Photovoltaic

Photovoltaic - Optimizer

AD-PVO 2000

Description

The Photovoltaic-Optimizer AD-PVO 2000 monitors the supply of solar energy to the main connection of a building. If the supply output exceeds a limiting value set by the customer via a PC, an internal output relay is triggered. With this switching relay, electric consumers (i.e. electric heating rod in the process water tank of the heating, air-conditioning device or heat pump) can now be triggered. With the AD-PVO 2000, the energy is converted on site and not fed back into the public low-voltage network. Through the use of this device PV systems are optimized for their own consumption and relieves the public low-voltage grid. Additionally, the AD-PVO 2000 has an error message LED and an integral error message relay, via which error messages (i.e. permanent failure of the feeding) can be displayed or acoustically signalled outside the distributor cabinet. It is recommended to mount the AD-PVO 2000 directly after the counter of the energy supply in the distributor cabinet, as measuring should be carried out as close as possible to the feeding point. The device requires all three outer conductor voltages for its measurements and the zero conductor. The AD-PVO 2000 measures the current via three external split current current transformer, which can be mounted directly onto the 3 phases after the counter, therefore saving space (without separation). The Photovoltaic Optimiser acquires the self-generated supply energy from the measurement voltage L1. Due to its efficient switching network and its low power consumption, the AD-PVO 2000 generates only a negligible amount of warming and can therefore be lined up closely.

Application

For optimising the self-generated energy at photovoltaic units

Specific characteristics

- Self-sufficiency through measuring voltages
- Internal overload and fault relay
- Current measurement with clamp on/split core current transformer
- Configuration via PC
- compatible with the most SG-Ready compatible heat pumps

Business data

Order number	AD-PVO 2000

Technical specifications

Current-inputs (I1...I3)	
Measuring range	0 ... 33 mA AC (0 ... 100 A AC via external current transformer)
Input resistance	ca. 10 Ohm
Voltage-inputs (L1...L3)	
Measuring range	230 V AC (+/- 10 %)
Input resistance	ca. 500 kOhm
External current-transformer	
Primary current	0 ... 100 A AC
Secondary current	0 ... 33 mA AC
Transformation ratio	1:3000 (Np : Ns)
Maximum wire diameter	15 mm
Max. secundary wire length	2 m
Isolation-voltage	2,5 kV / 1 min
Dimensions (WxHxD)	32x42x46 mm
Load-relay	
Maximum switching load AC	250 V, 9 A
Maximum switching load DC	50 V, 9 A
Contact construction	closing contact
Switching operations mechanical	6000000
At 230V/9A AC, cos(phi)=1	400000
At 230V/9A AC, cos(phi)=0,4	150000
At 24V/9A DC	200000
Error-relay	
Maximum switching load AC	250 V, 2 A
Maximum switching load DC	50 V, 2 A
Contact construction	changeover contact
Switching operations mechanical	10000000
At 230V/2A AC, cos(phi)=1	600000
At 230V/2A AC, cos(phi)=0,4	200000
At 24V/2A DC	200000
Supply	
Voltage range AC	230 V AC (+/- 10 %), 50/60 Hz (see voltage-inputs)
Nominal voltage AC	230 V AC
Power consumption	max. 3,8 VA
Transfer behavior - in reference to the current value	
Basic accuracy	< 1 % (class 1)
Temperature influence	80 ppm/K
Response time	< 2 s
Housing	
Dimensions (WxHxD)	71x90x58 mm
Type of protection	IP 20
Connection method	screw clamp
Terminals, wire cross section	2,5 mm² flex wire / 4 mm² one wire
Bolting torque terminals	0,6 Nm
Skinning length	6 mm
Weight	~ 175 g + 3x 75 g (current-transf.)
Manner of fastening	35 mm DIN rail 35mm
Environmental conditions	
Ambient temperature	0 ... 50 °C
Storage and transport	-10 ... 70 °C (no thawing)

ADAMCZEWSKI
Elektronische Messtechnik GmbH
Felix-Wankel-Str. 13
Tel. +49 (0)7046-875
vertrieb@ad-messtechnik.de
74374 Zaberfeld
Fax +49 (0)7046-7678
www.adamczewski.com

Photovoltaic - Optimizer

AD-PVO 2000

Technical specifications

EMC

Product family standard	EN 61326 [1]
Emitted interference	EN 55011, CISPR11 Cl. B

Electrical safety requirements

Product family standard	EN 61010-1
Overvoltage category	II
Pollution degree	2
Safety measurement	EN 61010-2-030
Measurement category	CAT III

Galvanic isolation, test voltages

Grid side to relay outputs	4 kV, 50 Hz (1 min.)
Grid side to the pc-interface	4 kV, 50 Hz (1 min.)
Grid side to control elements	4 kV, 50 Hz (1 min.)
Relay-outputs among each other	4 kV, 50 Hz (1 min.)

Protection circuits

Input	electrical surge protection
Load-relay	spark quenching
Power supply	protection against over-temperature, over-voltage and over-current

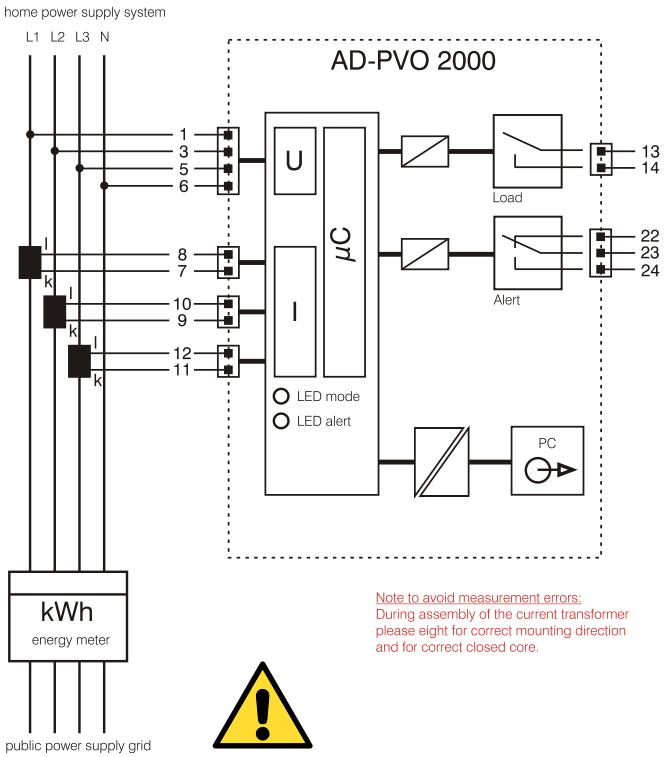
[1] During checking, slight signal deviations are possible.

Heat pump control

SG-Ready

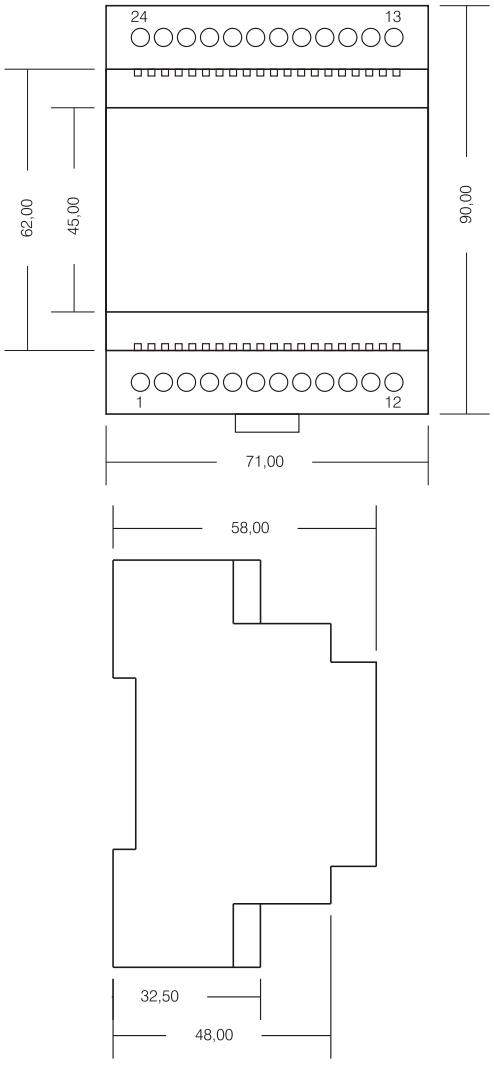
With the PV optimizer AD-PVO 2000 heat pumps can be signaled that enough PV surplus exists.
Thus, the heat pump can raise their storage or flow temperature and increase the personal consumption.
The optimizer is compatible with many SG-Ready (Smart Grid Ready) enabled heat pumps. The SG-Ready logo can be found on your heat pump.
The SG-ready interface is designed in in most cases as a contact input therefore, the overload relay of the PVO can be used easily as a signal for the temperature increase of the heat pump.
What is to be done at a SG-signal, it must be parameterized on the heat pump.

Block and wiring diagram



Note to avoid measurement errors:
During assembly of the current transformer please eight for correct mounting direction and for correct closed core.

Dimensions



Photovoltaic - Optimizer

AD-PVO 2000

Operation

Operating LED
The green operating LED indicates the operating status of the device.
- off: the device has no operating voltage
- permanently on: the device is in normal operation mode
- flashing with 1 Hz: the load is connected to the device
- flashing with 5 Hz: the manual load connection is active

Error LED
The red error LED indicates whether an error is present.
- off: no error
- on: error is present

Key: Manual load
The button "Manual load" serve the manual connection of the load relay. The load is activated with a long depression of the key (2s) and deactivated the same way.

Key: Quit
The key "Quit" is provided for quitting an error message. If an error is present, the red error indicator LED lights up and the error message relay responds. An acoustic indicator can be connected at the error message relay, for instance. Now if the key "Quit" is activated, the relay releases again. The red error LED, however, is lit until the error has been eliminated.

Software and parameterizing
The device can be parameterized and read out with the parameterizing software AD-Studio and the optionally available USB programming adapter AD-VarioPass3. The suitable USB driver for the USB programming adapter AD-VarioPass2 is supplied with the software AD-Studio. With the software, measuring values can also be read out or logged.For connecting to the PC, the blind plug must be removed from the parameterizing interface (AD-PC), i.e. with a small screwdriver. Push the screwdriver into the slot provided and work the blind plug out.
The following parameters can be edited:

- Filter: Analogue value filter for the input measuring dimensions. Serves the suppression of quick measuring value alterations.
- Current transformer type: Specifies the connected current transformers type (distinguishing primary current).
- Power of the load: The power consumption at the load relay required by the connected load must be specified here. This specification is required for internal calculations.
- Switch-on-level: Sets the switch-on threshold of the load relay, in reference to the fed power.
- Switch-off-level: Sets the switch-off threshold of the load relay, in reference to the fed power.
- Fault injection time: Sets the time, after which an alarm is triggered when during this set time no feeding has occurred.
- Plant size: Sets the plant size in kWp. Only used at 70%-message.
- Error relay function: Sets the function of the fault relay. You can choose between two modes: "feed-error" and "70%-message". The standard function "feed error" triggers a fault message after a specified time. This time is set in parameter "Fault injection time". The "70% message" triggers an alarm if all loads of the PVO are switched on and the PV-plant over 70% feeds. It is the "plant size" parameter evaluated.

Automatic load calibration
For commissioning the AD-PVO 2000, the parameters are normally adjusted via the parameterizing software AD-Studio and the available USB programming adapter AD-VarioPass3. However, an "automatic load calibration" can also be started directly at the device. In this operating mode, the output of the consumer connected to the load relay is automatically calibrated and a PC is not necessary. The load calibration is started with a longer depression of the "Quit-key" (3s). As long as the calibration is running, the two LEDs flash alternately. This process can last up to several minutes. If the calibration is cancelled with a brief depression of the "Quit-key", the values in the parameter are reset to the last status. After successful completion of the "automatic load calibration", the device takes over the measuring data and returns to normal operation. If the load calibration is not completed after approx. 15 minutes, there are too strong load fluctuations in the network. With too strong load fluctuations, the device is difficult to calibrate. Here we recommend to separate these loads briefly from the network during the calibration time, or to parameterize the device via the PC.

Safety instructions – it is essential to read these

Explanation of symbols
Two squares, one inside the other, indicate a DOUBLE or REINFORCED insulation of the device against dangerous high voltages (i.e. mains voltage). This is valid for all parts at the housing, which can be touched, for the operating elements and the low voltages generated by and lead from the device.

Explanation of symbols
An exclamation mark inside a triangle indicates important notes in the technical data sheet and in the notes on safety. Read both documents to the end prior to commissioning. They contain important notes for the correct operation and the installation. Non-observation and errors resulting from this can lead to dangers.

Designated usage
The device must only be used for the purpose described in the relevant data sheet.
The device conforms to the valid CE European guidelines and harmonised standards.
Usage in explosion-endangered areas, outdoors or in damp rooms is NOT admissible.
The device must only be operated with the specified nominal voltage. The specified switching capacities must not be exceeded.
Opening or altering the device is not admissible. Do not repair the device yourself, but replace it with an equivalent new device. Repairs must only be carried out by the manufacturer.
The manufacturer accepts no liability due to infringement.
An operation under adverse environmental conditions is not admissible.
Adverse environmental conditions are:
- high sun radiation
- wetness, dewing or too high humidity
- dust and flammable gases, vapours or solvents
- strong vibrations or electro-magnetic fields

Do not expose the device to stresses, which exceed the described limits.
Usage other than the one described in the relevant data sheet is not admissible and leads to damage of the product.
Furthermore, this is connected with dangers, as for instance short circuit, fire, electric shock etc., which can be fatal.

Notes on safety and dangers
Any warranty claim becomes void for damages due to non-observation of these notes on safety and the relevant technical data sheet.
The following points must be noted:
- the valid laws, standards and regulations
- the stand of technology at the time of the installation
- the handbook and/or the technical data sheet
- the recognised rules of technology
- the fact that operating instructions can only state general regulations and that these regulations must be observed
- the device is not a toy and does not belong in the hands of children
- only operate the device with undamaged connection lines.

Notes on connection and installation
WARNING: dangerous electric voltage can lead to electric shock and burns.
- The installation and maintenance must be carried out by qualified electricians.
- Observe the technical data specified in the data sheet.
- Provide a correctly dimensioned overcurrent device in the vicinity of the device.
- Mount the device in an appropriate control box/control cabinet with a suitable type of protection according to IEC
 60529 to protect it from mechanical or electrical damages.
- During maintenance work, cut the device off from all effective sources of energy and secure it against restart.
- If operating elements of protection class 1 are connected to the contact outputs of the device, the protective earthing
 conductor connection must be carried out separately and properly.

ESD
ATTENTION: When handling the device, protective measures against electrostatic discharge must be observed.

Maintenance and cleaning
The device is maintenance-free and does not have to be cleaned.

Disposal
Old electronic devices are valuable substances and do not belong into the household waste. If the device has reached the end of its useful life, dispose of the device according to the valid legal regulations.

Status: 09/2013

Adamczewski
Elektronische Messtechnik GmbH
74374 Zaberfeld
www.adamczewski.com