

 Monitoring Relay
Technical Manual

IMO



Monitoring Relays MR Series



- 3-Phase current/voltage monitoring
- Multifunction
- Fault latch
- Supply voltage selectable via power modules
- 2 Change-over contacts
- Width 22.5mm
- Industrial design



Options and ordering codes

Monitoring Relays	MR	-	PFR400
Voltage monitoring 3-phase 400volts			PFR400
Voltage monitoring 3-phase 230volts			PFR230
Voltage monitoring 3-phase, multifunction, modular supply			PFRAT
Voltage monitoring 1-phase, multifunction, modular supply			1PVM
Current monitoring 1-phase, multifunction, modular supply			1PIM

Power Supply	MR	-	PS	12
Power Supply			PS	
12 Volts AC Power supply				12
24 Volts AC Power supply				24
230 Volts AC Power supply				230
400 Volts AC Power supply				400

Dimensions



1. Functions

Voltage monitoring in 3-phase mains with adjustable thresholds, adjustable tripping delay, monitoring of phase sequence and phase failure monitoring of asymmetry with adjustable threshold and the following functions (selectable by means of rotary switch)

UNDER	Undervoltage monitoring
UNDER+SEQ	Undervoltage monitoring and monitoring of phase sequence
WIN	Monitoring of window between Min and Max
WIN+SEQ	Monitoring the window between Min and Max and monitoring of phase sequence

2. Time ranges

	Adjustment range
Start-up suppression time:	-
Tripping delay:	0.1s 10s

3. Mechanical design

Self-extinguishing plastic housing, IP rating IP40
 Mounted on DIN-Rail TS 35 according to EN 50022
 Mounting position: any
 Shockproof terminal connection according to VBG 4 (PZ1 required), IP rating IP20
 Tightening torque: max. 1Nm
 Terminal capacity:
 1 x 0.5 to 2.5mm² with/without multicore cable end
 1 x 4mm² without multicore cable end
 2 x 0.5 to 1.5mm² with/without multicore cable end
 2 x 2.5mm² flexible without multicore cable end

5. Output circuit

2 potential free change-over contacts
 Rated voltage: 250V AC
 Switching capacity (distance 750VA (3A / 250V AC)
 Switching capacity (distance 1250VA (5A / 250V AC)
 Fusing: 5A fast acting
 Mechanical life: 20 x 106 operations
 Electrical life: 2 x 105 operations
 at 1000VA resistive load
 max. 60/min at 100VA resistive load
 max. 6/min at 1000VA resistive load
 (according to IEC 947-5-1)
 Overvoltage category: III (according to IEC 60664-1)
 Rated surge voltage: 4kV

7. Accuracy

Base accuracy: ±5% (of maximum scale value)
 Frequency response: -
 Adjustment accuracy: ±5% (of maximum scale value)
 Repetition accuracy: ±2%
 Voltage influence: ±0.5%
 Temperature influence: ±0.1% / °C

9. Ambient conditions

Ambient temperature: -25 to +55°C (according to IEC 68-1)
 -25 to +40°C (according to UL 508)
 Storage temperature: -25 to +70°C
 Transport temperature: -25 to +70°C
 Relative humidity: 15% to 85%
 (according to IEC 721-3-3 class 3K3)
 Pollution degree: 3 (according to IEC 60664-1)
 Vibration resistance: 10 to 55Hz 0.35mm
 (according to IEC 68-2-6)
 Shock resistance: 15g 11ms (according to IEC 68-2-27)



4. Indicators

Red LED ON/OFF: indication of failure of the corresponding threshold
 Red LED flashing: indication of tripping delay of the corresponding threshold
 Yellow LED ON/OFF: indication of relay output

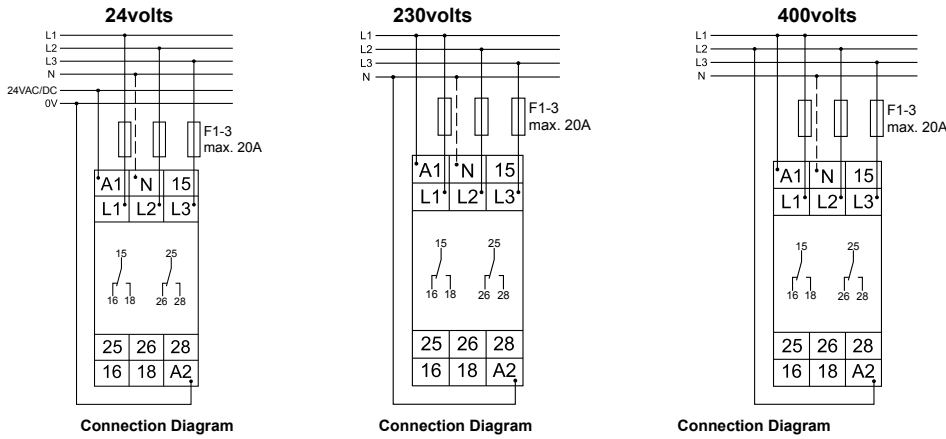
6. Input circuit

Supply voltage: 12 to 400V AC terminals A1-A2 (galvanically separated) selectable via power modules TR2
 Tolerance: according to specification of power module
 Rated frequency: according to specification of power module
 Rated consumption: 2VA (1.5W)
 Duration of operation: 100%
 Reset time: 500ms
 Residual ripple for DC: -
 Drop-out voltage: >30% of the supply voltage
 Overvoltage category: III (according to IEC 60664-1)
 Rated surge voltage: 4kV

8. Measuring circuit

Fusing: max. 20A (according to UL 508)
 Measured variable: AC Sinus (48 to 63Hz)
 Input:
 3(N)~ 115/66V terminals (N)-L1-L2-L3 (MR-PFRAT)
 3(N)~ 230/132V terminals (N)-L1-L2-L3 (MR-PFRAT)
 3(N)~ 400/230V terminals (N)-L1-L2-L3 (MR-PFRAT)
 Overload capacity:
 3(N)~ 115/66V 3(N)~173/100V (MR-PFRAT)
 3(N)~ 230/132V 3(N)~345/199V (MR-PFRAT)
 3(N)~ 400/230V 3(N)~600/346V (MR-PFRAT)
 Input resistance:
 3(N)~ 115/66V 220kT (MR-PFRAT)
 3(N)~ 230/132V 470kT (MR-PFRAT)
 3(N)~ 400/230V 1MT (MR-PFRAT)
 Switching threshold
 Max: -20% to +30% of UN
 Min: -30% to +20% of UN
 Asymmetry: 5% to 25%
 Overvoltage category: III (according to IEC 60664-1)
 Rated surge voltage: 4kV

MR-PFRAT-cont



For all the functions the LEDs MIN and MAX are flashing alternating, when the minimum value for the measured voltage was chosen to be greater than the maximum value. If a failure already exists when the device is activated, the output relays remain in off-position and the LED for the corresponding threshold is illuminated.

Under voltage monitoring (UNDER, UNDER+SEQ)

When the measured voltage (mean value of phase-to-phase voltages) falls below the value adjusted at the MIN-regulator, the set interval of the tripping delay (DELAY) begins (red LED MIN flashes). After the interval has expired (red LED MIN illuminated), the output relays switch into off-position (yellow LED illuminated). The output relays again switch into on-position (yellow LED not illuminated), when the measured voltage exceeds the value adjusted at the MAX-regulator.

Window function (WIN, WIN+SEQ)

The output relays switch into on-position (yellow LED illuminated) when the measured voltage (mean value of phase-to-phase voltages) exceeds the value adjusted at the MIN-regulator. When the measured voltage exceeds the value adjusted at the MAX-regulator, the set interval of the tripping delay (DELAY) begins (red LED MAX flashes). After the interval has expired (red LED MAX illuminated), the output relays switch into off-position (yellow LED not illuminated). The output relays again switch into on-position (yellow LED illuminated) when the measured voltage falls below the value adjusted at the MAX-regulator (red LED MAX not illuminated). When the measured voltage falls below the value adjusted at the MIN-regulator, the set interval of the tripping delay (DELAY) begins again (red LED MIN flashes). After the interval has expired (red LED MIN illuminated), the output relays switch into off-position (yellow LED not illuminated).

Phase sequence monitoring (SEQ)

Phase sequence monitoring is selectable for all functions.

If a change in phase sequence is detected (red LED SEQ illuminated), the output relays switch into off-position immediately (yellow LED not illuminated).

Phase failure monitoring (SEQ)

If one of the phase voltages fails, the set interval of the tripping delay (DELAY) begins (red LED SEQ flashes). After the interval has expired (red LED SEQ illuminated), the output relays switch into off-position (yellow LED not illuminated).

Reverse voltages of a consumer (e.g. a motor which continues to run on two phases only) do not effect the disconnection but can be monitored by using a proper value for the asymmetry.

Asymmetry monitoring

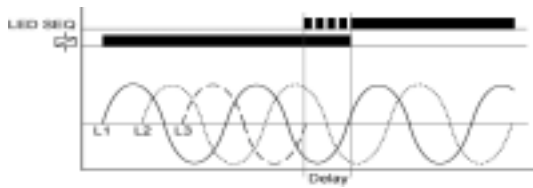
If the asymmetry of the phase-to-phase voltages exceeds the value set at the ASYM-regulator, the set interval of the tripping delay (DELAY) begins (red LED ASYM flashes). After the interval has expired (red LED ASYM illuminated), the output relays switch into off-position (yellow LED not illuminated).

If the neutral wire is connected to the device, the asymmetry of the phase voltages referred to the neutral wire (Y-voltage) is monitored also. In that case both values of the asymmetry are evaluated and if one of the values exceeds the value set at the ASYM-regulator, the set interval of the tripping delay (DELAY) begins (red LED ASYM flashes). After the interval has expired (red LED ASYM illuminated), the output relays switch into off-position (yellow LED not illuminated).

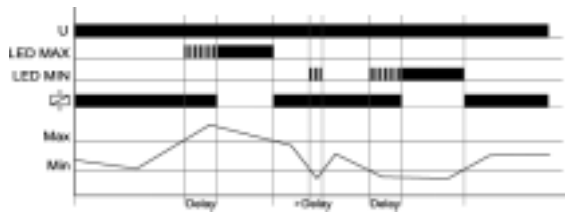
Loss of neutral wire by means of evaluation of asymmetry

A break of the neutral wire between power line and machinery is detected as soon as asymmetry between phase-to-phase voltage and neutral wire occurs. If the asymmetry exceeds the value set at the ASYM-regulator, the set interval of the tripping delay (DELAY) begins (red LED ASYM flashes). After the interval has expired (red LED ASYM illuminated), the output relays switch

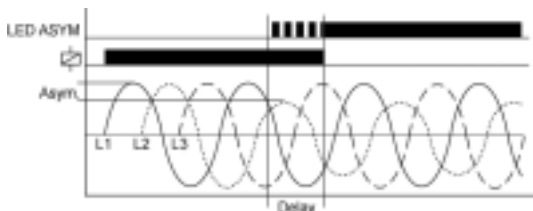
MR-PFRAT Phase Loss



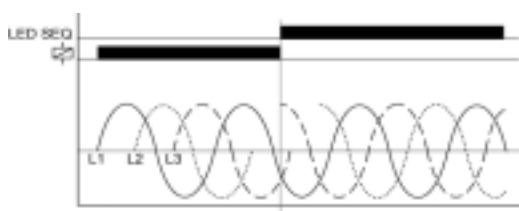
MR-PFRAT Window



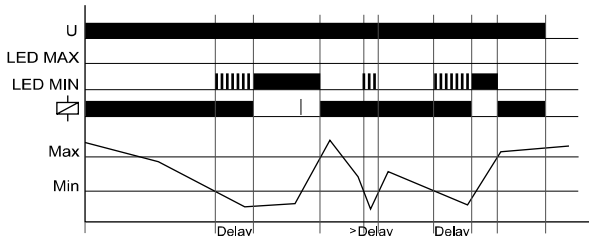
MR-PFRAT Asymmetrical



MR-PFRAT Sequence



MR-PFRAT Undervoltage



1. Functions

Monitoring of phase sequence, phase failure and detection of return voltage
(by means of evaluating the asymmetry)

2. Time ranges

	Adjustment range
Start-up suppression time:	fixed, max. 500ms
Tripping delay:	fixed, max. 350ms

3. Indicators

Green LED ON:	indication of supply voltage
Yellow LED ON/OFF:	indication of relay output

4. Mechanical design

Self-extinguishing plastic housing, IP rating IP40
Mounted on DIN-Rail TS 35 according to EN 50022
Mounting position: any
Shockproof terminal connection according to VBG 4 (PZ1 required),
IP rating IP20
Tightening torque: max. 1Nm
Terminal capacity:
1 x 0.5 to 2.5mm² with/without multicore cable end
1 x 4mm² without multicore cable end
2 x 0.5 to 1.5mm² with/without multicore cable end
2 x 2.5mm² flexible without multicore cable end

5. Input circuit

Supply voltage:		
3(N)~ 115/66V	terminals (N)-L1-L2-L3 (= measuring voltage)	(MR-PFR115VS02)
3(N)~ 230/132V	terminals (N)-L1-L2-L3 (= measuring voltage)	(MR-PFR230VS02)
3(N)~ 400/230V	terminals (N)-L1-L2-L3 (= measuring voltage)	(MR-PFR400VS02)
Tolerance:		
3(N)~ 115/66V	3(N)~ 99 to 132V	(MR-PFR115VS02)
3(N)~ 230/132V	3(N)~ 198 to 264V	(MR-PFR230VS02)
3(N)~ 400/230V	3(N)~ 342 to 457V	(MR-PFR400VS02)
Rated frequency:	48 to 63Hz	
Rated consumption:		
3(N)~ 115/66V	3VA	(MR-PFR115VS02)
3(N)~ 230/132V	6VA	(MR-PFR230VS02)
3(N)~ 400/230V	9VA	(MR-PFR400VS02)
Duration of operation:	100%	
Reset time:	<100ms	
Residual ripple for DC:	-	
Drop-out voltage:	>20% of the supply voltage	
Overvoltage category:	III (according to IEC 60664-1)	
Rated surge voltage:	4kV	

7. Measuring circuit

Measured variable:	AC Sinus, 48 to 63Hz	
Input:		
	3(N)~ 115/66V	terminals (N)-L1-L2-L3 (= supply voltage)
	3(N)~ 230/132V	terminals (N)-L1-L2-L3 (= supply voltage)
	3(N)~ 400/230V	terminals (N)-L1-L2-L3 (= supply voltage)
Overload capacity:		
	3(N)~ 115/66V	3(N)~ 132/76V (MR-PFR115VS02)
	3(N)~ 230/132V	3(N)~ 264/152V (MR-PFR230VS02)
	3(N)~ 400/230V	3(N)~ 457/264V (MR-PFR400VS02)
Input resistance:		
	3(N)~ 115/66V	5kW (MR-PFR115VS02)
	3(N)~ 230/132V	10kW (MR-PFR230VS02)
	3(N)~ 400/230V	15kW (MR-PFR400VS02)
Asymmetry:	fixed, typ. 30%	
Overvoltage category:	III (according to IEC 60664-1)	
Rated surge voltage:	4kV	



6. Output circuit

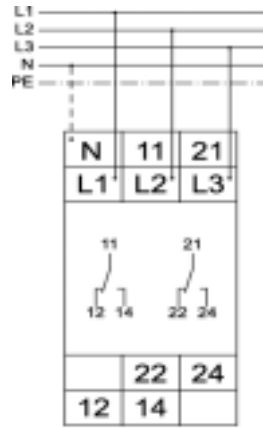
2 potential free change-over contacts	
Rated voltage:	250V AC
Switching capacity (distance <5mm):	750VA (3A / 250V AC)
Switching capacity (distance >5mm):	1250VA (5A / 250V AC)
Fusing:	5A fast acting
Mechanical life:	20 x 10 ⁶ operations
Electrical life:	2 x 10 ⁵ operations at 1000VA resistive load max. 60/min at 100VA resistive load max. 6/min at 1000VA resistive load (according to IEC 947-5-1)
Switching frequency:	III (according to IEC 60664-1)
Overvoltage category:	4kV
Rated surge voltage:	

8. Accuracy

Base accuracy:	-
Frequency response:	-
Adjustment accuracy:	-
Repetition accuracy:	-
Voltage influence:	-
Temperature influence:	-

9. Ambient conditions

Ambient temperature:	-25 to +55°C (according to IEC 68-1) -25 to +40°C (according to UL 508)
Storage temperature:	-25 to +70°C
Transport temperature:	-25 to +70°C
Relative humidity:	15% to 85% (according to IEC 721-3-3 class 3K3)
Pollution degree:	3 (according to IEC 60664-1)
Vibration resistance:	0 to 55Hz 0.35mm (according to IEC 68-2-6)
Shock resistance:	15g 11ms (according to IEC 68-2-27)



Connection Diagram

Phase sequence monitoring

When all the phases are connected in the correct sequence and the measured asymmetry is less than the fixed value, the output relays switch into on-position (yellow LED illuminated). When the phase sequence changes, the output relays switch into off-position (yellow LED not illuminated).

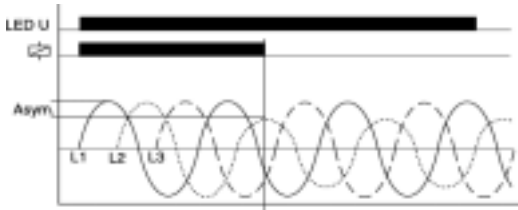
Phase failure monitoring

When one of the three phases fails, the output relays switch into off-position (yellow LED not illuminated).

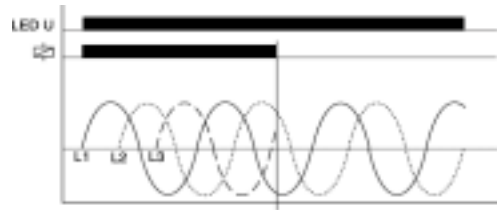
Detection of reverse voltage (by means of evaluation of asymmetry)

The output relays switch into off-position (yellow LED not illuminated) when the asymmetry between the phase voltages exceeds the fixed value of the asymmetry. An asymmetry caused by the reverse voltage of a consumer (e.g. a motor which continues to run on two phases only) does not effect the disconnection

Detection of reverse voltage



Phase failure monitoring



1. Functions

AC/DC voltage monitoring in 1-phase mains with adjustable thresholds, timing for start-up suppression and tripping delay separately adjustable and the following functions (selectable by means of rotary switch)

OVER	Overvoltage monitoring
OVER+LATCH	Overvoltage monitoring with fault latch
UNDER	Undervoltage monitoring
UNDER+LATCH	Undervoltage monitoring with fault latch
WIN	Monitoring the window between Min and Max
WIN+LATCH	Monitoring the window between Min and Max with fault latch

2. Time ranges

	Adjustment range	
Start-up suppression time:	0s	10s
Tripping delay:	0.1s	10s

3. Indicators

Green LED ON:	indication of supply voltage
Green LED flashing:	indication of start-up suppression time
Yellow LED ON/OFF:	indication of relay output
Red LED ON/OFF:	indication of failure of the corresponding threshold
Red LED flashing:	indication of tripping delay of the corresponding threshold

4. Mechanical design

Self-extinguishing plastic housing, IP rating IP40
 Mounted on DIN-Rail TS 35 according to EN 50022
 Mounting position: any
 Shockproof terminal connection according to VBG 4 (PZ1 required), IP rating IP20
 Tightening torque: max. 1Nm
 Terminal capacity:
 1 x 0.5 to 2.5mm² with/without multicore cable end
 1 x 4mm² without multicore cable end
 2 x 0.5 to 1.5mm² with/without multicore cable end
 2 x 2.5mm² flexible without multicore cable end

6. Output circuit

2 potential free change-over contacts
 Rated voltage: 250V AC
 Switching capacity (distance 750VA (3A / 250V AC)
 Switching capacity (distance 1250VA (5A / 250V AC)
 Fusing: 5A fast acting
 Mechanical life: 20 x 106 operations
 Electrical life: 2 x 105 operations at 1000VA resistive load
 Switching frequency: max. 60/min at 100VA resistive load
 max. 6/min at 1000VA resistive load (according to IEC 947-5-1)
 Overvoltage category: III (according to IEC 60664-1)
 Rated surge voltage: 4kV

8. Accuracy

Base accuracy: ±5% (of maximum scale value)
 Frequency response: -10% to +5% (at 16.6 to 400Hz)
 Adjustment accuracy: ±5% (of maximum scale value)
 Repetition accuracy: Ω2%
 Voltage influence: Ω0.5%
 Temperature influence: Ω0.1% / °C

9. Ambient conditions

Ambient temperature: -25 to +55°C (according to IEC 68-1)
 -25 to +40°C (according to UL 508)
 Storage temperature: -25 to +70°C
 Transport temperature: -25 to +70°C
 Relative humidity: 15% to 85% (according to IEC 721-3-3 class 3K3)
 Pollution degree: 3 (according to IEC 60664-1)
 Vibration resistance: 10 to 55Hz 0.35mm (according to IEC 68-2-6)
 Shock resistance: 15g 11ms (according to IEC 68-2-27)

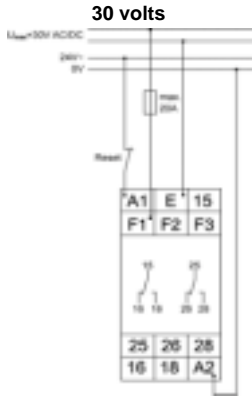
5. Input circuit

Supply voltage: 12 to 400V AC terminals A1-A2 (galvanically separated)
 selectable via power supplies MR-PS according to specification of power module
 Tolerance: according to specification of power module
 Rated frequency: according to specification of power module
 Rated consumption: 2VA (1.5W)
 Duration of operation: 100%
 Reset time: 500ms
 Residual ripple for DC: -
 Drop-out voltage: >30% of the supply voltage
 Overvoltage category: III (according to IEC 60664-1)
 Rated surge voltage: 4kV

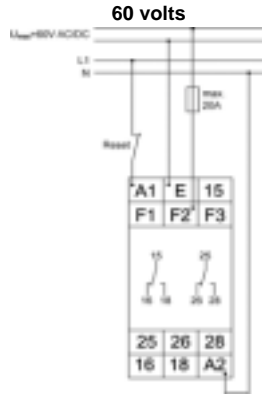
7. Measuring circuit

Fusing: max. 20A (according to UL 508)
 Measured variable: DC or AC Sinus (16.6 to 400Hz)
 Input:
 30V AC/DC terminals E-F1(+)
 60V AC/DC terminals E-F2(+)
 300V AC/DC terminals E-F3(+)
 Overload capacity:
 30V AC/DC 100Veff
 60V AC/DC 150Veff
 300V AC/DC 440Veff
 Input resistance:
 30V AC/DC 47kT
 60V AC/DC 100kT
 300V AC/DC 470kT
 Switching threshold
 Max: 10% to 100% of UN
 Min: 5% to 95% of UN
 Overvoltage category: III (according to IEC 60664-1)
 Rated surge voltage: 4kV

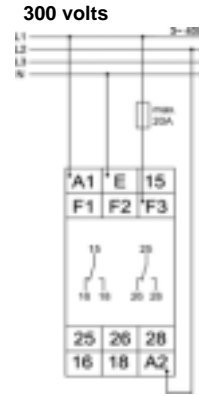




Connection Diagram



Connection Diagram



Connection Diagram

When the supply voltage U is applied, the output relays switch into on-position (yellow LED illuminated) and the set interval of the start-up suppression (START) begins (green LED U flashes). Changes of the measured voltage during this period do not affect the state of the output relay. After the interval has expired the green LED is illuminated steadily. For all the functions the LEDs MIN and MAX are flashing alternating, when the minimum value for the measured voltage was chosen to be greater than the maximum value.

Overvoltage monitoring (OVER, OVER+LATCH)

When the measured voltage exceeds the value adjusted at the MAX-regulator, the set interval of the tripping delay (DELAY) begins (red LED MAX flashes). After the interval has expired (red LED MAX illuminated), the output relays switch into off-position (yellow LED not illuminated). The output relays again switch into on-position (yellow LED illuminated), when the measured voltage falls below the value adjusted at the MIN-regulator (red LED MAX not illuminated).

If the fault latch is activated (OVER+LATCH) and the measured voltage remains above the MAX-value longer than the set interval of the tripping delay, the output relays remain in the off-position even if the measured voltage falls below the value adjusted at the MIN-regulator. After resetting the failure (interrupting and re-applying the supply voltage), the output relays switch into on-position and a new measuring cycle begins with the set interval of the start-up suppression (START).

Undervoltage monitoring (UNDER, UNDER+LATCH)

When the measured voltage falls below the value adjusted at the MIN-regulator, the set interval of the tripping delay (DELAY) begins (red LED MIN flashes). After the interval has expired (red LED MIN illuminated), the output relays switch into off-position (yellow LED not illuminated). The output relays again switch into on-position (yellow LED illuminated), when the measured voltage exceeds the value adjusted at the MAX-regulator.

If the fault latch is activated (UNDER+LATCH) and the measured voltage remains below the MIN-value longer than the set interval of the tripping delay, the output relays remain in the off-position even if the measured voltage exceeds the value adjusted at the MAX-regulator. After resetting the failure (interrupting and re-applying the supply voltage), the output relays switch into on-position and a new measuring cycle begins with the set interval of the start-up suppression (START).

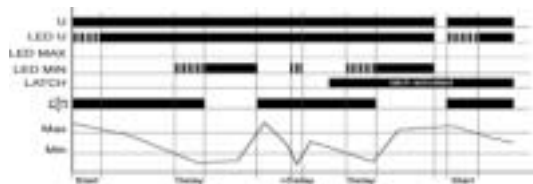
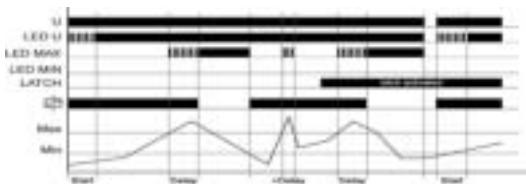
Window function (WIN, WIN+LATCH)

The output relays switch into on-position (yellow LED illuminated) when the measured voltage exceeds the value adjusted at the MIN-regulator. When the measured voltage exceeds the value adjusted at the MAX-regulator, the set interval of the tripping delay (DELAY) begins (red LED MAX flashes). After the interval has expired (red LED MAX illuminated), the output relays switch into off-position (yellow LED not illuminated). The output relays again switch into on-position (yellow LED illuminated) when the measured voltage falls below the value adjusted at the MAX-regulator (red LED MAX not illuminated). When the measured voltage falls below the value adjusted at the MIN-regulator, the set interval of the tripping delay (DELAY) begins again (red LED MIN flashes). After the interval has expired (red LED MIN illuminated), the output relays switch into off-position (yellow LED not illuminated).

If the fault latch is activated (WIN+LATCH) and the measured voltage remains below the MIN-value longer than the set interval of the tripping delay, the output relays remain in the off-position even if the measured voltage exceeds the value adjusted at the MIN-regulator. If the measured voltage remains above the MAX-value longer than the set interval of the tripping delay, the output relays remain in the off-position even if the measured voltage falls below the value adjusted at the MAX-regulator. After resetting the failure (interrupting and re-applying the supply voltage), the output relays switch into on-position and a new measuring cycle begins with the set interval of the start-up suppression (START).

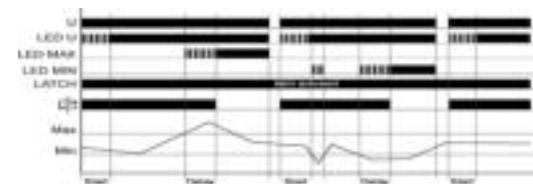
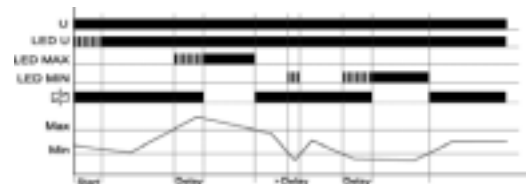
MR-1PVM Over Voltage

MR-1PVM Under Voltage



MR-1PVM Window

MR-1PVM Window + Latch



1. Functions

AC/DC current monitoring in 1-phase mains with adjustable thresholds, timing for start-up suppression and tripping delay separately adjustable and the following functions (selectable by means of rotary switch)

OVER	Overcurrent monitoring
OVER+LATCH	Overcurrent monitoring with fault latch
UNDER	Undercurrent monitoring
UNDER+LATCH	Undercurrent monitoring with fault latch
WIN	Monitoring the window between Min and Max
WIN+LATCH	Monitoring the window between Min and Max with fault latch

2. Time ranges

	Adjustment range
Start-up suppression time:	0s 10s
Tripping delay:	0.1s 10s

3. Indicators

Green LED ON:	indication of supply voltage
Green LED flashing:	indication of start-up suppression time
Yellow LED ON/OFF:	indication of relay output
Red LED ON/OFF:	indication of failure of the corresponding threshold
Red LED flashing:	indication of tripping delay of the corresponding threshold

4. Mechanical design

Self-extinguishing plastic housing, IP rating IP40
 Mounted on DIN-Rail TS 35 according to EN 50022
 Mounting position: any
 Shockproof terminal connection according to VBG 4 (PZ1 required), IP rating IP20
 Tightening torque: max. 1Nm
 Terminal capacity:
 1 x 0.5 to 2.5mm² with/without multicore cable end
 1 x 4mm² without multicore cable end
 2 x 0.5 to 1.5mm² with/without multicore cable end
 2 x 2.5mm² flexible without multicore cable end

6. Output circuit

2 potential free change-over contacts
 Rated voltage: 250V AC
 Switching capacity (distance <5mm): 750VA (3A / 250V AC)
 Switching capacity (distance >5mm): 1250VA (5A / 250V AC)
 Fusing: 5A fast acting
 Mechanical life: 20 x 106 operations
 Electrical life: 2 x 105 operations at 1000VA resistive load
 max. 60/min at 100VA resistive load
 max. 6/min at 1000VA resistive load (according to IEC 947-5-1)
 Overvoltage category: III (according to IEC 60664-1)
 Rated surge voltage: 4kV

8. Accuracy

Base accuracy: ±5% (of maximum scale value)
 Frequency response: -10% to +5% (16.6 to 400Hz)
 Adjustment accuracy: ±5% (of maximum scale value)
 Repetition accuracy: ±2%
 Voltage influence: -
 Temperature influence: ±0.1% / °C

9. Ambient conditions

Ambient temperature: -25 to +55°C (according to IEC 68-1)
 -25 to +40°C (according to UL 508)
 Storage temperature: -25 to +70°C
 Transport temperature: -25 to +70°C
 Relative humidity: 15% to 85% (according to IEC 721-3-3 class 3K3)
 Pollution degree: 3 (according to IEC 60664-1)
 Vibration resistance: 10 to 55Hz 0.35mm (according to IEC 68-2-6)
 Shock resistance: 15g 11ms (according to IEC 68-2-27)

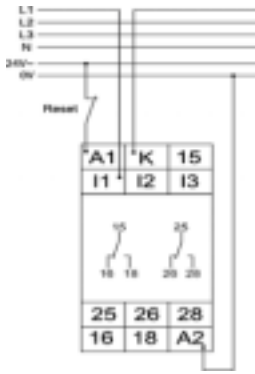


5. Input circuit

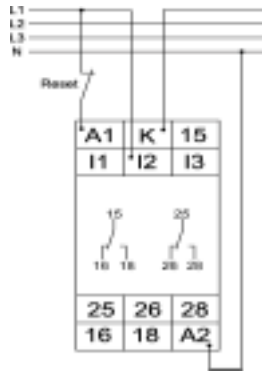
Supply voltage: 12 to 400V AC terminals A1-A2 (galvanically separated) selectable via power supply MR-PS
 Tolerance: according to specification of power module
 Rated frequency: according to specification of power module
 Rated consumption: 2VA (1.5W)
 Duration of operation: 100%
 Reset time: 500ms
 Residual ripple for DC: -
 Drop-out voltage: >30% of the supply voltage
 Overvoltage category: III (according to IEC 60664-1)
 Rated surge voltage: 4kV

7. Measuring circuit

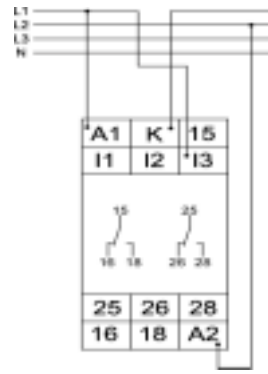
Measured variable: DC or AC Sinus (16.6 to 400Hz)
 Input:
 100mA AC/DC terminals K-1(+)
 1A AC/DC terminals K-2(+)
 10A AC/DC terminals K-13(+ (distance >5mm))
 Overload capacity:
 100mA AC/DC 800mA
 1A AC/DC 3A
 10A AC/DC 12A
 Input resistance:
 100mA AC/DC 470mT
 1A AC/DC 47mT
 10A AC/DC 5mT
 Switching threshold
 Max: 10% to 100% of IN
 Min: 5% to 95% of IN
 Overvoltage category: III (according to IEC 60664-1)
 Rated surge voltage: 4kV



Connection Diagram



Connection Diagram



Connection Diagram

When the supply voltage U is applied, the output relays switch into on-position (yellow LED illuminated) and the set interval of the start-up suppression (START) begins (green LED U flashes). Changes of the measured current during this period do not affect the state of the output relay. After the interval has expired the green LED is illuminated steadily. For all the functions the LEDs MIN and MAX are flashing alternating, when the minimum value for the measured current was chosen to be greater than the maximum value.

Overcurrent monitoring (OVER, OVER+LATCH)

When the measured current exceeds the value adjusted at the MAX-regulator, the set interval of the tripping delay (DELAY) begins (red LED MAX flashes). After the interval has expired (red LED MAX illuminated), the output relays switch into off-position (yellow LED not illuminated). The output relays again switch into on-position (yellow LED illuminated), when the measured current falls below the value adjusted at the MIN-regulator (red LED MAX not illuminated). If the fault latch is activated (OVER+LATCH) and the measured current remains above the MAX-value longer than the set interval of the tripping delay, the output relays remain in the off-position even if the measured current falls below the value adjusted at the MIN-regulator. After resetting the failure (interrupting and re-applying the supply voltage), the output relays switch into on-position and a new measuring cycle begins with the set interval of the start-up suppression (START).

Undercurrent monitoring (UNDER, UNDER+LATCH)

When the measured current falls below the value adjusted at the MIN-regulator, the set interval of the tripping delay (DELAY) begins (red LED MIN flashes). After the interval has expired (red LED MIN illuminated), the output relays switch into off-position (yellow LED not illuminated). The output relays again switch into on-position (yellow LED illuminated), when the measured current exceeds the value adjusted at the MAX-regulator.

If the fault latch is activated (UNDER+LATCH) and the measured current remains below the MIN-value longer than the set interval of the tripping delay, the output relays remain in the off-position even if the measured current exceeds the value adjusted at the MAX-regulator. After resetting the failure (interrupting and re-applying the supply voltage), the output relays switch into on-position and a new measuring cycle begins with the set interval of the start-up suppression (START).

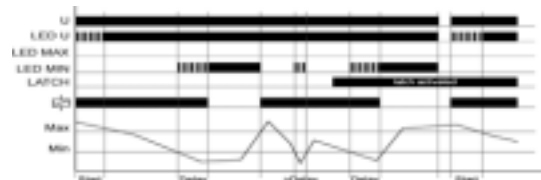
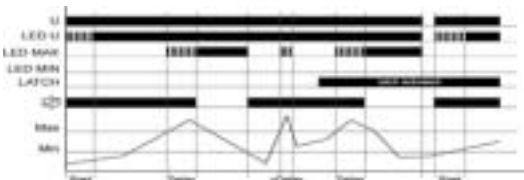
Window function (WIN, WIN+LATCH)

The output relays switch into on-position (yellow LED illuminated) when the measured current exceeds the value adjusted at the MIN-regulator. When the measured current exceeds the value adjusted at the MAX-regulator, the set interval of the tripping delay (DELAY) begins (red LED MAX flashes). After the interval has expired (red LED MAX illuminated), the output relays switch into off-position (yellow LED not illuminated). The output relays again switch into on-position (yellow LED illuminated) when the measured current falls below the value adjusted at the MAX-regulator (red LED MAX not illuminated). When the measured current falls below the value adjusted at the MIN-regulator, the set interval of the tripping delay (DELAY) begins again (red LED MIN flashes). After the interval has expired (red LED MIN illuminated), the output relays switch into off-position (yellow LED not illuminated).

If the fault latch is activated (WIN+LATCH) and the measured current remains below the MIN-value longer than the set interval of the tripping delay, the output relays remain in the off-position even if the measured current exceeds the value adjusted at the MIN-regulator. If the measured current remains above the MAX-value longer than the set interval of the tripping delay, the output relays remain in the off-position even if the measured current falls below the value adjusted at the MAX-regulator. After resetting the failure (interrupting and re-applying the supply voltage), the output relays switch into on-position and a new measuring cycle begins with the set interval of the start-up suppression (START).

MR-1PVM Over Voltage

MR-1PVM Under Voltage



MR-1PVM Window

MR-1PVM Window + Latch

