Life Is On | Schneider Electric

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.

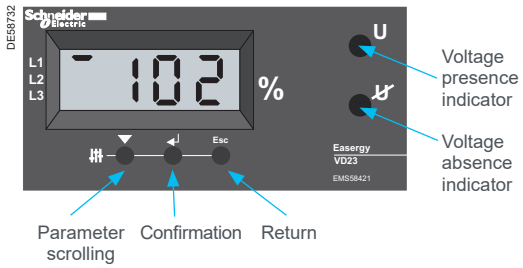
Compatibility

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

Frequency (auto-detection)				50 Hz and 60 Hz
Service voltage				Un: 3 to 36 kV - Vn: 1.7 to 24 kV
Cubicles				RM6 – Ringmaster - SM6 24/36 - CAS - MCSet - FBX
Display				4 digits LCD
Measurement				
	Voltage (% of the nominal voltage)	With VPIS V2-VO		Phase-to-neutral or phase-to-phase voltages
Voltage detection				
	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) Accuracy ±10%	Voltage presence (R1)		40 to 90% (10% increments)
		Residual voltage threshold		30 to 60% (10% increments
		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
Power supply				
	Auxiliary power supply	Voltage		24 to 48 Vdc –20% +10%
		Insulation		Inputs / mechanical ground: 2 kV 50 Hz 1 min
Test mode				
		By button on the front panel		Product name; Software version; Network frequency; Digits test
Insulation resistance		**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
EMC (immunity and electromagnetic interference)		**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 & 1MHz
	Damped oscillatory waves - rapid	IEC 61000-4-18	3	3 MHz, 10 MHz, 30 MHz, 2 kV CM
Climatic tests		**Standards**	**Level**	**Comments**
In operation	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
In storage	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
Corrosive atmosphere	Salt spray test	IEC 60068-2-52	Kb / 2	3 cycles: exposure period of 2 hours with 22 hours rest
Mechanical tests		**Standards**	**Level**	**Comments**
In operation	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
In storage	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
Enclosure protection		IEC 60529	IP41 / IP30	On front panel / Other parts
		IEC 62262	IK07	2 joules
Packaging impact protection		IEC 60068-2-32, NF EN 22248		Method 1m / 6 sides / 4 corners

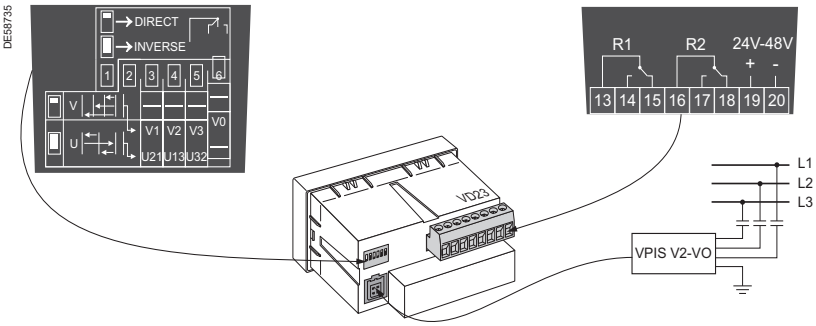
VD23 - voltage detector relay

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
  - $\overline{V1}$: 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.

DE58731EN

Sw 1 Direct output	Sw 1 Inverted output	Sw 1 Direct output	Sw 1 Inverted output
Sw 2 (V)		Sw 2 (U)	
3 4 5 6 R1 $\overline{V1}+\overline{V2}+\overline{V3}+V0$ $V1 \cdot V2 \cdot V3 \cdot \overline{V0}$ R2 $V1+V2+V3$ $\overline{V1} \cdot \overline{V2} \cdot \overline{V3}$	3 4 5 6 R1 $V1 \cdot V2 \cdot V3 \cdot \overline{V0}$ $\overline{V1}+\overline{V2}+\overline{V3}+V0$ R2 $\overline{V1} \cdot \overline{V2} \cdot \overline{V3}$ $V1+V2+V3$	3 4 5 6 (Sw6 without effect) R1 $\overline{U12}+\overline{U13}+\overline{U23}$ $U12 \cdot U13 \cdot U23$ R2 $U12+U13+U23$ $\overline{U12} \cdot \overline{U13} \cdot \overline{U23}$	3 4 5 6 (Sw6 without effect) R1 $U12 \cdot U13 \cdot U23$ $\overline{U12}+\overline{U13}+\overline{U23}$ R2 $\overline{U12} \cdot \overline{U13} \cdot \overline{U23}$ $U12+U13+U23$
3 4 5 6 R1 $\overline{V1}+\overline{V2}+\overline{V3}$ $V1 \cdot V2 \cdot V3$ R2 $V1+V2+V3$ $\overline{V1} \cdot \overline{V2} \cdot \overline{V3}$	3 4 5 6 R1 $V1 \cdot V2 \cdot V3$ $\overline{V1}+\overline{V2}+\overline{V3}$ R2 $\overline{V1} \cdot \overline{V2} \cdot \overline{V3}$ $V1+V2+V3$	3 4 5 6 (Sw6 without effect) R1 $\overline{U12}+\overline{U13}+\overline{U23}$ $U12 \cdot U13 \cdot U23$ R2 $U12+U13+U23$ $\overline{U12} \cdot \overline{U13} \cdot \overline{U23}$	3 4 5 6 (Sw6 without effect) R1 $U12 \cdot U13 \cdot U23$ $\overline{U12}+\overline{U13}+\overline{U23}$ R2 $\overline{U12} \cdot \overline{U13} \cdot \overline{U23}$ $U12+U13+U23$
3 4 5 6 R1 $\overline{V2}$ $V2$ R2 $V2$ $\overline{V2}$	3 4 5 6 R1 $V2$ $\overline{V2}$ R2 $\overline{V2}$ $V2$	3 4 5 6 R1 $\overline{U13}$ $U13$ R2 $U13$ $\overline{U13}$	3 4 5 6 R1 $U13$ $\overline{U13}$ R2 $\overline{U13}$ $U13$

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.

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