ZIEHL industrie – elektronik GmbH + Co KG
Daimlerstr.13, 74523 Schwäbisch Hall, Germany
+ 49 791 504-0, info@ziehl.de, www.ziehl.de



# Operating Manual SPI1021

updated: 2022-08-03 /Sc
from Firmware: 0-0

**For more information and help about this product please scan the QR-Code or choose the following link: SPI1021**

**Operating manual, Quick guide, Datasheet, Connection diagram, CAD Data
Firmwareupdates, FAQ, Videos about installation and settings, Certificates**

**- Grid- and Plant Protection According to CEI 0-21 and DEWA standard**
**- with self-test for < 11kW and Watchdog**
**- with integrated vector shift relay**
**- Pr3 = default**

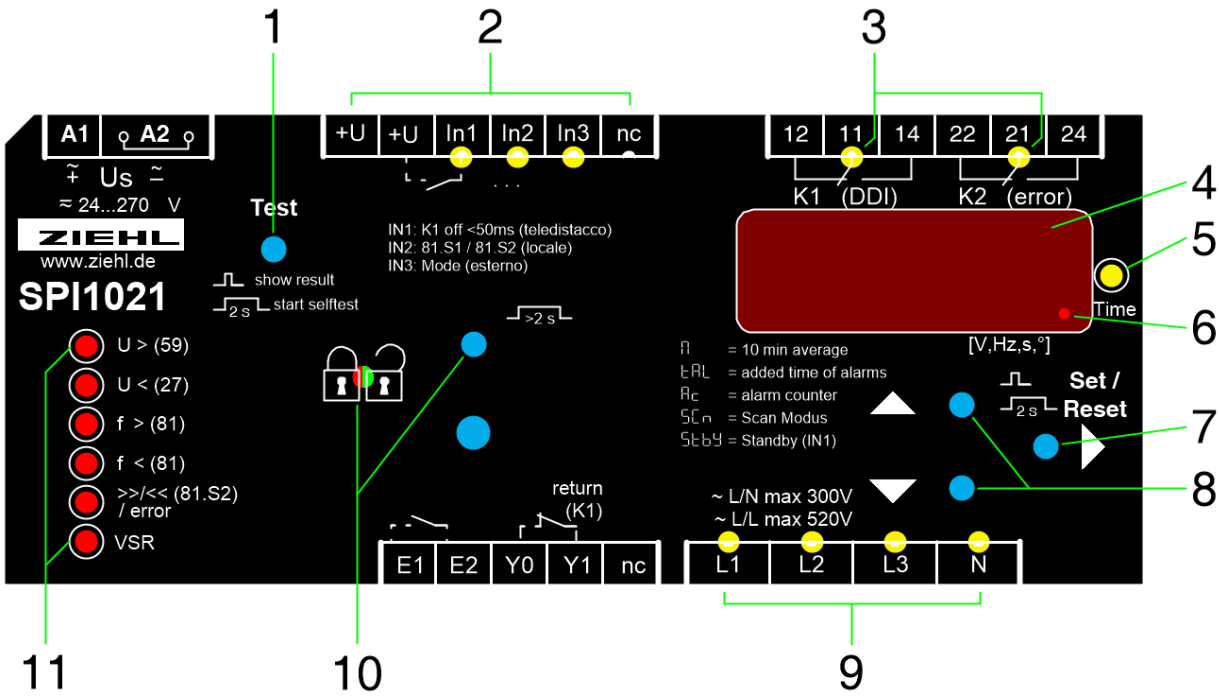
## Table of contents

# 1 General Notes

Compliance with the following instructions is mandatory to ensure the functionality and safety of the product. If the following instructions given especially but not limited for general safety, transport, storage, mounting, operating conditions, commissioning and disposal / recycling are not observed, the product may not operate safely and may cause a hazard to the life and limb of users and third parties.

Deviations from the following requirements may therefore lead both to the loss of the statutory material defect liability rights and to the liability of the buyer for the product that has become unsafe due to the deviation from the specifications.

# 2 Display and controls




1 **Test Button**

| | |
|---|---|
| Press briefly | The self-test result is displayed, display next result |
| Press for > 2 s | Start self-test, K1 de-energize, K2 energize (K2 = off in Pr4, 5 and 6) |

2 **LEDs Inputs status** (yellow)

| | |
|---|---|
| OFF | Input not active (open) |
| ON | Input active (closed) |

3 **LEDs relay status** (yellow)

| | |
|---|---|
| OFF | Relay is released |
| ON | Relay is operating |

4 **Digital display 4-digits** (red)
Depending on program, display of current voltage, frequency, vector shift, average value
Displays the alarm signals, e.g. AL , AL 1
Displays the errors with error code e.g. Err9

5 **LED Time** (yellow)

| | |
|---|---|
| ON | A time is displayed |

6 **Last decimal point** (red)

| | |
|---|---|
| OFF | Display mode |
| Illuminated | Menu mode |
| Flashes | Configuration mode |

7 **Set / Reset key** ▶ (in display mode, normal state)

| | |
|---|---|
| Press briefly | Display of next measured value / alarm counter |
| Press for > 2 s | Reset, quit error messages |
| Press for > 4 s | Displays the program, e.g. Pr 1 |
| Press for > 10 s | Displays the software version, e.g. 0-0 |

8 **Up / Down key** ▲▼ (in display mode, normal state)

| | |
|---|---|
| Press briefly | Change to the menu mode, display of alarm memory (Down) / cumulative time of alarms, standby counter, standby time (Up), pushing Set button for ≥ 2 s resets the stored values |
| Press for > 2 s | Display of MAX (Up) / MIN (Down) - measured values, additional pushing of Set button for ≥ 2 s deletes the stored values |

9 **LEDs measurement allocation** (yellow)

| LEDs | Measured value |
|---|---|
| Lx and N ON | Voltage value (L1 against N, L2 against N, L3 against N) |
| Lx and Ly ON | Voltage value (L1 against L2, L2 against L3, L1 against L3) |
| Lx FLASHING quickly | Vector surge (L1, L2, L3) |
| L1 FLASHING | Frequency |

10 **sealable button + LED** 

| | |
|---|---|
| Press for > 2 s | Lock / Unlock |
| LED red  | Settings and simulation mode are locked,<br>While attempting to set, Loc is displayed for 3s |
| LED green | Setting and simulation enabled |

11 **LEDs frequency / voltage / VSR Limit value undercut / exceeded** (red)

| | | |
|---|---|---|
| ON, | AL or AL n | Limit value undercut / exceeded |
| FLASHES, | AL or AL n | Reset delay doF counting down |

## 3 Default settings and firmware version

When changing programs, all parameters are reset to the *default settings.

| Menu item | Parameter / Unit | | | Default setting | | | | | | User data |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | CEI 0-21 | | | DEWA | | | |
| | | | | 3AC+N 230V | 3AC 400V | 1AC+N 230V | 3AC+N 230V | 3AC 400V | 3AC 100V | |
| | | | | Pr 1 | Pr2 | Pr3 * | Pr4 | Pr5 | Pr6 | |
| U-- 59.S2 59>S2 | U-- | Alarm on/off | | oFF | oFF | oFF | oFF | oFF | oFF | |
| | U-- | **Overvoltage** | V | 264 | 458 | 264 | 264 | 458 | 115 | |
| | H-- | Hysteresis | V | 10.5 | 17.5 | 10.5 | 10.5 | 17.5 | 4.5 | |
| | dAL | Response time | s | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | |
| | doF | OFF-delay | s | 0 | 0 | 0 | 0 | 0 | 0 | |
| U- 59.S1 59>S1 | U- | Alarm on/off | | on | on | on | on | on | on | |
| | U- | **Overvoltage** | V | 264 | 458 | 264 | 253 | 438 | 120 | |
| | H- | Hysteresis | V | 10.5 | 17.5 | 10.5 | 10.5 | 17.5 | 4.3 | |
| | dAL | Response time | s | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.60 | |
| | doF | OFF-delay | s | 0 | 0 | 0 | 0 | 0 | 0 | |
| UN 59-Av | UN | Alarm on/off | | on | on | on | on | on | on | |
| | UN | **Overvoltage** | V | 253 | 438 | 253 | 253 | 438 | 110 | |
| | HN | Hysteresis | V | 10.0 | 17.5 | 10.0 | 10.0 | 17.5 | 4.3 | |
| | dAL | Response time | s | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | |
| | doF | OFF-delay | s | 0 | 0 | 0 | 0 | 0 | 0 | |
| U_ 27.S1 27<S1 | U_ | Alarm on/off | | on | on | on | on | on | on | |
| | U_ | **Undervoltage** | V | 196 | 339 | 196 | 196 | 339 | 85.0 | |
| | H_ | Hysteresis | V | 8.0 | 13.5 | 8.0 | 8.0 | 13.5 | 3.5 | |
| | dAL | Response time | s | 1.50 | 1.50 | 1.50 | 0.40 | 0.40 | 1.50 | |
| | doF | OFF-delay | s | 0 | 0 | 0 | 0 | 0 | 0 | |
| U__ 27.S2 27<S2 | U__ | Alarm on/off | | on | on | on | on | on | on | |
| | U__ | **Undervoltage** | V | 34.5 | 60.0 | 34.5 | 92.0 | 159 | 3.0 | |
| | H__ | Hysteresis | V | 3.7 | 3.7 | 3.7 | 3.7 | 6.4 | 1.5 | |
| | dAL | Response time | s | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | 0.20 | |
| | doF | OFF-delay | s | 0 | 0 | 0 | 0 | 0 | 0 | |
| F-- 81.S2 81>S2 | F-- | Alarm on/off | | on | on | on | on | on | on | |
| | F-- | **Overfrequency** | Hz | 51.50 | 51.50 | 51.50 | 54.00 | 54.00 | 54.00 | |
| | H-- | Hysteresis | Hz | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | |
| | dAL | Response time | s | 0.10 | 0.10 | 0.10 | 10.0 | 10.0 | 10.0 | |
| | doF | OFF-delay | s | 0 | 0 | 0 | 0 | 0 | 0 | |
| F- 81.S1 81>S1 | F- | Alarm on/off | | oFF | oFF | oFF | oFF | oFF | oFF | |
| | F- | **Overfrequency** | Hz | 50.20 | 50.20 | 50.20 | 52.50 | 52.50 | 52.50 | |
| | H- | Hysteresis | Hz | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | |
| | dAL | Response time | s | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | |
| | doF | OFF-delay | s | 0 | 0 | 0 | 0 | 0 | 0 | |

| Menu item | Parameter / Unit | | | CEI 0-21 | | | DEWA | | | User data |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | 3AC+N 230V | 3AC 400V | 1AC+N 230V | 3AC+N 230V | 3AC 400V | 3AC 100V | |
| | | | | Pr 1 | Pr2 | Pr3 * | Pr4 | Pr5 | Pr6 | |
| F_ 81.S1 81<S1 | F_ | Alarm on/off | | oFF | oFF | oFF | oFF | oFF | oFF | |
| | F_ | **Underfrequency** | Hz | 49.80 | 49.80 | 49.80 | 47.50 | 47.50 | 47.50 | |
| | H_ | Hysteresis | Hz | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | |
| | dAL | Response time | s | 0.10 | 0.10 | 0.10 | 4.00 | 4.00 | 4.00 | |
| | doF | OFF-delay | s | 0 | 0 | 0 | 0 | 0 | 0 | |
| F__ 81.S2 81<S2 | F__ | Alarm on/off | | on | on | on | on | on | on | |
| | F__ | **Underfrequency** | Hz | 47.50 | 47.50 | 47.50 | 46.00 | 46.00 | 46.00 | |
| | H__ | Hysteresis | Hz | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | |
| | dAL | Response time | s | 0.10 | 0.10 | 0.10 | 10.0 | 10.0 | 10.0 | |
| | doF | OFF-delay | s | 0 | 0 | 0 | 0 | 0 | 0 | |
| UonF | UonF | Alarm on/off | | oFF | oFF | oFF | on | on | on | |
| | UonF | Voltage 0,2 Un | V | 46.0 | 80.0 | 46.0 | 46.0 | 80.0 | 20.0 | |
| uSr 78 | uSr | Alarm on/off | | oFF | oFF | oFF | oFF | oFF | oFF | |
| | uSr | **Vector shift** | ° | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | |
| | doF | OFF-delay | s | 3 | 3 | 3 | 1 | 1 | 1 | |
| | dEon | Suppression time | s | 2 | 2 | 2 | 2 | 2 | 2 | |
| | uSr | Number of phases | | 3Ph | 3Ph | | 3Ph | 3Ph | 3Ph | |
| rocF 81r | rocF | Alarm on/off | | oFF | oFF | oFF | oFF | oFF | oFF | |
| | dFdt | **delta f / delta t** | Hz/s | 0.800 | 0.800 | 0.800 | 2.000 | 2.000 | 2.000 | |
| | PEr | periods | | 20 | 20 | 20 | 20 | 20 | 20 | |
| | dAL | Response time | s | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | |
| | doF | OFF-delay | s | 60 | 60 | 60 | 1 | 1 | 1 | |
| rEL | trEL | response time Y1 | s | 5.0 | 5.0 | oFF | 5.0 | 5.0 | 5.0 | |
| | don | Delay On | s | 300 | 300 | 300 | 300 | 300 | 300 | |
| NodE | NodE | Mode | | trAn | trAn | trAn | trAn | trAn | trAn | |
| | dAL- | Response time(<</>>) | s | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | 1.00 | |
| | dAL_ | Response time(<</>>) | s | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | 4.00 | |
| ddi | ddi | Display delay | s | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | |
| | di t | Display duration SCn | s | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | |
| Si | U | Voltage | V | 230 | 400 | 230 | 230 | 400 | 100 | |
| | F | Frequency | Hz | 50.00 | 50.00 | 50.00 | 50.00 | 50.00 | 50.00 | |
| | uSr | Vector shift | ° | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | |
| CodE | Pin | Pincode | | 504 | 504 | 504 | 504 | 504 | 504 | |
| | CodE | on/off | | oFF | oFF | oFF | oFF | oFF | oFF | |
| InFo | Fnr | Firmware version | | 0-0 | 0-0 | 0-0 | 0-0 | 0-0 | 0-0 | |
| | Snr | Serial number | | xxxxx | xxxxx | xxxxx | xxxxx | xxxxx | xxxxx | |
| | h | Operating hours | h | xxxxx | xxxxx | xxxxx | xxxxx | xxxxx | xxxxx | |
| | Err | Error counter | | xxx | xxx | xxx | xxx | xxx | xxx | |
| | Pr | Program | | 1 | 2 | 3 | 4 | 5 | 6 | |

**Display program:** InFo → Pr or when switching on, **Display firmware version:** InFo → Fnr

# 4 Application and brief description

The SPI1021 monitors voltage and frequency in plants for own generation of electricity. It fulfills the requirements of CEI 0-21 + DEWA.
6 selectable programs allow measuring, 3 phases to neutral (4-wire mode), 3 phases phase-phase (3-wire mode) and single phase to neutral (2-wire).
The SPI1021 can monitor all decentralized power plants, photovoltaic, wind or thermal, that feed in the low or medium voltage grid. In applications with possible asymmetry >6kVA, power balance has to be monitored extra.
All limits are preset according to CEI 0-21(Pr1-3) or DEWA (Pr4-6). They can be changed if required and be protected with a code and/or a seal.
A counter for alarms and standbys stores the last 100 events with reason and elapsed time. In addition, the time the SPI1021 has interrupted the plant is recorded. All values can be read displayed at the device and give the operator valuable information about the availability of the plant.
The standby input allows a remote shutoff e.g. with a RCR. It can also be used to switch to an energy saving mode by a timer or a twilight switch. Number of standbys and added time are stored and can be read in the display.

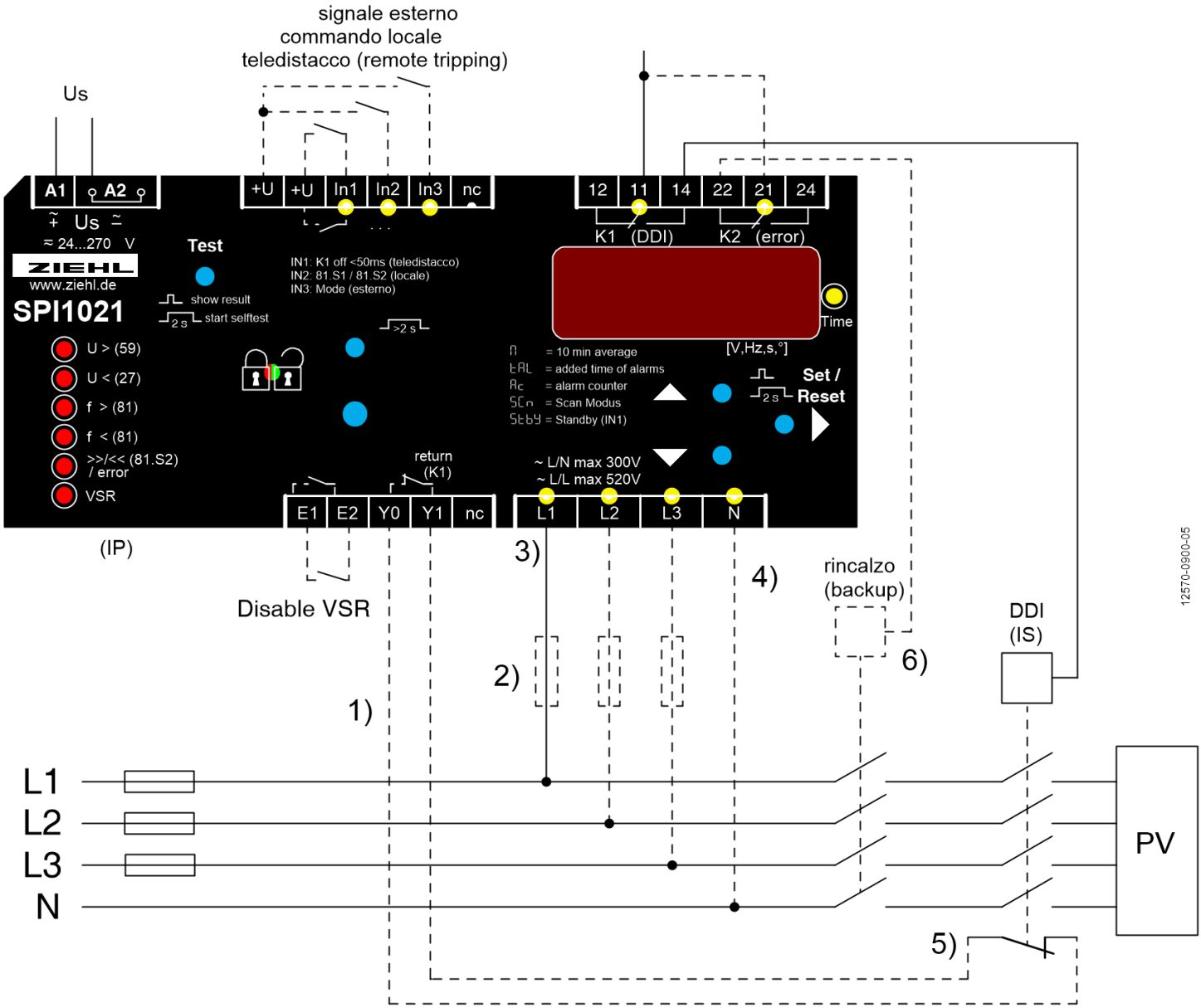
# 5 Summary of the functions

When the device has been installed, a self-test starts automatically. The self-test can be repeated when required. All values of the test are stored and can be read out at the display.

- Monitoring of under- and overvoltage 0/15-520 V
- Measuring of 3 phases with or without neutral or single phase
- Monitoring of over- and underfrequency 45-65 Hz (voltage dependent, adjustable)
- Monitoring of quality of voltage (10-minutes-average)
- Monitoring of vector-shift (connectible) and rocof (rate of change of frequency)
- Input IN2 for selection of frequency window
- Input In3 for selection of mode transitory or definitive
- Input Y0/Y1 for monitoring function of connected switch (automatic detection of nc/no)
- Relay K2 picks up (on time <500ms) only at failure at switch connected to K1, only with manual reset
- 2 restarts at switch-on error of connected switch
- Self-test with storing of values
- Switching delays adjustable 0,05…130 s
- Switching-back-delays adjustable 0…999 s
- Different switching time according to type of alarm and selected mode
- Switch-on delay 300 s
- All parameters preset according to CEI 0-21
- Alarm counter for 100 alarms with value, reason and elapsed time
- Recording of added time of alarms
- Input for standby (off time <50ms) with counter and recording of time
- Simulation for testing
- Sealing, all parameters can be read out while sealed
- Easy installation and programming with 6 preset programs
- Supply-voltage AC/DC 24-270 V
- Housing for DIN-rail-mount, 105 mm wide, mounting height 70 mm

# 6 Connection diagram

### 1x PV, 2x section switch




1) Feedback contacts not connected set rEL → trEL → oFF
2) Fuses only when line protection necessary, e.g. 3x16A
3) Pr 3 Phase connect to L1, L2 and L3 are not connected
4) N connected set Pr 1, Pr 3, Pr 4
5) NC- or NO-contacts can be connected, automatic detection when switching on
6) must be connected for plants ≥ 20kW

# 7 Important information

**A marked switch and a protective device must be provided in the supply line in the vicinity of the device (easily accessible) as a disconnecting element (rated current ≤ 6A).**

Flawless and safe operation of such a device requires proper transport and storage, professional instillation and later commissioning along with operation as intended.
Only persons who are familiar with the installation, commissioning and operation of the device and who are correspondingly qualified for their job are permitted to work on the device. They must comply with the contents of the operating manual, the instructions attached to the device and the pertinent safety regulations for the erection and operation of electrical equipment.
The devices are built and certified in accordance with EN 60255 and leave the factory in a safe and technically flawless condition. To maintain this condition they must comply with the safety regulations marked in the operating manual with the headline "Caution". Failure to follow the safety regulations can lead to death, bodily injury or property damage to the device itself and to other devices and equipment.
If the information contained in the operating instructions/operating manual are not sufficient, please contact us directly or contact your responsible agency or representative.
Instead of the industrial norms and stipulations stated in the operating manual and applicable in Europe you must comply with the valid and applicable regulations in the country of utilisation if the device is used outside of the area of application.

**WARNING**

**Hazards electrical voltage!**
**Can lead to an electric shock and burns.**
**Disconnect and de-energize before working on the system and the device.**

**Comply with the maximum permissible temperature when installing in a switch cabinet. Ensure sufficient clearance to other devices or heat sources. If cooling is inhibited, e.g., through close proximity to devices with increased surface temperature or interference with the cooling-air current, the permissible ambient temperature is decreased.**

**Caution!**
Before you apply mains voltage to the device, make sure that the permissible control voltage **Us** on the side rating plate matches the mains voltage connected to the device!

# 8 Assembly

The device can be mounted:

- Distribution panel or control panel on 35 mm rail according to EN 60715

# 9 Detailed description

## 9.1 Description of the connections

| Connection | Description |
|---|---|
| A1 and A2 | Rated control supply voltage Us, see Technical Data |
| 11, 12, 14; 21, 22, 24 | Relay K1 (DDI) und K2 (rincalzo, back up, only with manual reset) |
| E1 – E2<br>Enable – Input | volt-free contact |
| | usr → oFF, no function |
| | usr → on, E1-E2 closed: Vector shift active but not evaluated, monitoring of feedback contacts off for use with generator (mains synchronization) |
| Y0, Y1<br>Inputs feedback contacts | Volt-free n/o or n/c contact, self-learning when switching on |
| | Set value > turn-on time section switch under rEL → trEL / can switch-off if not connected or if external devices/switches can activate the section switch ( oFF ) |
| +U | Supply output for digital outputs, DC 15…35 V |
| IN1<br>(teledistacco, RCR) | volt-free contact |
| | closed: K1 released <50 ms (Standby mode, StbY ) |
| IN2<br>(commando locale) | volt-free contact |
| | <u>transitory mode</u><br>open: F-- + F__ = on ; F- + F_ = oFF<br>closed: F-- + F__ = oFF ; F- + F_ = on<br><br><u>definitiv mode</u><br>open: F-- + F__ = oFF ; F- + F_ = on<br>closed: F-- + F__ = on ; F- + F_ = oFF ;<br>alternative response time: dAL- + dAL_ active |
| IN3<br>(signale esterno) | volt-free contact |
| | nodE → trAn, nodE → dEFı , no function |
| | nodE → In 3,<br>closed: Definitiv mode<br>open: Transitory mode |
| L1, L2, L3, N | Phase L1, L2, L3 and neutral conductor |

## 9.2 functional characteristics

| Functional characteristics | Explanation |
|---|---|
| VSR display value | The highest measured value is always displayed. The display value is reset to 0 by deleting the max. Value and when resetting into the go (good) state. |
| Delay Enable On time | Runs down when starting the unit and after opening the enable input; during this time there is no evaluation of the vector shift |
| Reset time | When a reset time doF is running, it is always counted down in the display (shortest one first) |
| Reset | Use the Reset key or interrupt the control voltage for > 2 s (comply with reset delay) |
| Display mode Scn | After the last measurement it switches into the scan mode; this is indicated by the display Scn.<br>All measurements will now be displayed cyclically for the time set in dit. |
| MIN / MAX values | All min and max values are saved zero-voltage maintained (non-volatile). |
| Alarm counter | The unit saves max 100 alarms (cause, measurement value, at operating time). The LEDs indicate the cause; the tripping value that led to the alarm each stands in the 7-segment display. Alternately the time difference, current operating time – tripping operating time is displayed. (how long ago the alarm triggered) |
| Cumulative alarm time tAL | The cumulative alarm time TAL indicates how long the relay was switched off due to an alarm. It is recorded with a resolution of 1 minute and only when the control voltage is applied.<br>Query: In the display mode ▶ button to Ac is displayed. 1x ▲ button = Cumulative alarm time tAL |
| Standby mode | If IN1 is closed (e.g., by ripple control receiver, timer, dimmer), Relays K1 switched off. The number and duration of the shutdowns is recorded.<br>Query: In the display mode ▶ button to Ac is displayed. 2x ▲ button = Standby counter StbY 1x ▲ button = Standby time StbY |
| Automatic restart attempts | If there is an error by the feedback contacts Err1, 2 restart attempts are automatically performed in an interval of 10s.<br>False triggering by undervoltage trips (e.g. during a thunderstorm) do not lead to permanent shut-down. |
| Frequency undervoltage protection UonF | if one of the measured voltages less than UonF, the frequency evaluation is interrupted until all voltages have exceeded UonF. (does not apply to device start / apply of the control voltage) |

# 10 Commissioning

## 10.1 Program Setup

The suitable program must be set on the SPI1021 in accordance with the application. If the SPI1021 is sealed/locked (red LED illuminated), the sealing has to be deactivated first.

| Pr | Connection | Limit | | Rated voltage | default setting | Standard |
|---|---|---|---|---|---|---|
| 1 | 3 AC with N | 2x overvoltage,<br>2x overfrequency,<br>10min mean value,<br>1x rocof | 2x undervoltage<br>2x underfrequency<br>1x vector shift, | 230V | CEI 0-21 | CEI 0-21<br>+<br>DEWA |
| 2 | 3 AC without N | | | 400V | CEI 0-21 | |
| *3 | 1 AC with N | | | 230V | CEI 0-21 | |
| 4 | 3 AC with N | | | 230V | DEWA | |
| 5 | 3 AC without N | | | 400V | DEWA | |
| 6 | 3 AC without N | | | 100V | DEWA | |

* default setting

Adjustment process:
If present, remove seal (only authorized person)

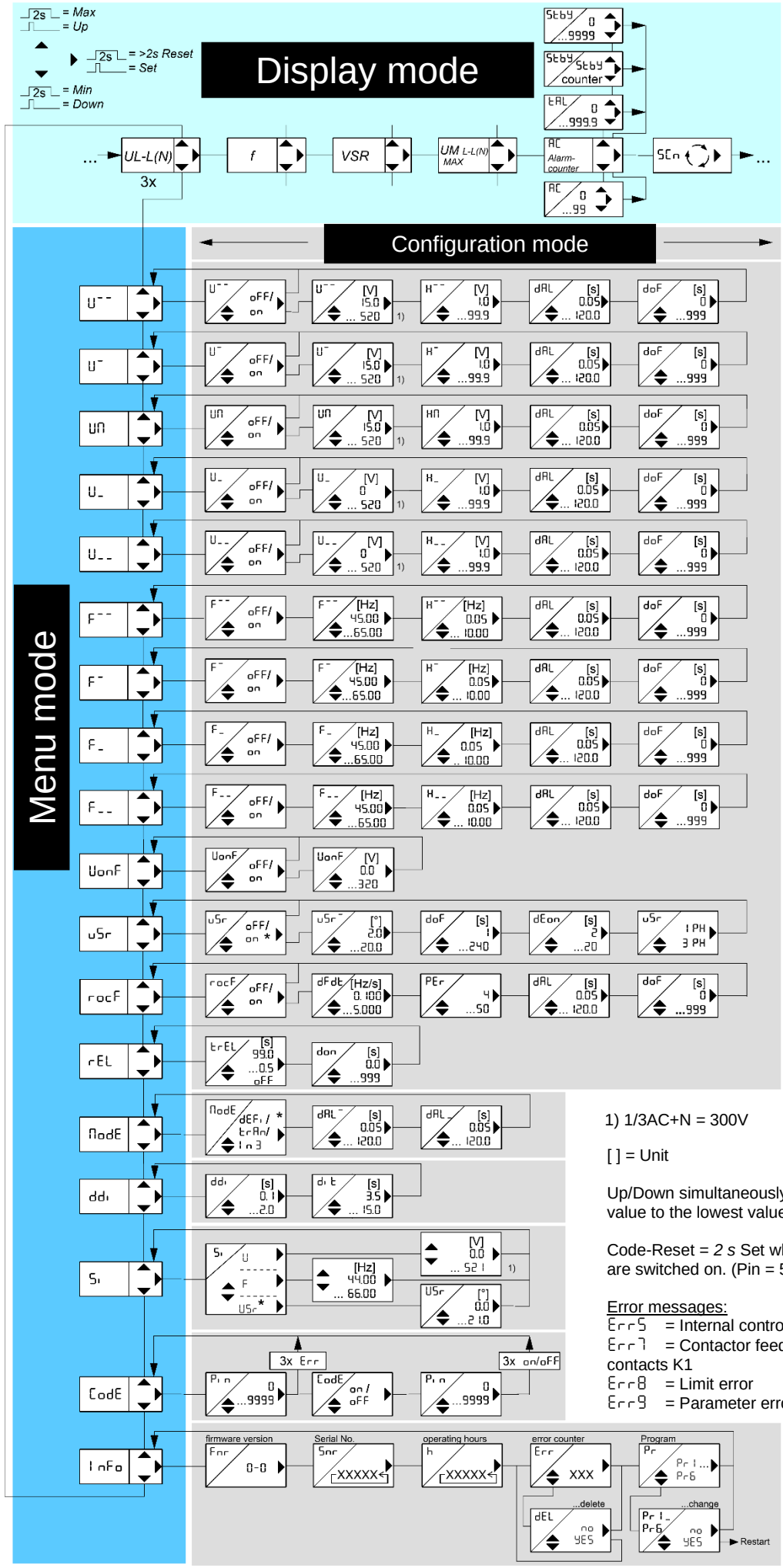
- Apply control supply voltage at A1-A2
- Slightly lift the key cover and turn 180°
- Actuate the small blue button by firmly pressing the button cover (LED starts flashing) until the green LED  is illuminated.

Sealing is deactivated

- Press ▲ button 1x → display InFo.
- Press ▶ button 5x → display Pr 1.
- Set the program with the buttons ▲ ▼
- Press ▶ button 1x → display no.
- Press ▼ button 1x → display YES.
- Press ▶ button
  ⇒ Device resets and starts with the newly selected program

Hint: When changing programs, all parameters of the selected program are reset to “default settings (see table „Default settings“). **Only change the parameters after having selected the correct program.**

## 10.2 Control chart Pr 1…6




1) 1/3AC+N = 300V

[ ] = Unit

Up/Down simultaneously sets the value to the lowest value.

Code-Reset = *2 s* Set when mains are switched on. (Pin = 504)

Error messages:
Err5 = Internal control
Err7 = Contactor feedback contacts K1
Err8 = Limit error
Err9 = Parameter error

## 10.3 description of the parameters

| Parameters | Display | Explanation | Adjustment range |
|---|---|---|---|
| **Power up delay (delay On)** | don | Runs once at startup device, adjustable rEL . → don . | 0.0 … 999 |
| **Limit value** | U-- U- U_ U_- UN U__ | Voltage limit value | 15.0 … 300 15.0 … 520 |
| **Limit value** | F-- F- F_ F__ | Frequency limit value | 45.00 … 65.00 |
| **Frequency Undervoltage** | UonF | frequency undervoltage, below this value the frequency protection is inhibited | 0.0 … 320 |
| **Hysteresis** | H | 253V (Limit) – 3V (Hysteresis) = 250V (Reset value) If the limit value is offset in Pr1 or Pr2 at F- , the hysteresis also has to be adapted. | 1.0 … 99.0 0.05 … 10.00 |
| **Response time (delay Alarm)** | dAL | An alarm is suppressed for the set time (seconds) | 0.05 … 120.0 |
| **Turn-on time (delay Off)** | doF | Reset is delayed for the set time, also during voltage recovery, this time (seconds) is always counted down in the display | 0 … 999 |
| **Enable time (delay On)** | dEon | There is no evaluation of the vector shift during this time; starts with the application of the control voltage and when opening the Enable input | 2 … 20 |
| **VSR** | uSr | 1 Ph : a vector surge on one phase leads to an alarm 3 Ph : a vector surge on all phases simultaneously leads to an alarm | 1 Ph … 3 Ph |
| **Limit value** | dFdt | ROCOF, df/dt limit value | 0.10 … 5.00 |
| **Periods** | PEr | Measuring time ROCOF, (4=sensitive, 50=insensitive) Response time= PEr * Period duration + dAL | 4 … 50 |
| **delay Display** | ddi | Interval during which the display is updated in the display mode | 0.1 … 2.0 |

## 10.4 Display mode (last decimal point off)

In the display mode, the SPI1021 is in its normal state; here, depending on the program, the actual voltage, the highest actual 10 minute mean value, the frequency or the vector surge is displayed. In addition, the alarm signals (e.g. AL , AL 1 ) and error codes (e.g. Err9 ) are displayed.

| | | |
|---|---|---|
| Function button Set / Reset | Press briefly: | Switches the measurement, alarm counter |
| | Press for > 2 s: | Resets after locked alarm (not possible if doF Reset delay is counting down) |
| | Press for > 4 s: | Displays the program, e.g. Pr 1 |
| | Press for > 10 s: | Displays the software version, e.g. 0-03 |
| Function key Up / Down | Press briefly: Display alarm counter: | Change into the menu mode, Down = Query the memory Up = Query the cumulative alarm time |
| | Press for ≥ 2 s: | Displays MAX and MIN measurements, additionally pressing the Set key for ≥ 2 s deletes the saved values |

## 10.5 Menu mode (last decimal point on)

The menu mode is used to select the menu items. If no key is pressed for 30 s, one automatically returns to the display mode.

| | |
|---|---|
| Function button<br>Set / Reset | Press briefly: Change into the configuration mode |
| | Press for ≥ 2 s: Returns to the display mode (the most recently set values are then applied) |
| Function key<br>Up / Down | Press briefly: Select menu item; changes into the display mode |

## 10.6 Configuration mode (last Decimal point flashes)

In the configuration mode you can set the value of a parameter. The display alternates between the parameter relation and the currently set value until one of the Up/Down buttons is pressed, which changes the value of the parameter. If no key is pressed for 2 s the display starts alternating again.
If no key is pressed for 30 s (simulation mode 15 min) one automatically returns to the display mode (the most recently set value is applied during this)

| | |
|---|---|
| Function button<br>Set / Reset | Press briefly: The settings are taken over; continue to next parameter. Changes into menu mode after the last parameter |
| | Press for ≥ 2 s: Returns to the display mode (the most recently set values are then applied) |
| Function key<br>Up / Down | Press briefly/long: Value change of the parameter (slow/fast) |

Hint: Simultaneously pressing the Up and Down keys resets the adjustable value to zero. If the Up or Down button is kept pressed while setting the value the change in the display is accelerated.

## 10.7 Self-test execute

In programs 1, 3, 4 the SPI1021 has an automatic self-test as recommended in CEI 0-21 and DEWA.
K1 can pick up only after the self-test has been passed once.
Self-test starts automatically as soon as measuring voltage is connected for the first time to a new device and when there is no alarm! Self-test also starts automatically when program has been changed to 1, 3, 4.
Self-test can be started manually by pressing button Test for ≥2 s.
During the Self-test is tESt displayed.
At the end of the test the result PASS (passed) or FAIL (not passed) is displayed for 30 seconds. Reset stops the test.
During self-test supply- and measuring-voltage may not be disconnected!

## 10.8 Display Self-test result

The values and times have been measured during self-test can be displayed by pressing button Test shortly. Kind of limit ( U⁻⁻, U⁻, UN, U_, U__, F⁻⁻, F⁻, F_, F__), response time, measured value, trigger value and adjusted limit are displayed. LEDs (yellow) at the terminals L1…N shows the measured and trigger value.
By pressing Test shortly display changes to the values of the next kind of limit. At last the result PASS (passed) or FAIL (not passed) is displayed and additionally the switching time from K1 if trEL is activated.
Display automatically returns to normal mode 30 s after button Test has been pressed for the last time.

## 10.9 Alarm counter

The alarm counter Ac is increased by 1 with every shut-down. Up to 100 shut-downs are counted. That allows quick detection of how often the SPI1021 has shut down since the last delete of the alarm counter (see cumulative alarm time).
Query the alarm counter:

- Change into the display mode
- Press the ▶ button several times until → display Acxx

## 10.10 Cumulative alarm time (display in hours)

The cumulative alarm time tAL indicates how long the relay was switched off due to an alarm. It is recorded with a resolution of 1 minute and only when the control voltage is applied.
Query the cumulative alarm time:

- Change into the display mode
- Press the ▶ button several times until → display Acxx
- Press the ▲ button 1x → display tAL / x.xx

Delete the alarm counter and cumulative alarm time (only together):

- Display alarm counter Acxx
- Press the ▲ button 1x → display tAL / x.xx
- Keep the ▶ button pressed for 2s until → display tAL / 0.00

## 10.11 Alarm Memory

Independent of the alarm counter, the SPI1021 stores the most recent 100 shut-down causes (cause, measurement value, at operating time). Simulated alarms are also registered. The LEDs indicate the cause; the tripping value that led to the alarm each stands in the 7-segment display. Alternative to that the time is shown in hours which have passed since the last tripping (with applied control voltage).
These values remain saved even after the power has been turned off.
Query alarm memory:

- Change into the display mode
- Press the ▶ button several times → display Acxx
- Press the ▼ button 1x → display x.xx / x.xx
  (tripping value or error no. / time that has passed in hours)
- Press the ▼ button 1x, go to next alarm

The alarm memory is only deleted during a program change.

## 10.12 Standby counter and standby time

The standby counter Stby, is increased by 1 with every standby shut-down. Up to 9999 shut-downs are counted. That lets the SPI1021 quickly detect how often, e.g., shut-down was performed through a ripple control receiver.
Query the standby counter:

- Change into the display mode
- Press the ▶ button several times until → display Acxx
- Press the ▲ button 2x → display Stby / xxxx

The standby time Stby indicates how long the relay was switched off by the standby mode. It is recorded with a resolution of 1 minute and only when the control voltage is applied and if no alarm is present.
Query the standby time:

- Change into the display mode
- Press the ▶ button several times until → display Acxx
- Press the ▲ button 3x → display Stby / x.xx (Time LED is illuminated)

Delete the standby counter and standby time (only together):

- Display alarm counter Acxx
- Press the ▲ button 2x → display Stby / xxxx
- Keep the ▶ button pressed for 2s until → display Stby / 0

## 10.13 Code lock

You can protect the set parameters by enabling the code lock here.
The device acknowledges an incorrect entry with `Err` (flashes three times).

Adjustment process:

- Select the menu item with the ▲▼ buttons until → display `CodE.`
- Press the ▶ button 1x → display `Pin` / `0`
- Set the **saved** pin code with the ▲▼ buttons (**default setting is** `504`)
- Press the ▶ button 1x → display `CodE` / `oFF`
- Use the ▲▼ buttons to set the desired code lock:
  - `oFF` off, all parameters can be changed
  - `on` on, no parameters can be changed
- Press the ▶ button 1x → display `Pin` / `504`
- Use the ▲▼ buttons to set the new, desired pin code (**caution: write down the pin code**)
- Press the ▶ button 1x
  - ⇒ Code lock on, display `on` flashes three times
  - ⇒ Code lock off, display `oFF` flashes three times
  - ⇒ Return to menu mode, menu item code lock

If there any problems with the code lock (Pin forgotten), the lock can be switched off and the pin can be reset to 504 by keeping the Set key pressed while switching on the mains until `CodE` / `oFF` appears in the display.

## 10.14 Sealing

All the settings and the simulation mode can be locked.

If the LED is illuminated, the SPI1021 is locked.
If an attempt is made to change a setting in the locked state, for 3s the display shows `Loc`.

Adjustment procedure Sealing/Lock ON (OFF):

- If present, remove seal (only authorized person)
- Apply control supply voltage at A1-A2
- Slightly lift the key cover and turn 180°
- Actuate the small blue button by pressing the button cover very firmly (LED starts flashing) until the green LED is illuminated.

## 10.15 Simulation

Here, the voltage, frequency or a vector surge can be simulated and the setting can be tested. All 3 phases plus the 10 minute mean value are always simulated. All functions of the device operate as if this value is actually being measured. Alarm and error messages are only indicated with the LEDs and not in the display. The set values are simulated until the menu item `SI` is exited with the ▲ or ▼ button. If the SPI1021 is sealed/locked, simulation is not possible.
If the section switch feedback contacts are connected to the SPI1021 and enabled, (set value > section-switch turn-on time under `trEL`), after a shut-down, the tripping time (dAL + time of slowest section switch) is displayed.

Adjustment process:

- Select the menu item with the ▲▼ buttons until → display `SI`
- Press the ▶ button 1x → display `SI` / `U`
- Use the ▲▼ buttons to set the measurement factor for simulation:
  - `U` Voltage + 10min mean value (frequency = last simulated value)
  - `F` Frequency (voltage = last simulated value)
  - `uSr` Vector shift
- Press the ▶ button 1x → display `230` (selected measurement factor is simulated)
- Use the ▲▼ buttons to set the desired value

After exiting the Simulation menu item with the ▲▼ buttons, the unit switches over to monitoring the limits. The unit automatically returns to the display mode if no button is pressed for 15 minutes.

Hint: A limit value should be tested that is higher than the set 10min mean value. If the 10min mean value has to be temporarily switched off, set ( `UN .` → `oFF.` since otherwise it will trip first. The same applies, for example, for `U-`, during a simulation of `U--`.

## 10.16 Possible indications in display

display mode

| | |
|---|---|
| AL , AM | Alarm, Alarm 10min mean value |
| Err5 ... Err9 | Error messages (see 11. Error messages and measures) |
| Ac , tAL | Alarm counter, cumulative alarm time |
| Scn , M | Scan mode, 10min mean value |

Menu mode / configuration mode

| | |
|---|---|
| U-- , U- , U__ , U_ | Voltage limit value |
| UM | Limit value 10min mean value |
| H-- , H- , H__ , H_ , HM | Hysteresis (if a limit value is changed, the reset value also shifts; that means it might be necessary to adapt it) |
| F-- , F- , F__ , F_ | Frequency limit value |
| dAL , doF | Response time, Reset time; is always counted down in the display |
| UonF | Frequency undervoltage (inhibited frequency protection) |
| uSr , rocF | Vector surge, ROCOF |
| dFdt , PEr | Limit ROCOF, response time in periods (4=sensitive, 50=insensitive) |
| StbY | Standby mode, standby-time, standby-counter |
| dEon | Delay Enable On, suppression time when switching on and after opening the enable input |
| 1 Ph , 3 Ph | Single phase, three-phase vector shift evaluation |
| rEL , trEL | Relay, Section switch turn-on time, oFF no feedback contacts |
| don | Power Up delay, runs once at power up device |
| ModE , trAn , dEFi | Mode, Transitory Mode, Definitiv Mode |
| ddi | Delay display, to calm down the display |
| di t | Display duration scan mode (each measurement is displayed for this duration) |
| Si | Simulation |
| F , U | Frequency, voltage |
| CodE , PLo , uSr | Code lock / sealing, vector shift |
| Pi n | Pin code (default 504) |
| InFo | Device information, program change |
| Fnr , Snr | Firmware version, serial number |
| h | Operating hours |
| Err , dEL | Error counter, delete error counter |
| YES , no | Yes, no query for acknowledgement |
| Pr | Program |
| on , oFF | On, Off |

# 11 Technical Data

| | |
|---|---|
| **Control voltage Us:** | |
| Rated-Connection | AC/DC 24-270 V, 0/40...70 Hz, <1,8W / <6,5 VA |
| | DC: 20,4...297 V, AC: 20,4...297 V |
| Voltage drop | SPI1021 must be supplied with a UPS (>5s) |
| **Output relay:** | 2 x change-over contact |
| Switching voltage | Max. AC 440 V |
| Conventional thermal current Ith | 6 A |
| Inrush current (at 10 % ED) | 25 A max. 4 s / 50 A max. 1 s |
| Nominal operating current Ie (AC 15) | 6 A AC 250 V |
| Rated operational current | DC-13 Ie = 2 A Ue = 24 V |
| Rated operational voltage | DC-13 Ie = 0,4 A Ue = 120 V |
| | DC-13 Ie = 0,2 A Ue = 240 V |
| Recommended series fuse | gG/gL 6 A |
| Contact service life, mech. | 30 x $10^6$ switching cycles |
| Contact service life, electr. | 1 x $10^6$ operating cycles at AC 250 V / 6 A |
| | 2 x $10^5$ operating cycles at AC 250 V / 10 A cos φ 0.6 |
| **Voltage measurement:** | |
| Measurement voltage phase – phase | AC 15…530 V (< 5 V: 0 is displayed) |
| Adjustment range phase – phase | AC 0/15…520 V |
| Measurement voltage phase – N | AC 10…310 V (< 5 V: 0 is displayed) |
| Adjustment range phase – N | AC 0/15…300 V |
| Measurement principle | Real root mean square measurement both half waves |
| Hysteresis | Adjustable 1.0…99.9 V |
| Measurement error (with N) | ± 0.6 % of the measurement value |
| Measurement error (without N) | ± 0.8 % of the measurement value |
| Display accuracy | >100V: -1 digit (res. 1 V) |
| | <100V: -1 digit (res. 0.1V) |
| Measurement function | 3-phase with/without N |
| Response time | Adjustable 0.05 (±15ms)…120.0 s |
| Reset time | Adjustable 0(>200ms) … 999 s |
| Input resistance Phase-N | 450 kΩ |
| **Frequency measurement** | |
| Frequency range | 40…70 Hz (U-L1 > UonF ) |
| Adjustment range | 45.00…65.00 Hz |
| Hysteresis | 0.05…10.00 Hz |
| Measurement accuracy | ± 0.04Hz ± 1 digit |
| Response time | Adjustable 0.05 (±15ms) …120.0 s |
| Reset time | Adjustable 0 (>200ms) … 999 s |
| **Vector surge** | |
| Measurement range | 0…45.0° |
| Adjustment range | 2.0…20.0° |
| Response time | < 50 ms |
| Reset time | Adjustable 3…240 s |
| Delay at Us on | Adjustable 2…20 s |
| **ROCOF (df/dt)** | |
| Frequency range | 40…70 Hz |
| Adjustment range | 0,100…5,000 Hz/s, 4…50 Periods |
| Hysteresis | fixed 0,05Hz |
| Measurement error | ± 0,04Hz ± 1Digit |
| Response time | adjustable 0,05 (±15ms) … 130.0 s |
| Reset time | adjustable 0 (>200ms) … 999 s |
| Measurement time | Number of adjusted Periods * Periods duration + Response time |

| | |
|---|---|
| **Digital inputs (INx)** | |
| Output voltage +U | DC 15…35 V |
| Current INx | > 3 mA |
| **Contactor feedback inputs** | |
| Voltage Y0 – Y1/2 | DC 15…35 V |
| Current | > 3 mA |
| Contactor response time (section switch) | Adjustable 0.5...99.0 s |
| **Self-test and Watchdog** | |
| in programs / alarms | Pr 1, 3, 4 |
| alarms | U>>, U>, U10min (dAL=100ms), U<, U<<, f>>, f>, f<, f<< |
| Slope Rate Voltage | <150V: 2,5V/s, ≥150V: 5,0V/s |
| Slope Rate Frequency | 0,05Hz/s |
| Permissible tolerance | measured value – trigger value: ≤±1%<br>Response time: ±20ms |
| Display result | „Pass“ = passed, „Fail“ = failed |
| TimeOut / max. Duration | 180s / 18 min (all dAL=120.0 s) |
| Watchdog | internally |
| **Test conditions** | EN 60255 |
| Rated impulse withstand voltage | 4000 V |
| Overvoltage category | III |
| Pollution degree | 3 |
| Rated insulation voltage Ui | 300 V |
| Operating time | 100 % |
| Permissible ambient temperature | -20 °C... +55 °C<br>EN 60 068-2-2 dry heat |
| EMC - noise immunity | EN 61000-6-2 |
| EMC - noise emission | EN 61000-6-3 |
| **Housing:** | |
| Construction form | V6 |
| Front-to-back size | 55 mm |
| Dimensions (W x H x D) | 90 x 105 x 69 mm |
| Wiring connection single strand | each 1 x 4mm$^2$ |
| Finely stranded with wire end ferrule | each 1 x 2.5mm$^2$ |
| Protection class, housing | IP 30 |
| Protection class, terminals | IP 20 |
| | Mounting snap-on fastening on 35 mm mounting rail acc. EN 60 715 or with M4 screwed attachment (additional bar not included in the scope of delivery) |
| Weight: | approx. 250 g |

**We reserve the right to make technical changes**

## 12 Maintenance and repair

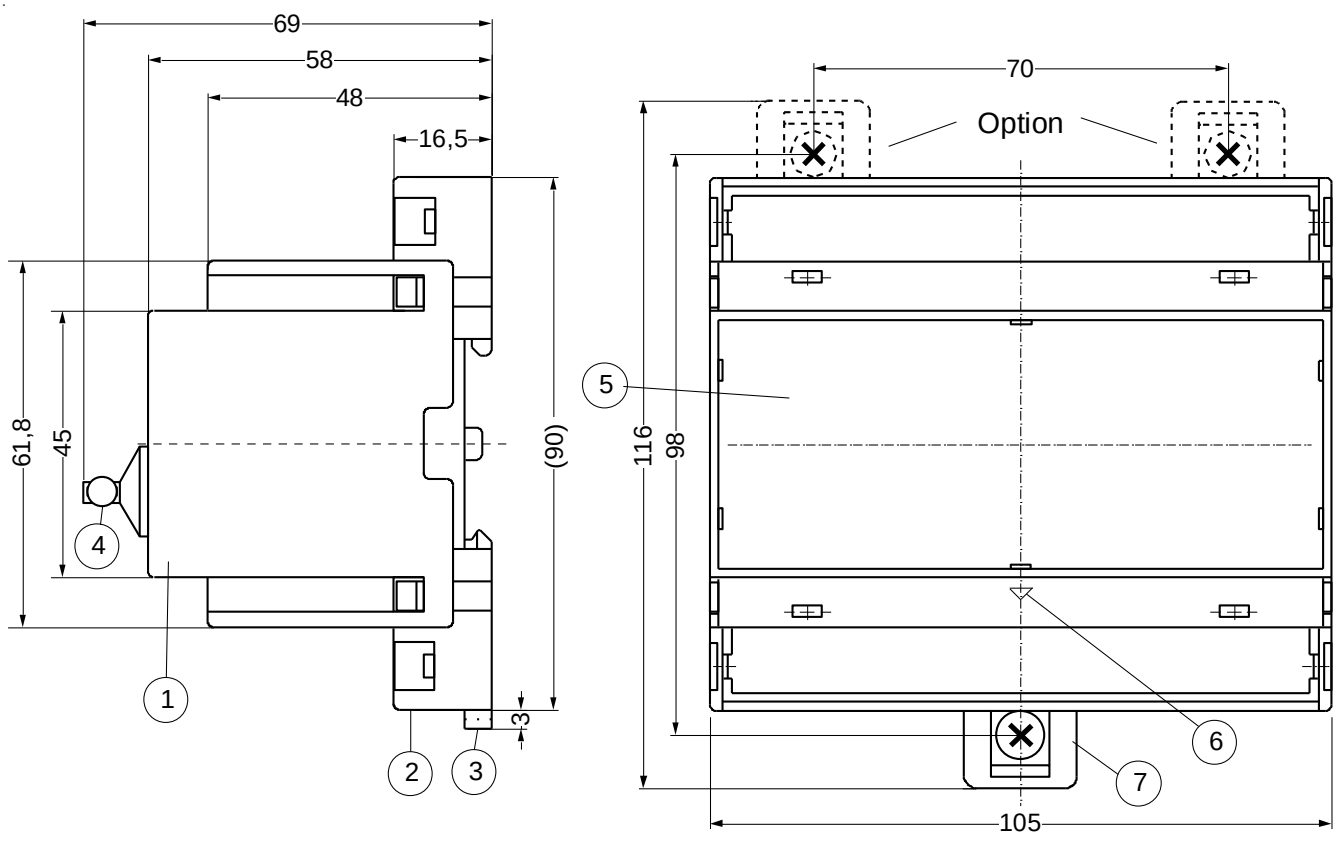
The SPI1021 is maintenance-free. Periodically test for proper functioning.

## 13 Troubleshooting an measures

| Error | Cause | Remedy |
|---|---|---|
| FAIL as self-test result | Self-test failed | Check all measured voltages, check Feedback contact (see Err1) |
| EEEE or -EEE appears in the display | Measurement is above/below range | Measured voltage, frequency or the vector surge is too large or too small; comply with measurement range |
| Err5 appears in the display | Error internal interface | Reset → interrupt control voltage for >5s |
| Err1 also appears in the display after 2 automatic reconnection attempts, LED K1 flashes | Error when the section switch turns on, section switch connected wrong, faulty or operated from a third-party switch | Feedback contacts not connected<br>Set - rEL. → trEL. → oFF<br>Feedback contacts connected<br>- Check for correct connection<br>- Set turn-on time of section switch under trEL.<br>- Do a reset → interrupt control voltage for >5s |
| Err1 LED K1 flashes and K2 is operating | Error when off the section switch | - Check the connection<br>- Check for broken section switch<br>- Do a reset → interrupt control voltage for >5s |
| Err8 appears in the display | Hysteresis error | Upper threshold value must be higher than the lower threshold value, check the threshold values |
| Err9 appears in the display | Parameter error | Reset to factory settings, see “Program setup” |
| A time expires in the display | Always when an OFF-delay time doF is running, it is counted down in the display (shortest one first) | Wait until the time has expired (depending on the setting, several times may elapse one after the other) |
| Device cannot be configured / only the limits can be configured | Code lock / Sealing activated | If there are any problems with the code lock (pin forgotten), the lock can be switched off and the pin can be reset to 504 by keeping the Set key pressed while switching on the mains until ▶ CodE / oFF appears in the display. |
| Implausible voltage values | Pr selected with N, but N not connected | Select Pr without N or connect N |
| Loc appears in the display | Seal is active | See Sealing |
| CodE appears in the display | Code lock is active | See „Code lock“ |
| StbY appears in the display | Standby mode, E1-E2 closed | Check parameter uSr. |

## 14 Construction form V6

Dimensions in mm




1 Oberteil / cover
2 Unterteil / base
3 Riegel / bar for snap mounting
4 Plombierung max. Ø 1,8 mm / sealing max. Ø 1,8 mm
5 Frontplatteneinsatz / front panel
6 Kennzeichen für unten / position downward
7 Riegel bei Wandbefestigung mit Schrauben. Riegelbohrung Ø 4,2 mm / for fixing to wall with screws, Ø 4,2 mm.

## 15 Disposal

Disposal should be carried out properly and in an environmentally friendly manner in accordance with legal provisions.
ZIEHL is registered with the EAR Foundation under WEEE no .: DE 49 698 543.

# Dichiarazione di conformità

## alle prescrizioni alla Norma CEI 0-21

**NOME ORGANISMO CERTIFICATORE:** **Bureau Veritas Consumer Products Services Germany GmbH**
Accreditamento a DAkkS, D-ZE-12024-01-00, Rif. DIN EN ISO/IEC 17065
Data validità: 15-ottobre-2020

**OGGETTO:**
**CEI 0-21: 2012-06**
**CEI 0-21; V1: 2012-12 edizione Dicembre 2012**
**CEI 0-21; V2: 2013-12 edizione Dicembre 2013**
**CEI 0-21: 2014-09**
**CEI 0-21; V1: 2014-12 edizione Dicembre 2014**
**CEI 0-21; 2016-07**
Regola tecnica di riferimento per la connessione di Utenti attivi e passivi alle reti BT delle imprese distributrici di energia elettrica

**TIPOLOGIA DI APPARATO CUI SI RIFERISCE LA DICHIARAZIONE:**

| DISPOSITIVO DI INTERFACCIA | PROTEZIONE DI INTERFACCIA | DISPOSITIVO DI CONVERSIONE STATICA | DISPOSITIVO DI GENERAZIONE ROTANTE |
|---|---|---|---|
| | X | | |

**COSTRUTTORE:** **ZIEHL industrie-elektronik GmbH+Co KG**
**Daimlerstraße 13**
**74523 Schwäbisch Hall**
**Germania**

| | |
|---|---|
| **TIPO APPARECCHITURA:** | **Protezione Di Interfaccia** |
| **MODELLO:** | **SPI1021** |
| **VERSIONE FIRMWARE:** | **0-0** |
| **NUMERO DI FASI:** | **trifase + monofase** |

NOTA:
Per impianti con squilibrio di potenza superiore a 6kW, lo squilibrio di potenza deve essere controllato separatamente.
Il modulo SPI1021 esterno assicura solo la tolleranza singola di guasto, se vengono utilizzati due moduli SPI1021 collegato in serie. Un singolo modulo SPI1021 non ha assicurato la tolleranza singola dell'anomalia.

**RIFERIMENTI DEI LABORATORI CHE HANNO ESEGUITO LE PROVE:**
**Bureau Veritas Consumer Products Services Germany GmbH**
Accreditamento a DAkkS, D-PL-12024-03-03, Rif. DIN EN ISO/IEC 17025
Data validità: 11-giugno-2019

Esaminato il certificato ISO 9001 del costruttore n°FS 529448/4542D, emesso dal British Standards Institution (BSI). Esaminati i Fascicoli Prove n°12TH0488-CEI 0-21_3, emessi dal laboratorio Bureau Veritas Consumer Products Services Germany GmbH. Si dichiara che il prodotto indicato è conforme alle prescrizioni CEI 0-21: 2012-06, CEI 0-21; V1: 2012-12, CEI 0-21; V2: 2013-12, CEI 0-21: 2014-09, CEI 0-21; V1: 2014-12, CEI 0-21; 2016-07.

**Numero di certificato:** **U17-0262**

**Data di emissione:** **2017-06-23**

**Organismo di certificazione**

Holger Schaffer
Organismo di certificazione Bureau Veritas Consumer Products Services Germany GmbH
Accreditamento a DIN EN ISO/IEC 17065

BUREAU VERITAS
Consumer Products Services Germany GmbH
Thurn-und-Taxis-Straße 18, 90411 Nürnberg, Germany
Phone: + 49 40 74041-0
cps-nuernberg@de.bureauveritas.com
www.bureauveritas.de/cps

# Declaration of conformity

## with the requirements of DEWA 2016

**CERTIFICATION BODY:** **Bureau Veritas Consumer Products Services Germany GmbH**
DAkkS accreditation, D-ZE-12024-01-00, ref. To DIN EN ISO / IEC 17065
validity date: 15-Oct-2020

**APPLIED RULES AND STANDARDS:** **DEWA 2016** Version 2.0, March 2016
Standards for Distributed renewable resources generators connected to the distribution network

**TOPOLOGY OF THE DEVICE COVERED BY THE DECLARATION**

| DISCONNECTION DEVICE | INTERFACE PROTECTION DEVICE | DEVICE FOR STATIC CERVERSION | ROTATING GENERATOR DEVICE |
|---|---|---|---|
| | X | | |

**MANUFACTURER:** **ZIEHL industrie-elektronik GmbH+Co KG**
Daimlerstraße 13
74523 Schwäbisch Hall
**Germany**

| | |
|---|---|
| **TYPE DISCRIPTION:** | **External IPS (Interface protection system)** |
| **MODEL / TYPE:** | **SPI1021** |

**VERSIONE FIRMWARE:** **0-0**

**NUMERO DI FASI:** **Single-phase + three-phase**

NOTA:
For systems where the power imbalance more than 5kW, the power imbalance must be checked separately.

**REFERENCE TO THE LABORATORY, WHICH PERFORMED THE APPROVAL:**
**Bureau Veritas Consumer Products Services Germany GmbH**
DAkkS accreditation, DPL-12024-03-03, ref. To DIN EN ISO / IEC 17025
Date of validity: 11-June-2019

Examined ISO 9001 Certificate of the Manufacturer n° FS 529448/4542D, issued by British Standards Institution (BSI).

**Report number:** **12TH0488-DEWA-2016_0**

**Certificate number:** **U16-0447**

**Date of issue:** **2016-08-04**

**Organismo di certificazione**

Dieter Zitzmann

Certification body of Bureau Veritas Consumer Products Services Germany GmbH
Accredited according to DIN EN ISO/IEC 17065

BUREAU VERITAS
Consumer Products Services Germany GmbH
Thurn-und-Taxis-Straße 18, 90411 Nürnberg, Germany
Phone: + 49 40 74041-0
cps-nuernberg@de.bureauveritas.com
www.bureauveritas.de/cps