Function:		Values:	Usr:	Description:
	VideoMode	**Unknown**, SD, 1080i59, 1080i50, 720p50, 720p50, 1080pfs23, 1080p59, 1080p50, 4K59, 4K50, 4K47, 4K29, 4K25, 4K23	1	
Video RX 2				
	Stream Active	Yes, **No**	1	
	Pkts in Buffer	<nnn>	1	
	VideoMode	**Unknown**, SD, 1080i59, 1080i50, 720p50, 720p50, 1080pfs23, 1080p59, 1080p50, 4K59, 4K50, 4K47, 4K29, 4K25, 4K23	1	
Video RX 3				
	Stream Active	Yes, **No**	1	
	Pkts in Buffer	<nnn>	1	
	VideoMode	**Unknown**, SD, 1080i59, 1080i50, 720p50, 720p50, 1080pfs23, 1080p59, 1080p50, 4K59, 4K50, 4K47, 4K29, 4K25, 4K23	1	
Audio				
	Stream Active	Yes, **No**	1	
	Profile	Ok, **NotOk**	1	
Intercom				
	Stream Active	Yes, **No**	1	
	Profile	Ok, **NotOk**	1	
PTP				
	Status	Listening, Calibrating, Locked, GM-found, **Off**	1	
	Path Delay	<nnn>	1	
	Offset to Master	-30000..30000 **(0)**	1	
	Selected GM	**None**, GM 1, GM 2	1	
	GM 1 Info			
	ID	???	1	
	IP	???	1	
	Status	Listening, Calibrating, Locked, **Off**	1	

Function:		Values:	Usr:	Description:
	Path Delay	<nnn>	1	
	Offset to Master	-30000..30000 **(0)**	1	
	Prio 1	0..255 **(0)**	1	
	Prio 2	0..255 **(0)**	1	
	Class	0..255 **(0)**	1	
	Accuracy	0..255 **(0)**	1	
GM 2 Info				
	ID	???	1	
	IP	???	1	
	Status	Listening, Calibrating, Locked, **Off**	1	
	Path Delay	<nnn>	1	
	Offset to Master	-30000..30000 **(0)**	1	
	Prio 1	0..255 **(0)**	1	
	Prio 2	0..255 **(0)**	1	
	Class	0..255 **(0)**	1	
	Accuracy	0..255 **(0)**	1	
Nmos Server				
	Priority	0..255 **(0)**	1	
	IP	<IP address>	1	
	Port	<port>	1	
TxApplication			S	
Private Data		**Off**, Active, NoDest	0	
Reference				
UserSelect		SDI Input, **PTP**, TriLvl, Composite, FreeRun	0	
Lock Source		**Unknown**, SDI Input, PTP, TriLvl, Composite, XF, FreeRun, FreeRun	0	
Lock Standard		**Unknown**, 1080i59, 1080i50, 720p59, 720p50, 1080p59, 1080p50, PAL, NTSC, SD, 4K50, 4K59	0	
Locked		Yes, No, **Invalid**	0	
Video Inputs				
Extern 1				
	Available	Yes, **No**	1	

Function:	Values:	Usr:	Description:
VideoMode	**Unknown**, SD, 1080i59, 1080i50, 720p50, 720p50, 1080pfs23, 1080p59, 1080p50, 4K59, 4K50, 4K47, 4K29, 4K25, 4K23	1	
Extern 2			
Available	Yes, **No**	1	
VideoMode	**Unknown**, SD, 1080i59, 1080i50, 720p50, 720p50, 1080pfs23, 1080p59, 1080p50, 4K59, 4K50, 4K47, 4K29, 4K25, 4K23	1	
Extern 3			
Available	Yes, **No**	1	
VideoMode	**Unknown**, SD, 1080i59, 1080i50, 720p50, 720p50, 1080pfs23, 1080p59, 1080p50, 4K59, 4K50, 4K47, 4K29, 4K25, 4K23	1	
BNC-D			
Available	Yes, **No**	1	
VideoMode	**Unknown**, SD, 1080i59, 1080i50, 720p50, 720p50, 1080pfs23, 1080p59, 1080p50, 4K59, 4K50, 4K47, 4K29, 4K25, 4K23	1	
HDMI			
Connected	Yes, **No**	0	
VideoMode	**Unknown**, 1080P50, 1080p59, 4K25, 4K29, 4K50, 4K59	0	
SampleFormat	**RGB**, YCrCb	0	
Bits	**8**, 10, 12	0	
HdrMode	**SDR**, PQ, HLG	0	
XF Transmission			
System Locked	**No**, Yes	0	
Fiber			
Fib B (XCU->CAM)			

Function:	Values:	Usr:	Description:
Cable Status	OK, Critic, Error, **NoSig**	0	
Signal Status	OK, Critic, Error, **NoSig**	0	
RX Margin	-100 dB..100 dB **(0 dB)**	0	
Signal Error Cnt	0..65535 **(50)**	0	
Fib A (CAM->XCU)			
Cable Status	OK, Critic, Error, **NoSig**	0	
Signal Status	OK, Critic, Error, **NoSig**	0	
RX Margin	-100 dB..100 dB **(0 dB)**	0	
Signal Error Cnt	0..65535 **(50)**	0	
Ethernet Tunnel			
CAM	**Off**, 10Mb, 100Mb, 1000Mb	0	
XCU	**Off**, On	0	
Active	**No**, Yes	0	
Transm Details			
Fiber			
Rx Margin		S	
Signal Err Cnt		S	
Ethernet Err/sec		S	
Eye Value		S	
Ethernet Load			
Rx Mb/sec		S	
Tx Mb/sec		S	
Ethernet Packets			
valid/sec		S	
error		S	
error/sec		S	
FEC Corr		S	
FEC Corr/sec		S	
Ethernet Network			
Status		S	
IP RX Info			
Loc IP		S	
Port_Ch0		S	
IP TX Info			
IP_Ch0		S	
Port_Ch0		S	

Function:		Values:	Usr:	Description:
	Stream Locked		S	
	Stream RxBuf_1		S	
	Stream RxBuf_2		S	
	Stream RxBuf_3		S	
Streams				
	Tx Available		S	
	Tx Not Used		S	
	Rx Requested		S	
	Rx Subscribed		S	
Ethernet Tunnel				
	MDIO		S	
	SGMII		S	
	PhySpeed		S	
	Tunnel Active		S	
	CAM		S	
	XCU		S	
	Rx Packets		S	
	Tx Packets		S	
C2IP Trunk				
	Rx Packets		S	
	Tx Packets		S	
Audio				
FrontMic Lvl		-127..0 **(-127)**	0	???
Audio1 Lvl		-127..0 **(-127)**	0	???
Audio2 Lvl		-127..0 **(-127)**	0	???
Audio3 Lvl		-127..0 **(-127)**	0	???
Audio 4 Lvl		-127..0 **(-127)**	0	???
Configuration				
Camera				
Type				
PID				
Alias				
Device ID				
Number				
Number				
MPB Image				
MPB Config				

Function:	Values:	Usr:	Description:
TXB Image			
TXB Config			
Viewfinder			
Type			
XCU			
Type			
Lens			
Package Info			
Package			
Code			
Version			
Component			
Valid			
Code			
Version			
Service Package			
Component	???	2	
Code	???	2	
Version	???	2	
Temperature			
Warning	**None**, Front, Head, Mpb Fpga, Txb Fpga, Fan, Fan+T, !STOP!	2	
Fan Mode	Off, **Var**, Manual	2	
Fan Profile	Silent+, Silent, **Default**, Cool	2	
Manual Speed	3000 rpm..9000 rpm **(6000 rpm)**	2	
Fan Speed			
Temp (C)			
Camera	-128 C..127 C **(0 C)**	2	
MPB FPGA	-128 C..127 C **(0 C)**	2	
Sitara	-128 C..127 C **(0 C)**	2	
TXB FPGA	-128 C..127 C **(0 C)**	2	
Front	-128 C..127 C **(0 C)**	2	
Sensor Red	-128 C..127 C **(0 C)**	S	
Sensor Green	-128 C..127 C **(0 C)**	S	
Sensor Blue	-128 C..127 C **(0 C)**	S	

Function:	Values:	Usr:	Description:
Backpanel	-128 C..127 C **(0 C)**	2	
Temp (F)			
Camera	-197 F..261 F **(0 F)**	2	
MPB FPGA	-197 F..261 F **(0 F)**	2	
Sitara	-197 F..261 F **(0 F)**	2	
TXB FPGA	-197 F..261 F **(0 F)**	2	
Front	-197 F..261 F **(0 F)**	2	
Sensor Red	-197 F..261 F **(0 F)**	S	
Sensor Green	-197 F..261 F **(0 F)**	S	
Sensor Blue	-197 F..261 F **(0 F)**	S	
Backpanel	-197 F..261 F **(0 F)**	2	
Front			
PID		2	
Code		2	
Status	0..255 **(0)**	2	
Red Sensor			
Imager Gain	0 dB..6 dB **(0 dB)**	S	
Green Sensor			
Imager Gain	0 dB..6 dB **(0 dB)**	S	
Blue Sensor			
Imager Gain	0 dB..6 dB **(0 dB)**	S	
Status			
PCB Status			
Board		2	
PID		2	
Code		2	
Rev/Ed		2	
System Status	**Unknown**, OK, Illegal, Illegal	2	
SXP Status			
SXP SW 12NC		2	
SXP SW Status		2	
SXP Detect	Yes, **No**	S	
SXP Power On	Yes, **No**	S	
SXP SW Version		S	
Status			

Function:		Values:	Usr:	Description:
	State	**??**, NoAccess, Recovered, Init, Valid	S	
	Oper.Hours	0..65535 **(0)**	S	
	Oper.Hours (SXP)	0..65535 **(0)**	S	
	Power Cycles	0..65535 **(0)**	S	
	Minimum Temp	-128 C..127 C **(0 C)**	S	
	Maximum Temp	-128 C..127 C **(0 C)**	S	
	High Temp Warn.	0..65535 **(0)**	S	

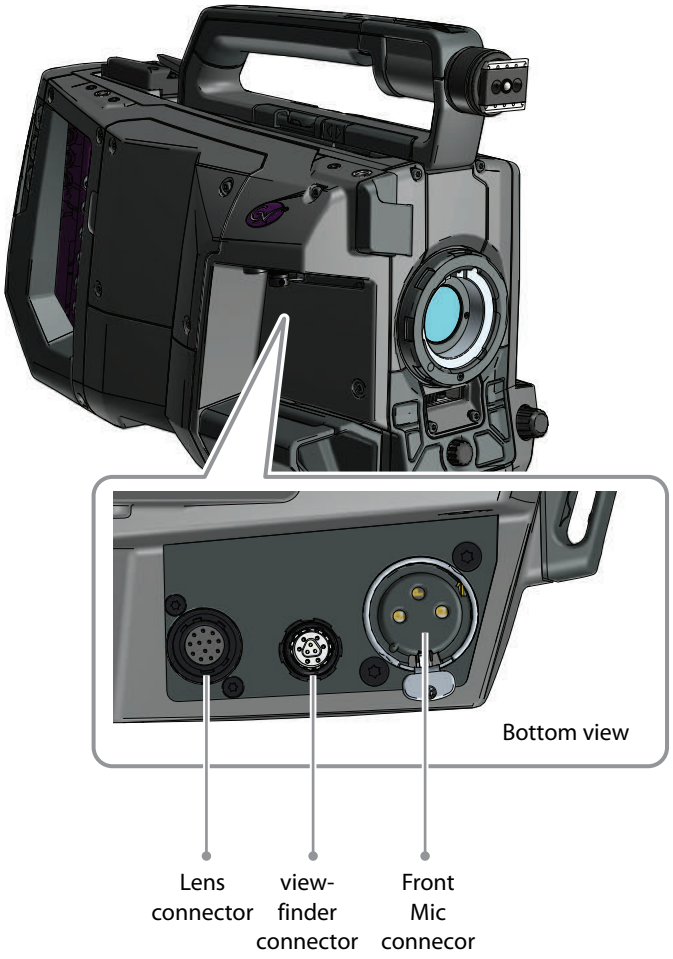
Service menu

Function:	Values:	U:	F:	Description:
Test signals				
Colour bar	**Off**, On	3	-	Enable/disable color bar
Test Signal	**Off**, On	3	-	Enable/disable test signal
Test Select	**SawT**, Step	3	-	Select Sawtooth or Stepped signal
Licenses				
Write Logfile	Exec, Busy	S	-	???
Diag Files				
File Selection				
Camera AppLog	No, **Yes**	S	-	Select Yes to include Camera Applog in diagnostics file
Config Info	No, **Yes**	S	-	Select Yes to include Camera Config in diagnostics file
Settings Info	No, **Yes**	S	-	Select Yes to include Settings Info in diagnostics file
Usage Info	No, **Yes**	S	-	Select Yes to include Usage Info in diagnostics file
Network Info	No, **Yes**	S	-	Select Yes to include Network Info in diagnostics file
Storage	**None**, SDcard, USB, SD+USB	S	-	Selec storage space for diagnostics files
Write Files	Exec, Busy, Abort	S	-	Shows writing status
Current File	**None**, Config, Usage, NetWork, Settings, AppLog	S	-	Shows file currently being written to storage space
SD Card				
Present	**Yes**, No	S	-	
Status	**Unknown**, Busy..., OK, Error, NonGV, Init..., Int. Error	S	-	
Format	**Off**, Running	S	-	
Copy to USB	Exec, Busy	S	-	
Data Partition				
Status	Unknown, Busy..., OK, Error, NonGV, Init..., Int. Error	S	-	
Space Left	0MB..65535MB	S	-	Show
Format	**Off**, Running	S	-	Select to format SD Card
USB				
Present	**No**, yes	S	-	
Space Left	0MB..65535MB	S	-	
Calibrations				

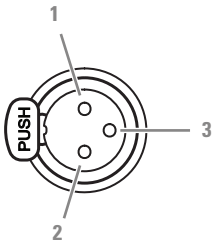
Function:	Values:	U:	F:	Description:
3200K Calibr				
3200K Calibr	**Off**, On	S	-	Select to run 3200K Calibration
3200K Reset	**Fact**, Cust	S	-	Resets 3200K Calibration data
Vref Calibr-				
Vref Calibr	**Off**, Running	S	-	Select to run Vref Calibration
Status	**Unknown**, Ok, Ready, Busy, Error, Abort, Filter Cap	S	-	Shows status of Vref Calibration
Progress	0%..100%	S	-	Progress of Vref Calibration procedure
Black Calibr				
Black Calibr	**Off**, Running	3		Select to run Black Calibration Note: this takes up to 80 seconds to complete
Status	**Unknown**, OK, Error, Fatal Error, Needed, Temp Low, Temp Unst, TimeOut, Temp Range, FullBlRec, Filter Cap, Running, Ready, Failed, Aborted	3		Shows status of the Black Calibration procedure
Progress	0%..100%	3		Progress of Black Calibration procedure
Act Temp	-128 C..127 C	3		Shows actual (current) camera temperature.
White Calibr				
User Calibr	**Off**, Running	S		Select to run User White Calibration
Status	Unknown, Error, Busy, OK, Ready, VidLvl	S		Shows status of White Calibration procedure
Progress	0%..100%	3		Progress of White Calibration procedure
User Clear	Exec, ...	S		Clears User White Calibration data
White Corr	Off, **On**	S		Enable or disable White Correction

B Connectors

Right front side



Front microphone connector



XLR 3-pin female connector
(panel view)

Pin	Description
1	Audio shield
2	Audio In (+)[1)]
3	Audio Return (-)

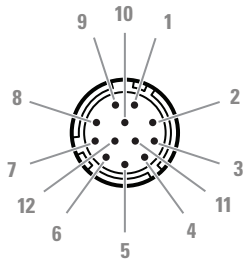
Microphone impedance >200 Ω

Nominal input level is adjustable from -22 dBu to -64 dBu in the camera menu.

Phantom power (+48 V) on this socket can be switched on or off.

[1)] Signal at pin 2 of audio input is in phase with signal at pin 2 of audio output.

Lens connector



12-pin Hirose
male connector
(panel view)

Pin	Description
1	External video on/off
2	VTR trigger switch
3	+13 VDC Return
4	Momentary iris
5	Iris control
6	+13 VDC (max 1.1 A) [1)]

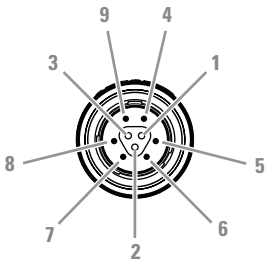
Pin	Description
7	Iris follow
8	Lens servo
9	Range Extender
10	Zoom follow
11	RxD / Focus follow [2)]
12	TxD

[1)] If more than maximum power is drawn from the lens connector, the camera automatically shuts off power to the lens. A message ("Lens Power Error") is shown in the viewfinder.

[2)] Focus Follow is not a default function of all lens types.

NOTE: Only connect broadcast ENG/EFP lenses to the lens interface connector.

Viewfinder connector

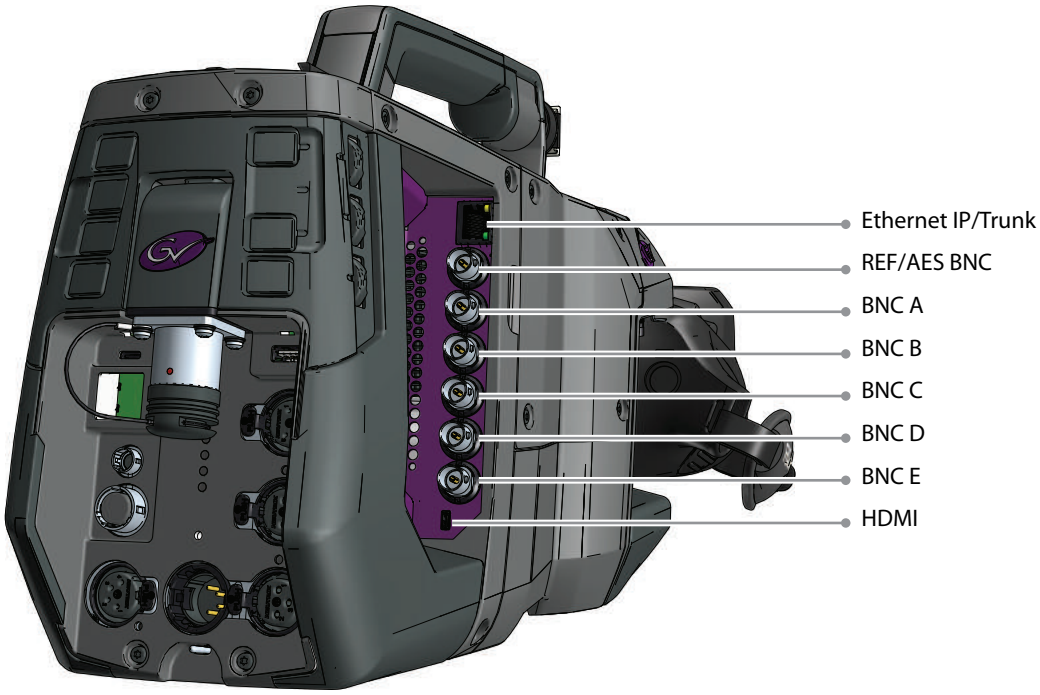


9-pin Fischer
male/female connector
(panel view)

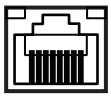
Pin	Description
1	USB - (I^2C control data)
2	Drain (Lane 1+2)
3	USB +(I^2C control data)
4	VF Power +
5	VF video (Lane 1 +)
6	VF video (Lane 1 -)
7	VF video (Lane 2 +)
8	VF video (Lane 2 -)
9	GND

manufacturer code:
Fischer MiniMax Series
MP11ZL08 2007 BK1 Z1AS

Right side connector panel



Ethernet Trunk/IP connector



8-pin standard RJ-45 ethernet connector (panel view)

Pin	Description
1	Transmit Data 1+ (TX_D1+)
2	Transmit Data 1- (TX_D1-)
3	Receive Data 2+ (RX_D2+)
4	BI_D3+
5	BI_D3-
6	Receive Data 2- (RX_D2-)
7	BI_D4+
8	BI_D4-

Ethernet 10/100/1000 Base-T compliant with IEEE-802.3 (edition 2000)

REF/AES connector

BNC connector
(panel view)

Can be programmed for Reference input, AES (AES digital audio) input, or TriLvl, Composite reference.

Go to the ***Configuration*** > ***Signals*** > ***BNC Ref/AES*** setting to change the signal for this connector.

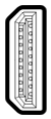
BNC A to E connectors

BNC connector
(panel view)

These BNC connectors can be programmed for different video output signals (1.5G, 3G or 12G). Refer to the table below for the options.

The following signals are available at the BNC A to E connectors. Go to the ***Configuration*** > ***Signals*** menu to change the signals for these connectors.

HDMI connector

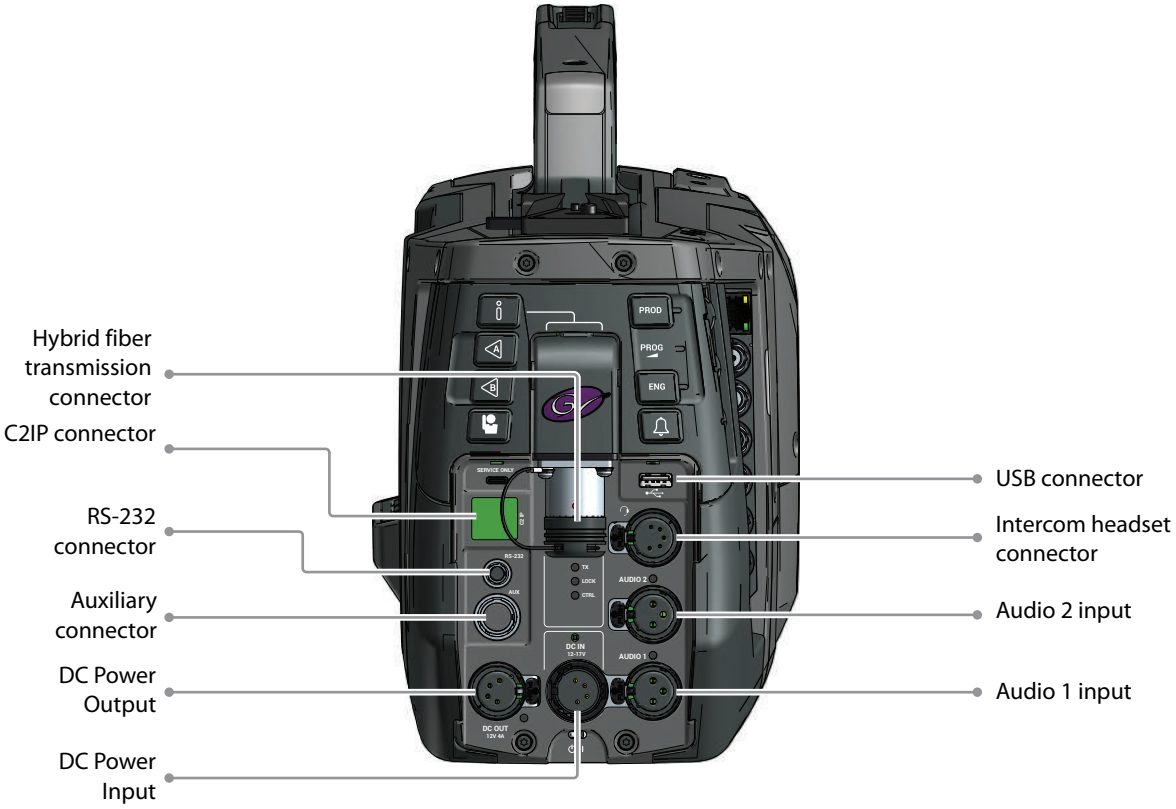


Micro HDMI (type D)
connector
(panel view)

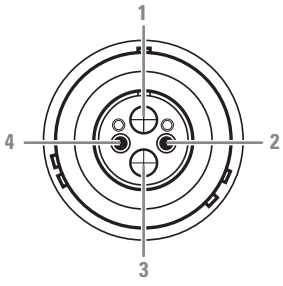
Pin	Description
1	Hot Plug Detect
2	Reserved
3	TDMS Data 2+
4	TDMS Data 2 Shield
5	TDMS Data 2 -
6	TDMS Data 1+
7	TDMS Data 1 Shield
8	TDMS Data 1-
9	TDMS Data 0+
10	TDMS Data 0 shield

Pin	Description
11	TDMS Data 0-
12	TDMS Clock+
13	TDMS Clock shield
14	TDMS clock -
15	CEC
16	GND
17	SCL-HDMI
18	SDA-HDMI
19	+5 V DC power

Back panel



Hybrid fiber transmission connector

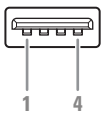


LEMO SMPTE304M Hybrid fiber connector

Pin	Description
1	Optic Fiber channel A
2	Power supply return
3	Optic Fiber channel B
4	Power

Manufacturer code: LEMO 3K.93C

USB connector

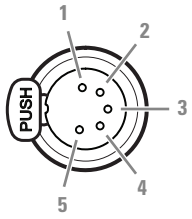


USB type A
host connector
(panel view)

Pin	Description
1	+ 5 VDC
2	Data -
3	Data +
4	GND

USB type A connector (host) compatible with USB 2.0 standard

Intercom headset connector

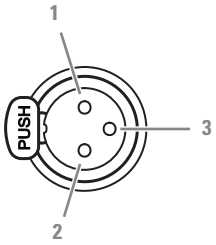


XLR 5-pin female
connector
(panel view)

Pin	Description
1	Microphone return
2	Microphone
3	Telephone return
4	Telephone left
5	Telephone right

Microphone level: -64 dBu/-24 dBu (switchable)
Microphone impedance > 600 Ω
Output level: +6 dBu nominal
Output impedance: < 50 Ω

Audio 1+2 input connectors



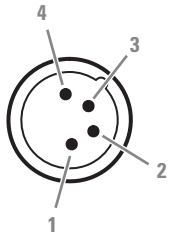
XLR 3-pin female
connector
(panel view)

Pin	Description
1	Audio shield
2	Audio In (+)[1)]
3	Audio Return (-)

Microphone impedance > 200 Ω
Phantom power +48 V switchable
Sensitivity range:
Mic: from -22 dBu to -64 dBu
Line: +4 dBu to -10 dBu

[1)] Signal at pin 2 of audio input is in phase with signal at pin 2 of audio output.

DC Power input connector

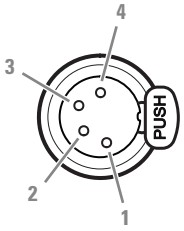


XLR 4-pin male connector (panel view)

Pin	Description	
1	GND	Pins 1 & 2 are bridged
2	GND	
3	+12 to +17 V	Pins 3 & 4 are bridged
4	+12 to +17 V	

CAUTIONS:
input voltage must not exceed 17 V
total input current must be <= 16A

DC Power output connector



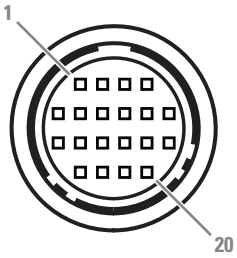
XLR 4-pin female connector (panel view)

Pin	Description	
1	GND	Pins 1 & 2 are bridged
2	GND	
3	+13 to +17 V	Pins 3 & 4 are bridged
4	+13 to +17 V	

NOTE: DC Power is not available when the camera is locally powered by the DC Power input connector.

When more than 4 A current is drawn from this connector, the power overload indicator (located next to the connector) lights.

Auxiliary connector

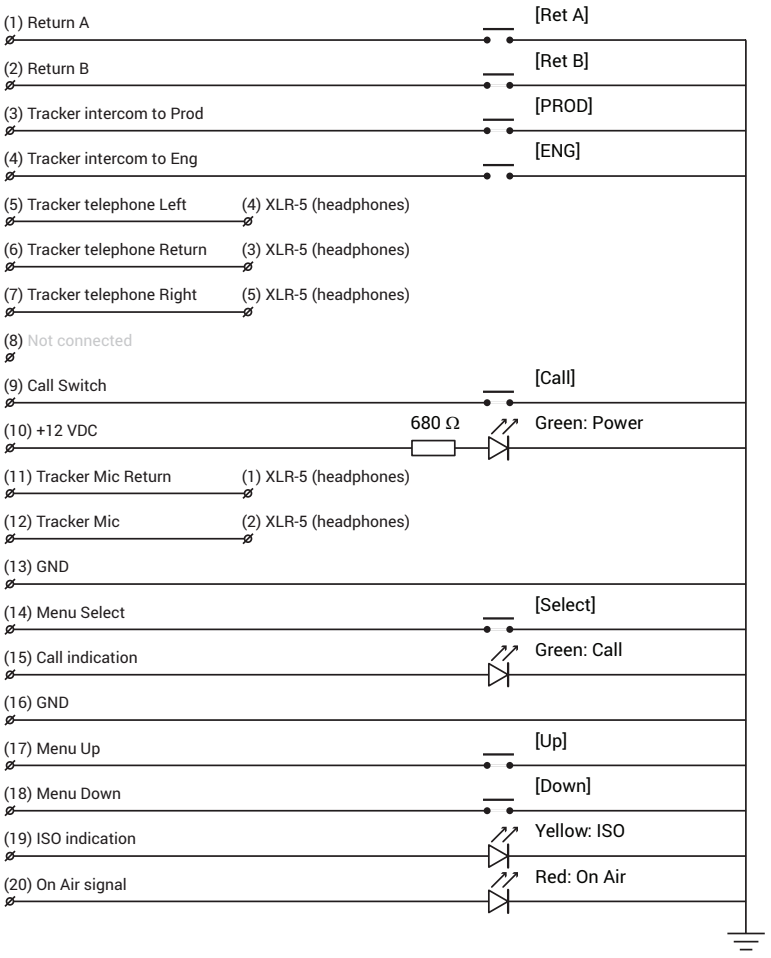


20-pin Hirose
female connector
(panel view)

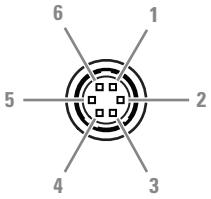
Pin	Description
1	Return A
2	Return B
3	Tracker intercom to Production
4	Tracker intercom to ENG
5	Tracker telephone left
6	Tracker telephone return
7	Tracker telephone right
8	not connected
9	Call switch
10	+12 Volt (max. 100mA)

Pin	Description
11	Tracker Microphone return
12	Tracker Microphone
13	GND
14	Menu select
15	Call indication
16	GND
17	Menu Up
18	Menu Down
19	ISO indication
20	On Air signal

Manufacturer code of the **mating** cable/plug connector: HR10A-13P-20P(C)
Below is an example for the wiring of the auxiliary connector:



RS-232 connector



6-pin Hirose
female connector
(panel view)

Pin	Description
1	GND
2	TxD1 (serial connection 1)
3	TxD2 (serial connection 2)
4	GND
5	RxD1 (serial connection 1)
6	RxD2 (serial connection 2)

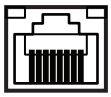
Serial connection 1: can be used for serial (private) data.

Serial connection 2: can be used for camera control or pan and tilt systems.

Signals are at RS-232 levels, 115 kB/s max.

Mating cable/plug connector:
HR10A-7P-6P(C)

C2IP Ethernet connector



8-pin standard
RJ-45 ethernet
connector
(panel view)

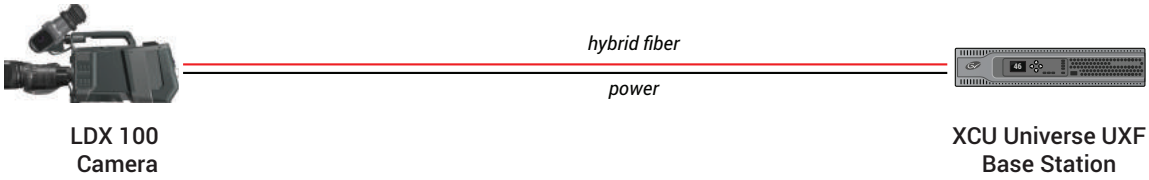
Pin	Description
1	Transmit Data 1+ (TX_D1+)
2	Transmit Data 1- (TX_D1-)
3	Receive Data 2+ (RX_D2+)
4	BI_D3+
5	BI_D3-
6	Receive Data 2- (RX_D2-)
7	BI_D4+
8	BI_D4-

Ethernet 10/100/1000 Base-T compliant with IEEE-802.3 (edition 2000)

C Video signals

XCU mode

Configuration



To switch the camera to XCU mode, go to ***Installation*** > ***Camera Mode*** and select ***XCU***.

Baseband signals

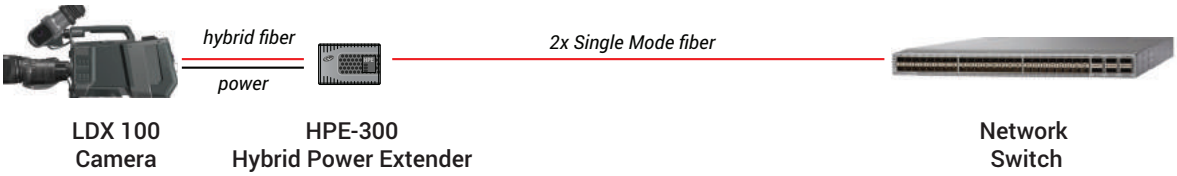
body

IP Streams

body

NativeIP mode

Configuration



To switch the camera to NativeIP mode, go to ***Installation*** > ***Camera Mode*** and select ***IP***.

Baseband (BNC) signals

Baseband signal are always available at the right side connector panel of the camera. The installation of a (Q)SFP module is not required for these signals.

Broadcast 4K video modes

Connector:	**4K150/179 (3X)** "Phases" profile[1)]	**4K50/59 (1X)** "Default" profile[1)]
BNC-A	Live combined out HDR (12 Gb/s)	Live out HDR (12 Gb/s)
BNC-B	Phase 1 out HDR (12 Gb/s)	Live out 1.5 Gb/s SMPTE 292M/296M or 3 Gb/s SMPTE 425-1 HDR or SDR[2)]
BNC-C	Phase 2 out HDR (12 Gb/s)	Ext1, 2 or 3 (1.5 Gb/s, 3 Gb/s or 12 Gb/s)[3)]
BNC-D	Phase 3 out HDR (12 Gb/s)	Ext1, 2 or 3 (270 Mb/s,1.5 Gb/s, 3 Gb/s or 12 Gb/s)[3)]
		Ext SDI input 3 Gb/s SMPTE 425-1 or 12 Gb/s SMPTE 2082[4)]
BNC-E	Monitoring out SDR (3 Gb/s)	

1. Go to ***Configuration > Signals > BNC Outputs*** and select Default or Phases.
2. To select the video mode for Live output go to ***Configuration > Signals > Live2K > Mode*** and select 1080p or 1080i. To select the dymanic range go to ***Configuration > Signals > Live2K > Source*** and select HDR or SDR.
3. In NativeIP mode Ext1 and 2 are HD/3G or 12 G formats. Return 3 is HD/3G only (transport formats: see IP streams in).
4. When BNC-D is set as SDI input and the applied SDI signal is a 1080p signal, level A/B is detected automatically and level B is converted to level A as input for the internal video router.

Filmic video modes

Connector:	**4K23.98**[1)]	**4K25**[2)]	**4K29.97**[2)]
BNC-A	UHD Live out HDR @23.98 (6 Gb/s)	UHD Live out HDR @25 (6 Gb/s)	UHD Live out HDR @29.97 (6 Gb/s)
BNC-B	HD Live out		
BNC-C			
BNC-D			
BNC-E			

1. The UHD Filmic Cinema (" UHD FilmC") license is needed.
2. The UHD filmic Broadcast ("UHD FilmB") license is needed.

IP Streams

Make sure that you have installed the right (Q)SFP modules that match the selected video mode.

Incoming IP streams

- 3X UHD HDR @4:2:2; 10 bits @150/179 Hz; - 1X UHD HDR/SDR @4:2:2; 10 bits @50/59 Hz	IP --> CAM					Bandwidth (100 G) single NIC		Remarks: (In Native IP mode three video receivers are available. RX1: up to UHD RX2: up to UHD RX3: up to 1080p)
Source >>	Switcher	Audio	Icom	Control	Trunk	ST2110-20@59.94	ST2022-6@59.94	UHD only as full raster 2110-20/21
Network connection:	V1	A1	I1	C1	T1			
Return 1 @4:2:2; 10 bits@50/59 Hz	2160p or 1080p or 1080i					11.10	11.10	2160p is full raster UHD. UHD with quadrants are not supported. Workaround for these signals is 1080p first 2SI quadrant
Return 2 @4:2:2; 10 bits@50/59 Hz	2160p or 1080p or 1080i					11.10	11.10	2160p is full raster UHD. UHD with quadrants are not supported. Workaround for these signals is 1080p first 2SI-quadrant
Return 3 @4:2:2; 10 bits@50/59 Hz	1080p or 1080i					2.77	3.20	
Total video tx:						24.97	25.40	
Audio/Intercom	IP --> CAM					Bandwidth (25G/ 100G)		
Source >>	Switcher	Audio	Icom	Control	Trunk	2110-30		
Network connection:	V1	A1	I1	C1	T1			
Audio RX		16 CH						Support for 1 ch, 2 ch, 4 ch, 8 ch, 16 ch stream 2110-30, level B
Intercom RX			16 CH					Support for 1 ch, 2 ch, 4 ch, 8 ch, 16 ch stream 2110-30, level B
Total audio/icom tx:						0.00		
Control/locking/ monitoring	IP --> CAM					Bandwidth (25G/ 100G)		
Source >>	Switcher	Audio	Icom	Control	Trunk	2110-30		
Network connection:	V1	A1	I1	C1	T1			
C2IP				TCP/IP				C2IP in band with own VLAN-tagging
Web Server								n/a

PTP				SMPT2059/ AES67				Precision time protocol, with BGM algorithm.
SAP				RFC2974				No support for announcements from other Dante nodes on the network.
LLDP				IEEE802.3-2012				LLDP is used as advertising only. No LLDP info available of switch port information
AMWA/NMOS IS-04/ 05				AMWA NMOS IS-04/05				
ARP				RFC 826				
IGMP V2/V3				RFC2236 /4604				
Total ctrl/lock/mon tx:						0.00		
Trunks	IP --> CAM					Bandwidth (25G/ 100G)		
Source >>	Switcher	Audio	Icom	Control	Trunk	2110-30		
Network connection:	V1	A1	I1	C1	T1			
1G Trunk					Ethernet packet encapsulation			Transparent interface for Ethernet packets.
Private data				TCP/IP network interface				TCP/IP interface on the media network. RS232/485 data from Aux connector is send and received with an in -band IP interface with user defined IP-destination adres/port and user defined source port. The source IP-address is the source IPaddress of the Media Network interface. Can be used with user defined VLAN tagging.
Total trunks tx:						0.00		

Outgoing IP streams

3X UHD HDR @4:2:2; 10 bits@150/179 Hz Native IP 100G	CAM --> IP						Bandwidth (100G) Single NIC	Bandwidth (100G) Single NIC	Remarks: The 100G media network interface is a single network node with one single source IP-address.
Destination:	Slomo	Switcher	Audio	Icom	Control	Trunk	2110-20/21 @59.94	2022-6 @59.94	By defautlt RS-FEC in Native IP mode. UHD only as full raster 2110-20/21.
Network connection:	V2	V1	A1	I1	C1	T1			VLAN tagging for Cntrl and Trunk only
4K phase 1 HDR	2160p						11.10		SMPTE 2110-22 Only
4K phase 2 HDR	2160p						11.10		SMPTE 2110-22 Only
4K phase 3 HDR	2160p						11.10		SMPTE 2110-22 Only
4K Live HDR		2160p					2.77		SMPTE 2110-22 Only
2K Live HDR/SDR		1080p or 1080i*							
Total video tx:							47.17	47.60	
4K single speed HDR @4:2:2; 10 bits@50/59 Hz Native IP 25G	CAM --> IP						Bandwidth (25 G)	Bandwidth (25 G)	Video paths prepared for 4:4:4; 12 bits for RAW filmic modes. 4K single speed mode also available in Native IP 100G.
Destination:	Slomo	Switcher	Audio	Icom	Control	Trunk	2110-20/21 @59.94	2022-6 @59.94	By defautlt RS-FEC in Native IP mode. UHD only as full raster 2110-20/21.
Network connection:	V2	V1	A1	I1	C1	T1			VLAN tagging for Cntrl and Trunk only
4K HDR		2160p					11.10	n/a	SMPTE 2110-22 only
2K Live HDR/SDR		1080p or 1080i					2.77	3.20	All downscaling on Main processor board. HDR/SDR user defined.
Total video tx:							13.87	14.30	
4K single speed SDR @4:2:2; 10 bits@50/59 Hz Native IP 25G	CAM --> IP						Bandwidth (25 G)	Bandwidth (25 G)	Video paths prepared for 4:4:4; 12 bits for RAW filmic modes. 4K single speed mode also available in Native IP 100G.
Destination:	Slomo	Switcher	Audio	Icom	Control	Trunk	2110-20/21 @59.94	2022-6 @59.94	By defautlt RS-FEC in Native IP mode. UHD only as full raster 2110-20/21.
Network connection:	V2	V1	A1	I1	C1	T1			VLAN tagging for Cntrl and Trunk only
4K HDR		2160p					11.10	n/a	SMPTE 2110-22 only

2K Live HDR/SDR		1080p or 1080i or 720p					2.77	3.20	All downscaling on Main processor board. HDR/SDR user defined.
Total video tx:							13.87	14.30	
Audio/intercom	CAM --> IP						Bandwidth (25 G)		
Destination:	Slomo	Switcher	Audio	Icom	Control	Trunk	2110-30		
Network connection:	V2	V1	A1	I1	C1	T1			
Audio TX			16 CH						Support for 1 ch, 2 ch, 4 ch, 8 ch, 16 ch stream
Intercom TX				16 CH					Support for 1 ch, 2 ch, 4 ch, 8 ch, 16 ch stream
Total Audio/int tx:							0.00		
Control/locking/ monitoring	CAM --> IP						Bandwidth (25 G)		
Destination:	Slomo	Switcher	Audio	Icom	Control	Trunk			
Network connection:	V2	V1	A1	I1	C1	T1			
C2IP					TCP/IP				C2IP in band with own VLAN-tagging.
PTP					SMPT2059/ AES67				Precision time protocol, with BGM algorithm.
SAP					RFC2974				Session announce protocol for discovery support of audio /intercom streams of the camera to Dante based audio /intercom equipment
LLDP					IEEE 802.3-2012				Link layer discovery protocol. Advertising identity, capabilities on a LAN.
AMWA NMOS IS-04/ 05					AMWA NMOS IS-04/05				
ARP					RFC 826				

IGMP V2/V3					RFC2236/4604				
Total Audio/int tx:							0.00		

D Procedures

Licenses

About licenses/options

With Grass Valley licenses it is possible to temporarily or permanently add one or more extra options to your LDX 100 camera.

Contact your local Grass Valley representative for information about the availability and prices of the different licenses.

Installation procedure

Licenses have the form of a **.lic** file which is a plain text file containing one or more licenses for one or more cameras. In most cases, you obtained the license file as an email or file attachment after purchasing a license from Grass Valley.

Note: It may be necessary to extract the license file(s) from a compressed (zip) archive before proceeding.

Using a USB Flash Drive

Copy the license file to the root directory of a USB Flash Drive and insert the USB Flash drive into the USB connector at the back panel of the camera head.

Note

The file system of the USB Flash Drive must be FAT32.

Adding licenses

1. In the camera menu, navigate to the **Licenses > New Licenses** menu.
2. Check the time, date and time zone settings in the **Time** menu. If these settings are correct, set the **Time & Date OK?** item to Yes and continu with step 5.
   - Date, time and time zone need to be set correctly before installing a temporary license. A temporary license uses these settings for its start date reference. Once a temporary license is activated, it will run until it is expired.
   - To confirm the correct setting of time and date, this step must be repeated after each power cycle.
3. If the time, date or time zone settings are incorrect, set the **Time & Date OK?** item to No and set the correct time in the **Change Time** menu and/or the correct date in the **Change Date** menu. After that, set the **Time & Date OK?** item to Yes.

4 Enter the **FinD Licenses** menu and select **Search Next** to start searching for licenses on the USB Flash Drive.
   - During the search process **[...]** is shown.
5 When a license is found, select **Add License** to install it.
   - License type, duration and start date (only for temporary licenses) are shown.
   - Up to 5 planned licenses are visible at the same time in the menu. More licenses can be installed; planned licenses show up when they become active.
6 Repeat steps 4 and 5 until all licenses are installed.
7 Finally, check the installed licenses in the **Licenses > Active Licenses** and the **Licenses > Planned Licenses** menus.

Tip

Websites such as http://time.is/UTC or www.timeanddate.com are a good source to find the correct date and time in a given time zone.

Trial licenses

Trial licenses can be activated at any time; they expire after 3 minutes. You do not need a license file to activate them.

To activate a trial license, navigate to the **Licenses > Trial Licenses** menu and switch on the license you want to use.

Running a trial license is a good way of checking if your camera system is capable of running a specific functionality.

Calibrations

Black Calibration

In high-end broadcast cameras such as Grass Valley's LDX 100, Black Calibration is an automated procedure that improves the image quality by re-mapping black level for each pixel to keep a consistent sensitivity over the entire image.

The Black Calibration procedure should be applied in the following cases:

- mandatory: when the message "Black Calibration needed" appears in the viewfinder. This may occur (once) after a firmware update that includes an imager update. In some cases, it may take about a minute before this message appears.
- recommended: when the ambient temperature changes by more than 20 °C / 36 °F.

Tip

The best results are achieved when camera settings and calibration conditions are similar to the intended shooting situation, for example, shortly before a shooting.

How to apply

To start the Black Calibration procedure proceed as follows:

- Switch on power and camera and wait for the system to become fully operational. To ensure the best black performance, wait until the camera has reached its operational temperature. This may take up to 30 minutes, depending on the ambient temperature.

☞ **Note**

The user level must be set to **Service** to access the Service menu.

Do not change Camera mode, Video mode and do not interrupt reference/locking during the calibration procedure.

- In the camera menu, go to the **Service > Calibrations > Black Calibr** menu and select the calibration temperature using the **Calibr Temp** item. There are two options: **37 C** (default) or **Act** (actual) temperature.
- Go to the **Black Cal** item and select it. The camera starts to warm up or cool down, depending on the ambient temperature and the selected calibration temperature. The lens is capped automatically and lens iris is closed during the calibration process. The Actual (current) temperature can be monitored using the **Act Temp** item.
- When the camera reaches the selected calibration temperature, the Black Calibration process starts. It takes up to 80 seconds to complete. During the process, you can monitor Black Calibration using the **status** item and a progress indication (%) is shown in the viewfinder.
- When the process is finished, the camera can be used normally.

☞ **Note**

It is recommended to carry out Black Calibration when the camera is used under extreme ambient temperature conditions. Make sure to set the **Calibr Temp** item to **Act** before performing the calibration.

The results of the Black Calibration procedure are stored in the camera's internal memory. The new values are used after switching the camera off and on.

Black Calibration affects all video modes within one of the following clusters of video modes: (720p+1080i+ 1080p in 1X speed), (720p+1080i+1080p in 3X speed) and 4K. The availability of video modes depend on installed licenses.

Full Black

A quicker method to carry out Black Calibration (up to 15 s of running time) is the Full Black procedure. Full Black can be started both from the CGP and the camera system menu:

CAM In the camera menu, go to the **Production Setup > Levels > Black** menu. Go to the **Full Black** item and select it to start the calibration.

The Full Black calibration procedure starts and takes approximately 10 to 15 seconds to run.

Note

The results of the Full Black procedure are NOT stored in the camera's internal memory: after switching off the camera the results are reset to their default values.

Black Calibration affects all video modes within one of the following clusters of video modes: (720p+1080i+ 1080p in 1X speed), (720p+1080i+1080p in 3X speed) and 4K. The availability of video modes depend on installed licenses.

Formatting the SD Card

In some situations it may be necessary to format the camera's internal storage (SD) Card. To format the SD Card, proceed as follows:

- Switch on the camera.

Note

The user level must be set to **Service** to access the Service menu.

- In the camera menu, go to the **Service > SD Card > Format** item and select it. The formatting process starts. It takes about one minute to complete.
- During the process, you can monitor the process using the **status** item.
- When the SD Card formatting has finished, the camera can be used normally.

Updating camera software

The basic procedure to update a camera package is as follows:

- Go the Grass Valley to find the latest software package for your camera and download it to your local PC.
- Connect your PC to the C2IP network (make sure you use the correct IP range)
- Run the LDK Scripter tool and connect to the LDX 100.
- Refer to the (embedded) documentation of the LDK Scripter to follow the update procedure for the camera.

E Installation of (Q)SFP modules

(Q)SFP modules configurations

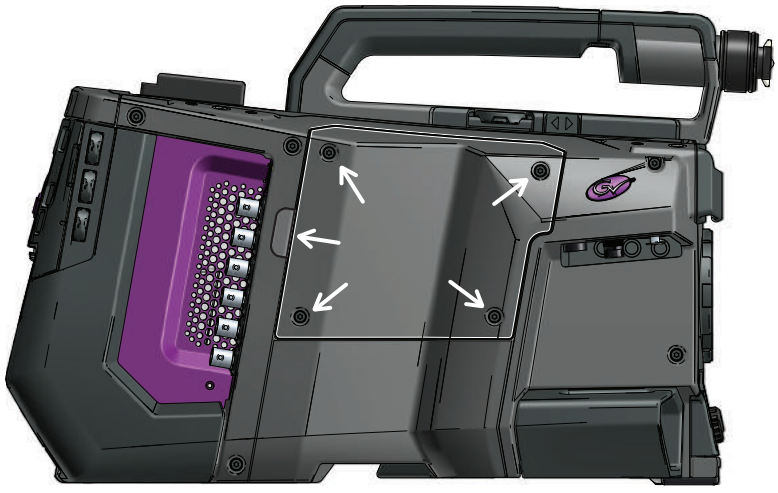
Depending on the workflow the optical connections of the camera need to be properly installed. This is done through internal installation of (Q)SFP modules.

(Q)SFP module configuration:	Workflow:	Camera mode:
none	Local/baseband mode	none
1: 1x 10G SFP (or 10/25G dual-rate SFP)	Legacy XCU modes	XCU
1: 1x 25G SFP	1x Speed UHD	NativeIP
2: 2x 25G BiDi SFP	1x Speed UHD with redundancy	NativeIP
3: 1x 100G QSFP	3x Speed UHD	NativeIP

Changing (Q)SFP modules

To install or exchange an (Q)SFP module proceed as follows:

- Switch off the camera.
- Use a Torx T10 screwdriver to loosen the four captive screws from the right side panel of the camera as indicated below:



- Lift the panel by using the small recess at the left. Remove the panel. The optic cabling and Q(SFP) module(s) become visible.

Note

The inside of the panel holds the cooling pads for the (Q)SFPs. Make sure that they stay in place and do not get deformed. Keep them free from dirt.

- Remove the LC fiber(s) from the dummy SFP module. Make sure the cable (ferrule) ends keep clean.
- Carefully remove the inserted (Q)SFP module(s) from their case(s). If two SFP modules are inserted, remove them one by one.
- If needed, place the new (Q)SFP module(s) into the suitable cage(s). Unused (Q)SFP modules can be left in their cage, the camera automatically switches off (all) unused modules.
- AFTER placing the (Q)SFP module(s), insert the fiber cables according to the desired configuration in the next section.

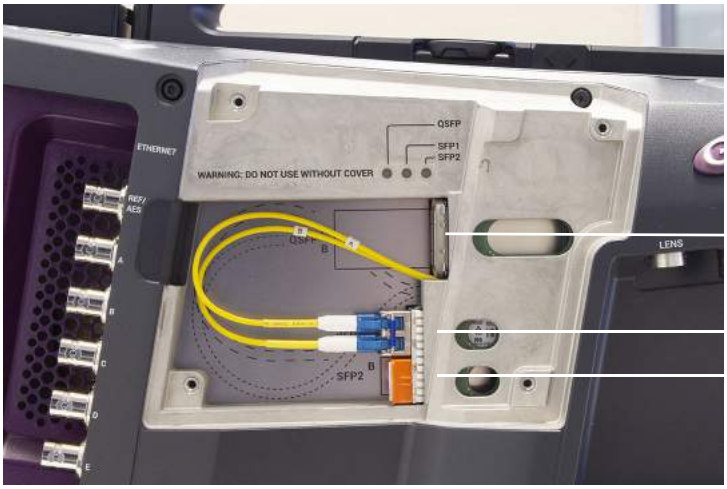
Caution

Only use (Q)SFP modules that comply to LASER CLASS 1.

Configuration 1 (1x 25G SFP module)

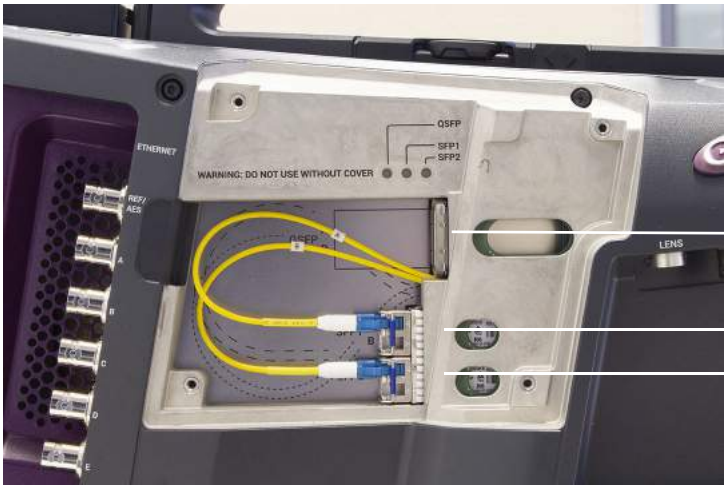
(also valid for 1x 10G/10G+25G dual-rate SFP module)

- Remove
- Insert fiber **A** into the top LC socket of the SFP module and insert fiber **B** into the bottom LC socket of the SFP module:



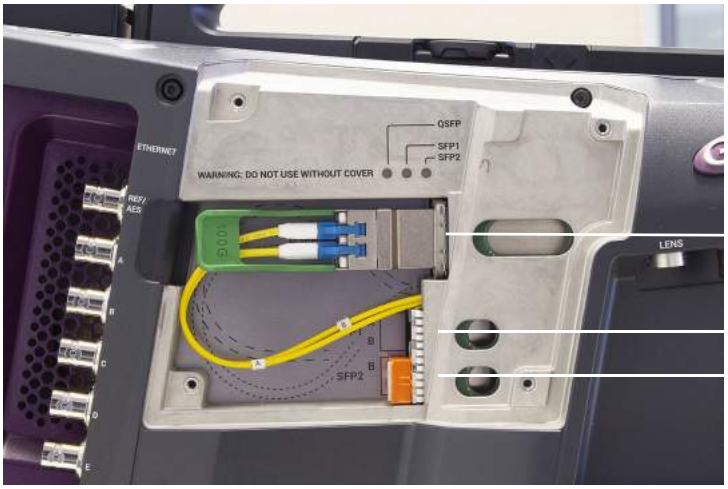
Configuration 2 (2x 25G BiDi SFP modules)

Insert fiber **A** into the top LC socket of the SFP module and insert fiber **B** into the top LC socket of the SFP module:



Configuration 3 (1x 100G QSFP module)

- Remove the plastic protection cap from the QSFP module (if present).
- Place the QSFP (without fibers) into the QSFP cage.
- Insert fiber **A** into the top LC socket of the QSFP module and insert fiber **B** into the bottom LC socket of the QSFP module.



- Reinstall the right side panel and tighten the four captive screws. Make sure that the screws are fixed hand-tight.
- The camera is now ready for operation with the new (Q)SFP configuration.

List of (Q)SFP modules

The following (Q)SFP modules have been released for use with the LDX 100:

manufacturer part number:	module type:	description:
Eoptolink EOLP-1325G-10-RI	25G/10G SFP SM 10 km 1310 nm	Single-Mode 1310 nm SFP28 Transceiver with DDM and dual CDR
Eoptolink EOLP-1396-10-I	10G SFP SM 10 km 1310 nm	Single-Mode 1310 nm 10GBASE-LW/LR Transceiver with DDM
Eoptolink EOLQ-161HG-10-LI	100G QSFP SM 10 km LR4	Single-Mode 100GBASE-LR4 QSFP28 Transceiver
EOLQ-161HG-02-SI1	100G QSFP SM 2 km CWDM4	Single-Mode CPRI/100GBASE CWDM4 2km QSFP28 Transceiver

Note

All listed modules have industrial specifications. Refer to your Grass Valley sales representative for availability and prices.

Note

Make sure that the matching ('other end') (Q)SFPs in the IP switch have the same specifications.

F Specifications

General

Temperature range (operating):	-20 °C to +45 °C (-4 °F to 113 °F)
Weight:	6.05 kg (13.3 lbs) including handgrip and shoulderpad
Dimensions (width x depth x height):	166.5 x 397.7 x 252.3 mm (6.56 x 15.66 x 9.93 in)
Power consumption (typ.):	125 W

Camera

Pick-up device:	3x 2/3" UHD Titan imagers
Smear:	no vertical smear
Shutter:	no mechanical shutter
Optical system:	F1.4 prism
Lens mount:	2/3" bayonet (B4 type) lens mount
Optical filters:	First wheel: Clear, 1/4 ND, 1/16 ND, 1/64 ND, *capped*; Second wheel: Clear, 4 point star, Soft focus Fixed: 2.5µ Optical Low Pass filter
Electronic color correction:	3200 K, 5600 K, 7500 K, FL, 2 AWB presets, Variable, Continuous Auto White
Exposure:	Electronic exposure down to 1/1000 s (in single speed operation)

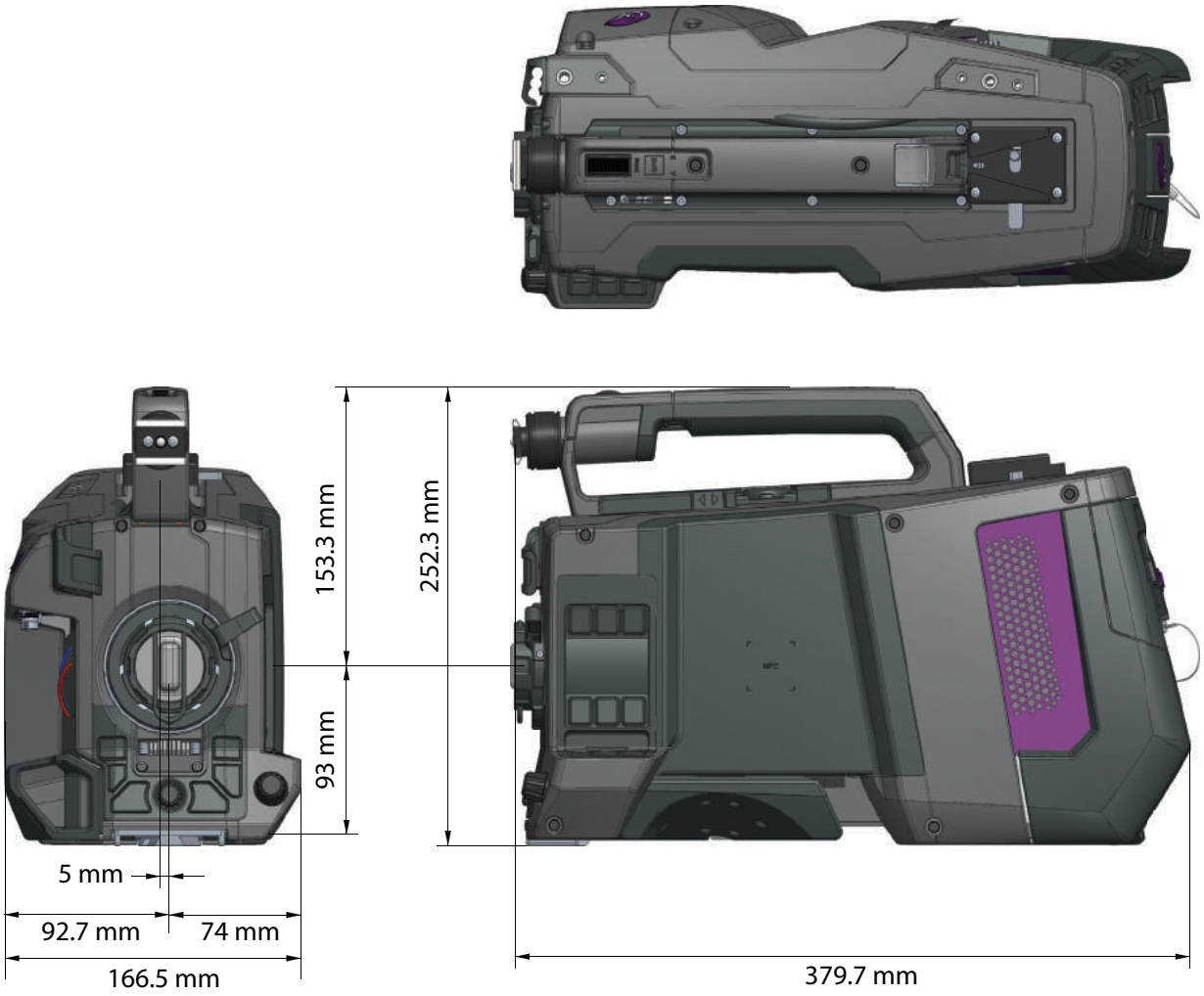
Video

S/N ratio (typ.)	60 dB (in 2160p59 video mode)
Sensitivity (@2000 lux)	F5.6 (in 2160p59 video mode)
Aspect ratio:	16:9
Gain selection:	-12 dB to +18 dB in 3 dB steps (user definable presets) or continuous gain in 0.1 dB steps
Sensitivity modes:	High Quality, Nominal or High Sensitivity

Connectivity

Microphone input (front):	XLR-3 female, balanced, with switchable +48 V phantom power
REF/AES BNC connector:	Reference input,output or AES digital audio
BNC A to E connectors:	Video BNC baseband connectors (1.5G, 3G or 12 G)
Camera control network (C2IP)	RJ-45 Ethernet connector (1 Gb/s)
Ethernet/IP Trunk	RJ-45 Ethernet connector (1 Gb/s)
Lens connector:	12p Hirose connector
Viewfinder connector:	9p Fischer MiniMax connector
Monitoring video:	Micro HDMI (type D) connector
Hybrid Fiber connector:	SMPTE 304M hybrid fiber connector (swiveling)
Mounting holes:	2x ¼" - 20 UNC + 3x M4 threaded holes (camera thread)
Audio inputs (rear):	2x XLR-3 female, balanced, with +48 V phantom power
Intercom:	XLR-5 with Engineering, Production and Program channels
DC Power input:	12 V (12 to 17 V), XLR-4 male <16 A
DC Power output:	13 V, XLR-4 female < 4 A

Dimensions



Grass Valley Technical Support

For technical assistance, contact our international support center, at 1-800-547-8949 (US and Canada) or +1 530 478 4148.

To obtain a local phone number for the support center nearest you, please consult the Contact Us section of Grass Valley's website (www.grassvalley.com).

An online form for e-mail contact is also available from the website.

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