嘉兴市科讯电子有限公司

JIAXING KEXUN ELECTRON CO.,LTD

子母钟系统

MARINE CLOCK SYSTEM

使 用 说 明 书

Instructions

（KX39-000SM）

（V0.0 版）

(Version 0.0)

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(Total 25 pages)

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1 概述 General

1.1 用途 Purpose

KZM型子母钟系统是我公司设计开发的船用子母钟系统。该系统由母钟和各种安装形式的子钟、调光器等设备组成。母钟采用7吋大屏幕真彩色触摸液晶显示器作为人机交互的界面，突破了船用子母钟行业传统按键操作模式和单色显示的局限，视觉冲击力强，操作简单易懂。该系统具有智能化、人性化程度高等优点，是为海军舰艇、远洋船只提供时间服务的首选产品。

KZM marine clock system is marine clock system designed and developed by us. This system consists of master clock, vairous slave clock, dimmer and so on. Master clock introduces 7” large screen true color touch type LCD as human-machine interaction interface, which break through marine marine clock conventional key mode and black and white display. Visual impact is strong and operation is simple. This system has advantages of high intelligence, hommization and so on, which is preferred product for naval vessels, ocean-going vessels, etc.

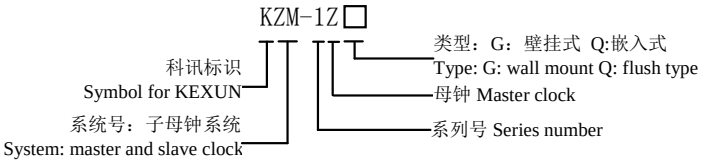
母钟可实时监控每一个子钟的运行状态。母钟通过485总线接口能接收GPS的NMEA-0183 $GPZDA标准时间信号并自动校正子钟时间，且能在跨时区时自动进行时区时间调整。系统可以在断开GPS信号的情况下进行自走时，同时控制子钟与母钟同步。系统还具有向其它系统提供标准时间信号的功能。

Master clock can monitor realtime running status of every slave clock. Master clock can receive NMEA-0183 $GPZDA standard time signal from GPSby 485 bus interface and automatically correct the time of slave clock; it can also automatically adjust the time when stride across the time zone. System can go by iteself when GPS signal is disconnected and control slave clock to synchronize with master clock. System can also offer standard time signal to other systems.

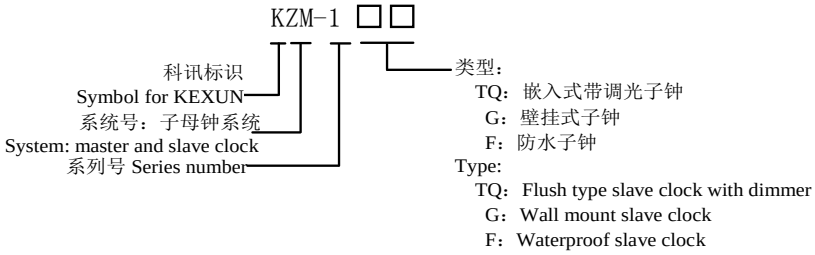
- ✧ 全自动自动调时：初始开通调试时，不需要对子钟逐一设置时间；
- ✧ 所有子钟均为三针：秒针误差不超过0.5秒；
- ✧ 数据线故障子钟自走，故障恢复自动校时；
- ✧ 任何一个子钟断线，母钟自动报警；
- ✧ 子钟带有蜂鸣器，母钟可以设置子钟闹铃功能
- ✧ Full-automatic time adjustment: when initial commissioning, it needn’t to adjust the time for slave clock one by one.
- ✧ All slave clocks have three hands: the error of second hand will not exceed 0.5s.
- ✧ When data line is faulty, slave clock will work by itself; after fault is removed, it will automatically correct the time.
- ✧ In case any slave clock is disconnected, master clock will automatically give an alarm.
- ✧ Slave clock has buzzer; alarm clock of slave clock can be set on the master clock.

1.2 型号及其含义 **Model definition**

1.2.1 母钟型号规定 Master clock



1.2.2 子钟型号规定 Slave clock



1.3 系统设备组成 **System configuration**

表 1 设备配置 Table 1 System configuration

序号 No.	型 号 Model	名称 Description	防护等级 Protection class	数量 Qty.	备注 Remark
1	KZM-1ZG	母钟 Master clock	IP44	1	驾驶室 Wheelhouse
2	KZM-1ZQ	母钟 Master clock	IP20		
3	KZM-1TQ	调光子钟 Slave clock with dimmer	IP20	1	驾驶室 Wheelhouse
4	KZM-1G	普通壁挂子钟 Common wall mount slave clock	IP20	若干，可选	船员房间等 Crew cabin, etc.
5	KZM-1F	防水子钟 Waterproof slave clock	IP44	若干，可选	厨房等 Galley, etc.
6	KZM-1G-B	报房子钟 Radio room slave clock	IP20	1	报房 Radio room
7	KZM-1G-S	双面子钟 Two-side slave clock	IP20	若干，可选	船员房间等 Crew cabin, etc.
8	KZM-1G-M	木质外壳子钟 Woody enclosure slave clock	IP20	若干，可选	船员房间等 Crew cabin, etc.
9	KZM-1TQ-T	调光器 Dimmer	IP20	若干，可选	驾驶室 Wheelhouse

1.4 使用环境 **Ambient condition**

设备的使用环境条件：

a) 环境温度：0℃～＋70℃；

b) 相对湿度： ≤95%；

c) 气　压：86 KPa～106 KPa；

d) 倾斜和摇摆；

e）船舶正常营运中所产生的振动和冲击；

e）潮湿空气、盐雾。

The equipments should be operated in the following ambient condition.

a) Ambient temperature: 0℃～＋70℃;

b) Relative humidity: ≤95%;

c) Atmospheric pressure: 86 kPa～106 kPa;

d) Inclination and swing;

e) Vibration and impact occurred onboard ships.

f) Humid air, salt mist.

2 主要技术参数 Main technical parameter

2.1 工作电源： 主电源：AC220V±10%，50Hz/60Hz

应急电源：DC24V $^{+30\%}_{-25\%}$。

Power supply: main power: AC220V±10%，50Hz/60Hz

Emergency power: DC24V $^{+30\%}_{-25\%}$

2.2 失电、故障报警声压级为：75dB～85dB。

Power failure, fault alarm sound pressure level: 75dB～85dB.

2.3 报警触点容量：DC30V/1A。

Alarm contact capacity: DC30V/1A.

2.4 母钟计时精度：未接 GPS:±0.5 S/d。

连接 GPS：与 GPS 标准时间自动同步

子钟自身计时精度：±1 S/d。

Master clock timing precision: not connected to GPS: ±0.5 S/d

Connected to GPS: automatically synchronous with GPS standard time

Slave clock timing precision: ±1 S/d

2.5 最大子钟数量：128。

Max. quantity of slave clocks: 128.

2.6 最大通信距离：1000M。

Max. communication distance: 1000M.

2.7 通信接口：485。 Communication interface: 485.

3 功能及操作说明 **Function and operation**

3.1 主界面 Main interface

母钟的主界面能同时显示本地时间和世界时间，其主界面如图 1。

Main interface of master clock can simultaneously show local time and universal time as fig.1.

图 1

Fig.1

母钟主界面的功能介绍及主要操作如下：

1）.主界面左边的指针式钟表显示世界时间(UTC)，点击进入【时间设置】页面。

2）.主界面右边的指针式钟表显示当地时间（LT），点击进入【子钟设置】页面。

3）.主界面右上角显示当地时区（LZT），点击进入【时区设置】页面。

4）.主界面左上角显示日期，点击进入【时间设置】页面。

5）.主界面底部为按钮操作区，其中点击【设置】按钮，进入【时间设置】页面；点击【中文】按钮，切换语言为中文，点击【English】按钮，切换语言为英文；点击【调光-】按钮，背光亮度减弱；点击【调光+】按钮，背光亮度增加；点击【消音】按钮，当系统有报警时，报警音停止。

The function and operation of main interface of master clock are as follows.

1) The left hand type clock shows universal time(UTC); press it to enter time setting interface.

2) The right hand type clock shows local time(LT); press it to enter slave clock setting interface.

3) The top right corner shows local time zone(LZT); press it to enter time zone setting interface.

4) The top left corner shows the date; press it to enter time setting interface.

5) The bottom is button operation area; press【Menu】 to enter time setting interface; press 【中文】 to change the language to Chinese; press 【English】 to change the language to English; press 【Dimm.-】 and backlight brightness will be weaken; press 【Dimm.+】 and backlight brightness will increase; press 【Mute】 and alarm tone will stop when there is an alarm.

注：进入系统设置页面前需输入密码，界面如图 2：

Note: Password is required as fig. 2 to enter system setting interface.

图 2

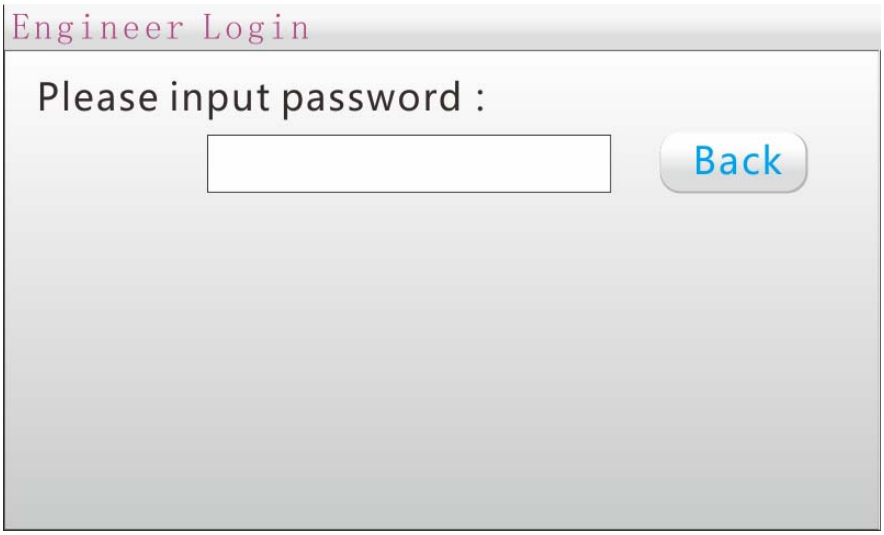


Fig.2

点击输入框输入 6 位密码（300800）。

Press the box and input 6-bit password(300800).

3.2 时间设置页面 Time setting interface

【时间设置】页面可设置日期及 UTC 时间，如图 2。通过点击【+】【-】键按钮，来调整日期及时间，点击【确定】应用。

On the time setting interface, date and UTC time can be set as fig.2. Adjust the date and time by press【+】【-】, then press 【Enter】 to confirm.

图 3

Fig. 3

3.3 时区设置页面 Time zone setting interface

【时区设置】页面完成时区相关设置，如图 4。

【时差设置】选项框可选择当前时差精度（20 分，30 分，60 分），即船舶远洋航海时，时区更新最大允许误差时间。点击地图上某时区，即可调整时区到所选区域，此时精度为 60 分，可单击页面右上角【+】【-】调整键，可按时差精度调进行调整。【自动】选型框选中时，时区由 GPS 接收并自动更新，未选中时，时区更改需手动进行，不随 GPS 信号自动更新。

Time zone setting can be carried out on【Timezone】interface as fig.4.

On【T.D.Accuracy】interface, current time difference(20min, 30min, 60min) can be selected; that is, when ship is sailing, it will update max. permitted error time. Press certain time zone on the map and it will adjust the time zone to the selected zone, then precision is 60min; press 【+】【-】 on the top right corner and the time difference precision can be adjusted. When the【AUTO】option box is selected,the time zone will be updated by the GPS input signal,when it is not selected,the time zone need to be changed by manually setting,and the value of the setted time zone will not be updated by the input GPS signal.

图 4

Fig. 4

3.4 子钟设置页面-状态显示 Slave clock setting interface- status display

【子钟设置】页面可查询所有子钟的实时运行状态，如图 5。点击页面中表格中的某一行，可进入子钟设置页面，可对子钟安装位置信息及闹钟进行设置。

点击【上一页】、【下一页】按键可翻页查询各个编号的子钟状态。

Real-time running status of all slave clocks can be searched on【Slave Clock】interface s fig.5. Press certain line on the table and it will enter slave clock setting interface, which can set the installation position of slave clock and alarm clock.

Press 【Page Up】, 【Page Down】and it can search the status of each slave clock.

图 5

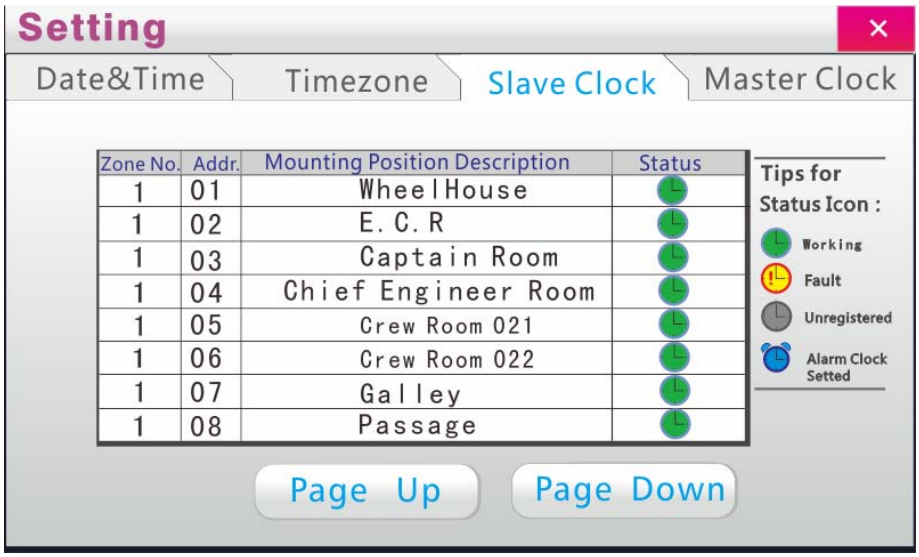


Fig. 5

3.5 子钟设置页面-闹钟及安装信息设置

Slave clock setting interface-alarm clock and installation information setting

子钟闹钟及安装信息设置页面如图 6，点击安装位置信息输入框，可进入输入法界面，如图 6，按实际输入文字后，按【OK】键录入信息并返回，按【ESC 键】退出输入法并返回。在【闹钟设置】栏可进行闹钟时间的设置或取消闹钟设置，点击个【+】【-】调整键调整设置时间，然后点击【设置】按钮设置子钟闹钟；点击【关闭】按钮关闭已设置的闹钟功能。点击【返回】按钮返回到【子钟设置】页面。Alarm clock of salve clock and installation information setting interface is shown as fig. 6. Press the box of installation position information and it will enter input method interface a fig. 6. After input, press 【OK】 to confirm and return, then press 【ESC】 to exit from input method and return. Alarm clock setting is available

on the column of 【Alarm Clock Set】; press 【+】【-】to adjust the time and 【Set】 to set the alarm clock of slave clock; press 【Close】to close the set alarm clock. Press 【Back】 to return to slave clock setting interface.

图 6

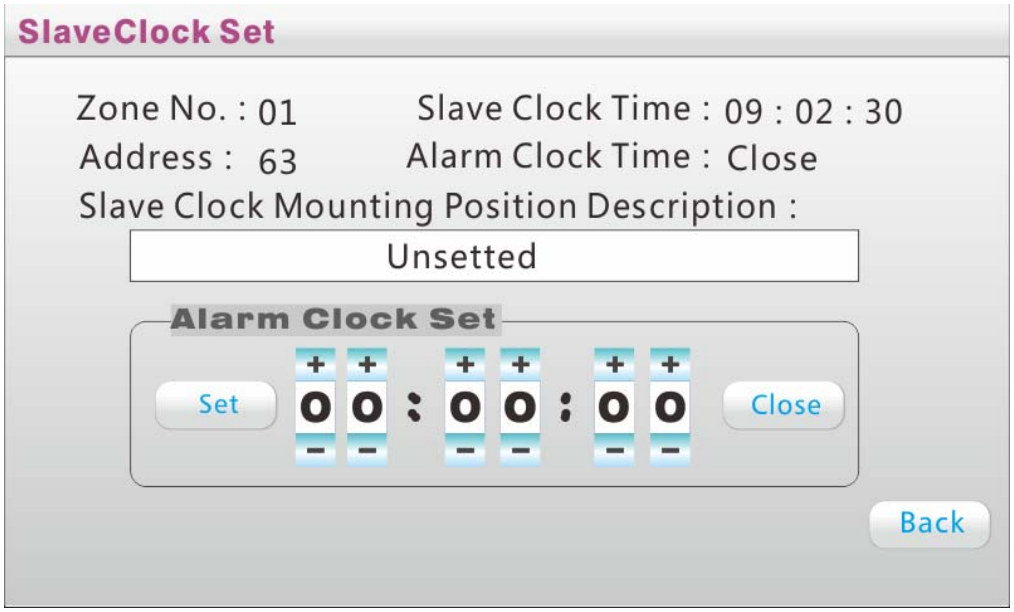


Fig. 6

3.6 母钟设置页面 Master clock setting interface

在【母钟设置】页面可设置母钟屏幕背光亮度、屏幕待机时长、母钟闹钟时间、GPS 通讯参数，如图 7。在母钟设置页面下，按下屏幕左下侧操作区的背光调整区域【+】,【-】后，可对屏幕背光进行调节，共分 7 级可调。在【待机设置】栏可设置屏幕背光关闭延迟时间（10-600S），【闹钟设置】栏可设置母钟闹钟功能，如图 8，在【母钟闹钟设置】页可进行母钟闹钟时间的设置或取消闹钟设置，点击个【+】【-】调整键调整设置时间，然后点击【设置】按钮设置母钟闹钟；点击【关闭】按钮关闭已设置的闹钟功能。点击【返回】按钮返回到【母钟设置】页面。【GPS 通讯设置】栏设置母钟 GPS 通讯接口参数。

Master clock setting interface can set backlight brightness of the screen of master clock, screen standby time, alarm clock of master clock and GPS communication parameter as fig. 7. On this interface, press backlight brightness setting【+】,【-】on the lower left corner and it will adjust the backlight brightness by 7 steps. 【Screen Standby Set】 can set backbight delay time(10-600S); 【Alarm Clock Set】 can set the alarm clock of master clock as fig. 8. On this interface, it can set the time of alarm clock of master clock or cancel the alarm clock; press 【+】【-】 to adjust the time, then press 【Set】 to set the alarm clock of master clock; press 【Close】to close the set alarm clock. Press【Back】to return to master clock setting interface. 【GPS Comm. Config】can set GPS communication interface parameter of master clock.


设置
时间设置
时区设置
子钟设置
母钟设置
闹钟设置
: 关闭
设 置
待机设置
延迟时间：
30
S(10-600)
背光亮度设置
GPS通讯设置
数据位：
8位
9位
停止位：
1位
2位
校验位：
奇校验
偶校验
无
波特率(bps):
1200
2400
4800
9600
19200
38400
56000
152000

图 7

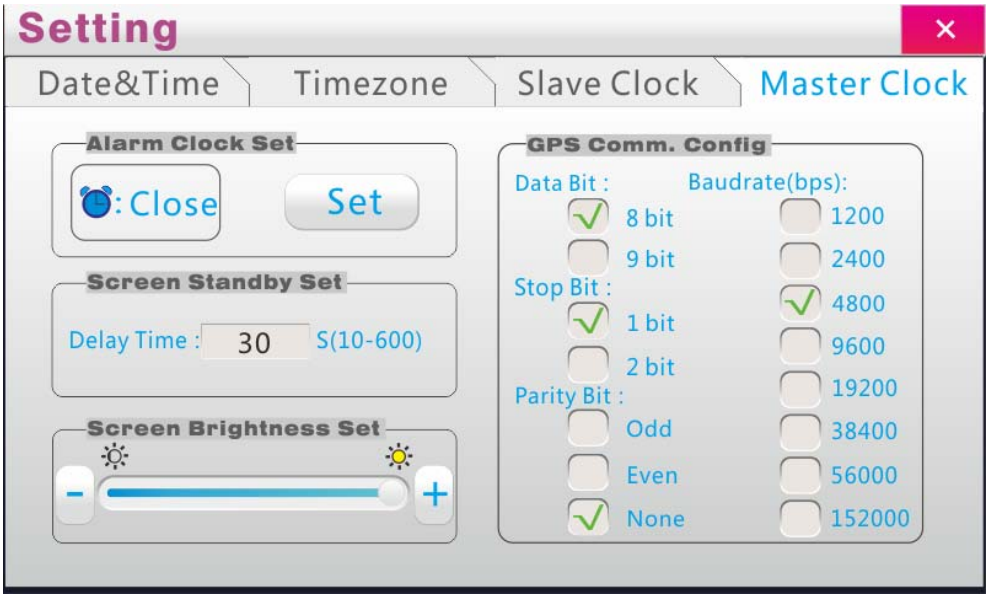

Setting
Date&Time
Timezone
Slave Clock
Master Clock
Alarm Clock Set
: Close
Set
Screen Standby Set
Delay Time :
30
S(10-600)
Screen Brightness Set
GPS Comm. Config
Data Bit :
8 bit
9 bit
Stop Bit :
1 bit
2 bit
Parity Bit :
Odd
Even
None
Baudrate(bps):
1200
2400
4800
9600
19200
38400
56000
152000

Fig. 7

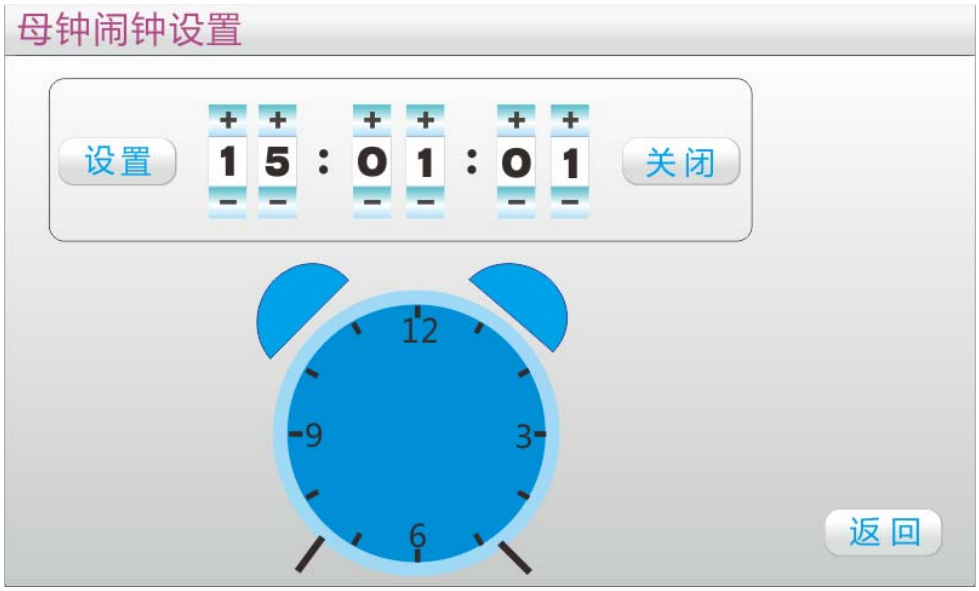


图 8

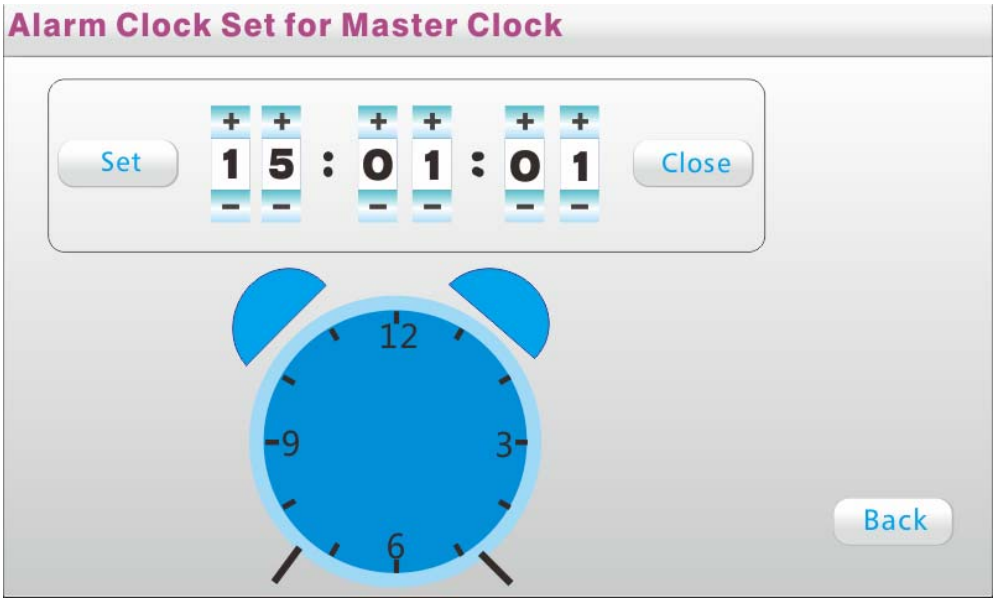


Fig. 8

3.7 失电报警功能 Power failure alarm function

当主电源或应急电源失电时，母钟发出 1S 通，1S 断的失电报警音，屏幕下方失电报警 led 灯闪烁，并输出失电报警触点，按【消音】后，报警音停止，失电报警灯由闪烁变为平光。消音后当电源恢复，失电报警灯熄灭，失电报警触点恢复正常。

When main power or emergency power is failure, master clock will send out power failure alarm tone of 1s on, 1s off; power failure alarm LED light on the screen lower will blink; it will also output power failure alarm contact; after press mute key, alarm tone will stop and power failure alarm light will become normally bright. When power recovers after mute, power failure alarm light will be off and power failure alarm contact will become normal.

3.8 故障报警功能 Fault alarm function

当已注册子钟发生故障时，屏幕下方子钟故障报警 led 灯闪烁， 蜂鸣器发出 1S 通，1S 断的报警音。按消音后，声音停止，子钟故障报警 led 灯由闪烁变为平光。当子钟故障恢复后，故障报警 led 灯熄灭。当母钟屏幕故障时，系统发出 1S 通，1S 断报警音，屏幕下方屏幕故障报警 led 灯闪烁直到故障消失，报警停止。当母钟主控板故障时，屏幕下方系统运行灯由绿色闪烁变为红色平光。

When registered salve clock is faulty, fault alarm LED light on the screen lower will blink and the buzzer will send out 1s on and 1s off alarm tone. After press mute key, alarm tone will stop and fault alarm LED light will become normally bright. When the fault is removed, fault alarm LED light will be off. When the screen of master clock is faulty, system will send out 1s on and 1s off alarm tone; fault alarm LED light on the screen lower will blink till fault is removed and alarm stop. When main control PCB of master clock is faulty, system running light on the screen lower will become normally bright in red from blink in green.

3.9 通讯功能 Communication function

母钟通过 485 输出标准 NMEA0183 格式时间信息（$KXZDA），波特率为 4800 bps，数据位为 8 位，奇偶校验无，停止位 1 位。语句格式如图 9：

Master clock will output standard NMEA0183 format time information($KXZDA) by 485, baud rate is 4800 bps; data bit is 8-bit, no even-odd check, 1-bit stop bit. The sentence format is shown as fig. 9.

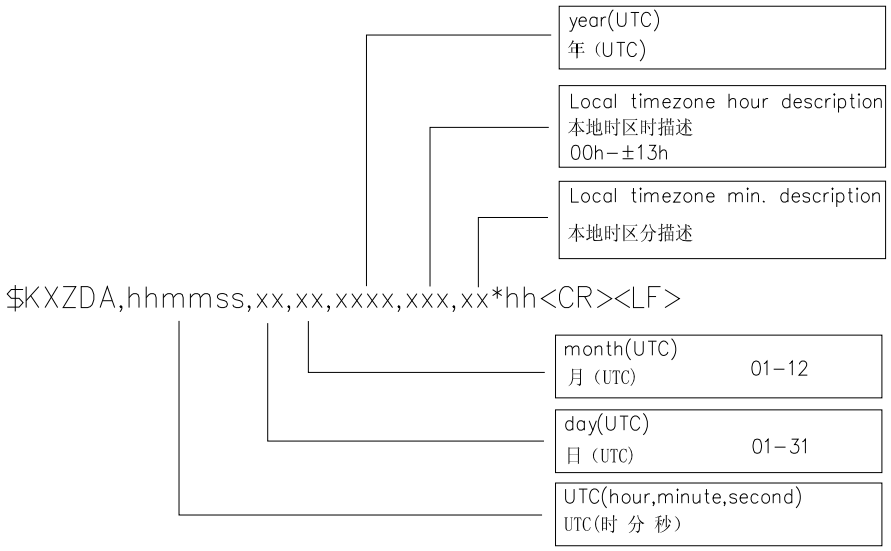


图 9 Fig. 9

当报警时，母钟同样通过485输出报警信息到VDR，报警语句格式如下：

$MCALR, hhmmss.ss,xxx,X,Y,c--c*hh<CR><LF>。

hhmmss.ss：报警发生时间。

xxx：报警源编号：例：001。

X:A:报警状态，V:未报警。

Y:A:已消音，V:未消音。

c--c:报警描述符：如Main Power Supply Fail Alarm,表示主电失电报警。

hh:校验码：$和*之间字符的异或和的 ASCII 码表示。

< CR >< LF >:回车换行。

When alarm, master clock will output alarm information by 485 to VDR; alarm sentence format is as follows.

$MCALR, hhmmss.ss,xxx,X,Y,c--c*hh<CR><LF>。

hhmmss.ss: alarm occurrence time.

Xxx: alarm source number: such as 001.

X: A: alarm status, V: for no alarm

Y: A: muted, V: not muted.

c--c: alarm descriptor: for example, Main Power Supply Fail Alarm means main power failure alarm.

hh: check code: XOR among the characters from $ to *, denoted by ASCII.

< CR >< LF >: enter, line feed.

母钟通过A3、B3接线端子接收NMEA-0183, IEC61162-1, RS-422/485 兼容, $GPZDA语句，该接口默认波特率为4800 bps，数据位为8位，奇偶校验无，停止位1位(可设置)。

Master clock will receive NMEA-0183, IEC61162-1, RS-422/485 compatibility and $GPZDA sentence by terminals A3 and B3. The default baud rate for this interface is 4800bps, data bit is 8-bit, no even-odd check, 1-bit stop bit(can be set).

3.10 主备电上电指示功能 Main and standby power ON indication function

当主电或备电上电后，屏幕右下方的“主电源”或“应急电源”指示灯亮，如果主电或备电失电，相应的指示灯熄灭。

After main power or standby power is ON, main power or emergency power light on the lower right corner of the screen will be on; if main power or standby power is failure, relevant indicator light will be off.

3.11 GPS 标准时间信号接收指示功能 GPS standard time signal receiving indication function

当母钟收到 GPS 标准时间信号时，屏幕下方的 GPS 指示灯亮，当收不到该信号时，屏幕下方的 GPS 指示灯闪亮。

When master clock receive GPS standard time signal, GPS indicator light on the lower will be on; when don’t receive this signal, GPS indicator light on the lower will blink.

3.12 车钟系统接口 Telegraph system interface

系统具有车钟系统接口，输出信号给车钟记录仪。信号接口如图 10：

System has telegraph system interface and will output signal to telegraph logger. Signal interface is shown as fig.10.

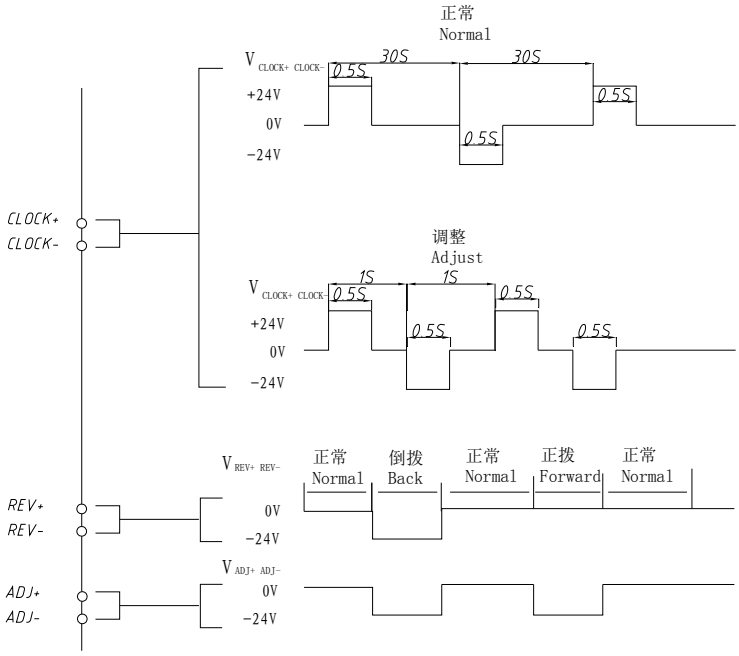


图 10 Fig. 10

3.13 子钟 Slave Clock

子钟具有通讯功能，用于接收母钟发出的标准时间或命令，从而实现子母钟同步。子钟必须接入母钟才能工作。子钟与母钟的接口共 2 个，分别为 V1+、V1-、A1、B1; V2+、V2-、A2、B2,每个接口最多可以接 64 个子钟，每个子钟设置为唯一的地址（0-63），通过子钟装置板上的拨码开关设置该地址，如图 11：

Slave clock has communication function for receiving standard time or command from master clock, which will achieve synchronization with master clock. Slave clock will not work unless connected with master clock. There are two interfaces between slave clock and master clock such as V1+,V1-,A1, B1 and V2+, V2-, A2, B2. Each interface can be connected to 64 slave clocks. Each slave clock has one unique address(0-63), which can be set by DIP switch on PCB of slave clock as follows.

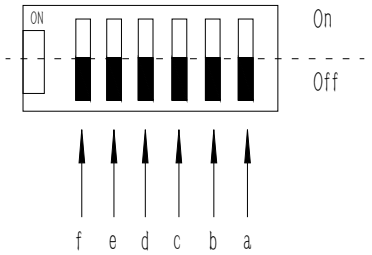


图 11 Fig. 11

说明：子钟地址=a+b+c+d+e+f。a：On 位置为 1，Off 位置为 0；b：On 位置为 2，Off 位置为 0；c：On 位置为 4，Off 位置为 0；d：On 位置为 8，Off 位置为 0；e：On 位置为 16，Off 位置为 0；f：On 位置为 32，Off 位置为 0。

Note: Slave clock address=a+b+c+d+e+f. a: On for 1 and Off for 0; b: On for 2 and Off for 0; c: On for 4 and Off for 0; d: On for 8 and Off for 0; e: On for 16 and Off for 0; f: On for 32 and Off for 0.

4 设备安装 **Equipment installation**

4.1 尺寸图 **Outline dimensions**

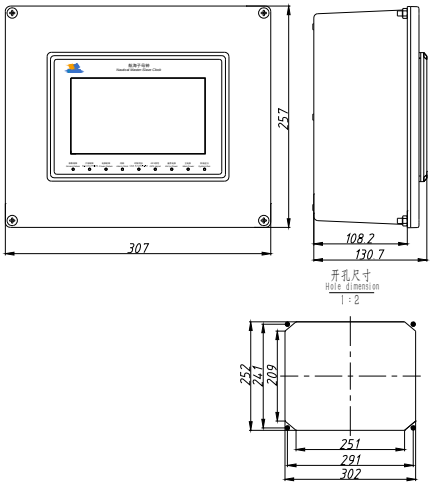


图 12 KZM-1ZQ 型母钟
Fig.12 KZM-1ZQ master clock

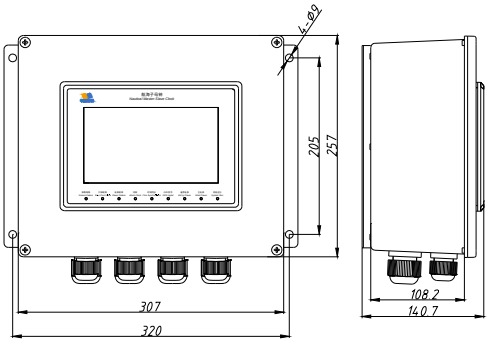


图 13 KZM-1ZG 型母钟
Fig. 13 KZM-1ZG master clock

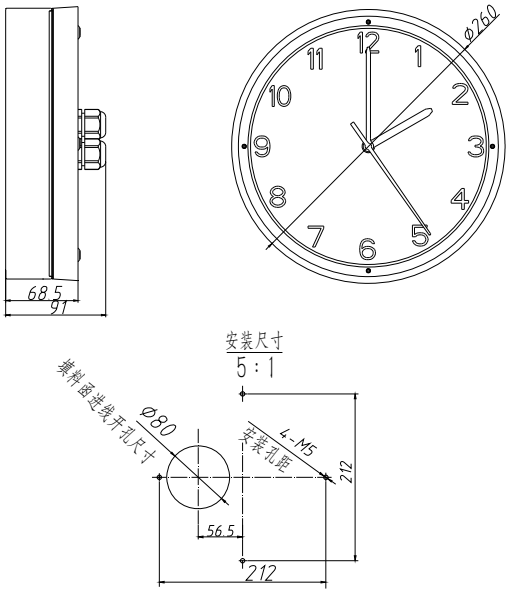


图 14 KZM-1G 型子钟
Fig.14 KZM-1G slave clock

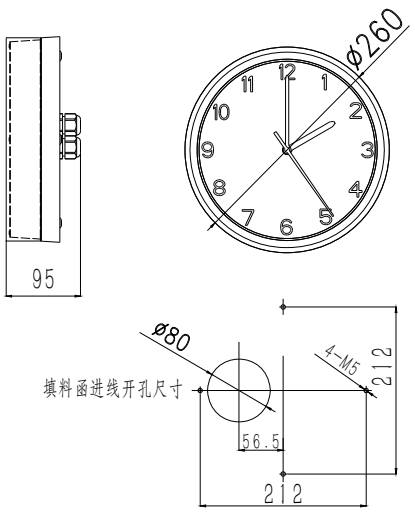


图 15 KZM-1F 型子钟
Fig. 15 KZM-1F slave clock

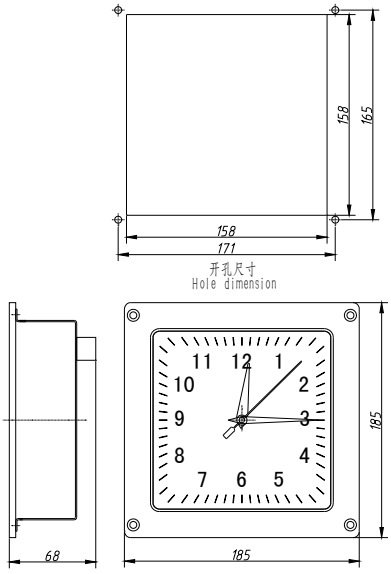


图 16 KZM-1TQ 型子钟

Fig. 16 KZM-1TQ slave clock

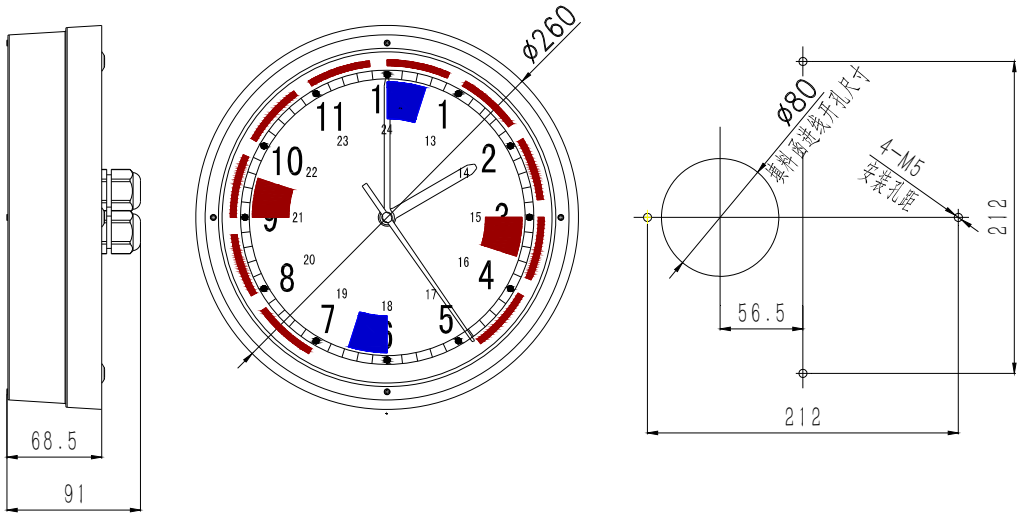


图 17 KZM-1G-B 型子钟

Fig. 17 KZM-1G-B slave clock

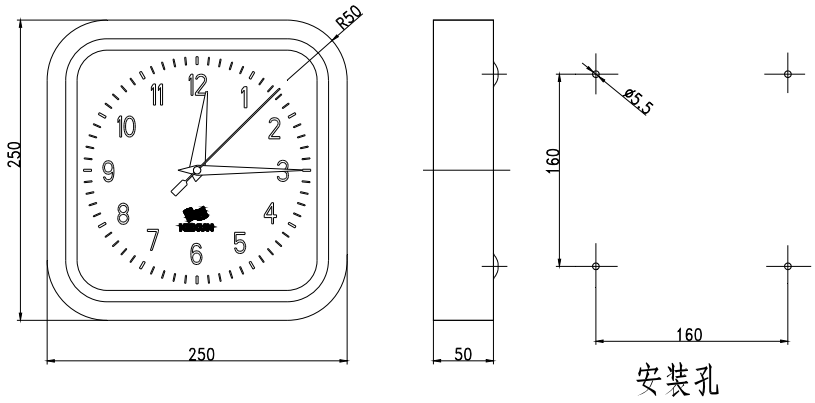


图 18 KZM-1G-M 型子钟

Fig. 18 KZM-1G-M slave clock

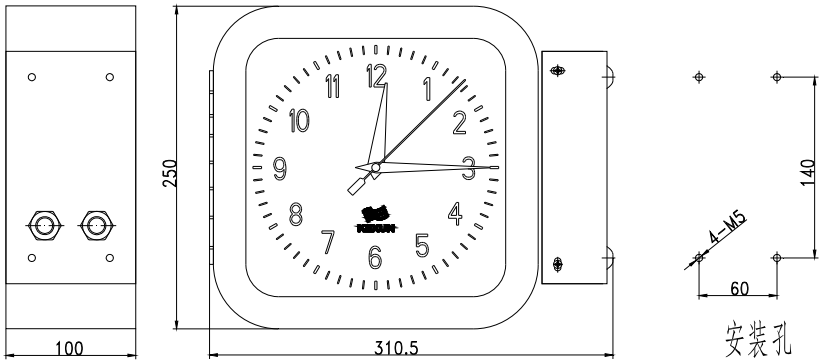


图 19 KZM-1G-S 型子钟

Fig. 19 KZM-1G-S slave clock

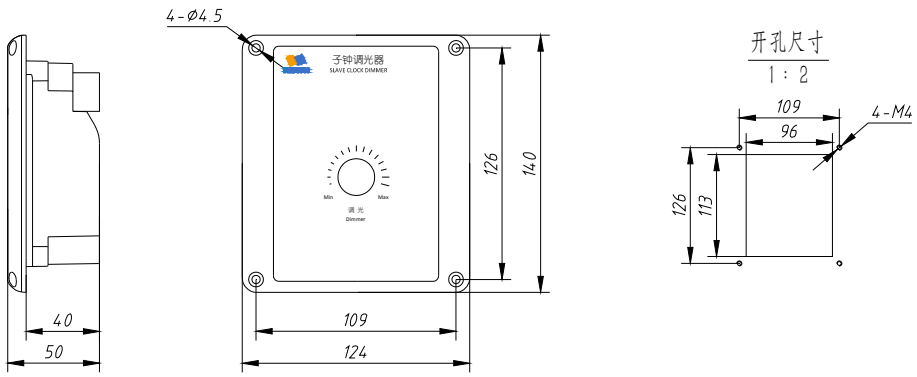


图 20 KZM-1TQ-T 型调光器

Fig. 20 KZM-1TQ-T Dimmer

4.2 系统接线图 **System connection**

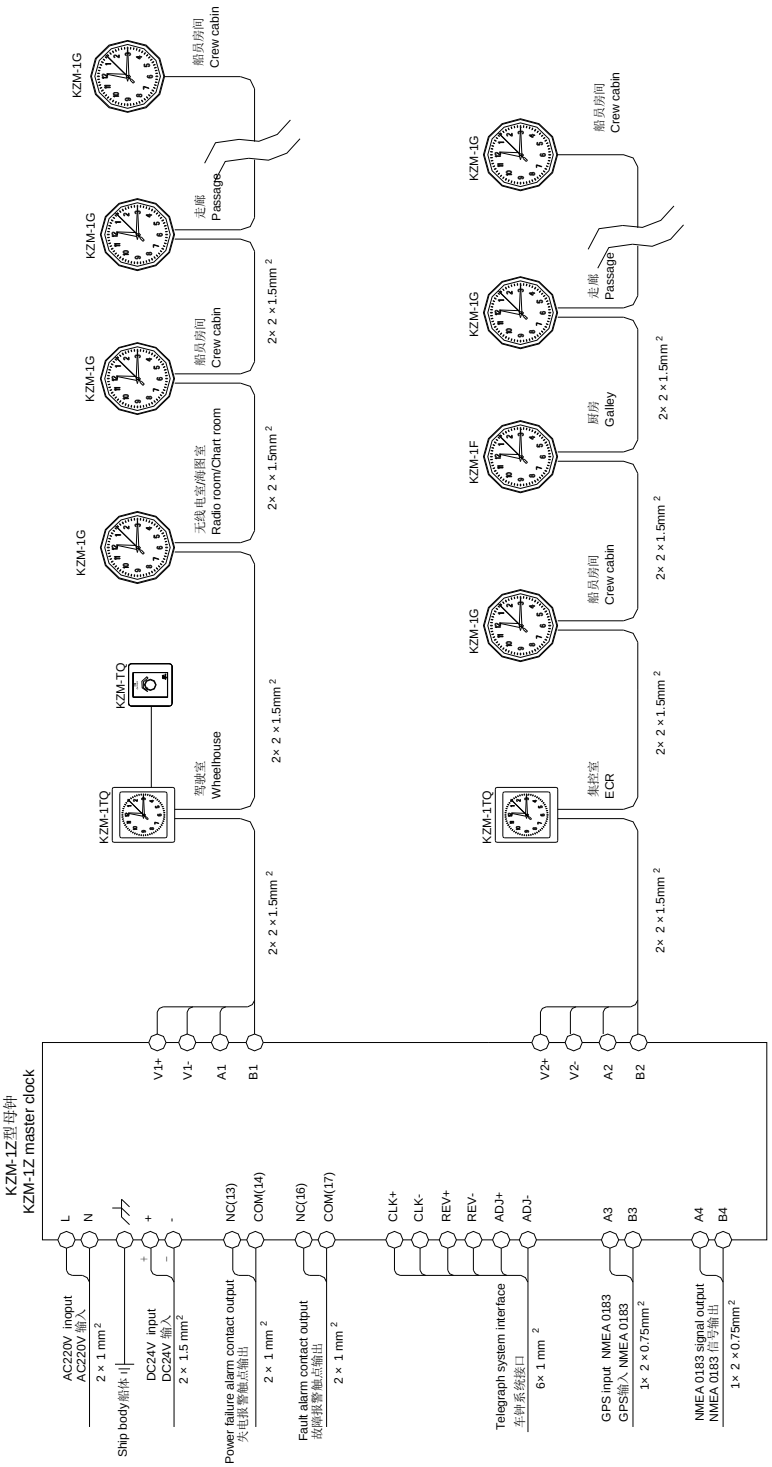


图 17 Fig.17

4.3 接线端子说明 **Terminals instruction**

表 2 接线端子说明
Table 2 terminals instruction

控制器接线座标号 Terminal block of alarm unit	脚 Pin	接线含义 Wiring meaning	连接设备 Connected equipment
L、N	X8-1、X8-2	主电输入(AC220V 50Hz) Main power supply input(AC220V 50Hz)	主电源 Main power supply
+、-	X1-2、X1-3	备电输入（DC24V） Standby power supply input(DC24V)	备用电源 Standby power supply
V1+、V1-	X4-1、X4-2	区域一子钟总线电源（+24V） Zone 1 slave clock bus power supply(+24V)	子钟 Slave clock
A1、B1	X4-3、X4-4	区域一子钟 485 总线 Zone 1 slave clock 485 bus	子钟 Slave clock
V2+、V2-	X4-5、X4-6	区域二子钟总线电源（+24V） Zone 2 slave clock bus power supply(+24V)	子钟 Slave clock
A2、B2	X4-7、X4-8	区域二子钟 485 总线 Zone 2 slave clock 485 bus	子钟 Slave clock
A4、B4	X4-11、X4-12	NMEA-0183 信息输出 NMEA-0183 information output	其它设备 Other equipments
A3、B3	X4-9、X4-10	NMEA-0183 GPS 信号输入 NMEA-0183 GPS signal input	GPS 接收机 GPS receiver
COM1、NC1、NO1	X4-13、14、15	失电报警无源触点 Power failure alarm passive contact	报警监控 Alarm monitor
COM2、NC2、NO2	X4-16、17、18	故障报警无源触点 Fault alarm passive contact	报警监控 Alarm monitor
CK+ CK- RV+ RV- AJ+ AJ-	X4-19、20、21、 22、23、24	车钟系统接口 Telegraph system interface	车钟记录仪 Telegraph logger

5 设备维护 **Equipment maintenance**

5.1 常见故障维修 **Troubleshooting**

故障一：打开电源开关，母钟没有工作。

处理方法：

a）检查电源是否连接正确，熔断器是否正常；

b）检查是否有电源送母钟。

Fault 1: Master clock will not work when power on.

Solution:

a) Check whether the connection of power supply is correct, whether fuse is ok;

b) Check whether there is power supply to master clock.

故障二：母钟系统运行灯停止闪烁，并红色平光。

处理方法：

a） 主控板故障，断电后重新开启系统，如仍有故障，则需要专业资质的人员进行维修；

Fault 2: Master clock system running light will not blink, but bright in red.

Solution:

a) Main control PCB is faulty; make power off and restart the system; if the fault still exists, it will need qualified personnel to repair.

故障三 ：母钟发出 1S 通 1S 断的报警音，且屏幕故障报警灯闪烁

母钟屏幕故障，检查屏幕排线是否连接好。如连接好，可能需要系统复位，断电后重新开启系统，如仍有故障，则需要专业资质的人员进行维修；

Fault 3: Master clock send out 1s on and 1s off alarm tone, moreover, fault alarm light blink.

Master clock screen is faulty, so check whether flat cable for screen is connected properly. If yes, maybe it need system reset, power off and restart the system.

If the fault still exists, it will need qualified personnel to repair.

6 注意事项 Notice

6.1 电源接线需正确，切不可把直流与交流混接，否则将引起不可逆转的损坏。

6.2 请将设备妥善接地。

6.3 维修需要有专业资质的人员进行，请勿带电打开操作。

6.1 Power supply must be connected correctly; DC and AC must not be confused, otherwise it will cause irreversible damage.

6.2 The equipments should be grounded properly.

6.3 Maintenance and repair should be performed by qualified personnel; please don’t open the cover to operate when electrified.