

# USER MANUAL

 **Indigo**  
SYSTEM



## Q-Down Mini

Minibox broadcast down converter  
and distribution amplifier

**Crystal**  **Vision**

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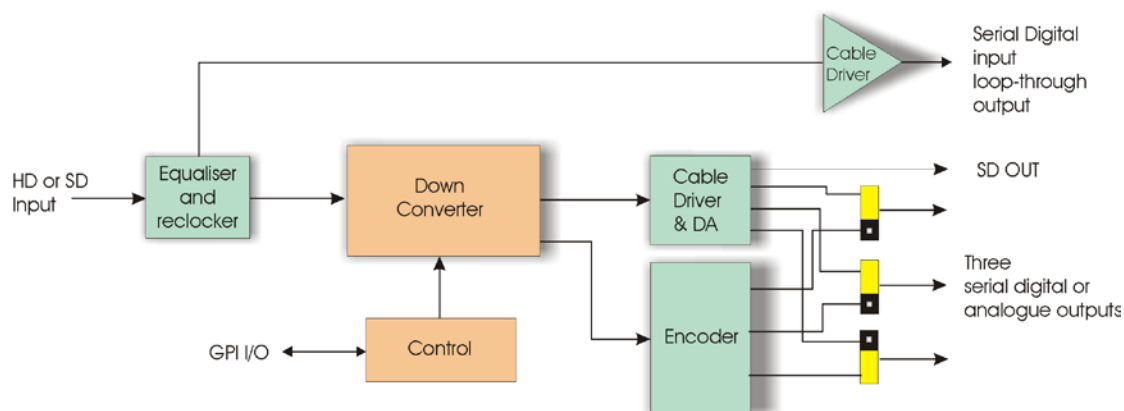
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# 1 Introduction

The Q-Down Mini is a broadcast down converter and distribution amplifier with a short processing delay of 16 lines. A reclocked input loop-through is available along with a standard definition SDI and three Standard Definition link selectable SDI/analogue outputs. The analogue outputs can be selected to give CVBS, Y/C, YUV or RGB. The output line rate at all times will be the same as the input line rate.

There are three video delay settings available, minimum (processing delay), fixed (52 SD lines) and frame.

Q-Down Mini's processing delay is determined by several factors such as input format, aspect ratio selection and reclocker status. With a High Definition input the minimum processing delay will be 16 SD lines with a full screen output. Selecting Letterbox will increase this delay to 52 SD lines. For a Standard Definition input the delay will be as little as 1 $\mu$ s with the reclocker bypassed.



*Q-Down Mini down converter*

The main features are as follows:

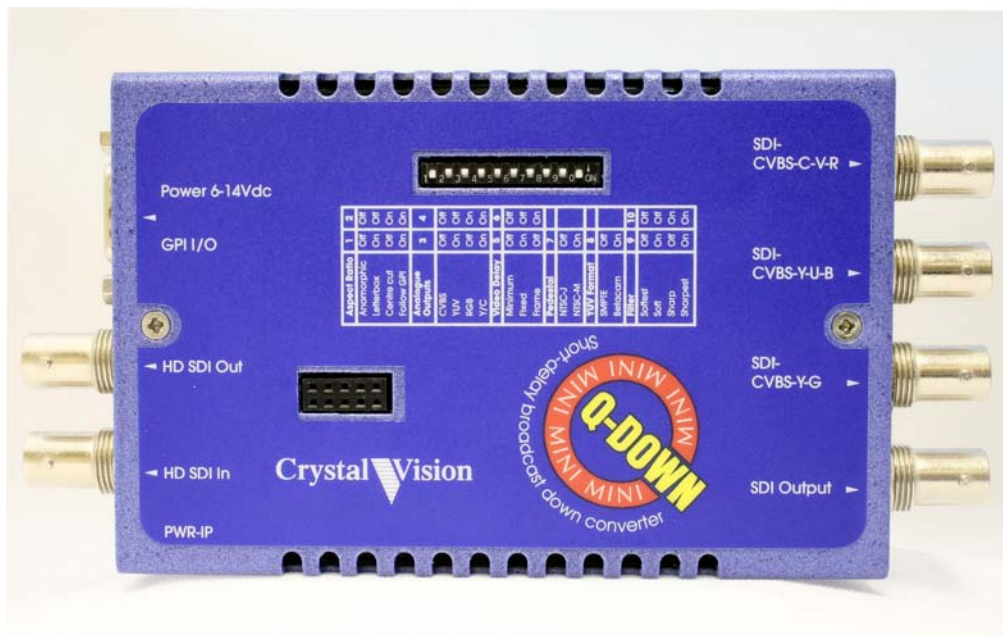
- Selectable output aspect ratio, (centre-cut, letterbox and anamorphic).
- High quality down conversion with a minimum of 16 lines of processing delay (dependent on conversion selected) Selectable fixed delay also available
- Aspect ratio and vertical filter selection with a High Definition input
- Link selectable output formats - Standard Definition analogue and digital
- Ideal for desktop and areas with limited access

Q-Down Mini is a 165mm x 80mm x 28mm module with an external universal AC mains adaptor. Q-Down Mini is ideal for use in any application where a stand-alone down converter is required.

## 2 Hardware installation

### 2.1 Connection details

The Q-Down Mini has six BNC connections for the video signals and a 9-way D Type plug for the power connections and access to the GPIs.



The three analogue outputs can be configured with internal moveable links and mini switches to give a variety of analogue and serial digital signals.

BNC	I/O assignment
<b>HD SDI IN</b>	High Definition/Standard Definition serial digital input
<b>HD SDI OUT</b>	High Definition/Standard Definition serial digital input reclocked loop-through
<b>SDI-CVBS-C-V-R</b>	Standard Definition SDI/CVBS, YC-C, V, R output
<b>SDI-CVBS-Y-U-B</b>	Standard Definition SDI/CVBS, YC-Y, U, B output
<b>SDI-CVBS-Y-G</b>	Standard Definition SDI/CVBS, Y, G output
<b>SDI Output</b>	Standard Definition SDI output

**Note:** When the Y/C output format is selected the third analogue output will give CVBS.

## 2.2 Module configuration

Each of the three analogue/SDI outputs is configurable by way of moveable links. To gain access to these moveable links it will first be necessary to remove the modules base. The modules base can be removed by taking out the six countersunk securing screws, two of which are found on each side and a further two on the centre line at each end.

**Note:** Do not remove the top cover as this will disturb the heatsink arrangement and could impair Q-Down Mini's extended temperature reliability.

There are a total of eight moveable links on the Q-Down Mini, of which five have no user configuration. PL1-PL6 is for output configuration. All other links should be left in their factory set state.

The four potentiometers have been factory set and should not require further adjustments.



*Q-Down Mini with lower case removed*

### Link configurations

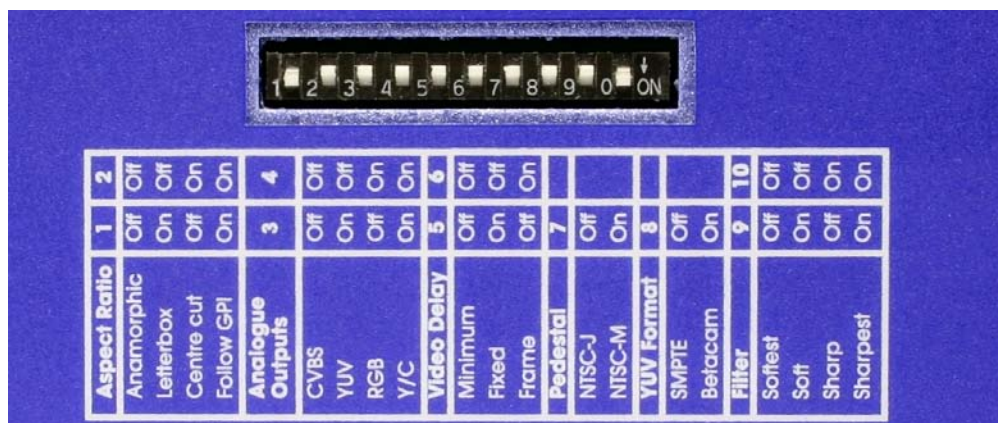
The output configuration links are designed to be moved as a pair. When moving these links ensure their orientation remains correct, as rotating by 90 degrees is likely to result in the output not being as desired.

Link	Towards board edge 1-2	Away from board edge 2-3
PL1/PL4	Standard Definition serial digital output	CVBS / Y / G output
PL2/PL5	Standard Definition serial digital output	CVBS / U / B / YC-Y output
PL3/PL6	Standard Definition serial digital output	CVBS / V / R / YC-C output



## Module setup

Apart from the internal SDI/analogue links, all configuration is made by switch selection.



## Switches

Aspect Ratio	1	2	Analogue Output	3	4	Video Delay	5	6
Anamorphic	Off	Off	CVBS	Off	Off	Minimum	Off	Off
Letterbox	On	Off	YUV	On	Off	Fixed	On	Off
Centre Cut	Off	On	RGB	Off	On	Frame	Off	On
Follow GPI	On	On	Y/C	On	On			
Pedestal	7	YUV Format	8	Filter	9	10		
NTSC-J	Off	SMPTE	Off	Softest	Off	Off		
NTSC-M	On	Betacam	On	Soft	On	Off		
				Sharp	Off	On		
				Sharpest	On	On		

## Output aspect ratio

With a High Definition input a choice of output aspect ratio can be made. The three choices are: 16:9 letterbox, centre cut and full screen anamorphic. This choice of aspect ratio is set by a combination of switches 1 and 2. It is further possible to control the aspect ratio remotely by using the GPI connections with switch 1 and 2 set to follow GPI.

## Analogue output format

The analogue output format is selected by a combination of switches 3 and 4. It should be noted that when Y/C is selected for output the third BNC will give a CVBS output.

**Note:** The final output configuration will depend on the settings of links PL1-6.

## Video delay

Video delay can be set using a combination of switches 5 and 6

With an HD video input the minimum processing delay will be 16 or 52 SD lines depending on the selected conversion. The fixed delay will always be 52 SD lines and frame will be one full SD video frame.

With an SD video input the minimum processing delay will become as little as 1 $\mu$ s. Fixed and frame will remain 52 SD line and one frame respectively.

## Pedestal

Switch 7 is to add or remove a +7.5IE pedestal for NTSC-M or NTSC-J. This switch will be ignored if the analogue video output is in the PAL format.

## YUV format

When the output format is set to component YUV switch 8 can be used to select Betacam levels.

## Vertical Filter

Q-Down Mini uses sophisticated two dimensional filtering to achieve a reliable artefact-free conversion. Four selectable levels of filtering from sharpest through sharp and soft to softest allow Q-Down Mini's performance to be optimised for the material being down converted.

Filter selection is made using a combination of switches 9 and 10(0).

## Status LEDs

Q-Down Mini has two LEDs - one for power present and the other for input present.

LED	Illuminated	Not Illuminated
LED1 (upper)	Input present	No valid input present
LED2 (lower)	All supplies are within tolerance	No power present or internal rail out of tolerance

## 2.3 General Purpose Interface (GPI)

The six GPI connections 'a-f' for GPI control and monitoring are available on the 9-way D-Type connector.

D-Type pin number	GPI	Low (<1V)	High (+5V)
1	a	Letterbox	
2	b	Centre cut	Anamorphic
3	c	No function at present	
4	d	No function at present	
5	e	No function at present	
6	f	Input missing or not valid	Input present

As supplied, each GPI output has a 270Ω resistor in series with its output. This allows for an external LED to be driven, connected to a DC voltage of +5V. Each GPI input is fitted with a 10kΩ pull-up resistor connected to the internal +5V.



*9-way D Type connector as seen from the end view*

### DC power connection

DC power is supplied to pins 8 (+ve) and pin 9 (0V) of the D Type connector. Q-Down Mini has an internal diode to prevent damage from inadvertent reversals of the supply connections, and is also fused. The supply voltage range is from 6V to 14V at 6.5 watts.

**Note:** The internal PCB fuse will require being de-soldered to replace.

## 2.4 Mounting

There are two convenient M3 threaded inserts in the base of the Q-Down Mini for the purpose of mounting the unit to a suitable back-plate. Orientation of the module is not critical but it is important that the venting holes are not obscured and the free flow of air is not restricted.



## 3 Trouble shooting

### Monitoring

The two LEDs provide useful power rail monitoring and input status.

The following table summarises the card edge LED functions and colours:

LED	Illuminated	Not Illuminated
LED1 (upper)	Input present	No valid input present
LED2 (lower)	All supplies are within tolerance	No power present or internal rail out of tolerance

### Basic fault finding guide

#### The Power OK LED is not illuminated

Check the PSU is functioning

#### There is no video output

Check that a valid SDI is present and that any cabling is intact

Check that input video is of a supported format

#### The video output is SDI when an analogue video output is expected

Check that the internal jumper link settings are correct for the expected output format as explained in the Installation chapter

#### The video output exhibits jitter

Check that the input SDI stability is within normal limits

# 4 Specification

## General

Dimensions	165mm x 80mm x 28mm.
Weight	480g
Supply	6-14 volts DC
Power consumption	6.5 W

## Inputs

Video	HD or SD SDI 270Mb/s or 1.485Gb/s serial digital compliant to SMPTE 259M and SMPTE 292M HD. Up to 140m with Belden 1694 or equivalent (Belden 8281 or equivalent up to 100m) SD (270Mb/s) >250 metres
Input formats	625i 50, 525i 59.94, 720p 50, 720p 59.94, 1080i 50, 1080i 59.94

## Outputs

Analogue	Three selectable for CVBS, YUV, RGB and Y/C
Serial digital	One reclocked input loop-through Up to four reclocked SDI outputs 270Mb/s or SMPTE 259M
Jitter:	Typically SDI < 0.2UI @ 1kHz
Processing delay:	Selectable
Component:	YUV and GBR 1 Volt $\pm$ 2% into 75ohm. Sync on G, B & R (Betacam levels selectable)
Composite:	1V $\pm$ 2% with sync into 75ohm
Auxillary data:	Blanked.

## Component performance

Processing:	Video input is 10 bit processed for 12 bit output DACs
Frequency response:	Luminance: +/- 0.3dB to 5.5 MHz. Chrominance: +/- 0.4dB to 2.5 MHz
Noise:	<-67dB weighted luminance or chrominance
Gain error:	< 1%

## Composite performance

Processing:	Video input is 10 bit processed for 12 bit output DACs
Frequency response:	Luminance: +/- 0.3dB to 5 MHz Chrominance: +/- 0.4dB to 2.5 MHz

Noise: < -67dB weighted luminance or chrominance

Differential gain: < 2% typ

Differential phase:  $\pm 1^\circ$  typ

### **Status monitoring**

LEDs PSU rails present  
SDI input HD/SD

### **GPI inputs**

Number and type: 4 x GPI inputs two of which select aspect ratio

### **GPI outputs**

Number and type: 2 x GPI outputs, one of which indicates loss of input

### **Input fail output**

Type: Blue