Bluebell

BC160i
Modular Rack Frame System

Operations Guide

Ref: BC160i Operations Guide v1

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Table of Contents

Overview

Thank you for purchasing this Bluebell Opticom professional broadcast video product. If you are new to Bluebell products, or to the subject of transmitting video and/or other types of signal over fibre links, please take the time to read through this document before putting the system to use.

Introduction

The BC160i is a 19", 1RU frame for the Bluebell Opticom BC Series of modular fibre interfaces. BC Series cards are designed primarily for Outside Broadcast (OB) and studio applications, and the very extensive range includes single-channel, two-channel and four-channel fibre-optic interfaces for SDI video (all current formats), audio, Ethernet data and serial control data. The BC160i can hold six BC Series cards of any type: thus up to 24 separate signals can be transmitted/received over fibre optic links from the frame.

The BC160i is an evolution of the BC160 frame, and incorporates greatly enhanced monitoring functions. The front panel is fitted with a 3.8" colour touchscreen (480 x 116 pixels), which displays the status of each card in the frame, and also various global parameters. There is no menu system to navigate and most information is available within a single touch.

Physical format

The BC160i accepts up to six single-slot BC Series cards: any combination of card types is permitted, and there are no restrictions regarding slot allocation. The card slots are at the rear of the frame, so that signal connections – fibre and copper – can be kept within the 19" rack in which the frame is fitted. A further card slot in the front panel is reserved for an optional BM102i or BM103 network monitoring card.

The frame includes dual power supplies (PSUs), which are fitted internally.

The frame depth is 150 mm. To allow for cables and connectors at the rear, installers should ensure that rack depth greater than this is available.

Ventilation

The BC160i frame is force cooled by two internal fans mounted in the rear of the chassis, between the pairs of card positions. The fans' are continually monitored for correct operation and their status displayed on-screen on the Frame page.

Air intake is through slots in the left-hand side panel (looking from the front) and exhaust through a similar set of slots in the right-hand side panel. When mounting the frame in a 19" rack enclosure, ensure that adequate space is left at the sides of the BC160i frame, and that the ventilation slots are not obstructed by cables or other rack components.

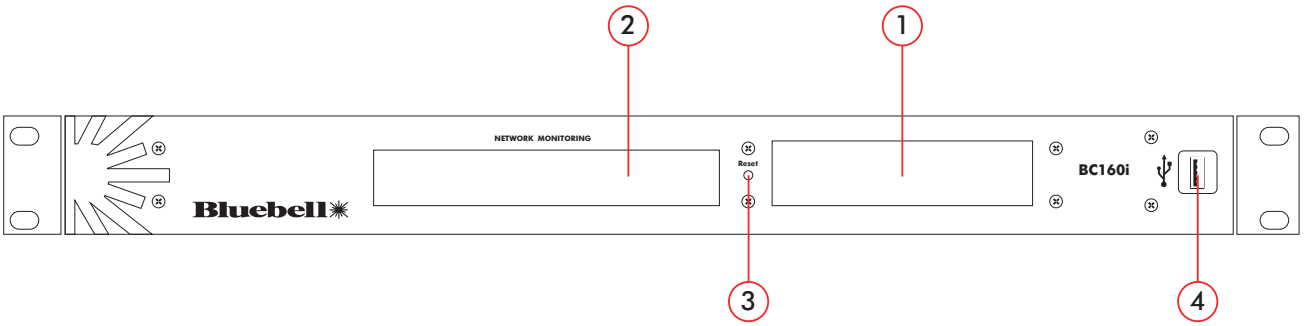
Power requirements

The frame is fitted with two independent, internal Power Supply Units (PSUs) rated at 40 W each. The PSUs are wired for fully redundant operation, and have independent rear panel IEC connectors. The PSUs are of the “universal” type and will operate on any AC mains supply voltage from 90 to 260 V, 50 to 60 Hz.

The DC outputs are distributed internally via the motherboard to all card slots using current-sharing: there is no interruption to frame operation in the unlikely event of a PSU failing. Each PSU can power a fully-loaded rack, regardless of card type mix.

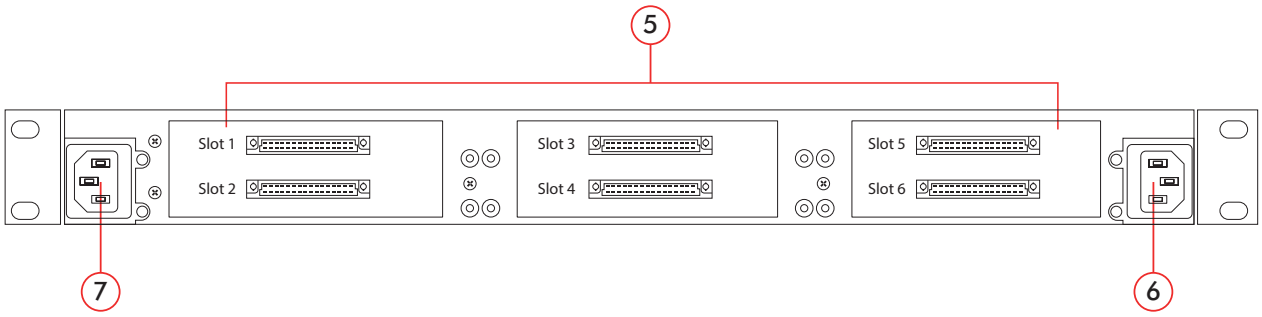
The BC160i has no user-replaceable fuses. When powering the frame with a fused IEC cable, fit a fuse of 5 A rating. Always replace a blown fuse with one of the same rating. If the replacement fuse blows immediately on connection, the PSU is faulty and the frame should be sent for repair.

BC160i front panel



1. Display – 3.8” colour touch-sensitive LCD, 480 x 116 pixels. The home page shows a status overview of all six card slots; further pages give further details of each card and its SFP(s), a network card (if fitted), and frame and PSU statuses.
2. Network card slot: this is reserved for a network monitoring card, either a BM102i or BM103.
3. Reset button – resets the BC160i’s internal microprocessor controlling the frame monitoring functions and display. Pressing this button will also update the frame’s firmware if a USB memory device with the new firmware is plugged into the USB port [4]. Use a small screwdriver (or similar) to press the internal tac button.
4. USB port – Type A USB connector for updating BC160i firmware.

BC160i rear panel



5. Card slots 1 to 6. BC Series cards may be freely fitted here. Note that the slots are paired vertically and numbered upper-left to lower-right: Slot 1 is the upper slot of the left-hand pair (viewed from the rear of the frame); Slot 2 is below it.
6. IEC mains connector for PSU 1.
7. IEC mains connector for PSU 2.

System Monitoring

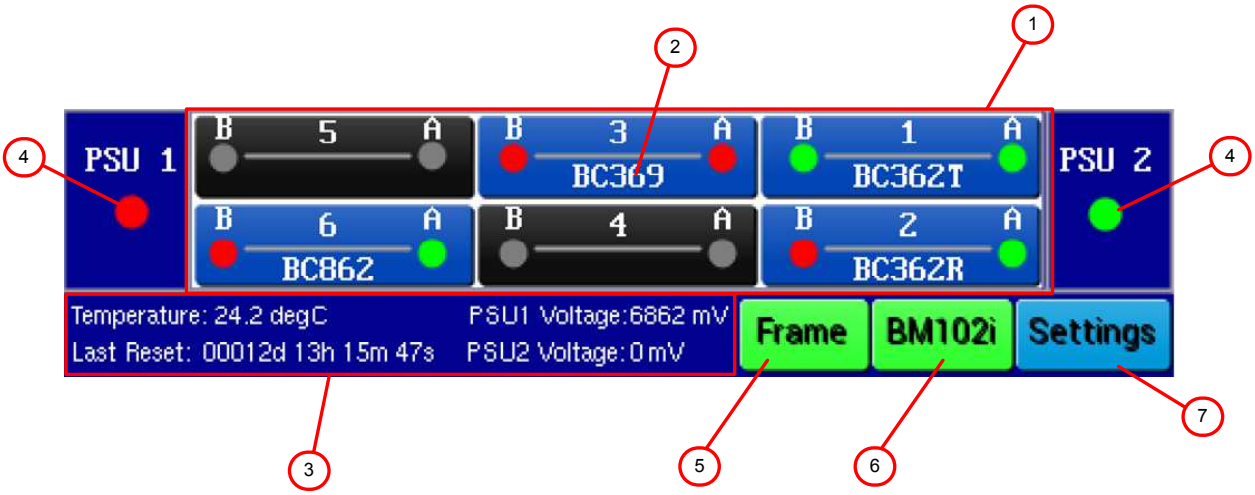
The BC160i incorporates a sophisticated, microprocessor-based monitoring system. All BC Series cards are able to report information about their type and status to the frame: this data is available for display on the front panel touchscreen.

The BC160i display has seven pages:

- Home page (the default page on power-up)
- Frame page
- Frame Settings page
- Card Info page
- SFP page
- Card specific parameters page
- Network Card page

Due to the BC160i's screen size, it is not possible for some pages to display all data simultaneously. For this reason, the Frame, Card Info, SFP and Network Card pages are provided with **Up** and **Down** scroll buttons. Touch these buttons to show any data not currently displayed. However, please note that in the descriptions of these pages which follow, the pages are shown "in full" graphically, to clearly indicate all the data that the page has available.

Home page



The Home page gives an overview of the frame, displaying the primary status of each card installed in the frame, plus additional frame status data.

1. The Overview area mimics the LED status array fitted to the front panel of the Bluebell BC160 frame. Each of the six card slots is represented by a coloured rectangle containing two bicolour "virtual LEDs".

In each slot:

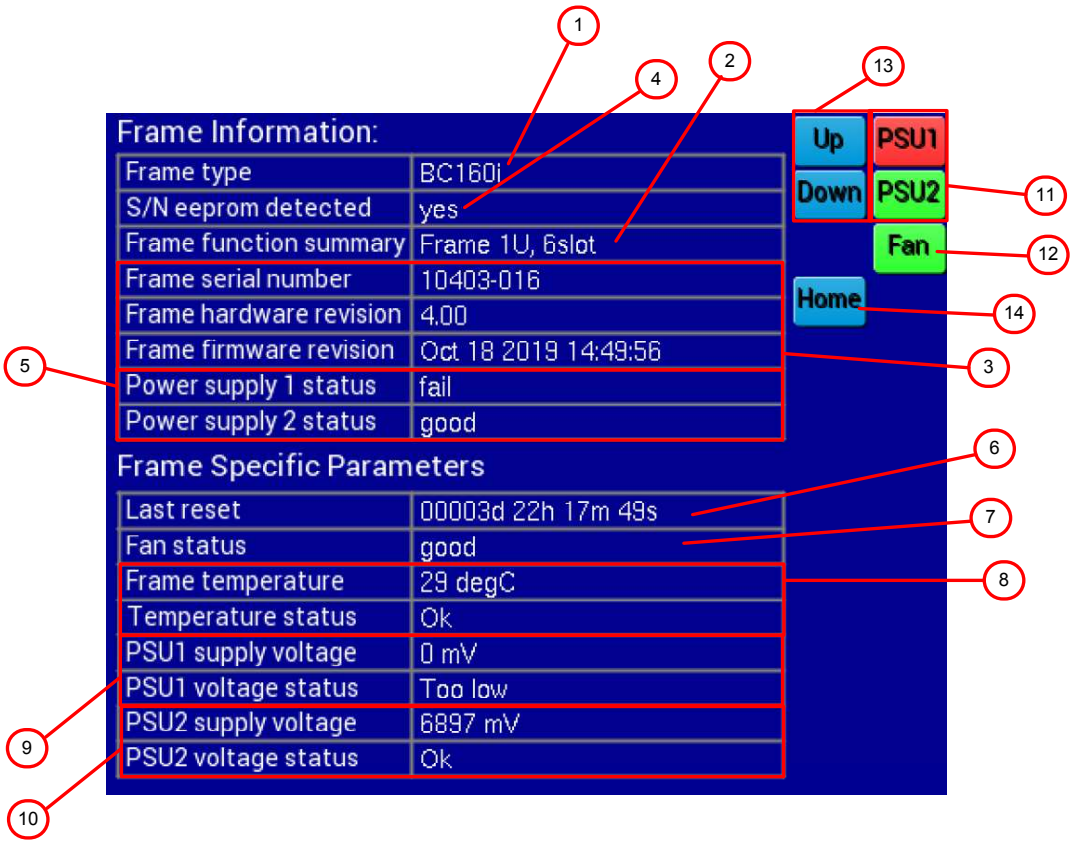
- Blue rectangle – card present
- Black rectangle – no card detected
- Green LED – valid signal detected, or no channel present on card (applicable only to certain single-channel cards)
- Red LED – no valid signal detected

The red and green LEDs give a general “go/no-go” indication of the status of each channel (A and B) on each card, but the precise method of status monitoring determining the LED colour varies considerably from card to card. Please refer to the Operation Guide for each type of card in use for full details of how the status indication is derived.

Touch a blue rectangle to navigate to the Card Info page for the card fitted to that slot.

2. Each card installed reports its identity to the frame monitoring system: the type is displayed below the slot number. **NOTE**: a few older types of BC Series cards do not report their identities.
3. The Home Page includes basic information about the BC160i frame’s operation and status: output voltage of each PSU, temperature of the frame and time since the last reset or power-up (whichever was more recent). The Frame page repeats and expands on this data.
4. **PSU 1** and **PSU 2** LEDs – confirm normal operation of each Power Supply Unit.
5. Press the **Frame** button to navigate to the Frame page.
6. If a Network Card is fitted in the dedicated slot at the front of the frame, this button will display **BM102i** or **BM103** according to card type. Press to navigate to the Network Card page. If no Network Card is fitted, the button displays **Network**.
7. Press the **Settings** button to navigate to the Settings page.

Frame page



The Frame page gives more detailed information about the BC160i frame itself. Use the **Up** and

Down buttons to see any data not currently displayed on the screen.

Frame Information

1. **Frame Type** – confirms frame type.
2. **Frame Function summary** – confirms the frame configuration.
3. **Frame Serial Number, Frame hardware revision** and **Frame firmware revision** – confirms serial number, hardware and firmware versions: you may need this information if you need to contact Bluebell with any technical issues that may arise with the BC160i.
4. **S/N eeprom detected** – confirms the detection of the frame's Serial Number EEPROM. (Included for assistance in fault-finding).
5. **Power Supply status** – confirms the correct operation of each of the frame's two PSUs.

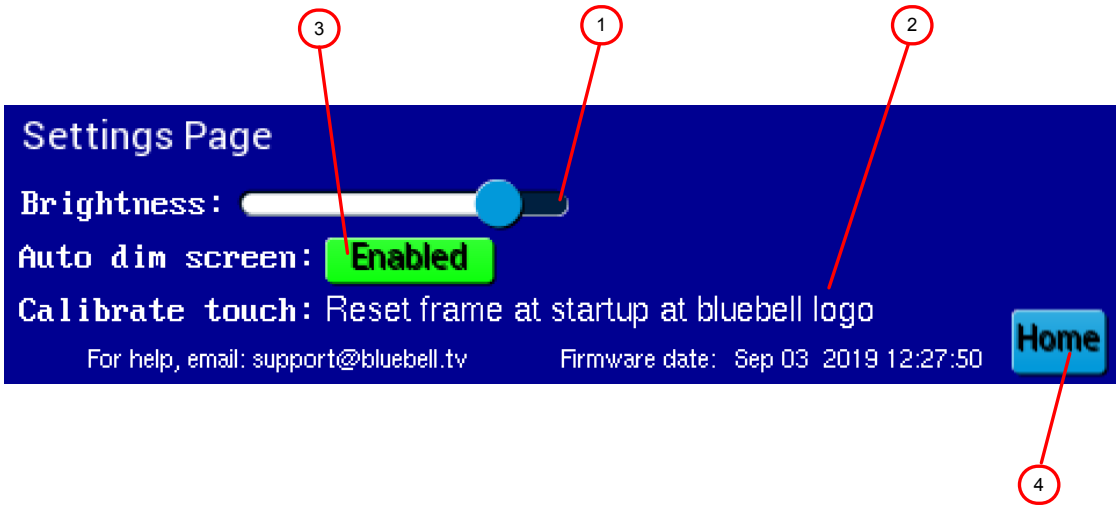
Frame Specific Parameters

6. **Last reset** – displays the elapsed time since the last BC160i frame microprocessor was reset, either by the front panel Reset button or by power-cycling. The time format is in days, hours, minutes and seconds.
7. **Fan status** – reports the correct operation of the two internal fans: it will display **good** if both fans are operating normally, or **fail** if either of them develops a problem.
8. **Frame temperature** and **Temperature status** – display the actual internal frame temperature and a status report about the temperature relative to the frame's permitted operating range, as follows:

Temperature status	Meaning
Too low	<= 0 °C
Low	<= 5 °C
Ok	> 5 °C to 60 °C
High	> 60 °C
Too high	> =70 °C

9. PSU1 data – the PSU's DC output voltage and internal temperature are displayed, together with a status comment for each.
10. PSU data – as [9] above, for PSU2.
11. The **PSU1** or **PSU2** indicators are colour-coded: green indicates the PSU is operating normally, red indicates that there is a problem.
12. **Fan** – a colour coded indicator; green confirms that the fans are operating normally, red that either or both are faulty.
13. Not all data on the Frame page is visible at any one time - press the **Up** and **Down** buttons to display the remainder of the page.
14. **Home** – press this button to return to the Home page.

Frame Settings page



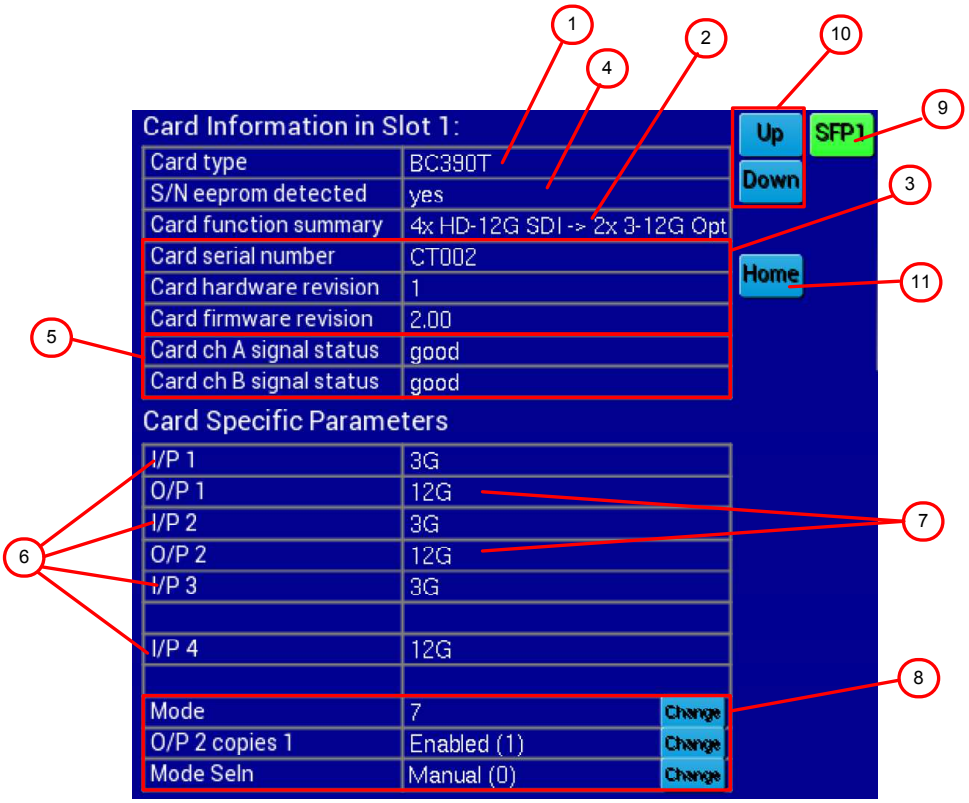
1. **Brightness** – he slider allows the brightness of the touch screen display to be adjusted. The setting is saved and reinstated on subsequent power-up.

2. Touch screen calibration – this procedure is not actually done from the Settings page: the text here is for user guidance. To recalibrate the touch screen, press the Reset button (see [3] at page 6) during the power-up sequence, while the Bluebell logo is displayed. This will launch the screen calibration routine: press the three dots displayed on the screen.

3. Auto dim - touch **Enabled** to activate the screen's Auto dim function. When enabled, the screen brightness will automatically reduce to 20% of the maximum value after 4 minutes of inactivity, and resume its previous level as soon the screen is next touched. Note that Auto dim does not operate if the screen brightness has already been set with slider [1] to 20% or less of the maximum level.

4. **Home** – press this button to return to the Home page.

Card Info page



The data displayed on the Card Info page varies considerably with BC card type. The example above is for a BC390T card (a 4K SDI multiplexer with four SDI inputs and a dual transmitter SFP, designed to perform a variety of format conversions). The tabular page layout is consistent for all card types, though some fields may be empty, depending on the card's function.

Use the **Up** and **Down** buttons to see any data not currently displayed on the screen.

Card Information

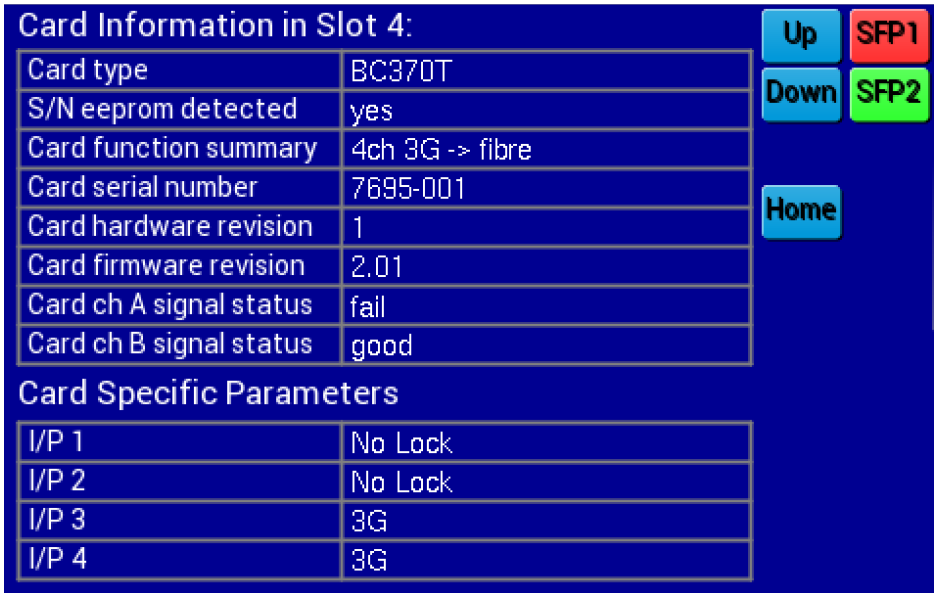
1. **Card Type** – confirms card type.
2. **Card Function summary** – a brief description of the card's signal architecture.
3. **Card serial number, Card hardware revision** and **Card firmware revision** – confirms serial number, PCB issue and firmware version: you may need this information if you need to contact Bluebell with any technical issues that may arise with the card.
4. **S/N eeprom detected** – confirms the detection of the card's Serial Number EEPROM. (Included for assistance in fault-finding).
5. **Ch A/B signal status** – confirms the presence of a valid signal in each channel; these fields are essentially text versions of the red/green LEDs on the Home page. Please refer to the Operation Guide for the specific card type for full details of signal status detection in each channel.

Card Specific Parameters

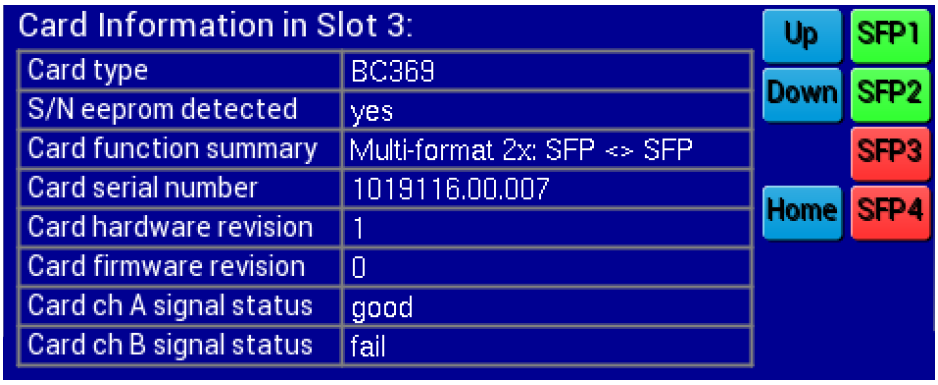
NOTE – this area of the page is omitted for certain card types – see examples below.

6. **I/P** status – confirms the signal type detected at each of the card's inputs. (In the example, the BC390T is receiving four separate 3G signals at the BNC inputs which are then converted to a 12G optical signal at each of the two SFPs: this is further confirmed in the **Card Function Summary** field above.) If the card type permits any Card Specific Parameters, the fields concerned will show a **Change** button. In the case of the BC390T, pressing the **Change** button opens the Change CSP page, where the copy mode can be enabled or disabled.
7. **O/P** status – confirms the signal type for each of the card outputs.
8. Card specific settings – these fields will be filled if the card has user-selectable functions that can be controlled from the BC160i. In the case of the BC390T example shown, its current encoding mode (7) is displayed as **Mode**, while the Mode Selection (**Mode Seln**) is set to **Manual**. Press the **Change** button to open the Change CSP page, where these settings can be altered.
9. **SFP 1** – press this button to navigate to the SFP page for SFP 1, where full details of the cartridge fitted in the SFP 1 carrier are displayed. If the card has more than one SFP carrier, additional SFP buttons are displayed, with an SFP page available for each. The SFP buttons will be green if the carrier is fitted with a valid SFP cartridge and red if one is not fitted or if the cartridge is faulty. Note that if the card has no active SFP, a single SFP button is still displayed, but it will be coloured red and non-functional.
10. Not all data on the Card page is visible at any one time - press the **Up** and **Down** buttons to display the remainder of the page.
11. **Home** – press this button to return to the Home page.

Further examples of Card Info pages are shown below:

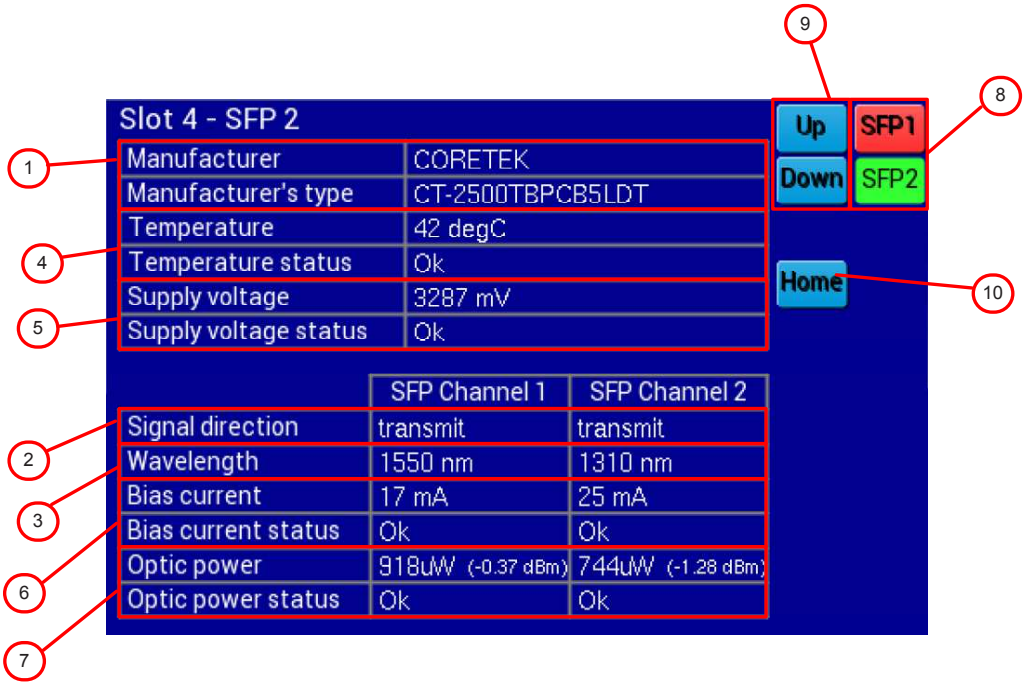


Example 1: Card type BC370T (Quad Electrical-to-Optical SDI converter with two SFP carriers). The Card Info page displays the status of each SDI co-ax input as a Card Specific Parameter, but no user-changeable settings are available.



Example 2: Card type BC369 (Dual Multi-format converter with four SFP carriers. This card type has no Card Specific Parameters.

SFP data page



The SFP pages, accessed from the Card Info page, display more detailed information about each SFP. Note that there is a separate page for each SFP carrier fitted to the card.

Use the **Up** and **Down** buttons to see any data not currently displayed on the screen.

NOTE: This data displayed on this page is that reported by the SFP itself. Users should be aware that not all SFPs are fully compliant with SFP reporting standards, and that this may be particularly so with older or time-expired SFPs. Apparently incorrect data may therefore originate with the SFP's reporting mechanism itself, and may not necessarily indicate a dysfunctional SFP.

1. **Manufacturer** and **Manufacturer's type** – identify the cartridge model fitted in the SFP carrier.

2. **Signal direction ch1** and **ch2** – confirm the type of SFP cartridge: dual transmit, dual receive, or transmit + receive.

3. **Wavelength ch1** and **ch2** – displays the wavelength on which the optical cartridge is operating. Note that as all receivers are wideband, SFP channels configured as receivers will report '**0 nm**'.

4. **Temperature** and **Temperature status** – the SFP temperature is measured once per second and the temperature display updated accordingly. The **Temperature status** field gives an indication of the temperature relative to the SFP's permitted operating range: the possible options are **Too low**, **Low**, **OK**, **High** or **Too high**. Because of the wide range of SFP options available, it is not possible to relate these options to specific temperature ranges.

5. **Supply voltage** and **status** – display the DC operating voltage to the SFP: this is derived from the main PSU DC on each card. The **status** field gives an status report of the voltage relative to the SFP's permitted operating range: the possible options are **Too low**, **Low**, **OK**, **High** or **Too high**.

6. **Bias current data** – display the bias current of each optical transmitter and a status report of the current relative to the approved range: the possible options are **Too low**, **Low**, **OK**, **High** or **Too high**. Note that receivers always report **"0 mA"**.

7. **Optic power ch1** and **ch2**, and **status** – the **power** fields display the optical power measured at each optical element, in both microwatts (µW) and dBm (where 0 dBm = 1 mW). The **status** fields give an status report of he figure relative to the SFP's rated power output: the possible options are **Too low**, **Low**, **OK**, **High** or **Too high**.

8. Press the **SFP** buttons to display the data for another SFP. The number of buttons displayed may not always the match the number of SFPs fitted to the selected card:

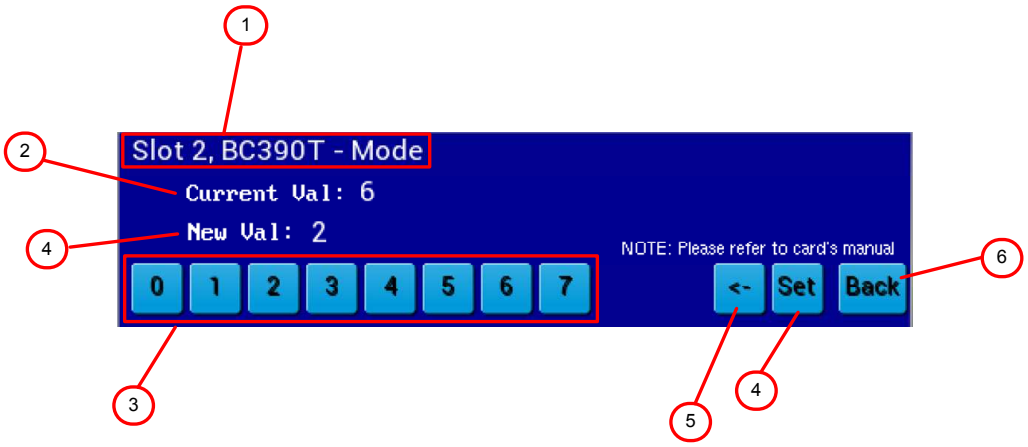
No. of SFPs on card	SFP buttons displayed
0	SFP 1
1	SFP 1
2	SFP 1, SFP 2
4	SFP 1, SFP 2, SFP 3, SFP 4

The buttons are colour coded: green confirms that an SFP is detected, red implies that the carrier is empty.

9. Not all data on the SFP page is visible at any one time - press the **Up** and **Down** buttons to display the remainder of the page.

10. **Home** – press this button to return to the Home page.

Card-specific parameters (CSP) page



A card-specific parameters page will be available if the currently-selected card has settings which may be changed from the frame touchscreen. The example above is for the BC390T card, which has eight user-selectable encoding modes, enabling SDI signals to be converted between different formats.

Card-specific parameters pages will be displayed by pressing the **Change** button in the relevant field on the card's Card Info page. In the example above, this page would be displayed if the **Change** button in the Mode field on the BC390T's Card Info page (see page 12) is pressed. (Note that the **Change** button on the Card Info page will only be available if the card has changeable parameters).

1. Parameter details – text confirming the card type, Slot number and the card setting or parameter the page is concerned with.
2. **Current Val:** the current value of the parameter or setting.
3. Parameter value – select the required parameter or setting with one of these buttons.

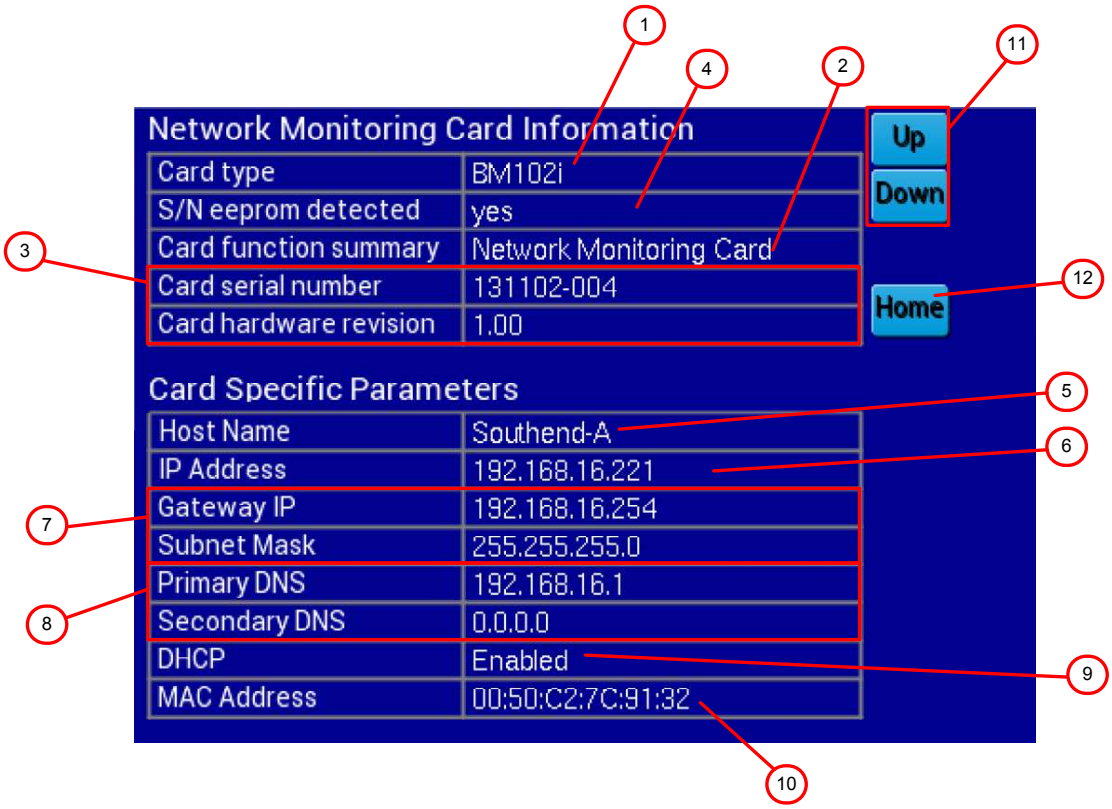
> **IMPORTANT**: Users are advised to refer to the Operation Guide for the card before changing any card-specific parameters from this page.

4. Press the **Set** button to establish the new parameter or setting. This will be confirmed in the **New val:** field.
5. Press the **<-** button to delete the last digit entered.
6. Press the **Back** button to return to the Card Info page.

Network Card page

This page will be available if the BC160i frame has a BM102i or BM103 Network card fitted in the dedicated front panel slot. It may be displayed by pressing the **BM102i** or **BM103** button on the Home page. (Note: if a Network card is not fitted in the frame, pressing the **Network** button the Home page will produce a reduced version of the page shown below, with the card data fields blank.)

Network cards allow external monitoring of the BC Series cards fitted in the BC160i frame from a remote location, via a standard network connection. An external computer, tablet or other suitable network device can use any compatible web browser application to display a series of web pages similar in appearance to those on the BC160i front panel. SNMP reporting is also supported. The BM103 Network card has an additional Ethernet port in the form of an SFP carrier.



The Network Card page provides card details together with a summary of the network settings applied to the card when it was set up for network use.

Use the Up and Down buttons to see any data not currently displayed on the screen.

Network Monitoring Card Information

1. **Card type** – confirms card type.
2. **Card function summary** – card description.
3. **Card serial number** and **Card hardware revision** – confirms serial number and PCB issue: you may need this information if you need to contact Bluebell with any technical issues that may arise with the card.
4. **S/N eeprom detected** - confirms the detection of the PSU's Serial Number EEPROM. (Included for assistance in fault-finding).

Card Specific Parameters

The settings displayed in this area of the page are the standard suite of settings used for identification of all Ethernet-enabled devices. The settings should be made using the Network Card's internal web page when the Network card is first connected to the LAN (or other network): see the Network Card Operation Guide for full details.

5. **Host Name** – assigned to the card at configuration.
6. **IP Address** – this is the Network card's IP address.
7. **Gateway IP** and **Subnet Mask** – standard Ethernet settings, assigned at configuration.
8. **Primary and Secondary DNS** – Dynamic Name System addresses.
9. **DHCP** – will be Enabled or Disabled.
10. **MAC Address** – the Network card's "physical" unique identifier.
11. Not all data on the Network Info page is visible at any one time - press the **Up** and **Down** buttons to display the remainder of the page.
12. **Home** – press this button to return to the Home page.

Firmware updates

The USB port on the front panel allows the firmware of the BC160i's motherboard processor to be updated if necessary.

To perform an update, download the latest firmware from www.bluebell.tv/firmware onto a removable USB memory device, and then plug it into the USB port on the front panel of the of the BC160i frame. An update is then initiated by either i) pressing the reset button, or ii) power-cycling the frame.

When updating by pressing the reset button, the screen will freeze while the update is in process. The frame PSUs are still active, and all cards fitted will remain operational while this happens. The Bluebell logo will be displayed at the end of the update process, which should take no longer than 10 seconds.

When updating by power cycling, frame functions and cards will not be available during the update process and the screen will be blank, but all cards fitted will remain operational. When the update is complete, the frame will restart as normal.

Specifications

BC160i General Specifications	
Number of card slots	6 + 1 for network card option
Power supplies	2 x 40 W internal power modules, fully redundant
Power input	90 to 260 VAC, 50/60 Hz
Operating temperature range	-30 °C to +70 °C
Dimensions (w x h x d)	445 mm x 44.5 mm (1RU) x 150 mm
Weight	4.5 kg (fully-loaded)
Warranty	5 years
Conformities	
EMI/RFI	89/336/EEC
Electrical	EN61000-6-1, EN61000-6-2
Laser Safety	Class 1 laser products, 24 CFR 1040.10 and 1040.11
RoHS	Directive 2002/95/EC

Main parts and options

Part No.	Description
BC160i	19” 3RU frame for up to 6 BCxxx cards, with Dual Redundant Power Supplies, integrated microprocessor-based card/frame monitoring and 3.8” touchscreen. Monitoring card is optional and accessible via dedicated front panel slot.
Optical Flight Case	Ruggedised aluminium flight case housing a BC160i 1RU frame. Any combination of cards, including WDM & CWDM, can be fitted for complete flexibility. Dual mains inputs with forced air cooling and a rugged rear panel is fitted with BNC, XLR and optical connectors as necessary. Contact the UK Sales Office for a written quotation.
BM102i	Network Monitoring card with Ethernet connection. Optional: 1 per frame.
BM103	Network Monitoring card with two Ethernet ports (RJ45 and SFP).. Optional: 1 per frame.

Related products

Part No.	Description
BC101	Single Slot Enclosure for a single BCxxx card. Needs external DC Power Supply.
BC102	Double Slot Enclosure for two BCxxx cards. Needs external DC Power Supply.
PS12	10 W Plugtop PSU for the BC101/102 Enclosures. Fitted with 4 pin XLR. IEC Mains Leads not supplied.
BC120	Triple Slot Enclosure for three BCxxx cards: integral Universal Mains Power Supply.
BC100i	19” 3RU frame for up to 15 BCxxx Cards, with Dual Redundant Power Supplies, integrated microprocessor-based card/frame monitoring and 7” touchscreen. Monitoring card is optional and accessible via dedicated rear slot.
BC160P	19” 1RU Frame for up to 6 Passive BCxxx Cards.