

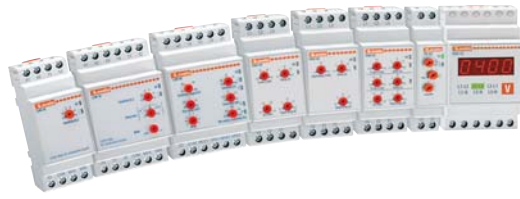


Protection relays PM series



Lovato
electric
100% electricity

Protection relays



moduLo



moduLo protection relays, PM series, have been developed and designed to warrant the maximum reliability, accuracy and flexibility.

TRMS measurements provide for reliable device operation even in presence of high harmonic voltages.

moduLo protection relays include the latest state-of-the-art generation of electromechanical and electronic components and are made with the use of the most recent technological and engineering assembly and control systems available.

Functions

Voltage monitoring



PMV10 PMV20 PMV30 PMV40 PMV50 PMV60 PMV70 PMV55

	Three-phase systems without neutral control							Single-phase systems
Minimum AC voltage			•		•	•	•	•
Maximum AC voltage					•		•	•
Phase loss	•	•	•	•	•	•	•	
Neutral loss								
Incorrect phase sequence	•	•	•	•	•	•	•	
Asymmetry				•		•	•	
Minimum frequency								
Maximum frequency								

Current monitoring



PMA20 PMA30 PMA40

	Single-phase systems		
Maximum AC/DC current	•		
Minimum or maximum AC/DC current		•	
Minimum and maximum AC/DC current			•

Pump protection



PMA50

	Single and three-phase systems
Dry running-minimum cosφ protection	•
Maximum AC current	•
Phase loss	•
Incorrect phase sequence	•

Phase shift monitoring



PMA60

	Single and three-phase systems
Minimum cosφ	•
Maximum cosφ	•

Frequency monitoring

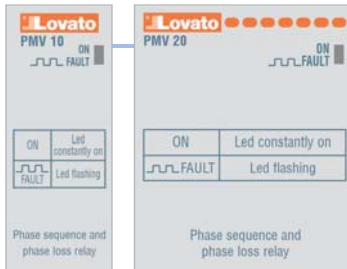


PMF20

	Single and three-phase systems
Minimum frequency	•
Maximum frequency	•

Voltage monitoring

Three-phase systems without neutral control

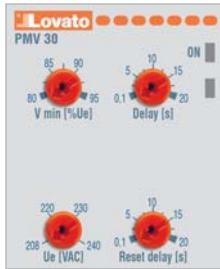


PMV10 - PMV20 Phase loss and incorrect phase sequence

1 relay output with 1 changeover contact, rated 8A at 250VAC in AC1, energised in normal conditions.

TECHNICAL NOTES:

Phase loss for voltage <70% with instantaneous tripping, automatic reset in 0.5s and fixed 5% hysteresis. Phase sequence controlled at unit power up.



PMV30 Minimum AC voltage, phase loss and incorrect phase sequence

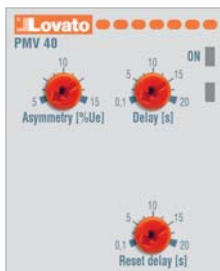
1 relay output with 1 changeover contact, rated 8A at 250VAC in AC1, energised in normal conditions.

ADJUSTMENTS:

“V min”: Tripping threshold for minimum voltage 80-95% Ue
 “Delay”: Tripping time 0.1-20s
 “Reset delay”: Reset time 0.1-20s
 “Ue”: Rated voltage.

TECHNICAL NOTES:

Phase loss for voltage <70% with instantaneous tripping, automatic reset in 0.5s and fixed 5% hysteresis. Phase sequence controlled at unit power up. Minimum voltage with fixed hysteresis at 3% Ue.



PMV40 Asymmetry, phase loss and incorrect phase sequence

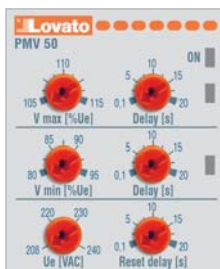
1 relay output with 1 changeover contact, rated 8A at 250VAC in AC1, energised in normal conditions.

ADJUSTMENTS:

“Asymmetry”: Tripping threshold for too high asymmetry 5-15% Ue
 “Delay”: Tripping time 0.1-20s
 “Reset delay”: Reset time 0.1-20s.

TECHNICAL NOTES:

Phase loss for voltage <70% with instantaneous tripping, automatic reset in 0.5s and fixed 5% hysteresis. Phase sequence controlled at unit power up. Asymmetry with fixed 3% hysteresis.



PMV50 Minimum and maximum AC voltage, phase loss and incorrect phase sequence

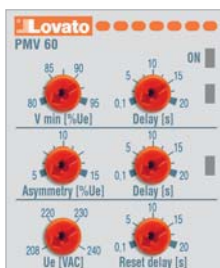
1 relay output with 1 changeover contact, rated 8A at 250VAC in AC1, energised in normal conditions.

ADJUSTMENTS:

“V max”: Tripping threshold for maximum voltage 105-115% Ue
 “V min”: Tripping threshold for minimum voltage 80-95% Ue
 “Delay”: Tripping time 0.1-20s
 “Reset delay”: Reset time 0.1-20s
 “Ue”: Rated voltage.

TECHNICAL NOTES:

Phase loss for voltage <70% with instantaneous tripping, automatic reset in 0.5s and fixed 5% hysteresis. Phase sequence controlled at unit power up. Minimum and maximum voltage with fixed 3% Ue hysteresis.



PMV60 Minimum AC voltage, asymmetry, phase loss and incorrect phase sequence

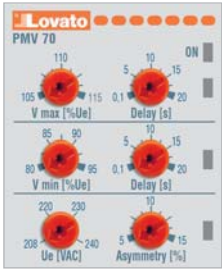
1 relay output with 1 changeover contact, rated 8A at 250VAC in AC1, energised in normal conditions.

ADJUSTMENTS:

“V min”: Tripping threshold for minimum voltage 80-95% Ue
 “Asymmetry”: Tripping threshold for too high asymmetry 5-15% Ue
 “Delay”: Tripping time 0.1-20s
 “Reset delay”: Reset time 0.1-20s
 “Ue”: Rated voltage.

TECHNICAL NOTES:

Phase loss for voltage <70% with instantaneous tripping, automatic reset in 0.5s and fixed 5% hysteresis. Phase sequence controlled at unit power up. Minimum voltage and asymmetry with fixed hysteresis at 3% Ue.



PMV70 Minimum and maximum AC voltage, asymmetry, phase loss and incorrect phase sequence

1 relay output with 1 changeover contact, rated 8A at 250VAC in AC1, energised in normal conditions.

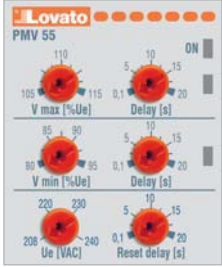
ADJUSTMENTS:

- "V max": Tripping threshold for maximum voltage 105-115% Ue
- "V min": Tripping threshold for minimum voltage 80-95% Ue
- "Asymmetry": Tripping threshold for too high asymmetry 5-15% Ue
- "Delay": Tripping time 0.1-20s
- "Ue": Rated voltage.

TECHNICAL NOTES:

Phase loss for voltage <70% with instantaneous tripping, automatic reset in 0.5s and fixed 5% hysteresis. Phase sequence controlled at unit power up. Minimum, maximum voltage and asymmetry with fixed 3% Ue hysteresis. Asymmetry with tripping time the same as for minimum voltage.

Single-phase system



PMV55 Minimum and maximum AC voltage

1 relay output with 1 changeover contact, rated 8A at 250VAC in AC1, energised in normal conditions.

ADJUSTMENTS:

- "V max": Tripping threshold for maximum voltage 105-115% Ue
- "V min": Tripping threshold for minimum voltage 80-95% Ue
- "Delay": Tripping time 0.1-20s
- "Reset delay": Reset time 0.1-20s
- "Ue": Rated voltage.

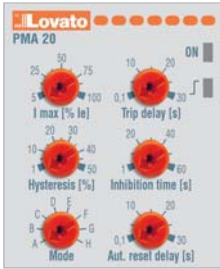
TECHNICAL NOTES:

Fixed 3% hysteresis.



Current monitoring

Single-phase systems



PMA20 AC/DC maximum current control

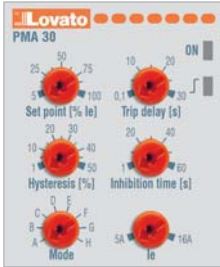
1 relay output with 1 changeover contact, rated 8A at 250VAC in AC1.

ADJUSTMENTS:

- "I max": Tripping threshold for maximum current 5-100% I_e
- "Hysteresis": Maximum threshold hysteresis 1-50%
- "Trip delay": Tripping time 0.1-30s
- "Inhibition time": Tripping delay for external input or at power up 1-60s
- "Aut. reset delay": Automatic reset time 0.1-30s
- "Mode": Current scale and operating mode selection: rated current 5A or 16A, output relay normally energised or de-energised, tripping memory On or Off.

TECHNICAL NOTES:

AC/DC power supply and digital input.
AC/DC current input.
Unidirectional DC current measurement.
External digital input for inhibition or reset.



PMA30 AC/DC minimum or maximum current control

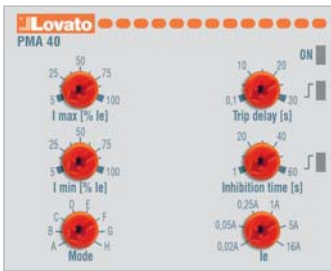
1 relay output with 1 changeover contact, rated 8A at 250VAC in AC1.

ADJUSTMENTS:

- "Set point": Tripping threshold for maximum or minimum current 5-100% I_e
- "Hysteresis": Maximum threshold hysteresis 1-50%
- "Trip delay": Tripping time 0.1-30s
- "Inhibition time": Tripping delay for external input or at power up 1-60s
- "I_e": Current scale selection: 5A or 16A
- "Mode": Operating mode selection: min or max function, output relay normally energised or de-energised, tripping memory On or Off.

TECHNICAL NOTES:

AC/DC power supply and digital input.
AC/DC current input.
Unidirectional DC current measurement.
External digital input for inhibition or reset.



PMA40 AC/DC minimum and maximum current control

2 relay outputs each with 1 changeover contact, rated 8A at 250VAC in AC1.

ADJUSTMENTS:

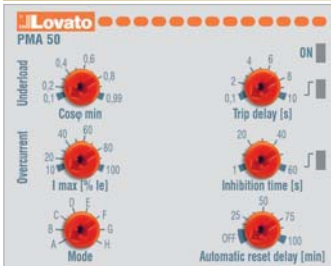
- "I max": Tripping threshold for max. current 5-100% I_e
- "I min": Tripping threshold for min. current 5-100% I_e
- "Trip delay": Tripping time 0.1-30s
- "Inhibition time": Tripping delay at power up 1-60s
- "I_e": Current scale selection: 20mA, 50mA, 250mA, 1A, 5A or 16A
- "Mode": Operating mode selection: independent or parallel output relays, output relays normally energised or de-energised, tripping memory On or Off.

TECHNICAL NOTES:

AC/DC auxiliary supply voltage and current input.
Fixed 3% threshold hysteresis.
Unidirectional DC current measurement.

Pump protection

Single and three-phase systems



PMA50 Maximum AC current, minimum cosφ, phase loss and incorrect phase sequence

1 relay output with 1 changeover contact, rated 8A at 250VAC in AC1, energised in normal conditions.

ADJUSTMENTS:

- "Cosφ min": Minimum cosφ threshold 0.1-0.99
- "I max": Maximum current threshold 10-100% I_e
- "Trip delay": Tripping time for minimum cosφ and maximum current 0.1-10s
- "Inhibition time": Tripping delay for external input or at power up 1-60s
- "Aut. reset delay": Automatic reset time OFF-100min
- "Mode": Current scale and operating mode selection: rated current 5A or 16A, single or three phase, external reset On or Off.

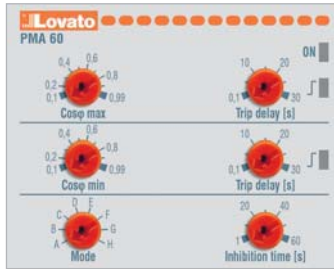
TECHNICAL NOTES:

Power supply independent of voltage control.
Voltage control 80-660VAC.
Current control 0.1-16A.
Fixed 3% current threshold hysteresis.
Protections: phase loss, incorrect phase sequence, underload (dry running) and current overload.
External digital input for enabling or reset.
N.B. Suitable for detecting abnormal conditions in belt or chain transmission systems.



Phase shift monitoring

Single and three-phase systems



PMA60 Minimum or maximum $\cos\phi$

2 relay outputs each with 1 changeover contact, rated 8A at 250VAC in AC1.

ADJUSTMENTS:

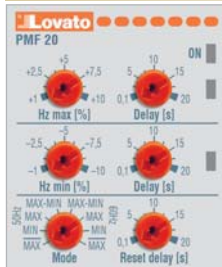
“Cos ϕ min”:	Minimum $\cos\phi$ threshold 0.1-0.99
“Trip delay”:	Tripping time for minimum $\cos\phi$ 0.1-30s
“Cos ϕ max”:	Maximum $\cos\phi$ threshold 0.1-0.99
“Trip delay”:	Tripping time for maximum $\cos\phi$ 0.1-30s
“Inhibition time”:	Tripping delay at power up 1-60s
“Mode”:	Operating mode selection: single or three phase, output relays normally energised or de-energised, tripping memory On or Off.

TECHNICAL NOTES:

Power supply independent of voltage control.
Voltage control 80-660VAC.
Current control 0.1-16A.

Frequency monitoring

Single-phase systems



PMF20 Minimum and maximum frequency

1 relay output with 1 changeover contact, rated 8A at 250VAC in AC1.

ADJUSTMENTS:

“Hz max”:	Maximum frequency tripping threshold +1 to +10%
“Trip delay”:	Tripping time 0.1-20s
“Hz min”:	Minimum frequency tripping threshold -1 to -10%
“Trip delay”:	Tripping time 0.1-20s
“Reset delay”:	Reset time 0.1-20s
“Mode”:	Operating mode selection: <ul style="list-style-type: none">– minimum and maximum frequency– output relay energised at maximum frequency– output relay energised at minimum frequency– output relay de-energised at maximum frequency.

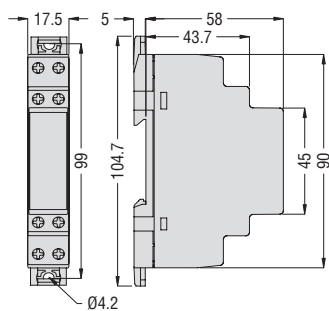
TECHNICAL NOTES:

Fixed 0.5% threshold hysteresis.

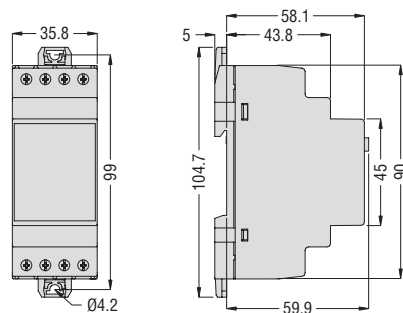


Overall dimensions [mm]

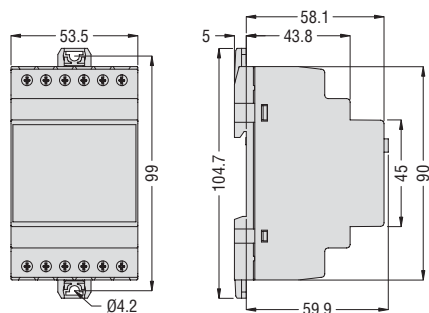
PMV10...



PMV... - PMA20 - PMA30 - PMF20



PMA40 - PMA50 - PMA60



Ambient conditions

- Operating temperature: $-20...+60^{\circ}\text{C}$
- Storage temperature: $-30...+80^{\circ}\text{C}$
- Relative humidity: $<90\%$
- Degree of protection: IP40 on front (only when mounted in housing or electric board with same or higher protection degree) IP20 at connections.

Certifications and compliance

- Certifications obtained: cULus - GOST.
- Comply with standards: IEC/EN 60255-6, IEC/EN 61000-6-2 and IEC/EN 61000-6-3.

How to order

VOLTAGE MONITORING

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

Three-phase systems without neutral

Phase loss and incorrect phase sequence. Instantaneous tripping.

PMV10 A440	208-480VAC	1	0.050
PMV20 A240	100-240VAC	1	0.120
PMV20 A575	208-575VAC	1	0.120
PMV20 A600	380-600VAC	1	0.120

Minimum AC voltage. Delayed tripping. Phase loss and incorrect phase sequence. Instantaneous tripping.

PMV30 A240	208-240VAC	1	0.130
PMV30 A575	380-575VAC	1	0.130
PMV30 A600	600VAC	1	0.130

Asymmetry. Delayed tripping. Phase loss and incorrect phase sequence. Instantaneous tripping.

PMV40 A240	208-240VAC	1	0.130
PMV40 A575	380-575VAC	1	0.130
PMV40 A600	600VAC	1	0.130

Minimum and maximum AC voltage. Delayed tripping. Phase loss and incorrect phase sequence. Instantaneous tripping.

PMV50 A240	208-240VAC	1	0.130
PMV50 A575	380-575VAC	1	0.130
PMV50 A600	600VAC	1	0.130

Minimum AC voltage and asymmetry. Delayed tripping. Phase loss and incorrect phase sequence. Instantaneous tripping.

PMV60 A240	208-240VAC	1	0.130
PMV60 A575	380-575VAC	1	0.130
PMV60 A600	600VAC	1	0.130

Minimum and maximum AC voltage and asymmetry. Delayed tripping. Phase loss and incorrect phase sequence. Instantaneous tripping.

PMV70 A240	208-240VAC	1	0.130
PMV70 A575	380-575VAC	1	0.130
PMV70 A600	600VAC	1	0.130

Single-phase systems

Minimum and maximum AC voltage. Delayed tripping.

PMV55 A240	208-240VAC	1	0.125
PMV55 A440	380-440VAC	1	0.125

CURRENT MONITORING

Order code	Rated current Ie	Auxiliary supply	Qty per pkg	Weight [kg]
	[A]	[V]		

Single-phase systems. Automatic or manual reset

AC/DC maximum current control. Delayed tripping.

PMA20 240	5 or 16	24-240VAC/DC	1	0.121
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AC/DC minimum or maximum current control. Delayed tripping.

PMA30 240	5 or 16	24-240VAC/DC	1	0.121
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AC/DC minimum and maximum current control. Delayed tripping.

PMA40 240	0.02-0.05-0.25-1-5-16 multiscale	24-240VAC/DC	1	0.166
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PUMP PROTECTION

Single and three-phase systems. Automatic or manual reset

Maximum AC current and minimum cosφ. Delayed tripping. Phase loss and incorrect phase sequence. Instantaneous tripping.

PMA50 A240		220-240VAC	1	0.251
PMA50 A415	5 or 16	380-415VAC	1	0.251
PMA50 A480		440-480VAC	1	0.251

PHASE SHIFT MONITORING

Single and three-phase systems

Minimum or maximum cosφ. Delayed tripping.

PMA60 A240		220-240VAC	1	0.254
PMA60 A415	16	380-415VAC	1	0.254
PMA60 A480		440-480VAC	1	0.254

FREQUENCY MONITORING

Order code	Rated voltage Ue	Qty per pkg	Weight [kg]
	[V] 50/60Hz		

Single-phase systems. Automatic reset

Minimum and maximum frequency.

PMF20 A240	220-240VAC	1	0.125
PMF20 A415	380-415VAC	1	0.125



new
2009



Switch disconnectors
16 to 1250A



Contactors



Signal towers and beacons



Digital multimeters and
power analyzers DMG series



Automatic transfer switch controllers
ATL 10 type

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PLANET Switch

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- Switch disconnectors
- Contactors
- Motor protection relays
- Electromechanical starters
- Control and signalling units
- Limit, micro and foot switches
- Rotary cam switches

PLANET Din

- Modular contactors
- Time relays
- Protection relays
- Level control relays
- Earth leakage relays

PLANET Logic

- Metering instruments and current transformers
- Soft starters
- AC motor drives
- Automatic power factor controllers
- Automatic battery chargers
- Automatic transfer switch controllers
- Programmable logic relays
- Switching power supplies
- Engine and generator controllers

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