

# PHASE FAILURE RELAYS



These relays are suitable for monitoring incoming 3- phase supply from Mains (Electricity distribution line). Being independent of load, they can be used for any HP/KW rating of load.

## MODELS

VSP D1, VSP D2, VPG D1, USP D1  
 P1 PFS1, P1 PFS2  
 S2 VMR1, S2 VMR2, S2 VMR3, S2 VMR6, S2 VMR8  
 ALV D2, D2 VMR2,  
 S1 VMR7, F3 VSR4,  
 S1VSP1, S1SUR1



## FEATURES

- Fixed/adjustable unbalance settings
- Fixed/adjustable under-voltage/over-voltage settings
- Fixed/adjustable trip delays
- Built-in or external power supply
- Resetting Auto / Manual / Remote
- Output contacts: 1 CO or 2 CO
- Choice of enclosures (DIN-Rail, Flush, Plug-in)
- Models with Micro-Controller based design
- 2 Line Alpha-Numeric LCD display (For F3 VSR4 model)
- Serial Communication (RS 232/485) Port (for F3 VSR4 model)
- Use of SMD Technology
- User-friendly LED indications

## PROTECTIONS / FUNCTIONS

- Phase Failure (Phase Loss / Single Phasing),
- Phase sequence reversal,
- Voltage Unbalance,
- Under Voltage,
- Over Voltage
- Dry Run

### Ordering Instructions

- Product Family Name
- Model Name
- System Supply Voltage & Frequency
- Aux. Supply / Control supply voltage

## TWIN AC CONTROLLER

MODEL  
 PROCOM - 4

# 3 PHASE FAILURE RELAYS

**VSP D1**  
Phase Failure Relay



Phase Failure, Unbalance, Phase Sequence, Auto Reset, Fixed Unbalance Setting, 1 CO output Relay

**VSP D2**  
Phase Failure Relay



Phase Failure, Unbalance, Phase Sequence, Auto/Manual/Remote Reset, Adjustable Unbalance setting, 2 CO output relay

**S1 VSP1**  
Phase Failure Relay



Phase Failure, Unbalance, Phase Sequence, Auto Reset, Fixed Unbalance Settings, 1 CO Output Relay

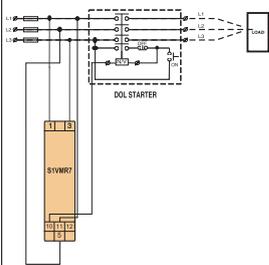
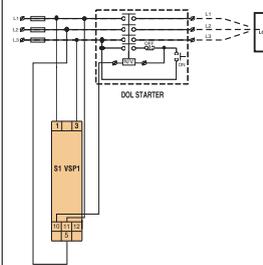
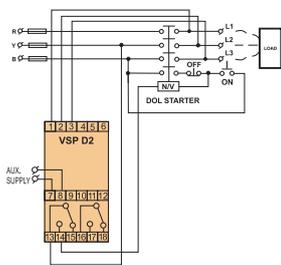
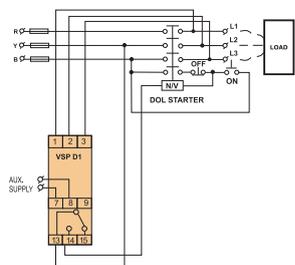
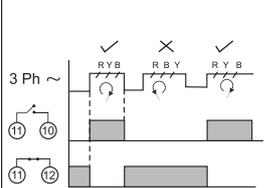
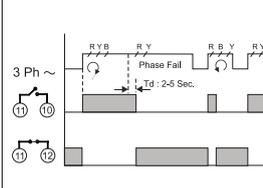
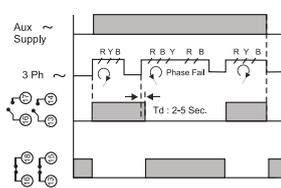
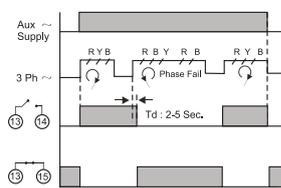
**S1 VMR7**  
Phase Sequence Relay



Phase Sequence, Auto Reset, 1 CO output relay

<b>Supply Voltage</b>	100-120/220-240/380-440 V AC ±20% 50 Hz / 60 Hz	100-120/220-240/380-440 V AC ±20% 50 Hz / 60 Hz	415 VAC ± 20%, 50 Hz / 60 Hz ± 3%	380 – 440 VAC, ± 20%, 3PH-3 Wire, 50 Hz / 60 Hz
<b>Output Contacts</b>	1 CO	2 CO	1 CO	1 CO
<b>Tripping Mode</b>	Phase Sequence: Yes Phase Unbalance: 40 V ± 6 V (fixed)	Phase Sequence: Yes Phase Unbalance: 30 V to 70 V ± 6 V (adjustable)	Phase Sequence: Yes Phase Unbalance: 60 V ± 6 V (fixed)	Phase Sequence: Yes Phase Unbalance: -
<b>Resetting Mode</b>	Auto	Auto / Manual / Remote	Auto	Auto Reset
<b>Weight</b>	320 gms.	400 gms.	71 gms	90 gms. (Approx.)
<b>Dimensions (mm)</b>	Overall (L x W x D): 76 x 30.5 x 117.5 Mounting (L x W): 68 centre to centre / 35 mm rail Mounting	Overall (L x W x D): 76 x 56.5 x 117.5 Mounting (L x W): 67 x 46 / 35 mm rail Mounting	Overall (L x W x D): 96 X 17.5 X 60 Mounting (L x W): 35 mm DIN rail mounting	Overall (L x W x D): 90 x 18 x 60 (Approx.) Mounting (L x W): 35 mm rail Mounting

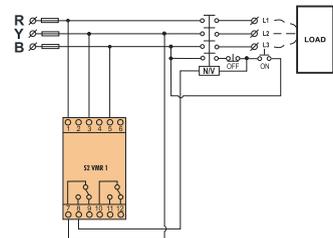
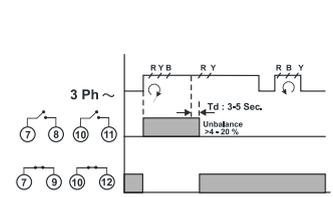
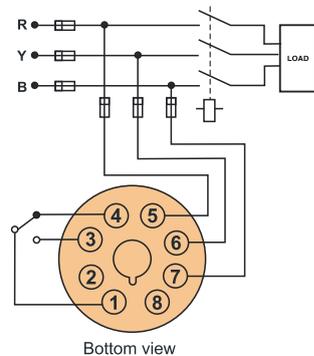
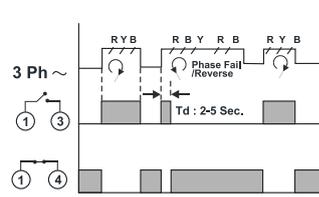
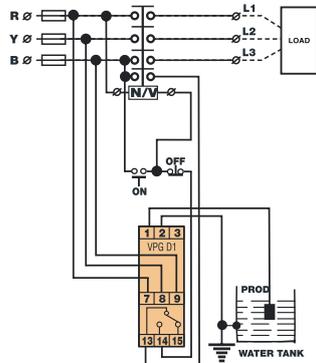
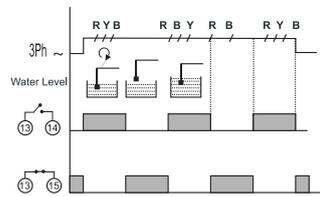
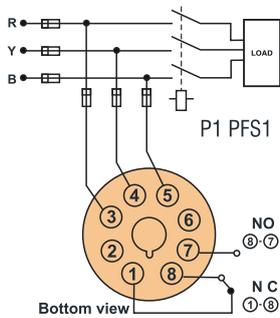
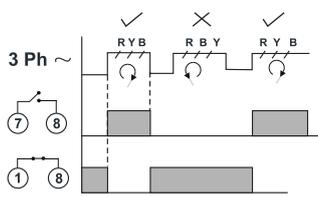
- Wherever not specified Contact Rating : 5A @ 230 V AC (resistive)
- \* Available on request.



Relay contact position shown in 'Power off' condition

# PHASE FAILURE RELAYS

<b>P1 PFS1</b> Phase Sequence Relay	<b>VPG D1</b> Phase Failure Relay + Lower Water Level Guard	<b>P1 PFS2</b> Phase Failure Relay	<b>S2 VMR1</b> Phase Failure Relay
 <p>Phase Sequence, Auto Reset, 1 CO output relay</p>	 <p>Single phasing, reverse phasing, unbalanced supply, Auto reset, 1 CO output contact Suitable for any HP/kW rating submersible pumps Low water level guard for dry running protection</p>	 <p>Phase Failure, Unbalance, Phase Sequence, Auto Reset, fixed unbalance setting, 1 CO output relay</p>	 <p>Microcontroller design, SMD Technology, Phase Failure, Unbalance, Phase Sequence Auto/Manual Reset, Adjustable Unbalance setting, 2 CO output relay</p>
110/ 220/ 380/ 415 VAC ± 10%, 50 / 60 Hz	415VAC ± 20%, 50 Hz ± 3%	110 / 240 / 380 / 415 V AC ±10%, 50 / 60 Hz	100-120 / 220-240 / 380-440V AC, -25 +20%, 48-63 Hz
Built-in 1 CO	Built-in 1 CO	Built-in 1 CO	Built In 2 CO
Yes -	Yes 40 V ± 6 V (fixed)	Yes 40V ± 6V (fixed)	Yes 4 % TO 20 % (Variable) ± 5% of full scale.
Instant N.A.	3.5 Sec ± 1.5 Sec 3.5 Sec ± 1.5 Sec	3.5 sec. ± 1.5 sec. N.A.	4 Sec ± 1 Sec / RP-Instant N.A.
Auto Reset 90 gms.	Auto Reset 300 gms.	Auto 175 gms.	Auto/ Manual Reset (Selectable by Front Push Button) 100 gms (Approx.)
50 x 40 x 80 8 Pin Plug - In	76 x 30.5 x 117.5 68 centre to centre / Panel Mounting & 35 mm rail Mounting	50 x 40 x 80 8 - Pin Plug-in	90 X 35 X 60 35 mm Rail Mounting



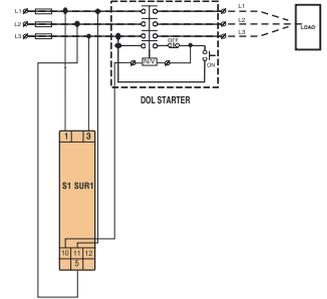
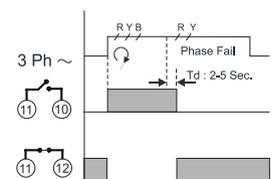
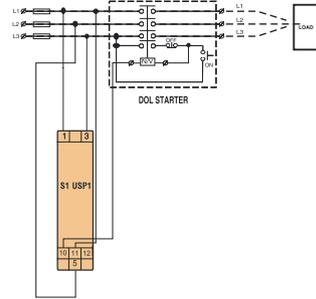
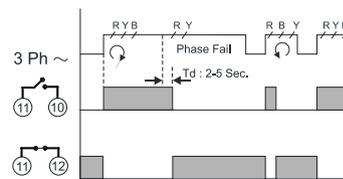
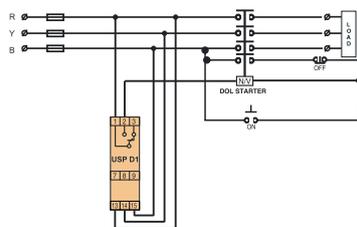
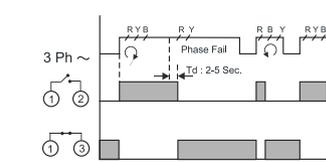
Relay contact position shown in 'Power off' condition

Note: S2 Series - RoHS Product available on request.  
CE marked VSP D1, VSP D2 available on request.

# 3 PHASE FAILURE RELAYS

	USP D1 Phase Failure Relay	S1 USP1 Phase Failure Relay	S1 SUR1 Phase Failure Relay
			
	Phase Failure, Unbalance, Phase Sequence, Auto Reset, Fixed Unbalance Setting, 1 CO output relay	Phase Failure, Unbalance, Phase Sequence, Auto Reset, Fixed Unbalance Settings, 1 CO Output Relay	Phase Failure, Unbalance, Auto Reset, Fixed Unbalance Settings, 1 CO Output Relay
<b>Supply Voltage</b>	415 VAC ± 20%, 50 Hz ± 3%	415 VAC ± 20%, 50 Hz / 60 Hz ± 3%	415 VAC ± 20%, 50 Hz / 60 Hz ± 3%
<small>Note: Mention specific voltage System (Fixed/wide range) in order</small>	Built In	Built In	Built In
<b>Output Contacts</b>	1 CO	1 CO	1 CO
<b>Trip Setting (Volts)</b>			
Phase Sequence	Yes	Yes	N.A
Phase Unbalance	60 V ± 6 V (fixed)	60 V ± 6 V (fixed)	60 V ± 6 V (fixed)
<b>Under Voltage</b>	For 380-440V AC For 220-240V AC For 100-120V AC		
<b>Over Voltage</b>	For 380-440V AC For 220-240V AC For 100-120V AC		
<b>Trip Time Delay</b>			
On Phase Failure	3.5 sec. ± 1.5 sec.	3.5 sec. ± 1.5 sec.	3.5 sec. ± 1.5 sec.
On UV/OV			
<b>Resetting Mode</b>	Auto Reset	Auto Reset	Auto
<b>Weight</b>	100 gms (Approx.)	70 gms (Approx.)	70 gms (Approx.)
<b>Dimensions (mm)</b>			
Overall (L x W x D)	76 x 30.5 x 117.5	96 X 17.5 X 60	96 X 17.5 X 60
Mounting (L x W)	68 centre to centre / 35 mm rail Mounting	35 mm DIN rail mounting	35 mm DIN rail mounting

- Wherever not specified Contact Rating : 5A @ 230 V AC (resistive)
- \* CE marked products available on request.



Relay contact position shown in 'Power off' condition

Note: S2 Series - RoHS Product available on request.  
CE marked HLV D2, ALV D2, VMR D2 available on request.

# 3 PHASE FAILURE RELAYS



## ALV D2

Phase Failure with UV / OV Relay



Phase Failure, Unbalance, Phase Sequence, under voltage, Over Voltage, Auto Reset, Fixed Unbalance setting, Adjustable UV/OV settings, 2 CO output relay

## S2 VMR2

Phase Failure Relay



Microcontroller design, SMD Technology, Phase Failure, Unbalance, Phase Sequence, under voltage, Over Voltage, Auto reset, Fixed Unbalance setting, Fixed UV/OV settings, 2 CO output relay

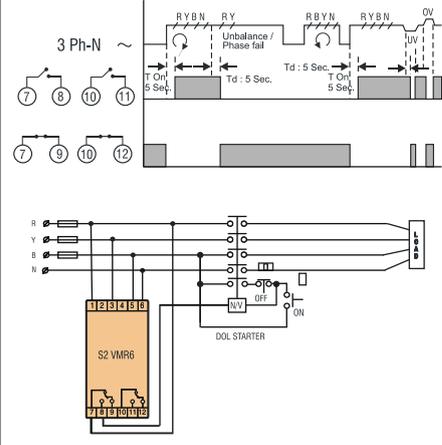
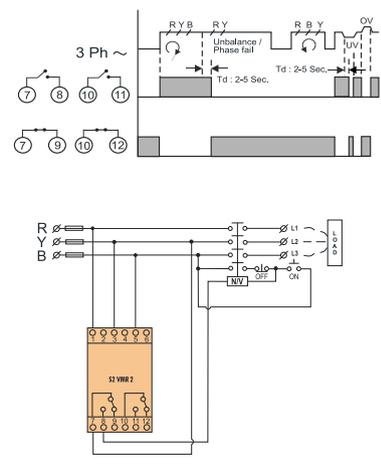
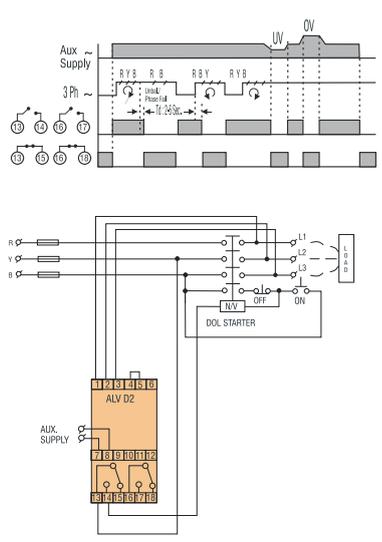
## S2 VMR6

Phase Failure with UV / OV Relay



Phase Failure, Unbalance, Phase Sequence, Under Voltage, Over Voltage, Auto Reset, Fixed Unbalance Settings, Adjustable UV/ OV Settings, Neutral Fail, 2 CO output relay

110 / 240 / 380 / 415 / 440 V AC $\pm 20\%$ , 50 / 60 Hz 110 V (Fixed) or (220-230-240) or (380-415-440) VAC $\pm 20\%$ selectable	100-110-120 / 220-230-240 / 380-415-440V AC -25+20%, Selectable by Front Knob, 48-63 HZ	415 V AC $\pm 20\%$ (fixed)
2 CO	Built In (from 3 Phase) 2 CO	Built-In 2 CO
Yes	Yes	Yes
40 V $\pm 6$ V (fixed)	10% (Fixed) $\pm 10\%$	94 V $\pm 6$ V ph- ph (fixed)
80% to 95% (adjustable)	- 20% (Fixed)	75% to 95% of 415 VAC
105% to 120% (adjustable)	+ 20% (Fixed)	105% to 125% of 415 VAC
3.5 secs. $\pm 1.5$ sec Less than 2 secs.	2 - 5 Sec. (Fixed) / RP-Instant	5 sec. $\pm 1$ sec for UB/SP/UV/OV, Instant for RP, Less than 2 secs. for NF.
Auto Reset 400 gms.	Auto Reset 100 gms (Approx.)	Auto Reset 110 gms.
76x 56.5 x 117.5 67 x 46 / 35 mm rail Mounting	90 X 35 X 60 35 mm Rail Mounting	90 x 35 x 60 35 mm rail mounting

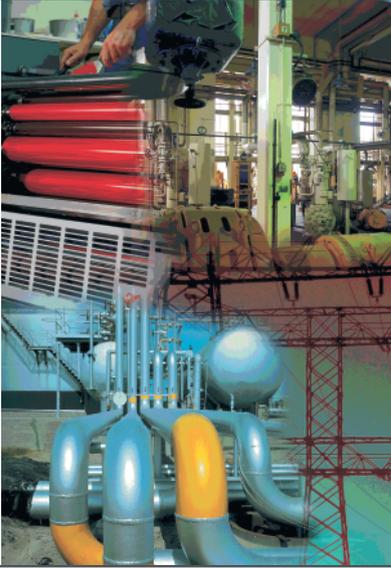


Relay contact position shown in 'Power off' condition

Note: Product available on request - P2 PFV1, P2 SMV1, VMR D2 & HLV D2

# 3 PHASE FAILURE RELAYS

## S2 VMR8 Phase Failure Relay



Phase Failure, Unbalance, Phase Sequence, Under Voltage, Over Voltage, Auto Reset, Fixed Unbalance Settings, Fixed UV/ OV Settings, 2 CO output relay

## D2 VMR2 Phase Failure with UV / OV (3Ø-4W)



Suitable for 3 Ph-4W system, Microcontroller design, Absolute values of UV/OV settings, Phase Failure, Unbalance, Phase Sequence, under voltage, Over Voltage Neutral Fail Auto/Manual reset, Adjustable settings for Unbalance, UV/OV and trip delays, 2 CO output relay, Fixed failsafe-non-failsafe logic.

## S2 VMR3 Phase Failure with UV / OV Relay



Microcontroller design, SMD Technology, Absolute values of UV/OV settings, Phase Failure, Unbalance, Phase Sequence, under voltage, Over Voltage Auto/Manual reset, Adjustable settings for Unbalance, UV/OV and trip delays, 2 CO output relay, Failsafe-non-failsafe selectable

### Supply Voltage

Note: Mention specific voltage (Fixed/wide range) in order

System  
Auxiliary

415 V AC  $\pm$  20%  
Built-In

100-120 / 220-240 / 380-440V AC -25%+20%, 48-63 Hz  
Built In (from 3 Phases)

100-120 / 220-240 / 380-440V AC -25%+20%, 48-63 Hz  
Built In (from 3 Phases)

### Output Contacts

2 CO

2 CO

2 CO

### Trip Setting (Volts)

Phase Sequence

Yes

Yes

Yes

Phase Unbalance

40 V  $\pm$  4 V (10%  $\pm$  10% of set value-fixed)

4% - 20% [Variable]

4% - 20% [Variable]

Under Voltage For 380-440V AC  
For 220-240V AC  
For 100-120V AC

85% of 415 V AC (fixed)

165-245V AC [Variable]  
95-135V AC [Variable]  
45-65V AC [Variable]

285-425V AC [Variable]  
165-225V AC [Variable]  
75-115V AC [Variable]

Over Voltage For 380-440V AC  
For 220-240V AC  
For 100-120V AC

110% of 415 V AC (fixed)

230-310V AC [Variable]  
130-170V AC [Variable]  
60-80V AC [Variable]

400-520V AC [Variable]  
230-290V AC [Variable]  
105-145V AC [Variable]

### Trip Time Delay

On Phase Sequence

Instant for RP/OV

Instant

Instant

On SP/UV/OV

3.5  $\pm$  1.5 sec. fixed for UB/SP/UV

1 To 10 Sec [Variable]

1 To 10 Sec [Variable]

### Resetting Mode

Auto Reset

Auto/ External Manual Reset (External NC Push Buttons)

Auto/ Manual Reset [Selectable]

### Weight

150 gms.

300 gms.

110 gms (Approx.)

### Dimensions (mm)

Overall (L x W x D)

110 x 35 x 60

76 X 56.5 X 117.5

90 X 35 X 60

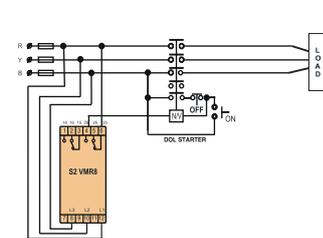
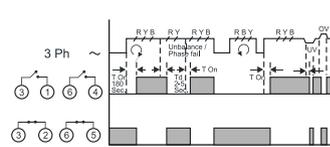
Mounting (L x W)

Screw Mounting

67 x 46 / 35 mm rail Mounting

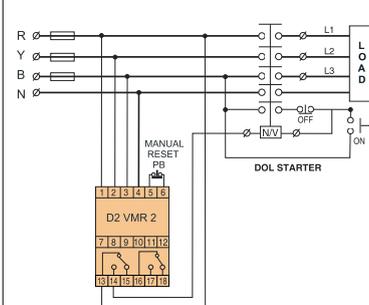
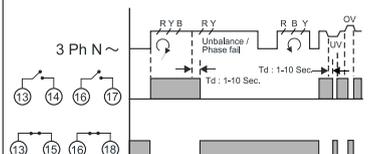
35 mm Rail Mounting

• Wherever not specified  
Contact Rating :  
5A @ 230 V AC  
(resistive)



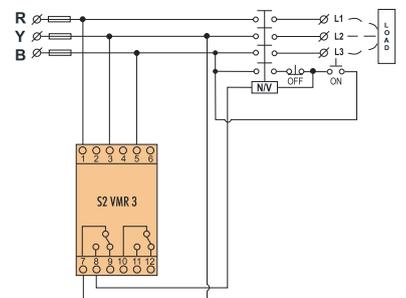
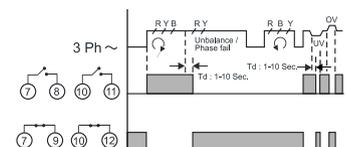
Relay contact position shown in 'Power off' condition

Note: S2 Series -  
RoHS Product available  
on request.



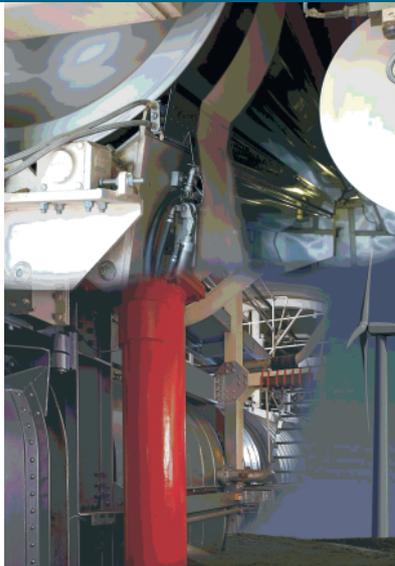
Relay contact position shown in 'Power off' condition

Note: Product available on request - P2 PFV1, P2 SMV1



## F3 VSR4

Voltage Scanner [3 Ph - 3 W / 4 W]



3-Phase 3-Wire or 3-Phase 4-Wire voltage monitoring & display, Phase Failure, Unbalance, Phase Sequence, under voltage, Over Voltage, Auto / Manual Reset, Adjustable unbalance trip setting, Adjustable under/over voltage settings, adjustable trip delay, Rs232/485 communication port, Failsafe-non-failsafe selectable, 2 CO output relay, True RMS Values

### Supply Voltage

Note: Mention specific voltage (Fixed/wide range) in order  
System  
Auxiliary

110 / 415 V AC + 20%,-30% (3 Ph-3 W or 3 Ph-4 W selectable)

24 VDC / 90-270 V AC/DC, 50 Hz/ (60 Hz) ± 3%

### Output Contacts

2 CO & RS 232 (optional)

### Trip Setting (Volts)

Phase Sequence

Yes

Phase Unbalance

1 - 20 % (Adjustable)

Under Voltage

1 - 15V below nominal voltage (for 3 Ph. 3 W)  
1 - 15V below nominal voltage (for 3 Ph. 4 W)

1 - 80V below nominal voltage (for 3 Ph. 3 W)  
1 - 50V below nominal voltage (for 3 Ph. 4 W)

Over Voltage

1 - 35V above nominal voltage (for 3 Ph. 3 W)  
1 - 25V above nominal voltage (for 3 Ph. 4 W)

1 - 60V above nominal voltage (for 3 Ph. 3 W)  
1 - 25V above nominal voltage (for 3 Ph. 4 W)

### Trip Time Delay

On Phase Sequence

RP - Instant

On SP/UV/OV

1 - 59 secs. or 1-5 mins Selectable

### Resetting Mode

Auto/ Manual Reset [Selectable]

### Weight

800 gms

### Dimensions (mm)

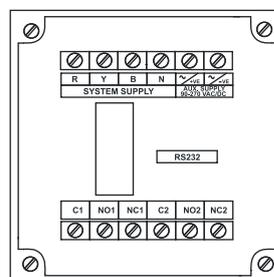
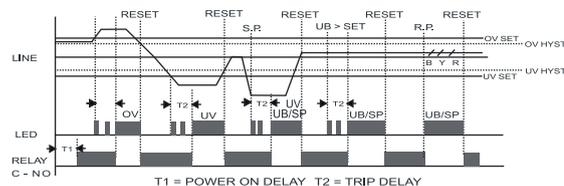
Overall (L x W x D)

96 x 96 x 130

Mounting (L x W)

92 x 92 mm

- Wherever not specified Contact Rating : 5A @ 230 V AC (resistive)



Relay position shown in 'Power off' condition

Note: S2 Series - RoHS Product available on request.

# TWIN AC CONTROLLER

## PROCOM-4 Twin AC Controller

Protocom 4 is useful for two AC installations in small offices / businesses, ATM centers, residential houses, for AC units of 1 or 1.5 Tons. Single AC Operation Alternate Mode. Single Or Both AC Operations Based On Temp. Rise In Alternate Mode. Built-in protection against UV, OV & OL for both AC units.



**PROCOM - 4** saves energy by alternatively using only one air conditioner (or both in case of temp rise) and that too only when it is required depending upon logic selected. Two Types of different operational logics can be selected with Protocom-4 through front Keys and display. These LOGICS are as follows.

### LOGIC OF OPERATION

- 1) Only one AC at a time will run for set time cycle in alternate mode. Changeover will take place only if a) Cycle time is completed. b) Running AC trip due to fault condition (UV/OV, UL/OL).
- 2) One AC will be running as normal running AC for set time cycle. If temp rises above set point of both AC ON, second AC is switched ON as stand - by running AC. This AC will be running until temp drops below both hysteresis level. When temp drops second AC will be switched OFF (LIFO). In case both ACs are running and cycle time of first AC completed & temp drops below both hysteresis set point, first started AC will be made OFF (FIFO) and running AC will be consider as normal running AC.

### FUNCTIONING

**NORMAL CYCLIC OPERATION** - After power ON display will start showing input AC1, AC2 voltages, AC1 & AC2 current and room temp with scanning time of 3 sec. AC1 will become ON for next set time cycle. After completion of timing cycle, it will be OFF and second AC will ON (Depending upon temp setting). Second AC will remain ON for next set time cycle. This operation will be repeated in cyclic mode. When AC is ON, respective LED glow steady. Every time any AC will be made ON after set ON delay.

**UNDER VOLT AGE & OVER VOLTAGE** : The PROTOCOM 4 monitors voltage of both phases connected & offers built-in protection against under voltage (def 170 VAC with auto reset gap of 6VAC) & over voltage (def 270 VAC with auto reset gap of 6VAC). Upon arising one of above condition running AC will switched OFF after trip delay (def-5 sec) & AC trip relay turn ON. (Manually AC trip relay can be made OFF by pressing UP & DOWN key simultaneously.) UV/OV trip conditions are separated by LED steady & flashing effect. Alternative AC will be switched ON & will operate for next time cycle.(See fig1)

**UNDER LOAD / OVER LOAD**-The PROTOCOM 4 monitors current of both Acs independently & protects the AC against over /under load condition depending on set value. After occurrence of fault running AC will switch OFF after UL/OL trip time delay. AC trip relay also activated after trip delay & remain ON till starting of another AC. Alternative AC will be switched ON for next time cycle resetting previous fault indication. UL/OL LED remain steady for UL & remain flashing for OL. (Manually AC trip relay can be made OFF by pressing UP & DOWN key simultaneously).If both ACs trips by UL/OL then these faults automatically reset after 3 min. (see fig 1)

**ROOM TEMP. HIGH** : The PROTOCOM 4 operates the AC by sensing the room temperature with help of temp sensor. Please keep sensor position properly so as to sense room temp correctly. After power ON or during running of any AC, the ambient temperature is monitored and if it is above set HT level then HT ALARM LED turns on, also HT alarm relay gets energized after trip delay(def- 60 sec). ALARM relay remain in energized condition till the ambient temp reduces below the hysteresis level of HT. HT ALARM relay can be made off manually by pressing UP & DOWN key simultaneously. See fig 2 for Ac1, AC2 ON/OFF depending upon set temperature.

<b>System supply</b>	240 V AC, ±20%, [L1, L2 & N]
<b>Frequency</b>	50 (60) Hz, ±3%
<b>Output Relay Contact</b>	1 NO + 1 NO + 1 NO + 1 NO
<b>Output Contact Rating</b>	30 Amp @ 240 V AC (RLY 1 & RLY 2) 5 Amp (for RLY 3 & RLY 4)
<b>Current Setting</b>	1-20 Amp (Variable)
<b>Power ON Delay</b>	2 - 600 Sec.
<b>Cyclic time Delay</b>	3 Min. To 24 hours.
<b>LED Indication</b>	
AC On	Green
Alarm	Red
UV / OV	Red
UC / OC	Red
<b>Enclosure</b>	Sheet metal fabricated and powder coated
<b>Dimension (mm)</b>	
Overall (LxWxD)	141 x 193.9 x 72
Mounting (L x W)	117 x 169.5
<b>Weight</b>	1100 gms.

### Trip settings, time delay and resets

Parameters	Under Voltage	Over Voltage	Over Load	Over Temperature
Trip Setting	120-210 VAC	240-300 VAC	5-20 AMP (Settable by Keys & Display (Default Set - 20 A)	22-45° C (Settable by Keys & Display (Default Set - 35° C)
Hysteresis for Auto Reset	6 VAC ± 3 VAC	6 VAC ± 3 VAC	N. A.	1° C - 10° C (Default - 3° C)
Trip Time Delay	5 SEC.	5 SEC.	2 - 5 SEC	2 - 900 Sec. (Default Set-600 Sec)

<b>Logic Setting</b>	Single ac operation only in alternate mode. single or both ac operation based on temp. rise in alternate mode.
<b>Setting Keys</b>	4 Nos of Front Keys

Fig 1 - FAULT DEPENDENT TIMING DIAGRAM

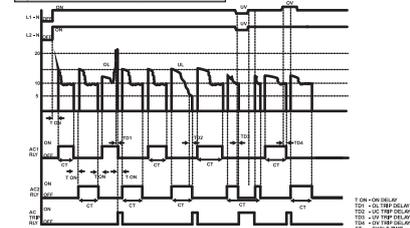


Fig 2 - TEMPERATURE DEPENDENT TIMING DIAGRAM

