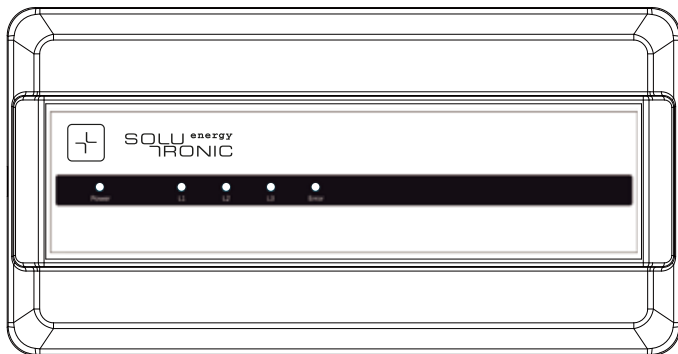


# User Manual GridManager with FEED-IN function



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# 1 Notes about the User Manual

Dear Customer,

Thank you for buying a GridManager with FEED-IN function designed and manufactured by Solutronic Energy. This manual describes how to use your GridManager with FEED-IN function. Please keep it somewhere where you have ready access to it whenever you need to. Please comply at all times with the safety precautions we refer to in this manual. Please be advised in all cases the security precautions referred to in this document.

## 2 Notes about this manual

### 2.1 Aim of this manual

This manual will help you to carry out installation work on your inverter quickly and safely. Please read this chapter thoroughly and carefully. It contains some important tips on how to use this manual.

### 2.2 Scope

This User Manual applies to the Solutronic GridManager with FEED-IN function.

### 2.3 Target group

All service work on SOLPLUS inverters must be performed by a fully qualified electrician who has completed the technical training offered by Solutronic. The fitter must have the necessary certification and authorisation of the responsible power utility.

### 2.4 Explanation of the symbols and associated terms used

#### 2.4.1 Explanation of the symbols used for safety instructions

Please read and observe the following safety instructions in this manual. The danger classes describe the risks of non-observance of the safety instructions. (The safety instructions describe the following danger classes per ANSI.)



Attention!

"Attention!" denotes a warning that, if not observed, can result in property damage!



Caution!

"Caution!" denotes a warning that, if not observed, can result in personal injury!



Warning!

"Warning!" denotes a warning that, if not observed, can result in death or serious injury!



Danger!

"Danger!" denotes a warning that, if not observed, will result in death or serious injury!



Note

Useful information and tips to help you operate the GridManager to best effect.

### Description of the Nameplate



## 2.5 Abbreviations

The following abbreviations are used in this manual:

SOLPLUS+	= Read-out and monitoring software for use with all Solutronic inverters
DC	= Direct current (direct voltage): electrical value on the input side of the inverter
AC	= Alternating current (alternating voltage): electrical value on the output side of the inverter
PV	= Photovoltaic
Generator	= Solar generator: interconnection of several solar modules to form a string or a number of parallel strings
GM	= GridManager with FEED-IN function

## 3 Safety

### 3.1 Safety in general

Please read the following safety information and instructions before you put the GridManager with FEED-IN function into operation for the first time, in order to avoid personal injuries and/or property damage. These instructions must be complied with at all times.

If you are not able to understand the language used in this documentation sufficiently, please contact and inform the supplier of the situation.

Do not try to attempt to install or put the GridManager with FEED-IN function into service until you have read through all the documentation supplied thoroughly.

Solutronic Energy shall accept no liability for damages resulting from non-observance of the warnings given in this User Manual.

If you sell on, hire out or pass on this device to someone else in some other way, make sure that you give the new user these safety instructions, too. Trouble-free and safe operation of the GridManager with FEED-IN function presumes proper, professional and workmanlike transportation, storage, mounting and installation as well as careful operation and thorough maintenance.



**Warning!**

Improper use of these devices, non-observance of the warnings given in this manual and improper tampering with the safety functions can lead to property damage, personal injury, electric shock and, in extreme cases, death.



**Danger!**

High voltage due to incorrect connection! Risk of fatal or bodily injury from electric shock.



### 3.2 Intended use

This device must be used only for the purpose described in this User Manual: accessory for use in grid-connected photovoltaic installations.

All safety regulations must be complied with. All installation work must be carried out precisely as described in this manual. No modification of any kind to or in this device or to its external wiring is permitted. Any such modification could lead to serious safety problems and danger to life and limb.

## 4 Prerequisites

The inverters and the GridManager should be connected in one Ethernet using a dedicated switch for this setup. Using RS485 for regulation is not possible.

Abbildung	Bezeichnung	Beschreibung	
	Laptop or PC death. with SOLPLUS+ professional	For setting up the GridManager. Not required for operation.	V 2.7.4 or higher
	GridManager 63 or  GridManager 250	Firmware	V1.4.9 or higher
Inverter	SOLPLUS 25-55:	Firmware	V2.67.2 or higher
Inverter	SOLPLUS 80-120:	Firmware	V1.49.13 or higher
Inverter	SE 40S2-SE 60S2:	Firmware	V2.2.7
	Switch	Preferably one with option to ground the shield of cables	

## 5 Mode of Operation

The GridManager covers the power management of the inverter as a function of local consumption.

It's located between the SOLPLUS inverters and appliances; and the power meter.

The typical reaction time for power regulation is 4 Milliseconds.

If e.g. a maximum of 70% of the installed DC power may be fed in but refrigerator, lights etc. are switched on. The consumption of these is added to the 70% and allows the inverter to produce more power to compensate for this.

Potential uses for GridManager:

- The energy provider requires a temporary power reduction of the installation:  
The inverters are regulated to produce no more power than the current allowed amount plus the current consumption.
- The connected power is generally limited: The inverters are regulated to produce no more power than the allowed amount plus the current consumption.
- There is no feed in allowed / required: The inverters are regulated to produce no more power than the current consumption minus a small margin for regulation.



## 6 Installation GridManager 63

### Connection

- 3x 230 Volt, N, PE, 50 Hertz, max. 63 Ampere per Phase
- It shall be installed between the meter (reference counter when feed in is zero or bidirectional meter when grid-feed is limited) and the local distribution for appliances and PV-inverter
- You may install either a GridManager or a PowerReductionCard, installing both at the same installation will not work.
- Connect appliances to the same phase as the inverter, especially if only one inverter is used.

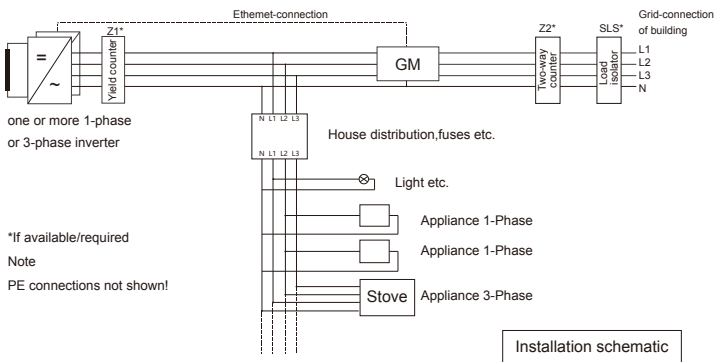
### Installation

#### AC-voltage measurement and power supply

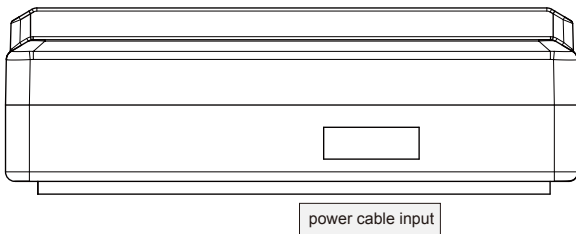
- The grid voltages L1, L2 and L3 and neutral line N are connected to the green 4-pin connector at the bottom side. L3 and N (230 V AC, 50 Hz) are used to supply the GridManager. Wire cross-section 1,5 mm<sup>2</sup>.
- Check for correct phasing
- For overall one phase operation connect the one phase used to all 3 pins L1, L2 and L3 of the 4-pin connector for voltage measurement. This can be achieved by bridging all 3 pins.
- For correct display of the measured voltages connect ground to the GridManager. This is best done on the shield of the Ethernet connector. However, the GridManager will regulate fine without ground connected.

#### AC-current measurement

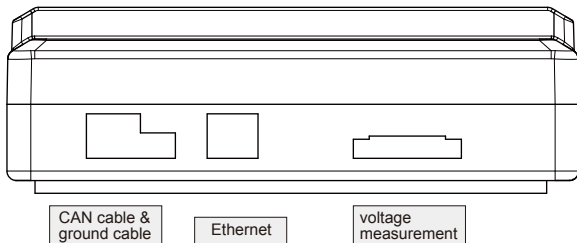
- The power lines have to be separated on terminals and routed from the bottom-up through the current transformers of the GridManager.
- Wire cross-section 16 mm<sup>2</sup> (max.) for GridManager 63  
Check for correct phasing



Lower side: power cable input, voltage measurement and N



Upper Side: Ethernet, power cable outlet



# 7 Installation GridManager 250

## Connection

- 3x 230 Volt, N, PE, 50 Hertz, max. 250 Ampere per Phase
- Use only the approved current transformers type JS24S-250/1A class 1,0 that were delivered with the GridManager 250
- It shall be installed between the meter (reference counter when feed in is zero or bidirectional meter when grid-feed is limited) and the local distribution for appliances and PV-inverter
- You may install either a GridManager or a PowerReductionCard, installing both at the same installation will not work.

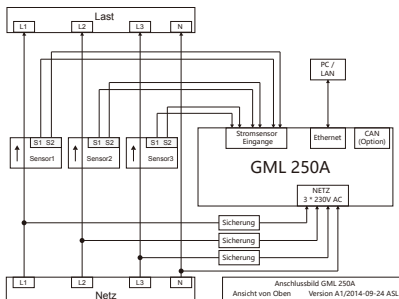
## Installation

### AC-voltage measurement and power supply

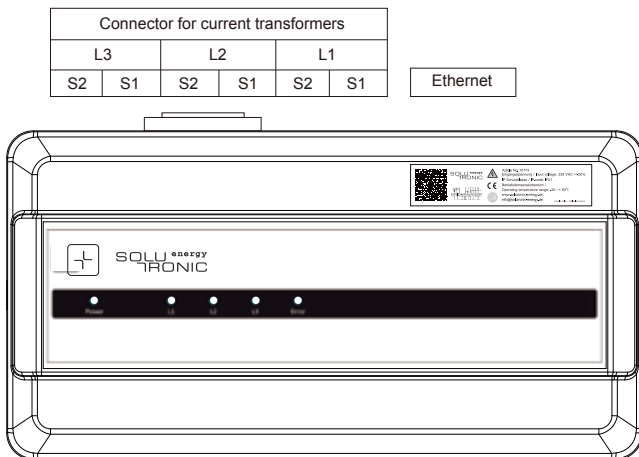
- The grid voltages L1, L2 and L3 and neutral line N are connected to the green 4-pin connector at the bottom side. L3 and N (230 V AC, 50 Hz) are used to supply the GridManager. Wire cross-section 1,5 mm<sup>2</sup>.
- Check for correct phasing
- For correct display of the measured voltages connect ground to the GridManager. This is best done on the shield of the Ethernet connector. However, the GridManager will regulate fine without ground connected.

### AC-current measurement

- The power lines have to be routed through the external current transformers of the GridManager. Watch for correct current flow direction on the current transformers.
- Wire cross-section 240 mm<sup>2</sup> (max.) for GridManager 250
- Check for correct phasing



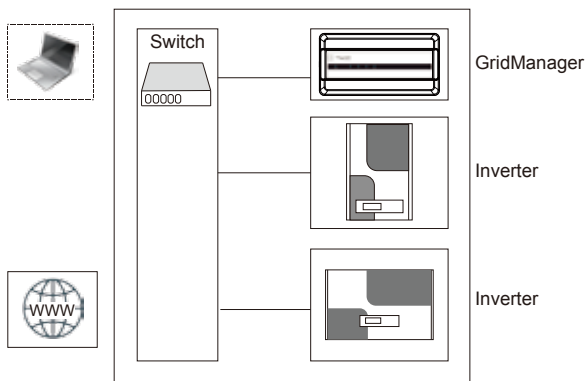
View from top:



## 8 Connecting GridManager, inverters and PC

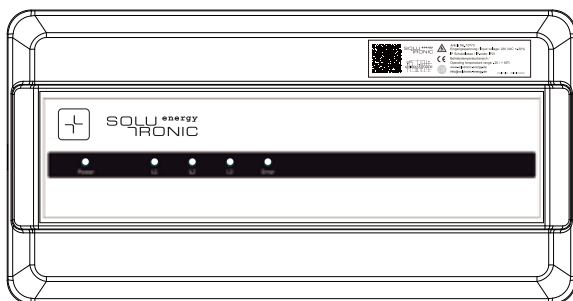
All devices are connected using a standard ethernet-switch and -cables.

The GridManager itself has no display. In the first 60 seconds after starting up the GridManager uses always the IP-address 192.168.0.98. If a connection to this address is established, the GridManager will continue to use this IP-address, otherwise it will switch to the set IP-address after these 60 seconds.



## 9 Operating status

The operating status of GridManager is shown by LEDs.



### 9.1 LED power

State	Meaning
Off	No power or not yet initialized
On	Everything okay
Flashing slowly	Internal error found or Default-communication
Flashing fast	Operation with default communication parameters

### 9.2 LED L1, L2, L3

State	Meaning
Off	No mains voltage on this phase
On	UAC okay
Flashing slow	UAC not okay
Flashing fast	Frequency not okay (only if UAC okay, otherwise slowly flashing LED)

### 9.3 LED error

State	Meaning
Off	No power or not yet initialized
Flashing slow	Warning pending or default communication
Flashing fast	Blink code shows error list. Also the LED flashes with a frequency of 2 Hz. After this there will be a break of 3 seconds and then the blink code will be repeated.

## 10 Data connection to GridManager using SOLPLUS+



### Note

SOLPLUS+ and its manuals are available on our homepage [www.solutronic-energy.de](http://www.solutronic-energy.de). Please use the latest version available, at least the version stated in chapter 4. To setup the GridManager you'll need the professional version of SOLPLUS+. If you need a professional key, please contact our service.

In "Administration" of SOLPLUS+ you may add the GridManager like a inverter in a plant using "TCP/IP individual" as connection type.

For the first setup set your PC to the IP-address 192.168.0.10 and use this data in SOLPLUS+ to create a new inverter (=GridManager):

- (Default) IP-address: 192.168.0.98
- SPP-Address (=Serial number): see the silver serial sticker on the GridManager

# 11 Parameter settings GridManager

## 11.1 IP-address GridManager



### Note

GridManager uses the same password mechanics as a inverter. You will need your individual password level 3 to setup the parameters. Please see the manual for password level 3 on how to get and enter a password level 3.

The IP-address is defined in 4 parameters, each representing a octet of a complete IP-address.

<b>Parameter 110:</b>	<b>IP address HH (octet 1)</b>
Menu:	Communication/WEB
Default setting:	192
Password-level:	1

The 1st segment of the IP address using the format 192.xxx.xxx.xxx

<b>Parameter 111:</b>	<b>IP address HL (octet 2)</b>
Menu:	Communication/WEB
Default setting:	168
Password-level:	1

The 2nd segment of the IP address using the format xxx.168.xxx.xxx

<b>Parameter 112:</b>	<b>IP address LH (octet 3)</b>
Menu:	Communication/WEB
Default setting:	0
Password-level:	1

The 3rd segment of the IP address using the format xxx.xxx.0.xxx

<b>Parameter 113:</b>	<b>IP address LL (octet 4)</b>
Menu:	Communication/WEB
Default setting:	98
Password-level:	2



The 4th segment of the IP address using the format xxx.xxx.xxx. 98

To use DHCP enter 0 (zero) in all 4 parameters 110-113. The GridManager will receive a IP-address from the DHCP server. If no DHCP server is present the default IP-address 192.168.0.98 is used.

However, for use with SOLPLUS+ we suggest using a fixed IP-address to avoid changes in the administration.

**Parameter:**                      **Network Port for UDP packages**

Menu:                                      Options  
Default setting:                      33010  
Password-level:                      2

(Not changeable up to Version 1.09. Make sure no other applications use this port) This port is used for broadcasting the control signal to the inverters. If you change this parameter, you need to change the parameter "network port for UDP packages" on the inverters also.

## 11.2 Total AC power of connected inverters

These parameters define how much inverter AC power is connected to the 3 phases L1, L2 and L3.

Add up the maximum output of all connected inverters. Maximum parameter value is 320000 W. If one phase is not connected to a inverter enter 0 (zero) on this phase.

**Parameter 390:**                      **AC total power inverter L1**

Menu:                                      Options  
Unit:                                        W  
Accuracy:                                1 W  
Default value:                        5000 W  
Password level:                        3

**Parameter 391:**                      **AC total power inverter L2**

Menu:                                      Options  
Unit:                                        W  
Accuracy:                                1 W  
Default value:                        5000 W  
Password level:                        3

**Parameter 392: AC total power inverter L3**

Menu: Options  
 Unit: W  
 Accuracy: 1 W  
 Default value: 5000 W  
 Password level: 3

### 11.3 Minimum withdrawal from grid / Maximum feed in to the grid

These parameters define how much power per phase should be either  
 -withdrawn from the grid in case of zero feed in  
 or  
 -fed into the grid in case of power reduction

#### 11.3.1 Minimum withdrawal from grid (Zero Feed-in)

These parameters define how much power should be withdrawn from the grid. For each inverter add 50 W with a total minimum of 100 W. This will prevent any feed in to the grid, as there is always a small amount of consumption.

Positive values define the withdrawal. Maximum value is 320000 W



**Note**

These parameters will be ignored if parameter 409 "Presetting accumulating grid-feed" is used.

**Parameter 397: Minimum removal of grid-total L1**

Menu: Options  
 Unit: W  
 Accuracy: 1 W  
 Default setting: 100 W  
 Password level: 3

**Parameter 398: Minimum removal of grid-total L2**

Menu:	Options
Unit:	W
Accuracy:	1 W
Default setting:	100 W
Password level:	3

**Parameter 399: Minimum removal of grid-total L3**

Menu:	Options
Unit:	W
Accuracy:	1 W
Default setting:	100 W
Password level:	3

## 11.3.2 Limited allowed feed in into the grid (single phases)

These parameters define how much power is allowed to be fed into the grid. Each phase is defined for itself, watch for total limits of feed in.

Negative values define the allowed feed in. Minimum value is -320000 W

**Note**

These parameters will be ignored if parameter 409 "Presetting accumulating grid-feed" is used.

**Note**

While the parameter name says "removal" these parameters can also be used for limiting the feed in power.

**Parameter 397: Minimum removal of grid-total L1**

Menu:	Options
Unit:	W
Accuracy:	1 W
Default setting:	100 W
Password level:	3

**Parameter 398: Minimum removal of grid-total L2**

Menu:	Options
Unit:	W
Accuracy:	1 W
Default setting:	100 W
Password level:	3

**Parameter 399: Minimum removal of grid-total L3**

Menu:	Options
Unit:	W
Accuracy:	1 W
Default setting:	100 W
Password level:	3

### 11.3.3 Limited allowed feed in into the grid (all phases)

This parameter defines how much power is allowed to be fed into the grid in total.

Power is calculated for all three phases simultaneously.

Positive values define the allowed feed in. Maximum value is 320000 W

**Parameter 409: Presetting accumulating grid-feed**

Menu:	Options
Unit:	Watt
Accuracy:	1 W
Default setting:	0 W
Password level:	3

## 11.4 Additional settings

### 11.4.1 Threshold of power regulation

This parameter defines the threshold of change in power before the GridManager starts regulating.

This prevents the inverters from powering up and down too often.

#### **Parameter 401:**                      **Readjustment of power**

Menu:	Options
Unit:	Watt
Accuracy:	1 W
Default setting:	50 W
Password level:	3

### 11.4.2 Defining power class for GridManager 63A and 250A

This setting is usually not necessary to change, as it's already set according to the power class of the GridManager. The value 80 or 81 defines the internal scaling of GridManager either to 63 A or 250 A.

Please note that, after entering this parameter, it will automatically switch back to its default value of 0

Parameter 66:                      set default values

Menu:	device configuration
Factory setting:	0
Password level:	2

Value of parameter 66	Setting of the scaling
80	63 A
81	250 A

After saving the parameter, the default value of 0 is displayed again.

### 11.4.3 UDP packet cycle

#### **Parameter**                              **UDP packet cycle**

Gridmanager:	Parameter 402
SPP Menu:	Device configuration
Resolution:	1
Factory setting:	4
Password level:	3

Sets the interval at which the UDP packets are sent.

All  $(P402 + 1) * 20\text{ms}$  a packet is sent. That is, With the default setting of "4" a packet is sent every 100ms, with the setting "0" a packet is sent every 20ms.

From firmware version 1.4.9.

## 12 Parameter settings Inverter



### Note

See the manuals of the inverters for information about display use and connecting the inverters to Ethernet.  
See the manual for SOLPLUS+ for information about setting parameters of a inverter.

### 12.1 Activating FEED-IN mode

This parameter enables the inverter to receive regulation packets from the GridManager. This overrules the power output settings of the inverter and uses the regulation sent by GridManager Set this parameter to 64.

#### Parameter

SOLPLUS 25 - 55:

SOLPLUS 80 - 120:

Menu:

Default setting:

Password-level:

#### FEED-IN operating mode

Parameter 315

Parameter 466

Options

0

3

#### Parameter

SE 40S2 - 60 S2:

Menu:

Default setting:

Password-level:

#### GM configuration

Parameter 134

Power reduction

0

3



### Note

For SOLPLUS 25-55:  
The parameter 242 effective power max. limits the output of the inverter in general. For use with the GridManager set this parameter to it's factory default value of 5700 W.

## 12.2 Assigning phases L1 L2 L3

These parameters define to which phase the inverter is connected. This is important for single phase inverters.

### Parameter 310

### Number of the net-phase 1

SOLPLUS 25 - 55:

SOLPLUS 80 - 120:

SE 40S2 - SE 60S2

Menu: Options

Default setting: 1

Password-level: 2

### Parameter 311

### Number of the net-phase 2

SOLPLUS 80 - 120

Menu: Options

Default setting: 2

Password-level: 2

### Parameter 312

### Number of the net-phase 3

SOLPLUS 80 - 120

Menu: Options

Default setting: 3

Password-level: 2

## 12.3 UDP-Port (Parameter are not active)

### Parameter: *is inactive*

### network port for UDP packages

SOLPLUS 25 - 55: Parameter 317

SOLPLUS 80 - 120: Parameter 468

Menu: device configuration

Default value: 33010

Password-level: 2

This port is used for receiving the control signal from the GridManager. If you change this parameter, you need to change the parameter "network port for UDP packages" on the GridManager also.

### Parameter: *is inactive*

### GM UDP Port

SE 40S2 - SE 60S2: Parameter 136

Menu: power reduction

Default value: 33010

Password-level: 3

This port is used for receiving the package from the Grid Manager.



## 12.4 Fallback

Should the inverters not be able to receive regulation packets from the GridManager they will use this parameter to limit their output. This prevents violation of rules but reduces effectiveness. This parameter is ignored as long the inverter receives regulation packets.

<b>Parameter:</b>	<b>Power limit</b>
SOLPLUS 25 - 55:	parameter 319
Menu:	device configuration
Unit:	W
Resolution:	1 W
Default setting:	0 W
Password level:	3

To limit the maximum power of communication loss, set the desired wattage in this parameter.

<b>Parameter:</b>	<b>Power limit per net phase</b>
SOLPLUS 80 - 120:	Parameter 463
Menu:	power reduction
Unit:	W
Resolution:	1 W
Default setting:	0 W
Password level:	3

To limit the maximum power of communication loss, set the desired wattage in this parameter.

<b>Parameter:</b>	<b>GM power limit</b>
SE 40S2 - SE 60S2:	Parameter 138
Menu:	power reduction
Unit:	W
Resolution:	1 W
Default setting:	0 W
Password level:	3

To limit the maximum power of communication loss, set the desired wattage in this parameter.

<b>Parameter:</b>	<b>UDP Timeout</b>
SOLPLUS 25 - 55:	Parameter 318
Menu:	device configuration
Default setting:	60 (=3 seconds)
Password level:	3

<b>Parameter:</b>	<b>UDP Timeout</b>
SOLPLUS 80 - 120:	Parameter 469
Menu:	device configuration
Default setting:	3 seconds
Resolution:	0,1 seconds
Password level:	3

This parameter defines the time after the last receipt of a packet from a GridManager to switch the inverter to the Power Limitation parameter.

<b>Parameter:</b>	<b>GM UDP Timeout</b>
SE 40S2 - SE 60S2:	Parameter 137
Menu:	Power reduction
Default setting:	3 seconds
Resolution	0,1 seconds
Password level:	3

This parameter defines the time after which a new UDP packet must be received by the Gridmanager. If no packet is received within this time, the inverter sets its maximum power to the value specified in the parameter "GM power limitation".

An error entry is made in the error list: Error 314 "Communication to Gridmanager failed".

## 12.5 Using more than one GridManager

This parameter defines from which GridManager this inverter accepts the regulation packets.

<b>Parameter:</b>	<b>GM SN</b>
SOLPLUS 25 - 55:	Parameter 316
SOLPLUS 80 - 120:	Parameter 467
Menu:	device configuration
Default setting:	0
Password level:	2

<b>Parameter:</b>	<b>GM serial number filter</b>
SOLPLUS 25 - 55:	Parameter 316
SOLPLUS 80 - 120:	Parameter 467
Menu:	power reduction
Default setting:	0
Password level:	3

The default setting 0 (zero) accepts regulation packets from all sources. Use the default setting if only one GridManager is used. If more than one GridManager is used enter the SPP-address of the GridManager responsible for this inverter.

## 12.6 Verifying communication

### **Parameter:** count register for UDP packages

SOLPLUS 25 - 55:	Parameter 43
SOLPLUS 80 - 120:	Parameter 203
Menu:	actual value / output
Default setting:	0

### **Parameter:** count register for UDP packages

SE 40S2 - SE 60S2:	Parameter 133
Menu:	yield control
Unit:	-
Resolution:	1

This parameter indicates the number of packets received. Depending on the transmission frequency of the packets from the Gridmanager, the value should be correspondingly increased.

### **Parameter:** performance specification

SOLPLUS 25 - 55:	Parameter 42
SOLPLUS 80 - 120:	Parameter 200, 201, 202
Menu:	actual value / output
Unit:	%
Resolution:	0.1%

This parameter indicates the received performance specification. Positive values mean performance can be increased. Negative values mean the power has to be reduced.

### **Parameter:** performance specification

SE 40S2 - SE 60S2:	Parameter 132
Menu:	yield control
Unit:	%
Resolution:	0.1%

This parameter specifies the allowed change of the AC current in 0.1% of the maximum current per 20ms. A positive value means the current is increased, a negative value reduces the current. A value of 0.1% means a change of the current by 5% IACMax per second.

## 13 Measurement readings GridManager

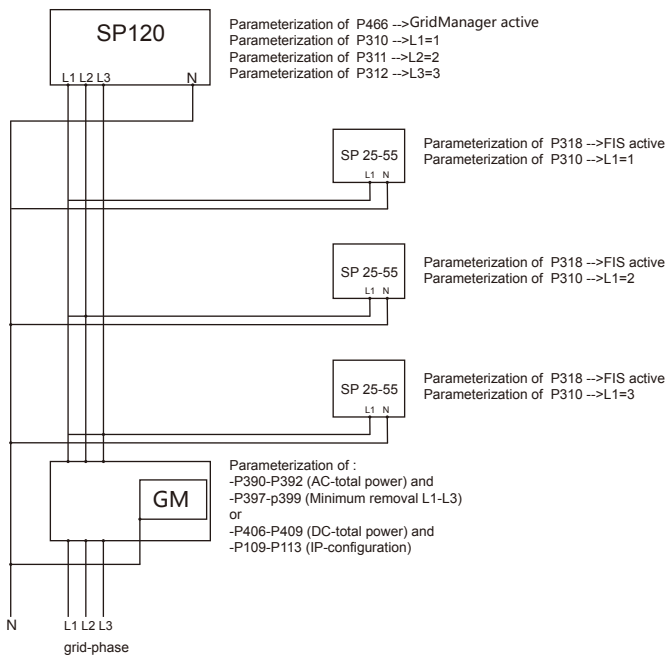
These parameters store the actual values of the GridManager. Use SOLPLUS+ to display this data. Positive values show retrieval from grid, negative values show feed in to the grid.

<b>Parameter 13:</b> Menu: Unit:	<b>Actual value grid voltage L1</b> Actual Values V
<b>Parameter 14:</b> Menu: Unit:	<b>Actual value grid voltage L2</b> Actual Values V
<b>Parameter 15:</b> Menu: Unit:	<b>Actual value grid voltage L3</b> Actual Values V
<b>Parameter 41:</b> Menu: Unit:	<b>Active power phase L1</b> Actual Values W
<b>Parameter 42:</b> Menu: Unit:	<b>Active power phase L2</b> Actual Values W
<b>Parameter 43:</b> Menu: Unit:	<b>Active power phase L3</b> Actual Values W
<b>Parameter 44:</b> Menu: Unit:	<b>Total active power sum of all phases</b> Actual Values W
<b>Parameter 103:</b> Menu: Unit:	<b>Grid current L1</b> Actual Values A
<b>Parameter 104:</b> Menu: Unit:	<b>Grid current L2</b> Actual Values A
<b>Parameter 105:</b> Menu: Unit:	<b>Grid current L3</b> Actual Values A
<b>Parameter 77:</b> Menu: Resolution: Unit:	<b>Grid frequency</b> Actual Values 0.001Hz Hz

Frequency of the phase connected to L3 on the voltage connector.

# 14 Attachment

## 14.1 Example



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