

digital keying modular
interface audio
converters analogue video

HDDA104R and HDDA108R

HD/SDI Distribution Amplifiers

USER MANUAL



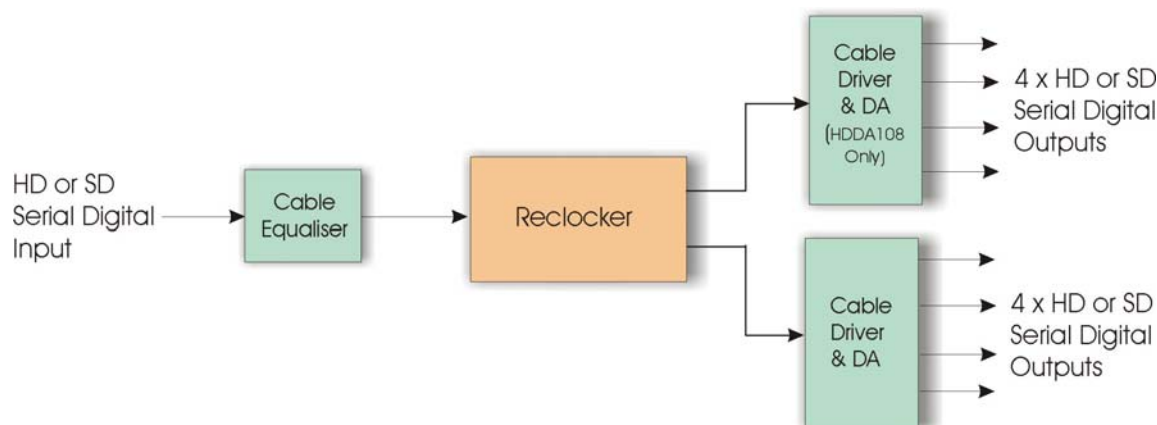
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1 Introduction

The HDDA104R/108R is a family of multi-standard High Definition/Standard Definition serial digital distribution amplifiers. Depending on configuration, they can provide one input to four outputs or by the addition of a sub PCB one input to eight outputs both options with reclocking. Auto input cable equalisation and output drivers ensure an SD cable length in excess of 250 meters with Belden 8281 or equivalent and up to 140 meters for HD with Belden 1694 or equivalent is obtainable.

The universal connection system allows a mixture of Crystal Vision modules in the frame. The modules plug in the front and the rear connectors plug in the rear. Depending on frame design, a hinged or removable front panel reveals LED and switch positions as an indication of input present, HD/SD and PSU status when opened.



HDDA104R/108R multi-standard distribution amplifiers

The HDDA family consists of two models. The basic model is the HDDA104R one input to four outputs reclocking DA. The addition of a four output sub PCB increases the total number of outputs to eight creating the HDDA108R. For simplicity the boards have six status monitoring LEDs and no other controls. For more detailed status monitoring the HDDA104R/108R can communicate with both an active control panel and the Statesman PC control system.

The HDDA104R uses the RM34 single-slot rear connector with six BNC connectors, the HDDA108R uses the addition of a second RM34 in the slot above to increase the number of outputs to eight.

The HDDA104R/108R family of boards are very compact with 24 HDDA104R modules or 12 HDDA108R modules fitting into a 4U frame.

The rear connector details may be found in the Installation chapter.

The main features are as follows:

- Up to one input and eight outputs HD/SD reclocking.
- Automatic Input cable length equalisation.
- Additional status monitoring via Statesman and active control panel.

2 Hardware installation

The HDDA104R/108R digital video distribution amplifiers fit into all Crystal Vision rack frames. All modules can be plugged in and removed while the frame is powered without damage.

2.1 Universal rear connectors


The HDDA104R uses a single-height rear connector, this will allow the 4U Indigo frame to house up to 24 modules and three power supplies. The 2U Indigo 2 frame will house 12 modules and dual power supplies. The 1U Indigo 1 will house six modules with a single power supply. The Indigo DT Desk Top Box has a built-in power supply and will house up to two modules.

The 4U, 2U and 1U frames all have a hinged front panel that gives access to the PSUs and all modules. The desk-top box also has a removable front to gain access to the modules. The universal frame wiring system allows any of the interface range of modules to be fitted in any position with the use of removable rear modules.

The HDDA108R uses a second single-slot rear connector to obtain the full number of outputs, this means that packing density will be reduced.

Rear module connections with RM34

HDDA104R

RM34 fits in all frames	Description
	RM34 <ul style="list-style-type: none"> • 24 modules in 4U • 12 modules in 2U • 6 in 1U • 2 in a DTB • All frame slots can be used

BNC	I/O assignment
A	HD/SD serial digital output
B	HD/SD serial digital output
C	HD/SD serial digital output
D	HD/SD serial digital output
E	No user connection
F	HD/SD serial digital input

Note: RM01 generic label shown

HDDA108R

RM34 fits in all frames	Description
	<p>RM34 x 2</p> <ul style="list-style-type: none"> • 12 modules in 4U • 6 in 2U • 3 in 1U • 1 in a DTB • 2 slots used for each card

BNC upper	BNC lower	I/O assignment
A		HD/SD serial digital output
B		HD/SD serial digital output
C		HD/SD serial digital output
D		HD/SD serial digital output
E		No user connection
F		No user connection
	A	HD/SD serial digital output
	B	HD/SD serial digital output
	C	HD/SD serial digital output
	D	HD/SD serial digital output
	E	No user connection
	F	HD/SD serial digital input

Note: RM01 generic label shown

General purpose interface

The external GPI control lines 'a' to 'f' at the frame remote connectors are provided to allow remote control and/or remote status indication. Line 'a' is assigned as a GPI output to provide remote indication of input presence.

The GPI output is fitted with 6k8Ω pull-up to +5V and 270Ωseries resistor so it can drive an LED directly. If the series resistor is shorted out, it can drive a bulb at +45V 500mA max.

Note: The +5V output is protected by self-resetting thermal fuses, which limit the total output current available from Remotes 1-4 to approximately 1A. Remotes 5-8 are similarly protected.

GPI Connections

	Not asserted (nominally 5Vdc)	Asserted (<0.5Vdc)
'a'	Not assigned	Not assigned
'b'	Not assigned	Not assigned
'c'	Not assigned	Not assigned
'd'	Not assigned	Not assigned
'e'	Input present	No input present
'f'	HD Input	SD Input

The following tables show the GPI pinout for each frame:

4U frame GPI connections

GPI lines 'a' to 'f' of each card connect to one of eight rear remote connectors as follows:

Slot no.	'a' pin	'b' pin	'c' pin	'd' pin	'e' pin	'f' pin
1	8 (1)	9 (1)	18 (1)	26 (1)	19 (2)	20 (2)
2	7 (1)	16 (1)	17 (1)	25 (1)	10 (2)	11 (2)
3	8 (3)	9 (3)	18 (3)	26 (3)	19 (4)	20 (4)
4	7 (3)	16 (3)	17 (3)	25 (3)	10 (4)	11 (4)
5	5 (1)	6 (1)	15 (1)	24 (1)	1 (2)	2 (2)
6	4 (1)	14 (1)	13 (1)	23 (1)	3 (2)	4 (2)
7	5 (3)	6 (3)	15 (3)	24 (3)	1 (4)	2 (4)
8	4 (3)	14 (3)	13 (3)	23 (3)	3 (4)	4 (4)
9	3 (1)	12 (1)	22 (1)	21 (1)	12 (2)	13 (2)
10	10 (1)	11 (1)	19 (1)	20 (1)	21 (2)	22 (2)
11	3 (3)	12 (3)	22 (3)	21 (3)	12 (4)	13 (4)
12	10 (3)	11 (3)	19 (3)	20 (3)	21 (4)	22 (4)
Slot no.	'a' pin	'b' pin	'c' pin	'd' pin	'e' pin	'f' pin
1	8 (5)	9 (5)	18 (5)	26 (5)	19 (6)	20 (6)
2	7 (5)	16 (5)	17 (5)	25 (5)	10 (6)	11 (6)
3	8 (7)	9 (7)	18 (7)	26 (7)	19 (8)	20 (8)
4	7 (7)	16 (7)	17 (7)	25 (7)	10 (8)	11 (8)
5	5 (5)	6 (5)	15 (5)	24 (5)	1 (6)	2 (6)
6	4 (5)	14 (5)	13 (5)	23 (5)	3 (6)	4 (6)
7	5 (7)	6 (7)	15 (7)	24 (7)	1 (8)	2 (8)
8	4 (7)	14 (7)	13 (7)	23 (7)	3 (8)	4 (8)
9	3 (5)	12 (5)	22 (5)	21 (5)	12 (6)	13 (6)
10	10 (5)	11 (5)	19 (5)	20 (5)	21 (6)	22 (6)
11	3 (7)	12 (7)	22 (7)	21 (7)	12 (8)	13 (8)
12	10 (7)	11 (7)	19 (7)	20 (7)	21 (8)	22 (8)

Table shows pin number (Remote number)

Note: Remote 1, Remote 3, Remote 5 and Remote 7 are 26 way high-density D-Type female sockets. Frame ground is pin 2 and +5V @500mA is pin 1 in each case.
Remote 2, Remote 4, Remote 6 and Remote 8 are 26 way high-density D-Type male plugs and frame ground is pin 6 in each case and +5V @500mA is pin 15 on Remote 2 and Remote 6.

2U frame GPI Connections

GPI lines 'a' to 'f' of each card connect to one of four rear remote connectors as follows:

Slot no.	'a' pin	'b' pin	'c' pin	'd' pin	'e' pin	'f' pin
1	8 (1)	9 (1)	18 (1)	26 (1)	19 (2)	20 (2)
2	7 (1)	16 (1)	17 (1)	25 (1)	10 (2)	11 (2)
3	8 (3)	9 (3)	18 (3)	26 (3)	19 (4)	20 (4)
4	7 (3)	16 (3)	17 (3)	25 (3)	10 (4)	11 (4)
5	5 (1)	6 (1)	15 (1)	24 (1)	1 (2)	2 (2)
6	4 (1)	14 (1)	13 (1)	23 (1)	3 (2)	4 (2)
7	5 (3)	6 (3)	15 (3)	24 (3)	1 (4)	2 (4)
8	4 (3)	14 (3)	13 (3)	23 (3)	3 (4)	4 (4)
9	3 (1)	12 (1)	22 (1)	21 (1)	12 (2)	13 (2)
10	10 (1)	11 (1)	19 (1)	20 (1)	21 (2)	22 (2)
11	3 (3)	12 (3)	22 (3)	21 (3)	12 (4)	13 (4)
12	10 (3)	11 (3)	19 (3)	20 (3)	21 (4)	22 (4)

Table shows Pin number (Remote number)

Note: Remote 1 and Remote 3 are 26 way high density 'D' type female sockets and frame ground is pin 2 and +5V @500mA is pin 1 in each case.
Remote 2 and Remote 4 are 26 way high density 'D' type male plugs and frame ground is pin 6 and +5V @500mA is pin 15 in each case.

1U frame GPI connections

GPI lines 'a' to 'f' of each card connect to one of two rear remote connectors as follows:

Slot no.	'a' pin	'b' pin	'c' pin	'd' pin	'e' pin	'f' pin
1	8 (1)	9 (1)	18 (1)	26 (1)	19 (2)	20 (2)
2	7 (1)	16 (1)	17 (1)	25 (1)	10 (2)	11 (2)
3	5 (1)	6 (1)	15 (1)	24 (1)	1 (2)	2 (2)
4	4 (1)	14 (1)	13 (1)	23 (1)	3 (2)	4 (2)
5	3 (1)	12 (1)	22 (1)	21 (1)	12 (2)	13 (2)
6	10 (1)	11 (1)	19 (1)	20 (1)	21 (2)	22 (2)

Table shows Pin number (Remote number)

Note: Remote 1: 26 way high density D-type socket. Frame ground is pin 2 and +5V @500mA is pin 1.
Remote 2: 26 way high density D-type plug. Frame ground is pin 6 and +5V @500mA is pin 15.

Indigo DT desk top box GPI connections

GPI lines 'a' to 'f' of each card connect to the rear remote connector as follows:

Slot no.	'a' pin	'b' pin	'c' pin	'd' pin	'e' pin	'f' pin
1	8 (1)	9 (1)	18 (1)	26 (1)	19 (2)	20 (2)
2	7 (1)	16 (1)	17 (1)	25 (1)	10 (2)	11 (2)

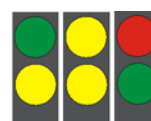
Table shows pin number (remote number)

- Note:** Remote 1: 26 way high-density D-Type female socket. Frame ground is pin 2 and +5V @500mA is pin 1.
Remote 2: 26 way high-density D-Type male plugs and frame ground is pin 6 and +5V @500mA is pin 15
Note. The +5V output is protected by self-resetting thermal fuses, which limit the total output current available from Remotes 1-2 to approximately 1A.

3 Card edge operation

HDDA104R/HDDA108R

The front card-edge of the HDDA104R/HDDA108R provides power rail monitoring and signal status.



HDDA104R

+5V HD Error
Config SD Input

HDDA104R front edge view

Name	LED Colour	Function when ON	Function when Off
+5V	Green	Good power supply (PSU) rails.	One or more of the monitor supplies is out of specification
Config	Yellow	Card configuring after power on	Card normal working
HD	Yellow	Video input standard is HD (High Definition)	} Input not present
SD	Yellow	Video input standard is SD (Standard Definition)	
Error	Red	Incoming signal has check sum errors or if input cable length is too long and signal contains bit errors	Input signal OK
Input	Green	Valid input present	No valid input present

Using the active front panel

3.1 Module selected

This operational guide assumes that the panel has been set up according to the Panel setup procedure described in the Crystal Vision Control Panel manual.

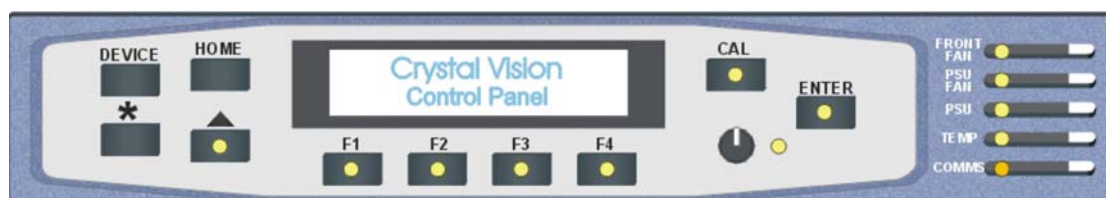
Note: It is **ESSENTIAL** that the Panel setup procedure is followed and any old or unknown passwords cleared prior to using the panel for the first time.

At power up, the two-line, 20-character screen will display 'Crystal Vision' followed by the firmware version number for the control panel. All eight control panel keys LEDs will illuminate.



The Crystal Vision control panel start up display

'Control Panel' then briefly replaces the version number display.



If the control panel firmware has been updated for Statesman control (version 1.5.0 or higher), Statesman Mode will be entered and the message, 'Press CAL to Exit' will be displayed and the CAL LED will light.



Statesman mode is entered by default

To continue with control panel operation or configuration, press the CAL key once. A second press of the CAL key will return to Statesman control.

The control panel will display the name of the card that first responds to the polling request together with its location number.

The location number consists of the frame number plus the card position in the frame.

Navigating the display

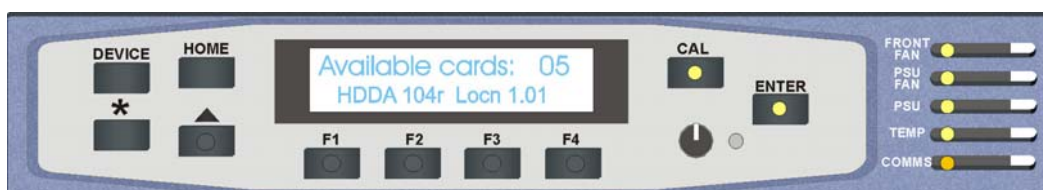
The functions assigned to control panel keys are:

- DEVICE – enters Device menu to select a card or show cards available / enters Panel setup when held down during power up / shows frame status when pressed from Statesman mode
- CAL – enters or leaves Statesman mode / enters panel diagnostics mode when held down during power up / updates the display
- Asterisk – enters board rename menu from the Device menu
- F1 to F4 – soft keys, function assigned within each menu
- HOME – moves the display to the home menu
- ENTER – accept current selection
- Upward arrow – used to move up the menu structure / enter lock panel menu from the Device menu
- Rotary control – shaft encoder used to select options or variable data

Note: Please refer to the Crystal Vision Control Panel manual for details of the Panel Setup, Lock Panel and Diagnostic menus.

Selecting an HDDA104R/108R

To select a particular card in a frame, press the DEVICE key to go to the Device menu. The top line of the display will show 'Available Cards X', where X is the number of cards that have responded so far to the polling request.



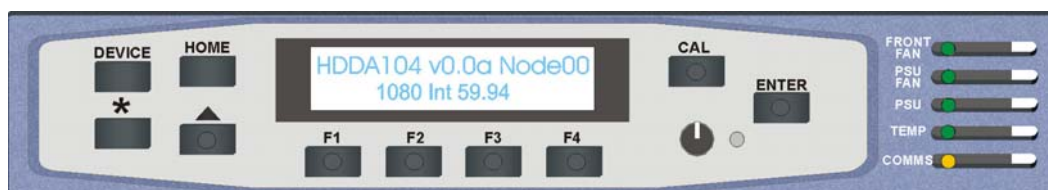
The available cards menu

Rotate the shaft encoder and the bottom row will display the successfully polled cards by name and location or slot number.

In the example above, the card displayed is located in the first frame in slot number 1.

When the desired card is selected press the ENTER key to access that card's HOME menu.

The message shows that an HDDA104R has been selected.



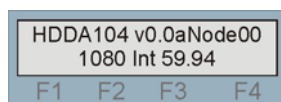
The HDDA104R home menu

Updating the display

The values displayed on an active front panel are only updated when an adjustment is made and when changing menu level. If mode changes occur through the use of Statesman, card edge controls or through automatic response to the input video signal, the text displayed on the active front panel will not be updated immediately. If necessary, press CAL to update the display.

The HDDA104R/108R menu structure

Pressing ENTER once the HDDA104R/108R has been selected in the cards available menu will display the home menu. The information displayed will be: the card type and its software version, its position in the rack and the input video standard. This is the only menu available to the HDDA104R/108R.



The following chart shows all the possible input standards that can be reported

No Input	625 Int 50	720 Prg 23.98	1035 Prg 23.98	1080 Int 24.98 1125
Unknown Input	525 Int 59.94	720 Prg 24	1035 Int 59.94	1080 Int 24.98 1250
		720 Prg 50	1035 Int 60	1080 Int 50 1250
		720 Prg 59.94		1080 Int 60
		720 Prg 60		1080 Int 50
				1080 Int 59.94
				1080 Prg 29.97
				1080 Prg 24.98
				1080 Prg 30
				1080 Prg 25
				1080 Prg 24
			1080 sF 23.98	
			1080 sF 24	

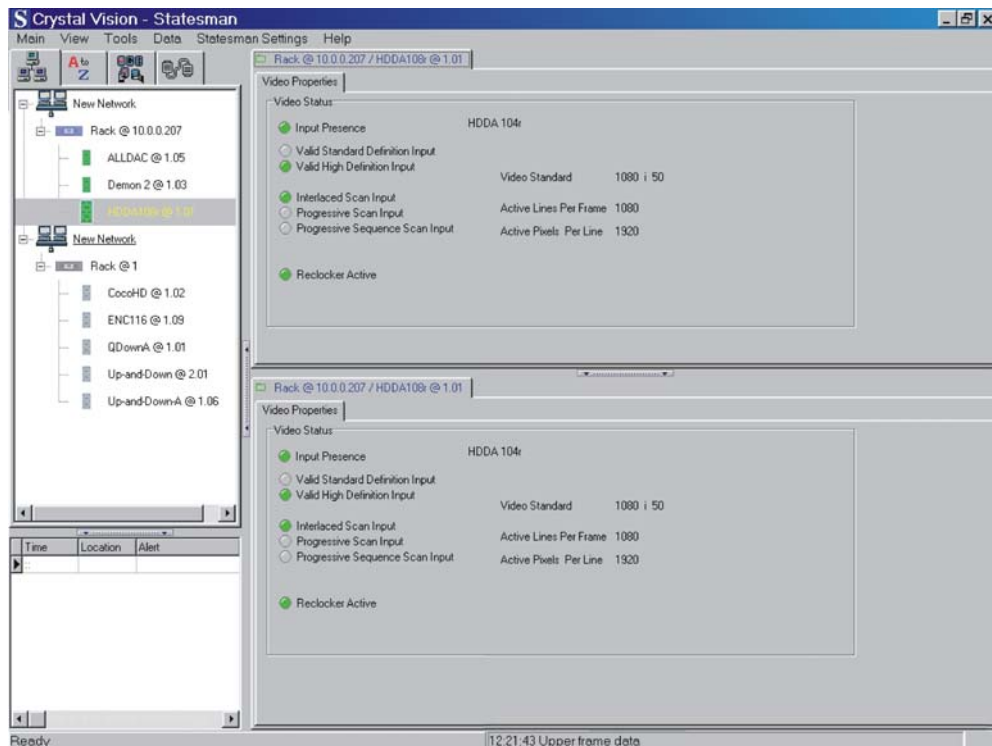
4 Statesman

The Crystal Vision Statesman PC control software is designed to control a range of Crystal Vision modules via serial control from a PC. Statesman provides a user friendly means of configuring and operating Crystal Vision modules with the benefit of “see-at-a-glance” status monitoring.

The main Statesman application communicates with each module in a frame through a Statesman capable or active control panel. An active panel or REMIND remote control panel must be fitted to allow for Statesman control.

4.1 Statesman operation

The initial view will show an Explorer style view of the connected frames and modules. Double clicking on a module will enable the display of the main application menus.



The Statesman main application window

The menu display is repeated for convenience to allow dual-control display of modules with duplicate signal paths or to allow two functions to be viewed at the same time.

HDDA104R/108R has only one Statesman menu tab that provides status information by way of simulated LEDs and text information.

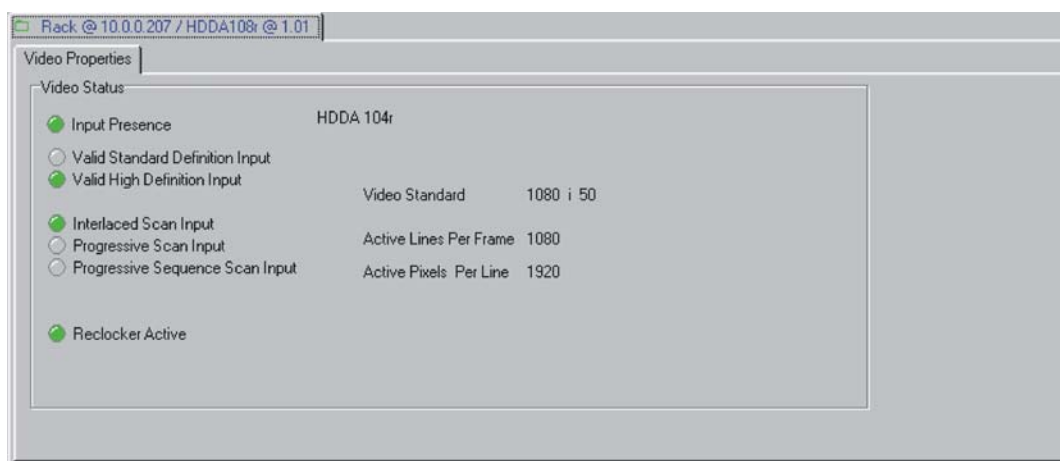
In general a green LED will indicate good or present and red bad or absent. A no selection or not applicable will cause an LED to be greyed out.

Video properties

The Video status tab provides the following information:

- Input present
- Valid Standard Definition Input
- Valid High Definition Input
- Interlaced Scan Input
- Progressive Scan Input
- Progressive Sequence Scan Input
- Reclocker Active

Information about the input video such as standard and line rate is given as text.



Status monitoring

The following chart shows all the possible input standards that can be reported

No Input	625 Int 50	720 Prg 23.98	1035 Prg 23.98	1080 Int 24.98 1125
Unknown Input	525 Int 59.94	720 Prg 24	1035 Int 59.94	1080 Int 24.98 1250
		720 Prg 50	1035 Int 60	1080 Int 50 1250
		720 Prg 59.94		1080 Int 60
		720 Prg 60		1080 Int 50
				1080 Int 59.94
				1080 Prg 29.97
				1080 Prg 24.98
				1080 Prg 30
				1080 Prg 25
				1080 Prg 24
			1080 sF 23.98	
			1080 sF 24	

5 Trouble shooting

Card edge monitoring

The card edge provides simple monitoring of the board status. This can be used as an initial aid to trouble shooting.

Fault finding guide

The Power OK LED is not illuminated

Check that the frame PSU is functioning – refer to the appropriate frame manual for detailed information

Check that the card is seated correctly in the frame

There is no video output

Check that a valid video input is present (input present LED illuminated) and that any cabling is intact

The video output is low quality

Check that the maximum length has not been exceeded

6 Specification

General

Dimensions	100mm x 266 mm module with DIN 41612 connector
Weight	
HDDA104R	230g
HDDA108R	290g
Power consumption	
HDDA104R	3W
HDDA108R	4W

Inputs

Video	HD or SD SDI 270Mb/s to 1.485Gb/s serial digital compliant to SMPTE-259M and SMPTE-292M Cable equalisation, Belden 8281 or equivalent HD (1.485Gb/s) – 100 meters SD (270Mb/s) >250 meters
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Outputs

HDDA104R	Four off HD or SD SDI 270Mb/s to 1.485Gb/s serial digital compliant to SMPTE-259M and SMPTE-292M
HDDA108R	Eight off HD or SD SDI 270Mb/s to 1.485Gb/s serial digital compliant to SMPTE-259M and SMPTE-292M

Remote control	RS485, 19200 baud, Statesman PC
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