



APPLICATION GUIDE FOR USE GRID AND SYSTEM PROTECTION

**Fronius grid and system protection solutions for SnapINverter, GEN24
Plus, Tauro, and mixed systems**

© Fronius International GmbH

Version 1.0 07/2021

Peter Schmidhuber, Franz Breitwieser, Maximilian Neuhaus, Leonhard Peböck, Jasmin Gross

Solar Energy

Fronius reserves all rights, in particular rights of reproduction, distribution and translation. No part of this document may be reproduced, in any form whatsoever, or stored, processed, duplicated or disseminated with the aid of electronic systems, without the written consent of Fronius. You are hereby reminded that the information published in this document, despite the greatest care being exercised in its preparation, is subject to change and that neither the author nor Fronius can accept any legal liability. Gender-specific wording refers equally to the male and female form.

TABLE OF CONTENTS

1	Introduction	4
2	Fronius grid and system protection solution	5
3	Solution for SnapINverter	6
4	GEN24 and/or Tauro	7
4.1	Communication and connection	7
5	Combination of SnapINverter & GEN24/Tauro	8
5.1	Communication and connection	8
6	Visualization in Fronius Solar.web	10
7	Specific requirements with DC-SPDs	11
7.1	Requirements for GEN24 Plus	11
7.2	Requirements for SnapINverter	12
7.3	Requirements for Tauro	12

1 INTRODUCTION

A grid and system protection solution ensures PV systems can be operated safely. A grid and system protection solution is a protection device which continuously monitors the voltage and frequency of the grid for the specified switch-off conditions. It therefore ensures the generator is switched off safely if voltage and frequency limits in the grid are not complied with.

The grid and system protection solution consists of several components and can be implemented differently depending on the size of the system and country-specific requirements. This document describes solutions for external grid and system protection that act on the internal section switch. Particular attention is paid to explaining grid and system protection solutions for Fronius inverters from the Fronius SnapINverter, Fronius GEN24 Plus, and Fronius Tauro series.

CAUTION: The normative requirements for grid and system protection differ from country to country. Please clarify the requirements with your grid operator!

2 FRONIUS GRID AND SYSTEM PROTECTION SOLUTION

A grid and system protection solution is a protection device which continuously monitors voltage and frequency of the grid for the specified switch-off conditions. The grid and system protection acts on the section switch and therefore ensures the generation system is safely switched off, if either unwanted conditions have occurred in the grid or an isolated network has formed.

Each inverter generally has a grid and system protection device integrated. The internal grid and system protection monitors the mains voltage and frequency, and switches off the PV system via the integrated section switch as soon as the switch-off conditions are met.

The normative requirements for the grid and system protection differ in the respective countries. Some grid operators also require different designs or settings. This document describes the subject of grid and system protection using Germany as an example (in accordance with VDE-AR-N 4105:2018), as this country is often used as a precedent in relation to norms and standards.

One unique feature of the Fronius grid and system protection solution, is that the integrated section switch is controlled via an on-board interface. Under certain conditions,¹ this may mean an **additional section switch is not required**.

Advantages of the Fronius grid and system protection solution:

- / Saving on central section switch (up to EUR 2000²)
- / Easy installation thanks to integrated section switch
- / Frees up space in the main distribution board
- / Proof of flawless function with certificate from an accredited testing institute

¹ Depending on normative requirements in the respective country

² Depending on the size of the system

3 SOLUTION FOR SNAPINVERTER

To implement the grid and system protection solution with SnapINverters, a low-voltage relay is required for each inverter as well as a central grid and system protection relay.

Caution: For the grid and system protection relay, we recommend products from the companies *Ziehl* or *Bender*. Nonetheless, you should contact your grid operator before planning the entire protection concept, to ensure that you comply with the relevant grid operator's guidelines!

The solution can be used both for systems that only use SnapINverters as well as for mixed systems. Mixed systems refers to photovoltaic systems in which SnapINverter devices as well as inverters from the Fronius GEN24 Plus and/or Fronius Tauro series are installed. For more details on implementing the grid and system protection solution in mixed systems, please refer to chapter 5 Combination of SnapINverter & GEN24/Tauro on page 8 et seqq.

Specific requirements of the grid and system protection solution with Fronius SnapINverters as well as other details on implementation can be found in the [user Information](#) and in our webinar:



Webinar DE



Webinar EN

4 GEN24 AND/OR TAURO

The Fronius grid and system protection solution for devices from the GEN24 Plus or Fronius Tauro series is particularly easy to implement. Unlike the SnapINverter, no additional relay is required. For this product series, an interface integrated into the inverter acts on the internal coupling relay, which makes implementation particularly easy.

Caution: For the grid and system protection relay, we recommend products from the companies *Ziehl* or *Bender*. Nonetheless, you should contact your grid operator before planning the entire protection concept, to ensure that you comply with the relevant grid operator's guidelines!

4.1 Communication and connection

For the GEN24/Tauro, the switch contacts of the grid and system protection relay are connected to the Wired Shutdown (WSD) terminal of the inverter. Switch-off via the WSD contact is a purely hardware solution. No software or software configuration has an influence on the correct and safe function.

If there is just a **single** inverter in the system, only the IN+ and IN- pin of the WSD terminal is connected to the grid and system protection relay. Please use a data communication cable of CAT 5 or higher for this.

When combining several GEN24 or Tauro inverters, the internal ring is used, which makes the solution extremely easy. The cabling (CAT5 or higher) is connected from the WSD terminal of the primary inverter (IN+/-) with the other inverters in the chain (secondary):

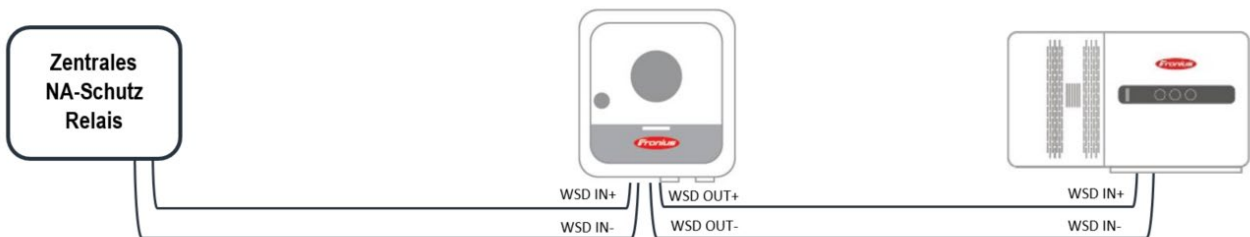


Figure 1: Connection of grid and system protection relay to WSD terminal

Please also take note of the position of the WSD switch. The WSD switch of the “primary” inverter must be set to “1”. All “secondary” inverters must be set to “0”.

5 COMBINATION OF SNAPINVERTER & GEN24/TAURO

To implement the grid and system protection solution with SnapInverters combined with GEN24 or Tauro, several low-voltage relays are required alongside a central grid and system protection relay.

Caution: For the grid and system protection relay, we recommend products from the companies *Ziehl* or *Bender*. Nonetheless, you should contact your grid operator before planning the entire protection concept, to ensure that you comply with the relevant grid operator's guidelines!

5.1 Communication and connection

If the Fronius grid and system protection solution is implemented with a combination of Fronius SnapInverter and GEN24 Plus or Tauro inverters, a relay with NO contact must be installed for each SnapInverter. In addition to this, an individual relay for every connected Gen24 Plus/Tauro is also required, which can be connected in a chain via WSD. The relay is connected to a "primary" device on the WSD terminal. The remaining Tauro/GEN24 Plus devices are configured as "secondary" devices.

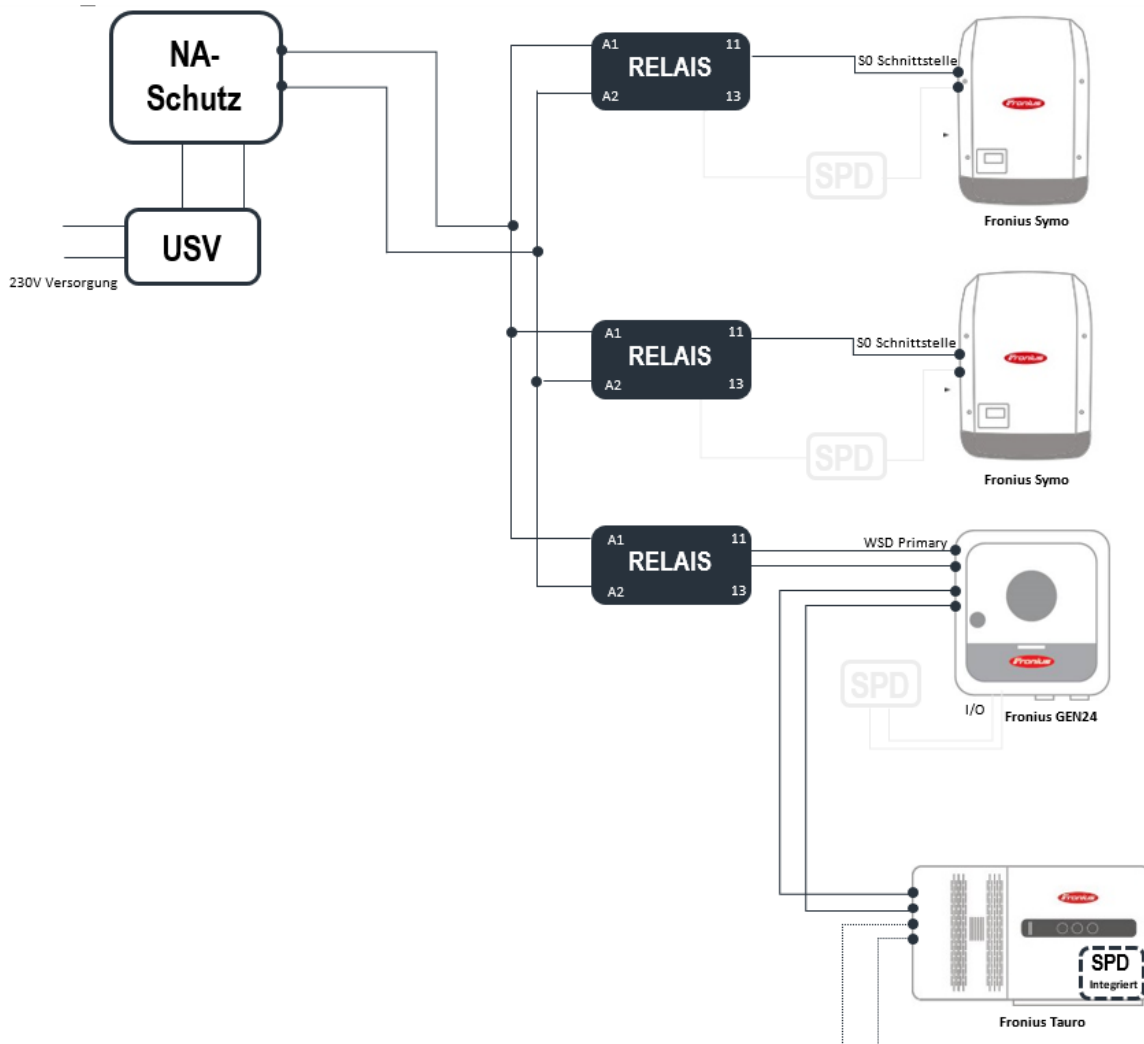


Figure 2: Connecting SnapInverter, GEN24, and Tauro within a system. Optionally with surge protection device (see chapter 7).

For each SnapINverter, the relay is connected to the multifunctional power interface “S0” on the inverter. The relay must be connected in parallel and connected to the grid and system protection, and a power supply.

Specific requirements for the relay as well as other details on implementing this solution can be found in the [user Information](#) as well as in our webinar:



Webinar DE



Webinar EN

6 VISUALIZATION IN FRONIUS SOLAR.WEB

Activation of the grid and system protection can be easily visualized in Fronius Solar.web. Further information on configuration can be found [here](#).

A Fronius Smart Meter is required in order to make use of the Fronius monitoring portal. The integration of a Fronius Smart Meter ensures that the PV system's consumption and feed-in data is shown in Fronius Solar.web and is available for analysis. Fronius Smart Meters are suitable for single-phase or three-phase networks. The meter communicates with the Fronius inverter via cable (CAT5 or higher) and Modbus RTU (RS485).

7 SPECIFIC REQUIREMENTS WITH DC-SPDS

If a DC surge protection device (SPD) is also required in the device alongside the Fronius grid and system protection solution, specific requirements must be observed depending on the inverter:

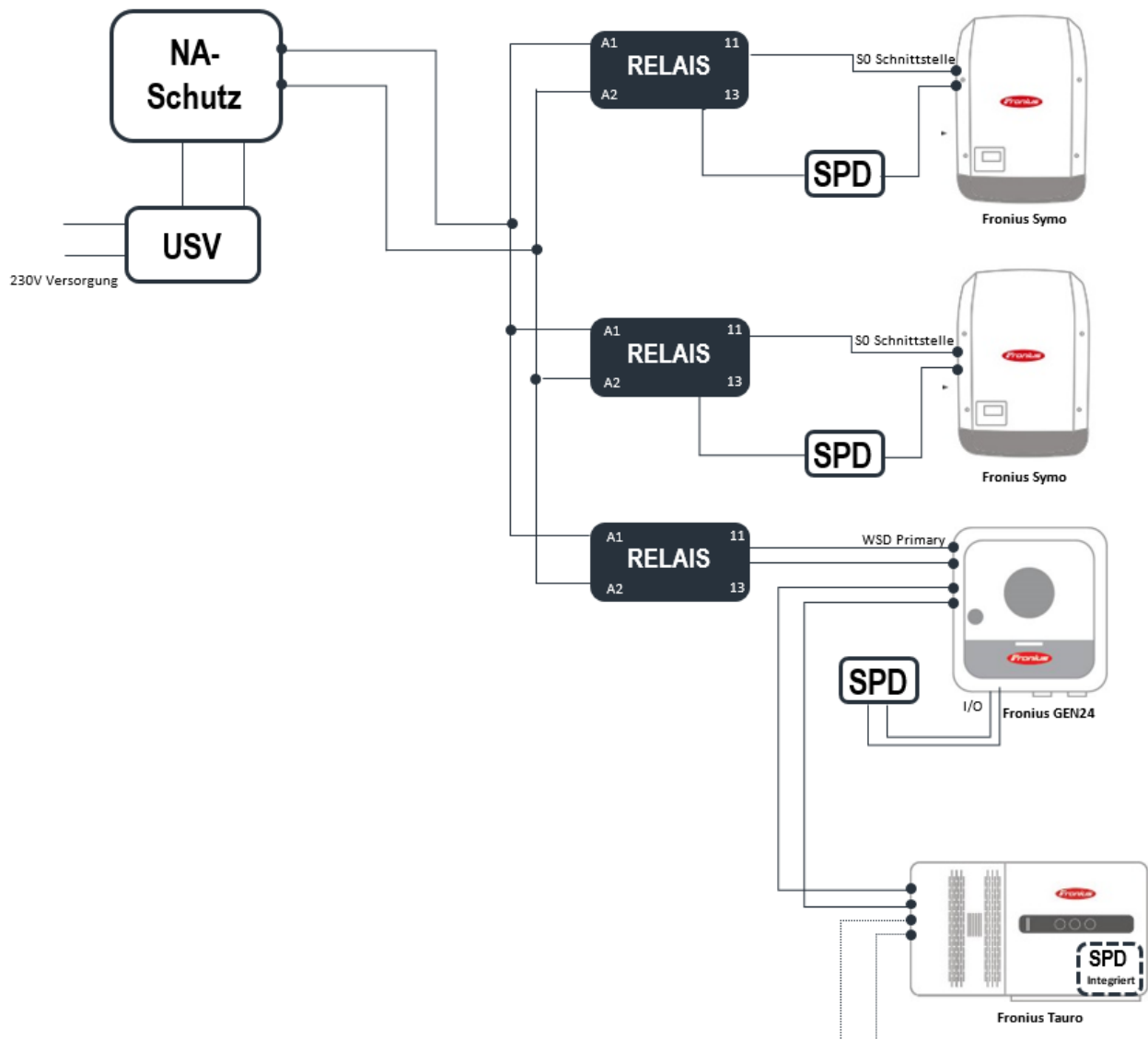


Figure 3: Connecting SPDs to an existing grid and system protection solution

7.1 Requirements for GEN24 Plus

If a DC surge protection device is also required alongside grid and system protection in PV systems with GEN24 devices, the following must be observed:

For GEN24 devices, the feedback contact of the DC surge protection device is usually connected to the WSD terminal. Since the grid and system protection solution is also connected to the WSD terminal, in this case the terminal is already occupied. Therefore, with GEN24 devices, the feedback contact of the DC-SPD can also be connected to another free digital I/O. Thanks to the configurable, integrated remote reporting function, the

system operator is automatically informed if the system is triggered via the online tool Fronius Solar.web or directly via the inverter. You can find further information on this solution [here](#).

Note: *If a ripple control receiver is also installed as well as a grid and system protection solution and SPD, the pin assignment may need to be adjusted.*

7.2 Requirements for SnapINverter

If a DC surge protection device is also required alongside grid and system protection in PV systems with SnapINverter devices, the following must be observed:

For SnapINverters, the low-voltage relay can be connected in series with the feedback contact of the DC-SPD. This enables both solutions to be implemented. If the grid and system protection device or DC-SPD is triggered, this is visualized in Solar.web. For this notification, it is not possible to distinguish whether the grid and system protection or the DC-SPD has been triggered.

7.3 Requirements for Tauro

For Fronius Tauro devices, a DC surge protection device is already integrated into the device. This is already connected to digital I/O 8, so no change is necessary here. Thanks to the configurable, integrated remote reporting function, the system operator is automatically informed if the system is triggered via the online tool Fronius Solar.web or directly via the inverter. Further information on this solution can be found [here](#).

Note: *If a ripple control receiver is also installed as well as an SPD, the pin assignment may need to be adjusted.*