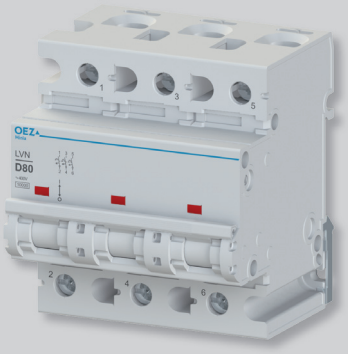
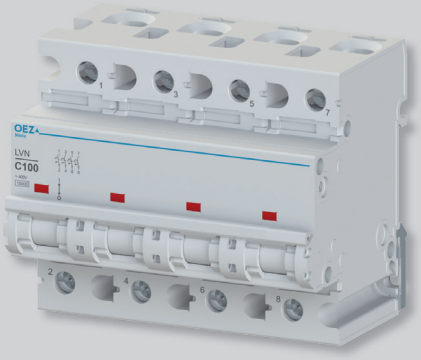
MINIATURE CIRCUIT BREAKERS LVN

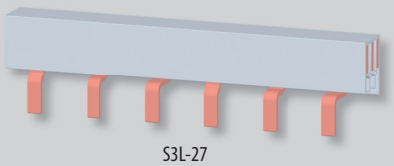
LVN-125C-1

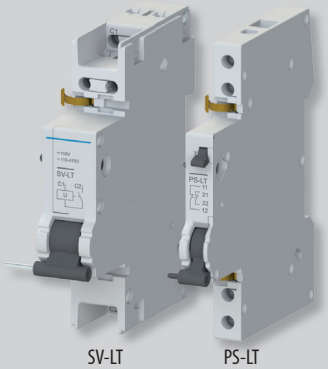


LVN-80D-3



LVN-100C-4


S3L-27


SV-LT PS-LT


AS-50-S-AL01

OD-LT-VU01

- Series of miniature circuit breakers up to 125 A, AC 230/400 V a DC 72 V / pole.
- For protection of cables and conductors against overload and short-circuit.
- Tripping characteristics B, C, D according to EN 60898-1.
- Breaking capacity 10 kA.
- Status indicator - indicates on/off position.
- Possibility of locking and sealing in off or on position.

Miniature circuit breakers 1-pole

I_n	Characteristic B		Characteristic C		Characteristic D		Number	Weight	Package
[A]	Type	Order code	Type	Order code	Type	Order code	of modules	[kg]	[pcs]
80	**LVN-80B-1**	OEZ:42262	**LVN-80C-1**	OEZ:42265	**LVN-80D-1**	OEZ:42268	1.5	0.283	1
100	**LVN-100B-1**	OEZ:42263	**LVN-100C-1**	OEZ:42266	**LVN-100D-1**	OEZ:42269	1.5	0.281	1
125	**LVN-125B-1**	OEZ:42264	**LVN-125C-1**	OEZ:42267	-	-	1.5	0.260	1

Miniature circuit breakers 3-pole

I_n	Characteristic B		Characteristic C		Characteristic D		Number	Weight	Package
[A]	Type	Order code	Type	Order code	Type	Order code	of modules	[kg]	[pcs]
80	**LVN-80B-3**	OEZ:42273	**LVN-80C-3**	OEZ:42276	**LVN-80D-3**	OEZ:42279	4.5	0.817	1
100	**LVN-100B-3**	OEZ:42274	**LVN-100C-3**	OEZ:42277	**LVN-100D-3**	OEZ:42280	4.5	0.821	1
125	**LVN-125B-3**	OEZ:42275	**LVN-125C-3**	OEZ:42278	-	-	4.5	0.827	1

Miniature circuit breakers 4-pole

I_n	Characteristic B		Characteristic C		Characteristic D		Number	Weight	Package
[A]	Type	Order code	Type	Order code	Type	Order code	of modules	[kg]	[pcs]
80	**LVN-80B-4**	OEZ:42282	**LVN-80C-4**	OEZ:42285	**LVN-80D-4**	OEZ:42288	6	1.092	1
100	**LVN-100B-4**	OEZ:42283	**LVN-100C-4**	OEZ:42286	**LVN-100D-4**	OEZ:42289	6	1.075	1
125	**LVN-125B-4**	OEZ:42284	**LVN-125C-4**	OEZ:42287	-	-	6	1.107	1

Accessories

Auxiliary and signal switches	**PS-LT, SS-LT**	page B36
Shunt trips	**SV-LT**	page B37
Undervoltage releases	**SP-LT**	page B37
Locking inserts	**OD-LT-VU01**	page B38
Sealing insert	**OD-LT-VP01**	page B39
Interconnecting busbars	**S1L-27, S3L-27, S4L-27**	page B45
Terminal extension	**AS-50-S-AL01**	page B47

MINIATURE CIRCUIT BREAKERS LVN

Specifications

Type		LVN
Standards		EN 60898-1
Approval marks		
Number of poles		1, 3, 4
Tripping characteristics		B, C, D
Rated current	I_n	80 ÷ 125 A
Rated operating voltage	U_e	AC 230/400 V
Max. operating voltage	U_{max}	AC 250/440 V, DC 72 V / protected pole
Min. operating voltage (1 pole)	U_{min}	AC/DC 24 V
Rated insulation voltage	U_i	AC 250/440 V
Rated frequency	f_n	50/60 Hz
Rated short-circuit breaking capacity (EN 60898-1)	I_{cn}	AC 10 kA
Rated short-circuit breaking capacity (EN 60898-2)	I_{cn}	DC 10 kA
Rated short-circuit ultimate breaking capacity (EN 60947-2)	I_{cu}	AC 10 kA
Rated short-circuit ultimate breaking capacity (EN 60947-2)	I_{cu}	DC 15 kA
Mechanical endurance		10 000 operating cycles
Electrical endurance		10 000 operating cycles
Mounting on "U" rail according to EN 60715 - Type		TH 35
Degree of protection - with connected conductors		IP20
Connection		
Conductor Cu - rigid (solid, stranded)		4 ÷ 50 mm^2
Conductor Cu - flexible with a sleeve		1.5 ÷ 35 mm^2
Screw head type		PZ2
Torque		max. 3.5 Nm
Top or bottom connection		top/bottom
Operating conditions		
Ambient temperature	℃	-25 ÷ +55 ℃, max. 95 % air humidity
Working position		arbitrary
Climatic resistance (EN 60068-2-30)		6 operating cycles
Shocks (EN 60068-2-27)	m/s^2	150 in 11 ms half-sine pulse
Resistance to sinusoidal vibration (EN 60068-2-6)	m/s^2	50 at 25 ÷ 150 Hz and 60 at 35 Hz (4 s)

MINIATURE CIRCUIT BREAKERS LVN

Internal impedance Z, powers losses P, impedance of fault loop Z_s

I_n	Characteristic B		Characteristic C		Characteristic D		Max. impedance of fault loop Z_s [Ω] [2]					
	Z[1]	P[1]	Z[1]	P[1]	Z[1]	P[1]	Characteristic B		Characteristic C		Characteristic D	
[A]	[mΩ/pole]	[W/pole]	[mΩ/pole]	[W/pole]	[mΩ/pole]	[W/pole]	t ≤ 0,4 s	t ≤ 5 s	t ≤ 0,4 s	t ≤ 5 s	t ≤ 0,4 s	t ≤ 5 s
80	1.1	7.0	1.1	6.7	1.1	6.7	0.58	0.58	0.3	0.46	0.14	0.46
100	0.8	8.0	0.88	8.0	0.8	8.0	0.46	0.46	0.23	0.37	0.12	0.37
125	0.7	10.1	0.7	10.8	-	-	0.37	0.37	0.18	0.3	-	-

[1] Average values per protected pole

[2] For TN network, U_0 = AC 230 V, according to EN 60364-4-41; if the measured value exceeds the table value, we recommend to use residual current circuit breaker.

Correction of rated current I_n

Correction of circuit breaker rated current I_n is determined by relation $I_{n1} = K_T \times K_N \times I_n$ where:

I_{n1} ... is corrected rated current of the circuit breaker

I_n ... is rated current of the circuit breaker (i.e. the one placed separately at reference temperature 30 °C)

K_T ... is correction factor taking ambient temperature into account

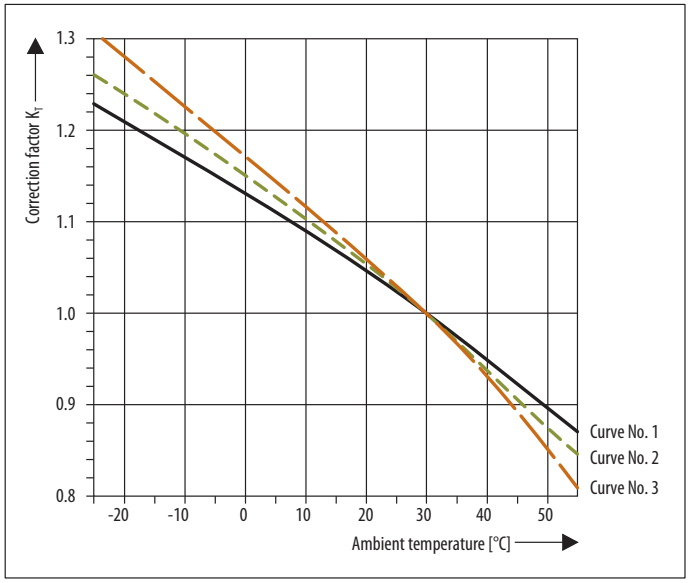
K_N ... is correction factor taking into account placement of more loaded circuit breakers side-by-side

1) Correction factor K_T

For concrete circuit breaker type (I_n, characteristic, number of poles), determine correction curve number (1, 2 or 3) in the table, and using the correction curve number and given ambient temperature on the graph, determine Correction factor K_T .

Characteristic	Number of poles	Rated current of the circuit breaker I_n [A]		
		80	100	125
		Correction curve number		
B	1	2	3	3
	3, 4	1	1	1
C	1	2	3	3
	3, 4	1	1	1
D	1	2	3	-
	3, 4	1	1	-

Correction factor K_T depending on ambient temperature



2) Correction factor K_N

Determine correction factor K_N according to the number of circuit breakers placed side-by-side .

Correction factor K_N for circuit breakers placed side-by-side				
Number of LVN circuit breakers side-by-side	1	2 ÷ 3	4 ÷ 6	> 7
Correction factor K_N	1.00	0.90	0.88	0.85

Example

Task: How rated current I_n = 100 A will change for circuit breaker LVN-100B-1 at ambient temperature 10 °C and for 4 circuit breakers placed side-by-side?

Determination of K_T: For characteristic B, number of poles 1, and I_n 100 A it is possible to take correction curve No. 3 from the table. For intersection of the correction curve No. 3 and ambient temperature 10 °C it is possible to determine correction factor K_T = 1.12 on the vertical scale of the graph.

Determination of K_N: For 4 circuit breakers LVN-100B-1 placed side-by-side it is possible to determine from the table correction factor K_N = 0.88.

Correction I_n: new rated current $I_{n1} = K_T \times K_N \times I_n = 1.12 \times 0.88 \times 100$ A = 98.56 A

MINIATURE CIRCUIT BREAKERS LVN

Correction of tripping characteristic depending on frequency

- Reference frequency: 50 Hz.

Thermal release

I_n [A]	Correction factor					
	0 Hz	16 2/3 Hz	50 Hz	125 Hz	400 Hz	1 000 Hz
80 ÷ 125	1	1	1	0.97	0.92	0.85

Electromagnetic release

I_n [A]	Correction factor					
	0 Hz	16 2/3 Hz	50 Hz	125 Hz	400 Hz	1 000 Hz
80 ÷ 125	1.5	1	1	1.05	1.3	1.8

Example:
For circuit breaker LVN-100B-1 in a circuit with frequency of 400 Hz, rated current is corrected $I_n = 100 \times 0.92 = 92$ A.
For characteristic B, range of electromagnetic release switching is changed to 1.3 x (3 ÷ 5) $I_n = (3.9 \div 6.5)\ I_n$.

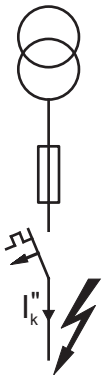
Selectivity with backup fuse

Selectivity of LVN miniature circuit breakers of characteristic B with backup fuses [kA]

I_n [A]	Fuse of type gG					
	100 A	125 A	160 A	200 A	224 A	250 A
80	2.8	3.8	5.7	8.1	10.0	10.0
100	-	3.8	5.2	7.0	10.0	10.0
125	-	-	5.2	7.0	10.0	10.0

Selectivity of LVN miniature circuit breakers of characteristic C with backup fuses [kA]

I_n [A]	Fuse of type gG					
	100 A	125 A	160 A	200 A	224 A	250 A
80	-	-	5.1	7.5	9.2	10.0
100	-	-	-	6.5	8.0	10.0
125	-	-	-	6.5	8.0	10.0



The time selectivity of particular combination up to the value of short-circuit current I_k" shown in the table is ensured in case of short-circuit behind the LVN circuit breaker with back-up fuse-link.
Which means that at short-circuit of particular combination under the I_k" value only the circuit breaker actuates. In case the short-circuit current value is bigger than I_k", value then also the back-up fuse-link actuates.

Example:
Miniature circuit breaker LVN-100B-.. actuates earlier than back-up fuse-link with rated current 200 A up to short-circuit current 7 kA.

Selectivity of LVN miniature circuit breakers of characteristic D with backup fuses [kA]

I_n [A]	Fuse of type gG					
	100 A	125 A	160 A	200 A	224 A	250 A
80	2.3	3.3	4.6	6.9	8.1	10
100	-	2.8	4.3	6.2	7.5	9.2

Max. short-circuit current with backup fuse in kA for LVN circuit breakers

In case that short-circuit current passing through the circuit breaker is not known in the place of installation or is higher than breaking capacity of the circuit breaker, backup fuse must be used to eliminate circuit breaker overload.

I_n [A]	Backup fuse of type gG			
	160 A	200 A	224 A	250 A
80	50	30*	20**	10
100	50	30*	20**	10
125	50	30	20	10

* characteristic D 20 kA
** characteristic D 15 kA

MINIATURE CIRCUIT BREAKERS LVN

Switching lighting fittings with HQ, HQI and NAV lighting source in the circuit with LVN circuit breakers

HQ - mercury discharge lamps
HQI - metal halide discharge lamp
NAV - sodium discharge lamp

The below tables determine:
- power and current of lighting fittings with HQ, HQI and NAV lighting source
- max. permitted number of lighting devices with HQ, HQI and NAV lighting source connected downstream of the circuit breaker - with this configuration, the circuit breaker does not trip in circuit (lighting fittings) switching on.

Power and current of lighting fittings with HQ, HQI and NAV lighting source

		Power output / lighting fitting [W]							
		35	70	150	250	400	1 000	2 000	3 500
Current / lighting fitting	[A]	0.5	1	1.8	3	3.5	9.5	10.3	18
Current / uncompensated lighting fitting	[A]	0.3	0.5	1	1.5	2	6	5.5	9.8
Starting current / lighting fitting	[A]	10	18	36	60	70	120	125	220

Max. permitted number (pieces) of lighting fittings with HQ, HQI and NAV lighting source connected downstream of the circuit breaker [1)]

	Rated current of the circuit breaker	Power output / lighting fitting [W]							
	I_n [A]	35	70	150	250	400	1 000	2 000	3 500
Characteristic C	80	76	42	21	12	11	6	6/5	3
	100	98	54	27	16	14	8/7	8/6	4
	125	116	64	32	19	16	9	9/8	5
Characteristic D	80	143/112	80/56	40/31	24/18	20/16	9/6	10/5	5/3
	100	186/140	103/70	51/39	31/23	26/20	11/7	12/6	7/4

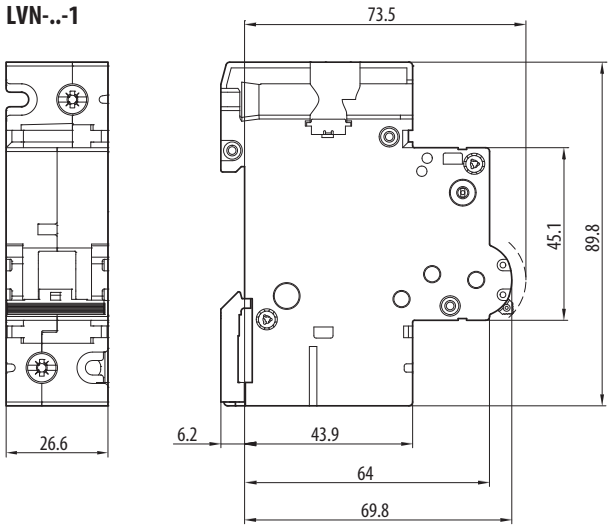
[1)] The values separated by slash mean the values for the lighting fittings „with compensation / without compensation".

Example:
In case of circuit breaker LVN-100C-1, max. permitted number of lighting fittings is 98 pieces for lighting fitting with unit power of 35 W. Operating current is 0.3 x 98 = 29.4 A for compensated lighting devices. The starting current is 10 x 98 = 980 A.

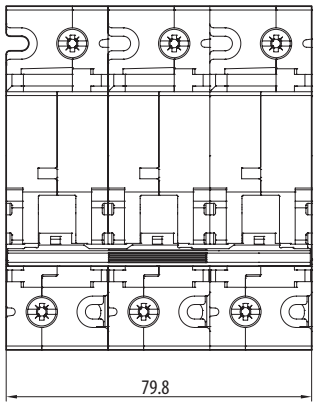
MINIATURE CIRCUIT BREAKERS LVN

Dimensions

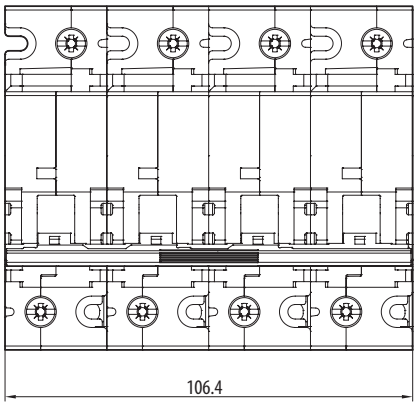
LVN-..-1

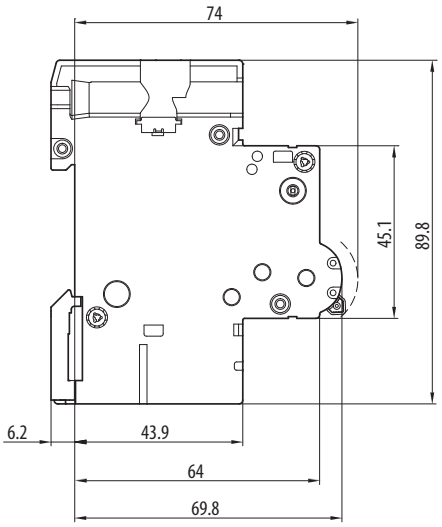


LVN-..-3



LVN-..-4

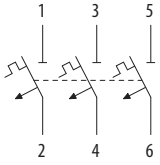




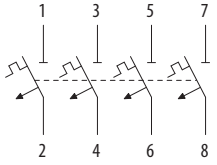
Diagram

LVN-..-1

LVN-..-3

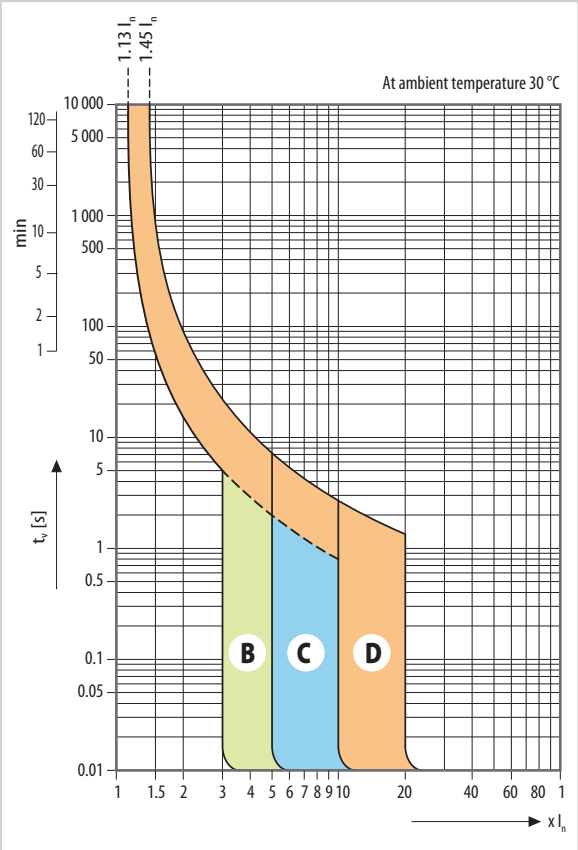


LVN-..-4



MINIATURE CIRCUIT BREAKERS LVN

Characteristics LVN in AC circuit [1)]



[1)] In DC circuit, limits of electromagnetic release are changed with correction factor 1.5.
Characteristic **B**: (4.5 ÷ 7.5) I_n / **C**: (7.5 ÷ 15) I_n / **D**: (15 ÷ 30) I_n

- **Characteristic B**: for protection of line of electrical circuits with equipment, which does not cause current surges. The short-circuit release is set to (3 ÷ 5) I_n.
- **Characteristic C**: for protection of line of electrical circuits with equipment, which causes current surges. The short-circuit release is set to (5 ÷ 10) I_n.
- **Characteristic D**: for protection of line of electrical circuits with equipment, which causes high current surges. The short-circuit release is set to (10 ÷ 20) I_n.

Tripping characteristics of circuit breakers according to EN 60898-1

Thermal release			Tripping characteristic type
			B, C, D
Conventional non-tripping current	I_{nt} for $t \geq 2$ hr	(for $I_n > 63$ A)	$I_{nt} = 1.13\ I_n$
Conventional tripping current	I_t for $t < 2$ hr	(for $I_n > 63$ A)	$I_t = 1.45\ I_n$
Current I_3 for	$1\ s < t < 120\ s$	(for $I_n > 32$ A)	$I_3 = 2.55\ I_n$

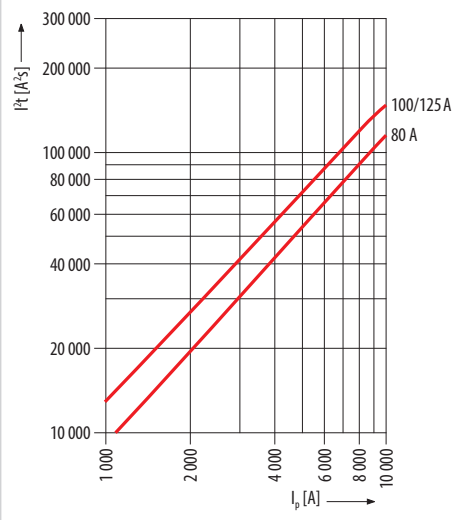
t - break time of the circuit breaker

Electromagnetic release			Tripping characteristic type		
			B	**C**	**D**
Current I_4 for	$0.1\ s < t < 90\ s$	(for $I_n > 32$ A)	$I_4 = 3\ I_n$		
	$0.1\ s < t < 30\ s$	(for $I_n > 32$ A)		$I_4 = 5\ I_n$	
	$0.1\ s < t < 8\ s$	(for $I_n > 32$ A)			$I_4 = 10\ I_n$
Current I_5 for	$t < 0.1\ s$		$I_5 = 5\ I_n$	$I_5 = 10\ I_n$	$I_5 = 20\ I_n$

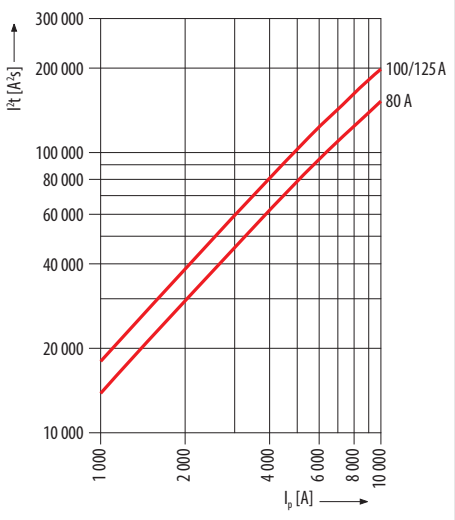
t - break time of the circuit breaker

Characteristics I^2t

LVN-Characteristic B



LVN-Characteristic C



LVN-Characteristic D