SPD Type 1+2 Surge arrester range with high performance "Low U_p" - three phase system

- Surge arrester suitable for 230/400 V system applications to prevent overvoltage effects caused by direct or indirect lightning strikes
- To be installed at the boundary of LPZ 0 and LPZ 1 zones
- Very Low U_p level to protect senstive equipment
- Visual indication of varistor status - Healthy/Replace
- Contact for remote signalling of varistor status. Connector 07P.01 included
- Replaceable varistor modules
- Complies with EN 61 643-11
- 17.5 mm rail EN 60715 mounting for each module

7P.14.8.275.1012 SPD Type 1+2 for three phase TT and TN-S system with Neutral.

- Varistor protection L1, L2, L3-N + spark gap protection N-PE
- Replaceable varistor modules
- Non replaceable high discharge current spark gap

7P.15.8.275.1012 SPD Type 1+2 for three phase TN-S system with Neutral.

- Varistor protection L1, L2, L3,N-PE
- Replaceable varistor modules

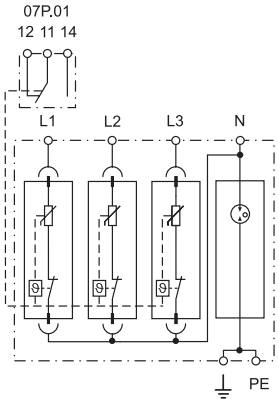
E

7P.14 / 7P.15
Screw terminals

For outline drawing see page 25

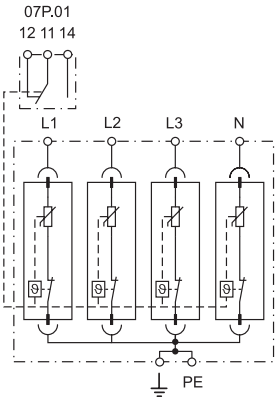
7P.14.8.275.1012

- SPD Type 1+2
- Replaceable varistor module
- Visual and remote signalling of varistor status



7P.15.8.275.1012

- SPD Type 1+2
- Replaceable varistor module
- Visual and remote signalling of varistor status



SPD specification		L-N	N-PE	L, N-PE
Nominal voltage (U_N)	V AC	230	—	230
Maximum continous operating voltage (U_C)	V AC/DC	275/—	255/—	275/350
Lightning impulse current (10/350 µs) (I_{imp})	kA	12.5	50	12.5
Nominal discharge current (8/20 µs) (I_n)	kA	30	50	30
Maximum discharge current (8/20 µs) (I_{max})	kA	60	100	60
Total discharge current (10/350 µs) (I_{total})	kA	50	50	50
Voltage protection level (U_p)	kV	1.5	1.5	1.5
Ability to independently switch off the following current (I_{fi})	A	No following current	100	No following current
I_{PE}	uA	< 2		< 2800
TOV 120 min L-N	V AC	440	—	440
TOV 5 s L-N (Withstand)	V AC	335	—	335
TOV 200 ms N-PE (Withstand)	V AC	—	1200	—
Response time (t_a)	ns	25	100	25
Short-circuit proof at maximum overcurrent protection - I_{SSCR}	kA_{rms}	50	—	50
Maximum overcurrent protection (fuse rating gL/gG)	A	160	—	160
Replacement module code		7P.10.8.275.0012	—	7P.10.8.275.0012
Other technical data				
Ambient temperature range	°C	–40…+80		
Protection degree		IP 20		
Wire size		solid cable		stranded cable
	mm^2	1 x 1…1 x 35		1 x 1…1 x 25
	AWG	1 x 17…1 x 2		1 x 17…1 x 4
Wire strip length	mm	12		
Screw torque	Nm	3		
Remote status signalling contact specification				
Contact configuration		1 CO (SPDT)	—	1 CO (SPDT)
Rated current	A AC/DC	0.5/0.1	—	0.5/0.1
Rated voltage	V AC/DC	250/30	—	250/30
Wire size (07P.01)		solid cable / stranded cable		solid cable / stranded cable
	mm^2	1.5 / 1.5	—	1.5 / 1.5
	AWG	16 / 16	—	16 / 16
Approvals (according to type)		CE EAC		

SPD Type 2 Surge arrester range for single/ three phase AC systems and for DC systems

- Surge arrester suitable for AC and DC systems to protect equipment against induced overvoltage or switching transients
- To be installed at the boundary of LPZ 1 - LPZ 2 zones or higher
- Visual indication of varistor status - Healthy/Replace
- Contact for remote signalling of varistor status. Connector (07P.01) included (depending on the version)
- Replaceable varistor and spark gap modules
- Complies with EN 61643-11:2012
- 17.5 mm rail EN 60715 mounting for each module

7P.21.8.075.1015 SPD Type 2, unipolar protection suitable for DC applications or low voltage AC single phase systems
- Varistor protection +/– or L/N (GND); –/+ or GND (L/N)
- Replaceable module

7P.21.8.130.1015 SPD Type 2, unipolar protection suitable for DC application or low voltage AC single phase systems
- Varistor protection +/– or L/N (GND); –/+ or GND (L/N)
- Replaceable module

7P.21.8.275.x020 SPD Type 2, unipolar protection suitable to realize single phase or three phase systems (230/400 V)
- Varistor protection L/N(GND)-GND/(L/N)
- Replaceable module

7P.21.8.440.x020 SPD Type 2, unipolar protection suitable for three phase systems (400 V AC)
- Varistor protection L/N(GND)-GND/(L/N)
- Replaceable module

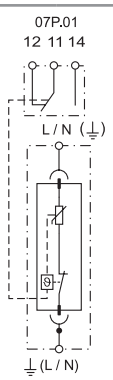
7P.22.8.275.x020 SPD Type 2 for single phase TT and TN-S system with Neutral
- Varistor protection L-N + spark gap protection N-PE
- Replaceable varistor and spark gap modules

7P.27.8.275.x020 SPD Type 2 for single phase TN system with Neutral
- Varistor protection L, N-PEx
- Replaceable varistor modules

For outline drawing see page 25

7P.21.8.xxx.x0xx

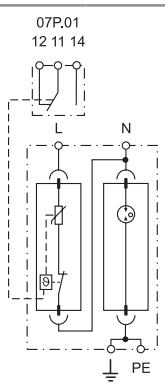
- SPD Type 2 (1 varistor)
- Replaceable varistor module
- Visual and optional remote connector for signalling of the varistor status



* 7P.20.8.075.0015
** 7P.20.8.130.0015
*** 7P.20.8.275.0020
**** 7P.20.8.440.0020

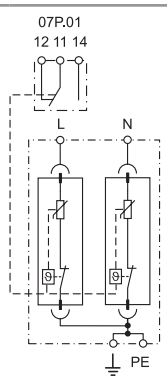
7P.22.8.275.x020

- SPD Type 2 (1 varistor + 1 spark-gap)
- Combination of replaceable varistor and encapsulated spark gap modules
- Visual and optional remote connector for signalling of the varistor status



7P.27.8.275.x020

- SPD Type 2 (2 varistors)
- Replaceable varistor modules
- Visual and optional remote connector for signalling of the varistor status



SPD specification		075.1015	130.1015	275.1020	440.1020	L-N	N-PE	L, N-PE
Nominal voltage (U_N)	V AC/DC	60/60	110/125	230/—	400/—	230/—	—	230/—
Maximum continous operating voltage (U_C)	V AC/DC	75/100	130/170	275/350	440/585	275/—	255/—	275/—
Nominal discharge current (8/20 µs) (I_n)	kA	15	15	20	20	20	20	20
Maximum discharge current (8/20 µs) (I_{max})	kA	40	40	40	40	40	40	40
Voltage protection level at 5 kA (U_{P5})	kV	0.3	0.45	0.9	1.5	0.9	—	0.9
Voltage protection level at I_n(U_p)	kV	0.4	0.7	1.35	1.9	1.35	1.5	1.35
I_{PE}	uA	< 350	< 350	< 200	< 350	< 4		< 400
TOV 120 min L-N	V AC	115	225	440	—	440	—	440
TOV 5 s L-N	V AC	90	175	335	580	335	—	335
TOV 200 ms N-PE	V AC	—	—	—	—	—	1200	—
Response time (t_a)	ns	25				25	100	25
Short-circuit proof at maximum overcurrent protection - I_{SSCR}	kA_{rms}	50			25	50	—	50
Maximum overcurrent protection (fuse rating gL/gG)	A	160			125	160	—	160
Replacement module code		*	**	***	****	7P.20.8.275.0020	7P.20.1.000.0020	7P.20.8.275.0020
Other technical data								
Ambient temperature range	°C	–40…+80						
Protection degree		IP 20						
Wire size		solid cable					stranded cable	
	mm^2	1 x 1…1 x 35					1 x 1…1 x 25	
	AWG	1 x 17…1 x 2					1 x 17…1 x 4	
Wire strip length	mm	12						
Screw torque	Nm	3						
Remote status signalling contact specification								
Contact configuration		1 CO (SPDT)					1 CO (SPDT)	
Rated current	A AC/DC	0.5/0.1					0.5/0.1	
Rated voltage	V AC/DC	250/30					250/30	
Wire size (07P.01)		solid cable		stranded cable		solid cable		stranded cable
	mm^2	1.5		1.5		1.5		1.5
	AWG	16		16		16		16
Approvals (according to type)								

SPD Type 2 Surge arrester range - three phase systems

- Surge arrester suitable for 230/400 V system applications to protect equipments against induced overvoltage or switching transients
- To be installed at the boundary of LPZ 1 - LPZ 2 zones or higher
- Visual indication of varistor status - Healthy/Replace
- Contact for remote signalling of varistor status. Connector (07P.01) included (depending on the version)
- Replaceable varistor and spark gap modules
- Complies with EN 61643-11:2012
- 35 mm rail (EN 60715) mounting

7P.23.8.275.x020 SPD Type 2 for three phase TN-C system without Neutral (PEN conductor).

- Varistor protection L1, L2, L3-PEN
- Replaceable varistor module

7P.24.8.275.x020 SPD Type 2 for three phase TT and TN-S system with Neutral.

- Varistor protection L1, L2, L3 + spark gap protection N-PE
- Replaceable varistor and spark gap modules

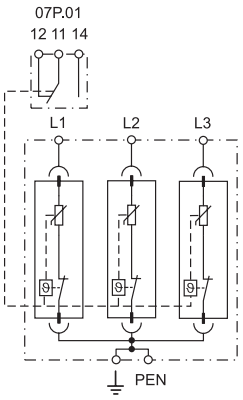
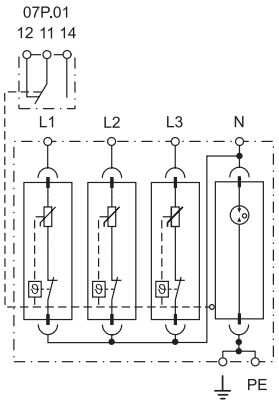
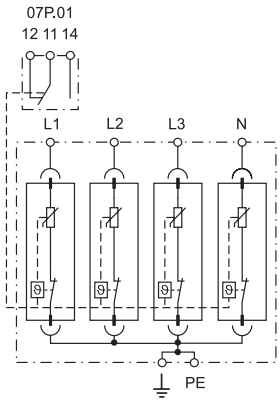
7P.25.8.275.x020 SPD Type 2 for three phase TN-S system with Neutral.

- Varistor protection L1, L2, L3, N-PE
- Replaceable varistor module

7P.23.8 / 7P.24 / 7P.25

Screw terminals

For outline drawing see page 26

	7P.23.8.275.x020	7P.24.8.275.x020	7P.25.8.275.x020
			
	• SPD Type 2 (3 varistors) • Replaceable varistor module, 3 pole • Visual and remote signalling of varistor status	• SPD Type 2 (3 varistors + 1 spark-gap) • Combination of replaceable varistor and encapsulated spark gap modules • Visual and optional remote connector for signalling of the varistor status	• SPD Type 2 (4 varistors) • Replaceable varistor module, 4 pole • Visual and optional remote connector for signalling of the varistor status
			

SPD specification		**L - PEN**	**L-N**	**N-PE**	**L, N-PE**
Nominal voltage (U_N)	V AC	230	230	—	230
Maximum continous operating voltage (U_C)	V AC/DC	275/350	275/—	255/—	275/350
Nominal discharge current (8/20 µs) (I_n)	kA	20	20	20	20
Maximum discharge current (8/20 µs) (I_{max})	kA	40	40	40	40
Voltage protection level at 5 kA (U_{P5})	kV	0.9	0.9	—	0.9
Voltage protection level at I_n(U_p)	kV	1.35	1.35	1.5	1.35
I_{PE}	uA	< 600	< 4		< 800
TOV 120 min L-N	V AC	440	440	—	440
TOV 5 s L-N	V AC	335	335	—	—
TOV 200 ms N-PE	V AC	—	—	1200	—
Response time (t_a)	ns	25	25	100	25
Short-circuit proof at maximum overcurrent protection - I_{SSCR}	kA_{rms}	50	50	—	50
Maximum overcurrent protection (fuse rating gL/gG)	A	160	160	—	160
Replacement module code		7P.20.8.275.0020	7P.20.8.275.0020	7P.20.1.000.0020	7P.20.8.275.0020
Other technical data					
Ambient temperature range	°C	–40…+80			
Protection degree		IP 20			
Wire size		solid cable		stranded cable	
	mm^2	1 x 1…1 x 35		1 x 1…1 x 25	
	AWG	1 x 17…1 x 2		1 x 17…1 x 4	
Wire strip length	mm	12			
Screw torque	Nm	3			
Remote status signalling contact specification					
Contact configuration		1 CO (SPDT)		1 CO (SPDT)	1 CO (SPDT)
Rated current	A AC/DC	0.5/0.1		0.5/0.1	0.5/0.1
Rated voltage	V AC/DC	250/30		250/30	250/30
Wire size (07P.01)		solid cable / stranded cable		solid cable / stranded cable	solid cable / stranded cable
	mm^2	1.5 / 1.5		1.5 / 1.5	1.5 / 1.5
	AWG	16 / 16		16 / 16	16 / 16
Approvals (according to type)					

II-2021, www.findernet.com

SPD Type 2 Surge arrester range for single/ three phase AC systems without leakage current

- Surge arrester suitable for AC systems to protect equipment against induced overvoltage or switching transients
- To be installed at the boundary of LPZ 1 - LPZ 2 zones or higher
- Versions with combination of varistor and high-performance spark gap (GDT) ensures:
  - high discarge current
  - high insulation resistance that eliminates leakage current
  - no following current
- Very low residual voltage
- Visual fault signalling: Healty/Replace
- Remote status signalling contact: Healty/Replace
- Connector 07P.01 included
- Replaceable modules
- Complies with EN 61643-11:2012
- 17.5 mm rail EN 60715 mounting for each module

7P.42.8.275.1020 SPD Type 2 for single phase TT and TN-S system. Varistor + GDT protection L-N + GDT protection N-PE

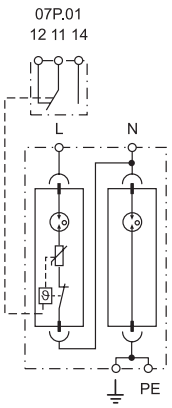
7P.43.8.275.1020 SPD Type for three phase TN-C system without Neutral (PEN conductor). Varistor + GDT protection L1, L2, L3-PEN

7P.42/7P.43
Screw terminals

For outline drawing see page 25, 26

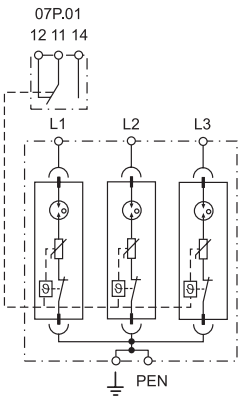
NEW **7P.42.8.275.1020**

- SPD Type 2
- Combination of varistor and encapsulated spark gap (for single phase systems)
- Replaceable modules
- Visual fault and remote contact fault signalling varistor/GDT status



NEW **7P.43.8.275.1020**

- SPD Type 2
- 3 x combined varistor and encapsulated spark gap
- Replaceable modules
- Visual fault and remote contact fault signalling varistor/GDT status



SPD specification		L-N	N-PE	L-PEN
Nominal voltage (U_N)	V AC	230	—	230
Maximum continous operating voltage (U_C)	V AC	275	255	275
Nominal discharge current (8/20 µs) (I_n)	kA	20	20	20
Maximum discharge current (8/20 µs) (I_{max})	kA	25	40	25
Voltage protection level (U_p)	kV	1.2	1.5	1.2
Ability to independently switch off the following current (I_{fi})	A	No following current	100	No following current
I_{PE}	uA	< 4		< 4
TOV 120 min L-N	V AC	440	—	440
TOV 5 s L-N	V AC	335	—	335
TOV 200 ms N-PE	V AC	—	1200	—
Response time (t_a)	ns	100	100	100
Short-circuit proof at maximum overcurrent protection - I_{SSCR}	kA_{rms}	35	—	35
Maximum overcurrent protection (fuse rating gL/gG)	A	125	—	125
Replacement module code		7P.40.8.275.0020	7P.40.1.000.0020	7P.40.8.275.0020
Other technical data				
Ambient temperature range	°C	–40…+80		
Protection degree		IP 20		
Wire size		solid cable		stranded cable
	mm^2	1 x 1…1 x 35		1 x 1…1 x 25
	AWG	1 x 17…1 x 2		1 x 17…1 x 4
Wire strip length	mm	12		
Screw torque	Nm	3		
Remote status signalling contact specification				
Contact configuration		1 CO (SPDT)	—	1 CO (SPDT)
Rated current	A AC/DC	0.5/0.1	—	0.5/0.1
Rated voltage	V AC/DC	250/30	—	250/30
Wire size (07P.01)		solid cable / stranded cable		solid cable / stranded cable
	mm^2	1.5 / 1.5	—	1.5 / 1.5
	AWG	16 / 16	—	16 / 16
Approvals (according to type)		CE EAC		

SPD Type 2 Surge arrester range for three phase AC systems (230/400 V) without leakage current

- Surge arrester suitable for AC systems to protect equipment against induced overvoltage or switching transients
- To be installed at the boundary of LPZ 1 - LPZ 2 zones or higher
- Versions with combination of varistor and high-performance spark gap (GDT) ensures:
  - high discarge current
  - high insulation resistance that eliminates leakage current
  - no following current
- Very low residual voltage
- Visual fault signalling: Healty/Replace
- Remote status signalling contact: Healty/ Replace. Connector 07P.01 included
- Replaceable modules
- Complies with EN 61643-11:2012
- 17.5 mm rail EN 60715 mounting for each module

7P.44.8.275.1020 SPD Type 2 for three phase TT and TN-S system with Neutral. Varistor + GDT protection L1, L2, L3-N + spark gap protection N-PE

7P.45.8.275.1020 SPD Type 2 for three phase TN-S system with Neutral. Varistor + GDT protection L1, L2, L3-N + varistor + GDT protection N-PE

7P.44/7P.45
Screw terminals

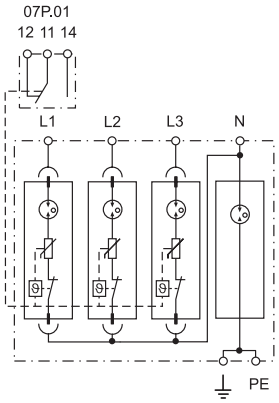
For outline drawing see page 26

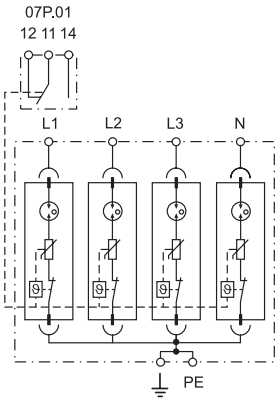
NEW **7P.44.8.275.1020**

- SPD Type 2
- 3 x combined varistor and encapsulated spark gap + 1 encapsulated spark gap
- Visual fault and remote contact fault signalling varistor/GDT status
- Replaceable modules

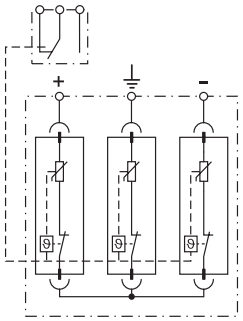
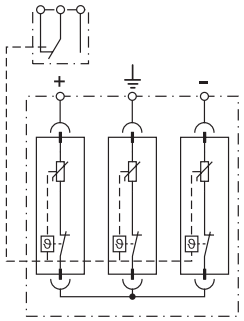
NEW **7P.45.8.275.1020**

- SPD Type 2
- 4 x combined varistor and encapsulated spark gap
- Visual fault and remote contact fault signalling varistor/GDT status
- Replaceable modules





SPD specification		L-N		N-PE	L, N-PE	
Nominal voltage (U_N)	V AC	230		—	230	
Maximum continous operating voltage (U_C)	V AC	275		255	275	
Nominal discharge current (8/20 µs) (I_n)	kA	20		20	20	
Maximum discharge current (8/20 µs) (I_{max})	kA	25		40	25	
Voltage protection level (U_p)	kV	1.2		1.5	1.2	
Ability to independently switch off the following current (I_{fi})	A	No following current		100	No following current	
I_{PE}	µA	< 4			< 4	
TOV 120 min L-N	V AC	440		—	440	
TOV 5 s L-N	V AC	335		—	335	
TOV 200 ms N-PE	V AC	—		1200	—	
Response time (t_a)	ns	100		100	100	
Short-circuit proof at maximum overcurrent protection - I_{SSCR}	kA_{rms}	35		—	35	
Maximum overcurrent protection (fuse rating gL/gG)	A	125 A		—	125 A	
Replacement module code		7P.40.8.275.0020		7P.40.1.000.0020	7P.40.8.275.0020	
Altri dati tecnici						
Ambient temperature range	°C	–40…+80				
Protection degree		IP 20				
Wire size		solid cable			stranded cable	
	mm^2	1 x 1…1 x 35			1 x 1…1 x 25	
	AWG	1 x 17…1 x 2			1 x 17…1 x 4	
Wire strip length	mm	12				
Screw torque	Nm	3				
Remote status signalling contact specification						
Contact configuration		1 CO (SPDT)		—	1 CO (SPDT)	
Rated current	A AC/DC	0.5/0.1		—	0.5/0.1	
Rated voltage	V AC/DC	250/30		—	250/30	
Wire size (07P.01)		solid cable	stranded cable		solid cable	stranded cable
	mm^2	1.5	1.5	—	1.15	1.5
	AWG	16	16	—	16	16
Approvals (according to type)		CE EAC				

SPD Type 2 Surge arrester range for Photovoltaic applications • Surge arrester for protection of DC side (750 V to 1200 V) of systems in photovoltaic applications • Protects equipment against induced overvoltage caused by lightning strikes or switching transients **7P.23.9.750.x020,** U_{CPV} = 750 V DC **7P.23.9.500.1015,** U_{CPV} = 1500 V DC • Visual indication of varistor status - Healthy/Replace • Contact for remote signalling of varistor status. Connector (07P.01) included (depending on the verision) • Replaceable modules • Complies with prEN 50539-11:2012 • 35 mm rail (EN 60715) mounting	**7P.23.9.750.x020**  • SPD Type 2 (3 varistors) for 750 V DC photovoltaic systems • Replaceable varistor modules • Visual and optional remote connector for signalling of the varistor status	**7P.23.9.500.1015**  • SPD Type 2 (3 varistors) for 1500 V DC photovoltaic systems • Replaceable varistor modules • Visual and remote signalling of varistor status
7P.23.9 Screw terminals 	07P.01 12 11 14 	07P.01 12 11 14 
For outline drawing see page 26		

SPD specification		**Varistor module**		**Varistor module**	
Maximum operating voltage (U_{CPV})	V DC	750		1500	
Maximum operating voltage/per module (U_{CPV})	V DC	375		750	
Nominal discharge current/ per module (8/20 µs) (I_n)	kA	20		15	
Maximum discharge current/ per module (8/20 µs) (I_{max})	kA	40		40	
Voltage protection level/per module (U_p)	kV	1.8		3.2	
Voltage protection level of the system U_p (+ → –)/(+/– → PE)	kV	3.6/3.6		6.4/6.4	
Residual current (+ → –)/(+/– → PE)	uA	<5		< 5	
Response time (t_a)	ns	25		25	
Short circuit current withstand I_{SCPV}	A	1000		1000	
Replacement module code		7P.20.9.375.0020		7P.20.9.750.0015	
Other technical data					
Ambient temperature range	°C	–40…+80			
Protection degree		IP 20			
Wire size		solid cable		stranded cable	
	mm²	1 x 1…1 x 35		1 x 1…1 x 25	
	AWG	1 x 17…1 x 2		1 x 17…1 x 4	
Wire strip length	mm	14			
Screw torque	Nm	3			
Remote status signalling contact specification					
Contact configuration		1 CO (SPDT)		1 CO (SPDT)	
Rated current	A AC/DC	0.5/0.1		0.5/0.1	
Rated voltage	V AC/DC	250/30		250/30	
Wire size (07P.01)		solid cable	stranded cable	solid cable	stranded cable
	mm²	1.5	1.5	1.5	1.5
	AWG	16	16	16	16
Approvals (according to type)		CE EAC			

SPD Type 1+2 and Type 2 Surge arrester range for Photovoltaic applications

- Surge arrester for protection of DC side (1020 V) of systems in photovoltaic applications
- Protects equipment against overvoltage caused by direct lightning strike (Type 1+2 only) and induced overvoltages (Type 1+2 and Type 2)

7P.26.9.000.x015, U_{CPV} = 1020 V DC (Type 2)
7P.23.9.000.x015, U_{CPV} = 1020 V DC (Type 2)
7P.03.9.000.1012, U_{CPV} = 1000 V DC (Type 1+2)

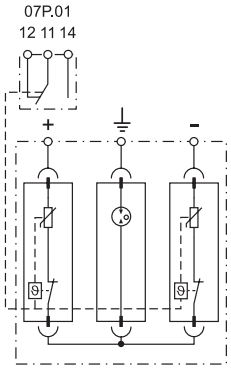
- Visual indication of varistor status - Healthy/Replace
- Contact for remote signalling of varistor status. Connector (07P.01) included (depending on the verision)
- Replaceable modules
- Complies with prEN 50539-11:2012
- 35 mm rail (EN 60715) mounting

7P.23.9 / 7P.26 / 7P.03
Screw terminals

For outline drawing see page 26

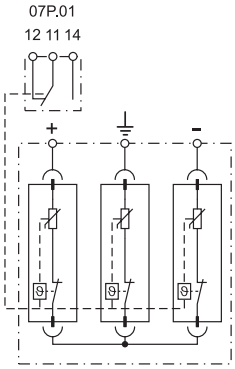
7P.26.9.000.x015

- SPD Type 2 (2 varistors + 1 spark-gap) for 1020 V DC photovoltaic systems
- Combination of replaceable varistor and encapsulated spark gap modules
- Visual and optional remote connector for signalling of the varistor status



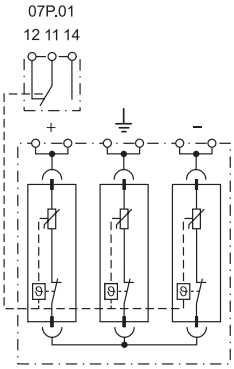
7P.23.9.000.x015

- SPD Type 2 (3 varistors) for 1020 V DC photovoltaic systems
- Replaceable varistor modules
- Visual and optional remote connector for signalling of the varistor status



7P.03.9.000.1012

- SPD Type 1+2 (3 varistors) for 1000 V DC photovoltaic systems
- Replaceable varistor modules
- Visual and remote signalling of varistor status



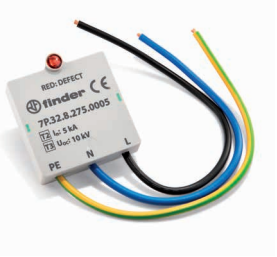
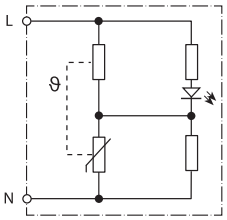
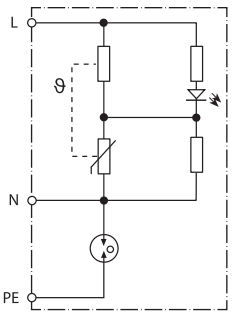
SPD specification		Varistor module	Spark-gap module	Varistor module	Varistor module	
Maximum operating voltage (U_{CPV})	V DC	1020		1020	1000	
Maximum operating voltage/per module (U_{CPV})	V DC	510	1020	510	500	
Lightning impulse current (10/350 µs)/ per module (I_{mp})	kA	—	—	—	12.5	
Nominal discharge current/ per module (8/20 µs) (I_n)	kA	15	15	15	30	
Maximum discharge current/ per module (8/20 µs) (I_{max})	kA	30	30	40	60	
Voltage protection level/per module (U_p)	kV	2	2.5	2	1.8	
Voltage protection level of the system U_p (+ → –)/(+/– → PE)	kV	4/2.5		4/4	3.6/3.6	
Residual current (+ → –)/(+/– → PE)	uA	< 1		< 5	< 5	
Response time (t_a)	ns	25	100	25	25	
Short circuit current withstand I_{SCPV}	A	1000	—	1000	1000	
Replacement module code		7P.20.9.500.0015	7P.20.1.000.9015	7P.20.9.500.0015	7P.00.9.500.0012	
Other technical data						
Ambient temperature range	°C	–40…+80				
Protection degree		IP 20				
Wire size		solid cable		stranded cable	solid cable	stranded cable
	mm²	1 x 1…1 x 35		1 x 1…1 x 25	1 x 2.5…1 x 50	1 x 2.5…1 x 35
	AWG	1 x 17…1 x 2		1 x 17…1 x 4	1 x 13…1 x 1	1 x 13…1 x 2
Wire strip length	mm	14			9	
Screw torque	Nm	3			4	
Remote status signalling contact specification						
Contact configuration		1 CO (SPDT)		1 CO (SPDT)	1 CO (SPDT)	
Rated current	A AC/DC	0.5/0.1		0.5/0.1	0.5/0.1	
Rated voltage	V AC/DC	250/30		250/30	250/30	
Wire size (07P.01)		solid cable	stranded cable	solid cable	stranded cable	solid cable	stranded cable
	mm²	1.5	1.5	1.5	1.5	1.5	1.5
	AWG	16	16	16	16	16	16
Approvals (according to type)		CE EAC				

SPD Type 3, Surge arrester for TT and TN-S system (with Neutral)
Single phase applications within socket outlets and 35 mm rail mounting

- Protects electrical and electronic equipment sensitive to impulse overvoltage
- Varistor and spark gap (GDT) combination avoiding earth leakage current
- Conforms to EN 61643-11:2012

7P.31.8.275.0005
- Unipolar protection (L/N)
- IP 65 SPD
- LED indication of need to replace the SPD
- 2 wires, 150 mm long, for ease of connection

7P.32.8.275.0005
- "1+1" configuration: varistor + spark gap with very low U_p level
- IP 65 SPD
- LED indication of need to replace the SPD
- 3 wires, 150 mm long, for ease of connection

	7P.31.8.275.0005	**7P.32.8.275.0005**
		
	• SPD Type 3 • Unipolar protection suitable also for LED lamp protection • IP 65	• SPD Type 3 • "1+1" configuration suitable also for LED lamp protection • IP 65
		

* see diagram L7P page 32
For outline drawing see page 27

SPD specification			
Nominal voltage (U_N)	V AC	230	230
Maximum continuous operating voltage (U_C)	V AC	275	275
Nominal discharge current (8/20 µs) L-N, L(N)-PE (I_n)	kA	5/—	5/5
Maximum discharge current (8/20 us) L-N, N-PE (I_{max})	kA	10/—	10/10
Test voltage of the combined generator L-N, L(N)-PE (U_{OC})	kV	10/—	10/10
Voltage protection level L-N, L(N)-PE (U_p)	kV	1.6/—	1.65/1.5
Response time L-N, L(N)-PE (t_a)	ns	25/—	25/100
Short-circuit proof at maximum overcurrent protection - I_{SSCR}	kA_{rms}	1.5	1.5
Maximum overcurrent protection		16 A gL/gG, B16 A, C10 A	16 A gL/gG, B16 A, C10 A
Other technical data			
Ambient temperature range	°C	–25…+80	–25…+80
Protection degree		IP 65	IP 65
Approvals (according to type)		CE	

E

SPD Type 3, Surge arrester for TT and TN-S system (with Neutral)
Single phase applications within socket outlets and 35 mm rail mounting

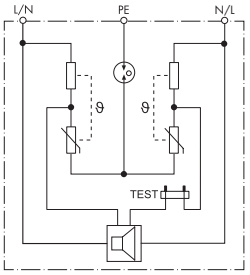
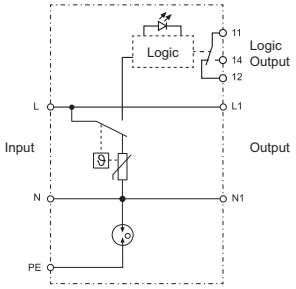
- Protects electrical and electronic equipment sensitive to impulse overvoltage
- Varistor and spark gap (GDT) combination avoiding earth leakage current
- Conforms to EN 61643-11:2012

7P.36.8.275.2003

- Provides easy additional surge protection for 230 V sockets
- "Y" configuration: varistor + spark gap with very low U_p level
- Audible indication of need to replace varistor and jumper test point for SPD status
- 3-wires, 150 mm long, for connection to socket terminals

7P.37.8.275.1003

- "1+1" configuration: varistor + spark gap with very low U_p level
- Permits serial connection for optimized load protection up to 16 A
- Integral CO contact for remote signalling of varistor status - contact gold plated for reliable low level switching
- 17.5 mm L-N/N-PE protection
- Mounting on 35 mm DIN rail (EN 60715)

		7P.36.8.275.2003	**7P.37.8.275.1003**
			
		• SPD Type 3 • "Y" configuration • Audible (buzzing) signalling of varistor fault	• SPD Type 3 • "1+1" configuration • Series connection for protection of loads up to 16 A • Remote signalling of varistor status by integral change-over relay contact
			
* see diagram L7P page 32 For outline drawing see page 26, 27			
SPD specification			
Nominal voltage (U_N)	V AC	230	230
Maximum continuous operating voltage L-N/N-PE (U_C)	V AC	275	275/255
Rated load current (I_L)	A	—	16
Nominal discharge current (8/20 µs) L-N, L(N)-PE (I_n)	kA	3/3	3/3
Test voltage of the combined generator L-N, L(N)-PE (U_{OC})	kV	6/6	6/6
Voltage protection level L-N, L(N)-PE (U_p)	kV	1.65/1.5	1/1.5
Response time L-N, L(N)-PE (t_a)	ns	25/100	25/100
Short-circuit proof at maximum overcurrent protection - I_{SSCR}	kA_{rms}	1.5	5
Maximum overcurrent protection		16 A gL/gG, B16 A, C10 A	C16 A, 16 A gG
Other technical data			
Ambient temperature range	°C	–20…+70	–20…+70*
Protection degree		IP 20	IP 20
Wire size		—	solid cable / stranded cable
	mm^2	—	0.5…4 / 0.5…4
	AWG	—	20…11 / 20…12
Wire strip length	mm	—	9
Screw torque	Nm	—	0.8
Remote status signalling contact specification			
Contact configuration		—	1 CO (SPDT)
Rated current	A AC	—	0.5
Rated voltage	V AC	—	230
Breaking capacity DC1: 30/110	A	—	2/0.3
Minimum switching load	mW (V/mA)	—	10 (5/5)
Contact material		—	AgNi + Au
Approvals (according to type)		CE EAC	

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SPD Type 2+3 with combination of coarse and fine suppression for 2 wires data lines and signalling network

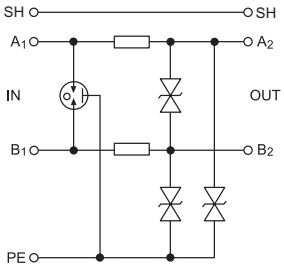
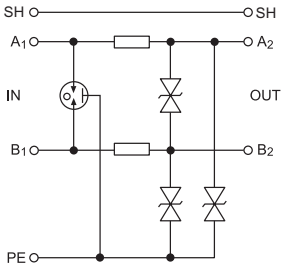
- Suitable for the protection of 2 wires data lines and telecommunication interface allowing continuity of the shield
- Permits serial connection optimizing the fine protection of longitudinal overvoltage (core-PG) and lateral overvoltage (core-core)
- Conform to EN 61643-21+A1,A2:2013, EN IEC61643-21+A1,A2:2012 C2,C3
- DIN rail mounting

7P.62.9.009.0485

- Suitable for the protection of RS485 data lines of inverter, PLC, energy meters or other interfaces

7P.62.9.036.0005

- Suitable for the protection of fire detection systems, telecommunications interfaces and 2-wire data lines

	7P.62.9.009.0485	7P.62.9.036.0005
		
	• SPD Type 2+3 • Protection of RS485 data lines, telecommunication and other Bus lines	• SPD Type 2+3 • Protection of fire detection systems, telecommunication and other data/Bus lines
		

For outline drawing see page 27

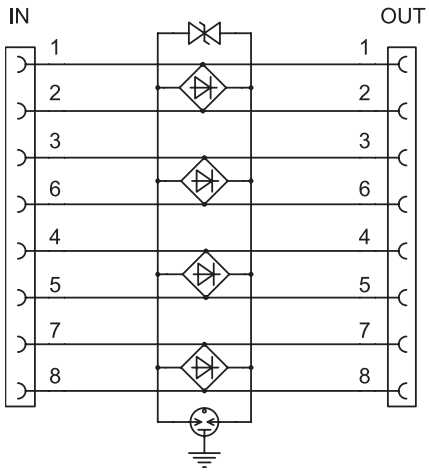
SPD specification					
Nominal voltage (U_N)	V DC	6		24	
Maximum operating voltage (U_C)	V DC	8.5		36	
Nominal load current (I_L)	A	0.5		0.5	
C2 nominal discharge current (8/20 µs) core-core (I_n)	kA	5		5	
C2 total discharge current (8/20 µs) cores-PE (C)	kA	10		10	
C2 voltage protection level mode core-core @ I_n (U_p)	V	18		50	
C2 voltage protection level mode core-PE @ I_n (U_p)	V	30		65	
C3 voltage protection level mode core-core @ 1 kV/µs (U_p)	V	12		45	
C3 voltage protection level mode core-PE @ 1 kV/µs (U_p)	V	15		45	
Response time core-core/core-PE (ta)	ns	1/1		1	
Serial resistance per core (R)	Ω	1.6		1.6	
Treshold frequency core-core (f)	MHz	1		4	
Other technical data					
Range of operating temperature	°C	–40…+70		–40…+70	
Degree of protection		IP 20		IP 20	
Wire size		solid cable	stranded cable	solid cable	stranded cable
	mm²	4	2.5	4	2.5
	AWG	12	14	12	14
Approvals (according to type)		CE			

Data line SPD for Ethernet Cat. 6

- Suitable for Ethernet, POE (Power over Ethernet) and dataline transmission system up to 250 MHz
- Protection of all pairs of conductors with minimum attenuation
- Aluminum chassis and RJ45 in metal screens
- Included accessories for simple installation near the equipment to be protected, LPZ boundary 2-3 (Type 3)
- Complies to EN 61643-21
- Mounting on 35 mm DIN rail

7P.68.9.060.0600

- Ethernet Cat 6 - 60 V
- Shielded RJ45 connectors



For outline drawing see page 27

SPD specification		
Nominal voltage of system (U_N)	V DC	48
Maximum operating voltage (U_C)	V DC	60
Nominal current (I_L)	mA	500
C2 total nominal discharge current (8/20 µs) line - PG (I_n)	kA	1.6
C2 nominal discharge current (8/20 µs) line-line (I_n)	A	200
Voltage protection level line-line @ I_n (C2) - (U_p)	V	130
Voltage protection level line-PG @ I_n (C2) - (U_p)	V	350
Voltage protection level line-line @ 1 kV/µs (C3) - (U_p)	V	130
Insertion attenuation @ 250 MHz	dB	< 2
Response time	ns	1
Other technical data		
Ambient temperature range	°C	–40…+80
Degree of protection		IP 20
Input-Output connection		RJ45/RJ45 shielded
Approvals (according to type)		CE

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Ordering information

Example: 7P series, surge protection device, Type 2, single phase (U_C = 275 V), 1 varistor + 1 encapsulated spark gap, with remote status signalling contact, I_n = 20 kA

7 P . 2 2 . 8 . 2 7 5 . 1 0 2 0

Series

Type
0 = Combined type 1 + 2 arresters high discharge capability
1 = Type 1+2 high performance "Low U_p" surge arresters
2 = Type 2 surge arresters
3 = Type 3 surge arresters
4 = Type 2 surge arrester without leakage current
6 = Data line SPD

Circuit
1 = Single phase (1 varistor)
2 = Single phase (1 varistor + 1 spark-gap), protected poles (data line SPD)
2 = Protected poles (Data line SPD)
3 = Three-phase (3 varistors)
4 = Three-phase (3 varistors + 1 spark-gap)
5 = Three-phase (4 varistors)
6 = 2 varistors + 1 spark-gap
6 = 1 varistors + 1 spark-gap(7P.36)
7 = Single phase (2 varistors) Type 2 (7P.27)
7 = Single phase (1 varistor + 1 spark gap) Type 3, DIN rail mounting (7P.37)
8 = Protected poles (Data line SPD)
9 = N-PE spark-gap for three phase system
0 = Spare module

Supply version
1 = N+PE connection (only for single spark gap replaceable module and 7P.09)
8 = AC (50/60 Hz)
9 = DC (PV application and Data line SPD)

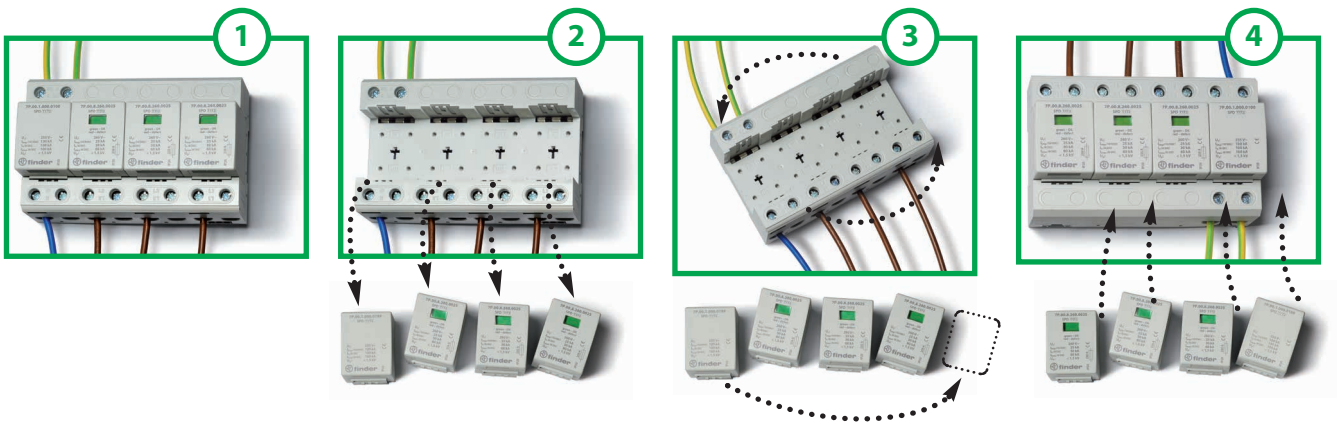
Supply voltage
000 = N+PE connection for spark gap modules
009 = 8.5 V DC Max (U_C) SPD Data line SPD
036 = 36 V DC Max (U_C) SPD Data line SPD
060 = 60 V DC Max (U_C), Data line SPD
075 = 75 V AC Max
130 = 130 V AC Max
440 = 440 V Max (U_C) for SPD Type 2 (for U_N = 400 V AC)
275 = 275 V Max for SPD Type 1+2 "Low U_p", Type 2 (U_C) (for U_N = 230-240 V AC) and Type 3
260 = 260 V Max (U_C) for SPD Type 1+ 2 (for U_N = 230-240 V AC)
255 = 255 V Max (U_C) for SPD Type 1, N+PE (7P.09)

Supply voltage PV SPD
UCPV >= 1.2 Uoc STC
000 = 1000 V DC UCPV SPD T1+2 (7P.03.9), 1020 V DC UCPV PV SPD T2 (7P.23.9, 7P.26.9)
500 = 1500 V DC UCPV
750 = 750 V DC UCPV

Nominal discharge current
100 = 100 kA (I_{imp} Type 1) only for 7P.09, N-PE GDT for 7P.04
050 = 50 kA (I_{imp} Type 1 N-PE GDT for 7P.02)
025 = 25 kA (I_{imp} Type 1+2)
020 = 20 kA (I_n Type 2)
015 = 15 kA (I_n Type 2)
012 = 12.5 kA (I_{imp} Type 1+2)
003 = 3 kA (I_n @ U_{oc} only for 7P.36 and 7P.37)
005 = 5 kA (I_n @ U_{oc} for 7P.31, 7P.32 and 7P.62)
007 = 7.5 kA (I_{imp} Type 1+2)
107 = 7.5 kA (I_{imp}Type 1+2) with remote status signalling contact
012 = 12.5 kA (I_{imp} Type 1+2)
112 = 12.5 kA (I_{imp}Type 1+2) with remote status signalling contact
485 = RS485 Modbus protocol (Data line SPD)
600 = Ethernet Cat 6 (Data line SPD)

Remote status signalling contact
0 = Without remote status signalling contact (only some Type 2 SPD and Data line)
1 = Built-in remote status signalling contact
2 = Acoustic fault signalling
S = Busbar fast mounting
Z = Busbar fast mounting with voltage tap

Upside down mounting



Replaceable modules

Replacement varistor and modules		7P.00.8.260.0025	7P.00.9.500.0012	7P.00.1.000.0050	7P.00.1.000.0100
		Varistor + GDT	Varistor + GDT	Spark-Gap	Spark-Gap
Maximum operating voltage (U_C/U_{CPV})	V AC/DC	260/—	—/500	255/—	255/—
Lightning Impulse current (10/350 µs) (I_{imp})	kA	25	12.5	50	100
Nominal discharge current (8/20 µs) (I_n)	kA	30	30	50	100
Maximum discharge current (8/20 µs) (I_{max})	kA	60	60	100	100
Voltage protection level (U_p)	kV	1.5	1.8	1.5	1.5
Leakage current (@ 253 V AC) & I_{pe} current	uA	< 4	< 4	< 4	< 4
Response time (t_a)	ns	100	25	100	100
Maximum overcurrent protection		250 A gL/gG	—	—	—

Replacement varistor and modules		7P.10.8.275.0012	7P.10.1.000.0025	7P.00.8.255.0007	7P.00.8.255.0012
		Varistor	Spark-Gap	Varistor + GDT	Varistor + GDT
Maximum operating voltage (U_C)	V AC/DC	275/350	255/—	255/—	255/—
Lightning Impulse current (10/350 µs) (I_{imp})	kA	12.5	25	7.5	12.5
Nominal discharge current (8/20 µs) (I_n)	kA	30	40	20	20
Maximum discharge current (8/20 µs) (I_{max})	kA	60	60	60	60
Voltage protection level (U_p)	kV	1.5	1.5	1.5	1.5
Response time (t_a)	ns	25	100	100	100
Maximum overcurrent protection		160 A gL/gG	—	160	160

Replacement varistor modules		7P.20.8.075.0015	7P.20.8.130.0015	7P.20.8.275.0020	7P.20.8.440.0020	7P.40.8.275.0020
		Varistor	Varistor	Varistor	Varistor	Varistor + GDT
Maximum operating voltage (U_C)	V AC/DC	75/100	130/170	275/350	440/585	275/—
Nominal discharge current (8/20 µs) (I_n)	kA	15	15	20	20	20
Maximum discharge current (8/20 µs) (I_{max})	kA	40	40	40	40	25
Voltage protection level (U_p)	kV	0.4	0.7	1.35	1.9	1.2
Response time (t_a)	ns	25	25	25	25	100
Maximum overcurrent protection		160 A gL/gG	160 A gL/gG	160 A gL/gG	125 A gL/gG	125 A gL/gG

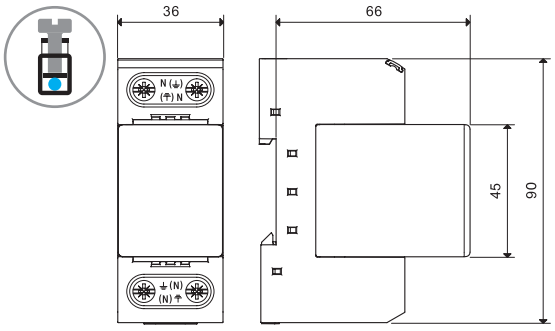
Replacement varistor modules		7P.20.9.375.0020	7P.20.9.500.0015	7P.20.9.750.0015
		Varistor	Varistor	Varistor
Maximum operating voltage (U_C/U_{CPV})	V AC/DC	—/375	—/510	—/750
Nominal discharge current (8/20 µs) (I_n)	kA	20	15	15
Maximum discharge current (8/20 µs) (I_{max})	kA	40	40	40
Voltage protection level (U_p)	kV	1.8	2	3.2
Response time (t_a)	ns	25	25	25
Maximum overcurrent protection		—	—	—

Replacement modules		7P.20.1.000.0020	7P.20.1.000.9015	7P.40.1.000.0020
		Spark-Gap	Spark-Gap	Spark-Gap
Maximum operating voltage (U_C/U_{CPV})	V AC/DC	255/—	—/1020	255/—
Nominal discharge current (8/20 µs) (I_n)	kA	20	15	20
Maximum discharge current (8/20 µs) (I_{max})	kA	40	30	40
Voltage protection level (U_p)	kV	1.5	2.5	1.5
Response time (t_a)	ns	100	100	100
Maximum overcurrent protection		—	—	—

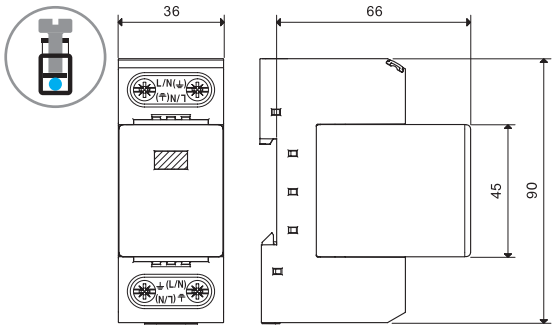
Temporary Overvoltage (TOV)		7P.32, 7P.36, 7P.37
Transient OverVoltage 5 s L-N (U_{TOV})	V	335
Transient OverVoltage 5 s L-PE (U_{TOV})	V	400
Transient OverVoltage 200 ms L-PE (U_{TOV})	V	1430

Outline drawings

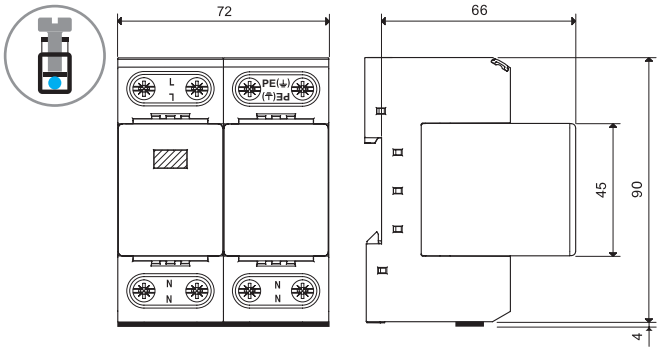
Type 7P.09
Screw terminal



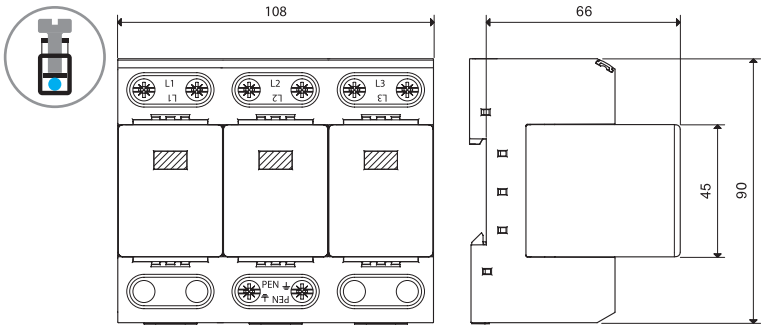
Type 7P.01
Screw terminal



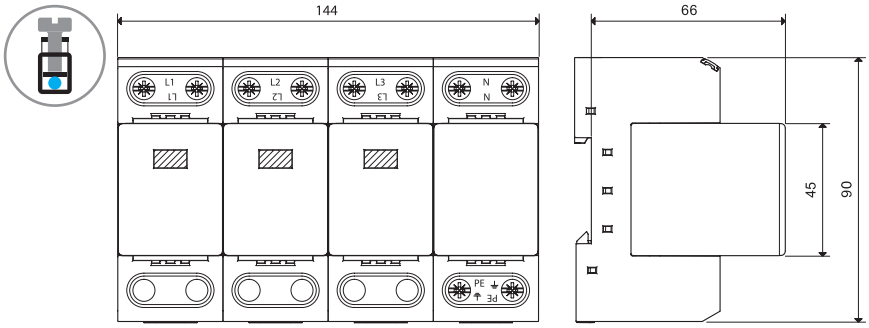
Type 7P.02
Screw terminal



Type 7P.03
Screw terminal



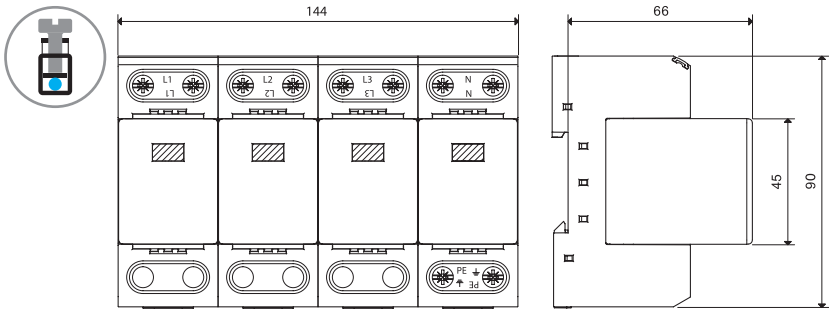
Type 7P.04
Screw terminal



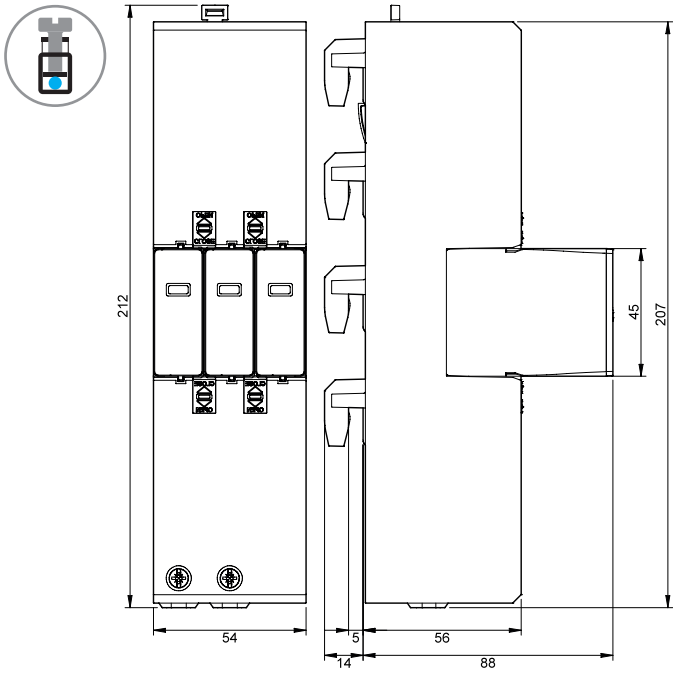
E

Outline drawings

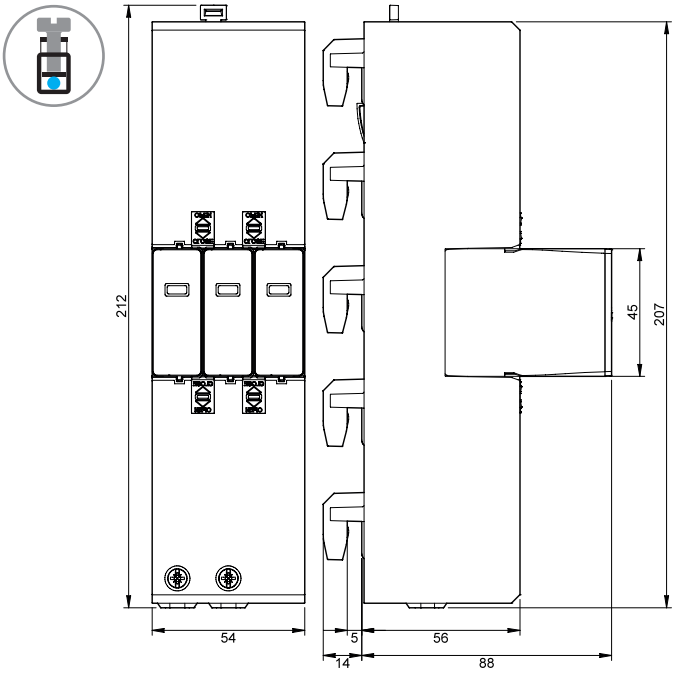
Type 7P.05
Screw terminal



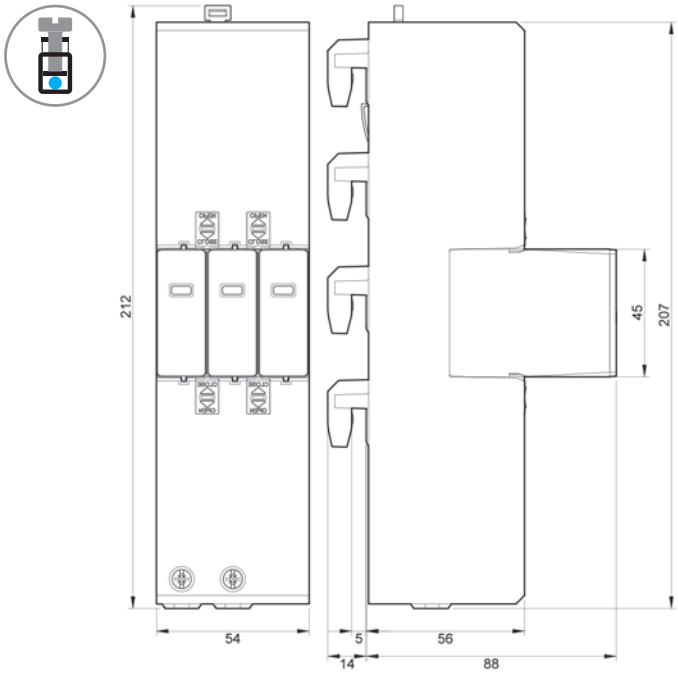
Type 7P.03.8.255.S0xx
Screw terminal



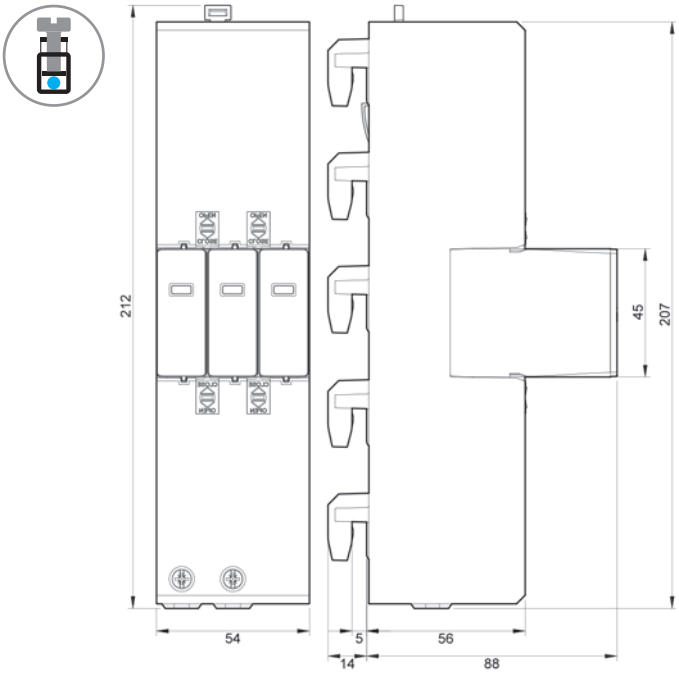
Type 7P.04.8.255.S0xx
Screw terminal



Type 7P.03.8.255.Z0xx
Screw terminal



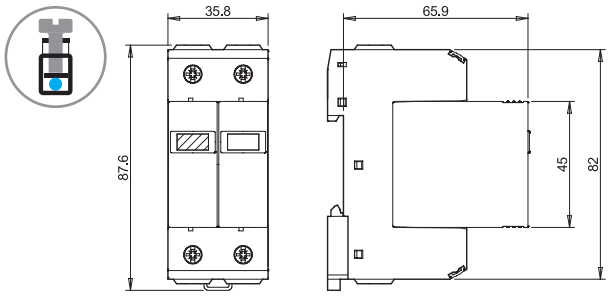
Type 7P.04.8.255.Z0xx
Screw terminal



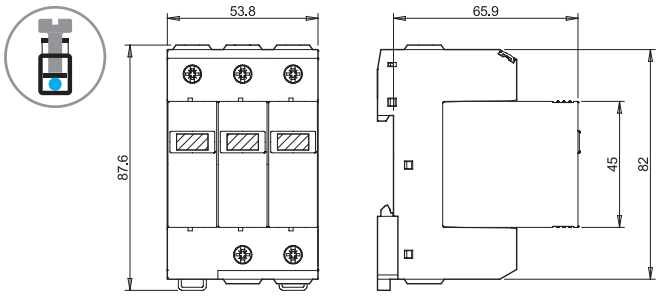
E

Outline drawings

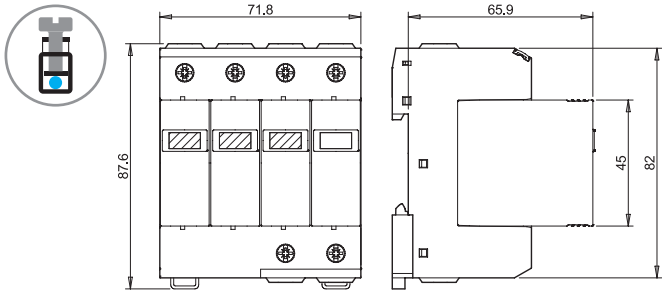
Type 7P.12
Screw terminal



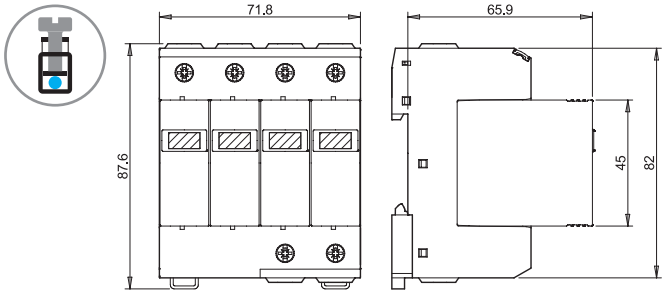
Type 7P.13
Screw terminal



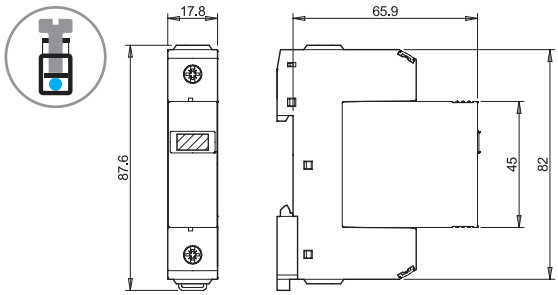
Type 7P.14
Screw terminal



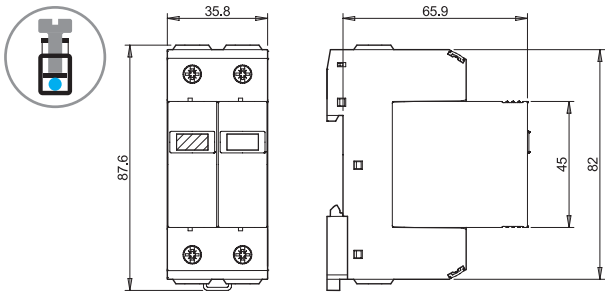
Type 7P.15
Screw terminal



Type 7P.21
Screw terminal



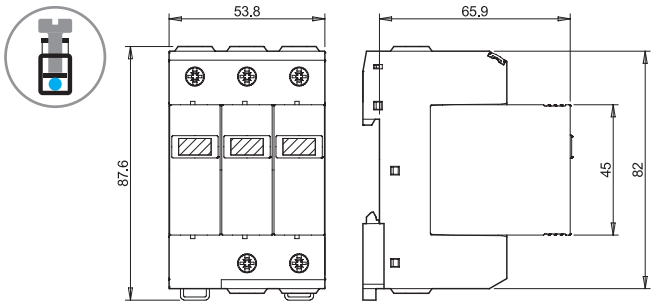
Types 7P.22 / 7P.27 / 7P.42
Screw terminal



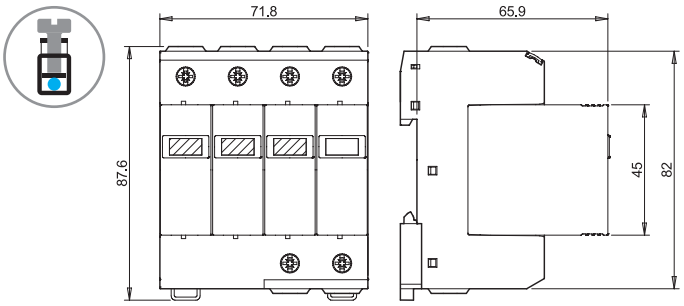
E

Outline drawings

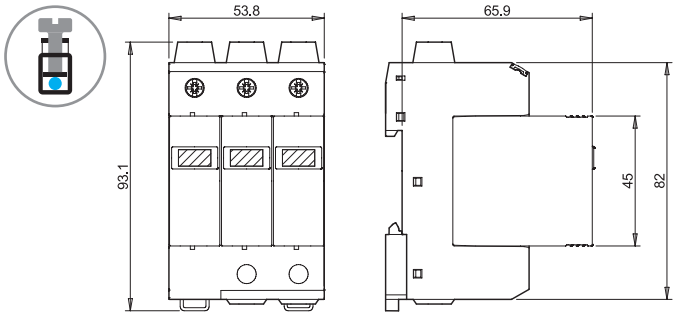
Types 7P.23.8 / 7P.43
Screw terminal



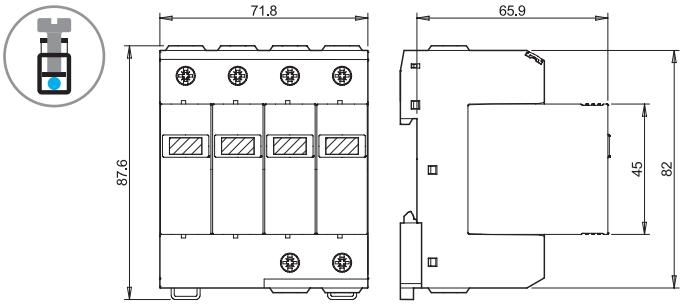
Types 7P.24 / 7P.44
Screw terminal



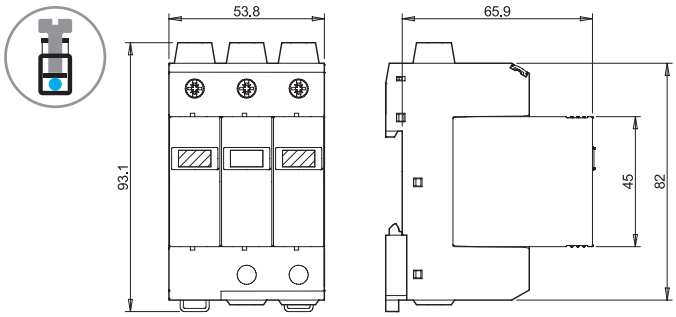
Type 7P.23.9
Screw terminal



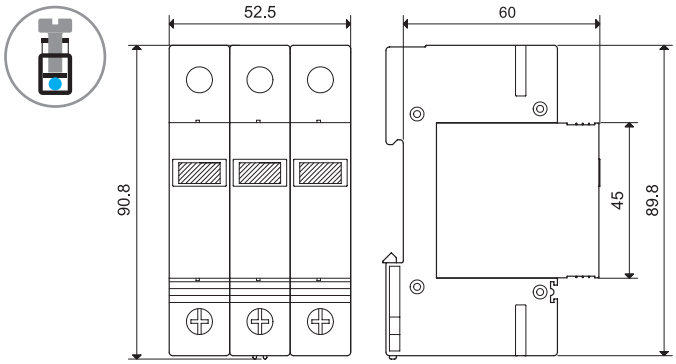
Types 7P.25 / 7P.45
Screw terminal



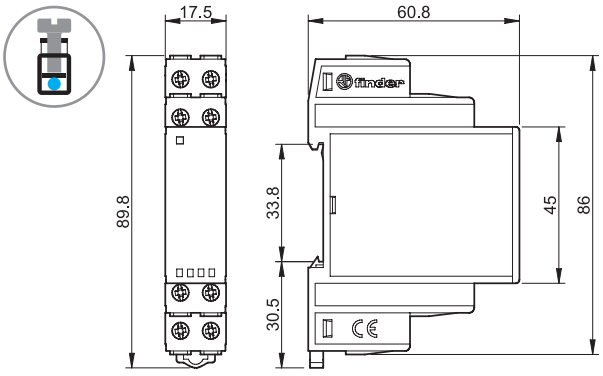
Type 7P.26.9.000.1015
Screw terminal



Type 7P.23.9.000.6020
Screw terminal



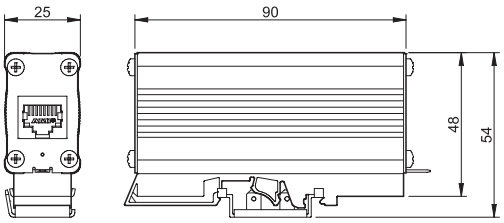
Type 7P.37.8.275.1003
Screw terminal



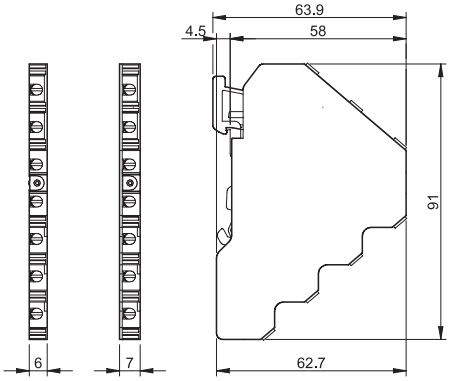
E

Outline drawings

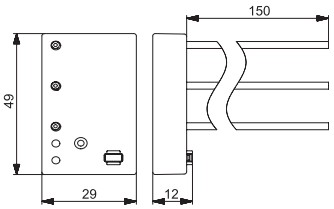
Type 7P.68.9.060.0600



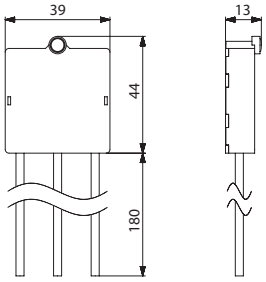
Types 7P.62.9.036.0005/7P.62.9.009.0485
Screw terminal



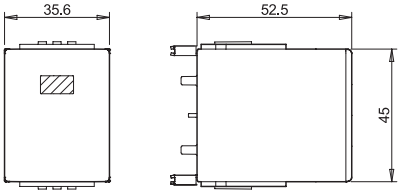
Type
7P.36.8.275.2003



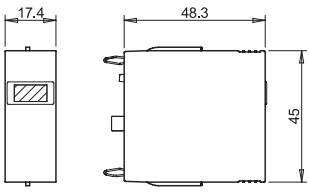
Types
7P.31.8.275.0005/7P.32.8.275.0005



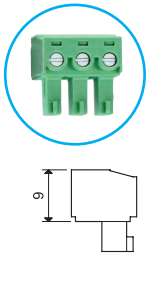
Type 7P.00
Replaceable module



Type 7P.10/20
Replaceable module

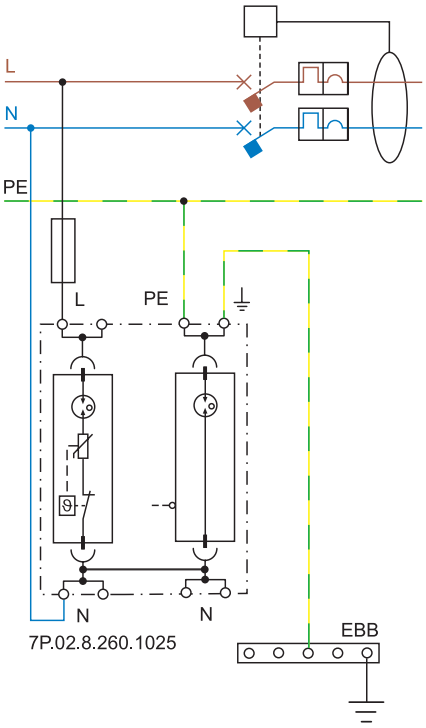


07P.01
Connector

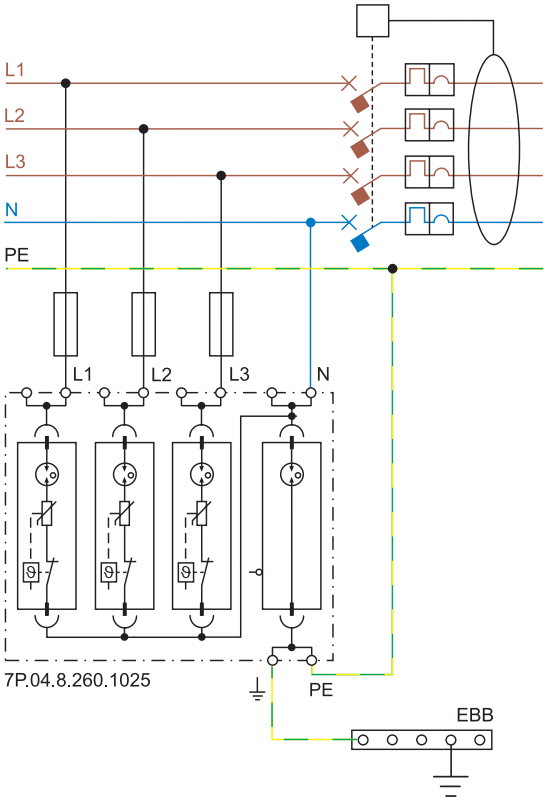


Installation example - SPD Type 1 + 2

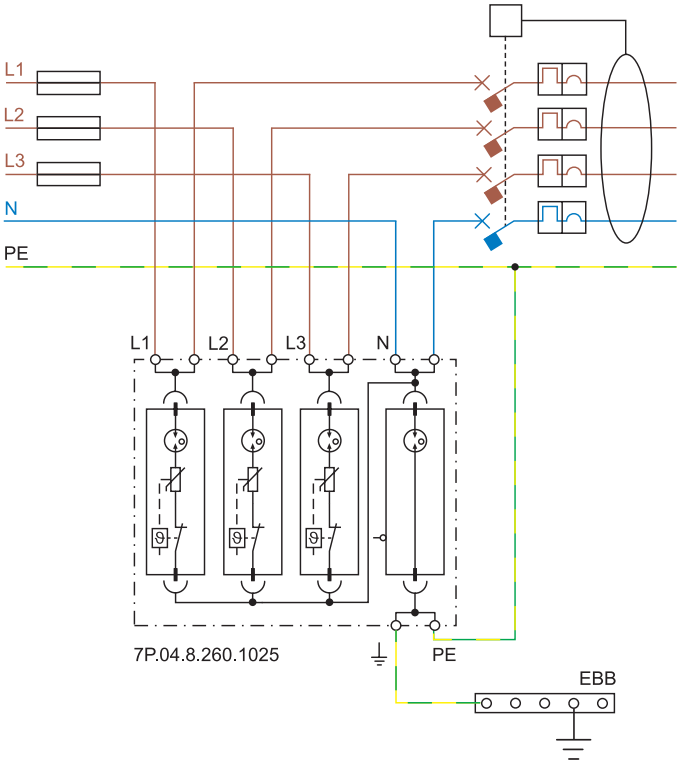
TT-SINGLE PHASE SYSTEM - SPD UP-STREAM OF RCD



TT-THREE PHASE SYSTEM - SPD UP-STREAM OF RCD

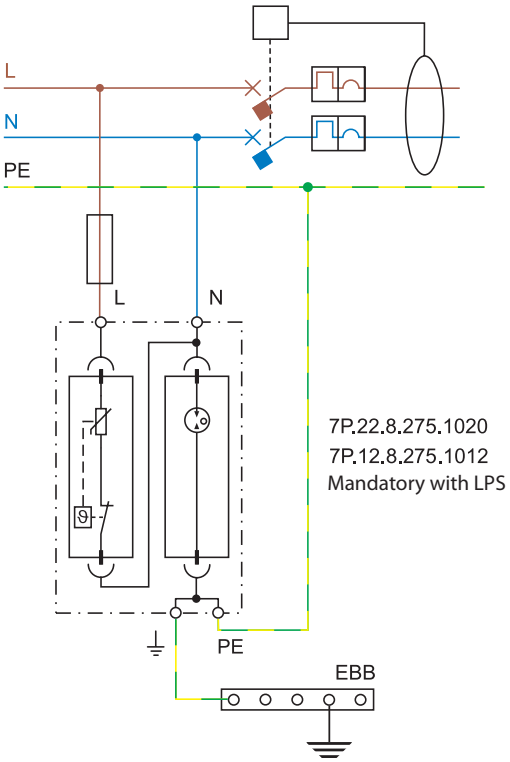


Wiring diagrams "V-shape" (fuse max = 125 A)



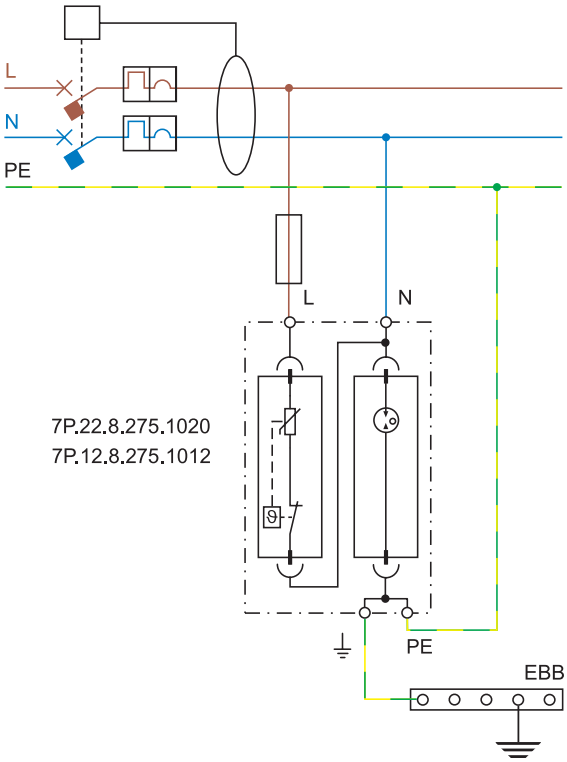
Installation example for SPD Type 1 + 2 and Type 2 - Single phase

TT-SINGLE PHASE SYSTEM - SPD UP-STREAM OF RCD



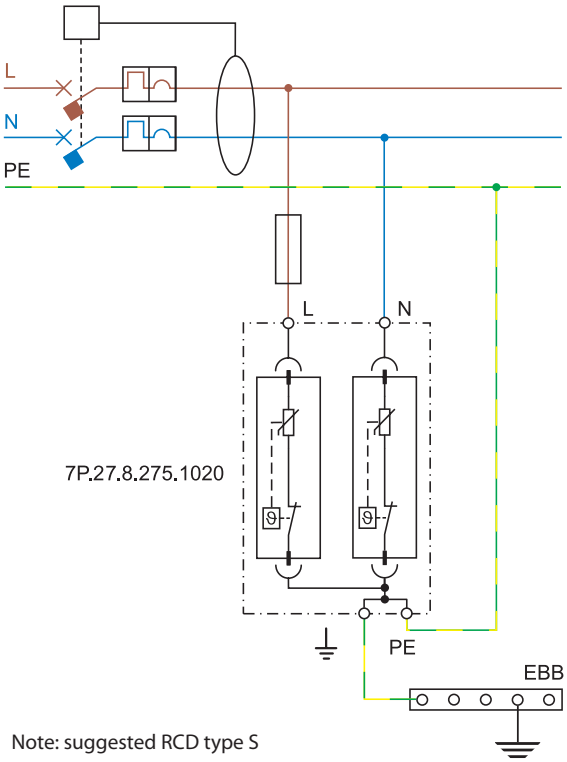
7P.22.8.275.1020
7P.12.8.275.1012
Mandatory with LPS

TT or TN-S SINGLE PHASE SYSTEM - SPD DOWN-STREAM OF RCD



7P.22.8.275.1020
7P.12.8.275.1012

TN-S SINGLE PHASE SYSTEM - SPD DOWN-STREAM OF RCD

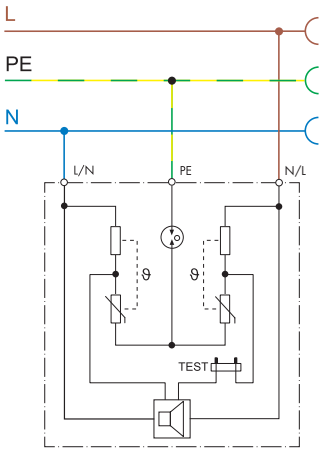


7P.27.8.275.1020

Note: suggested RCD type S

Installation example for SPD Type 3

TT or TN-S SINGLE PHASE SYSTEM - INCORPORATED IN SOCKET OUTLET

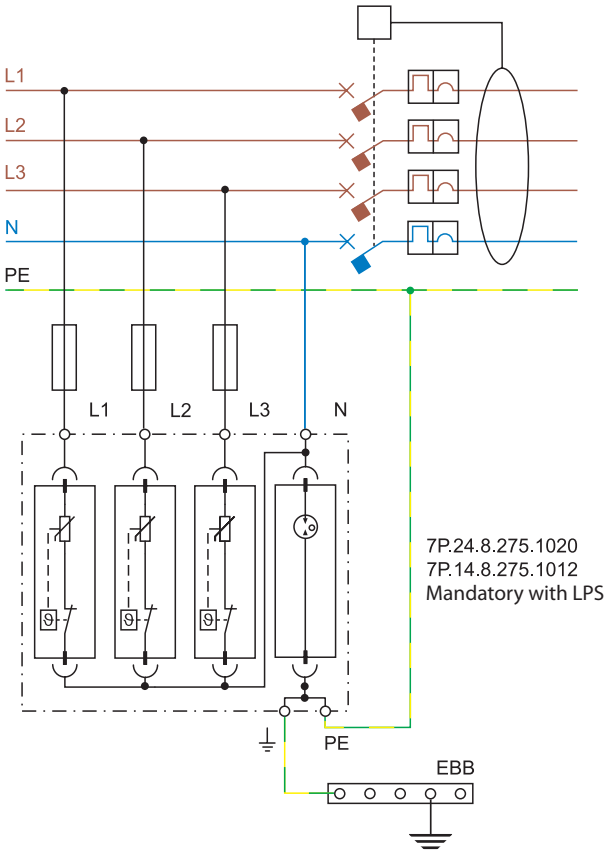


7P.36.8.275.2003

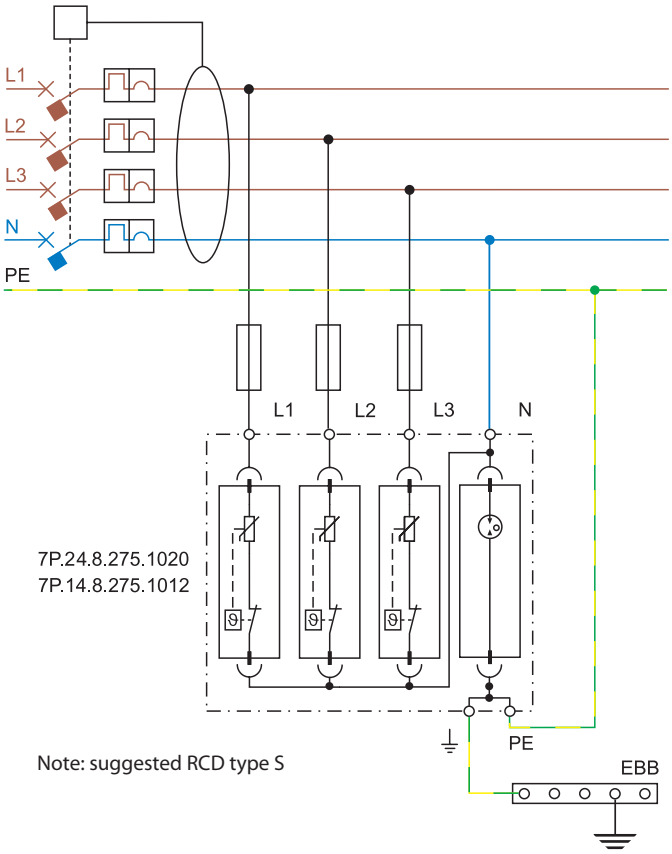
E

Installation example for SPD Type 1 + 2 and Type 2 - Three phase

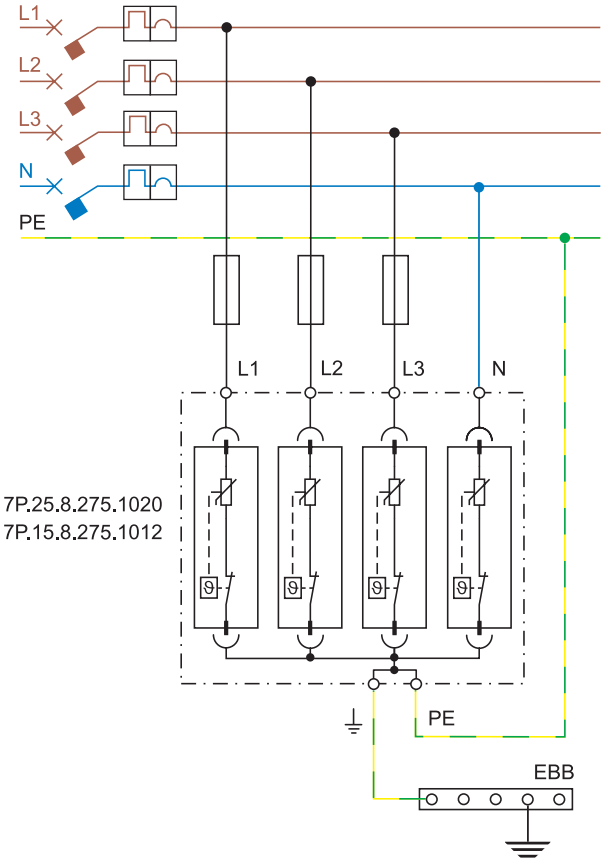
TT-THREE PHASE SYSTEM - SPD UP-STREAM OF RCD



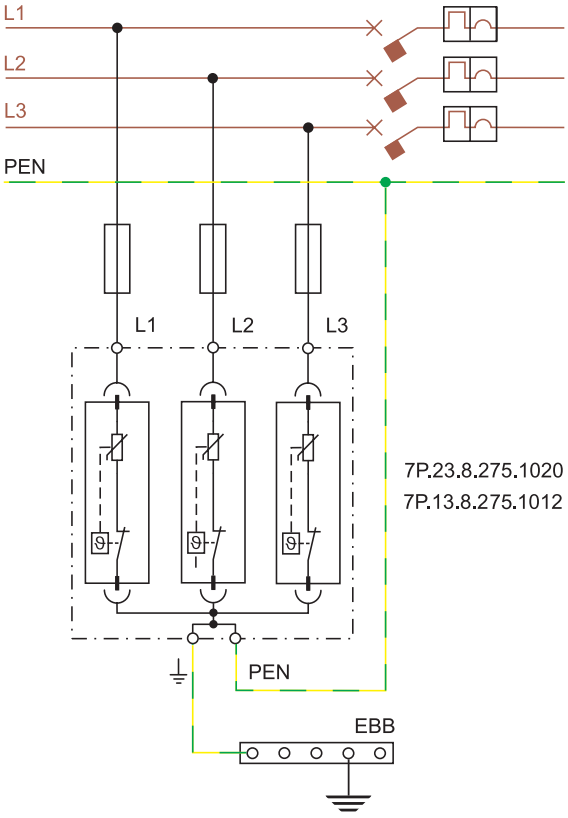
TT or TN-S THREE PHASE SYSTEM - SPD DOWN-STREAM OF RCD



TN-S THREE PHASE SYSTEM - SPD DOWN-STREAM OF OVERCURRENT PROTECTION



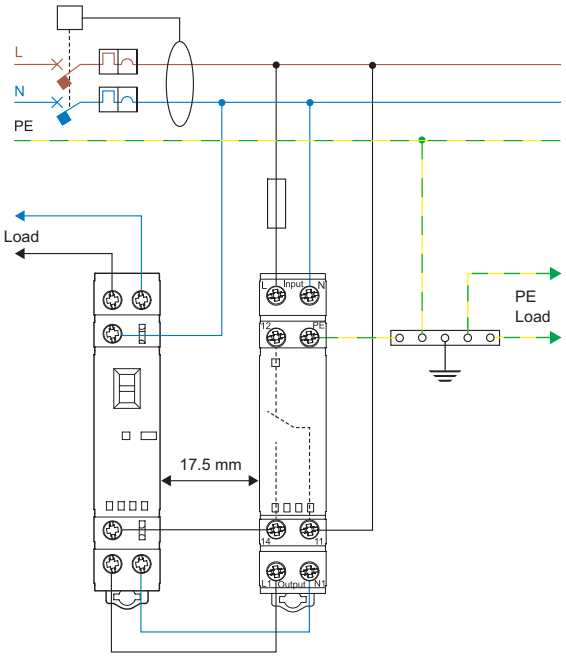
TN-C THREE PHASE SYSTEM - SPD UP-STREAM OF OVERCURRENT PROTECTION



II-2021, www.findernet.com

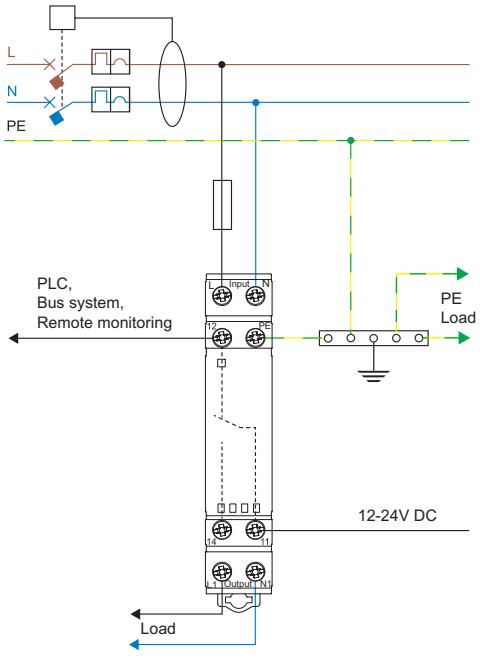
Installation example for SPD Type 3 - Single phase

TT or TN-S SINGLE PHASE SYSTEM - SPD DOWN-STREAM OF RCD
Serial connection



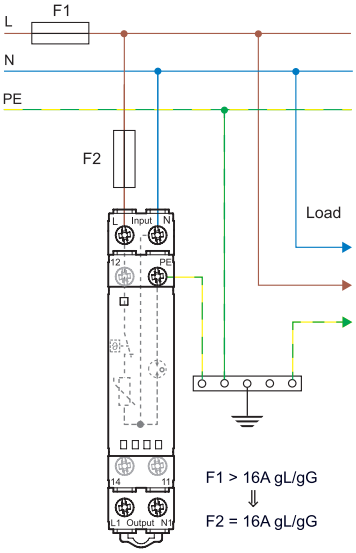
22.32.0.230.X440 7P.37.8.275.1003

TT or TN-S SINGLE PHASE SYSTEM - SPD DOWN-STREAM OF RCD
Serial connection + BUS line



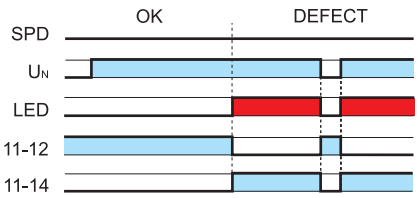
7P.37.8.275.1003

TT, TN-S SINGLE PHASE: parallel connection



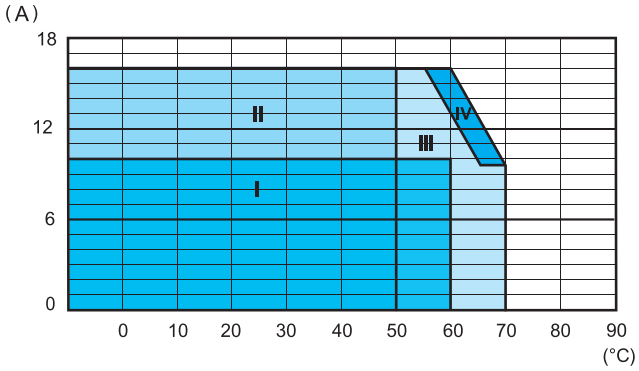
Function

Visual local LED signalling and remote signalling of varistor status

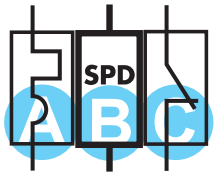


E

L7P Temperature/Current diagram for model 7P.37

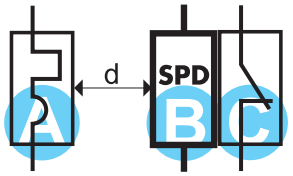


Zone I: SPD and other devices installed as a group (without gap)



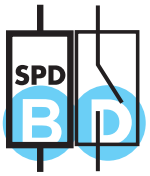
- A MCB = B10A, C10A
- B 7P.37.8.275.1003
- C 22.32.0.xxx.x4x0

Zone II: SPD spaced, at least from one side, from components that generate heat during their operation (17.5 mm gap)



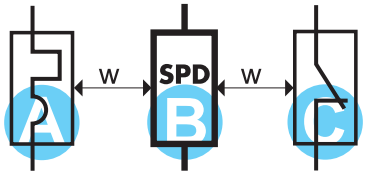
- A MCB = B16A, C16A
- B 7P.37.8.275.1003
- C 22.32.0.xxx.x4x0
- (d) 17.5 mm

- A MCB = B16A, C16A
- B 7P.37.8.275.1003



- B 7P.37.8.275.1003
- D 22.32.0.xxx.x3x0
  22.32.0.xxx.x4x0

Zone III: SPD spaced, on both side, from components that generate heat during their operation (20 mm gap)

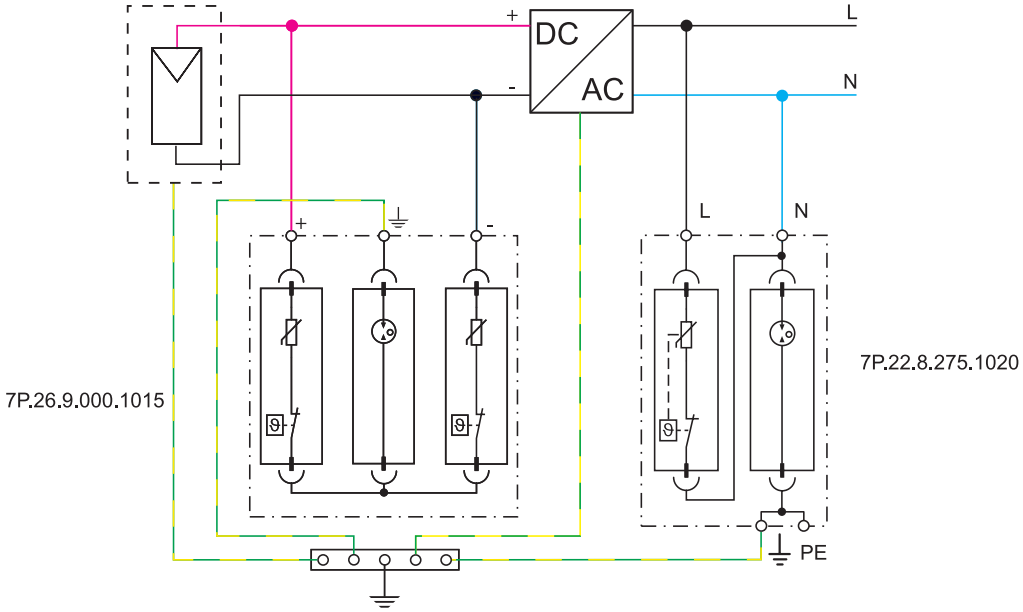


- A MCB = B16A, C16A
- B 7P.37.8.275.1003
- C 22.32.0.xxx.x4x0
- (W) 20 mm

Zone IV: SPD installed individually in free air (without significant influence from nearby components)

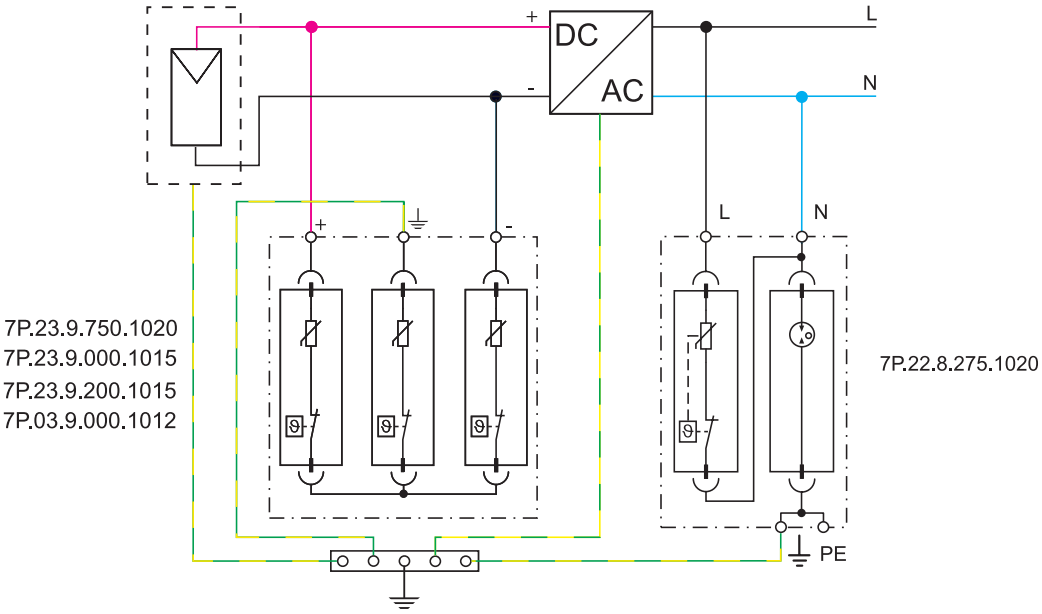
- B 7P.37.8.275.1003

Installation examples - photovoltaic



7P.26.9.000.1015

7P.22.8.275.1020



7P.23.9.750.1020
7P.23.9.000.1015
7P.23.9.200.1015
7P.03.9.000.1012

7P.22.8.275.1020

E

SURGE VOLTAGE PROTECTORS

Surge voltage protectors (such as Finder's Surge Protection Devices, SPD) are intended to be installed in electrical systems, to protect people and machines from surge voltages that can occur on the electrical supply line and which would otherwise have disastrous consequences. These surge voltages can be atmospheric (lightning) or can originate on the electrical system due to, for example: the opening and closing of large loads, short circuits, or the switching of large power factor correction capacitors. The SPD can be described as a switch that is in parallel with the electrical system's supply line - which it is protecting. At the nominal network voltage (e.g. 230 V) the SPD appears as an open switch, having a very high impedance (almost infinite). But, under an overvoltage condition its impedance rapidly falls to near 0 Ω. This effectively applies a short circuit across the supply lines and immediately "drains" the overvoltage to earth. In this way the supply line is protected wherever an SPD is installed. When the overvoltage has passed, the SPD impedance rises rapidly and resumes the state of an open switch again.

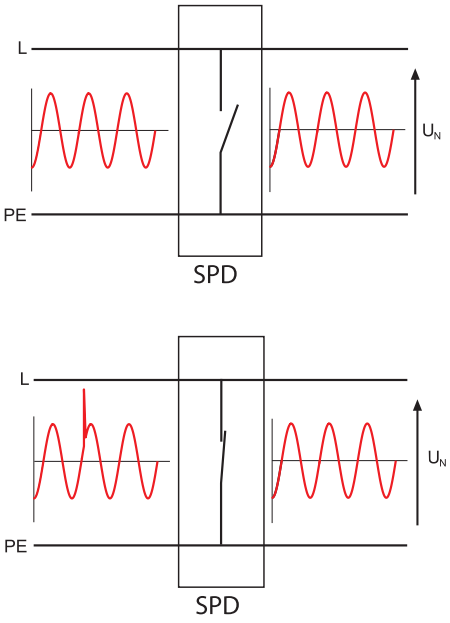


Figure 1: Ideal operation of an SPD

SPD technologies

Finder surge voltage protectors use either varistors or spark gaps.

Varistor: This can be considered as a variable resistance that at nominal voltage has a very high ohmic value. But the resistance rapidly falls to near zero as the voltage surges. In this way the varistor applies a near short circuit which clamps the surge voltage. The varistor is however subject to progressive degradation due to the small leakage current that occurs at the nominal voltage, and with the number of interventions. With every overvoltage that occurs the leakage current rises and accelerates the end of life for the device - which is ultimately indicated by the change from green to red in the signal-window.

Spark gap: This comprises two electrodes separated by air, or a gas. When a surge voltage occurs an electrical arc bridges the gap and a surge current flows to limit the surge voltage to a low and constant level. The arc extinguishes only when the surge current falls below about 10 ampere. The gas guarantees a constant level of breakdown voltage since the arc is struck in a protected environment; not exposed to pressure or humidity variations or impurities as would happen if it had occurred in air. There is however, a delay before the device arcs and the surge current is diverted, and this is dependent on the magnitude of the original voltage surge and on its rate of rise. Therefore, the voltage protection level can vary, although it is guaranteed to be less than U_p.

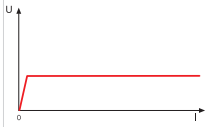
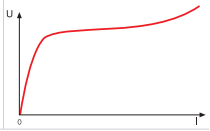
Component	Symbol	Leakage current	Energy dissipated	Response time	Voltage/Current characteristic
Ideal		0	High	Fast	
Spark gap		0	High	Medium	
Varistor		Very Low	Medium	Fast	

Figure 2: SPD component characteristics.

Installation (Overvoltage) categories

Choosing the SPD requires matching the Rated Impulse Voltage of the SPD with that of the equipment to be protected. This in turn relates to the Installation category (Overvoltage category). Installation categories are described within IEC 60664-1, which for a 230/400 V installation prescribes as follows:

- **Installation category I:** 1.5 kV for "particularly sensitive" equipment (e.g. electronic devices like PC or TV set);
- **Installation category II:** 2.5 kV for "user" equipment subject to "normal" impulse voltages (e.g. household electrical appliances, mobile items);
- **Installation category III:** 4 kV for equipment that are part of a fixed installation (e.g. switchboards, switches)
- **Installation category IV:** 6 kV for equipment installed at or near the origin of main incoming supply mains (e.g. energy meters).

Lightning Protection Zones and installation considerations

International standards refer to the various Lightning Protection Zones by the letters LPZ followed by an appropriate number.

LPZ 0A: An external area, where a direct lightning strike is possible and where there is total exposure to the electromagnetic field induced by the lightning.

LPZ 0B: An external area, but below a lightning conductor providing direct lightening strike protection. There remains total exposure to the electromagnetic field.

LPZ 1: Area within a building – therefore protected from direct lightning strike. The electromagnetic field will be attenuated, depending on the degree of shielding. This zone has to be protected by SPD type 1 device(s) at its boundary with the LPZ 0A or 0B zone.

LPZ 2: An area, typically a room, where the lightning current has been limited by preceding surge protectors. This zone has to be protected by SPD type 2 device(s) at its boundary with the LPZ 1 zone.

LPZ 3: An area within a room where the lightning current has been limited by preceding surge protectors (typically the wiring after a socket or an area within a metal enclosure).

This zone has to be protected by SPD type 3 device(s) at its boundary with the LPZ 2 zone. On the following picture (Figure 3, representation is not binding) it is shown that the transition from a protection zone to the next is through the installtion of SPD. SPD Type 1 must be connected upstream the system, at the point of delivery connection. As an alternative it is possible to use SPD Type 1+2. The grounding conductor must have a minimum section of 6 mm² for SPD Type 1, of 4 mm² for SPD Type 2, and 1.5 mm² for SPD Type 3 (If the building has an LPS, reference should be made to CEI 81-10/4 for the correct dimension of the cable).

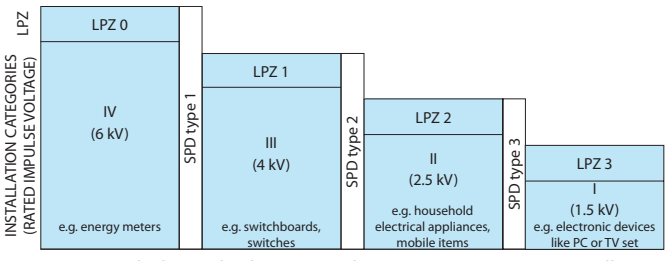


Figure 3: Typical relationship between Lightning Protection Zones, Installation Categories and SPD types

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Rated values and marking common to all SPD

[U_C] Maximum continuous operating voltage: Under this voltage the SPD is guaranteed to appear as an "open switch". This voltage is normally at least equal to the nominal supply voltage (U_N) +10%. For the Finder SPD, U_C is specified as 275 V.

[U_p] Voltage protection level: This is the highest voltage level seen across the SPD during its intervention. For example, for Finder SPD Type 2, this means that a 4 kV overvoltage would be limited by the SPD to a maximum 1.2 kV. Consequently, electronic devices such as PC, TV, stereo, etc. are protected - as their own internal protection will handle overvoltages U_p to 1.5 kV.
To better understand this concept; imagine that the SPD is a switch in series a low resistance. In the case of an overvoltage the switch closes and all the current goes through the resistance. According to Ohm's law the voltage developed across the resistance will be this resistance x the current (V = R x I), and will be limited to < U_p.

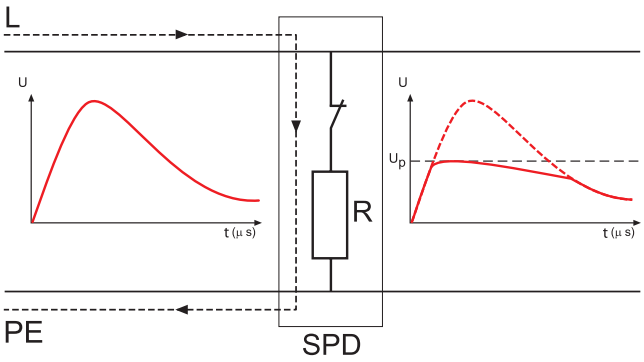


Figure 4: Overvoltage limiting

Short circuit proof: A further characteristic, not normally marked on the product but important for its correct installation, is the Short circuit proof at maximum overcurrent protection. This is the maximum short-circuit current that the SPD is able to withstand when it is installed with additional maximum overcurrent protection - such as a fuse rated in accordance with the value stated under the SPD specification. Consequentely the maximum prospective short-circuit current of the system at the point of installation of the SPD must not exceed this value.

Rated vaules and marking of SPD Type 1

SPD Type 1 must be connected upstream the system, at the point of delivery of power energy. SPD protects building and people from the risk of direct lightning (fire and death) and are characterized by:

[I_{imp}10/350] Impulse current: I_{imp} corresponds to the peak value of a 10/350 µs current impulse waveform. This waveform represents a direct lightning strike and is used in tests to prove the performance of SPD type 1 devices.

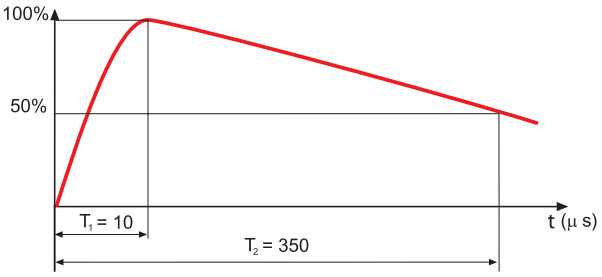


Figure 5: 10/350 µs current waveform

Comparison of the waveforms in figures 5 and 6 shows the much higher energy content controlled by the type 1 SPD.

[I_n8/20] Nominal discharge current: The peak current (and waveform shape) through the SPD under conditions prescribed by EN 62305 to represent the surge current as a consequence of a lightning strike to the electric supply line.

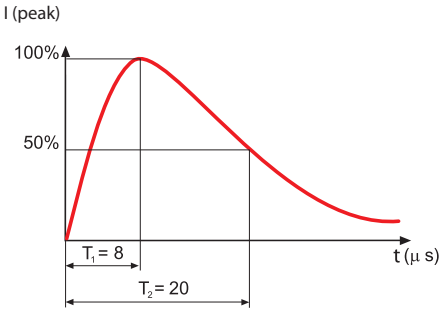


Figure 6: 8/20 µs current waveform

Rated values and marking of SPD Type 2

SPD Type 2 devices are designed to remove all the overvoltage from supply circuits that are not likely to be directly hit by lightning. SPD Type 2 are connected downstream SPD Type 1 or SPD Type 1+2, (minimum distance 1 m) and they protect machine and tools connected to the ground and reduce the risk of economic loss.
SPD Type 2 are characterized by:

[I_n8/20] Nominal discharge current: The peak current (and waveform shape) through the SPD under conditions prescribed by EN 62305 to represent the surge current as a consequence of a lightning strike to the electric supply line.

[I_{max}8/20] Maximum discharge current: Peak value of the highest current of a 8/20 µs waveform that an SPD can discharge at least once without breaking.

Rated values and marking of SPD Type 3

SPD type 3 devices are used to protect the end user from overvoltage.
They may be installed in supply networks where SDP types 1 and/or 2 already exist. They can be installed in fixed or mobile sockets and have the following characteristic parameters.

U_{oc}: test voltage. This is the peak value of the no load voltage of the combined test-generator; this has a waveform of 1.2/50 µs (figure 7) and can supply at the same time current with waveform 8/20 µs (figure 6).

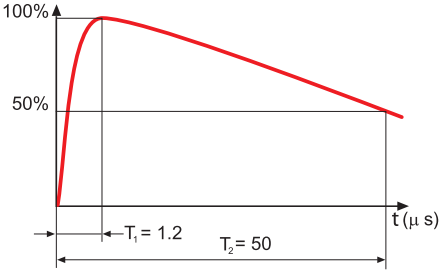
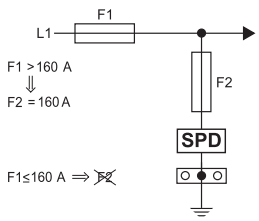


Figure 7: 1.2/50 µs voltage waveform

Suggestion for the connection

The correct connection of SPD requires a shortest as possible connection to the local equipotential bar, to which are connected PE cables of the equipment to be protected. From the local equipotential bar there is a connection to the EBB. The phase wiring remains appropriate to the load.



Short-circuit protection for the SPD is provided by the overcurrent protective devices (fuses type gL/gG) recomended.

In AC applications if the overcurrent protective devices F1 (which are part of the installation) have a rating smaller than or equal to the maximum recommended rating for the overcurrent protective devices for the SPD, then F2 (back up fuse), can be omitted.

7P.0X:

If F1 > 250 A, then F2 = 250 A

If F1 <= 250 A, F2 can be omitted

7P.1X, 7P.2X:

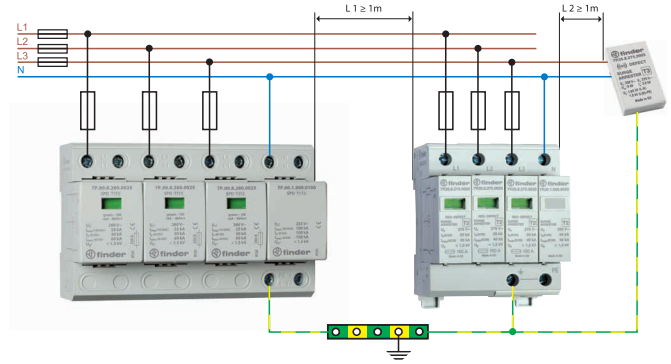
If F1 > 160 A, then F2 = 160 A

If F1 <= 160 A, F2 can be omitted

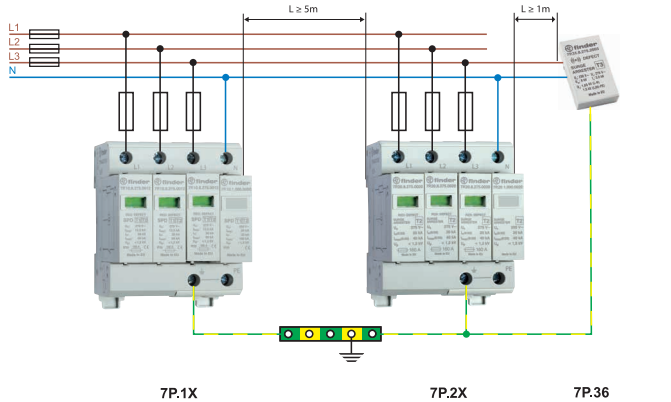
For DC applications the back up fuse must be always used.

Coordination of SPD

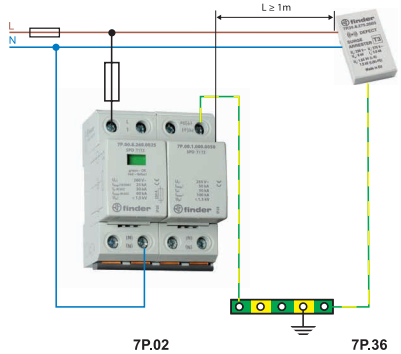
Optimal protection from surges requires cascaded coordinated SPDs. Coordination has the purpose of splitting the energy associated with voltage across the SPDs and it is achieved by introducing an impedance between the SPDs, or alternatively, by connecting them using wires having the minimum length indicated in the figures below, in order to use the cable's own impedance.



7P.0X 7P.2X 7P.36



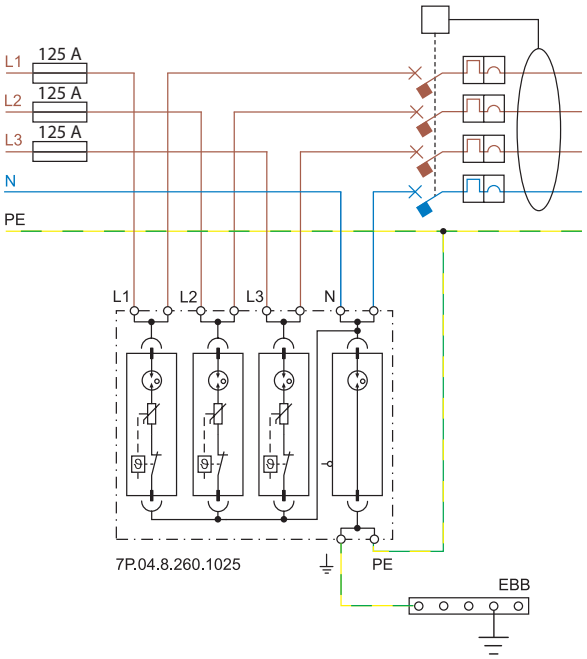
7P.1X 7P.2X 7P.36



7P.02 7P.36

V-shape connection

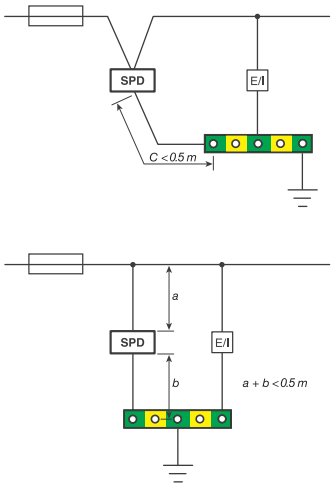
Using a V-shaped connection eliminates transferring downstream the inductive voltage generated by the surge current in the connecting wire to the SPD. This increases the protection to the system and equipment downstream. A limitation of this connection is that the nominal current for the downstream system is limited to 125 A, which is the maximum current permitted through the double SPD terminals.



For systems where the rated current is greater than 125 A, it is necessary to connect the SPD in parallel with the equipment (E/I).

Connecting cable

Depending on the type of connection, serial (V-shape) or parallel (T-shape), ensure that both the maximum cable lengths and minimum cross section of the connecting wires are respected in accordance with the information below (IEC 60634-5-534):



The section of the connecting wires (copper) must not be less than:
SPD Type 1: 16 mm² if it is subject to discharge a significant lightning current, 6 mm² otherwise
SPD Type 2: 6 mm²
SPD Type 3: 1.5 mm²

PROTECTING PHOTOVOLTAIC (PV) SYSTEMS AGAINST LIGHTNING

Installation characteristics

[U_{OCSTC}] PV voltage: Open circuit voltage, measured under standardized test conditions, of the PV module, panel, array, or the DC side of the photovoltaic inverter. prEN 50539-12.

[I_{SCSTC}]: Short-circuit current: Short-circuit current, measured under standardized test conditions, of the PV module, panel, array, or photovoltaic inverter. prEN 50539-12.

[U_{CPV}] SPD Maximum continuous operating voltage: Must be equal or greater than to 1.2 times U_{OCSTC} in all conditions of radiation and temperature. prEN 50539-11, prEN 50539-12.

[I_{SCPV}]: Maximum prospective short-circuit current from the power system for which the SPD, in conjunction with the disconnectors specified, is rated. EN 50539-11.

System installation

Photovoltaic systems are generally located external to a building and can be subjected to the direct or indirect effects of lightning.
Whilst the installation of photovoltaic panels on the roof does not, in itself, increase the risk of direct lightning, the only practical way to protect against the effects of a direct lightning strike would be the use of a lightning protection system (LPS).
The indirect effects of lightning can however, be mitigated by the appropriate use of Surge Protection Devices (SPD). These indirect effects occur when lightning strikes in proximity to the structure and where magnetic induction creates an overvoltage in the conductors – a danger to both people and equipment. In particular, the DC cables of a PV system would be exposed to the high conducted and radiated disturbances caused as a result of the lightning currents. In addition, overvoltages in PV systems are not only of atmospheric origin. It is also necessary to consider overvoltages due to switching on electrical networks connected to them. These overvoltages can also damage both the inverter and the PV panels, and this explains the need to protect the inverter on both DC and AC sides.

Photovoltaic system on a building without a lightning protection system (LPS)

As an example, Figure 10 represents a simplified photovoltaic system placed on a building without lightning rod. In such a system, the protection against lightning must be considered at the following points of installation:

- DC input of the inverter
- AC output of the inverter
- Low voltage supply network

At the DC input to the inverter SPDs specific for photovoltaic systems must be installed, according to the PV system voltage. At the inverter AC output, type 2 surge arresters must be installed suitable for the type of system. At the point of connection to the LV supply network, install type 2 surge arresters suitable to the type of system (TT, TN). In more complex systems, it might be necessary to introduce additional SPDs. DC side: if the distance between the inverter and PV modules exceeds 10 m, it is necessary to replicate and install the SPD as close as possible to the PV modules.

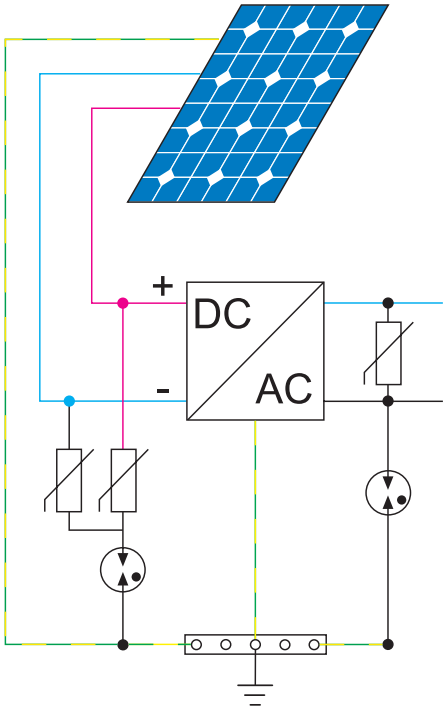


Figure 10: Example of a photovoltaic system located on a building without LPS, protected on the DC side by an SPD with U_{OCSTC} = 420 V, and on the AC side by a 7P.22, specific for TT systems.

Photovoltaic system on a building with a lightning protection system (LPS)

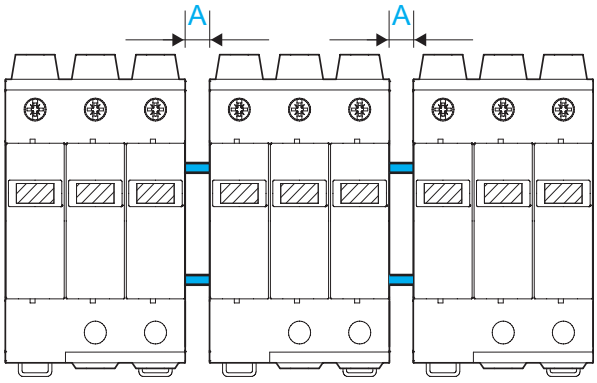
Where an LPS exists it is good practice to install the photovoltaic panels in the area protected by the lightning rod.
In addition it is necessary to realize a good equipotential bonding system, which must be positioned as close as possible to the entry point of LV supply into the structure. The LPS, the SPD and all metal parts have to be connected to this equipotential system.
SPD protection on the DC depends on the safety distance (referred in EN 50539-12:12-2012).
Note that under EN 62305 installation of a Type 1 SPD is mandatory at the point of delivery of the AC electricity supply, whether or not the building has LPS (with or without solar panels).

SPD fuse protection

Conforming to prEN 50539-11:2010, Finder SPDs are equipped with a thermal disconnector able to safely disconnect a worn or damaged varistor up to a value of short-circuit current equal to the short-circuit current withstand value (I_{scpv}), as specified in the technical data.
Ensure that the PV short circuit current $I_{sc} < I_{scpv}$.
Ensure that the PV short circuit current $I_{sc} < I_{scpv}$ or increase the number of the strings.

Insulation distances and wiring

To conform with prEN 50539-11 insulation distances and minimum wiring cross section must be respected.



Insulation distances		Minimum Wiring [mm²]	
U_{CPV}(SPD) ≥ 1.2 x U_{OCSTC}	A [mm]	+/– Poles	Ground
750 V DC	5	4	6
1000 V DC	5	4	6
1500 V DC	10	4	6

finder
SWITCH TO THE FUTURE

Switch mode power supplies

78
SERIES

- Building automation
- Elevators and lifts
- Automation for blinds, grilles and shutters
- Hoists and cranes
- Panels for electrical distribution
- Pump Control

12 W Low profile Modular DC Power Supplies for electrical cabinets

Type 78.12....2400
- Output 24 V DC, 12 W
- 17.5 mm (1 module) x 61 mm deep

Type 78.12....1200
- Output 12 V DC, 12 W
- 17.5 mm (1 module) x 61 mm deep

- Low (< 0.4 W) stand-by power consumption
- Thermal protection: internal, with V_{out} shutdown - power OFF to reset
- Short circuit protection: Hiccup (auto-recovery) mode
- Overvoltage protection: Varistor
- Flyback topology
- Compliant with EN 60950-1 and EN 61204-3
- Parallel working for automatic redundancy - with OR diodes
- Dual Polarity and Series connection permissible
- 35 mm rail (EN 60715) mount

Screw terminal

For outline drawing see page 25

	78.12....2400	78.12....1200
		
	• 24 V DC, 12 W output	• 12 V DC, 12 W output

* (see diagrams P78)
** peak to peak, 100 Hz component, with 100 V AC input
*** 88…100 V AC with output current limited to 80% I_N
**** (see derating diagrams L78)

Output specification				
Output current (–20…+40 °C, 230 V AC input)		A	0.63	1.25
Rated current I_N (50 °C, full input operating range)		A	0.50	1
Rated voltage		V	24	12
Rated power		W	12	12
Output power (–20…+40 °C, 230 V AC input)		W	15	15
Peak current capability for 3 ms*		A	2	3
Output voltage adjust		V	—	—
Voltage variation (from no-load to full-load)			< 1%	< 1%
Voltage ripple @ full load**		mV	< 200	< 200
Hold-up time @ full load:	with 100 V AC input	ms	> 10	> 10
	with 260 V AC input	ms	> 90	> 90
Input specification				
Nominal voltage (U_N)	V AC (50/60 Hz)		110…240	110…240
	V DC (not polarized)		220	220
Operating range	V AC (50/60 Hz)		100…265***	100…265***
	V DC		140…370	140…370
Max power consumption		VA	28.2	32
(@ 100 V AC, 50 Hz)		W	14.2	17.2
Stand-by power consumption		W	< 0.4	< 0.4
Power factor			0.50	0.53
Max current consumption (@ 88 V AC)		A	0.25	0.30
Max. inrush current (peak @ 265 V) for 3 ms		A	10	10
Replaceable input fuse			—	—
Technical data				
Efficiency (@ 230 V AC)		%	85	87
MTTF		h	> 400 · 10^3	> 400 · 10^3
Start-up delay		s	< 1	< 1
Dielectric strength between input/output		V AC	2500	2500
Dielectric strength between input/PE		V AC	—	—
Ambient temperature range****		°C	–20…+60	–20…+60
Protection category			IP 20	IP 20
Approvals (according to type)			CE EAC	

78 SERIES
Switch mode power supplies

25 W Low profile Modular DC Power Supplies for electrical cabinets

Type 78.25....2400
- Output 24 V DC, 25 W
- 35 mm (2-module) x 61 mm deep

Type 78.25....1200
- Output 12 V DC, 25 W
- 35 mm (2-module) x 61 mm deep

- Low (< 0.4 W) stand-by power consumption
- Thermal protection: internal, with V_{out} shutdown - power OFF to reset
- Short circuit protection: Hiccup (auto-recovery) mode
- Overvoltage protection: Varistor
- Flyback topology
- Compliant with EN 60950-1 and EN 61204-3
- Parallel working for automatic redundancy - with OR diodes
- Dual Polarity and Series connection permissible
- 35 mm rail (EN 60715) mount

Screw terminal

For outline drawing see page 25

	78.25....2400	78.25....1200
		
	• 24 V DC, 25 W output	• 12 V DC, 25 W output

* (see diagrams P78)
** peak to peak, 100 Hz component, with 100 V AC input
*** 88…100 V AC with output current limited to 80% I_N
**** (see derating diagrams L78)

Output specification			
Output current (–20…+40 °C, 230 V AC input)	A	1	2.1
Rated current I_N (50 °C, full input operating range)	A	0.75	1
Rated voltage	V	24	12
Rated power	W	25	25
Output power (–20…+40 °C, 230 V AC input)	W	25	25
Peak current capability for 3 ms*	A	3	4
Output voltage adjust	V DC	—	—
Voltage variation (from no-load to full-load)		< 1%	< 1%
Voltage ripple @ full load**	mV	< 200	< 200
Hold-up time @ full load: with 100 V AC input	ms	>40	> 40
with 260 V AC input	ms	>100	> 100
Input specification			
Nominal voltage (U_N) V AC (50/60 Hz)		110…240	110…240
V DC (not polarized)		220	220
Operating range V AC (50/60 Hz)		100…265***	110…265***
V DC		140…370	140…370
Max power consumption	VA	56.4	56
(@ 100 V AC, 50 Hz)	W	27.5	27.3
Stand-by power consumption	W	≤ 0.5	≤ 0.30
Power factor		0.50	0.50
Max current consumption (@ 88 V AC)	A	0.43	0.43
Max. inrush current (peak @ 265 V) for 3 ms	A	20	20
Replaceable input fuse		—	—
Technical data			
Efficiency (@ 230 V AC)	%	89	89
MTTF	h	$> 400 \cdot 10^3$	$> 400 \cdot 10^3$
Start-up delay	s	< 1	< 1
Dielectric strength between input/output	V AC	2500	2500
Dielectric strength between input/PE	V AC	—	—
Ambient temperature range****	°C	–20…+60	–20…+60
Protection category		IP 20	IP 20
Approvals (according to type)		CE EAC	

36 W, 60 W and 50 W High efficiency, low profile Modular DC Power Supplies for electrical cabinets

Type 78.36
- Output 24 V DC, 36 W
- Input fuse: Easily replaceable plus spare
- 70 mm (4-module) wide x 61 mm deep

Type 78.60
- Output 24 V DC, 60 W

Type 78.50
- Output 12 V DC, 50 W

- High efficiency (up to 91%)
- Low (< 0.4 W) stand-by power consumption
- Thermal protection: internal, with V_{out} shutdown - power OFF to reset
- Short circuit protection: Hiccup (auto-recovery) mode
- Input fuse: Easily replaceable plus spare
- Overvoltage protection: Varistor
- Flyback topology
- ZVS (Zero-voltage-switching), quasi-resonant mode switching
- Compliant with EN 60950-1 and EN 61204-3
- Parallel working for automatic redundancy - with OR diodes
- Dual Polarity and Series connection permissible
- Compact dimensions: 70 mm (4-modules) wide, 61 mm deep
- 35 mm rail (EN 60715) mount

Screw terminal

For outline drawing see page 25

	78.36	78.60	78.50
			
	• 24 V DC, 36 W output	• 24 V DC, 60 W output • Output adjustable between 24-28 V • ZVS technology	• 12 V DC, 50 W output • Output adjustable between 12-14 V • ZVS technology
	Replaceable fuse + spare		
			

* (see diagrams P78)
** peak to peak, 100 Hz component, with 100 V AC input
*** 88…100 V AC with output current limited to 80% I_N
**** (see derating diagrams L78)

Output specification				
Output current (–20…+40 °C, 230 V AC input)	A	1.7	2.8	4.6
Rated current I_N (50 °C, input (100…265)V AC - (140…370)V DC	A	1.5	2.5	4.2
Rated voltage	V	24	24	12
Rated power	W	36	60	50
Output power (–20…+40 °C, 230 V AC input)	W	40	68	55
Peak current capability for 3 ms*	A	8	10	12
Output voltage adjust	V	—	24…28	12…14
Voltage variation (from no-load to full-load)		< 1%	< 1%	< 1%
Voltage ripple @ full load**	mV	< 200	< 200	< 200
Hold-up time @ full load: with 100 V AC input	ms	> 20	> 20	> 30
with 260 V AC input	ms	> 100	> 130	> 150
Input specification				
Nominal voltage (U_N)	V AC (50/60 Hz)	110…240	110…240	110…240
	V DC (not polarized)	220	220	220
Operating range	V AC (50/60 Hz)	100…265***	88…265	88…265
	V DC	140…370	140…370	140…370
Max power consumption	VA	57.5	90	89
(@ 100 V AC, 50 Hz)	W	43	67.5	58.3
Stand-by power consumption	W	< 0.4	< 0.4	< 0.4
Power factor		0.74	0.75	0.65
Max current consumption (@ 88 V AC)	A	0.6	0.9	0.85
Max. inrush current (peak @ 265 V) for 3 ms	A	12	30	30
Replaceable input fuse		1 A - T	1.6 A - T	1.6 A - T
Technical data				
Efficiency (@ 230 V AC)	%	86	91	90
MTTF	h	> 600 · 10³	> 500 · 10³	> 400 · 10³
Start-up delay	s	< 1	< 1	< 1
Dielectric strength between input/output	V AC	3000	3000	3000
Dielectric strength between input/PE	V AC	—	1500	1500
Ambient temperature range****	°C	–20…+70	–20…+70	–20…+70
Protection category		IP 20	IP 20	IP 20
Approvals (according to type)		CE EAC		

60 W and 50 W High efficiency, low profile Modular DC Power Supplies for electrical cabinets

Fold-Back overload characteristics for Battery charging applications and parallel working for increased load current

Type 78.61
- Output 24 V DC, 60 W

Type 78.51
- Output 12 V DC, 50 W

- High efficiency (up to 91%)
- Low (< 0.4 W) stand-by power consumption
- Thermal protection: internal, with V_{out} shutdown - power OFF to reset
- Short circuit protection: Hiccup (auto-recovery) mode
- Overload protection: Fold-back mode
- Input fuse: Easily replaceable plus spare
- Overvoltage protection: Varistor
- Flyback topology
- ZVS (Zero-voltage-switching), quasi-resonant mode switching
- Compliant with EN 60950-1 and EN 61204-3
- Parallel working for increased load current (with OR diodes)
- Dual Polarity and Series connection permissible
- Compact dimensions: 70 mm (4-modules) wide, 60 mm deep
- 35 mm rail (EN 60715) mount

Screw terminal

For outline drawing see page 25

	78.61	78.51
		
	• 24 V DC, 60 W output • Output adjustable between 24-28 V • ZVS technology • Suitable for battery charging	• 12 V DC, 50 W output • Output adjustable between 12-15 V • ZVS technology • Suitable for battery charging
	Replaceable fuse + spare	
		

* (see diagrams P78)
** peak to peak, 100 Hz component, with 100 V AC input
*** (see derating diagrams L78)
suitable for battery charging (see details page 18)

			78.61	78.51
Output specification				
Output current (–20…+40 °C, 230 V AC input)		A	2.6	4.6
Rated current I_N (50 °C, input (100…265)V AC - (140…370)V DC		A	2.5	4.2
Rated voltage		V	24	12
Rated power		W	60	50
Output power (–20…+40 °C, 230 V AC input)		W	68	55
Peak current capability for 3 ms*		A	8	12
Output voltage adjust		V	24…28	12…15
Voltage variation (from no-load to full-load)			< 1%	< 1%
Voltage ripple @ full load**		mV	< 200	< 200
Hold-up time @ full load:	with 100 V AC input	ms	> 20	> 30
	with 260 V AC input	ms	> 130	> 150
Input specification				
Nominal voltage (U_N)	V AC (50/60 Hz)		110…240	110…240
	V DC (not polarized)		220	220
Operating range	V AC (50/60 Hz)		88…265	88…265
	V DC		140…370	140…370
Max power consumption		VA	90	89
(@ 100 V AC, 50 Hz)		W	67.5	58.3
Stand-by power consumption		W	< 0.4	< 0.4
Power factor			0.75	0.65
Max current consumption (@ 88 V AC)		A	0.9	0.85
Max. inrush current (peak @ 265 V) for 3 ms		A	30	30
Replaceable input fuse			1.6 A - T	1.6 A - T
Technical data				
Efficiency (@ 230 V AC)		%	91	90
MTTF		h	> 500 · 10³	> 400 · 10³
Start-up delay		s	< 1	< 1
Dielectric strength between input/output		V AC	3000	3000
Dielectric strength between input/PE		V AC	1500	1500
Ambient temperature range***		°C	–20…+70	–20…+70
Protection category			IP 20	IP 20
Approvals (according to type)			CE EAC	

Industrial Switch Mode DC Power Supplies: 110 W to 130 W

Type 78.1A
- Output 24 V DC, 120 W

Type 78.1B
- Output 24 V DC, 110 W, compact size
- Secure electrical separation (SELV according to EN 60950)

Type 78.1D
- Output 24 V DC, 130 W
- Double stage active Power Factor Correction

- Fold-Back overload characteristics for Battery charging applications and parallel working for increased load current (78.1D)
- High efficiency (up to 93%)
- Low stand-by power consumption (down to 1 W)
- LLC (78.1B) or forward topology (78.1D)
- Thermal protection: internal with pre-alert alarm via LED and auxiliary contact, and with V_{out} safety shutdown - power OFF to reset (78.1D)
- Overload indication: Pre-alert alarm via LED and auxiliary contact indication (78.1D)
- Boost current: Without time limit, with LED and auxiliary contact indication (78.1D)
- Overload protection: Fold-back mode (78.1D)
- Short circuit protection: Hiccup (auto-recovery) mode
- Input fuse: Easily replaceable plus spare
- Overvoltage protection: Varistor
- Compliant with EN 60950-1 and EN 61204-3
- Parallel working for increased load current (with OR diodes)
- Dual Polarity and Series connection permissible
- 35 mm rail (EN 60715) mount

For outline drawing see page 25, 26, 27

NEW **78.1A**

- 24 V DC, 120 W output
- Output adjustable between 24-28 V

78.1B

- 24 V DC, 110 W output
- Output adjustable between 24-28 V
- Compact size, low stand-by consumption

78.1D

- 24 V DC, 130 W output
- Output adjustable between 24-28 V
- Double stage with active PFC (Power Factor Correction)

Replaceable fuse + spare

Thermal protection with LED indication

(depending on type)

Auxiliary contact signalling

* (see diagrams P78)
** peak to peak, 100 Hz component, with 120 V AC input
*** (see derating diagrams L78)
+/- suitable for battery charging (see details page 18)

Output specification				
Output current (–20…+50 °C, 230 V AC input)	A	5.0 (@40 °C)	5.0 (@40 °C)	5.4 (@50 °C)
Output current (–20…+50 °C, 120 V AC input)	A	4.5 (@40 °C)	4.5 (@40 °C)	5.4 (@50 °C)
Rated voltage	V	24	24	24
Rated power	W	120	110	130
Output power (–20…+40 °C, 230 V AC input)	W	120	120	130
Peak current capability for 5 ms*	A	10	10	10
Output voltage adjust	V DC	24…28	24…28	24…28
Voltage variation (from no-load to full-load)		< 2%	< 3%	< 1%
Voltage ripple @ full load**	mV	< 500	< 300	< 100
Hold-up time @ full load: with 120 V AC input	ms	>25	>20	> 20
with 250 V AC input	ms	>110	>90	> 20
Input specification				
Nominal voltage (U_N)	V AC (50/60 Hz)	120…240	120…240	110…240
	V DC	—	220	110…240
Operating range	V AC (50/60 Hz)	120…250	100…265	88…265
	V DC	—	140…275 (polarized)	95…275 (non-polarized)
Drop out DC Voltage	V	—	110	80
Max power consumption	VA	195 (@50 Hz)	268 (@50 Hz)	145 (@50 Hz)
(@ minimum V AC operating range)	W	134 (@50 Hz)	133 (@50 Hz)	145 (@50 Hz)
Stand-by power consumption	W	< 1.9	< 1.0	< 3.3
Power factor		0.69	0.5	0.998
Max current consumption	A	1.75 (@120 V AC)	1.75 (@115 V AC)	1.6 (@88 V AC)
Max. inrush current (peak @ 250 V) for 3 ms	A	13	12	12
Replaceable input fuse		—	3.15 A - T	2.5 A - T
Technical data				
Efficiency (@ 230 V AC)	%	92	93	89
MTTF	h	> 500 · 10^3	> 500 · 10^3	> 400 · 10^3
Start-up delay	s	< 3	< 1	< 1
Dielectric strength between input/output	V AC	2000	2500 (SELV)	2500
Dielectric strength between input/PE	V AC	—	1500	1500
Ambient temperature range***	°C	–20…+60	–20…+70	–20…+70
Protection category		IP 20	IP 20	IP 20
Approvals (according to type)		CE EAC cULus	CE EAC cULus	CE EAC cULus

F

78 SERIES
Switch mode power supplies

Industrial Switch Mode DC Power Supply: 240 W

High efficiency PSU with high peak output current and low stand by power consumption

Type 78.2A

- Output 24 V DC, 240 W

- High efficiency (up to 94%)
- Low stand-by power consumption
- LLC topology
- Thermal protection internal, power OFF to reset
- Boost current: Without time limit
- Short circuit protection: Hiccup (auto-recovery) mode
- Overvoltage protection: Varistor
- Compliant with EN 61204-3
- Parallel working for increased load current (with OR diodes)
- Dual Polarity and Series connection permissible
- 35 mm rail (EN 60715) mount

Screw terminal

NEW **78.2A**

- 24 V DC, 240 W output
- Output adjustable between 24-28 V

* (see diagrams P78)
** peak to peak, 100 Hz component, with 100 V AC input
*** (see derating diagrams L78)
suitable for battery charging

For outline drawing see page 27

F

Output specification		
Output current (–20…+40 °C, 230 V AC input)	A	10
Output current (–20…+40 °C, 120 V AC input)	A	9
Rated voltage	V	24
Rated power	W	240
Output power (–20…+40 °C, 230 V AC input)	W	240
Peak current capability for 5 ms*	A	25
Output voltage adjust	V DC	24…28
Voltage variation (from no-load to full-load)		< 3%
Voltage ripple @ full load**	mV	< 300
Hold-up time @ full load: with 100 V AC input	ms	> 30
with 250 V AC input	ms	> 50
Input specification		
Nominal voltage (U_N)	V AC (50/60 Hz)	120 or 230
Operating range	V AC (50/60 Hz)	95…130 or 185…250
Drop out DC Voltage	V	—
Max power consumption	VA	361 (@ 50 Hz)
(@ minimum V AC operating range)	W	265 (@ 50 Hz)
Stand-by power consumption	W	≤ 3 @ 120 V ; ≤ 2.6 W @ 230 V
Power factor		0.73
Max current consumption	A	3.5 (@ 100 V AC)
Max. inrush current (peak @ 265 V) for 3 ms	A	14
Replaceable input fuse		—
Technical data		
Efficiency (@ 230 V AC)	%	94
MTTF	h	$> 400 \cdot 10^3$
Start-up delay	s	< 1
Dielectric strength between input/output	V AC	2000
Dielectric strength between input/PE	V AC	—
Ambient temperature range***	°C	–20…+60
Protection category		IP 20
Approvals (according to type)		CE EAC

Industrial Switch Mode DC Power Supply: 240 W

Overload characteristics support parallel working for increased load current

Type 78.2E
- Output 24 V DC, 240 W
- Double stage active Power Factor Correction

- High efficiency (up to 93%)
- Low stand-by power consumption
- Forward topology
- Thermal protection: internal with pre-alert alarm via LED and auxiliary contact, and with V_{out} safety shutdown - power OFF to reset
- Overload indication: Pre-alert alarm via LED and auxiliary contact indication
- Boost current: Without time limit, with LED and auxiliary contact indication
- Overload up to 20 A
- Short circuit protection: Hiccup (auto-recovery) mode
- Input fuse: Easily replaceable plus spare
- Overvoltage protection: Varistor
- Compliant with EN 60950-1 and 61204-3
- Parallel working for increased load current (with OR diodes)
- Dual Polarity and Series connection permissible
- 35 mm rail (EN 60715) mount

Screw terminal

For outline drawing see page 26

78.2E

- 24 V DC, 240 W output
- Output adjustable between 24-28 V
- Double stage with active PFC (Power Factor Correction)

Replaceable fuse + spare

Thermal protection with LED indication

Auxiliary contact signalling

* (see diagrams P78)
** peak to peak, 100 Hz component, with 110 V AC input
*** (see derating diagrams L78)

Output specification		
Output current (–20…+40 °C, 230 V AC input)	A	10.8
Rated current I_N (50 °C, full input operating range)	A	10
Rated voltage	V	24
Rated power	W	240
Output power (–20…+40 °C, 230 V AC input)	W	250
Peak current capability for 5 ms*	A	25
Output voltage adjust	V DC	24…28
Voltage variation (from no-load to full-load)		< 1%
Voltage ripple @ full load**	mV	< 100
Hold-up time @ full load: with 110 V AC input	ms	> 20
with 260 V AC input	ms	> 20
Input specification		
Nominal voltage (U_N) V AC (50/60 Hz)		110…240
V DC		110…240
Operating range V AC (50/60 Hz)		88…265
V DC		90…275 (non-polarised)
Drop out DC Voltage	V	80
Max power consumption	VA	275 (@ 50 Hz)
(@ minimum V AC operating range)	W	274 (@ 50 Hz)
Stand-by power consumption (@ 88 V)	W	≤ 2.8
Power factor		0.995
Max current consumption	A	3.0 (@ 88 V AC)
Max. inrush current (peak @ 265 V) for 3 ms	A	12
Replaceable input fuse		3.15 A - T
Technical data		
Efficiency (@ 230 V AC)	%	93
MTTF	h	$> 400 \cdot 10^3$
Start-up delay	s	< 1
Dielectric strength between input/output	V AC	2500
Dielectric strength between input/PE	V AC	1500
Ambient temperature range***	°C	–20…+70
Protection category		IP 20
Approvals (according to type)		CE EAC cULus

78 SERIES
KNX Switch mode power supplies

KNX power supply with 30 V DC output - 640 mA

- Output 30 V DC 640 mA, KNX Bus
- Diagnostic LEDs
- 72 mm wide (4 modules)
- 35 mm rail (EN 60715) mount
- Suitable for ETS 4 (or latest versions)

78.2K
Screw terminal

NEW **78.2K.1.230.3000**

- Thermal protection, overload protection and short-circuit protection
- Two power supplies can be installed 15 meters apart

F

For outline drawing see page 28

Output specification		
Output current	mA	640
Output voltage	V	30
Input specification		
Nominal voltage (U_N)	V AC	230…240
Operating range	V AC	185 - 260
Stand-by power consumption	W	1.45
Power factor		0.62
Max current consumption	A	0.25
Technical data		
Minimum distance between power supplies	m	15
Dielectric strength between input/output	V AC	3000
Ambient temperature range	°C	–5/+45
Protection category		IP 20
Approvals (according to type)		CE

Ordering information

Example: 78 series switch mode power supply, 36 W - 24 V DC output, supply voltage 110…240 V AC, replaceable fuse.

										A	B	C	D
7	8	.	3	6	.	1	.	2	3	0	.	2	4	0	1

Series

Power
12 = 12 W output
25 = 25 W output
36 = 36 W output
50/51 = 50 W output
60/61 = 60 W output
1A = 120 W output
2A = 240 W output
1B = 110 W output
1D = 130 W output
2E = 240 W output
2K = KNX 640 mA

Voltage conversion
1 = AC/DC input, DC output
1 = AC input, DC output (78.1A, 78.2A, 78.2K)

Input voltage
230 = 110…240 V AC / 220V DC
230 = 110…240 V AC/DC
230 = 120…240 V AC / 220V DC
230 = 230…240 V AC (78.2K)
230 = 120 or 230 V AC adjustable (78.2A)

D:
0 = Standard
1 = Replaceable fuse
2 = Embedded fuse + output voltage regulator
3 = Replaceable fuse + output voltage regulator
4 = Fuse + regulator + positive logic contact
5 = Fuse + regulator + pre-alarm contact

C:
0 = Standard
1 = Double stage, with PFC (Power Factor Correction)

AB:
12 = 12 V output
24 = 24 V output
30 = 30 V output KNX

Codes
78.12.1.230.1200
78.12.1.230.2400
78.25.1.230.1200
78.25.1.230.2400
78.36.1.230.2401
78.50.1.230.1203
78.51.1.230.1203
78.60.1.230.2403
78.61.1.230.2403
78.1A.1.230.2402
78.2A.1.230.2402
78.1B.1.230.2403
78.1D.1.230.2414
78.1D.1.230.2415
78.2E.1.230.2414
78.2E.1.230.2415
78.2K.1.230.3000

F

Technical data

EMC specifications (according to EN 61204-3)		Reference standard	78.12, 78.25, 78.36	78.60, 78.50	78.61, 78.51	78.1A	78.1B	78.1D	78.2A	78.2E
Electrostatic discharge	contact discharge	EN 61000-4-2	4 kV	4 kV	4 kV	4 kV	4 kV	4 kV	4 kV	4 kV
	air discharge	EN 61000-4-2	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV	8 kV
Radiated electromagnetic field	80…1000 MHz	EN 61000-4-3	6 V/m	10 V/m	10 V/m	10 V/m	10 V/m	10 V/m	10 V/m	10 V/m
	1…2.8 GHz	EN 61000-4-3	3 V/m	3 V/m	3 V/m	3 V/m	3 V/m	3 V/m	10 V/m	10 V/m
Fast transients (burst 5/50 ns, 5 and 100 kHz)	on supply terminals	EN 61000-4-4	2 kV	3 kV	3 kV	2 kV	2 kV	3 kV	3 kV	3 kV
Voltage pulses on supply terminals (surge 1.2/50 µs)	common mode	EN 61000-4-5	2 kV	2 kV	2 kV	2 kV	2 kV	3 kV	2.5 kV	2.5 kV
	differential mode	EN 61000-4-5	2 kV (78.12), 4 kV* (78.36)	4 kV*	4 kV*	4 kV **	4 kV **	4 kV**	4 kV	4 kV**
Radio-frequency common mode voltage (0.15…230 MHz)	on supply terminals	EN 61000-4-6	6 V	10 V	10 V	10 V	10 V	10 V	10 V	10 V
Short interruptions		EN 61000-4-11	5 cycles	6 cycles	6 cycles	5 cycles	5 cycles	6 cycles	5 cycles	5 cycles
Radio-frequency conducted emissions	0.15…30 MHz	EN 55022	class B	class A	class B	class A	class B	class B	class A	class B
Radiated emissions	30…1000 MHz	EN 55022	class B	class A	class B	class A	class A	class A	class A	class A

Terminals		Max	Min…Max
Wire size (Solid cable, stranded cable)	mm^2	1 x 4 / 2 x 2.5	1 x 0.5…1 x 4
	AWG	1 x 12 / 2 x 14	1 x 20…1 x 12
Wire size (Solid cable, stranded cable for 78.1A and 78.2A)	mm^2	1 x 2.5	1 x 0.5…2.5
	AWG	1 x 14	1 x 20…14
Screw torque	Nm	0.8	0.5
Wire strip length	mm	8 / 8 (for 78.1A and 78.2A)	8 / 8 (for 78.1A and 78.2A)
Other data			
Power lost to the environment with rated output current	W	2 (78.12), 2.3 (78.25), 5 (78.36, 78.50/51), 5.4 (78.60/61)	
	W	10 (78.1A), 9 (78.1B), 13.2 (78.1D), 15.3 (78.2A), 16.8 (78.2E)	

* input fuse may blow for surges higher than 1.5 kV
** input fuse may blow for surges higher than 2 kV

Technical data for 78.2K

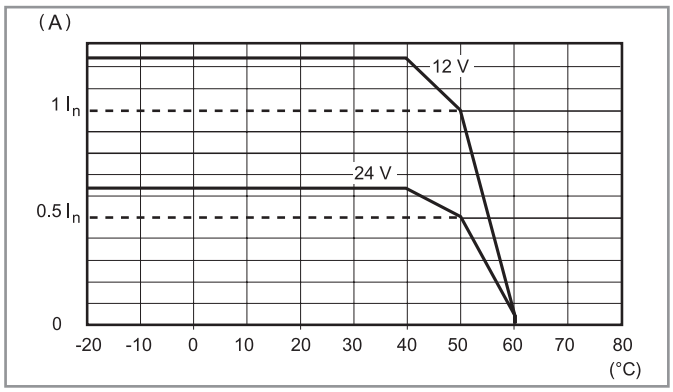
EMC specifications (according to EN 61204-3)		Reference standard	78.2K
Electrostatic discharge	contact discharge	EN 61000-4-2	4 kV
	air discharge	EN 61000-4-2	8 kV
Radiated electromagnetic field	80…1000 MHz	EN 61000-4-3	10 V/m
	1…2.8 GHz	EN 61000-4-3	3 V/m
Fast transients (burst 5/50 ns, 5 and 100 kHz)	HBES terminals	EN 61000-4-4	1 kV
	on supply terminals	EN 61000-4-4	2 kV
Voltage pulses on supply terminals (surge 1.2/50 µs)	DM supply terminals	EN 61000-4-5	1 kV
	CM supply terminals	EN 61000-4-5	2 kV
	HBES terminals	EN 61000-4-5	2 kV
Radio-frequency common mode voltage (0.15…230 MHz)	HBES terminals	EN 61000-4-6	10 V
	on supply terminals	EN 61000-4-6	10 V
Short interruptions	criterion A	EN 61000-4-11	10 cycles
Radio-frequency conducted emissions	0.15…30 MHz	EN 55022	class B
Radiated emissions	30…1000 MHz	EN 55022	class B

Terminals		Max
Wire size (Solid cable, stranded cable)	mm^2	1 x 4 / 2 x 2.5
	AWG	1 x 12 / 2 x 14
Screw torque	Nm	0.8
Wire strip length	mm	9
Other data		
Power lost to the environment with rated output current	W	4.8

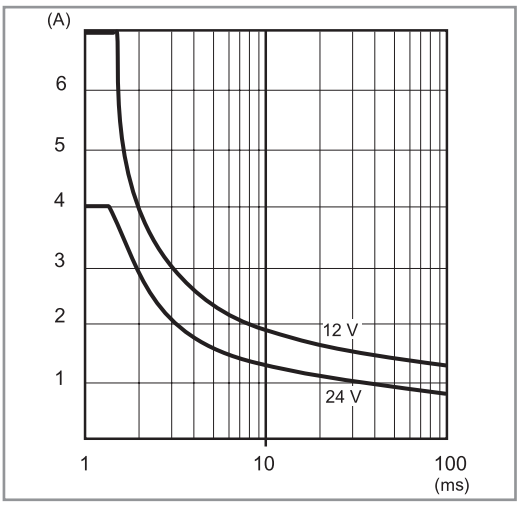
DM: differential mode
CM: common mode

Output specification

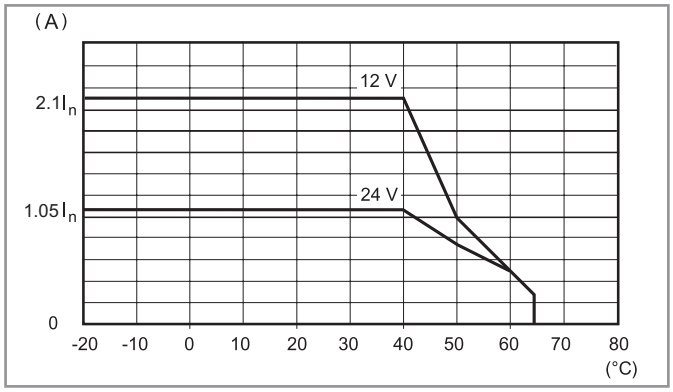
L78-1 Output current v ambient temperature (78.12)



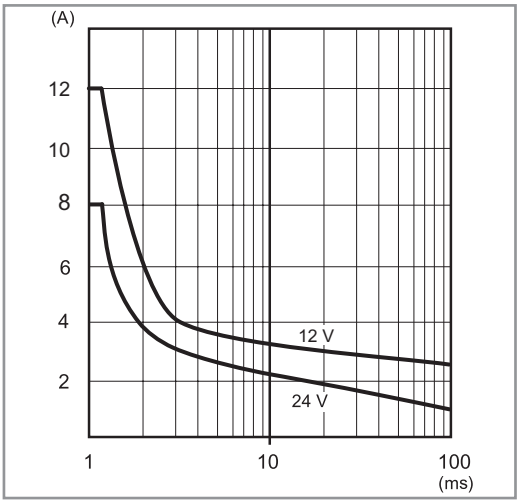
P78-1 Output peak current v time (78.12)



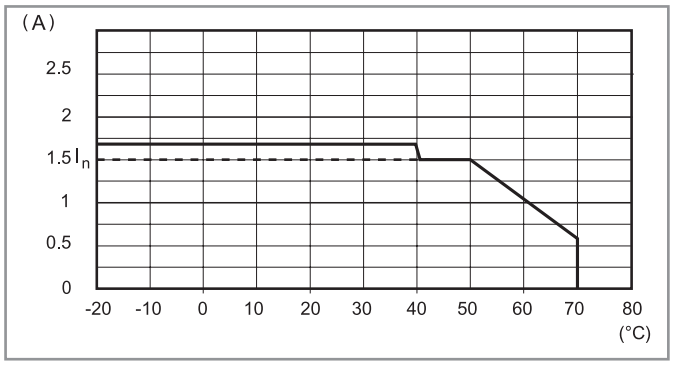
L78-2 Output current v ambient temperature (78.25)



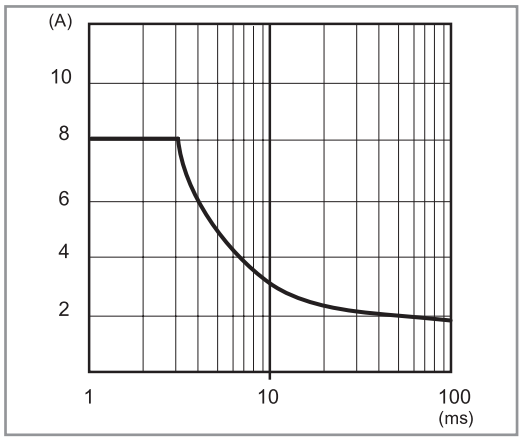
P78-2 Output peak current v time (78.25)



L78-3 Output current v ambient temperature (78.36)



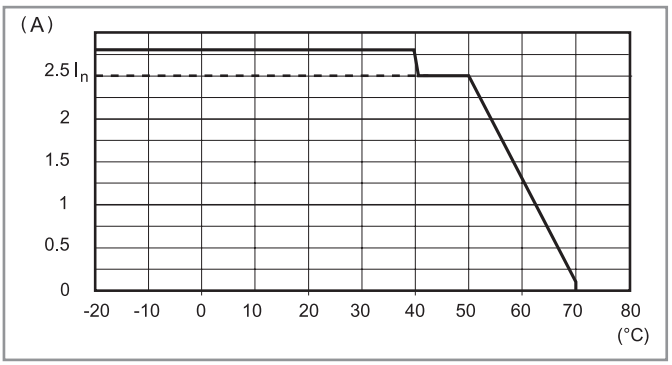
P78-3 Output peak current v time (78.36)



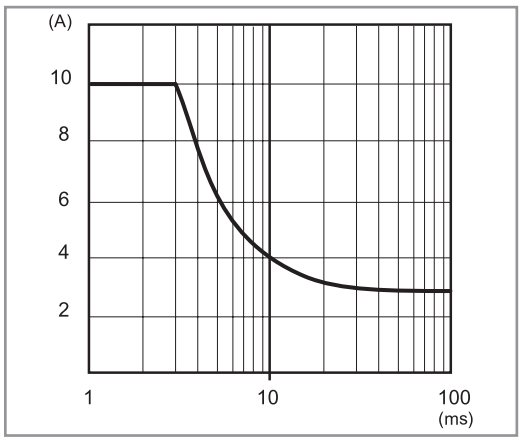
F

Output specification

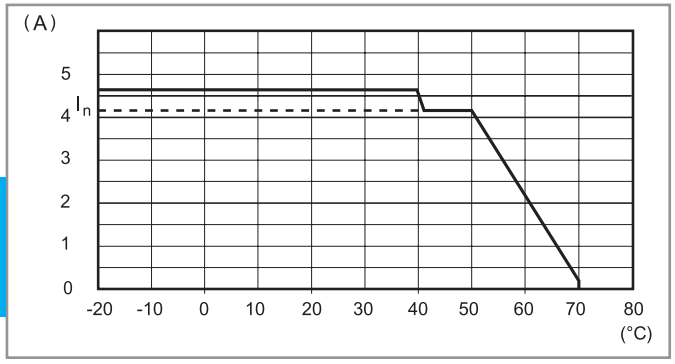
L78-4 Output current v ambient temperature (78.60)



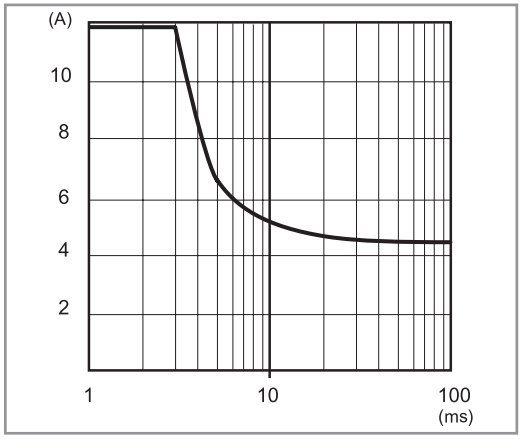
P78-4 Output peak current v time (78.60)



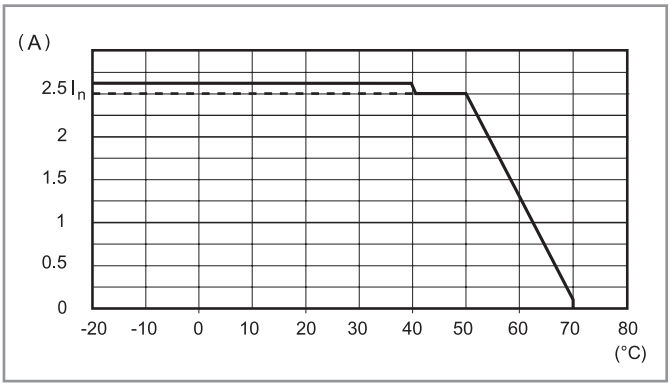
L78-5 Output current v ambient temperature (78.50/51)



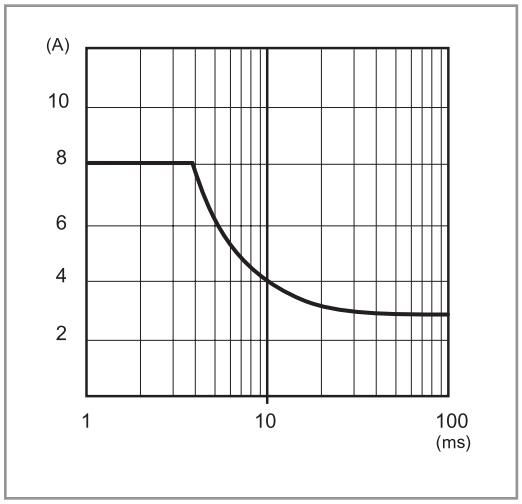
P78-5 Output peak current v time (78.50/51)



L78-6 Output current v ambient temperature (78.61)



P78-6 Output peak current v time (78.61)



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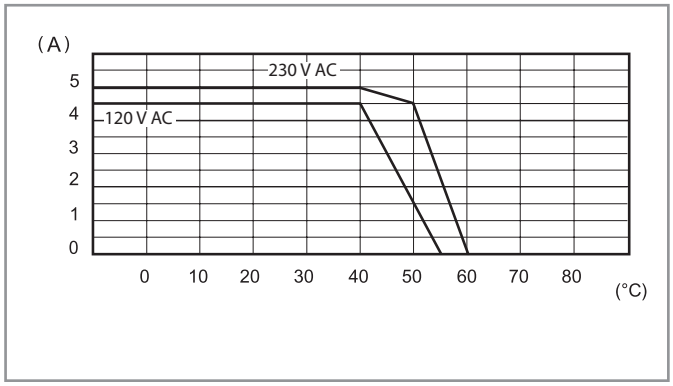
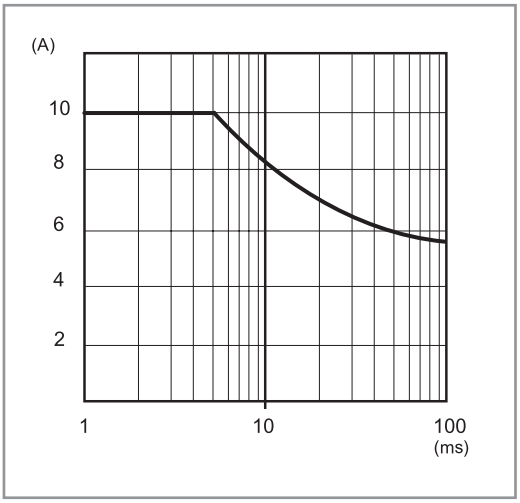
Output specification

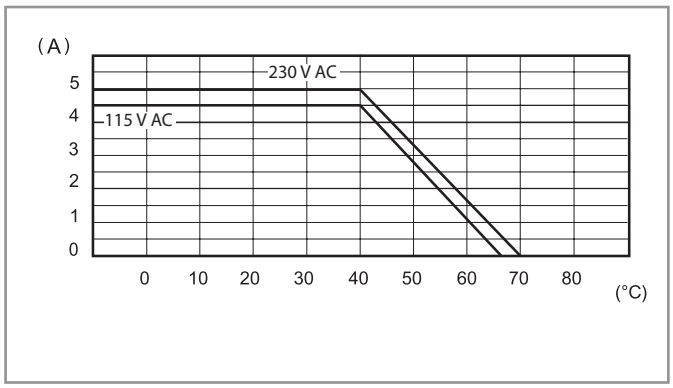
L78-7 Output current v ambient temperature (78.1A)



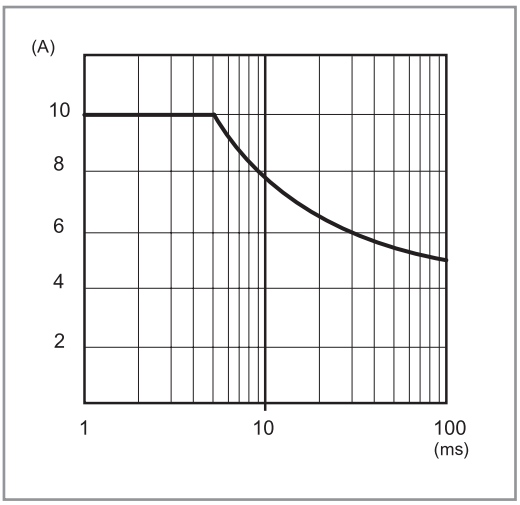
P78-7 Output peak current v time (78.1A)



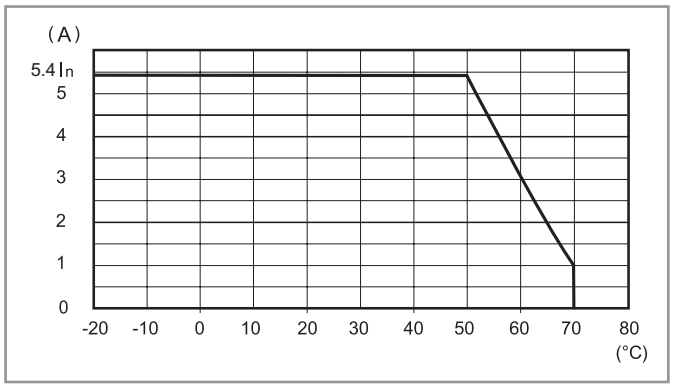
L78-8 Output current v ambient temperature (78.1B)



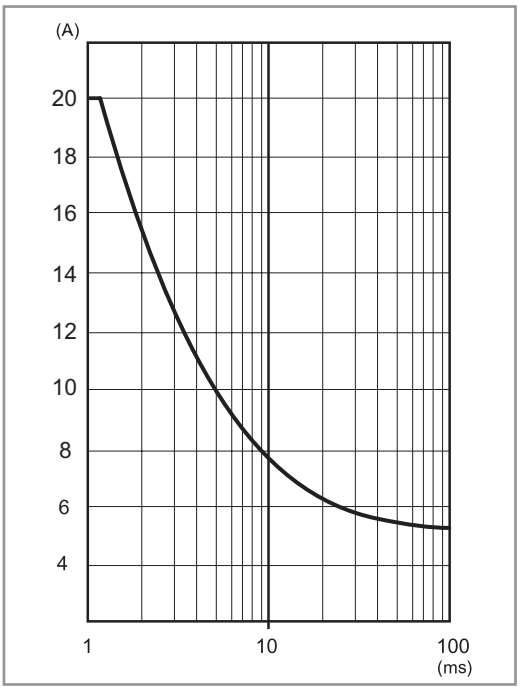
P78-8 Output peak current v time (78.1B)



L78-9 Output current v ambient temperature (78.1D)



P78-9 Output peak current v time (78.1D)



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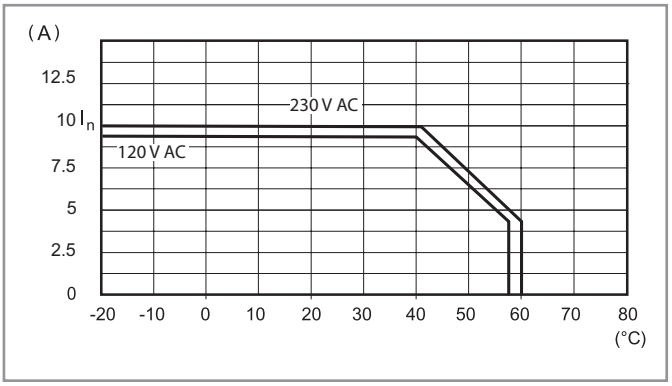
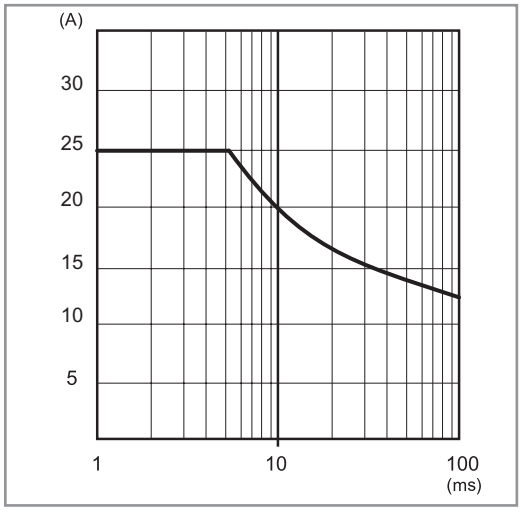
Output specification

L78-10 Output current v ambient temperature (78.2A)



P78-10 Output peak current v time (78.2A)



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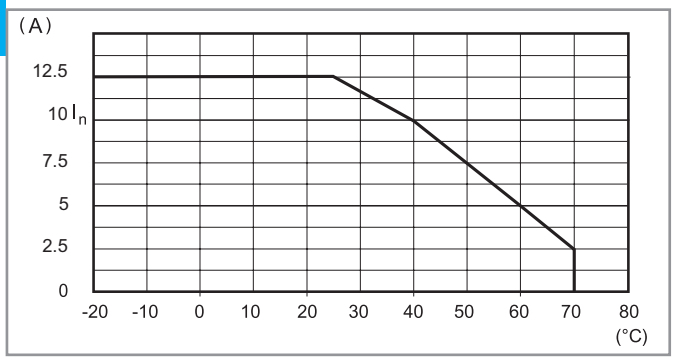
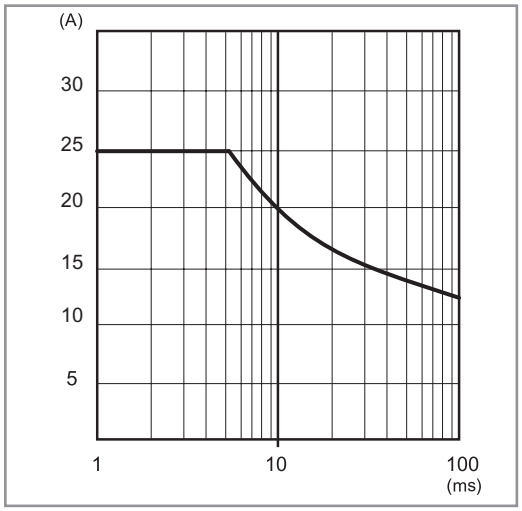
L78-11 Output current v ambient temperature (78.2E)

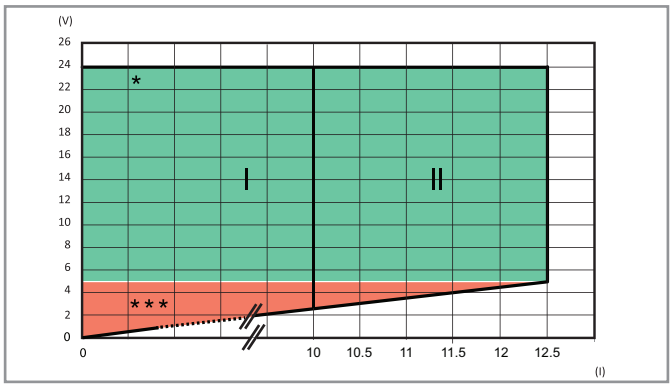


P78-11 Output peak current v time (78.2E)



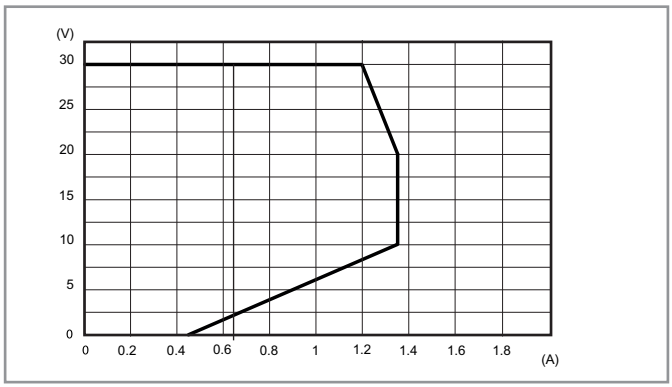
Output specification

FB78-5 Output voltage v output current (78.2E)



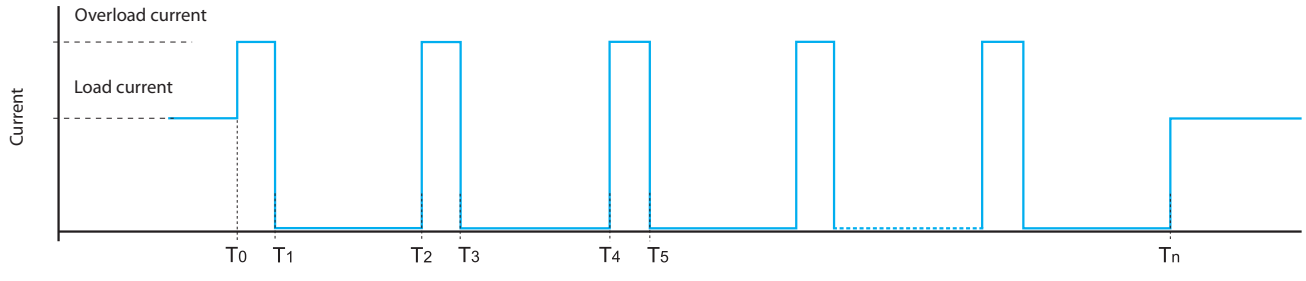
I: Output characteristic for temperature up to 50 °C
II: Output characteristic for temperature up to 25 °C
*** / ***:** See LED table below

FB78-6 Output voltage v output current (78.2K)



Overload diagram, KNX approved

Hiccup mode



Under normal conditions, the 78 Series Power Supply supplies the current required by the load.
However, under abnormal conditions such as a short circuit or heavy overload (T_0) the output voltage will be rapidly reduced to zero - followed by the current (T_1). After approximately 2 seconds (T_1 to T_2), the power supply checks for the persistence of the anomaly over the time period T_2 to T_3 (30 to 100ms - dependent on the type of anomaly). If the anomaly persists, as shown above, the current is again reset to 0 A for a further 2 s (T_3 to T_4). This "hiccup" process is repeated until the anomaly is removed (T_n), whereon the power supply then returns to normal working.

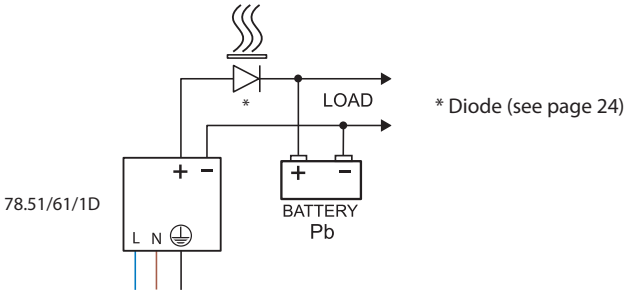
78.1B is able to handle this anomaly for 15 s. After this time it enters in protection mode, and a manual reset is necessary by removing and re-applying the supply voltage

Fold-back technology and battery charging

Fold-back technology allows load current to be maintained under conditions of heavy overload. In case of heavy overload, the fold-back circuit will provide the output current and the output voltage, in accordance with the relevant "FB" diagram. In practice, when overcurrent is drawn by the load, the fold-back circuit reduces the output voltage supplying the current up to the maximal value, then it starts to work in hiccup mode. Also in case of short circuit, the power supply will work in hiccup mode. Both these conditions end when the anomaly is removed, and the power supply returns to normal working.

The fold-back mode allows the use of the power supply as a **battery charger,** in particular 78.51/61 for charging lead acid batteries (both standard and gel types) rated 7…24 Ah and 78.1D for charging lead batteries rated 17…38 Ah. In any case, it is necessary to verify that the charging characteristics of the batteries are compliant with the output characteristics of the power supply.
It is suggested to insert a diode in series between the + output and the + input of the battery (if not already installed in the battery unit).

Back-up connection for mains interruption
When the mains is ON, the power supply is able to charge the battery and supply the load at the same time (the power supply must be rated minimum 110 % of the load). When the mains is OFF, the battery starts to supply the load.



* Diode (see page 24)

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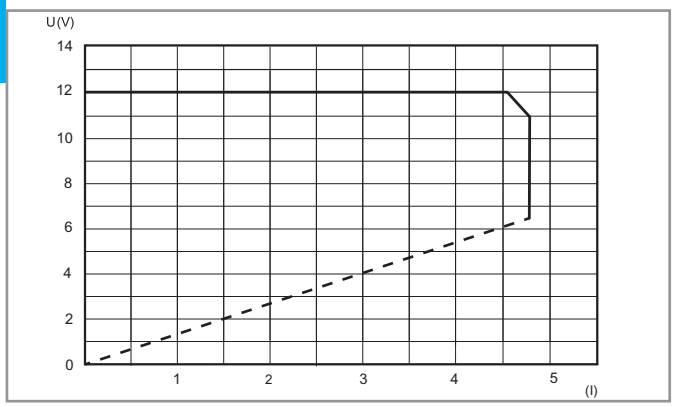
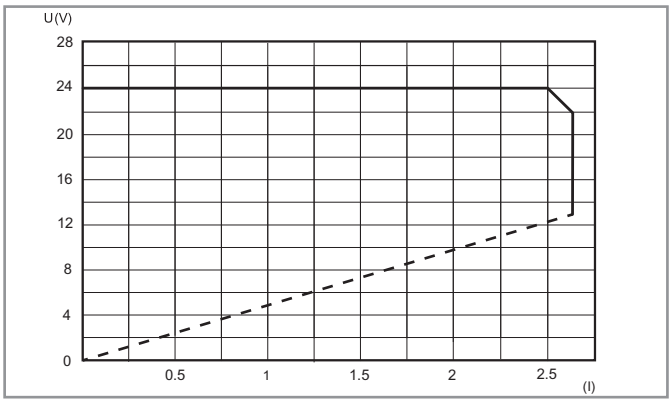
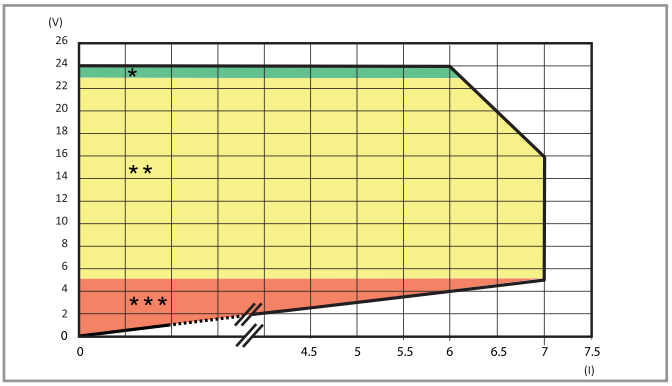
FB78-1 Output voltage v output current (78.51)



FB78-2 Output voltage v output current (78.61)



FB78-3 Output voltage v output current (78.1D)



Fold-back characteristic for ambient temperature up to 50 °C
* / ** / ***: See LED table below

III-2021, www.findernet.com

78.1D, 78.2E LED table

Feedback contact switching mode: Type 78.xx.x.xxx.24x4 ("positive logic")

The NO contact closes when power is applied to the unit and remains closed unless there is a serious fault preventing the power supply unit from delivering output current. (Such as a broken fuse, power supply failure, short-circuit or thermal protection.)
This version is suitable, for example, for signalling to a remote PLC all those alarms representing a service interruption of the power supply output.

Type	Area	State	LED	Contact 13-14
78.1D.1.230.2414 78.2E.1.230.2414	*	OK	DC OK ● / ALARM ● — OFF	
	**	Overload (78.1D only)	DC OK ● / ALARM ● — OFF	
	***	Short circuit	DC OK ● / ALARM ● — OFF	
		Thermal limit	DC OK ● / ALARM ●	
		Thermal protection#	DC OK ● / ALARM ● — OFF	

#Remove the supply voltage, following the intervention of the thermal protection, in order to reset the power supply.

78.1D, 78.2E LED table

Feedback contact switching mode: Type 78.xx.x.xxx.24x5 ("pre-alarm")

The NO contact closes when an anomaly happens (Overload, short circuit, thermal limit, thermal protection).
This version is suitable, for example, for activating visual or audible alarms, or to activate a cooling fan.

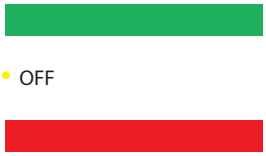
Type	Area	State	LED	Contact 13-14
78.1D.1.230.2415 78.2E.1.230.2415	*	OK	DC OK ● / ALARM ● — OFF	
	**	Overload (78.1D only)	DC OK ● / ALARM ● — OFF	
	***	Short circuit	DC OK ● / ALARM ● — OFF	
		Thermal limit	DC OK ● / ALARM ●	
		Thermal protection#	DC OK ● / ALARM ● — OFF	

#Remove the supply voltage, following the intervention of the thermal protection, in order to reset the power supply.

78.12, 78.25, 78.36, 78.50, 78.60, 78.51, 78.61, 78.1A, 78.2A, 78.1B LED table

Type	State	LED
78.12.1.230.xx00 78.25.1.230.1200 78.25.1.230.2400 78.36.1.230.2401 78.50.1.230.1203 78.60.1.230.2403 78.51.1.230.1203 78.61.1.230.2403 78.1A.1.230.2402	OK	●
	Short circuit	●
	Thermal limit	● — OFF
78.2A.1.230.2402 78.1B.1.230.2403	OK	●
	Short circuit	● — 15s — OFF
	Thermal limit	● — OFF

LED table

Type	Area	State	LED	OUTPUT
78.2K.1.230.3000	CHECK START UP	V_{out} OK		ON
		V_{out} LOW < 29V		OFF
		V_{out} HIGH > 33V		OFF
	NORMAL FUNCTION	V_{out} OK I_{out} > 0.9A		ON
		V_{out} < 29V I_{out} > 0.9A		ON
	Alarm condition: Tamb > 45°C @ Inom.	Pre-alarm: up to 60s		ON
		Latched alarm		OFF

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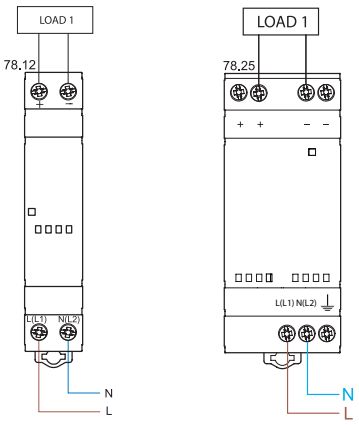
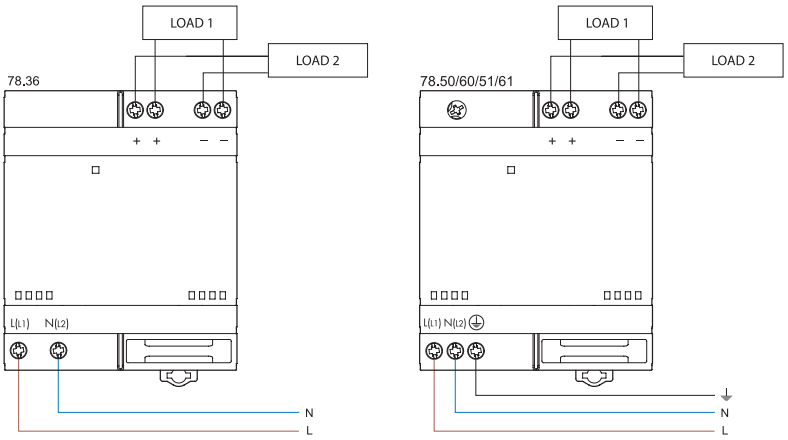
Wiring diagrams for 78.12, 78.25, 78.36, 78.50, 78.51, 78.60 & 78.61

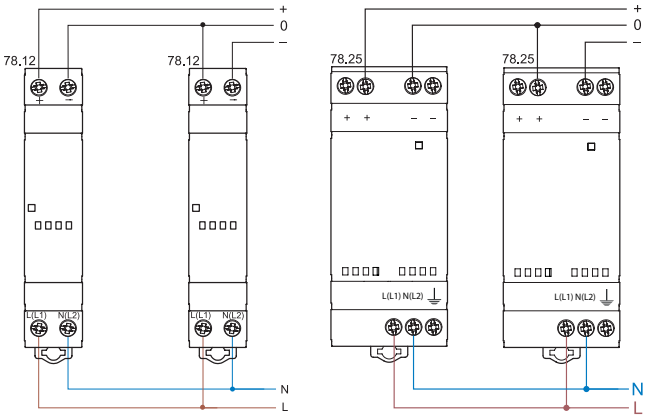
Basic connections



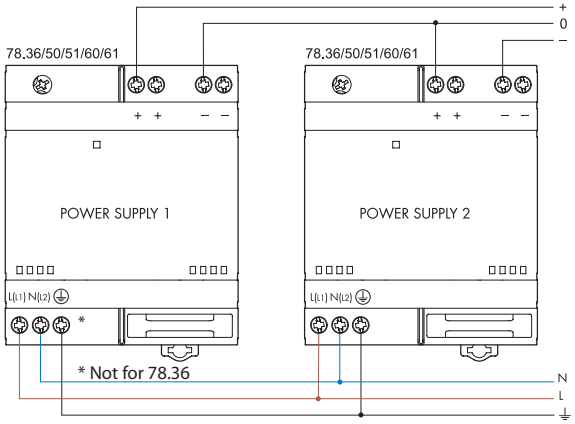
Basic connections



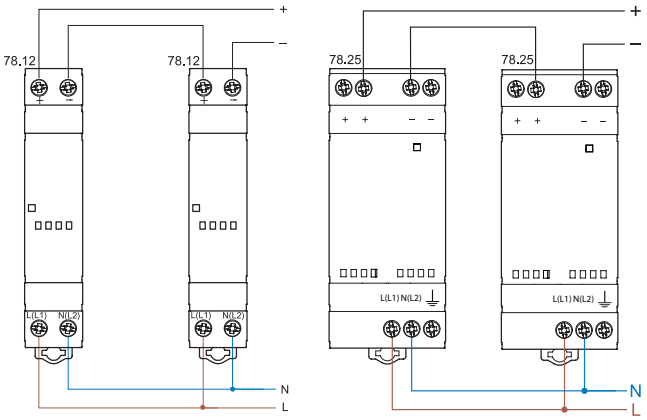
Dual polarity connection



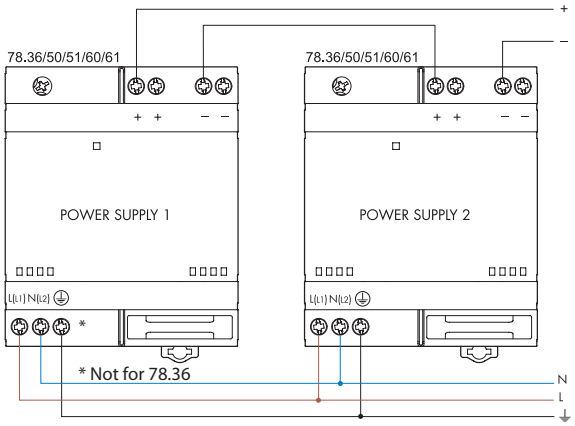
Dual polarity connection



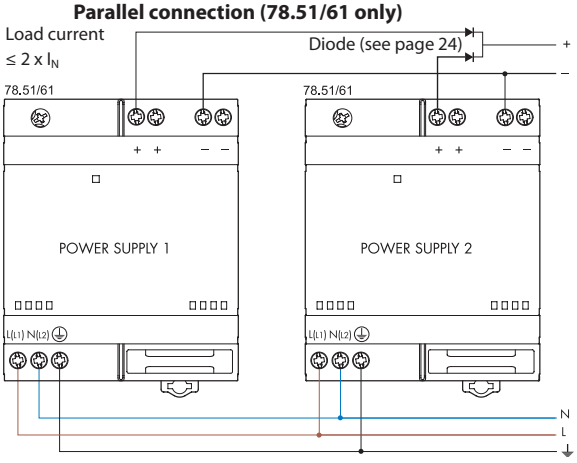
Series connection



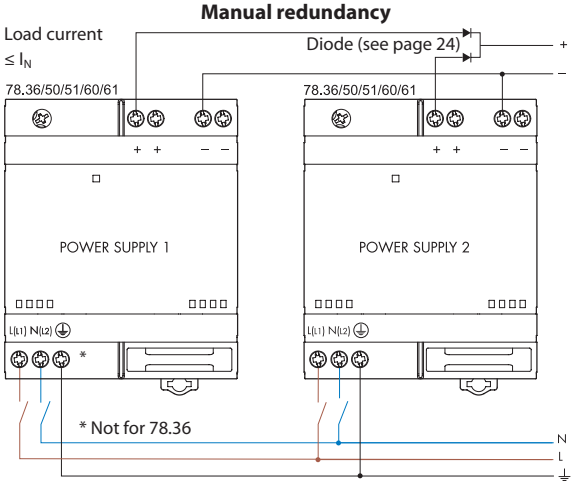
Series connection



Parallel connection (78.51/61 only)



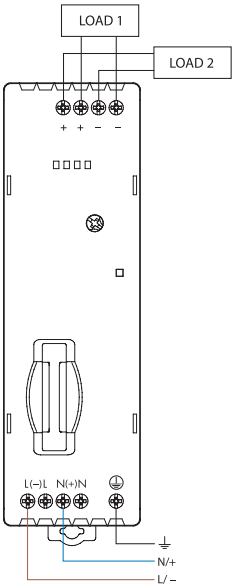
Manual redundancy



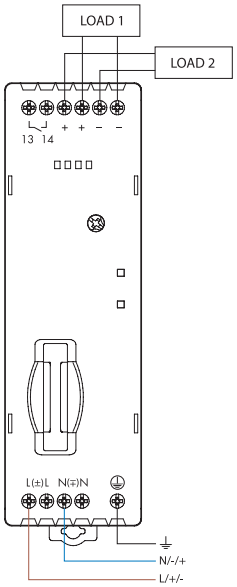
Wiring diagrams for 78.1B & 78.1D

Basic connections

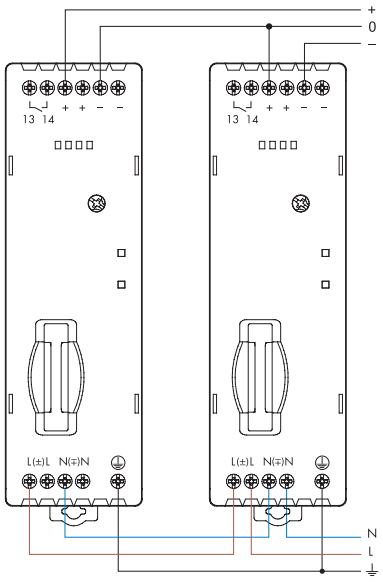
78.1B - Power supply connection



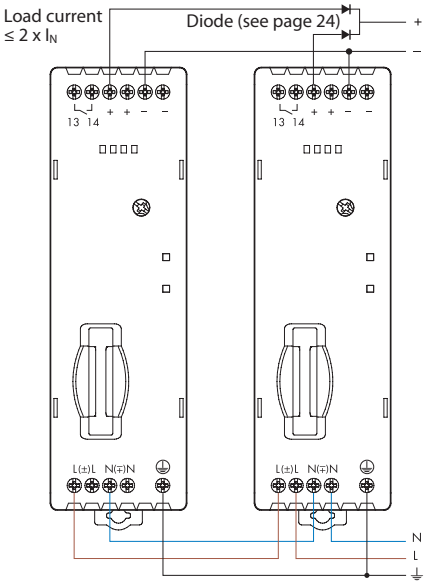
78.1D - Power supply connection



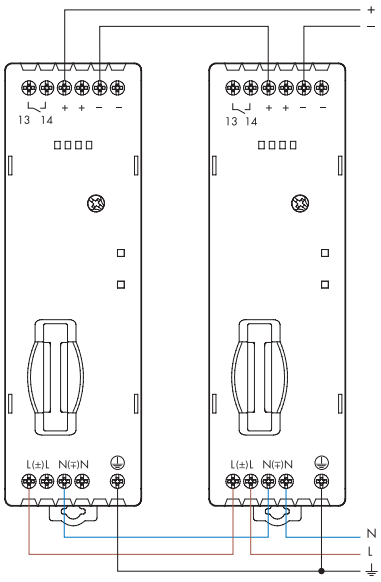
Dual polarity connection



Parallel connection



Series connection



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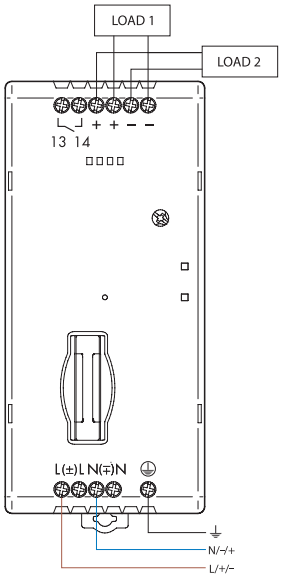
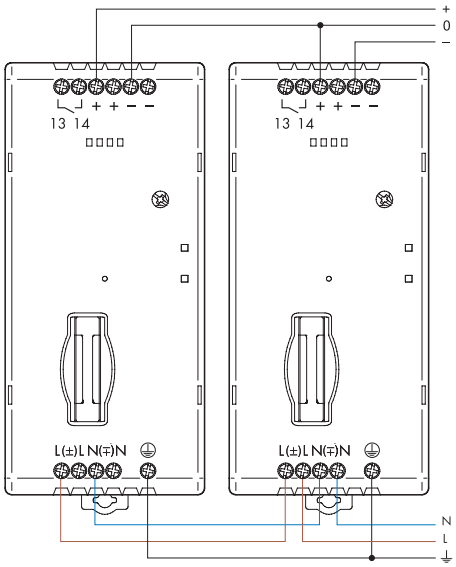
Wiring diagrams for 78.2E

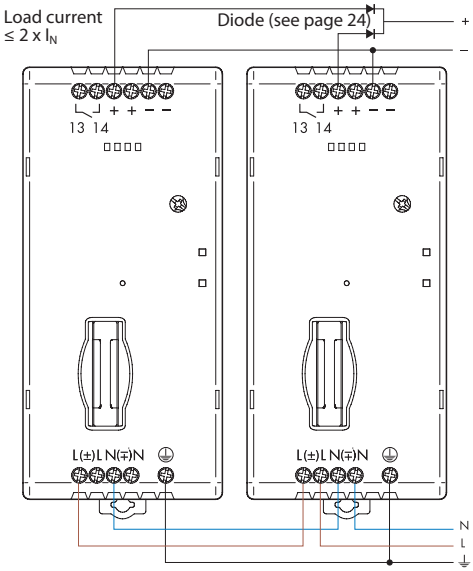
Basic connections



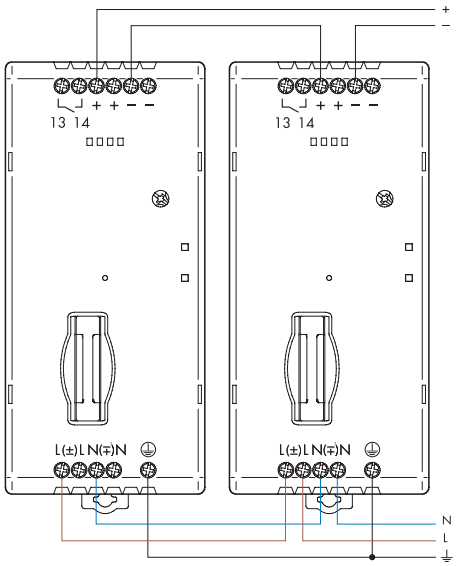
Dual polarity connection



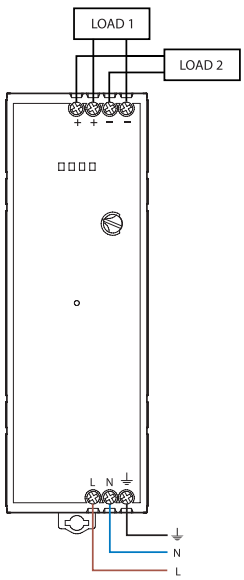
Parallel connection



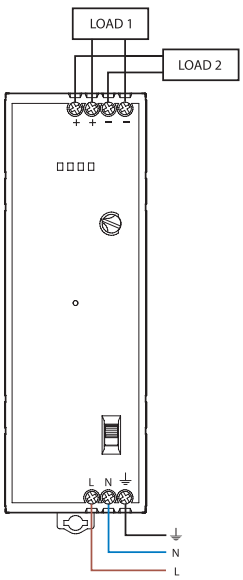
Series connection



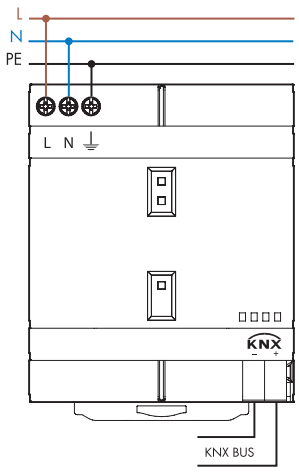
Wiring diagram for 78.1A



Wiring diagram for 78.2A



Wiring diagram for 78.2K



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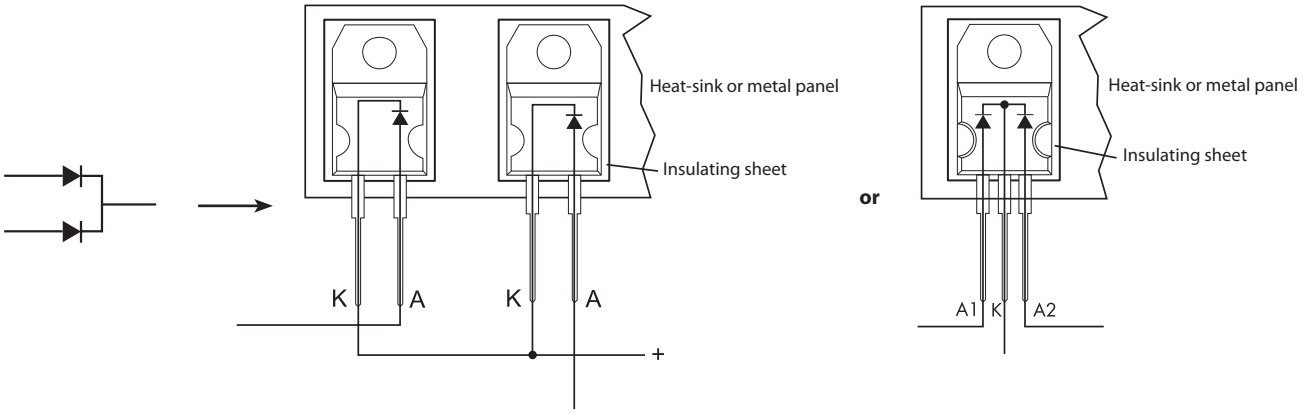
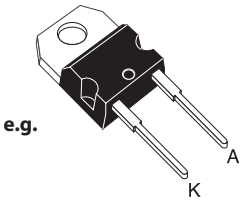
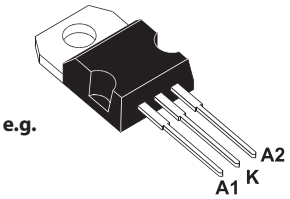
Diode(s)



Diode for type 78.25, 78.36, 78.50, 78.60, 78.51, 78.61

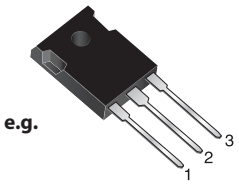


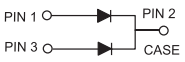
TO-220AC
STPS1545D



TO-220AB
STPS30L40CT

Diode for type 78.1B, 78.1D, 78.2E



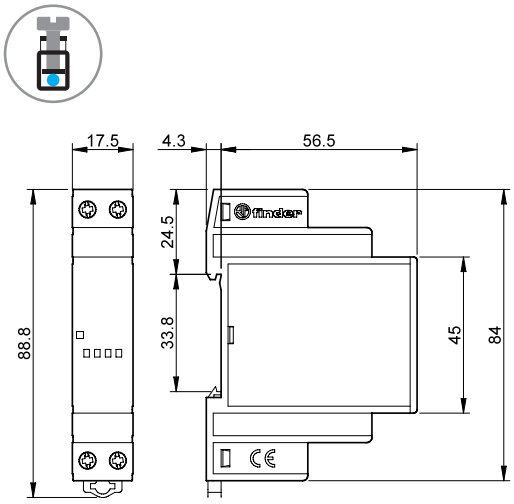


TO-247AD
MBR 4060PT

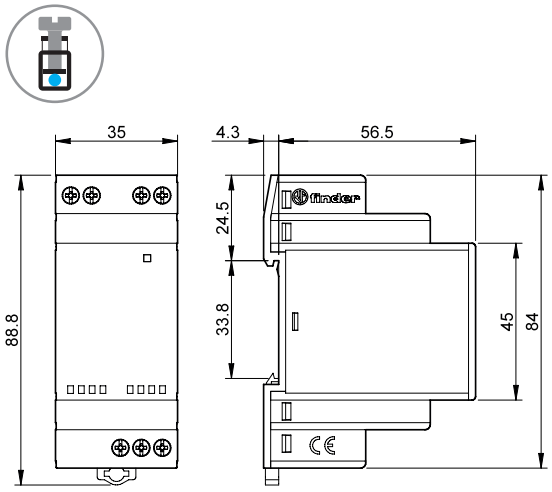
F

Outline drawings

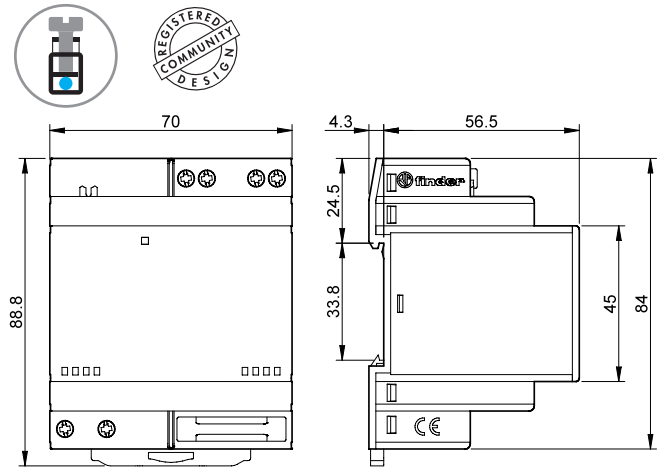
Type 78.12
Screw terminal



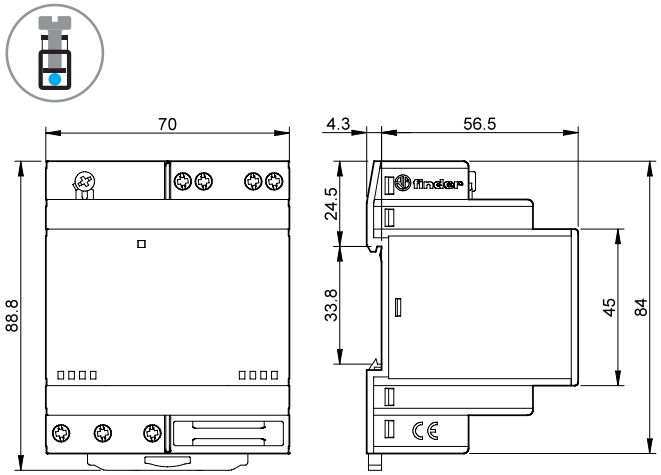
Type 78.25
Screw terminal



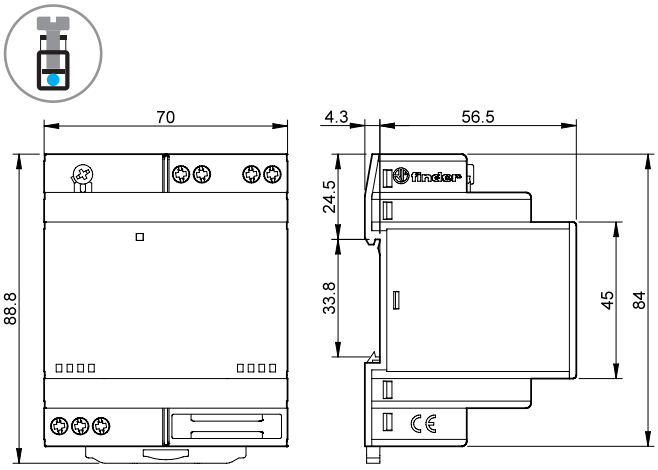
Type 78.36
Screw terminal



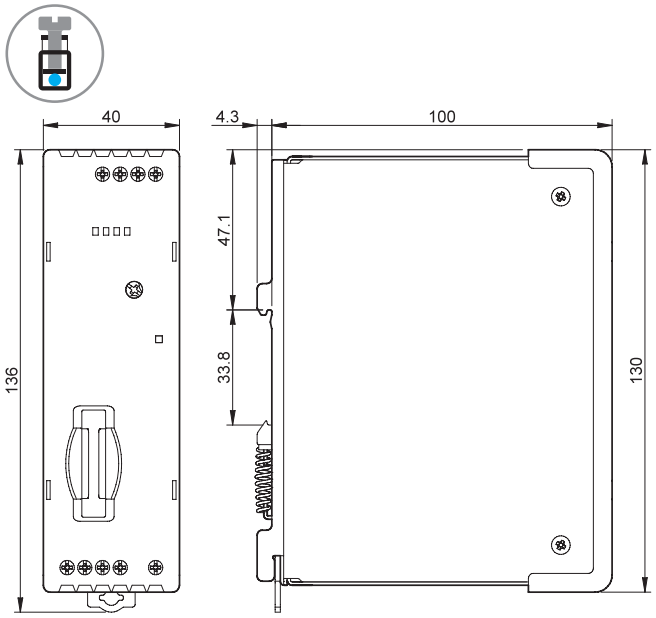
Types 78.50 / 78.60
Screw terminal



Types 78.51 / 78.61
Screw terminal



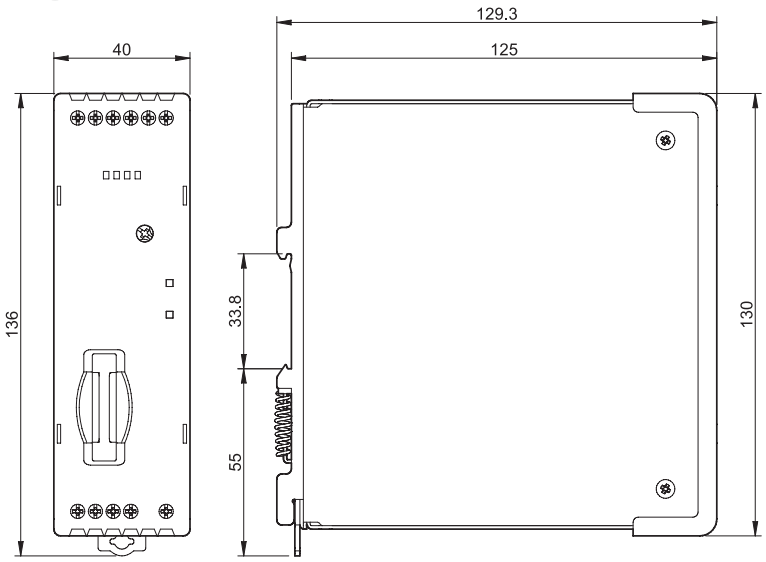
Type 78.1B
Screw terminal



F

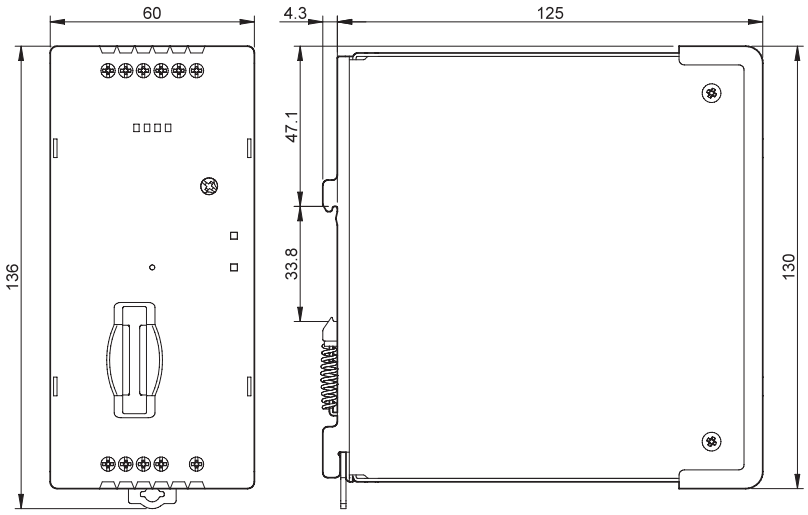
Outline drawings

Type 78.1D
Screw terminal



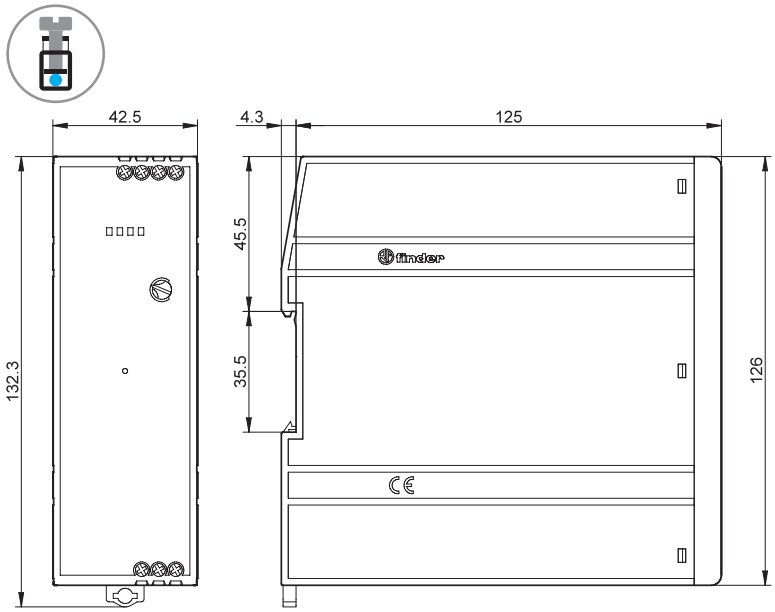
F

Type 78.2E
Screw terminal

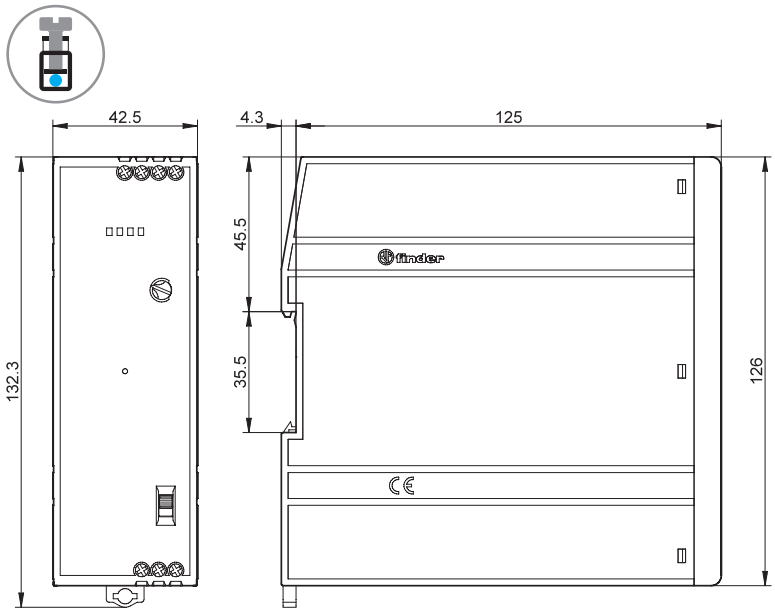


Outline drawings

Type 78.1A
Screw terminal



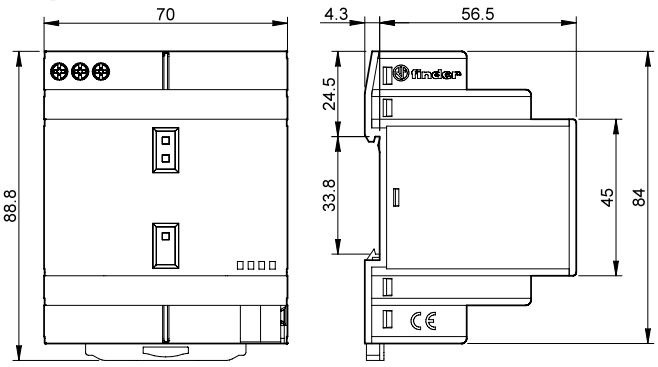
Type 78.2A
Screw terminal



F

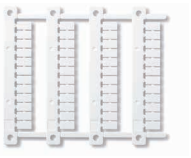
Outline drawings

Type 78.2K
Screw terminal



Accessories

F



060.48

Sheet of marker tags (CEMBRE Thermal transfer printers), (48 tags), 6 x 12 mm	060.48

019.01

Identification tag, plastic, 1 tag, 17 x 25.5 mm (for 78.12/25/36/50/60/51/61)	019.01

finder
SWITCH TO THE FUTURE

Panel Thermo-Hygrostat and Thermostats

7T
SERIES

- Drying kilns
- Industrial refrigeration
- Road / tunnel lighting
- Industrial furnaces and ovens
- Automatic car-washes
- Panels for electrical distribution
- Control panels
- Forced-air ventilators

Panel Thermo-Hygrostat

- Small, compact size (17.5 mm wide)
- Electronic control
- 4 functions
- Nominal voltage 110…240 V AC/DC
- Temperature ranges from +10 ° to +60°C
- Humidity range up to 90%
- LED status indication contact ON
- 35 mm rail (EN 60715) mount

Panel thermostat

- Small, compact size (17.5 mm wide)
- Snap action themostatic Bimetal sensor
- Wide temperature setting range
- Long electrical life
- 35 mm rail (EN 60715) mount

		NEW 7T.51	7T.81.0.000.240x	7T.81.0.000.230x
				
		• Thermo-Hygrostatic control • Nominal voltage 110…240 V AC/DC	• Heating control	• Ventilation control

* Measured with 0.3 K/min
** Measured with 0.5 %/min

For outline drawing see page 6

Contact specification								
Contact configuration		1 NO (SPST-NO)	1 NC (SPST-NC)			1 NO (SPST-NO)		
Rated current/Maximum peak current	A	10/20	10/20			10/20		
Rated voltage/ Maximum switching voltage	V AC	250/250	250/250			250/250		
Rated load AC1	VA	2500	2500			2500		
Rated load AC15 (230 V AC)	VA	250	250			250		
Single phase motor rating AC3 (230 V AC)	kW	1.1	1.1			1.1		
Breaking capacity DC1: 30/110/220 V	A	1/0.3/0.15	1/0.3/0.15			1/0.3/0.15		
Minimum switching load	mW (V/mA)	500 (12/10)	500 (12/10)			500 (12/10)		
Standard contact material		AgNi	AgNi			AgNi		
Coil specifications								
Nominal Voltage	V AC/DC	110…240	—			—		
Rated Power	VA (50Hz)/W	1.8/0.44	—			—		
Operating range	V AC/DC	88…264	—			—		
Temperature specifications *								
Setting range (ventilation)	°C	+10…+60	–20…+40	–20…+60	0…+60	–20…+40	–20…+60	0…+60
Switch differential	K	4 ± 2	7 ± 4			7 ± 4		
Setting accuracy full range	K	–1…+3	—			—		
Humidity specifications **								
Setting range (humidity)	%	50…90	—			—		
Hysteresis	%	4 ± 2	—			—		
Setting accuracy	%	5	—			—		
Technical data								
Electrical life at rated load AC1	cycles	$100 \cdot 10^3$	$100 \cdot 10^3$			$100 \cdot 10^3$		
Ambient temperature range	°C	–25…+60	–45…+80			–45…+80		
Protection category		IP 20	IP 20			IP 20		
Approvals (according to type)		CE EAC cULus	CE EAC 03 cULus					

Ordering information

Example: 7T Series, Thermo-Hygrostat for temperature and humidity control, 110…240 V AC/DC, Multifunction, 35 mm rail (EN 60715) mount.

7 T . 5 1 . 0 . 2 3 0 . 4 3 6 0

Series

Type
5 = Thermo-Hygrostatic control
8 = Temperature control

No. of contacts
1 = 1 contact

Voltage type
0 = AC/DC (only 7T.51)
0 = No operating voltage required (only 7T.81)

Rated operating voltage
230 = 110…240 V (only 7T.51)
000 = No operating voltage required

Control function
60 = Multifunction (only 7T.51)
01 = –20…+40 °C (only 7T.81)
02 = –20…+60 °C (only 7T.81)
03 = 0…+60 °C (only 7T.81)

Contact configuration
3 = 1 NO contact
4 = 1 NC contact

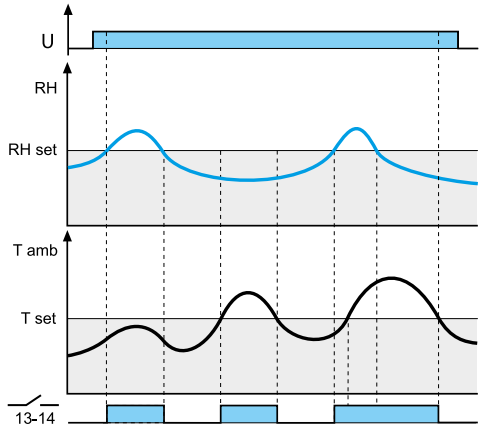
Monitoring function
2 = Temperature control
4 = Temperature and Humidity, adjustable

Technical data

Insulation		7T.51	7T.81
Dielectric strength between open contacts	V AC	1000	500
Dielectric strength between supply and contact	V AC	2000	—
Other data			
Screw torque	Nm	0.5	0.5
Max. wire size		solid cable	stranded cable
	mm²	1 x 2.5	1 x 1.5
	AWG	1 x 12	1 x 16

G

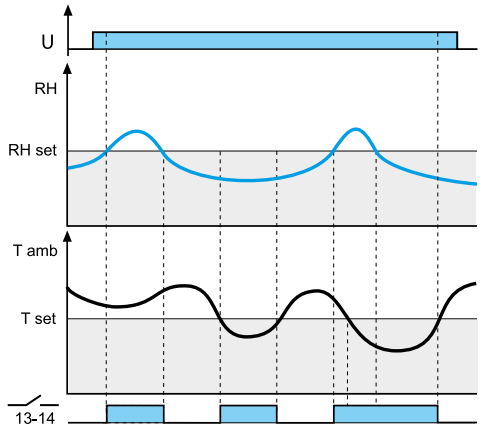
Functions 7T.51



HT: RH > RHset OR Tamb > Tset

Power is permanentely applied to the thermo-hygrostat.
The contact 13-14 closes if the ambient humidity (RH) is > of set humidity (RHset) OR if the ambient temperature (Tamb) is > of set temperature (Tset).

When contact is close, LED is ON



TH: RH > RHset OR Tamb < Tset

The contact 13-14 closes if the ambient humidity (RH) is > of set humidity (RHset) OR if the ambient temperature (Tamb) is < of set temperature (Tset).

When contact is close, LED is ON

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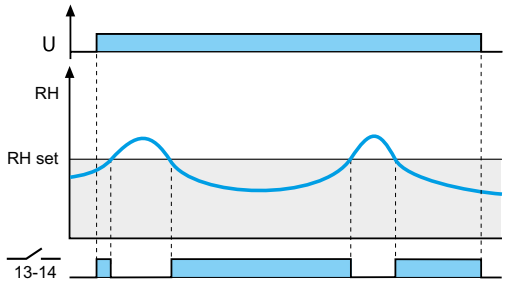
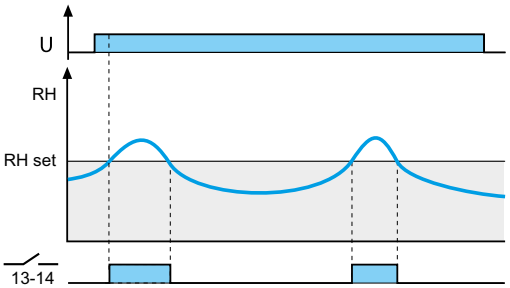
Functions 7T.51



HL: RH < RHset

The contact 13-14 closes if the ambient humidity (RH) is < of set humidity (RHset)

When contact is close, LED is ON

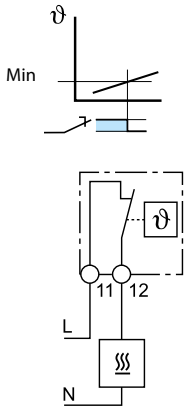


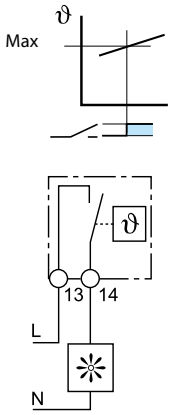
HM: RH > RHset

The contact 13-14 closes if the ambient humidity (RH) is > of set humidity (RHset)

When contact is close, LED is ON

Functions 7T.81



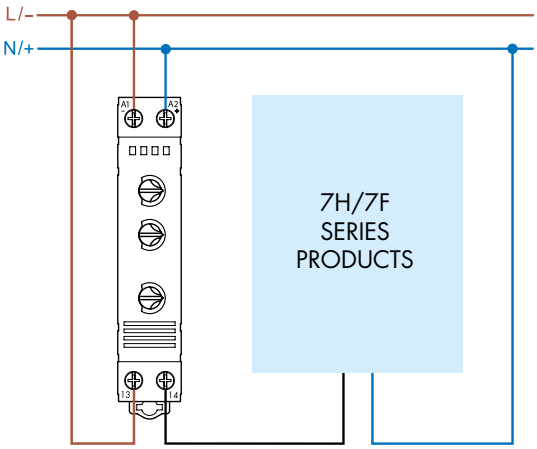


Heating control - Should the panel temperature fall below the (minimum) set temperature the contact will close to call for heat.
The contact will open when this set temperature is exceeded.
Ventilation control - Should the panel temperature exceed the (maximum) set temperature then the contact will close to call for cooling.
The contact will open when the temperature falls below this set temperature.

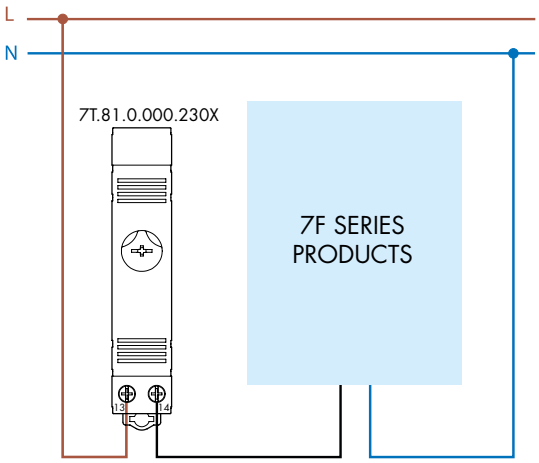
G

Wiring diagrams

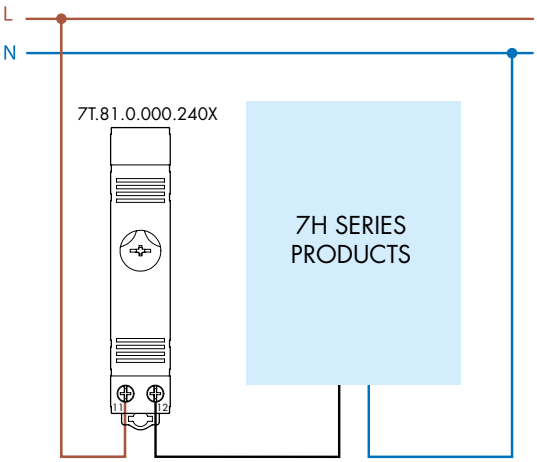
7T.51



7T.81…230x



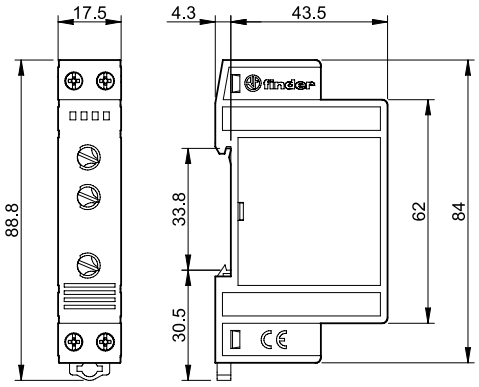
7T.81…240x



Outline drawings

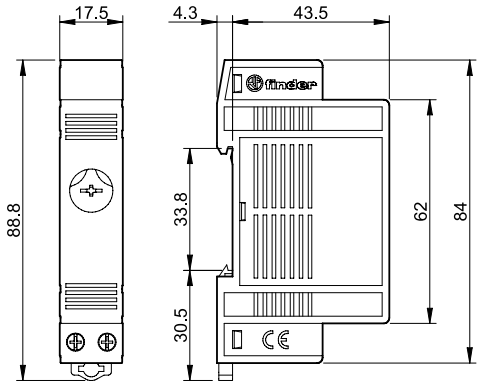
Type 7T.51

Screw terminal



Type 7T.81

Screw terminal



finder
SWITCH TO THE FUTURE

Filter Fan (24...630)m³/h and Exhaust Filter

7F
SERIES

- Drying kilns
- Textile machines
- Machines for paper processing
- Machines for ceramics
- Wood-processing machines
- Panels for electrical distribution
- Control panels
- Forced-air ventilators

Filter Fan for electrical cabinets and enclosures 120 V or 230 V AC versions

- Very low acoustic noise
- Minimal depth within enclosure
- Nominal voltage: 120 or 230 V AC (50/60 Hz)
- Time-saving installation and maintenance
- Easily replaceable filter mat
- Filter Fan supplied in Reverse flow mode (7F.21)
- Black colour RAL 9004 Available

NEW **7F.20.8.xxx.1020**

- Nominal voltage 120 or 230 V AC
- Air volume 50/60 Hz: 24/29 m³/h
- Size 1

NEW **7F.20.8.xxx.2055**

- Nominal voltage 120 or 230 V AC
- Air volume 50/60 Hz: 55/63 m³/h
- Size 2

NEW **7F.20.8.xxx.3100**

- Nominal voltage 120 or 230 V AC
- Air volume 50/60 Hz: 100/115 m³/h
- Size 3

For outline drawing see page 14

Fan data							
Air volume (free flow): 50/60 Hz	m³/h	24/29		55/63		100/115	
Air volume (with exhaust filter installed): 50/60 Hz	m³/h	14/16.5		40/45.5		75/85.5	
Noise level	dB (A)	27		42		42	
Life time at 40 °C	h	50000		50000		50000	
Electrical data							
Nominal voltage (U_N)	V AC (50/60 Hz)	120	230	120	230	120	230
Operating range	AC	(0…1.1)U_N		(0.8…1.1)U_N		(0.8…1.1)U_N	
Current consumption: 50/60 Hz	A	0.23/0.18	0.1/0.08	0.25/0.21	0.13/0.11	0.25/0.21	0.13/0.11
Rated power: 50/60 Hz	W	27/21	23/18	30/25	29/25	30/25	29/25
Other data							
Housing, cover		Plastics according to UL94 V-0					
Filter mat (included)		G3 according to EN 779, filtering degree (80…90)%					
Filter material		Synthetic fibre with progressive construction, temperature resistant to +100 °C, self extinguishing, Class F1 (DIN 53438)					
Electrical connections		Push-in terminals					
Wire size (mm²)	min/max	0.7/2.5					
Wire size (AWG)	min/max	18/14					
Ambient temperature range	°C	–15…+55					
Protection category according to EN 60529		IP 54					
Protection category according to NEMA		Type 12					
Approvals (according to type)		CE EAC cULus cULus					

7F SERIES
Filter Fan (24...630)m³/h

Filter Fan for electrical cabinets and enclosures 120 V or 230 V AC versions

- Very low acoustic noise
- Minimal depth within enclosure
- Nominal voltage: 120 or 230 V AC (50/60 Hz)
- Time-saving installation and maintenance
- Easily replaceable filter mat
- Filter Fan supplied in Reverse flow mode (7F.21)
- Black colour RAL 9004 Available

NEW 7F.20.8.xxx.4250

- Nominal voltage 120 or 230 V AC
- Air volume 50/60 Hz. 250/295 m³/h
- Size 4

NEW 7F.20.8.xxx.4400

- Nominal voltage 120 or 230 V AC
- Air volume 50/60 Hz: 400/445 m³/h
- Size 4

For outline drawing see page 15

Fan data					
Air volume (free flow): 50/60 Hz	m³/h	250/295		400/445	
Air volume (with exhaust filter installed): 50/60 Hz	m³/h	195/228		270/300	
Noise level	dB (A)	56		72	
Life time at 40 °C	h	50000		50000	
Electrical data					
Nominal voltage (U_N)	V AC (50/60 Hz)	120	230	120	230
Operating range	AC	(0.8…1.1)U_N		(0.8…1.1)U_N	
Current consumption: 50/60 Hz	A	0.35/0.40	0.2/0.22	0.6/1	0.3/0.49
Rated power: 50/60 Hz	W	42/48	46/50	72/120	69/112
Other data					
Housing, cover		Plastics according to UL94 V-0			
Filter mat (included)		G3 according to EN 779, filtering degree (80…90)%			
Filter material		Synthetic fibre with progressive construction, temperature resistant to +100 °C, self extinguishing, Class F1 (DIN 53438)			
Electrical connections		Push-in terminals			
Wire size (mm²)	min/max	0.7/2.5			
Wire size (AWG)	min/max	18/14			
Ambient temperature range	°C	–15…+55			
Protection category according to EN 60529		IP 54			
Protection category according to NEMA		Type 12			
Approvals (according to type)		CE EAC cULus			

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Filter Fan for electrical cabinets and enclosures 120 V or 230 V AC versions

- Very low acoustic noise
- Minimal depth within enclosure
- Nominal voltage: 120 or 230 V AC (50/60 Hz)
- Time-saving installation and maintenance
- Further available versions*:
  - EMC Filter Fan (7F.70) and EMC Exhaust Filter (7F.07)
  - Filter Fan supplied in Reverse flow mode (7F.80)

* Product codes, see pages 8 & 11

Note:
By reversing the fan motor, the air direction can be changed from "Inlet" Filter Fan mode to "Exhaust" Filter Fan mode** (except for the types 7F.50.8.xxx.4370, 7F.50.8.xxx.5500 and 7F.50.8.xxx.5630).

** Supplied in "Inlet" Filter Fan mode (Standard).

For outline drawing see page 15

	7F.50.8.xxx.5500	7F.50.8.xxx.5630
		
	• Nominal voltage 120 or 230 V AC • Air volume 500 m³/h • Rated power 70 W • Size 5	• Nominal voltage 120 or 230 V AC • Air volume 630 m³/h • Rated power 130 W • Size 5

Fan data					
Air volume (free flow)	m³/h	500		630	
Air volume (with exhaust filter installed)	m³/h	370		470	
Noise level	dB (A)	65		72	
Life time at 40 °C	h	50000		50000	
Electrical data					
Nominal voltage (U_N)	V AC (50/60 Hz)	120	230	120	230
Operating range	AC	(0.8…1.1)U_N		(0.8…1.1)U_N	
Current consumption	A	0.8	0.4	1.10	0.55
Rated power	W	70	70	130	130
Other data					
Housing, cover		Plastics according to UL94 V-0, light grey (RAL 7035)			
Filter mat (included)		G3 according to EN 779, filtering degree (80…90)%			
Filter material		Synthetic fibre with progressive construction, temperature resistant to +100 °C, self extinguishing, Class F1 (DIN 53438)			
Electrical connections/wire size		screw terminals / max. 2.5 mm²			
Screw torque	Nm	0.8			
Ambient temperature range	°C	–10…+70			
Protection category according to EN 60529		IP 54			
Approvals (according to type)		CE EAC cULus			

7F SERIES
Filter Fan (24...630)m³/h

Filter Fan for electrical cabinets and enclosures 24 V DC versions

- Very low acoustic noise
- Minimal depth within enclosure
- Nominal voltage: 24 V DC
- Time-saving installation and maintenance
- Easily replaceable filter mat
- Filter Fan supplied in Reverse flow mode (7F.21)
- Black colour RAL 9004 Available

	NEW 7F.20.9.024.1020	NEW 7F.20.9.024.2055	NEW 7F.20.9.024.3100
			
	• Nominal voltage 24 V DC • Air volume 24 m³/h • Rated power 3.6 W • Size 1	• Nominal voltage 24 V DC • Air volume 55 m³/h • Rated power 7 W • Size 2	• Nominal voltage 24 V DC • Air volume 100 m³/h • Rated power 7 W • Size 3
For outline drawing see page 14			
Fan data			
Air volume (free flow) m³/h	24	55	100
Air volume (with exhaust filter installed) m³/h	14	40	75
Noise level dB (A)	37.5	46	45
Life time at 40 °C h	50000	50000	50000
Electrical data			
Nominal voltage (U_N) V DC	24	24	24
Operating range DC	(0.8…1.1)U_N	(0.8…1.1)U_N	(0.8…1.1)U_N
Current consumption A	0.15	0.32	0.32
Rated power W	3.6	7	7
Other data			
Housing, cover	Plastics according to UL94 V-0		
Filter mat (included)	G3 according to EN 779, filtering degree (80…90)%		
Filter material	Synthetic fibre with progressive construction, temperature resistant to 100 °C, self extinguishing, Class F1 (DIN 53438)		
Electrical connections	Push-in terminals		
Wire size (mm²) min/max	0.7/2.5		
Wire size (AWG) min/max	18/14		
Ambient temperature range °C	–15…+55		
Protection category according to EN 60529	IP 54		
Protection category according to NEMA	Type 12		
Approvals (according to type)	CE EAC cULus cULus		

Filter Fan for electrical cabinets and enclosures 24 V DC versions

- Very low acoustic noise
- Minimal depth within enclosure
- Nominal voltage: 24 V DC
- Time-saving installation and maintenance
- Easily replaceable filter mat
- Filter Fan supplied in Reverse flow mode (7F.21)
- Black colour RAL 9004 Available

NEW **7F.20.9.024.4250**

- Nominal voltage 24 V DC
- Air volume 250 m³/h
- Rated power 43 W
- Size 4

For outline drawing see page 15

Fan data		
Air volume (free flow)	m³/h	250
Air volume (with exhaust filter installed)	m³/h	195
Noise level	dB (A)	64
Life time at 40 °C	h	50000
Electrical data		
Nominal voltage (U_N)	V DC	24
Operating range	DC	(0.8…1.1)U_N
Current consumption	A	1.8
Rated power	W	43
Other data		
Housing, cover		Plastics according to UL94 V-0
Filter mat (included)		G3 according to EN 779, filtering degree (80…90)%
Filter material		Synthetic fibre with progressive construction, temperature resistant to 100 °C, self extinguishing, Class F1 (DIN 53438)
Electrical connections		Push-in terminals
Wire size (mm²)	min/max	0.7/2.5
Wire size (AWG)	min/max	18/14
Ambient temperature range	°C	–15…+55
Protection category according to EN 60529		IP 54
Protection category according to NEMA		Type 12
Approvals (according to type)		CE EAC cULus

Ordering information

Example: Series 7F, Filter Fan for mounting in sidewalls, nominal voltage 230 V AC, size 1, air volume 24 m³/h.

7	F	.	2	0	.	8	.	2	3	0	.	1	0	2	0	

Series

Type
20 = Filter Fan - for indoor use
21 = Reverse flow Filter Fan - for indoor use
50 = Filter Fan - for indoor use
70 = EMC Filter Fan - for indoor use
80 = Reverse flow Filter Fan - for indoor use

Supply version
8 = AC (50/60 Hz)
9 = DC

Operating voltage
024 = 24 V DC
120 = 120 V AC
230 = 230 V AC

Enclosure cut-out
1 = Size 1 ($92^{+1.0}$ x $92^{+1.0}$) mm
2 = Size 2 ($125^{+1.0}$ x $125^{+1.0}$) mm
3 = Size 3 ($177^{+1.0}$ x $177^{+1.0}$) mm
4 = Size 4 ($223^{+1.0}$ x $223^{+1.0}$) mm
5 = Size 5 ($291^{+1.0}$ x $291^{+1.0}$) mm

Nominal air volume (free flow)
020 = 24 m³/h
055 = 55 m³/h
100 = 100 m³/h
250 = 250 m³/h
400 = 400 m³/h
500 = 500 m³/h
630 = 630 m³/h

Colour
Empty = Grey RAL 7035
0 = Black RAL 9004
(only for 7F.20 and 7F.21)

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Filter Fans - All versions

Standard versions	EMC versions	Reverse flow versions	
7F.20.8.120.1020	—	7F.21.8.120.1020	Filter Fan, Size 1
7F.20.8.120.2055	—	7F.21.8.120.2055	Filter Fan, Size 2
7F.20.8.120.3100	—	7F.21.8.120.3100	Filter Fan, Size 3
7F.20.8.120.4250	—	7F.21.8.120.4250	Filter Fan, Size 4
7F.20.8.120.4400	—	7F.21.8.120.4400	Filter Fan, Size 4
7F.50.8.120.5500	—	7F.80.8.120.5500	Filter Fan, Size 5
7F.50.8.120.5630	—	—	Filter Fan, Size 5
7F.20.8.230.1020	—	7F.21.8.230.1020	Filter Fan, Size 1
7F.20.8.230.2055	—	7F.21.8.230.2055	Filter Fan, Size 2
7F.20.8.230.3100	—	7F.21.8.230.3100	Filter Fan, Size 3
7F.20.8.230.4250	—	7F.21.8.230.4250	Filter Fan, Size 4
7F.20.8.230.4400	—	7F.21.8.230.4400	Filter Fan, Size 4
7F.50.8.230.5500	7F.70.8.230.5500	7F.80.8.230.5500	Filter Fan, Size 5
7F.50.8.230.5630	7F.70.8.230.5630	—	Filter Fan, Size 5
7F.20.9.024.1020	—	7F.21.9.024.1020	Filter Fan, Size 1
7F.20.9.024.2055	—	7F.21.9.024.2055	Filter Fan, Size 2
7F.20.9.024.3100	—	7F.21.9.024.3100	Filter Fan, Size 3
7F.20.9.024.4250	—	7F.21.9.024.4250	Filter Fan, Size 4

Note:
The technical features (air volume, dimensions and electrical parameters) for the Standard Filter Fans (7F.20 and 7F.50), the EMC Filter Fans (7F.70) and the Reverse flow versions (7F.21 and 7F.80) - are exactly the same.
7F.50.8.120.5630 has no UL approval. Other versions on request.

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Exhaust Filter

The size of the Exhaust Filter should match the size of the Filter Fan to achieve the best ventilation within the cabinet

- Minimum depth within enclosure
- Time-saving installation and maintenance
- Easily replaceable filter mat
- Black colour RAL 9004 Available

	NEW 7F.02.0.000.1000	NEW 7F.02.0.000.2000	NEW 7F.02.0.000.3000
			
	• For Filter Fans 7F.20.x.xxx.1020 • Size 1	• For Filter Fans 7F.20.x.xxx.2055 • Size 2	• For Filter Fans 7F.20.x.xxx.3100 • Size 3
For outline drawing see page 14			
Other data			
Housing, cover	Plastics according to UL94 V-0		
Filter mat (included)	G3 according to EN 779, filtering degree (80…90)%		
Filter material	Synthetic fibre with progressive construction, temperature resistant to +100 °C, self extinguishing, Class F1 (DIN 53438)		
Protection category according to EN 60529	IP 54		
Protection category according to NEMA	Type 12		
Approvals (according to type)	CE EAC cULus		

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Exhaust Filter

The size of the Exhaust Filter should match the size of the Filter Fan to achieve the best ventilation within the cabinet

- Minimum depth within enclosure
- Time-saving installation and maintenance
- EMC Exhaust Filters (7F.07 only for 7F.05)
- Easily replaceable filter mat (7F.02)
- Black colour RAL 9004 Available (only for 7F.02)

	NEW **7F.02.0.000.4000**	**7F.05.0.000.5000**
		
	• For Filter Fans 7F.20.x.xxx.4250 or 7F.20.8.xxx.4400 • Size 4	• For Filter Fans 7F.50.8.xxx.5500 or 7F.50.8.xxx.5630 • Size 5
For outline drawing see page 15		
Other data		
Housing, cover	Plastics according to UL94 V-0, light grey (RAL 7035)	
Filter mat (included)	G3 according to EN 779, filtering degree (80…90)%	
Filter material	Synthetic fibre with progressive construction, temperature resistant to +100 °C, self extinguishing, Class F1 (DIN 53438)	
Protection category according to EN 60529	IP 54	
Protection category according to NEMA	Type 12	
Approvals (according to type)	CE EAC cULus	

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Ordering information

Example: Series 7F, Exhaust Filter for mounting in sidewalls, size 1.

7	F	.	0	2	.	0	.	0	0	0	.	1	0	0	0	

Series

Type
02 = Exhaust Filter - for indoor use
05 = Exhaust Filter - for indoor use
07 = EMC Exhaust Filter - for indoor use

Supply and operating voltage
0 = Not applicable for Exhaust Filter

Operating voltage
000 = Not applicable for Exhaust Filter

Enclosure cut-out
1000 = Size 1 ($92^{+1.0}$ x $92^{+1.0}$) mm
2000 = Size 2 ($125^{+1.0}$ x $125^{+1.0}$) mm
3000 = Size 3 ($177^{+1.0}$ x $177^{+1.0}$) mm
4000 = Size 4 ($223^{+1.0}$ x $223^{+1.0}$) mm
5000 = Size 5 ($291^{+1.0}$ x $291^{+1.0}$) mm

Colour
Empty = Grey RAL 7035
0 = Black RAL 9004 (only for 7F.02)

Exhaust Filter - All versions		
Standard-versions	**EMC - versions**	
7F.02.0.000.1000	—	Exhaust Filter, Size 1
7F.02.0.000.2000	—	Exhaust Filter, Size 2
7F.02.0.000.3000	—	Exhaust Filter, Size 3
7F.02.0.000.4000	—	Exhaust Filter, Size 4
7F.05.0.000.5000	7F.07.0.000.5000	Exhaust Filter, Size 5

Components

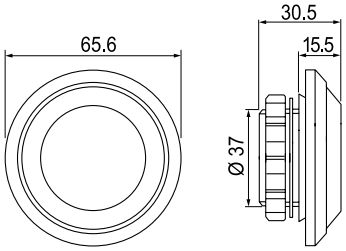
Standard-Filter Fan	Standard-Exhaust Filter	EMC-Filter Fan	EMC-Exhaust Filter	Filter mat	Size
7F.20.8.xxx.1020	7F.02.0.000.1000	—	—	07F.15	1
7F.20.8.xxx.2055	7F.02.0.000.2000	—	—	07F.25	2
7F.20.8.xxx.3100	7F.02.0.000.3000	—	—	07F.35	3
7F.20.8.xxx.4250	7F.02.0.000.4000	—	—	07F.45	4
7F.20.8.xxx.4400	7F.02.0.000.4000	—	—	07F.45	4
7F.50.8.xxx.5500	7F.05.0.000.5000	7F.70.8.230.5500	7F.07.0.000.5000	07F.55	5
7F.50.8.xxx.5630	7F.05.0.000.5000	7F.70.8.230.5630	7F.07.0.000.5000	07F.55	5
7F.20.9.024.1020	7F.02.0.000.1000	—	—	07F.15	1
7F.20.9.024.2055	7F.02.0.000.2000	—	—	07F.25	2
7F.20.9.024.3100	7F.02.0.000.3000	—	—	07F.35	3
7F.20.9.024.4250	7F.02.0.000.4000	—	—	07F.45	4

Spare Filter mats	07F.15	07F.25	07F.35	07F.45	07F.55
Protection category	IP54				

Accessories

07F.80

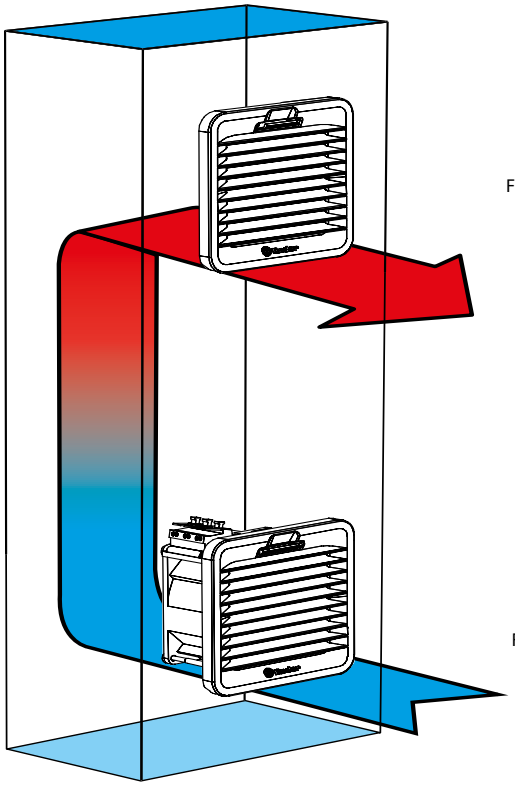
Pressure compensation device, for pressure compensation in closed cabinets or enclosures		**07F.80**
Air interface area	cm^2	7
Mounting		PG 29 thread with union nut
Torque	Nm	5 (max. 10)
Material		plastic according to UL94-V0
Dimensions (diameter/depth)	mm	65.5/30.5
Mounting position		upper part of cabinet sidewalls
Ambient temperature	°C	–45…+70
Protection category		IP 55

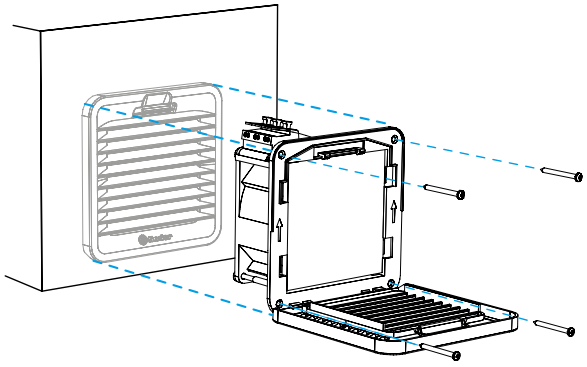


Unit package contains 2 pressure compensation devices

Mounting instructions for Filter Fans

Mounting arrangement of Filter Fans and Exhaust Filter





The installation with the only clips is optimized for 1.5 mm thick sheets;
it is also possible with thicknesses from 1 to 2.5 mm.
Fixing with screws (supplied) is recommended.
Tightening torque 0.3 Nm.

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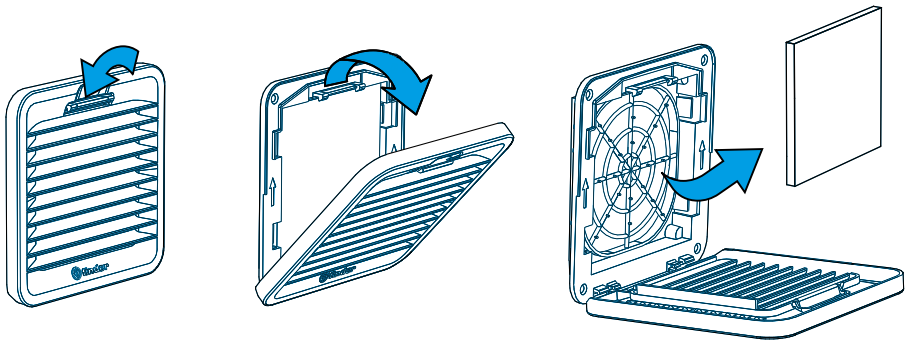
Replacement of Filter mat (Type 7F.20)



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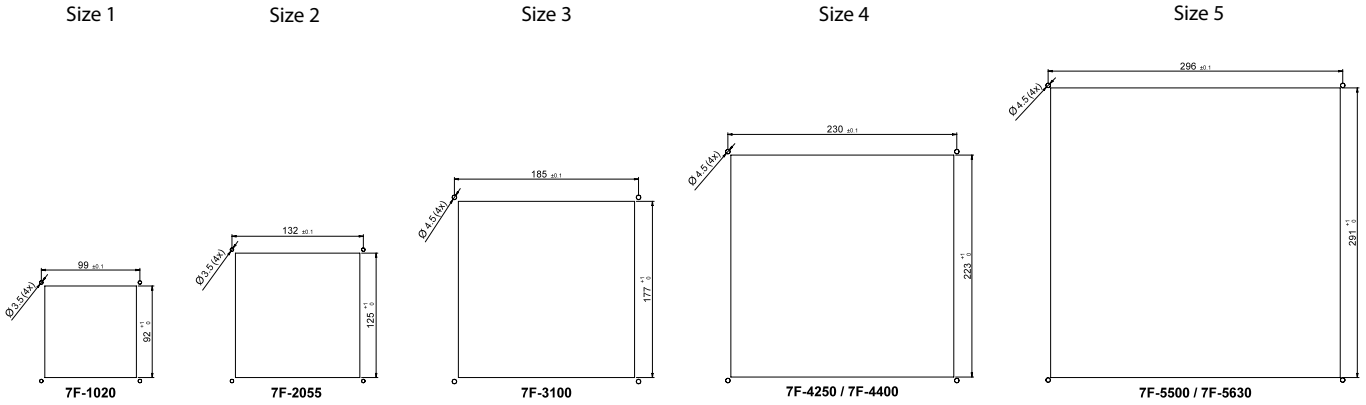
Drilling template and mounting cut-outs for Filter Fans and Exhaust Filter

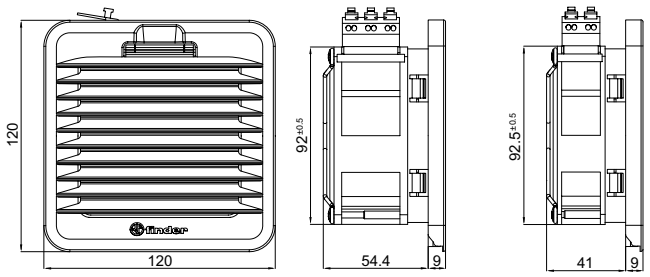


Mounting and maintenance

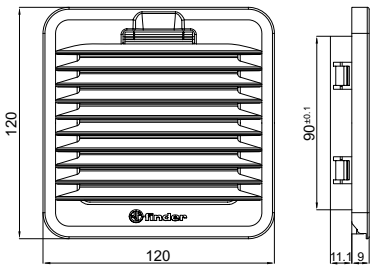
1. Make the panel cut-out according to the size of the Filter Fan or Exhaust Filter in the sidewall of the cabinet as appropriate.
   A template of the panel cut-out is included in the packaging of the Filter Fan or Exhaust Filter.
2. Make the electrical connection.
3. Mount by simply snapping the side-located lugs on the Filter Fan or Exhaust Filter into the panel cut-out (without using screws for sidewall thickness of 1.2…2.4 mm).
   At other thickness it is recommended to mount the Filter Fan by the screws supplied (for size 1, the template shows the mounting cut-out only).
4. When screws are needed for the mounting, remove the plastic cover and fix the Filter Fan with the 4 screws supplied.
   Then insert the filter mat and snap the plastic cover to the mounting frame.
5. During maintenance or when replacing the filter mat remove the plastic cover, replace the filter mat and snap on the plastic cover.

Outline drawings

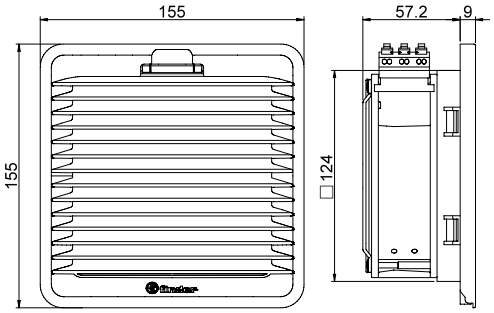
Type 7F.20.x.xxx.1020 AC version DC version



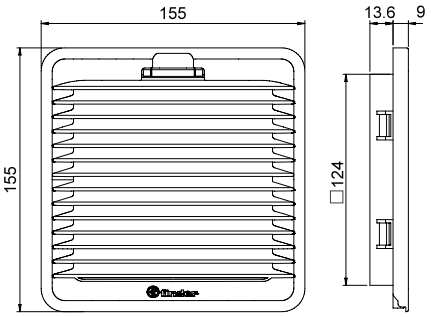
Type 7F.02.0.000.1000



Type 7F.20.x.xxx.2055

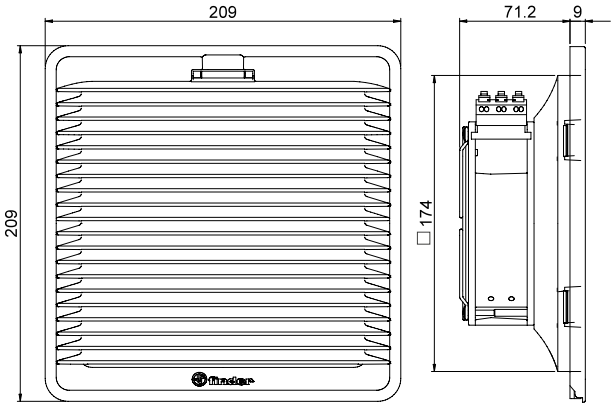


Type 7F.02.0.000.2000

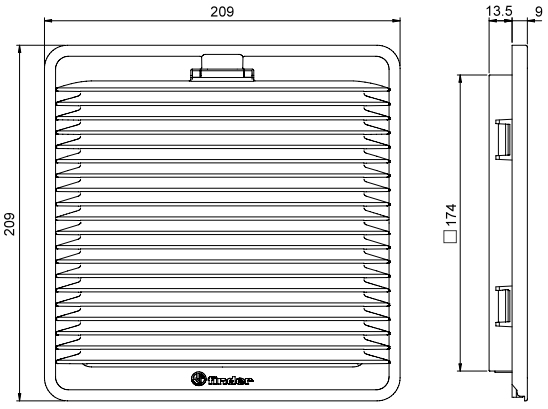


G

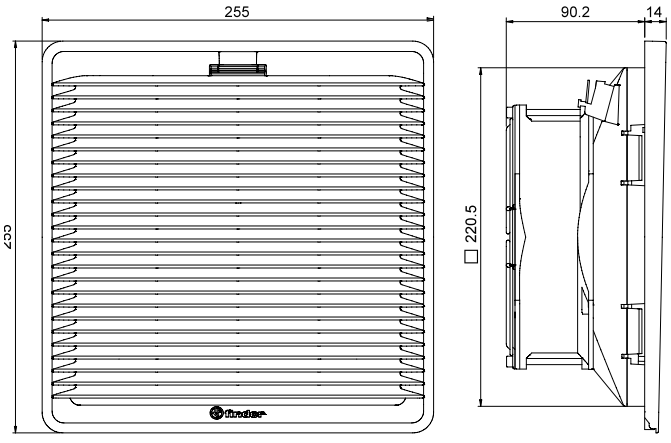
Type 7F.20.x.xxx.3100



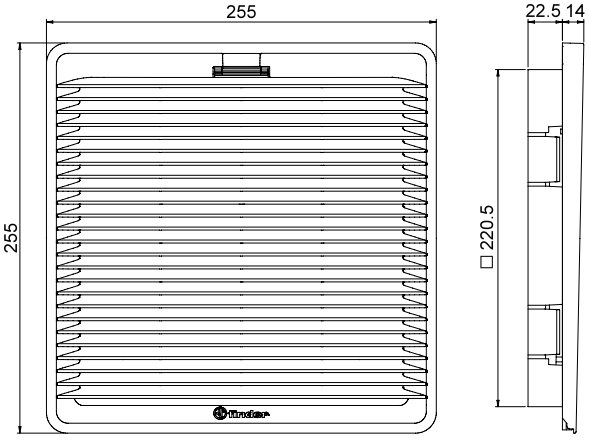
Type 7F.02.0.000.3000



Type 7F.20.x.xxx.4250



Type 7F.02.0.000.4000



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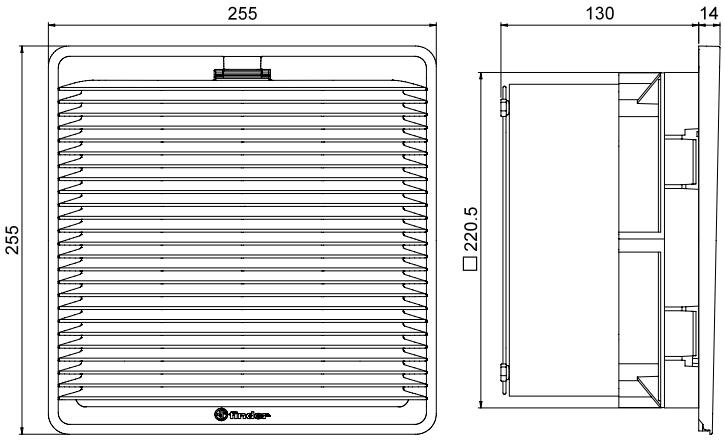
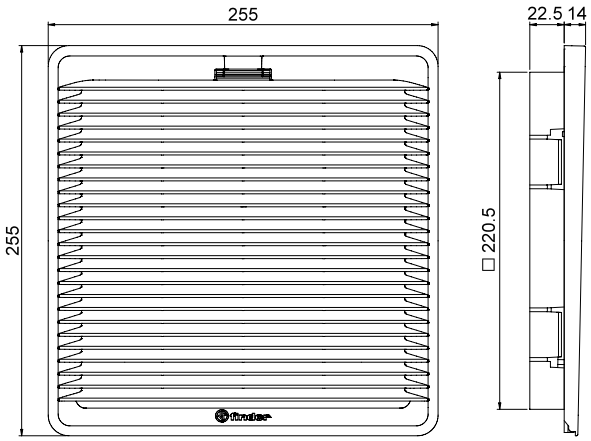
Outline drawings

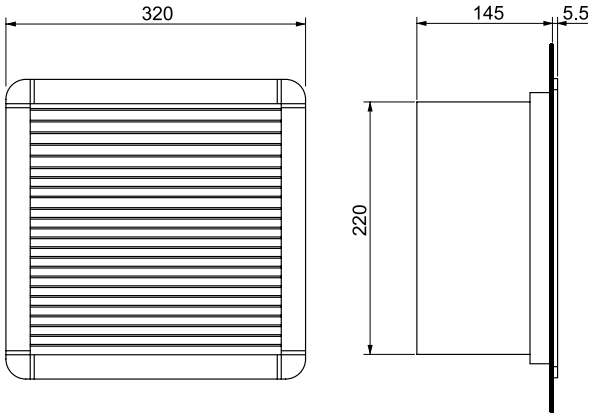
Type 7F.20.x.xxx.4400



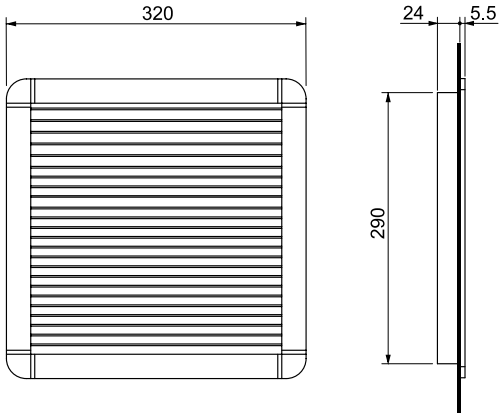
Type 7F.02.0.000.4000



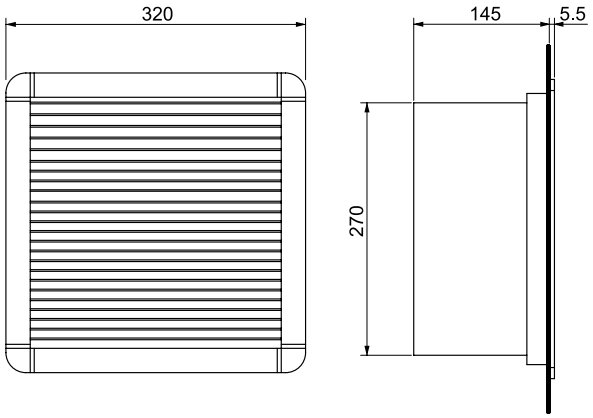
Type 7F.50.x.xxx.5500



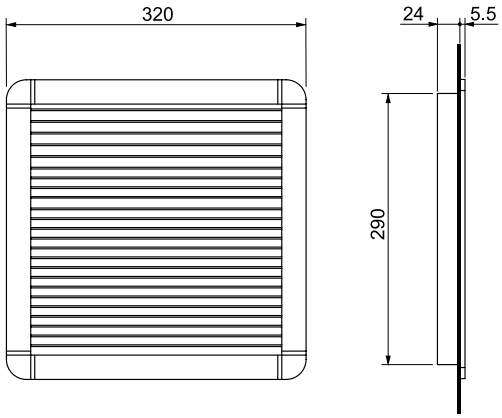
Type 7F.05.0.000.5000



Type 7F.50.x.xxx.5630



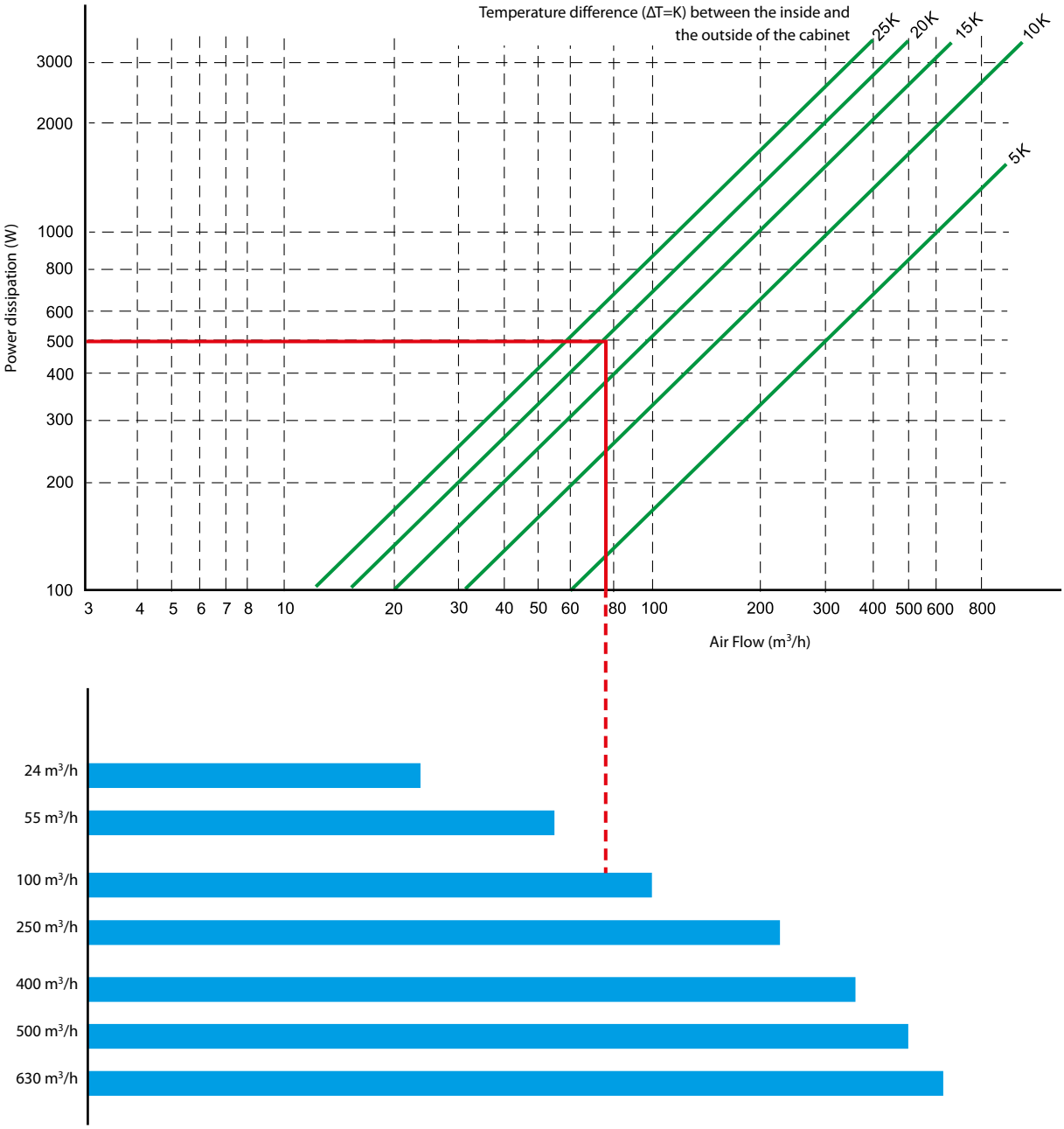
Type 7F.05.0.000.5000



G

7F SERIES
Filter Fan (24...630)m³/h

Fan selection



Example

First, estimate the power dissipated within the cabinet. Then calculate the maximum difference between the internal and external temperature (green lines) by considering the difference between the maximum permitted internal temperature (as dictated by the temperature rating of the enclosed components, or specification) and the maximum temperature expected outside the cabinet.

The projection onto the X axis, of the intersection between the power (watts) and the appropriate green line, corresponds to the air flow rate in m³/h required to meet the maximum internal temperature limit. Extending this line vertically to intersect with the blue horizontal lines, indicates the most appropriate model of 7F fan to be fitted to the cabinet to provide the requisite air flow.

The example above considers a cabinet with an internal thermal power dissipation of 500 W, and assumes the maximum temperature difference between the inside and the outside of the cabinet to be 20K. The required air flow can be seen to be a little less than 80 m³/h.

It is suggested that this is increased by 10% to allow for the affects of a dirty filter.

And so, it can be seen that models of the 7F with 100 m³/h flow rate will provide the proper dissipation of heat under these circumstances.

Application notes

Filter Fan
The ball-bearing axial fan housing is made of aluminium and the rotor is made of plastic or metal (depending on the type).

Filter classes
Within EN 779 are specified 9 filter classes, categorised into 4 coarse dust filters und 5 fine dust filters.
The coarse dust filters G1 - G4 are able to filter particles > 10 µm and the fine dust filters G5 - G9 are able to filter particles from (1…10)µm.

Filter classes	Example of particle	Particle size
G1 - G4 (EU1 - EU4)	Textile fibers, hair, sand, pollen, spores, insects, cement dust	> 10 µm
G5 - G9 (EU5 - EU9)	Pollen, spores, cement dust, tobacco smoke, oil smoke, soot	(1…10)µm

Filtering degree (Am)
The degree of filtering (Am) is the percentages of dust, by weight, that is caught and retained by the filter.

Filter mats
The quality of these filters mats has been independently tested, according EN 779 and branded after passing the test.
The filter mats are to filter class G3 and have an average filtering degree of (80…90)%.

Filter material
The filter material consists of a synthetic fiber with progressive construction which is moisture-resistant to 100% RH and temperature resistant to +100 °C.
According to the strict requirements of fire class F1, DIN 53438, these filter mats are self extinguishing.

Progressive construction at filter mats
The individual fibers of these filter mats are bonded by a special process to provide a progressive construction where the fiber size and spacing varies through the thickness of the filter mat.
This means that coarse dust particles are caught early and fine dust later through the thickness of the mat. In this way the entire depth of the filter mat is used.

Flammability class of the housing and the cover
The plastic materials used comply with flammability class V-0, according UL94.

EMC Filter Fans and EMC Exhaust Filters
The plastic mounting frame of the EMC Filter Fans (7F.70) and EMC Exhaust Filters (7F.07) are sprayed with a conductive (metallic) paint.
The gasket located on the mounting frame, for sealing the Filter Fan or Exhaust Filter in the cabinet is also metalised.
In addition; located at the EMC Filter Fan between the metalized mounting frame and the filter mat, is a metal grid.
Therefore, between the metal parts of the Filter Fan and the metal cabinet, there is a conductive connection.

Filter Fan in "reverse flow" version
As supplied, the standard Filter Fan is in "Draw-In"- mode, which means that cool air is filtered and drawn into the cabinet. In some cases it may be required that the warm air is blown out of the cabinet.
In which case it is possible to get Filter Fans in "Exhaust Filter" mode version (7F.21 and 7F.80).

Mounting of the pressure compensation device
In sealed cabinets and enclosures the internal pressure can vary due to changes in temperature. The pressure compensation device (07F.80) will relieve this internal/external pressure differential whilst maintaining a high level of protection - preventing the ingress of dust and moisture into the cabinet or the enclosure. The pressure compensation device is approved for use in cabinets and enclosures according to DIN EN 62208.

Drill a hole Ø $37^{+1.0}$ mm in the housing wall and fix the pressure compensation device with the accompanying nut. It is important to ensure that the sealing ring is located on the outside. To ensure optimum pressure balance, it is recommended to fit 2 pressure compensation device at the upper sides of the cabinet or enclosure.

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