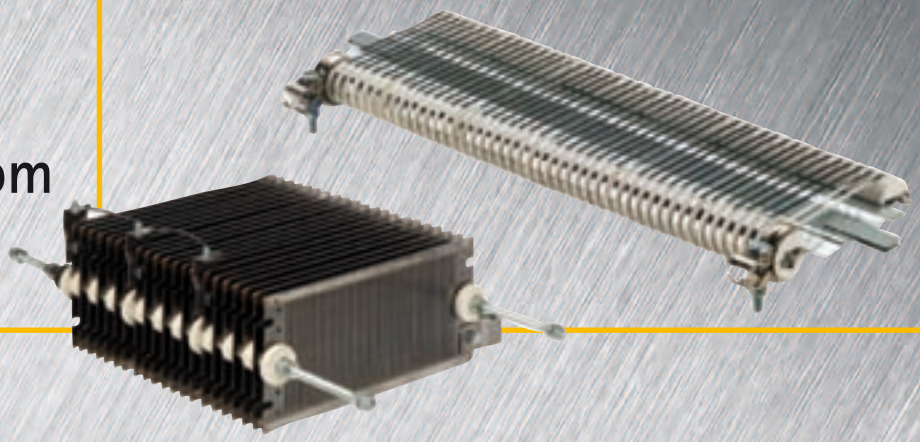
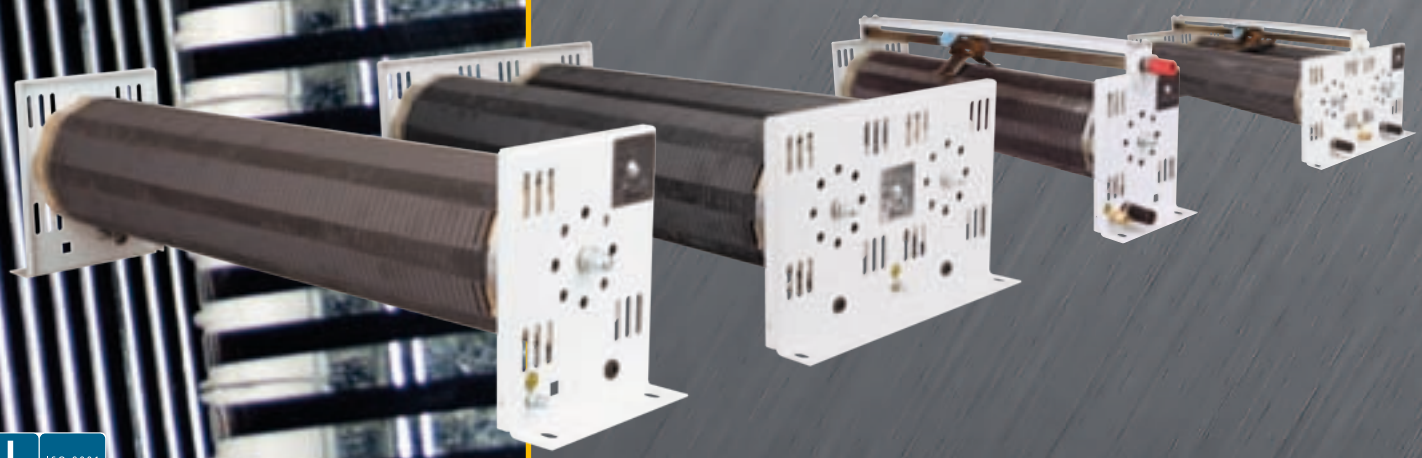
Ruhstrat®.com



Product catalogue

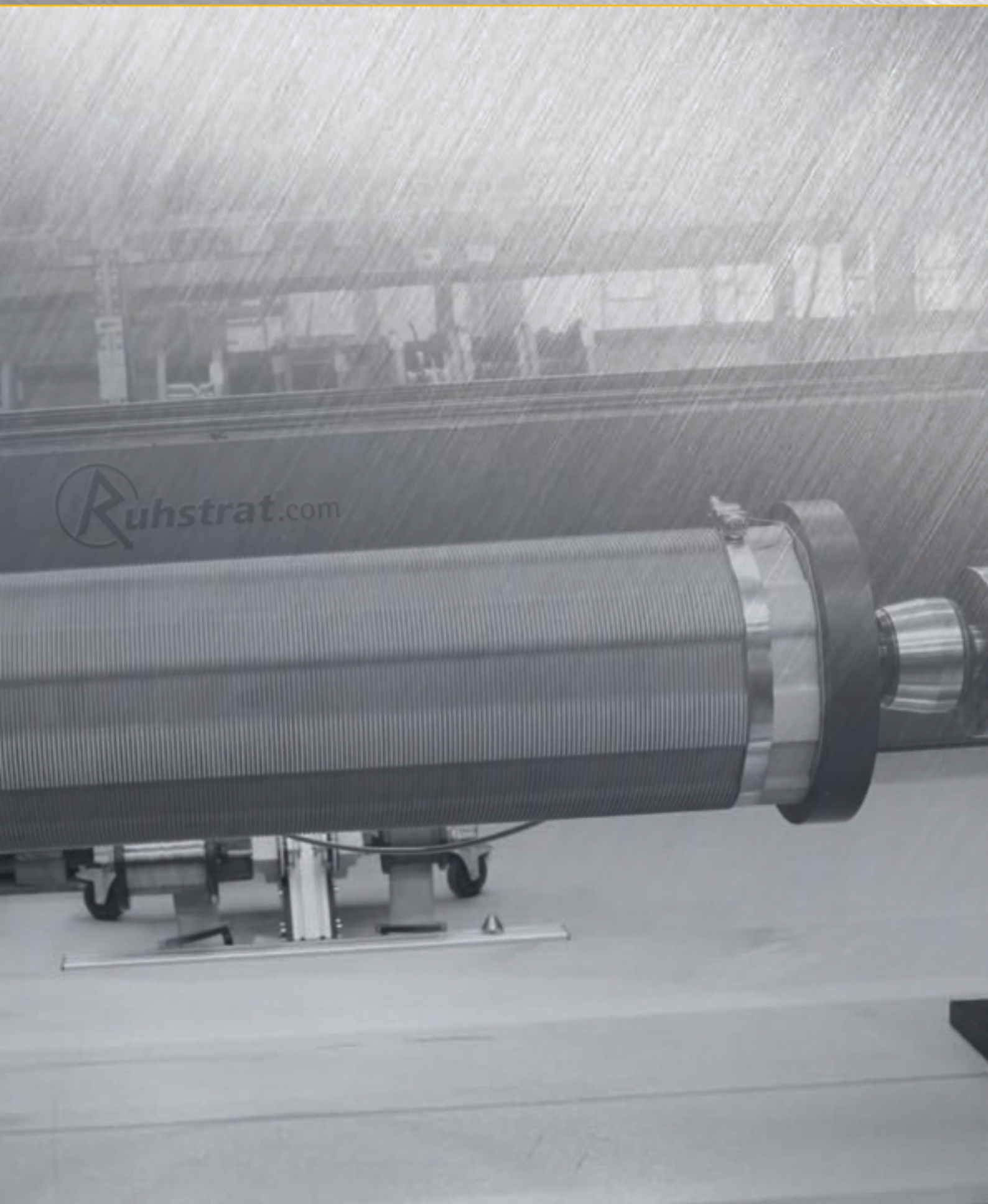
Power Resistors

- variable and fixed resistors
- wirewound resistor elements
- steel grid resistors



GL ISO 9001
GL Systems Certification

Ruhstrat –
Your competent partner for power resistors



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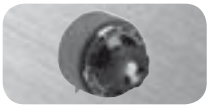

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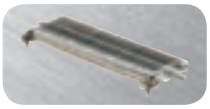

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POWER RESISTORS

Introduction

Quality and Experience are the guiding principles

Ruhstrat has decades of experience in the development and manufacture of coilware for use in electrical engineering. We offer more than innovative technology, because we are a reliable partner and support our customers with optimal solutions that are adapted to their needs.

Our decisive advantage is that we take care of more than just development, planning, delivery and installation of system solutions. We also offer a wide range of services including maintenance, technical support and replacement parts.

Ruhstrat has been specialized in developing and designing transformers, reactors, power supplies and power resistors. Besides the complete standard programme of these business fields Ruhstrat emphasizes the design and manufacturing of plants and systems individually tailored to the requirements of our customers. We manufacture custom-made transformers, reactors, power supplies and power resistors. Ruhstrat components are used wherever products made to specification and small and minimum batch sizes are needed, so for uses which cannot be provided with bulk goods.

Product overview:

Variable transformers from 20 VA up to 2 MVA

- Ring-type transformers
- Column-type regulating transformers
- Variable transformer aggregates

Voltage stabilizers from 60 VA up to 2 MVA

- Magnetic voltage stabilizers
- Transformer-type voltage stabilizers

Power transformers from 50 VA up to 8 MVA

- Low-voltage dry-type transformers
- Cast resin transformers

AC/DC reactors

- as power reactors, smoothing reactors, compensation reactors, filter circuit reactors, motor reactors

Ring core transformers up to 400 kVA

High-current transformers up to 30 kA

Power resistors up to 5 MW

- Tube resistors
- Test resistors
- Lab resistors
- Load resistors

POWER RESISTORS

Ruhstrat GmbH · Heinestraße 12 · 37120 Bovenden phone +49 (0) 55 93 803-0 · fax +49 (0) 55 93 803-50 e-mail: info@ruhstrat.com · www.ruhstrat.com

High Quality with Standard and Special Designs

The world's first wire-wound variable resistor was developed by Ruhstrat in the year 1886. This development became the basis for today's product range of Ruhstrat power resistors.

Apart from our standard programme we also provide tailor-made solutions for power ranges from 50 W to 5000 kW. According to your requirements we develop and manufacture a huge variety of resistors and resistor aggregates.

We give advice and acquire the necessary rating of the resistor according to your stipulations.

fig.: catalogue from the year 1920

We can offer fixed resistors and variable resistors, resistor aggregates as well as ohmic, inductive and capacitive load units.

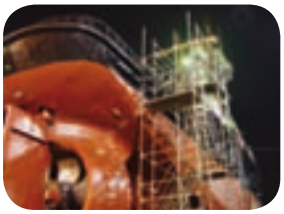
Characteristics and advantages of Ruhstrat power resistors:

- very low thermal coefficient and thus high resistance accuracy (resistance tolerance ±1%) over a broad temperature range
- thanks to their low resistance tolerance our power resistors are particularly suitable for measuring and testing purposes
- construction possible for very high load currents (≥1.000 A)
- construction for a large variety of load steps
- various options for connection (bolt connection, terminal connection and flat connection)
- different degrees of protection available (IP20/IP23)
- enclosure for stationary installation or mobile use
- portable construction of the enclosure is possible

Ruhstrat-power resistors can be used in many fields of application:

- in laboratories, schools, universities
- construction of switchgears
- battery technique
- conveyor technique and lift technique
- robotics and production
- welding technology
- shipbuilding
- railway technology

fig.: fixed resistors and variable resistors



POWER RESISTORS

*Wire-wound resistor tubes 50 to 2050 Watt**

High-class ceramic tubes and perfect windings are the basis of the high quality of our resistors and they make a long service life as well as a great reliability possible. By means of a layer made of a special cementation the windings are mechanically fixed and protected against mechanical impacts from outside. Moreover, the heat conduction is improved. In order to adapt the resistance value, regulating clamps can be put onto the windings.

* Different power values on request.

Wire-wound resistor tubes in basic version without regulating clamp and without clamping bolt

winding support: ceramic
winding: CuNi 44 (material no. 2.0842)

For the resistor's winding we use round resistor wire or resistor band with a low thermal coefficient of resistance. Our resistors are outstandingly suitable for applications requiring a high resistance accuracy over a broad temperature range. Thanks to the high resistance accuracy, there are no tolerances concerning the resistance values.

capacitance: DIN = 0,5– 0,8 W/cm²
MAX. = 0,7–1,0 W/cm²

rated voltage for air gaps and creep distances: 600 V AC or DC

frequency: 50/60 Hz

Size	L 1 [mm]	L 2 [mm]	D [mm]	d [mm]	Weights [kg]
150 × 30	150	90	30	20	0.15
200 × 30	200	140	30	20	0.20
200 × 40	200	140	40	28	0.30
300 × 40	300	240	40	28	0.50
400 × 60	400	340	60	46	1,50
500 × 60	500	440	60	46	1,80
600 × 60	600	540	60	46	2,10
400 × 120	400	320	120	90	4,50
500 × 120	500	420	120	90	5,40
600 × 120	600	520	120	90	6,70
800 × 120	800	720	120	90	8,90

table: dimensions and weights

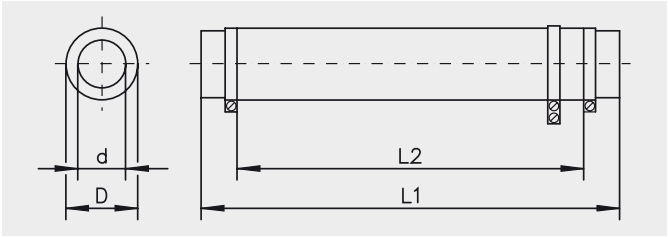


fig.: type W with adjusting clamp

Accessories (optional)

- 1R adjusting clamp
- B fixing bolt

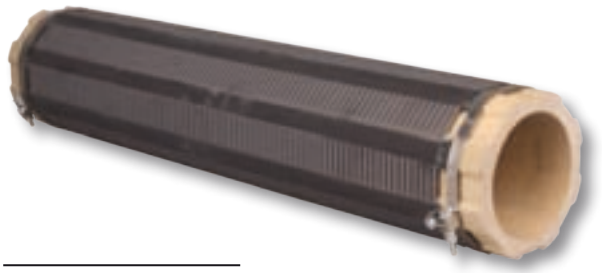


fig.: type W in basic version
without regulating clamp, without clamping bolt and without cover

fig.: type W + 1R + B
with regulating clamp and with clamping bolt

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Rated current [A]	Tube size 150×30		Tube size 200×30		Tube size 200×40		Tube size 300×40		Tube size 400×60		Tube size 500×60	
	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.
0.1	5600	81141101	8640	81142101	11500	81142201	19700	81143201	41600	81144301	54100	81145301
0.13	3100	81141102	4900	81142102	6500	81142202	11000	81143202	23600	81144302	31000	81145302
0.16	2120	81141103	3320	81142103	4390	81142203	7500	81143203	16100	81144303	20600	81145303
0.2	1250	81141104	1940	81142104	2570	81142204	4370	81143204	9580	81144304	12100	81145304
0.25	930	81141105	1440	81142105	1920	81142205	3270	81143205	7100	81144305	9000	81145305
0.3	640	81141106	980	81142106	1310	81142206	2250	81143206	4780	81144306	6160	81145306
0.4	3350	81141107	550	81142107	730	81142207	1260	81143207	2650	81144307	3400	81145307
0.5	250	81141108	390	81142108	520	81142208	880	81143208	1860	81144308	2420	81145308
0.6	170	81141109	265	81142109	350	81142209	600	81143209	1270	81144309	1640	81145309
0.8	86	81141110	134	81142110	178	81142210	310	81143210	650	81144310	840	81145310
1	75	81141111	110	81142111	135	81142211	230	81143211	488	81144311	660	81145311
1,3	34	81141112	52	81142112	69	81142212	119	81143212	252	8114312	330	81145312
1,6	27	81141113	43	81142113	55	81142213	95	81143213	204	81144313	263	81145313
2	16	81141114	23	81142114	40	81142214	56	81143214	120	81144314	156	81145314
2,5	11	81141115	17	81142115	25	81142215	38	81143215	80	81144315	104	81145315
3	8,5	81141116	13	81142116	18	81142216	229	81143216	63	81144316	81	81145316
4	4,4	81141117	6,8	81142117	9	81142217	15,6	81143217	33	81144317	42	81145317
5	2,6	81141118	4	81142118	5,5	81142218	9,5	81143218	20	81144318	26	81145318
6	1,9	81141119	3	81142119	4	81142219	6,9	81143219	14	81144319	19	81145319
8	1,1	81141120	1,75	81142120	2,2	81142220	4	81143220	8,4	81144320	10,9	81145320
10	0,68	81141121	1,1	81142121	1,4	81142221	2,4	81143221	5,1	81144321	6,6	81145321
13	0,44	81141122	0,65	81142122	0,9	81142222	1,5	81143222	3,2	81144322	4,2	81145322
16	0,26	81141123	0,41	81142123	0,55	81142223	0,92	81143223	2	81144323	2,5	81145323
20	0,18	81141124	0,28	81142124	0,37	81142224	0,62	81143224	1,32	81144324	1,71	81145324
25	0,12	81141125	0,18	81142125	0,23	81142225	0,4	81143225	0,85	81144325	1,12	81145325

table: types of wire-wound resistor tubes

Rated current [A]	Tube size 600×60		Tube size 400×120		Tube size 500×120		Tube size 600×120		Tube size 800×120	
	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.
0.1	66500	81146301								
0.13	37000	81146302								
0.16	25200	81146303								
0.2	14900	81146304								
0.25	11000	81146305								
0.3	7550	81146306	8830	81144406	11400	81145406	14000	81146406	18700	81147406
0.4	4200	81146307	4900	81144407	6400	81145407	7800	81146407	10400	81147407
0.5	2970	81146308	3500	81144408	1600	81145408	5600	81146408	7400	81147408
0.6	2010	81146309	2210	81144409	2900	81145409	3600	81146409	5000	81147409
0.8	1030	81146310	1120	81144410	1480	81145410	1830	81146410	2530	81147410
1	775	81146311	850	81144411	1110	81145411	1380	81146411	1900	81147411
1,3	400	81146312	440	81144412	580	81145412	710	81146412	990	81147412
1,6	320	81146313	355	81144413	468	81145413	570	81146413	800	81147413
2	190	81146314	210	81144414	275	81145414	340	81146414	470	81147414
2,5	127	81146315	138	81144415	183	81145415	225	81146415	310	81147415
3	100	81146316	125	81144416	163	81145416	200	81146416	265	81147416
4	52	81146317	65	81144417	85	81145417	104	81146417	139	81147417
5	31	81146318	40	81144418	51	81145418	64	81146418	85	81147418
6	23	81146319	29	81144419	38	81145419	46	81146419	62	81147419
8	13,5	81146320	16,8	81144420	22	81145420	26	81146420	35	81147420
10	8,1	81146321	10	81144421	13	81145421	16	81146421	21	81147421
13	5,2	81146322	6,5	81144422	8,3	81145422	10,5	81146422	13,5	81147422
16	3	81146323	3,8	81144423	5	81145423	6,5	81146423	8,1	81147423
20	2	81146324	2,6	81144424	3,4	81145424	4,2	81146424	5,6	81147424
25	1,4	81146325	1,7	81144425	2,2	81145425	2,7	81146425	3,5	81147425

table: types of wire-wound resistor tubes

Single-tube fixed resistors 50 to 2050 Watt*

High-class ceramic tubes and perfect windings are the basis of the high quality of our resistors and they make a long service life as well as a great reliability possible. By means of a layer made of a special cementation the windings are mechanically fixed and protected against mechanical impacts from outside. Moreover, the heat conduction is improved. In order to adapt the resistance value, regulating clamps can be put onto the windings.

* Different power values on request.

Single-Tube Fixed Resistors in basic version without Regulating Clamp, without Terminals, without Cover

winding support: ceramic
winding: CuNi 44 (material no. 2.0842)

For the resistor's winding we use round resistor wire or resistor band with a low thermal coefficient of resistance. Our resistors are outstandingly suitable for applications requiring a high resistance accuracy over a broad temperature range. Thanks to the high resistance accuracy, there are no tolerances concerning the resistance values.

capacitance: DIN = 0,5 – 0,8 W/cm²
MAX. = 0,7 – 1,0 W/cm²

rated voltage for air gaps and creep distances: 600 V AC or DC

test voltage: 2.5 kV, resistor connection against touchable parts, acc. to DIN/VDE 0110

frequency: 50/60 Hz

Size	L 1 mm	L 2 mm	L 3 mm	L 4 mm	B 1 mm	B 2 mm	H mm	D mm	F kg	FA kg
150 × 30	194	170	150	90	64	Single hole bore	87	30	0.50	0.60
200 × 30	244	220	200	140	64		87	30	0.55	0.65
200 × 40	244	220	200	140	75		98	40	0.60	0.70
300 × 40	344	320	300	240	75		98	40	0.80	1,1
400 × 60	448	426	400	340	92		122	60	2,1	2,6
500 × 60	548	526	500	440	92		122	60	2,5	3,1
600 × 60	648	626	600	540	92		122	60	2,7	3,4
400 × 120	475	440	400	320	152	112	186	120	5,2	6,3
500 × 120	575	540	500	420	152	112	186	120	6,2	7,5
600 × 120	675	640	600	520	152	112	186	120	7,3	9,5
800 × 120	875	840	800	720	152	112	186	120	9,8	12

table: dimensions and weights

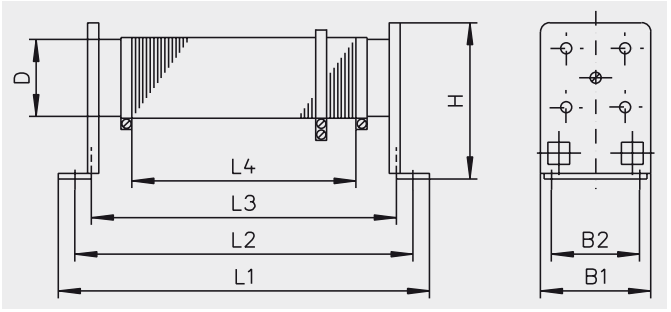

fig.: type F with adjusting clamp

Accessories (optional)

- A cover
- 2K binding posts
- 1R adjusting clamp

fig.: type F in basic version
without regulating clamp, without terminals, without cover

fig.: type SFA
with binding posts and cover

POWER RESISTORS

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Rated current [A]	Tube size 150×30		Tube size 200×30		Tube size 200×40		Tube size 300×40		Tube size 400×60		Tube size 500×60	
	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.
0.1	5600	81111101	8640	81112101	11500	81112201	19700	81113201	41600	81114301	54100	81115301
0.13	3100	81111102	4900	81112102	6500	81112202	11000	81113202	23600	81114302	31000	81115302
0.16	2120	81111103	3320	81112103	4390	81112203	7500	81113203	16100	81114303	20600	81115303
0.2	1250	81111104	1940	81112104	2570	81112203	4370	81113204	9580	81114304	12100	81115304
0.25	930	81111105	1440	81112105	1920	81112205	3270	81113205	7100	81114305	9000	81115305
0.3	640	81111106	980	81112106	1310	81112206	2250	81113206	4780	81114306	6160	81115306
0.4	3350	81111107	550	81112107	730	81112207	1260	81113207	2650	81114307	3400	81115307
0.5	250	81111108	390	81112108	520	81112208	880	81113208	1860	81114308	2420	81115308
0.6	170	81111109	265	81112109	350	81112209	600	81113209	1270	81114309	1640	81115309
0.8	86	81111110	134	81112110	178	81112210	310	81113210	650	81114310	840	81115310
1	75	81111111	110	81112111	135	81112211	230	81113211	488	81114311	660	81115311
1,3	34	81111112	52	81112112	69	81112212	119	81113212	252	81114312	330	81115312
1,6	27	81111113	43	81112113	55	81112213	95	81113213	204	81114313	263	81115313
2	16	81111114	23	81112114	40	81112214	56	81113214	120	81114314	156	81115314
2,5	11	81111115	17	81112115	25	81112215	38	81113215	80	81114315	104	81115315
3	8,5	81111116	13	81112116	18	81112216	229	81113216	63	81114316	81	81115316
4	4,4	81111117	6,8	81112117	9	81112217	15,6	81113217	33	81114317	42	81115317
5	2,6	81111118	4	81112118	5,5	81112218	9,5	81113218	20	81114318	26	81115318
6	1,9	81111119	3	81112119	4	81112219	6,9	81113219	14	81114319	19	81115319
8	1,1	81111120	1,75	81112120	2,2	81112220	4	81113220	8,4	81114320	10,9	81115320
10	0,68	81111121	1,1	81112121	1,4	81112221	2,4	81113221	5,1	81114321	6,6	81115321
13	0,44	81111122	0,65	81112122	0,9	81112222	1,5	81113222	3,2	81114322	4,2	81115322
16	0,26	81111123	0,41	81112123	0,55	81112223	0,92	81113223	2	81114323	2,5	81115323
20	0,18	81111124	0,28	81112124	0,37	81112224	0,62	81113224	1,32	81114324	1,71	81115324
25	0,12	81111125	0,18	81112125	0,23	81112225	0,4	81113225	0,85	81114325	1,12	81115325

table: types of single-tube fixed resistors

Rated current [A]	Tube size 600×60		Tube size 400×120		Tube size 500×120		Tube size 600×120		Tube size 800×120	
	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.
0.1	66500	81116301								
0.13	37000	81116302								
0.16	25200	81116303								
0.2	14900	81116304								
0.25	11000	81116305								
0.3	7550	81116306	8830	81114406	11400	81115406	14000	81116406	18700	81117406
0.4	4200	81116307	4900	81114407	6400	81115407	7800	81116407	10400	81117407
0.5	2970	81116308	3500	81114408	1600	81115408	5600	81116408	7400	81117408
0.6	2010	81116309	2210	81114409	2900	81115409	3600	81116409	5000	81117409
0.8	1030	81116310	1120	81114410	1480	81115410	1830	81116410	2530	81117410
1	775	81116311	850	81114411	1110	81115411	1380	81116411	1900	81117411
1,3	400	81116312	440	81114412	580	81115412	710	81116412	990	81117412
1,6	320	81116313	355	81114413	468	81115413	570	81116413	800	81117413
2	190	81116314	210	81114414	275	81115414	340	81116414	470	81117414
2,5	127	81116315	138	81114415	183	81115415	225	81116415	310	81117415
3	100	81116316	125	81114416	163	81115416	200	81116416	265	81117416
4	52	81116317	65	81114417	85	81115417	104	81116417	139	81117417
5	31	81116318	40	81114418	51	81115418	64	81116418	85	81117418
6	23	81116319	29	81114419	38	81115419	46	81116419	62	81117419
8	13,5	81116320	16,8	81114420	22	81115420	26	81116420	35	81117420
10	8,1	81116321	10	81114421	13	81115421	16	81116421	21	81117421
13	5,2	81116322	6,5	81114422	8,3	81115422	10,5	81116422	13,5	81117422
16	3	81116323	3,8	81114423	5	81115423	6,5	81116423	8,1	81117423
20	2	81116324	2,6	81114424	3,4	81115424	4,2	81116424	5,6	81117424
25	1,4	81116325	1,7	81114425	2,2	81115425	2,7	81116425	3,5	81117425

table: types of single-tube fixed resistors

Double-tube fixed resistors 100 to 4100 Watt*

High-class ceramic tubes and perfect windings are the basis of the high quality of our resistors and they make a long service life as well as a great reliability possible. By means of a layer made of a special cementation the windings are mechanically fixed and protected against mechanical impacts from outside. Moreover, the heat conduction is improved. In order to adapt the resistance value, regulating clamps can be put onto the windings.

* Different power values on request.

Double-Tube Fixed Resistors in basic version without Regulating Clamp, without Terminals, without Cover

winding support: ceramic
winding: CuNi 44 (material no. 2.0842)

For the resistor's winding we use round resistor wire or resistor band with a low thermal coefficient of resistance. Our resistors are outstandingly suitable for applications requiring a high resistance accuracy over a broad temperature range. Thanks to the high resistance accuracy, there are no tolerances concerning the resistance values.

capacitance: DIN = 0,5– 0,8 W/cm2
MAX. = 0,7– 1,0 W/cm2

rated voltage for air gaps and creep distances: 600 V AC or DC

test voltage: 2.5 kV, resistor connection against touchable parts, acc. to DIN/VDE 0110

frequency: 50/60 Hz

Size	L 1 mm	L 2 mm	L 3 mm	L 4 mm	B 1 mm	B 2 mm	H mm	D mm	F kg	FA kg
150 × 30	196	170	150	90	125	80	82	30	0.90	1,1
200 × 30	246	220	200	140	125	80	82	30	1	1,2
200 × 40	246	220	200	140	146	100	93	40	1,1	1,3
300 × 40	346	320	300	240	146	100	93	40	1,6	2
400 × 60	450	424	400	340	185	150	112	60	4,2	4,8
500 × 60	550	524	500	440	185	150	112	60	5	6
600 × 60	650	624	600	540	185	150	112	60	5,4	6,7
400 × 120	475	440	400	320	300	275	185	120	10,4	12,4
500×120	575	540	500	420	300	275	185	120	12,6	14,8
600×120	675	640	600	520	300	275	185	120	14,6	17,5
800×120	875	840	800	720	300	275	185	120	18,6	22,3

table: dimensions and weights

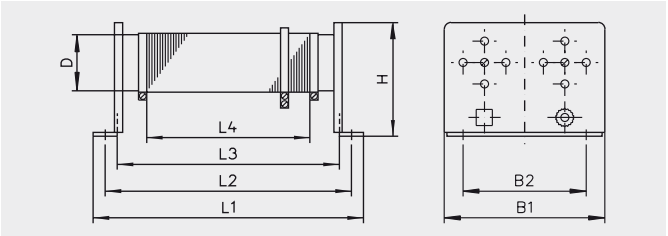


fig.: type FD with adjusting clamp

Accessories (optional)

- A cover
- 2K binding posts
- 1R adjusting clamp

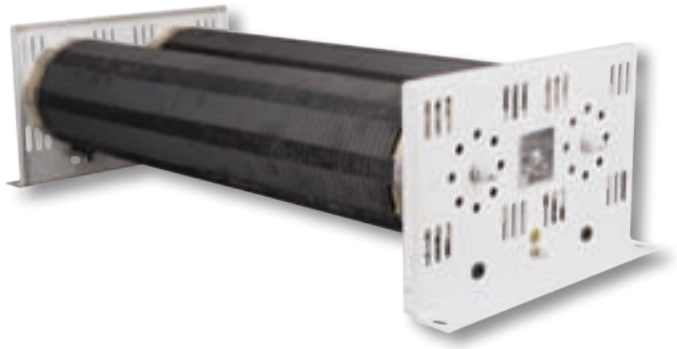


fig.: type FD in basic version
without Regulating Clamp, without Terminals, without Cover

fig.: type SFD
with binding posts and cover

POWER RESISTORS

Ruhstrat GmbH · Heinestraße 12 · 37120 Bovenden phone +49 (0) 55 93 803-0 · fax +49 (0) 55 93 803-50 e-mail: info@ruhstrat.com · www.ruhstrat.com

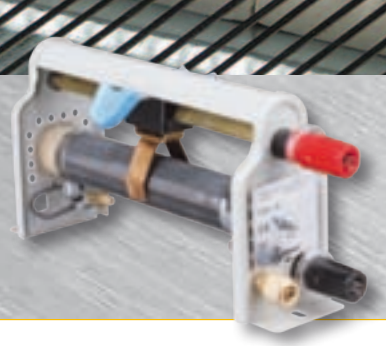
Rated current [A]	Tube size 150×30		Tube size 200×30		Tube size 200×40		Tube size 300×40		Tube size 400×60		Tube size 500×60	
	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.
0.1	11200	81121101	17300	81122101	23100	81122201	39500	81123201	83000	81124301	108000	81125301
0.13	6300	81121102	9700	81122102	12900	81122202	22000	81123202	47000	81124302	61000	81125302
0.16	4240	81121103	6640	81122103	8780	81122203	15000	81123203	32000	81124303	41300	81125303
0.2	2500	81121104	3880	81122104	5140	81122203	8750	81123204	19200	81124304	24200	81125304
0.25	1860	81121105	2880	81122105	3840	81122205	6540	81123205	14200	81124305	18000	81125305
0.3	1280	81121106	1960	81122106	2620	81122206	4500	81123206	9570	81124306	12300	81125306
0.4	700	81121107	1100	81122107	1460	81122207	2520	81123207	5300	81124307	6800	81125307
0.5	500	81121108	780	81122108	1040	81122208	1760	81123208	3720	81124308	4840	81125308
0.6	340	81121109	530	81122109	700	81122209	1200	81123209	2540	81124309	3280	81125309
0.8	173	81121110	268	81122110	360	81122210	610	81123210	1300	81124310	1680	81125310
1	150	81121111	220	81122111	270	81122211	460	81123211	976	81124311	1320	81125311
1,3	67	81121112	105	81122112	139	81122212	238	81123212	500	81124312	650	81125312
1,6	54	81121113	86	81122113	110	81122213	190	81123213	408	81124313	526	81125313
2	32	81121114	46	81122114	80	81122214	112	81123214	240	81124314	312	81125314
2,5	222	81121115	34	81122115	50	81122215	76	81123215	160	81124315	208	81125315
3	17	81121116	26	81122116	36	81122216	58	81123216	126	81124316	162	81125316
4	8,8	81121117	13,7	81122117	18,1	81122217	31	81123217	66	81124317	85	81125317
5	5,2	81121118	8	81122118	11	81122218	19	81123218	40	81124318	52	81125318
6	3,9	81121119	6,1	81122119	8	81122219	14	81123219	29	81124319	38	81125319
8	2,2	81121120	3,5	81122120	4,4	81122220	8	81123220	116,8	81124320	22	81125320
10	1,38	81121121	2,2	81122121	2,8	81122221	4,8	81123221	10,2	81124321	13,2	81125321
13	0,88	81121122	1,3	81122122	1,8	81122222	3	81123222	6,4	81124322	8,4	81125322
16	0,52	81121123	0,82	81122123	1,1	81122223	1,84	81123223	4	81124323	5	81125323
20	0,36	81121124	0,56	81122124	0,74	81122224	1,24	81123224	2,64	81124324	3,42	81125324
25	0,24	81121125	0,36	81122125	0,46	81122225	0,8	81123225	1,7	81124325	2,24	81125325

table: types of double-tube fixed resistors

Rated current [A]	Tube size 600×60		Tube size 400×120		Tube size 500×120		Tube size 600×120		Tube size 800×120	
	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.
0.1	135000	81126301								
0.13	75000	81126302								
0.16	51000	81126303								
0.2	29700	81126304								
0.25	22000	81126305								
0.3	15100	81126306	17600	81124406	22800	81125406	28000	81126406	37300	81127406
0.4	8400	81126307	9800	81124407	12700	81125407	15600	81126407	20800	81127407
0.5	5940	81126308	7000	81124408	9200	81125408	11200	81126408	14800	81127408
0.6	4020	81126309	4420	81124409	5800	81125409	7200	81126409	10000	81127409
0.8	2060	81126310	2250	81124410	2960	81125410	3700	81126410	5100	81127410
1	1550	81126311	1700	81124411	2220	81125411	2780	81126411	3820	81127411
1,3	800	81126312	880	81124412	1150	81125412	1430	81126412	2000	81127412
1,6	640	81126313	710	81124413	936	81125413	1140	81126413	1600	81127413
2	380	81126314	420	81124414	550	81125414	684	81126414	940	81127414
2,5	254	81126315	276	81124415	366	81125415	452	81126415	620	81127415
3	200	81126316	250	81124416	326	81125416	400	81126416	530	81127416
4	104	81126317	131	81124417	170	81125417	208	81126417	280	81127417
5	62	81126318	80	81124418	102	81125418	128	81126418	168	81127418
6	46	81126319	58	81124419	79	81125419	93	81126419	123	81127419
8	27	81126320	33,6	81124420	44	81125420	52	81126420	70	81127420
10	16,2	81126321	20	81124421	26	81125421	31	81126421	42	81127421
13	10,4	81126322	13	81124422	16,6	81125422	21	81126422	27	81127422
16	6	81126323	7,6	81124423	10	81125423	13	81126423	16,2	81127423
20	4	81126324	5,2	81124424	6,8	81125424	8,4	81126424	11,2	81127424
25	2,8	81126325	3,4	81124425	4,4	81125425	5,4	81126425	7	81127425

table: types of double-tube fixed resistors

Single-tube slide resistors 50 to 1350 Watt*



High-class ceramic tubes and perfect windings are the basis of the high quality of our resistors and they make a long service life as well as a great reliability possible. By means of a layer made of a special cementation the windings are mechanically fixed and protected against mechanical impacts from outside. Moreover, the heat conduction is improved. Operation can be effected manually as well as by means of a motor. In case of motor operation, Ruhstrat supplies the desired components individually according to your specifications, with drive and limit switches.

* Different capacitance values on request.

Single-tube slide resistors in basic version with 2 terminals, with manual slider, without cover

winding support: ceramic
winding: CuNi 44 (material no. 2.0842)

For the resistor's winding we use round resistor wire or resistor band with a low thermal coefficient of resistance. Our resistors are outstandingly suitable for applications requiring a high resistance accuracy over a broad temperature range. Thanks to the high resistance accuracy, there are no tolerances concerning the resistance values.

capacitance: DIN = 0,5 – 0,8 W/cm²
MAX. = 0,7 – 1,0 W/cm²

rated voltage for air gaps and creep distances: 600 V AC or DC

test voltage: 2.5 kV, resistor connection against touchable parts, acc. to DIN/VDE 0110

frequency: 50/60 Hz

Size	L 1 mm	L 2 mm	L 3 mm	L 4 mm	B 1 mm	B 2 mm	H mm	D mm	S kg	SA kg
150 × 30	196	174	150	90	64	Single hole bore	120	30	0.80	0.90
200 × 30	246	224	200	140	64		120	30	0.85	0.95
200 × 40	246	224	200	140	76		128	40	1	1,2
300 × 40	346	326	300	240	76		128	40	1,1	1,5
400 × 60	450	430	400	340	85	55	148	60	2,5	3,1
500 × 60	550	530	500	440	85	55	148	60	3,2	3,5
600 × 60	650	630	600	540	85	55	148	60	4,9	5,7
400 × 120	475	440	400	320	150	112	217	120	5	6,1
500 × 120	575	540	500	420	150	112	217	120	6,8	8,2
600 × 120	675	640	600	520	150	112	217	120	8,6	10,3
800 × 120	875	840	800	720	150	112	217	120	12,2	14,5

table: dimensions and weights

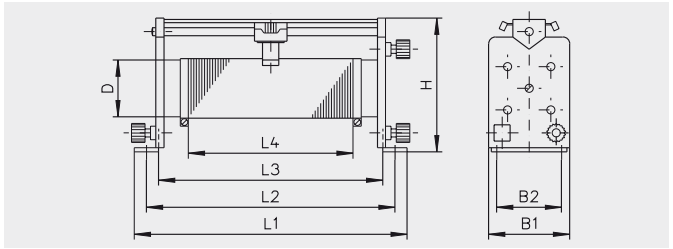


fig.: type S with 3rd binding post

Accessories (optional)

- A cover
- P 3rd binding post (for resistors to be used as voltage dividers)
- Sp spindle drive with handle
- SpK spindle drive with bevel gear and handle
- Q stepped winding
- Mo motor drive AC/DC

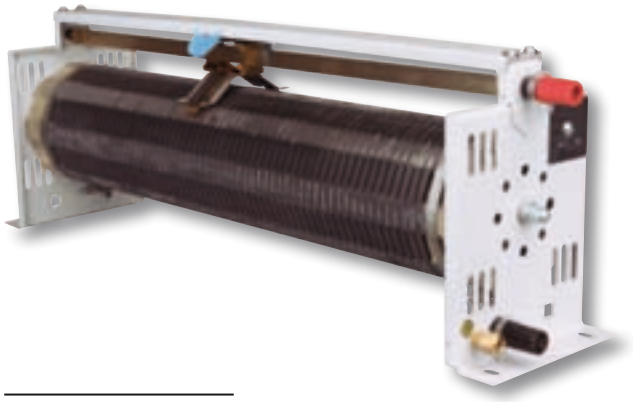


fig.: type S in basic version
with 2 terminals, with manual slider, without cover

fig.: type SSA
with 2 binding posts, with manual slider, with cover

POWER RESISTORS

Rated current [A]	Tube size 150×30		Tube size 200×30		Tube size 200×40		Tube size 300×40		Tube size 400×60		Tube size 500×60	
	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.
0.1	3280	81211101	5200	81212101	6890	81212201	11600	81213201	25000	81214301	33000	81215301
0.13	1980	81211102	3100	81212102	4100	81212202	7000	81213202	14900	81214302	19300	81215302
0.16	1350	81211103	2140	81212103	2810	81212203	4800	81213203	10300	81214303	12200	81215303
0.2	1060	81211104	1640	81212104	2170	81212203	3720	81213204	8030	81214304	10300	81215304
0.25	670	81211105	1060	81212105	1420	81212205	2370	81213205	5050	81214305	6500	81215305
0.3	525	81211106	810	81212106	1070	81212206	1840	81213206	3860	81214306	5000	81215306
0.4	270	81211107	380	81212107	580	81212207	880	81213207	1540	81214307	1950	81215307
0.5	171	81211108	267	81212108	357	81212208	602	81213208	1220	81214308	1650	81215308
0.6	132	81211109	204	81212109	271	81212209	470	81213209	990	81214309	1320	81215309
0.8	70	81211110	95	81212110	126	81212210	216	81213210	460	81214310	600	81215310
1	46	81211111	69	81212111	94	81212211	162	81213211	347	81214311	440	81215311
1,3	26	81211112	41	81212112	54	81212212	92	81213212	196	81214312	253	81215312
1,6	20	81211113	32	81212113	42	81212213	73	81213213	152	81214313	200	81215313
2	11,5	81211114	17,5	81212114	22,6	81212214	40	81213214	85	81214314	110	81215314
2,5	8	81211115	12,3	81212115	16,3	81212215	27,5	81213215	59	81214315	76	81215315
3	6,1	81211116	9,5	81212116	12,2	81212216	21,5	81213216	46	81214316	59	81215316
4	3,3	81211117	5,2	81212117	6,9	81212217	12	81213217	25	81214317	32	81215317
5	2,1	81211118	3,3	81212118	4,4	81212218	7,5	81213218	15	81214318	21	81215318
6	1,3	81211119	2,1	81212119	2,8	81212219	4,8	81213219	10	81214319	13	81215319
8	0,88	81211120	1,37	81212120	1,8	81212220	3	81213220	6,5	81214320	8,4	81215320
10	0,58	81211121	0,91	81212121	1,25	81212221	2	81213221	4,4	81214321	5,6	81215321
13	0,34	81211122	0,53	81212122	0,7	81212222	1,2	81213222	2,5	81214322	3,2	81215322
16	0,26	81211123	0,33	81212123	0,44	81212223	0,74	81213223	1,57	81214323	2,1	81215323
20	0,13	81211124	0,2	81212124	0,26	81212224	0,45	81213224	0,96	81214324	1,24	81215324
25	0,09	81211125	0,13	81212125	0,18	81212225	0,31	81213225	0,66	81214325	0,8	81215325

table: types of single-tube slide resistors

Rated current [A]	Tube size 600×60		Tube size 400×120		Tube size 500×120		Tube size 600×120		Tube size 800×120	
	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.
0.1	39200	81216301								
0.13	23600	81216302								
0.16	16300	81216303								
0.2	12500	81216304								
0.25	8000	81216305								
0.3	6140	81216306	7130	81214406	9310	81215406	11400	81216406	15200	81217406
0.4	2440	81216307	2670	81214407	3500	81215407	4400	81216407	6000	81217407
0.5	2050	81216308	2260	81214408	2950	81215408	3670	81216408	5100	81217408
0.6	1630	81216309	1720	81214409	2270	81215409	2810	81216409	3900	81217409
0.8	730	81216310	800	81214410	1050	81215410	1300	81216410	1800	81217410
1	540	81216311	590	81214411	785	81215411	960	81216411	1340	81217411
1,3	310	81216312	340	81214412	450	81215412	550	81216412	770	81217412
1,6	240	81216313	263	81214413	346	81215413	425	81216413	594	81217413
2	135	81216314	147	81214414	193	81215414	240	81216414	330	81217414
2,5	94	81216315	103	81214415	135	81215415	167	81216415	231	81217415
3	72	81216316	90	81214416	117	81215416	144	81216416	193	81217416
4	40	81216317	50	81214417	64	81215417	79	81216417	106	81217417
5	25	81216318	31	81214418	40	81215418	449	81216418	66	81217418
6	16	81216319	20	81214419	26	81215419	32	81216419	42	81217419
8	10	81216320	13	81214420	16,8	81215420	20,5	81216420	27	81217420
10	6	81216321	8,6	81214421	11,2	81215421	13,7	81216421	18,4	81217421
13	4	81216322	5	81214422	6,4	81215422	7,9	81216422	10	81217422
16	2,5	81216323	3,1	81214423	4	81215423	4,9	81216423	6,6	81217423
20	1,52	81216324	1,9	81214424	2,4	81215424	3	81216424	4	81217424
25	1,05	81216325	1,3	81214425	1,7	81215425	2,1	81216425	2,8	81217425

table: types of single-tube slide resistors

Double-tube slide resistors
100 to 2700 Watt*

High-class ceramic tubes and perfect windings are the basis of the high quality of our resistors and they make a long service life as well as a great reliability possible. By means of a layer made of a special cementation the windings are mechanically fixed and protected against mechanical impacts from outside. Moreover, the heat conduction is improved. Operation can be effected manually as well as by means of a motor. In case of motor operation, Ruhstrat supplies the desired components individually according to your specifications, with drive and limit switches.

* Different capacitance values on request.

Double-Tube Slide Resistors in basic version with 2 Terminals, with Manual Slider, without Cover

winding support: ceramic
winding: CuNi 44 (material no. 2.0842)

For the resistor's winding we use round resistor wire or resistor band with a low thermal coefficient of resistance. Our resistors are outstandingly suitable for applications requiring a high resistance accuracy over a broad temperature range. Thanks to the high resistance accuracy, there are no tolerances concerning the resistance values.

capacitance: DIN = 0,5 – 0,8 W/cm2
MAX. = 0,7 – 1,0 W/cm2

rated voltage for air gaps and creep distances: 600 V AC or DC

test voltage: 2.5 kV, resistor connection against touchable parts, acc. to DIN/VDE 0110

frequency: 50/60 Hz

Size	L 1 mm	L 2 mm	L 3 mm	L 4 mm	B 1 mm	B 2 mm	H mm	D mm	SD kg	SDA kg
150 × 30	196	174	150	90	125	80	120	30	1,1	1,3
200 × 30	246	224	200	140	125	80	120	30	1,3	1,5
200 × 40	246	224	200	140	146	100	128	40	1,7	1,9
300 × 40	346	326	300	240	146	100	128	40	2	2,3
400 × 60	450	430	400	340	185	150	152	60	3,4	4,1
500 × 60	550	530	500	440	185	150	152	60	4,1	5,7
600 × 60	650	630	600	540	185	150	152	60	5,3	6,9
400 × 120	462	436	400	320	332	276	222	120	11,3	12,7
500 × 120	562	536	500	420	332	276	222	120	14,9	16
600 × 120	662	636	600	520	332	276	222	120	18,5	21
800 × 120	862	836	800	720	332	276	222	120	25,7	29,5

table: dimensions and weights

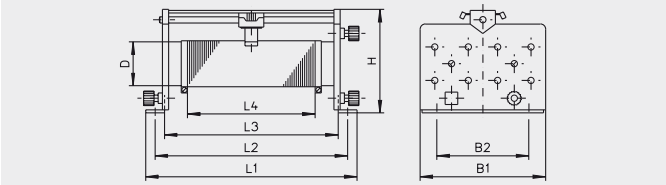


fig.: type SD with 3rd binding post

Accessories (optional)

- A cover
- P 3rd binding post (for resistors to be used as voltage dividers)
- Sp spindle drive with handle
- SpK spindle drive with bevel gear and handle
- Q stepped winding
- Mo motor drive AC/DC

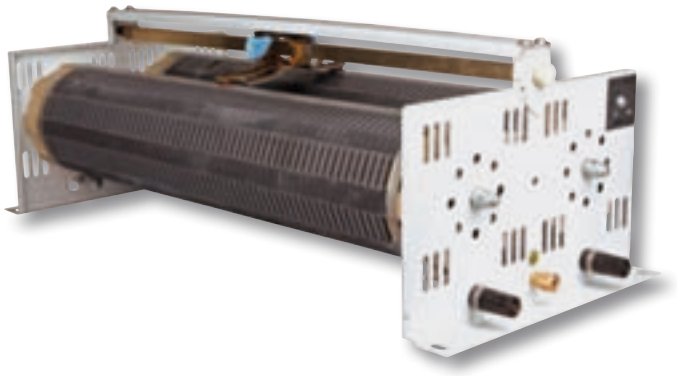


fig.: type SD in basic version
with 2 Terminals, with Manual Slider, without Cover

fig.: type SSD
with 2 binding posts, with manual slider, with cover

POWER RESISTORS

Rated current [A]	Tube size 150×30		Tube size 200×30		Tube size 200×40		Tube size 300×40		Tube size 400×60		Tube size 500×60	
	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.
0.1	6570	81221101	10400	81222101	13800	81222201	23300	81223201	50000	81224301	65700	81225301
0.13	4000	81221102	6100	81222102	8200	81222202	14000	81223202	29800	81224302	39000	81225302
0.16	2710	81221103	4280	81222103	5630	81222203	9590	81223203	20600	81224303	26500	81225303
0.2	2120	81221104	3280	81222104	4350	81222203	7450	81223204	16100	81224304	20500	81225304
0.25	1340	81221105	2120	81222105	2840	81222205	4740	81223205	10100	81224305	13000	81225305
0.3	1030	81221106	1620	81222106	2140	81222206	3680	81223206	7720	81224306	9900	81225306
0.4	410	81221107	630	81222107	850	81222207	1450	81223207	3100	81224307	3900	81225307
0.5	342	81221108	534	81222108	714	81222208	1200	81223208	2450	81224308	3320	81225308
0.6	264	81221109	408	81222109	542	81222209	940	81223209	1980	81224309	2650	81225309
0.8	141	81221110	391	81222110	252	81222210	430	81223210	920	81224310	1190	81225310
1	92	81221111	138	81222111	188	81222211	324	81223211	694	81224311	876	81225311
1,3	52	81221112	81	81222112	108	81222212	184	81223212	380	81224312	510	81225312
1,6	40	81221113	64	81222113	84	81222213	146	81223213	304	81224313	460	81225313
2	23	81221114	35	81222114	45	81222214	80	81223214	170	81224314	220	81225314
2,5	16	81221115	24	81222115	32.6	81222215	55	81223215	118	81224315	152	81225315
3	12,2	81221116	19	81222116	24.4	81222216	43	81223216	92	81224316	118	81225316
4	6,7	81221117	10	81222117	13.9	81222217	23.8	81223217	50	81224317	65	81225317
5	4,2	81221118	6.6	81222118	8.8	81222218	15	81223218	30	81224318	42	81225318
6	2,7	81221119	4.2	81222119	5.6	81222219	9.6	81223219	20	81224319	26	81225319
8	1,8	81221120	2.74	81222120	3.6	81222220	6	81223220	13	81224320	16.8	81225320
10	1,16	81221121	1.82	81222121	2.5	81222221	4	81223221	8.8	81224321	11.2	81225321
13	0,68	81221122	1.06	81222122	1.4	81222222	2.04	81223222	5	81224322	6.4	81225322
16	0,52	81221123	0.66	81222123	0.88	81222223	1.48	81223223	3.14	81224323	4.2	81225323
20	0,26	81221124	0.4	81222124	0.52	81222224	0.9	81223224	1.92	81224324	2.48	81225324
25	0,18	81221125	0.2	81222125	0.36	81222225	0.62	81223225	1.32	81224325	1.72	81225325

table: types of double-tube slide resistors

Rated current [A]	Tube size 600×60		Tube size 400×120		Tube size 500×120		Tube size 600×120		Tube size 800×120	
	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.	Ω	Ref. no.
0.1	78500	81226301								
0.13	47000	81226302								
0.16	32600	81226303								
0.2	25100	81226304								
0.25	15900	81226305								
0.3	12300	81226306	14300	81224406	18600	81225406	22800	81226406	30300	81227406
0.4	4900	81226307	5400	81224407	7100	81225407	8700	81226407	12100	81227407
0.5	4100	81226308	4510	81224408	5900	81225408	7340	81226408	10200	81227408
0.6	3260	81226309	3450	81224409	4530	81225409	5610	81226409	7750	81227409
0.8	1460	81226310	1800	81224410	2100	81225410	2600	81226410	3600	81227410
1	1080	81226311	1180	81224411	1570	81225411	1920	81226411	2610	81227411
1,3	630	81226312	680	81224412	900	81225412	1100	81226412	1530	81227412
1,6	484	81226313	526	81224413	692	81225413	850	81226413	1190	81227413
2	270	81226314	294	81224414	386	81225414	480	81226414	660	81227414
2,5	188	81226315	206	81224415	270	81225415	334	81226415	462	81227415
3	144	81226316	180	81224416	234	81225416	288	81226416	386	81227416
4	80	81226317	100	81224417	129	81225417	159	81226417	212	81227417
5	50	81226318	62	81224418	80	81225418	98	81226418	132	81227418
6	32	81226319	40	81224419	52	81225419	64	81226419	85	81227419
8	20.6	81226320	25.8	81224420	33.6	81225420	41	81226420	54	81227420
10	13.8	81226321	17.2	81224421	22.4	81225421	27.4	81226421	37	81227421
13	8	81226322	10	81224422	12.8	81225422	15.8	81226422	20	81227422
16	5	81226323	6.2	81224423	8	81225423	9.8	81226423	13.2	81227423
20	3.04	81226324	3.8	81224424	4.8	81225424	6	81226424	8	81227424
25	2,1	81226325	2.6	81224425	3.4	81225425	4.2	81226425	5.6	81227425

table: types of double-tube slide resistors

*Variable toroidal resistors (Potentiometers) 10 to 500 Watt**

Thanks to their ring-shaped design, these resistors offer flexibility in small spaces. Adjustments can be effected manually as well as by means of a motor drive. In case of motor-driven operation, Ruhstrat supplies the desired potentiometers according to your individual specifications and requirements.

* Different capacitance values on request.

Design

The ring-shaped rheostat supports are made of steatite. The round wires and bands with a low thermal coefficient of resistance used for the resistors consist of CuNi44. By means of a layer made of a special cementation the windings are mechanically fixed and protected against impacts from outside; moreover, the heat conduction is improved. All resistors are manufactured with 3 connections and insulated axis and can be used as voltage divides and as series resistances. In the standard design the sizes RW 10, RW 20, RW 40 and RW 80 have plug junctions, the sizes RW 100 to RW 500 have screw connections. Silver contacts are used for contact making. In case of high ohmic values and with frequent slider movements, a copper carbon contact is used.

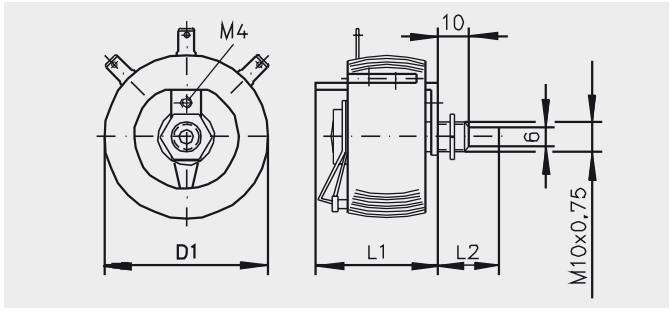


fig.: RW 10 – RW 80

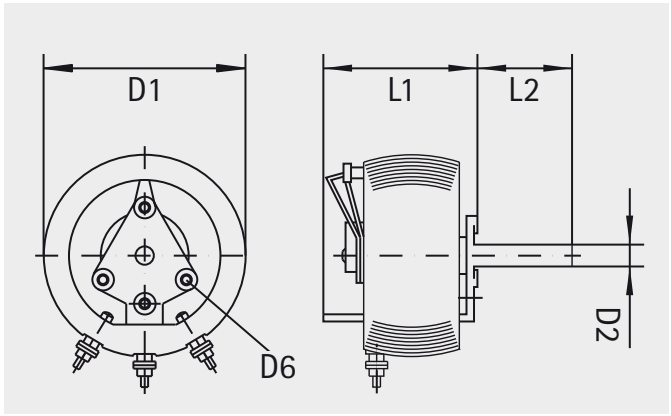


fig.: RW 100 – RW 500

fig.: type RW

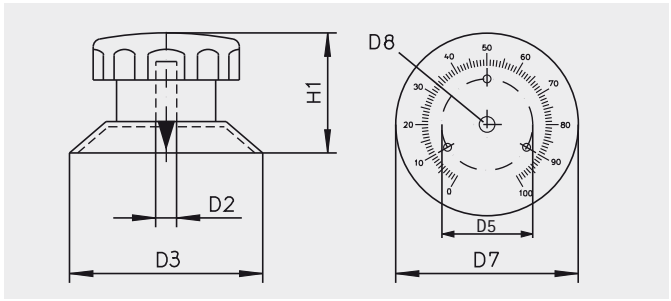


fig.: RW 10 – RW 500

Type	Weights kg	angle of rotation, mech.	L1 [mm]	L2 [mm]	H1 [mm]	D1 [mm]	D2 [mm]	D3 [mm]	D5 [mm]	D6 [mm]	D7 [mm]	D8 [mm]
RW 10	0.05	290°	28	35	19	34	6	30			48	10,5
RW 20	0.08	290°	30	35	19	42	6	30			48	10,5
RW 40	0.15	300°	40	35	26	54	6	41			65	10,5
RW 80	0.20	290°	50	35	26	68	6	41	30	M4	65	10,5
RW 100	0.50	285°	62	45	35	86	8	57	36	M4	80	8,5
RW 150	0.60	285°	82	45	35	86	8	57	36	M4	80	8,5
RW 250	1,3	290°	80	45	48	142	8	70	60	M4	120	8,5
RW 500	2,7	290°	98	45	48	198	8	70	80	M5	120	8,5

table: dimensions and weights

Special designs on request

Ruhstrat GmbH · Heinestraße 12 · 37120 Bovenden phone +49 (0) 55 93 803-0 · fax +49 (0) 55 93 803-50 e-mail: info@ruhstrat.com · www.ruhstrat.com

Wirewound resistor elements

Design:
The resistor elements consist of disc carriers, insulation sliders and resistor winding. Some of the insulation sliders which are made of steatite are put onto the disc carriers which are made of zinc-plated sheet steel. Some of the insulation sliders are provided with flutes in which the winding is fixed in a way that it cannot slip. Round resistor wire or resistor band (made of CuNi44) is used for the resistor's winding, they have a low thermal coefficient of resistance. Our resistors are outstandingly suitable for various kinds of application, especially for those requiring a high resistance accuracy over a broad temperature range. Thanks to the high accuracy, there are no tolerances concerning the tests and measurements to be made.

Thermal-lag switches are used for overload control. Tap clamps can also be mounted onto the windings for the adaptation of the resistance value.

carrier of the winding: ceramic, arranged on metal carrier

winding: CuNi 44 (material no. 2.0842)

capacity: DIN = 0,5–0,8 W/cm², MAX. = 0,7–1,0 W/cm²

creep distances and air gaps: 250 V AC or DC, if the resistor is built into a metal frame. If the metal carrier is isolated from the frame of the enclosure, the rated voltage can be increased according to the additional insulation of the metal carrier.

test voltage: 2.5 kV, resistor connection against metal carrier

fig.: type WE

Type	Dimensions B	T	H	Weights [kg]
WE165	105 mm	25 mm	165 mm	0,45
WE320	105 mm	25 mm	320 mm	0,70
WE620	105 mm	25 mm	620 mm	1,60

table: dimensions and weights

Rated current [A]	Type WE165 Ω	Ref. no.	Type WE320 Ω	Ref. no.	Type WE620 Ω	Ref. no.
0.4	370	81641001	740	81642001	1480	81643001
0.6	265	81641002	530	81642002	1060	81643002
1.0	190	81641003	380	81642003	760	81643003
1.4	135	81641004	275	81642004	550	81643004
1.7	74	81641005	148	81642005	295	81643005
2.3	45	81641006	90	81642006	180	81643006
3.2	24	81641007	56	81642007	112	81643007
4	20	81641008	41	81642008	82	81643008
4.5	12	81641009	24	81642009	48	81643009
5	8,5	81641010	17	81642010	35	81643010
6	7	81641011	14	81642011	28	81643011
7	5	81641012	11,9	81642012	23	81643012
8	4	81641013	8	81642013	16	81643013
10	2,8	81641014	5,6	81642014	11,2	81643014
12	2,35	81641015	4,7	81642015	9,4	81643015
14	1,5	81641016	3	81642016	6	81643016
17	1,2	81641017	2,4	81642017	4,8	81643017
22	0,675	81641018	1,35	81642018	2,7	81643018
26	0,55	81641019	1,1	81642019	2,2	81643019
29	0,475	81641020	0,95	81642020	1,9	81643020
32	0,415	81641021	0,85	81642021	1,7	81643021

table: types of resistor elements WE

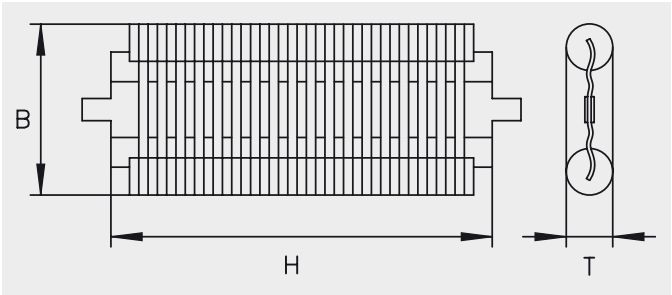


fig.: dimensional drawing type WE

Wirewound resistor elements

The resistor blocks are designed as load resistors, each of them for one of the stipulated rated voltages of 24V/36V/48V/60V/110V/220V DC*. Open design with degree of protection IP00, suitable for the insertion into an enclosure with degree of protection IP20.

*** Resistor blocks for different voltage values on request.**

Design:
The resistor blocks consist of series-connected resistor elements which are combined in a way that they form components.

Application:

- load resistor in test fields
- charging and discharging resistor in the maintenance area
- damping resistances for frequency converters and DC drives
- starter resistances and rheostats for slip-ring rotor engines of lifting devices
- starter resistances for DC motors
- series resistances for squirrel-cage motors
- current limiting resistors for charging and discharging of capacitors
- test resistors in laboratories, schools and universities
- protective resistors

Resistor blocks type RWB – open design with degree of protection IP00

permanent power:	500 Watt – 15000 Watt
winding:	CuNi 44 (Werkstoff Nr. 2.0842)
creep distances and air gaps:	250 V AC or DC, if the resistor is built into a metal frame. If the metal carrier is isolated from the frame of the enclosure, the rated voltage can be increased according to the additional insulation of the metal carrier.
test voltage:	2.5 kV, resistor connection against metal carrier
insertion:	vertical or horizontal
connection leads:	acc. to requirements, approx. 1000 mm long
dimensions:	see table at page 19

fig.: RWB IP00

Resistor blocks type RWB – degree of protection IP00

The power values [W] indicated are the admissible maximum values with permanent operation and a maximum room temperature of 40 °C. Apart from the power values mentioned in the table also different power and voltage values can be realized.

Type RWB	Power [W]	Voltage values[1,2] of the resistor blocks DC [V]	Dimensions resistors WxDxH [mm]	Weight approx. [kg]	number of elements	
RWB 0.5	500	24/36/48/60/110/220	320x30x125	0.7	1	Type WE 320
RWB 1.0	1000		320x95x125	1.4	2	
RWB 1.5	1500		320x95x125	1.4	2	
RWB 2.0	2000		320x160x125	2.1	3	
RWB 2.5	2500		320x225x125	2.8	4	
RWB 3.0	3000	24/36/48/60/110/220	320x225x125	2.8	4	Type WE 320
RWB 3.5	3500		320x290x125	3.5	5	
RWB 4.0	4000		320x290x125	3.5	5	
RWB 4.5	4500		320x355x125	4.2	6	
RWB 5.0	5000		320x420x125	4.9	7	
RWB 5.5	5500		320x420x125	4.9	7	
RWB 6.0	6000	24/36/48/60/110/220	620x225x125	6.4	4	Type WE 620
RWB 6.5	6500		620x225x125	6.4	4	
RWB 7.0	7000		620x290x125	8.0	5	
RWB 7.5	7500		620x290x125	8.0	5	
RWB 8.0	8000		620x290x125	8.0	5	
RWB 8.5	8500		620x355x125	9.6	6	
RWB 9.0	9000		620x355x125	9.6	6	
RWB 9.5	9500		620x355x125	9.6	6	
RWB 10.0	10000		620x420x125	11.2	7	
RWB 10.5	10500	24/36/48/60/110/220	620x420x125	11.2	7	Type WE 620
RWB 11.0	11000		620x420x125	11.2	7	
RWB 11.5	11500		620x485x125	12.8	8	
RWB 12.0	12000		620x485x125	12.8	8	
RWB 12.5	12500		620x485x125	12.8	8	
RWB 13.0	13000		620x550x125	14.4	9	
RWB 13.5	13500		620x550x125	14.4	9	
RWB 14.0	14000		620x550x125	14.4	9	
RWB 14.5	14500		620x615x125	16.0	10	
RWB 15.0	15000		620x615x125	16.0	10	

table: types of resistor blocks RWB

Resistor blocks are also available with different voltages (up to 1 MW) and power values.

[1] **When placing the order please indicate the desired voltage value!**

[2] **Please also consider our designs with voltage selector switch (type RWBGS)!**

Wirewound resistor elements

Resistor blocks with enclosure (degree of protection IP20) – type RWBG

permanent power:	500 Watt – 15000 Watt
winding:	CuNi 44 (material no. 2.0842)
creep distances and air gaps:	250 V AC or DC, if the resistor is built into a metal frame. If the metal carrier is isolated from the frame of the enclosure, the rated voltage can be increased according to the additional insulation of the metal carrier.
test voltage:	2.5 kV, resistor connection against metal carrier
connection:	inner bolt connection or terminal connection integrated into the front plate
enclosure:	made of zinc-plated steel-sheet, available in 4 basic sizes, portable construction
dimensions:	see page 21, table 1

fig.: resistor block type RWBG

Resistor blocks with enclosure (degree of protection IP20) and step switch – type RWBGS

The resistor blocks correspond to the degree of protection IP20 but with a step switch integrated into the front plate for selecting the rated voltages 24 V/36 V/48 V/60 V/110 V/220 V DC*.

*** Resistor blocks for different voltage values on request.**

permanent power:	500 Watt – 6000 Watt
winding:	CuNi 44 (material no. 2.0842)
creep distances and air gaps:	250 V AC or DC if the resistor is built into a metal frame. If the metal carrier is isolated from the frame of the enclosure, the rated voltage can be increased according to the additional insulation of the metal carrier.
test voltage:	2.5 kV, resistor connection against metal carrier
step switch:	with "0" position, 1 pole, 6 steps, switching without load
connection:	inner bolt connection or terminal connection integrated into the front plate
enclosure:	made of zinc-plated steel-sheet, available in 2 basic sizes, portable construction
dimensions:	see page 21, table 2

fig.: resistor block with step switch type RWBGS

Resistor blocks with enclosure (degree of protection IP20) – type RWBG

Type RWB	Power [W]	Voltage values[1] of the resistor blocks DC [V]	Dimensions enclosure W×D×H [mm]	Weight approx. [kg]	Number of elements max.
RWBG1 0.5	500	24/36/48/60/110/220	520×390×540	22	5 × Type WE 320
RWBG1 1.0	1000			23	
RWBG1 1.5	1500			23	
RWBG1 2.0	2000			24	
RWBG1 2.5	2500			25	
RWBG2 3.0	3000	24/36/48/60/110/220	715×390×550	25	8 × Type WE 320
RWBG2 3.5	3500			25	
RWBG2 4.0	4000			25	
RWBG2 4.5	4500			26	
RWBG2 5.0	5000			27	
RWBG2 5.5	5500			27	
RWBG3 6.0	6000	24/36/48/60/110/220	715×690×590	39	8 × Type WE 620
RWBG3 6.5	6500			39	
RWBG3 7.0	7000			41	
RWBG3 7.5	7500			41	
RWBG3 8.0	8000			41	
RWBG3 8.5	8500			42	
RWBG3 9.0	9000			42	
RWBG3 9.5	9500			42	
RWBG3 10.0	10000			44	
RWBG4 10.5	10500	24/36/48/60/110/220	845×690×650	52	10 × Type WE 620
RWBG4 11.0	11000			52	
RWBG4 11.5	11500			54	
RWBG4 12.0	12000			54	
RWBG4 12.5	12500			54	
RWBG4 13.0	13000			56	
RWBG4 13.5	13500			56	
RWBG4 14.0	14000			56	
RWBG4 14.5	14500			57	
RWBG4 15.0	15000			57	

table 1: types of resistor blocks RWBG

[1] **When placing the order please indicate the desired voltage value!**

Resistor blocks with enclosure (degree of protection IP20) and step switch – type RWBGS

Type RWB	Power [W]	Selectable voltage values[2] DC [V]	Dimensions enclosure W×D×H [mm]	Weight approx. [kg]	Number of elements	
RWBG1 0.5	500	24/36/48/60/110/220	650x705x628	6.4	4	Type WE 620
RWBG1 1.0	1000		650x705x628	8.0	5	
RWBG1 1.5	1500		650x705x628	8.0	5	
RWBG1 2.0	2000		845x705x628	11.2	7	
RWBG1 2.5	2500		845x705x628	12.8	8	
RWBG2 3.0	3000	24/36/48/60/110/220	845x705x628	12.8	8	Type WE 620
RWBG2 3.5	3500		845x705x788	17.6	11	
RWBG2 4.0	4000		845x705x788	19.2	12	
RWBG2 4.5	4500		845x705x788	22.4	14	
RWBG2 5.0	5000		845x705x788	27.2	17	
RWBG2 5.5	5500		845x705x788	27.2	17	
RWBG3 6.0	6000		845x705x788	27.2	17	

table 2: types of resistor blocks RWBGS

Resistor blocks are also available with different voltages (up to 1 MW).

[2] **Different voltage values on request!**

Test resistors

Resistor-aggregates as load resistors

The specified resistor aggregates consist of various resistor elements which are integrated into a movable steel-sheet enclosure (alternatively: stationary installation) with perforated cover and underpinned high-performance axial fan. For the winding of the resistor elements we use nealed wire (Isotan CuNi44). This wire is characterized by a particularly low thermal coefficient of resistance.

Therefore, these resistors are outstandingly suitable for applications requiring a high resistance accuracy over a broad temperature range. The different load steps can be combined in any way and consist of different parallel steps which can be connected and disconnected via contactors (230 V AC). For the activation of the power contactors we use coupling relays with 24 V DC. These are completely wired and ready for connection, led on terminals. In addition, the contactors and coupling relays each have protective circuit!

Additionally to these steps one can also make a fine regulation. This fine step is adjusted without steps by means of a motor drive. All in all, any value between 0.5 A and the maximum rated current value can thus be adjusted.

fig.: resistor aggregates with power switches and fine regulation

Type	RK1	RK2-F	RK3-F	RK5-F
rated power	13.8 kW	27.6 kW	41.4 kW	59.8 kW
rated connection voltage	230 V DC/AC (50/60 Hz)	230 V DC/AC (50/60 Hz)	230 V DC/AC (50/60 Hz)	230 V DC/AC (50/60 Hz)
rated current	0.5-60 A	0.5-120 A	0.5-180 A	0.5-260 A
rated resistance	3.83 Ω	1.92 Ω	1.28 Ω	0.88 Ω
range of adjustment				
1 parallel step				80 A 2.87 Ω
3 parallel steps			40 A 5.75 Ω	40 A 5.75 Ω
2 parallel steps	20 A 11.5 Ω	40 A 5.75 Ω	20 A 11.5 Ω	20 A 11.5 Ω
1 parallel step	10 A 23 Ω	20 A 11.5 Ω	10 A 23 Ω	10 A 23 Ω
1 parallel step	5 A 46 Ω	10 A 23 Ω	5 A 46 Ω	5 A 46 Ω
1 parallel step		5 A 46 Ω		
1 fine step	0.5 A 460-46 Ω	0.5 A 460-46 Ω	0.5 A 460-46 Ω	0.5 A 460-46 Ω
degree of protection	IP 20			
dimensions [mm]	ca. 540 × 540 × 1000	ca. 640 × 640 × 1200	ca. 690 × 740 × 1300	ca. 1100 × 1100 × 1600
weight [kg]	ca. 65	ca. 120	ca. 160	ca. 220

table: examples of resistor aggregates

Resistor aggregates also available with other power values (up to 1 MW) and voltage values.

Ruhstrat GmbH · Heinestraße 12 · 37120 Bovenden phone +49 (0) 55 93 803-0 · fax +49 (0) 55 93 803-50 e-mail: info@ruhstrat.com · www.ruhstrat.com

Resistor aggregates as special solutions

Customized solutions

For ohmic loads which are not covered by the standard resistors listed up in this catalogue we can also offer a huge variety of different resistor aggregates with various designs which are specially adapted to the respective kind of application. The resistor aggregates can be designed for power values up to 1 MW.

Resistor aggregates as ohmic load

- as load resistor, e. g. for application in test fields
- as charging and discharging resistor, e. g. for maintenance tasks
- as variable or braking resistor for motors or generators

Resistor aggregates as ohmic and inductive load

- for resistor combinations in connection with inductivities (chokes) and for variable load currents with different phase shift (LPF).

Resistor aggregates as ohmic, inductive and capacitive load

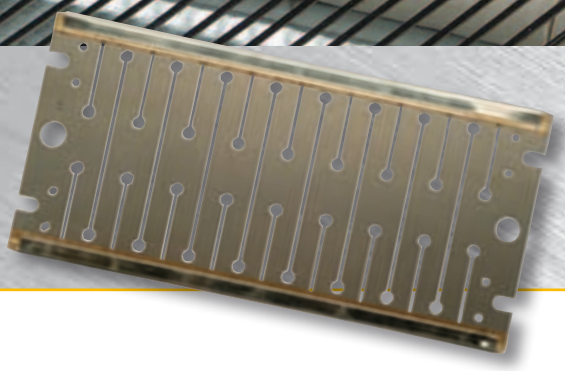
- for resistor combinations in connection with inductivities (chokes) and additional capacitors, in order to simulate certain reactive power loads for generators, switch loads, contactor loads, and control loads.

Example of a project: ohmic, inductive and capacitive load units

Ohmic, inductive and capacitive load units are used for simulating different loads with variable phase differences or certain idle powers with generators, switch loads, contactor loads or control loads. They are integrated into a mobile steel-sheet enclosure (alternatively: stationary construction). The different load steps are switchable by step switches or by remote control via contactors. For clear and easy usability the operator panel of the load units is executed with a screen printing.

fig.: ohmic, inductive and capacitive load units

Steel grid resistor elements



Steel grid resistor elements
RSW 1 to RSW 54 500 W for fitting

Characteristics

- degree of protection: IP00
- material: special alloy: Cu/Al (material no. 1.4724)
- temperature coefficient: 0,00025 1/°C
- power of the resistor elements: 500 W
- power forced air ventilated: 800 W
- resistance values at 20°C [Ω]: min. 0,0088 Ohm, max. 5,831 Ohm
- for fitting into enclosure
- direct connection to the resistor
- broad range of resistance and power
- flat type of construction with a sheet thickness of 1.0 resp. 0.5 mm

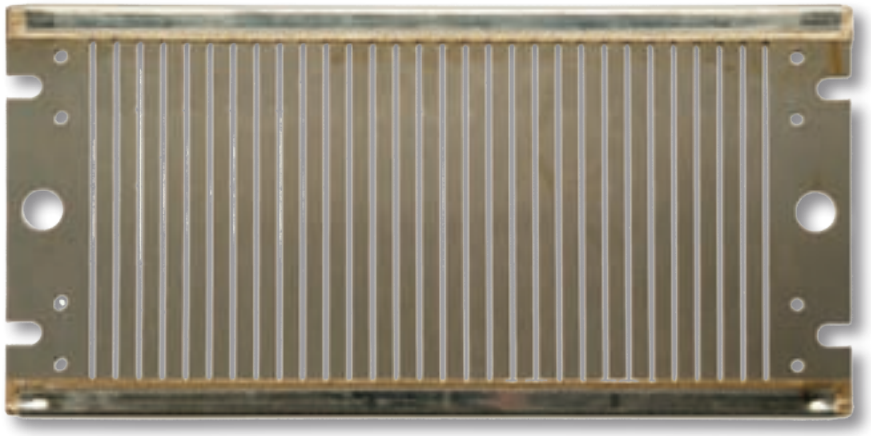


fig.: steel grid resistor element

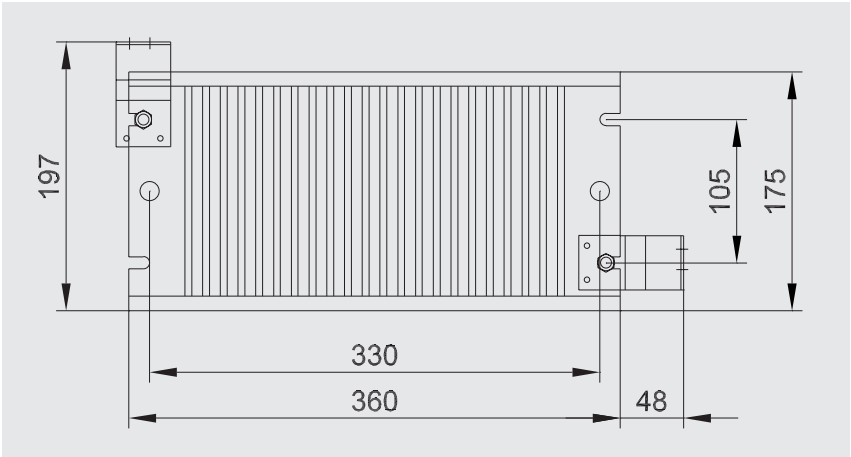


fig.: dimensional drawing steel grid resistor element

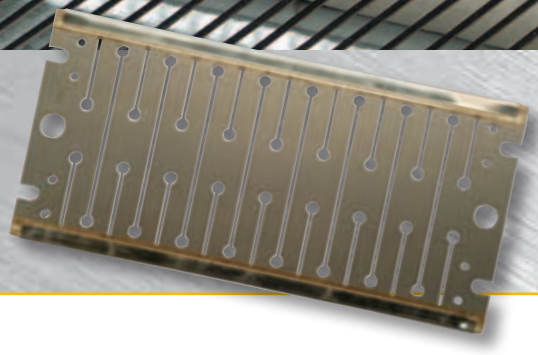
Type series RSW 1 to RSW 54

Type	Resistance [Ω]	Current [A]	max. Power [W]	Type	Resistance [Ω]	Current [A]	max. Power [W]
RSW 1	0,008	238,3	500	RSW 28	0,383	36,1	500
RSW 2	0,010	222,5	500	RSW 29	0,440	33,7	500
RSW 3	0,011	207,6	500	RSW 30	0,506	31,4	500
RSW 4	0,013	193,1	500	RSW 31	0,581	29,3	500
RSW 5	0,015	180,1	500	RSW 32	0,669	27,3	500
RSW 6	0,017	168,0	500	RSW 33	0,770	25,4	500
RSW 7	0,020	156,9	500	RSW 34	0,889	23,7	500
RSW 8	0,023	146,1	500	RSW 35	1,021	22,1	500
RSW 9	0,026	136,3	500	RSW 36	1,171	20,6	500
RSW 10	0,031	127,0	500	RSW 37	1,347	19,2	500
RSW 11	0,035	118,5	500	RSW 38	1,550	17,9	500
RSW 12	0,040	110,5	500	RSW 39	1,780	16,7	500
RSW 13	0,047	103,0	500	RSW 40	2,050	15,6	500
RSW 14	0,054	96,1	500	RSW 41	2,360	14,5	500
RSW 15	0,062	89,6	500	RSW 42	2,710	13,5	500
RSW 16	0,071	83,5	500	RSW 43	3,120	12,6	500
RSW 17	0,082	77,9	500	RSW 44	3,580	11,8	500
RSW 18	0,094	72,7	500	RSW 45	3,759	11,5	500
RSW 19	0,108	67,8	500	RSW 46	3,947	11,2	500
RSW 20	0,125	63,2	500	RSW 47	4,144	10,9	500
RSW 21	0,144	58,9	500	RSW 48	4,351	10,7	500
RSW 22	0,165	54,9	500	RSW 49	4,569	10,4	500
RSW 23	0,190	51,2	500	RSW 50	4,797	10,2	500
RSW 24	0,219	47,7	500	RSW 51	5,037	9,9	500
RSW 25	0,252	44,5	500	RSW 52	5,289	9,7	500
RSW 26	0,289	41,5	500	RSW 53	5,553	9,5	500
RSW 27	0,333	38,7	500	RSW 54	5,831	9,3	500

table: type series RSW 1 to RSW 54

Please note: The maximum rated current values indicated are valid for an ambient temperature of max. 40 °C and if there is a sufficient air supply. The production tolerance is ± 10%.

Steel grid resistor elements



RSWE 102 – RSWE 730
1000 W – 15000 W

Characteristics

- degree of protection IP00
- power of the resistor blocks 1000 W–15000 W
- compact construction, shock-proof and insensitive against vibrations
- for fitting into enclosures, switch cabinets and air ducts
- fixing in the enclosure by means of threaded bolt (M6 to M12)
- direct connection to the resistor[1]
- broad range of resistance and power
- high ohmic values by means of series connection of the resistor blocks
- high current and power values by means of parallel connection of the resistor blocks
- it is possible to build several partial resistors onto one block

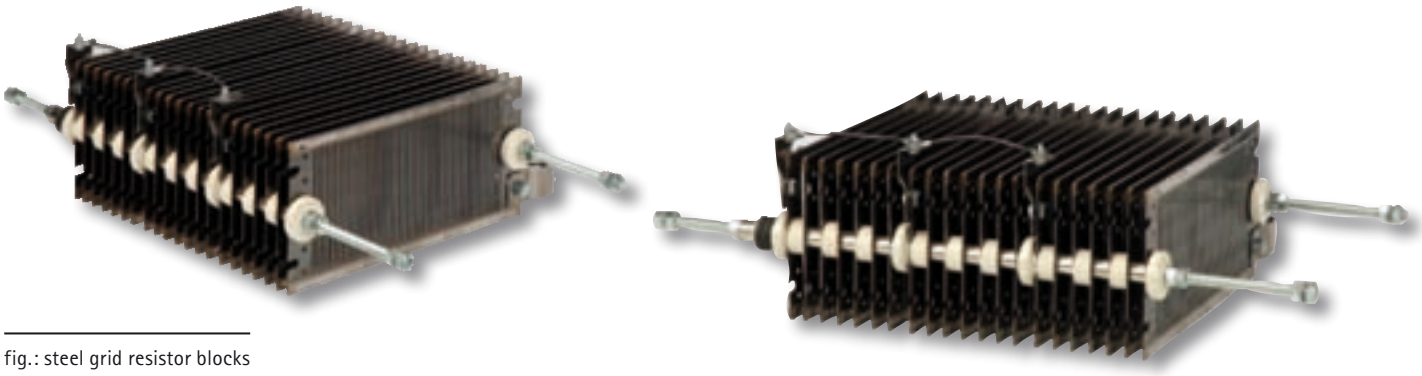


fig.: steel grid resistor blocks

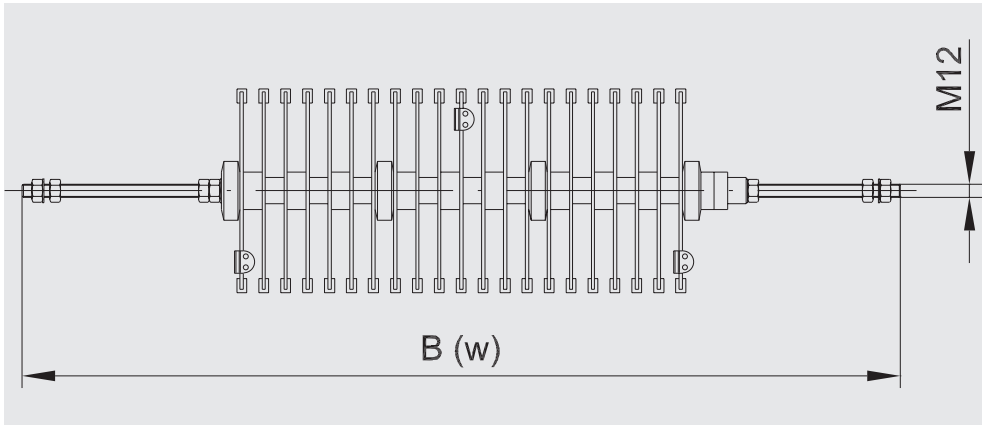


fig.: dimensional drawing steel grid resistor block

Type series RSWE 102 – RSWE 730

Type	Quantity elements	Power[2]	Width (W) [mm]	Weight [kg]
RSWE 102	2	1000	140	1,3
RSWE 203	3	1500	220	2,0
RSWE 204	4	2000	220	2,7
RSWE 205	5	2500	220	3,4
RSWE 306	6	3000	310	4,0
RSWE 307	7	3500	310	4,7
RSWE 308	8	4000	310	5,4
RSWE 309	9	4500	310	6,0
RSWE 310	10	5000	310	6,7
RSWE 511	11	5500	510	7,4
RSWE 512	12	6000	510	8,0
RSWE 513	13	6500	510	8,7
RSWE 514	14	7000	510	9,3
RSWE 515	15	7500	510	10,0
RSWE 516	16	8000	510	10,4
RSWE 517	17	8500	510	10,7
RSWE 518	18	9000	510	12,0
RSWE 519	19	9500	510	12,7
RSWE 520	20	10000	510	13,4
RSWE 721	21	10500	720	14,0
RSWE 722	22	11000	720	14,7
RSWE 723	23	11500	720	15,4
RSWE 724	24	12000	720	16,0
RSWE 725	25	12500	720	16,7
RSWE 726	26	13000	720	17,4
RSWE 727	27	13500	720	18,0
RSWE 728	28	14000	720	18,7
RSWE 729	29	14500	720	19,4
RSWE 730	30	15000	720	20,0

table: Type series RSWE 102 – RSWE 730

[1] **Connectors made of stainless steel (M6 – 63 A / M8 – 100 A / M10 – 200 A / M12 – 400 A).**
[2] **The maximum rated power values indicated are valid for an ambient temperature of max. 40 °C and if there is a sufficient air supply. Different power values on request!**

Steel grid resistor elements

Side plates for steel grid resistors RSWEE 13 – RSWEE 67

Characteristics

- zinc-plated steel-sheet side plates
- degree of protection IP00
- for fitting into enclosures, switch cabinets and air ducts
- application of 9 different sizes
- in compact-design and as variable modular sytems
- it is possible to build several partial resistors onto one block
- connections on bolt clamps[2]

Special designs

- side plates varnished with RAL 7035 or other RAL colours
- temperature switch led on terminals
- portable design

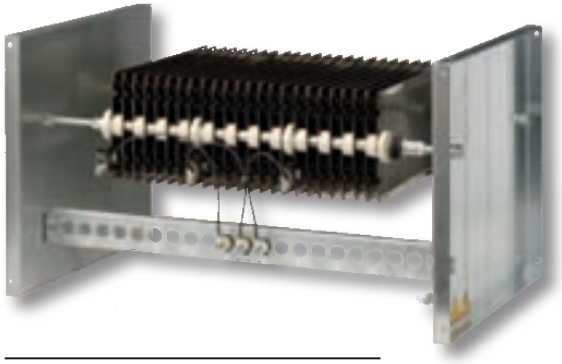


fig.: steel grid resistor block with side plates

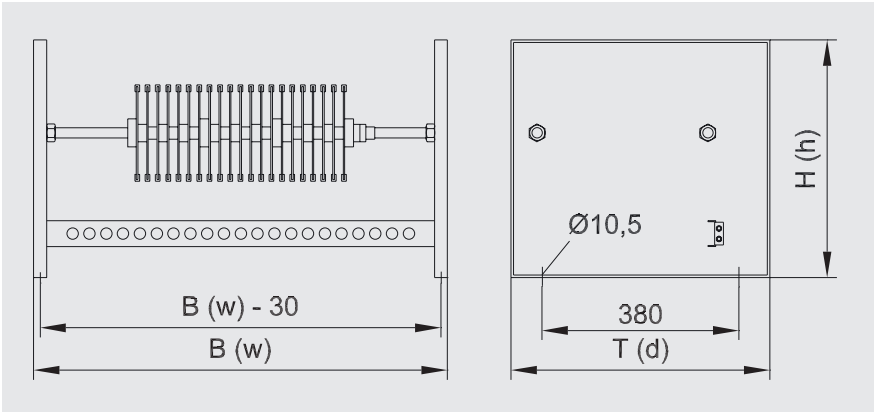


fig.: dimensional drawing steel grid resistor block with side plates

Type series RSWEE 13 – RSWEE 67

Type	Degree of protection	for resistor blocks type[1]	max. Power[3] [W]	Dimensions W×D×H [mm]	max. weight [kg]
RSWEE 13	IP00	1 × RSWE 3..	5000	330 × 520 × 420	18
RSWEE 15	IP00	1 × RSWE 5..	10000	530 × 520 × 420	28
RSWEE 17	IP00	1 × RSWE 7..	15000	740 × 520 × 420	33
RSWEE 25	IP00	2 × RSWE 5..	16000	530 × 520 × 720	36
RSWEE 27	IP00	2 × RSWE 7..	24000	740 × 520 × 720	61
RSWEE 37	IP00	3 × RSWE 7..	31500	740 × 520 × 1020	84
RSWEE 47	IP00	4 × RSWE 7..	36000	740 × 520 × 1320	117
RSWEE 57	IP00	5 × RSWE 7..	45000	740 × 520 × 1620	140
RSWEE 67	IP00	6 × RSWE 7..	49500	740 × 520 × 1920	158

table: type series RSWEE 13 – RSWEE 67

[1] For installation of steel grid resistor blocks of type series RSWE 306 to RSWE 730.
[2] Connections made as bolt clamps (M6–63 A / M8–100 A / M12–200 A / M16–400 A).
[3] The maximum rated power values indicated are valid for an ambient temperature of max. 40 °C and if there is a sufficient air supply.

Enclosure for steel grid resistors RSWG 13 – RSWG 67

Characteristics

- zinc-plated steel-sheet enclosure
- optionally degree of protection IP20 or IP23
- degree of protection IP20 without cover
- degree of protection IP23 with cover, suitable for outdoor installation
- application of 9 different sizes of enclosures
- enclosure in compact design and as variable modular system
- inner connections (bolt clamps)[2]

Special designs

- enclosure varnished with RAL 7035 or other RAL colours
- temperature switch led on terminals
- portable design

fig.: enclosure for steel grid resistor blocks

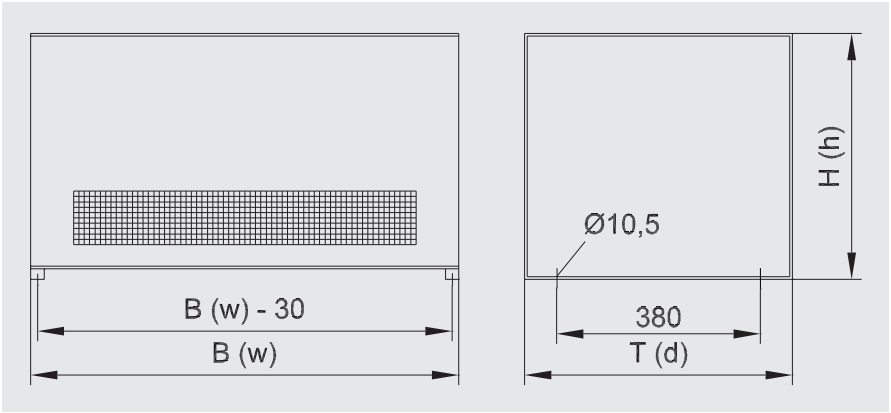


fig.: dimensional drawing enclosure for steel grid resistor blocks

Type series RSWG 13 – RSWG 67

Type	Degree of protection	for type[1]	Dimensions W×D×H [mm]	Degree of protection	for type[1]	Dimensions W×D×H [mm]	max. Weight [kg]
RSWG 13	IP20	1 × RSWE 3..	330 × 520 × 420	IP23	1 × RSWE 3..	330 × 520 × 500	20
RSWG 15	IP20	1 × RSWE 5..	530 × 520 × 420	IP23	1 × RSWE 5..	530 × 520 × 500	30
RSWG 17	IP20	1 × RSWE 7..	740 × 520 × 420	IP23	1 × RSWE 7..	740 × 520 × 500	35
RSWG 25	IP20	2 × RSWE 5..	530 × 520 × 720	IP23	2 × RSWE 5..	740 × 520 × 800	40
RSWG 27	IP20	2 × RSWE 7..	740 × 520 × 720	IP23	2 × RSWE 7..	740 × 520 × 800	65
RSWG 37	IP20	3 × RSWE 7..	740 × 520 × 1020	IP23	3 × RSWE 7..	740 × 520 × 1100	90
RSWG 47	IP20	4 × RSWE 7..	740 × 520 × 1320	IP23	4 × RSWE 7..	740 × 520 × 1400	125
RSWG 57	IP20	5 × RSWE 7..	740 × 520 × 1620	IP23	5 × RSWE 7..	740 × 520 × 1700	150
RSWG 67	IP20	6 × RSWE 7..	740 × 520 × 1920	IP23	6 × RSWE 7..	740 × 520 × 2000	170

table: enclosure for steel grid resistors

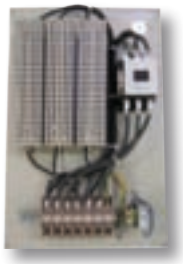
[1] For installation of steel grid resistor blocks of type series RSWE 102 to RSWE 730.
[2] Connections made as bolt clamps (M6–63 A / M8–100 A / M12–200 A / M16–400 A).
[3] The maximum rated power values indicated are valid for an ambient temperature of max. 40 °C and if there is a sufficient air supply.

Applications of Ruhstrat power resistors

Load resistors

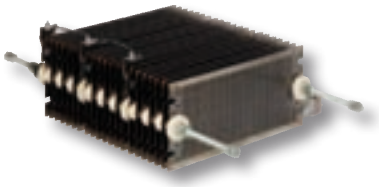
Whether they are needed for test purposes and for proving batteries, transformers, generators, power generation aggregates and power supply units or as load bank for your test field – Ruhstrat offers you an economic solution for each kind of application. Power values of several MW under permanent operation as well as special constructions can be implemented. The devices which are in most of the cases customized products can be equipped with any kind of step control, regulation, measurement and control unit. Upon request also an inductive and/or capacitive component can be added to the load resistors, in order to simulate different kinds of load with various phase differences or certain idle (reactive) powers with generators, switching, contactor or control loadings.

Damping resistors



Ruhstrat damping resistors are integral parts of inrush current damping units. Especially with the manufacture of transformers damping resistors are used for limiting the inrush current. With Ruhstrat inrush current damping units inrush currents are limited to the 3.5-fold rated current.

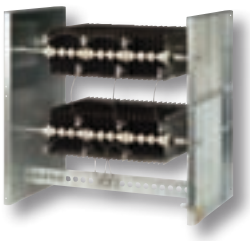
Braking resistors



Ruhstrat braking resistors can take short-time loads as well as the desired permanent power (e. g. braking resistors for frequency converter drives). For smaller drives resistor elements are very frequently used and for bigger drives steel grid resistors are used.

Test resistors

Whether you need a proof of functioning for generators or a load bank for your test field – we offer you an economic solution for each kind of application. Power values of several MW under permanent operation as well as special constructions can be implemented. In case of test field application the operation surface of the resistor enclosure is made with screenprint, if desired, for easier and clearer usability.



Starting resistors

Among other things Ruhstrat starting resistors are used for AC squirrel cage motors (starting column resistors), for AC motors with slip ring rotor (starting rotor resistors) or for DC motors.

Discharge resistors

By means of Ruhstrat discharge resistors inductive and capacitive components resp. batteries are discharged. With batteries they are used to ascertain which is the remaining capacity of an accumulator battery which had been fully charged before. Whether you need the discharge resistor for insertion into substations or as mobile device, with natural air cooling or with forced air ventilation – Ruhstrat has the ideal solution for each kind of application.

Grounding resistors

In medium-voltage mains with neutral earthing with low resistance our grounding resistors limit a coming up earth fault current to an admissible maximum value until the respective protective relays have switched off the faulty circuit. Ruhstrat grounding resistors are completely delivered according to the customer's requirements, with a current transformer, no-load switch or load switch etc..

Laboratory resistors

Ruhstrat laboratory resistors have been developed specially for schools, colleges, institutes and universities. Whether they are needed as fixed resistors, slide resistors or variable resistors – all laboratory resistors are completely equipped with bottom plate and rubber feet, shock-proof Ruhstrat binding posts and earthing terminal as well as with a protective cover.

POWER RESISTORS

Product inquiry power resistors

Please fill in using block letters **and send by fax** an +49 (0) 55 93 803-937. This product inquiry is also **available for download** at www.ruhstrat.com.

Your information:

Company:* _____

Contact:* _____

Department/Position: _____

Street address:* _____

Postal code/City:* _____

Country:* _____

E-mail:* _____

Phone*/Fax: _____

Technical data:

Rated power:* ▸ _____ W

Resistance value:* ▸ _____ Ohm

Rated current: ▸ _____ A

Rated voltage:* ▸ _____

Type of protection (IP):* ▸ _____

Operational conditions: ▸ _____

Quantity:* ▸ _____ Piece(s)

Laboratory design:** ▸ ☐ Yes ▸ ☐ No

Comments:

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(E-mail address required)

* required fields
** with shock-proof terminals, base plate, rubber feet, cover

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