BRAKING RESISTORS

SHORT FORM

S.I.R. Società Italiana Resistor

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➢ SMALL MEDIUM POWER + HIGH IP LEVEL

➢ MEDIUM HIGH POWER + MEDIUM IP LEVEL

➢ HIGH POWER SMALL VOLUME

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1. **FEATURES**

The SRF style resistors are products of good quality designed to achieve suitable level of protection and an elevated dielectric strength.

The special construction technology makes use of only inorganic materials that let confidence of use beyond 400°C and ensure a good endurance to adiabatic impulses. These characteristics and the mounting easiness make the SRF style particularly suitable when high reliability is required and in heavy duties as:

- **braking resistors**
- **inverter**
- **snubber**
- **capacity charge/discharge**

The SRF resistors provide two different housing: aluminium and zinc plated steel. It's to notice that the power rating of the aluminium ones can be respectively increased and reached using a suitable heat sink.

2. **MAIN CHARACTERISTICS**

Characteristics		SRF 100	SRF 150	SRF 120	SRF 180	SRF 250	SRF 350	SRF 170	SRF 171	SRF 172	SRF 173	SRF 174	SRF 175
Power rating (P_r) with heat sink [a]	W	100	150	120[a]	180[a]	250	350	165	210	305	400	500	600
IP level		IP 55		IP 55		IP 55		IP 55					
Thermostat 160°c option [b]		yes		yes		yes		yes					
Cable length	cm	25		30		30		30					
Dielectric strength @ 50 Hz [c]	V	3.000 V_{rsm} x 1 min		3.000 V_{rsm} x 1 min		3.000 V_{rsm} x 1 min		3.000 V_{rsm} x 1 min					
Insulation resistance @ 2.500 V_{dc}	MΩ	≥ 200		≥ 200		≥ 200		≥ 200					
Short term overload		$5P_r$ x 5 sec - $10P_r$ x 3 sec - $20P_r$ x 1 sec											

Notes:

(a) excluding SRF 120-180, for which the indicated power levels can be reached without heat sink, the heat sink thermal resistance has to be set in accordance with the max allowable temperature range (150-200°C).

(b) S.I.R. coding system provides a **"T" additional letter for external thermostat and "C" for internal one**. The possibility to have internal and/or external thermostat depends by the specific resistor type.

(c) **customized values can be provided.**

Characteristics		SRF 650	SRF 950	SRF 1350	SRF 600	SRF 900	SRF 1300	SRF E550	SRF E850	SRF E1250	SRF 601	SRF 901	SRF 1301	SRF 2001
Power rating (P_r) with heat sink [a]	W	650	950	1.350	600	900	1.300	550[a]	850[a]	1250[a]	600	900	1.300	2.000
IP level		IP 55			IP33			IP 55	IP 33		IP 33			
Thermostat 160°c option [b]	-	yes				yes		yes			yes			
Cable length	cm	30			30			30			30			
Dielectric strength @ 50 Hz [c]	V	3.000 V_{rsm} x 1 min			2.800 V_{rsm} x 1 min [d]			2.500 V_{rsm} x 1 min			2.800 V_{rsm} x 1 min [c]			
Insulation resistance @ 2.500 V_{dc}	MΩ	≥ 200			≥ 200			≥ 200			≥ 200			
Short term overload		$5P_r$ x 5 sec - $10P_r$ x 3 sec - $20P_r$ x 1 sec												

Notes:

(a) ref to shown SRF codes: the heat sink thermal resistance has to be set in accordance to the max allowable temperature (normal range: 150°C÷200°C).

(b) S.I.R. coding system provides a "**T" additional letter for external thermostat and "C" for internal one**. The possibility to have internal and/or external thermostat depends by the specific resistor type.

(c) **customized values can be provided**.

(d) 3.000 V_{rsm} x 1 min is available

3. OTHER CHARACTERISTIC

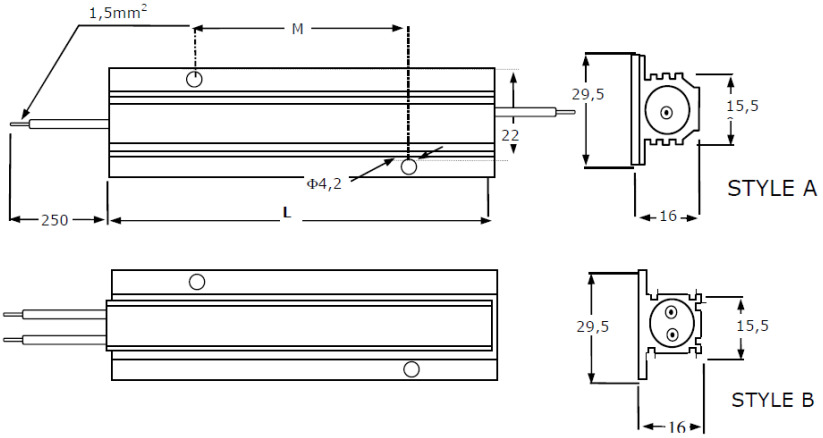
Characteristics		SRF 100	SRF 150	SRF 120	SRF 180	SRF 250	SRF 350	SRF 170	SRF 171	SRF 172	SRF 173	SRF 174	SRF 175
Temperature rise @ Pr	°C	370		330		350		400					
Max power with water cooled heat sink	W	150	200	---	---	400	500	180	230[)]	340	440	540	650
Max. power without heat sink	W	50	75	---		---		---					
Thermal resistance of heat sink	°C/W	≤ 0,3		---		---		---					
Absorbed energy @ 250°C ΔT	KJ	8	10	50	75	18	24	29	34	54	74	96	120
Absorbed energy in 5 sec overload	KJ	4	6	6	9	6,5	9	7,5	10	15	20	23	25
Resistance range [(a)]	min Ω	0,39	0,47	2 ,0	4,0	0,47	0,68	1,8	2	2,7	3,3	4,7	5,4
	max Ω	1000	1.500	250	300	300	400	470	620	820	1.000	1.300	1.800
Resistance tolerance		± 5%		± 5%		± 5%		± 5%					
Parasitic capacity (from 1 to 100 kHz)	pF	100	150	100	140	150	200	60	65	100	140	180	230
Max working voltage	KV	1,2		1,2				1,2					
Time constant	min	9		12		14		11		12			

Notes:
(a) **customized values can be provided.**

Characteristics		SRF 650	SRF 950	SRF 1350	SRF 600	SRF 900	SRF 1300	SRF E550	SRF E850	SRF E1250	SRF 601	SRF 901	SRF 1301	SRF 2001
Temperature rise @ P_r	°C	390			390			390			390			420
Max. power with water cooled heat sink	W	---	---	---	650	950	1.400	650	950	1.300	---	---	---	---
Max. power without heat sink	W	390	560	800	300	400	550	250	350	550	300	400	550	800
Thermal resistance of heat sink	°C/W	≤ 0,3	≤ 0,2	≤ 0,1	---			---			---			
Absorbed energy @ 250°C ΔT	KJ	90	120	150	35	50	75	35	50	75	35	50	75	85
Absorbed energy @ 5 sec overload	KJ	15	22	30	3	4	5,5	3	4	5,5	15	20	28	40
Resistance range [(a)]	min Ω	5,6	6,8	6,8	5,6	6,0	6,8	10	12	15	2,0	2,0	3,3	8
	max Ω	150	200	250	150	150	200	100	100	150	150	200	250	300
Resistance tolerance		± 5%			± 5%			± 5%			± 5%			
Parasitic capacity (from 1 to 100 kHz)	pF	120	190	250	90	110	150	90	110	150	90	110	150	160
Max working voltage	KV	1,0			1,0			1,0			1,0			1,2
Time constant	min	15			10			10			10			11

Notes:
(a) customized values can be provided.

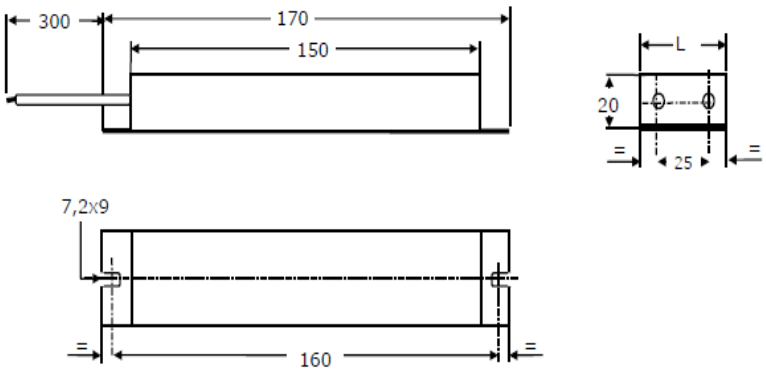
SRF 100 & 150
SRFC 100 & 150



Style (*)	M [mm]	L [mm]
SRF 100	60	120
SRF 150	120	180

(*) shown dimensions are valid for SRF resistors with thermostat option too.

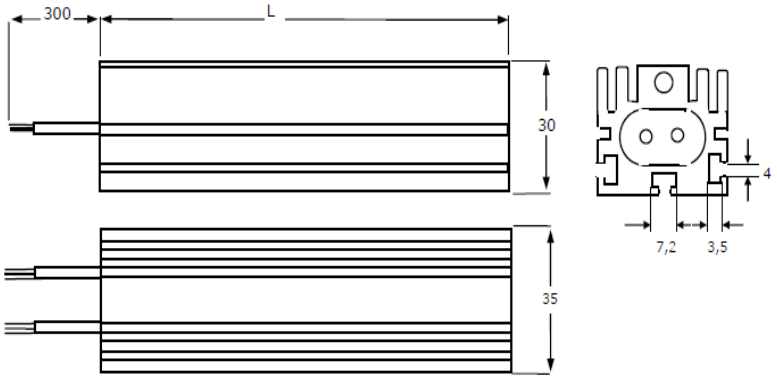
SRF 120 & 180
SRFC 120 & 180



Style (*)	L [mm]	Weight [g]
SRF 120	42	350
SRF180	65	540

(*) shown dimensions are valid for SRF resistors with thermostat option too.

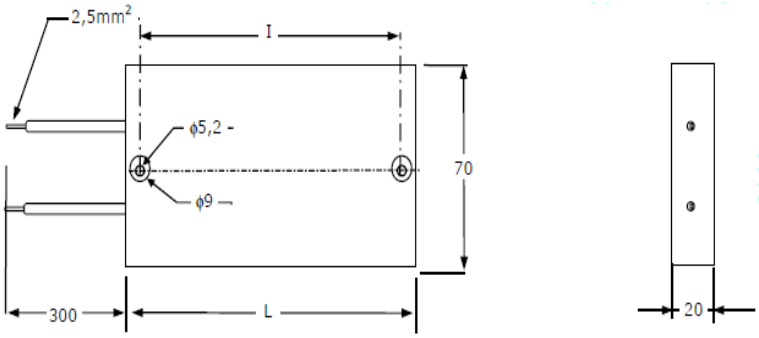
SRF 250 & 350
SRFC 250 & 350
SRFT 250 & 350



Style (*)	L [mm]
SRF 250	150
SRF 350	200

(*) shown dimensions are valid for SRF resistors

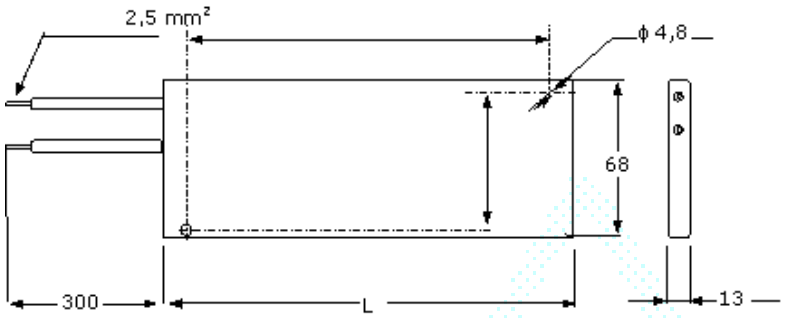
SRF 650 , SRF 950 , SRF 1350
SRFC 650 , SRFC 950 , SRFC 1350



Style (*)	I [mm]	L [mm]	Weight [g]
SRF 650	140	155	450
SRF 950	190	205	600
SRF 1350	240	255	750

(*) shown dimensions are valid for SRF resistors with thermostat option too.

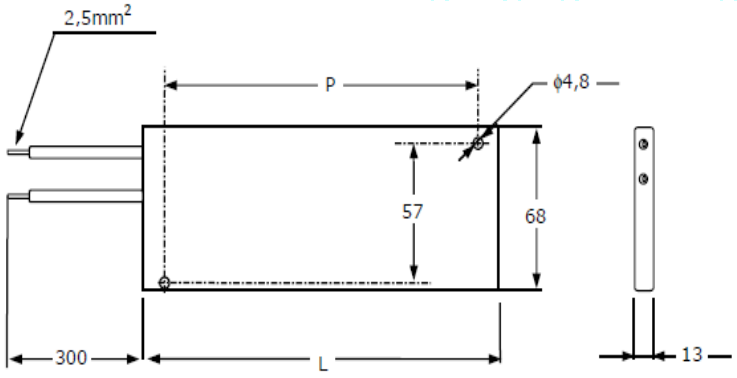
SRF E550 , SRF E850 , SRF E1250
SRFT E550 , SRFT E850 , SRFT E1250
SRFC E550 , SRFC E850 , SRFC E1250



Style (*)	L [mm]	L [mm]
SRF E550	102	81
SRF E850	145	124
SRF E1250	195	174

(*) shown dimensions are valid for SRF resistors with thermostat option

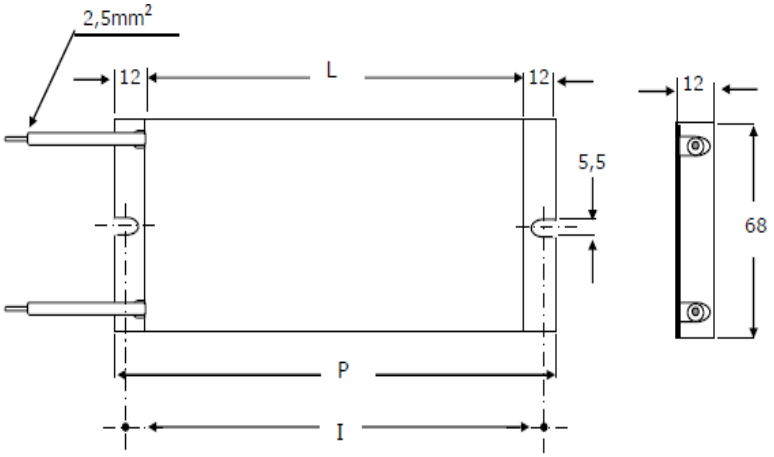
SRF 600 , SRF 900 , SRF 1300
SRFT 600 , SRFT 900 , SRFT 1300
SRFC 600 , SRFC 900 , SRFC 1300



Style	L [mm]	P [mm]
SRF 600	102	81
SRF 900	145	124
SRF 1300	195	174

(*) shown dimensions are valid for SRF resistors with thermostat option too.

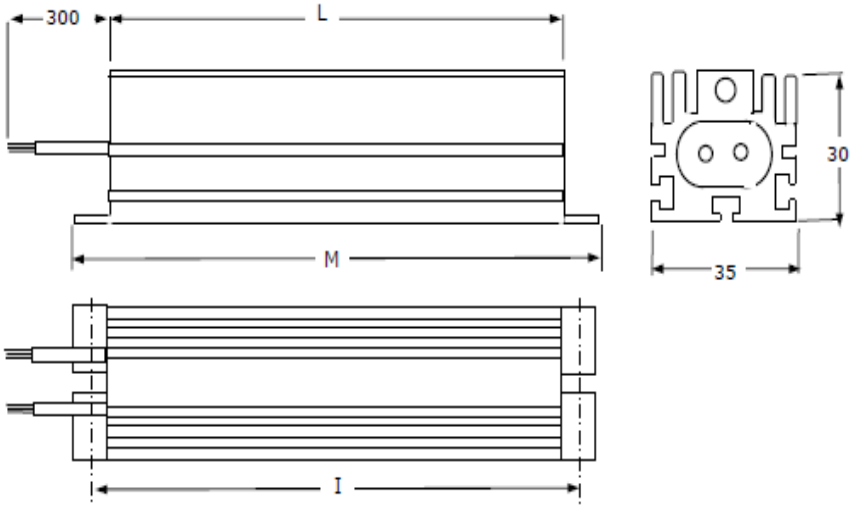
SRF 601 , SRF 901 , SRF 1301 , SRF 2001
SRFC 601 , SRFC 901 , SRFC 1301 , SRFC 2001



Style	L [mm]	P [mm]	M [mm]	I ± 2 [mm]
SRF 601	105	129	68	118
SRF 901	150	174	68	165
SRF 1301	198	222	68	213
SRF 2001	198	222	100	213

(*) shown dimensions are valid for SRF resistors with thermostat option too.

SRF 17x , SRFT 17x , SRFC 17x



	SRF 170	SRF 171	SRF 172	SRF 173	SRF 174	SRF 175
M [mm]	90	105	155	200	260	320
L **[mm]**	70	85	135	180	240	300
I **[mm]**	78÷92	92÷96	142÷146	187÷191	247÷251	307÷311

(*) shown dimensions are valid for SRF resistors with thermostat option too.

1. **FEATURES**

The SRF/XX are products style resistors are products of good quality designed to achieve suitable level of protection and an elevated dielectric strength.

The special construction technology makes use of only inorganic materials that let confidence of use beyond 400°C and ensure a good endurance to adiabatic impulses. These characteristics and the mounting easiness make the SRF style particularly suitable when high reliability is required and in heavy duties as:

- **braking resistors**
- **inverter**
- **snubber**
- **capacity charge/discharge**

The SRF/XX resistors provide aluminium housing having "trapezoidal section". Different versions (H for horizontal and V for vertical) suitable for the optimization of the assembling room have been provided. The difference between SRX XX3/V and SRF XX5 series is mainly in the resistor thickness that is lower in SFR XX5.

2. **MAIN CHARACTERISTICS**

Characteristics		SRF XX3/H and SRF XX3/V [a]									SRF XX5			
		83	103	123[a]	153[a]	203	303	403	503	603	105	155	185	255
Power rating (P_r)	W	80	100	120	150	200	250	300	400	500	100	150	180	250
IP level		IP 55									IP 55			
Thermostat 160°C option [b]		yes									yes			
Cable length	cm	30									30			
Dielectric strength @ 50 Hz [c]	V	3.500 V_{rsm} x 1 min									3.500 V_{rsm} x 1 min			
Insulation resistance @ 2.500 V_{dc}	MΩ	≥ 200									≥ 200			
Short term overload		10P_r x 5 sec - 15P_r x 3 sec - 25P_r x 1 sec												

Notes:

(a) H and V respectively mean horizontal and vertical shaped resistors. For instance, the codes for specific types can be SRF 103/H or SRF 103/V, SRF 123/H or SRF123/V etc., SRF 105/H or SRF105/v etc.

(b) S.I.R. coding system provides a **"C" additional letter for internal thermostat**. On SRF XX/H and SRF XX/V resistors only internal thermostat option is applicable; in this case the related codes become is SRFC XX/H and SRFC XX/V

(c) **customized values can be provided**

3. OTHER CHARACTERISTIC

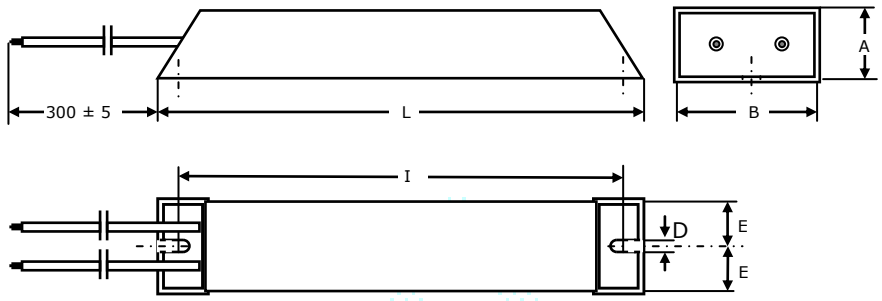
Characteristics		SRF XX3/H and SRF XX3/V [a]									SRF XX5			
		83	103	123[a]	153[a]	203	303	403	503	603	105	155	185	255
Temperature rise @ Pr	°C	400									400			
Absorbed energy in 5 sec overload	KJ	4	5	6	7,5	7,5	12,5	15	20	25	5	7,5	9	12,5
Resistance range [a]	min Ω	1,0	1,8	2,2	3,3	1,0	2,2	3,3	3,9	4,7	4,7	6,8	8,2	10
	max Ω	100	150	180	220	220	270	330	470	560	100	150	200	250
Resistance tolerance		± 5%									± 5%			
Parasitic capacity (from 1 to 100 kHz)	pF	40	45	60	70	80	100	150	180	200	45	70	100	130
Max working voltage	KV	1,0									1,0			
Time constant	min	11									4			

Notes:

(a) customized values can be provided.

SRF 83/H , SRF 103/H , SRF 123/H , SRF 153/H
SRF 203/H , SRF 303/H, SRF 403/H , SRF 503/H, SRF 603/H

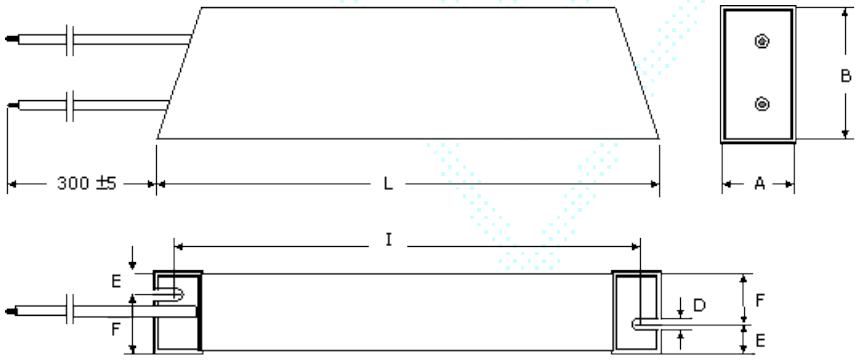
SRFC 83/H , SRFC 103/H , SRFC 123/H , SRFC 153/H SRFC 203/H ,
SRFC 303/H, SRFC 403/H , SRFC 503/H, SRFC 603/H



Dimensions [mm]	SRF XX3/H – SRFC XX3/H								
	83	**103**	**123**	**153**	**203**	**303**	**403**	**503**	**603**
L ±2	152	167	184	212	167	217	268	337	407
I ±2	133	148	165	193	147	197	248	317	387
A ±0,5	20	20	20	20	30	30	30	30	30
B ±0,5	40	40	40	40	60	60	60	60	60
D ±0,2	4,3	4,3	4,3	4,3	5,3	5,3	5,3	5,3	5,3
E ±0,5	20	20	20	20	30	30	30	30	30

SRFC 83/V , SRFC 103/V , SRFC 123/V , SRFC 153/V SRFC 203/V ,
SRFC 303/V, SRFC 403/V , SRFC 503/V, SRFC 603/V

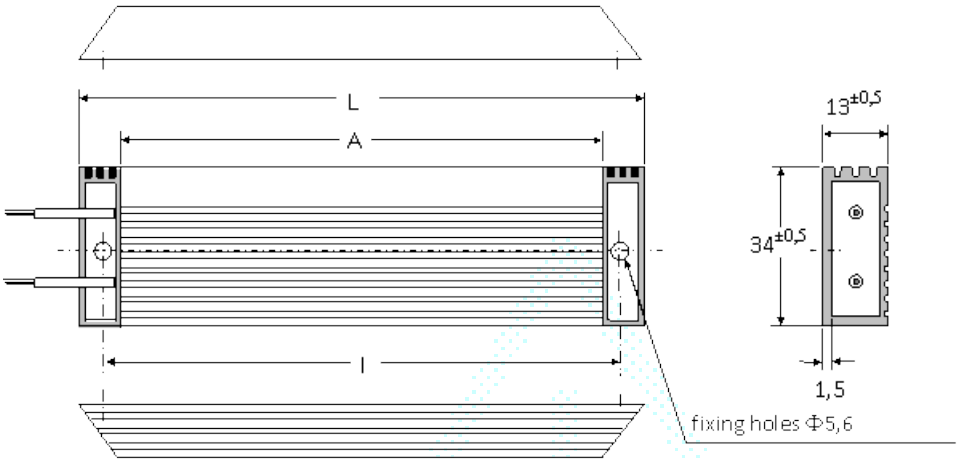
SRF 83/V , SRF 103/V , SRF 123/V , SRF 153/V
SRF 203/V , SRF 303/V, SRF 403/V , SRF 503/V, SRF 603/V



Dimensions [mm]	SRF XX3/V – SRFC XX3/V								
	83	**103**	**123**	**153**	**203**	**303**	**403**	**503**	**603**
L ±2	152	167	184	212	167	217	268	337	407
I ±2	133	148	165	193	147	197	248	317	387
A ±0,5	20	20	20	20	30	30	30	30	30
B ±0,5	40	40	40	40	60	60	60	60	60
D ±0,2	4,3	4,3	4,3	4,3	5,3	5,3	5,3	5,3	5,3
E ±0,5	20	20	20	20	30	30	30	30	30

SRF 105 , SRF 155 , SRF 185 , SRF 255

SRFC 105 , SRFC 155 , SRFC 185 , SRFC 255



Dimensions [mm]	SRF XX5 – SRFV XX5			
	105	**155**	**185**	**255**
L ±2	130	160	205	260
I ±2	118	148	193	248
A ±2	108	138	183	238

Main peculiarities of SRF/HE High Energy style resistors are the ability to undergo elevated overload and to show an high level of absorbable adiabatic energy.

The special construction technology makes only use of inorganic materials.

Above peculiarities and the mounting easiness make the SRF/HE style resistors particularly reliable and suitable for applications like:

- **braking resistors**
- **inverter**
- **snubber**
- **capacity charge/discharge**

SRF/HE resistors are aluminium housed.

Two main families, whose difference is on the power rating, have been planned.

2. **MAIN CHARACTERISTICS**

Characteristics		SRF 1001	SRF 2002
Power rating (P_r) without heat sink and vertical mounted	W	1.000	2.000
IP level		IP 55	
Thermostat 160°c option [a]		yes	
Cable length	cm	300	
Dielectric strength @ 50 Hz [b]	V	4.000 V_{rsm} x 1 min	
Insulation resistance @ 1.000 V_{dc}	MΩ	≥ 1.000	
Short term overload		60P_r x 0,5 sec 30P_r x 5 sec	

Notes:

(a) S.I.R. coding system provides a **"C" additional letter for internal thermostat**. On SRF/HE type only internal thermostat option is applicable; in this case the related code is SRF/HEC.

(b) **customized values can be provided.**

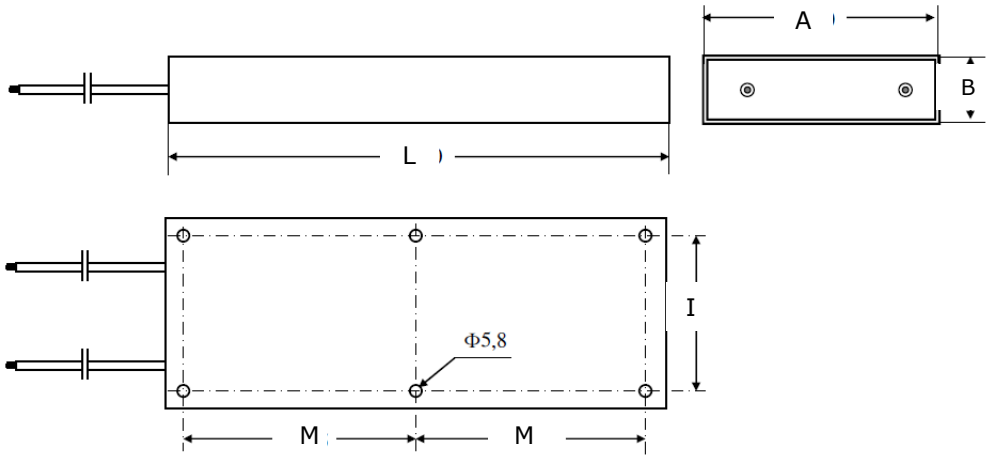
3. OTHER CHARACTERISTIC

Characteristics		SRF 1001	SRF 2002
Temperature rise @ P_r	°C	450	
Max. power with 0,25°C/W heat sink	W	1.500	3.000
Resistance range [a]	min Ω	6,8	10
	max Ω	300	300
Resistance tolerance		±5%	
Max working voltage	KV	1	
Time constant	min	8	14

Notes:

(a) **customized values can be provided.**

SRF 1001 , SRF 2002



Leads standard length: 300 mm

	L [mm]	I [mm]	M [mm]	A [mm]	B [mm]
SRF 1001	320	87	139,5	100	30
SRF 2002	385	133	172	150	50

1. **FEATURES**

The RFF style resistors have been designed in order to achieve high level of protection and an elevated dielectric strength.

The special construction technology makes use of only inorganic materials that let confidence of use beyond 400°C and ensure a good endurance to adiabatic impulses. These characteristics and the mounting easiness make the RFF style particularly suitable when high reliability is required and even in heavy duties like:

- **braking resistors**
- **inverter**
- **snubber**
- **capacity charge/discharge**

RFF housing is nickel plated steel; it's to take in account that power rating can be significantly improved using a suitable heat sink.

Two the shown product families differentiate on the mounting shape.

2. **MAIN CHARACTERISTICS**

Characteristics		RFF 201	RFF 202	RFF 301	RFF 302
Power rating (P_r)	W	200		300	
IP level		IP 55		IP 55	
Thermostat 160°C option [a]		yes		yes	
Cable length	cm	250		250	
Dielectric strength @ 50 Hz [b]	V	4.000 V_{rsm} x 1 min		4.000 V_{rsm} x 1 min	
Insulation resistance @ 2.500 V_{dc}	MΩ	≥ 200		≥ 200	
Short term overload		8P_r x 5 sec		8P_r x 5 sec	

Notes:

(a) S.I.R. coding system provides a **"C" additional letter for internal thermostat**. On RFF type only internal option is applicable; for this case the related code is RFFC.

(b) **customized values can be provided.**

3. OTHER CHARACTERISTIC

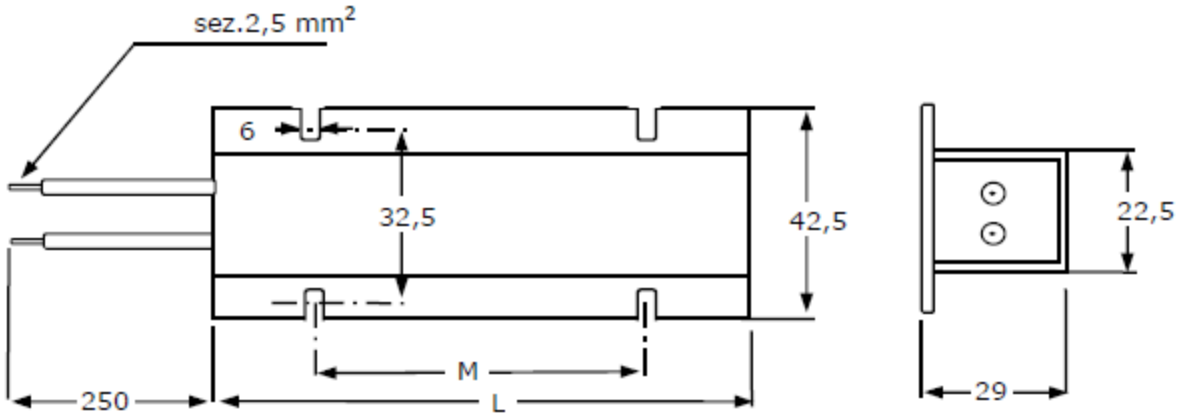
Characteristics		RFF 201	RFF 202	RFF 301	RFF 302
Temperature rise @ P_r	°C	370		370	
Max. power with water cooled heat sink	W	450		600	
Max. power with 1°C/W heat sink	W	350		500	
Absorbed energy @ 250°C ΔT	KJ	40		50	
Resistance range [a]	min	0,39		0,87	
	Ω max	5.000		8.200	
Resistance tolerance		±5%		±5%	
Parasitic capacity (from 1 to 100 kHz)	pF	400		600	
Max working voltage	KV	2		2	
Time constant	min	18		18	

Notes:

(a) **customized values can be provided.**

RFF201 , RFF301

RFFC201 , RFFC301

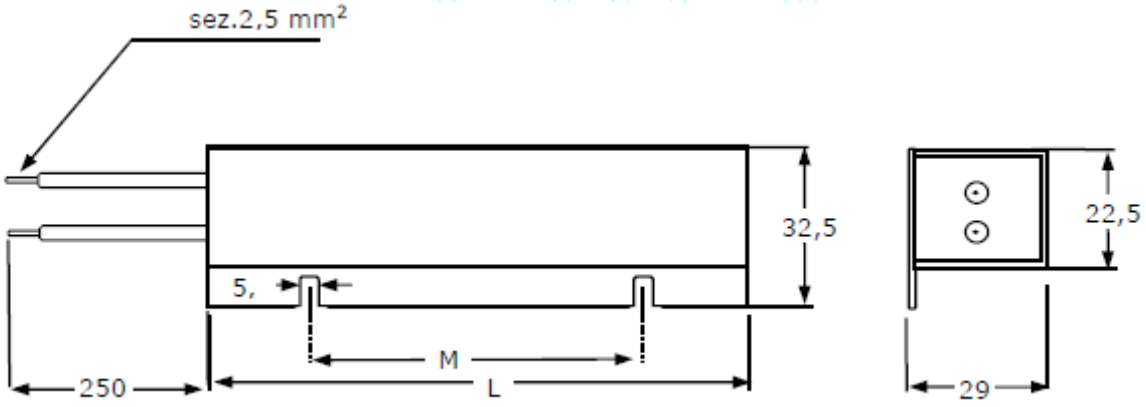


Style (*)	M [mm]	L [mm]
RFF201	100	150
RFF301	150	200

(*) shown dimensions are valid for RFFC style too.

RFF202 , RFF302

RFFC202 , RFFC302



Style (*)	M [mm]	L [mm]
RFF202	100	150
RFF302	150	200

(*) shown dimensions are valid for RFFC style too.

1. **FEATURES**

The SFO style resistors are products designed in order to achieve a suitable level of environmental protection and an elevated dielectric strength.

The special construction technology makes use of only inorganic materials that let confidence of use beyond 400°C and ensure a good endurance to adiabatic impulses. These characteristics and the mounting easiness make the SFO style resistors particularly appropriate essential when high reliability is required and in heavy duties as:

- **braking resistors**
- **inverter**
- **snubber**
- **capacity charge/discharge**

The SFO resistors are aluminium housed; it's to notice that, using a suitable heat sink, the power rating can be increased.

2. **MAIN CHARACTERISTICS**

Characteristics		SFO 100	SFO 150	SFO 200	SFO 300	SFO 450	SFO 600
Power rating (P_r)[a]	W	100	150	200	300	450	600
IP level		IP 55					
Thermostat 160°C option [b]		yes					
Dielectric strength @ 50 Hz [c]	V	3.000 V_{rsm} x 1 min					
Insulation resistance @ 2.500 V_{dc}	MΩ	≥ 200					
Short term overload		8P_r x 3sec - 4P_r x 5sec - 15P_r x 1sec					

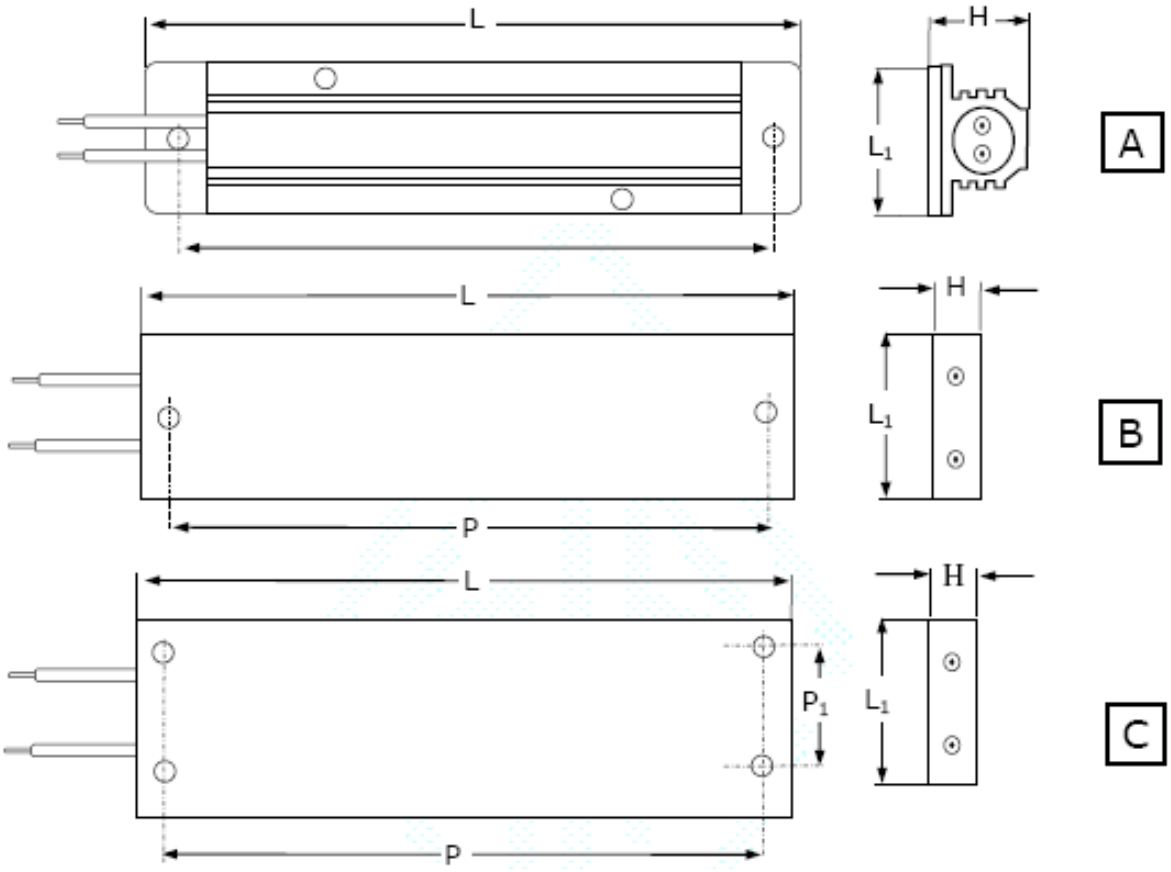
Notes:
(a) with 0,7 °C/W heat sink.
(b) S.I.R. coding system provides a **"C" additional letter for internal thermostat**. About SFO type only internal thermostat option is applicable; in case of thermostat the related code is SFOC.
(c) **customized values can be provided.**

3. OTHER CHARACTERISTIC

Characteristics		SFO 100	SFO 150	SFO 200	SFO 300	SFO 450	SFO 600
Temperature rise @ Pr	°C	300			320		
Max. power with water cooled heat sink	W	150	200	270	350	530	700
Max. power without heat sink	W	80	120	150	200	350	450
Absorbed energy @ 250°C ΔT	KJ	7	10	12,5	50	120	140
Resistance range[a]	min Ω	4,7		4,7	4,7		
	max Ω	100		200	250		
Resistance tolerance		± 5%					
Max working voltage	KV	2.0					

Notes:
(a) **customized values can be provided.**

SFO 100 , SFO 150 , SFO 200 , SFO 300 , SFO 450 , SFO 600
SFOC 100 , SFOC 150 , SFOC 200 , SFOC 300 , SFOC 450 , SFOC 600



Standard Cable Length 300 mm

Fastening holes Φ 5,2mm

STYLE	L	L_1	P	P_1	H	Drawing
SFO100	112	30	100	-	19	A
SFO150	192	30	180	-	19	A
SFO200	232	30	220	-	19	A
SFO300	205	40	180	-	15	B
SFO450	205	70	180	45	20	C
SFO600	245	70	220	45	20	C

(*) shown dimensions are valid for SFOC resistors too.

1. FEATURES

The RFH style resistors have been designed in order to achieve high performances on environmental protection level (IP55), dielectric strength, power dissipation and withstanding to adiabatic pulses.

These characteristics make RFH resistors very appropriate for applications where high reliability is required and in heavy duties like:

- **braking resistors**
- **inverter**
- **snubber**
- **capacitor charge limiting.**

Special material resistant to temperature higher than 450°C are used. Moreover, the rated power can by improved using suitable heat sink.

2. MAIN CHARACTERISTICS

Characteristics		RFH 350	RFH 500	RFH750	RFH 1100	RFH 1000	RFFH 1400	RFH 1900	RFH 1500	RFH 1800	RFH 2200
Power rating	KW	0,3	0,4	0,65	0,95	1,0	1,4	1,9	1,5	1,8	2,2
IP level		IP 55				IP 55-IP65			IP 54		
Thermostat 160°C option (a)		yes				yes			yes		
Dielectric strength @ 50 Hz (b)	V	4.500 V_{rsm} x 1 min				4.500 V_{rsm} x 1 min			4.500 V_{rsm} x 1 min		
Insulation resistance @ 1000 Vdc	MΩ	> 500				> 200			> 200		
Short term overload		$5P_r$ x 5 sec $10P_r$ x 3 sec $20P_r$ x 1 sec				$5P_r$ x 5 sec $10P_r$ x 3 sec $20P_r$ x 1 sec			$5P_r$ x 5 sec $10P_r$ x 3 sec $20P_r$ x 1 sec		

Notes:

(a) S.I.R. coding system provides a **"T" additional letter for external thermostat and "C" for internal one**.

(b) **customized values can be provided**.

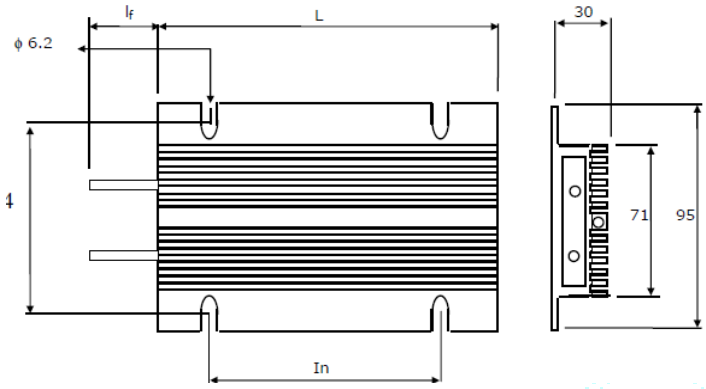
3. OTHER CHARACTERISTICS

Characteristics			RFH 350	RFH 500	RFH750	RFH 1100	RFH 1000	RFFH 1400	RFH 1900	RFH 1500	RFH 1800	RFH 2200
Temperature rise @ Pr		°C	365	375	375	385	380		410	410		
Suggested continuous max power		W	300	400	650	950	750	1.100	1.300	1.100	1.300	2.000
Max. power without heat sink		W	350	500	750	1.100	---			---		
Max. power with heat sink		W	650	850	1.300	1.800	---			---		
Max. power with water cooled heat sink		W	750	1.000	1.500	2.200	---			---		
Thermal resistance of heat sink		°C/W	≤ 0,5	≤ 0,5	≤ 0,5	≤ 0,5	---			---		
Absorbed energy @ 250°C ΔT		KJ	50	70	100	150	450	600	750	500	550	1.000
Absorbed energy @ 5 sec overload		KJ	20	28	40	60	36	55	85	55	55	83
Resistance range	min	Ω	1,0	1,0	2,2	2,2	6,8		10	6.8	6.8	10
	max		10.000	12.000	15.000	20.000	300			300	300	300
Tolerance for resistance values			± 5%				± 5%			± 5%		
Inductance @ 1000 Hz		µH	5÷50	7÷70	10÷100	20÷200	---			---		
Parasitic capacity (from 1 to 100 kHz)		pF	250÷60	300÷75	450÷120	600÷200	200	220	250	250		
Maximum working voltage		V	1.500	2.500	3.000	3.000	1.200			1.200		1.500
Thermal time constant		min	18				15	16	19	16	18	27

Notes:

(a) **customized values can be provided**

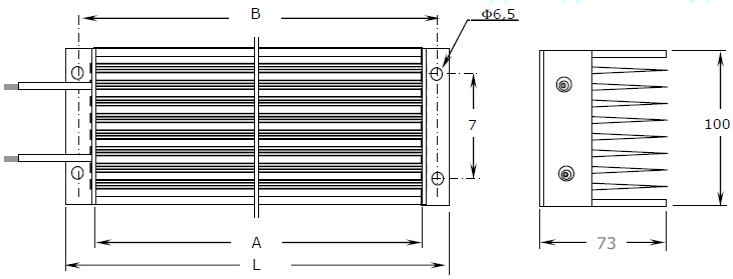
RHF 350 , RFH 500 , RFH 750 , RFH 1100
RHFT 350 , RFHT 500 , RFHT 750 , RFHT 1100
RHFC 350 , RFHC 500 , RFHC 750 , RFHC 1100



Style	L [mm]	In	Weight [g]
RFH 350	110	60	460
RFH 500	160	110	670
RFH 750	220	140	920
RFH 1100	320	240	1250

(*) shown dimensions are valid for RFH resistors with thermostat option too.

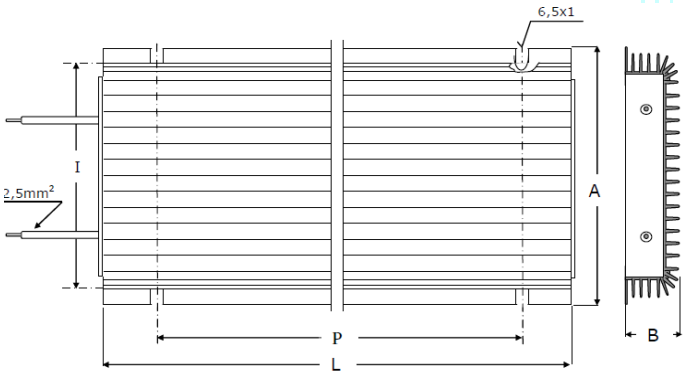
RFH 1000 , RFH 1400 , RFH 1900
RFHC 1000 , RFHC 1400 , RFHC 1900



Style (*)	L [mm]	A [mm]	B [mm]	Weight [g]
RFH 1000	246	202	230	2.500
RFH 1400	311	267	295	3.200
RFH 1900	366	322	350	4.000

(*) shown dimensions are valid for RFH resistors with thermostat option too.

RFH 1500 , RFH 1800 , RFH 2200
RFHC 1500 , RFHC 1800 , RFHC 2200



Style (*)	A [mm]	B [mm]	L [mm]	I ±3 [mm]	P [mm]	Weight [g]
RFH 1500	120	40	320	110	240	2.750
RFH 1800	120	40	380	110	300	3.000
RFH 2200	190	67	380	180	300	7.000

(*) shown dimensions are valid for RFH resistors with thermostat option too.

Leads standard length: 300 mm

1. FEATURES

The SFM style resistors are derived from SRF 250-350 and from RFH 350-1100, of which they keep the same performances. Specificity of the SFM resistor is the housing of a PG connection that lets the use of a single bipolar cable instead than the two wires (plus eventual other two for the possible internal thermostat). suitable in order have been designed in order to achieve high performances on environmental protection level (IP55), dielectric strength, power dissipation and withstanding to adiabatic pulses.

Keeping the same performances of These characteristics make RFH resistors very appropriate for applications where high reliability is required and in heavy duties like:

- **braking resistors**
- **inverter**
- **snubber**
- **capacitor charge limiting.**

Special material resistant to temperature higher than 450°C are used. Moreover, the rated power can by improved using suitable heat sink.

2. MAIN CHARACTERISTICS

Characteristics		SFM 251	SFM 351	SFM 350	SFM 500	SFM 750	SFM 1000
Power rating	KW	0,2	0,3	0,3	0,4	0,65	0,95
IP level		IP 41					
Thermostat 160°C option [a]		yes					
Insulated bipolar cable		yes					
Shielded bipolar cable		yes					
Possibility to connect the user cable		yes					
Cable length		from 0,5 to 2 mt					
Dielectric strength @ 50 Hz [b]	V	3.000 V_{rsm} x 1 min		4.500 V_{rsm} x 1 min			
Insulation resistance @ 2.500 Vdc	MΩ	> 200		---			
Insulation resistance @ 1.000 Vdc	MΩ	---		> 500			
Short term overload		$5P_r$ x 5 sec - $10P_r$ x 3 sec - $20P_r$ x 1 sec					

Notes:

(a) S.I.R. coding system provides a **"C" additional letter for internal thermostat and "C" for internal one**. For SFM resistor it's only possible the internal solution.

(b) **customized values can be provided.**

3. OTHER CHARACTERISTICS

Characteristics		SFM 251	SFM 351	SFM 350	SFM 500	SFM 750	SFM 1000
Temperature rise @ Pr	°C	350		365	375	375	380
Suggested continuous max power	W	---		300	400	650	950
Max. power without heat sink	W	---		350	1.100	750	1.100
Max. power with heat sink	W	---		650	850	1.300	1.800
Max. power with water cooled heat sink	W	400	500	750	1.000	1.500	2.200
Thermal resistance of heat sink	°C/W	≤ 0,3		≤ 0,5			

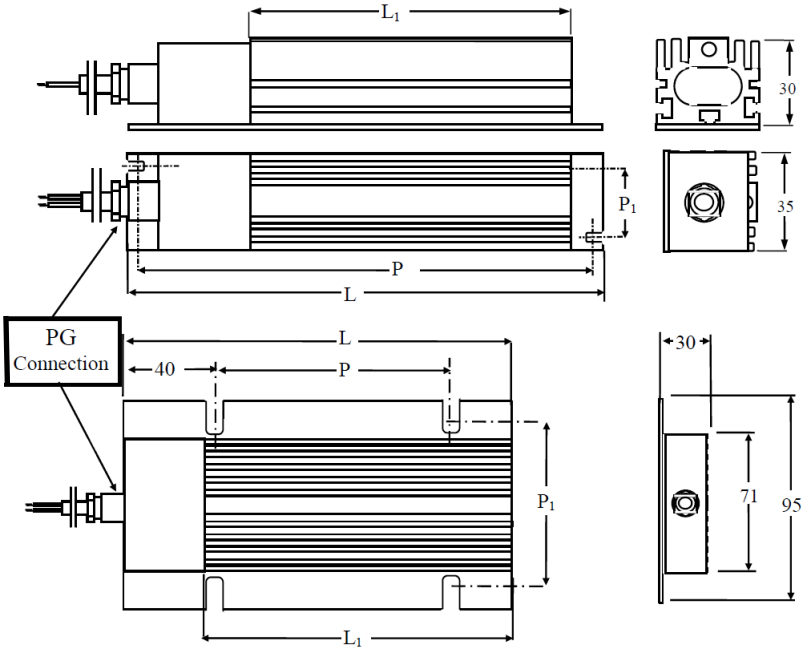
it continues from previous page								
Absorbed energy @ 250°C ΔT		KJ	8	10	50	70	100	150
Absorbed energy @ 5 sec overload		KJ	20	28	20	28	40	60
Resistance range	min	Ω	0,47	0,68	1	1	2,2	2,2
	max		300	400	10.000	12.000	15.000	20.000
Tolerance for resistance values			± 5%					
Inductance @ 1000 Hz		μH	---		5÷50	7÷70	10÷100	20÷200
Parasitic capacity (from 1 to 100 kHz)		pF	150	200	250÷60	300÷75	450÷120	600÷200
Maximum working voltage		V	1.500	2.000	1.500	2.500	3.000	3.000
Thermal time constant		min	14		18			

SFM 251 , SFM 265 , SFM 350 , SFM 500, SFM 750 , SFM 1000

SFMC 251 , SFMC 265 , SFMC 350 , SFMC 500, SFMC 750 , SFMC 1000

SFM 251, SFM 351

SFM 350, SFM 500,
SFM 750, SFM 1100



---	L	L_1	P	P_1
SFM251	215	150	200	20
SFM351	265	200	250	20
SFM350	148	110	80	81
SFM500	198	160	130	81
SFM750	258	220	175	81
SFM1100	358	320	275	81

1. **FEATURES**

In the dynamic braking and for high continuous power values, it arises the need of protected resistors (or resistors group) to be employed like an independent unit.

The BDR resistors group has been designed in order to satisfy above needs. Such group includes three product families whose whole characteristics are such to cover a significant power and IP level range.

Housings are made from perforated or integral white zinc plated sheets.
Suitable clamping connections have been provided.

2. **MAIN CHARACTERISTICS**

Characteristics		BDR-K0							BDR-K1						BDR-K2		BDR-K4		
		BDR2K0	BDR4K0	BDR5K0	BDR8K0	BDR12K0	BDR16K0	BDR24K0	BDR4K1	BDR8K1	BDR12K1	BDR16K1	BDR24K1	BDR32K1	BDR48K2	BDR64K2	BDR16K4	BDR24K4	BDR32K4
Power rating	KW	2	4	5	8	12	16	24	4	8	12	16	24	32	48	64	16	24	32
IP level		IP 20							IP 23						IP 21		IP 20		
Thermostat 160 °C option (a)		yes							yes						yes		yes		
Dielectric strength @ 50 Hz (b)	V	3.000 V_{rsm} x 1 min							4.000 V_{rsm} x 1 min						4.000 V_{rsm} x 1 min		4.000 V_{rsm} x 1 min		
Insulation resistance @ 2500 Vdc	MΩ	≥ 200							≥ 200						≥ 200		≥ 200		

Notes:
(a) S.I.R. coding system provides a **"T" additional letter for thermostat**. About BDR type only external option is applicable; in case of thermostat the related code is BDRT.
(b) **customized values can be provided.**

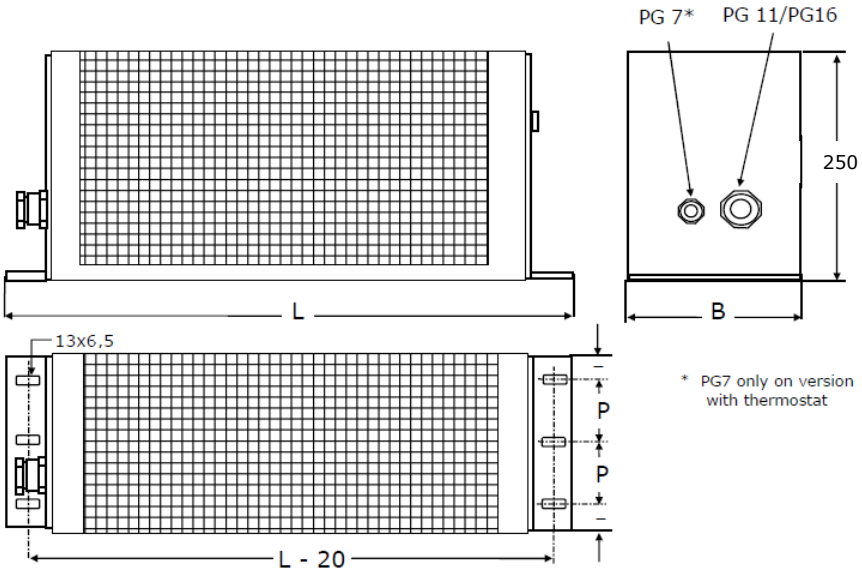
3. **OTHER CHARACTERISTICS**

Characteristics			BDR-K0							BDR-K1						BDR-K2		BDR-K4		
			BDR2K0	BDR4K0	BDR5K0	BDR8K0	BDR12K0	BDR16K0	BDR24K0	BDR4K1	BDR8K1	BDR12K1	BDR16K1	BDR24K1	BDR32K1	BDR48K2	BDR64K2	BDR16K4	BDR24K4	BDR32K4
Resistance range (a)	min	Ω	1,0			1,0		2,2		1,0	2,2					3,3		3,3		
	max		60			100		100		60	100					100		100		
Tolerance for resistance values			± 10%							± 10%						± 10%		± 10%		
Overload			$10P_r$ x 5 sec $5P_r$ x 10 sec					$5P_r$ x 5 sec		$10P_r$ x 5 sec $5P_r$ x 10 sec			$8P_r$ x 5 sec $3P_r$ x 10 sec			$8P_r$ x 5 sec $3P_r$ x 10 sec		$8P_r$ x 5 sec $3P_r$ x 10 sec		
Connections	resistors		no. 2							no. 2						no. 2		no. 2		
	earth		no. 1							no. 1						no. 2		no. 2		
	thermostat		no. 2 (optional)							no. 2 (optional)						no. 2 (optional)		no. 2 (optional)		

Notes:
(a) **customized values can be provided.**

BDR 2K0 , BDR 4K0 , BDR 5K0 , BDR 8K0 , BDR 12K0,
BDR 16K0 , BDR 24K0 ,

BDRT 2K0 , BDRT 4K0 , BDRT 5K0 , BDRT 8K0 ,
BDRT 12K0 , BDR16K0 , BDRT 24K0

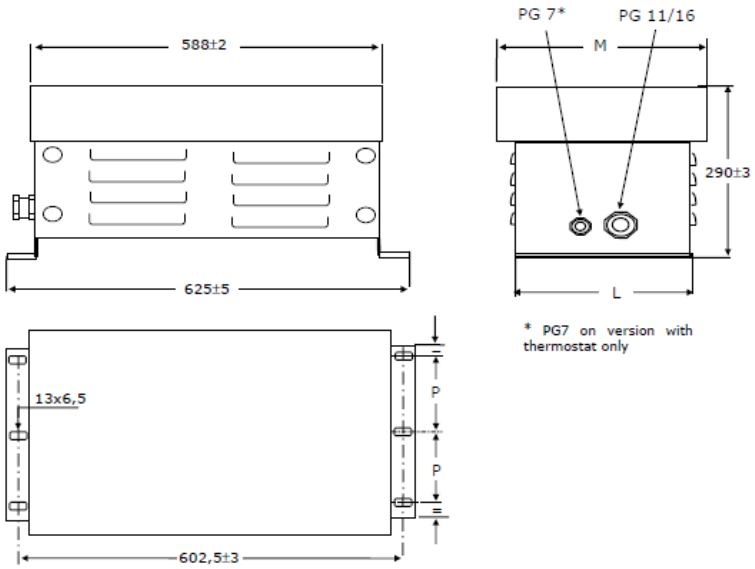


Style (*)	L ±3 [mm]	B [mm]	P [mm]
BDR2K0	498	100	40
BDR4K0	625	100	40
BDR8K0	625	160	60
BDR12K0	625	200	80
BDR16K0 (+)	625	160X2	60X2
BDR24K0 (+)	625	200X2	80X2

(*) shown dimensions are valid for BDRT style too.
(+) BDR16K0 and BDR24K0 are constituted by two 8K0 and 12K0 joint along L side.

BDR 4K1 , BDR 8K1 , BDR 12K1

BDRT 4K1 , BDRT 8K1 , BDRT 12K1

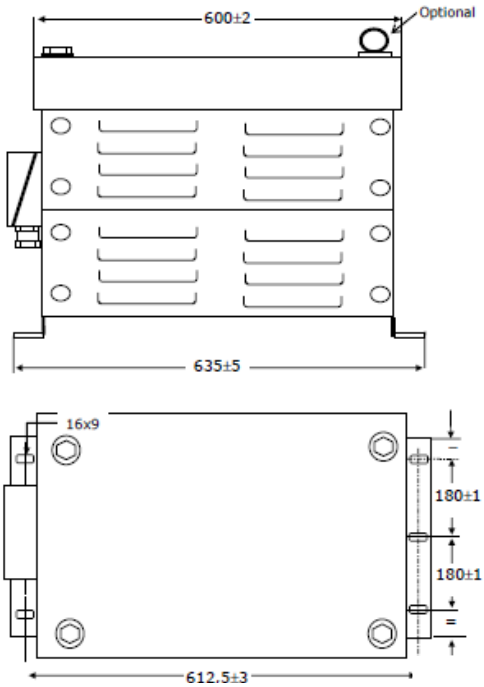


Style (*)	L [mm]	M [mm	P [mm]
BDR4K1	100	140	40
BDR8K1	160	200	60
BDR12K0	200	240	80

(*) shown dimensions are valid for BDRT style too.

BDR 16K1 , BDR 24K1 , BDR 32K1

BDRT 16K1 , BDRT 24K1 , BDRT 32K1

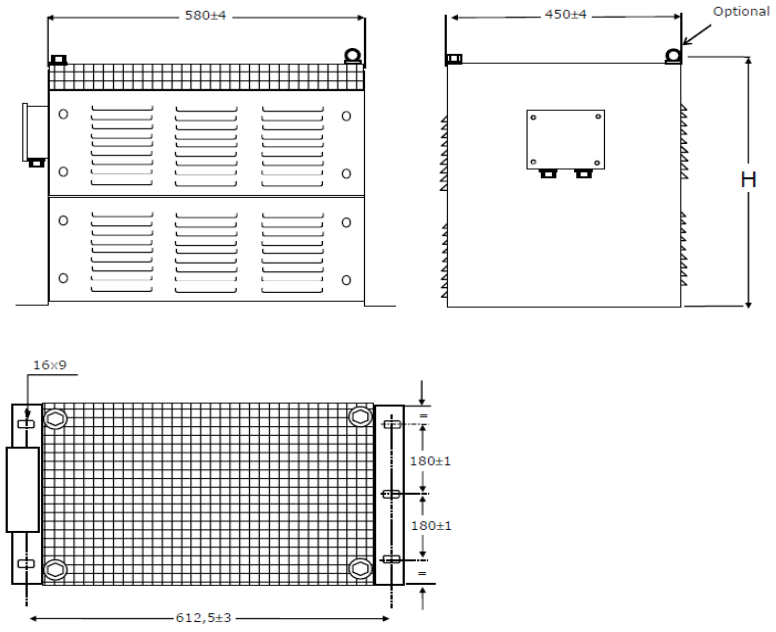


Style (*)	H ± 5 [mm]
BDR16K1	310
BDR24K1	550
BDR32K1	550

(*) shown dimensions are valid for BDRT style too.

BDR 16K4 , BDR 24K4 , BDR 32K4

BDRT 16K4 , BDRT 24K4 , BDRT 32K4

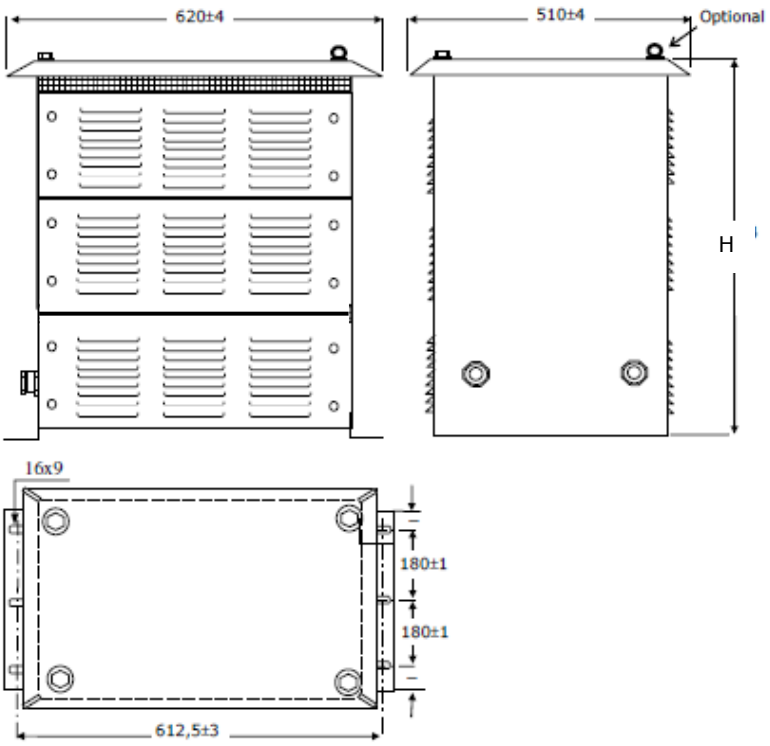


Style (*)	H ± 5 [mm]
BDR16K4	300
BDR24K4	540
BDR32K4	540

(*) shown dimensions are valid for BDRT style too.

BDR 48K2, BDR 64K2

BDRT 48K2, BDRT 64K2



Style (*)	H ± 5 [mm]
BDR48K2	860
BDR64K2	1200

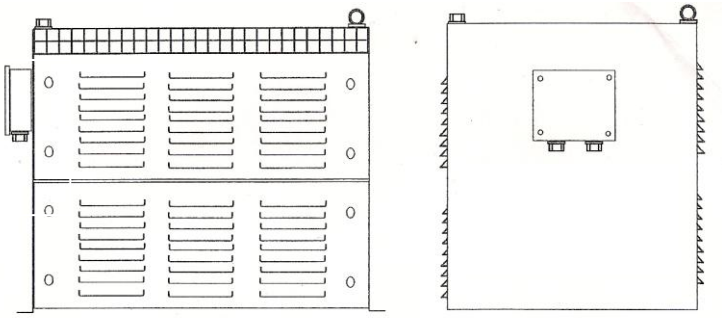
(*) shown dimensions are valid for BDRT style too.

BDR 16 ÷ 32K

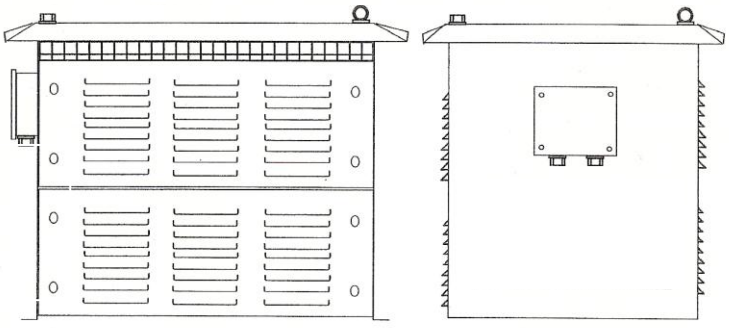
BDRT 16 ÷ 32K

CASES FOR DIFFERENT
IP LEVELS

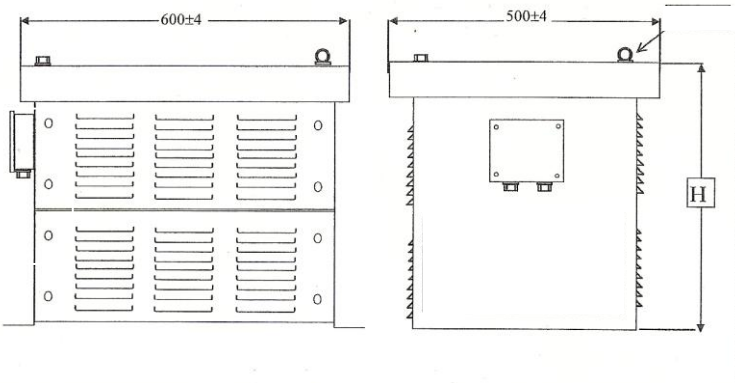
IP 20
case



IP 21
case



IP 23
case



1. **FEATURES**

In the dynamic braking and for continuous power values till 1,5 kW, it is often required a protected resistor easy to be assembled in electric panels. BRE is a **low cost** product designed for such application.

BRE resistors group includes two families: BREXX1 and BRE600+1000.

Main differences between the twos are about the internal resistor that is a spiral wounded on a grooved ceramic for BREXX1 and a wire wounded on a ceramic tube for BRE600 + BRE1000. Besides BREXX1 is provided with clamps, while BRE600 + BRE1000 are equipped with suitable cables.

2. **MAIN CHARACTERISTICS**

Characteristics		**BREXX1**			**BRE600+1000**		
		BRE601	BRE1001	BRE1501	BRE300	BRE600	BRE1000
Power rating	KW	0,6	1,0	1,5	0,3	0,55	1,0
IP level		IP 20			IP 20		
Thermostat option [a]		yes			yes		
Dielectric strength @ 50 Hz [B]	V	3.000 V_{rsm} x 1 min			3.000 V_{rsm} x 1 min		
Insulation resistance @ 2500 Vdc	MΩ	≥ 200			≥ 200		

Notes:

(a) S.I.R. coding system provides a **"T" additional letter for thermostat**. About BRE type only external option is applicable; in case of thermostat the related code is BRET.

(b) **customized values can be provided**.

3. **OTHER CHARACTERISTICS**

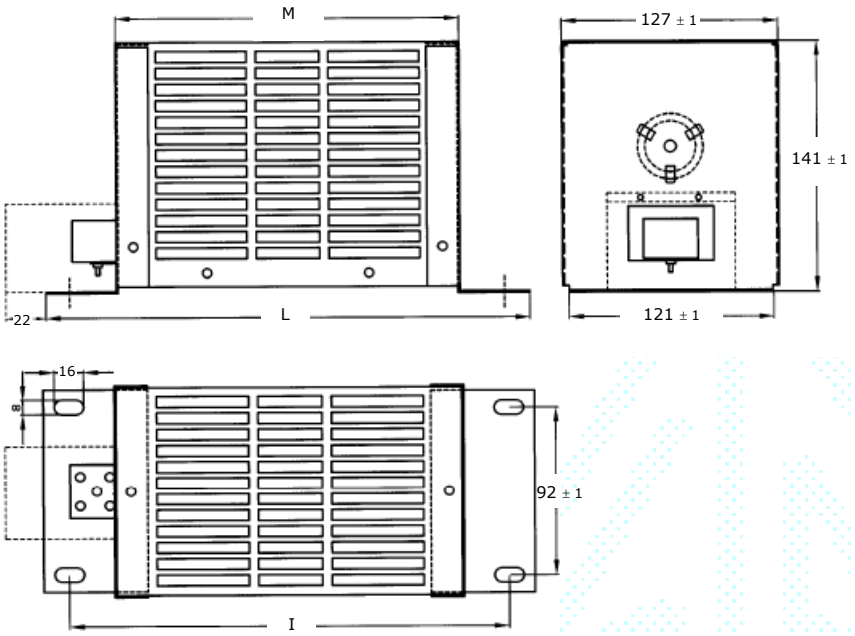
Characteristics			**BREXX1**			**BRE300+1000**		
			BRE601	BRE1001	BRE1501	BRE300	BRE600	BRE1000
Resistor range [a]	min	Ω	3,9	4,7	3,9	4,7		
	max		150	270	1.000	1.000		
Tolerance for resistance values			± 5%			± 5%		
Overload			8P_r x 5 sec 5P_r x 10 sec			10P_r x 5 sec 5P_r x 10 sec		
Connecting clamps	resistor		no. 2			n.a.		
	earth		no. 1					
	thermostat		no. 2 (optional)			no. 2 (optional)		
Cable length range [b]		cm	n. a.			400÷2.000		

Notes:

(a) (b) **customized values can be provided**.

BRE 601 , BRE 1001 , BRE 1501

BRET 601 , BRET 1001 , BRET 1501

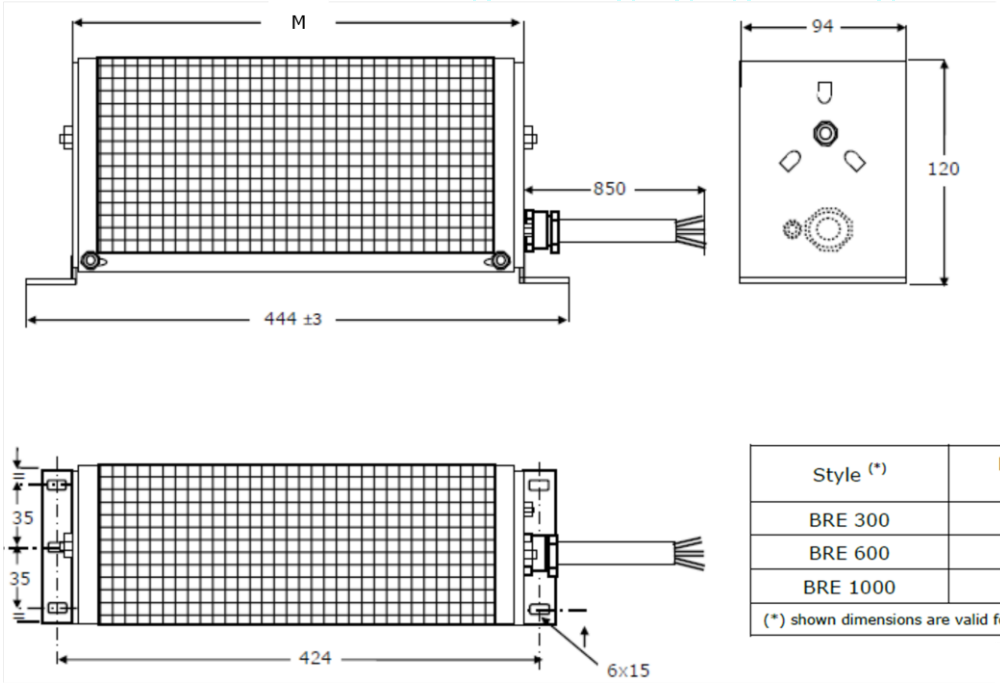


Style (*)	L ±1 [mm]	I ±1 [mm]	M [mm]
BRE 601	266	224	189
BRE 1001	345	303	268
BRE 1501	445	403	368

(*) shown dimensions are valid for BRET style too.

BRE 300 , BRE 600 , BRE 1000

BRET 300 , BRET 600 , BRET 1000



Style (*)	L ± 3 [mm]	M ± 3 [mm]
BRE 300	294	254
BRE 600	294	254
BRE 1000	444	404

(*) shown dimensions are valid for BRET style too

1. **FEATURES**

BRR resistors are braking resistors designed for power till 1,3 KW and that, like the BDR family can be usedas independent unit. It's to notice the **low noise level** of such resistors.

Housings are made from perforated or integral white zinc plated sheets.
Suitable clamping connections have been provided.

2. **MAIN CHARACTERISTICS**

Characteristics		BRR500	BRR800	BRR1K0	BRR1K3
Power rating	KW	0,5	0,8	1,0	1,3
IP level		IP 20			
Insulation resistance @ 2500 V_{dc}	MΩ	≥ 200			
Dielectric strength @ 50 Hz (a)	V	3.000 V_{rsm} x 1 min			
Thermostat 160 °C option (b)		yes			

Notes:
(a) **customized values can be provided**

(b) S.I.R. coding system provides a **"T" additional letter for thermostat**. On BRR type only external option is applicable; in this case of thermostat the related code is BRRT.

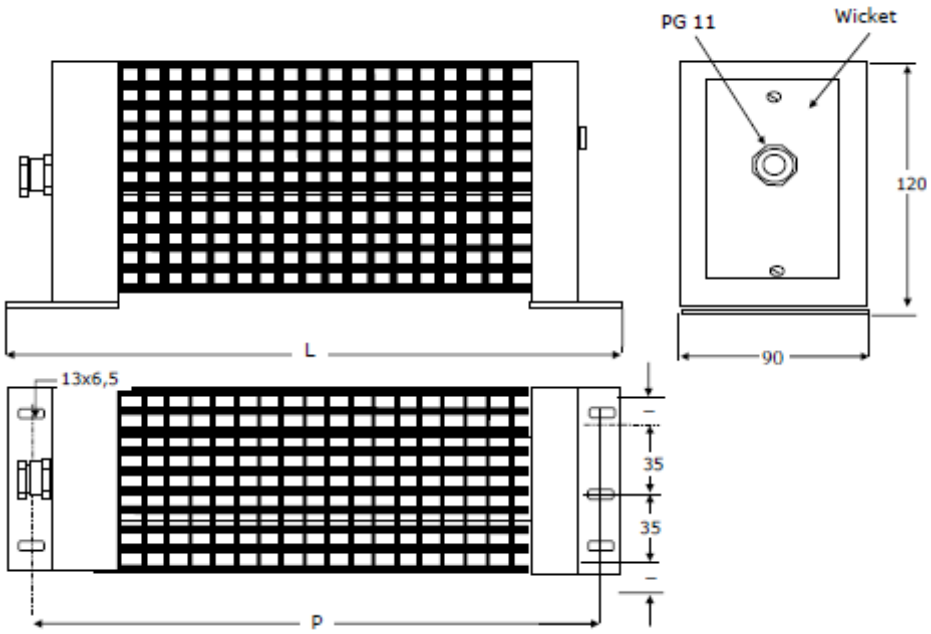
3. **OTHER CHARACTERISTICS**

Characteristics			BRR500	BRR800	BRR1K0	BRR1K3
Resistance range (a)	min	Ω	2,2		2,2	
	max		5.000		10.000	
Tolerance of resistance values			± 10%			
Overload		MΩ	$10P_r$ x 5 sec - $5P_r$ x 10 sec			
Connections	resistors		no. 2			
	earth		no. 1			
	thermostat		no. 2 (optional)			

Notes:
(a) **customized values can be provided.**

BRR500 , BRR800 , BRR1K0 , BRR1K3

BRRT500 , BRRT800 , BRRT1K0 , BRRT1K3



Style (*)	L ±3	P ±3
BRR 500	310	290
BRR 800	410	390
BRR 1K0	510	490
BRR 1K3	610	590

(*) shown dimensions are valid for BRRT style too.

1. **FEATURES**

The BDC resistors have the same application as BDR ones, that's when in dynamic braking the need for a protected resistor (or resistors group) to be employed like an independent unit arises.

It differs from BDR for its ability **to reduce the noise** caused by the brake current. Internal elements of BDC are tubular cemented resistors.

BDC housing is perforated.

2. **MAIN CHARACTERISTICS**

Characteristics		BDC 2K0	BDC 4K0	BDC 8K0	BDC 12K0
Power rating (P_r)	W	2.200	4.000	7.000	10.000
IP level		20			
Thermostat 160 °C option (a)		yes			
Dielectric strength @ 50 Hz (b)	V	4.500 V_{rsm} x 1 min			
Insulation resistance @ 2.500 V_{dc}	MΩ	> 200			

Notes

(a) S.I.R. coding system provides a **"T" additional letter for thermostat**. On BDC type only external option is applicable; in this case of thermostat the related code is BDCT.

(b) **customized values can be provided.**

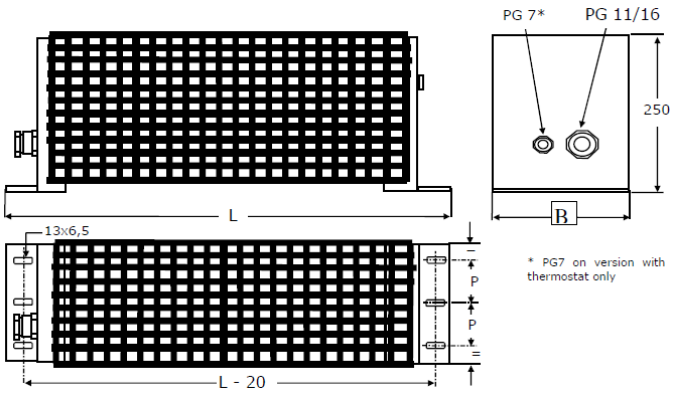
2. ELECTRICAL SPECIFICATION

			BDC 2K0	BDC 4K0	BDC 8K0	BDC 12K0
Power rating (P_r)		W	2.200	4.000	7.000	10.000
Resistance range	min	Ω	2			
	max		1.000			
Tolerance for resistance values		-	± 5%			
Overload		-	5P_r x 10 sec			
Connections	resistors	-	no. 2			
	earth	-	no. 1			
	thermostat	-	no. 2			

Notes

(a) **customized values can be provided**.

BDC 2K0, BDC 4K0, BDC 8K0, BDC 12K0
BDCT 2K0, BDCT 4K0, BDCT 8K0, BDCT 12K0



Styl	L ± 3 [mm]	B [mm]	P [mm]	P Style
BDC	49	10	4	1
BDC	62	10	4	1
BDC	62	16	6	1
BDC		20	8	1

(*) shown dimensions are valid for BDCT style too.

1. **FEATURES**

RHO resistors **(water cooled resistor)** have been designed in order to match **high power small volume** needs.

Peculiarity of these resistors is the cooling solution, that provides a cooling action directly on the resistor elements. Therefore, it's to underline that such cooling doesn't mean the using of water cooled heat sink, with significant advantages both on dimensional parameters and on cost.

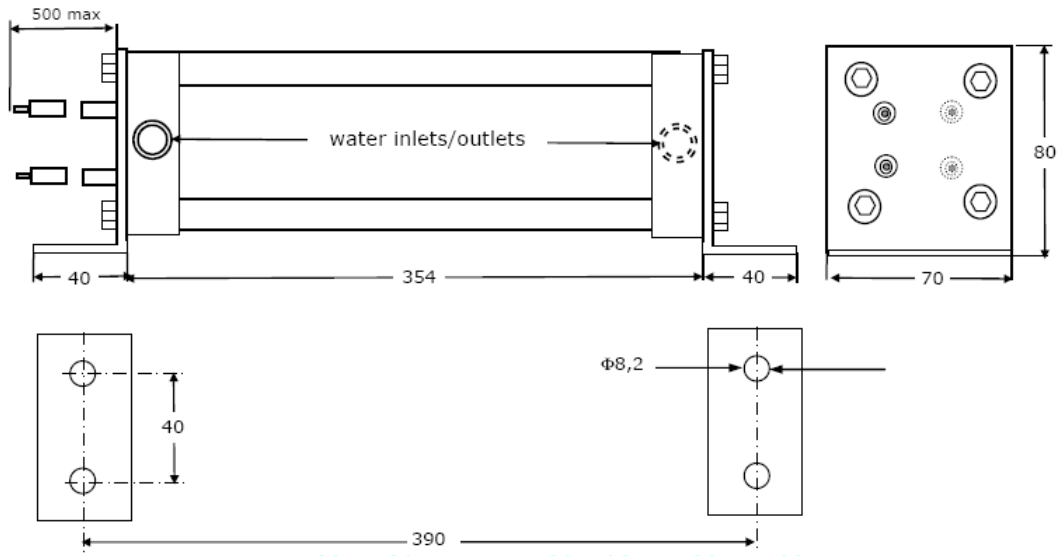
2. **MAIN CHARACTERISTICS**

Characteristics		RHO6000	RHO25000
Power rating	KW	5,0	15,0
Dielectric strength @ 50 Hz [a]	V	6.000 V_{rsm} x 1 min	10.000 V_{rsm} x 1 min
Insulation resistance @ 1000 Vdc	MΩ	≥ 10.000	
Short term overload		$2P_r$ x 5 sec	
Notes: (a) **customized values can be provided.**			

3. **OTHER CHARACTERISTICS**

Characteristics			RHO6000	RHO25000
Max applicable power	continuous		6,0 KW	15,0 KW
	for 10 min max		8,0	25,0
Resistor range [a]	min	Ω	3,3	10,0
	max		300	2.000
Resistance tolerance			± 5%	
Parasitic capacity (from 1 to 100 kHz)		pF	300	---
Max working voltage		V	4.000	6.000
Cable length range [b]		cm		
Cooling fluid			water	deionized water
Cable length range [b]		mm	400÷1000	

RHO 6000



RHO 25000