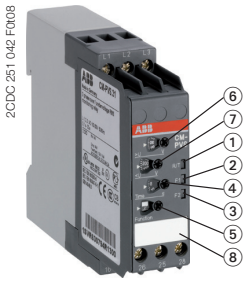
Three-phase monitoring relays
CM-PVS.31, CM-PVS.41 and CM-PVS.81
Data sheet



① R/T: yellow LED - relay status, timing
② F1: red LED - fault message
③ F2: red LED - fault message
④ Adjustment of the tripping delay t_v
⑤ Function selection (see rotary switch „Function“)
⑥ Adjustment of the threshold value for overvoltage
⑦ Adjustment of the threshold value for undervoltage
⑧ Marker label

Features

- Monitoring of three-phase mains for phase sequence (can be switched off), phase failure, over- and undervoltage
- Threshold values for over- and undervoltage are adjustable as absolute values
- Tripping delay can be adjusted or switched off by means of a logarithmic scale
- ON-delayed or OFF-delayed tripping delay selectable
- Powered by the measuring circuit
- True RMS measuring principle
- 2 c/o (SPDT) contacts
- 3 LEDs for status indication

Approvals

	UL 508, CAN/CSA C22.2 No.14	
	GL	(CM-PVS.81 pending)
	GOST	
	CB scheme	(CM-PVS.81 pending)
	CCC	(CM-PVS.81 pending)
	RMRS	

Marks

CE	CE	
	C-Tick	(CM-PVS.81 pending)

Order data

Type	Rated control supply voltage = measuring voltage	Order code
CM-PVS.31	3 x 160-300 V AC	**1SVR 630 794 R1300**
CM-PVS.41	3 x 300-500 V AC	**1SVR 630 794 R3300**
CM-PVS.81	3 x 200-400 V AC	**1SVR 630 794 R2300**

Order data - Accessories

Type	Description	Order code
ADP.01	Adapter for screw mounting	**1SVR 430 029 R0100**
MAR.01	Marker label	**1SVR 366 017 R0100**
COV.01	Sealable transparent cover	**1SVR 430 005 R0100**

Application

The CM-PVS.x1 are monitoring relays for three-phase mains. They monitor the phase parameters phase sequence, phase failure, over- and undervoltage. The threshold values for over- and undervoltage are adjustable.

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Operating mode

Configuration of the devices is made by means of setting elements accessible on the front of the unit and signalling is made by means of front-face LEDs.

Adjustment potentiometer

Threshold values

By means of two separate potentiometers with direct reading scales, the threshold values for over- and undervoltage can be adjusted within the measuring range.

	Measuring range for overvoltage	Measuring range for undervoltage
CM-PVS.31	3 x 220-300 V AC	3 x 160-230 V AC
CM-PVS.41	3 x 420-500 V AC	3 x 300-380 V AC
CM-PVS.81	3 x 300-400 V AC	3 x 210-300 V AC

Tripping delay t_V

The tripping delay t_V can be adjusted within a range of 0.1-30 s by means of a potentiometer with logaritmic scale. By turning to the left stop, the tripping delay can be switched off.

Rotary switch

Type of tripping delay and phase sequence monitoring

The type of tripping delay and phase sequence monitoring can be selected via the rotary switch „Function“.

ON-delay with phase sequence monitoring
The output relays de-energize as soon as a phase sequence error occurs. The output relays re-energize automatically as soon as the phase sequence is correct again.

OFF-delay with phase sequence monitoring
The output relays de-energize as soon as a phase sequence error occurs. The output relays re-energize automatically as soon as the phase sequence is correct again.

ON-delay without phase sequence monitoring
Phase sequence errors will not be recognized.

OFF-delay without phase sequence monitoring
Phase sequence errors will not be recognized.

LEDs

Function	R/T: yellow LED	F1: red LED	F2: red LED
Control supply voltage applied, output relay energized	⎍	-	-
Tripping delay t_V active	⎍⎍	-	-
Phase failure	-	⎍	⎍⎍
Phase sequence	-	⎍⎍ alternating	
Overvoltage	-	⎍	-
Undervoltage	-	-	⎍
Adjustment error [1]	⎍⎍	⎍⎍	⎍⎍

[1] Overlapping of the threshold values: An overlapping of the threshold values is given, if the threshold value for overvoltage is set to a smaller value than the threshold value for undervoltage.

Function descriptions/diagrams

Function diagram legend

Control supply voltage not applied / Output contact open / LED off
Control supply voltage applied / Output contact closed / LED glowing

Phase sequence and phase failure monitoring

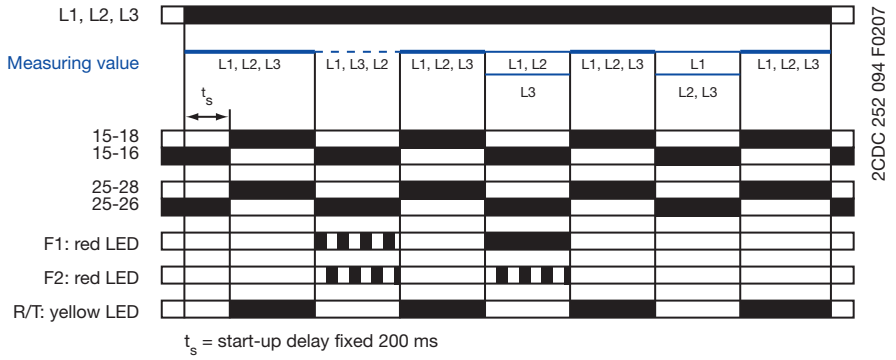
Applying control supply voltage begins the fixed start-up delay t_S. When t_S is complete and all phases are present with correct voltage, the output relays energize and the yellow LED R/T glows.

Phase sequence monitoring

If phase sequence monitoring is activated, the output relays de-energize as soon as a phase sequence error occurs. The fault is displayed by alternated flashing of the LEDs F1 and F2. The output relays re-energize automatically as soon as the phase sequence is correct again.

Phase failure monitoring

The output relays de-energize instantaneous if a phase failure occurs. The fault is indicated by lightning of LED F1 and flashing of LED F2. The output relays re-energize automatically as soon as the voltage returns to the tolerance range.



t_s = start-up delay fixed 200 ms

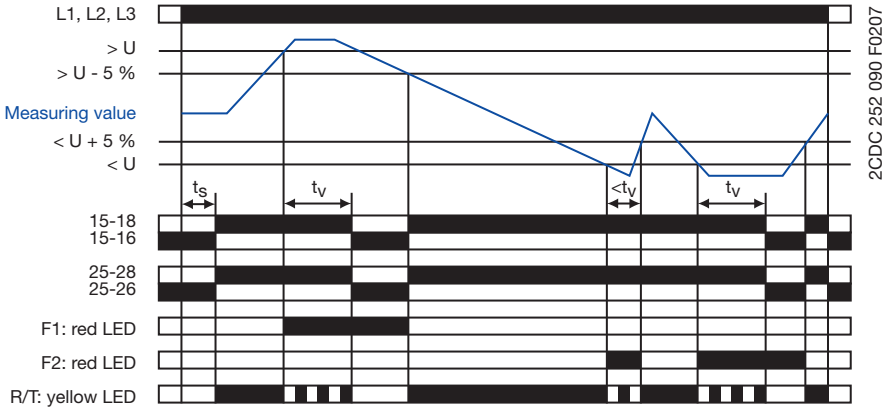
Over- and undervoltage monitoring

Applying control supply voltage begins the fixed start-up delay t_s. When t_s is complete and all phases are present with correct voltage and with correct phase sequence, the output relays energize and the yellow LED R/T glows.

Type of tripping delay = ON-delay ⊠

If the voltage to be monitored exceeds or falls below the set threshold value, the output relays de-energize after the set tripping delay t_v is complete. The LED R/T flashes during timing and turns off as soon as the output relays de-energize.

The output relays re-energize automatically as soon as the voltage returns to the tolerance range, taking into account a fixed hysteresis of 5 %. The LED R/T glows.

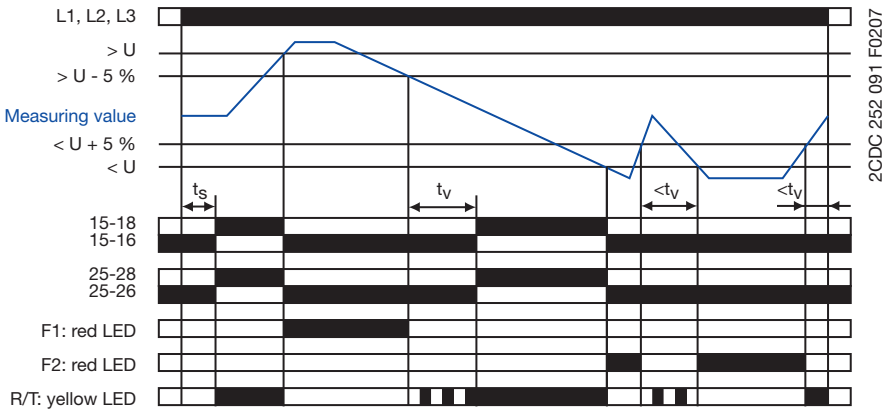


t_s = start-up delay fixed 200 ms
t_v = adjustable tripping delay

Type of tripping delay = OFF-delay ■

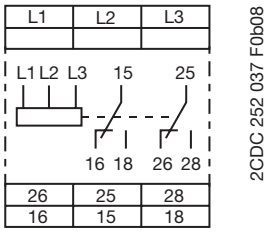
If the voltage to be monitored exceeds or falls below the set threshold value, the output relays de-energize instantaneously and the LED R/T turns off.

As soon as the voltage returns to the tolerance range, taking into account a fixed hysteresis of 5 %, the output relays re-energize automatically after the set tripping delay t_v is complete. The LED R/T flashes during timing and turns steady when timing is complete.



t_s = start-up delay fixed 200 ms
t_v = adjustable tripping delay

Connection diagram



L1, L2, L3	Control supply voltage = measuring voltage
15-16/18	Output contacts -
25-26/28	closed-circuit principle

CM-PVS.31, CM-PVS.41 and CM-PVS.81

Three-phase monitoring relays
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Data at T_a = 25 °C and rated values, unless otherwise indicated

Type			CM-PVS.31	CM-PVS.41	CM-PVS.81
Input circuit = Measuring circuit			**L1, L2, L3**		
Rated control supply voltage U_S = measuring voltage			3 x 160-300 V AC	3 x 300-500 V AC	3 x 200-400 V AC
Rated control supply voltage U_S tolerance			-15...+10 %		
Rated frequency			50/60 Hz		
Frequency range			45-65 Hz		
Typical current / power consumption			25 mA / 10 VA (230 V AC)	25 mA / 18 VA (400 V AC)	19 mA / 10 VA (300 V AC)
Measuring circuit			**L1, L2, L3**		
Monitoring functions		Phase failure	■		
		Phase sequence	can be switched off		
		Automatic phase sequence correction	-		
		Over-/undervoltage	■		
		Phase unbalance	-		
		Neutral	-		
Measuring range		Overvoltage	3 x 220-300 V AC	3 x 420-500 V AC	3 x 300-400 V AC
		Undervoltage	3 x 160-230 V AC	3 x 300-380 V AC	3 x 210-300 V AC
Thresholds		Overvoltage	adjustable within the measuring range		
		Undervoltage	adjustable within the measuring range		
Hysteresis related to the threshold value		Over-/undervoltage	fixed 5 %		
Rated frequency of the measuring signal			50/60 Hz		
Frequency range of the measuring signal			45-65 Hz		
Maximum measuring cycle time			100 ms		
Accuracy within the rated control supply voltage tolerance			$\Delta U \leq 0.5$ %		
Accuracy within the temperature range			$\Delta U \leq 0.06$ % / °C		
Measuring method			True RMS		
Timing circuit					
Start-up delay t_S			fixed 200 ms		
Tripping delay t_V			ON- or OFF-delay 0; 0.1-30 s adjustable		
Repeat accuracy (constant parameters)			< ±0.2 %		
Accuracy within the rated control supply voltage tolerance			$\Delta t \leq 0.5$ %		
Accuracy within the temperature range			$\Delta t \leq 0.06$ % / °C		
Indication of operational states			1 yellow LED, 2 red LEDs Details see operating mode and function description/diagrams		
Output circuits			**15-16/18, 25-26/28**		
Kind of output			2 x1 c/o (SPDT) contacts (Relays)		
Operating principle [1]			closed-circuit principle		
Contact material			AgNi alloy, Cd free		
Rated operational voltage U_e (IEC/EN 60947-1)			250 V		
Minimum switching power			24 V / 10 mA		
Maximum switching voltage			see load limit curve		
Rated operational current I_e (IEC/EN 60947-5-1)	AC12 (resistive) 230 V		4 A		
	AC15 (inductive) 230 V		3 A		
	DC12 (resistive) 24 V		4 A		
	DC13 (inductive) 24 V		2 A		
AC rating (UL 508)		Utilization category (Control Circuit Rating Code)	B 300		
		max. rated operational voltage	300 V AC		
		max. continuous thermal current at B 300	5 A		
		max. making/breaking apparent power at B 300	3600/360 VA		
Mechanical lifetime			30 x 10^6 switching cycles		
Electrical lifetime (AC12, 230 V, 4 A)			0,1 x 10^6 switching cycles		
Max. fuse rating to achieve short-circuit protection		n/c contact	6 A fast-acting		
		n/o contact	10 A fast-acting		

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Data at T_a = 25 °C and rated values, unless otherwise indicated

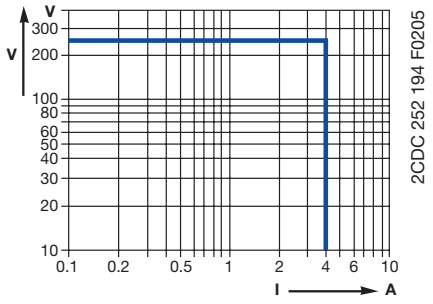
Type			CM-PVS.31	CM-PVS.41	CM-PVS.81
General data					
Duty time			100 %		
Dimensions (W x H x D)			22.5 x 78 x 100 mm (0.89 x 3.07 x 3.94 inch)		
Weight			0.13 kg (0.29 lb)		
Mounting			DIN rail (IEC/EN 60715), snap-on mounting without any tool		
Mounting position			any		
Minimum distance to other units		lateral	10 mm (0.4 in) in case of continuous voltage of ...		not necessary
			> 220 V	> 400 V	
Degree of protection		housing / terminals	IP50 / IP20		
Electrical connection					
Wire size	fine-strand with(out) wire end ferrule		2 x 0.75-2.5 mm² (2 x 18-14 AWG)		
		rigid	2 x 0.5-4 mm² (2 x 20-12 AWG)		
Stripping length			7 mm (0.28 inch)		
Tightening torque			0.6-0.8 Nm		
Environmental data					
Ambient temperature ranges		operation / storage	-25...+60 °C / -40...+85 °C		
Damp heat (IEC 60068-2-30)			55 °C, 6 cycles		
Climatic category			3K3		
Vibration (sinusoidal) (IEC/EN 60255-21-1)			Class 2		
Shock (IEC/EN 60255-21-2)			Class 2		
Isolation data					
Rated insulation voltage U_i	input circuit / output circuit		600 V		
	output circuit 1 / output circuit 2		300 V		
Rated impulse withstand voltage U_{imp} (VDE 0110, IEC/EN 60664)		input circuit	6 kV; 1.2/50 µs		
		output circuit	4 kV; 1.2/50 µs		
Test voltage between all isolated circuits (routine test)			2.5 kV, 50 Hz, 1 s		
Basis isolation		input circuit / output circuit	600 V		
Protective separation (VDE 0106 part 101 and 101/A, IEC/EN 61140)		input circuit / output circuit	-		
Pollution degree (VDE 0110, IEC/EN 60664)			3		
Overvoltage category (VDE 0110, IEC 60664)			III		
Standards					
Product standard			IEC/EN 60255-6, EN 50178		
Low Voltage Directive			2006/95/EC		
EMC directive			2004/108/EC		
RoHS directive			2002/95/EC		
Electromagnetic compatibility					
Interference immunity to			IEC/EN 61000-6-1, IEC/EN 61000-6-2		
electrostatic discharge		IEC/EN 61000-4-2	Level 3 (6 kV / 8 kV)		
radiated, radio-frequency, electro-magnetic field		IEC/EN 61000-4-3	Level 3 (10 V/m)		
electrical fast transient (burst)		IEC/EN 61000-4-4	Level 3 (2 kV / 2 kHz)		
surge		IEC/EN 61000-4-5	Level 4 (2 kV L-L)		
conducted disturbances, induced by radio-frequency fields		IEC/EN 61000-4-6	Level 3 (10 V)		
harmonics and interharmonics		IEC/EN 61000-4-13	Class 3		
Interference emission			IEC/EN 61000-6-3, IEC/EN 61000-6-4		
high-frequency radiated		IEC/CISPR 22, EN 55022	Class B		
high-frequency conducted		IEC/CISPR 22, EN 55022	Class B		

[1] Closed-circuit principle: Output relay(s) de-energize(s) if measured value exceeds or falls below the adjusted threshold value

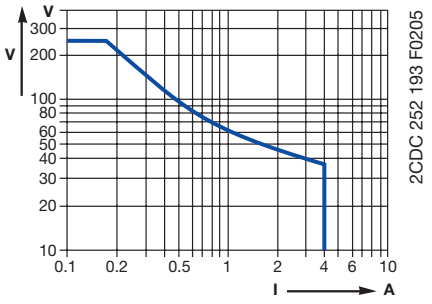
Technical diagrams

Load limit curves

AC load (resistive)

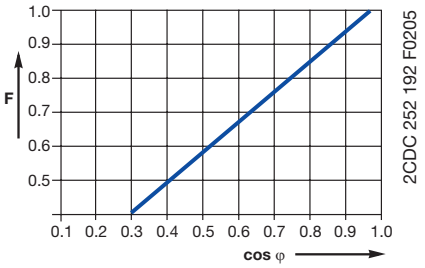


DC load (resistive)

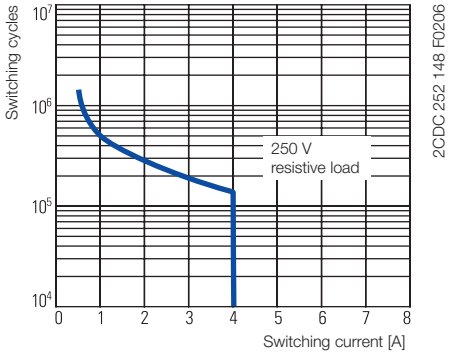


Derating factor F

at inductive AC load

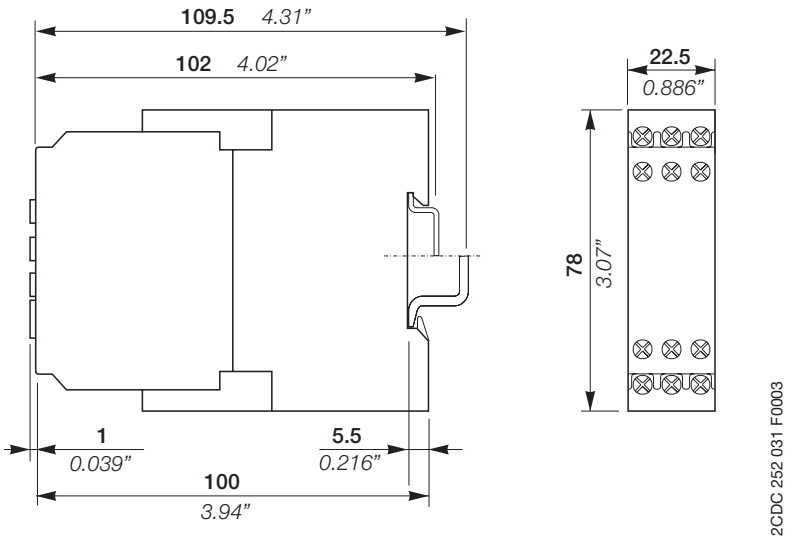


Contact lifetime



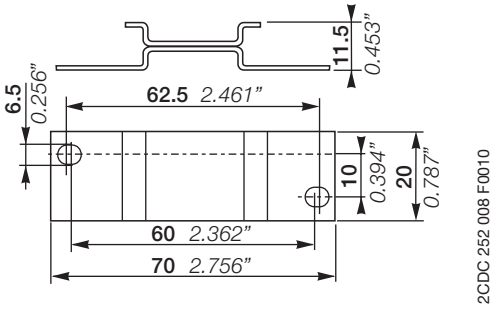
Dimensions

in mm

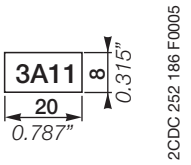


Dimensions - Accessories

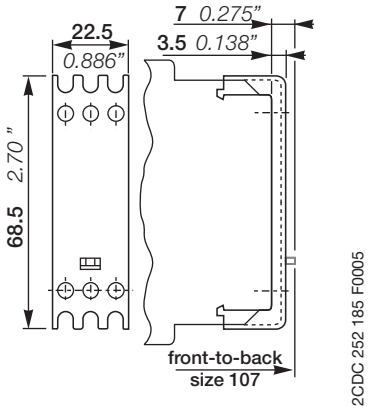
in mm



ADP.01 - Adapter for screw mounting



MAR.01 - Marker label



COV.01 - Sealable transparent cover

Further documentation

Document title	Document type	Document number
Electronic Products and Relays	Technical catalogue	2CDC 110 004 C020x
CM-PAS, CM-PFS, CM-PSS, CM-PVS	Instruction manual	1SVC 630 510 M0000

You can find the documentation online at www.abb.com/lowvoltage -> Control Products -> Electronic Relays and Controls -> Three phase monitors.

CAD system files

You can find the CAD files for CAD systems at http://abb-control-products.partcommunity.com/PARTcommunity/Portal/abb-control-products -> Low Voltage Products & Systems -> Control Products -> Electronic Relays and Controls -> Three Phase Monitors -> CM-PVx - Three Phase Monitors.

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