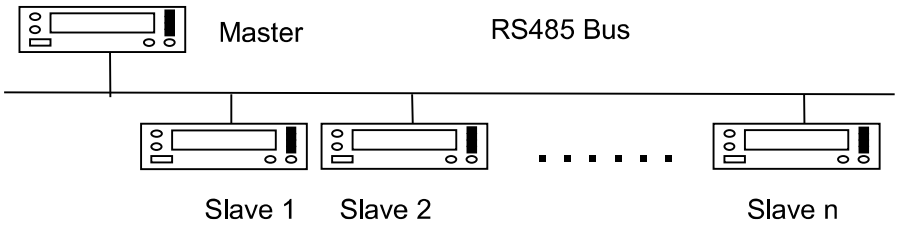
5. RS485 Interface (For Link Model of 19073 + RS485)

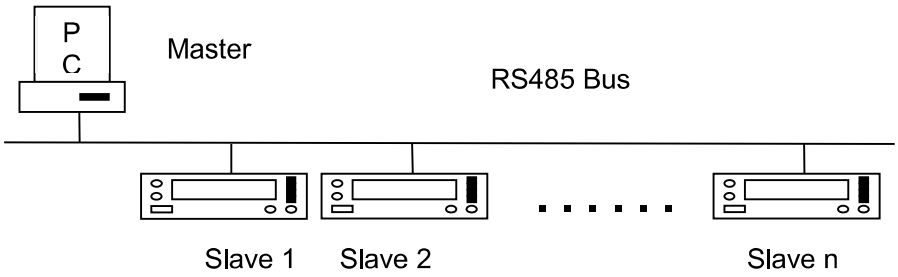
If link model of 19073 + RS485 is purchased, please refer this chapter.

5.1 Description of Function

1. RS485 interface can connect multi-device, and it up to multi-device test synchronously through Master operation.



2. It is able to connect PC from this interface (PC includes RS485 interface). The PC is instead of Master for up to remote control function.



5.2 Parameter Setting

1. Press [MENU] under [STANDBY] screen, and by using [F1], [F2] to move the highlight to “OPTION” then press [SELECT]. Move the highlight to [REMOTE INTERFACE], press [SELECT] then can enter RS485 setting screen.
2. Use [NEXT] to move the highlight, and [UP], [DOWN] to switch the setting value.
3. Setting item descriptions:
   a. INTERFACE: It selects if the RS485 interface existed or not.
   b. UNIT TYPE: It selects the device is Master or Slave.
   c. BAUD RATE: It selects the transmission rate is 4800, 9600 or 19200 baud rate.
   d. SLAVE NUMBER (Master Only): When the tester is powered-on or test completed (selectable), Master will detect if address 1 to Slave communication is normal or not.
   e. CHECK RESULT (Master Only): When CHECK RESULT ON, the rear panel signal meanings of Master are as the following:

UNDER TEST signal: It means Slave in testing.
PASS signal: It means all Slave connections are normal and the test completed.
FAIL signal: It means Slave not complete the test, may be the connections abnormal.

Notice When CHECK RESULT ON, Master will not judge the test result of the DUT, thus Master can't connect the DUT.

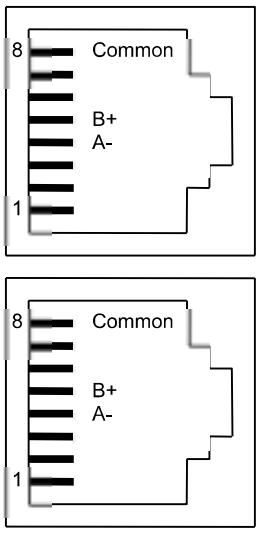
4. SEND START (Master Only): It controls that Master receives [START] signal of front panel or rear panel, if it will send the signal to all Slaves through RS485 interface.

Notice When the tester power-on, before testing if Slave communication is normal, Master will switch Slave to Remote status in advance. When the test is completed, if this switch (SEND START) set as OFF then Master will switch Slave to Local status.

5. UNIT ADDRESS (Slave Only): It sets Slave address, the range is 1-31 (Master address is fixed on 32).

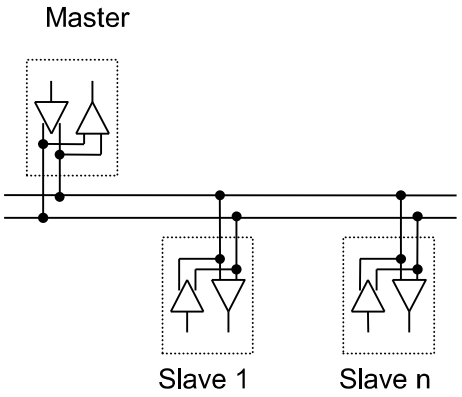
5.3 Terminal and Pin Signal Connection

RS485

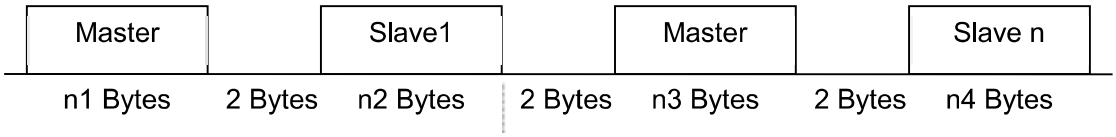


5.4 Communication Protocol

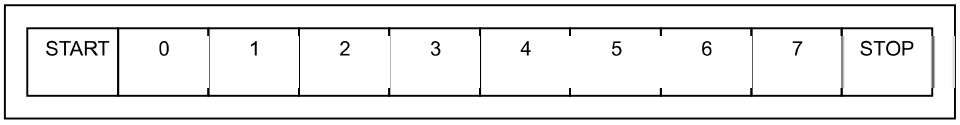
This interface uses half duplex of 2-wire system non-synchronized transmission mode.



Before the bus control is transferred, please wait the time of two characters.



The transmission format of character is 1 initial bit, 8 data bits and 1 end bit, the total is 10 bits.



The receivers don't respond any data under broadcast mode. When the receivers receive the query functions under node-to-node transmission mode, it returns the relative data. However, the receivers receive the execution command, it returns the result of executing. About Reply Message, please refer the descriptions of command.

The commands are packed into packets, Data Frame as the following:

Header	DA	SA	Length	Data Field	Checksum
1 byte	1 byte	1 byte	1 byte	n bytes	1 byte

Header: 0xAB
Destination Address: 0x0 ~ 0x7F, 0xFF is broadcast address
Source Address: 0x0 ~ 0x7F
Data Field Length: It means the length of data field.
Data Field: Please refer the command set.

Command Code	Parameter
1 byte	0 ~ n-1 bytes

Checksum: Summing these values into two's complements, included data are DA + SA + Length + Data Field

5.5 Command List

Commands	Code (Hex)
*IDN?	0x90
Display Address	0x20
Stop	0x21
Start	0x22
Offset Get/Off	0x23
Offset?	0xA3
Step Parameters	0x24
Step Parameters?	0xA4
Preset Parameters	0x25
Preset Parameters	0xA5
Store Memory	0x26
Recall Memory	0x27
Delete Memory	0x28
System Setting	0x29
System Setting?	0xA9
Key Lock	0x2A
Key Lock?	0xAA
Initialize All Steps Parameters	0x2C
Step Number?	0xAD
Remote/Local	0x2E
Remote?	0xAE
Set C Standard	0x2F
Result?	0xB1
Do Get C Standard	0x33
Reply Message	0x7F

5.6 Command Description

*IDN?

Description: It queries the devices' identification and describes the string.
Command code: 0x90
Parameter: None
Return data: The format is "Company Name, Device Name, Device S/N, Firmware Version, Hold Field"
Example:
Master (0x70): 0xAB 0x01 0x70 0x01 0x90 0xFE
Slave (0x01): 0xAB 0x70 0x01 0x16 0x90 0x43 0x48 0x52 0x4F 0x4D 0x41 0x2C 0x31 0x39 0x30 0x37 0x33 0x2C 0x30 0x2C 0x33 0x2E 0x31 0x31 0x2C 0x30 0x58

Descriptions of example
The setting meanings of HEX inputs are as the following:
0xAB = Header
0x01 = Destination Address
0x70 = Source Address
0x01 = Data Field Length
0x90 = Command Code
0xFE = Checksum

The reading meanings of returning HEX code are as the following:
0xAB = Header
0x70 = Destination Address
0x01 = Source Address
0x16 = Data Field Length
0x90 = Command Code
0x43 0x48 0x52 0x4F 0x4E 0x4D 0x41 = “CHROMA” Company Name (return data)
0x2C = “,” (return data)
0x31 0x39 0x30 0x37 0x33 = “19073” Device Name (return data)
0x2C = “,” (return data)
0x30 = “0” Device S/N (return data)
0x2C = “,” (return data)
0x33 0x2E 0x31 0x31 = “3.11” Firmware Version (return data)
0x2C = ” ,” (return data)
0x30 = ”0“Hold Field (return data)
0x58 = Checksum

Display Address

Description:	It displays the device address.
Command code:	0x20
Parameter:	None
Return data:	Reply Message
Example:	Master (0x70): 0xAB 0x01 0x70 0x01 0x20 0x6E
	Slave (0x01): 0xAB 0x70 0x01 0x02 0x7F 0x00 0x0E

Descriptions of example
The setting meanings of HEX inputs are as the following:
0xAB = Header
0x01 = Destination Address
0x70 = Source Address
0x01 = Source Address
0x20 = Command Code
0x6E = Checksum

The reading meanings of returning HEX code are as the following:
0xAB = Header
0x70 = Destination Address
0x01 = Source Address
0x02 = Source Address
0x7F = Reply Message Command Code
0x00 = Reply Message Return Data
0x0E = Checksum

Stop

Description:	Stop test
Command code:	0x21
Parameter:	None
Return data:	Reply Message
Example:	Master (0x70): 0xAB 0x01 0x70 0x01 0x21 0x6D
	Slave (0x01): 0xAB 0x70 0x01 0x02 0x7F 0x00 0x0E

Descriptions of example
The setting meanings of HEX inputs are as the following:
0xAB = Header
0x01 = Destination Address
0x70 = Source Address
0x01 = Data Field Length
0x21 = Command Code
0x6D = Checksum

The reading meanings of returning HEX code are as the following:
0xAB = Header
0x70 = Destination Address
0x01 = Source Address
0x02 = Data Field Length
0x7F = Reply Message Command Code
0x00 = Reply Message Return Data
0x0E = Checksum

Start

Description:	Start test
Command code:	0x22
Parameter:	None
Return data:	Reply Message
Example:	Master (0x70): 0xAB 0x01 0x70 0x01 0x22 0x6C Slave (0x01): 0xAB 0x70 0x01 0x02 0x7F 0x00 0x0E

Descriptions of example
The setting meanings of HEX inputs are as the following:
0xAB = Header
0x01 = Destination Address
0x70 = Source Address
0x01 = Data Field Length
0x22 = Command Code
0x6C = Checksum

The reading meanings of returning HEX code are as the following:
0xAB = Header
0x70 = Destination Address
0x01 = Source Address
0x02 = Data Field Length
0x7F = Reply Message Command Code
0x00 = Reply Message Return Data
0x0E = Checksum

Offset Get/Off

Description:	It switches OFFSET status.
Command code:	0x23
Parameter:	1 byte, 0:OFF or 2:GET
Return data:	Reply Message
Example:	Master (0x70): 0xAB 0x01 0x70 0x02 0x23 0x02 0x68 Slave (0x01): 0xAB 0x70 0x01 0x02 0x7F 0x00 0x0E

Descriptions of example
The setting meanings of HEX inputs are as the following:
0xAB = Header
0x01 = Destination Address
0x70 = Source Address
0x02 = Data Field Length
0x23 = Command Code
0x02 = 2:GET (Command Parameter)
0x68 = Checksum

The reading meanings of returning HEX code are as the following:
0xAB = Header
0x70 = Destination Address
0x01 = Source Address
0x02 = Data Field Length
0x7F = Reply Message Command Code
0x00 = Reply Message Return Data
0x0E = Checksum

Offset?

Description:	It queries OFFSET status.
Command code:	0xA3
Parameter:	None
Return data:	1 byte, 0: Off, 1:On or 2:Getting
Example:	Master (0x70):0xAB 0x01 0x70 0x01 0xA3 0xEB
	Slave (0x01): 0xAB 0x70 0x01 0x02 0xA3 0x00 0xEA

Descriptions of example
The setting meanings of HEX inputs are as the following:
0xAB = Header
0x01 = Destination Address
0x70 = Source Address
0x01 = Data Field Length
0xA3 = Command Code
0xEB = Checksum

The reading meanings of returning HEX code are as the following:
0xAB = Header
0x70 = Destination Address
0x01 = Source Address
0x02 = Data Field Length
0xA3 = Command Code
0x00 = 0: Off (Return Data)
0xEA = Checksum

Step Parameters

Description:	It sets all parameters of various steps.
Command code:	0x24
Parameter:	28 bytes

AC mode

Name	Size (byte)	Unit	Range	Description
Step index	1	-	1~10	Must less or equal original step number + 1
Mode	1	-	1	AC mode
Source	2	V	0, 50~5000	0:OFF
Ramp Time	2	100mS	0~9990	0:OFF
Reserved	2	-	0	Reserved
Test Time	2	100mS	0~9990	0:Continue
Fall Time	2	100mS	0~9990	0:OFF
High Limit	4	100nA	10~200000 10~30000	The max. is 200000 when EN50191 is OFF. The max. is 30000 when EN50191 is ON.
Low Limit	4	100nA	0, 10~200000 10~30000	0:OFF The max. is 200000 when EN50191 is OFF. The max. is 30000 when EN50191 is ON.
Arc Limit	4	100nA	0, 10000~200000	0:OFF
Reserved	4	-	0	Reserved

DC Mode

Name	Size (byte)	Unit	Range	Description
Step index	1	-	1~10	Must less or equal original step number + 1
Mode	1	-	2	DC mode
Source	2	V	0, 50~6000	
Ramp Time	2	100mS	0~9990	0:OFF
Dwell Time	2	100mS	0~9990	0:OFF
Test Time	2	100mS	0~9990	0:Continue
Fall Time	2	100mS	0~9990	0:OFF
High Limit	4	100nA	1~50000	
Low Limit	4	100nA	0~50000	0:OFF
Arc Limit	4	100nA	0, 10000~50000	0:OFF
Inrush	4	-	0/10000	0:OFF, 10000:ON

IR Mode

Name	Size (byte)	Unit	Range	Description
Step index	1	-	1~10	Must less or equal original step number + 1
Mode	1	-	3	IR mode
Source	2	V	0, 50~1000	
Ramp Time	2	100mS	0~9990	0:OFF
Dwell Time	2	100mS	0~9990	0:OFF
Test Time	2	100mS	0, 3~9990	0:Continue
Fall Time	2	100mS	0~9990	0:OFF
High Limit	4	100kOhm	0~500000	0:OFF
Low Limit	4	100kOhm	1~500000	
IR Range	4	-	0~6	0: 300nA, 1: 3uA, 2: 30uA, 3: 300uA, 4: 3mA, 5: 5mA, 6: Auto Range
Reserved	4	-	0	Reserved

GC Mode

Name	Size (byte)	Unit	Range	Description
Step index	1	-	1~10	Must less or equal original step number + 1
Mode	1	-	4	GC mode
Source	2	100mA	0/1	
Reserved	2	-	0	Reserved
Dwell Time	2	100mS	1~10	
Reserved	2	-	0	Reserved
Reserved	2	-	0	Reserved
High Limit	4	100mOhm	1~50	
Low Limit	4	100mOhm	0~50	0:OFF

Reserved	4	-	0	Reserved
Reserved	4	-	0	Reserved

PA Mode (Pause mode)

Name	Size (byte)	Unit	Range	Description
Step index	1	-	1~10	Must less or equal original step number + 1
Mode	1	-	5	PA mode
UT Signal	2	-	1 or 2	(Under Test Signal) 1:Off, 2:On
Message	16	-		C String, maximum length is 15
Reserved	4	-	0	Reserved
Reserved	4	-	0	Reserved

OS Mode (OSC mode)

Name	Size (byte)	Unit	Range	Description
Step index	1	-	1~10	Must less or equal original step number + 1
Mode	1	-	6	OS mode
Source	2	V	100	Always 100V
Open Limit	2	10%	1~10	10% ~ 100%
Reserved	2	-	0	Reserved
Test Time	2	100mS	1	Always 100mS
Short Limit	2	100%	0, 1~5	OFF, 100% ~ 500%
C Standard	4	pF	0~25100 0~5000	When Short Limit is OFF, Max. is 25100. When Short Limit is not OFF, Max. is 5000.
Reserved	4	-	0	Reserved
Range	4	-	1~3	3 is maximum range
Reserved	4	-	0	Reserved

Return data: Reply Message

Example: Master (0x70): 0xAB 0x01 0x70 0x1D 0x24 0x01 0x01 0xE8 0x03 0x14 0x00 0x00 0x00 0x32 0x00 0x1E 0x00 0x10 0x27 0x00 0x00 0xE8 0x03 0x00 0x00 0x10 0x27 0x00 0x00 0x00 0x00 0x00 0x00 0xA4

Slave (0x01): 0xAB 0x70 0x01 0x02 0x7F 0x00 0x0E

Remark:
1. When the length of data is larger than 1 character (byte), it is needed to send the minimum character in advance.
2. When the message of PA mode is lowercase character, it will change to uppercase character automatically.
3. The inputted various parameters will round off automatically then save to memory as needed.

Descriptions of example

The setting meanings of HEX inputs are as the following:
0xAB = Header
0x01 = Destination Address
0x70 = Source Address
0x1D = Data Field Length
0x24 = Command Code
0x01 = Step1 (Command Parameter)
0x01 = AC Mode (Command Parameter)
0xE8 0x03 = Voltage 1000V (Command Parameter)
0x14 0x00 = Ramp Time 2sec (Command Parameter)
0x00 0x00 = Reserved (Command Parameter)
0x32 0x00 = Test Time 5sec (Command Parameter)
0x1E 0x00 = fall time 3sec (Command Parameter)
0x10 0x27 0x00 0x00 = Hi Limit 1.000mA (Command Parameter)

0xE8 0x03 0x00 0x00 = Low Limit 0.100mA (Command Parameter)
0x10 0x27 0x00 0x00 = Arc Limit 1.000mA (Command Parameter)
0x00 0x00 0x00 0x00 = Reserved (Command Parameter)
0xA4 = Checksum

The reading meanings of returning HEX code are as the following:
0xAB = Header
0x70 = Destination Address
0x01 = Source Address
0x02 = Data Field Length
0x7F = Reply Message Command Code
0x00 = Reply Message Return Data
0x0E = Checksum

Step Parameters?

Description: It queries all parameters of various steps.
Command code: 0xA4
Parameter: 1 byte, the serial number of step, the range is 1-10
Return data: 28 bytes data
Example: Master (0x70): 0xAB 0x01 0x70 0x02 0xA4 0x01 0xE8
Slave (0x01): 0xAB 0x70 0x01 0x1D 0xA4 0x01 0x01 0x38 0x04
0x1E 0x00 0x00 0x00 0x3C 0x00 0x09 0x00 0x0C
0x17 0x00 0x00 0x90 0x01 0x00 0x00 0x20 0x4E
0x00 0x00 0x00 0x00 0x00 0x00 0x0B

Descriptions of example
The setting meanings of HEX inputs are as the following:
0xAB = Header
0x01 = Destination Address
0x70 = Source Address
0x02 = Data Field Length
0xA4 = Command Code
0x01 = Parameter
0xE8 = Checksum

The reading meanings of returning HEX code are as the following:
0xAB = Header
0x70 = Destination Address
0x01 = Source Address
0x1D = Data Field Length
0xA4 = Command Code
0x01 = Step1 (Return Data)
0x01 = AC Mode (Return Data)
0x38 0xE4 = Voltage 1080V (Return Data)
0x1E 0x00 = Ramp Time 3sec (Return Data)
0x00 0x00 = Reserved (Return Data)
0x3C 0x00 = Test Time 6sec (Return Data)
0x09 0x00 = Fall Time 0.9sec (Return Data)
0x0C 0x17 0x00 0x00 = Hi Limit 0.590mA (Return Data)
0x90 0x01 0x00 0x00 = Low Limit 0.040mA (Return Data)
0x20 0x4E 0x00 0x00 = Arc Limit 2.000mA (Return Data)
0x00 0x00 0x00 0x00 = Reserved (Return Data)
0x0B = Checksum

Preset Parameters

Description: It sets all parameters of Preset.
Command code: 0x25
Parameter: 6 bytes

Name	Size (byte)	Unit	Range	Description
AC Frequency	1	Hz	50/60	
Software AGC	1	-	0/1	0:OFF, 1:ON
WV Auto Range	1	-	0/1	0:OFF, 1:ON
IR Auto Range	1	-	0/1	0:OFF, 1:ON
GFI(Ground Fault Interrupt)	1	-	0/1	0:OFF, 1:ON
Fail Restart	1	-	0/1	0:OFF, 1:ON
Screen	1	-	0/1	0:OFF, 1:ON

Return data: Reply Message
Example: Master (0x70): 0xAB 0x01 0x70 0x08 0x25 0x32 0x00 0x01 0x00 0x01 0x01 0x00 0x2D
Slave (0x01): 0xAB 0x70 0x01 0x02 0x7F 0x00 0x0E

Descriptions of example
The setting meanings of HEX inputs are as the following:
0xAB = Header
0x01 = Destination Address
0x70 = Source Address
0x08 = Data Field Length
0x25 = Command Code
0x32 = ACV Frequency 50Hz
0x00 = Software AGC OFF
0x01 = WV Auto Range ON
0x00 = IR Auto Range OFF
0x01 = Ground Fault Interrupt (GFI) ON
0x01 = Fail Restart ON
0x00 = Screen OFF
0x2D = Checksum

The reading meanings of returning HEX code are as the following:
0xAB = Header
0x70 = Destination Address
0x01 = Source Address
0x02 = Data Field Length
0x7F = Reply Message Command Code
0x00 = Reply Message Return Data
0x0E = Checksum

Preset Parameter?

Description: It queries all parameters of Preset.
Command code: 0xA5
Parameter: None
Return data: 6 bytes
Example: Master (0x70): 0xAB 0x01 0x70 0x01 0xA5 0xE9
Slave (0x01): 0xAB 0x70 0x01 0x08 0xA5 0x3C 0x01 0x00 0x01 0x01 0x00 0x01 0xA2

Descriptions of example
The setting meanings of HEX inputs are as the following:
0xAB = Header
0x01 = Destination Address
0x70 = Source Address
0x01 = Data Field Length
0xA5 = Data Field Length
0xE9 = Checksum

The reading meanings of returning HEX code are as the following:
0xAB = Header
0x70 = Destination Address
0x01 = Source Address
0x07 = Data Field Length
0xA5 = Command Code
0x3C = ACV Frequency 60Hz (Return Data)
0x01 = Software AGC ON (Return Data)
0x00 = WV Auto Range OFF (Return Data)
0x01 = IR Auto Range ON (Return Data)
0x01 = Ground Fault Interrupt (GFI) ON
0x00 = Fail Restart OFF (Return Data)
0x01 = Screen ON
0xA2 = Checksum

Store Memory

Description: It saves the parameters of various steps and Preset to the internal memory.
Command code: 0x26
Parameter: Serial number of memory + Name of memory. The length of serial number of memory is 1 character. The range is 1 ~ 60, the name length of the memory is 0 ~ 10 character.
Return data: Reply Message
Example: Master (0x70): 0xAB 0x01 0x70 0x08 0x26 0x01 0x43 0x48 0x52 0x4F 0x4D 0x41 0xA6
Slave (0x01): 0xAB 0x70 0x01 0x02 0x7F 0x00 0x0E
Remark: When the name of memory is lowercase character, it will change to uppercase character automatically.

Descriptions of example
The setting meanings of HEX inputs are as the following:
0xAB = Header
0x01 = Destination Address
0x70 = Source Address
0x08 = Data Field Length (Length of memory name is 6)
0x26 = Command Code
0x01 = Memory S/N

0x43 0x48 0x52 0x4F 0x4D 0x41 = "CHROMA" Memory Name
(Command Parameter)
0xA6 = Checksum

The reading meanings of returning HEX code are as the following:
0xAB = Header

0x70 = Destination Address
0x01 = Source Address
0x02 = Data Field Length
0x7F = Reply Message Command Code
0x00 = Reply Message Return Data
0x0E = Checksum

Recall Memory

Description: It recalls the saved test steps from various device internal memories.
Command code: 0x27
Parameter: 1 byte, serial number of memory, the range is 1 ~ 60
Return data: Reply Message
Example: Master (0x70): 0xAB 0x01 0x70 0x02 0x27 0x01 0x65
Slave (0x01): 0xAB 0x70 0x01 0x02 0x7F 0x00 0x0E

Descriptions of example
The setting meanings of HEX inputs are as the following:
0xAB = Header
0x01 = Destination Address
0x70 = Source Address
0x02 = Data Field Length
0x27 = Command Code
0x01 = “01” Memory S/N (Command Parameter)
0x65 = Checksum

The reading meanings of returning HEX code are as the following:
0xAB = Header
0x70 = Destination Address
0x01 = Source Address
0x02 = Data Field Length
0x7F = Reply Message Command Code
0x00 = Reply Message Return Data
0x0E = Checksum

Delete Memory

Description: It deletes the saved test steps from the memories inside device.
Command code: 0x28
Parameter: 1 byte, serial number of memory, the range is 0 ~ 60. When the parameter is 0, it means it is need to clear the working memory, this includes all steps and Preset parameters.
Return data: Reply Message
Example: Master (0x70): 0xAB 0x01 0x70 0x02 0x28 0x01 0x64
Slave (0x01): 0xAB 0x70 0x01 0x02 0x7F 0x00 0x0E

Descriptions of example
The setting meanings of HEX inputs are as the following:
0xAB = Header
0x01 = Destination Address
0x70 = Source Address
0x02 = Data Field Length
0x28 = Command Code
0x01 = “01” Memory S/N (Command Parameter)
0x64 = Checksum

The reading meanings of returning HEX code are as the following:
0xAB = Header
0x70 = Destination Address
0x01 = Source Address
0x02 = Data Field Length
0x7F = Reply Message Command Code
0x00 = Reply Message Return Data
0x0E = Checksum

System Setting

Description: It sets the system parameter.
Command code: 0x29
Parameter: 4 bytes

Name	Size (byte)	Unit	Range	Description
Contrast	1	-	1~15	
Buzzer Volume	1	-	0/1/2/3	0:OFF, 1:Low, 2:Medium, 3:High
EN50191	1	-	0/1	0:OFF, 1:ON (AC maximum is 3mA)
DC 50V AGC	1	-	0/1	0:OFF, 1:ON
Pass On	1	100mS	0 ~ 100	0:OFF
END OF STEP	1	-	0/1	0:OFF, 1:ON
EOT	1	-	0/1	0:END OF TEST, 1:END OF TIMER

Return data: Reply Message
Example: Master (0x70): 0xAB 0x01 0x70 0x08 0x29 0x0A 0x03 0x00 0x00 0x00 0x00 0x01 0x50
Slave (0x01): 0xAB 0x70 0x01 0x02 0x7F 0x00 0x0E

Descriptions of example
The setting meanings of HEX inputs are as the following:
0xAB = Header
0x01 = Destination Address
0x70 = Source Address
0x08 = Data Field Length
0x29 = Command Code
0x0A = Contrast 10 (Command Parameter)
0x03 = Buzzer Volume High (Command Parameter)
0x00 = EN50191 OFF (Command Parameter)
0x00 = DC 50V AGC OFF (Command Parameter)
0x00 = PASS ON OFF (Command Parameter)
0x00 = END OF STEP OFF (Command Parameter)
0x01 = END OF TIMER (Command Parameter)
0x50 = Checksum

The reading meanings of returning HEX code are as the following:
0xAB = Header
0x70 = Destination Address
0x01 = Source Address
0x02 = Data Field Length
0x7F = Reply Message Command Code
0x00 = Reply Message Return Data

0x0E = Checksum

System Setting?

Description: It queries the system parameter.
Command code: 0xA9
Parameter: None
Return data: 7 bytes
Example:
Master (0x70): 0xAB 0x01 0x70 0x01 0xA9 0xE5
Slave (0x01): 0xAB 0x70 0x01 0x08 0xA9 0x08 0x01 0x01 0x01 0x00 0x00 0x01 0xD2

Descriptions of example
The setting meanings of HEX inputs are as the following:
0xAB = Header
0x01 = Destination Address
0x70 = Source Address
0x01 = Data Field Length
0xA9 = Command Code
0xE5 = Checksum

The reading meanings of returning HEX code are as the following:
0xAB = Header
0x70 = Destination Address
0x01 = Source Address
0x08 = Data Field Length
0xA9 = Command Code
0x08 = Contrast 8 (Return Data)
0x01 = Buzzer Volume Low (Return Data)
0x01 = EN50191 ON (Return Data)
0x01 = DC 50V AGC ON (Return Data)
0x00 = PASS ON OFF (Command Parameter)
0x00 = END OF STEP OFF (Command Parameter)
0x01 = END OF TIMER (Command Parameter)
0xD2 = Checksum

Key Lock

Description: It switches KEY LOCK status.
Command code: 0x2A
Parameter: 1 byte
0: key board lock OFF, recall key lock OFF
1: key board lock ON, recall key lock OFF
2: key board lock ON, recall key lock ON
Return data: Reply Message
Example: Master (0x70): 0xAB 0x01 0x70 0x02 0x2A 0x01 0x62
Slave (0x01): 0xAB 0x70 0x01 0x02 0x7F 0x00 0x0E

Descriptions of example
The setting meanings of HEX inputs are as the following:
0xAB = Header
0x01 = Destination Address
0x70 = Source Address
0x02 = Data Field Length

0x2A = Command Code
0x01 = "01"key board lock ON, recall key lock (Command Parameter)
0x62 = Checksum

The reading meanings of returning HEX code are as the following:
0xAB = Header
0x70 = Destination Address
0x01 = Source Address
0x02 = Data Field Length
0x7F = Reply Message Command Code
0x00 = Reply Message Return Data
0x0E = Checksum

Key Lock?

Description: It queries KEY LOCK status.
Command code: 0xAA
Parameter: None
Return data: 1 byte data
0: key board lock OFF, recall key lock OFF
1: key board lock ON, recall key lock OFF
2: key board lock ON, recall key lock ON
Example: Master (0x70): 0xAB 0x01 0x70 0x01 0xAA 0xE4
Slave (0x01): 0xAB 0x70 0x01 0x02 0xAA 0x01 0xE2

Descriptions of example
The setting meanings of HEX inputs are as the following:
0xAB = Header
0x01 = Destination Address
0x70 = Source Address
0x01 = Data Field Length
0xAA = Command Code
0xE4 = Checksum

The reading meanings of returning HEX code are as the following:
0xAB = Header
0x70 = Destination Address
0x01 = Source Address
0x02 = Data Field Length
0xAA = Command Code
0x01 = "01"Key Board Lock ON, Recall Key Lock OFF (Return Data)
0xE2 = Checksum

Initialize All Steps Parameters

Description: It sets all steps to the initial setting, this command will delete all steps.
Command code: 0x2C
Parameter: None
Return data: Reply Message
Example: Master (0x70): 0xAB 0x01 0x70 0x01 0x2C 0x62
Slave (0x01): 0xAB 0x70 0x01 0x02 0x7F 0x00 0x0E

Descriptions of example
The setting meanings of HEX inputs are as the following:
0xAB = Header

0x01 = Destination Address
0x70 = Source Address
0x01 = Data Field Length
0x2C = Command Code
0x62 = Checksum

The reading meanings of returning HEX code are as the following:
0xAB = Header
0x70 = Destination Address
0x01 = Source Address
0x02 = Data Field Length
0x7F = Reply Message Command Code
0x00 = Reply Message Return Data
0x0E = Checksum

Step Number?

Description: It queries the step numbers of being set.
Command code: 0xAD
Parameter: None
Return data: 1 byte data
Example: Master (0x70): 0xAB 0x01 0x70 0x01 0xAD 0xE1
Slave (0x01): 0xAB 0x70 0x01 0x02 0xAD 0x05 0xDB

Descriptions of example
The setting meanings of HEX inputs are as the following:
0xAB = Header
0x01 = Destination Address
0x70 = Source Address
0x01 = Data Field Length
0xAD = Command Code
0xE1 = Checksum

The reading meanings of returning HEX code are as the following:
0xAB = Header
0x70 = Destination Address
0x01 = Source Address
0x02 = Data Field Length
0xAD = Command Code
0x05 = “05” the step numbers of being set (Return Data)
0xDB = Checksum

Remote/Local

Description: It switches the device to remote or local control.
Command code: 0x2E
Parameter: 1 byte
0: Go to Local.
1: Go to Remote.
2: Go to Remote and Local Lockout
Return data: Reply Message
Example: Master (0x70): 0xAB 0x01 0x70 0x02 0x2E 0x01 0x5E
Slave (0x01): 0xAB 0x70 0x01 0x02 0x7F 0x00 0x0E

Descriptions of example

The setting meanings of HEX inputs are as the following:
0xAB = Header
0x01 = Destination Address
0x70 = Source Address
0x02 = Data Field Length
0x2E = Command Code
0x01 = "1"Go to Remote (Command Parameter)
0x5E = Checksum

The reading meanings of returning HEX code are as the following:
0xAB = Header
0x70 = Destination Address
0x01 = Source Address
0x02 = Data Field Length
0x7F = Reply Message Command Code
0x00 = Reply Message Return Data
0x0E = Checksum

Remote Status?

Description: It queries remote status of the device.
Command code: 0xAE
Parameter: None
Return data: 1 byte data
0: Local
1: Remote
2: Remote and Local Lockout
Example: Master (0x70): 0xAB 0x01 0x70 0x01 0xAE 0xE0
Slave (0x01): 0xAB 0x70 0x01 0x02 0xAE 0x01 0xDE

Descriptions of example
The setting meanings of HEX inputs are as the following:
0xAB = Header
0x01 = Destination Address
0x70 = Source Address
0x01 = Data Field Length
0xAE = Command Code
0xE0 = Checksum

The reading meanings of returning HEX code are as the following:
0xAB = Header
0x70 = Destination Address
0x01 = Source Address
0x02 = Data Field Length
0xAE = Command Code
0x01 = "1" Remote (Return Data)
0xDE = Checksum

Set C Standard

Description: It sets the standard capacitance of OS mode.
Command code: 0x2F
Parameter: 6 byte

Name	Size (byte)	Unit	Range	Description
Step Index	1	-	1~10	
C Standard	4	pF	0~25100 0~5000	When Short Limit is OFF, Max. is 25100. When Short Limit is not OFF, Max. is 5000.
Range	1	-	1~3	3 is maximum range

Return data: Reply Message
Example: Master (0x70): 0xAB 0x01 0x70 0x07 0x2F 0x01 0x00 0x04 0x00 0x00 0x01 0x53
Slave (0x01): 0xAB 0x70 0x01 0x02 0x7F 0x00 0x0E

Descriptions of example

The setting meanings of HEX inputs are as the following:
0xAB = Header
0x01 = Destination Address
0x70 = Source Address
0x07 = Data Field Length
0x2F = Command Code
0x01 = Step Index 1(setting data)
0x00 0x04 0x00 0x00 = C Standard 1024pF(setting data)
0x01 = Range 1(setting data)
0x53 = Checksum

The reading meanings of returning HEX code are as the following:
0xAB = Header
0x70 = Destination Address
0x01 = Source Address
0x02 = Data Field Length
0x7F = Reply Message Command Code
0x00 = Reply Message Return Data
0x0E = Checksum

Result?

Description: It queries the test result and measurement value.
Command code: 0xB1
Parameter: 2 bytes, serial numbers of steps + items of measurement values, the range of serial numbers of steps is 0 ~ 10. When the range is 0, it means to query the last one which starts to perform or the step which be performed completely. According to the weight of 2 to divide the measurement value option into 8 items, if queries multi-item simultaneously, the lesser weight is sent at first.

The measurement value option:

AC mode

Item Number	Name	Size (byte)	Unit	Description
1	Mode	1	-	1:AC Mode
2	Meter 1 (Source)	2	V	30000: Maximum, 31000: Not Value
4	Meter 2 (Current)	4	100nA	1000000000: Maximum, 1100000000: Not Value
8	Meter 3	4	-	Reserved
16	Ramp Time	2	100mS	30000: Maximum, 31000: Not Value
32	Reserved	2	-	Reserved
64	Test Time	2	100mS	30000: Maximum, 31000: Not Value
128	Fall Time	2	100mS	30000: Maximum, 31000: Not Value

DC mode

Item Number	Name	Size (byte)	Unit	Description
1	Mode	1	-	2:DC Mode
2	Meter 1 (Source)	2	V	30000: Maximum, 31000: Not Value
4	Meter 2 (Current)	4	100nA	1000000000: Maximum, 1100000000: Not Value
8	Meter 3 (Inrush)	4	100nA	1000000000: Maximum, 1100000000: Not Value
16	Ramp Time	2	100mS	30000: Maximum, 31000: Not Value
32	Dwell Time	2	100mS	30000: Maximum, 31000: Not Value
64	Test Time	2	100mS	30000: Maximum, 31000: Not Value
128	Fall Time	2	100mS	30000: Maximum, 31000: Not Value

IR mode

Item Number	Name	Size (byte)	Unit	Description
1	Mode	1	-	3:IR Mode
2	Meter 1 (Source)	2	V	30000: Maximum, 31000: Not Value
4	Meter 2 (Resistance)	4	100kOhm	1000000000: Maximum, 1100000000: Not Value
8	Meter 3	4	-	Reserved
16	Ramp Time	2	100mS	30000: Maximum, 31000: Not Value
32	Dwell Time	2	100mS	30000: Maximum, 31000: Not Value
64	Test Time	2	100mS	30000: Maximum, 31000: Not Value
128	Fall Time	2	100mS	30000: Maximum, 31000: Not Value

GC mode

Item Number	Name	Size (byte)	Unit	Description
1	Mode	1	-	4:GC Mode
2	Meter 1 (Source)	2	mA	30000: Maximum, 31000: Not Value
4	Meter 2 (Resistance)	4	100mOhm	1000000000: Maximum, 1100000000: Not Value
8	Meter 3	4	-	Reserved
16	Reserved	2	-	Reserved
32	Dwell Time	2	100mS	30000: Maximum, 31000: Not Value
64	Reserved	2	-	Reserved
128	Reserved	2	-	Reserved

PA mode

Item Number	Name	Size (byte)	Unit	Description
1	Mode	1	-	5:PA Mode
2	Under Test Signal	2	-	1:Off, 2:On
4, 8, 16, 32, 64 or 128	Message	16	-	C String, maximum length is 15

OS mode

Item Number	Name	Size (byte)	Unit	Description
1	Mode	1	-	6:OS Mode
2	Meter 1 (Source)	2	V	30000: Maximum, 31000: Not Value
4	Meter 2 (capacitance)	4	pF	1000000000: Maximum, 1100000000: Not Value
8	Reserved	4	-	Reserved
16	Reserved	2	-	Reserved
32	Reserved	2	-	Reserved
64	Test Time	2	100mS	30000: Maximum, 31000: Not Value
128	Reserved	2	-	Reserved

Return data: The flag of new test result (1 byte) + serial number of step (1 byte) + test result (1 byte) + measurement value option (1 byte) [+ measurement value 1 + measurement value 2 + …]

The flag is with new test result: it is the correct flag that can judge the measurement result. This flag set as ON when the test is initiated, and set as OFF when the test is stopped. Alternatively, the test is ended and the result is read by this command, then set as OFF. Thus, only in the test duration, the test completed or uses this command to read first time, this flag is ON otherwise is OFF.

Return test result codes:

Mode Code	AC		DC		IR		GC		OS		ALL	
	HEX	DEC	HEX	DEC	HEX	DEC	HEX	DEC	HEX	DEC	HEX	DEC
STOP											70	112
USER INTERRUPT											71	113
CAN NOT TEST											72	114
TESTING											73	115
PASS											74	116
SKIPPED											75	117
GFI TRIPPED											79	121
SLAVE FAIL											7A	122
Cs/SHORT FAIL											7B	123
HIGH FAIL	11	17	21	33	31	49	41	65				
SHORT FAIL									61	97		
LOW FAIL	12	18	22	34	32	50	42	66				
OPEN FAIL									62	98		
ARC FAIL	13	19	23	35								
I/O FAIL	14	20	24	36	34	52			64	100		
NO OUTPUT	15	21	25	37	35	53						
VOLTAGE OVER	16	22	26	38	36	54			66	102		
CURRENT OVER	17	23	27	39	37	55			67	103		
INRUSH FAIL			28	40								

Example: The test results of devices:

Master (0x70): 0xAB 0x01 0x70 0x03 0xB1 0x00 0xD7 0x04

Slave (0x01): 0xAB 0x70 0x01 0x12 0xB1 0x01 0x01 0x74 0xD7 0x01 0x63 0x00 0x5A 0x00 0x00 0x00 0x0F 0x00 0x1E 0x00 0x18 0x00 0x7C

Descriptions of example

The setting meanings of HEX inputs are as the following:

0xAB = Header

0x01 = Destination Address

0x70 = Source Address

0x03 = Data Field Length

0xB1 = Command Code

0x00 = “00“ It queries the last step that begins to execute or have been executed. (Command Parameter)

0xD7 = “D7” Item Number (Command Parameter)

0x04 = Checksum

The reading meanings of returning HEX code are as the following:

0xAB = Header

0x70 = Destination Address
0x01 = Source Address
0x12 = Data Field Length
0xB1 = Command Code
0x01 = New test result (Return Data)
0x01 = Step1 (Return Data)
0x74 = Test result code "PASS" (Return Data)
0xD7 = Item number (Return Data)
0x01 = AC mode (Return Data)
0x63 0x00 = Display Volt 0.099kV (Return Data)
0x5A 0x00 0x00 0x00 = Curr 0.009mA (Return Data)
0x0F 0x00 = ramp time 1.5sec (Return Data)
0x1E 0x00 = test time 3.0sec (Return Data)
0x18 0x00 = fall time 2.4sec (Return Data)
0x7C = Checksum

Notice When the tester is pause mode, the data field length of returning may be different from other modes.

Do Get C Standard

Description: It enables the standard capacitance get function of OS mode.
Command code: 0x33
Parameter: None
Return data: Reply Message
Example: Master (0x70): 0xAB 0x01 0x70 0x01 0x33 0x5B
Slave (0x01): 0xAB 0x70 0x01 0x02 0x7F 0x00 0x0E

Descriptions of example

The setting meanings of HEX inputs are as the following:
0xAB = Header
0x01 = Destination Address
0x70 = Source Address
0x01 = Data Field Length
0x33 = Command Code
0x5B = Checksum

The reading meanings of returning HEX code are as the following:
0xAB = Header
0x70 = Destination Address
0x01 = Source Address
0x02 = Data Field Length
0x7F = Reply Message Command Code
0x00 = Reply Message Return Data
0x0E = Checksum

Reply Message

Description: It queries the performed result of previous command.
Command code: 0x7F
Parameter: None
Return data: 1 byte
0 – OK, no error
1 – Command Error (Include Execution Error)
2 – Parameter Error

Example: Master (0x70): 0xAB 0x01 0x70 0x01 0x7F 0x0F
Slave (0x01): 0xAB 0x70 0x01 0x02 0x7F 0x00 0x0E

Descriptions of example
Inputted setting meanings of HEX are as the following:
0xAB = Header
0x01 = Destination Address
0x70 = Source Address
0x01 = Data Field Length
0x7F = Command Code
0x0F = Checksum

The reading meanings of returning HEX code are as the following:
0xAB = Header
0x70 = Destination Address
0x01 = Source Address
0x02 = Data Field Length
0x7F = Command Code
0x00 = “00”OK, no error (Return Data)
0x0E = Checksum

6. RS232 Interface

6.1 Guide

Users can use computer via RS232 interface to remote control for the tester. This interface applies binary code transmission mode, its command format is the same as RS485 interface. The detail command description, please see *section 5.6 Command Description*.

6.2 Interface Specification

It's a standard RS232 interface, the setting value as the following:

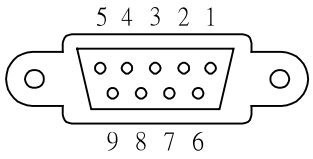
BAUD RATE : 4800/9600/19200
PARITY : NONE
FLOW CTRL. : NONE

6.3 RS-232 Single Unit Connection for Parameter Setting

1. Press **MENU** under "STANDBY" screen, by using **F1**, **F2** to move the highlight to "OPTION". Next to press **SELECT** to move the highlight to "REMOTE INTERFACE" then press **SELECT** to enter RS485 setting screen.
2. Use **NEXT** to move the highlight, and **UP**, **DOWN** to change the settings.
3. Setting item descriptions for single unit connecting:
   a. INTERFACE: Select RS485 interface
   b. UNIT TYPE: Select device type as SLAVE.
   c. BAUD RATE: Select transmission as 4800, 9600 or 19200 baud rate.
   d. UNIT ADDRESS: Set as 1.

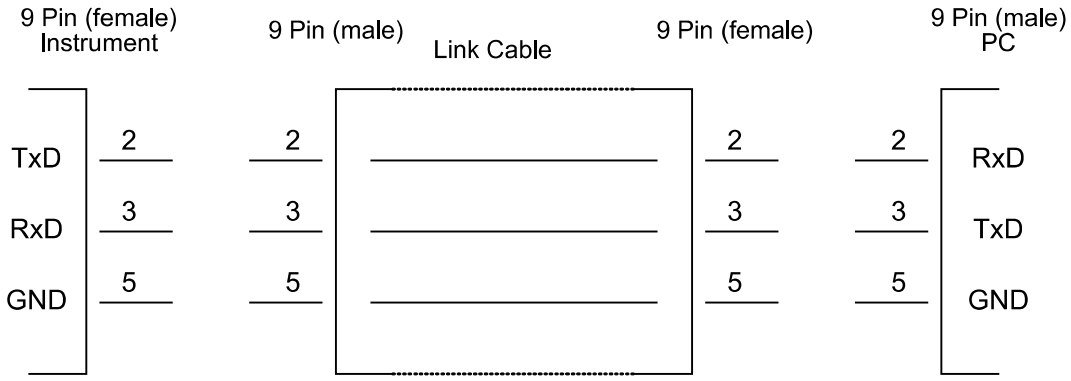
6.4 Connector

RS232 connecter of the instrument is a 9-pin D-Sub connector.



Pin Number		Description
1	*	Don't use
2	TxD	Send data
3	RxD	Receive data
4	*	Don't use
5	GND	Ground
6	*	Don't use
7	*	Don't use
8	*	Don't use
9	*	Don't use

6.5 Method of Connecting



6.6 Communication Protocol

This interface applies binary code transmission mode which is the same as RS485, the given command needs to include destination address and source address. The RS-485 UNIT ADDRESS setting is 1 as connecting single unit, thus set destination address to 0x01 and source address to 0x70. About command format, please refer *section 5.4 Communication Protocol*.