STAGE RACER

OPTICAL TRANSMISSION STAGE BOX

INSTALLATION MANUAL

CONTENTS

Further information is available in the Stage Racer Technical Manual.
Please contact us for a copy.

1   DETAILED DESCRIPTION

The stage racer base product is one 1RU rack solution ideally designed for base station fitment. For field application a 4 to 5 RU fly case integration offers sufficient room for properly expending all the connections on panel BNC and XLR sockets.
Rugged box integration is limited to 4 channels stage racer and subject to special order.

1.1   CONNECTORS LOCATION

The stage racer provides on one side all the connection of the base module signals. Some optional connectors are located on the front face close to the LED display panel.

Connectors for each signal are described below:

- D SUB 15 female sockets for GPIO 3-8.
- D SUB 37 female sockets for analog audio.
- RJ 45 for Serial signals (+ GPIO 1-2), Ethernet
- BNC for PAL, HD SDI and AES.
- LEMO 3K, NEUTRIK OpticalCon Duo/Quad, LC, SC/APC for optical ports.
- IEC/CEE22, for main power.

4 to 12 HD SDI IN or OUT
1 PAL IN + 1 PAL OUT
2 AES
1 RS + 1 GPIO
16 AUDIO OUT
6 GP IN

6 GP OUT
16 AUDIO IN
1 RS +1 GPIO
2 AES or 1 MADI
1 GIGA ETHERNET (2 RJ)
OPTICAL CONNECTIONS
2 PSU 90 to 260 VAC

Figure 1 : STAGE RACER connector location

1.2 CONNECTORS DESCRIPTION

The pinout for all the electrical access is described in the sections hereafter.

1.2.1 General Purpose IN

For forward product compatibility the GP IN section is split on two kind of connectors.

The input 1 and 2 are shared with each Serial signal transmission RJ 45 terminal, labeled "RS GPIO".
These inputs are protected by opto-coupler but are not floating, a grounding on the input pin triggers the GP-IN.

1: GND
2: GP IN
3: RX RS 422 – or RX RS 232
4: TX RS 422 – or TX RS 232
5: TX RS 422 +
6: RX RS 422 +
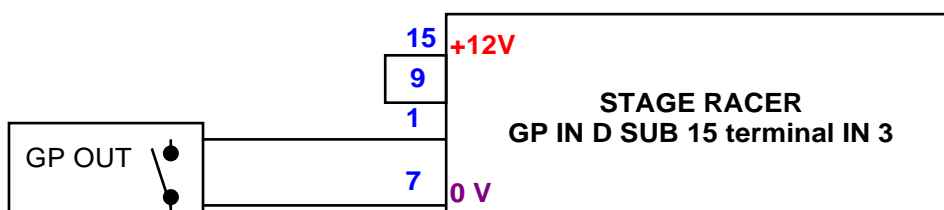*7: GP OUT*
8: GP OUT

The input 3 to 8 are on one D-SUB 15 terminal female socket. Inputs are independent and electrically isolated by opto-couplers. Each input is none polarized and feature an automatic 5mA current limitation working with an input voltage of 5 to 24 Volts. User do not have to care of your wiring polarity for these ones.

Ground and power pins are available on the connector to ease interfacing with others machines especially if the information is supplied by a dry contact, open connector, ground closure.

The 12 volts output of the stage racer is protected against external short circuit by a internal 100mA resettable fuse (polyswitch) common to GPIN and GPOUT socket.

GP IN N°	SIGNAL	Socket contact	D SUB 15 GP IN	Socket contact	SIGNAL
3	GP IN 3a	1		9	GP IN 3b
4	GP IN 4a	2		10	GP IN 4b
5	GP IN 5a	3		11	GP IN 5b
6	GP IN 6a	4		12	GP IN 6b
7	GP IN 7a	5		13	GP IN 7b
8	GP IN 8a	6		14	GP IN 8b
	GND (0V)	7		15	+ 12V 100 mA
	GND (0V)	8			

Example: GP IN 3 (with dry contact, ground closure, open collector drive).

1.2.2 General Purpose OUT

For forward product compatibility the GP OUT section is split on two kind of connectors.

The output 1 and 2 are shared with each Serial signal transmission RJ 45 terminal, labeled "RS GPIO".
These outputs are on floating dry contact relays with 50 Volts AC/DC and 0.25 A switching capacity.
The relay is open if the corresponding remote input is not triggered.

1: GND
2: GP IN
3: RX RS 422 – or RX RS 232
4: TX RS 422 – or TX RS 232
5: TX RS 422 +
6: RX RS 422 +
7: GP OUT
8: GP OUT

The input 3 to 8 are on one D-SUB 15 terminal female socket. These outputs are also on floating dry contact relays with 50 Volts AC/DC and 0.25 A switching capacity. The relay is also open if the corresponding remote input is not triggered.

Ground and power pins are available on the connector to ease interfacing with others machines especially if the driven machine need a voltage information rather than a contact closure.
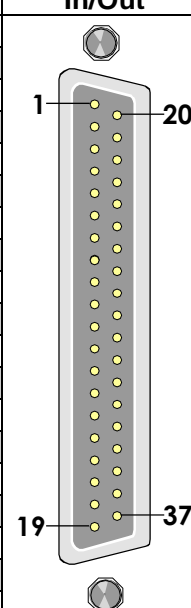
The 12 volts output of the stage racer is protected against external short circuit by a internal 100mA resettable fuse (polyswitch) common to GPIN and GPOUT socket.

Relay N°	SIGNAL	Socket contact	D SUB 15 GP OUT	Socket contact	SIGNAL
3	GP OUT 3a	1		9	GP OUT 3b
4	GP OUT 4a	2		10	GP OUT 4b
5	GP OUT 5a	3		11	GP OUT 5b
6	GP OUT 6a	4		12	GP OUT 6b
7	GP OUT 7a	5		13	GP OUT 7b
8	GP OUT 8a	6		14	GP OUT 8b
	GND (0V)	7		15	+ 12V 100 mA
	GND (0V)	8			

1.2.3 Analog AUDIO

1.2.3.1 Pinout

One D SUB 37 pin female socket provide the access to the 16 balanced analog AUDIO IN.
One D SUB 37 pin female socket provide the access to the 16 balanced analog AUDIO OUT.

SIGNAL	Socket contact	D SUB 37 AUDIO In/Out	Socket contact	SIGNAL
AUDIO 1 +	1		20	AUDIO 1 -
AUDIO 2 +	2		21	AUDIO 2 -
AUDIO 3 +	3		22	AUDIO 3 -
AUDIO 4 +	4		23	AUDIO 4 -
AUDIO 5 +	5		24	AUDIO 5 -
GND	6		25	GND
AUDIO 6 +	7		26	AUDIO 6 -
AUDIO 7 +	8		27	AUDIO 7 -
AUDIO 8 +	9		28	AUDIO 8 -
AUDIO 9 +	10		29	AUDIO 9 -
AUDIO 10 +	11		30	AUDIO 10 -
GND	12		31	GND
AUDIO 11 +	13		32	AUDIO 11 -
AUDIO 12 +	14		33	AUDIO 12 -
AUDIO 13 +	15		34	AUDIO 13 -
AUDIO 14 +	16		35	AUDIO 14 -
AUDIO 15 +	17		36	AUDIO 15 -
GND	18			
AUDIO 16 +	19		37	AUDIO 16 -

1.2.3.2 Audio option location

For units equipped with the 8 microphones gain block, the gain block is installed in the "RX" unit.
The gain blocks are connected to channels 8 to 16.

Thru the web server each 8 to 16 input can be amplified with a gain ranging from 9 to 60 dB (3dB steps) with or without Phantom power supply.

If the gain on a channel is not wanted the gain block could be totally bypassed and this input recovers the +18 dBm max input level.

The phantom power capacity is 10mA for each channel.

Note: To setup the gains remember to log on the RX unit.

Caution: Beware of the input phantom power, after switching off the phantom power the 48Volts will still be present for a significative amount of time on the inputs, time needed by the inputs capacitor to discharge.

1.2.4 <u>Digital AUDIO</u>

Digital audio is available on true 75 Ohms BNC sockets.

The total capacity of the stage racer is 4 simultaneous bidirectional AES signals. Thru the web server the AES 3 and 4 could be turned to MADI, Respectively Madi IN on port 3 and Madi OUT on port 4.

<u>Caution:</u> Avoid connecting 50Ohms plugs it will damage the socket central pin causing costly repair especially it this one is on the lower part of the connector side.

1.2.4.1 Bidirectional AES

Each AES port is internally equipped with a 2-4 wire converter connected to a fully bidirectional transmit path to the remote stage racer.

This allow to interconnect talkback panels working in a bidirectional manner on one 75 Ohms coax. The ports still can be used without configuration to transport unidirectional signal, no setup needed for channel direction.

<u>Note1:</u> For the internal 2-4 wire converter correct behavior the source/terminal impedance of the machine connected to the AES ports must be 75 Ohms.

<u>Note2:</u> The bidirectional function of the device constraint the design specially to provide an accurate AES activity led display and avoid signal loop if port impedance is not 75 ohms. The internal FPGA seeks for AES3 audio XYZ preamble at 48 KHz to light the corresponding AES Led <u>and</u> enable transmission in this direction. Basically, the equipment is able to transmit 44.1 and 48 KHz audio, in the other case the detection scheme will prevent transmission. Please ask for a product evolution if this stuck your application.

1.2.4.2 MADI transmission

When selected through the web server, MADI Is transmitted instead of 2 AES signals. The MADI signal applied to port 3 of a device is output on port 4 of the remote equipment.

The MADI clock information is transmitted along the MADI signal, at receiving side the original clock is precisely regenerated and MADI data delivered accordingly to this clock. Thus, the transmission is clock conservative, so if the MADI machine used is able to synchronize on the MADI payload, you do not have to carry a parallel wordclock signal thru another channel of the stage racer.

The MADI output VCXO capture range is +/- 100 ppm.

<u>Note:</u> If more MADI signals are needed it can be passed thru the Video channels by simply selecting the right channel direction and bypassing the corresponding reclocker.

1.2.5 Serial ports

Two multiprotocol RS232/422/485 serial signals are transmitted in standard by the equipment.
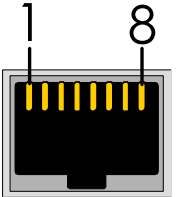The supported datarate of each signal is about 250Kbds.

The setting of the serial protocol is done within the web server of the STAGE RACER.

1.2.5.1 RS422/485

The RJ 45 connector provide 1 differential pair for RS422 transmit and 1 differential pair for RS422 receive.
To build half duplex RS485 transmission just bridge pins 3 with pin 4 and pin 5 with pin 6.

For RS485 also setup the corresponding Baud rate within the web server to enable the stage racer to manage output impedance at the right serial byte duration.
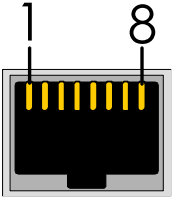
Refer the Shield to pin 1.

1: GND (Shield)
2: GP IN
3: RX RS 422 – (Stage racer electrical OUTPUT)
4: TX RS 422 – (Stage racer electrical INPUT)
5: TX RS 422 + (Stage racer electrical INPUT)
6: RX RS 422 + (Stage racer electrical OUTPUT)
7: GP OUT
8: GP OUT

Note: For RS 485 Telex/RTS talkback panels please ask ERECA for wiring tip.

1.2.5.2 RS232

Refer The RS 232 signal ground to pin 1. Leave pins 5 and 6 unconnected.

1: GND (Ground ref/Shield)
2: GP IN
3: RX RS 232 – (Stage racer electrical OUTPUT)
4: TX RS 232 – (Stage racer electrical INPUT)
5: Do not connect
6: Do not connect
7: GP OUT
8: GP OUT

1.2.6 Ethernet ports

The stage racer offers 2 Gigabit ethernet ports separated by internal VLANs, the 2 ports are transmitted simultaneously on a single 1Gbs trunk.

The 2 ports are separated with 802.3AD VLANs. This VLAN setup takes care of your customer VLANS by adding a service tag on input frames and removing this service tag on transmitted (output) frames. Basically, the traffic held by the stage racer is considered 100% as payload so all your network setup won't be affected.

Networked audio (Ethersound / Dante / Ravenna) are correctly transmitted by the stage racer.

Note: The stage racer admin web server is accessible on PORT 1.

1.2.7 HD VIDEO ports

Depending on the option chosen at order time the stage racer is equipped with 4, 8 or 12 video channels.

The signal direction of each channel is defined thru the web server into interface. The configuration is held on the "TX" machine and automatically forwarded to the "RX" machine.

For MADI or SDTI signals each reclocker can be individually bypassed.

Note: Take care of the port numbers, grouped 4 by 4 in square for the 4/8/12 channels option management.

Caution: Avoid connecting 50Ohms plugs it will damage the socket central pin causing costly repair especially it this one is on the lower part of the connector side.

1.2.8 Composite VIDEO ports

A bidirectional PAL / SECAM / NTSC / Tri-level sync compatible is transmitted thru the stage racer. Minimal latency and high-quality process with +/-3dB AGC input, 2x over sampling and 10 bits digital filtering and transmission is also provided for this signal often use as Genlock.

1.2.9 OPTICAL access

1.2.9.1 Standard

The stage racer uses only two fibers for signals transmission.

The STAGE RACER is available with the following optical terminals:

- LEMO 3K,
- NEUTRIK OPTICALCON Duo,
- NEUTRIK OPTICALCON Quad,
- SC/APC,
- SC/PC,
- ST/PC
- LC.

For OpticalCon QUAD connectors the 2 remaining fibers are output on 2 SC/APC connectors located on the front face. (Note: On some custom requirement theses connectors could be located on the connector side installed in the "spare fiber" free space).

1.2.9.2 Redundant path

As an option, the STAGE RACER can transmit the signals on the fiber by two optical paths. In this case the optical connection is duplicated.

The principle is based on Master and Slave path. In normal optical conditions the master path is used and the slave data path is monitored for good health. In the occurrence of master path failure, the slave path is used with minimal transmitted perturbation.

When master path is repaired the equipment will detect it and automatically revert on the master path.

In the event of an OpticalCon Quad stage racer, the two free fibers redundant path is also managed by built in wideband optical switches following the stage racer master/slave path decision.

1.3 OPTIONAL CONNECTORS / FUSE / PART NUMBER

1.3.1 Description

The left part of the Display face provides:

1	Extra SC/APC terminal option (in case of OpticalCon Quad optical connections)
2	12 green LED status of the optional signal transmission (Eg:12 RS422 TX/RX activity)
3	Two D SUB 25 female sockets for the optional signal transmission (Eg:12 RS422)
4	Fuse for PSU1 (2 Amperes Slow Blow 5*20mm fuse)
5	Fuse for PSU2 (2 Amperes Slow Blow 5*20mm fuse)
6	**(Video section)** Product information, a STAGE RACER is composed of 1 STAR TX + 1 STAR RX:
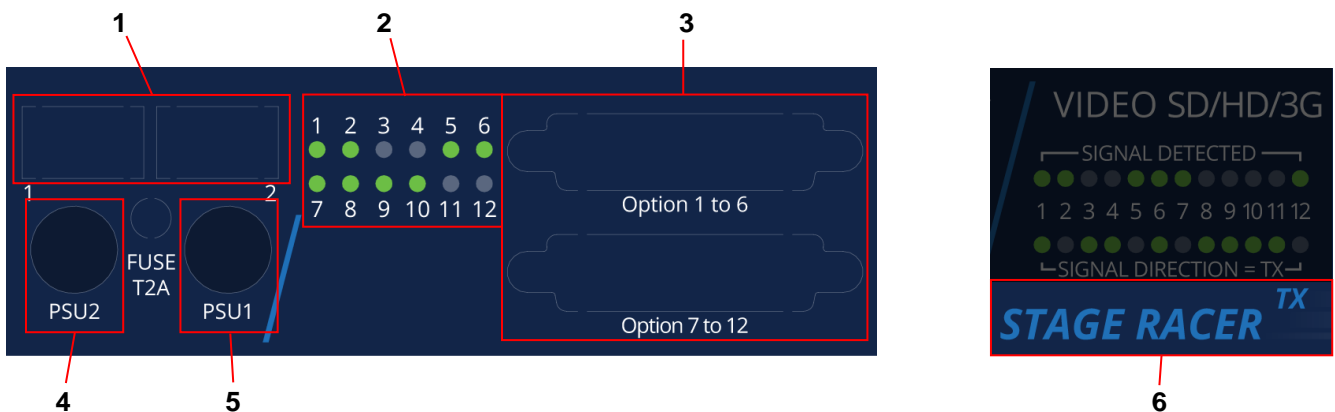
1.3.2 12 RS422 Pinout

One D SUB 25 pin female socket provide the access to the extra RS422 channels 1 to 6.
One D SUB 25 pin female socket provide the access to the extra RS422 channels 7 to 12.

Channel	SIGNAL	Socket contact	D SUB 25 RS422 1to6 & RS422 7to12.	Socket contact	SIGNAL
1 and 7	IN 1/7 -	1		14	IN 1/7 +
1 and 7	OUT 1/7 +	2		15	OUT 1/7 -
2 and 8	IN 2/8 -	3		16	IN 2/8 +
2 and 8	OUT 2/8 +	4		17	OUT 2/8 -
3 and 9	IN 3/9 -	5		18	IN 3/9 +
3 and 9	OUT 3/9 +	6		19	OUT 3/9 -
all	GND	7		20	IN 4/10 -
4 and 10	IN 4/10 +	8		21	OUT 4/10 +
4 and 10	OUT 4/10 -	9		22	IN 5/11 -
5 and 11	IN 5/11 +	10		23	OUT 5/11 +
5 and 11	OUT 5/11 -	11		24	IN 6/12 -
6 and 12	IN 6/12 +	12		25	OUT 6/12 +
6 and 12	OUT 6/12 -	13			

Pinout is the same for the two connectors. It is strongly recommended to connect the shield of the signals transmitted to the GND pin.

Each LED summarize the Input and Output signal activity on the corresponding channel.
Each signal activity is also reported on the web browser "signal status" page.

Each differential input is not 120Ohms loaded internally for optimum compatibility with transmitted protocols.
If impedance matching is needed a small SFR16 resistor could be added directly on the D SUB pints together with the signal wire.

The 12 extra RX 422 supported datarate of each signal is about 25Kbds. This option is totally independent and do not affect the 2 standard serial interfaces.

Note: For RS 485 Telex/RTS talkback panels please ask ERECA for wiring tip.

Note: As the differential inputs are unloaded internally a small crosstalk should happen on the adjacent channel only if it is unused and left floating.

1.4   SUPERVISION

1.4.1   Password/Default

Note: If IP add is lost, press S1 switch on the front face for 5 seconds, the unit will revert to default settings.

1.4.2   IP address

Setup the IP address of the unit, after validation with the password the unit instantaneously switches to the new IP settings, an "internet" link route the user to the new address.

Default IP: 192.168.1.245 on a TX / 192.168.1.246 on a RX / NetMask 255.255.254.0.

**Further information is available in the Stage Racer Technical Manual.
Please contact us for a copy.**

2 TECHNICAL SPECIFICATIONS

Optical	
Dynamic range:	10 dB for the 12 channels (11.5 dB/8Ch, 13 dB/4Ch) pathological signal.
Connector:	NEUTRIK OpticalCon DUO or LEMO 3K (EDW / FXW)

Video SD/HD	
Number, connector:	4 to 12 channels on BNC (Each channel is direction configurable).
Direction setting	Internal Web Server.
Impedance:	75 Ω
Standard:	SDI, ASI, HD, 3G Reclocker bypass available for SDTI or MADI compatibility
Amplitude:	Input: cable equalization (140 m Belden 1694A for 3G), Output: 800 mV pp
Return loss:	Better than - 15 dB for 0 to 1500 MHz and better than - 10 dB for 1500 to 3000 MHz

Analog Video / GL	
Number, connector:	1 Bidirectional, 2 BNC
Standard:	PAL, SECAM, NTSC, Tri-level (Bi / Tri level auto sense)
Impedance:	75 Ω
Bandwidth:	> 5.8 MHz at +/- 0.2 dB
Differential Gain/ Phase	< 1%, < 1°
Group delay:	< 10 ns
SNR:	> 67 dB (CCIR567)

Analog Audio	
Number, connector:	16 bidirectional channels Rugged box: 4 on XLR / 4 on one SUB D 25 socket; for 1U rack all on SUB D 37
Impedance:	Input: 10 KΩ differential (non floating), Output: 20 Ω differential (non floating)
Amplitude:	+4 dBm nominal (saturation at + 18 dBm)
Bandwidth:	50 Hz to 15 KHz at +/- 0.5dB, (20 Hz to 20 KHz at -3 dB)
Distortion:	0.05% at 1Khz +18 dBm
Signal to noise ratio:	90dB, "A" weighted

Digital audio	
Number, connector	4 AES bidirectional (Riedel panel compatible) **OR** 1 MADI (AES10) + 2 AES bidirectional (Riedel panel compatible)
Bitrate	Up to 48 KHz AES audio / 125 MBs full bandwidth for MADI, clock phase conservative
Impedance / Connector:	75 Ω, BNC
Setting:	Internal Web Server.

Data	
Number, connector:	2 bidirectional channels, 1 RJ 45 socket per channel.
Protocols:	RS485, RS422, RS232
Data rate:	0 to 230 Kbd/s
Setting:	Internal Web Server.

Ethernet	
Number, connector:	2 channels on VLAN (802.1.ab), RJ45 Socket
Protocols:	10, 100 or 1000 mb/s, Full or Half-duplex (Auto), MDI or MDI-X (Auto)

GPIO	
Number, connector:	8 bidirectional GPIO contacts 6 on D-SUB plus 1 GPIO along each DATA RJ45 connector
Output:	Relay (dry contact). 'Common' – 'Normally Open' terminals for each relay
Input:	Floating on the D-SUB, Input pin grounding on RJ45.

Powering	
Consumption:	20 Watts per side
Low voltage source:	8 to 20 VDC, XLR 4 pins connector, protected by 5*20 mm standard internal fuse
Mains source:	From 90 to 260 VAC / 47 to 63 Hz Dual supplies in the 1U rack

Mechanical	
Rugged model:	Die cast strong aluminum case, size 335 x 235 x 111mm excluding connectors and handles
Rack model:	1 RU 19" rack, depth 300mm excluding connectors.
Cooling:	Internal fan / (Case walls acting as Heat sink / No dust entry guarantee for the RUGGED)
Operating Temp range:	From -20 to + 60°C. (Avoiding direct sun exposition)

Signaling / Setup	
Transmitted signals:	1 LED per signal
Alarms	1 LED per technical alarm (Power supply / Temperature / Fiber alarm)
Remote	All signal presence / alarm are reported trough the web server.
Settings	All settings are done trough the web server.

STAGE RACER: OPTION SPECIFICATIONS

Optical OPTION	
Redundant path:	Double optical transmission with automatic optical path selection.
Optical losses:	1.8 dB per link for optical switching

Analog Audio OPTION	
Input:	Microphone input gain block on 8 of the 16 channels
Mic input, Gain:	From 10 to 60 dB, Bypass and Tunable by 3 dB steps, through internal Web Server.
Phantom power:	48 volts switchable , through internal Web Server, Source Impedance 6.8 KΩ

Data OPTION	
Number, connector:	12 bidirectional channels, one SUB D 25 for 6 channels (1U rack version).
Protocols:	RS422
Data rate:	0 to 19.2 Kbd/s

Remote Powering OPTION on LEMO 3K	
Power topology:	Power source: 1U rack STAGE RACER Powered device: Rugged STAGE RACER box
Camera powering:	12VDC, 30 W available on XLR 4
Performance with AWG16 SMPTE cable:	2.5 km for rugged STAGE RACER box alone (no camera remote powered) 950 m for rugged STAGE RACER box + 30W camera load

Nota: Due to space limitation on the rugged box connector area; please contact ERECA Company for your application.

3 APPENDIX: CAD FILE DOCUMENT

Connector and display location diagram for STAGE RACER 1U with the following labels:

- 2 AES bidirectionnal
- RS 232/422/485 + 1 GPIO (1)
- 6 GP OUT (3 to 8)
- 16 audio output
- Composite GL/PAL/Trilevel input
- Composite GL/PAL/Trilevel output
- SPARE optical access
- 12 videos ASI / SDI / HD /3G direction configurable
- Power supply 1 90-260 VAC
- 6 GP IN (3 to 8)
- 16 audio input
- RS 232/422/485 + 1 GPIO (2)
- Power supply 2 90-260 VAC
- 2 AES Bidirectionnal or 1 MADI Bidirectionnal
- Port 2 Giga Ethernet
- Port 1 Giga Ethernet
- Payload Port 1 + Port 2 = 1Giga max. (2x 802.3.AD Vlan over 1 Gbs trunk)
- MAIN optical access.
- Main/Spare data fiber alarm Lit if low power on one optical data receiver
- Composite IN
- Composite OUT
- Link speed 100Mbs on ports 1 & 2
- Output of 2 free fibers if Neutrik Opticalcon Quad connector is used.
- DATA receiver unlocked
- Internal FAN failure
- Motherboard PSU's OK
- HDSDI 1 to 12 Presence
- MADI active
- AES 1 & 2 input signal detected
- 16 Audio in & out signal
- 8 GPIO in & out signal
- Air outlet (leave enough place for correct airflow exit)
- Fuse PSU 2
- Fuse PSU 1
- S1 switch for config reset
- PSU 1 and 2 OK
- Over temperature
- RS232/422/485 in & out signal
- AES 3 & 4 input signal detected or MADI in & out signal detected
- Optionnal Zone (Ex 12 Rs 422 channels)
- MADI input unlocked
- Link speed 1Gbs on ports 1 & 2
- Spare fiber used
- Led lit if this channel is configured as a Transmitter
- Low power on one of the video optical receivers
- Fresh air inlet (leave enough place for correct airflow)
- 315mm
- Chassis depth: 315mm
- 12 Ch chassis weight: 3,8 KG

Title block:
- UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:
- FINISH:
- DEBUR AND BREAK SHARP EDGES
- DO NOT SCALE DRAWING
- REVISION
- NAME SIGNATURE DATE
- DRAWN
- CHK'D
- APPV'D
- MFG
- Q.A
- TITLE: Connectors + Display location
- MATERIAL:
- DWG
- **STAGE RACER 1U**
- A3
- WEIGHT:
- SCALE 1:2
- SHEET 1 OF 1