

□ **SPR-107-V.4**
Voltage Monitoring Device
with Change-Over Control



Product Information

Application

The SPR-107-V.4 is a voltage monitoring device with change-over control in conformity with DIN VDE 0100-710 (VDE 0100 T 710):2002-11. In automatic change-over facilities in conformity with section 710.537.6 of the previously mentioned standard it is used as control and monitoring device for the change-over between the general electric power supply and the Safety Power Supply (SPS). It therefore serves the purpose of:

- voltage monitoring in 3 lines; as single or three-phase system of max. 500 V AC
- triggering of load switching devices with open-circuit monitoring of the control leads
- monitoring of the neutral conductor in the outgoing feeder for impermissible interruption (optional, only in three-phase systems)

The LED indicators and the fully integrated full-graphics display visualise all status and error messages. The user-friendly and intuitive menu-assisted operation enables parameterization of the device. All settings and control commands are saved in a non-volatile EEPROM.

Functions

Voltage Monitoring

The device monitors the voltage for single or three-phase systems of max. 500 V AC on the preferred feeder (line 1) and the second feeder (line 2), as well as behind the load switching devices (consumers). The operate values for low voltage or overvoltage can be parameterized.

Note: For reasons of space only the designations Line 1 or “First line” (= preferred feeder) and Line 2 or “Second line” (= second feeder) will appear on labels and displays. The common outgoing feeder after the main switching devices is referred to as Line 3.

Change-Over Control

In normal operation the voltage supply for the connected consumers is taken from the preferred feeder (Line 1). If set limit values of the monitored voltages are fallen short of or exceeded, the load switching devices (e.g. latched contactors, load interrupter switches with motor drive, circuit breakers with motor drive) will switch from Line 1 to Line 2 – as second safe system. Once the voltage on Line 1 has been stabilised again, the system will switch back to this line. The switch-over times can be parameterized.

The SPR-107-V.4 continuously measures and monitors the voltages on line 1, 2 and 3. The decision for changing over generally depends on the voltage status of Line 3 (outgoing feeder). The software, among others, also initiates a plausibility check to establish whether the currently active switching device is working correctly. This way, a latching module failure, for example, can be detected and a change-over prevented by permanent triggering of the contactor. An error message will be emitted immediately.

The load switching devices are triggered via relays. All control functions can be adjusted to match the type of load switching device used. These control circuits have device integrated open-circuit monitoring (depending on the external wiring).

Monitoring of the Neutral Conductor

In three-phase systems the neutral conductor in the outgoing feeder can optionally be monitored for impermissible interruption, using a transformer connected to the device.

Fault Signals / Communication Interface

Fault signals are submitted through both the LED display and the text display and through potential-free contacts of an integrated signal relay.

Forwarding of current operation and error states to external peripheral equipment and the intrusion to the building services control system can be accomplished through the bus interface (CAN).

When using e.g. the signalling and testing combination BMTI 5, a visual and audible alarm is submitted by this device.

Connections

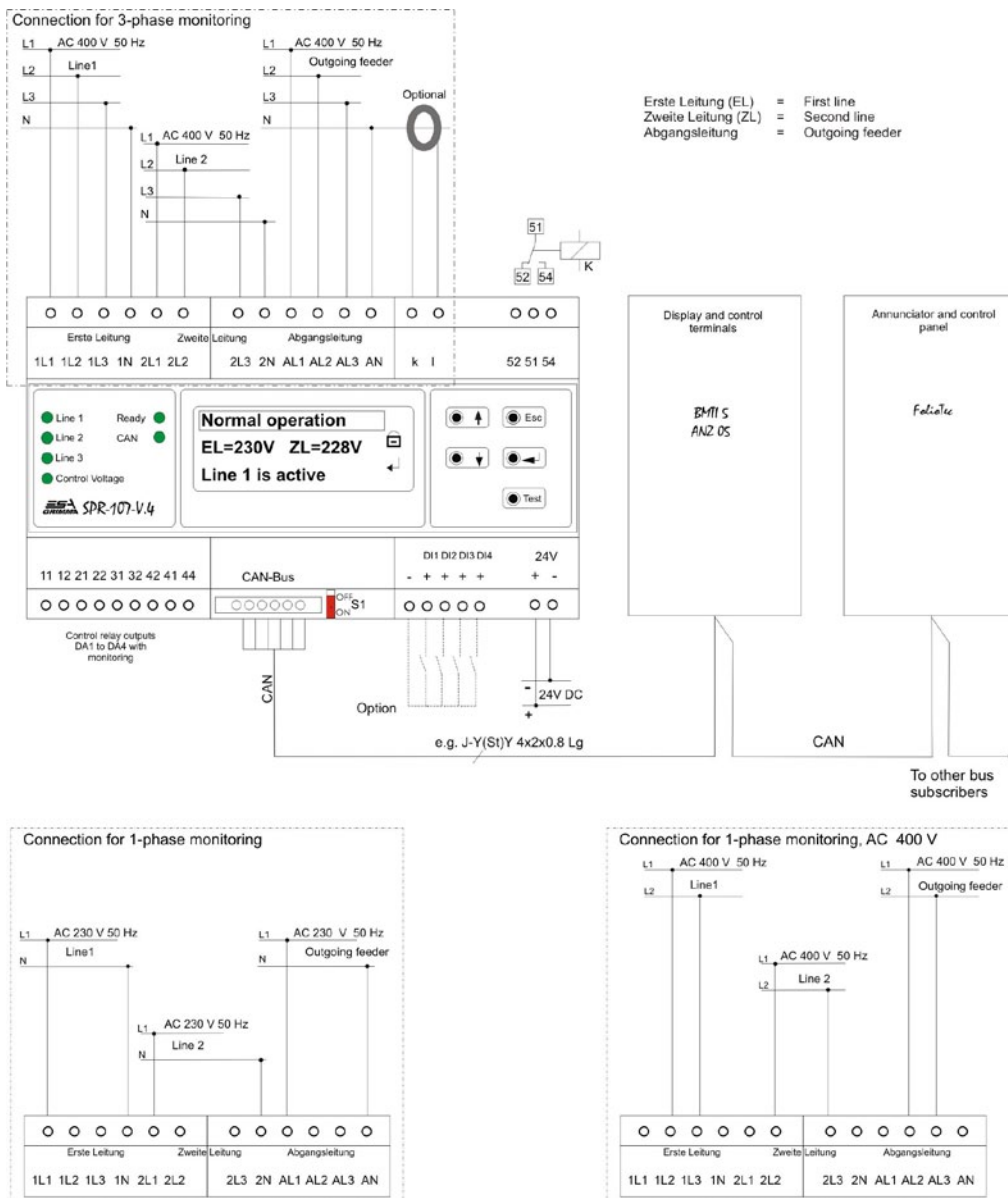


Figure 1: Connection diagram

Note: The special pin assignment in monitoring of a three-phase 400 V AC system must be observed!

Pin Assignment

1L1	system to be monitored, Line 1, phase conductor 1
1L2	system to be monitored, Line 1, phase conductor 2
1L3	system to be monitored, Line 1, phase conductor 3
1N	system to be monitored, Line 1, neutral conductor
2L1	system to be monitored, Line 2, phase conductor 1
2L2	system to be monitored, Line 2, phase conductor 2
2L3	system to be monitored, Line 2, phase conductor 3
2N	system to be monitored, Line 2, neutral conductor
AL1	system to be monitored, outgoing feeder (Line 3), phase conductor 1
AL2	system to be monitored, outgoing feeder (Line 3), phase conductor 2
AL3	system to be monitored, outgoing feeder (Line 3), phase conductor 3
AN	system to be monitored, outgoing feeder (Line 3), neutral conductor
k	transformer connection (“incoming”)
L	transformer connection (“running”)
52	potential-free contact signal relay (contacts 52-51 closed in case of a message)
51	potential-free contact signal relay
54	potential-free contact signal relay
24 V +	supply voltage 24 V DC (PELV) for SPR-107-V.4
24 V -	supply voltage 24 V DC (PELV) for SPR-107-V.4
-	digital input, GND
DI1	digital input 1
DI2	digital input 2
DI3	digital input 3
DI4	digital input 4
S1	connectible bus terminating resistor, under cover
CAN-Bus	bus interface CAN (2.0) Pin 1: 24 V DC GND, Pin 2: CAN-Low, Pin 3: Shield, Pin 4: CAN-High, Pin 5: + 24 V DC, Pin 6: Shield

Control relay outputs (control of load switching devices), open-circuit monitoring parameterizable

11	potential-free contact output DA1 (switching device 1 “On”)
12	potential-free contact output DA1
21	potential-free contact output DA2 (switching device 1 “Off”)
22	potential-free contact output DA2
31	potential-free contact output DA3 (switching device 2 “On”)
32	potential-free contact output DA3
42	potential-free contact output DA4
41	potential-free contact output DA4 (switching device 2 “Off”)
44	potential-free contact output DA4 (switching device 2 “Off”)



Connections DI1 to DI4 must only be used for the connection of original accessories or connected with potential-free contacts!

Incorrect connection can cause destruction of the device!

Assembly, Connection, Start-up, Service and Tests

The device is installed inside installation distributors conforming to DIN 43871 on top-hat rails conforming to DIN EN 60715. Assembly, connection and start-up must only be performed by skilled electricians and in strict compliance with applicable safety regulations and standards.

The operating manual of the device contains detailed references to the connection, start-up and tests

Meaning of LED Indicators and Status of Plain Text Messages

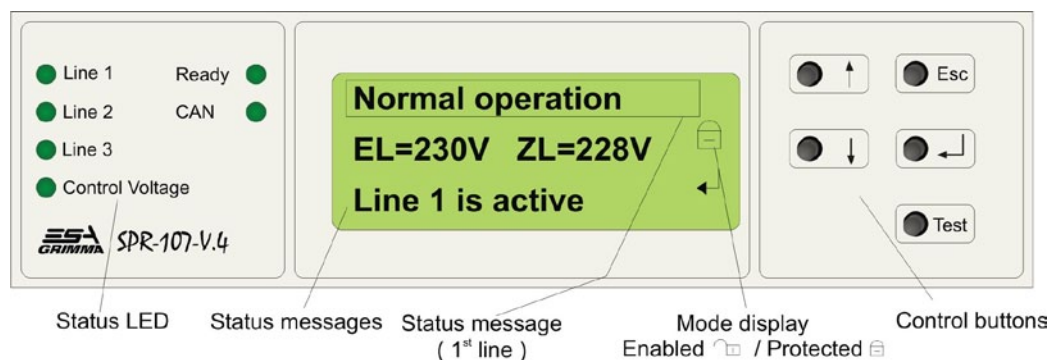


Figure 2: Front view SPR-107-V.4 in normal operation (no errors / faults present)

The text display supplies the “Basic Screen”.

⊗ “Line 1”	Status of Line 1 and the associated switching device 1	
	Red	Voltage of line outside limiting values
	Green	Voltage O.K.
	Permanent light	Contact element closed
	Flashing light	Contact element open
⊗ “Line 2”	Status of Line 2 and the associated contact element 2 as “Line 1”	
⊗ “Line 3”	Voltage status of outgoing feeder	
	Red	Voltage of line outside limiting values
	Green	Voltage O.K.
⊗ “Control Voltage”	Status of control voltage change-over unit (STU-107-V.3)	
	Green	STU in normal operation
	Red	STU has changed over
⊗ “Ready”	Status of change-over, presence of messages that have not yet been read	
	Green	Normal operation
	Green flashing	Error rectified / fault has disappeared unacknowledged message is still present
	Red flashing	new error / new fault has occurred unacknowledged message is still present
	Red	Message was acknowledged, but error / fault is still present
⊗ “CAN”	Status of bus connection	
	Green flashing	Bus O.K. (communication O.K.)
	Red flashing	Bus error (address conflict)
	off	Bus out of operation

All messages can be viewed in the text display.

Control Buttons and Status



Button	Function
↵	<p>Enter button</p> <p>in normal operation: to activate the control menu</p> <p>within the menu: to invoke sub-menus and menu options</p> <p>in parameterization mode: to accept values</p> <p>in the text display: to acknowledge messages</p>
↑↓	<p>Up / Down buttons</p> <p>in normal operation: no function</p> <p>within the menu: to navigate through sub-menus and between menu options</p> <p>in parameterization mode: to set values</p> <p>in the text display: to select messages</p>
Esc	<p>Escape button</p> <p>in normal operation: no function</p> <p>within the menu: to navigate back one menu level</p> <p>in parameterization mode: if values were changed, they are not accepted</p>
Test	<p>Test button</p> <p>in parameterization mode: to activate a test change-over</p> <p>Pressing this button for at least 4 seconds generates a test change-over.</p> <p>Messages are thereby not submitted through the signal relay and the CAN-bus.</p>
Status	Meaning
	<p>is equivalent to "Protected"</p> <p>Values in the menu cannot be changed, but viewed only. The release (change to the parameterization mode) takes place in menu option "1.2 unlock parameters".</p>
	<p>is equivalent to "Enabled"</p> <p>The parameterization mode is active. Values in the menu can be changed and saved.</p>

Table 1: Control buttons and mode display

Change-over Sequence – Switching and Delay Times

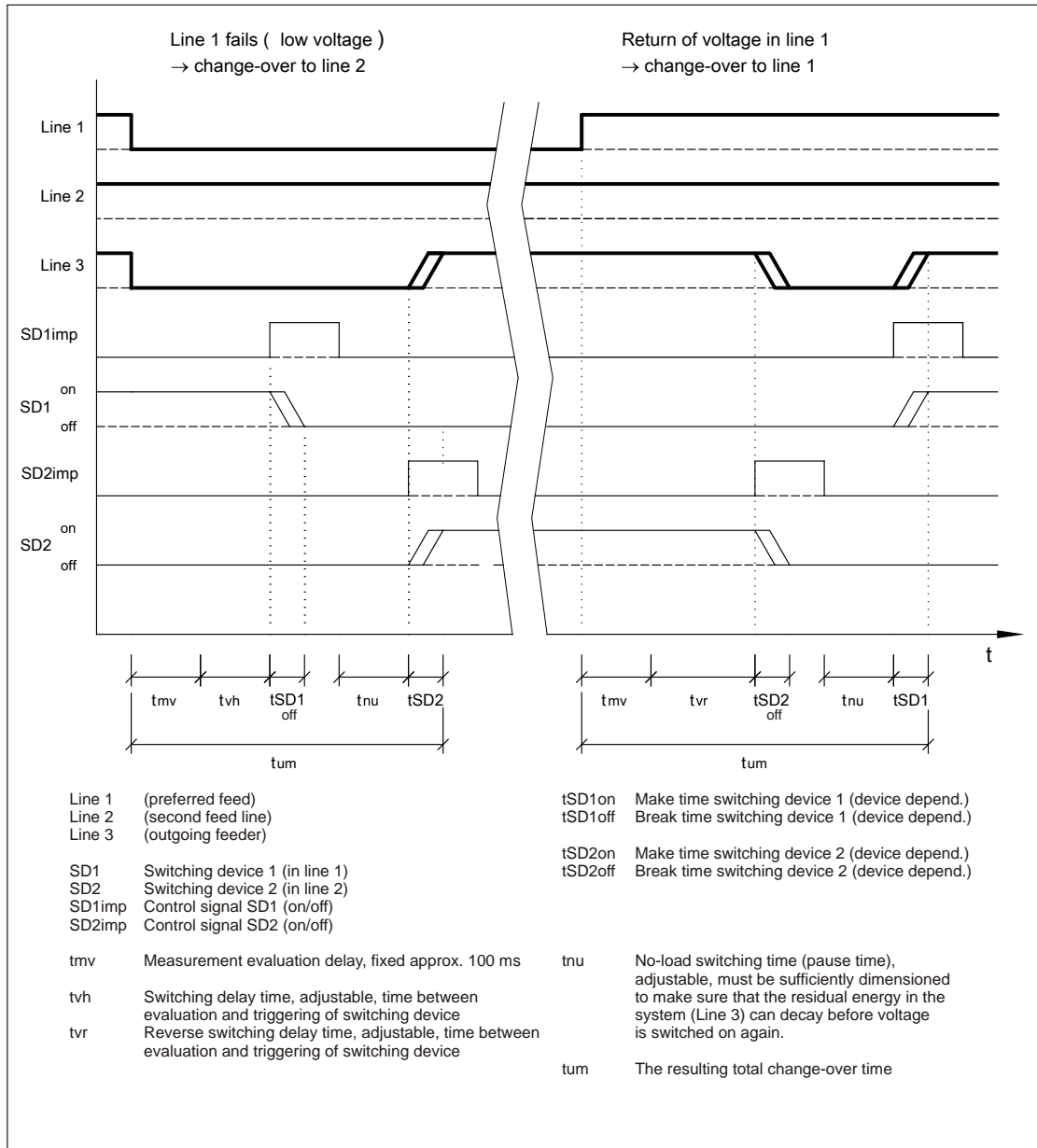


Figure 3: Change-over sequence – switching and delay times

Technical Data

General operating data	
Rated voltage U_e (insulation coordination acc. to IEC 60664-1)	AC 250 V
Rated impulse withstand voltage.....	4 kV
Pollution degree	3
Supply voltage U_s	DC 24 V (PELV)
Operating range	0.85 to 1.25 x U_s
Internal consumption.....	approx. 7 W
Messages via	plain text display / LED / signal relay / CAN-Bus
Voltage monitoring (Line 1, 2 and 3)	
System monitored	1/N AC 0 to 290 V / 3/N AC 0 to 500 V / 2 AC 0 to 500 V / each 50 to 60 Hz
Lower operate value (low voltage) 230 / 400 V system.....	parameterizable 150 to 230 V / 260 to 400 V
upper operate value (overvoltage) 230 / 400 V system.....	parameterizable 230 to 260 V / 400 to 460 V
Internal resistance R_i (1L1-1N, 2L1-2N, AL1-AN)	65 k Ω
Internal resistance R_i (1L2-1N, 1L3-1N, 2L2-2N, 2L3-2N, AL2-AN, AL3-AN)	1 M Ω
Change-over control	
Switching delay time T_{vh}	parameterizable 0 to 999 s
Reverse switching delay time T_{vr}	parameterizable 0 to 999 s
No-load switching time T_{nu}	parameterizable 0 to 999 s
Neutral conductor monitoring (option) in connection with a transformer	
Operate value / hysteresis	10 mA / fixed 30%
Control relay outputs DA1 – DA4	
Contact elements	1 make contact (DA4: 1 two-way contact)
Rated contact voltage	AC 250 V / DC 30 V
Making capacity	AC / DC 5 A
Open-circuit monitoring per output.....	parameterizable
Triggering time (pulse) per output	parameterizable 0.10 to 4 s
Signal relay (fault message)	
Contact elements	1 two-way contact
Rated contact voltage	AC 250 V / DC 30 V
Making capacity	AC / DC 5 A
Operating mode	Bias current
Digital inputs DI1 – DI4	
Voltage (permanently applied, internally generated).....	DC 24 V
Connection only with original accessories or potential-free contacts	
Communication interface / Protocol CAN / CAN (2.0) in compliance with ISO 11898	
Electromagnetic compatibility check (EMC)	
Interference immunity factor in conformity with EN 61000-6-2: March 2000 General standard for interference immunity in industrial areas	
Emitted interference in conformity with EN 50081-1-1:	
Installation conditions	
Ambient temperature (during operation) in conformity with EN 61557-8:1997	-5 °C to +45 °C
Ambient temperature (during storage) in conformity with EN 61557-8:1997.....	-25 °C to +70 °C
Climatic category in conformity with IEC 721	3K5, without thawing and icing
Installation position.....	vertical
Mounting	top-hat rail in conformity with DIN EN 60715
Device dimensions in mm (H x W x D).....	90 x 160 x 73
Type of connection.....	modular terminal blocks
Connection cross-section /single-core / multi-core	0.2 to 4 mm ² / 0.2 to 2.5 mm ² (AWG 24-12)
Degree of protection in conformity with DIN EN 60529 for installations / terminals.....	IP30 / IP20
Flammability class.....	UL94V-0
Weight	approx. 400 g
Order information	
SPR-107-V.4.....	Art.-No.: 0080038

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