



**UDT-70 TRANSMITTER MANUAL
V1.1
SW: V1_9809980813-06**



Accessories included in this manual:



SCDA



HAP-60



CELLULAR
DATALINK
ANTENNA

Contents

Chapter 1: Introduction

This first chapter provides a general description of the Ultra High Definition UDT-70 transmitter.

Chapter 2: Technical features

This second part offers the transmitter's physical and environmental characteristics.

Chapter 4: How to Order

This third part provides the user all the necessary information to order the product.

Chapter 4: Transmitter operation and Menus

This chapter provides the user all the necessary information to control and operate the equipment properly. It is detailed the function of each button on the keyboard. It is also explained how the information is shown on the display, transmitter menus, alarms, etc.

Chapter 5: Web Server

This chapter provides a detailed description of the Web Server tool. This feature allows controlling the UDT-70_H.264 transmitter through a website.

Chapter 6: Equipment Installation

This chapter indicates the available connections of the transmitter, their characteristics, and the installation of the equipment.

Chapter 7: Up Converter

This section provides the user all the necessary information to understand the general operation characteristics of the up-converter.

Index A: SCDA User's Guide

Index B: HAP User's Guide

Index C: 5G Antenna

Dear customer,

We would like to thank you for selecting this equipment and welcome you to the SVP's growing family of products.

We are sure that the addition of this equipment will cause you a complete satisfaction in your existing installation.

Please read these instructions carefully and keep them in hand in case you have to refer to them.

About this manual

This user's guide provides indications and explanations about how to set up easily the UDT-70 transmitter for the most common use cases.

This document is intended to help first time users:

- To find their way around the GUI.
- To understand the different possibilities of the UDT-70 transmitter.
- To configure the UDT-70 for their specific configurations.

Symbols

The symbols that appear in this manual are:



An information message which indicates explanations for the proper operation of the equipment.



This symbol advises users that if they do not take, avoid or make specific actions, several damages could appear in the device.



In the places where this symbol appears it means that by pressing the Down button of the equipment the user can access to the next screen.



This symbol means that pressing the OK button in the options where this symbol appears, the user can access to the submenu related to that option or can change the value of the parameter.



These symbols mean that the parameter can be modified in the same screen with the right and left keys.

Important Notes

1. The UDT-70 Ultra High Definition transmitter is completely compatible with the DVB-T/T2/S2/S Standards, included in the European Standard ETSI EN300744 (DVB-T), ETSI EN300755 (DVB-T2), ETSI EN302307 (DVB-S2) and ETSI EN300421 (DVB-S).
2. The control unit has available a 70 MHz output connection through which it is possible to transmit the signal to the RF head via a triax cable in DVB-T2, DVB-T, DVB-S2 or DVB-S mode.
3. This device has the ASI and IP (optional) output available when the input is ASI. Besides, it has also the ASI output available when the input is IP (optional).
4. It is important that when the transmitter is switched on, the selected RF output connection must have the suitable antenna or must be loaded.
5. The UDT-70 transmitter applies H.265 compression to one 12G-SDI input signal or up to 4 HD-SDI inputs. It is also compatible with H.264 and Mpeg-2 compressions.
6. Equipment's maximum output power for the DVB-T2/T is 3 W (selectable from 0.3 to 3 W in 2GHz) and for the DVB-S2/S is from -20 to + 5 dBm.
7. Special care should be taken with SDI cables, quality and length, these are very important, especially when 12G-SDI or 3G-SDI signals are transmitted.
8. If any audio or data channel are not to be used in a transmission, they should be disabled, in order to assign that bitrate to the video and achieve a higher quality transmitted video signal.
9. Only authorized personnel should open the product and any repair or warranty will be invalidated if the seals are broken.

First Aid in Case of Electric Shock

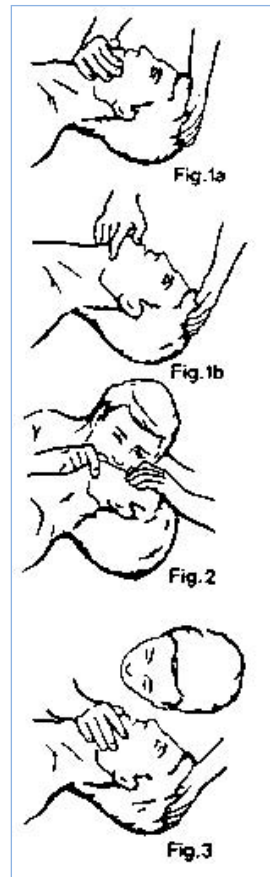
DO NOT TOUCH THE VICTIM WITH YOUR BARE HANDS until the circuit is broken. SWITCH OFF. If this is not possible, PROTECT YOURSELF with DRY insulating material and pull the victim clear of the conductor.

If breathing has stopped, indicated by unconsciousness, lack of respiratory movements and a 'blue' look to cheeks, lips, ears and nails, START RESUSCITATION AT ONCE.

EMERGENCY RESUSCITATION – THE EXPIRED AIR METHOD

(Approved by the Royal Life Saving Society)

1. If possible, lie the victim on his back with his head slightly higher than his feet. Clear the mouth and throat of any obvious obstruction.
2. Kneel on one side of the victim, level with his head. LIFT THE JAW AND TILT THE HEAD BACK AS FAR AS POSSIBLE (Figs. 1a and 1b)
3. One of the following may happen:
 - a) Breathing may begin and consciousness returns.
 - b) Breathing may begin but consciousness NOT return. Turn the victim on his side and ensure that the airway is kept clear.
 - c) Breathing may return but be NOISY which means that the airway is not fully clear. Try to clear the airway.
4. IF THERE NO SIGN OF BREATHING:
 - a) Check that the head is still tilted back.
 - b) Take a deep breath.
 - c) Pinch the victim's nose and blow firmly into his mouth (Fig. 2). As you do, the chest will RISE.
 - d) Turn your head away and take another breath, watching for the chest to FALL (Fig. 3).
5. Start with four quick breaths and then continue with one breath every five seconds (i.e. 12 times a minute). This should be continued until the victim revives or a doctor certifies death.
6. As consciousness returns the victim will start to breathe on his own, and a 'pink' color replaces the 'blue' look: this is the time to stop resuscitation. Continue to hold his chin up and so keep the airway clear.
7. In the case of injuries to the mouth, it may be necessary to use mouth-to-nose resuscitation. Seal the victim's mouth with your cheek and blow firmly into his nose, proceeding as above.



8. In the case of severe facial injuries it may be necessary to do a manual method of artificial respiration (Silvester-Brosch or Holger Nielsen). Briefly, these methods apply compression to ribcage with the victim lying on his back (S-B) or face down (H.N.) with associated movement of his arms up and out. The cycle of movement should take about five seconds, i.e. the normal breathing phase.
9. Whatever the method, it is **ESSENTIAL** to commence resuscitation **WITHOUT DELAY** and to send for medical assistance immediately.

TREATMENT FOR BURNS

If the victim is also suffering from burns, then, without hindrance to resuscitation, observe the following:

- a) **DO NOT ATTEMP TO REMOVE CLOTHING ADHERING TO THE BURN.**
- b) If possible alleviate the pain from the burnt part by immersing in cold water.
- c) If help as available or as soon as resuscitation is no longer required the wound should be covered with a **DRY** clean dressing.
- d) Oil or grease in any form should not be applied.
- e) If severely burnt, get the victim to hospital immediately.

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Chapter 1: Introduction

The UDT-70 is a split box portable microwave transmitter, which consists of a control unit and a RF head connected by triax cable or Fiber-Optic (optional). The control unit has a 70 MHz output connection available through which it is possible to transmit the signal to the RF head in DVB-T2, DVB-T and optionally in DVB-S2 or DVB-S modulations..

Its feature H.265 encodes for Ultra High Definition (UHD), High Definition (HD) and Standard Definition (SD) signals. For added security, transmitted signal can be encrypted using BISS encryption or AES encryption (Optional).

This new generation transmitter accepts 1 x 12G or 4 x 3G/HD/SD-SDI video input signals. User and GPS data can be transmitted over data channels.

ASI input and Transport Stream over IP input make possible to use this transmitter as a modulator. Besides, the ASI output and the Transport Stream over IP output (optional) enables the user to use the transmitter as a standalone encoder.

The UDT-70 transmitter performs DVB-T2, DVB-T and optionally DVB-S and DVB-S2 modulations. DVB-T enables compatibility with nearly all types of COFDM receivers. DVB-T2 modulation outperforms DVB-T modulation, and offers much higher data rate, which renders in a higher signal quality or much more robust signal than DVB-T, making possible longer and more difficult links. This transmitter also can perform DVB-S2 and DVB-S modulations.

Features

It features HEVC, H.264 and Mpeg-2 encodings for 12G, high definition (HD) and standard definition (SD) signals with ultra-low latency. HEVC allows the same video quality, reducing file sizes by up to 50% compared to its predecessor, the H.264.

Among the improvements of this new transmitter is the ability to transmit one 4K UHD signal with HDR at 10-bit 4:2:2 quality or 4 simultaneous HD signals(Optional).

Encoded signals can be encrypted using BISS-1 or BISS-E scrambling system. Encrypted signal will only be received by the receivers that have a valid descrambling key.

Transmitter system operation is very easy. It has a display and a keyboard which make possible the configuration and monitorization of every parameter of the equipment.

The equipment is fed with AC power supply from 90 to 240 V.

Its excellent design, mechanical and electronic assembly make the UDT-70 a robust and reliable solution.

DVB-T2 features

The UDT-70 digital camera transmitter uses COFDM (Coded Orthogonal Frequency Division Multiplexing) modulation system (1K, 2K and 4K) which provides superior signal robustness and a higher link performance. This technology provides operators with efficient means to overcome the challenges of NLOS propagation and mobile channels propagation.

OFDM spread spectrum modulation system distributes the data over a large number of closely-spaced carriers, for example, 1.705 carriers in 2K mode. The data are divided into several parallel data streams, one for each carrier, so, each carrier transports a lower data rate and the symbol duration is longer. Each carrier is then modulated with a QPSK, 16QAM, 64QAM or 256QAM scheme with a constellation rotation.

An OFDM modulated signal, since uses a low symbol rate modulation scheme (*i.e.* where the symbols are relatively long compared to the channel time characteristics) suffer less from intersymbol interference caused by multipath propagation. As the duration of each symbol is long, it is feasible to insert a guard interval between the OFDM symbols, thus eliminating the intersymbol and co-channel interference. So, if one carrier's information is lost, it would only be lost a small part of the whole information.

Besides, in OFDM, the sub-carrier frequencies are chosen so that the sub-carriers are orthogonal to each other, meaning that cross-talk, interference,

between the sub-channels is eliminated. The orthogonality allows high spectral efficiency.

On the other hand, OFDM system is invariably used in conjunction with channel coding (forward error correction). The error correction code used in this equipment is Reed-Solomon coding, which is concatenated with LDPC, and there is an additional interleaving between the two layers of coding. Error correcting codes build redundancy into the transmitted data stream. This redundancy allows bits that are in error or even missing to be corrected in the receiver.

The European ETSI EN 300755 standard defines the following LDPC coding rates: $1/2$, $3/5$, $2/3$, $3/4$, $4/5$, $5/6$. There is a compromise between the coding rate (signal robustness) and the transmitted bit rate. If the coding rate is higher the signal transmission is more robust ($1/2$ is the most robust) but the bit rate that the system is capable to transmit is lower.

Used modulation scheme of each OFDM sub-carrier, QPSK, 16QAM, 64QAM and 256 QAM is also connected with signal robustness and transmitted bit rate. QPSK is the most robust and 256QAM is able to transport a higher bit rate.

Besides, the system can define 7 guard intervals: $1/4$, $19/128$, $1/8$, $19/256$, $1/16$, $1/32$ and $1/128$. The guard interval is used to reduce intersymbol interferences due to the multipath propagation.

In addition, it also provides several bandwidths: 1.7, 5, 6, 7 and 8 MHz in case there are needed for different applications.

To summarize, with all of these characteristics, the maximum bit rate achieved is 46.4 Mbps.

DVB-T features

The RF stage of the UDT-70 transmitter is the same as the DVB-T2 one. The difference is found in the modulation part as it is commented below.

The UDT-70 digital camera transmitter uses COFDM (Coded Orthogonal Frequency Division Multiplexing) modulation system (2K mode).

The available modulations are QPSK, 16QAM or 64QAM where the most robust is the QPSK one and the one with the bigger bit rate is the 64QAM.

The European ETSI EN 300744 standard defines the following convolutional coding rates: $1/2$, $2/3$, $3/4$, $5/6$, $7/8$.

Used modulation scheme of each OFDM sub-carrier, QPSK, 16QAM and 64QAM, is also connected with signal robustness and transmitted bit rate. QPSK is the most robust and 64QAM is able to transport a higher bit rate.

Besides, the system can define 4 guard intervals: 1/4, 1/8, 1/16 and 1/32.

In conclusion, with all of these characteristics, the maximum bit rate achieved is 31.67 Mbps.

DVB-S2 features (optional)

The UDT-70 digital camera transmitter uses single carrier or one modulation from the next available: QPSK, 8PSK, 16APSK or 32APSK where the most robust is the QPSK one and the one with the bigger bit rate is the 32APSK.

In addition, the European ETSI EN 302307 standard defines the following LDPC coding rates: 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10.

In the modulation step it is also included a roll off factor (0.20, 0.25, 0.35) which is used to reduce intersymbol interference where the value that most reduces interference but with less bandwidth is 0.20.

To sum up, with all of these characteristics, the maximum bit rate achieved is 31 Msym/s.

DVB-S features (optional)

The UDT-70 digital camera transmitter uses QPSK modulation. In addition, the European ETSI EN 300421 standard defines the following Reed Solomon coding rates: 1/2, 2/3, 3/4, 5/6, 7/8.

Chapter 2: Technical Features

RF Stage DVB-T2 and DVB-T (ODU unit)

Available Frequency bands:	2 GHz (2.0GHz – 2.4GHz) 4 GHz (4.4GHz – 4.9GHz) 6 GHz (6.28GHz – 6.9GHz) 7 GHz (6.8GHz – 7.4GHz) 8 GHz (7.855GHz – 8.225GHz) 10 GHz (10.15GHz – 10.65GHz) 13 GHz (12.75GHz – 13.25GHz)
Output Power:	3 W in 2 GHz band (adjustable) 1 W in 4 GHz band (adjustable) 1 W in 6 GHz band (adjustable) 1 W in 7 GHz band (adjustable) 1 W in 8 GHz band (adjustable) 1 W in 10 GHz band (adjustable) 500 mW in 13 GHz band (adjustable)
Standard Bandwidth:	500 MHz
Tuning step:	250 KHz



The frequency of the output signal from the control unit is I.F. 70 MHz and, after going through the RF head, it is converted to RF.

Modulation

DVB-T2:	COFDM 1K, 2K, 4K QPSK, 16 QAM, 64 QAM, 256 QAM Constellation rotation LDPC FEC: 1/2, 3/5, 2/3, 3/4, 4/5, 5/6 IG: 1/4, 19/128, 1/8, 19/256, 1/16, 1/32 1/128 Bandwidth: 1.7, 5, 6, 7, 8 MHz Max. bitrate: 46.4 Mbps Min. bitrate: 1 Mbps
DVB-T:	COFDM 2K mode QPSK, 16 QAM, 64 QAM FEC: 1/2, 2/3, 3/4, 5/6, 7/8 IG: 1/4, 1/8, 1/16, 1/32 Bandwidth: 5, 6, 7, 8 MHz Max. bitrate: 31.67 Mbps

DVB-S2 (Optional): QPSK, 8PSK, 16APSK, 32APSK
LDPC FEC: 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
Max. Symbol Rate: 25 Msymb/s
Max. Bandwidth: 30MHz
Max. Bitrate: 90.5 Mbps

DVB-S (Optional): QPSK
Reed Solomon FEC: 1/2, 2/3, 3/4, 5/6, 7/8
Max. Symbol Rate 22.2 Msymb/s
Max. Bandwidth: 30MHz
Max. Bitrate: 35.802 Mbps

IF Stage (70 MHz) DVB-T, DVB-T2 and optionally DVB-S and DVB-S2

Frequency: 70 MHz
Connector: Triax-Lemo3
Fiber-Optic SMPTE (Optional)

RF Auxiliary Output at control unit (Optional)

Frequency range: 2.0 to 2.4 GHz
Connector: SMA Female

Video:

Inputs: 1 x 12G-SDI
4 x 3G, HD, SD-SDI (Optional)
Formats: 2160p-23.98/24/25/29.97/30/50/59.94/60 Hz
1080p-23.98/24/25/29.97/30/50/59.94/60 Hz
1080i - 50/59.94/60 Hz
720p - 23.98/24/25/29.97/30/50/59.94/60 Hz
576i - 50 Hz
480i - 59.94 Hz

Audio:

Quantity: 16 channels (8 pairs)
Formats: Embedded or Analogue
Analogue Input: 2 pair Line / Mic level
Analogue Max. Level: 24dBu (Balanced)
Phantom Power: 48V Phantom Power

Test Signals

Video:	Bars
Audio:	16 Audio tones

Data Channels:

Data channel:	User data/GPS Data
Data rate:	1,200 to 57,600 bps

ASI and IP

Input and Output:	ASI Transport Stream (EN50083-9) ASI over IP (SMPTE2022/CoP3) – FEC (optional)
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Encryption

BISS:	BISS-1 and BISS-E
AES (Optional):	AES-128 and AES-256
Remux:	(Optional)

Encoder

Video compression:	HEVC H.264 and MPEG2
Profile:	4:2:2/4:2:0, 8/10-bit
Latency Encoder+Decoder:	UHD 59p = 66ms UHD 50p = 75ms FHD 59p = 55ms FHD 50p = 70ms FHD 59i = 83ms FHD 50i = 98ms
Output Bitrate:	1 Mbps – 90 Mbps
Audio Encoder:	MPEG-1 Layer1, MPEG-1 Layer2 and AAC-LC

Control & Monitorization

Control Interfaces:	Front panel & display Web Server interface
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Monitoring: Encoding, Modulation, Frequency and
Output power, alarms and warnings

Power Supply

AC input: 100 to 240 V AC

DC input: 24 V to 36 V DC

Mechanical

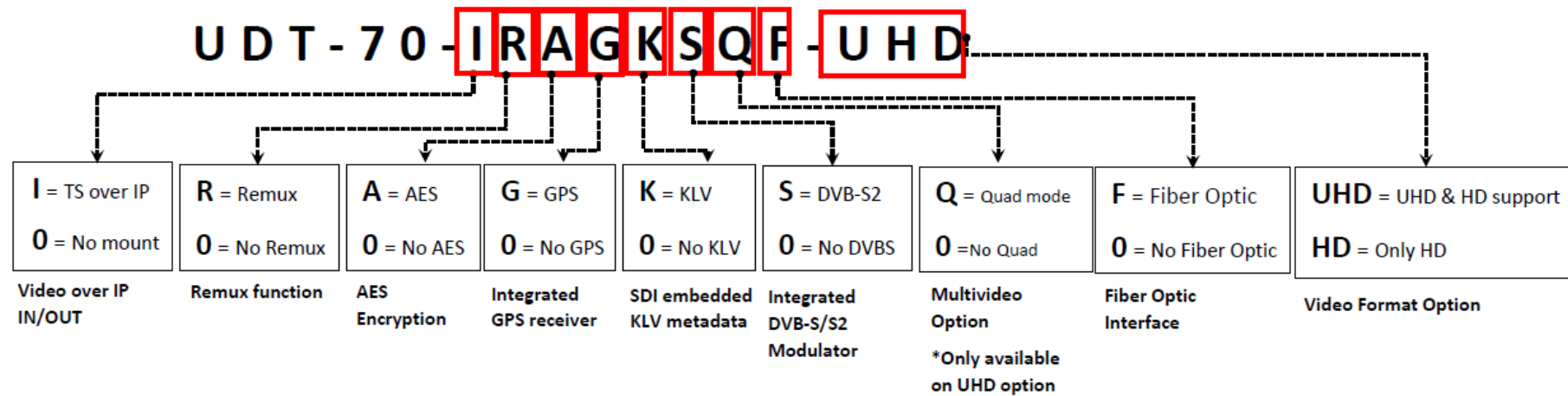
Control unit: 2 RU Half rack size
Weight: 3.2 Kg

RF head: Size: 185.5 x 84 x 339 mm
Weight: 4.6 kg

Max. distance Between:
Control unit and RF Head 2Km with Fiber-Optic (Optional)
400 m (triax cable 11 mm)

Control unit- IF Head:
Connector SMPTE Fiber-Optic (Optional)
TRIAX

Chapter 3: How to Order



Chapter 4: Transmitter Operation and Menus

This third chapter provides the user all the necessary information to control, configure and operate the equipment properly.

4.1 Display

To switch the equipment on and off, press ON/OFF button. When the equipment is turned on, the main screen of the UDT-70 transmitter is shown.

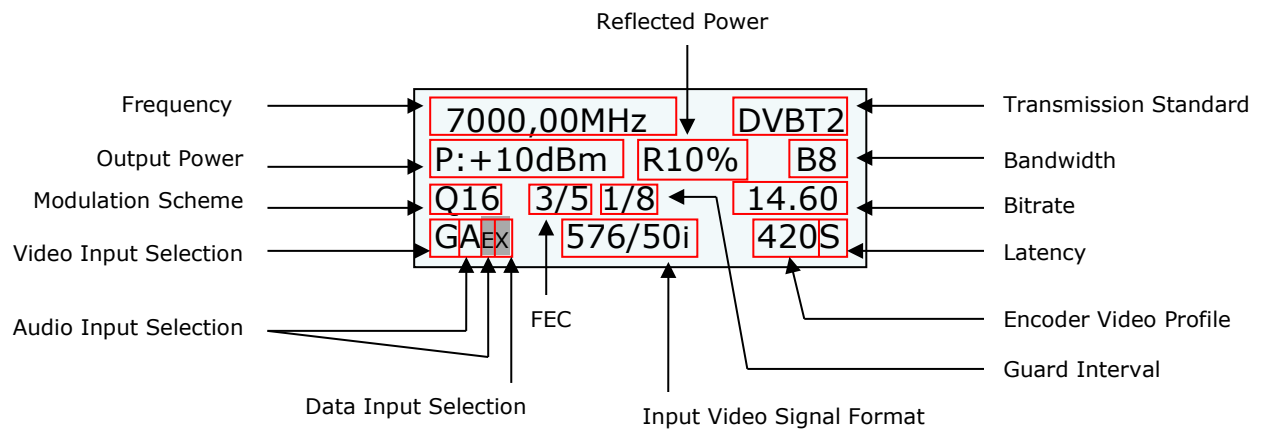


Figure 1 UDT-70 front panel/
Main screen explanation

These are the parameters displayed:

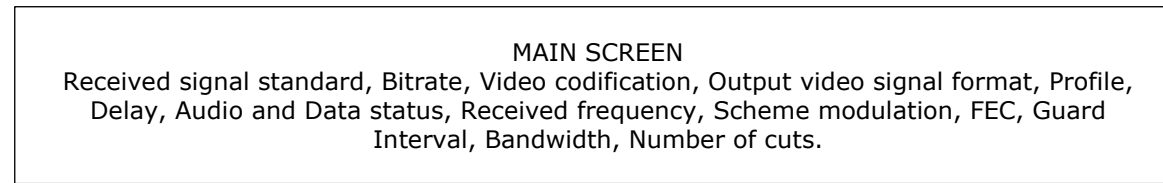
- Frequency (MHz).
- Transmission Standard (DVB-T2 and DVB-T)(Optional DVB-S/S2).
- Output power (dBm).
- Reflected Power (%).
- Bandwidth (MHz).
- Modulation Scheme.
- FEC.
- Guard Interval.
- Transmitted bitrate (Mbps).
- Video input selection
 - Possibilities: SDI, HDMI1, HDMI2, CVBS, DVB-ASI Transport Stream, IP or Generator.
 - Behaviour of the corresponding character: If the character is static then it means presence of that signal. If the character is blinking then it means absence of that signal.
- Audios status indication: If audio 1 or 2 is not darkened then it is enabled. On the other hand, if audio 1 or 2 is darkened then it is disabled.
- Data status indication: If this field is not darkened then it means that data is enabled. On the other hand, if this value is darkened it means that data is disabled. Moreover, in case this field is static, its meaning is presence of the data whereas if this field is blinking, it means absence of the data.
- Input video signal format.
- Encoder Video Profile (4.2.0 or 4.2.2)
- Latency (Standard delay, Low delay, Super Low Delay or Ultra Low Delay)
 - Standard Delay (Lipsync < 10 ms)
 - Low delay (Lipsync < 10 ms) → 3 frame
 - Super Low Delay (Lipsync < 10 ms) → 2 frame
 - Ultra Low Delay (Lipsync = 20 ms) → 1 frame

4.2 Menus

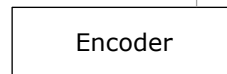
There is one menu in this transmitter that allows the user to change the transmitter's parameters and configure them.

To enter the menu of this equipment cross button must be pressed. In case it is wanted to return again to the principal screen from the menu, cross button must be pressed. Furthermore, in case of being in the submenus area, returning to the mainly screens is achieved by pressing the cross button as much times as it is needed.

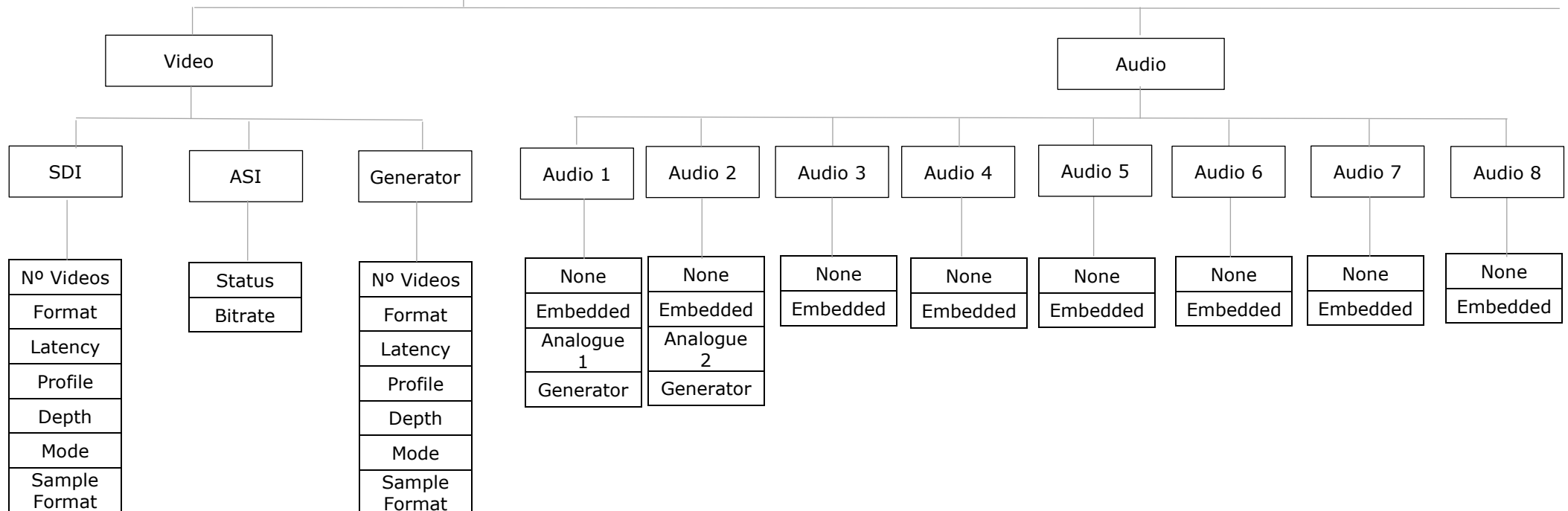
In the next page it is shown a scheme that specifies the different menu options available.



Continued→



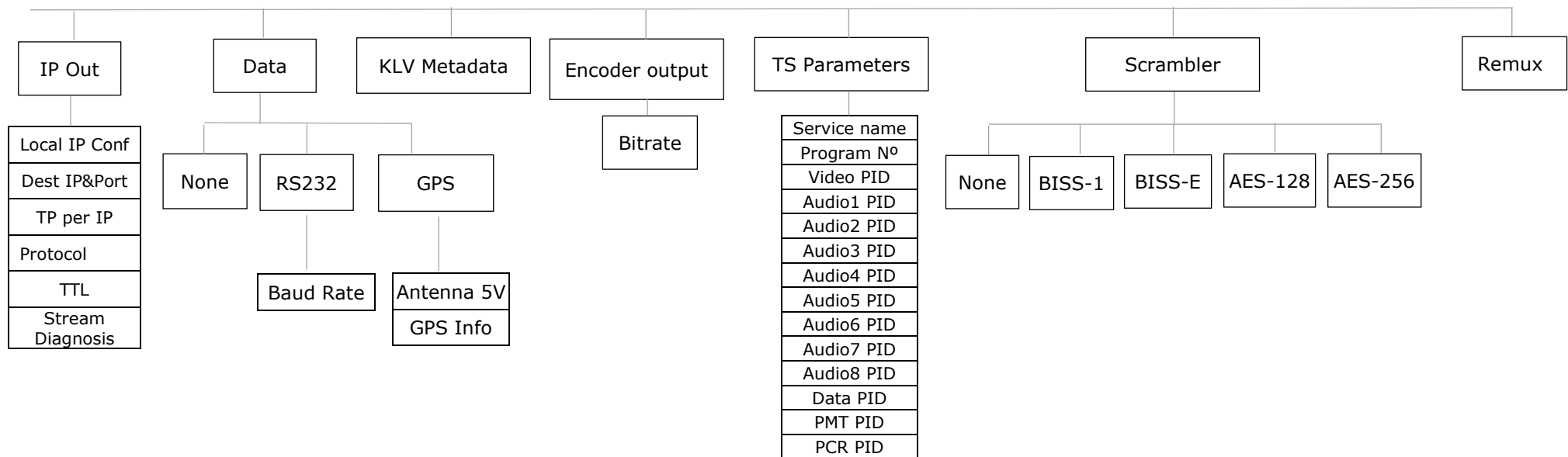
Continued→



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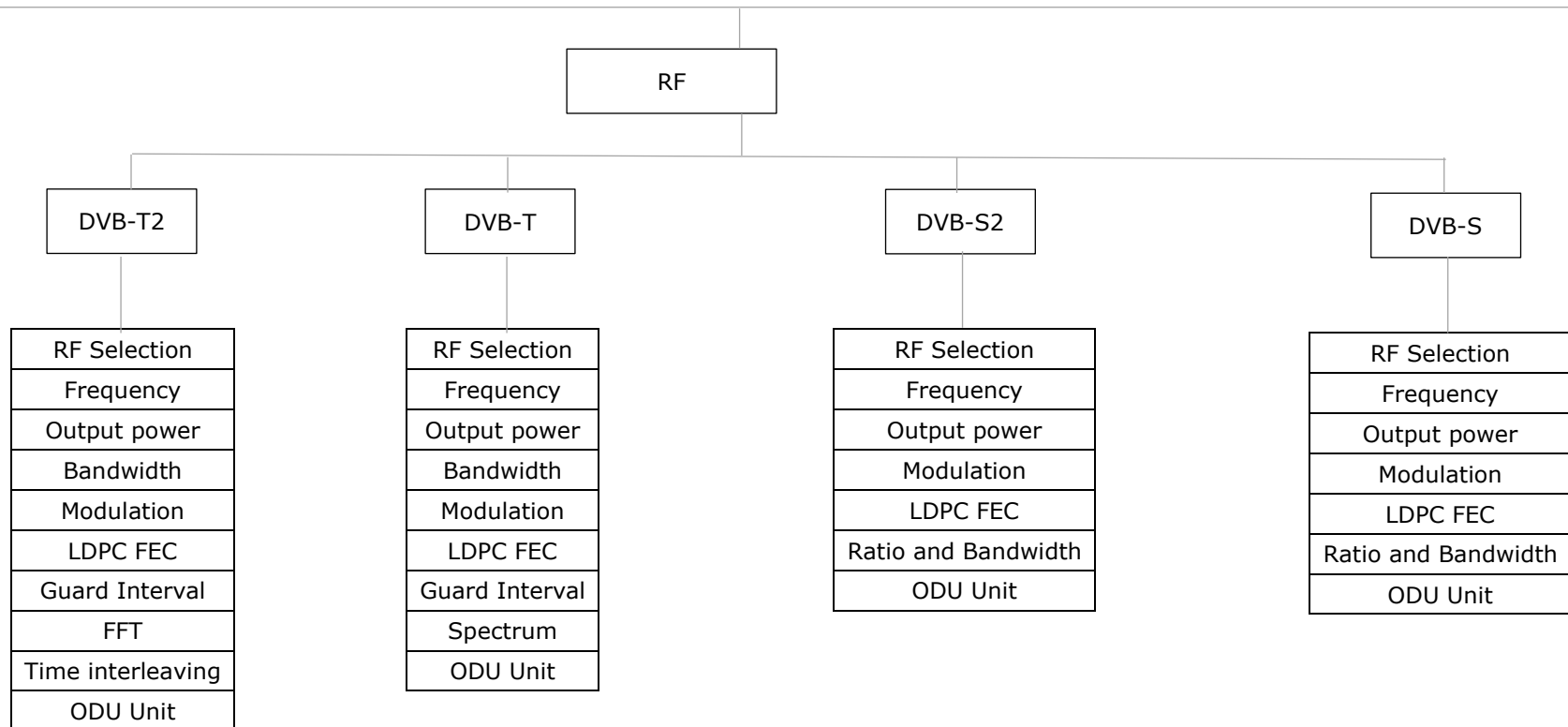
Continued→

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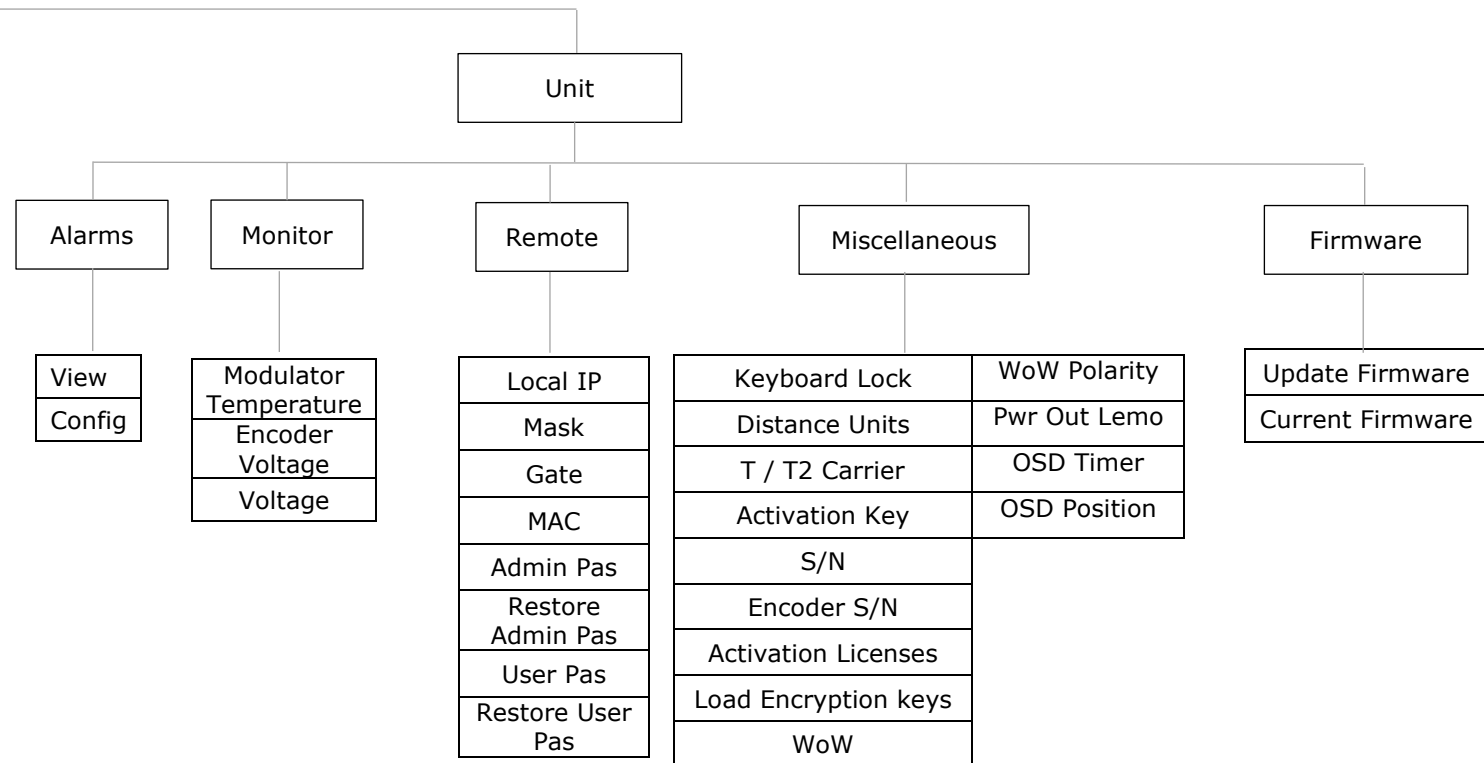


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←Continued



4.2.1 Menu Navigation

This section contains a detailed description of each parameter that can be configured in the UDT-70 transmitter via the MENU.

To enter the MENU, press the cross button in case of being in the principal screen or in any submenu.

To select a parameter or a submenu use the Up, Down arrows. Once selected, press the OK button to access to a submenu or to edit a parameter. To exit a submenu or a parameter press cross button.



Figure  means that to have access to the right image that button must be pushed.

Symbols <> mean that the parameter can be modified in the same screen with the right and left keys.

Symbol  means that pushing the OK button allows entering to the options of the submenu.

Different types of parameters are available:

- **Eligible:** When the user can choose between predetermined states. (They usually have the symbol <> near to them)
- **Editable:** When the user must enter a value in that option. (They usually have the symbol  near them). So as to save the introduced value, the OK button must be pressed.
- **Reading:** When the value of that parameter is a monitored parameter that can't be changed.

To change a parameter, for example, the transmitted frequency, press the OK button in the desired option and then with Up, Down buttons choose the value. Once the parameter is set, press the OK button so as to save the value.

Next, the different menus and submenus with the options and eligible parameters are shown. Also, in each figure, example parameters are shown.

4.2.2 Menu Structure

The following menu screen can be accessed by pressing the cross key from the monitoring menu.

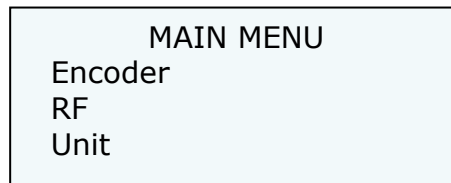


Figure 2 Menu

Encoder – All the parameters related to the video, audio and data inputs are configured here. Besides, all video, audio, data encoding and multiplexing parameters are accessed here.

RF – DVB-T2/T/S2/S transmission parameters are set in this section.

Unit –Parameters related to the Web Server and other internal options of the UDT-70 transmitter are configured here, as well as other characteristics of the device.

4.2.3 Encoder Menu

The Encoder menu allows the configuration of the video, Audio and data input and KLV metadata selection. On this menu, the encoder can be configured to output the bitrate set manually or auto. If auto is selected, the bitrate is set by the modulation parameters automatically (bandwidth, modulation, FEC, GI, FTT number).

The PID assignment for each data transmitter is made in the Encoder menu. The encryption is enabled or disabled here, and the key of the encryption selected is set inside the encryption menu.

In addition, you can send up to 8 different videos (1 SDI input+ 7 ASI input) by using the Remux option, which can be enabled in this menu.

Next, is explained how to configure each parameter.

By using the Up, Down arrow keys, select the **Encoder** option and press the OK key.

ENCODER	
Video: Generator	< ⏮
Audio1: Generator	< ⏮
Audio2: None	>

ENCODER	
Audio 3: Generator	< ⏮
Audio 4: Generator	< ⏮
Audio 5: None	>

ENCODER	
Audio 6: Generator	< ⏮
Audio 7: Generator	< ⏮
Audio 8: None	>

ENCODER	
Data: RS232	<> ⏮
KLV Metadata: Off	>
Encoder Output	⏮

ENCODER	
TS Parameters	⏮
Scrambler: None	>
Remux: Disable	>

Figure 3 Encoder Menu

Line nº	Function
	Video (eligible parameter): In this field, the video input must be chosen with the Right and Left buttons. Once the video input has been selected, press the OK button to configure the parameters related to it.
1	The available options are: • SDI • ASI • Generator
	Audio 1 (eligible parameter): In this field, the sort of Audio signal introduced in the Audio 1 input can be chosen with the right and left buttons. Once the Audio 1 input has been selected, press the OK button to configure the parameters related to it.
2	The available options are: • None • Embedded • Analogue 1 • Generator
	Audio 2 (eligible parameter): In this field, the sort of Audio signal introduced in the Audio 2 input can be chosen with the right and left buttons. Once the Audio 2 input has been selected, press the OK button to configure the parameters related to it.
3	The available options are: • None • Embedded • Analogue 2 • Generator
	Audio 3 (eligible parameter): In this field, the sort of Audio signal introduced in the Audio 1 input can be chosen with the right and left buttons. Once the Audio 1 input has been selected, press the OK button to configure the parameters related to it.
4	The available options are: • None • Embedded • Generator

Audio 4 (eligible parameter):

In this field, the sort of Audio signal introduced in the Audio 2 input can be chosen with the right and left buttons. Once the Audio 2 input has been selected, press the OK button to configure the parameters related to it.

5

The available options are:

- None
- Embedded
- Generator

Audio 5 (eligible parameter):

In this field, the sort of Audio signal introduced in the Audio 1 input can be chosen with the right and left buttons. Once the Audio 1 input has been selected, press the OK button to configure the parameters related to it.

6

The available options are:

- None
- Embedded
- Generator

Audio 6 (eligible parameter):

In this field, the sort of Audio signal introduced in the Audio 2 input can be chosen with the right and left buttons. Once the Audio 2 input has been selected, press the OK button to configure the parameters related to it.

7

The available options are:

- None
- Embedded
- Generator

Audio 7 (eligible parameter):

In this field, the sort of Audio signal introduced in the Audio 1 input can be chosen with the right and left buttons. Once the Audio 1 input has been selected, press the OK button to configure the parameters related to it.

8

The available options are:

- None
- Embedded
- Generator

Audio 8 (eligible parameter):

In this field, the sort of Audio signal introduced in the Audio 2 input can be chosen with the right and left buttons. Once the Audio 2 input has been selected, press the OK button to configure the parameters related to it.

9

The available options are:

- None
 - Embedded
 - Generator
-

Data (eligible parameter):	
In this field, the sort of data input can be selected.	
The available options are:	
10	• None • RS232 • GPS
KLV Metadata (eligible parameter) (Optional):	
11	In this field, the KLV metadata can be enabled. This feature is optional.
Encoder Output (eligible parameter):	
In this field, the encoder output bitrate mode can be selected.	
The available options are:	
12	• Auto • Manual Bitrate (editable parameter)
TS Parameters (editable parameters):	
13	This field consists of the configuration of the parameters of the Transport Stream. In this option, the different program identifiers are configured.
Scrambler (eligible parameter):	
In this field, the encryption system can be chosen with right and left buttons.	
The available options are:	
14	• None • BISS-1 • BISS-E • AES-128 (Optional) • AES-256 (Optional)
Remux (eligible parameter) (Optional):	
15	In this field, remux option can be activated. This feature is optional.

Table 1: Encoder Menu options

1.1.1.1.1 SDI Input

When SDI input is selected, press OK button to access the video configuration menu. The video format is automatically detected. The parameters which are configured in this section are explained below.

SDI	
Nº Videos: 1 Video	>
Format: Auto HD	<>
Latency: Normal	<

SDI	
Profile: 4.2.0	>
Depth: 8 bits	>
Mode: H.265	>

Figure 4 SDI Input Menu

Line nº	Function
Nº Videos:	
In this field, the number of videos is selected.	
1	The available options are: • 1 Video. Standard mode for single HD/UHD operation. • 4xHD. Flexible video input format and 4x HD operation.
Format:	
In this field, the video format is selected.	
2	The available options are: • Auto UHD. • Auto HD. • Manual. Used for other brand encoders.

Latency Mode:	
In this field, the latency mode is selected.	
The available options are:	
3	• Normal. Highest video quality per bitrate with typical end to end latency of 800-2000ms. • Low. Compromise between video quality, bitrate and latency with typical end to end latency of 200-1000ms. • Ultra Low. Requires the most bitrate but with typical end to end latency of a few frames, HEVC mode only.
Profile (eligible parameter):	
In this field, the chroma format is selected.	
The available options are:	
4	• 4:2:0 Lowest bitrate required. • 4:2:2 Recommended for interlaced applications, and highest picture quality.
Bit Depth:	
In this field, the bit depth is selected.	
The available options are:	
5	• 8-bit. Lowest bitrate required. • 10-bit. Recommended for HDR applications, and highest picture quality.
Encoding Mode:	
In this field, the Encoding mode is selected.	
The available options are:	
6	• H.265 HEVC. Highest video quality per bitrate, and lowest latency options. • H.264 AVC. Greater compatibility with legacy systems, and low latency option. • MPEG-2. Not recommended unless specifically required, limited to 8-bit 4:2:0 1080p30

Table 2: SDI Input options

1.1.1.1.2 ASI Input

When ASI input is selected, the signal is directly sent to the modulator.

This input is also used for Remux. When Remux option is enabled, the second video which is going to be sent must be connected to the ASI input, but the selected video input must be SDI (according to the inserted video input for the first channel to be remuxed) but not ASI.

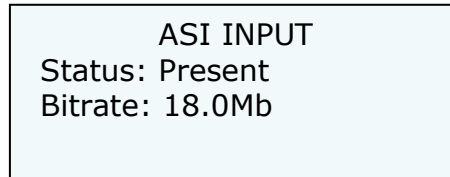


Figure 5 ASI Input Menu

Line n°	Function
Status:	
1	In this field it is indicated if there is any ASI signal in the ASI input. In case there is an ASI signal, this field will display the word present. If there is no ASI signal then, no present will be displayed. (reading parameter)
	The available options are:
	▪ Present ▪ No Present
Bitrate:	
2	In this field, the bitrate of the ASI input signal is shown. (reading parameter)

Table 3: ASI Input menu options

1.1.1.1.3 Generator Input

In this section the video generator can be configured, this option is used for tests when there is no video source.

GENERATOR	
Nº Videos: 1 Video	>
Format: Auto HD	<>
Latency: Normal	<

GENERATOR	
Profile: 4.2.0	>
Depth: 8 bits	>
Mode: H.265	>

Figure 6:ASI Main Screen

Line nº	Function
Nº Videos:	
In this field, the number of videos is selected.	
1	The available options are: • 1 Video. Standard mode for single HD/UHD operation. • 4xHD. Flexible video input format and 4x HD operation.
Format:	
In this field, the video format is selected.	
2	The available options are: • Auto UHD. • Auto HD. • Manual. Used for other brand encoders.
Latency Mode:	
In this field, the latency mode is selected.	
The available options are:	
3	• Normal. Highest video quality per bitrate with typical end to end latency of 800-2000ms. • Low. Compromise between video quality, bitrate and latency with typical end to end latency of 200-1000ms. • Ultra Low. Requires the most bitrate but with typical end to end latency of a few frames, HEVC mode only.

Profile (eligible parameter):	
In this field, the chroma format is selected.	
4	The available options are: • 4:2:0 Lowest bitrate required. • 4:2:2 Recommended for interlaced applications, and highest picture quality.
Bit Depth:	
In this field, the bit depth is selected.	
5	The available options are: • 8-bit. Lowest bitrate required. • 10-bit. Recommended for HDR applications, and highest picture quality.
Encoding Mode:	
In this field, the Encoding mode is selected.	
The available options are:	
6	• H.265 HEVC. Highest video quality per bitrate, and lowest latency options. • H.264 AVC. Greater compatibility with legacy systems, and low latency option. • MPEG-2. Not recommended unless specifically required, limited to 8-bit 4:2:0 1080p30

Table 4:Generator Input menu options

1.1.1.1.4 Audio Embedded 1 to 8

When Embedded Audio is selected, it means that the transmitted Audio is catch from the video input selected, where the Audio is embedded. There are up to 8 pairs of embedded audio.

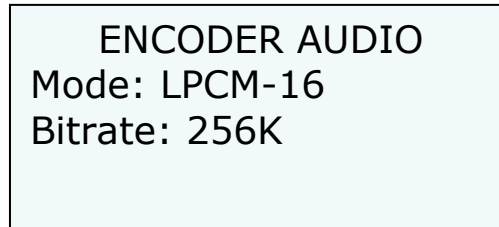


Figure 7: Audio Embedded Input Menu

Line nº	Function
	Audio Stream Encoding Mode:
	In this field, the audio stream encoding mode 1 to 8 is selected.
	The available options are:
1	• LPCM. Ultra Low latency uncompressed audio or data. Bit depth requirements may vary for data, typically 20-bit for Dolby pass-through. • MPEG-1 L1. Ultra Low latency compressed audio. • MPEG-1 L2. Low Latency compressed audio, Low/Normal latency modes use a higher quality codec on streams 1-4. • AAC-LC. Highest audio quality per bitrate, using with Ultra Low latency mode will increase video latency. Only audios 1 to 4.
	Audio Stream Bitrate (Kb/s):
2	In this field, the audio stream bitrate, currently information only which depends on the encoding mode.

Table 5: Audio Embedded Input menu options

1.1.1.1.5 Audio Analogue 1 or 2

When Analogue Audio is selected, the Audio is catch from the external Audio input. The cable from Lemo 5 to XLR-4 is needed, this cable is provided together with the transmitter. There are 2 pairs of analogue audio.

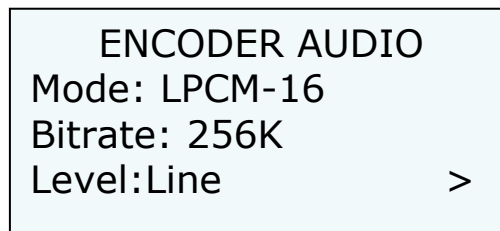


Figure 8 Audio Embedded Input Menu

Line n°	Function
	Audio Stream Encoding Mode:
	In this field, the audio stream encoding mode 1 to 8 is selected. The available options are:
1	• LPCM. Ultra Low latency uncompressed audio or data. Bit depth requirements may vary for data, typically 20-bit for Dolby pass-through. • MPEG-1 L1. Ultra Low latency compressed audio. • MPEG-1 L2. Low Latency compressed audio, Low/Normal latency modes use a higher quality codec on streams 1-4. • AAC-LC. Highest audio quality per bitrate, using with Ultra Low latency mode will increase video latency.
	Audio Stream Bitrate (Kb/s):
2	In this field, the audio stream bitrate, currently information only which depends on the encoding mode.
	Level:
	In this field, the type of analogue audio input can be selected. The available options are:
3	• Line. • Micro Dynamic. • Micro Phantom. • Variable.

Table 6: Audio Embedded Input menu options

1.1.1.1.6 Audio Generator 1 to 8

This Audio tone can be used for tests when an Audio source is not available.

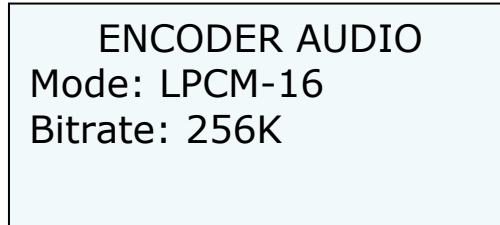


Figure 9 Audio Embedded Input Menu

Line nº	Function
Audio Stream Encoding Mode:	
In this field, the audio stream encoding mode 1 to 8 is selected.	
The available options are:	
1	• LPCM. Ultra Low latency uncompressed audio or data. Bit depth requirements may vary for data, typically 20-bit for Dolby pass-through. • MPEG-1 L1. Ultra Low latency compressed audio. • MPEG-1 L2. Low Latency compressed audio, Low/Normal latency modes use a higher quality codec on streams 1-4. • AAC-LC. Highest audio quality per bitrate, using with Ultra Low latency mode will increase video latency. Only audios 1 to 4.
Audio Stream Bitrate (Kb/s):	
2	In this field, the audio stream bitrate, currently information only which depends on the encoding mode.

Table 7:Audio Embedded Input menu options

1.1.1.1.7 IP Out

ENCODER IP OUT	
Local IP Config	↩
Dest IP&Port	↩
TPperIP: 7 (1..7)	<
ENCODER IP OUT	
Protocol: RTP	>
TTL:108 (1--255)	↩
Stream Diagnostics	↩

Figure 10:IP Output Menu

Line n°	Function
	Local IP Config: In this field, different parameters related to the configuration of the local network can be set. The available parameters are: - Local: IP address of the device which is going to send the information. To change the IP address first press the OK button and then, with the Up, Down keys select the desired number. To change from one character to another, press Right, Left keys. To save the value, press the OK button. (editable parameters) - Mask: Subnet address of the device which is going to send the information. To change the Subnet Mask address first press the OK button and then, with the Up, Down keys select the desired number. To change from one character to another, press Right, Left keys. To save the value, press the OK button. (editable parameters) - Gateway: Gateway address of the device which is going to send the information. To change the Gateway address first press the OK button and then, with the Up, Down keys select the desired number. To change from one character to another, press Right, Left keys. To save the value, press the OK button. (editable parameters) - Video over IP MAC: In this field the MAC address of the Video over IP card is displayed (reading parameter)
1	

2	Dest IP & Port: In this option, the IP address and the number of the port of the device to which data is sent must be configured. In case you want to send data to a multicast address just enter the desired multicast address. To change the IP address and the number of the port, first press the OK button and then, with the Up, Down keys select the desired number. To change from one character to another, press Right, Left keys. To save the value, press the OK button. (editable parameter)
3	TP per IP: In this field the number of Transport Stream packets per IP (from 1 to 7) can be configured. To select the desired value, press the Right and Left buttons. (eligible parameter)
4	Protocol: The type of protocol used for the communication can be RTP, UDP or SRT. To select the desired protocol for the communication, use Right and Left buttons. (eligible parameter)
5	Time To Live (TTL): This field limits the lifetime of the data. The Time To Live value (from 1 to 255) means the number of routers that a packet can reach until it is discarded. To configure this value, first press the OK button and then, with the Up, Down, Right and Left buttons select the desired value. To save the value, press OK button. (editable parameter)
6	Stream Diagnostics: In this field the estimated bitrate and IP packet size is shown.

Table 8: IP Output menu options

1.1.1.1.8 Data

To select the desired sort of data, press Right, Left buttons (eligible parameter).

The available options are:

- None
- GPS
- RS232

None

This option is selected in case no data is sent to the transmitter.

RS232

If it is wanted to send data to the transmitter through a RS232 connection, this option must be selected. It is also needed to configure the next parameters so as to achieve a successful communication.

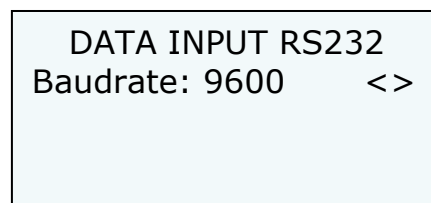


Figure 11: RS232 screen

Data option	Parameters
	Baudrate (eligible parameter):
1	Select the baudrate at which data user is received (Baudrate options are: 1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600, 115200, 230400).

Table 9: RS232 Parameters

Data option	Parameters
1	BaudRate: Select the baudrate at which data user is received. (Baudrate options are: 1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600) (eligible parameters)
2	Parity: Select the same parity as the parity of the received data user signal. (Parity options are None, Even, Odd) (eligible parameters)
3	Stop Bits: Select the same number of stop bits as the received data user signal has. (Stop bit options are 1 or 2) (eligible parameter)

Table 10: RS232 Parameters

GPS

If this option is selected, you can receive the GPS information from the internal GPS receiver using an external GPS antenna (which must be connected to the GPS Antenna Input). This information is sent to receiver. The antenna is fed directly from the transmitter at 5 V.

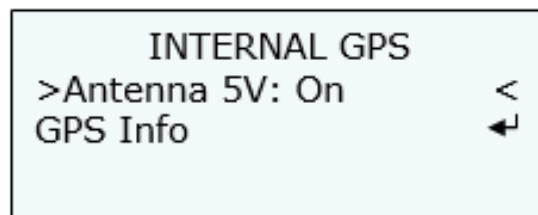


Figure 12: Internal GPS Main screen

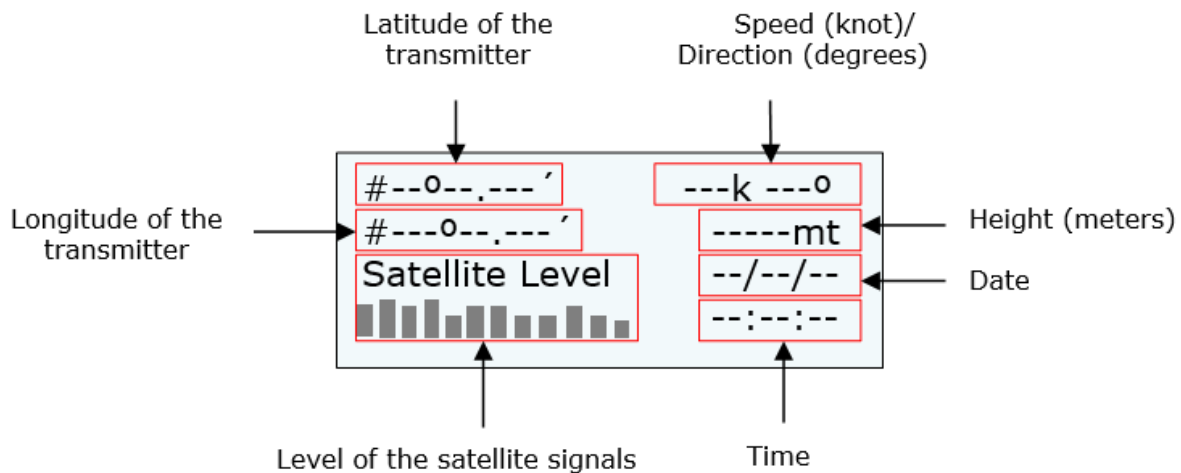


Figure 13: GPS Transmitter screen

The GPS info option screen shows the following information:

- **Latitude of the Transmitter:** The latitude position of the transmitter is specified.
- **Speed of the Transmitter:** It shows the speed of the transmitter in knots.
- **Direction of the Transmitter:** The direction of the transmitter is shown in this field.
- **Longitude of the Transmitter:** The longitude position of the transmitter is specified.
- **Height of the Transmitter:** The height of the transmitter from ground is specified in this value.
- **Date:** The updated date is shown.

1.1.1.1.9 KLV Metadata

When this option is ON, the KLV Metadata embedded on the SDI signal is sent through the radio link.

If KLV metadata is not embedded on SDI input, the HDT-02 Transmitter will show an alarm indicating that the KLV is not present.

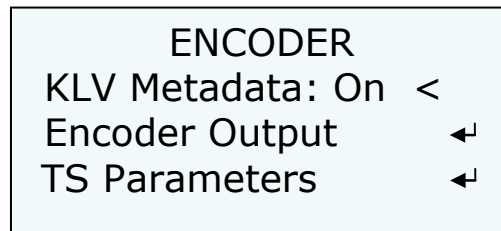


Figure 14: KLV Metadata option

Once that KLV is received at ground, using the TS over IP output of the receiver, KLV metadata can be monitored by a Mission Monitor program.

1.1.1.1.10 Encoder Output

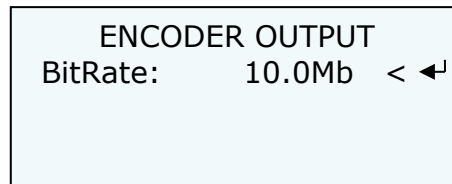


Figure 15: Encoder Output Menu

Line n°	Function
BitRate:	
1	In this field, the output bitrate is shown. It case it is wanted to select between an automatic bitrate or configure manually the bitrate, press Right, Left buttons. If manual configuration is selected then, press the OK button so as to select the desired bitrate with the UP, Down keys. Press the OK button so as to save the introduced value. (eligible parameter) The available options are: ▪ Auto ▪ Manual (editable parameter)

Table 11:Encoder Output menu options



If the user selects the manual option, the first and second lines disappear on the main screen.



When the encoder output is in Manual, if you activate the RF, the encoder output changes to AUTO mode automatically.

1.1.1.1.11 TS Parameters

ENCODER TS		
Service Name		⬅⬆
Program N°:	2	⬅⬆
Video PID:	200	⬅⬆

ENCODER TS		
Audio1 PID:	201	⬅⬆
Audio2 PID:	202	⬅⬆
Audio3 PID:	203	⬅⬆

ENCODER TS		
Audio4 PID:	204	⬅⬆
Audio5 PID:	205	⬅⬆
Audio6 PID:	206	⬅⬆

ENCODER TS		
Audio7 PID:	207	⬅⬆
Audio8 PID:	208	⬅⬆
Data PID:	209	⬅⬆

ENCODER TS		
PMT PID:	204	⬅⬆
PCR PID:	204	⬅⬆

Figure 16: TS Parameters Menu

Line n°	Function
	Service Name (editable parameter):
1	Here the Service name must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired letter. With the Right, Left keys, the user can select the character of the word. Press the OK button to save the introduced value.
	Program N° (editable parameter):
2	Here the Program number must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired number. Press the OK button to save the introduced value.

Video PID (editable parameter):	
3	Here the Video packet identifier must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired number. Press the OK button to save the introduced value.
Audio 1 PID (editable parameter):	
4	Here the Audio1 packet identifier must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired number. Press the OK button to save the introduced value.
Audio 2 PID (editable parameter):	
5	Here the Audio2 packet identifier must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired number. Press the OK button to save the introduced value.
Audio 3 PID (editable parameter):	
6	Here the Audio1 packet identifier must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired number. Press the OK button to save the introduced value.
Audio 4 PID (editable parameter):	
7	Here the Audio2 packet identifier must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired number. Press the OK button to save the introduced value.
Audio 5 PID (editable parameter):	
8	Here the Audio1 packet identifier must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired number. Press the OK button to save the introduced value.
Audio 6 PID (editable parameter):	
9	Here the Audio2 packet identifier must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired number. Press the OK button to save the introduced value.
Audio 7 PID (editable parameter):	
10	Here the Audio1 packet identifier must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired number. Press the OK button to save the introduced value.
Audio 8 PID (editable parameter):	
11	Here the Audio2 packet identifier must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired number. Press the OK button to save the introduced value.
Data PID (editable parameter):	
12	Here the Data packet identifier must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired number. Press the OK button to save the introduced value.

PMT PID (editable parameter):	
13	Here the Program Map Tables packet identifier must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired number. Press the OK button to save the introduced value.
PCR PID (editable parameter):	
14	Here the Program Clock Reference packet identifier must be entered. To change its value, first press the OK button and then, with the UP, Down arrows select the desired number. Press the OK button to save the introduced value.

Table 12:Encoder TS menu options

1.1.1.1.12 Scrambler

In this section the signal can be encrypted with different encryption methods.

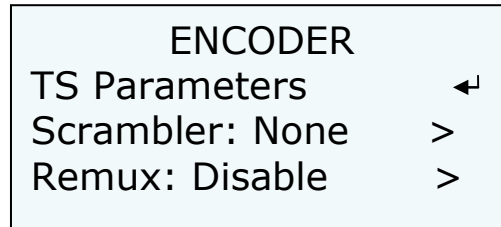


Figure 17: Scrambler menu

Line nº	Function
	Mode (eligible parameter):
	To choose the desired encryption, press the Right, Left keys.
	The available options are:
1	• None • BISS-1 • BISS-E • AES-128 (Optional) • AES-256 (Optional)

Table 13: Scrambler menu options

To introduce the key of the encryption, follow these steps:

1. Choose the correct encryption.
2. Press the OK button to introduce the key.
3. With Left and Right buttons select one field and with UP, Down buttons choose one value from 0 to 9 or A to F.
4. Press the OK button to set the key.

1.1.1.1.13 Remux (optional)

Remux option allows the transmitter to send up to 8 services multiplexed in one TS. The TS to be multiplexed with the TS from the encoder must be introduced in the ASI input.

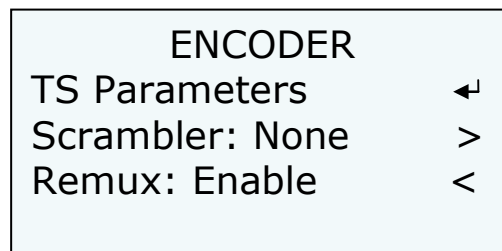


Figure 18: Remux menu screen

Please, make sure that the TS parameters are different for all services. When the Remux option is enabled, the Encoder Output is changed to manual bitrate mode. The modulator bitrate must be set to support the total bitrate; Manual bitrate + ASI input bitrate must be lower than the bitrate configured in the modulator.

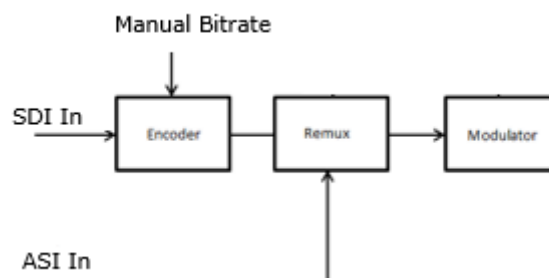


Figure 19: Remux work diagram



ASI bitrate must be known.



You must configure it to have ASI input Bit rate plus NTT encoder Bit rate minor than modulator total Bit rate.

1.1.1.2 RF Menu

By using the Up, Down arrow keys, select the **RF** option and press the OK key.

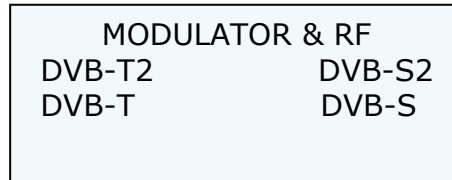


Figure 20: RF Menu

1.1.1.2.1 DVB-T2

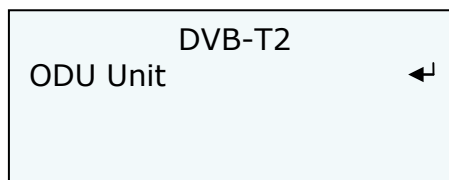
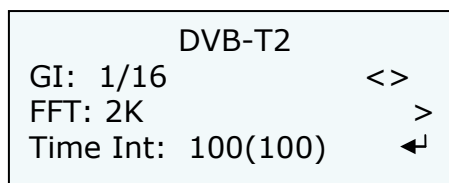
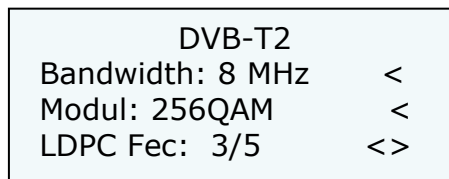
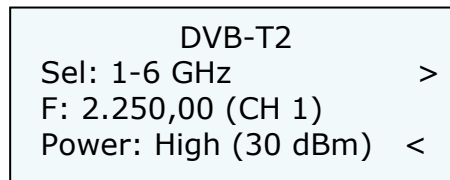


Figure 21: DVB-T2

Line n°	Function
1	ODU Select: In this option, the user can choose the type of the ODU unit. (elegant parameter) The available options are: ▪ 1-3 GHz ▪ 3-14 GHz ▪ PA-10 ▪ RF OUTPUT
2	Frequency: Select the frequency at which the signal is going to be transmitted. So as to establish the frequency value first, press the OK button and then, with the Up, Down arrows buttons select the desired value. So as to save the introduced value, press the OK button. (editable parameter)
3	Power: So as to establish the output power value first, press the OK button and then, with the right, left buttons select the desired option. (elegant parameter) The available options are: When ODU unit selected: • Low (24dBm) • High (30 dBm) When PA-10 selected • Low • Mid • High When RF OUTPUT Selected • Editable from -5dBm to +20 dBm

Bandwidth:

Here the bandwidth of the transmitted signal can be chosen. Use Right, Left buttons to select the desired value.

The available options are:

- 4**
- 1.7 MHz
 - 5 MHz
 - 6 MHz
 - 7 MHz
 - 8 MHz

Modulation:

Here the constellation can be chosen. Use the Right, Left buttons to select the desired constellation.

The available options are:

- 5**
- QPSK
 - 16QAM
 - 64QAM
 - 256QAM

In the Mobile 1/16 guard interval mode, 16QAM can be only selected.

LDPC FEC:

Here the value of the Forward Error Correction can be chosen. Use the Right, Left buttons to select the desired value.

The available options are:

- 6**
- 1/2
 - 3/5
 - 2/3
 - 3/4
 - 4/5
 - 5/6

GI:

Here the Guard Interval can be chosen. Use Right, Left buttons to select the desired value.

The available options are:

7

- Fixed 1/8: The guard Interval is configured to 1/8 and the receiver automatically detects the operation mode working on Fixed mode (packet switching reception).
- Fixed 1/32: The guard Interval is configured to 1/32 and the receiver automatically detects the operation mode working on Fixed mode (packet switching reception).
- Mobile 1/16: The guard Interval is configured to 1/16 and the receiver automatically detects the operation mode working on Mobile mode (MRC Diversity reception).

FFT Mode:

Here the number of FFT points can be chosen. Use Right, Left buttons to select the desired buttons.

8

The available options are:

- 2K
- 4K

Time Interleaving:

9

This option indicates the number of interleaver blocks per interleaving frame.

The user selects into how many interleaver blocks (TI_blocks) an interleaving frame is split.

To configure this option, press the OK button and then select the desired value with the Up and Down buttons.

ODU Unit

In this field, users can control ODU units:

10

- Alarms
- Temperature
- Voltage
- SN/RV
- Edit ODU channels

Table Table 14: DVB-T2 menu options

1.1.1.2.2 DVB-T2 Maximum Bitrates

These maximum values are reached under the following conditions: 8-MHz channel, 8K mode, G.I.=1/128.

Modulation Scheme	Code Rate	Bit Rate (Mbps)
QPSK	1/2	7.0
	3/5	8.4
	2/3	9.4
	3/4	10.5
	4/5	11.3
	5/6	11.7
16 QAM	1/2	14.5
	3/5	17.5
	2/3	19.4
	3/4	21.8
	4/5	23.3
	5/6	24.3
64 QAM	1/2	21.5
	3/5	25.9
	2/3	28.8
	3/4	32.4
	4/5	34.6
	5/6	36.0
256 QAM	1/2	29.0
	3/5	34.9
	2/3	38.8
	3/4	43.7
	4/5	46.6
	5/6	48.6

Table 15: DVB-T2 Maximum Bitrates

1.1.1.2.3 DVB-T

DVB-T	
Sel: 1-6 GHz	>
F: 1.040,50 (CH 1)	
Power: High (30dBm)	>

DVB-T	
Bandwidth: 8 MHz	<
Modul: 64 QAM	<
FEC: 1/2	>

DVB-T	
GI: 1/4	<
Spectrum: Normal	>
ODU Unit	↩

Figure 22: DVB-T Menu

Line n°	Function
ODU Select:	
1	In this option, the user can choose the type of the ODU unit. The available options are: ▪ 1-3 GHz ▪ 3-14 GHz ▪ PA-10 ▪ RF OUTPUT
Frequency:	
2	Select the frequency at which the signal is going to be transmitted. So as to establish the frequency value first, press the OK button and then, with the Up, Down arrows buttons select the desired value. So as to save the introduced value, press the OK button. (editable parameter)
Power:	
3	So as to establish the output power value first, press the OK button and then, with the right, left buttons select the desired option. (elegant parameter) The available options are: When ODU unit selected: • Low (24dBm) • High (30 dBm) When PA-10 selected • Low • Mid • High When RF OUTPUT Selected • Editable from -5dBm to +20 dBm

Bandwidth:

- 4** Here the bandwidth of the transmitted signal can be chosen. Use Right, Left buttons so as to select the desired value. (eligible parameter)

The available options are:

- 5 MHz
 - 6 MHz
 - 7 MHz
 - 8 MHz
-

Modulation:

- 5** Here the constellation of the modulation can be chosen. Use Right, Left buttons so as to select the desired constellation. (eligible parameter)

The available options are:

- QPSK
 - 16QAM
 - 64QAM
-

Fec:

- 6** Here the value of the Forward Error Correction can be chosen. Use Right, Left buttons so as to select the desired value. (eligible parameter)

The available parameters are:

- 1/2
 - 2/3
 - 3/4
 - 5/6
-

GI:

Here the Guard Interval value can be chosen. Use Right, Left buttons so as to select the desired value. (eligible parameter)

- 7** The available options are:

- 1/4
 - 1/8
 - 1/16
 - 1/32
-

Spectrum:

- 8** Here the type of the spectrum is configured. Inverted spectrum is just another method to help preventing signal theft. Use Right, Left buttons so as to select the desired option. (eligible parameter)

The available options are:

- Normal
- Invert

ODU Unit

In this field, users can control ODU units:

- 19**
- Alarms
 - Temperature
 - Voltage
 - SN/RV
 - Edit ODU channels

Table 16: DVB-T menu options

4.2.3.1.1 DVB-T Useful Bitrate

In this point, useful bitrates are given for the 4K mode in the following tables and cover the 8 MHz, 7 MHz and 6 MHz channels.

In the following tables, the values in italics are approximate values for the given channel bandwidth.

Modulation	Code rate	Guard interval			
		1/4	1/8	1/16	1/32
QPSK	1/2	4,98	5,53	5,85	6,03
	2/3	6,64	7,37	7,81	8,04
	3/4	7,46	8,29	8,78	9,05
	5/6	8,29	9,22	9,76	10,05
	7/8	8,71	9,68	10,25	10,56
16-QAM	1/2	9,95	11,06	11,71	12,06
	2/3	13,27	14,75	15,61	16,09
	3/4	14,93	16,59	17,56	18,10
	5/6	16,59	18,43	19,52	20,11
	7/8	17,42	19,35	20,49	21,11
64-QAM	1/2	14,93	16,59	17,56	18,10
	2/3	19,91	22,12	23,42	24,13
	3/4	22,39	24,88	26,35	27,14
	5/6	24,88	27,65	29,27	30,16
	7/8	26,13	29,03	30,74	31,67

Table 17: Useful bitrate (Mbit/s) for non-hierarchical systems in 8 MHz channels

Modulation	Code rate	Guard interval			
		1/4	1/8	1/16	1/32
QPSK	1/2	4,354	4,838	5,123	5,278
	2/3	5,806	6,451	6,830	7,037
	3/4	6,532	7,257	7,684	7,917
	5/6	7,257	8,064	8,538	8,797
	7/8	7,620	8,467	8,965	9,237
16-QAM	1/2	8,709	9,676	10,246	10,556
	2/3	11,612	12,902	13,661	14,075
	3/4	13,063	14,515	15,369	15,834
	5/6	14,515	16,127	17,076	17,594
	7/8	15,240	16,934	17,930	18,473
64-QAM	1/2	13,063	14,515	15,369	15,834
	2/3	17,418	19,353	20,491	21,112
	3/4	19,595	21,772	23,053	23,751
	5/6	21,772	24,191	25,614	26,390
	7/8	22,861	25,401	26,895	27,710

Table 18: Useful bitrate (Mbit/s) for non-hierarchical systems in 7 MHz channels

Modulation	Code rate	Guard interval			
		1/4	1/8	1/16	1/32
QPSK	1/2	3,732	4,147	4,391	4,524
	2/3	4,976	5,529	5,855	6,032
	3/4	5,599	6,221	6,587	6,786
	5/6	6,221	6,912	7,318	7,540
	7/8	6,532	7,257	7,684	7,917
16-QAM	1/2	7,465	8,294	8,782	9,048
	2/3	9,953	11,059	11,709	12,064
	3/4	11,197	12,441	13,173	13,572
	5/6	12,441	13,824	14,637	15,080
	7/8	13,063	14,515	15,369	15,834
64-QAM	1/2	11,197	12,441	13,173	13,572
	2/3	14,929	16,588	17,564	18,096
	3/4	16,796	18,662	19,760	20,358
	5/6	18,662	20,735	21,955	22,620
	7/8	19,595	21,772	23,053	23,751

Table 19: Useful bitrate (Mbit/s) for non-hierarchical systems in 6 MHz channels

Modulation	Inner Code Rate	Guard interval			
		1 / 4	1 / 8	1 / 16	1 / 32
QPSK	1 / 2	3.110	3.456	3.659	3.770
	2 / 3	4.147	4.608	4.879	5.027
	3 / 4	4.665	5.184	5.189	5.655
	5 / 6	5.184	5.760	6.099	6.283
	7 / 8	5.443	6.048	6.404	6.598
16-QAM	1 / 2	6.221	6.912	7.318	7.540
	2 / 3	8.294	9.216	9.758	10.053
	3 / 4	9.331	10.368	10.978	11.310
	5 / 6	10.368	11.520	12.197	12.567
	7 / 8	10.886	12.096	12.807	13.195
64-QAM	1 / 2	9.331	10.368	10.978	11.310
	2 / 3	12.441	13.824	14.637	15.080
	3 / 4	13.996	15.551	16.466	16.965
	5 / 6	15.551	17.279	18.296	18.820
	7 / 8	16.329	18.143	19.211	19.793

Table 20: Useful bitrate (Mbit/s) for non-hierarchical systems in 5 MHz channels

4.2.3.1.2 DVB-S2 (Optional)

DVB-S2	
Sel: 1-3GHz	>
F: 2.300,00 (CH 1)	
Power: High (30 dBm)	<

DVB-S2	
Modul: QPSK	>
LDPC Fec: 3/4	<>
SR: 12.400 B:14.88	↵

DVB-S2	
ODU Unit	↵

Figure 23: DVB-S2 Menu

Line nº	Function
ODU Select:	
In this option, the user can choose the type of the ODU unit. (elegant parameter)	
1	The available options are: ▪ 1-3 GHz ▪ 3-14 GHz
Frequency:	
2	Select the frequency at which the signal is going to be transmitted. So as to establish the frequency value first, press the OK button and then, with the Up, Down arrows buttons select the desired value. So as to save the introduced value, press the OK button. (editable parameter)
Power:	
So as to establish the output power value first, press the OK button and then, with the right, left buttons select the desired option. (elegant parameter) The available options are: When ODU unit selected:	
3	• Low (24dBm) • High (30 dBm)
Modulation:	
4	Here the constellation of the modulation can be chosen. Use Right and Left buttons so as to select the desired constellation. (eligible parameter) The available options are: ▪ QPSK ▪ 8PSK ▪ 16APSK ▪ 32APSK

LDPC Fec:

- 5** Here the value of the Forward Error Correction can be chosen. Use Right and Left buttons so as to select the desired value. (eligible parameter)

The available options are:

- 1/4
- 1/3
- 2/5
- 1/2
- 3/5
- 2/3
- 3/4
- 4/5
- 5/6
- 8/9
- 9/10

SR:

- 6** In this field, the value of the symbol rate can be introduced. (editable parameter)

BW:

In this field, the value of the bandwidth of the transmitted signal is displayed. (reading parameter)

This parameter is automatically adjusted according to the selected transport stream parameters.

ODU Unit

In this field, users can control ODU units:

- 7**
- Alarms
 - Temperature
 - Voltage
 - SN/RV
 - Edit ODU channels

▪

Table 21:DVB-S Menu

4.2.3.1.3 Symbol Rate calculation

So as to calculate the symbol rate needed for a determined bandwidth, the next equation must be implemented:

$$SR = \frac{BW}{(1 + Rolloff)}$$

Where:

SR: Symbol Rate in Msymb/s

BW: Bandwidth in MHz

Next, it is shown a table as an example of the Symbol Rate values for a determined Bandwidth of 28 MHz.

Bandwidth (MHz)	Roll-off	Symbol Rate (Msymb/s)
28	0.20	23.33
28	0.25	22.4
28	0.35	20.74

Table 22: Symbol Rate calculation

4.2.3.1.4 DVB-S (Optional)

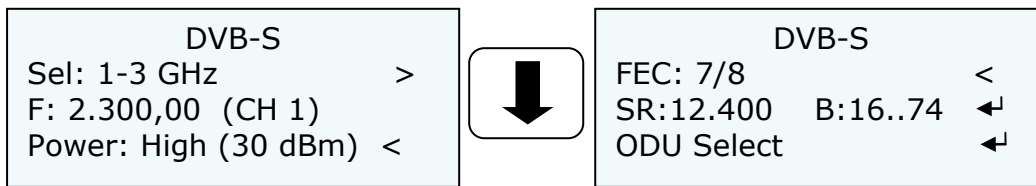


Figure 24: DVB-S Menu

Line nº	Function
ODU Select:	
1	In this option, the user can choose the type of the ODU unit. (elegant parameter) The available options are: ▪ 1-3 GHz ▪ 3-14 GHz
Frequency:	
2	Select the frequency at which the signal is going to be transmitted. So as to establish the frequency value first, press the OK button and then, with the Up, Down arrows buttons select the desired value. So as to save the introduced value, press the OK button. (editable parameter)
Power:	
3	So as to establish the output power value first, press the OK button and then, with the right, left buttons select the desired option. (elegant parameter) The available options are: When ODU unit selected: • Low (24dBm) • High (30 dBm)
FEC:	
4	Here the value of the Forward Error Correction can be chosen. Use Right and Left buttons so as to select the desired value. (eligible parameter) The available options are: ▪ 1/2 ▪ 2/3 ▪ 3/4 ▪ 5/6 ▪ 7/8

SR:

In this field, the value of the symbol rate can be introduced.
(editable parameter)

5

BW:

In this field, the value of the bandwidth of the transmitted signal
is displayed. (reading parameter)

This parameter is automatically adjusted according to the selected
transport stream parameters.

ODU Unit

In this field, users can control ODU units:

6

- Alarms
 - Temperature
 - Voltage
 - SN/RV
 - Edit ODU channels
-

Table 23: DVB-S menu options

4.2.3.2 Unit Menu

By using the Up, Down arrow keys, select the **Unit** option and press OK key.

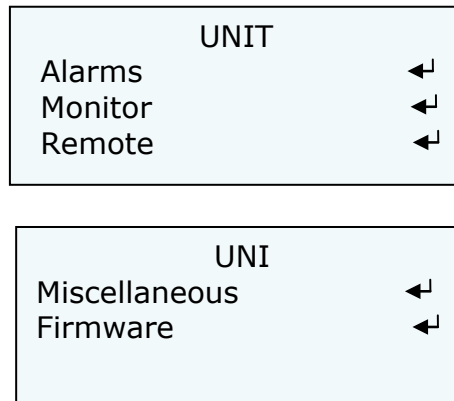


Figure 25: Unit Menu

4.2.3.2.1 Alarms

In this section, you can View and Configure the Alarms shown by the Transmitter. You can select view or configure an alarms by pressing Left and Right arrows.

The alarm screen can be accessed by pressing the OK button from the main screen as well. To return to the main screen from the alarm screen, the Cross button must be pressed.

The different alarms and warnings that configured in the transmitter are:

- High Voltage
- Low Voltage
- High Temperature
- ASI Overflow: this alarm means that the input bit rate is higher than the one that can be modulated due to the parameters configured (constellation, FEC, GI...).
- No SDI Input: Video source is not connected.
- No ASI Input: ASI source is not connected.
- No GPS: GPS source is not connected.
- No KLV
- PA No Forward
- PA Rev High
- PA Volt Low
- PA Temp High

- ODU no present
- ODU frequency Range
- ODU PLL Unlock
- ODU Temperature High
- ODU Voltage Low
- ODU RF Reverse
- ODU No RF Power

4.2.3.2.2 Monitor

UNIT MONITOR		
Mod Temp: +37,1°C	>	
Enc Temp: +37,1°C	>	
Voltage: +11.6V		

Figure 26: Unit Monitor Menu

▪ **Temperature:**

In this field, the internal temperature of the device is displayed. With the Right, Left keys, the user can select if the temperature is shown in °C or in °F. Also, the value which is between square brackets means the speed of the fans (values from 0 to 3) where 0 means that the fans are stopped and value 3 is the maximum speed. (Reading parameter)

▪ **Voltage:**

In this field, the voltage of the transmitter is shown. (Reading parameter)

4.2.3.2.3 Remote

UNIT ETHERNET
LOC 192.168.001.010 ←
MSK 255.255.000.000 ←
GAT 192.168.001.001 ↵

UNIT ETHERNET
MAC: 70-B3-D5-1A-C0-00
Admin Pass: ***** ↵
Restore Admin Pas ↵

UNIT ETHERNET
User Pass: ***** ↵
Restores User Pas ↵

Figure 27: Remote

Line nº	Function
Local IP:	
1	In this option it can be set the IP address of the device in case it is wanted to control the device remotely. So as to change the IP address first press OK button and then, with the Up and Down keys select the desired number. So as to change from one character to another, press Right and Left keys. Press the OK button so as to save the introduced value. (editable parameter)
Subnet Mask:	
2	Here it can be written the Subnet Mask address of the device. So as to change the Subnet Mask address first press OK button and then, with the Up and Down keys select the desired number. So as to change from one character to another, press Right and Left keys. Press the OK button so as to save the introduced value. (editable parameter)
Gateway:	
3	In this option, the address of the Gateway must be written. So as to change the Gateway address first press OK button and then, with the Up and Down keys select the desired number. So as to change from one character to another, press Right and Left keys. Press the OK button so as to save the introduced value. (editable parameter)
MAC ADDRESS (Reading parameter)	
4	In this field, the MAC address of the device is shown.
Admin Pass:	
5	The administrator's password is introduced. It can be set an own password which is a list of 8 digits. To set the password, press the OK button and then use the Up and Down buttons to establish the desired value, then press the Right and Left buttons to change other digits. Finally press OK button to save the introduced values.

Restore Admin Pass:

- 6** This option enables to restore the default administrator password (00000000).

User Pass:

- 7** The user's password is introduced. It can be set an own password which is a list of 8 digits.
- To set the password, press the OK button and then use the Up and Down buttons to establish the desired value, then press the Right and Left buttons to change other digits. Finally press the OK button to save the introduced values.

Restore User Pass:

- 8** This option enables to restore the default user password (00000000).
-

Table 24: Unit Ethernet menu options

4.2.3.2.4 Miscellaneous

UNIT MISCELLANEOUS
Keyboard Lock: Off <
Dist Units: Km >
T/T2 Carrier: Off ↵

UNIT MISCELLANEOUS
Activ Key:***** >
S/N: 660010911
Enc S/N: XXXXXXXX

UNIT MISCELLANEOUS
Activ Licenses: ↵
Load Encry Keys: ↵
OSD Timer: Off >

UNIT MISCELLANEOUS
OSD Position:Bot >

Figure 28: Miscellaneous Menu

Line	Function
Keyboard Lock:	
1	If the On option is selected and then, the buttons of the equipment remain for 5 minutes without being pressed, a message will appear in the screen saying that the keyboard is locked. Pressing the cross button, the keyboard can be unlocked. If the Off option is selected there will be no messages in the screen. The available options are: ▪ On ▪ Off
Dist Units:	
2	If miles is selected then, all the distances will be in miles and the same occurs if kilometers is selected. (eligible parameter) The available options are: ▪ Kilometers ▪ Miles
T/T2 Carrier:	
3	The available options are: • On: The carrier (without modulation) is shown for 1 minute. • Off: The option is disabled.
Activation Key	
4	In this field, you can activate your license. You can set the activation key pressing up and down buttons. It must have 8 characters alphanumeric.
S/N:	
5	In this field the serial number of the device is shown (reading parameter).
Encoder S/N:	
6	In this field the serial number of the encoder is shown (reading parameter).

Activ Licenses:

In this field you can enter the license code for the following optional features:

- AES
- KLV
- Remux
- Internal GPS

7

Once the code has been introduced, the license is enabled on the unit.
You can use this menu to check which licenses are enabled on this unit.
For a new license code, please contact us.

Load Encry Keys:

In this field you can load the encryption keys for BISS and AES modes by USB. The file must have ".svp" extension and the content must be as it is indicated in the following example:

- AES128:1202A3412348C9127348FE2348971234
- 8** AES256:123AB89070F8097D897EE8970DE87987980109891829182391
82399AFFC123AE
- BISS1:89701234ABE1
- BISSESW:0123AC1238907098
- BISSEU:413809ABA12393

Once the keys information has been loaded properly, "KEYS LOADED" message is shown in the screen.

Menu OSD:

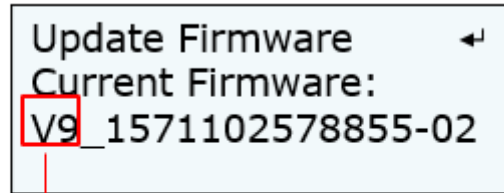
- 9** In this field, OSD menu timing can be configured, the options available are:
- Always. It is always present.
 - Timed. It disappears from screen after 1 minute.

Menu OSD Position:

- 10** In this field, the position of the OSD menu can be configured, the options available are:
- Top
 - Bottom

Table 25: Unit Miscellaneous menu options

4.2.3.2.5 Firmware



Transmitter PCB Version

Figure 29: Firmware Menu

Line n°	Function
1	Update Firmware: This field is the one for updating the version of the device. So as to update the equipment properly, follow the instructions below.
2	Rev: In this field it is shown the number of the version installed in the device. The characters which describe the number of the version are the one inside the red box shown in the figure above. The rest of the characters are important for the manufacturer but are not important for the user.

Table 26: Unit Firmware menu options

Next, the necessary steps so as to make a successful update are explained.

- 1) The latest firmware is allocated in the webpage of SVP Broadcast Microwave. So as to access to the firmware file, first enter www.svpbm.com in your web browser.
- 2) Click on the Support tab.

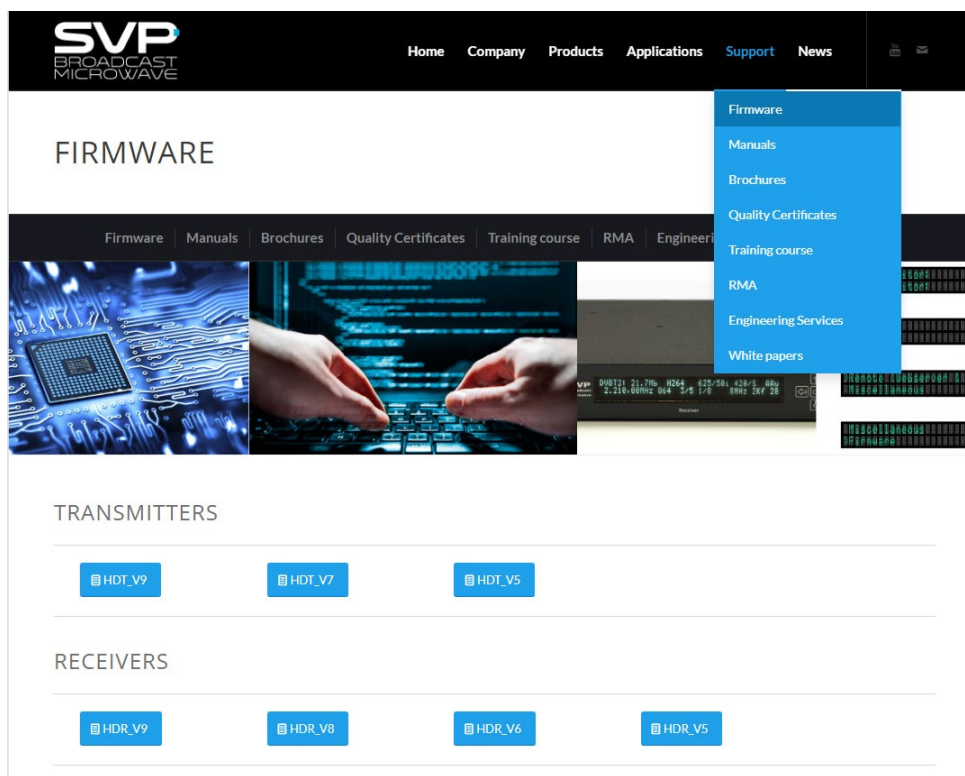


Figure 30: Updating firmware step 2

3) Click on Firmware.

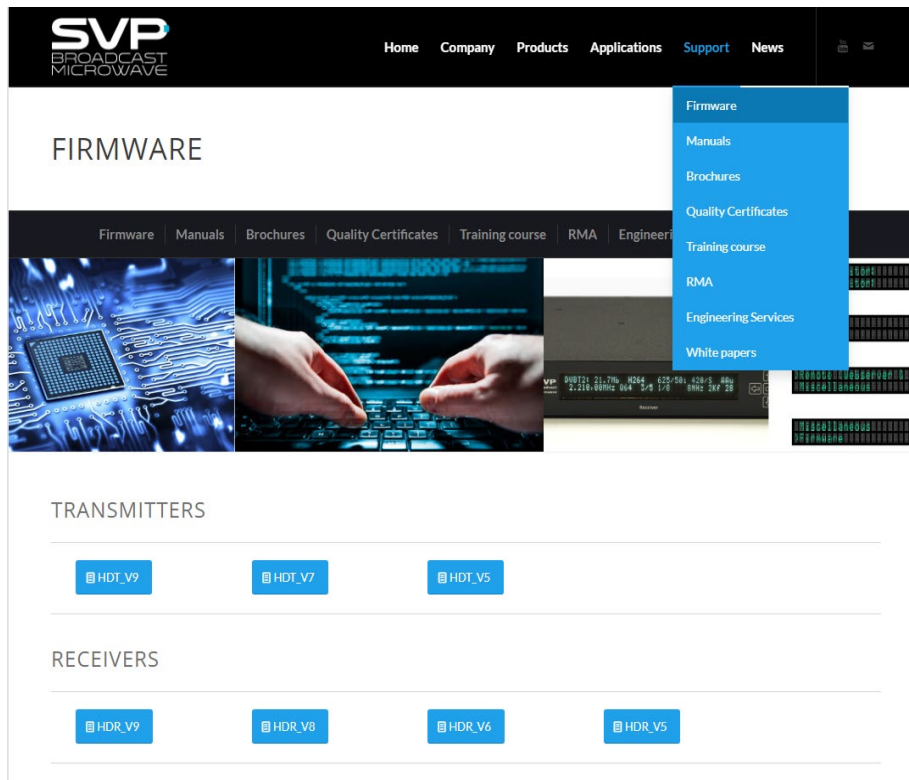


Figure 31: Updating firmware step 3

- 4) Press the version of the transmitter model (version of the equipment) to download the file.
To verify the version of the transmitter, go to firmware field and then look at the current firmware to check the number installed in the device (the first two digits).

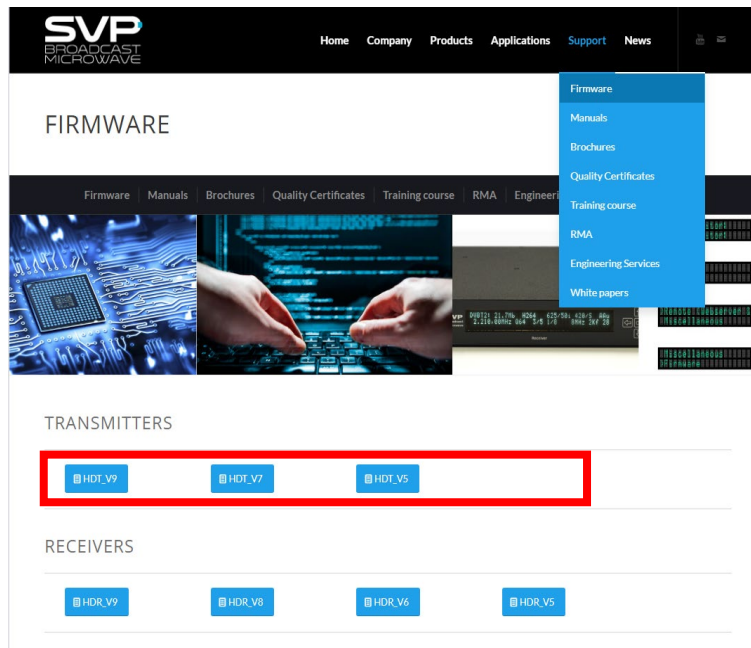


Figure 32: Updating firmware step 5

- 5) Once the firmware file has been downloaded, save it in a USB device.



In the USB device, the only file that can be allocated inside it is the firmware file of the device to be updated.

- 6) With the equipment completely power off (**with no power supply**), insert the USB device in the USB connector, situated in the rear panel.



Before introducing the USB device, remove the power supply of the equipment.

- 7) Now, switch on the device.
- 8) Go to Unit menu. In case of being in the main screen, press cross button so as to access to the menu. There, with the Up, Down buttons, select the Unit option.
- 9) Select Firmware by pressing the OK button.
- 10) Select Check USB Memory with the OK button.
- 11) Now, automatically the device updates the firmware. The screens which are shown below display the different steps that the device is making while the updating process.



Don't power off the device during the updating process.



You must remove the USB before start working with the new firmware.

Chapter 5: Web Server

5.1.1 ENCODER

Encoder
RF
TSolP
Unit

Video

Input:	Test Pattern ▼	Format:	625/50[SD]	Bitrate:	85,5 Mbps
Delay:	Standard ▼	Profile:	4:2:0 ▼	GOP Size:	Auto ▼ 12 ▼

Audio

[A1]Input:	Embedded ▼
[A1]Bitrate:	256 Kbps ▼
[A2]Input:	Test Tone ▼
[A2]Bitrate:	256 Kbps ▼
DID:	Group 1 ▼

Data

Input:	GPS ▼	Status:	GPS not detected
Latitude:	#--0--.--'	Longitude:	#---0--.--'
Altitude:	-----mt	Direction:	---0
		Speed:	---k

TS Parameters

Video PID:	200	Audio1 PID:	201	Audio2 PID:	202
Data PID:	203	PMT PID:	204	PCR PID:	205
Program Number:	1	TS Id:	7	Network Id:	7
Network Name:	COFDM NETWORK	Service Name:	PROGRAM 001		

TS Output

TS Bitrate Mode:	Auto ▼	TS Bitrate:	90,766 Mbps
------------------	--------	-------------	-------------

Scrambler

Mode:	None ▼
-------	--------

Remux

Mode:	Enable ▼
Program Number:	5
PMT PID:	504

Figure 33: Web Server Encoder screen

5.1.1.1 Video

- **Input:**

Select the type of the video input. The video input options available are SDI, HDMI 1, HDMI 2, CVBS, ASI, IP and Test Pattern. In case IP input is selected, the parameters related to this input can be configured in the TSoIP screen. (eligible parameter)

- **Format:**

Here the format of the video input signal is displayed. If there is no video input, then, the message 'not detected' is displayed. (reading parameter)

- **Bitrate:**

In this field the bitrate of the input signal in Mbps is displayed. (reading parameter)

- **Delay:**

In this field, the delay of the coding process is configured. The available options are Standard Delay, Low Delay, Super Low Delay or Ultra Low Delay. (eligible parameter)

- **Profile:**

In this field, the codification profile can be configured. The available options are 4:2:0 and 4:2:2. (eligible parameter)

- **GOP Size:**

In this field, the GOP size can be configured. The available options are auto or manual from 3 to 30.

5.1.1.2 Audio

- **[A1] Input:**

Select the type of signal introduced in the audio 1 input. The audio input options available are Embedded, Analogue, AES-EBU, Test Tone Generator and None. (eligible parameter)

- **[A1] Bitrate:**

Select the bitrate for the coding process of the audio 1 signal. The available options are 128, 192, 256 and 384 Kbps. (eligible parameter)

- **[A2] Input:**

Select the type of signal introduced in the audio 2 input. The audio input options available are Embedded, Analogue, AES-EBU, Test Tone Generator and None. (eligible parameter)

- **[A2] Bitrate:**

Select the bitrate for the coding process of the audio 2 signal. The available options are 128, 192, 256 and 384 Kbps. (eligible parameter)

- **DID:**

Here you can choose the group, available options are group 1,2,3 or 4.

5.1.1.3 Data

- **Input:**

Select the type of data introduced to the device. The available options are None, GPS and RS232. (eligible parameter)

5.1.1.3.1 RS-232



Figure 34: Remote RS-232 screen

If it is wanted to send data to the transmitter through a RS232 connection, this option must be selected. It is also needed to configure the next parameters so as to achieve a successful communication:

- **Baudrate:**

Choose the baudrate of the RS-232 connection. The available options are 1200, 2400, 4800, 9600, 14400, 19200, 38400, 57600. (eligible parameter)

- **Parity:**

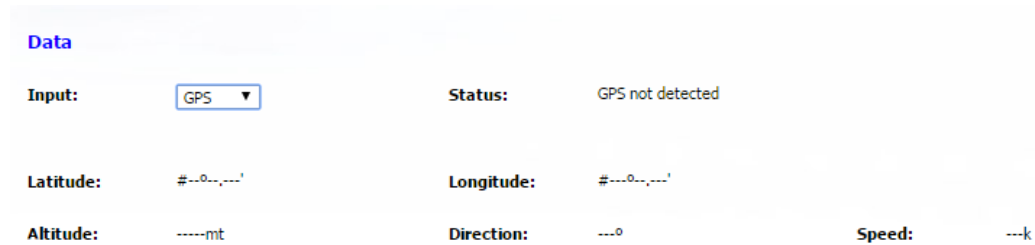
Select the parity for the RS-232 connection. The available options are None, ODD and Even. (eligible parameter)

- **Stop Bits:**

Establish the number of stop bits for the RS-232 connection. The available options are 1 and 2. (eligible parameter)

5.1.1.3.2 GPS

If GPS data is selected and the GPS antenna is connected to the device, then different parameters as shown in chapter 4 appear:



The screenshot shows a 'Data' section with the following parameters:

Input:	GPS	Status:	GPS not detected	
Latitude:	#--0--.--'	Longitude:	#---0--.--'	
Altitude:	-----mt	Direction:	---0	Speed: ---k

Figure 35: Remote GPS screen

The format of the GPS coordinates used is decimal minutes as shown in the next example:

N43°02.032'

W023°03.023'

- **Status:**

The status of the GPS input is displayed in this field. (reading parameter)

- **Latitude:**

It specifies the latitude position of the transmitter. (reading parameter)

- **Longitude:**

It specifies the longitude position of the transmitter. (reading parameter)

- **Altitude:**

The height of the transmitter from ground in meters is specified in this value. (reading parameter)

- **Direction:**

The direction in degrees of the transmitter is shown in this field. (reading parameter)

- **Speed:**

The speed of the transmitter in km/h is shown in this field. (reading parameter)

5.1.1.4 TS Parameters

- **Video PID:**

Here the video packet identifier must be entered. (editable parameter)

- **Audio 1 PID:**

Here the audio 1 packet identifier must be entered. (editable parameter)

- **Audio 2 PID:**

Here the audio 2 packet identifier must be entered. (editable parameter)

- **Data PID:**

Here the data packet identifier must be entered. (editable parameter)

- **GPS PID:**

Here the GPS packet identifier must be entered. (editable parameter)

- **Alarm PID:**

Here the alarm packet identifier must be entered. (editable parameter)

- **PMT PID:**

Here the program map tables packet identifier must be entered. (editable parameter)

- **PCR PID:**

Here the program clock reference packet identifier must be entered. (editable parameter)

- **Program Number:**

Here the program number must be entered. (editable parameter)

- **TS id:**

In this field the Transport Stream identifier must be set. (editable parameter)

- **Network id:**

In this option the network identifier must be specified. (editable parameter)

- **Network Name:**

Specify the name of the network. (editable parameter)

- **Service Name:**

Set the name of the service. (editable parameter)

5.1.1.5 Output

- **TS Bitrate Mode:**

Bitrate mode can be automatic or manual. In case automatic mode is selected, the device configures automatically the video bitrate depending on the modulation, FEC, IG, BW used, so as to the video bitrate can be always the maximum allowed. SVP advises to use the automatic mode when the signal is transmitted through RF. Manual mode is useful when the device is used as an encoder so as to configure the desired output bitrate in the ASI output. (eligible parameter)

- **TS Bitrate:**

In case bitrate mode is manual, select the desired bitrate. (editable parameter)



When editable parameters are being set in the Web Server and new values are being introduced, the text remains in red colour until the enter button is pressed. When the enter button is pressed, the new values are saved and the text will appear in black colour. It is necessary to press the enter button to keep and save the new values on the screen.

5.1.1.5.1 Scrambler

If you want an encryption system, it can be chosen here.

- **None:**

None encryption

- **BISS-1:**

Uses an encrypted key for the BISS key

- **BISS-E:**

Uses an encrypted key

- **AES-128**

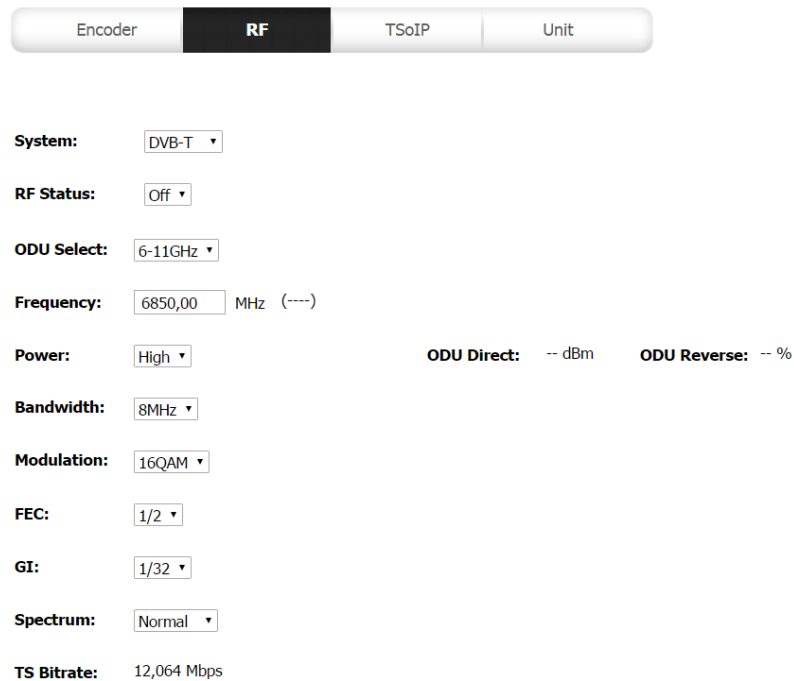
- **AES-256**

5.1.1.5.2 Remux

- **Mode:**

Here you can enable or disable Remux mode, when de enable mode is selected, Transport Stream Bitrate mode is always manual.

5.1.2 RF



The screenshot shows the 'RF' tab selected in a menu bar with 'Encoder', 'TSoIP', and 'Unit' options. Below the menu, the following parameters are displayed:

- System:** DVB-T
- RF Status:** Off
- ODU Select:** 6-11GHz
- Frequency:** 6850,00 MHz (----)
- Power:** High
- Bandwidth:** 8MHz
- Modulation:** 16QAM
- FEC:** 1/2
- GI:** 1/32
- Spectrum:** Normal
- TS Bitrate:** 12,064 Mbps
- ODU Direct:** -- dBm
- ODU Reverse:** -- %

Figure 36: Remote RF screen (DVB-T)

- **System:**
In this field the transmission standard can be chosen. The available options are DVB-T2, DVB-T, DVB-S2 and DVB-S. (eligible parameter)
- **RF Status:**
Select ON in case of wanting to activate the RF transmission or press OFF button so as to deactivate it. (eligible parameter)

5.1.2.1 DVB-T

- **ODU Select:**

In this option, the user can choose the type of the ODU unit.
(eligible parameter)

The available options are:

- 1-3 GHz
- 3-14GHz
- PA 2.0-2.4 GHz (Optional output)

- **Frequency:**

Introduce the frequency at which the signal is being transmitted.
(editable parameter)

- **Power:**

In this field, the user can select the power at which the signal is being transmitted, the available options are high (30 dBm) and low (24 dBm).

- **Bandwidth:**

Enter the transmitted signal bandwidth. The available options are 5, 6, 7, 8 MHz. (eligible parameter)

- **Modulation:**

Select the constellation of the transmitted signal. The available options are QPSK, 16 QAM, 64 QAM. (eligible parameter)

- **FEC:**

Select the FEC value for the transmitted signal. The available options are 1/2, 2/3, 3/4, 5/6, 7/8. (eligible parameter)

- **GI:**

Select the guard interval of the transmitted signal. The available options are 1/4, 1/8, 1/16, 1/32. (eligible parameter)

- **Spectrum**

Here the type of the spectrum is configured. Inverted spectrum is just another method to help preventing signal theft. Use Right, Left buttons so as to select the desired option. (eligible parameter)

The available options are normal or invert.

- **TS Bitrate:**

The bitrate of the transmitted signal is displayed in this field.
(reading parameter)



When editable parameters are being set in the Web Server and new values are being introduced, the text remains in red colour until the enter button is pressed. When the enter button is pressed, the new values are saved and the text will appear in black colour. It is necessary to press the enter button to keep and save the new values on the screen.

5.1.2.2 DVB-T2

The screenshot displays the 'Remote RF' configuration screen for a DVB-T2 system. At the top, there is a navigation bar with four tabs: 'Encoder', 'RF' (which is currently selected and highlighted in black), 'TSoIP', and 'Unit'. Below the navigation bar, the configuration parameters are listed in a clean, modern interface. Each parameter is followed by a dropdown menu or a text input field. The parameters include: 'System' set to 'DVB-T2', 'RF Status' set to 'Off', 'ODU Select' set to '6-11GHz', 'Frequency' set to '6850,00' MHz, 'Power' set to 'High', 'Bandwidth' set to '8MHz', 'Modulation' set to '16QAM', 'LDPC FEC' set to '1/2', 'Mode' set to '2K', 'GI' set to '1/32', 'Pilot Pattern' set to 'PPP4', 'Time Interl.' set to '100', and 'TS Bitrate' set to '13,762 Mbps'. Additionally, there are two fields on the right side: 'ODU Direct' set to '-- dBm' and 'ODU Reverse' set to '-- %'.

Figure 37: Remote RF screen (DVB-T2)

- **ODU Select:**

In this option, the user can choose the type of the ODU unit.
(elegant parameter)

The available options are:

- 1-3 GHz
- 3-14 GHz
- PA 2.0-2.4 GHz (Optional output)
- RF OUTPUT

- **Frequency:**

Introduce the frequency at which the signal is being transmitted.
(editable parameter)

- **Power:**

In this field, the user can select the power at which the signal is being transmitted, the available options are high (30dBm) and low (24dBm).

- **ODU Direct**

The direct power transmitted is shown in the screen (dBm).

- **ODU Reverse**

The quantity of reflected power of the transmitted signal is displayed (%).

- **Bandwidth:**

Enter the transmitted signal bandwidth. The available options are 1.7, 5, 6, 7, 8 MHz. (eligible parameter)

- **Modulation:**

Select the constellation of the transmitted signal. The available options are QPSK, 16 QAM, 64 QAM, 256 QAM. (eligible parameter)

- **LDPC FEC:**

Select the FEC value for the transmitted signal. The available options are 1/2, 3/5, 2/3, 3/4, 4/5, 5/6. (eligible parameter)

- **Mode:**

Specify the FFT mode. The available options are 1K, 2K, 4K, 8K, 8K.ext. (eligible parameter)

- **GI:**

Select the guard interval of the transmitted signal. The available options are 1/4, 19/128, 1/8, 19/256, 1/16, 1/32, 1/128. (eligible parameter)

- **Pilot Pattern:**

This field indicates the scattered pilot pattern used for the data OFDM symbols. The available options are between PP1 and PP8. (reading parameter)

- **Time Interleaving:**

This option indicates the number of time interleaver blocks per interleaving frame.

The user must select in how many time interleaver blocks (TI_blocks) an interleaving frame is split. Only the time interleaver mode 0 (TIME_IL_TYPE=0) is supported, so one interleaving frame always equates to exactly one OFDM frame.

To deactivate the time interleaver, this parameter must be set to 0. (editable parameter)

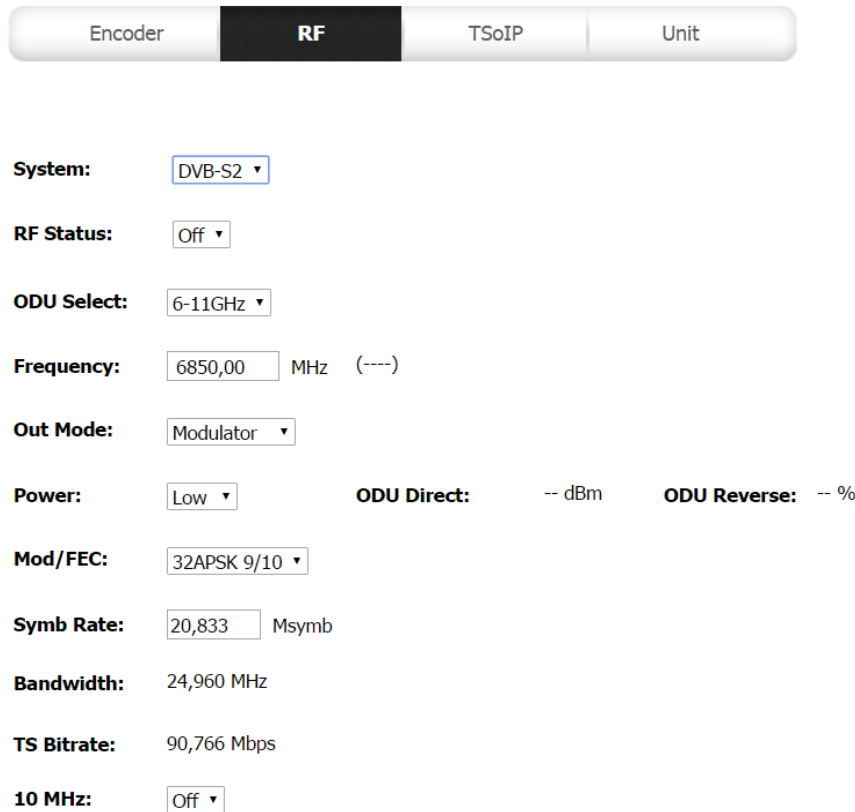
- **Bitrate:**

The bitrate of the transmitted signal is displayed in this field. (reading parameter)



When editable parameters are being set in the Web Server and new values are being introduced, the text remains in red colour until the enter button is pressed. When the enter button is pressed, the new values are saved and the text will appear in black colour. It is necessary to press the enter button to keep and save the new values on the screen.

5.1.2.3 DVB-S2 (Optional)



The screenshot displays the 'RF' configuration screen for a DVB-S2 system. At the top, there are four tabs: 'Encoder', 'RF' (selected), 'TSoIP', and 'Unit'. Below the tabs, the following parameters are configured:

- System:** DVB-S2
- RF Status:** Off
- ODU Select:** 6-11GHz
- Frequency:** 6850,00 MHz (----)
- Out Mode:** Modulator
- Power:** Low
- ODU Direct:** -- dBm
- ODU Reverse:** -- %
- Mod/FEC:** 32APSK 9/10
- Symb Rate:** 20,833 Msymb
- Bandwidth:** 24,960 MHz
- TS Bitrate:** 90,766 Mbps
- 10 MHz:** Off

Figure 38: Web Server RF screen (DVB-S2)

- **ODU Select:**

In this option, the user can choose the type of the ODU unit. (elegant parameter)

The available options are:

- 1-3 GHz
- 3-14 GHz
- LBAND (Optional output)

- **Frequency:**

Introduce the frequency at which the signal is being transmitted. (editable parameter)

- **Output Mode:**

Specify the transmission mode which can be no output. (eligible parameter)

The available options are:

- Low Carrier
- Carrier
- Modulator

- **Power:**

Specify the power at which the signal is being transmitted. (editable parameter)

- **ODU Direct**

The direct power transmitted is shown in the screen (dBm).

- **ODU Reverse**

The quantity of reflected power of the transmitted signal is displayed (%).

- **Mod / FEC:**

Introduce the constellation and LDPC FEC value of the transmitted signal. (Constellation options are: QPSK, 8PSK, 16 APSK, 32 APSK) (LDPC FEC options are: 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10) (eligible parameter)

- **Symbol Rate:**

In this field the value of the symbol rate of the transmitted signal can be selected. (From 2 to 45 Mbaud/s) (editable parameter)

- **Bandwidth:**

In this field, the value of the bandwidth of the transmitted signal is displayed. (reading parameter)

- **TS Bitrate:**

In this field, the value of the bitrate of the transmitted signal is displayed. (reading parameter)

5.1.2.4 DVB-S (Optional)

The screenshot shows the 'MOD_RF' configuration screen for DVB-S. At the top, there are four tabs: 'Encoder', 'RF' (selected), 'TS/IP', and 'Unit'. Below the tabs, the following settings are visible:

- System:** DVB-S (dropdown)
- RF Status:** Off (dropdown)
- ODU Select:** 6-11GHz (dropdown)
- Frequency:** 6850,00 MHz (input field) (----)
- Out Mode:** Modulator (dropdown)
- Power:** Low (dropdown)
- ODU Direct:** -- dBm
- ODU Reverse:** -- %
- FEC:** 3/4 (dropdown)
- Symb Rate:** 18,518 Msymb (input field)
- Bandwidth:** 24,975 MHz
- TS Bitrate:** 25,598 Mbps
- Spectrum:** Normal (dropdown)
- 10 MHz:** Off (dropdown)

Figure 39: Web Server MOD_RF screen (DVB-S)

▪ **ODU Select:**

In this option, the user can choose the type of the ODU unit.
(elegant parameter)

The available options are:

- 1-3 GHz
- 3-14 GHz
- LBAND (Optional output)

▪ **Frequency:**

Introduce the frequency at which the signal is being transmitted.
(editable parameter)

- **Output Mode:**

Specify the transmission mode which can be no output. (eligible parameter)

The available options are:

- Low Carrier
- Carrier
- Modulator

- **Power:**

Specify the power at which the signal is being transmitted. (editable parameter)

- **ODU Direct**

The direct power transmitted is shown in the screen. (dBm)

- **ODU Reverse**

The quantity of reflected power of the transmitted signal is displayed. (%)

- **FEC:**

Introduce the FEC value of the transmitted signal. The available FEC options are: 1/2, 2/3, 3/4, 5/6, 7/8. (eligible parameter)

- **Symbol Rate:**

In this field the value of the symbol rate of the transmitted signal can be selected. (Msymb/s) (editable parameter)

- **Bandwidth:**

In this field, the value of the bandwidth of the transmitted signal is displayed. (reading parameter)

- **TS Bitrate:**

In this field, the value of the bitrate of the transmitted signal is displayed. (reading parameter)

- **Spectrum:**

Here the type of the spectrum is configured. Inverted spectrum is just another method to help preventing signal theft. The spectrum options are inverted and normal. (eligible parameter)



When editable parameters are being set in the Web Server and new values are being introduced, the text remains in red colour until the enter button is pressed. When the enter button is pressed, the new values are saved and the text will appear in black colour. It is necessary to press the enter button to keep and save the new values on the screen.

5.1.2.5 IP Output

- **FEC:**

In this field the Forward Error Correction can be enabled or disabled. In case it is enabled, the number of columns and rows can be configured. If FEC option is enabled then, the only protocol which can be used is RTP. (editable parameter)

- **Destination address:**

In this option, the IP of the device to which data is sent must be configured. In case it is wanted to send data to a multicast address just enter the desired multicast address. (editable parameter)

- **UDP Port:**

In this option, the port number of the device to which data is sent must be configured. (editable parameter)

- **TP per IP:**

In this field the number of Transport Stream packets per IP (from 1 to 7) can be configured. (editable parameter)

- **Protocol:**

In this field the type of protocol used for the communication is selected. The type of protocol used for the communication can be RTP or UDP. (eligible parameter)

- **Time To Live[0..255]:**

This field limits the lifetime of data. The Time to Live value (from 1 to 255) means the number of routers that a packet can reach until that packet is discarded. (editable parameter)



When editable parameters are being set in the Web Server and new values are being introduced, the text remains in red colour until the enter button is pressed. When the enter button is pressed, the new values are saved and the text will appear in black colour. It is necessary to press the enter button to keep and save the new values on the screen.

5.1.3 UNIT



LEDs Status

ON/OFF: ☒
 RF: ☐
 ALARM: ☒
 STATUS: ☒

Alarms

WARNING: No Audio1 Input

Monitor

Voltage: 35,4 V
 Temperature: +46,7 °C ▼

Configuration

Standby Mode: On ▼
 Web&SNMP Address: 192.168.001.010
 Web&SNMP Subnet: 255.255.000.000
 Web&SNMP Gateway: 192.168.001.001
 Web&SNMP MAC: 70-B3-D5-1A-C0-00
 Admin Password: Default Mandatory: 8 characters
 User Password: Default Mandatory: 8 characters

Miscellaneous

Night Mode: 0 ▼
 S/N: 660010911
 Firmware: V7_7102713721-01

ODU T/T2 Unit

Temperature: ---,°C
 Voltage: ---, V
 S/N: -----
 Revision: ---

Figure 40: Web Server UNIT screen

5.1.3.1 LEDs Status (reading parameters)

- **ON/OFF:**

- If the LED is off the equipment is not being fed.
- The LED lights up in green when the equipment is turned on.

- **RF:**

- If the LED is off the equipment does not transmit RF signal.
- The LED lights up in green when the equipment transmits RF signal, RF stage is active.

- **ALARM:**

- The LED lights up in red when an alarm occurs.
- The different alarms that can appear in the transmitter are:

- Voltage Low (<22 dBm).
- Temperature High.
- ASI Overflow.

- The different warnings that can appear in the transmitter are:
 - No Video Input.
 - No GPS.

- **STATUS:**

The LED lights up when a change in the configuration of the device is being processed.

5.1.3.2 Alarms

In this option, different alarms which are present in the device are shown.

The different alarms that can appear in the transmitter are:

- Voltage Low.
- Temperature High.
- ASI Overflow:
this alarm means that the input bitrate is higher than the one that can be modulated due to the parameters configured (constellation, FEC, GI...).

The different warnings that can appear in the transmitter are:

- No Video Input.
- No GPS.

5.1.3.3 Monitor

- **Voltage:**

In this field, the voltage of the transmitter is shown. (reading parameter)

- **Temperature:**

In this field, the internal temperature of the device is displayed. (reading parameter)

5.1.3.4 Configuration

- **Standby Mode**

In this option the user can turn on or turn off the device pressing On or Standby options. (elegant parameters)

- **Web Address**

In this option it can be set the IP address of the device in case it is wanted to control the device remotely. So as to change the IP address, introduce the desired number and then press enter button to save the introduced value. (editable parameter)

- **Web Subnet**

Here it can be written the Subnet Mask address of the device. So as to change the Subnet Mask address, introduce the desired value and then press enter button to save it. (editable parameter)

- **Web Gateway**

In this option, the address of the Gateway must be written. So as to change the Gateway address, introduce the desired value and then press enter button to save it. (editable parameter)

- **Web MAC**

In this field, the MAC address of the device is shown

- **Admin Password**

In this field, the administrator's password is introduced. It can be set an own password which is a list of 8 digits. Then, to save the introduced value, press Enter button. Moreover, there is the option to restore the default administrator password (00000000).

- **User Password**

In this field, the user's password is introduced. It can be set an own password which is a list of 8 digits. Then, to save the introduced value, press Enter button. Moreover, there is the option to restore the default user password (00000000).

5.1.3.5 Miscellaneous

- **Night Mode:**

If the night mode is OFF then, the light in the screen will shine more than if the night mode is ON. (eligible parameter)

- **S/N:**

In this field, the serial number of the device is displayed. (reading parameter)

- **Firmware:**

In this field, the number of the version installed in the device is displayed. (reading parameter)

5.1.3.6 ODU T/T2 Unit

- **Temperature**

In this option, the temperature of the ODU is shown in the screen. (reading parameter)

- **Voltage**

In this field, the voltage of the ODU is displayed in the screen. (reading parameter)

- **S/N**

In this field the serial number of the ODU is shown (reading parameter).

- **Revision**

In this field it is shown the number of the version installed in the ODU (reading parameter).



When editable parameters are being set in the Web Server and new values are being introduced, the text remains in red colour until the enter button is pressed. When the enter button is pressed, the new values are saved and the text will appear in black colour. It is necessary to press the enter button to keep and save the new values on the screen.

Web Page Setup Notes

In order for the data to be refreshed correctly, you may need to change some settings on your browser.

Please follow these instructions carefully.

For Google Chrome:

1. Make click in the Chrome menu  situated in the toolbar of the browser.
2. Select tools.
3. Choose the option Delete navigation data...
4. Choose the option empty cache.
5. Make click in Delete navigation data.

For Internet Explorer:

1. From the Tools menu, select Internet Options
2. In the General tab, click the Settings button in the Browsing History section.
3. Select 'Every time I visit the webpage' then click the OK button.
4. Click the OK button

For Mozilla Firefox:

1. Open a new tab, in the address bar enter about:config
2. In the Filter box, enter disk
3. Set the value for 'browser.cache.disk.enable' to false (double click to change the setting).
4. Close the about:config tab.

Chapter 6: Equipment Installation

6.1 Introduction

This chapter provides important information for the transmitter system installation such as the connections available in the rear and front panel of the UDT-70 transmitter and their pinout, connectors needed and the accessories which are available with the transmitter device.

6.2 Connections

Every connection of the UDT-70 camera transmitter is on the rear panel, except for the RF antenna connections that are on the front panel.



All the Lemo part numbers and pinout refer to the connector that is fixed to the cable. The pinout of the cable connector is shown as if it is watched from the soldering side.

All the input/output connections of the UDT-70 transmitter are shown in the figure below:

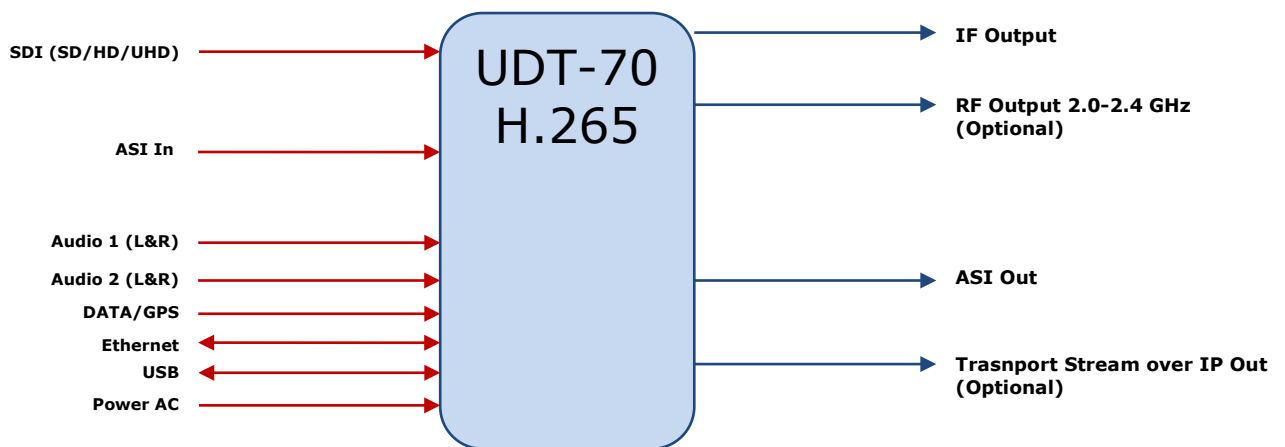


Figure 41: UDT-70 Connections

The following figures show the UDT-70 front and rear panel. The connections mentioned in the upper figure are shown below.



Figure 42: UDT-70 front panel



Figure 43: UDT-70 rear panel

6.2.1 Power supply

In this section technical features about the power supply connections and the connectors needed are described.

6.2.1.1 AC Power supply

The transmitter equipment can be powered by an AC source between 90 and 240 V.

The mains frequency should be between 50 and 60 Hz.

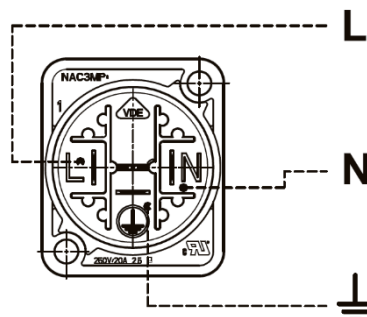
The AC mains input uses a Neutrik MLC connector. A cable with the required connectors is supplied with the equipment. The AC power connector used in this equipment is designed to prevent accidental disconnection. To extract the connector, pull back the locking clip and rotate the connector, as indicated on the connector itself.

Power supply AC connection technical features

Item	Features
Connector label	POWER A.C.
Connector type	MLC Neutrik
Supply voltage	90-240 V. (50/60Hz)

Table 27: AC Power supply features

Pinout

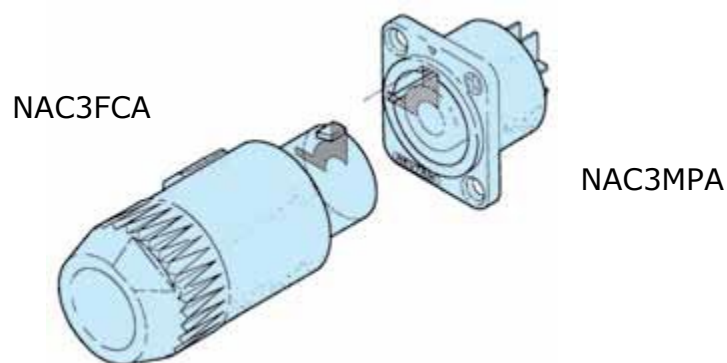


Pin	Description
1	L
2	GND
3	N

Table 28: AC Power supply connector pinout

6.2.1.2 DC Power supply

Connector needed



The DC power supply is connected via a Neutrik 4-pin male XLR connector with a safety clip to prevent accidental disconnection

Power supply DC connection technical features

Item	Features
Connector Label	POWER D.C.
Connector Type	XLR-4 male
Supply voltage	11-36 V.

Table 29: DC Power supply features

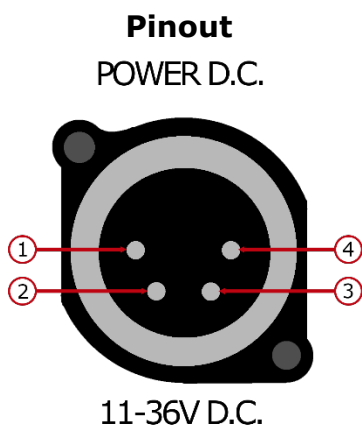


Figure 44: Connector pinout

Pin	Description
1	GND
2	GND
3	+ VCC
4	+ VCC

Table 30: DC Power supply connector pinout

Connector needed



Figure 45: Connector needed



The DC input is protected by a fuse (ATO model)

6.2.2 Intermediate frequency

In this section technical features about the output connections available and the connectors needed are described.

6.2.2.1 Intermediate frequency output IF

The connection between the transmitter unit and the up-converter uses triax cable, whose maximum length depends on the type of triaxial cable used.

Intermediate frequency connection technical features

Item	Features
Connector label	IF
Connector type (equipment)	Lemo 3 triax
Part Number (equipment)	Lemo EHP.3T
Part Number (cable)	Lemo FFA.3T
Manufacturer	Lemo
Required cable	Draka-Triflex 8 – Y HDTV

Table 31: IF output connections characteristics

6.2.3 70 MHz TEST

There is a 70 MHz test signal output available.

70 MHz TEST connection technical features

Item	Features
Connector label	70 MHz TEST
Connector type	SMA female
Impedance	50 Ω

Table 32:70 MHz Test connections characteristics

6.2.4 GPS (Optional)

When there is internal GPS, this connector is used for GPS antenna connection, it can supply 5 VDC to the antenna.

GPS connection technical features

Item	Features
Connector label	GPS
Connector type	SMA female
Impedance	50 Ω

Table 33:GPS output connections characteristics

6.2.5 RF AUX (Optional)

There is an RF Auxiliar output for DVB-T and DVB-T2 in the control unit which frequency range goes from 2.0 GHz to 2.4 GHz.

RF connection technical features

Item	Features
Connector label	RF AUX (2.0 to 2.4GHz)
Connector type	SMA female
Impedance	50 Ω
Output power	Maximum: 200 mW

Table 34: RF output connections characteristics

6.2.6 ASI

6.2.6.1 ASI input

The UDT-70 transmitter has a DVB-ASI Transport Stream input, available on an insulated 75 Ω Mini BNC connector.

ASI IN connection technical features

Item	Features
Connector label	ASI-IN
Connector type	Mini BNC
Impedance	75 Ω
Standard	EN50083-9
Maximum Bitrate	216 Mbps

Table 35:DVB-ASI Transport Stream input connection features

6.2.6.2 ASI output

ASI output signal type uses 75Ω Mini BNC connector. This connector is placed on transmitter rear panel.

It is important that 75 Ω connectors are used. This is because the female output connector of the UDT-70 unit may be damaged because of an impedance mismatch.

ASI OUT connection technical features

Item	Features
Connector label	ASI-OUT
Connector type	Mini BNC female
Impedance	75 Ω
Standard	EN50083-9
Maximum Bitrate	100 Mbit/s

Table 36: DVB-ASI Transport Stream output connection features

6.2.7 SDI 1 to 4

SDI connection technical features

Item	Features
Connector Label	SDI 1 to 4
Connector type	Mini BNC
Impedance	75 Ω
Input Level	800 mVpp nominal $\pm 10\%$

Table 37: SDI input signal connection features

6.2.8 Transport Stream over IP OUTPUT (Optional)

The UDT-70 transmitter has a connector that allows using the ODI as standalone IP encoder.

TS over IP connection technical features

Item	Features
Connector Label	VIDEO over IP OUTPUT
Connector type	RJ-45

Table 38: Transport Stream over IP connection technical features

6.2.9 Audio inputs

The UDT-70 transmitter has 2 possible audio inputs:

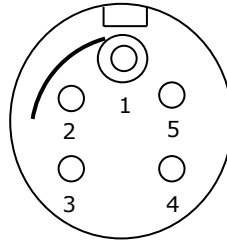
- 8 SDI embedded audios.
- 2 Analogue audio inputs.

Analogue Audio Input

Connector type	5 pin Lemo 0B
Cable connector part number	FGG.0B.305.CLAZ
Manufacturer	Lemo

Table 39: Analogue audio input connection technical features

Pinout of the cable connector (Watched from the soldering side)



Pin	Description
1	A1L+
2	A1L-
3	GND
4	A1R+
5	A1R-

Table 40: Analogue audio cable connector pinout

6.2.10 Data input

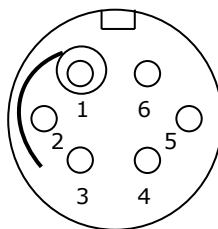
This input is mainly used in order to transfer user data through connections made using 6 pin Lemo 0B connector on equipment's rear panel.

Data connection technical features

Item	Features
Connector Label	DATA
Connector type	6 pin Lemo 0B
Cable connector part number	FGG.0B.306.CLAZ
Manufacturer	Lemo

Table 41: Data input connection technical features

Pinout of the cable connector (Watched from the soldering side)



Pin	Description
1	Ground
2	DATA
3	NOT USED
4	+5Vd_GPS
5	PA_ON/OFF
6	PA_DIRECT

Table 42: Data cable connector pinout

6.2.11 USB connection

Thanks to the USB connection, it is possible to update directly from an external USB device the firmware of the UDT-70 transmitter. The connector is type A.

USB connection technical features

Item	Features
Connector Label	USB
Connector type	Type A

Table 43: USB connection technical features

6.2.12 Remote

This connection allows the user to monitor and setup any parameter of the transmitter throughout Web Browser through the network.

Remote connection technical features

Item	Features
Connector Label	Remote
Connector type	RJ-45

Table 44: Remote input connection technical features

6.3 Rack Unit Installation

When the unit is installed the transmitter rack unit horizontally, guides should be used due to the weight of the equipment. Also, the transmitter has to be well chilled and therefore, some space must be left next to the sides of the UDT-70 transmitter for ventilation purposes. This is especially important when the rack unit is installed in a rack case.

6.4 Up-Converter and parabolic antenna installation

The up-converter is installed next to the transmitter antenna. The form that the antenna is connected to the up-converter input is through mechanical hook. The up-converter is connected to the UDT-70 transmitter through a triax cable. For better performance high quality cables and connectors should be used.



Do not connect wrongly down-converter to the transmitter. In this case, the down converter doesn't switch on.

The up-converter is powered by the transmitter by the IF output. So the IF output should be connected to one IF input of the HD diversity transmitter.



Figure 46: Up-Converter

The power supply to the up-converter in the transmitter should be disabled when the up-converter is being installed.

6.5 Antenna Installation

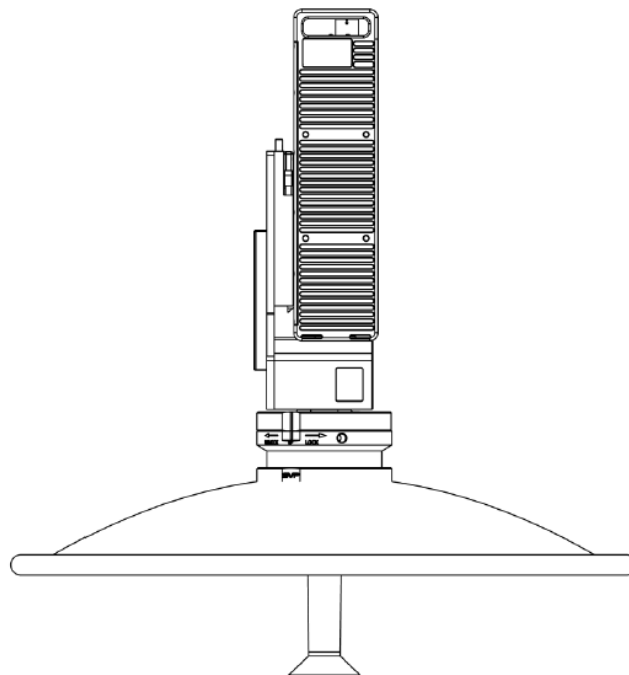
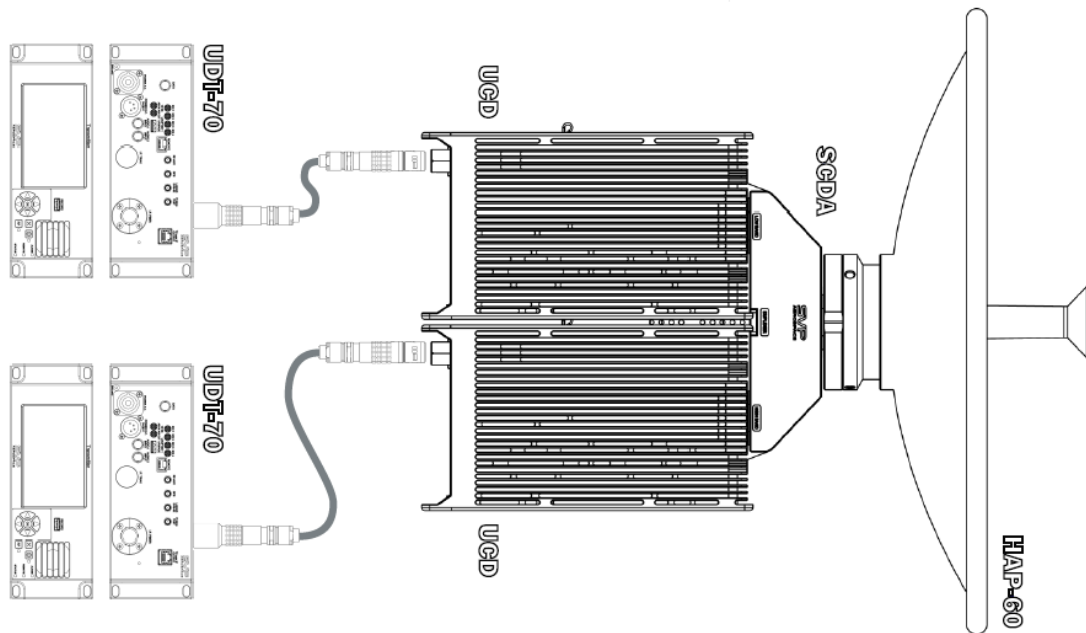
Parabolic antenna is connected to the up-converter through a mechanical hook as shown



Figure 47: UDT-70 transmitter system installation

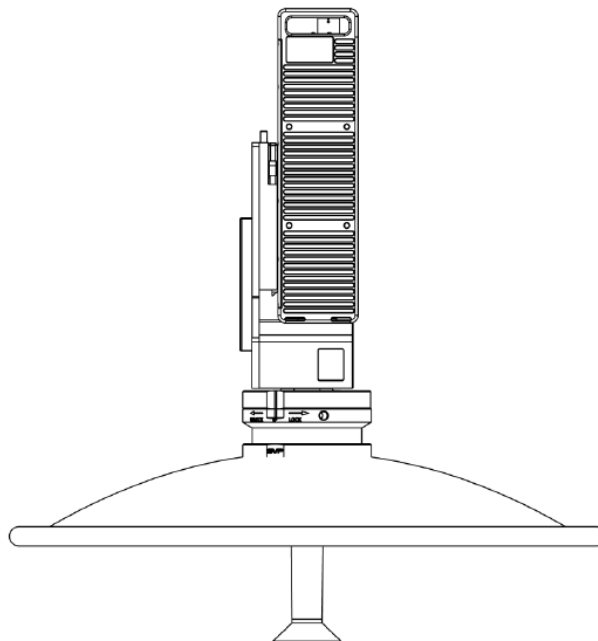
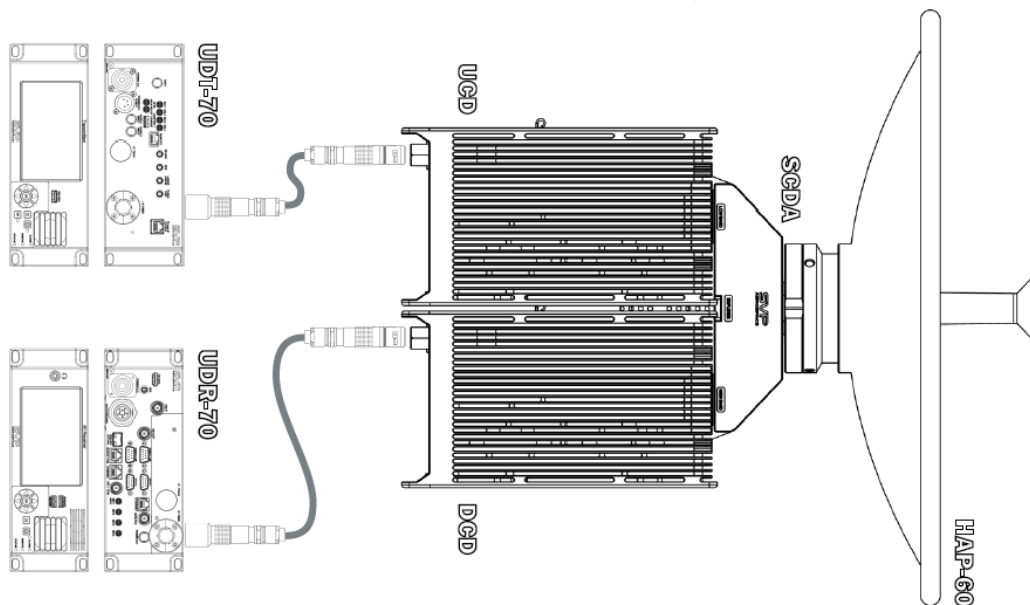
6.6 Installation diagrams

6.6.1 1+1 Configuration diagram



1+1 TX INSTALLATION

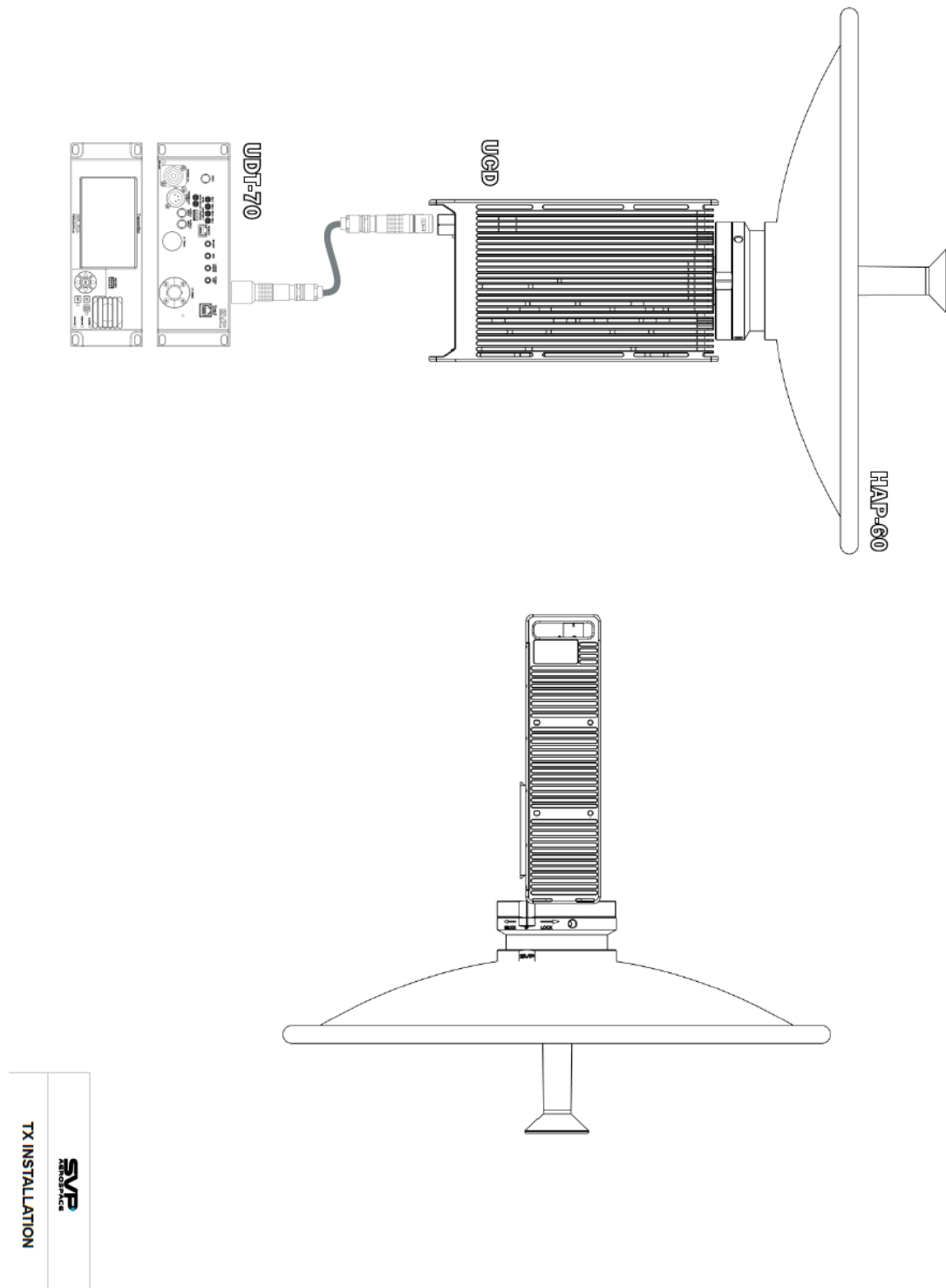
6.6.2 Duplex Configuration diagram



DUPLEX INSTALLATION

SVP
BROADCAST
MICROWAVE

6.6.3 Single Configuration diagram



Chapter 7: Up Converter

This chapter provides all the information needed about the HDT-70 transmitter up-converter.

The up-converter provides 3Watt power in 2GHz band and 1Watt power in 4GHz, 6GHz, 7GHz, 8GHz and 10GHz and 250 mW in 13GHz band.

7.1 Front Panel

The figure below shows the front panel of the up-converter.

- Lemo connector for IF
- SMPTE Fiber Optic
- Touchscreen



Figure 48: Front panel of the Up-Converter

The up-converter is a multi-frequency equipment. The reception frequency can be configured manually using the channel selector in the down-converter screen menu (one among 15 previously programmed frequencies).

Frequency configuration can be done from the demodulator rack unit or from the up-converter screen. To configure the frequency manually, go to the main menu and change the FRQ between the 15 pre-set frequencies. If you want to edit pre-set frequencies, you must do it from settings menu in the ODU menu.

To configure the reception frequency remotely, the frequency selector has to be set in slave mode.

7.2 Display

7.2.1 Main screen

Next, the main screen of the Up – Converter is shown.

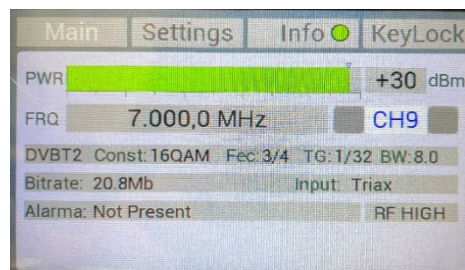


Figure 49: Up Converter Main screen

The parameters displayed in the panel are:

- Power: Output power in Watts
- Frequency: transmitted frequency in MHz
- Channel selection menu: press left or right to change the channel
- Transmission standard (DVB-T/T2)
- Constellation
- LDPC FEC (1/2, 3/5, 2/3, 3/4, 4/5, 5/6)
- Guard Interval (1/4, 19/128, 1/8, 19/256, 1/16, 1/32, 1/128)
- Bandwidth
- Transmitted bitrate
- Input type
- Alarms
- Output power level set in the transmitter

7.2.2 Settings

Next, the Settings screen of the Up – Converter is shown.

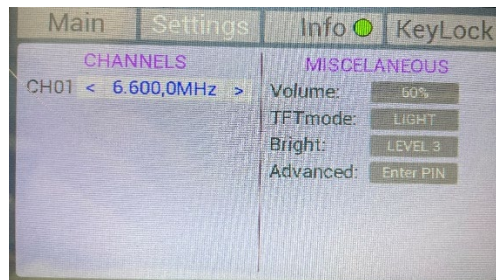


Figure 50: Up Converter Settings screen

The parameters displayed in the panel are:

- Channels: This menu is used to edit the frequency of the pre-sets channels
- Miscellaneous:
 - Volume: to set the volume of the unit
 - TFT mode: to change between day and night mode.
 - Bright: to set different brightness levels
 - Advanced: To access advanced menu (only accessible by SVP technical department)

7.2.3 Info

7.2.3.1 Device

This is a monitoring menu of the device parameters.



Figure 51: Up Converter Info screen

7.2.3.2 Alarms

Alarms and warnings detailed below can appear on the up-converter.

Up-converter transmission power: when the transmission power is equal or lower than 50% of the configured transmission power, the equipment shows an alarm, the LED next to ALARM button lights red. When the power reaches 55% of the configured transmission power the alarm is cancelled.

Reverse power: when the reverse power exceeds the 25% of the transmitted power, an alarm is triggered and the LED next to ALARM button lights red. Besides, the field corresponding to transmitted power blinks in both, main screen and line no.2 in the MONITOR STATUS menu. When the reverse power decreases below 23% of the transmitted signal power the alarm is cancelled.

Up-converter temperature: if the temperature inside the up-converter reaches or exceeds 85°C, an alarm is triggered and the red LED next to the ALARM button lights. When the temperature drops to 65°C, the alarm is cancelled.

Up-converter power supply: if the power supply voltage to the up-converter is below 18V or above 36V, an alarm is triggered and the red LED next to the ALARM button lights. The unit stops displaying the alarm when the power supply voltage is 18V or greater, but below 36V.

Lock status of the up-converter: if the PLL of the up-converter is not locked in frequency, the equipment shows an alarm and the LED next to alarm button lights.

7.2.4 Keyboard Lock

If you press this key for a few seconds, the touch screen will be locked. To unlock it, press it again.

7.3 Mechanical Dimensions

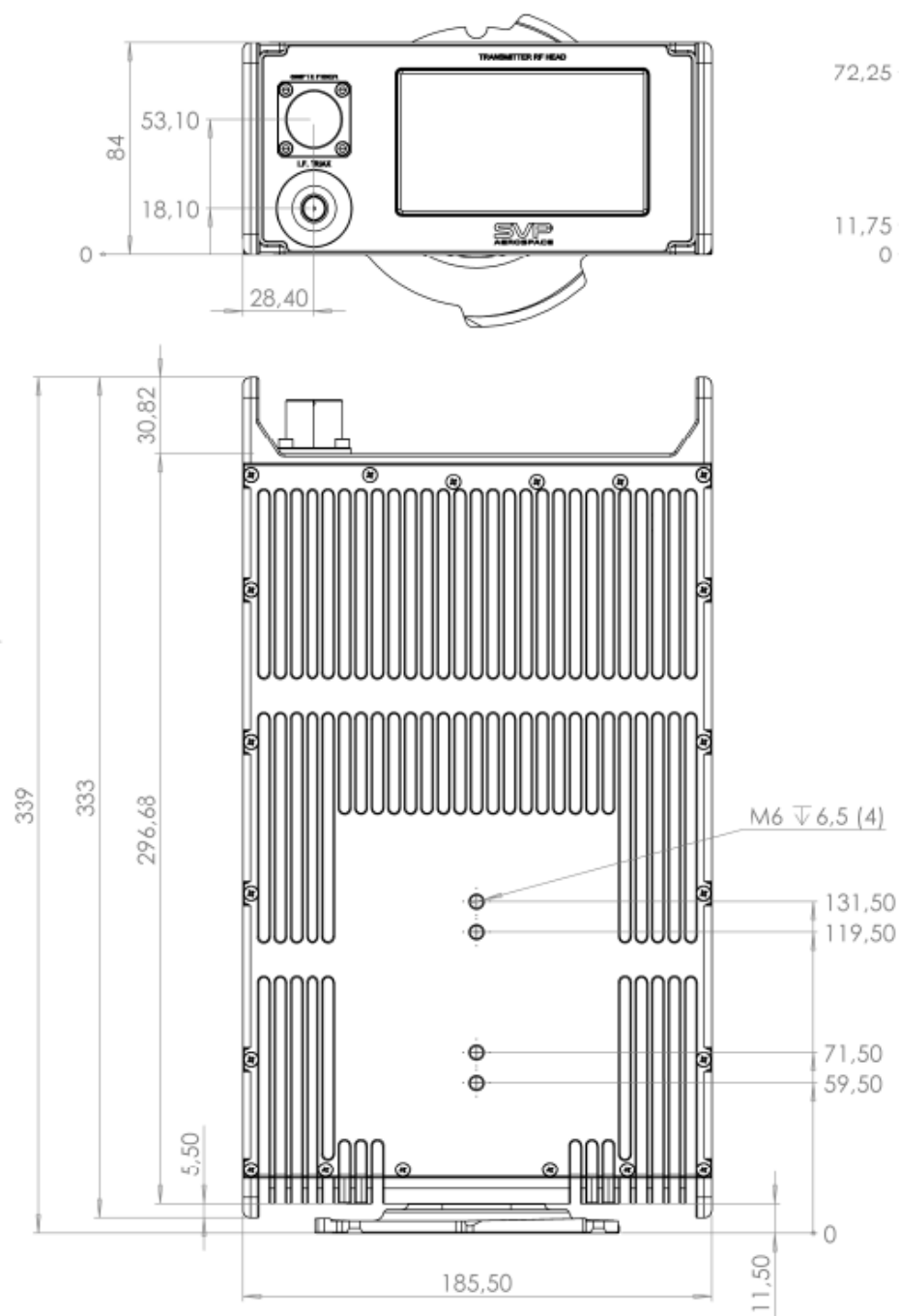


Figure 52: Mechanical Dimensions

7.4 Connections

This section provides important information about the connectors of the Up Converter.

7.4.1 IF connector

The connection between the transmitter unit and the up-converter uses triax cable, whose maximum length depends on the type of triax cable used.

Item	Features
Connector label	IF
Connector type (equipment)	Lemo 3 triax
Part Number (equipment)	Lemo EHP.3T
Part Number (cable)	Lemo FFA.3T
Manufacturer	Lemo
Required cable	Draka – Triflex 8 – Y HDTV

Table 45: Intermediate frequency connector technical features

7.4.2 SMPTE FIBER connector

Item	Features
Connector label	SMPTE FIBER
Connector type (equipment)	LEMO serie 3K.93C
Part Number (equipment)	EDW.3K.93C.TLE
Part Number (cable)	FUW 3K.93C
Manufacturer	Lemo
Required cable	2SM-9.2-37.5

Table 46: SMPTE Fiber Intermediate frequency connector technical features

Index A: SCDA User's Guide

Important Notes

1. The **SCDA duplexor** has been designed to allow an easy and quick installation of two equipments.
2. The duplexor is rugged and durable enough for virtually any environment.
3. The high performance of this equipment is only guaranteed when using high quality cables and connectors.
4. Only authorized personnel should open the product and any repair or warranty will be invalidated if the seals are broken.



Figure 53: SCDA Duplexor

A.1 Description

The **SCDA Duplexor** with double head bracket has been designed to allow an easy and quick installation of two equipments. Both equipments are installed near the antenna using just one tripod.

With this duplexor it is possible to connect two transmitters, two receivers or one receiver and one transmitter. This device is available for the frequency range which is needed.

The equipments can be up-converters or down-converters. This configuration makes possible for both equipments to share the same tripod and the same antenna.

The bracket has two clasps, one for each equipment, to prevent an unwanted manipulation.

A.2 Technical Specifications

Main Characteristics

Item	Specifications
Frequency bands	Any frequency band
Material	Stainless Steel
Weight	2 kg (4.4 lb)
Size	Width: 300 mm (11.8 inches) Height: 150 mm (5.9 inches) (without connectors) Depth: 22 mm (0.86 inches)

Table 47: SCDA Main Characteristics



Figure 54: SCDA Duplexor

A.3 Configurations

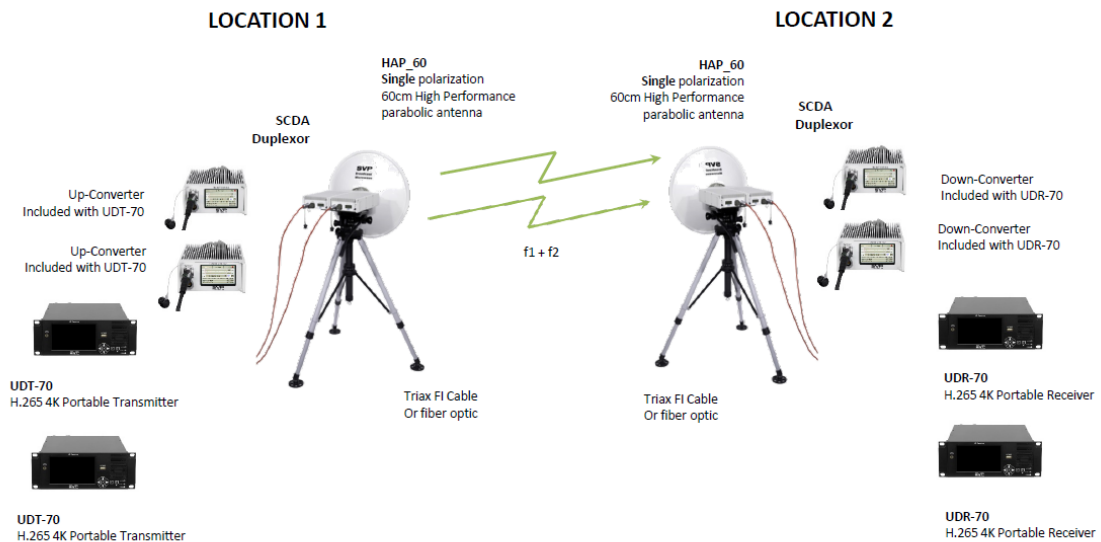


Figure 55: 1+1 Configuration

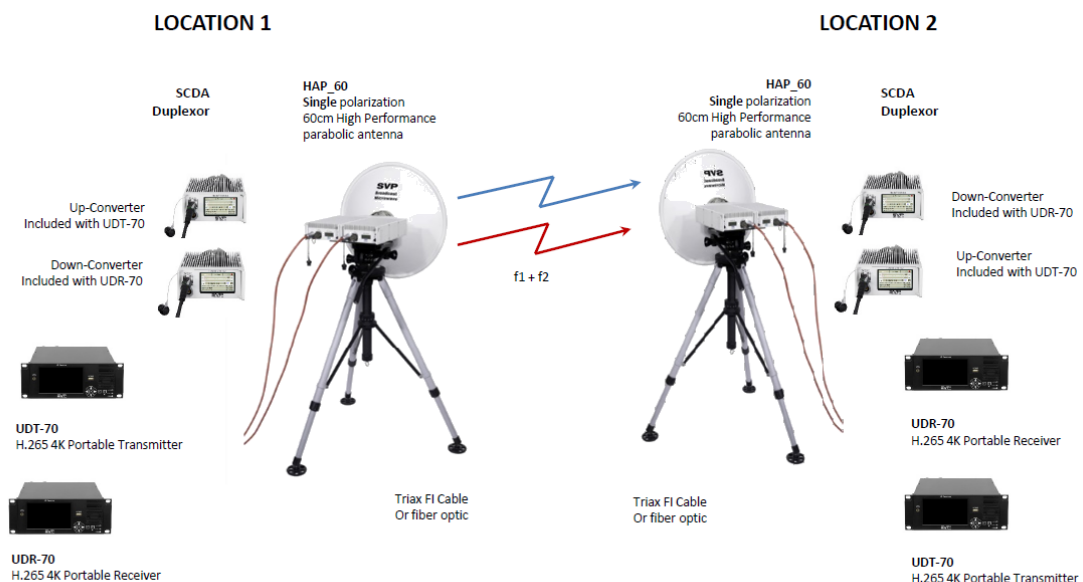


Figure 56: Bidirectional Configuration

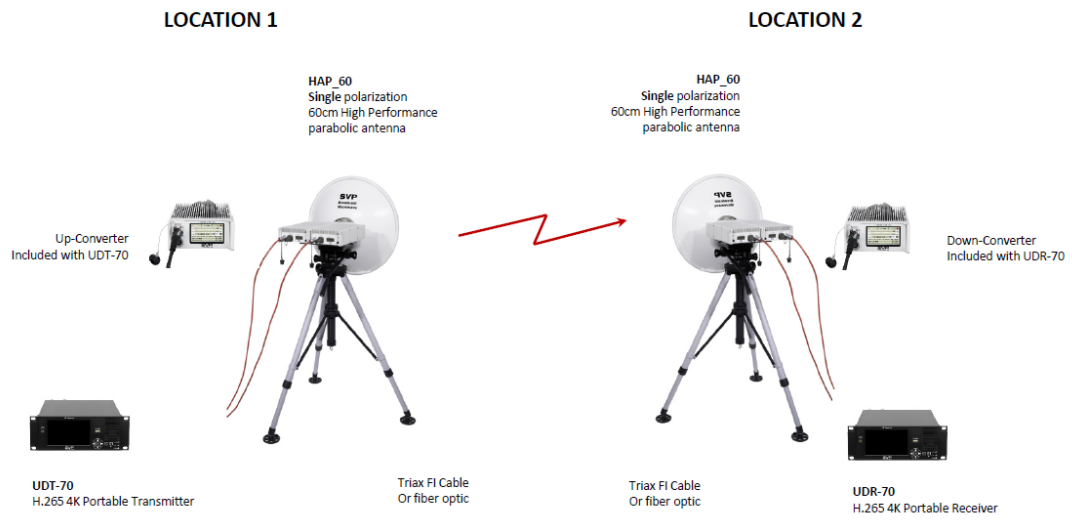


Figure 57: Single Link Configuration

Index B: HAP User's Guide

Important Notes

1. The **HAP-60 parabolic antenna** has been designed to be used in portable SVP links.
2. The antenna is rugged and durable enough for virtually any environment.
3. The high performance of this equipment is only guaranteed when using high quality cables and connectors.
4. Only authorized personnel should open the product and any repair or warranty will be invalidated if the seals are broken.



Figure 58: HAP-60 Parabolic Antenna

B.1 Description

The **HAP-60** parabolic antenna from SVP Broadcast Microwave is a single polarization antenna with a 60 cm diameter. This antenna works in the 2 GHz, 6GHz, 7 GHz and 10 GHz frequency bands.

It has been especially designed to be used in portable SVP links. So it can be clamped to the RF head of SVP equipment.

The reflector is made of aluminum and it has an external ring, which increases the robustness of the structure. The feeder has a quickset system and can be clamped to the antenna without screws.

The HAP antenna offers the best performance and a long useful life is guaranteed. It can be used in the most adverse weather conditions.

B.2 Technical Specifications

Main Characteristics

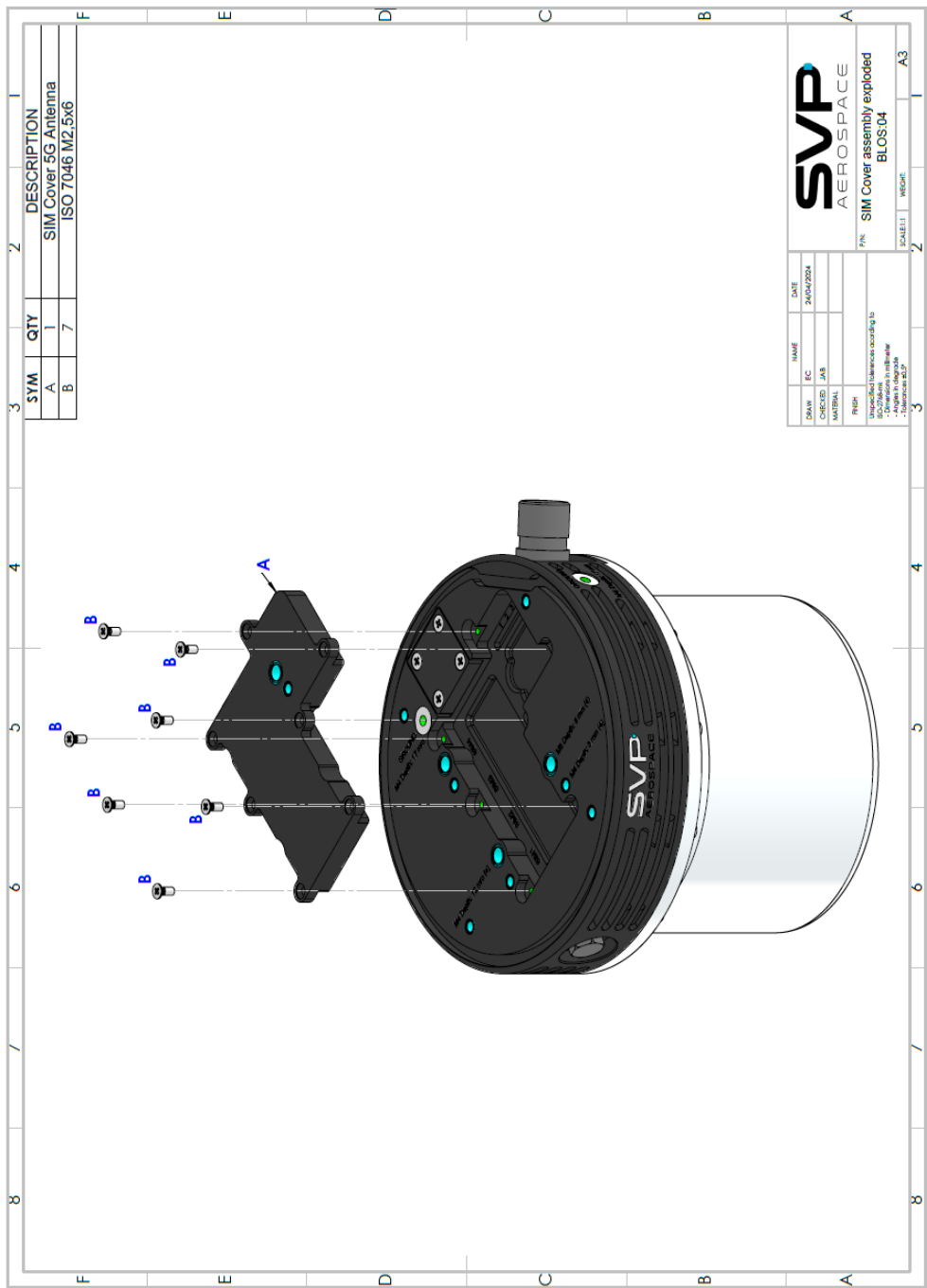
Item	Specifications
Frequency bands	2 GHz, 6GHz, 7 GHz and 10 GHz
Bandwidth	500 MHz
Gain	Depends on the frequency
Polarization	Linear
VSWR	Typ: < 1.8
Connector	N female
Diameter	60 cm
Weight	5 kg

Table 48: HAP-60 Main Characteristics

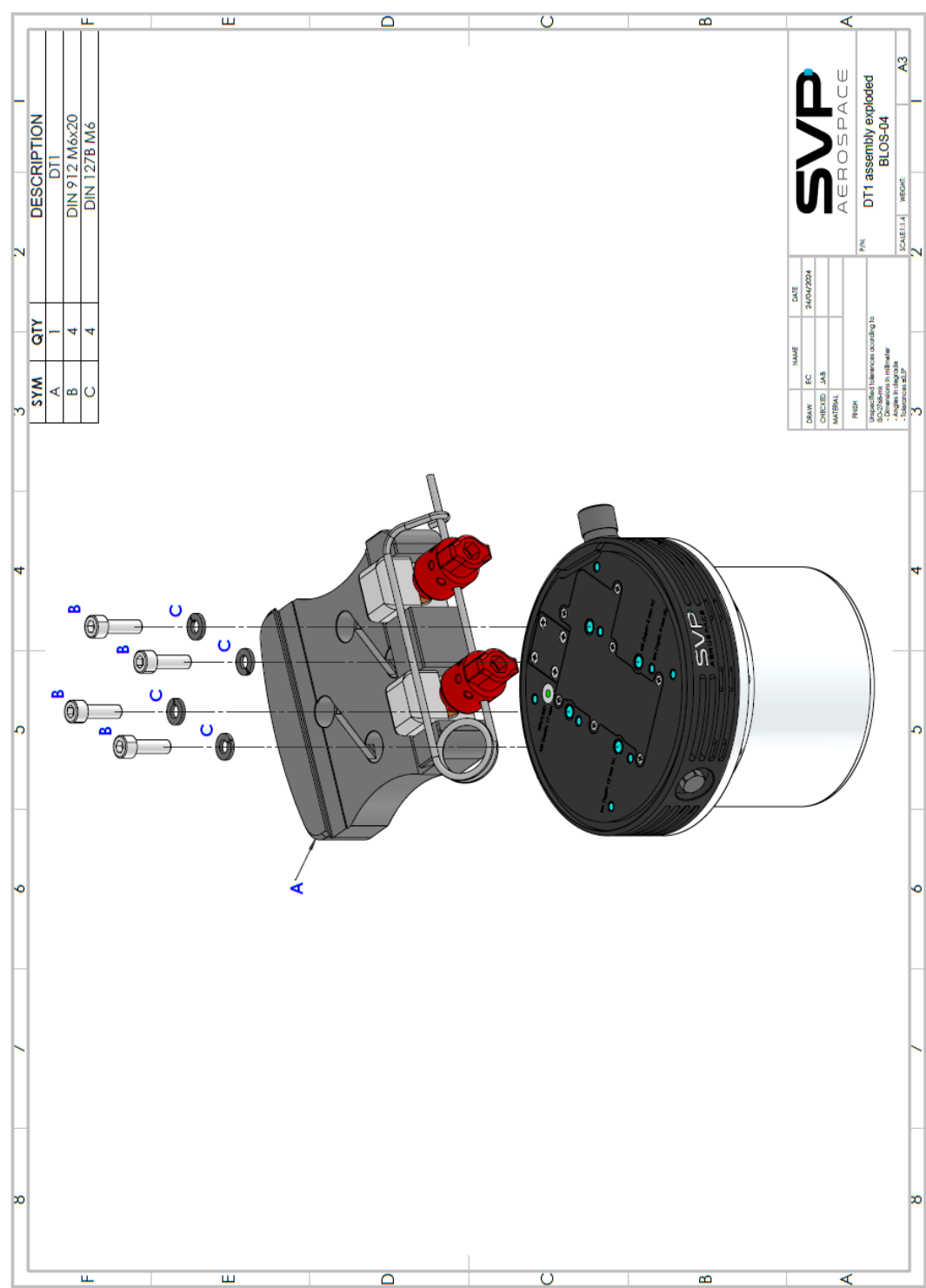
Index C: Cellular Datalink Antenna

C.1 Cellular Datalink Antenna Installation diagrams

C.1.1 Cellular Datalink Antenna SIM Cover

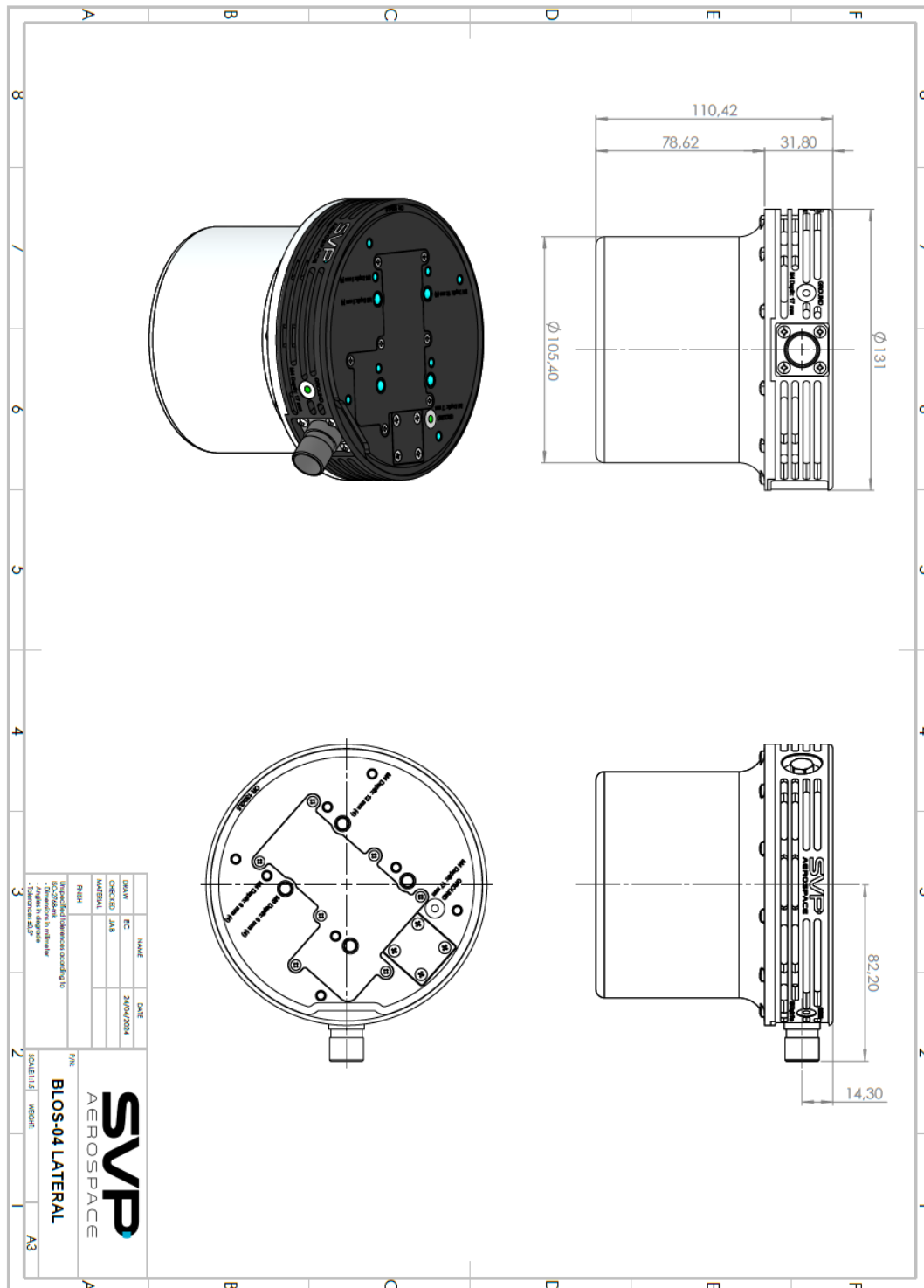


**C.1.1 Cellular Datalink Antenna AIRFILM
CAMERA SYSTEMS DT-1-1 Assembly**

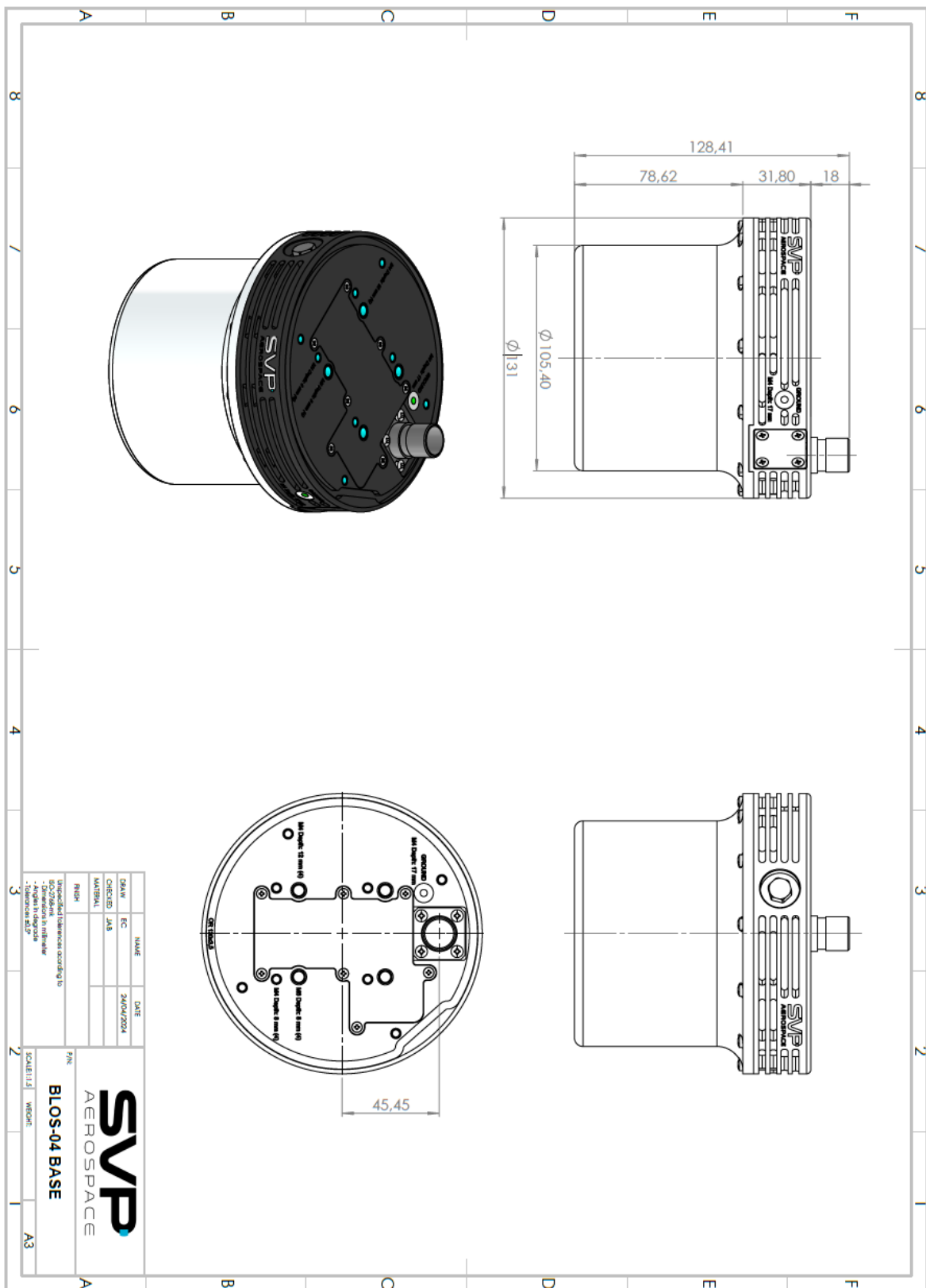


C.2 Cellular Datalink Antenna Mechanical Dimensions

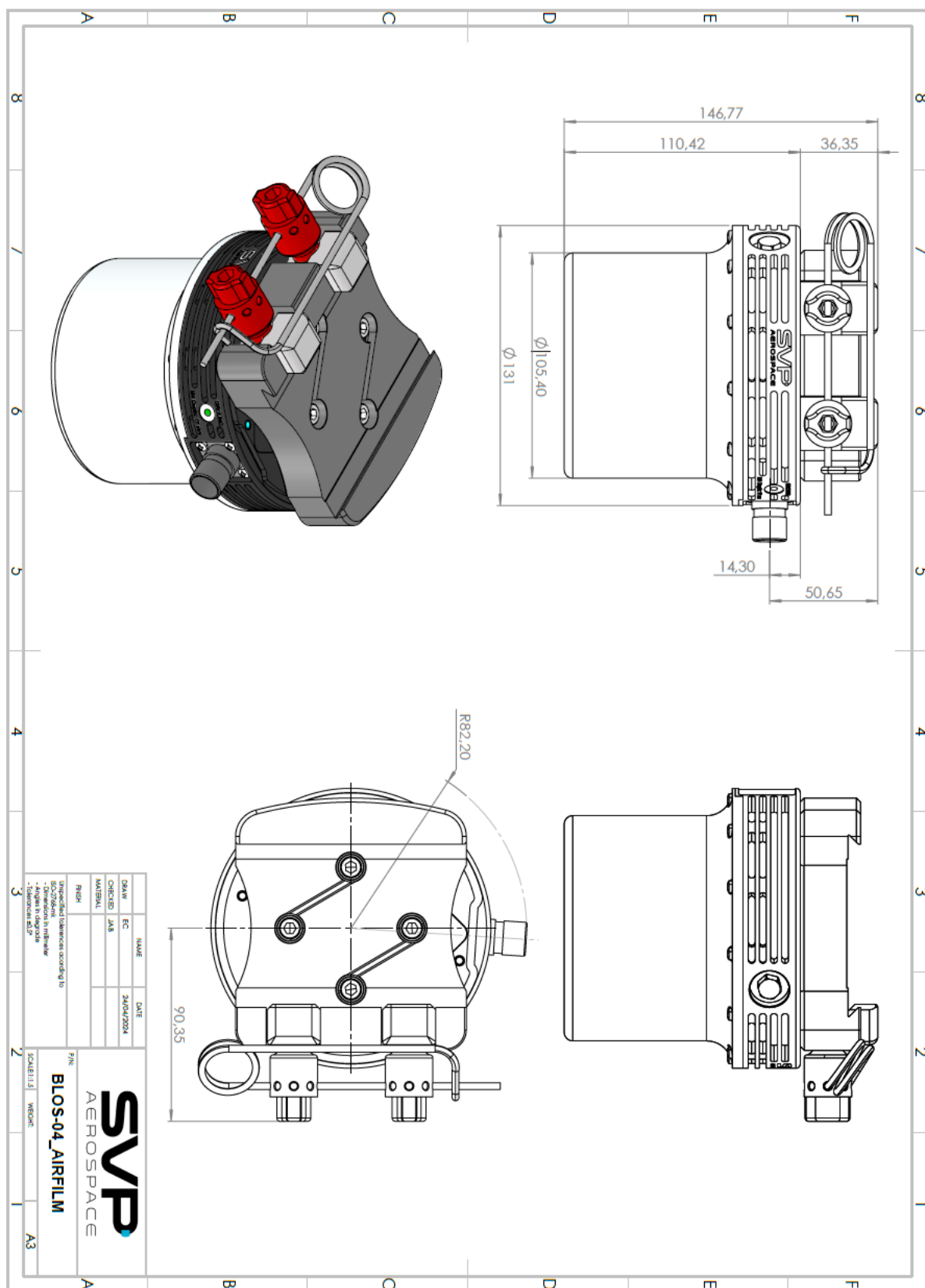
C.2.1 Cellular Datalink Antenna General Dimensions



C.2.1 Cellular Datalink Antenna Base



C.2.1 Cellular Datalink Antenna with AIRFILM



Glossary

AES/EBU	Audio Engineering Society/European Broadcasting Union
ACPR	Adjacent Channel Power Ratio
APSK	Amplitude and phase-shift keying or asymmetric phase-shift keying (APSK)
ASI	Asynchronous Serial Interface
BNC	Bayonet Neill-Concelman
BR	BitRate
CA-BISS	Conditional Access-BISS
COFDM	Coded Orthogonal Frequency Division Multiplexing
DC	Direct current
DVB-S2	Digital Video Broadcasting by Satellite – Second Generation
DVB-T	Digital Video Broadcasting – Terrestrial
DVB-T2	Digital Video Broadcasting – Terrestrial Second Generation
ETSI	

	European Telecommunications Standards Institute
EVM	Error Vector Magnitude
FEC	Forward Error Correction
FFT	Fast Fourier transform
GPS	Global Positioning System
HD	High Definition
HDMI	High-Definition Multimedia Interface
HDR	High Definition Receiver
HDT	High Definition Transmitter
IF	Intermediate Frequency
IG	Interval Guard
IP	Internet Protocol
LCD	Liquid Crystal Display
LED	Light-Emitting Diode
LD	Low Delay
MPEG	Moving Picture Experts Group
NLOS	Non Line of Sight

PAL	Phase Alternating Line
PID	Packet Identification
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase-Shift Keying
RF	RadioFrequency
RTC	Remote Control
SD	Standard Delay
SDI	Serial Digital Interface
TFT	Thin-Film Transistor
TS	Transport Stream
UDP	User Datagram Protocol
USB	Universal Serial Bus

Note

EU DECLARATION OF CONFORMITY

Certificate No.: S 2012018
Description: UDT-70 H.265 Portable Transmitter
Model: UDT-70

This declaration of conformity is issued under the exclusive responsibility of the manufacturer.
The equipment has been designed and tested in conformity with the relevant union harmonisation legislation:

2014/53/UE	Harmonization of the laws of the Member States on marketing of radio equipment directive.
2011/65/EU	RoHS Directive. Restriction of the use of certain hazardous substances.
1999/519/EC	Council Recommendation.

Above described product have been evaluated based on the requirement of the standard(s):

EN 62368-1:2024	Audio/video, information and communication technology equipment (Safety requirements).
EN 300 113:2020	Radio equipment intended for the transmission of data (and/or speech) using constant or non-constant envelope modulation and having an antenna connector harmonised Standard.
EN 301 489-1:2020	Electromagnetic Compatibility (EMC) standard for radio equipment and services; clause 8.2: Radiated emission clause 8.3&8.4: Conducted emission clause 8.5: Harmonic current emissions clause 8.6: Voltage fluctuations and flicker clause 8.7: Conducted emission

Manufacturer / Fabricante
SVP Broadcast Microwave S.L.
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Juan Antonio Burgos

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Final note

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