Congratulations on purchasing your EASY-ROTOR-CONTROL (**ERC**). This document will guide you through the needed steps for assembly, configuration and installation of the **ERC**. You will obtain the best result by following these instructions step by step.

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Safety-Instructions

- Don't continue using the product if it is damaged.
- Keep electronic assemblies and components away from children.
- Products that carry electric voltages must be handled in accordance with instructions and regulations to avoid damage to equipment and personnel.
- If the product must be repaired, use only original replacement parts. Using different parts may cause equipment damage and personal injury. Repairs should be accomplished by a qualified individual.
- Before applying main voltage the product must be securely build into a housing to provide protection against accidental contact.
- The installation should be performed by a qualified individual.
- Cables that carry dangerous voltages (e.g. main voltage) must be installed according to the valid instructions and regulations. The needed safety distances must be maintained.
- Connection cables have to be chosen according to the needed diameter.
- Before working on the product all supply voltages must be disconnected.
- The product is designed to work in clean and dry areas inside buildings.
- Protect the product from humidity, water and heat.
- Don't use the product in areas where explosive gas, vapour or dust may occur.
- Don't let the product fall or apply mechanical stress as the product may be damaged.

1. Bill of Material (BOM)

The Bom is in the order how you should use the parts.

QTY	Type	Value	Pitch	Reference	Comments
	ERC SMD USB V4.2 Bill Of Material				
1	PCB ERC SMD USB	V4.2 assembled			
4	Distance-Bolt	M3x8x6mm			
8	Spring-Wascher	3.2mm			
4	Nuts	M3			
4	Screw	M3x6mm			
2	Mounting Angle	11x10x7mm			
1	Cable	blue 1m 0.75sqmm			for installation
1	Cable	black 1m 0.75sqmm			for installation
3	Cable-Ties	150mm			

2. Establishing the USB-connection

Plug the USB-B-connector to the ERC and the USB-A-connector to a free USB-connector on your PC.

Depending on your operating-system, you will be asked to install an USB-driver. This driver is available on the CD delivered with your kit.

After successful installation of the driver, a new COM-Port (COMn) is available. You can identify the COM-port-number by inspecting the hardware-settings of your PC. In case you have a conflict with another COM-port (e.g. virtual COM-port), change the COM-port-number in the properties.

3. The Service-Tool

The Service Tool is on the CD supplied with the kit.

Start the Setup-File **SETUP ERC-M_Vnn.EXE** (nn=version) directly on the CD and follow the instructions.

The installation wizard will automatically install the Service Tool in the program directory (or any other if you choose a different one) and put an icon on your desktop.

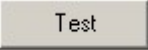Start the Service Tool by double-clicking the Icon on the desktop.
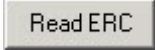
3.1 Configuration of the COM-Port

On shipment, the Service Tool is configured to COM1, which is most properly not the com-port, where you connected the ERC, hence after Start-Up the program may bring up an error-message because of the wrong COM-Port.

Choose the right COM-Port. COM: 12

The Service Tool will check the availability of the ERC at the chosen COM-Port. If successful, the Service Tool will read the configuration-parameters of the ERC and populates the configuration- and the calibration-windows.

You can now perform a little hardware-test before the installation. Click the ⟨Test⟩-button and all relays will be switched on sequentially.

3.2 Read the ERC-configuration-parameters

The parameters of the ERC can be read by clicking the ⟨Read ERC⟩ button.

3.3 Language

The Service-Tool and the help-files are available in different languages. Choose the language with the Language ⟨EN⟩-box.

3.4 Configuration of the AUX-relay

Depending on the rotator used, you need to configure the function of the 3rd relay. Otherwise the rotator may not move.
Please check in the installation-guide which setting is needed for your type of rotator.

Choose the desired function in Function of AUX ⟨brake⟩.

3.5 Other functions of the Service Tool

The other functions of the Service Tool are well described in the help-function of the Service Tool.

Click the ⟨Help⟩ button.

4. Installation of the ERC

Easy-Rotor-Control can either be installed in the rotor-controllers housing or in certain cases it can be installed on the outside of the housing. The installation is unique to every type of rotor/controller. Therefore the installation-guide on the CD, shipped with your ERC, provides instructions for each type of rotator control..

5. Theory of operation

A Microcontroller receives commands via the USB-interface in the Yaesu GS-232B (or GS-232A) or DCU-1 protocol from the programs that support controlling rotators.

The ERC takes the task to move the rotator to the desired position or to stop the rotator while it is moving. Also changes of the direction are possible while the rotator is moving. The current position of the rotators is calculated from the measured rotor-feedback-voltage. To achieve accurate function, the ERC has to be calibrated to the specific value of the rotor-feedback-voltages (ref. to the next chapter).

Depending on the direction to move, the CW- and CCW-relays are activated. With a programmable delay the AUX-relay will be activated to control the speed or the brake of the rotator.

The ERC SMD USB is fully powered by USB and no external supply is needed.

6. Calibration

After the ERC is connected to the rotor-controller, it needs to be calibrated. This calibration is needed, because different kinds of rotators deliver different kinds of feedback-voltages. Also variations between rotators of the same model would lead to inaccuracy. To calibrate the ERC, it has to measure the rotor-feedback-voltages at both ends including overlaps (turning radius > 360°). The calibration is

a software-guided procedure, which will be started by pressing the [Calibration 1] button of the service tool. Just follow the instructions given by the calibration assistant.

After pressing the calibrate-button, the calibration is always done in 3 steps:
1. Decide if you want to calibrate an elevation- or an azimuth-rotator and confirm with the OK-button.
2. Move the rotator to the most clockwise (right) position (to the most upwards position if it is an elevation-rotator), fill in the value, that the dial of your rotator shows and confirm with the OK-button.
3. Move the rotator to the most counter-clockwise (left) position (to the most downwards position, if it is an elevation-rotator), fill in the value, that the dial of your rotator shows and confirm with the OK-button

Please note, that the value to be filled in during the calibration-steps 2 and 3 is always the true value that the dial of your rotator shows. Don't put values like 450 (if you have a rotator with overhead) or -180° (if your rotator has the stop in south) or anything else that is not shown on the dial of your rotator.

Here are some examples:
- Azimuth-rotator with 360° turning-range and start at 0°: Step 1 = 360, Step 2 = 0
- Azimuth rotator with 360° turning-range and start at 180°: Step 1 = 180, Step 2 = 180
- Azimuth-rotator with 450° turning-range and start at 0°: Step 1 = 90, Step 2 = 0
- Azimuth rotator with 450° turning-range and start at 180°: Step 1 = 270, Step 2 = 180
- Elevation-rotator with 90° turning-range: Step 1 = 90, Step 2 = 0

Don't worry, the ERC will understand and make a correct calibration out of this.

EVERY position for the calibration of an azimuth-rotator is possible, if it is calibrated within a range of > 180° and < 540°.

After calibration, the Service-Tool will show the results of the calibration in the Calibration-data panel:
- Antenna-type
  - 0 AZ if you have calibrated an azimuth-rotator
  - 1 EL if you have calibrated an elevation-rotator
- ADC-data
  - First value is the range of voltage that has been chosen by the ERC in order to optimize the resolution (auto-range measurement).
    - 0/1/2 for axis 1 = range 16V/8V/4V
    - 3/4/5 for axis 2 = range 16V/8V/4V
  - Second value is the ADC-value of the feedback-voltage measured at the most counter-clockwise (most downward) position.

- o Third value is the ADC-value of the feedback-voltage measured at the most clockwise (most upwards) position.
- o The third value must always be greater than the second value as the feedback-voltage must increase while the rotator is moving clockwise or upwards.

If the feedback-voltage of the rotator has unlinearities, an extended calibration can be performed every 30° by pressing the [Extended 1] button. The installation-guide will tell you, if your specific rotator needs an extended calibration.

7. First check of calibration with Rotor-Control M

The rotor-control-program Rotor-Control M is on the CD supplied with the kit.

Start the Setup-File **SETUP RC-M_Vnn.EXE** directly on the CD and follow the instructions.
The installation wizard will automatically install the Service Tool in the program directory (or any other if you choose a different one) and puts an icon on your desktop.

Set the ERC with the Service-Tool to Baudrate 9600 and Protocol GS232B and close the Service-Tool.

It is important to close the Service-Tool before you start the Rotor Control M because Windows does not allow that more than 1 application is accessing a comport at the same time.

Start Rotor-Control M by double-clicking the Icon on the desktop.

Configure the Axis to <axis1=AZ | axis2=none>.

The green pointer and number show the current position of the rotator.
Targets can be put at the red numbers and the rotator moves after pressing the GO-button.
The STOP-button will terminate rotation.

You can also move the rotator to a target-position by clicking on any point of the graphics.
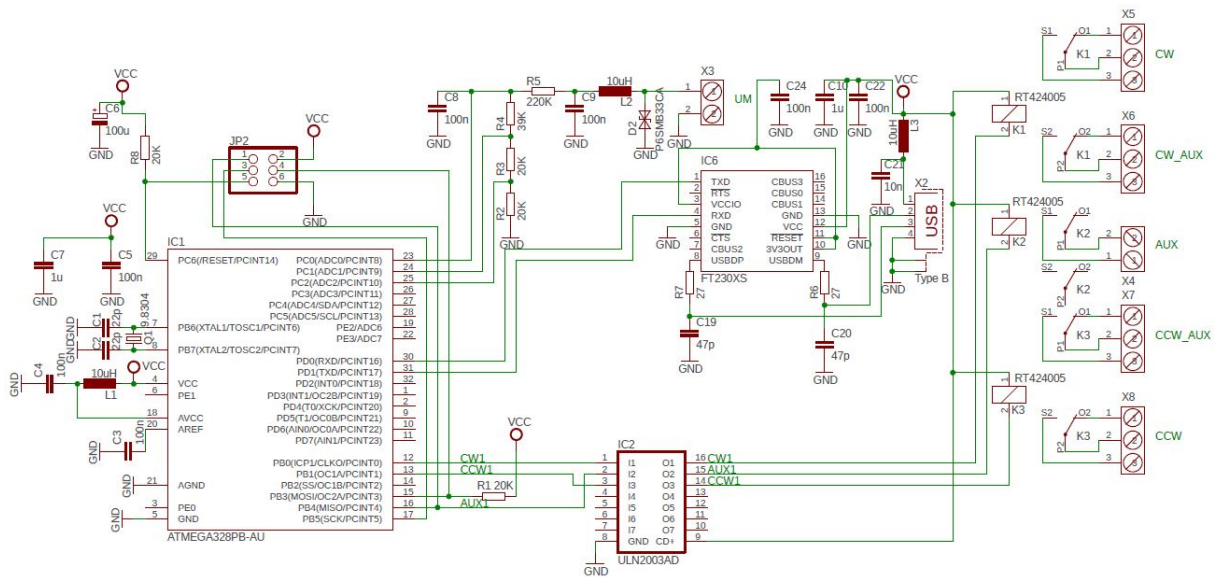By clicking the button PARK, the rotator move to the configured parking position.

8. Connect the ERC to other programs

Please take care about the following issues, if you want to control your ERC with other programs:

- Choose the right COM-port
- COM-port-speed in the program must be same as in ERC
- Adjust the comport in the program to : N-8-1 (No Parity, 8 databits,1 stopbit)
- Use the same protocol in program and ERC (Yaesu GS232B, GS232A or Hygain DCU-1)

More detailed information about specific program-setups can be found on our web-page in the Software-Guide.

Appendix A: Schematics

Appendix B: Assembly plan