

electrical characteristics	references					
	ML	MT	NB	NC	ND	NM★
poles	SP+N	SP	SP DP TP 4P	SP DP TP 4P	SP DP TP 4P	3P 4P
rates voltage - 50Hz	230	230	230/400	230/400	230/400	400
nominal current	2-32A	6-63A	6-63A	0.5-63A	6-63A	80-100A
breaking capacity to BSEN 60 898	6KA	6KA	10kA	10kA	10kA	
breaking capacity to BSEN 609 47-2			15kA	15kA	15kA	10kA
isolating voltage	500V	500V	500V	500V	500V	500V
insulating (dielectric) value	2500V	2500V	2500V	2500V	2500V	2500V
electrical endurance 0.5 to 32A 40 to 63A	10,000 cycles	20,000 cycles 10,000 cycles	20,000 cycles 10,000 cycles	20,000 cycles 10,000 cycles	20,000 cycles 10,000 cycles	

★ Din rail mount only

Power loss

The power loss of MCB's is closely controlled by the standards and is calculated on the basis of the voltage drop across the main terminals measured at rated current. The power loss of Hager circuit breakers is very much lower than that required by the British Standard, so in consequences run cooler and are less affected when mounted together.

The table below gives the watts loss per pole at rated current.

MCB rated current (A)	0.5	1	2	3	4	6	10	16	20	25	32	40	50	63	80	100
watts loss per pole (W)	1.3	1.5	1.7	2.1	2.4	2.7	1.8	2.6	2.8	3.3	3.9	4.3	4.8	5.2	8	10

Earth loop imredance (Z_s) values for MCBs

Below are list the maximum permissible values of Z_s to obtain disconnection in 0.4 & 5 seconds

type	rated max Z_s (ohms)			type	rated max Z_s (ohms)		
	trip I_n	0,4 secs	5 secs		trip I_n	0,4 secs	5 secs
MT	6	7.6	8.5	NC	3	8	18
	10	4.6	5.1		4	6	13
	16	2.8	3.2		6	4	8.5
	20	2.3	2.5		10	2.3	5.1
	25	1.8	2		16	1.4	3.2
	32	1.4	1.6		20	1.2	2.5
	40	1.1	1.3		25	0.92	2
	50	0.92	1.02		32	0.71	1.6
	63	0.73	0.81		40	0.6	1.3
NB	6	7.6	8.5	ND	50	0.46	1.02
	10	4.6	5.1		63	0.36	0.81
	16	2.8	3.2		6	1.9	8.5
	20	2.3	2.5		10	1.1	5.1
	25	1.8	2		16	0.7	3.2
	32	1.4	1.6		20	0.57	2.5
	40	1.1	1.3		25	0.46	2.0
	50	0.92	1.02		32	0.36	1.6
	63	0.73	0.81		40	0.28	1.3
NC	0.5	46	115		50	0.23	1.02
	1	23	51		63	0.18	0.81
	2	11	25				

For use with DC

Because of their quick make and break design and excellent arc quenching capabilities Hager circuit breakers are suitable for DC applications.

The following parameters must be considered.

- 1 system voltage:
Determined by the number of poles connected in series (see table 1)
- 2 short circuit current:
(see table 2)
- 3 tripping characteristics:
- the thermal trip remains unchanged
- the magnetic trip will become less sensitive requiring derating by $\sqrt{2}$ the AC value. (see table 2)

Table 1

no. of poles range	1 pole		2 poles in series	
	max voltage	breaking capacity L/R=15ms	max voltage	breaking capacity L/R=15ms
MT	60V	6kA	125V	6kA
NB NC ND	60V	10kA	125V	10kA

Table 2

thermal magnetic trip		B curve		C curve	
		AC ~50Hz	DC ---	AC ~50Hz	DC ---
1	I_{rm1}	1,13In	1,13In	1,13In	1,13In
2	I_{rm2}	1,45In	1,45In	1,45In	1,45In
3	I_{rm1}	3In	3In	5In	5In
4	I_{rm2}	5In	7,5In	10In	15In

Note: the breaker can be either top or bottom fed.

correction factor

The breaker is calibrated at a temperature of 30°C.
Temperature correction

In (A)	30°C	35°C	40°C	45°C	50°C	55°C	60°C
0.5	0.5	0.47	0.45	0.4	0.38	-	-
1	1	0.95	0.9	0.8	0.7	0.6	0.5
2	2	1.9	1.7	1.6	1.5	1.4	1.3
3	3	2.8	2.5	2.4	2.3	2.1	1.9
4	4	3.7	3.5	3.3	3	2.8	2.5
6	6	5.6	5.3	5	4.6	4.2	3.8
10	10	9.4	8.8	8	7.5	7	6.4
16	16	15	14	13	12	11	10
20	20	18.5	17.5	16.5	15	14	13
25	25	23.5	22	20.5	19	17.5	16
32	32	30	28	26	24	22	20
40	40	37.5	35	33	30	28	25
50	50	47	44	41	38	35	32
63	63	59	55	51	48	44	40

grouping factor (rated current reduce by factor K)

no. of units n	K
n = 1	1
$2 \leq n < 4$	0.95
$4 \leq n < 6$	0.9
$6 \leq n$	0.85

frequency

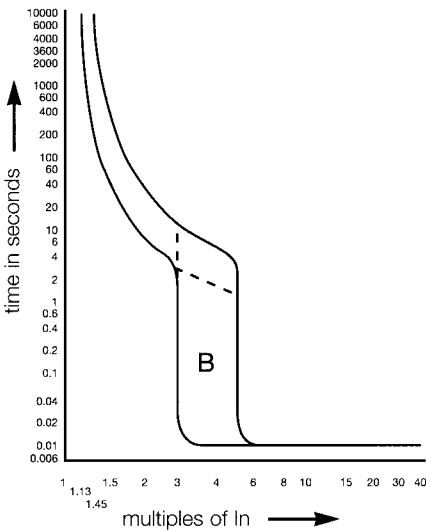
thermal – unchanged

magnetic – value multiplied by coefficient K

F (Hz)	16% Hz – 60Hz	100Hz	200Hz	400Hz
K	1	1.1	1.2	1.5

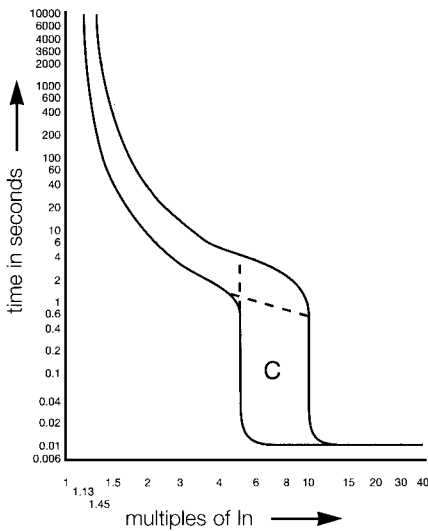
'B' curve (BSEN 60 – 898)

MCBs: MT rated 6 – 63A
NB rated 6 – 63A



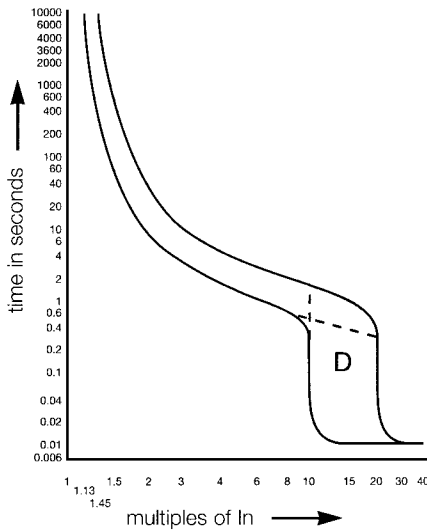
'C' curve (BSEN 60 – 898)

MCBs: NC rated 0.5 – 63A
ML rated 2 – 32A
NM rated 80 – 100A



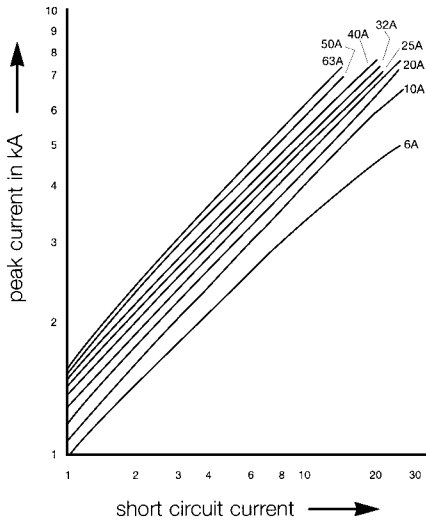
'D' curve (BSEN 60 – 898)

MCBs: ND rated 6 – 63A

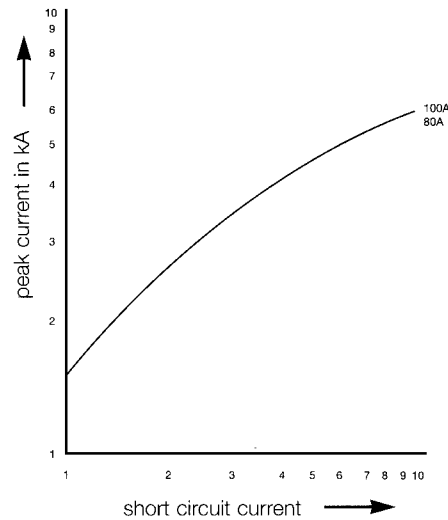


current limiting at 400V

MT NB NC ND

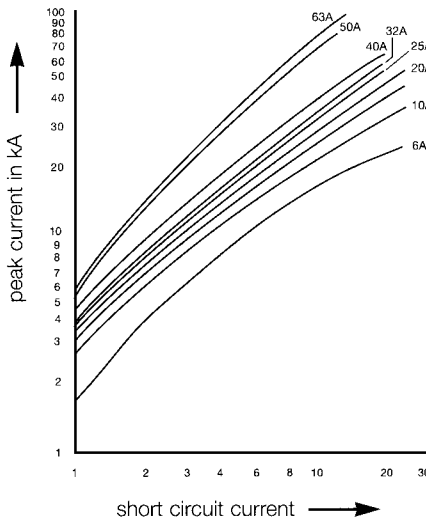


NM 80 - 100A



I_t characteristics

MT NB NC ND



NM 80 - 100A

