

# **Intelli-Mixer RM-2 USER MANUAL**


### Dear user!

The Intelli-Mixer RM-2 is a simple and reliable device. We ask you to consider technical requirements of exploitation to insure pleasant and continuous usage of machine.

### General information

The Intelli-Mixer RM-2 is designed to perform mixing of various laboratory liquid samples in a wide range of test tubes from 0.5ml up to 50ml volume. Control system features 28 mixing programs and 3 extra custom programs for manual programming by operator. This machine has proved its superior efficiency in medicine, biology, analytical chemistry and many others.

### Technical specifications

Variable rotation speed, rev./min.:	from 1 to 99
Speed selection step, rev./min.	1
Environmental temperature, °C:	from +2 to + 50
Relative moisture of the atmosphere (at the temp. +°20 C):	not more than 80 %
Power adapter input:	110-220 V; 50-60 Hz
Power adapter output: 	12VDC, 1.5 A
Power consumption, W:	not more than 12

Models	RM-2S	RM-2M	RM-2L
Dimensions L x W x H	316x125x168	344x125x168	420x125x168
Weight, kg	1.5	1.6	1.9
Applied racks	DxN 11x28 13x24 16x14 30x8	DxN 11x32 13x28 16x16 30x10	DxN 11x42 13x38 16x22 30x14

**D** – Diameter of applied test tubes.

**N** – Number of applied test tubes.

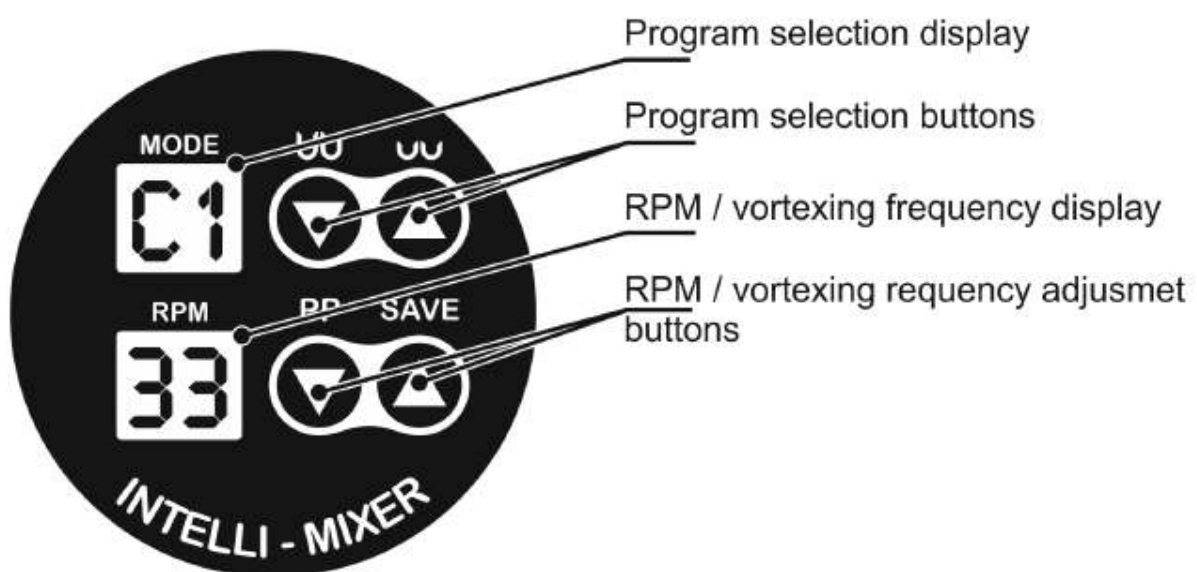
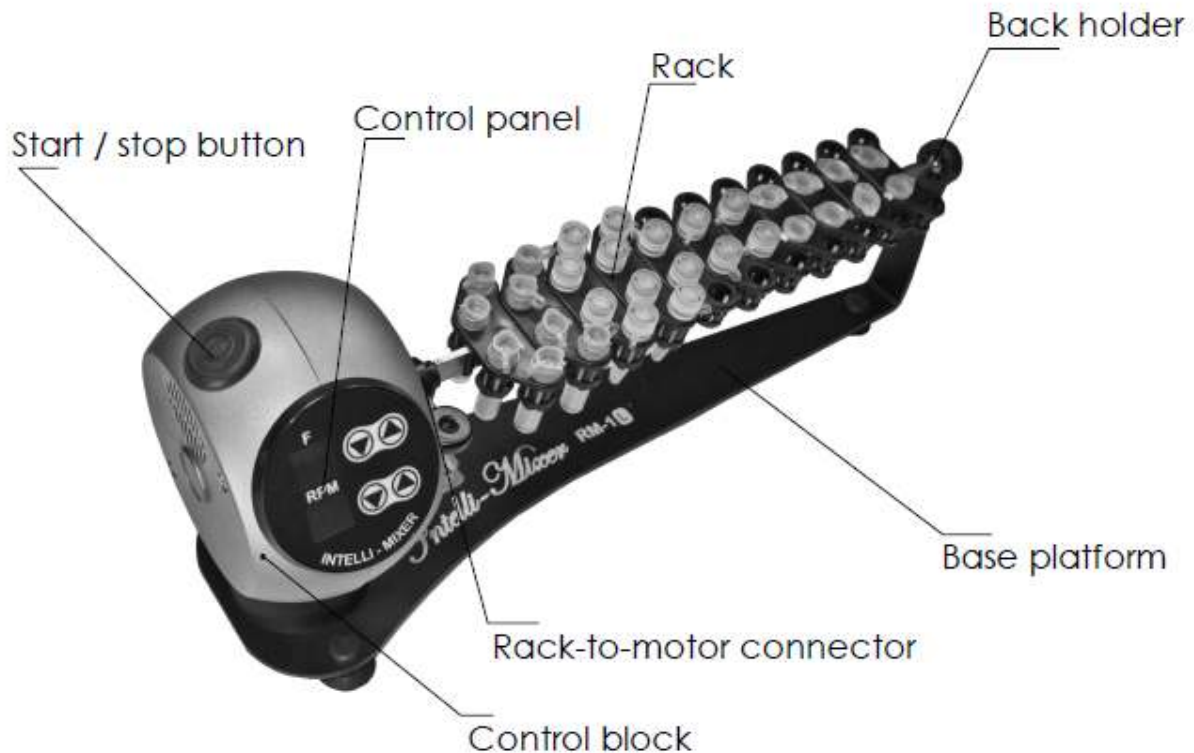
( ! ) It is also possible to combine different tubes types in one rack up to customers' desire and have mixed rack, blotting rack or rocking platform.

### Delivery package




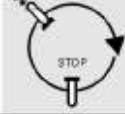


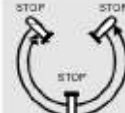


Item	Quantity
Intelli-Mixer RM-2.....	1
Power adapter 12VDC, 1,5A.....	1
Rack fixation wrench.....	1
User manual.....	1
Packaging box.....	1

### General description of Intelli-Mixer construction









Intelli-Mixer consists of the control block, base platform and rack. On the front side of control block the control panel is situated. Start/stop button is on the top of the control block. Power supply socket is on the back side of the control block. Rack-to-motor connector is on the right side of the control block.



### Intelli-Mixer programs overview

Indications on 'MODE' display.	Rack movement overview	Mixing program description.
F1		Variable speed continuous clockwise rotation.
F2		Rotation 360° <b>clockwise*</b> and hold for 1.5 sec. in <b>initial point**</b> .
F3		180° clockwise rotation, 1.5 sec. hold, 180° clockwise rotation, 1.5 sec. hold in initial point.
F4		135° clockwise rotation, 1.5 sec. big amplitude 'U' shaking, 225° clockwise rotation, 1.5 sec. hold in initial point.
F5		135° clockwise rotation, 1.5 sec. big amplitude 'U' shaking, 90° clockwise rotation, 1.5 sec. big amplitude 'U' shaking, 135° clockwise rotation, 1.5 sec. hold in initial point.
F6		135° clockwise rotation, 1.5 sec. small amplitude 'u' shaking, 90° clockwise rotation, 1.5 sec. small amplitude 'u' shaking, 135° clockwise rotation, 1.5 sec. hold in initial point.
F7		110° clockwise rotation, 1.5 sec. hold, 110° clockwise rotation, 1.5 sec. hold in initial point, 110° <b>counter clockwise***</b> rotation, 1.5 sec. hold, 110° clockwise rotation, 1.5 sec. hold in initial point.
F8		110° clockwise rotation, 1.5 sec. big amplitude 'U' shaking, 110° counter clockwise rotation, 1.5 sec. hold in initial point, 110° counter clockwise rotation, 1.5 sec. big amplitude 'U' shaking, 110° clockwise rotation 1.5 sec. hold in initial point.
F9		110° clockwise rotation, 1.5 sec. small amplitude 'u' shaking, 110° counter clockwise rotation, 1.5 sec. hold in initial point, 110° counter clockwise rotation, 1.5 sec. small amplitude 'u' shaking, 110° clockwise rotation 1.5 sec. hold in initial point.



2, 4, 6, 8, 10, 12 15, 30, 45, 60, 90, 99		Clockwise and counter clockwise continuous rotation with angles indicated on 'MODE' display: 2°, 4°, 6°, 8°, 10°, 12°, 15°, 30°, 45°, 60°, 90°, 99°. On RPM display numbers mean shakes per minute.
uu		Continuous variable intensity small amplitude 'u' vortexing under manually selected angle.
u1		Continuous variable intensity small amplitude 'u' vortexing with 1 <sup>st</sup> speed counter clockwise rotation.
u2		Continuous variable intensity small amplitude 'u' vortexing with 2 <sup>nd</sup> speed counter clockwise rotation.
UU		Continuous variable intensity big amplitude 'U' vortexing under manually selected angle.
U1		Continuous variable intensity big amplitude 'U' vortexing with 1 <sup>st</sup> speed counter clockwise rotation.
U2		Continuous variable intensity big amplitude 'U' vortexing with 2 <sup>nd</sup> speed counter clockwise rotation.
B1, B2, B3, B4		Specially designed modes for running western blotting. <u>Requires the blotting rack.</u>
C1, C2, C3		Customer programs see "Customer programs designing" instructions.

\***Clockwise rotation**- Rack rotation clockwise relatively to motor control block.

\*\***Initial point**- Initial rack vertical position.

\*\*\***Counter clockwise rotation** - Rack rotation counter clockwise relatively to motor control block.

( *Tip !* To restore factory settings on the device put angular shaking to "99" and rpm's to value 1, then hold start / stop button for 8 seconds. All custom programs will be erased and other parameters will be returned to factory settings).

## Using mixing programs

### Rotation programs F1, F2, F3, F7.

These programs are used to perform mixing of laboratory samples by means of rotation of the rack. Rotation speed is indicated on **RPM** display and could be changed either during the operation or when the rack is stopped.

*( Tip ! Once RPM has been set it will apply to all the programs in the **MODE** menu including customer programs).*

### Vortexing programs 'u' & 'U' (Vortexing regimes).

These programs are used to perform intensive mixing of different size test tubes by means of shaking and vortexing. Vortexing frequency is indicated on **RPM** display and could be changed either during the operation or when the rack is stopped.

During these regimes rack could be manually positioned under any angle by hand to insure best performance and convenience.

*( Tip ! Once vortexing frequency has been set it will apply to all the programs in the **MODE** menu that feature shaking including customer programs).*

*( Tip ! In case of rack losing its present position while vortexing reduce the vortexing frequency until operation becomes stable).*

### Angular shaking 2, 4, 6, 8, 10, 12, 15, 30, 45, 60, 90, 99.

These programs are performing defined angle and speed shakes from the vertical initial position. This kind of shaking is recommended for mixing samples in tubes bigger than 5 ml volume.

Current angel settings are displayed on **MODE** display. Shakes per minute are being set and shown on **RPM** display. All the parameters of angle and speed can be changed either during operation or when the rack is stopped.

*( Tip ! In case of rack losing its present position while shaking reduce the shaking frequency until operation become stable).*

*( Tip ! To restore **factory settings** on the device put it into angular shaking "99" and RPM to value 1, then hold start / stop button for 8 seconds. **All custom programs will be erased and other parameters will be returned to factory settings**).*

### Combined programs F4, F5, F6, F8, F9

These programs are performing different combinations of rotation and vortexing.

Current speed is shown on **RPM** display and can be changed either during operation or when the rack is stopped.

Vortexing frequency can be changed by selecting on **MODE** display either 'u' or 'U' function and set vortexing frequency accordingly. (see also **Vortexing programs 'u' and 'U'**)

Now vortexing frequency is adjusted to the best performance within current application.

*( Tip ! Vortexing frequency settings that has been defined in 'u' or 'U' functions and rotation speed settings are valid throughout all the programs including customer programs).*

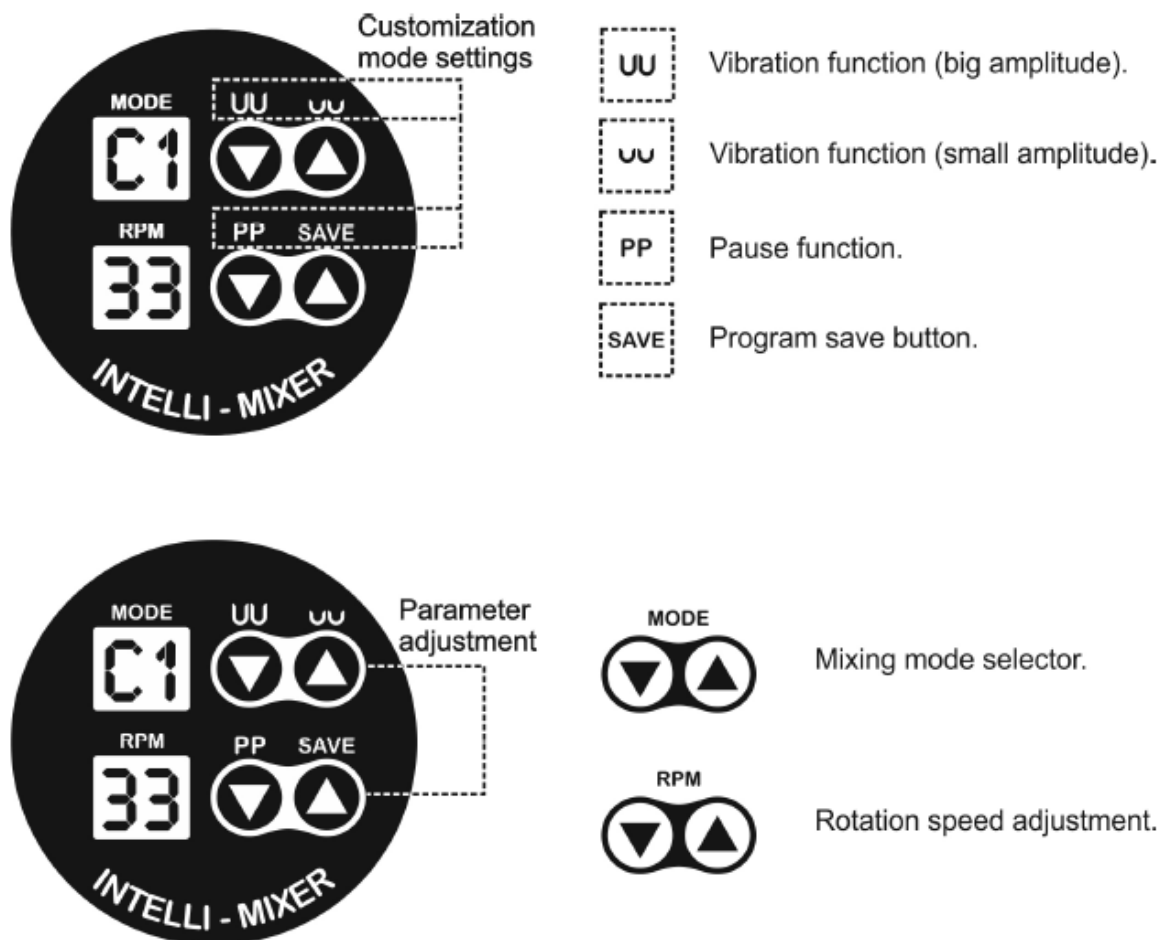
## Creating customer programs C1, C2, C3

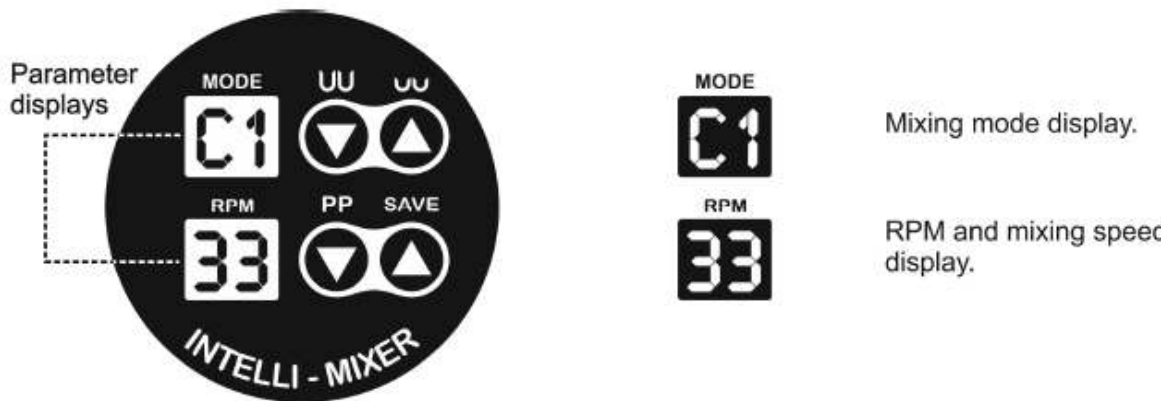
### Introduction.

In addition to 28 preset programs of the mixer 3 custom made modes can be easily created. The self learning algorithm of the mixer is designed to make this process fun and simple.

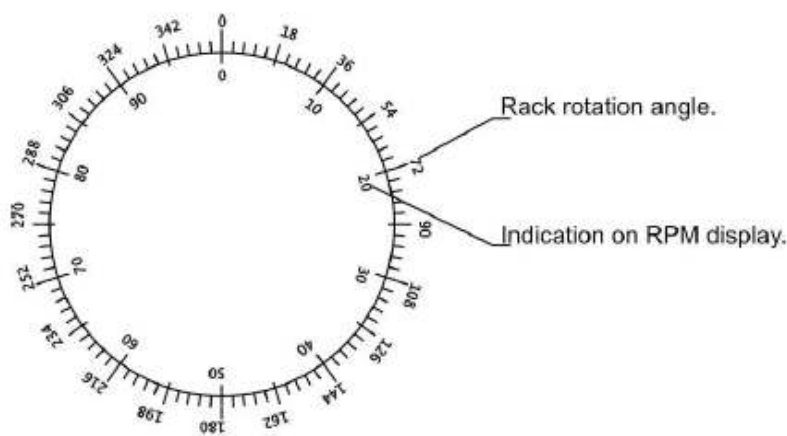
Please read carefully the guidelines mentioned bellow and find a great way for interaction with the mixer entertaining and useful.

### Controls description.





During the programming mode **RPM** display shows rack rotation angle relatively to initial (00) position.



The full circle of rack rotation is split in to 100 steps from 1 to 99. For example 20 steps are equal to 72 degree turn.

### Step by step instructions.

#### 1. Entering the customization mode.



Select one of the custom modes on the mode selection display.



4  $\frac{1}{2}$  sec.

Press and hold down the button for 4,5 seconds. Sound alarm will notify the successful entering to the customization mode. "MODE" display will clean and the "RPM" display will start showing the axial position of the rack.



## 2. Using the controls of the customization mode.



While using customization mode all the control buttons acquire the upper function accordingly.



Big amplitude vortexing function.



By pressing the button once the 1.5 sec long vortexing includes in the mixing program. By pressing the button repeatedly the duration of the vortexing increases by 1.5 second each time.



Small amplitude vortexing function.

By pressing the button once the 1.5 sec long vortexing includes in the mixing program. By pressing the button repeatedly the duration of the vortexing increases by 1.5 second each time.



While the amplitude in   is predefined accordingly, the frequency of the mixing is possible to adjust separately.

In order to adjust the vortexing frequency of the "UU" and "uu" modes, please choose any of these modes in the standard mode list and change the "RPM" parameter accordingly.

Please note that it is best to adjust the vortexing mode while the test tubes are loaded. This will insure the best effect could be matched for the given test tubes.



Pause. Rack freezing in the given position.

By pressing the button once the 1.5 sec long rack freezing includes in the mixing program. By pressing the button repeatedly the duration of the vortexing increases by 1.5 second each time.



Saving the program when finished.

By pressing this button all the steps of the program are saved in the flash memory. Programming mode quits automatically and the program is now ready to use.



Each of "C1", "C2", "C3" custom modes can be reprogrammed endlessly at any time by rewriting the new program over the existing one.

( **Tip !** Each program has a limit of 160 moves, if amount is exceeded sound alarm will sound and program will reset).

### 3. Defining the behaviour of the rack movement, by driving the rack with a hand.

*This version of the Intelli-Mixer is capable to "learn" the hand driven inputs for movement behaviour of the rack. This means that the system memorizes every step of rotation of the rack in all directions and will repeat it exactly the same when the mix-mode is saved. In between the rotation of the rack additional functions like "PP - pause", "uu/UU - vortexing" can be inserted in to the cycle of a mix-mode.*



Hold the rack in your hand and turn it back/forth in any desired combination and repetition. This will create a sequence of rotation, shaking of various frequency that will define how the rack will behave.

For example the rack can be rotated 180 degrees then "UU" mixing mode can be applied then the rack can be rotated another 90 degrees and the "uu" mixing mode applied then rotate 90 degrees backwards and a "PP" pause function applied. Press "save" and now the mixing mode is saved.

The customization mode is incredibly flexible and endless variety of different modes can be designed!



*During the hand driven input - the speed of the rotation should not exceed 25 RPM. In case of more rapid movements the system can not insure precision reading of the movement and therefore the mixing mode may contain errors.*

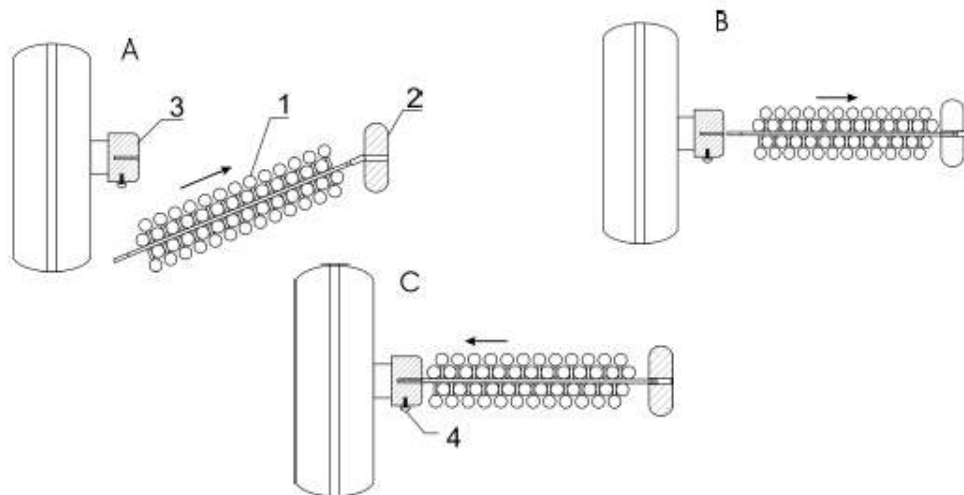
**Tip !** *When making custom programs it is best to end the program in the initial point (RPM display shows 00).*




### Operation order


Before turning the machine on carefully examine the power adapter, power supply wire and external look of the machine. In case of external damage do not turn on the machine without permission of the specialist.

- Fixing the rack.  
Put the rack **1** with the cylinder type end in to the back holder **2** until it is fixed (Fig. 5A, 5B)  
Put the flat side of the rack in to the shaft **3** until it is fixed and fasten the screw **4** by the rack fixation wrench (Fig. 5). Find rack fixation wrench underneath the machine.
- To replace the rack perform all the steps in reverse order.

## View from above



- Plug the adapter first to the machine power socket then to the power outlet 110-220V 50Hz.
- Put **closed** tubes in rack adapters.
- Using  buttons select operation program (see **Intelli-mixer program overview** table).
- Set rotation speed and shaking intensity (see **using mixing programs**). ( **Note !** Operation programs can be selected either during operation or while mixer is stopped).
- Start operation by pressing  button.
- When mixing is complete stop the machine by pressing  button.

If the machine is not operational and is not disturbed during 10 minutes it automatically goes in to energy saving **SLEEP** mode and shows blinking dots on **MODE** and **RPM** displays. To exit **SLEEP** mode either press any button or push the rack with your hand a few degrees. By pressing  button twice the machine goes out of the SLEEP mode and continues operation from the same rack position where it was stopped. (applies in vortexing programs).



## Disinfection and cleaning

Before you start disinfection or cleaning make sure the power adapter is unplugged. It is recommended to perform cleaning with water and universal washing liquids. Afterwards the machine should be carefully dried.

## Safety features

It is prohibited to:

- Plug the machine in to a power outlet with configuration which differs from the power adapters' plug configuration.
- Plug the power adapter in to the outlet if the adapter is damaged.
- Use the device with damaged control block.

## Transportation and storage

To insure safety during the transportation, transported equipment should be packed in the original manufacturers' packaging or similar packaging substitute. Equipment can be transported by any kind of closed transport so that equipment is tightly fixed and transportation runs accordingly to regulations applied to this way of transport.

Equipment should be stored in original manufacturers packaging in dry room with humidity not more than 80% and temperature range from +10 °C up to +40 °C. It is not recommended to store the equipment more than 36 month.

## Warranty statements

- Warranty applies to 24 month period from the date of purchasing.
- Malfunctions arisen through the fault of producer in the course of this period, are removed free of charge.
- Guaranty is not valid in the following cases:
  - If the serial number label of the manufacturer is damaged.
  - If damage appears as result of incorrect operation, transportation or storage.
- These documents are necessary if applying for warranty repair:
  - User manual with serial number of the machine.
  - Officially signed report, describing the reasons and conditions of equipment malfunction.
- **Warranty repair could be performed only if the equipment is delivered in the original manufacturers packaging or equally safe packaging.** Therefore please keep the transportation packaging after unpacking the device.
- If the above warranty requirements are disturbed, repair charges are applied to the consumer.

*For all further questions concerning exploitation and maintenance please Contact manufacturer or product vendor.*



### Certificate of approval

Intelli-Mixer RM-2 \_\_\_\_ N\_\_\_\_\_ has been inspected for the technical conditions and it meets all regulations necessary for such class of device.

Quality control  
person \_\_\_\_\_

(name)

(signature)

Date of manufacture \_\_\_\_\_

Place for stamp.

### Certificate of sale

Organization \_\_\_\_\_

Address \_\_\_\_\_

Phone \_\_\_\_\_

Vendor \_\_\_\_\_

(name)

(signature)

Date of sale \_\_\_\_\_

Manufacturer's address:  
21-136 Aizkraukles Str., Riga LV-1006  
Tel: (+371) 6755 8743  
Fax: (+371) 6755 1934  
E-mail: [info@elmi-tech.com](mailto:info@elmi-tech.com)  
WWW: [www.elmi-tech.com](http://www.elmi-tech.com)