

**Miniature Audio/Video Recorder**

**$\mu$ AVR-H.264S**

**Operation manual**

Telesystems Ltd. 2009

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***Thank you for choosing our miniature audio video recorder (mAVR)!  
μAVR H.264S is an extremely small modern audio/video recorder with a built-in video camera. The recorder provides recording on SD and SDHC cards and can operate with a rechargeable battery with a long service life.  
Before using, read the instructions carefully.***

## **In Box**

1. Audio/video recorder μAVR H.264S
2. Cable for video input with a remote control (intended for distant on-off recording using the button as well as for connection to the external source of video frequency signal)
3. Power adapter
4. 2GB SD card, for evaluation purposes only. For regular use we recommend to use high quality cards.
5. Rechargeable battery BL-5B (Li-ION)
6. CD with software and instructions
7. User manual
8. Packing box

## **Optional accessories for mAVR H.264S:**

1. Analog-to-Digital Adapter for mAVR H.264S
2. GPS-receiver based on ANTARIS 4 SuperSense chip.
3. Car Adapter for mAVR H.264S.
4. External microphones for mAVR H.264
5. mAVR H.264S Holder

The accessories are not included in the shipment set.

## Overlook

The  $\mu$ AVR-H.264 audio/video recorder is intended for professional recording of video and audio signals onto flash memory card (up to 32 GB). Then the recordings can be uploaded onto a computer, decoded (converted), and played back.

The recorder can provide video recording either from the built-in recorder video camera or from an external source (external video camera, video player, TV video output, and etc.). Tuning the recorder parameters, you can optimize brightness, contrast range, saturation, and color.

The recorder can provide audio recording either from the built-in microphone or from an external one. You can control the microphone amplification manually or by using an automatic system (mono or stereo).

Along with the information, that all the recorder's recordings have (the number, the date and time), you can add additional text (up to 48 symbols) as a note.

Using the recorder settings, you can:

- tune white balance
- reduce flickers with frequency of 50-60 Hz (for instance, from fluorescent lamps)
- set filtration parameters (to reduce small defects in images)

Varying the audio/video quality parameters (compression, bit rate, resolution, frame size), you can optimize a quality/duration ratio according to your needs.

There exists an opportunity of testing the integrity of video files.

The distinguishing feature of the recorder is a possibility to record an event with its 'prehistory' (see Recording with Prehistory).

The possibility of working with GPS-receiver as well as correcting recorder's clock according to GPS system signal is also preset.

The recorder has an extremely small size and weight, high recording density, low power consumption, 20 kHz frequency band, and a wide dynamic range up to 92 dB.

The recorder has a built-in clock and calendar with an option to correct their accuracy. With the help of 10 independent timers which the recorder has, you can set the recording's duration along with the time, date or weekday when it will begin automatically.

You can set the recorder's parameters to start recording when a sound level exceeds a threshold or when the recorder gets signals from a motion detector.

The recorder LCD shows operating modes and the capacity of recorder's free memory space.

You can use the recorder LCD to change the recorder's settings with the help of the buttons that are on the front side of the recorder's case.

Also, you can change the recorder's settings using the "mAVR\_h264\_v115.exe" program.

The recorder can get power supply either from a rechargeable lithium battery or from an external power source. While getting power supply from the external power source, the recorder's rechargeable battery is charging. The recorder can be a power source for other devices with a 5 or 12 V input (for instance, video camera).

# Main Technical Characteristics

- Built-in camera resolution – 640x480 pxl
- Video input resolution .....720x480 (NTSC) 720x576 (PAL, SECAM) pxl

Frame size of recorded video input:

- Built-in camera: 160x120, 320x240, 640x480
- NTSC: 180x120, 360x240, 720x480
- PAL, SECAM: 180x144, 360x288, 720x576

Frame rate of recorded video input: 1, 2, 5, 10, 12, 20, 25, 30 fps

Compression of video signal: AVC (H.264S)

Bit rate of video signal:

64, 96, 128, 160, 192, 256, 384, 512, 768, 1024 kb/sec

Input resistance: 75 Ohm

Supported video standards: NTSC (M, 4.43), PAL (B, G, H, I, M, N) SECAM

Dynamic range of video sensor: 68 dB.

Audio characteristics:

- Sampling rate: 44100 Hz
- Capacity: 16 bit
- Compression of audio signal: AAC
- Bit rate of audio signal: 32, 64, 96, 128 Kb / sec
- Range of amplification control: 60 dB
- Dynamic range: 92 dB
- Frequency range: 80-20,000 Hz
- Resistance of electret microphones' pull up resistors: 3 kOhm
- Voltage of power source for electret microphones: 2.5 V.

#### Memory card characteristics:

- SD-card capacity: up to 2 GB
- SDHC-card capacity: From 4 to 32 GB
- File system: FAT - 32.

#### Power source characteristics:

- Rechargeable battery: BL-5B (Li-ION)
- Rechargeable battery life (video camera is not taken into account): 2 Hours
- Rechargeable battery life in stand-by mode: up to 12 Months
- The duration of full charging of the rechargeable battery: ~2 Hours
- Voltage of the external power source: 4.5-5.5 V
- Current consumption taken from an external power source of the recorder while

#### charging:

- type: up to 1.0 A
- Max (while charging and working and working external video camera): 1.7 A
- Voltage provided for external video camera: 5, 12 V
- Current in the external video camera's circuit: 150 mA.

#### Monitor OLED display

Dimensions: 54x40x18 mm

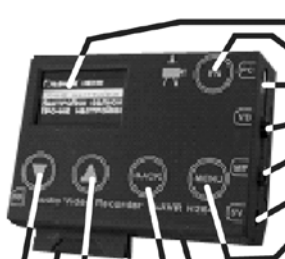
Weight: 32 g



## Recorder's Appearance



- 1 Switch
- 2 Video camera
- 3 Microphone (front)



- 4 Display
- 5 Keyboard lock
- 6 Connector for GPS-receiver
- 7 Video camera connection
- 8 Audio-and-video input
- 9 Connector for external power source
- 10 Button to go to the menu and choice confirmation
- 11 Microphone (back)
- 12 Navigation button "up"
- 13 Navigation button "up"
- 14 Memory Card (drawn out of the slot)
- 15 Navigation button "down"

## Control Panel

Control panel makes it possible to regulate the recorder's work and quickly change its settings if necessary.

In the upper part of the screen, you can see the amount of the free memory space, the current time, and the rechargeable battery's charge. The mode name is below.

# Preparing for Work

## Memory Card

To prepare the card for work a card reader is necessary (not available in the shipping box).

For this, follow the next steps:

1. Plug card-reader in and insert memory card
2. Launch “mavr\_h264\_v115.exe” and select the tab “Setting” in the appeared window “mAVR-H.264S V1.15 Manager”. Push the button “Setting”
3. In the appeared window “Program Settings” specify memory card path in the field “Source data folder” and the path to save the converted video files in the field “ Folder for output data”. Press the button “Accept”.
4. Format the card after you choose the FAT 32 file system in Windows or the  $\mu$ AVR-H.264S Manager program, by pushing the button “Formatting”.
5. After memory card is formatted, specify all the necessary settings and select “Preparation”. In this case “mavr-h264S\_v1.bin” instrumental file will be recorded on memory card.
6. Insert the memory card into the recorder’s card reader. If you slightly press for the second time the card will slide out.

**Note1: Don’t take the card out while the recorder is scanning or reading it.**

**Note2: If it is necessary to convert the existing video recording in paragraphs 2 or 3, specify the path to this video recording**

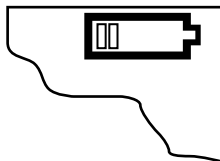
**Attention! In case of a changed memory card path (e.g. in case of changing the “letter” of a storage device), it is necessary to specify new path as stated in paragraphs 2 and 3.**

## Charging and Installing Rechargeable Battery

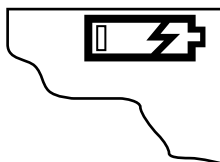
To charge the rechargeable battery, connect power adapter (which is on delivery set) to recorder's slot №9, shown at the Recorder Appearance picture the recorder, and then to power network (voltage 220V). Full charging takes about 2 hours.

### **Power adapter work is indicated on the recorder's display.**

1. The charging device is not connected. The pictogram shows the charge of the rechargeable battery



2. The charging device is connected. Charging is in progress.



3. The charging device is connected. The rechargeable battery is fully charged.



Recorder is charged only via the adapter.

To install or take out the rechargeable battery

Slightly press and move the back cover of the video recorder. Install or remove the battery. Close the cover.

# Working with the Recorder

## Main Recorder Modes

After you install the rechargeable battery or connect the recorder to a power source, the recorder turns on automatically. After a period of time that was previously set in the recorder settings (30 sec by default), the recorder will switch into the stand-by mode. In this mode, power consumption is minimal and the recorder will not need another recharge for about a year. However, we recommend charging the recorder every three months to keep it ready for use. If you do not use the recorder for more than 6 months, charge the rechargeable battery and take it out of the recorder.

The recorder will switch into the Record mode when:

- the recorder switch is in the left position
- the recorder gets commands from sensors
- the recorder is in a mode when it turns on automatically
- the recorder's timer turns the recorder on

The recorder switches into the stand-by mode and stops recording when:

- the recorder switch is in the "Stop" position
- the recorder's memory card is full
- the recorder's timer sends a correspondent signal according to previous settings
- if the recorder does not get a signal from the control or sensors do not send commands
- the recorder's rechargeable battery is discharged

## Two Readiness Modes

When the recorder is about to work, its power consumption is almost the same as the recorder has in Record mode. To reduce power consumption when the recorder works from the rechargeable battery, there are two additional modes: readiness mode and high readiness mode. While switching from the stand-by mode into the Record mode, the recorder can be

- in the readiness mode
- in the high readiness mode

While turning on recording, the recorder goes through the next succession of operations:

- scanning of the memory card for previously made recordings and free memory space (it is important for correct work in the circular mode). Thus the recorder switches in to the readiness mode. The operation takes no more than 40 sec.
- preparing the recorder hardware for work. The result of this operation is the High Readiness mode. This takes not more than 5 sec.
- In the Readiness mode, the recorder's power consumption is low so the recorder can remain without charging for some days. It takes 5 seconds for the recorder to switch from this mode to the Record mode. After the period of time that was previously set in the recorder's settings, the recorder will switch into stand-by mode again.




In the High Readiness mode, the power consumption is high. It takes less than 1 second for the recorder to switch into the Record mode. After you stopped recording, the recorder switches into the High Efficiency mode again. The recorder will stay in this mode if it has an external power source. If the external power source is not connected, in a certain period of time that is set in the recorder's settings, the recorder will switch into the Readiness mode and then into the stand-by mode.

## Recording Modes

The recorder provides recording in the modes:

- Linear mode
- Circular recording to free memory space – the Circular Recording 1
- Circular recording to whole memory space – The Circular Recording 2

To select the recording mode, go in to the Main menu. For this, press any keyboard button. On the recorder LCD, the information, which shows free memory space, the rechargeable battery charge, and the current time, will appear.

After you press the Menu button, the Main menu will appear. Select the Record Settings item using the ▲ ▼ buttons. Confirm your selection by pressing the  button again. Another menu will appear. Select the Record mode item using the ▲ ▼ buttons. Confirm your selection by pressing the  button. A list of modes will appear. Select one of the modes. To exit, press the  button.

### Linear Recording

In the Linear Recording mode, recording continues while there is free memory. Then recording stops.

### Circular Recording 1



In the Circular Recording 1 mode, recording continues while there is free memory space. When there is no free memory, recording continues over the beginning of the current recording. Previous recordings stay on the memory card. If when you selected this mode there were not free memory space, the recorder cannot create a new recording.

## Circular Recording 2

In the Circular Recording 2 mode, when free memory space ends, recording continues over the oldest data. As a result, all the previous recordings will be deleted.

## Recording with the Prehistory

When the recorder started recording after it got the command from sensors or timers (for instance, if the recorder is a part of a surveillance system), you would probably need the recording with something that preceded the command (Prehistory). Use the Recording with Prehistory mode to resolve this problem.

First, choose one of the three recording modes as it is described above. Then use the  button to go to the Recording Settings and choose the Prehistory menu item. After this you can choose among 4 options that are the durations of a recording that would precede the command from a timer or a sensor. Choose the option and confirm your choice by pressing the  button.

When the recorder's switch is on, the recorder is in the Prehistory mode. The recording is saved on the memory card the same way as it is in the Circular mode while the recorder does not get the command from the sensors or timers. The recording's duration is equal to one that was set in the Prehistory menu. The recorder saves the newest information on the memory card over the oldest one until the recorder gets the command from timers or sensors. After the recorder gets the command, the recorder records the event that was cause of the command. So the recorder's memory card does not have the useless information.

**Note:** Pay attention that after the Recording with Prehistory mode is on, the function of the recorder's operating controls are changed slightly. In this mode, the switch is used to turn on Prehistory recording while other controls start recording of the event that is cause of the command from the timer or sensor.

## Recording with GPS-receiver

Connected GPS-receiver makes it possible to define the geographical point of the recording.

To do this:

Switch on power supply of GPS-receiver in the tab “Setting – Others”  
“Rec-Manager-a”

Plug the GPS-receiver into the recorder’s 6-connector, the recorder’s indicator will show GPS, marking correct connection of the receiver. If the GPS module is powered – red LED will be on and the module will operate in satellite searching mode. If LED starts to blink in a series of flashes, that means that satellites are found and the positional information is being recorded.

You can also set the operating mode through the recorder’s menu.

Data flow from GPS-receiver is saved on the card when the “Extract GPS data” is ticked off in the tab “Setting” when pushing the button “Setting”. When converting the recording a GPS file with the same name as the video recording will be created in the folder with video files. This file can be opened with Google Earth.

In the recorder’s “Other settings” menu in the section “Expansion slot” you can select the operation mode of GPS module power supply (in a similar way to the video recorder’s power supply). There you can also select a set of adapter’s inputs that are used for recording control as well as their active output. Positional coordinates are saved on video picture. A list of available codes is displayed in the manager when hovering a cursor over “Text 1” or “Text 2” (Setting – Video).



## Playing back Recording

The recorder saves recordings on the memory card in its internal format. To play the recording back, you need:

- to convert the recording with help of the mAVR-H.264 V1.15 Manager Program
- play back the recording using the video player (For instance, Windows Media Player)

## Conversion of Video Data

To convert the video data, follow these steps:

1. Connect the card reader to the computer, and then insert the memory card with the recording into it.
2. Run the mAVR\_H264\_v1.15 exe program and select in the appeared window “mAVR-H.264 V1.15” a tab “Data conversion” .
3. Press the Scan button. After scanning is over, the list with recordings will appear. Select the recordings that you need to convert.
4. Press the Conversion button. After this the selected files will appear in the previously set folder for converted data.

These file names will have the following format:

DYYMMDD-THHMMSS\_P\_x.mp4

Where YY –year; MM –month; DD day; then HH –hours; MM – minutes;  
SS –seconds;

The last digit means the number of the recording’s part.

One continuous recording can be divided into some parts because:

- A file size is limited
- In the Recording with Prehistory mode, a part of the recording is deleted.

## Playing back the Converted Files

To play back the files, use the next programs:

- Quick Time Player ([www.apple.com](http://www.apple.com)). We tested this program with the 7.4.5 version.
- VLC media player ([www.videolan.org](http://www.videolan.org)). We tested this program with the 0.8.6f version.
- Windows Media Player, if K-Lite Codec Pack ([www.codecguide.com](http://www.codecguide.com)) is installed. This program was tested with 3.8.0 Full version of the Codec Pack.

## Videofiles integrity testing





There exists an opportunity to test the integrity of video files in “mAVR-H.264S”.

That checks the following information:

- Whether this video file was created by this particular program (1.15 version or further)
- Whether it was changed or damaged.

To launch this test shift to “Utilities” tab of “mAVR-H.264 V1.15” manager, select the file to be tested and choose “Test”.

## Setting the Recorder (in Menu)

In the Menu, you can change the recorder settings using the control panel. To browse the Menu or confirm your settings, use the  button. To exit, use the  button. Use the   buttons to go from one menu item to another.

## Keyboard lock

To select the type of lock shift to “Keyboard lock” point: Main menu – Other settings – Keyboard lock

Select the necessary keyboard lock type out of the list:

- Off (keyboard lock is off)
- 10 sec
- 20 sec
- 30 sec



If neither button is pushed within this time the keyboard will be locked.

## Date, Time, and Language Settings

Enter into the Main Menu and choose the Common Settings item. Confirm your choice. After the list appears, choose the Time item. Here you can set the current time (24 hours format).

To set the precise amount, use the ▲ ▼ buttons in the fields: Hours and Minutes.

**02      20**

Using the ▲ ▼ buttons, set the time in hours. To go to the next field, press the  button. The current time will be reset after you entered minutes and pressed the  button.

To go to the Date settings, go back to the Main Settings and choose the Date menu item. Enter the current date the same way as you did in the Time settings (date entry form is day/month/years). The current date will be reset after you entered the year.

In the Language settings, you have two options: Russian and English.

## Type of Record Settings

To switch to the Type of Record Settings, choose the Record Settings in the Main Menu, and then choose the Record type menu item.

**Main Menu → Record settings → Record type**

You can select among three options:

- Video + audio
- Video only
- Audio only

Select the correspondent check box in the program window.

## Video Settings

### Recording Modes

To go the recording modes, choose the Record Settings in the Main Menu, and then Record Mode.

**Main Menu → Record settings → Record Mode**

You can select among three options:

- Linear
- Circular recording 1
- Circular recording 2

Select the correspondent check box in the program window.

If you need the Recording with Prehistory (see above), select the Prehistory option in the Prehistory menu item.

**Main Menu → Record Settings → Prehistory**

In this menu window, select one of the check boxes:

- Off
- 10 sec
- 30 sec
- 1 minutes
- 3 minutes
- 5 minutes
- 10 minutes

## **Video Source Settings**

Go to the Video Source menu item.

**Main Menu → Record Settings → Video Settings → Video Source**

To choose a video source, select the correspondent check box:

- Int. camera
- Video input

## **Video Settings**

### **Picture Size**

The frame size depends on the video resolution that has the video source. The higher the resolution (picture size), the higher the image quality and memory consumption are.

To select the picture size, go the Picture Size menu item:

For PAL/SECAM:

Main Menu → Record settings → Video settings → V/in Settings →  
Parameters → For PAL/SECAM → Picture Size

For NTSC:

Main Menu → Record settings → Video settings → V/in Settings →  
Parameters → For NTSC → Picture Size

Select the check box that corresponds to the optimal frame size for your need:

- Low
- Medium
- High
- Custom

To optimize your choice, you can use the table below where the frame sizes are given in pixels.

	Built-in camera	PAL/SECAM	NTSC
Low	160x120	180x144	180x120
Medium	320x240	360x288	360x240
High	640x480	720x576	720x480
Custom	640x480	720x576	720x480

**Note: The meanings for Custom are set by default. They can be changed with the help of the µAVR-H.264 Manager program.**

## Frame Rate (FPS)

This parameter determines the number of frames that are recorded per second. To set the parameter, go to the FPS menu item.

Main Menu → Record settings → Video settings → Camera settings → Parameters → FPS

Main Menu → Record settings → Video settings → V/in settings →  
Parameters → For PAL/SECAM → FPS

Main Menu → Record settings → Video settings → In/Output Settings →  
Parameters → For NTSC → FPS

Choose the optimal frame rate using the table below.

Signal source	Built-in video camera NTSC (fps)	PAL, SECAM (fps)
Frame Rate	1	1
	2	2
	5	5
	10	10
	15	12
	30	25

## Bitrate

The higher this parameter is, the higher the image quality and the memory consumption are. To set the parameter, go to the FPS menu item.

**Main Menu → Record settings → Video settings → Camera settings → Parameters → Bitrate**

**Main Menu → Record settings → V/in settings → Parameters → PAL/SECAM → Bitrate**

**Main Menu → Record settings → V/in settings → Parameters → NTSC → Bitrate**

Select the check box that corresponds to the optimal bitrate for your need:

- 64 Kb/sec
- 96 Kb/sec
- 128 Kb/sec
- 256 Kb/sec
- 384 Kb/sec
- 512 Kb/sec
- 768 Kb/sec
- 1024 Kb/sec

## Brightness and Contrast

To adjust these parameters, go to the Brightness and Contrast menu items (use slider control).

For video camera:

Main Menu → Record Settings → Video settings → Camera settings → Brightness/Contrast

For video input:

Main Menu → Record Settings → Video settings → Input/output settings → Brightness/Contrast

## Hue and Saturation (for Video Input)

To adjust these parameters, go to the Hue and Saturation menu items (use slider control).

Main Menu → Record settings → Video settings → V/in settings → Hue/Saturation

## Color System

To change these parameters, go to the Color Space menu item:

Main Menu → Record settings → Video settings → V/in settings → Color system

- Auto
- PAL - B, G, H, I, N
- PAL - M
- PAL - Comb. N

If you select the Auto check box, the recorder will detect the video signal's type and switch into this type automatically. If you select any other check box, the recorder will support the correspondent type of a video signal. If the selected video standard



is not correspondent to the video input standard, but has the same frame rate, the image will be black and white with color moiré. If the frame rates are not the same, the recorder will not provide recording.

## **Amplification (for Built-in Camera)**

To control video signal's amplification, you can use two menu items: Gain for manual control and AGC for automatic control.

First, go to the Automatic Amplification:


**Main Menu → Record settings → Video settings → Camera settings → AGC**

There are two options:

- Check box on
- Check box off

If you set the AGC check box on, the Gain becomes unavailable. Otherwise, you will go to the Gain menu item.


**Main Menu → Record settings → Video settings → Camera settings → Gain**

Adjust the parameters using the slider control and then press the  button to confirm your choice.

## **Flicker elimination (for Built-in Camera Only)**

To change the parameter, go to the Flicker elimination menu item:

**Main Menu → Record settings → Video settings → Camera settings → Flicker elimination**

To confirm your choice, press the  button.

## Typing Text into the picture

The text prepared in “mavr\_h264\_v115.exe” program in the tab “Setting” – “Setting” button – Video can be hidden or displayed in the picture.

For this shift to “Text” point (Main menu – Recording settings – Video settings – Text) and select one of the types to display text in the picture:

- Off (the text isn't displayed)
- Upper (the text is displayed at the top of the picture)
- Lower (the text is displayed at the bottom of the picture)
- All (both texts are displayed)

Display of text can be controlled with the button «▲ » by preliminary choosing “back” before quitting “Main Menu”.

## Audio Recording Modes

To change the audio mode, go to the Mode menu item:

**Main Menu → Record settings → Audio settings → Mode**

Select one of the check boxes:

- Stereo
- Mono (Left)
- Mono (Right)

## Source

To select the source, go to the Source menu item:

**Main Menu → Record settings → Audio settings → Audio source**

Select one of the check boxes:

- Microphone (built-in microphone)
- Audio input (external audio source)

## Amplification

To control audio signal's amplification, you can use two menu items: Gain and AGC. First, go to the AGC:

**Main Menu → Record settings → Audio settings → AGC**

There are two options:

- Check box on
- Check box off

Gain parameter works in both cases:

- If AGC off, Gain sets the amplification rate.
- If AGC on, Gain limits the maximum amplification rate.

**Main Menu → Record settings → Audio settings → Gain**

Adjust the parameters using the slider control and then press the button to confirm your choice.

## Bitrate

To change the bitrate parameter, go to the Bitrate menu item:

**Main Menu → Record settings → Audio settings → Bitrate**

Depending on your need of audio signal's quality, choose the meaning of the bitrate from the list:

- 32 Kb/sec
- 64 Kb/sec
- 96 Kb/sec
- 128 Kb/sec

## Timer Settings

To change the settings for every of the ten independent timers, go to the menu item for every timer:

**Main Menu → Record settings → Timers → Timer 0**  
→ ...  
→ **Timer 9**

If you select the check box **Timer on**, the setting list for this timer will be used:

- Work mode
- Date

The entry form for the date is day/month/year. You can adjust the parameter using Up/Down buttons.

There are four options for **Work mode**:

- Daily
- Once
- Before date
- After date
- Auto Start

Auto start function allows the recorder to turn on/off according to the audio signal level (VAS) and to command from the motion detector. To change the correspondent settings, go to the **Auto Start** menu item:

**Main Menu → Record settings → Auto Start → VAS**  
**Main Menu → Record settings → Auto Start → Motion Detection**

Depending on the demanded delay, choose from the list:

- 5 sec
- 10 sec
- 20 sec
- 30 sec

Press  to confirm your choice.

## Detector Movement Setting (processed in Manager mAVR H264S Program)

Interest region (Region 1, Region 2, Region 3, Region 4) is an area of a recording picture within which you expect a movement to be recorded on audio/video recorder.

Each region may consist of 1-4 areas, their positions are specified by X and Y coordinates. The dimensions of these areas are specified in the interface windows beside coordinates. The dimensions and coordinates of the areas are changed in the following way:

1. First the coordinates and dimensions are set.
2. Then the corresponding window is ticked off, e.g.:

If you want to set the observation area full screen, specify the following settings:

```
X 0 100  
Y 0 100
```

If you want to set the observation area in the center, specify the following settings:

```
X 30 30  
Y 30 30
```

**Attention! The regions of detector movements mustn't margin with the text to be added into the recording (Text 1 and Text 2 in the "Video" tab), otherwise it may lead to improper work of the detector movement. If it is necessary to control movement in the area of text, switch off all notes on the screen.**

For each region you can specify sensitivity and hold time. The sensitivity is divided into two parts: according to the brightness and to the region's surface. The higher sensitivity according to the brightness the lesser brightness change (and movement) will be discovered. The sensitivity according to the region's surface specifies the character of the region's part with the discovered motion (according to the brightness change) to launch recording (in percent of the total surface of the region). Hold time specifies the recording duration after motion cessation.

## Efficiency and Stand-by Modes' Settings (Power Consumption Control)

To change these settings, go to the Power management menu item:

**Main Menu → Misc settings → Power management → Ready mode**

Choose one of the check boxes:

- Immediately
- 30 sec
- 1 minute
- 3 minutes

To change Stand-by mode's settings, go to the Sleep menu item.

**Main Menu → Misc settings → Power management → Sleep mode**

Choose one of the check boxes:

- 1 minute
- 5 minutes
- 10 minutes
- 30 minutes


## Power Supply for External Video Camera

The recorder can provide power supply for an external video camera. To change these settings, go to the Operating Mode menu item:

**Main Menu → Misc settings → Power source → Work mode**

Choose one of the check boxes:

- Off (always turned off)
- Auto (turned on while recording)
- Ext. power ( turned on if the recorder gets power supply from power adapter)
- On (always turned on)

Go back to the Power source menu item using the  button. Then go to the Voltage menu item. Choose the value of output voltage: 5 V or 12 V.

## Restore settings

To reset settings and get to the original state, go to the Reset settings menu item:

**Main Menu → Misc settings → Restore settings**

Choose Yes or No, to confirm your choice.

## Upgrading firmware

Format the memory card (see Memory Card Preparation page) and copy the firmware file to its root directory. Insert the memory card into the recorder. Go to the

Software update menu item:

**Main Menu → Misc settings → Software update**

If you choose Yes in the dialog window, the software will be upgraded.

**Attention: formatting will lead to the loss of all the recordings and data on the card.**

## Technical Support

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## Warranty

**The Telesystems Company** provides warranty repair for 1 year from the selling date, but not more than 2 years from the manufacturing date.

This warranty is voided if the recorder is:

- improperly used
- mechanically damaged
- received without supplier warranty tag on this document

All questions regarding product exchange and return must be solved with the seller's company according to Protection of Consumers Law.