USER MANUAL
VIBRATION CONTROL
RMA-POWER-BOX 107/24

IMPORTANT NOTES

Electrical danger within the meaning of this documentation or the warning labels on the product itself respectively means that death, serious injury or considerable material damage may occur if the respective measures of precaution are not taken.

Mechanical danger within the meaning of this documentation or the warning labels on the product itself respectively means that death, serious injury or considerable material damage may occur if the respective measures of precaution are not taken.

Disconnecting live parts within the meaning of this documentation means that before maintenance, repair and installation work, the voltage must be switched off and secured against being switched on again.

Qualified Staff

According to this user manual and the labels on the product itself, qualified staff includes those persons, who are familiar with the installation, mounting, initial operation and operation of the device as well as the dangers associated with this and who have the qualifications necessary for their work, such as:

1. Training or instruction or authorization respectively to switch electric circuits and devices on and off, ground and mark them according to the standards of safety engineering.
2. Training and instruction according to the standards of safety engineering concerning the care and use of adequate safety equipment.
3. First aid training

Intended Use

The RMA-POWER-BOX 107 must only be used for the control of our KÖBRATOR - oscillating rails.

Warranty

Adherence to the user manual is the pre-condition for a failure-free operation and for the settlement of possible claims under the warranty. Therefore, please study the user manual before you operate the device.

Disposal

Dispose of the RMA-POWER-BOX 107 depending on composition and existing regulations as:

- steel scrap
- aluminum
- copper
- synthetic material
- electronic scrap

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1. Safety Instructions

The RMA-POWER-BOX-107 controls oscillating mechanical parts (KÖBRATOR), which may be dangerous.

Safety measures and safety devices must correspond with the valid national regulations (e.g. VDE 0100 T410 / VDE 0113 T1 or EN 60204 / VDE 0160 respectively)
Necessary safety measure: grounding of the RMA-POWER-BOX-107
Necessary safety device: line safety switch (fuse is integrated)

If you do not wish to install the device immediately, but instead wish to store it:
- the storage place must be dry and clean;
–the storage temperature must be between -25℃ and +85 ℃.

Check the device immediately for damaged packaging. Send complaints concerning damages immediately.
See to it that damaged products are not operated!

The connection, initial operation, as well as maintenance and repair work must only be executed by qualified expert staff, taking into consideration
- this manual
- all other connection diagrams belonging to the RMA-POWER-BOX 107
- the presently valid national / international regulations (safety / accident prevention)

The RMA-POWER-BOX 107 is built for the operation in the DC system exclusively. (Nominal voltage 24 V DC)
Input voltage see technical data in Chapter 3.

We reserve the right to change technical data and constructions beneficial to technical progress.

2. Installation

2.1 Mechanical installation

Should the RMA-POWER-BOX 107 have already been mounted by KÖBERLEIN, please disregard Chapter 2.1.

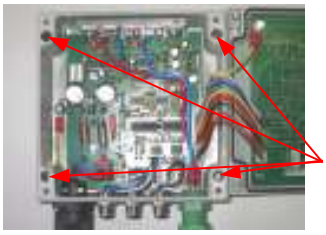
When opening the cover, live parts are uncovered.
When closing the cover, live lines can be pinched.

There is danger of pinching when opening and closing the cover.

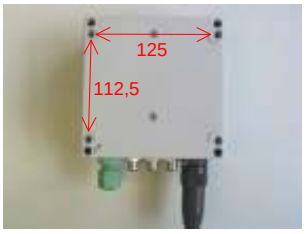
MAKE SURE the voltage of the RMA-POWER-BOX-107 is disconnected before opening the cover.

If the box is delivered loose, mount it through the intended mounting holes. The distance between the vibration control and the KÖBRATOR should not exceed 10 meters. The mounting holes are located under the cover of the RMA-POWER-BOX 107. Remove the four bolts to open the cover and access the mounting holes.

Loosen the four mounting bolts of the cover as shown.



Place cover near casing.
WARNING: Do not shear off any cables.
Now the mounting holes of the casing are accessible.



The drill hole distance is:
Horizontal: 125 mm
Vertical: 112,5 mm
Mounting bolts: max.: M4

2.2 Electrical Installation

Please be sure to note the safety instructions in Chapter 1 during the electrical installation!

THE DEVICE MUST BE GROUNDED.

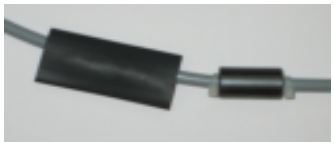
Please be sure to note the safety instructions in Chapter 1 during the electrical installation!

In order to guarantee EMC compatibility, the ferrite ring must be mounted around the feed line at the supply plug as shown at the bottom of the picture.

BE SURE to disconnect the voltage of the RMA-POWER-BOX-107 before the connection and disconnection of the mains connector plug.

The mains supply line must not exceed 1,5 mm² (limited by the plug on the underside of the BOX). Make sure you pay attention to the voltage drop in case of longer lines! Only the delivered cable may be used as a connecting line for the KÖBRATOR.

Make all electric connections according to the connection diagram (Example see Chapter 2.3)



Plug 1: Connection of the mains supply line
(plug and ferrite ring including mounting material included in the scope of delivery)

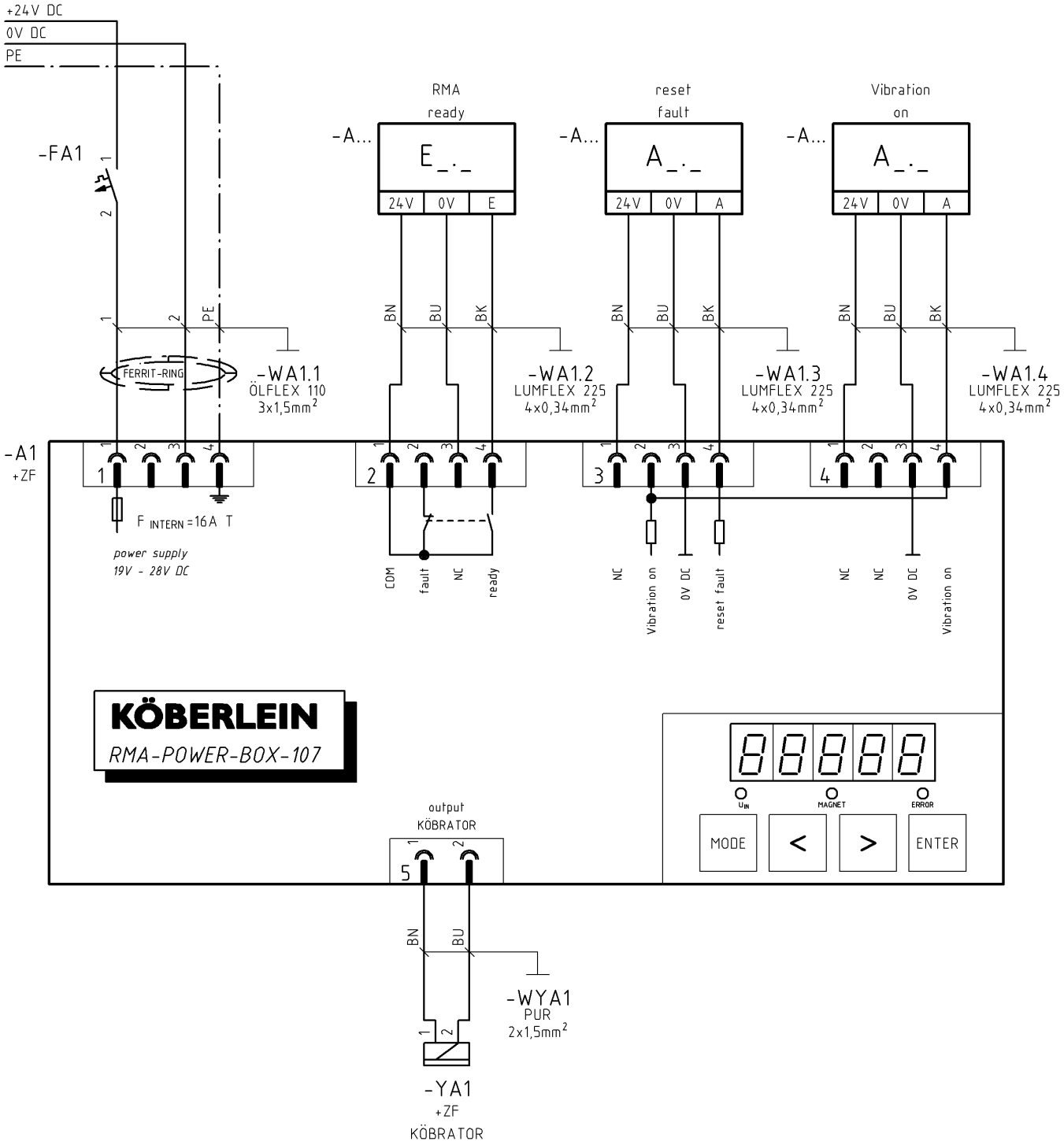
Plug 2: Connection of control, contact operative / malfunction
M12 connection plug

Plug 3: Connection of control, Reset malfunction (and alternatively vibration on)
M12 connection plug

Plug 4: Connection of control, vibration on
M12 connection plug

Plug 5: Connection of KÖBRATOR magnet
(plug and line included in the scope of delivery)

2.3 Connection diagram (example)



3. Technical Data

Operating voltage	19.2 V ... 28.8 V DC
Power consumption:	max. 200 VA
Fuse protection:	Internal 16A T fuse Provide circuit breaker according to EN60204!
Magnet output adjustable output voltage adjustable output frequency: smallest frequency interval: maximum connecting power: Disconnection in case of:	 15 Vpp ... 30 Vpp 10.00 Hz ... 99.99 Hz 0.01 Hz 200 VA overcurrent, short circuit, derating, open circuit
Inputs Input "Vibration on": current consumption at 24 V DC: Input "Reset malfunction”: current consumption at 24 V DC:	 approx. 7 mA approx. 7 mA
Relay output floating Maximum contact load	30 V DC 0.5 A
Operating ambient temperature Storage:	0 ... 50°C -25 ... 85°C
Dimensions W x H x D	140 x 180 x 72 mm
EMC test	According to EN55011 EN61000-3-3 (mains flicker)
Protection class	⊃ (grounded)
Protection type	IP65 (with screwed connecting lines)

4. Commissioning

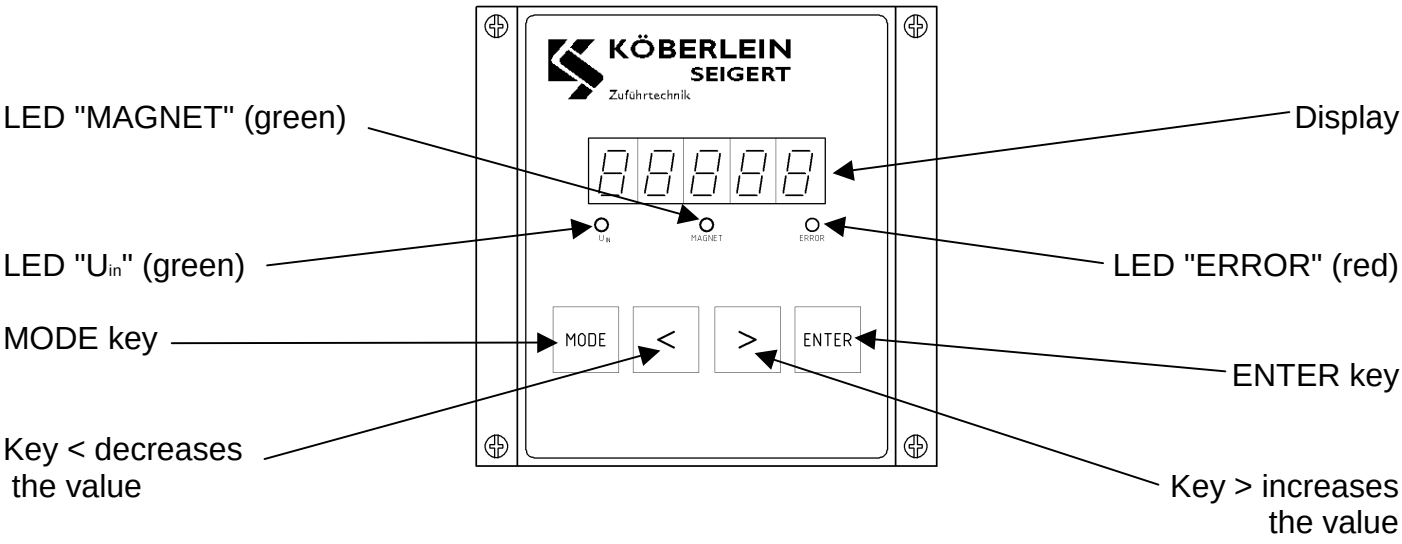
Before commissioning, the safety instructions in Chapter 1 regarding the dangers of electrical systems must be observed.

Before commissioning, the safety instructions in Chapter 1 regarding the dangers of mechanical systems must be observed.

When installation has been concluded, as described in Chapter 2, commissioning can be started. Switch on the supply voltage to the RMA-POWER-BOX 107. The display now shows the Program Version No. for 5 seconds. Subsequently, the RMA-POWER-BOX 107 signals that it is ready for operation via Plug 2. After power-up, the Auto Mode is always active. The input "Vibration ON" (Plug 4) can be used to switch the magnet on/off, e.g. by means of a PLC. With the magnet switched off, the display shows "A 0". With the magnet switched on, the display shows the preset vibration value, e.g. "A 87".

5. Operation

5.1 Operating and display elements



Briefly pressing the keys < or > decreases/increases the corresponding parameter in small steps. Holding the keys < or > down starts the fast mode, which permits rapid changing of the setting. The adjusted values are stored by pressing the ENTER key. Pressing the **MODE** key takes you to the next operating mode or to the next adjustment parameter.

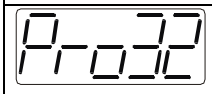
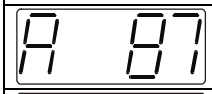
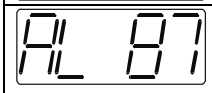
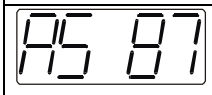
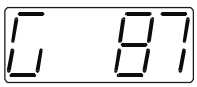
5.2 Permanent displays

The LED "U_{in}" lights up as soon as the supply voltage is connected to the unit.

The LED "MAGNET" blinks with the preset magnet output frequency as soon as the output is active.

The LED "ERROR" lights up as soon as the unit detects a fault (for details, see Chapter 6. Troubleshooting).

5.3 User menu

Display	Description	Value / function
	Display of the program version 3.2	Only Display
	Error indication (for detailed description, refer to Chap. 6. Troubleshooting)	Only Display
	Automatic Mode – (normal operating mode) the selected vibration is shown	Only display 0…130%
	Automatic Mode disabled – the key lock is active. Operation as in Automatic Mode.	Pressing ENTER for 10 sec. Toggles the key lock on/off.
	Automatic Mode – Soft start active Behavior identical to automatic mode The duration of Soft start can be set in the Main menu, parameter S.	Only display 0…130%
	Hand Mode – here, the vibration power for automatic operation can be changed.	0…130%
	HAND Mode – Soft start active The duration of Soft start can be set in the Main menu, parameter S	0…130%
	Basic Mode Pressing the following key combination takes you back to the **Main menu** Hold down **<** **>** and press ENTER three times	Pressing ENTER stores the vibration output value adjusted under **"u"** in the Main menu

5.3.1 AUTO Mode

In the **A**uto Mode, the magnet can only be operated via the input "Vibration ON" (Plug 4). With the magnet switched off, the display shows "**A 0**". With the magnet switched on, the display shows the preset vibration value, e.g. "**A 87**". The output power cannot be changed in this operating mode.

If Soft start is active, the frequency is increased by the set value (Main menu, parameter S) when the magnet is switched on and progressively adjusted to the nominal frequency. An “S” is shown in the display as long as Soft start is active (e. g. ”**AS 87**“).

The **key lock** can **only** be activated in the **A**uto Mode by pressing the **ENTER** key for 10 sec.
The display shows **AL** (=> AUTO LOCK).
To deactivate the key lock, simply press the **ENTER** key again for 10 sec.

5.3.2 HAND Mode

In the **H**and Mode, the output power for the magnet is permanently on. The display shows the currently selected value (e.g. **H 87**). By pressing the keys **<** or **>** it is possible to change the vibration power. Pressing the **ENTER** key stores the changed value for the **A**uto Mode (the value is maintained also in case of a power failure). If no key is pressed during 1 minute, the unit automatically switches back into the Auto Mode.

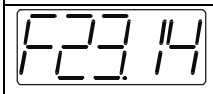
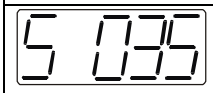
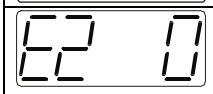
If Soft start is active, the frequency is increased by the set value (Main menu, parameter S) when the magnet is switched on and progressively adjusted to the nominal frequency. An “S” is shown in the display as long as Soft start is active (e. g. ”**HS 87**“).

5.3.3 BASIC Mode

Also in the Basic Mode, the output power for the magnet is permanently on. The display shows the currently active output value (e.g. **G 87**).
Pressing the **ENTER** key transfers the factory setting to the **A**uto and **H**and Modes.

Access to the Main menu from the BASIC Mode is via the key combination
“< > hold and press ENTER three times to confirm“.

5.4 Main menu

Display	Description	Value / function
	Vibration power – here, the standard factory setting For vibration power can be changed for automatic operation.	0...130%
	Resonance frequency of the magnet.	10.00Hz...99.99Hz
	Soft start – when the magnet is switched on, the frequency is increased by the set value and then progressively reduced to the nominal value set in parameter F. The operation mode cannot be changed during the soft start.	0...50
	Display of the unit's Serial No.	Only display
	Delay – here, a delayed switch-off for the output for the magnet can be activated.	0 = Off 1 = On
	Error – Active / deactivate malfunction **Err 2**	0 = Evaluation of malfunction Off 1 = Evaluation of malfunction On

Holding down the ENTER key for 3 sec. takes you back to the User menu.

5.4.1 Parameter "u" – Vibration power

This parameter has been preset to an optimum value (e.g. 60) at the factory. The value is stored for all Modes.
If the operator has changed the vibration power value in Mode "**H**" (e.g. to 87), Modes "A" and "H" can be reset to the original factory setting (stored in Parameter "u", e.g. 60) by means of the Basic Mode "G".
The setting made in Mode “H“ has priority.

5.4.2 Parameter "F" – Frequency

This parameter is used to preset the magnet voltage frequency. Every unit has been preset at the factory with the specific frequency of the KÖBRATOR. However, the resonance of the overall system depends on various factors. Therefore, it might be necessary to do some **fine tuning after the system has been installed**.

Proceed as follows for fine tuning:
Set Parameter "u" to 100%, and store by pressing ENTER. Change to parameter "F", and use key ">" or "<" to adjust the frequency until the Köbrator has reached maximum vibration amplitude. Store this setting by pressing the ENTER key. Now change back to Parameter "u", and adjust the optimum vibration power for the component. Press ENTER to store the value. Now hold down the ENTER key until the display changes to Mode "G" (Basic Mode) in the User menu. Pressing the ENTER key again will transfer the value adjusted in "u" into the Modes "A" and "H".

5.4.3 Parameter "S" – Soft start

Parameter “S“ enables an increase of frequency to be set which becomes active when the magnet is switched on. Then, the frequency is progressively reduced to the value set in parameter F. This increase in frequency prevents the magnet "bottoming" on the yoke during start-up.

The set value causes the frequency to be increased by S x 0.01Hz. Every 500 ms, the frequency is reduced by 0.01Hz until the nominal frequency is reached.

By way of example, F=13.15Hz is set for frequency and S=25 for Soft start. With these settings, the unit will start up at a frequency of 13.40Hz, and the set frequency of 13.15Hz will be reached after 12,5 sec.

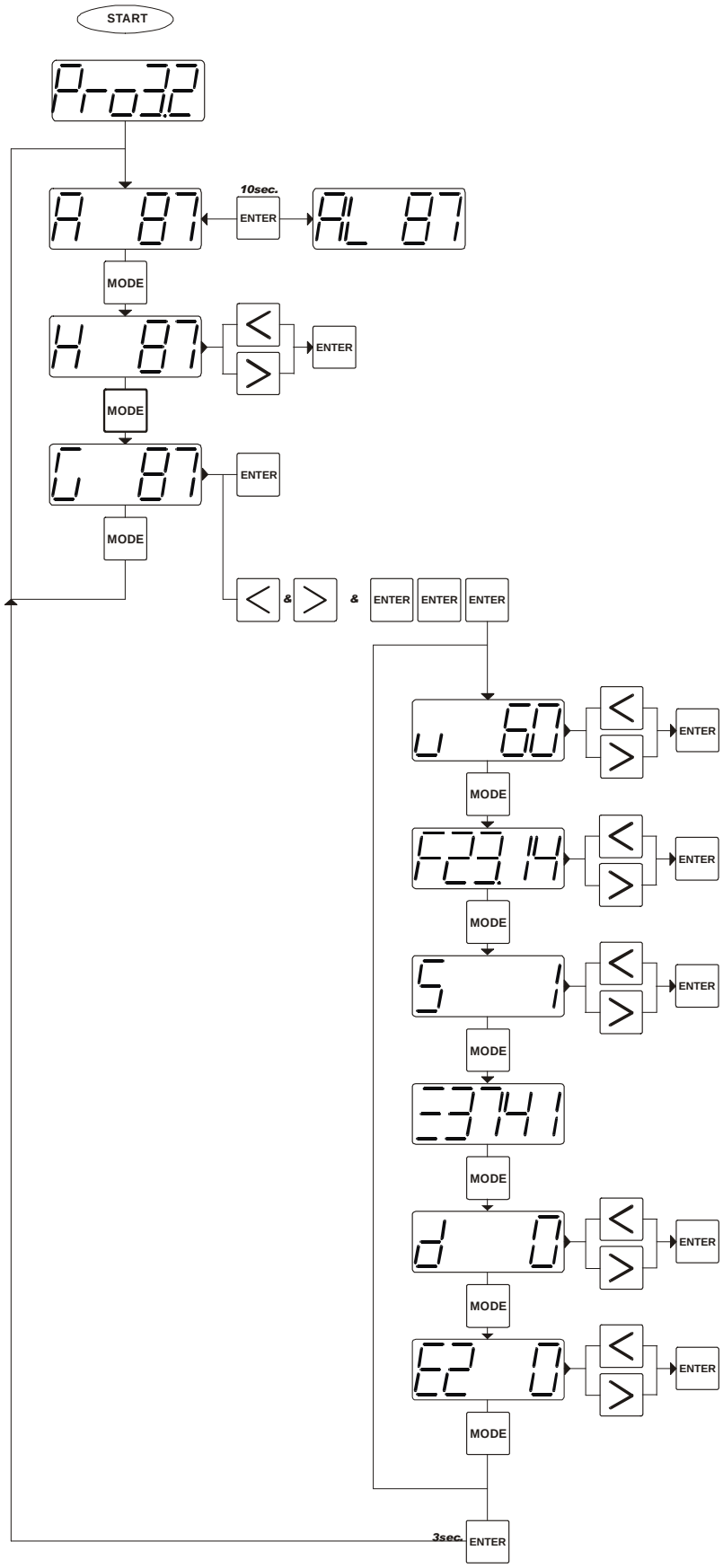
5.4.4 Parameter "d" – Delay

Parameter "d" – causes the magnet to be switched off only after a delay (=1) time has elapsed. This might be necessary e.g. with timed outputs of safety control systems, to prevent inadvertent operation of the magnet output.

5.4.5 Parameter "E“ - Error

The parameter „E“ – Error (=0) deactivates the malfunction **Err 2** Operation without magnet. Set the value to "1“ to activate evaluation, otherwise, the error message will be suppressed.

5.5 Menu structure



6. Troubleshooting

6.1 In case of a fault

The following applies for all operating modes:
In case of a malfunction (interruption or short circuit) of the device, the display indicates the potential cause. The display shows **Err** and the **number** of the current malfunction.
The magnet output (Plug 5) is switched off, and the potential-free relay (Plug 2) is de-energized. Evaluation of the malfunction is possible via pins **1, 2, and 4** at Plug 2.
Together with the **ERROR** display, the **red "ERROR" LED** lights up.

The malfunction can be acknowledged either by pressing the **ENTER** key, or by means of the input "Fault reset" (Plug 3). Subsequently, the RMA changes back into the **A**uto Mode.

6.2 Locating the fault

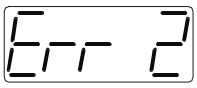
This chapter on troubleshooting only covers the components of the RMA-POWER-BOX 107 in connection with a KÖBRATOR.

Troubleshooting only by qualified staff!

Troubleshooting only by qualified staff!

BE SURE to disconnect the voltage of the RMA-POWER-BOX-107 before opening the cover.

6.2.1 Error list

Malfunction		Cause	Solution
	Short circuit Magnet output	Magnet in the KÖBRATOR defective **or** Cable connection between magnet and RMA defective (short circuit)	Check the plug connection at the rear of the KÖBRATOR. Check the cables for short circuit, replace if applicable. Determine the resistance of the magnet in the KÖBRATOR, replace the magnet if necessary. (For the resistance of the magnet, please refer to the maintenance instructions and the spare parts list of the KÖBRATOR)
	Operation without magnet	Electrical connection between KÖBRATOR and RMA 107 interrupted, **or** No magnet has been connected to the device output	Connect the magnet as shown in the sample connection diagram.
	Control error	Excessive hysteresis between the set point value and the actual value at the magnet output	The device is defective and must be replaced.
	Undervoltage	Line voltage has been under 19 V DC for more than 10 ms	Check line voltage.
Supply voltage has been applied, but the display shows no information		Miniature fuse is defective	Have the fuse replaced by qualified staff (See 6.3 Replacement of fuses)
The **MAGNET** output has been activated, but the KÖBRATOR does not vibrate		KÖBRATOR is jammed mechanically **or** The yoke-magnet distance in the KÖBRATOR has changed	Switch off the device and check whether the KÖBRATOR is jammed Please ask the service staff of our "Elektro" manufacturing department for the set dimension between the yoke and the magnet. Switchboard: +4936944/522-0 "Elektro" dept.: +4936944/522-203

6.3 Replacement of fuses

When opening the cover, live parts are uncovered. When closing the cover, live lines can be pinched.

There is danger of pinching when opening and closing the cover.

MAKE SURE the voltage of the RMA-POWER-BOX-107 is disconnected before opening the cover.

Disconnect the voltage of the RMA-POWER-BOX 107 and secure it against being switched on again.

Open the four mounting bolts of the cover as shown.

Place cover near casing.
WARNING: do not shear off any cables
Now the mounting holes of the casing are accessible

Remove the defective fuses and replace them by new ones. (I=16AT)
Refit the cover and activate the device.