Contents

Description *Page*

Application data . . . . . .7-1 - 7-2

CSA Type P and Type D fuses (CDS, CDN and PON) **7-3**

Tron™ HRC Form II Class C fuses (CGL Form II Class C) **7-4**

HRCI Industrial ceramic body fuses (CIF21 HRCI-CA and CIF06 HRCI-CB) **7-5**

HRCI-J Fast-acting fuses (CJ HRCI-J) **7-6**

HRCI-Miscellaneous Type K fuses (CIH, CIK and CIL HRCI-MISC) **7-7**

HRC Form II current-limiting fuses **7-8**

BS 88 British Standard low voltage fuses (SSD, NSD, ESD and STD, NITD, AAO, BAO, OSD, CEO, DEO BS 88 Part 1) **7-9**

BS 88 British Standard low voltage fuses (AC, AD, BC, BD, CD, DD, ED, EFS and EF, FF, FG, GF, GG, GH BS 88) **7-10**

DIN Style Type D (D16, D27, D33, D125 Type D) **7-11**

Neozed low voltage fuses (NZ01, NZ02 Type D0) **7-11**

NH HRC fuses . . . . . **7-12 - 7-15**

Class gG/gL IEC Industrial ferrule fuses (C08G, C08M, C10G, C10M, C14G, C14M, C22G, C22M) . . . . **7-16 - 7-17**

Class aM IEC Industrial ferrule fuses (C08M, C10M, C14M, C22M) **7-18**

Class aM and gG/gL IEC Industrial ferrule fuses with striker (C14G_S, C22G_S, C14M_S, C22M_S) **7-19**

HRC fuse holders

CAMaster **7-20**

SAFEloc **7-20**

Red Spot **7-20**

Application data

The standard range of fuses for low voltage industrial and general purpose applications meet the requirements of BS 88 and IEC 60269. By using advanced fuse technology, current ratings up to 400A have compact dimensions, but retain standard dimensional and performance requirements. These designs are for 315/240V systems. The standard range of fuses are available from 2-1250A in the following tag forms: Offset Blade - Offset Bolted - Center Bolted.

Supplementary ranges cover applications up to 660Vac and 500Vdc including those with nonstandard tag fixings.

Bussmann series fuses are manufactured under quality systems independently assessed to BS 5750 (ISO 9002) and appropriate ratings carry the ASTA 20 endorsement.

Selecting fuses is relatively simple and effective. The following notes cover the majority of applications. For further information contact our Application Engineers toll free at: 855-287-7626 (855-BUSSMANN).

Circuit loading

The current rating of the fuse should not be less than the full load current of the circuit. The circuit should be so designed that small overloads of long duration will not be of frequent occurrence.

Cable ratings and protection

There is an increasing move away from 70°C PVC insulation to materials that are more environmentally friendly, for example 90°C XLPE. The ratings of fusegear, switches, accessories, etc. are generally based upon the equipment being connected to conductors intended to be operated at a temperature not exceeding 70°C in normal service.

In view of the above, it is recommended that the practice of designs based upon conductor temperatures of 70°C be regarded as the norm. The equipment manufacturer should be consulted to ascertain the reduction of nominal current rating of the equipment if conductor temperatures exceeding 70°C are used. In addition, an overriding factor is often voltage drop.

Fuses with gG characteristics protect associated cables against both overload and short-circuit current, provided that the current rating of the fuse 1_N is equal or less than the current carrying capacity of the cable 1_Z.

In motor circuits, the motor starter will provide the overload protection and the fuses will provide the short-circuit protection. The maximum fuse size that can be used depends upon the type of cable used and is determined using the appropriate K factor. The following table gives the maximum sizes of fuses that are recommended for two popular cables with copper conductors, 70°C PVC (K = 115) and 90°C thermosetting (K = 143).

IEC and British Standard fuses

Application data for BS low voltage fuses

Cable size (mm²)	Max. fuse rating (amps) K = 115	K = 143
1	16	16
1.5	20	25*
2.5	32*	32*
4	50*	50*
6	63*	63*
10	100*	125*
16	125*	160*
25	200*	250*
35	315*	355*
50	400*	500
70	560	630
95	710	800
120	800	1000

* Extended Motor Circuit dual ratings can be used.

Protection against electrical shock

For a TN System, a disconnecting time not exceeding 5s is permitted for a distribution circuit. The maximum values of earth fault loop impedance (Zs) of 240V for Bussmann series gG fuses to BS 88: Parts 2 and 6 are:

Rating (A)	Zs (Ohms)	Rating (A)	Zs (Ohms)	Rating (A)	Zs (Ohms)
6	14	50	1.1	250	0.16
10	7.7	63	0.86	315	0.13
16	4.3	80	0.60	400	0.096
20	3.0	100	0.44	500	0.073
25	2.4	125	0.35	630	0.054
32	1.9	160	0.27	800	0.044
40	1.4	200	0.20		

Ambient temperature

The derating, in terms of current, of 0.5% per °C above an ambient of 35°C is recommended.

Interrupting rating

The standardized interrupting rating values are 80kA for voltages of 415Vac and above, and 40kA for DC applications. The 240Vac designs have an interrupting rating of 50kA.

Coordination ratio

All fuses to BS 88 Parts 2 and 6 will give a coordination ratio of 2:1; and for most practical situations a ratio of 1.6:1 (two steps in the R10 series). Example: an upstream fuse rated at 160A will coordinate with a downstream fuse rated at 100A.

Current and energy limitation

The range of fuses have pre-arcing I^2t values towards the bottom limits of BS 88 Parts 2 and 6. This ensures excellent current and energy limitation. They also have lower power losses at rated current. This assists in the appropriate interchangeability with other makes of fuses.

Transformers

When fuses are used on the primary side of transformers, the normal fuse current rating should be at least twice the nominal transformer primary current.

Fluorescent lighting

The normal fuse current rating should be at least twice the normal full load current of the maximum number of lights to be simultaneously switched.

Capacitor circuits

For power factor correction in capacitor circuits, the fuse should be chosen with a current rating greater than 1.5 times the rated capacitor current. This takes into account the high inrush current, circuit harmonics and capacitor tolerances.

Motor circuits

In motor circuits, the fuse has to withstand the motor's starting current and often requires a higher rating than the motor's full load current. Coordination recommendations are made by the manufacturers of motor starters in accordance with IEC 60947-4-1. To get Type 2 coordination with fuses, tests are performed with the latest gG or gM fuses to BS 88 or IEC 60269 that have pre-arcing I^2t values towards the bottom of specified limits. This means that Bussmann series fuses are suitable to provide Type 2 coordination.

Extended dual ratings of motor circuit protection fuses with gM characteristics are available in most popular fuse sizes to extend the use of associated equipment with appropriate economies. In the majority of applications, gG fuses are used. It is not essential to use gM fuses for motor circuit protection, they simply extend the utilization of standard equipment.

Below is a table of recommended fuses at 415V. In most applications, the run-up time is less than 5 seconds and duty is infrequent - no more than twice per hour. The next larger rating should be used for more demanding applications.

Rating motor		Direct on-line Standard (gG)	Direct on-line Motor circuit (gM)	Asst. start standard (gG)
kW	A	A	A	A
0.25	0.8	4	-	2
0.37	1.1	4	-	2
0.55	1.5	6	-	4
0.75	2.0	6	-	4
1.1	3 0	10	-	6
1.5	3.6	16	-	0 1
2.2	5.0	16	-	0 1
3.0	6.5	20	-	6 1
4.0	8.4	20	-	6 1
5.5	11.0	25	20M25	2 20
7.5	15.0	40	32M40	25
11.0	20.0	50	32M50	32
15.0	27.0	63	32M63	40
18.5	33.0	80	63M80	50
22.0	38.0	80	63M80	50
30.0	54.0	100	63M100	80
37.0	66.0	125	100M125	80
45.0	79.0	160	100M160	100
55.0	98.0	160	100M160	100
75.0	135.0	250	200M250	160
90.0	155.0	250	200M250	160
110.0	185.0	315	200M315	200
132.0	220.0	355	315M400	250
150.0	250.0	355	315M400	315
185.0	310.0	450	400M500	355
200.0	335.0	500	400M500	400
225.0	375.0	560	-	400
250.0	415.0	560	-	450
280.0	460.0	630	-	500
335.0	562.0	710	-	630
355.0	596.0	800	-	710