IT8500+ Series Frame Format

Programmable DC Electronic Load

Models IT8500+

Directory

Warranty Information

Certification

We certify that this product met its published specifications at time of shipment from the factory.

Warranty

This hardware product is warranted against defects in material and workmanship for a period of ONE year from date of delivery. IT8500 series electronic load for use with a hardware product and when properly installed on that hardware product, are warranted not to fail to execute their programming instructions due to defects in material and workmanship for a period of 90 days from date of delivery. During the warranty period our company will either repair or replace products which prove to be defective. Our company does not warranty that the operation for the software firmware or hardware shall be uninterrupted or error free.
For warranty service, with the exception of warranty options, this product must be returned to a service facility designated by our company. Customer shall prepay shipping charges by (and shall pay all duty and taxes) for products returned to our place for warranty service. Our company shall pay for return of products to Customer.

Limitation of Warranty

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by the Customer, Customer-supplied software or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product, or improper site preparation and maintenance.

Assistance

The above statements apply only to the standard product warranty. Warranty options product maintenance agreements and customer assistance agreements are also available.

Safety Summary

The following general safety precautions must be observed during all phases of operation of this instrument. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the instrument .We assumes no liability for the customer's failure to comply with these requirements.

Environmental Conditions

This instrument is intended for indoor use. Pollution degree 2 environments. It is designed to operate at a maximum relative humidity of 95% and at altitudes of up to 2000 meters. Refer to the specifications tables for the ac mains voltage requirements and ambient operating temperature range.

Before Applying Power

Verify that all safety precautions are taken. Note the instrument's external markings described under "Safety Symbols".

Ground the Instrument

This product is a Safety Class 1 instrument (provided with a protective earth terminal). To minimize shock hazard, the instrument chassis and cover must be connected to an electrical ground. The instrument must be connected to the ac power mains through a grounded power cable, with the ground wire firmly connected to an electrical ground (safety ground) at the power outlet. Note: Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury.

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE

Do not operate the instrument in the presence of fumes or flammable gases.

KEEP AWAY FROM LIVE CIRCUITS

Operating personnel must not remove instrument covers except as instructed in this Guide for installing or removing electronic load modules. Component replacement and internal adjustments must be made only by qualified service personnel. Do not replace components with power cable connected. Under certain conditions dangerous voltages may exist even with the power cable removed. To avoid injuries always disconnect power, discharge circuits, and remove external voltage sources before touching components.

DO NOT SERVICE OR ADJUST ALONE

Do not try to do some internal service or adjustment unless another person capable of rendering first aid resuscitation is present.

Safety Symbols

$\overline{\underline{}}$ Direct current

$\sim$ Alternating current

$\overline{\sim}$ Both direct and alternating current

⏚ Protective earth (ground) terminal

⚠ Caution (refer to accompanying documents)

WARNING

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

CAUTION

The CAUTION sign denotes a hazard. It calls attention to an operating procedure, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the

Chapter 1 Remote Operation Mode

DB9 in the rear panel of electronic load could connect with RS-232 through a TTL connector. The following information may help you to know how to control the electronic load through PC.

1.1 Communication Modules Introduction

DB9 in the rear panel of the DC load IT8511+/IT8511A+/IT8511B+/IT8512+ /IT8512A+/IT8512B+/IT8512C+/IT8512H+/IT8513A+/IT8513C+ is TTL level, which can be connected to the serial port of the PC through the level conversion of the accessory. The communication module is IT-E121/IT-E121A/IT-E122/IT-E123.

IT8513B+/IT8514B+/IT8514C+/IT8516C+ comes standard with RS232 and USB communication interfaces, no need to purchase IT-E121/IT-E121A/IT-E122/IT-E123.

> **CAUTION**
>
> Please do not connect the standard RS232 cable to the IT8511+/IT8511A+/IT8511B+/IT8512+/IT8512A+/IT8512B+/IT851 2C+/IT8512H+/IT8513A+/IT8513C+ electronic load, which may damage the instrument.

IT-E121 Communication Module

The DB9 interface connector on the rear panel of the DC load is TTL voltage level; You can use IT-E121 communication module and IT-E121's own RS232 extension cable to connect the DB9 interface connector of the DC load and the RS-232 interface connector of the computer for communication.

IT-E121 communication cable
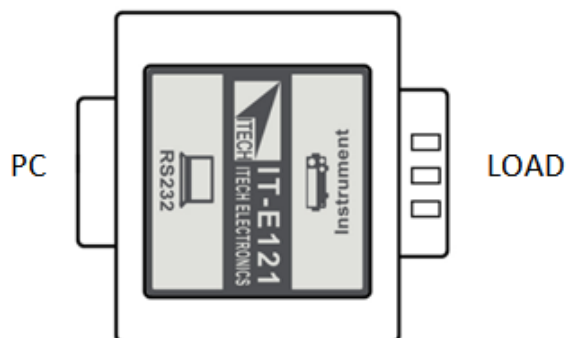
IT-E121A Communication Module

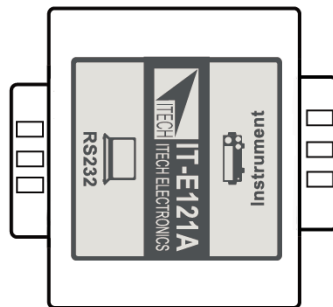The DB9 interface connector on the rear panel of the DC load is TTL voltage level; IT-E121A is derived from IT-E121 (not including communication cable). The main difference is that the DB9 female connector on the RS232 end is converted to a male connector.

IT-E121A communication cable

IT-E122 Communication Module

The DB9 interface connector on the rear panel of the DC load is TTL voltage level; IT-E122 has a USB interface (male connector B) on one end, you can use IT-E122 and a standard USB extension cable (type B female connector at one end and type A at one end) to connect the DB9 interface connector of the DC load and the USB interface connector of computer for the communication.

After connecting the load and computer by USB, you need to install IT-E122 driver (download from ITECH official website or contact ITECH agent). The device manager of PC will display 'Prolific USB-to-Serial COM Port' after installing.

IT-E122 communication cable

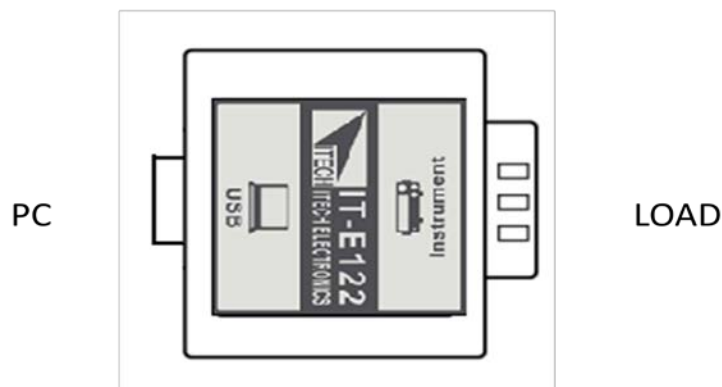## IT-E123 Communication Module

The DB9 interface connector on the rear panel of the DC load is TTL voltage level;

The interface on both side port of IT-E123 are DB9 interface and RS485

interface, you can use the communication module IT-E123 and an a standard RS485-RS232 conversion cable to connect the DB9 interface connector of the DC load and the RS-232 interface connector of computer for the communication.

RS485 pins
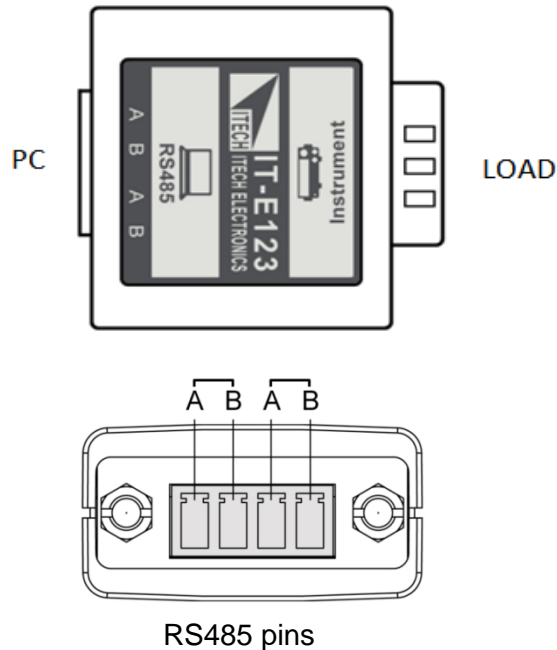
1.2 Communication with PC

Before using the remote operation mode, please make sure that the baud rate and communication address in the DC load are the same as in the computer software, otherwise, the communication will fail, you can change the baud rate and communication address from the front panel or from computer.

DB9 Serial Port

In order for the computer to communicate with the DC load, both must be set to the same RS-232 settings. These communication settings are:

1. Baud rate: 4800,9600,19200 and 38400 are selectable, default setting is 9600.

2. Data bit: 8 bit

3. Stop bit: 1

4. Parity: None

5. Address: the range is from 0 to 31, default setting is 0

Start Bit	8 Data Bits	Parity=None	Stop Bit
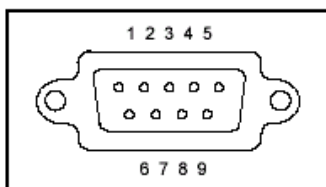
RS-232

IT8513B+/IT8514B+/IT8514C+/IT8516C+ electronic load has a DB9 interface on rear panel. Connect E-load and computer by cable of COM ends (DB9). Composite key **[Shift] + [8]** on front board can be used to enter system menu for activation.

● RS-232 Interface

In RS-232 interface, all SCPI commands can be used for programming. If RS-232 interface is selected, in accordance with internal connection of data terminal equipment (DTE) and data communication equipment (DCE) as defined in EIA RS-232, the load is connected to another DTE (e.g., PC COM interface) with direct-connected Modem cable.

RS232 Pins of Plug

Base Pin Number	Description
1	No conjunction
2	TXD, data transmission
3	RXD, data receiving
4	No conjunction
5	GND, grounding
6	No conjunction
7	CTS, clear to send
8	RTS, request to send
9	No conjunction

● Communication Setup

Please ensure the PC and the load have the same configuration in the following items.

Baudrate: 9600(4800, 9600, 19200, 38400). You could enter the system menu to set the baudrate.

Data bit: 8

Stop bit: 1

Parity bit: (none, even, odd)

EVEN   8 data bits have even parity

ODD   8 data bits have odd parity

NONE   8 data bits have no parity

Native machine address: (0 ~31, factory default is 0)

Start Bit	8 Data Bits	Parity=None	Stop Bit

USB Interface

Connect the load and the computer using a cable with two USB interfaces (each end). All functions of the load can be programmed via USB.

After connecting the load and computer by USB, you need to install IT-E122 driver (download from ITECH official website or contact ITECH agent). The device manager of PC will display 'Prolific USB-to-Serial COM Port' after installing.

Notes: Only IT8513B+/IT8514B+/IT8514C+/IT8516C+ models have the USB communication interface. After the driver is installed successfully, use USB line to connect in communication. (Please don't connect DB9 interface at the same time). Don't need to set the menu.

Chapter 2 Communication Order for IT8500+

Frame Format

Frame length is 26 bytes. Details as following:

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

Description ：

1．Start bit is AAH，occupies one byte.
2．Address range from 0 to 31, occupies one byte. 0XFF is boardcast address.
3．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/CW/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
2EH	Set CW mode watt value
2FH	Enquire CW mode watt value
30H	Set CR mode resistance value
31H	Enquire CR mode resistance value
32H	Set CC mode transient current and timer parameter.
33H	Enquire CC mode transient parameter
34H	Set CV mode transient voltage and timer parameter.
35H	Enquire CV mode transient parameter
36H	Set CW mode transient watt and timer parameter
37H	Enquire CW mode transient parameter
38H	Set CR mode transient resistance and timer parameter
39H	Enquire CR mode transient parameter
3AH	Set the list operation mode (CC)
3BH	Enquire the list operation mode.
3CH	Set the list repeat mode (ONCE / REPEAT)
3DH	Enquire the list repeat mode.
3EH	Set list steps counts.
3FH	Enquire list steps counts
40H	Set one of the step's current and time values.
41H	Enquire one of the step's current and time values.
4CH	Save list file in appointed area.
4DH	Recall the list file from the appointed area.
50H	Set timer value of FOR LOAD ON
51H	Enquire timer value of FOR LOAD ON
52H	Disable/Enable timer of FOR LOAD ON
53H	Enquire timer state of FOR LOAD ON
54H	Set communication address
55H	Enable/Disable LOCAL control button.
56H	Enable/Disable remote sense mode.
57H	Enquire the state of remote sense mode.
58H	Set trigger source.
59H	Enquire trigger source.
5AH	Sending a trigger signal to trigging the electronic load.
5BH	Saving user's setting value in appointed memory area for recall.
5CH	Recall user's setting value in appointed memory area.
5DH	Set function mode(FIXED/SHORT/TRAN/LIST/BATTERY).
5EH	Enquire function mode state.
5FH	enquire input voltage, current, power and relative state
01H	Get the information of E-Load(rated current/voltage,min voltage,max power,max

	resistance,min resistance)
02H	Set hardware OPP point
03H	Enquire hardware OPP point
80H	Set software OCP point
81H	Enquire software OCP point
82H	Set OCP delay time
83H	Enquire OCP delay time
84H	Enable/disable OCP function
85H	Enquire the state of OCP function
86H	Set software OPP point
87H	Enquire software OPP point
88H	Set software OPP delay time
89H	Enquire software OPP delay time
8AH	Set the first measuring point
8BH	Enquire the first measuring point
8CH	Set the second measuring point
8DH	Enquire the second measuring point
8EH	Set Vd value of CR-LED mode
8FH	Enquire Vd value of CR-LED mode
90H	Clear the protection state
91H	Enable/disable voltage autorange function
92H	Enquire the state of voltage autorange
93H	Enable/disable CR-LED function
94H	Enquire the state of CR-LED mode
9DH	Provide a trigger signal,nomatter what the current trigger source it is.
A0H	Read related information of E-load(working time,the rest time of the timer)
A1H	Read related information of E-load(max input voltage and current,min input votage and current)
A2H	Catch the max measuring voltage in list mode
A3H	Catch the min measuring voltage in list mode
A4H	Catch the max measuring current in list mode
A5H	Catch the min measuring current of E-load
A6H	enquire the capacitance
B0H	Set current rising slope
B1H	Enquire current rising slope
B2H	Set current falling slope
B3H	Enquire current falling slope
B4H	Set the voltage upper limit in CC mode
B5H	Enquire the voltage upper limit in CC mode
B6H	Set the voltage lower limit in CC mode
B7H	Enquire the voltage lower limit in CC mode
B8H	Set the current upper limit in CV mode
B9H	Enquire the current upper limit in CV mode
BAH	Set the current lower limit in CV mode

BBH	Enquire the current lower limit in CV mode
BCH	Set the voltage upper limit in CP mode
BDH	Enquire the voltage upper limit in CP mode
BEH	Set the voltage lower limit in CP mode
BFH	Enquire the voltage lower limit in CP mode
C0H	Set the max input resistance
C1H	Enquire the max input resistance
C2H	Set the voltage upper limit in CR mode
C3H	Enquire the voltage upper limit in CR mode
C4H	Set the voltage lower limit in CR mode
C5H	Enquire the voltage lower limit in CR mode
C6H	Set the current range in list mode
C7H	Enquire the current range in list mode
D0H	Set step counts of autotest file
D1H	Enquire step counts of autotest file
D2H	Set short steps
D3H	Read short steps
D4H	Set pause steps
D5H	Enquire pause steps
D6H	Set the on-load time of single step
D7H	Enquire the on-load time of single step
D8H	Set the delay time of single step
D9H	Enquire the delay time of single step
DAH	Set the no-load time of single step
DBH	Enquire the no-load time of single step
DCH	Set autotest stop condition
DDH	Enquire autotest stop condition
DEH	Set autotest chain file
DFH	Enquire autotest chain file
E0H	Save autotest file
E1H	Recall autotest file
0EH	Set Von mode
0FH	Enquire Von mode
10H	Set Von point
11H	Enquire Von point

NOTE

If control output of electronic through PC, please setting electronic load to PC control state. Command is 20H.

4． From 4th byte to 25th byte are information contents.
5． 26th is checksum code, is the sum of the former 25 bytes.

Communication Protocol

1. Set control mode（20H）

1st byte	Start bit (AAH)
2nd byte	Address (0—31,0XFF)
3rd byte	Command（20H）
4th .byte	Operation mode（0 is front panel operation mode ，1 is remote operation mode ）
From 5th to 25th byte	System reserve
26th byte	Sum code

NOTE

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

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2. Set the input on/off state （21H）

1st byte	Start bit (AAH)
2nd byte	Address(0—31,0XFF)
3rd byte	Command（21H）
4th byte	Input state（0 is OFF，1is ON）
From 5th to 25th byte	System reserve
From26th byte	Sum code

3. Set / Read max input voltage（22H/23H）

1st byte	Start bit (AAH)
2nd byte	Address (0—31,0XFF)
3rd byte	Command（22H/23H）
4th byte	The Lowest byte of max voltage value
5th byte	The lower byte of max voltage value.
6th byte	The higher byte of max voltage value.
7th byte	The highest byte of max voltage value.
From 8th to 25th byte	System reserve.
26th 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.

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

1st byte	Start bit (AAH)
2nd byte	Address(0—31,0XFF)
3rd byte	Command（24H/25H）

4th byte	The Lowest byte of max current value
5th byte	The Lowest byte of max current value
6th byte	The higher byte of max current value
7th byte	The highest byte of max current value
From 8th to 25th byte	System reserve
26th bye	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 **3.0000**A，the hex code is **0X00007530**，then the 4th byte is **0X30**，5th is **0X75**，6th is 0X00，7th is **0X00**。

5. Set / Read max input power（26H/27H）

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

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

1st byte	Start bit（AAH ）
2nd byte	Address (0—31,0XFF)
3rd byte	Command（28H/29H）
4th byte	Mode（0 is CC mode, 1 is CV mode , 2 is CW mode , 3 is CR mode ）
From 5th to 25th byte	System reserve
26th byte	Sum code

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

1st byte	Start bit（AAH ）
2nd byte	Address (0—31,0XFF)
3rd byte	Command （2AH/2BH）
4th byte	The lowest byte of current value
5th byte	The lower byte of current value.

6th byte	The higher byte of current value.
7th byte	The highest byte of current value.
From 8th To 25th byte	System reserve
27th 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 **3.0000**A，Hex code is **0X00007530**，NO. 4 bye is **0X30**，NO. 5 bye is **0X75**，NO. 6 bye is 0X00，NO. 7 bye is **0X00**。

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

1st byte	Start bit（AAH ）
2nd byte	Address (0—31,0XFF)
3rd byte	Command（2CH/2DH）
4th byte	The lowest byte of voltage value.
5th byte	The lower byte of voltage value.
6th byte	The higher byte of voltage value.
7th byte	The highest byte of voltage value.
From 8th to 25th byte	System reserve
26th 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 **16.000**V，Hex code is **0X00003EB0**，4th byte **0XB0**，5TH byte is **0X3E**，6th byte is 0X00，7th bytes **0X00**。

9. Set / Read watt value of CW mode（2EH/2FH）

1st byte	Start bit（AAH ）
2nd byte	Address (0—31,0XFF)
3rd byte	Command（2EH/2FH）
4th byte	The lowest byte of max power value
5th byte	The lower byte of max power value
6th byte	The higher byte of max power value
7th byte	The highest byte of max power value
8th to 25th byte	System reserve
26th byte	Sum code

NOTE

Represent power by 4 bytes of Hex. Lower bytes are in the front location, higher bytes are in the later location. For example :power is **200.000W**，Hex is **0X00030d40**，4th byte is **0X40**，5th byte is **0X0d**，6th byte is 0X03，7th byte is **0X00**。

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

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

11. Set / Read CC mode transient current and timer parameter. （32H/33H）

1st byte	Start bit（AAH）
2nd byte	Address (0—31,0XFF)
3rd byte	Command（32H/33H）
From 4th byte to 7th byte	Setting value of current A (Lower bytes are in the front location, higher bytes are in the later location.)
From 8th byte to 9th byte.	Time value of timer A ((Lower bytes are in the front location, higher bytes are in the later location) (1 represent 0.1mS)
From 10th to 13th byte	Setting value of current B (Lower bytes are in the front location, higher bytes are in the later location)
From 14th to 15th byte	Time value of timer B (Lower bytes are in the front location, higher bytes are in the later location) (1 represent 0.1mS)
16th byte	Transition operation mode (0 is CONTINUES, 1 is PULSE, 2 is TOGGLED)
From 17th to 25th byte	System reserve
26th byte	Sum code

12. Set / Read CV transient voltage and timer parameter.（34H/35H）

1st byte	Start bit（AAH）
2nd byte	Address (0—31,0XFF)
3rd byte	Command（34H/35H）
From 4th to 7th byte.	Setting value of voltage A (Lower bytes are in the front location, higher bytes are in the later location)
From 8th to 9th byte.	Time value of timer A (Lower bytes are in the front location, higher bytes are in the later location) (1represent 0.1mS)

From 10th to 13th byte	Setting value of voltage B(Lower bytes are in the front location, higher bytes are in the later location)
From 14th to 15th byte	Time value of timer B (Lower bytes are in the front location, higher bytes are in the later location) (1represent 0.1mS)
16th byte	Transient operation mode (0 is CONTINUES,1 is PULSE,2 is TOGGLED)
From 17th to 25th byte	System reserve
26th byte	Sum code

13. Set /Read CW transient watt and timer parameter（36H/37H）

1st byte	Start bit（AAH ）
2nd byte	Address (0—31,0XFF)
3rd byte	Command（36H/37H）
From 4th to 7th byte	Setting value of power A (Lower bytes are in the front location, higher bytes are in the later location)
From 8th to 9th byte	Time value of timer A (Lower bytes are in the front location, higher bytes are in the later location) (1 represent 0.1mS)
From 10th to 13th byte	Setting value of power B(Lower bytes are in the front location, higher bytes are in the later location)
From 14th to 15th byte	Time value of timer B (Lower bytes are in the front location, higher bytes are in the later location) (1 represent 0.1mS)
16th byte	Transition operation mode (0 is CONTINUES,1 is PULSE,2 is TOGGLED)
From 17th to 25th byte	System reserve
26th byte	Sum code

14. Set / Read CR transient resistance and timer parameter（38H/39H）

1st byte	Start bit（AAH ）
2nd byte	Address (0—31,0XFF)
3rd byte	Command（38H/39H）
From 4th byte to 7th byte	Setting value of resistance A (Lower bytes are in the front location, higher bytes are in the later location)
From 8th byte to 9th byte.	Time value of timer A (Lower bytes are in the front location, higher bytes are in the later location) (1 represents 0.1mS)
From 10th byte to 13th byte	Setting value of resistance B (Lower bytes are in the front location, higher bytes are in the later location)
From 14th byte to 15th byte	Time value of timer B (Lower bytes are in the front location, higher bytes are in the later location) (1 represents 0.1mS)
16th byte	Transition operation mode (0 is CONTINUES,1 is PULSE,2 is TOGGLED)
17th byte to 25th byte	System reserve
26th byte	Sum code

15．Set /Read the list operation mode (CC)（3AH/3BH）

1st byte	Start bit（AAH ）
2nd byte	Address (0—31,0XFF)
3rd byte	Command（3AH/3BH）

4th byte	LIST operation mode（0 is CC mode）
From 5th to 25 byte	System reserve
26th byte	Sum code

16. Set / Read the list repeat mode. (3CH/3DH)

1st byte	Start bit（AAH ）
2nd byte	Address (0—31,0XFF)
3rd byte	Command（3CH/3DH）
4th byte	LIST repeat operation mode(0 is ONCE, 1 is REPEAT,65535 represents no limit)
From 5th to 25th byte	System reserve
26th byte	Sum code

17. Set / Read list step counts. (3EH/3FH)

1st byte	Start bit（AAH ）
2nd byte	Address (0—31,0XFF)
3rd byte	Command（3EH/3FH）
From 4th byte to 5th byte	LIST steps count
From 6th to 25th byte	System reserve
26th byte	Sum code

18. Set / Read one of the step's current and time values. (40H/41H)

1st byte	Start bit（AAH ）
2nd byte	Address (0—31,0XFF)
3rd byte	Command（40H/41H）
From 4th byte to 5th byte	Appointed one step
From 6th to 9th byte	Current value of current step (Lower bytes are in the front location, higher bytes are in the later location)
From 10th to 13th byte	Time value of current step (Lower bytes are in the front location, higher bytes are in the later location) (1 represent 0.1mS)
From 14th to 15th byte	Single step up/down slope value (Lower bytes are in the front location, higher bytes are in the later location). The maximum slope value is used when the value exceeds the allowed value to make the old and new IT8500 compatible.
From 16th to 25th byte	System reserve
26th byte	Sum code

19. Save / Recall list file in appointed area.. (4CH/4DH)

1st byte	Start bit（AAH ）
2nd byte	Address (0—31,0XFF)
3rd byte	Command（4CH/4DH）
4th byte	Storing area (1 ~ 7)
From 5th to 25th byte	System reserve
26th byte	Sum code

20. Setting / Reading timer value of FOR LOAD ON (50H/51H）

1st byte	Start bit (AAH)
2nd byte	Address (0—31,0XFF)
3rd byte	Command（50H/51H）
4th byte	The lowest byte of time value in timer. (1 represent 1S)
5th byte	The highest byte of time value in timer.
From 8th to 25th byte	System reserve
26th byte	Sum code

Time unit in Timer is S, 1S is represented by 1.

21. Disable / Enable timer of FOR LOAD ON (52H); Enquire timer state of FOR LOAD ON (53H)

1st byte	Start bit (AAH)
2nd byte	Address (0—31,0XFF)
3rd byte	Command（52H/53H）
4th byte	Timer state (0:OFF,1:ON)
From 5th to 25th byte	System reserve
26th byte	Sum code

22. Set communication address (54H)

1st byte	Start bit (AAH)
2nd byte	Address (0—0XFE)
3rd byte	Command （54H）
4th byte	New communication address (0~31)
From 5th to 25th byte	System reserve
26th byte	Sum code

23. Enable/Disable LOCAL control mode. (55H)

1st byte	Start bit (AAH)
2nd byte	Address (0—31)
3rd byte	Command（55H）
4th byte	State of LOCAL button(0:disable,1:enable ")
From 5th to 25th byte	System reserve
26th byte	Sum code

24. Enable / Disable remote sense mode. (56H) Enquire the state of remote sense mode. (57H)

1st byte	Start bit (AAH)
2nd byte	Address (0—31,0XFF)
3rd byte	Command（56H/57H）
4th byte	Remote mode state (0:OFF,1:ON)
5th to 25th byte	System reserve
26th byte	Sum code

25. Set / Enquire trigger source. (58H/59H)

1st byte	Start bit（AAH）
2nd byte	Address (0—31,0XFF)
3rd byte	Command （58H/59H）
4th byte	**Trigger mode** (0:Manual,1: External,2:Bus,3:Hold)
From 5th to 25th byte	System reserve
26th byte	Sum code

26. Send a trigger signal to trigging the electronic load. (5AH)

1st byte	Start bit（AAH）
2nd byte	Address (0—31,0XFF)
3rd byte	Command（5AH）
From 4th to 25th byte	System reserve
26th byte	Sum code

27. Saving / Recall user's setting value in appointed memory area for recall. (5BH/5CH)

1st byte	Start bit（AAH）
2nd byte	Address (0—31,0XFF)
3rd byte	Command（5BH/5CH）
4th byte	Storing area
From 5th to 25th byte	System reserve
26th byte	Sum code

28. Selecting / Getting FIXED/SHORT/TRAN/LIST/ BATTERY function mode. (5DH/5EH)

1st byte	Start bit（AAH）
2nd byte	Address (0—31,0XFF)
3rd byte	Command（5DH/5EH）
4th byte	Work mode (0:FIXED,1:SHORT, 2:TRANSITION,3:LIST,4: BATTERY)
From 5th to 25th byte	System reserve
26th byte	Sum code

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

1st byte	Start bit（AAH）
2nd byte	Address (0—31,0XFF)
3rd byte	Command （5FH）
From 4th to 7th byte	Actual input voltage value (Lower bytes are in the front location, higher bytes are in the later location)
From 8th to 11th byte	Actual input current value (Lower bytes are in the front location, higher bytes are in the later location)
From 12th to 15th byte	Actual input power value (Lower bytes are in the front location, higher bytes are in the later location)
16th byte	Operation state register
From 17th to 18th byte	Demand state register

From 19th to 25th byte	System reserve
26th byte	Sum code

Operation status register

7	6	5	4	3	2	1	0
NO USE	LOT	SENSE	LOCAL	OUT	REM	WTG	CAL
	FOR LOAD ON timer status	Remote sense mode	LOCAL button state(0 is disabled,1 is enabled)	Load input state	remote control mode	Waitting for a trigger signal	Load is in calibration mode

Enquire status register

0	RV	Reverse voltage
1	OV	Over voltage
2	OC	Over current
3	OP	Over power
4	OT	Over temperature
5	SV	remote sense wires are disconnected
6	CC	Constant current
7	CV	Constant voltage
8	CW	Constant power
9	CR	Constant resistance
10	PASS	Pass autotest
11	FAULT	fail to pass autotest
12	COMPLET	Complete autotest

Get the information of E-Load(rated max current,max voltage,min voltage,max power,max resistance,min resistance). (01H)

1st byte	Start bit（AAH）
2th byte	Address（0—31,0XFF)
3th byte	Command（01H）
From 4th to 7th byte	Rated max current (Lower bytes are in the former location, higher bytes are in the later location)
From 8th to 11th byte	Rated max voltage(Lower bytes are in the former location, higher bytes are in the later location)
From 12th to 15th byte	Rated min voltage (Lower bytes are in the former location, higher bytes are in the later location)
From 16th to 19th byte	Rated max power(Lower bytes are in the former location, higher bytes are in the later location)
From 20th to 23th byte	Rated max resistance(Lower bytes are in the former location, higher bytes are in the later location)
From 24th to 25th byte	Rated min resistance (Lower bytes are in the former location, higher bytes are in the later location)

26th byte	Sum code

30. Set/Enquire hardware OPP value (02H/03H)

1st byte	Start bit (AAH)
2th byte	Address (0—31,0XFF)
3th byte	Command （02H/03H）
From 4th to 7th byte	OPP value (Lower bytes are in the former location, higher bytes are in the later location)
From 8th to 25th byte	System reserve
26th byte	Sum code

31. Set / Read OCP value. (80H/81H)

1st byte	Start bit (AAH)
2th byte	Address (0—31,0XFF)
3th byte	Command （80H/81H）
From 4th to 7th byte	OCP value (Lower bytes are in the former location, higher bytes are in the later location)
From 8th to 25th byte	System reserve
26th byte	Sum code

32. Set / Read OCP delay time.(82H/83H)

1st byte	Start bit (AAH)
2th byte	Address (0—31,0XFF)
3th byte	Command （82H/83H）
From 4th	Delay time
From 5th to 25th byte	System reserve
26th byte	Sum code

33. Enable/Disable OCP function.(84H/85H)

1st byte	Start bit (AAH)
2th byte	Address (0—31,0XFF)
3th byte	Command （84H/85H）
From 4th	Set OCP state (0:off 1:on)
From 5th to 25th byte	System reverse
26th byte	Sum code

34. Set/Enquire software OPP value. (86H/87H)

1st byte	Start bit (AAH)
2th byte	Address (0—31,0XFF)
3th byte	Command （86H/87H）

From 4th to 7th byte	Software OPP value (Lower bytes are in the former location, higher bytes are in the later location)
From 8th to 25th byte	System reserve
26th byte	Sum code

35. Set/Enquire software OPP delay time.(88H/89H)

1st byte	Start bit (AAH)
2th byte	Address (0—31,0XFF)
3th byte	Command (88H/89H）
From 4th	OPP delay time
From 5th to 25th byte	System reserve
26th byte	Sum code

36. Set/Enquire the first measuring point.(8AH/8BH)

1st byte	Start bit (AAH)
2th byte	Address (0—31,0XFF)
3th byte	Command（8AH/8BH）
From 4th to 7th byte	The first measuring value(Lower bytes are in the former location, higher bytes are in the later location)
From 8th to 25th byte	System reserve
26th byte	Sum code

37. Set/Enquire the second measuring point. (8CH/8DH)

1st byte	Start bit (AAH)
2th byte	Address (0—31,0XFF)
3th byte	Command（8CH/8DH）
From 4th to 7th byte	The second measuring value(Lower bytes are in the former location, higher bytes are in the later location)
From 8th to 25th byte	System reserve
26th byte	Sum code

38. Set/Enquire Vd value in CR-LED mode.(8EH/8FH)

1st byte	Start bit (AAH)
2th byte	Address (0—31,0XFF)
3th byte	Command（8EH/8FH）
From 4th to 7th byte	Vd value (Lower bytes are in the former location, higher bytes are in the later location)
From 8th to 25th byte	System reserve
26th byte	Sum code

39. Clear protection state.(90H)

1st byte	Start bit (AAH)
2th byte	Address (0—31,0XFF)
3th byte	Command（90H）
From 4th to 25th byte	System reserve
26th byte	Sum code

40. Enable/Disable voltage autorange function.(91H/92H)

1st byte	Start bit (AAH)
2th byte	Address (0—31,0XFF)
3th byte	Command（91H/92H）
From 4th	Auto voltage range state(0:off　1:on)
From 5th to 25th byte	System reserve
26th byte	Sum code

41. Enabel/Disable CR-LED function.(93H/94H)

1st byte	Start bit (AAH)
2th byte	Address (0—31,0XFF)
3th byte	Command（93H/94H）
From 4th	CR-LED mode(0: OFF　1:ON)
From 5th to 25th byte	System reserve
26th byte	Sum code

42. Send a trigger signal.(9DH)

1st byte	Start bit (AAH)
2th byte	Address (0—31,0XFF)
3th byte	Command（9DH）　No matter the current trigger source it is, this command can provide a trigger signal
From 4th to 25th byte	System reserve
26th byte	Sum code

43. Get the information of load(on-load capacitance, on-load time…).(A0H)

1st byte	Start bit (AAH)
2th byte	Address (0—31,0XFF)
3th byte	Command（A0H）
From 4th to 7th byte	On-load capacitance (Lower bytes are in the former location, higher bytes are in the later location)
From 8th to 11th byte	On-load time or rising/falling slope (Lower bytes are in the former location, higher bytes are in the later location)

From 12th to 15th byte	The rest time of timer (Lower bytes are in the former location, higher bytes are in the later location)
From 16th to 25th byte	System reserve
26th byte	Sum code

44. Get the information of E-load(max/min input voltage/current).(A1H)

1st byte	Start bit (AAH)
2th byte	Address (0—31,0XFF)
3th byte	Command（A1H）
From 4th to 7th byte	Max input voltage (Lower bytes are in the former location, higher bytes are in the later location)
From 8th to 11th byte	Min input voltage(Lower bytes are in the former location, higher bytes are in the later location)
From 12th to 15th byte	Max input current (Lower bytes are in the former location, higher bytes are in the later location)
From 16th to 19th byte	Min input current(Lower bytes are in the former location, higher bytes are in the later location)
From 20th to 25th byte	System reserve
26th byte	Sum code

45. Catch the max measuring voltage in list mode.(A2H)

1st byte	Start bit (AAH)
2th byte	Address (0—31,0XFF)
3th byte	Command（A2H）
From 4th to 7th byte	Max measuring voltage(Lower bytes are in the former location, higher bytes are in the later location)，reset this value after enquire
From 8th to 25th byte	Syetem reserve
26th byte	Sum code

46. Catch the min measuring voltage in list mode.(A3H)

1st byte	Start bit (AAH)
2th byte	Address (0—31,0XFF)
3th byte	Command（A3H）
From 4th to 7th byte	Min measuring voltage(Lower bytes are in the former location, higher bytes are in the later location)，reset this value after enquire
From 8th to 25th byte	Syetem reserve
26th byte	Sum code

47. Catch the max measuring current in list mode.(A4H)

1st byte	Start bit (AAH)

2th byte	Address (0—31,0XFF)
3th byte	Command（A4H）
From 4th to 7th byte	max measuring current(Lower bytes are in the former location, higher bytes are in the later location)，reset this value after enquire
From 8th to 25th byte	Syetem reserve
26th byte	Sum code

48. Catch the min measuring current in list mode.(A5H)

1st byte	Start bit（AAH）
2th byte	Address (0—31,0XFF)
3th byte	Command（A5H）
From 4th to 7th byte	min measuring current(Lower bytes are in the former location, higher bytes are in the later location)，reset this value after enquire
From 8th to 25th byte	Syetem reserve
26th byte	Sum code

49. Read on-load capacitance.(A6H)

1st byte	Start bit（AAH）
2th byte	Address (0—31,0XFF)
3th byte	Command（A6H）
From 4th to 7th byte	On-load capacitace (Lower bytes are in the former location, higher bytes are in the later location)，reset this value after enquire
From 8th to 25th byte	Syetem reserve
26th byte	Sum code

50. Set/Enquire current rising slope.(B0H/B1H)

1st byte	Start bit（AAH）
2th byte	Address (0—31,0XFF)
3th byte	Command（B0/B1H）
From 4th to 7th byte	Current rising slope(Lower bytes are in the former location, higher bytes are in the later location)
From 8th to 25th byte	Syetem reserve
26th byte	Sum code

51. Set/Enquire current falling slope.(B2H/B3H)

1st byte	Start bit（AAH）
2th byte	Address (0—31,0XFF)
3th byte	Command（B2H/B3H）
From 4th to 7th byte	Current falling slope(Lower bytes are in the former location, higher bytes are in the later location)

From 8th to 25th byte	Syetem reserve
26th byte	Sum code

52. Set/Enquire the voltage upper limit in CC mode.(B4H/B5H)

1st byte	Start bit（AAH）
2th byte	Address (0—31,0XFF)
3th byte	Command（B4H/B5H）
From 4th to 7th byte	The voltage upper limit in CC mode (Lower bytes are in the former location, higher bytes are in the later location)
From 8th to 25th byte	Syetem reserve
26th byte	Sum code

53. Set/Enquire the voltage lower limit in CC mode.(B6H/B7H)

1st byte	Start bit（AAH）
2th byte	Address (0—31,0XFF)
3th byte	Command（B6H/B7H）
From 4th to 7th byte	The voltaeg lower limit in CC mode (Lower bytes are in the former location, higher bytes are in the later location)
From 8th to 25th byte	Syetem reserve
26th byte	Sum code

54. Set/Enquire the current upper limit in CV mode.(B8H/B9H)

1st byte	Start bit（AAH）
2th byte	Address (0—31,0XFF)
3th byte	Command（B8H/B9H）
From 4th to 7th byte	The current upper limit (Lower bytes are in the former location, higher bytes are in the later location)
From 8th to 25th byte	Syetem reserve
26th byte	Sum code

55. Set/Enquire the current lower limit in CV mode.(BAH/BBH)

1st byte	Start bit（AAH）
2th byte	Address (0—31,0XFF)
3th byte	Command（BAH/BBH）
From 4th to 7th byte	The current lower limit (Lower bytes are in the former location, higher bytes are in the later location)
From 8th to 25th byte	Syetem reserve
26th byte	Sum code

56. Set/Enquire the voltage upper limit in CW mode.(BCH/BDH)

1st byte	Start bit (AAH)
2th byte	Address (0—31,0XFF)
3th byte	Command（BCH/BDH）
From 4th to 7th byte	The voltaeg upper limit (Lower bytes are in the former location, higher bytes are in the later location)
From 8th to 25th byte	Syetem reserve
26th byte	Sum code

57. Set/Enquire the voltage lower limit in CW mode(BEH/BFH)

1st byte	Start bit (AAH)
2th byte	Address (0—31,0XFF)
3th byte	Command（BEH/BFH）
From 4th to 7th byte	The voltaeg lower limit (Lower bytes are in the former location, higher bytes are in the later location)
From 8th to 25th byte	Syetem reserve
26th byte	Sum code

58. Set/Read max input resistance setting of E-load.(C0H/C1H)

1st byte	Start bit (AAH)
2th byte	Address (0—31,0XFF)
3th byte	Command(C0H/C1H）
From 4th to 7th byte	max input resistance value(Lower bytes are in the former location, higher bytes are in the later location)
From 8th to 25th byte	Syetem reserve
26th byte	Sum code

59. Set/Enquire the voltage upper limit in CR mode.(C2H/C3H)

1st byte	Start bit (AAH)
2th byte	Address (0—31,0XFF)
3th byte	Command（C2H/C3H）
From 4th to 7th byte	The voltage upper limit (Lower bytes are in the former location, higher bytes are in the later location)
From 8th to 25th byte	Syetem reserve
26th byte	Sum code

60. Set/Enquire the voltage lower limit in CR mode.(C4H/C5H)

1st byte	Start bit (AAH)
2th byte	Address (0—31,0XFF)
3th byte	Command（C4H/C5H）

From 4th to 7th byte	The voltaeg lower limit (Lower bytes are in the former location, higher bytes are in the later location)
From 8th to 25th byte	Syetem reserve
26th byte	Sum code

61. Set/Enquire the current range in list mode.(C6H/C7H)

1st byte	Start bit（AAH）
2th byte	Address (0—31,0XFF)
3th byte	Command（C6H/C7H）
From 4th to 7th byte	Current range (Lower bytes are in the former location, higher bytes are in the later location)
From 8th to 25th byte	Syetem reserve
26th byte	Sum code

62. Set/Enquire autotest steps.(D0H/D1H)

1st byte	Start bit（AAH）
2th byte	Address (0—31,0XFF)
3th byte	Command (D0H/D1H）
From 4th to 5th byte	Autotest steps (Lower bytes are in the former location, higher bytes are in the later location),when one step is selected,then corresponding bit should be set to 1.
From 6th to 25th byte	System reserve
26th byte	Sum code

63. Set/Enquire Short steps.(D2H/D3H)

1st byte	Start bit（AAH）
2th byte	Address (0—31,0XFF)
3th byte	Command (D2H/D3H）
From 4th to 5th byte	Autotest short steps (Lower bytes are in the former location, higher bytes are in the later location),if one step is set to short on mode,then this bit should be set to 1
From 6th to 25th byte	System reserve
26th byte	Sum code

64. Set/Enquire Pause steps.（D4H/D5H）

1st byte	Start bit（AAH）
2th byte	Address (0—31,0XFF)
3th byte	Command (D4H/D5H）
From 4th to 5th byte	Autotest Pause steps (Lower bytes are in the former location, higher bytes are in the later location),if one step need to pause,then

	this bit should be set to 1
From 6th to 25th byte	System reserve
26th byte	Sum code

65. Set/Enquire single-step on-load time of autotest mode.（D6H/D7H）

1st byte	Start bit（AAH）
2th byte	Address (0—31,0XFF)
3th byte	Command（D6H/D7H）
4th byte	Step number
From 5th to 7th byte	Single step on-load time (Lower bytes are in the former location, higher bytes are in the later location)
From 8th to 25th byte	System reserve
26th byte	Sum code

66. Set/Enquire delay time of single-step in autotest mode.（D8H/89H）

1st byte	Start bit（AAH）
2th byte	Address (0—31,0XFF)
3th byte	Command（D8H/D9H）
4th byte	Step number
From 5th to 7th byte	Single step delay time (Lower bytes are in the former location, higher bytes are in the later location)
From 8th to 25th byte	System reserve
26th byte	Sum code

67. Set/Enquire single-step off-load time of autotest mode.(DAH/DBH)

1st byte	Start bit（AAH）
2th byte	Address (0—31,0XFF)
3th byte	Command（DAH/DBH）
4th byte	Step number
From 5th to 7th byte	Single step off-load time (Lower bytes are in the former location, higher bytes are in the later location)
From 8th to 25th byte	System reserve
26th byte	Sum code

68. Set/Enquire autotest stop condition.(DCH/DDH)

1st byte	Start bit（AAH）
2th byte	Address (0—31,0XFF)
3th byte	Command（DCH/DDH）
4th byte	Stop condition (0:complete,1:failure)

From 5th to 25th byte	System reserve
26th byte	Sum code

69. Set/Enquire autotest chain file.（DEH/DFH）

1st byte	Start bit（AAH）
2th byte	Address (0—31,0XFF)
3th byte	Command（DEH/DFH）
4th byte	Chain file number(0 repersents chain no file)
From 5th to 25th byte	System reserve
26th byte	Sum code

70. Save/Recall autotest file.(DEH/DFH)

1st byte	Start bit（AAH）
2th byte	Address (0—31,0XFF)
3th byte	Command（E0H/E1H）
4th byte	File number(0 repersents do not save)
From 5th to 25th byte	System reserve
26th byte	Sum code

71. Set/Enquire Von mode.（0EH/0FH）

1st byte	Start bit（AAH）
2th byte	Address (0—31,0XFF)
3th byte	Command（0EH/0FH）
4th byte	Von mode(0:Living 1:Latch)
From 5th to 25th byte	System reserve
26th byte	Check sum

72. Set/Enquire Von value.(10H/11H)

1st byte	Start bit（AAH）
2th byte	Address (0—31,0XFF)
3th byte	Command（10H/11H）
4th byte	Von value(Lower bytes are in the former location, higher bytes are in the later location)
From 5th to 25th byte	System reserve
26th byte	Check sum

NOTE

Receiving one frame command and verify them

If verify sum is wrong, return the parameter 90H

If setting parameter is wrong or over brim, return parameter A0H.

If command is not enforce, return to parameter B0H

If command is invalid, return to parameter C0H

Otherwise, return to parameter 80H

NOTE

Receiving one frame command and verify them

If verify sum is correct, return the relative reading data

If verify sum is wrong, return the verify command (90H)

Support process

If you have a problem, follow these steps:

1 Check the documentation for the product

2 Visit the ITECH online service Web site is www.itechate.com ,ITECH is available to all ITECH customers. It is the fastest source for up-to-date product information and expert assistance and includes the following features :

    Fast access to email AE

    Software and driver updates for the product

Call ITECH support line 4006-025-000