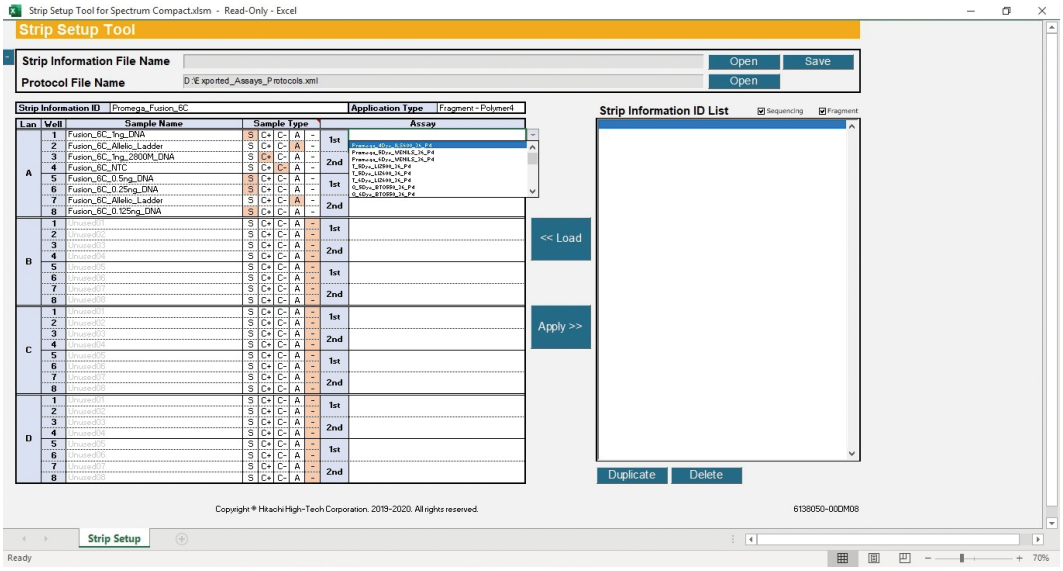



**Figure 212. Strip Setup Tool for Spectrum Compact with Assay pull-down menu.**

5. Repeat these steps for the 2nd assay field if a second assay will be run for the strip.

   **Note:** The assays available in the 2nd assay field are filtered based on the dye set in the assay selected in the 1st assay field. For example, if a 'Promega_6-dye' dye set based assay is chosen in the 1st assay field, then only assays using that same dye set are available as an option in the 2nd assay field. In this way, injections can be duplicated with the same assay conditions by choosing the same assay in the 2nd assay field as that used in the 1st assay field. Duplicate injections of the same assay conditions can be run by using the Duplicate function of the 'Edit Injection List' screen (see Section 5.6).

6. Select **Apply** to move the newly created strip information to the Strip Information ID List. The name of the newly created strip will appear in this list (Figure 213).

   **Notes:**

   a. An asterisk appears in front of the newly created strip file name in the Strip Information ID List prior to saving the strip information as a .xml file. After saving as a .xml file, the asterisk disappears (Figure 212).

   b. Multiple strips may be created and added to the Strip Information ID List prior to saving the strip .xml file. In this way, multiple strips can be made available on one strip .xml file. These multiple strips are then available for individual import when setting up a run on the Spectrum Compact CE System (see Section 5.3.4).

   c. Strip information may be filtered by application type (sequencing and fragment, sequencing alone, or fragment alone) by checking boxes adjacent to “Sequencing” and “Fragment” above the Strip Information ID List.

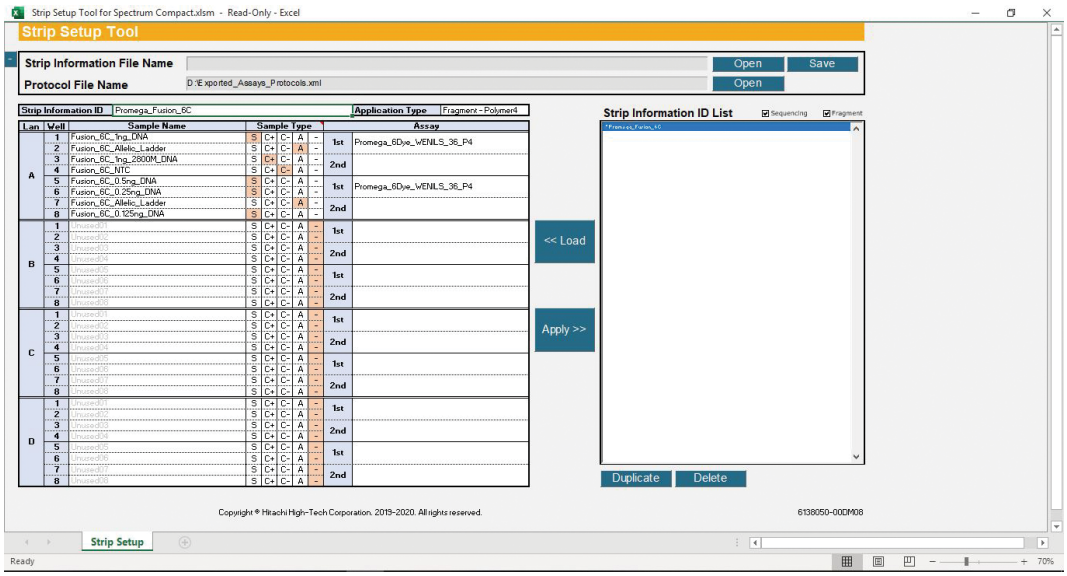



**Figure 213. ‘Strip Setup Tool for Spectrum Compact’ with new strip in Strip Information ID List.**

7. By selecting either **Duplicate** or **Delete** with the new strip highlighted in Strip Information ID List, the newly created strip can be duplicated or deleted prior to saving the strip .xml file.

8. To save the new strip information as a .xml file that can be imported into the Spectrum Compact Control Software via a USB drive, select **Save** to the right of the Strip Information File Name. A ‘Save As’ window will appear. Browse to the location (e.g., a USB drive) where you wish to save the new strip .xml file and save to a folder named Strips within that location (if folder does not already exist, create a new folder with that name).

   **Note:** To import the Strips .xml files onto a Spectrum Compact CE System, they must be stored in a folder called Strips on the USB drive. If they are stored in a different location on the USB drive, the Spectrum Compact CE System Software will not be able to locate these files.

9. The name and location of the new strip will now appear in the Strip Information File Name cell (Figure 214).

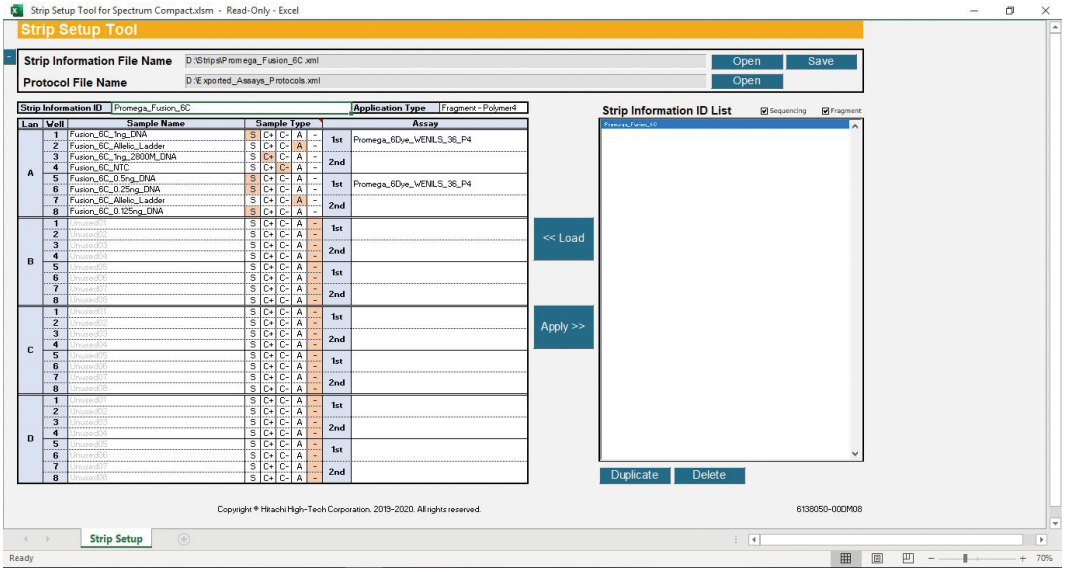



**Figure 214. Strip Setup Tool for Spectrum Compact with new strip in Strip Information File Name.**

## 13.7.3 Loading and Editing Existing Strip Information

The Strip Setup Tool for Spectrum Compact can be used to import strip .xml files and edit these files to create new strip .xml files. To use the Strip Setup Tool for Spectrum Compact to edit a strip .xml file, a protocol .xml file (created using the Protocol Setup Tool for Spectrum Compact and containing protocols and assays to be used in setting up the strip) must also be opened within the Strip Setup Tool for Spectrum Compact as described above (see Section 13.7.1).

1. After opening a protocol .xml file within the Strip Setup Tool for Spectrum Compact, select **Open** on the right-hand side of the Strip Information File Name box (Figure 215). This opens a browsing window. Browse to the location of the strips .xml file created and select **Open** (Figure 216). A Microsoft® Excel® window will appear stating "Strip information file read complete". Select **OK** to close out of this window. The strip .xml file name is now displayed at the top of the Strip Setup Tool in the Strip Information File Name box (Figure 217).

   **Note:** If a strip .xml file is chosen when opening a Protocol File Name or if a protocol .xml file is chosen when opening a Strip Information File Name, a Microsoft® Excel® window will appear stating "Cannot read protocol file. Unsupported file format." or "Cannot read strip information file. Unsupported file format.", respectively. Select **OK** and confirm that the correct .xml file is being opened.

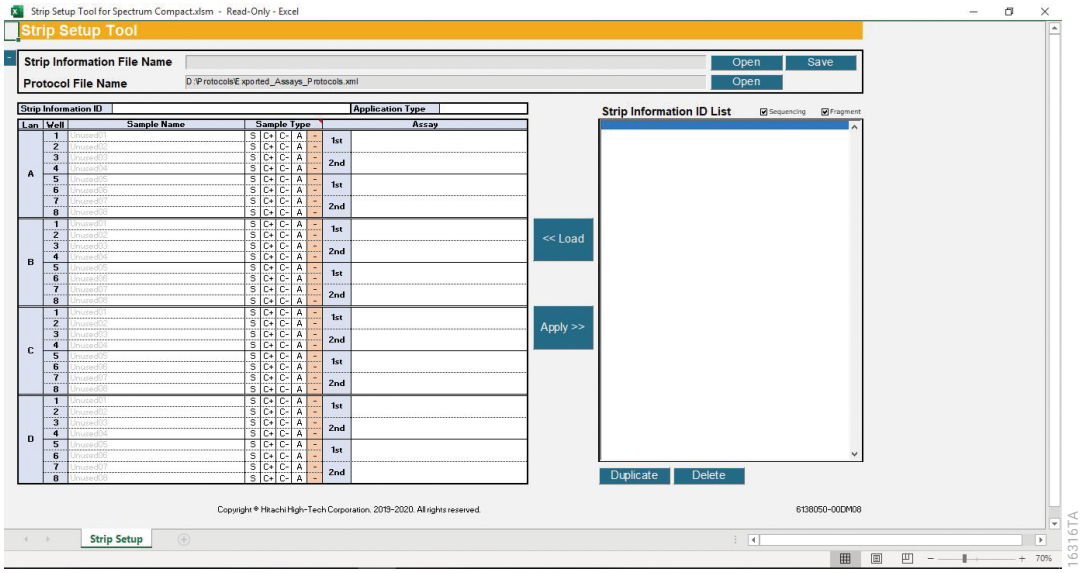



**Figure 215. Strip Setup Tool for Spectrum Compact with Protocol .xml file in Protocol File Name.**

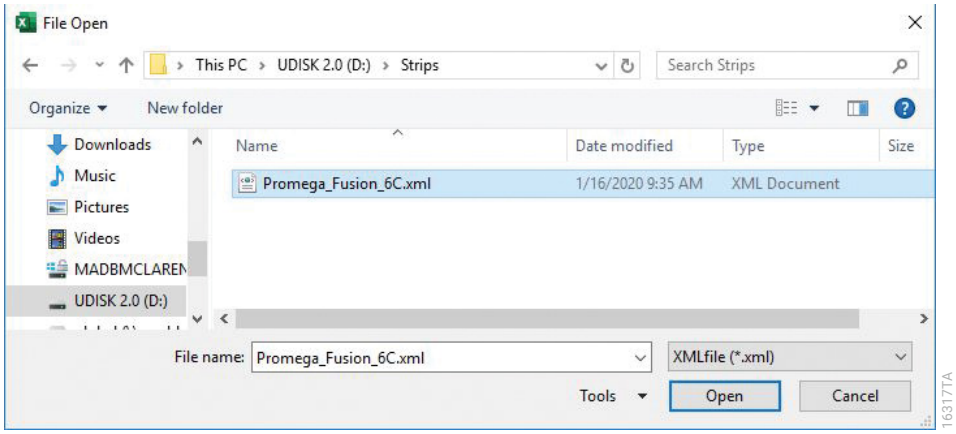



**Figure 216. Browsing window.**

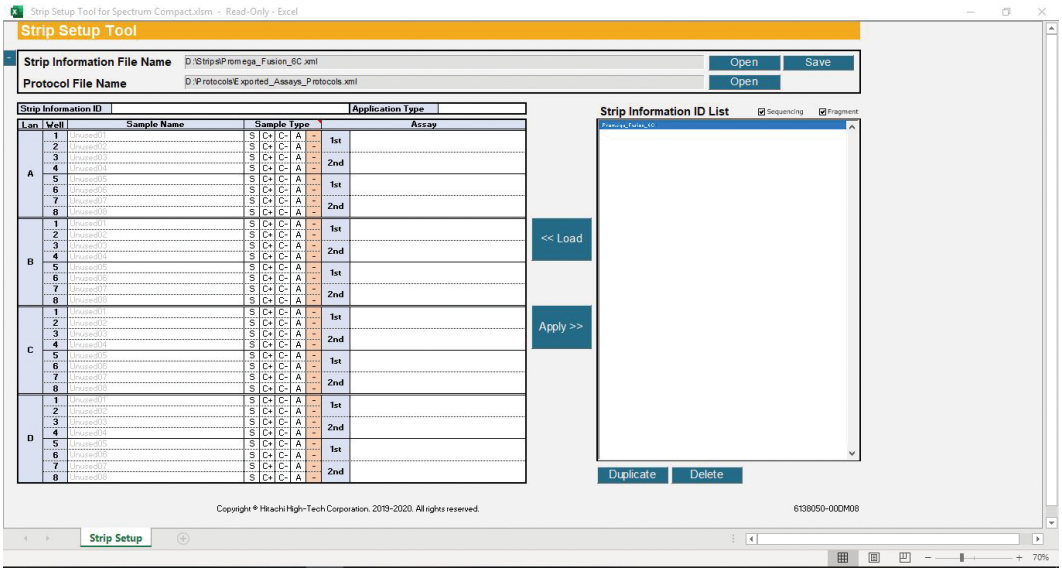



**Figure 217. Strip Setup Tool for Spectrum Compact with strip .xml file in Strip Information File Name.**

2. Select the desired Strip in the Strip Information ID List on the right-hand side of the screen followed by **Load** (Figure 217).

   **Note:** Strip information may be filtered by application type (sequencing and fragment, sequencing alone, or fragment alone) by checking boxes adjacent to “Sequencing” and “Fragment” above the Strip Information ID List.

3. The information for that strip now appears on the left-hand side of the screen (Figure 218).

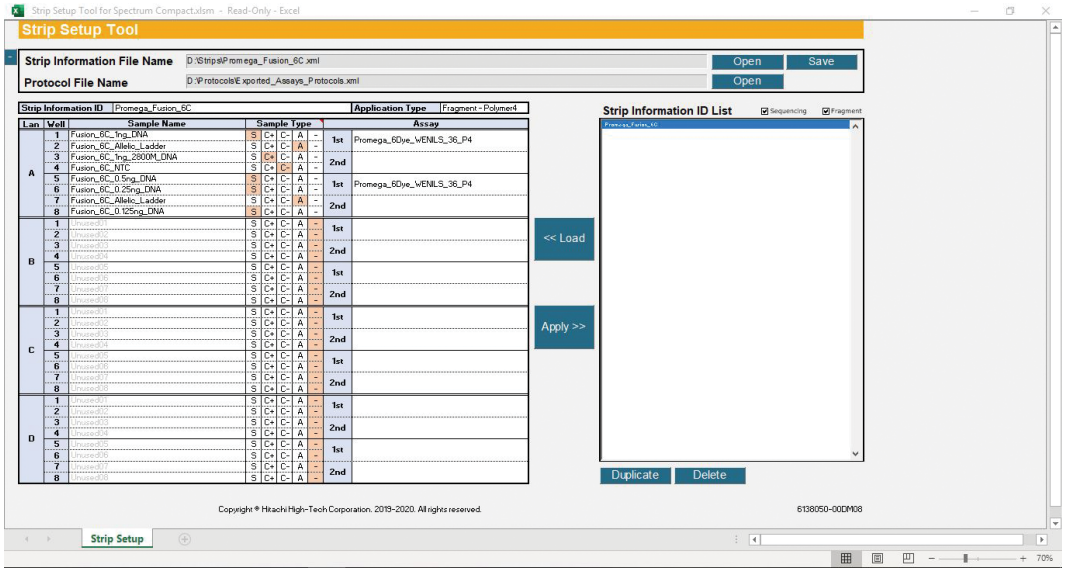



**Figure 218. Strip Setup Tool for Spectrum Compact with Strip Information ready for editing.**

4. Edit the information for the new strip following the instructions for Creating New Strip Information (Section 13.7.2). If desired, a new Strip Information ID can be assigned (Figure 219).

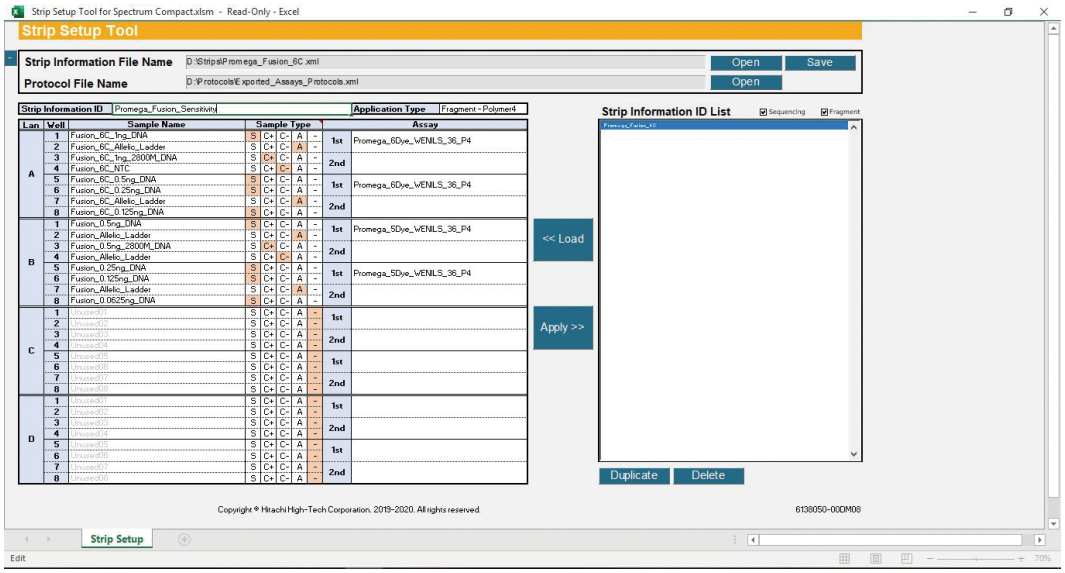



**Figure 219. Strip Setup Tool for Spectrum Compact with edited new Strip Information ID.**

5. Select **Apply** to move the newly created strip information to the 'Strip Information ID List'. The name of the newly created strip will appear in this list (Figure 220).

**Notes:**

a. An asterisk appears in front of the newly created strip file name in the Strip Information ID List prior to saving the strip information as a .xml file. After saving as a .xml file, the asterisk disappears (Figure 221).

b. Multiple strips may be created and added to the Strip Information ID List prior to saving the strip .xml file. In this way, multiple strips can be made available on one strip .xml file. These multiple strips are then available for individual import when setting up a run on the Spectrum Compact CE System (see Section 5.3.4).

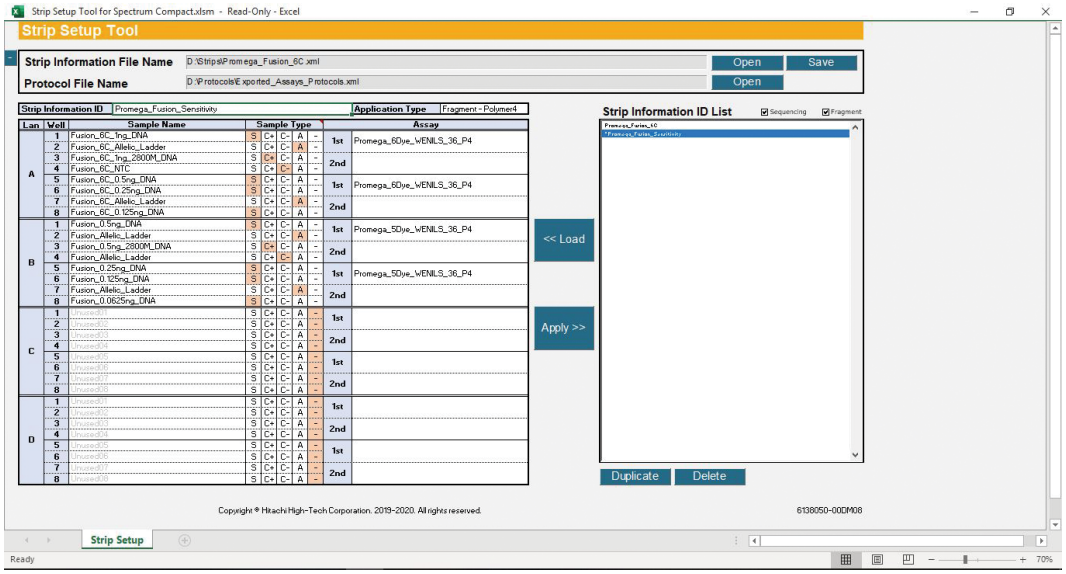



**Figure 220. Strip Setup Tool for Spectrum Compact with new strip in Strip Information ID List.**

6. By selecting either **Duplicate** or **Delete** with the new strip highlighted in Strip Information ID List, the newly created strip can be duplicated or deleted prior to saving the strip .xml file.

7. To save the new strip information as a .xml file that can be imported into the Spectrum Compact CE System Software via a USB drive, select **Save** to the right of the Strip Information File Name. A 'Save As' window will appear. Browse to the location (e.g., a USB drive) where you wish to save the new strip .xml file and save to a folder named Strips within that location (if folder does not already exist, create a new folder with that name). The existing strip file information name may be overwritten (if saving to the same location where the original unedited file was stored) or saved as a new name, as desired.

   **Note:** To import the Strips .xml files onto a Spectrum Compact CE System, they must be stored in a folder called Strips on the USB drive. If they are stored in a different location on the USB drive, the Spectrum Compact CE System Software will not be able to locate these files.

8. The name and location of the new strip will now appear in the Strip Information File Name cell (Figure 221).

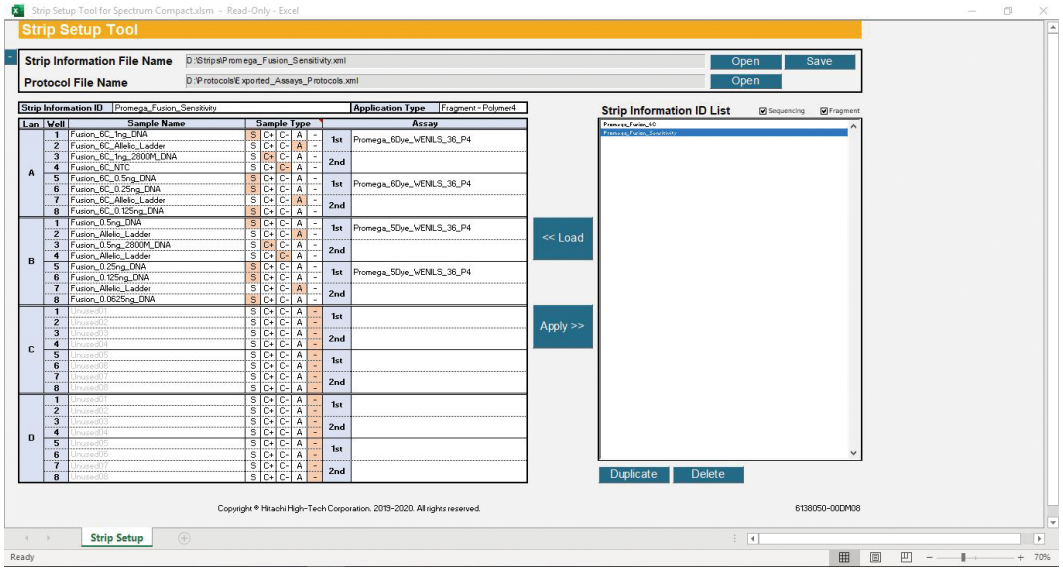



**Figure 221. Strip Setup Tool for Spectrum Compact with new strip in Strip Information File Name.**

# Reviewing System Tests 14

System Tests are performed by service engineers at time of installation of the Spectrum Compact CE System or following a service. While these System Tests are only performed by service engineers, the results of these System Tests may be viewed at any time by a user.

There are two types of System Test:

- Fragment System Test
- Sequencing System Test

Select **System Tests** on the 'Main Menu' screen (Figure 9) to access the 'System Test' screen (Figure 222). Three options are displayed:

1. Sequencing System Test
2. Fragment System Test
3. Review Result

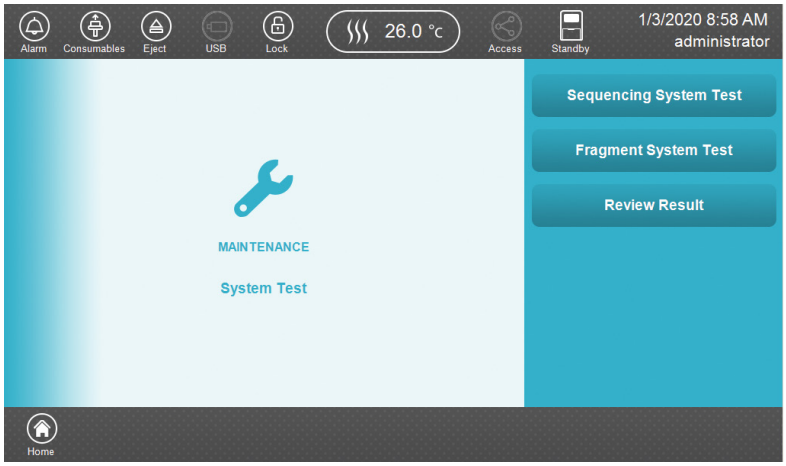



**Figure 222. 'System Test' screen.**

**Sequencing System Test** and **Fragment System Test** are for use by the service engineer only and their functionality is not covered in the operating manual.

Select **Review Results** on the 'System Test' screen (Figure 222) to display the 'Result List' screen (Figure 223).

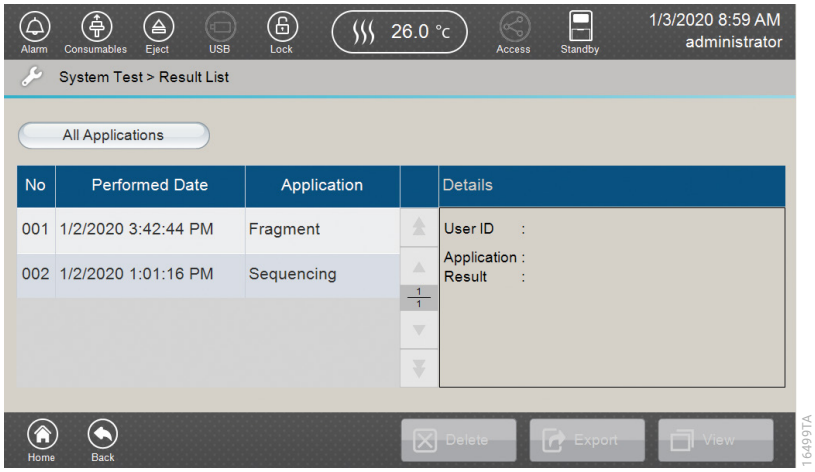



**Figure 223. 'Result List' screen.**

The list of system tests displayed can be filtered based on application type (all applications, fragment, or sequencing) by repeatedly selecting the filter button in the top left corner of the screen.

## 14.1 Reviewing Fragment System Test Results

The 'Result List' screen is divided into four main sections: No (the system test number), Performed Date, Application and Details (Figure 223).

1. Use the scroll buttons to the right side of the Application column in the 'Result List' screen to locate the completed system test you wish to review.
2. Select the system test you wish to review. This will display the Details section of the 'Result List' screen for the selected system test (Figure 224).
3. Select **View** in the footer to review the detailed results of the system test in the 'Result View' screen (Figure 225). **View** and **Export** do not become active until a sample is selected.

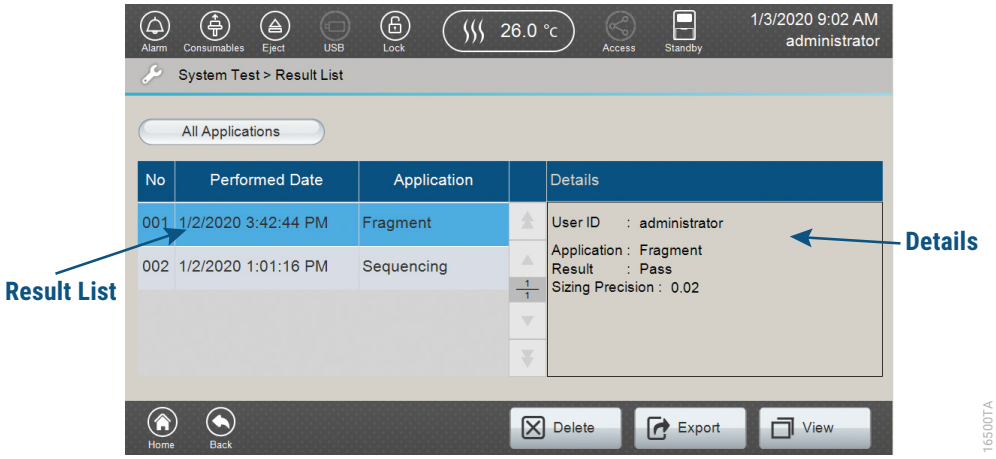



**Figure 224. 'Result List' screen with Selected Fragment System Test. Delete, Export, and View do not become active until a system test is selected in the 'Result List' screen.**

The footer provides three options.

| Command | Function |
|---|---|
| Delete | Deletes the selected system test.<br>**Note:** A window appears after selecting **Delete** asking "Are you sure you want to delete selected data?" Selecting **Yes** completes the deletion process. Selecting **No** takes you back to the 'Result List' screen. |
| Export | Exports the selected system test report as a pdf file.<br>**Note:** A USB drive must be connected to the Spectrum Compact CE System for the export option to function. |
| View | Opens the Result View screen for the selected system test |

4. Select **View** in the footer to view the list of four samples in that system test in the 'Result View' screen (Figure 225).

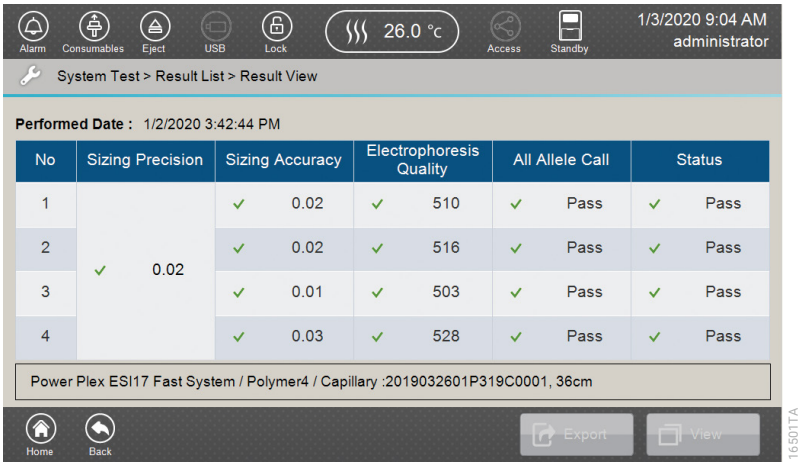



**Figure 225. Fragment System Test 'Result View' screen.**

5. Six columns of data are displayed with information on fragment system test performance.

| Analysis Type | Item | Description |
|---|---|---|
| Fragment | No | Capillary number |
| | Sizing Precision | Maximum standard deviation of allele sizing observed across all alleles in the four Allelic Ladder samples. To pass, this value must be <0.16 bases. |
| | Sizing Accuracy | Maximum deviation in size (bases) of any given allele in the Allelic Ladder, on any of the four capillaries, relative to mean expected value for that allele. To pass, this value must be <0.5 bases. |
| | Electrophoresis Quality | Electrophoresis Quality is the size (bases) at which the peak width at half maximal height is equal to the distance between two bases, as calculated from the size standard. To pass, this value must be ≥400 bases. |
| | All Allele Call | Indicates whether or not all the expected alleles in the Allelic Ladder were present. Overall evaluation (Pass/Fail). |
| | Status | All of the above parameters must pass in order for Status to pass. Failure of any one of the above parameters is sufficient for Status to fail. Overall evaluation (Pass/Fail). |

6. Select the line in the Result List corresponding to the system test sample you wish to review. This will activate **Export** and **View** in the footer (Figure 226).

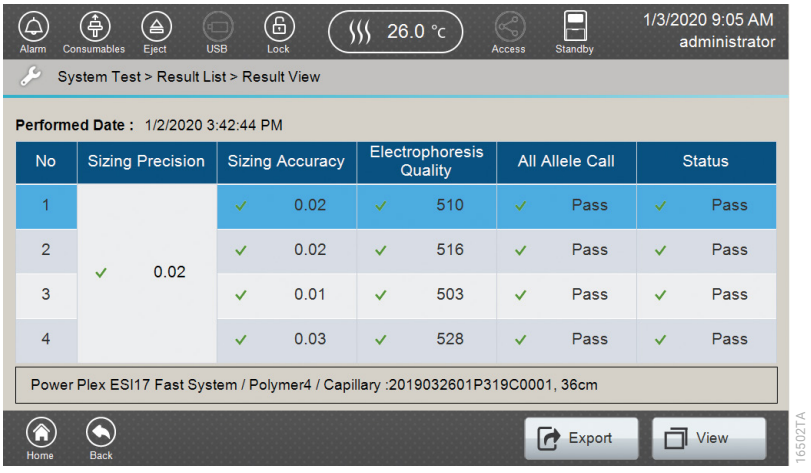



**Figure 226. Fragment System Test 'Result View' screen with selected sample.**

7. Selecting **Export** will export the system test report as a pdf file in the same way as selecting **Export** from the 'Result List' screen (Figure 224).
8. Select **View** in the footer to view the data for that sample in the 'Graph' screen (Figure 227). See 'Results' Tab in Section 5.7, Monitoring a Run, for definitions of the navigation icons on this screen and how to use them.

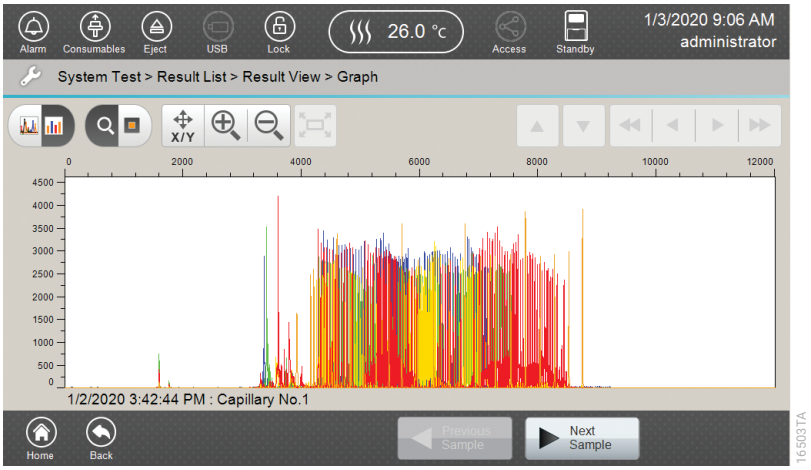



**Figure 227. Fragment System Test 'Graph' screen of selected sample.**

## 14.2 Reviewing Sequencing System Test Results

The 'Result List' screen is divided into four main sections: No (the system test number), Performed Date, Application and Details (Figure 223).

1. Use the scroll buttons to the right side of the Application column in the 'Result List' screen to locate the completed system test you wish to review.
2. Select the system test you wish to review. This will display the Details section of the 'Result List' screen for the selected system test (Figure 228).
3. Select **View** in the footer to view a list of samples in that run in the 'Result View' screen (Figure 229). **View** and **Export** do not become active until a sample is selected.

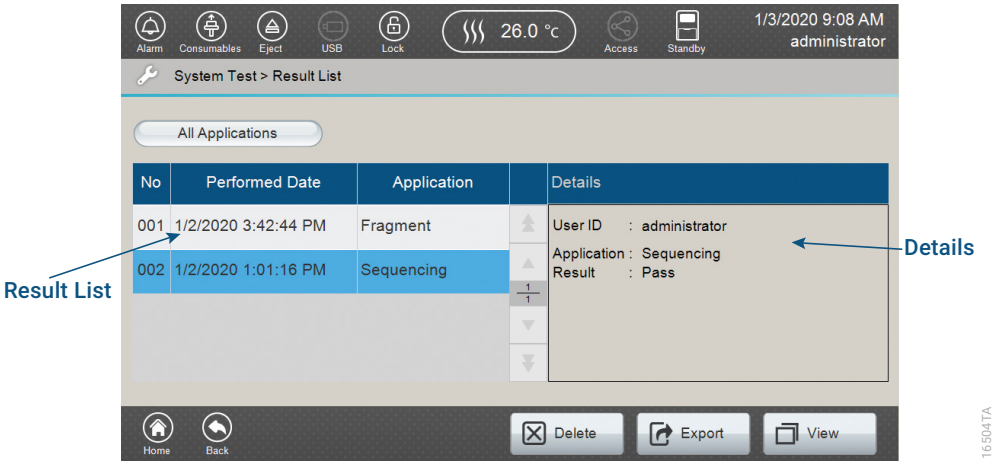



**Figure 228. 'Result List' screen with Selected Sequencing System Test. Delete, Export, and View do not become active until a system test is selected in the 'Result List' screen.**

The footer provides three options.

| Command | Function |
|---|---|
| Delete | Deletes the selected system test.<br>**Note:** A window appears after selecting **Delete** asking "Are you sure you want to delete selected data?" Selecting **Yes** completes the deletion process. Selecting **No** takes you back to the 'Result List' screen. |
| Export | Exports the selected system test report as a pdf file.<br>**Note:** A USB drive must be connected to the Spectrum Compact CE System for the export option to function. |
| View | Opens the 'Result View' screen for the selected system test. |

4. Select **View** in the footer to view the list of four samples in that system test in the 'Result View' screen (Figure 229).

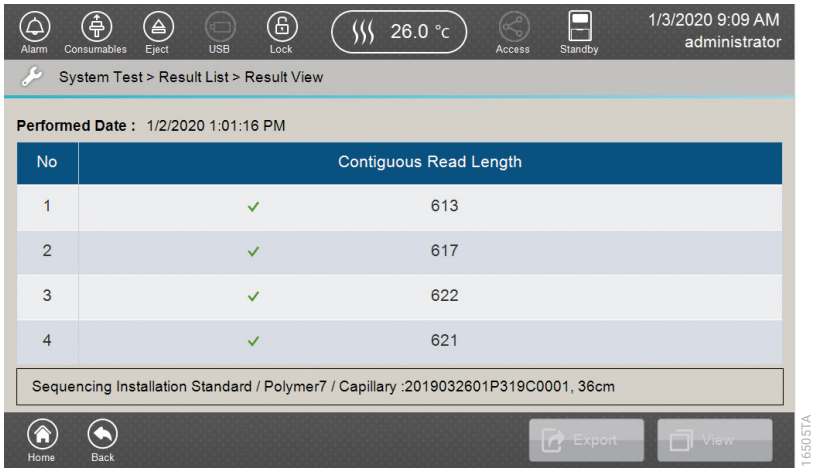



**Figure 229. Sequencing System Test 'Result View' screen.**

5. Two columns of data are displayed with information on sequencing system test performance.

| Analysis Type | Item | Description |
|---|---|---|
| Sequencing | No | Capillary number |
| | Contiguous Read Length | Number of contiguous bases in the sequence that have an average quality value (QV) score ≥20 over a 21 base sliding window. To pass, this value must be ≥600 bases. |

6. Select the line in the Result List corresponding to the system test sample you wish to review. This will activate **Export** and **View** in the footer (Figure 230).

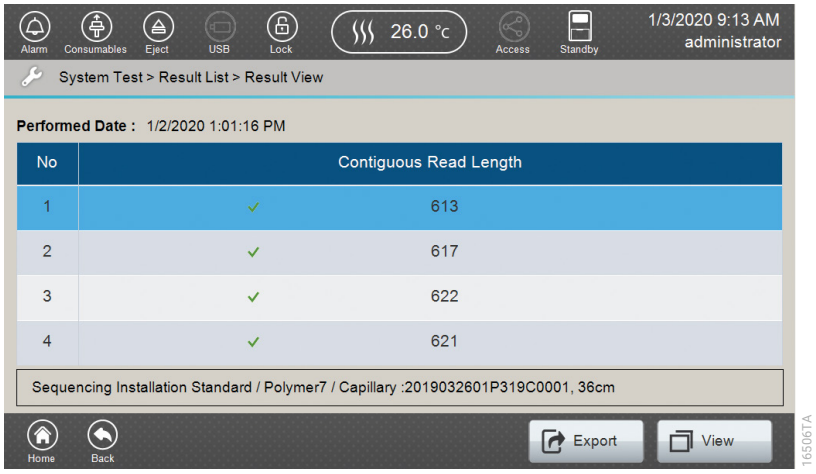



**Figure 230. Sequencing System Test 'Result View' screen with selected sample.**

7. Selecting **Export** will export the system test report as a pdf file in the same way as selecting **Export** from the 'Result List' screen (Figure 228).

8. Select **View** in the footer to view the data for that sample in the 'Graph' screen (Figure 231). See 'Results' Tab in Section 5.7, Monitoring a Run, for definitions of the navigation icons on this screen and how to use them.

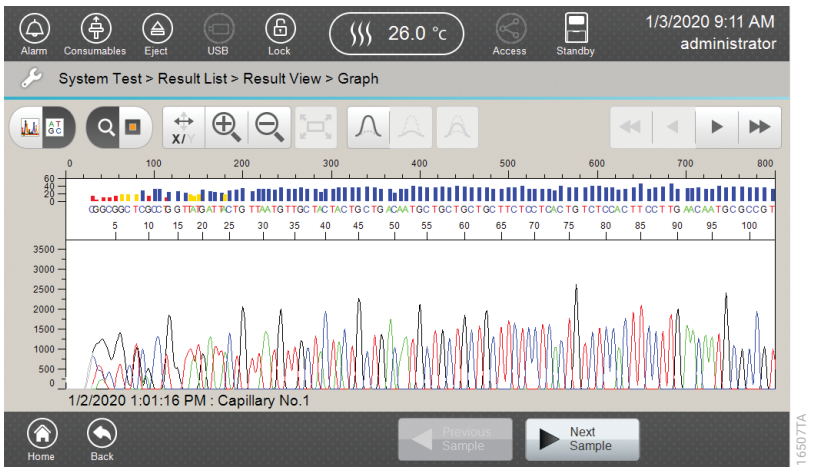



**Figure 231. Sequencing System Test 'Graph' screen of selected sample.**

# Summary of Changes 15

The following changes were made to the 3/25 revision of this document:

1. Updated Section 1.2 to include a warning about lead.
2. Added information about Cat.# CE2507 to Sections 1.8, 3.1 and 3.2.
3. Corrected software version compatibility in Sections 1.8 and 3.1.
4. Updated Sections 1.9 and 12.1.
5. Made minor text edits.

PROMEGA CORPORATION • 2800 WOODS HOLLOW ROAD • MADISON, WI 53711-5399 USA • TELEPHONE 608-274-4330