Littelfuse®

Expertise Applied | Answers Delivered

SOLAR PRODUCTS CATALOG

SOLAR-RATED

1500 V DC PRODUCTS

OVERVOLTAGE PROTECTION

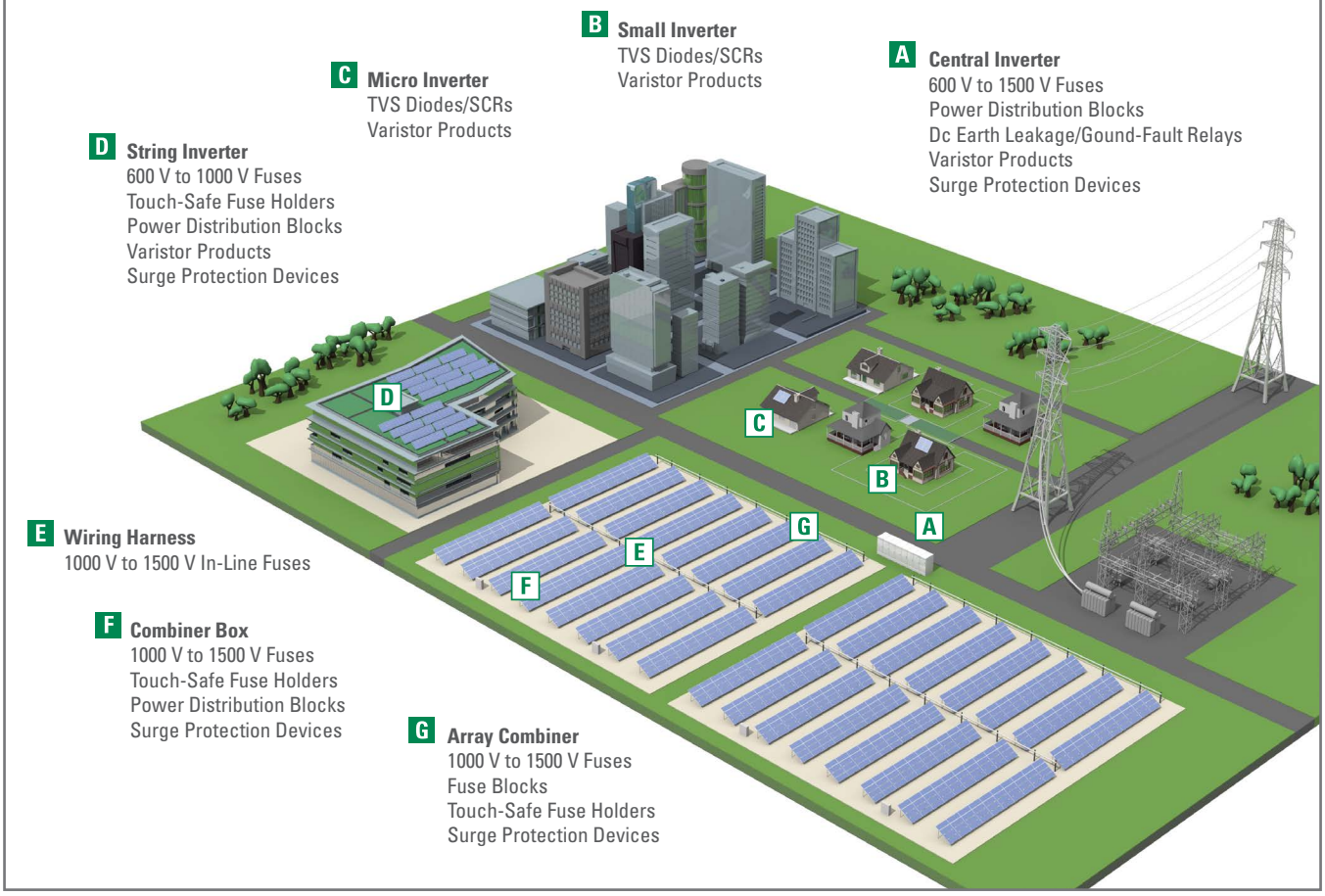
IN-LINE FUSES

PROTECTION RELAYS

SURGE PROTECTION

Solar-Rated Products by Application

Solar Applications



With over 25 million devices installed in photovoltaic power systems, Littelfuse understands the global challenges of the solar market. Littelfuse offers numerous circuit-protection products that are uniquely suited to protect the equipment and systems subject to the harsh environments of standard photovoltaic installations.

Look for this logo to indicate products that are used in solar applications. Visit our website **Littelfuse.com/Solar** for the latest updates on approvals, certifications, and new products.

Solar Products
TABLE OF CONTENTS

1500 V dc • 1–60 A

Description

The Littelfuse SPXV solar string fuse has been specifically designed for the protection of photovoltaic (PV) systems.

It is available in multiple ampere ratings to match various requirements in a range of applications.

Features/Benefits

- Offers higher amperage protection in less space for increased design flexibility
- Full range, fast-acting fuse helps eliminate common low-overload faults
- Up to 50,000 A interrupting rating

Applications

- Inverters
- Combiner boxes

Recommended Accessories

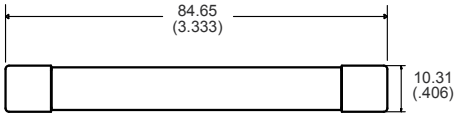
Fuse Holder: LFPXV Series 1500 V dc
Fuse Clips: 125004/125005

Web Resources

Download technical resources at: **Littelfuse.com/spxv**

SPXV-M Dimensions mm (in)

25 – 32 A



Specifications

Voltage Rating	1500 V dc
Amperage Rating	1, 2, 2.25, 2.5, 3, 3.5, 4, 5, 6, 8, 10, 12, 15, 16, 20, 25, 30, 32 35, 40, 45, 50, 55, 60 A
Interrupting Rating	SPXV 1 A-30 A: 30 kA (50 kA Self-Certified) SPXV 35 A-60 A: 50 kA SPXV-M 25 A-32 A: 50 kA
Time Constant	≤ 1ms
Material	Body: melamine Caps: copper alloy (nickel plated)
Approvals	UL 248-19 Listed (File: E339112)
Applicable Standards	UL 248-1, 248-19 IEC 60269-6*
Environmental	RoHS Compliant REACH
Country of Origin	Mexico

*SPXV 25 and 30 amp fuses meet electrical performance only.

Part Numbering System

SPXV xxx T –

Series

Ampere Code
Refer to Ampere Code Column in Ordering Information Table

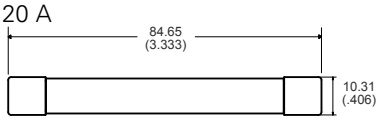
Options
Blank = 1–20 A 10 x 85 mm
25–30 A 14 x 85 mm
35–60 A 20 x 127 mm
XM = 25–32 A 10 x 85 mm

Package Quantity
T = 10
L = 50

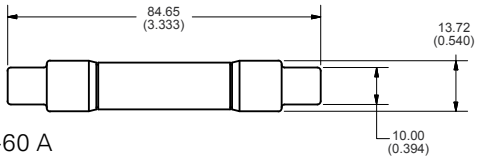
SERIES	AMPERAGE	PACKAGE QUANTITY	CATALOG NUMBER	ORDERING NUMBER
SPXV	6	10	SPXV006	SPXV006.T
SPXV	20	50	SPXV020	SPXV020.L
SPXV	32	10	SPXV032-M	SPXV032.TXM
SPXV	60	10	SPXV060	SPXV060.T

SPXV Dimensions mm (in)

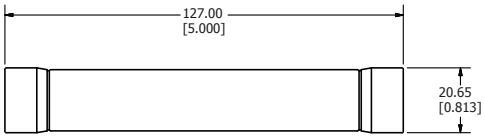
1 – 20 A



25 – 30 A



35–60 A



1500 V dc • 1–60 A

Description

The Littelfuse SPXI solar fuse is specifically designed for the protection of photovoltaic (PV) systems. It integrates into an in-line assembly within a wire harness and can be electrically insulted by either overmolding or using heat-shrink.

Littelfuse offers multiple ampere ratings to match specific requirements in a variety of applications.

Features/Benefits

- Offers higher amperage protection in less space for increased design flexibility
- One-piece cap design, without joints, offers easier wire crimping and more streamlined molding
- No fuse holder required helps save space, time, and money
- 50,000 A interrupting rating

Applications

- Photovoltaic high-capacity homerun, trunk harness, and wire harness

Recommended Crimping Tool

10-12 AWG: T&B Sta-Kon ERG4002
8 AWG: T&B Sta-Kon ERG4
6 AWG: Burndy MRC840AL

Specifications

Voltage Rating	1500 V dc
Amperage Rating	1, 2, 2.25, 2.5, 3.5, 4, 4.5, 5, 6, 8, 10, 12, 15, 16, 20, 25, 30, 32, 35, 40, 45, 50, 55, 60 A
Interrupting Ratings	SPXI 1-30 A and SPXI-B 1-20 A: 30 kA SPXI 35-50 A and SPXI-B 35-60 A: 50 kA SPXI-M and SPXI-BM 25-32A: 50 kA
Time Constant	≤ 1ms
Material	Body: melamine Caps: copper alloy (nickel plated)
Approvals	UL Recognized (File: E339112)
Applicable Standards	UL 248-1, 248-19 IEC 60269-6 (electrically only)
Environmental	RoHS Compliant REACH
Country of Origin	Mexico
US Patent	9,564,281

Part Numbering System

SPXI xxx T XB

Series

Ampere Code
Refer to Ampere Code Column in Ordering Information Table

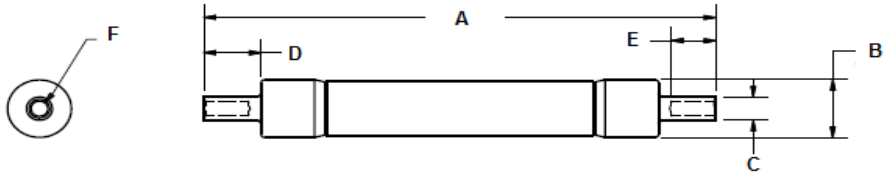
Options
Refer to Ordering Number column in Ordering Information table

Package Quantity
T = 10
L = 50

Web Resources

Download additional technical information and view the complete solar portfolio: **Littelfuse.com/spxi**

Dimensions



SERIES	AMPS	DIMENSIONS IN MM (INCHES)						WIRE RANGE
		A	B	C	D	E	F	
SPXI	2.5–4	81.41 (3.205)	10.31 (0.406)	5.59 (0.22)	12.26 (0.483)	9.53 (0.375)	3.56 (0.14)	10-12 AWG (6-4 mm^2)
	4.5–20	110.06 (4.333)	10.31 (0.406)	5.59 (0.22)	12.26 (0.483)	9.53 (0.375)	3.56 (0.014)	10-12 AWG (6-4 mm^2)
	25–30	110.06 (4.333)	13.72 (0.54)	5.59 (0.22)	12.26 (0.483)	9.53 (0.375)	3.56 (0.014)	10-12 AWG (6-4 mm^2)
	35–50	158.04 (6.222)	20.65 (0.813)	6.7 (0.264)	14.25 (0.561)	10.25 (0.404)	4.7 (0.185)	8 AWG (10mm^2)
SPXI-B	2.5–4	85.4 (3.362)	10.31 (0.406)	6.7 (0.264)	14.25 (0.561)	10.25 (0.404)	4.7 (0.185)	8 AWG (10mm^2)
	4.5–20	114.05 (4.49)	10.31 (0.406)	6.7 (0.264)	14.25 (0.561)	10.25 (0.404)	4.7 (0.185)	8 AWG (10mm^2)
	35–60	163.58 (6.44)	20.65 (0.813)	8.5 (0.335)	17.02 (0.67)	13.72 (0.54)	5.5 (0.217)	6 AWG
SPXI-M	25–32	110.06 (4.333)	10.31 (0.406)	5.59 (0.22)	12.26 (0.483)	9.53 (0.375)	3.56 (0.014)	10-12 AWG (6-4 mm^2)
SPXI-BM	25–32	114.05 (4.49)	10.31 (0.406)	6.7 (0.264)	14.25 (0.561)	10.25 (0.404)	4.7 (0.185)	8 AWG (10mm^2)

1500 V dc • 50-400 A • NH Style

Specifications

Voltage Rating	1500 V dc
Amperage Rating	50, 63, 80, 100, 125, 160, 200, 250, 315, 350, 400
Interrupting Rating	30 kA
Time Constant	≤ 2 ms
Material	Body: Ceramic End Bells: Copper Alloy
Approvals	UL 248-19 Listed (File: E339112, Vol. 4) IEC 60269-6
Environmental	RoHS Compliant

Part Numbering System

SPNH XXX .X X DL

Series

Amp Code
Refer to Amp Code Column in Electrical Specifications Table

Package Quantity
X = 1

Case Size*
X = 1XL size
2XL = 2XL size
3L = 3L size

Termination*
Blank = Solid Blade
DL = S Blade
DE = U blade
DLMS= S Blade w/ Microswitch tab
DEMS= U Blade w/ Microswitch tab

Description

The SPNH series has been designed to meet the emerging circuit protection needs for 1500 volt photovoltaic (PV) systems. These fuses provide full range protection for all potential overcurrent conditions that exist in PV applications. Suitable for PV inverter protection and array combiner applications.

Features/Benefits

- Meets UL and IEC photovoltaic standards
- Compact NH XL Sizes
- Low watt Loss Design
- 1500 V dc rating for emerging market needs
- Designed to protect against a full range of overcurrents

Applications

- Inverters
- Re-combiner boxes
- Array/re-combiner application
- PV inverter dc input protection

Web Resources

Download technical documents: **Littelfuse.com/spnh**

SERIES	AMPERAGE	PACKAGE QUANTITY	CATALOG NUMBER	ORDERING NUMBER
SPNH	50	1	SPNH050	SPNH050.X
SPNH	200	1	SPNH200	SPNH200.X
SPNH	400	1	SPNH400	SPNH400.XXDLMS

*Solid blade option for 1XL case size does not require a case or termination designator for the part number.

Recommended Accessories

1XL Case Size
Fuse Holder: LFNH152001CST
Fuse Terminial Covers: LFNH15200FBC

2XL Case Size
Fuse Holder: LFNH154001CST
Fuse Terminial Covers: LFNH15400FBC

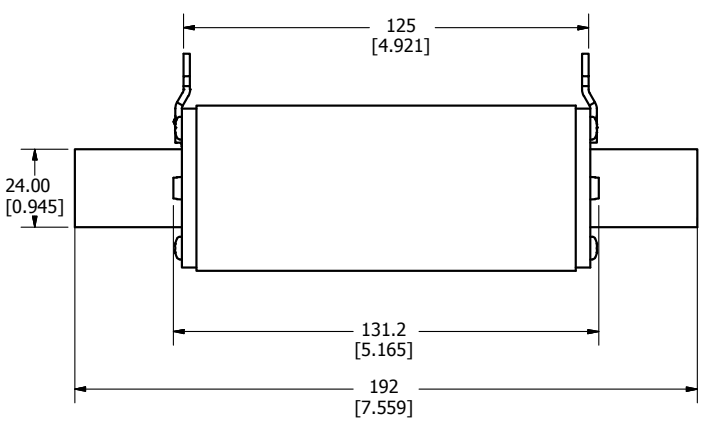
3L Case Size
Fuse Holder: LFNH156301CST
Fuse Terminial Covers: LFNH15630FBC

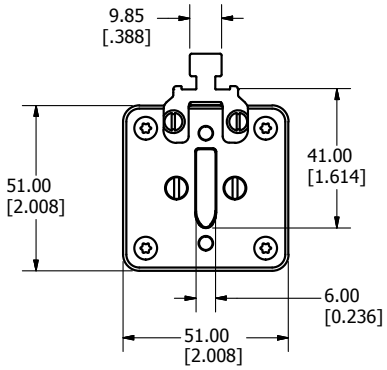
Microswitch
MSSPNH1500X

1

Dimensions Millimeters (in)

Size: 1 XL

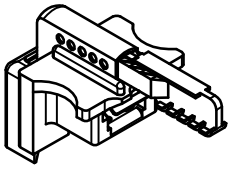


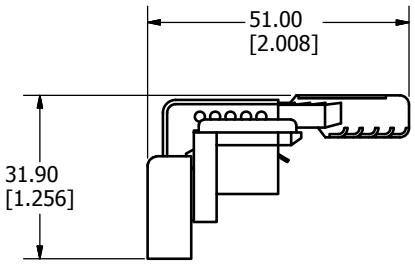


Microswitch

MSSPNH1500X

Dimensions Millimeters (in)





1500 V • 30 A

Specifications

Voltage Ratings	1500 V dc
Amperage Rating	30 A UL, 32 A Littelfuse self-certified
SCCR Rating	50 kA
Power Dissipation	8W maximum
Fuse Type	10 x 85 mm
Material	Thermoplastic Fuse Clip: Silver-plated copper alloy Screws: Zinc-plated steel
Operating Temperature	-55 °C to +125 °C
Flammability Rating	UL94 V-0
Temperature Stability	Body: 130 °C Carrier: 140 °C
Approvals	UL 4248-19 Listed (File: E345481) IEC 60269-6
Environmental	RoHS compliant, Lead (Pb) free, REACH
Recommended DIN Rail	TH 35-7,5 per IEC 60715

Description

The Littelfuse LFPXV fuse holder is designed to hold 1500 V 10x85 mm fuses.

Features/Benefits

- Finger-safe design offers personnel protection
- No fuse pullers or tools required for fuse removal
- 35 mm DIN-rail mountable
- Evaluated for use with copper alloy busbars
- Compact design

Recommended Fuses

Littelfuse SPXV/SPXV-S Fuses

Web Resources

Download the complete datasheet and other technical documents: **Littelfuse.com/LFPXV**

MATERIAL AND TEMP RATING	WIRE TYPE
75 °C or 90 °C CU Only Stranded	UL Class B and Class C wire
	AlphaWire PV Series Photovoltaic Wire
	IEC Class 5 Flexible Wire

BUSBAR SPECIFICATIONS			
TERMINAL	THICKNESS	WIDTH	TORQUE
Maximum	0.188 in (4.78 mm)	0.290 in (7.37 mm)	24-28 lb-in (2.71-3.16 N-m)
Minimum	0.125 in (3.18 mm)	0.200 in (5.08 mm)	

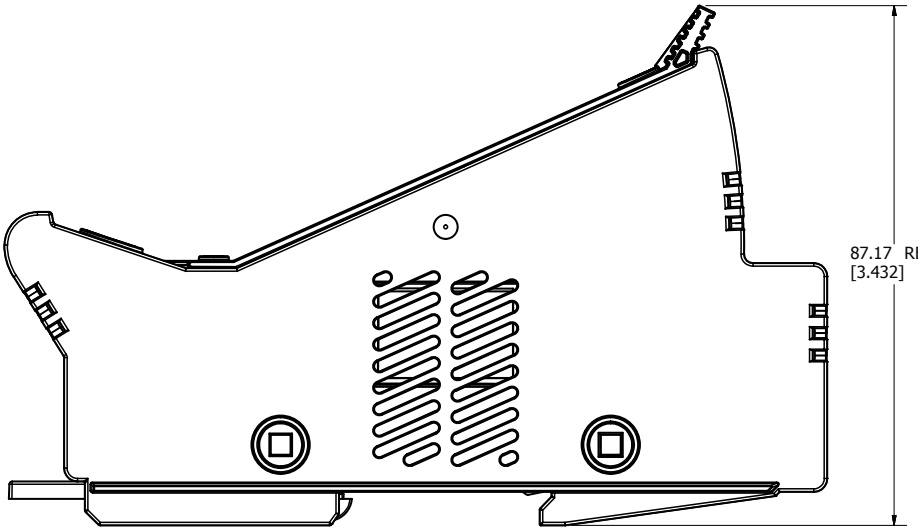
Ordering Information

SERIES	VOLTAGE (V dc)	POLES	CATALOG NUMBER	ORDERING NUMBER	PACK QTY	TERMINAL INFORMATION			
						TERMINAL TYPE	NUMBER OF WIRES	WIRE SIZE	TORQUE
LFPXV	1500	1	LFPXV001	LFPXV0001Z	20	Box Lug	1	4-14 AWG (25-2.5 mm²)	24-28 lb-in (2.71-3.16 N-m)
							1	16-18 AWG (1.5-0.75 mm²)	18-22 lb-in (2.03-2.49 N-m)
							2*	6-14 AWG (16-2.5 mm²)	26-30 lb-in (2.94-3.69 N-m)
							2*	16-18 AWG (1.5-0.75 mm²)	20-24 lb-in (2.26-2.71 N-m)

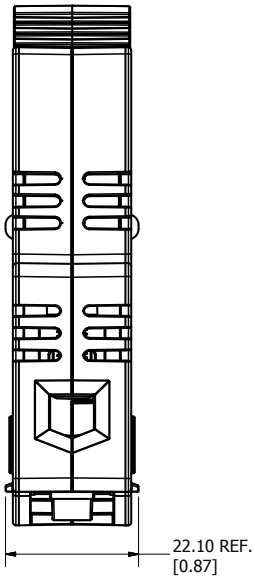
*Must be the same cross-sectioned size

1

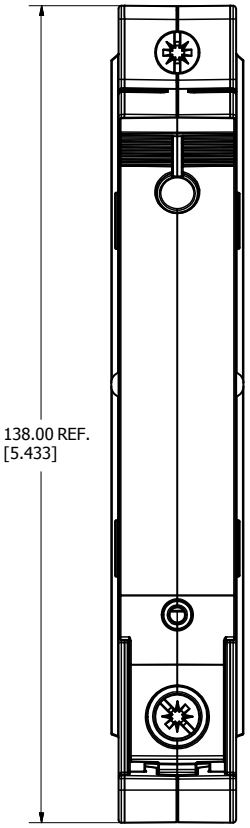
Dimensions Millimeters (in)



Side View



Top View



Front View

Description

The LFNH series fuse block is specifically designed for the Littelfuse SPNH 1500 V solar fuse. It meets UL electrical requirements, is available in multiple case sizes and has an optional cover to enclose the lugs.

Features/Benefits

- Narrow width increases space savings
- Range of amperages to match all SPNH fuse options

Specifications

Voltage Rating	1500 V dc
Ampere Rating	200, 400, 630 A
Interrupt Rating	30 kA
Termination Type	Stud Mount
Base Temp Rating	
Approvals	UL4248-1 UL4248-19 FILE: E345481 Vol. 2
Environmental	RoHS Compliant
Material	Fuse Clip: Silver-Plated Copper Spring: Zinc-Plated Steel Mounting Plate: Zinc-Plated Steel Insulator: Ceramic

Recommended Fuses

SPNH Series

Web Resources

For sample requests, downloadable CAD drawings, dimensions and other technical information:
Littelfuse.com/LFNH

For a comprehensive overview of solar market solutions, visit:
Littelfuse.com/solar

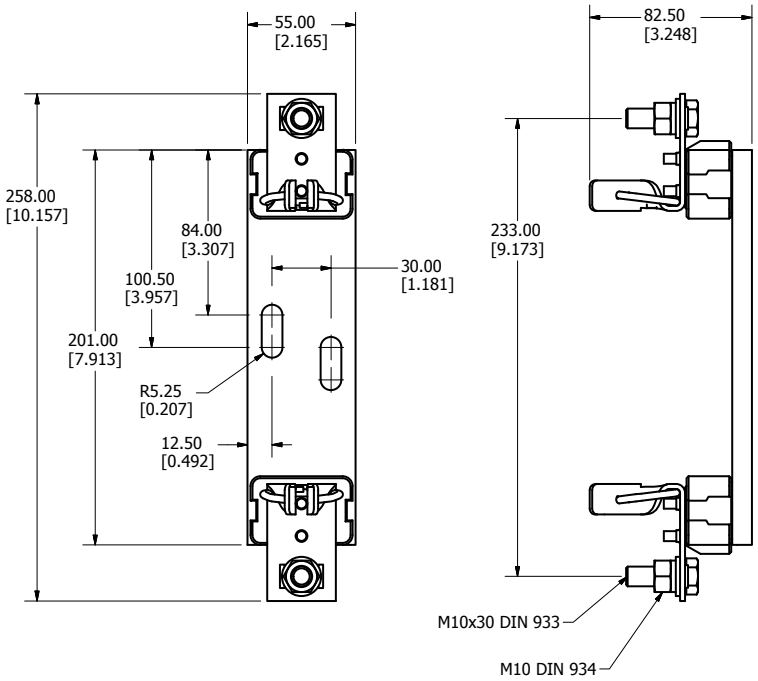
Ordering Information

AMPERAGE	ORDERING NUMBER	FUSE SIZE	RECOMMENDED TORQUE		TERMINAL COVER ORDERING NUMBER*
			TERMINAL	BASE	
200	LFNH152001CST	NH1XL	283 in-lb (32 N-m)	132 in-lb (15 N-m)	LFNH15200FBC
400	LFNH154001CST	NH2XL	283 in-lb (32 N-m)	132 in-lb (15 N-m)	LFNH15400FBC
630	LFNH156301CST	NH3L	283 in-lb (32 N-m)	132 in-lb (15 N-m)	LFNH15630FBC

*Terminal covers sold separately

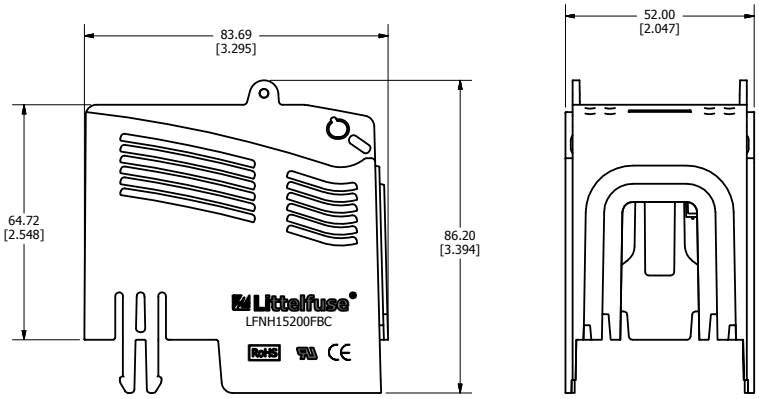
1

Dimensions Millimeters (in)



Fuse Block

LFNH152001CST



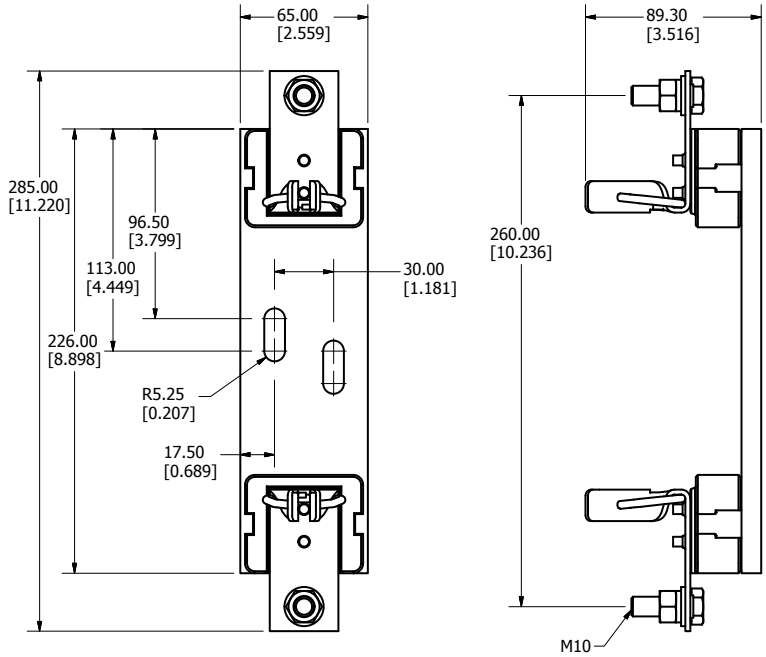
Fuse Terminal Cover

LFNH15200FBC

Specifications

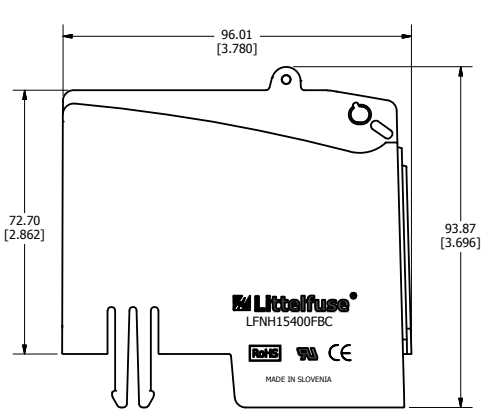
Voltage Rating:	1500 V
Ampere Rating:	200 amperes
Flammability Rating:	UL 94 V-0
Material:	V0-rated Nylon
Packaging:	Sold in pairs

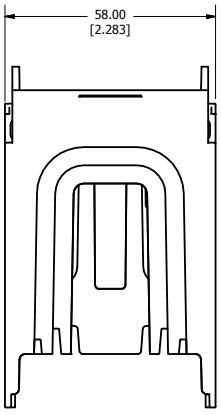
Dimensions Millimeters (in)



Fuse Block

LFNH154001CST





Fuse Terminal Cover

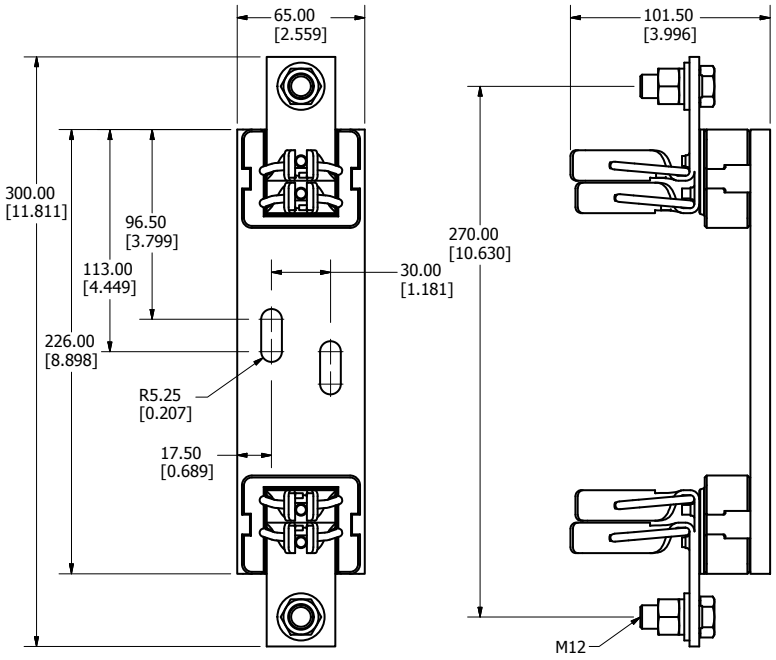
LFNH15400FBC

Specifications

Voltage Rating:	1500 V
Ampere Rating:	400 amperes
Flammability Rating:	UL 94 V-0
Material:	V0-rated Nylon
Packaging:	Sold in pairs

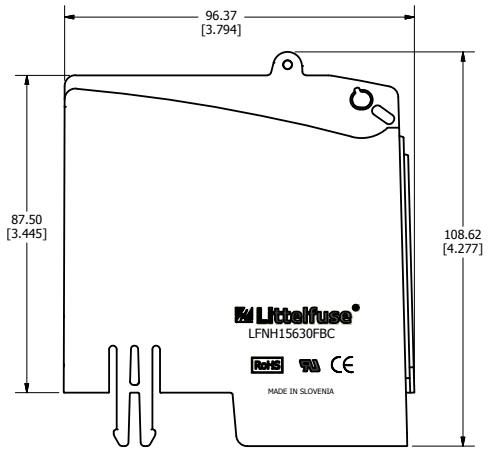
1

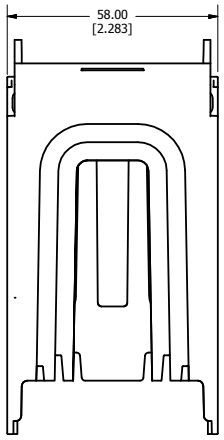
Dimensions Millimeters (in)



Fuse Block

LFNH156301CST





Fuse Terminal Cover

LFNH15630FBC

Specifications

Voltage Rating:	1500 V
Ampere Rating:	630 amperes
Flammability Rating:	UL 94 V-0
Material:	V0-rated Nylon
Packaging:	Sold in pairs

1000 V dc • 70–450 A

Description

The SPFJ series is the smallest 1000 V dc 70-450 A photovoltaic (PV) fuse available in the market. The SPFJ series is manufactured in Class J case sizes that allows for both fuse holder and busbar mounting configuration. The SPFJ meets both UL and IEC requirements.

Features/Benefits

- Meets UL and IEC photovoltaic standards
- Small footprint reduces panel size
- Flexibility of fuse holder or busbar mounting
- Higher amperage solar fuses in standard sizes
- UL Listed branch and feeder circuit rated
- Class J case sizes for the 125-450 A ratings

Applications

- Inverters
- Re-combiner boxes

Recommended Fuse Holder

LFJ1000 Solar Series

Web Resources

Download technical documents: **Littelfuse.com/spfj**

Specifications

Voltage Rating	1000 V dc 600 V ac (125-450 A)
Amperage Rating	70, 80, 90, 100, 125, 160, 200, 250, 300, 350, 400, 450
Interrupting Rating	Ac: 200 kAIC (125-450 A) Dc: 70-200 A: 20 kAIC 250-400 A: 10 kAIC 450 A: 20 kAIC
Time Constant	≤ 1 ms
Material	Body: Melamine End Bells: Copper Alloy
Approvals	UL 248-19 Listed (File: E339112) UL 248-8, Class J (125-450 A) cULus (125-450 A) IEC 60269-6 (125-450 A)
Environmental	RoHS Compliant
Country of Origin	Mexico

Part Numbering System

SPFJ xxx X –

Series

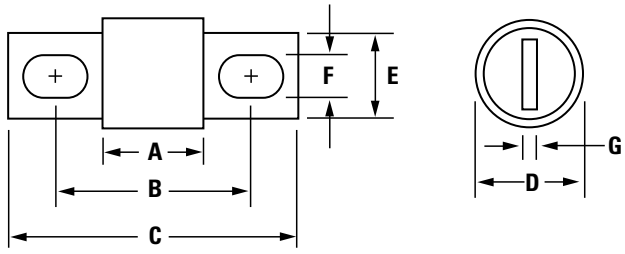
Amp Code
Refer to Amp Code Column in Electrical Specifications Table

Mounting Options
Blank = Std. Class J Dimensions
XL = 8.5mm Slot (125 - 200A Only)

Package Quantity
X = 1

SERIES	AMPERAGE	PACKAGE QUANTITY	CATALOG NUMBER	ORDERING NUMBER
SPFJ	70	1	SPFJ070	SPFJ070.X
SPFJ	200	1	SPFJ200	SPFJ200.XXL

Dimensions Inches (mm)



AMPERAGE	DIMENSIONS IN INCHES (MM)						
	A	B	C	D	E	F	G
70-100	3.02 (76.5)	4.38 (111.3)	5.75 (146.1)	1.5 (38.1)	1.125 (28.3)	.335 (8.5)	.189 (4.8)
125-200	3.02 (76.5)	4.38 (111.3)	5.75 (146.1)	1.5 (38.1)	1.125 (28.3)	.281 (7.1)*	.189 (4.8)
250-400	3.37 (85.7)	5.25 (133.4)	7.125 (181.0)	2.0 (50.8)	1.63 (41.3)	.406 (10.3)	.252 (6.4)
450	3.75 (95.3)	5.98 (152.0)	8.0 (203.2)	2.5 (63.5)	2.0 (50.8)	.531 (13.5)	.374 (9.5)

* SPFJ L option = 8.5 mm (UL 248-19 approval only)

1000 V dc • 1–30 A

Specifications

Voltage Rating	1000 V dc
Amperage Rating	1, 2, 3, 3.5, 4, 5, 6, 8, 10, 12, 15, 20, 25, 30
Max. Interrupting Rating	20 kA - 1 A - 20 A 50 kA - 25 A - 30 A
Time Constant	≤ 2 ms
Material	Body: Melamine Caps: Copper Alloy
Approvals	UL 248-19 Listed (File: E339112) IEC 60269-6 (1-30 A) CSA Certified (File: 029862_0_000)
Environmental	RoHS Compliant
Country of Origin	Mexico

Description

The SPF Solar Protection Fuse series has been specifically designed for the protection of photovoltaic (PV) systems. This family of midget-style fuses (10 x 38 mm) can safely protect PV modules and conductors from reverse-overcurrent conditions.

As PV systems have grown in size, so have the corresponding voltage requirements. This increase in system voltage has typically been intended to minimize power loss associated with long conductor runs. Standard circuit protection devices are not designed to completely protect photovoltaic panels. However, the SPF series is UL Listed to safely interrupt faulted circuits up to this demanding voltage level.

Littelfuse offers 14 ampere ratings to match specific requirements in a variety of applications.

Features/Benefits

- Meets UL and IEC photovoltaic standards
- UL 248-19 Listed 1000 V dc maximum
- 1-30 A ratings available
- 20,000 A Interrupting Rating - 1 A - 20 A
- 50,000 A Interrupting Rating - 25 A - 30 A
- Both PCB mount and dead-front holder options available

Applications

- Inverters
- Combiner boxes
- Battery charge controllers

Recommended Accessories

Fuse Holder: LPHV 1000 V dc POWR-Safe Series
Fuse Clips: 125004/125005

Web Resources

Download technical documents: **littelfuse.com/spf**

Part Numbering System

0SPF xxxx H XR

Series

Amp Code
Refer to datasheet for amp code

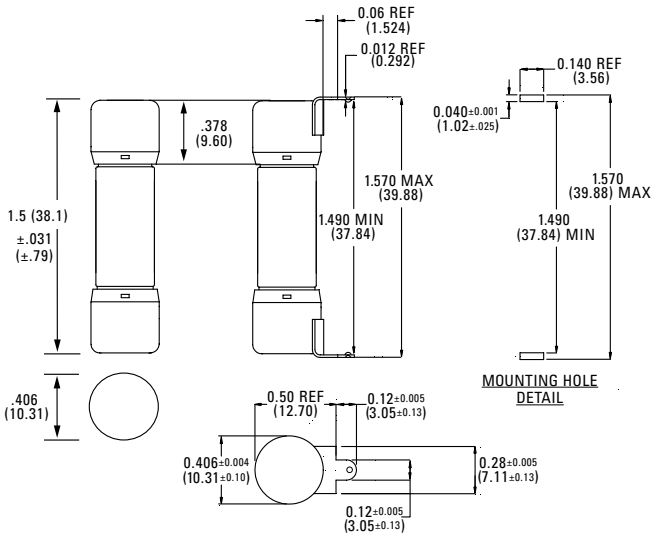
Mounting Options
Blank = Ferrule
XR = PCB

Package Quantity
T = 10
H = 100

SERIES	AMPERAGE	PACKAGE QUANTITY	MOUNTING METHOD	CATALOG NUMBER	ORDERING NUMBER
SPF	2	10	FERRULE	SPF002	0SPF002.T
SPF	3.5	10	FERRULE	SPF03.5	0SPF03.5T
SPF	30	100	PCB TABS	SPF030R	0SPF030.HXR

Dimensions Inches (mm)

Ferrule Version **PCB Version**



1000 V dc • 2–30 A

Description

The Littelfuse SPFI solar fuse is designed to integrate into an in-line assembly within a wire harness. The fuse provides photovoltaic (PV) protection that meets UL 248-19 for photovoltaic applications. The SPFI can be electrically insulated by either overmolding or using approved heat-shrink.

Features/Benefits

- UL 248-19 Recognized
- Meets IEC 60269-6 electrical performance requirements
- 20,000 A Interrupting Rating
- No fuse holder required

Applications

- Photovoltaic wire harnes

Specifications

Voltage Rating	1000 V dc
Amperage Rating	2, 2.5, 3, 3.5, 4, 5, 6, 8, 10, 12, 15, 20, 25, 30 A
Interrupting Rating	20 kA
Time Constant	≤ 1 ms
Material	Body: Melamine Caps: Copper Alloy (Nickel Plated)
Approvals	UL 2579 Recognized (File: E339112)
Environmental	RoHS Compliant REACH
Country of Origin	Mexico
US Patent	9,564,281

Part Numbering System

SPFI xxx T

Series

Amp Code
Refer to datasheet for amp code

Package Quantity
T = 10
L = 50

SERIES	AMPERAGE	PACKAGE QUANTITY	CATALOG NUMBER	ORDERING NUMBER
SPFI	2	10	SPFI002	SPFI002.T
SPFI	3.5	10	SPFI03.5	SPFI03.5T
SPFI	20	50	SPFI020	SPFI020.L

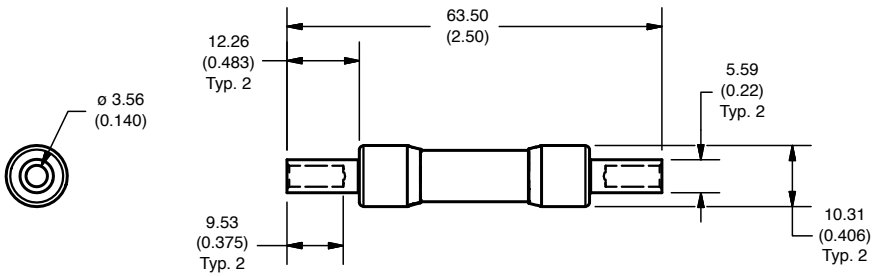
Web Resources

Downloadable CAD drawings and other technical information:
littelfuse.com/spfi

Recommended Crimping Tool

T&B Sta-Kon ERG4002

Dimensions mm (in)



1000 V dc • Clip-to-Box • Stud-to-Stud • Clip-to-Stud

Clip-to-Box Stud-to-Stud Clip-to-Stud

Description

The LFJ1000 series fuse block is specifically designed for the Littelfuse SPFJ 1000 V Solar Fuse. It meets UL electrical requirements, is available in multiple amperages, and comes in a variety of fuse mounting and termination configuration: fuse clip to box lug, fuse stud to wire stud and fuse clip to wire stud.

Features/Benefits

- Narrow width increases space savings
- Range of amperages to match all SPFJ fuse options
- Box lug termination style accommodates a wide range of cable sizes
- Stud-mounted option increases convenience
- Approval for use with copper or aluminum lugs allowing for design flexibility

Specifications

Voltage Rating	1000 V dc
Ampere Rating	200, 400, 450 A
Flammability Rating	UL 94 V-0
Termination Type	Box Lug or Stud Mount
Base Temp Rating	130 °C
Approvals	UL 4248-18 Listed File: E345481 Vol. 1
Environmental	RoHS Compliant

Recommended Fuses

SPFJ Solar Series

Web Resources

Sample requests, downloadable CAD drawings, dimensions and other technical information:
Littelfuse.com/LFJ1000

For a comprehensive overview of solar market solutions visit:
Littelfuse.com/solar

Ordering Information

(Clip-to-Box Lug 1000 V)

AMPERAGE	ORDERING NUMBER	INTERRUPT RATING	WIRE RANGE STANDARD (METRIC)	WIRE TYPE		RECOMMENDED TORQUE
200	LFJ102001C	20 kA	250 kcmil - #6 (127 mm² - 16 mm²)	Cu/Al	Solid/ Stranded	275 in-lb (31.1 N-m)
400	LFJ104001C	10 kA	350 kcmil - 1/0 (177 mm² - 55 mm²)			275 in-lb (31.1 N-m)
450	LFJ104501C	20 kA	500 kcmil - #4 (253 mm² - 25 mm²)			375 in-lb (42.4 N-m)

(Stud-to-Stud 1000 V)

AMPERAGE	ORDERING NUMBER	INTERRUPT RATING	RECOMMENDED TORQUE		MAX. BUSBAR THICKNESS	RECOMMENDED BASE TORQUE	
			FUSE	TERMINAL		BOLT SIZE	TORQUE
200	LFJ102001STST	20 kA	65 in-lb (7.3 N-m)	200 in-lb (22.6 N-m)	.774" (19.66 mm)	1/4" 5/16"	30-40 in-lb 40-50 in-lb
400	LFJ104001STST	10 kA	170 in-lb (19.2 N-m)	200 in-lb (22.6 N-m)	.555" (14.10 mm)		
450	LFJ104501STST	20 kA	300 in-lb (33.9 N-m)	300 in-lb (33.9 N-m)	.570" (14.18 mm)		

(Clip-to-Stud 1000 V)

AMPERAGE	ORDERING NUMBER	INTERRUPT RATING	RECOMMENDED TORQUE	MAX. BUSBAR THICKNESS	RECOMMENDED BASE TORQUE	
			TERMINAL		BOLT SIZE	TORQUE
200	LFJ102001CST	20 kA	200 in-lb (22.6 N-m)	.774" (19.66 mm)	1/4" 5/16"	30-40 in-lb 40-50 in-lb
400	LFJ104001CST	10 kA	200 in-lb (22.6 N-m)	.555" (14.10 mm)		
450	LFJ104501CST	20 kA	300 in-lb (33.9 N-m)	.570" (14.18 mm)		

1000 V dc

Specifications

Voltage Rating	1000 V dc
Amperage Rating	30 A
SCCR Rating	20 kA
Power Dissipation	4 W Maximum
Fuse Type	10 X 38 mm up to 1000 V dc
Material	Thermoplastic
Flammability Rating	UL 94 V-0
Approval	Self-certified 1000 V dc IEC 60269-2, -4, -6
Environmental	RoHS compliant, Lead (Pb) Free

Description

The Littelfuse LPHV fuse holder is designed to house 1000 V fuses. It is not designed for load break but is ideal for isolating photovoltaic (PV) module strings for maintenance and meets UL requirements for 1000 V solar fuse protection.

Features/Benefits

- Touch-safe design offers protection when replacing fuses
- Compact design
- 35 mm DIN-rail mountable
- Available in 1-, 2-, 3- and 4-pole configurations
- No fuse pullers or tools required for fuse removal

Multi-Pole Assembly Kit

Kits are used to create multi-pole holders from 1-pole LPHV fuse holders. Please contact factory for more information.

ORDERING NUMBER	DESCRIPTION
CYHP001	20 Connector Pincers & 10 Handle Pins
CYHP002	Connector Pincer Only
CYHP003	Handle Pin Only

Web Resources

Sample requests, downloadable CAD drawings and other technical information: **Littelfuse.com/lphv**

More information about solar applications: **Littelfuse.com/solar**

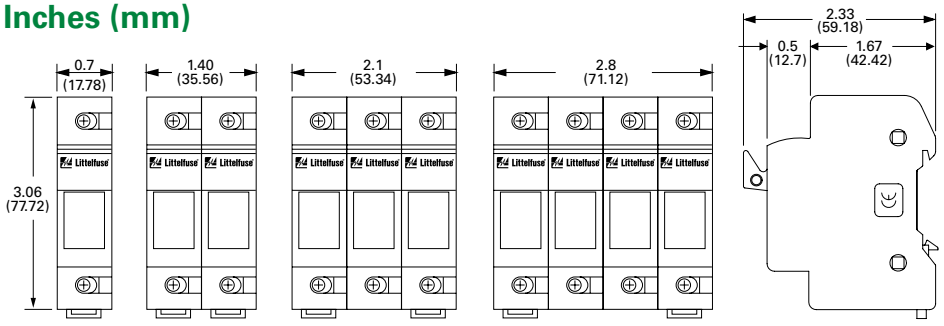
Recommended Fuses

10 x 38 mm 1000 V dc Fuses
SPF 1000 V Series
FLU 1000 V Series

Ordering Information

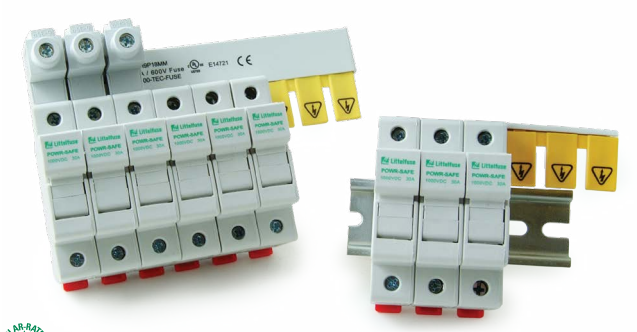
SERIES	POLES	CATALOG NUMBER	ORDERING NUMBER	TERMINAL TYPE	WIRE TYPE		WIRE RANGE	TERMINAL TORQUE	ROHS
LPHV	1	LPHV001	LPHV0001Z	Pressure Plate	75 °C or 90 °C CU Only	Stranded / [Solid]	#8-14 AWG (2-10 mm²) / [#10-14 AWG (2-6 mm²)]	17.7 in-lbs (2 N-m)	•
LPHV	2	LPHV002	LPHV0002Z						•
LPHV	3	LPHV003	LPHV0003Z						•
LPHV	4	LPHV004	LPHV0004Z						•

Dimensions Inches (mm)



Front View Side View

POWR-BAR Distribution



Description

A key objective for panel designers is safe distribution of power to multiple fuse holders in a compact design. The Littelfuse UL 508 Listed bus bar system eliminates most wire terminations in a timesaving package. A power distribution block and associated conductors are no longer needed to feed multiple POWR-safe fuse holders.

Features/Benefits

- Touch-safe design offers protection when replacing fuses
- Compact design
- 35mm DIN-rail mountable
- Available in one and three phase configurations
- Can be cut down to optimal size

Recommended Fuse Holders

Littelfuse LFPSM / LFPSC / LPSM / LPSC (600 V)
Littelfuse LPHV (1000 V)

Web Resources

Download technical documents: **Littelfuse.com/busbar**

Specifications

Voltage Ratings 600 V ac/dc
1000 V dc*

Current Ratings

CROSS SECTION (mm^2)	18 mm^2	25 mm^2
END FED	80 A	100 A
CENTER FED	160 A	200 A

SCCR 10 kA, 100 kA†
Conductor Copper
Pitch 17.8 mm
Approvals UL 508 Listed (File E328654)
Environmental RoHS Compliant
Lead (Pb) free

*1 Phase 18 mm^2 rated 1000 V dc up to 160 A when center fed
1 Phase 25 mm^2 rated 1000 V dc up to 200 A when center fed
† When protected directly upstream by Class J 175 amperes max (18 mm^2 bus bar) and Class J 200 amperes max (25 mm^2 bus bar).

Ordering Information

1 PHASE, 18 mm^2		LENGTH (mm)	1 PHASE, 25 mm^2		LENGTH (mm)
ORDERING NUMBER	POLES		ORDERING NUMBER	POLES	
1PH3P18mm	3	50	1PH3P25mm	3	50
1PH4P18mm	4	79	1PH4P25mm	4	79
1PH6P18mm	6	104	1PH6P25mm	6	104
1PH9P18mm	9	155	1PH9P25mm	9	155
1PH12P18mm	12	208	1PH12P25mm	12	208
1PH15P18mm	15	270	1PH15P25mm	15	270
1PH57P18mm	57	1009	1PH57P25mm	57	1009

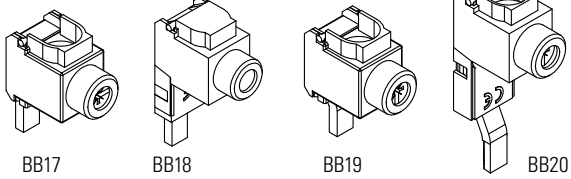
3 PHASE, 18 mm^2		LENGTH (mm)	3 PHASE, 25 mm^2		LENGTH (mm)
ORDERING NUMBER	POLES		ORDERING NUMBER	POLES	
3PH6P18 mm	6	104	3PH6P25 mm	6	104
3PH9P18 mm	6	158	3PH9P25 mm	9	158
3PH12P18 mm	12	214	3PH12P25 mm	12	214
3PH15P18 mm	15	266	3PH15P25 mm	15	266
3PH57P18 mm	57	1009	3PH57P25 mm	57	1009

Endcaps are standard with all 3 phase configurations except 57-pole.
Endcaps are not needed for the 1 phase configurations from the factory or if the copper bus is trimmed per the supplied instructions.
Power feed lugs and protective covers are extra.

Accessories

Power Feed Lug

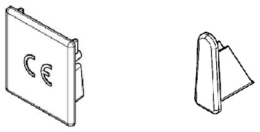
PART NUMBER	AMPERAGE RATING	VOLTAGE (ac/ dc)	WIRE RANGE	WIRE TYPE	TORQUE
BB17	115	1000	#10 - 1/0 AWG	CU	50 lb-in
BB18	115	1000	#10 - 1/0 AWG	CU	50 lb-in
BB19	115	1000	#10 - 1/0 AWG	CU	50 lb-in
BB20	115	1000	#10 - 1/0 AWG	CU	50 lb-in



BB17 BB18 BB19 BB20

Endcaps

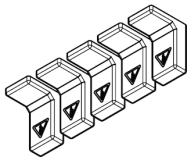
PART NUMBER	PHASE	QUANTITY
EDCP42	Single	50
EDCP7	Three	50



EDCP7 EDCP42

Pole Protective Covers

PART NUMBER	QUANTITY
CTPT5	5

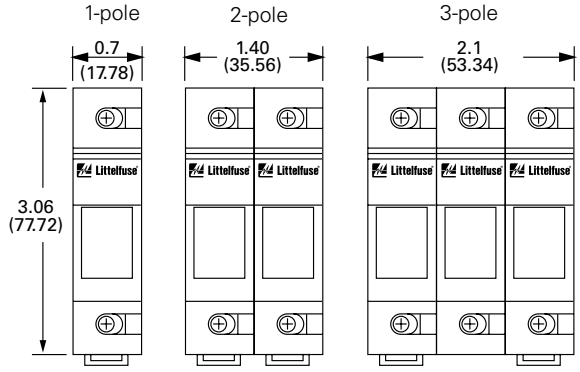


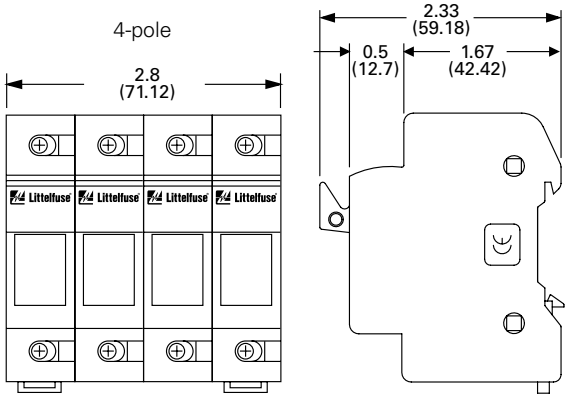
600 V

Description

Littelfuse POWR-Safe dead front holders provide optimum protection to personnel for Class CC and midget-style fuses.

Dimensions Inches (mm)





Features/Benefits

- Indicating and non-indicating options available
- 1-, 2-, 3- and 4-pole configurations
- Easy installation and fuse removal with no additional pullers or tools required
- 35 mm DIN-rail mountable
- Ventilated design for cooler operation

Specifications

Voltage Rating	600 V ac/dc
Ampere Rating	30 A
Interrupting Rating	200 kA (Class CC) 100 kA (midget)
Terminal Type	Pressure plate
Suggested Torque	17.7 in–lbs
Wire Range	#8–#14 CU
Material	Thermoplastic
Flammability Rating	UL 94 V-0
Approvals	UL Listed (LPSC File: E14721) UL Recognized (LPSM File: E14721) CSA Certified (LPSC/LPSM File: LR7316)
Environmental	RoHS compliant, Lead (Pb) Free

Ordering Information

INDICATING		NON-INDICATING		FUSE TYPE	POLES
CATALOG NUMBER	ORDERING NUMBER	CATALOG NUMBER	ORDERING NUMBER		
LPSC001ID	LPSC0001ZXID	LPSC001	LPSC0001Z	Class CC	1
LPSC002ID	LPSC0002ZXID	LPSC002	LPSC0002Z	Class CC	2
LPSC003ID	LPSC0003ZXID	LPSC003	LPSC0003Z	Class CC	3
LPSC004ID	LPSC0004ZXID	LPSC004	LPSC0004Z	Class CC	4
LPSM001ID	LPSM0001ZXID	LPSM001	LPSM0001Z	Midget	1
LPSM002ID	LPSM0002ZXID	LPSM002	LPSM0002Z	Midget	2
LPSM003ID	LPSM0003ZXID	LPSM003	LPSM0003Z	Midget	3
LPSM004ID	LPSM0004ZXID	LPSM004	LPSM0004Z	Midget	4

Multi Pole Assembly Kit Ordering No. CYHP0001Z-KIT
(Kit contains 20 connector pincers & 10 handle pins)

Web Resources

Download CAD drawings and other technical information:
littelfuse.com/lpsc
littelfuse.com/lpsm

Recommended Fuses

Class CC
Midget-style (10 x 38 mm)

600 V ac/V dc • 1/10–30 A • Fast Acting

Description

The KLKD fuse series is fast-acting with a high dc voltage rating. This family of midget-style fuses (10 x 38 mm) is used in solar combiner boxes and in circuits with dc fault currents up to 50,000 amperes. KLKD fuses are available in standard and board-mount configurations.

In addition, the KLKD series has been designed to meet both the UL and IEC photovoltaic (PV) fuse standards.

Littelfuse offers a wide range of ampere ratings to match specific requirements in a variety of applications.

Features/Benefits

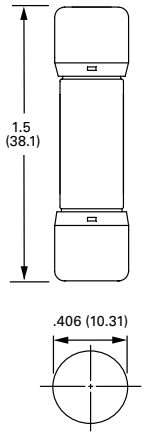
- Designed to UL and IEC photovoltaic specifications
- 1/10 - 30 A ratings available
- 50,000 A Interrupting Rating
- Available in ferrule or PCB mount options
- 1-5 A meets UL 1741 GFDI requirements

Applications

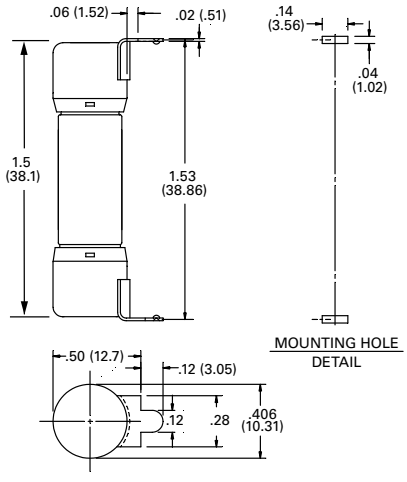
- Combiner boxes and inverters
- Power supplies
- Desktop meters

Dimensions Inches (mm)

Ferrule Version



PCB 1-Tab



Specifications

Voltage Rating	600 V ac/V dc
Amperage Rating	1/10, 1/8, 2/10, 1/4, 3/10, 1/2, 3/4, 1, 1 1/2, 2, 2 1/2, 3, 3 1/2, 4, 5, 6, 7, 8, 9,10, 12, 15, 20, 25, 30
Interrupting Ratings	AC: 100 kA 200 kA Littelfuse self-certified DC: 1/10-30: 10 kA (UL 2579) 1/10-30: 50 kA (UL 248-14)
Material	Body: Melamine / Caps: Copper Alloy
Operating Temperature	See rerating curve
Approvals	UL 2579 Listed (File: E339112) IEC 60269-6 (2-25 A) VDE Certified (No. 40033094) UL 248-14 Listed (File: E10480) CSA Certified Ferrule only (File: LR29862)
Environmental	RoHS Compliant
Country of Origin	Mexico

Part Numbering System

KLKD xxx H XR

Series

Amp Code
Refer to datasheet for amp code

Mounting Options
Blank = Ferrule
XR = PCB 1-tab

Package Quantity
T = 10
H = 100

SERIES	AMPERAGE	PACKAGE QUANTITY	MOUNTING METHOD	CATALOG NUMBER	ORDERING NUMBER
KLKD	1/8	10	FERRULE	KLKD.125	KLKD.125T
KLKD	5	100	FERRULE	KLKD005	KLKD005.H
KLKD	15	10	PCB 1-TAB	KLKD015R	KLKD015.TXR

Recommended Fuse Holders

Littelfuse LPSM and LFPSM dead-front series
Littelfuse L60030M open-face series

Web Resources

Download CAD drawings and other technical information:
littelfuse.com/klkd

Distribution Blocks • Splicer Blocks • Covers

Description

POWR-BLOKS power distribution blocks offer a safe, convenient way of splicing cables, providing a fixed junction tap-off point or splitting primary power into secondary circuits. Lx2xxx-DIN series offers integral DIN-rail mount and an optional hinged safety cover.

Optional power distribution block covers provide protection against accidental shorting between poles caused by loose wires, tools, or other conductive material. They also protect personnel from accidentally contacting energized connectors.

Applications

Typical applications include heating, air conditioning and refrigeration systems, elevator systems, material handling equipment, control panels, motor controls, switchgear, and anywhere power needs to be distributed to more than one load.

Connectors

Box lug connectors are designed for use with a single or multiple, solid or class B or C stranded conductor. For UL approved use of more than one conductor per connector opening, contact Littelfuse Technical Service. Manufacturers of cable terminations can furnish crimp-on sleeves for fine stranded conductors which permit these conductors to be used with box lugs.

Ampere Ratings

The ampere rating per pole for power distribution blocks is based on the line ampacity of 75 °C insulated conductors per NEC* Table 310.16. If 60 °C insulated conductors are used, load must not exceed the ampacity of 60 °C conductors. Use of conductors rated in excess of 75 °C is permitted (for example 90 °C), however, load must not exceed the ampacity of 75 °C conductors.

Specifications

Voltage Rating	600 V
Current Rating	Based on NEC Table 310.16, using 75 °C copper wire
SCCR	Consult factory
Material	Phenolic rated at 150 °C and Thermoplastic rated at 125 °C (LD1400 and LS1300 series only)
Connector	Aluminum: Highly conductive aluminum, tin plated Copper: Highly conductive copper, tin plated
Flammability Rating	UL 94 V-0
Approvals	UL Recognized - 0LD/0LS Series (File: E171395) LFD/LFS Series (File: E309688) CSA Certified - 0LD/0LS Series (File: LR700111) LFD/LFS Series (File: 007316_0_000) UL Listed - 0LD57xxxx (File: E482231)
Environmental	RoHS compliant, Lead (Pb) free

Web Resources

For dimension, CAD and 3-D drawings, visit:
littelfuse.com/powrbloks

Hinged Plastic Covers

Clear Plastic Covers

600/1200 V • S Package • D Package • WB Package

Specifications

Voltage Rating	600 / 1200 V
Amperage Rating	S Package: 75, 100, 150, 200 D Package: 100, 150, 200, 300, 400 WB Package: 225, 300, 450, 600
Circuit Type	Half-Bridge
Approvals	UL Listed (File: E71639)
Environmental	RoHS Compliant

Description

Half-Bridge Circuit IGBT Modules offer the high efficiency and fast switching speeds of modern IGBT technology in a robust and flexible format. Used for power control applications, Littelfuse offers IGBT modules for flexible and efficient motor control and inverter applications.

Features

- Ultra low loss
- High ruggedness
- High short-circuit capability
- Positive temperature coefficient
- With fast free-wheeling diodes

Benefits

- High efficiency and switching speed
- High reliability in demanding applications
- Reduced protection needs
- Easily paralleled
- Integrated solution in compact module package

Applications

- AC motor control
- Inverter
- Motion/servo control
- Power supplies
- Photovoltaic/fuel cell

Web Resources

Download the complete datasheet and other technical information: **littelfuse.com**

Part Numbering System

M G xx xx S-B xx xx

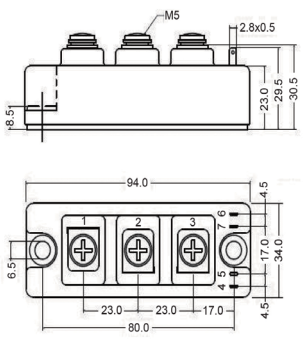
- **Product Type** — M: Power Module
- **Module Type** — G: IGBT
- **Voltage Rating** — 06: 600 V; 12: 1200 V
- **Current Rating**
- **Package Type** — "S" Package; "D" Package; "WB" Package
- **Circuit Type** — 2x (IGBT + FWD)
- **Wafer Type**
- **Assembly Site**

Ordering Information

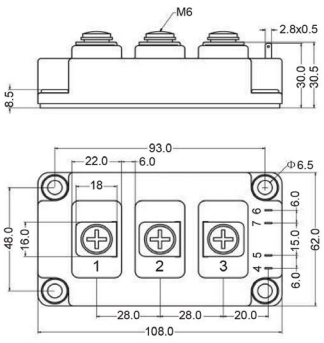
ORDERING NUMBER	VOLT	AMPERAGE	PACKAGE TYPE	MOUNTING METHOD	M.O.Q.
MG1250S-BA1MM	1200	50	S	SCREW	100
MG12100S-BN2MM	1200	100	S	SCREW	100
MG12150S-BN2MM	1200	150	S	SCREW	100
MG1275S-BA1MM	1200	75	S	SCREW	100
MG06100S-BN4MM	600	100	S	SCREW	100
MG06150S-BN4MM	600	150	S	SCREW	100
MG06300D-BN4MM	600	300	D	SCREW	60
MG06400D-BN4MM	600	400	D	SCREW	60
MG12200D-BA1MM	1200	200	D	SCREW	60
MG12300D-BA1MM	1200	300	D	SCREW	60
MG12300D-BN3MM	1200	300	D	SCREW	60
MG12400D-BN2MM	1200	400	D	SCREW	60
MG06600WB-BN4MM	600	600	WB	PRESS FIT	60
MG12225WB-BN2MM	1200	225	WB	PRESS FIT	60
MG12300WB-BN2MM	1200	300	WB	PRESS FIT	60
MG12450WB-BN2MM	1200	450	WB	PRESS FIT	60

Dimensions Inches (mm)

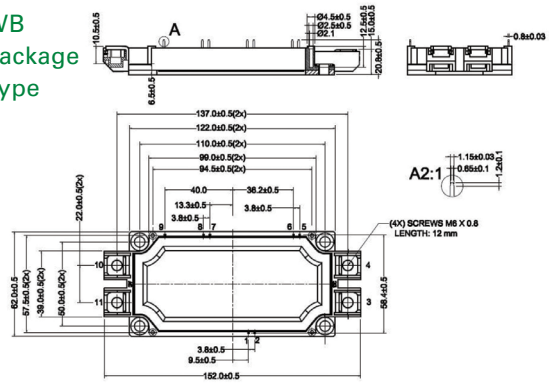
S Package Type



D Package Type



WB Package Type



RoHS HF

What Are Voltage Transients?

Voltage transients are unwanted short duration surges of electrical energy. They may result from the sudden release of previously stored energy, and can come from internal and external sources. If the voltage magnitude of the transient is large enough, circuit component damage or malfunction of the circuit may result.

Transients can occur either repeatedly or as random impulses. Repeatable transients are frequently caused by the operation of other system components, such as motors, generators or the switching of reactive circuit components. Random transients, are often caused by lightning, electrostatic discharge (ESD), and other outdoor environment events.

SOURCE	VOLTAGE	CURRENT	RISE-TIME	DURATION
Lightning	25 kV	20 kA	10 µs	50 ms
Load Switching	600 V	500 A	50 µs	500 ms
Electromagnetic Pulse (EMP)	1 kV	300 kV	20 ns	1 ms
Electrostatic Discharge (ESD)	15 kV	30 A	1–5 ns	100 ns

TVS and Solar Inverter Protection

Integration of Transient Voltage Suppression (TVS) components within solar system designs help to prevent the damaging effects of transient events and assure compliance to safety and reliability standards. Solar power inverters are vulnerable to transient voltage effects and its direct connection to other system components allows transient voltage transfer. For example:

- Lightning-induced transient events may pass through the solar array and outdoor cabling to the inverter
- Transients originating from the outside utility power grid may pass through the main circuit panel and cabling to the inverter
- Startup of motorized equipment enables vulnerabilities produced by repeated load changes
- Electrostatic discharge events generated internally and externally to the system may pass between the inverter and sensitive electronic control equipment

It is important to build surge protection in the inverter and at other locations before damaging transients may reach sensitive equipment.

4

Transient Voltage Suppression Diodes

TVS Diodes are used to protect semiconductor components from high-voltage transients. Their p-n junctions have a larger cross-sectional area than those of a normal diode, allowing them to conduct large currents to ground without sustaining damage. Littelfuse supplies TVS Diodes with peak power ratings from 200 W to 30 kW, and reverse standoff voltages from 5 V to 512 V. For more information visit **Littelfuse.com/tvsdiodes**

SERIES NAME	PHOTO	PACKAGE TYPE	REVERSE STANDOFF VOLTAGE (V_R)	PEAK PULSE POWER RANGE (P_{PP} 10/1000 µs)	PEAK PULSE CURRENT (I_{PP} 8/20 µs)	OPERATING TEMPERATURE	HF	ROHS
SURFACE MOUNT - STANDARD APPLICATION (200-5000 W)								
SMF		SOD-123	5.0-85	200 W	–	-67 °F to +302 °F (-55 °C to +150 °C)	•	•
SMAJ		DO-214AC	5.0-440	400 W	–		•	•
P4SMA		DO-214AC	5.8-468	400 W	–		•	•
SMA6J		DO-214AC	5.0-12	600 W	–		•	•
SMA6L		DO-221AC	5.0-85	600 W	–		•	•
SACB		DO-214AA	5.0-50	500 W	–		•	•
SMBJ		DO-214AA	5.0-440	600 W	–		•	•
P6SMB		DO-214AA	5.8-468	600 W	–		•	•
1KSMB		DO-214AA	5.8-153	1000 W	–		•	•
SMCJ		DO-214AB	5.0-440	1500 W	–		•	•
1.5SMC		DO-214AB	5.8-468	1500 W	–		•	•
4.0SDJ		DO-214AB	24.0	4000W	–		•	•
SMDJ		DO-214AB	5.0-220	3000 W	–		•	•
5.0SMDJ		DO-214AB	12-170	5000 W	–		•	•
AXIAL LEADED - STANDARD APPLICATION (400-5000 W)								
P4KE		DO-41	5.8-468	400 W	–	-67 °F to +347 °F (-55 °C to +175 °C)	•	•
SA		DO-15	5.0-180	500 W	–		•	•
SAC		DO-15	5.0-50	500 W	–		•	•
P6KE		DO-15	5.8-512	600 W	–		•	•
1.5KE		DO-201	5.8-512	1500 W	–		•	•
LCE		DO-201	6.5-90	1500 W	–		•	•
3KP		P600	5.0-220	3000 W	–		•	•
5KP		P600	5.0-250	5000 W	–		•	•
AXIAL LEADED - HIGH POWER (15000-30000 W; 1-15 kA)								
15KPA		P600	17-280	15000 W	–	-67 °F to +347 °F (-55 °C to +175 °C)	•	•
20KPA		P600	20-300	20000 W	–		•	•
30KPA		P600	28-288	30000 W	–		•	•
AK1		Radial Lead	76.0	–	1000 A	-67 °F to +302 °F (-55 °C to +150 °C)	•	•
AK3		Radial Lead	15-430	–	3000 A		•	•
AK6		Radial Lead	30-430	–	6000 A		•	•
AK10		Radial Lead	15-530	–	10000 A		•	•
AK15		Radial Lead	58-76	–	15000 A		•	•

Protection Application and Needs

Description:

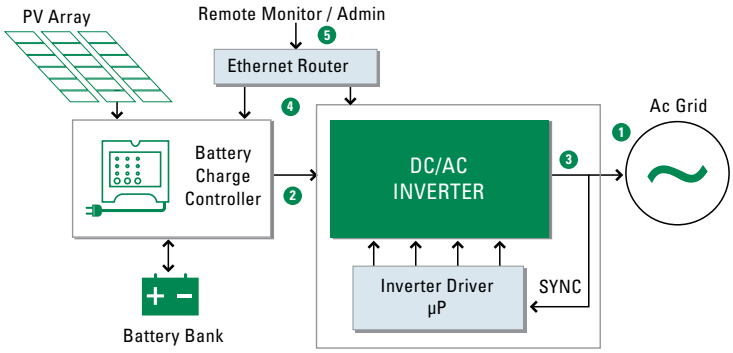
Microprocessor-controlled inverter with the ac output synchronized to the ac grid stores energy in utility company and maximizes photovoltaic (PV) array energy output.

Threats:

- Power surges on ac or dc input and ac output
- ESD threats through the communication network

Solutions:

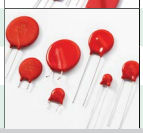
1. **Ac Input:** Fuse / MOV / GDT
2. **Dc Input:** Dc-rated fuse / Unidirectional TVS / MOV
3. **Ac Output:** Fuse / TVS / MOV
4. **Local Ethernet:** MLV / SPA
5. **Outside Ethernet:** SEP series SIDACtor® device



Example: Hybrid Solar Inverter Configuration

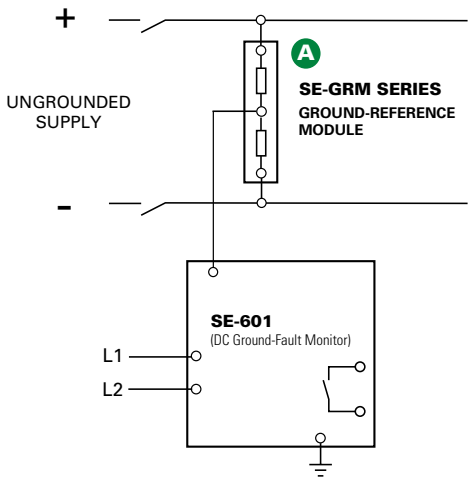
Varistor Products

Varistors possess characteristics that divert transient currents away from sensitive components. Littelfuse offers two types: Miniature surface mount Multi-Layer Varistors (MLVs) for small electronics applications and Metal Oxide Varistors (MOVs) for higher energy applications. For more information visit **Littelfuse.com/varistor**

SERIES NAME	PHOTO	OPERATING V AC RANGE	OPERATING V DC RANGE	PEAK CURRENT RANGE[2] (A)	PEAK ENERGY RANGE (J)	OPERATING TEMPERATURE	MOUNT/ FORM FACTOR	DISC SIZE	AGENCY APPROVALS				ROHS	HF
									UR	CSA	VDE	CECC		
SURFACE MOUNT MLV / MOV														
ML		2.7-107	5.5-120	4-500	0.02-2.5	-55 to +125 °C	Surface Mount	Not Applicable					•	•
CH		14-275	18-369	100-400	1.0-8.0	-55 to +125 °C	Surface Mount	Not Applicable	•				•	
SM7		115-510	369-675	1200	10-40	-55 to +85 °C	Surface Mount	Not Applicable	•				•	•
SM20		20-320	26	2000-6500	20-150		Surface Mount	Not Applicable	•				•	•
RADIAL LEADED MOV														
UltraMOV™		130-625	170-825	1750-10000	12.5-720	-55 to +85 °C	Radial Leaded	7, 10, 14, 20 mm	•	•	•	•	•	•
UltraMOV™ 25S		115-750	150-970	22000	230-890			25 mm	•	•	•	•	•	•
C-III		130-660	–	3500-9000	40-530			10, 14, 20 mm	•	•	•		•	•
LA		130-1000	175-1200	1200-6500	11-360			7, 10, 14, 20 mm	•	•	•	•	•	•
ZA		4-460	5.5-615	50-6500	0.1-52			5, 7, 10, 14, 20 mm	•		•	•	•	•
THERMALLY PROTECTED MOV														
SMOV™ 25S		115-750	150-970	20000	170-670	-45 to +75 °C	Industrial Packaged Radial Leads	25 mm	•				•	
SMOV™ 34S		115-750	150-970	40000	280-1200	-45 to +75 °C	Industrial Packaged Radial Leads	34 mm	•				•	
TMOV® 25S		115-750	150-970	20000	170-670	-55 to +85 °C	Radial Leaded	25 mm	•		•	•	•	
TMOV® 34S		115-750	150-970	40000	235-1050			34 mm	•		•	•	•	
TMOV®/iTMOV®		115-750	150-970	6000-10000	35-480			14, 20 mm	•		•	•	•	

Dc Ground-Fault Monitor

Simplified Circuit Diagram



Ordering Information

ORDERING NUMBER	CONTROL POWER
SE-601-OU	120/240 V ac/V dc
SE-601-OD	12/24 V dc
SE-601-OT	48 V dc

ACCESSORIES	REQUIREMENT
SE-GRM SERIES	Required
PGA-0500	Optional
PMA-55	Optional
PMA-60	Optional

Note: For optional conformal coating please consult factory.

Description

The SE-601 is a microprocessor-based ground-fault relay for ungrounded dc systems. It provides sensitive ground-fault protection without the problems associated with nuisance tripping. Ground-fault current is sensed using an SE-GRM Series Ground-Reference Module—a resistor network that limits ground-fault current to 25 mA. The SE-601 is used on ungrounded dc systems ranging from industrial 24 V dc control circuits to 1000 V dc solar and transportation systems.

Features & Benefits

FEATURES	BENEFITS
Adjustable pickup (1-20 mA)	Ten settings provide a wide range of low-level protection
Adjustable time delay (50 ms-2.5 s)	Adjustable trip delay allows quick protection or delayed response
Output contacts	Form A and Form B output contacts for operation of separate annunciation and trip circuits
Analog output (0-5 V)	Provides means for connecting to a meter (PGA-0500) or a control system
Non-volatile trip memory	Retains trip state when de-energized to simplify troubleshooting
Selectable contact operating mode	Selectable fail-safe or non-fail-safe operating modes allow connection to shunt or undervoltage breaker coil
Microprocessor-based	No calibration required saves on maintenance cost

Accessories

A **SE-GRM Series Ground-Reference Module**
Required accessory, used to connect the SE-601 dc Ground-Fault Monitor to the dc bus.

PGA-0500 Analog % Current Meter
Optional panel-mounted analog meter displays ground-fault current as a percentage of 22 mA.

Specifications

IEEE Device Numbers Dc Overcurrent Relay (76G)
Input Voltage See ordering information
Dimensions **H** 75 mm (3.0"); **W** 55 mm (2.2"); **D** 115 mm (4.5")
Trip Level Settings 1-20 mA
Trip Time Settings 0.05-2.5 s
Output Contacts Isolated Form A and Form B
Contact Operating Mode Selectable fail-safe or non-fail-safe
Test Button Local
Reset Button Local and remote
Analog Output 0-5 V
Conformally Coated Consult factory
Approvals CSA certified, UL Listed (E340889), CE (European Union), C-Tick (Australian)
Warranty 5 years
Mounting DIN, surface (standard)
Panel (with PMA-55 or PMA-60 adapter)

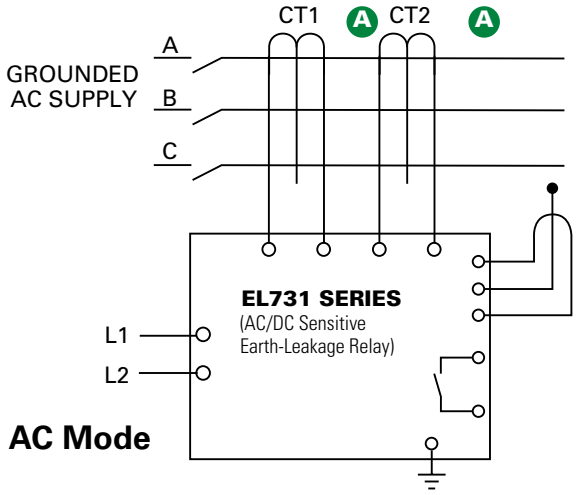
5

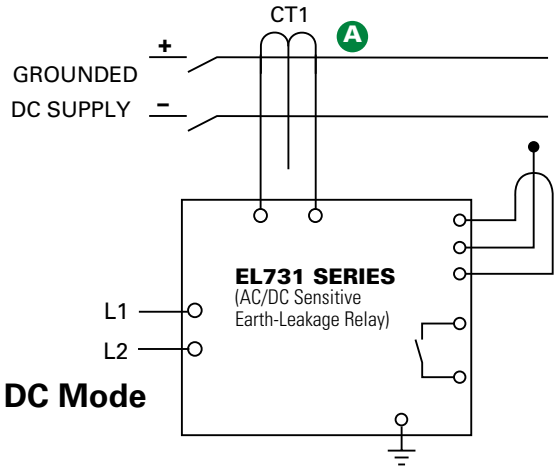
Ac/Dc Sensitive Earth-Leakage Relay

Description

The EL731 is a microprocessor-based ac/dc Sensitive Earth-Leakage Relay that offers complete coverage for all frequencies from 0 to 6,000 Hz. Two CTs are required for the entire frequency range, or one CT can be used for only low- or high-frequency detection. An RTD/PTC sensor input allows over-temperature protection for a motor or drive. The EL731 offers metering, password-protected alarm and trip settings and optional network communications. It is primarily used to add low-level ground-fault protection to variable-speed drives, and to dc circuits.

Simplified Circuit Diagram





Ordering Information

ORDERING NUMBER	CONTROL POWER	COMMUNICATIONS
EL731-00-X0	120/240 V ac/V dc	None
EL731-01-X0	120/240 V ac/V dc	DeviceNet*
EL731-02-X0	120/240 V ac/V dc	Profibus*
EL731-03-X0	120/240 V ac/V dc	EtherNet/IP*
EL731-04-X0	120/240 V ac/V dc	Modbus* TCP
EL731-10-X0	48 V dc & 24 V ac	None
EL731-11-X0	48 V dc & 24 V ac	DeviceNet
EL731-12-X0	48 V dc & 24 V ac	Profibus
EL731-13-X0	48 V dc & 24 V ac	EtherNet/IP
EL731-14-X0	48 V dc & 24 V ac	Modbus TCP
EL731-20-X0	24 V dc	None
EL731-21-X0	24 V dc	DeviceNet
EL731-22-X0	24 V dc	Profibus
EL731-23-X0	24 V dc	EtherNet/IP
EL731-24-X0	24 V dc	Modbus TCP

Accessories

EFCT Series Earth-Fault Current Transformer
Required zero-sequence current transformer specifically designed for low-level detection.

AC700-CUA Series Communication Adapter
Optional network-interface and firmware-upgrade communications adapters field-install in EL731.

AC700-SMK DIN-rail & Surface-mount Adapter
EL731 plugs into adapter for back-plane mounting.

ACCESSORIES	REQUIREMENT
EFCT Series CT	One Required
AC700-CUA Series Com. Unit	Optional
AC700-SMK Surface-Mount Kit	Optional
AC700-CVR-00 Watertight Cover (IP66) for Panel-Mount Applications	Optional
PGA-0520 Analog Meter	Optional

Note: When building a part number, replace the "X" with "1" for AS/NZS 2081:2011 Compliant product, "0" otherwise.
*DeviceNet, Profibus, EtherNet/IP and Modbus TCP are trademarks of their respective owners.

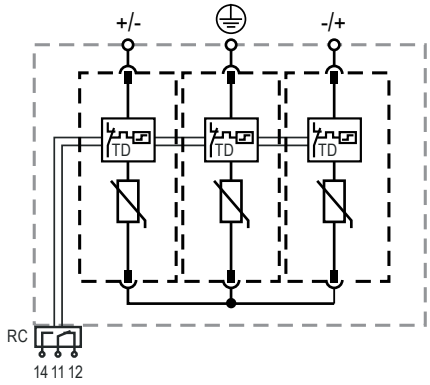
Class 2 (IEC)/Type 2 (EN)/Type 1CA (UL) Pluggable Multi-Pole Surge Protective Device for PV Systems

Description

Surge protective devices (SPDs) provide equipment protection from transient overvoltage events lasting micro-seconds. By limiting the overvoltage to the equipment during these events, costly damage and downtime can be mitigated.

The surge protective devices for solar string box and inverter applications are available in 1100 and 1500 V dc in the 3+0 configuration.

Internal Configuration



Legend

⏚ *Protective Earth*
RC *Optional Remote Contact*
TD *Thermal Disconnection*

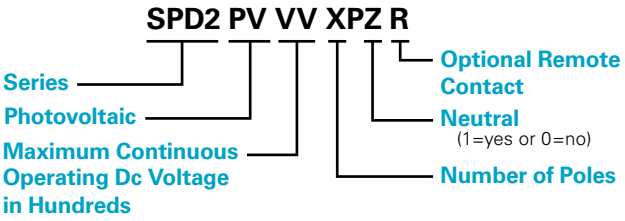
Features & Benefits

FEATURES	BENEFITS
Capability to clamp and withstand high-energy transients	Ensures low-residual voltage during high-energy surge events and higher nominal discharge current to prevent disruption, downtime, and degradation or damage to equipment
No additional overcurrent protection devices required in UL applications	Reduces the number of components and costs required for protection
Compact footprint	Increases panel design flexibility
Visual life indicator	Quick visual determines module replacement status to avoid loss of protection
Pluggable modules	Fast and simple to replace, minimizing maintenance and downtime. No tools required
Thermal protection	Eliminates catastrophic failure
IP20 protection rating	Finger-safe design increases worker protection

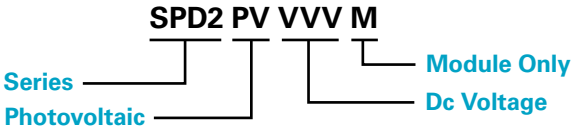
Module & Base Ordering Information

Ordering Number	IEC Electrical						UL Electrical				Single Unit Weight
	Maximum Continuous Operating Dc Voltage (U_{CPV})	Nominal Discharge Current (8/20 µs) (I_n)	Maximum Discharge Current (8/20 µs) (I_{max})	Total Discharge Current (I_{Total})	Voltage Protection Level (U_p)	Short-Circuit Current Rating (I_{SCPV})	Maximum Permitted Dc Voltage (I_{pvdc})	Voltage Protection Rating (VPR)	Nominal Discharge Current (8/20 µs) (I_n)	Short-Circuit Current Rating (SCCR)	
SPD2-PV11-3P0 SPD2-PV11-3P0-R	1100 V	20 kA	40 kA	50 kA	4200 V	9 kA	1100 V	3000 V	20 kA	50 kA	333 g (0.734 lb)
SPD2-PV15-3P0 SPD2-PV15-3P0-R	1500 V	15 kA	40 kA	40 kA	4800 V	9 kA	1500 V	4000 V	20 kA	65 kA	363 g (0.800 lb)

Module & Base Part Numbering System



Module Only Part Numbering System



Replacement Module Ordering Information

Ordering Number	IEC Electrical						UL Electrical				Single Unit Weight
	Maximum Continuous Operating Dc Voltage (U_{CPV})	Nominal Discharge Current (8/20 µs) (I_n)	Maximum Discharge Current (8/20 µs) (I_{max})	Total Discharge Current (I_{Total})	Voltage Protection Level (U_p)	Short-Circuit Current Rating (I_{SCPV})	Maximum Permitted Dc Voltage (I_{pvdc})	Voltage Protection Rating (VPR)	Nominal Discharge Current (8/20 µs) (I_n)	Short-Circuit Current Rating (SCCR)	
SPD2-PV550-M	1100 V	20 kA	40 kA	50 kA	4200 V	9 kA	1100 V	3000 V	20 kA	50 kA	61 g (0.134 lb)
SPD2-PV750-M	1500 V	15 kA	40 kA	40 kA	4800 V	9 kA	1500 V	4000 V	20 kA	65 kA	71 g (0.157 lb)

Specifications

Mode of Protection (+) - PE, (-) - PE, (+) - (-)
Nominal Discharge Current (8/20 µs) (I_n) 20 kA
Maximum Discharge Current (8/20 µs) (I_{max}) Up to 40 kA
Protective Elements High Energy MOV
Response Time (t_A) < 25 ns
Number of Ports 1

Mechanical & Environmental

Operating Temperature Range (T_a) -40 °C to +80 °C (-40 °F to +185 °F)
Permissible Operating Humidity (RH) 5% to 95%
Altitude (max) 4,000 m (13,123 ft)
Terminal Screw Torque) (M_{max}) 4.5 Nm (39.9 lbf-in)
Conductor Cross Section (max) 35 mm² (2 AWG) (Solid, Stranded)/ 25 mm² (4 AWG) (Flexible)
Mounting 35 mm DIN Rail, EN60715
Degree of Protection IP20 (built-in)
Housing Material Thermoplastic: Extinguishing Degree UL 94 V-0
Thermal Protection Yes
Operating State/Fault Indication Green Flag/No Green Flag
Remote Contact Switching Capacity Ac: 250 V/1 A, 125 V/1 A; Dc: 48 V/0.5 A, 24 V/0.5 A, 12 V/0.5 A
Remote Contact Conductor Cross Section (max) 1.5 mm² (16 AWG) (Solid)
Standards Passed EN 50539-11:2013+A1:2014
UL 1449 4th Edition; E320116

Product Dimensions

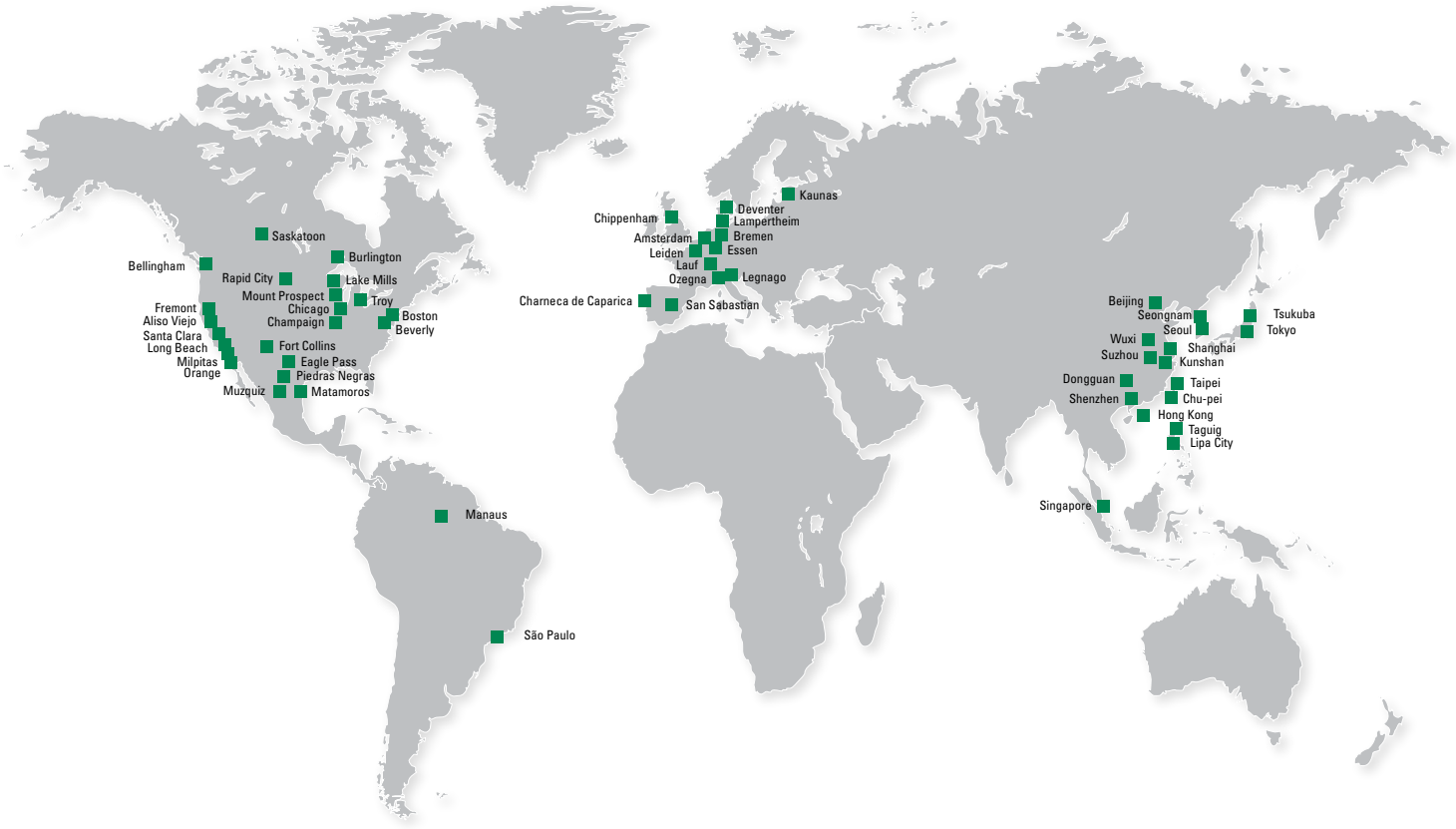
3TE Module and Base **H** 90.7 mm (3.57"); **W** 53.8 mm (2.11"); **D** 66.1 mm (2.60")
1TE Replacement Module **H** 45.0 mm (1.77"); **W** 18.0 mm (0.71"); **D** 57.2 mm (2.25")

Package Dimensions

3TE Module and Base **H** 102.0 mm (4.01"); **W** 64.0 mm (2.52"); **D** 110.0 mm (4.33")
1TE Replacement Module **H** 102.0 mm (4.01"); **W** 28.0 mm (1.10"); **D** 110.0 mm (4.33")

Warranty – Visit **www.littelfuse.com/warranty** for details.

Local Resources for a **GLOBAL** Market



Sales and Technical Support

- **United States and Mexico**
  Phone +1 800 TEC FUSE
  +1 800 832 3873
  Fax +1 800 522 7697
- **Brazil**
  Phone +55 11 4427 6261
- **Canada**
  Phone +1 306 373 5505
- **China**
  Hong Kong
  Phone +852 2810 5099
  Shanghai
  Phone +86 21 2327 6000
  Shenzhen
  Phone +86 755 8207 0760
  Taiwan
  Phone +886 2 8751 1234
- **Europe**
  Phone +49 4244 819149
- **India**
  Phone +65 6885 9185
- **Japan**
  Phone +81 45 478 1088
- **Singapore**
  Phone +65 6885 9188
- **South Korea**
  Phone +82 2 6000 8600
- **United Arab Emirates (UAE)**
  Phone +971 4341 3660

Protection Relays & Controls Catalog (PF130N)

The comprehensive line of electronic and microprocessor-based protection relays, timers, and flashers safeguard equipment and personnel to prevent expensive damage, downtime or injury due to electrical faults.

Fuses & Fuse Holders Catalog (PF101N)

Littelfuse offers a complete circuit protection portfolio of industrial power fuses, including time-saving indication products for an instant visual blown-fuse identification.

Surge Protection Devices Catalog (PF612)

These surge protection devices safeguard components from transient overvoltage or surges.

Visit Technical Resources at Littelfuse.com

Technical information is only a click away. The Littelfuse Technical Resources section contains datasheets, product manuals, white papers, application guides, demos, on-line design tools, and more.

North America

Littelfuse World Headquarters
8755 West Higgins Road, Suite 500
Chicago, IL 60631, USA

Littelfuse SymCom
222 Disk Drive
Rapid City, SD 57701, USA

Littelfuse Startco
140 – 15 Innovation Boulevard
(The Galleria Building)
Saskatoon, SK S7N 2X8
Tel: +1-306-373-5505

Technical Support:
Tel: +1-800-TEC-FUSE
E-mail: techline@littelfuse.com

Customer Service:
Tel: +1-800-227-0029
E-mail: PG_CSG@littelfuse.com

Asia

Littelfuse
Unit 1604B Desay Building,
Gaoxin Nanyi Ave.
Hi-Tech Industrial Park
Nashan District
Shenzen, 518057, China
+86 755 8207 0760

Europe

Littelfuse
Julius-Bamberger-Str. 8a
Bremen, D-28279, Germany
+49 421 82 87 3 147

Littelfuse products are certified to many standards around the world. To check certifications on specific product please refer to the product datasheet on Littelfuse.com.

FORM PF140N
Rev: 6-A-091420

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Littelfuse:

3PH39P18MM 3PH27P18MM BB20 3PH21P18MM 1PH4P18MM 3PH33P18MM