GMQ Aluminum Power Resistors

The GMQ-1 and GMQ-2 resistors with optional integrated thermal supervision from the KWX high power range of Aluminium Houseo Compact Brake Rake Alpha Resistors are electrically insulated compact resistors.They can easily be fitted into compact constructions and are especially designed to withstand high pulse-loads. The aluminium construction ensures that surface temperatures are kept low(seeTable 3)such that any accumulated dust will not burn and trigger smoke alarms.

Steady- state power ratings range from 510W to 4450W per body case style and up to 20 bodies can be combined in one unit. The pulse-load capability is up to 380 times the nominal power for a duty cycle of one second per hour, depending on the ohmic value and resistor wire, which allows several MWs of pulse-load to be absorbed. GMQ resistors have thermal time- constants of about one hour.

Specially reinforced versions are available for Low Voltage Ride Through -LVRT as Energy Dump Resistors for Wind Turbine applications.

KWX has developed thermal models for all resistor types and resistor values which allow the prediction of temperature rise of both the internal resistor wire and the housing surface for all possible load profiles.

This simulation capability is part of KWX applications support to help customers find the optimum solution for their designs.

GMQ resistors are optionally available with different terminal boxes for various cable sizes and from Ip20 to IP54 and in special cases, to Ip65

These special data-sheets are available on request..

Construction

The resistors are designed as follows:

The resistors are designed as follows: The resistor elements are made with helixwound wire elements mounted in special ceramic fixtures. The outer housing is an extruded aluminium profile electrically insulated with micanite sheets on all inner surfaces.The resistor elements are fixed symmetrically in the housing by ceramic insulators which ensures symmetric expansion of the resistors and a maximal surge-withstand capability. Aluminium housings with fixed resistor elements are filled with Al2O3 or SiO2 This ensures a minimal change of resistor surfacetemperature even at maximal pulse rating (minimized temperature cycles)Standard cables are 300 mm AWG 10 ~AWG 4, 1000V but non-standard cables (different types, lengths, connectors) can also be supplied, on request.

Accessories

The resistor can be customized with respect to the following features: connection style(open terminals or connection box),IP class, horizontal or vertical mounting, thermal supervision(a PT-100temperature sensor or NC thermal switch) can be fitted, in which case the maximal surface-temperature near the cables will be 200° C.

Ordering Information

GMQ 400 CH (T) 22R 2 8 1

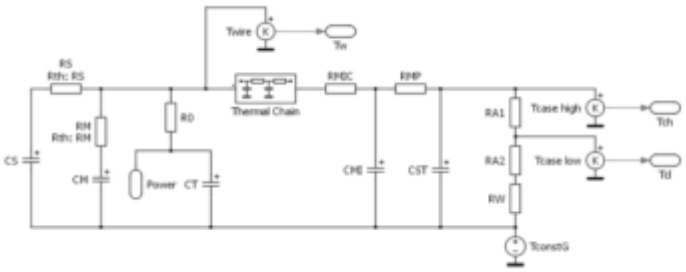
- Last digits XXX > 400: Customer specified version, otherwise:
- Number of bodies 1, 2, 3 or 4
- Thermal switch temperature: 3=80℃; 4=100℃; 5=130℃; 6=160℃; 7=180℃; 8=200℃; 9=PT100
- 0=cable connection; 2=connection box
- Ohm value (Examples: 2R2 = 2.2 Ω, 22R = 22 Ω, 220R = 220 Ω, 2k2 = 2.2 kΩ
- T = Thermal switch (NC)
- Wire element (t.b.d. by KWX) E = parallel, H = series, N = 4S2P
- Connector; Box: 0 = IP00; D = IP20; B = IP65, C = cable version
- Length of resistor body in mm. (210, 260, 330, 400, 460, 560, 660, 760, 860, 960)
- GMQ-1 = Horizontal mounting feet, GMQ-2 = Vertical mounting feet

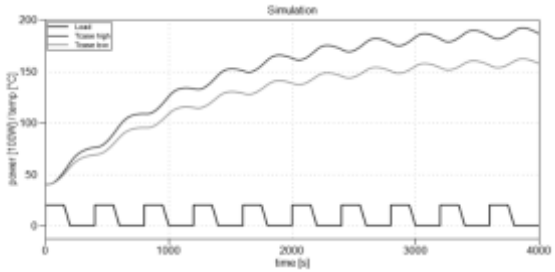
Reference Standards

JISC 5201-1

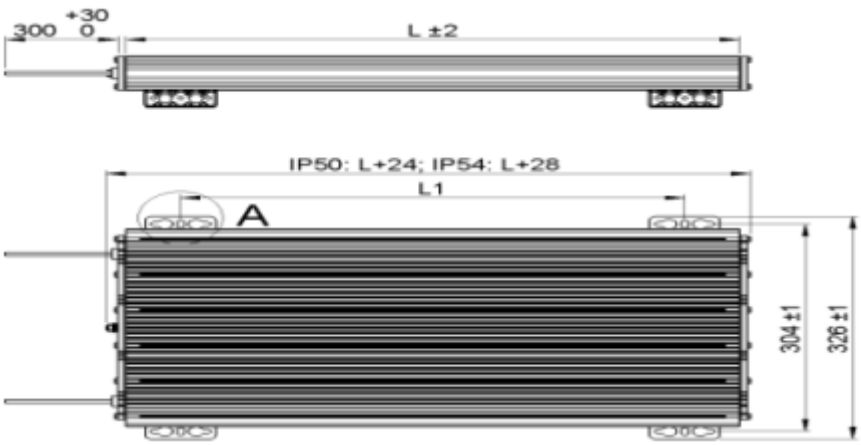
Thermal simulations

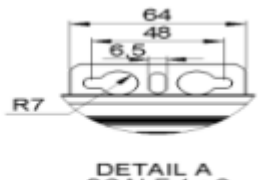
A power-time graph of the application is the start for each resistor selection which KWX inputs to thermal simulation models. The GMQ Compact Alpha Power Resistor has a very high pulse-load capability for 1 second, exceeding 380 times the steady-state load power (depending on resistor type and ohmic value). This makes the GMQ ideal for high pulse-load application like LVRT (Low Voltage Ride Through) and other high load-dumps from drives applications. KWX uses sophisticated simulation models that predict the behaviour of the power resistors under any given load conditions . This shortens the user’ s design-time and ensures the highest reliability because the resistor can be customized to the exact application requirements.





Dimensions





Type	L ± 2(mm)	L ± 1(mm)
GMQ-1 210	210	110
GMQ-1 260	260	160
GMQ-1 330	330	230
GMQ-1 400	400	300
GMQ-1 460	460	360
GMQ-1 560	560	460
GMQ-1 660	660	560
GMQ-1 760	760	760
GMQ-1 860	860	860
GMQ-1 960	960	960

Construction

square puises each 120 seconds.ambient temp.=40 ℃										
Type	duty1second (kw)	Max Surface temp (℃)	duty5second (kw)	Max Surface temp (℃)	duty10second (kw)	Max Surface temp (℃)	duty20second (kw)	Max Surface temp (℃)	duty40second (kw)	Max Surface temp (℃)
GMQ 210	53.7	205	17.3	265	9.20	270	4.60	270	2.30	270
GMQ 260	95.0	230	26.9	275	13.4	275	6.70	275	3.40	275
GMQ 330	135	245	36.3	280	18.1	285	9.00	280	4.50	280
GMQ 400	182	265	45.0	290	22.5	290	11.3	290	5.60	290
GMQ 460	263	295	53.0	295	26.3	295	13.1	295	6.60	295
GMQ 560	310	300	65.0	305	32.5	305	16.3	305	8.10	305
GMQ 660	390	315	77.5	315	.8.8	315	19.4	315	9.70	315
GMQ 760	470	325	95.0	325	47.5	325	23.8	325	11.9	325
GMQ 860	550	335	110	335	55.0	335	27.5	335	13.8	335
GMQ960	620	345	125	345	62.5	345	31.3	345	15.6	345

square puises each 1800 seconds.ambient temp.=40 ℃										
Type	duty1second (kw)	Max Surface temp (℃)	duty5second (kw)	Max Surface temp (℃)	duty10second (kw)	Max Surface temp (℃)	duty20second (kw)	Max Surface temp (℃)	duty40second (kw)	Max Surface temp (℃)
GMQ 210	75	70	32.0	95.0	22.0	110	14.8	130	9.9	160
GMQ 260	144	75	56.0	105	38.5	125	25.5	150	16.8	180
GMQ 330	202	80	76.0	110	55.0	135	39.0	165	26.3	200
GMQ 400	284	85	101	110	74.0	140	52.5	175	35.5	210
GMQ 460	476	100	160	135	109	160	72.0	190	46.5	220
GMQ 560	532	100	174	125	124	155	87.0	190	58.5	230
GMQ 660	704	105	222	135	156	160	109	200	73.0	240
GMQ 760	920	110	282	140	194	170	134	210	89.0	250
GMQ 860	1264	125	380	160	252	190	168	225	107	260
GMQ 960	1712	140	504	175	324	200	204	235	128	270

triangle square puises each 1800 seconds.ambient temp.=40 ℃										
Type	duty1second (kw)	Max Surface temp (℃)	duty5second (kw)	Max Surface temp (℃)	duty10second (kw)	Max Surface temp (℃)	duty20second (kw)	Max Surface temp (℃)	duty40second (kw)	Max Surface temp (℃)
GMQ 210	158	70	65	95	47.5	115	32.5	140	21.5	165
GMQ 260	300	80	116	110	82.0	130	56.0	160	36.8	190
GMQ 330	420	80	152	110	112	135	83.0	170	58.0	210
GMQ 400	592	85	204	115	148	140	110	180	79.0	220
GMQ 460	992	100	332	135	230	165	157	200	102	235
GMQ 560	1100	700	356	130	248	155	182	200	129	245
GMQ 660	1455	105	456	135	316	165	228	205	161	250
GMQ 760	1888	115	584	145	400	175	284	215	196	260
GMQ 860	2625	130	792	160	528	195	364	235	238	280
GMQ 960	3520	140	1056	180	688	210	448	245	280	280

$p(t)=pmax.e^{-t/t}$ logoritmic puise each 1800 seconds(e-curve).ambient temp.=40 ℃.tital energy E=t.pmax										
Type	Tau 1second (kJ)	Max Surface temp (℃)	Tau 5second (kJ)	Max Surface temp (℃)	Tau 10second (kJ)	Max Surface temp (℃)	Tau 20second (kJ)	Max Surface temp (℃)	Tau 40second (kJ)	Max Surface temp (℃)
GMQ 210	126	90	292	150	400	180	532	220	704	250
GMQ 260	236	110	508	180	696	210	912	250	1152	280
GMQ 330	316	110	680	180	1016	230	1440	270	1600	280
GMQ 400	432	120	896	190	1344	240	1952	290	1984	290
GMQ 460	720	150	1424	230	1952	280	22304	300	2304	300
GMQ 560	776	140	1520	220	2224	270	2880	300	2912	300
GMQ 660	1008	160	1936	230	2784	290	3456	320	3456	320
GMQ 760	1312	170	2448	250	3488	300	4032	330	4096	330
GMQ 860	1792	200	3264	280	4480	330	4608	340	4608	340
GMQ 960	2416	230	4224	320	5120	350	5120	350	5120	350

Applications And Ratings

Ratings Resistors with 200C T.W.

GMQ	1 badypn(w)@40℃ According Ul508 Max surface 250℃ noTs	R Ω ±10%	1 bady Max surface temp190℃ Ts	2 bodies Max surface temp 250℃ noTs	3 bodies Max surface temp 250℃ noTs	4 bodies Max surface temp 250℃ noTs
	pn(w)@40℃ According UL508Max					
TSG:Thermal S watch						
GMQ 210	725	0.02-30	55	-	-	-
GMQ 260	1060	0.04-50	855	-	-	-
GMQ 330	1420	0.065-80	1090	-	-	-
GMQ 400	1720	0.07-100	1320	2925	4350	5800
GMQ 460	1980	0.09-140	1520	3375	5000	6650
GMQ 560	2400	0.12-170	1850	4090	6050	8050
GMQ 660	2840	0.15-210	2180	4825	7100	9450
GMQ 760	3450	0.18-250	2660	5875	8500	11300
GMQ 860	3990	0.20-300	3060	6750	10000	13300
GMQ 960	4450	0.25-340	3420	7575	11200	14900

Performance Characteristics

Temperature Coefficient:	< ± 100ppm
Dielectric strength: Standard:	3500VAC 1 minute
On Demand	6000 VAC 1 minute
Working Voltage: Standard	1000VAC;1400VDC
Isolation Resistance:	> 20 MΩΩ/body
Overload: @1sec pulse /hour	80-200 x (depending on resistor)
Overload: @5sec pulse /hour	30-60 x (depending on resistor)
Environmental:	-40℃-90℃
DE-rating Cable Version	linear:40℃=Pn@250℃ to70℃=0.85*pn@250℃
DE-rating TW 200℃ Version	linear:40℃=Pn@190℃ to70℃=0.80*pn@190℃
DE-rating TW 180℃ Version	linear:40℃=0.85*Pn@190℃ to70℃=0.75*pn@190℃
DE-rating vertical mouting	no de rating
DE-rating horizontal mouting	0.8*pn
Thermo watch, optional	130° C/160° C/180° C / 200° C, 2A, 250Vac, NC

Pulse load

The ability to withstand pulse-loads varies with resistor size and length and diameter of the internal resistor wire. As such, it is impossible to create standard graphs that would apply for most customers' applications. In some cases, the load-profile will be the combination of a squareand a triangular pulse , such as is the case with Low Voltage Ride Through (LVRT) and Emergency Brake situations, as encountered in the Wind Power industry..

On request, KWX performs simulations based on the actual application and for guidance, has produced tables for various load-profiles for resistors with standard wire(but these are only examples)The table shown above is based on a 5 ohm resistor with standard wire thickness.Depending on the application,resistor construction can be adapted to optimally match the application.

In the table above, the peak power for a train of pulses of 1 to 40 seconds duty time (on-time) and cycle times of 120 seconds or 1800 seconds be found, corresponding to the duty cycle which brings the resistor wire temperature to its rated thermal maximum of 1000° C.

GMQ Aluminum Power Resistors

KWX offers standard solutions for one to six resistor bodies combined in one compact resistor unit with pulse-withstand capability of 3MW(15MJ)and also OEM versions with a maximum of 20 bodies.Depending on the electrical connection, the IP class ranges from IP 20 to IP 65.Connection can be via a terminal box, DIN-rail terminals or cable lugs. These resistor types are also offered in high-voltage versions.

The salient features of Alpha resistors are that they have:

Ⅰ.Small dimensions
Ⅱ.low-temperature surfaces in operation
Ⅲ.High pulse-load capabilities
Ⅳ.High vibration capabilities
Ⅴ.No external electrically-live parts
Ⅵ. High IP classes
Ⅶ.Fail safe (on request)
Ⅷ.Low noise levels

Triple-body unit GMQ-1 BHT 283
Pnom. = 4350—11200 W, IP 54
Connection box with 3 cable glands

GMQ-2 BHT 282

unit GMQ-BHT
Pnom. = 2925—7575 W double-body unit (282)
Pnom. = 5800—14900 W four-body unit (284)
B-type Connection Box with 3 cable glands
IP 54 protection class

GMQ-2 BHT 284