DC Electronic Load
User Manual

Model: KP182/KP184

KUNKIN

Notes

To use the electronic load better and prevent damage caused by improper operation. Please not the following several points:

▶ DC INPUT terminal of load cannot be connected with AC voltage.

▶ The anode and cathode of the tested power output must be connected to the anode and cathode of electronic load correctly. It they are connected wrong, it may cause short circuit.

▲ Make sure the input voltage connected to the electronic load within the specification range. Exceeding the specification may cause permanent damage.

▲ The connection from the tested product to the load input should use short and thick multi-stranded wire as much as possible.

▲ The air inlet and outlet of load should be smooth. If it is not ventilated, it will cause OverTemperature protection.

▲ Avoid vibration of the load.

▲ Avoid working in a humid, damp or dusty place.

▲ Dedust at regular time.

▲ Ensure the enclosure of the load is grounded well.

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If load fails to power on:

The following methods can help you to solve possibly encountered problem when you open the load.

1) Check the connection of power line, the power supply of load, fuse and power switch.

2) Check the power voltage of load. The operating voltage is 110V/220V±5%. Check whether the power supply selection switch setting of back panel matches with actual power supply voltage or not.

3) Check the fuse of load. If it is burned, please use 0.5A 5*20mm fuse to replace it.

4) The replacement method of fuse: open the small plastic cover below the outlet on the back panel of load with slotted screwdriver, the you can see fuse. Please use the fuse with the size conforming to the above specification.
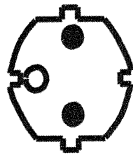
Option of power line

Connect power line and ensure the electronic load has been supplied power normally. Please select the model applicable to the voltage of your region. If you purchase a wrong model, please contact the local dealer or vendor to replace it directly.

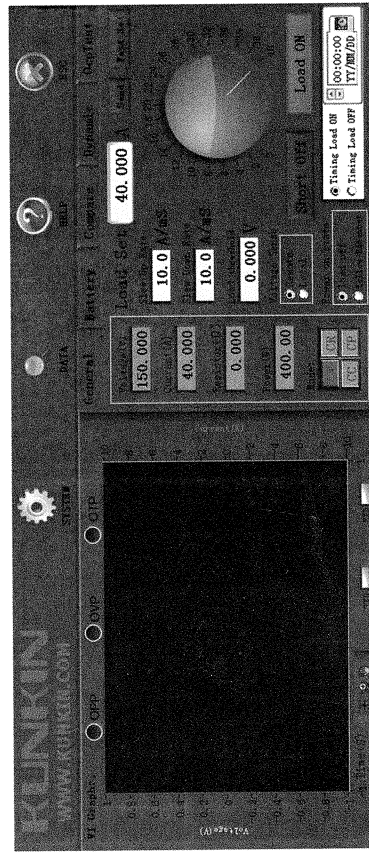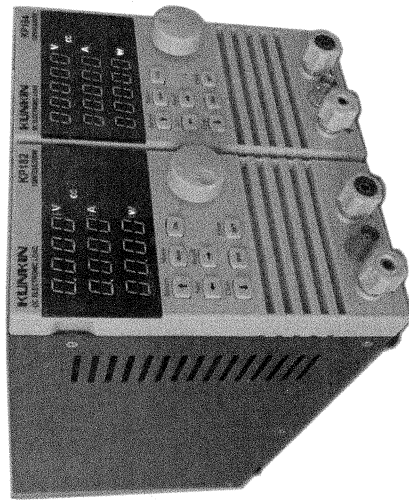| China	USA and Canada	Europe	UK
K-E171	K-E172	K-E173	K-E174

Safety

Please don't install alternative parts on the instrument of yourself or perform any unauthorized revision. Please send the instrument to the maintenance department designated by our company for maintenance to ensure its safety.

Please refer to the specific warning or precaution information in the Manual to avoid human injury or instrument damage. There are no parts repairable by the operator. If you need maintenance service, please contact the trained maintenance personnel.

Safety rules

To prevent electric shock, unauthorized persons are forbidden to dismantle the machine. The equipment is forbidden to be used for life maintenance system or other equipment with safety requirement. We will not liable for possible direct or indirect property loss arising from the use of the product.

Certification and quality assurance

KP182 series electronic load fully meets the various technical indicators stipulated in the Manual.

Warranty service

The material and manufacturing technology are granted with one-year quality assurance since the date of OQC.

If the product needs warranty service or repair, please make sure send the product to the maintenance unit designated by our company. For the product send to our company for maintenance, the customer should pay the single-trip freight for the product to the Maintenance Department of our company and our company will pay the back freight. If the product returns to our factory for maintenance from foreign countries, all the freight, tariff and other taxes shall be borne by the customer.

Guarantee restriction

The above guarantee is not applicable to the damage caused by the following cases: incorrect or improper maintenance of product by customer; customer uses his/her own software or interface; unauthorized revision or misuse; operate the product in a non-specified environment, or assemble or repair the product in an improper place; the product is damaged owing to the circuit installed by the customer, or the defects of product is caused by the customer; the model or serial number of product is revised, deleted, removed or beyond of recognition; the damage arises from accident, including but not limited to thunder shock, inflow, fire accident, abuse or ignorance.

Notice There is no further notice for the content change in the manual.

Warning To ensure the measuring precision, please start operating 30 minutes after warning the product.

Overview

KP182 series electronic load can be widely applied to product testing and ageing in LED lighting, power source, charger and accumulator. The current mode can be sued for simulating resistive load to discharge the battery and load the power source; the voltage mode can be used for simulating capacitive load and load the charge, as well as simulating the constant voltage of LED and load the power source. It is used simply, adjusted conveniently and has perfect protection function. The performance and function are unmatched by traditional slide wire resistor. If it is used for related industries, it could enhance productivity and reduce the cost.

KP182 series product has special function and advantages:

● It has four basic load modes like CC, CV, CW and CR.

● Input positive and negative transposition protection and give alarm

● Optimized heat radiation structure realizes high power density;

● Digital control mode, high precision and good stability

● Has overvoltage, overcurrent, overpower and overtemperature protection;

● Voltage far-end measuring function (remote sense)

● Auto testing function, external I/0 trigger signal, PASS, FAIL indication signal;

● 10KHz dynamic testing function;

● Battery capacity testing function;

● Testing of internal resistance of battery

● Overcurrent protection point/protection time testing function

● Fan PWM temperature control;

● Power source 110VAC/220VAC shift use

● RS485 and 232 communication interface, MODBUS protocol (KP184 only);

● Synchronous operation function of multiple loaded devices online (KP184 only);

● Upper computer software support with powerful function and friendly interface (KP184 only);

Front panel display overview:

Schematic diagram of KP182 display area

V	ON	🔒	⇧
SS	CC	CV	OK
A	CW	CR	NG
Ω	BATT	COMP	
W	DYNA	OcpT	
AH	OP	OV	
WH	OT		

Schematic diagram of KP184 display area

V	ON	🔒	⇧
SS	CC	CV	OK
A	CW	CR	NG
Ω	BAT	COP	
W	DYN	OCT	
AH	OP	OV	
WH	OT		

V A W voltage, current and power unit
CC CV CW CR constant current/constant voltage/constant power/constant resistance on-load mode
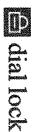
ON on-load mark   🔒 dial lock   ⇧ grade key is on;

OK/NG compare the judgment result   AH/WH battery capacity unit amp-hour/watt-hour
BATT (BAT) the battery testing mode is on   COMP (COP) compare mode
DYNA(DYN) dynamic test   OcpT(OCT) overcurrent protection test
OP Overpower protection mark   OV input overvoltage protection mark
OT overtemperature protection mark

Function introduction of button:
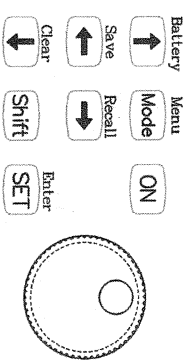
ON: LOAD ON/OFF
Mode: swit
SET / Enter: set up load value/enter/exit
Shift: shift the key to the second function

↑ :The set value plus 1/ menu state move upward so as to set the value
↓ :The set value minus 1/menu state move downward so as to set the value
← :The set position (flashing position) moves leftward for single order.
→ :The set position (flashing position) moves rightward for single order.

Battery → Mode(Menu) ON
Save → Recall →
Clear ↑ Shift
← ↓ SET(Enter)

Combination key: press shift firstly, then press other keys (5 shifts)

Shift + → (Battery): turn on battery capacity test function
Shift + Mode(Battery): enter menu setting
Shift + ← (Save): save the set value as nth group (n is 0 to 9)
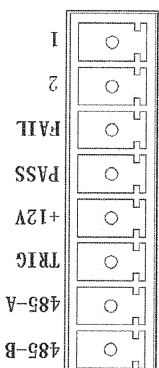Shift + → (Recall): call the set value nth group
Shift + ↑ (Clear): clear the battery capacity test result
Long press: → reset to the factory setting   ← lock/unlock the keyboard

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Function introduction of back panel (KP184 only)

Definition of 8bit green terminals:

1,2: Undefined (reserved for standby);
FAIL/PASS: test result output;
+12V/TRIG: the short circuit of these two ports is deemed as valid trigger
485-A/485-B: these two terminals are RS485 communication interface;

Terminals: 1   2   FAIL   PASS   +12V   TRIG   485-A   485-B
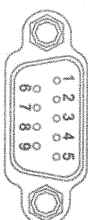
COM1: RS232

Definition of COM-mouth pin:
PIN2: TXD (connect to the RXD of upper computer);
PIN3: RXD (connect to the TXD of upper computer);
PIN5: GND (GND of +12V in 8bit green terminals);

KP182 series load has the following four basic working modes:

1. Constant current operation mode (CC)

In the constant current mode, no matter the input voltage is changed or not, the electronic load consumes a constant current, as shown in the following diagram

I (current)
set current
V (voltage)
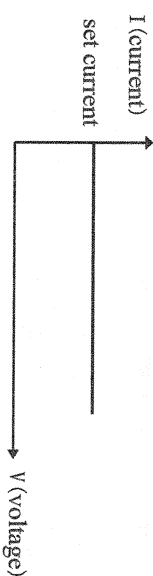
2. Constant voltage operation mode(CV)

In the constant voltage mode, electronic load will consume enough current to maintain the input voltage at the set voltage.

V (voltage)
set voltage
I (current)
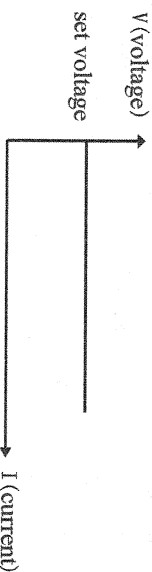
3. Constant resistance operation mode(CR)

In the constant resistance mode, electronic load simulates a constant resistance. In the situation of voltage change, adjust the current and make V/I keep constant, as shown in the following diagram.
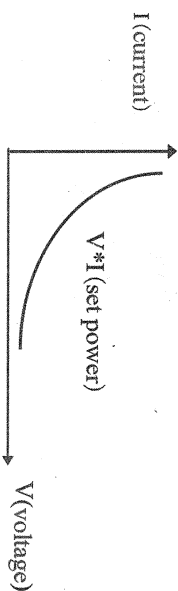
I (current)
V/I(set resistance)
V (voltage)
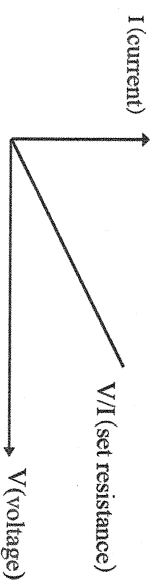
4. Constant power operation mode(CW)

In the constant power mode, the electronic load consumes a constant power. In the situation of voltage change, adjust the current and make V/I keep constant, as shown in the following diagram.

I (current)

V*I (set power)

V (voltage)

To use electronic load better and prevent damage caused by improper operation, please note the following several points:

▶ The DC INPUT of load cannot be connected with AC voltage.

▶ Please make sure the correct connection between anode and cathode. If they are connected reversely, it will cause short circuit.

▶ Make sure the input voltage connected to the electronic load within the specified range. If exceeding the range, it may cause permanent damage.

▶ The connection between the tested product to the load input should use short and thick multi-stranded wire as much as possible.

▶ The air inlet and outlet of the load should be smooth; ventilation obstruction will cause overtemperature;

▶ Please avoid the vibration of load; especially avoid operating the product in a humid, damp and dusty place. Please dedust at regular time.

▽ **ON/OFF shift and CC/CV shift of load**

Press ON/OFF key can shift between on-load and off-load. The default mode at starting is off-load. However, if the on-load restore function is on and the load is on before shut down, the product is on load when starting. The function is mainly designed against the ageing continuity after the ageing power is disconnected and then supplied again.

Press MODE key to shift the working mode. However, when the load is ON, you cannot execute the mode shift. When the battery test function, dynamic test function, OCP test function are on, the load will switch to CC mode automatically and cannot execute shift mode operation.

▽ **Set up voltage or current of load**

Press SET key (or rotary knob), the set value is displayed as CC/CV/CW/CR according to the current operating mode. It decides the flashing of the set window. Press left and right direction key can change the position of

the set nixie tube. Rotating the rotary knob can change the value of the corresponding flashing position. After setting, press ENTER key to save the set value and exit.

▽ **Menu setting**

Press SHIFT key and then press MODE key to enter the menu interface. There are 6 master catalogues and 30 subitems. Press left and right direction key, you can realize shift in the same level of catalogue or item, press the up key, return to the previous level of menu, press the down key to enter the next level of menu or item. Then, the currently selected menu or item will in a flashing state. Rotating the knob button can change the set value of item. When the value is revised, press ENTER key to save the revision, and press up key to return the previous level of menu. If you don't press ENTER to save the set change, but press up key to return the previous levels of menu, the revision will not come into force.

The below is the menu structure chart and detailed explanation of various functions:

KP182 series load has different models of nixie tube, including 4-bit type and 5-bit type. Thus, in the menu display, each item has a additional letter in the bracket. (The menu is made in a list form and printed on a piece of self-adhesive paper. Please post the self-adhesive paper on the side of instrument for easy reference)

A.SYS (T) $RSYS RSYSES$ System setting

1.ADD(R) $\underline{iR d d}$ $iRddr$: set up communication address. The range is 1 to 250.

2.BA(U)D $EbRd$ $EbRUd$ set up communication Baud rate. 2400, 4800, 9600, 18200, 38400, 57600 and 115200 are optional.

3.ONL(I) $EoRL$ $EoRLi$: Set up online mode. KP182 load provides a multimachine online mode. The multimachine is connected through 485 communication wire. There is one master, and the other devices are slaves. When setting up parameter on the host panel and operating ON/OFF, these operations are sent to the slave through communication port and the slave will execute the same operation.

OFFL(I) $oFFL$ $oFFLi$:off line.

HOST $HoSE$:host online.

SLAV(E) $SLRV$ $SLRVE$: slave online.

4.INC(A) iRC $iRCR$:memory function in the load state

ON on :turn of memory function. when the load is started, the previous load

state will restore automatically.

OFF oFF :turn off memory function. When the load is started, the machine is always in a load OFF state.

5. SOU(N) 55oU55oUN: sound of pressing key

ON on:Turn on the key sound.

OFF oFF: turn off the key sound.

B. CON(F) bConbConF :Function configuration

1.SEN(S) !SENi.SEN5: far terminal voltage measuring function. When testing the power source with high output current, the lead between the power source and load appears obvious voltage drip and results in the voltage at the load end is lower than that of power source end. Using such function can eliminate such phenomenon.

RE(O)TE rEtErEotE: turn on the far terminal voltage measuring function. Voltage measuring point is BNC terminal of front panel. Then, the user needs to connect BNC terminal wire to the measured point, such as the output terminal of measured power source.

LOCA(L) LoCALoCAL : turn off far terminal voltage measuring function. the measuring point of voltage is the input terminal of load.

2.ONL(L) 2onL2onLL: threshold voltage of load. Set a voltage value. When the input voltage of load is lower than the set value, the load is off automatically. Such function is invalid in the CV mode.

3. S(L)UP 3SLUP 3SLUP: current rising slope. Set a value with the unit of A/Ms (ampere/millisecond). When the load is on or set value of current increases, the actual current is controlled by the load so that the speed of the set value climbs to the target current value.

4.S(L)DN 4SdN45LdN: current descending slope. Set a value with the unit of A/Ms (ampere/millisecond). When the set value of current descends, the actual current is controlled by the load so that the speed of the set value descends to the target current value.

5.FAC(T) 5FAC5FACt: restore to factory setting.

OFF oFF keep the setting of menu item.

CALL CALL when select this item and press ENTER key, the load will restore all the menu to the factory setting.

C.BAT(T) CbAt CbAtt battery test function. KP182 load provides a battery test mode. It provides automatic discharge termination, half current discharge and capacity computation functions.

1.ENA(B) iENAiENAb: turn on or off battery test function.

ON on turn on battery test function. the load mode will shift to CC mode automatically.

OFF oFF turn off battery test function.

2.END(V) 2ENd2ENdu discharge end voltage. The setting range is 0 to 150V. when the load tests that the battery output voltages is lower than such set value, the load will be off automatically. If turn on the half current discharge function. when the battery output voltage is lower than the end voltage for the first time, switch to the common load of the set current. When it is lower than the end voltage for the second time, turn off load.

3.H(A)LF 3HLF 3HALF half current discharge. When testing battery, usually after discharging the battery until the voltage is lower than the discharge end voltage, the electric quantity of battery is not discharged totally. When you turn off the load, the output voltage will rise modestly. The half current discharge function continue loading as per half of the set discharge current when the batter voltage is lower than the end voltage for the first time, until the battery output voltage is lower than the end voltage again.

ON on turn on half current discharge function.

OFF oFF turn off half current discharge function.

4.UN(I)T 4Unit4UnIt capacity computation unit. Select battery capacity computed and displayed unit

AH AH ampere hour. 1A current is discharged for 1h, namely 1 ampere hour.

PH PH watt hour. 1w power is discharged for 1h, namely 1 watt hour.

5.BUZ(Z) 5bUZ5bUZZ discharge end hint mode. at the end of discharge, the load will hint as per the setting mode.

LA LV LA LE buzzer rings continuously until the PASS signal of I/O port on the back panel acts.

LAST LASt buzzer rings continuously until you press any key.

LEVE(L) LEUELEUEL PASS signal of I/O port on the back panel acts until the load is off or discharged again.

D.COP(A) dCoP dCoPA automatic test function. After turning on the function, the load compares the measure voltage and current with the set upper and lower limit. When the measured value is off the range, the load sends hint signal.

1.ENA(B) iENAiENAb turn on or off automatic test function.

AUTO AUto turn on automatic test function and compare and refresh the test result continuously.

TRIG $tr'iC$ turn on automatic test function. When TRIG port is triggered once, it tests once.

OFF off turn off automatic test function.

2.**V-H** $2u-H$ the upper limit of voltage. The setting range is 0 to 150V.

3.**V-L** $3u-L$ the lower limit of voltage. The setting range is 0 to 150V.

4.**A-H** $4A-H$ the upper limit of current. The setting range is 0 to 30A.

5.**A-L** $5A-L$ the lower limit of current. The setting range is 0-30A.

6.**OUT(S)** $6out6out5$ signal output mode of test result.

ONE one when the machine is bad, the buzzer rings once.

LAST $LASt$ when the machine is bad, the buzzer rings continuously until you press any key.

LEVE(L) $LEUELEUEL$ I/O port signal action of back panel acts in the range of PASS signal, doesn't acts in the range of FAIL signal.

E.DYN(A) $EdynEdynA$ dynamic test and internal resistance function. for dynamic test, set up current A, current B and corresponding period, press ON key, the load control current is shifted fast between these two values as per the set period so as to simulated an unstable load state. For the internal resistance test, set up current A, current B and corresponding on-load time, press ON key, the load is loaded with the current A and current B in turn. Meanwhile, test the load voltage change and compute the internal resistance of the tested power source.

1.**ENA(B)** $iEnAiEnAb$ turn on or off dynamic test function or internal resistance test function.

DYNA $dynA$ turn on dynamic test function.

REST $rESt$ turn on internal resistance test function.

OFF off turn off dynamic test and internal resistance test function.

2.**A-1** $2A-l$ point value of current A

3.**T-1** $3t-l$ pulse width of current A

4.**A-2** $4A-2$ point value of current B.

5.**T-2** $5t-2$ pulse width of current B.

F.OCP(T) $F.oCPF.oCPt$ overcurrent test function. set up starting current, stepping current and stepping time, press ON key to trigger test. Then, the load starts loading from the starting current. The current increases a stepping value for every stepping time interval, until it exceeds the upper limit of output of the tested power source after one current stepping. Then, the power source enters short-circuit protection state, the load stops and computes the time from the last stepping to the

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occurrence of short-circuit protection of the tested power source. Such time is the short-circuit protection time of the tested power source.

1.**ENA(B)** $iEnAiEnAb$ turn on or off OCP test function.

ON on turn on OCP test function.

OFF off turn off OCP test function.

2.**STA(C)** $2StArtAC$ starting current value.

3.**STP(C)** $3StP3StPC$ stepping current value.

4.**ST(P)T** $4Stt4StPt$ stepping time.

◇ Save and call:

Save: firstly press Shift key, then press left key. The bottom row of nixie tube will show $SAU=0$, and the flashing bit means the number of stored data. Then, press up, down, left and right keys can save the currently set data (load mode and load value) to 1#, 2#, 3# and 4# memory, or rotate the rotary knob of encoder to change the number to 4 – 9. Then, press SET/ENTER key to save them in the corresponding number of memory.

Call: firstly press Shift key, then press left key. The bottom row of nixie tube will show $CAL=0$, and the flashing bit means the number of stored data. Then, press up, down, left and right keys to call the stored data 1#, 2#, 3# and 4#, or rotate the rotary knob of encoder to change the number to 4 – 9. When the number changes, call the corresponding number directly. At last, press SET/ENTER key to exit.

◇ Communication function introduction:

1. Serial port parameter setting

Before using serial port to operate load, please firstly ensure the setting of Baud rate, check bit, data bit and stop bit is correct. The Baud rate at the communication end of load is optional. Please refer to menu setting introduction for details. Check bit, data bit and stop bit are fixed as N81 (no check bit, 8-bit data bit, 1-bit stop bit)

2. Setting of communication address

The instruction sent by the upper computer includes the address code of one bit, which is used for distinguish multiple devices hung and mounted on the communication bus. Only the load with the set address of the load the same as the address code in the instruction will respond the instruction. Refer to the menu setting instruction for detailed setting. The address of multiple loads on the same bus cannot be repeated. The setting range is 1 to 99.

3. Port connection

KP182 load has two communication interfaces: 232 and 485. See the logo on the product for the definition of port.

4. Communication protocol

KP182 load adopts MODBUS-RTU protocol. An instruction includes:

Equipment address function code data check code

The equipment address is the communication address on the load controlled by the instruction. When the address code in the instruction is 0, it means the instruction is broadcast instruction, namely the load of all the buses will respond.

Function code means the type of operation to be executed by the instruction. KP182 load only opens the following three function codes at present:

0 x 03 : read in register

0 x 06 : write in single register

0 x 10 : write in multiple continuous registers.

Check code is calculated according to instruction code, sent attached to the instruction and used for checking whether the data transmission is correct. KP182 load adopts CRC mode and RTU standard. The generation mode is as below:

a. Set up a 16-bit CRC result register and initialize 0xFFFF.

b. Bitwise xor the first byte of instruction cluster, namely address code and low 8-bit of CRC register, and save the result in the CRC register.

c. Move CRC register rightward for one bit and detect the shift out bit. If it is 1, CRC register and fixed value is 0xA001 xor.

d. Repeat step c for 8 times

e. For all the bytes of the instruction cluster, repeat step b, c and d.

f. The final value in the CRC register is the final computed result. When sending instruction, the low order is before the high order, which is attached to the instruction and sent together.

Generate C language function of CRC check code:

```
unsigned short Get_CRC16RTU(volatile unsigned char *ptr,unsigned char len)
{
    unsigned char i;
    unsigned short crc = 0xFFFF;
    if(len == 0)   len = 1;
    while (len--)
    {
        crc ^= *ptr;
        for(i=0; i<8; i++)
        {
            if(crc&1) {crc >>= 1; crc ^= 0xA001;}   else crc >>= 1;
        }
        ptr++;
    }
    return(crc);
}
```

Common register list

Register	Address	Number of byte	Read and write attribute	Value range	Notes
LOAD ONOFF	0x010E	4	R/W	0,1	Load switch is 1, the load is ON; load switch is 0, the load isOFF.
LOAD MODE	0x0110	4	R/W	0-3	CR,3-CW, when the load is ON, loading mode cannot be shifted
CV SETTING	0x0112	4	R/W	0-150000	Loaded voltage value, unit mV
CC SETTING	0x0116	4	R/W	0-30000	Loaded load value, unit mA
CR SETTING	0x011A	4	R/W	0-80000	Loaded resistance value, unit Ohm
CW SETTING	0x011E	4	R/W	0-2500	Loaded power value, unit 0.1W
U MEASURE	0x0122	4	R	0-150000	Measured voltage value, unit mA
I MEASURE	0x0126	4	R	0-30000	Measured current value, unit mA

Instruction example:

The following instances suppose the communication be 01, data is hexadecimal format.

1.Set up load current:

Send instruction: _01 06 01 16 00 01 04 00 00 07 D0 9D 0C_

The meaning of each byte is:

_01_: equipment address.

_06_: instruction number written in the single register.

_01 16_: address written in the target register (load current register).

_00 01_: the number written in the target register

_04_: the byte number of data written in the target register. If the target register is 4-byte register, the value is 4.

_00 00 07 D0_ : data, if it is 07D0, the current is set up as 2000mA.

_9D 0C_: check code. The high order is before the low order.

Load return data: 01 06 01 16 00 01 04 00 00 07 D0 9D 0C

When operating single register of the load, the load return data is returning the instruction as original.

2.Set up load voltage:

Send instruction: _01 06 01 12 00 01 04 00 00 4E 20 AB 2B_

The meaning of each byte is the same as the instruction of the set current. Data byte 0x00004E20 means setting the load voltage as 20V. Load return data is returning the instruction as original.

3. Set up the load mode:

Send instruction: *01 06 01 10 00 01 04 00 00 00 01 DF 44*

The meaning of each byte is the same as the instruction of the set current. Data byte *0x00000001* means setting the load mode as CC mode. Write in 1 is CC mode, write in 2 is CR mode, and write in 3 is CW mode. Write in is CV mode, return data is returning the instruction as original.

4. Set up load switch:

Send instruction: *01 06 01 0E 00 01 04 00 00 00 01 5F CA*

The meaning of each byte is the same as the instruction of the set current. Data byte *0x00000001* means setting the load as load ON. Write in 0 is load OFF, write in 1 is load ON. Load return data is returning the instruction as original.

5. Read actual voltage and current:

Send instruction: *01 03 03 00 00 00 45 8E*

It is a special instruction, which facilitates reading the common data register bank at one time.

01: equipment address.

03: read the instruction number of register.

03 00 : read the special defined address of the common register bank.

00 00 : it can be any value, because it is senseless in this special instruction.

45 8E: check code. The high order is before the low order.

Load return data: *01 03 30 D1 D2 D3 D4 D5 D6 D7 D8 D9 D10 D11 D12 D13 D14 D15 D16 D17 D18 CRCL CRCH*

Hereinto, D1 to D18 are valid data.

D1.0 is ON/OFF bit, D1.1-D1.2 is mode bit

D3-D5 is the actual voltage value (unit mV), which is three bytes 24 bit data with the high order is before the low order.

D6-D8 is the actual current value, which is three bytes 24 bit data with the high order is before the low order.

If you need more specific information about communication protocol, please contact the technical support department of our company to get it.

Various technical parameters of KP182 series load is shown as the following table:

Model		KP182	KP184
Indicator			
Power supply input	Voltage	AC 110V/220V ±10%, 50±2Hz	
	Power consumption	< 20 W	
Load input	Load voltage	DC 1 -150 V	
	Load current	0-20A	0-40A
	Load power	0-200W	0-400W
Measuring precision	Current	±(0.1%+20mA)	±(0.1%+40mA)
	Voltage	±(0.05%+30mV)	±(0.05%+30mV)
Control precision	Current	±(0.1%+20mA)	±(0.1%+40mA)
	Voltage	±(0.05%+40mV)	±(0.05%+40mV)
Communication mode		Communication is disabled	RS232/RS485
Protection	Overvoltage	When the voltage is more than 152V, the load is turned off load.	
	Over temperature	85℃	
	Overpower	Single channel 210W	Single channel 410W
	Overpower	Power supply input fuse 0.5A	
Operational environment temperature range		0~50℃	
Operational environment humidity range		10~90%RH	
Withstand voltage of DC input end to the motor box		±500VDC	
Insulation resistance of DC input end to the motor box		>20MΩ,500VDC	
Insulation resistance of AC input end to the motor box		>20MΩ,500VDC	
Boundary size (mm) L×B×H		About 300×90×190	
Weight (about)		3.5 Kg	4.5 Kg

Supplementary characteristics

Suggested calibration frequency: once a year.

Operation environment temperature: 0 to 40℃.

Storage environment temperature: -20 to 70℃.

Operational environment: the indoor use: the maximum humidity is 95%.