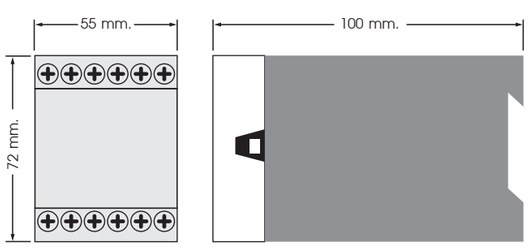
VPM-05-D-SERIES DIGITAL VOLTAGE PROTECTION RELAY

Primus
User Manual

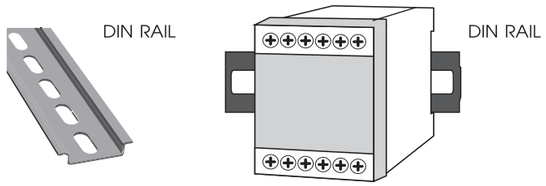
TECHNICAL SPECIFICATION

Model.		VPM-05-P2-2-D	VPM-05-P4-4-D	VPM-05-P4-3-D	VPM-05-P3-3-D	VPM-05-P3-4-D
Input Voltage		220VAC 50-60Hz (1P/2W)	380VAC 50-60Hz (3P/4W)	380VAC 50-60Hz (3P/3W)		380VAC 50-60Hz (3P/4W)
Power Consumption		3 VA				
Display		7-Segment, Size 0.39 Inch, 3 Digit, 1 Row				
Input	Voltage Range	160-300 VAC	280 - 520 VAC(3ø)			
	Over Voltage	230-290 VAC	400 - 500 VAC(3ø)			
	Under Voltage	170-230 VAC	300 - 400 VAC(3ø)			
	Phase Sequence	No			Yes	
	% Unbalance	No	2 - 20%			
	Hysteresis	1%				
	Accuracy	±0.25 f.s. +1dgt				
	Resolution	1V				
Output	Relay Output	Relay DPDT Output 5A 250VAC				
	Time Delay Off	0 - 10 Sec				
	Time Delay On	0 - 900 Sec				
Ambient Operation	Temperature	-10˚C to 60˚C				
	Humidity	< 85 %RH Non-Condensing				
Ambient Storage	Temperature	-20˚C to 80˚C				
	Humidity	< 85 %RH Non-Condensing				
Protection Degree		IP20				
Installation		DIN RAIL Mounting				
Material		ABS-V0				
Size (mm.)		55 x 72 x 100				
Weight		270g.				

DIMENSION



INSTALLTION



DESCRIPTION

- VPM-05 is relay to protect Over-Under voltage, Unbalance phase, Phase sequence.
- Electrical system 1-Phase and 3-Phase, 3 Wire/4 Wire.
- Measure accurate in True RMS.
- Show voltage result by 7-Segment LED 3 Digits size 0.39 inches
- Easy to wiring
- Output Relay size 5 A, 250 VAC, DPDT.
- DIN Rail installation.
- LED show status of output relay.

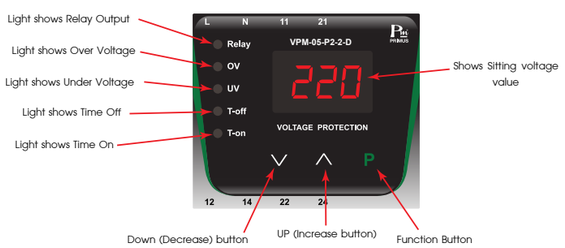
OPERATION

● VPM-05-P2

VPM-05 is Digital Voltage Protection Relay that display result and measured value digital which made the display has accurate and cleary.

When supply power VPM-05 will measure voltage that is normal or not means voltage do not over or lower from setting If everything is fine VPM-05 will start delay follow T-ON from setting (Range 0-900 Sec) when time has completed Output Relay will operate.

After that if VPM-05 check irregular comdition of high voltage lower than value from setting VPM-05 will start delay follow T-OFF (Range 0-10 Sec) when complete time Relay will stop operation.



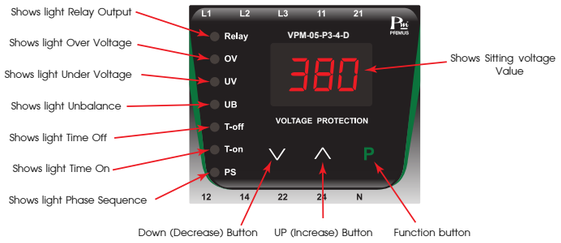
● VPM-05-P3 and VPM-05-P4

VPM-05 is Digital Voltage Protection Relay that display result and measured voltage in Digital which made display has accurate and cleary value.

When supply electrical to VPM-05 will measure voltage that over or less than setting value. Phase Unbalance is not over than setting percentage and correct sequence (For model VPM-05-P3 if everything normal VPM-05 will delay follow time from T-ON setting when complete time Output Rlay will operate.

After that if VPM -05 check malfunction of over voltage or lower setting value Phase Unbalance over than setting value or phase sequence is over setting value or phase unbalance. VPM -05 will start delay follow T-OFF time (Range 0-10 Sec) when time has complete then Output Relay will stop operate.

% Unbalance or percent of voltage each phase that difference can set 2-20%



% Unbalance calculation

Unbalance voltage will check voltage of each phase compare with average voltage all 3 phase. There are difference % Unbalance that setting or not if the value higher than delay time it will stop operation then Relay will stop operate. % Unbalance calculation in 3 phase 4 wire will be follow as formula

$$\% \text{ UBL} = 100 \times \frac{V^{MD}}{V_{avg}} \quad (1)$$

$$V_{avg} = \frac{V_a+V_b+V_c}{3} \quad (2)$$

V^{MD} is Absolute maximum of voltage difference in each phase with average voltage.

$$V^{MD} = \text{Max}(|V_a-V_{avg}|,\ |V_b-V_{avg}|,\ |V_c-V_{avg}|) \quad (3)$$

Example V_a = 110 V, V_b = 220 V, V_c = 220 V, V_{avg} = 183 V,
$|V_a - V_{avg}|$ = 73 V, $|V_b - V_{avg}|$ = 37 V, $|V_c - V_{avg}|$ = 37 V
ดังนั้น % UBL = $\frac{73}{183}$ x 100 = 39.89 %

and model 3 phase 3 wire will be follow formula as

$$\% \text{ UBL} = 100 \times \frac{V_{LL}^{MD}}{V_{LL\ avg}} \quad (4)$$

$$V_{LL\ avg} = \frac{V_{ab}+V_{bc}+V_{ca}}{3} \quad (5)$$

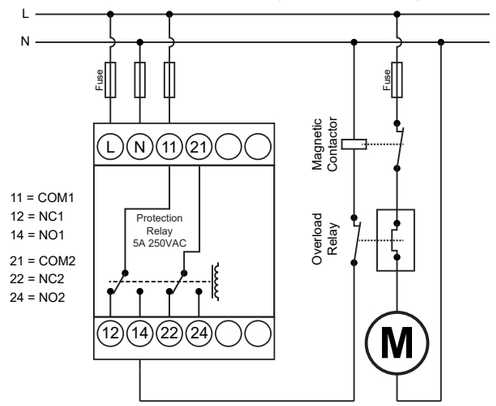
V_{LL}^{MD} is Absolute maximum of voltage difference between line with average voltage 3 phase.

$$V^{MD} = \text{Max}(|V_{ab}-V_{LLavg}|,\ |V_{bc}-V_{LLavg}|,\ |V_{ca}-V_{LLavg}|) \quad (6)$$

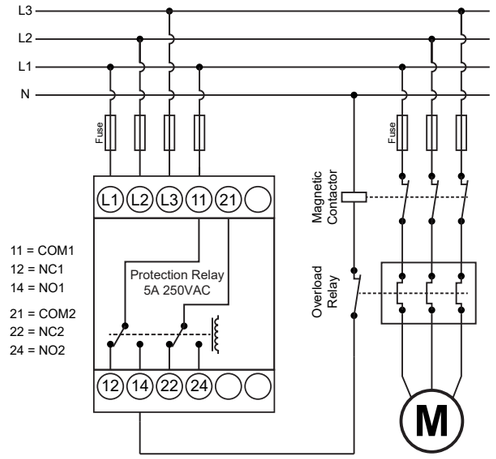
Example V_{ab} = 329 V, V_{bc} = 381 V, V_{ca} = 329 V, V_{LLavg} = 346 V,
$|V_{ab} - V_{LLavg}|$ = 17 V, $|V_{bc} - V_{LLavg}|$ = 35 V, $|V_{ca} - V_{LLavg}|$ = 17 V
so % UBL = $\frac{35}{346}$ x 100 = 10.12 %

WIRING DIAGRAM

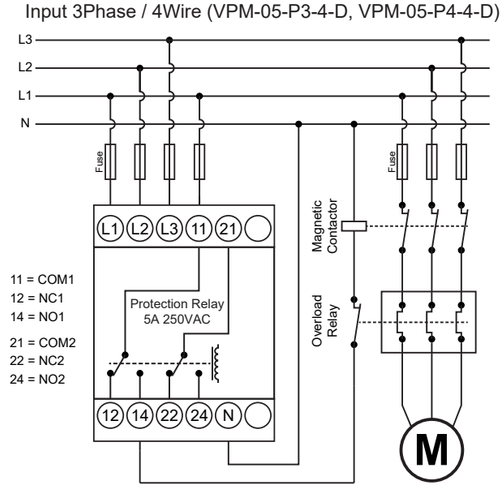
Input 1Phase / 2Wire (VPM-05-P2-2-D)



Input 3Phase / 3Wire (VPM-05-P3-3-D, VPM-05-P4-3-D)



Input 3Phase / 4Wire (VPM-05-P3-4-D, VPM-05-P4-4-D)

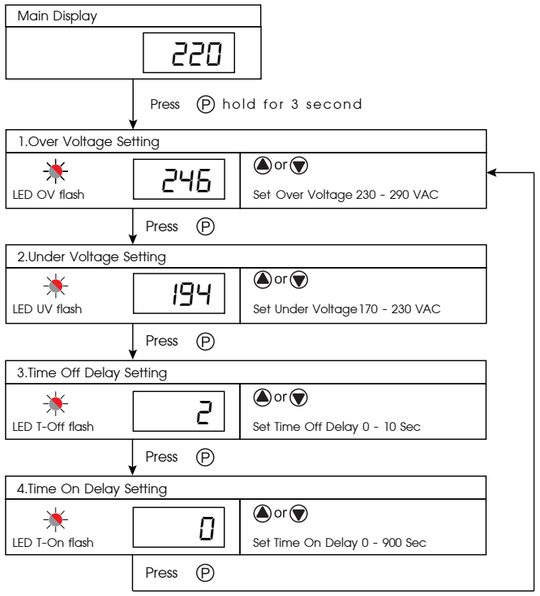


VPM-05-D-SERIES DIGITAL VOLTAGE PROTECTION RELAY

OPERATION DISPLAY (Input 1 Phase)

Voltage Status		Display Output	LED Signal
Normal Voltage		220	Relay LED ON
Trip	Over Voltage	246	Relay LED OFF OV LED ON
	Under Voltage	194	Relay LED OFF UV LED ON
Time Delay	Time Off Delay	220	T-off LED ON
	Time On Delay	220	T-on LED ON
Setting Parameter	Over Voltage	246	OV LED BLINK
	Under Voltage	194	UV LED BLINK
	Time Off Delay	2	T-off LED BLINK
	Time On Delay	0	T-on LED BLINK

SETTINGS (Input 1 Phase)



* Press Ⓟ hold 3 second for backK to main page

or not press button for 10 second will back to main page.

OPERATION DISPLAY (Input 3 Phase)

Voltage Status		Display Output	LED Signal
Normal Voltage		380	Relay LED ON
Trip	Over Voltage	437	Relay LED OFF OV LED ON
	Under Voltage	323	Relay LED OFF UV LED ON
	Unbalance	357	Relay LED OFF UB LED ON
	Phase Sequence	380	Relay LED OFF PS LED ON
Time Delay	Time Off Delay	380	T-off LED ON
	Time On Delay	380	T-on LED ON
Setting Parameter	Over Voltage	425	OV LED BLINK
	Under Voltage	334	UV LED BLINK
	Unbalance	12	UB LED BLINK
	Time Off Delay	2	T-off LED BLINK
	Time On Delay	0	T-on LED BLINK

SETTINGS (Input 3 Phase)

*Press Ⓟ hold 3 second for backK to main page

or not press button for 10 second will backK to main page.

ORDERING CODE

VPM - 05 - ☐ - ☐ - D

Input Signal	
P2	1 Phase

Electrical System	
2	1Phase / 2Wire

VPM - 05 - ☐ - ☐ - D

Input Signal	
P3	3 Phase + Phase Sequence
P4	3 Phase

Electrical System	
3	3Phase / 3Wire
4	3Phase / 4Wire

EX. VPM-05-P3-3-D

- means Electrical System : 3Phase / 3Wire
- means Input Signal : 3Phase + Phase Sequence
- means Output Type : Relay 1 Out (DPDT)

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VPM-05