REFERENCE GUIDE V. 1.3

CT6020HD

List of Contents

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Appendix A   List of Abbreviations

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About this Reference Guide

This Reference Guide provides instructions and information for the installation and operation of the CT6020HD.

This Reference Guide should be kept in a safe place for reference for the life of the equipment. It is not intended that this Reference Guide will be amended by the issue of individual pages. Any revision will be by a complete reissue. Further copies of this Reference Guide can be ordered from the address shown on *page viii*. If passing the equipment to a third party, also pass the relevant documentation.

Issues of this Reference Guide are listed below:

Issue	Date	Build Version	Comments
1	December 2008	1.0	Initial release.
1	January 2009	1.1	Update
1	March	1.2	Notes added

Note…

The Build Version in the table refers to an overall number which encompasses all the various software/firmware versions of video, audio, etc in the device.

Acknowledgements

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Warnings, Cautions and Notes

Heed Warnings

All warnings on the product and in the operating instructions should be adhered to. The manufacturer can not be held responsible for injuries or damage where warnings and cautions have been ignored or taken lightly.

Read Instructions

All the safety and operating instructions should be read before this product is operated.

Follow Instructions

All operating and use instructions should be followed.

Retain Instructions

The safety and operating instructions should be retained for future reference.

> **Warnings...**
>
> **Warnings give information which, if strictly observed, will prevent personal injury or death, OR DAMAGE TO PERSONAL PROPERTY OR THE ENVIRONMENT. They are boxed and shaded for emphasis, as in this example, and are placed immediately preceding the point at which the reader requires them.**

> **Cautions...**
>
> Cautions give information which, if strictly followed, will prevent damage to equipment or other goods. They are boxed for emphasis, as in this example, and are placed immediately preceding the point at which the reader requires them.

> **Notes...**
>
> Notes provide supplementary information. They are highlighted for emphasis, as in this example, and are placed immediately after the relevant text.

EMC Compliance

This equipment is certified to the EMC requirements detailed in *Annex B, Technical Specification*. To maintain this certification, only use the leads supplied or if in doubt contact Customer Services.

RF Exposure Info:

For body worn operation, device has been tested and meets FCC RF exposure guidelines when used with an accessory that contains no metal and that positions device a minimum of 20cm from the body. Use of other accessories may not ensure compliance with FCC RF exposure guidelines.

Technical Training

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Germany

Return of Equipment

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1. Introduction to the CT6020HD

1.1 Preliminary Remarks

This manual is provided for users and operators of the CT6020HD Transmitter. It is intended to support the installation, operation, maintenance and daily use of the unit in general.

The manual should be kept with the CT6020HD Transmitter and may be consulted when questions occur. Should problems remain after you have read the manual carefully or if you have any further questions concerning the functionality or operation of the Transmitter, please contact Customer Service.

1.2 Designation and P/N

Designation   CT6020HD

Frequency range   P/N

6.425 – 6.525 GHz   11.2456.000

1.3 Description

General Information on D-ENG (Digital Electronic News Gathering)

The introduction of the DVB standard established the basis for digital broadcast video transmission making efficient use of the available bandwidth. Powerful compression algorithms allow a reduction in the amount of data to be transferred, while maintaining the high quality standards for video and audio signals used in broad-casting applications. New modulation techniques and error correction algorithms ensure a secure signal transmission even when the transmission conditions are poor.

The DVB-T standard was established for terrestrial digital TV broadcasting, in particular considering the difficult conditions of radio transmission. The highly efficient OFDM multicarrier modulation procedure enables transmission without interference even under multipath propagation conditions occurring with non-directional transmission or reception. Practical experience soon has proved that the DVB-T standard guarantees ruggedness of transmission to an extent even allowing mobile reception.

Increasing miniaturization, in particular of MPEG encoders and OFDM modulators, enables using the DVB-T standard for mobile portable transmission systems.

Previous analog FM systems were adversely affected by signal reflections directly resulting in video and audio interferences. Such effects do not occur when the digital ENG system (D-ENG) is deployed. Even mobile transmission from moving vehicles or the use of omni-directional antennas on the transmitting or receiving side does not impair the picture or sound quality at all, opening a completely new range of applications in TV production and news gathering.

Video Inputs

The CT6020HD accepts only HDSDI and SDI information at the input:

- SDI BNC(f)

OFDM (Orthogonal Frequency Division Multiplex) Modulator

The digital data signal for wireless transmission is processed by the OFDM Modulator and following IQ Modulator. The OFDM modulation procedure has a major impact on the transmission properties and was specifically developed for terrestrial radio transmission.

User interface

The integrated Multifunctional Display allows easy configuration of the device. The current Software and firmware version can also be displayed.

Linear Power Amplifier

The linear power amplifier amplifies the output signal of the Modulator to an output of about 200 mW (+23 dBm). The output port is located on top of the device.

2. Installing the Equipment

2.1 Safety instructions

<div style="border:2px solid red; color:red;">

Warning

The regulations of VDE0100 must be observed for installation and operation of the unit.

</div>

<div style="border:2px solid olive;">

Caution

• Establish all other connections before starting the unit by connecting it to 12VDC. Essential, a valid video signal must be connected to the desired input before power on the CT6020HD.

• When you connect the CT6020HD as described in the following sections, make sure that the "Caution" instructions given there are observed.

• Make sure that there is sufficient air circulation to ensure adequate cooling of the unit.
External forced ventilation may be required if the unit is installed in a rack or cabinet.

</div>

2.2 Connectors
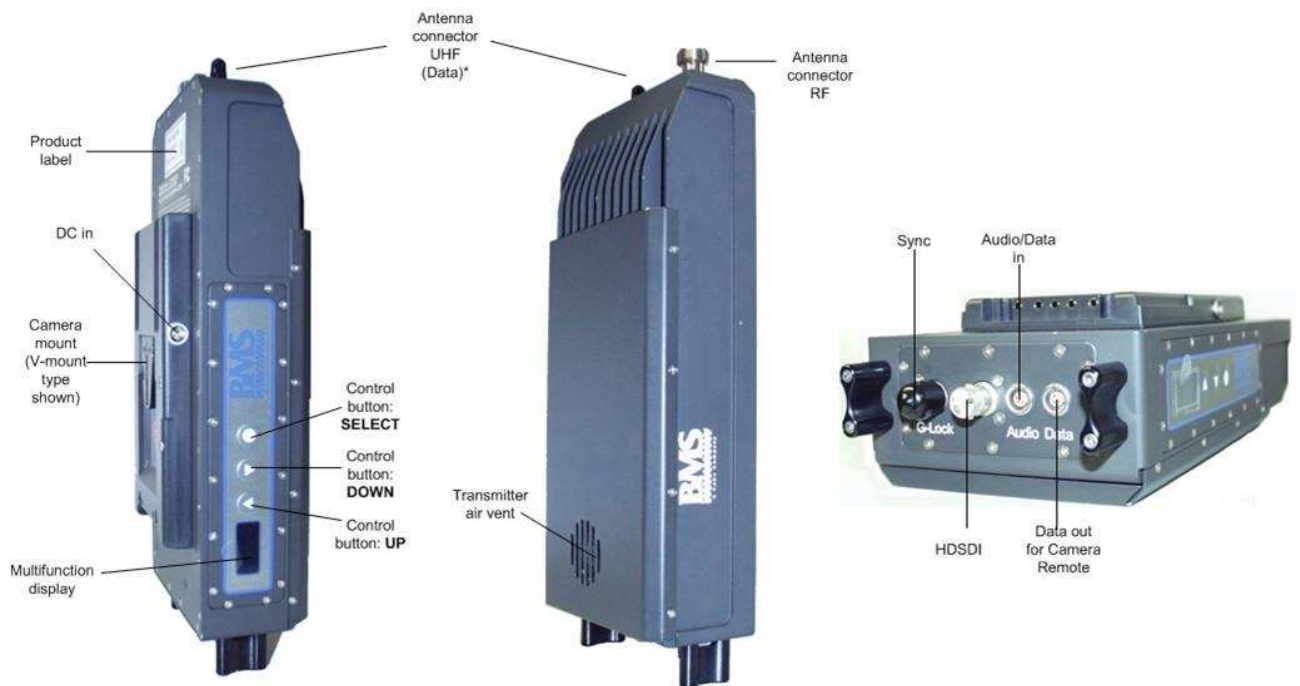
Figure 1   Input connector of the CT6020HD

RF Connector

The RF output signal of the Low-Power Amplifier is fed out at the N(f) connector on top of the unit.

The CT6020HD provides RF output of about 200 mW (+23dBm).

Connecting Signal Sources

The Video signal supplied by the camera has to be applied to the HDSDI BNC(f) connector of the transmitter.

The Audio signal supplied by the camera has to be applied to the Audio in 5pol Lemo connector of the transmitter.

Connecting the RF Output

An omni directional antenna with N(m) connector can be directly mounted at the RF out socket.

Connecting the UHF Data Input (optional)

An UHF antenna with SMA(m) connector can be directly mounted at the UHF in socket.

Connecting the 12VDC Supply Voltage

> ## Caution
>
> When using a battery or power pack, make sure that the minimum supply current is at least 3A and the output voltage matches the input voltage range of the CT6020HD.
>
> Failure to comply with these requirements **may cause fatal damage** to the battery/power pack and/or CT6020HD.

Battery Powered Operation of the CT6020HD

Many types of batteries are available on the market and we tried to support the best ones.

2.3 Shut-Down

> ## Caution
>
> To shut-down the unit, first disconnect it from the 12VDC supply voltage.

After disconnection from the supply voltage by removing the battery or disconnecting the 12VDC supply cable, the other connecting cables can be removed from the unit.

3. Operating the Equipment

3.1 Multifunctional display
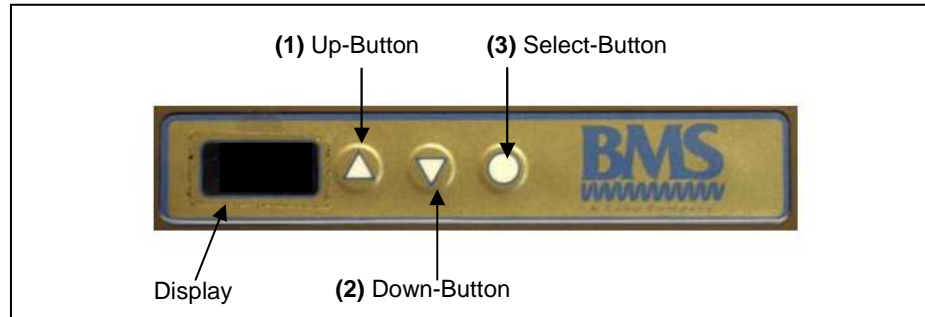
During start up the transmitter is in a self test mode. After the self test the transmitter's name is displayed before the display permanentlyshows the current frequency.

Current transmission frequency
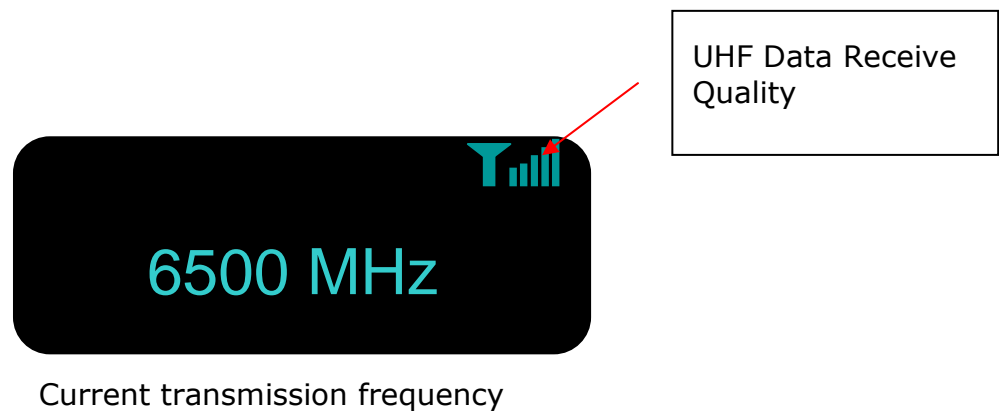
The automatic COFDM setup is very easy to handle.

When the Enter-Button is pressed and held for approximately 2 seconds the setup menu is accessible:

Menu structure as follows:
- (1) FREQUENCY
- (2) RESOLUTION
- (3) FRAME RATE
- (4) MODULATION
- (5)   LATENCY
- (6) AUDIO INPUT
- (7) LINE GAIN
- (8) MIC GAIN
- (9)   MIC PHANTOM
- (10) DATA FREQ
- (11) OUTPUT POWER
- (12) CONTRAST
- (13) DISPLAY OFF
- (14) SOFTWARE
- *(15) STATUS**
- *(15) ENCODER FW* (after a re-start please reset this option)*

Use Up and Down button to navigate through this menu. To activate a sub menu press Enter-button for 2 seconds.

To exit all sub menus press Enter button.

3.2 Frequency input (1)

At the frequency menu the current frequency is displayed.

FREQUENCY 📶

6500 MHz

To change the frequency press Enter button for 2 sec.

The inverted digit displays the current changeable position of the frequency. By use of Up and Down button the inverted digit can be changed, digit by digit. To confirm a change and switch to the next position of the frequency press Enter-button and continue with the next digit. To save the changed frequency and leave this sub-menu press Enter-button after all digits of the frequency are set.

3.3 Resolution (2)

In the sub menu "Resolution" the desired resolution of your transmitter can be chosen.

Four options for resolution are available. For proper selection, please check the video output of your camera.

- SD
- 720p
- 1080i
- 1080p

To edit the resolution sub-menu press Enter-Button for 2 seconds.

Use the Up- and Down-Buttons for navigation and select the desired modulation by pressing the Enter-Button.

To exit this submenu press Enter-Button.

3.4 Framerate (3)

After setting the resolution (1080p/1080i/720p/SD) it is important to set the correct corresponding frame-rate.

Please check, at all costs, which HD output signal, which resolution the video signal has and which frame-rate (1080p/1080i/720p) the camera is set to. A list of the resolution and corresponding frame rates is added below.

The following Frame rates are available:

- 23,98 Hz (1080p)
- 24 Hz (1080p)
- 24 PsF (1080p)
- 50 Hz (1080i/720p/SD)
- 59,94 Hz (1080i/720p/SD)
- 60 Hz (1080i/720p/SD)

To edit the frame rate sub-menu press Enter-Button for 2 seconds.

Use the Up- and Down-Buttons for navigation and select the desired frame rate by pressing the Enter-Button.

To exit this submenu press Enter-Button.

Note

With PsF, a progressive frame is sliced into two "segments", with the odd lines in one segment and the even lines in the other segment. This allows for a progressive picture to be processed through the same electronic circuitry that is used to store, process and route interlaced video. Technically, progressive segments are equivalent to interlaced fields, but unlike native interlaced video, there is no motion between the two fields to make up the video frame, both fields represent the same instant in time.

3.5 Modulation (4)

In the sub menu "Modulation" the Modulation method can be changed. The following options are available:

- QPSK (if SD Resolution is selected)
- 16 QAM (if SD Resolution is selected)
- 64 QAM (1080p/1080i/720p/SD)

Below table shows the Bitrates for the different modulation options. FEC and Guard Interval will be changed automatically along with the selected modulation.

Bitrate for SD Modulations

Modulation	FEC	GUARD	BITRATE
QPSK	½	1/32	6.03 MBit/s
16QAM	½	1/32	12.06 MBit/s
64QAM	½	1/32	18.09 MBit/s

Bitrate for HD Modulations

Modulation	FEC	GUARD	BITRATE
64QAM	2/3	1/32	24.13 MBit/s

Note

If you have selected the HD resolution 1080p or 1080i or 720p a modulation of 64QAM will be used and can not be changed.
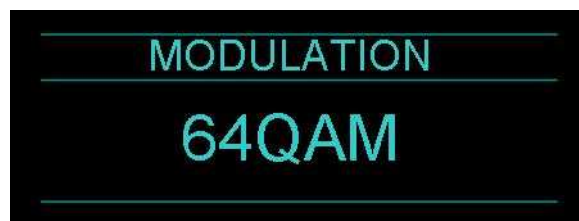
To edit the modulation sub-menu press Enter-Button for 2 seconds.

Use the Up- and Down-Buttons for navigation and select the desired modulation by pressing the Enter-Button.

To exit this submenu press Enter-Button.

3.5 Latency (5)

In the sub-menu "Latency" the latency can be chosen. There are two settings, "Ultra low" and "Standard".

If low latency is your requirement, then please use the "Ultra-low" setting

If you require a higher picture quality then use the option "Standard".

To edit the latency sub-menu press Enter-Button for 2 seconds.

Use the Up- and Down-Buttons for navigation and select the desired latency by pressing the Enter-Button.

To exit this submenu press Enter-Button.

3.6 Audio Input (6)

In the sub menu "Audio Input" the required Audio input can be chosen.

- LINE
- MIC
- EMBEDDED

Please set the transmitter Audio input to match the selected Audio input source. For example, if you use a microphone then please chose the option "MIC". Having chosen "MIC" then you must check further settings under sub-menu points 8 (Mic Gain) & 9 (MIC Phantom)

Correspondingly the choice of "LINE" Option for an external Audio signal would require checking and adjusting the settings for point 7 (Line Gain).

To edit the audio input sub-menu press Enter-Button for 2 seconds.

Use the Up- and Down-Buttons for navigation and select the desired audio input by pressing the Enter-Button.

To exit this submenu press Enter-Button.

3.7 Line Gain (7)

Sub menue "LINE GAIN" will become available, if you have selected "Line" as your input source. Line amplification options are

+00dB;+10dB…..(in 1dB steps)…..+65dB

To edit the line gain sub-menu press Enter-Button for 2 seconds.

Use the Up- and Down-Buttons for navigation and select the desired line gain by pressing the Enter-Button.

To exit this submenu press Enter-Button.

3.8 Mic Gain (8)

Sub menue "MIC GAIN" will become available, if you have selected "Mic" as your input source.

You can adjust the signal strength of the Audio level within the menu "Mic Gain" (8)

+00dB;+10dB…..(in 1dB Steps)…..+65dB

To edit the mic gain sub-menu press Enter-Button for 2 seconds.

Use the Up- and Down-Buttons for navigation and select the desired mic gain by pressing the Enter-Button.

To exit this submenu press Enter-Button.

3.9 MIC Phantom (9)

In the "MIC PHANTOM" sub-menu the use of a condenser Microphone is supported and "ON" or "OFF" can be set.

> **Note:**
>
> In general, phantom voltages are used to power electronics within condenser microphones. Condenser microphones require power for various parts of their operation, including impedance converters, preamplifier circuitry and, in some cases, to polarized microphone capsules. Phantom is usually a DC voltage ranging from 12 to 48 volts. Microphones draw current from this voltage based on their needs.

To edit the mic phantom sub-menu press Enter-Button for 2 seconds.

Use the Up- and Down-Buttons for navigation and select the desired mic phantom by pressing the Enter-Button.

To exit this submenu press Enter-Button.

3.10 Data Freq (10) (optional)

In the sub menu "Data Freq" the frequency of the data receiver can be set. However, this setting is only valid for those models of the CT6020HD Series, which have integrated data receivers for remote operation of the camera installed.

At the bottom of the display a bar is displayed. This is an indicator of UHF receive strength, the "stronger" the bar the "stronger" the signal at the antenna.

The frequency may be changed in 10Khz steps.

Please be aware that the RX frequency will have to match the TX frequency of the UHF data transmitter to enable remote operation of the camera.

UHF Data Receive Quality 'bar'

To edit the data freq sub-menu press Enter-Button for 2 seconds.

Use the Up- and Down-Buttons for navigation and select the desired data freq by pressing the Enter-Button.

To exit this submenu press Enter-Button.

3.11 Output Power (11)

In the sub menu "Output Power" you can adjust the power output. The more power is selected the further is the distance the signal can be transferred. There are three different power settings:

- LOW (10mW)
- MEDIUM (100mW)
- HIGH (200mW)

To edit the power output sub-menu press Enter-Button for 2 seconds.

Use the Up- and Down-Buttons for navigation and select the desired power output by pressing the Enter-Button.

To exit this submenu press Enter-Button.

3.12 Contrast (12)

According to the brightness in your surrounding you may want to adjust the "Display Contrast".

The range is between 0= Dark to 31= Bright. The contrast value at delivery is 8.

To edit the display contrast sub-menu press Enter-Button for 2 seconds.

Use the Up- and Down-Buttons for navigation and select the desired display contrast by pressing the Enter-Button.

To exit this submenu press Enter-Button.

3.13 Display OFF (13)

The sub menu "Display OFF" controls the automatic switch off function. If you wish to have the display always on, this should be set to "OFF". Otherwise you have the possibility to have the display active for a predefined time ranging from 15 and 240 seconds, in 15 second steps before it switches off.

Edit mode is reached by pressing Enter-Button for 2 seconds. Here, through buttons 1 & 2, the desired duration value can be entered. Please confirm selection with Enter-Button.

To edit the display off sub-menu press Enter-Button for 2 seconds.

Use the Up- and Down-Buttons for navigation and select the desired option for display off by pressing the Enter-Button.

To exit this submenu press Enter-Button.

3.14 Software (14)

This sub-menu displays the actual Software and Firmware versions number.

3.15 Status* (15)

This sub-menu displays the actual Status

N.B. This menu is reachable through menu point 14 (Software) and after that and while the unit is switched on remains visible however if power is removed for any reason please go back to menu point 14 and repeat the procedure to reach menu point 15 again.

To enable the Status Menu:

Please go to the Menu-point "Software" (14)

Next press Enter-Button for 2 seconds. After 2 seconds release Enter-Button and press Up-Button (arrow up), you have now reached the special "Status" menu.

3.16 Encoder FW* (16)

N.B. This menu is reachable through menu point 14 (Software) and after that and while the unit is switched on remains visible however if power is removed for any reason please go back to menu point 14 and repeat the procedure to reach menu point 16 again.

The complete transmitter performance can be influenced with the changing of the Firmware. Here, the choice of "HI QUALITY" will give you the best picture quality however with a slight penalty on the latency side and on the other side the choice of "HIGH SPEED" will give the optimum latency, however with a penalty on the picture quality.

Please be aware: When this setting is changed the transmitter must be completely re-started. This is achieved by separating the transmitter from the power supply. Please wait 10 seconds before connecting the transmitter back to the power supply. Because new Firmware has been loaded a 5 minute re-boot is required. A % table indicates the re-boot status.

To change the Encoder Firmware:

Please go to the Menu-point "Software" (14)

Next press Enter-Button for 2 seconds. After 2 seconds release Enter-Button and press Up-Button (arrow up), you have now reached the special "Encoder FW" menu.

As explained above you can now choose between the special settings "HI QUALITY" and "FAST SPEED". Please confirm the selection with Enter-Button and wait. After approximately 10 seconds please perform a re-boot.

4. Application note for wireless HD cameras

4.1 Introduction

The typical cameras that were used today in the broadcast section are triax cameras which are used for wireless applications as well. Mostly the customers can not afford an additional HD camera with Battery mounts for wireless applications.

As an example we take the Sony 1450, 1500 or 1550 camera which are the most frequent cameras in the broadcast section.

Caution

- The original cameras have no mount and no support for batteries

- Also we as BMS do not recommend screwing a bracket on a camera for a day by day use. Therefore we are trying to use original Sony brackets or for other cameras other original brackets which can support a adaptor for wireless applications

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Sony camera without V-mount bracket

Sony camera with Sony V-mount bracket attached

Note

The V-mount bracket for Sony cameras is part of the Sony viewfinder and not separately available!

4.2 Mounting instructions for CT6020HD on the Sony 1500 camera

1. In the menu of the Sony 1500 camera the user has the possibility to configure all connectors at the camera. Please configure the SDI connector in the camera-menu. Set the SDI connector to HD-SDI output. Before you proceed to the next step, please make sure which kind of HD video signal you get at the output connector of the camera. The best way to check this, is to connect the programmed output connector of the HD camera with a HD-control monitor which will show the user the parameter of the video signal at the camera output.

Note

The HD video parameter of the camera has to comply with the parameter of the transmitter. Please check the output video signal before proceeding.

Please see below table for an example for HD video parameter:

Resolution	Frame rate
1080p	23,98
1080p	24
1080i	50
1080i	59,94
1080i	60
720p	50
720p	59,94
720p	60

Please write down the video settings which you get from the HD control monitor regarding resolution and frame rate. You will need these settings later when you have to configure the transmitter, otherwise you will not be able to transmit a video signal!

Programmable connector

Configure the SDI connector to HD-SDI output
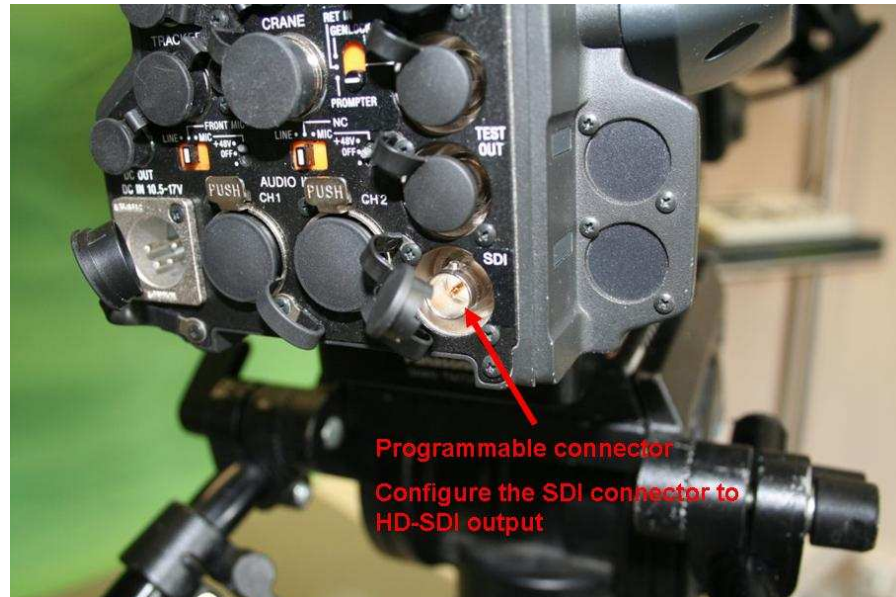
2. Now fix the adaptor on the Sony monitor V-mount bracket.

Push the adaptor into the V-mount bracket until it snaps in.

3. After you have fixed the adaptor on the camera you will have to connect the cables to the camera, therefore you have to open the back of the adaptor to be able to get access to the connectors.

Press the little lever down and open the back door of the adaptor. Now you have free access to all the connectors on the back of the camera.

4. Now you have to connect first the cables at the camera and then to the transmitter
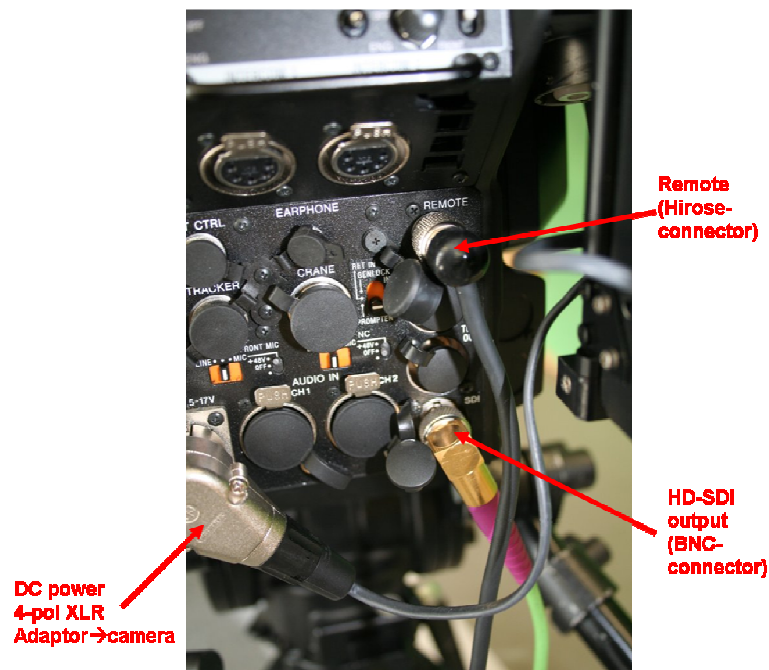
First connect the short BNC video cable to the HD-SDI video output connector. After that, connect the remote cable (Hirose-connector) to the remote connector of the camera.

There is a 4-pol XLR cable which is fixed at the adaptor, please connect this cable to the DC input of the camera as shown in the picture.

> **Note**
>
> This camera has no audio output connector, therefore you have to use an extension cable from the camera microphone to the transmitter on the backside of the camera

5. When you have finished connecting the cables to the camera please close the door of the adaptor, fix the two antennas on the transmitter and fix the transmitter to the adaptor.

To fix the transmitter to the adaptor push the transmitter from up to down until it snaps into the V-mount bracket.

Caution

- Please double check that the transmitter is firmly attached

6. Now you can connect the cables to the transmitter.
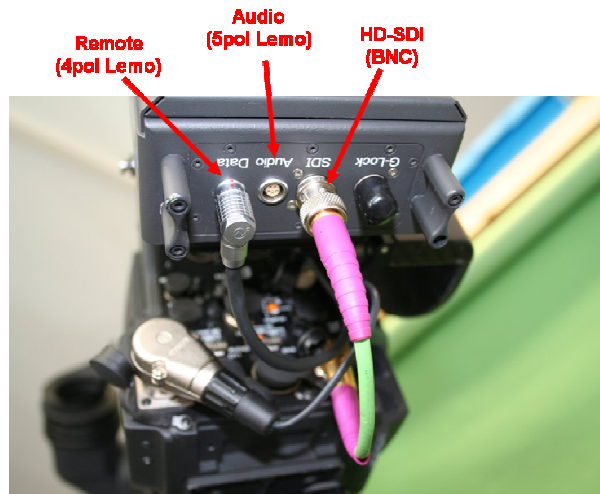
Connect the remote cable to the "Data", (4pol Lemo), the audio cable from the microphone to the "Audio" (5pol Lemo) and the HD-SDI video cable to the "SDI" connector.

7. The next step will be to turn on the camera and the transmitter.

Caution
• Be sure that the antennas are fixed
• Be sure that all the cables are connected

Now push the battery into the V-mount adaptor until it snaps in. After you attached the battery the transmitter will start automatically. If the camera is turned off please turn the camera on.

8. At this point you have finished with the connections. Now you will have to set the HD video settings in the transmitter, otherwise you will not be able to transmit any video.

At step 1 you checked the output video signal of the HD camera with its resolution and frame rate and which you have written down. Please make a note of these settings and configure the transmitter likewise. This is very important!

> **Note**
>
> Configure the transmitter with the same parameters of the HD video signal you checked with the HD control monitor

At this point the transmitter is receiving the right signals and you can proceed to the configuration of the transmitter and transmission.

List of Abbreviations

The following specific abbreviations are used within this document:

4:2:0	Digital video coding method in which the color difference signals are sampled on alternate lines at half the luminance rate.
4:2:2	Digital video coding method in which the color difference signals are sampled on all lines at half the luminance rate.
COFDM	Coded Orthogonal Frequency Division Multiplex (digital modulation procedure)
Composite	CVBS video signal, 1 V_{pk-pk}
CVBS	Color Video Black Sync Signal
D-ENG	Digital Electronic News Gathering
DVB-T	Digital Video Broadcasting Terrestrial
EMC	Electromagnetic Compatibility
ETS	European Telecommunications Standard
FBAS	German for CVBS
FEC	Forward Error Correction
FM	Frequency Modulation (analog modulation procedure)
IF	Intermediate Frequency
IEC	International Electro-technical Committee
ISO	International Standards Organisation
kbit/s	1000 bits per second
Mbit/s	Million bits per second.
MP@ML	Main Profile at Main Level: A subset of the MPEG-2 standard, which supports digital video storage (DVD etc.) and transmissions up to 15 Mbit/s over various mediums.
MPEG	Motion Pictures Experts Group (compression technique)
NTSC	National Television Systems Committee
OFDM	Orthogonal Frequency Division Multiplex
QAM	Quadrature Amplitude Modulation: A method of modulating digital signals
QPSK	Quadrature phase shift keying (digital modulation technique)
PAL	Phase Alternation Line (a color TV broadcasting system)
PCM	Pulse Code Modulation
RF	Radio Frequency
RGB	Red, green, blue. The chroma information in a video signal.

RS 232, RS-232	EIA-232
SDI	Serial Digital Interface
TS	Transport Stream
XLR	Audio connector featuring three leads, two for signal and one for GND
YUV	Y: Luminance component (brightness), U and V: chrominance (color difference)
Y/C	Broadcast Video with separate color, Y luminance and C chroma (sometimes called S-Video)

Technical Specification

B.1   Compliance[1]

B.1.1   Safety

This equipment has been designed and tested to meet the requirements of the following:

EN 60950	European	Safety of information technology equipment including business equipment.
IEC 60950	International	Safety of information technology equipment including business equipment.

B.1.2   EMC[2]

The equipment has been designed and tested to meet the following:

EN 55022 and AS/NZS 3548	European Australia and New Zealand	Emission Standard Limits and methods of measurement of radio frequency interference characteristics of information technology equipment - Class A.
EN 61000-3-2[3]	European	Electromagnetic Compatibility (EMC), Part 3 Limits; Section 2. Limits for harmonic current emissions (equipment input current $\leq$ 16 A per phase).
EN 61000-3-3[3]	European	Electromagnetic Compatibility (EMC), Part 3. Limits; Section 3. Limitation of voltage fluctuations and flicker in low voltage supply systems for equipment with rated current $\leq$ 16 A.
EN 55024:1998	European	Information technology equipment - Immunity characteristics - Limits and methods of measurement.

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[1] The version of the standards shown is current as of time of manufacture.

[2] The EMC tests were performed with the Technical Earth attached and configured using recommended cables.

[3] Applies only to models of the equipment using mains (ac) power sources.

B.1.3 Shock and Vibration

The device chassis complies with the requirements of ETS 300-019-2-5 Table 2, for both non-operational and operational states, without any special mounting or casing requirements over and above the standard mounting requirements specified.

ETS 300-019-2-5   European   Equipment Engineering (EE):
Environmental conditions and environmental tests for telecommunications equipment
Part 2-5: Specification of environmental tests Ground Vehicle Installations.
Table 2.

B.1.4 CE Marking

The CE mark is affixed to indicate compliance with the following directives:

89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility.

73/23/EEC of 19 February 1973 on the harmonisation of the laws of the Member States relating to electrical equipment designed for use within certain voltage limits.

B.1.5 FCC Marking

FCC ID: VFB-CT6020HD

Radio Frequency Interference

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This device complies with Part 15 of the FCC Rules

Operation is subject to the following two conditions:

(1)   this device may not cause harmful interference, and

(2)   this device must accept any interference received, including interference that may cause undesired operation.

Modifications

Changes or modifications made to this equipment not expressly approved by Broadcast Microwave Services may void the FCC authorization to operate this equipment.

Radiofrequency radiation exposure Information

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance of 20 cm between the radiator and your body.

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter

B.2   Technical Specifications

Frequency	6.425 - 6.525 GHz
Video Input	HDSDI - BNC(f)
Audio Input	2x Analogue audio in (Line or Mic Level) – 5pol Lemo
Modulator	COFDM, ETS 300744, 2k carriers only Bandwidth: 8 MHz QPSK,16 QAM,64 QAM
RF Output Power	200 mW
Power Input	11 to 18 VDC
Power Consumption	30W
Operating Conditions	Ambient temperature -20℃ to +45℃
Dimensions (W x D x H)	272 mm x 106 mm x 56 mm (without Battery bracket)
Weight	1.45 kg approx