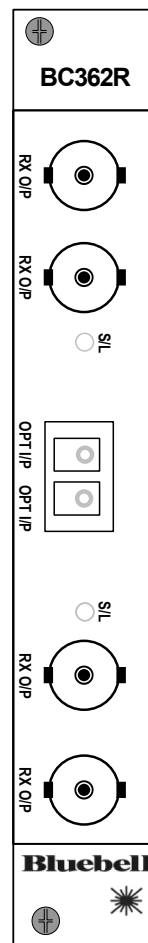
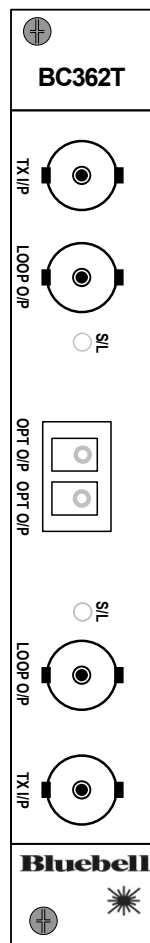


## BC362 Series Fibre video interfaces



# Operation Guide

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## Declaration of Conformities

The components of the Bluebell Opticom BC362 Fibre-optic Transmission System complies with the essential requirements of the following EU directives, where appropriate:

89/336/EEC, EN61000-6-1, EN61000-6-2, EC61000-6-3, EC61000-6-4, EN55022B, EN61000-4-11, EN61000-4-4 (Level 2), EN61000-4-4FTB, EN61000-4-2, EN61000-4-5  
Class 1 Laser Safety Compliant.

## RoSH and WEEE declaration

Bluebell Opticom Ltd. complies with EU RoSH Directive 2002/95/EC, which restricts the use of substances hazardous to humans and their environment in the manufacture of electrical and electronic equipment.



The “crossed out wheellie bin” symbol on the enclosures and represented above is there to remind users of the obligation of selective collection of waste. This label is applied to various products to indicate that the product is not to be thrown away as unsorted municipal waste. At the end of life, dispose of this product by returning it to the point of sale or to your local municipal collection point for recycling of electric and electronic devices. Customer participation is important to minimize the potential effects on the environment and human health that can result from hazardous substances that may be contained in this product. Please dispose of this product and its packaging in accordance with local and national disposal regulations, including those governing the recovery and recycling of waste electrical and electronic equipment. Contact your local waste administration, waste collection company or dealer.

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## 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 BC362 to use.

### Introduction

The BC362T and BC362R plug-in cards belong to the range of Bluebell Opticom BC Series modular fibre interfaces, designed primarily for Outside Broadcast (OB) and studio applications. The cards have two identical channels, and allow the unidirectional transport of two independent SDI video signals (3G-SDI, HD-SDI, SD-SDI or ASI) between locations remote from each other over a fibre-optic link.

The cards are used in pairs; the BC362T has two video inputs and modulates each signal onto an optical carrier for transmission. The equalised and reclocked inputs are also available as loop-through outputs on the faceplate. The BC362R receives the optical signals and demodulates the video signals; each channel has two fully buffered SDI outputs.

### Physical formats

BC362 cards fit the Bluebell BC100 or BC160 19" modular rack enclosures. The racks can house six (BC160) or fifteen (BC100) interface cards, and are fitted with dual internal AC power supplies.

Alternatively, cards may be fitted into smaller aluminium chassis: the BC101 and BC102 hold one and two cards respectively and require an external DC power source, while the BC120 holds three cards and has an integral mains PSU.

All plug-in cards are fitted with cartridge-style SFP fibre modules. Singlemode operation will normally be at 1310 nm or 1550 nm; alternative CWDM grid wavelengths are also possible. The optical option is generally specified at the time of order.

## Power requirements

Power supply requirements are dictated by the enclosure type used.

### **BC100 modular rack units:**

These may be fitted with either one or two AC mains PSU modules (number specified at time of order). Each module has sufficient capacity to power a fully-loaded rack. The AC connection is via standard IEC cables, DC power distribution inside the rack is via the motherboard. See the Operation Guide supplied with the rack units for more details.

### **BC160 modular rack units:**

These are fitted as standard with dual internal AC mains power supplies, each of sufficient capacity to power a fully-loaded rack. The AC connection is via standard IEC cables, DC power distribution inside the rack is via the motherboard. See the Operation Guide supplied with the rack units for more details.

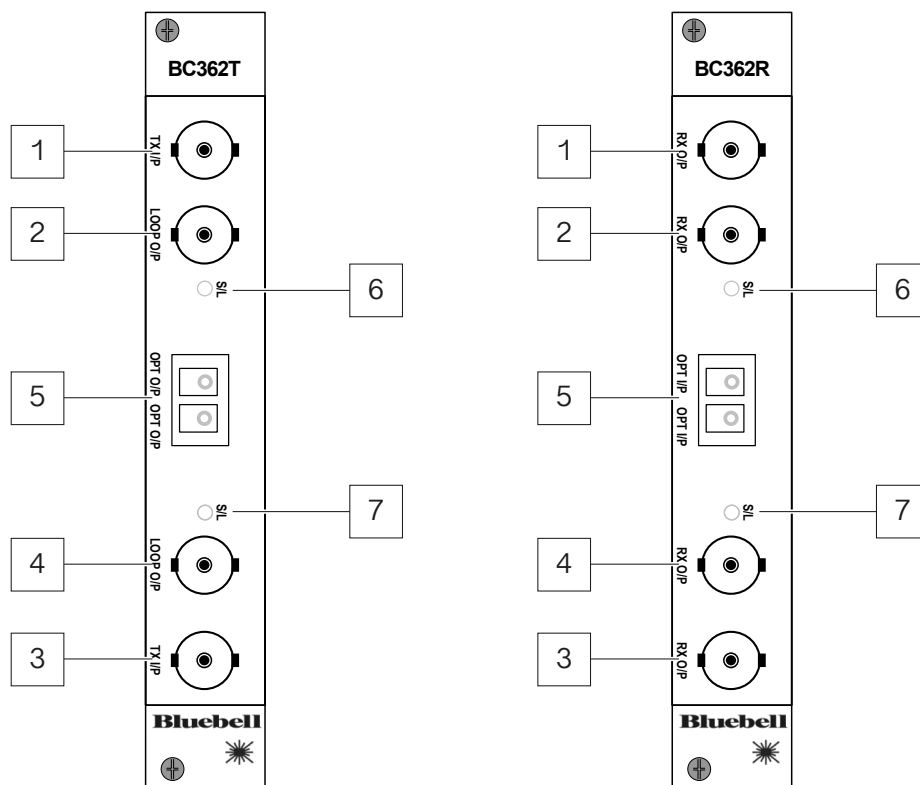
### **BC101 and BC102 single- and dual-slot chassis:**

These are supplied with an external Universal AC adaptor which connects to the chassis via a flying lead terminated in a 4-pin locking XLR connector. Mains is supplied via an IEC connector.

### **BC120 triple-slot chassis:**

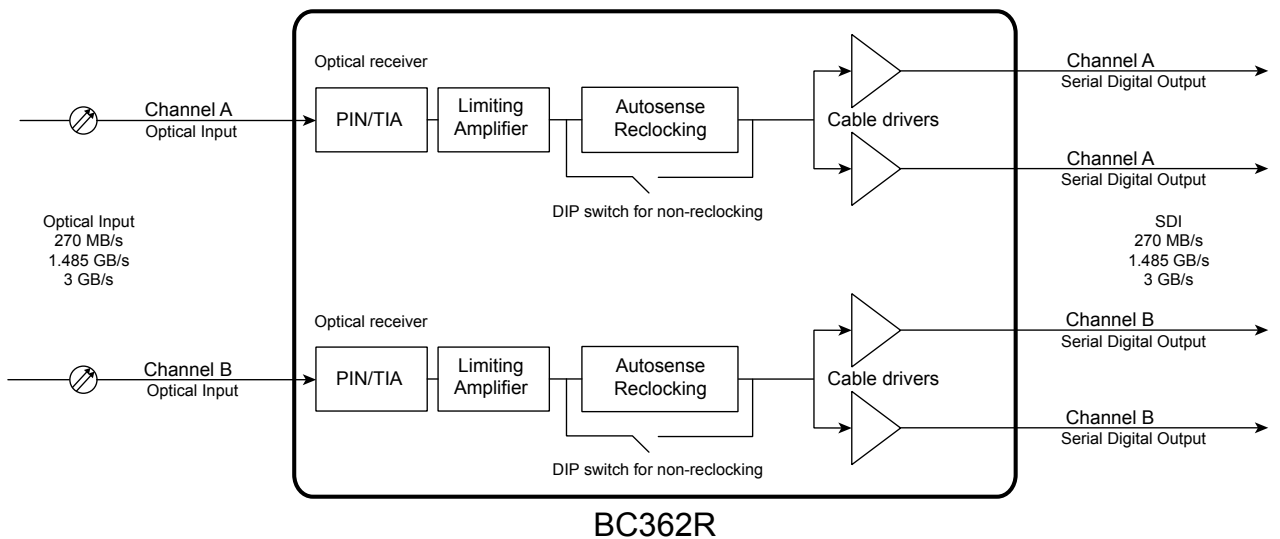
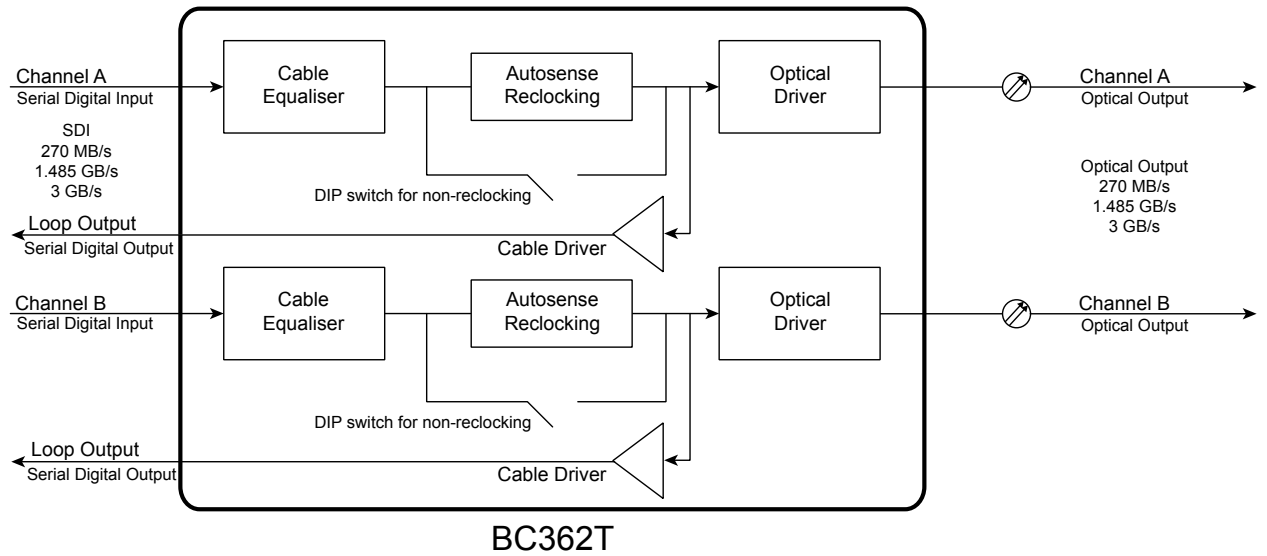
This housing for three plug-in cards is fitted with an internal AC mains supply; mains connection is via a rear IEC connector.

## BC362 Series connections



1. **TX I/P (BC362T)/RX O/P (BC362R)** – Channel A: standard 75 ohm BNC connectors for SDI video, compliant with SMPTE 259/292/297/424 at data rates of between 143 Mb/s and 2.97 Gb/s. Also ASI-compatible.
2. **LOOP O/P (BC362T)/RX O/P (BC362R)** – Channel A: standard 75 ohm BNC connector for SDI video reclocked loophrough (BC362T) or parallel buffered output (BC362R).
3. **TX I/P (BC362T)/RX O/P (BC362R)** – Channel B. Details as [1].
4. **LOOP O/P (BC362T)/RX O/P (BC362R)** – Channel B. Details as [2].
5. **OPTICAL I/O** – SFP dual fibre connector. The connector is mounted on a removable cartridge. The BC362T uses singlemode fibre as standard, at a wavelength of 1310 nm; alternative CWDM wavelengths or multimode operation are available if specified at the time of order. The BC362R optical receiver element is wideband; both singlemode and multimode versions are available. As the cards have two independent channels, both ports on each SFP are active.
6. **S/L** ('signal loss') – red error LED; on the BC362T this illuminates to indicate either data lock error or low signal strength (selectable by internal jumper) for Channel A. On the BC362R, it illuminates to indicate loss of data lock only.
7. **S/L** – red error LED for Channel B. Details as [6].

# System block diagram



A BC362 system uses two fibres, each carrying a single-wavelength optical signal to provide a robust long-distance interconnection between two widely-separated locations. The interfaces have two independent channels, and each fibre carries one SDI video signal.

## SDI format compatibility

BC362 interfaces are intended for use with serial digital video signals with data rates up to 3 Gb/s. Standards supported are SD-SDI (SMPTE 259M-compliant), HD-SDI (SMPTE 292M-compliant) and 3G-SDI (SMPTE 424M-compliant); ASI baseband streams are also compatible.

## Configuration and setup options

Both BC362T and BC362R cards have movable, internal PCB jumpers (“links”), whose position modify the interface’s operation. There are no other user adjustments. The table below and the PCB layout diagram show the various options and the jumper locations.

The jumpers’ functions are as follows:

### Reclocking:

The factory default is for the data at all the inputs (SDI or optical) to be internally reclocked. This will generally be desirable for the majority of operational situations. The reclocking circuitry may be bypassed on a per-channel basis by moving jumpers as shown in the table below; this may be desirable when low data rates or asynchronous operation are in use.

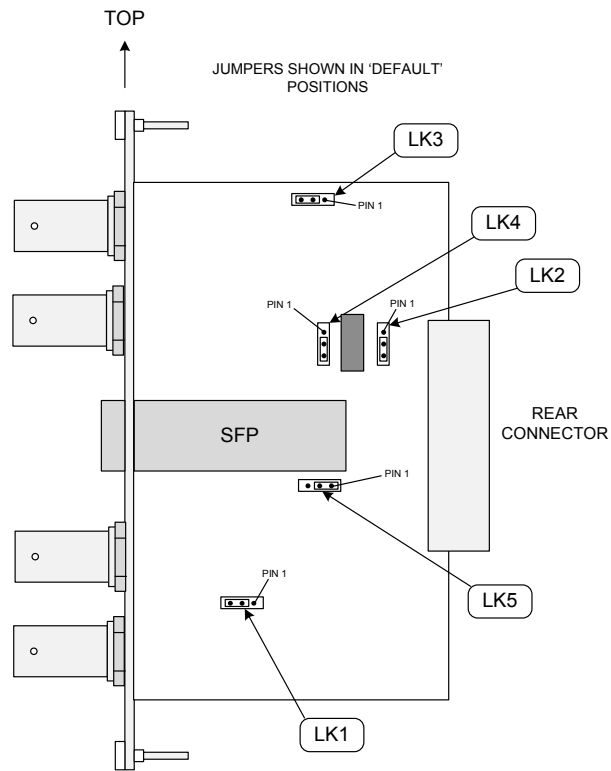
### SDI LED detection source:

Each of the BC362T’s two transmission channels has an additional jumper that sets the source signal for triggering the S/L LED. The default setting is for the LED to confirm that the card has locked to a valid SDI stream, but this may be altered to monitor the amplitude of the incoming signal, in which case the LED illuminates when the signal level is too low for data recovery to be made.

Jumper	Setting	BC362T	BC362R
LK1	Pins 1, 2 linked	Reclocking disabled (Ch. B)	Reclocking disabled (Ch. B)
	Pins 2, 3 linked	<b>Reclocking enabled (Ch. B)</b>	<b>Reclocking enabled (Ch. B)</b>
LK2	Pins 1, 2 linked	S/L LED indicates low signal level (Ch. B)	Reclocking disabled (Ch. A)
	Pins 2, 3 linked	<b>S/L LED indicates data lock error (Ch. B)</b>	<b>Reclocking enabled (Ch. A)</b>
LK3	Pins 1, 2 linked	Reclocking disabled (Ch. A)	(or no link) – eeprom protected
	Pins 2, 3 linked	<b>Reclocking enabled (Ch. A)</b>	For factory use only
LK4	Pins 1, 2 linked	S/L LED indicates low signal level (Ch. A)	
	Pins 2, 3 linked	<b>S/L LED indicates data lock error (Ch. A)</b>	
LK5	Pins 1, 2 linked	<b>(or no link) - eeprom protected</b>	
	Pins 2, 3 linked	For factory use only	

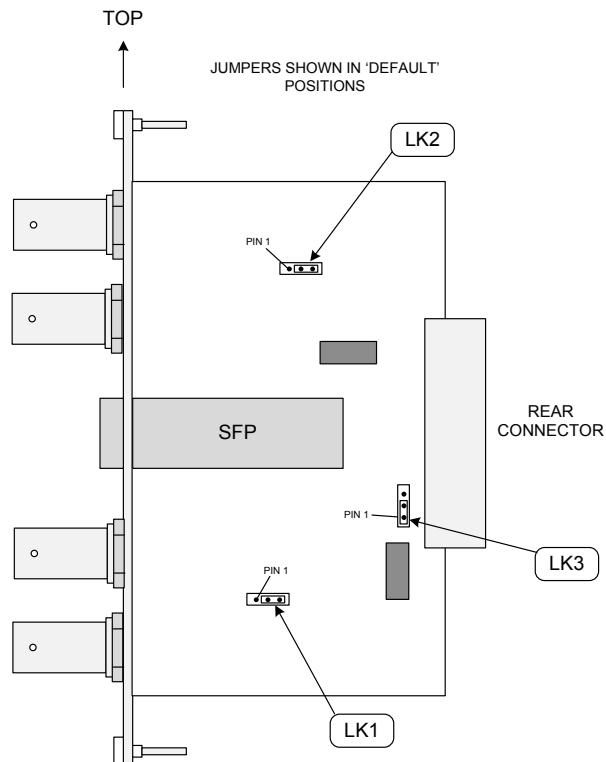
Factory default settings are shown in **Bold**. Note that the BC362R has no LK4 or LK5.





BC362T

SIMPLIFIED VIEW - ONLY PRIMARY COMPONENTS SHOWN



BC362R

SIMPLIFIED VIEW - ONLY PRIMARY COMPONENTS SHOWN

The diagrams above show the locations of the PCB jumpers. Note that on the PCB itself, Pin 1 of each jumper is indicated by a bevelled corner on the silkscreen outline around the header, and a square solder pad on the rear of the card.

## Appendix

### Specifications - BC362 Series

	BC362T	BC362R
<b>Video Inputs &amp; Outputs</b>		
Connector	2 x 75 ohm BNC per IEC 60169-8 Amendment 2	
Standards supported	SMPTE 424M, SMPTE 292M, SMPTE 259M, SMPTE 297M, DVB-ASI	
Equalisation	Automatic to 100 m @ 3 Gb/s Automatic to 200 m @ 1.485 Gb/s Automatic to 300 m @ 270 Mb/s	
Return loss	> 15 dB @ 1.485 Gb/s	
Polarity	Non-inverting	
DC Offset	0 ±0.5 V	
Jitter	<0.15 UI line equalised	
Signal level	800 mV ±10%	
<b>Optical Output &amp; Input</b>		
Physical	SFP Module	
Connector	Dual LC	
Wavelength	1310 nm singlemode or 850 nm multimode. User-specified CWDM wavelengths (see following table) are also available	Wideband receiver – 1260 nm to 1610 nm
Optical Power	-2 dBm @ 1310/1510 nm (typical)	
Sensitivity		SFP-dependent
Max. input power		SFP-dependent
<b>Conformities</b>		
EMI/RFI	Complies with 89/336/EEC	
Electrical	Complies with EN 61000-6-1, EN61000-6-2	
Laser Safety	Class 1 laser safety compliant	
RoHS	Complies with Directive 2002/95/EC	
<b>Physical</b>		
Depth	87 mm (inc. connectors)	
Width	20 mm (4HP)	
Height	129 mm (3RU)	
Weight	100 g	
Operating Temp	-30°C to +70°C	
Power	2.4 W	1.8 W

## Optical wavelengths

BC362 Series plug-in cards are fitted with a removable SFP cartridge: dual transmitters on the BC362T and dual receivers on the BC362R. Transmitters have a standard wavelength of 1310 nm, however the wavelength may be specified at the time of ordering to be any of the standard CWDM wavelengths. Cartridges are field-interchangeable. All receivers are generally wideband.

### BC362T:

SFP Part Ref.	Dual Transmitter
<b>Standard wavelengths:</b>	
VT/S/SFP/13/13	Singlemode dual channel video SFP transmitter 1310 nm
VT/S/SFP/13/15	Singlemode dual channel video SFP transmitter, 1 x 1310 nm, 1 x 1550 nm
VT/S/SFP/13/15/WDM	Singlemode dual channel video single fibre SFP transmitter, 1 x 1310 nm, 1 x 1550 nm. Fitted with internal WDM multiplexer
<b>CWDM wavelengths:</b>	
VT/S/SFP/CWDM/27/29	Singlemode dual channel video CWDM SFP transmitter 1270/1290 nm
VT/S/SFP/CWDM/31/33	Singlemode dual channel video CWDM SFP transmitter 1310/1330 nm
VT/S/SFP/CWDM/35/37	Singlemode dual channel video CWDM SFP transmitter 1350/1370 nm
VT/S/SFP/CWDM/39/41	Singlemode dual channel video CWDM SFP transmitter 1390/1410 nm
VT/S/SFP/CWDM/47/49	Singlemode dual channel video CWDM SFP transmitter 1470/1490 nm
VT/S/SFP/CWDM/51/53	Singlemode dual channel video CWDM SFP transmitter 1510/1530 nm
VT/S/SFP/CWDM/55/57	Singlemode dual channel video CWDM SFP transmitter 1550/1570 nm
VT/S/SFP/CWDM/59/61	Singlemode dual channel video CWDM SFP transmitter 1590/1610 nm

### BC362R:

SFP Part Ref.	Dual Receiver
<b>Wideband receivers:</b>	
VR/S/SFP	Singlemode dual channel video SFP wideband receiver
VR/S/APD/SFP	Singlemode dual channel video SFP wideband APD receiver
VR/S/SFP/WDM	Singlemode dual channel video single fibre SFP receiver, 1 x 1310 nm, 1 x 1550 nm. Fitted with internal WDM demultiplexer