

Xcalibur 11

User Manual

Excalibur 11 Transmitter (HX150-11-18G-T)

Excalibur 11 Receiver (HX150-11-18G-R)

4K HDMI 2.0 EXTENDER SET

150m @1080p or 120m @4K

HDMI 2.0 (4K60 4:4:4), Down-Scaler, Test Pattern, VKA,
EDID & HDCP control, Audio de-embed, PoC

Thank you for purchasing this PRODUCT

This PRODUCT is designed with the professional AV installers in mind. The many extensive features assist in system integration, validation, and maintenance.

Installation precautions

This product has special circuitry to protect it against moderate surges and static discharges. However, to ensure reliable operation and long service life, it is important to take the necessary precautions against any spikes, surges and static discharges.

Place the units away from heat sources and allow adequate ventilation.

Shielded cable and in particular cat6, cat6a or cat7 is highly recommended. As much as possible, cables should be in one piece and routed away from any noisy sources, avoiding long runs in close proximity to AC mains cables.

FEATURES	4
CONNECTORS AND CONTROLS	5
TRANSMITTER	5
<i>Front</i>	5
<i>Rear</i>	5
RECEIVER	5
<i>Front</i>	5
<i>Rear</i>	6
<i>RJ45 Status LEDs</i>	6
USING THIS EXTENDER SET	6
EXTENDER SET-UP COMMANDS	7
SYSTEM COMMANDS	7
4K DOWN-SCALING	7
HDCP OPTIONS	8
TEST PATTERN	8
VIDEO KEEP ALIVE (VKA)	8
EDID MANAGEMENT	9
FACTORY DEFAULTS	10
SYSTEM CONNECTION	11
RJ45 WIRING	12
IR PASS THROUGH	12
SPECIFICATIONS	13
GENERAL	13
ENVIRONMENTAL	13
PHYSICAL	13
PACKING LIST	13
SAFETY INSTRUCTIONS	14
AFTER SALES SERVICE	14

This 18Gbps HDMI 2.0 Xcalibur Extender Set, extends a single HDMI source up to 150m for 1080p or 120m for 4K2K to a display, using the Xcalibur 11 Transmitter and Xcalibur 11 Receiver.

The Xcalibur 11 also extend bi-directional IR & RS232 signals, together with many features such as 4K → 1080p down-scaler, Test Pattern generator, VKA (video Keep Alive), as well HDCP and EDID management. The Xcalibur Receiver unit also provides a de-embedded stereo L/R audio output.

IMPORTANT: The Transmitter and Receiver pair in this set work with all Xcalibur product range. They are not compatible with HDBaseT products.

Features

- HDMI 2.0 compatible – 18Gbps signal bandwidth
- Supports all PC and HDMI resolutions up to 4K60 4:4:4
- **150m** for 1080p or **120m** for 4K, using single Cat5e, 6, 6a, 7
- Built-in **Test Pattern** feature with several patterns and resolutions
- Video Keep-Alive (**VKA**) option prevents displays entering standby mode
- 4K → 1080p **Down-Scaler** – Set or Auto option for any 4K to 1080p
- Supports HDR, HDR10, HDR10+, HDR12, HLG and Dolby vision
- HDCP 1.4 and HDCP 2.2 compliant
- **HDCP** and **EDID** management
- HDMI audio support up to 7.1 surround sound
- **Stereo Audio** (L/R) de-embedding output at the receiver
- Supports bidirectional **RS232** pass-through
- Supports bidirectional **IR** pass-through
- Supports **CEC** pass-through
- **PoC** – Only one 24V PSU required at either the Transmitter or the Receiver

Connectors and Controls

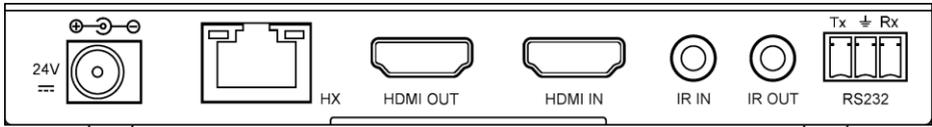
Transmitter

Front



Name	Description
Power LED	Lit – Transmitter powered
SERVICE	Micro USB for configuration or update

Rear



Name	Description
24V	24V DC Power input (2.1mm barrel jack)
HX (Cat6 Output)	RJ45 Cat6 cable output to the Xcalibur 11 Receiver
HDMI OUT	HDMI Loop-out to the local display device
HDMI IN	HDMI input from the source device
IR IN	Input for IR signal to the Receiver unit
IR OUT	IR signal output from the Receiver unit
RS232	Bi-directional RS232 control supporting Tx and Rx signals

Receiver

Front



Name	Description
Power LED	Lit – Receiver powered
SERVICE	Micro USB for configuration or update

Rear



Name	Description
24V	24V DC Power input (2.1mm barrel jack)
HX (Cat6 Input)	Cat6 cable input from the Xcalibur 11 Transmitter
HDMI OUT	HDMI output to the display device
AUDIO OUT	Stereo (L/R) analogue audio output – 3.5mm
IR IN	Input for IR control to the Transmitter unit
IR OUT	IR control signal output from the Transmitter unit
RS232	Bi-directional RS232 control supporting Tx and Rx signals

RJ45 Status LEDs

The RJ45 HX connectors on the Transmitter and Receiver units also provide LED indication of the cable link status and data signal status:

LED	Meaning
GREEN LED	Lit – Valid link status between the Transmitter and the Receiver: Solid: Good Link status Flashing: Poor Link status Off: No link detected
YELLOW LED	Lit – Valid data signal between the Transmitter and the Receiver. This LED also indicates the HDCP status: Solid: HDCP Present Flashing: No HDCP Off: No data signal

Using this Extender Set

These HDMI extenders are designed to function only with other products in the Xcalibur range.

1. Connect the video source to the HDMI input.
2. Connect the HX ports of the Xcalibur extenders using Cat6 cable.
3. If a local display is required, connect it to the Transmitter HDMI OUT.
4. Connect the 24V DC PSU to the transmitter or receiver unit
5. Connect any external controls that are required to their respective ports: i.e. RS232 or IR.
6. Connect any analogue audio amplifier to the AUDIO OUT connection on the receiver.

Extender Set-Up Commands

Connect your PC / laptop to the **SERVICE** USB connector of Xcalibur 11 Transmitter unit, which will appear as a serial port with the following port settings are:

115200 baud, 8 data bits, no parity, 1 stop bit.

All commands are in lowercase, and any spaces shown must always be included. Commands should be sent as a single burst as manual typing will often result in no response being returned. Every command must end with an exclamation mark (!). Any carriage-return (0x0d) or line-feed (0x0a) characters sent will be ignored by the device.

Every response message will terminate with a carriage-return and line-feed (0x0d 0x0a) character sequence.

In the following tables, **x**, and **y** represent parameter values that are presented in the description of the respective command.

System Commands

RS232 Command	Description	Response Example
s reboot!	Reboot the transmitter unit	System initialising (note 1)
s reset!	Restore the extender to factory defaults	System initialising (note 1)
r fw version!	Get the installed firmware versions	MCU BOOT: Vx.xx.xx MCU APP: Vx.xx.xx
help!	List all available commands	(note 2)

Notes:

1. The “**s reboot!**” and “**s reset!**” commands both respond with **System initialising...** followed by several other messages.
2. The “**help!**” command will list all available commands present.

NB: All the commands and parameters in the following sections are related to the Xcalibur 11 Transmitter unit only (SY-HX150-11-18G -T).

4K Down-Scaling

The Xcalibur 11 (SY-HX150-11 -18G-T) can be set to downscale 4K video to 1080p at the same refresh rate, by either directly downscaling 4K signals to 1080p or the ‘Auto mode’ (default) which depends on the connected Display capability.

Note that the HDMI Out of the Transmitter is pass-through and not affected by the down-scaler – it always outputs the same signal resolution as the HDMI input.

RS232 Command	Description	Response Example
s downscaler mode x!	Select the down-scaler mode: x = 0 Auto down scaling mode x = 1 4K→1080p down scaling mode x = 2 Bypass mode. No down-scaling	Down-Scale mode: Auto
r downscaler mode!	Get status of the down-scaler mode.	Down-Scale mode: 1080P

HDCP Options

The following commands independently control the HDCP options for the HDMI input, HDMI output and HX output. The default input HDCP is 'on', and both HDMI and HX output HDCP is in 'Bypass' mode.

RS232 Command	Description	Response Example
s input hdcp x!	Enable / disable the HDCP for the HDMI input. x = on (default) x = off	input hdcp on
r input hdcp!	Get the current status of the input HDCP.	input hdcp off
s hdmi hdcp x!	Set the HDCP mode for the HDMI output. x = 0 HDCP off x = 1 HDCP 1.4 x = 2 HDCP 2.2 x = 3 HDCP Bypass mode	hdmi ouput hdcp: HDCP 2.2
r hdmi hdcp!	Get the current status HDCP mode for the HDMI output of the transmitter	hdmi hdcp off
s hx hdcp x!	Set the HDCP mode for the HX output. x = 0 HDCP off x = 1 HDCP 1.4 x = 2 HDCP 2.2 x = 3 HDCP Bypass mode	hx ouput hdcp: HDCP 1.4
r hx hdcp!	Get the current status HDCP mode for the HX output of the transmitter	hx hdcp off

Test Pattern

The Xcalibur 11 transmitter (SY-HX150-11 -18G-T) can generate 6 different Test Patterns, with 3 possible resolution settings. The selected Test Pattern is activated by sending the "**s test pattern on!**" command and deactivated with the "**s test pattern off!**" command.

The default Test Pattern is set to 'Chequerboard at 1080p 60Hz', but disabled (Test Pattern off).

RS232 Command	Function	Response Example
s tp pattern x resolution y!	Set the desired Test Pattern and its resolution. x = 0 Chequerboard x = 1 Red x = 2 Green x = 3 Blue x = 4 Black x = 5 White y = 0 1080p60 y = 1 4K30 y = 2 4K60	Test pattern: Red Resolution: 4K60
r tp pattern!	Get the current settings for the Test Pattern	Test pattern: Green Resolution: 1080p60
s test pattern on!	Enable the Test Pattern	Test pattern: on
s test pattern off!	Turn off the Test Pattern	Test pattern: off

Video Keep Alive (VKA)

When there is no signal present at the HDMI input, VKA can be activated. VKA is suspended should the HDMI input signal resume, or VKA time out. The following VKA options are available:

- Output current Test Pattern – Maintain output video stream (Video Keep-Alive).
- No timing output (default) – (VKA off) No output video; hence video drop-out.
- The Test Pattern can be displayed permanently or for a programmable time interval.

RS232 Command	Description	Response Example
s vka time x!	Set the time, in minutes, after which the VKA times out and Test Pattern will be suspended. x = 1 - 240 x = 0 or > 240 will set the VKA to never time out.	Video keep-alive timeout: 38 minutes
r vka time!	Get the current maximum timeout value.	Video keep-alive timeout: 38 minutes
s vka mode x!	Enable / Disable the VKA mode: x = 0 VKA mode off (default) x = 1 VKA mode on	Video keep-alive on
r vka mode!	Get the current state of the VKA mode.	Video keep-alive off

EDID Management

The Xcalibur 11 Transmitter (HX150-11-18G-T) provides a few EDID management commands to ensure that the source is able to provide the correct image resolution to the display device.

The default EDID mode is set to 'Bypass'.

RS232 Command	Description	Response Example
s edid bypass!	Set the HDMI input to use the Receiver display EDID.	edid mode: bypass
s edid user!	Set the HDMI input to use the User EDID.	edid mode: user
s edid user1 <EDID data>!	Load the User programmable EDID memory with the <edid data>. This data is represented by space separated hexadecimal character pairs, without the brackets.	user1 EDID data: <EDID data>
r edid data hdmi x!	Get the EDID data from either the local HDMI output or the remote HDMI output. x = 1 EDID data from Transmitter HDMI OUT display. x = 2 EDID data from remote Receiver display.	EDID: <EDID data>
r edid in data!	Read the EDID data present at the HDMI input.	Input edid: <EDID data>
r edid mode!	Get the current EDID mode setting.	edid mode: bypass
r edid user1!	Read the contents of the User programmable EDID memory.	user EDID data: <EDID data>

For all EDID commands that either require or return <EDID data>, the EDID data is always given as pairs of ASCII characters representing the hexadecimal data, for example:

```
s edid user1 00 FF FF FF FF FF FF 00 ...!
```

The <EDID data> marker shown in the above table is where the actual EDID data should be placed, as shown in the above example.

The "r edid data!", "r edid data hdmi x!" and "r edid user1!" all return their respective EDID data values as ASCII encoded hexadecimal values.

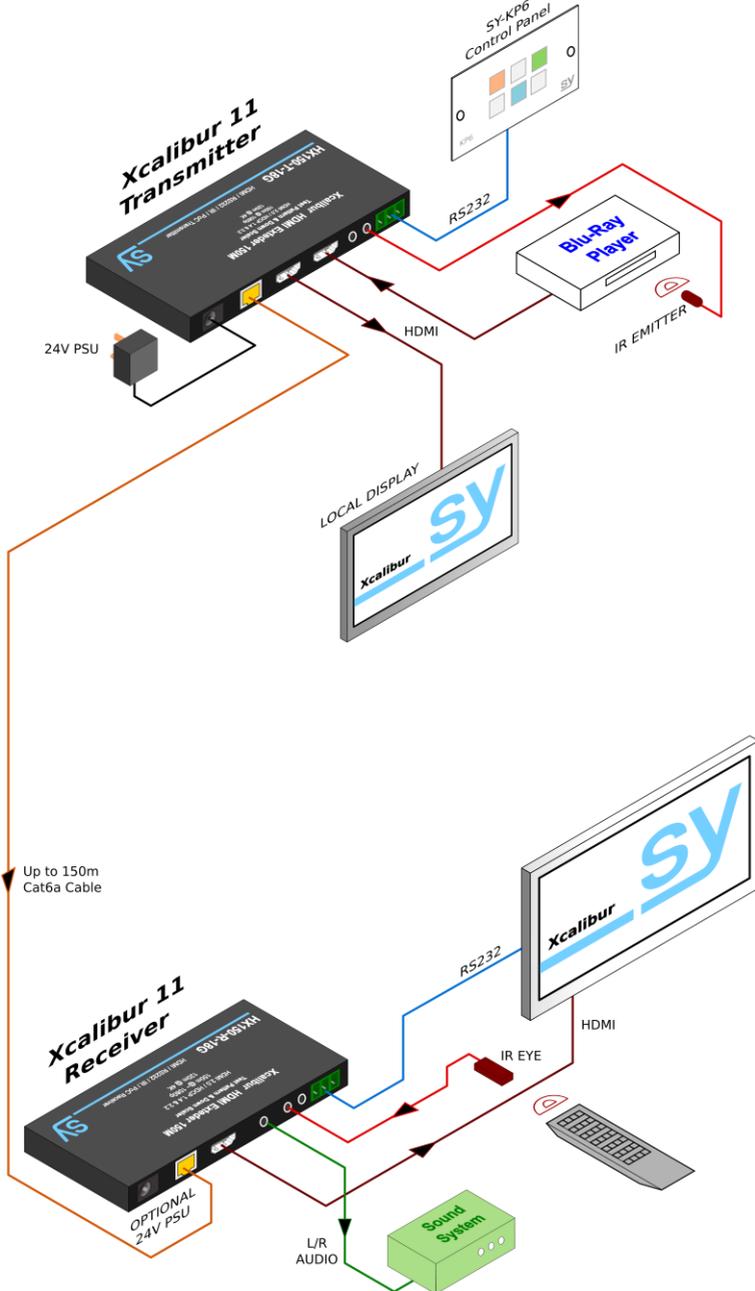
The <EDID data> marker data must contain exactly 256 hexadecimal values, with each value given as a pair of ASCII characters separated from the next pair by a single space.

Factory Defaults

The following table lists the factory default settings for each command type:

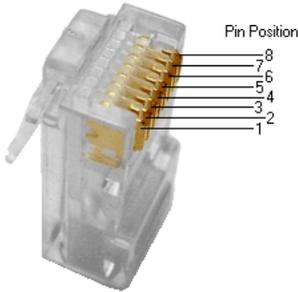
Command	Factory Default Setting
Input HDCP	On
HDMI Output HDCP	Bypass
HX Output HDCP	Bypass
Down-scaler Mode	Auto
EDID Setting	Bypass
VKA Mode (Video-Keep Alive)	Off
VKA Timeout Value	0
Test Pattern and Resolution	Chequerboard at 1080p 60Hz
Test Pattern State	Off

System Connection



RJ45 Wiring

Both connectors must be wired identically.



8	BROWN
7	WHITE / BROWN
6	GREEN
5	WHITE / BLUE
4	BLUE
3	WHITE / GREEN
2	ORANGE
1	WHITE / ORANGE

IMPORTANT: The signals used by this extender set will not pass through any Ethernet device. The transmitter and receiver provided in this set will only work with the Xcalibur product range.

Please make sure that the Cat6 cable uses 4 pairs of 23AWG solid copper wires. Do not use inferior cables such as CCA, as these exhibit high resistances.

It is recommended for the cable run between the Xcalibur Transmitter / Receiver units to be a continuous run. Cat6, cat6a, or cat7 cabling is preferred for best performance.

Only one 24V DC power supply is required either at the Transmitter or the Receiver unit.

IR Pass Through

Connect the IR Eye (IR detector) to the IR IN. Connect the IR Emitter (blaster) to the IR OUT of the remote device. The IR signals are then passed through to the remote device and emitted. The IR OUT will mix the IR signals from all the receivers, so it is best to ensure that only one. The emitter connector can be a 3.5mm mono style, in which case the entire sleeve is the +ve signal.

IR signals with carrier frequency in the range of 25-60 KHz can pass through.



Figure 1 - Xcalibur IR Eye



Figure 2 - Xcalibur IR Emitter

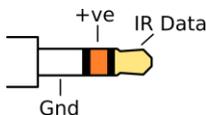


Figure 3 - IR Eye Connector Wiring

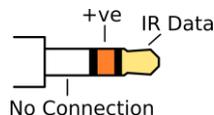


Figure 4 - IR Blaster Connector Wiring

Specifications

General

HDMI Resolutions	All HDMI and PC resolutions up to 4K2K 60Hz 4:4:4
HDMI Standard	Up to HDMI 2.0
HDCP Compliance	HDCP 1.4 & HDCP 2.2
HDMI Audio	L-PCM 2.0, 2.1, 5.1, 6.1, 7.1 Dolby Digital, Dolby TrueHD, Dolby Digital+ (DD+), DTS-ES, DTS HD Master, DTS-HRA, DTS-X
Analogue Audio Out (Receiver)	De-embedded Stereo L/R analogue output – 0.775 V rms
Transmission Distance	150m @ 1080p, 120m @ 4K2K
Power Supply	24V 1.0A
Power Consumption	10W Max (Transmitter 2.75W Receiver: 7.25)
USB SERVICE port Serial Settings	115200, 8 data, no parity, 1 stop bit for all Control Commands through the SERVICE USB port
RS232	Bi-directional RS232 (Tx, Rx) bypass port, supporting any serial baud rate
IR IN, IR OUT	25-60 KHz carrier frequency

Environmental

Operating Temperature	0 ~ 40°C (32 ~ 104°F)
Operating Humidity	10 ~ 90% RH (non-condensing)

Physical

Dimensions (WxDxH)	140 x 65 x 18 mm
Weight	250g

Packing List

- 1x User Manual
- 1x Transmitter unit
- 1x Receiver unit
- 1x 24V 1A Power Supply
- 1x IR Detector
- 1x IR Emitter
- 2x 3-way Screw Terminal Connectors
- 2x Pairs of mounting plates

Safety Instructions

To ensure reliable operation of this product as well as protecting the safety of any person using or handling these devices while powered, please observe the following instructions:

1. **ONLY USE** the power supply provided. If an alternate supply is required, check the voltage, polarity and that it has sufficient power to supply the device it is connected to.
2. **DO NOT** operate this product outside the specified temperature and humidity range given in the above specifications.
3. Ensure there is adequate ventilation as this product generates heat while operating.
4. Repair of this product should only be carried out by qualified professionals as this product contains sensitive devices that may be damaged by any mistreatment.
5. Only use this product indoors and in a dry environment. **DO NOT** allow any liquids or harmful chemicals to come into contact with this product.

After Sales Service

1. Should you experience any problems while using this product, firstly refer to the Troubleshooting section in this manual and/or your local dealer before contacting SY Technical Support.
2. When calling SY Technical Support, please provide the following information:
 - Full Product Name and Model Number
 - Product Serial Number
 - Details of the fault and any conditions under which the fault occurs.
3. This product has a two year standard warranty beginning from the date of purchase as stated on the sales invoice. For full details please refer to our Terms and Conditions.
4. The SY Product warranty is automatically void under any of the following conditions:
 - The product is already outside of its warranty period
 - Damage to the product due to incorrect usage or storage
 - Damage caused by unauthorised repairs
 - Damage caused by mistreatment of the product
5. Please direct any questions or problems you may have to your local dealer before contacting SY Electronics.

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