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Acrel Electric Co.,Ltd

医用 IT 系统绝缘监测产品

（四件套）

安装使用说明书 V2.2

Medical IT System Insulation Monitoring Products (Four-piece Set) Installation and Operation Manual V2.2

安科瑞电气股份有限公司

Acrel Electric Co., Ltd.

申　　明

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更 改 履 历

次数	更改日期	更改后版次	更改原因
01	2016.1.20	V2.0	在原来绝缘监测产品的基础上，把所有四件套产品的内容都整合进来，以完全替代各分产品的说明书。
02	2016.10.25	V2.1	对部分的错误进行了修正。
03	2016.11.7	V2.2	概述中增加了“产品符合企业标准 Q31/0114000129C013-2016 《IT 系统绝缘监测仪》的规定。”
Number of times	Revision date	Versions after revision	Reasons for revision
01	2016.1.20	V2.0	On the basis of the original insulation monitoring products, all four pieces of products are integrated into the content to completely replace the specifications of the products.
02	2016.10.25	V2.1	Corrected some mistakes
03	2016.11.7	V2.2	The overview added "products conform to Enterprise standards Q31/0114000129C013-2016 ***IT System Insulation Monitoring Instrument”***
备注： Note:			

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1 概述

1 Introduction

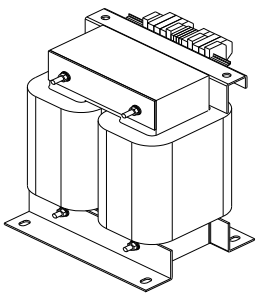
医用 IT 系统主要应用于诸如手术室、ICU/CCU 重症监护室等重要的医疗 2 类场所，为这些场所的重要设备提供安全、可靠、连续的配电。医用绝缘监测产品是安科瑞电气集多年电力仪表行业的设计经验，根据医疗 2 类场所对配电系统绝缘电阻的特殊要求而开发的监测仪表。可用于医疗场所的各类手术室和重症监护室的隔离电源系统，实现系统绝缘、负载和隔离变压器温度等运行状况的实时监测，并可实现远程监控。产品符合企业标准 Q31/0114000129C013-2016 《IT 系统绝缘监测仪》的规定。

The medical IT system is mainly used in important Class 2 medical locations such as operating room, ICU/CCU intensive care unit, providing safe, reliable and continuous power distribution for the important equipment at these locations. Medical insulation monitoring and fault locating device is developed by the many years' design experience of the Acrel Electric in electric power meter industry, according to the special requirements of the insulation monitoring and fault locating of the power distribution system in Class 2 medical locations. The products can realize the real-time monitoring of insulation, load and temperature of isolation transformer in IT system, and have the functions of system insulation fault loop positioning and centralized monitoring by multiple pieces of systems. Products conform to the provisions of enterprise standard Q31/0114000129C013-2016 *IT System Insulation Monitoring Instrument*.

医用 IT 系统绝缘监测产品（四件套）包括 AITR 系列医用隔离变压器、AIM-M10 医疗智能绝缘监测仪、AKH-0.66P26 电流互感器和 AID 系列（AID10、AID130、AID150）外接报警与显示仪等，产品如表 1 所示。

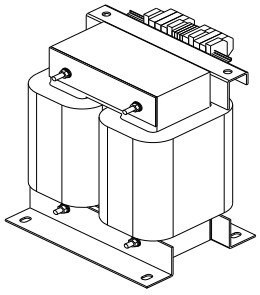
Medical IT system insulation monitoring (four-piece set) include AITR series medical isolation transformer, AIM-M10 medical intelligent insulation monitoring instrument, AKH-0.66P26 current transformer, and AID series(AID10、AID130、AID150) centralized alarm and display instrument, which are shown in Table 1.

表 1 医用 IT 系统绝缘监测产品（四件套）

名称及型号	产品图片	说明
AITR 系列医用隔离变压器		AITR 系列隔离变压器专用于医疗 IT 系统，铁芯采用日本进口的硅钢片叠加而成，损耗很小。绕组间采用了双重绝缘处理，并设有静电屏蔽层，减少了绕组间的电磁干扰。线包内安装了 PT100 温度传感器，用于监测变压器温度。整体采用真空侵漆处理，增加了机械强度和抗腐蚀性。产品具有很好的温升性能和很低的噪声。

AIM-M10 医疗智能绝缘监测仪			AIM-M10 医疗智能绝缘监测仪采用先进的微控制器技术，集成度高，体积小巧，安装方便，集智能化、数字化、网络化于一身，是手术室、重症监护室等医疗 2 类场所隔离电源系统绝缘监测的理想选择。
AKH-0.66P26 电流互感器			AKH-0.66P26 型电流互感器是与 AIM-M10 绝缘监测仪配套使用的保护型电流互感器，最大可测电流为 60A，变比是 2000：1，电流互感器采用螺丝直接固定的方式装于机柜内部，二次侧通过接线柱引出，安装和使用方便。
AID 系列外接报警与显示仪	AID10		适合于嵌入墙体安装，可监控 1 台 AIM-M10 绝缘监测仪，具有绝缘、过载、超温、设备故障等故障的声光报警功能，指示灯显示，RS485 通讯。
	AID130 AID150		AID130 和 AID150 集中报警与显示仪采用相同的产品外壳，采用 LCD 液晶显示，RS485 总线，可集中监控最多 16 套 AIM-M10 医疗智能绝缘监测仪的数据，可远程声光报警。AID150 还可监控多套 AIM-R100 剩余电流监测仪的数据。

Table 1 Medical IT System Insulation Monitoring Products

Name and Model	Product Pictures	Descriptions
AITR series medical isolation transformer		AITR series isolation transformer is specially used in medical IT system, and the core superposition adopts the silicon steel sheet imported from Japan, which has very small losses. The windings are treated with double insulation and have electrostatic shielding layer, which reduces electromagnetic interference between windings. The PT100 temperature sensor is installed in the wire bag to monitor the temperature of transformer. The whole body is treated with vacuum invasion paint, which increases mechanical strength and corrosion resistance. The product has good temperature rise performance and very low noise.

AIM-M10medical intelligent insulation monitoring instrument			AIM-M10 medical intelligent insulation monitoring instrument adopts advanced microcontroller technology, which has high integration, compact size, convenient installation and integrates intelligence, digitalization and networking in one. It is ideal selection for insulation monitoring of isolation power system in Class 2 medical locations such as operating room and intensive care unit.
AKH-0.66P26 current transformer			The AKH-0.66P26 type current transformer is the protective current transformer supporting the AIM-M200 insulation monitor, of which the maximum measurable current is 60A and the transformation ratio is 2000:1. The current transformer is directly fixed inside cabinet by screwing, and the secondary side is leaded out by the terminal, which is convenient to install and use.
AID series external alarm and displayer	AID130 AID150		The concentrated alarms and displayers of AID130 and AID150 employ the same product shell, LCD and RS485 bus, which can do centralized monitoring of the data of 16 sets of medical intelligent insulation monitoring instruments to the maximum and are capable of remote sound-light alarm. AID150 can also monitor the data of multiple sets of AIM-R100 aftercurrent monitoring instruments.

2 功能特点

2.Functional characteristics

2.1 AITR 系列医用隔离变压器功能特点

2.1 Function features of AITR series medical isolation transformer

- 初次级绕组之间的变比为 1：1；
- 绕组与绕组之间采用了双重绝缘处理，并设计了静电屏蔽层；
- 每个线包内均安装了 PT100 温度传感器，用于监测隔离变压器的温度；
- 用于将 TN 系统经隔离变压器后，转接成 IT 系统（不接地系统）。
- The transformation ratio between the primary and secondary windings is 1:1;
- Double insulation treatment is adopted between the windings, and the electrostatic shielding layer is designed.
- The PT100 temperature sensor is installed in each wire packet to monitor the temperature of the isolation transformer;

- Used for the transformation of TN system into IT system (ungrounded system) after isolation transformer.

2.2 AIM-M10 绝缘监测仪功能特点

2.2 Function features of AIM-M100 medical intelligent insulation monitoring instrument

- 具有对被监测 IT 系统对地绝缘电阻、变压器负荷电流、变压器绕组温度实时监测与故障报警功能；
- 能实时监测与被测系统连线断线故障、温度传感器断线故障以及功能接地线断线故障，并在故障发生时给出报警指示；
- 继电器报警输出、LED 报警指示等多种故障指示功能；
- 采用先进的现场总线通讯技术，与外接报警与显示仪通讯，可以实时监控 IT 系统的运行状况；
- 具有事件记录功能，能够记录报警发生的时间和故障类型，方便操作人员分析系统运行状况，及时消除故障；
- DC24V 电源输出功能，可为外接报警与显示仪提供仪表电源。
- Functions of real-time monitoring and fault alarming of the ground insulation resistance, transformer load current and transformer winding temperature of the monitored IT system;
- Real-time monitor the line disconnection fault, temperature sensor disconnection fault and the functional grounding line disconnection fault of the monitored system, and give the alarm indication when the fault occurs;
- Relay alarm output, LED alarm indication and other faults indication functions;
- Adopt the advanced field bus communication technology and communicate the external alarm with the displayer to monitor operation condition of IT system;
- DC24V power output function to provide the power supply for the external alarm and displayer.

2.3 AID10/130/150 报警与显示仪功能特点

2.3 **Functional characteristics of AID10/130/150 alarm and displayer**

- AID130/150 报警与显示仪可以对系统的绝缘电阻报警值、负荷电流报警值和变压器温度报警值进行远程设置；
- 当系统出现绝缘故障、过负载、变压器温升过高和接线故障时，报警与显示仪提供相应的声光报警功能，并具有消除声音报警功能。
- 采用先进的现场总线技术，可与绝缘监测仪实时进行数据交互，实现对其远程监控功能。
- The insulation resistance alarm value, load current alarm value and transformer temperature alarm value of each system insulation monitoring instrument can be set up remotely.
- When there are insulation faults, overload, excessive temperature rise of the voltage transformer or wiring faults in any of the monitored system, centralized alarm and display instrument can provide corresponding sound and light alarm function, and can manually eliminate the alarm sound.
- Adopt the advanced field bus technology, exchange data with the insulation monitor in real time to achieve the remote monitoring function.

表 2 AID 系列各型号产品功能说明

型号	选用说明

AID10	可监控 1 台 AIM-M10，适合于嵌入墙体安装
AID130	最多可监控 16 台 AIM-M10，嵌入墙体安装，适用于最多 16 套隔离电源供电的重症监护室的集中监控
AID150	最多可监控 16 台 AIM-M10 绝缘监测仪和 AIM-R100 剩余电流监测仪，嵌入墙体安装，适用于手术室或重症监护室或其它医疗场所的集中监控

Table 2 Functional Description of AID Series Products of Various Types

Model	Selection Description
AID10	It can monitor one set of AIM-M10 insulation monitoring instrument which is only suitable for installation by embedding into wall.
AID130	It can monitor 16 sets of AIM-M100 insulation monitoring instruments to the maximum and be used for installation by embedding into wall. It can be applied to do centralized monitoring on ICUs of 16 sets of isolated power supply to the maximum.
AID150	It can monitor 16 sets of AIM-M100 insulation monitoring instruments to the maximum and AIM-R100 aftercurrent monitoring instrument which can be used for installation by embedding into wall. It is fit for the centralized monitoring on operating room or ICU or other medical sites.

2.4 AKH-0.66P26 电流互感器功能特点

2.4 Function features of AKH-0.66P26 current transformer

- 最大可测电流为 60A，变比是 2000：1；
- 与 AIM-M10 绝缘监测仪配套，测量隔离变压器的负载电流。

- The maximum measurable current is 60A, and the transformation change ratio is 2000:1;
- Work with the AIM-M100 insulation monitoring instrument to measure the load current of isolation transformer.

3 参考标准

■ GB 16895.24-2005/IEC 60364-7-710:2002《建筑物电气装置第 7-710 部分：特殊装置或场所的要求—医疗场所》；

■ IEC 61557-8-2007《交流 1000V 和直流 1500V 以下低压配电系统电气安全 防护检测的试验、测量或监控设备 第 8 部分：IT 系统用绝缘监测装置》；

■ IEC 61557-9-2007《交流 1000V 和直流 1500V 以下低压配电系统电气安全 防护检测的试验、测量或监控设备 第 9 部分：IT 系统用绝缘故障定位设备》；

■ JGJ 16-2008 《民用建筑电气设计规范》；

■ GB19212.1-2008/IEC61558-1：2005《电力变压器、电源、电抗器和类似产品的安全 第 1 部分：通用要求和试验》；

■ GB19212.16-2005/IEC61558-2-15：1999《电力变压器、电源装置和类似产品的安全 第 16 部分：医疗场所供电用隔离变压器的特殊要求》。

◆ GB 16895.24-2005/IEC 60364-7-710: 2002 *Building electrical installations section 7-710: Requirements for*

special installations or locations----medical locations;

- IEC 61557-8-2007 *Electrical safety of low voltage distribution system below AC 1000V and DC 1500V, Test, measurement or monitoring equipment for protection test section 8: Insulation monitoring device for IT systems*;
- IEC 61557-9-2007 *Electrical safety of low voltage distribution system below AC 1000V and DC 1500V, Test, measurement or monitoring equipment for protection test section 9: insulation fault positioning equipment for IT systems*;
- JGJ 16-2008 *Code for electrical design of civil buildings*;
- GB19212.1-2008/IEC61558-1: 2005 *Safety of power transformers, power supplies, reactors and similar products section 1: General requirements and tests*;
- GB19212.16-2005/IEC61558-2-15: 1999 *Safety of power transformers, power supplies and similar products section 16: Special requirements for isolation transformers for power supply in medical locations*.

4 技术参数

4.1 AITR 系列医用隔离变压器技术参数

见表 3。

4.1 Technical parameters of AITR series medical isolation transformer

See Table 3.

表 3 AITR 系列隔离变压器技术参数表

型号	AITR10000	AITR8000	AITR6300	AITR5000	AITR3150
绝缘等级	H	H	H	H	H
保护等级	IP00	IP00	IP00	IP00	IP00
功率/电压/电流					
额定功率	10000VA	8000VA	6300VA	5000VA	3150VA
额定频率	50-60Hz	50-60Hz	50-60Hz	50-60Hz	50-60Hz
额定输入电压	AC230V	AC230V	AC230V	AC230V	AC230V
额定输入电流	45.3A	36A	28.5A	22.5	14.2A
额定输出电压	AC230V/115V	AC230V/115V	AC230V/115V	AC230V/115V	AC230V/115V
额定输出电流	43.5A	34.7A	27.4A	21.7	13.7A
涌流	<12In	<12In	<12In	<12In	<12In
泄露电流	<200μA	<200μA	<200μA	<200μA	<200μA
空载输入电流	1.359A	1.08A	0.855A	0.675A	0.426A
空载输出电压	235V±3%	235V±3%	235V±3%	235V±3%	235V±3%
短路电压	<6.9V	<6.9V	<6.9V	<6.9V	<7.5V
通用参数					
熔丝	80A	63A	50A	35A	25A
初级绕组电阻	<55mΩ	<64mΩ	<80mΩ	<131 mΩ	<245mΩ

次级绕组电阻	<45mΩ	<64mΩ	<80mΩ	<116 mΩ	<228mΩ
铁损	<150W	<105W	<107W	<77W	<55W
铜损	<230W	<200W	<170W	<125W	<120W
效率	>96%	>96%	>96%	>96%	>95%
最高环境温度	<40℃	<40℃	<40℃	<40℃	<40℃
空载温升	<36℃	<33℃	<31℃	<26℃	<22℃
满负荷温升	<65℃	<76℃	<67℃	<62℃	<55℃
噪声等级	<40dB	<40dB	<40dB	<40dB	<40dB

Table 3 Technical Parameters of AITR Series of Medical Isolation Transformer

Type	**AITR10000**	**AITR8000**	**AITR6300**	**AITR5000**	**AITR3150**
Insulation class	H	H	H	H	H
Protection class	IP00	IP00	IP00	IP00	IP00
Power / voltage / current					
Rated power	10000VA	8000VA	6300VA	5000VA	3150VA
Rated frequency	50-60Hz	50-60Hz	50-60Hz	50-60Hz	50-60Hz
Rated input voltage	AC230V	AC230V	AC230V	AC230V	AC230V
Rated input current	45.3A	36A	28.5A	22.5	14.2A
Rated output voltage	AC230V/115V	AC230V/115V	AC230V/115V	AC230V/115V	AC230V/115V
Rated output current	43.5A	34.7A	27.4A	21.7	13.7A
Inrush current	<12In	<12In	<12In	<12In	<12In
Leakage current	<200μA	<200μA	<200μA	<200μA	<200μA
No load input current	1.359A	1.08A	0.855A	0.675A	0.426A
No load output voltage	235V±3%	235V±3%	235V±3%	235V±3%	235V±3%
Short circuit voltage	<6.9V	<6.9V	<6.9V	<6.9V	<7.5V
General parameters					
Fuse wire	80A	63A	50A	35A	25A
Primary winding resistance	<55mΩ	<64mΩ	<80mΩ	<131 mΩ	<245mΩ
Secondary winding resistance	<45mΩ	<64mΩ	<80mΩ	<116 mΩ	<228mΩ
Iron loss	<150W	<105W	<107W	<77W	<55W

Copper loss	<230W	<200W	<170W	<125W	<120W
Efficiency	>96%	>96%	>96%	>96%	>95%
Maximum ambient temperature	<40℃	<40℃	<40℃	<40℃	<40℃
No-load temperature rise	<36℃	<33℃	<31℃	<26℃	<22℃
Full load temperature rise	<65℃	<76℃	<67℃	<62℃	<55℃
Noise grade	<40dB	<40dB	<40dB	<40dB	<40dB

4.2 AIM-M10 医疗智能绝缘监测仪技术参数

见表 4。

4.2 Technical parameters of AIM-M10 medical intelligent insulation monitoring instrument

See Table 4.

表 4　AIM-M10 绝缘监测仪技术参数

辅助电源	电压	AC220V（可波动范围±10%)	温度监测	热敏电阻	PT100
	频率	50/60Hz		测量范围	-50—+200℃
	最大功耗	<5W		报警值范围	0—+200℃
绝缘监测	绝缘电阻测量范围	10-999kΩ	报警输出	输出方式	1 路继电器输出
	相对百分比误差	0—±10%		触点容量	AC 250V/3A　DC 30V/3A
	报警值范围	10—995kΩ	环境	工作温度	-10—+55℃
	响应时间	<2s		存储温度	-20—+70℃
	测量电压	<12V		相对湿度	5%-95%，不结露
	测量电流	<42uA		海拔高度	≤2500m
负载电流	测量范围	2.1-50A	通讯		RS485 接口，Modbus-RTU 协议
	报警值范围	5-50A	额定冲击电压/污染等级		4KV/III
	测量精度	≤±5%	EMC 电磁兼容/电磁辐射		符合 IEC 61326-2-4

Table 4 Technical parameters of AIM-M10 insulation monitoring instrument

Auxiliary power supply	Voltage	AC220V (fluctuating range±10%)	Temperature measurement	Thermistor	PT100
	Frequency	50/60Hz		Measuring range	-50—+200℃
	Maximum power consumption	<5W		Alarm value scope	0—+200℃
Insulation monitoring	Measuring range of insulation resistance	10-999kΩ	Alarm output	Output mode	1-route relay output
	Absolute percentage error	0—±10%		Contact capacity	AC 250V/3A DC 30V/3A
	Alarm value scope	50—999kΩ	Environment	Operating temperature	-10—+55℃
	Response time	<2s		Storage temperature	-20—+70℃
	Measuring voltage	<12V		Relative humidity	5%-95%, non-condensate
	Measuring current	<42uA		Altitude	≤2500m
Load current	Measuring range	2.1-50A	Communication		RS485 interface, Modbus-RTU agreement
	Alarm value scope	5-50A	Rated impulse voltage/pollution degree		4KV/Ⅲ
	Measuring accuracy	≤±5%	EMC electromagnetic compatibility/electromagnetic radiation		Conform to IEC 61326-2-4

4.3 AID10/130/150 外接报警与显示仪技术参数

见表 5。

4.3 Technical parameters of AID10/130/150 external alarm and displayer

See table 5.

表 5 AID10/130/150 报警与显示仪技术参数

参数 \ 仪表		AID10	AID130	AID150
辅助电源	电压	DC 24V		
	功耗	< 0.6W		
绝缘电阻显示范围		—		
绝缘报警范围		—		
变压器负载率显示		—		
负载电流报警设置		—	14A、18A、22A、28A、35A、45A	
温度报警设置范围		—	0 —+200℃	
可监测系统数		1	16	
报警方式		声光报警		
报警类型		绝缘故障、过负荷、超温、设备故障		
通讯方式		RS485 接口 MODBUS-RTU 协议		
显示方式		LED 指示灯显示	128×64 点阵液晶显示	

Table 5 Technical parameters of AID10/130/150 alarm and displayer

Parameter \ Instrument		AID10	AID130	AID150
Auxiliary power supply	Voltage	DC 24V		
	Consumption	< 0.6W		
Display range of insulation resistance		—		
Insulation alarming range		—		
Transformer load rate display		—		
Load current alarm setting		—	14A、18A、22A、28A、35A、45A	
Temperature alarm setting range		—	0 —+200℃	
Number of monitored systems		1	16	
Alarm method		Sound-light alarm		
Alarm type		Insulation failure, overload, overheat, equipment failure		
Communication mode		RS485 interface MODBUS-RTU agreement		
Display mode		LED display	128×64 lattice LCD display	

4.4 AKH-0.66P26 电流互感器技术参数

见表 6。

4.4 Technical parameters of AKH-0.66P26 current transformer

Refer to Table 6.

表 6 AKH-0.66P26 电流互感器技术参数

输入电流	0.5mA～50A		使用频率范围	0.02-10 KHZ
输出电流	0.025～25 mA		负载电阻	<200Ω
温度系数	100 ppm/℃		瞬间电流 1s	200A
相移	10′		安装固定	十字槽盘头 4×10 螺丝固定
工作温度	-35～+70℃		二次侧接线	单芯线>0.75mm2 **错误！未找到引用源。**，最长 1m
储存温度	-40～+75℃			单芯双绞线 0.75mm2，最长 10m
副边内阻范围	95～120Ω		隔离耐压	5000Vac
精度	0.5%		线性度	0.5%

Table 7 Technical Parameters of AKH-0.66P26 Current Transformer

Input current	0.5mA～50A		Frequency range	0.02-10 kHZ
Output current	0.025～25 mA		Loading resistance	<200Ω
Temperature coefficient	100 ppm/℃		Transient current (1s)	200A
Phase displacement	10′		Installation	Pan head of cross slot 4×10, pedicle screw fixation
Operating temperature	-35～+70℃		Secondary wiring	Single core >0.75mm^2 **错误！未找到引用源。**, Maximum length of 1 meter
Storage temperature	-40～+75℃			Single core twisted pair, 0.75mm^2 **错误！未找到引用源。**, Maximum length of 10 meters
Secondary resistance range	95～120Ω		Isolation pressure	5000Vac
Accuracy	0.5%		Linearity	0.5%

5 安装与接线

5 Installation and wiring

5.1 外形与安装开孔尺寸

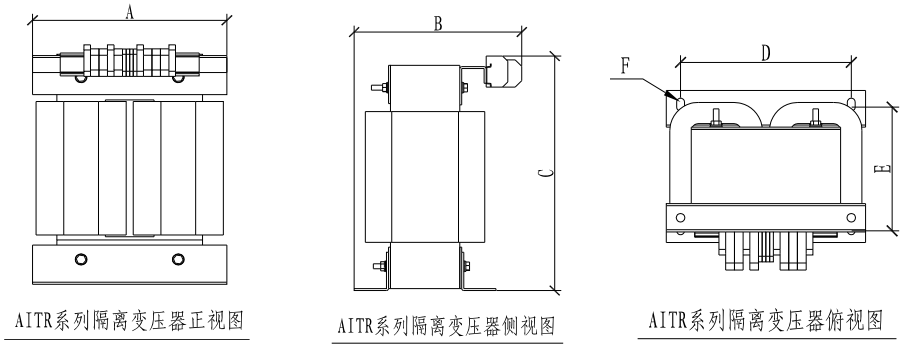
5.1 Dimension and installation hole size

5.1.1 AITR 系列医用隔离变压器外形尺寸（单位：mm）

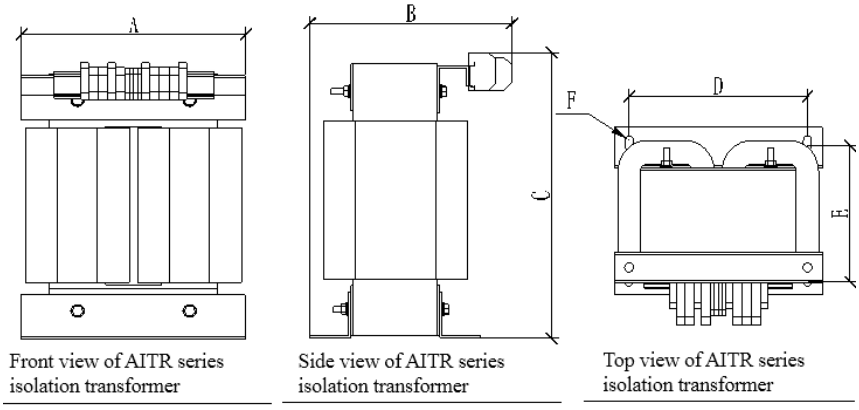
5.1.1 External dimensions of AITR series medical isolation transformer (unit: mm)

AITR 系列医用隔离变压器的外形结构及尺寸如下图和表 9 所示（单位：mm）

Shape structure and size of AITR series medical isolation transformer are shown as below and in Table 9 (unit: mm)



AITR 系列隔离变压器外形尺寸图



External dimensions of AITR series medical isolation transformer

表 9 AITR 系列隔离变压器外形尺寸

型号	容量 (VA)	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)	F(mm)	总重量(kg)
AITR10000	10000	280	275	427	240	190	Φ11	92
AITR8000	8000	280	265	427	240	190	Φ11	90
AITR6300	6300	280	255	427	240	175	Φ11	75
AITR5000	5000	280	255	427	240	175	Φ11	73
AITR3150	3150	280	225	427	240	175	Φ11	53

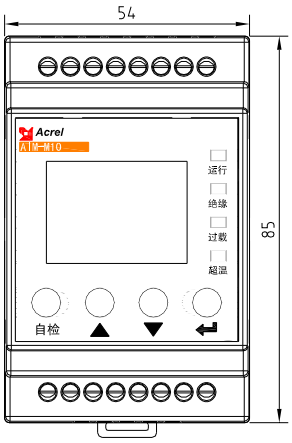
Table 9 External Dimensions of AITR Series Medical Isolation Transformer

Type	Capacity (VA)	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)	F(mm)	Total weight (kg)
AITR10000	10000	280	275	427	240	190	φ11	92
AITR8000	8000	280	265	427	240	190	φ11	90

AITR6300	6300	280	255	427	240	175	φ11	75
AITR5000	5000	280	255	427	240	175	φ11	73
AITR3150	3150	280	225	427	240	175	φ11	53

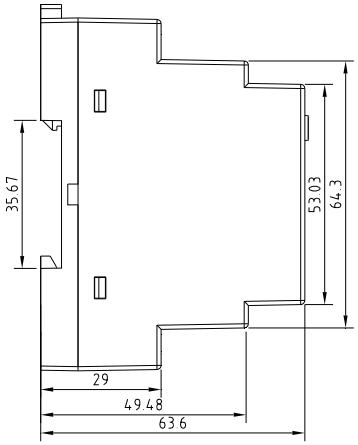
5.1.2 AIM-M10 绝缘监测仪外形与安装开孔尺寸（单位：mm）

5.1.2 Dimension and installation hole size of AIM-M10 insulation monitoring instrument (unit: mm)



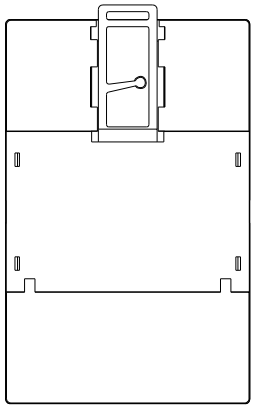
AIM-M10 正视图

Front view



AIM-M10 侧视图

Side view

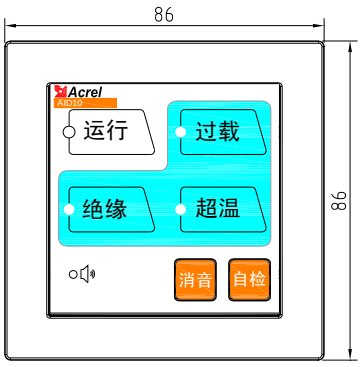


AIM-M10 底视图

bottom view

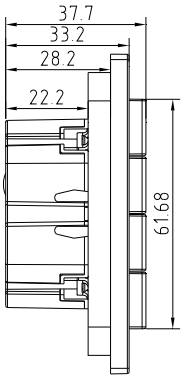
5.1.3 AID 系列外接报警与显示仪外形与安装开孔尺寸（单位：mm）

5.1.4 Dimension and installation hole size of AID series external alarm and displayer (unit: mm)



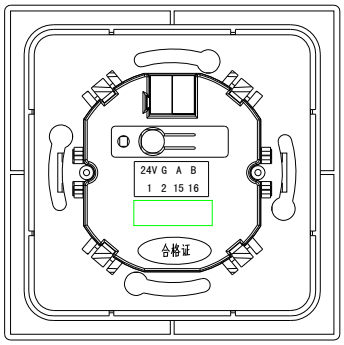
AID10 正视图及开孔尺寸

AID10 Front view and hole size



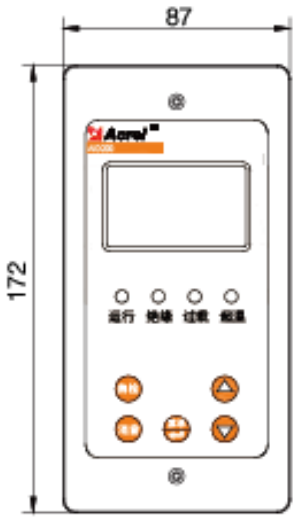
AID10 侧视图

AID10 Side view



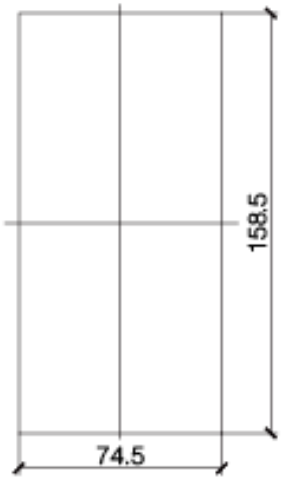
AID10 背视图

AID10 Back view



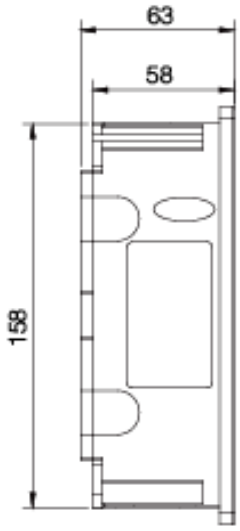
AID130/AID150 正视图

AID130/AID150 Front view



AID130/AID150 面板开孔尺寸

AID130/AID150 panel hole size

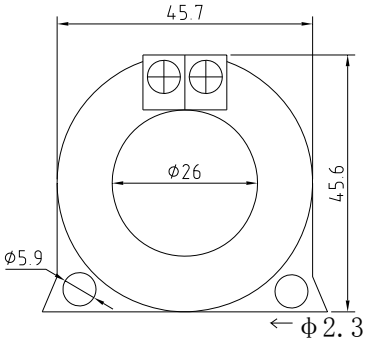


AID130/AID150 侧视图

AID130/AID150 Side view

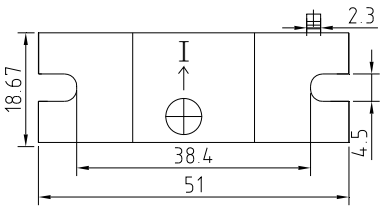
5.1.4 AKH-0.66P26 电流互感器外形尺寸（单位：mm）

5.1.5 Overall dimensions of AKH-0.66P26 current transformer (unit: mm)



正视图

Front view



底视图

Bottom view

5.2 接线方法

5.2 Connection method

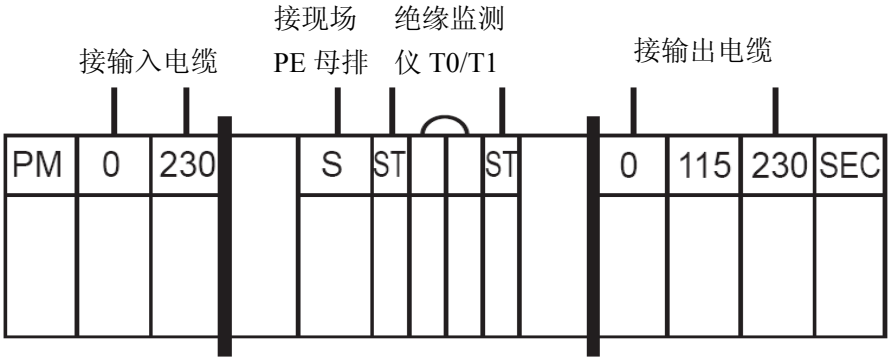
5.2.1 AITR 系列医用隔离变压器接线方式

5.2.1 Wiring mode of AITR series medical isolation transformer

在变压器接线端子处，标记为“PM”的为输入端，其中 0、230 两个端子接输入的 220V 单相交流电。标记为“SEC”的为输出端，其中 0、230 两个端子输出电压为交流 220V，外接现场负载。S 端子连接到现场的 PE 母排（或等电位端子排）。两个 ST 端子为温度传感器接口，分别与 AIM-M10 绝缘监测仪的 17、18 号端子相连。

The input terminals at the transformer terminal blocks are labeled with “PM”, in which two terminals 0 and 230 are connected to the input 220V single-phase AC. The output terminals are labeled with “SEC”, in which the output voltage of two terminals 0 and 230 is AC 220V and is connected to external field load. The S terminal is connected to

the PE bus bar on the spot (or the equipotential terminal line). Two ST terminals are temperature sensor interfaces, which are respectively connected to the No.13 and 14 terminals of AIM-M200 insulation monitoring instrument.



AITR 系列医用隔离变压器接线端子图

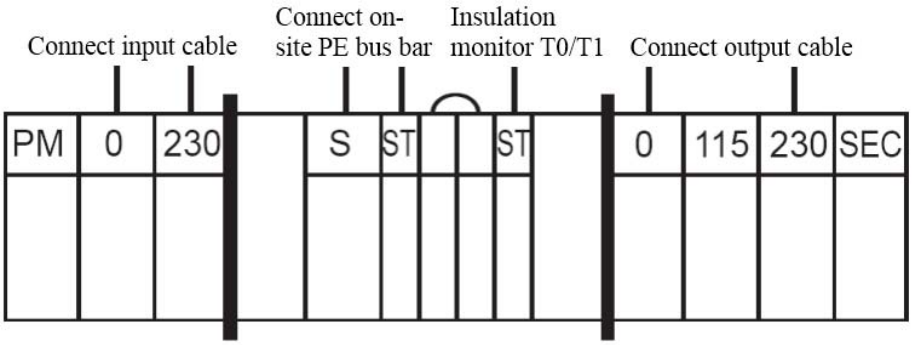


Figure 2 AITR series medical isolation transformer terminal blocks diagram

说明：隔离变压器输入输出端的接线，应根据隔离变压器额定输入输出电流来选择匹配线径的铜线(详见后面 5.4 部分表格),S 端子的接线地可选用 2×4㎜^{2}黄绿线。两个 ST 端子的接线可选用 2×1.5㎜2 的屏蔽双绞线，且接线不宜过长。

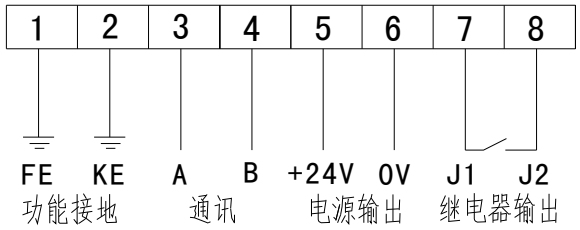
Note: The wirings of input and output terminals of the isolation transformer should select the copper wires matching the line diameter based on the isolation transformer rated input and output current (refer to tables in section 5.4). S terminal wiring can select 2×4mm^2 yellow-green wire. The wiring of two ST terminals can select 2×1.5mm^2 shielded twisted pairs, and the wiring should not be too long.

5.2.2 AIM-M10 绝缘监测仪接线方法

5.2.2 Wiring method of AIM-M100 insulation monitoring instrument

上排端子：FE、KE（1、2）作为仪表功能接地分别连接到现场等电位接地端子排上； A、B（3、4）为与外接报警与显示仪连接通讯端子；+24V、0V（5、6）为直流稳压电源输出为报警与显示仪供电；J1、J2（7、8）为超温报警继电器输出（用于控制散热风扇）。

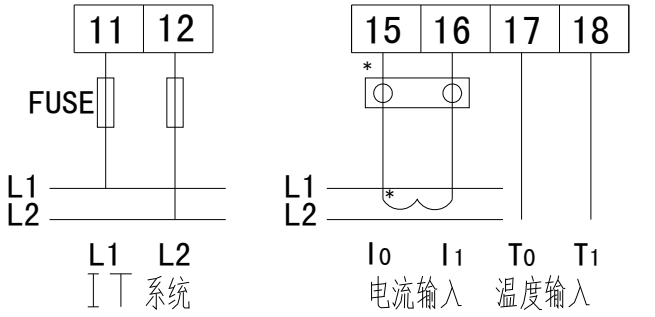
Upper row of terminals: FE and KE (1 and 2) are connected on the field equipotential earth terminal row as the instrument functional earthing; A and B (3 and 4) are connected with the external alarm and displayer as the communication terminals; +24V and 0V (5 and 6) power the displayer and output the DC stabilized power supply; J1 and J2 (7 and 8) are the over-temperature alarm relay output (to control the cooling fan).



功能接地	Functional earthing
通讯	Communication
电源输出	Power output
继电器输出	Relay output

下排端子：L1、L2（11、12）与被监测 IT 系统连接，I0、I1（15、16）为电流互感器 AKH-0.66P26 的信号输入，T0、T1（17、18）为温度传感器的信号输入。

Lower row of terminals: L1 and L2 (11 and 12) are connected with the monitored IT system, I0 and I1 (15 and 16) are the signal output of AKH-0.66P26, T0 and T1 (17 and 18) are the signal input of temperature sensor.



IT system　　Current input　Temperature input

注：

Notes:

1）  为用于 CT 二次侧短接的试验端子。

1)  refers to the test terminal of short circuit at CT secondary side.

2）11、12 号电源接线，可选用 2×1.5㎜^{2}的多股铜线；1、2 号对应的 FE 和 KE 端子，可选用 2×4㎜^{2}黄绿线（接地线）；7、8 号继电器输出为干节点，控制外接负载时需另加电源，如控制交流 220V 散热风扇时，需外加交流 220V 电源，接线线型根据负载电流确定。

2) No. 11 an d12 power wires may be made of 2×1.5mm^2 multi-strand copper wire; No. 1 and 2 FE and KE terminals may be made of 2×4mm^2 yellow green wires (earth wires); No. 7 and 8 relay outputs are dry nodes. If the external load is connected, power supply needs to be added. If AC 220V coolign fan is controlled, AC 220V power supply is needed. The wiring mode shall be determiend according to the load current.

3）15、16 号端子对应的互感器信号线、17、18 号端子对应的温度信号线、3、4 号端子对应的 RS485 通讯线，可选用 2×1.5㎜^{2}屏蔽双绞线，通讯用 COM 口均不接线。

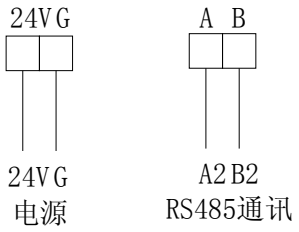
3) The transfomer signal line corresponding to No. 15 and 16 terminals, the temperature signal wire corresponding to No. 17 and 18 terminals and RS485 communication line corresponding to No. 3 and 4 terminals may be made of 2×1.5mm^2 shieled twisted pair. COM interface for communication is connected with the wire.

5.2.3 AID 系列外接报警与显示仪接线方法

5.2.3 Wiring method of AID series external alarm and displayer

A、B 端子与 AIM-M10 下排端子中的 A、B 对应相连。电源端子分别对应接 24V 直流电源的正极和地，接线图如下图所示。

The connection is done between A, B terminals and A2 and B2 of AIM-M10 lower terminals. The power supply terminals connect to positive electrode and earthing of 24V DC power supply separately with the wiring diagram as follows.



Power supply RS485 communication

24V 电源接线可选用 2×1.5㎜^{2}的多股铜线连接；RS485 通讯端子对外接线可选用 2×1.5㎜^{2}屏蔽双绞线，通讯用 COM 口不接线。

24V power supply can adopt multistrand copper wire of 2×1.5mm^2 to connect. The external wiring of communication terminals can use shielded twisted pair of 2×1.5mm^2 and there is no wiring for COM port of communication.

5.3 安装方法

5.3 Installation method

医用 IT 系统绝缘监测四件套产品除了 AID 系列外接报警与显示仪外，最好集中安装在配电柜（隔离电源柜）里，隔离变压器安装于配电柜底部，用配套的螺栓固定，并安装散热风扇。仪表和断路器则安装于上部面板上。若隔离变压器单独安装，不宜离 AIM-M10 绝缘监测仪太远。AID10/AID130/AID150 外接报警与显示仪用于手术室内时，可嵌墙安装于手术室内情报面板的旁边，以便手医务人员查看；AID130/150 用于 ICU/CCU 等重症监护室里时，应安装与护士站内，供值班护士查看。AID 系列外显装置对外接线包括两根 24V 电源线和 1 根 2 芯屏蔽双绞线的 RS485 通讯线，这 3 根线均从隔离电源柜内引来，施工时应注意预留管线。

Medical IT system insulation monitoring four pieces of products are preferably installed in the distribution cabinet (isolation power cabinet) except for the AID alarm and display instrument. The isolation transformer is installed in the bottom of the distribution cabinet fixed with matching bolts, and the cooling fan should be installed.

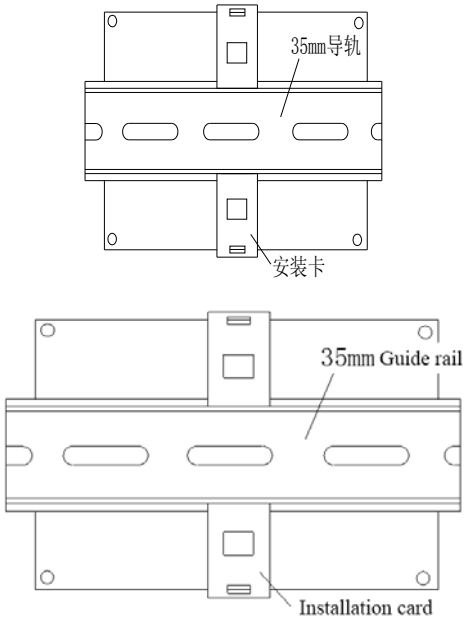
The instrument and the circuit breaker are installed on the upper panel. If the isolation transformer is installed separately, it is not suitable to put it too far away from the AIM-M10 insulation monitor. If the AID10/AID130/AID150 centralized alarm and display instrument is used in the operation room, it can be embedded in the wall and installed in the operating room next to the intelligence panel, so that the medical staff can view conveniently. If it is used in ICU/CCU and other intensive care units, it should be installed in the nurses station, so that the duty nurses can view. When AID130/150 is used for ICU/CCU, it should be installed in the nurse station for the nurses on duty to check. RS485 communication among insulation monitoring instrument, AID concentrated alarm and displayer of centralized monitoring should be connected by hand-in-hand type. The external wirings of AID series external devices include two nos. of 24V power line and one no. of RS485 line of communication of 2-core shielded twisted pair. These three lines are all drawn from the isolated power supply cabinet which should be reserved pipelines during construction.

5.3.1 AIM-M10 医疗智能绝缘监测仪安装方式

5.3.1 Installation mode of AIM-M10 medical intelligent insulation monitoring instrument

AIM-M10 绝缘监测仪采用导轨式的安装方式，采用卡扣固定，如下图所示：

AIM-M10 insulation monitor adopts the installation method of the guide rail, and the fixation mode is the clip buckle type, as shown in the following figure:

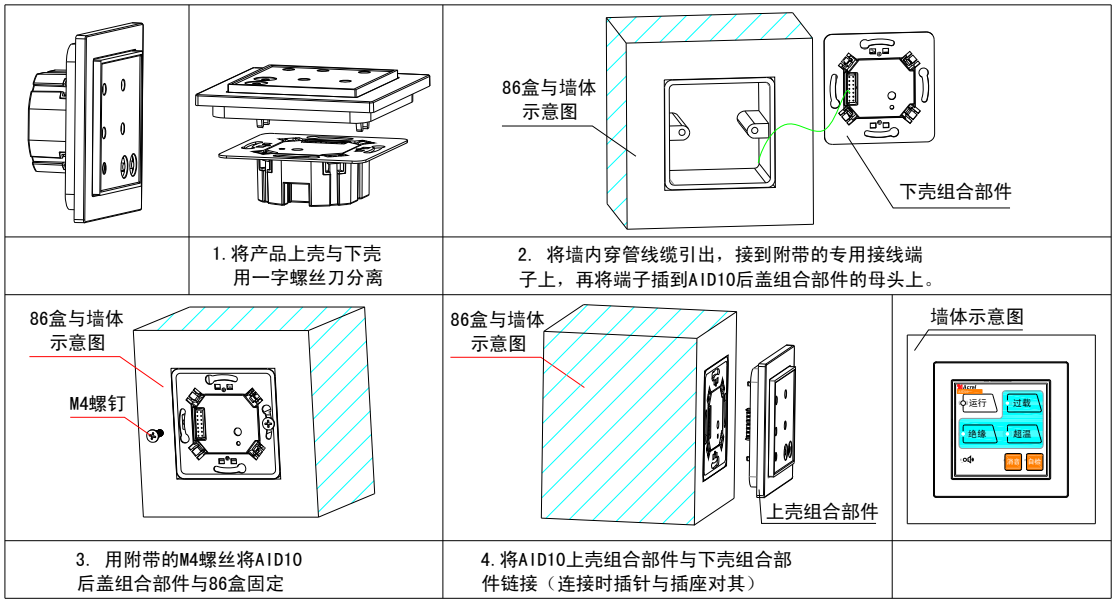


5.3.2 AID 系列报警与显示仪安装方式

5.3.2 Installation mode of AID series of alarm and displayer

1）AID10 外接报警与显示仪的安装方式是嵌入安装，采用标准 86*86 式后壳，适合嵌入墙体安装，事先预留标准式 86*86 安装开口，其安装示意图如下图所示。

1) AID10 external alarm and displayer are embedded and standard 86*86 rear shell is adopted. They are embedded in the wall. The standard 86*86 installation opening is reserved. The installation diagram is shown below.

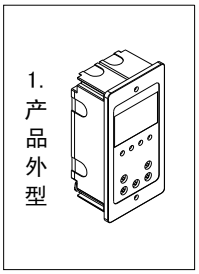


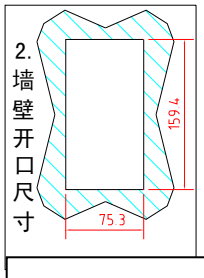
1. 将产品上壳与下壳用一字螺丝刀分离	1. Separate the upper shell from the lower shell with the straight screwdriver
86 盒与墙体示意图	Diagram of 86 box and wall
下壳组合部件	Lower shell assembly
2. 将墙内穿管线引出，接到附带的专用接线端子上，再将端子查到 AID10 后盖组合部件的母头上	2. Lead the in-wall pipeline out and connect the pipeline with the attached connection terminal. Then, inesrt the terminal into the female contact of AID10 rear cover assmebly.
M4 螺钉	M4 screw
3. 用附带的 M4 螺丝将 AID10 后盖组合部件与 86 盒固定	3. Fix AID 10 rear cover assembly with 86 box by the attached M4 screw.
4. 将 AID10 上壳组合部件与下壳组合部件连接（连接时插针与插座对齐）	4. Connect the AID10 upper shell assmebly with the lower shell assembly (align the pin with the socket during connection)
上壳组合部件	Upper shell assembly
墙体示意图	Wall diagram

2 ）AID130/AID150 集中报警与显示仪的外壳相同，适合嵌入墙体安装，以 AID130 为例，其安装示意图如下图所示。

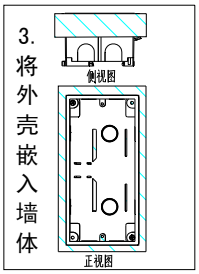
2) Shells of the external alarms and displayers of AID130/AID150 are same, which are fit for installation by embedding into wall. To takeAID130 for an example with its installation instructions as follows:

1. Product configuration

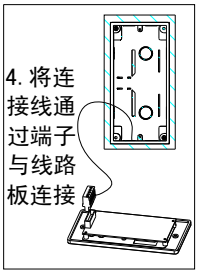




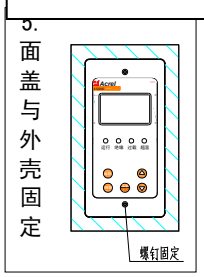
2. Wall hole size



3. To embed the shell into wall



4. To connect the connecting lines by terminal and circuit board



5. Fix the cover and shell

注意：

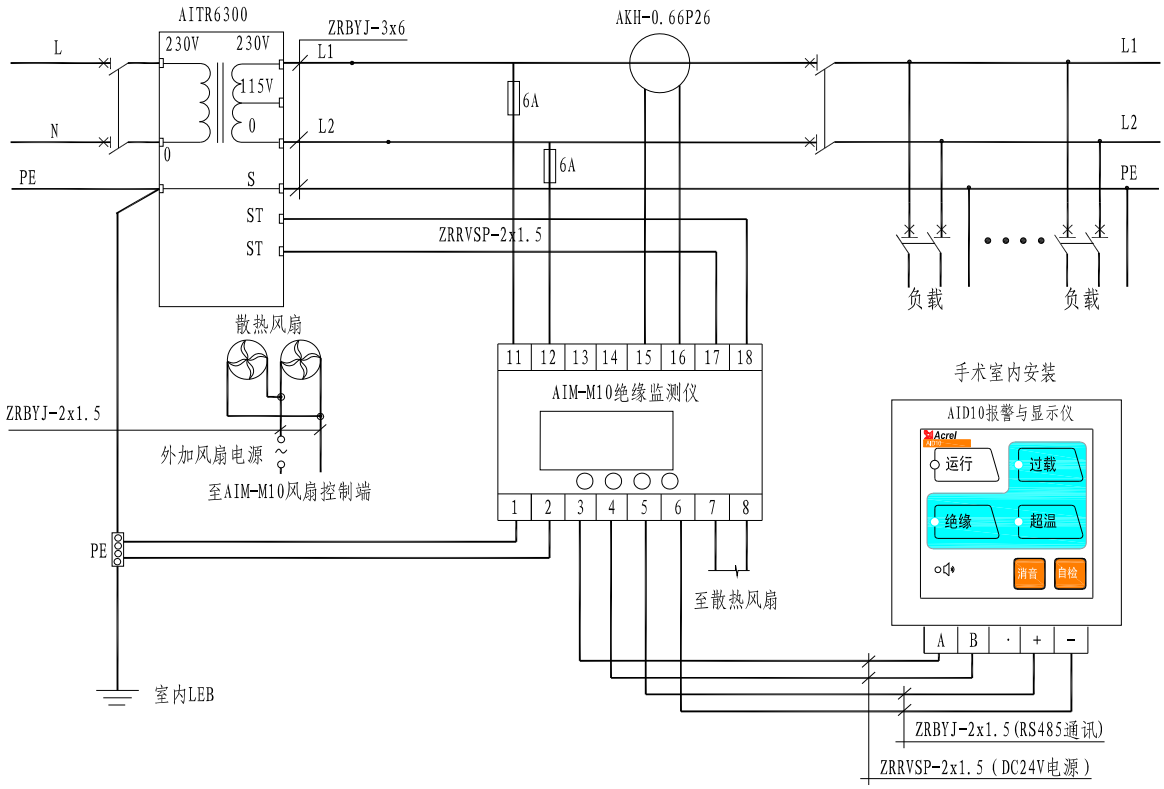
由于本公司产品在不断地更新，在未得到有关人员确认之前，此图仅供参考。

Note: Because our products are updated constantly, the pictures are only for reference before obtaining confirmations from personnel concerned.

在装修时，应先将外显装置的外壳嵌入墙体内固定，并将靠近管线的敲落孔敲，使导线（2 根电源线+1 根两芯的屏蔽双绞线）引入，接到前面盖后，再将面盖固定在外壳上。

During decoration, the shells of external devices should be embedded into wall for fixation first, then the knockout nearby pipelines shall be made available to make the conductors (2 power lines of 1.5mm^2 +1 shielded twisted pair of 2×1.5 mm^2) to be drawn in and to be connected to the corresponding terminals of front cover circuit board, then the cover is installed on the shell and tightened by the accessory tapping screw.

5. 4 典型接线图 Typical connection diagram



负载	Load

说明：

Explanation:

1） 隔离变压器输入输出端的接线线径应该与隔离变压器的额定电流相匹配，也可以根据下表选型：

1) The wire diameters of input and output wirings of isolation transformer should match with the rated current of isolation transformer, which can be also selected as per below table:

隔离变压器型号 Model Nos. of isolation transformer	所选线径 Selected wire diameters
AITR3150	3×4mm^2
AITR5000/AITR6300	3×6mm^2
AITR8000/AITR10000	3×10mm^2

2） AIM-M10 绝缘监测仪的 11、12 号端子，需接 IT 系统的交流 220V 电压，可按图示方式直接连接到隔离变压器二次侧的 0、230V 输出端子，并串接 6A 的熔断器保护。

2) No. 11 and 12 terminals of AIM-M10 insulation monitors need to be connected with AC 220V voltage of IT system. These terminals may be connected with 0 and 230V output terminals at secondary side of isolation transformer and be connected with 6A fuse in series for protection.

3）AIM-M10 绝缘监测仪的 7、8 号端子继电器输出控制为干节点，用于控制风扇时需另加风扇的电源。当多台变压器集中安装于 1 台隔离电源柜内时，多台风扇应该连接成由多台绝缘监测仪并行控制的方式，即每 1 台绝缘监测仪都能启停所有的风扇。

3) AM-M10 insulator monitor is controlled by No. 7 and 8 terminal relay that is a dry node. If it is used to control the fan, the fan's power supply is needed. When multiple transformers are integrated in one isolated power cabinet, multiple fans shall be connected so that the parallel control is carried out by multiple insolation monitors, that is, 1 insulation monitor can start and stop all fans.

4）AKH-0.66P26 只需穿过隔离变压器二次侧输出 L1、L2 两根线中的任何一根即可，不能同时穿两根线。其输出用 2×1.5mm^2 的线接至 AIM-M10 的 15、16 号端子上，且不允许接地。

4) AKH-0.66P26 only needs to pass through one of the L1, L2 two wires of the isolation transformer secondary side output terminal, but can not pass through the two wires simultaneously. The output is connected with the 2×1.5mm^2 wire to the No.8, 9 terminals of AIM-M200, which is not allowed for grounding.

5）为了可靠监测隔离电源系统对地绝缘，AIM-M10 绝缘监测仪的 11、12 号端子应用可靠连接到 IT 系统上（可并联连到隔离变压器的输出端），1、2 号端子应用两根独立的 4mm^2 的黄绿接地线分别连接到现场的等电位端子排（或隔离电源柜内的接地端子排）上。

5) In order to reliably monitor the grounding insulation of the isolation power system, the No.11, 12 terminals of AIM-M10 insulation monitor should be reliably connected to IT system (which can be connected in parallel to the output terminal of the isolation transformer) with 2×1.5mm^2 multicore copper wires, and the No.1, 2 terminals should

be respectively connected to the on-site equipotential terminals (or the grounding terminals in the isolation power cabinet) with two independent 4mm^2 yellow-green grounding wires.

6）AIM-M10 绝缘监测仪的 3、4 号端子与 AID 系列外接报警与显示仪的 A、B 通讯端子之间通讯线可选用 2×1.5㎜^{2}的屏蔽双绞线，当采用 AID130/AID150 集中报警与显示仪监控多套 AIM-M10 时，其通讯线应采用手拉手的接线方式（即上一只表的通讯线接至本表的通讯端子后，再从本表的端子上引出来，接至下表的通讯端子上），RS485 总线的首末端的两通讯端子间应各并接 1 只匹配电阻，推荐并随货附带的电阻阻值为 120Ω。AIM-M10 的 5、6 号端子分别对应+24V、G 建议选用 0.5㎜^{2}的线给报警与显示仪供电。

6) Shielded twisted pair of 2×1.5mm^2 can be employed by the lines of communication between No.3 and No.4 terminals of AIM-M10 insulation monitoring instrument and AID series external alarm and A and B communication terminals of displayer. When AID130/AID150 centralized alarm and displayer are used to monitor multiple sets of AIM-M100, its lines of communication should adopt hand-in-hand wiring method (namely after lines of communication for last meter are connected to communication terminals of this meter, which is drawn from the terminals of this meter and connected to the communication terminals of the next meter). One matched resistance should be connected in parallel between the two communication terminals of heads and ends of RS485 bus respectively. The recommended and accessory resistance value along with the goods is 120Ω. No.5 and No.6 terminals of AIM-M10 are RS485 communication terminals as well, which are used for communication of upper computer. Wiring is not required if there is no upper computer.

5.5 注意事项

5.5 Considerations

（1）医用 IT 系统绝缘监测产品，除了 AID 系列外接报警与显示仪外，应集中安装于隔离电源柜中。若现场空间有限无法采用隔离电源柜时，隔离变压器可单独安装，但不宜离绝缘监测仪和现场负载过远。

(1) Medical IT system insulation monitoring products should be centrally installed in the isolation power cabinet except for AID. If the field space is too limited to apply the isolation power cabinet, the isolation transformer can be installed separately, but should not be too far away from the insulation monitor and the field load.

（2）安装接线时严格应按接线图进行接线，接线最好用针式套接头压接后，再插入仪表相应端子并将螺钉拧紧，避免因接触不良而导致仪表工作不正常。

(2) The installation of wiring should strictly follow the wiring diagrams, which should preferably use the pressure connection with the needle-type fittings, and then insert into the corresponding terminal of the instrument and tighten the screws to avoid the abnormal work conditions of instrument caused by loose connection.

（3）仪表和变压器的接地线均应与现场的等电位端子排可靠连接。当采用隔离电源柜时，应先连接到隔离电源柜内的接地端子排上，再统一连接至现场的等电位端子排。

(3) The grounding wire of the instrument and the transformer shall be reliably connected with the equipotential terminals in the field. When applying the isolation power cabinet, it should be connected to the grounding terminals in the isolation power supply cabinet, and then to the equipotential terminals in the field.

（4）AIM-M10 医疗智能绝缘监测仪电流输入要采用配套的 AKH-0.66P26 型电流互感器，接线时建议接线

用 U 型压头压接后，再接到 CT 的接线端子上，不要直接用裸线头连接，以保证连接可靠，也便于拆装。去除该接线前，必须先切断 CT 一次回路或者短接二次回路。

(4) The current input of AIM-M10 medical intelligent insulation monitoring instrument should use a matching AKH-0.66P26 type current transformer. It is recommended to use pressure connection with U-type indenters during wiring operation, and then connect to the CT terminal. Do not directly use the bare head connection, for the considerations of reliable connection and easy disassembly. Before removing the wiring, the CT primary circuits must be cut off or the secondary circuits must be short connection.

(5)**特别提醒：**

(5) Special reminder:

任何隔离变压器在启动时均会产生冲击电流，过大的冲击电流可能会造成变压器一次侧的断路器断开或闭合困难，因此对于采用医用隔离变压器及绝缘监测产品组成的医疗 IT 系统，在选择隔离变压器进线回路的断路器时，应按国标要求选用只带短路保护，不带过负荷保护的断路器。若选用带过载保护的断路器，应选用符合国标 GB14048.2-2008 的 C、D 脱扣曲线的断路器，且断路器的额定电流根据隔离变压器的容量按如下对应关系确定：10kVA-63A；8kVA-50A；6.3kVA-40A；5kVA-40A；3.15kVA-20A。

Any isolation transformer will have an impact current when it starts up, and too large impact current may cause the circuit breaker at primary side of the transformer difficult to disconnect or shut down. Therefore, for medical IT systems composed of medical isolation transformers and insulation monitoring products, in the selection of inlet circuit breaker of the isolation transformer, it is recommended to choose the circuit breakers only with short circuit protection but without overload protection according to GB requirements. If choosing the circuit breaker with overload protection, the circuit breaker should conform to the C and D tripping curves of GB14048.2-2008, and the rated current of the circuit breaker should be determined according to the capacity of the isolation transformer as follows: 10kVA-63A, 8kVA-50A, 6.3kVA-40A, 5kVA-40A, 3.15kVA-20A.

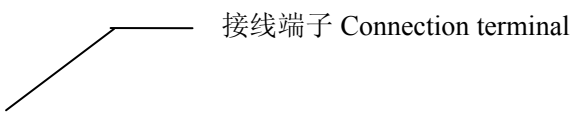
若未按上述要求选择断路器，发生断路器闭合困难或运行过程中断开而引起的医疗事故，本公司不承担任何责任。

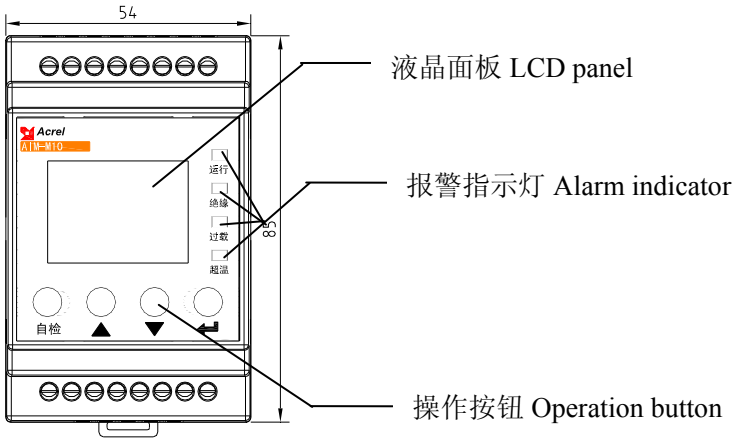
If the circuit breaker selection is not in accordance with the above requirements, the company shall not be liable for any medical malpractice caused by the closure difficulty of the circuit breaker or the disconnection of the circuit breaker during operation.

6 编程与使用 Programming and use

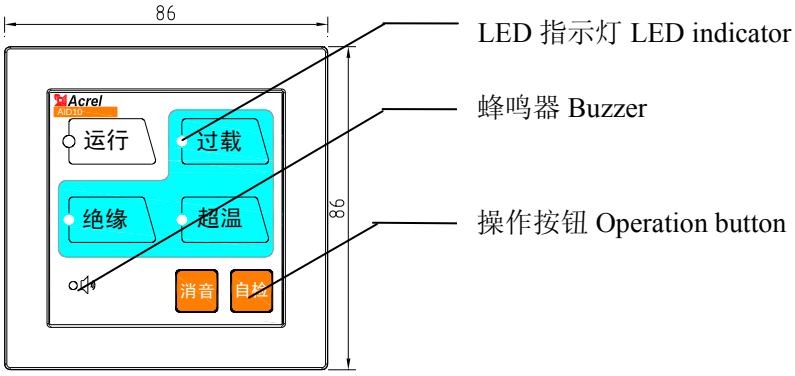
6.1 面板说明 Explanation of panel

1）AIM-M10 绝缘监测仪面板 AIM-M10 insulation monitor pan



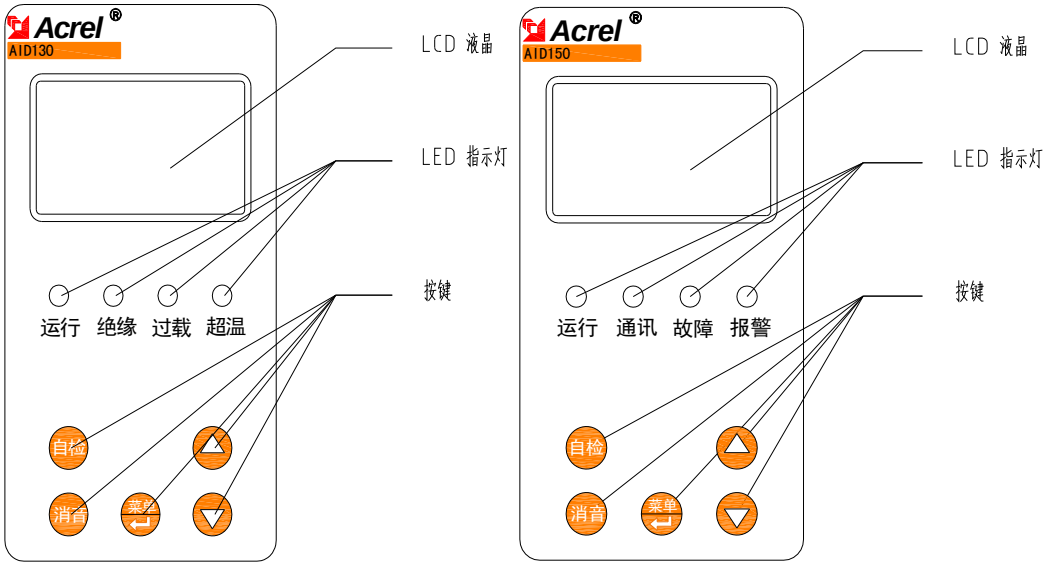


2）AID10 外接报警与显示仪面明 AID10 external alarm and displayer panel



运行	Operation
过载	Overload
绝缘	Insulation
超温	Over-temperature
消音	Noise reduction
自检	Self-inspection

3）AID130/AID150 集中报警与显示仪 AID130/AID150 centralized alarm and displayer



LCD 液晶：LCD liquid crystal

运行：Operation

绝缘：Insulation

过载：Overload

超温:Overheat

通讯：Communication

故障：Failure

6.2 LED 指示说明 LED instruction

6.2.1 AIM-M10 医疗智能绝缘监测仪 LED 指示说明

6.2.1 LED instruction of AIM-M10 medical intelligent insulation monitoring instrument

指示灯状态	说明
“运行”状态	装置正常运行时，指示灯闪烁，闪烁频率大约为一秒一次
“通讯”状态	指示装置通讯状况，有数据通讯时，指示灯闪烁
“绝缘”状态	当绝缘电阻超过报警值，或 LL 断线/FK 断线时，指示灯闪烁报警
“过载”状态	当负荷电流超过变压器总负荷电流时，指示灯闪烁报警
“超温”状态	当检测的变压器温度超过报警值，或温度传感器接线断线时，指示灯闪烁报警

Indicator status	Instructions
“operation” status	When the instrument operation is normal, the indicator light flashes, with the flashing frequency of about one time per second.
“communication” status	Indicate the status of device communication, when there is data communication, the indicator light flashes.
“insulation” status	When the insulation resistance exceeds the alarm value, or when the LL/FK is disconnected, the indicator light flashes to alarm.
“overload” status	When load current exceeds the total load current of transformer, the indicator light flashes to alarm.
“overheat” status	When testing transformer temperature exceeds the alarm value, or when the temperature sensor wiring is disconnected, the indicator light flashes to alarm.

6.2.2 AID10 外接报警与显示仪 LED 指示说明

指示灯状态	说明

“运行”状态	装置正常运行时，指示灯闪烁，闪烁频率大约为一秒一次
“绝缘”状态	当绝缘电阻超过报警值时，指示灯闪烁报警
“过载”状态	当负荷电流超过变压器总负荷电流时，指示灯闪烁报警
“超温”状态	当检测的变压器温度超过报警值时，指示灯闪烁报警

Indicator status	Instructions
“operation” status	When the instrument operation is normal, the indicator light flashes, with the flashing frequency of about one time per second.
“communication” status	Indicate the status of device communication, when there is data communication, the indicator light flashes.
“insulation” status	When the insulation resistance exceeds the alarm value, or when the LL/FK is disconnected, the indicator light flashes to alarm.
“overload” status	When load current exceeds the total load current of transformer, the indicator light flashes to alarm.
“overheat” status	When testing transformer temperature exceeds the alarm value, or when the temperature sensor wiring is disconnected, the indicator light flashes to alarm.

6.2.3 AID130 集中报警与显示仪 LED 指示说明

6.2.3 LED instruction of AID130 centralized alarms and displayers

指示灯状态	说明
“运行”状态	装置正常运行时，指示灯闪烁，闪烁频率大约为一秒一次
“绝缘”状态	当绝缘电阻超过报警值时，指示灯闪烁报警
“过载”状态	当负荷电流超过变压器总负荷电流时，指示灯闪烁报警
“超温”状态	当检测的变压器温度超过报警值时，指示灯闪烁报警

Indicator status	Instructions
“operation” status	When the instrument operation is normal, the indicator light flashes, with the flashing frequency of about one time per second.
“insulation” status	When the insulation resistance exceeds the alarm value, the indicator light flashes to alarm.
“overload” status	When load current exceeds the total load current of transformer, the indicator light

	flashes to alarm.
“overheat” status	When testing transformer temperature exceeds the alarm value, the indicator light flashes to alarm.

6.2.4 AID150 集中报警与显示仪 LED 指示说明

6.2.3 LED instruction of AID150 centralized alarm and displayer

指示灯状态	说明
“运行”状态	装置正常运行时，指示灯闪烁，闪烁频率大约为一秒一次
“通讯”状态	指示装置通讯状况，有数据通讯时，指示灯闪烁
“故障”状态	当 AIM-M10 和 AIM-R100 检测到断线故障时，指示灯闪烁报警
“报警”状态	当 AIM-M10 和 AIM-R100 监测量超阈值报警，指示灯闪烁报警

Status of indicator light	Descriptions
“running” status	When the device is normally run, the indicator light flickers with the flicker frequency of about one time per second.
“communication” status	As to the communication status of indicating device, the indicator light flickers when there is data communication.
“failure” status	The indicator light flickers and gives an alarm when off-line failure is detected by AIM-M100 and AIM-R100.
“alarm” status	The indicator light flickers and gives an alarm when monitoring quantity super-threshold of AIM-M100 and AIM-R100 alarms.

6.3 按键功能说明

6.3 Descriptions of keys function

6.3.1 AIM-M10 绝缘监测仪按键功能说明

6.3.1 Function descriptions of AIM-M10 insulation monitoring instrument keys

绝缘监测仪共有四个按键，分别为“菜单回车”共用键、“▲”上键、“▼”下键、“自检”键。

There are four keys in total for insulation monitoring instrument, those are “Menu Enter” shared key, “▲” “Up” key, “▼” “Down” key and “Self-inspection” key.

按键 Keys	按键功能 Keys function
菜单回车合用键 “Menu Enter” shared key	非编程模式下，按该键进入编程模式； 编程模式下，当回车确认键使用。 Under non-programming mode, to press this key to enter into programming mode; under programming mode, it is used as “Enter” confirmation key.
▲上键、▼下键 “▲” up key, “▼” down key	非编程模式下，在报警记录界面时用于翻阅日志； 编程模式下，用于数值的增减或更改保护动作状态。 Under non-programming mode, it is used for browse log when at alarm recording interface; under programming mode, it is used for increase and decrease of values or change of protetive action states.
自检键 “Self-inspection” key	非编程模式下，用于启动仪表自检功能。 Under non-programming mode, it is used for starting instrument self-inspection function.

6.3.2 AID10 外接报警与显示仪功能按键说明

6.3.2 Function descriptions of AID10 external alarms and displayers keys

外接报警与显示仪共有两个按键，分别为“消音键”、“自检”键。

External alarms and displayers have two buttons, the “Eliminate sound button”, and the “Self-test” button.

按键	按键功能
消音键 Eliminate sound button	当有报警产生时，按下此键可以消去报警声音。 When there is alarm, press this button to eliminate the alarm sound.
自检键 Self-test button	非编程模式下，用于启动仪表自检功能。 In non-programming mode, used to start the self-test function of instrument. In other state, used as return function.

6.3.3 AID130/150 外接报警与显示仪功能按键说明

6.3.3 Function descriptions of AID130/150 external alarms and displayers keys

集中报警与显示仪共有五个按键，分别为“消音键”、“菜单回车”共用键、“▲”上键、“▼”下键、“自检”键。

The centralized alarm and display instrument has five buttons in total, namely the “Eliminate sound button”, “Menu and Enter” shared button, “▲” Up button, “▼”Down button, and “Self-test” button.

按键	按键功能
消声键	当有报警产生时，按下此键可以消去报警声音。
▲上键、▼下键	编程模式下，用于个位数的增加或减少。
自检键	非编程模式下，用于启动仪表自检功能。
菜单回车合用键	非编程模式下，按该键进入编程模式； 编程模式下，当回车确认键使用。

Button	Function
Eliminate sound button	When there is alarm, press this button to eliminate the alarm sound.
▲ Up button, ▼Down button	In programming mode, used to increase or decrease the single-digit.
Self-test button	In non-programming mode, used to start the self-test function of instrument. In other state, used as return function.
Menu and Enter shared button	In non-programming mode, press this button to enter the programming mode; In programming mode, used as the Enter button.

6.4 按键操作说明

6.4 Operating instructions of keys

6.4.1 绝缘监测仪在 RUN 模式下按键操作

6.4.1 The operating instructions for the keys of insulation monitoring instrument under RUN mode

(1)进入 RUN 运行模式。开机默认进入的模式就是 RUN 模式，LCD 在显示软件版本号后，系统进入 RUN 模式并运行。主界面显示绝缘电阻值、变压器温度值和负荷电流值。

(1) Enter RUN the operation mode. The mode of the default entry is RUN mode, after the LCD displays the software version number, if you do not do other button operation, the system goes into RUN mode and starts operation. The main interface shows the insulation resistance value, temperature value, current value, load rate and current system time.

(2)查看报警记录。在主界面下，按“下键”则可进入“SOE”界面，按“回车”键确认，便可通过“下键”或“上键”翻页，依次查询各条故障记录情况。第一条记录为最新的记录，第十条记录为最老的记录。

(2) View the alarm records. In the main interface, press "Down button" to enter the "Fault records query" interface, and press "enter" button to confirm, then you can turn the pages through "Down button" or "Up button" to query each fault record in sequence. The first record is the most recent record, and the tenth is the oldest record.

(3)仪表自检。在主界面下，按下“自检”键，监测仪将启动自检程序，模拟过载故障、绝缘故障和超温

故障。如果监测仪能检测出上述三种故障，则表明仪表功能正常。

(3) Instrument self-test. In the main interface, press the "Self-test" button, then the monitor will start the Self-test program, simulating the overload fault, insulation fault and over-temperature fault to test whether the detection and judgment function of the instrument to the main faults is normal. If the monitor can detect the above three kinds of faults, it indicates that the instrument function is normal.

6.4.2 绝缘监测仪在编程模式下按键操作

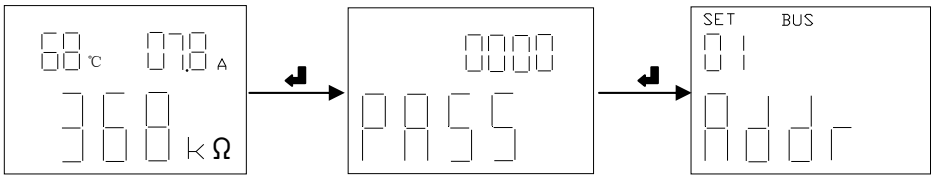
6.4.2 Button operation of insulation monitoring instrument in programming mode

（1）进入编程模式

(1) Enter programming mode

在正常运行情况下，按“回车”键，进入编程模式的密码输入页面。通过“上键”设置增大数字，通过“下键”减小数字，输入正确密码后，按“回车”键便可进入编程模式。

Under normal operation condition, press “Enter” key to ender the password input page of programming mode. Increase the number by “UP” key and reduce the number by “Down” key. Enter the correct password and press “Enter” key to enter the programming mode.



（2）编程模式中，仪表参数设置

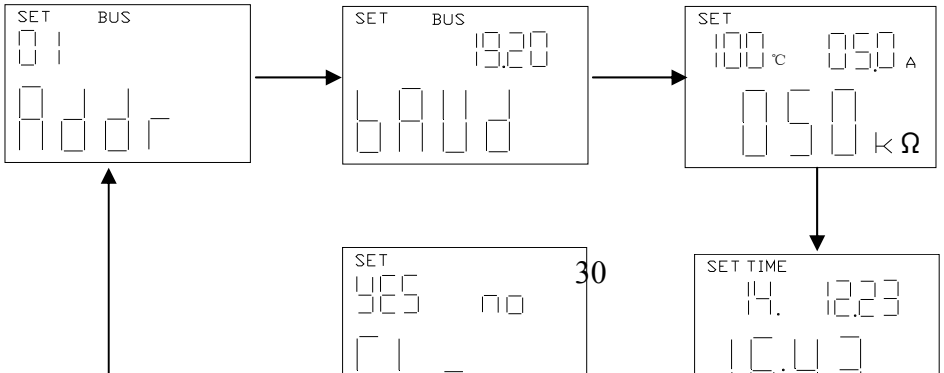
(2) Instrument parameter setting under programming mode

进入编程模式后，按“▲”或者“▼”可翻看各个参数界面。

Enter the programming mode, press “▲” or “▼” to view all parameter interfaces.

在编程模式中，按“↵”键，参数闪烁，通过“▲”“▼”可以修改参数。当界面中有多个参数时，如报警值设置界面、时间设置界面，当参数闪烁时，“▲”用于选中参数，“▼”用于修改参数值。再次按“↵”键，退出修改参数模式，进行菜单浏览。

Under programming mode, press “↵” key. And then the parameter flashes. Change the parameter by “▲”“▼”. When there are multiple parameters on the interface, such as alarm value setting interface, time setting interface, when the parameter flashes, select the parameter by “▲” and change the parameter by“▼”. Press “↵” key again to exit the change parameter mode and browse the menu.

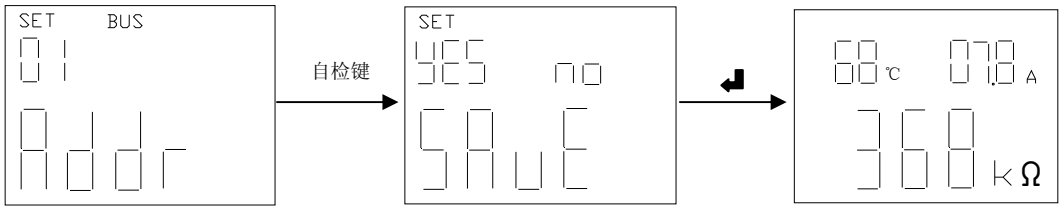


（3）退出编程模式

(3) Exit programming mode

在编程模式下，通过自检键进入“是否保存参数菜单”，上下键选择“yes”和“no”，闪烁表示选中。按下“回车”键便可保存参数或者不保存参数，退出编程模式，进入运行模式。

Under the programming mode, enter “save parameter menu or not” by the self-inspection key. Select “yes” or “no” by the up and down keys. If the parameter flashes, it indicates the parameter is selected. Press “Enter” key to save or not save the parameter, exit the programming mode and to enter the operation mode.



6.4.3 AID10 报警与显示仪按键操作 AID10 alarm and displayer key operation

（1）AID10 与 AIM-M10 通过 RS485 通讯连接后，运行灯闪烁，表示通讯正常，若运行灯常亮，表示通讯不正常。

(1) After AID10 and AIM-M10 are connected with RS485, the operation lamp flashes, which indicates that the communication is normal. If the operation lamp is on normally, it indicates that the communication is abnormal.

（2）当 AID10 监测到 AIM-M10 发出的故障标志后，相应的指示灯闪烁，并且蜂鸣器响，按下消音键，蜂鸣器关闭。

(2) When AID10 monitors the fault symbol from AIM-M10, the corresponding indicator flashes and the buzzer sounds. Press the muffled key, and then the buzzer is off.

（3）当系统正常运行时，按下自检键，启动 AIM-M10 绝缘监测仪自检。

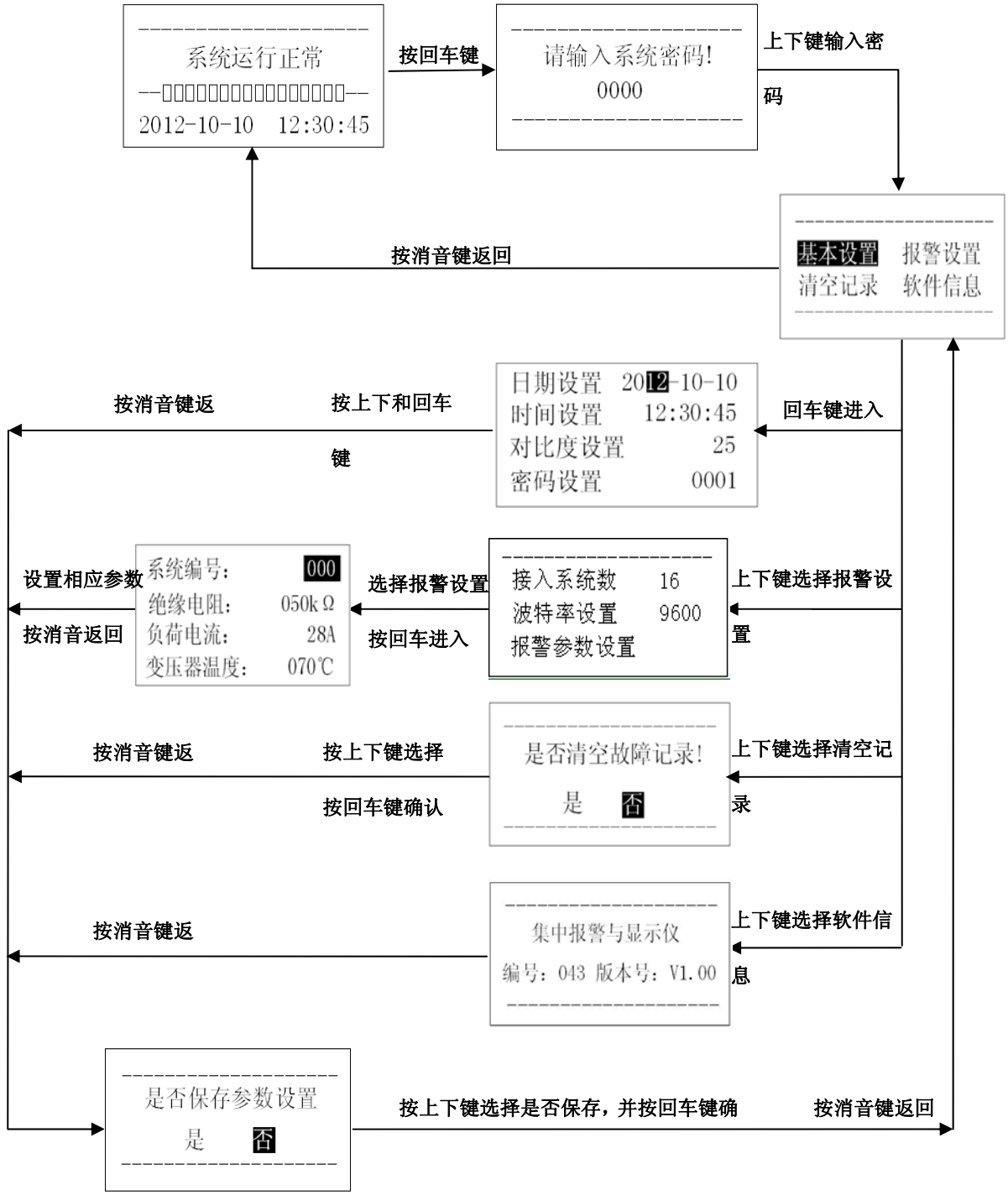
(3) When the system runs normally, press the self-inspection key and start AIM-M10 insulation monitor to conduct the self-inspection.

6.4.4 AID130 集中报警与显示仪编程操作说明

6.4.4 Programming operating instructions of AID130 centralized alarm and displayer

AID130 集中报警与显示仪采用 128*64 点阵的液晶显示，按“菜单”键就可以进入编程菜单，仪表出厂默认的密码为 0001，输入密码后就进入编程菜单界面，详细的操作步骤如下所示：

AID130 centralized alarm and displayer employs 128*64 lattice liquid crystal display. To press “Menu” key to enter into programming menu. The factory default password of instrument is 0001. Programming menu interface can be entered after password input with detailed steps as follows:



在主界面下，按下“自检”键，仪表将远程自检所接入的每套绝缘监测装置，所有的自检结果通过 RS485

通讯线路回传给集中报警与显示仪显示，按回车键返回正常界面。

Under main interface, the instrument will do remote self-inspection on the connecting every set of insulation monitoring device by pressing “Self-inspection” key. All the self-inspection results are passed back to centralized alarm and displayer to display by lines of communication, and to press “Enter” key to return to normal interface.

6.4.5 AID150 集中报警与显示仪在编程模式下按键操作

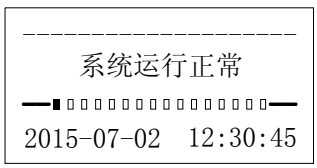
6.4.5 Keys operation of AID150 centralized alarm and displayer under programming mode

1）运行界面的说明

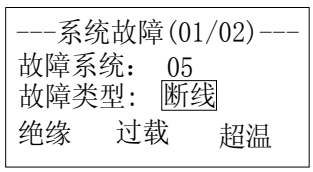
1) Introduction to running interface

系统上电后，若无故障报警，则 AID150 显示正常运行的界面如下图所示，图中填黑的小框表示对应位置序号的相应该地址编号的仪表通讯连接上，没有填黑的小框表示无仪表连接，或通讯没连上。当绝缘监测仪或剩余电流监测仪监测到故障时，AID150 显示相应的报警界面，并发出相应的声光报警。

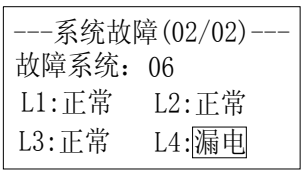
After the system powers on, if there is no failure alarm, the normal running interface shown by AID150 is shown as below diagram. The small black boxes in the diagram mean the communication connection of instrument of relevant address no. of corresponding serial no. The small boxes with no black filling mean no instrument connection or no communication connection. If failures are detected by insulation monitoring instrument or aftercurrent monitoring instrument, AID150 displays the corresponding alarm interface and gives out the relevant sound-light alarm.



系统运行正常界面



绝缘监测故障



漏电流监测故障

系统运行正常 System operation is normal

系统故障：System failure

故障系统：Failure system

故障类型：Failure type

断线：Off line

绝缘：Insulation

过载：Overload

超温：Overheat

正常：Normal

漏电：Electric leakage

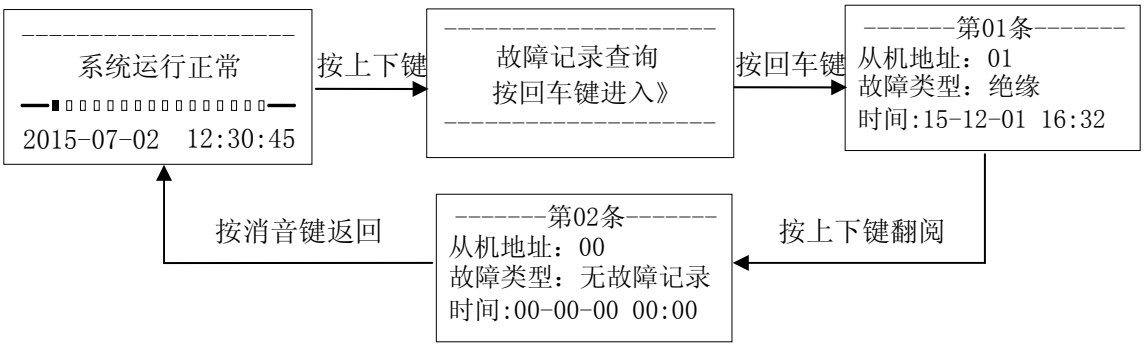
系统运行正常界面：System running normal interface

绝缘监测故障：Insulationg monitoring failure

漏电流监测故障：Leakage current monitoring failure

2）故障记录查看界面操作及说明

2) Operation and instruction of failure recordings examination interface



系统运行正常 System operation is normal

按上下键 Press “Up” and “Down” keys

故障记录查询 Failure recordings inquiry

按回车键进入 Press “Enter” key to enter

按回车键 Press “Enter” key

第 01 条 Article 01

从机地址：Slave address

故障类型：绝缘 Failure type: Insulation

时间：Time

按消音键返回 Press “Ventil” to return

第 02 条 Article 02

故障类型：无故障记录 Failure type: No failure recording

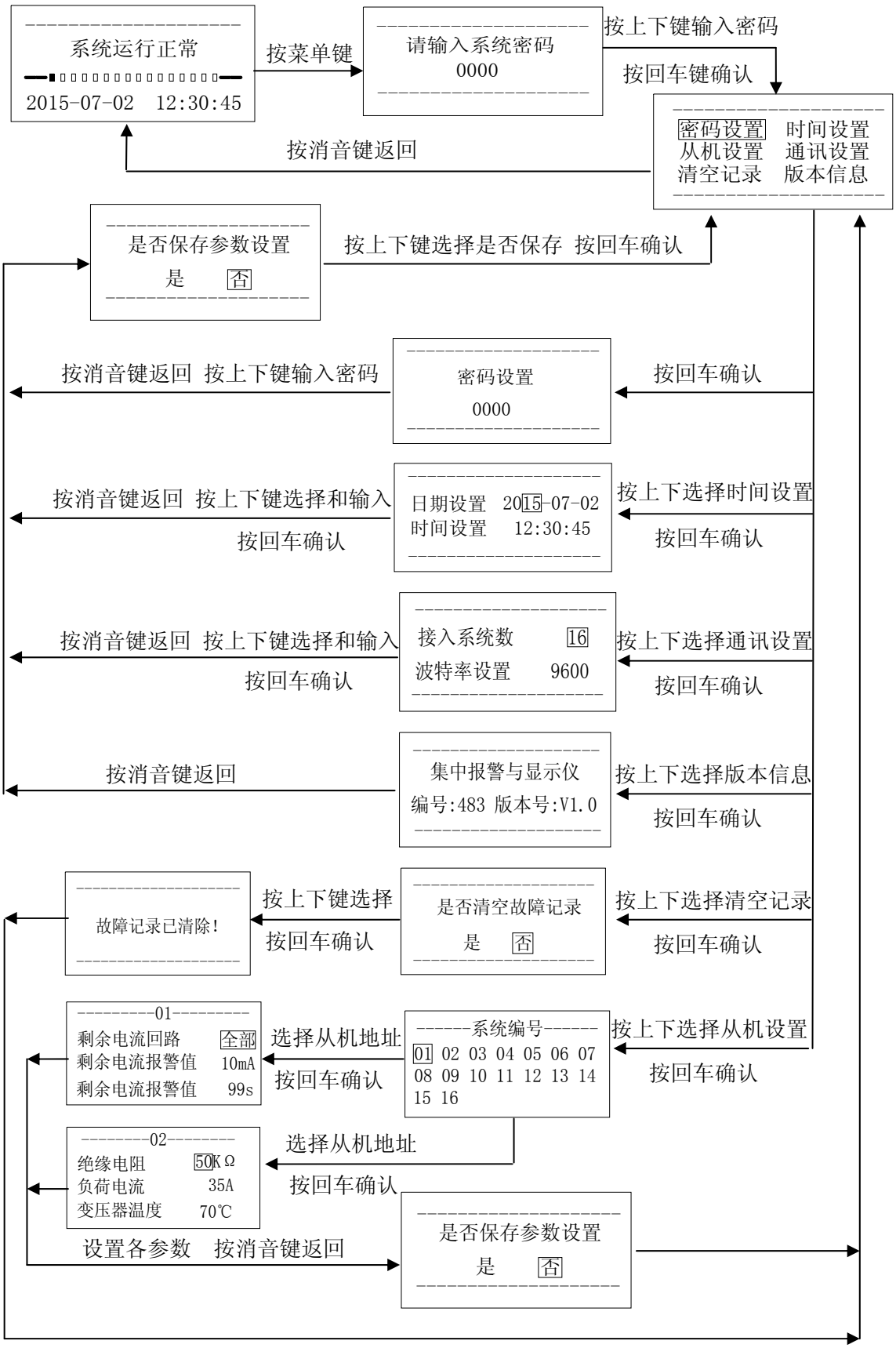
按上下键翻阅：To browse by pressing “Up” and “Down” keys

3）编程界面操作及说明

3) Operation and instruction of programming interface

操作方法和过程如下流程流所示。

The operation method and process are shown in the below flow.



系统运行正常 System operation is normal

按菜单键：Press “Menu” key

请输入系统密码：Please enter system password

按上下键输入密码 Press “Up” and “Down” keys to enter password

按回车键确认 Press “Enter” key to confirm

按消音键返回 Press “Ventil” to return

密码设置，时间设置，从机设置，通信设置，清空记录，版本信息：Password setting, time setting, slave setting, communication setting, empty recordings, version information

是否保存参数设置：是、否 Whether to save the parameter setting or not: yes, no

按上下键选择是否保存 按回车确认 Press “Up” and “Down” keys to select whether to save or not and press “Enter” key to confirm

按消音键返回 按上下键输入密码 Press “Ventil” to return and “Up” and “Down” keys to enter password

按上下选择时间设置 Press “Up” and “Down” keys to select time setting

按上下选择通讯设置 Press “Up” and “Down” keys to select communication setting

按消音键返回 按上下键选择和输入 Press “Ventil” to return and “Up” and “Down” keys to select and input

接入系统数：The number of access system

波特率设置：Baud rate setting

集中报警与显示仪：Centralized alarm and displayer

编号，版本号：Serial No., Version No.:

按上下选择版本信息，按回车确认 Press “Up” and “Down” keys to select version information and “Enter” key to confirm

按上下键选择 Press “Up” and “Down” keys to select

故障记录已清除：Failure recordings have been cleared

是否清空故障记录：Whether to clear the failure recordings or not

按上下选择清空记录，按回车确认 Press “Up” and “Down” keys to select to empty recordings and “Enter” key to confirm

剩余电流回路，全部，剩余电流报警值: Aftercurrent circuit, all, aftercurrent alarm value

选择从机地址，按回车确认: Select slave address and press “Enter” key to confirm

系统编号: System No.

按上下选择从机设置，按回车确认: Press “Up” and “Down” keys to select slave setting and “Enter” key to confirm

绝缘电阻，负荷电流，变压器温度: Insulation resistance, load current, transformer temperature

设置各参数 按消音键返回: To set up parameters and Press “Ventil” to return

说明：AID150 在使用时，应先设置接入 RS485 总线的绝缘监测仪和剩余电流监测仪的总数，且该总数不能超过 16 套。该设置在菜单中的[通讯设置]里。各绝缘监测仪和剩余电流监测仪的从机地址的设置尽量按从 1 到 16 的顺序编号，当绝缘监测仪和剩余电流监测仪的总数超过 16 套时，应增加 AID150 的数量并分别组网。

Explanation: When AID150 is in use, the total amount of insulation monitoring instrument connecting to RS485 bus and aftercurrent monitoring instrument should be set first which cannot be more than 16 sets. This setting is in “Communication setting” in the memu. The settings of slave addresses of each insulation monitoring instrument and aftercurrent monitoring instrument should be numbered from 1 to 16. When the total amount of insulation monitoring instrument and aftercurrent monitoring instrument are more than 16 sets, the quantity of AID150 should be increased and networking should be done respectively as well.

7 通信协议

7. Communication protocol

7.1 通讯协议概述

7.1 Overview of communication protocol

四件套产品中，AIM-M10 绝缘监测仪和 AID 系列外显装置使用了 Modbus-RTU 通讯协议，Modbus 协议详细定义了校验码、数据序列等，这些都是特定数据交换的必要内容。Modbus 协议在一根通讯线上使用主从应答式连接（半双工），这意味着在一根单独的通讯线上信号沿着相反的两个方向传输。首先，主计算机的信号寻址到一台唯一的终端设备（从机），然后，终端设备发出的应答信号以相反的方向传输给主机。

In four sets of products, Modbus-RTU communciation protocl is adopted by AIM-M10 insualtion monitor and AID series of dispayers. Modbus specifies the check code, data series and so on. These are the required contents for specific data exchange. Modbus protocol uses the master-slave response connection (half-duplex) on one communication line, which means the signals on one single communication line are transmitted along two inverse directions. First, the signals on the master computer finds one unique terminal equipment (slave computer) by addressing. Later, the answering signal from the terminal equipment is transmitted to the master computer along the inverse direction.

Modbus 协议只允许在主机（PC、PLC 等）和终端设备之间通讯，而不允许独立的终端设备之间的数据交换，这样各终端设备不会在它们初始化时占据通讯线路，而仅限于响应到达本机的查询信号。AID 系列外显装置与 AIM-M10 绝缘监测仪通讯时，外显装置为主机，绝缘监测仪为从机。

Modbus protocol only allows the communication between the master computer (Pc and PLC) rather than the data exchange among the separate terminal equipment. Thus, all terminal equipment will not occupy the communication line during initialization but only responds to the query signals arrived. When the extremal displayer of AID series and AIM-M10 insulation monitor communicate, the external displayer is the master computer and the

insulation monitor is the slave computer.

7.1.1 传输方式

7.1.1 Transmission mode

信息传输为异步方式，并以字节为单位，在主机和从机之间传递的通讯信息是 11 位格式，包含 1 个起始位、8 个数据位（最小的有效位先发送）、无奇偶校验位、2 个停止位。

The information transmission is asynchronous mode and takes byte as the unit. The communication information transmitted between mainframe and slave is in the format of 11 bytes, including one start bit, eight data bits(the minimum significance bit to be sent first), no parity bit and two stop bits.

7.2.1 功能码 03H 或 04H：读寄存器 Functional code 03H or 04H: read register

此功能允许用户获得设备采集与记录的数据及系统参数。主机一次请求的数据个数没有限制，但不能超出定义的地址范围。

With this function, the user is allowed to acquire the equipment acquisition and record data and system parameters. The number of data requested by the master computer at a time is not limited but cannot be beyond the defined address range.

下面的例子是从 01 号从机读 1 个测量的绝缘电阻值，其绝缘电阻值的地址为 0008H。

1 insulation resistance measured by No. 01 slave computer is read. The address of the insulation resistance is 0008H.

主机发送 Transmitted by master computer		发送信息 Transmitted information
地址码 Address code		01H
功能码 Functional code		03H
起始地址 Starting address	高字节 high byte	00H
	低字节 Low byte	08H
寄存器数量	高字节 high byte	00H
	低字节 Low byte	01H
CRC 校验码	高字节 high byte	74H
	低字节 Low byte	0CH

从机返回 Returned from slave computer		返回信息 Returned information
地址码 Functional code		01H
功能码 Number of bytes		03H
字节数		02H
寄存器数据 Register data	高字节 high byte	00H
	低字节 Low byte	50H
CRC 校验码 CRC check code	高字节 high byte	21H
	低字节 Low byte	75H

7.1.2 功能码 10H：写寄存器 Functional code 10H: write register

功能码 10H 允许用户改变多个寄存器的内容，该仪表中时间日期可用此功能号写入。主机一次最多可以写入 16 个（32 字节）数据。

Functional code 10H allows the user to change multiple registers'' contents. The time and data in the instrument may be written with this functional code. The master computer can write 16 (32 bytes) data at most at a time.

下面的例子是预置地址为 01 的装置日期和时间为 09 年 12 月 01 日，星期五，12 点 00 分。其中周一到周日分别用 1 到 7 代替。

The equipment date and time with 01 preset address are December 1, 2009, Friday, 12 o'clock. The days from Monday to Sunday are expressed by 1 to 7.

主机发送 Transmitted by master computer		发送信息 Transmitted information
地址码 Address code		01H
功能码 Functional code		10H
起始地址 Starting address	高字节 high byte	00H
	低字节 Low byte	04H
寄存器数量 Number of registers	高字节 high byte	00H
	低字节 Low byte	03H
字节数 Number of bytes		06H
0004H 待写入数据 0004H Data to be written	高字节 high byte	09H
	低字节 Low byte	0CH
0005H 待写入数据 0005H Data to be written	高字节 high byte	01H
	低字节 Low byte	05H
0006H 待写入数据 0006H Data to be written	高字节 high byte	0CH
	低字节 Low byte	00H

从机返回 Returned from slave computer		返回信息 Returned information
地址码 Address code		01H
功能码 Functional code		10H
起始地址 Starting address	高字节 high byte	00H
	低字节 Low byte	04H
寄存器数量 Number of registers	高字节 high byte	00H
	低字节 Low byte	03H
CRC 校验码 CRC check code	高字节 High byte	31H
	低字节 Low byte	C9H

CRC 校验码 CRC check code	高字节 high byte	53H
	低字节 Low byte	3FH

7.2 绝缘监测仪表内参数地址表 Parameter address in insulation monitor

序号 No.	地址 Address	参数 Parameter	读写 Read-write	数值范围 Numerical range	Word
1	0000H	保护密码 Protected password	R/W	0001-9999	1
2	0001H 高字节 high byte	通讯 1 地址 Communication 1 address	R/W	1~247 (默认值：1) 1~247 (default:1)	1
	0001H 低字节 low byte	通讯 1 波特率 Communication 1 baud rate	R/W	1~3：4800、9600、19200（单位：bps）（默认值：9600） 1~3: 4800, 9600, 19200 (unit: bps) (default: 9600)	
3	0002H 高字节 high byte	预留 Reserved			1
	0002H 低字节 low byte	预留 Reserved			
4	0003H 高字节 high byte	预留 Reserved			1
	0003H 低字节 low byte	预留 Reserved			
5	0004H 高字节 high byte	年 Year	R/W	1~99（单位：年）（默认值：11） 1~99 (unit: year) (default: 11)	1
	0004H 低字节 low byte	月 Month	R/W	1~12（单位：月）（默认值：4） 1~12 (unit: month) (default: 4)	
6	0005H 高字节 high byte	日 Date	R/W	1~31（单位：日）（默认值：20） 1~31 (unit: date) (default: 20)	1
	0005 低字节 low byte	周 Week	R/W	1~7 （单位：周）（默认值：3） 1~7 (unit: week) (default: 3)	
7	0006H 高字节 high byte	时 Hour	R/W	1~24（单位：时）（默认值：12） 1~24 (unit: hour) (default:12)	1
	0006 低字节 low byte	分 Minute	R/W	1~60（单位：分）（默认值：0） 1~60 (unit: minute) (default: 0)	
8	0007H 高字节 high byte	秒 Second	R/W	1~60（单位：秒）（默认值：0） 1~60 (unit: second) (default:0)	1
	0007H 低字节 low byte	保留 Reserved			
9	0008H	绝缘电阻 Insulation resistance	R	10~999（单位：KΩ） 10~999 (unit: KΩ)	1

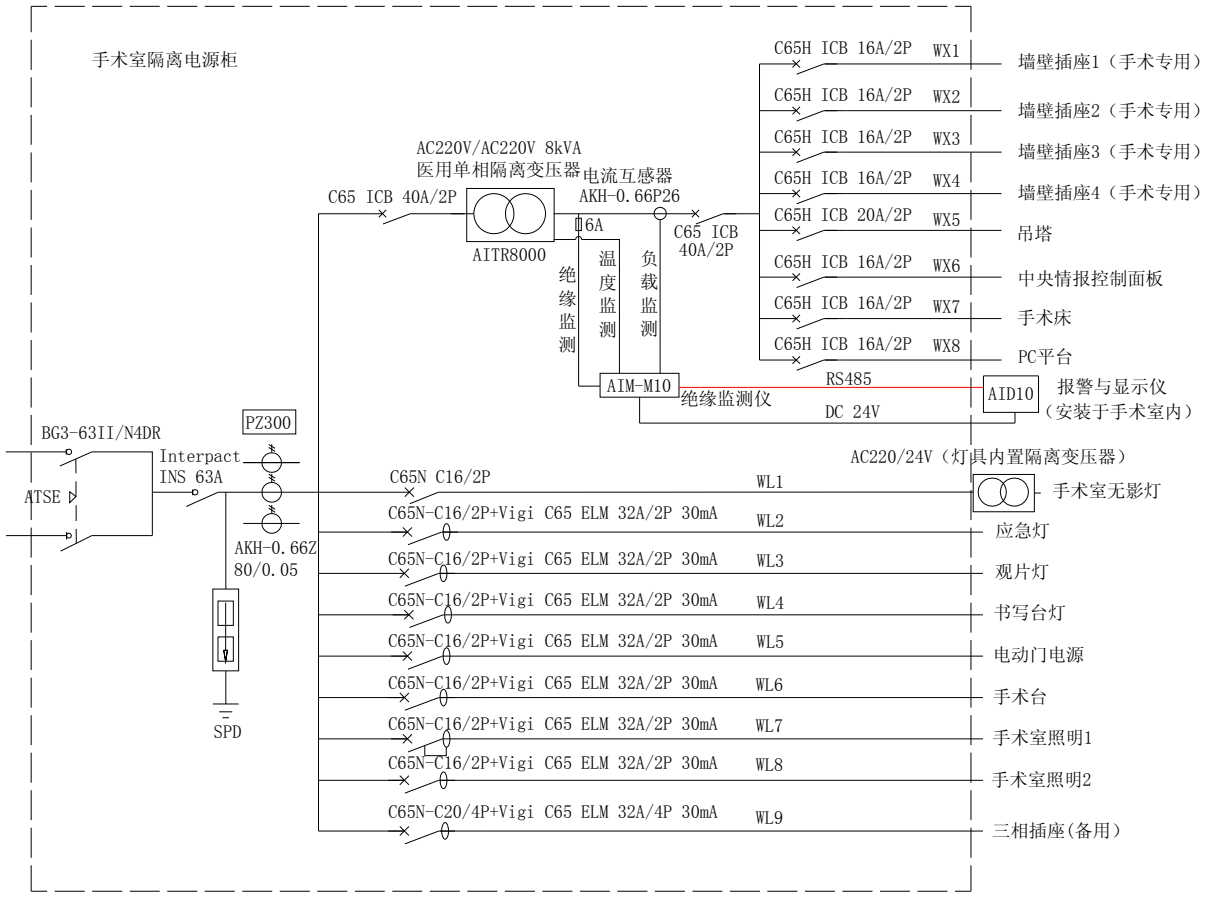
10	0009H	负荷电流 Load current		R	0~500 （单位：0.1A） 0~500 (unit: 0.1A)	1
11	000AH	变压器温度 Transformer temperature		R	-50~200 (单位：℃) -50~200 (unit: ℃)	1
12	000BH 高字节 high byte	保留 Reserved				1
	000BH 低字节 low byte	故障类型 Fault type		R	Bit0:1 绝缘电阻故障 insulation resistance fault Bit1:1 过负荷故障 overload fault Bit2:1 变压器超温故障 transformer over-temperature fault Bit3:1 预留 reserved Bit4:1 FE 或 KE 断线故障 FE or KE disconnection fault Bit5:1 温度传感器断线故障 temperature sensor disconnection fault Bit6:1 预留 reserved Bit7:1 预留 reserved	
13-16	000CH-000FH	预留 Reserved				4
17	0010H	绝缘电阻值设定值 Set value of insulation resistance		R/W	10~999（单位：KΩ）（默认值：50） 10~999 (unit: KΩ) (default: 50)	1
18	0011H	负荷电流值设定值 Set value of load current		R/W	5~50 （单位：A ） （默认值：35） 5~50 (unit: A) (default: 35)	1
19	0012H	变压器温度值设定值 Set value of transformer temperature		R/W	0~200 （单位：℃） （默认值：70） 0~200 (unit: ℃) (default: 70)	1
20-24	0013H-0017H	预留 Reserved				5
25	0018H 高字节 high byte	事件记录 1 Event record 1	保留 Reserved			1
	0018H 低字节 low byte		STA1	R	事件 1 内容：0~6 Event 1 content: 0~6 0 表示：无故障记录 0: no fault log 1 表示：绝缘故障 1: insulation fault 2 表示：过负荷故障 2: overload fault 3 表示：超温故障 3: over-temperature fault 4 表示：LL 断线 4: LL disconnection 5 表示：PK 断线\	

					5: PK disconnection 6 表示：TC 断线 6: TC disconnection	
26	0019H 高字节 high byte		Year1	R	事件 1 时间-年 Event 1 time-year	1
	0019 低字节 low byte		Moth1	R	事件 1 时间-月 Event 1 time-month	
27	001AH 高字节 high byte		Day1	R	事件 1 时间-日 Event 1 time-date	1
	001AH 低字节 low byte		Hour1	R	事件 1 时间-时 Event 1 time-hour	
28	001BH 高字节 high byte		Minute1	R	事件 1 时间-分 Event 1 time-minute	1
	001BH 低字节 low byte		Second1	R	事件 1 时间-秒 Event 1 time-second	
29-64	001CH-003FH	这部分空间存其余 9 条事件记录，规律和格式和第 1 条相同 The space saves other 9 event logs. The rule and format are same with Article 1.				

8 典型应用 Typical application

8. 1 医疗 IT 绝缘监测五件套产品在手术室配电中的应用

8.1 Application of medical IT insulation monitoring four-piece sets of products in power distribution in the operating room.



手术室隔离电源柜：Isolated power supply cabinet in operating room

医用单相隔离变压器：Medical single-phase isolation transformer

电流互感器：Current transformer

绝缘监测：Insulation monitoring

温度监测：Temperature monitoring

负载监测：Load monitoring

仪用电源：Instrument power

绝缘监测仪：Insulation monitoring instrument

墙壁插座（手术专用）：Wall socket (exclusive use of operation)

吊塔：Tower crane

中央情报控制面板：Central intelligence control panel

手术床：Operating bed

PC 平台：PC platform

报警与显示仪（安装于手术室内）：Alarm and displayer (installed for operating room)

灯具内置隔离变压器：Lamps internally installed isolation transformer

手术室无影灯：Shadowless lamp of operating room

应急灯：Emergency light

双片灯：Biplate light

书写台灯：Writing desk lamp

电动门电源：Power supply of electrically operated gate

手术台：Operating table

手术室照明：Operating room illumination

三相插座（备用）: Three-phase socket (backup)

9 上电及调试说明 Explanation of powering on and debugging

9.1 接线检查

9.1 Wiring inspection

每一套 IT 系统在上电前都要先进行接线检查，主要检查有没有错接、漏接或短接等。可对照本说明书第 5.4 部分所示的接线图按以下顺利依次检查：

Every set of IT system should be done wiring inspection before power on, mainly including misconnection, missing connection or short circuit etc. Inspection can be done as per the following sequences based on the wiring diagram shown in Part 5.4 in this Instruction.

1）检查每一个四件套是否组成一套独立的 IT 配电系统，确保每一台绝缘监测仪监测的电流、电阻和温度信号接线接到同一台隔离变压器及其组成的 IT 系统上。

1) To check whether each five-piece set forms one-set independent IT power distribution system so as to ensure wirings of current, resistance and temperature signal monitored by each set of insulation monitoring instrument to be connected to the same set of isolation transformer and its component IT system.

2）检查 AIM-M10 直流稳压电源输出。其 24V 输出端的 5、6（+24V、G）是否分别与 AID 系列外显装置的 24V、G 端子可靠相连，且正负极无误。

2) To check whether the terminals of AIM-M10 V and G of its 24V output terminals connect with 24V and G terminals of AID series external devices reliably and no error for positive and negative electrode as well.

3）检查每一套系统中的 AIM-M10 的 15（I0）、16（I1）号端子是否可靠连接到对应隔离变压器的二次侧套接的互感器 AKH-0.66P26 的端子上，且不接地。该互感器只穿过隔离变压器输出端两根线的其中一根线。

3) To check whether No.15(I0) and No.16(I1) terminals of AIM-M10 in each set of system connect to the terminals of mutual inductor AKH-0.66P26 socketed by secondary side of corresponding isolation transformer

reliably and no earthing as well. This mutual inductor only passes through one out of two lines at output terminal of isolation transformer.

4）检查每一套系统中的 AIM-M10 的 17（T0）、18(T1)号端子是否与隔离变压器的两个 ST 端子相连接，并可靠连接。

4) To check whether No.17(T0) and No.18(T1) terminals of AIM-M10 in each set of system connect to two nos. of ST terminals of isolation transformer reliably.

5）检查每一套系统中的 AIM-M10 的 11（L1）、12（L2）号端子是否与 IT 系统（即隔离变压器的二次侧输出端）的两根线可靠连接。

5) To check whether No.11(L1) and No.12(L2) terminals of AIM-M10 in each set of system connect to the two nos. of wires of IT system(that is secondary side output terminal of isolation transform) reliably.

6）检查每一套系统中的 AIM-M10 的第 1（FE）、2(KE)号端子是否分别用导线连接到现场的等电位端子排上，同时隔离变压器的 S 端子是否也与等电位端子排可靠连接。

6) To check whether No.1 (FE) and No.2 (KE) terminals of AIM-M10 in each set of system connect to spot equipotential terminals strips by conductor jointing respectively, meanwhile, S terminal of isolation transformer connects to equipotential terminal strips reliably.

7）检查每一套系统中的 AIM-M10 仪表 RS485 通讯的 3（A2）、4(B2)号端子是否分别与 AID 系列的外接报警与显示仪的 A、B 端子以手拉手的方式可靠连接，且正反无误。

7) To check whether No.3(A2) and No.4(B2) terminals of AIM-M100 instrument RS485 communication in each set of system connect to A and B terminals of external alarm and displayer of AID series by ways of hand in hand reliably with no positive and negative reverse.

8）如果每一台隔离变压器有散热风扇，则检查该散热风扇电源的控制是否连接到该套系统中 AIM-M10 的 7、8 号端子上。

8) if each set of isolation transformer has cooling fan, inspection should be done on whether the power supply of this cooling fan connects to No.7 and No.8 terminals of AIM-M10 in this set of system.

9.2 常见故障与排除 Common faults and elimination

确保接线正确无误后，给系统上电，并查看各仪表是否异常，AIM-M10 是否有故障报警，对于常见的问题，可根据各仪表的现象及故障类型判断原因并进行故障排除：

Guarantee to connect the wire without error, power on the system and check whether all instruments are abnormal. Check whether AIM-M10 has fault warming. For ordinary problems, judge the cause according to the instrument phenomenon and fault types and eliminate the faults:

设备名称 Equipment name	故障现象 Fault phenomenon	可能的原因及其排查 Possible cause and elimination
AIM-M10 绝缘监测仪	液晶显示：FK 断线故障，绝缘指示灯亮 LCD: PK disconnection fault, insulation indicator ON	AIM-M10 的 1、2 号端子没有可靠连接到等电位端子排上，检查接线并确保其可靠连接。 No. 1 and 2 terminals of AIM-M10 are not reliably connected with the equipotential terminal strip. Check the connection and guarantee the reliable connection.
	液晶显示：TC 断线故障，超温指示灯亮 LCD: TC disconnection fault, over-temperature indicator ON	AIM-M10 的 17、18 号端子没有与隔离变压器的两个 ST 端子可靠连接，检查接线并确保可其靠连接。 No. 17 and 18 terminals of AIM-M10 are not reliably connected with two ST terminals of isolation transformer. Check the connection and guarantee the reliable connection.
	液晶显示：绝缘故障，绝缘指示灯亮 LCD: insulation fault, insulation indicator ON	隔离变压器二次侧的 IT 系统的两根线中至少有一根出现接地故障，排除后即可恢复正常。 At least one line from two IT system lines at secondary side of isolation transformer has a fault. After the fault is eliminated, it can become normal.
	仪表不亮 Instrument OFF	AIM-M10 的 220V 工作电源没有接好，检查 11、12 号端子接线并确保其可靠连接。 220V working power supply of AIM-M10 is not connected. Check N0. 11 and 12 terminal wires and guarantee the reliable connection.
	上电指示灯不亮 Power indicator OFF	检查 220V 电源输入接线是否正常，两端子间电压是否在允许输入的范围之内。 Check whether 220V power input wire is normal. The voltage between two terminals is within the allowable input range.
AID 系列外接报警与显示仪 AID system external alarm and displayer	通讯不正常或无通讯 Communication abnormal or no communication	1） AIM-M10 的通讯地址没有设为默认的 1，或从 BUAD 没有设为默认的 9600，需将其设为默认值。 1) The communication address of AIM-M10 is not defaulted as 1, or BUAD is not defaulted as 9600. Please set as the default. 2） 与系统中 AIM-M10 的通讯线没接好，对通讯线进行排查，并确认匹配电阻是否接好。 2) The communication line of AIM-M10 is not connected. Eliminate

		the faults of the communication wire and confirm whether the matching resistance is connected.

注意：出现以上故障，均断电排查，调整接线，直到一切正常为止。

Notice: in case of the above faults, please power off and eliminate the faults, adjust the connection wires until all becomes normal.

9.3 设置及调试

9.3 Setup and commissioning

1）安科瑞医疗 IT 产品在进入菜单设置时，均需要输入密码才能进入。安科瑞所有医疗 IT 产品的初始密码均为 0001。

1) Acrel medical IT products can enter into the menu setup only after entering password with initial password of 0001.

2)系统正常上电后，需根据隔离变压器的容量，设置 AIM-M10 负载电流报警值，报警电流与隔离变压器容量的对应关系为：45A---10kVA、35A---8kVA、28A---6.3kVA、14A---3.15kVA。设置完后按步骤一步一步退出，保存设置参数即可。仪表默认电流报警值为 35A，如果配套的变压器为 8kVA，则该项参数不用设置。

1) After the system is powered on, set the AIM-M10 load current alarm value according to the capacity of the isolation transformer. The corresponding relations between alarm current and isolation transformer capacity are: 45A---10kVA, 35A---8kVA, 28A---6.3kVA, 14A---3.15kVA. After you set up, follow the process step by step to exit and save the setting parameters. The default alarm current value of the instrument is 35A, if the matching transformer is 8kVA, then this parameter does not need to be set.

3)通讯地址设置。为保证多套绝缘监测仪通过集中报警与显示仪 AID130/AID150 集中监控功能的实现，需依次设置各 AIM-M10 的通讯地址，再将仪表间通讯依次手拉手连接。设置完后通讯总线的首末端各并连一只 120Ω的匹配电阻（该电阻必须加，否则可能无法通讯。）。AID130/AID150 不需要设置 RS485 通讯地址。采用 AID10 外接报警与显示仪监控 1 套 AIM-M10 绝缘监测仪时，绝缘监测仪的从地址应为 1，从波特率应为 9600，否则无法通讯。

3) To set up postal address. In order to realize the centralized monitoring function of multiple sets of insulation monitoring instruments by AID130/AID150 of centralized alarms and displayers, slave addresses of each AIM-M10 should be set in sequence(Main address is used for communication with upper computer. No need for setup if there is not upper computer), then the communication among instruments should be connected by hand in hand. After completion of setup, the heads and ends of communication bus connect in parallel to one 120Ω matched resistance (this resistance is a must, otherwise communication cannot be done). RS485 communication address is not required to be set for AID130/AID150. When external alarm and displayer of AID100 or AID120 are adopted to monitor one set of AIM-M100 insulation monitoring instrument, the slave address of insulation monitoring instrument should be 1 and Baud rate should be 9600, otherwise communication cannot be done.

4）AID130/AID150 在使用时，应先设置接入 RS485 总线的绝缘监测仪或剩余电流监测仪的总数，且该总数不能超过 16 套。在 AID130 中，该参数的设置在菜单中的[报警设置]子菜单里。在 AID150 中，该参数的设置在菜单中的[通讯设置]子菜单里。各绝缘监测仪或剩余电流监测仪的从机地址的设置尽量按从 1 到 16 的顺序编号，当总数超过 16 套时，应增加 AID150 的数量并分别组网。

4) When AID130/AID150 is in use, the total amount of insulation monitoring instrument connecting to RS485 bus and aftercurrent monitoring instrument should be set first which cannot be more than 16 sets. In AID130, the setting of the paramethers is in the submenu of “ALARM SETTING” in the menu. In AID150, the setting of the parameters is in the submenu of “Communication SETTING” in the menu. The setting of slave addresses for each insulation monitoring instrument or aftercurrent monitoring instrument should be numbered from 1 to 16. When the total amount is more than 16 sets, the quantity of AID150 should be increased and networking should be done respectively as well.

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