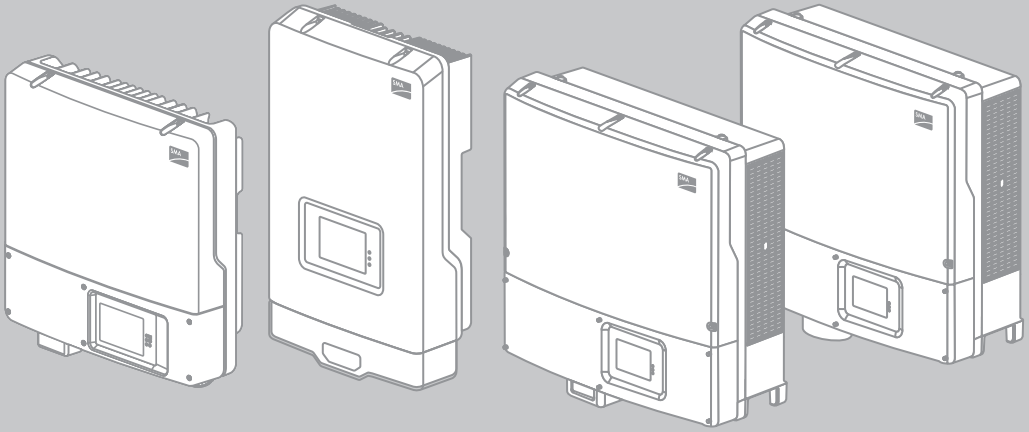
Multi-Function Relay and OptiTrac Global Peak

SUNNY BOY / SUNNY TRIPOWER / WINDY BOY

Technical Description



ZusFunktNG-TB-TEN121224 | Version 2.4

EN

Table of Contents

1 Information on this Document

1.1 Validity

This document describes the connection options and operating modes of the multi-function relay and the OptiTrac Global Peak function.

The multi-function relay and OptiTrac Global Peak are available in the following SMA inverters depending on the hardware and firmware status.

Inverter type	Multi-function relay	OptiTrac Global Peak
Sunny Boy 2000HF (SB 2000HF-30)	▲	●
Sunny Boy 2500HF (SB 2500HF-30)	▲	●
Sunny Boy 3000HF (SB 3000HF-30)	▲	●
Sunny Boy 2500TL Single Tracker (SB 2500TLST-21)	■	○
Sunny Boy 3000TL Single Tracker (SB 3000TLST-21)	■	○
Sunny Boy 3000TL (SB 3000TL-20/SB 3000TL-21)	● / ●	● / ○
Sunny Boy 3600TL (SB 3600TL-20/SB 3600TL-21)	● / ●	● / ○
Sunny Boy 4000TL (SB 4000TL-20/SB 4000TL-21)	● / ●	● / ○
Sunny Boy 5000TL (SB 5000TL-20/SB 5000TL-21)	● / ●	● / ○
Sunny Tripower 8000TL (STP 8000TL-10)	●	●
Sunny Tripower 10000TL (STP 10000TL-10)	●	●
Sunny Tripower 12000TL (STP 12000TL-10)	●	●
Sunny Tripower 15000TL (STP 15000TL-10)	●	●
Sunny Tripower 17000TL (STP 17000TL-10)	●	●
Sunny Tripower 15000TL Economic Excellence (STP 15000TLEE-10)	■	–
Sunny Tripower 15000TL High Efficiency (STP 15000TLHE-10)	■	–
Sunny Tripower 20000TL Economic Excellence (STP 20000TLEE-10)	■	–
Sunny Tripower 20000TL High Efficiency (STP 20000TLHE-10)	■	–
Windy Boy 3600TL (WB 3600TL-20)	●	–
Windy Boy 5000TL (WB 5000TL-20)	●	–

● available

○ planned

■ retrofit option for the multi-function relay

▲ retrofit option for the multi-function relay via the RS485-Quick Module

– not available

Keep this document in a convenient place for future reference.

1.2 Target Group

This document is for users and installers of the inverter. Some tasks described in this document may only be carried out by electrically qualified persons.

1.3 Additional Information

Detailed information on the electrical connection of the multi-function relay in your inverter can be found in the installation manual of the respective inverter or of the multi-function relay retrofit kit MFR01-10. See the user manual for detailed information on using the inverter.

You can find further information on special subjects in the download area at www.SMA.de/en.

1.4 Symbols Used

The following types of safety precautions and general information appear in this document:

DANGER!

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING!

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION!

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE!

NOTICE indicates a situation that can result in property damage if not avoided.

Information

Information provides tips which, if not avoided, could cause property damage.

2 Safety

2.1 Intended Use

The multi-function relay is used for switching a fault indicator or other external load on or off, based on parameters and measured values of the inverter.

OptiTrac Global Peak is for performance optimization in the event of partially shadowed modules.

Also observe the installation manual of the respective inverter.

2.2 Safety Precautions

DANGER!

Danger to life due to high voltages in the inverter.

- All work on the inverter may be carried out by an electrically qualified person only.
- Disconnect the inverter from both the DC and AC connections, as described in the installation manual.

NOTICE!

Electrostatic discharges can damage the inverter.

- Ground yourself before touching any component parts.

NOTICE!

Destruction of the multi-function relay as a result of too high contact load.

- Adhere to maximum switching voltage and maximum switching current (see Section 3.4 "Multi-Function Relay Technical Data" (page 17)).
- Only connect suitable contactors (see Section 3.2.2 "Connection for the Control of a Load" (page 11)).

3 Multi-Function Relay

3.1 Possible Applications of the Multi-Function Relay

The multi-function relay can be used for various purposes. The applications which can be implemented using the multi-function relay depend on the firmware version. If the inverter has suitable firmware, you can select one of 6 operating modes to control the multi-function relay. All firmware versions support the function as a fault indicator relay. If required, the remaining functions can be retrofitted via a firmware update.

Fault Indicator Relay

You can connect a display device to the multi-function relay, which reports either interferences or undisturbed operation of the inverter.

Optimization of Self-Consumption

In order to optimize the self-consumption, loads can be switched on or off based on the power availability of the PV array. The minimum duty cycle is configurable.

Connecting Loads via Communication Devices

The multi-function relay allows you to activate and deactivate operational loads via the communication interface of the inverter.

Power-Dependent Charging of Batteries

Via the multi-function relay, you can control the charging of batteries based on the power availability of the PV array.

Temperature-Dependent Activation of an External Fan

At high ambient temperatures, SMA inverters reduce power to prevent overheating. If the installation site does not meet the climate requirements specified in the inverter installation manual, possible losses can be minimized through the use of additional cooling. For tailored cooling, an external fan can be controlled via the multi-function relay based on the temperature of the inverter.

Reporting Start of Feed-In to the Grid Operator

If the local grid operator requires it, you can trigger a signal to the grid operator via the multi-function relay as soon as the inverter connects to the power distribution grid. To do so, the multi-function relay emulates the switching status of the grid relay.

3.2 Connection Options of the Multi-Function Relay

The connections described in this section may only be made by electrically qualified persons.

NOTICE!

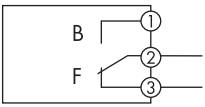
Destruction of the multi-function relay as a result of too high contact load.

- Adhere to maximum switching voltage and maximum switching current (see Section 3.4 "Multi-Function Relay Technical Data" (page 17)).
- Only connect suitable relays downstream (see Section 3.2.2 "Connection for the Control of a Load" (page 11)).

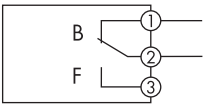
In the event of inverter voltage loss, the multi-function relay switches from the position 1-2 (Operation, B) to the position 2-3 (Error, F).

As a result of this relay switching behavior, there are 2 connection options:

- Use as fault indicator relay:
  - The function to be switched is inactive in relay position 1-2 (B)
  - The function to be switched is active in relay position 2-3 (F)



- Use for the switching of loads:
  - The function to be switched is active in relay position 1-2 (B)
  - The function to be switched is inactive in relay position 2-3 (F)



If you connect the multi-function relay to the power distribution grid, you must fuse it with an individual miniature circuit-breaker.

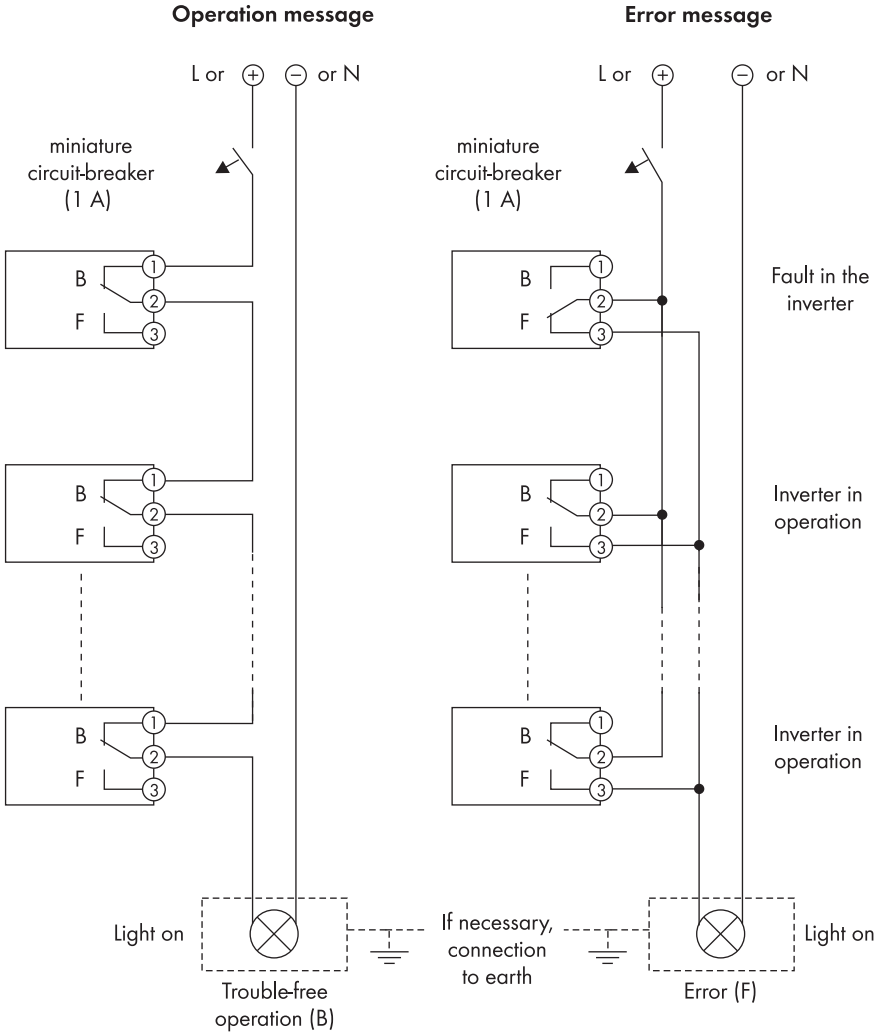
In the following table, the various operation modes with the respective relay positions including active and inactive functions are listed.

Operating mode	Function active	Function inactive
Fault indicator relay, error message	Position 2-3	Position 1-2
Fault indicator relay, operation message	Position 1-2	Position 2-3
Power-dependent control of loads	Position 1-2	Position 2-3
Control of an external fan	Position 1-2	Position 2-3
Control via communication	Position 1-2	Position 2-3
Power-dependent charging of batteries	Position 1-2	Position 2-3
Report switching status of grid relay	Position 1-2	Position 2-3

3.2.1 Connection as Fault Indicator Relay

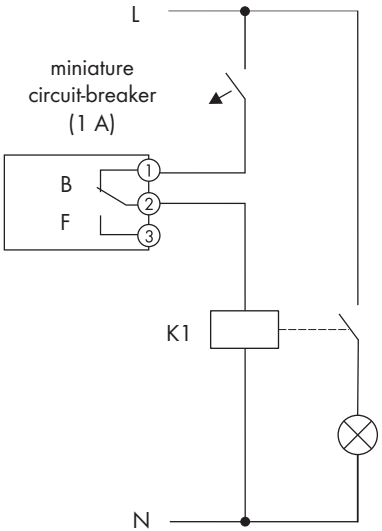
If you would like to operate a fault indicator, the relay must be connected so that position 2-3 is the active position. You can also connect the multi-function relays of several inverters to one fault indicator relay. Then, the fault indicator displays as soon as one of the inverters exhibits an error.

If you would like to use the multi-function relay to indicate undisturbed operation, you must connect it to all inverters in such a way that position 1-2 is the active position.



3.2.2 Connection for the Control of a Load

In most operation modes, a load is switched on and off based on parameters and measured values of the inverter. For these operation modes, connect the multi-function relay so that it is active in position 1-2 (operation). It controls a contactor (K1), which switches the operating current for the load.

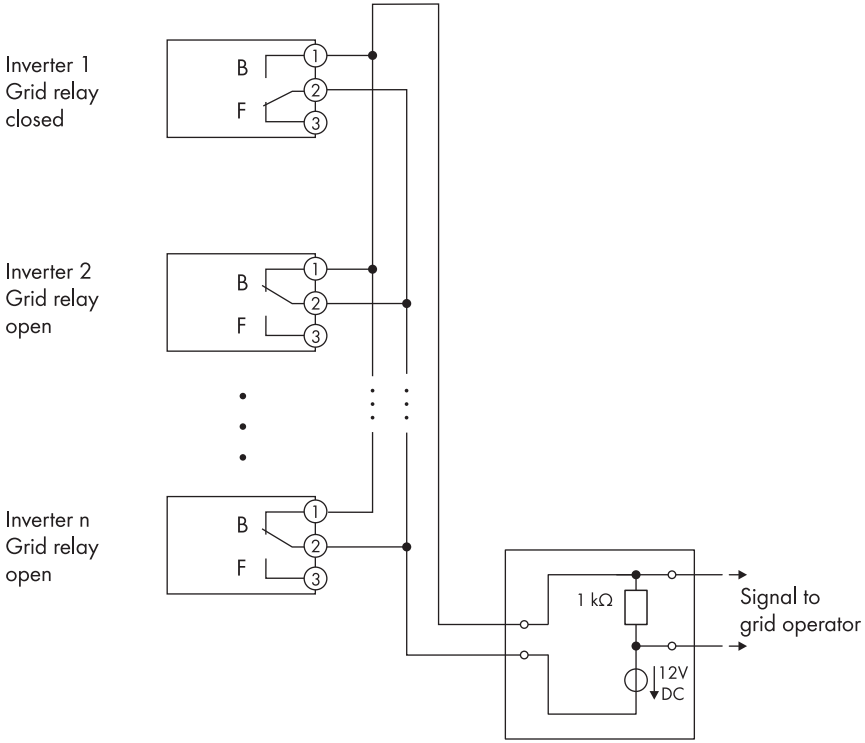


Only use contactors which meet the connection requirements of the multi-function relay between the multi-function relay and the load (see Section 3.4 "Multi-Function Relay Technical Data" (page 17)). You will find some examples in the following table.

Manufacturer	Model	Coil
ABB	TAL 9 ... 40 series	230 V
Hager	ES 2xx	230 V
Siemens	Insta contactor 5TT5 8xx-0	230 V
Siemens	Insta contactor 5TT5 80x-2	24 V

3.2.3 Connection for Grid Relay Switching Status

To send a signal to the grid operator as soon as the first inverter connects to the power distribution grid, connect the multi-function relays of all connected inverters in parallel. The diagram below shows an example of this type of connection.



3.3 Parameter Settings of the Multi-Function Relay

3.3.1 Selecting the Operating Mode

You configure the required operating mode and further settings via parameters. The following options are available depending on the type of communication:

- Via RS485 with Sunny Data Control or Sunny WebBox
- Via *Bluetooth*® Wireless Technology with Sunny Explorer

Depending on the type of communication, the parameters are displayed differently on the communication products.

Selection of the Operating Mode via RS485

Name	Description	Value	Explanation	Default value
Mlt.OpMode	Operating mode of multi-function relay	FltInd	Fault indicator relay	FltInd
		SelfCsmp	Power-dependent control of the self-consumption	
		FanCtl	Control of an external fan	
		ComCtl	Control of external loads via communication devices	
		BatCha	Charging the battery	
		GriSwCpy	Display switching status of the grid relay	

Selecting the Operating Mode via *Bluetooth*

Name	Description	Value	Explanation	Default value
Operating mode of multi-function relay	Operating mode of multi-function relay	Fault indication	Fault indicator relay	Fault indication
		Self-consumption	Power-dependent control of self-consumption	
		Fan control	Control of an external fan	
		Control via communication	Control of external loads via communication devices	
		Battery bank	Charging the battery	
		Switching status grid relay	Display switching status of the grid relay	

3.3.2 Operating Mode: Error Message

To use the multi-function relay as fault indicator relay, you only need to select the operating mode "FltInd" or "Fault indication". The type of connection determines whether the fault indicator displays interferences or undisturbed operation, as described in Section 3.2.2 "Connection for the Control of a Load" (page 11).

3.3.3 Operating Mode: Self-Consumption

In this operating mode, the relay switches after a minimum time, in which the power was above a certain limiting value. It then remains switched on for a configurable minimum duration.

Parameter Setting via RS485

Name	Description	Range	Default value
Mlt.MinOnPwr	Minimum start-up power, trigger threshold for self-consumption function	100 W ... nominal power	1,500 W
Mlt.MinOnPwrTmm	Minimum time for which the minimum start-up power must be present for the relay to switch	0 min ... 1,440 min	30 min
Mlt.MinOnTmm	Minimum duration for which the relay remains switched on	1 min ... 1,440 min	120 min

Parameter Setting via *Bluetooth*

Name	Description	Range	Default value
Minimum On power for MFR self-consumption	Minimum start-up power, trigger threshold for self-consumption function	100 W ... nominal power	1,500 W
Minimum power On time, MFR self-consumption	Minimum time for which the minimum start-up power must be present for the relay to switch	0 min ... 1,440 min	30 min
Minimum On time for MFR self-consumption	Minimum duration for which the relay remains switched on	1 min ... 1,440 min	120 min

3.3.4 Operating Mode: Fan Control

In this operating mode, the fan is automatically activated if the device temperature reaches 5°C under the temperature that triggers derating. The fan is switched off again as soon as the temperature falls 10°C below the temperature threshold. You do not need to set any parameters other than the operating mode.

3.3.5 Operating Mode: Control via Communication

In this operating mode you can switch the relay via the communication interface of the inverter.

Parameter Setting via RS485

Name	Description	Value	Explanation	Default value
MltComCtl.Sw	Status of the multi-function relay in the operating mode 'Control via communication'	On	Relay closed, function active	Off
		Off	Relay open, function inactive	

Parameter Setting via *Bluetooth*

Name	Description	Value	Explanation	Default value
Status of MFR with control via communication	Status of the multi-function relay in the operating mode 'Control via communication'	On	Relay closed, function active	Off
		Off	Relay open, function inactive	

3.3.6 Operating Mode: Charging the Battery

In this operating mode, the multi-function relay switches as soon as a set minimum power is exceeded. Once the power has fallen below the set power, the relay switches off. It can then only be switched again after a set minimum time.

Parameter Setting via RS485

Name	Description	Range	Default value
Mlt.BatCha.Pwr	Threshold for switching the relay in operating mode 'Charging the battery'	100 W ... nominal power	1,500 W
Mlt.BatCha.Tmm	Minimum time between switching the relay off and back on	1 min... 1,440 min	30 min

Parameter Setting via *Bluetooth*

Name	Description	Range	Default value
Minimum On power for MFR of battery bank	Threshold for switching the relay in operating mode 'Charging the battery'	100 W ... nominal power	1,500 W
Minimum time before reconnection of MFR of battery bank	Minimum time between switching the relay off and back on	1 min... 1,440 min	30 min

3.3.7 Operating Mode: Switching Status Grid Relay

In this operating mode, the multi-function relay switches simultaneously with the grid relay of the inverter. You do not need to set any parameters other than the operating mode.

3.4 Multi-Function Relay Technical Data

Maximum Switching Voltage

AC	240 V
DC	30 V

Maximum Switching Current

AC	1.0 A
DC	1.0 A

General

Terminal	3-pole spring clamp terminal
Terminal on RS485-Quick Module (only for SB 2000HF-30/SB 2500HF-30/ SB 3000HF-30)	3-pole screw terminal
Electrical endurance (providing that the maximum switching voltage and maximum switching current are adhered to)	Min. 100,000 switching cycles*

*equates to 20 years at 12 switching operations per day

4 OptiTrac Global Peak

OptiTrac Global Peak is an extension of the proven OptiTrac yield optimization function. OptiTrac Global Peak improves the yield of the PV plant for partially shadowed PV modules. Detailed information on this topic is available in the technical information "Shade Management" in the download area at www.SMA.de/en.

4.1 Activate OptiTrac Global Peak

OptiTrac Global Peak is deactivated upon delivery. Only activate this function to increase the yield if the PV plant is shaded. The following options are available depending on the type of communication:

- Via RS485 with Sunny Data Control or Sunny WebBox
- Via *Bluetooth* with Sunny Explorer or Sunny WebBox with *Bluetooth*.

Depending on the type of communication, the parameters are displayed differently on the communication products.

Parameter Setting via RS485

Name	Description	Value	Explanation	Default value
MPPShdw.IsOn	Activation or deactivation of OptiTrac Global Peak	On	Function active	Off
		Off	Function inactive	

Parameter Setting via *Bluetooth*

Name	Description	Value	Explanation	Default value
OptiTrac Global Peak switched on	Activation or deactivation of OptiTrac Global Peak	On	Function active	Off
		Off	Function inactive	

4.2 Setting OptiTrac Global Peak

If you log on as an installer, you can also configure the functions of OptiTrac Global Peak. You can specify the interval between 2 samplings of the operating point of the PV array.

Parameter Setting via RS485

Name	Description	Range	Default value
MPPShdw.CycTms	Interval in which the inverter optimizes the operating point of the PV plant	6 min ... 30 min	6 min

Parameter Setting via *Bluetooth*

Name	Description	Range	Default value
Cycle time of the OptiTrac Global Peak algorithm	Interval in which the inverter optimizes the operating point of the PV plant	6 min ... 30 min	6 min

5 Contact

If you have technical problems concerning our products, contact the SMA Service Line. We require the following information in order to provide you with the necessary assistance:

- Inverter device type
- Inverter serial number
- Firmware version of the inverter
- Special country-specific settings of the inverter (if applicable)
- Type and number of the PV modules connected
- Mounting location and altitude of the inverter
- 3 or 4-digit event number and display message of the inverter
- Optional equipment, e.g. communication products
- Type of use of the multi-function relay/fault indicator relay (if present)

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SMA Service Line

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E-Mail:	ServiceLine@SMA.de

SMA Factory Warranty

The current warranty conditions come enclosed with your device. These are also available online at www.SMA.de and can be downloaded and are available on paper from the usual sales channels if required.

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