

## Defining a protection relay in simple terms

A protection relay is an automation device that measures electrical values and detects electrical faults.

## Which actions are executed?

**Sensing** **Detection**  
**Protection** **Delaying**

A protection relay measures electrical values such as current, voltage, frequency etc. in order to **protect** your machines.

It can stop your engine from overheating with external PTC **sensor**.

Electrical network which is connected to your machines is examined continuously. if a fault is **detected**, the machine is stopped immediately or with time **delay** by output contacts. After that, any malfunctions can be fixed. This avoids expensive breakdowns, synonymous with production delays and loss of profitability.

## Benefits and Advantages

- First Class quality to fulfill all your monitoring needs
- Quick view of status with leds
- Easy configuration with knobs
- High level of Electromagnetic compatibility (EMC) i.e. maximum immunity to interferences.
- Sleek 17.5mm wide housing and compact design saves panel space.
- Perfect to fit in modular enclosure
- Self-Extinguishing plastic housing
- No auxiliary supply needed
- Preventing overheating thanks to PTC input
- High mechanical endurance
- High accuracy and switching reliability

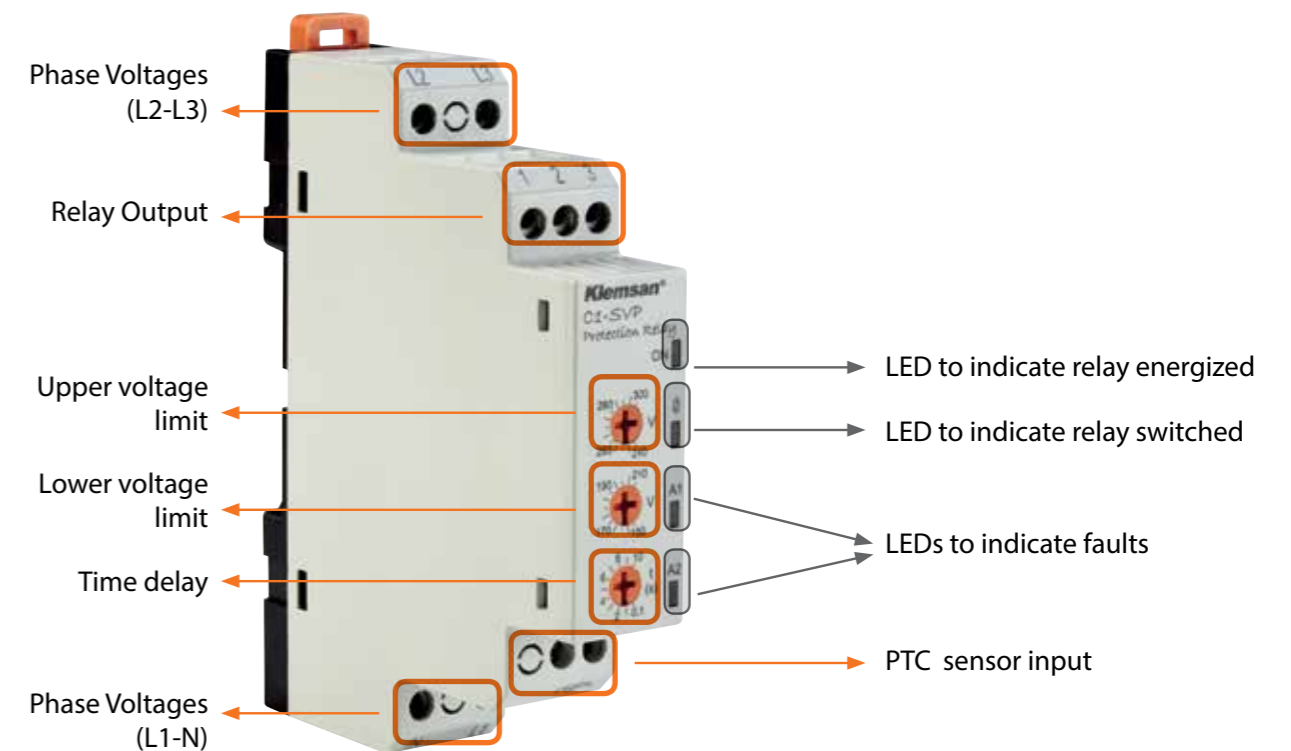
## Mounting

Klemsan protection relays are suitable for snap mounting onto 35mm standards DIN rails.

## Which markets are they used frequently?

- Industrial machines
- Construction industry
- Stone pits
- Food and agriculture industry
- Water treatment system
- Moving stairs & elevators

## Layout



C1-SVP Protection Relay

## Overcurrent Protection with Smart MCB



Detect a fault condition and interrupt current flow with adjustable time delay. After the fault is gone, unlike a circuit breaker, smart MCB turns its normal position automatically.



CURRENT PROTECTION  
CPR-16

## Control Panel



Control panels must be monitored carefully otherwise the effects of a power outage or voltage drop can be highly harmful for equipments.



VOLTAGE PROTECTION  
V1-S, C1-SVP, ...

## Escalators



Detection of unbalanced voltage on motors.



MOTOR PROTECTION  
C1D-SA, P1-SA, ...

## Temperature Control of Motors



Preventing overheating with external PTC sensor.



OVERHEAT PROTECTION  
C1D-SVP, P1-SAP...

## Conveyor Application



Detection of overcurrent when conveyor is jammed.



CURRENT PROTECTION  
CPR-16

## Generators



Frequency control for generators.



FREQUENCY PROTECTION  
F1

## Machine Line



Providing phase loss, phase sequence and asymmetry protection for 3 phase applications.



MOTOR PROTECTION  
P1D-SA, C1-SA ...

## Cranes



Adjustments of over and under voltage limit in order for cranes to operate correctly.



VOLTAGE PROTECTION  
V1, V1D, C1-SVP,

## Compressors



Detection of phase-loss and sequence in order compressors to work correctly.



MOTOR PROTECTION  
P1-S, C1-SA, ...



P1-SAP



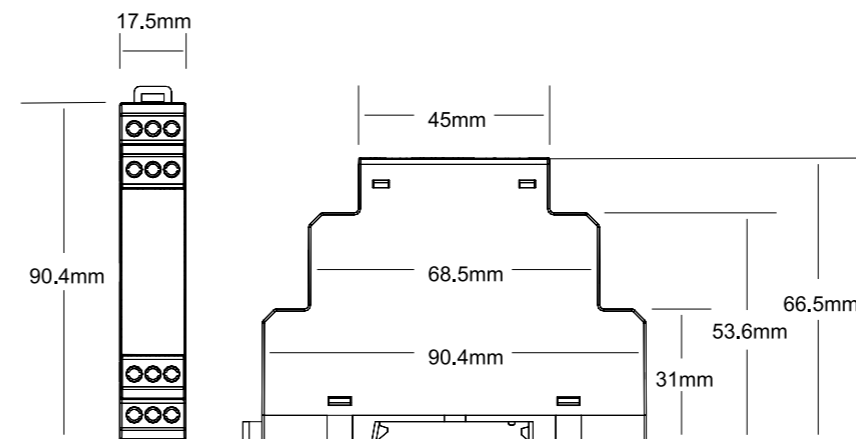
Type		P1-A	P1-P	P1-S	P1-SP	P1-SA	P1-SAP	P1D-SA	P1D-SAP	P1-SU (FormA-220V)	P1-SU (FormC-220V)	P1-SU (FormA-110V)	P1-SU (FormC-110V)	
<b>Definiton</b>		Motor protection relay	Motor protection relay	Motor protection relay	Motor protection relay	Motor protection relay	Motor protection relay	Motor protection relay	Motor protection relay	Motor protection relay	Motor protection relay	Motor protection relay	Motor protection relay	
<b>Order Number</b>		270150	270151	270152	270153	270154	270155	270254	270255	270400	270401	270402	270403	
<b>Casing Width(mm)</b>		17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	
<b>Connections</b>		Screw terminal	Screw terminal	Screw terminal	Screw terminal	Screw terminal	Screw terminal	Screw terminal	Screw terminal	Screw terminal	Screw terminal	Screw terminal	Screw terminal	
<b>Network</b>		3Ø with neutral	1Ø with neutral	3Ø with neutral	3Ø with neutral	3Ø with neutral	3Ø with neutral	3Ø without neutral	3Ø without neutral	3Ø with neutral	3Ø with neutral	3Ø with neutral	3Ø with neutral	
<b>Monitoring Functions</b>	Phase Failure	Fixed delay time	500msec	-	500msec	500msec	500msec	500msec	500msec	<1sn	<1sn	<1sn	<1sn	
	Phase Sequence	Fixed delay time	-	-	500msec	500msec	-	500msec	-	500msec	<1sn	<1sn	<1sn	
	Fixed Unbalanced Protection	Limit	± 20%	-	-	-	± 20%	± 20%	± 20%	± 20%	-40%	-40%	-40%	-40%
		Hysteresis	3% x Un ≈ 6,9VAC	-	-	-	3% x Un ≈ 6,9VAC	3% x Un ≈ 6,9VAC	3% x Un ≈ 12VAC	3% x Un ≈ 12VAC	3% x Un ≈ 12VAC	3% x Un ≈ 12VAC	3% x Un ≈ 12VAC	3% x Un ≈ 12VAC
		Delay time	500msec	-	-	-	500msec	500msec	500msec	500msec	<1sn	<1sn	<1sn	<1sn
	Extremely High-Low Voltage Protection	Upper limit	310 VAC (L-N)	-	310 VAC (L-N)	310 VAC (L-N)	310 VAC (L-N)	310 VAC (L-N)	510 VAC (L-L)	510 VAC (L-L)	-	-	-	-
		Lower limit	140 VAC (L-N)	-	140 VAC (L-N)	140 VAC (L-N)	140 VAC (L-N)	140 VAC (L-N)	240 VAC (L-L)	240 VAC (L-L)	-	-	-	-
		Hysteresis	6 VAC	-	6 VAC	6 VAC	6 VAC	6 VAC	6 VAC	6 VAC	-	-	-	-
		Delay time	100ms	-	100ms	100ms	100ms	100ms	100ms	100ms	-	-	-	-
	PTC Protection	Fixed delay time	-	2000ms	-	2000ms	-	2000ms	-	2000ms	-	-	-	-
Threshold		-	1100Ω	-	1100Ω	-	1100Ω	-	1100Ω	-	-	-	-	
<b>Response time for monitoring any function</b>		Max.250ms	Max.250ms	Max.250ms	Max.250ms	Max.250ms	Max.250ms	Max.250ms	Max.250ms	Max.250ms	Max.250ms	Max.250ms	Max.250ms	
<b>Type of Output</b>		Relay	Relay	Relay	Relay	Relay	Relay	Relay	Relay	Relay	Relay	Relay	Relay	
<b>Auxiliary contacts</b>	Type	1 C/O (SPDT)	1 C/O (SPDT)	1 C/O (SPDT)	1 C/O (SPDT)	1 C/O (SPDT)	1 C/O (SPDT)	1 C/O (SPDT)	1 C/O (SPDT)	1 NO (SPST)	1 C/O (SPDT)	1 NO (SPST)	1 C/O (SPDT)	
	Max ratings-AC (for NO side)	5A/250V; 1250 VA	5A/250V; 1250 VA	5A/250V; 1250 VA	5A/250V; 1250 VA	5A/250V; 1250 VA	5A/250V; 1250 VA	5A/250V; 1250 VA	5A/250V; 1250 VA	5A/250V; 1250 VA	5A/250V; 1250 VA	5A/250V; 1250 VA	5A/250V; 1250 VA	
	Max ratings-DC (for NO side)	5A/30VDC; 150W	5A/30VDC; 150W	5A/30VDC; 150W	5A/30VDC; 150W	5A/30VDC; 150W	5A/30VDC; 150W	5A/30VDC; 150W	5A/30VDC; 150W	5A/30VDC; 150W	5A/30VDC; 150W	5A/30VDC; 150W	5A/30VDC; 150W	
	Mechanical life time	≥ 10 <sup>7</sup> operations	≥ 10 <sup>7</sup> operations	≥ 10 <sup>7</sup> operations	≥ 10 <sup>7</sup> operations	≥ 10 <sup>7</sup> operations	≥ 10 <sup>7</sup> operations	≥ 10 <sup>7</sup> operations	≥ 10 <sup>7</sup> operations	≥ 10 <sup>7</sup> operations	≥ 10 <sup>7</sup> operations	≥ 10 <sup>7</sup> operations	≥ 10 <sup>7</sup> operations	
	Electrical life time operations (for NO side)	5×10 <sup>4</sup> (5A@250VAC) 1×10 <sup>5</sup> (5A@30VDC)	5×10 <sup>4</sup> (5A@250VAC) 1×10 <sup>5</sup> (5A@30VDC)	5×10 <sup>4</sup> (5A@250VAC) 1×10 <sup>5</sup> (5A@30VDC)	5×10 <sup>4</sup> (5A@250VAC) 1×10 <sup>5</sup> (5A@30VDC)	5×10 <sup>4</sup> (5A@250VAC) 1×10 <sup>5</sup> (5A@30VDC)	5×10 <sup>4</sup> (5A@250VAC) 1×10 <sup>5</sup> (5A@30VDC)	5×10 <sup>4</sup> (5A@250VAC) 1×10 <sup>5</sup> (5A@30VDC)	5×10 <sup>4</sup> (5A@250VAC) 1×10 <sup>5</sup> (5A@30VDC)	5×10 <sup>4</sup> (5A@250VAC) 1×10 <sup>5</sup> (5A@30VDC)	5×10 <sup>4</sup> (5A@250VAC) 1×10 <sup>5</sup> (5A@30VDC)	5×10 <sup>4</sup> (5A@250VAC) 1×10 <sup>5</sup> (5A@30VDC)	5×10 <sup>4</sup> (5A@250VAC) 1×10 <sup>5</sup> (5A@30VDC)	5×10 <sup>4</sup> (5A@250VAC) 1×10 <sup>5</sup> (5A@30VDC)
<b>Supply Voltage</b>		85-320VAC from L1-N	85-320VAC from L1-N	85-320VAC from L1-N	85-320VAC from L1-N	85-320VAC from L1-N	85-320VAC from L1-N	150-500VAC from L2-L3	150-500VAC from L2-L3	180-265VAC from L3-N	180-265VAC from L3-N	90-150VAC from L3-N	90-150VAC from L3-N	
<b>Supply Frequency</b>		35-70 Hz	35-70 Hz	35-70 Hz	35-70 Hz	35-70 Hz	35-70 Hz	35-70 Hz	35-70 Hz	50-60 Hz	50-60 Hz	50-60 Hz	50-60 Hz	
<b>Permissible ambient temperature</b>	During operation	-20 to +60 °C	-20 to +60 °C	-20 to +60 °C	-20 to +60 °C	-20 to +60 °C	-20 to +60 °C	-20 to +60 °C	-20 to +60 °C	-20 to +60 °C	-20 to +60 °C	-20 to +60 °C	-20 to +60 °C	
	During storage	-40 to +75 °C	-40 to +75 °C	-40 to +75 °C	-40 to +75 °C	-40 to +75 °C	-40 to +75 °C	-40 to +75 °C	-40 to +75 °C	-40 to +75 °C	-40 to +75 °C	-40 to +75 °C	-40 to +75 °C	
<b>Relative Humidity</b>		Max. 95% (no condensation)	Max. 95% (no condensation)	Max. 95% (no condensation)	Max. 95% (no condensation)	Max. 95% (no condensation)	Max. 95% (no condensation)	Max. 95% (no condensation)	Max. 95% (no condensation)	Max. 95% (no condensation)	Max. 95% (no condensation)	Max. 95% (no condensation)	Max. 95% (no condensation)	
<b>Operating frequency</b>		35-70 Hz	35-70 Hz	35-70 Hz	35-70 Hz	35-70 Hz	35-70 Hz	35-70 Hz	35-70 Hz	50-60 Hz	50-60 Hz	50-60 Hz	50-60 Hz	



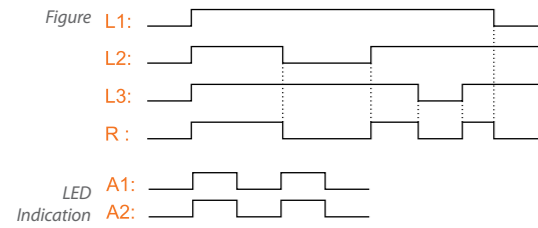
**P1-SAP**

Type		P1-A	P1-P	P1-S	P1-SP	P1-SA	P1-SAP	P1D-SA	P1D-SAP	P1-SU (FormA-220V)	P1-SU (FormC-220V)	P1-SU (FormA-110V)	P1-SU (FormC-110V)
Degree of protection		IP20	IP20	IP20	IP20	IP20	IP20	IP20	IP20	IP20	IP20	IP20	IP20
Power consumption	DC	-	-	-	-	-	-	-	-	-	-	-	-
	AC	<3VA	<3VA	<3VA	<3VA	<3VA	<3VA	<4VA	<4VA	<13VA	<13VA	<4.5VA	<4.5VA
Permissible mounting position		any	any	any	any	any	any	any	any	any	any	any	any
Weight(gr)		66	65	65	69	65	69	70	74	59	59	59	59
EMC-EMI	55011/A1, 61000-4-2, 61000-4-3/A1, 61000-4-4, 61000-4-6, 61000-4-8	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK
Schematics													

Dimensional Drawings

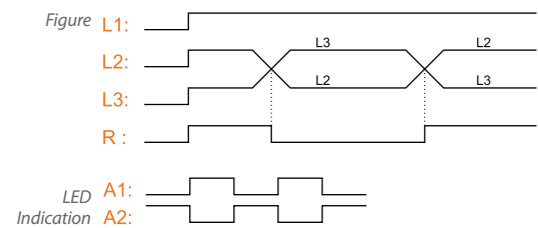


Phase Failure / Off delay operation



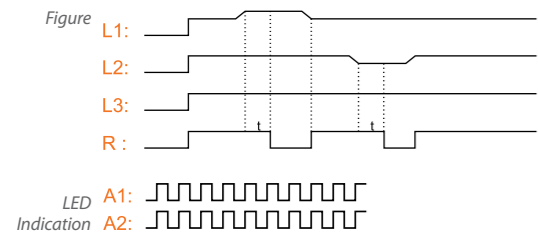
if a phase failure occurs the output relay de-energizes in 500msec. The fault is indicated by flashing LED A1 and LED A2 simultaneously. The output relay re-energizes automatically as soon as the voltage returns to the tolerance range.

Phase Sequence Error / Off delay operation



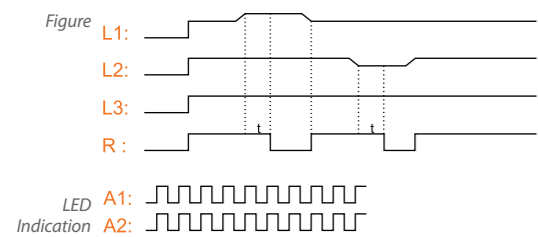
If a phase sequence error occurs the output relay de-energizes in 500msec. The fault is displayed by alternated flashing of the LEDs A1 and A2. The output relay re-energizes automatically as soon as the phase sequence is correct again.

Adjustable Unbalance Protection / Off delay operation



If the voltage to be monitored exceeds or falls below the set phase unbalance threshold percentage ( $5\% \leq \%20$ ), the output relay de-energizes after time delay (0.1-10s). The fault is indicated by flashing LED A1 and LED A2 quickly and simultaneously. As soon as the voltage returns to the tolerance range, taking into account a fixed hysteresis of  $3\% \times U_n$  the output relay re-energizes automatically.

Fixed Unbalance Protection / Off delay operation



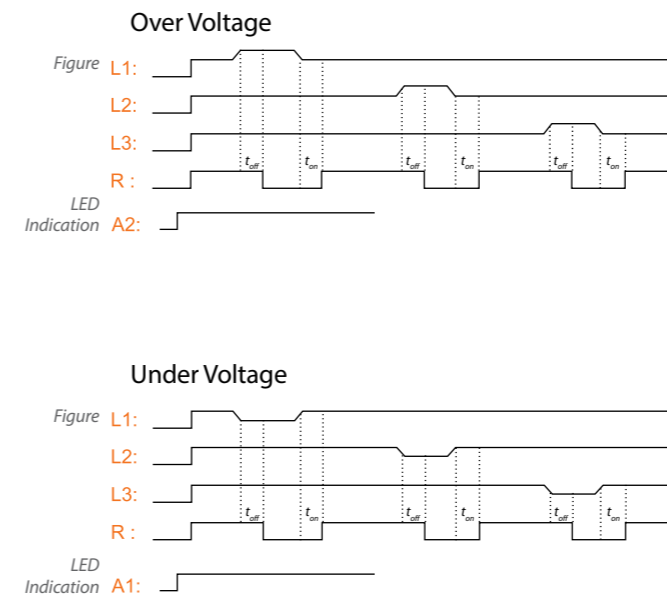
If the voltage to be monitored exceeds or falls below the set phase unbalance threshold percentage ( $\%20$ ), the output relay de-energizes after time delay (2sec). The fault is indicated by flashing LED A1 and LED A2 quickly and simultaneously. As soon as the voltage returns to the tolerance range, taking into account a fixed hysteresis of  $3\% \times U_n$  the output relay re-energizes automatically.

Adjustable Voltage Protection / Off delay operation



If the voltage to be monitored exceeds or falls below adjusted high limit or low limit value, the output relay de-energizes after time delay (0.1-10s). The fault type is indicated by LEDs A1 or A2 with constant light. As soon as the voltage returns to the tolerance range, taking into account a fixed hysteresis of 6VAC, the output relay re-energizes automatically.

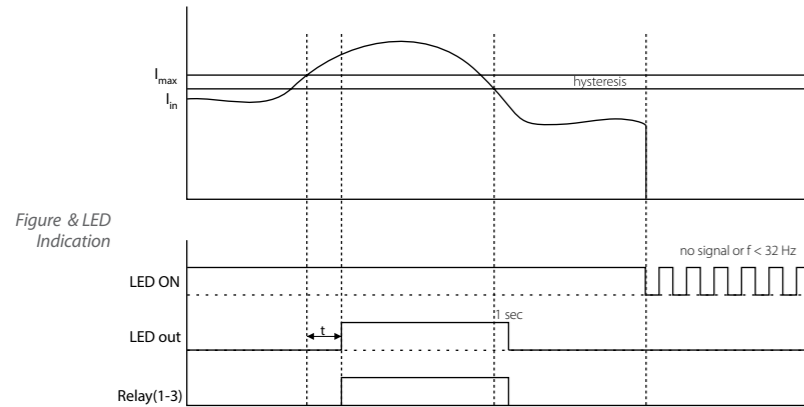
Adjustable Voltage Protection / On-Off delay operation (Available only for V1-T)



If the voltage to be monitored exceeds or falls below adjusted high limit or low limit value, the output relay de-energizes after  $t_{off}$  time delay (0.1-10s). The fault type is indicated by LEDs A1 or A2 with constant light. As soon as the voltage returns to the tolerance range, taking into account a fixed hysteresis of 6VAC, the output relay re-energizes after  $t_{on}$  time delay (0.1-10s).

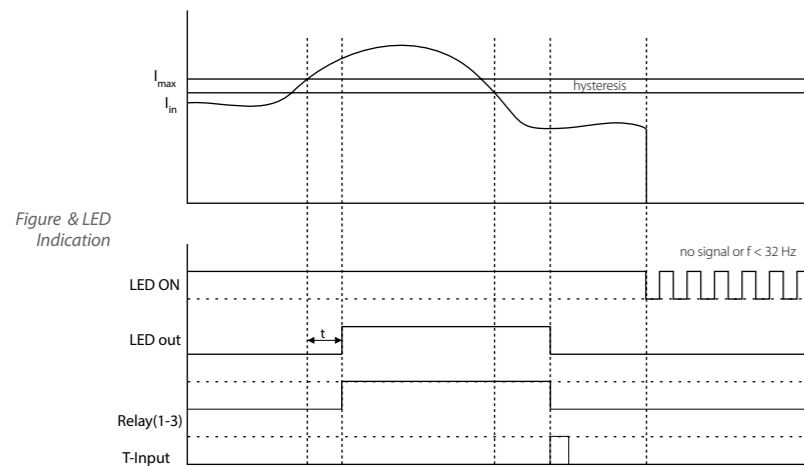


Adjustable Current Protection / On delay operation



**AUTOMATIC MODE**

If the current to be monitored exceeds adjusted high limit value, the output relay de-energizes after time delay(0.1-10s). As soon as the current returns to the tolerance range, taking into account adjusted hysteresis (5-20%) and 1 second safety time, the output relay re-energizes automatically.

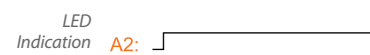
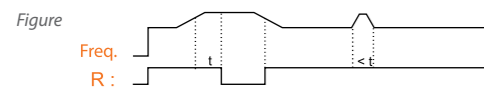


**MANUAL MODE**

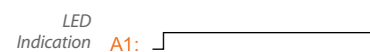
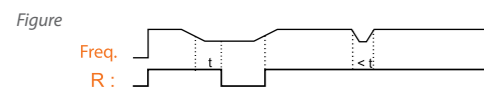
If the current to be monitored exceeds adjusted high limit value, the output relay de-energizes after time delay(0.1-10s). After the current returns to the tolerance range, taking into account adjusted hysteresis (5-20%) and 1 second safety time, the output relay waits till trigger input is applied. After that it re-energizes automatically.

Adjustable Frequency Protection / Off delay operation

**Over Frequency**



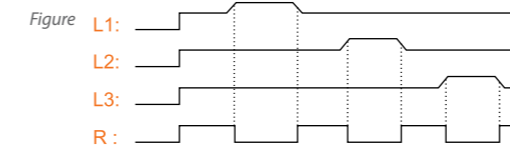
**Under Frequency**



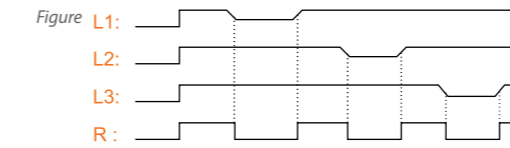
If the frequency to be monitored exceeds or falls below adjusted high limit or low limit value, the output relays de-energizes after time delay(1-10s). The fault type is indicated by LEDs A1 or A2 with constant light. As soon as the frequency returns to the tolerance range, taking into account a fixed hysteresis of 0.4kHz, the output relay re-energizes automatically.

Extremely High-Low Voltage Protection / Off delay operation

**Over Over Voltage**



**Under Under Voltage**

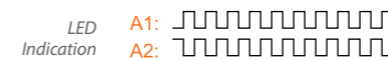
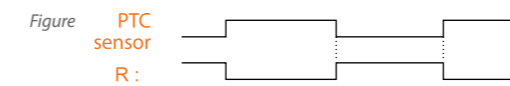


If the voltage to be monitored exceeds 310VAC for star connection device or 510VAC for delta connection device, output relay de-energizes immediately.

If the voltage to be monitored falls below 140VAC for star connection device or 240VAC for delta connection device, output relay de-energizes immediately.

The fault type is indicated by LEDs A1 or A2 with blinking. As soon as the voltage returns to the tolerance range, taking into account a fixed hysteresis of 6VAC, the output relay re-energizes automatically.

PTC Protection / Off delay operation



In order to use this function, PTC temperature sensors must be connected to the relay's PTC input. Under normal operating conditions the PTC resistance is below the response threshold. If the motor heats up excessively, it means resistance value is increased, the output relay de-energizes after 2 seconds delay.

The output relay re-energizes automatically as soon as the motor heat turns back to its normal operating conditions.