# Frequency- and voltage monitoring

**G4PM400VDFA02**
**50Hz VDE**

Monitoring relays - GAMMA series

Frequency and voltage monitoring in 3-phase mains in accordance with VDE 0126-1-1

Quick net error recognition

Connection of neutral wire necessary

Detection of off-grid operation

Integrated fail-safety

2 change over contacts

Width 45mm

Industrial design


Read and understand these instructions before installing, operating or maintaining the equipment.

Danger!
Never carry out work on live parts! Danger of fatal injury! The product must not be used in case of obvious damage. To be installed by an authorized person.

## Technical data

**1. Functions**
Frequency monitoring in Phase L1 in accordance with VDE 0126-1-1 with adjustable ON-Delay and adjustable thresholds.

| | |
|---|---|
| $WIN_F$ (Frequency) | Monitoring the window between Min and Max |

Voltage monitoring in 3-phase mains in accordance with VDE 0126-1-1 with adjustable ON-Delay, adjustable thresholds and detection of off-grid operation.

| | |
|---|---|
| $WIN_V$ (Voltage) | Monitoring the window between Min and Max |

Adjustable 10-minutes average threshold ($\overline{U}$max) in accordance with VDE 0126-1-1.

**2. Time ranges**

| | |
|---|---|
| ON-Delay: | 30s to 3min |
| OFF-Delay: | |
| $U_{\triangle} \leq 80\%$ of $U_N$ | < 200ms |
| $U_{\triangle} \geq 115\%$ of $U_N$ | < 200ms |
| $U_{\curlywedge} \leq 80\%$ of $U_N$ | < 200ms |
| $U_{\curlywedge} \geq 115\%$ of $U_N$ | < 200ms |
| f ≤ 47.5Hz | < 200ms |
| f ≥ 50.2Hz | < 200ms |

**3. Indicators**
see display specification!

**4. Mechanical design**
Self-extinguishing plastic housing, IP rating IP40
Mounted on DIN rail TS 35 according to EN 60715
Mounting position: any
Shockproof terminal connection according to VBG 4 (PZ1 required), IP rating IP20
Tightening torque: max. 1Nm
Terminals capacity:
- 1 x 0.5 to 2.5mm² with/without multicore cable end
- 1 x 4mm² without multicore cable end
- 2 x 0.5 to 1.5mm² with/without multicore cable end
- 2 x 2.5mm² flexible without multicore cable end

**5. Input circuit**

| | |
|---|---|
| Supply voltage: | 230V a.c.<br>terminals A1-A2 (galvanically separated) |
| Tolerance: | -20% to +15% |
| Rated frequency: | 50Hz |
| Rated consumption: | 6VA (4W) |
| Duty cycle: | 100% |
| Reset time: | 500ms |
| Drop-out voltage: | 30% of nominal supply voltage |
| Overvoltage category: | III (in accordance with IEC 60664-1) |
| Rated surge voltage: | 4kV |

**6. Output circuit**
2 potential free change over contacts

| | |
|---|---|
| Rated voltage: | 250V a.c. |
| Switching capacity: | 750VA (3A / 250V a.c.)<br>If the distance between the devices is less than 5mm! |
| Switching capacity: | 1250VA (5A / 250V a.c.)<br>If the distance between the devices is greater than 5mm! |
| Fusing: | 5A fast acting |
| Mechanical life: | 20 x $10^6$ operations |
| Electrical life: | 2 x $10^5$ operations<br>at 1000VA resistive load |
| Overvoltage category: | III (in accordance with IEC 60664-1) |
| Rated surge voltage: | 4kV |

**7. Measuring circuit**
*Frequency monitoring*

| | |
|---|---|
| Measured variable: | frequency of phase L1 |
| Measurement input: | 230V a.c. |
| Terminals: | Na-L1a & Nb-L1b |
| Switching threshold: | |
| Max: | 50.1 to 50.2Hz |
| Min: | 47.5 to 49.9Hz |

*Voltage monitoring $U_{\triangle}$*

| | |
|---|---|
| Measured variable: | voltage, a.c. Sinus |
| Measurement input: | 3x 400V a.c. |
| Terminals: | Na-L1a-L2a-L3a & Nb-L1b-L2b-L3b |
| Overload capacity: | |
| 3N~ 400/230V | 3N~ 600/346V |
| Input resistance: | |
| 3N~ 400/230V | 1MΩ |
| Switching threshold $U_S$: | |
| Max: | 105% to 115% of $U_N$ (420V to 460V) |
| Min: | 80% to 95% of $U_N$ (320V to 380V) |

*Voltage monitoring $U_{\curlywedge}$*

| | |
|---|---|
| Measured variable: | voltage, a.c. Sinus |
| Measurement input: | 3x 230V a.c. |
| Terminals: | Na-L1a-L2a-L3a & Nb-L1b-L2b-L3b |
| Overload capacity: | |
| 3N~ 400/230V | 3N~ 600/346V |

# Technical data

Input resistance:
3N~ 400/230V 1MΩ
Switching threshold $U_S$:
Max: 110% to 115% of $U_N$ (253V to 264.5V)
Min: 80% to 95% of $U_N$ (184V to 218.5V)

10-minutes-average $\overline{U}$max: 110% to 115% of $U_N$
Overvoltage category: III (in accordance with IEC 60664-1)
Rated surge voltage: 4kV

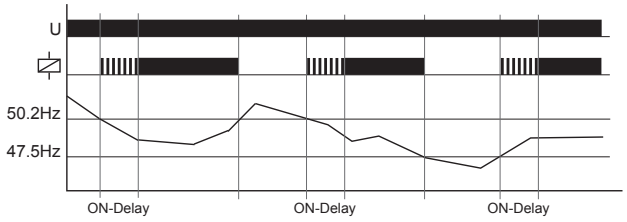
**8. Accuracy**
Base accuracy voltage measurement : 1.5% of $U_{nom}$
Temperature influence voltage measurement: 0.05% / °C
Accuracy frequency measurement: <0.02Hz

**9. Ambient conditions**
Ambient temperature: -25 to +55°C
(in accordance with IEC 60068-1)
-25 to +40°C
(in accordance with UL 508)
Storage temperature: -25 to +70°C
Transport temperature: -25 to +70°C
Relative humidity: 15% to 85%
(in accordance with IEC 60721-3-3 class 3K3)
Pollution degree: 3 (in accordance with IEC 60664-1)
Vibration resistance: 10 bis 55Hz 0.35mm
(in accordance with IEC 60068-2-6)
Shock resistance: 15g 11ms
(in accordance with IEC 60068-2-27)

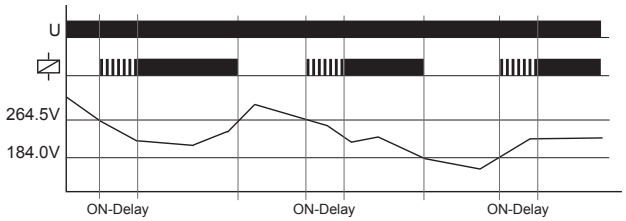
# Functions

If a failure already exists when the device is activated, the output relay R remains in off-position and the failure is displayed.
The monitoring of frequency and voltage works in parallel.

**Window function $WIN_F$ (Frequency):**
When the supply voltage U is applied, the output relay R switches into on-position after the set interval of the tripping delay (ON-Delay) has expired and if the frequency is within the adjusted window. As soon as the frequency leaves the acceptance region, the output relay R switches into off-position.
The output relay R switches into on-position again after the frequency reenters the acceptance region and the tripping delay (ON-Delay) has expired.




**Window function $WIN_V$ (Voltage):**
When the supply voltage U is applied, the output relay R switches into on-position after the set interval of the tripping delay (ON-Delay) has expired and if the voltage is within the adjusted window. As soon as the voltage leaves the acceptance region, the output relay R switches into off-position.
The output relay R switches into on-position again after the voltage reenters the acceptance region and the tripping delay (ON-Delay) has expired.



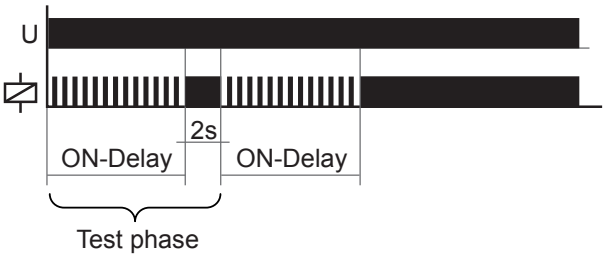

**10-minutes-average**
The 10-minute average value is used for monitoring the voltage quality. The floating average over 10 minutes will be measured for each input phase. The output relay R switches into off-position if the floating average is exceeded. The output relay R switches into on-position again after the floating average reenters the acceptance region and the tripping delay (ON-Delay) has expired.

**These functions are implemented twice for fail-safe operation.**

**Relay test**
The relay test is executed:
- after powering up
- after manually resetting an error
- after each parameter change

During the relay test a question mark is displayed at the bottom left corner of the display.

No relay test is executed when input is deactivated!

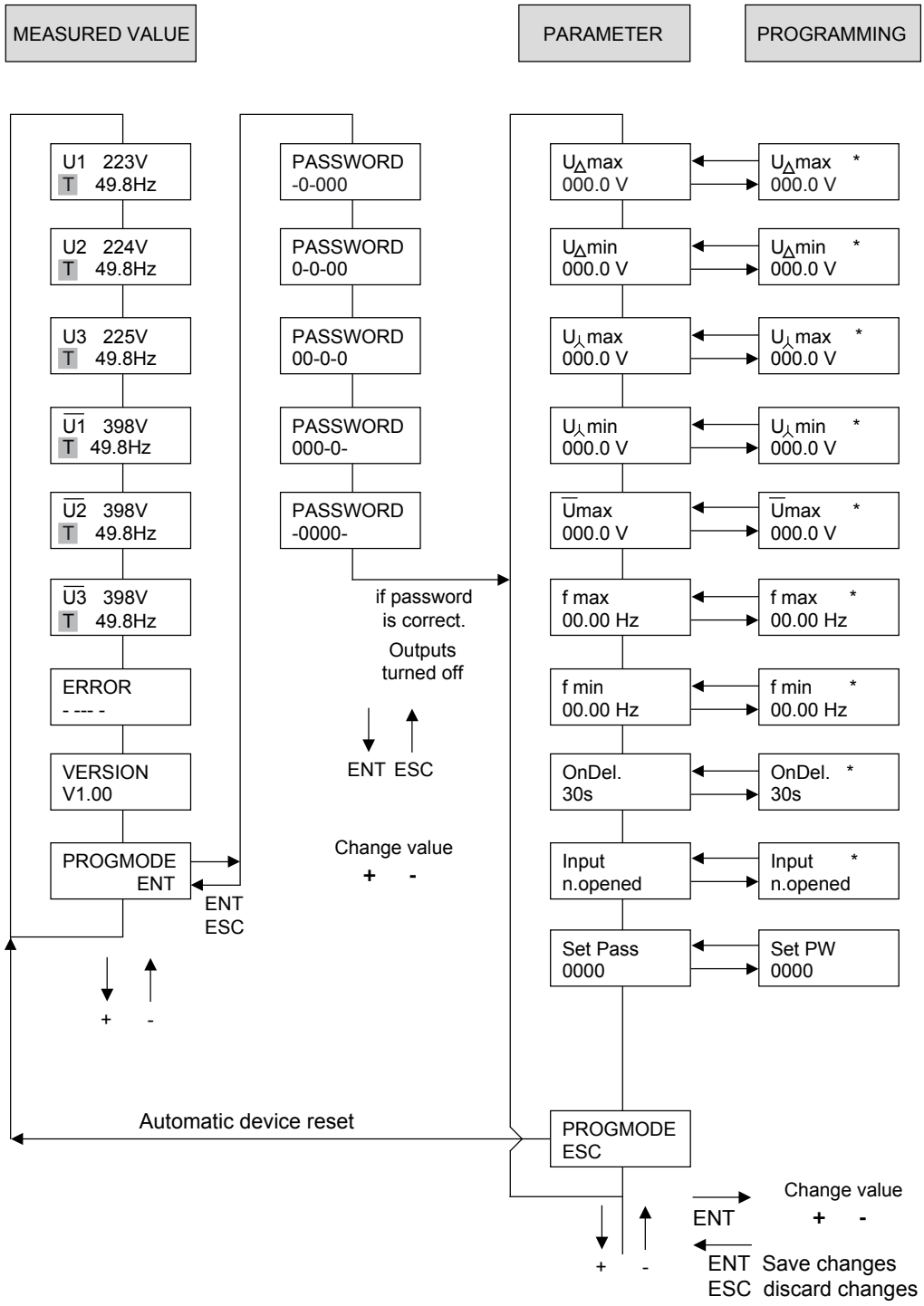



The following list shows causes and display for this error states:

| Definition | Display | Remark |
|---|---|---|
| incorrect combination of SW versions | ERROR! VERSION | Enter to quit and reset device |
| communication error | ERROR! INTERCOM | |
| unaccaptable devitation between measured values of channel A and B | ERROR! CHA<>CHB | Enter to quit and reset device |
| although the relay outputs are „off“ the auxiliary contact of the disconnection device signals „on“ (after expiring of a delay) | ERROR! CONTACT | Enter to quit and reset device |
| inconsistent data and/or checksums | ERROR! DATA | Enter to quit and reset device |

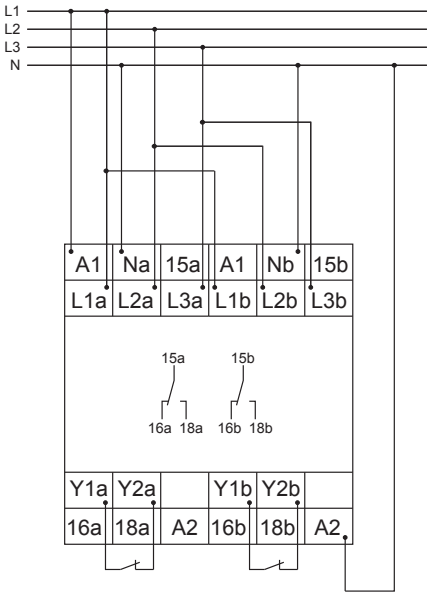
# Display specification

**Menu configuration**



## Connections

G4PM400VDFA02 50Hz VDE




Note that the terminals A1-A1 and A2-A2 are internally connected.

## Dimensions