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Acrel Electric Co., Ltd.

医用 IT 系统绝缘监测产品

（五件套）

安装使用说明书 V2.2

Medical IT System Insulation Monitoring Products

(Five-piece Set)

Installation and Operation Manual V2.2

安科瑞电气股份有限公司

Acrel Electric Co., Ltd.

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更 改 履 历

Revision history

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，把所有五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	2016.11.7	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 five pieces of products are integrated into the content to completely replace the specifications of the products.
02	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

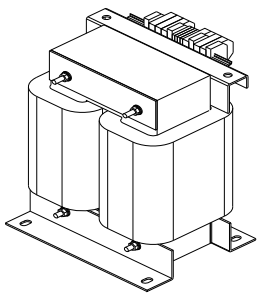
医用 IT 系统主要应用于诸如手术室、ICU/CCU 重症监护室等重要的医疗 2 类场所，为这些场所的重要设备提供安全、可靠、连续的配电。医用绝缘监测及故障定位装置是安科瑞电气集多年电力仪表行业的设计经验，根据医疗 2 类场所对配电系统绝缘监测和故障定位的特殊要求而开发的。产品可实现 IT 系统的绝缘、负载和隔离变压器温度等状况的实时监测，并具有系统绝缘故障回路定位和多套系统集中监控等功能。产品符合企业标准 Q31/0114000129C013-2016 《IT 系统绝缘监测仪》的规定。

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 系统绝缘监测及故障定位产品（五件套）包括 AITR 系列医用隔离变压器、AIM-M100 医疗智能绝缘监测仪、AKH-0.66P26 电流互感器、ACLP10-24 仪用直流稳压电源和 AID 系列（AID100、AID120、AID130、AID150）集中报警与显示仪等，产品如表 1 所示。

Medical IT system insulation monitoring and fault locating products (five-piece set) include AITR series medical isolation transformer, AIM-M100 medical intelligent insulation monitoring instrument, AKH-0.66P26 current transformer, ACLP10-24 DC power supply, and AID series(AID100、AID120、AID130、AID150) centralized alarm and display instrument, which are shown in Table 1.

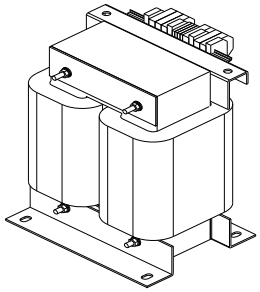
表 1 医用 IT 系统绝缘监测产品

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-M100 医疗智能绝缘监测仪			AIM-M100 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-M100 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。
ACLP10-24 仪用直流稳压电源			仪表专用的直流稳压模块，采用完全隔离的线性变压器。具有输出电压稳定，纹波小、耐压等级高等特点，并带有电源上电指示功能。模块采用标准导轨安装的方式，可以和绝缘监测仪安装在同一导轨上，安装方便。
AID 系列外接报警与显示仪	AID100		仅适合于嵌入柜体安装，可监控 1 台 AIM-M100 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，数码管显示，RS485 通讯。
	AID120		适合于嵌入手术室或护士站内墙体安装，可监控 1 台 AIM-M100 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，数码管显示，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-M100 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-M100 medical intelligent insulation monitoring instrument		AIM-M100 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.
ACLP10-24 instrument DC stabilized power supply		The DC voltage regulator module for exclusive use of instrument employs completely isolated linear transformer with the characteristics of stable output voltage, small ripple and high-grade withstand voltage etc. It is also equipped with the electric indicative function of power on. The module adopts the installation method of standard guide rail which can be installed on the same guide rail as the insulation monitoring instrument conveniently.

AID series external alarm and displayer	AID100		It is only suitable for installation of embedding into cabinet which can monitor one set of AIM-M100 insulation monitoring instrument with the function of sound-light alarm on failures like insulation, overload, overheat and equipment failure etc. and digital display and RS485 communication.
	AID120		It is fit for embedding into operating room or nurse station internal wall installation which can monitor one set of AIM-M100 insulation monitoring instrument with the function of sound-light alarm on failures like insulation, overload, overheat and equipment failure etc. and digital display and RS485 communication.
	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-M100 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；
- 可与绝缘故障定位装置配套使用，在绝缘故障时可远程启动故障定位，并显示定位结果；
- 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；
- 采用两种现场总线通讯技术，分别用于集中报警与显示仪、测试信号发生器、绝缘故障定位仪以及上位机管理软件通讯，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；
- 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;
- Can be used with insulation fault locator, remotely starting fault-locating and displaying locating results when there are insulation faults;
- 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;
- Two kinds of fieldbus communication technology, which are used for centralized alarm and display instrument, test signal generator, insulation fault locator and upper computer management software communications, and can monitor the operation status of IT system in real time.
- Events logging function, which can record alarm occurrence time and fault type and is convenient for operation personnel to analyze the operation conditions of system and promptly eliminate the faults;

2.3 AID100/120/130/150 报警与显示仪功能特点

- 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；
- 当被监测的任一系统出现绝缘故障、过负载、变压器温升过高或接线故障时，集中报警与显示仪提供相应的声光报警功能，并可手动消除报警声音。
- 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.

表 2 AID 系列各型号产品功能说明

型号	选用说明
AID100	可监控 1 台 AIM-M100 绝缘监测仪，仅适合于嵌入柜体面板安装
AID120	可监控 1 台 AIM-M100 绝缘监测仪，嵌入墙体安装，适用于手术室或仅使用单套隔离电源的重症监护室的监控

AID130	最多可监控 16 台 AIM-M100 绝缘监测仪，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-M100 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
AID100	It can monitor one set of AIM-M100 insulation monitoring instrument which is only suitable for installation by embedding into cabinet panel.
AID120	It can monitor one set of AIM-M100 insulation monitoring instrument and be used for installation by embedding into wall. It can be applied to monitor operating room or ICU only using single set of isolated power.
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 ACLP10-24 仪用**直流稳压**电源功能特点

2.4 Functional characteristics of ACLP10-**24 instrument DC stabilized power supply**

- 采用隔离的线性变压器，具有抗干扰能力强，纹波小等特点；
- 交流 220V 输入，直流 24V 输出，最大输出功率为 3W；
- 可用于为 AID 系列报警与显示仪等仪表提供直流 24V 电源。
- To employ isolated linear transformer with the characteristics of strong capacity of resisting disturbance and small ripple etc.
- AC 220V input, DC 24V output, with max output power of 3 W;
- Used for the DC 24V power supply for AID series centralized alarm and display instrument and other instruments.

2.5 AKH-0.66P26 电流互感器功能特点

2.5 Function features of AKH-0.66P26 current transformer

- 最大可测电流为 60A，变比是 2000：1；
- 与 AIM-M100 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

3 Reference standard

- 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 Technical parameters

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-M100 医疗智能绝缘监测仪技术参数

见表 4。

4.2 Technical parameters of AIM-M100 medical intelligent insulation monitoring instrument

See Table 4.

表 4　AIM-M100 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	<8W		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	2 路继电器输出（可编程）
	相对百分比误差	0—±10%		触点容量	AC 250V/3A　DC 30V/3A
	报警值范围	50—999kΩ	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	<50uA		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-M100 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	<8W		Alarm value scope	0—+200℃

Insulation monitoring	Measuring range of insulation resistance	10-999kΩ	Alarm output	Output mode	2-route relay output(programmable)
	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	<50uA		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 **AID100/120/130/150 外接**报警与显示仪技术参数

见表 5。

4.3 Technical parameters of AID100/120/130/150 external alarm and displayer

See table 5.

表 5 AID100/120/130/150 **报警与显示仪技术参数**

参数 / 仪表		AID100	AID120	AID130	AID150
辅助电源	电压	DC 24V			

	功耗	< 0.6W	
绝缘电阻显示范围		0—999kΩ	—
绝缘报警范围		50—999kΩ	—
变压器负载率显示		百分比显示	—
负载电流报警设置		14A、18A、22A、28A、35A、45A	
温度报警设置范围		0 —+200℃	
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		数码管显示	128×64 点阵液晶显示

Table 5 Technical parameters of AID100/120/130/150 alarm and displayer

Parameter / Instrument		AID100	AID120	AID130	AID150
Auxiliary power supply	Voltage	DC 24V			
	Consumption	< 0.6W			
Display range of insulation resistance		0—999kΩ		—	
Insulation alarming range		50—999kΩ		—	
Transformer load rate display		Percentage display		—	
Load current alarm setting		14A、18A、22A、28A、35A、45A			
Temperature alarm setting range		0 —+200℃			
Alarm method		Sound-light alarm			
Alarm type		Insulation failure, overload, overheat, equipment failure			
Communication mode		RS485 interface MODBUS-RTU agreement			
Display mode		Digital display		128×64 lattice LCD display	

4.**4 ACLP10**-24 仪用**直流稳压**电源技术参数

见表 6

4.4 Technical parameters of ACLP10-**24 instrument DC stabilized power supply**

See Table 6.

表 6 ACLP10-24 **仪用直流稳压电源技术参数**

输入电压	AC 220V（可波动范围±10%)
频率	50/60Hz
功率	3W
输出电压	DC 24V±5%

电压调整率	≤30%
温升	≤20℃
抗电强度	4000V AC/分钟

Table 6 Technical parameters of ACLP10-24 instrument DC stabilized power supply

Input voltage	AC 220V(fluctuating range±10%)
Frequency	50/60Hz
Power	3W
Output voltage	DC 24V±5%
Voltage regulation factor	≤30%
Temperature rise	≤20℃
Dielectric intensity	4000V AC/minute

4.5 AKH-0.66P26 电流互感器技术参数

4.5 Technical parameters of AKH-0.66P26 current transformer

见表 7。

Refer to Table 7.

表 7 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，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, Maximum length of 1 meter
Storage temperature	-40～+75℃			Single core twisted pair, 0.75mm^2, 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

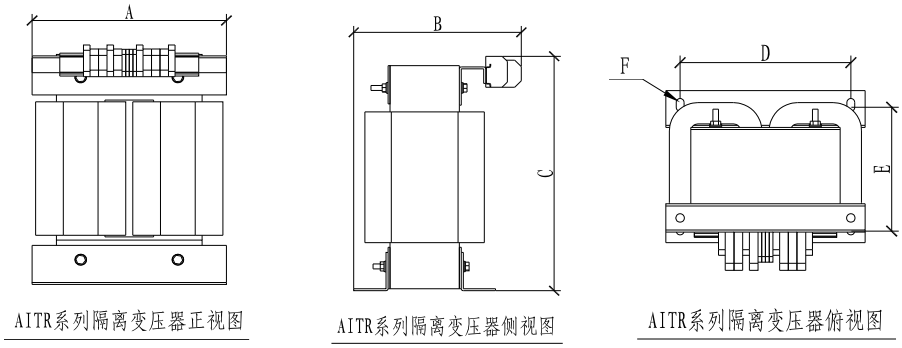
5.1 Dimension and installation hole size

5.1.1 AITR 系列医用隔离变压器外形尺寸（单位：mm）

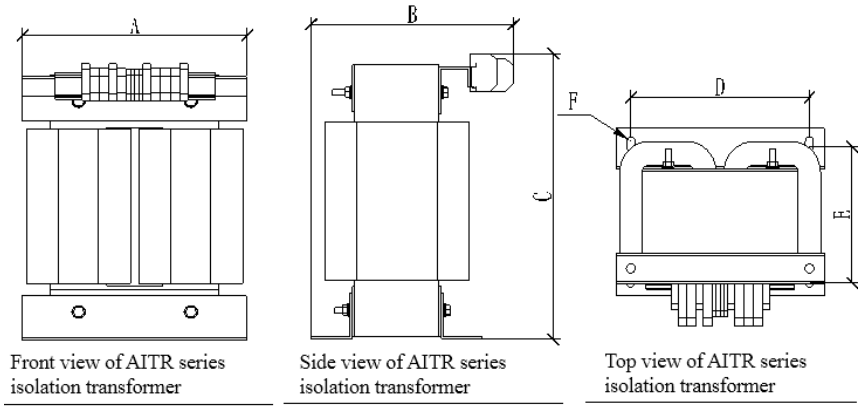
5.1.1 External dimensions of AITR series medical isolation transformer (unit: mm)

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

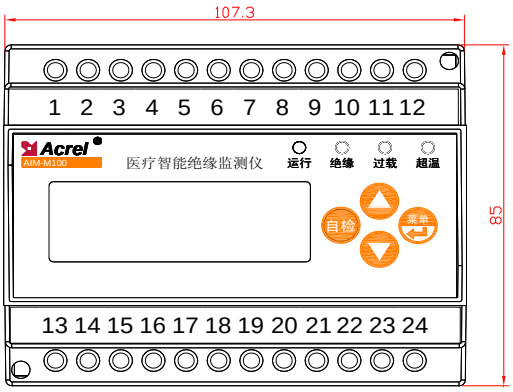
型号	容量 (VA)	A(mm)	B(mm	C(mm	D(mm)	E(mm)	F(mm)	总重量(kg)
AITR10000	10000	280	275	427	240	190	φ11	92
AITR8000	8000	280	265	427	240	190	φ11	90
AITR6300	6300	280	255	427	240	175	φ11	75
AITR5000	5000	280	255	427	240	175	φ11	73
AITR3150	3150	280	225	427	240	175	φ11	53

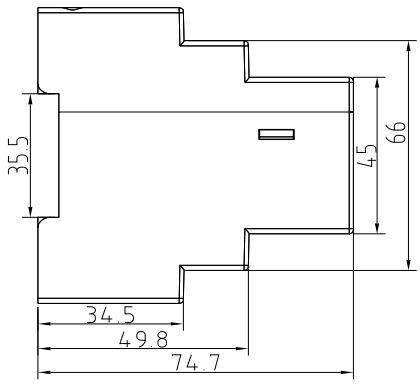
Table 9 External Dimensions of AITR Series Medical Isolation Transformer

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-M100 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-M100 insulation monitoring instrument (unit: mm)



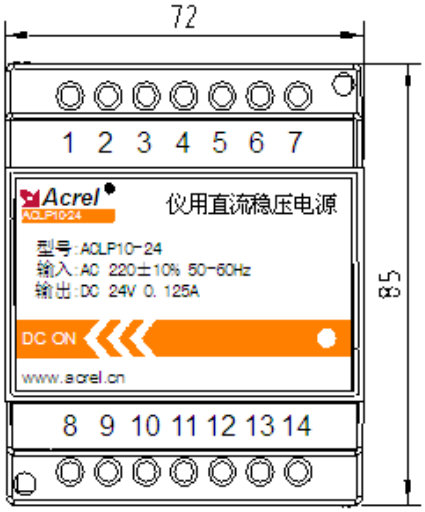


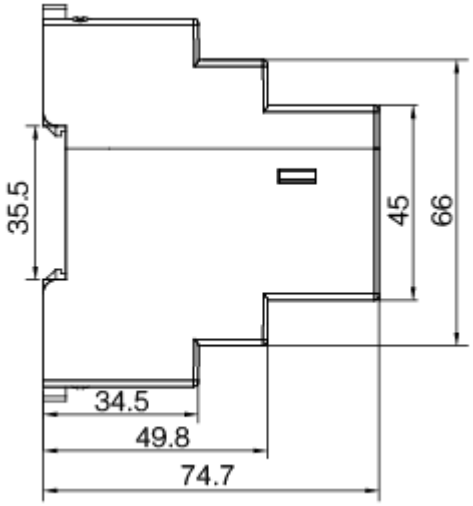
正视图　　侧视图

Front view　　Side view

5.1.3 ACLP10-24 仪用直流稳压电源外形与安装开孔尺寸（单位：mm）

5.1.3 Dimension and installation hole size of ACLP10-24 instrument DC stabilized power supply (unit: mm)



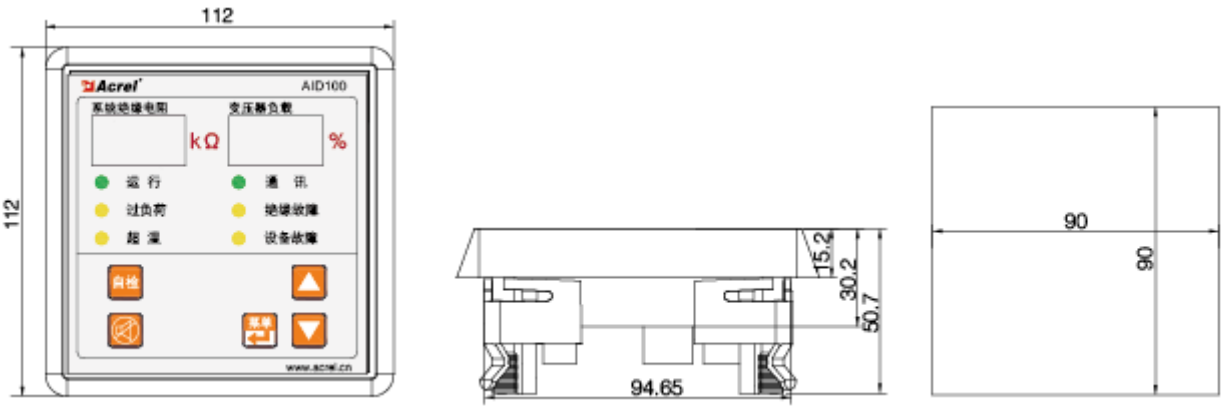


正视图　　侧视图

Front view　　Side view

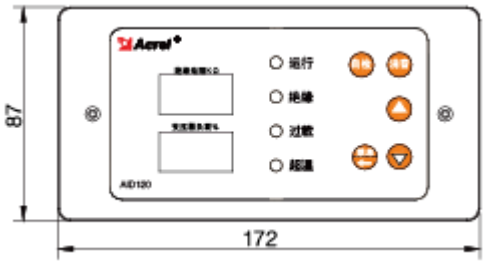
5.1.4 AID 系列外接报警与显示仪外形与安装开孔尺寸（单位：mm）

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



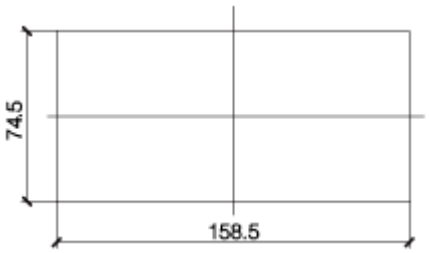
AID100 正视图

AID100 front view



AID100 底视图

AID100 bottom view



AID100 面板开孔尺寸

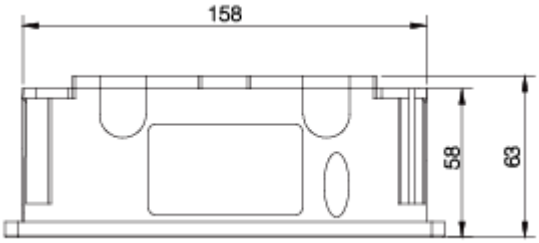
AID100 panel hole size

AID120 正视图

AID120 front view

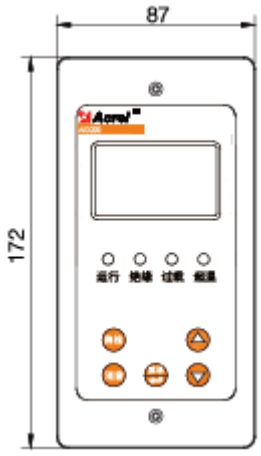
AID120 面板开孔尺寸

AID120 panel hole size



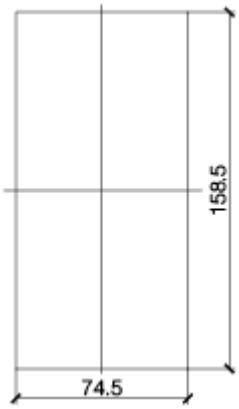
AID120 侧视图

AID 120 side view



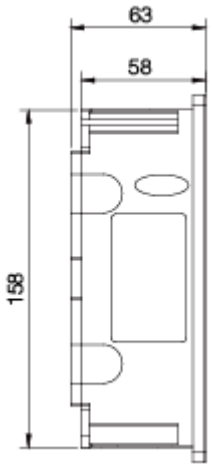
AID130/AID150 正视图

AID130/AID150 front view



AID130/AID150 面板开孔尺寸

AID130/AID150 panel hole size

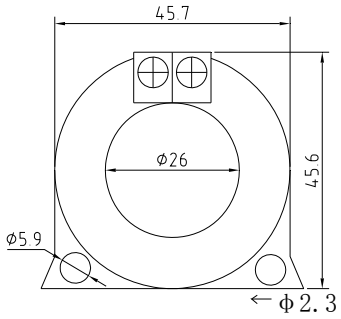


AID130/AID150 侧视图

AID130/AID150 side view

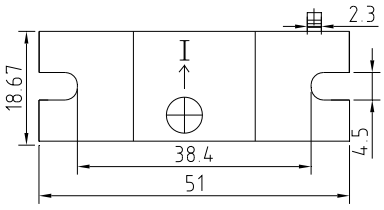
5.1.5 AKH-0.66P26 电流互感器外形尺寸（单位：mm）

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 安装方法

5.2 Installation method

医用 IT 系统绝缘监测五件套产品除了 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）内，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-M100 绝缘监测仪太远。AID120/ AID130/150 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，应安装手护士站内，供值班护士查看,集中监控的各绝缘监测仪表、AID 集中报警与显示仪之间 RS485 通讯应以手拉手的方式连接。AID 系列外显装置对外接线包括两根 24V 电源线和 1 根根 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 and fault locating instrument seven pieces of products are preferably installed in the distribution cabinet (isolation power cabinet) except for the AID200 centralized 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-M200 insulation monitor. If the AID200 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.

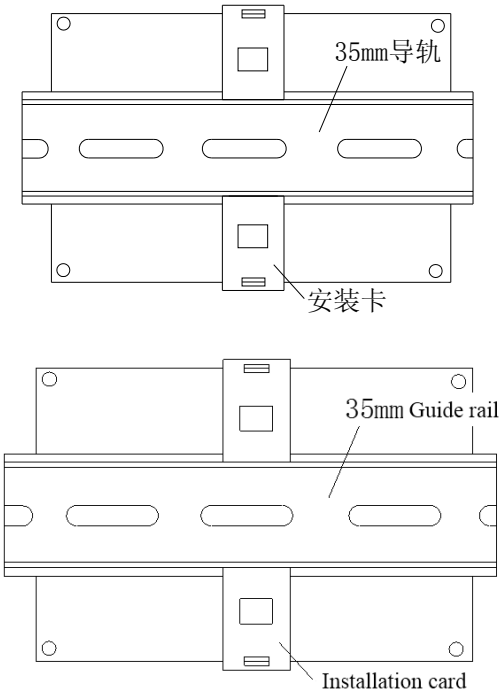
5.2.1 AIM-M100 医疗智能绝缘监测仪安装方式

5.2.1 Installation mode of AIM-M200 medical intelligent insulation monitoring instrument

AIM-M100 绝缘监测仪采用导轨的安装方式，固定方式为卡扣式，如下图所示：

AIM-M100 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:



5.2. 2 ACLP10-24 仪用稳压电源安装方式

5.2.2 Installation method of ACLP10-24 instrument regulated power supply

ACLP10-24 仪用稳压电源采用导轨的安装方式，卡扣式固定，也可同 AIM-M 1 00 监测仪并排安装在同一导轨上。

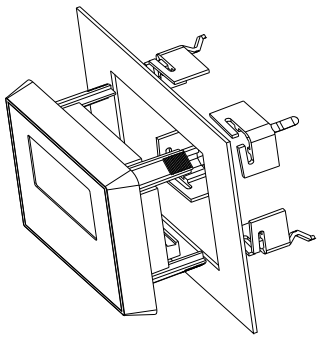
ACLP10-24 instrument regulated power supply is installed by guide rail and fixed by clip-on, which can also be installed at the same guide rail as AIM-M100 monitoring instrument.

5.2. 3 AID 系列报警与显示仪安装方式

5.2.3 Installation methods of AID series alarm and displayer

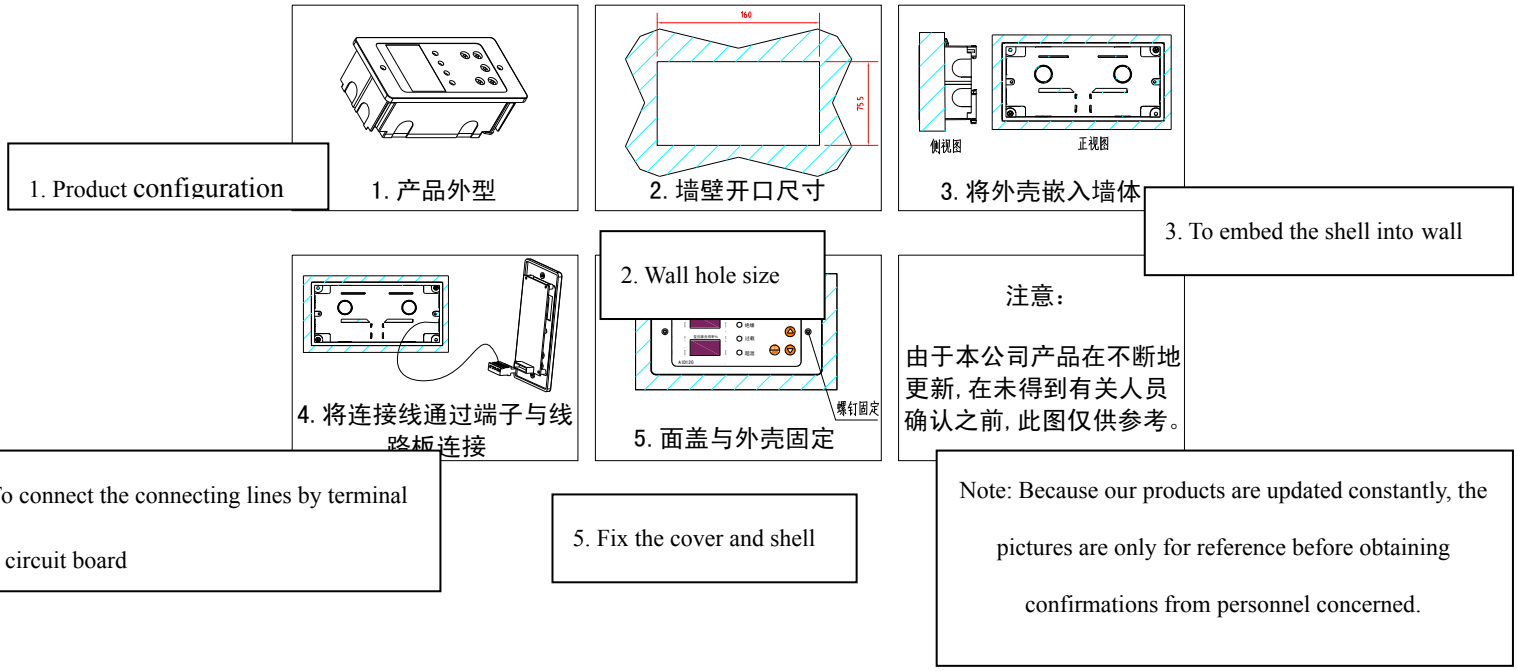
1 ）AID100 外接报警与显示仪的安装方式是嵌入安装，挤压式固定，适合嵌入柜体面板安装，其安装示意图如下图所示。

1) The installation methods of AID100 external alarm and displayer are embedded installation and squeezing fixation, which are suitable for installation by embedding into cabinet panel with installation instructions as follows.



2 ）AID120/AID130/AID150 外接报警与显示仪的外壳相同，适合嵌入墙体安装，以 AID120 为例，其安装示意图如下图所示。

2) Shells of the external alarms and displayers of AID120/AID130/AID150 are same, which are fit for installation by embedding into wall. To takeAID120 for an example with its installation instructions as follows:



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 1.5mm^2 的电源线+1 根 2×1.5mm^2 的屏蔽双绞线）引入，接到前面盖线路板的对应端子上后，再将面盖安装在外壳上，并用附带的自攻螺钉拧紧固定。

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.

5.3 接线方法

5.3 Wiring method

5.3.1 AITR 系列医用隔离变压器接线方式

5.3.1 Wiring mode of AITR series medical isolation transformer

在变压器接线端子处，标记为“PM”的为输入端子，其中 0、230 的两个端子接输入的 220V 单相交流电。标记为“SEC”的为输出端子，其中 0、230 的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 母排上（或等电位端子排上）。两个 ST 端子为温度传感器接口，分别与 AIM-M200 绝缘监测仪的 13、14 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.

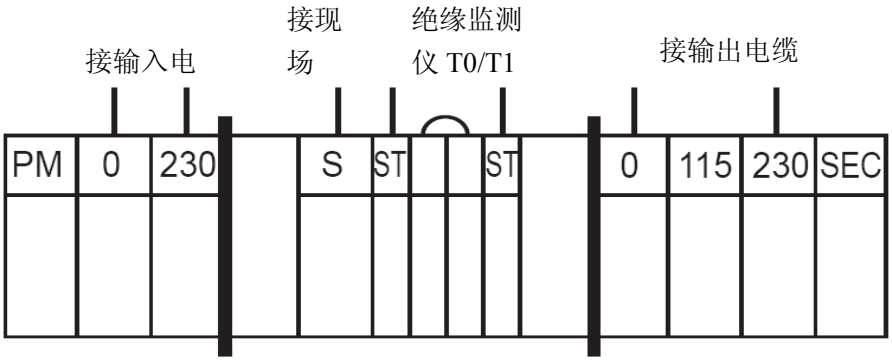


图 2　AITR 系列医用隔离变压器接线端子图

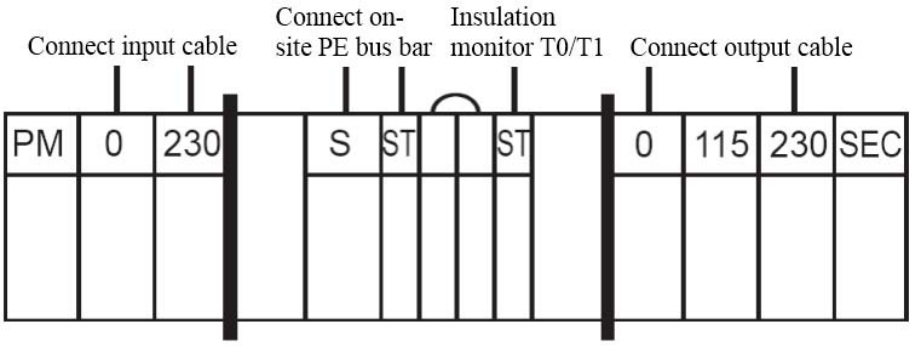


Figure 2 AITR series medical isolation transformer terminal blocks diagram

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 2×4mm^2 黄绿线。**两个 ST 端子的接线可选用 2×1.5mm2 的屏蔽双绞线，且接线不宜过长。**

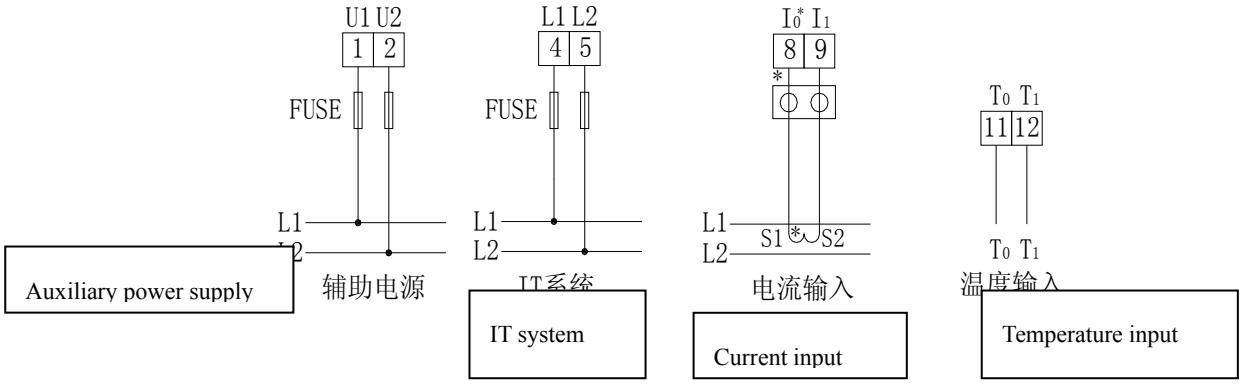
Note: The wirings of input and output terminals of the isolation transformer should select the copper wires matching the line diameter based on the isolation transformer rated input and output current (refer to tables in section 5.4). S terminal wiring can select 2×4mm^2 yellow-green wire. The wiring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

5.3.2 AIM-M100 绝缘监测仪接线方法

5.3.2 Wiring method of AIM-M100 insulation monitoring instrument

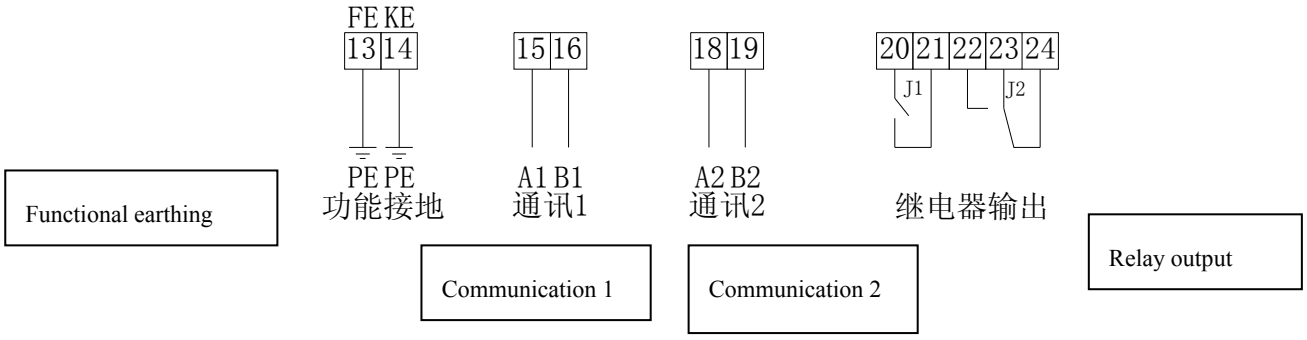
上排端子： U1、U2 为辅助电源，L1、L2 与被监测 IT 系统连接，L1、L2 端子可分别先与 U1、U2 并联后接到隔离变压器 0-230V 输出两个端子上。I0、I1 为电流互感器的信号输入端，T0、T1 为温度传感器的信号输入端。

Upper terminals: U1 and U2 are auxiliary power supplies. L1 and L2 connect to the monitored IT system. The terminals of L1 and L2 can connect to the two terminals of isolation transformers 0-230V output after parallel connection with U1 and U2 respectively. I0 and I1 are signal input terminals of current transformer. T0 and T1 are signal input terminals of temperature sensor.



下排端子：FE、KE 分别连接到现场等电位接地端子排上， A1、B1 为与上位机通讯的端子，A2、B2 为与外接报警与显示仪通讯的端子，J1 为超温报警输出（用于控制散热风扇），J2 为故障报警继电器输出。

Lower terminals: FE and KE are connected to spot equipotential earth terminal strips separately. A1 and B1 are the terminals of upper computer communication. A2 and B2 are terminals of external alarm and displayer communication. J1 is over temperature alarm output (used for controlling cooling fan) and J2 is failure alarm relay output.



注：

2）绝缘监测仪在安装时切勿上下颠倒安装，以防止误将 1、2 号端子的辅助电源接到继电器的常闭触点 23、24 上，造成上电后烧坏仪表的后果。

Notes:

2) Insulation monitoring instrument cannot be installed in up-down reverse in order to prevent connection of auxiliary power supplies of No.1 and No.2 terminals to normally-closed contacts 23,24 of relay by mistake which will cause instrument burnout after power on.

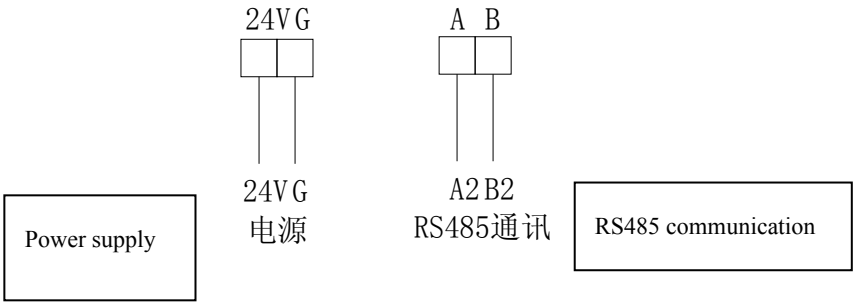
5.3.3 AID 系列外接报警与显示仪接线方法

5.3.3 Wiring method of AID series external alarm and displayer

A、B 端子与 AIM-M100 下排端子中的 A2、B2 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-M100 lower terminals. The power

supply terminals connect to positive electrode and earthing of 24V DC power supply separately with the wiring diagram as follows.

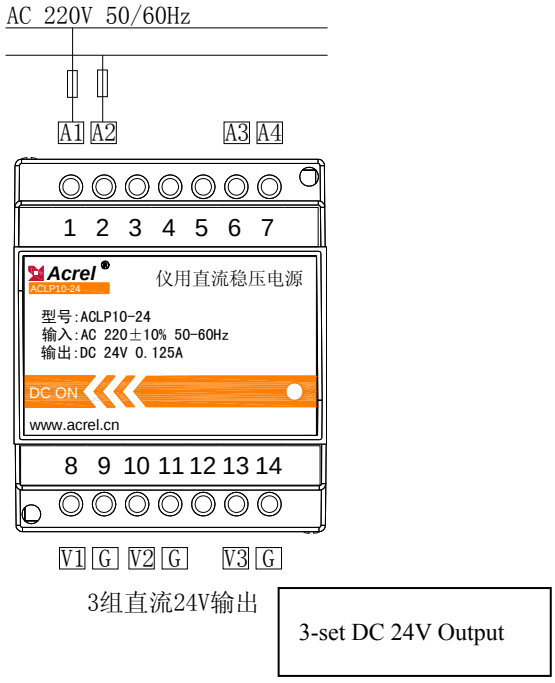


24V 的电源可采选用 2×1.5mm² 的多股铜线连接；RS485 通讯端子对外接线可选用 2×1.5mm² 屏蔽双绞线，通讯用的 COM 口不接线。

24V power supply can adopt multistrand copper wire of 2×1.5mm² to connect. The external wiring of communication terminals can use shielded twisted pair of 2×1.5mm² and there is no wiring for COM port of communication.

5.3. 4　ACLP10-24 仪用直流稳压电源接线方法

5.3.4 Wiring method of ACLP10-24 instrument DC stabilized power supply

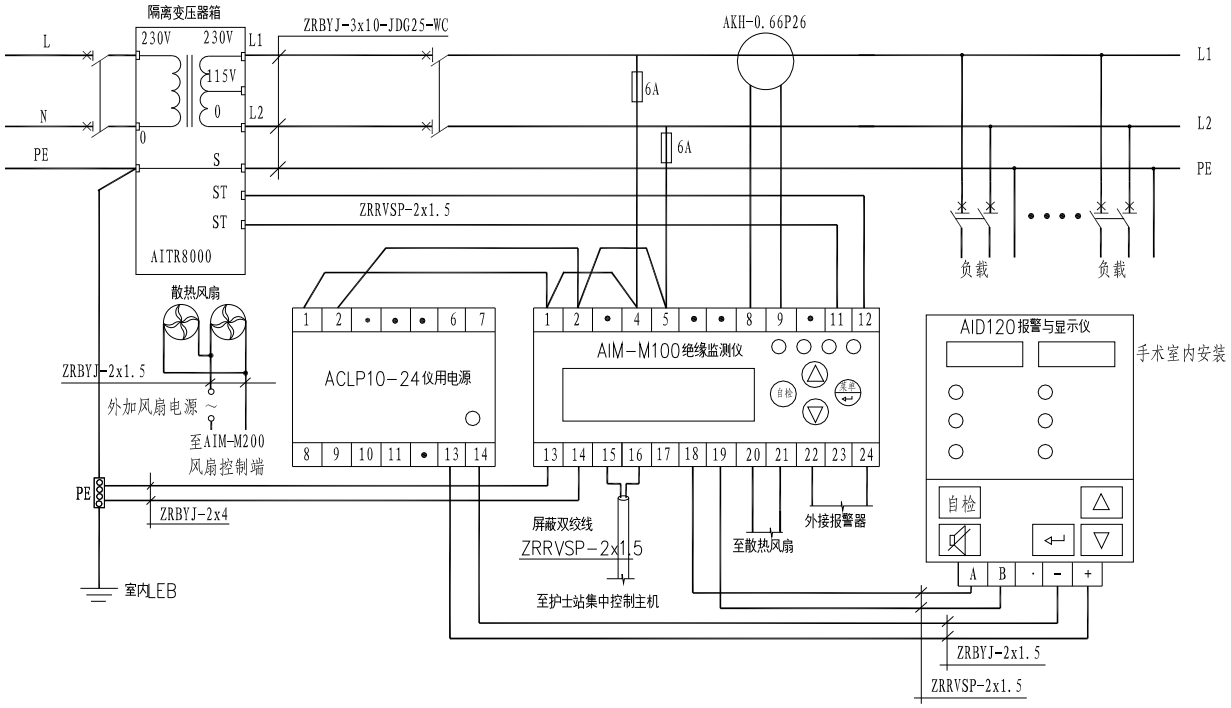


ACLP10-24 仪用直流稳压电源的 1、2 号端子对应和 A1 和 A3 是交流 220V 电源的输入端子，7、8 号端子对应的 A3 和 A3 是输入扩展端子，在仪表内部，A3 与 A1 相连通，A4 与 A2 相连通。8、9 号端子对应的 V1、G，10、11 号端子对应的 V2、G,以及 13、14 号端子对应的 V3、G 是三组 24V 电源的输出端子，用于给 AID 系列的外接报警与显示仪提供 24V 直流电源。在仪表内部，所有的 V 端子是相连通的，所有 G 端子是相连通的。No.1 and No.2 terminals of ACLP10-24 instrument DC stabilized power supply correspond to A1 and

A3 that are the input terminals of alternating 220V power. No 7 and No.8 terminals correspond to A3 that is input extension terminal. Inside the instruments, A3 connects to A1 and A4 connects to A2. V1 and G corresponded by No.8 and No.9 terminals, V2 and G corresponded by No.10 and No.11 terminals and V3 and G corresponded by No.13 and No.14 terminals are the output terminals of three-set 24V power supplies, which are used for providing 24V DC power supply to AID series external alarm and displayer. Inside the instruments, all the V terminals are linked together, so do G terminals.

5.4 典型接线图

5.4 Typical wiring diagram



说明：

Descriptions:

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-M100 绝缘监测仪的 1、2 号端子和 4、5 号端子，以及 ACLP10-24 仪用电源的 1、2 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 输出端子上，并串接 6A 的熔断器保护。

2) No.1 and No.2 terminals and No.4 and No.5 terminals of AIM-M100 insulation monitoring instrument and No.1 and No.2 terminals of ACLP10-24 instrument power supply require to connect alternating 220V voltage of IT system, which can connect to 0 and 230V output terminals of secondary side of isolation transformer directly as per the ways shown in the diagram as well as concatenate 6A fuse for protection.

3）AIM-M100 绝缘监测仪的 20、21 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) The relay output control of the No.20 and 21 terminals of the AIM-M100 insulation monitor is a dry node, which needs an additional fan power supply when used for the fan control. When multiple transformers are centrally installed in one isolation power cabinet, multiple fans should be connected in a parallel mode controlled by multiple insulation monitors, that is, every one insulation monitor can start or 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，但不能同时穿两根线。其输出用 2×1.5mm^2 的线接至 AIM-M200 的 8 号、9 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-M100 绝缘监测仪的 4、5 号端子应用 2×1.5mm^2 的多芯铜线可靠连接到 IT 系统上（可并联连到隔离变压器的输出端），13、14 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.4, 5 terminals of AIM-M100 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.13, 14 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-M100 绝缘监测仪的 18、19 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 2×1.5mm^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-M100 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-M100 的 13、14 号端子也为 RS485 通讯端子，用于与上位机的通讯，如果没有上位机，则不接线。

6) Shielded twisted pair of 2×1.5mm^2 can be employed by the lines of communication between No.18 and No.19 terminals of AIM-M100 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.13 and No.14 terminals of AIM-M100 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 系统绝缘监测和故障定位七件套产品，除了 AID200 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 and fault locating seven pieces of products should be centrally installed in the isolation power cabinet except for AID200. 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-M200 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-M200 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

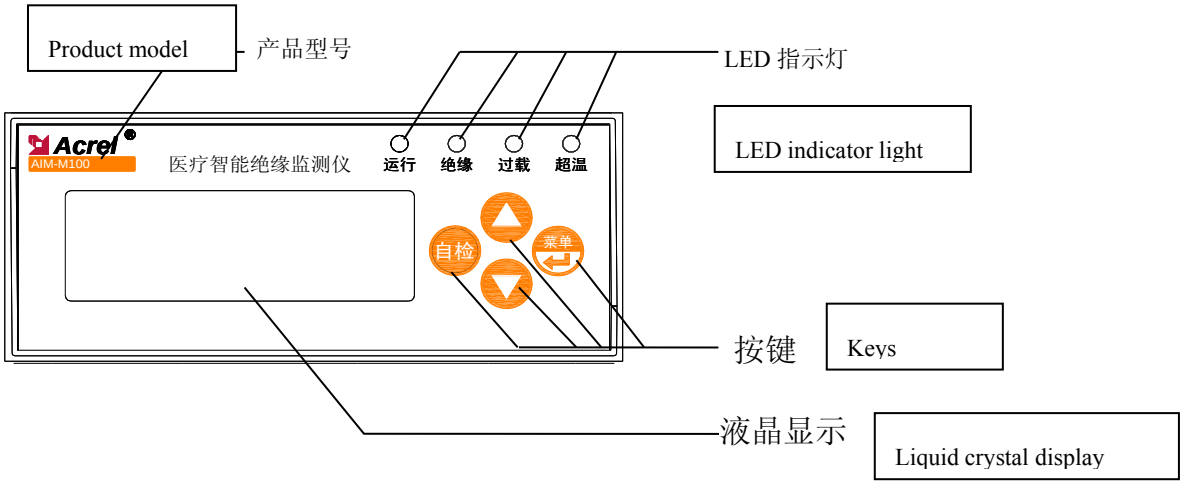
6. Programming and use

6.1 面板说明

6.1 Panel description

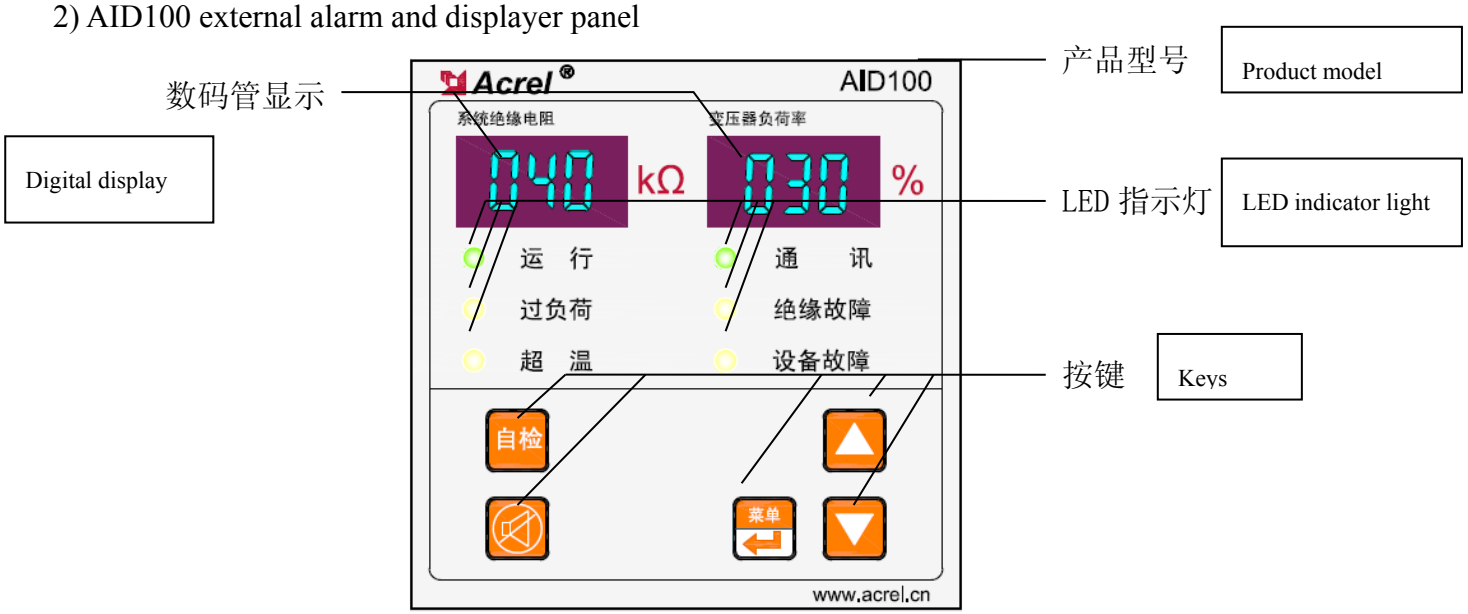
1）AIM-M100 绝缘监测仪面板

1) AIM-M100 insulation monitoring instrument panel



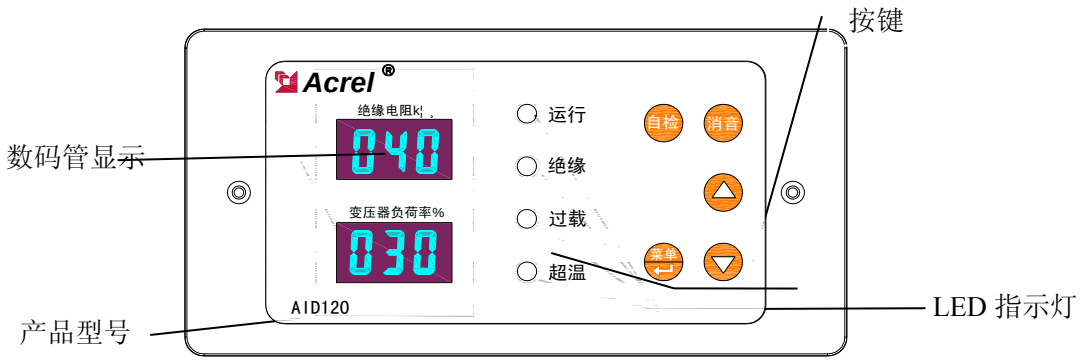
2）AID100 外接报警与显示仪面板

2) AID100 external alarm and displayer panel



3）AID120 外接报警与显示仪面板

3) AID120 external alarm and displayer panel



产品型号：Product model

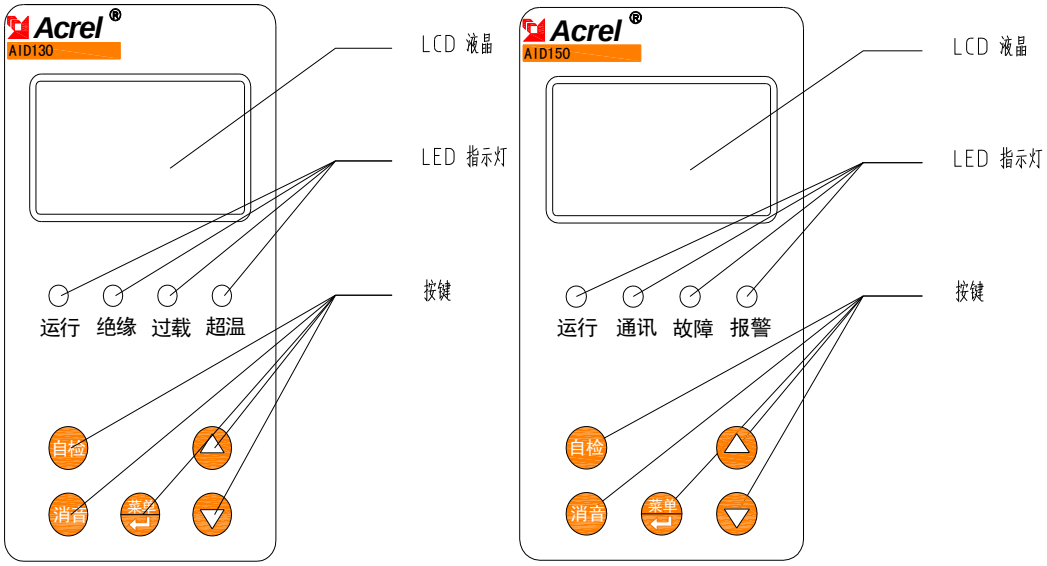
数码管显示：Digital display

按键：Keys

LED 指示灯：LED indicator light

4）AID130/AID150 集中报警与显示仪

4) 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

6.2 LED instruction

6.2.1 AIM-M100 医疗智能绝缘监测仪 LED 指示说明

6.2.1 LED instruction of AIM-M100 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 AID100 集中报警与显示仪 LED 指示说明

6.2.2 LED instruction of AID100 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
“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
“设备故障”状态	当绝缘监测仪检测到断线故障时，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.
“insulation” status	The indicator light flickers and gives an alarm when the insulation resistance exceeds the alarm value.
“overload” status	The indicator light flickers and gives an alarm when load current exceeds total load current of transformer.
“overheat” status	The indicator light flickers and gives an alarm when temperature of the checked transformer exceeds the alarm value.
“equipment failure” status	The indicator light flickers and gives an alarm when off-line failure is detected by insulation monitoring instrument.

6.2.2 AID120/AID130 集中报警与显示仪 LED 指示说明

6.2.2 LED instruction of AID120/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.

6.2.3 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-M100 和 AIM-R100 检测到断线故障时，指示灯闪烁报警
“报警”状态	当 AIM-M100 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-M100 绝缘监测仪按键功能说明

6.3.1 Function descriptions of AIM-M100 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 AID100/120/130/150 外接报警与显示仪功能按键说明

6.3.2 Function descriptions of AID100/120/130/150 external alarms and displayers keys

接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。其它状态下用于返回功能
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。

按键	按键功能
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，如果不进行其它按键操作，则系统进入 RUN 模式并运行。主界面显示绝缘电阻值、温度值、电流值、负荷率和当前系统时间。

(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“故障记录查询”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，第十条记录为最旧的记录。

(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。以检测仪表对主要故障的检测和判断功能是否正常。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 AIM-M100 医疗绝缘监测仪在编程模式下按键操作

6.4.2 Button operation of AIM-M100 medical intelligent insulation monitoring instrument in programming mode

（1）进入编程模式

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。再次按“回车”键使密码数字位反白显示，通过“上键”设置反白数字大小，通过“下键”选择反白数字位，输入正确密码后，按“回车”清除反白位，再次按“回车”键便可进入编程模式。

(1) Enter into programming mode

Under normal running condition, to press “Enter” key to enter into password input page of programming mode. Repress “Enter” key to make digit bit of password display reversedly. To set up the sizes of figures in reverse type by “Up”key and select the bits of figures in reverse by “Down” key. After the correct password is entered, “Enter” key is pressed to eliminate reverse bit and repress “Enter”key to enter programming mode.

（2）退出编程模式

在编程模式下，通过上下键选择菜单[退出]，即使 “◀”指向退出菜单。按下“回车”键便可退出编程模式，进入运行模式。

(2) Exit from programming mode

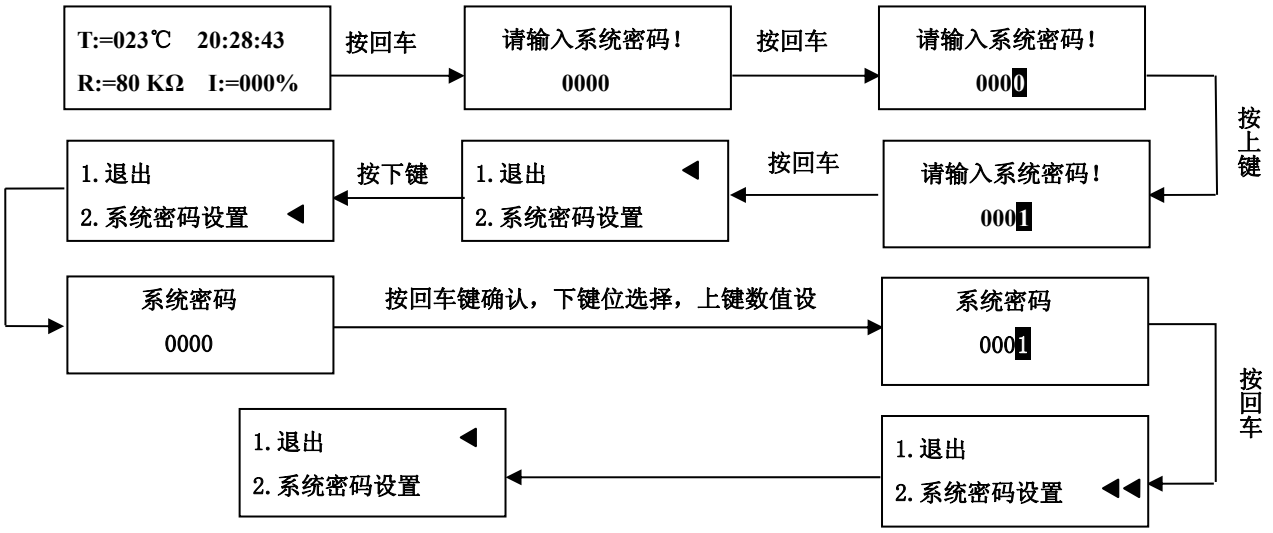
Under programming mode, “Exit”in the menu can be selected by “Up” and “Down”keys, even “◀” pointing at exit menu. To press “Enter” key to exit from programming mode and enter into running mode.

(3) 系统密码设置

(3) Systme password setting

在编程模式下，通过“上键”或“下键”选择[其它设置]，按“回车”键进入其它设置项，再通过“上键”或“下键”使密码数字部分反白显示，按“回车”键确认修改，此时便可以通过“上键”或“下键”改变密码数值大小，修改完后，再次按“回车”键确认，然后按“自检”键保存并退出编程模式。操作示例如下：

In programming mode, select [Other Settings] by "Up button" or "Down button", and press "Enter" button to enter other settings item, then make the password number part reverse video by "Up button" or "Down button", and press "Enter" button to confirm the modification. At this time you can change the password value by "Up button" or "Down button", and press "Enter" button to confirm after modification, then press "Self-test" button to save and exit programming mode. Examples of operations are as follows:



1 按回车: Press “Enter” key

2 请输入系统密码！: Please input system password

3 退出: Exit

4 系统密码设置 : System password setting

5 按下键 : Press “Down” key

6 按上键: Press “Up” key

7 按回车键确认，下键位选择，上键数值设: Press “Enter” key to confirm, “Down” key to select and “Up” key to set up value

(4) 主界面设置

(4) Main interface setting

主界面设置是选择不同风格的显示界面，有三种显示风格可供用户选择。其操作方式和“系统密码设置”类似，这里不再赘述。

Main interface setting is to select display interfaces of different styles with three types for user’s selection. Its operating mode is similar to “system password setting”, so the details are not given here again.

(5) 安全设置

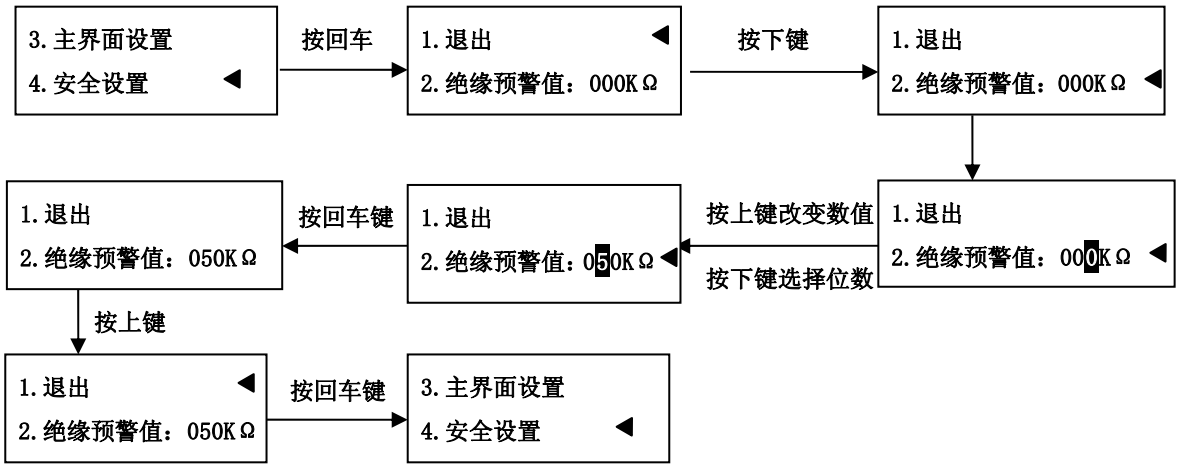
(5) Safety setting

安全设置是对系统绝缘预警值、负载电流预警值和变压器温度预警值的大小进行设置，和“系统密码设置”设置步骤类似。下面只对绝缘预警值、电流预警值和温度预警值的设置进行编程示例。

The safety setting means to set the system insulation early warning value, the load current early warning value and the transformer temperature early warning value, which are similar to the setting procedure of "System password setting". The following are examples of programming for insulation early warning value, current early warning value, and temperature early warning value.

将绝缘预警值设为 50kΩ，电流预警值设为 14A 和温度预警值设为 70℃。操作步骤如下：

The insulation early warning value is set to 50kΩ, and the current early warning value is set to 14A and the temperature early warning value is set to 70℃. The procedure is as follows:



1 主界面设置 Mainframe interface setting

2 安全设置 Safety setting

3 按回车 Press “Enter” key

4 绝缘预警值 Insulation pre-warning value

5 按下键 Press “Down” key

6 退出 Exit

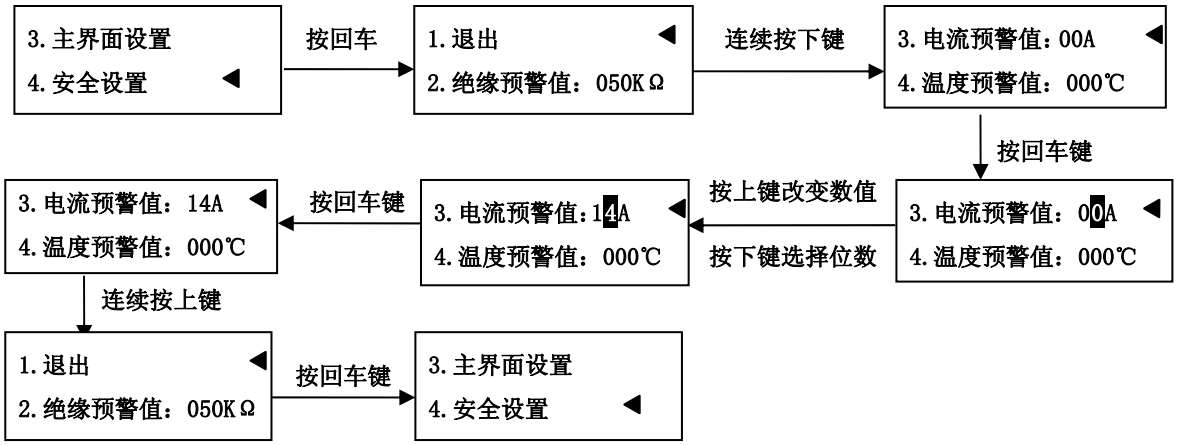
7 按上键改变数值 Press “Up” key to change value

8 按下键选择位数 Press “Down” key to select digit

9 按上键 Press “Up” key

将电流预警值设为 14A，操作步骤如下：

To set current pre-warning value as 14A with the operating steps as follows:



1 主界面设置 Mainframe interface setting

2 安全设置 Safety setting

3 按回车 Press “Enter” key

4 退出 Exit

5 绝缘预警值 Insulation pre-warning value

6 连续按下键 Press “Down” key without stop

7 电流预警值 Current pre-warning value

8 温度预警值 Temperature pre-warning value

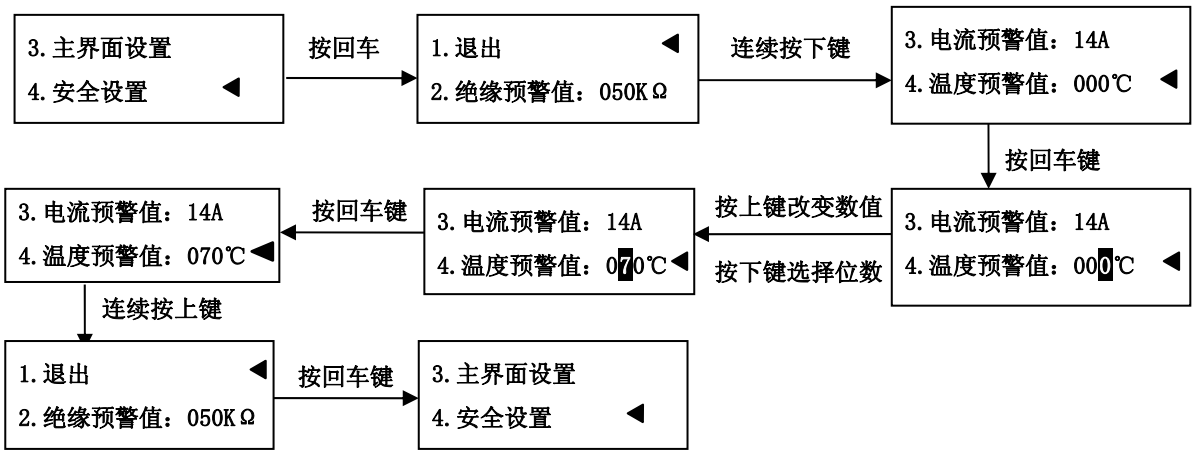
9 按上键改变数值 Press “Up” key to change value

10 按下键选择位数 Press “Down” key to select bit

11 连续按下键 Press “Up” key without stop

将温度预警值设为 70℃，操作步骤如下：

To set temperature pre-warning value as 70℃ with the operating steps as follows:



1 主界面设置 Mainframe interface setting

2 安全设置 Safety setting

3 按回车 Press “Enter” key

4 绝缘预警值 Insulation pre-warning value

5 退出 Exit

6 连续按下键 Press “Up” key without stop

7 电流预警值 Current pre-warning value

8 温度预警值 Temperature pre-warning value

9 按上键改变数值 Press “Up” key to change value

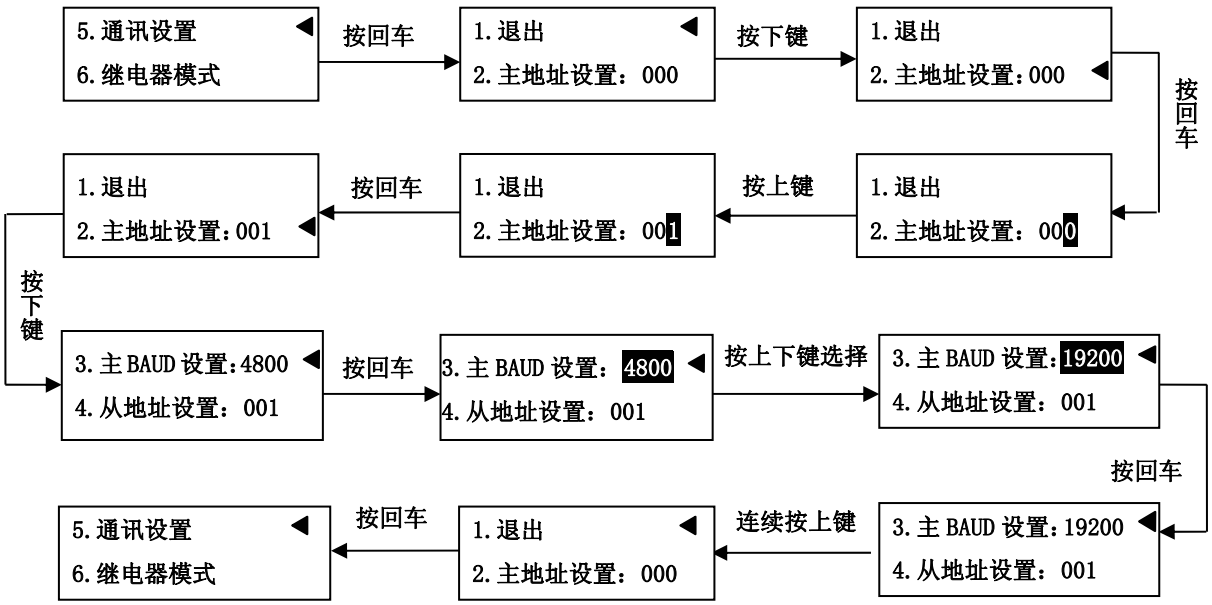
10 按下键选择位数 Press “Down” key to select bit

(6) 通讯波特率设置

(6) Communication Baud rate setting

将主地址设置为 001，主 BAUD 设置为 19200bps，编程示例如下：

To set main address as 001 and main BAUD as 19200bps with programming examples as follows:



1 通讯设置 Communication setting

2 继电器模式 Relay mode

3 按回车 Press “Enter” key

4 退出 Exit

5 主地址设置 Main address setting

6 按下键 Press “Up” key

7 按下键 Press “Down” key

8 主 BAUD 设置 Main BAUD setting

9 从地址设置 Slave address setting

10 按上下键选择 To press “Up” and “Down” keys to select

11 连续按上键 Press “Up” key without stop

说明：当 AIM-M100 与 AID100/AID120 通讯时，AIM-M100 的从地址必须设为 1，从 BAUD 必须设为 9600。

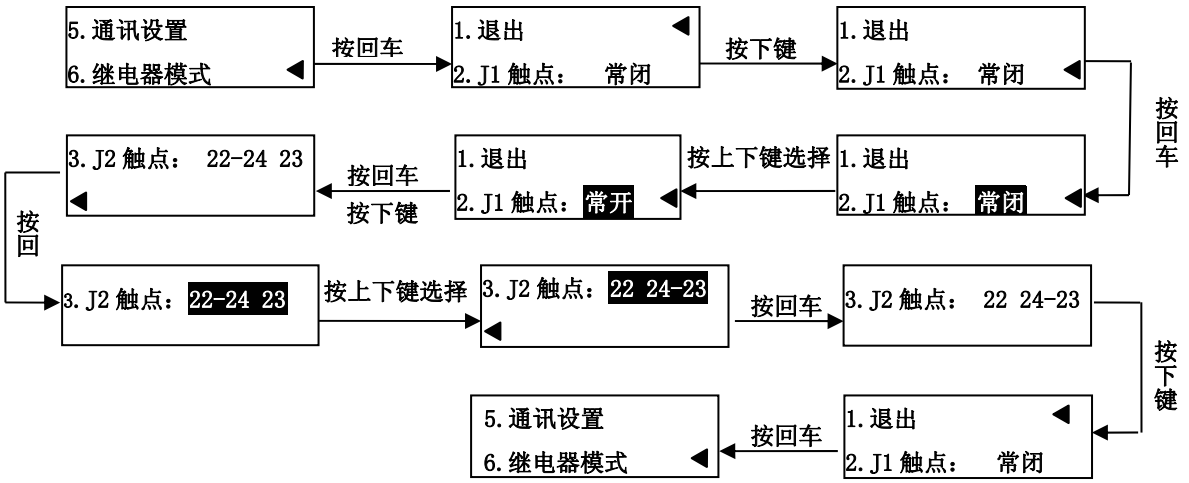
Explanation: When AIM-M100 communicates with AID100/AID120, the slave address of AIM-M100 must be set as 1 and slave BAUD must be set as 9600.

（7）继电器模式设置。

(7) Relay mode setting

设置 J1 触点常开，J2 触点 22 和 24 之间断开、23 和 24 之间闭合。示例如下：

To set J1 contact as normally open, disconnect between 22 and 24 of J2 contact and close between 23 and 24 of J2 contact. The examples are shown as follows:



1 通讯设置 Communication setting

2 继电器模式 Relay mode

3 按回车 Press “Enter” key

4 J1 触点 J1 contact

5 常闭 Normally closed

6 按下键 Press “Down” key

7 J2 触点 J2 contact

8 常开 Normally open

9 按上下键选择 To press “Up” and “Down” keys to select

（8）时间设置

(8) Time setting

“时间设置”是对仪表的日期和当前时间进行设置。“时间设置”和“主界面设置”和“系统密码设置”等属于同一级的菜单，操作类似，这里不再赘述。

“Time setting” is to set up the date and current time of instrument. “Time setting”, “Main interface setting” and “System password setting” etc. belongs to the same-level menu with similar operations. So details are not given here again.

（9）恢复出厂设置“恢复出厂设置”可以对仪表参数恢复为出厂时的设置。

(9) To restore factory settings. “Restore factory settings” can restore instrument paramers to the factory settings.

（10）版本信息“版本信息”显示仪表型号和软件版本的信息。

(10) Version information. “Version information” displays the information of instrument model and software version.

6.4.3 AID100/AID120 外接报警与显示仪按键操作

6.4.3 Keys operation of AID100/AID120 external alarm and displayer

（1）AID100/AID120 开机默认有 5 秒的时间来读取主机的数据，此时绝缘电阻值和变压器负荷率所显示

的是初始值 0。如果连续 5 次没有读到主机的数据，则 AID100/AID120 的系统绝缘电阻显示 Err，变压器负荷率显示 Err；此时，声音报警启动，所有发光二级管闪烁。

(1) For starting up of AID100/AID120, there are five seconds tacitly approved to read the data from mainframe. The initial values of insulation resistance value and transformer load rate now are 0. If the data from mainframe cannot be read for 5 consecutive times, the system insulation resistance of AID100/AID120 shows Err and transformer load rate shows Err. At this moment, audible alarm starts and all the luminous diodes flickers.

（2）如果正常读取到主机发送的数据，则在系统绝缘电阻里显示系统的绝缘电阻值，在变压器负荷率里显示当前系统的负荷情况。

(2) If the data sent by mainframe can be read normally, the insulation resistance value of the system is as shown in system insulation resistance and load condition of the current system is shown in transformer load rate.

（3）当系统正常运行时，按下自检键，启动 AIM-M100 绝缘监测仪自检，AID100/AID120 响应绝缘监测仪自检的结果和报警状态，自检结束后，AID100/AID120 回归正常运行状态

(3) When the system runs normally, self-inspection of AIM-M100 insulation monitoring instrument can be started by pressing “Self-inspection” key. AID100/AID120 responds to the result and alarm state of self-inspection of insulation monitoring instrument. After the self-inspection completes, AID100/AID120 returns to normal running status.

6.4.4 AID100/AID120 外接报警与显示仪编程菜单

6.4.4 Programming menus of AID100/AID120 external alarm and displayer

界面显示 Interface display	数值范围 Numerical range	说明 Explanations
ESCESC	无 None	退出 Exit
Adr001	固定为 1 To be fixed as 1	通讯地址 Postal address
bdr096	固定设置为 096 Fixed setting is 096	波特率为 9600 Baud rate is 9600
rn5000	0～999	绝缘电阻报警值设置 Insulation resistance alarm value setting
In5000	14、18、22、28、35、45	电流报警值设置

		Current alarm value setting
tn5000	0～200	变压器温度报警值设置 Transformer temperature alarm value setting
u 100	无 None	软件版本号 Software version no.

6.4.5 AID100/AID120 外接报警与显示仪编程示例

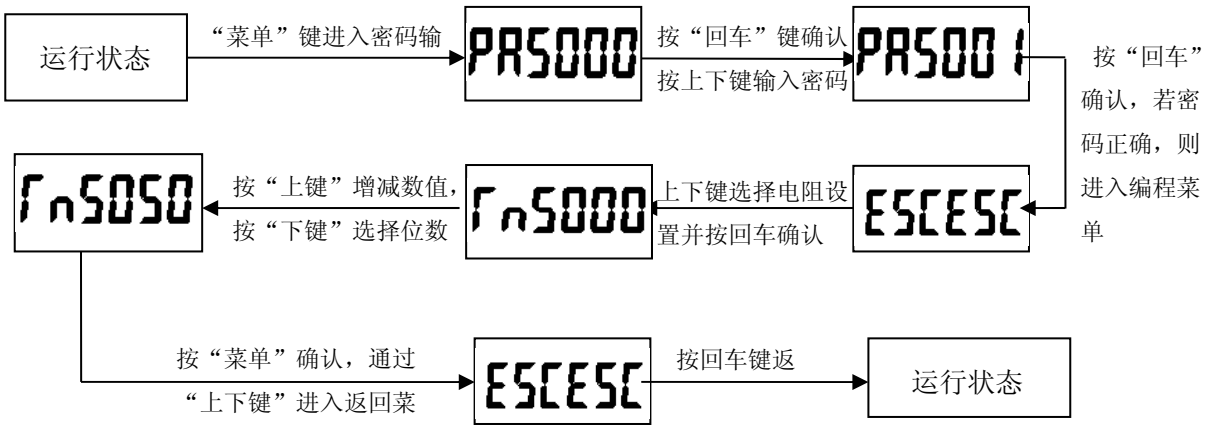
6.4.5 Programming examples of AID100/AID120 external alarm and displayer

（1）绝缘电阻值设置

(1) Insulation resistance value setting

以 50KΩ报警值设置为例，设置步骤如下：

To take 50KΩ alarm value setting as an example with the setting steps as follows:



1 运行状态: Running status

2 “菜单”键进入密码输: To press “Menu” key to enter into password input

3 按“回车”键确认: To press “Enter” key to confirm

4 按上下键输入密码: To press “Up” and “Down” keys to input passwords

5 按“回车”确认，若密码正确，则进入编程菜单 To press “Enter” key to confirm. If the password is correct, it can enter into programming menu.

6 按“上键”增减数值 To press “Up’ key to increase and decrease value

7 按“下键”选择位数 To press “Down” key to select the digit.

8 上下键选择电阻设置并按回车确认 To press “Up” and “Down” keys to select resistance setting and press “Enter” key to confirm

9 按“菜单”确认，通过“上下键”进入返回菜: To press “Menu” key to confirm and enter into return menu by “Up” and “Down” keys

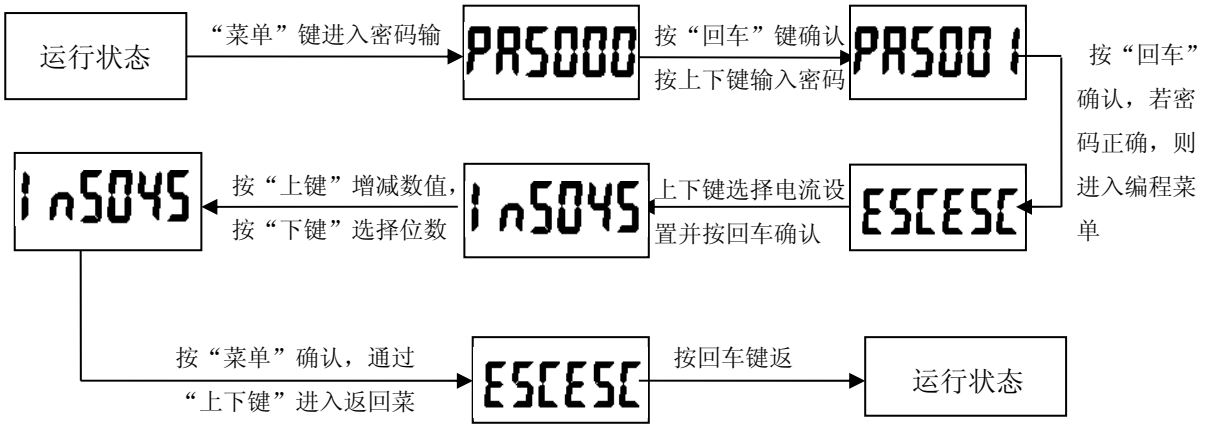
10 按回车键返 To press “Enter” key to return

（2）电流报警值设置

(2) Current alarm value setting

以电流报警值 45A 为例，设置如下：

To take current alarm value 45A as an example with settings as follows:



1 运行状态: Running status

2 “菜单”键进入密码输: To press “Menu” key to enter into password input

3 按“回车”键确认: To press “Enter” key to confirm

4 按上下键输入密码: To press “Up” and “Down” keys to input passwords

5 按“回车”确认，若密码正确，则进入编程菜单 To press “Enter” key to confirm. If the password is correct, it can enter into programming menu.

6 按“上键”增减数值 To press “Up’ key to increase and decrease value

7 按“下键”选择位数 To press “Down” key to select the bit.

8 上下键选择电流设置并按回车确认 To press “Up” and “Down” keys to select current setting and press “Enter” key to confirm

9 按“菜单”确认，通过“上下键”进入返回菜: To press “Menu” key to confirm and enter into return menu by “Up” and “Down” keys

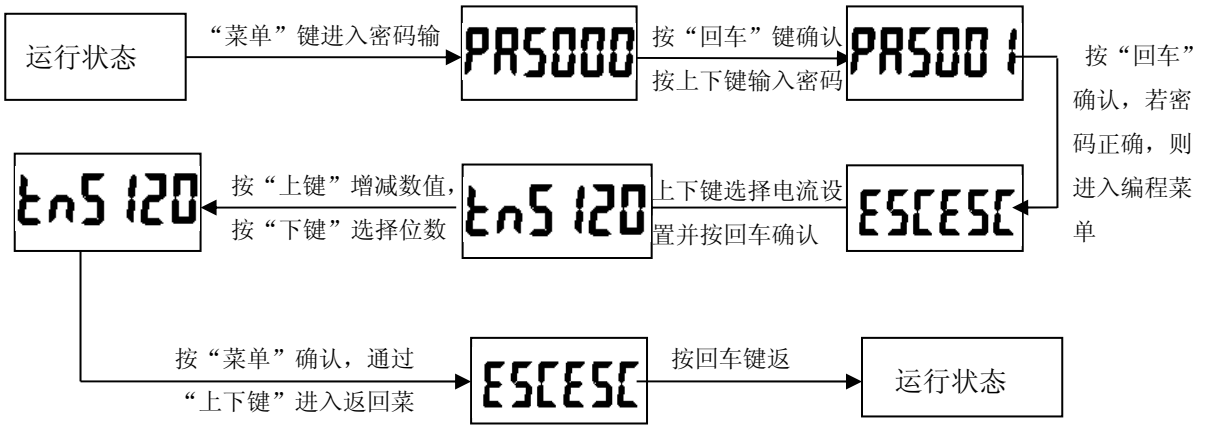
10 按回车键返 To press “Enter” key to return

（3）变压器温度报警值设置

(3) Transformer temperature alarm value setting

以 120 摄氏度为例，设置步骤如下：

To take 120 ℃ as an example with the setting steps as follows:



1 运行状态: Running status

2 “菜单”键进入密码输: To press “Menu” key to enter into password input

3 按“回车”键确认: To press “Enter” key to confirm

4 按上下键输入密码: To press “Up” and “Down” keys to input passwords

5 按“回车”确认，若密码正确，则进入编程菜单 To press “Enter” key to confirm. If the password is correct, it can enter into programming menu.

6 按“上键”增减数值 To press “Up’ key to increase and decrease value

7 按“下键”选择位数 To press “Down” key to select the bit.

8 上下键选择电流设置并按回车确认 To press “Up” and “Down” keys to select current setting and press “Enter” key to confirm

9 按“菜单”确认，通过“上下键”进入返回菜: To press “Menu” key to confirm and enter into return menu by “Up” and “Down” keys

10 按回车键返 To press “Enter” key to return

6.4.5 AID130 集中报警与显示仪编程操作说明

6.4.5 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.

6.4.6 AID150 集中报警与显示仪在编程模式下按键操作

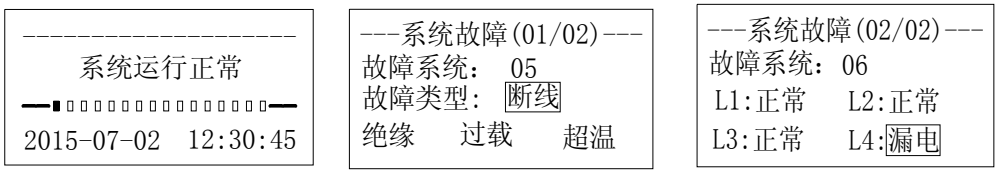
6.4.6 Keys operation of AID150 centralized alarm and displayer under programming mode

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 则显示相应该的报警界面，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

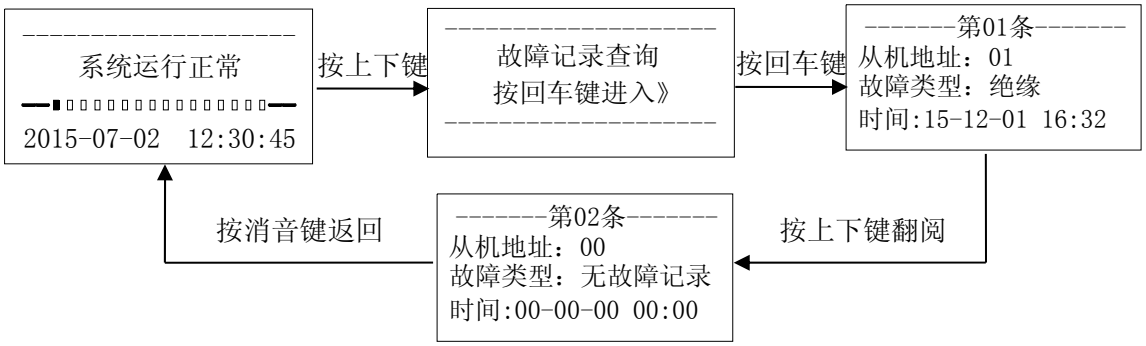
系统运行正常界面：System running normal interface

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

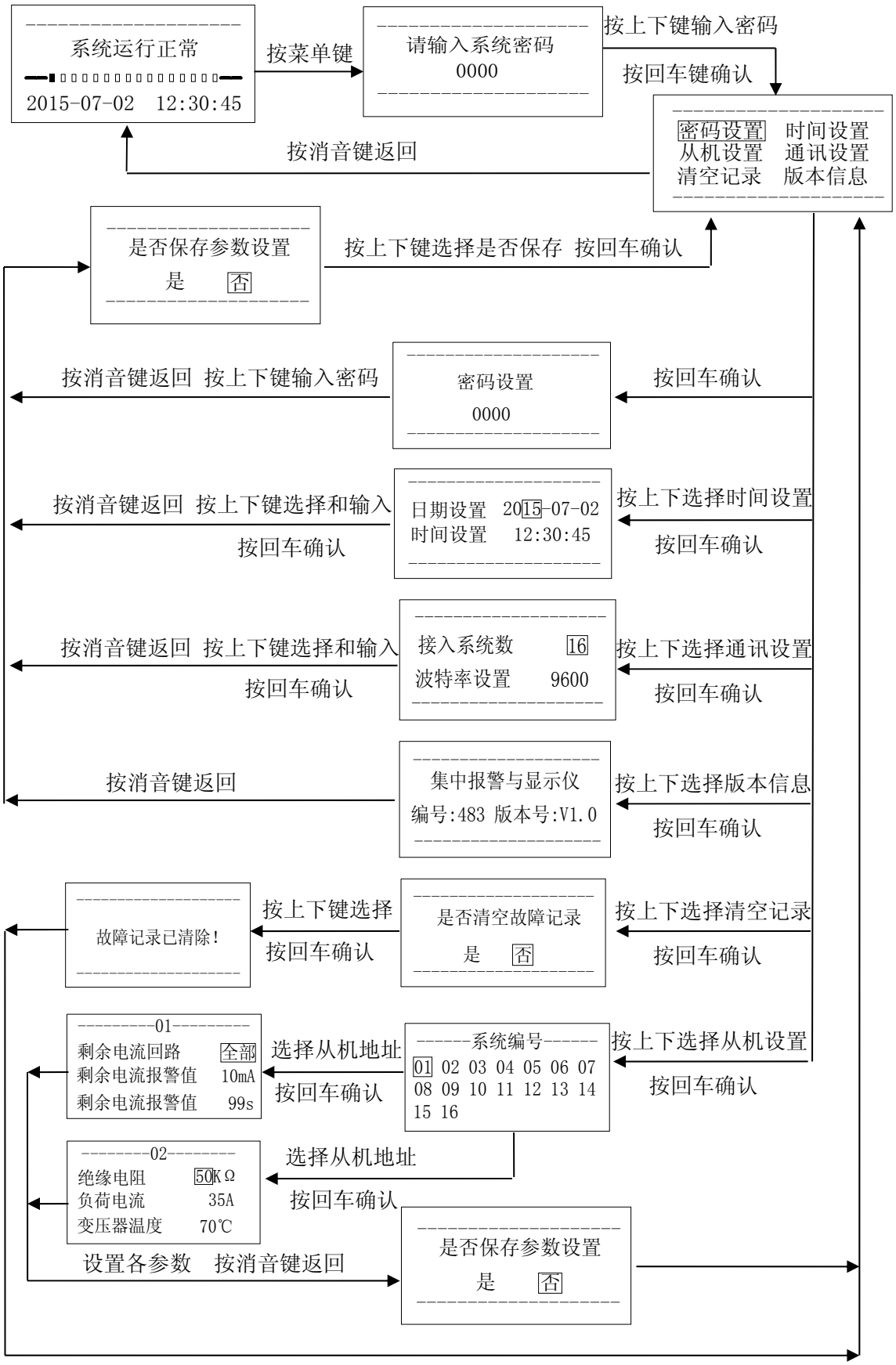
按上下键翻阅：To browse by pressing “Up” and “Down” keys

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

AID 系列外显装置与 AIM-M100 绝缘监测仪通讯时，外显装置为主机，绝缘监测仪为从机。

When the external devices of AID series communicate with insulation monitoring instrument of AIM-M100, the external devices are mainframe and the insulation monitoring instrument is slave.

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.

7.1.2 信息帧格式

7.1.2 Information frame format

地址码 Address code	功能码 Function code	数据区 Data area	CRC 校验码 CRC check code
1 字节 1 byte	1 字节 1 byte	n 字节 n byte	2 字节 2 bytes

地址码：地址码在帧的开始部分，由一个字节（8 位二进制码）组成，十进制为 0～255，。这些位标明了用户指定的终端设备的地址，该设备将接收来自与之相连的主机数据。每个终端设备的地址必须是唯一的，仅被寻址到的终端会响应包含了该地址的查询。当终端发送回一个响应，响应中的从机地址数据便告诉了主机哪台终端正与之进行通信。

Address code: The address code is at the beginning part of frame which consists of one byte(8-bit binary code) , and decimal base is 0～255. These bits indicate the address of terminal equipment appointed by the user. This equipment receives the data from mainframe that connects with it. The address of each terminal equipment must be unique which only responds to the addressed terminal, including inquiry of this address. When one response is sent by the terminal, the slave address data in response will tell mainframe which terminal is communicating with it.

功能码：功能码告诉了被寻址到的终端执行何种功能。下表列出了该系列仪表用到的功能码，以及它们的意义和功能。

Function code: Function code tells which kind of function is executed by the addressed terminal. It is listed in the below table about the function code, its significance and function employed by the instrument of this series.

功能 Function	定义 Definition	操作 Operation
03H/04H	读数据寄存器 Read data register	获得一个或多个寄存器的当前二进制值 To gain the current binary values of one or multiple registers.
10H	预置多寄存器 Preset multiple registers	设定二进制值到一系列多寄存器中 To set binary value into one series of multiple registers.

数据区：数据区包含了终端执行特定功能所需要的数据或者终端响应查询时采集到的数据。这些数据的内容可能是数值、参考地址或者设置值。例如：功能码告诉终端读取一个寄存器，数据区则需要指明从哪个寄存器开始及读取多少个数据，内嵌的地址和数据依照类型和从机之间的不同内容而有所不同。

Data area: it includes the data required by execution of specific function by terminal or the data collected during terminal responding to inquiry. The data may be numerical value, reference address or set value. For example: function code tells when terminal reads one register, the data area should indicate which register should be started and how many data should be read. The embedded addresses and data differ according to the type and the different content of slave machines.

CRC 校验码：错误校验（CRC）域占用两个字节，包含了一个 16 位的二进制值。CRC 值由传输设备计算出来，然后附加到数据帧上，接收设备在接收数据时重新计算 CRC 值，然后与接收到的 CRC 域中的值进行比较，如果这两个值不相等，就发生了错误。

CRC check code: Error check (CRC) domain occupies two bytes, including one 16-bit binary value. CRC value is calculated by transmission equipment and then attached to data frame. CRC value is recalculated when the receiving equipment receives data and then comparison will be made with the received value in CRC domain. If the two values are not equal, it means that error occurs.

生成一个 CRC 的流程为：

The flow to generate one CRC is:

1）、预置一个 16 位寄存器为 0FFFFH（全 1），称之为 CRC 寄存器。

1) To preset one 16-bit register that is 0FFFFH (all 1), which is called as CRS register.

2）、把数据帧中的第一个字节的 8 位与 CRC 寄存器中的低字节进行异或运算，结果存回 CRC 寄存器。

2) XOR operation is done between the 8 bits of the first byte in the data frame and low bytes in CRC register, the result is saved to CRC register.

3）、将 CRC 寄存器向右移一位，最高位填以 0，最低位移出并检测。

3) One-bit right shift is done on CRC register with filling 0 for the most significant bit and shift out of least significant bit for inspection.

4）、如果最低位为 0，重复第三步（下一次移位）；如果最低位为 1，将 CRC 寄存器与一个预设的固定值（0A001H）进行异或运算。

4) If the least significant bit is 0, the third step should be repeated (next-time shift); if the least significant bit is 1, XOR operation should be done between CRC register and one preset fixed value (0A001H).

5）、重复第三步和第四步直到 8 次移位，这样处理完了一个完整的八位。

5) To repeat the third step and the fourth step till 8 times of shifting. One complete 8 bits are completed in such a way.

6）、重复第 2 步到第 5 步来处理下一个八位，直到所有的字节处理结束。

6) To repeat the second step and the fifth step to handle the next 8 bits till all byte manipulations are finished.

7）、最终 CRC 寄存器的值就是 CRC 的值。

7) The value of final CRC register is CRS value.

此外还有一种利用预设的表格计算 CRC 的方法，它的主要特点是计算速度快，但是表格需要较大的存储空间，该方法此处不再赘述，请参阅相关资料。

In addition, there is another method to calculate CRC by using preset table with its main characteristic of quick computation speed, but bigger memory space is required by table. The details of this method is not given here anymore, please refer to the related information.

7.2 功能码简介

7.2 Introduction to function code

7.2.1 功能码 03H 或 04H：读寄存器

7.2.1 Function 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。

This function permits user to obtain the data collected and recorded by the equipment and system parameters. There is no limitation on the nos. of data requested by mainframe for one time, but it cannot 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。

The below examples are to read one measured insulation resistance value from No.01 Slave with 0008H as the address of insulation resistance value.

主机发送 Mainframe sending		发送信息 Send message	从机返回 Slave returning		返回信息 Return information
地址码 Address code		01H	地址码 Address code		01H
功能码 Function code		03H	功能码 Function code		03H
起始地址 Initial address	高字节 High byte	00H	字节数 No. of bytes		02H
	低字节 Low byte	08H	寄存器数据 Register data	高字节 High byte	00H
寄存器数量 Nos. of registers	高字节 High byte	00H		低字节 Low byte	50H
	低字节 Low byte	01H	CRC 校验码 CRC check code	高字节 High byte	21H
CRC 校验码 CRC check code	高字节 High byte	74H		低字节 Low byte	75H
	低字节 Low byte	0CH			

7.2.2 功能码 10H：写寄存器

7.2.2 Function code 10H: write register

7.**3 AIM-M100** 绝缘监测仪表内参数地址表

7.3 Parameters address table of AIM-M100 insulation monitoring instrument tables

序号 Serial no.	地址 Address	参数 Parameters	读写 Read-write	数值范围 Numerical range	Word

1	0000H	保护密码 Protection password	R/W	0001-9999	1
2	0001H 高字节 0001H 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 0001H 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 0002H high byte	通讯 2 地址 Communication 2 address	R/W	1-247 (默认值：1) 1~247 (default：1)	1
	0002H 低字节 0002H low byte	通讯 2 波特率 Communication 2 Baud rate	R/W	0-3：4800、9600、19200（单位：bps）（默认值：9600） 0-3：4800、9600、19200（unit：bps）（default：9600）	
4	0003H 高字节 0003H high byte	预留 Preserve			1
	0003H 低字节 0003H low byte	继电器接线与输出状态 Relay wiring and output state	R/W	Bit3:0 表示 22 24 -23，1 表示 22-24 23 Bit2:0 表示 J1 常开，1 表示 J 1 常闭 Bit1: 0 表示 J2 打开，1 表示 J2 闭合 Bit0: 0 表示 J1 打开，1 表示 J1 闭合 Bit3:0 indicates 22 24 -23，1 indicates 22-24 23 Bit2:0 indicates J1normal open，1 indicates J 1 normal close Bit1: 0 indicates J2 open, 1indicates J2 close Bit0: 0 indicates J1open，1 indicates J1 close	

5	0004H 高字节 0004H 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 0004H 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 0005H high byte	日 Date	R/W	1~31（单位：日）（默认值：20） 1~31（unit：date）（default：20）	1
	0005H 低字节 0005H 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 0006H high byte	时 Hour	R/W	1~24（单位：时）（默认值：12） 1~24（unit：hour）（default：12）	1
	0006H 低字节 0006H 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 0007H 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 0007H high byte	保留 Reserve			
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 000BH high byte	保留 Reserve			1
	000BH 低字节 000BH low byte	故障类型 Failure type	R	Bit0:1 绝缘电阻故障 insulation resistance failure Bit1:1 过负荷故障 overload failure Bit2:1 变压器超温故障 transformer overheat failure Bit3:1 L1 或 L2 断线故障 L1 or L2 off-line failure Bit4:1 FE 或 KE 断线故障 FE or KE off-line failure Bit5:1 温度传感器断线故障 temperature sensor off-line failure Bit6:1 电流互感器断线故障（预留）current transformer(preserve) Bit7:1 设备故障 equipment failure	
13-16	000CH-000FH	预留 Preserve			4
17	0010H	绝缘电阻值设定值 Set value of insulation resistance value	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 value	R/W	14、18、22、28、35、45 (单位：A) （默认值：35） 14、18、22、28、35、45 (unit：A) （default：35）	1
19	0012H	变压器温度值设定值 Set value of transformer temperature value	R/W	0~200 (单位：℃) （默认值：70） 0~200 (unit：℃) （default：70）	1
20-24	0013H-0017H	预留 Preserve			5

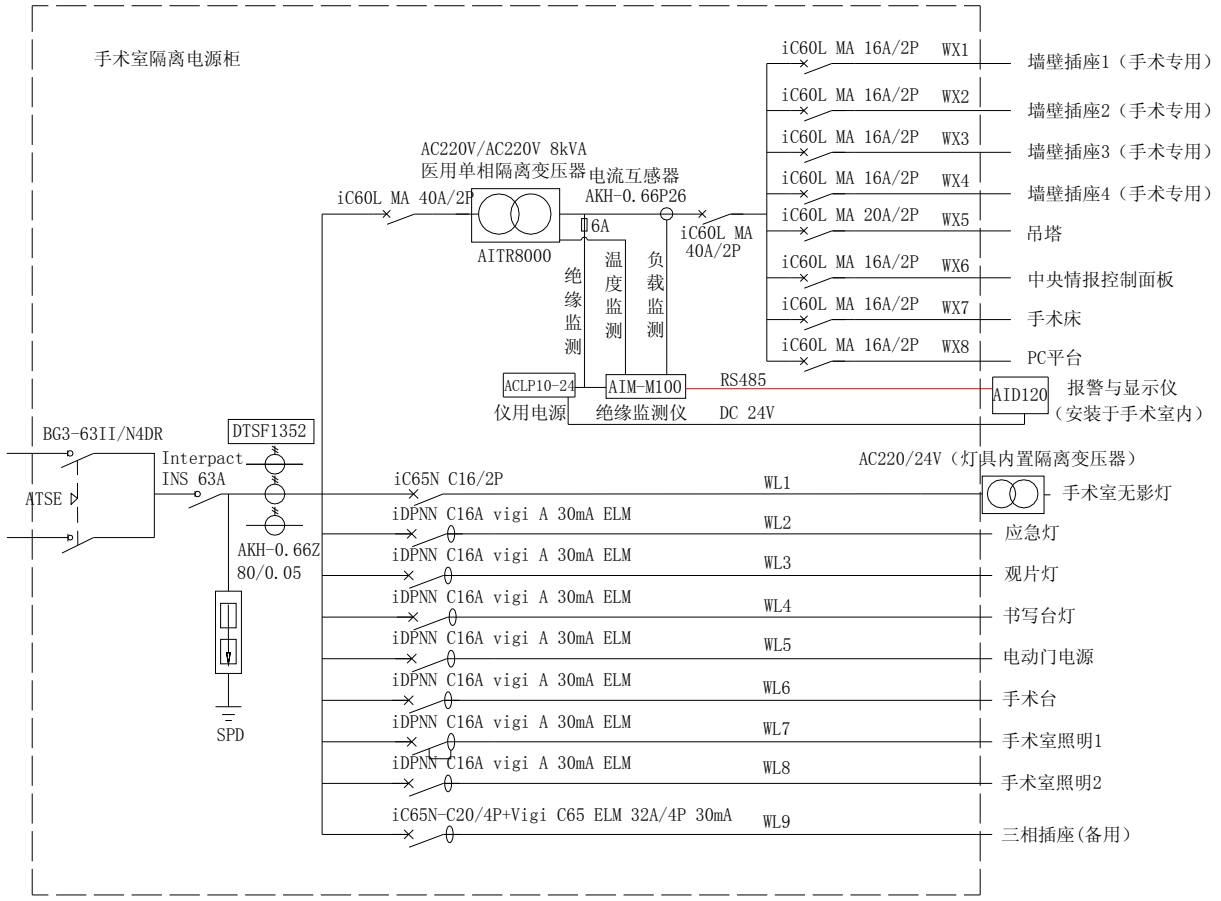
	0018H 高字节 0018H high byte		保留			
25	0018H 低字节		STA1 Reserve STA1	R	事件 1 内容：0~6 event 1 content: 0~6 0 表示：无故障记录 0 indicates no failure recording 1 表示：绝缘故障 1 indicates insulation failure 2 表示：过负荷故障 2 indicates overload failure 3 表示：超温故障 3 indicates overheat failure 4 表示：LL 断线 4 indicates LL off line 5 表示：PK 断线 5 indicates PK off line 6 表示：TC 断线 6 indicates TC off line	1
26	0019H 高字节 0019H high byte	事件记录 1 Event logging 1	Year1	R	事件 1 时间-年 Event 1 time-year	1
	0019H 低字节 0019H low byte		Moth1	R	事件 1 时间-月 Event 1 time-month	
27	001AH 高字节 001AH high byte		Day1	R	事件 1 时间-日 Event 1 time-date	1
	001AH 低字节 001AH low byte		Hour1	R	事件 1 时间-时 Event 1 time-hour	
28	001BH 高字节 001BH high byte		Minute 1	R	事件 1 时间-分 Event 1 time-minute	1
	001BH 低字节 001BH low byte		Second 1	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 rest nine event loggings will be saved to this space with rule and format same as Article 1.				

8 典型应用

8. 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 five-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

9. Power on and commissioning instructions

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）检查每一个五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）检查每一套 IT 系统中 ACLP10-24 电源模块的 1、2 号输入端是否接到隔离变压器的二次侧 0、230V

端子上。其 24V 输出端的 V、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 No.1 and No.2 input terminals of ACLP10-24 power module in each set of IT system connect to 0 and 230V terminals of secondary side of isolation transformer. To check whether 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-M100 的 8（I0）、9（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.8(I0) and No.9(I1) terminals of AIM-M100 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-M100 的 11（T0）、12(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.11(T0) and No.12(T1) terminals of AIM-M100 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-M100 的 4（L1）、5（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.4(L1) and No.5(L2) terminals of AIM-M100 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-M100 的第 13（FE）、14(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.13 (FE) and No.14 (KE) terminals of AIM-M100 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-M100 仪表 RS485 通讯的 18（A2）、19(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.18(A2) and No.19(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-M100

的 20、21 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.20 and No.21 terminals of AIM-M100 in this set of system.

9.2 常见故障与排除

9.2 Common failures and exclusion

AID 系列外接报警与显示仪 AID series external alarm and displayer	仪表不亮 Instrument cannot be lightened	24V 工作电源没有接好，检查 24V、G 端子接线是否正常，并重新接线。 24V working power supply is not well connected. To check whether 24V and G terminals are normal and reconnect the wire.
	通讯不正常或无通讯 Abnormal communication or no communication	1） AIM-M100 的从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 slave address of AIM-M100 is not set as default 1 or slave BUAD is not set as default 9600, it should be set as default. 2） 与系统中 AIM-M100 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) Not well-connected with line of communication of AIM-M100 in the system. To check the line of communication and confirm whether the matched resistance connects.

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。

Note: When the above failures occur, to check after outage and adjust the wiring till everything is 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.

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-M100 的从地址（主地址用于和上位机通讯，如果无上位机，则不需设置），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 AID100 或 AID120 型外接报警与显示仪监控 1 套 AIM-M100 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-M100 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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