



SYNAPSE

UDR416

4K Distribution amplifier with single wire and 4-wire converter

Installation and operation manual

Original manual V1.0

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Preface

- ALWAYS disconnect your entire system from the AC mains before cleaning any component. The product frame (SFR18, SFR08 or SFR04) must be terminated with three-conductor AC mains power cord that includes an earth ground connection. To prevent shock hazard, all three connections must always be used.
- NEVER use flammable or combustible chemicals for cleaning components.
- NEVER operate this product if any cover is removed.
- NEVER wet the inside of this product with any liquid.
- NEVER pour or spill liquids directly onto this unit.
- NEVER block airflow through ventilation slots.
- NEVER bypass any fuse.
- NEVER replace any fuse with a value or type other than those specified.
- NEVER attempt to repair this product. If a problem occurs, contact your local Axon distributor.
- NEVER expose this product to extremely high or low temperatures.
- NEVER operate this product in an explosive atmosphere.

Warranty: Axon warrants their products according to the warranty policy as described in the general terms. That means that Axon Digital Design BV can only warrant the products as long as the serial numbers are not removed.


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Date created: 04-12-2017

Date last revised: 04-12-2017

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This product complies with the requirements of the product family standards for audio, video, audio-visual entertainment lighting control apparatus for professional use as mentioned below.

	EN60950	Safety
	EN55103-1: 1996	Emission
	EN55103-2: 1996	Immunity

Axon Digital Design B.V. UDR416  FOR HOME OR OFFICE USE	Tested To Comply With FCC Standards	This device complies with part 15 of the FCC Rules Operation is subject to the following two conditions: 1. This device may cause harmful interference, and 2. This device must accept any interference received, including interference that may cause undesired operation.
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1 Introduction to Synapse

An Introduction to Synapse

Synapse is a modular system designed for the broadcast industry. High density, intuitive operation and high quality processing are key features of this system. Synapse offers a full range of converters and processing modules. Please visit the AXON Digital Design Website at www.axon.tv to obtain the latest information on our new products and updates.

Local control Panel

The local control panel gives access to all adjustable parameters and provides status information for any of the cards in the Synapse frame, including the Synapse rack controller. The local control panel is also used to back-up and restore card settings. Please refer to the rack controller manuals for a detailed description of the local control panel, the way to set-up remote control over IP and for frame related settings and status information.

Remote Control Capabilities

The remote control options are explained in the rack controller manual. The method of connection to a computer using Ethernet is described in the ERC/ERS/RRC/RRS manual.



"AXON CORTEX" SOFTWARE WILL INCREASE SYSTEM FLEXIBILITY OF ONE OR MORE SYNAPSE FRAMES

Although not required to use Cortex with a Synapse frame, you are strongly advised to use a remote personal computer or laptop PC with Axon Cortex installed, as this increases the ease of use and understanding of the modules.

2 Unpacking and Placement

Unpacking

The Axon Synapse card must be unpacked in an anti-static environment. Care must be taken NOT to touch components on the card – always handle the card carefully by the edges. The card must be stored and shipped in anti-static packaging. Ensuring that these precautions are followed will prevent premature failure from components mounted on the board.

Placing the card

The Synapse card can be placed vertically in an SFR18 frame or horizontally in an SFR04 and SFR08 frame. Locate the two guide slots to be used, slide in the mounted circuit board, and push it firmly to locate the connectors.

Correct insertion of card is essential as a card that is not located properly may show valid indicators, but does not function correctly.



On power up all LED's will light for a few seconds, this is the time it takes to initialise the card.

3 A Quick start

When Powering-up On powering up the Synapse frame, all settings of the card will be set to the default state. All LED's will light during this process. After initialisation, several LED's will remain lit – the exact number and configuration is dependent upon the number of inputs connected and the status of the inputs.

Changing settings and parameters The front panel controls or the Axon Cortex can be used to change settings. An overview of the settings can be found in chapter 5, 6 and 7 of this manual.

Front Panel Control Front Panel Display and Cursor



Settings are displayed and changed as follows;

Use the cursor 'arrows' on the front panel to select the menu and parameter to be displayed and/or changed.

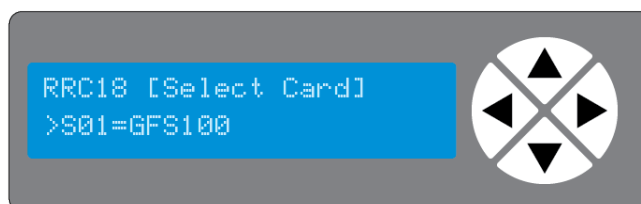
Press ►	To go forward through the menu structure.
Press ◀	To go back through the menu structure.
Press ▲	To move up within a menu or increase the value of a parameter.
Press ▼	To move down through a menu or decrease the value of a parameter.



Whilst editing a setting, pressing ► twice will reset the value to its default.

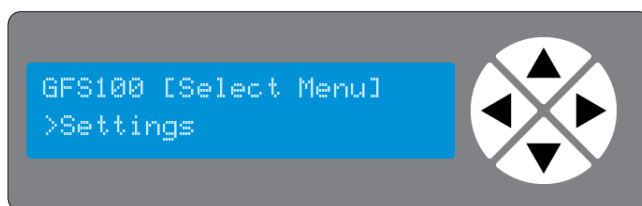
Example of changing parameters using front panel control

With the display as shown below



Pressing the ► selects the GFS100 in frame slot 01.

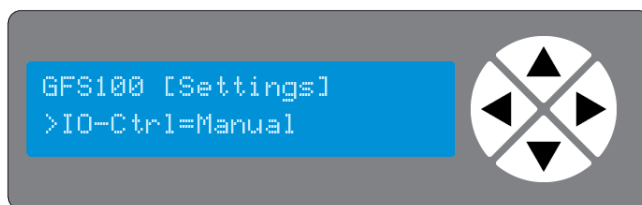
The display changes to indicate that the GFS100 has been selected. In this example the Settings menu item is indicated.



Pressing the ► selects the menu item shown, in this example Settings.

(Pressing ▲ or ▼ will change to a different menu eg Status, Events).

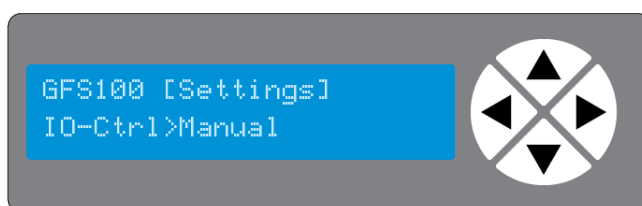
The display changes to indicate that the GFS100 Settings menu item IO-Ctrl has been selected and shows that its current setting is Manual.



Pressing the ► selects the settings item shown, in this example IO-Ctrl.

(Pressing ▲ or ▼ will change to a different setting, eg #Out-Frmt or #Inp_SelA).

The display changes to indicate that the GFS100 Edit Setting menu item SDI-Format has been selected



To edit the setting of the menu item press ▲ or ▼.

All menu items can be monitored and/or changed in this way. Changing a setting has an immediate effect.

Synapse Cortex can be used to change the settings of Synapse modules from a PC, either locally or remotely. The software enables communication based on TCP/IP between the Setup PC and Synapse frames/modules.

Each Synapse frame is addressed through its rack controller's unique IP address, giving access to each module, its menus and adjustment items. Axon Cortex has access to data contained within the Synapse module and displays it on a GUI. The software has an intuitive structure following that of the module that it is controlling.

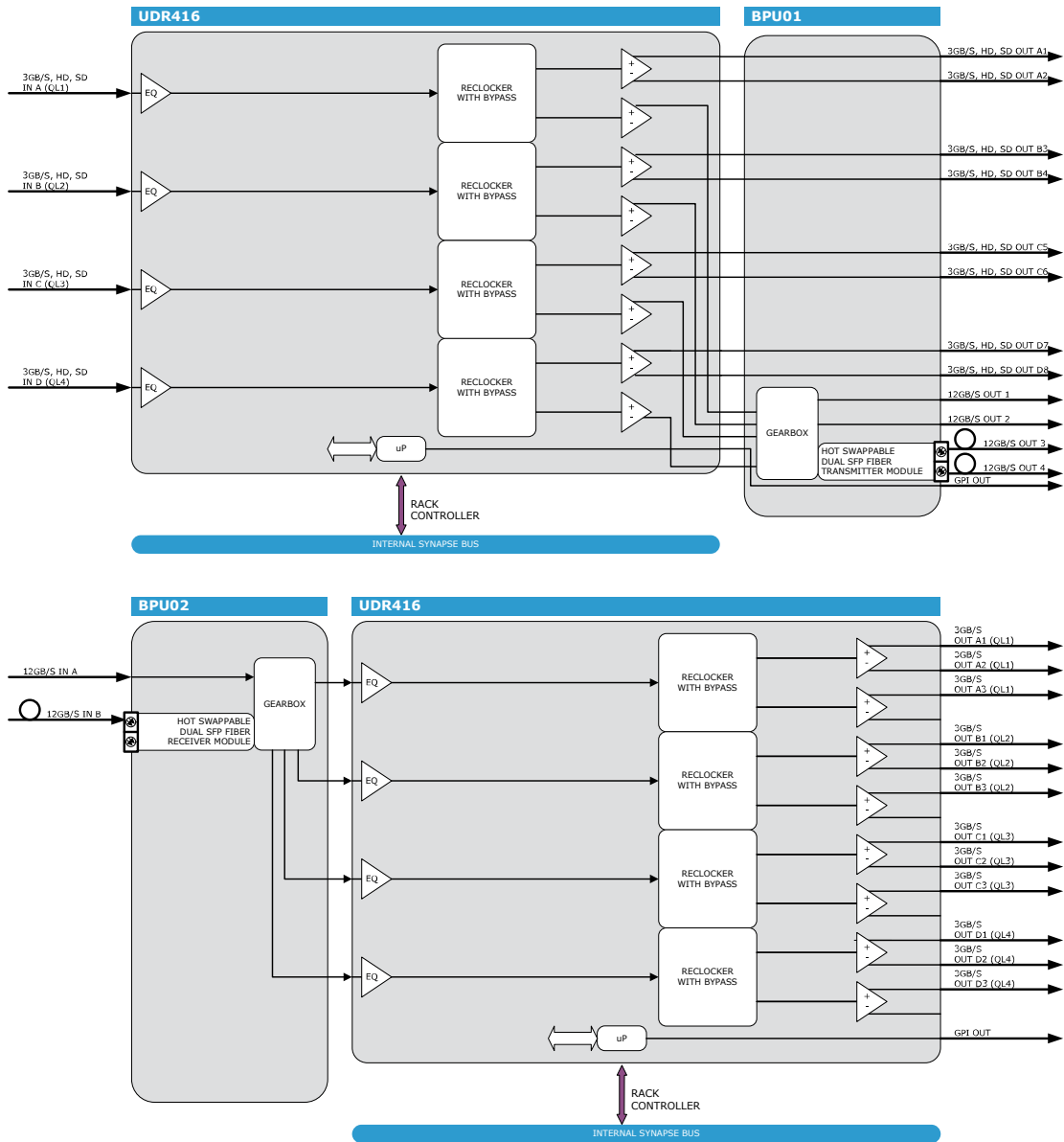
For operation of Axon Cortex, please refer to the Cortex help files.

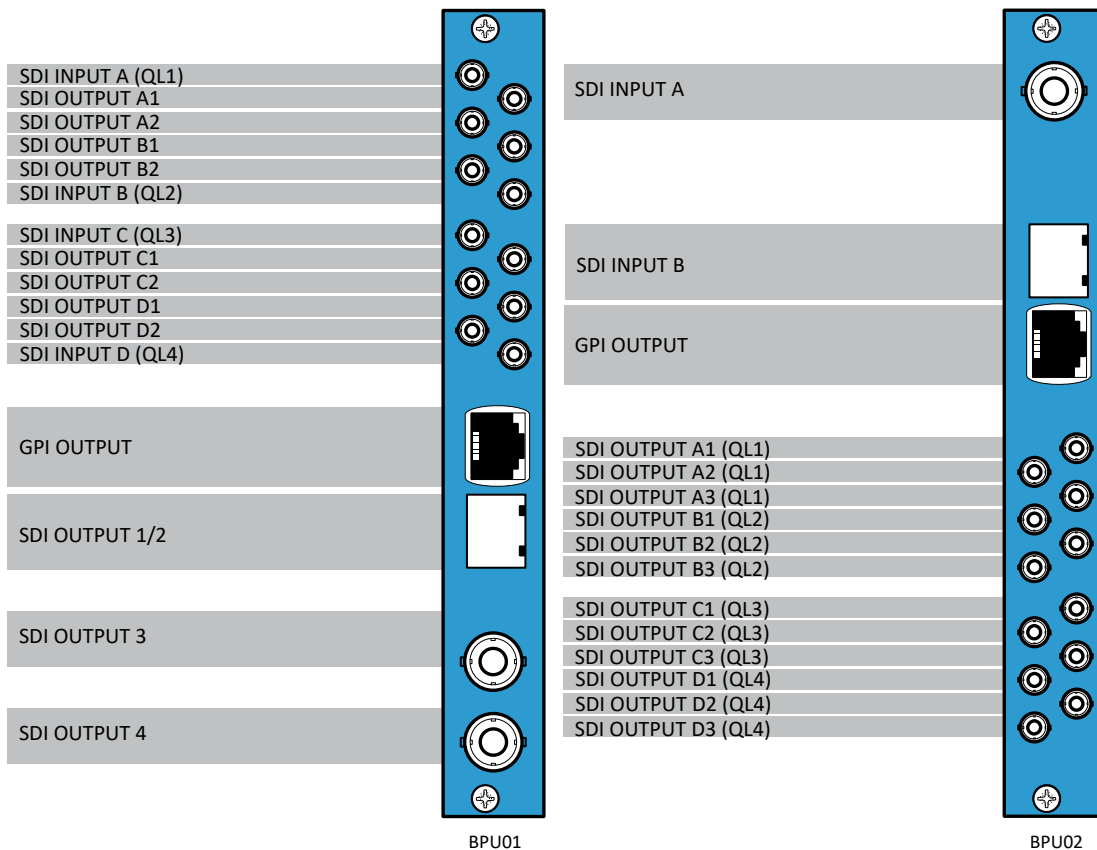
Menu Structure Example

Slot	Module	Item	Parameter	Setting
▲				
▲				
S02		Identity		
▲		▲		
S01	GFS100	▶ Settings	▶ IO-Ctrl	▶ Manual
▼		▼	▼	▼
S00	RRC18	Status	IO_Prst_Act	GPI
		▼	▼	▼
		Events	IO_Prst_Edit	GPI-A
			▼	▼
			#Inp-SelA	GPI-B
			▼	▼
			▼	GPI-C

4 Introduction

4.1 Block schematic & I/O panel





4.2 Features

The functionality of the UDR416 is twofold. Firstly, it is a four channel 3Gb/s, HD, SD SDI reclocking distribution amplifier. Secondly, the UDR416 is a 4K quad 3Gb/s link to single 12Gb/s link converter and back depending on the back panel.

- Conversions between 4-wire 4k and single link 4k 2SI SDI signals
- BPU01 for 4-wire 3Gb/s to 12Gb/s
- BPU02 for 12Gb/s to 4-wire 3Gb/s
- With BPU01 it is a 4 channel DA with 8 outputs and dual 12Gb/s outputs on BNC or SFP
- With BPU02 it is a 4 channel DA with 12 outputs (4x3)
- GPI controlled input swapping and status monitoring
- Compatible with SD SDI 270 Mbit/s and HD SDI 1485 Mbit/s with BPU01 only
- Compatible with 3Gb/s SDI 2970 Mbit/s and 12Gb/s SDI (SMPTE2082)
- Compatible with ASI/DVB on the positive outputs only (see block schematic)
- Bypass function of the reclocker for non-standard frequencies
- Optional 12Gb/s fiber I/O modules

4.3 Applications

- High End Truck dual input frame synchronizer and anything to anything converter

- High End Infrastructure up/down/cross conversion
- High End transmission up/cross conversion
- UHD (4k) up and down conversion from and to any supported video standard in the same frequency

4.4 Specifications

Video

Standard 12Gb/s, 3Gb/s, HD and SD SDI: SMPTE425-5/6, SMPTE424M, SMPTE292M, SMPTE259M

Serial video input

Number of inputs 4 on BPU01, 2 on BPU02
 Connector DIN1.0/2.3, BNC, Fiber LC
 Return loss > 15dB up to 3GHz

BPU01 Serial video output

Number of outputs 8 on 3Gb/s, 1 on 12Gb/s
 Connector for 3Gb/s, HD, SD DIN1.0/2.3
 Connector for 12Gb/s BNC, fiber LC
 Signal level 800mV nominal
 DC Offset 0V \pm 0.5V
 Rise/fall time 135ps nominal
 Overshoot < 10% of amplitude
 Return Loss > 15dB up to 1.5GHz (typ.), > 10dB up to 3GHz (typ.)
 Wideband Jitter < 0.2UI

BPU02 Serial video Output

Number of outputs 12
 Connector DIN1.0/2.3
 Signal level 800mV nominal
 DC Offset 0V \pm 0.5V
 Rise/fall time 135ps nominal
 Overshoot < 10% of amplitude
 Return Loss > 15dB up to 1.5GHz (typ.), > 10dB up to 3GHz (typ.)
 Wideband Jitter < 0.2UI

GPI output

Number of outputs	4
Connector	RJ45
Type	>2.5V high level, <0.8V low level

Miscellaneous

Weight	Approx. 250g
Operating Temp.	0 °C to +50 °C
Dimensions	137 x 296 x 20 mm (HxWxD)

Electrical

Voltage	+24V to +30V
Power	< 6 Watts

5 Settings

5.1 Introduction

The settings menu displays the current state of each UDR416 setting and allows you to change or adjust it. Settings can be changed using the front panel of the Synapse frame (SFR18, SFR08 or SFR04) or with Cortex. Also the SCP08 control can be used. Please refer to chapter 3 for information on the Synapse front panel control and Cortex.



All items preceded with a #-sign are part of the presets.

5.2 Settings

- Input_sel** With this item you select which input source must be used. You can choose between *SDI* or *SFP*. default is *SDI*.
- Mute** With *Mute* you can mute the outputs (*on*) or not (*off*). You can also decide to only mute the outputs in case of a *Input Loss* or in case of a *PLL unlock*.

6 Status

6.1 Introduction

The status menu indicates the current status of each item listed below.

6.2 Status

SDI-Input_A These status item indicates whether the input on channel A is *present* or not (*NA*)

PLL-rate_A These status item indicates what PLL-rate is detected on channel A. Possible indications are:

- 270 Mbps
- 1485 Mbps
- 2970 Mbps
- *NA* (No rate detected)

SDI-Input_B These status item indicates whether the input on channel B is *present* or not (*NA*)

PLL-rate_B These status item indicates what PLL-rate is detected on channel B. Possible indications are:

- 270 Mbps
- 1485 Mbps
- 2970 Mbps
- *NA* (No rate detected)

SDI-Input_C These status item indicates whether the input on channel C is *present* or not (*NA*)

PLL-rate_C These status item indicates what PLL-rate is detected on channel C. Possible indications are:

- 270 Mbps
- 1485 Mbps
- 2970 Mbps
- *NA* (No rate detected)

SDI-Input_D These status item indicates whether the input on channel D is *present* or not (*NA*)

PLL-rate_D These status item indicates what PLL-rate is detected on channel D. Possible indications are:

- 270 Mbps

- 1485 Mbps
- 2970 Mbps
- NA (No rate detected)

SDI-Input_12G

This status item indicates what PLL-rate is detected on the 12G Input. Possible indications are:

- 125 Mbps
- 270 Mbps
- 1485 Mbps
- 2970 Mbps
- 5940 Mbps
- 11880 Mbps
- NA (No rate detected)

Backplane-type

This status item indicates what backplane is connected to the card. Possible indications are:

- BPU01
- BPU02
- NA (No backplane detected)

The BPU01 is a 12G transmitting backpanel and the BPU02 is the 12G receiving backpanel. The backpanels determine the functionality of the product.

6.3 SFP status

SFP1-Vendor

These status item display the name of the vendor of the SFP input/output module A.

SFP1-Type

These status items display the type name/number of SFP input/output module A.

SFP1-Temp-Stat

These indicate whether the temperature of SFP input/output module A is *Too_High*, *High*, *OK*, *Low* or *Too_Low*. Can also be *NA* in case Temperature monitoring is not available or the module is not inserted.

SFP1-Volt-Stat

These indicate whether the voltage usage of SFP input/output module A is *Too_High*, *High*, *OK*, *Low* or *Too_Low*. Can also be *NA* in case voltage monitoring is not available or the module is not inserted.

Port1/2-Enabled

These item indicate whether the corresponding output port

on SFP output module A is *enabled*, *disabled* or *NA* (Not available, when no input signal is available or an input module is inserted).

Port1/2-Power	These status items indicate the current transmitter power of the specified port on SFP output module A between 0mW and 6.55mW. When a receiver is installed or no SFP module is inserted this value is 0.
Port1/2-Power-Stat	These indicate whether the output power of the specified port on SFP output module A is <i>Too_High</i> , <i>High</i> , <i>OK</i> , <i>Low</i> or <i>Too_Low</i> . Can also be <i>NA</i> in case the module is not inserted or when there's no transmitter module inserted.
Port1/2-Bias	These status items indicate the current laser bias of the specified port on SFP module A is between 0mA and 300mA. When there is a non fiber SFP or an input module is inserted, this value will be 0.
Port1/2-Bias-Stat	These indicate whether the laser bias of the specified port on SFP output module A is <i>Too_High</i> , <i>High</i> , <i>OK</i> , <i>Low</i> or <i>Too_Low</i> . This can also be <i>NA</i> in case laser bias monitoring is not available or no output module is inserted.
Port1/2-Wavelength	Indicates the current wave length of the corresponding output port on the SFP output module A between 0nm and 2000nm. When there is a non fiber SFP or RX module installed, this value will be 0.
SFP2-Vendor	These status item display the name of the vendor of the SFP input/output module B.
SFP2-Type	These status items display the type name/number of SFP input/output module B.
SFP2-Temp-Stat	These indicate whether the temperature of SFP input/output module B is <i>Too_High</i> , <i>High</i> , <i>OK</i> , <i>Low</i> or <i>Too_Low</i> . Can also be <i>NA</i> in case Temperature monitoring is not available or the module is not inserted.
SFP2-Volt-Stat	These indicate whether the voltage usage of SFP input/output module B is <i>Too_High</i> , <i>High</i> , <i>OK</i> , <i>Low</i> or <i>Too_Low</i> . Can also be <i>NA</i> in case voltage monitoring is not available or the module is not inserted.
Port3/4-Enabled	These item indicate whether the corresponding output port

on SFP output module B is *enabled, disabled* or *NA* (Not available, when no input signal is available or an input module is inserted).

Port3/4-Power

These status items indicate the current transmitter power of the specified port on SFP output module B between 0mW and 6.55mW. When a receiver is installed or no SFP module is inserted this value is 0.

Port3/4-Power-Stat

These indicate whether the output power of the specified port on SFP output module B is *Too_High, High, OK, Low* or *Too_Low*. Can also be *NA* in case the module is not inserted or when there's no transmitter module inserted.

Port3/4-Bias

These status items indicate the current laser bias of the specified port on SFP module B is between 0mA and 300mA. When there is a non fiber SFP or an input module is inserted, this value will be 0.

Port3/4-Bias-Stat

These indicate whether the laser bias of the specified port on SFP output module B is *Too_High, High, OK, Low* or *Too_Low*. This can also be *NA* in case laser bias monitoring is not available or no output module is inserted.

Port3/4-Wavelength

Indicates the current wave length of the corresponding output port on the SFP output module B between 0nm and 2000nm. When there is a non fiber SFP or RX module installed, this value will be 0.

7 Events Menu

7.1 Events

Introduction	An event is a special message that is generated on the card asynchronously. This means that it is not the response to a request to the card, but a spontaneous message.
What is the goal of an event?	The goal of events is to inform the environment about a changing condition on the card. A message may be broadcast to mark the change in status. The message is volatile and cannot be retrieved from the system after it has been broadcast. There are several means by which the message can be filtered.
Events Announcements	The following event(s) are reported by the UDR416. <i>Announcements</i> is not actually an event. This item is only used for switching the announcement of status changes on/off. 0=off, other =on
Input_A	<i>Input_A</i> reports the loss of a signal at the input A and can be set between 0 and 255. 0= no event, 1 to 255 is the priority setting.
Input_B	<i>Input_B</i> reports the loss of a signal at the input B and can be set between 0 and 255. 0= no event, 1 to 255 is the priority setting.
Input_C	<i>Input_C</i> reports the loss of a signal at the input C and can be set between 0 and 255. 0= no event, 1 to 255 is the priority setting.
Input_D	<i>Input_D</i> reports the loss of a signal at the input D and can be set between 0 and 255. 0= no event, 1 to 255 is the priority setting.
What information is available in an event?	The message consists of the following items; <ol style="list-style-type: none">1. A message string to show what has happened in text, for example: "INP_LOSS", "REF_LOSS", "INP_RETURN".2. A tag that also shows what happens, but with a predefined number: e.g. 1 (= loss of input), 2 (= loss of reference), 129(= 1+128 = return of input). For a list of these predefined tags see the table on the next page.3. A priority that marks the importance of an event. This value is defined by the user and can have any value between 1 and 255, or 0 when disabled.4. A slot number of the source of this event.

The message string The message string is defined in the card and is therefore fixed. It may be used in controlling software like Cortex or Cerebrum to show the event.

The tag The tag is also defined in the card. The tag has a fixed meaning. When controlling or monitoring software should make decisions based on events, it is easier to use the tag instead of interpreting a string. The first implementation is the tag controlled switch in the GPI16.

In cases where the event marks a change to fault status (e.g. 1 for Loss of Input) the complement is marked by the tag increased by 128 (80_{hex}) (e.g. 129 (81_{hex}) for Return of Input).

Defining Tags The tags defined for the UDR416 are:

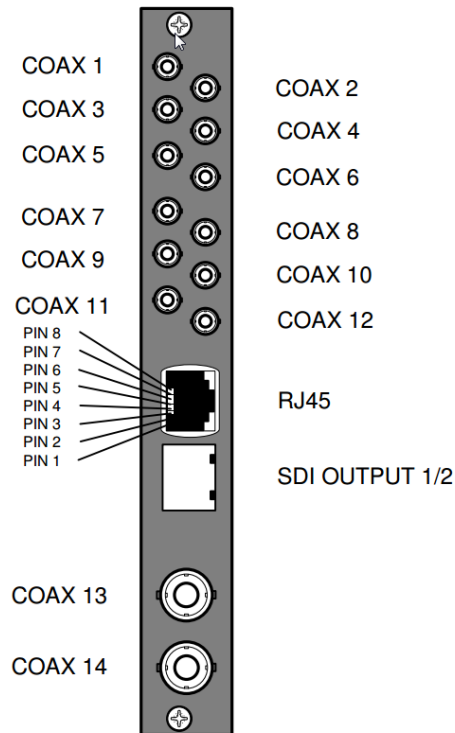
Event Menu Item	Tag		Description
Announcements	0 or NA	0 or NA	Announcement of report and control values
Input_A	01 _{hex} = INP_LOSS_A	81 _{hex} = INP_PRESENT_A	Channel A input lost or returned
Input_B	12 _{hex} = INP_LOSS_B	92 _{hex} = INP_PRESENT_B	Channel B input lost or returned
Input_C	13 _{hex} = INP_LOSS_C	93 _{hex} = INP_PRESENT_C	Channel C input lost or returned
Input_D	52 _{hex} = INP_LOSS_D	d2 _{hex} = INP_PRESENT_D	Channel D input lost or returned
Ref_Status	03 _{hex} = REF_LOSS	83 _{hex} = REF_RETURN	Reference lost or returned

The Priority The priority is a user-defined value. The higher the priority of the alarm, the higher this value. Setting the priority to Zero disables the announcement of this alarm. Alarms with priorities equal or higher than the Error Threshold setting of the ERC/ERS will cause the error LED on the Synapse rack front panel to light.

The Address Together with the message string or the tag, the slot number or address of the card is relevant to be able to assign the event to a certain card.

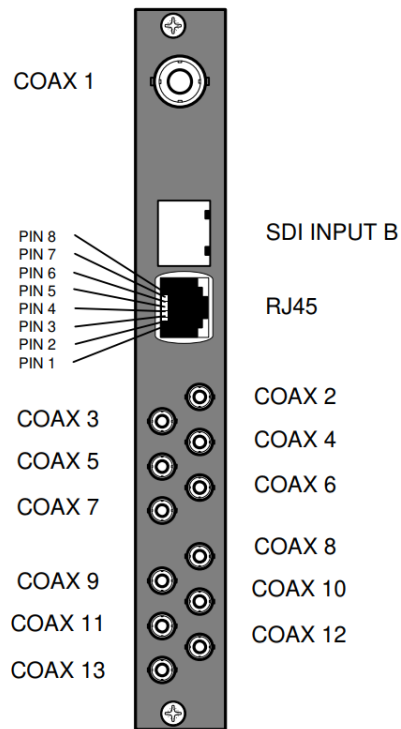
8 I/O panel description

8.1 BPU01



UDR416	
COAX 1	SDI INPUT A (QL1)
COAX 2	SDI OUTPUT A1
COAX 3	SDI OUTPUT A2
COAX 4	SDI OUTPUT B1
COAX 5	SDI OUTPUT B2
COAX 6	SDI INPUT B (QL2)
COAX 7	SDI INPUT C (QL3)
COAX 8	SDI OUTPUT C1
COAX 9	SDI OUTPUT C2
COAX 10	SDI OUTPUT D1
COAX 11	SDI OUTPUT D2
COAX 12	SDI INPUT B (QL4)
COAX 13	12Gb/s SDI OUTPUT3
COAX 14	12Gb/s SDI OUTPUT4
RJ45	
PIN 1	GPO0 (INPUT A)
PIN 2	GPO1 (INPUT B)
PIN 3	GPO2 (INPUT C)
PIN 4	GND
PIN 5	GPO3 (INPUT D)
PIN 6	
PIN 7	
PIN 8	

8.2 BPU02



UDR416	
COAX 1	12Gb/s SDI INPUT A
COAX 2	SDI OUTPUT A1 (QL1)
COAX 3	SDI OUTPUT A2 (QL1)
COAX 4	SDI OUTPUT A3 (QL1)
COAX 5	SDI OUTPUT B1 (QL2)
COAX 6	SDI OUTPUT B2 (QL2)
COAX 7	SDI OUTPUT B3 (QL2)
COAX 8	SDI OUTPUT A1 (QL1)
COAX 9	SDI OUTPUT A2 (QL1)
COAX 10	SDI OUTPUT A3 (QL1)
COAX 11	SDI OUTPUT B1 (QL2)
COAX 12	SDI OUTPUT B2 (QL2)
COAX 13	SDI OUTPUT B3 (QL2)
RJ45	
PIN 1	GPO0 (INPUT A)
PIN 2	GPO1 (INPUT B)
PIN 3	GPO2 (INPUT C)
PIN 4	GND
PIN 5	GPO3 (INPUT D)
PIN 6	
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