

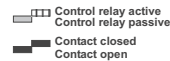
ICV

overview

- ◆ AC or DC voltage monitor
- ◆ 3 different current ranges
- ◆ 4 selectable base modes (over, under, between septs, outside setpoints)
- ◆ 2 selectable measuring function
- ◆ automatic and manual reset selectable
- ◆ output relay contact invertable
- ◆ LED indicator for power supply, over voltage and under voltage, failure and status of the output relay, start-up & reaction timer
- ◆ 22.5mm DIN rail mount housing

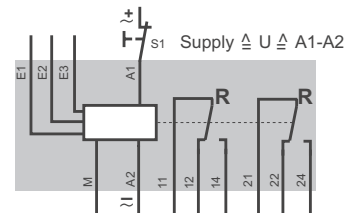
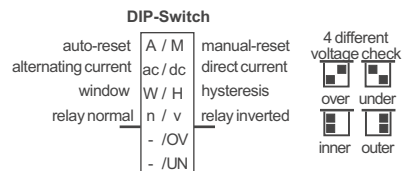
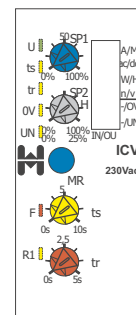
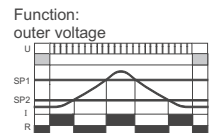
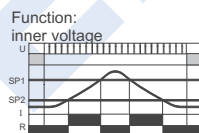
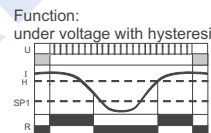
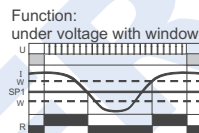
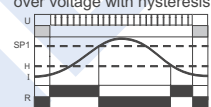
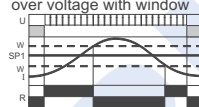


Function



DIP-Switch: Auto-Reset / Relay normal

Function: over voltage with window Function: over voltage with hysteresis



specification

supply voltage variation	nominal voltage -20%..+10%
frequency range	48 - 63 Hz
duty cycle	100%
repeat accuracy	<1%
output relay specification	max. 6A 230V~
Ue/Ie AC-15	24V/1,6A 115V/1,6A 230V/1,6A
Ue/Ie DC-13	24V/1A
expected life time	DPCO
mechanical	10 x 10 ⁶ operations
electrical	8 x 10 ⁴ operations
screws	pozidrive 1
screw tightening torque	0,6...0,8Nm
operating conditions	-20 to +60 °C non condensing

* EN 60947-5-1 VDE 0435

ordering information

part no	supply	output	sup. galv. iso*	CS	housing types
ICV 24Vac	24V~ 2,5VA/1W	DCPO	yes	-	L
ICV 115Vac	115V~ 2,5VA/1W	DCPO	yes	-	L
ICV 230Vac	230V~ 2,5VA/1W	DCPO	yes	-	L
ICV 400Vac	400V~ 2,5VA/1W	DCPO	yes	-	L

* The measurement input is galvanically isolated from the power supply

For further information please refer to our homepage www.hiquel.com in the products area, or contact us per mail or e-mail.

input	range	resistance	U _{EMAX} (20°C)
E1-M	0V - 10V	30 kOhm	13Vac
E2-M	0V - 45V	200 kOhm	70Vac
E3-M	0V - 450V	1,7 MOhm	550Vac



Monitoring relays – in-case Series

Single-phase voltage relay - ICV

FEATURES

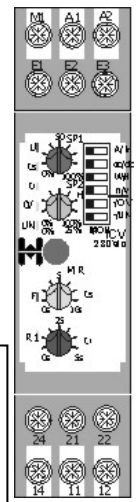
- AC or DC voltage monitor
- 3 different voltage ranges
- 4 selectable base modes (over, under, active band, dead band)
- 2 selectable measuring functions
- Automatic or manual reset selectable
- output relay contact normal or inverted
- DPCO configuration
- LED indicator for supply voltage, over current and under voltage, failure, output relay status, start-up and reaction timers
- 22,5mm DIN rail mount housing

Start-up and reaction timers, and the thresholds for the functions can be easily adjusted using the potentiometers and rotary switches on the front plate. Terminals A1+A2 are used to supply the ICV single phase voltage monitor. In order to increase the accuracy and flexibility of the ICV three different input measurement ranges are featured. **The measuring inputs are galvanically isolated from the power supply terminals and the output relay circuit** and can be used for both alternating current and direct current. When measuring direct voltage terminal 'M' must be connected to negative potential, when measuring alternating voltage the polarity is of no significance.

input	range	resistance	max. voltage @+20°C
E1-M	0V..10V	30 kΩ	13Vac
E2-M	0V..60V	200 kΩ	75Vac
E3-M	0V..450V	1,7 MΩ	550Vac

LED STATUS INDICATION

The presence of the supply voltage is indicated with a green LED (U), and the active state of the start-up timer and the reaction timer of the time delay (ts, tr) with a yellow flashing LED. If the measured voltage exceeds the upper threshold value, but now is under this value this is represented by a flashing 'OV' LED. A continuous yellow 'OV' LED indicates that the measured value exceeds the upper threshold value. If the measured voltage had fallen below the lower threshold value but now is higher than this level the yellow LED 'UN' flashes. If the measured value is under the lower threshold value the 'UN' LED is a continuous yellow. A red flashing LED represents a device or setting fault condition. An active state of the output relay is indicated with the yellow LED R1.



The supply voltage must not be removed before making any changes or settings of the controls. If either time range or time function is changed (changes of the selector switch position) a red LED is active for a short time for checking purposes. The new settings are immediately active. Depending on the change of the settings, the output relay might be switched off temporarily.

CONTROLS

The controls of the in-case series are colour coded for simplicity. Blue potentiometers or rotary switches are used for set values, time settings are yellow, the time range of a reaction timer is red, and percentage hysteresis is always grey.

The ICV features a blue potentiometer for adjusting the first threshold, a grey one for second threshold or hysteresis setting, a yellow one for start up delay time and a red one for trip reaction time setting.

POTENTIOMETER

With the **blue** SP1 (set point 1) potentiometer the voltage threshold of the monitoring function is set. The desired threshold is set as a factor between 0% and 100% of the selected input range. Depending on the function selected the **grey** H/SP2 control is used to fix either the % value for hysteresis (H) or the voltage value for set point 2 (SP2). Hysteresis can be adjusted between 0% and 25% of the SP1 value. SP2 can be set between 0% and 100% of the selected input range. With the **yellow** potentiometer the start delay time (ts) of the measurement is set, and can be selected between 0 and 10 seconds. The voltage on the measuring input is not measured until 'ts' has elapsed.

The **red** potentiometer is used to set the reaction time (tr) in case of any current alarm. At the end of this trip time which can be set between 0 and 5 seconds the relay switches into the alarm position.

PUSH-BUTTON

The blue push-button in the middle of the front plate is only used in the 'manual reset' mode. If a failure condition is detected and the relay was set accordingly, the stored failure state is deleted and the relay is reset by pushing the 'MR' button.

FUNCTION SETTING

Using the six white DIP switches on the front plate, the reset mode of a failure condition (A/M), the nature of the voltage (ac/dc), the switching function (W/H), the output relay function (n/v) and the desired monitoring function (-/OV), (-/UN) can be selected.

auto-reset	A	M	manual-reset
alternating voltage	ac	dc	direct voltage
window function	W	H	hysteresis function
normal output relay	n	v	inverted output relay
-	-	OV	OVER
-	-	UN	UNDER

Reset after failure condition

The first (A/M) DIP switch is used to select between 'automatic reset' (A) and 'manual reset' (M) function. If 'A' is selected, the relay resets immediately the voltage fault condition has cleared. If the DIP switch is in the 'M' position even if the voltage fault condition has cleared, the relay only resets after pressing the middle blue 'MR' (manual reset) button. This is also the case if the supply voltage is interrupted for some time. Thus any error remains stored when the 'M' function is selected even if the supply voltage is interrupted.

Selecting the nature of the current

This selection is to be taken according to the signal form of the measuring current an incorrect selection leads to false results.

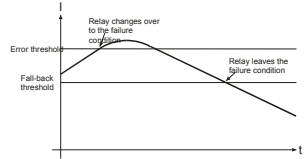
! NOTE: Only superposition-free direct voltage signals when measuring direct voltage signals and sinusoidal alternating voltage signals when measuring alternating voltage lead to correct results!

Reset Differential

SP1 is always the base for the reset differential calculation. If 'windows' (W) function is selected, this differential extends symmetrically in both directions from SP1, and if H (Hysteresis) function is selected, in one or the other direction from the preset SP1 value depending if Over or Undercurrent mode is selected. From this it follows that compared to the 'H' function, the total switching differential is two times larger when the 'W' function is selected.

Refer to drawing:

The relay changes over to a fault condition after the measured voltage has passed a certain threshold in a certain direction (error threshold - ET). The error condition is cleared, after the so called fall-back threshold (FT) is passed in the opposite direction.



The reset differential is only of significance if 'OVER' or 'UNDER' function is selected and is always set with potentiometer H/SP2 no matter if 'H' or 'W' is selected. The table below summarises the corresponding ET or FT depending on the selected reset differential. SP1 in that case represents the value set with potentiometer SP1, H the value set with potentiometer SP2/H.

Function	Differential	ET	FT
OVER	hysteresis	SP1	SP1-H
OVER	window	SP1+H	SP1-H
UNDER	hysteresis	SP1	SP1+H
UNDER	window	SP1-H	SP1+H

Output relay function

If the function 'normal output relay' (n) is selected the output relay is pulled in as long as no fault condition is present. This offers open circuit detection and failsafe operation. If the 'inverted output relay' (v) function is selected the output relay state is exactly opposite to the 'n' function. Therefore the output relay is dropped out when there is no fault condition and pulled in when a fault condition is detected. In both (n) and (v) modes the output relay is dropped out when no supply voltage is present

Monitoring functions

The table below summarises the ICV features in all six different monitoring functions by combining the four base modes OVER; UNDER; INNER and OUTER with the hystereses and window function. (also see list of abbreviations below)

Function	ET / UET	FT / UFT	LET	LFT
Over+H	SP1	SP1-H		
Over+W	SP1+H	SP1-H		
Under+H	SP1	SP1+H		
Under+W	SP1-H	SP1+H		
INNER	SP1	SP1-[(SP1-SP2)/16]	SP2	SP2+[(SP1-SP2)/16]
OUTER	SP1	SP1+[(SP1-SP2)/16]	SP2	SP2-[(SP1-SP2)/16]

As can be seen from the table above, the hysteresis for 'inner' and 'outer' functions is equal to the difference of the error thresholds divided by 16.

Monitoring relays – in-case Series

Single-phase voltage relay - ICV

Diagrams: Time is plotted on the X-axis, signal status on the Y-axis. Status OFF or ZERO is shown on the base line, status ON or 'signal/voltage present' is stepped upward.

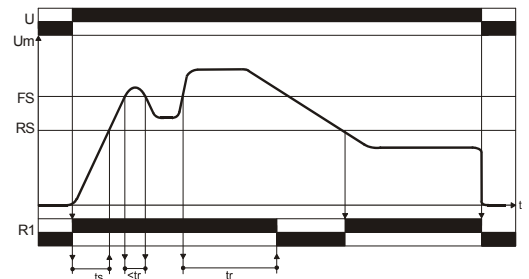
Abbreviations used in the function diagrams:

- U** supply voltage
- Um** measured voltage
- ts** start timer, start time, measuring delay time
- tr** reaction timer, reaction time, failure trip delay time
- tr<** duration of the failure condition is shorter than tr
- R1** relay, output relay
- ET, LET, UET** error threshold, lower – upper error threshold
- FT, LFT, UFT** fall-back threshold, lower – upper fall-back threshold

OV – OVER DIP-Switch positioning:

With this function over voltage can be monitored. R1 drops out as soon as I exceeds the error threshold level. If 'automatic reset' function is selected R1 resets immediately when the measured voltage returns within the permitted range (falls below the fall-back threshold). If 'manual reset' is selected, the error condition remains until the 'MR' button is pushed.

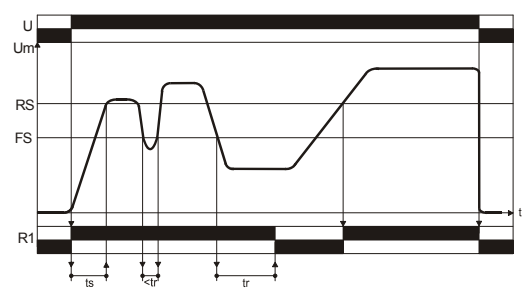
OFF: Um > ET; ON: Um < FT



UN – UNDER DIP-Switch positioning:

With this function under voltage can be monitored. R1 drops out as soon as I falls below the error threshold. If the 'automatic reset' function is selected R1 resets immediately when the measured voltage returns within the permitted range (exceeds the fall-back threshold). If 'manual reset' is selected, the error condition remains until the 'MR' button is pushed.

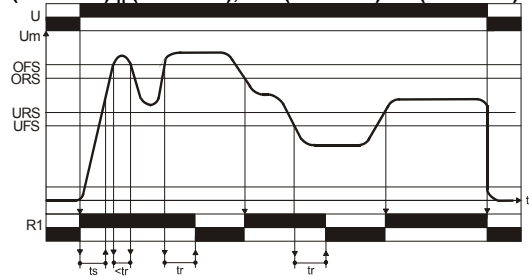
OFF: Um < ET; ON: Um > FT



IN – INNER (ACTIVE BAND) DIP-Switch positioning:

This function monitors if the measured voltage (Um) is within a permitted range limited by the LET and UET. This function can be seen as a combination of both functions described previously. R1 drops out, if I falls below the LET or exceeds the UET. If 'automatic reset' function is selected R1 resets immediately when the measured current returns within the two fall-back thresholds. If 'manual reset' is selected, the error condition remains until the 'MR' button is pushed.

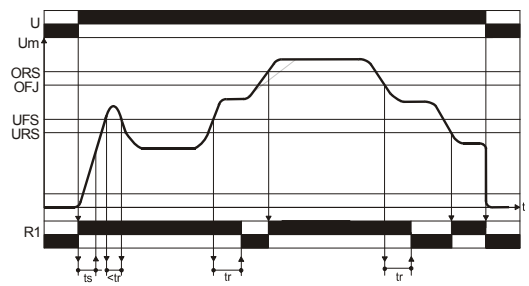
OFF: (Um < LET) || (Um > UET); ON: (Um > LFT) && (Um < UFT)



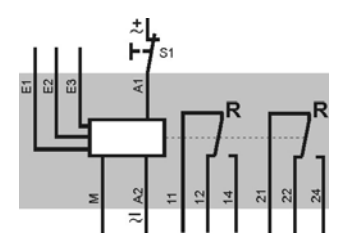
OU – OUTER (Dead band) DIP-Switch positioning:

This function monitors if the measured voltage (Um) is outside a permitted range limited by the LET and UET. R1 drops out, if I exceeds the LET or falls below the UET. If 'automatic reset' function is selected R1 resets immediately when the measured voltage falls under the lower threshold or exceeds the upper threshold. If 'manual reset' is selected, the error condition remains until the 'MR' button is pushed.

OFF: (Um > LET) && (Um < UET); ON: (Um < LFT) || (Um > UFT)



BLOCK CONNECTION DIAGRAM:



SPECIFICATION

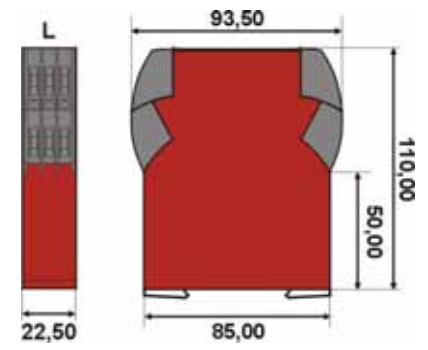
supply voltage variation	nominal voltage -20%..+10%
frequency range	48 - 63 Hz
duty cycle	100%
repeat accuracy	<1%
output relay specification	max. 6A 230V~
Ue/Ie AC-15*	24V/1,5A 115V/1,5A
Ue/Ie DC-13*	24V/1,5A
expected life time	DPCO
Mechanical	10 x 10 ⁶ operations
Electrical	8 x 10 ⁴ operations
screws	Pozidrive 1
screw tightening torque	0,6...0,8Nm
operating conditions	-20 to +60 °C
	non condensing

* EN 60947-5-1 VDE 0435

TYPE APPROVAL INFORMATION



DIMENSIONS (in mm)



MOUNTING

Use the spring clip on the base to mount device on a symmetrical DIN rail according to DIN EN 50022. The devices are suitable for mounting side by side without an air gap with an ambient temperature range from -20 to + 60°C.

ORDERING INFORMATION

Part no	supply	
ICV 24Vac	24Vac	1W / 2,5VA
ICV 115Vac	115Vac	1W / 2,5VA
ICV 230Vac	230Vac	1W / 2,5VA
ICV 400Vac	400Vac	1W / 2,5VA