Frequency Distribution Amplifier

VCH-605

Operating Manual

468732.022 OM

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1 Safety precaution

1.1. You must carefully read the operating manual before working with 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 1000V).

2 Device description

2.1. Description and operation

2.1.1. Frequency distribution amplifier is designed for ultra-low-noise distribution of sinusoidal signals (5±0,00005), (10±0,0001), (100±0,001) MHz at nominal level of the root mean square value of the input voltage (1,0±0,1)V at the input and output load (50,0 ± 0,3) Ohm. The device has 3 independent channels with 1 input and 4 outputs each. 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-232 interface.

The external view of the device is given in Fig. 1.

Fig. 1

2.1.2. Normal operating conditions:

— Air temperature: +20 up to +25°C

— Relative humidity: 65±20 at +30 °C

— Atmospheric pressure 84 – 106 kPa (630-795 mm Hg)

— Power supply: 220±4,4 V AC

— AC sinusoidal voltage distortion: up to 5%

— External power supply source (24^{+6}_{-2}) V

2.1.3. Working operating conditions:

— Air temperature: +5 up to +40°C

— Relative humidity: up to 80% at +25 °C

— Atmospheric pressure 60 – 106 kPa (450-795 mm Hg)

— Power supply: (100 - 240) V AC

— External power supply source (24^{+6}_{-2}) V

2.1.4. Utmost operating conditions:

— Air temperature: -50 up to +50°C

— Relative humidity: up to 80% at +25 °C

2.1.5. Official name of the device in all the documentation should be stated as:

Frequency Distribution Amplifier VCH-605 468732.022

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	−120	−120	−100
Input/Input, dB	−120	−120	−100

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

2.2.5. Allan deviation at 1 second added by the device: no more than $4{,}0\times10^{-14}$.

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

Table 2

Frequency offset, Hz	Signal frequency, MHz		
	5	10	100
1	−141dBc/Hz	−141dBc/Hz	−130dBc/Hz
10	−150dBc/Hz	−150dBc/Hz	−145dBc/Hz
100	−155dBc/Hz	−155dBc/Hz	−150dBc/Hz
1000	−161 dBc/Hz	−161dBc/Hz	−155dBc/Hz
10000	−163dBc/Hz	−163dBc/Hz	−160dBc/Hz

2.2.7. Output phase variation temperature coefficient: no more than 5 ps/°C

2.2.8. Power consumption is no more than 45 VA (AC) and no more than 40 W (DC)at nominal voltage.

2.2.9. The amplifier 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 amplifier 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-232 standard interface.

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

2.2.13. Mean time to failure 20,000 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. Weight: no more than 12 kg netto; 16 kg in factory package; 25 kg in transport crate.

2.2.17. Dimensions (1 U case): 483.0×44.0×310.0 mm (W × H × D)

2.3. Product composition

The device composition is given in Table 3.

Table 3

Type	Designation	Quantity
Frequency Distribution Amplifier VCH-605	468732.022	1
Power cable 220V	SCZ-1	1
Power cable for 24 V source	685670.026	1
Operating manual	468732.022 OM	1
Packing case	323361.032	1
Package	411915.078	1

2.4. Basic configuration and operation

The device consists of these main parts:

- AC/DC inverter;

- Power supply unit;

- Amplifiers 1-4;

- RS-232 output unit;

- Indication unit

within a single-unit case, 483×44×310 mm. 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.

The back of the case contains three amplifier units 1-4 and RS-232 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.

Principle of operation of the signal amplifier is illustrated by the block-diagram in the Fig. 2.

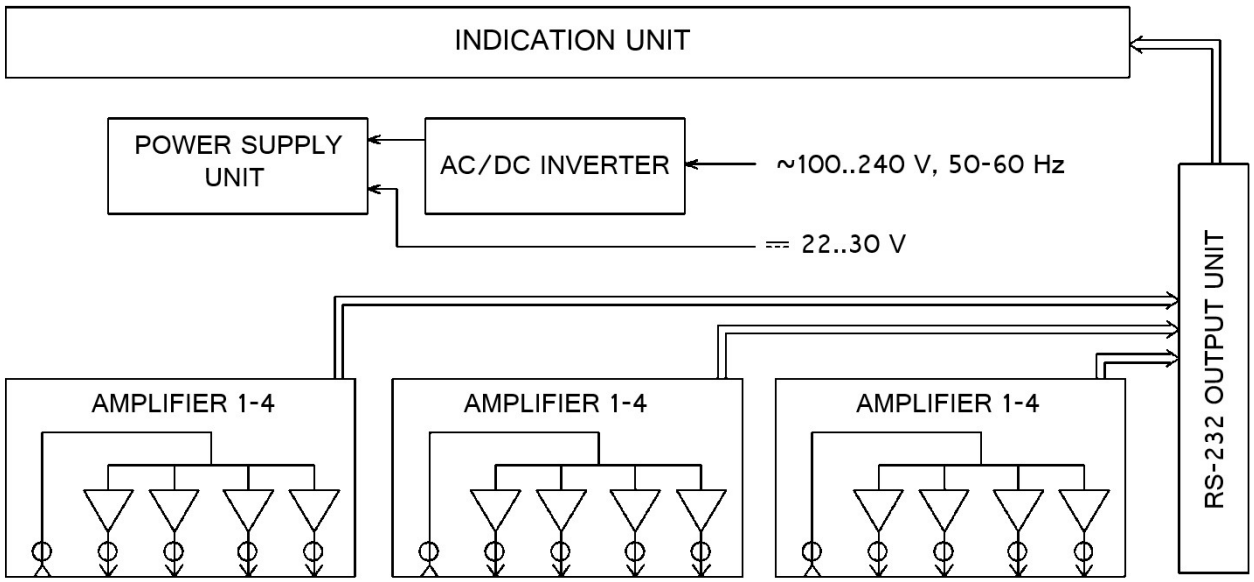

Fig 2

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 1-4.

Each amplifier provides amplification and distribution of a high frequency signal input to 4 outputs. Each output has a detector, which transmits the information about the presence/absence of a signal to the RS-232 output. Detection threshold is +2 - +5 dBm.

2.5.4. RS-232 output unit.

RS-232 output unit transmits status of the device outputs and information on the device faults to the PC. Data is transmitted at 9600 bps without parity bit. Data are sent only on request from the PC. Transmission/reception protocol is presented in Table 4.

Table 4

Received data	Transmitted data	Note
5D (hex)	15 (hex)	Used for COM-port recognition when device is connected to PC
41 (hex)	1B (hex)	
46 (hex)		4 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	OutputB4	OutputB3	OutputB2	OutputB1	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	OutputC4	OutputC3	OutputC2	OutputC1	0 – signal 1– no signal

Byte5 - error information*:								
D7	D6	D5	D4	D3	D2	D1	D0	Note
1	0	0	0	0	ChannelC error	ChannelB error	ChannelA error	0 – no error 1–error

*Note – 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.

2.5.5. Indication unit.

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

3 Preparing device for use

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

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

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

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

Table 5

No.	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	⏚	Grounding terminal
7	⎓ 22…30 V	External power supply socket
8	~100–240 V 50/60 Hz 40 V·A	220V power line socket
9	RS-232C	RS-232 connector

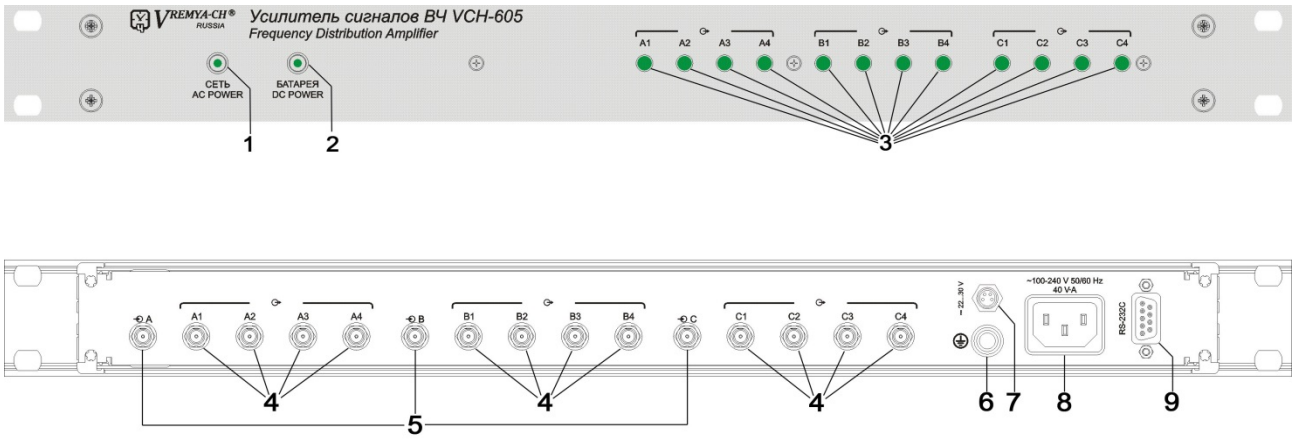

Fig. 3

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 Device Packaging

5.1. Packaging

Device packaging must comply with design documentation.

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

Overall dimensions of the device, the package and the packing case are given in Appendix A.

5.2. Unpacking and re-packing the device

5.2.1. Unpack the device in following order:

- Pull the packaging out of the packing case;
- Remove packaging from the device.

5.2.2. Packing is done in reverse order:

- Place the device in a plastic bag and seal with the tape labeled "scotch tape";
- Place the device in the package and seal it with the tape labeled "scotch tape";
- Place the package in the packing case.

6 Shipping marks and sealing

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 a representative of the customer is sealed.

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Appendix A

Overall dimensions of the device, the packaging and the packing case (millimeters):

Device dimensions: 483 × 44 × 310 (W × H × D).

Dimensions of packaging: 520 × 125 × 362 (W × H × D).

Dimensions of the packing case: 657 × 351 × 514 (W × H × D).