



VREMYA-CH

FREQUENCY DISTRIBUTION AMPLIFIER

VCH-611

Operating Manual

468732.034OM

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1 Safety precaution

1.1 You must carefully read the Operating Manual before working the Frequency Distribution Amplifier VCH-611 (hereinafter referred to as the Device) and note the safety information.

1.2 Before the Device starts operating you must provide reliable grounding. If the Device is intended to be used in combination with other equipment, then all this associated equipment also must be grounded.

1.3 To avoid the influence of static electricity all further connections must be made only with the grounded Device.

1.4 You must avoid contact with current-carrying parts during repair as it may result in shock.

1.5 Before touching any components or wiring always unplug the Device.

1.6 All repair and maintenance of the Device must be carried out by qualified personnel authorized for work on high voltage (up to 1000 V).

2 Device description

2.1 Description and operation

2.1.1 Frequency Distribution Amplifier VCH-611 is designed for ultra-low-noise distribution of sinusoidal signals 5; 10; 100 MHz at nominal level of the root mean square value of the input voltage $(1,0 \pm 0,1)$ V at the input and output load $(50,0 \pm 0,3)$ Ohm. Main applications are the time frequency measurements and reference measurement systems and telecommunications.

The Device can be used as an integral part in automated measurement systems. Signal availability can be checked via RS-232C interface.

The external view of the Device is given in Figure 1.



Figure 1

Normal operating conditions:

Air temperature	$+(20 \pm 5) ^\circ\text{C}$
Relative humidity	from 30 to 80 %
Atmospheric pressure.....	$(84-106)$ kPa $((630-795)$ mm Hg)
Power supply	$(220,0 \pm 4,4)$ V
AC sinusoidal voltage distortion.....	up to 5 %
External power supply source	$(22-30)$ V

Working operating conditions:

Air temperature from +5 °C up to +40 °C

Relative humidity up to 90 % at +25 °C

Atmospheric pressure.....(70,0–106,7) kPa ((537–800) mm Hg)

Power supply (100–240) V

External power supply source(22–30) V

2.1.2 Official name of the Device in all the documentation should be stated as:

Frequency Distribution Amplifier VCH-611 468732.034.

2.2 Product specifications

2.2.1 Maximum input power: no more than 17 dBm.

2.2.2 Input/output gain: no more than (0±1) dB.

2.2.3 Isolation between channels: no more than the values given in Table 1.

Table 1

	Signal frequency, MHz		
	5	10	100
Output/Output, dB	-120	-120	-100
Output/Input, dB			
Input/Input, dB			

2.2.4 Harmonic distortion added by the Device: no more than minus 40 dB at 5, 10 MHz and no more than minus 35 dB at 100 MHz at nominal voltage.

2.2.5 Allan deviation at 1 second added by the Device: no more than 4×10^{-14} .

2.2.6 Ultra-low phase noise (single-side power spectral density) introduced by the Device: no more than the values given in Table 2.

Table 2

Frequency offset	Signal frequency		
	5 MHz	10 MHz	100 MHz
1 Hz	−141 dBc/Hz	−141 dBc/Hz	−130 dBc/Hz
10 Hz	−150 dBc/Hz	−150 dBc/Hz	−145 dBc/Hz
100 Hz	−155 dBc/Hz	−155 dBc/Hz	−150 dBc/Hz
1 kHz	−161 dBc/Hz	−161 dBc/Hz	−155 dBc/Hz
10 kHz	−163 dBc/Hz	−163 dBc/Hz	−160 dBc/Hz

2.2.7 Output phase variation temperature coefficient: no more than 4 ps/°C.

2.2.8 Power consumption is no more than 40 VA (AC) and no more than 40 W (DC) at nominal voltage.

2.2.9 The Device preserves its specifications when powered by (100–240) V AC with frequency (50–60) Hz. In the absence of AC voltage the Device automatically switches to backup power from an external DC source (22–30) V. The Device will retain its specifications during the AC/DC changeover.

2.2.10 The Device provides its specifications in working conditions after a 2-hour warm-up time.

2.2.11 The Device provides access to its parameters via the RS-232C standard interface.

2.2.12 The Device provides continuous non-stop operation in working conditions with all specifications preserved.

2.2.13 Mean time to failure 20000 hours.

2.2.14 Service life — 15 years.

2.2.15 Average storage time is at least 10 years for heated storage and 3 years for non-heated storage.

2.2.16 The weight of the Device does not exceed 3 kg; in a cardboard box — no more than 5 kg; in a wooden transport box — no more than 15 kg.

2.2.17 Dimensions (1 U case): 483×44×300 mm (W×H×D).

2.3 Product composition

2.3.1 The Device composition is given in Table 3.

Table 3

Type	Designation	Quantity	Note
Frequency Distribution Amplifier VCH-611	468732.034	1	
Operating Manual	468732.034OM	1	
Power cable 220V	SCZ-1	1	
Power cable 27V	685650.076	1	
Cardboard box	411915.078	1	
Wooden transport crate	323361.032	1	Delivery in accordance with the terms of the contract

2.4 Basic configuration and operation

2.4.1 The Device consists of these main parts:

- AC/DC inverter;
- power supply unit;
- amplifier 3-12;
- indication unit

within a single-unit case 483×44×300 mm (W×H×D). The top and the bottom of the case have easy-removable covers.

All input and output connectors are located on the rear panel. The front panel contains all output and supply voltage indicators.

In the back of the case there is a amplifier 3-12 board and RS-232C output unit. The front of the case contains power supply unit, AC/DC inverter and indication unit.

To ensure high maintainability all nodes and units are accessible through top and bottom covers of the Device.

The principle of operation of the Device is illustrated by the block diagram in Figure 2.

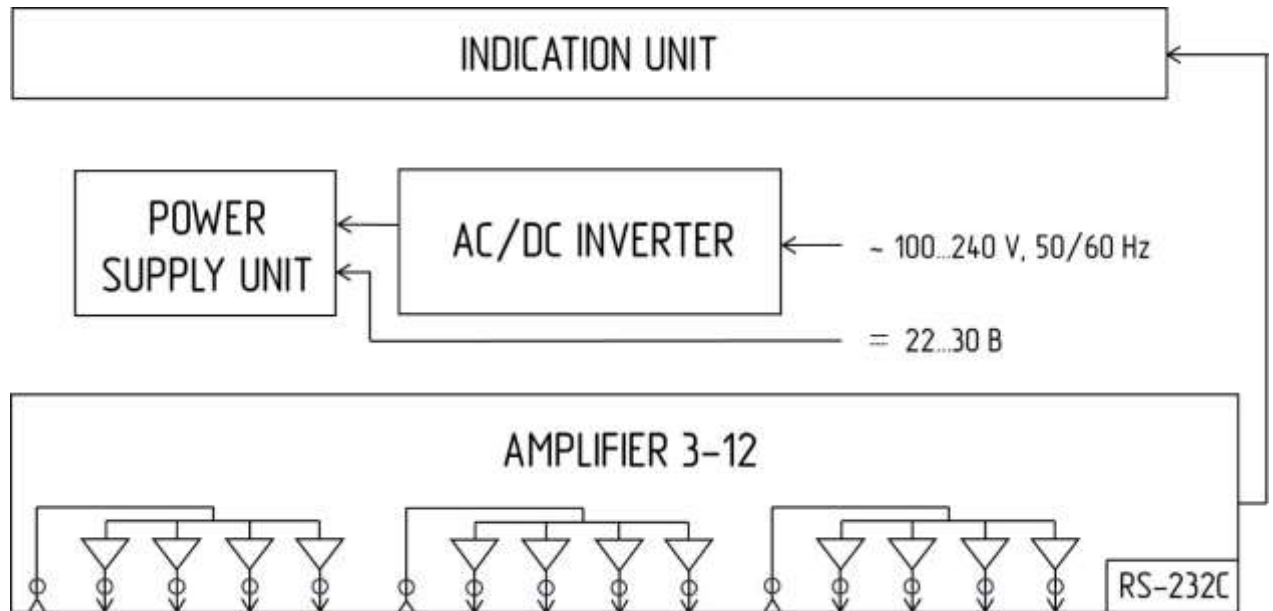


Figure 2 — Frequency Distribution Amplifier VCH-611 block-diagram

2.5 Description and function of the main Device units

2.5.1 AC/DC inverter

AC/DC converter is used to convert the AC supply voltage (100–240) V to a constant voltage 24 V.

2.5.2 Power supply unit

The power supply unit enables switching between the AC/DC inverter and an external DC power source. In case of a voltage failure from the AC/DC inverter power supply unit automatically switches to the external DC source. The power supply outputs generate constant voltage for all of the Device units.

2.5.3 Amplifier 3-12

The amplifier 3-12 provides amplification and multiplication of three high-frequency input signals into 12 outputs (four outputs for each input). A detector is

installed at each output, which transmits information about the presence/absence of a signal to the output device RS-232C. The detection threshold is from plus 2 to plus 5 dBm.

The RS-232C output Device transmits messages to the PC about the status of the Device outputs, the type of Device, and malfunctions. Data is transmitted at 9600 bps without parity bit. Data are sent only on request from the PC. The transmission/reception protocol is presented in Table 4.

Table 4

Received data		Transmitted data		Note				
5D (hex)		15 (hex)		Used for COM-port when connected to PC				
41 (hex)		1B (hex)						
46 (hex)				5 bytes are transmitted sequentially: byte 1 — device type; byte 2 — status of channel A outputs; byte 3 — status of channel B outputs; byte 4 — status of channel C outputs; byte 5 — error information.				
Byte 1: 00 (hex) — device with 3 inputs 4 outputs each								
Byte 2 — status of channel A outputs(bin):								
D7	D6	D5	D4	D3	D2	D1	D0	Note
0	0	1	0	Output A4	Output A3	Output A2	Output A1	0 — signal 1 — no signal
Byte 3 — status of channel B outputs(bin):								
D7	D6	D5	D4	D3	D2	D1	D0	Note
0	0	1	1	Output B4	Output B3	Output B2	Output B1	0 — signal 1 — no signal
Byte 4 — status of channel C outputs(bin):								
D7	D6	D5	D4	D3	D2	D1	D0	Note
0	1	0	0	Output C4	Output C3	Output C2	Output C1	0 — signal 1 — no signal
Byte5 — error information*:								
D7	D6	D5	D4	D3	D2	D1	D0	Note
1	0	0	0	0	Channel C error	Channel B error	Channel A error	0 — no error 1 — error

*N o t e — Error signal is generated if there is no signal on any of the four outputs. If there is no signal at all four outputs, error signal will not be generated.

2.5.4 Indication unit

Indication unit provides LED indication of the presence/absence of signals at the Device outputs.

3 Preparing Device for use

3.1 Before starting you need to carry out an external inspection of the Device.

Make sure that:

- there are no visible mechanical defects;
- the seals are intact;
- the external surfaces of the Device, connectors, terminals and sockets are clean;
- connecting wires and converters are in good condition.

ATTENTION!

Before turning ON the Device the grounding terminal must be connected to the grounding conductor.

4 Device operation

4.1 Safety requirements

4.1.1 Operation of the Device must comply with the security measures set out in Section 1 of this Operating Manual.

4.2 Location of control and connection systems

4.2.1 Control and connection system and their functions are shown in Table 5. Their location is shown in Figure 3.

4.2.2 The Device has no power switch, so it will be turned on immediately after connecting it to the power supply.

Table 5

Positions in Figure 3	Designation	Usage
1	AC POWER	Powered by AC 220V
2	DC POWER	Powered by external DC
3	 A1, A2, A3, A4 B1, B2, B3, B4 C1, C2, C3, C4	Output signals indicators
4	 A1, A2, A3, A4 B1, B2, B3, B4 C1, C2, C3, C4	High frequency output connectors
5	 A  B  C	High frequency input connectors
6	RS-232C	RS-232 connector
7		Grounding terminal
8	 22...30 V	External power supply socket
9	~100–240 V 50/60 Hz 40 V·A	220V power line socket

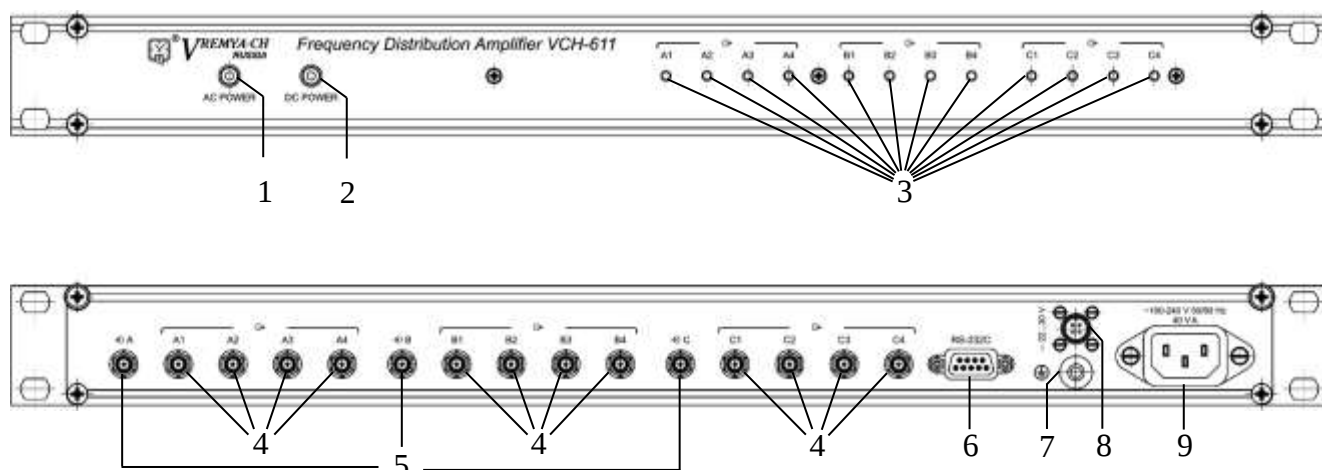


Figure 3

4.3 Switching ON

- 4.3.1 Carefully read this Operating Manual before starting.
- 4.3.2 Check the reliability of the Device grounding.
- 4.3.3 If the storage or transportation conditions of the Device were different from the working conditions, it is necessary to keep the Device in working conditions for no less than 3 hours before switching on.

5 Repair

5.1 If the Device does not comply with technical specifications or for other reasons making its further use impossible, the Device must be repaired.

5.2 Repairs of the Device and its components may only be performed by the manufacturer.

6 Transportation and storage

6.1 Transportation

6.1.1 The Device must allow transportation in standard package by all modes of transport, provided that it is protected from direct exposure to atmospheric precipitation.

6.1.2 Climatic conditions of transportation must not exceed the specified limit conditions:

- ambient air temperature from minus 50 °C to plus 50 °C;
- relative humidity 95 % at temperature plus 25 °C.

6.1.3 After staying under limit conditions, the holding time under normal conditions shall be at least 3 hours.

6.2 Storage

6.2.1 The Device is stored before being put into operation in its standard packaging at the manufacturer's warehouse at an ambient temperature of 0 °C to plus 40 °C and a relative air humidity of up to 80 % at a temperature of plus 35 °C.

6.2.2 The Device should be stored without packaging at an ambient temperature of plus 10 °C to plus 35 °C and a relative humidity of up to 80 % at a temperature of plus 25 °C.

7 Device Packaging

7.1 Packaging

7.1.1 Device packaging must comply with design documentation.

7.1.2 The package must be labeled in accordance with the design documentation.

7.1.3 The overall dimensions of the Device, the cardboard box and the wooden transport crate are given in Appendix A.

7.2 Unpacking and re-packing the Device

7.2.1 Unpack the Device in following order:

- remove the cardboard box from the wooden transport crate;
- remove the Device, cable set and documentation from the cardboard box.

7.2.2 Packing is done in reverse order:

- place the Device and cable set in a plastic bag and seal with the tape labeled "scotch tape";
- place the Device and cable set in a cardboard box and seal it with the tape labeled "scotch tape";
- place the cardboard box in a wooden transport crate.

8 Shipping marks and sealing

8.1 The name and reference designation of the Device and trademark are applied to the left side of the front panel.

Serial number and year of manufacture are marked on the rear panel.

The Device inspected by the Department of Quality control and is sealed.

Appendix A

A.1 Overall dimensions of the Device and the packaging (millimeters):

- dimensions of the Device: $483 \times 44 \times 300$ (W×H×D);
- dimensions of a cardboard box: $520 \times 160 \times 360$ (W×H×D);
- dimensions of a wooden transport crate: $657 \times 351 \times 514$ (W×H×D).