Micro-Inverter

INV315-50EU

English

AE CONVERSION

Assembly and operating instructions
INV315-50EU

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1.0 About this manual

Diese Anleitung beschreibt die Montage und Bedienung des Micro-Wechselrichters. Die Montage- und Bedienungsanleitung sollte stets in greifbarer Nähe des Wechselrichters aufbewahrt werden.

1.1 Symbols used

The following types of safety instructions are used in these manual and must be observed when mounting and operating the inverter:

Danger!
„Danger" indicates a situation which, if not avoided, will result in personal injury.

Attention!
„Caution" refers to a situation which, if not avoided, will result in damage to property, non-observance of which can lead to damage to property.

Note!
The term „Note" lists an issue for which its observance leads to an improvement in the operation.

1.2 Scope

These instructions apply to the following micro inverters:

- INV315-50 EU
- INV315-50 EU RF

1.3 Target audience

This manual is for the installer and operator of the inverter types mentioned in the scope.

Attention!
This manual requires knowledge corresponding to a recognized professional qualification as an electrician.

2.0 Safety and regulations

The micro inverter converts the DC voltage generated by the PV modules into AC voltage and feeds it into the grid. AEconversion GmbH & Co KG does not assume any liability for damages caused by non-observance of these instructions. When installing the inverter, please observe all assembly and installation instructions of all parts and components of the system.

2.1 General information and safety instructions

The proper and safe operation of this device requires proper transport, storage, installation and assembly as well as careful operation and maintenance. When operating this equipment, certain parts of the equipment are under dangerous voltage which can cause serious bodily injury or death.
Therefore, please follow the instructions below to minimize the risk of injury.

2.1.1 Storage, transportation, operation and maintenance

The following warnings must be observed for storage, transport, operation and maintenance.

- Proper grounding, conductor sizing and appropriate short circuit protection must be provided to ensure operational safety.
- Never disconnect the solar generator from the inverter while it is connected to the grid.
- Before carrying out visual inspections and maintenance work, check that the power supply is switched off and secured against being switched back on.
- Observe the hazard, warning and safety information provided in these operating and installation instructions.

- Do not under any circumstances tamper with or manipulate the inverter or other parts of the system.
- Risk of damage due to improper modifications!
- Keep all contacts dry and clean!
- Only transport the inverter in the packaging provided.

2.1.2 Assembly, installation and electrical connection

The following warnings must be observed for assembly, installation and electrical connection.

- The device must be mounted in accordance with the safety regulations (e.g. DIN, VDE) and all other relevant state or local regulations.

- The installation must only be carried out by persons who have a recognized professional qualification as electricians.
- If you mount the inverters at a great height, avoid possible risks of falling.
- Do not insert any electrically conductive parts into the plugs and sockets! Tools must be dry.

- The electrical connection to the central building services may only be carried out by a licensed electrician.

- Do not tamper with or manipulate the inverter or other parts of the system under any circumstances.
- Risk of damage due to improper modifications!

2.2 CE Mark

The CE mark documents that the inverter fulfills the basic requirements of the following relevant directives according to the type plate:

- Electromagnetic Compatibility 2014/30/EU
  Low Voltage Directive 2014/35/EU

For CE declaration of conformity, see page 17.

2.3 Label

The label is located on the top or on the side edge of the inverter. The information on the label includes the technical data as well as the article and serial number of the device.
Safety instructions on the type plate are listed and explained below:

Danger! „Danger“ indicates a situation which, if not avoided, will result in personal injury.

Attention! „Attention“ indicates a situation which, if not avoided, may result in damage to property.

Observe operating instructions!
Under „Observe operating instructions“ it is pointed out that assembly and operating instructions must be read and understood before assembly, installation and maintenance.

Caution hot surface!
Under „Caution hot surface“ it is pointed out that surfaces of devices could be hot and there is a risk of burns.

Observe special disposal!
Under „Observe special disposal“ it is pointed out that this product must not be disposed of with normal waste. Improper disposal may cause damage to the environment.

3.0 Notes on liability, warranty and service

The following information relates to liability, warranty and service.

3.1 Intended use and liability

The AEconversion PV inverter converts the DC voltage generated by PV modules into AC voltage and feeds this into the grid. Any other use or use that goes beyond this is considered improper use. The manufacturer/supplier is not liable for any damage resulting from this. The risk is borne solely by the operator.

Intended use also includes observing the operating and installation instructions. Some of the documents you need for the registration and acceptance of your photovoltaic system are attached to the installation instructions.

The inverter may only be operated with a fixed connection to the public grid. The inverter is not intended for mobile use. Modifications to the inverter are generally prohibited. For changes in the environment, you must always consult a qualified electrician.

3.2 Guaranty and Warranty

AEconversion grants a statutory warranty of 10 years from the date of purchase on the inverters. In addition, AEconversion grants a further multi-year limited warranty.
If you have any questions about the warranty, please contact your specialist dealer or installer. If your device has a defect or malfunction during the warranty period, please also contact your specialist dealer or installer.

Warranty claims are excluded in the event of:

- Unauthorised modifications to the unit or repair attempts
- Opening the inverter, for example by unscrewing the cover
- Non-intended use of the units
- Improper installation that does not comply with the standards
- Improper operation
- Operating the units with defective protective devices
- Impact of foreign bodies and force majeure (lightning, overvoltage, thunderstorms, fire)
- Insufficient or non-existent ventilation of the unit
- Non-observance of safety regulations
- Transport damage
- Use of non-original PV mating plugs and sockets from the HELIOS H4 product series by Amphenol

3.3 Service

We have already placed special emphasis on the quality and durability of the inverter during the development phase. Despite all quality assurance measures, faults can occur in exceptional cases. In this case, AEconversion will provide you with the maximum possible support in order to eliminate the fault quickly and free of bureaucratic effort. Please contact our service department directly.

AEconversion -Service Phone: +49 2927 9194-10
In order for our service department to be able to react quickly and correctly, the following information is absolutely necessary.

1) Information on the inverter
The details of the type designation, as well as the article number and serial number of the inverter can be found on the type plate of the unit.

Brief description of the fault:
- Did the fault occur immediately during commissioning or only at a later point in time?
- Is the fault reproducible or does it occur sporadically?
- What were the ambient conditions (irradiation) at the time of the fault?

2) Information on the PV generator:
- Which module manufacturer and module type was installed?
- What does the system wiring look like?
- What is the open-circuit voltage (Voc) of the module?

4.0 Legal regulations and technical guidelines

The legal regulations and technical guidelines are listed below.

4.1 Derating

The service life can be extended by not operating the unit at maximum power, but by reducing this power. This is described below for the micro inverter.

4.1.1 Derating as a function of input voltage

The maximum value of the input current from the PV module of 9.5A results in a maximum power that the inverter can convert depending on the input voltage. The limit of 9.5A is limited by the inverter and cannot be exceeded.

This results in the following curve of the maximum absorbed power depending on the input voltage of the PV module.

See diagram on page 16 : Power reduction P pv / I pv

4.1.2 Derating as a function of ambient tem. / wind speed

Depending on the installation location of the inverter, there are different environmental conditions. The ambient temperature and the air velocity around the inverter influence its performance.

A power control is integrated in the inverter depending on the temperature. The following diagrams show the maximum input power of the inverter versus the ambient temperature and air velocity.

See diagrams on page 16:
- Power reduction Ppv / T ambient 0m/s Air velocity
- Power reduction Ppv / T ambient 0.1 m/s air velocity

Please note that the performance of your PV module also decreases with increasing module temperature. As a rule with approx. 0.4% / °C. This means that a module with 330W under STC conditions will only produce a maximum of 271W at 70°C and 1000 W/m^2.

5.0 Product description

The AEconversion micro-inverter is connected directly behind one or two modules, depending on the power specification, and converts the direct current generated into grid-compliant alternating current. The individual conversion at each module enables the solar energy to be optimally utilised. In addition, the micro-inverter solves a widespread problem. Due to the series connection in systems with central or string inverters, the modules are dependent on each other in terms of power. If the power of a single module drops, for example due to partial shading or module mismatch, it negatively affects the power of an entire string. This is referred to as the domino effect. Due to the parallel connection in systems with micro-inverters, the outputs of the modules are independent of each other and allow each module to work at maximum output.

The „plug-and-play" system avoids connection errors and makes installation simple and safe.

There is no dangerously high DC voltage and installation time and costs are significantly reduced. Installations are effective for a wide range, from kilowatts to megawatts, from small family homes to building facades. Each photovoltaic system can be rearranged or upgraded, for example when power is increased or structural changes are made.

Zudem wird es durch den Micro-Wechselrichter möglich sein, die Leistungen der Photovoltaik-Anlage auf modularer Basis zu überwachen, was die Voraussetzung für eine genaue Anlagenüberwachung und eventuelle Problemerkennung schafft. So werden nicht nur die Leistungssteigerungen der Photovoltaik-Anlage gewährleistet, sondern auch eventuelle Leistungsverluste durch eine Früherkennung und Problemlokalisierung vermieden.

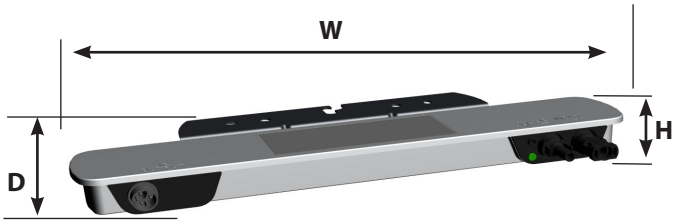
The housing of the micro-inverter is IP65 protected and designed for operating temperatures from -25°C to 70°C. If the temperature inside the enclosure exceeds a certain value, the inverter automatically regulates the maximum power to protect itself. Systems with micro-inverters are easy to design and install. Each inverter can be mounted on the mounting rack underneath the PV modules, but it is recommended to have a place where emergency service work can be easily carried out.

Further mounting options are listed in chapter 7.0.
An overview of the technical data of the inverter can be found in the appendix on pages 15-16.

5.1 Scope of delivery

Included in the scope of delivery:
- Inverter

5.2 Dimensions



Typ	Width [mm]	Depth [mm]	Height [mm]
INV315-50EU	**385**	**155**	**30**
INV315-50EU Without mounting plate	**385**	**109**	**30**

5.3 LED-Display

In normal operation, the PV generators produce a voltage as soon as there is sufficient daylight or sunlight. When this voltage is present at the inverter at a certain level and for a corresponding period of time, the inverter begins feeding into the grid. The inverter is equipped with an LED display that provides information on the operating status in the following manner.

Feed-in operation:
As the power level increases, the flashing frequency of the LED increases. The following flashing frequencies show the percentages as a function of the unit's power:

0% to 3% LED 0.5 Sec „ON" 2 Sec „OFF"
3% to 30% LED 0.5 Sec „ON" 1 Sec „OFF"
30% to 60% LED 0.5 Sec „ON" 0.5 Sec „OFF"
60% to 85% LED 0.5 Sec „ON" 0.2 Sec „OFF"
85% to 100% LED continuously „ON"

Non-feed-in operation:
When the inverter is in non-feed-in operation, the LED indicates certain states, which are described below. These can be used for troubleshooting in the event of a fault. Each stage begins with the indication of the following sequence:

Sequence starts: 5 sec. „ON", 2 sec. „OFF"

Power stages:
Synchronisation in progress:
LED 1sec. „ON" 0.75sec. „OFF „0.25sec. 1 cycle
AC voltage not within tolerance range:
LED 1sec. „ON" 0.75sec. „OFF „0.25sec., 2 cycles
DC voltage not within tolerance range:
LED 1sec. „ON" 0.75sec. „OFF „0.25sec., 3 cycles
AC and DC voltages not within tolerance range:
LED 1sec. „ON" 0.75sec. „OFF „0.25sec., 4 cycles
Internal overtemperature:
LED 1sec. „ON" 0.75sec. „OFF „0.25sec., 5 cycles

Sequence ends: 2 sec. „AUS"

Insulation measurement on the PV side:
In feed-in operation, a too low insulation resistance between PV and AC side is signalled with a fast flashing. For this purpose, the flashing frequency for displaying the feed-in power is interrupted every approx. 15s and flashing at a high frequency is set for approx. 2s.

5.4 Protection soncepts

The following monitoring and protection concepts are integrated in the AEconversion units of the validity range:

- Overvoltage arresters / varistors to protect the power semiconductors
- Temperature monitoring
- EMC filters to protect the inverter from high-frequency mains interference
- Mains-side varistors to earth to protect the inverter from overvoltages
- BISI (Bidirectional Safety Interface) Mains monitoring for personal protection and to avoid islanding according to VDE0126-1-1 / VDE AR-N 4105 / IEC 62116
- Insulation monitoring of the PV input

5.5 Network and system protection

According to VDE AR-N 4105, the last five fault states of the network and system protection and the set tripping values and tripping times must be readable. For unit versions without communication interface and with integrated fibre optics, the data output is via the LED.
For units with communication, the values can also be called up via the integrated interface.

Activate output via fibre optics:
- Switch off AC
- LED signals the start of the output sequence by „ON“ for 5 sec.
- LED outputs the data as a pulse pattern (duration approx. 50 sec.)
- LED signals the end of the output sequence with 5 sec. „ON
- LED switches to normal signalling mode

The LED output sequence must be recorded via a video (smartphone, digital camera, or similar) with a resolution of 680x480DPI. This video is then analysed using PC software. The software can be found on the AEconversion website (http://aeconversion.com/de/downloads.html). After successful analysis of the video, the set values are displayed in plain text. When recording, make sure that a few seconds of the start and end of the output sequence are recorded. If possible, the position of the LED on the screen must always remain the same. Please observe further instructions when running the software.

Additional option for versions with communication interface:
- Establish a data connection between the PC and the Micro Inverter
- Download AEsolar software
- Query the device via the corresponding menu item

6.0 Operating Conditions

The selection of the PV generator is of central importance in the design of a PV system. It is essential to ensure that the inverter also matches the PV module.

6.1 Dimensioning the PV generator

The number of PV modules connected in series must be selected so that the output voltage of the PV generator does not exceed the permitted input voltage range of the inverter, even at extreme outdoor temperatures. In Central Europe, module temperatures between -20°C and +70°C should be assumed. Depending on the mounting type of the generators and the geographical location, +60°C or +70°C is used in the voltage calculation. You should take the temperature coefficients of the PV modules into account. The following criteria must be fulfilled for the voltage of the PV generator:

- Uo (-15°C) < max. input voltage:
50 V and -15°C for an INV315-50EU / RF

The open-circuit voltage of the connected PV generator must be within the permitted input voltage range even at very low outdoor temperatures (-15°C). If the temperature is lowered from 25°C to -10°C, the open-circuit voltage of 12 V modules increases by approx. 2.8 V per module (5.6 V for a 24V module). The open-circuit voltage of the entire PV generator must be less than 50 for INV315.

- U_{Mpp} (+60 °C) > input voltage:
20 V_{DC} for INV315-50EU
The U_{Mpp} voltage of the connected string should not fall below the permitted input voltage range even at very high module temperatures (+60°C).
If the temperature rises from 25°C to 60°C, the UMpp voltage of 12 V modules drops by approx. by approx. 3.6 V per module (7.2 V for a 24 V module).

If the U_{Mpp} -voltage falls below the permitted input range, the system continues to operate without any problems. In this state, however, the maximum possible power is no longer fed into the grid, but slightly less.

It does not harm the inverter if a connected PV generator delivers a higher input current than the maximum usable input current, provided the input voltage is within the permissible range. It may happen that the inverter switches off for safety reasons if the PV generator briefly provides more than the max. DC input power of the inverter, especially during changing cloud cover and relatively low module temperatures.
Normally, however, the control of the inverter is so dynamic that it continues to operate without interruption.

In general, for an optimal energy yield of the PV generator in Central Europe, a southern orientation with an inclination of 30° should be selected. The optimal power factor for south-facing systems is between 1.10 and 1.25.
For an east-west system, the power factor can be selected up to 1.30. The prerequisite is that all other limit values of the inverter are complied with. For exposed locations in the mountains or in southern regions, a corresponding reduction (< 1.15) of the power ratio is necessary.

7.0 Installation

Select the mounting position so that the following points are observed:

- As good as possible access to the unit for installation work or any service work that may need to be carried out at a later date. .
- Ensure a minimum distance of 20 mm between the upper edge of the roof and the underside of the inverter. We also recommend a distance of 25 mm between the back of the PV module and the top edge of the inverter.
- The unit is designed to be mounted on the mounting frame under a PV module, but other mounting variants are possible.

- The inverter is to be mounted so that the connection area of the inverter faces downwards
- The inverter is to be mounted so that the cover (type label) is always facing upwards
- The free air flow around the enclosure must not be obstructed.

Due to the PV generator voltage, a higher current flows on the DC side than on the AC side. As a result, with the same cable cross-sections and lengths, the losses on the DC side would be higher. For this reason, it makes sense to place the inverter close to the PV module. The cable lengths on the DC side can thus be kept correspondingly short.

For fastening the inverters under a PV module, we recommend the use of suitable accessories depending on the mounting frame, e.g. with slot nuts and M8 screws.

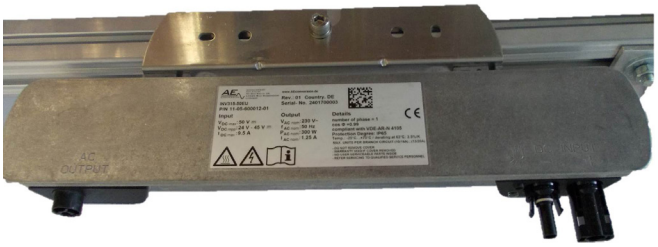
7.1 Installation on PV-racking

For mounting on the frame below the PV modules, observe the following:

Mark the approximate centre of the PV module on the mounting profile. Fasten the inverter centred on this marking with the help of accessories that are matched to the mounting frame. As an example, slot stones can be fastened to the mounting profiles at the positions below the inverter brackets with screws.

When mounting, make sure that the inverter is mounted in the correct installation position:

- the cover must face upwards
- connection plugs must point downwards



7.2 Installation alternative

If mounting on the mounting frame below the PV modules is not possible, another mounting alternative is possible, which is described below:
For mounting on the wall, the inverter can be mounted with an appropriate substructure.
The substructure must be designed accordingly to guarantee sufficient distance to the wall.

8.0 Connections

The following sections describe how to make the AC, DC and data transmission connections.

When making the connections, the standards and regulations must be followed, as well as the safety instructions contained in these operating instructions.

8.1 Connections overview

The connections of the micro inverter are described below.

8.1.1 Connections

①	AC connector
②	Climatic membrane
③	LED
④	DC connector PV-
⑤	DC connector PV+

8.2 AC connection

The circuit to which the inverters are connected must be fused with a maximum of 16A. In addition, an earth leakage circuit breaker of min. type A must be provided in the installation.

If several inverters are to be operated on one AC connection, the total current must not exceed the current of the fuse. (max. 16A)

DO NOT exceed the maximum permitted number of inverters in an AC circuit as specified in chapter 8.2.1.

Open AC connections at the end of an AC circuit must be closed with a protective sealing cap.

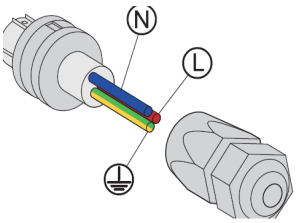
To achieve protection class IP65/IP67, all plugs and sockets must be plugged in with the respective mating plugs or closed with protective caps.

If the line resistance is high, i.e. if the line length is long on the AC side, the voltage at the mains terminals of the inverter increases during feed-in operation. This voltage is measured by the inverter. If the voltage at the grid terminals exceeds the limit for grid overvoltage, the inverter switches off due to grid overvoltage.

This circumstance must be taken into account in the AC wiring and when dimensioning the AC line.

When using several AC circuits in a PV system, it is necessary to distribute the feed-in phase symmetrically to the three-phase grid.

If the PV system consists of more than one inverter, the individual inverters can be connected via connecting lines:



PIN L	L1 (brwon)
PIN N	N (blue)
⏚	PE (green-yellow)

Make sure that you use sufficiently large cable cross-sections to avoid excessive line resistance between the house distribution and the respective inverter.

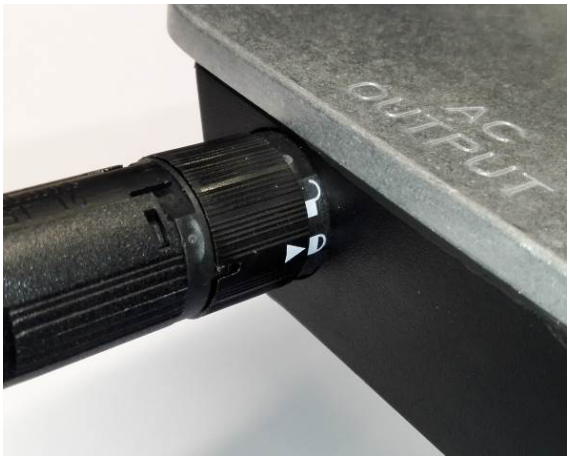
The plug can accommodate a conductor cross-section of 0.25mm² - 1.5mm² for a flexible cable with wire end ferrules up to 1.0mm². Please note the resulting maximum cable length.

Make sure that you use sufficiently large cable cross-sections to avoid excessive line resistance between the house distribution and the respective inverter.

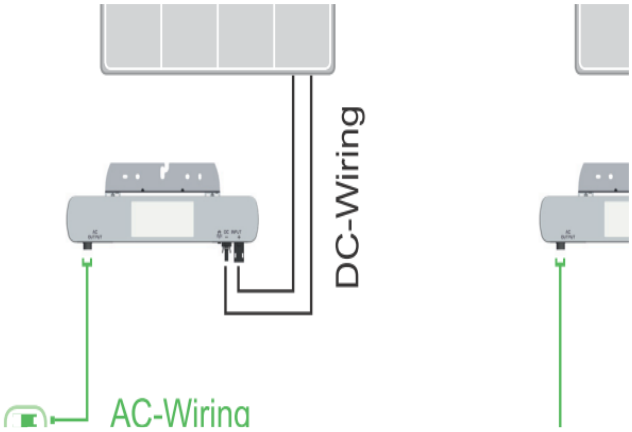
Connecting the AC cable assembly to the inverter:

Plug the cable coupling together until it clicks into place.

Check the correct locking of the connector with the white arrow pointing to the closed locking symbol.



8.2.1 AC connection of multiple units



The AC connection is located on the left side of the connection area and is made via a cable with a 3-pin 16A plug.
Two inverters at a time can be connected to the entire circuit via a distribution block.

Up to 9 inverters can be operated on one string (circuit), each equipped with a 16A type B circuit breaker. The distribution blocks are not included in the scope of delivery of the micro inverter. (See Accessories Overview for ordering information).

Open AC connections must be closed with a protective cap at the end of an AC circuit. This cap is also not included in the scope of delivery of the micro inverter.

(See accessories overview for ordering information)

8.3 DC connection

Dangerous touch voltages can occur during the installation of the photovoltaic system. To ensure your safety, please make sure that the DC connection cables of the PV generator do not come into contact with the earth potential.

- Risk of damage!
Make absolutely sure that the polarity of the connections is correct!
- Check the PV generator for earth connection before connecting it to the inverter.

- Only use original mating plugs and sockets from the HELIOS H4 product range from Amphenol.
- Observe the Amphenol assembly instructions for the DC connectors if you assemble the cables yourself.

Check that the PV generator is free of earth faults before connecting it to the inverter.

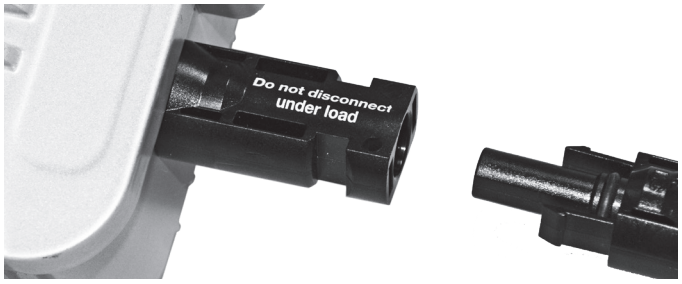
Before connecting the DC cables to the inverter, check whether the maximum PV module voltage is suitable for feeding into the inverter. If the PV module voltage is too high, the unit will be destroyed. Remember to increase the open-circuit voltage of the solar field at low temperatures!

Before installing the PV modules, the inverters should be completely installed and all wiring between the inverters should be completed. If possible, mount the PV modules above the respective inverter on the mounting frame. The connection cables of the PV modules are connected to the inverter via negatively and positively polarised PV plugs and sockets.

First determine the polarity of the PV module. Connect the positive pole of the module outlet to the input marked „+“ on the inverter. Connect the negative pole of the PV module output to the input marked „-“ on the inverter.

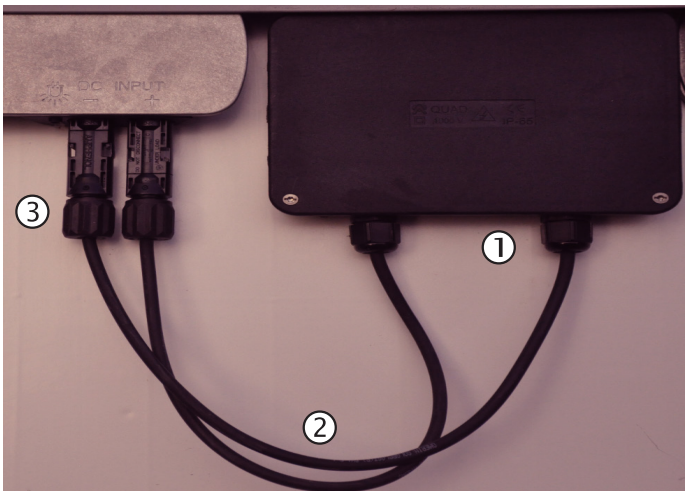
This step is carried out for all remaining PV modules with the inverter attached below, without exceeding the maximum number of inverters in the AC circuit.
The exact handling of the DC connections is as follows:

Plug the cable coupling together until it snaps into place. Check for correct engagement by carefully pulling on the cable couplings. Once the connections are fully engaged, check that there are no sharp bends or kinks.



When separating the cable couplings, press the latching tabs together by hand and separate the cable coupling.

The DC cabling of an inverter with a PV module looks conceptually as follows:



①	PV generator(Module)
②	Module connection cable
③	Inverter

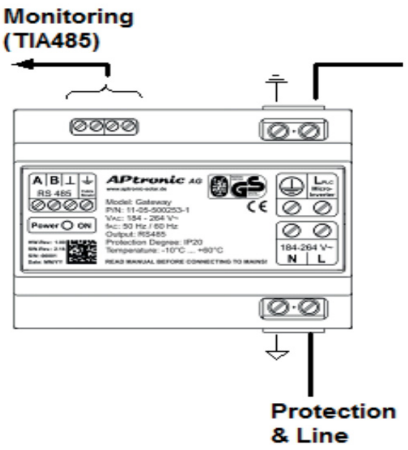
8.4 Communication

Depending on the communication version of the inverter, different procedures must be followed. Please follow the communication setup procedure that is appropriate for your inverter.

8.4.1 RF-Communication

If the micro inverter is equipped with RF communication, the steps for setting up communication, including wiring and monitoring, are described below. Communication via the RFC interface takes place via a frequency of 2.4 GHz.

In combination with the AEconversion RF gateway, it is possible to set up a simple monitoring network. The following diagram shows how to connect the micro inverters to the gateway:



The AEconversion RF gateway is needed to convert the received data to standard RS-485. For more information about the AEconversion RF gateway, see the separate gateway manual.

8.4.2 Without communication

Die Micro-Inverter-Versionen ohne Kommunikation sind nicht für eine umfassende Überwachung bestimmt, und können daher nicht durch Anwendung der AEconversion Datalogger, Gateway oder Software verwendet werden. Um die grundlegenden Daten der PV-Anlage überwachen zu können, kann der Anwender einen unabhängigen Energie-Monitor installieren.

9.0 Initial operation and registration with the utility company

During commissioning, the inverter must be supplied with PV voltage. To start the inverter, it is also imperative that an AC voltage is applied which is within the respective valid tolerance range.

When registering and accepting the PV system, the modalities of the respective utility grid operator must be observed.
Commissioning usually proceeds as follows:

- Submission of the documents to the responsible utility company
- Installation of the system
- Installation of the meter by the utility company

9.2 Acceptance of the plant by the utility company

The following documents are generally required for this:

- Registration / completion notification by registered installer
- Site plan showing the boundaries of the property and the installation site of the PV system
- General plan of the entire system with the equipment used (single-pole representation)
- Data sheet for self-generating systems
- Description of the protective device with information on type, circuit, make and function
- Description of the inverter or
- Declaration of conformity and clearance certificate
- Information on the short-circuit resistance of the switching devices

10.0 Switching off the inverter

You must switch off the inverter for adjustment, maintenance and repair work. Proceed as follows:

- Switch off the mains voltage (deactivate the external fuse elements).
- After switching off, check that there is no voltage
- Follow the local regulations for work on electrical installations.

- Danger to life due to electric shock at live connections!
- Even after disconnecting the electrical connections, life-threatening voltages are still present in the inverter.
- Therefore, wait at least five minutes before carrying out any further work on the inverter.

11.0 External limiting

The term „external limitation“ is understood to mean the remote control of the output power of a PV system by the energy supplier or the energy supply company (EVU).

According to the Renewable Energy Sources Act of 01.01.2012 (EEG, §6), external control of the output power must be possible. Depending on the size of the system, 70% control can also be used as an alternative.

This external power setting is carried out via ripple control signals. For this purpose, a ripple control receiver must be installed by the utility company.

The signals are then forwarded to the data logger. The data logger has four potential-free contacts that are available for processing the ripple control signals and are forwarded to the connected inverters via the RS485 interface.

Further information can be found in the installation and operating instructions of the data logger.

The power reduction is based on the maximum AC power of the respective inverter in percent.

The energy suppliers have currently agreed on four percentage values.

The power specifications and their influence on the inverters can be seen in the following table.

Standard given by utility company	Display inverter	Meaning
100%	External limitation 100%	The maximum possible power is fed in. Normal feed-in operation. No limitation.
60%	External limitation 60%	60% of the maximum power is fed in.
30%	External limitation 30%	30% of the maximum power is fed in.
0%	External limitation 0%	External limitation 0% No feed-in. Disconnection from the grid.

- The inverter feeds in with limited power as long as it receives a corresponding signal from the data logger.
- If no signal is transmitted to the inverter for more than 5 minutes, it feeds in again with the maximum possible power.
- The time and amount of the power reduction is determined by the respective energy supply company.
- The energy supplier is responsible for the loss of yield.
- The external limitation is recorded by the data logger.

The heat sink can reach temperatures of more than 60° C. The inverter has temperature monitoring for self-protection (power electronics), which disconnects the inverter from the grid from 85°C heat sink temperature.

12.0 further Informations

The following sections provide further information.

12.1 Disposal

Dispose of the packaging in accordance with the generally applicable legal and technical regulations. Comply with the environmentally relevant requirements regarding recovery, reuse and disposal of operating materials and components in accordance with DIN EN 378.

12.2 Care

Keep the surface of the inverter free of dust and dirt.

12.3 Laws, regulations and technical rules

When constructing solar installations, the laws and regulations applicable to the respective country at state, federal and European or international level must be observed.

In general, the generally recognised rules of technology apply, which are usually formulated in the form of standards, guidelines, regulations, provisions and technical rules by state and federal organisations, energy supply companies, as well as trade associations and committees for the relevant specialist area.

The installation of solar elements/solar systems must take into account the requirements of the roof covering, roof sealing or external wall cladding in accordance with the rules and regulations of the German roofing trade, or corresponding national and international guidelines and standards.
A check of the stability, thermal protection and ageing behaviour is required for subsequent installation.
In order to comply with accident prevention regulations, the use of safety systems (belts, scaffolding, catching devices, etc.) may be necessary. These safety systems are not included in the scope of delivery and must be ordered separately.

Installation may only be carried out by professionally qualified and authorised personnel with a recognised training certificate (by a state or federal organisation) for the respective field.

There are no parts inside the inverter that require maintenance or replacement.
The inverter must not be opened by the customer or the system installer.

13.0 Technical data

The technical data of the inverters can be found on pages 15-17. Ordering information for different country versions is shown on page 18.

Technical data for INV 315

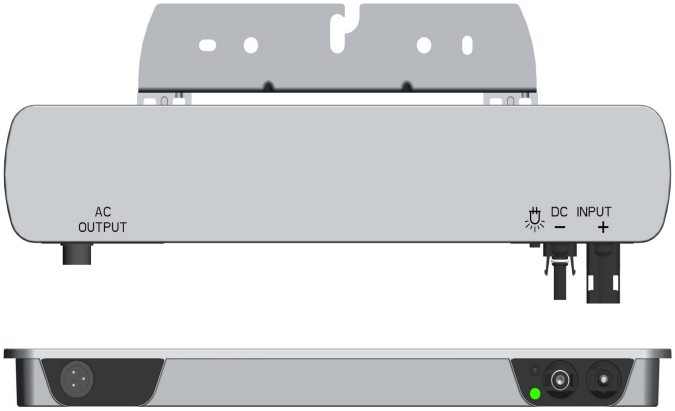
EN

INV315-50

Micro-Inverter

Description

The AEconversion Micro-Inverter INV315-50 converts the generated energy into grid-compliant alternatingcurrent. For this, the INV315-50 is directly connected to one PV-module. The individual conversion enables a maximum harvest of solar energy.
The micro-inverter INV315-50 operates with PV-modules up to a maximum power of 400W with a maximum input



Input
· Recommended PV power: 290W - 400W
· Maximum DC voltage: 50 V
· MPPT voltage range: 24 V... 40V
· Compatible for modules with a max. current of : 14 A

Output
· Maximum AC Power: 300W
· Nominal Current: 1.2 A
· Power factor: > 0.99

Efficiency
· Peak inverter efficiency: 96 %
· European efficiency: 95 %
· MPPT-efficiency: 99.8 %

Mechanical Data
· Operating Temperature: -25 °C ... +70 °C
· Night time power consumption: 30 mW
· Max. altitude a.s.l.: 2000 m
· DC Input: Amphenol H4
· AC Output: female connector Wieland system RSTi mini
· Dimensions (WxHxD): 390mm x 100 mm x 30 mm
· Weight: 0.8 kg
· Cooling: natural convection
· Enclosure material: aluminum
· Protection Degree: IP65 (iP67) & NEMA4

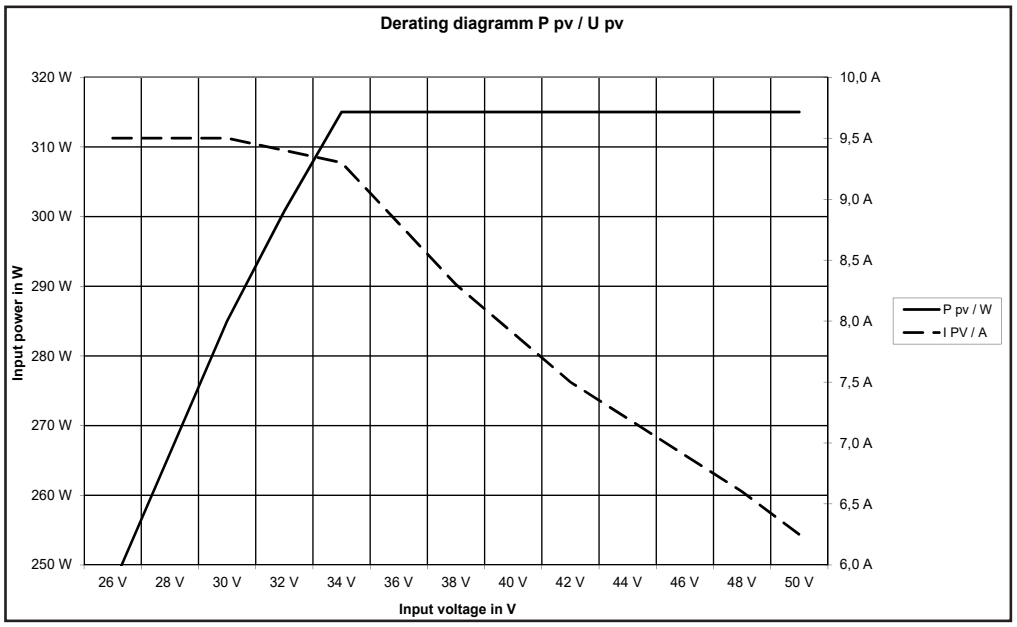
50 Hz-Version
· Nominal AC voltage: 230 V
· Nominal AC voltage range: 184V ... 264V
· Frequency: 50.0 Hz
· Frequency range: 47.5 Hz ... 51.5 Hz

60 Hz-Version
· Nominal AC voltage: 208 V or 240 V
· Nominal AC voltage range: 184V ... 264V
· Frequency: 60.0 Hz
· Frequency range: 59.5 Hz ... 60.3 Hz

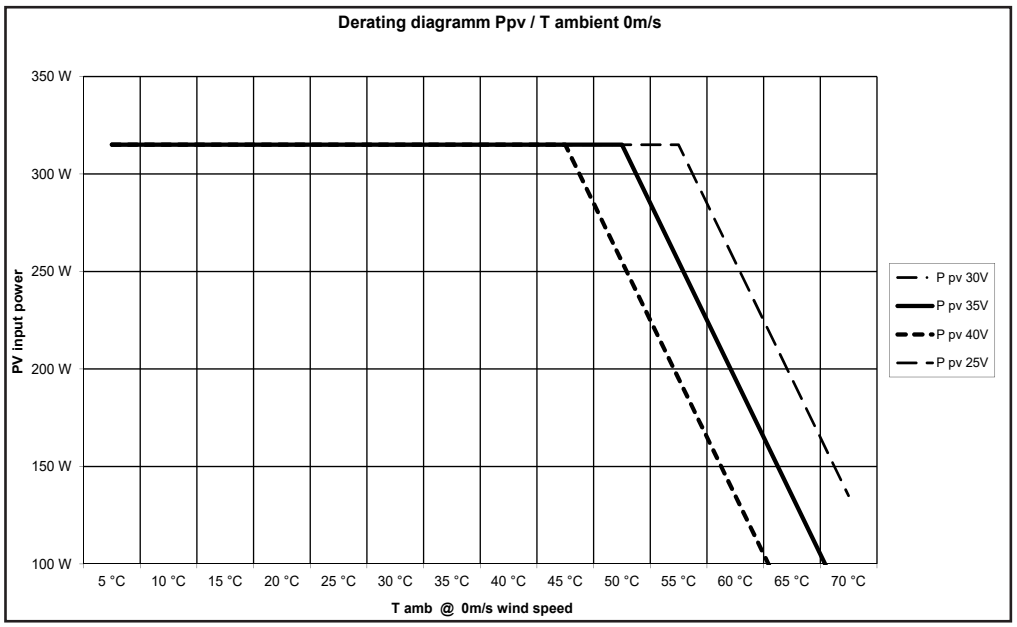
Safety and standards
· Productsafety:
IEC 62109-1
IEC62109-2
UL1741
IEEE 1547
CSA C22.2
· EMC:
IEC 61000-6-3
IEC 61000-6-4
IEC 61000-6-1
IEC 61000-6-2

Features
· Communication Version: smart RF communication
· Safety class: Class I
· Topology: Transformer/galvanically isolated
· integrated safety features

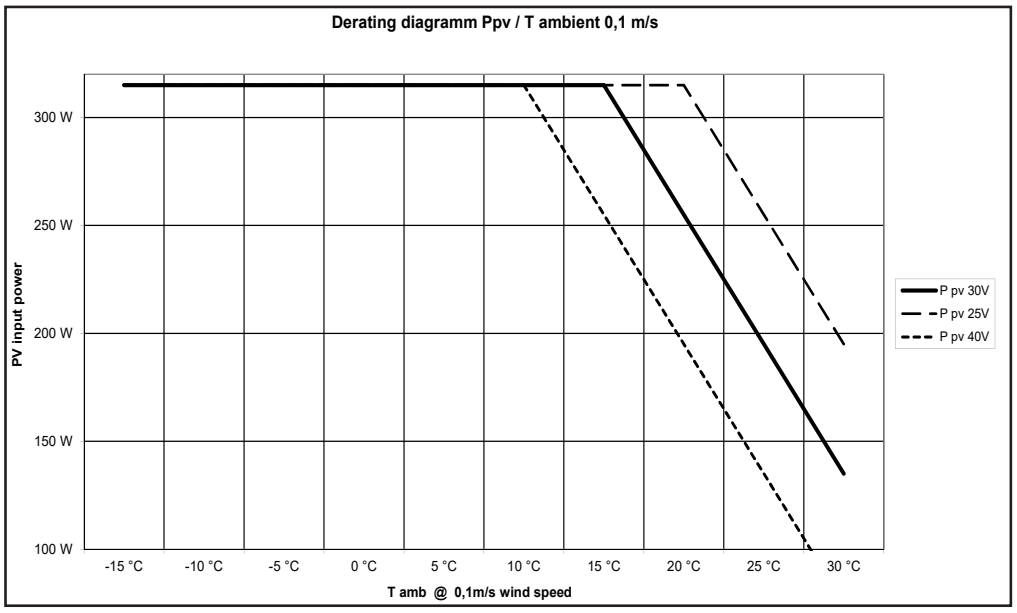
Derating diagrams for INV315



Derating diagram P pv / I pv



Derating diagram Ppv / T ambient 0m/s Wind speed



Derating diagram Ppv / T ambient 0,1 m/s Wind speed

EG-Konformitätserklärung
EC-Declaration of Conformity

Hersteller: *Manufacturer:*	**AEconversion GmbH & Co. KG**
Anschrift: *Address:*	An der Helle 26 D-59505 Bad Sassendorf, Germany

Produktbezeichnungen:
Name of Product:

Micro-Inverter	**Art. Nr. / *Part No.***
INV315-50EU	**11-05-600012-XX**

Further models of this family:
Die bezeichneten Produkte stimmen mit den Vorschriften folgender europäischer Richtlinien überein:
The indicated products are in correspondence with the following regulations of European Council:

Nummer/Kurztitel *Number/Titel*	Eingehaltene Vorschriften *Observed regulations*
2014/30/EU EMV-Richtlinie *EMC-Directive*	EN 61000-6-2:2005 EN 61000-6-3:2007 EN 61000-3-2:2006 + A1:2009 + A2:2009 EN 61000-3-3:2008
2014/35/EU Niederspannungsrichtlinie *Low Power Directive* Elektrische Sicherheit *Electrical Safety*	IEC 62109-1:2010 IEC 62109-2:2011
Automatische Freischaltung *Automated AC Disconnection*	VDE-AR-N 4105:2018-11

Aussteller: Geschäftsführer
Issuer: Director

Walter Knittel

Ort, Datum: Bad Sassendorf, 2019 April 11
Place, date:

Diese Erklärung bescheinigt die Übereinstimmung mit den genannten Richtlinien, beinhaltet jedoch keine Zusicherung von Eigenschaft
This declaration certifies the compliance with the indicated regulations, it doesn't guarantees attributes.

Overview: Country-specific ordering information INV315

Länderübersicht Micro-Inverter INV315

Artikelnummernsystem

Artikelnummernschlüssel: **11 - 05 - 600YYY - XX**

50 Hz
Leistungsversion
012 - 315W 50V 50Hz

50 Hz
Länderversion

-01	DE	Germany
-02	AT	Austria
-03	BE	Belgium
-04	DK	Denmark
-05	ES	Spain
-06	FR	France
-07	GB	United Kingdom G83/2
-08	GR	Greece (Mainland)
-09	IT	Italy
-10	NL	Netherlands
-11	PT	Portugal
-12	TR	Turkey
-13	LT	Lithuania
-14	LV	Latvia
-15	BG	Bulgaria
-16	CY	Cyprus
-17	SE	Sweden
-18	CH	Switzerland
-19	PL	Poland
-20	CZ	Czech Republic
-21	SK	Slowakia
-22	FI	Finnland
-23	AL	Albany
-24	IE	Ireland
-25	SI	Slovenia
-26	MT	Malta
-27	HR	Croatia
-28	RO	Romania
-29	XZ	Kosovo
-40	IL	Israel
-41	AU	Australia
-42	TN	Tunisia
-43	BB	Barbados
-44	CL	Chile
-45	ZA	South Africa
-46	IR	Iran
-47	CN	China
-48	KZ	Kazakhstan
-49	IN	India
-50	TZ	Tansania
-51	MU	Mauritius
-52	LK	Sri Lanka
-53	SA	Saudi Arabia (50Hz)
-54	JP	Japan (50Hz)
-55	GH	Ghana

Einheitenzertifikat

Hersteller / Antragsteller: AE conversion GmbH & Co.KG
An der Helle 26
59505 Bad Sassendorf
Deutschland

Typ Erzeugungseinheit:	**Photovoltaikwechselrichter**			
Name der EZE:	**INV315-50EU**	–	–	–
Wirkleistung (Nennleistung bei Nennbedingungen) [kW]:	**0,3**	–	–	–
Bemessungsspannung:	**230V; N; PE**			

Firmwareversion: **ab 0.5BL4**

Netzanschlussregel: **VDE-AR-N 4105:2018-11 – Erzeugungsanlagen am Niederspannungsnetz**
Technische Mindestanforderungen für Anschluss und Parallelbetrieb von Erzeugungsanlagen am Niederspannungsnetz

Mitgeltende Normen / Richtlinien: **DIN VDE V 0124-100 (VDE V 0124-100):2020-06 – Netzintegration von Erzeugungsanlagen – Niederspannung**
Prüfanforderungen an Erzeugungseinheiten vorgesehen zum Anschluss und Parallelbetrieb am Niederspannungsnetz

Die oben bezeichnete Eigenerzeugungseinheit wurde nach der Prüfrichtlinie VDE 0124-100 geprüft und zertifiziert. Die in der Netzanschlussregel geforderten elektrischen Eigenschaften werden erfüllt:

- Nachweis zulässiger Netzrückwirkungen
- Nachweis des Symmetrieverhaltens von Drehstromumrichtereinheiten
- Nachweis des Verhaltens der Erzeugungseinheit am Netz
- Nachweis der dynamischen Netzstützung
- Nachweis der Teilnahmefähigkeit am Erzeugungsmanagement / Netzsicherheitsmanagement

Das Zertifikat beinhaltet folgende Angaben:

- Technische Daten der Erzeugungseinheit, der eingesetzten Hilfseinrichtungen und der verwendeten Softwareversion
- Zusammengefasste Angaben zu den Eigenschaften der Erzeugungseinheit (Wirkungsweise)

Berichtsnummer: **17TH0135-VDE-0124-100_1**
Zertifikatsnummer: **U21-0219**
Zertifizierungsprogramm: **NSOP-0032-DEU-ZE-V01**
Ausstellungsdatum: **2021-03-09**

Zertifizierungsstelle

Thomas Lammel

DAkkS Deutsche Akkreditierungsstelle D-ZE-12024-01-00

Zertifizierungsstelle der Bureau Veritas Consumer Products Services Germany GmbH akkreditiert nach DIN EN ISO/IEC 17065

Eine auszugsweise Darstellung des Zertifikats bedarf der schriftlichen Genehmigung der Bureau Veritas Consumer Products Services Germany GmbH

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