Instructions

Congratulations for buying your EASY-ROTOR-CONTROL M SMD (shortly **ERC-M SMD**). This document will guide you through the needed steps for assembly and configuration of the **ERC-M SMD**. You will reach 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 by taking care about the valid instructions and regulations.
- If the product must be repaired, only use original spare parts! Using different parts may cause property damage and personal injury! The repair has only to be done by an expert!
- The installation has to be done by a skilled expert.
- Connection-cables have to be chosen according to the needed diameter.
- Before working on the product all supply-voltages have to be securely cut of.
- The product is designed to work in clean and dry areas inside buildings.
- Prevent the product of humidity, water and heat.
- Don't use the product in areas where explosive gases, vapour or dust are or may occur.
- Don't let the product fall or apply mechanical stress as the product may be damaged.

1. Bill of material (BOM)

QTY	Type	Value	Reference	Comments
**ERC-M SMD V2.3 Bill Of Material**				
1	PCB assembled	ERC-M SMD V2.4		
1	DC-Connector	2.1/5.5/9mm		for DC-cable
1	DSUB-connector	15 pole male solder		for rotor-Cable
1	DSUB-case	for 15 pole		for rotor-Cable
1	USB-cable	A to B 1.8m		USB-cable
1	RS232-cable	phone-jack to D-SUB9		RS232-cable

2. Assembly drawing
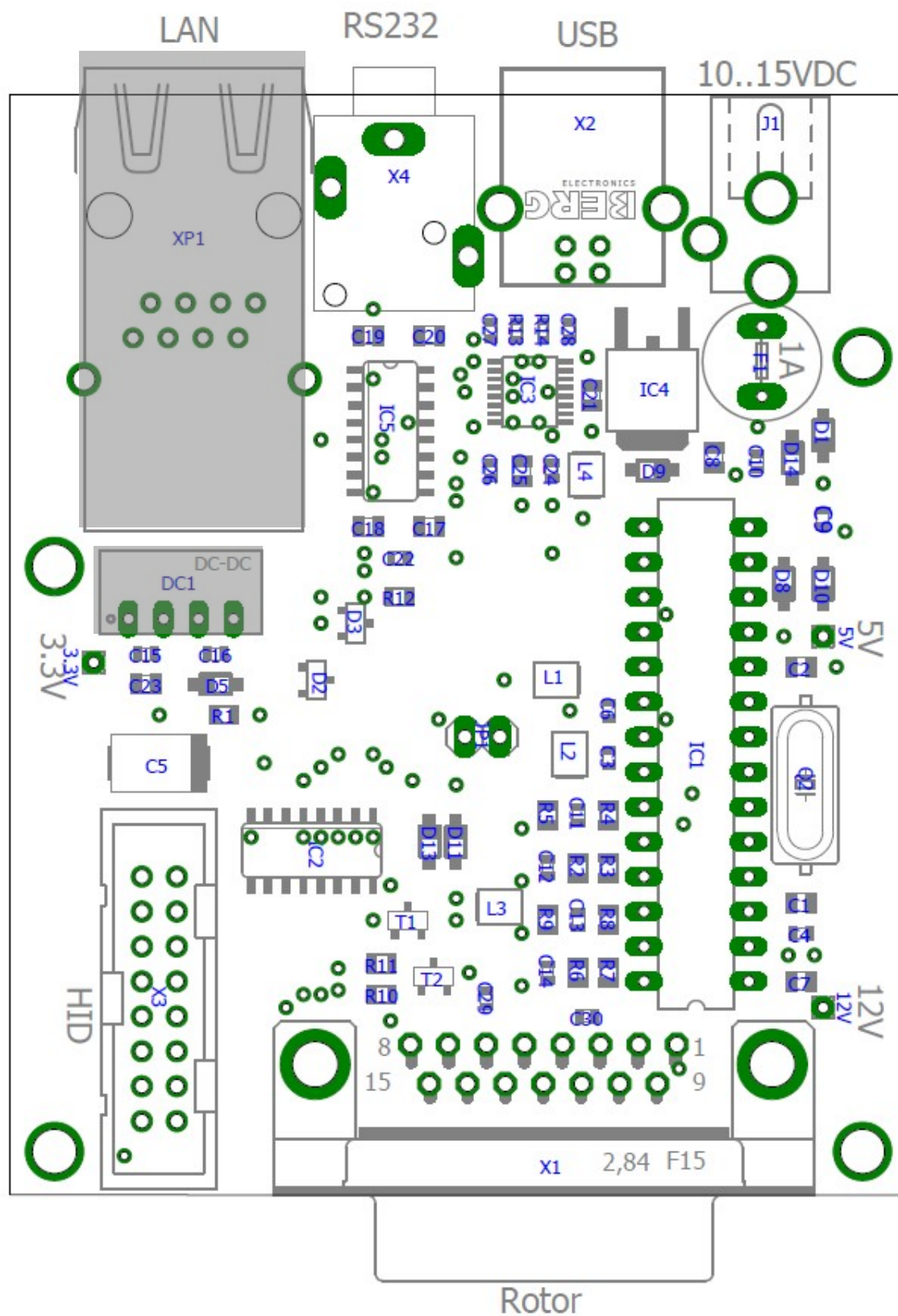
grey = not assembled

3. Connection of the DC-supply

If you don't have rotor-cards or the LAN-option, you don't need to connect an external DC-supply. In this case the ERC-M USB will be powered by USB. Skip this chapter.

Prepare a DC-cable with 10 to 15VDC by using the DC-connector supplied with the ERC-M or use any other DC-supply with that voltage and an appropriate DC-Connector of 2.1/5.5mm.

Connect the **Plus(+)-pole** to the center contact and the **Minus(-)-pole** to the outer contact.

Before connecting the DC-connector to the ERC-M, measure the voltage at the connector, if it is in the range needed.

If DC is reversed, nothing will happen as the Circuit is proven against wrong polarization.
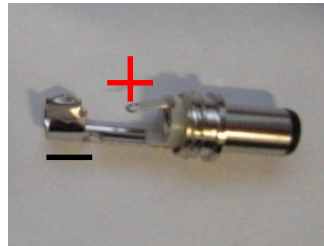
4. Establishing the USB-connection

Plug the USB-B-connector to the ERC-M 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.

```
RS-PC
  Anschlüsse (COM & LPT)
    Enhanced Communication Port (COM5)
    Enhanced Communication Port (COM6)
    Enhanced Communication Port (COM7)
    Enhanced Communication Port (COM8)
    Kommunikationsanschluss (COM2)
    Lantronix CPR Port (COM12)
    USB Serial Port (COM4)
```

5. 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.
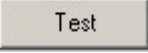
Start the Service Tool by double-clicking the Icon on the desktop.

5.1 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-M, 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-M at the chosen COM-Port. If successful, the Service Tool will read the configuration-parameters of the ERC-M 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 LEDs on the HID-PCB and relays on the rotor-cards will be switched on sequentially.

5.2 Read the ERC-M-configuration-parameters

The parameters of the ERC-M can be read by clicking the [Read ERC] button.

5.3 Language

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

5.4 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.

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6. Theory of operation

A Microcontroller receives commands via the RS232- or USB or LAN-interface in the Yaesu GS-232B (or GS-232A) or DCU-1 protocol from the programs that support controlling rotators.

The ERC-M 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-voltages AZ and EL. To achieve accurate function, the ERC-M has to be calibrated to the specific value of the rotor-feedback-voltages (ref. to the next chapter).
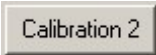
Depending on the direction to move, the contacts CW and CCW or UP and DWN are tighten to ground. With a programmable delay the contact AUX1 and AUX2 will be activated to control the speed or the brake of the rotator.

The ERC-M is powered either by the USB-bus, by the control-box it is connected to or by external 10..12VDC. The current consumption is according to the USB-specifications. Using an USB-hub may require to power this hub. Wherever there is a suitable DC-supply available on the rotor-controllers remote-jack, it is taken from there to supply the ERC-M. The ERC-M is than switching automatically to the external supply in order not to drawn current from the USB-bus.

7. Calibration

After the ERC-M is connected to the rotor-controller, it has 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-M, 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` or

`Calibration 2` 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.
    - Third value is the ADC-value of the feedback-voltage measured at the most clockwise (most upwards) position.
    - 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 un-linearities, an extended calibration can be performed

every 30° for azimuth or every 15° for elevation by pressing the [Extended 1] or [Extended 2] button.

8. 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-M 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.

The green pointers and numbers show the current position of the rotators.
Targets can be put at the red numbers.
You can control the rotators for Azimuth and Elevation separately or together. Click the GO- or STOP-buttons.
You can also move a rotator to a target-position by clicking on any point of the graphics.
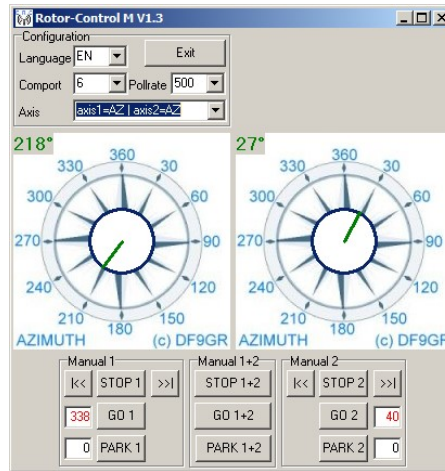By clicking the button PARK, the rotators move to their configured parking positions.

Rotor-Control M can be configured to work for a single-axis setup or a dual-axis setup.
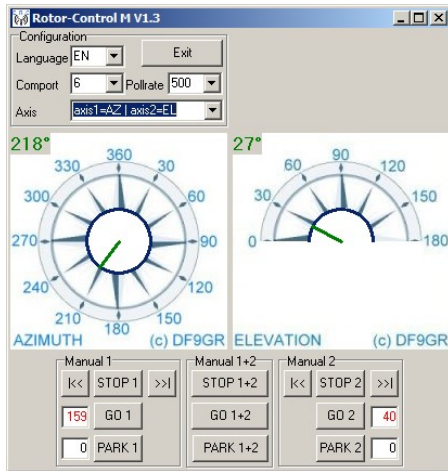
AZ&EL   AZ&AZ   AZ only

9. Connection of ERC-M to other programs

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

- Choose the right COM-port
- COM-port-speed in the program must be same as in ERC-M
  - The speed of ERC-M is shown during the start-up on the LCD or in the service-tool
- Adjust the comport in the program to : N-8-1 (No Parity, 8 databits,1 stopbit)
- Use the same protocol in program and ERC-M (Yaesu GS232B, GS232A or Hygain DCU-1)
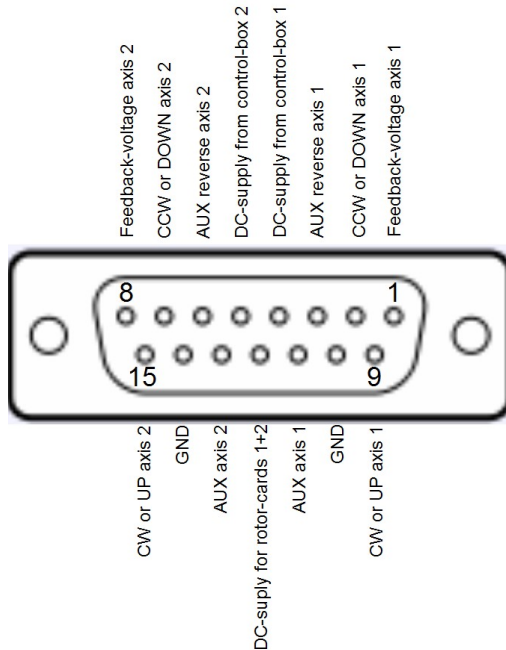 - The protocol of ERC-M is shown during the start-up on the LCD or in the service-tool

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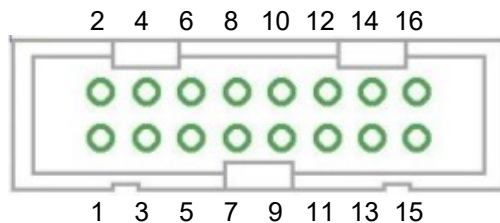
Appendix

Appendix 1: Pin-out of D-SUB15 ERC-M

Connector seen from outside to the female connector on ERC-M or to the back of the desktop-housing.

Appendix 2: Pin-out of the HID-connector on ERC-M

Pin		Pin	
1	GND	9	LCD E
2	VCC	10	LCD RS
3	Keyboard Common	11	LED AUX2
4	+5V	12	LED AUX1
5	LCD D7, Keyboard UP	13	LED DWN
6	LCD D6, Keyboard DWN	14	LED UP
7	LCD D5, Keyboard CW	15	LED CCW
8	LCD D4, Keyboard CCW	16	LED CW

Appendix 3: Schematics ERC-M SMD