

Programmable DC Electronic Load

Series IT8200 Programming Guide



Statement

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Safety Notices

CAUTION

A CAUTION sign denotes a hazard. It calls attention to an operating procedure or practice that, if not correctly performed or adhered to, could result in damage to the product or loss of important data. Do not proceed beyond a CAUTION sign until the indicated conditions are fully understood and met.

WARNING

A WARNING sign denotes a hazard. It calls attention to an operating procedure or practice that, if not correctly performed or adhered to, could result in personal injury or death. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.



NOTE

A NOTE sign denotes important hint. It calls attention to tips or supplementary information that is essential for users to refer to.

Certification and Quality Assurance

Series IT8200 electronic load completely reaches nominal technical indicators in the manual.

Warranty service

ITECH Company will provide one-year warranty services for the product materials and manufacturing (excluding the following limitations).















- When warranty service or repair is needed, please send the product to the service unit specified by ITECH Company.
- When the product is sent to ITECH Company for warranty service, the customer must pay the one-way freight to the maintenance department of ITECH, and ITECH will be responsible for return freight.
- If the product is sent to ITECH for warranty service from other countries, the customer will be responsible for all the freight, duties and other taxes.


Limitation of Warranty

Warranty service does not apply to the damage caused in the following circumstances:

- Damage resulting from customer-wired circuits or customer-supplied parts or accessories;
- Product which has been modified or repaired by the customer;
- Damage caused by the circuit installed by the customer or damage caused by operation of the product in non-specified environment;
- The product model or serial number is altered, deleted, removed or made illegible by customer;
- Damage caused by accidents, including but not limited to lightning, water, fire, abuse or negligence.

Safety signs

	DC power		ON (with the power switched on)
	AC power		OFF (with the power supply switched off)
	Both DC and AC power supply		Power supply switching-on status
	Protective grounding terminal		Power supply switching-off status
	Grounding terminal		Reference terminal
	Danger sign		Positive terminal
	Warning sign (refer to specific "Warning" or "Caution" information in the manual)		Negative terminal

	Ground wire connection end sign	-	-
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Safety Precautions

General safety precautions below must be followed in each phase of instrument operation. In case of failure to follow these precautions or specific warnings in other parts of the manual, violation against the safety standards related to the design, manufacture and purpose of the instrument will occur. If the user does not follow these precautions, ITECH will bear no responsibility arising there from.

WARNING

- **Series IT8200 electronic load supports 110V/220VAC input and need to switch the input voltage before operation.**
- **Do not use the instrument if it is damaged. Before operation, check the casing to see whether it cracks. Do not operate the instrument in the presence of inflammable gasses, vapors or dusts.**
- **The power supply is provided with a power line during delivery and should be connected to junction box. Before operation, be sure that the power supply is well grounded. Make sure to use the power cord supplied by ITECH.**
- **Check all marks on the instrument before connecting the instrument to power supply.**
- **Use electric wires of appropriate load. All loading wires should be capable of bearing maximum short-circuit current of electronic load without overheating. If there are multiple electronic loads, each pair of the power cord must be capable of bearing the full-loaded rated short-circuit output current**
- **Ensure the voltage fluctuation of mains supply is less than 10% of the working voltage range in order to reduce risks of fire and electric shock.**
- **Do not install alternative parts on the instrument or perform any unauthorized modification.**
- **Do not use the instrument if the detachable cover is removed or loosen.**
- **To prevent the possibility of accidental injuries, be sure to use the power adapter supplied by the manufacturer only.**
- **We do not accept responsibility for any direct or indirect financial damage or loss of profit that might occur when using the instrument.**
- **This instrument is used for industrial purposes, do not apply this product to IT power supply system.**
- **Never use the instrument with a life-support system or any other equipment subject to safety requirements.**

CAUTION

- **Failure to use the instrument as directed by the manufacturer may render its protective features void.**

- Always clean the casing with a dry cloth. Do not clean the internals.
- Make sure the vent hole is always unblocked.

Environmental Conditions

The instrument is designed for indoor use and an area with low condensation. The table below shows the general environmental requirements for the instrument.




Environmental Conditions	Requirements
Operating temperature	0°C to 40°C
Operating humidity	20%-80% (non-condensation)
Storage temperature	-20°C to 70 °C
Altitude	Operating up to 2,000 meters
Installation category	II
Pollution degree	Pollution degree 2



Note

To make accurate measurements, allow the instrument to warm up for 30 min.

Regulatory Markings

	<p>The CE mark indicates that the product complies with all the relevant European legal directives. The specific year (if any) affixed refers to the year when the design was approved.</p>
	<p>The instrument complies with the WEEE Directive (2002/96/EC) marking requirement. This affix product label indicates that you must not discard the electrical/electronic product in domestic household waste.</p>
	<p>This symbol indicates the time period during which no hazardous or toxic substances are expected to leak or deteriorate during normal use. The expected useful life of the product is 10 years. The product can be used safely during the 10-year Environment Friendly Use Period (EFUP). Upon expiration of the EFUP, the product must be immediately recycled.</p>

Waste Electrical and Electronic Equipment (WEEE) Directive



2002/96/EC Waste Electrical and Electronic Equipment (WEEE) Directive

This product complies with the WEEE Directive (2002/96/EC) marking requirement. This affix product label indicates that you must not discard the electrical/electronic product in domestic

household waste.

Product Category

With reference to the equipment classifications described in the Annex 1 of the WEEE Directive, this instrument is classified as a “ Monitoring and Control Instrument “.

To return this unwanted instrument, contact your nearest ITECH office.

Compliance Information

Complies with the essential requirements of the following applicable European Directives, and carries the CE marking accordingly:

- Electromagnetic Compatibility (EMC) Directive 2014/30/EU
- Low-Voltage Directive (Safety) 2014/35/EU

Conforms with the following product standards:

EMC Standard

IEC 61326-1:2012/ EN 61326-1:2013 ¹²³

Reference Standards

CISPR 11:2009+A1:2010/ EN 55011:2009+A1:2010 (Group 1, Class A)

IEC 61000-4-2:2008/ EN 61000-4-2:2009

IEC 61000-4-3:2006+A1:2007+A2:2010/ EN 61000-4-3:2006+A1:2008+A2:2010

IEC 61000-4-4:2004+A1:2010/ EN 61000-4-4:2004+A1:2010

IEC 61000-4-5:2005/ EN 61000-4-5:2006

IEC 61000-4-6:2008/ EN 61000-4-6:2009

IEC 61000-4-11:2004/ EN 61000-4-11:2004

1. The product is intended for use in non-residential/non-domestic environments. Use of the product in residential/domestic environments may cause electromagnetic interference.
2. Connection of the instrument to a test object may produce radiations beyond the specified limit.
3. Use high-performance shielded interface cable to ensure conformity with the EMC standards listed above.

Safety Standard

IEC 61010-1:2010/ EN 61010-1:2010

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Chapter1 Communication Interfaces

1.1 Communication Modules Introduction

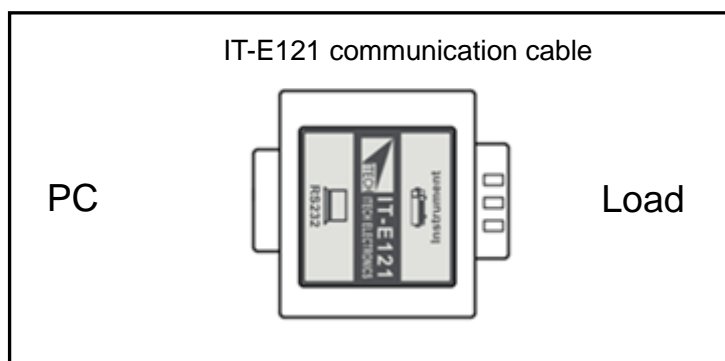
The DB9 interface connector on the rear panel of series IT8200 electronic load is TTL voltage level, which needs to be connected to the serial port of the PC through level conversion. The optional communication module is IT-E121.

CAUTION

Do not connect the electronic load with a standard RS232 cable, which may result in damage to the instrument.

RS232 communication cable

IT-E121 includes IT-E121 communication module and a standard RS232 extension cable.



1.2 Communication with PC

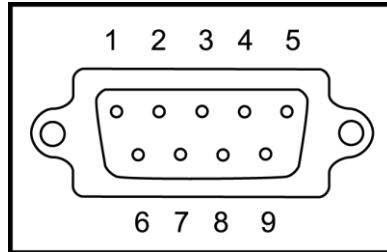
The DB9 interface connector on the rear panel of series IT8200 electronic load can be connected to RS-232 interface of the PC through level conversion. The following content can help you know about how to control the electronic load by PC.

Communication setting

Before using the remote operation mode, please make sure that the following parameters of electronic load are the same as those in the computer software.

- Baud rate: 4800
- Data bit: 8
- Stop bit: 1
- Parity: None
- Address: the range is from 0 to 31, default setting is 0

Start Bit	8 Data Bits	Parity=None	Stop Bit
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DB9 Serial Port

Chapter2 Communication Order

Frame Format

Frame length is 26 bytes (compatible with Fab). Details as following:

AAH	Address	Command	4—25bytes are information content	Parity code
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Description:

- Start bit is AAH, occupies one byte.
- Address range from 0 to FE, occupies one byte.
- Each command occupies one byte. Following is the command details.

20H	Set the Remote control mode
21H	Set the input on/off state
22H	Set the max input voltage
23H	Enquire the max setup input voltage.
24H	Set max input current
25H	Enquire the max setup input current.
26H	Set max input power.
27H	Enquire the max setup input power.
28H	Set CC, CV, CR operation mode of electronic load.
29H	Enquire the operation mode.
2AH	Set CC mode current value
2BH	Enquire CC mode current value
2CH	Set CV mode voltage value
2DH	Enquire CV mode voltage value
30H	Enquire CR mode resistance value
31H	Set CC mode transient current and timer parameter.
54H	Set communication address.
57H	Enquire the state of remote sense mode.
5FH	Enquire the input voltage, input current, input power and related information.

Note

If control output of electronic through PC, please setting electronic load to PC control state. Command is 20H. Make a calibration on input of electronic Load, Ensure the calibration protection mode is OFF state when setting calibration information. If electronic load in calibration mode, user can't change the input and operation mode of electronic load.

- From 4th byte to 25th byte are information contents.
- 26th is checksum code, is the sum of the former 25 bytes.

Chapter3 Communication Protocol

3.1 Regular Command

3.1.1 Set control mode (20H)

1 st byte	Start bit (AAH)
2 nd byte	Address (0-0XFE)
3 rd byte	Command (20H)
4 th .byte	Operation mode (0 is front panel operation mode , 1 is remote operation mode)
From 5 th to 25 th byte	System reserve
26 th byte	Sum code


Note

Front panel operation state is not in effect if electronic load is in calibration mode.

3.1.2 Set the input on/off state (21H)

1 st byte	Start bit (AAH)
2 nd byte	Address(0—0XFE)
3 rd byte	Command (21H)
4 th byte	Input state (0 is OFF , 1 is ON)
From 5 th to 25 th byte	System reserve
From 26 th byte	Sum code

3.1.3 Set / Read max input voltage (22H/23H)

1 st byte	Start bit (AAH)
2 nd byte	Address (0—0XFE)
3 rd byte	Command (22H/23H)
4 th byte	The Lowest byte of max voltage value
5 th byte	The lower byte of max voltage value.
6 th byte	The higher byte of max voltage value.
7 th byte	The highest byte of max voltage value.
From 8 th to 25 th byte	System reserve.
26 th byte	Sum code.


Note

Represent a voltage upper limit value by 4 bytes of Hex. Lower bytes are in the front location, higher bytes are in the later location. 1 represent 1mV. For Example : The voltage upper limit is 16.000V , the hex code is 0X00003E80 , then the 4th byte is 0X80 , 5th byte is 0X3E , 6th byte is 0X00 , 7TH byte is 0X00.

3.1.4 Set / Read the max input current (24H/25H)

1 st byte	Start bit (AAH)
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2 nd byte	Address(0—0XFE)
3 rd byte	Command (24H/25H)
4 th byte	The Lowest byte of max current value
5 th byte	The Lowest byte of max current value
6 th byte	The higher byte of max current value
7 th byte	The highest byte of max current value
From 8 th to 25 th byte	System reserve
26 th byte	Sum code

 **Note**

Represent an current value by 4 bytes of Hex .Lower bytes are in the front location, higher bytes are in the later location.1 represent 0.1mA,If setting upper limit is 3.0000A , the hex code is 0X00007530 , then the 4th byte is 0X30 , 5th is 0X75 , 6th is 0X00 , 7th is 0X00.

3.1.5 Set / Read max input power (26H/27H)

1 st byte	Start bit (AAH)
2 nd byte	Address (0—0XFE)
3 rd byte	Command (26H/27H)
4 th byte	The lowest byte of max power value.
5 th byte	The lower byte of max power value
6 th byte	The higher byte of max power value.
7 th byte	The highest byte of max power value.
From 8 th to 25 th byte	System reserve
26 th byte	Sum code

 **Note**

Represent power value by 4 bytes of Hex. Lower bytes are in the Front location, higher bytes are in the later location. 1 represents 1mW. If setting upper value is 200.000W , the hex code is 0X00030d40 ,then the 4th byte is 0X40 ,5th is 0X0d ,6th is 0X03 ,7th is 0X00.

3.1.6 Select / Read operation mode(CC/CV/CR) of electronic load (28H/29H)

1 st byte	Start bit (AAH)
2 nd byte	Address (0—0XFE)
3 rd byte	Command (28H/29H)
4 th byte	Mode (0 is CC mode, 1 is CV mode , 2 is CR mode)
From 5 th to 25 th byte	System reserve
26 th byte	Sum code

3.1.7 Set / Read current value of CC mode (2AH/2BH)

1 st byte	Start bit (AAH)
2 nd byte	Address (0—0XFE)
3 rd byte	Command (2AH/2BH)
4 th byte	The lowest byte of current value
5 th byte	The lower byte of current value.
6 th byte	The higher byte of current value.

7 th byte	The highest byte of current value.
From 8 th To 25 th byte	System reserve
27 th byte	Sum code

 **Note**

Represent current by 4 bytes of Hex. Lower bytes are in the front location, higher bytes are in the later location. For example: current is 3.0000A , Hex code is 0X00007530 , NO. 4 byte is 0X30 , NO. 5 byte is 0X75 , NO. 6 byte is 0X00 , NO. 7 byte is 0X00.

3.1.8 Set / Read voltage value of CV mode. (2CH/2DH)

1 st byte	Start bit (AAH)
2 nd byte	Address (0—0XFE)
3 rd byte	Command (2CH/2DH)
4 th byte	The lowest byte of voltage value.
5 th byte	The lower byte of voltage value.
6 th byte	The higher byte of voltage value.
7 th byte	The highest byte of voltage value.
From 8 th to 25 th byte	System reserve
26 th byte	Sum code

 **Note**

Represent voltage by 4 bytes of Hex. Lower bytes are in the front location, higher bytes are in the later location. For example :voltage is 16.000V , Hex code is 0X00003E80 , 4th byte 0XB0 , 5TH byte is 0X3E , 6th byte is 0X00 , 7th bytes 0X00.

3.1.9 Set / Read resistance value CR mode (30H/31H)

1 st byte	Start bit (AAH)
2 nd byte	Address (0—0XFE)
3 rd byte	Command (30H/31H)
4 th byte	The lowest byte of resistance value.
5 th byte	The lower byte of resistance value.
6 th byte	The higher byte of resistance value.
7 th byte	The highest byte of resistance value.
8 th to 25 th byte	System reserve
26 th byte	Sum code

 **Note**

Represent resistance value by 4 bytes of Hex. Lower bytes are in the front location, higher bytes are in the later location. If resistance value is 200.000R , Hex code is 0X00030d40 , 4TH byte is 0X40 , 5TH byte is 0X0d , 6th byte is 0X03 , 7th byte is 0X00.

3.1.10 Set communication address (54H)

1 st byte	Start bit (AAH)
2 nd byte	Address (0—0XFE)
3 rd byte	Command (54H)
4 th byte	New communication address (0~0XFE)
From 5 th to 25 th byte	System reserve
26 th byte	Sum code

3.1.11 Enquire the state of remote sense mode (57H)

1 st byte	Start bit (AAH)
2 nd byte	Address (0—0XFE)
3 rd byte	Command (57H)
4 th byte	Remote mode state (0:OFF,1:ON)
5 th to 25 th byte	System reserve
26 th byte	Sum code

3.1.12 Read input voltage, current, power and relative state. (5FH)

1 st byte	Start bit (AAH)
2 nd byte	Address (0—0XFE)
3 rd byte	Command (5FH)
From 4 th to 7 th byte	Actual input voltage value (Lower bytes are in the front location, higher bytes are in the later location)
From 8 th to 11 th byte	Actual input current value (Lower bytes are in the front location, higher bytes are in the later location)
From 12 th to 15 th byte	Actual input power value (Lower bytes are in the front location, higher bytes are in the later location)
16 th byte	Operation state register
From 17 th to 18 th byte	Demand state register
From 19 th to 25 th byte	System reserve
26 th byte	Sum code

BIT	Signal	Meaning
Operation status register		
0	CAL	Load is in calibration mode
2	REM	Remote control mode
3	OUT	Load input state
4	LOCAL	LOCAL button state(0 is disabled,1 is enabled)
5	SENSE	Remote sense mode
6	LOT	FOR LOAD ON timer status
Enquire status register		
0	RV	Reverse voltage
1	OV	Over voltage
2	OC	Over current
3	OP	Over power
4	OH	Over temperature
5	SV	Remote sense wires are disconnected
6	CC	Constant current
7	CV	Constant voltage
8	CP	Constant power
9	CR	Constant resistance

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2. Visit ITECH website: www.itechate.com.
3. Select the most convenient contact method for further information.