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Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠️ **DANGER**
indicates that death or severe personal injury will result if proper precautions are not taken.

⚠️ **WARNING**
indicates that death or severe personal injury may result if proper precautions are not taken.

⚠️ **CAUTION**
with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

⚠️ **CAUTION**
without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

⚠️ **NOTICE**
indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by personnel qualified for the specific task in accordance with the relevant documentation for the specific task, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠️ **WARNING**
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be adhered to. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of the Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.
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<td>8 Technical data</td>
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<td>9.2 Spare parts &amp; accessories</td>
<td>47</td>
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<tr>
<td>A Appendix</td>
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</tr>
<tr>
<td>Index</td>
<td>51</td>
</tr>
</tbody>
</table>
Introduction

1.1 About this manual

Purpose of this manual
This document describes how to work with the SINVERT PVM ControlBox. It focuses particularly on the following tasks:
• Connection of the SINVERT PVM ControlBox to the ripple-control receiver of the grid operator
• Connection of a photovoltaic system with SINVERT PVM inverters to the public supply network of the grid operator
• Derating of the photovoltaic system by the grid operator using a ripple-control receiver

For further information about handling the SINVERT PVM inverters and the SINVERT Webmonitor, you will also need the operating instructions for these two systems.

Basic knowledge required
• Training as an electrical technician
• Experience of working with PV systems
• Experience in the installation and commissioning of PV systems
• Experience of working with inverters

Conventions
In this manual, the abbreviation SINVERT PVM is used to refer to the product designations of inverters in the SINVERT PVM range, e.g. SINVERT PVM10 or SINVERT PVM13.

Trademarks
SINVERT® is a registered trademark of Siemens AG.

1.2 History of changes in this documentation
Currently released editions of this manual:

<table>
<thead>
<tr>
<th>Edition</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>04/2010</td>
<td>First Edition</td>
</tr>
<tr>
<td>11/2010</td>
<td>Functional expansion: Programmability of derating</td>
</tr>
</tbody>
</table>
1.3 Disposal

The device is RoHS-compliant and can thus be disposed of at local sites for the disposal of household equipment.
2.1 Safety notes for the product

The SINVERT PVM ControlBox itself is supplied with a protective extra-low voltage of 24 V DC and does not pose any risk of electric shock when it is wall-mounted.

### WARNING

**Risk of electric shock with cabinet-mounted boxes**

If the SINVERT PVM ControlBox is to be installed in a control cabinet (optional), then the control cabinet itself poses a risk to life by electric shock (electrocution).

- This installation work must always be undertaken by a properly qualified electrician.
- Before the control cabinet is opened, the power supply must be disconnected and secured against reconnection.

### WARNING

**People with pacemakers, metal implants, and hearing aids are at risk of damaging their health in the immediate vicinity of a SINVERT PVM inverter.**

People with pacemakers and metal implants must be prohibited from entering the area in the immediate vicinity of the SINVERT PVM inverters.

The magnetic and electromagnetic fields that are present in the immediate vicinity of SINVERT PVM inverters can present a serious danger to people with pacemakers, metal implants, and hearing aids.

### CAUTION

**Damage to the device due to electrostatic charge**

Do not open the SINVERT PVM ControlBox! It contains components which are susceptible to electrostatic discharge and might sustain irreparable damage if you touch them.

### CAUTION

**Invalidation of the warranty**

The device may be opened only by authorized specialist personnel, otherwise the warranty will be invalidated.

### Note

**Please also observe the operating instructions of the SINVERT PVM inverters**

The operating instructions for the SINVERT PVM inverters contain information about the dangers posed by the inverters, for example, risk of electric shock (electrocution) and radiation of strong electromagnetic fields.
2.2 National standards

- Adherence to the safety regulations and standards applicable in the country of use is essential.
- The device must not be commissioned until it has been verified that the system in which the products are installed complies with the relevant national standards and safety regulations.
- The device may be operated only on condition of conformance to the national EMC regulations for this particular application. The manufacturer of the system or machine is responsible for ensuring operation within the tolerance limits stipulated by national regulations. European countries: EC Directive 2004/108/EC (EMC Directive).
Description

3.1 Device description

SINVERT PVM ControlBox

The following diagram shows the interfaces on the SINVERT PVM ControlBox:

1. Ethernet port: RJ45 socket
2. RS485 master terminal block; external overvoltage protection EN type D1 required
3. LED operating display
4. USB interface for parameterization
5. Terminal block for digital inputs/outputs (IN1 - IN4 only)
6. Terminal block for analog inputs/outputs (P24VKL for ripple-control receiver)
7. RS485 master terminal block; with internal overvoltage protection EN type D1
8. Jumper plug between operational ground and PE 2; storage pins for jumper plug
9. 24 V DC 15 W power supply
   The plug-in power supply unit is included in the scope of supply.
10. The blue LED indicates whether voltage is connected to the device through the plug-in power supply unit.

Figure 3-1 SINVERT PVM ControlBox
Description

3.1 Device description

For more information about interfaces, refer to Section Wiring diagram and interface assignments (Page 26). Interfaces which are not described above are not used for this application and must not be connected.

LED operating display

The following table shows the meaning of the LEDs:

<table>
<thead>
<tr>
<th>LED</th>
<th>Display</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAULT</td>
<td>Illuminated red</td>
<td>System fault (the blue LED &quot;POWER&quot; is illuminated as well)</td>
</tr>
<tr>
<td>ACTIVE</td>
<td>-</td>
<td>No function</td>
</tr>
<tr>
<td>READY</td>
<td>Flashes green</td>
<td>Initialization</td>
</tr>
<tr>
<td></td>
<td>Illuminated green</td>
<td>Device is operating normally (the blue LED &quot;POWER&quot; is illuminated as well)</td>
</tr>
<tr>
<td>POWER</td>
<td>Illuminated blue</td>
<td>Device is operating normally (the green &quot;READY&quot; LED is illuminated as well)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>System fault (the red LED &quot;FAULT&quot; is illuminated as well)</td>
</tr>
<tr>
<td>LED next to the power supply</td>
<td>Illuminated blue</td>
<td>24 V DC power supply is connected</td>
</tr>
</tbody>
</table>

Supplied plug-in power supply unit

AC 230 V, 50 Hz, DC 24 V, 15 W

Overall length: Plug-in power supply unit with cable 1.5 m
3.2 Features and principle of operation

Features

The latest amendment to the German Renewable Energy Sources Act requires that from January 2009, PV systems with a connected load of more than 100 kWp must be included in infeed and system safety management.

The new BDEW guideline "Generating Plants in the Medium-Voltage Grid" stipulates this requirement for all systems feeding in at the medium-voltage level. The primary significance of this ruling is that grid operators now have the option of reducing the power of the plant by remote control in accordance with §6 of the Renewable Energy Sources Act 2009.

The features of the SINVERT PVM ControlBox are as follows:

- The SINVERT PVM ControlBox permits communication with up to 2 x 31 SINVERT PVM inverters.
- All of the connected SINVERT PVM inverters can be connected over an RS485 bus via the SINVERT PVM ControlBox to the SINVERT Webmonitor.
- Derating takes place via a ripple-control receiver connected to the SINVERT PVM ControlBox. The derating setpoints can be parameterized and are transferred to the inverters over the RS485 bus. The specified derating is stored in the SINVERT PVM ControlBox.
- Cos φ specification as a fixed value: The SINVERT PVM ControlBox distributes the specified cos φ setpoint to the individual SINVERT PVM inverters.

Principle of operation

The SINVERT PVM ControlBox provides a communication link with 2 x 31 SINVERT PVM inverters over two RS485 interfaces and makes the collected data available to the SINVERT Webmonitor.

![Communication over RS485 interface](image-url)
3.3 Scope of supply

The scope of supply of the SINVERT PVM ControlBox includes the following:

- SINVERT PVM ControlBox
- The supplied connectors are inserted in the appropriate sockets on the device
- Wall-mounting support plate
- Screws for mounting on the enclosed wall-mounting support plate
- Plug-in power supply unit 230 V AC / 24 V DC, 15 W
- Ferrite ring, hinged for "Derating" cable
- Operating instructions in hardcopy form and on CD
- SINVERT PVM ControlBox Config on CD

Figure 3-3 Scope of supply
Application planning

4.1 Transport and storage

Interim storage areas must be dry.

4.2 Requirements of the installation location

With respect to the installation of a SINVERT PVM ControlBox, please note the following:

- The SINVERT PVM ControlBox is suitable for installation in indoor areas in the vertical position.
- It can be installed outdoors provided that additional precautions (protected area) are taken.
- Ambient conditions:
  - Degree of protection IP20
  - Climate class 3K3
  - Ambient temperature -25 °C to + 55 °C
  - No condensation allowed.
  - Provide adequate ventilation to ensure compliance with permissible ambient temperatures (taking quality of cooling air into consideration).
- Ensure compliance with minimum passage widths where device is installed in electrical operating areas and station rooms. Refer to DIN VDE 0100 Parts 729 and 731, or to the regulations applicable in the country of use.
- To prevent accidents during installation and servicing, there must be free and safe access to the units!
- To allow the necessary heat dissipation, the following minimum distances to the ceiling and wall, or adjacent units, must be observed.

<table>
<thead>
<tr>
<th>At the side</th>
<th>100 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Above</td>
<td>100 mm</td>
</tr>
<tr>
<td>Below</td>
<td>100 mm</td>
</tr>
</tbody>
</table>

CAUTION

The SINVERT PVM ControlBox must on no account be installed above or below a PVM inverter.
Application planning

4.2 Requirements of the installation location
Assembling

5.1 Device dimensions

The following diagram shows the dimensions of the SINVERT PVM ControlBox without support plate.

![Dimension drawing SINVERT PVM ControlBox](image)

Figure 5-1 Dimension drawing SINVERT PVM ControlBox
5.1 Device dimensions

Note

Allow for the dimensions of the support plate when installing

Please ensure that you allow for the dimensions of the required support plate when installing the SINVERT PVM ControlBox. You can find the dimensions of the support plate in the following chapters.
5.2 Wall mounting

Wall-mounting support plate

The scope of supply includes a support plate for wall-mounting of the SINVERT PVM ControlBox.

The following figure shows the dimensions of the wall-mounting support plate.

Figure 5-2 Dimensions of the wall-mounting support plate

① Hole for fixing the device
② Shield connection for shielding signal cables
③ Lugs for suspending the box on the support plate
④ Central grounding screw
5.2 Wall mounting

Procedure

1. Prepare the area for wall-mounting the box.
   – Use the support plate as a drilling template.
   – The materials for mounting the plate to the wall are not included in the scope of supply.

2. Use suitable screws to attach the plate to the wall.

3. Turn the SINVERT PVM ControlBox slightly on its edge in order to suspend it from the lugs on the wall-mounting support plate ①.

4. Turn the SINVERT PVM ControlBox to the support plate as shown in the diagram ②.

5. Screw the SINVERT PVM ControlBox onto the support plate at the top and bottom.
   – The mounting screws are included in the scope of supply of the unit ③.
5.3 Mounting in control cabinet (optional)

Support plate for control-cabinet mounting (accessory)

A special support plate is available as an accessory for mounting the SINVERT PVM ControlBox in a control cabinet (see Ordering data (Page 47)).

Figure 5-4 Dimensions of the cabinet-mounting support plate

- Shield connection for shielding signal cables
- Holes for attaching the box
- Central grounding screw
5.3 Mounting in control cabinet (optional)

Procedure

**WARNING**

Risk of electric shock with cabinet-mounted boxes

If the SINVERT PVM ControlBox is to be installed in a control cabinet (optional), then the control cabinet itself poses a risk to life by electric shock (electrocution).

- This installation work must always be undertaken by a properly qualified electrician.
- Before the control cabinet is opened, the power supply must be disconnected and secured against reconnection.

---

1. Disconnect the control cabinet from the power supply.
   - Take measures to ensure that the power supply to the cabinet cannot be reconnected.
2. Prepare the mounting area.
3. Use suitable screws to mount the plate in the control cabinet.
   - The materials for mounting the plate in the cabinet are not included in the scope of supply.

---

Figure 5-5 Control-cabinet mounting

---
4. Position the SINVERT PVM Control Box on the cabinet-mounting plate, as illustrated in the diagram ①.

5. Screw the SINVERT PVM Control Box onto the support plate at the top and bottom ②.
   - The two mounting screws are included in the scope of supply of the unit.

### 5.4 Standard-rail mounting (optional)

**Support plate for standard-rail mounting (accessory)**

A special support plate is available as an accessory for mounting the SINVERT PVM Control Box on a standard rail. (See Ordering data (Page 47))

[Diagram of support plate with dimensions and labels ① Holes for attaching the box, ② Clips for attachment to the standard rail]

**Figure 5-6 Dimensions of the support plate for standard-rail mounting**
Procedure

1. Screw the SINVERT PVM ControlBox onto the support plate ①.
   - The two mounting screws are included in the scope of supply of the unit.
2. Attach the support plate with SINVERT PVM ControlBox to the standard rail.
6.1 Safety information for connecting up the SINVERT PVM ControlBox

The SINVERT PVM ControlBox itself is supplied with a protective extra-low voltage of 24 V DC and does not pose any risk of electric shock when it is wall-mounted.

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk of electric shock with cabinet-mounted boxes</td>
</tr>
</tbody>
</table>
If the SINVERT PVM ControlBox is to be installed in a control cabinet (optional), then the control cabinet itself poses a risk to life by electric shock (electrocution).
- This installation work must always be undertaken by a properly qualified electrician.
- Before the control cabinet is opened, the power supply must be disconnected and secured against reconnection.

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td>People with pacemakers, metal implants, and hearing aids are at risk of damaging their health in the immediate vicinity of a SINVERT PVM inverter.</td>
</tr>
</tbody>
</table>
People with pacemakers and metal implants must be prohibited from entering the area in the immediate vicinity of the SINVERT PVM inverters.
The magnetic and electromagnetic fields that are present in the immediate vicinity of SINVERT PVM inverters can present a serious danger to people with pacemakers, metal implants, and hearing aids.
6.2 Wiring diagram and interface assignments

Wiring diagram

You can see the wiring principle of the ControlBox from the figure below.

Figure 6-1 Wiring diagram (example)
Arrangement of interfaces on the device

The position and pin assignments of the individual interfaces are shown in the diagram below.

X13 Ethernet port: RJ45 socket
X15 RS485 master terminal block; external overvoltage protection EN type D1 required
X16 USB interface for parameterization
X17/18 Terminal block for digital inputs/outputs
X77 RS485 master terminal block; with internal overvoltage protection EN type D1
S1 Jumper plug between operational ground and PE 2; storage pins for jumper plug
6.3 Connection tasks

General procedure for connection of shielding

Make an effective conductive bond between the cable shield of all signal cables and the shield connection on the support plate.

![Shield connection diagram](image)

Figure 6-3 Shield connection

1. Open the sheath of the signal cables at a point level with the shield connection on the support plate ①.
2. Use a cable tie to attach the cable to the shield connection in such a way as to make conductive contact with the support.
   - The support plate for standard-rail mounting does not have a shield connection. The user is responsible for contacting the shield to frame.

<table>
<thead>
<tr>
<th>NOTICE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Malfunction in the event of use of interfaces which are not described above</strong></td>
</tr>
<tr>
<td>Interfaces which are not described above are not used for this application and must not be connected.</td>
</tr>
</tbody>
</table>

See also

Initialization and connection process (Page 32)
Connecting the central grounding screw

1. Ground the support plate by the central grounding screw \( \textcircled{1} \).
   - The support plate for standard-rail mounting does not have a central grounding screw. The user is responsible for central grounding of the support.

![Grounding screw](image)

**NOTICE**

**Communication errors in the event of incorrect grounding**

If the signal cables are not correctly grounded, potential differences may give rise to communication errors.

Connecting the inverters

1. Connect all SINVERT PVM inverters (up to 2 x 31 devices) and the SINVERT PVM ControlBox via the primary RS485 interfaces X77.
   - The terminal assignments are shown in the wiring diagram
2. Connect the SINVERT PVM inverters via the secondary connection X15. An external overvoltage protection type 2 is required for the secondary connection over X15.
   - The terminal assignments are shown in the wiring diagram

Connecting the ripple-control receiver of the grid operator

**Recommended cable cross-sections**

- Without plastic sleeve: 0.2 to 1.5 mm\(^2\)
- With plastic sleeve: 0.2 to 0.75 mm\(^2\)

**Procedure**

1. Connect the +24 V DC power supply of the external ripple-control transmitter to terminal block X18:1 with a 7-core cable.
2. Connect the signal cables of the external ripple-control transmitter to terminal block X17:1-4 (IN 1 to 4) with the 7-core cable.
The derating parameters are set as follows at the factory:
- Terminal X17:1 (IN1) to 0% rated power
- Terminal X17:2 (IN2) to 30% rated power
- Terminal X17:3 (IN3) to 60% rated power
- Terminal X17:4 (IN4) to 100% rated power

Making the Ethernet connection
1. Use a CAT.6 patch cable SFTP (screened foil twisted-pair) to link the SINVERT PVM Control Box to your Internet connection at RJ45 socket X13.
   - In a network with multiple nodes, you will require an external switch between the patch cable and modem.
   - With a single node, you can connect the patch cable directly to the modem.
2. Make an effective conductive bond between the Ethernet cable shield and the shield connection on the support plate!

Power supply connection
1. Insert the power supply connector (plug-in power supply) into socket X78 of the Control Box.
2. Do not insert the power plug of the power supply unit in the socket until you commission the device (see Chapter Initialization and connection process (Page 32)).

<table>
<thead>
<tr>
<th>NOTICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>The unit begins to initialize as soon as you connect the supply voltage.</td>
</tr>
<tr>
<td>The SINVERT PVM Control Box &quot;powers up&quot; as soon as it is supplied with voltage.</td>
</tr>
<tr>
<td>For this reason, just prepare the power supply connection for the SINVERT PVM Control Box.</td>
</tr>
<tr>
<td>Do not insert the power plug of the plug-in power supply unit until you are ready to commission the device.</td>
</tr>
</tbody>
</table>

Isolate functional ground in special cases
In EMC projects, it may be necessary to isolate the functional ground of the SINVERT PVM Control Box from the mains PE, due to a special grounding concept, for example.

Procedure for isolating functional ground
1. Remove jumper plug "S1" above socket X78 (see Chapter Wiring diagram and interface assignments (Page 26)).
2. Insert the jumper plug into the two free pins. These are provided for safe storage of the jumper plug.
7.1 Typical system representation

The figure shows a typical configuration for a communication scenario with the PVM ControlBox.

Figure 7-1 Communication via RS485 interface

When operating the RS485 interface, please note that each bus node requires a unique address. The address area ranges from 1 to 31, so up to 62 SINVERT PVM inverters can be operated with one PVM ControlBox. The PVM ControlBox always has bus address 0.

The bus is connected using wire jumpers on X14 at the last bus node. For more details, see the PVM Operating Instructions Chap. 6.9 Interface connection.

Use an Ethernet cable with SFTP (screened foiled twisted-pair) design for connecting the ControlBox to the DSL modem or a switch.
7.2 Initialization and connection process

Operating states

<table>
<thead>
<tr>
<th>Operating state</th>
<th>LED display</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initialization</td>
<td>Green LED &quot;ACTIVE&quot; flashes</td>
</tr>
<tr>
<td>Normal operation</td>
<td>Green LED &quot;ACTIVE&quot; and blue LED &quot;READY&quot; illuminated</td>
</tr>
<tr>
<td>System fault</td>
<td>Red LED &quot;FAULT&quot; and blue LED &quot;READY&quot; illuminated</td>
</tr>
</tbody>
</table>

Initialization

1. Insert the supplied plug-in power supply unit (230 V AC / 24 V DC, 15 W) into socket X78.
2. All LEDs light up briefly for a self-test.
3. The blue LED next to the power supply socket always lights up if the 24 V DC supply is connected.
4. The unit begins initializing as soon as it is connected to power.
   - The green LED "READY" flashes.
5. The box switches to normal mode as soon as it has successfully initialized.
   - The green LED "READY" and the blue LED "POWER" are illuminated
6. In the event of a system fault, the red LED "FAULT" and the blue LED "POWER" light up.

Response to faults

If the SINVERT PVM ControlBox signals a system fault (red LED FAULT is illuminated) or there is a communication failure, follow the steps below.
1. Pull out the plug-in power supply unit connector.
2. Check the shields of the signal cables and the central grounding screw.
3. Check all signal cables.
4. Insert the plug-in power supply unit connector.
5. If the system fault is still present, please contact the Service center.

Establishing a connection and normal operation

- The IP address of the SINVERT PVM ControlBox is assigned at the factory.
- The SINVERT PVM ControlBox sends its data to the SINVERT Webmonitor portal.
- The SINVERT PVM ControlBox controls the SINVERT PVM inverters according to the signals from the ripple-control receiver.
- The SINVERT PVM ControlBox communicates the set reactive power to every SINVERT PVM.
7.3 Configuration with "PVM ControlBox Config"

The "PVM ControlBox Config" software tool is used for configuring the Sinvert PVM ControlBox and only functions in conjunction with a ControlBox with firmware version 2.5 or higher.

7.3.1 System requirements

- Windows XP SP3 or higher.
- Microsoft .NET Framework 3.5 SP1

**NOTICE**

Only 32-bit systems are supported.

7.3.2 Preparatory measures

**Configuring the SINVERT PVM inverters**

To guarantee the full functionality of the SINVERT PVM ControlBox, the following basic settings must be made on the SINVERT PVM inverter:

1. First, the password "72555" must be entered via the menu "F1 - Configuration - Password". (P2000 = 72555)
2. The settings below must also be made via the menu "F1 - Configuration - Communication - RS485":
   - Protocol: Set "USS protocol and RPC protocol" (P407.3 = 1)
   - USS addresses: Make a unique assignment of the "USS address" of the relevant PVM inverter in the valid range from 1-31 for each bus (P406.3 = 1 … 31)
   - Data transfer rate: Set "Baudrate" on the PVM inverter to "57600" bit/s (P420.3 = 57600)

**Note**

**Data transfer to the WebPortal via SINVERT PVM ControlBox**

While data is transferring to the WebPortal via the SINVERT PVM ControlBox, the portal monitor on the SINVERT PVM inverter must be deactivated. Menu: "F1 - Configuration - Portal monitor - Activation" = "0" (P473.0 = 0)
3. Switch each inverter off and on again to transfer the parameter settings to memory.

<table>
<thead>
<tr>
<th>NOTICE</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Data transfer by switching the PVM off and on</strong></td>
</tr>
<tr>
<td>To transfer the modified data, the PVM must be switched off and on again via the DC switch. See the operating instructions of your PVM unit for further information.</td>
</tr>
</tbody>
</table>

### 7.3.3 Function description

The Sinvert PVM ControlBox can be fully set up with the "PVM ControlBox Config" software tool.

- Derating parameters can be set as desired (after consultation with the power supply utility).
- The total number of nodes set on the RS485 network can be displayed.
- Ethernet and RS485 interface settings are possible.
- The date & time can be set.
- The yield data of the PVM can be forwarded to our "Webmonitor" portal.
- The reactive power specifications can be set as desired (after consultation with the power supply utility).

### 7.3.4 Installation

The "PVM ControlBox Config" software is on the supplied CD.

**Procedure**

1. Install the data locally on your PC initially.
   - You require the driver file "Treiber_CDM 2.04.16 WHQL Certified" only if the connected COM port is not recognized.
   - The file "Setup_SINVERT_PVM_ControlBox_Config_V1.zip" contains the "Setup_x86.msi" installation package for the PVM ControlBox Config.
2. Unzip the file "Setup_SINVERT_PVM_ControlBox_Config_V1.zip".
3. Start the installation by running the "Setup_x86.msi" file.
4. Acknowledge each installation window by clicking on "Next".
   - The standard installation options are the correct choice for most users.

During the installation, a desktop link to the application is set up.
7.3.5 Start and interface definition

After starting the software, the first task is to define the interface to the ControlBox. Access to the ControlBox is either:

- via the Ethernet interface with the factory-set standard IP address: 192.168.0.123 and port number: 21062
- via USB.

By establishing a USB connection between the Sinvert PVM ControlBox and your computer, a COM port is added to the Device Manager of your computer.

**Note**

If the COM port is not recognized, please install the available driver "Treiber_CDM 2.04.16 WHQL Certified" from the CD.

**Procedure**

1. Start "PVM ControlBox Config" via the desktop link or the Windows Start menu.
2. Select the desired interface (Ethernet or COM).
   - If Ethernet, keep the factory default settings.
   - If USB, select the newly added COM port from the dropdown list. Ideally, set the COM port at a COM connection point between 1 and 9.
3. Under Protocol, click on "USS + RTP address" and select the address "0".
4. Confirm your entries with "OK".

![Selecting the communication interface](image-url)
7.3.6 The main window

The entire functionality of the Sinvert PVM ControlBox can be activated or deactivated via the "ControlBox main switch (Hauptschalter) ".

In addition, the relevant functionalities of the PVM ControlBox can be started or stopped individually in the main menu. These are:

- Derating ("Leistungsreduzierung")
- Forwarding of portal data ("Portaldatenweiterleitung")
- Reactive power ("Blindleistung")

To activate a specific functionality, the ControlBox main switch (Hauptschalter) must also be activated.

Examples:

- To activate Derating, "ControlBox main switch" and "Derating" must be checked. Following this, the desired data can be entered under the menu point "Configuration".

- If the "Webmonitor" Internet portal is used, or the Reactive power settings are to be made for the PVM used, the relevant functionalities "Forwarding of portal data" and "Reactive power" must be set.
7.3.7 "Configuration" menu

You can find the submenus for configuring the relevant functions of the Sinvert PVM ControlBox via the "Configuration (Konfiguration)" menu.

![Configuration menu](image)

Figure 7-4 "Configuration" menu

7.3.7.1 Derating

The derating values specified by the power supply utility are entered via the menu item "Derating (Leistungsreduzierung)".

The digital inputs at which the ripple-control receiver of the power supply utility is connected are designated "IN1" to "IN4" (digital inputs of the Sinvert PVM ControlBox at interface X17).

**NOTICE**

You can obtain the configuration of derating via the digital inputs from your local power supply utility. The inputs "IN1" to "IN4" are set to 0.5%, 30%, 60% and 100% at the factory.

**Procedure**

1. Enter the values specified by the power supply utility for relays 1 to 4 in the fields marked in red (see the figure below).
   - A "1" in the matrix of menu ① means if this input INx is set, the power is reduced to the specified value.
   - Relay combinations with several set relays are not relevant.
2. Set the desired updating interval ("Aktualisierungsintervall").
   - An updating interval of 3 minutes is recommended. In this interval, the PVM is set automatically with the current values.
3. The changes must be saved to transfer the settings.

Figure 7-5  Relay configuration for derating
7.3.7.2 Forwarding of portal data

Forwarding of the yield data of the PVM to the Webmonitor portal is enabled via the menu item "Forwarding of portal data (Portaldatenweiterleitung)".

- The frequency with which the Sinvert PVM ControlBox is to send the yield data to the portal can be set.
- The connection is checked with the "Portal test" button.

NOTICE

If forwarding of the data to the Webmonitor portal is not desired, the "Forwarding of portal data" functionality must be deactivated.

The portal test only functions if the Ethernet interface has been correctly configured and the ControlBox is connected to the Internet.

Procedure

1. First, check communication from the ControlBox to the Webmonitor by clicking on the "Portal test (Portaltest)" button.
   - If the settings are correct, the feedback message "Test successful (Test erfolgreich)" appears.
2. Set the desired updating interval in the "Configuration (Konfiguration)" field.
   - The standard setting is a 3-minute interval.
3. The changes must be saved to transfer the settings.
7.3 Configuration with "PVM ControlBox Config"

7.3.7.3 Communication

Select the interface type via the menu point "Communication". The choice is "Ethernet" or "RS485".

Ethernet

If Ethernet, the IP settings such as IP address, subnet mask, and standard Gateway of the ControlBox are made or modified.

The factory settings (delivery status) of the Sinvert PVM ControlBox are:

- IP address: 192.168.0.123
- Subnet mask: 255.255.255.0
- Standard gateway: 192.168.0.1

![IP Einstellungen](image1)

**Figure 7-7** IP settings of the ControlBox

RS485

When configuring the RS485 interface, the data transfer rate for the ControlBox must be selected. A data transfer rate ("Baudrate") of 57,600 bit/s is set as standard. You are recommended to use the default data transfer rate.

**NOTICE**

You must ensure that the same data transfer rate is set on the Sinvert PVM ControlBox and the PVM.

![RS485 Konfiguration](image2)

**Figure 7-8** RS485 configuration of the ControlBox
• Bus A corresponds to connector X15 on the ControlBox.
• Bus B corresponds to connector X77 on the ControlBox.

We recommend a data transfer rate of 57,600 bit/s for both interfaces. The changes must be saved to transfer the settings.

7.3.7.4 Setting the date/time

The date and time are set via the menu item "Date/Time (Datum/Uhrzeit setzen)".
• It is possible to set the time to the computer time, or to specify a date and time.
• The ControlBox transmits this time once a day between 11 and 12 o'clock to all connected inverters.

**NOTICE**

**Time setting essential for correct functioning**

To guarantee correct functioning, the time must be set before commissioning the ControlBox.

![Figure 7-9 Date/time setting of the ControlBox](image)

**Procedure**

1. Select "Set to computer time (Auf Computeruhrzeit setzen)" or enter your desired time manually (menu "Auf folgende Uhrzeit setzen").
2. The changes must be saved to transfer the settings.
7.3 Configuration with "PVM ControlBox Config"

7.3.8 "Options" menu

You can use the "Options (Extras)" menu to see an overview of all the nodes, and to set the angular offset of the reactive power.

![Figure 7-10 "Options" menu]

7.3.8.1 Node overview

The menu item "Node overview (Teilnehmerübersicht)" presents an overview of all the nodes (all connected PVMs).

- To ensure the overview of all nodes is always up to date, the "Derating" functionality must be active.
- All active and inactive PVMs are represented in the node overview.
- If a PVM is connected and correctly configured, it is indicated in green in the node overview (see the figure below).
- If a PVM is not connected, or if it is not reached by the ControlBox, it is indicated in white in the node overview.
Example:

- PVMs are correctly configured on bus A, addresses 3 and 5, and they are supplying properly.
- All other addresses are inaccessible from the perspective of the ControlBox.
- Should there be other nodes connected that are not shown here by the ControlBox, the settings on the PVM and the RS485 wiring must be checked.
- After checking the RS485 wiring, you must click on the "Update (Aktualisierung)" button. Updating can take up to 8 minutes.
7.3.8.2 Reactive power specification

The angular offset (reactive power) required by the power supply utility can be set via the menu item "Reactive power specification (Blindleistungsvorgabe)".

- The reactive power is specified here by an angular offset (cos⁻¹) to the active power in degrees.
- A positive angle results in capacitive reactive power and a negative angle in inductive reactive power. From the perspective of the load, an angular offset of 5.00 degrees (cos⁻¹) corresponds to 0.996 cos Phi capacitive (load reference arrow system).

Figure 7-12 Reactive power specification

Procedure

1. Enter the required "angular offset (Winkelversatz)" in degrees.
2. By clicking on the button "Send to all inverters (An alle WR senden)" , the specification is sent to all connected PVMs.
Technical data

Electrical data

### Plug-in power supply unit

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>230 V AC at 50 Hz</td>
</tr>
<tr>
<td>Permissible voltage range</td>
<td>115 V to 230 V AC</td>
</tr>
<tr>
<td>Rated frequency</td>
<td>50 Hz / 60 Hz</td>
</tr>
<tr>
<td>Output voltage</td>
<td>24 V DC ±3 V</td>
</tr>
<tr>
<td>Power consumption at the power supply unit</td>
<td>18 W</td>
</tr>
<tr>
<td>Overall length: Plug-in power supply unit with cable</td>
<td>1.5 m</td>
</tr>
</tbody>
</table>

### Basic unit

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>24 V DC</td>
</tr>
<tr>
<td>Permissible voltage range</td>
<td>21.6 V to 26.4 V DC</td>
</tr>
<tr>
<td>Power consumption, maximum</td>
<td>12 W</td>
</tr>
<tr>
<td>Current consumption, maximum</td>
<td>500 mA</td>
</tr>
</tbody>
</table>

### Interfaces

#### Ethernet interface (X13)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>1</td>
</tr>
<tr>
<td>Type</td>
<td>RJ45 socket</td>
</tr>
</tbody>
</table>

#### RS485 interfaces (X15, X77)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>2</td>
</tr>
<tr>
<td>Type</td>
<td>X77</td>
</tr>
<tr>
<td></td>
<td>Master terminal block with internal overvoltage protection EN-type D1</td>
</tr>
<tr>
<td>Type</td>
<td>X15</td>
</tr>
<tr>
<td></td>
<td>Master terminal block external overvoltage protection EN-type D1 required</td>
</tr>
</tbody>
</table>

#### Digital inputs (X17)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>4</td>
</tr>
<tr>
<td>Type</td>
<td>X17 terminal block</td>
</tr>
<tr>
<td>Input voltage</td>
<td>−1 V to +33 V DC typically: 24 V DC</td>
</tr>
<tr>
<td>Input current</td>
<td>8 mA ... 9 mA</td>
</tr>
<tr>
<td>Galvanic isolation</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Technical data

Interfaces

<table>
<thead>
<tr>
<th>Signal level:</th>
<th>0</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>–1 V ... 5 V</td>
<td>+13 V ... +33 V</td>
</tr>
<tr>
<td>With open input</td>
<td>Level 0</td>
<td></td>
</tr>
</tbody>
</table>

USB interface (X16), for Service personnel only

<table>
<thead>
<tr>
<th>Number</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Type 2 (Device)</td>
</tr>
</tbody>
</table>

Ambient conditions, EMC

Storage and transport

<table>
<thead>
<tr>
<th>Ambient temperature</th>
<th>-25 ... +55°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum relative humidity</td>
<td>5 ... 99% without condensation</td>
</tr>
</tbody>
</table>

Operation

<table>
<thead>
<tr>
<th>Manufacturer's declaration of conformity</th>
<th>CE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature</td>
<td>-25 ... +55°C</td>
</tr>
<tr>
<td>Relative humidity</td>
<td>5 ... 99% without condensation</td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP20 according to IEC 60529</td>
</tr>
<tr>
<td>EMC interference emission</td>
<td>EN 61000-6-4</td>
</tr>
<tr>
<td>EMC immunity</td>
<td>EN 61000-6-2</td>
</tr>
<tr>
<td>Other climatic conditions in accordance with</td>
<td>3K3 to EN 60721-3-3</td>
</tr>
<tr>
<td>Shock/vibration</td>
<td>4M3</td>
</tr>
</tbody>
</table>

Applicable standards and conformity

<table>
<thead>
<tr>
<th>Manufacturer's declaration of conformity</th>
<th>CE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Degree of protection</td>
<td>IP20 according to IEC 60529</td>
</tr>
<tr>
<td>Other climatic conditions in accordance with</td>
<td>3K3 to EN 60721-3-3</td>
</tr>
</tbody>
</table>

Mechanical properties

<table>
<thead>
<tr>
<th>Dimensions of unit without support plate Width / height / depth</th>
<th>140 mm 1) / 270 mm / 87 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions</td>
<td></td>
</tr>
<tr>
<td>Unit with wall-mounting support plate</td>
<td></td>
</tr>
<tr>
<td>Width / height / depth</td>
<td>267 mm / 267 mm / 103 mm</td>
</tr>
<tr>
<td>Minimum clearances top</td>
<td>100 mm / 100 mm / 100 mm</td>
</tr>
<tr>
<td>Weight</td>
<td>Approx. 1.6 kg</td>
</tr>
</tbody>
</table>

1) Width: Without inserted connectors
Ordering data

9.1 SINVERT PVM ControlBox

SINVERT PVM ControlBox

<table>
<thead>
<tr>
<th>Designation</th>
<th>Order number (MLFB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINVERT PVM ControlBox</td>
<td>6AG3600-3AB10-0AA0</td>
</tr>
</tbody>
</table>

9.2 Spare parts & accessories

Spare parts

<table>
<thead>
<tr>
<th>Designation</th>
<th>Power supply utility</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector accessory pack</td>
<td>Siemens AG</td>
<td>A5E03363347</td>
</tr>
<tr>
<td>Wall-mounting support plate</td>
<td>Siemens AG</td>
<td>A5E03363348</td>
</tr>
<tr>
<td>Plug-in power supply unit</td>
<td>Siemens AG</td>
<td>A5E03372626</td>
</tr>
</tbody>
</table>

Accessory

<table>
<thead>
<tr>
<th>Designation</th>
<th>Power supply utility</th>
<th>Order number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cabinet-mounting support plate</td>
<td>Siemens AG</td>
<td>6AG3960-3BA10-1AA0</td>
</tr>
<tr>
<td>Support plate for standard-rail mounting</td>
<td>Siemens AG</td>
<td>6AG3960-3BA00-1AA0</td>
</tr>
</tbody>
</table>
Ordering data

9.2 Spare parts & accessories
Appendix

Technical support for SINVERT products

- Information material und downloads for SINVERT products: SINVERT infocenter (http://www.siemens.com/sinvert-infocenter)
  Here you can find, for example:
  - Catalogs
  - Brochures
- Documentation on SINVERT products: SINVERT support (http://www.siemens.com/sinvert-support)
  Here you can find, for example:
  - Manuals and operating instructions
  - The latest product information, FAQs, downloads, tips and tricks
  - Characteristics and certificates
- Contacts for SINVERT are available at: SINVERT partners (http://www.siemens.com/sinvert-partner)

Technical assistance for SINVERT products

For all technical queries, please contact:

- Phone: +49 (911) 895-5900
  Monday to Friday, 8 am – 5 pm CET
- Fax: +49 (911) 895-5907
- E-mail: Technical assistance (mailto:technical-assistance@siemens.com)
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