ISOMETER® IRDH275BM-7 with coupling device AGH675-7 and AGH675-7MV15

Device combination for insulation monitoring

in unearthed AC, AC/DC and DC power systems (IT systems)

IRDH275BM-7_D00123_04_D_XXEN/07.2018

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ISOMETER® IRDH275BM-7 with AGH675S-7 and AGH675S-7MV15

Device features

- Insulation monitoring for drives including medium voltage converters up to 15.5 kV
- Two separately adjustable response values 100 kΩ…10 MΩ
- ***AMP***^{Plus} measurement method (European patent: EP 0 654 673 B1)
- Automatic adaptation to the system leakage capacitance
- Info button to display device settings and the system leakage capacitance
- History memory with real-time clock to store alarm messages with date and time stamp
- BMS interface (Bender Measuring Device Interface) for communication with other Bender devices (RS-485 electrically isolated)
- Current output 0(4)…20mA (electrically isolated) analogously to the measured insulation value
- Self monitoring with automatic alarm
- Automatic self test, selectable
- Connection for external kΩ indication
- Test and reset button
- Connection external test and reset button
- Two separate alarm relays with two potential-free changeover contacts
- N/O or N/C operation, selectable
- Backlit two-line plain text display
- Remote setting of specific parameters via Internet (option; COM460IP with at least Option C required)

Product description

The device combination ISOMETER® IRDH275BM-7 and the coupling device AGH675S-7 or the coupling devices AGH675S-7MV15 is designed to monitor the insulation resistance of unearthed medium voltage systems (IT systems). It is suitable for universal use in 3AC, combined AC/DC and DC systems.
AC systems may include extensive DC-supplied loads. The AMPPlus measurement method meets the particular requirements of modern power supplies which often include rectifiers, converters, thyristor-controlled DC drives and directly connected DC components. Taking the system leakage capacitances into account, the IRDH275BM-7 automatically adapts itself to the existing system conditions in order to optimise the measuring time.

Application

- AC, DC or AC/DC medium voltage systems
- AC/DC medium voltage systems with directly connected DC components, such as rectifiers, converters, and thyristor-controlled DC drives

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. 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 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 earth connections are 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.

In addition, the device features:

- History memory with real-time clock to store all alarm messages with date and time stamp.
- Electrically isolated RS-485 interface (BMS protocol) for communication with other Bender devices
- Current output 0(4)…20 mA (electrically isolated)

Measurement method

AMP^{Plus} The IRDH275BM-7 series 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 IRDH275BM-7 series complies with the requirements of the device standards: DIN EN 61557-8 (VDE 0413-8), EN 61557-8, IEC 61557-8, IEC 61326-2-4, DIN EN 60664-1 (VDE 0110-1), DIN EN 60664-3 (VDE 0110-3), ASTM F1669M-96 (2007), ASTM F1207M-96 (2007)

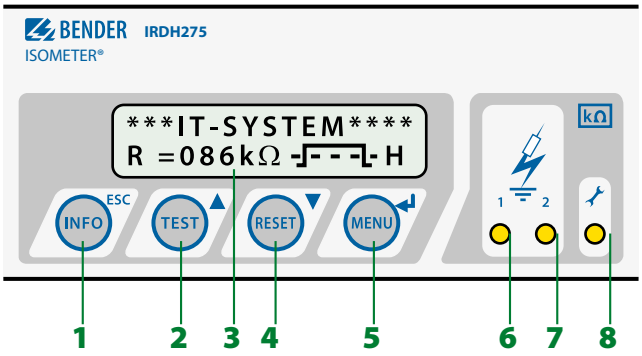
Approvals

IRDH275BM-7 and AGH675S-7

c UL us LISTED

AC/DC

Operating elements



1 - "INFO" button: to query standard information 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 - Two-line display for standard and menu mode
4 - "RESET" button: to delete stored insulation fault alarms parameter change, to move down in the menu
5 - "MENU" button: to call up the menu system.
Enter button: to confirm parameter change
6 - Alarm LED "1" lights:
insulation fault, first warning level reached.
7 - Alarm LED "2" lights:
insulation fault, second warning level reached.
8 - System fault LED lights: IRDH275 or earth terminal defective

Ordering information

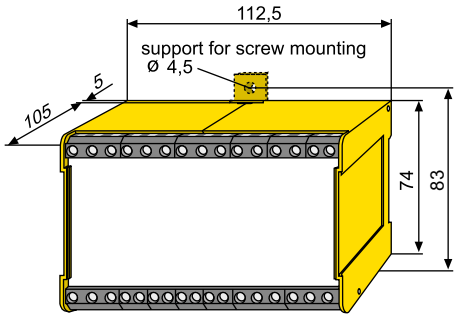
Nominal system voltage U_n	Supply voltage U_S		Cable length	Type	Art. No.
AC, 3(N)AC/DC	AC	DC			
–	19.2…55 V	19.2…72 V	–	IRDH275BM-727	B 9106 5120
0…7.2 kV, 0…460 Hz	–	–	2000 mm	AGH675S-7-2000	B 913 061
			500 mm	AGH675S-7-500	B 913 060
0…15.5 kV, 0…460 Hz	–	–	500 mm	AGH675S-7MV15-500	B 913 058

Suitable system components

Type designation	Type	Art. No.
External kΩ measuring instruments	9620-1421	B 986 849

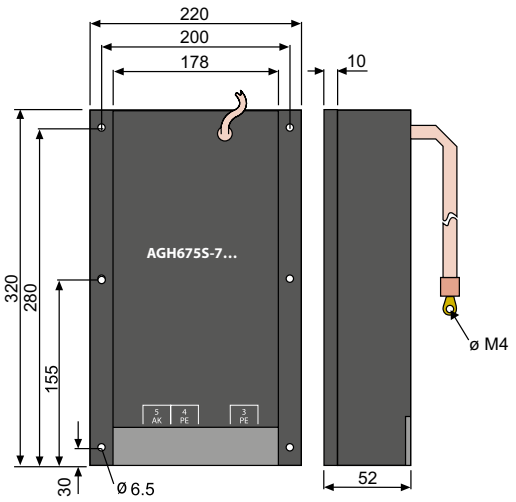
Dimension diagram XM112

Dimensions in mm



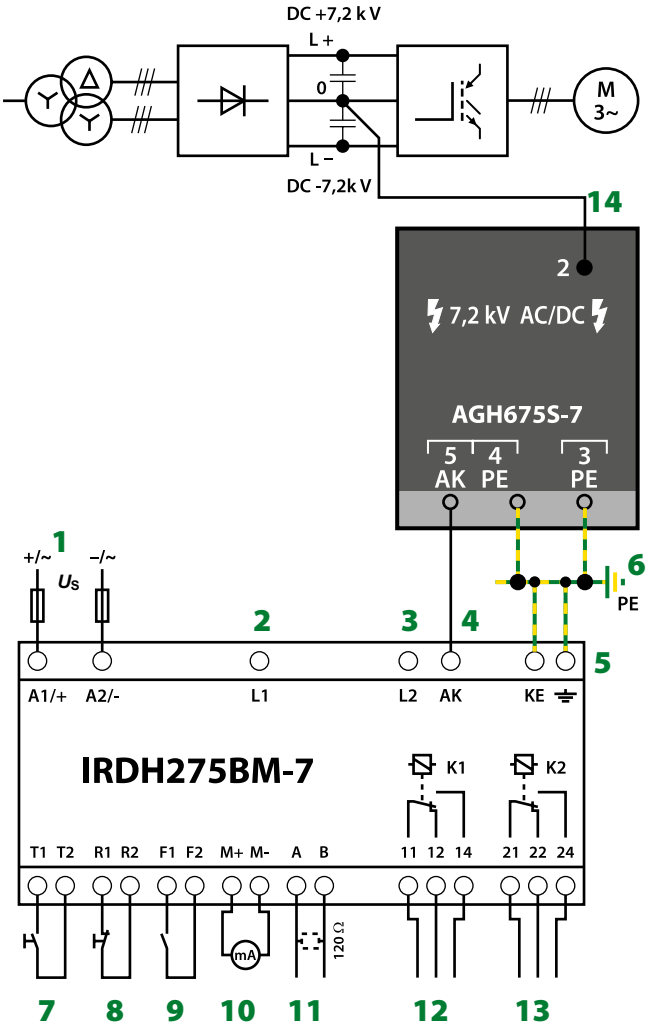
Dimension diagram

Dimensions in mm

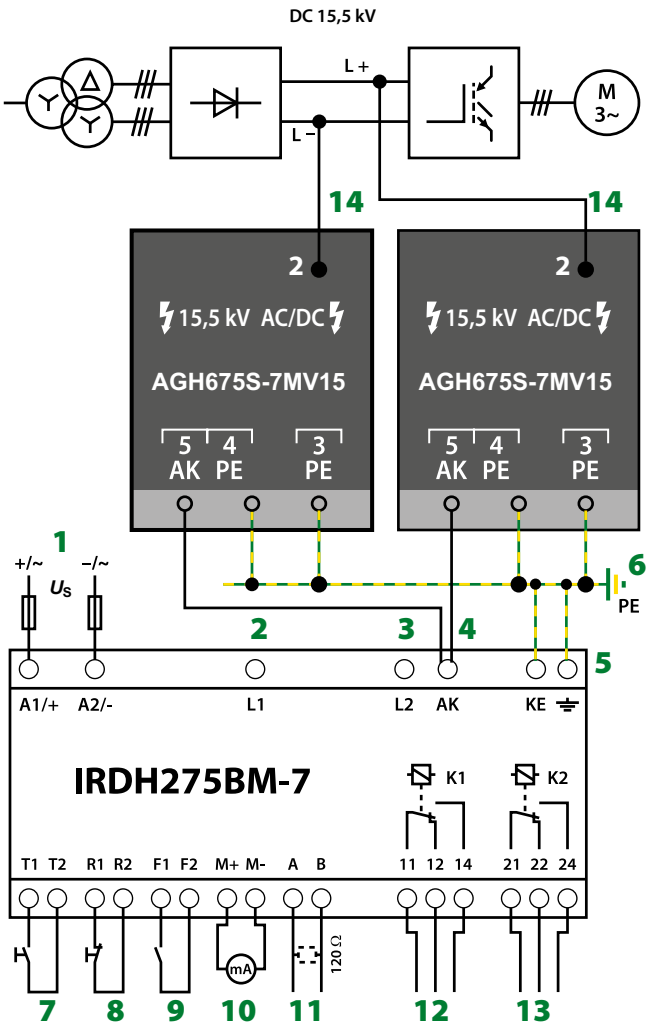


Wiring diagram – mains connection/example

Connection AGH675S-7



Connection AGH675S-7MV15



1 - Supply voltage U_S (see ordering information) via 6 A fuse; for UL and CSA applications, it is mandatory to use 5 A fuses.

2,3 - Terminals L1, L2 are not connected!

4 - Connection to the coupling device AGH675S-7 or the two coupling devices AGH675S-7MV15:

Connect terminal AK to terminal(s) 5 of the coupling device AGH675S-7 (or the two coupling devices AGH675S-7MV15),

Connection with standard low-voltage cable, maximum voltage at terminal 5: 200 V

5 - Separate connection of ⏚ and KE to PE

6 - Separate connection of the terminals 3 and 4 of the AGH675S-7 or AGH675S-7MV15 to PE

7 - External TEST button (NO contact)

8 - External RESET button (NC 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, insulation measurement does not take place.

10 - Current output, galvanically separated: 0…20 mA or 4…20 mA

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

12 - Alarm relay 1; changeover contacts provided

13 - Alarm relay 2 (system fault relay); changeover contacts provided

14 - Connection of the coupling device AGH675S-7 to the converter: connect the high voltage cable encapsulated on one end to the mid-point of the DC intermediate circuit.

Connection of the two coupling devices AGH675S-7MV15 to the converter: connect the high voltage cable encapsulated on L+ and L-.

Technical data IRDH275BM-7

Insulation coordination acc. to IEC 60664-1	
Rated voltage	AC 800 V
Rated impulse voltage/pollution degree	8 kV/3

Voltage ranges

Nominal voltage range U_n	via AGH675S-7…
Supply voltage U_S (also see nameplate)	AC 19.2…55 V*
Frequency range U_S	42…460 Hz
Supply voltage U_S (also see nameplate)	DC 19.2…72 V*
Power consumption	≤14 VA

Response values

Response value Ran1 (Alarm 1)	100 kΩ…10 MΩ
Response value Ran2 (Alarm 2)	100 kΩ…10 MΩ
Relative percentage error 100…500 kΩ	±100 kΩ
Relative percentage error 500 kΩ…10 MΩ	0 %…+20 %
Response time tan	≤ 5 min
Hysteresis	25 %

Measuring circuit

Measuring voltage Um	≤ 50 V
Measuring current Im (at RF = 0 Ω)	≤ 21 µA
Internal DC resistance Ri	≥ 2.4 MΩ
Internal impedance Zi, at 50 Hz	≥ 2.4 MΩ
Permissible extraneous DC voltage Ufg	with AGH675S-7…
Permissible system leakage capacitance Ce	≤ 5 µF
Factory setting	2 µF

Displays

Display, illuminated	two-line display
Characters (number of characters)	2 x 16
Display range, measuring value	50 kΩ…10 MΩ
Relative percentage error 50…500 kΩ	±50 kΩ
Relative percentage error 500 kΩ…10 MΩ	±10 %

Outputs/inputs

TEST/ RESET button	internal/external
Cable length TEST/RESET button external	≤ 10 m

Current output for measuring instrument SKMP (scale centre point = 1.2 MΩ):

Current output (load)	20 mA (≤ 500 Ω)
Accuracy current output (100 kΩ…10 MΩ)	±10 %, ±100 kΩ

Serial interface

Interface/Protocol IRDH275B	RS-485/BMS
Connection	terminals A/B
Cable length	≤ 1200 m
Recommended cable (screened, screen on one side connected to PE)	J-Y(St)Y 2x0.6
Terminating resistor	120 Ω (0.5 W)
Device address, BMS bus	1…30 (factory setting = 3)

Switching components

Switching components	2 changeover contacts: K1 (Alarm 1), K2 (Alarm 2, system fault)
Operating principle K1, K2 (Alarm 1, Alarm 2)	N/O or N/C operation
Factory setting (Alarm 1/Alarm 2)	N/O operation
Electrical endurance	12 000 switching operations
Contact class	IIB (IEC 60255-23)
Rated contact voltage	AC 250 V/DC 300 V
Making capacity	AC/DC 5 A
Breaking capacity	2 A, AC 230 V, cos phi = 0.4
	0,2 A, DC 220 V, L/R = 0.04 s
Minimum contact current at DC 24 V	≥ 2 mA (50 mW)

Environment/EMC

EMC immunity	acc. to EN 61326
EMC emission	acc. to EN 61326
Shock resistance IEC 60068-2-27 (device in operation)	15 g/11 ms
Bumping IEC 60068-2-29 (during transport)	40 g/6 ms
Vibration resistance IEC 60068-2-6 (device in operation)	1 g/10…150 Hz
Vibration resistance IEC 60068-2-6 (during transport)	2 g/10…150 Hz
Ambient temperature (during operation)	-10 …+55 °C
Storage temperature range	-40 …+70 °C
Climatic class acc. to IEC 60721-3-3	3K5

Connection

Connection	screw terminals
Connection	
rigid, flexible	0.2…4 mm²/0.2…2.5 mm²
flexible with connector sleeve, without/with plastic sleeve	0.25…2.5 mm²
Conductor sizes (AWG)	24…12

Other

Operating mode	continuous operation
Mounting	as indicated on the display
Protection class, internal components (DIN EN 60529)	IP30
Protection class, terminals (DIN EN 60529)	IP20
Type of enclosure	X112, free from halogen
DIN rail mounting	IEC 60715
Flammability class	UL94 V-0
Tightening torque	0.5 Nm
Documentation number	D00123
Weight approx.	510 g

Technical Data AGH675S-7…

Insulation coordination acc. to DIN EN 61800-5-1

AGH675S-7	
Rated insulation voltage	AC 7.2 k V
AGH675S-7MV15	
Rated insulation voltage	AC 15.5 k V

Voltage test acc. to DIN EN 61800-5-1

Type test:	
AGH675S-7	
Voltage impulse test (basic insulation)	40 kV
AC voltage test (basic insulation)	20 kV
Partial discharge test	14 kV
AGH675S-7MV15	
Voltage impulse test (basic insulation)	111 kV
AC voltage test (basic insulation)	70 kV
Partial discharge test	29 kV
Routine test:	
AC voltage test	40 kV

Voltage ranges

AGH675S-7	
Nominal system voltage U_n	AC, 3(N)AC, DC 0…7.2 kV
Nominal frequency f_n	0…460 Hz
Internal DC resistance R_i	≥ 2.39 MΩ
AGH675S-7MV15	
Nominal system voltage U_n	AC, 3(N)AC, DC 0…15.5 kV
Nominal frequency f_n	0…460 Hz
Internal DC resistance R_i	≥ 4.7 MΩ

Environment

Operating temperature (normal operation)	- 10…+ 60 °C
Operating temperature (continuous operation with asymetrical earth fault	- 10…+ 55 °C

Classification of climatic conditions acc. to IEC 60721

Stationary use (IEC 60721-3-3)	3K5 (no condensation, no formation of ice)
Transport (IEC 60721-3-2)	2K3
Long-term storage (IEC 60721-3-1)	1K4

Classification of mechanical conditions acc. to IEC 60721

Stationary use (IEC 60721-3-3)	3M4 (3M7 Y shaft)
Transport (IEC 60721-3-2)	2M2
Long-term storage (IEC 60721-3-1)	1M3

Connection

Connection terminal 2 (medium voltage)	high-voltage cable (encapsulated on the device side)
Connection, flexible with ring terminal	M4
Connection 3, 4, 5	screw-type terminals
Connection	
rigid, flexible	0.2…4 mm²/0.2…2.5 mm²
flexible with connector sleeve	0.25…2.5 mm²

Other

Operating mode	continuous operation
Mounting	any position
Protection class, internal components (DIN EN 60529)	IP64
Protection class, terminals (DIN EN 60529)	IP20
Type of enclosure	resin-encapsulated block
Screw mounting	M5
Flammability class	UL94 V-0
Documentation number	D00095
Weight approx.	≤ 5100 g

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