

# Low-voltage SPDs

## technical characteristics and installation (continued)

### Distribution board SPDs

Mains 230/400 V~ (50/60 Hz) - Degree of protection IP 20  
 1P+N (3P+N) SPDs: L-N and N-PE protection, also called mode 1+1 (3+1 resp.) or protection type CT2 as per the installation standards.

Cat.Nos	Type	Poles	Neutral earthing system	Max. voltage (Uc)	Protection mode	Nominal current In/pole (8/20)	Max. discharge current			Protection Level		Max. short-circuit Isc (IscCR)	Protection to be added <sup>1</sup>	SD auxiliary (status feedback)
							Imax/pole (8/20)	Iimp/pole (10/350)	I total (10/350)	Up (L-N/L-PE/N-PE)	Up at 5 kA			
4 122 80	T1+T2/35 kA	1P	TT, TNC, TNS, IT	440 V~	-	35 kA	50 kA	35 kA	35 kA	2.5 kV			yes	
4 122 81	T1+T2/25 kA	1P+N	TT, TNS	350 V~	CT2	25 kA	50 kA	25/50 kA	50 kA	1.5/2.5/1.5 kV		DPX <sup>3</sup> 160 80 A	yes	
4 122 82	T1+T2/25 kA	3P	TNC	350 V~	CT1	25 kA	50 kA	25 kA	75 kA	1.5 kV			yes	
4 122 83	T1+T2/25 kA	3P+N	TT, TNS	350 V~	CT2	25 kA	50 kA	25/100 kA	100 kA	1.5/2.5/1.5 kV			yes	
4 122 70	T1+T2/12.5 kA	1P	TT, TNC, TNS	320 V~	-	25 kA	60 kA	12.5 kA	12.5 kA				no	
4 122 71	T1+T2/12.5 kA	2P	TT, TNS	320 V~	CT1	25 kA	60 kA	12.5 kA	25 kA	1.5 kV to 12.5 kA 1.9 kV to 25 kA	1 kV		no	
4 122 72	T1+T2/12.5 kA	3P	TNC	320 V~	CT1	25 kA	60 kA	12.5 kA	37.5 kA			DX <sup>3</sup> 63 A curve C	yes	
4 122 73	T1+T2/12.5 kA	4P	TT, TNS	320 V~	CT1	25 kA	60 kA	12.5 kA	50 kA				no	
4 122 74/76	T1+T2/12.5 kA	1P+N	TT, TNS	320 V~	CT2	25 kA	60 kA	12.5/25 kA	25 kA	1.5/1.6/1.5 kV to 12.5 kA 1.9/2.1/1.5 kV to 25 kA	1 kV		yes	
4 122 75/77	T1+T2/12.5 kA	3P+N	TT, TNS	320 V~	CT2	25 kA	60 kA	12.5/50 kA	50 kA				yes	
4 122 50	T1+T2/8 kA	1P	TT, TNS	320 V~	-	20 kA	50 kA	8 kA	8 kA				no	
4 122 51	T1+T2/8 kA	2P	TT, TNS	320 V~	CT1	20 kA	50 kA	8 kA	16 kA	1.2 kV to 8 kA 1.7 kV to 20 kA	1 kV		no	
4 122 52	T1+T2/8 kA	3P	TNC	320 V~	CT1	20 kA	50 kA	8 kA	25 kA				no	
4 122 53	T1+T2/8 kA	4P	TT, TNS	320 V~	CT1	20 kA	50 kA	8 kA	32 kA				no	
4 122 54/56	T1+T2/8 kA	1P+N	TT, TNS	320 V~	CT2	20 kA	50 kA	8 kA	16 kA	1.2/1.5/1.5 kV to 8 kA 1.7/2/1.5 kV to 20 kA	1 kV		no	
4 122 55/57	T1+T2/8 kA	3P+N	TT, TNS	320 V~	CT2	20 kA	50 kA	8 kA	25 kA				no	
4 122 40	T2/40 kA	1P	TT, TNS	320 V~	-	20 kA	40 kA						no	
4 122 41	T2/40 kA	2P	TT, TNS	320 V~	CT1	20 kA	40 kA			1.5 kV to 15 kA 1.7 kV to 20 kA	1 kV		no	
4 122 42	T2/40 kA	3P	TNC	320 V~	CT1	20 kA	40 kA					DX <sup>3</sup> 40 A curve C	yes	
4 122 43	T2/40 kA	4P	TT, TNS	320 V~	CT1	20 kA	40 kA						no	
4 122 44/46 4 122 64/66	T2/40 kA	1P+N	TT, TNS	320 V~	CT2	20 kA	40 kA			1.5/1.6/1.4 kV to 15 kA 1.7/2/1.4 kV to 20 kA	1 kV		no	
4 122 45/47 4 122 65/67	T2/40 kA	3P+N	TT, TNS	320 V~	CT2	20 kA	40 kA						no	
4 122 14/16	T2/40 kA	1P+N	TT, TNS	320 V~	CT2	20 kA	40 kA			2.5 kV		Integrated Isc protection	yes	
4 122 15/17	T2/40 kA	3P+N	TT, TNS	320 V~	CT2	20 kA	40 kA						yes	
4 122 30	T2/40 kA	1P	TT, TNC, TNS, IT	440 V~	-	20 kA	40 kA						no	
4 122 32	T2/40 kA	3P	TNC, IT	440 V~	CT1	20 kA	40 kA			1.8 kV to 15 kA 2.1 kV to 20 kA	1.3 kV		yes	
4 122 33	T2/40 kA	4P	TT, TNS, IT	440 V~	CT1	20 kA	40 kA						yes	
4 122 20	T2/20 kA	1P	TT, TNS	320 V~	-	5 kA	20 kA						no	
4 122 21	T2/20 kA	2P	TT, TNS	320 V~	CT1	5 kA	20 kA			1.2 kV to 5 kA 1.4 kV to 10 kA	1.2 kV		no	
4 122 23	T2/20 kA	4P	TT, TNS	320 V~	CT1	5 kA	20 kA						no	
4 122 24/26 4 122 60/62	T2/20 kA	1P+N	TT, TNS	320 V~	CT2	5 kA	20 kA			1.2/1.4/1.4 kV to 5 kA 1.4/1.4/1.4 kV to 10 kA	1.2 kV		no	
4 122 25/27 4 122 61/63	T2/20 kA	3P+N	TT, TNS	320 V~	CT2	5 kA	20 kA						no	
4 122 10/12	T2/20 kA	1P+N	TT, TNS	320 V~	CT2	5 kA	20 kA						yes	
4 122 11/13	T2/20 kA	3P+N	TT, TNS		CT2	5 kA				2.5 kV		Integrated Isc protection	yes	
0 039 51 0 039 71	T2+T3/12 kA	1P+N	TT, TNS	275 V~	CT2	10 kA	12 kA			1.1/1.2/1.2 kV to 10 kA	1 kV		no	
0 039 53 0 039 73	T2+T3/12 kA	3P+N	TT, TNS	275 V~	CT2	10 kA	20 kA						no	

CT1: L(N)-PE protection modes  
 CT2: L-N and N-PE protection modes  
 1: DPX<sup>3</sup> type circuit breakers (only with SPDs Cat.Nos 4 122 80/81/82/83)  
 Protected with fuses or other values than those indicated in the chart: please consult us or see product technical data sheet

### Characteristics of proximity SPDs

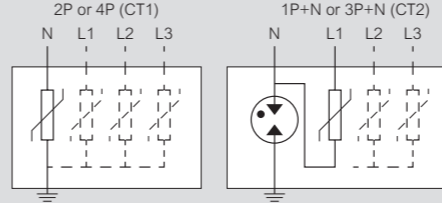
230 V~ protection: Type 3 (T3) SPDs

Cat.Nos	0 775 40	6 945 05/07/08/09/10/11/12/13/14	6 945 95
Up	1/1.2 kV	1 kV	1 kV
Uoc	3 kV	4 kV	4 kV

TT system: Installation downstream of an earth leakage module

### 1P+N+ 3P+N SPDs

1P+N+ 3P+N SPDs, also called 1+1 or 3+1 in accordance with IEC and EN 60364-5-534 standards, or even CT2 configuration, cleverly combine two technologies:  
 An encapsulated spark gap on the Neutral-Earth spur, and voltage-dependent resistors (varistors) between Phase and Neutral



In this diagram (above right), the voltage-dependent resistors (varistors) dealing with overvoltages on the phases are connected on the "IN" side of the Neutral-Earth spur with encapsulated spark gap. Hence any current leaks inherent in the voltage-dependent resistors (varistors) (from a few µA when new to a few mA at end of life) will be discharged to the neutral (whereas to Earth for CT1s), because the encapsulated spark gap is a totally insulated component, without any current leaks when supplied with mains voltage. It only switches to "conductor" mode when dealing with overvoltages (a few microseconds)

These SPDs do not therefore result in any leaks to Earth apart from when dealing with overvoltages, and have proved much more suitable for TT neutral earthing systems which use residual current protective devices

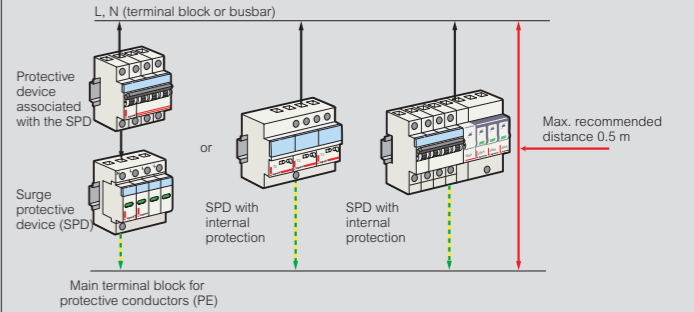
Indeed, this new type of SPD does not cause unwanted tripping of upstream earth leakage modules, and does not need an earth leakage module dedicated to SPDs

Alternatively, Type 1+Type 2 SPDs, or type 2 SPDs using this type of assembly can be installed upstream of the earth leakage modules. Conversely, Type2+Type3 SPDs (Cat.Nos 0 039 51/53/71/73) use this CT2 type of assembly, but should be installed downstream of an earth leakage module

### The installation

**1 - SPD protection**  
 SPDs must be protected by a circuit breaker (or fuses), to deal with cases of short-circuited end-of-life which can occur internally: see table p. 11-13  
 SPDs which have this protection built-in (4 122 10/11/12/13/14/15/16/17 and 0 039 51/53/71/73) simplify installation, and optimise performance of the whole assembly ("50 cm" rule is easier to implement)  
 However, the most common cause of end of life is still overheating of its components, which is dealt with by an internal thermal disconnect, mechanically connected to the status indicator, which is found in all SPDs

### 2 - Connection principle



Keep connection lengths short, < 50 cm if possible.  
 EMC (ElectroMagnetic Compatibility) rules: avoid loops, fix the cables firmly against the exposed metal conductive parts

### 3 - Coordinating upstream/downstream SPDs

Consists of ensuring that any downstream SPD (in distribution enclosures or proximity SPDs) is correctly coordinated in energy terms with any SPD located upstream (TS 61643-12)

Minimum distances between SPDs in m:

Upstream SPD	Downstream SPD	With LPS <sup>(1)</sup>	Without LPS <sup>(1)</sup>
T1+T2/35 and T1+T2/25	T2/40 (Uc 440 V)	0	0
	T2/40 (Uc 320 V)	1	0
T1+T2/12.5	T2/40	5	0
	T2/20 or T2+T3/12	8	0
T2/40	T2/20 or T2+T3/12	-	1
T2/20	T2+T3/12	-	0.5
T2/20 and T2+T3/12	Proximity SPD	-	2

1: Lightning Protection System