

## User Manual

# **MFT-31C and MFT-31V**

## **Multi-Format Wall-plate Transmitters 3 Inputs to 1 HDBaseT Output**

2 x HDMI + USB-C to HDBaseT  
or  
2 x HDMI + VGA to HDBaseT

These wall mounting Multi-Format HDBaseT Transmitters are ideal for classroom and meeting room environments where a quick and simple connection from a laptop, mobile or any other devices is required.

Both versions have three video inputs - two HDMI inputs and one other video input as either USB-C or VGA, with a single HDBaseT output.

## Features

- 2x HDMI inputs
- 1x USB-C video input or 1x VGA input (with Audio)
- 1x HDBaseT output (70m @ 1080p, 40m @ 4K30)
- RS232 control (Tx, Rx)
- RS232 data pass through
- IR Eye data pass through
- Built in IR Eye (IR receiver)
- MFT-31C supports IR learning for Display On/Off control
- Display On/Off control via RS232 and CEC
- LED indication for selected input
- LED indication for Link status to HDBaseT receiver
- Auto / Manual selection

## Panel Descriptions

### Front

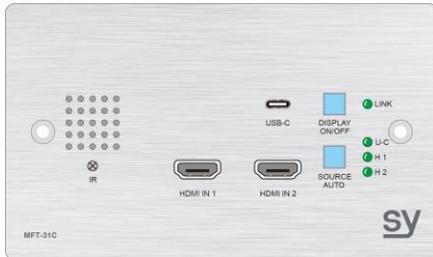


Figure 1 - SY-MFT-31C

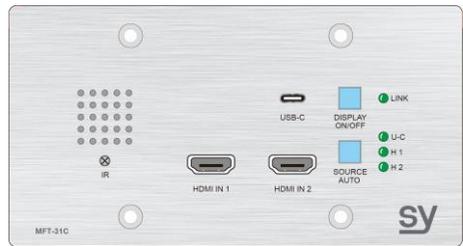


Figure 2 - SY-MFT-31CE

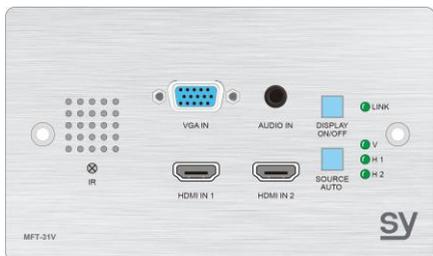


Figure 3 - SY-MFT-31V

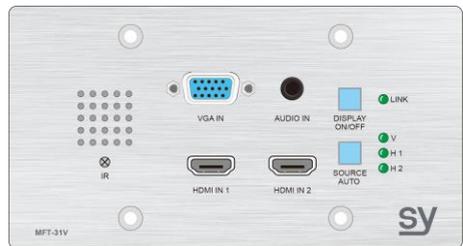
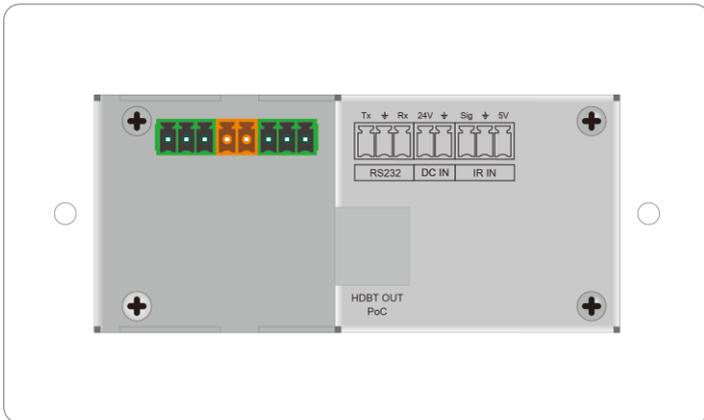


Figure 4 - SY-MFT-31VE

Name	Description
<b>IR</b>	Built-in IR Sensor for IR data to remote receiver
<b>HDMI1 &amp; HDMI2</b>	HDMI input ports, connect to HDMI sources
<b>USB-C</b>	USB Type C input connector - <b>MFT-31C / MFT-31CE</b> only
<b>VGA</b>	VGA input connector - <b>MFT-31V / MFT-31VE</b> only
<b>AUDIO IN</b>	Stereo audio input for the VGA input - <b>MFT-31V / MFT-31VE</b> only
<b>DISPLAY ON/OFF</b>	Turns the display ON or OFF via CEC or RS232 (after programming)
<b>SOURCE / AUTO</b>	Manual Input source selection or auto input detection mode
<b>LINK LED</b>	Indicates a successful data link with the HDBaseT receiver
<b>U-C LED</b>	USB-C input is selected - <b>MFT-31C / MFT-31CE</b>
<b>V LED</b>	VGA input is selected - <b>MFT-31V / MFT-31VE</b>
<b>H1 LED</b>	HDMI 1 input is selected
<b>H2 LED</b>	HDMI 2 input is selected

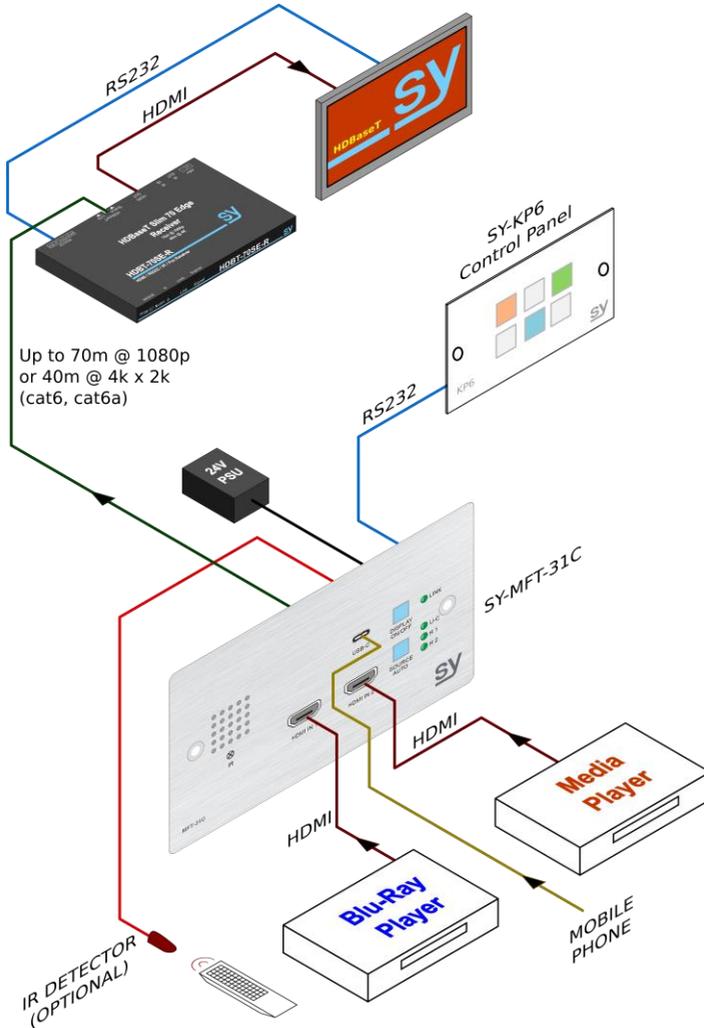
## Rear



*Figure 5 - MTF-31 Rear Panel*

Name	Description
<b>RS232</b>	RS232 port for configuration and communication via remote receiver
<b>DC IN</b>	24V DC power supply input (orange)
<b>IR IN</b>	External IR Eye input connection
<b>HDBT OUT (PoC)</b>	HDBaseT output to the receiver with Power-over-Cable in either direction (side entry)

# System Connection



System Diagram

## Connection Procedures

1. Connect the HDMI sources to the **HDMI 1** and **HDMI 2** inputs.
2. For the SY-MFT-31C, any device that has a Type C USB connector may be connected to the **USB-C** input.
3. For the SY-MFT-31V, any device that has a VGA connector may be connected to the **VGA** input, together with associated Audio.
4. Connect the HDBaseT output to a HDBaseT receiver, using cat6 cable.

5. Connect the 24V DC PSU to the MFT-31 or it can be powered from the appropriate HDBaseT receiver (with PoC).
6. If required, an RS232 controller may be connected to the rear of the MFT-31 to control the MFT-31 as well as for control of the remote display device.
7. If required, an IR Eye may be connected to the rear of the MFT-31 to control the remote display device.

## Controlling the MFT-31

The MFT-31 has two illuminated buttons that indicate their respective states when there is at least one active source present:

Button	Button Lit	Button Un-lit
<b>DISPLAY ON/OFF</b>	Display ON	Display OFF
<b>SOURCE AUTO</b>	Auto Selection Mode	Manual Selection Mode

### Using the SOURCE / AUTO Button

To toggle between MANUAL and AUTO modes, hold down the SOURCE / AUTO button for 3 seconds until the desired mode is selected.

**Manual Selection Mode:** Press to cycle through all three inputs.

**Auto Selection Mode:** Each button press will index through active inputs only. A new active input is automatically selected; whilst de-activating the current input forces selection of the next available input.

When there are no active inputs detected then all the input source LEDs will be off, and the SOURCE / AUTO button will be inactive.

### Using the DISPLAY ON/OFF Button

The Display ON/OFF button can be used to turn a display device on or off, either by using CEC commands or RS232 messages.

#### *CEC Display Power Control*

The CEC commands to change the display power status (on/off) are built-in to the MFT31 by default. Hence if the display device is CEC enabled, the ON/OFF button can switch the display on/off through the HDMI CEC line. RS232 CEC commands to the MFT31 may be used for controlling the display unit at any time.

#### *RS232 Display Power Control*

To use the RS232 feature of the Display On/Off button, the RS232 commands for the display device must be programmed into the MFT31 first. Once done, the correct RS232 power command will be sent to the display device each time the ON/OFF button is pressed.

When programming the Display On/Off RS232 commands, only use the most appropriate version of the commands given in the following table:

Function	ASCII Display Command	Binary Display Command
<b>Display On</b>	/+0x:aa	/-0x:yy
<b>Display Off</b>	/+1x:bb	/-1x:zz

Where:

- **x** is the baud rate for the display device:  
0 = 2400            1 = 4800            2 = 9600            3 = 19200  
4 = 38400        5 = 57600        6 = 115200
- **aa** is the ASCII command to turn the display on
- **bb** is the ASCII command to turn the display off
- **yy** are hexadecimal representation of the binary values to turn the display on
- **zz** are hexadecimal representation of the binary values to turn the display off

### Examples:

To set the LG power control commands using ASCII (at 9600 baud):

Display On:        \+02:ka 00 01↵

Display Off:       \+12:ka 00 00↵

Note that ↵ represents a single carriage-return character (0x0d), which is required for the LG command set.

These same commands can also be sent using binary mode commands:

Display On:        \-02:6b 61 20 30 30 20 30 31 0d

Display Off:       \-12:6b 61 20 30 30 20 30 30 0d

Note that there must be a space between each hexadecimal value, and that each hexadecimal value must consist of two ASCII characters.

## LINK LED

The LINK LED indicates a correct communication with the remote HDBaseT receiver.

## SOURCE Input LEDs

The three LEDs beside the SOURCE / AUTO button indicate the currently selected input with an active input (Flashing LED if input not active).

If there are no inputs detected, then all the source input LEDs and the SOURCE / AUTO button LED will be off.

## IR Pass-Through

The MFT-31 also supports IR pass through to the HDBaseT receiver, which can be done either by using the built-in IR sensor or by connecting an IR Eye to the rear of the MFT-31.

Always check the wiring details for the IR Eye before wiring it to the MFT-31 – The following table only gives the most common configuration:

3.5mm Connector Wiring	IR Signal Usage
Tip	+5V
Ring	Data
Sleeve	Ground

## MFT-31C IR Learning Feature

The MFT-31C / CE feature IR learning of the Display On/Off button commands:

1. Press and hold both the DISPLAY ON/OFF and SELECTION / AUTO buttons until the both the button LEDs flash alternately.
2. Use the DISPLAY ON/OFF button to choose the command to be set:
  - a. Rapid flashing indicates that DISPLAY ON mode is selected
  - b. Slow flashing indicates that DISPLAY OFF mode is selected
3. Point the IR remote at the IR sensor and press the respective button on the IR remote.
4. The DISPLAY ON/OFF button LED will stop flashing and remain lit to indicate that the IR command has been learnt.
5. Press the SOURCE / AUTO button to exit the IR learning mode.

Note that the IR Learning function will self-terminate after 30 seconds of inactivity.

To use this feature, an IR emitter must be plugged into the IR out of the HDBaseT receiver and located so as to give a direct line of sight with the display device.

## RS232 Commands

All RS232 commands should be sent as a single packet with these settings:

Baud rate:	9600
Parity:	None
Data bits:	8
Stop bits:	1

Note that the MFT-31V / MFT-31VE versions can be set to one of seven baud rate values, see **Control Port Baud Rate** below for more details.

The following sections detail the RS232 commands by category.

### Input Selection

Input Source	RS232 command
Switch to HDMI 1	50701%
Switch to HDMI 2	50702%
Switch to USB-C (MFT-31C and MFT-31CE)	50704%
Switch to VGA (MFT-31V and MFT-31VE)	50704%
Enable Auto Selection Mode	50710%
Enable Manual Selection Mode	50711%
Return Switching Mode	50712%

## EDID Management

The input resolution (EDID setting) can be set using RS232 commands to one of the options given in the following table. Please note that the EDID setting commands are used differently for the MFT-31C and MFT-31V models.

Preferred Input Video EDID	HDMI Audio Mode	MFT-31C RS232 Command	MFT-31V RS232 Command
<b>720p</b>	PCM 2ch	50768%	—
<b>720p</b>	Dolby/DTS PCM 6ch	50769%	—
<b>1360x768@60</b>	PCM 2ch	—	50769%
<b>1080p</b>	PCM 2ch	50770%	50770%
<b>1080p</b>	Dolby/DTS PCM 6ch	50771%	—
<b>4K30</b>	PCM 2ch	50772%	50771%
<b>4K30</b>	Dolby/DTS PCM 6ch	50773%	—
<b>1280x720@60 (DVI)</b>	None	50774%	50772%
<b>1920x1080p@60 (DVI)</b>	None	50775%	50773%
<b>1920x1200p@60</b>	PCM 2ch	50776%	50768%
<b>3840x2160@60 (4:2:0)</b>	PCM 2ch	50777%	—
<b>1280x720@60</b>	PCM 2ch	—	50774%
<b>1280x800@60</b>	PCM 2ch	—	50775%
<b>Get TV EDID</b>	—	—	50776%
<b>Select Default EDID</b>	—	—	50777%
<b>Copy EDID from USB</b>	As per User EDID data file	—	50781%
<b>Select User EDID Memory</b>	As per User memory EDID	50782%	50782%
<b>EDID Bypass</b>	As per Display EDID	50783%	50783%
<b>Return current EDID setting</b>	Depends on EDID setting	50784%	50784%

When setting one of the fixed input EDID values, be sure that the source equipment can produce that setting. Otherwise, a lower resolution could be chosen instead.

**User EDID** (50782%) requires a valid EDID data file to be sent to the MFT-31 device.

**EDID Bypass** (50783%) presents the display EDID directly to the video source devices.

The factory default setting is 1080p PCM 2ch.

## CEC Commands

The MFT-31 also supports sending of a few common CEC commands using RS232 command code. Specific CEC command can also be sent from the MFT-31. The RS232 commands are as given in the following table. Please note that only CEC enabled devices that have the specified logical address will respond to CEC commands.

CEC Command	RS232 Command
<b>Volume Up (MFT-31C only)</b>	50730%
<b>Volume Down (MFT-31C only)</b>	50731%
<b>Volume Mute Toggle (MFT-31C only)</b>	50732%
<b>Display On</b>	50733%
<b>Display Off</b>	50734%
<b>Send Specific CEC Command</b>	CEC<xx:xx:xx:...>

The last command given in the above table is used to send a specific CEC command, where **xx:xx:xx:...** represents the CEC data in hexadecimal format separated by colons.

Example:       CEC<40:44:41>           Display Volume Up pressed  
                  CEC<40:45>           Button released (Display Volume Up in this example)

Always refer to any relevant documentation for the device that the CEC command is intended for, as incorrect usage could produce unexpected results.

## HDCP Status

HDCP Mode	RS232 Command
<b>HDCP Active (Same as source HDCP)</b>	50706%
<b>HDCP Off</b>	50707%
<b>HDCP Force On (V1.4)</b>	50708%
<b>Get HDCP Mode (On / Off Status)</b>	50709%
<b>Get HDCP Status (V1.4 or V2.2)</b>	50713%
<b>Update HDCP 2.2 Key (MFT-31V Only)</b>	50735%

## MFT-31 System Commands

System Command	RS232 Command
<b>Get Firmware Version</b>	50699%
<b>Restore Factory Defaults</b>	50617%
<b>Disable Display On/Off Button</b>	50740%
<b>Enable Display On/Off Button</b>	50741%

## Commands Specific to the MFT-31V and MFT-31VE Only

### Output Resolution

The VGA versions of the MFT-31 also supports VGA scaling output to the HDBaseT port, which

can be set using one of the following commands. Always be sure that the display device is able to display the chosen resolution to ensure that an image can be displayed.

Output Resolution	RS232 Command
<b>Auto Adjust VGA Input</b>	50714%
<b>1024x768@60Hz</b>	50715%
<b>1280x720@50Hz</b>	50716%
<b>1280x720@60Hz</b>	50717%
<b>1360x768@60Hz</b>	50718%
<b>1600x1200@60Hz</b>	50719%
<b>1080p50</b>	50720%
<b>1080p60</b>	50721%
<b>1920x1200@60</b>	50722%
<b>3840x2160@30</b>	50723%

## VGA Audio Control

Output Resolution	RS232 Command
<b>Mute VGA Audio Input</b>	50726%
<b>Unmute VGA Audio Input</b>	50727%
<b>Get VGA Audio Mute Status</b>	50728%

## Control Port Baud Rate

The VGA versions of the MFT-31 also provide the following baud rate options for the RS232 control port. (The MFT-31C/MFT-31CE is fixed at 9600 baud only).

Control Port Baud Rate	RS232 Command
<b>2400</b>	50742%
<b>4800</b>	50743%
<b>9600</b>	50744%
<b>19200</b>	50745%
<b>38400</b>	50746%
<b>57600</b>	50747%
<b>115200</b>	50778%

## Product Part Numbers

Version	UK Format	EU Format
<b>2 x HDMI + 1 x USB-C</b>	SY-MFT-31C	SY-MFT-31CE
<b>2 x HDMI + 1 x VGA</b>	SY-MFT-31V	SY-MFT-31VE

# Specifications

## General

<b>HDMI Video Input</b>	VESA and SMPTE 480p to 2160p with 3D. All HDMI resolutions to 3840x2160p @60Hz 4:2:0		
	480p@60Hz 1080p@24Hz 4K@24Hz	576p@50Hz 1080p@50Hz 4K@30Hz	720p@60Hz 1080p@60Hz 4K@60Hz YUV4:2:0
	All PC resolutions to 1920x1200@60Hz		
<b>USB-C Video Input (for MFT-31C and MFT-31CE)</b>	Up to 4K30 4:4:4 – 4K@60Hz YUV4:2:0		
<b>VGA Video Input (for MFT-31V and MFT-31VE)</b>	Up to 1920x1200@60Hz		
<b>Audio Input (for MFT-31V and MFT-31VE)</b>	L+R 3.5mm Stereo Jack. 20Hz – 20kHz, 1.5Vrms max.		
<b>HDMI Version</b>	1.4		
<b>HDCP Version</b>	1.4 and 2.2		
<b>HDBaseT Transmission Distance</b>	4K60 4:2:0 – 40m 1080p60 – 70m		
<b>HDBaseT Bandwidth</b>	10.2 Gbps max.		
<b>Control Ports</b>	RS232 & IR		
<b>RS232 Settings</b>	Factory default: 9600, 8 bits, no parity, 1 stop bit MFT-31V/MFT-31VE also provides the following baud rate settings: 2400, 4800, 9600, 19200, 38400, 57600 and 115200		
<b>Control Connectors</b>	1x Built-in IR sensor, 2x 3-pin pluggable terminal block for RS232 and external IR Eye 1x HDBaseT output with bi-directional PoC		
<b>Power Supply</b>	24V DC @ 1.25A max.		
<b>Power Consumption</b>	5W max. (MFT-31 only – add extra for HDBaseT receiver)		

## Environmental

<b>Operating Temperature</b>	-10 to +40°C (+14 to +104°F)
<b>Operating Humidity</b>	10 to 90 % RH (non-condensing)
<b>Weight</b>	MFT-31C / 31CE: 235g MFT-31V / 31VE: 245g

## Physical

<b>Dimensions (WxHxD)</b>	UK: 146 x 86 x 43mm	EU: 151 x 80 x 43mm
<b>Case Material</b>	Aluminium chassis	

## 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. Use the power supplies provided. If an alternate supply is required, check Voltage, polarity and that it has sufficient power to supply the device it is connected to.
2. Do not operate either of these products outside the specified temperature and humidity range given in the above specifications.
3. Ensure there is adequate ventilation to allow this product to operate efficiently.
4. Repair of this equipment 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 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 before contacting SY Technical Support.
2. When calling SY Technical Support, the following information should be provided:
  - 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. 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.