USER MANUAL
VIBRATION CONTROLLER
RMA POWER BOX 108

IMPORTANT INFORMATION

Electrical Danger **as used in this documentation and in the warning information attached to the product means that failure to take the appropriate safety measures can result in severe physical injury or considerable damage to property.**

Mechanical Danger **as used in this documentation and in the warning information attached to the product means that failure to take the appropriate safety measures can result in death, severe physical injury or considerable damage to property.**

Disconnect Current-Conducting Components **as used in this documentation means that the power supply is to be disconnected before commencing any maintenance, repair or installation work, and secured against inadvertent reconnection.**

Qualified Personnel

Qualified Personnel, as referred to in this documentation and in the information attached to the product itself, are those persons who are familiar with the installation, assembly, start-up procedures, and general operation of the apparatus; they are also familiar with the associated dangers and in they possess qualifications appropriate to their activities, e.g:

1. **Training in or instruction/authorisation to switch electric circuits and apparatus on and off, to ground them and to label them, in accordance with prevailing technical standards.**
2. **Training or instruction in accordance with the standards of safety engineering in the care and use of appropriate protection equipment.**
3. **Training in First Aid.**

Intended Use

The RMA POWER BOX 108 may only be used to control KÖBRATOR oscillating rails made by us.

Guarantee

This user manual must be adhered to in order to ensure failure-free operation of the apparatus and for settlement of possible warranty claims. You should therefore read the manual before commencing any work with the apparatus.

Disposal

The RMA POWER BOX 108 is to be disposed of in accordance with the materials and with respect to prevailing regulations, as follows:

- **Steel scrap**
- **Aluminium**
- **Copper**
- **Plastic**
- **Electronic scrap**

Contents

1. Safety Guidelines

The RMA POWER BOX 108 controls vibrating mechanical parts (KÖBRATOR), which may be dangerous.

Safety measures and protective devices must conform with valid national regulations (e.g. VDE 0100 T410 /VDE 0113 T1 / EN 60204 / VDE 0160
Necessary safety measure: Grounding of the RMA POWER BOX 108
Necessary protective device: Line safety switch (with integrated fuse)

If you do not intend to install the apparatus immediately but wish to store it first, please observe the following:

- **Store the apparatus in a dry and clean place;**
- **Store at a temperature between –25°C and +85°C.**

Inspect the apparatus immediately for transport damage. Any claims regarding damage are to be made immediately.
Ensure that damaged products are never put into operation!

Connection, initial start-up, and all maintenance and repair work must be performed by qualified personnel, taking into consideration the following:

- **This manual**
- **All schematic diagrams referring to the RMA POWER BOX 108**
- **Currently valid national and international regulations (concerning safety and accident prevention)**

The RMA POWER BOX 108 is designed solely for DC operation (nominal voltage: 24V DC). For information on input voltage, see Technical Data in Section 3.

We reserve the right to make changes to technical data and engineering constructions in the interest of technical progress.

2. Installation

2.1 Mechanical Installation

If the RMA POWER BOX 108 has already been installed by KÖBERLEIN, Section 2.1 may be disregarded.

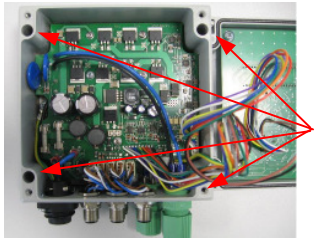
When removing the lid, current-conducting components are exposed.
Ensure that no conducting cables are trapped when replacing the lid.

Danger of pinching when removing or replacing the lid.

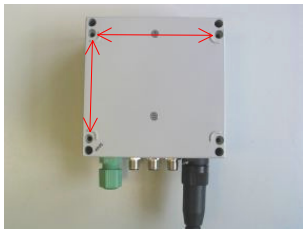
MAKE SURE that the power is disconnected from the RMA POWER BOX 108 before removing the lid.

If the BOX is supplied unmounted, it should be fixed using the mounting holes provided. The distance from the vibration controller to the KÖBRATOR should not exceed 10 metres. The mounting holes are located underneath the lid of the RMA POWER BOX 108. Remove the four screws to open the lid.

Remove the four screws from the lid as shown.



Place the cover near the casing.
WARNING: Do not sheer off any cables.
The mounting holes of the casing can now be accessed.



The holes are positioned as follows:
Horizontally: 125mm
Vertically: 102.5mm
Mounting screws: max. M4

2.2 Electrical Installation

Be sure to read the safety information in Section 1 before continuing with the electrical installation!

THE DEVICE MUST BE GROUNDED.

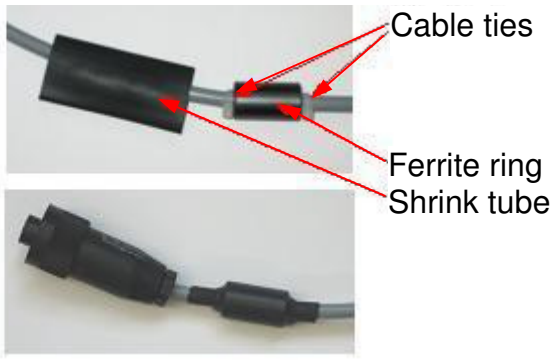
Be sure to read the safety information in Section 1 before continuing with the electrical installation!

To ensure EMV conformity, the ferrite ring around the power supply cable must be mounted as illustrated below.

BE SURE to disconnect the power from the RMA POWER BOX 108 before connecting or removing the power supply plug.

The mains supply line must not exceed 1.5mm² (due to the dimensions of the plug on the underside of the BOX). Please note that longer supply lines may result in a voltage drop! Only use the cable supplied for connecting the KÖBRATOR.

Make all electrical connections in accordance with connection diagram (see example in Section 2.3).



Plug 1: Power supply connector
(Plug and ferrite ring incl. mounting materials supplied)

Plug 2: Controller connector, "Operational"/"Error" contact
M12 connecting plug

Plug 3: Controller connector, "Reset Error" (alternatively "Vibration On")
M12 connecting plug

Plug 4: Controller connector, "Vibration On"
M12 connecting plug

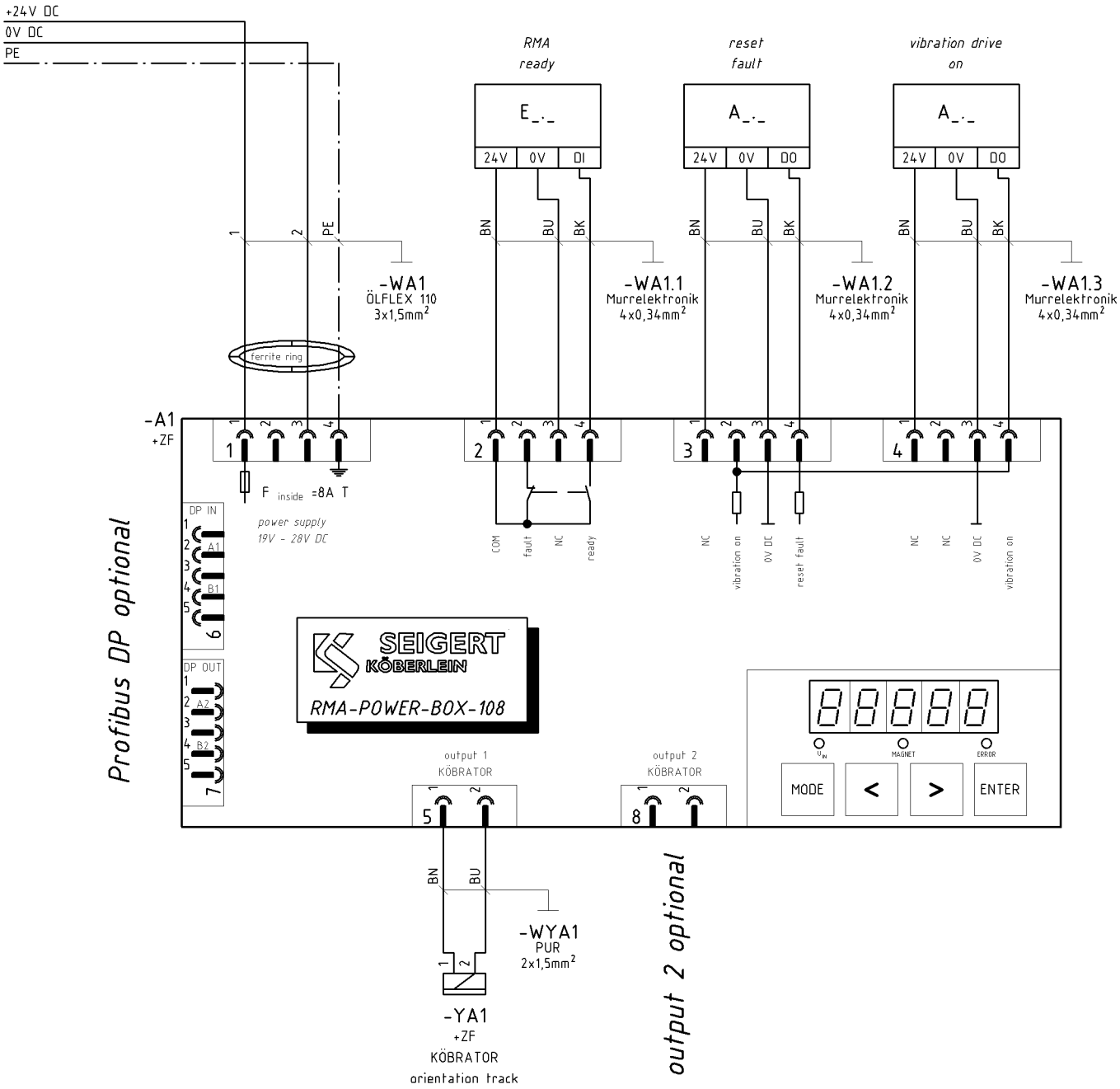
Plug 5: KÖBRATOR Magnet 1 connector
(Plug and cable supplied)

Plug 6: Profibus In connector (Option RMA 108/DP/...)
M12 connecting plug

Plug 7: Profibus Out connector (Option RMA 108/DP/...)
M12 connecting plug for connection to Profibus
If RMA 108 is used as the final Profibus device, an M12 terminating resistor must be connected, e.g. (Siemens 6GK1905-0EC00).

Plug 8: KÖBRATOR Magnet 2 connector (Option RMA 108.../2x4Q)
(plug and cable supplied)

2.3 Connecting diagram (example)



3. Technical Data

Operating voltage:	19.2V ... 28.8V DC
Power consumption:	max. 200VA
Fuse:	Internal: 2x8A T Provide line protector as per EN60204!
4Q magnet output : Adjustable output voltage Adjustable output frequency: Smallest frequency interval: Maximum connection power: Switch-off conditions:	 15Vss ... 30Vss 10.00Hz ... 40.00 Hz 0.01Hz 200VA Overload, short circuit, Underload, idle operation
Inputs: "Vibration On" Current consumption at 24V DC: "Reset Error" Current consumption at 24V DC:	 ca. 7mA ca. 7mA
Relay output, potential-free: Max. contact load:	 30V DC 0.5A
Ambient operating temperature: Storage:	 0 ... 50°C -25 ... 85°C
Dimensions: W x H x T	 140x180x72mm
EMV test	According to EN55011 EN61000-3-3 (circuit feedback)
Protection class:	I (grounded)
Protection type	IP65 (with screwed connecting lines)

4. Start-up

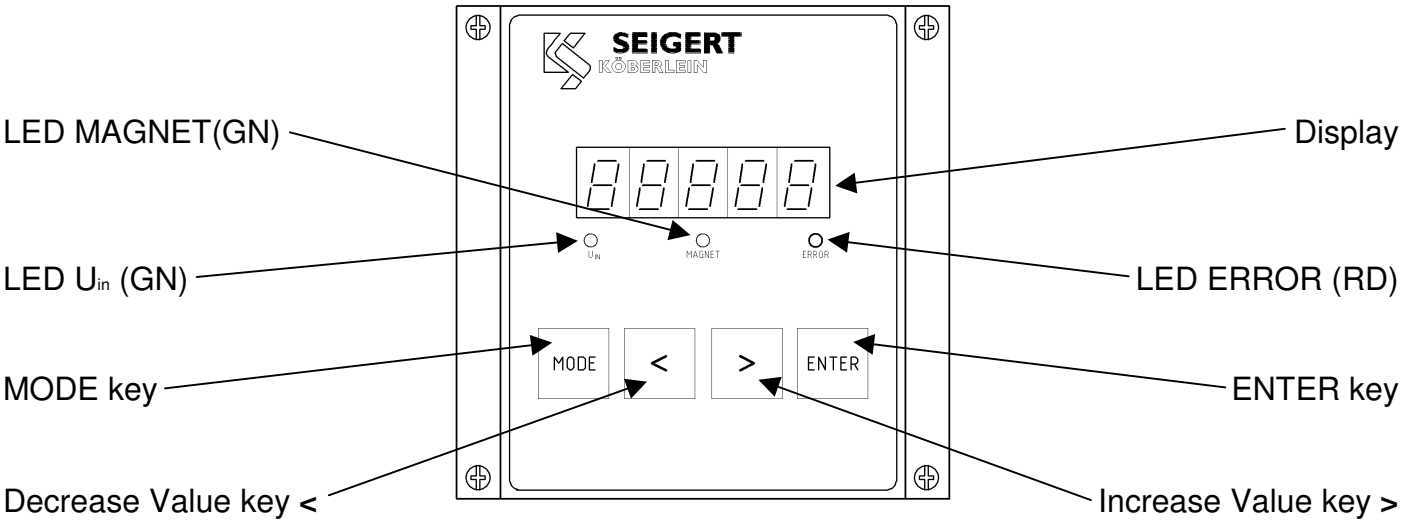
Before performing the start-up, be sure to observe the safety information regarding Electrical Danger in Section 1!

Before performing the start-up, be sure to observe the safety information regarding Mechanical Danger in Section 1!

Once installation has been completed as described in Section 2, the apparatus can be put into operation.
Switch on the power supply of the RMA POWER BOX 108. The display will show the firmware version number for the first 5 sec. after switch-on. Then the RMA POWER BOX 108 signals its readiness for use via the output (plug 2). Immediately after switch-on, the unit is always in AUTO mode. The Vibration On input (plug4) can, for example, be used for switching the magnet of an SPS on or off. When the magnet is switched off, the display shows A 0, and when it is switched on, it shows the vibration value, e.g. A 87.

5. Operation

5.1 Position of Operating and Display Elements



Pressing the **<** or **>** keys will increase or decrease the values of the respective parameter in fixed intervals. Hold either of the **<** and **>** keys down to rapidly change the setting values. Press the **ENTER** key to apply setting values. Press the **MODE** key to advance to the next operating mode or the next parameter.

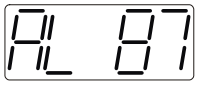
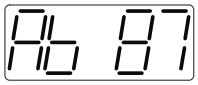
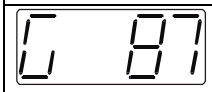
5.2 Permanent Displays

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

The MAGNET LED flashes showing the set magnet output frequency, as soon as the output is active.

The ERROR LED lights up as soon as the apparatus detects an error (for precise description, see Section 6. Troubleshooting).

5.3 User Menu

Display	Description	Value/Function
	Firmware version number 1.0 displayed	Display only
	Error (for precise description, see Section 6. Troubleshooting)	Display only
	Automatic mode – (standard operating mode) the set vibration power is displayed	Display only: 10...130
	Automatic mode locked – The key lock has been activated. Proceed as for Automatic mode	Hold down ENTER (10 sec.) to toggle key lock on or off.
	Automatic mode – Soft Start activated Proceed as for Automatic mode The duration of the Soft Start can be set in the Main Menu under Parameter S	Display only: 10...130
	Automatic mode – (operating mode when using Profibus) the transmitted vibrating power is displayed	Display only: 10...130
	Manual mode – to change the vibration power for the Automatic mode	10...130
	Manual mode – Soft Start activated The duration of the Soft Start can be set in the Main Menu under Parameter S	10...130
	Basic mode Press the keys in the following combination to enter the **Main Menu**. Hold down < > and press ENTER three times.	Press ENTER to apply vibration power settings made in main menu under **u**.

5.3.1 AUTO Mode

In Automatic mode, the magnet can only be switched on by means of a signal from the input (plug 4). When it is switched off, the display shows "**A 0"** and when it is switched on, the set vibration value is displayed, e.g. "**A 87**". The vibration power can not be reset in this mode!

If the Soft Start is activated, the frequency is altered gradually to the target frequency after the magnet has been switched on. The number of steps is defined by the parameter S. Active Soft Start is indicated by the letter S in the display (e.g. **AS 87**).

Holding down the **ENTER** key for **10 seconds** in Auto mode will toggle the key lock on or off. The display then shows an **L** after the **A** (**AL** => AUTO LOCK).

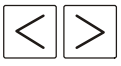
5.3.2 MANUAL Mode

In Manual mode, the magnet output is switched on permanently. The display shows the setting value (e.g. **H 87**). The keys **<** or **>** can now be pressed to change the vibration value. Press the **ENTER** key to apply the value in Automatic mode (the value is retained in the memory even if the power is interrupted). If no button is pressed for one minute, the unit automatically returns to AUTOMATIC mode.

If the Soft Start is activated, the frequency is altered gradually to the target frequency after the magnet has been switched on. The number of steps is defined by the parameter S. Active Soft Start is indicated by the letter S in the display (e.g. **AS 87**).

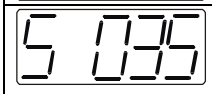
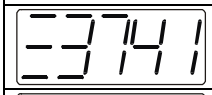
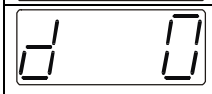
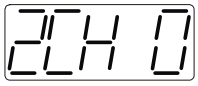
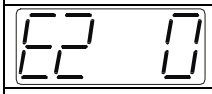
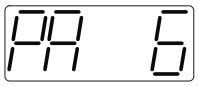
5.3.3 BASIC Mode

In the Basic Settings mode, the magnet output is switched on permanently (e.g. **G 87**).
By pressing the **ENTER** key, the value which has been stored in the main menu (e.g., u87) is copied into the auto- and manual modes.
If no button is pressed for one minute, the unit automatically returns to AUTOMATIC mode.

When the unit is in BASIC mode, the main menu can be accessed by pressing the keys in the following combination: hold down  and press 

three times (see 5.3 User Menu).

5.4 Main Menu

Display	Description	Value/Function
	Vibration power – the factory-set vibration value is set for Automatic mode.	10...130%
	Resonant frequency of magnet	10.00Hz...40.00Hz
	Soft Start – when the magnet is switched on, the frequency is raised by the setting value and then gradually dropped until it reaches the target value set in Parameter F. It is not possible to change the operating mode during a soft start.	0...50
	The serial number of the apparatus are displayed	Display only
	Delay – to activate a switch-off delay time for the magnet output	0 = Off 1 = On
	Channel 2 – for activating Channel 2	0 = Off 1 = On
	Error 2 – activate/deactivate **Err 2**	0 = Error evaluation Off 1 = Error evaluation On
	Error 5 activate/deactivate **Err 5**	0 = Error evaluation Off 1 = Error evaluation On
	Set PROFIBUS address	2 - 125

In the main menu, the magnet is switched on permanently!

Press the ENTER key and hold it for 3 seconds to return to the User Menu.

5.4.1 Parameter u – Vibration Output

This parameter is factory-set to the ideal value. This value is applied in all modes.
If the user has changed the vibrating power in mode H, the value originally stored in the u parameter can be restored for modes A and H by pressing the ENTER key in mode G.
The setting made in mode H has priority.

5.4.2 Parameter F - Frequency

This parameter is used to set the frequency of the magnet. All units are factory set to the specific frequency for the KÖBRATOR. The resonance of the system as a whole is however dependent on a number of factors. For this reason, it may be necessary to perform some **fine adjustments after completing the installation and mounting of the system**.

To do this, proceed as follows:

Set parameter u to 100 and press ENTER to apply. Change to parameter F and change frequency using the > and < keys, until the maximum vibration amplitude is arrived at in the Köbrator. Press ENTER to apply this value. Change to parameter u and set the optimum vibration value for the component. Press ENTER to apply this value. Press the ENTER again and hold it until the display changes to User Menu Mode G. Press the ENTER key once more to apply the new value for u to the A and H modes.

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 setting value causes the frequency to increase by S x 0.01Hz. The frequency is reduced by 0.01Hz every 500ms until the target frequency is reached.

As an example, the frequency is set to F=13.15Hz and Soft Start to S=25 in the unit. On switch-on, the apparatus will set a frequency value of 13.40Hz and drop to the set frequency of 13.15Hz after 12.5 sec.

5.4.4 Parameter d (Delay)

Parameter d (=1) causes a switch-off delay at the output of the RMA 108. This may be necessary with timed outputs of safety control systems, to prevent inadvertent switching off of the magnet output.

5.4.5 Parameter E2 – Error 2

Parameter E2 (=0) deactivates the **Err 2** error – Operation without a magnet. Error evaluation is activated when the value is set to 1.

5.4.6 Parameter E5 – Error 5

Parameter E5 (=0) deactivates the **Err 5** error – No Profibus. Error evaluation is activated when the value is set to 1.

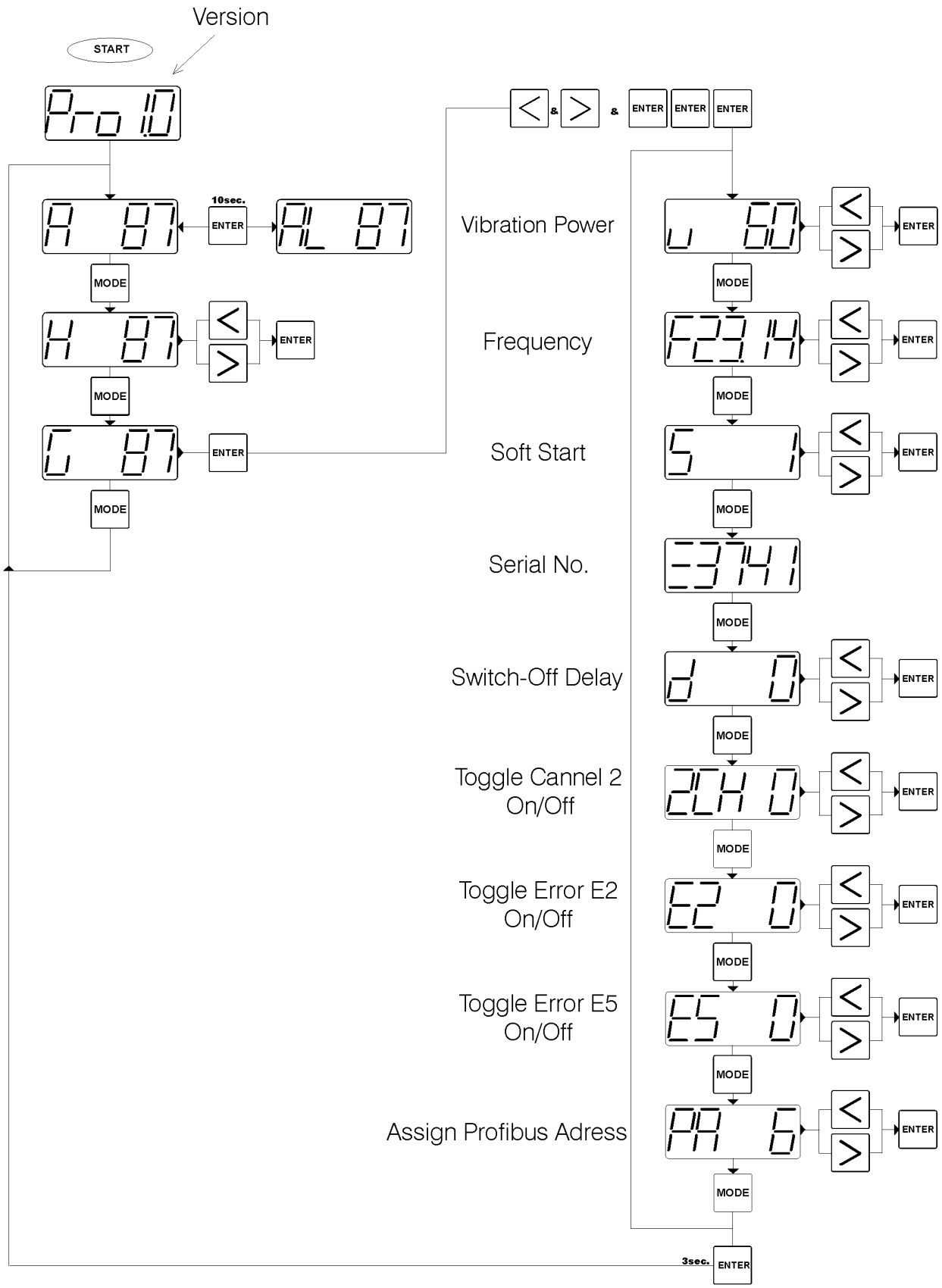
5.4.7 Parameter PA PROFIBUS Address

Parameter PA is used for assigning an address of 2 to 125 to the Profibus.

5.5 Menu Structure

Main Menu

Basic Settings



6. Profibus (Option RMA 108/DP/...)

6.1 Profibus Communication

During communication with the PROFIBUS master, the following 9 bytes of data are exchanged:

Byte	r/w	Description	Function	Range
1	[7-0] r	Error status	Error byte indicates current error Bit 7 … Bit 0 Error 4 Channel 1 | Error 3 Channel 1 | Error 2 Channel 1 | Error 1 Channel 1 | Error 4 Channel 2 | Error 3 Channel 2 | Error 2 Channel 2 | Error 1 Channel 1	0/1
2	[6] r [5-4] w [3-0] r/w	Control	(De-)activate operational readiness, release, error acknowledgement, operating mode, error 5/2, (De-)activate delay Bit 7 … Bit 0 - | Operational | Release | Ackn. error | Chann. 2 on/off | Error 5 on/off | Error 2 on/off | Delay on/off	0/1
3-4	r/w	Target frequency	Target frequency 10.00-40.00Hz (enter in whole numbers!) E.g. desired target frequency is 25.78Hz. Procedure: value transferred to bytes 3 and 4 in binary form with no decimal point. 25.78 → 2578 → 0000101000010010 Bit 7 … Bit 0 Bit 7 … Bit 0 0 0 0 0 1 0 1 0 0 0 0 1 0 0 1 0	1000-4000
5	r/w	Vib. power	Vibration power (pulse-width modulation)	1-130
6	r/w	Soft Start	Delayed start-up	0-50
7-8	r	PBAddr	Assigned Profibus address	2-125
9-10	r	SNR	Serial number of apparatus	1-9999

6.2 GSD File

The GSD file "KuS0C42.GSD" is supplied on CD for enabling communication between the PROFIBUS master and the PROFIBUS slave. Alterations to the profibus addresses are only taken over after restarting the RMA 108!

7. Errors

7.1 In the Event of an Error

The following applies for all operating modes:
Should a fault develop with the apparatus (open or short circuit), the display indicates possible causes of the malfunction. The display shows the word **ERROR** together with the respective **error number**. The magnet output (Plug 5) is switched off, and the potential-free relay (plug 2) is de-energised. Evaluation of the malfunction can either be performed via pins **1, 2, and 4** on plug 2 or on the Profibus.

As well as displaying the word **ERROR**, the **red "ERROR" LED** lights up.

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

7.2 Troubleshooting

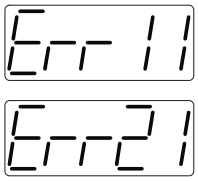
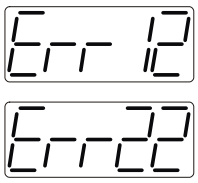
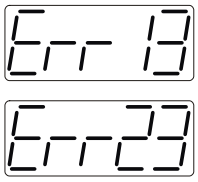
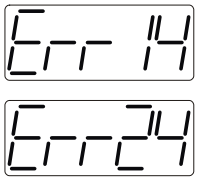
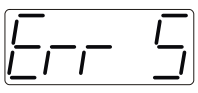
This troubleshooting section only covers the RMA-POWER-BOX 108 module in conjunction with a KÖBRATOR.

Troubleshooting must always be performed by qualified personnel!

Troubleshooting must always be performed by qualified personnel!

BE SURE to disconnect the RMA POWER BOX 108 from the power supply before removing the lid.

7.2.1 List of Errors

Error/Display	Description	Cause	Solution
	Short circuit at magnet output Channel 1 Channel 2	Magnet in KÖBRATOR defective **or** Cable connection between magnet and RMA defective (short circuit)	Check plug connection at back of KÖBRATOR. Check cable for shorting and replace if necessary. Determine resistance of magnet in KÖBRATOR and replace magnet is necessary. (for magnet resistance please consult maintenance instructions and spare parts list for the KÖBRATOR)
	No magnet Channel 1 Channel 2	Electrical connection between the KÖBRATOR and the RMA 108 is interrupted **or** There is no magnet connected to the magnet output	Connect magnet in accordance with example connection.
	Control error Channel1 Channel 2	Hysteresis between target value and actual value too high	Apparatus is defective and needs to be replaced.
	Low voltage Channel 1 Channel 2	Power voltage was below 19V DC for more than 10ms.	Check supply voltage.
	PROFIBUS Communication	Profibus cable is either defective or not connected Profibus address assigned wrongly	Check Profibus cable Set Profibus address
Supply voltage is present but there is no display		Defective fuse	Fuse to be replaced by qualified personnel (See 7.3 Fuse Replacement)

The **MAGNET** output receives a signal but no vibration is discernible on the KÖBRATOR	KÖBRATOR is jammed mechanically **or** Yoke magnet distance in the KÖBRATOR has changed	Switch the unit off and determine whether the KÖBRATOR still jams. Ask for the setting distance between the yoke and the magnet from our internal service engineers in the electrical production department. Central switchboard: +4936944/522-0 Electrical dept: +4936944/522-203

7.3 Fuse Replacement

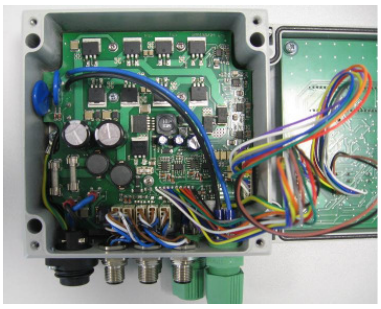
When removing the lid, current-conducting components are exposed. Ensure that no conducting cables are trapped when replacing the lid.

Danger of pinching when removing or replacing the lid.

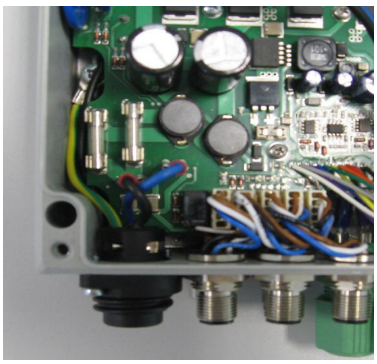
MAKE SURE that the power is disconnected from the RMA POWER BOX 108 before removing the lid.

Switch off all power to the RMA POWER BOX 108 and secure it against inadvertent reconnection.

Remove the four screws from the lid as shown



Place the cover near the casing.
WARNING: Do not sheer off any cables.



Remove defective fuses and replace. (I=8AT)
Replace lid and put unit back into operation.