

TESSERA

SX40

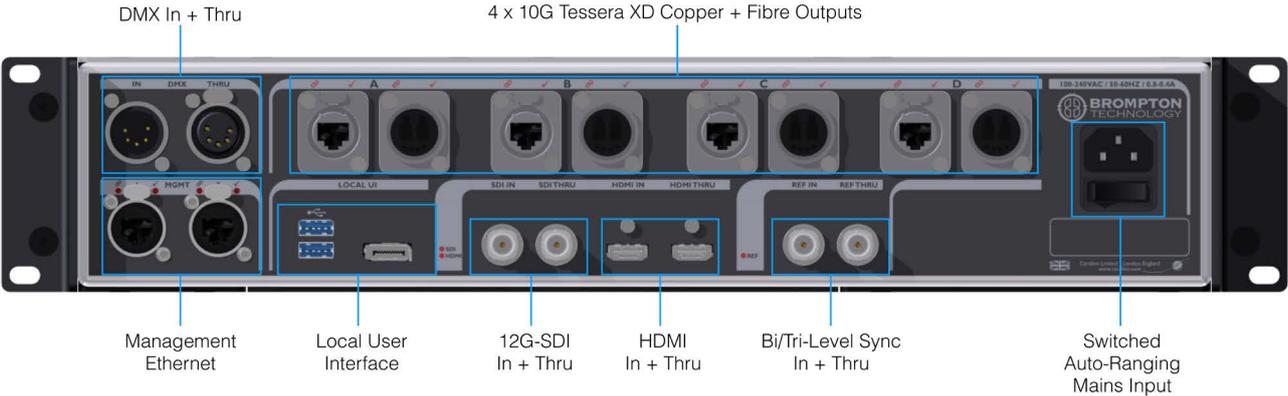
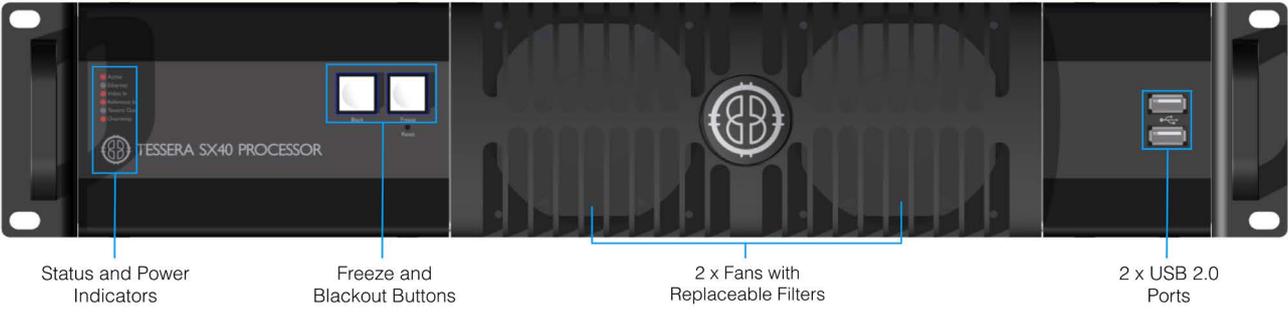
4K LED VIDEO PROCESSOR



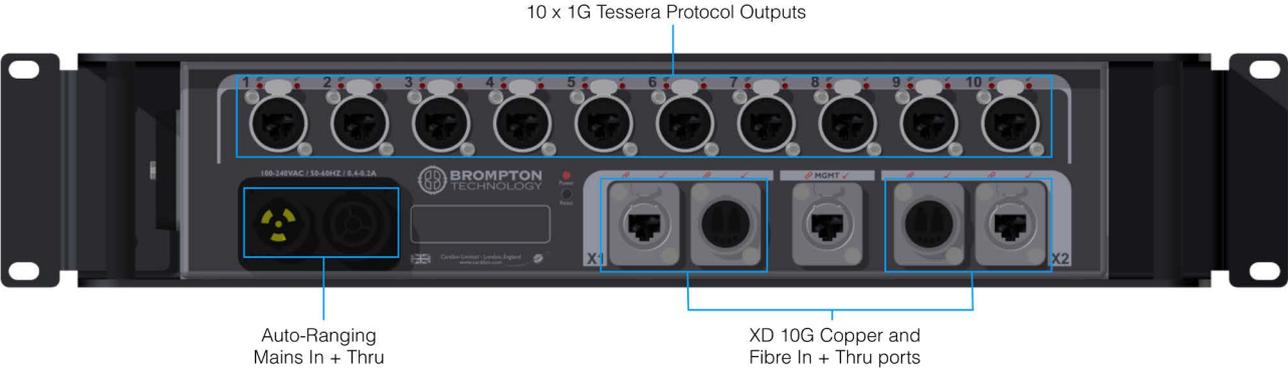
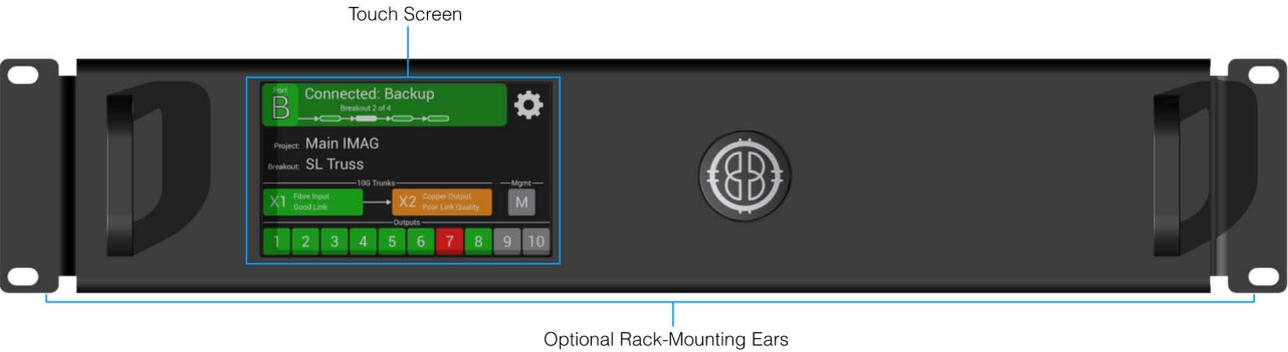
QUICK START

GUIDE

Hardware



SX40 4K LED VIDEO PROCESSOR



XD DATA DISTRIBUTION UNIT

Data Distribution With The XD

The SX40 processor is designed to be used with the XD 10G Data Distribution Unit. When planning and setting up a new system you should consider which frame rate you wish to work in and the network bit depth, in addition to the video canvas resolution. More information on this can be found in the appendix. XD units can be daisy chained using any of the 10G ports to send the signal through to the next XD, thus make cabling easier and more convenient.

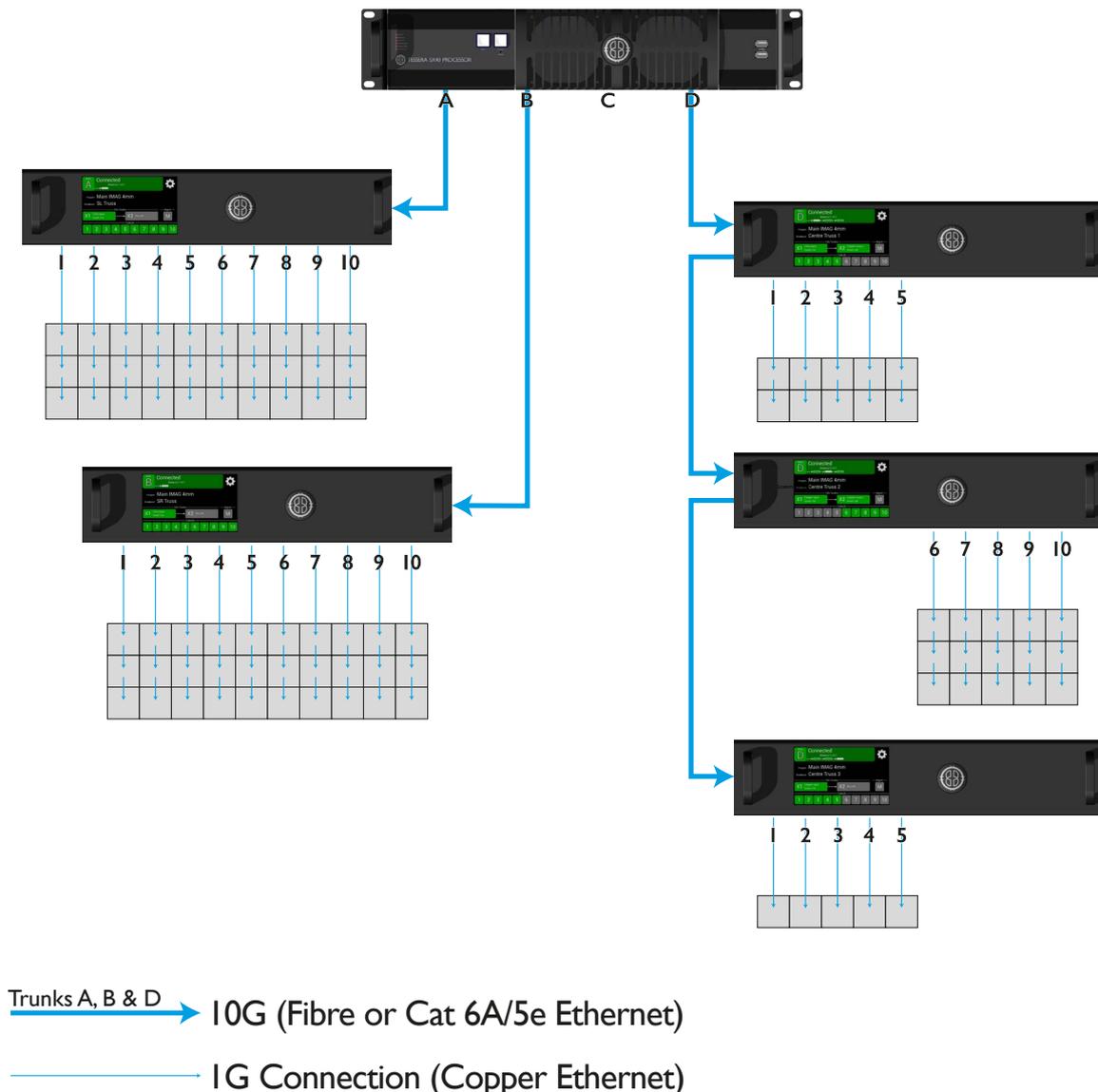
5 XDs can be daisy chained per 10G output. Daisy chaining shares 10G of bandwidth between the 1G outputs of the same output number on each XD.

Connect fixtures together and connect to XD outputs using Cat 5e or better cable. 1G outputs can be split into separate strings of fixtures using unmanaged Gigabit network switches. A maximum of 50 fixtures can be used in a string. Brompton processors support a wide variety of different topologies. **NB Sub-Fixtures are not supported on the SX40.**

Connect relevant XD units via one of their 10G links to the SX40 processor's 10G outputs using either Cat 6A or compatible single mode fibre optic cables.

Single mode fibre optic cables are suitable for any length of cable run up to 2km from the SX40 to a XD, whereas Cat 6A is only suitable for shorter runs under 60m.

Typical System Diagram



Preparing to start a new project

The SX40 can be run either using the Local User Interface by connecting an external monitor, keyboard and mouse or by using the Tessera Remote app on a Windows PC or Mac.

Connect your chosen source or sources. The SX40 supports HDMI 2.0 up to 4096 x 2160@60Hz, and 12G SDI to a maximum of 4096 x 2160@60Hz.

Using the Local User Interface

You can attach a local monitor to the DP++ port in the Local UI section of the Rear Panel. The processor also has 2 USB 3.0 ports on the rear panel, and 2 USB 2.0 ports on the front panel for connecting a USB keyboard and mouse. You can also attach external media such as USB flash drives to these ports.

The local monitor or the screen on Windows PC or Mac should have a resolution of 1920x1080 or greater. The DisplayPort v1.2 port is DP++ compatible and therefore can support DisplayPort adapters to other video formats such as DVI, VGA and HDMI.

Connecting via Tessera Remote

Connect either a Windows PC or Mac running v.2.x Tessera Remote software via a Gigabit Ethernet network connected to one of the MGMT ports on the SX40, or connect a local monitor, keyboard and mouse to the SX40's DisplayPort v1.2 output and the two USB 3.0 ports on the back of the SX40.

The default IP address of the processor is 192.168.0.50/255.255.255.0 if connecting remotely using a Windows PC or Mac. Open the Tessera Remote software and if the computer and processor are on the same subnet then they will locate each other using SLP protocol.

Detected processors will be listed with their name, firmware version, processor type, IP address and project name, if one is loaded.

Double clicking the relevant processor will connect to that processor. Also clicking on a processor to highlight it and clicking the Connect button will also connect to that processor.



Selecting a processor to connect to remotely

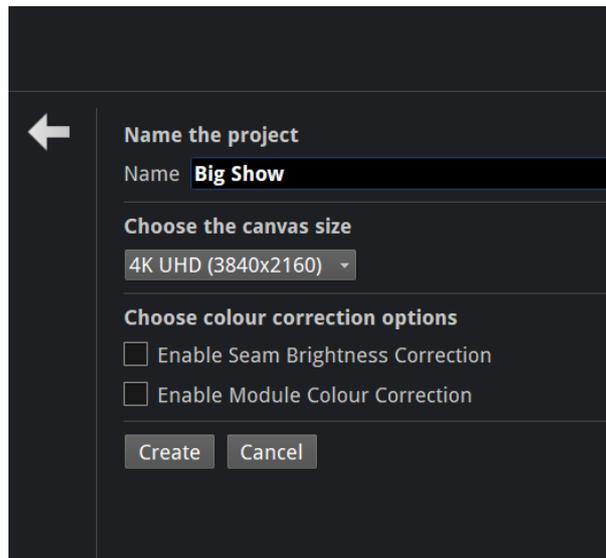
Creating A New Project

Power up the fixtures, XDs and SX40. Connect to the SX40 if you are using Tessera Remote. You can then create a new project by clicking the New button.

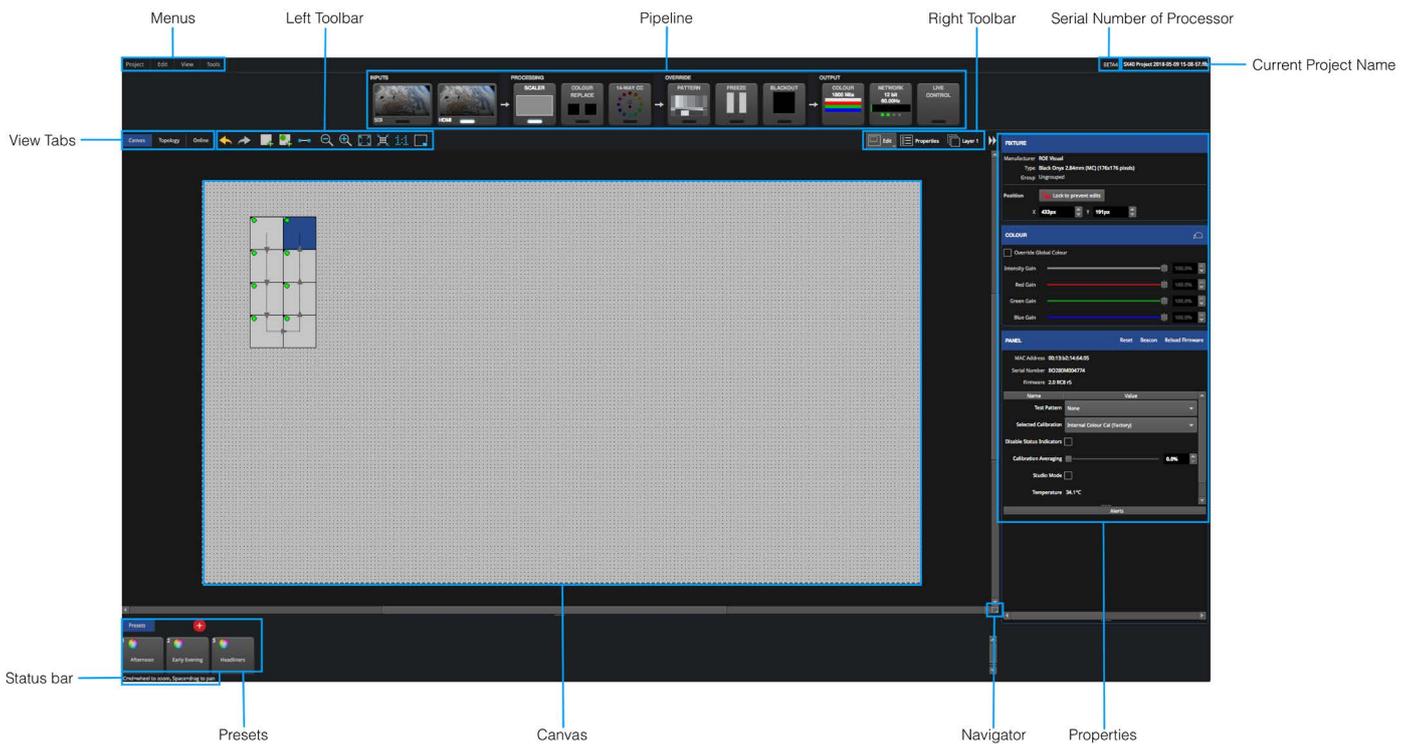


Click on New to start a New Project

Give the project a name and choose a canvas resolution. You can also choose to enable OSCA Seam Brightness Correction and Module Colour Correction. Click on Create to create the project. This opens the Main Project Screen.



Choose the canvas size and a project name



Main Project Screen

Click the Topology tab on the View Tabs of the Main Project window to check that the Topology view shows the correct number of connected XD's and IG connections to fixtures.



The Topology View

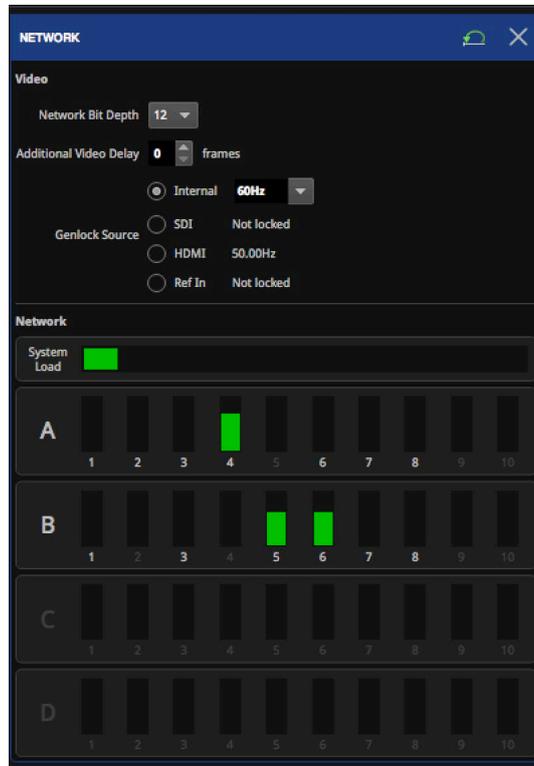
Click the Network button on the Pipeline to set the processor refresh rate, network bit depth, and if necessary the genlock source. The SX40 can be locked to source or an external reference. Clicking the Canvas tab takes you back to the Canvas view.



The Network button in the Pipeline

The SX40 can use its internal reference. Typically, if you are working in PAL countries the frame rate would be 50Hz, and in ATSC(NTSC) countries the frame rate would be 59.94Hz. Tessera processors can be set to work in 8 bit, 10 bit or 12 bit network bit depth. 12 bit delivers the maximum quality, but uses more resources, and thus fewer fixtures per output can be used. 8 bit uses the least amount of network resources and thus many more fixtures can be used per output, but at only 8 bits per colour channel per pixel. This is suitable for low-resolution applications. Often 10 bit network bit depth gives very acceptable results, particularly with sources that are 10 bit or less, such as SDI. NB Network bit depth is different from the processor's front side processing bit depth which works at 12 bit.

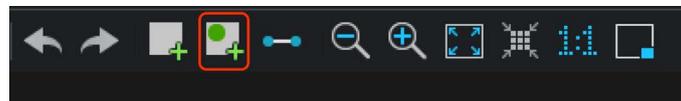
Selecting Ref In allows the processor to be genlocked to bi-level or tri-level sync, whilst selecting HDMI or SDI sets the processor to sync to the selected source.



Network Preferences

Note the System Load meter which shows the overall system load and the system load on each XD output. The maximum system load for an SX40 is 9 million pixels. An overloaded system or individual outputs will turn their respective load meters red.

Select the Add Fixtures from Network button to add the connected fixtures to the current project.



Add Fixtures From Network

Click the Trunk of the fixtures you wish to add. This will highlight the fixtures in the Trunk's colour. The Trunk letters A, B, C and D correspond to how the Trunks are labelled on the back of the processor.



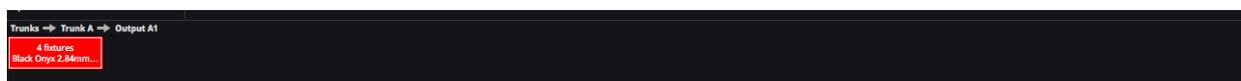
Select a Trunk. Trunks A and B are connected to XDs that have fixtures attached

Select the string of fixtures you wish to add. This will cause the string to be highlighted in the string's colour.



Outputs are coloured to denote they have fixtures attached

Then click on the string to add the string to the canvas.



The selected string on Output A1

Select the fixtures within the string you wish to add. This will cause the fixtures in the string to be highlighted with the fixture that is first in the string coloured white. Subsequent fixtures are coloured with that string's colour getting progressively darker the further the fixture is along the string.

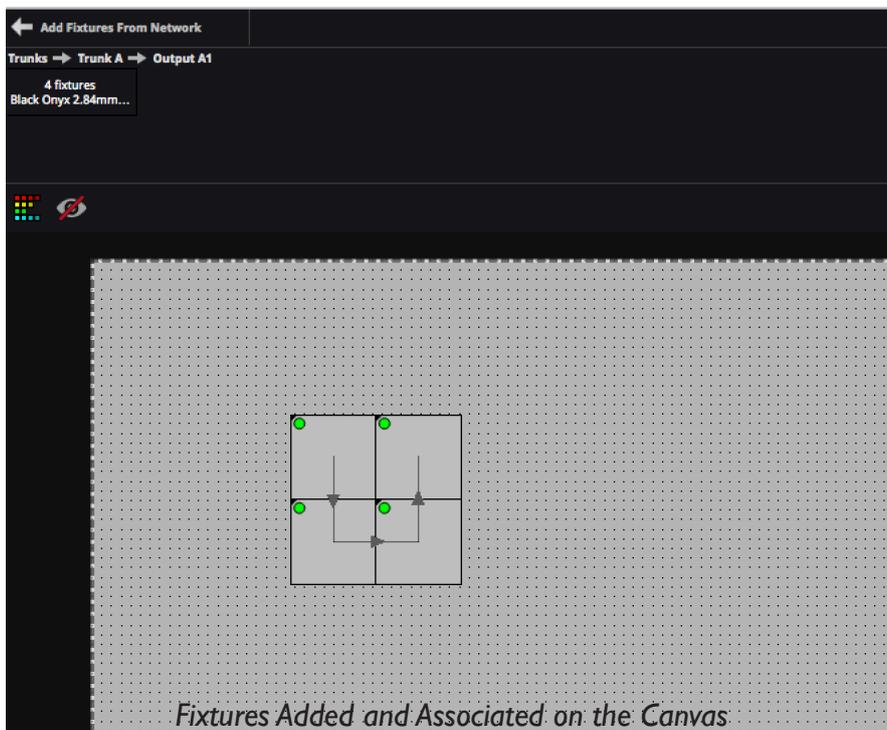
Under the user interface cursor is a fixture symbol which shows the user is in add fixture to canvas mode. Clicking on the canvas will add a single fixture, whilst clicking and dragging will add a string of fixtures to the canvas. You can change the strings network topology in the property section of the window, and choose to configure the string into a grid, circle or radial pattern.

Note the Group Fixtures check box. It can be very useful to group fixtures that are going to be used and adjusted together, such as an Imagen screen.



Array and Topology Preferences

Fixtures that are correctly associated have a little green indicator in the top left corner of each fixture.

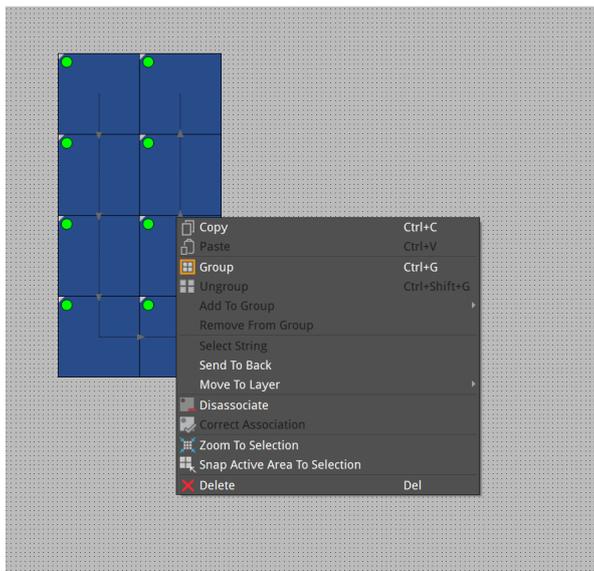


Fixtures Added and Associated on the Canvas

When you have finished adding fixtures to the canvas, click the green tick in the top left corner to accept the fixtures. Clicking the red cross will exit the window without committing the changes. To return to the Main Project Screen click the Left Arrow icon in the top left of the screen.

To select fixtures individually just click on them. Clicking and dragging the resulting bounding box around a group of fixtures will 'marquee' select them all. Selected fixtures are highlighted in blue, and the fixtures properties are displayed in Properties.

If you have not created a Group when adding fixtures, it is easy to create one by clicking and dragging a bounding box around the fixtures you wish to group. Right clicking will show the Canvas menu. Select Group Fixtures, or by using the shortcut Ctrl+G (or CMD+G if you are using Mac OS). Groups are useful for adjusting fixtures that will be used together.



Selected fixtures with the Canvas Menu

Test Patterns

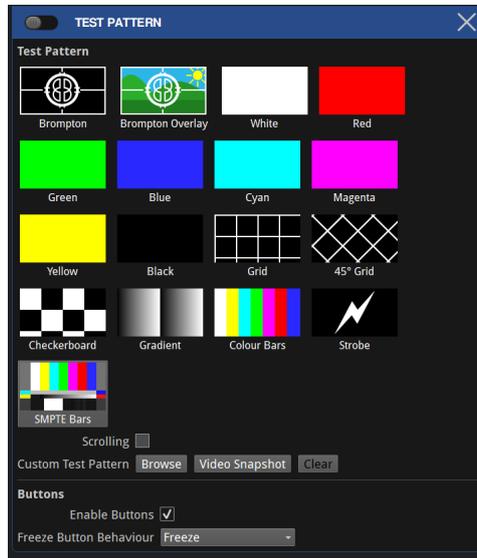
Tessera processors feature a selection of useful test patterns for checking your fixture configuration.



Select Patterns on the Pipeline to access Test Patterns

Clicking on the Pattern button in the Pipeline section of the Main Project Window will display the selection of test patterns in Properties. Test Patterns can be static or scrolling where appropriate. To enable a Test Pattern, select the relevant Test Pattern in Test Pattern Preferences and double click the Pattern button on the Pipeline or toggle the activate button in the top left of the Test Pattern Preferences tab.

Custom Test Patterns can be imported from external storage such as a USB memory stick or captured from the selected source. Imported Test Patterns can be .jpg, .PNG, or .bmp up to 4096 x 2160.



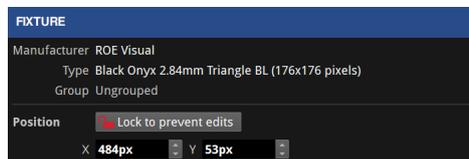
Test Pattern Preferences

Note that the function of the Freeze Button on the front panel can be customised and the front panel buttons can also be disabled.

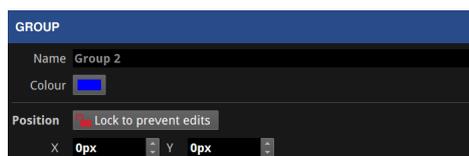
Positioning

Fixtures and Groups of Fixtures can easily be positioned on the Canvas by clicking and dragging them around the canvas, or by adjusting the X and Y Position of selected fixtures in Properties. Fixtures can be positioned with sub-pixel accuracy.

Once you have positioned your fixtures on the canvas you can then scale your source appropriately to meet your requirements.



Adjusting fixture position in Preferences



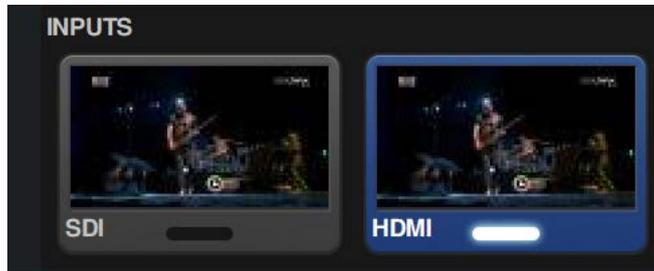
Adjusting Group position in Preferences

Inputs

The SX40 supports HDMI 2.0 and 12G SDI and can support UHD (3840 x 2160) and DCI (4096 x 2160) resolutions at refresh rates up to 60Hz. When a valid source is connected to an input, a video thumbnail of the source will be displayed on the relevant input

Selecting Inputs

Inputs can be selected by double-clicking on an thumbnail. Active sources have a thumbnail source content. Inactive sources have an image of the source connector.



Active Inputs showing thumbnails

Single-clicking on a source will open the Input Preferences tab. Input Preferences displays the various Input Colour Control settings, as well as the source resolution, frame rate, chroma subsampling and bit depth.



Input Preferences

Scaling

The processor's Scaler allows sources to be scaled appropriately on the canvas. The Scaler can be accessed by clicking on the Scaler button in the Pipeline.



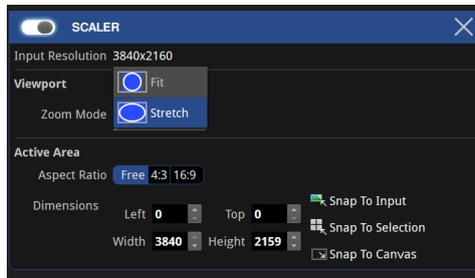
Scaler in the Pipeline

This opens the Scaler Preferences. The Scaler uses the Active Area setting to scale the incoming source. Helpfully, clicking on Snap to Input sets the Active Area to the exact size of the incoming source. Snap to Selection snaps the Active Area to the selected fixtures, and Snap to Canvas sets the Active Area to the resolution of the Canvas.

The 4:3 and 16:9 buttons will automatically adjust the width parameter of the Active Area to the chosen ratio based on the height. Free allows free adjustment of the aspect ratio.

The Scaler has a Viewport Zoom Mode, which sets whether the scaler scales the source to Fit the Active Area or Stretches the selected source to fit the Active Area.

The Active Area is represented by a dotted line on the Canvas.



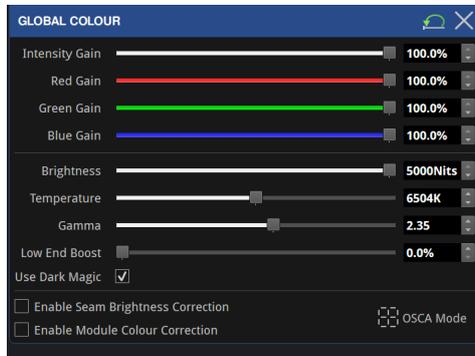
Scaler Preferences

The active area can also be adjusted by clicking and dragging on the dotted line around the Canvas.

Screen Brightness and Global Colour

Clicking on the Colour button in the Output section of the Pipeline accesses the Global Colour Preferences. This is where basic colour correction parameters, overall Brightness, Colour Temperature and Gamma can be set.

The Brightness setting controls the overall screen brightness in Nits (candela/m²). The processor knows the maximum brightness of each fixture and thus default value of Brightness will be the brightest the fixtures can reach.



Global Colour Preferences

Appendix

THE NUMBER OF PIXELS SUPPORTED PER IG OUTPUT:

	BITS PER COLOUR		
	8	10	12
60Hz	525,000	420,000	350,000
50Hz	630,000	504,000	420,000
30Hz	1,050,000	840,000	700,000
25Hz	1,260,000	1,008,000	840,000
24Hz	1,312,500	1,050,000	875,000

NB Panels with width or height below 64 pixels should have those dimensions rounded up to 64 pixels for capacity calculations.

e.g. a 20 x 80 panel uses the same capacity as a 64 x 80 panel.

To calculate how many XD units required for your application, bearing in mind the frame rate and network bit depth you wish to work in:

- Calculating how many fixtures are required for the desired canvas resolution.
- Calculate how many panels fit on a IG output at the desired frame rate and bit depth. Round this number down.
- Divide the result of a) by b) to give the amount of IG outputs required. Round this number up.
- Divide the result of c) by 10 and round up to give the number of XD units required.

MINIMUM NUMBER OF XD UNITS REQUIRED TO SUPPORT FULL 4K OUTPUT:

	BITS PER COLOUR		
	8	10	12
60Hz	2	2	3
50Hz	2	2	2
30Hz	1	1	2
25Hz	1	1	1
24Hz	1	1	1

SX40 and XD Cable Requirements

The SX40 processor and XD distribution boxes may be connected by either copper or fibre cables. Each port independently auto-switches between copper and fibre according to the type of cable connected. A mixture of copper and fibre may be used within a single installation (for example, copper for shorter links and fibre for longer ones).

Fibre cables are typically preferable to copper cables, due to their ability to operate over longer distances, their immunity to environmental electrical noise, and their electrical isolation of the connected devices. However, copper cables are typically more widely available, lower cost and easier to terminate, so may be preferred in some situations.

Fibre

For fibre connections, SX40 and XD feature opticalCON DUO connectors. These support single-mode fibre cables terminated with the following connectors:

- Neutrik opticalCON DUO ARMORED (PC)
- Neutrik opticalCON DUO X-TREME (PC)
- Neutrik opticalCON DUO (PC)
- Neutrik opticalCON DUO LITE (PC)
- Generic LC Duplex (PC)

Fibre cables must be single-mode fibre, 1310nm, 9/125 µm, with PC or UPC connectors. Multi-mode fibre is not supported, nor are APC connectors. Plugging APC connectors into SX40 and XD must be avoided as this may cause damage to the connectors.

SX40 and XD have been tested with fibre cables up to 2KM in length. Longer distances (up to 10KM) may be achievable, but have not been tested by Brompton Technology.

Copper

For copper connections, SX40 and XD feature Neutrik Cat6A etherCON connectors. These support cables terminated with the following connectors:

- Neutrik etherCON CAT6A
- Neutrik etherCON (CAT5e)
- Generic Cat6A RJ45
- Generic Cat5e RJ45

Copper cables may consist of:

- Cat6A (typically up to 60 metres)
- Cat5e (typically up to 30 metres)

The cable type (Cat5e or Cat6A) must be terminated with the correct connector type, so a Cat6A cable should be terminated with a Cat6A connector whereas Cat5e only needs to be terminated with a Cat5e connector. Cable lengths have been tested using Belden 1302E CatSnake S/FTP Cat6A and Belden 1305A CatSnake UTP Cat5e, but other types of Cat6A and Cat5e compliant cable may be used. Cable lengths are provided as an indication only for the above Belden cables, as the maximum achievable distance will be dependent on the quality and condition of the cable, the quality of the terminations at both ends, and the electrical environment in which the cable is used. Cat6A should generally be used in preference to Cat5e where possible. Cat7 or higher may also be used, but has not been tested by Brompton Technology.

Shielded cables will typically provide better immunity from external electrical interference. The shield must be electrically connected at both ends of the cable to ensure correct operation. As a side-effect of this, the earths of the devices at each end of the cable will be connected via the cable's shield. Care must therefore be taken to ensure both devices are at the same earth potential when using shielded cables, otherwise data corruption or potentially severe damage to the cable or connected devices may occur.

If earth potentials cannot be guaranteed, we recommend the use of unshielded copper cable (for shorter distances in quiet electrical environments) or fibre (for longer distances or noisy electrical environments), as these both maintain electrical isolation between the connected devices.

10G Ethernet Compatibility

The use of third-party 10G Ethernet media converters for conversion between copper and fibre formats is discouraged, and should be unnecessary as both SX40 and XD support both copper and fibre natively. Similarly, the use of third-party 10G Ethernet 'repeaters' (to extend cable lengths) is discouraged. Brompton Technology does not test for correct system operation with the use of third-party media converters or repeaters.

Where it is necessary to convert between fibre and copper, or to 'repeat' a signal for longer transmission distances, a Brompton Technology XD may be used to achieve this. Up to five XDs may be daisy-chained together as required to achieve any necessary signal conversion or repetition.

The use of 10G Ethernet switches is not supported, as these can disrupt the extremely high-bandwidth data flows in unpredictable ways, resulting in intermittent system failures. In addition, 'splitting' 10G Ethernet feeds using switches is not supported. Instead, multiple outputs on the SX40 should be used, or alternatively up to five XDs may be daisy-chained together as required to achieve outputs to panels at multiple locations.