Protection of lines (primary side of transformer)

General

Lines must be protected against overloads and short-circuits. Protection against overloads is only compulsory if the line is likely to be affected by an overload current. This protection can be installed at the head or end of the line. Protection against short-circuits is compulsory in all installations ; this protection has to be installed at the head of the line

Supply line

The transformer is a devicethat cannot generate overloads. Its supply line requires protection against short-circuits only. When a transformer is energised. a very high inrush current is produced (in the region of 25 In) for approximately 10 ms. The line protection must take these 2 factors into consideration. Legrand offers 3 possibilities: aM fuse cartridges, type D MCBs (average value of the magnetic 12 In, with a standard adjustment range between 10 and 14 In), type C MCBs (average value of the magnetic 7 In, with a standard adjustment range between 5 and 10 In)

Minimal protection rating for primary supply line on transformer(1)

Power	230 V single - phase				400 V single - phase			230 V three - phase			400 V three - phase		
	aM Cartridge	MCBs C curve or MCCBs	MCBs D curve or MCCBs	type B MCB with inrush current limiter	aM Cartridge	MCBs C curve or MCCBs	MCBs D curve or MCCBs	aM Cartridge	MCBs C curve or MCCBs	MCBs D curve or MCCBs	aM Cartridge	MCBs C curve or MCCBs	MCBs D curve or MCCBs
40 VA	0.5 A 0 130 95	1 A 4 077 76		1 A 4 089 52	0.25 A 0 130 92	1 A 4 077 76							
63 VA	1 A 0 130 01	2 A 4 077 77		1 A 4 089 52	0.5 A 0 130 95	1 A 4 077 76	0.5 A 4 080 07						
100 VA	1 A 0 130 01	3 A 4 077 78	1 A 4 080 08	1 A 4 089 52	1 A 0 130 01	2 A 4 077 77	1 A 4 080 08						
160 VA	2 A 0 130 02	4 A 4 077 79	2 A 4 080 09	1 A 4 089 52	1 A 0 130 01	2 A 4 077 77	1 A 4 080 08						
220 VA	2 A 0 130 02	6 A 4 077 80	3 A 4 080 10	2 A 4 089 53	1 A 0 130 01	3 A 4 077 78	2 A 4 080 09						
250 VA	2 A 0 130 02	6 A 4 077 80	3 A 4 080 10	2 A 4 089 53	2 A 0 130 02	3 A 4 077 78	2 A 4 080 09						
310 VA	4 A 0 130 04	8 A 4 077 81	3 A 4 080 10	2 A 4 089 53	2 A 0 130 02	4 A 4 077 79	2 A 4 080 09						
400 VA	4 A 0 130 04	10 A 4 077 82	4 A 4 080 11	3 A 4 089 54	2 A 0 130 02	6 A 4 077 80	3 A 4 080 10	2 A 0 130 02	6 A 4 078 25	3 A 4 080 55	2 A 0 130 02	3 A 4 078 23	2 A 4 080 54
450 VA	4 A 0 130 04	10 A 4 077 82	6 A 4 080 12	3 A 4 089 54	2 A 0 130 02	6 A 4 077 80	3 A 4 080 10						
630 VA	6 A 0 130 06	16 A 4 077 84	6 A 4 080 12	6 A 4 089 56	4 A 0 130 04	8 A 4 077 81	4 A 4 080 11	4 A 0 130 04	10 A 4 078 27	4 A 4 080 56	2 A 0 130 02	6 A 4 078 25	2 A 4 080 54
800 VA	6 A 0 130 06	16 A 4 077 84	10 A 4 080 14	6 A 4 089 56	4 A 0 130 04	10 A 4 077 82	6 A 4 080 12						
1000 VA	10 A 0 130 10	20 A 4 077 85	10 A 4 080 14	10 A 4 089 57	4 A 0 130 04	16 A 4 077 84	6 A 4 080 12	4 A 0 130 04	16 A 4 078 29	6 A 4 080 57	4 A 0 130 04	10 A 4 078 27	4 A 4 080 56
1250 VA	10 A 0 130 10	25 A 4 077 86	16 A 4 080 15	10 A 4 089 57	6 A 0 130 06	16 A 4 077 84	8 A 4 080 13						
1600 VA	10 A 0 130 10	32 A 4 077 87	16 A 4 080 15	10 A 4 089 57	6 A 0 130 06	20 A 4 077 85	10 A 4 080 14	6 A 0 130 06	20 A 4 078 30	10 A 4 080 58	4 A 0 130 04	16 A 4 078 29	6 A 4 080 57
2000 VA	12 A 0 130 12	40 A 4 077 88	20 A 4 080 16	16 A 4 089 59	8 A 0 130 08	25 A 4 077 86	16 A 4 080 15	10 A 0 130 10	25 A 4 078 31	16 A 4 080 59	6 A 0 130 06	16 A 4 078 29	10 A 4 080 58
2500 VA	16 A 0 130 16	50 A 4 077 89	25 A 4 080 17	20 A 4 089 60	10 A 0 130 10	32 A 4 077 87	16 A 4 080 15	10 A 0 130 10	32 A 4 078 32	16 A 4 080 59	6 A 0 130 06	20 A 4 078 30	10 A 4 080 58
4 kVA	25 A 0 130 25	80 A 4 092 28	32 A 4 080 18	25 A 4 089 61	16 A 0 130 16	40 A 4 077 88	20 A 4 080 16	16 A 0 130 16	50 A 4 078 34	25 A 4 080 61	10 A 0 130 10	32 A 4 078 32	16 A 4 080 59
5 kVA	32 A 0 140 32	80 A 4 092 28	40 A 4 080 19	40 A 4 089 63	16 A 0 130 16	50 A 4 077 89	25 A 4 080 17	20 A 0 130 20	63 A 4 078 35	32 A 4 080 62	12 A 0 130 12	40 A 4 078 33	20 A 4 080 60
6.3 kVA	32 A 0 140 32	100 A 4 092 29	50 A 4 080 20	50 A 4 089 64	20 A 0 130 20	63 A 4 077 90	32 A 4 080 18	25 A 0 130 25	80 A 4 092 80	40 A 4 080 63	16 A 0 130 16	50 A 4 078 34	25 A 4 080 61
8 kVA	40 A 0 140 40		63 A 4 080 21	63 A 4 077 90	25 A 0 130 25		40 A 4 080 19	32 A 0 140 32	100 A 4 092 81	50 A 4 080 64	20 A 0 130 20	63 A 4 078 35	32 A 4 080 62
10 kVA	63 A 0 150 63		80 A 4 094 58		32 A 0 140 32		50 A 4 080 20	32 A 0 140 32	100 A 4 092 81	50 A 4 080 64	20 A 0 130 20	63 A 4 078 35	32 A 4 080 62
12.5 kVA	63 A 0 150 63		100 A 4 094 59		40 A 0 140 40		63 A 4 080 21						
16 kVA	80 A 0 150 80		160 A 4 200 07		50 A 0 140 50		80 A 4 094 58	50 A 0 140 50		80 A 4 095 06	32 A 0 140 32		50 A 4 080 64
20 kVA	100 A 0 150 96		160 A 4 200 07		63 A 0 150 63		100 A 4 094 59	63 A 0 150 63		100 A 4 095 07	40 A 0 140 40		63 A 4 080 65
25 kVA	125 A 0 150 97		200 A 4 200 08		80 A 0 150 80		125 A 4 094 60	80 A 0 150 80		125 A 4 095 08	50 A 0 140 50		80 A 4 095 06
31.5 kVA	160 A 0 165 55		250 A 4 200 09		100 A 0 150 96		160 A 4 200 07	100 A 0 150 96		160 A 4 200 07	63 A 0 150 63		100 A 4 095 07
40 kVA	200 A 0 170 60		320 A 4 220 01		125 A 0 150 97		200 A 4 202 08	125 A 0 150 97		250 A 4 202 09	63 A 0 150 63		125 A 4 095 08
50 kVA	315 A 0 175 70		400 A 4 220 02		160 A 0 165 55		250 A 4 202 09	160 A 0 165 55		250 A 4 202 09	80 A 0 150 80		160 A 4 200 07
63 kVA	315 A 0 175 70		500 A 4 220 03		200 A 0 170 60		320 A 4 220 01	200 A 0 170 60		250 A 4 202 09	100 A 0 150 96		160 A 4 200 07
80 kVA								250 A 0 170 65		250 A 4 202 09	160 A 0 165 55		160 A 4 200 07
100 kVA								315 A 0 175 70		320 A 4 220 01	160 A 0 165 55		160 A 4 200 07
125 kVA								400 A 0 175 75		400 A 4 220 02	200 A 0 170 60		200 A 4 202 08
160 kVA								500 A 0 180 25		500 A 4 220 03	250 A 0 170 65		250 A 0 252 06
200 kVA								630 A 0 180 30		630 A 4 220 04	315 A 0 175 70		320 A 4 220 01
250 kVA								630 A 0 180 30		630 A 4 220 04	400 A 0 175 75		400 A 4 220 02
315 kVA								800 A 0 184 85		800 A 4 222 64			500 A 4 220 03
400 kVA								1000 A 0 184 90		1000 A 4 222 65			630 A 4 220 04

1: These values are given for information only for transformers with inrush currents of around 25 In.

Protection of transformers (secondary side of transformer)

According to IEC/EN 61558 standards, transformers must be protected against overloads and short-circuits which may occur during normal operations
The standards do not specify the location or type of protective device: it is the manufacturer's responsibility to select the most suitable position, either on the primary or secondary side
Legrand has selected secondary protection. The rating, type and location of the protective device are indicated on the front of its devices

Operating line

This line must be protected against overloads (ensure that the protection rating chosen is ≤ transformer secondary current) and short-circuits (ensure that a short-circuit occurring at the furthest point of the line will trigger the protective device within 5 seconds. Legrand offers two possibilities: gG cartridge fuses, type C MCBs (magnetic set to 7 In average). If the transformer only supplies a single operating line, and provided the calculations show perfect compatibility, transformer protection (if on the secondary) and line protection can be one and the same
A single protective device performs both functions (see table of transformer protective devices). If the transformer supplies several operating lines, overload and short-circuit calculations must be performed for each individual line

Single-phase: Control, safety isolating, isolating, equipment and installation transformers

Nominal power IEC and CSA	12 V				24 V				48 V				115 V				230 V			
	Rating	Cartridge Cat.Nos	Rating	MCBS Cat.Nos	Rating	Cartridge Cat.Nos	Rating	MCBS Cat.Nos	Rating	Cartridge Cat.Nos	Rating	MCBS Cat.Nos	Rating	Cartridge Cat.Nos	Rating	MCBS Cat.Nos	Rating	Cartridge Cat.Nos	Rating	MCBS Cat.Nos
40 VA	4	T4 AL(1)	-	-	2	T2 AL(1)	-	-	1	T1 AL(1)	-	-	0.4	T0.4 AL(1)	-	-	0.2	T0.2 AL(1)	0.2	T0.2 AL(1)
63 VA	5	T5 AL(1)	-	-	2.5	T2.5 AL(1)	-	-	1.25	T1.25 AL(1)	-	-	0.5	T0.5 AL(1)	-	-	0.25	T0.25 AL(1)	0.25	T0.25 AL(1)
100 VA	8	T8 AE(1)	8	4 076 97	4	T4 AE(1)	4	4 076 95	2	T2 AL(1)	2	4 076 93	0.8	T0.8 AL(1)	1	4 076 92	0.4	T0.4 AL(1)	0.5	4 076 91
160 VA	16	0 133 16	13	4 076 99	8	0 133 08	6	4 076 96	3.15	T3.15 AE(1)	4	4 076 95	1.6	T1.6 AL(1)	2	4 076 93	0.63	T0.63 AL(1)	1	4 076 92
220 VA	20	0 133 20	20	4 077 01	10	0 133 10	10	4 076 98	5	T5 AE(1)	6	4 076 96	2	T2 AL(1)	2	4 076 93	1	T1 AL(1)	1	4 076 92
250 VA	20	0 133 20	20	4 077 01	10	0 133 10	10	4 076 98	6	0 133 06	6	4 076 96	2	T2 AL(1)	2	4 076 93	1	T1 AL(1)	1	4 076 92
310 VA	25	0 133 25	25	4 077 02	12	0 133 12	13	4 076 99	6	0 133 06	6	4 076 96	2.5	T2.5 AE(1)	3	4 076 94	1.25	T1.25 AL(1)	2	4 076 93
400 VA	32	0 143 32	32	4 077 03	16	0 133 16	16	4 077 00	8	0 133 08	8	4 076 97	4	0 133 04	4	4 076 95	2	0 133 02	2	4 076 93
450 VA	40	0 143 40	40	4 077 04	20	0 133 20	20	4 077 01	10	0 133 10	10	4 076 98	4	0 133 04	4	4 076 95	2	0 133 02	2	4 076 93
630 VA	50	0 143 50	50	4 076 59	25	0 133 25	25	4 077 02	12	0 133 12	13	4 076 99	6	0 133 06	6	4 076 96	4	0 133 04	3	4 076 94
1000 VA	80	0 153 80	80	4 091 40	40	0 143 40	40	4 077 04	20	0 133 20	20	4 077 01	8	0 133 08	8	4 076 97	4	0 133 04	4	4 076 95
1600 VA	125	0 153 97	125	4 091 42	63	0 153 63	63	4 076 60	32	0 143 32	32	4 077 03	16	0 133 16	13	4 076 99	8	0 133 08	8	4 076 97
2500 VA	-	-	200	-	100	0 153 96	100	4 091 41	50	0 143 50	50	4 076 59	20	0 133 20	20	4 077 01	10	0 133 10	10	4 076 98
4 kVA	-	-	-	-	-	-	-	-	80	0 153 80	80	4 091 40	32	0 143 32	32	4 077 03	16	0 133 16	16	4 077 00
5 kVA	-	-	-	-	-	-	-	-	100	0 153 96	100	4 091 41	40	0 143 40	40	4 077 04	20	0 133 20	20	4 077 01
6.3 kVA	-	-	-	-	-	-	-	-	125	0 153 97	125	4 091 42	50	0 143 50	63	4 076 59	25	0 133 25	32	4 077 02
8 kVA	-	-	-	-	-	-	-	-	-	-	-	-	80	0 153 80	80	4 091 40	32	0 143 32	32	4 077 03
10 kVA	-	-	-	-	-	-	-	-	-	-	-	-	80	0 153 80	80	4 091 40	40	0 143 40	40	4 077 04
12.5 kVA	-	-	-	-	-	-	-	-	-	-	-	-	100	0 153 96	100	4 091 41	50	0 143 50	50	4 076 59
16 kVA	-	-	-	-	-	-	-	-	-	-	-	-	160	0 163 55	160	4 200 47	80	0 153 80	80	4 091 40
20 kVA	-	-	-	-	-	-	-	-	-	-	-	-	160	0 163 55	200	4 202 08	80	0 153 80	80	4 091 40
25 kVA	-	-	-	-	-	-	-	-	-	-	-	-	200	0 168 60	250	4 202 09	100	0 153 96	100	4 091 41
31.5 kVA	-	-	-	-	-	-	-	-	-	-	-	-	250	0 173 65	250	4 202 09	125	0 153 97	125	4 092 30
40 kVA	-	-	-	-	-	-	-	-	-	-	-	-	400	0 178 75	320	0 255 22	160	0 163 55	200	4 202 08
50 kVA	-	-	-	-	-	-	-	-	-	-	-	-	400	0 178 75	400	0 255 23	200	0 168 60	250	4 202 09
63 kVA	-	-	-	-	-	-	-	-	-	-	-	-	500	0 181 25	500	0 255 35	250	0 173 65	250	4 202 09

1: Fuses IEC 127 (cartridge 5 x 20 T type)