








# Three-phase monitoring relays

## Benefits, advantages, & applications

### Characteristics of the CM range three-phase monitors

- Adjustable phase unbalance threshold value <sup>1)</sup>
- Adjustable ON-delay/OFF-delay time <sup>1)</sup>
- Dual frequency measuring 50/60 Hz
- Powered by the measuring circuit
- 1 n/o contact, 1 or 2 contacts
- LED status indication
- Approvals:     
- Marks:  
- Multifunctional and single-functional devices
- Phase loss monitoring
- Phase sequence monitoring <sup>1)</sup>
- Over- and undervoltage monitoring (fixed or adjustable)<sup>1)</sup>
- Wide-range operating voltage guarantees world-wide operation

<sup>1)</sup> depending on device type

### Phase unbalance monitoring

If the supply by the three-phase system is unbalanced due to uneven distribution of the load, the motor will convert a part of the energy into reactive power. This energy gets lost unexploited; also the motor is exposed to higher thermal strain. Other thermal protection devices fail to detect continuing unbalances which can lead to damage or destruction of the motor. The CM range three-phase monitors with phase unbalance monitoring can reliably detect this critical situation.

### Phase sequence

Changing the phase sequence during operation or a wrong phase sequence prior to startup causes a change of the rotational direction of the connected device. Generators, pumps or fans rotate in the wrong direction and the installation is no longer working properly. Especially for moveable equipment, such as construction machinery, phase sequence detection prior to the startup process is highly reasonable.

### Phase loss

In case of phase loss, undefined stats of the installation are likely to occur. E.g. the startup process of motors is disturbed. All three-phase monitors of the ABB CM range detect a phase loss as soon as the voltage of one phase drops below 60% of its nominal value.

### Voltage monitoring

All electric devices can be damaged when operated continuously in a network with out-of-range voltages. For example, safe starting is not ensured in case of undervoltage. Also, the switching state of a contactor is not clearly defined when operated in a „forbidden“ voltage range. This can lead to undefined stats of the installation and cause damage or destruction of valuable parts.

### Expanded functionality

ABB's new generation of three-phase monitoring relays feature additional functions making the application field for the devices considerably larger.

### Selectable phase sequence monitoring

The phase sequence monitoring can be switched off by means of a rotary switch or a DIP switch. This enables monitoring of three-phase mains where phase sequence is not relevant for the application, for example in case of motors with forward and reverse rotation, heating applications, etc.

### Automatic phase sequence correction

The automatic phase sequence correction is activated by means of a DIP switch. With activated phase sequence correction, it is ensured that for any non-fixed or portable equipment, e.g. construction machinery, the correct phase sequence is always applied to the input terminals of the load. For details regarding the wiring, please see function description / diagrams.

### Structure of the type designation

#### CM-\_\_ x.yz

x: width of enclosure

y: Control supply voltage / measuring range

1	110, 115, 120, 127 V supply systems (phase-neutral)
2	220, 230, 240 V supply systems (phase-neutral)
3	200, 208, 220, 230, 240, 257, 260 V supply systems (phase-phase)
4	440, 460 V supply systems (phase-phase)
5	480, 500 V supply systems (phase-phase)
6	575, 600 V supply systems (phase-phase)
7	660, 690 V supply systems (phase-phase)
8	200, 400 V supply systems (phase-phase)

z: Rated frequency / output circuit

1	50/60 Hz – 1x2 c/o
2	50/60 Hz – 1x2 or 2x1 c/o
3	50/60/400 Hz – 1x2 oder 2x1 c/o



**1** Threshold value  $V_{min}/V_{max}$

**2** R/T: yellow LED  
Relay status, timing

F1: red LED  
fault message

F2: red LED failure:  
- overvoltage: F1  
- undervoltage: F2

- phase unbalance:  
F1 and F2 constant  
- phase loss: F1 on F2  
flashing

- phase sequence:  
F1 and F2 alternately flashing

**3** Adjustment of the tripping delay

**4** Time setting 0.1-10 s  
Phase sequence and phase loss  
are indicated without any time delay

# Three-phase monitoring relays

## Selection and conversion

Measuring & monitoring relays  
CM Range

Rated control supply voltage $U_s$	Reference code	Catalog number	Predecessor
	CM-PBE	1SVR550881R9400	
	CM-PBE	1SVR550882R9500	
	CM-PVE	1SVR550870R9400	no predecessor
	CM-PVE	1SVR550871R9500	
	CM-PFE	1SVR550824R9100	
	CM-PFS.S <sup>1)</sup>	1SVR730824R9300	1SVR630824R9300
	CM-PFS.P <sup>1)</sup>	1SVR740824R9300	
	CM-PSS.31S	1SVR730784R2300	1SVR630784R2300
	CM-PSS.31P	1SVR740784R2300	
	CM-PSS.41S	1SVR730784R3300	1SVR630784R3300
	CM-PSS.41P	1SVR740784R3300	
	CM-PVS.31S	1SVR730794R1300	1SVR63079 R1300
	CM-PVS.31P	1SVR740794R1300	
	CM-PVS.41S	1SVR730794R3300	1SVR630794R3300
	CM-PVS.41P	1SVR740794R3300	
	CM-PVS.81S	1SVR730794R2300	1SVR630794R2300
	CM-PVS.81P	1SVR740794R2300	
	CM-PAS.31S	1SVR730774R1300	1SVR630774R1300
	CM-PAS.31P	1SVR740774R1300	
	CM-PAS.41S	1SVR730774R3300	1SVR630774R3300
	CM-PAS.41P	1SVR740774R3300	
	CM-MPS.11S	1SVR730885R1300	1SVR630885R1300
	CM-MPS.11P	1SVR740885R1300	
	CM-MPS.21S	1SVR730885R3300	1SVR630885R3300
	CM-MPS.21P	1SVR740885R3300	
	CM-MPS.31S	1SVR730884R1300	1SVR630884R1300
	CM-MPS.31P	1SVR740884R1300	
<b>Phase to Phase</b>			
160-300 V AC			
200-400 V AC			
200-500 V AC			
208-440 V AC			
300-500 V AC			
320-460 V AC			
350-580 V AC			
380 V AC			
380-440 V AC	■	■	
400 V AC			
450-720 V AC			
530-820 V AC			
<b>Phase to Neutral</b>			
90-170 V AC			
180-280 V AC			
185-265 V AC			
220-240 V AC	■		
230 V AC			
<b>Rated frequency</b>			
50/60 Hz	■	■	■
50/60/400 Hz			
<b>Suitable for monitoring</b>			
Single-phase mains	■	■	
Three-phase mains	■	■	■
<b>Monitoring function</b>			
Phase failure	■	■	■
Phase sequence			sel
Automatic phase sequence correction			
Overvoltage		■	■
Undervoltage		■	■
Unbalance			■
Neutral	■	■	
Overfrequency			■
Underfrequency			■
<b>Thresholds</b>			
fix	fix	fix	fix
<b>Timing functions for tripping delay</b>			
ON delay			fix
On and OFF delay	fix	fix	fix
<b>Connection type</b>			
Easy Connect Technology			■
Double-chamber cage connection terminals			■