

# Easergy Range - VD23

Voltage detector relay for transfer system and safety



VD23 is a compact voltage detection relay for MV networks voltage from 3 kV to 36 kV, 50/60 Hz, efficient and self-adapted.

## Product at a glance

- **At the leading edge of technology.**  
VD23 provides a presence and an absence of voltage relay for all MV network neutral systems.
- **Self-adapted to the network voltage.**  
VD23 is ready to use.
- **Skilfully designed.**  
VD23 displays the voltage (in % of the calibrated voltage).
- **Adapted to various situation.**  
VD23 can be configured to work on different combination of phase and unbalanced voltage.
- **Compact and in DIN format.**  
VD23 fits naturally into MV cubicles.
- **The VD23 function is also available in the Flair 23DM,** which also includes the fault current detection function and the possibility to communicate via an RS485 Modbus port.

The VD23, voltage detector relay for transfer system and safety, provides:

- Presence of voltage detection
- Absence of voltage detection
- Automatic calibration
- Flexibility
- Programmable logic.

## Application

- Application based on presence of voltage
  - The loss of voltage activates a change of state of the R1 relay
  - Automatic transfer systems
  - Alarms on voltage loss
  - Automation on loss of voltage.
- Application based on absence of voltage
  - Earth locking on presence on voltage
  - Alarms on voltage presence.

## Reference

The ordering code for the VD23 is: EMS58421.

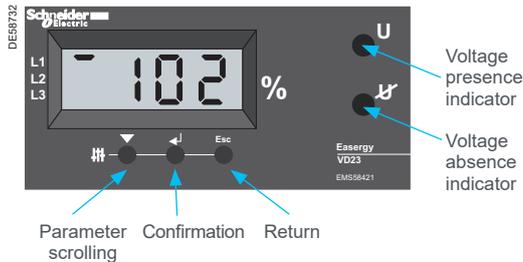
## Compatibility

VD23 VPIS-VO input is compatible with VPIS V2 only. It is not compatible with VPIS V3.

# VD23 - voltage detector relay

## Hardware and software description

### Display and keyboard



- Voltage indication
  - Percent of the nominal voltage
  - Phase by phase scrolling
  - 3 digits.
- Voltage detection display
  - 1 LED for absence of voltage (image of relay R1)
  - 1 LED for presence of voltage (image of relay R2).
  - Configuration by means of 3 keys and the display
  - Thresholds in % of the nominal value
  - Threshold for absence of voltage
  - Threshold for presence of voltage
  - Threshold for unbalanced voltage (presence of voltage only)
  - Delay for both functions.
- Settings display
  - Parameters set from the keyboard
  - Microswitches position.

### Assembly and dimension

- Compact case assembly:
  - DIN format 93 x 45 mm
  - Secured, extraction-proof mounting
  - Extractable terminal connections
  - Mounting in all types of MV cubicle: RM6, SM6, CAS, FBX others.
- Dimension in mm
  - Outer casing:
    - H x L x P: 48 x 96 x 100
  - Flush-mounting cut-out
    - (max. plate thickness: 20/10°)
    - L: 92 (-0, + 0.8); H: 45 (-0, + 0.6)

### Voltage detection

- VD23 detects a presence and absence of voltage, and activates 2 relays:
  - R1 = Presence of voltage
  - R2 = Absence of voltage.
- The 2 functions are running simultaneously
  - The two relay outputs are separate and can therefore work independently (e.g. voltage absence for automatic transfer function, voltage presence indication for interlocking on earthing switch, etc).
  - The combination of the function allows specific applications.

### Calibration principle

- At the VD23 power up, the voltage input is scanned, and as soon as it is stabilized, the input voltage is memorized, and is considered as the nominal voltage.
  - Stabilization time = 3 s
  - At any time, through the keyboard configurator a new calibration can be done.

### Settings

- By configuration (microswitches) the phase to take into account or the unbalanced voltage can be chosen
  - Select the phase or phases voltage to be checked
  - Select to check the unbalanced voltage
  - Select to check phase to earth or phase to phase voltage.

For example:

  - 3 phases and unbalanced: V1+V2+V3+V0
  - 3 phases: V1+V2+V3, or U12+U13+U23
  - Single phase: V1, V2, V3, U12, U13 or U23
  - Unbalanced voltage only: V0.
- Relay fail-safe position
  - A switch allows choice of normal or inverse position for each relay. It gives the relay position when power supply is down.
- Time delay is configurable for each relay
  - On active position
  - On inactive position.
- Thresholds are configurable (from keyboard) independently for both relays
  - Configuration in % of the voltage
  - Single voltage or unbalanced voltage.

# VD23 - voltage detector relay

## Characteristics

<b>Frequency (auto-detection)</b>		50 Hz and 60 Hz	
<b>Service voltage</b>		Un: 3 to 36 kV - Vn: 1.7 to 24 kV	
<b>Cubicles</b>		RM6 – Ringmaster - SM6 24/36 - CAS - MCSet - FBX	
<b>Display</b>		4 digits LCD	
<b>Measurement</b>			
Voltage (% of the nominal voltage)		With VPIS V2-VO	Phase-to-neutral or phase-to-phase voltages
<b>Voltage detection</b>			
Configuration of detection mode		Via microswitches	
Detection settings	Measurement type	Phase-to-neutral or phase-to-phase voltage	
	R1 and R2 relay outputs	Direct or reverse	
	Measured phases	Measured or not (for each phase)	
	Residual voltage	Measured or not	
Configuration of thresholds and time delays		Via front panel buttons	
Thresholds settings (% of rated voltage)	Voltage presence (R1)	40 to 90% (10% increments)	
	Residual voltage threshold	30 to 60% (10% increments)	
Accuracy ±10%	Voltage absence (R2)	10 to 30% (10% increments)	
Time delays settings	Activation time delay (R1 or R2 direct)	0 to 1 s (0.1 s increments) and from 1 to 21 s (2 s increments) and from 1 to 15 mn (1, 3, 5, 7, 10, 15 mn)	
	Release time delay (R1 or R2 direct)	0 to 1 s (0.1 s increments) and from 1 to 3 s (0.5 s increments)	
Characteristics of relays R1 and R2	Maximum load	AC: 8 A; DC: 8 A	
	Maximum cut-off voltage	AC: 400 V; DC: 300 V	
	Maximum cut-off power	AC: 2000 VA (8 A, 240 V); DC: 240 W (8 A, 30 V)	
	Dielectric between open contacts	1 kV - 1 min	
<b>Power supply</b>			
Auxiliary power supply	Voltage	24 to 48 Vdc -20% +10%	
	Insulation	Inputs / mechanical ground: 2 kV 50 Hz 1 min	
<b>Test mode</b>			
		By button on the front panel	Product name; Software version; Network frequency; Digits test
<b>Insulation resistance</b>			
	Standards	Comments	
Dielectric withstand	IEC 60255-5	2 kVrms, 1 min	
Impulse wave	IEC 60255-5	1.2/50 µs, 5 kV	
Insulation resistance	IEC 60255-5	R > 100 MΩ 500 V, 1 min	
<b>EMC (immunity and electromagnetic interference)</b>			
	Standards	Level	Comments
Electrostatic discharge	IEC 61000-4-2	3	8 kV air; 6 kV contact
Radiated fields	IEC 61000-4-3	3	10 V/m 80 MHz, 1 GHz
Fast transients	IEC 61000-4-4	4	4 kV CM; 5 kHz, 100 kHz
Impulse waves	IEC 61000-4-5	3	42 Ω on I/O; 2 Ω on power supply
Common mode radio frequencies	IEC 61000-4-6	3	0.15-80 MHz 10 V/m 80% MA (1 kHz)
50 Hz magnetic fields	IEC 61000-4-8	4	30A/m permanent 300A/m 1s
Damped oscillatory waves	IEC 61000-4-12	4	± 2.5 kV MC, ± 1 kV MD, 1 MHz
Damped oscillatory waves - short	IEC 61000-4-18	3	2.5 kV CM, 1 kV DM, 100 kHz & 1 MHz
Damped oscillatory waves - rapid	IEC 61000-4-18	3	3 MHz, 10 MHz, 30 MHz, 2 kV CM
<b>Climatic tests</b>			
	Standards	Level	Comments
<b>In operation</b>	Exposure to cold	IEC 60068-2-1	Ad -40°C; 96 h
	Exposure to dry heat	IEC 60068-2-2	Bd +70°C; 96 h
	Exposure to damp heat	IEC 60068-2-78	Cab 93% RH, 40°C, 56 days, no condensation
	Temperature variation	IEC 60068-2-14	Nb -40 +70°C; 5°C/min
	Damp heat cyclic test	IEC 60068-2-30	Db 2 x 12 h (+25 -55°C); 6 cycles; 93-95% RH
<b>In storage</b>	Exposure to cold	IEC 60068-2-1	Ab -40°C; 96 h
	Exposure to dry heat	IEC 60068-2-2	Bb +70°C; 96 h
	Exposure damp heat	IEC 60068-2-78	Cab 93% RH; 40°C; 56 days, no condensation
	Temperature variation	IEC 60068-2-14	Na -40 +70°C; transfer time 8 s
<b>Corrosive atmosphere</b>	Salt spray test	IEC 60068-2-52	Kb / 2 3 cycles: exposure period of 2 hours with 22 hours rest
<b>Mechanical tests</b>			
	Standards	Level	Comments
<b>In operation</b>	Vibrations	IEC 60255-21-1 (IEC 60068-2-26 Fc)	1 Gn; 9-200 Hz; 1 cycle
	Shock test	IEC 60255-21-2 (IEC 60068-2-27 Ea)	10 Gn; 11 ms; 3 pulses/direction per axis
	Seismic test	IEC 60255-21-3 (IEC 60068-2-29)	2 Gn horizontal, 1 Gn vertical
<b>In storage</b>	Vibrations	IEC 60255-21-1 (IEC 60068-2-26 Fc)	2 Gn; 10-150 Hz; 20 cycles
	Shock test	IEC 60255-21-2 (IEC 60068-2-27 Ea)	30 Gn; 11ms; 3 pulses/direction per axis
	Seismic test	IEC 60255-21-3 (IEC 60068-2-29)	20 Gn; 16 ms; 1000 pulses/axis
<b>Enclosure protection</b>		IEC 60529	IP41/IP30 On front panel/Other parts
		IEC 62262	IK07 2 joules
<b>Packaging impact protection</b>		IEC 60068-2-32, NF EN 22248	Method 1m/6 sides/4 corners

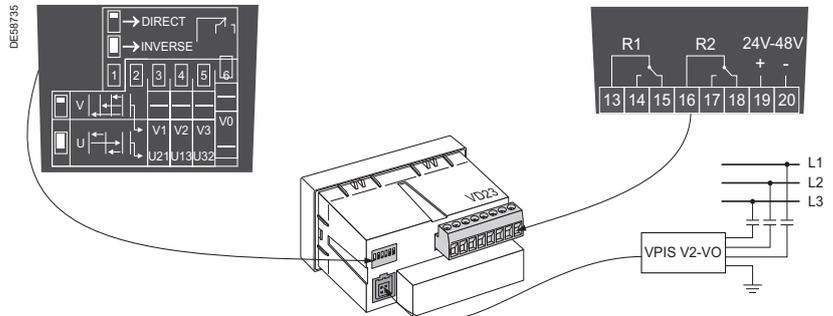
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## Configuration and accessories

### Wiring

- Turn screw terminal block
  - Relays with 2 dry contact each
  - Power supply from 24 to 48 Vdc.
- Connector for VPIS
 

The voltage input signal is given by a VPIS V2-VO. This VPIS has a cable with a connector.



VPIS-VO input of VD23 is compatible with VPIS V2 only. It is not compatible with VPIS V3.

### Microswitches

- 6 microswitches are dedicated to define the logical:
  - SW1: direct/inverse action on output relays. The inverse action switches the logical relay output.
  - SW2: calculation on phase to earth voltage (V) or phase to phase voltage (U)
  - SW3, SW4, SW5: choice of the voltage to monitor (used/not used).  
SW3= Ph 1 / SW4= Ph 2 / SW5= Ph 3.
  - SW6: monitor of the unbalanced voltage (used/not used). Only for phase to earth voltage
- Example of settings
  - V1: Phase to earth voltage on line 1 is present
  - $\bar{V}1$ : Phase to earth voltage on line 1 is absent
  - V1+V2: V1 or V2 is present
  - V1.V2: V1 and V2 are present.

The table below shows the relays position upon the voltage status, according to the phases defined to be checked by the microswitches position.

Sw 1	Direct output	Inverted output	Sw 1	Direct output	Inverted output	
	Sw 2 (V)		Sw 2 (U)			
3 4 5 6	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	3 4 5 6	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> (Sw6 without effect)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> (Sw6 without effect)	
R1	$\bar{V}1+V2+V3+V0$ $V1 \cdot V2 \cdot V3 \cdot V0$	$V1 \cdot V2 \cdot V3 \cdot V0$ $\bar{V}1+V2+V3+V0$	R1	$\bar{U}12+\bar{U}13+\bar{U}23$ $U12 \cdot U13 \cdot U23$	R1	$U12 \cdot U13 \cdot U23$ $\bar{U}12+\bar{U}13+\bar{U}23$
R2	$V1+V2+V3$ $\bar{V}1 \cdot \bar{V}2 \cdot \bar{V}3$	$\bar{V}1 \cdot \bar{V}2 \cdot \bar{V}3$ $V1+V2+V3$	R2	$U12+U13+U23$ $\bar{U}12 \cdot \bar{U}13 \cdot \bar{U}23$	R2	$\bar{U}12 \cdot \bar{U}13 \cdot \bar{U}23$ $U12+U13+U23$
3 4 5 6	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	3 4 5 6	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> (Sw6 without effect)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> (Sw6 without effect)	
R1	$\bar{V}1+V2+V3$ $V1 \cdot V2 \cdot V3$	$V1 \cdot V2 \cdot V3$ $\bar{V}1+V2+V3$	R1	$\bar{U}12+\bar{U}13+\bar{U}23$ $U12 \cdot U13 \cdot U23$	R1	$U12 \cdot U13 \cdot U23$ $\bar{U}12+\bar{U}13+\bar{U}23$
R2	$V1+V2+V3$ $\bar{V}1 \cdot \bar{V}2 \cdot \bar{V}3$	$\bar{V}1 \cdot \bar{V}2 \cdot \bar{V}3$ $V1+V2+V3$	R2	$U12+U13+U23$ $\bar{U}12 \cdot \bar{U}13 \cdot \bar{U}23$	R2	$\bar{U}12 \cdot \bar{U}13 \cdot \bar{U}23$ $U12+U13+U23$
3 4 5 6	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	3 4 5 6	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
R1	$\bar{V}2$ $V2$	$V2$ $\bar{V}2$	R1	$\bar{U}13$ $U13$	R1	$U13$ $\bar{U}13$
R2	$V2$ $\bar{V}2$	$\bar{V}2$ $V2$	R2	$U13$ $\bar{U}13$	R2	$\bar{U}13$ $U13$

**Note:** not all the possibilities are represented above.

### Accessories

VD23 is fitted to a VPIS-VO adapted for the voltage measurement. The VPIS-VO, is linked to the capacitor connected to the MV busbar, and delivers a voltage signal on a specific connector. Various references of VPIS-VO allows adaptation to different level of MV Voltage and MV capacitors values.

Consult VPIS V2 Technical Leaflet (reference ENMED309037EN) for VPIS references to be used in each case.