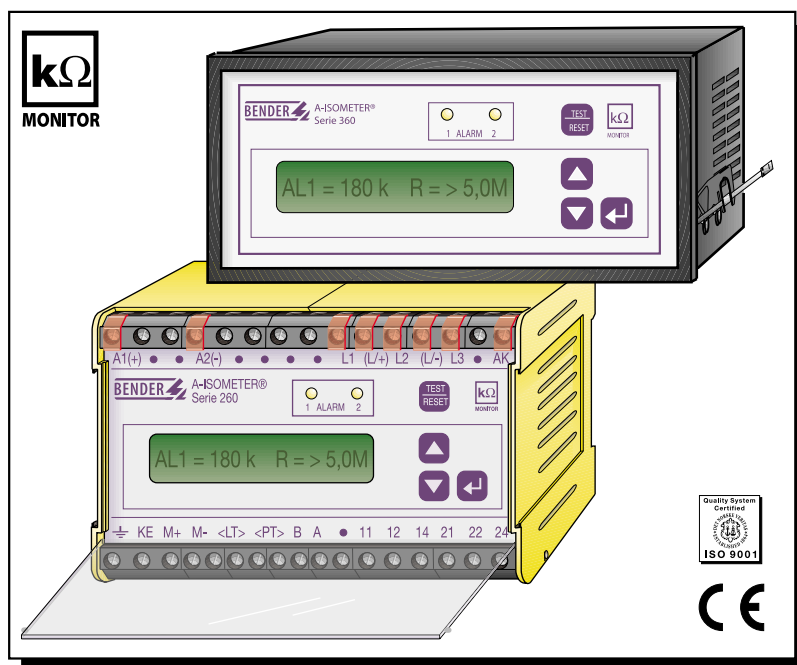




BENDER

A-ISOMETER® IRDH265 IRDH365

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



Manual

D0001400MXXEN

Bender GmbH & CoKG

Londorfer Straße 65

D-35305 Grünberg

Telefon: (+49) 6401 / 807-0

Telefax: (+49) 6401 / 807 259

Edition: 04.2000

Right to modifications reserved

1. Safety information	5
2. General	11
2.1 The fundamental functions	11
2.2 Product description	12
2.3 Function	12
2.4 Self-test	14
2.5 Connection monitoring	14
2.6 System fault	14
3. Connection	15
3.1 Wiring diagrams	
3.1.1 IRDH265	15
3.1.2 IRDH365	16
3.2 Connection to various system types	18
3.3 Connection via coupling devices	19
3.4 Operation with coupling device AGH204S-4 AC system with rectifier	20
4. Operation and setting	21
4.1.1 Operating elements and displays IRDH265	21
4.1.2 Operating elements and displays IRDH365	22
4.2 Function keys	23
4.3 Display of reponse values and measuring values	23
4.4 Setting the basic functions (Setup1)	24
4.4.1 Password	25
4.4.2 Response values RALARM	25
4.4.3 Operating principle of the alarm relays	25
4.4.4 Branching to Setup2	25
4.5 Setting of the extended functions (Setup2)	26
4.5.1 Alarm functions ALARM 1/ 2	27
4.5.2 Setting the coupling devices	29
4.5.3 Connection monitoring	30
4.5.4 Activating the flashing function	30

4.5.5	Alarm initiated during functional test	30
4.5.6	Time delay ON	30
4.5.7	Setting the time delay	31
4.5.8	Matching to the system leakage capacitance	31
4.5.9	Activating the password	31
4.5.10	Entering the password	31
4.5.11	RESET for basic setting	31
4.5.12	Display software version	31
4.5.13	Status display (status word IRDH265)	32
4.6	Additional device settings (Setup3)	33
4.6.1	Selection of the measuring principle	
4.6.1.1	AMP measuring principle	34
4.6.1.2	DC measuring voltage	34
4.6.1.3	UG/AMP measuring principle	34
4.6.1.4	AMP/UG measuring principle	35
4.6.2	Current level for DC fast response	35
5.	Interface	37
6.	Technical data	42
6.1	Standards	43
7.	Characteristic curves	44
7.1.1	Response time -4..	44
7.1.2	Response time -3..	45
7.1.3	Response time -7..	46
7.1.4	Response time -8..	46
7.2	Max. AC voltage between system and PE	47
8.	Dimension diagrams	48
9.	Ordering details	49

1.1 Intended use



Warning

The intended use of the A-ISOMETERS is to monitor the insulation resistance of IT systems. Any other use, or any use beyond the foregoing, is deemed to be improper. The BENDER companies shall not be liable for any loss and damaging arising therefrom.

Correct use also includes

- compliance with all instructions from the operating manual
- and adherence to any inspection intervals.

As a basic principle, our „General conditions of Sale and Delivery“ shall apply. These are available to the operator not later than the time when the contract is concluded.

1.2 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 A-ISOMETERS.
- Improper assembly/fitting, commissioning, operation and maintenance of the A-ISOMETERS.
- Failure to take note of the operating instructions concerning transport, commissioning, operation and maintenance of the A-ISOMETERS.
- Unauthorized structural modifications to the A-ISOMETERS.
- 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.
- Cases of disaster 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 A-ISOMETERS. In addition, it is essential to comply with the rules and regulations on accident prevention which are valid for the place of use.

1.3 Personnel

Only appropriately qualified personnel may work on these A-ISOMETERS. „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.

1.4 About the operating manual

This operating manual has been compiled with the greatest possible care. Nevertheless, errors and mistakes cannot be entirely ruled out. BENDER companies assume no liability whatsoever for any injury to persons or damage to property which may be sustained as a result of faults or errors in these operating instructions.

1.5 Hazards when handling the A-ISOMETERS IRDH265 and IRDH365

The A-ISOMETERS IRDH265 and IRDH365 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 A-ISOMETERS or on other valuable property. The A-ISOMETERS 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

1. Safety information



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 A-ISOMETERS.

Warning signs must always be easily legible. Damaged or illegible signs must be replaced immediately.

1.6 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 company immediately.

The A-ISOMETERS 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.

1.7 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 A-ISOMETERS.

Please check whether the basic setting of the devices complies with the system requirements.

Children or the public must not have access to the A-ISOMETERS.

1.8 Explanation of symbols and notes

The following designations and symbols for hazards and warnings are used in BENDER documentation.

**Warning**

This symbol means a possible threat of danger to the life and health of human beings.

- Failure to comply with these warnings means that death, serious physical injury or substantial damage to property **may** ensue if the relevant precautions are not taken.

**Caution**

This symbol means a possible dangerous situation.

- Failure to comply with these warnings means that slight physical injury or damage to property may ensue if the relevant precautions are not taken.



This symbol gives important information about the correct handling of the A-ISOMETERS.

- Failure to comply with this information can result in faults on the A-ISOMETERS or in their environment.



Where you see this symbol, you will find application tips and other particularly useful information.

- This information will help you to make optimal use of the A-ISOMETERS.

1.9 Directions for installation



Only one insulation monitoring device may be used in each interconnected system.

The terminals $\underline{\underline{\perp}}$ 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 A-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 setting;

Device types	-3..	-4..	-7..	-8..
Alarm 1 / Alarm 2 (k Ω) =	40 / 10	180 / 40	600 / 300	1 M Ω / 500 k Ω
Operating principle K1/K2 =	N/O operation	N/O operation	N/O operation	N/O operation
Max. system leakage capacitance =	500 μ F	150 μ F	2 μ F	2 μ F

Please check, whether the basic setting of the A-ISOMETERs 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 > 5 .. 10 mA.

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 (patent pending)
- two adjustable response ranges
- LC display
- RS485 interface
- Connection monitoring
- automatic self-test

2.2 Product description

The A-ISOMETERS IRDH265 and IRDH365 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 A-ISOMETER IRDH265 is fitted into a standard plastic casing suitable for DIN rail mounting according to DIN EN 50022 or for screw mounting.

Version IRDH365 is fitted into a flush-mounting casing, 144x72 mm (WxH) .

2.3 Function

The A-ISOMETERS IRDH265 (IRDH365) 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.

2. General



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 A-ISOMETERs IRDH265 (IRDH365) can be tested. After pressing the test button ($> 2s$), the display indicates "TEST". If no fault has been found, the display indicates "TEST OK $R < 1k\Omega$ ", 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 $k\Omega$ 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).

- *) Measuring principle "**adaptive measuring pulse**", developed by BENDER (patent pending).

2.4 Self-test

If the insulation resistance exceeds 20 times the maximum response value, resp. every 24 h, the A-ISOMETERS IRDH265 (IRDH365), automatically carry out a self-test (applies only to versions -3..., -4...) provided that the alarm relay has been set to system fault alarm.

2.5 Connection monitoring (*applies only to versions -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 as 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 be initiated, too. In this case, the connection monitoring can be switched off in the Setup2 menu.

2.6 System fault



If a system fault occurs, the alarm message "TEST ALARM" is indicated on the LC display. In this case, switch the supply voltage of the A-ISOMETER off for a short time and then switch it on again.

Warning

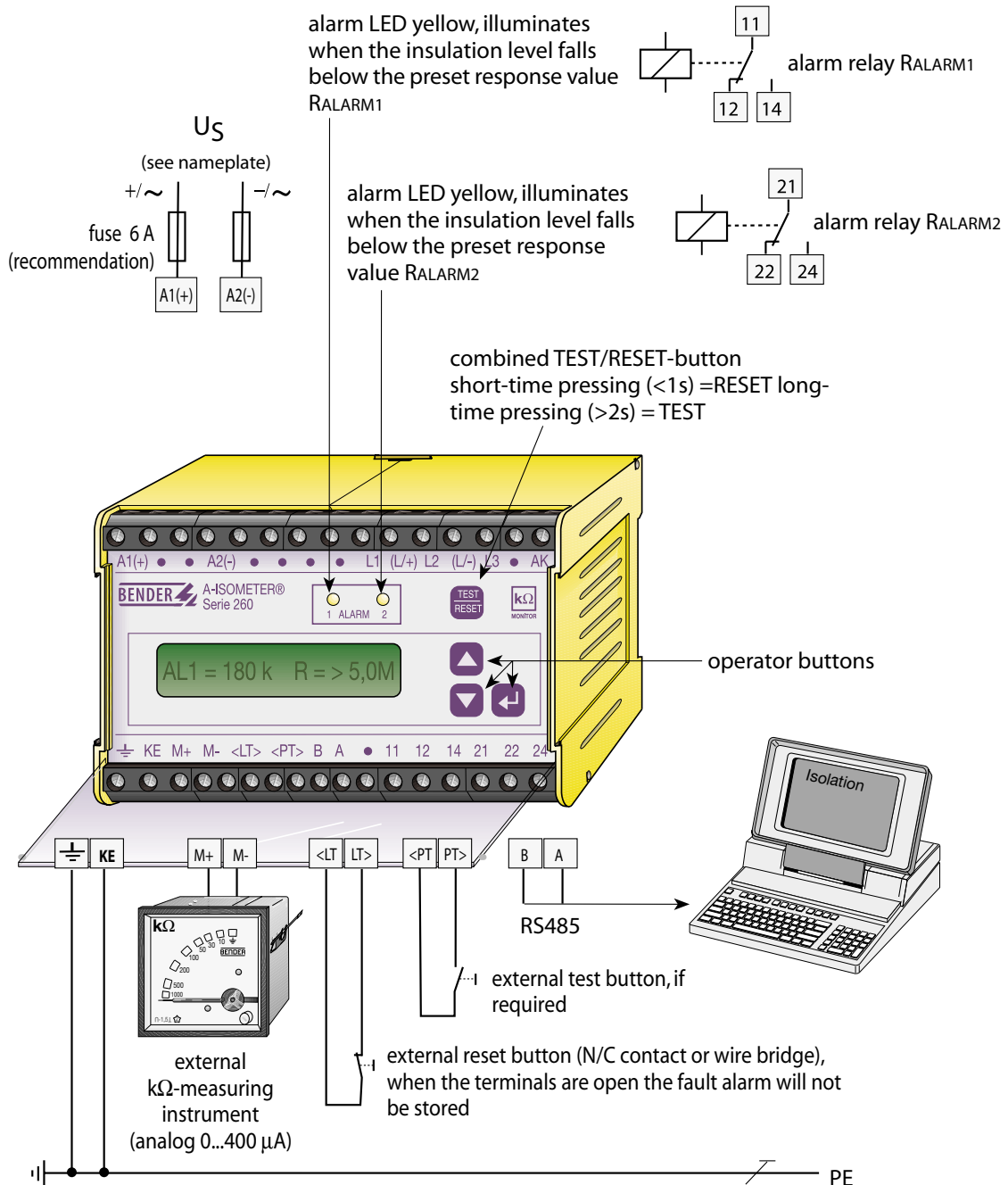
If the device keeps on indicating the message after the expiry of the response time, it points out to a device error.

3. Connection

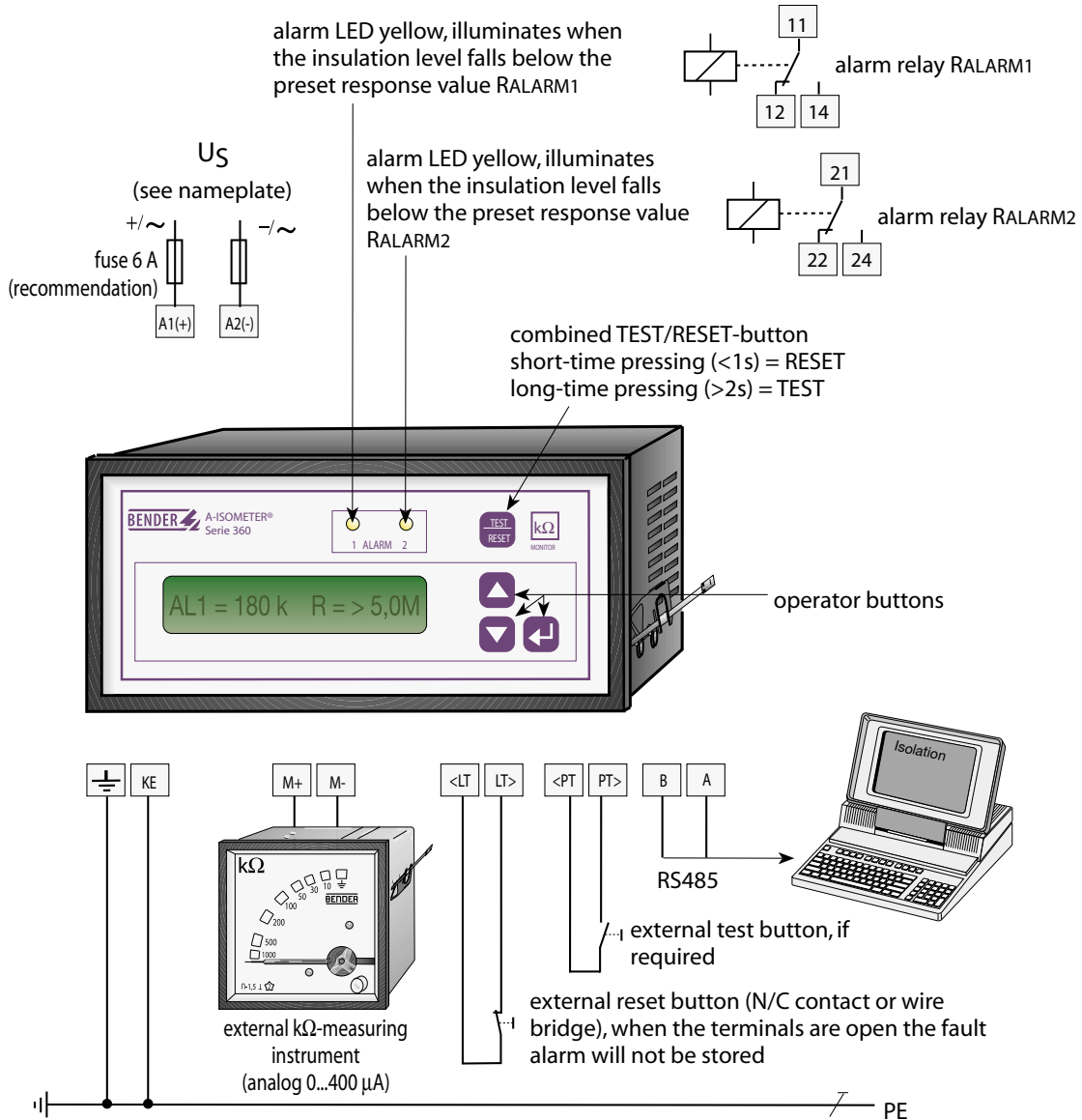


3.1 Wiring diagrams

3.1.1 IRDH265



3.1.2 IRDH365



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).

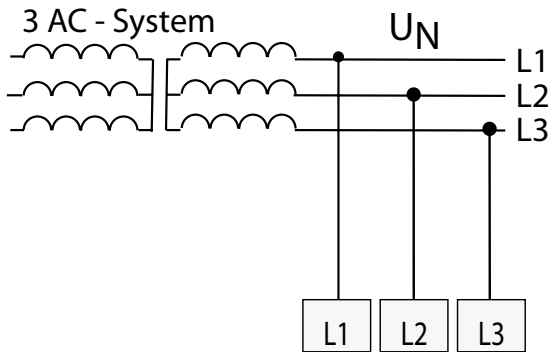
For the measuring connection of the insulation monitoring device to the system, it is not necessary, according to IEC 60364-4-473, to use protective devices as protection against short-circuit provided that the wire or cable is realized in a way which restricts the risk of a short-circuit to a minimum.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

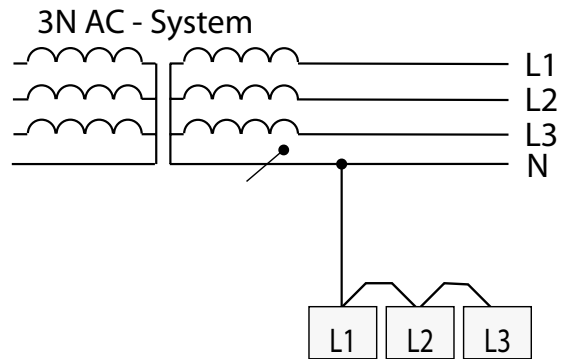
The terminals of the test and reset buttons of several insulation monitoring devices must not be connected in parallel for a group test.

3.2 Connection to various system types

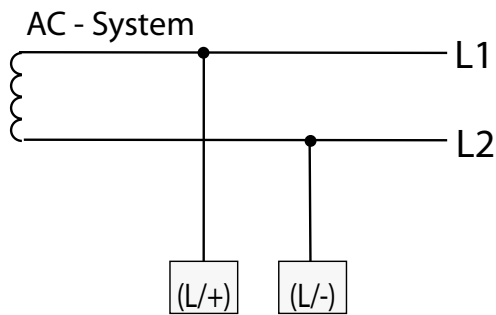
3.2.1



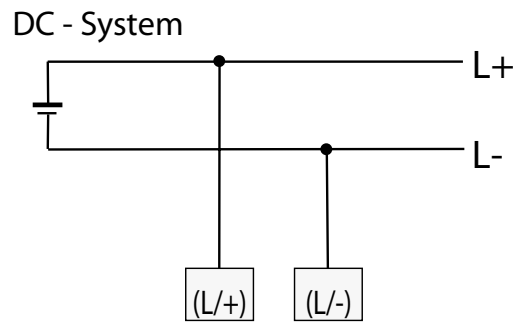
3.2.2



3.2.3



3.2.4

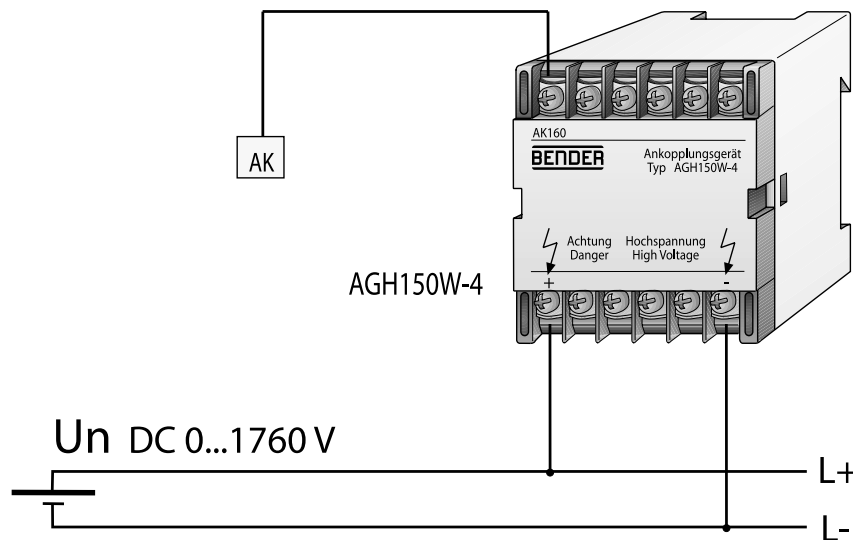


3. Connection

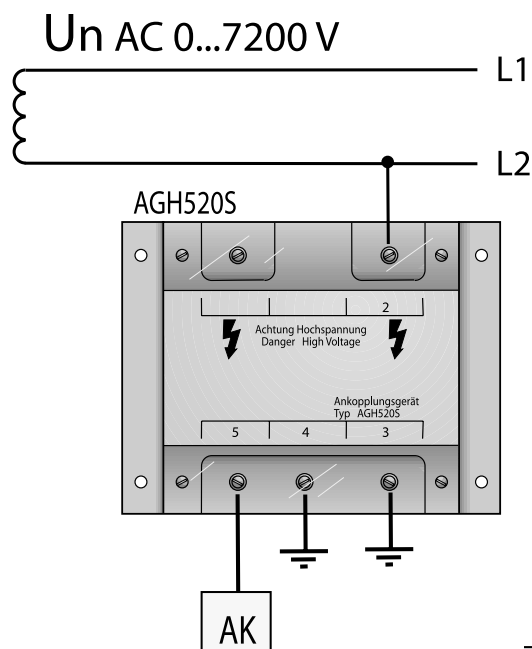


3.3 Connection via coupling devices

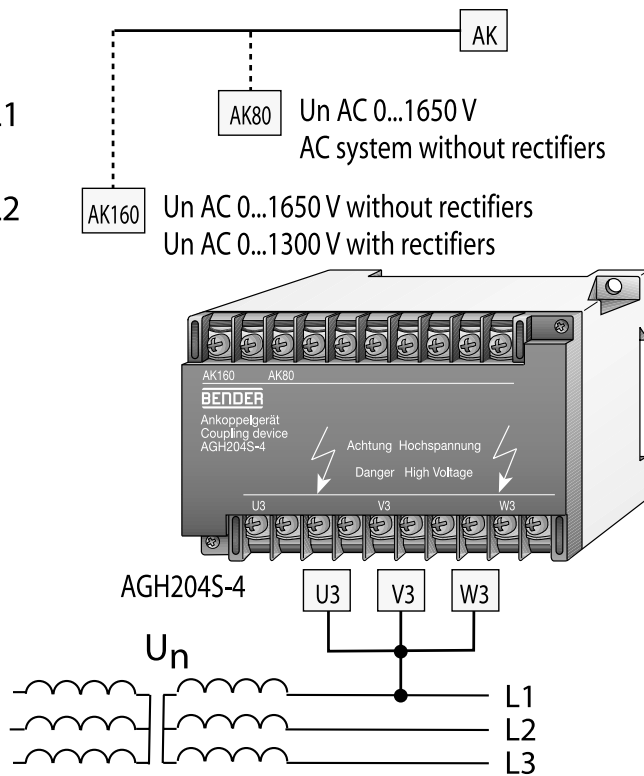
3.3.1



3.3.2



3.3.3



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 $\sqrt{2}$.

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 $\sqrt{2}$ between DC voltage and AC voltage).

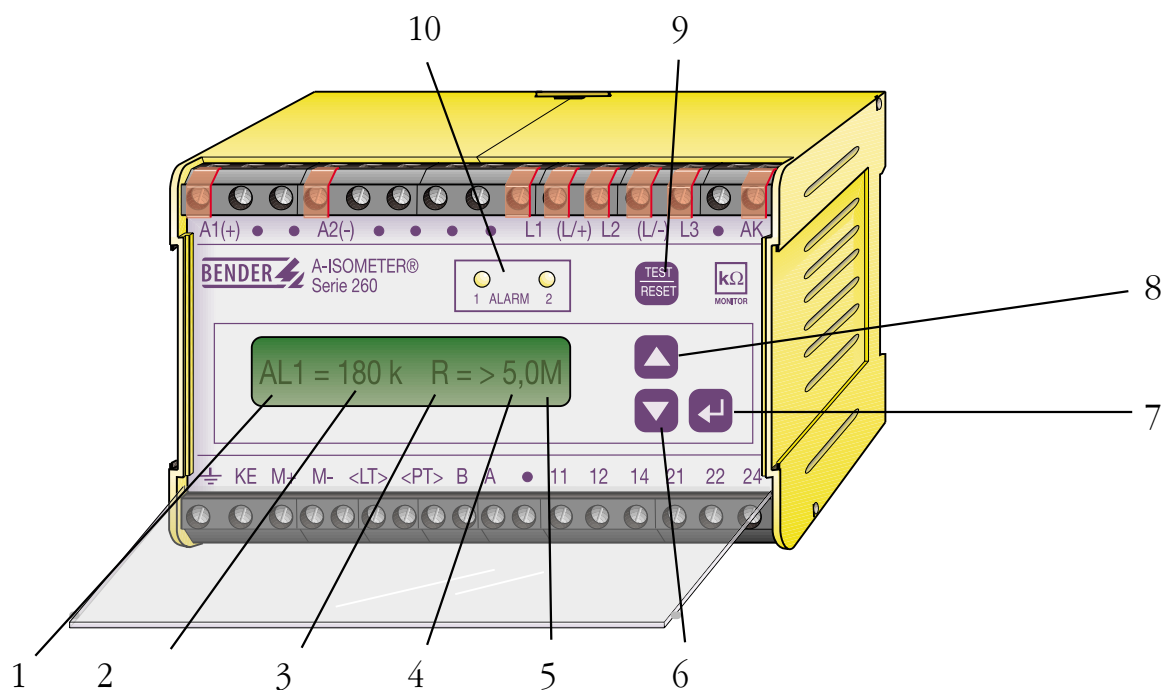
The maximum DC voltage in the case of insulation failures in the DC part of the system e.g. inverter intermediate circuit is DC 1840 V. From this, the maximum nominal AC voltage is calculated:

$$U_{\max} = \text{DC } 1840 \text{ V} / \sqrt{2} = \text{AC } 1300 \text{ V}$$

4. Operation and setting

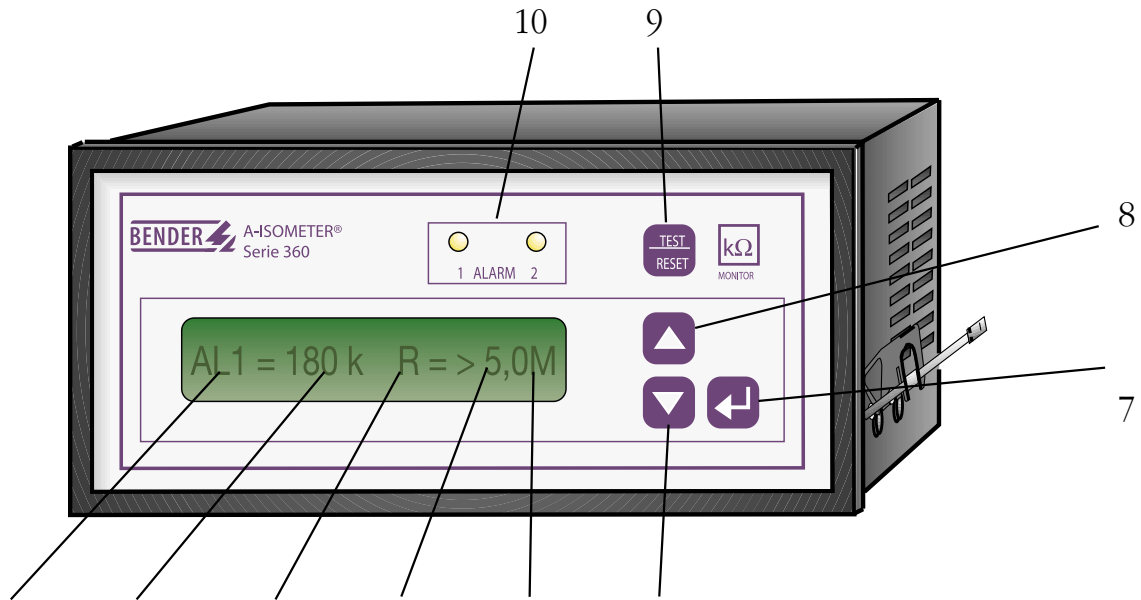


4.1.1 Operating elements and displays IRDH265




- 1 AL1 = Alarm 1, AL2 = Alarm 2
- 2 pre-set response value (k Ω)
- 3 fault location
"R" = AC insulation fault
"R+" = DC insulation fault at L+
"R-" = DC insulation fault at L-
"Rs" = new measuring value is being calculated (measuring cycle active)
- 4 Measuring value
- 5 unit measuring value (k = k Ω , M = M Ω)
- 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 pre-set response value (kΩ)
- 3 fault location
 "R" = AC insulation fault
 "R+" = DC insulation fault at L+
 "R-" = DC insulation fault at L-
 "Rs" = a new measuring value is being calculated
 (measuring cycle active)
- 4 Meßwert
- 5 unit measuring value (k = kΩ, M = MΩ)
- 6, 7, 8 function keys
- 9 TEST/RESET button
- 10 alarmLEDs 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.

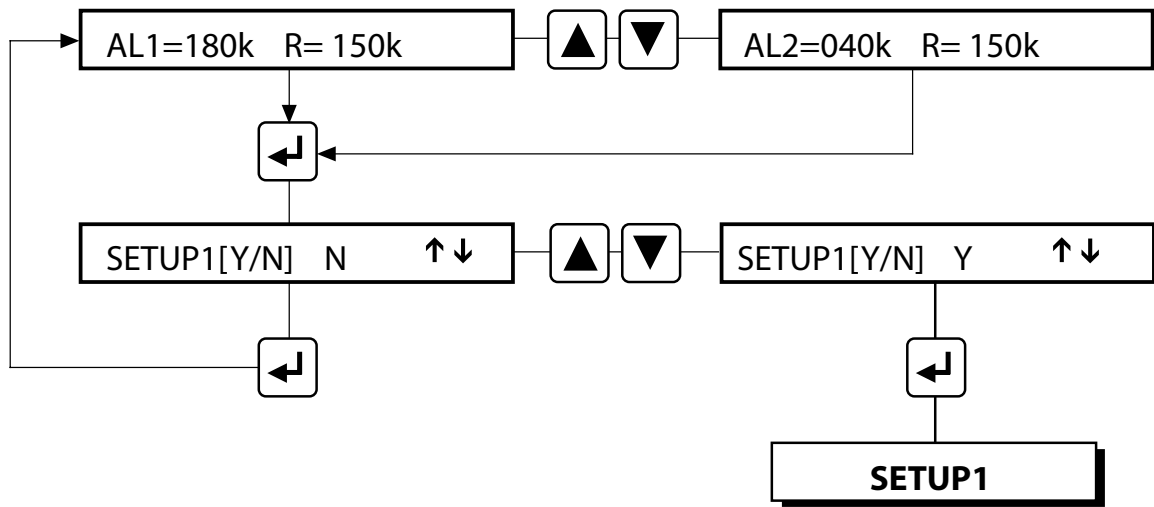
 Press this key to select the previous menu (only in the Setup menu).

 During all setting-up functions, insulation monitoring is interrupted for the setting time. If the setting-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.

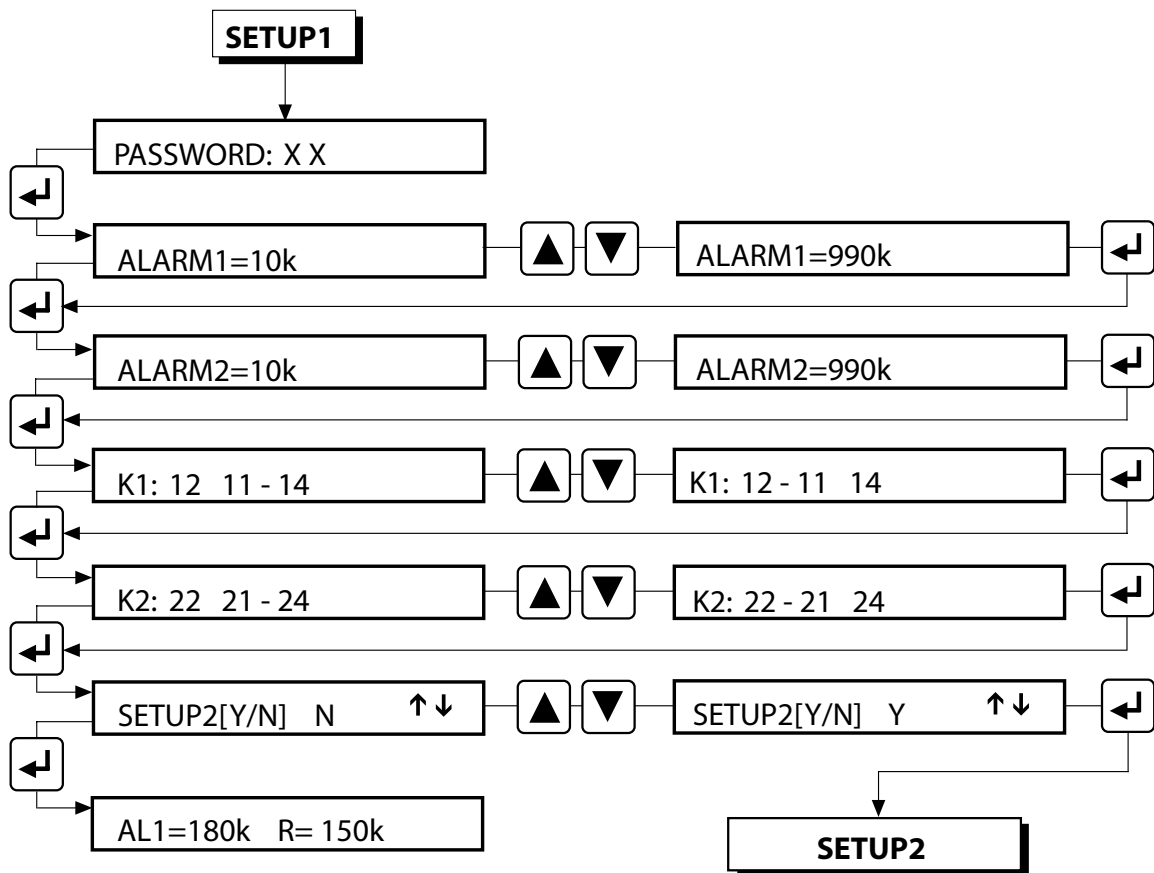
4.3 Display of response values and measuring values

After commissioning, the actual measuring 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 A-ISOMETER returns to the display of the measuring values.

4.4.2 Response values R_{ALARM} [ALARM1= 10k] / [ALARM2= 10k]

Use the   keys for setting the response values 1 and 2 and by the  key for saving 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",

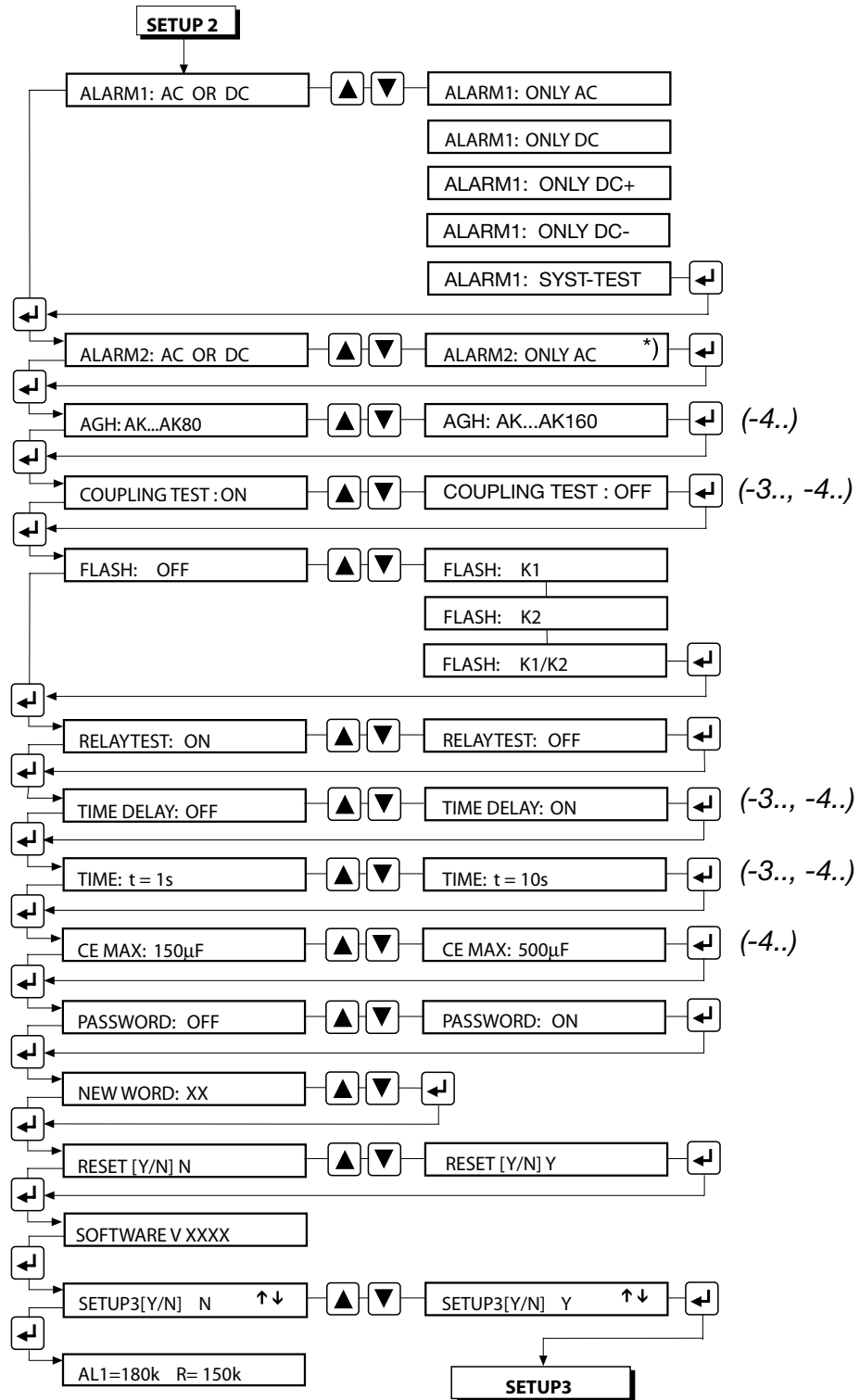
N/C operation "12 11 - 14".

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 of the extended functions (Setup2)



*) the same as alarm1

4.5 Setting of the extended functions (Setup2)

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:

ALARM 1	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

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



Warning

4.5.2 Setting the coupling devices (AK TERMINAL) [AGH: AK...AK80] (*applies only to version -4..*)

Basic setting, when no coupling device is used (pre-set 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 connected to the terminal AK 160 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] ***(applies only to versions -3.., -4..)***



Use this menu to switch the automatic connection monitoring on or off. This connection monitoring should always be in ON position (see also 2.5).

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 (= Relay test : OFF).

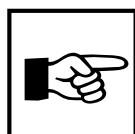
4.5.6 Time delay ON [TIME DELAY: ON] ***(applies only to versions -3.., -4..)***

Use this menu to activate the time delay for the alarm relays. Before activating the time delay, the A-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] (applies only to -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 μ F] (applies only to -4.)



In this menu, the A-ISOMETERS can be matched to the relevant system leakage capacitance (max. 500 μ F). Please take into consideration that the basic measuring time will be increased to 15 s (see characteristic curve page 40) when the setting $C_E = 500 \mu$ F has been selected.

4.5.9 Activating 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 basic settings.

4.5.12 Display software version [SOFTWARE VXXX]



Warning

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

4.5.13 Status display (status word IRDH265)



Display status word: press the  key, hold the  key down for at least 5 seconds.

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

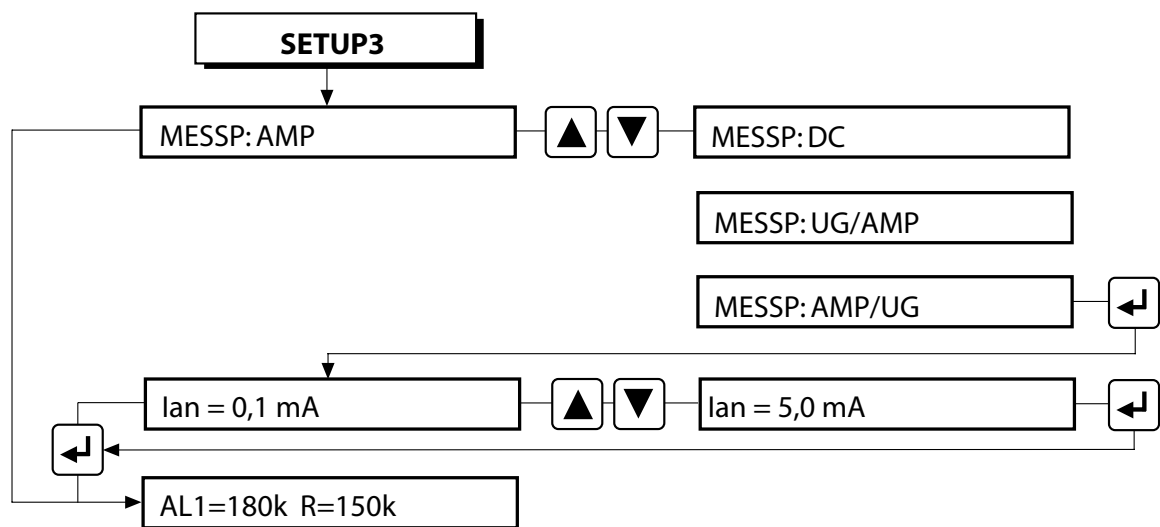
* applies only to version -4

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) (*applies only to -3.., -4..*)



In this menu, the measuring principle of the A-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 Selection of 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 the function description, chapter 2.3.

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. The DC current which is caused by asymmetrical faults at L+ or L-, respectively the shift voltage caused thereby, is 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.

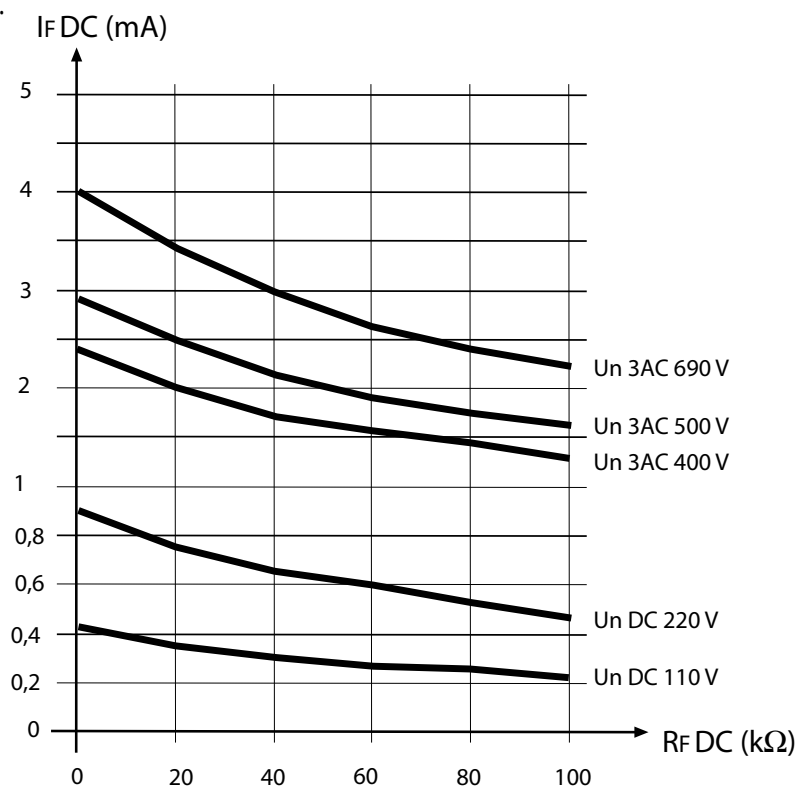
4.6.1.4 AMP/UG measuring principle [MESSP: AMP/UG]

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.

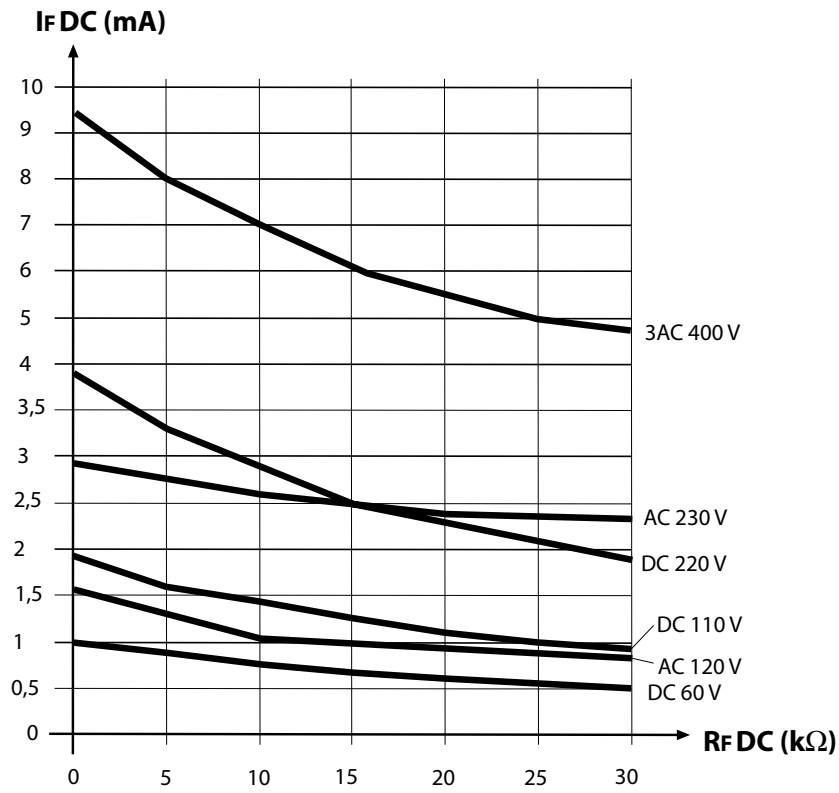
4.6.2 Current level for DC fast response [$I_{an} = 0.1\text{mA}$]

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 A-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 versions -4..



applies to versions -3..



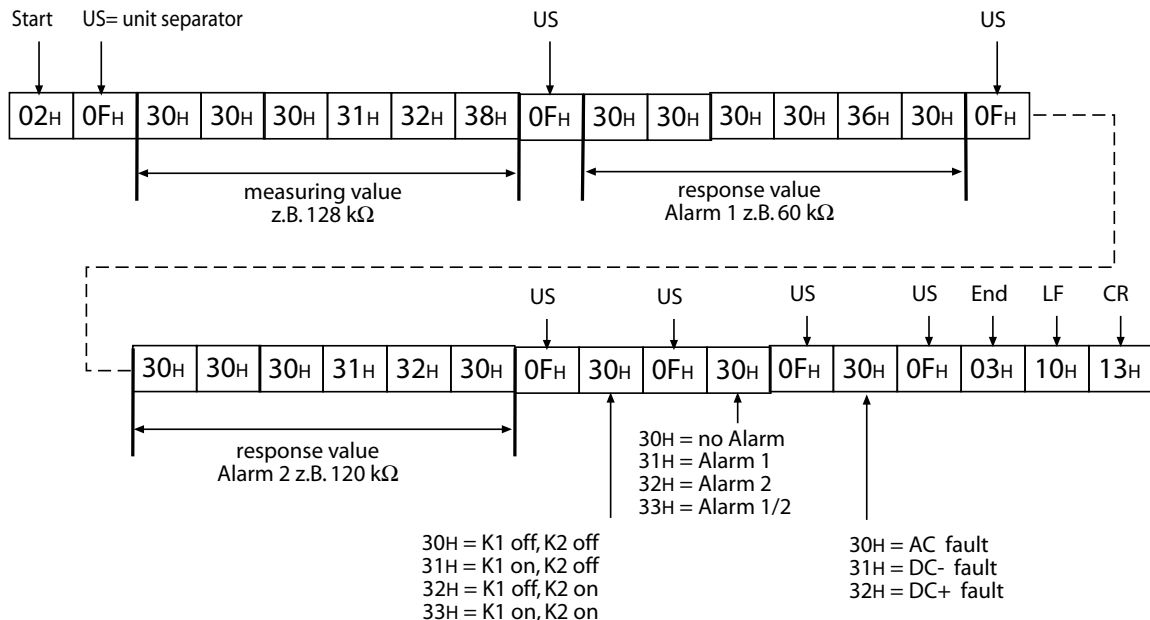
5. Interface



Serial interface

- Serial interface (RS485) without electrical isolation (= EIA RS-485)
- Connections to the terminals A and B
- Max. cable length 1200m
- Transmission protocol
9600 Baud - 1 Starbit - 1 Stopbit - 8 Datenbit
- 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.



example: terminal program (Windows)

```

0 0 0 1 2 8 | 0 0 0 0 6 0 | 0 0 0 1 2 0 | 2 | 2 | 0
measuring value | Alarm 1 | Alarm 2 | | | AC Fault
128 K | 60 K | 120 K | | | Alarm 2
| | | | | | | | | | | K1 off, K2 on
    
```

Insulation coordination acc. to IEC 60664-1

Rated insulation voltage	AC 800 V
Rated impulse withstand voltage/contamination level	8 kV / 3
Dielectric test acc. to IEC 60255-5	3 kV
Operation class	continuous operation

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 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 k Ω
Hysteresis	ca. 25%
Response time ($C_E = 1 \mu F$)	≈ 8 s see characteristic curves
Response value asymmetry measuring principle	0.1 ... 5 mA
Response time asymmetry measuring principle (in case of direct earth fault, 0 k Ω , 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
Pre-set by factory	150 μF

Measuring circuit

Measuring voltage U_M (peak value)	27 V
Measuring current I_M	max. 230 μA
Internal DC resistance R_i acc. to IEC 61557-8	120 k Ω
Impedance Z_i , 50 Hz IEC 61557-8	> 250 k Ω

6. Technical data



-3..	-499	-R4.. -4921 -T-4921	-7..	-8..
0...506 V	0...793 V	0...793 V	0...793 V	0...793 V
0...286 V	0...650 V	0...650 V	0...750 V	0...780 V
2...200 k Ω	10...990 k Ω	10...990 k Ω	0.2...10 M Ω	0.5...20 M Ω
0.1...10 mA	0.1...5 mA	0.1...5 mA	-	-
1...10 s	1...10 s	1...10 s	-	-
500 μ F	500 μ F	500 μ F	2 μ F	2 μ F
500 μ F	150 μ F	150 μ F	2 μ F	2 μ F
1 mA	230 μ A	230 μ A	10 μ A	5 μ A
28 k Ω	120 k Ω	120 k Ω	2.8 M Ω	5.6 M Ω

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

Contact circuit

Switching components	2 change-over contacts
Contact class	IIB acc. to DIN IEC 60255 Teil 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
Pre-set by factory	N/O operation

Type tests**Test of the Electromagnetic Compatibility (EMC)****Immunity against electromagnetic interferences 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°C ... +55°C*
Storage temperature range	-40°C ... +70°C
Climatic class acc. to IEC 60721	3K5, except condensation and formation of ice

Option T

Shock resistance IEC 60068-2-27 (during operation)	30 g / 11 ms
Bumping IEC 60068-2-29 (during transport)	40 g / 6 ms
Vibration resistance IEC 60068-2-6 (during operation)	1,6 mm / 10...25 Hz

6. Technical data



-3.. 28 kΩ <1k...>500k	-499 120 kΩ <1k...>5MΩ	-T-4921** -R4.. -4921** 120 kΩ <1k...>5MΩ	-7.. 2.8 MΩ <0.2M...>20M	-8.. 5.6 MΩ <0.5M...>30M
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

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	acc. to DIN EN 50 022
Screw mounting IRDH265	mounting plate Art. No. 990 056
Protection class acc. to DIN EN 60529	
Built-in components	IP 30
Terminals	IP 20
Type of enclosure	
IRDH265	X M112
IRDH365	X300
Flammability class	
XM112	UL94V-0
X300	UL94V-1
Weight approx.	
IRDH265	825 g
IRDH365	1075 g

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

*** Notes on the environmental temperature**

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

**** Notes on the environmental temperature**

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.

6. Technical data



6.1 Standards

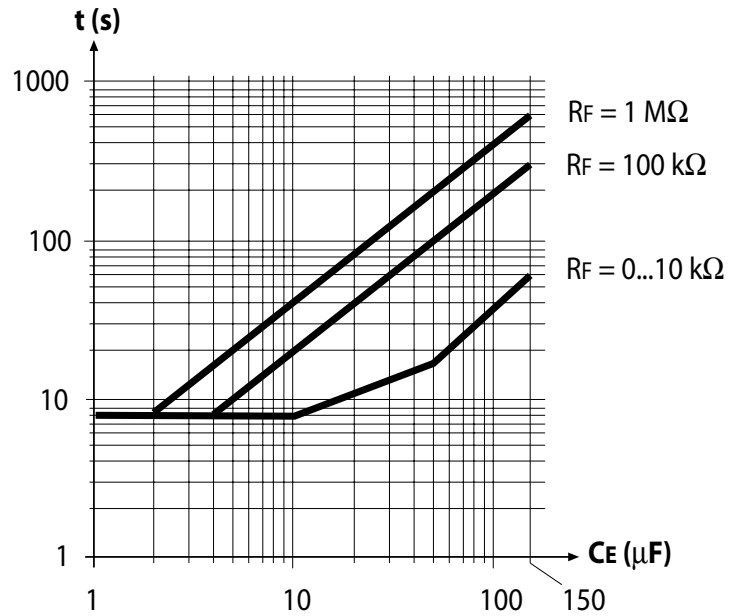
The A-ISOMETERS IRDH265 and IRDH365 comply with IEC 61557-8 1997-02 (Insulation monitoring devices for IT systems), ASTM F25.10.11 (Standard Specification for Electrical Insulation Monitors for Monitoring Ground Resistance in Ungrounded Active AC Electrical Systems Having Large DC Components or DC Electrical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

The devices are UL (Underwriters Laboratories) certified.

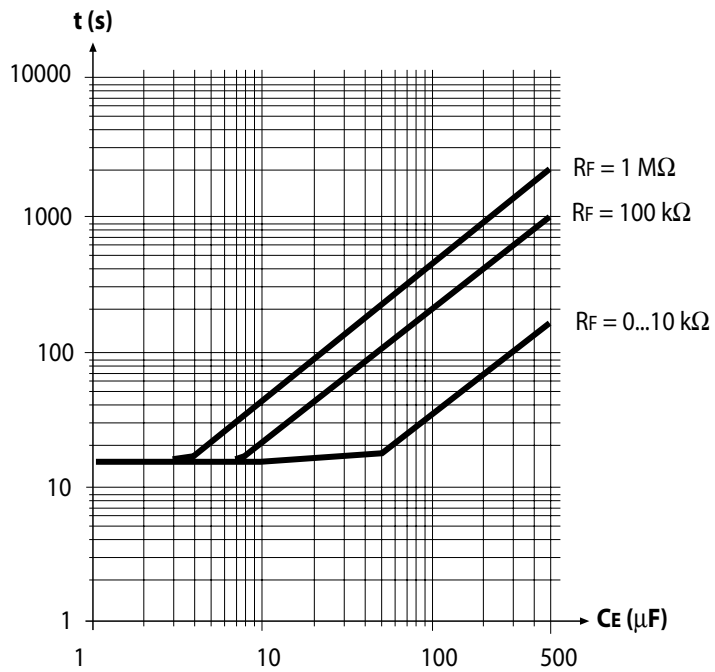


7.1.1 Response time -4..

Setting $C_E = 150 \mu\text{F}$

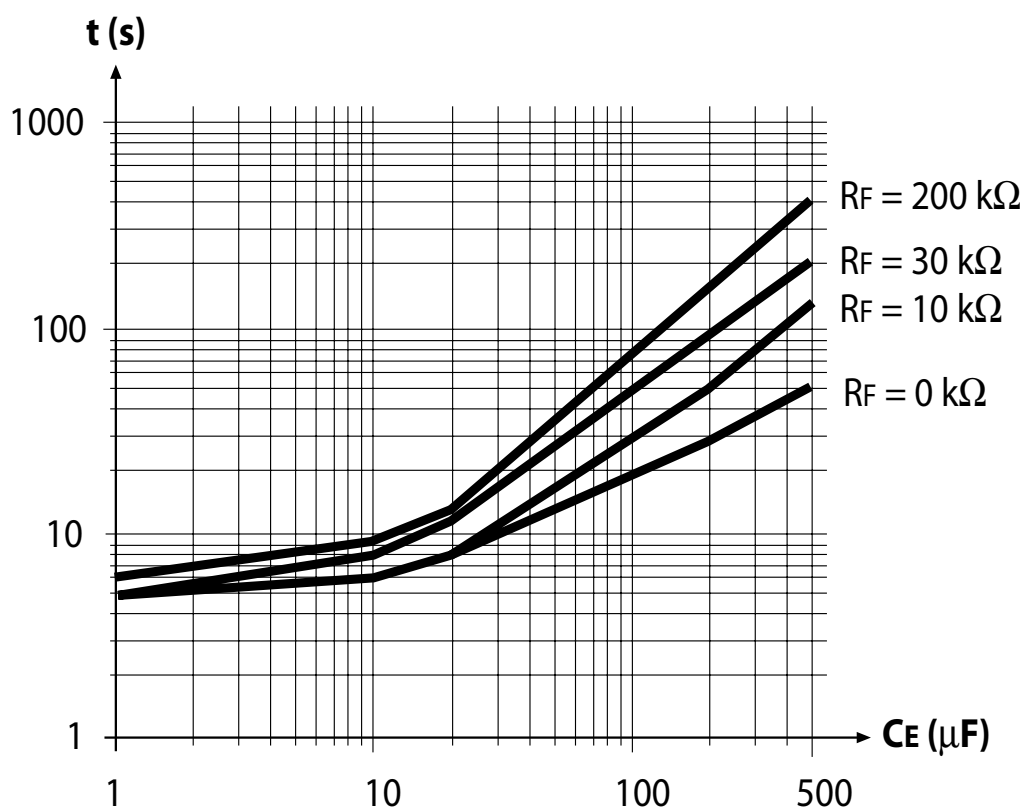


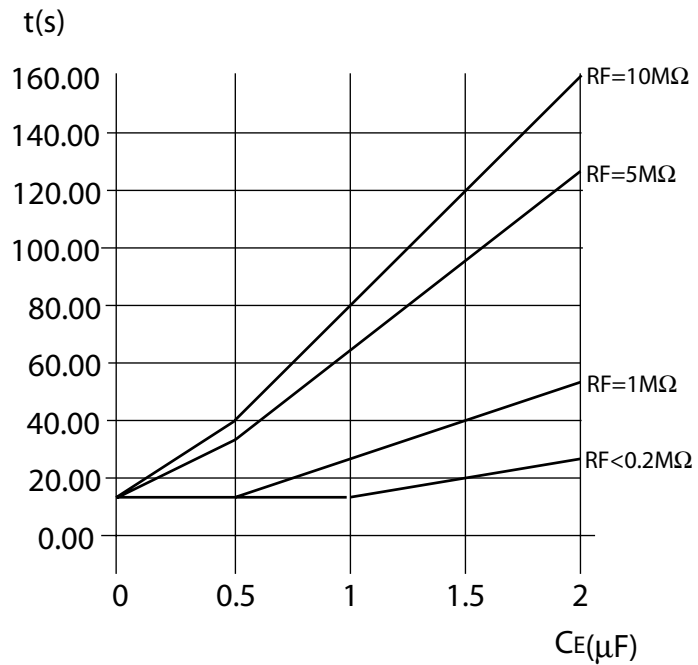
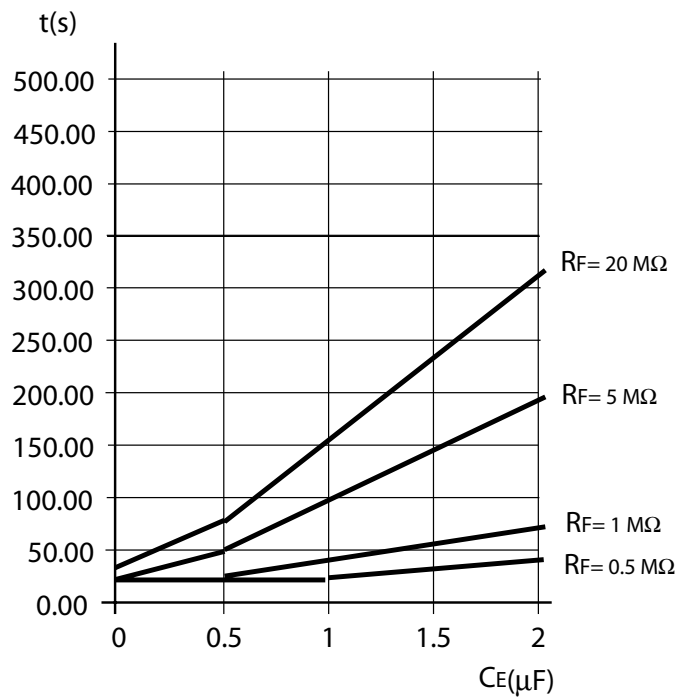
Setting $C_E = 500 \mu\text{F}$



7. Characteristic curves

7.1.2 Response time -3..



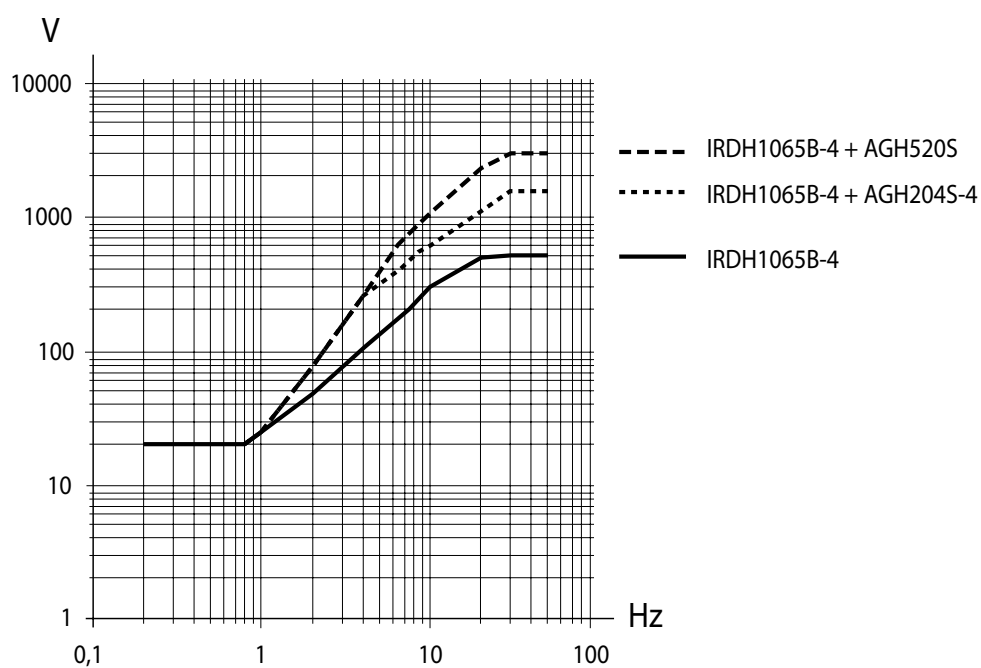
7.1.3 Response time -7..**7.1.4 Response time -8..**

7. Characteristic curves

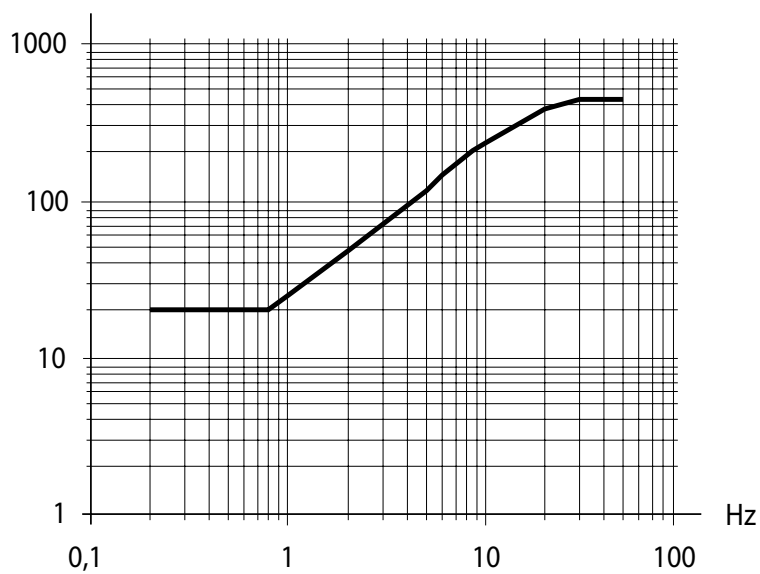


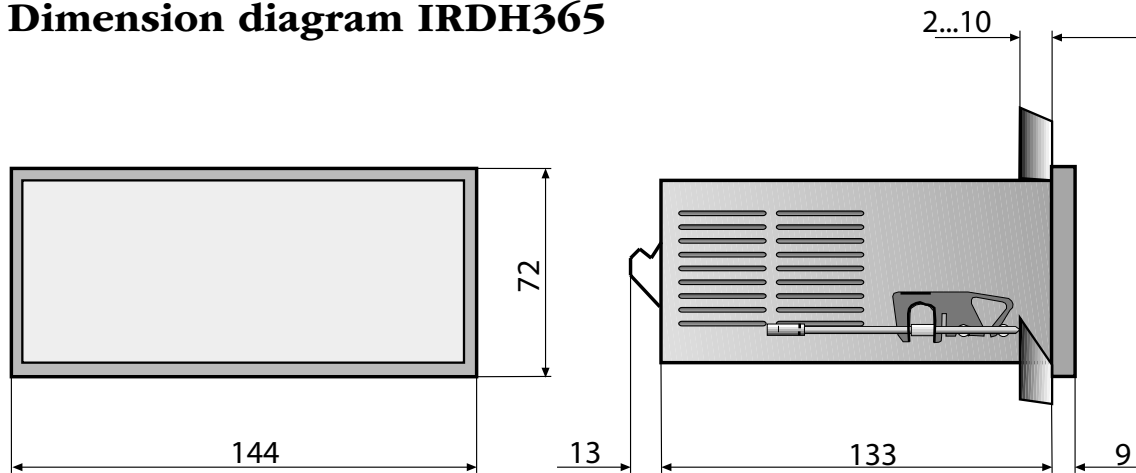
7.2 Max. AC voltage between system and PE (earth) in the frequency range <50Hz

applies to versions -4..



applies to versions -3..

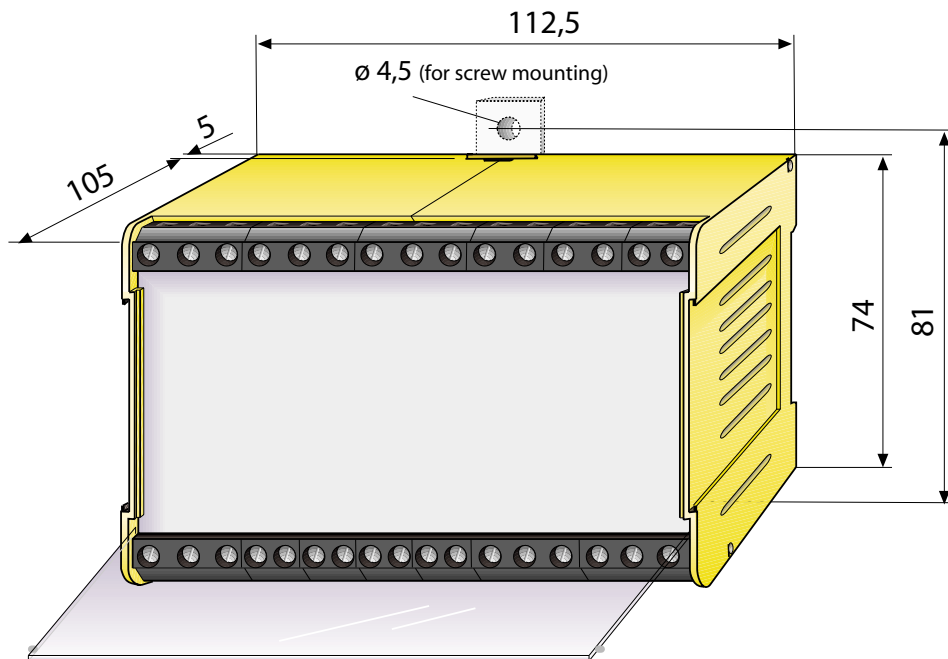


Dimension diagram IRDH365

switch board cutout 138 x 66
(dimensions in mm)

Dimension diagram IRDH265

Mounting onto support rails acc. to DIN EN 50 022



For screw mounting, a mounting plate, Art.-Nr. 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 details



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

* This is the maximum operating range of the supply voltage.

Options

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

* This is the maximum operating range of the supply voltage.

IRDH265T-4921

DC 10,5...80 V

B 9106 8023 T

9. Ordering details



Coupling devices

Type	Nominal voltage range U_n	Art. No.
AGH204S-4	AC 0 ... 1650 V	B 914 013
AGH520S	AC 0 ... 7200 V	B 913 033
AGH150W-4	DC 0 ... 1760 V	B 98 018 006

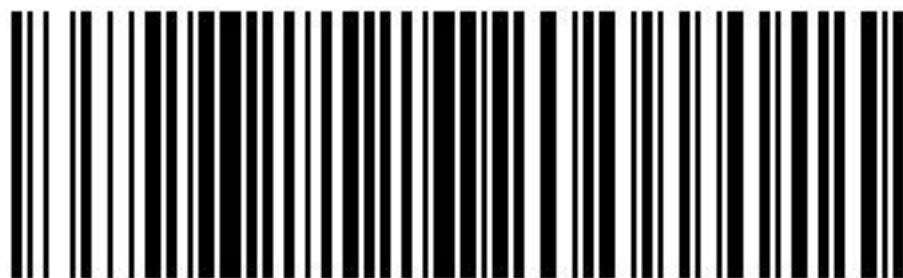
Measuring instrument for -4.. (current output 0...400 μ A)

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

Measuring instrument for -3.. (current output 0...400 μ A)

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

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



D0001400MXEN