

Dip Coater RDC 15 with Stepper Motor Control

Translation of the original instruction



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General

Dip Coater RDC 15 with Stepper Motor Control

This machine is the successor of the approved gear motor driven RDC 15 and was developed to meet the demand for a greater variety of speeds and settings. It is mainly used for laboratory dip coating of modern liquid photoresists. Today a more and more popular application is also so called: "sol-gel-application". For a even higher variety of speed settings, we offer also a new type RDC 21 with stepper motor drive (see details below).

Features:

- Lift bar for several workpiece fittings. The dipping height and the sizes of the aluminium profiles can be easily adapted to even dip-coat bulky items.
- The dip coater is working with constant dipping speed. This speed is adjustable between 30 - 10.010 mm/min. The drawing speed determines the thickness of the coating. This speed is as well adjustable from 30 - 10.010 mm/min.
- The dipping time as well as the drip-off-time (pause time up and down) is separately adjustable from 0 s bis 99 h:59 min.:59 s. 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 9 iterations are possible.
- Universal power supply enables to work the RDC worldwide with all power systems.
- The working range of the lift bar can be adjusted via the control panel. The maximum size of the workpiece is therefore only limited by the maximum lift range of the machine and the size of your cuvette.
- On request we built machines according to your specification. Especially the stroke length is easily adaptable.



Technical Data

Stroke length	0 - 650 mm
Maximum load:	1,5 kg (reduced max. speed with maximum load)
Weight:	12 kg
Dimensions (BxWxH):	330 x 465 x 965 mm
Insertion speed:	Programmable from 30-10.010 mm/min
Drawing speed:	Programmable from 30-10.010 mm/min
Dipping Time:	0 s bis 99 h:59 min.:59 s
Drip Off Time:	0 s bis 99 h:59 min.:59 s
Iterations	Up to 9-times
Power supply:	100-240 V 50-60 Hz 120 w

EG- Declaration of Conformity



EG-Konformitätserklärung/Declaration of Conformity

Hersteller / Supplier:	Bungard Elektronik GmbH & Co. KG Rilkestraße 1 51570 Windeck Germany
Bevollmächtigte Person für die Zusammenstellung der technischen Unterlagen: Person in charge	Jürgen Bungard, Geschäftsführer /general director Rilkestraße 1 51570 Windeck Germany
Product:	Tauchbeschichter RDC15 Dip Coater RDC15

Hiermit erklären wir, dass die oben beschriebenen Maschinen allen einschlägigen Bestimmungen der Maschinenrichtlinie 2006/42/EG entspricht.

Die oben genannte Maschine erfüllt die Anforderungen der nachfolgend genannten Richtlinien und Normen:

We hereby declare that the machines described above complies with all relevant provisions of the Machinery Directive 2006/42/EC.

The above machine meets the requirements of the following guidelines and standards:

- Maschinenrichtlinie 2006/42/EG / Machinery Directive 2006/42/EC**
- EMV-Richtlinie 2014/30/EG / EMC Directive 2014/10830EC**
- Niederspannungsrichtlinie 2014/35/EG / Low Voltage Directive 2014/35/EC**

- DIN EN 60204-1** Sicherheit von Maschinen - Elektrische Ausrüstung von Maschinen - Teil 1: Allgemeine Anforderungen / Safety of machinery - Electrical equipment of machines - Part 1: General requirements
- DIN EN ISO 14121-1** Sicherheit von Maschinen - Risikobeurteilung - Teil 1: Leitsätze / Safety of machinery - Risk assessment - Part 1: Principles
- DIN EN ISO 12100-1** Sicherheit von Maschinen - Allgemeine Gestaltungsleitsätze, Risikobeurteilung und Risikominimierung / Safety of machinery - Basic concepts, risk assessment and risk reduction
- DIN EN 55014-1 2012-05** Elektromagnetische Verträglichkeit, Anforderungen an Haushaltsgeräte, Elektrowerkzeuge und ähnliche Elektrogeräte, Teil 1: Störaussendung / Electromagnetic compatibility Requirements for household appliances, electric tools and similar electrical appliances Part 1: Emission
- DIN EN 55014-2-2009-06** Elektromagnetische Verträglichkeit - Anforderungen an Haushaltgeräte, Elektrowerkzeuge und ähnliche Geräte - Teil 2: Störfestigkeit - / Electromagnetic compatibility - Requirements for household appliances, electric tools and similar apparatus - Part 2: Immunity
- Niederspannungsrichtlinie / Low Voltage Directive 2014/35/EG**
- Maschinenrichtlinie / Machinery Directive 2006/42/EG/37/EG**

Windeck, 10.1.2021

Jürgen Bungard Geschäftsführer

Intended Use

The machines are designed for coating positive and negative photoresists and solder masks as well as other paints or SolGel liquids.

All other applications require our written consent or are at full risk of the user. Bungard GmbH & Co. KG assumes no liability whatsoever for any damage that may result from the use of the machine.

Safety Regulations

General

Read all the safety instructions and all the operating instructions thoroughly before using the unit for the first time.

Keep these safety instructions and operating instructions somewhere safe in case you need to refer to them again in the future.

The machine is designed for use in the laboratory and shall be operated only by qualified staff. Also the unit should be repaired by qualified staff only. Never try to do more in the way of maintenance to your unit than the operating instructions allow. Beyond that, always consult an expert for repair work.

The machines are not intended for the integration or interconnection with other machines or systems. They may only be used in specially equipped rooms and be operated by qualified personnel. Children and pets must be kept away!

The general safety regulations for handling electrical equipment need to be observed.

Transport

Only use suitable lifting and transport equipment such as forklifts or pallet lifts. Secure the machine against sliding / tilting. Danger of damage!

Place of installation

The machine must be level and must have sufficient space around the machine for operation and maintenance (approx 1m on all sides).

Do not place the unit in a location near heat sources such as radiators, hot air ducts, furnace, and the like.

Electrical

The machine is manufactured using tested components according to standard practice for electrical safety. This does not release the user from his duty of care when handling electrically powered devices.

Connect the device only to the power source indicated in the operating instructions or on the device. We assume a house-side fuse for the power source. The connection to the power supply may only be performed by a specialist.

After completion of the work, the main switch should always be turned off.

Before any work on the machine (cleaning, etc.) and when not in use switch off the machine and unplug it.

Cleaning

When cleaning the appliance, keep yourself to the manufacturer's recommendations.

Operation safety

Protect from moisture. Protect from falling

Do not engage the toothed belt while the machine is running.

Important: The machine may only be loaded when the operating voltage is switched on, otherwise there will be no holding moment for the motors and the boom will run downwards. The max. Load is 1.0 kg at max. Speed.

Setup

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.

Connect to power supply.

Operating

After switching on the operating voltage, the LCD briefly shows a welcome screen, followed by the input prompt:

Important: All your parameters are saved even after switching off the machine, and are available, when you switch on the machine again until you overwrite the parameters.

The only exception is the travel depth, which must be re-determined for safety reasons during each reference drive.



Comment	Display
After switching on: <u>Welcome Screen with Software-Version</u>	Bungard BEL RDC 21-k version xx-xx-xx
Prompt to drive to home position.	drive home position start press green
Drive to the upper end switch. If you do not want to start the dip process from the upper end switch, e.g. if the substrate is small and the dipping vessel is low, you can always set a virtual end switch during the home position drive to the upper end switch. All dives will then start from this virtual end position. You can delete the virtual end position by turning off the machine or by a new reference run.	Home position wait for end switch user home position press yellow button
After arriving at the home-position you are prompted to start a reference drive.	Reference drive start press green
If you do not want the dive to go to the lower end switch (probably the general case), you can stop the drive at any time by pressing the yellow button. This can only be done while the machine is moving down.	Max. travel distance wait for end switch user defined dist. press yellow button

<p>After that you reach the main menu. There you can change settings for the dip (edit), start the last dip (auto) or make a reference run again.</p> <p>If your home position is too high and you want to change it, you can either start a dipping process and switch off the machine when the lever-arm is lower than the desired home position. Or switch off the machine directly, move the lever arm in an unpowered state (Caution! Self induction of the motor!) slowly below the desired position, switch the unit on again and interrupt the travel to the upper end switch at the desired home position.</p>	<p>Main menu</p> <p>edit auto home grn red blk yel</p>
<p>With the Edit-Mode you can adjust speeds (velocity), pause times and iterations. If you press the yellow button you get always back the next higher level.</p>	<p>Edit mode</p> <p>veloc time iter esc grn red blk yel</p>
<p>You can adjust different speeds for the dip (down) and the coating (up) drive.</p>	<p>velocity</p> <p>V.up Vdown esc grn red blk yel</p>
<p>You can adjust the speed for the dip drive between 0 and 999. This speed is a virtual value. The correspondance table at the end of this manual gives you the relation between this virtual speed to the speed in mm per minute.</p>	<p>Velocity up</p> <p>speed up: _ _ _ up down ok esc grn red blk yel</p>
<p>The same is valid for the coating drive.</p>	<p>Velocity down</p> <p>speed down: _ _ _ up down ok esc grn red blk yel</p>
<p>You can adjust different pause times for the upper and lower end position.</p>	<p>Pause time menu</p> <p>t. up t. down esc grn red blk yel</p>
<p>For the pause time in the upper end position, time can be set between 00:00:00 and 99:59:59. (27.1.17: You can set up to 99 minutes and 99 seconds by means of a programming error, so the first minute will be 99 seconds and the first hour will be 99 minutes.) Please enter only a maximum of 59 for minutes and seconds and we will fix the error as soon as possible)</p>	<p>Pause time up</p> <p>time: _ _ : _ _ : _ _ up down ok esc grn red blk yel</p>
<p>The same is valid for the lower end position.</p>	<p>Pause time down</p> <p>time: _ _ : _ _ : _ _ up down ok esc grn red blk yel</p>
<p>In the Iteration menu you can adjust between 1 and 9 iterations</p>	<p>Iteration menu</p> <p>iterations: _ up down ok esc grn red blk yel</p>
<p>Back in the main menu you can go to the automatic program by pressing the red button.</p>	<p>Main menu</p> <p>edit auto home grn red blk yel</p>
<p>Pressing green will start the dip drive.</p>	<p>Automatic mode</p> <p>start esc grn red blk yel</p>
<p>During the dipping cycle the active function with the set parameters is shown.</p>	<p>Drive down</p> <p>speed stage: _ _ _</p>
<p>The timer counts down the set time and shows the active iteration.</p>	<p>Timer _ _ _ : _ _ : _ _ iteration: _</p>

	Drive up speed stage: _ _ _
	Timer _ _ _ : _ _ : _ _ iteration: _
At the end the machine announces the end of cycle and with pressing green you go back the main menu.	Job complete OK press green
	Main menu edit auto home grn red blk yel

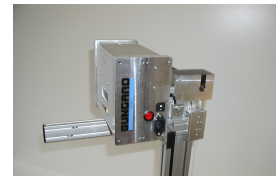
If the machine does not reach the upper end position (e.g. because of overload), the message **no home-position** is displayed. In this case, please reduce the weight of the probe.

Loading

Important: the motor holds the lift bar only when the power supply is switched on. Mount items only to the holder when the power is on. Otherwise the lift bar will move downwards. The maximum load is 1.0 kg at maximum speed.

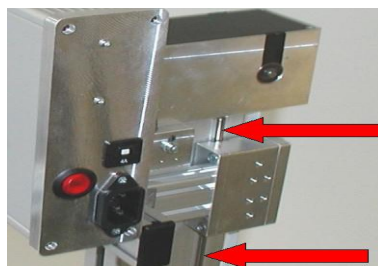
The machine is equipped with a universal lift bar.

Inserted in the bar you will find a couple of special nuts M5. You can fix your dipping items with screws and clamp sheets to these nuts.



Maintenance

The machine is mostly maintenance free. We only recommend to grease once a week the driving rails with a non corrosive oil (e.g. sewing machine oil).



Spare Part List

Article	Bezeichnung	Text	
RDC15-1	Netzteil	Power supply	
RDC15-2	Netzkabel	Power cord	
RDC15-3	Motorplatine	Motor pcb	
RDC15-4	Displayplatine	Display pcb	
CCD4X02 1	Schrittmotor	stepper motor	
CCD3X01 4	Zahnriemen Getriebekasten	Timing belt gearbox	
CCD3X05 7	Zahnriemen 14 mm	Tooth belt 14 mm CCD	
CCD4X02 2	Microschalter	Microswitch XY	
RDC085	Schaltnetzteil extern	Switching power supply external	
RDC083	Controllerplatine	Controller board RDC21MAIN-V13 best.m.system terminals	
RDC082	Schrittmotor-Endstufe	Stepper motor output stage RDC31DRV-B populated m. system terminals	
RDC081	Folientastatur 4x4	Membrane keypad 4x4	

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

Bungard GmbH & Co.KG reserves the right to change or enhance its machines or machine specifications according to its judgement, if necessary. Bungard cannot be held responsible to implement aforesaid changes into machines sold already.

Bungard products and services are liable to the current prices and conditions, which are subject to change.

The instructions and definitions in this document are also subject to change and mark no assurance on the part of Bungard.

This manual contains informations of the Bungard RDC15 and is the translated English version.

Please regard the "Sales terms and delivery conditions". These are available after fulfilment of the contract. We don't furnish a guarantee or warranty in cause of damages at material or hurts of people because of

- Incorrect use of the machine
- Wrong setup, installing and operating of the machine or incapable service
- Use of the machine with defective safety equipment
- Non-observance of the service manual in regard to transport, stocking, setup, installation and service of the machine
- Unlicensed modifications at the machine
- Incorrect or incomplete repairs
- Destructive force effect at the machine in cause of foreign objects or external use of force
- Use of non-original spare parts
- normal wear parts.

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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Correspondence Table for Coating or Dipping Drive

You can set different speeds for dipping and for coating drive between 0 and 999. This speed is a virtual quantity. The allocation table on the next page provides information on the corresponding speeds in mm / min.

Alternatively, you can set the set speed by the formula:

Speed = Display value x 10 + 20.

Correspondingly, you can calculate the display value by subtracting from the desired speed in mm / min 20mm / min and dividing the result by 10.

For example, if your photo coat supplier recommends a coating speed of **350** mm / min, you set in the display the value $(350 - 20) / 10 = \mathbf{33}$.

Stufe	mm/Minute	Stufe	mm/Minute	Stufe	mm/Minute	Stufe	mm/Minute	Stufe	mm/Minute	Stufe	mm/Minute	Stufe	mm/Minute	Stufe	mm/Minute	Stufe	mm/Minute	Stufe	mm/Minute
0	-	100	1020	200	2020	300	3020	400	4020	500	5020	600	6020	700	7020	800	8020	900	9020
1	30	101	1030	201	2030	301	3030	401	4030	501	5030	601	6030	701	7030	801	8030	901	9030
2	40	102	1040	202	2040	302	3040	402	4040	502	5040	602	6040	702	7040	802	8040	902	9040
3	50	103	1050	203	2050	303	3050	403	4050	503	5050	603	6050	703	7050	803	8050	903	9050
4	60	104	1060	204	2060	304	3060	404	4060	504	5060	604	6060	704	7060	804	8060	904	9060
5	70	105	1070	205	2070	305	3070	405	4070	505	5070	605	6070	705	7070	805	8070	905	9070
6	80	106	1080	206	2080	306	3080	406	4080	506	5080	606	6080	706	7080	806	8080	906	9080
7	90	107	1090	207	2090	307	3090	407	4090	507	5090	607	6090	707	7090	807	8090	907	9090
8	100	108	1100	208	2100	308	3100	408	4100	508	5100	608	6100	708	7100	808	8100	908	9100
9	110	109	1110	209	2110	309	3110	409	4110	509	5110	609	6110	709	7110	809	8110	909	9110
10	120	110	1120	210	2120	310	3120	410	4120	510	5120	610	6120	710	7120	810	8120	910	9120
11	130	111	1130	211	2130	311	3130	411	4130	511	5130	611	6130	711	7130	811	8130	911	9130
12	140	112	1140	212	2140	312	3140	412	4140	512	5140	612	6140	712	7140	812	8140	912	9140
13	150	113	1150	213	2150	313	3150	413	4150	513	5150	613	6150	713	7150	813	8150	913	9150
14	160	114	1160	214	2160	314	3160	414	4160	514	5160	614	6160	714	7160	814	8160	914	9160
15	170	115	1170	215	2170	315	3170	415	4170	515	5170	615	6170	715	7170	815	8170	915	9170
16	180	116	1180	216	2180	316	3180	416	4180	516	5180	616	6180	716	7180	816	8180	916	9180
17	190	117	1190	217	2190	317	3190	417	4190	517	5190	617	6190	717	7190	817	8190	917	9190
18	200	118	1200	218	2200	318	3200	418	4200	518	5200	618	6200	718	7200	818	8200	918	9200
19	210	119	1210	219	2210	319	3210	419	4210	519	5210	619	6210	719	7210	819	8210	919	9210
20	220	120	1220	220	2220	320	3220	420	4220	520	5220	620	6220	720	7220	820	8220	920	9220
21	230	121	1230	221	2230	321	3230	421	4230	521	5230	621	6230	721	7230	821	8230	921	9230
22	240	122	1240	222	2240	322	3240	422	4240	522	5240	622	6240	722	7240	822	8240	922	9240
23	250	123	1250	223	2250	323	3250	423	4250	523	5250	623	6250	723	7250	823	8250	923	9250
24	260	124	1260	224	2260	324	3260	424	4260	524	5260	624	6260	724	7260	824	8260	924	9260
25	270	125	1270	225	2270	325	3270	425	4270	525	5270	625	6270	725	7270	825	8270	925	9270
26	280	126	1280	226	2280	326	3280	426	4280	526	5280	626	6280	726	7280	826	8280	926	9280
27	290	127	1290	227	2290	327	3290	427	4290	527	5290	627	6290	727	7290	827	8290	927	9290
28	300	128	1300	228	2300	328	3300	428	4300	528	5300	628	6300	728	7300	828	8300	928	9300
29	310	129	1310	229	2310	329	3310	429	4310	529	5310	629	6310	729	7310	829	8310	929	9310
30	320	130	1320	230	2320	330	3320	430	4320	530	5320	630	6320	730	7320	830	8320	930	9320
31	330	131	1330	231	2330	331	3330	431	4330	531	5330	631	6330	731	7330	831	8330	931	9330
32	340	132	1340	232	2340	332	3340	432	4340	532	5340	632	6340	732	7340	832	8340	932	9340
33	350	133	1350	233	2350	333	3350	433	4350	533	5350	633	6350	733	7350	833	8350	933	9350
34	360	134	1360	234	2360	334	3360	434	4360	534	5360	634	6360	734	7360	834	8360	934	9360
35	370	135	1370	235	2370	335	3370	435	4370	535	5370	635	6370	735	7370	835	8370	935	9370
36	380	136	1380	236	2380	336	3380	436	4380	536	5380	636	6380	736	7380	836	8380	936	9380
37	390	137	1390	237	2390	337	3390	437	4390	537	5390	637	6390	737	7390	837	8390	937	9390
38	400	138	1400	238	2400	338	3400	438	4400	538	5400	638	6400	738	7400	838	8400	938	9400
39	410	139	1410	239	2410	339	3410	439	4410	539	5410	639	6410	739	7410	839	8410	939	9410
40	420	140	1420	240	2420	340	3420	440	4420	540	5420	640	6420	740	7420	840	8420	940	9420
41	430	141	1430	241	2430	341	3430	441	4430	541	5430	641	6430	741	7430	841	8430	941	9430
42	440	142	1440	242	2440	342	3440	442	4440	542	5440	642	6440	742	7440	842	8440	942	9440
43	450	143	1450	243	2450	343	3450	443	4450	543	5450	643	6450	743	7450	843	8450	943	9450
44	460	144	1460	244	2460	344	3460	444	4460	544	5460	644	6460	744	7460	844	8460	944	9460
45	470	145	1470	245	2470	345	3470	445	4470	545	5470	645	6470	745	7470	845	8470	945	9470
46	480	146	1480	246	2480	346	3480	446	4480	546	5480	646	6480	746	7480	846	8480	946	9480
47	490	147	1490	247	2490	347	3490	447	4490	547	5490	647	6490	747	7490	847	8490	947	9490
48	500	148	1500	248	2500	348	3500	448	4500	548	5500	648	6500	748	7500	848	8500	948	9500
49	510	149	1510	249	2510	349	3510	449	4510	549	5510	649	6510	749	7510	849	8510	949	9510
50	520	150	1520	250	2520	350	3520	450	4520	550	5520	650	6520	750	7520	850	8520	950	9520
51	530	151	1530	251	2530	351	3530	451	4530	551	5530	651	6530	751	7530	851	8530	951	9530
52	540	152	1540	252	2540	352	3540	452	4540	552	5540	652	6540	752	7540	852	8540	952	9540
53	550	153	1550	253	2550	353	3550	453	4550	553	5550	653	6550	753	7550	853	8550	953	9550
54	560	154	1560	254	2560	354	3560	454	4560	554	5560	654	6560	754	7560	854	8560	954	9560
55	570	155	1570	255	2570	355	3570	455	4570	555	5570	655	6570	755	7570	855	8570	955	9570
56	580	156	1580	256	2580	356	3580	456	4580	556	5580	656	6580	756	7580	856	8580	956	9580
57	590	157	1590	257	2590	357	3590	457	4590	557	5590	657	6590	757	7590	857	8590	957	9590
58	600	158	1600	258	2600	358	3600	458	4600	558	5600	658	6600	758	7600	858	8600	958	9600
59	610	159	1610	259	2610	359	3610	459	4610	559	5610	659	6610	759	7610	859	8610	959	9610
60	620	160	1620	260	2620	360	3620	460	4620	560	5620	660	6620	760	7620	860	8620	960	9620
61	630	161	1630	261	2630	361	3630	461	4630	561	5630	661	6630	761	7630	861	8630	961	9630
62	640	162	1640	262	2640	362	3640	462	4640	562	5640	662	6640	762	7640	862	8640	962	9640
63	650	163	1650	263	2650	363	3650	463	4650	563	5650	663	6650	763	7650	863	8650	963	9650
64	660	164	1660	264	2660	364	3660	464	4660	564	5660	664	6660	764	7660	864	8660	964	9660
65	670	165	1670	265	2670	365	3670	465	4670	565	5670	665	6670	765	7670	865	8670	965	9670
66	680	166	1680	266	2680	366	3680	466	4680	566	5680	666	6680	766	7680	866	8680	966	9680
67	690	167	1690	267	2690	367	3690	467	4690	567	5690	667	6690	767	7690	867	8690	967	9690
68	700	168	1700	268	2700	368	3700	468	4700	568	5700	668	6700	768	7700	868	8700	968	9700
69	710	169	1710	269	2710	369	3710	469	4710	569	5710	669	6710	769	7710	869	8710	969	9710