

## Rotary antenna rotator controller GNI-r5



### User manual

#### Introduction

The GNI-r5 controller supports a rotator with pulse output (pulser or reed switch). The number of pulses per stage must be in the range from 1 to 8. Antenna rotation is possible with a resolution from 0.125 to 1 degree in the range of 0 to 360 degrees. You can set the rotation reserve in each direction (lower and upper limit) outside the range of 0-360 degrees. The default value of the reserve is 180 degrees (half a turn), in this case the rotation is from -180 to +540 degrees (two full revolutions). Reading of the azimuth value is possible with a resolution 1 degree. The GNI-r5 controller is suitable for rotators as RAU, RAK, RAEL, SPX, BIG-RAK.

The current value of the antenna position is written into the EEPROM non-volatile memory when the final value (sent by the computer program) is reached, or when the "Stop" button is pressed.

External dimensions (W x H x D): 109 x 58 x 125 mm.

#### Installation

The controller GNI-r5 is powered from the computer's USB connector via the cable and the USB-mini connector on the back panel. The current drawn from the USB output is typically 45 mA, up to 90 mA. For manual operation without a computer, you can use a typical charger or power bank with an USB socket.

The rotator motor power supply given to the 2.1/5.5 socket (plus in the centre!) on the rear panel can range from 12V to 24V. You can use any DC power supply with a current output at least 3 A, for example a typical 13.8V power supply used to power your transceiver. Equally good is the use of a 19 V power supply from a laptop, and at such the voltage the antenna rotation is 50% faster than for 13.8V. Current consumption is approx. 1 A, maximum 3 A.

The motor power ground has galvanic separation from the controller and computer ground.

To connect the rotator, use the NC/4p (Model 25-724-0) type connector, and plug it into the appropriate socket on the back plate with the connection to the pins as follows:

- Pin 1 (M1) – motor control (connector 1 in the RAU / RAK rotator junction box)
- Pin 2 (M2) – motor control (connector 2 in the RAU / RAK rotator junction box)
- Pin 3 (K2) – pulse sensor (connector 3 in RAU / RAK rotator junction box)
- Pin 4 (K1) – pulse sensor (connector 4 in RAU / RAK rotator junction box).

After installing and checking the connections, set the antenna towards north (azimuth 0) or south (azimuth 180) and perform the calibration as described below.

### Front panel

Display:

- The upper line indicates by default the current azimuth of the antenna in the range of 0-359 degrees,
- The bottom line displays by default **actual** current location of the antenna in the range defined by the lower and upper limits (e.g. -180 to +540 degrees).

Buttons:

- ">" - start rotation clockwise
- "<" (left) - start rotation counter-clockwise
- "Stop" (red) - immediate stop of the rotator, or calibration
- "Menu" - (right) enter the settings menu.

Note - press the button and **keep it pressed** for about 1 second until the relay operates and the motor starts (the green diode starts blinking).

The LED1 (green) flashes with every pulse from the rotator pulse sensor. It lights continuously after each use of the "Stop" button, as well as: after a successful calibration of the antenna setting, after switching off the display backlight, and when the lower or upper rotation limit is reached. This backlight automatically turns off after (by default) 3 minutes of inactivity. The value of this time can be changed in the menu to a different one in the range of 1-60 minutes.

The LED2 (red) indicates the 12-24 V DC power supply connection.

### Manual operation

To manually control the rotator, three front panel buttons are used: ">" (start of rotation clockwise), "<" (start of rotation to the opposite side) and "Stop" (red, immediate stop of the rotator after reaching the desired position or for another reasons ). The rotation of the rotator will **always** stop after pressing the "Stop" button. If during rotation you want to change its direction, it is recommended to first stop the movement by using the "Stop" key, and then press the ">" or "<" button. The antenna position value is entered into the EEPROM non-volatile memory in the moment when the "Stop" button is pressed.

For manual control of the rotator, you can also use a mouse controller, attached to a mini-jack on the rear panel of the controller. Here the control works in a different way: pressing the right mouse button causes the antenna to rotate clockwise until the pressure is released, while pressing the left mouse button causes rotation in the opposite direction until the pressure is released. Pressing the middle button (or rotary knob) stops the rotator movement in the same way as the red button on the front panel.

Note - the mouse controller GNI-r5 is **not a computer mouse** and has no other functions except described above.

## Calibration

The red button "Stop" also has the function of calibration, i.e. setting the initial position (zeroing) in any physical position of the antenna. Keep the "Stop" button pressed during power on the microcontroller and wait for the "Calibrate rotator" message to appear. If you want the azimuth values of the antenna and the actual position of the antenna to be set in the non-volatile EEPROM memory to 0 degrees (direction to the north), select the "<" button. If you want the azimuth values of the antenna and its position in the EEPROM memory to be set to 180 degrees (direction to the south), then select the ">" button. If you want to cancel the calibration, press the "Menu" key.

If during your antenna operation you find that the controller's display deviates from the actual one, set the antenna to the north or south with ">" or "<" buttons, and then calibrate.

## Automatic operation

Controlling from a computer is possible using any program compatible with the AlfaSpid communication protocol. The GNI-r5 controller has been checked with the following programs: DXView (part of DX Lab), Logger32, N1MM Rotor, PstRotator, HRD and Spid Driver.

When configuring a software, find in appropriate configuration window and select:

- AlfaSpid or AlfaSpid RAK Az - rotator type, model or protocol
- Serial Port - appropriate COM number (after connecting the USB cable it will be reported automatically - you can check its number in the Windows Device Manager)
- and then set: speed 1200 baud, word length 8 bits, 1 stop bit, no parity.

A rotation request below 3 degrees is ignored. The value of the dead zone can also be changed in the menu to another in the range 1-30 degrees.

The current antenna position value is entered into the EEPROM memory when the target (sent by the computer program) is reached. You can use the "Stop" button during rotation. In this case, the rotation will be stopped immediately, and the current antenna position value will be displayed and written into the EEPROM non-volatile memory.

## GNI-r5 controller programming

Press and hold the Menu button (gray on the right). "Entering setup .." will appear, followed by the first option:

1. „LOW ant. limit:“. The number in brackets is the current value. If you want to change it, use the ">" and "<" buttons. The value can be set in the range -180 to 0 degrees. After setting the desired value, press the Menu button again.
2. „HIGH ant. limit:“. The number in brackets is the current value. If you want to change it, use the ">" and "" buttons. The value can be set in the range of 360 to 540 degrees. After setting the desired value, press the Menu button again.
3. „Dead zone (°):“. It is the **minimum** value of rotation, which will be performed when receiving a command from computer, below this value the command will be ignored. The number in brackets is the current value. If you want to change it, use the ">" or "<" buttons. The value can be set in the range of 1 to 30 degrees. From practical point of view it is highly recommended to use the value **3 degrees or more**. After setting the desired value, press the Menu button.
4. „Pulses per °:“ (number of pulses per degree). It is the number of impulses from the rotator pulser

corresponding to the rotation by one degree. The value can be set in the range from 1 to 8. The default value and the most common one is 1. After setting the desired value, press Menu button again. **Attention** - choosing a value that is not suitable for your rotator may result in damage to the antenna system! For example RAU, RAK, RAEL rotors should have setting „1”, and BIG-RAK “2”.

5. „BL ON (minutes)”. This is the time after which the display backlight turns off automatically. The number in brackets is the current value. If you want to change it, use the ">" or "<" buttons. The value can be set in the range of 1 to 60 minutes. After setting the desired time, press the Menu button again. Press the "Stop" button if the backlight has turned off. All changes in the menu will be activated after restarting or resetting the controller.
6. „Antenna name:”. You can select a number from 1 to 20. Each number is assigned to a different name, which will be displayed in the bottom line of the display. This is especially useful if you use more than one GNI-r5 controller at the same time. Antenna names are in the table below. After setting the desired value, press the Menu button again.

1	2	3	4	5	6	7	8	9	10
Antenna	Hexbeam	SteppIR	Yagi	Quad	Delta	Spider	OptiB	GB312	GXP

11	12	13	14	15	16	17	18	19	20
20 m	17 m	15 m	12 m	10 m	6 m	UHF/VHF	Mast 1	Mast 2	Mast 3

### Notes

1. After connecting USB cable (supply 5V) the controller starts up and makes reset. After 10 seconds it is ready for operation. The best if the motor supply is connected already before the reset (red LED on).

2. When you start rotation the controller switches-on one of two relays, and you should hear a "click". If all is OK the rotator should start rotation. The controller waits for pulses from rotator. Each pulse is confirmed by green LED on the front panel - short blink. If the controller do not receive any pulse, it assumes that there is a fault and stops rotation. After that, for the safety reasons GNI-r5 controller **blocks rotation orders**, form buttons, mouse and form PC. It means that you can't activate any relay and you won't hear the "click". In that case you must check what is wrong on hardware side. One of the reason can be very simple - motor supply (red LED) was not present when you tried to activate the rotation. The second reason is of course lack of a connection of one of the four wires from the controller to the rotator. After removing the cause of disability, you need to disconnect/connect USB supply of GNI-r4 controller, or alternatively wait for at least 5 seconds before performing any action.

3. Turning off the power of the GNI-r5 controller while the antenna is in motion causes loss of information about the real position of the antenna. This may cause the system to malfunction and may be **dangerous to the coaxial cable**. RAU, RAK, REAL, BIG-RAK rotators do not have any mechanical limit switch, but only software. Avoid the following when the antenna is turning:

- disconnecting the USB cable from the GNI-r5 controller or computer
- turning off or restarting the computer
- changing of configuration of serial ports
- starting or closing the rotator PC controlling program

4. Take care of an adequate length of coaxial cable (not to over-wind), especially when using the maximum +/- 180 degree rotation reserve.

5. Motor control cables should have a diameter of **at least 1.5 mm** (AWG 14). If their length exceeds 30 m, it is recommended to use 2 mm wires (AWG 12). Cables from impulse sensor like 0.5 mm diameter (AWG 22) are sufficient.

6. It is advisable that each cable connected to the controller has a ferrite core.

7. Selection in the Menu of the number of impulses from the rotator pulser corresponding to the rotation by one degree is critical for the proper operation of the antenna rotation system. Choosing a value that is not suitable for a given rotator may result in damage to the antenna system. The default and most commonly used value is 1 - applicable to RAU, RAK and REAL rotators. For the SPX AZ-02 or BIG-RAK type rotators select the value 2. In the case of double rotators (azimuth/elevation), the GNI-r5 controller can be used to control azimuth rotation. Then, for the RAS type rotator, select the value 1, select the value 2 for the BIG-RAS type, and 8 for the RAS/HR type rotator.

8. Limit values and the number of pulses per one degree selected during programming are superior to the parameters from computer control programs and cannot be changed via the AlfaSpid protocol. An external program may have its own rotating limits, but the attempt to rotate out of the controller's limit will fail. The internal program in each case will determine the shortest route to the target within the permissible range of rotation.

9. The set includes a mini-USB cable, a plug for DC power supply, and NC/4p plug for the rotator cable.

Questions: [sp5gni@gmail.com](mailto:sp5gni@gmail.com)