# 三代升级款数控升降压电源彩屏版

型号：ZK-SK150C

## 产品参数

产品名称：数控直流升降压电源
输入电压：7-36.00V
输出电流：0-8.000A
输出功率：150W
电压分辨率：0.01V
数据组存储：11组
屏幕尺寸：1.8寸升级大屏，36*29mm可视范围
转换效率：88%左右
产品尺寸：83x48x48mm。（高度不含旋转编码器）
产品重量：净重112g，含包装重132g

产品型号：ZK-SK150C
输出电压：0.5-40.00V
输出电压精度：±0.3% +3个字（可校准）
输出电流精度：±0.5% +3个字(可校准)
电流分辨率：0.001A
硅胶按键：5个
蜂鸣器：有
软启动：有

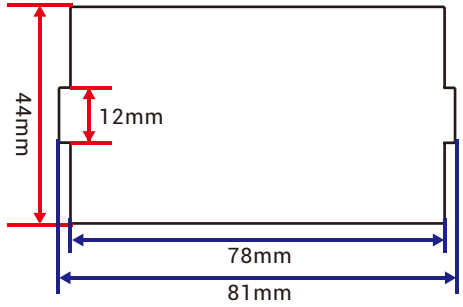
**保护机制：**

输入防反接： 有　　输出防倒灌： 有
输入欠压保护(LUP)：6.0-40V可调，出厂默认值6.0V
输出过压保护(OUP)：0.5-42V可调，出厂默认值42V
输出过流保护(OCP)：0.001-8.2A可调 ,出厂默认值8.2A
输出过功率保护(OPP)：0.1-180W可调，出厂默认值160W
过温保护（OTP）：30-150℃可调，出厂默认值100℃
超时保护（OHP）：1分钟-99小时59分钟，出厂默认关闭
超容量保护（OAH）：0.001-9999Ah，出厂默认关闭
超能量保护（OPH）：0.001-4000KWh，出厂默认关闭

## 按键功能


## 产品尺寸

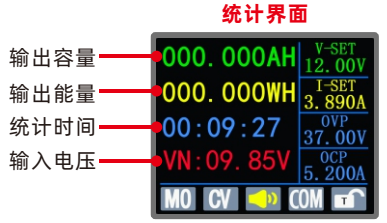

## 建议开口尺寸



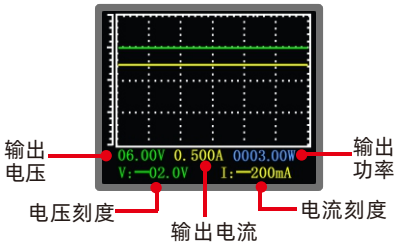

## 显示界面介绍

**电源主界面**

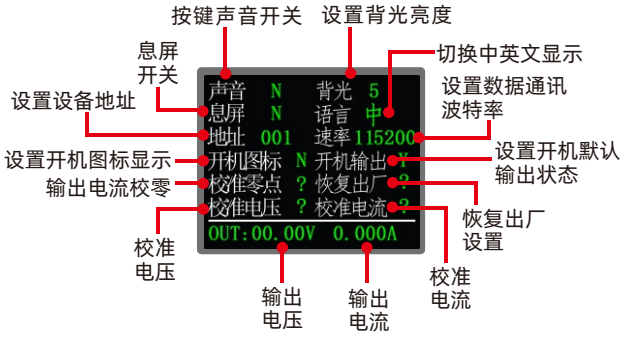

**统计界面**

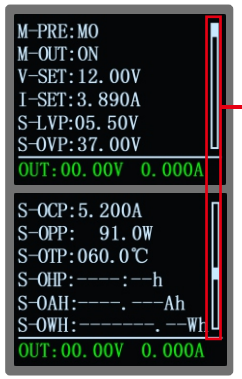



**曲线显示界面**




**菜单界面**




滚动条

数据组设置界面

M-PRE：选择数据组M0-M10
M-OUT：设置对应数据组调出时的默认开关
V-SET：设置对应数据组的输出电压值
I-SET：设置对应数据组的输出电流值
S-LVP：设置对应数据组的输入欠压保护值，默认6.0V
S-OVP：设置对应数据组的输出过压保护值，默认42V
S-OCP：设置对应数据组的输出过流保护值，默认8.2A
S-OPP：设置对应数据组的输出过功率保护值，默认160W
S-OTP：设置对应数据组的过温保护值，默认100℃
S-OHP：设置对应数据组的超时保护时间，默认关闭
S-OAH：设置对应数据组的超容量保护值，默认关闭
S-OWH：设置对应数据组的超能量保护值，默认关闭

# 使用说明

## 调用数据组

按 M/↑ 调出数据组设置，旋转编码器切换数据组M0-M10；
按 OK/↓ 确定并退出

## 设置电压电流

短按 V-SET 进入电压设置，短按旋转编码器移位，旋转调整大小。
设置好后，再按 V-SET 或 OK/↓ 一下，退出设置。

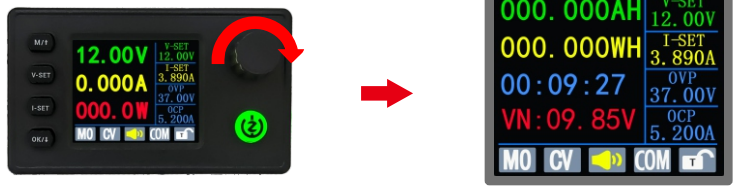
短按 I-SET 进入电流设置，短按旋转编码器移位，旋转调整大小。
设置好后，再按 I-SET 或 OK/↓ 一下，退出设置。

## 快捷设置OVP/OCP

长按 V-SET 进入OVP设置，短按旋转编码器移位，旋转调整大小。
设置好后，再按 V-SET 或 OK/↓ 一下，退出设置。

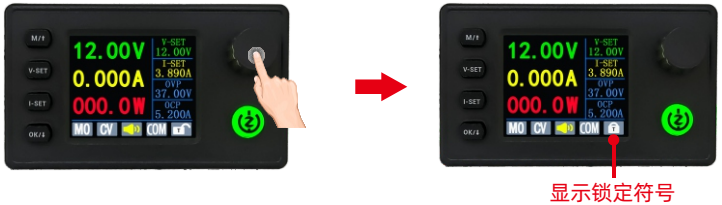
长按 I-SET 进入OCP设置，短按旋转编码器移位，旋转调整大小。
设置好后，再按 I-SET 或 OK/↓ 一下，退出设置。

## 切换显示界面



旋转编码器切换界面显示

## 锁定功能



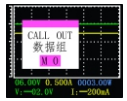
在正常显示界面，长按旋转编码器2秒，锁定设置的电压与电流，防止误操作；锁定后长按编码器2秒解锁。
锁定后电源键一样能够正常操作，确保随时可以断开电源。

## 参数设置操作介绍

在正常界面，旋转编码器切换界面显示

**曲线显示界面**

按 OK/↓ 设置电压刻度（显示V:—02.0V），旋转编码器切换大小，再按 OK/↓ 切换到电流刻度（显示I:—200mA），旋转编码器切换大小，再按 OK/↓ 退出；短按旋转编码器暂停。

按 M/↑ 调出数据组  旋转编码器切换数据组M0-M10；按 OK/↓ 确定并退出

按 V-SET 调出设置界面，  可以设置电压、电流、过压保护、过流保护

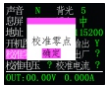
按 I-SET 调出设置界面， 

可以设置电压、电流、过压保护、过流保护

## 菜单界面

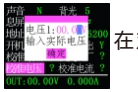
短按 M/↑ 选择设置选项


1. 声音 N：旋转编码器打开/关闭
2. 息屏 N：旋转编码器打开/关闭并设置息屏时间
3. 地址 001：旋转编码器设置通信地址
4. 开机图标 N：旋转编码器打开/关闭
5. 校准零点 ?：短按 OK/↓ 弹出校准零点对话框



短按 M/↑ 取消并退出，短按 OK/↓ 确定并退出。

6. 校准电压 ?：短按 OK/↓ 弹出校准电压对话框



在对话框中短按 M/↑ 取消校准并退出。

校准步骤：

1. 用万用表测量现在输出端（输出端空载，测量电源端子）实际电压并输入。
2. 短按 OK/↓ ，显示电压2。
3. 用万用表再次测量现在输出端实际电压并输入。
4. 短按 OK/↓ ，完成校准。

如果校准成功，会显示“校准成功”并退出，否则显示“校准失败”并退出。如果失败可尝试再次校准。

7. 背光 5：旋转编码器调整背光亮度；0-5级
8. 语言 中：旋转编码器切换中/英文
9. 速率115200：旋转编码器切换通信速率大小
10. 开机输出 Y：旋转编码器调整开机默认输出开/关
11. 恢复出厂 ?：短按 OK/↓ 弹出校准恢复出厂对话框

短按 M/↑ 取消并退出，短按 OK/↓ 确定并退出。

12. 校准电流 ?：短按 OK/↓ 弹出校准电流对话框

在对话框中短按 M/↑ 取消校准并退出。

校准步骤：

1. 用万用表电流档或用电子负载，短接输出两端测量现在实际电流并输入。
2. 短按 OK/↓ ，显示电流2。
3. 用万用表再次测量现在输出端实际电流并输入。
4. 短按 OK/↓ ，完成校准。

如果校准成功，会显示“校准成功”并退出，否则显示“校准失败”并退出。如果失败可尝试再次校准。

## 数据组设置界面

短按 M/↑ 选择设置选项，设置完成后短按 OK/↓ 确定并退出。



1. M-PRE:M0 ：设置数据组
   旋转编码器选择数据组
2. M-OUT:ON：设置调出时默认开/关
   旋转编码器设置调出时默认开/关
3. V-SET:12.00V：设置输出电压
   短按编码器移位，旋转编码器调整大小
4. I-SET:3.890A：设置输出电流
   短按编码器移位，旋转编码器调整大小
5. S-LVP:05.50V：设置输入欠压保护
   短按编码器移位，旋转编码器调整大小
6. S-OVP:37.00V：设置输出过压保护
   短按编码器移位，旋转编码器调整大小
7. S-OCP:5.200A：设置输出过流保护
   短按编码器移位，旋转编码器调整大小
8. S-OPP: 91.0W：设置输出过功率保护
   短按编码器移位，旋转编码器调整大小
9. S-OTP:060.0℃：设置过温保护
   短按编码器移位，旋转编码器调整大小
10. S-OHP:-----:--h：设置超时间保护
    长按编码器打开/关闭

    S-OHP:0000:01h 在打开状态短按编码器移位，旋转编码器调整大小
11. S-OAH:-----.---Ah：设置超容量保护
    长按编码器打开/关闭

    S-OAH:0000.001Ah 在打开状态短按编码器移位，旋转编码器调整大小
12. S-OWH:--------.---Wh：设置超能量保护
    长按编码器打开/关闭

    S-OWH:0000000.01Wh 在打开状态短按编码器移位，旋转编码器调整大小

## APP联机方法




① 电源主板通信接口插入ZK-BT蓝牙板，插入瞬间ZK-BT指示灯会闪一下。

② 打开无治智联APP和手机蓝牙，APP界面点击“添加设备”，会自动搜索到 Wuzhi Power，点击后自动连接。

③ 显示连接成功，点击完成。

④ 点击设备图标，进入正常操作界面，长按产品图标可更改名字或删除设备。

下载电源APP

## 上位机联机方法


可装配到机箱上

① 电脑插入数据线连接ZK-U2T（usb转ttl模块），ZK-U2T模块另一端4P线插入电源主板的通信口；

② 在我的电脑-设备管理器-端口中中找到USB-SERIAL CH340对应的端口号COMx;

③ 电脑打开“无治智联”上位机，选择对应的端口号COMx，点击上位机左下角的“连接”按钮，自动联机。

④ 运行环境是 .NET Framework 4.8 如果有运行不了的可至 .net官网下载安装

下载上位机

下面附Modbus通讯协议

# 一. 协议简介

采用 TTL 串口传输接口，通信协议为 MODBUS-RTU 协议， 本产品只支持功能码 0x03、 0x06、 0x10。

# 二. 通信协议介绍

信息传输为异步方式， Modbus-RTU 模式以 11 位的字节为单位

| | |
|---|---|
| 起始位 | 1 位 |
| 数据位 | 8 位 |
| 奇偶校验位 | 无 |
| 停止位 | 1 位 |

数据帧结构：

| 数据帧间隔 | 地址码 | 功能码 | 数据区 | CRC 校验 |
|---|---|---|---|---|
| 3.5 字节以上 | 1 字节 | 1 字节 | N 字节 | 2 字节 |

发送数据前要求数据总线静止时间即无数据发送时间大于 3.5（例如：波特率为 9600 时为 5ms）消息发送至少要以 3.5 个字节时间的停顿间隔开始，整个消息帧必须作为一连 续的数据传输流，如果在帧完成之前有超过 3.5 个字节时间的停顿时间，接收设备将刷新 不完整的消息并假定下一字节是一个新消息的地址域。同样地，如果一个新消息在小于 3.5 个字符时间内接着前个消息开始，接收的设备将认为它是前一消息的延续。

**1.1 地址码：**

地址码是每次通讯信息帧的第一字节（8 位），从 1 到 255(初始默认为 1,0 同时也为广播地址)。这个字节表明由用户设置地址的从机将接收由主机发送来的信息。每个从机都必须有唯一的地址码，并且只有符合地 址码的从机才能响应回送信息。当从机回送信息时，回送数据均以各自的地址码开始。主机发送的地址码表明将发送到的从机地址，而从机返回的地址码表明回送的从机地址。相应的地址码表明该信息来自于何处。

**1.2 功能码：**

功能码为每次通讯信息帧传送的第二个字节，ModBus 通讯规约可定义的功能码为 1 到 127。作为主机请求发送，通过功能码告诉从机应执行什么动作。作为从机响应，从机返回 的功能码与从主机发送来的功能码一样，并表明从机已响应主机并且已进行相关的操作。 本机仅支持 0x03、0x06、0x10 功能码。

| 功能码 | 定 义 | 操 作（二进制） |
|---|---|---|
| 0x03 | 读寄存器数据 | 读取一个或多个寄存器的数据 |
| 0x06 | 写单个寄存器 | 把一组二进制数据写入单个寄存器 |
| 0x10 | 写多个寄存器 | 把多组二进制数据写入多个寄存器 |

**1.3 数据区**

数据区包括需要由从机返送何种信息或执行什么动作， 这些信息可以是数据（如：开关量输入/输出、模拟量输入/输出、寄存器等等）、参考地址等。例如，主机通过功能码 03 告诉从机返回寄存器的值（包含要读取寄存器的起始地址及读取寄存器的长度），则返回的数据包括寄存器的数据长度及数据内容。(单个寄存器地址内的数据为双字节型数据)

**0x03 读取功能主机格式**

| 地址码 | 功能码 | 寄存器起始地址 | 寄存器地址数量 n(1～32) | CRC 校验码 |
|---|---|---|---|---|
| 1 字节 | 1 字节 | 2 字节 | 2 字节 | 2 字节 |
| 01 | 03 | 00 00 | 00 10 | 44 06 |

**0x03 读取功能从机返回格式**

| 地址码 | 功能码 | 返回寄存器个数 n | 寄存器数据 | CRC 校验码 |
|---|---|---|---|---|
| 1 字节 | 1 字节 | 1 字节 | 2*n 个字节 | 2 字节 |
| 01 | 03 | 04 | 2*n | |

**0x06 写单个寄存器功能主机格式**

| 地址码 | 功能码 | 寄存器起始地址 | 寄存器数据 | CRC 校验码 |
|---|---|---|---|---|
| 1 字节 | 1 字节 | 2 字节 | 2 字节 | 2 字节 |
| 01 | 06 | 00 12 | 00 01 | E8 0F |

**0x06 写单个寄存器功能从机返回格式**

| 地址码 | 功能码 | 寄存器起始地址 | 寄存器数据 | CRC 校验码 |
|---|---|---|---|---|
| 1 字节 | 1 字节 | 2 字节 | 2 个字节 | 2 字节 |
| 01 | 06 | 00 12 | 00 01 | E8 0F |

**0x10 写多个寄存器功能主机格式**

| 地址码 | 功能码 | 寄存器起始地址 | 寄存器地址数量 n(1~32) | 写入字节数 2*n | 寄存器数据 | CRC 校验码 |
|---|---|---|---|---|---|---|
| 1 字节 | 1 字节 | 2 字节 | 2 字节 | 1 字节 | 2*n 字节 | 2 字节 |

**0x10 写多个寄存器从机主机格式**

| 地址码 | 功能码 | 寄存器起始地址 | 寄存器地址数量 n(1～32) | CRC 校验码 |
|---|---|---|---|---|
| 1 字节 | 1 字节 | 2 字节 | 1 字节 | 2 字节 |

**协议寄存器介绍(单个寄存器地址内的数据为双字节型数据)**

| 名称 | 说明 | 字节数 | 小数点 | 单位 | 读写 | 寄存器地址 |
|---|---|---|---|---|---|---|
| V-SET | 电压设置 | 2 | 2 | V | R/W | 0000H |
| I-SET | 电流设置 | 2 | 2 | A | R/W | 0001H |
| VOUT | 输出电压显示值 | 2 | 2 | V | R | 0002H |
| IOUT | 输出电流显示值 | 2 | 2 | A | R | 0003H |
| POWER | 输出功率显示值 | 2 | 1 | W | R | 0004H |
| UIN | 输入电压显示值 | 2 | 2 | V | R | 0005H |
| AH-LOW | 输出 AH 低 16 位 | 2 | 0 | maH | R | 0006H |
| AH-HIGH | 输出 AH 高 16 位 | 2 | 0 | maH | R | 0007H |
| WH-LOW | 输出 WH 低 16 位 | 2 | 0 | mwH | R | 0008H |
| WH-HIGH | 输出 WH 高 16 位 | 2 | 0 | mwH | R | 0009H |
| OUT_H | 开启时长-小时 | 2 | 0 | H | R | 000AH |
| OUT_M | 开始时长-分钟 | 2 | 0 | M | R | 000BH |
| OUT_S | 开启时长-秒 | 2 | 0 | S | R | 000CH |
| T_IN | 内部温度值 | 2 | 1 | C | R | 000DH |
| T_EX | 外部温度值 | 2 | 1 | C | R | 000EH |
| LOCK | 按键锁 | 2 | 0 | - | R/W | 000FH |
| PROTECT | 保护状态 | 2 | 0 | - | R/W | 0010H |

| | | | | | | |
|---|---|---|---|---|---|---|
| CVCC | 恒压恒流状态 | 2 | 0 | - | R | 0011H |
| ONOFF | 开关输出 | 2 | 0 | - | R/W | 0012H |
| F-C | 温度符号 | 2 | 0 | - | R | 0013H |
| B-LED | 背光亮度等级 | 2 | 0 | - | R/W | 0014H |
| SLEEP | 息屏时间 | 2 | 0 | M | R/W | 0015H |
| MODEL | 产品型号 | 2 | 0 | - | R | 0016H |
| VERSION | 固件版本号 | 2 | 0 | - | R | 0017H |
| SLAVE-ADD | 从机地址 | 2 | 0 | - | R/W | 0018H |
| BAUDRATE_L | 波特率 | 2 | 0 | - | R/W | 0019H |
| T-IN-OFFSET | 内部温度修正 | 2 | 1 | C | R/W | 001AH |
| T-EX-OFFSET | 外部温度修正 | 2 | 1 | C | R/W | 001BH |
| BUZZER | 蜂鸣器开关 | 2 | 0 | - | R/W | 001CH |
| EXTRACT-M | 快捷调出数据组 | 2 | 0 | - | R/W | 001DH |
| DEVICE | 设备状态 | 2 | 0 | - | R/W | 001EH |
| V-SET | 电压设置 | 2 | 2 | V | R/W | 001FH |
| | | | | | | |
| | | | | | | |
| V-SET | 电压设置 | 2 | 2 | V | R/W | 0050H |
| I-SET | 电流设置 | 2 | 2 | A | R/W | 0051H |
| S-LVP | 低压保护值 | 2 | 2 | V | R/W | 0052H |
| S-OVP | 过压保护值 | 2 | 2 | V | R/W | 0053H |
| S-OCP | 过流保护值 | 2 | 2 | A | R/W | 0054H |
| S-OPP | 过功率保护值 | 2 | 1 | W | R/W | 0055H |
| S-OHP_H | 最大输出时长--小时 | 2 | 0 | H | R/W | 0056H |
| S-OHP_M | 最大输出时长—分钟 | 2 | 0 | M | R/W | 0057H |
| S-OAH_L | 最大输出 AH 低 16 位 | 2 | 0 | maH | R/W | 0058H |
| S-OAH_H | 最大输出 AH 高 16 位 | 2 | 0 | maH | R/W | 0059H |
| S-OWH_L | 最大输出 WH 低 16 位 | 2 | 0 | 10mwH | R/W | 005AH |
| S-OWH_H | 最大输出 WH 高 16 位 | 2 | 0 | 10mwH | R/W | 005BH |
| S-OTP | 过温保护值 | 2 | 1 | F/C | R/W | 005CH |
| S-INI | 上电输出开关 | 2 | 0 | - | R/W | 005DH |
| S-O_CLOSE | 过时 过容量 过能量开关 最后一位 开关状态<br><br>0000000000000001 过时<br>0000000000000010 过容<br>0000000000000100 过能<br>0000000100000000 | 2 | 0 | - | R/W | 005EH |
| Restore Factory | 恢复出厂设置 | 2 | 0 | | W | 0020H |
| ZERO | 清零 | 2 | 0 | - | W | 0021H |
| Reset | 重启 | 2 | 0 | | W | 002FH |

注 1:本产品设计有 M0-M10 共 11 组存储数据组，每组有序号 00-0D 共 14 个数据，其中 M0 数据组为产品上电默认调用的数据组，数据组的起始地址计算方法是： 0050H+数据组号*0010H,例如 M3 数据组的起始地址为：
0050H+3*0010H=0080H。
注 2:按键锁功能读写数值为 0 和 1， 0 为非锁定， 1 为锁定。

注 3:保护状态读取值为 0-11:
0:正常运行,1:OVP,2:OCP,3:OPP,4:LVP,5:OAH,6:OHP,7:OTP,8:OEP,9:OWH,10:ICP。 11：IVP
注 4:恒压恒流状态读取值为 0 和 1， 0 为 CV 状态， 1 为 CC 状态。
注 5:开关输出功能读写值为 0 和 1， 0 为关闭状态， 1 为打开状态。
注 6:背光亮度等级读写范围为 0-5， 0 级最暗， 5 级最亮。
注 7:快捷调出数据组功能写入值为 0-10，写入后会自动调出对应数据组数据。

**1.4 错误校验码（CRC 校验）:**

主机或从机可用校验码进行判别接收信息是否正确。由于电子噪声或一些其它干扰，信息在传输过程中有时会发生错误，错误校验码（CRC）可以检验主机或从机在通讯数据传送过程中的信息是否有误，错误的数据可以放弃（无论是发送还是接收），这样增加了系统的安全和效率。 MODBUS 通讯协议的 CRC（冗余循环码）包含 2 个字节，即 16 位二进制数。CRC 码由发送设备（主机）计算，放置于发送信息帧的尾部。接收信息的设备（从机）再重新计算接收到信息的 CRC，比较计算得到的 CRC 是否与接收到的相符，如果两者不相符，则表明出错。 CRC 校验码发送时低位在前，高位在后。

**CRC 码的计算方法：**

(1)预置 1 个 16 位的寄存器为十六进制 FFFF（即全为 1） ;称此寄存器为 CRC 寄存器;
(2)把第一个 8 位二进制数据（既通讯信息帧的第一个字节）与 16 位的 CRC 寄存器的低 8 位相异或，把结果放于 CRC 寄存器;
(3)把 CRC 寄存器的内容右移一位（朝低位）用 0 填补最高位，并检查右移后的移出位;
(4)如果移出位为 0：重复第 3 步（再次右移一位） ;如果移出位为 1： CRC 寄存器与多项式 A001（1010 0000 0000 0001）进行异或;
(5)重复步骤 3 和 4，直到右移 8 次，这样整个 8 位数据全部进行了处理;
(6)重复步骤 2 到步骤 5，进行通讯信息帧下一个字节的处理;
(7)将该通讯信息帧所有字节按上述步骤计算完成后，得到的 16 位 CRC 寄存器的高、低字节进行交换;
(8)最后得到的 CRC 寄存器内容即为 CRC 码。

## 三、通讯实例

**例 1： 主机读取输出电压和输出电流显示值**

主机发送的报文格式：

| 主机发送 | 字节数 | 发送的信息 | 备 注 |
|---|---|---|---|
| 从机地址 | 1 | 01 | 发送至地址为 01 的从机 |
| 功能码 | 1 | 03 | 读寄存器 |
| 寄存器起始地址 | 2 | 0002H | 寄存器起始地址 |
| 寄存器地址数量 | 2 | 0002H | 共 2 个字节 |
| CRC 码 | 2 | 65CBH | 由主机计算得到 CRC 码 |

例如如当前显示值是 05.00V， 2.00A，则从机响应返回的报文格式：

| 从机响应 | 字节数 | 返回的信息 | 备 注 |
|---|---|---|---|
| 从机地址 | 1 | 01 | 来自从机 01 |
| 功能码 | 1 | 03 | 读寄存器 |
| 读取字节数 | 1 | 04 | 共 1 个字节 |
| 地址为 0002H 寄存器的内容 | 2 | 01F4H | 输出电压显示值 |
| 地址为 0003H 寄存器的内容 | 2 | 00C8H | 输出电流显示值 |

| | | | |
|---|---|---|---|
| CRC 码 | 2 | BBABH | 由从机计算得到 CRC 码 |

**例 2： 主机要设定电压为 12.00V**

主机发送的报文格式：

| 主机发送 | 字节数 | 发送的信息 | 备 注 |
|---|---|---|---|
| 从机地址 | 1 | 01H | 来自从机 01 |
| 功能码 | 1 | 06H | 写单个寄存器 |
| 寄存器地址 | 2 | 0000H | 寄存器地址 |
| 地址为 0000H 寄存器的内容 | 2 | 04B0H | 设定输出电压值 |
| CRC 码 | 2 | 8ABEH | 由主机计算得到 CRC 码 |

从机接收后响应返回的报文格式：

| 从机响应 | 字节数 | 返回的信息 | 备 注 |
|---|---|---|---|
| 从机地址 | 1 | 01H | 发送至地址为 01 的从机 |
| 功能码 | 1 | 06H | 写单个寄存器 |
| 寄存器地址 | 2 | 0000H | 寄存器起始地址 |
| 地址为 0000H 寄存器的内容 | 2 | 04B0H | 设定输出电压值 |
| CRC 码 | 2 | 8ABEH | 由从机计算得到 CRC 码 |

**例 3：主机要设定电压为 24.00V，电流 15.00A。**

主机发送的报文格式：

| 主机发送 | 字节数 | 发送的信息 | 备 注 |
|---|---|---|---|
| 从机地址 | 1 | 01H | 来自从机 01 |
| 功能码 | 1 | 10H | 写寄存器 |
| 寄存器起始地址 | 2 | 0000H | 寄存器起始地址 |
| 寄存器地址数量 | 2 | 0002H | 共 2 个字节 |
| 写入字节数 | 1 | 04H | 共 1 个字节 |
| 地址为 0000H 寄存器的内容 | 2 | 0960H | 设定输出电压值 |
| 地址为 0001H 寄存器的内容 | 2 | 05DCH | 设定输出电流值 |
| CRC 码 | 2 | F2E4H | 由主机计算得到 CRC 码 |

从机接收后响应返回的报文格式：

| 从机响应 | 字节数 | 返回的信息 | 备 注 |
|---|---|---|---|
| 从机地址 | 1 | 01H | 发送至地址为 01 的从机 |
| 功能码 | 1 | 10H | 写寄存器 |
| 寄存器起始地址 | 2 | 0000H | 寄存器起始地址 |
| 寄存器地址数量 | 2 | 0002H | 共 2 个字节 |
| CRC 码 | 2 | 41C8H | 由从机计算得到 CRC 码 |

# Third generation upgraded CNC voltage buck-boost power supply color screen

Model: ZK-SK150C

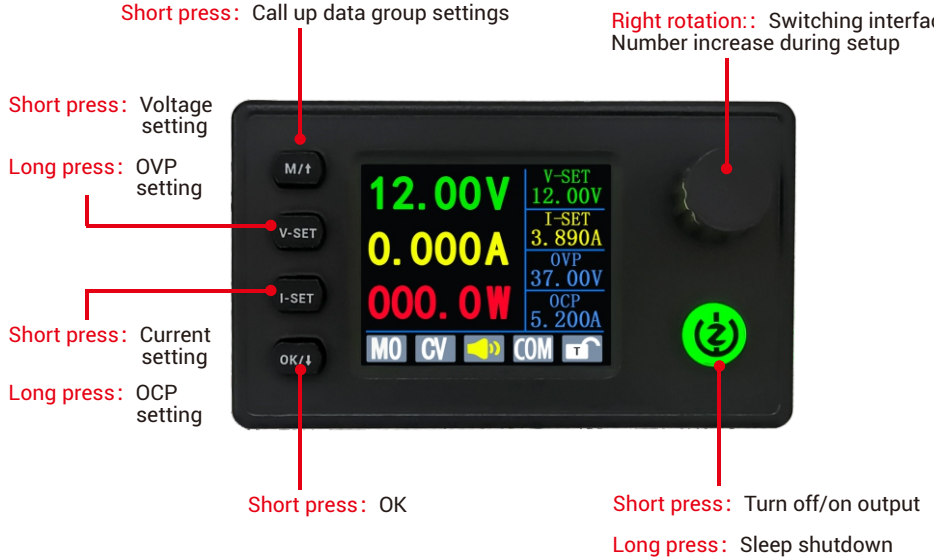
## Product parameters

Product name: CNC DC voltage buck-boost power supply
Product model: ZK-SK150C
Input voltage: 7-36.00V
Output voltage: 0.5-40.00V
Output current: 0-8.000A
Output voltage accuracy: ± 0.3%+3 words (Calibratable)
Output power: 150W
Output current accuracy: ± 0.5%+3 words (Calibratable)
Voltage resolution: 0.01V
Current resolution: 0.001A
Data group storage: 11 groups
Silicon rubber keypads: 5
Screen size: Upgraded 1.8-inch large screen, 36 * 29mm visible range
Buzzer: Yes
Conversion efficiency: About 88%
Soft start: Yes
Product size: 83x48x48mm. (Height does not include rotary encoder)
Product weight: Net weight 112g, Weight with packaging 132g

**Protection mechanism:**

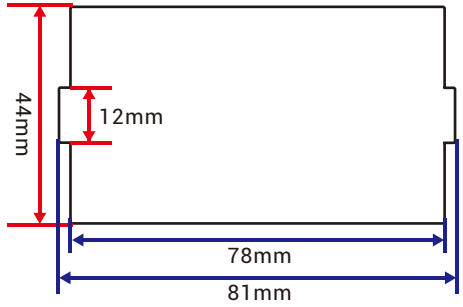
Input anti reverse connection: Yes
Output anti backflow: Yes
Input undervoltage protection (LUP): 6.0-40V adjustable, factory default value of 6.0V
Output overvoltage protection (OUP): 0.5-42V adjustable, factory default value 42V
Output overcurrent protection (OCP): 0.001-8.2A adjustable, factory default value of 8.2A
Output overpower protection (OPP): 0.1-180W adjustable, factory default value 160W
Over temperature protection (OTP): 30-150 ℃ adjustable, factory default value of 100℃
Timeout protection (OHP): 1-99 hours and 59 minutes, factory default off
Overcapacity protection (OAH): 0.001-9999Ah, factory default off
Superenergy protection (OPH): 0.001-4000KWh, factory default off

## Key functions



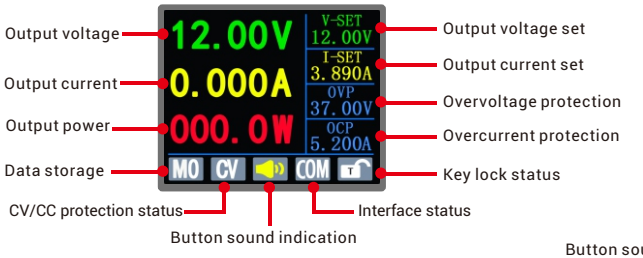

## Product size


## Suggested opening size



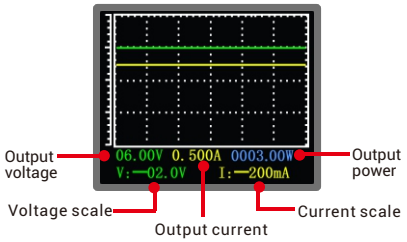

## Interface Introduction

### Main interface of power supply

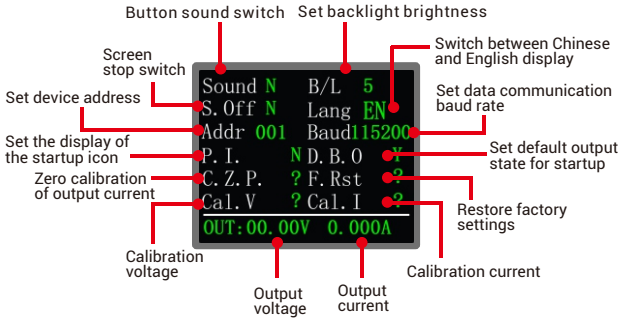



### Statistics Interface

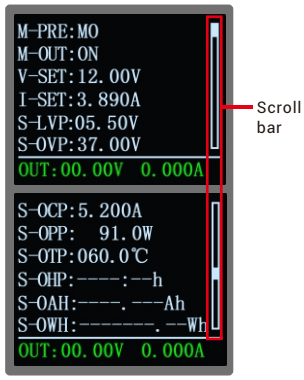

### Curve display interface




### Menu interface




### Data group setting interface




M-PRE: Select data group M0-M10
M-OUT: Set the default switch when calling out the corresponding data group
V-SET: Set the output voltage value for the corresponding data group
I-SET: Set the output current value for the corresponding data group
S-LVP: Set the input undervoltage protection value for the corresponding data group, with a default of 6.0V
S-OVP: Set the output overvoltage protection value for the corresponding data group, default to 42V
S-OCP: Set the output overcurrent protection value for the corresponding data group, with a default of 8.2A
S-OPP: Set the output overpower protection value for the corresponding data group, with a default of 160W
S-OTP: Set the over temperature protection value for the corresponding data group, default to 100℃
S-OHP: Set the timeout protection time for the corresponding data group, which is disabled by default
S-OAH: Set the over capacity protection value for the corresponding data group, which is disabled by default

# Instructions for use

## Call out data group

Press M/↑ to call up the data group settings, rotate the encoder to switch to data group M0-M10;
Press OK/↓ to confirm and exit

## Set voltage and current

Short press V-SET to enter the voltage setting, short press to rotate the encoder to shift and adjust the size.
After setting up, press V-SET or OK/↓ again to exit the setup.

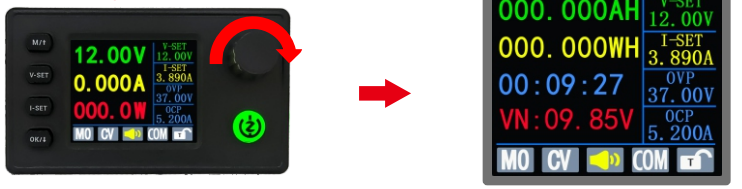
Short press I-SET to enter the current setting, short press to rotate the encoder to shift and adjust the size.
After setting up, press I-SET or OK/↓ again to exit the setup.

## Quick settings OVP/OCP

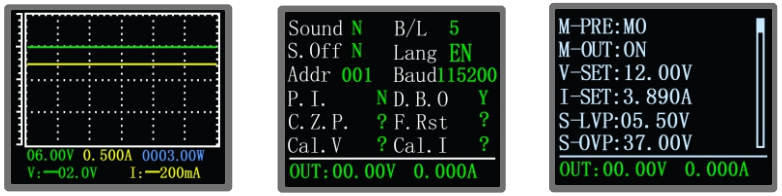
Long press V-SET to enter OVP settings, short press the rotary encoder to shift, rotate to adjust size.
After setting up, press V-SET or OK/↓ again to exit the setup.

Long press I-SET to enter OCP settings, short press the rotary encoder to shift, rotate to adjust size.
After setting up, press I-SET or OK/↓ again to exit the setup.

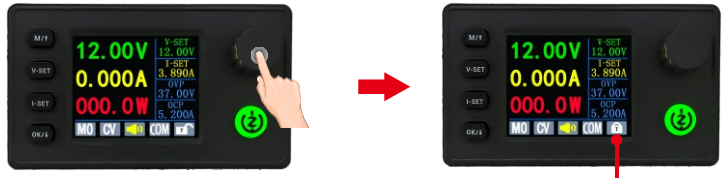
## Switch display interface



Rotation encoder switch interface display



## Locking function



Show lock symbols

On the normal display interface, long press and hold the rotary encoder for 2 seconds to lock the set voltage and current to prevent accidental operation; After locking, press and hold the encoder for 2 seconds to unlock. After locking, the power button can still operate normally, ensuring that the power can be disconnected at any time.

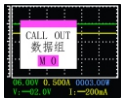
## Introduction to parameter setting operations

On the normal interface, the rotary encoder switch interface displays

Curve display interface

Press OK/↓ to set the voltage scale (display V:—02.0V), rotate the encoder to switch size, then press OK/↓ to switch to the current scale (display I:—200mA), rotate the encoder to switch size, and then press OK/↓ to exit; Short press the rotary encoder to pause.

Press M/↑ to call out the data group



Rotating encoder switching data group M0-M10;
Press OK/↓ to confirm and exit

Press V-SET to bring up the settings interface

Can set voltage, current, overvoltage protection, overcurrent protection

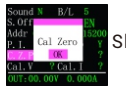
Press I-SET to bring up the settings interface

Can set voltage, current, overvoltage protection, overcurrent protection

## Menu interface

Short press M/↑ to select the settings option

1. Sound N : Rotating encoder on/off
2. S.Off N : Turn the rotary encoder on/off and set the screen rest time
3. Addr 001 : Set communication address for rotary encoder
4. P.I. N : Rotating encoder on/off
5. C.Z.P. ? : Short press OK/↓ to pop up the calibration zero point dialog box



Short press M/↑ to cancel and exit,Short press OK/↓ to confirm and exit.

6. Cal.V ? : Short press OK/↓ to pop up the calibration voltage dialog box

Short press M/↑ in the dialog box to cancel calibration and exit.

Calibration steps:

1. Use a multimeter to measure the actual voltage at the current output terminal (output terminal unloaded, measure the power terminal) and input it.
2. Short press OK/↓ to display voltage 2.
3. Use a multimeter to measure the actual voltage at the current output terminal again and input it.
4. Short press OK/↓ to complete the calibration.
   If calibration is successful, it will display "CALI Success" and exit; otherwise, it will display "CALI Failed" and exit. If it fails, you can try calibrating again.

7. B/L 5 : Rotate the encoder to adjust the backlight brightness; 0-5 levels
8. Lang EN : Rotating encoder switching between Chinese and English
9. Baud 115200 : Rotation encoder switching communication rate size
10. D.B.O Y : Rotate the encoder to adjust the default output on/off during startup
11. F.Rst ? : Short press OK/↓ to pop up the calibration and factory reset dialog box

Short press M/↑ to cancel and exit,Short press OK/↓ to confirm and exit.

12. Cal.I ? : Short press OK/↓ to pop up the calibration current dialog box

Short press M/↑ in the dialog box to cancel calibration and exit.

Calibration steps:

1. Use a multimeter current range or electronic load to short circuit the output terminals and measure the current actual current and input it.
2. Short press OK/↓ to display current 2.
3. Use a multimeter to measure the actual current at the current output terminal again and input it.
4. Short press OK/↓ to complete the calibration.
   If calibration is successful, it will display "CALI Success" and exit; otherwise, it will display "CALI Failed" and exit. If it fails, you can try calibrating again.

## Data group setting interface

Short press M/↑ to select the settings option, and once the settings are complete, short press OK/↓ to confirm and exit.

1. M-PRE:M0 : Set up data groups
   Rotating encoder selection data group
2. M-OUT:ON : Set default on/off when calling out
   Default on/off when calling up rotary encoder settings
3. V-SET:12.00V : Set output voltage
   Short press the encoder to shift, rotate the encoder to adjust size
4. I-SET:3.890A : Set output current
   Short press the encoder to shift, rotate the encoder to adjust size
5. S-LVP:05.50V : Set input undervoltage protection
   Short press the encoder to shift, rotate the encoder to adjust size
6. S-OVP:37.00V : Set output overvoltage protection
   Short press the encoder to shift, rotate the encoder to adjust size
7. S-OCP:5.200A : Set output overcurrent protection
   Short press the encoder to shift, rotate the encoder to adjust size
8. S-OPP: 91.0W : Set output overpower protection
   Short press the encoder to shift, rotate the encoder to adjust size
9. S-OTP:060.0℃ : Set up over temperature protection
   Short press the encoder to shift, rotate the encoder to adjust size
10. S-OHP:----:-0h : Set timeout protection
    Long press the encoder to turn on/off

    S-OHP:0000:01h Short press the encoder shift in the open state, rotate the encoder to adjust size
11. S-OAH:----.--0Ah : Set up over capacity protection
    Long press the encoder to turn on/off

    S-OAH:0000.001Ah Short press the encoder shift in the open state, rotate the encoder to adjust size
12. S-OWH:-------.-0Wh : Set up over energy protection
    Long press the encoder to turn on/off

    S-OWH:0000000.01Wh Short press the encoder shift in the open state, rotate the encoder to adjust size

## APP online method




① Insert the communication interface of the power motherboard into the ZK-BT BT board, and the ZK-BT indicator light will flash once when inserted.

② Open the Wuzhi Zhilian APP and mobile BT, click "Add Device" on the APP interface, and Wuzhi Power will be automatically searched for. After clicking, it will automatically connect.

③ Display successful connection, click complete.

④ Click on the device icon to enter the normal operation interface.
Long press the product icon to change the name or delete the device.

Download the power app

## Online method of upper computer


Can be assembled onto the chassis

① Insert a data cable into the computer and connect it to the ZK-U2T (USB to TTL module). The other end of the ZK-U2T module has a 4P cable inserted into the communication port of the power motherboard;

② Find the port number COMx corresponding to USB-Serial CH340 in my computer - Device Manager - Ports;

③ Open the "Wuzhi Zhilian" upper computer, select the corresponding port number COMx, and click the "Connect" button in the bottom left corner of the upper computer to automatically connect.

④ The operating environment is If NET Framework 4.8 cannot run, you can download and install it from the. net official website

Download the upper computer

Attached below is the Modbus communication protocol

## 一. Protocol Introduction

Using TTL serial transmission interface and MODBUS-RTU communication protocol, this product only supports function codes 0x03, 0x06, and 0x10.

## 2、 Introduction to Communication Protocol:

Information transmission is asynchronous, and Modbus RTU mode is based on 11 bit bytes

| | |
|---|---|
| Starting position | 1 digit |
| Data bits | 8 digits |
| Parity check bit | nothing |
| Stop bit | 1 digit |

Data frame structure:

| Data frame interval | Address code | Function code | Data area | CRC verification |
|---|---|---|---|---|
| 3.5 bytes or more | 1 byte | 1 byte | N bytes | 2 bytes |

Before sending data, it is required that the data bus rest time, i.e. no data transmission time, be greater than 3.5 (for example, 5ms at a baud rate of 9600). Message transmission must start with a pause interval of at least 3.5 bytes, and the entire message frame must be treated as a continuous data transmission stream. If there is a pause time of more than 3.5 bytes before the frame is completed, the receiving device will refresh the incomplete message and assume that the next byte is the address domain of a new message. Similarly, if a new message starts with the previous message within less than 3.5 characters, the receiving device will consider it a continuation of the previous message.

### 1.1 Address Code:

The address code is the first byte (8 bits) of each communication information frame, ranging from 1 to 255 (initially set to 1,0 and also the broadcast address). This byte indicates that the slave set by the user will receive information sent by the host. Each slave must have a unique address code, and only slaves that match the address code can respond to feedback messages. When the slave sends back information, the returned data starts with their respective address codes. The address code sent by the host indicates the slave address to be sent, while the address code returned by the slave indicates the slave address to be returned. The corresponding address code indicates where the information comes from.

### 1.2 Function code:

The function code is the second byte transmitted in each communication information frame, and the ModBus communication protocol can define function codes ranging from 1 to 127. Sent as a host request, telling the slave what action to take through a function code. As a response from the slave, the function code returned by the slave is the same as the function code sent from the master, and indicates that the slave has responded to the master and performed relevant operations. This machine only supports function codes 0x03, 0x06, and 0x10.

| Function code | Definition | Operation (binary) |
|---|---|---|
| 0x03 | Read register data | Read data from one or more registers |
| 0x06 | Write a single register | Write a set of binary data into a single register |
| 0x10 | Write multiple registers | Write multiple sets of binary data into multiple registers |

### 1.3 Data Area

The data area includes what information or actions need to be returned by the slave, which can be data (such as switch inputs/outputs, analog inputs/outputs, registers, etc.), reference addresses, etc. For example, if the host tells the slave through function code 03 to return the value of the register (including the starting address of the register to be read and the length of the read register), the returned data includes the length and content of the register. (The data within a single register address is double byte data)

**0x03 Read function host format**

| Address code | Function code | Register Start Address | Number of register addresses n (1-32) | CRC verification code |
|---|---|---|---|---|
| 1 byte | 1 byte | 2 bytes | 2 bytes | 2 bytes |
| 01 | 03 | 00 00 | 00 10 | 44 06 |

**0x03 Read Function Slave Return Format**

| Address code | Function code | Return the number of registers n | Register data | CRC verification code |
|---|---|---|---|---|
| 1 byte | 1 byte | 1 byte | 2*n 个字节 | 2 bytes |
| 01 | 03 | 04 | 2*n | |

**0x06 Write Single Register Function Host Format**

| Address code | Function code | Register Start Address | Register data | CRC verification code |
|---|---|---|---|---|
| 1 byte | 1 byte | 2 bytes | 2 bytes | 2 bytes |
| 01 | 06 | 00 12 | 00 01 | E8 0F |

**0x06 Write Single Register Function Slave Return Format**

| Address code | Function code | Register Start Address | Register data | CRC verification code |
|---|---|---|---|---|
| 1 byte | 1 byte | 2 bytes | 2 bytes | 2 bytes |
| 01 | 06 | 00 12 | 00 01 | E8 0F |

**0x10 Write Multiple Registers Function Host Format**

| Address code | Function code | Register Start Address | Number of register addresses n (1-32) | Write Bytes 2*n | Register data | CRC verification code |
|---|---|---|---|---|---|---|
| 1 byte | 1 byte | 2 bytes | 2 bytes | 1 byte | 2*n 字节 | 2 bytes |

**0x10 Write multiple registers in slave host format**

| Address code | Function code | Register Start Address | Number of register addresses n (1-32) | CRC verification code |
|---|---|---|---|---|
| 1 byte | 1 byte | 2 bytes | 1 byte | 2 bytes |

**Introduction to Protocol Registers (Data within a Single Register Address is Double Byte Data)**

| name | explain | Byte count | decimal point | unit | Reading and | Register Address |
|---|---|---|---|---|---|---|

| | | | | | writing | |
|---|---|---|---|---|---|---|
| V-SET | Voltage setting | 2 | 2 | V | R/W | 0000H |
| I-SET | Current setting | 2 | 2 | A | R/W | 0001H |
| VOUT | Output voltage display value | 2 | 2 | V | R | 0002H |
| IOUT | Output current display value | 2 | 2 | A | R | 0003H |
| POWER | Output power display value | 2 | 1 | W | R | 0004H |
| UIN | Input voltage display value | 2 | 2 | V | R | 0005H |
| AH-LOW | Output AH low 16 bits | 2 | 0 | maH | R | 0006H |
| AH-HIGH | Output AH high 16 bits | 2 | 0 | maH | R | 0007H |
| WH-LOW | Output WH low 16 bits | 2 | 0 | mwH | R | 0008H |
| WH-HIGH | Output WH high 16 bits | 2 | 0 | mwH | R | 0009H |
| OUT-H | Opening duration - hours | 2 | 0 | H | R | 000AH |
| OUT-M | Start time in minutes | 2 | 0 | M | R | 000BH |
| OUT-S | Opening time - seconds | 2 | 0 | S | R | 000CH |
| T.IN | Internal temperature value | 2 | 1 | C | R | 000DH |
| T.EX | External temperature value | 2 | 1 | C | R | 000EH |
| LOCK | Key lock | 2 | 0 | - | R/W | 000FH |
| PROTECT | Protection status | 2 | 0 | - | R/W | 0010H |
| CVCC | Constant voltage and constant current state | 2 | 0 | - | R | 0011H |
| ONOFF | Switch output | 2 | 0 | - | R/W | 0012H |
| F-C | Temperature symbol | 2 | 0 | - | R | 0013H |
| B-LED | Backlight brightness level | 2 | 0 | - | R/W | 0014H |
| SLEEP | Screen rest time | 2 | 0 | M | R/W | 0015H |
| MODEL | Product model | 2 | 0 | - | R | 0016H |
| VERSION | Firmware Version | 2 | 0 | - | R | 0017H |
| SLAVE-ADD | Slave address | 2 | 0 | - | R/W | 0018H |
| BAUDRATE-L | Baud rate | 2 | 0 | - | R/W | 0019H |
| T-IN-OFFSET | Internal temperature correction | 2 | 1 | C | R/W | 001AH |
| T-EX-OFFSET | External temperature correction | 2 | 1 | C | R/W | 001BH |
| BUZZER | Buzzer switch | 2 | 0 | - | R/W | 001CH |
| EXTRACT-M | Quick access to data groups | 2 | 0 | - | R/W | 001DH |
| DEVICE | Device status | 2 | 0 | - | R/W | 001EH |
| V-SET | Voltage setting | 2 | 2 | V | R/W | 001FH |
| | | | | | | |
| | | | | | | |
| V-SET | Voltage setting | 2 | 2 | V | R/W | 0050H |
| I-SET | Current setting | 2 | 2 | A | R/W | 0051H |
| S-LVP | Low voltage protection value | 2 | 2 | V | R/W | 0052H |
| S-OVP | Overvoltage protection value | 2 | 2 | V | R/W | 0053H |
| S-OCP | Overcurrent protection value | 2 | 2 | A | R/W | 0054H |
| S-OPP | Overpower protection value | 2 | 1 | W | R/W | 0055H |
| S-OHP_H | Maximum output duration - hours | 2 | 0 | H | R/W | 0056H |
| S-OHP_M | Maximum output duration in minutes | 2 | 0 | M | R/W | 0057H |
| S-OAH.L | Maximum output AH low 16 bits | 2 | 0 | maH | R/W | 0058H |
| S-OAH_H | Maximum output AH high 16 bits | 2 | 0 | maH | R/W | 0059H |
| S-OWH.L | Maximum output WH low 16 bits | 2 | 0 | 10mwH | R/W | 005AH |
| S-OWH.H | Maximum output WH high 16 bits | 2 | 0 | 10mwH | R/W | 005BH |
| S-OTP | Over temperature protection value | 2 | 1 | F/C | R/W | 005CH |
| S-INI | Power on output switch | 2 | 0 | - | R/W | 005DH |
| S-O-CLOSE | The last switch state of the outdated over capacity and over energy switch<br><br>Obsolete<br>Over capacity<br>1000000000000 100<br>Overpower<br>000000 10000000 | 2 | 0 | - | R/W | 005EH |
| Restore Factory | Restore factory settings | 2 | 0 | | W | 0020H |
| ZERO | Zeroing | 2 | 0 | - | W | 0021H |
| Reset | restart | 2 | 0 | | W | 002FH |

Note 1: This product is designed with 11 storage data groups of M0-M10, each with a total of 14 data groups numbered 00-0D. The M0 data group is the default data group called by the product when powered on, and the starting address calculation method for the data group is: 0050H+data group number * 0010H. For example, the starting address for the M3 data group is 0050H+3 * 0010H=0080H.

Note 2: The reading and writing values for the key lock function are 0 and 1, where 0 is non locked and 1 is locked.

Note 3: The read value for protection status is 0-11:

0: Normal operation, 1: OVP, 2: OCP, 3: OPP, 4: LVP, 5: OAH, 6: OHP, 7: OTP, 8: OEP, 9: OWH, 10: ICP. 11: IVP

Note 4: The reading values for constant voltage and current state are 0 and 1, where 0 is the CV state and 1 is the CC state.
Note 5: The read and write values for the switch output function are 0 and 1, with 0 being the off state and 1 being the on state.
Note 6: The reading and writing range of the backlight brightness level is 0-5, with level 0 being the darkest and level 5 being the brightest.
Note 7: The quick access data group function writes values from 0 to 10, and after writing, the corresponding data group data will be automatically retrieved.

### 1.4 Error Check Code (CRC Check):

The host or slave can use a checksum to determine whether the received information is correct. Due to electronic noise or other interferences, errors may sometimes occur during the transmission of information. Error check codes (CRC) can verify whether the information of the host or slave during communication data transmission is correct. Incorrect data can be discarded (whether sent or received), which increases the security and efficiency of the system. The CRC (Redundant Cyclic Code) of MODBUS communication protocol contains 2 bytes, which is a 16 bit binary number. The CRC code is calculated by the transmitting device (host) and placed at the end of the transmitted information frame. The receiving device (slave) recalculates the CRC of the received information and compares whether the calculated CRC matches the received CRC. If the two do not match, it indicates an error. When sending CRC checksum, the low bit is in front and the high bit is in the back.

**Calculation method for CRC code:**

(1) Set one 16 bit register as hexadecimal FFFF (i.e. all are 1); Call this register CRC register;
(2) Distinguish the first 8-bit binary data (i.e. the first byte of the communication information frame) from the lower 8 bits of the 16 bit CRC register, and place the result in the CRC register;
(3) Shift the content of the CRC register to the right by one bit (towards the low bit) and fill the highest bit with 0, and check the shifted out bit after the right shift;
(4) If the displacement is 0: repeat step 3 (move one position to the right again); If the removal bit is 1: CRC register XOR with polynomial A001 (1010 0000 0000 0001);
(5) Repeat steps 3 and 4 until shifted 8 times to the right, so that the entire 8-bit data has been processed;
(6) Repeat steps 2 to 5 to process the next byte of the communication information frame;
(7) After calculating all bytes of the communication information frame according to the above steps, swap the high and low bytes of the 16 bit CRC register obtained;
(8) The final CRC register obtained is the CRC code.

## 3、 Communication

**Example 1: The host reads the displayed values of output voltage and output current**

Message format sent by the host:

| Host sending | Byte count | Message sent | Remarks |
|---|---|---|---|
| Slave address | 1 | 01 | Sent to slave with address 01 |
| Function code | 1 | 03 | Read Register |
| Register Start Address | 2 | 0002H | Register Start Address |
| Number of register addresses | 2 | 0002H | 2 bytes in total |
| CRC code | 2 | 65CBH | CRC code calculated by the host |

For example, if the current displayed value is 05.00V, 2.00A, the format of the message returned by the slave response is:

| Slave response | Byte count | Information returned | Remarks |
|---|---|---|---|
| Slave address | 1 | 01 | From slave 01 |
| Function code | 1 | 03 | Read Register |
| Read Bytes | 1 | 04 | 1 byte in total |
| The content of register with address 0002H | 2 | 01F4H | Output voltage display value |
| The content of register with address 0003H | 2 | 00C8H | Output current display value |
| CRC code | 2 | BBABH | CRC code calculated by slave machine |

**Example 2: The host needs to set the voltage to 12.00V**

Message format sent by the host:

| Host sending | Byte count | Message sent | Remarks |
|---|---|---|---|
| Slave address | 1 | 01H | From slave 01 |
| Function code | 1 | 06H | Write a single register |
| Register Address | 2 | 0000H | Register Address |
| The content of register with address 0000H | 2 | 04B0H | Set output voltage value |
| CRC code | 2 | 8ABEH | CRC code calculated by the host |

The format of the message returned by the response received by the slave is:

| Slave response | Byte count | Information returned | Remarks |
|---|---|---|---|
| Slave address | 1 | 01H | Sent to slave with address 01 |
| Function code | 1 | 06H | Write a single register |
| Register Address | 2 | 0000H | Register Start Address |
| The content of register with address 0000H | 2 | 04B0H | Set output voltage value |
| CRC code | 2 | 8ABEH | CRC code calculated by slave machine |

**Example 3: The host needs to set the voltage to 24.00V and the current to 15.00A.**

Message format sent by the host:

| Host sending | Byte count | Message sent | Remarks |
|---|---|---|---|
| Slave address | 1 | 01H | From slave 01 |
| Function code | 1 | 10H | Write Register |
| Register Start Address | 2 | 0000H | Register Start Address |
| Number of register addresses | 2 | 0002H | 2 bytes in total |
| Write Bytes | 1 | 04H | 1 byte in total |
| The content of register with address 0000H | 2 | 0960H | Set output voltage value |
| The content of register 0001H with address | 2 | 05DCH | Set output current value |

| | | | |
|---|---|---|---|
| CRC code | 2 | F2E4H | CRC code calculated by the host |

The format of the message returned by the response received by the slave is:

| Slave response | Byte count | Information returned | Remarks |
|---|---|---|---|
| Slave address | 1 | 01H | Sent to slave with address 01 |
| Function code | 1 | 10H | Write Register |
| Register Start Address | 2 | 0000H | Register Start Address |
| Number of register addresses | 2 | 0002H | 2 bytes in total |
| CRC code | 2 | 41C8H | CRC code calculated by slave machine |