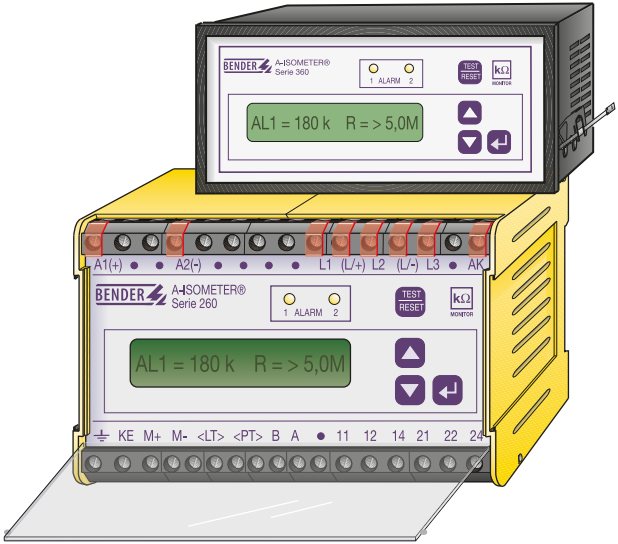
EN Manual

BENDER
The Power in Electrical Safety©

ISOMETER® IRDH265
AC/DC
IRDH365



Insulation monitoring devices for IT AC systems, IT AC systems with galvanically connected DC circuits and for IT DC systems (isolated power)

IRDH265-365_D00014_01_M_XXEN/09.2015

Bender GmbH & Co. KG
Londorfer Str. 65 • 35305 Gruenberg • Germany
Postfach 1161 • 35301 Gruenberg • Germany

Tel.: +49 6401 807-0
Fax: +49 6401 807-259

Email: info@bender.de
www.bender.de

Photos: Bender archives

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1. Safety information

1.1 Explanation of symbols and notes

This manual is intended for qualified personnel working in electrical engineering and electronics!

To make it easier to understand and revisit certain sections of text and instructions in this manual, we have used symbols to identify important instructions and information:

*The signal word indicates that there is a **high risk** of danger that will result in **electrocution** or **serious injury** if not avoided.*

*This signal word indicates a **medium risk** of danger that can lead to **death** or **serious injury** if not avoided.*

*This signal word indicates a **low level risk** that can result in minor or **moderate injury** or **damage to property** if not avoided.*

*This symbol denotes information intended to assist the user to make **optimum use of the product**.*

1.2 Intended use

WARNING

The intended use of this ISOMETER® is to monitor the insulation resistance of IT systems. Any other use other than that described in this operating manual is regarded as improper. The Bender group shall not be liable for any loss and damage arising thereof.

Correct use also includes:

- Compliance with all instructions in the operating manual
- Adherence to any inspection intervals

As a basic principle, our "General conditions of Sale and Delivery" shall apply. These are made available to the operator no later than at the time when the contract is concluded.

1.3 Warranty and liability

Warranty and liability claims in the event of injury to persons or damage to property are excluded if they can be attributed to one or more of the following causes:

- Improper use of the ISOMETER®s.
- Improper assembly/fitting, commissioning, operation and maintenance of the ISOMETERs.
- Failure to take note of the operating instructions concerning transport, commissioning,
  operation and maintenance of the ISOMETERs.
- Unauthorized structural modifications to the ISOMETER®s.
- Failure to take note of the technical data.
- Improperly performed repairs and the use of spare parts or accessories which are not
  recommended by the manufacturer.
- Disasters brought about by the effect of foreign bodies and force majeure.

- The assembly and installation of non-recommended combinations of devices.

This operating manual, and in particular the safety information, must be noted by all persons who work with the ISOMETER®s. In addition, it is essential to comply with the rules and regulations on
accident prevention which are valid for the place of use.

1.4 Personnel

Only appropriately qualified personnel may work on these ISOMETER®s. "Qualified" means that such personnel are familiar with the installation, commissioning and operation of the product, and that they have undergone training or instruction which is appropriate to the activity. The personnel must have read and understood the safety chapter and the warning information in these operating instructions.

1.5 About this operating manual

This manual has been compiled with the greatest of care. Nevertheless, errors and mistakes cannot be entirely ruled out. The Bender Group assumes no liability whatsoever for any injury to persons or damage to property which may result because of faults or errors in these operating instructions.

1.6 Hazards when handling the IRDH265 and IRDH365 ISOMETER®s

The IRDH265 and IRDH365 ISOMETER®s are constructed according to state of the art and the recognised safety engineering rules. Nevertheless, when they are being used, hazards may occur to the life and limb of the user or of third parties, or there may be adverse effects on the ISOMETER®s or on other valuable property. The ISOMETER®s must only be used:

- For the purpose for which they are intended
- When they are in perfect technical condition as far as safety is concerned

Any faults which may impair safety must be eliminated immediately. Impermissible modifications and the use of spare parts and additional devices

which are not sold or recommended by the manufacturer of the devices may cause fire, electric shocks and injuries.
Unauthorized persons must not have access to or contact with the ISOMETER®s .
Warning signs must always be easily legible. Damaged or illegible signs must be replaced immediately.

1.7 Inspection, transport and storage

Inspect the dispatch packaging and the equipment packaging for damage, and compare the contents of the package with the delivery documents. In the event of damage during transport, please notify the Bender Group immediately.

The ISOMETER®s must only be stored in rooms where they are protected against dust and moisture, and spraying or dripping water, and where the indicated storage temperatures are maintained.

1.8 Important

Please check for correct system and supply voltage !
When insulation and voltage tests are to be carried out, the device must be isolated from the system for the test period.

In order to check the proper connection of the device, it is recommended to carry out a functional test, before starting the ISOMETER®s.

Please check whether the basic setting of the devices complies with the system requirements.
Children or the public must not have access to the ISOMETER®s.

1.9 Installation information

CAUTION

In an IT system, only one active ISOMETER® may be connected in each interconnected system.

The terminals ⏚ and KE must be connected by a separate wire, to the protective conductor (PE). If the device is connected with the terminals L1, L2, L3, L/+ or L/- or an external coupling device to a system under operation, the connection between the terminals E and KE and the protective conductor (PE) must not be removed or opened.

In order to check the proper connection of the device, it is recommended to carry out a functional test using a genuine earth fault, e.g. via a suitable resistance, before starting the ISOMETER®.
When insulation or voltage tests are to be carried out, the device must be isolated from the system for the test period.

The devices are delivered with the following basic settings:

Device type	**-3...**	**-4...**	**-7...**	-8...
Alarm 1 / Alarm 2 (kΩ)	40 / 10	180 / 40	600 / 300	1 MΩ / 500 kΩ
Operating principle K1/K2	N/O operation	N/O operation	N/C operation	N/O operation
Max. system leakage capacitance	500 µF	150 µF	2 µF	2 µF

Please check, whether the basic setting of the ISOMETER®s complies with the requirements of the system being monitored.

Insulation faults in DC circuits which are directly connected to the AC system are only monitored correctly when the rectifiers carry a load current of > 5 . . . 10 mA.

2. General

2.1 The fundamental functions

- For IT AC systems, for IT AC systems with galvanically connected rectifiers and IT DC systems (isolated power)
- Extended voltage range via coupling devices
- Automatic adaptation to the existing system leakage capacitance
- AMP measuring principle
- Two adjustable response ranges
- LCD display
- RS-485 interface
- Connection monitoring
- Automatic self test

2.2 Product description

The IRDH265 and IRDH365 ISOMETER®s monitor the insulation resistance of IT 3(N)AC, AC/DC and DC systems. The AC systems may include extensive DC-supplied loads (e.g. rectifiers, converters, thyristor-controlled DC drives, see 2.3). The devices automatically adjust to the system leakage capacitance.

Coupling devices are available to extend the voltage range.
The IRDH265 ISOMETER® is fitted into a standard plastic casing suitable for DIN rail mounting according to DIN EN 50022 or for screw mounting. The IRDH365 ISOMETER® is fitted into a flush-mounting casing, 144x72 mm (WxH).

2.3 Functional description

Both ISOMETER®s are connected between the unearthed system and the equipotential bonding conductor (PE). The setting of the response values and other parameters can be carried out via the function keys. The parameters are indicated on the LC display and are stored in a non-volatile memory (EEPROM) after setting.

A pulsating AC measuring voltage is superimposed on the system (AMP measuring principle*). The measuring pulse consists of positive and negative pulses of the same amplitude. The period depends on the respective leakage capacitances and the insulation resistance of the system to be monitored. An insulation fault between system and earth closes the measuring circuit. An electronic evaluation circuit calculates the insulation resistance which is indicated on a LC display or an external ohmmeter after the response time.

The response time depends on the system leakage capacitance, the insulation resistance, and the system related interference disturbances. System leakage capacitances do not influence the measuring accuracy.

If the reading is below the selected response values ALARM1/ALARM2, the appropriate alarm relays are activated, the alarm LEDs "ALARM 1/2" illuminate and the measuring value is indicated on the LC display (in the event of DC insulation faults, the faulty supply line is indicated, too). If the terminals LT are bridged (external RESET button (N/C contact) or wire jumper), the fault indication will be stored.

By pressing the test button, the function of the ISOMETER®s can be tested. After pressing the test button (> 2s), the display indicates "TEST". If no fault has been found, the display indicates "TEST OK R<1kΩ", the alarm relays switch and both alarm LEDs illuminate after the expiry of the time delay. If a system fault has been detected during the test, the LC display indicates "TEST ALARM". The fault indications can be reset by pushing the "TEST/RESET" button (<1s).

The terminals M+/M- for the external kΩ indication are not galvanically separated. If measuring transducers are to be connected for the purpose of evaluation in process control systems, these must be properly galvanically separated (e.g. RK170).

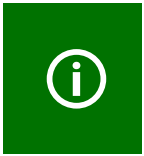
*) "**Adaptive Measuring Pulse**" measuring principle developed by Bender.

2.4 Self test

If the insulation resistance exceeds 20 times the maximum response value every 24 h, the ISOMETER®s automatically carry out a self test (only applies to versions -3..., -4...) provided that the alarm relay has been set to system fault alarm.

2.5 Connection monitoring

(applies to variants -3.., -4..)



The connections to the IT system and earth (PE) are continuously monitored. If the connections are broken or not connected or high resistance, the display indicates "ALARM E-KE" or "ALARM L1-L3". This alarm will only be initiated in the event of failure of all connecting leads.

In this case, please check the connecting leads immediately otherwise the insulation resistance will not be measured correctly.

If the insulation resistance is in the range of 20 times the maximum response value, which may be the case in new or small systems, an alarm will also be initiated. In this case, the connection monitoring can be switched off in the Setup2 menu.

2.6 System fault

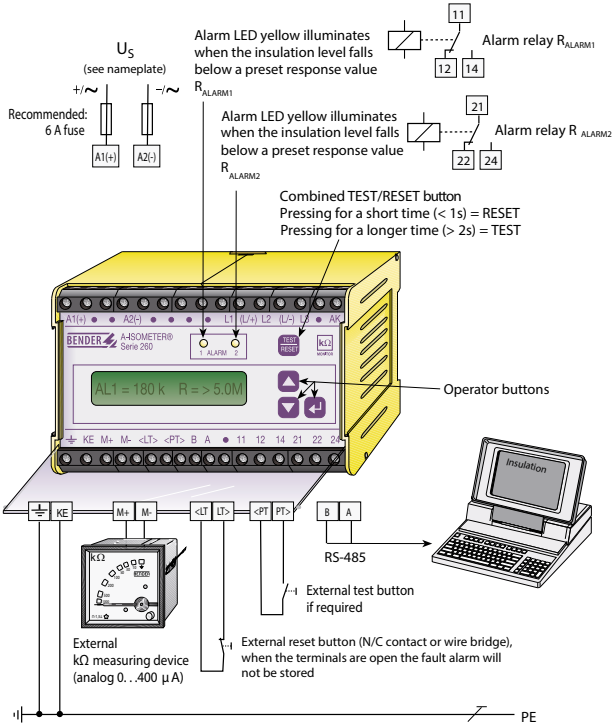
WARNING

If a system fault occurs, the alarm message "TEST ALARM" is indicated on the LCD. In this case, switch off the supply voltage to the ISOMETER® for a short time and then switch it on again. If the device keeps on indicating the message after the response time has expired, then a device error has most likely occured.

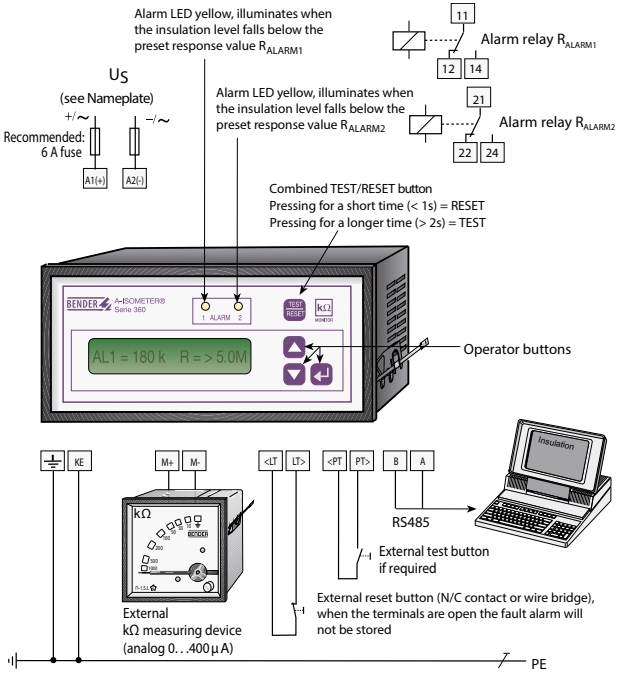
3. Connection

3.1 Wiring diagrams

3.1.1 IRDH265



3.1.2 IRDH365


Alarm LED yellow, illuminates when the insulation level falls below the preset response value R_{ALARM1}
11
Alarm relay R_{ALARM1}
12
14
Us
(see Nameplate)
+/~
-/~
Recommended:
6 A fuse
A1(+)
A2(-)
Alarm LED yellow, illuminates when the insulation level falls below the preset response value R_{ALARM2}
21
Alarm relay R_{ALARM2}
22
24
Combined TEST/RESET button
Pressing for a short time (< 1s) = RESET
Pressing for a longer time (> 2s) = TEST
BENDER
ISOMETER®
Serie 360
1 ALARM 2
TEST RESET
AL1 = 180 k R = > 5.0M
Operator buttons
KE
M+
M-
<LT
LT>
<PT
PT>
B
A
kΩ
RS485
Insulation
External test button if required
External reset button (N/C contact or wire bridge), when the terminals are open the fault alarm will not be stored
External kΩ measuring device (analog 0...400 µA)
PE

Wiring

The supply voltage input is to be protected against short circuit by protective devices in accordance with IEC 60364-4-473 (a 6 A fuse is recommended).

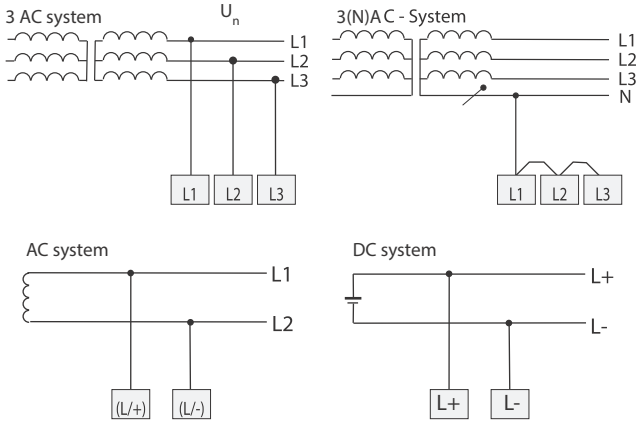
According to IEC 60364-4-473, for the measuring connection of the insulation monitoring device to the system, it is not necessary to use protective devices as protection against short-circuit provided that the wire or cable is realized in a way which restricts the risk of a short circuit to a minimum. In this case, short-circuit proof and earth-fault proof wiring is recommended.

If required, the enclosed terminal covers (only for IRDH265) for protection against direct contact can be used.

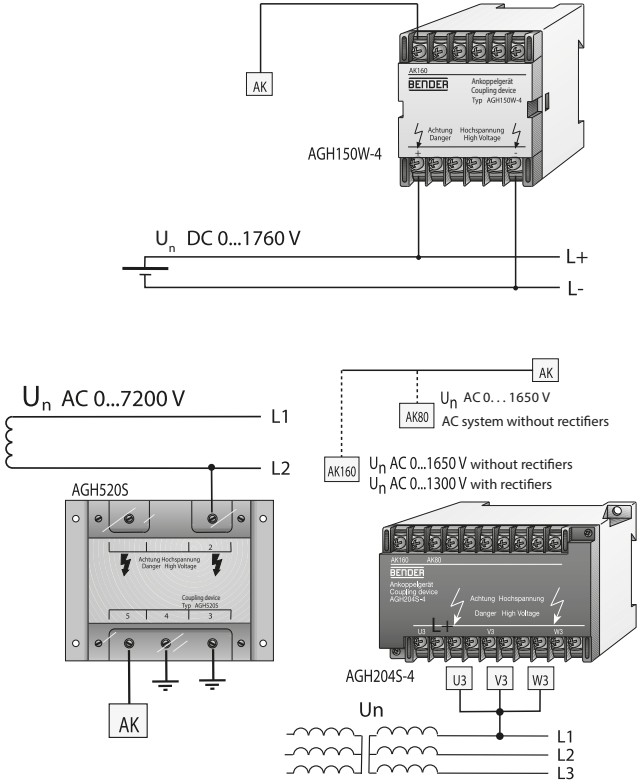
The terminals of the test and reset buttons of several insulation monitoring devices must not be connected in parallel for a group test.

3.2 Connection to various system types

3.2.1 Connection to a 3AC, 3(N)AC, AC and DC systems



3.3 Connection via coupling devices



3.4 Operation with coupling device AGH204S-4

AC system with rectifier

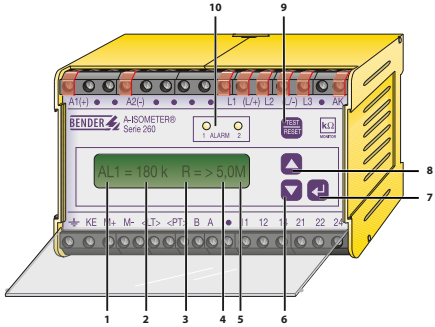
The maximum DC voltage is the voltage which may appear in the AC part of the system to PE, if the IRDH265 and/or IRDH365 is coupled with AGH204S-4. This voltage is dependent on the level of the nominal voltage, the type of rectification (6 pulse, 12 pulse, etc.), the type of inverter intermediate circuit (current or voltage) and the inverter technology. In the case of inverters with voltage intermediate circuits it usually corresponds to the phase to phase voltage of the AC system multiplied by √2.
In the case of current-controlled intermediate circuits there may be higher DC voltages. The given voltage values for AC/DC systems take into account values found by previous experience (factor √2 between DC voltage and AC voltage).

The maximum DC voltage in the case of insulation failures in the DC part of the system e.g. inverter intermediate circuit is DC 1840 V. From this, the maximum nominal AC voltage is calculated:
Umax = DC 1840 V / √2 = AC 1300 V

4. Operation and setting

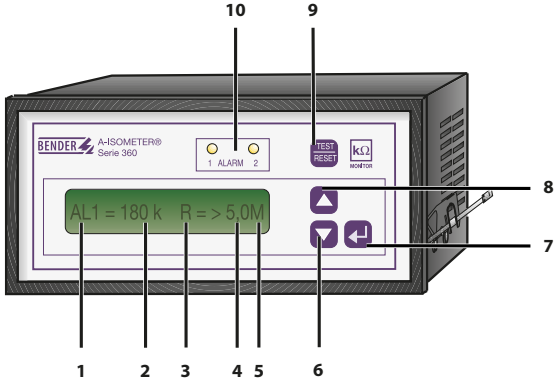
4.1 Operating elements

4.1.1 Operating elements and displays IRDH265



1	AL1 = Alarm 1, AL2 = Alarm 2
2	Preset response value (kΩ)
3	Fault location "R"= AC insulation fault "R+"= DC insulation fault on L+ "R-"= DC insulation faut on L- "Rs"= New measuring value is being calculated (measuring cycle active)
4	Measured value
5	Measured value unit (k = kΩ , M = MΩ)
6, 7, 8	Function keys
9	TEST/RESET button
10	Alarm LEDs Alarm1/Alarm 2

4.1.2 Operating elements and displays IRDH365



1	AL1 = Alarm 1, AL2 = Alarm 2
2	Preset response value (kΩ)
3	Fault location "R"= AC insulation fault "R+"= DC insulation fault on L+ "R-"= DC insulation faut on L- "Rs"= New measuring value is being calculated (measuring cycle active)
4	Measured value
5	Measured value unit (k = kΩ , M = MΩ)
6, 7, 8	Function keys
9	TEST/RESET button
10	Alarm LEDs Alarm1/Alarm 2

4.2 Function keys

	Use these keys to change a parameter or to select the next setting.
	Use this key to activate the next menu or to save the parameter modification.
	Press this key to select the previous menu (only in the Setup menu).

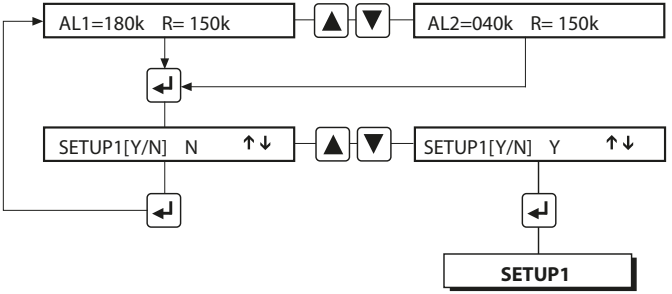
During all set-up functions, insulation monitoring is interrupted for the setting time. If the set-up function has been interrupted without returning to the measuring function, the device will automatically switch to the measuring function after approx. 10 minutes. All the modifications will be accepted.

4.3 Displaying reponse and measuring values

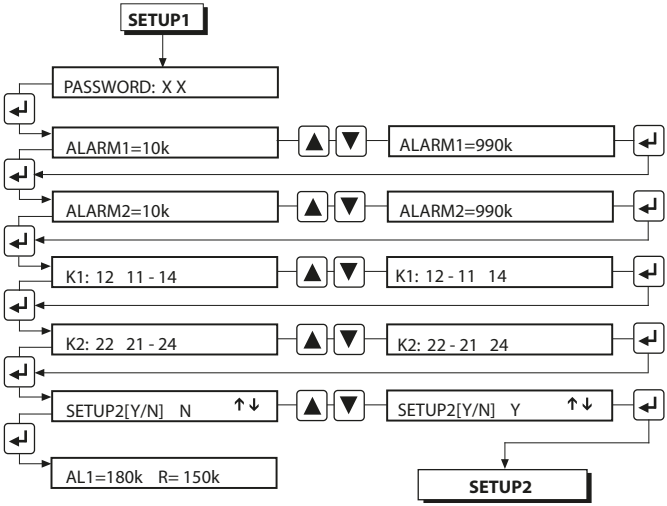
After commissioning, the actual measured value and one response value will be displayed. The second response value is displayed by pressing the

▲ ▼ keys.

Call up the Setup1 menu by pressing the ↵ key.



4.4 Setting the basic functions (Setup1)



4.4.1 Password

[PASSWORD: XX]

The "password" query cannot be carried out unless the function in the Setup2 menu has been set to „ON" position. The password consists of two letters (e.g. AB). The flashing letter can be changed using the ▲ ▼ key. After pressing the ↵ key, the second letter will flash and can also be changed. The password entry can be quitted by pressing the ↵ key.
If a wrong password is used, the ISOMETER® returns to the display of the measuring values.

4.4.2 Response values R_{ALARM}

[ALARM1= 10k] / [ALARM2= 10k]

Use the  keys to set the response values 1 and 2 and the  key to save the response values.

4.4.3 Operating principle of the alarm relays

[12 - 11 14]

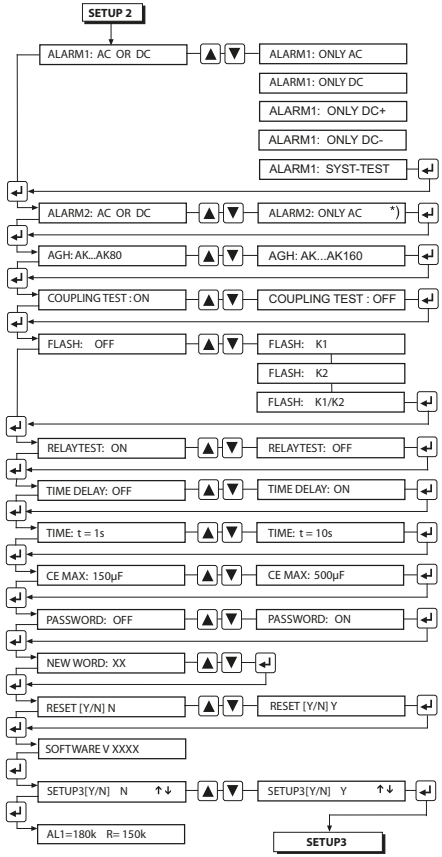
The hyphen between the contact designations indicates which contacts are closed in no-alarm condition.
N/O operation "**12 - 11** 14"
N/C operation "12 **11 - 14**"

4.4.4 Branching to Setup2

[SETUP2 [Y/N] Y]

Use this menu to branch to Setup2.
The Setup2 menu (expert setup) can be used for special applications and should only be changed by persons who are familiar with the device and the existing system conditions.

4.5 Setting the extended functions (Setup2)



*) The same as Alarm1

4.5.1 Alarm functions ALARM 1/ 2

[ALARM: ONLY AC]

Use this menu to specify which types of insulation faults are to be signalled. The following indications are possible:

AC OR DC	Alarm in the event of AC or DC faults
ONLY AC	Alarm only in the event of AC or symmetrical DC faults in a de-energized system
ONLY DC	Alarm only in the event of single-pole DC faults
ONLY DC+	Alarm only in the event of single-pole DC faults at L+
ONLY DC-	Alarm only in the event of single-pole DC faults at L-
SYST	Alarm only in the event of system faults. The 24 h self test will be activated

Certain combinations of the alarm functions cannot be used, since no alarm would be activated. The following combinations are possible:

ALARM1	ALARM2
AC OR DC	AC OR DC
AC OR DC	ONLY DC
AC OR DC	ONLY AC
AC OR DC	SYST
ONLY AC	AC OR DC
ONLY AC	ONLY DC
ONLY DC	AC OR DC
ONLY DC	ONLY AC
ONLY DC+	ONLY DC- *)
ONLY DC-	ONLY DC+ *)
SYST	AC OR DC

WARNING

**) This setting may only be carried out in pure ITDC systems!*

4.5.2 Setting the coupling devices

(AK TERMINAL)

[AGH: AK...AK80] (only applies to version -4...)
Basic setting, when no coupling device is used (preset by factory)

or

when the AK terminal of IRDH265 and/or IRDH365 is connected to the terminal AK80 of the AGH204S-4, the operating range of the nominal voltage will be extended to 3AC 0 ... 1650 V.
Only current converters with an output voltage not exceeding 1000 V may be connected.

or

When the terminal AK of IRDH265 and/or IRDH365 is connected to terminal 5 of AGH520S, the operating range of the nominal voltage will be extended to AC 0 ... 7200 V.
Only current converters with an output voltage not exceeding 1000 V may be connected

[AGH: AK...AK160]
When the terminal AK of IRDH265 and/or IRDH365 is connected to the terminal AK 160 of AGH204S-4, the operating range of the nominal voltage will be extended to 3AC 0 ... . 1300 V.
Power converters with DC 0...1840 V may be connected to the system.

or

If the terminal AK of IRDH265 and/or IRDH365 is connceted to the AK 160 terminal of AGH150W-5, the operating range of the nominal voltage will be extended to DC 0 ... 1760 V.

4.5.3 Connection monitoring

[COUPLING TEST: ON] (only applies to versions -3..., -4...)

Use this menu to switch the automatic connection monitoring on or off.

The connection monitoring should always be in the ON position. (See "chapter 2.5 Connection monitoring").

4.5.4 Activating the flashing function

[FLASH: ...]
The alarm relays K1/K2 and the associated alarm LEDs can be set to flashing function (pulse frequency 1 Hz).

Flash OFF = 11-12-14 and 21-22-24 not flashing
Flash K1 = 11-12-14 flashing, 21-22-24 not flashing
Flash K2 = 21-22-24 flashing, 11-12-14 not flashing
Flash K1/K2 = 11-12-14/21-22-24 flashing

4.5.5 Alarm initiated during functional test

[RELAYTEST: ON]
In this menu, the operation of the alarm relays can be switched off during functional tests (i.e. Relay test : OFF).

4.5.6 Time delay ON

[TIME DELAY: ON]
(only applies to versions -3..., -4...)
Use this menu to activate the time delay for the alarm relays. Before activating the time delay, the ISOMETER® must have been set to the asymmetry measuring principle (UG/AMP AMP/UG) or superimposed DC measuring voltage. The time delay only has an effect on the alarm steps according to this measuring principle and adds to the measuring time.

4.5.7 Setting the time delay

[TIME: t = 1s]
(only applies to versions -3..., -4...)

After activating the time delay, the adequate time can be set.

4.5.8 Matching to the system leakage capacitance

[CE MAX: 150 µF]
(only applies to version -4...)

In this menu, the ISOMETER®s can be matched to the relevant system leakage capacitance
(max. 500 µF).

Please consider that the basic measuring time will be increased to 15 s (see characteristic curve) when the setting C_E = 500 µF has been selected.

4.5.9 Activate the password

[PASSWORD: OFF]

Use this menu to activate a password query. This protects against unauthorized modifications and settings.

4.5.10 Entering the password

[NEW WORD : XX]

Use this menu to enter a new password (see also 4.4.1).The password will only be stored after the password query has been confirmed.

4.5.11 RESET for basic setting

[RESET [Y/N] N]

Use this menu to reset to the manufacturer's settings

4.5.12 Display Software version

[SOFTWARE VXXX]

This menu indicates the actual software version on the LC display.

4.5.13 Status display

(Status word IRDH265)

To display the status word, press the  key, hold the  key down for at least 5 seconds.

Digit	Description	Number					
		0	1	2	3	4	5
1 2	Operating principle alarm relay K1 Operating principle alarm relay K1	N/C. N/C	N/O N/O				
3 4	Alarm functions Alarm1 Alarm functions Alarm2	AC or DC AC or DC	ONLY AC ONLY AC	ONLY DC ONLY DC	ONLY DC+ ONLY DC+	ONLY DC- ONLY DC-	System test System test
5	Connection monitoring	OFF	ON				
6 7	Flashing function Alarm 1 Flashing function Alarm 2	OFF OFF	ON ON				
8	Relay test during function test	OFF	ON				
9	Time delay	OFF	ON				
10* 11*	Max. leakage capacitance (15) Max. leakage capacitance (50)	500 µF	150 µF				500 µF 150 µF
12	Measuring principle	AMP	DC	UG/ AMP	AMP/ UG		

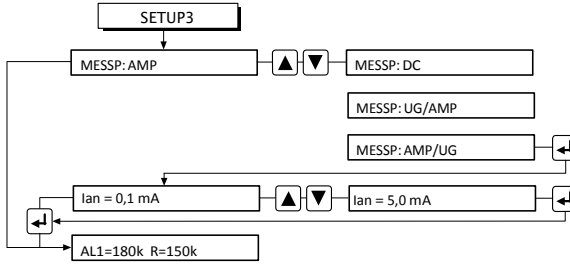
* Only applies to version -4...

(All other versions have no possibility to set the maximum leakage capacitance. For more information please refer to the technical data).

4.6 Additional device settings

(Setup3)
(only applies to versions -3..., -4...)

In this menu, the measuring principle of the ISOMETER® can be selected. A modification within this setup should not be carried out without having thorough knowledge of the functions of the individual measuring principles.



4.6.1 Selecting the measuring principle

4.6.1.1 AMP measuring principle

[MESSP: AMP]

The basic setting of the devices is the AMP measuring principle. The characteristics are explained in "chapter 2.3 Functional description".

4.6.1.2 DC measuring voltage

[MESSP: DC]

Instead of a measuring pulse, a DC voltage (27 V) is superimposed on the system. This measuring principle applies to pure AC systems only since DC insulation faults are indicated with an increased response sensitivity respectively are not monitored correctly.

4.6.1.3 UG/AMP measuring principle

[MESSP: UG/AMP]

Passive asymmetry measurement (without DC measuring voltage) applies to DC systems only. A DC current is caused by asymmetrical faults on L+ or L- and the resulting residual voltage is then measured.
By setting the response value I_{AN}, a DC fast response adapted to the system can be carried out. The alarm is indicated via ALARM2. After the fault indication of ALARM2 is activated, the AMP measuring principle automatically begins to measure the insulation resistance and actuates ALARM1 if the value is below the respective threshold. In order to detect symmetrical faults too, a measurement with the AMP measuring method is carried out additionally in cycles of an hour. If a fault is detected, the AMP measuring principle remains activated.

Only devices with settings according to 4.6.1.1, 4.6.1.2 or 4.6.1.4 comply with the standards for insulation monitoring devices.

4.6.1.4 AMP/UG measuring principle

[MESSP: AMP/UG]

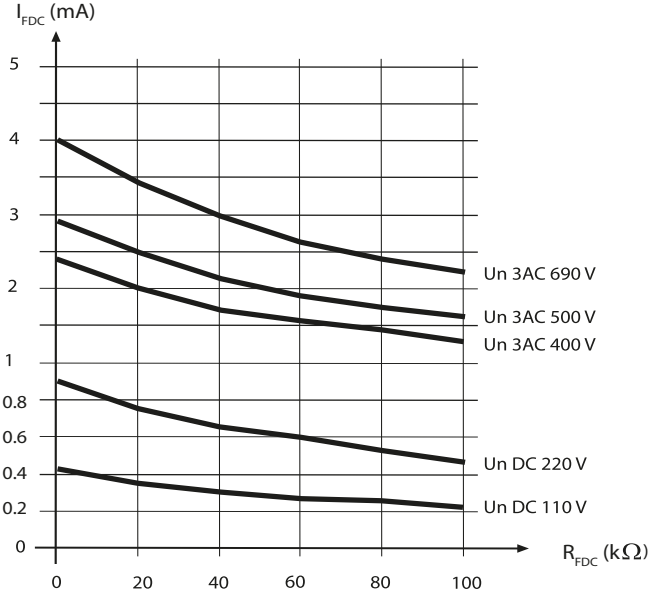
AMP measuring principle with superimposed asymmetry measurement. Fault indications according to the AMP measuring principle are displayed via ALARM2, fault indications according to the asymmetry measurement are displayed via ALARM1.

4.6.2 Current level for fast DC response

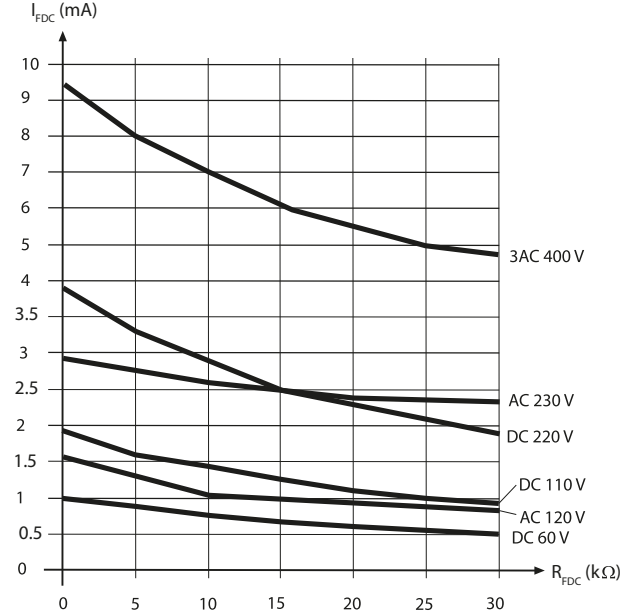
[Ian = 0.1mA]

In this menu, the alarm current level for the DC fast response can be set. The set value of the current is the DC current I_{FDC} which in case of single-pole insulation faults flows via the internal resistance of the ISOMETER® driven by the system voltage. The respective values for the insulation resistance in AC systems in case of insulation faults behind directly connected rectifiers are shown in the diagram given below.

Applies to version -4.



Applies to version -3.

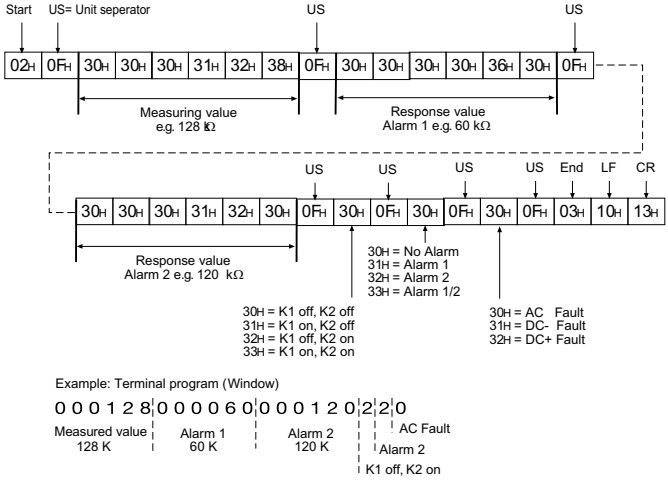


5. Interface

Serial interface

- Serial interface (RS-485) without electrical isolation (= EIA RS-485)
- Connections to terminals A and B
- Max. cable length 1,200 m
- Transmission protocol
  9600 Baud - 1 Start bit - 1 Stop bit - 8 Data bits
- After each measurement, an update of the following data block will be transmitted.

The data transmission is carried out continuously and cannot be interrupted or influenced in some other way by any other bus member.



6. Technical data

( )* = Factory setting

6.1 Technical data

Insulation coordination acc. to IEC 60664-1

Rated insulation voltage ..... AC 800 V
Rated impulse withstand voltage/pollution class ..... 8 kV / 3
Dielelectric test acc. to IEC 60255-5 ..... 3 kV
Operation class ..... Continuous

System being monitored

Operating range of the nominal voltage U_n ..... 3AC 0...793 V
Frequency range (for f<50 Hz see characteristic curves) ..... 50...400 Hz
Operating range of the nominal voltage U_n ..... DC 0...650 V

Supply voltage

Supply voltage U_S (see device nameplate) ..... AC 50...60 Hz 230 V
..... (for other voltages refer to ordering details)
Operating range ..... 0.8...1.15 U_S
Max. power consumption ..... 6 VA

Response values

Response value $R_{ALARM1/ALARM2}$ ..... 10 ... 990 kΩ
Hystersis ..... ca. 25%
Response time (C_E=1 µF) ..... ~ 8 sec. see characteristic curves
Response value asymmetry measuring principle ..... 0,1 ... 5 mA
Response time asymmetry measuring principle (in case of direct earth fault, 0 kΩ, 0...150 µF) ..... <1s
Time delay, adjustable for asymmetry measuring principle
and superimposition of a DC measuring voltage ..... 1 ... 10 s
System leakage capacitance ..... max. 500 µF
Factory setting ..... 150 µF

Measuring circuit

Measuring voltage $U_{M\ (peak\ value)}$ ..... 27 V
Measuring current I_M ..... max. 230 µA
Internal DC resistance Ri acc. to DIN VDE 0413 T8 ..... 120 kΩ
Impedance Z_i, 50 Hz DIN VDE 0413 T8 ..... > 250 kΩ

-3.	-499	-R4..-4921 **-T-4921**	-7..	-8..
0...506 V 0...286 V	0...793 V 0...650 V	0...793 V 0...650 V	0...793 V 0...750 V	0...793 V 0...780 V
2...200 kΩ	10...990 kΩ	10...990 kΩ	0.2...10 MΩ	0.5...20 MΩ
0.1...10 mA 1...10 s 500 µF 500 µF	0.1...5 mA 1...10 s 500 µF 150 µF	0.1...5 mA 1...10 s 500 µF 150 µF	- - 2 µF 2 µF	- - 2 µF 2 µF
1 mA 28 kΩ	230 µA 120 kΩ	230 µA 120 kΩ	10 µA 2.8 MΩ	5 µA 5.6 MΩ

Outputs

Measuring instrument SKMP ..... 120 kΩ
Current output (max. load) ..... 400 µA (12.5 k Ω)
Display range ..... < 1 kΩ ... > 5 M Ω
Display accuracy (10K...990K) ..... +/-20%
Terminal AK for coupling device ..... yes

Contact circuit

Switching components ..... 2 changeover contacts
Contact class ..... IIB nach DIN IEC 60255 Parts 0-20
Rated contact voltage ..... AC 250 V / DC 300 V
Admissible number of operations ..... 12000 cycles
Making capacity ..... UC 5 A
Breaking capacity
AC 230 V, cos phi = 0.4 ..... AC 2 A
DC 220 V, L/R = 0.04s ..... DC 0.2 A
Operating principle ..... N/O or N/C operation
Factory setting ..... N/O operation

Type tests

Test of the Electromagnetic Compatibility (EMC):
Immunity against electromagnetic interferences acc. to EN 50082-2
Emissions acc. to EN 50081:
Emissions acc. to EN 55011/CISPR11 ..... Class A[2)]
Mechanical test
Shock resistance acc. to IEC 6068-2-27 ..... 15 g / 11 ms
Bumping acc. to IEC 6068-2-29 ..... 40 g / 6 ms
Vibration strength acc. to IEC 6068-2-6 ..... 10...150 Hz / 0.15 mm - 2 g

Environmental conditions

Ambient temperature, during operation ..... -10 ... +55 °C*
Storage temperature range ..... -40 ... +70 °C**
Climatic class acc. to IEC 60721 ..... 3K5 (except condensation and formation of ice)

Option T

Schock resistance acc. to IEC 60068-2-27 (during operation) ..... 30 g / 11 ms
Bumping acc. to IEC 60068-2-29 (during transport) ..... 40 g / 6 ms
Vibration resistance IEC 60068-2-6 (during operation) ..... 1.6 mm / 10...25 Hz
..... 4 g / 25...150 Hz

Notes:

2) Class A devices are designed for industrial use. For any other use, it may be necessary to take additional measures for interference suppression.

* At temperatures higher than +40°C, the ventilation slots must be kept clear (at least a clearance of 10mm to the next device).

** The device variants are suitable for the temperature range -45°C to +70°C. The display function can only be guaranteed up to -40°C.

-3... 28kΩ <1kΩ... >500 kΩ	-499 120kΩ <1kΩ... >5 MΩ	**-T-4921 **** -R4..-4921 ** 120kΩ	-7... 2.8 MΩ <0.2MΩ... >20 MΩ	-8... 4.6 MΩ <0.5MΩ... >30 MΩ
N/O operation	N/O operation	N/O operation	N/C operation.	N/O operation
	-15°C...+55°C -40°C ...+85°C	-40°C...+70°C ** -40°C...+70°C **		

General information

Mounting ..... Any position
Connection ..... screw terminals
Cross sectional area of connecting cable
single wire ..... 0.2 ... 4 mm^2
flexible ..... 0.2 ... 2.5 mm^2
DIN rail mounting ..... IRDH265 rail DIN EN 50 022
Screw mounting ..... IRDH265 holder: artical number 990 056
Protection class acc. to DIN 40050
Built-in components IP30
Terminals IP20
Type of enclosure
IRDH265 ..... XM112
IRDH365 ..... X300
Flammability class
XM112 ..... UL94V-0
X300 ..... UL94V-1
Approx. weight:
IRDH265 ..... 825 g
IRDH365 ..... 1075 g

6.2 Standards and certification

The IRDH265 and IRDH365 ISOMETER®s comply with IEC 61557-8 1997-02 (Insulation monitoring devices for IT systems), ASTM F25.10.11 (Standard Specification for Electrical Insulation Monitors for Monitoring Ground Resistance in Ungrounded Active AC Electrical Systems Having Large DC Components or DC Electrical Systems).

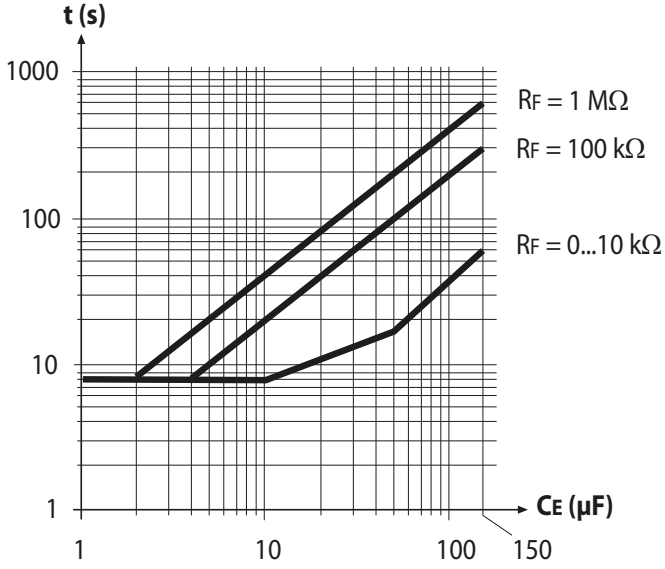
The devices are UL (Underwriters Laboratories) certified.

7. Characteristic curves

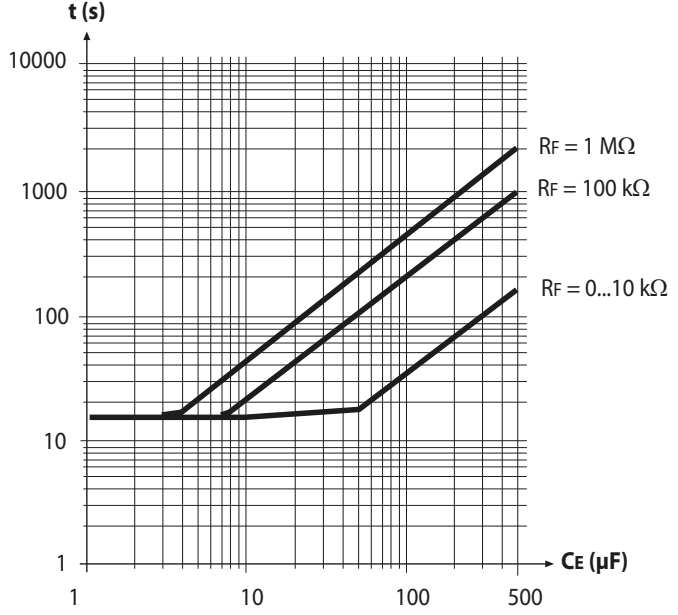
7.1 Response times

7.1.1 Response time -4...

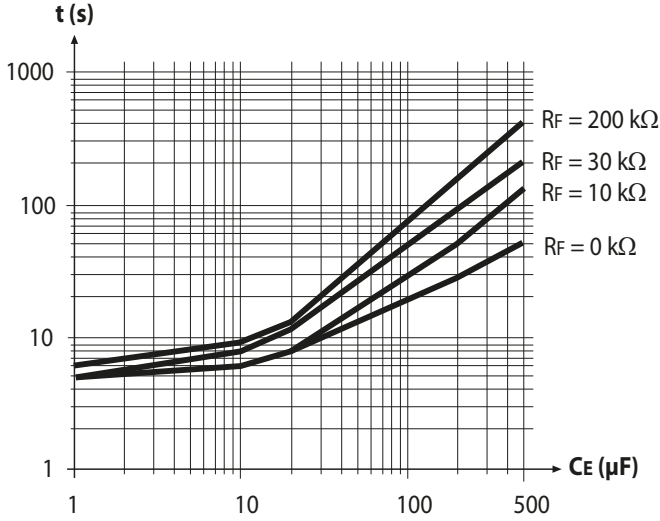
C_E = 150 µF



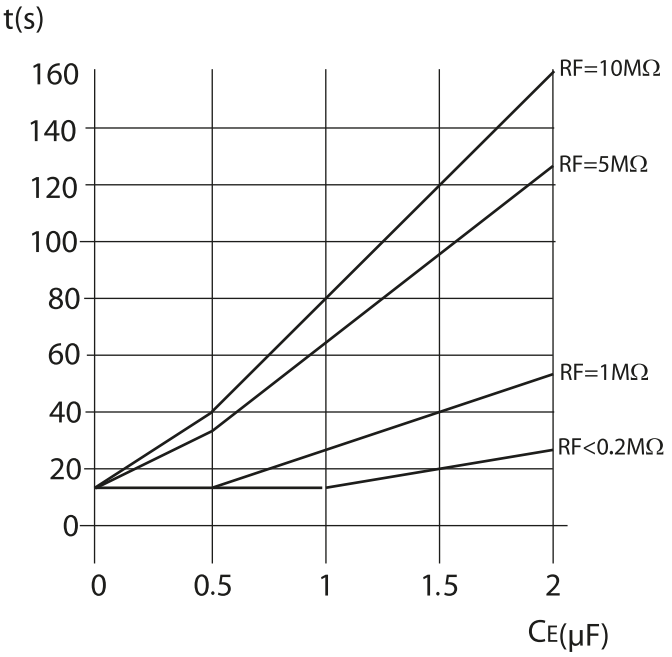
C_E = 500 µF



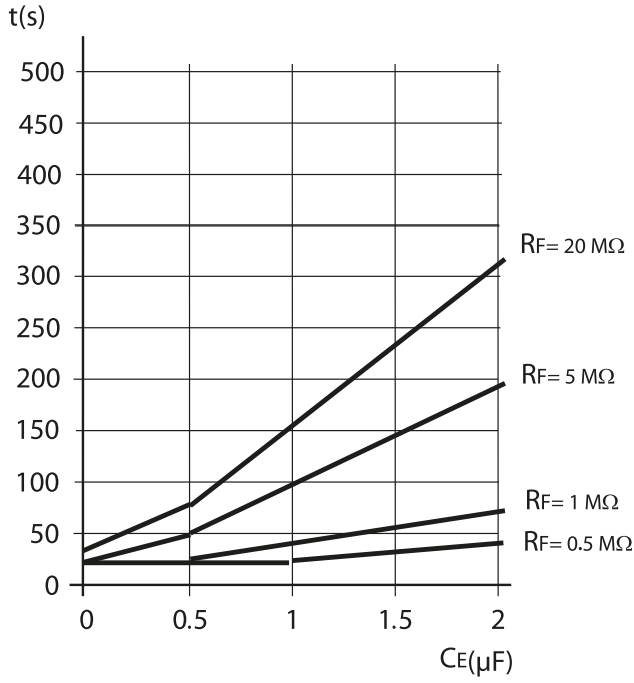
7.1.2 Response time -3...



7.1.3 Response time -7...

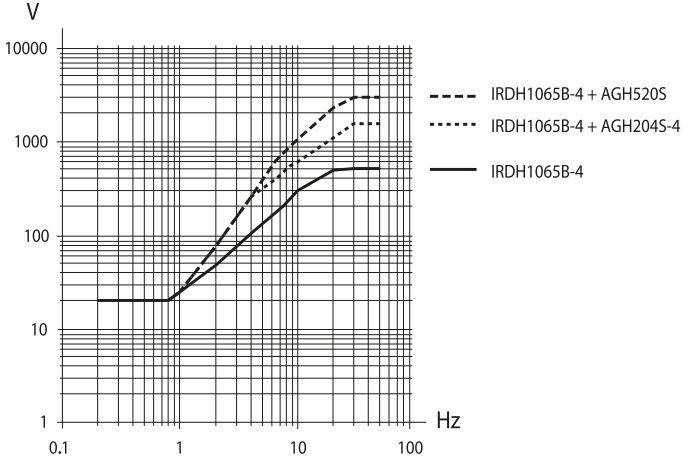


7.1.4 Response time -8..

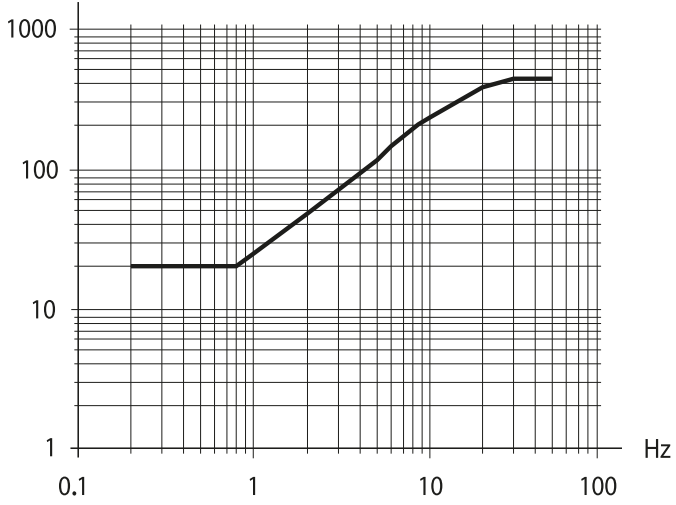


7.2 Max. AC voltage between system and PE (earth) in the frequency range <50Hz

applies to version -4...

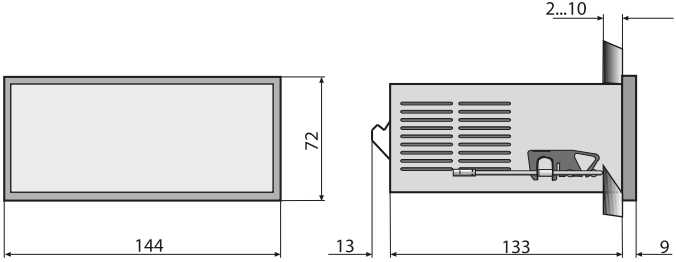


Applies to version -3..



8. Dimension diagrams

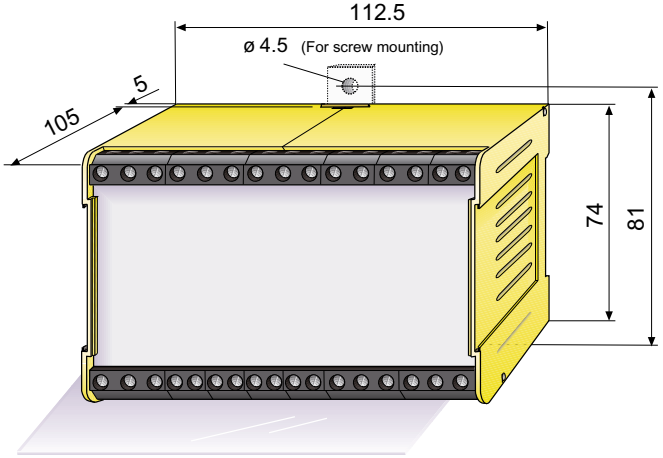
8.1 Dimension diagram for IRDH365



Switchboard cutout 138 x 66
(dimensions in mm)

8.2 Dimension diagram for IRDH265

Mounting onto support rails acc. to DIN EN 50 022



For screw mounting, a mounting plate, article number 990056, is available. The device type IRDH265-4921 has to be mounted by screws according to DIN EN 50155 / VDE 0115 T.200.

9. Ordering information

9.1 Standard type

Type	Supply voltage U_S	Art. no.
IRDH265-4	AC 230 V	B 9106 8001
IRDH265-413	AC 90...132 V*	B 9106 8004
IRDH265-415	AC 400 V	B 9106 8017
IRDH265-416	AC 500 V	B 9106 8009
IRDH265-422	DC 19.2 ... 84 V*	B 9106 8002
IRDH265-423	DC 77 ... 286 V*	B 9106 8003
IRDH365-4	AC 230 V	B 9106 8006
IRDH365-413	AC 90...132 V*	B 9106 8011
IRDH365-415	AC 400 V	B 9106 8012
IRDH365-416	AC 500 V	B 9106 8025

* Maximum operating range of the supply voltage

9.2 Options

Type	Supply voltage U_S	Art. no.
IRDH265-3 IRDH265-311 IRDH265-313 IRDH265-322 IRDH265-323	AC 230 V AC 24 V AC 90...132 V* DC 19.2...84 V* DC 77 ... 286 V*	B 9106 8008 B 9106 8035 B 9106 8024 B 9106 6005 B 9106 8019
IRDH265-R413 IRDH265-R421	AC 90...132 V* DC 10.5...80 V*	B 9106 8022 B 9106 8062
IRDH265-4921 IRDH265-499	DC 10.5...80 V* DC 77...130 V*	B 9106 8023 B 9106 8032
IRDH265-7 IRDH265-722	AC 230 V DC 19.2...84 V*	B 9106 8034 B 9106 8026
IRDH265-8 IRDH265-822	AC 230 V DC 19.2...84 V*	B 9106 9003 B 9106 9001
IRDH365-3 IRDH365- 313 IRDH365-315 IRDH365-322	AC 230 V AC 90...132 V* AC 400 V DC 19.2...84 V*	B 9106 8013 B 9106 8020 B 9106 8016 B 9106 8018
IRDH365-422 IRDH365-423	DC 19,2...84 V* DC 77 ... 286 V*	B 9106 8014 B 9106 8021
IRDH365-8 IRDH265T-4921	AC 230 V DC 10.5...80 V	B 9106 9004 B 9106 8023 T

* Maximum operating range of the supply voltage

9.3 Coupling devices

Type	Nominal voltage range U_n	Art. no.
AGH204S-4 AGH520S AGH150W-4	AC 0 ... 1650 V AC 0 ... 7200 V DC 0 ... 1760 V	B 914 013 B 913 033 B 9801 8006

9.4 Measuring instrument for -4.. (current output 0...400µA)

Type	Dimensions	Art. no.
7204-1421 9604-1421	72x72 mm 96x96 mm	B 986 763 B 986 764
7204S-1421 9604S-1421	72x72 mm 96x96 mm	B 986 804 B 986 784

9.5 Measuring instrument for -3.. (current output 0...400µA)

Type	Dimensions	Art. no.
7204-1311 9604-1311	72x72 mm 96x96 mm	B 986 755 B 986 753
7204S-1311 9604S-1311	72x72 mm 96x96 mm	B 986 705 B 986 779

The measuring instruments 7204S and 9604S are shock and vibration resistant.

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Bender GmbH & Co. KG
Londorfer Str. 65 • 35305 Gruenberg • Germany
Postfach 1161 • 35301 Gruenberg • Germany

Tel.: +49 6401 807-0
Fax: +49 6401 807-259

Email: info@bender.de
www.bender.de

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