166

AIM-R100 Residual Current Monitoring Products

Installation and Operation Manual V1.4

Acrel Co., Ltd.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Declaration

Please read this instruction carefully before using this product. All pictures, logos and symbols involved are owned by Acrel Co., Ltd. All or part of the content shall not be reproduced publicly without written authorization by non-company personnel.

Please read the instructions and precautions in this operation manual carefully before using this series of products. Acrel will not be responsible for personal injury or economic loss caused by ignoring the instructions in this operation manual.

The equipment is professional electrical equipment, any related operation, need to be carried out by special electrical technicians. Acrel is not responsible for personal injury or financial loss resulting from the error of non-professional personnel.

The contents of this description will be updated and amended constantly, and it is inevitable that there will be a slight discrepancy between the physical product and the description in the product function upgrading. Please refer to the physical product purchased and obtain the latest version of the description through www. acrel.cn or sales channels.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Modified Records

No.	Time	Versions	Reasons for revision
1	2018.11.20	V1.0	Primary version
2	2019.05.15	V1.1	Modified some cable connections and description
3	2019.10.22	V1.2	Update address and contact information
4	2020.12.30	V1.3	Correct errors and add English version
5	2022.09.30	V1.4	Update the Logo, modify some errors, update the standard, modify the communication example, and update the company contact information
Note:			

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Contens

1 Introduction 1
2 Functional characteristics 2
2.1 Function characteristics of AIM-R100 2
2.2 Function characteristics of AKH-0.66/L-20 2
2.3 Function characteristics of AID150 2
2.4 Function characteristics of ACLP10-24 2
3 Reference standards 2
4 Technical parameters 3
4.1 Technical parameters of AIM-R100 3
4.2 Technical parameters of AKH 0.66P26/L-20 3
4.3 Technical parameters of AID150 3
4.4 ACLP10-24 DC power supply 4
5 Installation and connection 4
5.1 Appearance and installation opening size 4
5.2 Method of installation 5
5.3 Wiring method 6
5.4 Typical wiring method 8
5.5 Matters needing attention 9
6 Operation and Usage 9
6.1 Display Panel 9
6.2 LED instructions 10
6.3 Function description of keys 10
6.4 Key operation instructions 11
7 Communication protocol 16
7.1 Modbus-RTU communication protocol 16
7.2 Introduction to the function code 16
7.3 AIM-R100 communication address table 17
8 Typical applications 19
9 Power on and debugging instructions 19
9.1 Wiring check 19
9.2 Common faults and eliminations 20
9.3 Settings and debugging 20

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

AIM-R100 Residual Current Monitoring Products

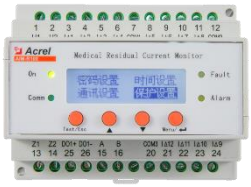
1 Introduction

Residual current monitoring products are suitable for medical class 2 and class 1 places and other places that need to monitor the residual current, mainly used for monitoring the residual current of TN-S distribution system mains and branches. When the residual current value exceeds the preset threshold, the system will send an alarm signal to remind the staff to deal with it according to the actual situation, so as to eliminate the potential safety hazards such as electrical fire and electric leakage shock caused by the residual current and provide clean, safe, and continuous power supply for the equipment.

The residual current monitoring products are also the monitoring instruments developed by Acrel with rich product design experience and strict reference to the requirements in the standards and specifications. The product conforms to the enterprise standard Q31/0114000129C025-2017 *Residual Current Monitoring Device.*

The residual current monitoring products mainly include AIM-R100 residual current monitor, AKH-0.66/L-20 residual current transformer, AID150 centralized alarm and display instrument and ACLP10-24 DC24V power supply, as shown in Table 1 below.

Table 1 Residual current monitoring products

Type and Name	Picture	Introduction
AIM-R100 Residual current monitor		AIM-R100 residual current monitor adopts advanced microcontroller technology, with high integration, small size, easy installation, intelligent, digital, and networked, it is the preferred product for multi-loop residual current monitoring in medical class 1, class 2, and other places.
AKH-0.66/L-20 Residual current transformer		AKH-0.66/L-20 residual current transformer is used together with AIM-R100 residual current monitor, high accuracy and ratio is 2000:1. The current transformer is installed in the cabinet in the way of screw direct fixation, which is flexible and convenient for installation and use.
AID150 Centralized alarm and display instrument		AID150 centralized alarm and display instrument adopts LCD display and RS485 bus communication, which can centrally monitor the data of up to 16 sets of AIM-R100 residual current monitors or the insulation monitors such as AIM-M10 and AIM-M100, and it can alarm remotely by sound and light.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

ACLP10-24 DC power supply		ACLP 10-24 is DC24V power supply for AID150, which uses a completely isolated linear transformer. It has the characteristics of stable output voltage, small ripple, high voltage withstand grade. It adopts the standard guide way to install, and can be installed on the same guide way near the residual current monitor.

2 Functional characteristics

2.1 Function characteristics of AIM-R100

- With TN-S system residual current real-time monitoring and display function;
- Monitoring the residual current transformer wiring short circuit, break line, and the failure alarm;
- Relay output, LED alarm indication and various fault indicator function;
- Monitoring Advanced field bus communication technology, and centralized alarm and display, communication, can monitoring system operation condition real-time;
- SOE function, it can record the time of the alarm and fault types, convenient operating personnel analysis system running status, promptly eliminate malfunction;
- Self-checking function, through the function test device of residual current detection function;
- Remote reset function, can remote reset residual current monitor, eliminate the alarm message.

2.2 Function characteristics of AKH-0.66/L-20

- Measuring residual current in load with AIM - R100 residual current monitor;
- Measurement precision is 0.2 class, ratio is 2000:1.

2.3 Function characteristics of AID150

- Field bus technology, which can be communicated with the residual current monitor;
- Instrument can set the number of monitor and residual current alarm threshold in system remotely;
- When residual current exceeded threshold or connection failure, it provides sound and light alarm function, and it can be eliminated;
- Up to 16 AIM-R100 residual current monitors or insulation monitors can be monitored, wall installation, apply to the operating room, ICU, or other places of centralized monitoring.

2.4 Function characteristics of ACLP10-24

- Adopts linear transformer isolation, has strong anti-interference ability, low ripple;
- AC 220V input and DC 24V output, the maximum output power is 3W.

3 Reference standards

■ IEC 60364-7-710 *Building electrical installations section 7-710: Requirements for special installations or locations----medical locations*

■ IEC62020-1 *Electrical accessories - Residual current monitors (RCMs) - Part 1: RCMs for household and similar uses*

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

4 Technical parameters

4.1 Technical parameters of AIM-R100

They are shown in Table 2.

Table 2 Parameters of AIM-R100 residual current monitor

Items		Parameters
Accessory power supply	Voltage	AC 220V±10%
	Power dissipation	≤3VA
Residual current monitoring	Loops	12
	Measure range	0~5000mA
	Setting range	6~1000mA
	Frequency	50±5 Hz
Relay output	output	1 relay output, normally open
	Contact capacity	AC 250V/3A; DC 30V/3A
Communication	Interface	RS485
	Protocol	Modbus-RTU
MTBF		≥50000 hour

4.2 Technical parameters of AKH 0.66P26/L-20

They are shown in Table 3.

Table 3 Technical parameters of the AKH-0.66/L-20 residual current transformer

Items	Parameters
Precision	0.2
Ratio	2000:1
Rated (secondary) current	50mA
Secondary output of transformer	Cable line

4.3 Technical parameters of AID150

They are shown in Table 4.

Table 4 Technical parameters of AID150 centralized alarm and display instrument

Items		Parameters
Accessory power supply	Voltage	DC 24V
	Power dissipation	< 0.6W
Residual current display range		--
Self-check function		√
Number of systems		≤16
alarm		Sound and light alarm, sound can be eliminated
SOE		Leakage fault, transformer break, short circuit of

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

	transformer, equipment fault
Communication	RS485; Modbus-RTU
Display	128*64 dots LCD

4.4 ACLP10-24 DC power supply

They are shown in Table 5.

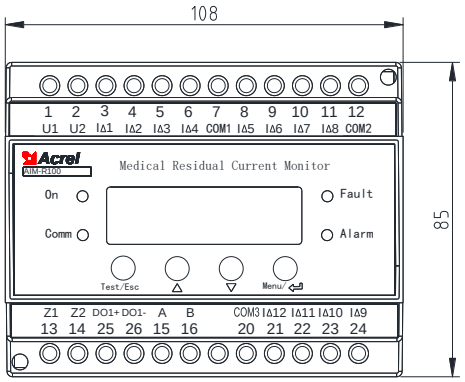
Table 5 Technical parameters of the ACLP10-24 DC power supply

Items	Parameters
Input Voltage	AC 220V（±10%）
Frequency	50/60Hz
Power	3W
Output Voltage	DC 24V±5%
Voltage change rate	≤30%
Heat	≤20℃

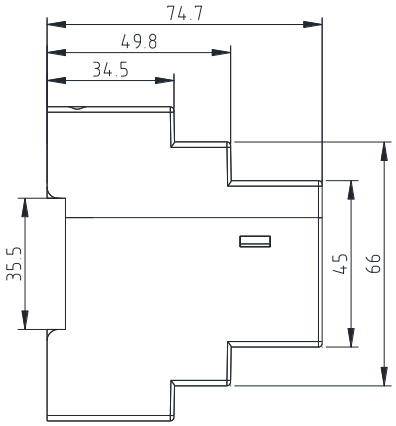
5 Installation and connection

5.1 Appearance and installation opening size

5.1.1 Appearance and mounting hole size of AIM-R100 Residual current monitor (unit: mm)

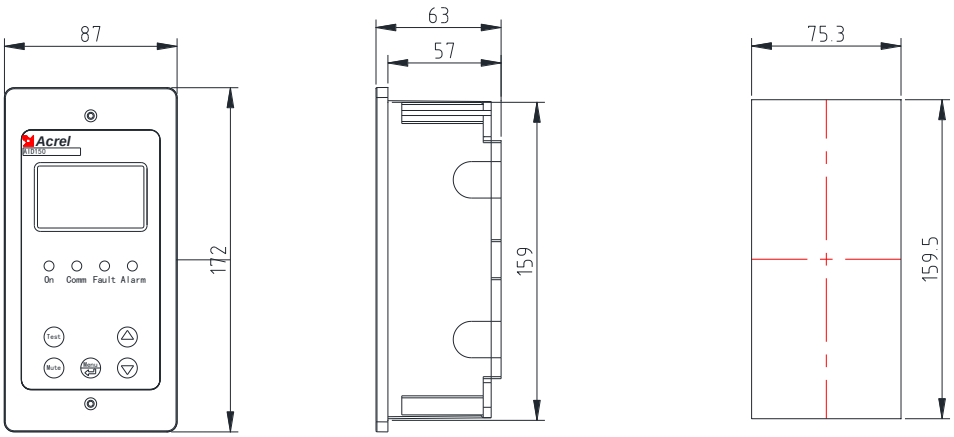


Front view



Side view

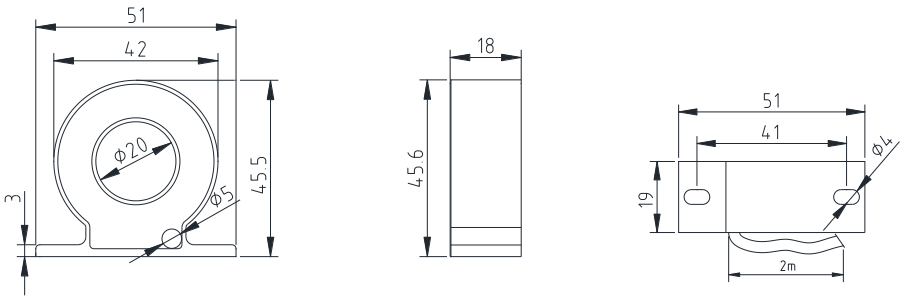
5.1.2 Shape and mounting hole size of AID150 (unit: mm)



Front view　　Side view　　Hole size

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

5.1.3 Shape and mounting hole size of AKH-0.66/L-20 residual current transformer (unit: mm)



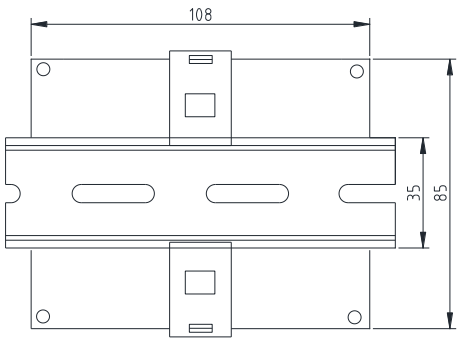
Front view Side view Bottom view

5.2 Method of installation

In addition to the AID150 centralized alarm and display instrument, the residual current monitoring products are best centrally installed in the distribution cabinet. AIM-R100 residual current monitor uses 35mm standard guide rail to install, AKH-0.66/L-20 residual current transformer uses screws (attached) directly fixed installation. When the AID150 is used in the operating room, it can be embedded in the wall and installed next to the information panel in the operating room for medical personnel to view; When AID150 is used in other medical places, it is recommended to install in the nurse station. It can also be installed in other locations that are easy to monitor. External wiring of the AID150 includes two DC24V power supply lines and two RS485 communication lines, which are drawn from the distribution cabinet. Pipelines should be reserved during construction. In the centralized monitoring, the RS485 communication between the AIM-R100 and AID150 should be connected hand in hand.

5.2.1 Installation method of AIM-R100 residual current monitor

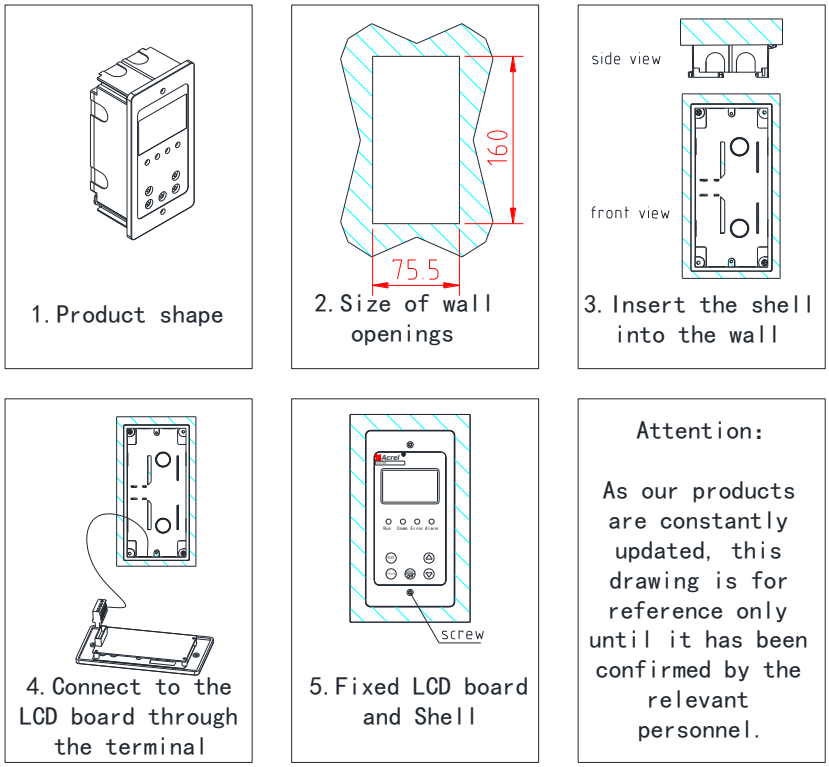
The AIM-R100 residual current monitor is installed with guide rail and fixed with buckles, as shown in the figure below:



5.2.2 Installation method of AID150 centralized alarm and display instrument

AID150 centralized alarm and display instrument, which is suitable for embedded wall installation. installation diagram is shown in figure below.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000



During the decoration, firstly, the AID150 should be embedded in the wall to be fixed and be close to the knockouts of the pipeline, so that the wires (two power cords and two-core shielded twisted pair) can be drawn to the front cover, and then fix the cover on the shell with screws.

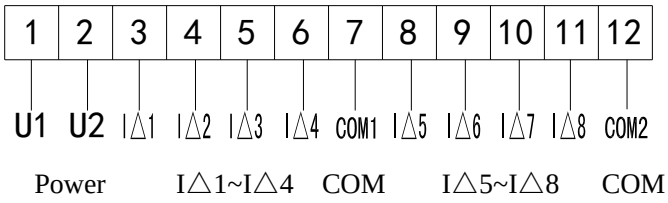
5.2.3 Installation method of ACLP10-24 DC24V power supply

The ACLP10-24 DC24V power supply is used to install in the way of guide rail, which is fixed with snap-in type. It can also be installed on the same guide rail side by side with the AIM-R100 insulation monitor.

5.3 Wiring method

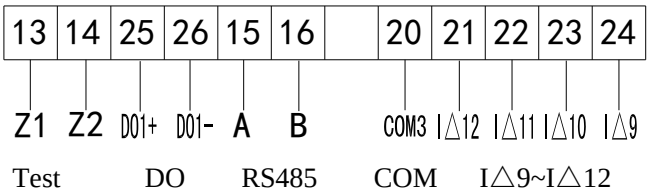
5.3.1 Wiring method of AIM-R100 residual current monitor

Upper terminals: U1, U2 (1, 2) are AC220V auxiliary power supply. I△1~I△8 (3, 4, 5, 6, 8, 9, 10, 11) are connected to one end of the residual current transformer, and COM1 (7) or COM2 (12) are connected to the other end of the residual current transformer corresponding (wiring without polarity).



Lower terminal: Z1, Z2 (13, 14) access to external self-check reset button, DO1+, DO1- is alarm relay output, A, B is centralized alarm and display instrument terminal, I△9-I△12 (24, 23, 22, 21) access to the end of the residual current transformer, COM3 (20) access to the other end of the residual current transformer (wiring without polarity).

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000



Notes:

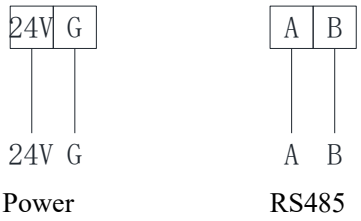
(1) The residual current monitor is matched with the transformer's own outgoing line.

(2) The wiring of residual current monitor U1 and U2 (1 and 2) is suggested to connect each 6A fuse to ensure instrument safety.

(3) when the residual current monitoring is not match with 12 transformers, the empty interface I△n should be connected to the nearby COM with 100Ω resistance, avoid the break line fault alarm.

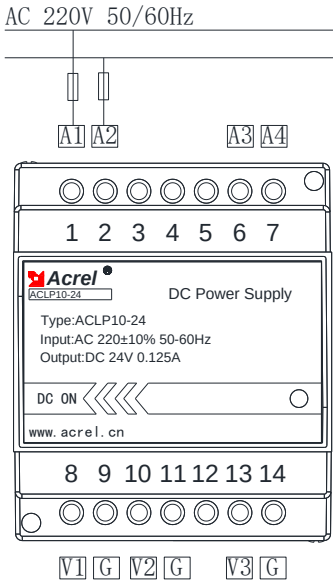
5.3.2 Wiring method of AID150 centralized alarm and display instrument

Terminal A and B are connected to terminals A and B (15, 16) in AIM-R100.The power terminals shall be connected to the positive pole and ground of the DC24V power supply respectively. The wiring diagram is shown in the figure below.



DC24V power supply can be selected with 2×1.5mm^2 multi-strand copper wire connection; 2×1.5mm2 shielded twisted pair can be used for external wiring of RS485 communication terminals. COM terminals used for communication should not be connected.

5.3.3 ACLP10-24 DC24V power supply

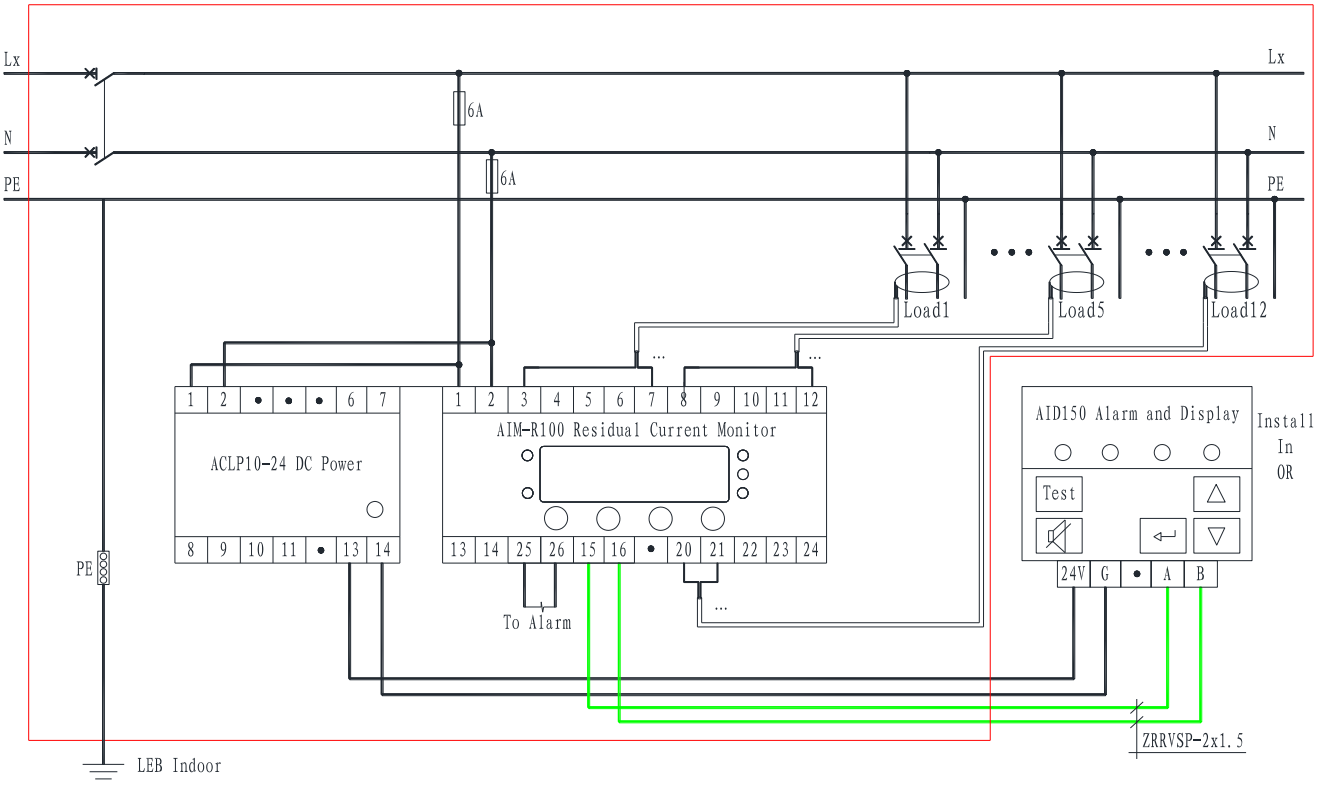


Terminals 1 and 2 of the ACLP10-24 DC24V power supply and A1, A3 are the input terminals of AC 220V power supply, while A3 and A4 are the input extension terminals corresponding to terminals

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

7 and 8. In the instrument, A3 is connected with A1 and A4 is connected with A2.V1, G, V2, G corresponding to Terminals 8 and 9, V2, G corresponding to terminals 10 and 11, and V3 and G corresponding to terminals 13 and 14 are the output terminals of three groups of DC24V power supply, which are used to provide DC24V power for the AID 150. In the meter, all V terminals are connected and all G terminals are connected.

5.4 Typical wiring method



Added description:

(1) Each residual current monitor can be equipped with at most 12 AKH-0.66/L-20 residual current transformers.

(2) Terminals 1 and 2 of the AIM-R100 residual current monitor and terminals 1 and 2 of the power supply of ACLP10-24 DC24V power supply shall be connected to AC220V, which can be directly connected to the bus bar as shown in the figure above, and connected to fuse protection of 6A.

(3) Terminals 13 and 14 of the AIM-R100 residual current monitor are connected to the remote reset button, which is used for the automatic reset of the instrument to ensure the safety and reliability of the system.

(4) When applied to single-phase branches, AKH 0.66/L-20 needs to pass through two lines of L and N of each output circuit, and the PE line does not need to be worn in; When applied in three-phase three-wire branch, the transformer passes through three wires A, B and C. When applied to three-phase four-wire, the transformer passes through four wires A, B, C and N. Residual current transformer output lines connected to the corresponding terminal of AIM-R100, connecting to 100Ω resistance to empty terminal to avoid causing false alarms.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

(5) Terminal 15, 16 of the AIM-R100 residual current monitor and Terminals A and B of AID150 centralized alarm and display instrument can be connected with 2*1.5 mm^2 shielded twisted-pair cable. When AID150 is used to monitor multiple AIM - R100, the connection mode of the communication line should be hand in hand (A to A, B to B, one by one), RS485 bus between the end of the first two communication terminal should be matches with a resistance, recommend and appendant resistance is 120 Ω.

5.5 Matters needing attention

(1) The residual current monitoring products, except for the AID150 centralized alarm and display instrument, should be centrally installed in the isolated power cabinet or distribution cabinet. centralized alarm and display instrument generally select wall installation.

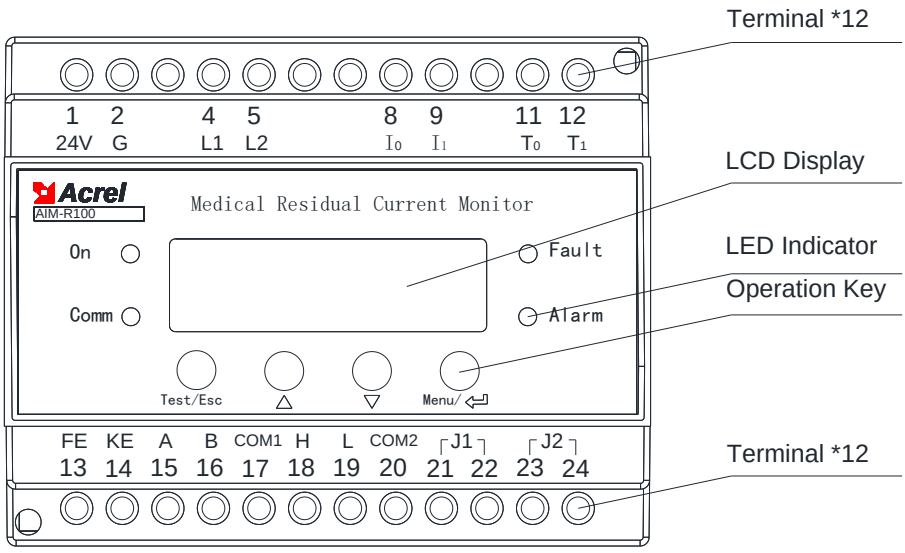
(2) During installation and wiring, the wiring diagram shall be followed. It is better to press and connect the wiring with the needle-type sleeve joint, then insert the corresponding terminals of the instrument and tighten the screws to avoid abnormal working of the instrument due to poor contact.

(3) The empty loop of AIM-R100 must be connected to 100Ω resistance.

6 Operation and Usage

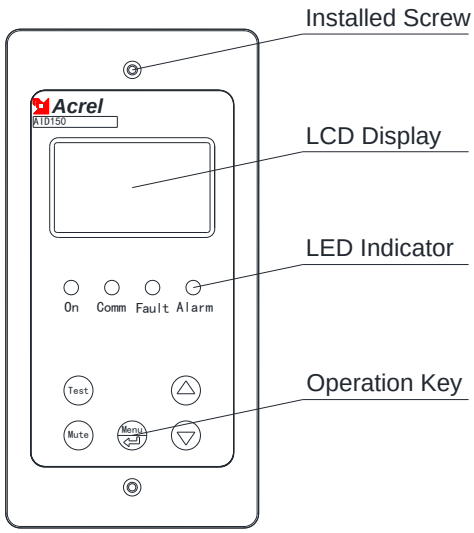
6.1 Display Panel

(1) AIM-R100 residual current monitor panel



(2) AID150 centralized alarm and display instrument

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000



6.2 LED instructions

6.2.1 AIM-R100 residual current monitor LED instruction

LED states	Instruction
"RUN"	In normal operation, the light flashes at a frequency of about once a second
"COMM"	Communication status of the device. the indicator light flashes while communication.
"FAULT"	The indicator light flashes and alarms while the residual current monitor has fault
"ALARM"	The indicator light flashes and alarms while the detected circuit has leakage.

6.2.2 AID150 centralized alarm and display instrument LED instruction

LED states	Instruction
"RUN"	In normal operation, the light flashes at a frequency of about once a second
"COMM"	Communication status of the device. the indicator light flashes while communication.
"FAULT"	The indicator light flashes and alarms while AIM-R100 or AIM-M 100 has fault
"ALARM"	When the value of AIM-R100 exceeds the threshold alarm, the indicator light flashes and alarms

6.3 Function description of keys

6.3.1 Key function description of AIM-R100 Residual current monitor

AIM-R100 residual current monitor has four buttons, "Test/ESC", "▲", "▼", "Menu/Enter".

Keys	Function
Test/ESC	In non-programming mode, self-check function; In programming mode, used as a return key.
▲, ▼	In non-programming mode, used to browse SOE; In programming mode, used to increase, decrease, or change the state.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Menu/Enter	In non-programming mode, press this key to enter programming mode; In programming mode, when enter ok key is used.

6.3.2 Key function description of AID150 centralize alarm and display instrument

AID150 centralize alarm and display instrument has five buttons, "Test", "Mute", "Menu/Enter", "▲", "▼".

Keys	Function
Test	In non-programming mode, used for self-check function.
Mute	Cancel the alarm sound when an alarm occurs by press this key.
Menu/Enter	In non-programming mode, press this key to enter programming mode; In programming mode, when enter ok key is used.
▲, ▼	In programming mode, used for increasing or decreasing.

6.4 Key operation instructions

6.4.1 AIM-R100 residual current monitor key operation in programming mode

(1) Enter the programming mode

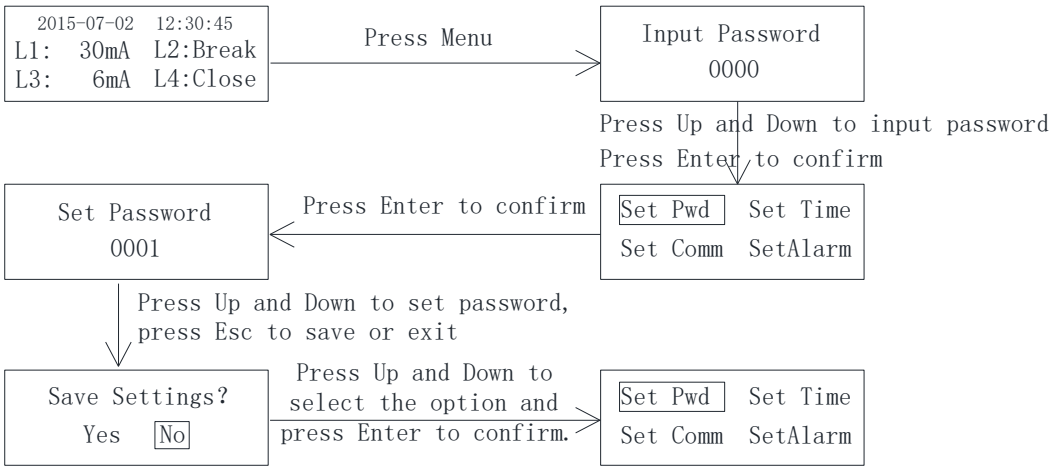
In normal operation, press the "Menu/Enter" key to enter the programming mode password entry page. After entering the correct password, press enter to enter programming mode. The default password is 0001.

(2) Quit the programming mode

In programming mode, press "Test/ESC" to directly return to the operation interface.

(3) System password setting

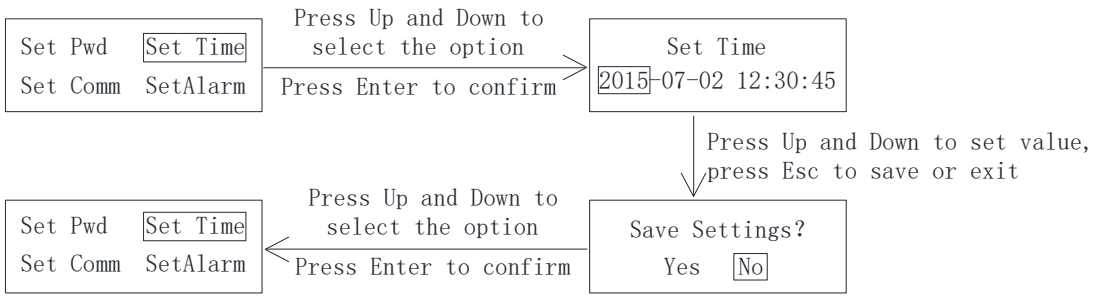
Select the option [Set Pwd] in programming mode and press "Menu/Enter". Change the system password by "▲" and "▼", and press "Test/ESC" to exit after the change is completed. Press "Menu/Enter" to save the change to "Yes" and exit. Operation examples are as follows:



(4) Time setting

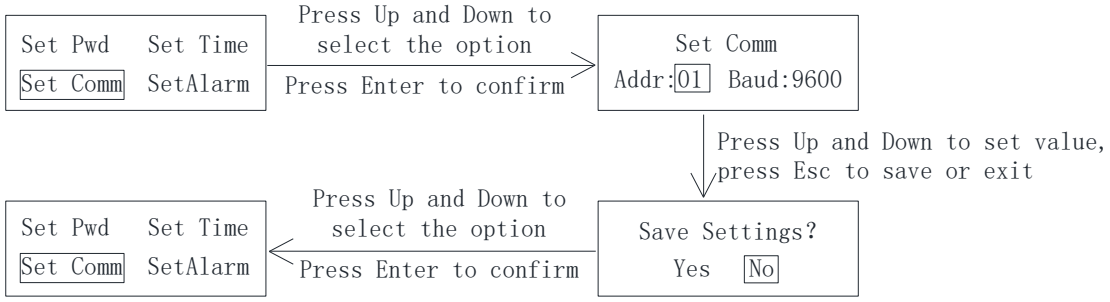
Select the option [Set Time] in programming mode and press enter. Change the system time by "▲" and "▼", and press "Test/ESC" to exit after the change is completed. Press "Menu/Enter" to save the change to "Yes" and exit. Operation examples are as follows:

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000



(5) Communication Settings

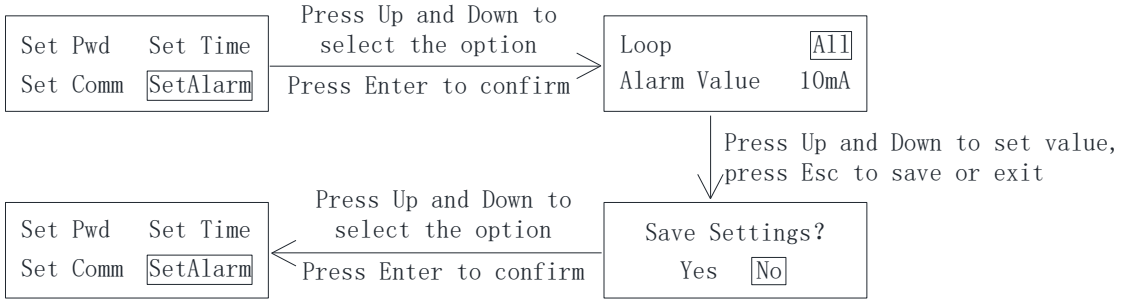
[Set Comm] is to set the communication parameters between the residual current monitor and the centralized alarm and display instrument. It belongs to the menu of the same level as [Set Pwd], and the entry steps are the same. Press "Test/ESC" to exit when the setup is complete. Press "Menu/Enter" to save the change to "Yes" and exit. Operation examples are as follows:



Note: When setting communications, set the monitor communication addresses in an order of 1 to 245 (the addresses cannot be repeated), and set the baud rate to 9600. One AID150 can be connected to a maximum of 16 AIM-R100s. When only one AIM-R100 is connected to the AID150, use the default value.

(6) Protection Settings

[SetAlarm] is the residual current detection threshold setting. Select [SetAlarm] in the programming mode to set the residual current loop number, loop alarm value and trip time. Press "Test/ESC" to exit when the setup is complete. Press "Menu/Enter" to save the change to "Yes" and exit. Operation examples are as follows:

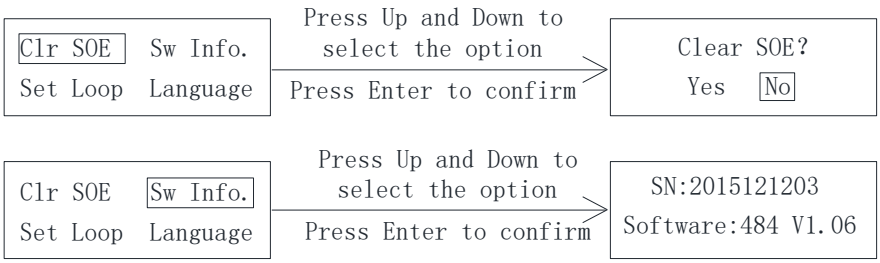


(7) Empty the record and version information

[Clr SOE] is for clearing fault records and re-records at the current time.

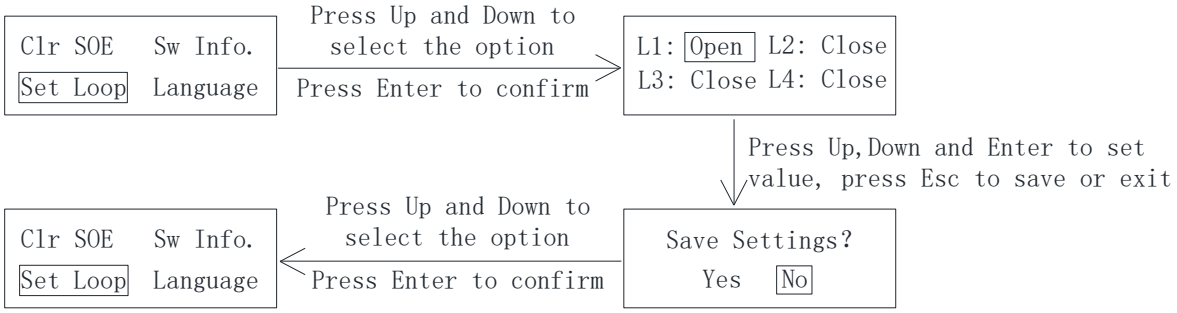
[Sw Info.] is used to display information about the meter model and software version. The operation is relatively simple, as follows:

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000



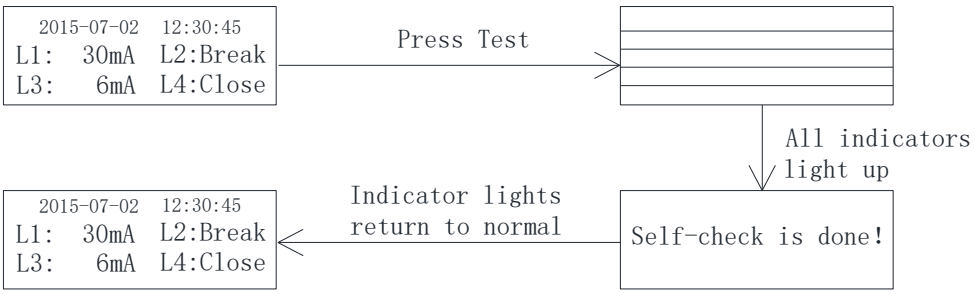
(8) Enable and close some unused circuits

[Set Loop], AIM-R100 can be connected to 12 AKH-0.66/L-20 residual current transformers at most, it can close off the unused part of the circuit that is not connected to the transformer, so as to avoid the instrument identification as the wiring failure of the transformer. The operation is as follows:



(9) Self-check operation

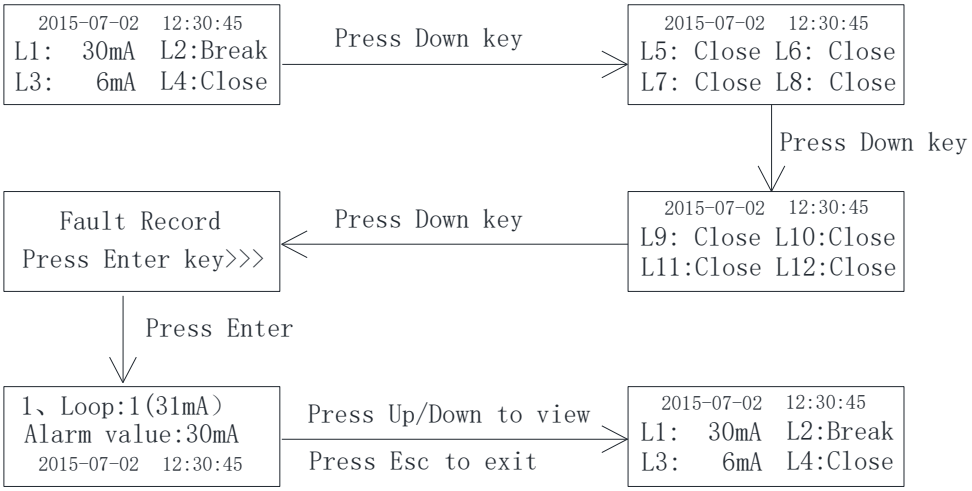
Click the "Test/ESC" button in the normal operation state, and the instrument will monitor its own functional status. After the self-check is completed, it will automatically jump to the normal operation state. Operation examples are as follows:



(10) Fault event record query

Click "Down" button for many times in normal operation to reach the interface of [Fault Record], and click "Menu/Enter" button to enter. Up to 10 fault records can be recorded, arranged from new to old. Press "Test/ESC" button to exit when the view is complete.

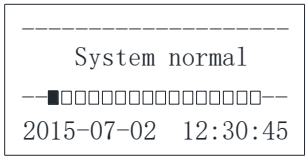
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000



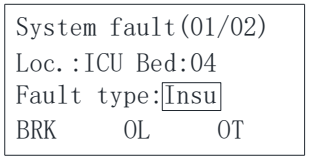
6.4.2 AID150

(1) Description of the Operating Interface

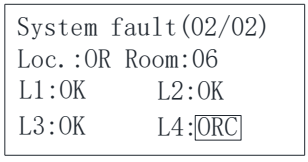
After the system is powered on, if there is no fault alarm, AID150 shows the normal operation interface as shown in the following figure. The black boxes in the figure indicate that the corresponding address serial number is connected to the instrument communication, and the black boxes indicate that there is no instrument connection, or that the communication is not connected. When the insulation monitors or residual current monitor detects the fault, AID150 displays the corresponding alarm interface and sends out the corresponding sound and light alarm.



Normal System

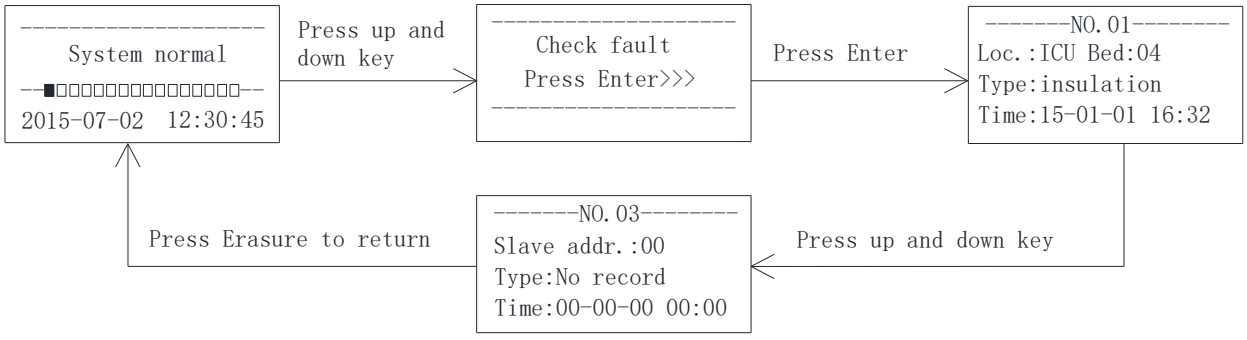


Fault Indication (AIM-M100)



Fault Indication (AIM-R100)

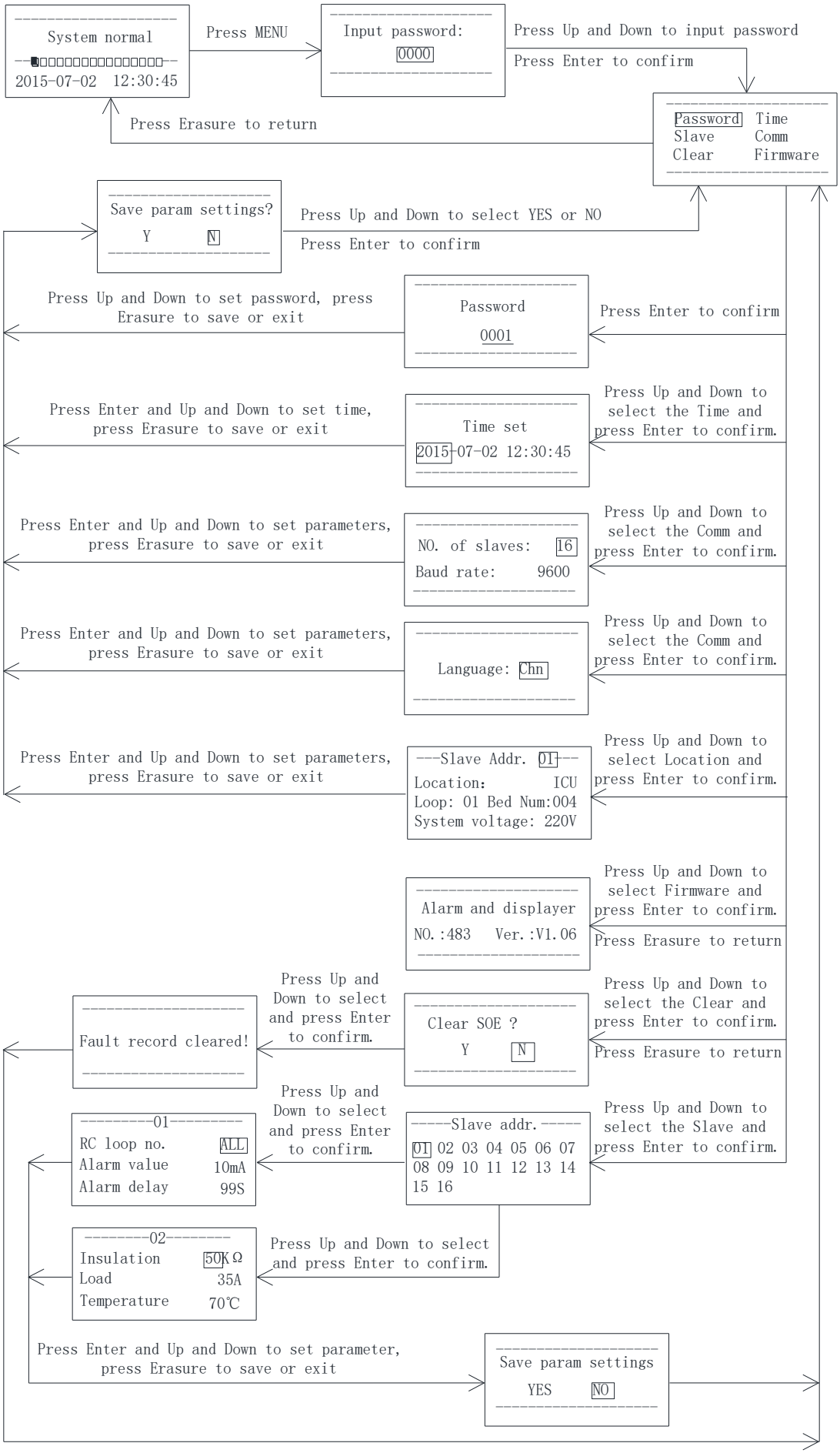
(2) Fault record viewing interface operations and descriptions



(3) Programming Interface Operation and Explanation

The operation method and process are shown in the following flow chart.

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000



LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Note:

when AID150 is in use, the total number of Insulation Monitors and residual current monitors connected to RS485 bus should be set first, and the total number should not exceed 16 sets. This parameter is in [Set Comm] in the menu. The slave address of each insulation monitor and residual current monitor shall be numbered from 1 to 16 as far as possible. When the total number of Insulation Monitors and residual current monitors exceeds 16 sets, the number of AID150 shall be increased and networking shall be conducted separately.

7 Communication protocol

7.1 Modbus-RTU communication protocol

Meter RS485 interface adopts Modbus-RTU communication protocol, which defines the address, function code, data, check code in detail. It is the necessary content to complete the data exchange between the host and slave machine.

7.2 Introduction to the function code

7.2.1 Function code 03H or 04H: Read the registers

This function allows the user to acquire the data collected and recorded by equipment and the system parameters. The number of data requested by hosts has no limit, but cannot exceed the defined address range.

The following example shows how to read a measured insulation resistance value from No.01 slave computer, with the address of the value of 0008H.

The host computer sends		Send message
Address code		01H
Function code		03H
Start address	High byte	00H
	Low byte	08H
Number of registers	High byte	00H
	Low byte	01H
CRC check code	Low byte	05H
	High byte	C8H

The slave computer returns		Return message
Address code		01H
Function code		03H
Bytes		02H
Register data	High byte	00H
	Low byte	50H
CRC check code	Low byte	B8H
	High byte	78H

7.2.2 Function code 10H: Write the registers

The function code 10H allows the user to change the contents of multiple registers, which can write the time and date in this meter. The host can write up to 16 (32 bytes) data at a time.

The following example shows a preset address of 01 with an installation date and time of 12:00, Friday, December 1, 2009.

The host computer sends		Send message
Address code		01H
Function code		10H
Start address	High byte	00H

The slave computer returns		Return message
Address code		01H
Function code		10H
Start address	High byte	00H

Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

	Low byte	04H
Number of registers	High byte	00H
	Low byte	03H
Number of registers		06H
0004H data	High byte	09H
	Low byte	0CH
0005H data	High byte	01H
	Low byte	05H
0006H data	High byte	0CH
	Low byte	00H
CRC check code	Low byte	A3H
	High byte	30H

	Low byte	04H
Number of registers	High byte	00H
	Low byte	03H
CRC check code	Low byte	C1H
	High byte	C9H

7.3 AIM-R100 communication address table

No.	Address	Parameter	Read-Write	Value Range	Data Type
1	0000H	Password	R/W	0001~9999; default 0001	word
2	0001H	RS485 address	R/W	1~16; default 1	word
		RS485 baud rate	R/W	1~3: 4800, 9600, 19200 bps; default 2	
3	0002H	Reserve	R/W		word
4	0003H	Reserve	R/W		word
5	0004H	Clock-year	R/W	1~99	word
		Clock-month	R/W	1~12	
6	0005H	Clock-day	R/W	1~31	word
		Reserve	R/W		
7	0006H	Clock-hour	R/W	0~23	word
		Clock-minute	R/W	0~59	
8	0007H	Clock-second	R/W	0~59	word
		Reserve	R/W		
9	0008H	Trip time	R/W	0~60; unit second	word
10~11	0009H~000AH	Reserve	R/W		
12	000BH	Meter type	R	bit15~bit12, 0 for IMD; 1for RCM	word
		Reserve	R	bit11-bit8, Reserve	

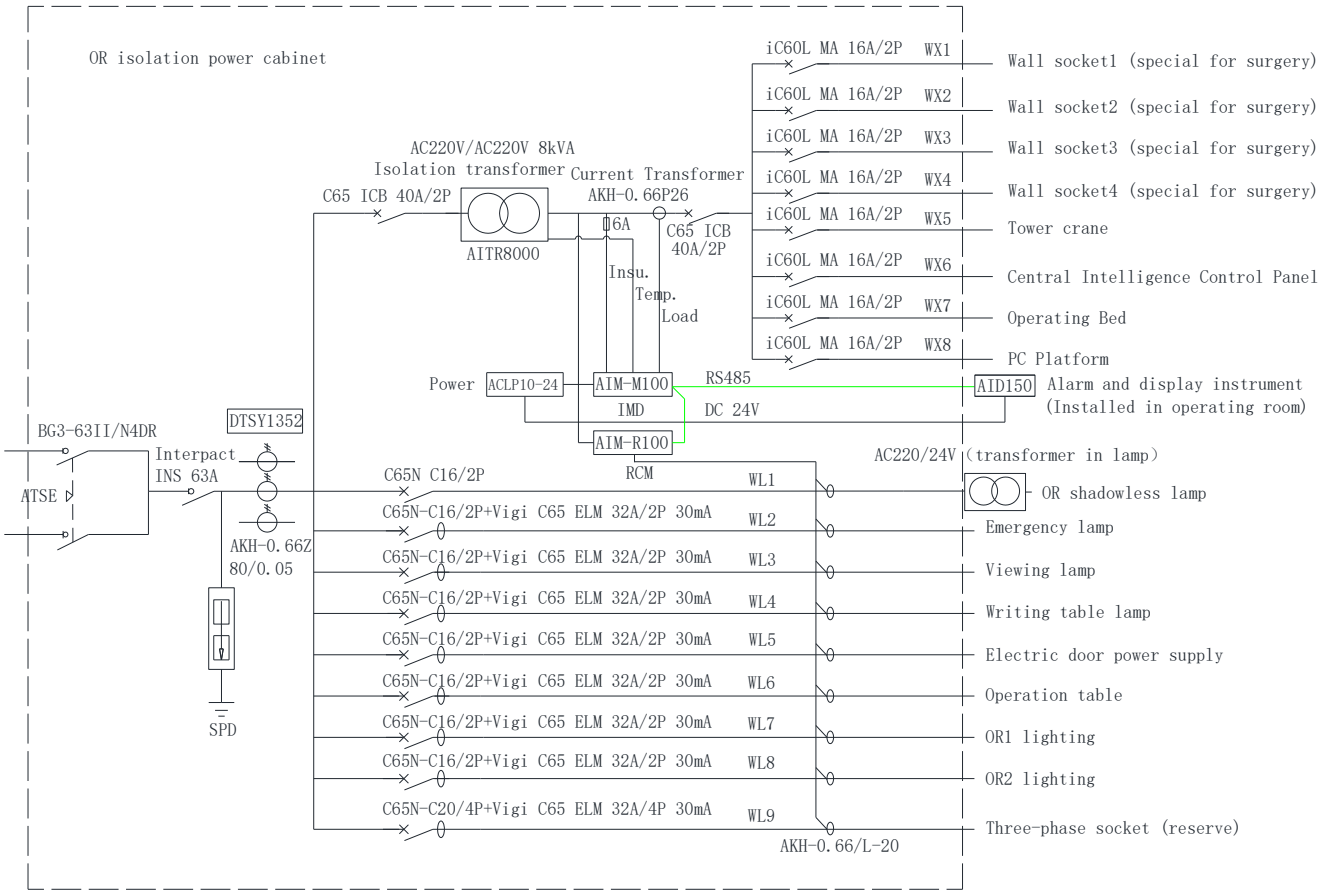
Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

		Fault Flag	R	bit7-bit6, Loop 1 state (00 normal, 01 short circuit, 10 break line, 11over current)	
			R	bit5-bit4, Loop 2 state	
			R	bit3-bit2, Loop 3 state	
			R	bit1-bit0, Loop 4 state	
13	000CH	Fault Flag	R	bit15~bit14, Loop 5 state	word
			R	bit13~bit12, Loop 6 state	
			R	bit11~bit10, Loop 7 state	
			R	bit9~bit8, Loop 8 state	
			R	bit7~bit6, Loop 9 state	
			R	bit5~bit4, Loop 10 state	
			R	bit3~bit2, Loop 11 state	
			R	bit1~bit0, Loop 12 state	
14	000DH	SOE1 Fault loop	R	1~12	word
15	000EH	Fault current value	R	10~5000 (0xE5E5 for short circuit, 0xFAFA for break line)	word
16	000FH	Fault value set	R	10~1000	word
17	0010H	Fault time-year	R	1~99	word
		Fault time-month	R	1~12	
18	0011H	Fault time-day	R	1~31	word
		Fault time-hour	R	0~23	
19	0012H	Fault time-minute	R	0~59	word
		Fault time-second	R	0~59	
20~73	0013H~0048H	SOE 2~10	R	Format like SOE 1	
74	0049H	Reserve	R		word
75~86	004AH~0055H	Loop 1~12 value	R	0~5000	
87~98	0056H~0061H	Loop 1~12 fault value	R	6~1000	

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

8 Typical applications

The application of medical residual current monitoring products in the operating room power distribution system is shown in the figure below:



Note: The grounding in the isolated power supply cabinet should be connected reliably with the equipotential terminals in the field.

9 Power on and debugging instructions

9.1 Wiring check

Each set of residual current monitoring products should be connected before power on, mainly to check whether there is wrong connection, missing connection, or short circuit. According to the wiring diagram shown in part 5.4 of this manual, the inspection can be carried out in the following order:

(1) Check each set of residual current monitoring system, including AIM-R100 residual current monitor, AKH0.66/l-20 residual current transformer, AID150 centralized alarm and display instrument, and ACLP10-24 DC24V power supply which supply power for AID150.

(2) Check input terminals 1 and 2 of ACLP10-24 DC24V power supply in each set of residual current products are connected to AC220 V power supply. Whether the 24V and G of the output end are reliably connected with the 24 V and G terminals of the AID150 centralized display instrument, and the positive and negative poles are correct.

(3) Check the corresponding wiring of each residual current transformer in the system is connected with I△n at one end and COM terminal at the other end (without positive and negative). Check the

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

wiring of transformer.

9.2 Common faults and eliminations

Make sure the wirings are correct and power on the system. Then check whether each meter is abnormal, and whether there is a fault alarm in AIM-R100. For common problems, the causes can be determined and the faults can be eliminated according to the phenomenon of each instrument and the fault types:

Type	Fault	Possible causes and troubleshooting
AIM-R100 residual current monitor	LCD display: disconnection fault, fault indicator light on	The outgoing line of residual current transformer (or 100Ω resistance) is not reliably connected to the signal input terminal of AIM-R100. Check the wiring and ensure the reliable connection.
	LCD display: short-circuit fault, fault indicator light lights on	If the outgoing line of residual current transformer is short circuited, check the wiring and ensure its reliable connection.
	The meter doesn't work	The 220V power supply of AIM-R100 is not connected well. Check the wiring of terminals 1 and 2 and ensure its reliable connection.
ACLP10-24DC24 power supply	Power on indicator is not lit.	Check whether the wirings of 220V power input are normal and whether the voltage between the two terminals is within the allowable input range.
AID150 centralized alarm and display instrument	The meter doesn't work	The 24V power supply is not connected well. Check the wirings of 24V and G terminals and rewire.
	Communication fault	(1) The address setting of AIM-R100 is repeated, or BAUD is not set to the default 9600. (2) If the communication line with AIM-R100 in the system is not well connected, check the communication line and confirm whether the matching resistance is connected properly.

Note: If the faults occur, interrupt the power to troubleshoot, and adjust the wirings until everything is ok.

9.3 Settings and debugging

(1) When entering the menu settings, products need to input the password. The initial password of all products is 0001.

(2) After the system is powered on normally, the default alarm current threshold is 10mA. If it needs to be adjusted, please refer to chapter 6.4 to change the parameter operation.

(3) Communication address setting. In order to realize the centralized monitoring function of multiple sets of residual current monitors through centralized alarm and display AID150, it is necessary to set the communication address of AIM-R100 of each residual current monitor in turn, and then connect the communication lines between instruments hand in hand. After setting, the head and end of the communication bus are connected in parallel with a matching resistor of 120Ω (the resistance must be added, otherwise communication may not be possible). AID150 does not require additional setting of RS485 communication address.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

(4）When AID150 is used, the total number of residual current monitors or insulation monitors connected to RS485 bus should be set first, and the total number should not exceed 16 sets. This parameter is set in the [Comm set] submenu of the menu. The slave address of each residual current monitor or insulation monitor shall be numbered from 1 to 16 as far as possible. When the total number exceeds 16 sets, the number of AID150 shall be increased and networking shall be conducted separately.

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000

Headquarters: Acrel Co., LTD.
Address: No.253 Yulv Road Jiading District, Shanghai，China
TEL.: 0086-21-69158338　0086-21-69156052　0086-21-59156392　0086-21-69156971
Fax: 0086-21-69158303
Web-site: www.acrel-electric.com
mail: ACREL008@vip.163.com
Postcode: 201801

Manufacturer: Jiangsu Acrel Electrical Manufacturing Co., LTD.
Address: No.5 Dongmeng Road,Dongmeng industrial Park, Nanzha Street,Jiangyin City,Jiangsu Province,China
TEL：0086-510-86179966
Fax：0086-510-86179975
Web-site: www.jsacrel.com
Postcode: 214405
E-mail: sales@email.acrel.cn

LRI Distribuída no Brasil pela LRI | vendas@lri.com.br | 51 2129-3000