User Manual

MFT62

6 Input / 2 Output Multi-Format Switcher

4 HDMI, DisplayPort and VGA inputs with independent
HDMI and HDBaseT outputs

4K UHD

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Thank you for purchasing the MFT62 Multi-format Transmitter.

This product is designed with professional AV installers in mind. The many extensive features assist with system integration, validation and maintenance. Please carefully read this manual prior to installation and keep for future reference. You can download further supporting documentations from our web site (sy.co.uk)

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, lightening and static discharges.

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

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

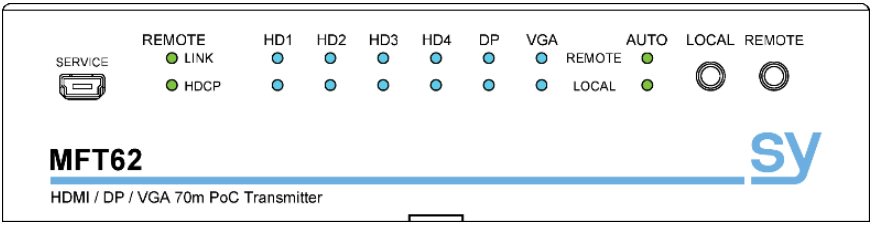
The MTF62 is a 4K 6-input Multi-Format Switcher with 2 independent outputs, Local HDMI and HDBaseT Transmitter. The HDBaseT output can broadcast up to 70m @ 1080p or 40m @ 4K 30Hz using cat6a cable.

It provides the following features:

- 4x HDMI inputs (4K UHD)
- 1x DisplayPort input
- 1x VGA input
- Local HDMI output
- Remote HDBaseT output with iPoC control
- 2x RS232 ports – For control and data pass through
- Bi-directional IR input /output
- External pushbutton interface
- EDID Management
- Auto display on/off control option on HDBaseT port

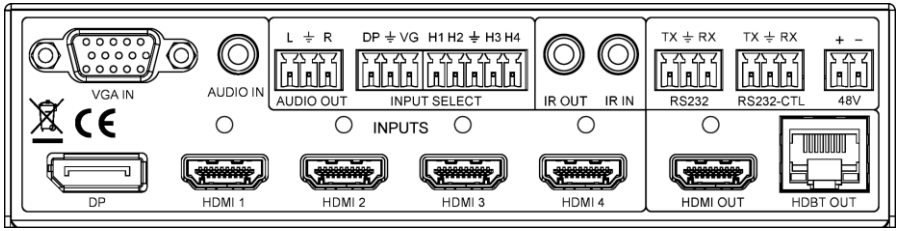
The inputs can be independently selected for either of the outputs using the front panel buttons, RS232 commands, IR commands or external contact closures.

Front Panel



Name	Description
Service	Mini USB for firmware upgrades only
Remote Link	Solid – Transmitter Receiver pair are linked
Remote HDCP	Solid – HDCP ON Flashing – HDCP OFF
HD1, HD2, HD3, HD4, DP, VGA	Solid – Currently selected input is active Flashing – No video on currently selected input
Auto	Solid – Auto mode OFF – Manual mode
Local button	Input select for the Local HDMI output. > 3S for Auto mode
Remote button	Input select for the Remote HDBaseT output. > 3S for Auto mode

Rear Panel



Name	Description
VGA IN	VGA input connector
Audio In	Analogue audio input for VGA IN
DP In	DisplayPort input connector
HDMI1 to HDMI4	HDMI Input connectors
HDMI Out	Local HDMI Output connector
HDBT Out	HDBaseT Output connector (iPoC)
Audio Out	De-embedded analogue stereo audio output from HDBT OUT
Input Select	External pushbutton (push-to-make) interface for input selection
IR In	IR input from IR eye to control devices at the remote location
IR Out	IR output to control local devices from the remote location
RS232	Pass-through RS232 between HDBaseT output and the receiver
RS232-CTL	RS232 for controlling the MFT62
48V	48V DC power input

Using the MFT62

1. Connect the video inputs as required.
2. Connect the video outputs as required.
3. Power up the MFT62.
4. Press the LOCAL button to select an input to the local display.
5. Press the REMOTE button to select an input to the remote display.
6. To use Auto input detection, press and hold either the LOCAL or the REMOTE buttons until its respective AUTO LED is lit. Auto Input detection is cancelled when the respective LOCAL or the REMOTE button is pressed and held until its AUTO LED has gone out.
7. An external pushbutton interface to the INPUT SELECT connector may also be used to select any input to the outputs either separately or simultaneously.

Front Panel Controls

The two front panel buttons allow for video input selection to the two outputs, enabling or disabling the auto input detection mode as well as changing the EDID setting for each input.

Local Button

The LOCAL button selects the signal source to send to the HDMI output of the MFT62. When the Local AUTO mode is off, repeated presses of the LOCAL button will switch sequentially through all the inputs, even if there is no signal present. When the Local AUTO mode is ON, only inputs with video signal present are selectable.

To enable or disable the Local AUTO mode, press and hold the LOCAL button until the LOCAL AUTO LED changes state (~ 3s).

Remote Button

The REMOTE button selects the signal source to send to the HDBaseT output of the MFT62. When the Remote AUTO mode is off, repeated presses of the REMOTE button will switch sequentially through all the inputs, even if there is no signal present. When the Local AUTO mode is ON, only inputs with video signal present are selectable.

To enable or disable the Local AUTO mode, press and hold the REMOTE button until the REMOTE AUTO LED changes state (~ 3s).

AUTO Detection Mode

With the Auto Mode enabled for either the LOCAL or REMOTE outputs, the MFT62 will only switch between inputs that have an active input signal. If a new input source is detected, the MFT62 will immediately switch to that input.

Should the currently selected input signal go off or become disconnected, then the MFT62 will automatically switch to the next available input signal. The direction in which this switching can be set using an RS232 command.

Input LED Modes

The Input LEDs (HD1-4, DP, and VGA) provide visual feedback as to the selected input for both the LOCAL and REMOTE outputs. An OFF LED indicates input is not selected. They also provide information about the input signal status as detailed in the following table:

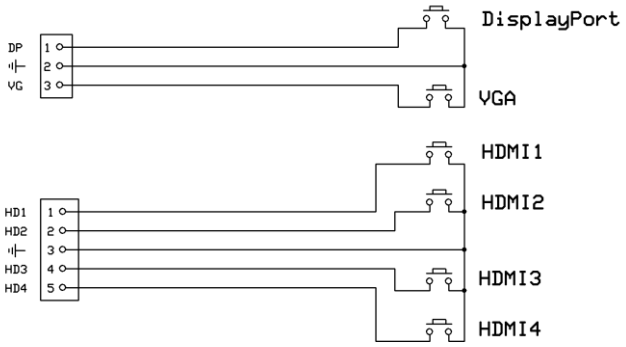
Input Selection LEDs	Input Signal State
ON	Selected - Input signal present / Active
Flashing	Selected - Input signal missing / Off
Off	Not Selected

De-embedded Audio output

Either the Local HDMI or the Remote HDBaseT output can be de-embedded and presented on the phoenix L/R Stereo output. Only PCM stereo audio streams are extracted in this way. RS232 commands allow for selection of the video output the audio is taken from, as well as enabling or disabling the analogue audio output.

Using an External Switches

The MFT62 has an interface for Input selection, using simple external Push Button switches, as shown in the following schematic:



For each connector, pin 1 is left-most when viewed from the rear of the MFT62.

An LED can be used in parallel with each switch, mirroring the input selection status as per front panel (FP). Any input selection (from FP, external PB switches, RS232) is accordingly reflected on all FP LEDs, External PB switches/LEDs, and the RS232.

The output that is controlled by the external switch can be set using an RS232 command. The available settings are: Both outputs together; the Local output only or the Remote output only.

An additional feature provided by this external keypad is that an input can be selected for preview on the Local output before setting the Remote output to that same input by pressing both the DP and VG buttons at the same time.

Cascade Mode

Cascade mode can be enabled/disabled via RS232 commands (SET CAD EN, SET CAD DIS), using RS232-CTL port. This may speed up the overall system switching speed when several devices are cascaded together (such as MFT62 to MSUHD88 to Apollo 4K to…).

EDID Setting

Each of the 6 inputs can have its own comprehensive EDID management, using RS232 commands (RS232-CTL) or manually from the front panel.

Manual EDID Setting: To access this mode, press and hold both the Local & Remote buttons together (~3s) until the LEDs flash briefly.

Remote LEDs indicate the input being set. Use the Remote button to select the desired input.

Local LEDs show the EDID setting for the selected input. Use the Local button to change the EDID setting to another value.

Press and hold the Local button to accept the new setting. The MFT62 drops out of the manual EDID setting mode when a new setting is accepted or if there is no activity for about 10 seconds, at which time the MFT62 will revert to the previously stored settings.

The following EDID table applies only to the HD1, HD2, HD3, HD4 and DP inputs:

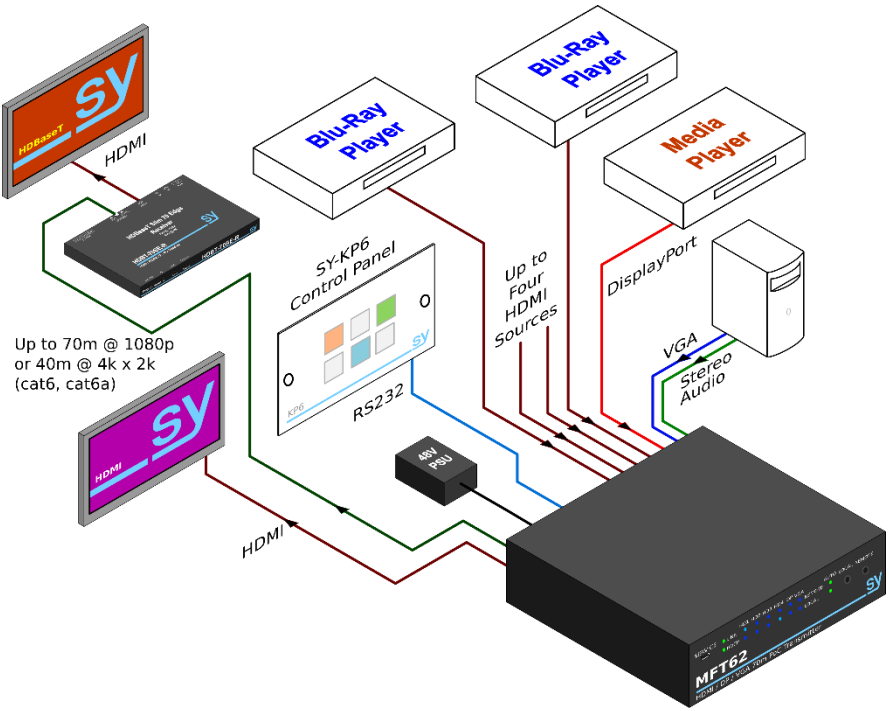
HD1	HD2	HD3	HD4	DP	VG	EDID Setting
○	○	○	○	○	○	1080P 2CH (PCM)
●	○	○	○	○	○	1080P 6CH
○	●	○	○	○	○	1080P 8CH
●	●	○	○	○	○	1080P 3D 2CH (PCM)
○	○	●	○	○	○	1080P 3D 6CH
●	○	●	○	○	○	1080P 3D 8CH
○	●	●	○	○	○	4K30Hz 3D 2CH (PCM)
●	●	●	○	○	○	4K30HZ 3D 6CH
○	○	○	●	○	○	4K30HZ 3D 8CH
●	○	○	●	○	○	4K60Hz (Y420) 3D 2CH (PCM)
○	●	○	●	○	○	4K60Hz (Y420) 3D 6CH
●	●	○	●	○	○	4K60Hz (Y420) 3D 8CH
○	○	●	●	○	○	1080P 2CH (PCM) HDR
●	○	●	●	○	○	1080P 6CH HDR
○	●	●	●	○	○	1080P 8CH HDR
●	●	●	●	○	○	1080P 3D 2CH (PCM) HDR
○	○	○	○	●	○	1080P 3D 6CH HDR
●	○	○	○	●	○	1080P 3D 8CH HDR
○	●	○	○	●	○	4K30Hz 3D 2CH (PCM) HDR
●	●	○	○	●	○	4K30Hz 3D 6CH HDR
○	○	●	○	●	○	4K30Hz 3D 8CH HDR
●	○	●	○	●	○	4K60Hz (Y420) 3D 2CH (PCM) HDR
○	●	●	○	●	○	4K60Hz (Y420) 3D 6CH HDR
●	●	●	○	●	○	4K60Hz (Y420) 3D 8CH HDR
○	○	○	●	●	○	USER1 EDID
●	○	○	●	●	○	USER2 EDID
○	●	○	●	●	○	USER3 EDID

The following EDID table applies only to the VGA input:

HD1	HD2	HD3	HD4	DP	VG	EDID Setting
○	○	○	○	○	○	VGA 1080P
●	○	○	○	○	○	USER1 EDID
○	●	○	○	○	○	USER2 EDID
●	●	○	○	○	○	USER3 EDID

The USER1 EDID, USER2 EDID and USER3 EDID memory locations on each input can only be programmed by using RS232 commands, and must contain valid EDID data before being used.

Connecting the MFT62



RS232-CTL Commands

All commands are sent at 57600 baud, 8 data bits, no parity and one stop bit.
Commands are not case sensitive, but must always be followed by a carriage-return (0x0d).

All responses are in uppercase and provide an acknowledgement of the command or reply with the requested data, and are terminated with a carriage-return & line-feed (0x0d 0x0a).

System Commands

RS232 Command	Command Details
`H`	Help – list all available commands
`STA`	Show Global System Status
`SET RST`	Reset to Factory Defaults
`SET ADDR xx`	Set System Address to xx, where xx is in the range [00~99]. The factory default is 00
`GET ADDR`	Get System Address
`SET CAS DIS`	Turn Cascade mode OFF for both outputs
`SET CAS EN`	Turn Cascade mode ON for both outputs
`GET CAS`	Get Cascade Mode Status
`GET STA`	Get System Status
`GET INx SIG STA`	Get the signal status for input x Signal present returns `INx SIG STA 1` No signal present returns `INx SIG STA 0`

Output Setup Commands

RS232 Command	Command Details
`SET OUTx VS INy`	Set Output x To Input y Output x is: 0 = Both outputs (HDMI & HDBaseT) 1 = Local HDMI output 2 = Remote HDBaseT output Input y is: 1-4 = HDMI inputs 1 to 4 5 = DisplayPort input 6 = VGA input
`SET OUT EXA DIS`	Disable Extracted Audio Output
`SET OUT EXA EN`	Enable Extracted Audio Output
`SET EXA BTV OUTx`	Set Video Output to Select for Audio De-embedding: Output x is: 1 = Local HDMI output 2 = Remote HDBaseT output
`GET OUTx VS`	Get Output x Video Routing Output x is: 0 = Both outputs (HDMI & HDBaseT) 1 = Local HDMI output 2 = Remote HDBaseT output
`GET OUT EXA`	Get Ex-Audio (de-embedded) Output Enable/Disable Status
`GET EXA BTV OUT`	Get the video output number being used for audio de-embedding

RS232-CTL to Remote HDBT Commands

RS232 Command	Command Details
SET SEPM x EN/DIS	Set data (8bit, no parity, 1 stop) Baud rate, and Enable or Disable x is: 0 = 57600 1 = 1200 2 = 2400 3 = 4800 4 = 9600 5 = 14400 6 = 19200 7 = 38400 8 = 56000 9 = 115200
GET SEPM	Get RS232 Enable/Disable state
SET HDBT OUT1 POEy	Set the PoE mode of the HDBaseT output: Where y is: 0 = Auto – The output power is only ON when a valid Slim 70 recevier is connected. 1 = Enable – Force the HDBT output power to be always on
GET HDBT OUT1 POE	Get the status of the HDBaseT output PoE mode.

HDBaseT Auto Display ON/OFF Commands

The following commands allow the programming of specific RS232 commands to be sent to the HDBaseT Receiver RS232 output port, so as to control the power state of the remote display device. An ON command is automatically sent when the first video input is detected and the OFF command is sent when the last video input is lost. The OFF command can also be sent more than once. Use the SET SEPM x EN command given above to set the baud rate at which the ON and OFF commands will be transmitted.

Where given, the ↵ character represents the carriage-return character (0x0d) that must be included in the command string. This is in addition to the carriage-return that must appear at the end of every command. For those commands, it would be easier to use a file containing the relevant MFT62 command and the display device power command and send that file to the MFT62 from a terminal emulation program. This method would be the best way to send binary power command data that cannot be represented purely by ASCII characters.

RS232 Command	Command Details
SET USER CMD SW ON/OFF	Enable or disable transmission of the User Commands On = Enable transmission of the User Commands Off = Disable transmission of the User Commands
SET USER CMD RP x	Set the number of time to send the commands, where x is from 1~9
SET USER OFF CMD DT x	Set the x delay in minutes before the OFF command is sent. x is 0 to 255
SET USER ON CMD LEN x↵ z	Set the Power On command for the display device. x is the number of bytes or characters (max. 30) z is the command values in binary or ASCII
SET USER OFF CMD LEN x↵ z	Set the Power Off command for the display device. x is the number of bytes or characters (max. 30) z is the command values in binary or ASCII
GET USER CMD SW	Return the On/Off status of the User Command
GET USER CMD RP	Return the repetition number for the User commands
GET USER OFF CMD DT	Return the delay time for the User Off command
GET USER ON CMD	Return the current User On command values
GET USER OFF CMD	Return the current User Off command values

Input EDID Setup Commands

RS232 Command	Command Details
SET INx EDID y	Set Input x EDID to the built-in EDID y Input x is: 1-4 = HDMI inputs 1 to 4 5 = DisplayPort input EDID y is one of the following (0-26): 0: 1080P_2CH(PCM) 1: 1080P_6CH 2: 1080P_8CH 3: 1080P_3D_2CH(PCM) 4: 1080P_3D_6CH 5: 1080P_3D_8CH 6: 4K30Hz_3D_2CH(PCM) 7: 4K30HZ_3D_6CH 8: 4K30HZ_3D_8CH 9: 4K60Hz(Y420)_3D_2CH(PCM) 10: 4K60Hz(Y420)_3D_6CH 11: 4K60Hz(Y420)_3D_8CH 12: 1080P_2CH(PCM)_HDR 13: 1080P_6CH_HDR 14: 1080P_8CH_HDR 15: 1080P_3D_2CH(PCM)_HDR 16: 1080P_3D_6CH_HDR 17: 1080P_3D_8CH_HDR 18: 4K30Hz_3D_2CH(PCM)_HDR 19: 4K30Hz_3D_6CH_HDR 20: 4K30Hz_3D_8CH_HDR 21: 4K60Hz(Y420)_3D_2CH(PCM)_HDR 22: 4K60Hz(Y420)_3D_6CH_HDR 23: 4K60Hz(Y420)_3D_8CH_HDR 24: USER1_EDID 25: USER2_EDID 26: USER3_EDID
SET IN6 EDID y	Set Input 6 (VGA) EDID where y is in the range 0~3. Where y is: 0 = VGA1080P 1 = USER1_EDID 2 = USER2_EDID 3 = USER3_EDID
SET INx EDID CY OUTy	Copy Output y EDID To Input x(USER1 BUF) {x[1~6], y[1~2]} (Note 1) Input x is: 1-4 = HDMI inputs 1 to 4 5 = DisplayPort input 6 = VGA input Output y is: 1 = Local HDMI output 2 = Remote HDBaseT output
SET INx EDID Uy DATAz	Write EDID To User y Buffer of Input x {x[1~6], y[1~3], z[EDID Data]
GET INx EDID	Get Input x EDID Index {x[0~6](0 All)}
GET INx EDID y DATA	Get Input x EDID y Data {x[1~5],y[0~26]}
GET IN6 EDID y DATA	Get VGA input EDID y Data {y[0~3]}
GET OUTx EDID DATA	Get Output x EDID Data x is: 1 = Local HDMI output, 2 = Remote HDBaseT output

Note 1: This command must be followed by either the `SET INx EDID y` or the `SET IN6 EDID y` command, as appropriate for the respective input and the programmed User EDID memory.

IR Code Setup

RS232 Command	Command Details
`SET IR SYS xx yy`	Set IR System Code Where xx and yy define a 16-bit address, each in the range [00-FF] (Factory default is 00 FF)
`SET IR OUTx INy CODE zz`	Set IR Data Code {x[1~2], y[1~6], zz[00~FF]} Define the IR data code to select the inputs and outputs: Output x is: 1 = Local HDMI output 2 = Remote HDBaseT output Input y is: 1 - 4 = HDMI inputs 1 to 4 5 = DisplayPort input 6 = VGA input Data value zz is for the given input and output combination. Each value must be unique. Default IR values are: Local Remote HDMI 1 to Output 0x80 0x90 HDMI 2 to Output 0x82 0x92 HDMI 3 to Output 0x84 0x94 HDMI 4 to Output 0x86 0x96 DisplayPort to Output 0x88 0x98 VGA to Output 0x8a 0x9a
`GET IR SYS`	Get IR System Code
`GET IR OUTx INy CODE`	Get IR Data Code for {x[0~2], y[1~6]} x[0~2] 0 = Both outputs, 1 = Local HDMI, 2 = Remote HDBaseT y[1~6] 1 - 4 = inputs HDMI 1 to 4, 5 = DP, 6 = VGA

Back Panel PB Input Selection

RS232 Command	Command Details
`SET BP SEL BUTx`	Set "INPUT SELECT" Push buttons to operate output x is: 0 = Both outputs, 1 = Local HDMI, 2 = Remote HDBT
`GET BP SEL BUT`	Get "INPUT SELECT" push buttons function setting

Auto Mode Commands

RS232 Command	Command Details
`SET HDx AUTO EN`	Enable Auto Mode. x is: 0=Both, 1= Local HDMI, 2= Remote HDBT
`SET HDx AUTO DIS`	Disable Auto Mode. x is: 0=Both, 1= Local HDMI, 2= Remote HDBT
`SET HDx ACRCN`	Switch to the next available input port, for output x Output x is: 0 = Both outputs, 1 = Local HDMI, 2 = Remote HDBT
`SET AUTO DETECT L`	Auto mode fall back to the LEFT (6, 5, 4, …)
`SET AUTO DETECT R`	Auto mode fall back to the RIGHT (1, 2, 3, …)
`GET HDx AUTO`	Get output Auto mode status. x is: 1 = Local HDMI, 2= Remote HDBT
`GET AUTO DETECT`	Get Auto Mode direction status

Other Response Messages

There are two additional response messages that indicate the input video signal status:

RS232 Command	Command Details
`INx SIG STA 1`	A valid video signal is detected at input x. x = 0 - 6
`INx SIG STA 0`	The video signal for input x is turned off or disconnected. x = 0 - 6

The above messages are sent either when the MFT62 is powered up or whenever the status of the input video signal changes. They are not included as part of the `GET STA` command.

The input video signal status can be obtained using the `STA` command, which provides a detailed report of the status and settings of the MFT62. The **Input Setup Status** section shows **Link = ON** for any input where there is a valid input signal or **Link = OFF** for any input where there is no signal.

De-embedded Audio output

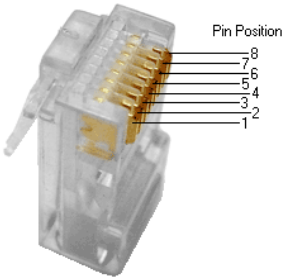
The Local or Remote HDBaseT outputs are de-embedded and presented on the phoenix L/R Stereo output. Only PCM stereo audio streams are extracted in this way. The factory default is set to the Remote HDBaseT output, this can be changed using RS232 commands, see System Commands on page 10.

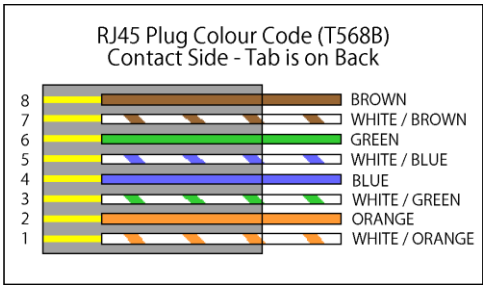
Specification

Items	Description
HDMI Video Input/output	VESA and SMPTE 480p to 2160p (4K UHD) with 3D. (All resolutions to: 4096x2160p @60Hz 4:2:0 8bit, 3840x2160p @30Hz 4:4:4 8bit) All PC resolutions to 1920x1200
VGA Video Input	The following VGA resolutions are supported: 800x600, 1024x768, 1280x768, 1280x800, 1280x1024, 1400x1050, 1600x1200, 1920x1080 and 1920x1200.
HDMI Audio Input/output	Pass through: All HDMI audio formats including Dolby D (TrueHD) / DTS (HD-Master Audio) / PCM. Channel count: from 2-8 (2.0 to 7.1) Sample rates: 32 kHz, 44.1 kHz, 48 kHz, 88.2 kHz, 96 kHz, 176.4 kHz and 192 kHz
De-embedded Audio out	PCM 2.0 channel from the LOCAL or HDBT output, onto 3 pin Phoenix connector. Stereo L/R, 0.7V Rms – 20Hz-20KHz
HDBaseT Output	Max 70m (230 feet) of cat6a @ 1080p. Max of 40m (130 feet) of cat6a @ 4K30 HDMI video, RS232, IR control & iPoC (when SY-HDBT-SLIM-70SR is detected).
Power Supply	48V DC @ 0.5A max.
Control	RS232 & IR Full function bi-directional pass-though RS232-CTL port – 57,600 Baud, no Parity, 1 Stop bit
Power Consumption	14.4W including the receiver
Dimensions	164 x 145 x 40mm
Case Material	Metal chassis
Weight	860g

RJ45 Cabling Details

The RJ45 connectors should both be wired to the T568B standard as follows:





Ensure that the cable terminations are correctly wired and properly crimped before inserting the cable connector into the HDBT output port of the MFT-62.

Note: You may use cat5e, cat6 UTP in conjunction with the HDBaseT output. However, for best performance use cat6a or cat7 (particularly in electrically noisy environments). The maximum distances & transmission performance for HDMI and HDBT may be compromised by cable quality, patch panels, poor termination, wall plates, cable kinks and electrical interferences. Generally, ensure that the cat cable is solid copper core (avoid CCA type), in one straight run (avoid/minimise patches) and avoid close proximity to any noisy electrical sources.

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.