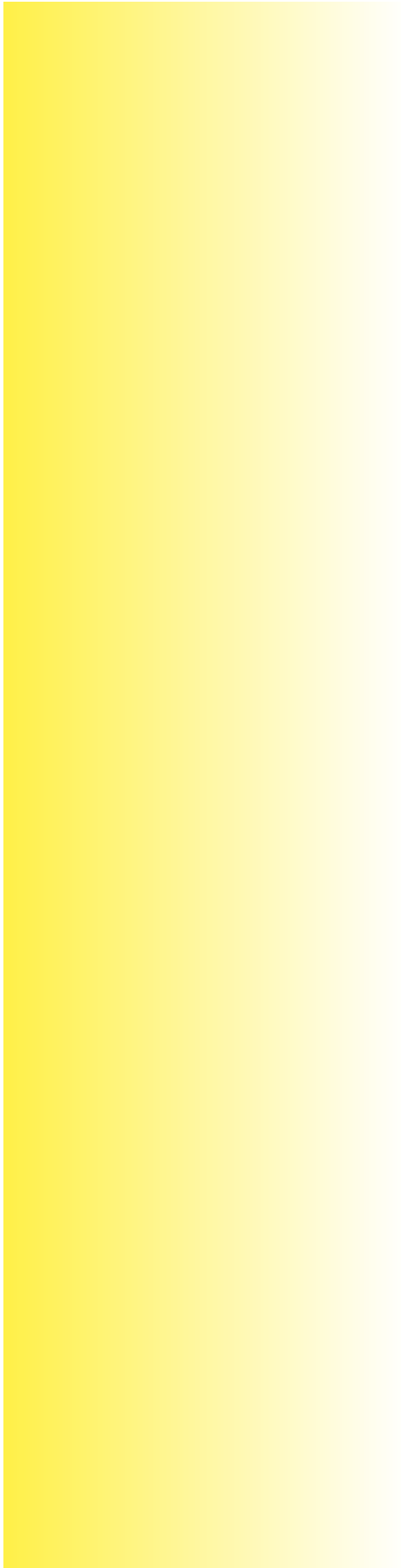


Surge Protection for Telecommunication Networks, Terminals and Equipment

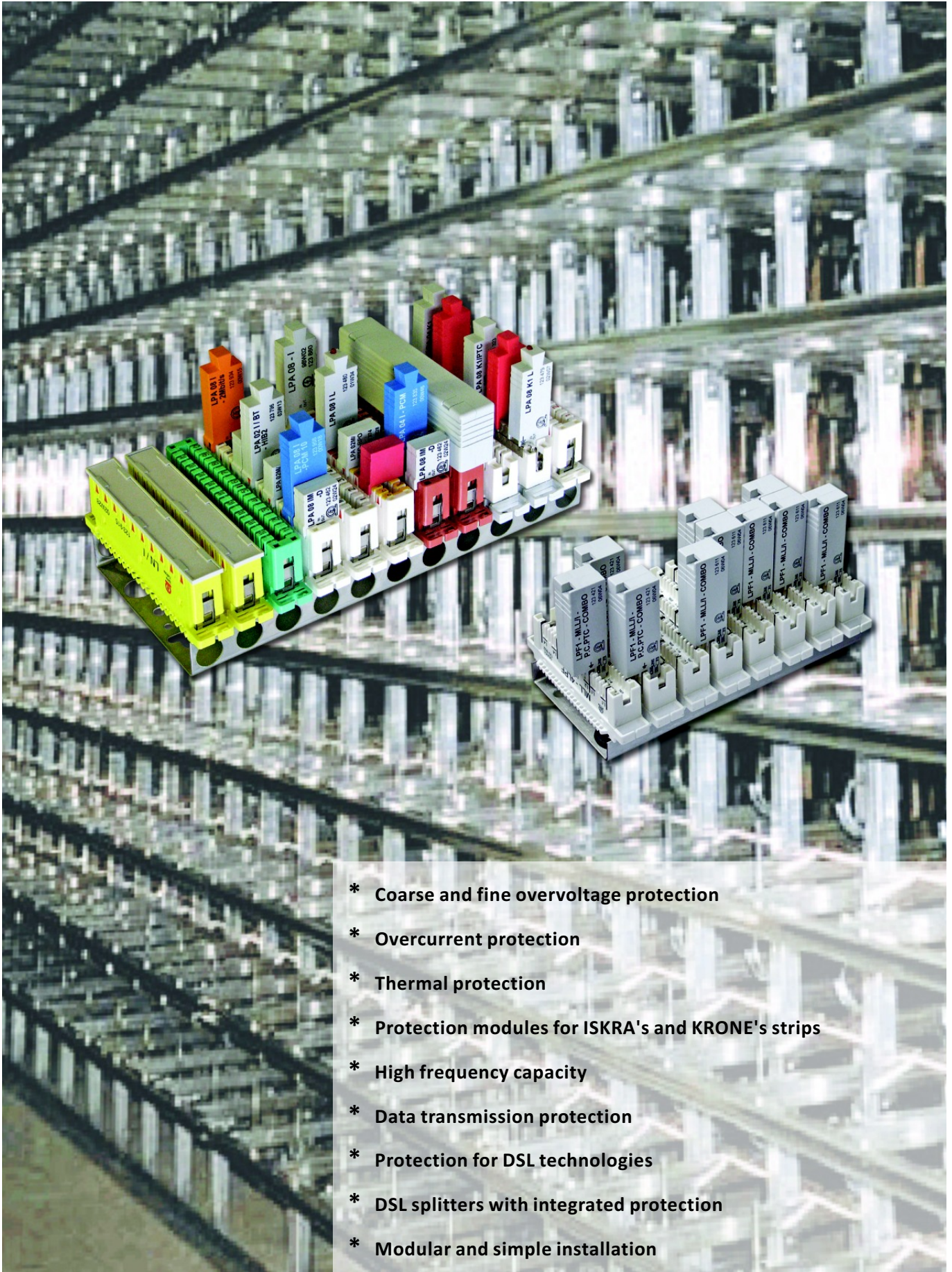


ISKRA ZAŠČITE

BE ON THE SAFE SIDE



Surge Protection Solutions for Telephone Exchanges



- * Coarse and fine overvoltage protection
- * Overcurrent protection
- * Thermal protection
- * Protection modules for ISKRA's and KRONE's strips
- * High frequency capacity
- * Data transmission protection
- * Protection for DSL technologies
- * DSL splitters with integrated protection
- * Modular and simple installation

Surge Protection Solutions for Telephone Exchanges

Different type of overvoltage protection modules

A. Basic protection modules - LPA 02

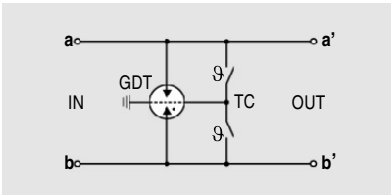
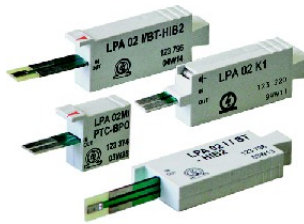
(3-pole gas arrester protection)

Advantage:

- + High limit frequency (xDSL)

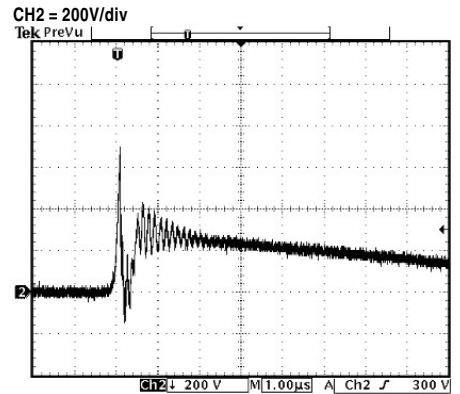
Disadvantage:

- Low protection level
- Slow response time (100 ns)



Protection Level:

- $U_p(a-L) = 850 V_{pp}$
- $U_p(b-L) = 850 V_{pp}$
- $U_p(a-b) = 850 V_{pp}$



Protection Level: a-L, b-L, a-b

B. Complex overvoltage protection modules - LPA 04

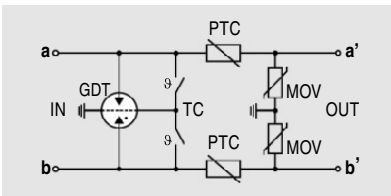
(Integrated circuit with metal oxide varistors protection)

Advantage:

- + Higher protection level
- + Fast response time (25 ns)

Disadvantage:

- Low limit frequency (POTS)

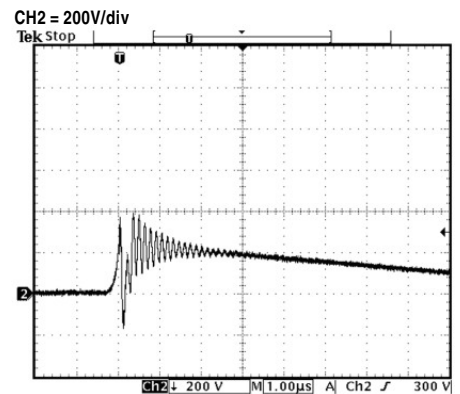


Protection Level:

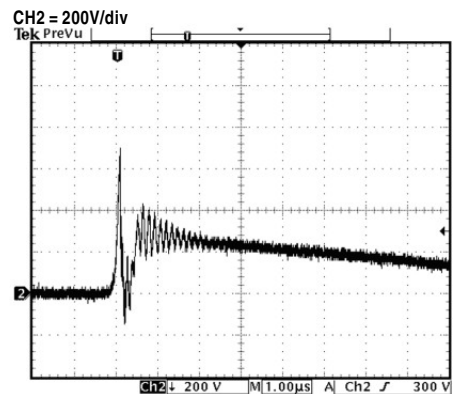
- $U_p(a-L) = 560 V_{pp}$
- $U_p(b-L) = 560 V_{pp}$

Protection Level:

- $U_p(a-b) = 850 V_{pp}$
- The protection level is equal to 3-pole gas arrester.



Protection Level: a-L, b-L



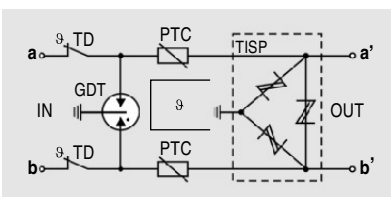
Protection Level: a-b

C. Complex overvoltage protection modules - LPA 08

(Integrated circuit with transient voltage suppressor or diodes protection)

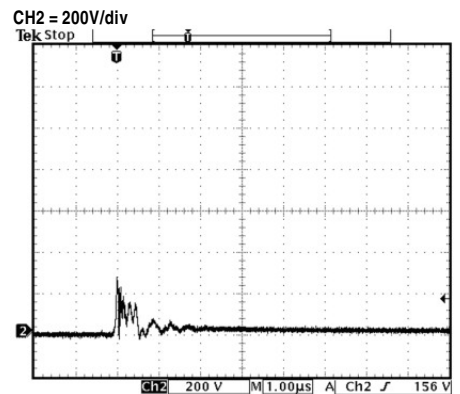
Advantage:

- + High protection level
- + Fast response time (5 ns)
- + High limit frequency (xDSL)



Protection Level:

- $U_p(a-L) = 290 V_{pp}$
- $U_p(b-L) = 290 V_{pp}$
- $U_p(a-b) = 290 V_{pp}$

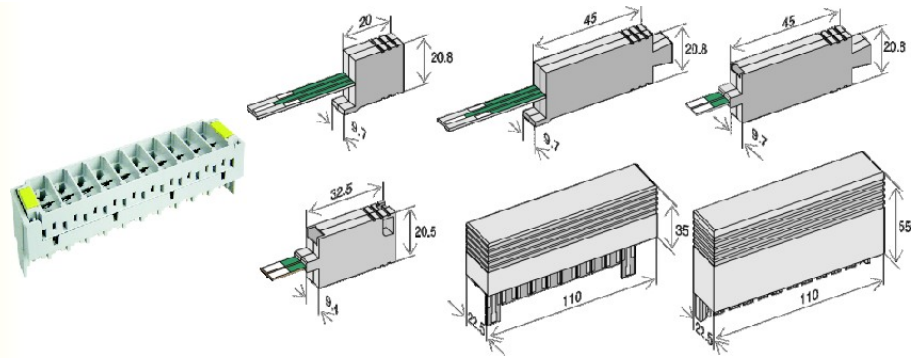


Protection Level: a-L, b-L, a-b

Protection Modules on the Telecommunication side

<p>LPA 02</p> <ul style="list-style-type: none"> - Simple protection modules - Single-pair or 10-pair - Overvoltage and overcurrent protection - Coarse protection - longitudinal and transversal direction - Thermal protection - Response time: 100ns - Protection level: < 900V 		<p>Telecommunicaton</p> <ul style="list-style-type: none"> - POTS - ADSL - xDSL - ISDN S0, S2M, U - P-MUX - PCM-E1 - PCM 100V - Modem Analogue <p>Data Transmission</p> <ul style="list-style-type: none"> - Modem DatexP - RS 232 - RS 485 - Ethernet - Token Ring <p>Measuring Technology</p> <ul style="list-style-type: none"> - TTL - TTY 24V
<p>LPA 04</p> <ul style="list-style-type: none"> - Complex protection modules - Single-pair - Overvoltage and overcurrent protection - Coarse protection - longitudinal and transversal direction - Fine protection - longitudinal and transversal direction - Thermal protection - High protection level: 15 - 600V - Response time: 5 - 25ns - Operating voltage: 5 - 110V_{DC} 		<p>Telecommunicaton</p> <ul style="list-style-type: none"> - POTS - ADSL - xDSL - ISDN S0, S2M, U - P-MUX - PCM-E1 - PCM 100V - Modem Analogue <p>Data Transmission</p> <ul style="list-style-type: none"> - Modem DatexP - RS 232 - RS 485 - Ethernet - Token Ring <p>Measuring Technology</p> <ul style="list-style-type: none"> - TTL - TTY 24V
<p>LPA 08</p> <ul style="list-style-type: none"> - Complex protection modules - Single-pair or 10-pair - Overvoltage and overcurrent protection - Coarse protection - longitudinal and transversal direction - Fine protection - longitudinal and transversal direction - Thermal protection - Protection level: < 450V - Fast response time: 5ns 		<p>Telecommunicaton</p> <ul style="list-style-type: none"> - POTS - ADSL - xDSL - ISDN S0, S2M, U - P-MUX - PCM-E1 - PCM 100V - Modem Analogue <p>Data Transmission</p> <ul style="list-style-type: none"> - Modem DatexP - RS 232 - RS 485 <p>Measuring Technology</p> <ul style="list-style-type: none"> - TTL - TTY 24V
<p>LPA2 02</p> <p>LPA2 08</p> <ul style="list-style-type: none"> - Complex protection modules - 2-pairs - Overvoltage and overcurrent protection - Coarse protection - longitudinal and transversal direction - Fine protection in longitudinal and transversal direction - Thermal protection - High protection level: 300V - Fast response time: 5ns 		<p>Telecommunicaton</p> <ul style="list-style-type: none"> - POTS - ADSL - xDSL - ISDN S0, S2M, U - P-MUX - PCM-E1 - PCM 100V - Modem Analogue <p>Data Transmission</p> <ul style="list-style-type: none"> - Modem DatexP - RS 232 - RS 485 - Ethernet - Token Ring <p>Measuring Technology</p> <ul style="list-style-type: none"> - TTL - TTY 24V
<p>LPF</p> <ul style="list-style-type: none"> - Low pass filter for POTS and ISDN - COMBO version for ISDN & POTS - ISDN : 135 Ω (2B1Q) - POTS : 600 Ω - Single pair - Overvoltage and overcurrent protection (optional) - Coarse protection - longitudinal and transversal direction (optional) - Thermal protection (optional) - Loop current: I > 80mA 		<p>Telecommunicaton</p> <ul style="list-style-type: none"> - POTS - ISDN - ADSL - ADSL2 - VDSL - VDSL2

LPA 02 Series



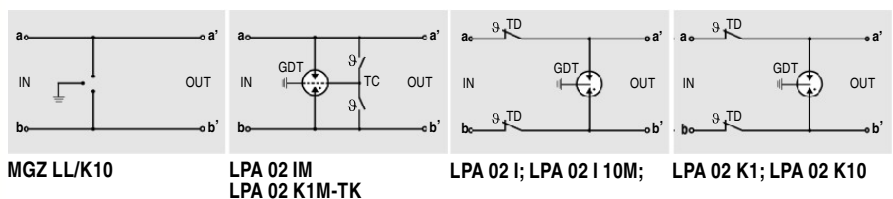
Technical characteristics

Module type	MGZ LL/K10	LPA 02 IM LPA 02 K1M-TK	LPA 02 I LPA 02 I 10M	LPA 02 K1 LPA 02 K10
No. of protected pairs		1	1 or 10	1 or 10
Electrical characteristics				
Max. operating voltage	U_c	180 V	180 V	180 V
Max. operating current at 20°C	I_L	/	300 mA	300 mA
Rated DC spark-overvoltage	(a/b-e)	184 - 276 V	184 - 276 V	184 - 276 V
	(a-b)	184 - 550 V	184 - 550 V	184 - 550 V
Protection level at I_n (a,b-e/a-b)	U_p	< 900 V	< 900 V	< 900 V
Thermal protection		None/thermal clip	Thermal clip	Thermal decoupler
Actuating of thermal protection		None/*	*	**
Rated surge current (8/20 μ s)	I_n	/	5 kA	5 kA
Max. surge current (8/20 μ s)	I_{max}	10 kA	10 kA	10 kA
Transverse capacitance	C	< 5 pF	< 5 pF	< 5 pF
Serial inductance	L	/	/	/
Serial resistance at 20°C	R	< 0.1 Ω	< 0.1 Ω	< 0.1 Ω
Frequency range	f	> 30 MHz	> 30 MHz	> 30 MHz
Response time of overvoltage protection		< 100 ns	< 100 ns	< 100 ns
Mechanical characteristics				
Operating temperature		- 25°C + 80°C	- 25°C + 60°C	- 25°C + 60°C
Housing colour		Grey	Grey	Grey
Housing material		Thermoplastic, extinguishing degree V-0		
Ordering code		123 931	123 845 123 252	123 852 123 703
	GDT with fail safe	698 011		123 220 123 320
	GDT without fail safe	698 057		

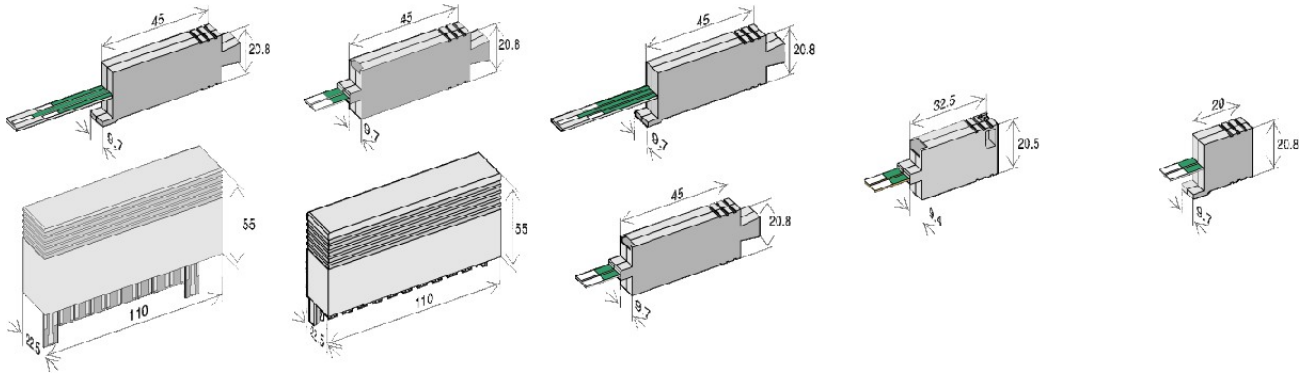
Connection schemes of modules

Legend:

TD	thermal decoupler
TC	thermal clip
GDT	gas discharge tube
PTC	resistor with a positive temperature coefficient
ϑ	thermal connection



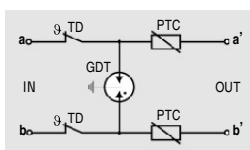
Protection Modules on the Telecommunication side



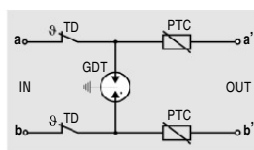
LPA 02 I-PTC LPA 02 I10-PTC	LPA 02 K1-PTC LPA 02 K10-PTC	LPA 02 I/BT-HIB2 LPA 02 K1/BT-HIB2	LPA 02 K1M-TK-PTC	LPA 02 M/PTC-BPO
1 or 10	1 or 10	1	1	1
180 V	180 V	180 V	180 V	245V
150 mA	150 mA	60 mA	150 mA	60mA
184 - 276 V	184 - 276 V	184 - 276 V	184 - 276 V	/
184 - 550 V	184 - 550 V	184 - 550 V	184 - 550 V	/
< 900 V	< 900 V	< 900 V	< 900 V	/
Thermal decoupler + PTC	Thermal decoupler + PTC	Thermal decoupler + PTC	Thermal clip + PTC	PTC
***	***	***	*****	****
5 kA	5 kA	5 kA	5 kA	/
10 kA	10 kA	10 kA	10 kA	/
< 10 pF	< 10 pF	< 10 pF	< 10 pF	< 10 pF
/	/	/	/	/
9 - 11 Ω	9 - 11 Ω	20 - 24 Ω	9 - 11 Ω	20 - 24Ω
> 30 MHz	> 30 MHz	> 30 MHz	> 30 MHz	> 30 Mhz
< 100 ns	< 100 ns	< 100 ns	< 100 ns	/
- 25°C + 60°C	- 25°C + 60°C	- 25°C + 50°C	- 25°C + 60°C	- 25°C + 50°C
Grey	Grey	Grey	Grey	Grey
Thermoplastic, extinguishing degree V-0				
123 942	123 207	123 796	123 253	123 374
123 483	123 319	123 427		

Actuating of thermal protection

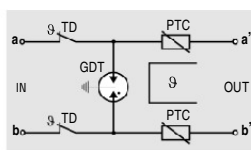
- * Short circuit connection between line and ground
- ** Disconnection of the line to the exchange
- *** Limitation of current into the exchange and disconnection of the line to the exchange
- **** Limitation of current into the exchange
- ***** Limitation of current into the exchange and short circuit connection between line and ground



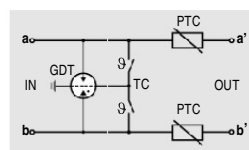
LPA 02 I-PTC;
LPA 02 I10-PTC



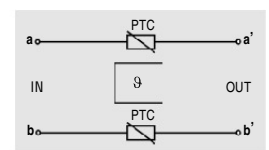
LPA 02 K1-PTC;
LPA 02 K10-PTC;



LPA 02 I/BT-HIB2;
LPA 02 K1/BT-HIB2

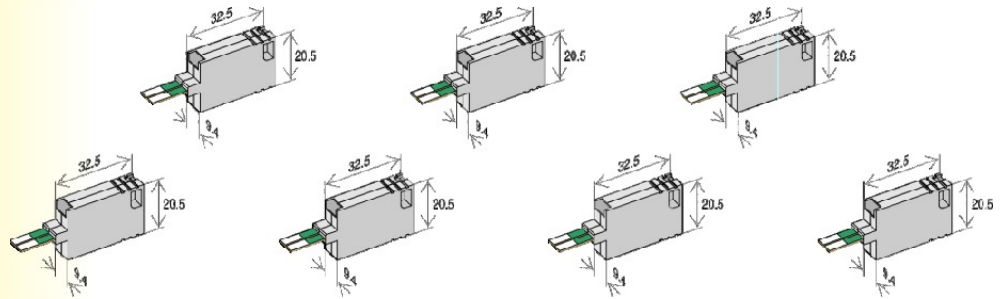


LPA 02 K1M-TK-PTC



LPA 02 M/PTC-BPO

LPA 04 Series



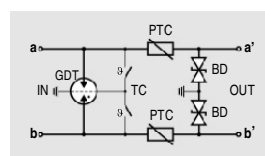
Technical characteristics

Module type		LPA 04 K1M-TK-E5	LPA 04 K1M-TK-E12	LPA 04 K1M-TK-E15	LPA 04 K1M-TK-E24	LPA 04 K1M-TK-E48	LPA 04 K1M-TK-E60	LPA 04 K1M-TK-E110
No. of protected pairs		1	1	1	1	1	1	1
Electrical characteristics								
Max. operating voltage	U_C	6 V	12 V	18 V	28 V	85 V	100 V	180 V
Max. operating current at 20°C	I_L	150 mA	150 mA	150 mA	150 mA	150 mA	150 mA	150 mA
Rated DC spark-overvoltage	(a/b-e)	7 - 8 V	14 - 16 V	21 - 23 V	31 - 35 V	90 - 110 V	108 - 132 V	184 - 264 V
	(a-b)	14 - 16 V	28 - 32 V	42 - 46 V	62 - 70 V	180 - 220 V	184 - 264 V	184 - 528 V
Protection level at I_n	(a,b-e)	$U_p < 15$ V	$U_p < 28$ V	$U_p < 40$ V	$U_p < 60$ V	$U_p < 240$ V	$U_p < 300$ V	$U_p < 600$ V
	(a-b)	$U_p < 30$ V	$U_p < 65$ V	$U_p < 80$ V	$U_p < 120$ V	$U_p < 240$ V	$U_p < 600$ V	$U_p < 900$ V
Thermal protection		Thermo clip + PTC						
Actuating of thermal protection		*	*	*	*	*	*	*
Rated surge current (8/20 μ s)	I_n	5 kA	5 kA	5 kA	5 kA	5 kA	5 kA	5 kA
Max. surge current (8/20 μ s)	I_{max}	10 kA	10 kA	10 kA	10 kA	10 kA	10 kA	10 kA
Transverse capacitance	C	< 4500 pF	< 2500 pF	< 2000 pF	< 1400 pF	< 300 pF	< 250 pF	< 100 pF
Serial inductance	L	/	/	/	/	/	/	/
Serial resistance at 20°C	R	9 - 11 Ω	9 - 11 Ω	9 - 11 Ω	9 - 11 Ω	9 - 11 Ω	9 - 11 Ω	9 - 11 Ω
Frequency range	f	> 0.9 MHz	> 1.0 MHz	> 1.1 MHz	> 1.2 MHz	> 1.5 MHz	> 1.5 MHz	> 10 MHz
Response time of overvoltage protection		< 1 ns	< 1 ns	< 1 ns	< 1 ns	< 25 ns	< 25 ns	< 25 ns
Mechanical characteristics								
Operating temperature		- 25°C ... + 60°C						
Housing colour		Grey	Grey	Grey	Grey	Grey	Grey	Grey
Housing material		Thermoplastic, extinguishing degree V-0						
Ordering code		123 260	123 261	123 262	123 263	123 265	123 267	123 268

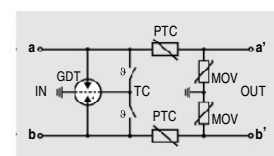
Connection schemes of modules

Legend:

TC	thermo clip
GDT	gas discharge tube
MOV	varistor
PTC	resistor with a positive temperature coefficient
ϑ	thermal connection
BD	bidirectional diode

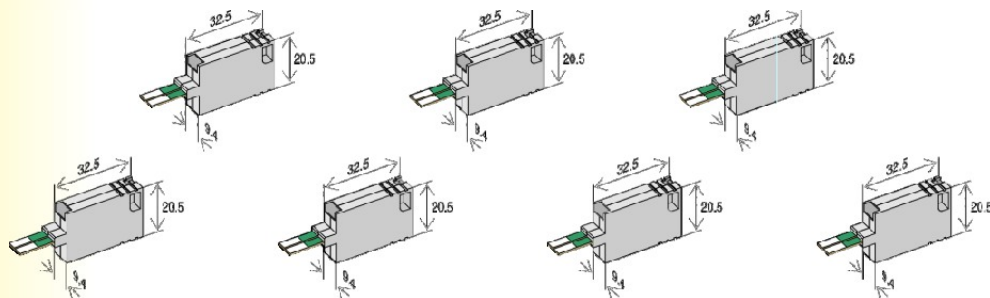


LPA 04 K1M-TK-E5 ... E24



LPA 04 K1M-TK-E48 ... E110

Protection Modules on the Telecommunication side

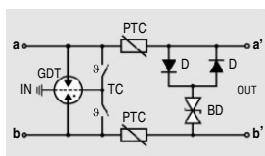


Technical characteristics

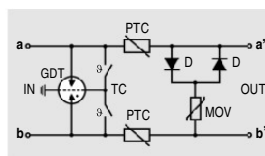
Module type		LPA 04 K1M-TK-C5	LPA 04 K1M-TK-C12	LPA 04 K1M-TK-C15	LPA 04 K1M-TK-C24	LPA 04 K1M-TK-C48	LPA 04 K1M-TK-C60	LPA 04 K1M-TK-C110
No. of protected pairs		1	1	1	1	1	1	1
Electrical characteristics								
Max. operating voltage	U_C	6 V	12 V	18 V	28 V	85 V	100 V	180 V
Max. operating current at 20°C	I_L	150 mA	150 mA	150 mA	150 mA	150 mA	150 mA	150 mA
Rated DC spark-overvoltage	(a/b-e)	184 - 550 V	184 - 550 V	184 - 550 V	184 - 550 V	184 - 550 V	184 - 550 V	184 - 550 V
	(a-b)	7 - 9 V	14 - 17 V	21 - 24 V	31 - 36 V	90 - 110 V	108 - 132 V	184 - 264 V
Protection level at I_n	(a-b)	U_p < 14 V	< 28 V	< 40 V	< 60 V	< 240 V	< 300 V	< 600 V
	(a,b,e)	< 900 V	< 900 V	< 900 V	< 900 V	< 900 V	< 900 V	< 900 V
Thermal protection Thermo clip + PTC								
Actuating of thermal protection		*	*	*	*	*	*	*
Rated surge current (8/20 μ s)	I_n	5 kA	5 kA	5 kA	5 kA	5 kA	5 kA	5 kA
Max. surge current (8/20 μ s)	I_{max}	10 kA	10 kA	10 kA	10 kA	10 kA	10 kA	10 kA
Transverse capacitance	C	< 30 pF	< 30 pF	< 30 pF	< 30 pF	< 30 pF	< 30 pF	< 100 pF
Serial inductance	L	/	/	/	/	/	/	/
Serial resistance at 20°C	R	9 - 11 Ω	9 - 11 Ω	9 - 11 Ω	9 - 11 Ω	9 - 11 Ω	9 - 11 Ω	9 - 11 Ω
Frequency range	f	> 30 MHz	> 30 MHz	> 30 MHz	> 30 MHz	> 30 MHz	> 30 MHz	> 10 MHz
Response time of overvoltage protection		< 1 ns	< 1 ns	< 1 ns	< 1 ns	< 25 ns	< 25 ns	< 25 ns
Mechanical characteristics								
Operating temperature		- 25°C ... + 60°C						
Housing colour		Grey	Grey	Grey	Grey	Grey	Grey	Grey
Housing material		Thermoplastic, extinguishing degree V-0						
Ordering code		123 255	123 256	123 257	123 258	123 269	123 270	123 259

Actuating of thermal protection

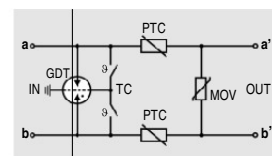
* Limitation of current into the exchange and short circuit connection between line and ground



LPA 04 K1M-TK-C5 ... C24

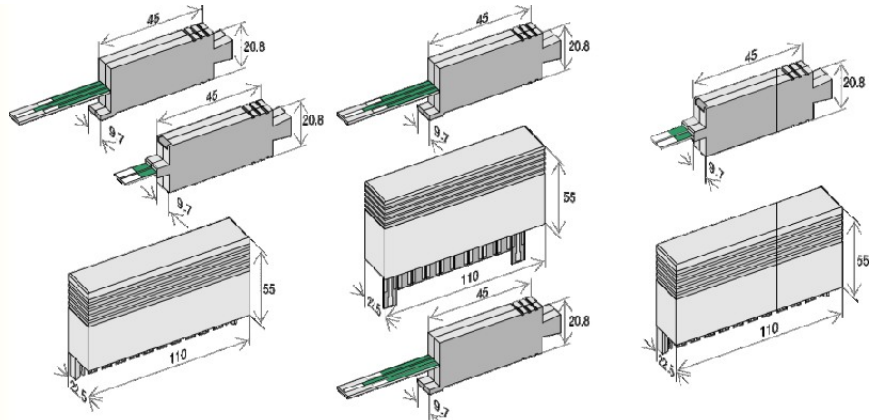


LPA 04 K1M-TK-C48, C60



LPA 04 K1M-TK-C110

LPA 08 Series



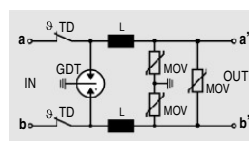
Technical characteristics

Module type	LPA 08 I LPA 08 K1 LPA 08 K10	LPA 08 I-PTC LPA 08 I10-PTC LPA 08 I BT/PTC	LPA 08 K1-PTC LPA 08 K10-PTC
No. of protected pairs	1 or 10	1 or 10	1 or 10
Electrical characteristics			
Max. operating voltage	U_C 180 V	180 V	180 V
Max. operating current at 20°C	I_L 150 mA	150 mA	150 mA
Rated DC spark-overvoltage	(a/b-e) 184 - 264 V	184 - 264 V	184 - 264 V
	(a-b) 184 - 264 V	184 - 264 V	184 - 264 V
Protection level at I_n (a,b-e/a-b)	U_p ≤ 600 V	≤ 600 V	≤ 600 V
Thermal protection	Thermal decoupler	Thermal decoupler + PTC	Thermal decoupler + PTC
Actuating of thermal protection	*	**	**
Rated surge current (8/20 μs)	I_n 5 kA	5 kA	5 kA
Max. surge current (8/20 μs)	I_{max} 10 kA	10 kA	10 kA
Transverse capacitance	C < 250 pF	< 250 pF	< 250 pF
Serial inductance	L 47 μH	/	/
Serial resistance at 20°C	R 3 - 6 Ω	9 - 11 Ω	9 - 11 Ω
Frequency range	f > 1.2 MHz	> 1.5 MHz	> 1.5 MHz
Response time of overvoltage protection	< 25 ns	< 25 ns	< 25 ns
Mechanical characteristics			
Operating temperature	- 25°C + 60°C	- 25°C + 60°C	- 25°C + 60°C
Housing colour	Grey	Grey	Grey
Housing material		Thermoplastic, extinguishing degree V-0	
Ordering code	123 880 123 280 123 380	123 948 123 587 123 740	123 281 123 382

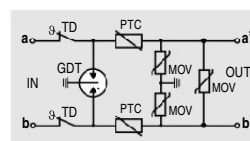
Connection schemes of modules

Legend:

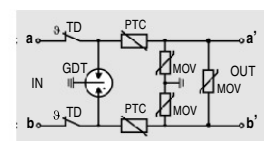
TD	thermal decoupler
GDT	gas discharge tube
MOV	varistor
L	coil
PTC	resistor with a positive temperature coefficient
⊕	thermal connection
D	rectifier diode
R	resistor
BD	bidirectional diode
SID	suppressor diode
TISP	integrated circuit with thyristor



LPA 08 I
LPA 08 K1
LPA 08 K10

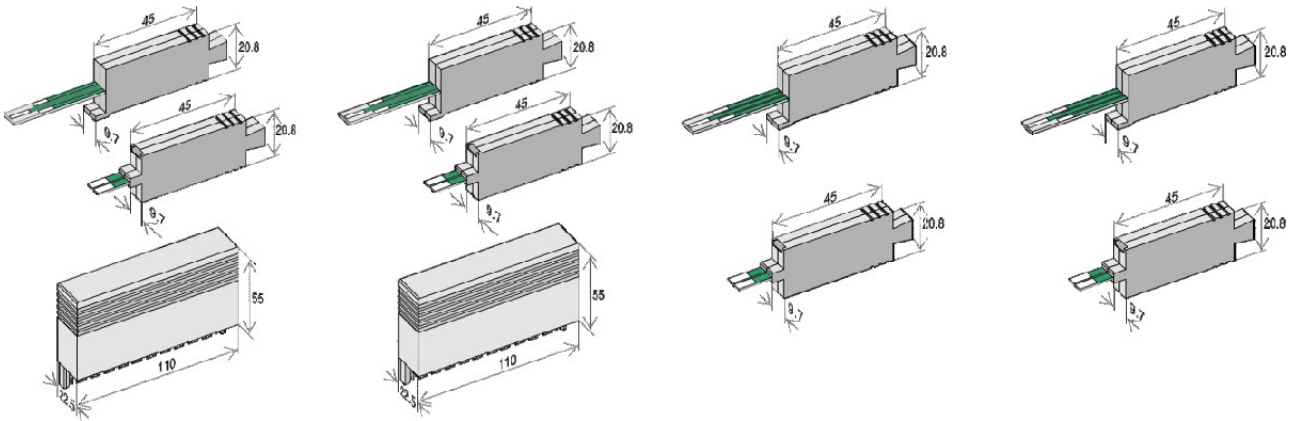


LPA 08 I-PTC
LPA 08 I10-PTC
LPA 08 I BT/PTC



LPA 08 K1-PTC
LPA 08 K10-PTC

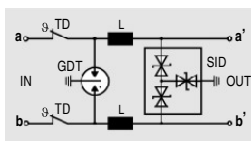
Protection Modules on the Telecommunication side



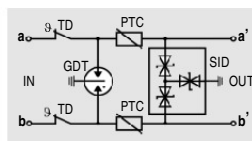
LPA 08 I-SID LPA 08 K1-SID LPA 08 K10-SID	LPA 08 I-PTC-SID LPA 08 K1-PTC-SID LPA 08 K10-PTC-SID	LPA 08 I/BT-HIB2 LPA 08 K1/BT-HIB2	LPA 08 I-HIB-T LPA 08 K1-HIB-T
1 or 10	1 or 10	1	1
180 V	180 V	180 V	180 V
150 mA	150 mA	60 mA	60 mA
184 - 220 V	184 - 220 V	184 - 264 V	184 - 240 V
184 - 220 V	184 - 220 V	184 - 264 V	184 - 240 V
≤ 400 V	≤ 400 V	≤ 600 V	≤ 600 V
Thermal decoupler	Thermal decoupler + PTC	Thermal decoupler + hybrid PTC	Thermal decoupler + hybrid PTC
*	**	**	**
5 kA	5 kA	5 kA	5 kA
10 kA	10 kA	10 kA	10 kA
< 250 pF	< 250 pF	< 250 pF	< 150 pF
47 μH	47 μH	/	/
3 - 6 Ω	9 - 11 Ω	20 - 22 Ω	20 - 22 Ω
> 1.2 MHz	> 1.2 MHz	> 1.5 MHz	> 2 MHz
< 1 ns	< 1 ns	< 25 ns	< 5 ns
- 25°C + 60°C	- 25°C + 60°C	- 25°C + 50°C	- 25°C + 50°C
Grey	Grey	Grey	Grey
Thermoplastic, extinguishing degree V-0			
123 822	123 823	123 795	123 590
123 324	123 323	123 485	123 591
123 327	123 326		

Actuating of thermal protection

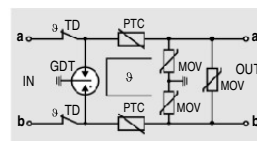
- * Disconnection of the line to the exchange
- ** Limitation of current into the exchange and disconnection of the line to the exchange



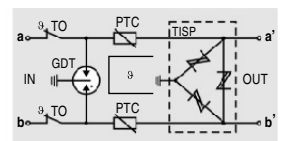
LPA 08 I-SID
LPA 08 K1-SID
LPA 08 K10-SID



LPA 08 I-PTC-SID
LPA 08 K1-PTC-SID
LPA 08 K10-PTC-SID

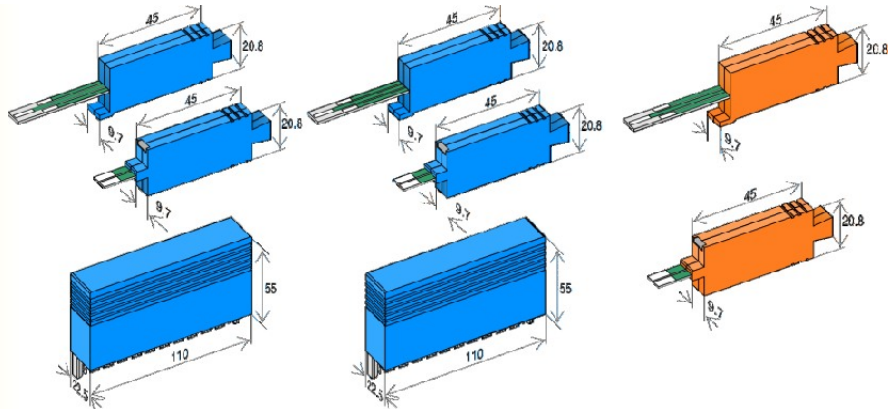


LPA 08 I/BT-HIB2
LPA 08 K1/BT-HIB2



LPA 08 I-HIB-T
LPA 08 K1-HIB-T

LPA 08 Series



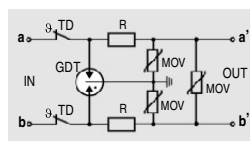
Technical characteristics

Module type	LPA 08 I-PCM		LPA 08 I-PCM10		LPA 08 I-2Mbit/s	
	LPA 08 K1-PCM	LPA 08 K10-PCM	LPA 08 K1-PCM10	LPA 08 K10-PCM10	LPA 08 K1-2Mbit/s	LPA 08 K10-2Mbit/s
No. of protected pairs	1 or 10		1 or 10		1	
Electrical characteristics						
Max. operating voltage	U_C	180 V	280 V	280 V	8 V	
Max. operating current at 20°C	I_L	200 mA	200 mA	200 mA	200 mA	
Rated DC spark-overvoltage	(a/b-e)	184 - 276V	184 - 226 V	184 - 226 V	184 - 264V	
	(a-b)	184 - 297V	324 - 396 V	324 - 396 V	8 - 11V	
Protection level at I_N (a,b-e/a-b)	U_p	≤ 600 V	< 700 V	< 700 V	≤ 100 V (a-b)	
Thermal protection		Thermal decoupler	Thermal decoupler	Thermal decoupler	Thermal decoupler	
Actuating of thermal protection		*	**	**	*	
Rated surge current (8/20 μs)	I_N	5 kA	5 kA	5 kA	5 kA	
Max. surge current (8/20 μs)	I_{max}	10 kA	10 kA	10 kA	10 kA	
Transverse capacitance	C	< 250 pF	< 250 pF	< 250 pF	< 150 pF	
Serial inductance	L	/	/	/	/	
Serial resistance at 20°C	R	4 - 6 Ω	4 - 6 Ω	4 - 6 Ω	4 - 6 Ω	
Frequency range	f	> 1.5 MHz	> 1.5 MHz	> 1.5 MHz	> 2 MHz	
Response time of overvoltage protection		< 25 ns	< 25 ns	< 25 ns	< 1 ns	
Mechanical characteristics						
Operating temperature		- 25°C + 60°C	- 25°C + 60°C	- 25°C + 60°C	- 25°C + 60°C	
Housing colour		Blue	Blue	Blue	Orange	
Housing material			Thermoplastic, extinguishing degree V-0			
Ordering code		123 830	123 958	123 958	123 934	
		123 305	123 316	123 316	123 390	
		123 379	123 389	123 389		

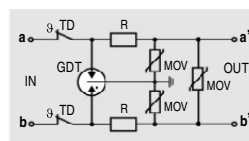
Connection schemes of modules

Legend:

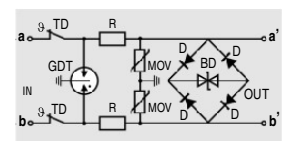
TD	thermal decoupler	Z	zener diode
TC	thermo clip	B	bridge diode
GDT	gas discharge tube	T	trisol
MOV	varistor		
PTC	resistor with a positive temperature coefficient		
⊗	thermal connection		
D	rectifier diode		
R	resistor		
BD	bidirectional diode		
TISP	integrated circuit with thyristor		
LED	light emitting diode		



LPA 08 I-PCM
LPA 08 K1-PCM
LPA 08 K10-PCM;

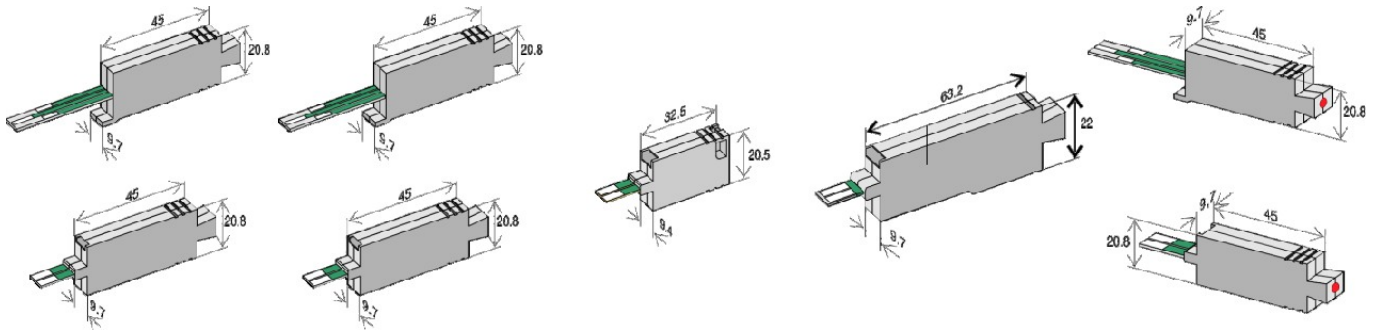


LPA 08 I-PCM10
LPA 08 K1-PCM10
LPA 08 K10-PCM10



LPA 08 I-2Mbit/s
LPA 08 K1-2Mbit/s

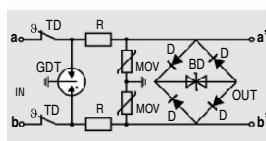
Protection Modules on the Telecommunication side



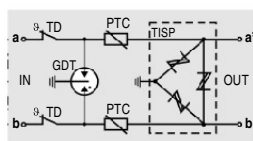
LPA 08 I xDSL LPA 08 K1 xDSL	LPA 08 I-PTC-xDSL LPA 08 K1-PTC-xDSL	LPA 08 K1M-TK-T110	LPA 08 K1 PTC-VAR	LPA 08 IL LPA 08 K1L
1	1	1	1	1
180 V	180 V	180 V	180 V	160 V
200 mA	150 mA	150 mA	60 mA	150 mA
184 - 264 V	184 - 240 V	184 - 240 V	62 - 206 V	180 - 200 V
144 - 176 V	184 - 240 V	184 - 240 V	184 - 284 V	180 - 200 V
< 300 V	< 300 V	< 300 V	< 600 V	< 300 V
Thermal decoupler	Thermal decoupler + PTC	Thermo clip + PTC	Thermal decoupler + PTC	Thermal decoupler + PTC
*	**	***	**	****
5 kA	5 kA	5 kA	5 kA	5 kA
10 kA	10 kA	10 kA	10 kA	10 kA
< 50 pF	< 50 pF	< 100 pF	< 250 pF	< 150 pF
/	/	/	/	/
4 - 6 Ω	9 - 11 Ω	9 - 11 Ω	24 - 26 Ω	9 - 11 Ω
> 20 MHz	> 20 MHz	> 10 MHz	> 1.2 MHz	> 2 MHz
< 5 ns	< 5 ns	< 5 ns	< 25ns	< 5 ns
- 25°C + 60°C	- 25°C + 60°C	- 25°C + 60°C	- 25°C + 50°C	- 25°C + 60°C
Grey	Grey	Grey	Grey	Grey
Thermoplastic, extinguishing degree V-0				
123 459	123 238	123 254	123 215	123 480
123 437	123 233			123 479

Actuating of thermal protection

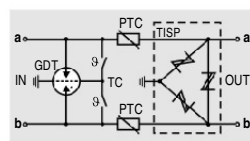
- * Disconnection of the line to the exchange
- ** Limitation of current into the exchange and disconnection of the line to the exchange
- *** Limitation of current into the exchange and short circuit connection between line and ground
- **** Signalisation of dangerous voltage, limitation of current into the exchange and disconnection of the line to the exchange



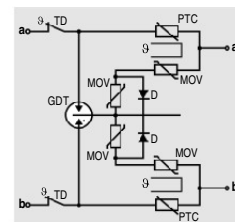
LPA 08 I- xDSL
LPA 08 K1- xDSL



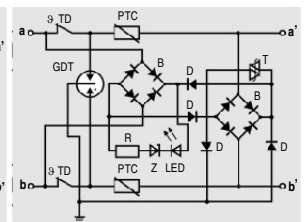
LPA 08 I-PTC- xDSL
LPA 08 K1-PTC- xDSL



LPA 08 K1M-TK-T110

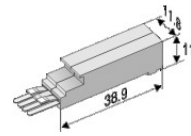
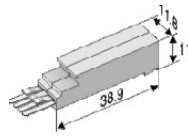


LPA 08 K1 PTC-VAR



LPA 08 IL
LPA 08 K1L

LPA2 Series



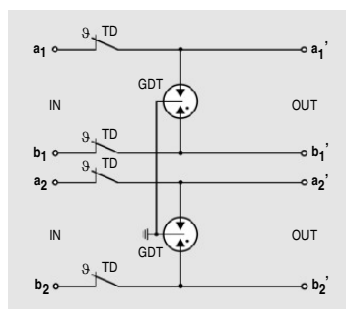
Technical characteristics

Module type		LPA2 02 IH	LPA2 02 IH-R
No. of protected pairs		2	2
Electrical characteristics			
Max. operating voltage	U_C	180 V	180 V
Max. operating current at 20°C	I_L	300 mA	200 mA
Rated DC spark-overvoltage	(a/b-e)	184 - 276 V	184 - 276 V
	(a-b)	184 - 550 V	184 - 550 V
Protection level at I_n (a,b-e/a-b)	U_p	≤ 900 V	≤ 900 V
Thermal protection		Thermal decoupler	Thermal decoupler
Actuating of thermal protection		*	*
Rated surge current (8/20 μs)	I_n	5 kA	5 kA
Max. surge current (8/20 μs)	I_{max}	10 kA	10 kA
Transverse capacitance	C	< 15 pF	< 15 pF
Serial inductance	L	/	/
Serial resistance at 20°C	R	/	8 - 9 Ω
Frequency range	f	> 30 MHz	> 30 MHz
Response time of overvoltage protection		< 100 ns	< 100 ns
Mechanical characteristics			
Operating temperature		- 25°C + 60°C	- 25°C + 60°C
Housing colour		Grey	Grey
Housing material		Thermoplastic, extinguishing degree V-0	Thermoplastic, extinguishing degree V-0
Ordering code		123 461	123 467

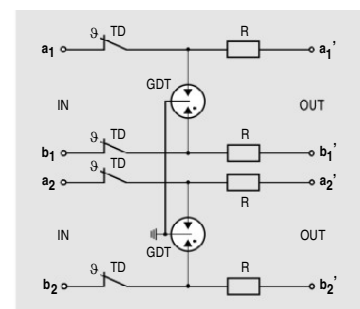
Connection schemes of modules

Legend:

TD	thermal decoupler
GDT	gas discharge tube
R	resistor
PTC	resistor with a positive temperature coefficient
TISP	integrated circuit with thyristor

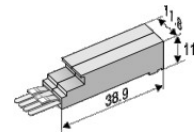
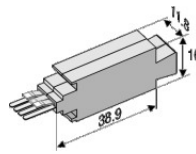
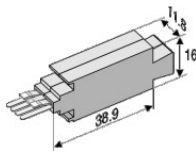


LPA2 02 IH



LPA2 02 IH-R

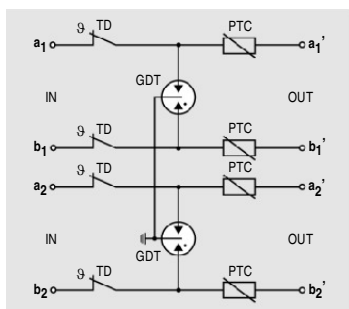
Protection Modules on the Telecommunication side



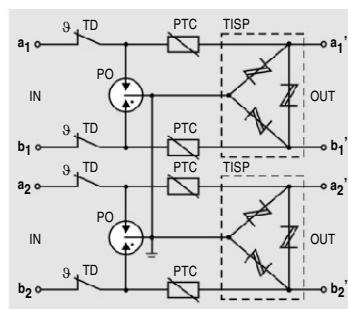
LPA2 02 I-PTC	LPA2 08 I-PTC D	LPA 08 IH-RD
2	2	2
180 V	180 V	180 V
150 mA	150 mA	200 mA
184 - 276 V	184 - 240 V	184 - 240 V
184 - 550 V	184 - 240 V	184 - 240 V
≤ 900 V	≤ 300 V	≤ 300 V
Thermal decoupler + PTC	Thermal decoupler + PTC	Thermal decoupler
**	**	*
5 kA	5 kA	5 kA
10 kA	10 kA	10 kA
< 15 pF	< 50 pF	< 50 pF
/	/	/
9 - 11 Ω	9 - 11 Ω	8 - 9 Ω
> 30 MHz	> 20 MHz	> 20 MHz
< 100 ns	< 5 ns	< 5 ns
- 25°C + 50°C	- 25°C + 50°C	- 25°C + 50°C
Grey	Grey	Grey
	Thermoplastic, extinguishing degree V-0	
123 470	123 471	123 468

Actuating of thermal protection

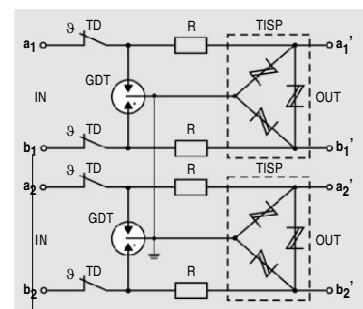
- * Disconnection of the line to the exchange
- ** Limitation of current into the exchange and disconnection of the line to the exchange



LPA2 02 I-PTC



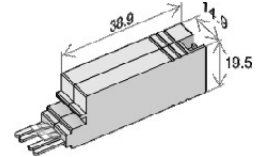
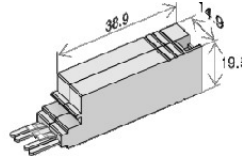
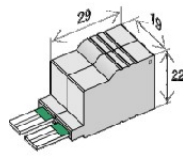
LPA2 08 I-PTC D



LPA 08 IH-RD

LPF Series

DSL Low-pass Filter for POTS & ISDN



Technical characteristics

Module type	LPF1-LL/K-COMBO	LPF - MLL/I COMBO	LPF - MLL/I P.C.PTC - COMBO
No. of splitters (LPF)	1	1	1
Used for disconnecting strips	LL/K (123 976) LL/I (123 901)	MLL/I 4LPF (123 602)	MLL/I 4LPF (123 602)

Electrical characteristics

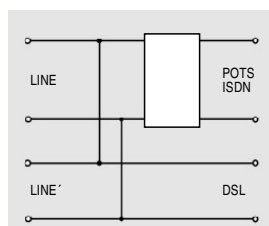
Over-voltage protection	NO	NO	YES
Over-current protection	NO	NO	YES
Thermal protection	NO	NO	YES
Blocking capacitors	NO	NO	YES
ISDN:	$a_E < 0.8 \text{ dB}$	$f \leq 40 \text{ kHz}$	$f \leq 40 \text{ kHz}$
Zline: 135 Ω (2B1Q)	$a_E < 2.5 \text{ dB}$	$40 \text{ kHz} < f \leq 80 \text{ kHz}$	$40 \text{ kHz} < f \leq 80 \text{ kHz}$
	$a_S > 55 \text{ dB}$	$138 \text{ kHz} \leq f < 150 \text{ kHz}$	$138 \text{ kHz} \leq f < 150 \text{ kHz}$
	$a_S > 65 \text{ dB}$	$150 \text{ kHz} \leq f \leq 1104 \text{ kHz}$	$150 \text{ kHz} \leq f \leq 1104 \text{ kHz}$
	$a_S > 55 \text{ dB}$	$1104 \text{ kHz} \leq f \leq 12 \text{ MHz}$	$1104 \text{ kHz} \leq f \leq 12 \text{ MHz}$
	$a_R > 16 \text{ dB}$	$f \leq 40 \text{ kHz}$	$f \leq 40 \text{ kHz}$
	$a_R > 14 \text{ dB}$	$40 \text{ kHz} < f \leq 80 \text{ kHz}$	$40 \text{ kHz} < f \leq 80 \text{ kHz}$
POTS:	$a_E < 1 \text{ dB}$	$f = 15 \text{ kHz}$	$f = 15 \text{ kHz}$
Zline: 600 Ω	$a_E < 3 \text{ dB}$	$15 \text{ kHz} \leq f \leq 17 \text{ kHz}$	$15 \text{ kHz} \leq f \leq 17 \text{ kHz}$
	$a_S > 55 \text{ dB}$	$138 \text{ kHz} \leq f \leq 12 \text{ MHz}$	$138 \text{ kHz} \leq f \leq 12 \text{ MHz}$
	$a_R > 12 \text{ dB}$	$0.3 \text{ kHz} \leq f \leq 0.6 \text{ kHz}$	$0.3 \text{ kHz} \leq f \leq 0.6 \text{ kHz}$
	$a_R > 10 \text{ dB}$	$1.6 \text{ kHz} < f \leq 3.4 \text{ kHz}$	$1.6 \text{ kHz} < f \leq 3.4 \text{ kHz}$
Cut frequency	$f_S = 138 \text{ kHz}$	$f_S = 138 \text{ kHz}$	$f_S = 138 \text{ kHz}$
Loop current	100 mA	100 mA	100 mA
Standards	ETSI Standard TS 101 952-1-4		

Mechanical characteristics

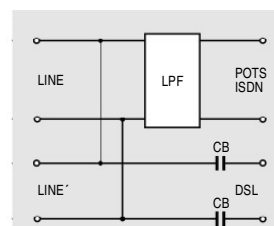
Operating temperature	-25°C +50°C	-25°C +50°C	-25°C +50°C
Housing colour	Grey	Grey	Grey
Housing material	Thermoplastic, extinguishing degree V-0		
Ordering code	123 609	123 611	123 421

Connection schemes of modules

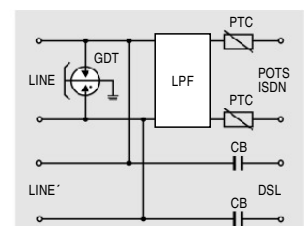
Legend:	
LPF	low pass filter
GDT	gas discharge tube
PTC	resistor with a positive temperature coefficient
CB	blocking capacitor



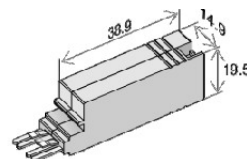
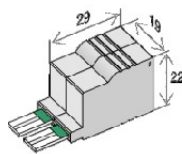
LPF1-LL/K-COMBO



LPF - MLL/I COMBO



LPF - MLL/I P.C.PTC - COMBO



Technical characteristics

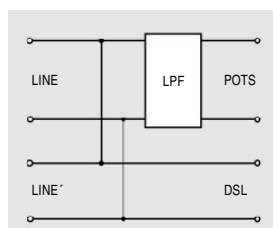
Module type	LPF1-KH-DSL-POTS	LPF-MLL/I-POTS
No. of splitters (LPF)	1	1
Used for disconnecting strips	LL/K (123 976) LL/I (123 901)	MLL/I 4LPF (123 602)

Electrical characteristics

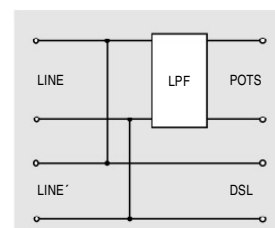
Over-voltage protection	NO	NO	
Over-current protection	NO	NO	
Thermal protection	NO	NO	
Blocking capacitors	NO	NO	
POTS:	$a_E < 0.3 \text{ dB}$	$f = 1 \text{ kHz}$	$f = 1 \text{ kHz}$
Zline: 600 Ω	$a_E < 1 \text{ dB}$	$0.2 \text{ kHz} \leq f \leq 4 \text{ kHz}$	$0.2 \text{ kHz} \leq f \leq 4 \text{ kHz}$
	$a_S > 55 \text{ dB}$	$32 \text{ kHz} \leq f \leq 30 \text{ MHz}$	$32 \text{ kHz} \leq f \leq 30 \text{ MHz}$
	$a_R > 18 \text{ dB}$	$0.5 \text{ kHz} \leq f \leq 2.0 \text{ kHz}$	$0.5 \text{ kHz} \leq f \leq 2.0 \text{ kHz}$
	$a_R > 14 \text{ dB}$	$0.2 \text{ kHz} < f \leq 3.4 \text{ kHz}$	$0.2 \text{ kHz} < f \leq 3.4 \text{ kHz}$
Cut frequency	$f_S = 25 \text{ kHz}$	$f_S = 25 \text{ kHz}$	
Loop current	60 mA	60 mA	
Standards	ITU-T G.992.1, ITU-T G.992.3, ITU-T G.993.2	ITU-T G.992.1, ITU-T G.992.3, ITU-T G.993.2	

Mechanical characteristics

Operating temperature	- 25°C + 50°C	- 25°C + 50°C
Housing colour	Grey	Grey
Housing material	Thermoplastic, extinguishing Degree V-0	Thermoplastic, extinguishing Degree V-0
Ordering code	123 601	123 612



LPF1-KH-DSL-POTS



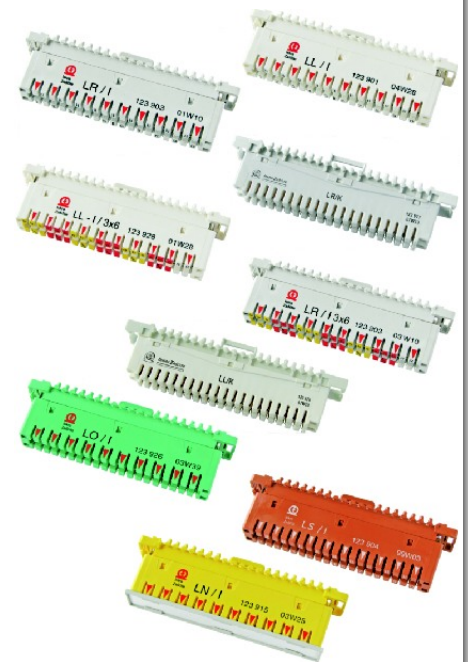
LPF-MLL/I-POTS



Strips

Standard Strips 10 pairs

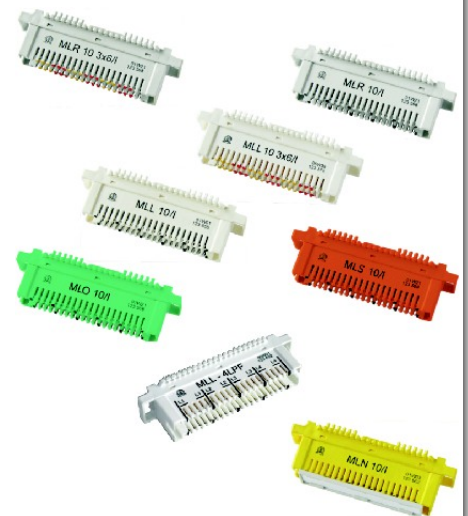
- Line side:**
- LL/I – disconnecting
 - LL/K – disconnecting
 - LS/I – switching
 - LL// 3x6 – disconnecting for 2 Mbit/s lines
 - LO/I – earthing
 - LN/I – inscription
- Exchange side:**
- LR/I – terminal
 - LR/K – terminal
 - LR/I 3x6 - terminal for 2 Mbit/s lines
 - LN/I – inscription
- Optional:**
- LL/I – disconnecting
 - LL/K – disconnecting
 - LL// 3x6 – disconnecting for 2 Mbit/s lines



Small Strips 10 (8) pairs

With the small strips in comparison with the standard strips we save approximately 30% of space in the exchanges. The Strip type ML... is particularly adequate for mounting in cases when the saving up of space is of a most importance.

- Line side:**
- MLL 10/I – disconnecting
 - MLS 10/I – switching
 - MLL 10/I 3x6 - disconnecting for 2 Mbit/s lines
 - MLO 10/I – earthing
 - MLN 10/I – inscription
 - MLL/I 4LPF - disconnecting
- Exchange side:**
- MLR 10/I – terminal
 - MLR 10//3x6 – terminal for 2 Mbit/s lines
 - MLN 10/I – inscription
- Optional:**
- MLL 10/I – disconnecting
 - MLL 10/I 3x6 - disconnecting for 2 Mbit/s lines
 - MLL/I 4LPF - disconnecting



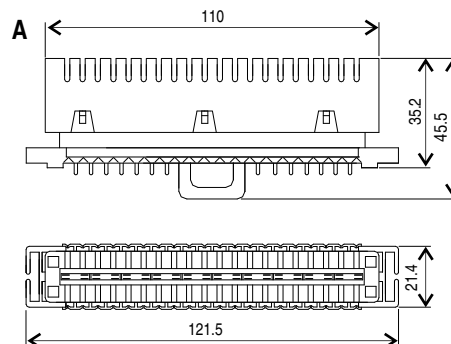
LR, MLR Series



Technical characteristics

Type	LR/I	LR/K
Electrical characteristics		
Internal diameter of the Cu connection wire	0.4 ... 0.8 mm	0.4 ... 0.8 mm
External diameter of the connection wire (shield)	0.7 ... 1.5 mm	0.7 ... 1.5 mm
No. of wires connected per contact slot	max. 2 (≤ 0.65 mm)	max. 2 (≤ 0.65 mm)
Insulation resistance	$> 5 \times 10^4$ M Ω	$> 5 \times 10^4$ M Ω
Typical contact resistance of the connection wire	1 m Ω	1 m Ω
Total contact resistance (wire length 50 mm)	< 15 m Ω	< 15 m Ω
Voltage strength (50 Hz)	> 2.0 kV _{rms}	> 2.0 kV _{rms}
Pulse voltage strength 1,2/50 μ s	> 3.6 kV	> 3.6 kV
Capacitance between wires a-b	< 1 pF	< 1 pF
Crosstalk attenuation between neighbouring wires		
1 MHz	> 70 dB	> 70 dB
10 MHz	> 60 dB	> 60 dB
30 MHz	> 50 dB	> 50 dB
60 Mhz	> 45 dB	> 45 dB
100 Mhz	> 40 dB	> 40 dB
Insertion loss at 1MHz	< 0.1 dB	< 0.1 dB
Bit error rate - BER at 2,048 Mbit/s	0	0
Mechanical characteristics		
Operating temperature	- 25°C ... + 80°C	- 25°C ... + 80°C
Storage temperature	- 40°C ... + 90°C	- 40°C ... + 90°C
Colour	Grey-grey	Grey-grey
No. of insertions of connection wire	≥ 200 x	≥ 200 x
Plastic parts	PBT UL94 V-0	PBT UL94 V-0
Contacts	Tin-brass alloy nickel and silver plated	Tin-brass alloy nickel and silver plated
Dimensions	A	B
Ordering code	123 903	123 977

Dimensional drawings

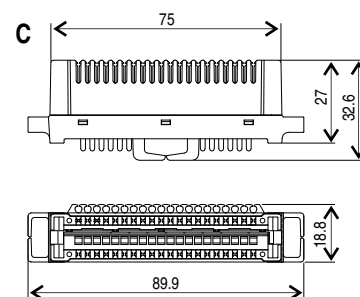
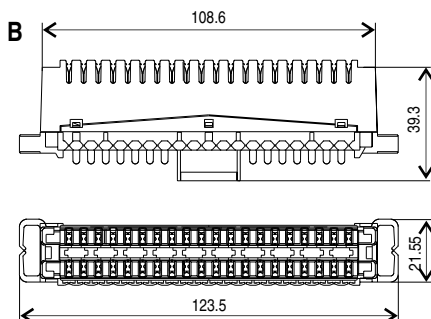


Terminal Strips

Exchange side



MLR 10/I	LR/I - 3x6	MLR 10/I 3x6
0.4 ... 0.6 mm	0.4 ... 0.8 mm	0.4 ... 0.6 mm
0.7 ... 1.0 mm	0.7 ... 1.5 mm	0.7 ... 1.0 mm
max. 2	max. 2 (≤ 0.65 mm)	max. 2
> 5 x 10 ⁴ MΩ	> 5 x 10 ⁴ MΩ	> 5 x 10 ⁴ MΩ
1 mΩ	1 mΩ	1 mΩ
< 15 mΩ	< 15 mΩ	< 15 mΩ
> 2.0 kV _{rms}	> 2.0 kV _{rm}	> 2.0 kV _{rms}
> 3.6 kV	> 4 kV	> 3.6 kV
< 1 pF	< 1 pF	< 1 pF
> 65 dB	> 75 dB	> 70 dB
> 55 dB	> 65 dB	> 60 dB
> 45 dB	> 55 dB	> 50 dB
> 40 dB	> 50 dB	> 45 dB
> 35 dB	> 45 dB	> 40 dB
< 0.1 dB	< 0.1 dB	< 0.1 dB
0	0	0
- 25°C ... + 80°C	- 25°C ... + 80°C	- 25°C ... + 80°C
- 40°C ... + 90°C	- 40°C ... + 90°C	- 40°C ... + 90°C
Grey-gray	Grey-grey	Grey-gray
≥ 200 x	≥ 200 x	≥ 200 x
PBT UL94 V-0	PBT UL94 V-0	PBT UL94 V-0
Tin-brass alloy nickel and silver plated	Tin-brass alloy nickel and silver plated	Tin-brass alloy nickel and silver plated
C	A	C
123 568	123 935	123 573



LL, MLL Series

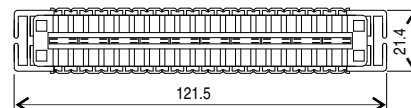
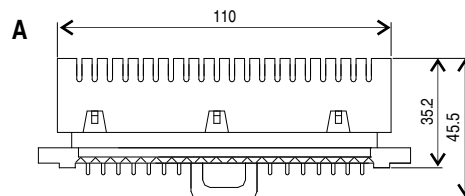


Technical characteristics

Type	LL/I	LL/K
Electrical characteristics		
Internal diameter of the Cu connection wire	0.4 - 0.8 mm	0.4 ... 0.8 mm
External diameter of the connection wire (shield)	0.7 - 1.5 mm	0.7 ... 1.5 mm
No. of wires connected per contact slot	max. 2 (≤ 0.65 mm)	max. 2 (≤ 0.65 mm)
Insulation resistance	$> 5 \times 10^4$ M Ω	$> 5 \times 10^4$ M Ω
Typical contact resistance of the connection wire	1 m Ω	1 m Ω
Total contact resistance (wire length 50 mm)	< 15 m Ω	< 15 m Ω
Voltage strength (50 Hz)	> 2.0 kV _{rms}	> 2.0 kV _{rms}
Pulse voltage strength 1,2/50 μ s	> 3.6 kV	> 3.6 kV
Max. Operating current 8/20 μ s	10kA	10 kA
Capacitance between wires a-b	< 1.5 pF	< 1 pF
Crosstalk attenuation between neighbouring wires		
1MHz	> 70 dB	> 70 dB
10 MHz	> 60 dB	> 60 dB
30 MHz	> 50 dB	> 50 dB
60 Mhz	> 45 dB	> 45 dB
100 Mhz	> 40 dB	> 40 dB
Insertion loss at 1MHz	< 0.1 dB	< 0.1 dB
Bit error rate - BER at 2.048 Mbit/s	0	0
Mechanical characteristics		
Earthing contact	Yes	No*
Operating temperature	- 20°C ... + 80°C	- 25°C ... + 80°C
Storage temperature	- 40°C ... + 90°C	- 40°C ... + 90°C
Colour	White-white	White-white
No. of insertions of connection wire	≥ 200 x	≥ 200 x
Plastic parts	PBT UL94 V-0	PBT UL94 V-0
Contacts	Tin-brass alloy nickel and silver plated	Tin-brass alloy nickel and silver plated
Dimensions	A	B
Ordering code	123 901	123 930

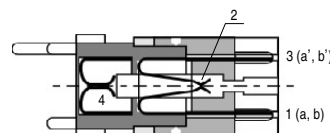
* External earthing contact K1 (Ordering code 023 025)

Dimensional drawings



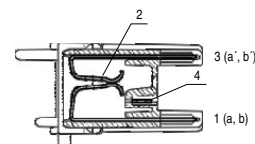
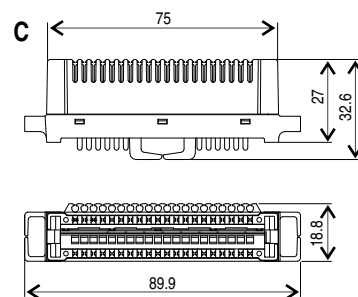
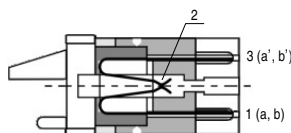
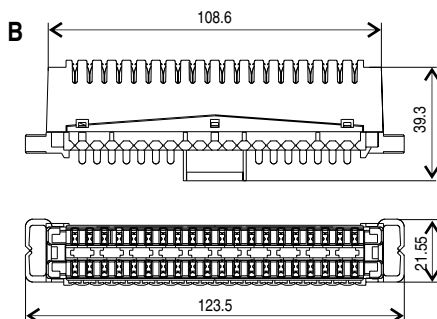
Strips cross section

1. Connection contact on line side a, b
2. Position of contacts a-a' and b-b' (normally closed)
3. Connection contact for terminal side a', b'
4. Earthing contact





MLL 10/I	LL/I - 3x6	MLL 10/I 3x6
0.4 ... 0.6 mm	0.4 ... 0.8 mm	0.4 ... 0.6 mm
0.7 ... 1.0 mm	0.7 ... 1.5 mm	0.7 ... 1.0 mm
max. 2	max. 2 (≤ 0.65 mm)	max. 2
$> 5 \times 10^4$ M Ω	$> 5 \times 10^4$ M Ω	$> 5 \times 10^4$ M Ω
1 m Ω	1 m Ω	1 m Ω
< 15 m Ω	< 15 m Ω	< 10 m Ω
> 2.0 kV _{rrm}	> 2.0 kV _{rrm}	> 2.0 kV _{rrm}
> 3.6 kV	> 3.6 kV	> 4 kV
10 kA	10 kA	10 kA
< 1.5 pF	< 1.5 pF	< 1.5 pF
> 65 dB	> 75 dB	> 70 dB
> 55 dB	> 65 dB	> 60 dB
> 45 dB	> 55 dB	> 50 dB
> 40 dB	> 50 dB	> 45 dB
> 35 dB	> 45 dB	> 40 dB
< 0.1 dB	< 0.1 dB	< 0.05 dB
0	0	0
Yes	Yes	Yes
- 25°C ... + 80°C	- 25°C ... + 80°C	- 25°C ... + 80°C
- 40°C ... + 90°C	- 40°C ... + 90°C	- 40°C ... + 90°C
White-white	White-white	White-white
≥ 200 x	≥ 200 x	≥ 200 x
PBT UL94 V-0	PBT UL94 V-0	PBT UL94 V-0
Tin-brass alloy nickel and silver plated	Tin-brass alloy nickel and silver plated	Tin-brass alloy nickel and silver plated
C	A	C
123 556	123 928	123 572

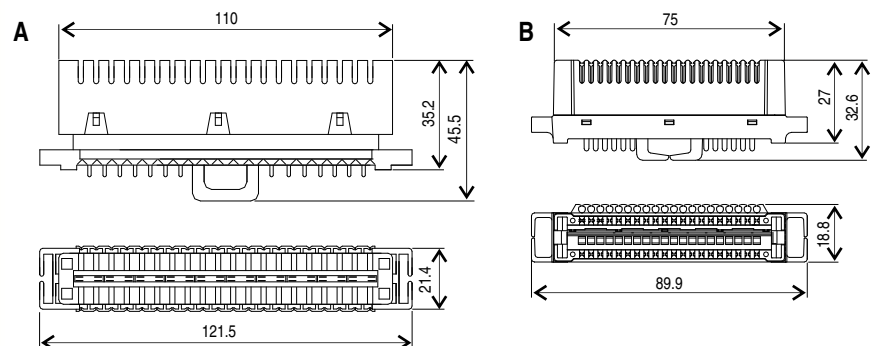




Technical characteristics

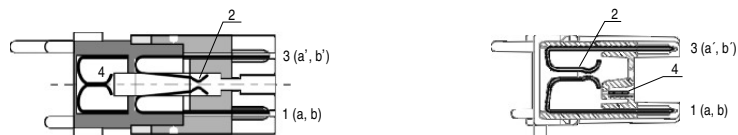
Type	LS/I	MLS 10/I
Electrical characteristics		
Internal diameter of the Cu connection wire	0.4 - 0.8 mm	0.4 ... 0.6 mm
External diameter of the connection wire (shield)	0.7 - 1.5 mm	0.7 ... 1.0 mm
No. of wires connected per contact slot	max. 2 (≤ 0.65 mm)	max. 2
Insulation resistance	$> 5 \times 10^4$ M Ω	$> 5 \times 10^4$ M Ω
Typical contact resistance of the connection wire	1 m Ω	1 m Ω
Total contact resistance (wire length 50 mm)	< 15 m Ω	< 15 m Ω
Voltage strength (50 Hz)	> 2.0 kV _{rms}	> 2.0 kV _{rm}
Pulse voltage strength 1,2/50 μ s	> 3.6 kV	> 3.6 kV
Max. Operating current 8/20 μ s	10kA	10 kA
Capacitance between wires a-b	< 1.5 pF	< 1.5 pF
Crosstalk attenuation between neighbouring wires		
1MHz	> 70 dB	> 65 dB
10 MHz	> 60 dB	> 55 dB
30 MHz	> 50 dB	> 45 dB
60 Mhz	> 45 dB	> 40 dB
100 Mhz	> 40 dB	> 35 dB
Insertion loss at 1MHz	< 0.1 dB	< 0.1 dB
Bit error rate - BER at 2.048 Mbit/s	0	0
Mechanical characteristics		
Earthing contact	Yes	Yes
Operating temperature	- 20°C ... + 80°C	- 25°C ... + 80°C
Storage temperature	- 40°C ... + 90°C	- 40°C ... + 90°C
Colour	Brown-brown	Brown-brown
No. of insertions of connection wire	≥ 200 x	≥ 200 x
Plastic parts	PBT UL94 V-0	PBT UL94 V-0
Contacts	Tin-brass alloy nickel and silver plated	Tin-brass alloy nickel and silver plated
Dimensions	A	B
Ordering code	123 904	123 575

Dimensional drawings



Strips cross section

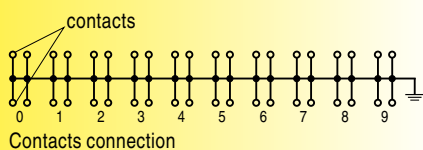
1. Connection contact on line side a, b
2. Position of contacts a-a' and b-b' (normally opened)
3. Connection contact for terminal side a', b'
4. Earthing contact



LO Series LN Series

Earthing Strips Inscription Strips

Line side Line and exchange side



Technical characteristics

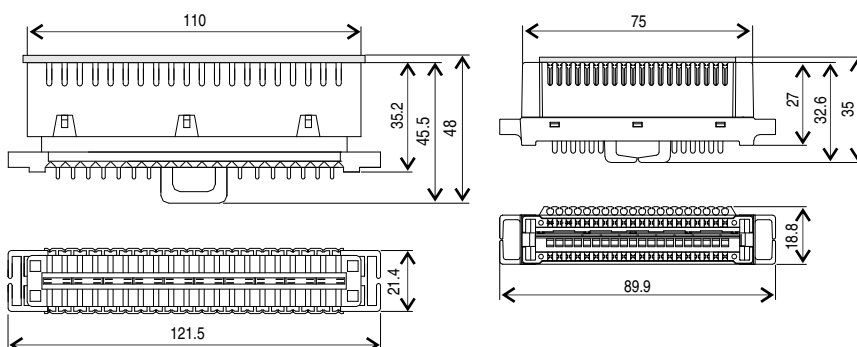
Type	LO/I	MLO 10/I
Electrical characteristics		
Internal diameter of the Cu connection wire	0.4 - 0.8 mm	0.4 ... 0.6 mm
External diameter of the connection wire (shield)	0.7 - 1.5 mm	0.7 ... 1.0 mm
No. of wires connected per contact slot	max. 2 (≤ 0.65 mm)	max. 2
Typical contact resistance of the connection wire	1 m Ω	1 m Ω
Total contact resistance (wire length 50 mm)	< 15 m Ω	< 15 m Ω
Mechanical characteristics		
Operating temperature	- 20°C ... + 80°C	- 25°C ... + 80°C
Storage temperature	- 40°C ... + 90°C	- 40°C ... + 90°C
Colour	Green-green	Green-green
No. of insertions of connection wire	≥ 200 x	≥ 200 x
Plastic parts	PBT UL94 V-0	PBT UL94 V-0
Contacts	Tin-brass alloy nickel and silver plated	Tin-brass alloy nickel and silver plated
Dimensions	A	B
Ordering code	123 926	123 560



Mechanical characteristics

Type	LN/I	MLN 10/I
Operating temperature	- 20°C ... + 80°C	- 25°C ... + 80°C
Storage temperature	- 40°C ... + 90°C	- 40°C ... + 90°C
Colour	Green-green	Green-green
No. of insertions of connection wire	≥ 200 x	≥ 200 x
Plastic parts	PBT UL94 V-0	PBT UL94 V-0
Dimensions	A	B
Ordering code		
Complete	023 217	023 815
Inscription plate	123 924	023 817

Dimensional drawings

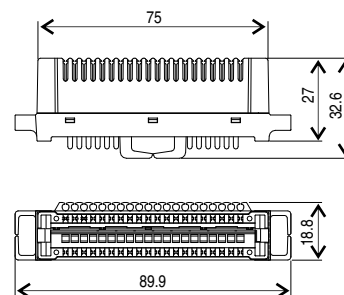




Technical characteristics

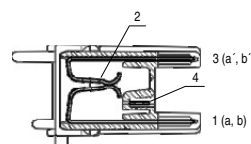
Type	MLL/I 4LPF
Electrical characteristics	
Internal diameter of the Cu connection wire	0.4 - 0.6 mm
External diameter of the connection wire (shield)	0.7 - 1.0 mm
No. of wires connected per contact slot	max. 2 (≤ 0.65 mm)
Insulation resistance	$> 5 \times 10^4$ M Ω
Typical contact resistance of the connection wire	1 m Ω
Total contact resistance (wire length 50 mm)	< 15 m Ω
Voltage strength (50 Hz)	> 2.0 kV _{rms}
Pulse voltage strength 1,2/50 μ s	> 3.6 kV
Max. Operating current 8/20 μ s	10kA
Capacitance between wires a-b	< 1 pF
Crosstalk attenuation between neighbouring wires	
1MHz	> 70 dB
10 MHz	> 60 dB
30 MHz	> 50 dB
60 Mhz	> 45 dB
100 Mhz	> 40 dB
Insertion loss at 1MHz	< 0.1 dB
Bit error rate - BER at 2.048 Mbit/s	0
Mechanical characteristics	
Earthing contact	Yes
Operating temperature	- 20°C ... + 80°C
Storage temperature	- 40°C ... + 90°C
Colour	White-white
No. of insertions of connection wire	≥ 200 x
Plastic parts	PBT UL94 V-0
Contacts	Tin-brass alloy nickel and silver plated
Dimensions	A
Ordering code	123 602

Dimensional drawings



Strips cross section

1. Connection contact on line side a, b
2. Position of contacts a-a' and b-b' (normally closed)
3. Connection contact for terminal side a', b'
4. Earthing contact



Earthing Mounting Frames

Mounting Earthing Frames NMI, NMIM

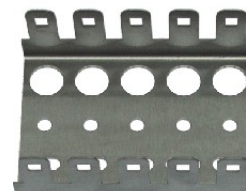
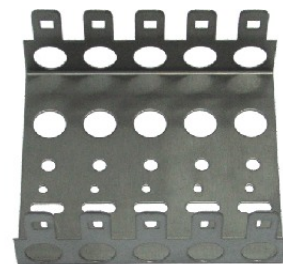
The mounting frames are used for mounting the various types of strips (terminals, disconnecting, switching, earthing, marking) and subsequently they are installed on the MDF's.

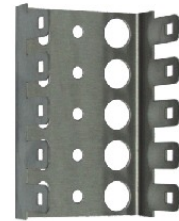
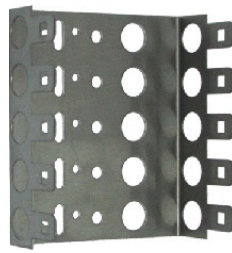
They can be also used as an earthing link for the overvoltage protection and as an entry for the cable bundles.

Mounting earthing frame with strips is suitable for all climates and temperatures.

Corrosion - at the onset of humidity, stainless steel has a great affinity to Al, Cd and Zn.

All fixing components must have zinc or nickel protection or they must be made by the same stainless steel material as the mounting frames.

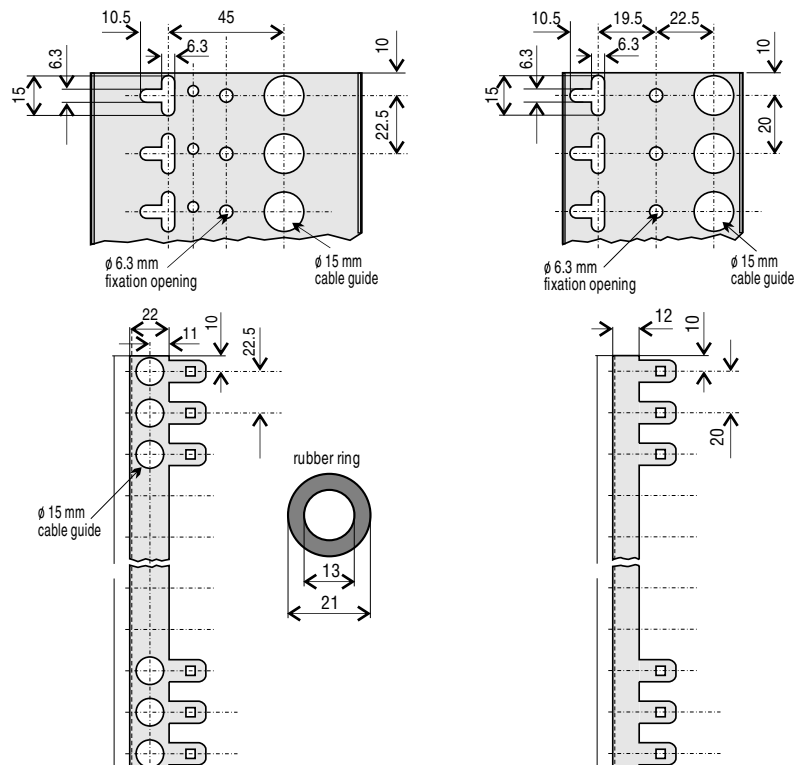




Technical characteristics

Type	NMI	NMIM
Mechanical characteristics		
Height to frame	22 mm	12 mm
Material	Stainless steel	Stainless steel
Ordering code		
for 1 strip	NMI-22-1 023 559	NMIM-12-1 023 564
for 3 strips	NMI-22-3 023 561	NMIM-12-3 023 565
for 5 strips	NMI-22-5 023 562	NMIM-12-5 023 567
for 8 strips	NMI-22-8 023 563	NMIM-12-8 023 495
for 11 strips	NMI-22-11 023 204	NMIM-12-11 023 821

Dimensional drawings



Main Distribution Frames (MDF)

The main distribution frame ISKRA has the following advantages:

- occupies minimum space
- simple mounting
- fast and easy wiring

The MDF is a modular construction and contain components compatible with various telecommunication systems. The structure is of aluminium C profile.

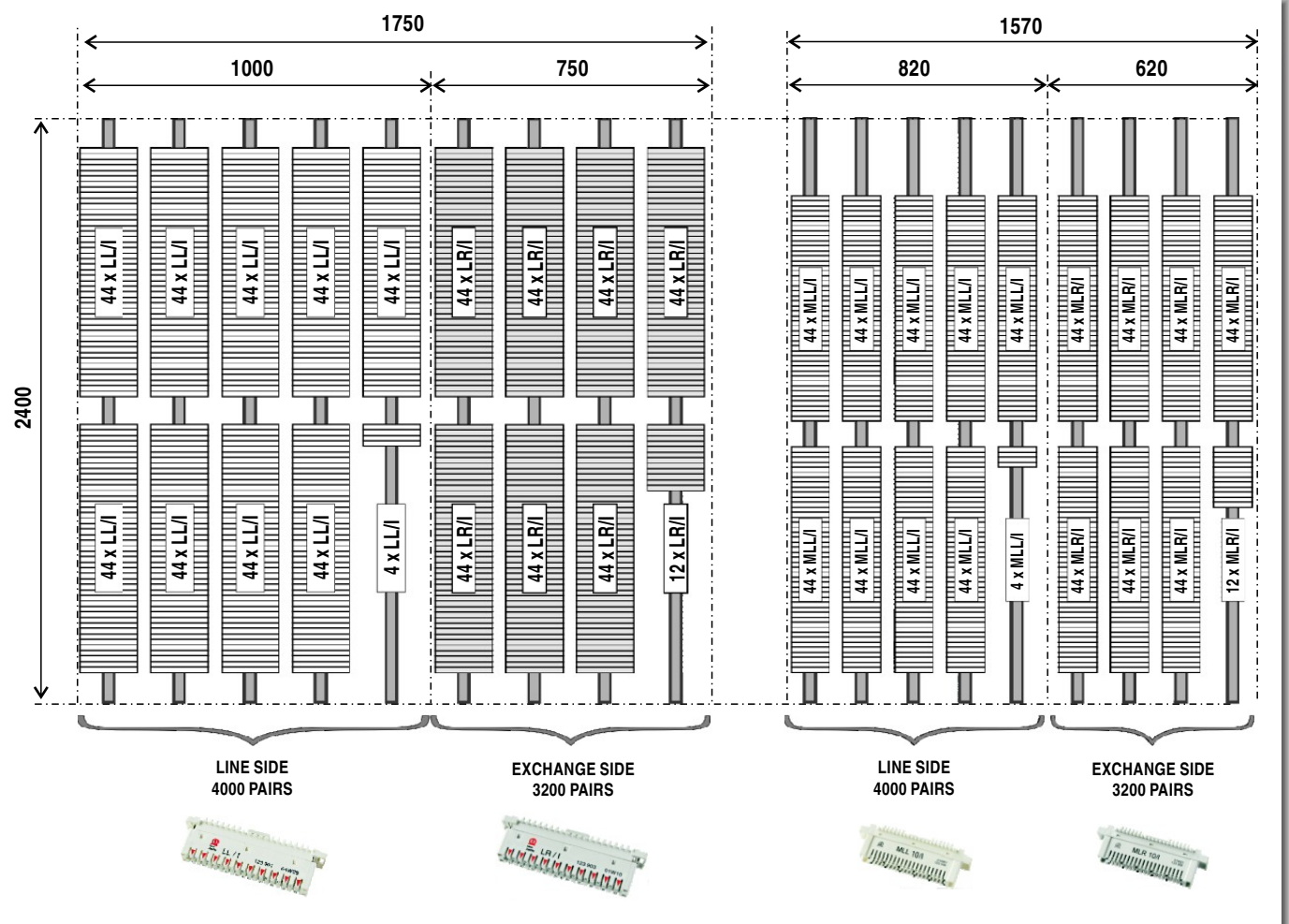
The construction of main distribution frames:

- Free Standing Frames PSD 1, PSD 10, PSD 100, PSD 100M
- Wall Frames SD 10, SD 10M
- Wall mounting Frames PD 10, PD 10M, PD 100, PD 100M

The equipment consists of:

- unit structure (basic module)
- mounting frames
- connection strips
- accessories

Cable entry is available from top or from the bottom. For the top entry a cable distribution net must be mounted on the frame. For the bottom entry is a channel adjusted under the frame. The MDF can be also mounted on a double floor in which case the channel cable entry in the floor becomes superfluous.



Main Distribution Frames (MDF)

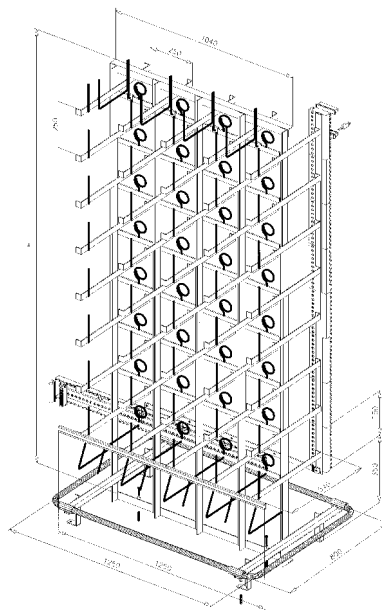
Free Standing Frame PSD 1

The construction is made of iron and protected against the corrosion. The distribution frame is divided among two parts: the horizontal exchange side and vertical line side.

The distance between two verticals is 250 mm (200 mm).

Standard height

H (mm)	No. of horizontals	No. of connections (Basic module 5 verticals)	
		line / exchange	
2350	8	4000 / 3200	
2850	10	5000 / 4000	
3350	12	6000 / 4800	



Free Standing Frame PSD 10

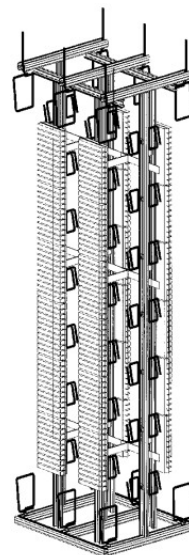
The main characteristic of the free standing frame PDS 10 is that the exchange side and line side are both placed vertically.

The basic module is a double C profile of aluminium.

The distance between two verticals is 250 mm (200 mm).

The frame PSD 10 is constructed for max. 10.000 lines.

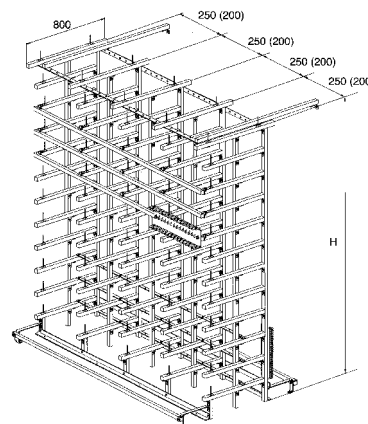
Standard height.



Free Standing Frame PSD 100 (PSD 100M)

The basic module is a double C profile of aluminium. The distance between two verticals is 250 mm (200 mm). The distance between two verticals by the strips of type ML is 200 mm (150 mm). The distribution frame is divided among two parts: the horizontal part is always the exchange side and the vertical is always the line side.

It is possible to add more verticals and more horizontals to the frame.



Mounting Accessories

Rubber Ring

Earthing contact K1

Connection Frames

Adapter for connection between strips and with MDF
"PIPE HOLDERS"

Mounting Tools

Extracting Tool

Group Disconnecting Plug

Disconnecting Plug (blind)

Marking Label

Measuring wires for Iskra and KRONE strip

Measuring wires for Iskra MLL, MLR strip

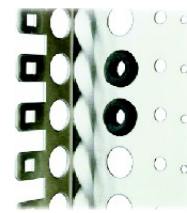
Maintenance Ladder



Rubber Ring

The rubber ring is used for fixing and protecting cable bundles at the entry through the opening of the mounting frame.

Designation	Code
SG	023 006



Earthing contact K1

Earthing contact enables protection modules earthing (for one pair) over mounting earthing frame. It must be put on LL/K strip, which is already mounted on mounting earthing frame.

Designation	Description	Code
K1	earthing contact for Krone strip	023 035

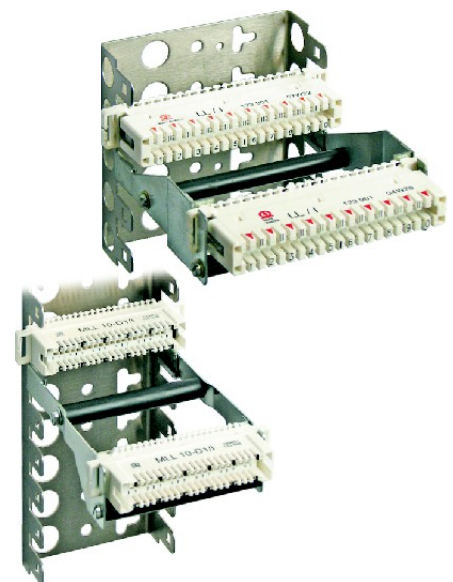


Connection Frames

The connection frame is used for speedy work with cables. It is inserted on a mounting frame and a strip (LL, LR, LS, MLL, MLR, MLS) is mounted on top.

The cables are led over the contacts and are pressed into the strip by a mounting tool. It is then removed. In this way longer cable lengths are acquired, which come in handy should the wire be torn out of the strip. Since it is longer, the cable can be reattached to the strip.

Designation	Description	Code
PZR 10/I	connection frame for standard strips	023 011
PR-ML10	connection frame for small strips	023 819
PZR 10/K	connection frame for Krone strip	023 490



Adapter for connection between strips and with MDF "PIPE HOLDERS"

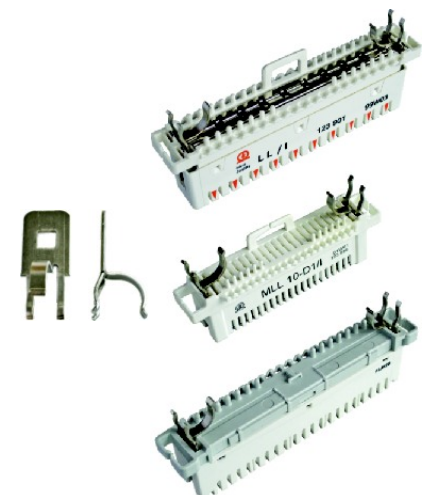
Universal adapter for all types of Iskra strips - mounting of standard I, standard K and small.

Universal adapter connects the strips with the newest MDF "pipe holders". Adapter is good electrical conductor and it is used for electrical connection between earthing of the strips and MDF "pipe holders".

Technical data for mounting:

Diameter of rod	11.5 - 12.5 mm
Spacing of rads (Strip I standard; type K)	94 - 96 mm
Spacing of rads (Strip I small)	62 - 64 mm
Material	Tin-brass alloy, nickel plated

Designation	Code
NMI-PSA12 (2 pcs)	570 191



Mounting Accessories

Mounting Tools

Functions:

- attaching and cutting of wires on the strip
- extraction of wires
- blocking of cuts
- strip extraction

Designation	Code
KLMI / K	023 040
KLM-ML	023 548

Extracting Tool

Intended for extracting overvoltage protection modules.

Designation	Code
KLD I/K1	023 041
KLD2I	023 829

Group Disconnecting Plug

The plug is used for disconnection telephone lines. All 10 pairs are disconnected by inserting the plug into the disconnection or terminal strips. The switching strip does not need the plug since it already has the disconnecting function without the module.

Designation	Code
VL-10 I	023 033
VL-10	023 030

Disconnecting Plug (blind)

It is used with the disconnecting strip LL/I for interrupting telephone lines (cutting-off the subscriber) and simultaneous marking of the cut-off line.

Case colour: red.

For the strips type ML... are available three different disconnecting plugs:

- Disconnecting plug left single (VLL); left part of the case is red - interrupted line, right part of the case is grey - protected line
- Disconnecting plug right single (VLD); right part of the case is red - interrupted line, left part of the casing is grey - protected line
- Disconnecting plug double (VL2); red casing - disconnection of two lines at the same time

The disconnecting plugs are used with the disconnecting strip for interrupting telephone lines (cutting-off the subscriber) and simultaneous marking of the cut-off line.

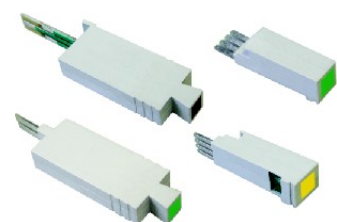
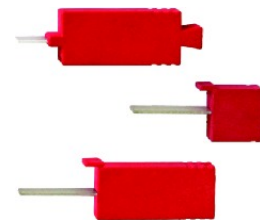
Designation	Code
VL-I	023 039
VL-IM	023 231
VL-K	023 025
VLL1	023 830
VLD1	023 831
VL2	023 832

Marking Label

The labels are used for marking lines (unpaid subscriber bills, free lines,...).

They are attached to the protection modules.

Designation	Code
Green	023 577
Yellow	023 579
Brown	023 578



Measuring wires for Iskra and KRONE strip

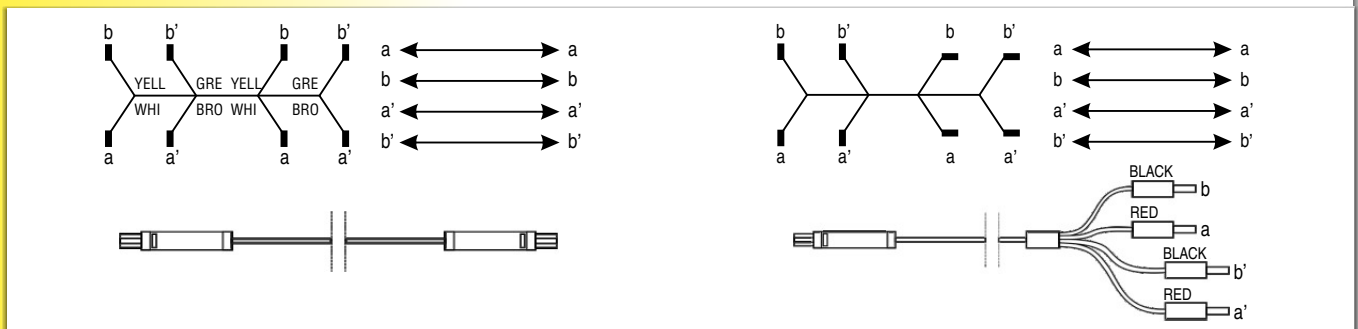
They are used as connecting and testing components of telephone lines.

The standard version is 1.5 m. Shorter or longer lengths are available as well as different combinations of internal connections

4-pole; two plugs and 4 separate contacts



Designation	Code
VMI-P	023 220
VMK-P	023 441
VPO 4I	023 068
VPO 4K	023 111

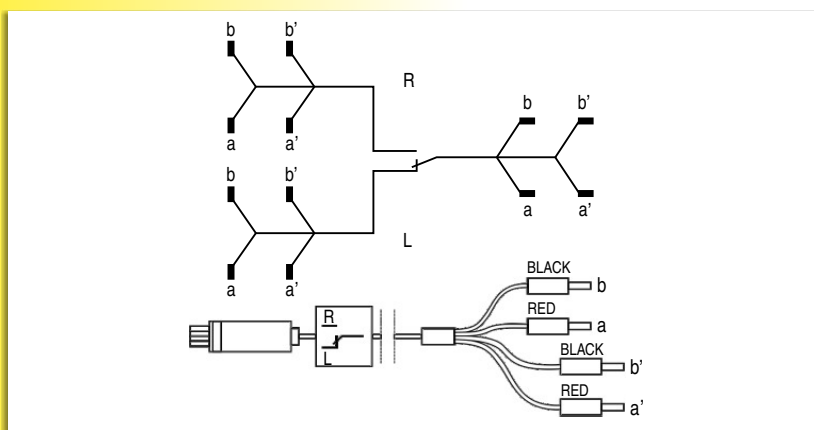


Measuring wires for Iskra MLL, MLR strip

They are used as connecting and testing components of telephone lines.

Standard version is 4 m. Shorter or longer lengths are available as well as different combinations of internal connections.

Designation	Code
VMK 4I	023 839
VMP 4I	023 911

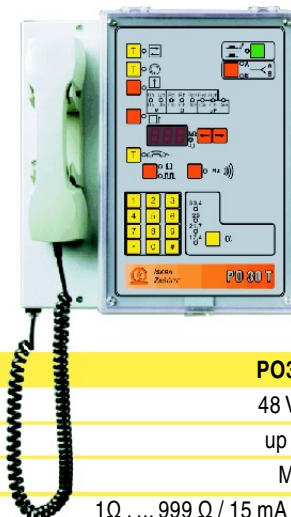


Testing Device

PO30 PROT testing device

Testing device serves for the fault detection on telephone exchanges and public lines as well as on end users. They fulfill the requirements of modern electronics and are simple and easy to use for checking all necessary technical parameters in exchanges and public lines.





Technical characteristics

Type	PO30 PROT
Rated voltage	48 V or 60 V
Consumption	up to 10 W
Fuse	M 0.5 A
Resistance ranges / Measuring currents / Accuracy	1 Ω ... 999 Ω / 15 mA / ± (2 % reading + 2 digits) 10 Ω ... 9.99 k Ω / 3.6 mA / ± (2 % reading + 2 digits) 100 Ω ... 99.9 k Ω / 36 mA / ± (2 % reading + 2 digits) 1 k Ω ... 999 k Ω / 3.6 μA / ± (2 % reading + 2 digits)
Capacitance measuring range / Accuracy	0.05 ... 9.99 μF / ± (2% reading + 3 digits)
Voltage measuring range / Accuracy	- 12,0 V ... + 65.0 V / 48 V or 60 V ± 2 digits
Display	3 digit LED
Pulse count electronic counter	0 ... 99 impulses
Pulse duration range	0.01 s ... 0.63 s
Operating temperature	+ 5 °C ... + 45 °C
Ordering code	023 797

Description of tester device functions:

- Telephone calls
- Voltage measurement on 'a' and 'b' wires
- Selection of 'A' or 'B' subscriber - party line for all tests
- Testing of 'a' and 'b' wires for breaking and connecting
- Testing of internal line by dialling the subscriber line
- Voltage measurement on internal line 'a' and 'ab' wires
- Measurement of all insulating resistances between internal line 'a' and 'b' wires and earth
- Measurement of fuse resistance in 'a' wire
- Measurement of fuse resistance in 'b' wire
- Automatic fault detection on the external line and indication of subscriber telephone set presence
- Voltage measurement on external line 'a' and 'b' wires
- Measurement of all insulating resistances between external line 'a' and 'b' wires and earth
- Measurement of all capacitances between external line 'a' and 'b' wires and earth
- Testing of subscriber's telephone set capacitor
- Checking of subscriber's telephone set hook switch
- Direct call to the subscriber and local call (without telephone exchange)
- Measurement of 'a' and 'b' wire loop resistance in combination with the telephone set
- Testing of subscriber's telephone set dialling
- Generation of tone signal 800 Hz
- Testing of speech signal attenuation
- Tone dialling of subscriber - MFC

Description of symbols on front plate

	ON - OFF
	PARTY LINE
	CONNECTION TEST (#P.O.)
	SET-UP OF SUBSCRIBER NO.
	INTERNAL LINE MEASUREMENT
	EXTERNAL LINE MEASUREMENT
	tone SIGNAL
	RESISTANCE / DIALOG
	CALL TO THE SUBSCRIBER AND LOCAL CALL
	ATTENUATION (dB)



Combined Plug-in Adapters with Overvoltage Protection

ZE 200 xDSL

Adapter is intended for protection of NT interface, VDSL low-band filter (splitter) and VDSL modem unit.

The protective module ZE 200 xDSL protects the entire telecommunication equipment on the subscriber's side against overvoltages as a result of lightning strikes, switching manipulations of large consumers, inductances and other overvoltage influences.

The protection is functionally divided into power protection (230V/50H) and protection of the telephone line itself through which the existing ISDN service is transmitted and at the same time the expanded service of VDSL technology signal transmissions.



ZE 200 ISDN-SO

Adapter is intended for the protection of terminals (S-bus) of the ISDN technology, as well as ISDN modems and computers (PC) connected on this bus (4-wire lines). The protection is functionally divided into power protection (230 V) and protection of the ISDN line (S-bus) itself.

It is recommended especially for longer S-bus lines because overvoltages are induced (due to lightning strikes, switching manipulations of large consumers, etc.) which are damaging for terminals, NT interfaces and computers (PC).



ZE 200 ISDN-BA

Adapter is intended for protection of NT (Network Terminal) interfaces. At the same time they also protect an end user on the terminal sides of interfaces. The protection is functionally divided into power protection (230 V) and protection of an ISDN line (U-bus) itself. The protective modules protect electronic equipment against overvoltages as a result of lightning strikes, switching manipulations of large consumers, inductances and other overvoltage influences.



ZE 200-FAX/TEL

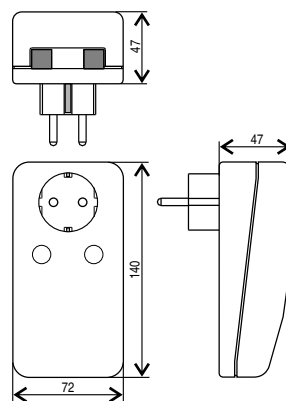
Adapter is intended for the protection of telecommunication terminals from overvoltages, which originate at electrostatic and atmospheric discharges (lightning) and high voltage inductances resulting from power line switching manipulations and large electricity consumers.

The protective module is adequate for protecting facsimile machines, modems, cordless telephones, answering machines and other telecommunication devices.





Dimensional drawings



Technical characteristics

Type **ZE 200 xDSL**

Electrical characteristics

Data part

Max. operating voltage	U_c	175 V
Max. operating current at 20°C	I_L	150 mA
Rated DC spark-overvoltage	(a/b-PE)	184 - 240 V
	(a-b)	184 - 240 V
Protection level at I_n (a,b-PE/a-b)	U_p	≤ 300 V
Thermal protection	Thermal protection + PTC	
Actuating of thermal protection	*	
Rated surge current (8/20 μ s)	I_n	2.5 kA
Max. surge current (8/20 μ s)	I_{max}	5 kA
Transverse capacitance	C	< 100 pF
Serial inductance	L	/
Serial resistance at 20°C	R	9 - 11 Ω
Frequency range	f	> 10 MHz
Response time of overvoltage protection	< 5 ns	
Connection	RJ11 input, RJ11 output	

Power part

Nominal AC voltage	U_n	230 V
Max. continuous operating AC voltage	U_c	275 V
Nominal load current	I_L	16 A
Nominal discharge current (8/20) I_n	L-N	3 kA
	L/N-PE	6 kA (L+N-PE)
Combined wave (1.2/50 - 8/20) U_{oc}/I_{sc}	L-N	6 kV
	L/N-PE	10 kV (L+N-PE)
Protection level U_p	L-N	< 1000 V
	L/N-PE	< 1500 V

Back-up fuse (only required if there is no fuse in mains) 16 A gI / C 16 A

Connection Plug in system with grounding contact
DIN 49 440-CE(7)III, DIN 49 441-CEE(7)IV

Tested to IEC-61643-1

Category IEC III

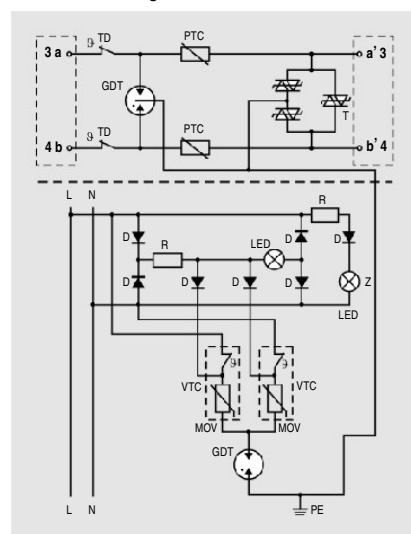
Mechanical characteristics

Supervising device	Supply present	Green light
	Error	Red light
Operating temperature	- 25 °C ... + 60 °C	
Degree of protection	IP20	
Housing material, colour	Thermoplastic, extinguishing degree V-O, gray	
Ordering code	121 539	

Actuating of thermal protection

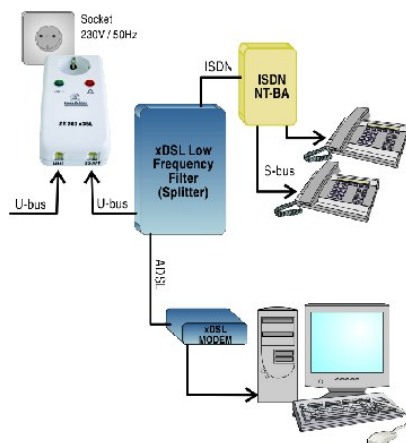
* Limitation of current into the exchange and disconnection of the line to the exchange.

Connection diagram



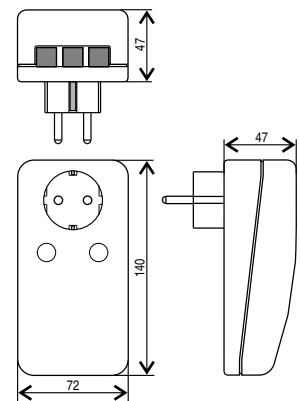
Legend:

TD	thermal decoupler
GDT	gas discharge tube
MOV	varistor
PTC	resistor with a positive temperature coefficient
⊗	thermal decoupled
D	diode
T	thyristor
LED	light emitting diode

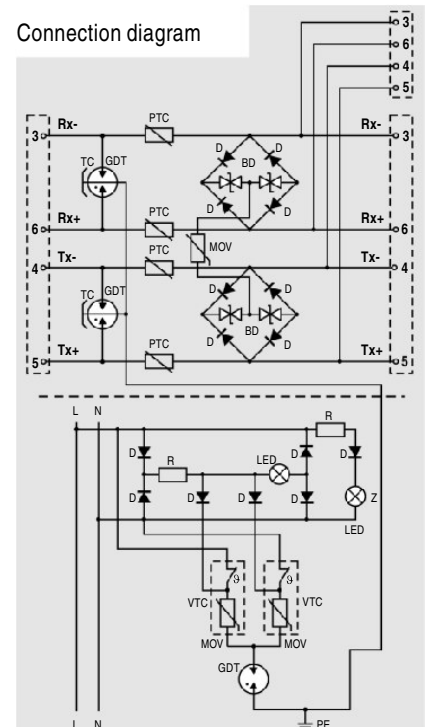




Dimensional drawings



Connection diagram



Legend:

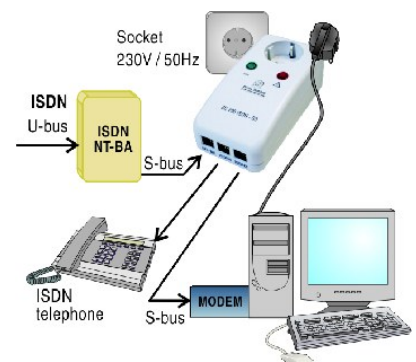
- TC *thermo clip*
- GDT *gas discharge tube*
- MOV *varistor*
- PTC *resistor with a positive temperature coefficient*
- ⊖ *thermal decoupled*
- D *diode*
- BD *bidirectional diode*

Technical characteristics

Type	ZE 200 ISDN-S0	
Electrical characteristics		
Data part		
Max. operating voltage (signal/power)	U_c	9 V / 56 V
Max. operating current at 20°C	I_L	150 mA
Rated DC spark-overvoltage	(Rx(Tx)-PE)	184 - 276 V
	(Rx(Tx)-Rx(Tx))	13 - 16 V
Protection level at I_n	U_p	≤ 30 V (Rx(Tx)-Rx(Tx)), ≤ 900 V (Rx(Tx)-PE)
Thermal protection	Thermo clip + PTC	
Actuating of thermal protection	*	
Rated surge current (8/20 μ s)	I_n	2.5 kA
Max. surge current (8/20 μ s)	I_{max}	5 kA
Transverse capacitance	C	< 100 pF
Serial inductance	L	/
Serial resistance at 20°C	R	9 - 11 Ω
Frequency range	f	> 10 Mhz
Response time of overvoltage protection	< 1 ns (Rx(Tx)-Rx(Tx)), < 100 ns (Rx(Tx)-PE)	
Connection	RJ45 input, RJ45 2x output	
Power part		
Nominal AC voltage	U_n	230 V
Max. continuous operating AC voltage	U_c	275 V
Nominal load current	I_L	16 A
Nominal discharge current (8/20) I_n	L-N	3 kA
	L/N-PE	6 kA (L+N-PE)
Combined wave (1.2/50 - 8/20) U_{oc}/I_{sc}	L-N	6 kV
	L/N-PE	10 kV (L+N-PE)
Protection level U_p	L-N	< 1000 V
	L/N-PE	< 1500 V
Back-up fuse (only required if there is no fuse in mains)	16 A gl / C 16 A	
Connection	Plug in system with grounding contact DIN 49 440-CE(7)III, DIN 49 441-CEE(7)IV	
Tested to	IEC-61643-1	
Category IEC	III	
Mechanical characteristics		
Supervising device	Supply present	Green light
	Error	Red light
Operating temperature	- 25 °C ... + 60 °C	
Degree of protection	IP20	
Housing material, colour	Thermoplastic, extinguishing degree V-O, gray	
Ordering code	121 540	

Actuating of thermal protection

* Limitation of current into the exchange and short circuit connection between line and ground.

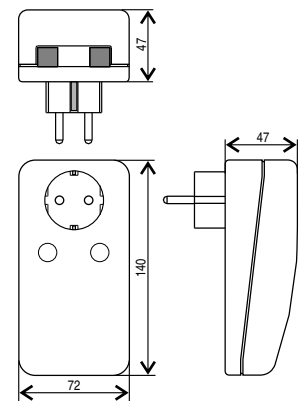


ZE 200 ISDN-BA

Combined Plug-in Adapter with Overvoltage Protection



Dimensional drawings



Technical characteristics

Type **ZE 200 ISDN-BA**

Electrical characteristics

Data part

Max. operating voltage	U_c	155 V
Max. operating current at 20°C	I_L	150 mA
Rated DC spark-overvoltage	(a/b-PE)	184 - 264 V
	(a-b)	170 - 210 V
Protection level at I_n	U_p	≤ 300 V (a-b), ≤ 600 V (a,b-PE)
Thermal protection	Thermal protection + PTC	
Actuating of thermal protection	*	
Rated surge current (8/20 μ s)	I_n	2.5 kA
Max. surge current (8/20 μ s)	I_{max}	5 kA
Transverse capacitance	C	< 100 pF
Serial inductance	L	/
Serial resistance at 20°C	R	9 - 11 Ω
Frequency range	f	> 10 Mhz
Response time of overvoltage protection	< 1 ns (a-b), < 25 ns (a,b-PE)	
Connection	RJ45 input, RJ45 output	

Power part

Nominal AC voltage	U_n	230 V
Max. continuous operating AC voltage	U_c	275 V
Nominal load current	I_L	16 A
Nominal discharge current (8/20) I_n	L-N	3 kA
	L/N-PE	6 kA (L+N-PE)
Combined wave (1.2/50 - 8/20) U_{oc}/I_{sc}	L-N	6 kV
	L/N-PE	10 kV (L+N-PE)
Protection level U_p	L-N	< 1000 V
	L/N-PE	< 1500 V

Back-up fuse (only required if there is no fuse in mains) 16 A gl / C 16 A

Connection Plug in system with grounding contact
DIN 49 440-CE(7)III, DIN 49 441-CEE(7)IV

Tested to IEC-61643-1

Category IEC III

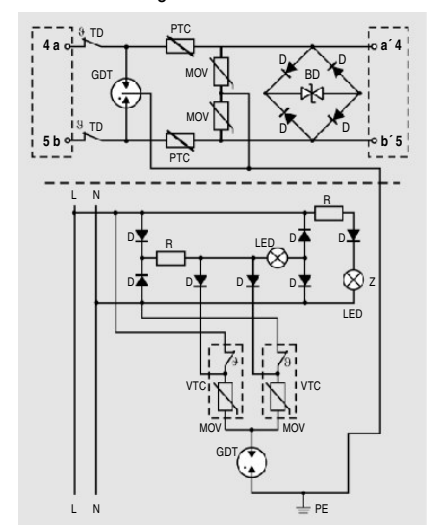
Mechanical characteristics

Supervising device	Supply present	Green light
	Error	Red light
Operating temperature	- 25 °C ... + 60 °C	
Degree of protection	IP20	
Housing material, colour	Thermoplastic, extinguishing degree V-O, gray	
Ordering code	121 248	

Actuating of thermal protection

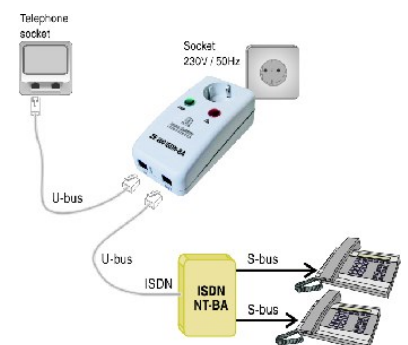
* Limitation of current into the exchange and disconnection of the line to the exchange.

Connection diagram



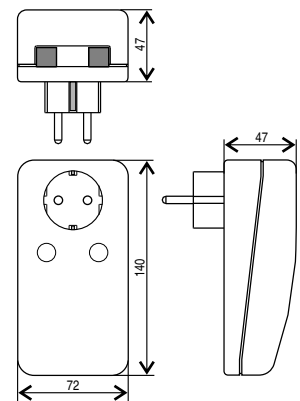
Legend:

TD	thermal decoupler
GDT	gas discharge tube
MOV	varistor
PTC	resistor with a positive temperature coefficient
⊘	thermal decoupled
D	diode
BD	bidirectional diode

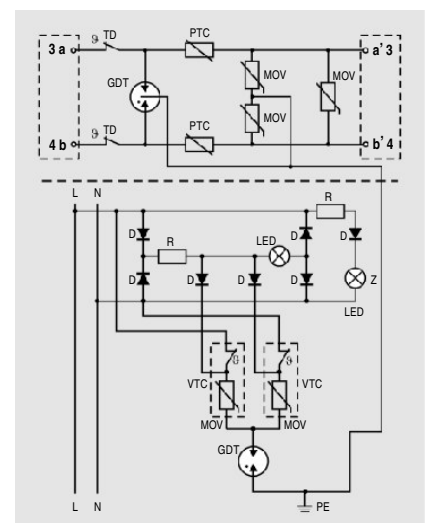




Dimensional drawings

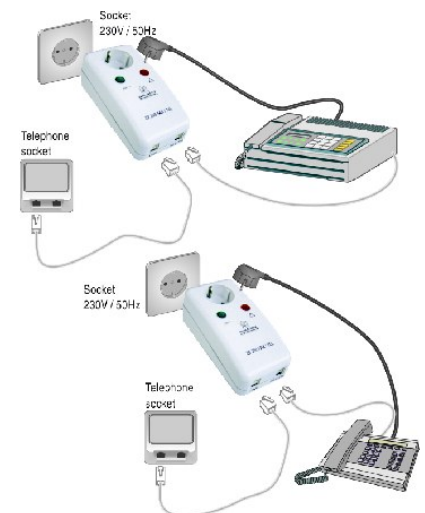


Connection diagram



Legend:

TD	thermal decoupler
GDT	gas discharge tube
MOV	varistor
PTC	resistor with a positive temperature coefficient
⊗	thermal decoupled
D	diode



Technical characteristics

Type	ZE 200 FAX/TEL	
Electrical characteristics		
Data part		
Max. operating voltage	U_c	175 V
Max. operating current at 20°C	I_L	150 mA
Rated DC spark-overvoltage	(a/b-PE)	184 - 264 V
	(a-b)	184 - 264 V
Protection level at I_n (a,b-PE/a-b)	U_p	≤ 600 V
Thermal protection	Thermal protection + PTC	
Actuating of thermal protection	*	
Rated surge current (8/20 μs)	I_n	2.5 kA
Max. surge current (8/20 μs)	I_{max}	5 kA
Transverse capacitance	C	< 250 pF
Serial inductance	L	/
Serial resistance at 20°C	R	9 - 11 Ω
Frequency range	f	> 1.5 Mhz
Response time of overvoltage protection	< 25 ns	
Connection	RJ11 input, RJ11 output	
Power part		
Nominal AC voltage	U_n	230 V
Max. continuous operating AC voltage	U_c	275 V
Nominal load current	I_L	16 A
Nominal discharge current (8/20) I_n	L-N	3 kA
	L/N-PE	6 kA (L+N-PE)
Combined wave (1.2/50 - 8/20) U_{oc}/I_{sc}	L-N	6 kV
	L/N-PE	10 kV (L+N-PE)
Protection level U_p	L-N	< 1000 V
	L/N-PE	< 1500 V
Back-up fuse (only required if there is no fuse in mains)	16 A gl / C 16 A	
Connection	Plug in system with grounding contact DIN 49 440-CE(7)III, DIN 49 441-CEE(7)IV	
Tested to	IEC-61643-1	
Category IEC	III	
Mechanical characteristics		
Supervising device	Supply present	Green light
	Error	Red light
Operating temperature	- 25 °C ... + 60 °C	
Degree of protection	IP20	
Housing material, colour	Thermoplastic, extinguishing degree V-O, gray	
Ordering code	121 244	

Actuating of thermal protection

* Limitation of current into the exchange and disconnection of the line to the exchange.

Overvoltage Protection for DSL, ISDN and POTS Technologies

LZ-DSL 01P

The module LZ-DSL 01P is intended for the protection of NT interface, ADSL low-band filter (splitter) and ADSL modem unit.

A complete overvoltage protection on the telecommunication side (U-bus) entirely enables signal transmissions of ADSL technology even on utmost ranges (lengths) of this system. It is also suitable for signal transmission technology VDSL.



LZ-ISDN-BA/TEL

The module LZ-ISDN-BA/TEL is intended for the protection of NT interface and terminals on the subscriber's side of the ISDN line, and is also used for the protection of classical telephone terminals on the subscriber's side of the telephone line.

A complete overvoltage protection on the telecommunication side (U-bus) entirely enables signal transmissions of ISDN technology even on utmost ranges (lengths) of this system.



TPNO-ISDN

The TPNO-ISDN socket is intended for the protection of terminals on the subscriber's side of the ISDN line.

A complete overvoltage protection on the telecommunication side (S0-bus) entirely enables signal transmission of ISDN technology.



Splitter LPF-DSL01P DSL-COMBO

Splitter can be used for ISDN technology as well as for analog POTS communication on the telephone exchange side. DSL splitter is universally designed (COMBO version for ISDN & POTS) with 600 Ω line impedance.

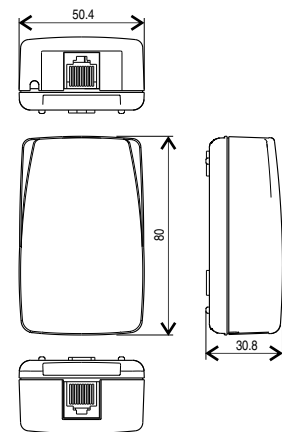


LZ-DSL 01P

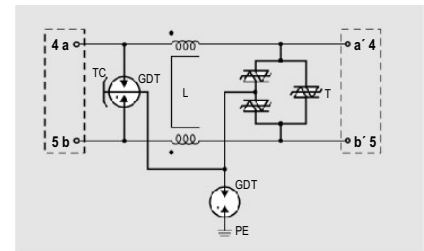
Overvoltage Protection for DSL Technologies



Dimensional drawings



Connection diagram

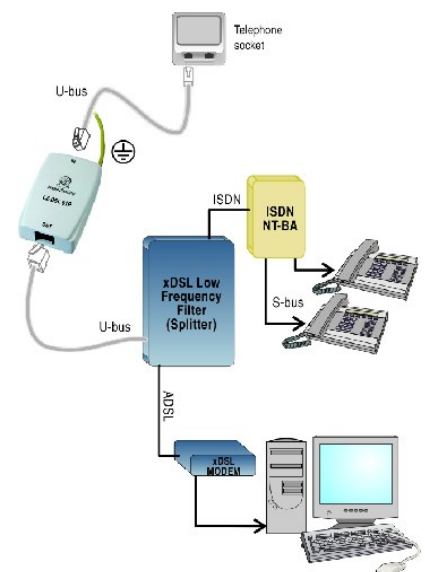


Legend:

TC	thermo clip
GDT	gas discharge tube
T	thyristor
L	coil

Technical characteristics

Type	LZ-DSL 01P	
Electrical characteristics		
Data part		
Max. operating voltage	U_c	175 V
Max. operating current	I_L	150 mA
Rated DC spark-overvoltage	(a/b-PE)	368 - 516 V
	(a-b)	184 - 240 V
Protection level at I_n	U_p	≤ 300 V (a-b)
		≤ 1000 V (a,b-PE)
Thermal protection	Thermo clip	
Actuating of thermal protection	*	
Rated surge current (8/20 μ s)	I_n	2.5 kA
Max. surge current (8/20 μ s)	I_{max}	5 kA
Transverse capacitance	C	< 100 pF
Serial inductance	L	2 x 25 μ H
Inductance in transmission		< 0.5 μ H
Serial resistance at 20°C	R	0.2 - 0.4 Ω
Frequency range	f	> 10 Mhz
Response time of overvoltage protection		< 5 ns (a-b)
		< 100 ns (a,b-PE)
Connection	RJ45 input, RJ45 output	
Mechanical characteristics		
Operating temperature	- 25 °C ... + 60 °C	
Degree of protection	IP20	
Housing material, colour	Thermoplastic, extinguishing degree V-0, gray	
Ordering code	124 143	

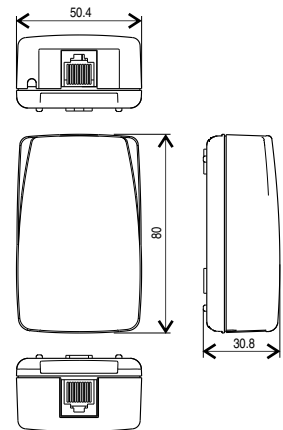


Actuating of thermal protection

* Short circuit connection between line and ground.



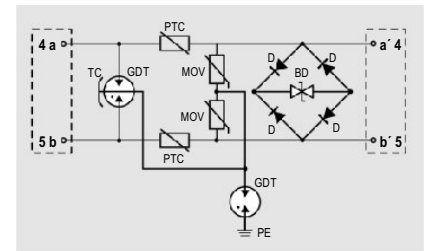
Dimensional drawings



Technical characteristics

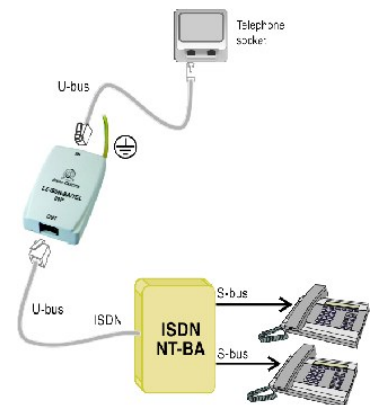
Type	LZ-ISDN-BA/TEL 01P	
Electrical characteristics		
Data part		
Max. operating voltage	U_C	155 V
Max. operating current	I_L	150 mA
Rated DC spark-overvoltage	(a/b-PE)	368 - 540 V
	(a-b)	170 - 210 V
Protection level at I_n	U_p	≤ 300 V (a-b)
		≤ 1000 V (a,b-PE)
Thermal protection	Thermo clip + PTC	
Actuating of thermal protection	*	
Rated surge current (8/20 μ s)	I_n	2.5 kA
Max. surge current (8/20 μ s)	I_{max}	5 kA
Transverse capacitance	C	< 100 pF
Serial inductance	L	/
Serial resistance at 20°C	R	9 - 11 Ω
Frequency range	f	> 10 Mhz
Response time of overvoltage protection		< 1 ns (a-b)
		< 100 ns (a,b-PE)
Connection	RJ45 input, RJ45 output	
Mechanical characteristics		
Operating temperature	- 25 °C ... + 60 °C	
Degree of protection	IP20	
Housing material, colour	Thermoplastic, extinguishing degree V-0, gray	
Ordering code	124 136	

Connection diagram



Legend:

TC	<i>thermo clip</i>
GDT	<i>gas discharge tube</i>
D	<i>diode</i>
BD	<i>bidirectional diode</i>
MOV	<i>varistor</i>
PTC	<i>resistor with a positive temperature coefficient</i>

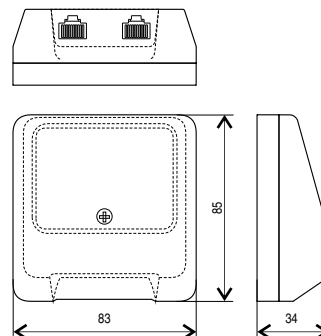


Actuating of thermal protection

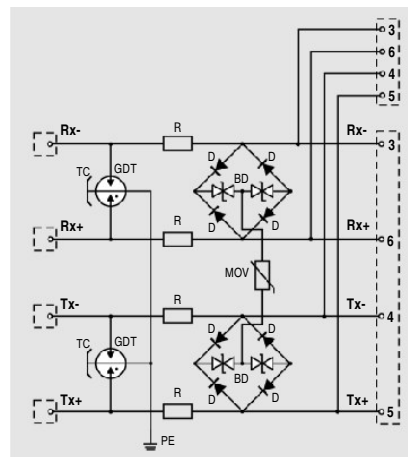
* Limitation of current into the exchange and short circuit connection between line and ground.



Dimensional drawings



Connection diagram



Legend:

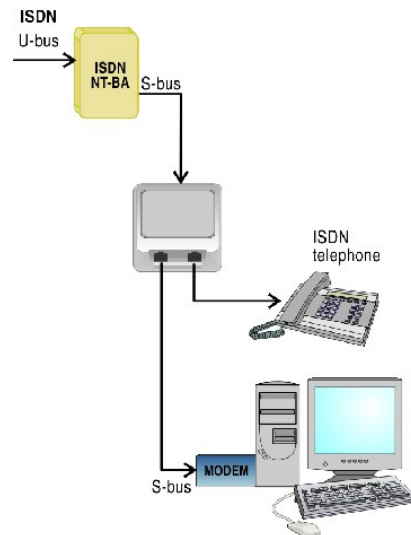
TC	thermo clip
GDT	gas discharge tube
R	resistor
D	diode
BD	bidirectional diode
MOV	varistor

Technical characteristics

Type	TPNO-ISDN	
Electrical characteristics		
Data part		
Max. operating voltage (signal/power)	U_c	9 V / 56 V
Max. operating current at 20°C	I_L	150 mA
Rated DC spark-overvoltage	(Rx(Tx)-PE)	184 - 276 V
	(Rx(Tx)-Rx(Tx))	13 - 16 V
Protection level at I_n	U_p	≤ 30 V (Rx(Tx)-Rx(Tx))
		≤ 900 V (Rx(Tx)-PE)
Thermal protection	Thermo clip + PTC	
Actuating of thermal protection	*	
Rated surge current (8/20 μ s)	I_n	2.5 kA
Max. surge current (8/20 μ s)	I_{max}	5 kA
Transverse capacitance	C	< 100 pF
Serial inductance	L	/
Serial resistance at 20°C	R	9 - 11 Ω
Frequency range	f	> 10 Mhz
Response time of overvoltage protection	< 1 ns (Rx(Tx)-Rx(Tx))	
	< 100 ns (Rx(Tx)-PE)	
Connection	Terminal block input, RJ45 2x output	
Mechanical characteristics		
Operating temperature	- 25 °C ... + 60 °C	
Degree of protection	IP20	
Housing material, colour	Thermoplastic, extinguishing degree V-0, gray	
Ordering code	125 334	

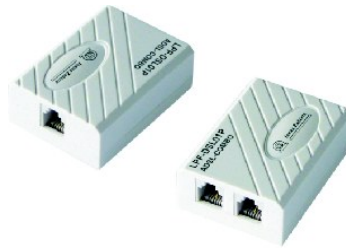
Actuating of thermal protection

* Short circuit connection between line and ground.

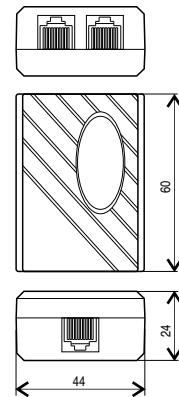


LPF-DSL01P DSL-COMBO

DSL Low-pass Filter for POTS & ISDN



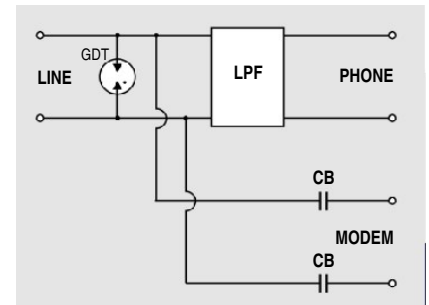
Dimensional drawings



Technical characteristics

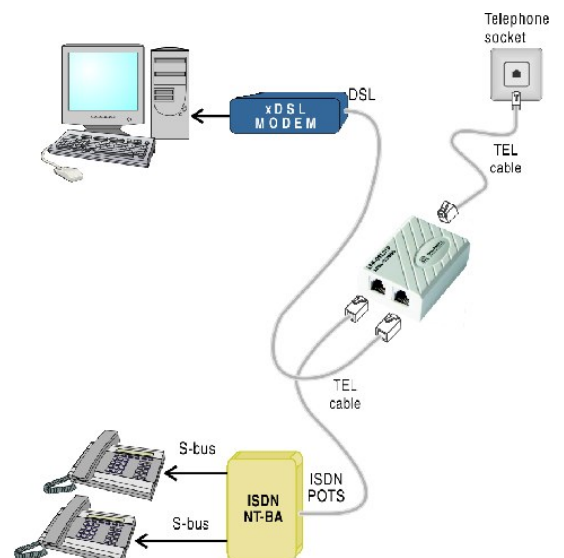
Type		LPF-DSL01P DSL-COMBO	
No. of splitters (LPF)		1	
ISDN: Zline: 135 Ω (2B1Q)	$a_E < 0.8$ dB	1 kHz < f < 40 kHz	
	$a_E < 2.0$ dB	40 kHz < f < 80 kHz	
	$a_S > 65$ dB	150 kHz < f < 12 MHz	
	$a_S > 55$ dB	138 kHz < f < 30 MHz	
	$a_R > 16$ dB	1 kHz < f < 40 kHz	
	$a_R > 12$ dB	1 kHz < f < 40 kHz	
POTS: Zline: 600 Ω	$a_E < 1$ dB	f = 1 kHz	
	$a_E < 1$ dB	200 Hz < f < 4 kHz	
	$a_E < 5$ dB	15 kHz < f < 17 kHz	
	$a_S > 55$ dB	138 kHz < f < 30 MHz	
	$a_R > 8$ dB	0.3 kHz < f < 3.4 kHz	
	$a_R > 12$ dB	0.6 kHz < f < 1.6 kHz	
Cut frequency		f = 138 kHz	
Loop current		80 mA	
Standards		ETSI Standard TS 101 952-1-4	
Connection		RJ11 line, RJ11 modem, RJ11 phone	
Mechanical characteristics			
Operating temperature		- 20 °C ... + 80 °C	
Storage temperature		- 40 °C ... + 85 °C	
Housing material, colour		PBT, white	
Ordering code		ADSL-COMBO	123 157
		VDSL - COMBO	123 156

Connection diagram



Legend:

LPF	low pass filter
GDT	gas discharge tube
CB	blocking capacitor



Independent Line Overvoltage Protection for POTS and DSL Technologies

RVD Distribution Housing for External and Internal Mounting

This rain - proof housing can incorporate terminal, disconnecting or switching strips (up to 10 lines) Iskra Zaščite or KRONE as well as corresponding protection modules LPA. Both parts are interconnected with a string, which prevents the cover from falling during the mounting.

Possibility of a special version with lock.



LZ-D Protection Devices for External and Internal Mounting

LZ-D protection device is a product for the line protection of telephone terminals. They are used in different variations of 1 - 6 lines.

They contain coarse and fine overvoltage protection in the longitudinal and transversal directions.

Special version LZD is used for external mounting (IP54).



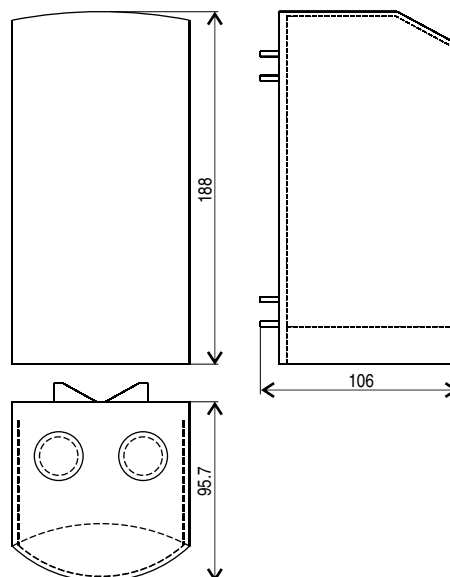
RVD Series Independent Line Overvoltage Protection for POTS and DSL Technologies

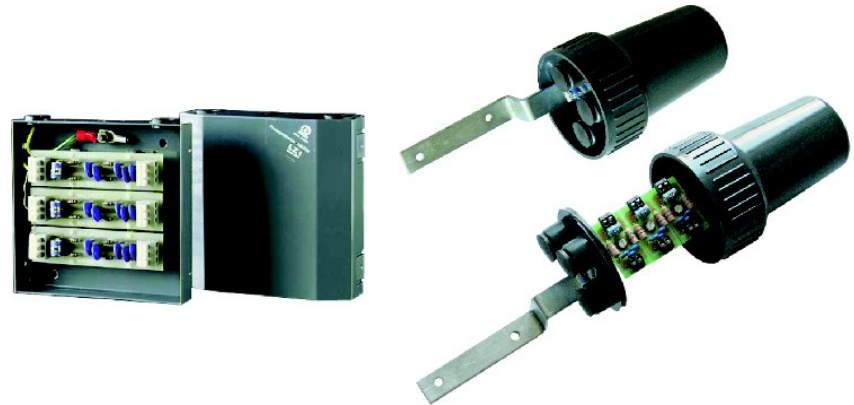


Technical characteristics

Type	RVD 10 LL/I	RVD 10 LL/K	RVD 20 LL/K	RVD 30 MLL/I
Number of strips	1	1	2	3
Strip type	LL/I (123 901)	LL/K (123 976)	LL/K (123 976)	MLL/I (123 556)
Housing with lock	Yes	Yes	No	No
Glade type	2 x PG 13.5	2 x PG 13.5	2 x PG 13.5	2 x PG 13.5
Mechanical characteristics				
Material	PBT UL94 V-0	PBT UL94 V-0	PBT UL94 V-0	PBT UL94 V-0
Color	Gray	Gray	Gray	Gray
Set of fixing	Kit included	Kit included	Kit included	Kit included
Set of grounding	Kit included	Kit included	Kit included	Kit included
Dimensions (Width, Height, Depth)	94 x 188 x 97 mm	94 x 188 x 97 mm	94 x 188 x 97 mm	94 x 188 x 97 mm
Ordering code	124 014	124 117	124 162	124 161

Dimensional drawings





Technical characteristics

Type		LZ-2A	LZD-2AB
Electrical characteristics			
Data part			
No. of protected pairs		1-6	1-4
Max. operating voltage	U_c	175 V	175 V
Max. operating current	I_L	2 A	2 A
Rated DC spark-overvoltage	(a/b-PE)	184 - 264 V	184 - 264 V
	(a-b)	184 - 264 V	184 - 264 V
Protection level at I_n	U_p	≤ 600 V	≤ 600 V
Thermal protection		Thermo clip	Thermo clip
Actuating of thermal protection		*	*
Rated surge current (8/20 μ s)	I_n	5 kA	5 kA
Max. surge current (8/20 μ s)	I_{max}	10 kA	10 kA
Transverse capacitance	C	< 250 pF	< 250 pF
Serial inductance	L	47 μ H	47 μ H
Serial resistance at 20°C	R	< 0.5 Ω	< 0.5 Ω
Frequency range	f	> 1.2 Mhz	> 1.2 Mhz
Response time of overvoltage protection		< 25 ns	< 25 ns
Connection		Terminal block	Terminal block
Mechanical characteristics			
Operating temperature		- 25 °C ... + 60 °C	- 25 °C ... + 60 °C
Degree of protection		IP20	IP54
Housing material, colour		Steel sheets, gray	Thermoplastic, extinguishing degree V-0, black
Dimensions (Width, Height, Depth)		120 x 115 (225) x 35 mm	\varnothing 75 (95) x 100 (140) mm
Ordering code	1-pair	124 171	124 231
	2-pairs	124 172	124 232
	3-pairs	124 173	124 233
	4-pairs	124 174	124 234
	5-pairs	124 175	124 235
	6-pairs	124 176	124 236

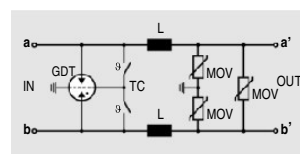
Actuating of thermal protection

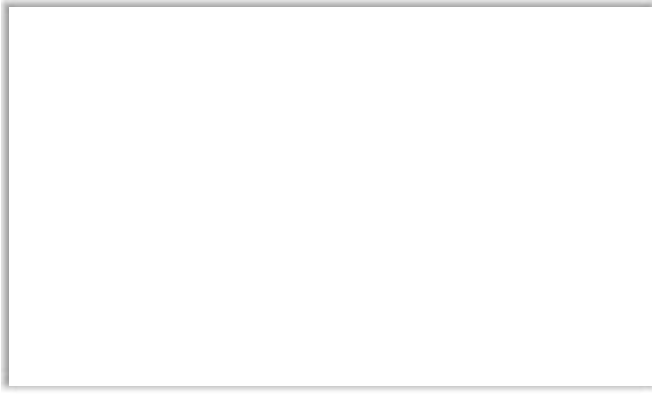
* Short circuit connection between line and ground.

Connection schemes of modules

Legend:

TC	thermo clip
GDT	gas discharge tube
MOV	varistor
Θ	thermal decoupled
L	coil





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