



- Modular versions suitable for different types of installations, DIN rail, screw fixing or switchboard, also suitable for rear mounting plate fixing
- Minimum and maximum voltage monitoring relays for single and three-phase systems, with or without neutral
- Voltage asymmetry, phase sequence and phase loss control relays
- Multifunction voltage and frequency monitoring relays with NFC technology and APP
- Frequency monitoring relays
- Minimum and maximum current monitoring relays
- Insulation monitoring relays
- Interface protection system units compliant with standards CEI 0-21, CEI 0-16, DEWA DRRG, ENA G98/G99, VDE-AR-N 4105, VDE-AR-N 4110, VDE-AR-N 4120, VDE V 0126-1-1, SEC (Saudi Electricity Company).

Voltage monitoring relays

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Frequency monitoring relays	22 - 9
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Current monitoring relays

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VOLTAGE MONITORING RELAYS

- For three-phase systems with or without neutral and single-phase systems
- Minimum and maximum AC voltage
- Phase loss and incorrect phase sequence
- Asymmetry
- Minimum and maximum frequency.



Page 22-8

MULTIFUNCTION VOLTAGE AND FREQUENCY MONITORING RELAYS

- Voltage and frequency monitoring relays for three-phase systems with or without neutral
- Programmable via NFC technology and APP
- Minimum and maximum AC voltage
- Phase loss, neutral loss and incorrect phase sequence
- Asymmetry
- Minimum and maximum frequency.



Page 22-9

FREQUENCY MONITORING RELAYS

- For single and three-phase systems
- Minimum frequency
- Maximum frequency.



Pages 22-9 and 10

CURRENT MONITORING RELAYS

- For single and three-phase systems
- Maximum AC/DC current
- Minimum or maximum AC/DC current
- Minimum and maximum AC/DC current.



Page 22-11

PUMP PROTECTION RELAYS

- For single and three-phase systems
- Minimum $\cos\phi$ for dry running protection
- Maximum AC current
- Phase loss and incorrect phase sequence.



Page 22-11

INSULATION MONITORING RELAYS

- Insulation monitoring for IT network up to 230VAC
- Front LEDs for trip and status indication operation
- Test pushbutton
- Adjustable intervention threshold.



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INTERFACE PROTECTION SYSTEM UNITS

- Compliant with Italian standard CEI 0-21, for low voltage
- Compliant with Italian standard CEI 0-16, for medium voltage
- Compliant with standard SHAMS DUBAI - DRRG (DEWA)
- Compliant with technical guide SEC (Saudi Electricity Company)
- Compliant with technical guide ENA G98/G99
- Compliant with technical guide VDE-AR-N 4105, VDE-AR-N 4110, VDE-AR-N 4120 and VDE V 0126-1-1.

Voltage monitoring relays for three-phase systems without neutral



	PMV10	PMV20	PMV30	PMV40	PMV50	PMV70
Modular version	●(1U)	●(2U)	●(2U)	●(2U)	●(2U)	●(2U)
Minimum AC voltage			●		●	●
Maximum AC voltage					●	●
Phase loss	●	●	●	●	●	●
Incorrect phase sequence	●	●	●	●	●	●
Asymmetry				●		●
Page			22-4		22-5	22-5

Voltage monitoring relays for three-phase systems with or without neutral



	PMV50N	PMV70N	PMV80N	PMV95N
Modular version	●(3U)	●(3U)	●(3U)	●(2U)
Minimum AC voltage	●	●	●	●
Maximum AC voltage	●	●	●	●
Phase loss	●	●	●	●
Neutral loss	●	●	●	●
Incorrect phase sequence	●	●	●	●
Asymmetry		●		●
Minimum frequency			●	●
Maximum frequency			●	●
Programmable via NFC technology and APP				●
Page	22-6	22-6	22-7	22-8

Voltage monitoring relay for single-phase systems



	PMV55
Modular version	●(2U)
Minimum AC voltage	●
Maximum AC voltage	●
Page	22-7

Frequency monitoring relays for single-phase and three-phase systems



	PMF20
Modular version	●(2U)
Minimum frequency	●
Maximum frequency	●
Page	22-9

Current monitoring relays for single and three-phase systems



	PMA20	PMA30	PMA40
Modular version	●(2U)	●(2U)	●(3U)
Maximum AC/DC current	●		
Minimum or maximum AC/DC current		●	
Minimum and maximum AC/DC current			●
Page	22-9	22-10	22-10

Pump protection relay for single and three-phase systems



Insulation monitoring relay



	PMA50
Modular version	●(3U)
Minimum cosφ for dry running pump protection	●
Maximum AC current	●
Phase loss	●
Incorrect phase sequence	●
Page	22-11

	PMIB1A230
Modular version	●(3U)
Adjustable low insulation intervention threshold	●
Page	22-11

Interface protection system units



	PMVF3000	PMVF52	PMVF61	PMVF71	PMVF81	PMVF90
CEI 0-21		●				
CEI 0-16	●					
DEWA DRRG			●			
SEC (Saudi Electricity Company)			●			
ENA G98/G99				●		
VDE-AR-N 4105					●	
VDE V 0126-1-1					●	
For systems requiring 3 maximum voltage thresholds						●
Page	22-13	22-12	22-15	22-15	22-14	22-15

For three-phase systems, without neutral



PMV10A440

PMV20...

Order code	Rated voltage to control U _e (phase-to-phase)	Qty per pkg	Wt
	[V] 50/60Hz	n°	[kg]

Three-phase system, without neutral. Phase loss and incorrect phase sequence. Instantaneous trip. 1 module housing.

PMV10A440	208...480VAC	1	0.050
2 modules housing.			
PMV20A240	100...240VAC	1	0.120
PMV20A575	208...575VAC	1	0.120
PMV20A600	380...600VAC	1	0.120



PMV30...

Order code	Rated voltage to control U _e (phase-to-phase)	Qty per pkg	Wt
	[V] 50/60Hz	n°	[kg]

Three-phase system, without neutral. Minimum AC voltage. Delayed trip. Phase loss and incorrect phase sequence. Instantaneous trip.

PMV30A240	208...240VAC	1	0.130
PMV30A575	380...575VAC	1	0.130
PMV30A600	600VAC	1	0.130



PMV40...

Order code	Rated voltage to control U _e (phase-to-phase)	Qty per pkg	Wt
	[V] 50/60Hz	n°	[kg]

Three-phase system, without neutral. Asymmetry. Delayed trip. Phase loss and incorrect phase sequence. Instantaneous trip.

PMV40A240	208...240VAC	1	0.130
PMV40A575	380...575VAC	1	0.130
PMV40A600	600VAC	1	0.130

General characteristics

- Voltage monitoring relay, self powered, for phase loss and incorrect phase sequence
- Phase loss detection if one of the voltages is <70% rated value
- Phase loss tripping time: 60ms
- 1 relay output with 1 changeover contact (SPDT)
- Modular DIN 43880 housing: 1 module for PMV10; 2 modules for PMV20
- Mounting on 35mm DIN rail (IEC/EN/BS 60715) or screw fixing via pull out tabs
- IEC degree of protection: IP40 on front (only when placed in IP40 enclosure or control board); IP20 at terminals.

Certifications and compliance

Certifications obtained: UL Listed, for USA and Canada (cULus - File E93601) as Auxiliary Devices; EAC. Compliant with standards: IEC/EN/BS 60255-27, IEC/EN/BS 61000-6-2, IEC/EN/BS 61000-6-3, UL 508, CSA C22.2 n° 14.

General characteristics

- Voltage monitoring relay, self powered, for minimum voltage, phase loss and incorrect phase sequence
- Configurable rated voltage (U_e):
 - PMV30A240: 208-220-230-240VAC
 - PMV30A575: 380-400-415-440-460-480-525-575VAC
- Excellent tripping accuracy
- TRMS measurements (True Root Mean Square)
- Control of phase-to-phase voltages
- Phase loss detection if one of the voltages is <70% rated value
- Phase loss tripping time: 60ms
- 1 relay output with 1 changeover contact (SPDT)
- Modular DIN 43880 housing, 2 modules
- Mounting on 35mm DIN rail (IEC/EN/BS 60715) or screw fixing via pull out tabs
- IEC degree of protection: IP40 on front (only when placed in IP40 enclosure or control board); IP20 at terminals.

ADJUSTMENTS

"V min"	Minimum voltage tripping threshold 80...95% U _e
"Delay"	Tripping time 0.1...20s
"Reset delay"	Resetting time 0.1...20s.

Certifications and compliance

Certifications obtained: UL Listed, for USA and Canada (cULus - File E93601), as Auxiliary Devices; EAC. Compliant with standards: IEC/EN/BS 60255-27, IEC/EN/BS 61000-6-2, IEC/EN/BS 61000-6-3, UL 508, CSA C22.2 n° 14.

General characteristics

- Voltage monitoring relay, self powered, for asymmetry, phase loss and incorrect phase sequence
- Excellent tripping accuracy
- TRMS measurements (True Root Mean Square)
- Control of phase-to-phase voltages
- Phase loss detection if one of the voltages is <70% rated value
- Phase loss tripping time: 60ms
- 1 relay output with 1 changeover contact (SPDT)
- Modular DIN 43880 housing, 2 modules
- Mounting on 35mm DIN rail (IEC/EN/BS 60715) or screw fixing via pull out tabs
- IEC degree of protection: IP40 on front (only when placed in IP40 enclosure or control board); IP20 at terminals.

ADJUSTMENTS

"Asymmetry"	High voltage asymmetry tripping threshold 5...15% U _e
"Delay"	Tripping time 0.1...20s
"Reset delay"	Resetting time 0.1...20s.

Certifications and compliance

Certifications obtained: UL Listed, for USA and Canada (cULus - File E93601), as Auxiliary Devices; EAC. Compliant with standards: IEC/EN/BS 60255-27, IEC/EN/BS 61000-6-2, IEC/EN/BS 61000-6-3, UL 508, CSA C22.2 n° 14.

For three-phase systems, without neutral



PMV50...

Order code	Rated voltage to control Ue (phase-to-phase)	Qty per pkg	Wt
	[V] 50/60Hz	n°	[kg]

Three-phase system, without neutral.
Minimum and maximum AC voltage. Delayed trip.
Phase loss and incorrect phase sequence. Instantaneous trip.

PMV50A240	208...240VAC	1	0.130
PMV50A575	380...575VAC	1	0.130
PMV50A600	600VAC	1	0.130

General characteristics

- Voltage monitoring relay, self powered, for minimum and maximum voltage, phase loss and incorrect phase sequence
- Configurable rated voltage (Ue):
 - PMV50A240: 208-220-230-240VAC
 - PMV50A575: 380-400-415-440-460-480-525-575VAC
- High tripping accuracy
- TRMS measurements (True Root Mean Square)
- Control of phase-to-phase voltages
- Phase loss detection if one of the voltages is <70% rated value
- Phase loss tripping time: 60ms
- 1 relay output with 1 changeover contact (SPDT)
- Modular DIN 43880 housing, 2 modules
- Mounting on 35mm DIN rail (IEC/EN/BS 60715) or screw fixing via pull out tabs
- IEC degree of protection: IP40 on front (only when placed in IP40 enclosure or control board); IP20 on terminals.

ADJUSTMENTS

“V max” Maximum voltage tripping threshold
105...115% Ue

“V min” Minimum voltage tripping threshold
80...95% Ue

“Delay” for each Tripping time 0.1...20s

“Reset delay” Resetting time 0.1...20s.

Certifications and compliance

Certifications obtained: UL Listed, for USA and Canada (cULus - File E93601) as Auxiliary Devices; EAC.
Compliant to standards: IEC/EN/BS 60255-27, IEC/EN/BS 61000-6-2, IEC/EN/BS 61000-6-3, UL 508, CSA C22.2 n° 14.



PMV70...

Order code	Rated voltage to control Ue (phase-to-phase)	Qty per pkg	Wt
	[V] 50/60Hz	n°	[kg]

Three-phase system, without neutral.
Minimum and maximum AC voltage and asymmetry.
Delayed trip.
Phase loss and incorrect phase sequence. Instantaneous trip.

PMV70A240	208...240VAC	1	0.130
PMV70A575	380...575VAC	1	0.130
PMV70A600	600VAC	1	0.130

General characteristics

- Voltage monitoring relay, self powered, for minimum and maximum voltage, phase loss, incorrect phase sequence and asymmetry
- Configurable rated voltage (Ue):
 - PMV70A240: 208-220-230-240VAC
 - PMV70A575: 380-400-415-440-460-480-525-575VAC
- Excellent tripping accuracy
- TRMS measurements (True Root Mean Square)
- Control of phase-to-phase voltages
- Phase loss detection if one of the voltages is <70% rated value
- Phase loss tripping time: 60ms
- 1 relay output with 1 changeover contact (SPDT)
- Modular DIN 43880 housing, 2 modules
- Mounting on 35mm DIN rail (IEC/EN/BS 60715) or screw fixing via pull out tabs
- IEC degree of protection: IP40 on front (only when placed in IP40 enclosure or control board); IP20 at terminals.

ADJUSTMENTS

“V max” Maximum voltage tripping threshold
105...115% Ue

“V min” Minimum voltage tripping threshold
80...95% Ue

“Delay” for each Tripping delay 0.1...20s

“Asymmetry” High voltage asymmetry tripping threshold
5...15% Ue.

Certifications and compliance

Certifications obtained: UL Listed, for USA and Canada (cULus - File E93601), as Auxiliary Devices; EAC.
Compliant with standards: IEC/EN/BS 60255-27, IEC/EN/BS 61000-6-2, IEC/EN/BS 61000-6-3, UL 508, CSA C22.2 n° 14.

For three-phase systems with or without neutral



PMV50N...

Order code	Rated voltage to control Ue (phase-to-phase)	Qty per pkg	Wt
	[V] 50/60Hz	n°	[kg]

Three-phase system, with or without neutral. Minimum and maximum AC voltage. Delayed trip. Phase loss, neutral loss and incorrect phase sequence. Instantaneous trip.

PMV50NA240	208...240VAC	1	0.200
PMV50NA440	380...440VAC	1	0.200
PMV50NA600	480...600VAC	1	0.200



PMV70N...

Order code	Rated voltage to control Ue (phase-to-phase)	Qty per pkg	Wt
	[V] 50/60Hz	n°	[kg]

Three-phase system, with or without neutral. Minimum and maximum AC voltage and asymmetry. Delayed trip. Phase loss, neutral loss and incorrect phase sequence. Instantaneous trip.

PMV70NA240	208...240VAC	1	0.200
PMV70NA440	380...440VAC	1	0.200
PMV70NA600	480...600VAC	1	0.200

General characteristics

- Voltage monitoring relay, self powered, for minimum and maximum voltage, phase loss, neutral loss and incorrect phase sequence
- 4 configurable rated voltages (Ue):
 - **PMV50NA240:** 208-220-230-240VAC (phase-to-phase) 120-127-132-138VAC (phase-to-neutral)
 - **PMV50NA440:** 380-400-415-440VAC (phase-to-phase) 220-230-240-254VAC (phase-to-neutral)
 - **PMV50NA600:** 480-525-575-600VAC (phase-to-phase) 277-303-332-347VAC (phase-to-neutral)
- Excellent tripping accuracy
- TRMS measurements (True Root Mean Square)
- Phase loss detection when one of the voltages is <70% rated voltage
- Phase or neutral loss tripping time: 60ms
- 2 relay outputs, each with 1 changeover contact (SPDT)
- Modular DIN 43880 housing, 3 modules
- Mounting on 35mm DIN rail (IEC/EN/BS 60715) or screw fixing via pull out tabs
- IEC degree of protection: IP40 on front (only when placed in IP40 enclosure or control board); IP20 at terminals.

ADJUSTMENTS

- "V max" Maximum voltage tripping threshold 105...115% Ue
- "V min" Minimum voltage tripping threshold 80...95% Ue
- "Delay" for each Tripping time 0.1...20s
- "Reset delay" Resetting time 0.1...20s.

Certifications and compliance

Certifications obtained: EAC.
Compliant with standards: IEC/EN/BS 60255-27, IEC/EN/BS 61000-6-2, IEC/EN/BS 61000-6-3.

General characteristics

- Voltage monitoring relay, self powered, for minimum and maximum voltage, phase loss, neutral loss, incorrect phase sequence and asymmetry
- 4 configurable rated voltages (Ue):
 - **PMV70NA240:** 208-220-230-240VAC (phase-to-phase) 120-127-132-138VAC (phase-to-neutral)
 - **PMV70NA440:** 380-400-415-440VAC (phase-to-phase) 220-230-240-254VAC (phase-to-neutral)
 - **PMV70NA600:** 480-525-575-600VAC (phase-to-phase) 277-303-332-347VAC (phase-to-neutral)
- Excellent tripping accuracy
- TRMS measurements (True Root Mean Square)
- Phase loss detection when one of the voltages is <70% rated value
- Phase or neutral loss tripping time: 60ms
- 2 relay outputs, each with 1 changeover contact (SPDT)
- Modular DIN 43880 housing, 3 modules
- Mounting on 35mm DIN rail (IEC/EN/BS 60715) or screw fixing via pull out tabs
- IEC degree of protection: IP40 on front (only when placed in IP40 enclosure or control board); IP20 at terminals.

ADJUSTMENTS

- "V max" Maximum voltage tripping threshold 105...115% Ue
- "V min" Minimum voltage tripping threshold 80...95% Ue
- "Delay" for each Tripping time 0.1...20s
- "Asymmetry" High voltage asymmetry tripping threshold 5...15% Ue.

Certifications and compliance

Certifications obtained: EAC.
Compliant with standards: IEC/EN/BS 60255-27, IEC/EN/BS 61000-6-2, IEC/EN/BS 61000-6-3.

For three-phase systems, with or without neutral



PMV80N...

Order code	Rated voltage to control Ue (phase-to-phase)	Qty per pkg	Wt
	[V] 50/60Hz	n°	[kg]

Three-phase system, with or without neutral.
Minimum and maximum AC voltage, minimum and maximum frequency. Delayed trip.
Phase loss, neutral loss and incorrect phase sequence.
Instantaneous trip.

PMV80NA240	208...240VAC	1	0.200
PMV80NA440	380...440VAC	1	0.200
PMV80NA600	480...600VAC	1	0.200

General characteristics

- Voltage monitoring relay, self powered, for minimum and maximum voltage, minimum and maximum frequency, phase loss, neutral loss and incorrect phase sequence
- 4 configurable rated voltages (Ue):
 - PMV80NA240: 208-220-230-240VAC (phase-to-phase) 120-127-132-138VAC (phase-to-neutral)
 - PMV80NA440: 380-400-415-440VAC (phase-to-phase) 220-230-240-254VAC (phase-to-neutral)
 - PMV80NA600: 480-525-575-600VAC (phase-to-phase) 277-303-332-347VAC (phase-to-neutral)
- Excellent tripping accuracy
- TRMS measurements (True Root Mean Square)
- Phase loss detection if one of the voltages is <70% rated value
- Phase or neutral loss tripping time: 60ms
- 2 relay outputs, each with 1 changeover contact (SPDT)
- Modular DIN 43880, 3 modules
- Mounting on 35mm DIN rail (IEC/EN/BS 60715) or screw fixing via pull out tabs
- IEC degree of protection: IP40 on front (only when placed in IP40 enclosure or control board); IP20 at terminals.

ADJUSTMENTS

“V max”	Maximum voltage tripping threshold 105...115% Ue
“V min”	Minimum voltage tripping threshold 80...95% Ue
“Hz min/max”	Minimum/maximum frequency tripping threshold $\pm 1...10\%$ rated frequency
“V delay”	Tripping time 0.1...20s
“Hz delay”	Tripping time 0.1...5s.

Certifications and compliance

Certifications obtained: EAC.
Compliant with standards: IEC/EN/BS 60255-27, IEC/EN/BS 61000-6-2, IEC/EN/BS 61000-6-3.

For single-phase systems



PMV55...

Order code	Rated voltage to control Ue	Qty per pkg	Wt
	[V] 50/60Hz	n°	[kg]

Single-phase system.
Minimum and maximum AC voltage. Delayed trip.

PMV55A127	110...127VAC	1	0.125
PMV55A240	208...240VAC	1	0.125
PMV55A440	380...440VAC	1	0.125

General characteristics

- Voltage monitoring relay, self powered, for minimum and maximum voltage
- 4 configurable rated voltages (Ue):
 - PMV55A127: 110-115-120-127VAC
 - PMV55A240: 208-220-230-240VAC
 - PMV55A440: 380-400-415-440VAC
- Excellent tripping accuracy
- TRMS measurements (True Root Mean Square)
- 1 relay output with 1 changeover contact (SPDT)
- Modular DIN 43880 housing, 2 modules
- Mounting on 35mm DIN rail (IEC/EN/BS 60715) or screw fixing via pull out tabs
- IEC degree of protection: IP40 on front (only when placed in IP40 enclosure or control board); IP20 at terminals.

ADJUSTMENTS

“V max”	Maximum voltage tripping threshold 105...115% Ue
“V min”	Minimum voltage tripping threshold 80...95% Ue
“Delay” for each	Tripping time 0.1...20s
“Reset delay”	Resetting time 0.1...20s.

Certifications and compliance

Certifications obtained: UL Listed, for USA and Canada (cULus - File E93601), as Auxiliary Devices; EAC.
Compliant with standards: IEC/EN/BS 60255-27, IEC/EN/BS 61000-6-2, IEC/EN/BS 61000-6-3, UL 508, CSA C22.2 n° 14.

Multifunction voltage and frequency monitoring relays for three-phase systems with or without neutral, with NFC technology and APP



PMV95N...



The App can be downloaded from Google Play Store and App Store.



Order code	Rated voltage to control Ue (phase-to-phase) [V] 50/60Hz	Qty per pkg n°	Wt [kg]
PMV95NA240NFC	208...240VAC	1	0.130
PMV95NA575NFC	380...575VAC	1	0.130

Three-phase system, with or without neutral. Minimum and maximum AC voltage, minimum and maximum frequency and asymmetry. Delayed trip. Phase loss, neutral loss and phase sequence. Instantaneous trip. Programmable via smartphone or tablet with NFC technology and App.

General characteristics

- Multifunction voltage and frequency monitoring relay, self powered, for minimum and maximum voltage, minimum and maximum frequency, phase loss, neutral loss, incorrect phase sequence and asymmetry.
- NFC connectivity for parameter setting with LOVATO NFC App, freely downloadable from Google Play Store and App Store
- Simple, fast and intuitive programming
- Very high accuracy and repeatability of the settings
- Possibility to save the program on smartphone or tablet to be copied on other PMV95N, even with device powered off
- Possibility to enable or disable individually the functions of interest
- Possibility to protect the settings with a password
- QR code for the direct connection to the website www.LovatoElectric.com for the download of the technical manual
- Excellent tripping accuracy
- TRMS measurements (True Root Mean Square)
- Phase loss detection if one of the voltages is <70% rated value
- 1 relay output with changeover contact (SPDT)
- Modular DIN 43880 housing, 2 modules
- Mounting on 35mm DIN rail (IEC/EN/BS 60715) or screw fixing via pull out tabs
- IEC degree of protection: IP40 on front (only when placed in IP40 enclosure or control board); IP20 at terminals
- Adjustments: consult the technical manual on the website www.LovatoElectric.com.

8 protection functions in a single product, with possibility to enable or disable individually the functions of interest.

- maximum voltage
- minimum voltage
- maximum frequency
- minimum frequency
- asymmetry
- phase loss
- neutral loss
- incorrect phase sequence

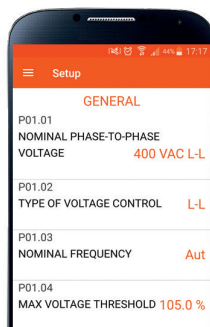
Compact dimensions

Suitable for three-phase systems with or without neutral. It comes in a 2 DIN module housing

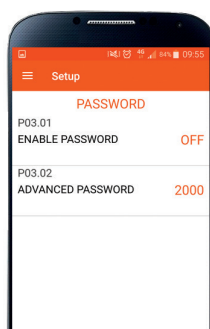
Excellent accuracy of settings with digital setting of time and tripping thresholds.

Repeatability of settings, with possibility to save the programming on the smartphone to be copied in fast way on other relays without risk of error.

Simple and intuitive programming thanks to the graphic interface of the LOVATO NFC App that shows on the display of the smartphone the functions and parameters without need to consult the technical manual.



Protection of settings with a password.



22 Monitoring relays

Frequency monitoring relays.
Current monitoring relays

Frequency monitoring relays for single and three-phase systems



PMF20...

Order code	Rated voltage Ue	Qty per pkg	Wt
	[V] 50/60Hz	n°	[kg]
Single and three-phase systems. Minimum and maximum frequency. Delayed trip. Automatic reset.			
PMF20A240	220...240VAC	1	0.125
PMF20A415	380...415VAC	1	0.125

General characteristics

- Frequency monitoring relay, self powered, for minimum and maximum control
- Rated frequency selection: 50 or 60Hz
- Tripping threshold for minimum and maximum frequency
- Excellent tripping accuracy
- 1 relay output, configurable, with 1 changeover contact (SPDT)
- Modular DIN 43880 housing, 2 modules
- Mounting on 35mm DIN rail (IEC/EN/BS 60715) or screw fixing via pull out tabs
- IEC degree of protection: IP40 on front (only when placed in IP40 enclosure or control board); IP20 at terminals.

ADJUSTMENTS

- "Hz max" Maximum frequency tripping threshold
101...110% rated frequency
- "Delay" Tripping time 0.1...20s
- "Hz min" Minimum frequency tripping threshold
90...99% rated frequency
- "Delay" Tripping time 0.1...20s
- "Reset delay" Resetting time 0.1...20s
- "Mode"
 - Minimum and maximum frequency with output relay normally energised
 - Maximum frequency with output relay normally energised
 - Minimum frequency with output relay normally energised
 - Maximum frequency with output relay normally de-energised.

Certifications and compliance

Certifications obtained: UL Listed, for USA and Canada (cULus - File E93601), as Auxiliary Devices; EAC. Compliant with standards: IEC/EN/BS 60255-27, IEC/EN/BS 61000-6-2, IEC/EN/BS 61000-6-3, UL 508, CSA C22.2 n° 14.

Current monitoring relay for single-phase systems



PMA20240

Order code	Rated current Ie	Auxiliary supply voltage	Qty per pkg	Wt
	[A]	[V]	n°	[kg]
Single-phase system. AC/DC maximum current control. Auxiliary AC/DC power supply. Automatic or manual reset.				
PMA20240	5 or 16A	24...240V AC/DC	1	0.121

General characteristics

- Current monitoring relay for AC/DC maximum current control
- AC/DC multivoltage auxiliary power supply
- Direct connection up to 16A max or by current transformer (CT)
- Excellent tripping accuracy
- TRMS current measurements (True Root Mean Square)
- Resetting and inhibition input
- 1 relay output with 1 changeover contact (SPDT)
- Modular DIN 43880 housing, 2 modules
- Mounting on 35mm DIN rail (IEC/EN/BS 60715) or screw fixing via pull out tabs
- IEC degree of protection: IP40 on front (only when placed in IP40 enclosure or control board); IP20 at terminals.

ADJUSTMENTS

- "I_{max}" Maximum current tripping threshold
5...100% I_e
- "Hysteresis" Maximum hysteresis threshold
1...50%
- "Trip delay" Tripping time 0.1...30s
- "Inhibition time" Inhibition delay for external input or at power up 1...60s
- "Aut. reset delay" Automatic resetting time 0.1...30s
- "Mode"
 - Rated current 5A or 16A
 - Relay output normally energised or de-energised
 - Tripping memory (latch) ON or OFF.

Certifications and compliance

Certifications obtained: UL Listed, for USA and Canada (cULus - File E93601), as Auxiliary Devices - Modular ampere monitoring relays; EAC. Compliant with standards: IEC/EN/BS 60255-27, IEC/EN/BS 61000-6-2, IEC/EN/BS 61000-6-3, UL 508, CSA C22.2 n° 14.

Current monitoring relays for single and three-phase systems



PMA30240

Order code	Rated current I _e	Auxiliary supply voltage	Qty per pkg	Wt
	[A]	[V]	n°	[kg]

Single and three-phase system.
AC/DC minimum or maximum current control. Delayed trip.
Auxiliary AC/DC power supply.
Automatic or manual reset.

PMA30240	5 or 16A	24...240V AC/DC	1	0.121
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General characteristics

- Current monitoring relay for AC/DC minimum or maximum current control
- AC/DC multivoltage auxiliary power supply
- Automatic or manual reset.
- Direct connection up to 16A max or by current transformer (CT)
- Excellent tripping accuracy
- TRMS current measurements (True Root Mean Square)
- Resetting and inhibition input
- 1 relay output with 1 changeover contact (SPDT)
- Modular DIN 43880 housing, 2 modules
- Mounting on 35mm DIN rail (IEC/EN/BS 60715) or screw fixing via pull out tabs
- IEC degree of protection: IP40 on front (only when placed in IP40 enclosure or control board); IP20 at terminals.

ADJUSTMENTS

"Set point"	Minimum or maximum current tripping threshold 5...100% I _e
"Hysteresis"	Minimum or maximum hysteresis threshold 1...50%
"Trip delay"	Tripping time 0.1...30s
"Inhibition time"	Inhibition delay for external input or at power up 1...60s
"I _e "	Current scale selection: 5A or 16A
"Mode"	<ul style="list-style-type: none"> • Min or max function • Relay output normally energised or de-energised • Tripping memory (latch) ON or OFF.

Certifications and compliance

Certifications obtained: UL Listed, for USA and Canada (cULus - File E93601), as Auxiliary Devices - Modular ampere monitoring relays; EAC.
Compliant with standards: IEC/EN/BS 60255-27, IEC/EN/BS 61000-6-2, IEC/EN/BS 61000-6-3, UL 508, CSA C22.2 n° 14.



PMA40240

Order code	Rated current I _e	Auxiliary supply voltage	Qty per pkg	Wt
	[A]	[V]	n°	[kg]

Single and three-phase system.
AC/DC minimum and maximum current control. Delayed trip.
Auxiliary AC/DC power supply.
Automatic or manual reset.

PMA40240	0.02-0.05-0.25-1-5-16A	24...240V AC/DC	1	0.166
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General characteristics

- Current monitoring relay for AC/DC minimum and maximum current control
- AC/DC multivoltage auxiliary power supply
- Direct connection up to 16A max or by current transformer (CT)
- Excellent tripping accuracy
- TRMS current measurements (True Root Mean Square)
- Automatic or manual resetting (manual resetting by power removal)
- 2 relay outputs (Min and Max), configurable, each with 1 changeover contact (SPDT)
- Modular DIN 43880 housing, 3 modules
- Mounting on 35mm DIN rail (IEC/EN/BS 60715) or screw fixing via pull out tabs
- IEC degree of protection: IP40 on front (only when placed in IP40 enclosure or control board); IP20 at terminals.

ADJUSTMENTS

"I _{max} "	Maximum current tripping threshold 5...100% I _e
"I _{min} "	Minimum current tripping threshold 5...100% I _e
"Trip delay"	Minimum and maximum current tripping time 0.1...30s
"Inhibition time"	Inhibition time at power up 1...60s
"I _e "	Current scale selection: 20mA, 50mA, 250mA, 1A, 5A or 16A
"Mode"	<ul style="list-style-type: none"> • Separate or common relay outputs • Relay output normally energised or de-energised • Tripping memory (latch) ON or OFF.

Certifications and compliance

Certifications obtained: UL Listed, for USA and Canada (cULus - File E93601), as Auxiliary Devices - Modular ampere monitoring relays; EAC.
Compliant with standards: IEC/EN/BS 60255-27, IEC/EN/BS 61000-6-2, IEC/EN/BS 61000-6-3, UL 508, CSA C22.2 n° 14.

For single and three-phase systems



PMA50...

Order code	Rated current I _e	Auxiliary supply voltage	Qty per pkg	Wt
	[A]	[V]	n°	[kg]

Single and three-phase systems.
Maximum AC current and minimum cosφ. Delayed trip.
Phase loss and incorrect phase sequence. Instantaneous trip.
Auxiliary AC power supply.
Automatic or manual reset.

PMA50A240	5 or 16A	220...240VAC	1	0.251
PMA50A415		380...415VAC	1	0.251
PMA50A480		440...480VAC	1	0.251

General characteristics

- Pump protection relay against dry running
- Auxiliary AC power supply
- Motor under-load and over-current control
- Direct connection up to 16A max or by current transformer (CT)
- Excellent tripping accuracy
- Voltage control range 80...660VAC
- Current control range 0.1...16A
- Resetting and enabling consent input
- 1 relay output relay with 1 changeover contact (SPDT)
- Modular DIN 43880 housing, 3 modules
- Mounting on 35mm DIN rail (IEC/EN/BS 60715) or screw fixing via pull out tabs
- IEC degree of protection: IP40 on front (only when placed in IP40 enclosure or control board); IP20 at terminals.

ADJUSTMENTS

- "Cosφ min" Minimum cosφ threshold 0.1...0.99 (under-load/dry running)
- "I_{max}" Maximum current threshold 10...100%I_e
- "Trip delay" Tripping time for minimum cosφ and maximum current 0.1...10s
- "Inhibition time" Inhibition delay for external input or at power up 1...60s
- "Aut. reset delay" Automatic reset time OFF...100min
- "Mode"
 - Rated current 5A or 16A
 - Single or three phase
 - External reset ON or OFF.

Certifications and compliance

Certifications obtained: UL Listed, for USA and Canada (cULus - File E93601), as Auxiliary Devices - Modular ampere monitoring relays; EAC.
Compliant with standards: IEC/EN/BS 60255-27, IEC/EN/BS 61000-6-2, IEC/EN/BS 61000-6-3, UL 508, CSA C22.2 n° 14.

Insulation monitoring relay for AC IT systems



PMIB1A230

new

Order code	Rated voltage	Limit threshold	Qty per pkg	Wt
	[V]		n°	[kg]

For IT networks up to 230VAC.
1 adjustable intervention threshold.

PMIB1A230	230VAC	1	1	0.200
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General characteristics

The PMIB1A230 insulation monitoring relay is a device that allows the monitoring of the insulation towards earth of alternating current networks up to 230VAC isolated from earth (IT systems).

The insulation resistance is checked by applying a continuous component measurement signal between the insulated line and earth. By detecting the leakage current generated towards earth it is possible to measure the level of insulation.

On the front there are the TEST and RESET buttons, as well as the device powered (ON) and low insulation trip (TRIP) signals.

The intervention threshold is adjustable via a frontal potentiometer.

- Auxiliary power supply: 230VAC
- Insulation control of IT networks up to 230VAC
- Intervention threshold settable via front potentiometer
- LED signaling of ON and TRIP
- Dedicated buttons for the RESET and TEST function
- Dedicated inputs for the remote RESET and TEST function
- 250VAC 5A AC1 changeover relay output for signaling the intervention
- Modular DIN 43880 housing, 3 modules
- Mounting on 35mm DIN rail (IEC/EN/BS 60715)
- Degree of protection: IP40 on the front; IP20 on the terminals.

ADJUSTMENTS:

Intervention threshold: 25...100kOhm.

To indicate the low insulation signal, a dry changeover output is available.

Certifications and compliance

Compliant with standards: IEC/EN/BS 61010-1, IEC/EN/BS 61557-8, IEC/EN/BS 61326-1.

For low voltage



PMVF52

new

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

For single-phase and three-phase systems with and without low voltage neutral. Dual threshold minimum and maximum voltage and frequency protection.
Modular (4U).

PMVF52	230VAC 400VAC	24...240VAC/ 24...240VDC	1	0.326
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Voltage threshold for CEI 0-21.

Type of protection	Tripping threshold	Tripping time
Maximum voltage 59.S2	1.15Un	0.2s
Maximum voltage 59.S1 (moving mean over 10min)	1.10Un	≤ 3s
Minimum voltage 27.S1	0.85Un	1.5s
Minimum voltage 27.S2	0.15Un	0.2s

Frequency threshold for CEI 0-21.

Type of protection	Tripping threshold	Tripping time
High external signal and low local control conditions.		
Maximum frequency 81>.S2	51.5Hz	0.1s
Minimum frequency 81<.S2	47.5Hz	0.1s
Low external signal and high local control conditions.		
Maximum frequency 81>.S2	51.5Hz	1s
Minimum frequency 81<.S2	47.5Hz	4s
High conditions for both external signal and local control.		
Maximum frequency 81>.S1	50.2Hz	0.1s
Minimum frequency 81<.S1	49.8Hz	0.1s

NOTE: Low conditions for both external signal and local control are not taken into consideration by the standard.

Order code	Description
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

IEC 61850 protocol

The EXM1018 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 0-21 standard).

Order code	Description	Qty per pkg	Wt
		n°	[kg]
PMVFUPS02	Input 230VAC Output 230VAC with stored energy 800Ws and power 650VA	1	0.450

- Compatible with contactors (IS or backup function) with standard AC or electronic coils.
- Compatible with undervoltage trip releases (IS or backup function) of moulded case circuit breakers.

new

Backup power supply



PMVFUPS02

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 device (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 3 relay outputs for:

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

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 voltage: 24...240VAC/24...240VDC
- Voltage inputs:
 - 400VAC (three-phase connection)
 - 230VAC (single-phase connection)
- Relays output:
 - OUT1: 8A 250VAC, 8A 30VDC
 - OUT2: 5A 250VAC, 5A 30VDC
 - OUT3: 2A 250VAC, 2A 30VDC
- Predisposed for IEC/EN/BS 61850 signal supervision using expansion EXM1018 or external module
- Expandable with up to 2 module EXM... by optical interface
- Event log (128 events with time reference):
 - interface protection interventions
 - action on password
 - command execution
 - system events
- Parameter configuration and remote control (only with communication expansion module) with software **Synergy** and **Xpress**
- Housing: modular (4 modules)
- Mounting on 35mm DIN rail or screw fixing
- Degree of protection for both: IP40 on front; IP20 on terminals.

Reference standards

Compliant standard: Italian CEI 0-21, IEC/EN/BS 60255-27, IEC/EN/BS 60255-26.

General characteristics for PMVFUPS02

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.

- power supply: 230VAC, 50Hz
- output voltage: 230VAC, 50Hz
- output power: 650VA
- accumulated energy: 800Ws
- accumulation time: 60s
- Housing: modular (9 modules)
- Mounting on 35mm DIN rail or screw fixing
- operating temperature: -5...+50°C
- degree of protection IP20 on front and terminals.

Reference standards

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

For medium voltage



PMVF3000

new

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

Medium-voltage system.
Dual threshold minimum and maximum voltage and frequency protection.
Flush mount type with standard cutout dimensions 92x92mm/3.62x3.62"

PMVF3000	Measurements via VTs in MV or direct in LV	100...240VAC/ 110...250VDC	1	0.389
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Voltage threshold for CEI 0-16

Type of protection	Tripping threshold	Tripping time
Maximum voltage 59.S2	1.2Un	0.6s
Maximum voltage 59.S1 (moving mean over 10min)	1.1Un	≤ 3s
Minimum voltage 27.S1	0.85Un	0.4s
Minimum voltage 27.S2	0.15Un	0.2s
Maximum residual voltage 59.V0 (59N)	5% Urn	25s

Frequency threshold for CEI 0-16
Frequency protection at voltage choice

Type of protection	Tripping threshold	Tripping time
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Configuration in standard conditions.

Maximum frequency 81>.S2	51.5Hz	1s
Minimum frequency 81<.S2	47.5Hz	4s

Limited configuration in case of local control or voltage choice condition.

Maximum frequency 81>.S1	50.2Hz	0.15s
Minimum frequency 81<.S1	49.8Hz	0.15s

– Voltage choice functions

Maximum residual voltage 59.V0 (59N)	5% Urn	-
Minimum direct sequence voltage 27.Vd	70% Un	-
Maximum inverse sequence voltage 59.Vi	15% Un	-

Order code	Description
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EXPANSION MODULES FOR PMVF3000.

For auto reclosing management of automatic circuit breaker (IS).

EXP1003	2 relay outputs 5A 250VAC
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Communication ports.

EXP1010	Opto-isolated USB interface
EXP1011	Opto-isolated RS232 interface
EXP1012	Opto-isolated RS485 interface
EXP1013	Opto-isolated Ethernet interface
EXP1018	IEC/EN/BS 61850 interface

● 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).

Order code	Description	Qty per pkg	Wt
		n°	[kg]
PMVFUPS02	Input 230VAC Output 230VAC with stored energy 800Ws and power 650VA	1	0.450

- Compatible with contactors (IS or backup function) with standard AC or electronic coils.
- Compatible with undervoltage trip releases (IS or backup function) of moulded case circuit breakers.

new

Backup power supply



PMVFUPS02

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, PMVF... must step in by de-energising a relay output so that the interface device (IS) trips.

PMVF3000 is equipped with inputs having the following functions:

- IS status feedback
- Interface protection system exclusion
- Local control
- Remote tripping (forced IS opening, independent of voltage and frequency values).

In addition, there are two relay outputs to configure as:

- 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).

Standby device opening

In installations with more than 400kW, the standard specifies there must be a command signal, that releases another standby 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.

Operational characteristics

- Auxiliary voltage: 100-240VAC/110-250VDC
- Voltage inputs (connection via VTs in MV or directly in LV end):
 - Primary: until 150,000V
 - Secondary: 50...500V (for voltage/frequency); 50...150V (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
- Built-in Ethernet communication port
- Expandable with up to 2 module EXP...
- Parameter configuration and remote control with software **Synergy** and **Xpress**
- Housing: Flush mount 118x96mm/4.64x3.78", cutout 92x92mm/3.62x3.62".
- 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 0-16; IEC/EN/BS 60255-27, IEC/EN/BS 61010-1, IEC/EN/BS 61000-6-2, IEC/EN/BS 61000-6-3.

Synergy: supervision and Energy management software with remote and configuration capabilities.

Xpress: free software for Energy management controlling one device only.
See section 36.

General characteristics for PMVFUPS02

See page 22-12.

22 Monitoring relays

Interface protection system units compliant with VDE-AR-N 4105, VDE-AR-N 4110, VDE-AR-N 4120 and VDE V 0126-1-1 standards

For low, medium and high voltage



new

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

For single-phase and three-phase systems with and without low voltage neutral. Dual threshold minimum and maximum voltage and frequency protection.

R.O.C.O.F and Vector shift. Modular type (4U).

PMVF81	Programmable	24...240VAC/ 24...240VDC	1	0.326
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PMVF81

Voltage threshold (default for VDE-AR-N 4105).

Type of protection	
Maximum voltage threshold 2	●
Maximum voltage threshold 1	● (10 min. avg)
Minimum voltage threshold 1	●
Minimum voltage threshold 2	Optional set to OFF

Frequency threshold (default for VDE-AR-N 4105).

Type of protection	
Maximum frequency threshold 2	●
Maximum frequency threshold 1	Optional set to OFF
Minimum frequency threshold 1	Optional set to OFF
Minimum frequency threshold 2	●

Expansion modules



EXM10...

Order code	Description
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

IEC 61850 protocol

The EXM1018 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 0-21 standard).

Backup power supply



PMVFUPS02

new

Order code	Description	Qty per pkg	Wt
		n°	[kg]
PMVFUPS02	Input 230VAC Output 230VAC with stored energy 800Ws and power 650VA	1	0.450

- Compatible with contactors (IS or backup function) with standard AC or electronic coils.
- Compatible with undervoltage trip releases (IS or backup function) of moulded case circuit breakers.

General characteristics

PMVF81 interface protection system (IP) unit has been developed according to VDE-AR-N 4105, VDE-AR-N 4110, VDE-AR-N 4120 and VDE V 0126-1-1 standards.

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, PMVF81 must step in by de-energising a relay output so that the interface device (IS) trips.

PMVF81 is equipped with 5 inputs having the following functions:

- IS status feedback
- R.O.C.O.F./Vector shift delay
- disabling tripping
- remote tripping (forced IS opening independent of voltage and frequency values).
- programmable.

Also, there are 3 relay outputs for:

- IS opening and closing
- standby device opening (programmable: retentive normally energised, retentive normally de-energised or adjustable pulse)
- 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 voltage: 24...240VAC/24...240VDC
- Voltage inputs: 100-500000VAC (with VT)
- Relays output:
 - OUT1: 8A 250VAC, 8A 30VDC
 - OUT2: 5A 250VAC, 5A 30VDC
 - OUT3: 2A 250VAC, 2A 30VDC
- The device can be password protected to prevent parameters from being altered
- 5 digital input
- Programmable voltage rating, voltage thresholds, frequency and delays
- Support of EXM series communication port (USB, RS232, RS485, Ethernet)
- Predisposed for IEC/EN/BS 61850 signal supervision using expansion EXM1018 or external module
- Expandable with up to 2 module EXM... by optical interface
- Event log (128 events with time reference):
 - interface protection interventions
 - action on password
 - command execution
 - system events
- Parameter configuration and remote control (only with communication expansion module) with software **Synergy** and **Xpress**
- Housing: modular (4 modules)
- Mounting on 35mm DIN rail or screw fixing
- Degree of protection: IP40 on front; IP20 on terminals.

Reference standards

Compliant standard VDE-AR-N 4105, VDE-AR-N 4110, VDE-AR-N 4120, IEC/EN 61010-1, IEC/EN 61000-6-2 and IEC/EN 61000-6-4.

Synergy: supervision and Energy management software with remote and configuration capabilities.

Xpress: free software for Energy management controlling one device only. See section 36.

General characteristics for PMVFUPS02

See page 22-12.

22 Monitoring relays

Interface protection system units compliant with standards ENA G98/G99, SHAMS DUBAI - DRRG STANDARDS (DEWA), SEC (Saudi Electricity Company)



PMVF...

new

Order code	Rated voltage	Auxiliary	Qty per pkg	Wt
	Control			
	[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).

PMVF61	Programmable	24...240VAC/ 24...240VDC	1	0.326
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Compliant with standards G98/G99.

PMVF71	Programmable	24...240VAC/ 24...240VDC	1	0.326
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For systems requiring 3 maximum voltage thresholds (E.g.: Czech Republic and Slovakia).

PMVF90	Programmable	24...240VAC/ 24...240VDC	1	0.326
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Voltage threshold

Protection type	PMVF61	PMVF71	PMVF90
Maximum voltage threshold 3			●
Maximum voltage threshold 2	●	●	●
Maximum voltage threshold 1	● (10 min. average)	●	●
Minimum voltage threshold 1	●	●	●
Minimum voltage threshold 2	●	●	●

Frequency threshold

Protection type	PMVF61	PMVF71	PMVF90
Maximum frequency threshold 2	Optional set to OFF	●	●
Maximum frequency threshold 1	●	●	Optional set to OFF
Minimum frequency threshold 1	●	●	Optional set to OFF
Minimum frequency threshold 2	Optional set to OFF	●	●



EXM10...

Order code	Description
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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 inputs, opto-isolated and 2 relay outputs, rated 5A 250VAC
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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).

Backup power supply



PMVFUPS02

new

Order code	Description	Qty per pkg	Wt
		n°	[kg]
PMVFUPS02	Input 230VAC Output 230VAC with stored energy 800Ws and power 650VA	1	0.450

- Compatible with contactors (IS or backup function) with standard AC or electronic coils.
- Compatible with undervoltage trip releases (IS or backup function) of moulded case circuit breakers.

General characteristics

PMVF... interface protection system (IPS) 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 IPS must step in by de-energising a relay output so that the interface device (IS) trips.

PMVF... is equipped with 5 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 3 relay outputs for:

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

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 voltage: 24...240VAC/24...240VDC
- Voltage inputs: 100-500000VAC (with VT)
- Relays output:
 - OUT1: 8A 250VAC, 8A 30VDC
 - OUT2: 5A 250VAC, 5A 30VDC
 - OUT3: 2A 250VAC, 2A 30VDC
- The device can be password protected to prevent parameters from being altered
- 5 digital input
- Programmable voltage rating, voltage thresholds, frequency and delays
- Support of EXM series communication port (USB, RS232, RS485, Ethernet)
- Predisposed for IEC/EN/BS 61850 signal supervision using expansion EXM1018 or external module
- Expandable with up to 2 module EXM... by optical interface
- Event log (128 events with time reference):
 - interface protection interventions
 - action on password
 - command execution
 - system events
- Parameter configuration and remote control (only with communication expansion module) with software **Synergy** and **Xpress**
- Housing: modular (4 modules)
- Mounting on 35mm DIN rail or screw fixing
- Degree of protection: IP40 on front; IP20 on terminals.

Reference standards

Compliant with standards: DEWA DRRG (PMVF61); SEC (PMVF61); ENA G98/G99 (PMVF71); IEC/EN/BS 60255-27; IEC/EN/BS 61010-1, IEC/EN/BS 61000-6-2, IEC/EN/BS 61000-6-4.

Synergy: supervision and Energy management software with remote and configuration capabilities.

Xpress: free software for Energy management controlling one device only.
See section 36.

General characteristics for PMVFUPS02

See page 22-12.

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
	GSM Modem (modular - 4U). IP69K outside aerial with 2.5m cable. RJ45-USB programming cable (included).
EXCGSM01	100...240VAC, 1 digital input, 1 analogic input (0...10V, 0...20mA, NTC), 1 relay output

Blue LED: GSM status

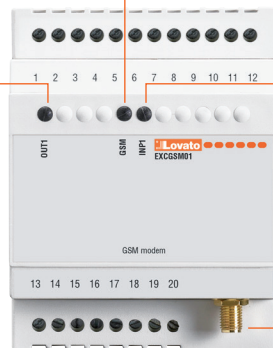
Off: not supplied

Flashing slowly: network registration OK

Flashing quickly: communication in progress

Relay output status

Digital input status



Aerial connector

RJ45 connector for programming

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) 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).

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.

Functional characteristics

- Connection to the GSM network for sending and receiving SMS messages
- Programmable message texts
- Command output piloted by SMS or internal logic, for example to send the remote disconnection command to the interface device CEI 0-16
- Programmable digital input, for example to detect the status of the Interface Switch (IS) and sending of successful IS opening and closing SMSs
- POD management (active user code)
- Management of the list of caller IDs (CLI) up to 5000 callers enabled
- Detection of mobile network coverage
- Full compatibility with medium-voltage PI LOVATO Electric PMVF30: no software/hardware updates or programming required
- **Compatibility with third-party PIs where the remote disconnection signal is transmitted via digital input (dry contact)**

For additional information contact our Technical support
Tel. + 39 035 4282422; E-mail: service@LovatoElectric.com.

Operational characteristics

MODEM

- Supply: 100...240VAC
- Consumption: 5VAC
- 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
- Protection rating: IP40 on front; IP20 on terminals.

AERIAL

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

Compliance

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

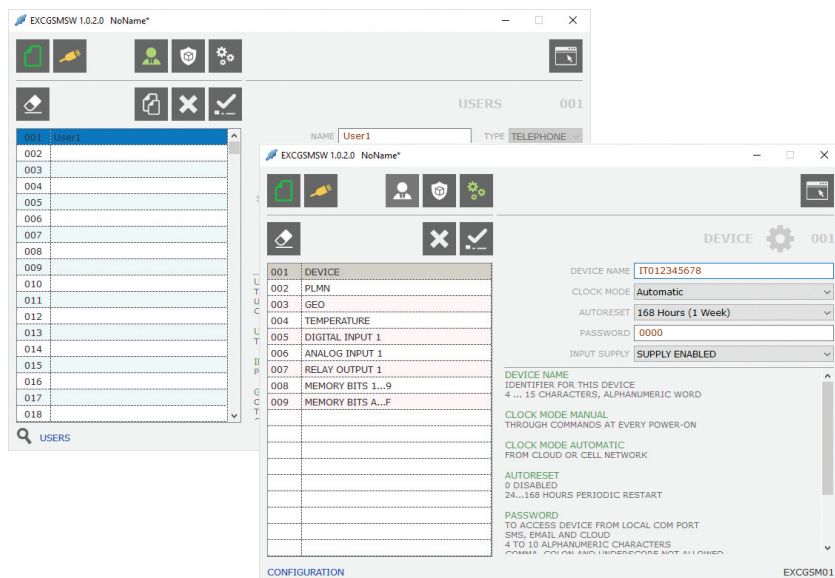
Software

To configure the EXCGSM01 modem (using the RJ45-USB programming cable included), the EXCGSMSW software must be used. This can be downloaded for free from the www.LovatoElectric.com website.

The software allows you to set:

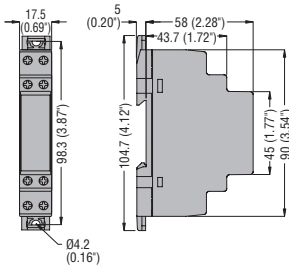
- the users enabled to exchange messages with the modem
- the identifier of the modem, for example the active customer code (POD) in CEI 0-16 applications;
- the functions assigned to the digital output and input and to analog input;
- the texts of the SMS associated with the commands
- the logic of the actions taken following the SMS arrival, change of input status, alarm situations.

Configuration is also possible off-line, creating a file to transfer to the modem at another time.

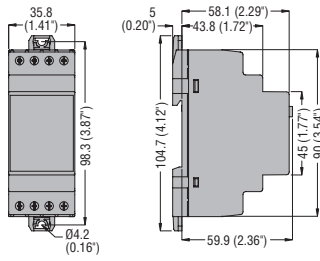


MONITORING RELAYS

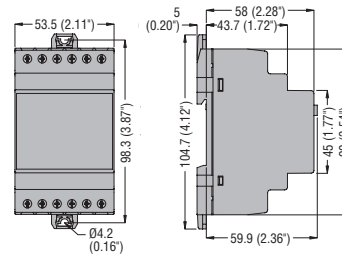
PMV10...



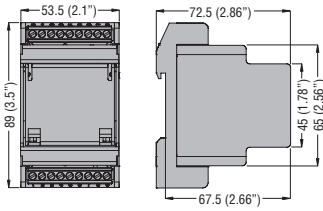
**PMV20... - PMV95N... - PMF20
PMA20... - PMA30...**



**PMV50N... - PMV70N... - PMV80N... - PMA40...
PMA50...**

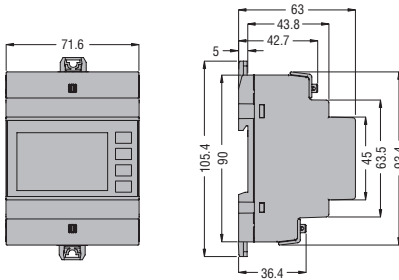


PMIB1A230



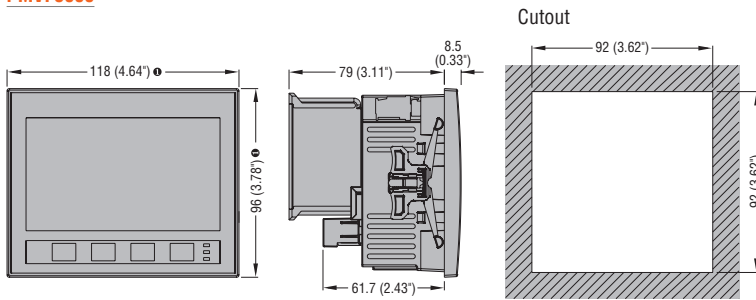
INTERFACE PROTECTION SYSTEM UNITS

PMVF52 - PMVF61 - PMVF71 - PMVF81 - PMVF90



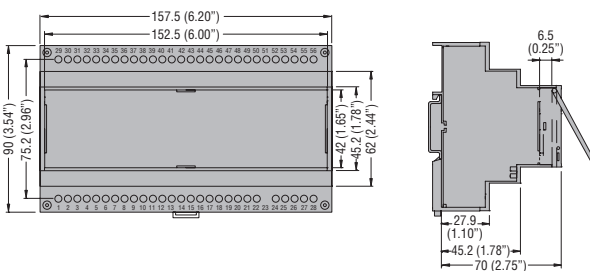
INTERFACE PROTECTION SYSTEM UNIT

PMVF3000



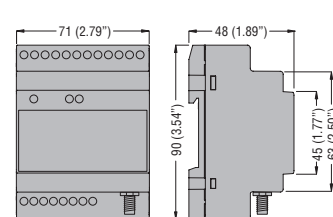
BACKUP POWER SUPPLY

PMVFUPS02



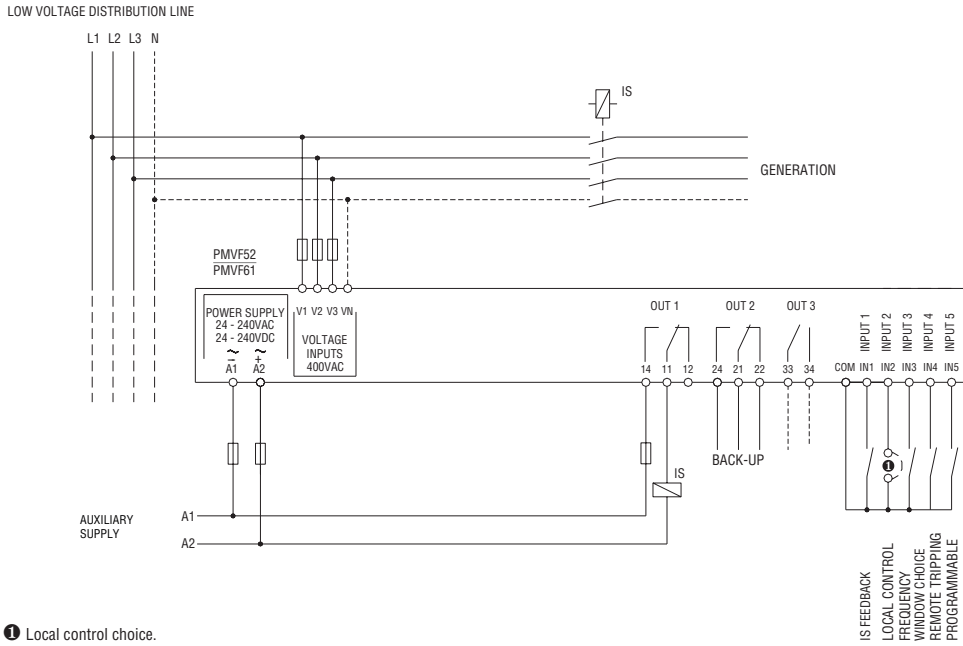
GSM MODEM FOR REMOTE DISCONNECTION SIGNAL

EXCGSM01



PMVF52 - PMVF61

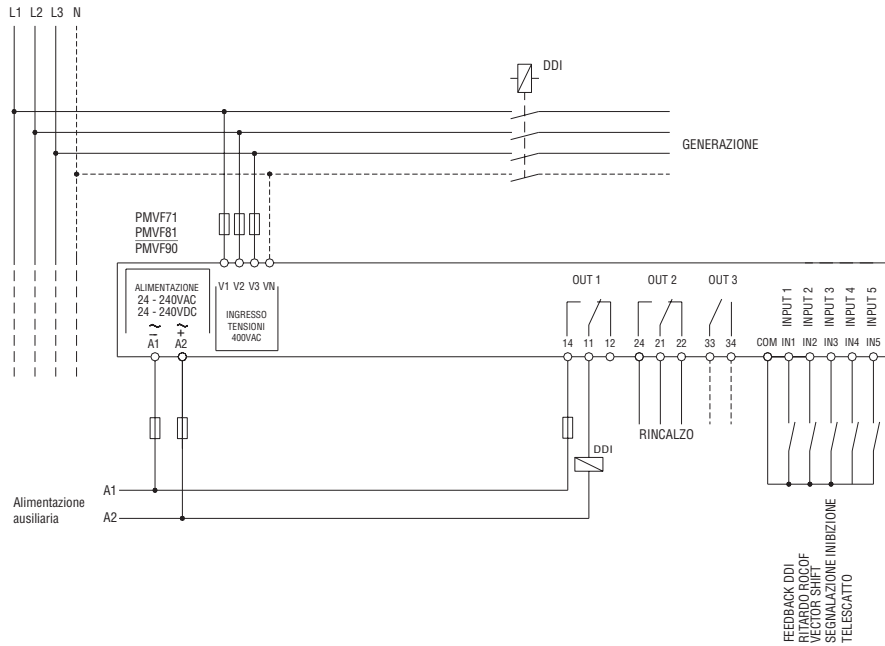
Three-phase connection



PMVF71 - PMVF81 - PMVF90

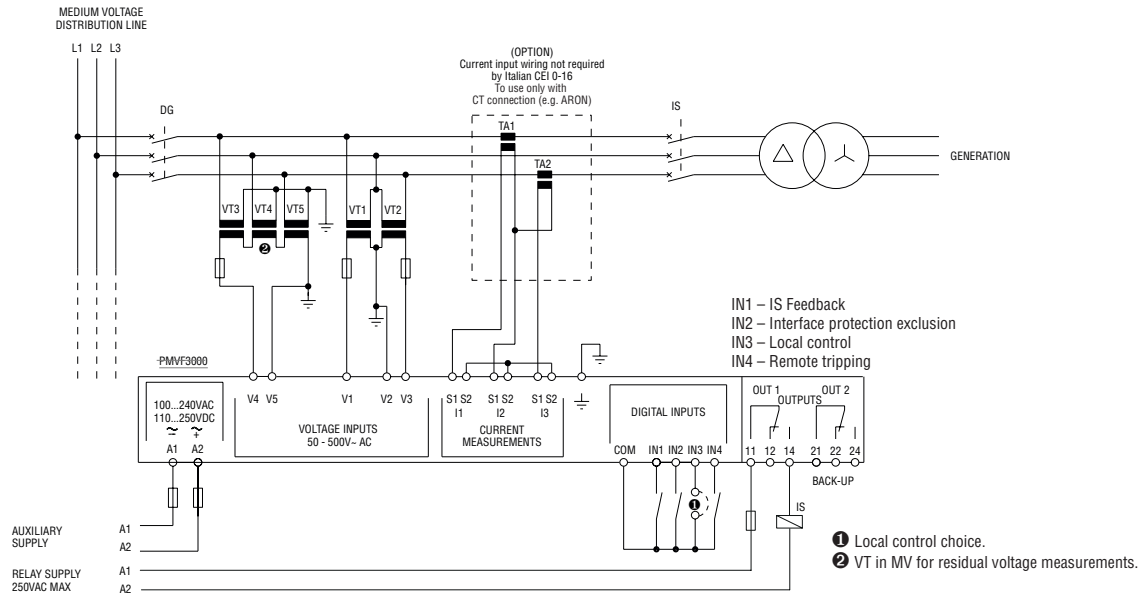
Three-phase connection

RETE DI DISTRIBUZIONE IN BASSA TENSIONE

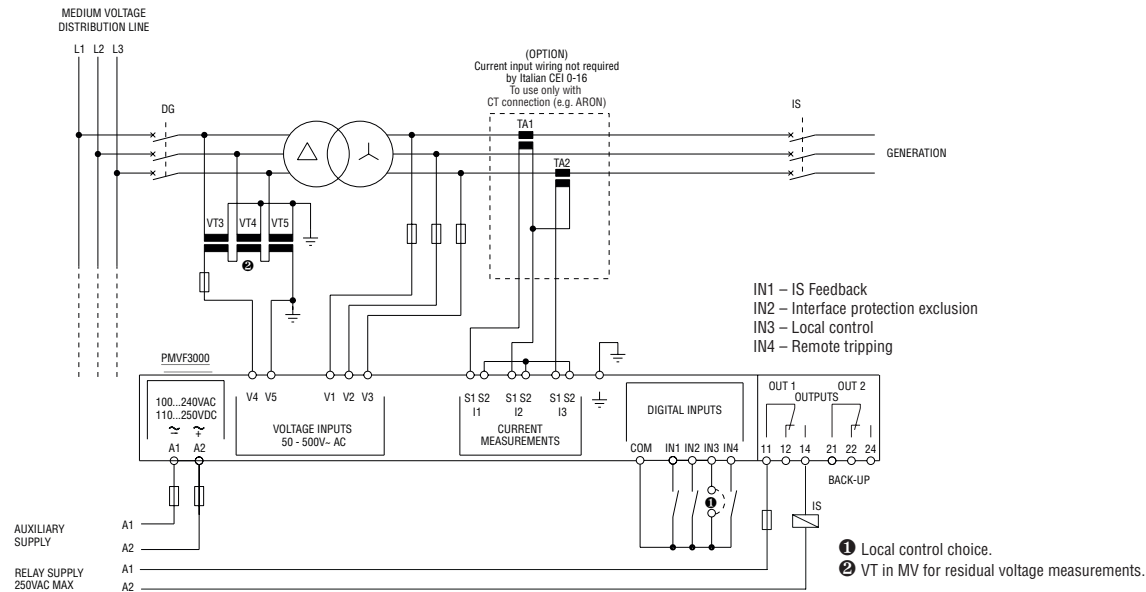


PMVF3000

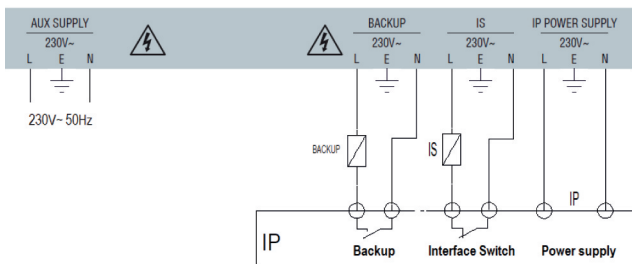
Connection through VTs in Medium Voltage
Three-phase connection



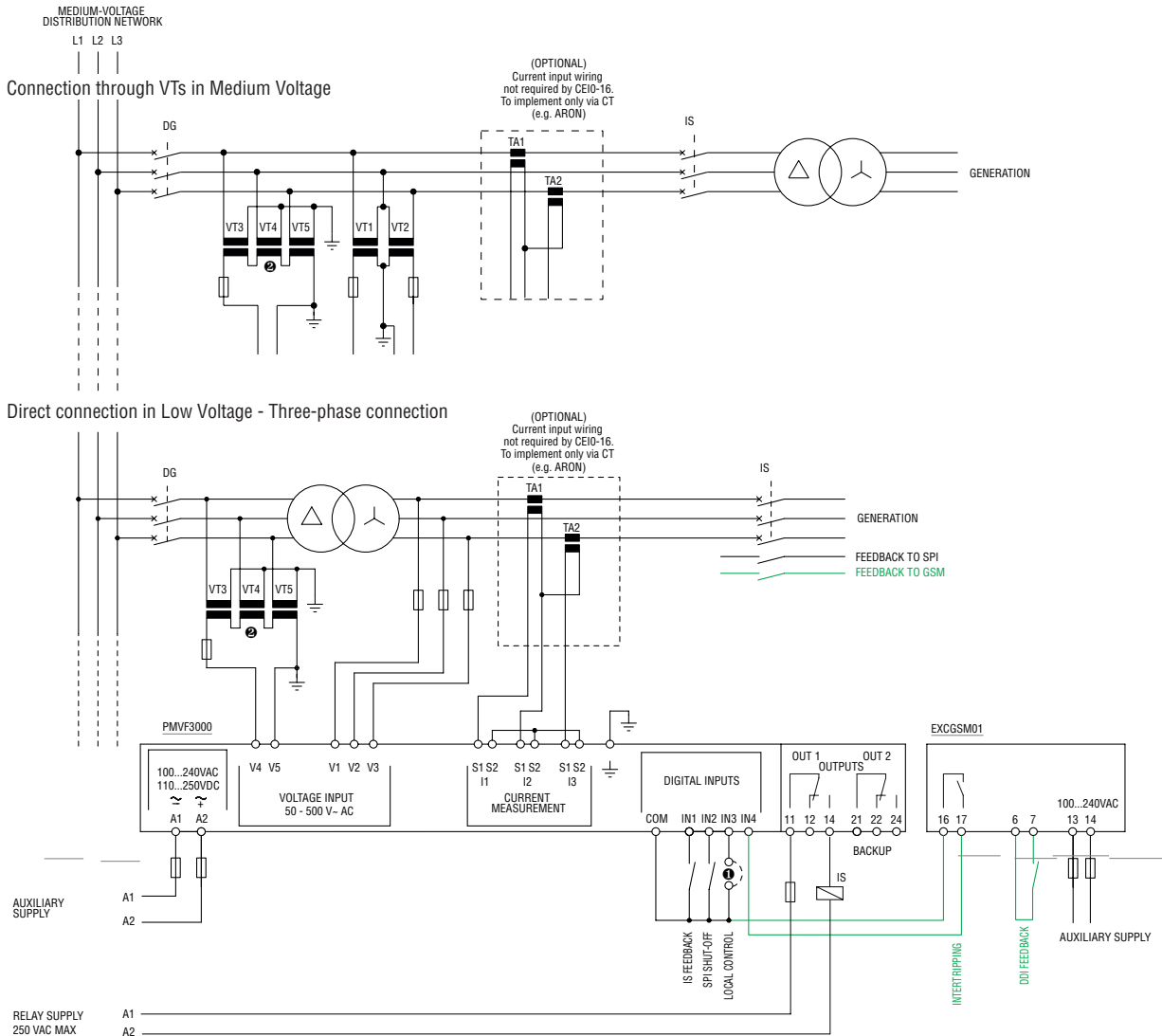
Direct connection in Low Voltage
Three-phase connection



PMVFUPS02



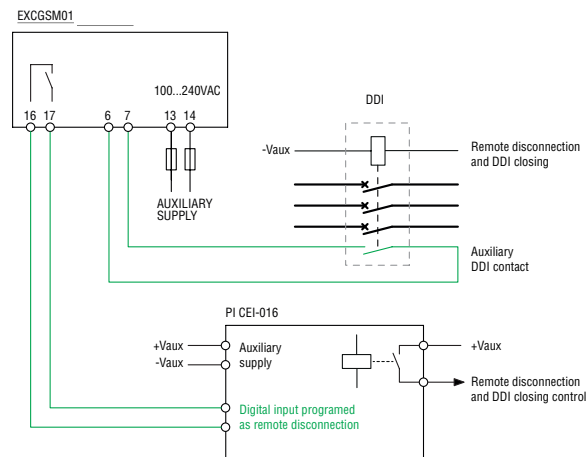
PMVF3000 with EXCGSM01



- ① Local control choice.
- ② VT in MV for residual voltage measurements.

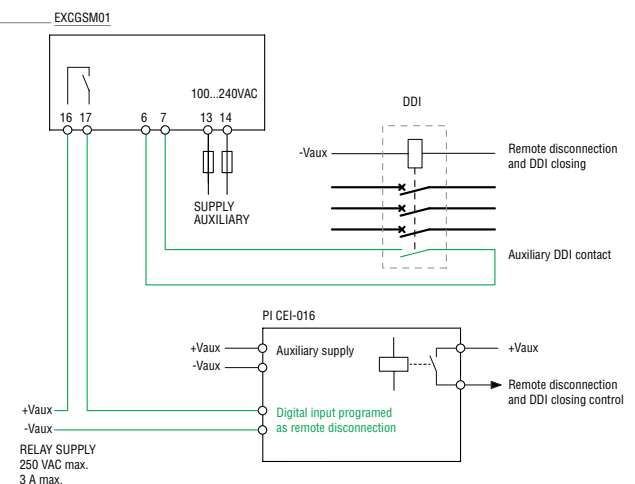
The connections coloured in GREEN, in addition to the GSM Modem, represent the only wiring necessary for the adaptation.

EXCGSM01 modem wiring diagram with other interface protections (PI) with self-supplied remote disconnection input



The connections coloured in GREEN, in addition to the GSM Modem, represent the only wiring necessary for the adaptation.

EXCGSM01 modem wiring diagram with other interface protections (PI) with remote disconnection input to be supplied



22 Monitoring relays

Technical characteristics Voltage monitoring relays



INDEX

TYPE	Single phase	PMV55	—	—	—	—	—
	Three phase	—	PMV10	PMV20	PMV30	PMV40	—
	Three phase with/without neutral	—	—	—	—	—	—
DESCRIPTION							
	Minimum and maximum AC voltage		Phase loss and incorrect phase sequence		Minimum AC voltage, phase loss and incorrect phase sequence		Asymmetry, phase loss and incorrect phase sequence
CONTROL CIRCUIT							
Rated voltage to control (Ue)	110...127VAC	208...480VAC	100...240VAC	208...240VAC			
	208...240VAC		208...575VAC	380...575VAC			
	380...440VAC		380...600VAC	600VAC			
Maximum voltage set-point	105...115% Ue	—	—	—	—	—	—
Minimum voltage set-point	80...95% Ue	—	—	80...95% Ue	—	—	—
Asymmetry set-point	—	—	—	—	—	5...15% Ue	—
Minimum and maximum frequency set-point	—	—	—	—	—	—	—
Tripping time	0.1...20s	60ms		0.1...20s			
Resetting time	0.1...20s (0.5s at power up)	0.5s		0.1...20s (0.5s at power up)			
Resetting hysteresis	3%	5%		3%			
Instantaneous tripping for Ue	<70% Ue configured	U _{min} <70% Ue		<70% Ue configured	<70% Ue configured		
Repeat accuracy	< ±0.1%	< ±1%		< ±0.1%	< ±0.1%		
POWER SUPPLY							
Auxiliary voltage (Us)	Self powered						
Operating range	105...115% Ue	—	—	—	—	—	—
Frequency	0.7...1.2Ue	0.85...1.1Ue		0.7...1.2Ue			
Power consumption (maximum)	10VA (208...240VAC) ① 17VA (380...440VAC) ①	20VA ①	28VA ①	11VA (208...240VAC) ① 30VA (380...575VAC) ① 19VA (600VAC) ①			
Power dissipation (maximum)	1.5W	2.2W	2.5W				
RELAY OUTPUTS							
Number of relays	1						
Relay state	Normally energised De-energises at tripping						
Contact arrangement	1 changeover SPDT						
Rated operational voltage	250VAC						
Maximum switching voltage	400VAC						
Conventional free-air thermal current (I _{th})	8A						
UL/CSA and IEC/EN/BS 60947-5-1 designation	B300						
Electrical life (with rated load)	10 ⁹ cycles						
Mechanical life	30x10 ⁶ cycles						
Indications	1 green LED for power on and tripping 2 red LEDs for tripping	1 green LED for power on and tripping		1 green LED for power on and tripping 1 red LED for tripping			
CONNECTIONS							
Terminal tightening torque (maximum)	0.8Nm (7lb.in; 7...9lb.in for UL/CSA)						
Conductor section min...max	0.2...4.0mm ² (24...12AWG; 18...12AWG for UL/CSA)						
INSULATION (input-output)							
IEC rated insulation voltage U _i	440VAC	480VAC	600VAC				
IEC rated impulse withstand voltage U _{imp}	6kV						
IEC power frequency withstand voltage	4kV						
AMBIENT CONDITIONS							
Operating temperature	-20...+60°C						
Storage temperature	-30...+80°C						
HOUSING							
Material	Self-extinguishing polyamide						

① Power consumption (maximum) at 50Hz.

	—	—	—	—	—	—
	PMV50	PMV70	—	—	—	—
	—	—	PMV50N	PMV70N	PMV80N	PMV95N
	Minimum and maximum AC voltage, phase loss and incorrect phase sequence	Minimum and maximum AC voltage, phase loss incorrect phase sequence and asymmetry	Minimum and maximum AC voltage, phase loss neutral loss and incorrect phase sequence	Minimum and maximum AC voltage, phase loss neutral loss, incorrect phase sequence and asymmetry	Minimum and maximum AC voltage and frequency, phase loss, neutral loss and incorrect phase sequence	Minimum and maximum AC voltage and frequency, phase loss, neutral loss, incorrect phase sequence and asymmetry
	208...240VAC 380...575VAC 600VAC 105...115% Ue 80...95% Ue — —	208...240VAC 380...575VAC 600VAC 105...115% Ue 80...95% Ue 5...15% Ue —	208...240VAC 380...440VAC 480...600VAC 105...115% Ue 80...95% Ue — —	208...240VAC 380...440VAC 480...600VAC 105...115% Ue 80...95% Ue 5...15% Ue —	208...240VAC 380...440VAC 480...600VAC 105...115% Ue 80...95% Ue — ±1...10% rated frequency	208...240VAC 380...575VAC — 105...115% Ue 80...95% Ue 5...15% Ue ±1...10% rated frequency
	0.1...20s (0.5s at power up) 3%	0.1...20s 0.5s 3%	0.1...20s (0.5s at power up) 3%	0.5s 3%	0.1...20s 0.1...5s freq. 0.5s 3% 0.5% freq.	0.1...30s (0.5s at power up) 1...5%
	<70% Ue configured < ±0.1%					
	Self powered					
	0.7...1.2Ue					
	50/60Hz ±5%	50/60Hz ±10%				
	11VA (208...240VAC) ● 30VA (380...575VAC) ● 19VA (600VAC) ● 2.5W	27VA			30VA	
		1.9W			2.5W	
	1	2			1	
	Normally energised De-energises at tripping					
	1 changeover SPDT	2 changeover SPDT			1 changeover SPDT	
	250VAC					
	400VAC					
	8A					
	B300					
	10 ⁵ cycles					
	30x10 ⁶ cycles					
	1 green LED for power on and tripping 2 red LEDs for tripping	1 green LED for power on and tripping 3 red LEDs for tripping	1 green LED for power on and tripping 2 red LEDs for tripping	1 green LED for power on and tripping 3 red LEDs for tripping		1 green LED for power 5 red LEDs for tripping
	0.8Nm (7lb.in; 7...9lb.in for UL/CSA - PMV50N/70N/80N excluded)					
	0.2...4.0mm ² (24...12AWG; 18...12AWG for UL/CSA - PMV50N/70N/80N excluded)					
	600VAC					
	6kV					
	4kV					
	-20...+60°C					
	-30...+80°C					
	Self-extinguishing polyamide					

TYPE	PMF20
DESCRIPTION	Single-phase minimum and maximum frequency control
FREQUENCY CONTROL CIRCUIT	
Rated frequency	50 or 60Hz selectable
Operating frequency range	40...70Hz
Adjustment	MAX tripping 101...110% operating frequency
	MIN tripping 90...99% operating frequency
	Resetting hysteresis 0.5%
	Inhibition time 0.1...20s
	Reset delay 0.1...20s
Resetting	Automatic
Repeat accuracy	< ±0.1%
AUXILIARY POWER SUPPLY	
Rated supply voltage U _e	220...240VAC
	380...415VAC
Operating range	0.85...1.1U _e
Rated frequency	50/60Hz
Power consumption (maximum)	10VA (220...240VAC); 17VA (380...415VAC)
Power dissipation (maximum)	1.5W
RELAY OUTPUTS	
Number of relays	1
Relay state	Normally energised, de-energises at tripping ^❶
Contact arrangement	1 changeover contact SPDT
Rated operational voltage	250VAC
Maximum switching voltage	400VAC
IEC conventional free air thermal current I _{th}	8A
UL/CSA and IEC/EN/BS 60947-5-1 designation	B300
Electrical life (with rated load)	10 ⁵ cycles
Mechanical life	30x10 ⁶ cycles
Indications	1 green LED for power on/tripping 2 red LEDs for min-max tripping
CONNECTIONS	
Tightening torque maximum	0.8Nm (7lb.in)
Conductor section min-max	0.2...4.0mm ² (24...12AWG)
INSULATION (input - output)	
IEC rated insulation voltage U _i	575VAC
IEC rated impulse withstand voltage U _{imp}	6kV
IEC power frequency withstand voltage	4kV
AMBIENT CONDITIONS	
Operating temperature	-20...+60°C
Storage temperature	-30...+80°C
HOUSING	
Material	Self-extinguishing polyamide

❶ Normally de-energised, energises at tripping with MAX function configured.

22 Monitoring relays

Technical characteristics

Current monitoring and pump protection relays

TYPE	PMA20	PMA30	PMA40	PMA50
DESCRIPTION				
	Single-phase maximum current monitoring AC/DC multiscale	Single-phase minimum or maximum current monitoring AC/DC multiscale	Single-phase minimum or maximum current monitoring AC/DC multiscale	Single and three-phase pump protection (motor under-load and over-current control) monitoring for max AC current, min $\cos\varphi$, phase loss and incorrect phase sequence
CONTROL CIRCUIT				
Rated current	5 or 16A		0.02 - 0.05 - 0.25 - 1 - 5 - 16A	5 or 16A
Rated frequency	50/60Hz $\pm 5\%$			
Overload capacity	5 le for 1s 160A for 10ms Constant 16A		50mA - 1A inputs: 5 le for 1s 10le for 10ms Constant 2le	16A input: 5 le for 1s 160A for 10ms Constant 16A
Connection	Direct or by current transformer			
Current monitoring relays adjustments	Tripping values 5...100% f.s.			—
	Tripping time 0.1...30s			—
	Inhibition time 1...60s			—
	Resetting hysteresis 1...50%		3% fixed	
Pump protection relays adjustments	End-scale value —			5 or 16A
	Tripping for MAX current —			10...100le
	Tripping for $\cos\varphi$ —			0.1...0.99 $\cos\varphi$ (Min)
	Tripping delay —			0.1...10s
	Inhibition time —			1...60s
	Automatic resetting delay —			OFF...100min
Resetting	Automatic or manual			
External input	Resetting or inhibition		—	
Repeat accuracy	$\pm 1\%$ with constant parameters			
VOLTAGE CONTROL CIRCUIT				
Voltage measuring range (Ue)	—			80...660VAC
Tripping time for phase loss	—			60ms
AUXILIARY SUPPLY				
Auxiliary supply voltage Us	24...240VAC/DC			220...240VAC 380...415VAC 440...480VAC
Operating range	0.85...1.1Us			
Rated frequency	50/60Hz $\pm 5\%$			
Power consumption (maximum)	3.2VA		7VA	4.5VA
Power dissipation (maximum)	1.6W		1.7W	2.3W
RELAY OUTPUTS				
Number of relays	1		2	1
Relay state	Normally energised / de-energised (selectable)			Normally energised, de-energises at tripping
Contact arrangement	1 changeover contact SPDT each			
Rated operational voltage	250VAC			
Maximum switching voltage	400VAC			
IEC conventional free air thermal current Ith	8A			
UL/CSA and IEC/EN/BS 60947-5-1 designation	B300			
Electrical life (with rated load)	10 ⁵ cycles			
Mechanical life	30x10 ⁶ cycles			
Indications	1 green LED for power on/inhibition 1 red LED for tripping		1 green LED for power on/inhibition 2 red LEDs for max/min tripping	
CONNECTIONS				
Tightening torque maximum	0.8Nm (7lb.in; 7...9lb.in per UL/CSA)			
Conductor section min...max	0.2...4.0mm ² (24...12AWG; 18...12AWG per UL/CSA)			
INSULATION (input-output)				
IEC rated insulation voltage Ui	415VAC			600VAC
IEC rated impulse withstand voltage Uimp	4kV			6kV
IEC power frequency withstand voltage	2.5kV			
AMBIENT CONDITIONS				
Operating temperature	-20...+60°C			
Storage temperature	-30...+80°C			
HOUSING				
Material	Self-extinguishing polyamide			

TYPE	PMIB1A230
DESCRIPTION	Insulation monitoring relay
VOLTAGE CONTROL CIRCUIT	
Voltage measuring range	207...253VAC
Adjustable intervention threshold	25...100kOhm
AUXILIARY SUPPLY	
Auxiliary supply voltage U_s	220...240VAC
Operating range	0.85...1.1 U_s
Rated frequency	50/60Hz \pm 5%
Power consumption (maximum)	3VA
Power dissipation (maximum)	1.5W
RELAY OUTPUTS	
Number of relays	1
Relay state	Normally energised, de-energises at tripping
Contact arrangement	1 changeover contact SPDT each
Rated operational voltage	250VAC
Maximum switching voltage	250VAC
IEC conventional free air thermal current I_{th}	5A
Electrical life (with rated load)	3x10 ⁵ cycles
Mechanical life	50x10 ⁶ cycles
Indications	1 green LED for power on/inhibition 1 red LED for tripping
CONNECTIONS	
Tightening torque maximum	0.5Nm (4.5lb.in)
Conductor section min...max	0.2...2.5mm ² (24...12AWG)
INSULATION (input-output)	
IEC rated insulation voltage U_i	600VAC
IEC rated impulse withstand voltage U_{imp}	4kV
IEC power frequency withstand voltage	2.5kV
AMBIENT CONDITIONS	
Operating temperature	-10...+60°C
Storage temperature	-20...+70°C
HOUSING	
Material	Self-extinguishing polycarbonate

TYPE	PMVF52	PMVF61 - PMVF71 - PMVF81 - PMVF90	PMVF3000
AUXILIARY POWER SUPPLY			
Rated control supply voltage U_s	24...240VAC / 24...240VDC	24...240VAC / 24...240VDC	100...240VAC / 110...250VDC
Operating limits	22...264VAC / 22...264VDC	22...264VAC / 22...264VDC	90...264VAC / 93.5...300VDC
Frequency	45...55Hz	45...55Hz	45...55Hz
Power consumption max	6.2VA	6.2VA	15VA
Power dissipation max	2W	2W	6W
Micro-breaking immunity	240VAC 50Hz \leq 2000ms 240VDC \leq 1000ms 24VAC 50Hz \leq 30ms 24VDC \leq 15ms	240VAC 50Hz \leq 2000ms 240VDC \leq 1000ms 24VAC 50Hz \leq 30ms 24VDC \leq 15ms	\leq 50ms
Overload category	III	III	III
VOLTAGE INPUTS			
Rated operating voltage	400VAC L-L; 230VAC L-N 50Hz	400VAC L-L; 230VAC L-N 50Hz	50...500VAC (for voltages/frequency) / 50...150V (for residual voltage measurement)
Measuring range	40...480VAC L-L; 23...277VAC L-N	without VT: 10...520VAC L-L; 5...300VAC L-N with VT: 100...500000VAC L-L; 57...290000VAC L-N	400-150,000V (VT primary)
Frequency range	45...55Hz	45...55Hz - 45...66 (for PMVF61)	45...55Hz
Overload category	IV	IV	IV
CURRENT INPUTS (OPTIONAL)			
Rated operational current I_e	–	–	1A or 5A in AC programmable
Measuring range	–	–	For 1A scale: 0.01...1.2A; for 5A scale: 0.01...6A
Type of input	–	–	Shunts powered by external current transformer (low voltage) 5A max.
Type of measurement	–	–	RMS
Overload capacity	–	–	\pm 100% I_e
Overload peak	–	–	50A for 1 second
RELAY OUTPUTS			
Number of outputs	3 ^①	3 ^①	2
Type of output	2 changeover contact and 1 output NO	2 changeover contact and 1 output NO	1 changeover contact/SPDT each
Rated operating voltage	250VAC	250VAC	250VAC
IEC/EN/BS 60947-5-1 designation	OUT1: 8A 250VAC, 8A 30VDC OUT2: 5A 250VAC, 5A 30VDC OUT3: 2A 250VAC, 2A 30VDC	OUT1: 8A 250VAC, 8A 30VDC OUT2: 5A 250VAC, 5A 30VDC OUT3: 2A 250VAC, 2A 30VDC	5A 250VAC AC1 / B300, 5A 30VDC
Overload category	III	III	III
DIGITAL INPUTS			
Number and type of inputs	4 positive (PNP)	4 positive (PNP)	4 negative (NPN)
Input voltage	5VDC output from the common	5VDC output from the common	24VDC isolated
Input current	6mA	6mA	7mA
SUPPLY/VOLTAGE MEASURING CIRCUIT CONNECTIONS			
Type of terminal	Screw - fixed	Screw - fixed	Screw - fixed
Number of terminals	–	–	2 for power supply; 5 for voltage control
Conductor section (min...max)	0.2...4mm ² (24...12AWG)	0.2...4mm ² (24...12AWG)	0.2...4.0mm ² (24...12AWG)
Tightening torque	0.8Nm (7lb.in)	0.8Nm (7lb.in)	0.8Nm (7lb.in)
CURRENT MEASURING CIRCUIT CONNECTIONS			
Type of terminal	–	–	Screw - fixed
Number of terminals	–	–	6 for external CT connections
Conductor section (min...max)	–	–	0.2...4mm ² (24...12AWG)
Tightening torque	–	–	0.44Nm (4lb.in)
RELAY OUTPUT CONNECTIONS			
Type of terminals	Screw - fixed	Screw - fixed	Screw - removable
Conductor section (min...max)	0.2...2.5mm ² (24...12AWG)	0.2...2.5mm ² (24...12AWG)	0.2...2.5mm ² (24...12AWG)
Tightening torque	0.44Nm (4lb.in)	0.44Nm (4lb.in)	0.5Nm (4.5lb.in)
INPUT CONNECTIONS – Input terminals			
Type of terminals	Screw - fixed	Screw - fixed	Screw - removable
Conductor section (min...max)	0.2...2.5mm ² (24...12AWG)	0.2...2.5mm ² (24...12AWG)	0.2...1.5mm ² (28...14AWG)
Tightening torque	0.44Nm (4lb.in)	0.44Nm (4lb.in)	0.18Nm (1.7lb.in)
INPUT CONNECTIONS – COM and auxiliary voltage terminals			
Type and (number) of terminals	Screw - fixed	Screw - fixed	Screw - removable
Conductor section (min...max)	0.2...2.5mm ² (24...12AWG)	0.2...2.5mm ² (24...12AWG)	0.2...2.5mm ² (24...12AWG)
Tightening torque	0.44Nm (4lb.in)	0.44Nm (4lb.in)	0.5Nm (4.5lb.in)
HOUSING			
Material	Polyamide	Polyamide	Polyamide
Version	Modular 4U	Modular 4U	Flush

① Single insulation between the two outputs. Both outputs must use the same voltage group.