KROKS

SCIENTIFIC PRODUCTION COMPANY

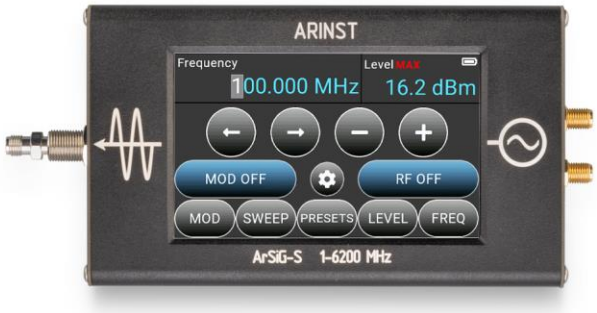
SIGNAL GENERATORS

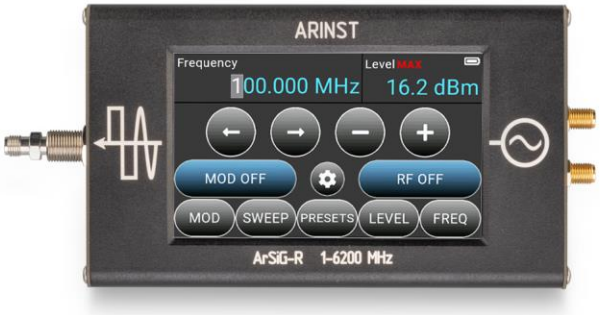
ARINST ArSiG-S

ARINST ArSiG-R

1-6200 MHz

MANUAL





CONTENT

1. PURPOSE

1.1. Portable signal generators **ARINST ArSiG-S** and **ARINST ArSiG-R** are designed to generate high-frequency signals in the range 1-6200 MHz. The devices are capable of sweeping the output signal, both in frequency and in level. The generators have the ability to use an external highly stable signal source as a reference.

1.2. Generator **ARINST ArSiG-S** is a generator of sinusoidal signals in the entire operating frequency range. The **ARINST ArSiG-R** generator generates rectangular signals in the frequency range up to 3000 MHz. In the range from 3000-6200 MHz, the device generates sinusoidal signals.

1.3. Generators play an important role in electrical and radio measurements. They are used to generate test signals for the development and debugging of various devices: amplifiers, filters, receiving and transmitting paths, when measuring and analyzing antennas.

1.4. The devices are intended for amateur radio applications, as they are not a professional measuring instrument. The built-in battery allows you to make measurements, both in the laboratory and in practical conditions..

2. SAFETY RULES FOR WORKING WITH THE DEVICE

2.1. General safety requirements

2.1.1. Persons who have read this «Manual» and have been instructed in the rules of safe work with electrical appliances are allowed to work with the device.

2.1.2. The risk of injury is possible when the charger is connected or disconnected from the electrical network. Use serviceable power outlets and chargers.

2.1.3. To avoid damage to the wires and connectors of the device, do not hang anything on the wires, paint over and glue the wires and connectors, disconnect the wires by pulling the cord.

2.1.4. Persons using the device are strictly prohibited: pass the device to strangers, disassemble and carry out any repairs not agreed with the manufacturer, use a device with a damaged case.

2.1.5. If you find a fault, stop operation immediately and turn off the device.

2.1.6. If you need to leave your workplace, turn off the device and other devices. Do not leave the working device unattended!

2.1.7. Do not use the device in hospitals. The use of the device near medical equipment is allowed only with the consent of the medical staff.

2.2. Additional safety requirements

2.2.1. Use the device only for its intended purpose. Read the purpose, device, and technical characteristics of the device.

2.2.2. Avoid working in open spaces during snow or rain. High humidity and all types of liquid, getting inside the device, can damage it.

2.2.3. Do not expose the device to very low or very high temperatures, exposure to extreme temperatures can damage the built-in battery.

2.2.4. Do not use the device in areas with a corrosive or explosive environment. Aggressive vapors can destroy the insulation, which can cause the device to fail.

2.2.5. Do not apply excessive force to the device's connectors, controls, or screen. Avoid bumps and falls on the device. If the device falls, it may be damaged.

2.2.6. Do not disassemble or modify the device without the consent of the manufacturer or without the instructions described in this manual. Incorrect self-intervention in the device will result in loss of warranty.

2.2.7. Use chargers, cords, adapters, and other accessories recommended by the manufacturer.

2.2.8. When connecting other tools to the device, carefully read their purpose, technical characteristics. Do not connect incompatible devices.

2.2.9. Maintenance and repair of the device must only be performed by the manufacturer or an authorized service center.

3. SPECIFICATIONS

3.1. General specification

General technical characteristics of the device are shown in Table 1.

Table 1

Parameter		Value	
		ArSiG-S	**ArSiG-R**
Frequency range		1-6200 MHz	
Output power level error[1]		±1 dB	
Frequency resolution		3 kHz	
Step of setting the output power level		0,1 dB	
SSB phase noise @ 1GHz (carrier offset = 100 kHz)		-95,2 dBc/Hz	-110,1 dBc/Hz
Nominal output power level		+10 dBm	
Minimum output power level	1-50 MHz	-20 dBm	-5 dBm
	50-100 MHz		0 dBm
	100-3000 MHz		-10 dBm
	3000-5500 MHz	-10 dBm	-10 dBm
	5500-6200 MHz	-20 dBm	-20 dBm
Output impedance		50 Ohm	
Maximum DC Input Voltage		+25 V	
Maximum input power		+10 dBm	
Number of stored user settings		10	
The number of stored sweep items in each list		50	
Working temperature range		0 … +40°C	
Screen diagonal		4”	
Screen type		touch resistive	
Screen resolution		800×480	
Output port connector type		SMA female	
External reference signal source			
Connector type		SMA female	
Input frequency range		10-40 MHz	
Input signal level	maximum	+13 dBm	
	recommended	+5 ÷ +10 dBm	
Input impedance		50 Ohm	
External trigger			
Connector type		SMA female	
Maximum input voltage		+3,3 V	
Power consumption and dimensions			
Supply voltage		5 V	
Power consumption		3,7 W	3 W
Maximum consumed current, no more	when charging the battery[2]	≤2 A	
	when working from USB with battery charging[3]	≤2 A	
Battery capacity		5000 mAh	
Time of continuous battery life[4]		4,5 h	5,5 h
Battery charge time		~ 3,5 h	
Overall dimensions (L × W × H)		150×81×27 mm	
Weight		0,4 kg	

[1] The measurement is performed after warming up the device for at least five minutes. The change in ambient temperature from the moment of calibration to measurements should not exceed ± 3°C.

[2] When connecting the device to a charger with an output current of at least 3A.

[3] If your PC has a limit on the maximum current supplied to the USB port, the device will automatically limit the maxi-mum charging current according to the current USB specification.

[4] At an ambient temperature of 20±5°C after the battery is fully charged.

3.2. Output power level

The graphs of the maximum output power level of the devices are shown in Figures 3.1 and 3.2.

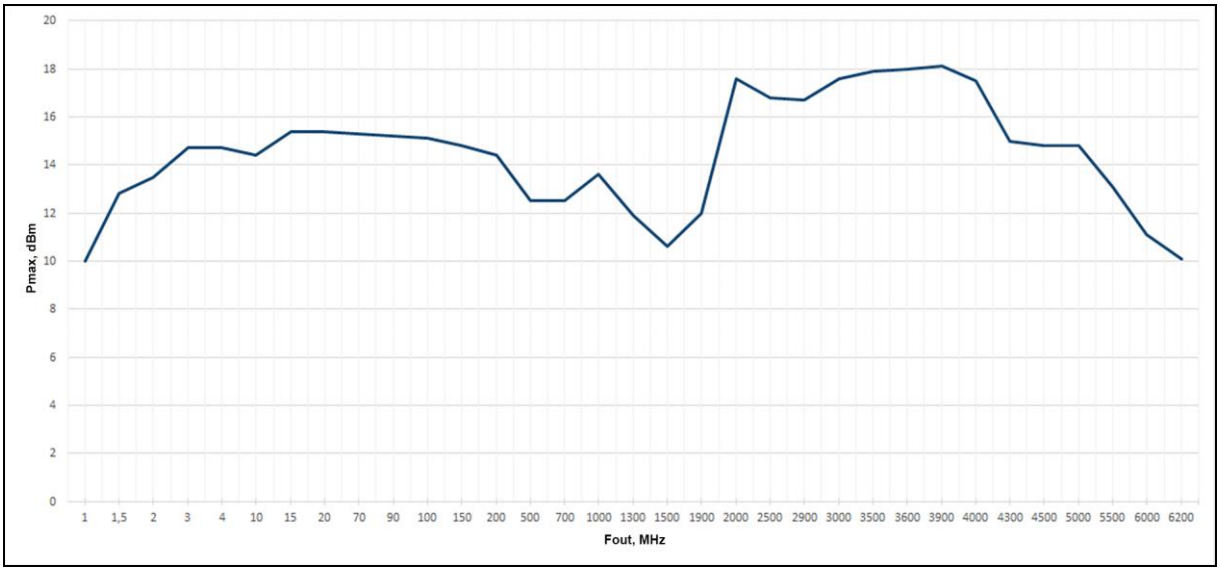


Figure 3.1 – Maximum output power level of the ARINST ArSiG-S generator

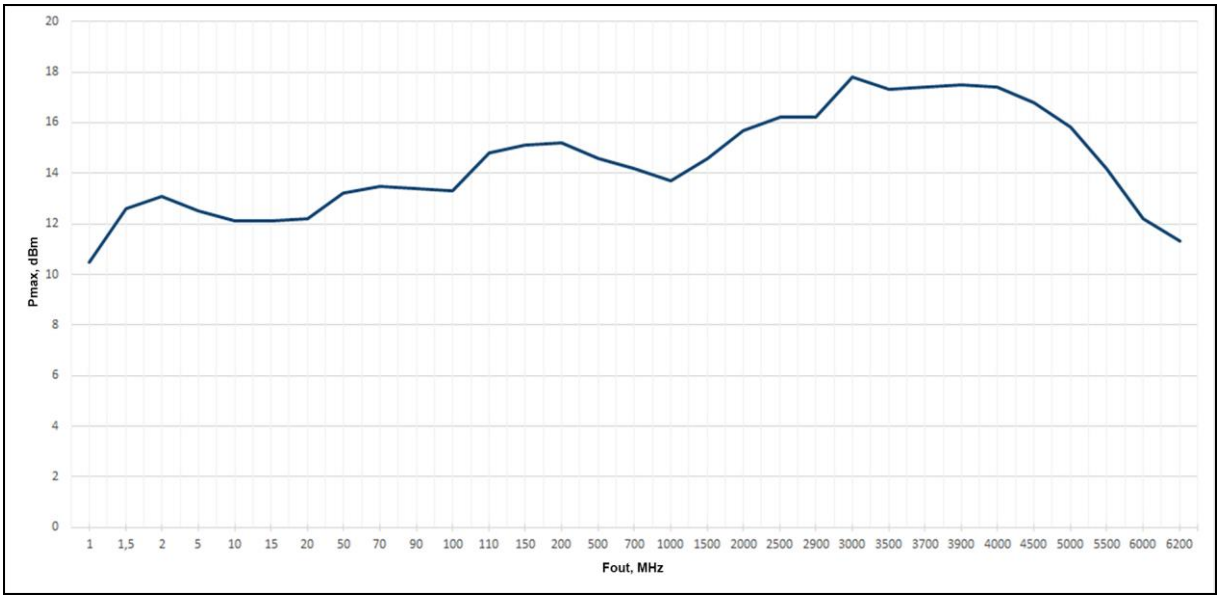


Figure 3.2 – Maximum output power level of the ARINST ArSiG-R generator

3.3. Spectral purity

Measurements were made with an output power level of 0 dBm.

3.3.1. Broadband Non-harmonic Spurious spectral components

Table 2

ARINST ArSiG-S	
Frequency, MHz	**dBc**
1-1900	< -75
1900-3000	< -72
3000-6200	< -60

Table 3

ARINST ArSiG-R	
Frequency, MHz	**dBc**
1-100	< -92
100-3000	< -70
3000-6200	< -60

3.3.2. Harmonics (2nd or 3rd harmonics, whichever is worse).

Table 4

Frequency, MHz	**dBc**	
	ArSiG-S	**ArSiG-R**
1	-25	-8
5	-35	-10,1
10	-36	-8,7
50	-36	-9,1
100	-36	-15,9
500	-34	-9
1000	-24	-4
2000	-16	-7,8
3000	-21	-21
4000	-31	-36
5000	-36	-36
6000	-40	-45
6200	-50	-47

3.3.3. Phase noise.

Table 5

Frequency, MHz	**ARINST ArSiG-S**			
	Offset from carrier			
	1 kHz	**10 kHz**	**100 kHz**	**1 MHz**
	SSB phase noise, dBc/Hz			
1	-88,1	-93,4	-95,1	-
10	-95,8	-96,5	-95,3	-123,1
100	-93,1	-94,9	-97,1	-121,6
1000	-90,3	-90,8	-95,2	-119,8
2000	-93,2	-87,9	-105,4	-129,4
3000	-84,4	-82,8	-100,8	-127,1
4000	-82,7	-84,1	-99,5	-128,4
5000	-79,8	-81,8	-96,1	-125,7
6000	-82,9	-77,5	-94,8	-123,1
6200	-82,3	-77,6	-91,8	-122,1

Table 6

Frequency, MHz	ARINST ArSiG-R			
	Offset from carrier			
	1 kHz	10 kHz	100 kHz	1 MHz
	SSB phase noise, dBc/Hz			
1	-96,5	-118,3	-116,1	-
10	-97	-117,6	-116,5	-134
100	-91,9	-103,6	-111,1	-125,2
1000	-90	-95,4	-110,1	-132,1
2000	-91,1	-90,6	-105,6	-129,7
3000	-85,2	-86,7	-100,8	-125,6
4000	-84,3	-85,5	-100,5	-127,6
5000	-85,9	-82,3	-93,2	-125,4
6000	-81,2	-78,1	-93,5	-123,7
6200	-84,6	-78,4	-92,3	-123,2

3.4. Pulse modulation

Table 7

Pulse modulation			
	Frequency, MHz	ArSiG-S	ArSiG-R
On/Off Ratio	1	>70 dB (typ.)	>70 dB (typ.)
	10	>70 dB (typ.)	>70 dB (typ.)
	100	>70 dB (typ.)	>70 dB (typ.)
	1000	70 dB (typ.)	>70 dB (typ.)
	3000	70 dB (typ.)	>70 dB (typ.)
	5000	60 dB (typ.)	30 dB (typ.)
	6000	60 dB (typ.)	35 dB (typ.)
Minimum pulse width		1000 µs (typ.)	
Minimum pulse period		2000 µs (typ.)	
Maximum pulse period		1000000 µs (typ.)	

4. COMPLETENESS

4.1. The delivery set of the device is shown in Table 8.

Table 8

Name	Quantity	
	ArSiG-S	ArSiG-R
RF signal generator ARINST ArSiG-S	1 pc.	-
RF signal generator ARINST ArSiG-R	-	1 pc.
USB 2.0 – Mini-USB cable	1 pc.	1 pc.
SMA (female) – SMA (female) adapter	2 pc.	2 pc.
Manual (product passport)	1 pc.	1 pc.
Package	1 pc.	1 pc.

Due to the continuous improvement of the device and software, the manufacturer reserves the right to make changes to its technical characteristics and completeness.

5. DEVICE DESIGN

5.1. The device structure is shown in Figure 5.1.

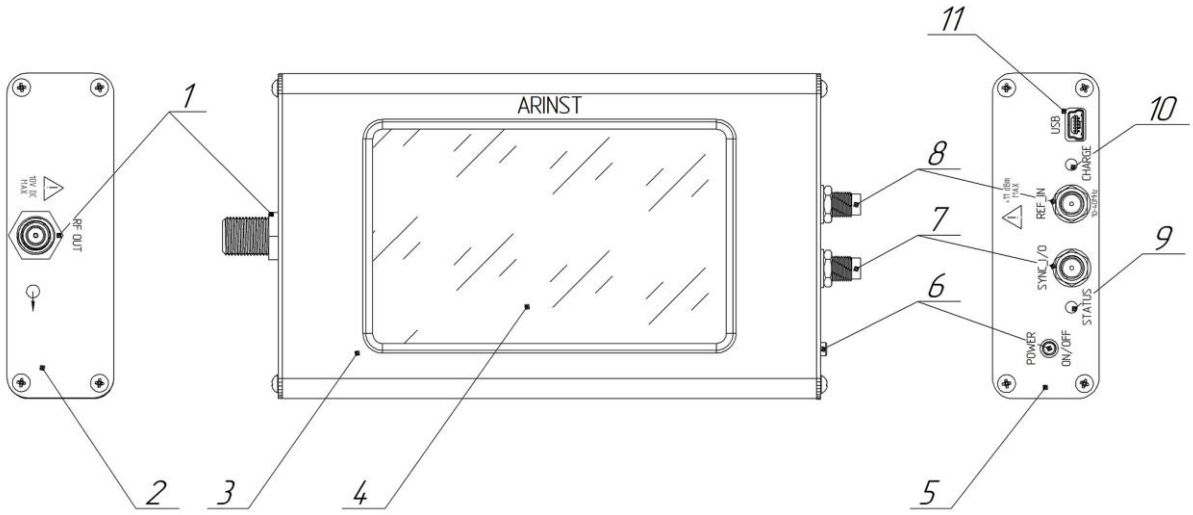


Figure 5.1 - External view of the device

1. RF output connector (RF OUT) intended for connection of the test devices and acts as a signal source.

2. Left panel

3. Device body

4. Color resistive screen 4” serves to configure the device through the on-screen interface.

5. Right panel

6. Multifunctional button. Turns the device on and off by pressing and holding for about 2 seconds. When pressed twice, it turns off the device screen. Tap the screen anywhere to turn it on.

7. Synchronization signal input / output (Trigger) (SYNK I/0).

8. External reference signal input (REF_IN).

9. Indicator STATUS. Lights up when the device is turned on.

10. Battery charging indicator CHARGE. It lights up when the battery is charging and when the device is powered by USB. When charging is finished, it goes off.

11. Connector Mini-USB. Serves for data transmission and battery charging of the device.

6. DESCRIPTION AND OPERATION PRINCIPLE OF THE DEVICE

Signal generators **ARINST ArSiG-S** and **ARINST ArSig-R** are based on a phase-locked loop (PLL) synthesizer. The output signal is generated by dividing the set frequency of the voltage controlled oscillator (VCO). Comparing the obtained value with the frequency of the reference oscillator and adjusting the VCO with a voltage proportional to the obtained difference. Structural diagrams of generators are shown in Figures 6.1 and 6.2.

Generator **ARINST ArSiG-S** is a generator of sinusoidal signals in the entire operating frequency range. Structurally, it is a generator with a support. The basic principle of the formation of the output signal in the low-frequency region of the frequency range is the multiplication of the signals of the two generators using a mixer. The mixer output is filtered to suppress higher harmonics and isolate the fundamental frequency. In the second subband, the signal from the synthesizer output is fed to the low-pass filter to suppress the higher harmonics of the generated signal. In the third subband, the output of the VCO of the frequency synthesizer is used to generate the output signal. The output of the VCO is a fundamental frequency with suppressed harmonics, so there is no additional filtering. Then the generated signal is fed to a power amplifier. The amplified signal is fed to the output connector. Also, with the help of a power coupler, the output power is measured and with the help of an automatic adjustment loop, the set level is maintained.

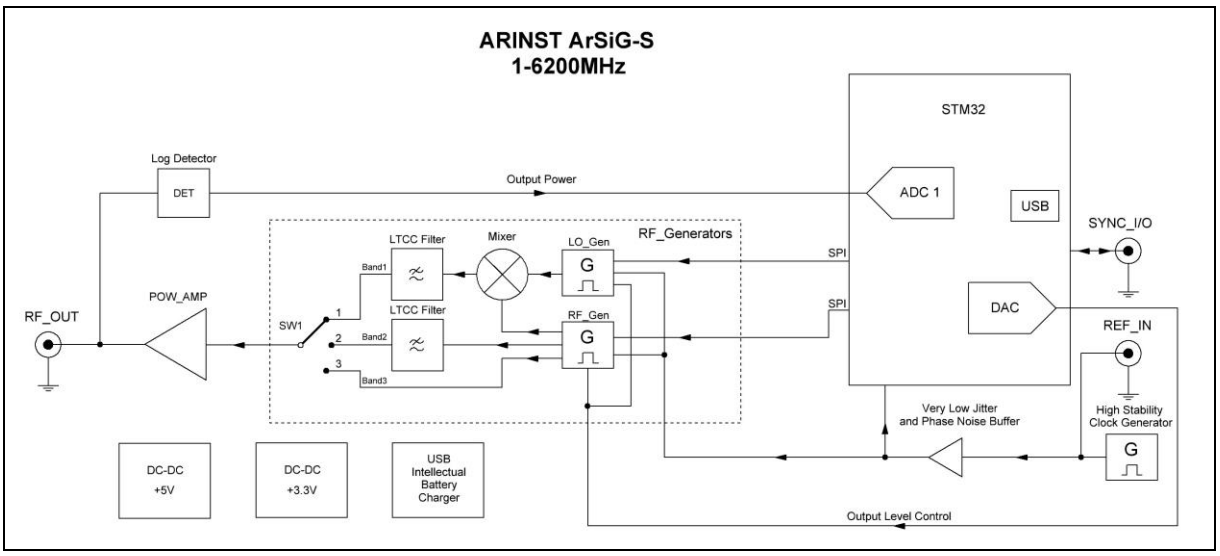


Figure 6.1 - Block diagram of the ARINST ArSiG-S signal generator

The **ARINST ArSiG-R** generator produces rectangular signals in the frequency range up to 3 GHz. From 3 GHz, the output of the VCO of the frequency synthesizer is used to generate the output signal. Thus, the output signal is sinusoidal. Then the generated signal is fed to the power amplifier. The amplified signal is fed to the output connector. Also, with the help of a power coupler, the output power is measured and with the help of an automatic adjustment loop, the set level is maintained.

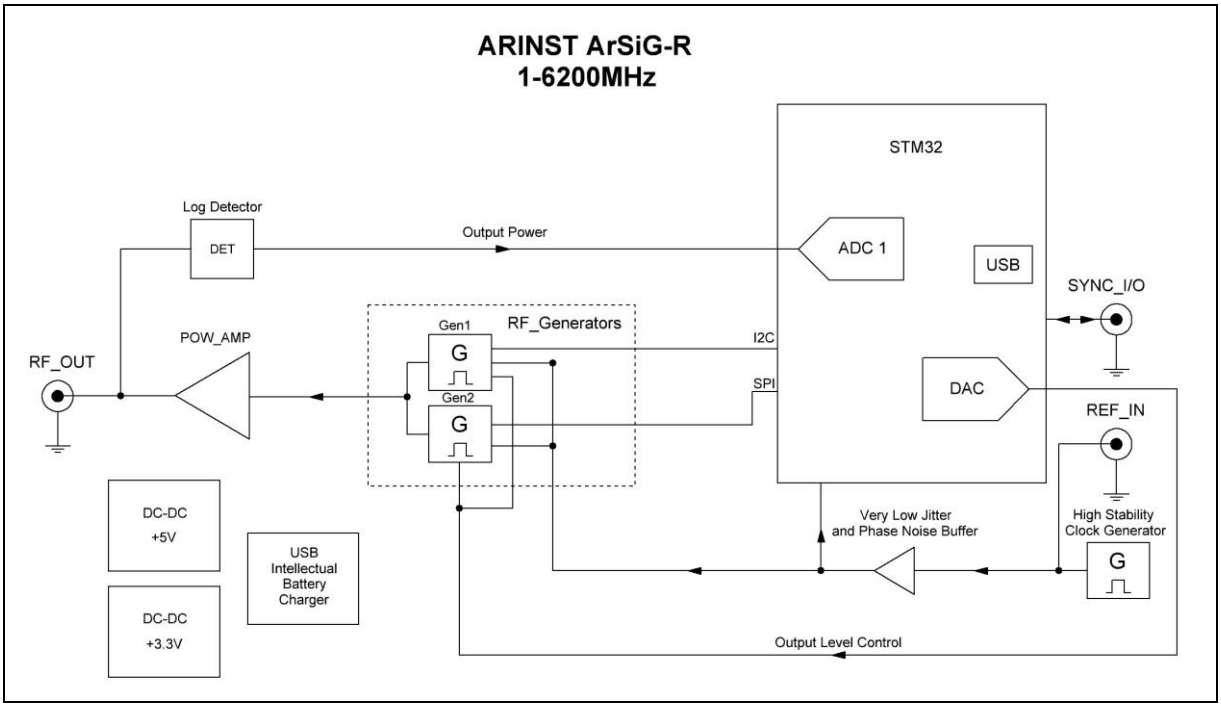


Figure 6.2 - Block diagram of the ARINST ArSiG-R signal generator

Both generators use a high-stability temperature-compensated oscillator with low phase noise as a reference frequency source.

7. TURNING ON

⚠ Do not use the device outdoors during snowfall or rain. If the device is brought in during the cold season from a cold room or from the street into a warm room, do not turn it on for a time sufficient for the condensation from the device to evaporate.

⚠ Correlate the signal strength and the voltage applied to the ports with the maximum technical characteristics of the device specified in Table 1.

7.1. Make sure that the device has no external damage and the battery is charged. Charge the discharged battery in accordance with clause 11.2.

7.2. Press and hold the button (6) for about 2 seconds. Switching on the device is confirmed by turning on the STATUS indicator (9).

7.3. The device has a function of turning off the screen to save battery power. To turn off the screen (4), press the button (6) twice. The device will continue to operate with the screen off. To turn on the screen, tap it anywhere once.

7.4. To turn off the device, press and hold the button (6) for about 2 seconds. The screen (4) of the instrument will turn off and the instrument will turn off. Each time the device is turned off, the current user settings are recorded in non-volatile memory, which allows you to avoid configuring the device when you turn it on again.

8. SCREEN INTERFACE

On the screen of the device there are information areas and interactive buttons for controlling the device.

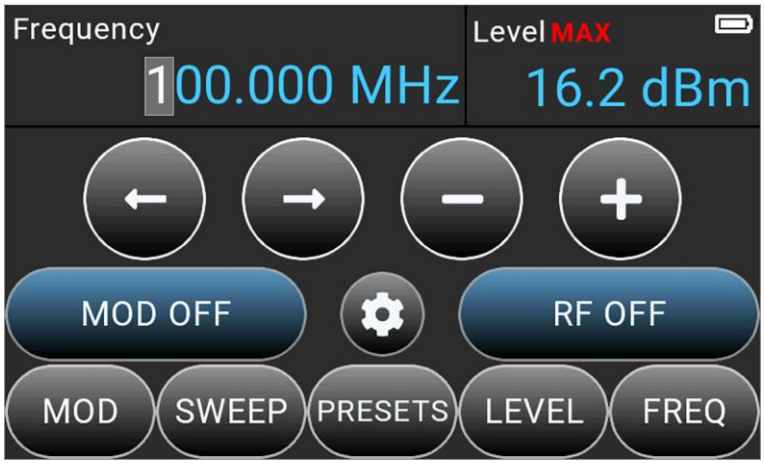


Figure 8.1 – Screen interface of the device

8.1. The information areas of the screen display information about the current settings and status of the device.

8.1.1. Built-in battery status indicator:

- indicator in the form of a spark (lightning) - the battery is being charged;
- the battery indicator symbol is completely filled with white – the battery is fully charged;
- the indicator symbol in the form of a white outline of the battery – the battery is low, you need to charge it;
- the device displays a message about a critical charge level – the battery is completely discharged, the device will automatically turn off.

8.1.2. **Frequency**:

The user-defined signal frequency is displayed. Frequency setting is carried out in the range 1-6200 MHz.

8.1.3. Signal power level (**Level**):

- The set output power level is displayed in dBm, dBV, dBμV;
- The maximum possible signal power level with the specified parameters. Indicated by the symbol **MAX**. This indication informs that a further increase in power for the current frequency is impossible.

8.2. Interactive interface control buttons are located under the information areas (Figure 8.1):

8.2.1. Signal frequency setting buttons:

-  and  – moving the cursor over the digits of the set frequency value or output signal power level;
-  and  – decrease or increase in the frequency or power level of the output signal.

8.2.2. Function buttons:

-  /  – Disabled / enabled signal modulation;
-  /  – Disabled / enabled supply of the output signal to the RF OUT connector.

8.2.3. The buttons of the main menu of the device:

-  – menu for setting the pulse modulation of the output signal;
-  –menu for setting the output signal in the sweep mode;
-  – menu for saving user settings;
-  – setting the power level of the output signal;
-  – setting the frequency of the output signal.
-  – menu of additional settings of the device.

9. FAST START

9.1. Turn on the device according to section 7.

9.2. Set the desired output frequency in the **FREQ** menu. For more information about setting the output frequency, see section 10.1.

9.3. In the **LEVEL** menu, set the output power level. For more information about setting the output power level, see section 10.2.

9.4. Connect the test device to the RF OUT (1) connector. Turn on the output signal by pressing the **RF OFF** button.

9.5. To test the device with a pulse-modulated signal, set the desired parameters in the **MOD** menu. For more information about setting parameters in the pulse modulation menu, see section 10.3.

9.6. The pulse-modulated signal is sent by pressing the **MODE OFF** button in the **MOD** menu.

9.7. To output the signal in sweep mode, make the **SWEEP** menu settings. For more information, see section 10.4.

9.8. Save the instrument settings in the **PRESETS** menu in accordance with section 10.5.

10. DEVICE MENU

10.1. Setting the output frequency

10.1.1. To set the output frequency, press the button 

on-screen interface of the device.

10.1.2. In the submenu that opens (Fig. 10.1), enter a numeric value for the output frequency and click one of the units of measurement buttons. To delete erroneous values, click ⌫ **Del**. To exit the menu without entering values, press **BACK**.

Figure 10.1 – Input of the output signal frequency

10.1.3. Adjustment and change of the output signal frequency is carried out using the buttons of the screen interface (see section 8.2.1.).

10.2. Setting the output power level

10.2.1. To set the power level of the output signal, press the button 

of the instrument's on-screen interface.

10.2.2. In the submenu that opens, enter the numerical value of the output signal power level and press one of the unit buttons.

10.2.3. Adjustment and change of the output signal power is carried out using the buttons of the screen interface (see section 8.2.1.).

The power level of the output signal may be lower than the value set by the user, as it depends on the current frequency. In the **Level** information area, the maximum possible signal power value for the current settings **MAX** is displayed, as shown in Figure 8.

10.3. Pulse signal modulation menu

10.3.1. Enter the pulse modulation menu **MOD** by pressing the button 

on the screen of the device. The menu for setting the pulse modulation of the output signal is shown in Figure 10.2.

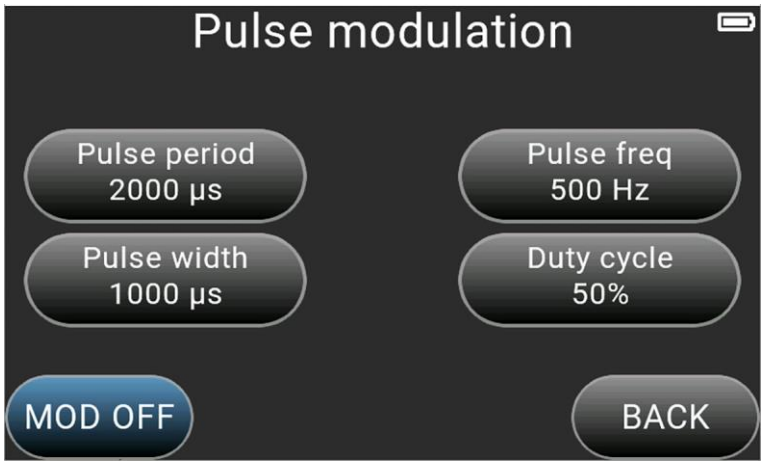


Figure 10.2 – Pulse modulation menu

10.3.2. Each button in the pulse modulation menu has its own purpose:
Pulse period – the pulse period. Set by the user in the range from 2000-1000000 µs;
Pulse width – pulse width. Set in the range 1000-1000000 µs;
Pulse freq – pulse repetition rate. Value range 1-500 Hz;
Duty cycle –fill factor. Depends on the set values of the period and pulse width;
MOD OFF / MOD ON – modulation off / on;
BACK – exit the menu.

10.3.3. The parameters are set by entering a numerical value in the opened submenu, as shown in Figure 10.3. Enter a numeric value and click ✓ **Input**. To delete erroneous values, click ⌫ **Del**. To exit the menu without entering values, press **BACK**.

Figure 10.3 – Entering parameters

Pulse repetition rates **Pulse freq** and fill factor **Duty cycle** depend on the set period values **Pulse period** and **Pulse width**.

10.4. Signal output menu in sweep mode

The device implements two methods of signal sweep:

- Step sweep in frequency and / or power level of the output signal;
- Sweep according to the list of frequency and / or power of the output signal.

10.4.1. Stepped sweep

A step sweep provides a linear change in frequency and / or power level from one selected value to another, delaying at each step for a time set in the menu. The sweep can be performed in the direction of increasing, decreasing the value, or controlled by a trigger.

10.4.1.1. Enter the signal output menu in **SWEEP** mode by pressing the button. 

on the device screen. The signal output menu in the sweep mode is shown in Figure 10.4.

Figure 10.4 – Signal output menu in sweep mode

10.4.1.2. Purpose of the menu buttons:

- Frequency setting buttons **Frequency:**
  Start – setting the starting frequency;
  Stop – setting the final frequency;
  Step – sweep frequency step.

The larger the sweep frequency step, the fewer the number of points in the frequency interval and the less time it takes to cycle. On the contrary, the smaller the frequency step, the more points and the longer the process takes.

- Buttons for setting steps **Steps**:
  Step time – sweep step delay time;
  Points – quantity of points.

After setting the start and final frequency and sweep step, set the sweep step delay time.

- Buttons for setting the output power level **Level**:
  Start – setting the initial value of the power level;
  Stop – setting the final value of the power level;
  Step – power level change step.

SWP OFF / SWP ON – sweep off / on;
BACK – exit the menu.

10.4.1.3. Select from the drop-down list:
Sweep freq – frequency sweep. The output power setting buttons are not available.
Sweep level – sweep by signal power level. Frequency setting buttons are not available.
Sweep freq & level – frequency sweep and output signal power level.

10.4.1.4. Turn on the sweep by clicking the button **SWP OFF**. The enabled scan mode is displayed by the green button **SWP ON**.

10.4.2. Sweep on list

The list sweep allows you to enter the frequency and power of the output signal at various intervals in any order.

10.4.2.1. Enter the signal output menu in **SWEEP** mode by pressing the button. 

on the device screen. The signal output menu in the sweep mode is shown in Figure 10.5.

10.4.2.2. Select from the dropdown list:

Sweep freq by list – list of steps by frequency;

Sweep level by list – list of steps by signal power level;

Sweep freq & level by list – list of steps by frequency and power level.

The device can store up to 50 sweep elements in each list.

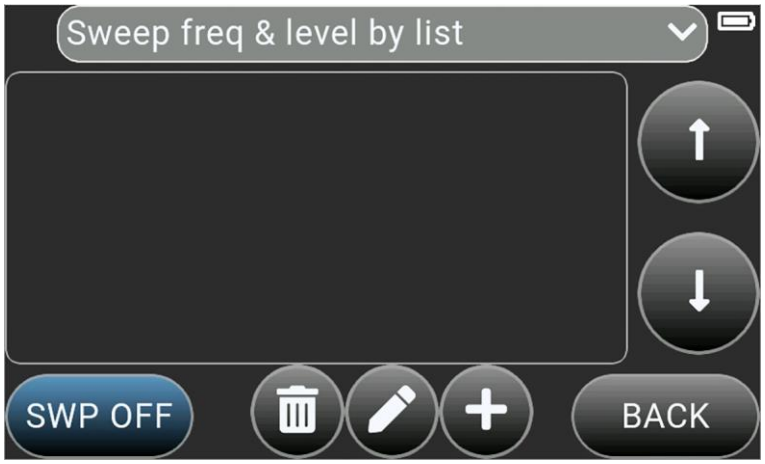


Figure 10.5. – Menu for creating a list of sweeps

10.4.2.3. Buttons for working with the list of sweeps:

-  - add the sweep element to the list. Go to the menu "Add new sweep record". **New sweep entry** (Fig. 10.6);
-  - edit the selected element of the sweep;
-  - remove the selected sweep item from the list;
- Moving through the list of unfolding elements is carried out using the buttons  and  ;

SWP OFF / SWP ON – sweep off / on;

BACK – exit from the menu.

10.4.2.4. Purpose of the menu buttons "Add new sweep record" **New sweep entry** (Fig. 10.6):

Freq – setting the frequency in the range 1-6200 MHz. Option not available when selecting the list **Sweep level by list**;

Step time – setting step time;

Level – setting the power level of the output signal in the sweep. Option not available when selecting the list **Sweep freq by list**.

OK – create a sweep item in the list.

Cancel – refusing to create a sweep item in the list.

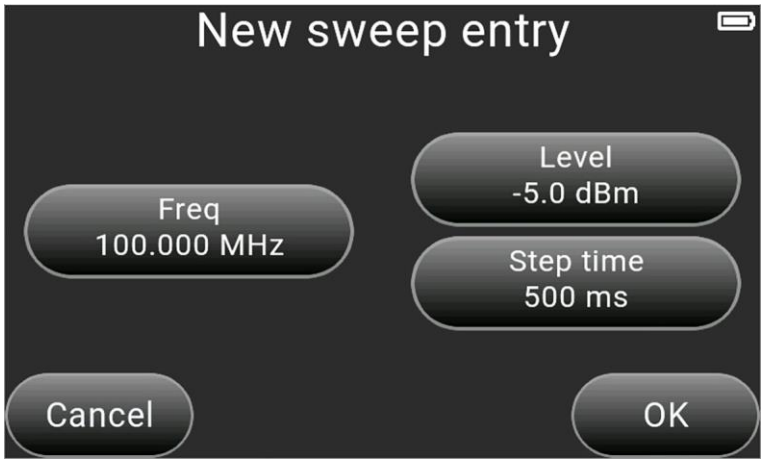


Figure 10.6 – New sweep entry menu

10.5. User settings menu

10.5.1. To enter the **PRESETS** user settings menu, click 

on the device screen. The user settings menu is shown in Figure 10.77.

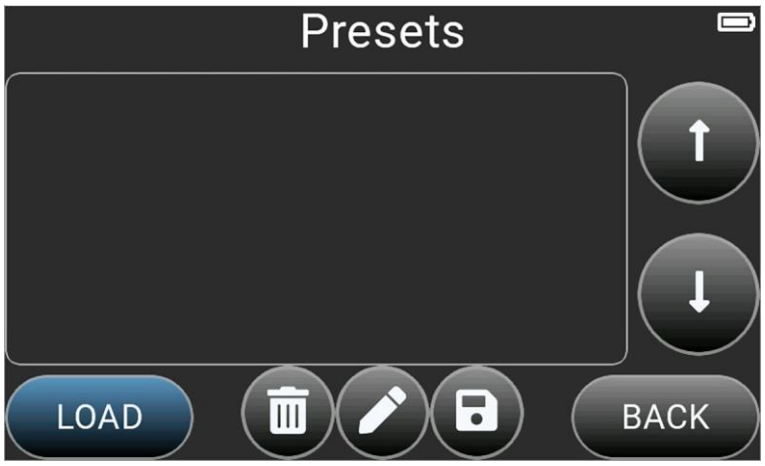


Figure 10.7 – User settings menu

10.5.2. User settings menu buttons:

-  -Save the current settings. Go to the menu to assign the name of the setting (Figure 10.8);
-  - edit the name of the highlighted custom setting. Go to the menu to change the name of the setting;
-  -remove the selected setting from the list;
- You can move through the list of settings using the buttons  and  ;

LOAD – loading a dedicated custom setting;
BACK – exit from the menu.

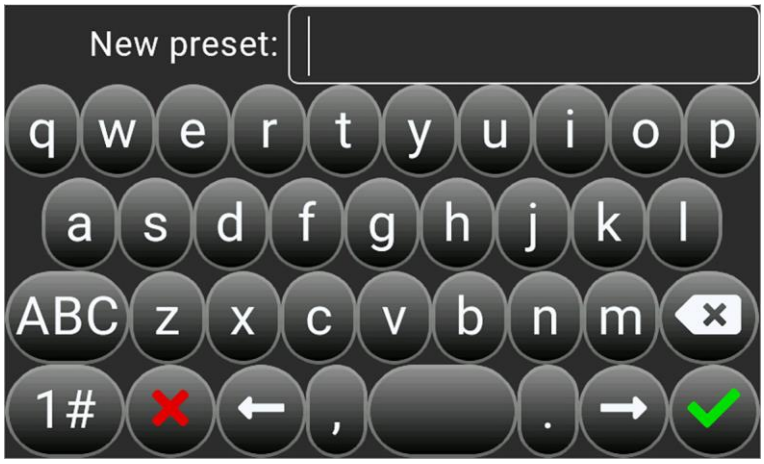


Figure 10.8 – Assigning a name to a new user setting

10.5.3. Enter a name for the custom setting using the instrument's on-screen keyboard and press the button ✓ **Input**. To delete erroneous values, click ⌫ **Del**. To exit the menu without entering values, press × **Exit**. Up to 10 user settings can be stored in the device memory.

10.5.4. The name of an existing user setting is edited in the same way as in section 10.5.3.

10.5.5. Download the selected setting by clicking **LOAD**.

10.6. Additional options menu

10.6.1. Enter the additional **Settings** menu by pressing the button  on the device screen. The additional options menu is shown in Figure 10.9.

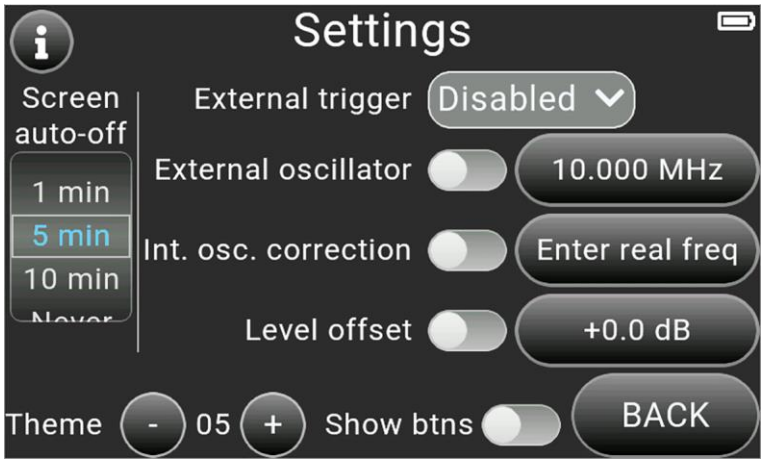


Figure 10.9 – Menu of additional options

9.6.2. This section of the menu contains options:

- information about the device (device id, firmware version) - button  ;
- setting the time to automatically turn off the screen - **Screen auto-off;**
- external trigger control - **External trigger**;
- enabling the step from an external reference source - **External oscillator**;
- output signal frequency adjustment - **Int. osc. correction;**
- offset of the output signal level value **Level offset**;
- changing the theme of the interface **Theme**.

For a detailed description of the use of these options, see sections 10.7, 10.8, 10.9, 10.10, 10.11, and 10.12.

BACK – exit from the menu.

10.7. Setting the time to automatically turn off the screen

10.7.1. Enter the **Settings** advanced options menu by clicking  on the device screen (Fig. 10.9).

10.7.2. Set the timer to automatically turn off the screen **Screen auto-off** after 1, 5 or 10 minutes from the moment there is no interaction between the user and the controls of the device. This setting allows you to save a lot of battery power. If you do not need to turn off the display of the device after a certain period of time, select the parameter **Never**. Setting the time of automatic shutdown of the device screen is made by "scrolling" the values.

The device continues to work after the screen is turned off, the **STATUS** indicator is on. Tap anywhere on the screen to turn it on.

10.8. External trigger control

To synchronize measurements using several instruments, use the SYNK I / 0 signal connector located on the right panel of the generator (Fig. 5.1). The connector is used both as an input and as an output of the synchronization pulse.

10.8.1. Enter the additional **Settings** menu by pressing the button  on the device screen (Fig. 10.9). By default, the **External trigger** control option is disabled **Disabled**.

10.8.2. To use the generator as a master device and send a control pulse from the **SYNK I / 0** connector, select the **Master** mode in the drop-down menu. If the generator is used as a controlled device and must receive a control pulse from the master device on the **SYNK I / 0** connector, select the **Slave** mode from the drop-down menu.

 **The maximum input voltage applied to the SYNC I / O port is + 3.3V.**

10.9. Using an external reference frequency source

The device can use both an internal and an external signal as a reference signal. The external reference signal is fed to the **REF IN** input located on the right panel of the generator (Fig. 5.1).

10.9.1. Enter the additional **Settings** menu by pressing the button  on the device screen (Fig. 10.9). Switching between the external and internal sources of the reference signal is performed by the “slider” of the **External oscillator**. Set the frequency of the external reference signal.

 **The maximum allowable power of the external input signal is +13 dBm. It is recommended to apply a signal with a power of no more than +10 dBm to the input of the device.**

10.10. Output frequency correction

The output frequency may differ slightly from the output frequency of the reference instrument. Adjust the generator output frequency to match the frequency of the reference instrument.

10.10.1. Enter the additional **Settings** menu by pressing the button  on the device screen (Fig. 10.9). The input signal frequency adjustment mode is enabled by the **Int. osc. correction** slider. Set the actual frequency of the output signal. The difference between the current frequency value and the input reference value should not exceed ±0.1% (1000 ppm) of the current frequency. Otherwise, a message appears stating that this adjustment cannot be applied.

10.11. Offset of the output signal level value

Offsetting the value of the output signal level allows you to compensate for the effect of a device connected to the generator output and changing the output power level.

The power level offset option allows a constant value to be applied to the displayed level, thereby compensating for loss or gain from the connected device. In this case, the displayed power level will correspond to the actual power level at the output of the connected device.

10.11.1. Enter the additional **Settings** menu by pressing the button on the device screen (Fig. 10.9). The power level offset of the output signal is enabled by the slider **Level** offset. Set the power level offset value. When connecting an attenuator, use negative offset values, such as -10, -20, etc., and when connecting an amplifier, use positive values, such as +10, +20, etc.

10.11.2. The value of the power level offset is shown in parentheses in the power field of the device (Figure 10.10).

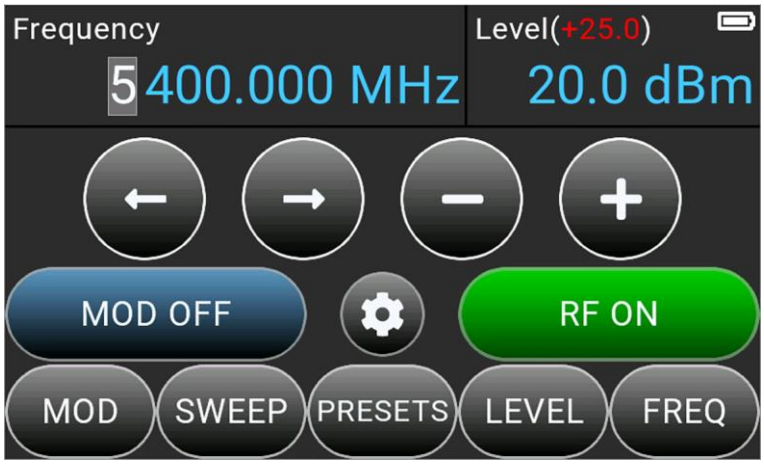


Figure 10.10 – Signal power level offset enabled

10.12. Changing the theme of the on-screen interface

The device has 40 pre-installed on-screen interface themes for individual customization.

10.12.1. Enter the additional **Settings** menu by pressing the button on the device screen (Fig. 10.9). Switching the themes of the on-screen interface is carried out using the buttons and .

10.12.2. When the slider «Show buttons» is enabled (**Show btns**), buttons for switching the themes of the on-screen interface and displayed on the main screen of the interface.

11. CARE AND MAINTENANCE

11.1. General care of the device

11.1.1. Maintenance consists in maintaining the device in working order, regularly carrying out preventive maintenance.

11.1.2. Wipe the connectors of the test ports with a soft cloth or a brush dampened in rectified ethyl alcohol, not allowing alcohol to get on the surfaces of dielectrics.

11.1.3. Clean the body of the device from dirt with a soft cloth dampened with soapy water or wet household wipes. The penetration of liquids into the housing of the device is not allowed!

⚠ **Do not use solvents based on alcohol or petroleum products to clean the screen and body of the device! These liquids can damage the outer coating of the screen and the case of the product.**

11.2. Charge the battery

11.2.1. It is recommended to use a stabilized power supply with an output voltage of 5V and a current of at least 1000 mA to charge the battery.

The device has an intelligent system for determining the maximum charging current depending on the available power source. When the charger is connected, the maximum charging current is automatically determined. To reduce the charging time of the built-in battery, it is recommended to use industrial power supplies (chargers) with a maximum output current of 3 A as a charger.

11.2.2. Соедините USB-кабелем из комплекта поставки Mini-USB разъём прибора (11) с USB-разъёмом блока питания или USB-портом ПК.

11.2.3. The **CHARGE** indicator (10) lights up while the battery is being charged. The battery charging process will take about 3.5 hours. When charging is complete, the **CHARGE** indicator (10) will turn off. The device is allowed to operate while the battery is charging, provided that the power supply is capable of providing an output current of at least 1500 mA. If the charger or the USB port of the PC is not able to provide the current required for the operation of the device and charging the battery, the device will automatically reduce the charging current until the battery is completely charged.

11.3. Battery replacement

11.3.1. After a certain period, the capacity of the Li-Ion battery is reduced, and long-term use of the device without recharging becomes difficult.

11.3.2. Replacing the battery is necessary when the following symptoms occur:

- the battery charges very quickly and discharges very quickly;
- the battery charges for a very long time (more than 10 hours);
- the battery does not accept charge;
- the device does not turn on offline (with the cord disconnected from the charger).

11.3.3. To replace, you must purchase a new Li-Ion battery with an operating voltage of 3.7 V, a capacity of at least 5000 mA and dimensions of not more than: height 7 mm, length 90 mm, width 60 mm.

When purchasing and installing a battery with a capacity other than the one installed by the device manufacturer, it is necessary to take into account the fact that the battery charging time will also change up or down.

⚠ **Attention! When using a battery of another capacity, the correspondence of the displayed charge level of the battery on the device screen to the real value is not guaranteed.**

⚠ **Attention! To replace the battery, you will need to disassemble the device. Ensure that you have the necessary tools, knowledge, and qualifications sufficient to carry out an independent repair of the device. With a lack of experience and qualifications, contact specialists with relevant qualifications.**

11.3.4. Unscrew the 2 upper screws (12) of the panels (2) and (5). Carefully lift off the top of the housing (Figure 11.1).

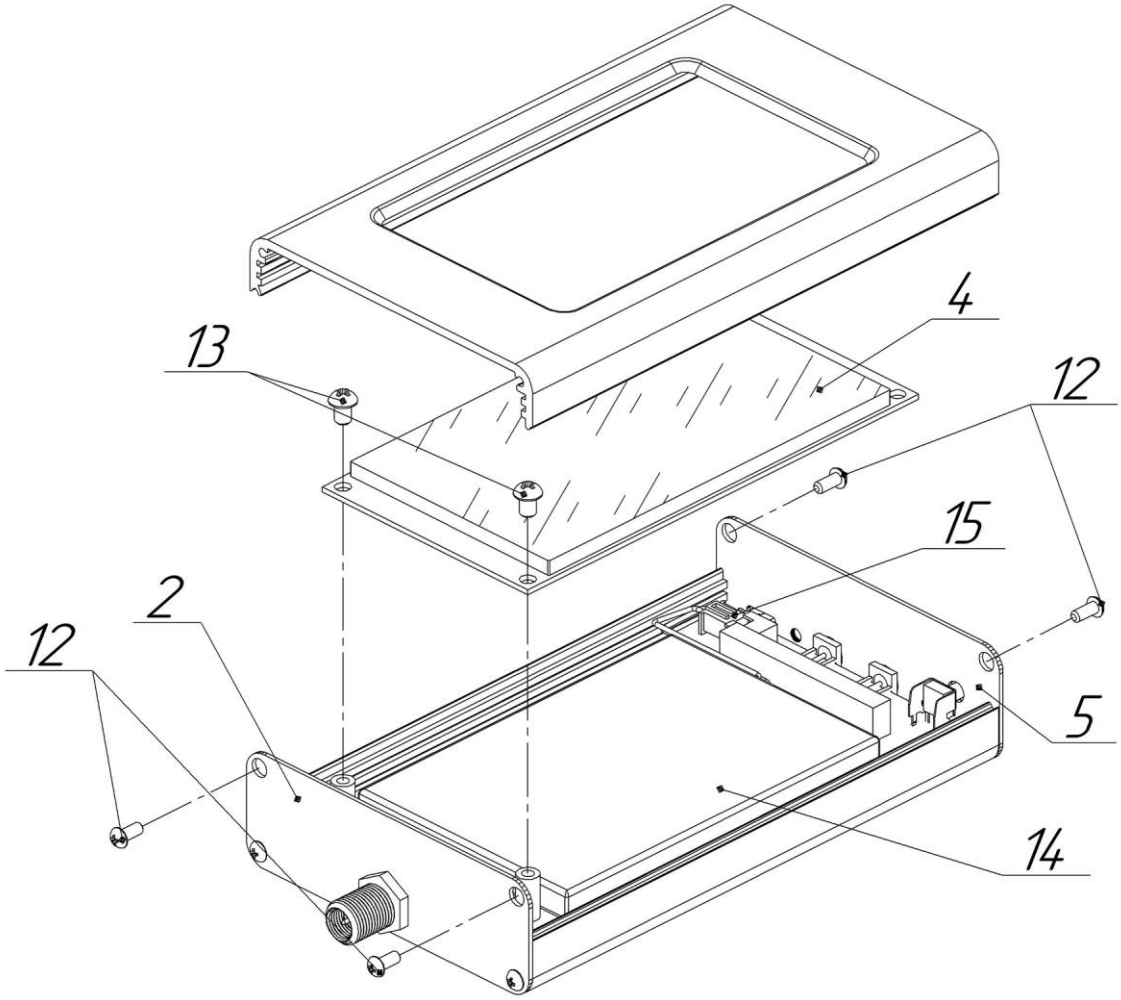


Figure 11.1 - Disassembly of the device case

11.3.5. Unscrew 2 screws (13) and remove the screen module (4).

11.3.6. The battery (14) is located on the board under the screen module (4) and is secured with double-sided tape. Carefully disconnect the connector (15) of the battery (14) from the connector on the printed circuit board. Take out the old battery (14) and remove the old double-sided tape with which it was attached to the board.

11.3.7. Apply double-sided tape and glue the new battery (14) securely to the board. Connect the battery connector (15) to the connector on the board. Reassemble the device in reverse order.

11.3.8. After assembling the device, charge the battery in accordance with paragraph 11.2.

11.4. Storage

11.4.1. Before putting into operation, the device must be stored in the manufacturer's packaging at an ambient temperature of 0 to plus 40°C and a relative humidity of no more than 80% (at a temperature of plus 25°C).

11.4.2. Store the device unpacked at an ambient temperature of 0 to plus 40°C and a relative humidity of no more than 80% (at a temperature of plus 25°C).

11.5. Transportation

11.5.1. It is allowed to transport the device in a shipping container by all means of transport at an ambient temperature from minus 20 to plus 60ºC. During transportation, the device must be securely fastened. Shaking, knocking and dropping can damage the appliance.

11.5.2. When transported by air, the device must be placed in a heated, sealed compartment.

11.5.3. During transportation, the device must be protected from atmospheric precipitation and dust.

11.6. The criterion of the limit state

11.6.1. The criterion of the limiting state of the device is a sign, or a set of signs, upon reaching which:

- further operation of the device is not allowed;
- recovery to a healthy state is impossible or economically impractical.

11.6.2. Upon reaching the limit state, the device must be decommissioned and disposed of.

11.7. Utilization

11.7.1. The device, battery, cords and cables that have failed, should be transferred to special collection points for the disposal of electronic devices. Do not throw away broken devices, batteries, cables into household waste!

12. POSSIBLE MALFUNCTIONS AND METHODS OF THEIR ELIMINATION

If a malfunction occurs, check the possible causes of the fault in table 9.

Table 9

Проявление неисправности	Возможная причина	Способ устранения
1. The device does not turn on.	The battery is discharged.	Charge the battery.
	Multifunctional button **MENU** defective.	Contact a service center for repair.
2. The device does not turn on in autonomous mode.	Bad battery.	Replace battery.
3. The battery life is less than 1 hour.	The device is operated at extremely low ambient temperatures.	Operate the device at an ambient temperature of 0 to plus 40 °C.
	Discharged battery.	Charge the battery.
	Bad battery.	Replace battery.
4. The screen of the device does not respond to touch or reacts with a delay.	The device is operated at extremely low ambient temperatures.	Operate the device at an ambient temperature of 0 to plus 40 °C.
	The screen is dirty.	Clear the screen.
	Faulty on-screen device module.	Contact a service center for repair.
5. No RF signal from RF OUT.	The output signal is disabled.	Make sure the green RF ON button is displayed on the screen.
	There is no contact between the cable of the equipment under test and the RF OUT.	Ensure reliable contact of the cable of the equipment under test with the connector of the device.
	The output circuit of the device is defective.	Contact a service center for repair.
6. There is no modulation at the RF output.	The signal modulation mode is disabled.	Make sure the green MOD ON button is displayed on the screen.
	Device malfunction.	Contact a service center for repair.
7. Sweep mode does not work.	Sweep mode is disabled.	Make sure the green SWP ON button is displayed in the SWEEP menu.
	There are no entries in the sweep list.	Create a list of sweep items. Make sure the green SWP ON button is in the SWEEP menu.

13. WARRANTY

Kroks Plus LLC guarantees the compliance of this product with the technical characteristics specified in this document.

The warranty period is 12 months from the date of purchase of the product by the customer. During this period, the manufacturer provides a free warranty service.

The warranty does not cover the following cases:

- the warranty period of the product has expired from the date of sale;
- more than 12 months have passed from the date of manufacture of the product (only if the product does not have documents confirming the date of sale, such as a sales receipt or a correctly completed warranty card containing information about the product and the seller);
- a product intended for personal needs was used for commercial activities, as well as for other purposes that do not correspond to its intended purpose;
- violation of the rules and operating conditions specified in the «Manual» and other documentation provided to the Buyer complete with the product;
- if the Product contains traces of unqualified repairs or attempts to open it outside an authorized service center, as well as due to unauthorized interference with the software;
- damage (defects) of the Goods caused by the influence of virus programs, interference with the software, or the use of third-party software (non-original);
- the defect is caused by force majeure (for example, earthquake, fire, lightning strike, instability in the electrical network), accidents, deliberate or careless actions of the consumer or third parties;
- mechanical damage (cracks, chips, holes) arising after the transfer of the product to the Buyer;
- damage caused by exposure to moisture, high or low temperatures, corrosion, oxidation, ingress of foreign objects, substances, liquids, insects into the product;
- the defect arose due to the supply of a signal to the input connectors, terminals, case that exceeds the values permissible for this Product;
- the defect is caused by natural wear and tear of the Goods (for example, but not limited to: natural wear and tear of connectors due to frequent plugging / unplugging of adapters).

The warranty only covers defects caused by the fault of the manufacturer. Warranty service is performed by the manufacturer.

I have read the warranty obligations _____
(Buyer's signature)

Date of sale:_____ Seller _____
(date) (store name or stamp)

Country of origin:	Russia
Manufacturer:	LLC "Kroks Plus"
Manufacturer's address:	394005, Voronezh, Moskovsky pr-t 133, office 263
Organization authorized to accept claims:	LLC "Kroks Plus", Voronezh, st. Vladimir Nevsky, 39b

APPLICATION A
(informational)
ARINST ArSiG-S and ARINST ArSiG-R RF signal generators software update

Firmware of the RF signal generator is constantly being improved and optimized. Errors are corrected, additions are made that optimize the operation of the device and have a positive effect on the accuracy of measurements. In addition to fixing errors and stabilizing work, new functionality is being added that expands the scope of the device.

We recommend that you regularly update the device firmware.

1. Installing the boot loader and virtual port driver on your PC

1.1. Go to the official website of ARINST by entering the address www.arinst.net in the address bar of your browser. Go to the **DOWNLOAD** section and click on the file *Arinst Firmware Updater* to update the firmware of RF signal generators (Figure A1. 1).

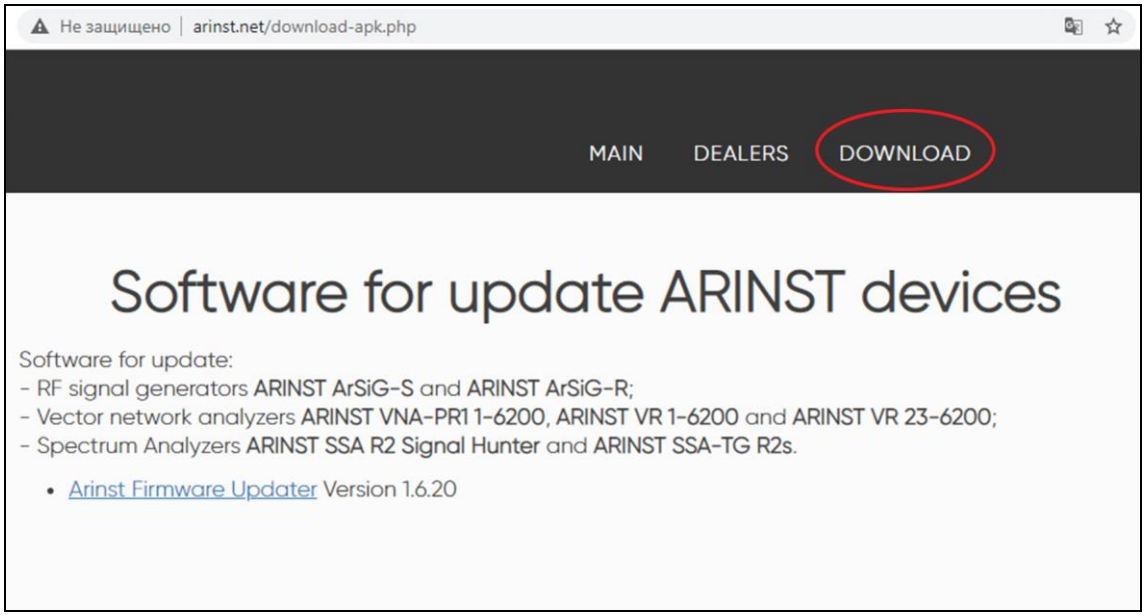


Figure A1.1 - Downloading the application for updating the device

1.3. Enter the directory with the downloaded compressed (archived) file. Unzip the downloaded file using archiving programs (Figure A1.2).

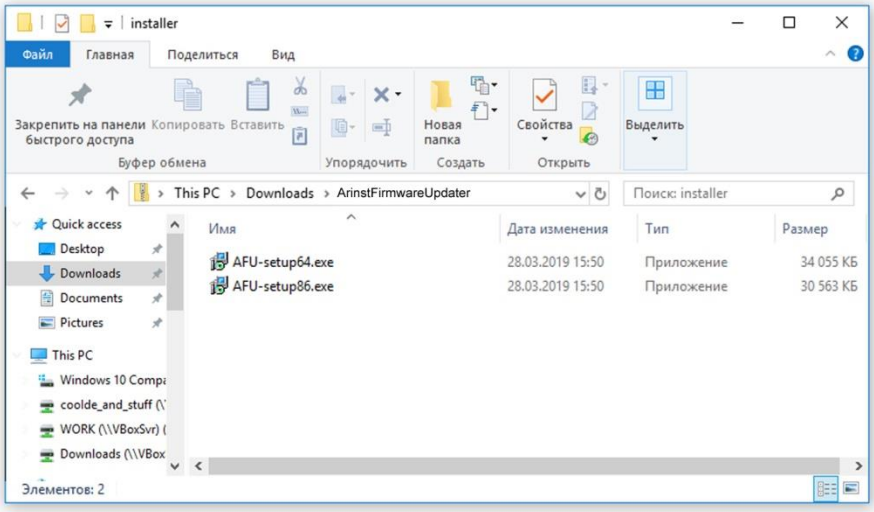


Figure A1.2 - Unzipped downloaded file

The unzipped file contains 2 objects:

- The *AFU-setup64.exe* update loader installation file for 64-bit Windows operating systems.
- The *AFU-setup86.exe* update loader installation file for 32-bit Windows operating systems.

To determine which Windows operating system (32-bit or 64-bit) is installed on your PC, run:

For Windows 7:

- Click the **Start** button, right-click **Computer**, and then select **Properties**.
- In the **System** section, see what type of system is listed.

For Windows 8.1 and Windows 10:

- Click the **Start** button and select: **Settings** → **System** → **About**.
- In the **Specifications** section, see which System type is listed.

1.4. After selecting the installation file corresponding to the bitness of your operating system, install the update loader on your PC, following the instructions of the installer.

The **Arinst Firmware Updater** application and the virtual COM port driver will be installed.

⚠ **The installer package contains all the necessary components for the correct operation of the application and the connected equipment. If the installation of any components was interrupted by the user, these components must be installed independently or restart the installer package.**

2. Device firmware update

⚠ **Before updating the device firmware, make sure that your PC has access to the Internet.**

2.1. Connect the device with a USB cable to the USB port of the PC. Switch on the device.

2.2. Run the application **Arinst Firmware Updater**.

2.3. Click the button [5] to connect the device to your PC (Figure A2.1).

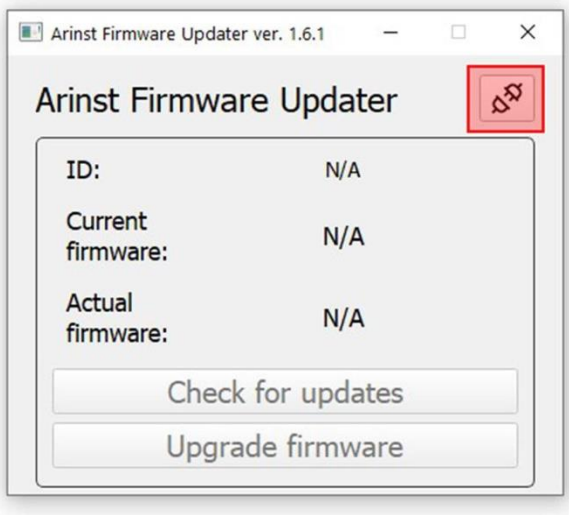


Figure A2.1 - Connecting the device to PC

2.4. In the window that opens, from the drop-down list select the virtual COM port for connecting the device (Figure A2.2).

[5] The command buttons of the loader interface in this application are highlighted in red only for ease of reading.

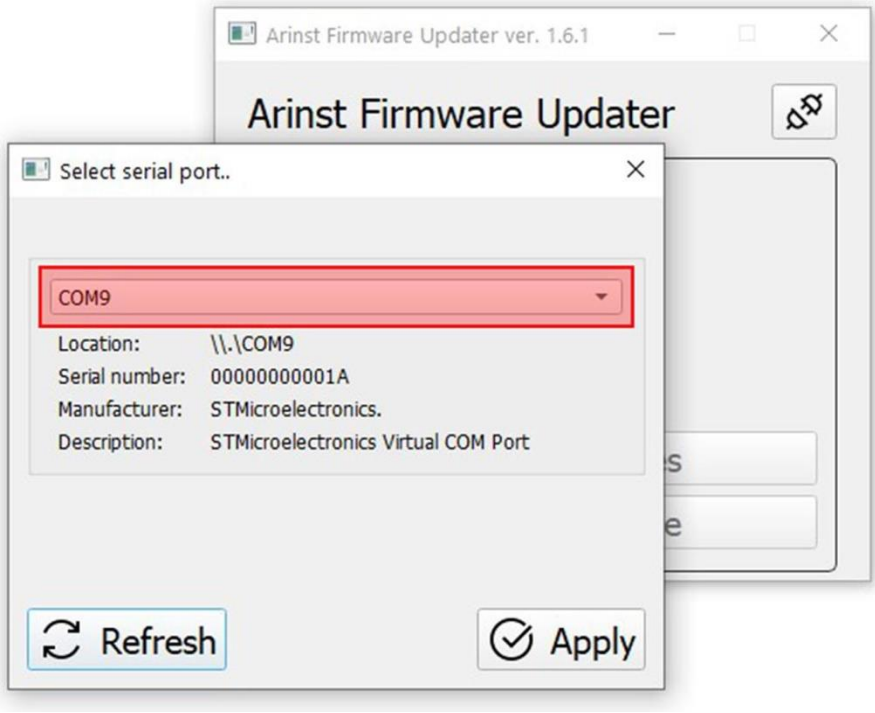


Figure A2.2 - Selecting a virtual COM port for connecting the device

In our example, in Figure A2.2, the COM9 virtual port is selected.

2.5. If the desired port is not in the list of virtual ports, click the **Refresh** button.
2.6. After selecting the COM port, connect the device by clicking the **Apply** button.
2.7. After connection, the ID and firmware version of the device will be determined. The **Check for updates** button will become active (Figure A2.3).

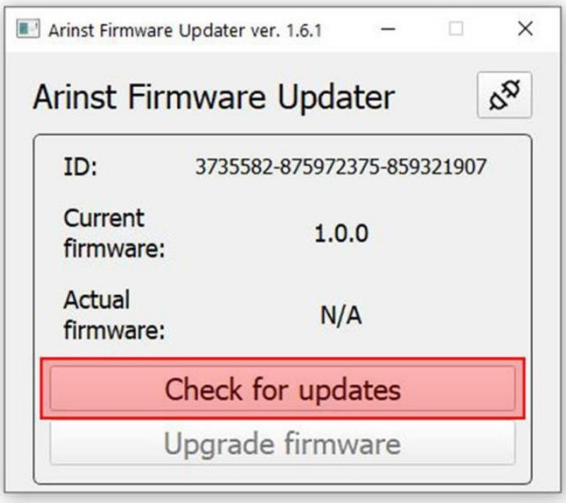


Figure A2.3 - The device is connected to the PC

Click the **Check for updates** button. If the current firmware version is lower than the actual one, the application will offer to update the device's firmware (figure A2. 4).

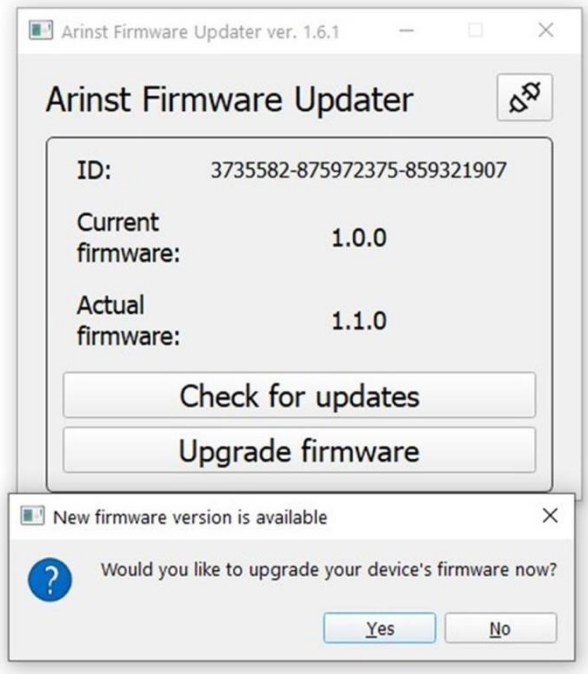


Figure A2.4 - Message about a later firmware version

2.8. To update the device firmware automatically, click **Yes**. If you plan to update the firmware later, click **No**.

To update the device firmware manually, click the **Upgrade firmware** button.

If the device was in application mode, it will automatically restart during the firmware update. The application message will be displayed on the PC screen (figure A2. 5).

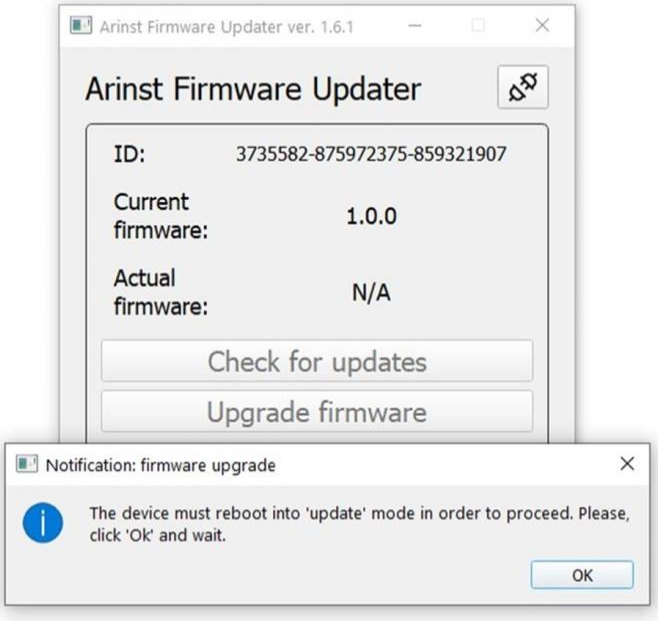


Figure A2. 5 - Application message about the device switching to update mode

2.9. During the device firmware update, a window will appear with the download progress (Figure A2. 6).

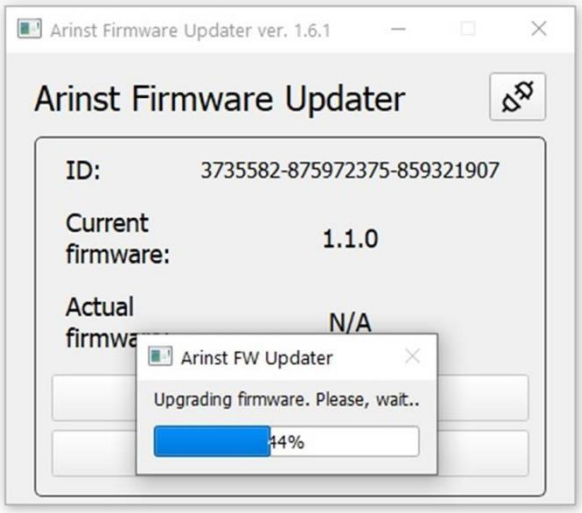


Figure A2.6 - Updates download process

After completing the download of the updates, the device will automatically reboot and switch to the application mode. An application message will be displayed on the PC screen.

2.10. After downloading and installing the new firmware, the application will display the latest installed version of the device software (Figure A2.7)

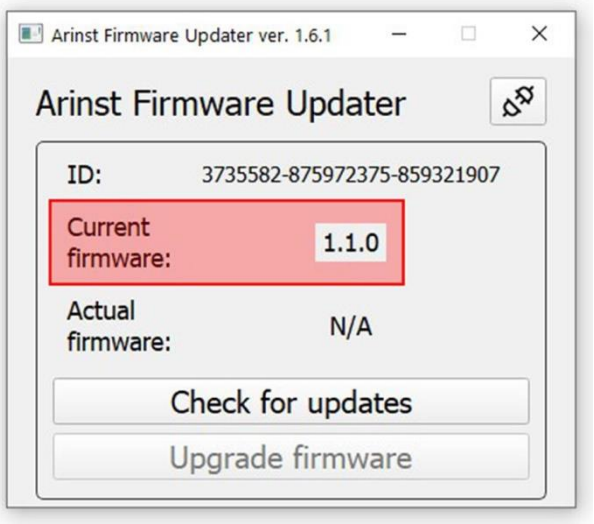


Figure A2.7 - Displaying the device firmware version

To ensure that the latest firmware is installed, click the **Check for updates** button. A message about the latest firmware version will be displayed on the screen.

3. Device status messages displayed during the update process

3.1. Standard firmware download without errors. The device screen displays its number and the result of checking the downloaded firmware (Figure A3. 1).

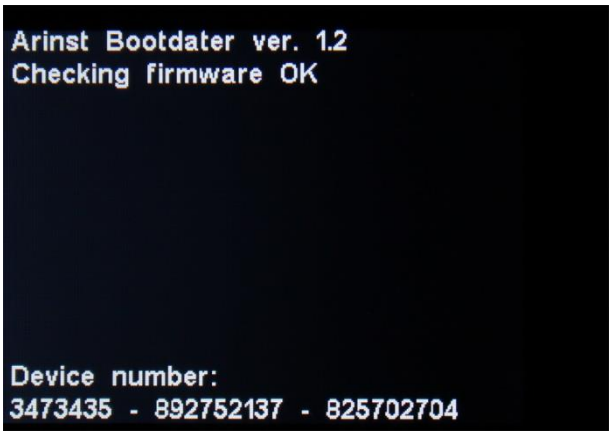


Figure A3. 1 - Successful firmware download

3.2. Unsuccessful firmware download. (Figure A3.2). Connect the device to a PC and update the device firmware again.

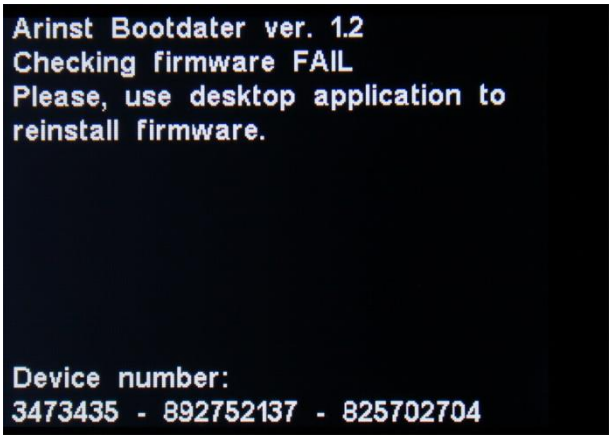


Figure A3.2 - Unsuccessful firmware download

3.3. If the update process was interrupted, the device will start in update mode until the update process is completed. The device displays a message about the update mode in which the device is located (Figure A3.3).

Check the connection of the device to the PC and carry out the firmware update again.

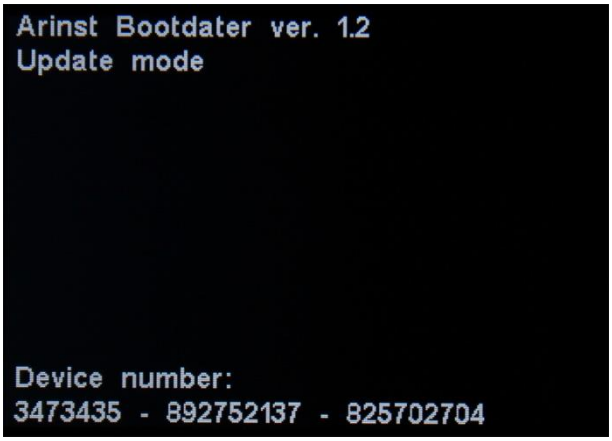


Figure A3.3 - The device is in update mode

3.4. After completing the update process, the device checks the installed firmware. If the checksums do not converge, a mismatch message is displayed on the screen (Figure A3.4). After rebooting, the device will be in the update error mode. Check the connection of the device to the PC and carry out the firmware update again.

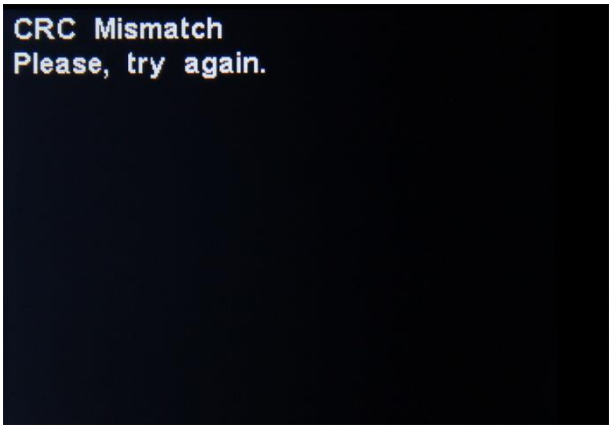


Figure A3.4 - Unsuccessfully installed firmware