



Carbonite Black Solo Configuration Guide

v1.2

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Patents

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Carbonite

Designed for Live!

Carbonite Black Solo builds on the highly successful CrossOver[®] Solo by bringing the power and advanced features of the Carbonite Black series into the classic all-in-one form factor.

Designed for Linear!

The Carbonite family of switchers continues to build on Ross[®] Video's reputation for setting the standard for multi-definition linear editing suites. The traditional layout and familiar controls of other Ross[®] switchers provide the power and ease of use you have come to expect.

Carbonite cleanly connects to virtually any editor using the industry standard GVG100/110 protocols.

Designed for You!

With Ross[®] Video products installed in well over 125 countries world-wide, our sales, demonstration, and training people get a lot of ongoing feedback from customers. This feedback is carefully tracked and considered in the design and feature-set development of our products. Key members of the design teams are part of an ongoing program in which they provide product demonstrations, assist with product installation, and train operators. As a result, the complete line of Ross Video products continues to offer our legendary combination of power and ease of use.

Join our Growing Customer Base!

Deciding to purchase a Carbonite switcher will put you in good company, with many thousands of Ross switchers installed worldwide. Carbonite continues to build on a family of multi-definition switchers that have been delivering the goods every day in live sports, stadium scoreboards, and drama productions, mobile productions, as well as local and network newscasts.

Experience Great Support!

Ross[®] has designed and manufactured production switchers for over 40 years, with significant year over year growth for the past 20 years. We believe that an important factor of our success is our focus on providing a superior customer experience. We continually benchmark our warranty and technical support to ensure that they are the best in the industry.

We hope that you join the many thousands of satisfied video professionals around the world that are proud

owners of Ross[®] production switchers. Please do not hesitate to contact us with any questions or comments you have related to this Configuration Guide at Tel: +1-613-652-4886, Fax: +1-613-652-4425 or email us at solutions@rossvideo.com.

What's New!

We are all very proud of the many new features that have been packed into this release of the Carbonite software. Here is a list of some of the feature we are sure you will be interested in!

Improved Usability

The user interface has been improved by adding new user buttons and full RGB button colors.

- **Key Button Colors** — Each keyer can have a different button color. The **KEY #** button is lit in this color, and when the key bus is assigned to that keyer it is also lit in that color.
- **Expanded User Buttons** — All the **Key #** buttons, as well as the **AUX**, **ME**, **MiniME/MS**, and **CC BANK** buttons are now user buttons that can be assigned to select different buses on the switcher.

Media-Store Frame Syncs

The switcher has 6 FSFC channels that can be assigned to any input, and 4 additional frame syncs from the Media-Store (MSFS). Each Media-Store channel can be converted to a frame sync and assigned to an input, this removes the Media-Store functionality.

***Note:** The Media-Store Frame Syncs (MSFS) do no support format conversion. If you need format conversion, you must use a standard FSFC.*

CB9 Control Panel

Support for the Carbonite Black CB9 control panel was added. This panel has the same layout as the Carbonite Black Solo panel, but must be connected to a frame; the same way the Carbonite Black control panels are.

New Video Format (1080p 25Hz)

The switcher now supports the 1080p 25Hz video format.

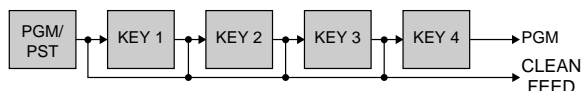
Features

Thank you for your interest in the Ross® Carbonite Black Solo switcher. The Carbonite Black Solo builds on the Ross® reputation for designing switchers that fit the needs of any production environment.

Clean Feed Output

Clean feed is typically used for bilingual and live-to-tape productions. It provides a second Program output that is derived from a different location than the standard program output. A frequent application is the recording of shows for later airing without call-in phone numbers inserted.

The clean feed output can come from before or between the keyers.



Custom Controls

This feature brings the power of macros to the switcher operator. Button presses, menu selections, event commands, or even the switcher state can be recorded to a custom control with pauses or holds between the events. A simple button press can play these events back again. Step through complex show openings as easily as pressing Custom Control buttons 1, 2, then 3.

Device Control

The switcher can control a number of external devices, such as video servers and robotic cameras. For a complete list of supported devices, and information on how to set up and control these devices, visit the Ross Video website (rossvideo.com/production-switchers/carbonite/interface-list).

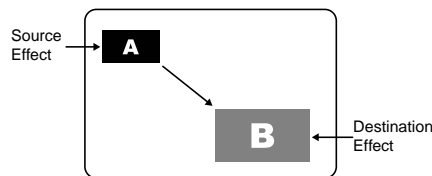
DVE (Fly Key)

The advanced 2D DVE comes standard with each switcher, and can be used for performing over the shoulder, or picture in picture shots. This allows all key types to be zoomed, cropped, and repositioned horizontally and vertically to create the look you want, or you can use one of the useful pre-built 2D effects to perform 2D background transitions.

Effects Dissolve

The Effects Dissolve feature allows you to interpolate from one memory to another using a memory recall. The switcher will interpolate from the starting memory to the

destination memory, creating a smooth, two key frame effect.



Only elements such as clip level and pattern position can be interpolated in the effects dissolve. Other elements, such as crosspoint selection, pattern, and next transition data are recalled first, and then the switcher will slew to the recalled memory.

An effects dissolve can be performed on as many elements and MEs as required, based on the memory that is being recalled.

General Purpose Interface (GPI)

The switcher is equipped with 24 GPI I/Os that can be assigned as either an input or output independently.

The GPI inputs allow the switcher to interface with peripheral equipment such as editors. Each GPI input can be used to perform simple editing and switcher functions such as fade to black or an auto transition.

LiveEDL

Edit Decision Lists (EDL) are files used by non-linear editing (NLE) suites to aid in post-production. Your switcher can capture EDL data in a file that you load into your NLE suite.

A Ross® GearLite TSC-9902 must be connected to the serial port of the switcher to provide timecode for the EDL.

For information on using the LiveEDL feature, visit the Ross Video Website (rossvideo.com).

Matte/Wash Generator

A matte generator and complex wash generator per ME, capable of multi-color washes comes standard. Any one of the color generators can be assigned to MATTE, or wipe pattern edges. An additional simple color generator is available for an Aux Bus.

ME Effect System

The ME (Multi-level Effect) systems are standard. The number of MEs depends on the chosen switcher model.

Each ME provides 4 keyers supporting pattern mask, box mask, self-key, linear key, and an UltraChrome advanced chroma key for each ME and is available to each keyer.

Media-Store

Up to 4 independent channels of still/animations are available switcher-wide, allowing for thousands of full screen stills and logos that can be cached and used on the switcher.

Media-Store provides 8 GB of cache. The number of images cached increases considerably when smaller, non-full screen images like logos are loaded from USB.

MediaManager

The MediaManager allows you to easily manage stills and animations on the switcher in a graphics interface.

MediaWipe

A MediaWipe allows you to use an animation from the Media-Store to play over a background or key transition. When the transition starts, the switcher plays the selected animation over top of the background and keys that are being transitioned. A cut, dissolve, wipe, or DVE wipe is then performed layered under the animation to bring up the next shot when the animation ends.

MemoryAI Recall Mode

We take the guessing out of memory recalls by ensuring that a memory recall will not affect what is currently on-air. MemoryAI uses the content of the memory to configure the Next Transition area and Preview bus for the background and keyers so that the next transition takes the same sources on-air that were on-air in the memory.

For example, store a memory that has a key on-air with CAM1 and CAM2 selected on the background. When this memory is recalled normally, it pops the same key on-air with CAM1 and CAM2 on the background. When the memory is recalled with MemoryAI turned on, CAM1 is selected on the preset bus, and CAM2 is selected on a key that is not on-air. The transition area is then set up for a background transition to bring CAM2 onto the background, take any on-air keys off, and take a key on-air with CAM1.

Memory System

Storage for 100 complete switcher snapshots per ME, MiniME™, and MultiScreen comes standard with all switchers. All of these memories can be stored to a USB media drive, providing custom tailored memories for every operator and every show.

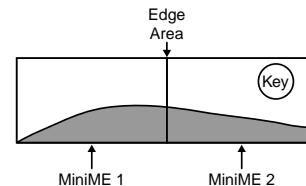
MiniME™

The MiniME™ is an additional ME that is provided with the switcher to perform basic dissolves and cuts. Each MiniME™ has 2 keys, background, and preset buses. Unlike a full ME, the MiniME™ only supports dissolves and cuts, restricts key 1 to DVE keys only, and has no preview output. Key 2 on a MiniME™ is the same as an ME keyer. The MiniME™ shares all the same sources as the ME.

MultiScreen

The switcher comes standard with 1 integrated MultiScreen generator. The MultiScreen can break a scene into up to 2 outputs that can be sent to independent projectors or displays to make a unified picture.

Each screen in the MultiScreen output uses a MiniME™ to create the background and key of the output.



Note: No edge blending is available.

MultiViewer

The MultiViewer allows you to view up to 10 video sources, in 23 layouts, from a single output BNC. Any video source on the switcher, including ME Program, Preview, and Media-Store channels, can be routed to any box on the MultiViewer. All boxes on the MultiViewer output include mnemonic source names and red and green tallies.

The Carbonite Black Solo comes standard with 1 broadcast-quality integrated MultiViewer generator. Only one MultiViewer output is supported at a time from the switcher on output BNC 5, or HDMI OUT1.

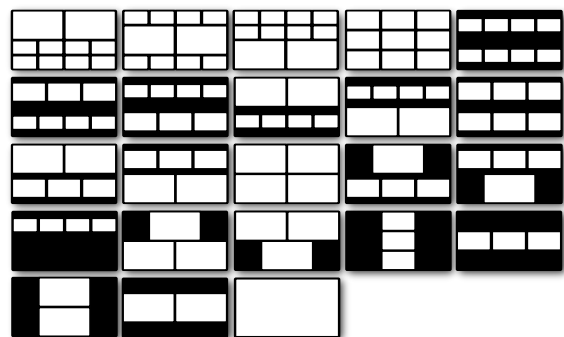


Figure 1: HD Layouts

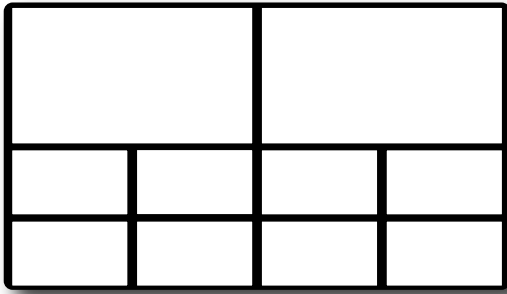


Figure 2: MultiViewer Grid

Pattern and Matte/Wash Generators

A single pattern generator dedicated to wipes comes standard, and is equipped with 10 classic wipes. Most wipes can be rotated, bordered, multiplied, aspectized, and repositioned.

Tally Outputs

The switcher has 16 assignable tally relays. Each tally can be assigned to any number of combinations of input and output or bus.

UltraChrome

The UltraChrome chroma keyer uses advanced video processing technology to provide exceptional blue spill reduction and clean edges, even with difficult source material. Glass, smoke, translucent materials, and natural shadows are handled superbly.

There is 1 floating Chroma Key.

XPression Live

Seamlessly combine the creative power of the Ross® XPression Designer software with the ease of use of your Ross® switcher. Create stunning still graphics using XPression Designer, and transfer them directly to a media-store channel on the switcher using the RossLinq interface. Up to two (2) channels with dedicated alpha can be controlled from the XPression Software Client. This feature supports still images only.

Each switcher comes with a single license of XPression. Additional licenses can be ordered.

Standard System

The Carbonite Black Solo comes either as an all-in-one panel and frame, or as a standalone frame. The standalone frame requires DashBoard to operate the switcher.

Option	Description
CB-SOLO	An integrated panel and frame with a single panel row with 9 source and custom control buttons, 4 key transition buttons, 4 key type buttons, and 4 aux bank buttons.
CB9-PANEL	A single panel row with 9 source and custom control buttons, 4 key transition buttons, 4 key type buttons, and 4 aux bank buttons.
CBF-109	A 1 ME frame with 6 SDI input BNCs, 3 HDMI™ inputs, 5 SDI output BNCs, 1 HDMI™ output, 24 GPIs, 16 tallies, and 1 AES output.

System Options

Options are typically ordered when the switcher is purchased. However, you can order options if your needs change in the future. Most of our options can be easily installed in the field. You can take comfort in knowing that you can purchase options in the future and that installation at your site will be a smooth process.

XPression Live (XDS0-0001-CPS)

Each switcher comes standard with a single license of XPression that provides up to two (2) channels with dedicated alpha that can be controlled from the XPression Software Client. This feature supports still images only.

The XPression Designer requires a computer with a Windows® 7 (32/64 Bit) operating system and an NVIDIA® graphics card.

Redundant Power (PSU-12V9A-6PIN)

The redundant power supply options provides protection against AC power failure. It allows two external power supplies to receive power from independent power sources. Complete failure of one source, or power supply, will not affect the operation of the switcher in the slightest. If the main AC power fails, the switcher instantly draws power from the remaining source. The transition from one power source to the other is totally transparent and has no effect on the output of the switcher; a critical feature should one power source fail during an on-air broadcast.

Remote Panels

This option provides external control for selecting sources on an Aux bus from a remote panel. There are a number of options for the remote control panels, depending on your requirements.

These panels connect to the switcher through an NK-IPS and NK-NET over ethernet (T-BUS connection between the NK-IPS and remote control panel).

The serial panels connect to the swicther directly between the serial port and the NK-IPS.

Option	Description
NK	Adds the 32 source button NK remote control panel.
RCP-NKM	Adds the 40 source button RCP-NKM remote control panel with integrated backlit display.
RCP-NKQ	Adds the 17 mnemonic button RCP-NKQ remote control panel.

DashBoard Display (CBPS-DashMenu)

The DashBoard Display combines a DashBoard computer with a touchscreen into a single unit that can be installed onto a standard VESA-100 mount. The DashBoard Display connects to the switcher over ethernet to provide the advanced menu system interface to the setup and operation of your Carbonite or Carbonite Black switcher.

The DashBoard Display eliminates the need to connect another computer to your switcher network just to run DashBoard.

Mounting Options (CB-SOLO only)

The Carbonite Black Solo all-in-one can be mounted into a desk or equipment rack.

Option	Description
CBF-SOLO-DESKMOUNTKIT	The Desk Mount Kit provides the hardware for mounting your Carbonite Black Solo into a desk or rack shelf.
CBF-SOLO-RACKMOUNTKIT	The Rack Mount Kit provides the hardware for mounting your Carbonite Black Solo into an equipment rack.

SMC-9901 Serial to MIDI Converter (SMC-9901)

The SMC-9901 Serial to MIDI Converter is used to allow control of an Audio Mixer from a Ross Video switcher.

The SMC-9901 provides a single DB-9 connector for 38,400 baud serial RS-422 communication, one 5-pin DIN connector for MIDI in, and two 5-pin DIN connectors for MIDI out. Power, Serial Tx and Rx, MIDI In and MIDI Out Status LEDs next to the ports show activity status.

The SMC-9901 connect to the switcher via the serial port on the frame, or an external port expander such as the Control® DeviceMaster®.

TSC-9902 Linear Timecode to Serial Converter (TSC-9902)

The TSC-9902 Linear Timecode to Serial Converter is a high-quality signal conversion solution within the family of GearLite compact, self-contained modular products. Supporting Linear Timecode Signal (LTC) to Serial conversion, the TSC-9902 is the ideal converter for interpreting linear timecode and sending the timecode over a serial port to Carbonite Solo.

The TSC-9902 provides a single DB-9 connector for 38,400 baud serial RS-422 communication, and one BNC connector for LTC input. Note that the shell of the BNC connector is isolated from ground. Power, LTC Status, and Serial Tx LEDs show activity status.

A universal power adapter and line cord, suitable for the country of use, is supplied with each module. Various mounting options are included that enable a wide range of installation choices.

The TSC-9902 connect to the switcher via the serial port on the frame, or an external port expander such as the Control[®] DeviceMaster[®].

SHC-9642 SDI to HDMI Converter (SHC-9642)

The SHC-9642 SDI to HDMI Converter is a high-quality signal conversion solution within the family of GearLite compact, self-contained modular products. The SHC-9642 is the ideal solution for converting any SDI input signal (up to 3Gb/s) into an HDMI Type-A output format. User-selectable audio decoding is available with unbalanced, stereo analog audio outputs. Up to 16 channels of embedded audio are selectable, in stereo pairs, for de-embedding and decoding.

Onsite Operational Training (CARBONITE-OTR-1DAY)

Although Ross Video switchers are designed to be as easy as possible to install and operate, training is highly recommended to ensure that the process of taking your Ross Video switcher to air is a smooth one.

Training is provided on the customer's equipment at their site. Expenses are extra, and billed at the completion of the visit. Ross Video cannot guarantee the availability of a local Trainer, as such, travel costs to all locations will be invoiced at cost. Two (2) days, or more, of training is recommended for multiple MLE systems. Four (4) weeks advanced scheduling notice is required. Additional days of training can be added with the **CARBONITE-OTR-1DAY** option. Please quote one additional option for each additional day of training required.

Customers cancellation or rescheduling of on-site services without seven (7) calendar days advanced notice will incur full invoice.

Online Operational Training (CARBONITE-ONL-1DAY)

Sometimes you don't need the hands-on attention that having a trainer come to your facility provides. In these

situations Ross Video provides comprehensive, web-based, online training.

Two (2) days, or more, of training is recommended for multiple ME systems. Four (4) weeks advanced scheduling notice is required. Additional days of training can be added with the **CARBONITE-ONL-1DAY** option. Please quote one additional option for each additional day of training required.

Customers cancellation or rescheduling of on-site services without seven (7) calendar days advanced notice will incur full invoice.

Onsite Technical Training (CARBONITE-OTT-1DAY)

On-site technical training introduces the user to some of the technical aspects of switcher operation and maintenance. This includes, but is not limited to; Basic operation, Switcher installation and configurations, Peripheral interfaces, Video signal flow, System timing requirements, Circuit block diagrams, Circuit board overviews, Jumpers and indicators, Troubleshooting tips, Software upgrading, and Routine maintenance.

Training is provided on the customer's equipment at their site. Expenses are extra, and billed at the completion of the visit. Ross Video cannot guarantee the availability of a local Trainer, as such, travel costs to all locations will be invoiced at cost. Two (2) days, or more, of training is recommended for multiple ME systems. Four (4) weeks advanced scheduling notice is required. Additional days of training can be added with the **CARBONITE-OTT-1DAY** option. Please quote one additional option for each additional day of training required.

Onsite Commissioning (CARBONITE-COM-1DAY)

On-site Commissioning is a great way to ensure that your switcher is properly installed into your facility and tuned to maximum performance.

Once the customer has installed and cabled the equipment, a Ross Commissioning expert will come on site to get the switcher configured, verify that all peripheral interfaces are operating properly, provide a basic technical orientation, and help you get on the air.

Training is provided on the customer's equipment at their site. Expenses are extra, and billed at the completion of the visit. Ross Video cannot guarantee the availability of a local Trainer, as such, travel costs to all locations will be invoiced at cost. Two (2) days, or more, of training is recommended for multiple MLE systems. Four (4) weeks advanced scheduling notice is required.

Additional days of training can be added with the **CARBONITE-COM-1DAY** option. Please quote one additional option for each additional day of training required.

Customers cancellation or rescheduling of on-site services without seven (7) calendar days advanced notice will incur full invoice.

Please note that commissioning does not replace operator or technical training. Contact your Ross representative to discuss which types of assistance are best suited to your needs.

Extended Warranty

This extends the standard one-year warranty on your control panel or frame by one year. Additional years can be purchased if required.

Option	Description
CB-SOLO-ROSSCARE	Adds an additional year of warranty to the CB-SOLO switcher.
CBF-109-ROSSCARE	Adds an additional year of warranty to the CBF-109 frame.
CB9-PANEL-ROSSCARE	Adds an additional year of warranty to the CB9 control panel.

Specifications

The information in this section is subject to change without notice.

Switcher Resources

The number of resources specific to your switcher depends on the options installed.

Resource	Carbonite Black Solo/Carbonite Black 109
2D DVE Channels per ME	2
Aux Buses	16
Chroma Keys per ME	1
Custom Controls	256
FSFCs	6
GPI I/Os	24
Keyers per ME	4
Keyers per MiniME™	2
Matte Generators per ME	2
Media-Store Channels	4
Media-Store CACHE	8 GB
Memories per ME	100
MEs (max)	1
MiniME™ Engines	2
MultiScreen Generators	1
MultiViewer Boxes	10
MultiViewer Layouts	23
MultiViewer Heads	1
Pattern Generators per ME	2
Tallies	16
SDI Video Inputs	6
HDMI Video Inputs	3
SDI Video Outputs	5
HDMI Video Outputs	1
Carbonite Black Solo/Carbonite Black 109 IP Address	192.168.0.123
CB9 Control Panel IP Address	192.168.0.129

Hardware Weights

Hardware	Weight
CB9 Panel	8lbs (3.63kg)

Hardware	Weight
CB-SOLO	11lbs (4.99kg)

Environmental Characteristics

All Switchers	
Ambient Temperature Range	0 - 40°C (32 - 104°F)
Frame Cooling	Active, Front-to-Back airflow
Control Panel Cooling	Passive

Video Input Specifications

Input Specification	Value
Equalization (using Belden 1694 cable)	>50m @ 3Gb/s
	>100m @ 1.5 Gb/s
	>300m @ 270 Mb/s (5°-40°C)
Impedance	75 ohms, terminating
Video Inputs, SDI	SMPTE 259M/292M/424M serial digital (non-looping)
Video Inputs, HDMI	HDMI 1.4
	High Speed HDMI Cable (Max 10m)
Reference Inputs (non-terminating, looping)	Standard Definition — analog black
	High Definition — tri-level sync

Video Output Specifications

Output Specification	Value
Return Loss	<-23dB @ 1.5GHz
	<-18dB @ 3GHz
Rise and Fall Time	800ps ±10% (SD)
	240ps ±10% (HD)
Signal Level	800mV ±10%
DC Offset	0 Volts
Overshoot	<10%
Video Outputs, SDI HD Mode	10-bit SMPTE-292M/424M serial digital
Video Outputs, HDMI	HDMI 1.4
	High Speed HDMI Cable (Max 10m)

Audio Specifications

Specification	Carbonite Black Solo
Audio Depth	24-bit AES3 in HD (20-bit in SD)
Channels	1 Stereo Pair (2 channels)
Output	AES
File Format	Multi-channel Waveform Audio File (.wav)
Impedance	110 Ohms, differential
Minimum/Maximum output voltage swing	1.5/6V peak-to-peak
Rise and Fall Times	20ns, typical
Sample Rate	48kHz
Synchronization	Locked to Video

Jitter

Specification	Value
HD - Tri-Level Sync	Alignment (> 100KHz) < 0.2UI
	Timing (<10Hz) < 1.0UI
HD - Composite Reference	Performance not guaranteed with composite reference
SD - Tri-Level Sync	Alignment (> 1KHz) < 0.2UI
	Timing (<10Hz) < 0.2UI
SD - Composite Reference	Alignment (> 1KHz) < 0.2UI
	Timing (<10Hz) < 0.5UI

System Timing

- All video inputs zero time relative to reference input, auto timing will correct for inputs out of time by up to +/- 0.25 line.
- System delay is less than 1 line.

Power Consumption

	Carbonite Black Solo	Carbonite Black Solo Frame Only	CB9 Panel
Power	57W 4.75A 12V	45W 3.75A 12V	24W 2A 12V
Input Voltage	100 - 120V~, 220 - 240V~, 47-63Hz, 1.6A		

Option Summary

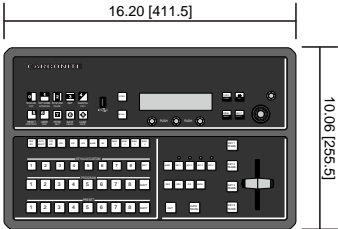
Use the available options listed in the following tables for each control panel or frame.

	Carbonite Black Solo	Carbonite Black Solo (frame only)
Carbonite Black Solo	CB-SOLO	CBF-109
Redundant Power	PSU-12V9A-6PIN	PSU-12V9A-6PIN
Extended Warranty, Carbonite Black Solo	CB-SOLO-ROSSCARE	CBF-109-ROSSCARE
Switcher Options		
Desk Mount Kit	CBF-SOLO-DESKMOUNTKIT	
Rack Mount Kit	CBF-SOLO-RACKMOUNTKIT	
DashBoard Display	CBPS-DashMenu	
SHC-9642 SDI to HDMI Converter	SHC-9642	
SMC-9901 Serial to MIDI Converter	SMC-9901	
TSC-9902 Linear Timecode to Serial Converter	TSC-9902	
XPression Live	XDS0-0001-CPS	
Training Options		
Online Operational Training	CARBONITE-ONL-1DAY	
Onsite Commissioning	CARBONITE-COM-1DAY	
Onsite Operational Training	CARBONITE-OTR-1DAY	
Onsite Technical Training	CARBONITE-OTT-1DAY	

Dimensions

Dimensions are in inches with metric dimensions shown in brackets [mm].

Carbonite Black Solo (CB-SOLO/CB9)



Carbonite Black Solo Frame (CBF-109)

