Advanced Energy® AE IMC pmu
Installation and use
Operating instructions
May 2015 Nr. 30707
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Exclusion and limitation of liability

<table>
<thead>
<tr>
<th>WARNING</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AE assumes no liability in the event of damage as a consequence of</strong> the failure to observe the warning instructions in these operating instructions or of improper usage.</td>
</tr>
<tr>
<td><strong>The operating, maintenance and safety instructions are to be read carefully prior to installation and commissioning.</strong></td>
</tr>
<tr>
<td><strong>The installation, commissioning and safety-related check must be undertaken by a qualified electrician.</strong></td>
</tr>
<tr>
<td><strong>Error-free and safe operation of the device requires proper and professional transport, storage, assembly, and installation, as well as careful operation and maintenance.</strong></td>
</tr>
<tr>
<td><strong>Only accessories and spare parts approved by the manufacturer are permitted.</strong></td>
</tr>
<tr>
<td><strong>Technical modifications to the device are not permitted.</strong></td>
</tr>
<tr>
<td><strong>Adherence to the safety regulations and provisions of the country in which the inverter will be used are to be observed.</strong></td>
</tr>
<tr>
<td><strong>The environmental conditions, technical calculation data and connection conditions of the grid operator given in the product documentation must be upheld.</strong></td>
</tr>
<tr>
<td><strong>For European countries, the valid EU guidelines are to be observed when using the inverter.</strong></td>
</tr>
<tr>
<td><strong>The technical data, calculation, connection and installation conditions are to be derived from the product documentation and must be observed under all circumstances.</strong></td>
</tr>
<tr>
<td><strong>No liability is assumed for damages in connection with force majeure and disaster situations.</strong></td>
</tr>
</tbody>
</table>
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Feedback from customers

The technical editor of Advanced Energy has carefully developed this handbook on the basis of research-based document design principles. Suggestions for improvements are always welcome. Please send your comments regarding the content, structure or format of these operating instructions to: mail.aei-power@aei.com.
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1 About these Operating Instructions

These operating instructions form part of the product.
⇒ Read the operating instructions carefully before installing and using the product.
⇒ Keep the operating instructions readily available with the device for the entire service life of the product.
⇒ Provide all future users of the device access to the operating instructions.
⇒ For more information on the device, troubleshooting, and options under: http://www.advanced-energy.de/en/1TL_3TL_Downloads.html

1.1 SYMBOLS AND MARKUP

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓</td>
<td>Prerequisite</td>
</tr>
<tr>
<td>⇒</td>
<td>One-step instruction</td>
</tr>
<tr>
<td>1.</td>
<td>Multiple-step instruction</td>
</tr>
<tr>
<td>•</td>
<td>Bulleted list</td>
</tr>
<tr>
<td>✪</td>
<td>Highlighting within a text</td>
</tr>
</tbody>
</table>

1.2 WARNING NOTICES

1.2.1 Layout of a Warning Notice

**WARN**ING **TEXT**

The type and source of danger are described here.  
⇒ Measures for avoiding the danger are shown here.

**Example**

Death or severe injury due to high discharge current when opening the device.  
⇒ It is essential to ensure an earthing connection has been established prior to connection to the supply current circuit.

1.2.2 Categories of warning notices

There are three categories of warning notices.

**DANGER**

"DANGER" designates a safety notice, the disregarding of which will lead directly to death or severe injury!
"WARNING" designates a safety notice, the disregarding of which can lead to death or severe injury!

"CAUTION" designates a safety notice, the disregarding of which can lead to property damage or minor injury!

1.3 INFORMATION

**Note:**
A notice describes information which is important for the optimum and cost-effective operation of the equipment.
2 Safety Information

2.1 PROTECTION AGAINST TOUCHING ELECTRICAL PARTS

Note
This section only relates to units and unit components that are under voltages greater than 50 volts.

Any contact with live parts being under voltages greater than 50 V may result in potentially lethal shock currents. Dangerous voltages are applied to certain components of electrical equipment in operation.

<table>
<thead>
<tr>
<th>High voltage! Risk of death or severe personal injury by electric shock.</th>
</tr>
</thead>
<tbody>
<tr>
<td>⇒ AE IMC pmu may only be installed by qualified specialists. Furthermore, the installer must be licensed by responsible power suppliers.</td>
</tr>
<tr>
<td>⇒ Only trained and qualified personnel specialized in electrical equipment is allowed to operate, maintain and/or repair the AE IMC pmu</td>
</tr>
<tr>
<td>⇒ The operator must observe all of the above regulations at all times.</td>
</tr>
</tbody>
</table>

2.2 DISPOSAL

Dispose of the packaging and replaced parts according to the rules applicable in the country where the device is installed.

The AE IMC pmu complies with the RoHS Directive. That means that the device can be delivered to local sites for the disposal of household appliances.

2.3 GENERAL INFORMATION

- AE IMC pmu is a low-voltage device and is supplied by a CE-tested AC adaptor.
- AE does not assume any liability for damage caused by failure to observe the warnings given in these operating instructions.
- The operating and maintenance instructions as well as safety-related guidelines must be read before commissioning.
• Proper and correct transport, storage, assembly and installation, as well as care in operation and maintenance, are prerequisites for optimal and safe operation of the unit.

• Only assign trained and qualified personnel to work with electrical installations. Only persons who are trained and qualified for the use and operation of this unit may work on or near the unit. Such persons are qualified if they have sufficient knowledge of the assembly, installation and operation of the product, as well as an understanding of all warnings and precautionary measures contained in these operating instructions. Furthermore, such persons must be trained, instructed or authorized to switch electric circuits and devices on and off in accordance with technical safety regulations, to ground such circuits and devices and to identify them appropriately according to the requirements of safe work practices. These persons must also have adequate safety equipment and be trained in first aid.

• Always replace the complete AC adaptor (incl. plug) if it is damaged or defective.

• Only use spare parts and accessories approved by the manufacturer.

• Follow all safety regulations and requirements for the specific application as practiced in the country of use.

• The ambient conditions given in the product documentation must be observed.

• You may commission the unit only after having verified that the machine or installation in which the products are installed complies with the national regulations, safety specifications and standards of the application.

• Operation is only permitted if the national EMC regulations for the application are met.

• The machine or installation manufacturer is responsible for compliance with the limit values as prescribed in the national regulations.
3 Description of the unit

According to the current amended german EEG version, photovoltaic plants in Germany having a connected load of more than 30 kWp have to take part in the management of power supply and network safety. The new guideline entitled "Generating Plants Connected to the Medium-Voltage Network" issued by the BDEW (German Federal Association of the Energy and Water Industry) defines this requirement for all installations feeding in on medium-voltage level. Primarily, this allows the network operator to limit the power of the installation by remote control according to Para. 6 EEG 2012. In addition, calls for new BDEW "Generating Plants medium-voltage network" that the network operator required idle power can be fed. 

PV systems with a capacity of less than 30 kWp must not engage in the supply and network security management. However, they may be required to limit their feed at 70%.

The pmu offers the following advantages:

- Achievement of the reduction of feed-in performance specified by the network operator.
- Parameterization of inverters
- Idle power control of inverters
- The pmu allows for communication with 2 x 31 inverters.
- The pmu provides the SiteLink monitoring portal with the data.
- Free selectable stages for reducing the feed-in performance.
- Configuration of the current input for idle power control

Note

There is no direct feedback of the pmu to the network operator!
4 Mounting and Dimensions

4.1 REQUIREMENTS FOR THE ASSEMBLY SITE
AE IMC pmu has a protection degree of IP20 and may therefore only be installed vertically in dry rooms, preferably in electric rooms or control cabinets.

> Possible damage to property

⇒ Be absolutely sure not to mount AE IMC pmu device above or below an inverter device.

4.2 UNIT DIMENSIONS

*Fig. 1: Dimensions of the AE IMC pmu*
4.3 MOUNTING TO WALLS

Fig. 2: Mounting plate for attachment to walls

4.4 MOUNTING IN A CONTROL CABINET

The attachment of the PMU for the support rail can be ordered optional under item 0031655.

Fig 3: Mounting cabinet holder
5 Startup Instructions

The following instructions provide a description of how to install the hardware and how to integrate a photovoltaic plant in the SiteLink monitoring portal.

5.1 HARDWARE INSTALLATION

- Data exchange between pmu, the inverters and the SiteLink monitoring portal is achieved via the RS485 interface. The pmu allows for the connection of up to a maximum of 31 devices per terminal via terminals X77 and X15. Terminal X77 should be used in the first instance, as this has internal surge protection. A Type 2 external surge protection must be provided for use with Terminal X15, if required.

- The external ripple control transmitter must be connected to the pmu via a 7-wire cable (preferably Ölflex) at terminals X18.1 and X17.1-4 (see connection plan Fig. 5).

- Be absolutely sure to observe the radio noise emission limits according to EN 61000-6-4. All cable shields must be grounded. In addition, the supplied ferrite sleeve must be mounted upstream of terminal X17/18.

- Factory settings for the power reduction stages:
  
  X17.1 (IN1) = 0%; X17.2 (IN2) = 30%; X17.3 (IN3) = 60%; X17.4 (IN4) = 100% power reduction (rated AC power).
  
  Further details about this can be found in the Chapter on configuration with the software tool PMUvis.

- Connection to the internet
  
  Inverter data can only be transmitted to the SiteLink monitoring portal if the pmu is connected to the modem/router via terminal X13. Use a patch cable CAT.5 or CAT.6 with RJ45 plug for this connection.
  
  **Be absolutely sure that you apply the Ethernet cable shield to the PE bar such that it is electrically conducting!**

- The USB service interface X16 can be configured either using the PMUvis software tool or by the Service on site.

- The pmu is supplied with electric power at X78 by means of the supplied AC-adapter (230 VAC/24 VDC, 15 W).

  **Note**
  
  Do not install the power socket at a distance from the pmu that exceeds 1.5 m!

- A plug-in jumper S1 that can be used to disconnect the system ground of the pmu from the protective conductor is arranged above X78. The two unassigned pins are provided for safe storage of the plug-in jumper.

- Terminal strip X11 is not used.
Fig. 4: Layout of connectors and terminal strips

1) X78: Power supply connector 24VDC 15W (Figure No. 6)
2) S1: Plug-in jumper across the system ground and the protective conductor; 2 pins for keeping the plug-in jumper
3) X77: RS-485 master terminal strip (with internal surge protection EN-type D1)
4) X17/18: Terminal strip for digital inputs and outputs
5) X16: USB interface (for service purposes)
6) X15: RS-485 master terminal strip (requires external surge protection EN-type D1)
7) X13: Ethernet interface (RJ45 connector)
8) X11: Not used
9) X74.1 specification for cos $\varphi \pm 0...20\text{mA}$
Fig. 5: Wiring diagram

1)) Connector: flexible with wire end ferrule, without plastic sheathing 0.2 – 1.5 mm²
   flexible with wire end ferrule, with plastic sheathing 0.2 – 0.75 mm²

2) Overvoltage protection EN type D1

3) The ferrite sleeve is included in the delivery (hinged). Its part no. is 0020557.

Note

The plugs for the RS485 interface with the AE 3 TL 8 … 23 allow for a maximum cable diameter of 8 mm!

Error! Reference source not found.

5.2 AC ADAPTER

Fig. 6: AC adapter
6 Configuration with PMUvis

Hinweis
The **PMUvis** software supplied on CD with this description only operates in connection with a **PMU firmware version of 2.5 or higher** and is used to configure the pmu. The current version of the tool can be downloaded from the homepage [http://www.advanced-energy.de/de/1TL_3TL_Downloads.html](http://www.advanced-energy.de/de/1TL_3TL_Downloads.html).

6.1 SYSTEM REQUIREMENTS
a. Windows XP SP3 32 Bit or higher (32- and 64-bit systems are supported).
b. Microsoft .NET Framework 4

6.2 PREPARATORY MEASURES
To properly install the pmu, make the following basic settings at the inverter at menu Configuration > Communication.
- Enter “72555” as password for the modifications.
- For the transfer protocol of the RS485 interface must be set on the inverter “1”.
- Deactivation of SiteLink activated to this extent. Inverter will stop to send independently, even if an internet-connection exist.
- A clear USS address must be allocated to every inverter. The address 1-31 is the valid address area for each channel of the pmu.
- Set the baud rate at the inverter to 57600.

Note
To apply the modified data, switch the inverter off, wait for at least 30 seconds and on again using the DC switch.
For more information, please refer to the operating instructions of the inverter.

6.3 FUNCTIONAL DESCRIPTION
The pmu can be completely set up with the PMUvis software tool.
- The power reduction can be set as desired (in agreement with the power supply company).
- The set total number of users of the RS485 network can be displayed.
- Ethernet and RS485 interface settings can be made.
- Date and time can be set.
- The data of the inverters can be transferred to the SiteLink portal.
- Specification of the idle power required by the power company
6.4 INSTALLATION

- File < PMUvis_setup_x-x-x.exe > contains the installation package for PMUvis.
- Execute the file to start installation.
- Usually, the default installation options are the proper ones for most users. Confirm each installation window by clicking on next.
- A link to the application is created on the desktop during installation.
- Depending on whether an internet connection is present, there are two types of installation:
  a. No Internet connection: Complete package with all auxiliary components.
  b. Internet connection is available: Web installer to download any additional components required.

6.5 APPLYING PMUVIS

- Start PMUvis using the link on the desktop or the Windows Start menu.

Access the pmu either

- via the Ethernet interface using the factory-set default IP address 192.168.130.20 and port number 21062

or

- using the USB port.

If you connect the pmu to your computer via USB, a COM port is added to the Device Manager of your computer.
- Select the new COM port and click “OK” to confirm.
- Select 0 as “USS + RTP address” (USS + RTP Adresse) in the “Protokoll” (Protocol) field.

![Fig. 7: Selecting the communication interface](image)
6.6 PMU VIS MAIN WINDOW

The particular pmu functionalities can be separately started and stopped in the main menu.

**Fig. 8: Main window of the PMUvis software tool**

The main window contains 7 checkboxes functionality and 2 checkboxes operation mode. The following the meaning of the checkboxes will be explained. The details on each setting are explained under 5.7 Configuration menu item.

**PMU Main Switch:** About the pmu main switch all of the functionality of PMUvis be enabled or disabled! The box is checked in the rule. For service purposes, it may be necessary to disable the PMU switch.

**Power limitation:** Enables the power limitation. The power limitation is via configuration> PMU> power limitation.

**Portal data forwarding:** Enables data forwarding to the SiteLink portal. Configuration settings> PMU> portal.

**Reactive power:** Enables forwarding of the reactive power setpoint values. settings to control the reactive power through configuration> PMU> reactive power setpoint. The reactive power must be configured according to the requirements of the network operator.

**Time Synchronization:** If this box is checked, the pmu sends 10 to 11 clock their time to all connected inverters. The pmu-time is updated several times a day over the Internet portal. The portal activation checkbox must be activated for this purpose. Disabling this checkbox is only useful if the pmu the wrong time could be transferred. Alignment of the pmu time via Configuration> PMU date / time.

**Portal enable:** Used to forward the pmu data to the internet portal. Alignment via Configuration > PMU> portal.

**AC power collection:** The current AC power of all inverters will be collected by the pmu and summed to a total power.

**Operating mode Normal:** Control is via the ripple control receiver of the power company.

**Operating mode Remote control:** Control via a process computer for example Siemens S7. The pmu is used only to forward the signals to the inverters 1-62.
**6.7 MENU CONFIGURATION**

Using menu Configuration you can go to the various functions of the pmu and the inverter.

### 6.7.1 Power Reduction at Operation mode “Normal”

Via “Configuration > PMU > Power limitation” the power limit is specified. The ripple control signal of the power supply company is connected to the X17 "IN1" to "IN4" data ports.

16 values can be freely programmed. In the following example (Illustration No., indicated in red), the "IN2" relay is switched on (this is shown with a 1).

Select the appropriate relay setting to enter or edit the percentage value.

#### Note

The configuration of the performance reduction is specified by the local power supply company through the relay ports!

Factory-made setting: "IN1" – "IN4" ports with 0%, 30%, 60%, 100%.

---

*Fig. 9: Relay configuration for power reduction*

To apply the settings, click on Save.
6.7.2 Power reduction at Operation mode "Remote Control"
The control of power is restricted via a process computer (e.g., Siemens S7). The digital inputs X17, IN1 to IN4 and the current input X74 for reactive power are disabled in this mode.

6.7.3 Portal
The sub-menu portal via "configuration> PMU > portal".
Here you can set how often the pmu should send data to the portal.
For the interval time, the predefined values 5, 10, 60, 240, 360 and 720 minutes can be selected. And default value of 10 should be sufficient for most cases.
Click the portal test button to check the connection. If the setting is correct, this will be acknowledged by a message "test successful".
If the test fails, proceed as follows:
1. Check the local IP settings, and adjust if necessary. Complete changes to the settings with reboot the pmu.
2. Check the DNS server IP using the DOS command ipconfig / all. Complete changes to the settings with reboot the pmu.

Note
If you do not want to transfer data to the SiteLink portal, deactivate the portal data transfer checkbox. The portal test can only be carried out correctly if the Ethernet interface is properly configured and the pmu is connected to the internet.

To apply the settings, click on Save and restart the pmu.
By pressing the button "Send configuration" etc., the following data will be sent:
- Firmware Version
- Hardware Revision
- Production date

6.7.4 Communication
For communication, there are two possibilities:
Ethernet:
Enter or edit the IP settings, such as IP address, subnet mask and default gateway.
Factory settings on delivery of the pmu

- IP address: 192.168.130.020
- Subnet mask: 255.255.255.000
- Default gateway: 192.168.130.001

**Fig. 11: IP settings of the pmu**

**RS485**

Call with configuration > PMU > Communication > RS485

The default setting for X15 and X77 is a baud rate of 57600. We recommend that you leave this setting as it is!

**Note**

Care must be taken to ensure that the same baud rate is set on the pmu and on the inverters!

**Fig. 12: RS485 configuration**

To apply the settings, click on Save and restart the pmu.

6.7.5 Setting Date and Time

The configuration menu provides item set date/time which allows you to set the date and time.

You can either set the computer time or specify a date and a time.

**Note**

When commissioning the pmu time must be checked and corrected if necessary, to ensure proper function! The pmu sends every day at 11:00 to 12:00 clock this time to all connected inverters.
To apply the settings, click on Save and restart the pmu.

6.7.6 Operating mode reactive power with remote control
The angle requirements are not of the analog inputs (ripple control) throughout. It is controlled by a process computer (e.g., Siemens S7).

6.7.7 Reactive power via pmu

**\( \cos \phi \) – Variable squint angle**
This function means the phase shift can be specified based on a current signal of 
\(-20\text{mA} \ldots +20\text{mA}\). The control is carried out by the pmu.

Pre-condition: In "Configuration > Inverter > Reactive power > Operating mode" must be set "Variable \( \cos \phi \)."

After "configuration > PMU > reactive power interface" following screen appears:

Adjustable values range of \(-30^\circ\) to \(+30^\circ\)

6.7.8 Reactive power control by inverter

**Note**
The following items are sent from the pmu after pressing the button "Send to all inverters" directly to the inverters. The inverters control then automatically, irrespective of the pmu.
Operating mode

The mask appears via "Configuration> Inverter > Reactive power > Operating mode"

![Operating mode](image)

*Fig. 15: Operating mode*

Here you can select the operating mode.

**cos φ – fixed value**

A fixed phase shift or a fixed cos φ shift factor can be set here.

Pre-condition: "Configuration > Inverter > Reactive power > Operating mode" must be set on "Static cos φ".

![Static cos φ](image)

*Fig. 16: Static cos φ*

Adjustable value range of – 30° to +30°

The value range for a fixed cos φ is between +0,866 and +1

**cos φ – (P)-characteristic curve**

This menu item can be entered into a table used to adjust the cos φ characteristic curves of the shift factor, displayed, depending on the current effective performance, as a percentage proportion of the nominal performance.

Pre-condition: "Configuration > Inverter > Reactive power > Operating mode" must be set on "Power characteristic curve".

There is the option of either entering the φ phase shift in ° or the cos φ shift factor. The type of feeding-in (over-excited or under-excited) can likewise be determined.

Adjustable value range of – 30° to +30°
Fig. 17: Power characteristic Curve

If the "Send to all inverters" button is pressed, the data entered is transmitted to all inverters and the "transmission status" dialogue is opened.

**cos φ – (U)-characteristic curve**

This menu item can be entered into a table used to adjust the cos φ characteristic curves of the shift factor, displayed (depending on the measured supply voltage shown as a percentage proportion of the nominal current).

Pre-condition: In "Configuration > Inverter > Reactive power > Operating mode" must be set to "Voltage characteristic curve".

There is the option of either entering the φ phase shift in ° or the cos φ shift factor. The type of feeding-in (over-excited or under-excited) can likewise be determined. Adjustable value range of –30° to +30°
If the "Send to all inverters" button is pressed, the data entered is transmitted to all inverters and the "transmission status" dialogue is opened.

**Fig. 18: Voltage characteristic Curve**

### Send information to all inverters

For the changes to be active, use the button "Send to all inverters". After the button is clicked, the amended data is transmitted to the inverters and the transmission status opens. The transmission status displays the following information:

<table>
<thead>
<tr>
<th>Status</th>
<th>Farbe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inverter has not responded</td>
<td>white</td>
</tr>
<tr>
<td>Inverter has replied and storing the parameters</td>
<td>green</td>
</tr>
</tbody>
</table>
6.8 MENU TOOLS

6.8.1 User List

The Tools menu provides item user list which displays a list of the total number of users (all connected inverters, whether active or not).

Any inverter that is connected and properly configured is shown in green color (see Fig. 19).

Any inverter that is not connected or is not reached by the pmu is shown in white color in the user list.

Example:

A inverter is properly configured at bus A, address 3 and 5 is properly feeding in.

All other addresses are not available for the pmu.

If there are other users that are connected but not shown by the pmu in this list, the inverter settings and the RS485 cabling must be checked.

Depending on the setting (power reduction refresh interval) of the pmu, refreshing of the user list can take up to 8 minutes.
6.8.2 Languages
Via "Extras > Language" can set the language. Available languages are English and German.

6.8.3 Device Information
Via "Extras > Device Information" following screen appears:

```
Device information
Firmware Package: RFP-901R000-4.4-S
SR Firmware: 240.01.06.01
Device Type: 901R000
Serial Number: 01XXXXXXXX
MAC Address: 0050C2B6ABE2
```

Fig. 19: User list of the inverters connected to the pmu

Fig. 20: Device Information
7 Wiring diagrams

7.1 008K-023K
7.3 SEVERAL PMU IN ONE FACILITY

If several pmu are deployed in one PV facility, these are to be wired in parallel to the X17 ports.

7.4 VARIABLE SQUINT ANGLE CONNECTION

(-20mA … +20mA)
## 8 Technical Data

<table>
<thead>
<tr>
<th>Type</th>
<th>AE IMC pmu</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AC adaptor</strong></td>
<td></td>
</tr>
<tr>
<td>Supply voltage</td>
<td>AC 230 V, 50Hz</td>
</tr>
<tr>
<td>Voltage range</td>
<td>115 to 230 V</td>
</tr>
<tr>
<td>Frequency range</td>
<td>50 / 60 Hz</td>
</tr>
<tr>
<td>Output voltage</td>
<td>DC: 21 V to 24 V</td>
</tr>
<tr>
<td>Output Power</td>
<td>18 W</td>
</tr>
<tr>
<td>Output Current</td>
<td>750 mA</td>
</tr>
<tr>
<td><strong>Basic device</strong></td>
<td></td>
</tr>
<tr>
<td>Supply voltage</td>
<td>DC: 21 V to 24 V</td>
</tr>
<tr>
<td>Power consumption</td>
<td>12 W</td>
</tr>
<tr>
<td>Current consumption max.</td>
<td>500 mA</td>
</tr>
<tr>
<td><strong>Interfaces</strong></td>
<td></td>
</tr>
<tr>
<td>USB interface</td>
<td>1</td>
</tr>
<tr>
<td>USB interface type</td>
<td>Typ 2 (Device)</td>
</tr>
<tr>
<td>Ethernet interface</td>
<td>1</td>
</tr>
<tr>
<td>Ethernet interface type</td>
<td>RJ45 port</td>
</tr>
<tr>
<td>RS485 interface</td>
<td>3</td>
</tr>
<tr>
<td><strong>Digital inputs (terminal strip X17)</strong></td>
<td></td>
</tr>
<tr>
<td>Digital input</td>
<td>4</td>
</tr>
<tr>
<td>Input voltage</td>
<td>DC: -1 V to +33 V</td>
</tr>
<tr>
<td>Input current</td>
<td>8 mA to 9 mA</td>
</tr>
<tr>
<td>Potential isolation</td>
<td>RJ45 port</td>
</tr>
<tr>
<td>RS485 interface</td>
<td>No</td>
</tr>
<tr>
<td>Signal level input 0</td>
<td>-1 V to +5 V</td>
</tr>
<tr>
<td>1</td>
<td>+13 V to +33 V</td>
</tr>
<tr>
<td>With open input 0 level</td>
<td>0 level</td>
</tr>
<tr>
<td><strong>Analog inputs (terminal strip X74)</strong></td>
<td></td>
</tr>
<tr>
<td>Number</td>
<td>2</td>
</tr>
<tr>
<td>Input</td>
<td>DC</td>
</tr>
<tr>
<td>Input impedance</td>
<td>100 ohm</td>
</tr>
<tr>
<td>Nominal input current</td>
<td>+/-20 mA</td>
</tr>
<tr>
<td>Nominal input voltage</td>
<td>+/-2,0 V</td>
</tr>
<tr>
<td>Control limit</td>
<td>+/-25 mA, +/-2,5 V</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td><strong>AE IMC pmu</strong></td>
</tr>
<tr>
<td>--------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>Overload limit</td>
<td>+/-30 mA, +/-3.0 V</td>
</tr>
<tr>
<td>Operating frequency range</td>
<td>0 to 1 kHz</td>
</tr>
<tr>
<td>Limit frequency</td>
<td>-3 dB: 6 kHz, -6 dB: 10 kHz</td>
</tr>
<tr>
<td>Potential separation</td>
<td>No</td>
</tr>
<tr>
<td>Surge protector</td>
<td>No</td>
</tr>
<tr>
<td>operating mode</td>
<td>passiv</td>
</tr>
<tr>
<td>Connection</td>
<td>plug terminals</td>
</tr>
</tbody>
</table>

**Cooling, ambient conditions, EMC**

<table>
<thead>
<tr>
<th><strong>Cooling</strong></th>
<th>Natural convection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ambient temperature</td>
<td>-25 °C to +55 °C</td>
</tr>
<tr>
<td>Setup height</td>
<td>Up to 2000 m above MSL</td>
</tr>
<tr>
<td>Noise radiation</td>
<td>EN61000-6-4</td>
</tr>
<tr>
<td>Certificate</td>
<td>CE</td>
</tr>
<tr>
<td>Radio immunity</td>
<td>EN 61000-6-2</td>
</tr>
<tr>
<td>Environment classes</td>
<td>3K3H acc. to DIN IEC 60721-3-3</td>
</tr>
</tbody>
</table>

**Mechanics**

<table>
<thead>
<tr>
<th><strong>Degree of protection</strong></th>
<th>IP20 acc. to EN 60529</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dimensions of basic unit Width / height / depth</td>
<td>130 mm / 280 mm / 87 mm (without plug)</td>
</tr>
<tr>
<td>Dimensions of basic unit with the mounting plate. Width / Height / Depth</td>
<td>245 mm / 280 mm / 114 mm (without plug)</td>
</tr>
<tr>
<td>Weight</td>
<td>Ca. 1.6 kg</td>
</tr>
</tbody>
</table>
9 Contact

Please address any questions on malfunctions or technical problems to:
Service hotline: +49 (0) 7123 / 969 – 202 (Monday – Friday, 8 a.m. to 5 p.m)
E-mail: service.aei-power@aei.com
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