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ISOMETER® isoPV with coupling device AGH-PV

Insulation monitoring device for unearthed
AC, AC/DC and DC systems (IT systems)
for photovoltaic plants up to AC 793 V/DC 1100 V

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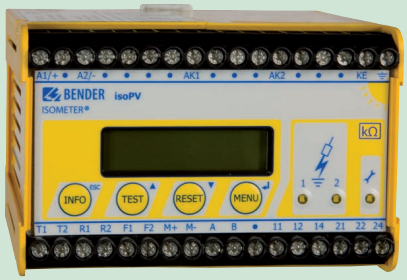
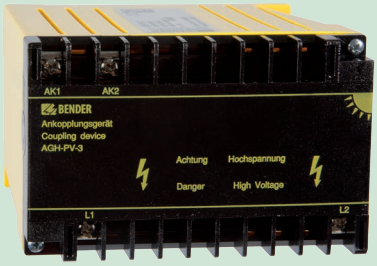


ISOMETER® isoPV



Coupling device AGH-PV

Device features

- Insulation monitoring for unearthed systems AC, AC/DC 0…793 V, DC 0…1100 V
- Two separately adjustable response values 0.2…100 kΩ
- Various ***AMP***^{Plus} measurement methods selectable
- Automatic adaptation to the system leakage capacitance
- Info button to display device settings and the system leakage capacitance
- Self monitoring with automatic alarm
- Automatic self test, selectable
- Connection for external kΩ indication
- Test and reset button
- External test/reset button can be connected
- Two separate alarm relays with two potential-free changeover contacts
- N/O or N/C operation, selectable
- Backlit LC display
- RS-485 interface
- Presetting for PV systems via menu

Approvals

Product description

The ISOMETER® of the isoPV series is designed to monitor the insulation resistance of unearthed main circuits (IT systems) AC, AC/DC 0…793 V resp. DC 0…1100 V. Solar systems containing inverters and isolating transformers are often designed as IT systems. isoPV variants using the ***AMP***^{Plus} measurement method capable of adapting to slow voltage fluctuations meet the particular requirements of modern solar systems. Due to wide spatial distribution or EMC interference suppression methods often high leakage capacitances against earth occur in these systems. Considering this, the isoPV automatically adapts to the system conditions in order to optimise the measuring time. In particular, the requirements for permissible voltage ranges along with a low level of insulation can be met here.

Use the ISOMETER® isoPV in combination with the AGH-PV only. An external supply voltage allows deenergised systems to be monitored too.

Application

- AC, DC or AC/DC main circuits
- Solar systems with directly connected inverters
- Solar systems with large system capacitances of up to 2000 µF
- Solar systems with high but slow voltage fluctuations
- Installations including switch-mode power supplies
- Coupled IT systems

Function

When the insulation resistance between the system conductors and earth falls below the set response value, the alarm relays switch and the alarm LEDs light up. Two separately adjustable alarm relays allow to distinguish between prewarning and alarm. The measured value is indicated on the LC display or an externally connectable measuring instrument. In this way any changes, for example when circuits are connected to the system, can be recognised easily. The fault message can be stored. The fault memory can be reset by pressing the reset button. By pressing the test button, the function of the device as well as the connections to system and earth can be tested. Pressing the Info button provides additional information, such as the existing system leakage capacitance or device settings.

The function of the device and the system and earth connections are continuously monitored. When a fault occurs, the system fault relay switches and the alarm LED “system fault” lights up. The parameterisation of the device can be carried out via the LC display or the function buttons integrated in the front plate.

Additional functions

- History memory with real-time clock to store all alarm messages with date and time stamp
- Electrically isolated RS-485 interface (BMS protocol) for data exchange with other Bender devices
- Isometer disconnecting relays for the operation of several ISOMETER®s in coupled IT systems
- Current output 0(4)…20 mA (electrically isolated)

Use in coupled IT systems

Isometer disconnecting relays and the control inputs F1/F2 integrated in the insulation monitoring device make them suitable for coupled IT systems too, and guarantees that only one ISOMETER® is active at any one time.

Measurement method

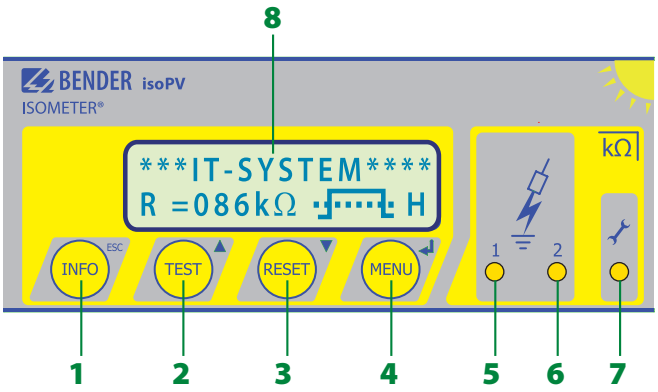
AMP^{Plus} The isoPV uses the patented ***AMP***^{Plus} measurement method. This measuring method allows concise monitoring of modern power supply systems, also in case of extensive, directly connected DC components and high system leakage capacitances.

Standards

The ISOMETER® of the isoPV series complies with the requirements of the device standards: DIN EN 61557-8 (VDE 0413-8), IEC 61557-8, IEC 61326-2-4 Ed. 1.0, DIN EN 60664-1 (VDE 0110-1), DIN EN 60664-3 (VDE 0110-3).

AC/DC PV

Control elements isoPV



1 - "INFO" button: to query standard information
"ESC" button: back (menu function), to confirm parameter change

2 - "TEST" button: to call up the self test.
Arrow up button: parameter change, to move up in the menu

3 - "RESET" button: to delete stored insulation fault alarms Arrow down button: parameter change, to move down in the menu

4 - "MENU" button: to call up the menu system.
Enter button: to confirm parameter changes

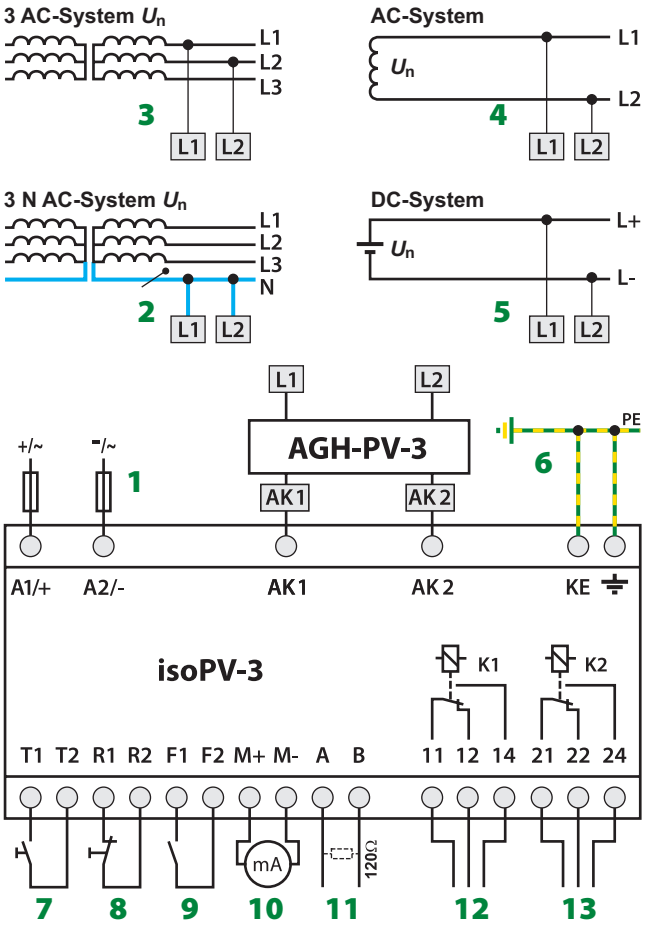
5 - Alarm LED "1" lights: insulation fault, first warning level reached

6 - Alarm LED "2" lights: insulation fault, second warning level reached

7 - Device error LED lights: isoPV faulty

8 - Two-line display for standard and menu mode

Wiring diagram



1 - Supply voltage US (see nameplate) via 6 A fuse;
For UL and CSA applications, the use of 5 A fuses is mandatory.

2, 3 - Connection to the 3 AC system to be monitored:
Connect the terminals L1, L2 to neutral conductor N or terminals L1, L2 to conductor L1, L2.

4 - Connection to the AC system to be monitored:
connect terminals L1, L2 to conductor L1, L2.

5 - Connection to the DC system to be monitored:
Connect terminal L1 to conductor L+, terminal L2 to conductor L-

6 - Separate connection of E ⏚ and KE to PE

7 - External test button (N/O contact)

8 - External reset button (N/C contact or wire jumper), when the terminals are open, the fault message will not be stored.

9 - STANDBY by means of the function input F1, F2:
when the contact is closed, the insulation resistance is not measured.
Disconnection from the IT system

10 - Current output, electrically isolated: 0…20 mA or 4…20 mA

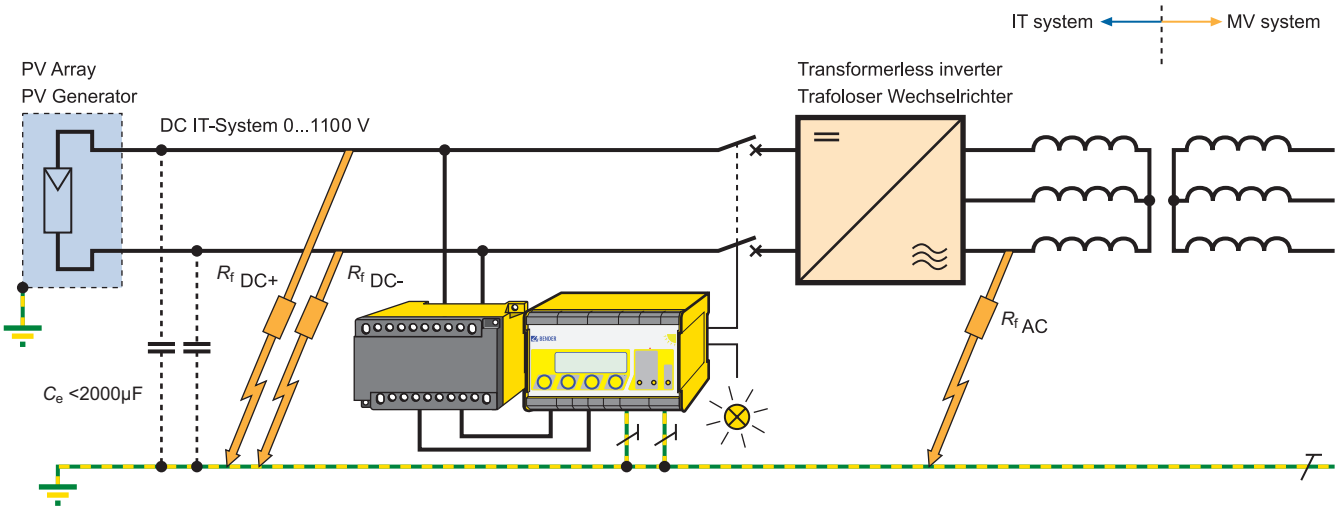
11 - Serial interface RS-485 (termination with a 120 Ω resistor)

12 - Alarm relay 1; available changeover contacts.

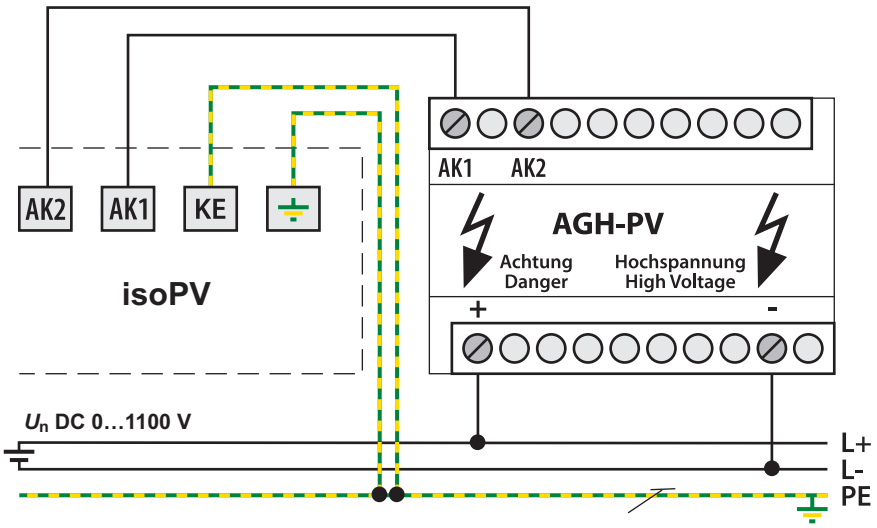
13 - Alarm relay 2 (device error relay); available changeover contacts.

Wiring diagram

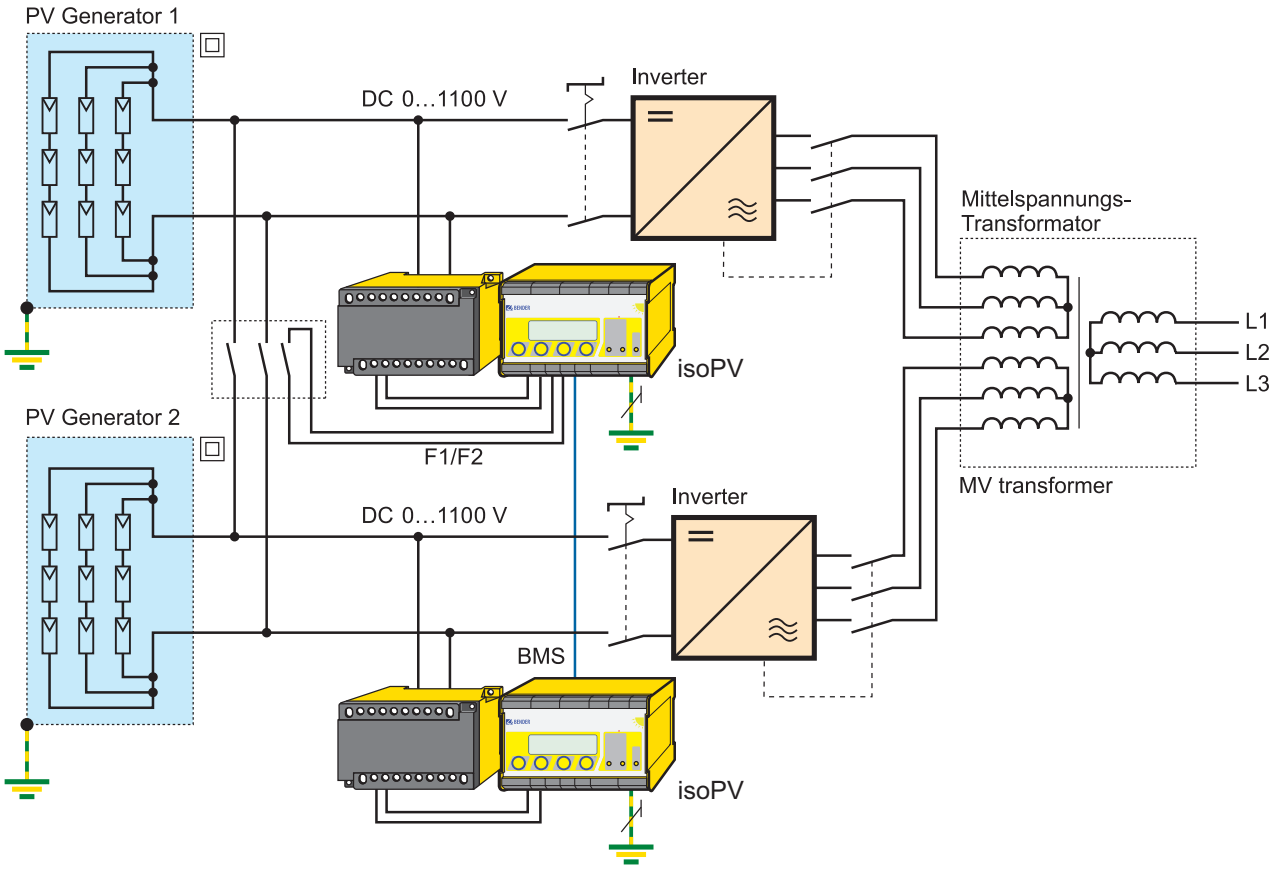
PV generator unearthed (IT system) with nominal voltage ≤ DC 1100 V and ISOMETER® isoPV with coupling device AGH-PV

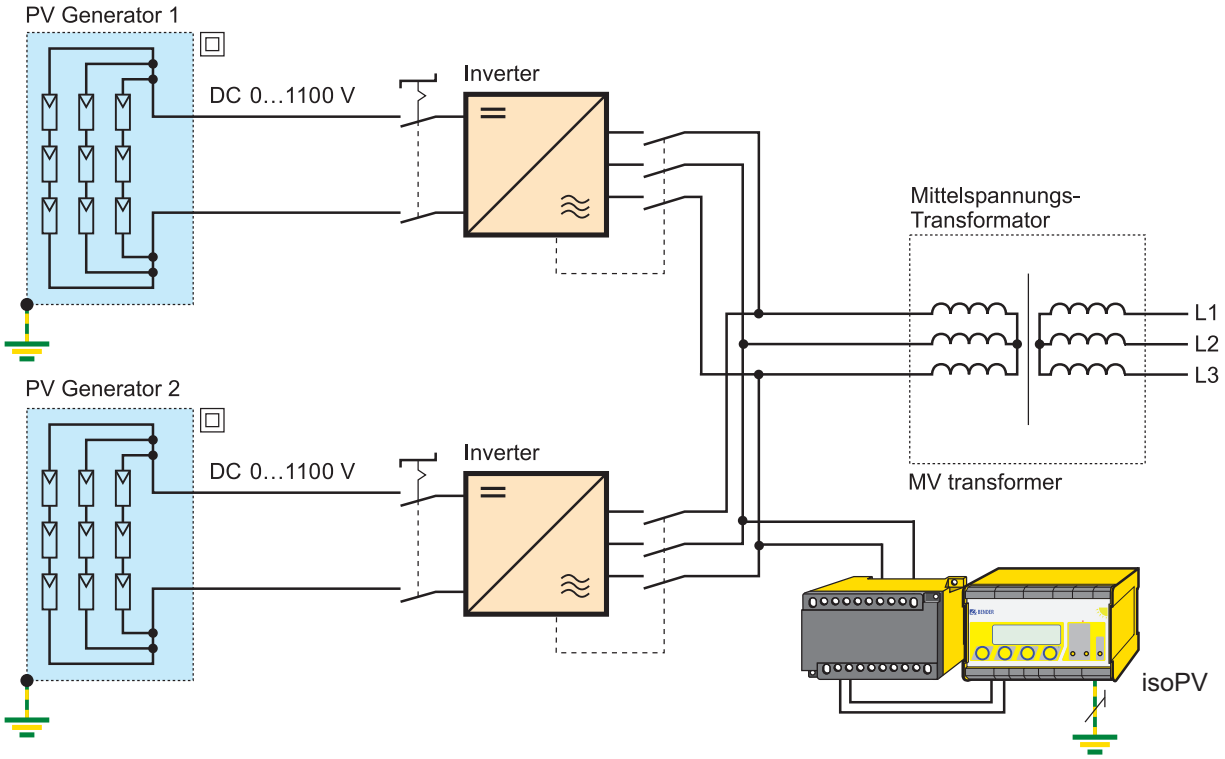


Wiring diagram – isoPV with coupling device AGH-PV



Several PV generators unearthed (IT system) with nominal voltage ≤ DC 1100 V as a coupled system and ISOMETER® isoPV with coupling device AGH-PV





Technical data ISOMETER® isoPV

Insulation coordination acc. to IEC 60664-1

Rated insulation voltage	AC 800 V
Rated impulse withstand voltage/pollution degree	8 kV/3

Voltage ranges

Nominal system voltage U_n	via AGH-PV
isoPV-335:	
Supply voltage U_S (also see nameplate)	AC 88…264 V**
Frequency range U_S	42…460 Hz
Supply voltage U_S (also see nameplate)	DC 77…286 V**
isoPV-327:	
Supply voltage U_S (also see nameplate)	DC 19.2…72 V**
isoPV…:	
Power consumption	≤ 8 VA

Response values

Response value R_{an1}	0.2…100 kΩ
Factory setting R_{an1} (Alarm1)	4 kΩ
Response value R_{an2}	0.2…100 kΩ
Factory setting R_{an2} (Alarm2)	1 kΩ
Relative uncertainty (7…100 kΩ) (acc. to IEC 61557-8)	±15 %
Relative uncertainty (0.2…7 kΩ)	±1 kΩ
Response time t_{an}	see table THG1454 from page 39 onwards
Hysteresis	25 %, +1 kΩ

Measuring circuit

Measuring voltage U_m (peak value)	± 50 V
Measuring current I_m (at $R_F = 0\ \Omega$)	≤ 1.5 mA
Internal DC resistance R_i	≥ 35 kΩ
Impedance Z_i at 50 Hz	≥ 35 kΩ
Permissible extraneous DC voltage U_{fg}	≤ DC 1100 V
Permissible system leakage capacitance C_e	≤ 2000 µF (2000 µF)*

Displays

Display, illuminated	two-line display
Characters (number/height)	2 x 16/4/mm
Display range measured value	0.2 kΩ…1 MΩ
Operating uncertainty	±15%, ±1 kΩ

Outputs/Inputs

Test/reset button	internal/external
Cable length test/reset button, external	≤ 10 m
Current output (load)	0/4…20 mA (≤ 500 Ω)
Accuracy current output, related to the value indicated (1…100 kΩ)	±15 %, ±1 kΩ

Serial interface

Interface/protocol	RS-485/BMS
Connection	terminals A/B
Cable length	≤ 1200 m
Cable (twisted in pairs, shield connected to PE)	2-core, ≥ 0.6 mm², recommended: J-Y(St)Y min. 2 x 0.8
Terminating resistor	120 Ω (0.5 W)
Device address, BMS bus	1…30 (3)*

Switching elements

Switching elements	2 changeover contacts: K1 (Alarm 1), K2 (Alarm 2, device error)
Operating mode K1, K2 (Alarm 1/Alarm 2)	N/C operation/N/O operation (N/O operation)*

Contact data acc. to IEC 60947-5-1:

Utilisation category	AC 13	AC 14	DC-12	DC-12	DC-12
Rated operational voltage	230 V	230 V	24 V	110 V	220 V
Rated operational current	5 A	3 A	1 A	0.2 A	0.1 A

Minimum contact rating	1 mA at AC/DC ≥ 10 V

Environment/EMC

EMC	
not suitable for household and small companies	IEC 61326-2-4: 1.0
Operating temperature	-25…+65 °C
Classification of climatic conditions acc. to IEC 60721:	
Stationary use (IEC 60721-3-3)	3K5 (with condensation and formation of ice)
Transport (IEC 60721-3-2)	2K3 (with condensation and formation of ice)
Long-term storage (IEC 60721-3-1)	1K4 (with condensation and formation of ice)
Classification of mechanical conditions acc. to IEC 60721:	
Stationary use (IEC 60721-3-3)	
for screw mounting with accessories 990 056	3M7
for DIN rail mounting	3M4
Transport (IEC 60721-3-2)	2M2
Long term storage (IEC 60721-3-1)	1M3

Connection

Connection	screw-type terminals
Connection properties	
rigid/flexible	0.2…4 mm²/0.2…2.5 mm²
flexible with ferrules without/with plastic sleeve	0.25…2.5 mm²
Tightening torque	0.5 Nm
Conductor sizes (AWG)	24…12
Cable length between iso-PV and AGH-PV	≤ 0.5 m

Other

Operating mode	continuous operation
Mounting	display-oriented
Distance to adjacent devices	≥ 30 mm
Degree of protection, internal components (DIN EN 60529)	IP30
Degree of protection, terminals (DIN EN 60529)	IP20
Type of enclosure	X112, free from halogen
Screw mounting	2 x M4 with mounting clip
DIN rail mounting acc. to	IEC 60715
Flammability class	UL94 V-0
Documentation number	D00024
Weight	≤ 510 g

( )* = factory setting
Data labelled with ** are absolute values

Technical data coupling device AGH-PV

Voltage ranges

Nominal system voltage U_n	AC, 3(N)AC 0…793 V, DC 0…1100 V
Nominal frequency f_n	DC, 10…460 Hz
Max. AC voltage U~ in the frequency range f_n = 0.1…10 Hz	$U_{\sim max}$ = 110 V/Hz * f_n

Environment/EMC

EMC	IEC 61326-2-4 Ed. 1.0
Operating temperature	-25…+70 °C
Classification of climatic conditions acc. to IEC 60721:	
Stationary use (IEC 60721-3-3)	3K5 (with condensation and formation of ice)
Transport (IEC 60721-3-2)	2K3 (with condensation and formation of ice)
Long-term storage (IEC 60721-3-1)	1K4 (with condensation and formation of ice)
Classification of mechanical conditions acc. to IEC 60721:	
Stationary use (IEC 60721-3-3)	3M7
Transport (IEC 60721-3-2)	2M2
Long-time storage (IEC 60721-3-1)	1M3

Connection

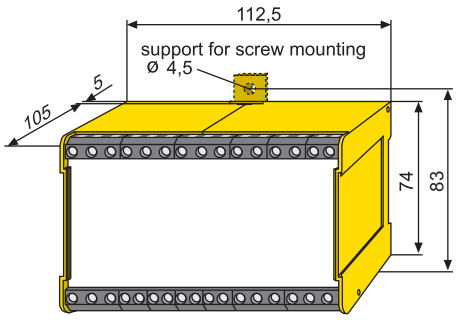
Connection	screw-type terminals
Connection properties	
rigid/flexible	0.2…4 mm²/0.2…2.5 mm²
flexible with ferrules without/with plastic sleeve	0.25…2.5 mm²
Tightening torque	0.5 Nm
Conductor sizes (AWG)	24…12
Cable length between iso-PV and AGH-PV	≤ 0.5 m

Other

Operating mode	continuous operation
Mounting	cooling slots must be ventilated vertically!
Distance to adjacent devices	≥ 30 mm
Degree of protection, internal components (DIN EN 60529)	IP30
Degree of protection, terminals (DIN EN 60529)	IP20
Type of enclosure	X200
Screw mounting	2 x M4
DIN rail mounting acc. to	IEC 60715
Flammability class	UL94 V-0
Weight	≤ 230 g

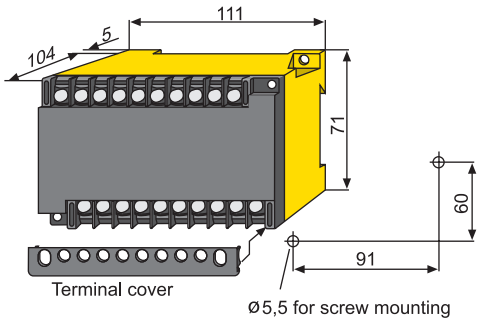
Dimension diagram XM112 – ISOMETER® isoPV

Dimensions in mm



Dimension diagram X200 – coupling device AGH-PV

Dimensions in mm



Ordering information

Supply voltage U_S		Set comprising		Art. No.
AC	DC	Type	Art. No.	
–	19.2…72 V	isoPV-327	B 9106 5130W	B 9106 5132W
		AGH-PV	B 9803 9020W	
88…264 V	77…286 V	isoPV-335	B 9106 5131W	B 9106 5133W
		AGH-PV	B 9803 9020W	

Devices are available as a set.

Accessories

Type designation	Art. No.
Screw mounting	B 990 056

Suitable system components

Type designation	Type	Art. No.
External kΩ measuring instruments	9620-1421	B 986 841

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