



# SOLUTIONS FOR PHOTOVOLTAIC APPLICATIONS

 **Lovato**  
**electric**  
ENERGY AND AUTOMATION

## Fuse holders for photovoltaic applications up to 1000VDC

Order code	Pole arrangement	Status indicator	DIN size
			n°

For 10x38mm fuses.  
IEC 32A rated current at 1000VDC.

<b>FBE01D1P</b>	1P	—	1
<b>FBE01D1PL</b>	1P	YES	1
<b>FBE01D2P</b>	2P	—	2
<b>FBE01D2PL</b>	2P	YES	2

## Fuses for photovoltaic applications up to 1000VDC

Order code	Rated current In
	[A]

10x38mm fuses.  
IEC 25kA breaking capacity at 1000VDC.

<b>FE01D0...</b>	2...20
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## Fuse holders for photovoltaic applications up to 1500VDC

Order code	Pole arrangement	Status indicator	DIN size
			n°

For 10x85mm and 14x85mm fuses.  
IEC 32A rated current at 1500VDC.

<b>FB04D1P</b>	1P	—	1
<b>FB04D1PL</b>	1P	YES	1

## Fuses for photovoltaic applications up to 1500VDC

Order code	Rated current In
	[A]

10x38mm fuses.  
IEC 10kA breaking capacity at 1500VDC.

<b>FE04D0...</b>	6...20
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14x85mm fuses.  
IEC 10kA breaking capacity at 1500VDC.

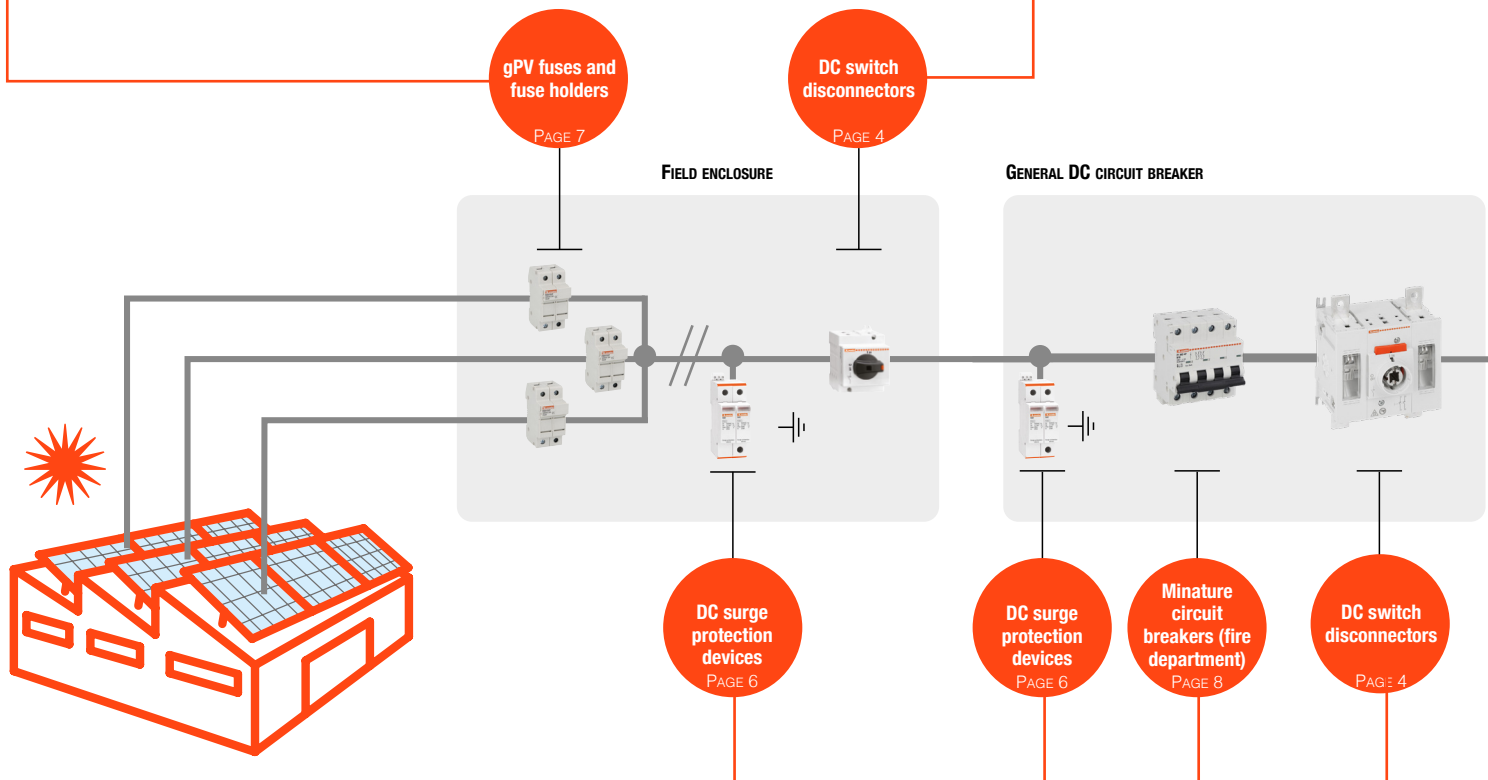
<b>FE05D0...</b>	20...32
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## Switch disconnectors GD series

Order code	IEC conventional free air thermal current Ith	IEC rated operational current Ie DC21B			
		≤800V	1000V	1200V	1500V
	[A]	[A]	[A]	[A]	[A]

Switch disconnector complete with black handle.

<b>GD025AT2</b>	25	25	16	—	—
<b>GD025AT3</b>	25	25	25	—	—
<b>GD032AT3</b>	32	32	32	—	—
<b>GD032AT4</b>	32	32	32	25	20
<b>GD040AT3</b>	40	40	32	—	—
<b>GD040AT4</b>	40	40	40	32	25



## Surge protection devices type 1-2 - DC with plug-in cartridge

EN rated voltage Un	1100VDC.
<b>SG2EDGK10M3R</b>	+, -, PE SI 3
EN rated voltage Un	1500VDC.
<b>SG2EDGK50M3R</b>	+, -, PE SI 3

## type 2 - DC with plug-in cartridge

Order code	Pole arrangement	Relay output	Number of DIN module
		(SPDT)	n°

EN rated voltage Un	600VDC.
<b>SE2DG600M2</b>	+, -, PE NO 2
<b>SE2DG600M2R</b>	+, -, PE YES 2
EN rated voltage Un	1000VDC.
<b>SE2DGK00M3</b>	+, -, PE NO 3
<b>SE2DGK00M3R</b>	+, -, PE YES 3
EN rated voltage Un	1500VDC.
<b>SE2DGK50M3</b>	+, -, PE NO 3

## Miniature circuit breakers 1000VDC

Order code	Ie	Number of DIN module
	[A]	n°

Miniature circuit breakers in DC - B curve characteristics

<b>P1MD4PB16</b>	16	4
<b>P1MD4PB20</b>	20	4
<b>P1MD4PB25</b>	25	4
<b>P1MD4PB50</b>	50	4

## Switch disconnectors 1

Order code	IEC free air thermal current Ith	IEC rated operational current Ie DCPV1		
		800V	1000V	1500V
	[A]	[A]	[A]	[A]

Switch disconnector to be completed with handle.

<b>GLD0100T2C3</b>	100	100	100	100
<b>GLD0160T2C3</b>	160	160	160	160
<b>GLD0200T2C3</b>	200	200	200	200
<b>GLD0250T2C3</b>	250	250	250	250
<b>GLD0315T2C3</b>	315	315	315	315
<b>GLD0100T4C3</b>	100	100	100	100
<b>GLD0160T4C3</b>	160	160	160	160
<b>GLD0200T4C3</b>	200	200	200	200
<b>GLD0250T4C3</b>	250	250	250	250
<b>GLD0315T4C3</b>	315	315	315	315

## Interface protection system units for low, medium and high voltage systems

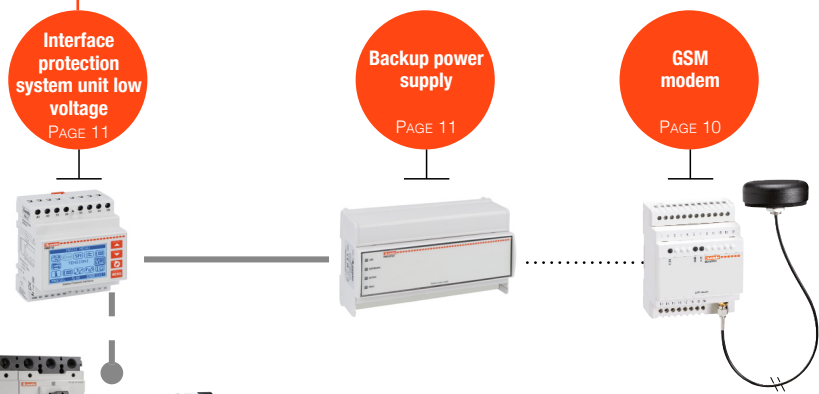
Order code	Compliant with standards
Low, medium, high voltage system.	
<b>PMVF52</b>	CEI 0-21
<b>PMVF60</b>	DEWA DRRG and SEC (Saudi Electricity Company)
<b>PMVF70</b>	ENA G59-3/G99
<b>PMVF81</b>	VDE-AR-N 4105, 4110, 4120 and VDE V 0126-1-1
<b>PMVF90</b>	For systems requiring 3 maximum voltage thresholds

## Backup power supply for interface protection system units

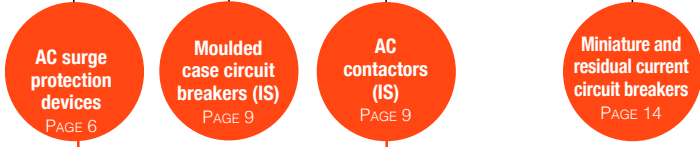
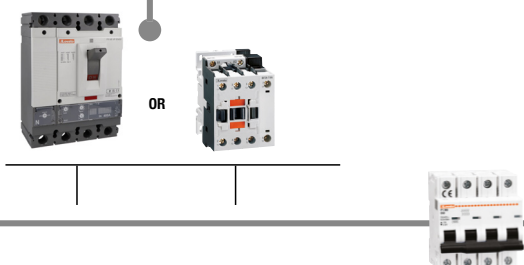
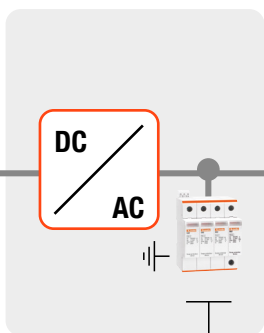
Order code	Description
Backup power supply for interface protection system units PMVF...	
<b>PMVFUPS02</b>	Input 230VAC. Output 230VAC with stored energy 645Ws and power 50VA

## Remote control and monitoring GSM modem via SMS

Order code	Description
GSM modem (modular - 4U). IP69K outside aerial with 2.5m cable. RJ45-USB programming cable (included).	
<b>EXCGSM01</b>	100...240VAC, 1 digital input, 1 analogic input (0...10V, 0...20mA, NTC), 1 relay output, SMS send/receive for remote control and alarm signals



INVERTER PANEL



## Surge protection devices type 2 - AC with plug-in cartridge In=20kA

Order code	Pole arrangement	Relay output	Number of DIN modules n°
VERSION WITH PLUG-IN CARTRIDGES. Rated discharge current In (8/20µs) 20kA per pole.			
<b>SG2C1NA275</b>	1P+N	NO	1
<b>SG2C1NA275R</b>	1P+N	YES	1
<b>SG2C3NA275</b>	3P+N	NO	2
<b>SG2C3NA275R</b>	3P+N	YES	2
<b>SG2C4PA275</b>	4P	NO	2
<b>SG2C4PA275R</b>	4P	YES	2

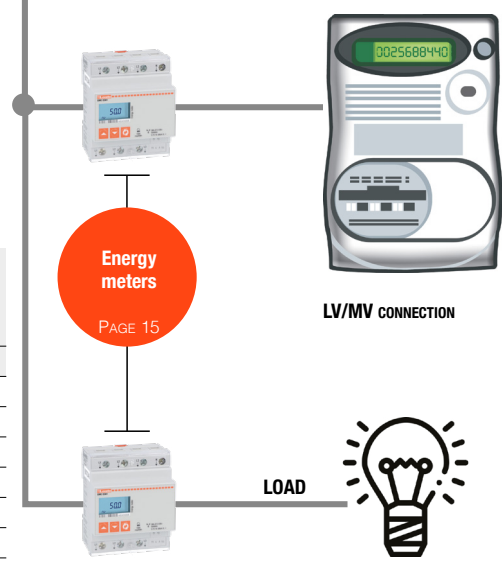
See complete range at pag. 6

## Four pole contactors

Order code	AC3 operational data	
	le current ≤440V ≤55°C [A]	Max power ≤400V ≤55°C [kW]
AC COIL.		
<b>BF26T4A</b>	26	13
<b>BF38T4A</b>	38	18.5
<b>BF40T4A</b>	40	18.5
<b>BF50T4A</b>	50	22
<b>BF65T4A</b>	65	30
<b>BF80T4A</b>	80	45
<b>BF95T4A</b>	95	55
<b>BF115T4A</b>	115	55
<b>BF150T4A</b>	150	75

## AC/DC ELECTRONIC COIL.

<b>BF160T4E</b>	160	75
<b>BF195T4E</b>	195	90
<b>BF230T4E</b>	230	110



- 1 The order code must be completed with the coil voltage as follows:
  - AC 50-60Hz 024 - 048 - 110 - 230 - 400V
  - AC 60Hz 024 60 - 048 60 - 120 60 - 220 60 - 230 60 - 460 60 - 575 60 (V).
- 2 The contactor coil is electronically controlled; it can be either AC or DC powered and has a wide operational range. The order code must be completed with the coil voltage as follows:
  - AC/DC 024 = 24...60VAC/20...60VDC; 110 = 60...130VAC/DC; 230 = 100...250VAC/DC; 400 = 250...500V.

## Switch disconnectors GA series



GA040D



GAX42...D

Order code	IEC conventional free air thermal current Ith	IEC rated operational current Ie DC21B <sup>①</sup>			Qty per pkg	Wt [kg]
		3 poles 500V	4 poles 600V	800V		
[A]	[A]	[A]	[A]	[A]	n°	[kg]

Switch disconnector complete with black handle.

<b>GA040D</b>	40	12	—	—	1	0.135
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Fourth pole.

<b>GAX42040D</b>	40	—	20	15	1	0.040
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<sup>①</sup> Connection of 4 poles in series.

## Switch disconnectors GD series



GD...

Order code	IEC conventional free air thermal current Ith	IEC rated operational current Ie DCPV1				Qty per pkg	Wt [kg]
		≤800V	1000V	1200V	1500V		
[A]	[A]	[A]	[A]	[A]	[A]	n°	[kg]

Switch disconnector complete with black handle.

<b>GD025AT2</b>	25	25	16	—	—	1	0.140
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<b>GD025AT3</b>	25	25	25	—	—	1	0.180
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<b>GD032AT3</b>	32	32	32	—	—	1	0.180
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<b>GD032AT4</b>	32	32	32	25	20	1	0.220
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<b>GD040AT3</b>	40	40	32	—	—	1	0.180
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<b>GD040AT4</b>	40	40	40	32	25	1	0.220
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## Plastic enclosed switch disconnectors IEC/EN/BS IP65



GAZ016DT2



GAZ040DT4

Order code	IEC conventional thermal current Ith	IEC rated operational current Ie DCPV1				Qty per pkg	Wt [kg]
		≤800V	1000V	1200V	1500V		
[A]	[A]	[A]	[A]	[A]	[A]	n°	[kg]

With red/yellow handle.

<b>GAZ025DT2</b>	25	25	16	—	—	1	0.450
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<b>GAZ032DT3</b>	32	32	32	—	—	1	1.050
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<b>GAZ040DT4</b>	40	40	40	32	25	1	1.050
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With black handle.

<b>GAZ025DT2B</b>	25	25	16	—	—	1	0.450
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<b>GAZ032DT3B</b>	32	32	32	—	—	1	1.050
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<b>GAZ040DT4B</b>	40	40	40	32	25	1	1.050
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### General characteristics

- Up to 40A (1000VDC) and 32A (1200VDC)
- Modular construction
- Jumpers for connecting the poles in series supplied as standard with disconnectors GD series...
- Available versions:
  - Direct operating
  - Door coupling version. Use switch disconnector with direct actuator and separately purchase the handle and shaft extension for this version.
- Screw or 35mm DIN rail fixing
- Padlockable in 0 position with no extra accessory.

### Operational characteristics

- Rated insulation voltage for GA...D and GD... Ui: 1000V (pollution degree 3)
- Rated insulation voltage for GD... Ui: 1500V (pollution degree 2)
- Rated impulse withstand Uimp: 8kV
- Mechanical life:
  - 100,000 cycles GA040D
  - 10,000 cycles GD...
- Operating temperature: -25°C...+55°C
- Storage temperature: -40°C...+70°C
- Degree of protection: IP20 (only for GA040D).

### Certifications and compliance

Certifications obtained: UL Listed for USA and Canada (cULus - File E93602) as Manual Motor Controllers, to UL508/CSA C22.2 n° 14 for GA040D and GAX42040D; EAC for GA...D.

Compliant with standards: IEC/EN/BS 60947-3, IEC/EN/BS 60947-1.

### Components

Enclosure	Switch disconnector	Handle included with GAZ...
GAZ1	GD025AT2	GAX61
GAZ2 <sup>②</sup>	GD032AT3	GAX61
GAZ2 <sup>②</sup>	GD040AT4	GAX61
GAZ1B	GD025AT2	GAX61B
GAZ2B <sup>②</sup>	GD032AT3	GAX61B
GAZ2B <sup>②</sup>	GD040AT4	GAX61B

<sup>②</sup> For further details contact our Technical support; see contact details on inside front cover.

### General characteristics

- Enclosure material: ABS
- Possible accessories to mount afterwards, if any required:
  - GAX30 to provide shielded cable connection continuity
- Padlockable handles
- Sealable cover
- Tightening torque for cover screws:
  - GAZ025...: 1.3Nm/16lb.in
  - Other types: 1.5Nm/13lb.in
- Degree of protection: IP65
- Cable entry:
  - GAZ025... types: PG16/M25 and PG13.5/M20 knockouts
  - GAZ032... and GAZ040... types: PG16/M25 and PG29/M32 knockouts.

### Certifications and compliance

Certifications obtained: EAC  
Compliant with standards: IEC/EN/BS 60947-3, IEC/EN/BS 60947-1.

## Switch disconnectors IEC/EN/BS GLD series



GLD...T2C3

Order code	IEC conventional free air thermal current Ith	IEC rated operational current Ie DCPV1			Qty per pkg	Wt [kg]
		800V	1000V	1500V		
	[A]	[A]	[A]	[A]	n°	[kg]

Direct operating and door coupling versions.  
Separately purchase the handle.

GLD0100T2C3	100	100	100	-	1	1.340
GLD0160T2C3	160	160	160	-	1	1.340
GLD0200T2C3	200	200	200	-	1	1.340
GLD0250T2C3	250	250	250	-	1	1.340
GLD0315T2C3	315	315	250	-	1	1.340
GLD0100T4C3	100	100	100	100	1	2.140
GLD0160T4C3	160	160	160	160	1	2.140
GLD0200T4C3	200	200	200	200	1	2.140
GLD0250T4C3	250	250	250	250	1	2.140
GLD0315T4C3	315	315	315	315	1	2.140

## Switch disconnectors UL98B GLD series



GLD...T4C3UL

Order code	General purpose current		Qty per pkg	Wt [kg]
	1000V	1500V		
	[A]	[A]	n°	[kg]

Direct operating and door coupling versions.  
Separately purchase the handle.

GLD0100T2C3UL	100	-	1	1.340
GLD0200T2C3UL	200	-	1	1.340
GLD0100T4C3UL	100	100	1	2.140
GLD0200T4C3UL	200	200	1	2.140

## Switch disconnectors IEC/EN/BS GE series



GE...DT4

Order code	IEC conventional free air thermal current Ith	IEC rated operational current Ie DC21B ①			Qty per pkg	Wt [kg]
		220V	800V	1000V		
	[A]	[A]	[A]	[A]	n°	[kg]

Direct operating and door coupling versions.  
Separately purchase the handle.

GE0630DT4	630	630	600	500	1	4.500
GE0800DT4	800	800	630	630	1	4.500
GE1250DT4	1250	1250	1000	850	1	8.900

① Connection of 4 poles in series.

## Direct operating handles



GLX61DB

Order code	Characteristics	Qty per pkg	Wt [kg]
		n°	[kg]

Direct operating lever handle. Padlockable.  
Rotating type with screw fixing on switch disconnector.

GLX61DB	Black handle for GLD...	1	0.070
GLX61D	Red/Yellow handle for GLD...	1	0.095
GEX67ND	Black handle for GE0630DT4 and GE0800DT4	1	0.322
GEX68ND	Black handle for GE1250DT4	1	0.322

### General characteristics

- Up to 315A 1500V DCPV1
- Up to 100A 1000V DCPV2 for GLD0315T2C3 and up to 125A 1500V DCPV2 for GLD0315T4C3
- Available versions:
  - Direct operating
  - Door coupling version. Use switch disconnector with direct actuator and separately purchase the handle and shaft extension for this version.
- Screw or 35mm DIN rail fixing
- Padlockable in 0 position with no extra accessory.

### Operational characteristics

- IEC rated insulation voltage Ui: 1000V for GLD...T2...; 1500V for GLD...T4...
- Mechanical life: 20,000 cycles.

### Certifications and compliance

Certifications obtained: UL Listed for GLD...UL.  
Compliant with standards: IEC/EN/BS 60947-1, IEC/EN/BS IEC/EN/BS 60947-3, UL98B.

### General characteristics

- Up to 850A, 1000VDC
- Available versions:
  - Direct operating
  - Door coupling version. Use switch disconnector with direct actuator and separately purchase the handle and shaft extension for this version.
- Screw fixing
- Padlockable in 0 position with no extra accessory.

### Operational characteristics

- IEC rated insulation voltage Ui: 1000V
- Mechanical life: 10,000 cycles.

### Certifications and compliance

Certifications obtained: EAC.  
Compliant with standards: IEC/EN/BS 60947-1, IEC/EN/BS 60947-3.

## Type 2 - AC Compact version with plug-in cartridge In=20kA



SG2...

## Type 2 - AC With plug-in cartridge In=20kA



SG2...

## Type 1 and 2 - DC with plug-in cartridge



SG2EDGK10M3R

## Type 2 - DC with plug-in cartridge



SE2DG600M2

SE2DGK...M3

Order code	Pole arrangement	Relay output	Number of DIN modules	Qty per pkg	Wt
			n°	n°	[kg]
VERSION WITH PLUG-IN CARTRIDGES. Rated discharge current In (8/20µs) 20kA per pole.					
SG2C1NA275	1P+N	NO	1	1	0.234
SG2C1NA275R	1P+N	SI	1	1	0.240
SG2C3NA275	3P+N	NO	2	1	0.477
SG2C3NA275R	3P+N	SI	2	1	0.486
SG2C4PA275	4P	NO	2	1	0.496
SG2C4PA275R	4P	SI	2	1	0.505

Order code	Pole arrangement	Relay output	Number of DIN modules	Qty per pkg	Wt
			n°	n°	[kg]
VERSION WITH PLUG-IN CARTRIDGES. Rated discharge current In (8/20µs) 20kA per pole.					
SG21NA300	1P+N	NO	2	1	0.234
SG21NA300R	1P+N	YES	2	1	0.240
SG22PA300	2P	NO	2	1	0.252
SG22PA300R	2P	YES	2	1	0.266
SG23NA300	3P+N	NO	4	1	0.477
SG23NA300R	3P+N	YES	4	1	0.486
SG24PA300	4P	NO	4	1	0.496
SG24PA300R	4P	YES	4	1	0.505

Order code	Pole arrangement	Relay output	Number of DIN modules	Qty per pkg	Wt
			n°	n°	[kg]
EN rated voltage Un 1100VDC.					
SG2EDGK10M3R	+, -, PE	YES	3	1	0.406
EN rated voltage Un 1500VDC.					
SG2EDGK50M3R	+, -, PE	YES	3	1	0.406

Order code	Pole arrangement	Relay output	Number of DIN modules	Qty per pkg	Wt
			n°	n°	[kg]
EN rated voltage Un 600VDC.					
SE2DG600M2	+, -, PE	NO	2	1	0.320
SE2DG600M2R	+, -, PE	YES	2	1	0.325
EN rated voltage Un 1000VDC.					
SE2DGK00M3	+, -, PE	NO	3	1	0.396
SE2DGK00M3R	+, -, PE	YES	3	1	0.406
EN rated voltage Un 1500VDC.					
SE2DGK50M3	+, -, PE	NO	3	1	0.444

### General characteristics

SURGE PROTECTION DEVICES TYPE SG2...  
They are available in plug-in cartridge version and they are suitable for installation in secondary boards and in terminal equipment.

They ensure protection against overvoltages conditions. The protection cartridges are plug-in and can be easily replaced for quick servicing.

SG2... surge arresters are immune to temporary overvoltages (TOV) and block the circulation of the subsequent network current after the intervention.

### Operational characteristics

- IEC maximum continuous operating voltage U<sub>c</sub>: 275VAC for SG2C... and 300VAC for SG2...
- IEC maximum discharge current I<sub>max</sub> (8/20µs): 40kA for SG2C... and 50kA for SG2...
- IEC rated discharge current I<sub>n</sub> (8/20µs): 20kA per pole
- Versions with or without relay output with changeover contact for remote status indication
- IEC degree of protection: IP20.

### Certifications and compliance

Certification obtained: EAC.  
Compliant with standards: IEC/EN/BS 61643-11.

### Characteristics

Type	IEC rated voltage Un [V]	IEC voltage protection level Up [kV] L-N	Power installation system
SG2C1NA275...	230	<1.5	TT, TN-S
SG2C3NA275...	230/400	<1.5	TN-S
SG2C4PA275...	230/400	<1.5	TT, TN-S

Type	IEC rated voltage Un [V]	IEC voltage protection level Up [kV] L-N	Power installation system
SG21NA300...	230	<1.5	TT, TN-S
SG2PA300...	230	<1.5	TN-S
SG23NA300...	230/400	<1.5	TT, TN-S
SG24PA300...	230/400	<1.5	TN-S

### General characteristics

The surge protection devices type SG2EDG... and SE2DG... with plug-in cartridge for photovoltaic applications are suitable for installation on the direct-current side of a photovoltaic installation and protects against induced overvoltage conditions.

The protection cartridges are plug-in and can be easily replaced for quick servicing.

### Operational characteristics

- EN maximum continuous voltage U<sub>cpv</sub>: 600VDC, 1100VDC, 1500VDC
- EN short circuit current rating I<sub>scpv</sub>: 11kA for SG2EDG... and SE2DG..., 9kA per SA2EDG...
- Versions with or without relay output with changeover contact for remote status indication
- EN degree of protection: IP20.

### Characteristics

Type	EN rated voltage Un [VDC]	EN continuous voltage U <sub>cpv</sub> [VDC]	EN voltage protection level Up [kV]
SG2EDGK10M3R	1100	1100	<3.8
SG2EDGK50M3R	1500	1500	<3.8
SE2DG600M2	600	670	<2.2
SE2DG600M2R	600	670	<2.2
SE2DGK00M3	1000	1060	<4.2
SE2DGK00M3R	1000	1060	<4.2
SE2DGK50M3	1000	1060	<4.2

### Certifications and compliance

Certification obtained: EAC.  
Compliant with standards: IEC/EN/BS 50539-11.

## Fuse holders for photovoltaic applications up to 1000VDC



FBE01D1P



FBE01D1PL



FBE01D2P



FBE01D2PL

Order code	Pole arrangement	Status indicator	DIN size	Qty per pkg	Wt
			n°	n°	[kg]

For 10x38mm fuses.  
IEC 32A rated current at 1000VDC.

<b>FBE01D1P</b>	1P	—	1	12	0.064
<b>FBE01D1PL</b>	1P	YES	1	12	0.065
<b>FBE01D2P</b>	2P	—	2	6	0.127
<b>FBE01D2PL</b>	2P	YES	2	6	0.130

### Operational characteristics

- IEC rated voltage  $U_n$ : 1000VDC
- IEC rated current  $I_n$ : 32A
- IEC utilisation category: DCPV0 1000VDC
- Suitable for IEC fuse class: gPV
- IEC degree of protection: IP20.

### Reference standards

Compliant with standards: IEC/EN/BS 60269, IEC/EN/BS 60947-1, IEC/EN/BS 60947-3.

## Fuses for photovoltaic applications up to 1000VDC



FE01D...

Order code	Rated current $I_e$	Qty per pkg	Wt
	[A]	n°	[kg]

10x38mm fuses.  
IEC 25kA breaking capacity at 1000VDC.

<b>FE01D02</b>	2	10	0.008
<b>FE01D04</b>	4	10	0.008
<b>FE01D06</b>	6	10	0.008
<b>FE01D08</b>	8	10	0.008
<b>FE01D10</b>	10	10	0.008
<b>FE01D12</b>	12	10	0.008
<b>FE01D16</b>	16	10	0.008
<b>FE01D20</b>	20	10	0.008

### Operational characteristics

- IEC rated voltage  $U_n$ : 1000VDC
- IEC rated current  $I_n$ : 2...20A
- IEC fuse class: gPV.

### Reference standard

Compliant with standard: IEC/EN/BS 60269-6.

## Fuse holders for photovoltaic applications up to 1500VDC



FB04D1P



FB04D1PL

Order code	Pole arrangement	Status indicator	Qty per pkg	Wt
			n°	[kg]

For 10x85mm and 14x85mm fuses.  
IEC 32A rated current at 1500VDC.

<b>FB04D1P</b>	1P	No	6	0.109
<b>FB04D1PL</b>	1P	Yes	6	0.110

### Operational characteristics

- IEC rated voltage  $U_n$ : 1500VDC
- IEC rated current  $I_n$ : 32A
- IEC utilisation category: DC20B 1500VDC
- Suitable for IEC fuse class: gPV
- IEC degree of protection: IP20.

### Reference standard

Compliant with standard: IEC/EN/BS 60947-3.

## Fuses for photovoltaic applications up to 1500VDC



FE05D...



FE04D...

Order code	Rated current $I_e$	Qty per pkg	Wt
	[A]	n°	[kg]

10x85mm fuses.  
IEC 10kA breaking capacity at 1500VDC.

<b>FE04D006</b>	6	10	0.019
<b>FE04D010</b>	10	10	0.019
<b>FE04D015</b>	15	10	0.019
<b>FE04D020</b>	20	10	0.019

14x85mm fuses.  
IEC 10kA breaking capacity at 1500VDC.

<b>FE05D020</b>	20	5	0.031
<b>FE05D025</b>	25	5	0.031
<b>FE05D032</b>	32	5	0.031

### Operational characteristics

- IEC rated voltage  $U_n$ : 1500VDC
- IEC rated current
  - $I_n$ : 6...20A for 10x85mm version
  - $I_n$ : 20...32A for 14x85mm version
- Suitable for IEC fuse class: gPV.

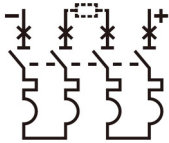
### Reference standard

Compliant with standard: IEC/EN/BS 60269-6.

## Miniature circuit breakers 1000VDC



P1MD4PB...



Order code	le	Number of DIN module	Qty per pkg	Wt
	[A]	n°	n°	[kg]
Miniature circuit breakers for DC - B curve characteristics				
P1MD4PB16	16	4	3	0.505
P1MD4PB20	20	4	3	0.505
P1MD4PB25	25	4	3	0.505
P1MD4PB50	50	4	3	0.505

### General characteristics

The miniature circuit breakers for photovoltaic applications type P1MD... are designed to protect against overloads and short circuits the cables located between the photovoltaic panel strings and the inverter. In addition to photovoltaic applications, these devices can be used for other DC-1 loads, such as non-inductive or slightly-inductive loads. Main features include:

- Rated current from 16A to 50A
- IEC breaking capacity Icu 5kA 1000VDC
- Contact status with flag indicator
- Tripping characteristic: curve type B
- Accessories available: auxiliary contacts, shunt trips and undervoltage releases.

### Operational characteristics

- Rated insulation voltage  $U_i$ : 1000V
- Rated impulse voltage  $U_{imp}$ : 4kV
- Mechanical life: 20.000 cycles
- Mounting on 35mm DIN rail (IEC/EN/BS 60715)
- Mounting position: any
- Utilization category: A.

### Reference standard

Compliant with standard: IEC/EN/BS 60947-2.

## Add-on blocks for miniature circuit breakers



P1X1011

P1X16...

Order code	Description	Qty per MCB	Qty per pkg	Wt
		n°	n°	[kg]
Auxiliary contact.				
P1X1011	1 changeover contact	1	12	0.040
Indicator contact for thermal-magnetic trip.				
P1X1311	1 changeover contact	1	12	0.040
Undervoltage trip release.				
P1X14230	230VAC 50/60Hz	1	8	0.070
Shunt trip release.				
P1X16230	110...415VAC 50/60Hz	1	8	0.070
P1X16024	12...24VAC/DC 50/60Hz	1	8	0.070

### General characteristics

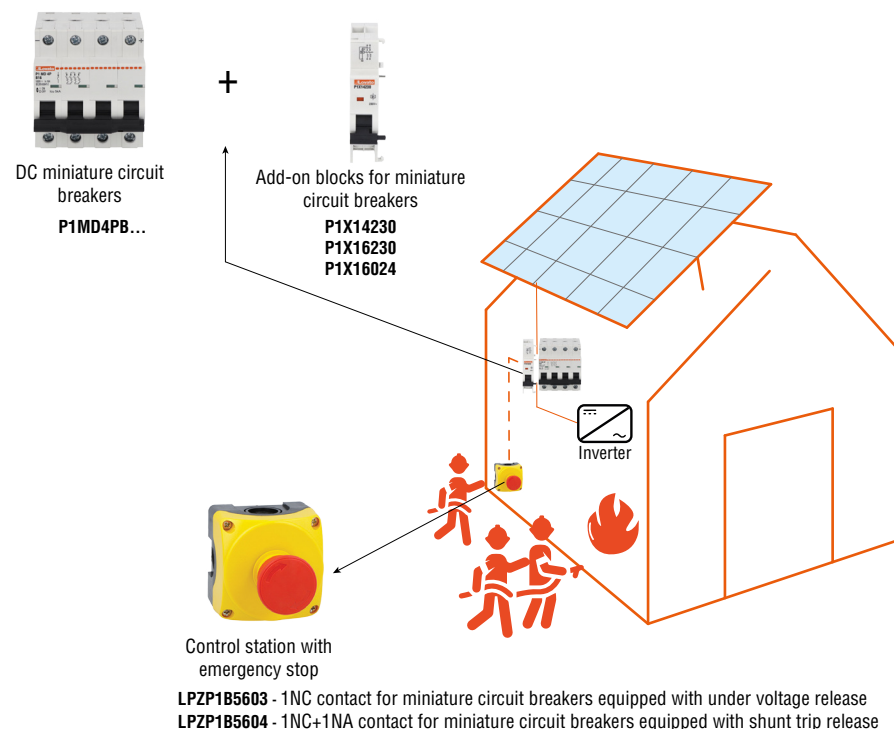
- Auxiliary and indicator contact width: 9mm/0.35" (0.5 module)
- Undervoltage and shunt trip release width: 18mm/0.71" (1 module)
- Maximum combination: 3 add-on blocks on MCB left side only of which 1 undervoltage or shunt release directly on MCB side and then 2 contacts of which 1 auxiliary contact and 1 indicator contact.

### Operational characteristics

- IEC rated impulse voltage  $U_{imp}$ : 4kV
- IEC rated operational current in AC: 6A 230V; 3A 400V (auxiliary contacts).

### Reference standard

Compliant with standard: IEC/EN/BS 60947-5-1.



### PV Cut-Off Switch

Also known as a fireman's switch, it may be required in photovoltaic systems for emergency shutdown of solar panels in case of fire or dangerous functional anomalies. The shutdown must be performed using a switch suitable for load separation, which can be operated by a remote command located in a clearly marked and accessible position. The command should be provided via appropriate emergency buttons that can activate undervoltage coils or shunt trip release devices of the switch. Lovato Electric offers P1MD circuit breakers for this application, which cover nominal currents from 16A to 50A for systems up to 1000VDC.

## Four-pole contactors for photovoltaic applications



BF09AT4A...BF18T4A

BF95T4A...BF150T4A



BF160T4E...BF230T4E

## Four-pole moulded case circuit breakers IEC standard



P5ME4PS0100

## Accessories



P5X1011

P5X14E...



P5X19...



P5X16E...

Order code	AC3 Current Ie	Max power	Qty per Pkg	Wt
	≤440V ≤55°C	≤400V ≤55°C	n°	[kg]
AC COIL.				
BF26T4A	26	13	1	0.508
BF38T4A	38	18.5	1	0.508
BF40T4A	40	18.5	1	1.240
BF50T4A	50	22	1	1.240
BF65T4A	65	30	1	1.240
BF80T4A	80	45	1	1.240
BF95T4A	95	55	1	2.420
BF115T4A	115	55	1	2.420
BF150T4A	150	75	1	2.420
BF160T4E	160	75	1	4.000
BF195T4E	195	90	1	4.000
BF230T4E	230	110	1	4.000
BF265T4E	265	132	1	6.135
BF330T4E	330	160	1	6.135
BF420T4E	420	200	1	6.135
BF500T4E	500	250	1	20.91
BF630T4E	630	335	1	21.88

Order code	Overload trip adjustment range	Short circuit trip adjustment range	Short circuit breaking capacity at 400V Icu Ics	Qty per pkg	Wt
	[A]	[A]	[kA] [kA]	n°	[kg]
Four-pole, IEC standard. Fourth pole on the left side.					
P5ME4PS0100	40...100	60...1000	50 50	1	2.600
P5ME4PS0160	64...160	96...1600	50 50	1	2.600
P5ME4PS0250	100...250	150...2500	50 50	1	2.600
P5ME4PS0400	160...400	240...4000	65 65	1	7.200
P5ME4PS0630	252...630	378...6300	65 65	1	7.200
P5ME4PS0800	320...800	480...8000	65 65	1	19.600

Order code	Description	Qty per pkg	Wt
		n°	[kg]
Add-on auxiliary contacts.			
P5X1011	One changeover contact. Screw terminals.	1	0.025
Undervoltage trip releases.			
P5X14E024	24VAC/DC	1	0.095
P5X14E230	220...240VAC - 250VDC	1	0.095
Shunt trip releases.			
P5X16E024	24VAC/DC	1	0.095
P5X16E230	220...240VAC - 250VDC	1	0.095
Motor operator for remote operation.			
P5X19D024	Motor operator 24VDC	1	0.850
P5X19E230	Motor operator 230VAC/220VDC	1	0.850

### General characteristics

In photovoltaic systems, contactors are used with the function of IS (Interface Switch) between the DC/AC inverter output and the line.

The Italian CEI 0-21 standard, prescribes that contactors used as ISs must have dimensions corresponding to the AC-3 utilisation category.

### Operational characteristics

Average consumption at ≤20°C		BF26T4A BF38T4A	BF50T4A BF65T4A BF80T4A	BF95T4A BF115T4A BF150T4A
50/60Hz coil powered at	50Hz in-rush	VA	75	210
	holding	VA	9	15
	60Hz in-rush	VA	70	195
	holding	VA	6,5	13
Dissipation at 50Hz		W	2.5	5

Average consumption at ≤20°C		BF160T4E BF195T4E BF230T4E	BF265T4E BF330T4E BF400T4E	BF420T4E BF500T4E BF630T4E
AC/DC coil	in-rush	V/VA	160...230	160...320
	holding	V/VA	1.5...3.0	3.5...8.0
			350...450	3.3...4.3

### Reference with standards

Compliant with standards: IEC/EN/BS 60947-1, IEC/EN/BS 60947-4-1, UL 60947-1, UL 60947-4-1, CSA C22.2 n° 60947-1, CSA C22.2 n° 60947-4-1.

### General characteristics

MOULDED CASE CIRCUIT BREAKERS (MCCBs) are technologically advanced devices with electronic trip units, which can be used in photovoltaic systems with the function of IS (Interface Switch) between the DC/AC inverter output and the line, in alternative to contactors. MCCBs offer a wide current adjustment range, ensuring high precision in tripping and providing the flexibility to set a short tripping delay in the event of a short circuit.

The operating lever is equipped with a trip position, serving as an indicator for openings resulting from faults in the plant. A useful test button facilitates the verification of the plant's signalling system. Additionally, a LED on the MCCB's front signals a high current level that may cause the breaker to trip. A dedicated adjuster allows for the specific setting of tripping current on the 4th pole, which can differ from the three main poles.

### Operational characteristic

- IEC rated insulation voltage Ui: 1000V
- IEC rated impulse withstand voltage: 8kV
- IEC rated frequency: 50/60Hz
- IEC breaking capacity: 50kA for sizes 100...250A, 65kA for sizes 400...800A
- Mounting position: Any
- IEC degree of protection: IP20 on front
- Operating temperature: -20°C...+70°C (with derating above 40°C)

### Reference standard

Compliant with standard: IEC/EN/BS 60947-2.

- Complete order code with coil voltage as follows:
  - AC 50-60Hz 024 - 048 - 110 - 230 - 400V
  - AC 60Hz 024 60 - 048 60 - 120 60 - 220 60 - 230 60 - 460 60 - 575 60 (V).
- The contactor coil is controlled electronically; it can have either an AC or a DC supply and has a wide operating range. Complete the order code with the coil voltage as follows:
  - AC/DC 024 = 24...60VAC/20...60VDC; 110 = 60...130VAC/DC; 230 = 100...250VAC/DC; 400 = 250...500V.
- For the BF420, BF500, and BF630 contactors, operation is only in DC within the range 24...48V.
- Complete the order code as follows:
  - 1 for P5ME size 100A, 125A and 250A
  - 2 for P5ME size 400A and 630A
  - 3 for P5ME size 800A

## Compliant with Italian standard CEI 0-16 For medium voltage



PMVF3000



EXP10...

Order code	Rated voltage		Qty per pkg	Wt [kg]
	Control [V]	Auxiliary [V]		
			n°	[kg]

Medium voltage system.  
Dual threshold minimum and maximum voltage and frequency protection. Flush mount type.

<b>PMVF3000</b>	Measurements via VTs in MT or direct in LV	100...240VAC/110...250VDC	1	0,389
<b>PMVF3KORL</b>	License for enabling OR logic function on PMVF3000			

Order code	Description
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Relay outputs

<b>EXP1003</b>	2 relays outputs 5A 250VAC
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Communication ports

<b>EXP1010</b>	Opto-isolated USB interface
<b>EXP1011</b>	Opto-isolated RS232 interface
<b>EXP1012</b>	Opto-isolated RS485 interface
<b>EXP1013</b>	Opto-isolated Ethernet interface

Additional expansion modules are available; for more information, refer to the PMVF3000 technical instruction.

### Backup device opening

In installations with more than 400kW, the standard specifies there must be a command signal, that releases another backup device, given within 1 second whenever the IS opening fails or malfunctions.

### Automatic IS reclosing

Whenever an automatic circuit breaker is used as the IS, the PMVF3000 is capable of controlling both the opening (according to the installation conditions indicated in the Italian CEI 0-16 standard) and the auto reclosing. The auto reclosing function includes defining the number of attempts and the time interval between an attempt and the following one as well as generating an alarm if the closing operation does not take place.

This function can be carried out through a programmable output of the PMVF3000 (unless it is already used for the standby device operation) or by installing an EXP1003 expansion module.

### General characteristics

PMVF3000 interface protection system (IP) unit has been developed according to the Italian CEI 0-16 standard prescriptions. It is used when a local generating system is connected in parallel with the medium-voltage utility distribution grid. The controls refer to limits of voltage and frequency monitoring. In the case when either the voltage or the frequency are out of admissible limits, PMVF3000 must step in by de-energising a relay output so that the interface switch (IS) trips. PMVF3000 is equipped with inputs having the following functions:

- 4 digital inputs:
  - IS status feedback
  - Interface protection system exclusion
  - Local control
  - Remote tripping (forced IS opening, independent of voltage and frequency values).
- 2 relays outputs:
  - IS opening
  - Programmable (either as factory default for standby device opening or to set up as auto reclosing if the IS is an automatic circuit breaker)
- Built-in Ethernet port with web server
- OR logic function between multiple IP in communication, enabled by purchasing the PMVF3KORL license
- Integrated NFC connectivity for programming with Android and iOS smart devices and the LOVATO NFC app.

### Operational characteristics

- Auxiliary supply voltage: 100-240VAC/110-250VDC
- Voltage inputs (connection via VTs in MV or directly in LV):
  - Primary: up to 150,000V
  - Secondary: 40...600V (for voltage/frequency); 0...85V (for residual voltage measurement)
- Relay outputs 5A 250VAC AC1 / 5A 30VDC
- 4 digital inputs
- 3 current inputs (for optional measuring): Use via CTs with selectable /5A or /1A secondary
- Widescreen color LCD display
- Expandable up to 2 EXP... series expansion modules
- Parameter configuration and remote control with software **Synergy** and **Xpress**
- Flush mount housing, cut-out 92x92mm
- Degree of protection: IP65 on front
- Predisposed for IEC/EN/BS 61850 signal supervision using expansion or external module.

### Reference standards

Compliant with standards: Italian CEI 0-16; IEC/EN/BS 60255-27, IEC/EN/BS 60255-26.

## Remote control and monitoring GSM modem via SMS

Compliant with Italian CEI 0-16 Standard, paragraph 8.8.6.5 and annex M, resolution 421/2014 of the ARERA



EXCGSM01

Order code	Description	Qty per pkg	Wt [kg]
		n°	[kg]

GSM Modem (modular - 4U).  
IP69K outdoor aerial with 2.5m cable.  
RJ45-USB programming cable (included).

<b>EXCGSM01</b>	100...240VAC, 1 digital input, 1 analog input (0...10V, 0...20mA, NTC), 1 relay output, SMS send/receive for remote control and alarm signals	1	0.340
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### Use with CEI 0-16

The CEI 0-16 standard in paragraph 8.8.6.5 and in attachment M prescribes that the electricity production plants powered by wind or solar photovoltaic sources with power greater than or equal to 100kW, connected or to be connected to medium voltage grids, are equipped with GSM modem. Thanks to this modem it is possible to manage the disconnection of the generation through the messages sent by the energy distributor.

### AERIAL

- Quad band 850/900/1800/1900MHz
- Degree of protection: outdoor IP69K
- 2.5m cable
- Fixing via M10 hole:
  - with adhesive seal
  - with threaded pin and nut.

### General characteristics

With EXCGSM01 it is possible to remotely operate a relay output and obtain information on the system by sending programmable SMS. Using the configuration software (downloaded for free from [www.LovatoElectric.com](http://www.LovatoElectric.com)) the user can control the relay output and both the digital and analog inputs. The logic is based on events (for example, the activation of the digital input or the arrival of an SMS with specific text), to which the user can decide specific actions (reply either by SMS or voice message, or by switching the relay output).

### Operational characteristics

- Auxiliary supply voltage: 100...240VAC
- 1 digital output 3A 250VAC
- 1 self-supplied digital input
- 1 analog input 0...10V, 0...20mA, NTC
- Housing for 3V and 1.8V SIM card
- SIM PIN management
- Temperature sensor
- Update time, sunrise and sunset via GSM network
- Position update via GSM
- Certified according to FCC rules, part 15B
- Housing: modular (4 modules)
- Mounting on 35mm DIN rail
- Operating temperature: -20...+60°C
- Degree of protection: IP40 on front; IP20 on terminals.

### Reference standards

Compliant with electrical safety standards: EN/BS 62368, EN/BS 62311.

## Compliant with Italian standard CEI 0-21 For low voltage



PMVF52



EXM10...

Order code	Rated voltage		Qty per pkg	Wt [kg]
	Control [V]	Auxiliary [V]		
PMVF52	230VAC 400VAC	24...240VAC/ 24...240VDC	1	0.470

Low voltage system.  
Dual threshold minimum and maximum voltage and frequency protection. Modular type with 2 relay outputs.

Order code	Description
EXPANSION MODULES FOR PMVF52. Communication ports.	
EXM1010	Opto-isolated USB interface
EXM1011	Opto-isolated RS232 interface
EXM1012	Opto-isolated RS485 interface
EXM1013	Opto-isolated Ethernet interface
EXM1018	IEC/EN/BS 61850 interface
Inputs and outputs.	
EXM1001	2 digital opto-isolated inputs and 2 relay outputs 5A 250VAC

### General Characteristics

PMVF52 interface protection system (IP) unit has been developed according to the Italian CEI 0-21 standard prescriptions. Each is used when a local solar generating system is connected in parallel with the low-voltage electric utility. The controls refer to limits of voltage and frequency monitoring.

In the case when either the voltage or the frequency are out of admissible limits, PMVF52 must step in by de-energising a relay output so that the interface switch (IS) trips.

PMVF52 is certified for use in single and three phase systems, where it is required in presence of storage systems connected in parallel to the distribution network and to the photovoltaic inverter on the AC side (presence of multiple energy generators simultaneously or exceeding the threshold of 11.08kW overall).

PMVF52 is equipped with 5 inputs having the following functions:

- IS status feedback
- External signal for frequency selection (communication network malfunction)
- Local control for frequency selection
- Remote tripping (forced IS opening, independent of voltage and frequency values)
- 5th programmable input.

Also, there are three relay outputs for:

- IS opening and closing
- Standby device opening (programmable: retentive normally energised, retentive normally de-energised or adjustable pulse)
- 3rd programmable output.

The standby device control is compulsory in installations with more than 20kW and consists of a signal, with a 0.5s delay respect to the IS opening command, transmitted only if the IS failed and did not complete the disconnection.

### Operational characteristics

- Auxiliary supply voltage: 24...240VAC/24...240VDC
- Voltage inputs:
  - 400VAC (three-phase connection)
  - 230VAC (single-phase connection)
- Relay outputs
  - OUT1: 8A 250VAC, 8A 30VDC
  - OUT2: 5A 250VAC, 5A 30VDC
  - OUT3: 2A 250VAC, 2A 30VDC
- Parameter configuration and remote control (only with communication expansion module) with software **Synergy** and **Xpress**
- Housing: Flush mount 96x96mm/3.78x3.78"
- IEC degree of protection: IP65 on front; IP20 on terminals
- Predisposed for IEC/EN/BS 61850 signal supervision using expansion or external module.

### Reference standards

Compliant with standards: Italian CEI 0-21, IEC/EN/BS 60255-27, IEC/EN/BS 61010-1, IEC/EN/BS 61000-6-2, IEC/EN/BS 61000-6-3.

## Backup power supply for interface protection system units



PMVFUPS02

Order code	Description	Qty per pkg	Wt
Backup power supply for interface protection system units PMVF series.			
PMVFUPS02	Input 230VAC. Output 230VAC with stored energy 645Ws and power 50VA	1	0.500

### Compatibility:

- Compatible with contactors (IS or backup function) with standard AC or electronic coil.
- Compatible with undervoltage trip releases (IS or backup function) of moulded case circuit breakers.
- Compatible with PMVF series interface protection system units.

Note. For use with PMVF3000, an isolation transformer with secondary 100...240VAC, 30VA must be interposed. For more information, contact our Technical Support at [service@lovatoelectric.com](mailto:service@lovatoelectric.com).

### General characteristics

CEI 0-21 and CEI 0-16 standards require an auxiliary power supply to feed the interface protection (IP), the interface switch (IS) and the backup switch for at least 5 seconds in the event of a power failure. PMVFUPS02 guarantees the necessary energy by accumulating it in capacitors, thus avoiding the use of batteries that require maintenance.

### Operational characteristics

- Power supply: 230VAC, 50Hz
- Output voltage: 230VAC, 50Hz
- Output power: 50VA
- Accumulated energy: 645Ws
- Accumulation time: 60s
- 9U modular housing
- Operating temperature: -5...+ 50°C
- Degree of protection IP20.

### Reference standards

Compliant with standards: IEC/EN/BS 61010-1.

**Compliant with low, medium and high voltage**



PMVF81  
PMVF90



EXM10...



PMVFUPS02



EXCGSM01

Order code	Rated voltage		Qty per pkg	Wt
	Control	Auxiliary		
	[V]	[V]	n°	[kg]

Three-phase systems with or without neutral.  
Dual threshold minimum and maximum voltage and frequency protection. R.O.C.O.F and Vector shift.  
Modular type with three relay outputs.

<b>PMVF81</b>	230VAC 400VAC	24...240VAC/ 24...240VDC	1	0.470
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For systems requiring 3 maximum voltage thresholds.

<b>PMVF90</b>	Programmable	24...240VAC/ 24...240VDC	1	0.326
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Order codes	Description
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EXPANSION MODULES FOR PMVF81 AND PMVF90  
Communication ports.

<b>EXM1010</b>	Opto-isolated USB interface
<b>EXM1011</b>	Opto-isolated RS232 interface
<b>EXM1012</b>	Opto-isolated RS485 interface
<b>EXM1013</b>	Opto-isolated Ethernet interface
<b>EXM1018</b>	IEC/EN 61850 interface

Inputs and outputs.

<b>EXM1001</b>	2 digital opto-isolated inputs and 2 relay outputs 5A 250VAC
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Order code	Description
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Accessories for PMVF81 and PMVF90

<b>PMVFUPS02</b>	Backup power supply for interface protection system units PMVF..., 230VAC
<b>EXCGSM01</b>	Remote control and monitoring GSM modem via SMS

#### IEC/EN/BS 61850 protocol

The EXP1018 module will be made available only when the competent authorities have established the exact terms of the supervision and control of the specific commands (currently under study as specified in the Italian CEI 0-16 standard).

- ② For details see page 11.
- ③ For details see page 10.

#### Reference standards

##### PMVF81

Germany: VDE-AR-N 4105, VDE-AR-N 4110, VDE-AR-N 4120

South Africa: VDE-AR-N 4105

Poland: VDE-AR-N 4105

Australia: VDE-AR-N 4105

Switzerland: NA/EEA-NE7 – CH 2020

Chile: VDE-AR-N 4105, VDE V 0126-1-1

France: VDE V 0126-1-1

Romania: VDE-AR-N 4105, VDE-AR-N 4110, VDE-AR-N 4120

##### PMVF90

Slovakia - Czech Republic:  
systems requiring 3 maximum voltage thresholds.

#### General characteristics

PMVF... interface protection system (IP) units have been developed in order to be used when a local generating system is connected in parallel with the utility distribution grid. The controls refer to limits of voltage and frequency monitoring. In the case when either the voltage or the frequency are out of admissible limits, the PI must step in by de-energising a relay output so that the interface device (IS) trips.

PMVF81 and PMVF90 are equipped with 5 inputs having the following functions:

- IS status feedback
- R.O.C.O.F or Vector shift delay
- Disabling signal
- Remote tripping (forced IS opening, independent of voltage and frequency values)
- Programmable

Also, there are 3 relay outputs for:

- IS opening and closing
- Backup device opening: PMVF81 is able to manage as backup both a contactor or a breaker (pulse or continuous type)
- Programmable (default: global alarm).

The backup device consists of a signal contemporary or delayed respect to the IS opening command, transmitted only if the IS failed and did not complete the disconnection.

#### Operational characteristics

- Auxiliary supply voltage: 24...240VAC/24...240VDC
- Voltage inputs range: 50-500000VAC
- Relay outputs:
  - OUT1: 8A 250VAC, 8A 30VDC
  - OUT2: 5A 250VAC, 5A 30VDC
  - OUT3: 2A 250VAC, 2A 30VDC
- Password for parameters protection
- 5 digital inputs
- Programmable rated voltage, programmable voltage and frequency thresholds and delays
- Support of EXM series communications modules (USB, RS232, RS485, Ethernet)
- Event log (128 events with time reference):
  - Interface protection trip events
  - Password interaction events
  - Commands execution
  - System events
- Parameter configuration and remote control (only with communication expansion module) with software **Xpress** and **Synergy**
- Housing: modular, 4 modules
- Degree of protection: IP40 on front; IP20 on terminals
- Predisposed for IEC/EN 61850 signal supervision using expansion or external module ①.

#### Reference standards

Compliant with standards: VDE-AR-N 4105, VDEAR-N 4110, VDE-AR-N 4120 and IEC/EN 61010-1 only PMVF81. PMVF90 and PMVF81 IEC/EN 61000-6-2, IEC/EN 61000-6-4 application guides.

**Compliant with standards ENA G59-3/G99, SHAMS DUBAI - DRRG STANDARDS (DEWA), SEC (Saudi Electricity Company)**



PMVF60  
PMVF70



EXM10...



PMVFUPS02

Order code	Rated voltage Control	Auxiliary	Qty per pkg	Wt
	[V]	[V]	n.	[kg]
Dual threshold minimum and maximum voltage and frequency protection, R.O.C.O.F. and Vector shift. Modular type.				
Compliant with standards DEWA DRRG and SEC (Saudi Electricity Company).				
<b>PMVF60</b>	Programmable	100...240VAC/ 110...250VDC	1	0.470
Compliant with standards ENA G59-3/G99.				
<b>PMVF70</b>	Programmable	100...240VAC/ 110...250VDC	1	0.470

Order code	Description
EXPANSION MODULES FOR PMVF60 AND PMVF70 Communication ports.	
<b>EXM1010</b>	Opto-isolated USB interface
<b>EXM1011</b>	Opto-isolated RS232 interface
<b>EXM1012</b>	Opto-isolated RS485 interface
<b>EXM1013</b>	Opto-isolated Ethernet interface
<b>EXM1018</b>	IEC/EN/BS 61850 interface
Inputs and outputs.	
<b>EXM1001</b>	2 digital opto-isolated inputs and 2 relay outputs 5A 250VAC

Order code	Description
Accessories for PMVF60 and PMVF70	
<b>PMVFUPS02</b>	Backup power supply for interface protection system units PMVF..., 230VAC

**IEC/EN/BS 61850 protocol**

The EXP1018 module will be made available only when the competent authorities have established the exact terms of the supervision and control of the specific commands.

For details see page 11.

**General characteristics**

PMVF... interface protection system (IP) units have been developed in order to be used when a local generating system is connected in parallel with the utility distribution grid. The controls refer to limits of voltage and frequency monitoring.

In the case when either the voltage or the frequency are out of admissible limits, the PI must step in by de-energising a relay output so that the interface device (IS) trips.

PMVF... is equipped with 4 inputs having the following functions:

- IS status feedback
- R.O.C.O.F./Vector shift delay or external signal for frequency selection (communication network malfunction)
- Disabling signal
- Remote tripping (forced IS opening, independent of voltage and frequency values).

Also, there are two relay outputs for:

- IS opening and closing
- Standby device opening (programmable: retentive normally energised, retentive normally de-energised or adjustable pulse).

The backup device consists of a signal contemporary or delayed respect to the IS opening command, transmitted only if the IS failed and did not complete the disconnection.

PMVF... also has two additional relay outputs (EXM1001) to configure as:

- Programmable alarm
- Autonomous signalling in case of phase power unbalance (LSP), only if three CTs are also installed.

**Operational characteristics**

- Auxiliary supply voltage: 100...240VAC/110...250VDC
- Voltage inputs: max 400VAC
- Relay outputs:
  - OUT1: 5A 250VAC AC1 / 5A 30VDC
  - OUT2: 5A 250VAC AC1 / 5A 30VDC
- Password for parameters protection
- 4 digital inputs
- Current inputs (optional): use via CTs with selectable /5A or /1A secondary
- Support of EXM series communications ports (USB, RS232, RS485, Ethernet) see section 31
- Parameter configuration and remote control (only with communication expansion module) with software **Synergy** and **Xpress**
- Housing modular (6 modules)
- Mounting on 35mm DIN rail (IEC/EN/BS 60715) or screw fixing via pull out tabs
- Degree of protection: IP40 on front; IP20 on terminals.

**Reference standards**

Compliant with standards: DEWA DRRG (PMVF60); SEC (PMVF60); ENA G59-3/G99 (PMVF70); VDE-AR-N 4105, VDE V 0126-1-1 (PMVF80); IEC/EN/BS 60255-27; IEC/EN/BS 61010-1, IEC/EN/BS 61000-6-2, IEC/EN/BS 61000-6-4.

## Miniature circuit breakers 1...63A

### 2P, 4P - 10kA (IEC/EN/BS)



P1MB4P...

Order code	Curve	IEC In	IEC Icn	Mod. DIN	Qty per pkg	Wt
		[A]	[kA]	n°	n°	[kg]
Miniature circuit breakers – 2P – C-curve characteristic.						
P1MB2PC16	C	16	10	2	6	0.230
P1MB2PC20	C	20	10	2	6	0.230
P1MB2PC25	C	25	10	2	6	0.230
P1MB2PC32	C	32	10	2	6	0.230
P1MB2PC40	C	40	10	2	6	0.230
Miniature circuit breakers – 4P – C-curve characteristic.						
P1MB4PC20	C	20	10	4	3	0.460
P1MB4PC25	C	25	10	4	3	0.460
P1MB4PC32	C	32	10	4	3	0.460
P1MB4PC40	C	40	10	4	3	0.460
P1MB4PC50	C	50	10	4	3	0.460
P1MB4PC63	C	63	10	4	3	0.460

#### General characteristics

These devices are used to protect against short circuits and overloads of wiring installations and loads in panel boards, office buildings, stores and similar applications.

Their purpose is circuit protection, circuit isolation and load operation controls. They have characteristics of instantaneous trip defined as follows:

- C-curve: instantaneous trip 5...10 times I<sub>n</sub> for inductive loads (mixed loads, resistive and inductive with low inrush current)

Main features include:

- IEC rated current I<sub>n</sub>: 1...63A
- Pole width: 17.5mm / 0.69"
- Contact status with flag indicator
- Trip characteristic: curve type B, C and D
- Auxiliary contacts and trip releases mounted on left side
- Fixing on 35mm DIN rail (IEC/EN/BS 60715).

#### Operational characteristics

- Dissipation per pole: 3...13W
- IEC rated insulation voltage U<sub>i</sub>: 440V
- IEC rated impulse voltage U<sub>imp</sub>: 4kV
- IEC rated operational voltage U<sub>e</sub>: 230/400VAC
- UL 1077 rated operational voltage: 480VAC
- Short circuit breaking capacity: IEC/EN/BS 10kA - UL 7.5kA 480V.

#### Certifications and compliance

Certifications obtained: cURus (E369585); EAC; TÜV-Rheinland. Compliant with standards: IEC/EN/BS 60898-1, IEC/EN/BS 60947-2, UL 1077, CSA C22.2 n°235.

## Miniature circuit breakers 80...125A

### 4P - 10kA



P2MB4P...

Order code	Curve	IEC In	IEC Icn	Mod. DIN	Qty per pkg	Wt
		[A]	[kA]	n°	n°	[kg]
Miniature circuit breakers - 4P - C-curve characteristic.						
P2MB4PC080	C	80	10	6	2	0.680
P2MB4PC100	C	100	10	6	2	0.680
P2MB4PC125	C	125	10	6	2	0.680

#### General characteristics

- IEC rated current I<sub>n</sub>: 80...125A
- Pole width: 27mm / 1.06"
- Contact status with flag indicator
- Trip characteristic: curve type C and D
- Fixing on 35mm DIN rail (IEC/EN/BS 60715).

#### Operational characteristics

- Dissipation per pole: 15...20W
- IEC rated insulation voltage U<sub>i</sub>: 400V
- IEC rated impulse voltage U<sub>imp</sub>: 4kV
- IEC rated operational voltage U<sub>e</sub>: 230/400VAC (230VAC 1P version)
- Short circuit breaking capacity: IEC/EN/BS 10kA - UL 5kA 240V (1P) - 5kA 480V (2-3-4P).

#### Certifications and compliance

Certifications obtained: cURus (E369585); EAC; TÜV-Rheinland. Compliant with standards: IEC/EN/BS 60898-1, IEC/EN/BS 60947-2, UL 1077, CSA C22.2 n°235.

## Residual current operated circuit breakers

### 1P+N - 10kA



P1RE1N...

Order code	Curve	IEC In	IEC Icn	IEC I n	Mod. DIN	Qty per pkg	Wt
		[A]	[kA]	[mA]	n°	n°	[kg]
Single pole + neutral RCBO type AC.							
P1RE1NC06AC030	C	6	10	30	2	1	0.205
P1RE1NC06AC300	C	6	10	300	2	1	0.205
P1RE1NC10AC030	C	10	10	30	2	1	0.205
P1RE1NC10AC300	C	10	10	300	2	1	0.205
P1RE1NC16AC030	C	16	10	30	2	1	0.205
P1RE1NC16AC300	C	16	10	300	2	1	0.205
P1RE1NC20AC030	C	20	10	30	2	1	0.205
P1RE1NC20AC300	C	20	10	300	2	1	0.205
P1RE1NC25AC030	C	25	10	30	2	1	0.205
P1RE1NC25AC300	C	25	10	300	2	1	0.205
P1RE1NC32AC030	C	32	10	30	2	1	0.205
P1RE1NC32AC300	C	32	10	300	2	1	0.205
P1RE1NC40AC030	C	40	10	30	2	1	0.205
P1RE1NC40AC300	C	40	10	300	2	1	0.205

#### General characteristics

These RCCBs are intended for the protection of people against indirect contact (electric shock) and of installations against fire hazards due to a persistent earth/ground fault current. They also protect against short circuit and overcurrent.

From a practical point of view, they integrate both functions of MCB and of RCCB.

Its main features are:

- IEC rated current I<sub>n</sub>: 6...40A
- Version: 1P+N
- Contact status with flag indicator
- Double control lever to distinguish the residual current tripping from short circuit or overcurrent tripping
- Trip characteristic: curve type C
- Fixing on 35mm DIN rail (IEC/EN/BS 60715).

#### Operational characteristics

- Dissipation per pole: 3...13W
- Rated insulation voltage U<sub>i</sub>: 400V
- Rated impulse voltage U<sub>imp</sub>: 4kV
- Operating frequency: 50/60Hz
- Rated operational voltage U<sub>e</sub>: 230VAC
- Rated residual operating voltage I<sub>n</sub>: 30mA or 300mA
- IEC short-circuit breaking capacity I<sub>cn</sub>: 10kA

#### Certifications and compliance

Certifications obtained: TÜV Rheinland, EAC. Compliant with standards: IEC/EN/BS 61009-1, IEC/EN/BS 61009-2-1.

## Single-phase direct connection energy meters



Type	DMED100T1	DMED110T1	DMED111	DMED112	DMED115T1	DMED120T1	DMED121	DMED122
Maximum current	40A	40A	40A	40A	40A	63A	63A	63A
Display								
Vertical, no backlight	●	●	●	●				
Horizontal, backlight					●	●	●	●
Measurements								
kWh	●	●	●	●	●	●	●	●
kW with average and max demand		●	●	●	●	●	●	●
kvarh, kvar, V, I, Hz, PF, total and partial hour counter		●	●	●		●	●	●
Interface								
Pulse output	●							
Programmable output (pulses/thresholds)		●			●	●		
Built-in Modbus-RTU (RS485)			●				●	
Built-in M-Bus				●				●
MID version -25...+55°C❶	●	●	●	●		●	●	●
MID version -25...+70°C❷			●	●				
Compatibility with Synergy and Xpress software			●				●	

## Three-phase energy meters



Type	DMED300T2	DMED311	DMED302	DMED305T2	DMED330	DMED332	DMED310T2
Maximum current	80A	80A	80A	CT /5 o CT /1	CT /5 o CT /1	CT /5 o CT /1	CT /5
Connection type							
Direct	●	●	●				
Via CT				●	●	●	●
Interface							
Programmable output (pulses/thresholds)	●			●			●
Built-in Modbus-RTU (RS485)		●			●		
Built-in M-Bus			●			●	
Expandability							
Communication (RS485, Ethernet, USB)							●
Relay outputs for load disconnection							●
Data memory (Data logger)							●
MID version -25...+55°C❶❸	●		●	●	●	●	●
MID version -25...+70°C❷		●					
cULus version (ANSI C12.20)❹	●						
Compatibility with Synergy and Xpress software		●			●		●

- ❶ For MID versions up to +55°C, add "MID" at the end of the code.
- ❷ For MID versions up to +70°C, add "MID7" at the end of the code.
- ❸ For cULus versions add "UL" at the end of the code.
- ❹ UTF certified versions available on request.



## SOLUTIONS FOR PHOTOVOLTAIC APPLICATIONS



ENERGY AND AUTOMATION

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