

一、 summary

It is a new generation of dc electronic load, use the high performance chip, high speed, high precision design, provide 0.1 mV, the resolution of 0.01 mA (basic accuracy was 0.03%, the current rise of 2.5 A/us), novel appearance, scientific and strict production technology, compared with similar products, more cost-effective. Widely used in the production line (phone charger, cell phone batteries, electric vehicle batteries, switch power supply, linear power supply), research institutions, automotive electronics, aerospace, ship, solar batteries, fuel cells and other industries.

Features

- 1.Constant current, constant resistance and constant voltage, constant power, constant current and constant voltage, constant resistance and constant voltage, six kinds of high-speed action mode;
- 2.Over current, over voltage, power, overheating, polarity reverse connection protection;
- 3.High brightness, vacuum, VFDS screen, double row and four road synchronous display;
- 4.According to the temperature change, the infinite servo, intelligent fan system;
- 5.Soft start circuit time setting, can be set according to the voltage on load;
- 6.Battery test and the function of short circuit;
- 7.Provide dynamic testing, set up and down the slope.
- 8.Provide any waveform editing ability (LIST);
- 9.Support automatic testing function
- 10.Support external trigger input and output;
- 11.Provide external current waveform monitor terminal;
- 12.Support far end voltage compensation, multiple data storage;
- 13.Boot self-checking, correction software, standard machine frame design;
- 14.Support GPIB, RS232, RS485, USB communication.

二、Specification

MODEL		MST-150W		MST-300W	
Input Rating	Power	150W		300W	
	Current	0-30A		0-60A	
	Voltage	0-150V		0-150V	
CC mode	Range	0-3A	0-30A	0-6A	0-60A
	Resolution	0.1mA	1mA	0.1mA	1mA
	Accuracy	0.03%+0.05%	0.03%+0.05%	0.03%+0.05%	0.03%+0.05%
CV mode	Range	0.1-19.999V	0.1-150V	0.1-19.999V	0.1-150V
	Resolution	1mV	10mV	1mV	10mV
	Accuracy	0.03%+0.02%	0.03%+0.02%	0.03%+0.02%	0.03%+0.02%
CR mode ≥10% full scale	Range	0.3Ω-10k	0.3Ω-5k	0.3Ω-10k	0.3Ω-5k
	Resolution	16 digit	16 digit	16 digit	16 digit
	Accuracy	0.1%+0.1%	0.1%+0.1%	0.1%+0.1%	0.1%+0.1%
CW mode ≥10% full scale	Range	0-150W	0-150W	0-300W	0-300W
	Resolution	1mW	10mW	1mW	10mW
	Accuracy	0.1%+0.1%	0.1%+0.1%	0.1%+0.1%	0.1%+0.1%
V Measurement	Voltage	0-19.999V	0-150V	0-19.999V	0-150V
	Resolution	1mV	10mV	1mV	10mV
	Accuracy	0.015%+0.05%FS	0.015%+0.08%FS	0.015%+0.05%FS	0.015%+0.08%FS
I Measurement	Current	0-3A	0-30A	0-6A	0-60A
	Resolution	0.01mA	0.1mA	0.01mA	0.1mA
	Accuracy	0.03%+0.05%FS	0.03%+0.08%FS	0.03%+0.05%FS	0.03%+0.08%FS
W Measurement ≥10% full scale	Watt	100W	150W	100W	300W
	Resolution	1mW	10mW	1mW	10mW
	Accuracy	0.1%+0.1%	0.1%+0.1%	0.1%+0.1%	0.1%+0.1%
Battery Measurement Battery Input : 0.5-150V;Max.Measruement : capacity=999/H;Resolution=0.1mA;Time= Range=1S-16HS					

Table 22 system parameter test mode:

operation	register	value	instruction
Write the register	IMAX	Double	optional
Write the register	UMAX	Double	optional
Write the register	PMAX	Double	optional
Write the coil	REMOTE	0xFF00/0x0000	optional
Write the register	CMD	41	optional

security

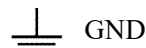
Do not install replacement parts in the instrument itself, or perform any unauthorized modification. Please send the instrument to the company's maintenance department for repair, to ensure its safe use.

Please refer to this manual in a specific warning or notice of information, in order to avoid personal injury or equipment damage.

Security identity

warning

It reminds the user to pay attention to some may result in personal injury operating procedure, practice, condition, etc.



GND



High pressure.(non-professional personnel shall not open the machine)



Refer to the related document of the warning, pay attention to the prompt.(high voltage, please wear gloves when operating, beware of electric shock do not use machines for the security Settings).

Certification and quality assurance

MST-150W series programmable dc electronic load completely manual technical indicators of the nominal.

operation	register	value	instruction
Write the register	IFIX	Double	optional
Write the register	UCCCV	Double	optional
Write the register	CMD	34	required

Turn table 19 fixed resistance constant voltage mode:

operation	register	value	instruction
Write the register	RFIX	Double	optional
Write the register	UCRCV	Double	optional
Write the register	CMD	35	required

Table 20 battery test mode:

operation	register	value	instruction
Write the register	IFIX	Double	optional
Write the register	UBATTEND	Double	optional
Write the register	CMD	38	optional

Table 21 dynamic test mode:

operation	register	value	instruction
Write the register	IA	Double	optional
Write the register	IB	Double	optional
Write the register	TMAWD	Double	optional
Write the register	TMBWD	Double	optional
Write the register	TMTRANRIS	Double	optional
Write the register	TMTRANFAL	Double	optional
Write the register	MODETRAN	0~2	optional
Write the register	CMD	22	optional

Dynamic Measurement TransitionList: 0-25KHz;2.5A/uS;T1&T2:60Us-999S;Accuracy:±15%offset+10%FS					
CC soft-startup Time 1mS;2Ms;5mS;10mS;20mS;50mS;100mS;200 mS ;Accuracy:±15%offset+10%FS					
Short Circuti	Current(CC)	3.3A	33A	6.6A	66A
	Valtge(CV)		0V		0V
	Resistance(CR)		55mΩ		25mΩ
Temperature	Operating	0-40°C		0-40°C	
	Nonoperating	-10°C~70°C		-10°C~70°C	
Dimension	W*H*D(mm)	215*110*365		215*110*365	
Weight	Kg	3.8		4.2	

三、Quick start

3.1 boot self-inspection

First, the user need to connect the power cord correctly and electricity, the following is the specific steps self-checking.

step	VFD display	content
When it power on	SYSTEM SELF TEST Vx.x	System self-check, and display the product model and the software version number
After 1 s	EPROM ERROR	Block if EEPROM of damage or loss of last load state in block exists EEPROM, VFDS show a tooltip (about 2S)
	ERROR CAL.DATA	If the loss of the calibration data in block exists EEPROM VFDS display message (about 2S) as follow
If error, about 2s	xxxxxxxV xxxxxxxA xxxxxxxW xxxxxxxX	VFDS displayed as actual input voltage, current, power, set the parameter value and the current state.

3.2 if the load can't start

Use the following methods can help to solve problem you may encounter when

open load.

1) check whether the power cord connected

Whether should first check the power cord is connected and the load has been power supply, power switch has been open.

2) check the power of the load voltage setting

Load working voltage is 110 v or 220 v two ways, check whether your load voltage setting and match the power supply voltage.

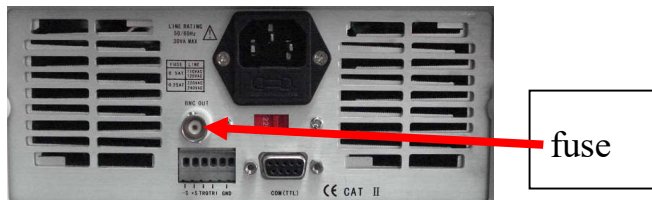
3) check the load of the fuse is burnt

If the fuse is burnt, please use the table below to replace the fuse specifications.

model	Fuse spc (110VAC)	Fuse spc(220VAC)
MST-150W	T0.5A 250V	T0.3A 250V
MST-300W	T0.5A 250V	T0.3A 250V

4). The fuse replacement method

With flat mouth screwdriver will load on the rear panel of the power input socket at the bottom of the small plastic cover is opened, you can see the fuse, please use only a fuse of the above specifications.(the position of the fuse the diagram below)



Picture:3.1 fuse place

3.3 the front panel and rear panel

Electronic load front panel

operation	register	value	instruction
Write the register	IFIX	Double	optional
Write the register	UCCONSET	Double	optional
Write the register	UCCOFFSET	Double	optional
Write the register	CMD	30	required

Table 15 rated voltage loading unloading mode:

operation	register	value	instruction
Write the register	UFIX	Double	optional
Write the register	UCVONSET	Double	optional
Write the register	UCVOFFSET	Double	optional
Write the register	CMD	31	required

Table 16 rated power load unload mode:

operation	register	value	instruction
Write the register	PFIX	Double	optional
Write the register	UCPONSET	Double	optional
Write the register	UCPOFFSET	Double	optional
Write the register	CMD	32	required

Table 17 fixed resistor loading unloading mode:

operation	register	value	instruction
Write the register	RFIX	Double	optional
Write the register	UCRONSET	Double	optional
Write the register	UCROFFSET	Double	optional
Write the register	CMD	33	required

Table 18 deciding power flow constant voltage mode:

Table 9 constant voltage operation:

operation	register	value	instruction
Write the register	UFIX	Double	optional
Write the register	CMD	2	required

Table 10 rated power operation:

operation	register	value	instruction
Write the register	PFIX	Double	optional
Write the register	CMD	3	required

Table 11 rated resistance operation:

operation	register	value	instruction
Write the register	RFIX	Double	optional
Write the register	CMD	4	required

Table 12 rated current soft start:

operation	register	value	instruction
Write the register	IFIX	Double	optional
Write the register	TMCCS	Double	optional
Write the register	CMD	20	required

Table 13 constant voltage soft start:

operation	register	value	instruction
Write the register	UFIX	Double	optional
Write the register	TMCVS	Double	optional
Write the register	CMD	39	required

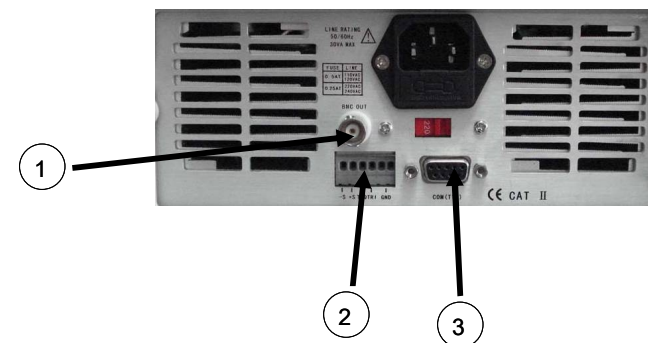
Table 14 constant current load unload mode:



Picture:3.2 front panel

(1) the first half of the panel is black VFDS screens and knobs
 (2) the lower part of the panel from left to right in turn to digital and ESC escape keys 0-9, function keys, move up and down keys and the Enter key, input and output terminals.

Electronic load rear panel



- ① 0 - full scale current, corresponding to 0 to 10 v output, can connect the oscilloscope, the dynamic waveform
- ② Far terminals, terminal measurement trigger input/output interface
- ③ Multi-function communications interface, GPIB, RS232, RS425, USB adapter

3.4 the keyboard

1	~	9	0~9digit keyboard input
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Esc	Cancel key, can exit in any work state
I-Set	Set current output value
V-Set	Set voltage output value
P-Set	Set power output value
R-Set	Set resistance output value
Shift	Shift Composite key
On/Off	Load on/off key
▲	Moving on key, in menu selects individual operation
▼	Under the mobile key, in menu selects individual operation
Enter	Enter key

3.5 menu operation

Press Shift + Menu button after entering function table function, as shown on the VFDS Menu options are available, you can use upper and lower operating key del and delta or knob to flip VFDS screen, in order to appear the following functions. Press Enter at this time, it will Enter the location of the cursor options, you can use upper and lower operating key del and delta or knob to flip VFDS screen, press the Enter key to get into the next level menu. Press the Esc key to return to a layer on the menu.

MENU	
CONFIG	
INPUT RECALL	
ON	OFF
KEY SOUND SET	
ON	OFF
CONNECT MODE	
MAXTIDLEXING	SEPARATE
	SEPARATE

operation	register	value	instruction
Write the coil	PC1	0	required

Table 3 local ban control operation:

operation	register	value	instruction
Write the coil	PC2	1	required

Table 4 local allows operation:

operation	register	value	instruction
Write the coil	PC2	0	required

Table 5 input ON operation:

operation	register	value	instruction
Write the register	CMD	42	required

Table 6 input OFF operation:

operation	register	value	instruction
Write the register	CMD	43	required

Table 7 short circuit operation:

operation	register	value	instruction
Write the register	CMD	26	required

Table 8 rated current operation:

operation	register	value	instruction
Write the register	IFIX	Double	optional
Write the register	CMD	1	required

4.8.8 CMD command register definition

define	CMD value	instruction
Set current	1	
Set voltage	2	
Set power	3	
Set resistor	4	
Set the current soft start	20	
Dynamic model	25	
Short circuit model	26	
LIST mode	27	
Constant current load unload mode	30	
Constant voltage load unload mode	31	
Constant power load unload mode	32	
Fixed resistor loading unloading mode	33	
Deciding power flow constant voltage mode	34	
Turn resistance constant voltage mode	36	
Battery test mode	38	
Constant voltage soft start mode	39	
Changes of system parameters	41	
Input ON	42	
Input OFF	43	

4.8.9 common operations function

Table 1 remote control operation:

operation	register	value	instruction
Write the coil	PC1	1	required

Table 2 cancel remote control operation:

BAUDRATE SET					
2400	9600	14400	28800	57600	115200
COMM.PARITY					
NONE	EVEN		ODD		
ADDRESS SET					
1~200					
KEY LOCK SET					
EXIT					
SYSTEM SET					
MAX CURRENT SET			MAX VOLTAGE SET		
MAX POWER SET			TERMINAL SEL		
FRONT	BACK		EXIT		
LIST					
LOAD LIST					
EDIT LIST					
MINIMUM TIME					
LIST MODE					
CONTINOUS					
END HOLD					
END RESET					
STEP LENGTH					
STEP n					
CURRENT					
TIME					
EXIT					
AUTO TEST					
LOAD AUTO TEST					

EDIT AUTO TEST		
STEP LENGTH		
STEP n		
WORK MODE		
LOAD OFF MODE		
CC MODE		
CV MODE		
CP MODE		
CR MODE		
SHORT MODE		
TEST MODE		
TEST CURRENT		
TEST VOLTAGE		
TEST POWER		
TEST RESI		
DELAY TIME		
INPUT xxxx		
MINIMUM xxxx		
MAXIMUM xxxx		
SETUP AUTO TEST		
TRIGGER		
WHEN PASS		
WHEN FAIL		
WHEN TEST END		
DISABLE		
OUTPUT		
PULSE		
LEVEL		
EXIT		

				registers, double type
BATT	0x0A30	2	W/R	Battery capacity registers, double type
SERLIST	0x0A32	1	W/R	LIST Register the serial number, u16 type
SERATEST	0x0A33	1	W/R	Automatic test serial number to register, u16 type
IMAX	0x0A34	2	W/R	A maximum current register, double type
UMAX	0x0A36	2	W/R	A maximum voltage register, double type
PMAX	0x0A38	2	W/R	A maximum power register, double type
ILCAL	0x0A3A	2	W/R	Calibration current low-end target value, double type
IHCAL	0x0A3C	2	W/R	Calibration of current high-end target value, double type
ULCAL	0x0A3E	2	W/R	Calibration voltage low target, double type
UHCAL	0x0A40	2	W/R	Calibration voltage high-end target value, double type
TAGSCAL	0x0A42	1	W/R	Calibration status labels, u16 type
U	0x0B00	2	R	Voltage register, double type
I	0x0B02	2	R	Current register, double type
SETMODE	0x0B04	1	R	Working mode register, u16e type
INPUTMODE	0x0B05	1	R	Enter the status register, u16 type
MODEL	0x0B06	1	R	Type of register, u16 type
EDITION	0x0B07	1	R	Software version number registers, u16 type

UCVOFFSET	0x0A13	2	W/R	Constant volt discharge volt register, double type
UCPONSET	0x0A15	2	W/R	Constant power load volt register, double type
UCPOFFSET	0x0A17	2	W/R	Constant power discharge volt register, double type
UCRONSET	0x0A19	2	W/R	Constant resistance load voltage register, double type
UCROFFSET	0x0A1B	2	W/R	Constant resistance discharge voltage register, double type
UCCCV	0x0A1D	2	W/R	Deciding power flow constant voltage register, double type
UCRCV	0x0A1F	2	W/R	Voltage register transfer constant voltage resistance, double type
IA	0x0A21	2	W/R	Dynamic model of A phase current registers, double type
IB	0x0A23	2	W/R	Dynamic model B phase current registers, double type
TMAWD	0x0A25	2	W/R	Dynamic model of A pulse width register, double type
TMBWD	0x0A27	2	W/R	Dynamic model B phase pulse width registers, double type
TMTRANRIS	0x0A29	2	W/R	Dynamic model of rising along the time to register, double type
TMTRANFAL	0x0A2B	2	W/R	Falling edge dynamic model of the time to register, double type
MODETRAN	0x0A2D	1	W/R	Dynamic working mode register, u16 type
UBATTEND	0x0A2E	2	W/R	Battery test termination voltage

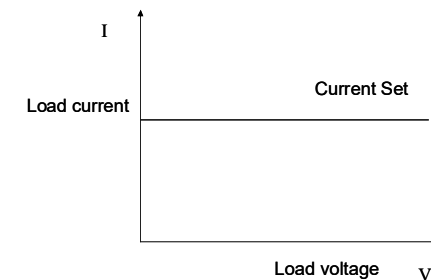
EXIT	
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4.1 the basic operating modes

Electronic load can work in the following four patterns:

1. The current operating mode (CC).
 2. The constant voltage operation mode (CV).
 3. The rated resistance operating mode (CR).
 4. The constant power operation mode (the CW)
- 4.4.1 rated current operation mode (CC)

In constant current mode, regardless of whether or not to change the input voltage, the electronic load consumption by a constant current, as shown in the figure below. Please note that if the source under test can output the maximum current value is less than the set current value of the load will not be able to ensure adjustment to set the current value, source voltage under test may also be lower.



Picture:4.1 CC mode

4.1.1.1 standard constant current mode

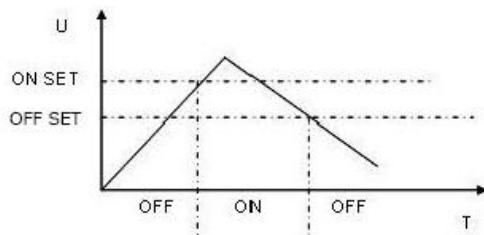
Press I - SET key, the load according to "STANDARD" CURR = xxxxxxxxA, prompt the SET current value, this time can be on the front panel digital key and key point, from high to low in turn, Enter the required constant current value, and press the Enter key to confirm, load into STANDARD constant current mode. At this point, if the input status to OFF, the display panel of "OFF", if you want to change the input state to ON, please press the ON/OFF button, the display panel

"CC" or "Unreg", according to "CC" indicates the desired constant current value, according to "Unreg" said load cannot be adjusted to the preset current value correctly, please check whether the source under test is properly connected and open, or the source under test can output set current value.

At this point, if you want to fine tune set current value, can be used in the top right corner of the rotary encoder, clockwise adjustment to increase, counterclockwise to adjust to reduce, please note that if the set current value has been achieved load set the maximum current value, is unable to adjust the current value up. At this point, on the lower right side of the display panel to set the current value indicator, under one of the bits digital vernier prompt, said the current fine-tuning fineness to the current position of a unit, if the user wants to change to adjust fineness, can press the rotary encoder and rotary encoder contains a button, the button is pressed each next time, prompt the cursor will move one space, to realize the adjustment of the fineness of adjustment.

4.1.1.2 load unload constant current mode

Loading unloading mode is a kind of protection, treatment of source when started to climb as the source voltage under test load automatic adjustment for open circuit state, until after test the source voltage climb to ONSET load voltage, began to load, load adjustment for set current value. When the source voltage under test began to decline, and fell to OFFSET discharge voltage, load automatic adjustment for open circuit state. If the ONSET load voltage value is more than OFFSET discharge voltage, load could avoid unloading voltage near the critical point is frequent load unload, can better protect the source under test.



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I O V E R	0x0520	1	R	1 for over current mark
U O V E R	0x0521	1	R	1 for over voltage mark
P O V E R	0x0522	1	R	1 for over power mark
H E A T	0x0523	1	R	1 for over temperature mark
R E V E R S E	0x0524	1	R	1 for reverse mark
U N R E G	0x0525	1	R	1 the parameter failure to mark
E R R E P	0x0526	1	R	1 mark EPPROM error
E R R C A L	0x0527	1	R	1 mark for calibration data error

Table 2 register XRAM area definition:

name	addr	dig it	prop erty	instructions
CMD	0x0A00	1	W/R	Read and write command register: low 8 effective, high eight meaningless.
IFIX	0x0A01	2	W/R	Set the current register, double type
UFIX	0x0A03	2	W/R	Set the volt register, double type
PFIX	0x0A05	2	W/R	Set the power register, double type
RFIX	0x0A07	2	W/R	Set the resistance register, double type
TMCCS	0x0A09	2	W/R	Current soft start rising along the time to register, double type
TMCVS	0x0A0B	2	W/R	Volt soft start rising along the time to register, double type
UCCONSET	0x0A0D	2	W/R	Constant current load voltage registers, double type
UCCOFFSET	0x0A0F	2	W/R	Constant current discharge voltage registers, double type
UCVONSET	0x0A11	2	W/R	Constant volt load volt register, double type

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Request: 0 x01 0 x10 x0a 0 0 x01 0 x00 0 x02 x04 0 0 x40 x13 XFC x33 x33 0 0 0 0 x23

Get reply normal 0 x01 0 0 x10 x0a 0 x01 0 x00 0 x02 0 0 xd0 x13

4.8.7 coil and register address allocation

Table 1 coil a definition:

name	addr	digi t	prop erty	instructions
PC1	0x0500	1	W/R	remote control state bits to 1, button panel before failure.
PC2	0x0501	1	W/R	Local ban: to 1, banning the use of "Shift + 7 key steal back to front panel control.
TRIG	0x0502	1	W/R	Trigger flag bits, it can be 1, software to complete a trigger.
REMOTE	0x0503	1	W/R	1: remote input voltage,
ISTATE	0x0510	1	R	State of the input, input ON 1, 0 for input OFF
TRACK	0x0511	1	R	Track status, 1 is the voltage tracking, 0 for current tracking
MEMORY	0x0512	1	R	1 for the input state memory
VOICEEN	0x0513	1	R	1 button can make sound
CONNECT	0x0514	1	R	1 on multiple machines, 0 for single machine works
ATEST	0x0515	1	R	1 model for automatic test work
ATESTUN	0x0516	1	R	1 wait trigger for automatic test work patterns
ATESTPASS	0x0517	1	R	1 for automated tests pass, 0 for failure

Picture:4.2 Loading unloading mode

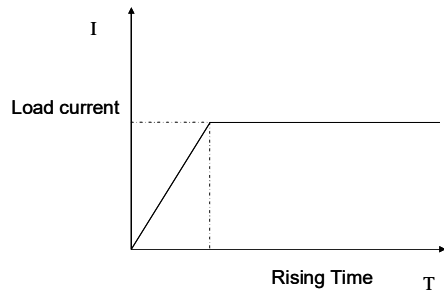
In the standard constant current mode, press Shift + 1 (V_Level), in order to Enter to load unload constant current mode, the load display "ONSET VOLT = xxxxxxxxV" prompt the load voltage, at this time can be on the front panel digital key and key point, from high to low in turn, Enter the required load voltage value, and press the Enter key to confirm, the load according to the OFFSET VOLT = xxxxxxxxV "prompt discharge voltage, and current at this time can be on the front panel digital key and key point, from high to low in turn, Enter the required unloading voltage value, and press the Enter key to confirm and load into the loading unloading constant current mode.

At this point, if the input status to OFF, the display panel of "OFF", if you want to change the input state to ON, please press the ON/OFF button, the display panel "CC_UN" or "Unreg," show "CC_UN said the desired" set current value, according to "Unreg" said load cannot be adjusted to the preset current value correctly, please check whether the source under test is properly connected and open, the voltage is within the normal range, or whether the source under test can output set current value.

At this time, the loading unloading constant current mode, press Shift + 1 (V_Level), will come back to standard load constant current mode.

4.1.1.3 soft start constant current mode

Soft start current model, equivalent to a perceptual load and its analog inductance size is proportional to the rise of soft start time length, in this mode, the source under test would be likely to avoid large current moment of impact.



Picture:4.3 start current mode

In the standard constant current mode, press Shift + 2 (S_Start), in turn into soft start current mode, the load display "RISING TM = xxxxxxxxvmS" suggests the current rise along the time, this time can be on the front panel digital key and key point, in turn from high to low yuan rise along the time needed for the input, and press the Enter key to confirm, load into soft start constant current mode.

At this point, if the input status to OFF, the display panel of "OFF", if you want to change the input state to ON, please press the ON/OFF button, the display panel "CC_S" or "Unreg," show "CC_S said the desired" set current value, according to "Unreg" said load cannot be adjusted to the preset current value correctly, please check whether the source under test is properly connected and open, or the source under test can output set current value.

At this point, the loading unloading constant current mode, press Shift + 2 (S_Start), will come back to standard load constant current mode.

Please note that the set up along the time will automatically be neat to 20 us integer times.

4.1.1.4 deciding power flow constant voltage mode

Electricity flow constant voltage mode, can better protect the source under test does not damage due to the over discharge.

number 10 v.

4.write register

Request frame	bytes	value
Additional address	1	1~200
Function code	1	0x10
Starting address	2	0~0xFFFF
Register number	2	n=1~32
Bytes count	1	2*n
Register value	2*n	
Check code	2	
Reply frame	bytes	value
Additional address	1	1~200
Function code	1	0x10
starting address	2	0~xFFFF
register number	2	N
Check code	2	
exception frame	bytes	value
Addition address	1	1~200
Function code	1	0x90
Exception code	1	1~4
Check code	2	

Example: load the communication address is 1, set the ifixes constant current value was 2.3

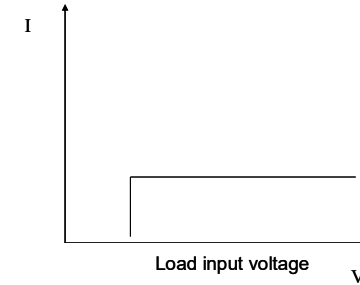
Look-up table 4.8.7 table. 2 set current value ifixes register address 0 x0a01, 2 word length floating point number

Send the request: 0 x01 x05 x05 0 0 0 x00 0 XFF xf6 0 x00 x8c 0 0
 Have normal 0 x01 x05 x05 0 0 0 x00 0 XFF xf6 0 x00 x8c 0 0

3 read the register:

Request frame	bytes	value
Additional address	1	1~200
Function code	1	0x03
Starting address	2	0~0xFFFF
Register number	2	n=1~32
Check code	2	
Reply frame	bytes	value
Additional address	1	1~200
Function code	1	0x03
Bytes number	1	2*n
Register value	2*n	
Check code	2	
Exception frame	bytes	value
Additional address	1	1~200
Function code	1	0x83
Exception code	1	1~4
Check code	2	

Example: load the communication address is 1, read the current voltage U
 Look-up table 4.8.7 table 2 to know the current voltage U register address 0 x0b00
 Request: 0 x01 0 x03 x0b 0 0 x00 0 x00 0 x02 xc6 0 0 x2f
 Get reply normal 0 x01 0 x03 x04 0 x41 0 0 x20 0 x00 x6e x2a 0 0 0 x1a
 The 0 x41 0 x20 0 0 x00 x2a is read back the voltage value, said floating-point



Picture:4.4 To determine the current voltage

In standard constant current mode, press Shift + 4 + CV (CC) in turn key, Enter the electrical flow constant voltage mode, the load according TO "CC TO CV VOLT = xxxxxxxxV" suggests the current voltage value, at this time can be on the front panel digital key and key point, from high TO low, in turn, Enter the required voltage value, and press the Enter key TO confirm, the load into deciding power flow constant voltage mode.

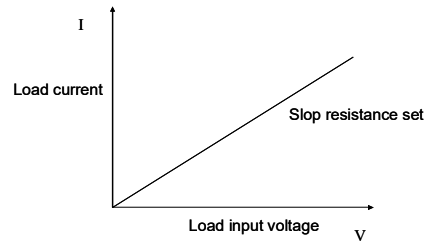
At this point, if the input status to OFF, the display panel of "OFF", if you want to change the input state to ON, please press the ON/OFF button, the display panel "CC + CV" or "Unreg," show "CC + CV said the desired" set current value, according to "Unreg" said load cannot be adjusted to the preset current value correctly, please check whether the source under test is properly connected and open, the voltage is within the normal range.

At this point, the loading unloading constant current mode, press Shift + 4 + CV (CC), will come back to standard load constant current mode.

4.1.2 rated resistance operating mode (CR)

Under the mode of constant resistance, the electronic load is equivalent to a constant resistance, as shown in the figure below, the electronic load will consume a linear change with the change of the input voltage to current. Note that when the source under test voltage is too high, and set the resistance is too small, lead to the consumption of the current is greater than the source under test the maximum

output current, or the maximum absorption current, load will not be equivalent to a constant resistance and may even cause the oscillation of the load.



Picture:4.5 CR mode

4.1.2.1 standard resistance model

Press R - SET key, the load shows "STANDARD rsei = XXXXXXXX Ω", suggests the current resistance value, you can press the digital key on the panel and the decimal point key, from high to low in turn SET needed for the input resistance, and press the Enter key to confirm, load into STANDARD resistance model. At this point, if the input status to OFF, the display panel of "OFF", if you want to change the state of input bits ON, please press the ON/OFF button, the display panel "CR" or "Unreg", according to the expected "CR" achieve resistance, according to "Unreg" said load can't adjusted to the preset resistance value correctly, please check whether the source under test is properly connected and open, or the source under test can output the default resistance absorption by the current. At this point, if you want to fine tune set resistance, can be used in the top right corner of the rotary encoder, clockwise adjustment to increase, to reduce while reverse adjust. On the lower right side of the display panel, instructions for setting resistance under one of the bits digital vernier, said the current fine-tuning fineness to the current position of a unit, if the user wants to change to adjust fineness, can press the rotary encoder and rotary encoder contains a button, the button is pressed each next time, prompt the cursor will move one space, to realize the adjustment of the fineness of adjustment.

state.

2. write the coil

Request frame	bytes	value
Additional address	1	1~200
Function code	1	0x05
Starting address	2	0~0xFFFF
Output value	2	0x0000 or 0xFF00
Check code	2	
Reply frame	bytes	value
Additional address	1	1~200
Function code	1	0x01
Output address	2	0~0xFFFF
Output value	2	0x0000 or 0xFF00
Check code	2	
Exception frame	bytes	value
Additional address	1	1~200
Function code	1	0x85
Exception code	1	1~4
Check code	2	

Example: load the communication address is 1, control the load for the remote control

Look-up table 4.8.7 known address of the remote control PC1 table 1 to 0 x0500, 2 words long floating point number

in the high.

4.8.6 full command frame parsing

1. Read the coil

Request frame	bytes	value
Additional address	1	1~200
Function code	1	0x01
The starting address	2	0~0xFFFF
The coil number	2	1~16
Check code	2	
Reply to the frame	bytes	value
Additional address	1	1~200
Function code	1	0x01
Byte count	1	1~2
The coil state	n	
Check code	2	
Exception frame	bytes	value
Additional address	1	1~200
Function code	1	0x81
Exception code	1	1~4
Check code	2	

Example: load the communication address is 1, read ISTATE load input state

Look-up table 4.8.7 know ISTATE address 0 x0510 in table 1

Request: 0 x01 x05 0 x01 0 0 x10 0 x00 XFC 0 x01 0 0 xc3

Get reply normal 0 x01 0 x01 x48 0 x01 0 0 0 x51 xbe

With zero x48 read back data, its lowest yuan 0, says ISTATE to OFF load input

4.1.2.2 loading unloading resistance model

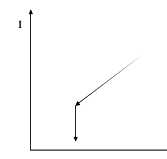
The principle of loading unloading mode, please refer to the 4.1.1.2

Resistance in standard mode, press Shift + 1 (V_Level), in turn into the loading unloading resistance model, load display "ONSET VOLT = xxxxxxxxV" prompt the load voltage, at this time can be on the front panel digital key and key point, from high to low in turn, Enter the required load voltage value, and press the Enter key to confirm, load according to the OFFSET VOLT = xxxxxxxxV "prompt discharge voltage, and current at this time can be on the front panel digital key and key point, from high to low in turn, Enter the required unloading voltage value, and press the Enter key to confirm and load into the loading unloading resistance model.

If for the input status to OFF, the display panel display the "OFF", if you want to change the state of input bits ON, please press the ON/OFF button, the display panel "CR_UN" or "Unreg," show "CR_UN said the desired" set of resistance, show "Unreg" said load can't adjusted to the preset resistance value correctly, please check whether the source under test is properly connected and open, the voltage is within the normal range, or whether the source under test can output absorbed by default resistance current value.

Under the mode of loading unloading rated resistance, press Shift + 1 (V_Level), will come back to standard load resistance model.

4.1.2.3 turn resistance constant voltage mode



Picture:4.6 resistance constant voltage mode

Constant voltage mode to set the resistance, can better protect the source under test

does not damage due to the over discharge.

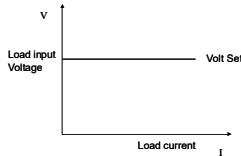
Resistance in standard mode, press Shift + 5 + CV (CR), turn into the fixed resistor voltage mode, load display "CR TO CV VOLT = xxxxxxxxV" suggests the current voltage value, at this time can be on the front panel digital key and key point, from high TO low, in turn, Enter the required voltage value, and press the Enter key TO confirm, load into the rated resistance constant voltage mode.

If for the input status to OFF, the display panel display the "OFF", if you want to change the input state to ON, please press the ON/OFF button, the display panel "CR + CV" or "Unreg", according to the expected "CR + CV" achieve resistance, according to "Unreg" said load can't adjusted to the preset resistance value correctly, please check whether the source under test is properly connected and open, the voltage is within the normal range.

Under the mode of loading unloading rated resistance, press Shift + 5 + CV (CR), will come back to standard load resistance model.

4.1.3 constant voltage operation mode (CV)

In constant voltage mode, the electronic load will consume enough current to set the input voltage to maintain in the voltage. Please note that when the source voltage is lower than the set under test voltage value, or maximum output current exceeds the maximum current of the load can absorb, will probably not be able to load voltage stability in the value.



Picture:4.7 CV mode

4.1.3.1 standard constant voltage mode

Press V - SET key, the load according to the "STANDARD" VOLT = xxxxxxxxV, prompt the current voltage value, you can press the digital key on the panel and the decimal point key, from high to low in turn SET needed for the input voltage value,

4.8.3 data

In part of the command frame, data is fixed, but in another part of the frame, the data is long. Follow the Modbus protocol, data domain hexadecimal data, as well as floating point Numbers, tuples are high in the former, tuples in the low. In addition, when writing the coil output values, the data must be 0 x0000 and 0 xff00, including 0 x0000 said zero, 0 xff00 said position 1.

4.8.4 function code

Function code for single-byte hexadecimal data, currently only open the following four function model

Function code	instructions
0x01	Read the coil, press the bit addressing read data
0x05	Write a coil, according to the written data bit addressing
0x03	Read the register, according to the word read data addressing
0x10	Addressing write write register, according to the word information

4.8.5 error checking

Load using cyclic redundancy check (CRC), CRC result for words, its low tuples in the former, high tuples in the back. The generated rules are as follows.

- A) set a 16-bit CRC register, and assign to initial value 0 XFFFF.
- B) to the first byte of a data frame that is additional address, and eight CRC register low bitwise xor, and stored in CRC register.
- C) the CRC register moves to the right one, and check whether the lowest of the removal of 1, if the lowest is 1, will the CRC register and the fixed number 0 xa001 xor.
- D) repeat steps C 8 times.
- E) the next byte of data frame repeat steps b, c, d, until the data column of the last.
- F) the contents of the final CRC register, is the final calibration value, attach it in the frame of the last data, and keep low 8 bits in the former, the placement of 8 for

1) additional address and communication parameter setting

Additional address for single-byte hexadecimal data, the load response only additional address and native additional address consistent request data frames.

2) set up additional address

In turn into the main MENU, press Shift + 0 buttons load display "MENU CONFIG", press Enter to confirm, the load into the CONFIG configuration MENU, press the up and down key until the load according to the "CONFIG ADDRESS SET", prompted for additional ADDRESS Settings, press Enter to Enter, the load according to "ADDRESS ADDR = XXX", suggests the current additional ADDRESS, if the user needs to modify the ADDRESS, press digital editing, and press Enter to confirm. Please note that this address is supposed to be an integer between 1 and 200.

3) choose the way to check

In turn into the main MENU, press Shift + 0 buttons load display "MENU CONFIG", press Enter to confirm, the load into the CONFIG configuration MENU, press the up and down key until load display "CONFIG COMM. PARITY", prompted to select check way, press Enter to Enter, the load display "COMM. PAR XXXXX", suggests the current way of checking, user can use the up and down, the key to choose to suit oneself PARITY and press Enter to confirm. Current load support without calibration, calibration, parity, a total of 3 kinds of mode selection.

4.8.2 choose communication serial transmission rate

In turn into the main MENU, press Shift + 0 buttons load display "MENU CONFIG", press Enter to confirm, the load into the CONFIG configuration MENU, press the up and down key until the load according to the "CONFIG BAUDRATE SET", prompted to select the serial transmission rate, press Enter to Enter, the load display "BAUDRATE XXXXX", suggests the current serial transmission rate, the user can use the up and down keys to choose suits own serial transmission rate, and press Enter to confirm. The current load only supports 2400, 9600, 14400, 28800, 57600, 115200, a total of 6 kinds of serial transmission rate.

and press the Enter key to confirm, the load into STANDARD constant voltage mode.

If for the input status to OFF, the display panel display the "OFF", if you want to change the state of input bits ON, please press the ON/OFF button, the display panel "CV" or "Unreg," show "CV", said the desired voltage value, according to "Unreg" said load can't adjusted to the preset voltage value correctly, please check whether the source under test is properly connected and open, or the source under test voltage is too low, or the power of output current exceed the maximum load current of the load.

If you want to fine tune set voltage value, can be used in the top right corner of the rotary encoder, clockwise adjustment to increase, counterclockwise to adjust to reduce, please note that if the set voltage value has reached the maximum voltage, load Settings will not adjust the voltage value up. At this point, on the lower right side of the display panel to set the voltage indicator, under one of the bits digital vernier prompt, said the current fine-tuning fineness to the current position of a unit, if the user wants to change to adjust fineness, can press the rotary encoder and rotary encoder contains a button, the button is pressed each next time, prompt the cursor will move one space, to realize the adjustment of the fineness of adjustment.

4.1.3.2 loading unloading voltage mode

The principle of loading unloading mode, please refer to the 4.1.1.2

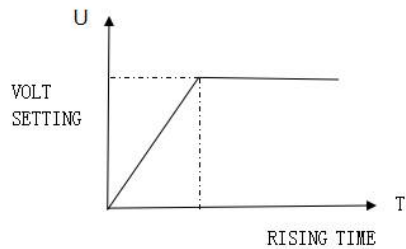
In standard voltage mode, press Shift + 1 (V_Level), in turn into the loading unloading voltage mode, the load display "ONSET VOLT = xxxxxxxxV" prompt the load voltage, at this time can be on the front panel digital key and key point, from high to low in turn, Enter the required load voltage value, and press the Enter key to confirm, load according to the OFFSET VOLT = xxxxxxxxV "prompt discharge voltage, and current at this time can be on the front panel digital key and key point, from high to low in turn, Enter the required unloading voltage value, and press the Enter key to confirm and load into the loading unloading resistance model.

If for the input status to OFF, the display panel display the "OFF", if you want to change the state of input bits ON, please press the ON/OFF button, the display panel "CV_UN" or "Unreg," show "CV_UN said the desired" set voltage, display "Unreg" said load can't adjusted to the preset voltage value correctly, please check whether the source under test is properly connected and open, the voltage is within the normal range, or whether the maximum current of the source to the output under test is beyond the maximum absorption current load.

At the loading unloading voltage mode, press Shift + 1 (V_Level), will come back to standard load constant voltage mode.

4.1.3.3 soft start constant voltage mode

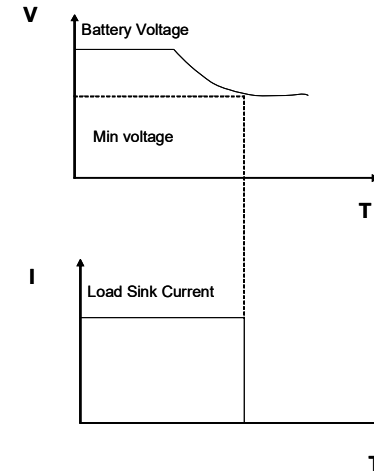
Soft start voltage model, equivalent to a capacitive load, its size is proportional to the capacitance analogy soft start up time length, in this mode, the source under test will be a large current moment



Picture:4.8 Soft start constant voltage mode

In the standard constant voltage mode, press Shift + 2 (S_Start), in turn into the soft start voltage mode, load display "RISING TM = xxxxxxxxvmS" suggests the current rise along the time, this time can be on the front panel digital key and key point, in turn from high to low yuan rise along the time needed for the input, and press the Enter key to confirm, load into soft start constant voltage mode.

If for the input status to OFF, the display panel display the "OFF", if you want to



Picture:4-16 battery capacity calculation diagram

4.8 protocol

4.8.1 overview

MST-150W series electronic load, application support the Modbus protocol. The data frame structure includes four parts:

Additional address	Function code	data	Error checking
--------------------	---------------	------	----------------

In order to guarantee the reliability of the communication, we should ensure that each frame data should be greater than 3.5 times the single-byte character transfer time, if the serial transfer rate of 9600, the time interval between the frame and the frame must be greater than $11 * 3.5/9600 = 0.004$ seconds.

Load USES two-way asynchronous communication, fixed one start bit, 8 bits of data bits, one stop bit. Support without checking, odd parity, parity of three methods for checking. Support 2400, 9600, 14400, 28800, 57600, 115200, a total of 6 kinds of serial transmission rate.

lowest components reliability, therefore, must be a load test on a regular basis to ensure the reliability of the battery

Capacity test

MST-150W series electronic load capacity test using constant current mode. Programmable SheZhiGuan break level, when the battery voltage is too low, the system determines the battery to set threshold value or not safe state on the eve of the automatic interrupt the test, can be observed in the process of testing the battery voltage, discharge current, load power and battery discharge capacity. If used with PC suite, you can observe the battery discharge curve in the discharge process. This test can reflect the reliability of the battery and its residual life, therefore very necessary before replacing the battery for such tests.

Operation method:

- 1) in the standard constant current mode, the needed to adjust the battery discharge current value
- 2), in turn, press Shift + 8 (battery), VFDS show END TEST VOLT = xxxxxxxxV, SheZhiGuan voltage and press the Enter key to start capacity TEST, when the Battery voltage drop to shut OFF voltage, load OFF automatically.
- 3) at this time can press On/Off button to start or stop battery capacity test.
- 4) press Shift + 8 (.), you can exit the Battery capacity test state.

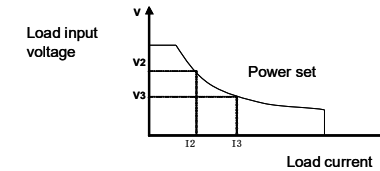
change the state of input bits ON, please press the ON/OFF button, the display panel "CV_S" or "Unreg," show "CV_S said the desired" set voltage, display "Unreg" said load can't adjusted to the preset voltage value correctly, please check whether the source under test is properly connected and open, the voltage is within the normal range, or whether the maximum current of the source to the output under test is beyond the maximum absorption current load.

At the loading unloading voltage mode, press Shift + 2 (S_Start), will come back to standard load constant voltage mode.

Please note that the set up along the time will automatically be neat to 20 us integer times.

4.1.4 constant power operation mode (the CW)

In constant power mode, the electronic load will consume a constant power, as shown in the figure below, if the input voltage increases, the input current will be reduced, the power $P (= V * I)$ will remain on the set power.



Picture:4.9 CW mode

4.1.4.1 standard constant power mode

Press P - SET key, the load shows "STANDARD POWR = xxxxxxxxW", suggests the current power value, at this time can be on the front panel digital key and key point, from high to low on power value of the yuan, in turn, Enter the required, and press Enter to confirm, the load into STANDARD constant power mode.

If the input status to OFF, the display panel display the "OFF", if you want to change the input state to ON, please press the ON/OFF button, the display panel of the CW "or" Unreg, "according to" the CW said the desired "set power value,

according to "Unreg" said load can't adjusted to the preset power value correctly, please check whether the source under test is properly connected and open, or the source under test voltage is too low, or whether the maximum output current of the source under test.

Set if you want to fine tune the power value, can be used in the top right corner of the rotary encoder, clockwise adjustment to increase, counterclockwise to adjust to reduce, please note that if the set power value has reached the maximum power load setting value, cannot adjust upward power value. At this point, on the lower right side of the display panel is set power value indicator, under one of the bits digital vernier, said the current fine-tuning to read for the current position of the 1 unit, if the user wants to change to adjust fineness, can press the rotary encoder and rotary encoder contains a button, the button is pressed each next time, prompt the cursor will move one space, to realize the adjustment of the fineness of adjustment.

4.1.4.2 loading unloading rated power mode

The principle of loading unloading mode, see 3.1.1.2 instructions

In standard rated power mode, press Shift + 1 (V_Level), in order to load unload power mode, load display "ONSET VOLT = xxxxxxxxV" prompt the load voltage, at this time can be on the front panel digital key and key point, from high to low in turn, Enter the required load voltage value, and press the Enter key to confirm, load according to the OFFSET VOLT = xxxxxxxxV "prompt discharge voltage, and current at this time can be on the front panel digital key and key point, from high to low in turn, Enter the required unloading voltage value, and press the Enter key to confirm, load into loading unloading rated power mode.

If for the input status to OFF, the display panel display the "OFF", if you want to change the input state to ON, please press the ON/OFF button, the display panel "CW_UN" or "Unreg," show "CW_UN said the desired" rated power value, according to "Unreg" said load can't adjusted to the preset power value correctly, please check whether the source under test is properly connected and open, the voltage is within the normal range, or whether the source under test can output the default power absorbed by the current value.

be test equipment of producing pressure drop on the cable. In order to guarantee the accuracy of measurement, load measurement provides a far away look in the back panel terminals, users can use the terminal to measuring instrument's output terminal voltage being measured.

Users can SET the remote measurement function in the MENU MENU selection, in turn, press Shift + 0 (MENU), then press ▼ load display "MENU SYSTEM SET", press Enter key to Enter, the load according to "SYSTEM IMAX = xxxxxxxxA", according to the up and down keys to adjust, only to load the SYSTEM TERMINAL SEL "clew, this is the distal tip SET the current test function parameters, users continue to press the Enter key to Enter, load display" TERMINAL the SELECT FRONT "or" TERMINAL SELECT BACK ", the user can choose remote testing capabilities through the up and down keys to adjust parameters, and press the Enter key to confirm. "TERMINAL SELECT FRONT" SELECT the source input terminals on the FRONT panel, and then panel remote testing capabilities have been banned, "TERMINAL SELECT BACK" said, SELECT the source input terminals in the panel and FRONT panel of the input be banned, at this time the user can press the Esc key to exit the MENU the main MENU.

Please note that the input terminal of the front panel and rear panel at any time, all can have an effective, if the user is found near the zero load display voltage, is not associated with the signal change, please check whether the connection mode and the remote parameter matching test function.

4.7 battery discharge test operation

Experiments prove that the best way to determine whether the battery work is with load testing. Only to correct the load test to determine whether the battery in the expected life curve of the position. MST-150W series electronic load can use any type of battery test today.

For any protective equipment or the battery system used by the interrupt service system, and load tests are essential. Because in a system, the battery is almost the

will be automatically adjusted to 30 a.

In addition, the maximum current Settings, can influence the resolution of the current display, when the maximum current value set in a 3 a or 3 a, the load voltage resolution of 0.01 mA, and when the maximum voltage value is set for more than 3 a, voltage resolution is only 0.1 mA.

4.5.3 over power protection (OW)

When consumed power increase to the power limit, load over-voltage protection, input OFF, buzzer, VFDS, show the following information "OVER POW", now requires the user to press any key to restore, pay attention to the input status to OFF, if the select button for "ON/OFF", the load will again take years, if there is no lift power conditions, load will again prompt "OVER POW".

Users can SET a maximum power in the MENU function table, in turn, press Shift + 0 (MENU), and then press ▼ load "MENU SYSTEM SET", press Enter key to Enter, the load according to "SYSTEM IMAX = xxxxxxxxA", according to the up and down keys to adjust, only to the load "SYSTEM PMAX = xxxxxxxxW" message, it is suggested the current maximum power, the user is able to get through the digital key and decimal point key input needed to power the maximum, and press the Enter key to confirm. At this time the user can press the Esc key to exit MENU main MENU.

Please note that the maximum power of 300 w maximum IV8711 type load, the set of more than 300 w, will be automatically adjusted to 300 w.

4.5.4 input polarity reverse connection

When the input polarity REVERSE connection, buzzer, VFDS "REVERSE" shows the following information.

4.5.5 over temperature protection (OH)

More than 80 °C when load internal power device, load temperature protection. The input OFF, buzzer, VFDS "OVERHEAT" shows the following information.

4.6 the remote test function

In CV, CR, CP mode, when the load consumption current to the load terminals will

Under the mode of loading unloading rated power, press Shift + 1 (V_Level), will come back to standard load rated power mode.

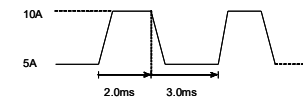
4.2 dynamic testing operation

Dynamic testing operation can make the load between the two kinds of load current or voltage switch repeatedly, this function can be used to test the power of dynamic characteristics. Dynamic test operations can use the front panel (Shift + Tran) key enabling or disability, the dynamic testing before operation, should first set related parameters of dynamic testing operation (Shift + S - Tran). These parameters include: A value, A time of pulse width, the rise of A to B along time, B value, value, pulse width, B B drop to A decline in along time, and the dynamic testing mode.

Dynamic testing mode can be divided into continuous and pulse mode and trigger mode.

4.2 Continuous mode

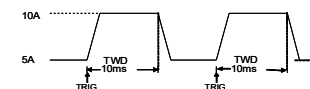
In continuous mode, the dynamic testing can make after operation, the load will be continuous to switch between A and B values.



Picture:4.10 continuous mode

4.2.2 PULSE mode

In pulse mode, the dynamic testing after the operation can make, each receives A trigger signal, load will switch to the B value, in maintaining the pulse width of time, B will switch back to A value.



Picture:4.11 pulse mode

4.2.3 TRIGGER mode

In trigger mode, the dynamic testing after the operation can make, each received A trigger signal, load will switch between A and B values.



Picture:4.12 trigger mode

4.2.4 dynamic testing parameter Settings

Push the Shift + 6 (S_Tran) in turn, load display "LEVEL A" CURR = xxxxxxxxA, prompt the current setting A current value, this time can be on the front panel digital key and key point, from high to low in turn, Enter the required value, and press the Enter key to confirm.

The load shows "WIDTH = A TM xxxxxxxxmS", suggests the current setting A duration, at this time can be on the front panel digital key and decimal point key, Enter the required values in turn from high to low yuan, and press the Enter key to confirm.

Load at this time display "RISING TM = xxxxxxxxmS", suggests the current set up from A to B along the time, this time can be on the front panel digital key and key point, from high to low in turn, Enter the required value, and press the Enter key to confirm.

Load at this time display "CURR LEVEL B = xxxxxxxxA", prompt the set current value B, you can press the digital key on the panel with the decimal point key, Enter the required values in turn from high to low yuan, and press the Enter key to confirm.

Load at this time display "WIDTH B TM = xxxxxxxxmS", prompt the current set B last time, you can press the digital key on the panel and the decimal point key, Enter the required values in turn from high to low yuan, and press the Enter key to confirm.

Load at this time display "FALLING TM = xxxxxxxxmS", suggests the current setting from B to A FALLING edge of the time, this time can be on the front panel digital key and key point, from high to low in turn, Enter the required value, and

Load including several protection functions described below

4.5.1 overvoltage protection (OV)

When the input voltage is greater than the maximum voltage, load over-voltage protection, input OFF, buzzer, VFDS "OVER VOLT" shows the following information.

Users can SET the maximum voltage in the MENU function table, in turn, press Shift + 0 (MENU), and then press ▼ load "MENU SYSTEM SET", press Enter key to Enter, the load according to "SYSTEM IMAX = xxxxxxxxA", press the up and down key to adjust, only to the load in the SYSTEM UMAX = xxxxxxxxV "tip, it's tip of maximum current voltage, the user is able to get through the digital key and decimal point key input required by the current maximum value, and press the Enter key to confirm. The user can press the Esc key to exit MENU main MENU. Please note that MST-150W type maximum load voltage 150 v, maximum set of more than 150 v, will be automatically adjusted to 150 v.

In addition, the maximum voltage setting, it will affect the voltage display resolution, when the maximum voltage value is set at 20 v or below 20 v, load voltage resolution of 0.1 mV, and when the maximum voltage value is set, when more than 20 v voltage resolution only 1 mV.

4.5.2 of overcurrent protection (OC)

When the load on the input current is added to the current period, the load will be adjusted for maximum protection current input, buzzer, VFDS "OVER CUR" shows the following information

Users can SET the maximum voltage in the MENU function table, in turn, press Shift + 0 (MENU), and then press ▼ load "MENU SYSTEM SET", press Enter key to Enter, load shows "SYSTEM IMAX = xxxxxxxxA" right now, this is the maximum current, prompt the current the user is able to get through the digital key and decimal point key input required by the current maximum value, and press the Enter key to confirm. At this time the user can press the Esc key to exit MENU main MENU.

Please note that MST-150W type load current maximum of 30 a, more than 30 a set,

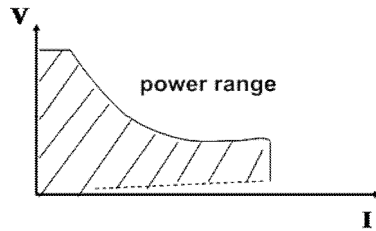
maximum short-circuit current for the current range of 120% in CV mode, the short circuit is equivalent to setting load voltage of 0 v.

4.3.2 input switch operation

When the input state to ON, press the ON/OFF button, the input state will be turned OFF, the upper right corner of the "OFF". On the other hand, when the input state is OFF, press the On/OFF button, the input state will be turned On, the top right corner tip in the current working state.

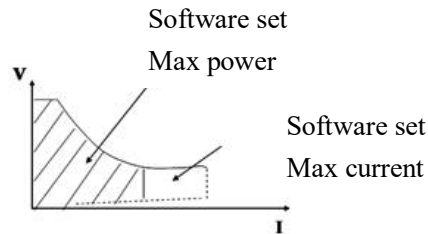
4.4 the electronic load can be operating range

Electronic load working at rated current, rated voltage and rated power range, the shadow part of the diagram below



Picture:4-13 load power range

Load mode change



Picture:4-14 software set max value

4.5 protection function

press the Enter key to confirm.

The load shows "TRANMODE CONTINUOUS"/" TRANMODE PULSE "/" TRANMODE TRIGGER ", said the current setting of the dynamic testing mode, press Sunday afternoon or V choice at this time the need to set the mode, and press the Enter key to confirm.

4.2.5 waveform control

4.2.5.1 square wave

If falling edge will rise along the time and the time is set to 0, test mode to continuous mode, the output for the square wave. Output frequency for current A and current duration and the reciprocal of B, since all of the time set minimum fineness of 20 us, so the load can edit the maximum frequency of 25 KHZ square wave duty ratio is 50%.

4.2.5.2 triangle wave

If the duration of the current A and B are set to 0, test mode to continuous mode, the output for the triangular wave. Falling edge output frequency is increased along with the time and the reciprocal of, because all the time to set the minimum fineness to 20 us, so the load can edit the maximum frequency of 25 KHZ triangle wave. Due to the rise along with the fall of the triangular wave along the are based on 20 us output frequency of the ladder wave, so the ideal level of the triangular wave and output frequency is inversely proportional to, under extreme conditions may be equivalent to square wave, the rising and falling on the basis of setting time is different, from 0 to 100 points were fine degrees of difference.

4.2.5.3 trapezoidal wave

If needed to set up four time parameters were greater than 0, the test model for continuous output mode, the normal output of trapezoidal wave load. The frequency characteristics with the description of the triangular wave.

4.2.6 trigger control

When the dynamic testing mode is set to pulse, or trigger mode, the trigger control

to activate. Trigger way as three types:

A. key trigger

Press Shift + in turn Trigger buttons, a Trigger

B. external hardware input triggers

When load the back-end TRIG_IN terminal level at low level more than 5 ms in a row, on a trigger.

C. PC control software trigger

4.2.7 LIST functionality

Load can perform sequential operation (LIST), most can edit 8 sets of data, each set of editable 200 steps, each step can edit the execution time, the user can be defined in each group of data of different minimum time unit, the minimum time unit of 0.02 mS integer times, set the smallest unit of time range of 0.02 ~ 0.02 mS, every single step of executable time range related to set the smallest unit of time, if the minimum time unit is set to 0.02, mS, every single step can be executed the time range of 0.02 ~ 1310.7 mS, and if the minimum time unit is set to 2 mS, every single step can be executed the time range is 2 ~ 131070 mS.

4.2.7.1. Edit the LIST

1) in turn, press Shift + 0 into function table Settings, bring about ▲ or ▼ button until the load tips "MENU LIST", press Enter key to Enter, bring about ▲ or ▼ button until the load prompts "EDIT LIST", press Enter key to Enter, press bring ▲ or ▼ button to set the sequence of code, and press the Enter key to Enter the EDIT MENU LIST.

2) the load tips "MINIMUM TM = XXXXXX mS", this is prompted for the need to set the MINIMUM unit of time. This value affect the regulation of arbitrary waveform fineness and operational length, please carefully choose the right parameters. Input data and press the Enter key after load suggests the following three sets of output mode, the user use bring about ▲ or ▼ button, press Enter to confirm.

LOAD prompts "MENU AUTO TEST", press Enter key to Enter, bring about ▲ or ▼ button until the LOAD prompts "LOAD AUTO TEST", press Enter key to Enter, press bring ▲ or ▼ button to set the sequence of code, and press the Enter key. At this point, the load the top right corner shows "AUT n", said the state bits of automatic test pattern, perform first n automatic testing, the lower right corner shows "OFF", said the current wait for the user the priming of automatic test. If the user is ready to, can press On/Off key to start an automated test, can also through the rear panel TRIG IN port of electricity between low more than 5 ms, to start an automated test. The load will be implemented step by step gear automatic testing, the top right corner shows "STPxx" in turn, said the current steps are performed. The lower right corner will show "WAIT", "PASS" or "FAIL" status and result of single step test. After finish all the test steps, middle position at the bottom of the load will be prompted to "ATEST PASS" or "ATEST FAIL", said the whole automatic test results. When the test fails, buzzer will be issued bursts of alarm, when the test pass, buzzer will be intermittent voice prompt test completed. Press any key can remove alarm, and wait for the trigger automatic test next time. When a test finished, users can according to bring ▲ or ▼ button to start the single-step mode test, the load will be carried out step loading, each one bring ▲ or ▼ button, perform step on or next load test, the user can observe the actual condition of each step. When the user has triggered input or ON/OFF button press, the load will be automatically out of manual test mode, a automatic test again.

4.3 the input control

4.3.1 SHORT circuit operation

Can load in a short circuit input analog circuit. In panel operation situation, you can press Shift + 9 (Short) to switch short-circuit condition. Short circuit operation does not affect the current setting, when short circuit operation switch back to the OFF state, load returns to the original setting condition.

Load short circuit when consumed by the actual current value depends on the current load working mode and current range. In CC, the CW and CR mode, the

press number keys to edit and press Enter to confirm. Then load shows "MAXIMUM XXXX = XXXXXX" prompt for eligibility to compare cap, press the number keys to edit and press Enter to confirm.

Press Enter to confirm, if you have edited all of setting step, shows the "EDIT AUTO TEST", says back to automatic testing function main function table. If you haven't edit all the setting STEP, return 3) process, but at that time, it shows "STEP n XXXXX MODE", says you are editing is the first STEP n.

4.2.8.2 set the automatic test trigger output mode

Press Shift + 0 in turn into the MENU Settings, bring about ▲ or ▼ button until the load prompts "MENU AUTO TEST", press Enter key to Enter, bring about ▲ or ▼ button until the load prompts "SETUP AUTO TEST", press Enter into automatic TEST trigger output edit MENU.

The load suggests the following four trigger output timing, according to bring ▲ or ▼ button and press Enter to confirm.

Prompt information	Sense
TRIGGER WHEN PASS	When testing qualified start trigger output at a time
TRIGGER WHEN FAIL	When test failure start trigger output at a time
TRIGGER WHEN TEST END	When the test start trigger output at a time
TRIGGER DISABLE	Ban trigger output

The load prompt the following two trigger output electrical characteristics

Prompt information	Sense
OUTPUT LEVEL	When the trigger output level from low to high, only to have buttons or trigger input down again
OUTPUT PLUSE	When the trigger output level from low to high, automatic down after about 5 ms

4.2.8.3 perform the function of automatic test

Press Shift + 0 in turn into the MENU Settings, bring about ▲ or ▼ button until the

"LIST of CONTINUOUS" said for continuous output mode.

"LIST END HOLD" all points output END of the last value.

"LIST END RESET" says all points output END of the negative load as the light.

3) press Enter to confirm, after load tips "STEP LENG = XXX", said the total need to edit the STEP length, the total STEP must be 1 ~ 200 integer, according to the digital key to confirm.

4) press the digital key confirmation, load according to "STEP 1 CURR = xxxxxA", prompt the user for the first STEP required to set the current, the press digital editing and press the Enter key to confirm, the load according to STEP 1 TM = "XXXXX" mS, prompt the user for the first STEP on the duration of the constant current, press number keys to edit and press Enter to confirm.

5) press Enter to confirm, if you have edited all of setting step, shows the "EDIT LIST", says returned to the main menu LIST function. If you haven't edit all the setting STEP, is returned (4) shows the "CURR STEP n = xxxxxA", says you are editing is the first STEP n.

6) with a LIST function with automatic testing function public storage space, so the editors should pay attention to when the selected serial number, the LIST function if the serial number is used for automatic test function of originally, editor for the LIST, the original serial number of the same test LIST will be deleted automatically, unable to recover.

4.2.7.2 perform the function of the LIST

Press Shift + 0 in turn into the MENU Settings, bring about ▲ or ▼ button until the LOAD tips "MENU LIST", press Enter key to Enter, bring about ▲ or ▼ button until the LOAD prompts "LOAD LIST", press Enter key to Enter, bring about ▲ or ▼ button to execute the sequence code, and press the Enter key.

Because the LIST function with automatic testing function public storage space, if a part of the LIST of the serial number identification is defined as the function of automatic test, while according to bring ▲ or ▼ button sequence code, corresponding to the serial number will be blocked.

4.2.8 automatic testing function

Load can perform the function of automatic test, most can edit 8 sets of data, each set of editable fifty steps, each step can edit for racing, rated current, rated voltage, rated power and rated resistance, short-circuit 6 kinds of working mode, you can edit the test comparison of current, voltage, power, resistance of 4 types of parameters, can edit the delay parameters, test time delay time was 0.1 ~ 25.5 S the promptness and accuracy of the test. Load IN after completion of an automatic test will indicate passed or failed, if failed, will sound alarm, at the same time, load support before the trigger button panel and rear panel TRIGGER IN hardware level trigger, and from the back panel TRIGGER OUT port output trigger level, the user can edit the level trigger or two trigger pulse trigger mode, you can edit by triggering, failure to trigger, complete test trigger, trigger four trigger output option.

4.2.8.1 editor automatic test list

- 1), in turn, press Shift + 0 into function table Settings, bring about ▲ or ▼ button until the load prompts "MENU AUTO TEST", press Enter key to Enter, bring about ▲ or ▼ button until the load prompts "EDIT AUTO TEST", press Enter key to Enter, press bring ▲ or ▼ button to set the sequence of code, and press the Enter key to Enter the EDIT MENU automatic TEST list.
- 2) the load according to "STEP LENG = XX", prompt for automatic testing of STEP length. Press digital input total step length, and press the Enter key to confirm, the total step should be an integer from 1 to 50.
- 3) the load will show "STEP 1 XXXXX MODE", prompt the first selected work MODE, there are the following 6 kinds of work patterns to choose from, according to bring ▲ or ▼ button and press Enter to confirm.

Work mode	Prompt information	instructions
No- load	Load off mode	Compare the no-load voltage
Set current	CC mode	Can choose to compare current, voltage, power, resistance is one of the four parameters
Set voltage	CV mode	Can choose to compare current, voltage, power, resistance is one of the four parameters
Set power	CP mode	Can choose to compare current, voltage, power, resistance is one of the four parameters
Set resistance	CR mode	Can choose to compare current, voltage, power, resistance is one of the four parameters
Short circuit	Short mode	Compare the short circuit current

- 4) the load according to "STEP 1 TEST XXXX", prompted to select the TEST comparison of data types, there are four current, voltage, power, resistance selection, according to bring ▲ or ▼ button and press Enter to confirm. If 3) choose to open circuit or short circuit mode, skip this option.
- 5) load display at this time DELAY TM = xx. XS, prompt test comparison of DELAY time, the DELAY time range of 0.1 ~ 25.5 S, setting value is smaller, shorter test need time, but under certain conditions, the parameter is too small will probably because of the power supply have not reached a stable state, and to influence the outcome of the test, user, please choose this parameter carefully, recommended data is 0.5 S. Press digital editing and press Enter to confirm.
- 6) load at this time display "INPUT XXXX = XXXXXX" prompts for a working mode of the current/voltage/resistance or power values, if 3) work mode selection is open circuit or short circuit mode, skip this setting. Press digital editing and press Enter to confirm.
- 7) the load shows "MINIMUM XXXX = XXXXXX" prompt for eligibility is lower,