

## Preface

The RDC 21-K is a machine designed for laboratory dip coating. They can be used to apply liquid photoresists to e.g. miniature etching parts or other substrates, to apply liquid solder mask or any other kind of protective or technical coating. Today a more and more popular application is the so called: "sol-gel-application". This machine was developed to meet the demand of a greater variety of speeds, iterations, dipping and dripping times and heavier work-pieces.

### Features:

- numeric foil keyboard for easy data entry.
- illuminated Display 90 x 35 mm with 20 x 4 digits.
- up to 10 dip cycles can be stored and loaded again on demand.
- Lifting device operated by precision stepper motor.
- Setting of virtual offset and virtual end switch position prevents unnecessary travel paths and saves time.
- You can distinct between fast distance drive and rather slow dipping/coating drive. Each of the 4 different drives can be set with an individual speed. In addition the point of speed change can be adjusted. This way you can program fast drives to the vessel and precise drives into and out of the vessel and this in accordance to your work-piece and vessel size.
- Distance speed is separately adjustable from 3 to 7000mm/min and dip drive and coat drive can be separately set between 3 and 2500mm.
- On customer request, the RDC 21-K can be equipped with a 0.9° stepper motor. With this motor speeds between 1.5 and 3500 mm/min are possible.
- Other speeds can be achieved by customized gears or longer/shorter drive distances by adapting the aluminium frame. Ask for an offer!
- The dipping time as well as the drip-off-time (pause time up and pause time down) are separately adjustable from 0 s up to 99h : 59min : 59s. This enables the machine not only to coat but also to precisely develop. This is of great importance with certain photo coatings of the miniature etching technology.
- Up to 1000 iterations of a dip routine are possible.
- lift bar for several work-piece fittings. The dipping height and the sizes of the aluminium profiles can be easily adapted to even dip-coat bulky items.
- The working range of the lift bar can be adjusted via the control panel. The maximum size of the work-piece is therefore only limited by the maximum lift range of the machine and the size of your cuvette.
- A optional metal ruler on the side of the vertical bar makes it easy to define the necessary positions to be entered into the menu



### Technical Data

<b>Stroke length:</b>	565mm
<b>Maximum load:</b>	5 kg (reduced max. speed with maximum load)
<b>Weight:</b>	12 kg
<b>Dimensions (BxTxH):</b>	350 x 500 x 1000 mm
<b>Distance drive up/down:</b>	3 - 7000 mm/min or 1,5 - 3500 mm/min
<b>Insertion/drawing drive:</b>	3-2500 mm / min or 1.5 - 1750 mm/min
<b>Dipping / Drip off Time:</b>	0s – 99h : 59min : 59s
<b>Power supply:</b>	100-240 V, 50-60 Hz, 100 W

With stepper motor 0.9° the display shows the same speeds as with the standard-1-8° motor. But the speed refers to a time of **2** minutes. (e.g. **1500mm/2min**). This solution was chosen for storage and processor reasons.

### Options

- metal ruler
- stepper motor with 0.9° step angle resolution for speeds between 1.5 and 3500 mm
- remote controller
- wall holder for remote controller
- customer specific frame, drive distances and speeds

### Safety Regulations

Please apply the general safety rules for working with electrical machines.

There are no tools needed to operate the machine. With any intervention on the machine the warranty will void.

**Do not run the machine in corroding, humid, dusty, extremely hot or explosive atmosphere. If you do run the machine in an atmosphere as described above be aware that this happens on your own risk and responsibility.**

The operator has to provide appropriate safety precautions and equipment. We explicitly exclude any warranty for damages resulting from running the machine in an atmospheres as described above.

Important: the motor holds the lift bar only when the power supply is switched on. Mount items only to the holder with power on. Otherwise the lift bar will move downwards. The maximum load is 2 kg at maximum speed.

**Attention: Change the step resolution of the microcontroller only when the power is switched off !**

**Please take great care when adjusting stroke length and speeds. Consider the height of the liquid container and additional stirring devices.**

**We do not warrant damages caused by wrong settings.**

### Set Up

Examine the machine for possible transport damages. If you encounter any problems inform us **and** the carrier immediately.

Carefully transport the machine to its operation site. Do not use the motor or other extending parts as a handle.

Strip off the packing. Make sure not to damage the tooth belt.

### Maintenance

The Dip Coater RDC 21-K is almost maintenance free. After each working day please clean the guidance tracks with an oil soaked rag (resin and acid free, e.g. sewing machine oil).

### Operating

#### Menu structure RDC 21-K

On the whole menu, you can correct your entries with the "\*" key. With the "#" key you jump to the next position.



Line	Comment	Display
1	After switching on: Welcome screen with the software version.	Bungard BEL RDC 21-k version xx-xx-xx
2	Call for reference drive.	For home position (end switch up) press 1
3	Drive to HOME POSITION (upper limit switch).	Drive home position
4	Here you can adjust the offset (= virtual upper end switch), if you press 2. With 1 the machine drives to the last set or loaded offset and you can here continue reading in line 6	Change offset pos. 1=no 2=yes
5	If you just pressed 1, you can now adjust the offset (upper virtual end switch). If you have to dip small work pieces, you can avoid unnecessary drives and save time. Values between 0 and 999mm can be inserted. With the standard machine then lower mechanical end switch will limit the drive at 565mm.	Offset position virtual end switch up (in mm/max. 999)
6	Then you are asked to drive to the set virtual home position.	For offset position (virtual end switch up) press 1
7	The RDC21-K moves to the VIRTUAL HOME POSITION...	Drive offset position (virtual end switch)
8	....and calls for confirmation. If you now press "not ok = 2", the menu starts again with line 2. If you press 1, you continue with line 9.	Offset position ok press 1 not ok press 2
9	Pressing 1 you will reach the main menu. Pressing 2.....	Change calib. cycle 1=no 2=yes

10	<p>... you can now set 1 to 50 calibration cycles before you reach the main menu. If you set a 2 in this menu, the machine will make a reference drive after 2 iterations; if you set 20, the reference drive will be done after 20 iterations. A recommended value is 10. A calibration after a certain amount of iterations can be necessary, because the machine can lose steps due to arithmetical reasons when changing between half-, quarter-, 1/8-, 1/16-step size in the motor resolution. These step losses can add up after many iterations to a range of millimetres, so the machine will minimally fail to reach the set positions. With the calibration cycle you can compensate these step losses.</p> <p>Insert the desired iterations after those the machine shall make a reference drive and confirm with #. You will automatically enter the main menu.</p>	<p>Calibrate cycle: (min.1/max.50)</p>
11	<p><b>Main menu</b></p> <p><b>1. view:</b> you can view the current work cycle  <b>2. edit:</b> you can edit the current work cycle  <b>3. load:</b> you can load one of 10 possible cycles  <b>4. save:</b> you can save the current cycle  <b>5 home pos:</b> leave the main menu and make a reference drive  <b>6. power:</b> controls the energy settings (standard = 75%)  <b>7. start:</b> starts the dipping cycle</p>	<p>1. View pos  2. edit  3. load  4. save  5. home pos  6. power  7. Start</p>

## Sub menus to the main menu

Line	Key	Comment	Display
12	1 View	Here you can view the parameters of the current cycle. Press the according number to view each setting.	view param. file:1 1. V.up 4. time 2. V.down 5. iter 3. dist. 6. back
13	1-1 View-V.up	Speed for distance and for the coating drive (UP) in mm per minute. With one you go back to the overview.	V.dist.up: xxxx V.dip .up: xxxx mm/min back press 1
14	1-2 View-V.down	Speed for distance and for the dipping drive (DOWN) in mm per minute. With one you go back to the overview.	V.dist.down: xxxx V.dip .down: xxxx mm/min back press 1
15	1-3 View-dist.	Here you can control the set stop and speed change points. The distances are relative! Please check: the sum of <b>offset+dip+distance</b> must be equal or less than the maximum drive distance (standard machine = 565mm). If this is not the case, the machine will not drive correct!	dist.: xxxx mm dip .: xxxx mm offset: xxxx mm back press 1
16	1-4 View-time	Check upper and lower waiting time.	t.down: 00:00:00 t.up : 00:00:00 back press 1
17	1-5 View-iter	View number of iterations in this cycle, the number of iterations after which the machine will make a reference drive and which motor power is set. <b>Standard motor power setting is 75%.</b>	iteration: x calibrate cycle: x power_ 75% back press 1
18	1-6 View-back	with 6 you go back to main menu.	1. View 5. home pos 2. edit 6. power 3. load 7. Start 4. save

19	2 edit	In the edit sub menu you can edit all parameters. Pressing the numbers you will reach the sub-sub-menus:	<table border="0"> <tr> <td>1. V.up</td> <td>5. time up</td> </tr> <tr> <td>2. V.down</td> <td>6. time down</td> </tr> <tr> <td>3. dist.</td> <td>7. iteration</td> </tr> <tr> <td>4. dip</td> <td>8.back</td> </tr> </table>	1. V.up	5. time up	2. V.down	6. time down	3. dist.	7. iteration	4. dip	8.back
1. V.up	5. time up										
2. V.down	6. time down										
3. dist.	7. iteration										
4. dip	8.back										
20	2-1 edit-V.up	Speed up distance: Speeds for distance drive UP can be set between 3 and 7000 mm/min. Confirm with # and you will automatically get to...	Speed up distance xxxx mm/min (min. 3/max.7000)20								
21	2-1-1 edit-V.up	Speed up dip: Speeds for coating drive UP can be set between 3 and 2500 mm/min (speeds are reduced for safety reasons). Confirm with # and you will automatically get back to edit menu.	Speed up dip xxxx mm/min (min. 3/max.2500)								
22	2-2 edit-V.down	Speed down distance: Speeds for distance drive DOWN can be set between 3 and 7000 mm/min. Confirm with # and you will automatically get to....	Speed down distance xxxx mm/min (min. 3/max.7000)								
23	2-2-1 edit-V.down	Speed down dip: Speeds for dipping drive DOWN can be set between 3 and 2500 mm/min (speeds are reduced for safety reasons). Confirm with # and you will automatically get back to edit menu.	Speed down dip xxxx mm/min (min. 3/max.2500)								
24	2-3 edit-Dist.	Setting of speed change height. Position where the fast distance drives changes to the rather slow dip drive (and vice versa). The value for this position adds to the set virtual home position (offset). You can insert values between 50 and 1000 mm.	distance distance: xxxx mm min. 50/max.1000 mm								
25	2-4 edit-DIP	Setting of the lower virtual end switch (dipping depth) in mm. You can insert values between 0 and 1000 mm. The value for this position adds to the set virtual home position (offset) and the speed change height.	distance DIP distance: xxxx mm min. 0/max.1000 mm								
26	2-5 edit-time up	Setting of the upper waiting time (drip off time) between each iteration. You can insert between 0 seconds and 99 hours : 59 minutes : 59 seconds. Confirm each inserted digit with #-key to store the value. If you entered the wrong value and you did not yet confirm with the #-key, then you can correct the value by pressing the *-key.	time up : 00:00:00 successively enter (#=#ok /max.9/ *=k)								
27	2-6 edit-time down	Setting of the lower waiting time (dipping time) between each iteration. You can insert between 0 seconds and 99 hours : 59 minutes : 59 seconds. Confirm each inserted digit with # to store the value. If you entered the wrong value and you did not yet confirm with the #-key, then you can correct the value by pressing the *-key.	time down: 00:00:00 successively enter (#=#ok /max.9/ *=k)								
28	2-7 iteration	Setting the number of iterations of the complete cycle. You can insert between 1 and 1000 iterations.	iteration: xxxx min. 1/max.1000 mm								
29	2-8 Back	Back to main menu.	<table border="0"> <tr> <td>1. View</td> <td>5. home pos</td> </tr> <tr> <td>2. edit</td> <td>6. power</td> </tr> <tr> <td>3. load</td> <td>7. Start</td> </tr> <tr> <td>4. save</td> <td></td> </tr> </table>	1. View	5. home pos	2. edit	6. power	3. load	7. Start	4. save	
1. View	5. home pos										
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4. save											

30	3 Load	Here you can load one of the 10 possible stored programs. Insert the number of the desired program and confirm with #. If you load a new program you have to perform a reference drive (main menu 5 home pos.). When being asked for changing offset, insert 1= no) for using the loaded offset.	Load parameter file Number: xx min.1/max.10
31	4 Save	If you have completely set a dipping cycle you can store this cycle for later use. Press a (free) value and confirm with #. Note: if you store a program it will not be automatically active for making dip drives. Example: Loaded is program #3. You change in this program you change some parameters and then save these changes as program #5. Now you are still in program #3 with the changed parameters. These changed parameters remain active (even if you switch off the machine) and can be seen in the view menu. You can delete these current values by loading another program (e.g. program 3 with the old parameters, program 5 with the new parameters).	save parameter file Number: xx min.1/max.10
32	5 Home pos	Pressing 5 you can make a reference drive. You will jump back to line 6 in the menu.	For home position (end switch up) press 1
33	6 Power	Setting motor power. 100% is only needed for high loads and drives at maximum speed. <b>Standard setting is 75%.</b> Setting 50% can be used to reduce vibrations when dipping small loads and/or slow speeds. If you use this setting with heavy loads, step loss might be the result, In this case make a reference drive.	Power ratio 1. 100% 2. 75% 3. 50%
34	7 start	Start of the chosen program. The RDC processes the chosen cycle with no interaction of the operator. You can interrupt the cycle by switching of power supply. The Display informs you on the drive which is being performed in this moment and the parameters used (example on the right).	Drive distance down: 200 mm speed : 900 mm/min iteration: 3
35		After a cycle is completely finished, the display shows „job completed“. Pressing 1 you jump to line 11 in the main menu, with 2 you start the current cycle one more time.	Job complete press 1 for menu press 2 for start

Selected parameters - except OFFSET - are stored and can be used next time the machine is switched on.

All measures relate to the lower edge of the mounting beam for holding the samples.

An optional metal ruler at the side of the machine makes entry of the necessary heights very easy.

To attach the holder to the beam special nuts with M4 threads are part of delivery. Additional special nuts M3 / M4 / M5 are available from us.

Another limit switch prevents down drives that exceed the maximum possible way.

**Please take great care when adjusting stroke length and speeds. Consider the height of the liquid container and additional stirring devices.**

**We do not warrant damages caused by wrong settings.**

### Loading of machine

**Important: The tool should be loaded only when the machine is under voltage, otherwise there is no holding torque of the engines and the beam will lower.**

The machine is equipped with a universal carrier.

Inserted into these four are found special nuts M4. You can attach your coating substrates with a screw and a clip sheet.

### Guarantee

All machines are submitted before distribution to examination on function and continuous operation firmness. On the machine we grant a work warranty of 12 months to our customers starting from purchase date on accuracy in material and processing. We warrant at our choice by exchange of incorrect parts or by repair of the machine in our house. Old parts change into our possession.

### Disclaimer of Warranty

All parts subjected to wear are excluded from this warranty. Non-observance of this manual shall void all warranty claims.

We cannot accept subsequent claims from damage or destruction of work-pieces worked on in the machine, because we have no knowledge or control over the operating conditions at your site. This is valid in a general manner also for requirements from damage to articles, buildings and persons as well as the environment.

We do not warrant that the function of the machine will meet the customer's requirements or that the operation of the machine will to this regard be error free.

In no event will we be liable to the customer for any incidental, consequential, or indirect damages of any kind, including loss of profit and prosecution for environmental pollution, even if we could have been aware of the possibility of such damages.

All information was arranged with great care. We reserve ourselves however mistake and technical changes without previous announcement.

Running the machine in corroding, humid, dusty, extremely hot or explosive atmosphere happens at the operator's own risk and responsibility.

We explicitly exclude any warranty for damages resulting from running the machine in in corroding, humid, dusty, extremely hot or explosive atmosphere.

### Copyright

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Setting the RDC21-K : Sample Programming  
Offset: 210mm / distance: 140mm / DIP: 80mm

