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VOLTAGE MONITORING RELAYS
- For three-phase systems without neutral, 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.

Pages 17-8 and 9

CURRENT MONITORING RELAYS
- For single-phase systems
- Maximum AC/DC current
- Minimum or maximum AC/DC current
- Minimum and maximum AC/DC current.

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PUMP PROTECTION RELAYS
- For single and three-phase systems
- Minimum cosφ for dry running protection
- Maximum AC current
- Phase loss and incorrect phase sequence.

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PHASE SHIFT MONITORING RELAYS
- For single and three-phase systems
- Minimum cosφ
- Maximum cosφ.

Page 17-12

FREQUENCY MONITORING RELAYS
- For single and three-phase systems
- Minimum frequency
- Maximum frequency.

Page 17-13

VOLTAGE-FREQUENCY MONITORING RELAY
- Minimum and maximum voltage
- Minimum and maximum frequency
- ROCOF (Rate Of Change Of Frequency).

- Modular version for switchgear panels, suitable also 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
- Minimum and maximum current monitoring relays
- Frequency monitoring relay
- Voltage and frequency control relay.

Voltage monitoring relays for three-phase systems without neutral




	PMV10	PMV20	PMV30	PMV40	PMV50	PMV60	PMV70
Modular version	●(1U)	●(2U)	●(2U)	●(2U)	●(2U)	●(2U)	●(2U)
Minimum AC voltage			●		●	●	●
Maximum AC voltage					●		●
Phase loss	●	●	●	●	●	●	●
Incorrect phase sequence	●	●	●	●	●	●	●
Asymmetry				●		●	●
Page	17-4				17-5		17-6

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



	PMV50N	PMV70N	PMV80N
Modular version	●(3U)	●(3U)	●(3U)
Minimmum AC voltage	●	●	●
Maximum AC voltage	●	●	●
Phase loss	●	●	●
Neutral loss	●	●	●
Incorrect phase sequence	●	●	●
Asymmetry		●	
Minimum frequency			●
Maximum frequency			●
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Voltage monitoring relay for single-phase systems

	PMV55
Modular version	●(2U)
Minimum AC voltage	●
Maximum AC voltage	●
Page	17-8

Current monitoring relays for single-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	17-8	17-9	

Pump protection relay for single and three-phase systems

	PMA50
Modular version	●(3U)
Minimum cosφ for dry running pump protection	●
Maximum AC current	●
Phase loss	●
Incorrect phase sequence	●
Page	17-10

Phase shift monitoring relay for single and three-phase systems

	PMA60
Modular version	●(3U)
Minimum cosφ	●
Maximum cosφ	●
Page	17-11

Frequency monitoring relay for single and three-phase systems

	PMF20
Modular version	●(2U)
Minimum and maximum frequency	●
Minimum frequency only	●
Maximum frequency only	●
Page	17-12

Voltage and frequency monitoring relay

	PMVF10
Modular version	●(3U)
Minimum and maximum voltage	●
Minimum and maximum frequency	●
ROCOF	●
Page	17-13

Voltage monitoring relays

PMV10 A440

Order code	Rated voltage to control Ue (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.			
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

General characteristicz
- Voltage monitoring relay, self powered, for phase loss and incorrect phase sequece
- 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-module for PMV20
- IEC protection degree: IP40 on front (only when placed in IP40 enclosure or control board); IP20 at terminals.

Certifications and compliance
Certifications obtained: GOST; UL Listed, for USA and Canada (File E93601) as Auxiliary Devices.
Compliant with standards: IEC/EN 60255-5, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL 508, CSA C22.2 n° 14.

Operational diagram
See page 17-15.

PMV20...

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 AC voltage. Delayed trip. Phase loss and incorrect phase sequence. Instantaneous trip.			
PMV30 A240	208-240VAC	1	0.130
PMV30 A575	380-575VAC	1	0.130
PMV30 A600	600VAC	1	0.130

General characteristics
- Voltage monitoring relay, self powered, for minimum voltage, phase loss and incorrect phase sequence
- Configurable rated voltage (Ue):
  - PMV30 A240: 208-220-230-240VAC
  - PMV30 A575: 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-module
- IEC protection degree: IP40 on front (only when placed in IP40 enclosure or control board); IP20 at terminals.

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

Certifications and compliance
Certifications obtained: GOST; UL Listed, for USA and Canada (File E93601), as Auxiliary Devices.
Compliant with standards: IEC/EN 60255-5, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL 508, CSA C22.2 n° 14.

Operational diagram
See page 17-15.

PMV30...

PMV40...

Order code	Rated voltage to control Ue (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.			
PMV40 A240	208-240VAC	1	0.130
PMV40 A575	380-575VAC	1	0.130
PMV40 A600	600VAC	1	0.130

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-module
- IEC protection degree: IP40 on front (only when placed in IP40 enclosure or control board); IP20 at terminals.

ADJUSTMENTS
"Asymmetry" High voltage asymmetry tripping threshold 5-15% Ue
"Delay" Tripping time 0.1-20s
"Reset delay" Resetting time 0.1-20s

Certifications and compliance
Certifications obtained: GOST; UL Listed, for USA and Canada (File E93601), as Auxiliary Devices.
Compliant with standards: IEC/EN 60255-5, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL 508, CSA C22.2 n° 14.

Operational diagram
See page 17-15.

Voltage monitoring relays

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.			
PMV50 A240	208-240VAC	1	0.130
PMV50 A575	380-575VAC	1	0.130
PMV50 A600	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):
  - PMV50 A240: 208-220-230-240VAC
  - PMV50 A575: 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-module
- IEC protection degree: 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: GOST; UL Listed, for USA and Compliant to standards: IEC/EN 60255-5, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL 508, CSA C22.2 n° 14.

Operational diagram
See page 17-15.

PMV60...

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 AC voltage and asymmetry. Delayed trip. Phase loss and incorrect phase sequence. Instantaneous trip.			
PMV60 A240	208-240VAC	1	0.130
PMV60 A575	380-575VAC	1	0.130
PMV60 A600	600VAC	1	0.130

General characteristics
- Voltage monitoring relay, self powered, for minimum voltage, phase loss and incorrect phase sequence
- Configurable rated voltage (Ue):
  - PMV60 A240: 208-220-230-240VAC
  - PMV60 A575: 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-module
- IEC protection degree: IP40 on front (only when placed in IP40 enclosure or control board); IP20 on terminals.

ADJUSTMENTS

"V min"	Minimum voltage tripping threshold 80-95% Ue
"Asymmetry"	High voltage asymmetry tripping threshold 5-15% Ue
"Delay"	Tripping time 0.1-20s
"Reset delay"	Resetting time 0.1-20s

Certifications and compliance
Certifications obtained: GOST; UL Listed for USA and Canada (File E93601), as Auxiliary Devices.
Compliant with standards: IEC/EN 60255-5, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL 508, CSA C22.2 n° 14.

Operational diagram
See page 17-15.

Voltage monitoring relay

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.			
PMV70 A240	208-240VAC	1	0.130
PMV70 A575	380-575VAC	1	0.130
PMV70 A600	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):
  - PMV70 A240: 208-220-230-240VAC
  - PMV70 A575: 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-module
- IEC protection degree: 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: GOST; UL Listed, for USA and Canada (File E93601), as Auxiliary Devices.
Compliant with standards: IEC/EN 60255-5, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL 508, CSA C22.2 n° 14.

Operational diagram
See page 17-15.

Voltage monitoring relay 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.			
PMV50N A240	208-240VAC	1	0.150
PMV50N A440	380-440VAC	1	0.150
PMV50N A600	480-600VAC	1	0.150

General characteristics
- Voltage monitoring relay, self powered, for minimum and maximum voltage, phase loss, neutral loss and incorrect phase sequence
- 4 configurable rated voltage (Ue):
  - PMV50N A240: 208-220-230-240VAC (phase-phase) 120-127-132-138VAC (phase-neutral)
  - PMV50N A440: 380-400-415-440VAC (phase-phase) 220-230-240-254VAC (phase-neutral)
  - PMV50N A600: 480-525-575-600VAC (phase-phase) 277-303-332-347VAC (phase-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-module
- IEC protection degree: 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: cULus pending completion at time of catalogue printing.
Compliant with standards: IEC/EN 60255-5, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL 508, CSA C22.2 n° 14.

Operational diagram
See page 17-16.

Voltage monitoring relays

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.			
PMV70N A240	208-240VAC	1	0.150
PMV70N A440	380-440VAC	1	0.150
PMV70N A600	480-600VAC	1	0.150

General characteristics
- Voltage monitoring relay, self powered, for minimum and maximum voltage, phase loss, neutral loss, incorrect phase sequence and asymmetry
- 4 configurable rated voltage (Ue):
  - PMV70N A240: 208-220-230-240VAC (phase-phase) 120-127-132-138VAC (phase-neutral)
  - PMV70N A440: 380-400-415-440VAC (phase-phase) 220-230-240-254VAC (phase-neutral)
  - PMV70N A600: 480-525-575-600VAC (phase-phase) 277-303-332-347VAC (phase-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-module
- IEC protection degree: 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 "Asymmetry"	Tripping time 0.1-20s High voltage asymmetry tripping threshold 5-15% Ue

Certifications and compliance
Certifications obtained: cULus pending completion at time of catalogue printing.
Compliant with standards: IEC/EN 60255-5, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL 508, CSA C22.2 n° 14.

Operational diagram
See page 17-16.

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.			
PMV80N A240	208-240VAC	1	0.150
PMV80N A440	380-440VAC	1	0.150
PMV80N A600	480-600VAC	1	0.150

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 voltage (Ue):
  - PMV80N A240: 208-220-230-240VAC (phase-phase) 120-127-132-138VAC (phase-neutral)
  - PMV80N A440: 380-400-415-440VAC (phase-phase) 220-230-240-254VAC (phase-neutral)
  - PMV80N A600: 480-525-575-600VAC (phase-phase) 277-303-332-347VAC (phase-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-module
- IEC protection degree: 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 thripping threshold 80-95% Ue
"Hz min/max"	Minimum/maximum frequency tripping threshold 1-10%
"V delay"	Tripping time 0.1-20s
"Hz delay"	Tripping time 0.1-5s.

Certifications and compliance
Certifications obtained: cULus pending completion at time of catalogue printing.
Compliant with standards: IEC/EN 60255-5, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL 508, CSA C22.2 n° 14.

Operational diagram
See page 17-16.

Voltage monitoring relay

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

General characteristics
- Voltage monitoring relay, self powered, for minimum and maximum voltage
- 4 configurable rated voltage (Ue):
  - PMV55 A240: 208-220-230-240VAC
  - PMV55 A440: 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-module
- IEC protection degree: 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: GOST; UL Listed, for USA and Canada (File E93601), as Auxiliary Devices.
Compliant with standards: IEC/EN 60255-5, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL 508, CSA C22.2 n° 14.

Operational diagram
See page 17-16.

Current monitoring relay

PMA20 240

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.				
PMA20 240	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-module
- IEC protection degree: IP40 on front (only when placed in IP40 enclosure or control board); IP20 at terminals.

ADJUSTMENTS

"Imax"	Maximum current tripping threshold 5-100% Ie
"Hysteresis"	Maximum hysteresis thresold 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 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: GOST; UL Listed, for USA and Canada (File E93601), as Auxiliary Devices - Modular ampere monitoring relays.
Compliant with standards: IEC/EN 60255-5, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL 508, CSA C22.2 n° 14.

Operational diagram
See page 17-17.

Current monitoring relays

PMA30 240

Order code	Rated current Ie	Auxiliary supply voltage	Qty per pkg	Wt
	[A]	[V]	n°	[kg]
Single-phase system. AC/DC minimum or maximum current control. Delayed trip. Auxiliary AC/DC power supply. Automatic or manual reset.				
PMA30 240	5 or 16A	24-240V AC/DC	1	0.121

General characteristics
- Current monitoring relay for AC/DC minimum or 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-module
- IEC protection degree: 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% Ie
"Hysteresis"	Minimum or maximum hysteresis threshold 1-50%
"Trip delay"	Tripping time 0.1-30s
"Inhibition time"	Tripping delay for external input or at power up 1-60s
"Ie"	Current scale selection: 5A or 16A
"Mode"	• Min or max function • Relay output normally energised or de-energised • Tripping memory (Latch) On or Off.

Certifications and compliance
Certifications obtained: GOST; UL Listed, for USA and Canada (File E93601), as Auxiliary Devices - Modular ampere monitoring relays.
Compliant with standards: IEC/EN 60255-5, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL 508, CSA C22.2 n° 14.

Operational diagram
See pages 17-18 and 19.

PMA40 240

Order code	Rated current Ie	Auxiliary supply voltage	Qty per pkg	Wt
	[A]	[V]	n°	[kg]
Single-phase system. AC/DC minimum and maximum current control. Delayed trip. Auxiliary AC/DC power supply. Automatic or manual reset.				
PMA40 240	0.02-0.05-0.25-1-5-16A	24-240V AC/DC	1	0.166

General characteristics
- Current monioring 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-module
- IEC protection degree: IP40 on front (only when placed in iP40 enclosure or control board); IP20 at terminals.

ADJUSTMENTS

"Imax"	Maximum current tripping threshold 5-100% Ie
"Imin"	Minimum current tripping threshold 5-100% Ie
"Trip delay"	Minimum and maximum current tripping time 0.1-30s
"Inhibition time"	Tripping time at power up 1-60s
"Ie"	Current scale selection: 20mA, 50mA, 250mA, 1A, 5A or 16A
"Mode"	• Separate or common relay outputs • Relay output normally energised or de-energised • Tripping memory (Latch) On or Off.

Certifications and compliance
Certifications obtainee: GOST; UL Listed, for USA and Canada (File E93601), as Auxiliary Devices - Modular ampere monitoring relays.
Compliant with standards IEC/EN 60255-5, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL 508, CSA C22.2 n° 14.

Operational diagram
See page 17-20.

Pump protection relay

PMA50...

Order code	Rated current Ie	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.				
PMA50 A240	5 or 16A	220-240VAC	1	0.251
PMA50 A415		380-415VAC	1	0.251
PMA50 A480		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-module
- IEC protection degree: 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)
"Imax"	Maximum (over) current threshold 10-100%Ie
"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"	• Rated current 5A or 16A • Single or three phase • External reset On or Off.

Certifications and compliance
Certifications obtained: GOST; UL Listed, for USA and Canada (File E93601), as Auxiliary Devices - Modular ampere monitoring relays.
Compliant with standards: IEC/EN 60255-5, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL 508, CSA C22.2 n° 14.

Operational diagram
See page 17-21.

Phase shift monitoring relay

PMA60...

Order code	Rated current Ie	Auxiliary supply voltage	Qty per pkg	Wt
	[A]	[V]	n°	[kg]
Single and three-phase systems. Minimum and maximum cosφ control. Delayed trip. AC auxiliary power supply. Automatic or manual reset.				
PMA60 A240	16A	220-240VAC	1	0.254
PMA60 A415		380-415VAC	1	0.254
PMA60 A480		440-480VAC	1	0.254

General characteristics
- Minimum and maximum phase shift monitoring relay, AC auxiliary power supply
- 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
- 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-module
- IEC protection degree: 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 inductive
"Trip delay"	Tripping time for minimum cosφ 0.1-30s
"Cosφ max"	Maximum inductive cosφ threshold 0.1-0.99
"Trip delay"	Tripping time for maximum cosφ 0.1-30s
"Inhibition time"	Tripping delay at power up 1-60s
"Mode"	• Single or three phase • Relay outputs normally energised or de-energised • Tripping memory (Latch) On or Off.

Certificartions and compliance
Certifications obtained: GOST; UL Listed, for USA and Canada (File E93601), as Auxiliary Devices - Modular ampere monitoring relays.
Compliant with standards: IEC/EN 60255-5, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL 508, CSA C22.2 n° 14.

Operational diagram
See page 17-22.

Frequency monitoring relay

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.			
PMF20 A240	220-240VAC	1	0.125
PMF20 A415	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-module
- IEC protection degree: IP40 on front (only when placed in IP40 enclosure or control board); IP20 at terminals.

ADJUSTMENTS

"Hz max"	Maximum frequency tripping threshold +1 to +10%
"Delay"	Tripping time 0.1-20s
"Hz min"	Minimum frequency tripping threshold -1 to -10%
"Delay"	Tripping time 0.1-20s
"Reset delay"	Resetting time 0.1-20s
"Mode"	• Minimum and maximum frequency • Output relay energised at maximum frequency • Output relay energised at minimum frequency • Output relay de-energised at maximum frequency.

Certifications and compliance
Certifications obtained: GOST; UL Listed, for USA and Canada (File E93601), as Auxiliary Devices.
Compliant with standards: IEC/EN 60255-5, IEC/EN 61000-6-2, IEC/EN 61000-6-3, UL 508, ßCSA C22.2 n° 14.

Operational diagram
See page 17-23.

Voltage and frequency monitoring relay

PMVF10

Order code di ordinazione	Rated voltage to control Ue	Qty per pkg	Wt
	[V]	n°	[kg]
Three-phase low-voltage system, with or without neutral. Compatible for single-phase low-voltage system. Minimum and maximum AC voltage and frequency control and ROCOF.			
PMVF10	230VAC 50Hz 400VAC 50Hz	1	0.254

Status indication table

Anomaly	Green LED "ON"	Red LED "Vmin"	Red LED "Vmax"	Red LED "Hz"	Relay output 1 and 2
None	Constantly lighted	Switched off	Switched off	Switched off	Energised
Min/max frequency or ROCOF	Flashing	Switched off	Switched off	Constantly lighted	De-energised
Voltage <Vmin	Flashing	Constantly lighted	Switched off	Switched off	De-energised
Voltage >Vmax	Flashing	Switched off	Constantly lighted	Switched off	De-energised

General characteristics
The monitoring relay PMVF10 is designed and developed to satify requirements of the local power authority (ENEL guide edition 2.1 of 12/2010). The authority imposes that the following automatic controls be done whenever an independent power source (e.g. wind turbine or photovoltaic system, diesel generating set, etc.) is connected in parallel with the electric grid (local low-voltage utility):
– Limits of minimum and maximum voltage values
– Limits of minimum and maximum frequency values
– Limit of the Rate Of Change Of Frequency (ROCOF).
When at least one of these limits are not respected, abnormal conditions need to be signalled using a contact.
Typically, the contact is used to isolate the independent power source from the electric grid.

The following are the relay protections available:
– Maximum voltage
– Minimum voltage
– Maximum frequency
– Minimum frequency
– ROCOF.
TRMS measurements of this relay can obtain a correct operation even in presence of harmonic voltages.
It has fixed tripping thresholds for minimum and maximum voltage while those for frequency can be selected between two predefined values, using a rotary switch. A reset delay is adjustable by potentiometer.

Operational characteristics
– Self powered by the system controlled
– Compatible for:
  • Three-phase systems (400VAC 50Hz, with or without neutral)
  • Single-phase systems (230VAC 50 Hz)
– TRMS measurements (True Root Mean Square)
– 2 relay outputs, each with 1 changeover contact (SPDT), rated 8A 250VAC (AC1)
– Modular DIN 43880 housing, 3-module
– IEC protection degree: IP40 on front (only when placed in IP40 enclosure or control board); IP20 at terminals.

PROTECTIONS
Maximum voltage protection:
– Fixed threshold ≥ 1.13Ue
– Fixed tripping time ≤ 0.1s.
Minimum voltage protection:
– Fixed threshold ≤ 0.825Ue
– Fixed tripping time ≤ 0.2s.

ADJUSMENTS
"Mode" Multifunction rotary switch:
  • Control of phase or phase-to-phase voltage values
  • Frequency threshold ±0.3 or ±1Hz
  • ROCOF (> 0.5Hz/s) On or Off
"Reset delay" Resetting time 0.1-30s.

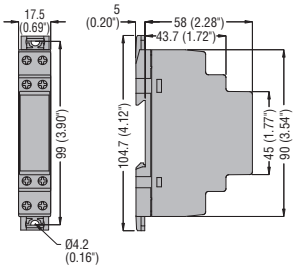
STATUS INDICATIONS
– 1 green LED for system with limits (flashing when out of limits)
– 3 red LEDs for minimum and maximum voltage, minimum and maximum frequency and ROCOF.

Certifications and compliance
Certifications obtained: Local Power Authority (ENEL guide, edition 2.1 December 2010).
Compliant with standards: IEC/EN 60255-5, IEC/EN 61000-6-2, IEC/EN 610006-3.

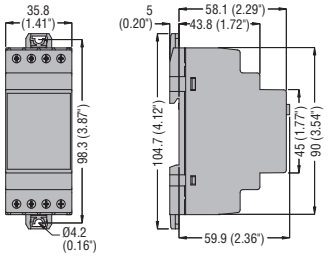
Operational diaagram
See page 17-23.

Protection relays

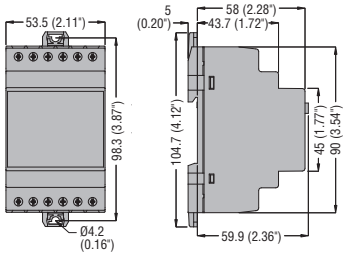
PMV10...



PMV... - PMF20
PMA20... - PMA30...

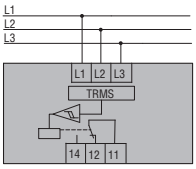


PMV...N - PMA40... -
PMA50... - PMA60... - PMVF10

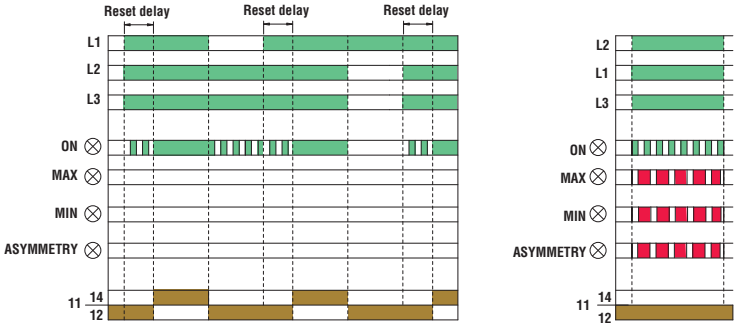


Voltage monitoring relays for
3-phase systems without neutral

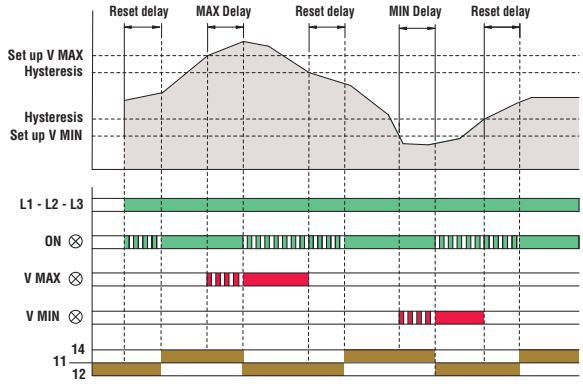
PMV10 - PMV20 - PMV30 - PMV40
PMV50 - PMV60 - PMV70



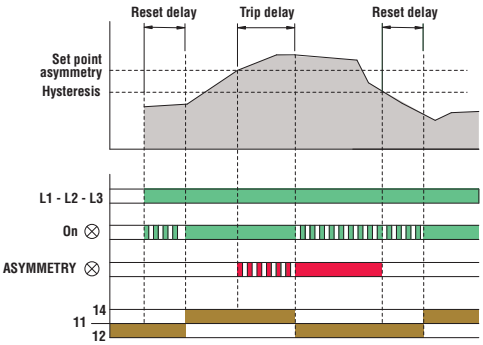
Phase loss and incorrect phase sequence (PMV10-PMV20-PMV30-PMV40-PMV50-PMV60- MV70)



Maximum and minimum voltage (PMV30 - PMV50 - PMV60 - PMV70)

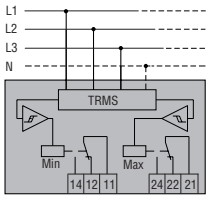


Asymmetry (PMV40 - PMV60 - PMV70)

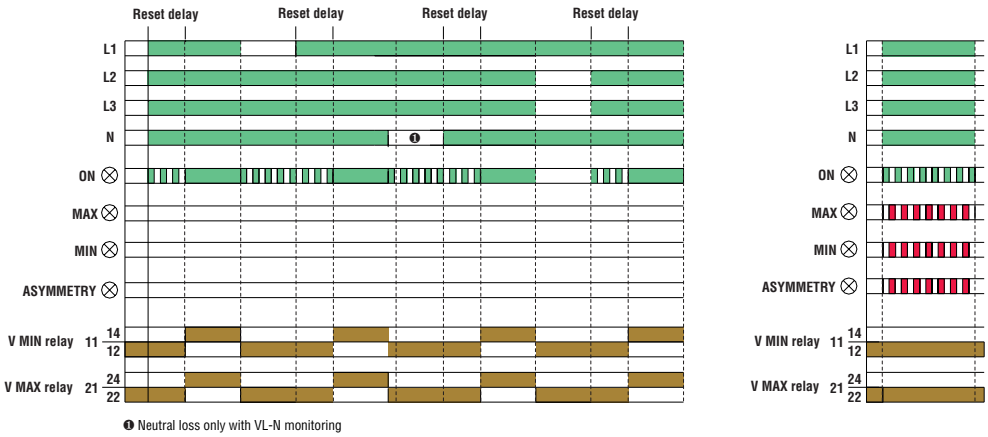


Voltage monitoring relays for 3-phase systems c/w or w/o neutral

PMV50N - PMV60N - PMV70N

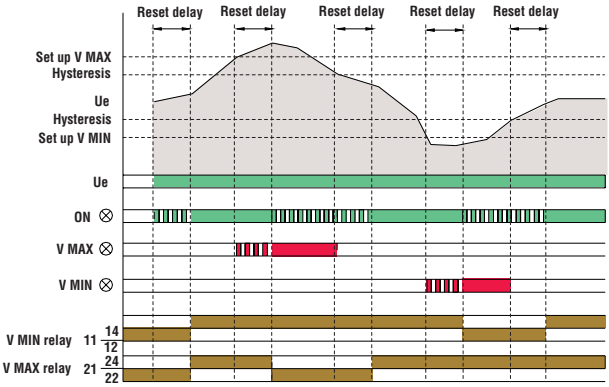


Phase loss and incorrect phase sequence (PMV50N - PMV60N - PMV70N)

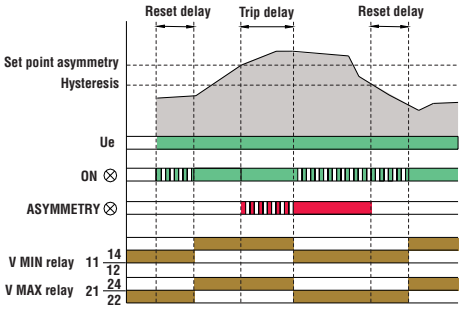


❶ Neutral loss only with VL-N monitoring

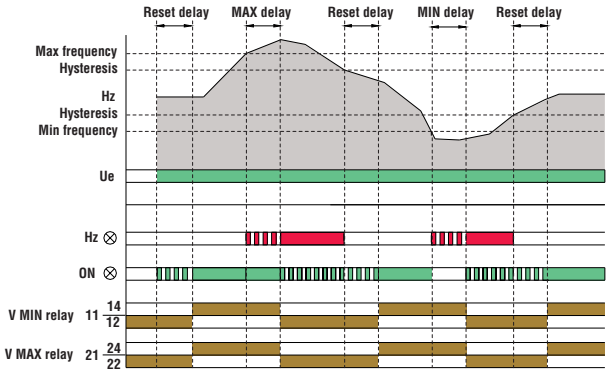
Maximum and minimum voltage (PMV50N - PMV60N - PMV70N)



Asymmetry (PMV70N)

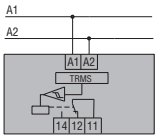


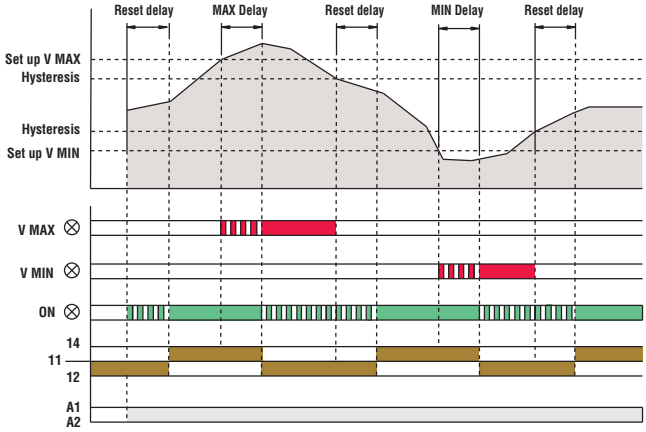
Maximum and minimum frequency (PMV80N)



Voltage monitoring relay for 1-phase systems

PMV55



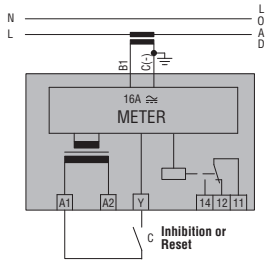


17

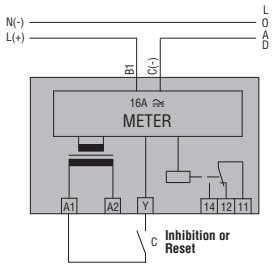
Current monitoring relay for 1-phase systems

PMA20

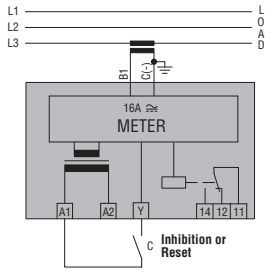
Single-phase connection with CT



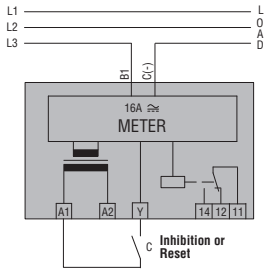
Single-phase direct connection



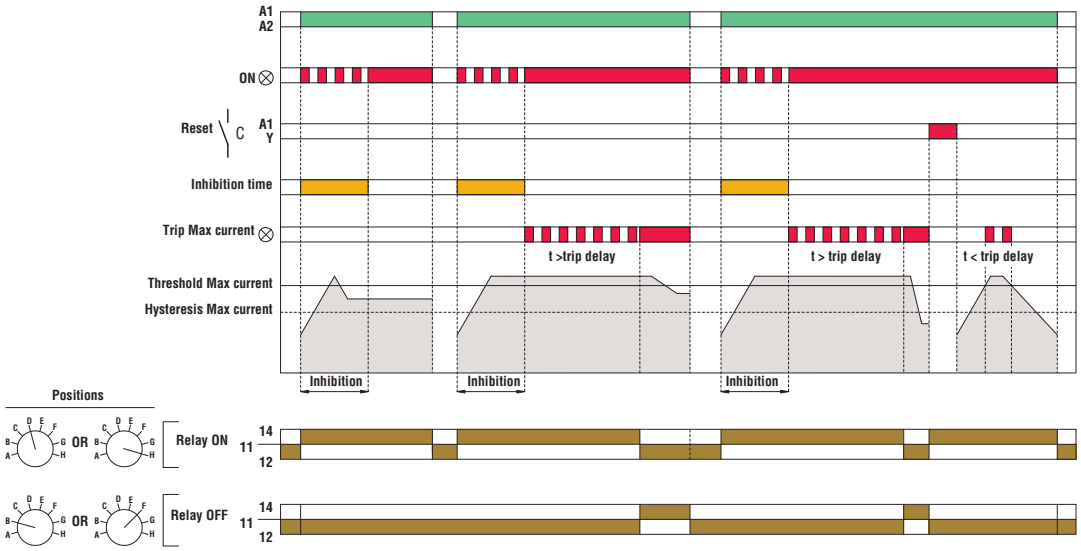
Three-phase connection with CT (1 phase control)



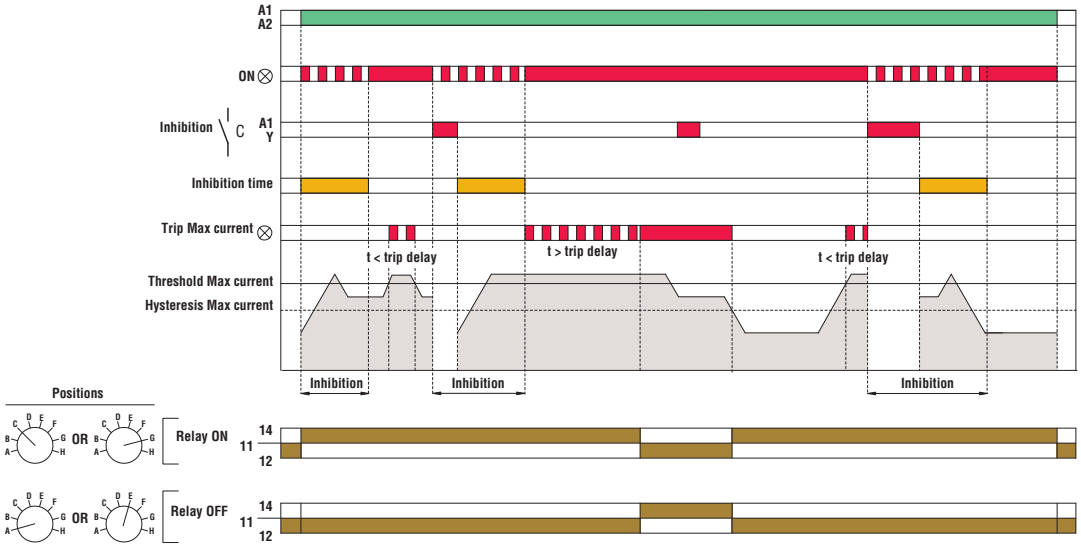
Three-phase direct connection (1 phase control)



Operation with tripping latch (Latch ON)



Operation with no tripping latch (Latch OFF)

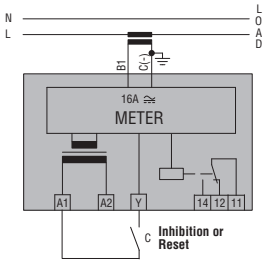


Operation			
Position	Ie	Relay output	Latch
A	5A	OFF	OFF
B			ON
C		ON	OFF
D			ON
E	16A	OFF	OFF
F			ON
G		ON	OFF
H			ON

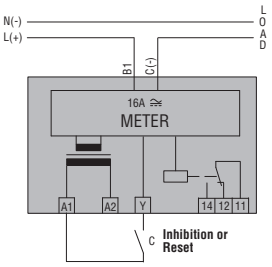
Current monitoring relay for 1-phase systems

PMA30

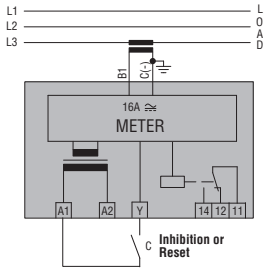
Single-phase connection by CT



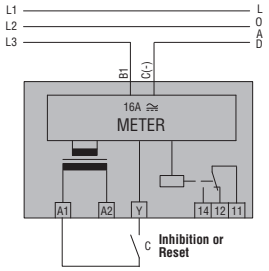
Single-phase direct connection



Three-phase connection by CT (1 phase control)

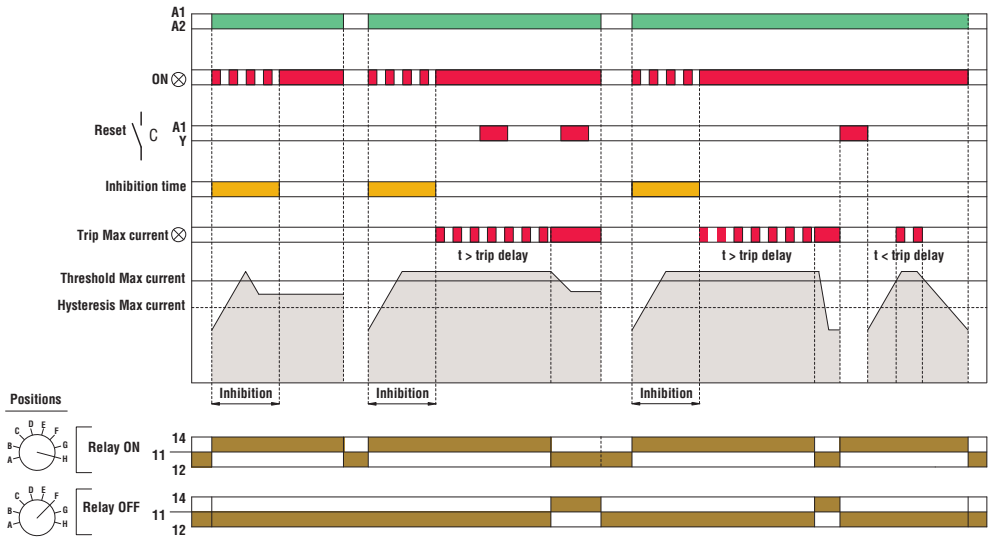


Three-phase direct connection (1 phase control)

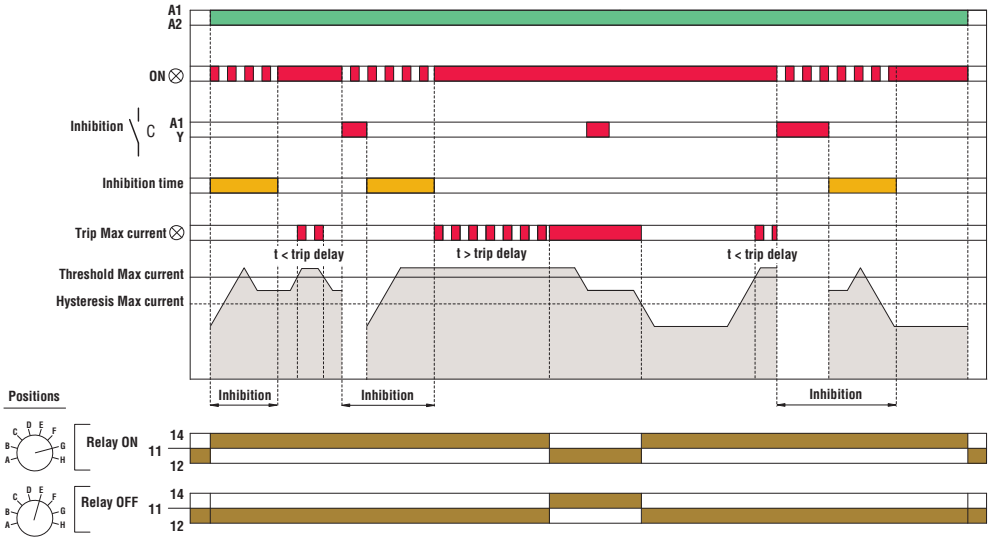


Operation			
Position	Function	Relay output	Latch
A	Minimum current	OFF	OFF
B			ON
C		ON	OFF
D			ON
E	Maximum current	OFF	OFF
F			ON
G		ON	OFF
H			ON

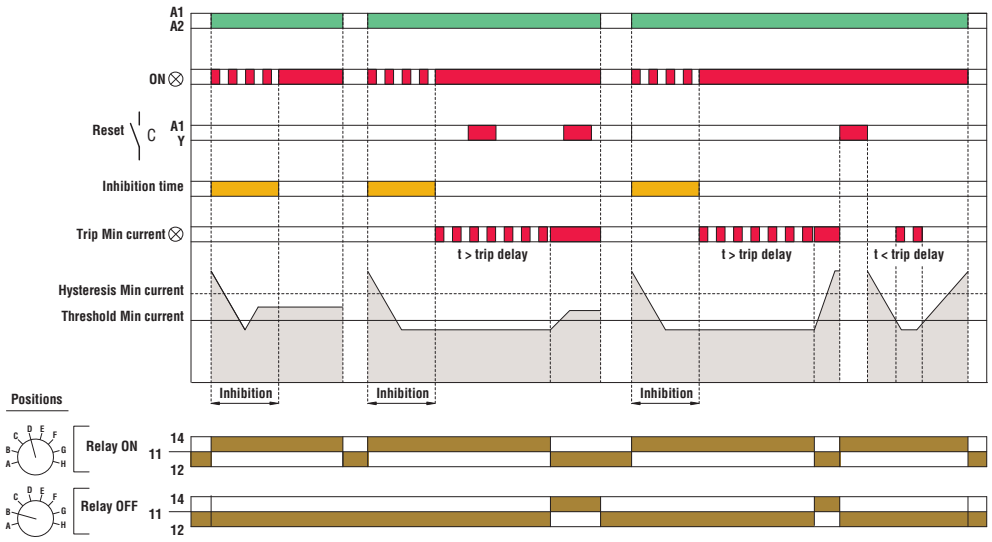
Maximum current control operation with tripping latch (Latch ON)



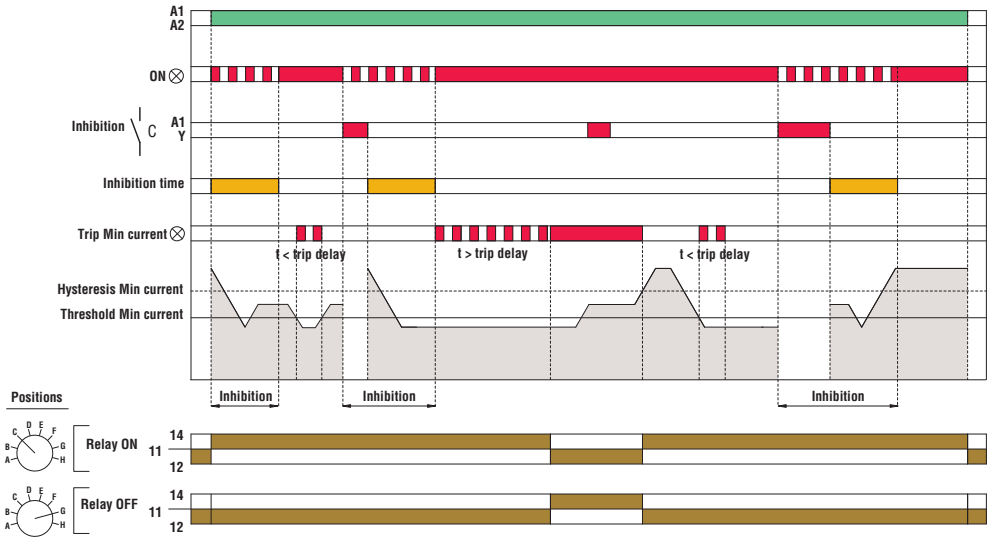
Maximum current control operation with no tripping latch (Latch OFF)



Minimum current control operation with tripping latch (Latch ON)



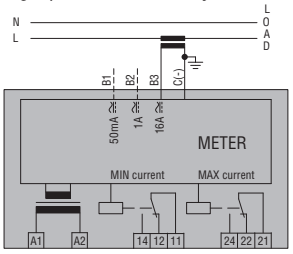
Minimum current control operation with no tripping latch (Latch OFF)



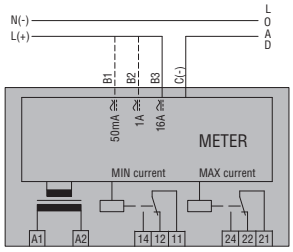
Current monitoring relay for 1-phase systems

PMA40

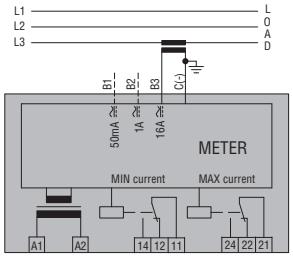
Single-phase connection by CT



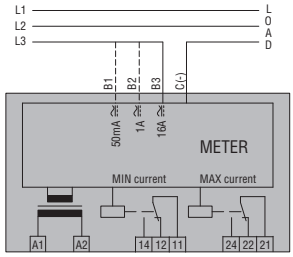
Single-phase direct connection



Three-phase connection by CT (1 phase control)

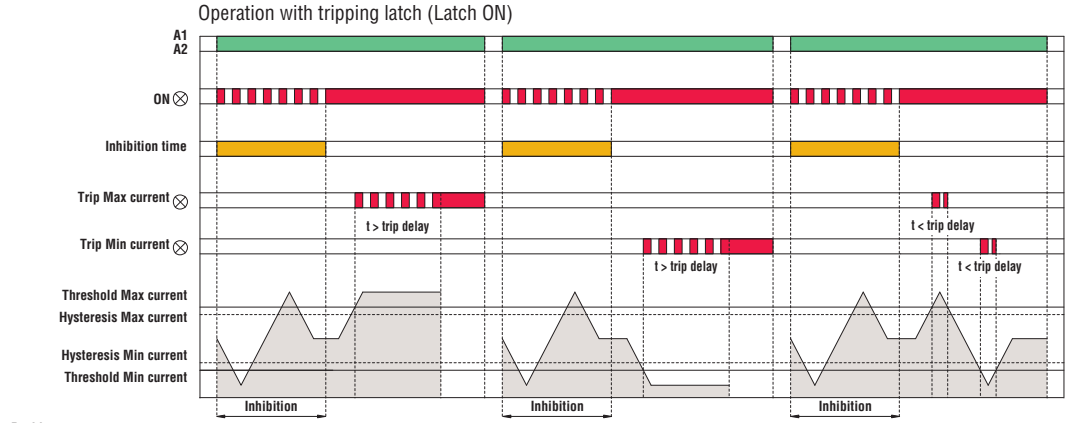


Three-phase direct connection (1 phase control)

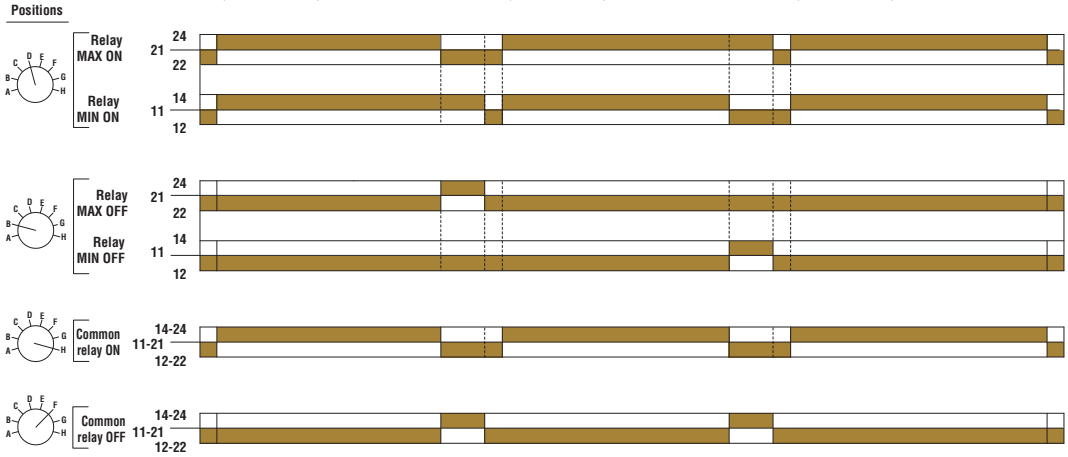


Operation			
Position	Operation	Relay output	Latch
A	Separate relays	OFF	OFF
B			ON
C		ON	OFF
D			ON
E	Common relays	OFF	OFF
F			ON
G		ON	OFF
H			ON

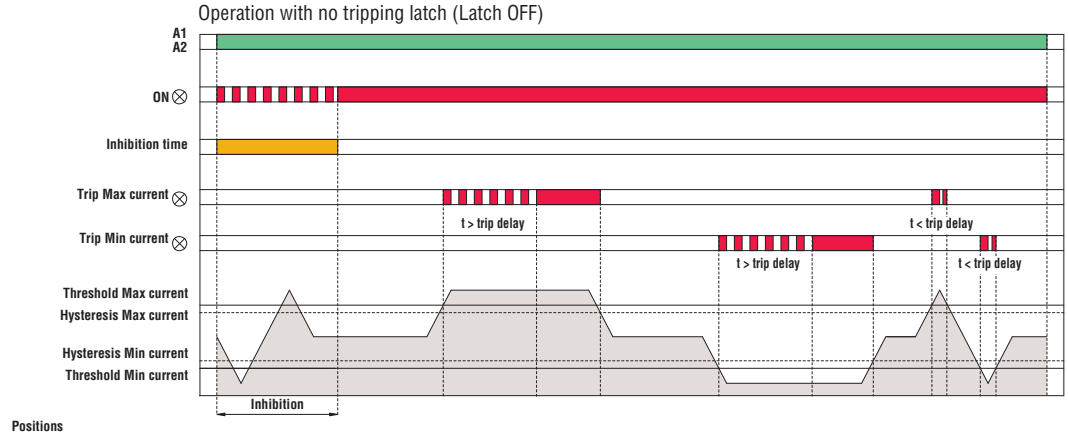
Operation with tripping latch (Latch ON)



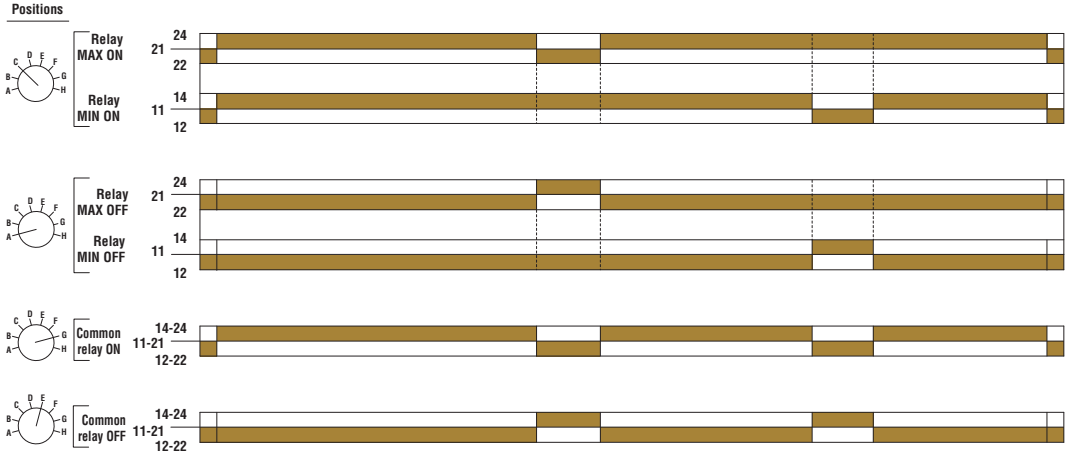
Positions



Operation with no tripping latch (Latch OFF)



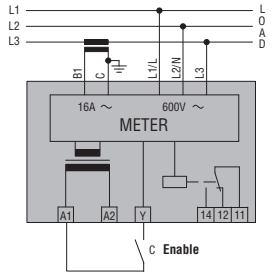
Positions



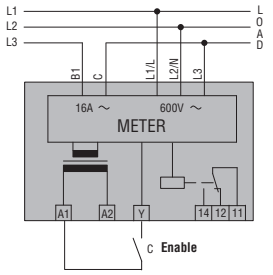
Pump protection - motor under-load/over-current monitoring

PMA50

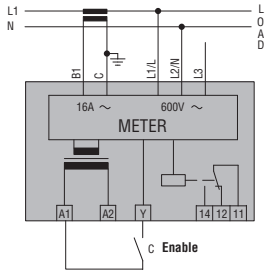
Three-phase connection by CT



Three-phase direct connection

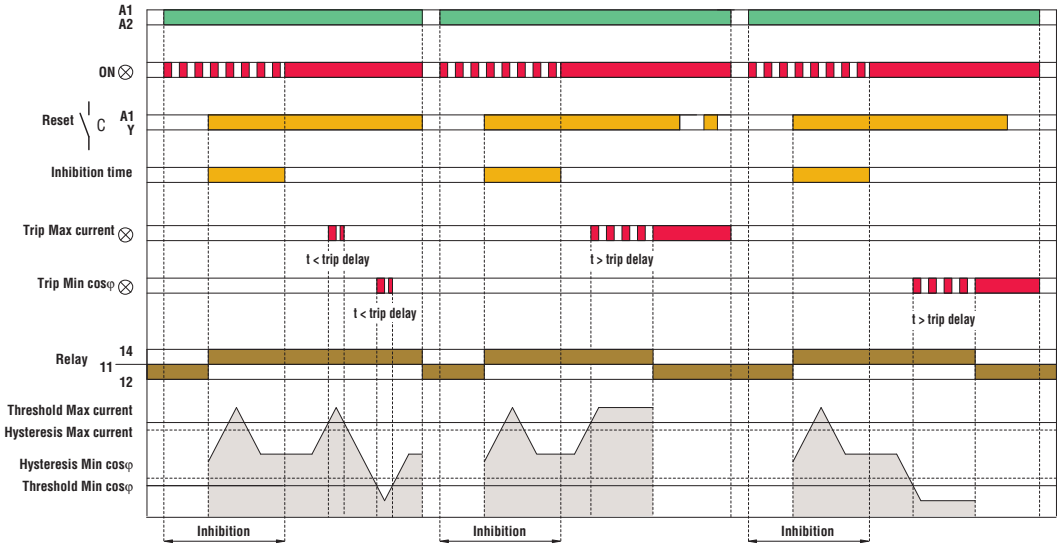


Single-phase connection by CT

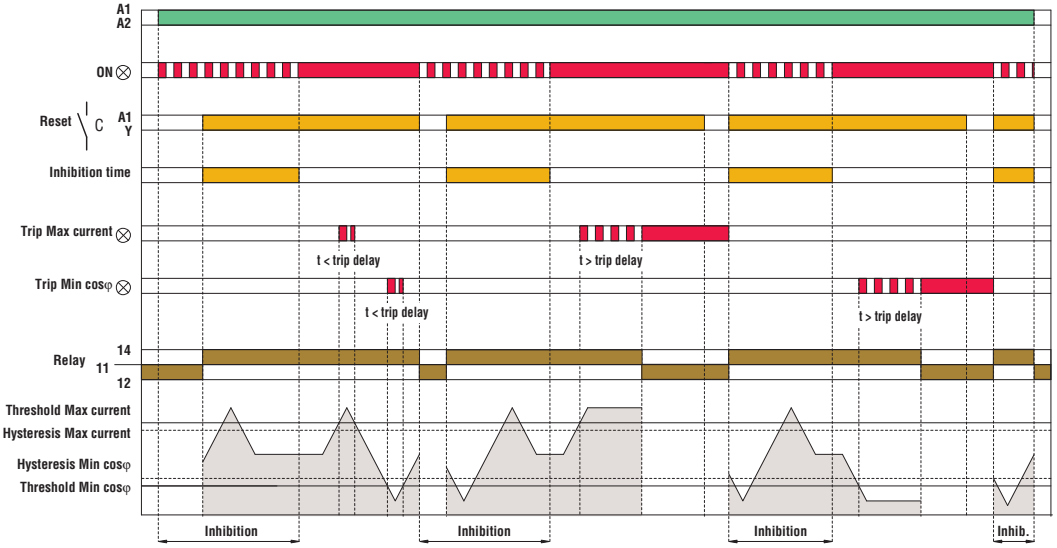


Operation			
Position	Ie	Connection	External reset
A	5A	1 phase	OFF
B			ON
C		3 phase	OFF
D			ON
E	16A	1 phase	OFF
F			ON
G		3 phase	OFF
H			ON

External reset disabled (OFF)

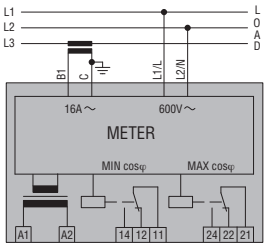


External reset enabled (ON)

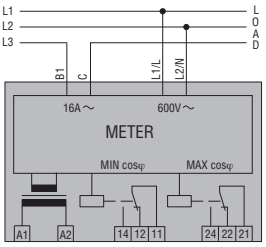


Phase shift monitoring relay
PMA60

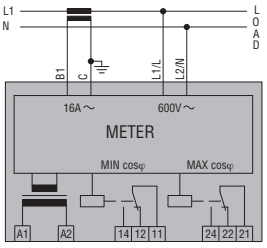
Three-phase connection by CT



Three-phase direct connection

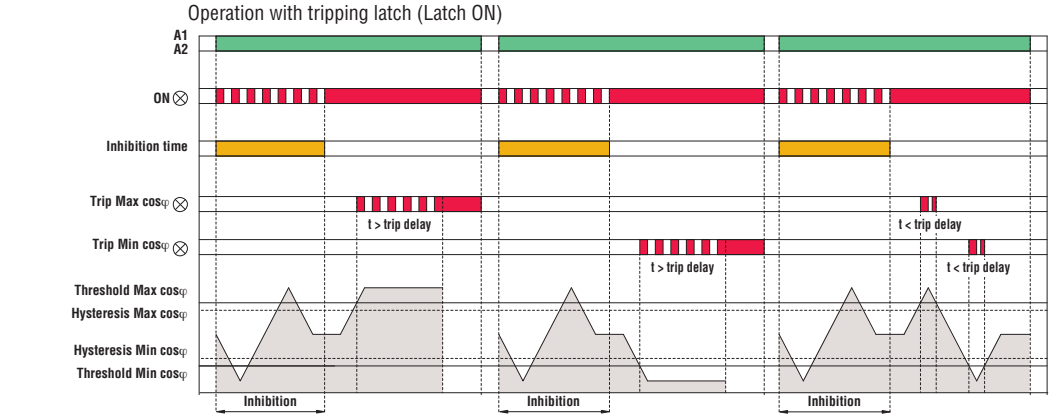


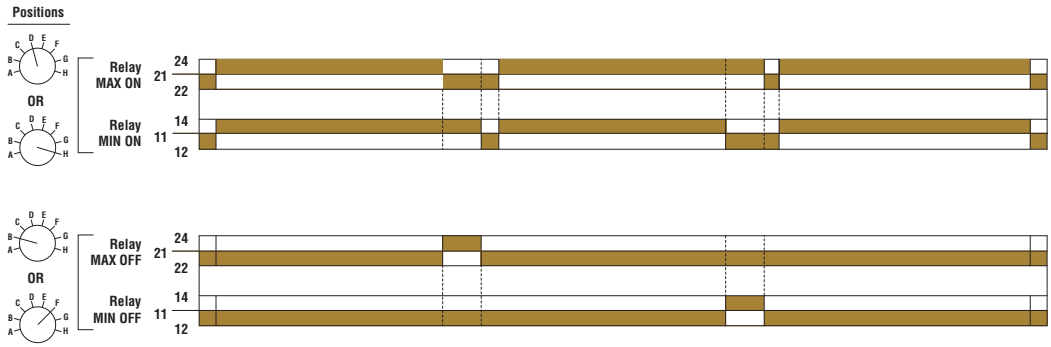
Single-phase connection by CT



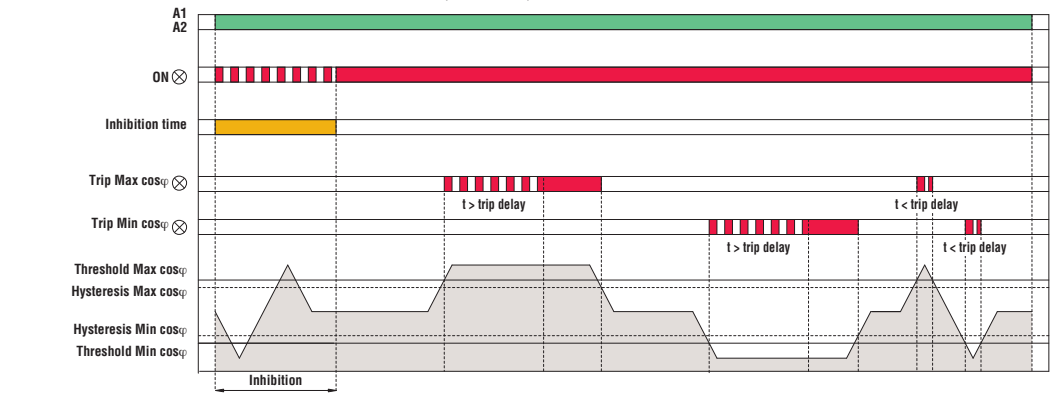
Operation			
Position	Connection	Relay output	Latch
A	1 phase	OFF	OFF
B			ON
C		ON	OFF
D			ON
E	3 phase	OFF	OFF
F			ON
G		ON	OFF
H			ON

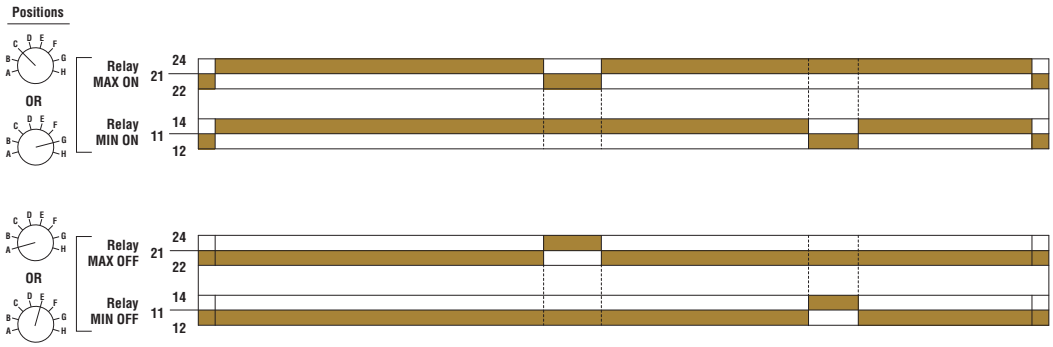
Operation with tripping latch (Latch ON)



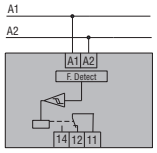


Operation with no tripping latch (Latch OFF)

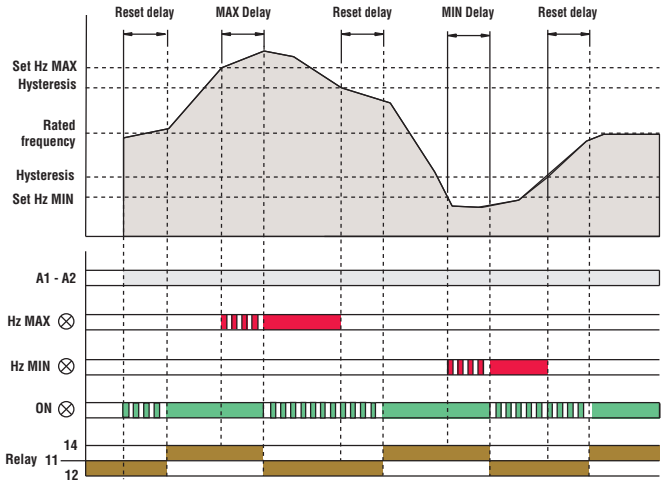




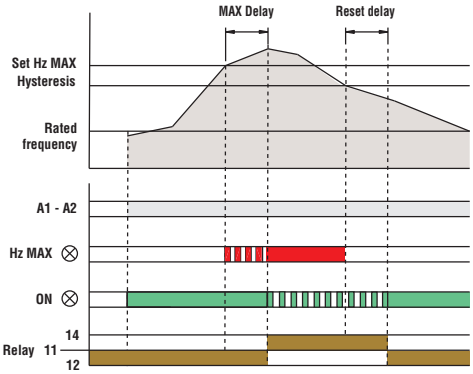
Frequency monitoring relay
PMF20



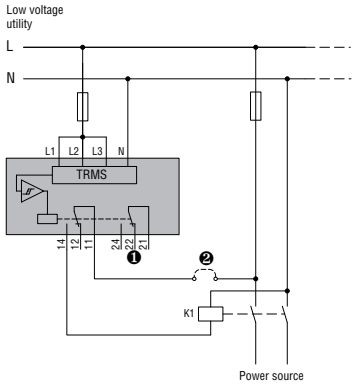
MAX-MIN, MAX or MIN function

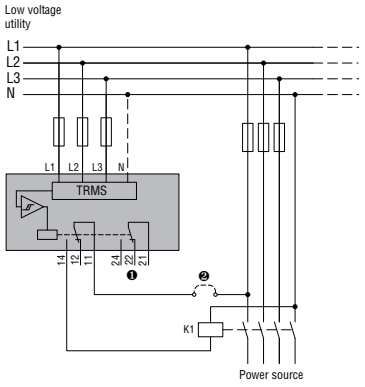


$\overline{\text{MAX}}$ function



Voltage and frequency monitoring
relay (per ENEL guide ed. 2.1 (12.2010)
PMVF10

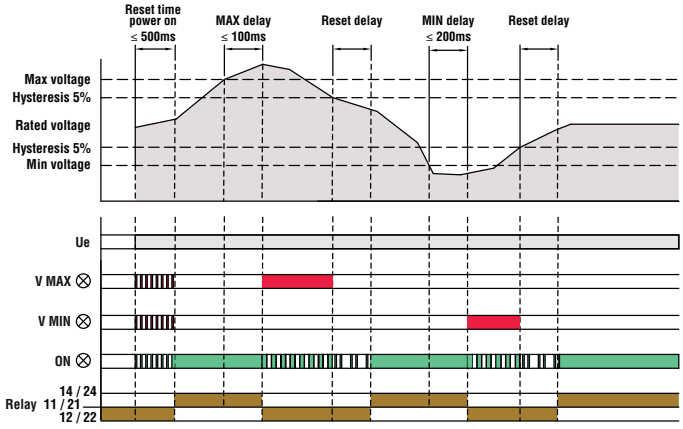




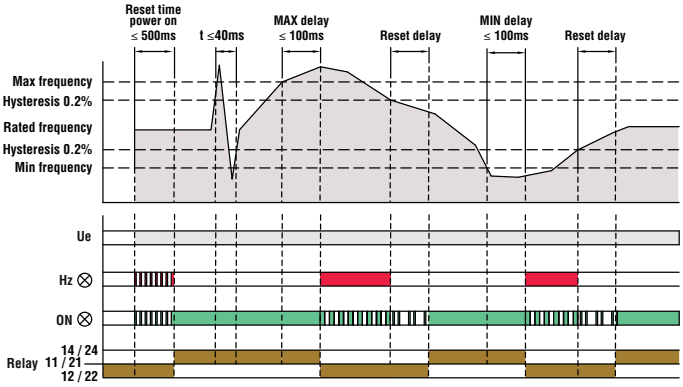
❶ Contact available for signalling, second contactor or inverter stop.
❷ Remote disconnection control device.

Operation			
Position	Voltage control	Frequency threshold	ROCOF
A	L-L (Δ)	±0.3Hz	OFF
B	L-N (λ)	±0.3Hz	OFF
C	L-L (Δ)	±1Hz	OFF
D	L-N (λ)	±1Hz	OFF
E	L-L (Δ)	±0.3Hz	ON
F	L-N (λ)	±0.3Hz	ON
G	L-L (Δ)	±1Hz	ON
H	L-N (λ)	±1Hz	ON

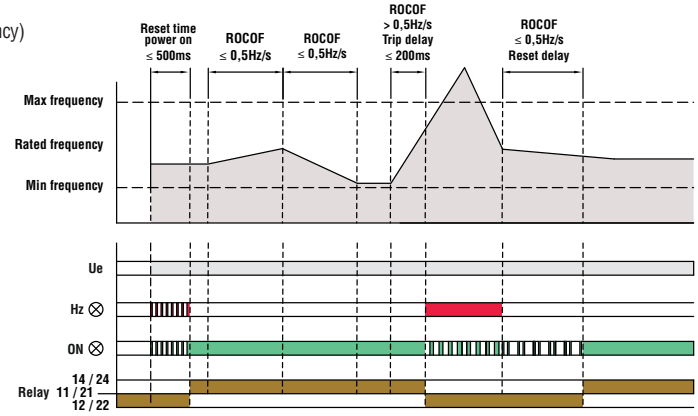
Voltage tripping function



Frequency tripping function



ROCOF function
(Rate Of Change Of Frequency)



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TYPE	Single phase	**PMV55**	—	—	—	—	
	Three phase	—	**PMV10**	**PMV20**	**PMV30**	**PMV40**	
	Three phase with/without neutral	—	—	—	—	—	
DESCRIPTION							
		Mimum 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)		208-240VAC	208-480VAC	100-240VAC	208-240VAC		
		380-440VAC		208-575VAC	380-575VAC		
				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	Umin<70% Umax		<70% Ue configured	<70% minimum Ue	
Repeat accuracy		< ±0-1%	< ±1%		< ±0.1%	< ±0.1%	
POWER SUPPLY							
Auxiliary voltage (Us)		Self powered					
Operating range		0.7-1.2Ue	0.85-1.1Ue		0.7-1.2Ue		
Frequency		50/60Hz ±5%					
Power consumption (maximum)		10VA (208-240VAC)❶ 17VA (380-440VAC)❶	20VA❶	28VA❶	11VA (208-240VAC)❶ 30VA (380-575VAC)❶ 19VA (600VAC)❶		
Power dissipation (maximum)		1.5W	2.2W	2.5W			
RELAY OUTPUTS							
Number of relays		1					
Relay state		Normally enegised De-energises at tripping					
Contact arrangement		1 changeover (SPDT)					
Rated operational voltage		250VAC					
Maximum switching voltage		400VAC					
Conventional free-air thermal current (Ith)		8A					
UL/CSA and IEC/EN 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 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 (7lbin)					
Conductor section min-max		0.2-4.0mm^2 (24-12AWG)					
INSULTION (input-output)							
IEC rated insulation voltage Ui		440VAC	480VAC	600VAC			
IEC rated impulse withstand voltage Uimp		6kV					
IEC power frequency withstand voltage		4kV					
AMBIENT CONDITIONS							
Operating temperature		–20...+60°C					
Storage temperature		–30...+80°C					
HOUSING							
Material		Selft-extinguishing polyamide					

❶ Power consumption (maximum) at 50Hz.

	—	—	—	—	—	—
	PMV50	**PMV60**	**PMV70**	—	—	—
	—	—	—	**PMV50 N**	**PMV70 N**	**PMV80 N**
	Minimum and maximum AC voltage, phase loss and incorrect phase sequence	Minimum AC voltage, phase loss, incorrect phase sequence and asymmetry	Minimum and maximum AC voltage, phase loss, incorrect phase sequence 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
	208-240VAC	208-240VAC	208-240VAC	208-240VAC	208-240VAC	208-240VAC
	380-575VAC	380-575VAC	380-575VAC	380-440VAC	380-440VAC	380-440VAC
	600VAC	600VAC	600VAC	480-600VAC	480-600VAC	480-600VAC
	1051-15% Ue	—	105-115% Ue	105-115% Ue	105-115% Ue	105-115% Ue
	80-95% Ue	80-95% Ue	80-95% Ue	80-95% Ue	80-95% Ue	80-95% Ue
	—	5-15% Ue	5-15% Ue	—	5-15% Ue	—
	—	—	—	—	—	1-10% rated frequency
	0.1-20s					0.1-20s / 0.1-5s frequency
	0.1-20s (0.5s at power up)	0,1-20s (0.5s at power up)	0.5s	0.1-20s	0.5s	0.5s
	3%	3%	3%	3%	3%	3% / 0.5% frequency
	<70% Ue configured					
	< ±0.1%					
	Self powered					
	0.7-1.2Ue					
	50/60Hz ±5%					
	11VA (208-240VAC)❶ 30VA (380-575VAC)❶ 19VA (600VAC)❶			27VA max		
	2.5W			1.9W max		
	1			2		
	Normally energised De-energises at tripping					
	1 changeover (SPDT)			2 changeover (SPDT each)		
	250VAC					
	400VAC					
	8A					
	B300					
	10^5 cycles					
	$30x10^6$ cycles					
	1 green LED for power on and tripping 2 red LED's for tripping		1 green LED for power on and tripping 3 red LED's for tripping	1 green LED for power on and tripping 2 red LED's for tripping		
	0.8Nm (7lbin)					
	0.2-4.0mm^2 (24-12AWG)					
	600VAC					
	6kV					
	4kV					
	–20...+60°C					
	–30...+80°C					
	Self-extinguishing polyamide					

TYPE		PMA20	PMA30	PMA40	
DESCRIPTION					
		Single-phase maximum current monitoring AC/DC multiscale	Single-phase minimum or maximum current monitoring AC/DC multiscale	Single-phase minimum and maximum current monitoring AC/DC multiscale	
CONTROL CIRCUIT					
Rated current to be monitored Ie		5 - 16A		0.02 - 0.05 - 0.25 - 1 - 5 - 16A	
Rated frequency		50/60Hz ±5%			
Overload capacity		5 Ie for 1s 160A for 10ms Constant 16A		50mA - 1A 5 Ie for 1s 10Ie for 10ms Constant 2Ie	16A 5 Ie for 1s 160A for 10ms Constant 16A
Connection		Direct or by current transformer			
Adjustment	Tripping values	5-100% f.s.			
	Tripping time	0.1-30s			
	Inhibition time	1-60s			
	Resetting hysteresis	1-50%		3% fixed	
Resetting		Automatic / Manual			
External input		Resetting / Inhibition		—	
Repeat accuracy		±1% with constant parameters			
AUXILIARY SUPPLY					
Auxiliary supply voltage Us		24-240VAC/DC			
Operating range		0.85-1.1 Us			
Rated frequency		50/60Hz ±5%			
Power consumption (maximum)		3.2VA		7VA	
Power dissipation (maximum)		1.6W		1.7W	
RELAY OUTPUTS					
Number of relays		1		2	
Relay state		Normally energised / de-energised (selectable)			
Contact arrangement		1 changeover contact (SPDT)			
Rated operational voltage		250VAC			
Maximum switching voltage		400VAC			
IEC conventional free air thermal current Ith		8A			
UL/CSA and IEC/EN 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 (7lbin)			
Conductor section min-max		0.2-4.0mm^2 (24-12AWG)			
INSULATION (input-output)					
IEC rated insulation voltage Ui		415V			
IEC rated impulse withstand voltage Uimp		4kV			
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		PMA50	PMA60
DESCRIPTION			
		Single and three-phase pump protection (motor under-load and over-current control) monitoring for max AC current, min cosφ, phase loss and incorrect phase sequence	Single and three-phase shift control for minimum and maximum cosφ monitoring
CURRENT AND COSφ CONTROL CIRCUIT			
Rated current Ie		5-16A	
Rated frequency		50/60Hz ±5%	
Overload capacity		5Ie for 1s 160A for 10ms Constant 16A	
Connection		Direct or by current transformer	
Adjustments	End-scale value	5 or 16A	
	Tripping for MAX current	10-100Ie	—
	Tripping for cosφ	0.1-0.99 cosφ (MIN)	0.1-0.99 cosφ (MIN and MAX)
	Tripping delay	0.1-10s	0.1-30s
	Inhibition time	1-60s	
	Automatic resetting delay	OFF-100min	—
External input		Consent for running/resetting	—
Repeat accuracy		±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		220-240VAC	
		380-415VAC (maximum voltage for UL/CSA)	
		440-480VAC	
Operating range		0.85-1.1 Us	0.85-1.1 Us
Frequency range		50/60Hz ±5%	50/60Hz ±5%
Power consumption (maximum)		4.5VA	4.4VA
Power dissipation (maximum)		2.3W	2.4W
RELAY OUTPUTS			
Number of relays		1	2
Relay state		Normally energised, de-energises at tripping	Normally energised / de-energised (ON-OFF) (configurable)
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 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 2 red LEDs for minimum/maximum tripping	
CONNECTIONS			
Tightening torque maximum		0.8Nm (7lbin)	
Conductor section min-max		0.2-4.0mm² (24-12AWG)	
INSULATION (input-output)			
IEC rated insulation voltage Ui		600VAC	
IEC rated impulse withstand voltage Uimp		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		**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 hysteresys	0.5%
	Inhibition time	0.1-20s
	Reset delay	0.1-20s
Resetting		Automatic
Repeat accuracy		< ±0.1%
AUXILIARY SUPPLY		
Auxiliary supply voltage Us		220-240VAC
		380-415VAC
Operating range		0.85-1.1 Us
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 tripping❶
Contact arrangement		1 changeover contact (SPDT)
Rated operational voltage		250VAC
Maximum switching voltage		400VAC
IEC conventional free air thermal current Ith		8A
UL/CSA and IEC/EN 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 (7lbin)
Conductor section min-max		0.2-4.0mm^2 (24-12AWG)
INSULATION (input - output)		
IEC rated insulation voltage Ui		575V
IEC rated impulse withstand voltage Uimp		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 $\overline{\text{MAX}}$ function configured.

TYPE	**PMVF10**
TRIPPING THRESHOLDS FOR VOLTAGE	
Tripping for maximum voltage	113% of rated voltage Ue
Tripping for minimum voltage	82.5% of rated voltage Ue
Voltage threshold hysteresis	5%
Tripping delay for maximum voltage	≤0.1s
Tripping delay for minimum voltage	≤0.2s
TRIPPING THRESHOLDS FOR FREQUENCY	
Frequency threshold tripping	±0.3Hz or ±1Hz configurable
Frequency threshold hysteresis	0.2%
Tripping delay	≤100ms
Transient immunity time	≥40ms
ROCOF threshold	≥0.5Hz/s
ROCOF hysteresis	25mHz/s
ROCOF tripping delay	≤200ms
ADJUSTABLE DELAYS	
Reset delay	0.1-30s
AUXILIARY SUPPLY	
Rated supply voltage (Us)	230VAC / 400VAC
Operating range	0.7-1.3 Ue
Rated frequency	50Hz
Power consumption/dissipation max	27VA / 1.9W
Resetting	Automatic
Reset time at power up	≤500ms
RELAY OUTPUTS	
Number of relays	2
Contact arrangement	1 changeover each (SPDT each)
Rated operational voltage	250VAC
Maximum switching voltage	400VAC
IEC conventional free air thermal current (Ith)	8A
UL/CSA and IEC/EN 60947-5-1 designation	B300
Electrical life (with rated load)	10^5 cycles
Mechanical life	$30x10^6$ cycles
CONNECTIONS	
Maximum tightening torque	0.8Nm (7 lbin)
Conductor cross section min-max	0.2-4.0mm^2 (24-12AWG)
INSULATION (input-output)	
IEC rated insulation voltage Ui	400V
AMBIENT CONDITIONS	
Operating temperature	–20...+60°C
Storage temperature	–30...+80°C
HOUSING	
Material	Self-extinguishing polyamide