

**DVB-S2/-C/-T2 (H.264) Meter**

**smartmeter S30**



**User Manual**

**Version: 24.04.2017 - English**

**SMA·RT**<sup>®</sup>  
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## ***Preface***

Dear Customer,

Thank you for purchasing the digital DVB-S/C/T meter smartmeter S30.

This user manual contains all the information required

- to connect,
- to operate,
- to clean, and
- to dispose of the device.

Please read the user manual carefully before you start using the meter.

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# 1 User Information

## 1.1 Use of this Manual

- This manual is intended for the DVB-S/C/T Meter smartmeter S30.
- Please carefully read this user manual before operating the device for the first time.
- Please note all warnings and notes included in this user manual.
- Consider this user manual to be an integral part of the product, and store it at a well accessible location.
- This user manual should also be enclosed when handing over the device to a third party.
- In case of loss, the current version of the user manual can be downloaded at the support center on our website [www.smart-electronic.de](http://www.smart-electronic.de).
- The software is still being further developed even after your purchase of the device. Thus, it may be possible that certain operation steps do not fully correspond to the user manual.

## 1.2 Signs, Symbols, Layout

Symbol/layout	Meaning
	WARNING Danger due to electric shock with possible severe bodily injury
	CAUTION Warnung vor einem möglichen Sachschaden
	NOTE Useful information and hints
➤	You are requested to perform an action.
1. 2.	Perform these steps in the stated order.
•	List
<i>italic</i>	The various possibilities of settings as well as image captions are stated in <i>Italics</i> .
<b>fat</b>	The designations of keys are printed in bold letters.
<b><i>fat &amp; italic</i></b>	Menu windows and menu items (that often include further hidden menu items or direct settings) are printed in <b><i>bold &amp; italic</i></b> letters.

## 2 Product Description

The smartmeter S30 is a handy digital DVB-S/C/T measuring device for a quick and easy alignment of signal reception. If a satellite or terrestrial network is found, the smartmeter S30 shows it on the display and emits an audible signal. Signal strength and quality are displayed as numerical values and bar graphs.

Another measurement value is the forward error correction (FEC<sup>1</sup>), the carrier-to-noise ratio (C/N), the bit error rate after Viterbi (VBER), and the Modulation error rate (MER<sup>2</sup>). In addition, the picture quality can be revised on the high-resolution 3.5-inch TFTLCD screen.

Many satellites/networks are pre-programmed in order to allow a quick antenna/signal adjustment.

There is a protective pouch for transport and as a protection.

## **2.1 Scope of Delivery**

Please check if the delivery is complete.

Included in delivery:

- DVB-S/C/T Meter smartmeter S30
- Lithium battery pack (built in)
- 15 V plug-in power supply
- 12 V car adapter cable
- Quick-F connector
- Carrying bag
- User manual

If the delivery should be incomplete, contact your specialist dealer or the Avanit GmbH.

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<sup>1</sup> FEC = Forward Error Correction: In each data packet there are control bits. FEC 5/6 means, that there are 5 data bits and 1 control bit. The better the ration between data and control bits, the less errors are at the receiver's side. With FEC 3/4 the ratio is better than with FEC 5/6. Possible values are FEC 1/2, 2/3, 3/4, 5/6, 7/8 und 8/9.

<sup>2</sup> Modulation error rate = all signal disturbances are summarized to one measurement value. The higher the MER value, the better is the signal quality.

## 2.2 Meter

### 2.2.1 Front View



No.	Description		
1	LC-Display		Display of the TV picture, the menu and the measured values..
2	POWER	LED	<ul style="list-style-type: none"> <li>• red the meter is on</li> <li>• off the meter is turned off</li> </ul>
	LOCK		Lights when a signal is received.
	13V		Lights if there is a 13 V signal for the polarization control (vertical)
	18V		Lights if there is a 18 V signal for the polarization control (horizontal)
3	FUNCTION keys		Different functions depending on the menu. The functions are displayed at the bottom of the screen.
4	FIND		Call of the channel search function.
5	SCAN		Start of the automatic channel scan.
6	⏻ POWER		Switch device on/off.
7	AV IN		Switch to the analog video input.
8	Numeric keys		Direct entry of numbers.
9	Cursor cross		Press to navigate through menus/submenus: Press ▲, ▼ to switch between stations, Press ◀, ▶ to adjust the volume.
	OK		Press to confirm your selection / display station list.
10	MENU		Display the main menu.
11	EXIT		Leave the current menu, cancel operation.
12	SYSTEM		TV mode: call of the menu <i>OSD Setting</i>

### 2.2.2 Top View

No.	Description
1	Digital satellite signal input
2	Digital cable/terrestrial signal input
3	Analog A/V Input/Output (Composite Video)



### 2.2.3 Bottom View

No.	Description
1	Low-voltage socket (for power plug)
2	Switch for battery (for separating the smartmeter S20 electronics from the rechargeable battery)
3	USB port for external data storage devices
4	HDMI port for Digital Video Output



The above figures show the smartmeter S30 without the black part covering at the top of the device.

### 2.2.4 Rear View

At the rear is the battery compartment. Normally, you must not open it. If you suspect that the lithium battery must be replaced, contact your dealer.

## 2.3 Guarantee

The digital meter smartmeter S30 of Avanit GmbH comes with a guarantee in accordance with legal requirements as applicable at the time of the purchase.

# 3 Safety Notes

## 3.1 Safety of persons

Ensure that nobody can be hurt by falling tools or parts of the satellite antenna during the adjustment and installation of the antenna. For your own security use a rope on sloping roofs.

## 3.2 Appropriate Usage

The measuring device smartmeter S30 was developed to measure signals of digital satellite antennas and satellite systems DVB-S/S2, for measuring signals in DVB-C systems and digital aerials and aerial systems – DVB-T/T2(H.264). It is exclusively for this purpose and should only be used for this purpose. Use the equipment only for the purpose, which is described in this manual.

Any other usage is rated as not properly and can result in damage or even injury. There will be no liability for damages caused by a non-intended use.

### 3.3 Hazards from Improper Use



CAUTION!

- Make sure the meter and especially the power plug are always kept dry.
- Do not expose the meter to temperatures below 0° C.
- Connect the power plug only to 100-240 V AC, 50/60 Hz.
- Charge the meter only with the supplied power plug.
- During electrical storms, disconnect the meter from the aerial and from the power supply.
- Do not put heavy objects onto the meter.
- Avoid mechanical influences that can damage e.g. the LCD display or the housing of the meter.
- Do not bend or crimp the cables.
- Do not start to use the meter if you can see signs of damage or if you can hear loose parts inside the device.



WARNING!

Danger of electrical shock from high voltage

Damages on the housing of the power plug or an improperly repaired power plug can expose the user to mains voltage.

- Do not open the supplied power plug.
- Have the power plug repaired by qualified personnel only.



Taking the device from cold into warm temperatures can lead to condensation forming inside the device.

- Do not connect the device instantly. Leave it switched off for a few hours.

### 3.4 Lithium Battery

The smartmeter S30 is provided with a lithium battery. Please observe the following safety notes for the battery:



WARNING

Fire and explosion hazard

Any kind of heat (from inside or outside) can trigger uncontrollable chain reactions inside the battery.

- Do not store or use the battery in temperatures above 40 °C.
- Never connect the two poles (+ and -).
- Never expose the battery to high temperatures, e.g. close to stoves or cookers or other hot objects.



WARNING

- Charge the battery only with the supplied power plug.



CAUTION!

**Risk of injury**

Damages on and improper use of the battery can lead to fumes leaking from the battery. When inhaled, these fumes can irritate the respiratory tracts.

- Avoid any damaging of the battery.
- If fumes leak from the battery, open the window and seek medical advice if you experience health problems that may result from inhaling battery fumes.



CAUTION!

**Damages to other objects**

Defective batteries can leak and spill battery liquid onto close-by objects.

- Check the objects affected.
- Clean or, if necessary, replace the objects affected.

## 4 Initial Setup

### 4.1 Charging the Battery



- Charge the battery completely before you use the meter for the first time.

The battery can be charged regardless of

- whether the meter is switched on or off or
- whether the battery-switch on the underside of the meter is set to On or Off.

An integrated automatic charging system ensures optimum charging of the battery.

- Switch off the meter, if it is not yet switched off, to ensure that the complete power of the power supply can be used to charge the battery.



Basically, the meter is also charged if it is switched on, then the charging period becomes longer.

- Plug the power plug into a 230-V socket.
- Connect the low-voltage plug of the power plug to the low-voltage socket on the bottom of the meter.

The battery starts charging as soon as you connect the smartmeter S30 to the power plug.



- When you charge the battery for the first time, charge it for at least 5 hours.

The maximum charging time is 12 hours.

#### 4.1.1 Charge Control

- Charging is indicated by a continuously moving battery symbol in the display:



- Completed charging is indicated by a steady battery symbol filled with four bars: .

### 4.1.2 State of Charge

The current status of the battery is continuously displayed:

- If the battery is not adequately charged, the battery charging icon will be displayed in white with less than 50% (corresponding to the state of charge). You should charge the battery.
- If the battery is sufficiently charged, the battery charging icon will be displayed in green with 100% status.

## 4.2 Switching the Meter On and Off

### 4.2.1 Switching On

- Ensure that the battery-switch on the underside of the meter is set to an *ON* position.
- Press the POWER key to switch on the meter. The POWER LED lights red.



In case of disconnected power supply, the smartmeter S30 will be turned on, once you put the battery switch from the OFF to the ON position.

If the power supply is plugged in, the battery switch will be useless, meaning that the smartmeter S20 can be switched on regardless of the switch position.

### 4.2.2 Switching Off

- Press the POWER key once again to switch off the meter after use.



For long operational pauses, please also separate the smartmeter S30 electronics from the battery by setting the battery switch on the underside of the device to the *OFF* position.

## 4.3 Entering and Exiting the Menu

- Press MENU to enter the main menu. The display shows the OSD<sup>3</sup> main menu.

The display shows the main menu window when you switch the smartmeter S30 on and when you re-enter the menu.

- Press EXIT to exit the menu or to return to the previous menu level.



Depending on the submenu you are in, you may have to press the EXIT key several times to return to the main menu.

<sup>3</sup> OSD = On Screen Display

## 4.4 Navigating through the Menu

Use the colored function keys and the navigation keys to navigate through the menu:

- Press ► / the yellow function key to select the menu item to the right or to increase the selected value.
- Press ▼ / the red function key to select the menu item below.
- Press ◀ / the blue function key to select the menu item to the left or to decrease the selected value.
- Press ▶ / the green function key to select the menu item above.
- Press OK to enter the selected menu item.

Activated menu items are highlighted by color.



The function keys may call different functions, dependent on the regarding menu.

Instead of changing a value by using the keys ► und ◀, with many menu items you can also press the OK key, select a new value from the list, and confirm such value by again pressing the OK key.

## 5 Aligning the Satellite Dish

1. Press MENU.
2. Use the keys ◀ / ► and ▲ / ▼ to select the menu item *satellite/TP SEARCH* and confirm your selection with *OK*.
3. Select the desired satellite in the setting field with the keys ◀ / ►.
4. Go to *LNB Freq* and select the right value for the used LNB. You also press **F1** to delete the satellite, show constellation with **F3** or **F4** to explore the signal information.

Possible values for *LNB Freq* (MHz)

5150	10600	<i>Universal (9750 - 10600)</i>
5750	10700	<i>UnicableA (9750 - 10600)</i>
5950	10750	<i>UnicableA (10200)</i>
9750	11250	<i>UnicableB (9750 - 10600)</i>
10000	11300	<i>UnicableB (10200)</i>
10050	5150 - 5750	
10450	5750 - 5150	

5. If you use a multifeed antenna, go to *DiSEqC1.0* and select the port for the selected satellite. You also can change the *DiSEqC1.0* port with the yellow function key.
6. If you can receive signals from more than four satellites select *DiSEqC1.1<sup>4</sup>* and set the port for the selected satellite. Factory setting is *Disable*.

<sup>4</sup> *DiSEqC1.1* supports 16 satellite positions

7. Go to *Transponder* and use the keys ◀ / ▶ to select the transponder, broadcasting the channel, which you want to use for adjusting your antenna. Signal strength and signal quality (of the selected transponder) are displayed on the bottom of the window. Alternatively go to *Transponder*, press OK, select the corresponding transponder from the list and confirm by pressing OK.
8. Turn the dish until the *LOCK LED* lights or the bar graph displays signal strength and signal quality. If the *LOCK LED* lights there is also an acoustic signal



In the menu *OSD Setting* → *Beeper* you can set, whether an acoustic signal should be output (*On*) or not (*Off*), if a signal is found.

9. Fixate the Dish in the position with the best signal strength.
10. Vary the angle of inclination until the bargraph displays even more signal strength and signal quality.
11. Press EXIT, several times to get to the TV mode. In the info window on the bottom of the window signal strength S, signal quality Q, *FEC*, *VBER* (bit error rate after Viterbi), and *MER* (modulation error rate) are shown.
12. Fixate the Dish in the position with the best *VBER* quality.



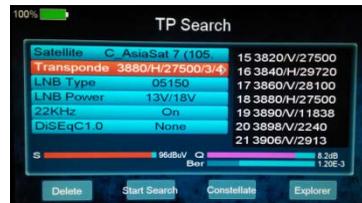
The *VBER* value with good reception is 10E-8 (so almost 0). The higher *VBER* is, the worse is the signal (e. g. antenna wrong aligned).

## 6 Menu TP Search

- Select the menu *TP Search* and press OK.

In the menu *TP Search* a list of the stored satellites is shown.

10 satellites are displayed on each page. To display further satellites use the keys ▲ and ▼.



### 6.1 Renaming a Satellite

1. Select the satellite you'd like to rename in the list with the keys ▲ and ▼.
2. Press the function key (Edit). A screen keyboard opens.
3. Give a new name for the satellite. Use the keys ◀/▶ and ▲/▼ to mark a character and confirm each character with *OK*.
4. Repeat until you have the desired name.
  - Press the function key (Delete) to delete the respectively selected character.
  - Press the function key (CAPS) to switch between upper case and lower case.
  - Press the function key (Cancel) to discard the changes made so far and to close the window *Rename*.
  - Press the function key (OK) to accept the changes made so far and to close the window *Rename*.

## 6.2 Adding a Satellite

1. Press the function key (Add). A screen keyboard opens.
2. Give a name for the new satellite. Use the keys ◀/▶ and ▲/▼ to mark a letter and confirm each letter with *OK*.
3. Repeat until you have the desired name.
  - Press the function key (Delete) to delete the respectively selected character.
  - Press the function key (CAPS) to switch between upper case and lower case.
  - Press the function key (Cancel) to discard the changes made so far and to close the window *Rename*.
  - Press the function key (OK) to accept the changes made so far and to close the window *Rename*.



The transponder list of the new satellite is empty. Create a new transponder as described below (Adding a new Transponder).

## 6.3 Deleting a Satellite

1. Select the satellite you'd like to delete from the list with the keys ▲ and ▼.
2. Press the function key (Delete).
3. Use the keys ◀/▶ to mark the button *Yes* and confirm with *OK* to delete the satellite from the list.  
Mark the button *No* and confirm with *OK* to go back to the menu *TP Search*, without deleting the satellite.

## 6.4 Searching for a Transponder

- Select with the keys ▲ and ▼ the satellite on which you'd like to look for a transponder.
  - Press *OK*.
  - With the keys ◀ and ▶ you can now change once more the satellite.
- 
- The screenshot shows the 'TP Search' menu with the following data:
- | Satellite   | C AsiaSat 7 (105) | 15 3820/V/27500 |
|-------------|-------------------|-----------------|
| Transponder | 3880/H/27500/3/4  | 16 3840/H/29720 |
| LNB Type    | 05150             | 17 3860/V/28100 |
| LNB Power   | 13V/18V           | 18 3880/V/27500 |
| 22KHz       | On                | 19 3890/V/11838 |
| DiSEqC1.0   | None              | 20 3898/V/2240  |
|             |                   | 21 3906/V/2913  |
- At the bottom of the screen, there are two progress bars: a red one for 'S' at 96dBV and a blue one for 'Ber' at 8.2dB and 1.20E-3. Below the bars are four buttons: Delete, Start Search, Constellate, and Explorer.
- Go to *LNB Type* and select the right value for the used LNB. The possible values are listed in the section "Aligning the Satellite Dish".
  - If you use a multifeed antenna, go to *DiSEqC1.0* and select the port for the selected satellite. You also can change the *DiSEqC1.0* port with the yellow function key.
  - If you can receive signals from more than four satellites select *DiSEqC1.1* and set the port for the selected satellite. Factory setting is *Disable*.
  - Press the function key to call for the constellation diagram. A constellation diagram is the graphic representation of a digital modulated signal (e. g. Quadrature Phase Shift Keying QPSK or Quadrature Amplitude Modulation QAM).  
The more point-source the dots are, the less noisy is the signal.

## 6.5 Deleting a Transponder

1. Select in the sub menu *TP search* with the keys ▲ and ▼ the satellite on which you'd like to delete a transponder and press OK. With the keys ◀ and ▶ you can now change once more the satellite.
2. Select with the keys ▲ and ▼ the line *Transponder* and press OK.
3. Select with the keys ▲ and ▼ the Transponder you want to delete and press OK.
4. Press the function key (Del).
5. Use the keys ◀/▶ to mark the button *Yes* and confirm with OK to delete the transponder from the list.  
Mark the button *No* and confirm with OK to go back to the menu *TP Search*, without deleting the transponder.

## 6.6 Adding a Transponder

1. Select in the sub menu *TP search* with the keys ▲ and ▼ the satellite on which you'd like to add a transponder and press OK. With the keys ◀ and ▶ you can now change once more the satellite.
2. Select with the keys ▲ and ▼ the line *Transponder* and press OK.
3. Select with the keys ▲ and ▼ the last position *New TP* in the list and press OK. The window *Add TP* opens.
  - Select with the keys ▲ and ▼ the line *Frequency* and insert with the numeric keys the frequency (in MHz) of the new transponder.
  - Select with the keys ▲ and ▼ the line *Symbol Rate* and insert with the numeric keys the symbol rate (in kS/s) of the new transponder.
  - Select with the keys ▲ and ▼ the line *Polarity* and insert with the keys ◀ and ▶ the polarization of the new transponder.  
*H* = horizontal  
*V* = vertical
4. Press the function key (OK) to confirm the new transponder.

## 6.7 Searching Channels

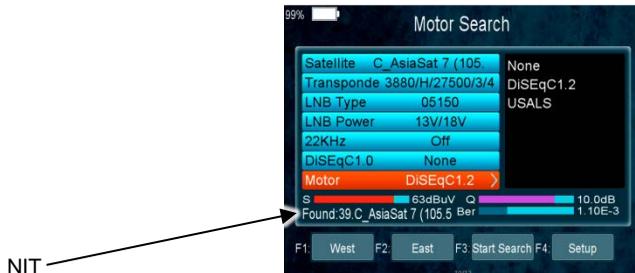
1. Select in the sub menu *TP search* the satellite containing the transponder on which you'd like to look for receivable channels and press OK.
2. Go to *Transponder* and select with the keys ▲ and ▼ from the list the transponder on which you'd like to look for receivable channels and press OK.
3. Go to *LNB Freq* and select the right value for the used LNB. The possible values are listed in the section "Aligning the Satellite Dish". You also can change the LNB frequencies with the function key.
4. If you use a multifeed antenna, go to *DiSEqC1.0* and select the port for the selected satellite. You also can change the DiSEqC1.0 port with the yellow function key.
5. If you can receive signals from more than four satellites select *DiSEqC1.1* and set the port for the selected satellite. Factory setting is *Disable*.
6. Press the **F2** function key to start the channel search  
Found programs are attached to the rear of the channel list.

## 6.8 NIT

The smartmeter S30 is equipped with NIT. NIT means Network Information Table and is transmitted in the data stream of the satellite. It contains data regarding to transponders and channels, such as frequency, sound carrier or symbol rates.

To align a satellite antenna you can also use the NIT display. When a signal is found worthy to receive, the NIT display tells you to which satellite your antenna is actually aligned.

Examples:



In order that a satellite can be found, the remaining data, especially transponder data and DiSEqC port must be correct.

## 7 Menu Satellite Identify

1. In TV mode press the MENU key (or navigate to main menu).
2. Select the sub menu *Satellite/ Satellite- IDE* and confirm with OK.
3. If you don't know the signal information of some usual sat, in this menu, please wait a moment, it will find the satellite identify.



*Satellite Identify* uses the transponder lists stored in the smartmeter S30.

## 8 Menu Packet Control

In this menu you can

- display signal strength and signal quality of each transponders as well as
- perform a satellite search.

## 8.1 Showing Measurement Values of Transponders

1. In TV mode press the MENU key (or navigate to main menu).
2. Select with the keys ◀/▶ and ▲/▼ the sub menu *Packet Control* and confirm with OK.
3. Select at *Satellite* with the keys ▶ and ◀ the satellite where you can find the transponders to display.
4. Go to *LNB Freq* and select the right value for the used LNB. The possible values are listed in the section “Aligning the Satellite Dish”. You also can change the LNB frequencies with the blue function key.
5. If you use a multifeed antenna, go to *DiSEqC1.0* and select the port for the selected satellite. You also can change the DiSEqC1.0 port with the yellow function key.
6. If you can receive signals from more than four satellites select *DiSEqC1.1* and set the port for the selected satellite. Factory setting is *Disable*.



You can see on the screen signal strength S and signal quality Q of five consecutive transponders.

- Press the **F1** function key (Select TPs) to display the values of the next transponders in the transponder list.

## 9 Menu DiSEqC Search

In this menu you can scan the DiSEqC switch. As result of the scan you see on which port which Satellit is received.

1. In TV mode press the MENU key (or navigate to main menu).
2. Select the sub menu *DiSEqC Search* and confirm with OK.



The DiSEqC search begins automatically. One after another, all four DiSEqC1.0 ports are scanned. After completing the scan, the screen will show the sat which is connected.

- Press the **F4** function key to select the right frequency for the used LNB.

## 10 Menu DiSEqC Motor Search

This menu is used to set up a motor antenna and its control system.

In all menu windows (e. g. moving dish) you see signal strength S and signal quality Q.

1. In TV mode press the MENU key (or navigate to main menu).
2. Select the sub menu *Motor Search* and confirm with OK.



- Press the **F1** function key to turn the satellite dish to the west.
- Press the **F2** function key to turn the satellite dish to the east.
- Press the **F3** function key to start a channel search for the current transponder (see section 6.7 „Searching Channels“). Since you use DiSEqC1.2 or USALS for the antenna control, normally you can ignore the lines *DiSEqC1.0* and *DiSEqC1.1*. There are special cases (e. g. cascading of DiSEqC switches) where additionally to DiSEqC1.2 you need *DiSEqC1.1*.
- Press the **F4** function key to set the details for the motor control:
  - Select at *Satellite* with the keys ◀ and ▶ the satellite for the following settings should be valid.
  - Select *Transponder* to set the transponder which should be reference for the antenna position (generally the transponder which broadcasts your favorite channel).
  - Select *Motor Type* to set the used control technique. Select between *DiSEqC1.2* and *USALS* (depending on the used motor). Depending on your choice, different settings are available.

## 10.1 DiSEqC 1.2

- Select *Position No & Save* to set a position number as which the current satellite (the current antenna position) will be saved.
- Select *Go To X* to call a position from which you want start the settings (the value *Reference* is the zero position).
- Select *Save* and move the dish with the keys ▶ and ◀ to the west or the east. Look for the maximum values of signal strength and signal quality which are shown at the bottom edge of the screen.
- Then press OK to save the found position.
- If necessary, repeat these steps for other satellites / transponders.
- Select *Recalculation* and press OK to discard all settings and define once more the antenna positions. A query window opens. Confirm the deletion with the function key (Yes) or cancel it with the function key (No).

## 10.2 USALS

- Select *Local Longitude* to enter the longitude of your antenna's position with the numeric keys 0 ... 9.
- Select *Local Latitude* to enter the latitude of your antenna's position with the numeric keys 0 ... 9.

## 11 Menu Spectrum

In this submenu, you can check the different transponders across the entire spectrum.

1. In TV mode press the MENU key (or navigate to main menu).
2. Select the sub menu *Spectrum* and confirm with OK.



- Press the **F1** function key to switch the polarization between horizontal *H* and vertical *V*.
- Press the **F3** function key to select the DiSEqC port and thus the satellite.
- Press the **F2** function key to set the 22 kHz control voltage for the switch between high band and low band:
  - On* Permanent on,
  - Off* Permanent off,
  - Auto* automatic

The permanent settings are required, for example, for certain antenna systems or to avoid interferences.

## 12 Menu Watch Program

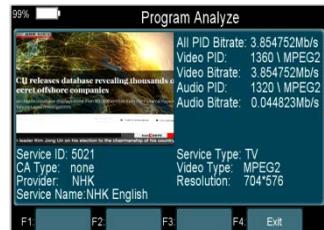
To check the TV reception, you can put the smartmeter S30 in the TV mode.

- In the main menu select the sub menu *Watch TV* and confirm with OK or press EXIT in the main menu to switch to TV mode.



After the first switch-on (or after resetting to factory settings), no programs are stored, the channel list is empty. You receive an error message: „No Channel!“

- Press the **F1** function key to select any satellite.
- Press the **F2** function key to open the Channel/Radio menu.
- Press the **F3** function key (Full Screen) to close the toolbar and to show only live TV.
- Press the **F4** function key to analyze the program.



### 12.1 Selecting a Channel

You have several possibilities to select a channel.

#### 12.1.1 Direct Channel Selection

- Select the desired channel by using the keys ▲ and ▼.

With each change of channel, an information window with information on the current channel will be displayed (see above).

#### 12.1.2 Channel Selection via Selection Window

1. Press the OK key to display a selection window with all available channels.
2. Select the channel list with the desired channel by using the keys ► and ◀. You can select between a channel list for all satellites, channel lists for each satellite and you favorite lists.
3. Select the channel to be displayed by using the keys ▲ and ▼ and confirm your selection by pressing OK. The channel will be correspondingly switched.

## 13 Cable Network

- Press MENU to enter the main menu. The display shows the OSD<sup>5</sup> main menu.

The display shows the main menu window when you switch the smartmeter S30 on and when you re-enter the menu.

- Press OK to enter the *CABLE* mode.
- Select *TP Search* with OK



### 13.1 TP Search - Checking Television Reception

The TP search sub-menu primarily serves as checking the television reception in a DVB-C-system.

In this Menu you can Delete, Add, Manual Search, Network Search and Blindscan.



#### 13.1.1 Deleting a Frequency from the List

1. Using the keys ◀ and ▶, select the frequency which you would like to delete from the list in the search window under the menu item frequency.
2. Press the **F1** key. A message will appear asking if you are sure you want to delete this frequency.
3. Using the keys ◀ and ▶, select the *YES* box and confirm your selection by pressing the OK key once again.

#### 13.1.2 Adding a Frequency to the List

1. Press the **F2** key in the search window. The input mask will open.
2. Using the numeric keypad, adjust the Frequency/BandWidth value or select one from the default values using the keys ◀ and ▶.
3. Use the ▼ key to then enter the symbol rate and adjust this to the current value using the numeric keypad or select one from the default values using the ◀ and ▶ keys.
4. Use the ▼ key to then enter the QAM mode and select from the default values using the ◀ and ▶ keys.

#### 13.1.3 Searching Channels Manually

You can search channels manually for e.g. due to poor reception.

1. Press the keys ▲ and ▼ to select the Frequency menu item.

<sup>5</sup> OSD = On Screen Display

2. Use the keys ◀ and ▶ to select the frequency you want to search channels on. Alternatively, press OK, select a suitable frequency from the list and confirm by pressing OK. This will then also set the symbol rate and QAM mode.
3. Press the keys ▲ and ▼ to select the symbol rate menu item.
4. Press the keys ◀ and ▶ to select the desired symbol rate.
5. Press the keys ▲ and ▼ to select the QAM mode menu item.
6. Press the keys ◀ and ▶ to select the desired QAM mode.
7. Press the keys ▲ and ▼ to select the Search menu item.
8. Press **F3** key to change to *Manual search* and press OK.  
A message will appear asking whether or not you only want to search FTA channels.
  - Use the keys ◀ and ▶ to select *YES* or *NO*.  
If *NO* is selected, both encoded and FTA channels will be found. If *YES* is selected, only FTA channels will be found.

A search for receivable channels within the selected frequency will now be initiated. The channels found will be listed in the channel list.

9. After the search has ended, the number of TV and radio channels found will be shown. Confirm by pressing OK to return to the main menu.
10. See point 4 to search for channels on other transponders. The channels found will be added to the channel list.

### 13.1.4 "Network Search"

You can search channels automatically by network search.

Use same settings like explained in 13.1.3 point 1 – 6.

7. Press the keys ▲ and ▼ to select the Search menu item.
8. Use the keys ◀ and ▶ to change to *Network search* and press OK.  
A certain transponder is assigned to the data entered (frequency, symbol rate, QAM mode). All transponders with the same ID will now search for receivable channels. The channels found will be listed in the channel list.



The *Network search* can also be found using the functional **F4** key (replaces steps 7 and 8).

### 13.1.5 "Blind Scan"

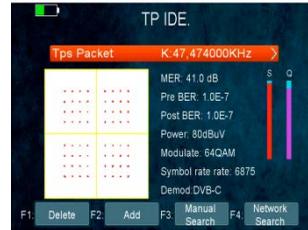
1. Press the keys ▲ and ▼ in order to select the menu item search.
2. You can search all transponders with *SCAN* key.  
At intervals of 1 MHz, the entire reception area within 50-858 MHz will now be searched. All receivable channels will be listed in the channel list. There will be no distinction made between encoded or FTA<sup>6</sup>-channels.
3. After the search process has ended, the number of TV and radio channels found will be shown. Confirm by pressing OK to return to the menu.

<sup>6</sup> FTA = Free To Air (engl.), ohne Verschlüsselung ausgestrahtetes Programm

## 13.2 Frequency Overview

The smartmeter S30 can display different key figures and measurement values of individual channels.

1. Press MENU to go to the main menu.
2. Select CABLE and confirm by pressing OK. Select TP IDE and confirm by pressing OK. The following window will open:



3. Use the ◀/▶ keys to set the desired Transponder Packet (displayed in the upper right corner) or press OK: a selection window will open in which you can set the desired frequency using the keys ▲/▼. Confirm by pressing OK to go back to the frequency sub-menu.

The following will be displayed:

Display	Meaning
Frequency	Frequency, symbol rate, modulation
Power	Signal voltage given in db $\mu$ V
MER	Modulation Error Rate. All signal disturbances are summarized to one measurement value. The higher the MER value, the better is the signal quality
a.BER	Bit error rate before the FEC (Forward Error Correction). Errors occur for values < 2e-002. BER = number of distorted bits in a time interval / total volume of all bits transmitted in a time interval.
S	Bar graph of the signal strength in %
Q	Bar graph of the signal quality in %

Using the functional keys F3 / F4, different search functions can be carried out:

- F3: Manual search
- F4: Network search



- Press the FIND key instead of using the menu to go directly to the FREQ. OVERVIEW function.

## 13.3 Packet Control

The smartmeter S30 also allows you to read the signal strength (S) and signal quality (Q) of seven successive channels.

1. Press the MENU key.
2. Using the ◀/▶ and ▲/▼ keys, select the **CABLE / PACKET CONTROL** menu item and confirm your selection by pressing OK. The following window will open:

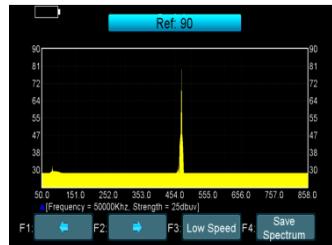


3. In this menu you can see the strength and quality of each channel.

### 13.4 Spectrum

You can also display the spectrum of TV signal on the screen of the smartmeter S30:

1. Press the MENU key.
2. Using the ◀/▶ and ▲/▼ keys, select the **CABLE / SPECTRUM** menu item and confirm your selection by pressing the OK key. The following window will open:



- You can change the refresh rate by pressing the **F3** key several times.
- **F4** to save the currently displayed spectrum on a data storage device

## 14 Terrestrial DVB-T/T2

- Press MENU to enter the main menu. The display shows the OSD<sup>7</sup> main menu.

The display shows the main menu window when you switch the smartmeter S30 on and when you re-enter the menu.

- Press OK to enter the *TERRESTRIAL* mode.
- Select *TP Search* with OK



### 14.1 TP Search - Checking Television Reception

The TP search sub-menu primarily serves as checking the television reception in a DVB-T/T2 area.

In this Menu you can Delete, Add, Manual Search, Network Search and Blindscan.



#### 14.1.1 Deleting a Frequency from the List

1. Using the keys ◀ and ▶, select the frequency which you would like to delete from the list in the search window under the menu item frequency.
2. Press the F1 key. A message will appear asking if you are sure you want to delete this frequency.
3. Using the keys ◀ and ▶, select the YES box and confirm your selection by pressing the OK key once again.

#### 14.1.2 Adding a Frequency to the List

1. Press the F2 key in the search window. The input mask will open.
2. Using the numeric keypad, adjust the Frequency/BandWidth value or select one from the default values using the keys ◀ and ▶.
3. Use the ▼ key to then enter the symbol rate and adjust this to the current value using the numeric keypad or select one from the default values using the ◀ and ▶ keys.
4. Use the ▼ key to then enter the QAM mode and select from the default values using the ◀ and ▶ keys.

#### 14.1.3 Searching Channels Manually

You can search channels manually for e.g. due to poor reception.

1. Press the keys ▲ and ▼ to select the Frequency menu item.

<sup>7</sup> OSD = On Screen Display

2. Use the keys ◀ and ▶ to select the frequency you want to search channels on. Alternatively, press OK, select a suitable frequency from the list and confirm by pressing OK. This will then also set the symbol rate and QAM mode.
3. Press the keys ▲ and ▼ to select the BandWidth menu item.
4. Press the keys ◀ and ▶ to select the desired BandWidth.
5. Press the keys ▲ and ▼ to select the Search menu item.
6. Press **F3** key to change to *Manual search* and press OK.  
A message will appear asking whether or not you only want to search FTA channels.
  - Use the keys ◀ and ▶ to select *YES* or *NO*.  
If *NO* is selected, both encoded and FTA channels will be found. If *YES* is selected, only FTA channels will be found.

A search for receivable channels within the selected frequency will now be initiated. The channels found will be listed in the channel list.

7. After the search has ended, the number of TV and radio channels found will be shown. Confirm by pressing OK to return to the main menu.
8. See point 4 to search for channels on other transponders. The channels found will be added to the channel list.

#### 14.1.4 Automatic Search

You can search channels automatically by Auto search.

Use same settings like explained in 13.1.3 point 1 – 6.

7. Press the keys ▲ and ▼ to select the Search menu item.
8. Use the keys ◀ and ▶ to change to *Auto search* and press OK.



The *Network search* can also be found using the functional **F4** key (replaces steps 7 and 8).

## 14.2 Frequency Overview

The smartmeter S30 can display different key figures and measurement values of individual channels.

1. Press MENU to go to the main menu.
2. Select TERRESTRIAL and confirm by pressing OK. Select TP IDE and confirm by pressing OK. The following window will open:
3. Use the ◀/▶ keys to set the desired Transponder Packet (displayed in the upper right corner) or press OK: a selection window will open in which you can set the desired frequency using the keys ▲/▼. Confirm by pressing OK to go back to the frequency sub-menu.



The following will be displayed:

Display	Meaning
Frequency	Frequency, symbol rate, modulation
Power	Signal voltage given in dbμV
C/N	Carrier To Noise. This value states how much useful signal above the background noise there is e.g. of the transponder. The higher the C/N value the stronger the signal.
MER	Modulation Error Rate. All signal disturbances are summarized to one measurement value. The higher the MER value, the better is the signal quality
a.BER	Bit error rate before the FEC (Forward Error Correction). Errors occur for values < 2e-002. BER = number of distorted bits in a time interval / total volume of all bits transmitted in a time interval.
S	Bar graph of the signal strength in %
Q	Bar graph of the signal quality in %

Using the functional keys F3 / F4, different search functions can be carried out:

- F3: Manual search
- F4: Auto search



➤ Press the FIND key instead of using the menu to go directly to the FREQ. OVERVIEW function.

### 14.3 Packet Control

The smartmeter S30 also allows you to read the signal strength (S) and signal quality (Q) of seven successive channels.

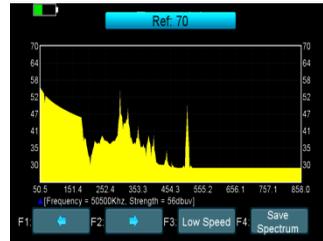
1. Press the MENU key.
2. Using the ◀/▶ and ▲/▼ keys, select the *TERRESTRIAL / PACKET CONTROL* menu item and confirm your selection by pressing OK. The following window will open:
3. In this menu you can see the strength and quality of each channel.



## 14.4 Spectrum

You can also display the spectrum of TV signal on the screen of the smartmeter S30:

1. Press the MENU key.
2. Using the ◀/▶ and ▲/▼ keys, select the *TERRESTRIAL / SPECTRUM* menu item and confirm your selection by pressing the OK key. The following window will open:



- You can change the refresh rate by pressing the **F3** key several times.
- **F4** to save the currently displayed spectrum on a data storage device

## 15 Menu Settings

1. In TV mode press the MENU key (or navigate to main menu).
2. Select the sub menu *Settings* and confirm with OK. The window *System Setting* opens.



### 15.1 Selecting the OSD Language

- Select *Language* to set with the keys ◀ and ▶ the OSD language. Factory setting is *Deutsch*.

### 15.2 Selecting Audio 1

- Set the preferred audio language.

### 15.3 Selecting Audio 2

- Set the sub-prime audio language.

### 15.4 Power Out 12V

- If you set it on it will support 12V Output voltage for powering camera systems.

### 15.5 DVB-T Power

- If you set it "ON" it will provide 5V system power for DVB-T antennas.

## **15.6 OSD - Display Mode**

- Set the HD output format between 1080p, 1080i, 720p, 480p, 480i

## **15.7 OSD – TV Type**

- Select the TV type PAL/NTSC/Automatic.

## **15.8 OSD - Screen Mode**

- Set the display format according to the screen ratio. Select TV screen mode either 4:3 or 16:9 according to the TV type, or press the MODE button of the RCU directly. Factory setting is *Deutsch*.

## **15.9 OSD – Time Out**

- Select *OSD Timeout*, to set with the keys ◀ and ▶ the number of seconds when the OSD should be hidden.

## **15.10 OSD - Screen Mode**

- Set the display format according to the screen ratio. Select TV screen mode either 4:3 or 16:9 according to the TV type, or press the MODE button of the RCU directly. Factory setting is *Deutsch*.

## **15.11 Times – Time Settings**

- In this menu you will set the *Time Mode, Time Zone and Summer/Winter Time*.

## **15.12 Color Settings/Screen**

- You can adjust the *Sharpness/Brightness/Contrast/Saturation/Backlight* in this menu.

## **15.13 System info**

- In this menu you can get the information about the hardware, such as model ID, Hardware/Software version, and Loader-Version. When you need support from the dealer you need to submit this information in order to get the correct and fast after sales support.

## **15.14 Restoring Factory Settings**

- Select *Menu/Settings/Factory Default* and press OK to restore factory settings.
  1. *All* - All data and settings will be deleted
  2. *Channel List Only* – All channels data will be deleted
  3. *Radio Channel Only* – All radio channels data will be deleted
  4. *Scrambled Channel Only* – All scrambled channels data will be deleted

# **16 Expansion**

The EXPANSION menu mainly intended for all USB functions.

## **16.1 USB Port**

In this menu you navigate through the USB tools like Mediaplayer, Software Update, Record.

1. In TV mode press the MENU key (or navigate to main menu).
2. Select the sub menu *EXPANSION /USB* and confirm with OK. The window USB opens.



### 16.1.1 Upload

- You can upload Software Updates or database files.

### 16.1.2 PVR Setting

- Record Partition: Select the Partition where you want to save your recordings or result of your operation
- Record Mode: Set the Record Mode Channel or Transponder
- Record Type: Set the Record Type TS or PS
- Record Time: Set the Record Default Time off – 30/60/90/120 minutes or enter value directly
- Timeshift Buffer Size (MB): Set the Timeshift Buffer Size – 100/200/400/800/1600/3200/6400MB
- Timeshift Need Save: Set the Timeshift if needed to save
- Play Start Pos: When playing the PVR file, set the Play Start Position whether head of the file or to last position (Playback stopped last time manually) of the file

### 16.1.3 Tool

- You can do various operations when using USB HDD or USB stick. In this menu you can Rename, Delete, Move, Copy, Create folders, Sort and Format Disk

### 16.1.4 Play Mode

- Loop: Set the loop state on Normal, Reverse, Random, Single or OFF
- Slideshow Interval: Set the Slide Show Interval from 2s to 10s
- Photo View Mode: Set the state on Full-Screen, 2x2 Thumbnail or 2x3 Thumbnail

### 16.1.5 Play Files

- Press the keys ◀ and ▶ to select the file type
- Press the ▲/▼ keys to change the folder or file and press the OK button to open the folder or play the file

### 16.1.6 Music

The S30 supports .mp3, .flac, .mp2, .wav and .ogg format music files.

- Press the ▲/▼ keys to change the highlighted item, press the OK button to play the file.
- Press the keys ◀ and ▶ to adjust the volume

### 16.1.7 Picture

The S30 supports .bmp, .jpg, .gif format photos.

- Press the ▲/▼ keys to change the highlighted item, press the OK button to show the picture.

### 16.1.8 **Movie**

The S30 supports .3GP, .AVI, .DAT, .FLV, .MKV, .MOV, .MP4, .MPG, .TS, .VOB format files.

- Press the ▲/▼ keys to change the highlighted item, press the OK button to play the file.
- Press the keys ◀ and ▶ to adjust the volume

### 16.1.9 **Software Upgrade**

- Insert USB to your PC, copy the update file to the USB stick
- Restart the smartmeter S30. When it is starting up insert the USB stick.
- In *MAIN MENU/EXPANSION/USB* find and select the update file and press the OK button. Upgrade progress will start.
- After flashing the memory the S30 will restart automatically.

NOTE: During the software Upgrade progresss the keys ◀ and ▶ to adjust the volum

Press the FIND key instead of using the menu to go directly to the *FREQ. OVERVIEW* function.



**CAUTION!**

- Never switch the meter off while you are updating the meter software!
- If you are not sure whether the battery charge will last through the update, connect the smartmeter C10 to the power supply via the power plug before you start the update.

## 16.2 **WI-FI**

The smartmeter S30 can be upgraded by an WIFI USB stick.

- Plug in the wireless USB dongle to the USB port.
- Enter Menu->Expansion->WIFI>
- Select the network name of your Wi-Fi access point from the list.
- Press the OK button, then input the right password.
- Enter Menu-> Expansion->IP Setting.
- If the Network is connected, it should get the correct IP address and display the "Connected"

## 16.3 **IP Settings**

If the Network is connected fine, it will display "Connected". In this menu, you can set the IP-address manually, also you can get IP address automatically.

- F3: Get IP address automatically.
- F4: Test the network if connect correctly. The smartmeter S30 can be upgraded by an WIFI USB stick.

## 16.4 RECORD function

### 16.4.1 Start Recording

- You can press the F4 button then highlight the PVR item and press the OK button to start recording while watching program.

### 16.4.2 Stop Recording

- You can press the EXIT button or F4 button to stop recording .
- If the free space on the USB HDD or USB disk is insufficient, recording will stop.
- Watch the Other program while recording.

### 16.4.3 TP Recording

- When you watch a program, you can press the F4 key and select TP PVR item to begin TP PVR. It allows record all program under the same TP. At the same time, you can only watch the program from the same TP.

### 16.4.4 Auto Timeshift

- When you watch a program, you can press the F4 key and select Auto Timeshift item to begin Timeshift.
- While it is in timeshift mode, press the F1 button to display the playing menu, press F2 button to stop Timeshift.
- In this menu you can press F1 button to fast backward the program, press F2 button to play or pause the program, press F3 button to display recording information, and press F4 button to stop playing recording.



## 17 Capturing a Screenshot

If a USB data storage device is connected to the meter, you can save a screenshot of the display to the data storage device (e.g. to document measuring values).

- Press the  key.  
A screenshot of the display is saved to the USB data storage device in a bmp file.

## 18 Operation in a Unicable System

### 18.1 About Unicable

The smartmeter S30 allows for changing the receiving mode to the unicable standard. This makes it possible - depending on the antenna type - to connect up to eight independent receivers to only one main line.

For this, an own IF channel and a corresponding frequency should be set for each receiver via the settings menu.

Allocation of channels and frequencies depends on the used LNBS and/or multi-switches.

The data sheet and the technical documentation of your LNB and/or multi-switch include an allocation table similar to the following table.

### 18.2 Allocation of IF channels and frequencies

Receiver	IF channel	Exemp. frequency (MHz)	Frequency (MHz)
Receiver 1	1	1284	
Receiver 2	2	1400	
Receiver 3	3	1516	
Receiver 4	4	1632	
Receiver 5	5	1748	
Receiver 6	6	1864	
Receiver 7	7	1980	
Receiver 8	8	2096	

### 18.3 Installation

1. Select the menu item *TP Search* and press *OK*.
2. Select with the keys **▲** and **▼** a satellite and press *OK*.
3. Select with the keys **▲/▼** the line *LNB Freq.*
4. Select with the keys **◀** and **▶** the right value for the used Unicable LNB (according to the LNB specs).
5. Select with the keys **▲/▼** the line *DiSEqC1.0* and switch off the DiSEqC port use with the keys **◀** and **▶**. Ensure that also *DiSEqC1.1* is *disabled*.
6. Select with the keys **▲/▼** the line *IF Channel* and set with the keys **◀** and **▶** the IF channel according to the specs of the unicable system.
7. Select with the keys **▲/▼** the line *Centre Freq* and set with the keys **◀** and **▶** the frequency according to the specs of the unicable system.

The assignment of channels and frequencies depends on the LNB or multiswitch manufacturer.



You can also input the Centre Frequency (if you selected a Unicable LNB) by pressing the yellow function key.

## 19 Cleaning the Meter



WARNING!

Danger of electric shock during cleaning:

- Before you start cleaning the meter, disconnect the meter from the power plug. Unplug the power plug from the socket.
- Never use a wet wipe to clean the meter or power plug.
- Make sure that meter and power plug are always kept dry.



CAUTION!

Risk of damages to the meter during cleaning:

- Always use solvent-free cleaning agents (no benzene, no thinner).
- Use a soft lint-free wipe to clean the housing and display of the meter. If the meter is very dirty, you may use mild, solvent-free soapsuds or spirit for cleaning.

## 20 Transporting and Storing the Meter

If you want to transport the meter or if you intend to stop using the meter, handle the device as follows:

1. Disconnect the meter and all connected devices from the power supply.
2. Remove the aerial cable from the device.
3. Remove all other cables connected to the meter.
4. Put the meter, the cables and the user manual into the original packing.
5. Store the meter and the accessories in a dry and dust-free place.
6. Make sure that the meter is protected from frost.

## 21 Troubleshooting

Fault phenomenon	Probable reasons	Solutions
Device does not react.	The battery is empty.	Charge the battery.
Bad picture , block defect	The antenna is not adjusted to the satellite.	Adjust the antenna.
	The LNB is defect	Replace the LNB.
No or only faint signal.		Please check all cable connections. Adjust the antenna.
No picture, no sound.	Display/ Sounds turned off	Turn on the sound increasing the Volume.

If the troubleshooting suggestions do not help to correct a malfunction, please contact your specialist dealer.



You can find an FAQ-list with updated troubleshooting suggestions in the support section on our website at [www.smart-electronic.de](http://www.smart-electronic.de).

## 22 Disposal



CAUTION!

- Do not dispose of the meter or battery in your normal household waste.



- Ask your municipal authorities about how to dispose of the device in an eco-friendly and proper manner.
- Take spent batteries to an official collection point.



The WEEE<sup>8</sup> symbol on the product or the product packing indicates that this is an electrical or electronic device.

Thus, you will contribute to protecting the environment and people's health. Material recycling helps to reduce the consumption of raw materials.

You can help to preserve the environment we live in.

<sup>8</sup> The WEEE symbol stands for the Waste Electrical and Electronic Equipment Directive (2002/96/EC). This Directive was introduced to reduce the ever growing quantity of electronic waste from spent electrical and electronic devices. The aim is to avoid and reduce growing quantities of electronic waste and to promote eco-friendly disposal of such waste through extended manufacturer responsibilities.

## 23 Specifications

### 23.1 General

- 3,5" TFT-LCD, 720 x 576 pixel
- Physical separation of meter and battery (on-off-switch)
- Period of operation 4 – 8 hrs. (depending on operation mode)
- Display of signal strength and signal quality:  
numeric / bar graph
- Spectrum Analyzer
- Signal with good reception: optical and acoustical

### 23.2 Satellite LNB/Tuner input - Demodulation

LNB connector	F connector female
Frequency range	950 MHz to 2150 MHz
Input level	-20 dBm to -85 dBm
Input resistance	75 Ω
LNB power supply	13/18 V, max. 400 mA
LNB control signal	22 kHz
DiSEqC control	yes
Front-End-Modul	QPSK
Symbol rate	1 Mbps to 45 Mbps
Video resolution	720x576(PAL) 720x480(NTSC)
FEC	1/2, 2/3, 3/4, 5/6, 7/8, 9/10

### 23.3 Cable and Terrestrial Tuner Input - Demodulation

LNB connector	IEC connector female
Frequency range	174 MHz to 858 MHz
RF Impedance	75Ohm unbalanced
Input level	-20 dBm to -85 dBm
Front-End-Modul	COFDM/QAM
IF Band Width	6M, 7M, 8M
Video resolution	720x576(PAL) 720x480(NTSC)
FEC	1/2, 2/3, 3/4, 5/6, 7/8
Active Antenna Power	5 Volt / 12 Volt

### **23.4 System Resources**

DDRAM	1GByte DDR
FLASH	8MByte

### **23.5 Connector**

Data Interface	USB
Audio Video Output Digital	HDMI
Audio Video Output Analog	Hosiden

### **23.6 Power Supply**

Supply voltage	15 V
Li-Ion battery	3000 mAh
Supply voltage (charger)	175 - 250 V ~, 50/60 Hz

### **23.7 Dimensions and Weight**

Length x Width x Height	11.2 cm x 17.7 cm x 4.8 cm
Weight	0.5 Kg

### **23.8 Temperatur**

Operating temperature	0° C to +40° C
Storage temperature	-40° C to +65° C

## **24 Declaration of Conformity**

The company Avanit GmbH, Am Sternbach 1, 91477 Markt Bibart hereby declares conformity with the following guidelines and standards for this product:

- Guideline for electromagnetic compatibility 99/5/EC and 2014/30/EU
  - EN61326-1:2013
  - EN61326-2-2:2013
  - EN301489-1:2011-09
  - EN301489-17:2012-09
  - EN300328 V1.9.1:2015-02
- Guideline for low voltage 2014/35/EU
  - EN61010-1:2010
  - EN62479:2010

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Artikel Nr.: 25.0001



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