

FVR-R23 Voltage Frequency Protection Relay



ISO 9001:2015



The device has been designed for the continuous monitoring of the system's voltage, frequency and related variations.

It is able to disconnect the power generation system from the grid in case of over/under frequency, df/dt , over/under voltage, voltage unbalance, voltage vector shift, phase sequence.

APPLICATION FIELDS

- Generating plants
- Commercial, industrial and public utility

DIGITAL MEASUREMENT

- Phase and Line Voltages
- Phase Sequence
- Voltage Average
- Voltage Unbalance
- Voltage THD
- Voltage Harmonics
- Frequency (Hz)
- Frequency variation (rate of change df/dt)

APPLICABILITY

- Systems: Three phase 3 or 4 wire, Wye or Delta three-phase
- Frequency: 50/60 Hz
- Voltage: up to 278/485Vac (direct measure) or external VTs (Wye or delta connection)

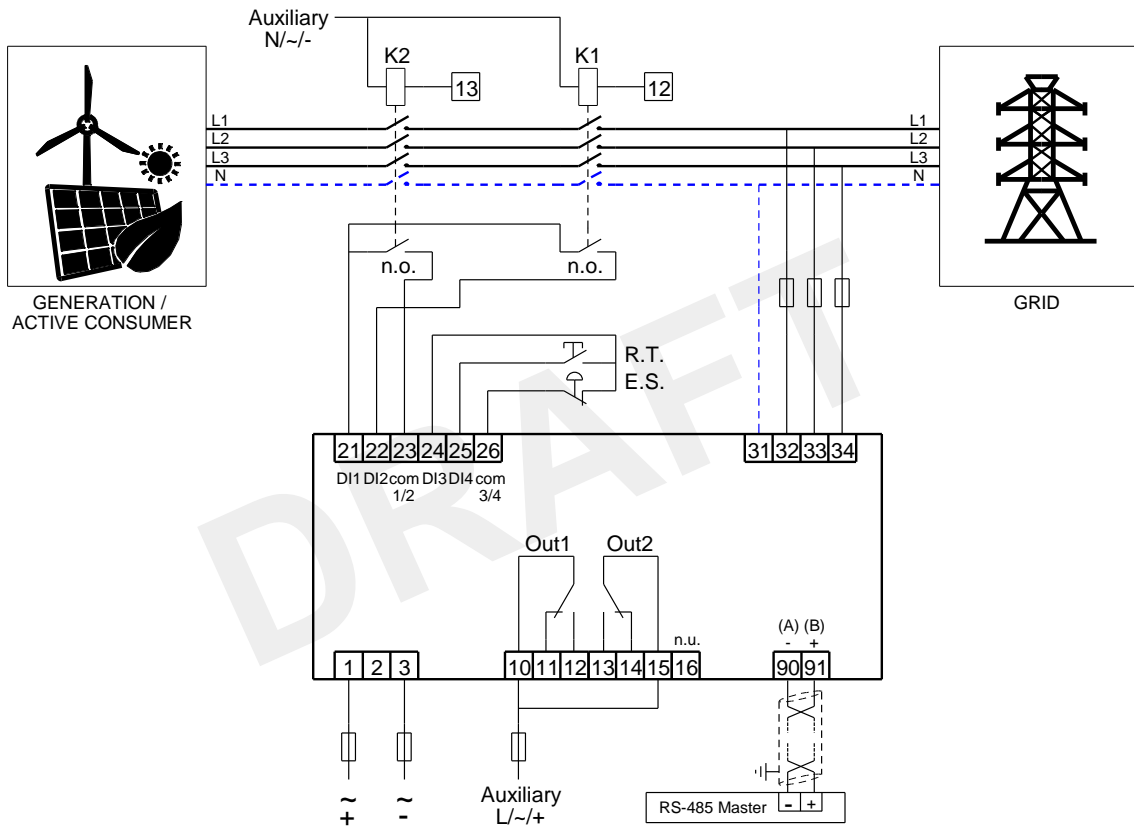
SIGNALLING AND PROGRAMMING

- Graphic LCD & LED based HMI
- Indication of fault conditions
- Indication of the system status
- Pop up signalling in case of fault

PROTECTION AND FUNCTIONALITY

- Under & Over Voltage
- Voltage Unbalance
- Phase Sequence
- Voltage Vector Shift
- Under & Over Frequency
- dF/dT (ROCOF)
- Monitoring of the main and backup switch
- Back up function on main switch failure

CIRCUIT DIAGRAM



SPECIFICATIONS

<p>SUPPLY VOLTAGE 85V (115V) ÷ 264V (300V) Vac (Vdc)</p> <p>MAX. POWER CONSUMPTION 7 VA (5 W)</p>	<p>TEMPERATURE Operational: -20 °C +55 °C Storage Temperature: -30 to +70 °C</p> <p>RELATIVE HUMIDITY Max. 90% (non condensing)</p>
<p>DIELECTRIC WITHSTAND VOLTAGE 2 kVac, 60s from all circuits and enclosure 2 kVac, 60s between HLV and LV circuit</p> <p>ELECTRICAL INSULATION CONSTRUCTION Overvoltage Category: III Pollution degree: 2 Altitude: 2000m (AMSL)</p>	<p>BURN IN 48 hours at 50 °C</p>
<p>VOLTAGE INPUTS Rated Input: 230V/400V Vac (ph-N/ph-ph) 50/60 Hz VT burden: 0,5 VA max. Max. Continuous: 300V/500Vac (ph-N /ph-ph) System: 3 wires, 4 wires. Optional VTs: Wye or Delta</p>	<p>OUTPUT CONTACTS Out1, Out2 Rated load: 8A@ 240Vac Resistive 8A@ 24Vdc Resistive (0,2 A @125 Vdc)</p> <p>Max Switching Voltage: 400 Vac / 150 Vdc Max Continuous current: 5 A</p>

SPECIFICATIONS

<p>DIGITAL INPUT DI1, DI2, DI3, DI4 (2+2) optoisolated dry contacts Max connection lengths: 3 mt Rated Voltage: 12 Vdc internally powered Function programmable Active when Closed/Opened</p>	<p>ACCURACY Voltage: $\pm 0,5\% \pm 1$ digit Frequency: ± 0.01 Hz ± 1 digit df/dt: ± 0.05 Hz/s ± 1 digit</p>
<p>MECHANICAL Back connection, section 2.5 mm² or 14 AWG Frame: Noryl auto-extinguish IP40 Front (up to IP54 front, on request) Dimension: 96 x 96 x 146 mm. Front panel cutout: 91-0,5x 91-0,5 mm Weight: 600 gr.</p>	<p>COMMUNICATION RS-485 serial port Protocol: Modbus RTU-Slave Insulation: 1.5 kVdc</p>
<p>MEASURED PARAMETERS RMS Voltage: AN+, BN+, CN+; AB+, BC+, CA+. For ratings: See Voltage Inputs. Voltage Unbalance: Range 0 ÷ 100% Voltage Harmonics: Up to 11th Frequency: Based on Voltage Vab, Vbc, Vca Range: 45 ÷ 65Hz df/dt: Based on Voltage Vab, Vbc, Vca Range: ± 0.01Hz/s ÷ ± 9.99 Hz/s Resolution: ± 0.01Hz/s</p>	<p>UNDERVOLTAGE PROTECTION Number of stages: 2 Required voltage: > 0,5V at voltage inputs, applied to all phases Pickup level: 25% ÷ 99% of Vn, steps: 1% Reset level: 26% ÷ 100% of Vn, steps: 1% Delay time: 0.1s ÷ 600s, steps: 0.01s ; 0.1s ; 1s Phases: Any one, any two, all three (programmable) Minimum Operation level: 0 ÷ 50% of Vn Threshold Accuracy: 2*Voltage Accuracy (see "accuracy") Timing accuracy: ± 20ms or 1% setpoint (worst case)**</p>
<p>PHASE/LINE VOLTAGE UNBALANCE PROTECTION+ Number of stages: 1 Pickup level: 1 ÷ 99% Dropout: 50 ÷ 90% Pickup level, Steps: 1% Delay time: 0.10 ÷ 600s, steps: 0.01s; 0.1s ; 1s Threshold Accuracy: 2*Voltage Accuracy (see "accuracy") Timing accuracy: ± 20ms or 1% setpoint (worst case)*</p>	<p>OVERVOLTAGE PROTECTION Number of stages: 2 Pickup level: 101% ÷ 125% Vn, steps: 1% Reset level: 100% ÷ 124% Vn, steps: 1% Delay time: 0.1s ÷ 600s, steps: 0.01s ; 0.1s ; 1s Phases: Any one, any two, all three (programmable) Threshold Accuracy: 2*Voltage Accuracy (see "accuracy") Timing accuracy: ± 20ms or 1% setpoint (worst case)*</p>
<p>PHASE REVERSAL PROTECTION Delay time: Fixed 0.5s Timing accuracy: ± 50ms</p>	<p>FIRMWARE UPGRADE via RS-485 Serial Port</p>
<p>VOLTAGE VECTOR SHIFT PROTECTION Number of stages: 1 Pickup level: 5 ÷ 20 deg Start Delay: 0,00 ÷ 600s From Reset (reconnection); steps: 0.01s; 0.1s; 1s Timing accuracy: max trip time $\leq 0,14$s Reset Time: 0,00 ÷ 600s steps: 0.01s; 0.1s ; 1s</p>	<p>UNDER FREQUENCY PROTECTION Number of stages: 2 Required voltage: >40V (phase voltage) at all voltage inputs Pickup level: 47.0 ÷ 59,9Hz, steps: 0.1Hz Reset level: 47.1 ÷ 60Hz, steps: 0.1Hz Delay time: 0.10 ÷ 600s, steps: 0.01s; 1s; 1s Threshold Accuracy: 2*Frequency Accuracy (see "accuracy") Timing accuracy: ± 20ms or 1% setpoint (worst case)** Startup time: 160ms after Voltages establishment</p>
<p>OVER FREQUENCY PROTECTION Number of stages: 2 Required voltage: >40V (phase voltage) at all voltage inputs Pickup level: 50.1 ÷ 63Hz, Steps: 0,1Hz Reset level: 50.0 ÷ 62,9Hz, Steps: 0,1Hz Delay time: 0.10 ÷ 600s, steps: 0.01s; 0.1s ; 1s Threshold Accuracy: 2*Frequency Accuracy (see "accuracy") Timing accuracy: ± 20ms or 1% setpoint (worst case)* Startup time: 160ms after Voltages establishment</p>	<p>df/dt PROTECTION Number of stages :1 Required voltage: >40V (phase voltage) at all voltage inputs Pickup level: 0.6 ÷ 2.5Hz/s, steps: 0.01Hz Dropout: 50 ÷ 90% Pickup, steps: 1% Delay time: 0.14 ÷ 3.0s, steps 0.01s Startup time: 160ms after Voltages establishment Threshold Accuracy: 2*df/dt Accuracy (see "accuracy") Timing accuracy: ± 20ms or 1% setpoint (worst case)*</p>

(+) Depending on Voltage connection type (*) at testing value > setpoint + 2*Threshold accuracy (**) at testing value < setpoint - 2*Threshold accuracy