



Programming Manual

UT5140 Ground Bond Tester

V1.0
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1. SCPI

SCPI (Standard Commands for Programmable Instruments) is a standard command set based on the existing standards IEEE 488.1 and IEEE 488.2. And follow the IEEE754 standard floating-point arithmetic rules, ISO646 information exchange 7 bits code symbol (equivalent to ASCII programming) and other standard standardized instrument programming language.

1.1 General Commands

The following commands control the ON/OFF functions or select specific parameter tables. No additional values or parameters are required when executing these commands.

Test Command

Command	Range	Description
TEST		Start the test.
RESET		Stop the test.

File Management Command Set

Command	Range	Description
FL nn	nn = 01-100	Read the file.
FL?		Query the file serial number.
FN xxxx	xxxx = name Return value: nn= 01-100	Add a new file and assign filename (maximum 8 characters).
FR xxxx	xxxx = name	Rename the file (maximum 8 characters).
LF?	work file now	Query the current file and filename
LF nn?	nn = 01-100	Query the specified file and filename.
LFDT?		Query the save date of the current file.
LFDT nn?	nn = 01-100	Query the save date of the specified file.
LFTM?		Query the save time of the current file.
LFTM nn?	nn = 01-100	Query the save time of the specified file.
FD		Delete the current file.
FD nn	nn = 01-100	Delete the specified file.
FS		Save the current file.
FSA xxxx	xxx = name Return value: nn = 01-100	Save as a new file.
ST?		Query the number of test steps in the file.
FT?		Query the total number of test steps

		in the file.
SS nn	nn = 01-100	Select the test step.
SS?	nn = 01-100	Query the test step.
SD		Delete the current test step.
SD nn	nn = 01-100	Delete the specified test step.
LS?		Query the setting parameters of the current test step.
LS nn?	nn = 01-100	Query the setting parameters of the specified test step.
BS?	nn = 01-100	Query the start test step.

1.2 System Command Set

Command	Range	Description
TD?	Testing data	Query the test results.
RD nn?	nn = 1 - 100	Read the test results of the specified test step.
RR?	0 = OFF 1 = ON	Query ON/OFF status.
RI?	0 = CLOSE 1 = OPEN	Query INTERLOCK status.
SPR n	n = 0-1, 0 = OFF, 1 = ON	Set the remote control (PLC Remote) status.
SPR?		Query the remote control (PLC Remote) status.
SSI n	n = 0-1, 0 = OFF, 1 = ON	Set the Single Step status.
SSI?		Query the Single Step status.
SF n	n = 0-1, 0 = OFF, 1 = ON	Set the test failure (Fail Stop) function.
SF?		Query the test failure (Fail Stop) function status.
SAL n	n = 0-3	Set the alarm volume.
SAL?		Query the alarm volume.
SDT yy,dd,mm	Date Format by SDF yy = 0-99, dd = 1-31, mm = 1-12	Set the system date.
SDT?	Date Format by SDF	Query the system date.
STM hh,mm	Time Format by STF	Set the system time.
STM?	Time Format by STF	Query the system time.
SCT n	n = 0-1 0 = Dull, 1 = Vivid	Set the color.
SCT?		Query the color status.
SR n	n = 0-2 0 = LAST, 1 = ALL, 2 = P/F	Set the display mode for the test results.
SR?		Query the display status of the test results.

STS n	n = 0-3	Set the keypad sound.
STS?		Query the keypad sound status.
SLA n	n = 0-1 0 = Traditional Chinese, 1 = English	Set the system language.
SLA?		Query the system language.
*IDN?		Query the instrument model.
SVG		Perform GB FailCHEK.
SVG?	0: Self-check failed 1: Self-check successful	Query GB FailCHEK status.

1.3 Impedance Test Command Set

Add an impedance test item to a file

Command	Range	Description
SAG		Add GB test item.

Set or query the GB open-circuit voltage

Command	Range	Description
EV nn	nn = 3.00-8.00	Set the GB open-circuit voltage (V).
EV?		Query the setting value of the GB open-circuit voltage (V).

Set or query the GB test current

Command	Range	Description
EC nn	nn = 1.00-40.00	Set the GB test current (A).
EC?		Query the setting value of the GB test current (A).

Set or query the upper and lower limits of the test ground impedance.

Command	Range	Description
EH nn	nn = 0-150 (30.1-40.0 A) nn = 0-200 (10.1-30.0 A) nn = 0-600 (1.0-10.0 A)	Set the upper limit (Max-Limit) of GB.
EH?		Query the upper limit (Max-Limit) of GB.
EL nn	nn = 0-150 (30.1-40.0 A) nn = 0-200 (10.1-30.0 A) nn = 0-600 (1.0-10.0 A)	Set the lower limit (Min-Limit) of GB.
EL?		Query the lower limit (Min-Limit) of GB.

Set or query the upper and lower limits for terminal voltage of the DUT

Command	Range	Description
EHV nn	nn = 0.00-6.00	Set the upper limit (Max-Limit Volt) for the GB terminal voltage.
EHV?		Query the upper limit (Max-Limit Volt) for

		the GB terminal voltage.
ELV nn	nn = 0.00-6.00	Set the lower limit (Min-Limit Volt) for the GB terminal voltage.
ELV?		Query the lower limit (Min-Limit Volt) for the GB terminal voltage.

Set or query the OFFSET status

Command	Range	Description
SAO		Automatically perform OFFSET.
EO nn	nn = 0-100	Set the ground impedance OFFSET of GB.
EO?		Query the ground impedance OFFSET of GB.
EOV nn	nn = 0.00-4.50	Set the ground OFFSET of GB.
EOV?		Query the ground OFFSET of GB.

Set or query the test time

Command	Range	Description
EDW n.n	n.n = 0.0, 0.5-999.9	Set the test time (Dwell Time) of GB.
EDW?		Query the test time (Dwell Time) of GB.

Set or query GB output mode

Command	Range	Description
EGO n	n = 0-1 0 = AC, 1 = DC	Set GB output mode.
EGO?		Query GB output mode status.

Set or query GB output frequency

Command	Range	Description
EF n	n = 0-1 0 = 50 HZ, 1 = 60 HZ	Set GB output frequency.
EF?		Query GB output frequency status.

2. ModBus Command Set

2.1 Register Overview

The following table lists all register addresses used by the instrument.

Notes:

1. Unless otherwise specified, all command values and response frame values described below are in hexadecimal format.
2. Registers include commands for starting/stopping tests, modifying test files or steps, changing test settings, and obtaining measurement results.
3. For online conversion of floating-point numbers, refer to the following website: <https://www.h-schmidt.net/FloatConverter/IEEE754.html>

Register Address	Name	Value	Description
200	Start/Stop the test	2-byte integer 0000: Stop 0001: Start	Read-Write Register: The data occupies one register. Repeatedly query the register to obtain the test status.
201	Read the test file	2-byte integer File number: 0001-0064	Read-Write Register: The data occupies one register. Repeatedly query the register to obtain the serial number of the current test file.
202	Add a new test file	2-byte integer File number: 0001-0064	Read-Write Register: The data occupies one register. Repeatedly query the register to obtain the total number of test file.
203	Save the test file	2-byte integer Fixed value: 1	Write-Only Register: The data occupies one register.
204	Delete the test file	2-byte integer File number: 0001-0064	Write-Only Register: The data occupies one register.
205	Add the test step	2-byte integer Fixed value: 1 Test steps: 0001-0064	Read-Write Register: The data occupies one register. Repeatedly query the register to obtain the total number of the test step.
206	Delete the test step	2-byte integer Test steps: 0001-0064	Write-Only Register: The data occupies one register.
207	Select the test step	2-byte integer Test steps: 0001-0064	Read-Write Register: The data occupies one register. Repeatedly query the register to obtain the serial number of the current step.
210	Output mode	2-byte integer 0001: AC-50 Hz 0002: AC-60 Hz 0003: DC	Read-Write Register: The data occupies one register. Repeatedly query the register to obtain the test mode of the current step.

211	Dwell time	4-byte integer 0.0 (continuous test) 0.5-999.9 (floating-point number)	Read-Write Register: The data occupies two registers. Repeatedly query the register to obtain the test time of the current step.
213	Test current	4-byte integer 1.00-40.00 (floating-point number)	Read-Write Register: The data occupies two registers. Repeatedly query the register to obtain the test current of the current step.
215	Test voltage	4-byte integer 3.00-8.00 (floating-point number)	Read-Write Register: The data occupies two registers. Repeatedly query the register to obtain the test voltage of the current step.
217	Upper limit of impedance	2-byte integer 0000-0096 (30.01-40.00) 0000-00C8 (10.01-30.00) 0000-0258 (1.00-10.00)	Read-Write Register: The data occupies one register. Repeatedly query the register to obtain the impedance upper limit of the current step.
218	Lower limit of impedance	2-byte integer 0000-0096 (30.01-40.00) 0000-00C8 (10.01-30.00) 0000-0258 (1.00-10.00)	Read-Write Register: The data occupies one register. Repeatedly query the register to obtain the impedance lower limit of the current step.
219	Upper limit of voltage	4-byte integer 0.00-6.00 (floating-point number)	Read-Write Register: The data occupies two registers. Repeatedly query the register to obtain the voltage upper limit of the current step.
21B	Lower limit of voltage	4-byte integer 0.00-6.00 (floating-point number)	Read-Write Register: The data occupies two registers. Repeatedly query the register to obtain the voltage lower limit of the current step.
21D	Zero setting	2-byte integer 0000-0064	Read-Write Register: The data occupies one register. Repeatedly query the register to obtain the impedance zeroing value of the current step.
21E	Voltage zeroing	4-byte integer 0.00-4.00 (floating-point number)	Read-Write Register: The data occupies two registers. Repeatedly query the register to obtain the voltage zeroing value of the current step.
220	Auto zero setting	2-byte integer Fixed value: 1	Write-Only Register: The data occupies one register.
230	INTERLOCK status	2-byte integer 0000: Connected 0001: Unconnected	Read-Only Register: The data occupies one register.
231	Single step test setting	2-byte integer 0000: Off 0001: On	Read-Write Register: The data occupies one register. Repeatedly query the register to obtain the test status of the single step.
232	Test failure setting	2-byte integer 0000: Off 0001: On	Read-Write Register: The data occupies one register. Repeatedly query the register to obtain the test failure status.
233	Test results setting	2-byte integer 0000: Last step 0001: All 0002: Pass/Fail	Read-Write Register: The data occupies one register. Repeatedly query the register to obtain the test results status.

234	Test results color	2-byte integer 0000: Dull 0001: Vivid	Read-Write Register: The data occupies one register. Repeatedly query the register to obtain the test results color.
235	Remote control setting	2-byte integer 0000: Off 0001: On	Read-Write Register: The data occupies one register. Repeatedly query the register to obtain the remote-control status.
236	Alarm volume setting	2-byte integer 0000: Off 0001: Low 0002: Middle 0003: High	Read-Write Register: The data occupies one register. Repeatedly query the register to obtain the alarm volume status.
240	Test step serial number	2-byte integer 0001-064	Read-Only Register: The data occupies one register. Repeatedly query the register to obtain the serial number of the test step.
241	Test results	2-byte integer 0001: Rise 0002: Hold 0003: Pass 0004: Abort 0005: Upper limit setting failed 0006: Lower limit setting failed 0007: Voltage upper limit setting failed 0008: Voltage lower limit setting failed	Read-Only Register: The data occupies one register. Repeatedly query the register to obtain the test results.
242	Output mode	2-byte integer 0001: AC-50 Hz 0002: AC-60 Hz 0003: DC	Read-Only Register: The data occupies one register. Repeatedly query the register to obtain the output mode.
243	Test current	4-byte integer 1.00-40.00 (floating-point number)	Read-Only Register: The data occupies two registers. Repeatedly query the register to obtain the test current.
245	Test voltage	4-byte integer 0.00-8.00 (floating-point number)	Read-Only Register: The data occupies two registers. Repeatedly query the register to obtain the test Repeatedly query the register to obtain the test voltage.
247	Test resistance	2-byte integer 0001-0258	Read-Only Register: The data occupies one register. Repeatedly query the register to obtain the test resistance.
248	Dwell time	4-byte integer 0.00-999.9 (floating-point number)	Read-Only Register: The data occupies two registers. Repeatedly query the register to obtain the test time.

300	001 step Test sorting results	2-byte integer 0001: Rise 0002: Hold 0003: Pass 0004: Abort 0005: Upper limit setting failed 0006: Lower limit setting failed 0007: Voltage upper limit setting failed 0008: Voltage lower limit setting failed	Read-Only Register: The data occupies one register. Repeatedly query the register to obtain the test results.
301	001 step Output mode	2-byte integer 0001: AC-50 Hz 0002: AC-60 Hz 0003: DC	Read-Only Register: The data occupies one register. Repeatedly query the register to obtain the output mode.
302	001 step Test current	4-byte integer 1.00-40.00 (floating-point number)	Read-Only Register: The data occupies two registers. Repeatedly query the register to obtain the test current.
304	001 step Test voltage	4-byte integer 0.00-8.00 (floating-point number)	Read-Only Register: The data occupies two registers. Repeatedly query the register to obtain the test voltage.
306	001 step Test resistance	2-byte integer 0001-0258	Read-Only Register: The data occupies one register. Repeatedly query the register to obtain the test resistance.
307	001 step Dwell time	4-byte integer 0.00-999.9 (floating-point number)	Read-Only Register: The data occupies two registers. Repeatedly query the register to obtain the test time.
309-679	002-099 steps	----	----
67B	100 steps Test sorting results	2-byte integer 0001: Rise 0002: Hold 0003: Pass 0004: Abort 0005: Upper limit setting failed 0006: Lower limit setting failed 0007: Voltage upper limit setting failed 0008: Voltage lower limit setting failed	Read-Only Register: The data occupies one register. Repeatedly query the register to obtain the test results.
67C	100 steps Output mode	2-byte integer 0001: AC-50 Hz 0002: AC-60 Hz 0003: DC	Read-Only Register: The data occupies one register. Repeatedly query the register to obtain the output mode.
67D	100 steps Test current	4-byte integer 1.00-40.00 (floating-point number)	Read-Only Register: The data occupies two registers. Repeatedly query the register to obtain the test current.
67F	100 steps Test voltage	4-byte integer 0.00-8.00 (floating-point number)	Read-Only Register: The data occupies two registers.

			Repeatedly query the register to obtain the test voltage.
681	100 steps Test resistance	2-byte integer 0001-0258	Read-Only Register: The data occupies one register. Repeatedly query the register to obtain the test resistance.
682	100 steps Dwell time	4-byte integer 0.00-999.9 (floating-point number)	Read-Only Register: The data occupies two registers. Repeatedly query the register to obtain the test time.

2.2 General Register

2.2.1 Explanation

Default Units

Current: A

Voltage: V

Time: s

Resistance: mΩ

Multiple Register Operations

Supports simultaneous reading or writing of multiple registers.

Example 1: Read the test results of step 1 and step 2 simultaneously.

Send

1	2	3	4	5	6	7	8
01	03	03	00	00	12	C5	83
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4-5	6-7	8-11	12-15	16-17	18-21
01	03	24	0003	0002	409FC469	3E950421	003A	404147AE
Station address	Read	Byte	Step 1 results	Step 1 output	First step current	First step voltage	Step 1 resistance	First step time

22-23	24-25	26-29	30-33	34-35	36-39	40	41
0003	0001	4040302F	3E31CDA7	0039	3000A3D7	A1	21
Step 2 results	Step 2 output	Step 2 current	Step 2 voltage	Step 2 resistance	Step 2 time	CRC-16	

in which,

B4-B5: 0x0003

Step 1 sorting results (integer) = Pass

B6-B7: 0x0002 Step 1 output mode(integer)= AC-60 Hz
 B8-B11: 0x409FC469 Step 1 current (floating-point number) = 4.99 A
 B12-B15: 0x3E950421 Step 1 voltage (floating-point number) = 0.29 V
 B16-B17: 0x003A Step 1 resistance (integer) = 58 mΩ
 B18-B21: 0x404147AE Step 1 time (floating-point number) = 3.02 s

B22-B23: 0x0003 Step 2 sorting results(integer)= Pass
 B24-B25: 0x0001 Step 2 output mode(integer)= AC-50 Hz
 B26-B39: 0x4040302F Step 2 current (floating-point number) = 3.00 A
 B30-B33: 0x3E31CDA7 Step 2 voltage (floating-point number) = 0.17 V
 B34-B35: 0x0039 Step 2 resistance (integer) = 57 mΩ
 B36-B39: 3000A3D7 Step 2 time (floating-point number) = 2.01 s

Example 2: Simultaneously write the dwell time, test current, and test voltage parameters for a single step.

Send

1	2	3-4	5-6	7	8-11	12-15	16-19	20-21
01	10	0211	0006	0C	41200000	42200000	41000000	80C0
Station address	Write	Register address	Number of registers	Byte	Dwell time	Test current	Test voltage	CRC-16

in which,

B8-B11: 0x41200000 Set dwell time (floating-point number) = 10.0 s
 B12-B15: 0x42200000 Set test current (floating-point number) = 40.00 A
 B16-B19: 0x41000000 Set test voltage (floating-point number) = 8.00 V

Response

1	2	3	4	5	6	7	8
01	10	02	11	00	06	11	B6
Station address	Write	Register address		Number of registers		CRC-16	

2.2.2 Start/Stop Test

Read a Single Register

1	2	3	4	5	6	7	8
01	03	02	00	00	01	85	B2
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7
01	03	02	00	00	B8	44
Station address	Read	Byte	Register value		CRC-16	

Write a Single Register

1	2	3	4	5	6	7	8	9	10	11
01	06	02	00				00	01	49	B2
01	10	02	00	00	01	02	00	01	44	50
Station address	Write	Register address		Number of registers		Byte	Register value		CRC-16	

Response

1	2	3	4	5	6	7	8
01	06	02	00	00	01	49	B2
01	10	02	00	00	01	00	71
Station address	Write	Register address		Register value/Number of registers		CRC-16	

2-byte integer

0000: Stop

0001: Start

2.2.3 Read Test File

Read a Single Register

1	2	3	4	5	6	7	8
01	03	02	01	00	01	D4	72
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7
01	03	02	00	01	79	84
Station address	Read	Byte	Register value		CRC-16	

Write a Single Register

1	2	3	4	5	6	7	8	9	10	11
01	06	02	01				00	01	18	72
01	10	02	01	00	01	02	00	01	45	81
Station address	Write	Register address		Number of registers		Byte	Register value		CRC-16	

Response

1	2	3	4	5	6	7	8
01	06	02	01	00	01	18	72
01	10	02	01	00	01	51	B1

Station address	Write	Register address	Register value/Number of registers	CRC-16
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2-byte integer

File number: 0001-0064

2.2.4 Add a New Test File

Read a Single Register

1	2	3	4	5	6	7	8
01	03	02	02	00	01	24	72
Station address	Read	Register address	Number of registers		CRC-16		

Response

1	2	3	4	5	6	7
01	03	02	00	05	78	47
Station address	Read	Byte	Register value		CRC-16	

2-byte integer

Total number of files: 0001-0064

Write a Single Register

1	2	3	4	5	6	7	8	9	10	11
01	06	02	02				00	01	E8	72
01	10	02	02	00	01	02	00	01	45	B2
Station address	Write	Register address	Number of registers		Byte	Number of registers		CRC-16		

Response

1	2	3	4	5	6	7	8
01	06	02	02	00	01	E8	72
01	10	02	02	00	01	A1	B1
Station address	Write	Register address	Register value/Number of registers		CRC-16		

2-byte integer

Fixed value: 1

2.2.5 Save Test File

Write a Single Register

1	2	3	4	5	6	7	8	9	10	11
01	06	02	03				00	01	B9	B2
01	10	02	03	00	01	02	00	01	44	63
Station address	Write	Register address		Number of registers		Byte	Register value		CRC-16	

Response

1	2	3	4	5	6	7	8
01	06	02	03	00	01	B9	B2
01	10	02	03	00	01	F0	71
Station address	Write	Register address		Number of registers		CRC-16	

2.2.6 Delete Test File

Write a Single Register

1	2	3	4	5	6	7	8	9	10	11
01	06	02	04				00	02	48	72
01	10	02	04	00	01	02	00	03	C4	15
Station address	Write	Register address		Number of registers		Byte	Register value		CRC-16	

Response

1	2	3	4	5	6	7	8
01	06	02	04	00	02	48	72
01	10	02	04	00	01	41	B0
Station address	Write	Register address		Register value/Number of registers		CRC-16	

2-byte integer

File number: 0001-0064

2.2.7 Add Test Step

Read a Single Register

1	2	3	4	5	6	7	8
01	03	02	05	00	01	95	B3
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7
01	03	02	00	04	B9	87
Station address	Read	Byte	Register value		CRC-16	

Write a Single Register

1	2	3	4	5	6	7	8	9	10	11
01	06	02	05				00	01	59	B3
01	10	02	05	00	01	02	00	01	44	05
Station address	Write	Register address	Number of registers		Byte	Register value		CRC-16		

Response

1	2	3	4	5	6	7	8
01	06	02	05	00	01	59	B3
01	10	02	05	00	01	10	70
Station address	Write	Register address		Register value/Number of registers		CRC-16	

2-byte integer

Fixed value: 1

Test steps: 0001-0064

2.2.8 Delete Test Step

Write a Single Register

1	2	3	4	5	6	7	8	9	10	11
01	06	02	06				00	02	E9	B2
01	10	02	06	00	01	02	00	02	04	37
Station address	Write	Register address	Number of registers		Byte	Register value		CRC-16		

Response

1	2	3	4	5	6	7	8
01	06	02	06	00	02	E9	B2
01	10	02	06	00	01	E0	70
Station address	Write	Register address		Register value/Number of registers		CRC-16	

2-byte integer

Test steps: 0001-0064

2.2.9 Select Test Step

Read a Single Register

1	2	3	4	5	6	7	8
01	03	02	06	00	01	34	73
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7
01	03	02	00	01	79	84
Station address	Read	Byte	Register value		CRC-16	

Write a Single Register

1	2	3	4	5	6	7	8	9	10	11
01	06	02	07				00	03	79	B2
01	10	02	07	00	01	02	00	02	05	E6
Station address	Write	Register address		Number of registers		Byte	Register value		CRC-16	

Response

1	2	3	4	5	6	7	8
01	06	02	07	00	03	79	B2
01	10	02	07	00	01	B1	B0
Station address	Write	Register address		Register value/Number of registers		CRC-16	

2-byte integer

Test steps: 0001-0064

2.2.10 Output Mode

Read a Single Register

1	2	3	4	5	6	7	8
01	03	02	10	00	01	84	77
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7
01	03	02	00	02	39	85
Station address	Read	Byte	Register value		CRC-16	

Write a Single Register

1	2	3	4	5	6	7	8	9	10	11
01	06	02	10				00	01	48	77
01	10	02	10	00	01	02	00	01	46	C0
Station address	Write	Register address		Number of registers		Byte	Register value		CRC-16	

Response

1	2	3	4	5	6	7	8
01	06	02	10	00	01	48	77
01	10	02	10	00	01	01	B4
Station address	Write	Register address		Register value/Number of registers		CRC-16	

2-byte integer

0000: AC-50 Hz

0001: AC-60 Hz

0002: DC

2.2.11 Dwell time

Read Two Registers

1	2	3	4	5	6	7	8
01	03	02	11	00	02	95	B6
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7	8	9
01	03	04	3F	00	00	00	F6	27
Station address	Read	Byte	Register value1		Register value2		CRC-16	

Register value is: 3F00 0000, after conversion using the conversion tool, the value is 0.5, indicating that the dwell time is 0.5 s.

Write Two Registers

1	2	3	4	5	6	7	8	9	10	11	12	13
01	10	02	11	00	02	04	3F	C0	00	00	26	27
Station address	Write	Register address		Number of registers		Byte	Register value				CRC-16	

Response

1	2	3	4	5	6	7	8
01	10	02	11	00	02	10	75
Station address	Write	Register address		Number of registers		CRC-16	

4-byte integer

0.5-999.9(floating-point number)

2.2.12 Test current

Read Two Registers

1	2	3	4	5	6	7	8
01	03	02	13	00	02	34	76
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7	8	9
01	03	04	3F	80	00	00	F7	CF
Station address	Read	Byte	Register value1		Register value2		CRC-16	

Write Two Registers

1	2	3	4	5	6	7	8	9	10	11	12	13
01	10	02	13	00	02	04	41	20	00	00	BE	20
Station address	Write	Register address		Number of registers		Byte	Register value				CRC-16	

Response

1	2	3	4	5	6	7	8
01	10	02	13	00	02	B1	B5
Station address	Write	Register address		Number of registers		CRC-16	

4-byte integer

1.00-40.00(floating-point number)

2.2.13 Test voltage

Read Two Registers

1	2	3	4	5	6	7	8
01	03	02	15	00	02	D4	77
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7	8	9
01	03	04	40	40	00	00	EE	27
Station address	Read	Byte	Register value1		Register value2		CRC-16	

Register value is: 4040 0000, after conversion using the conversion tool, the value is 3.0, indicating that the test voltage is 3.0 V.

Write Two Registers

1	2	3	4	5	6	7	8	9	10	11	12	13
01	10	02	15	00	02	04	40	D3	33	33	9B	20
Station address	Write	Register address		Number of registers		Byte	Register value				CRC-16	

Register value is: 40D3 3333, after conversion using the conversion tool, the value is 6.6, indicating that the test voltage is 6.6 V.

Response

1	2	3	4	5	6	7	8
01	10	02	15	00	02	51	B4
Station address	Write	Register address		Number of registers		CRC-16	

4-byte integer

3.00-8.00 (floating-point number)

2.2.14 Impedance Upper Limit

Read a Single Register

1	2	3	4	5	6	7	8
01	03	02	17	00	01	35	B6
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7
01	03	02	02	58	B8	DE
Station address	Read	Byte	Register value		CRC-16	

Write a Single Register

1	2	3	4	5	6	7	8	9	10	11
01	06	02	17				01	2C	38	3B
01	10	02	17	00	01	02	00	64	87	5C
Station address	Write	Register address		Number of registers		Byte	Register value		CRC-16	

Response

1	2	3	4	5	6	7	8
01	06	02	17	01	2C	38	3B

01	10	02	17	00	01	B0	75
Station address	Write	Register address		Register value/Number of registers		CRC-16	

2-byte integer

0000-0096(30.01-40.00)

0000-00C8(10.01-30.00)

0000-0258(1.00-10.00)

2.2.15 Impedance Lower Limit

Read a Single Register

1	2	3	4	5	6	7	8
01	03	02	18	00	01	05	B5
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7
01	03	02	00	58	B9	BE
Station address	Read	Byte	Register value		CRC-16	

Write a Single Register

1	2	3	4	5	6	7	8	9	10	11
01	06	02	18				00	58	09	8F
01	10	02	18	00	01	02	00	32	07	9D
Station address	Write	Register address		Number of registers		Byte	Register value		CRC-16	

Response

1	2	3	4	5	6	7	8
01	06	02	18	00	58	09	8F
01	10	02	18	00	01	80	76
Station address	Write	Register address		Register value/Number of registers		CRC-16	

2-byte integer

0000-0096(30.01-40.00)

0000-00C8(10.01-30.00)

0000-0258(1.00-10.00)

2.2.16 Voltage Upper Limit

Read Two Registers

1	2	3	4	5	6	7	8
01	03	02	19	00	02	14	74
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7	8	9
01	03	04	40	C0	00	00	EF	CF
Station address	Read	Byte	Register value1		Register value2		CRC-16	

Write Two Registers

1	2	3	4	5	6	7	8	9	10	11	12	13
01	10	02	19	00	02	04	40	40	00	00	3F	BD
Station address	Write	Register address		Number of registers		Byte	Register value				CRC-16	

Response

1	2	3	4	5	6	7	8
01	10	02	19	00	02	91	B7
Station address	Write	Register address		Number of registers		CRC-16	

4-byte integer

0.00-6.00 (floating-point number)

2.2.17 Voltage Lower Limit

Read Two Registers

1	2	3	4	5	6	7	8
01	03	02	1B	00	02	B5	B4
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7	8	9
01	03	04	00	00	00	00	FA	33
Station address	Read	Byte	Register value1		Register value2		CRC-16	

Write Two Registers

1	2	3	4	5	6	7	8	9	10	11	12	13
01	10	02	1B	00	02	04	40	00	00	00	BF	B0

Station address	Write	Register address	Number of registers	Byte	Register value	CRC-16
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Response

1	2	3	4	5	6	7	8
01	10	02	1B	00	02	30	77
Station address	Write	Register address		Number of registers		CRC-16	

4-byte integer

0.00-6.00(floating-point number)

2.2.18 Zero Setting

Read a Single Register

1	2	3	4	5	6	7	8
01	03	02	1D	00	01	15	B4
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7
01	03	02	00	19	79	8E
Station address	Read	Byte	Register value		CRC-16	

Write a Single Register

1	2	3	4	5	6	7	8	9	10	11
01	06	02	1D				00	0A	98	73
01	10	02	1D	00	01	02	00	12	06	10
Station address	Write	Register address	Number of registers		Byte	Register value		CRC-16		

Response

1	2	3	4	5	6	7	8
01	06	02	1D	00	0A	98	73
01	10	02	1D	00	01	90	77
Station address	Write	Register address		Register value/Number of registers		CRC-16	

2-byte integer

0000-0064

2.2.19 Voltage Zeroing

Read Two Registers

1	2	3	4	5	6	7	8
01	03	02	1E	00	02	A5	B5
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7	8	9
01	03	04	3F	80	00	00	F7	CF
Station address	Read	Byte	Register value1		Register value2		CRC-16	

Write Two Registers

1	2	3	4	5	6	7	8	9	10	11	12	13
01	10	02	1E	00	02	04	3F	C0	00	00	66	67
Station address	Write	Register address		Number of registers		Byte	Register value				CRC-16	

Response

1	2	3	4	5	6	7	8
01	10	02	1E	00	02	20	76
Station address	Write	Register address		Number of registers		CRC-16	

4-byte integer

0.00-4.00 (floating-point number)

2.2.20 Auto Zero Setting

Write a Single Register

1	2	3	4	5	6	7	8	9	10	11
01	06	02	20				00	01	48	78
01	10	02	20	00	01	02	00	01	43	30
Station address	Write	Register address		Number of registers		Byte	Register value		CRC-16	

Response

1	2	3	4	5	6	7	8
01	06	02	20	00	01	48	78
01	10	02	20	00	01	01	BB
Station address	Write	Register address		Register value/Number of registers		CRC-16	

2-byte integer

Fixed value: 1

2.2.21 INTERLOCK Status

Read a Single Register

1	2	3	4	5	6	7	8
01	03	02	30	00	01	85	BD
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7
01	03	02	00	00	B8	44
Station address	Read	Byte	Register value		CRC-16	

2-byte integer

0000: Connected

0001: Unconnected

2.2.22 Sing Step Test

Read a Single Register

1	2	3	4	5	6	7	8
01	03	02	31	00	01	D4	7D
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7
01	03	02	00	00	B8	44
Station address	Read	Byte	Register value		CRC-16	

Write a Single Register

1	2	3	4	5	6	7	8	9	10	11
01	06	02	31				00	01	18	7D
01	10	02	31	00	01	02	00	01	40	71
Station address	Write	Register address		Number of registers		Byte	Register value		CRC-16	

Response

1	2	3	4	5	6	7	8
01	06	02	31	00	01	18	7D

01	10	02	31	00	01	51	BE
Station address	Write	Register address		Register value/Number of registers		CRC-16	

2-byte integer

0000: Off

0001: On

2.2.23 Test Failure Setting

Read a Single Register

1	2	3	4	5	6	7	8
01	03	02	32	00	01	24	7D
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7
01	03	02	00	00	B8	44
Station address	Read	Byte	Register value		CRC-16	

Write a Single Register

1	2	3	4	5	6	7	8	9	10	11
01	06	02	32				00	01	E8	7D
01	10	02	32	00	01	02	00	01	40	42
Station address	Write	Register address		Number of registers		Byte	Register value		CRC-16	

Response

1	2	3	4	5	6	7	8
01	06	02	32	00	01	E8	7D
01	10	02	32	00	01	A1	BE
Station address	Write	Register address		Register value/Number of registers		CRC-16	

2-byte integer

0000: Off

0001: On

2.2.24 Test Results Setting

Read a Single Register

1	2	3	4	5	6	7	8
01	03	02	33	00	01	75	BD
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7
01	03	02	00	00	B8	44
Station address	Read	Byte	Register value		CRC-16	

Write a Single Register

1	2	3	4	5	6	7	8	9	10	11
01	06	02	33				00	02	F9	BC
01	10	02	33	00	01	02	00	01	41	93
Station address	Write	Register address	Number of registers		Byte	Register value		CRC-16		

Response

1	2	3	4	5	6	7	8
01	06	02	33	00	02	F9	BC
01	10	02	33	00	01	F0	7E
Station address	Write	Register address	Register value/Number of registers		CRC-16		

2-byte integer

0000: Last step

0001: All

0002: Pass/Fail

2.2.25 Test Color Setting

Read a Single Register

1	2	3	4	5	6	7	8
01	03	02	34	00	01	C4	7C
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7
01	03	02	00	01	79	84
Station address	Read	Byte	Register value		CRC-16	

Write a Single Register

1	2	3	4	5	6	7	8	9	10	11
01	06	02	34				00	00	C9	BC
01	10	02	34	00	01	02	00	01	40	24
Station address	Write	Register address	Number of registers		Byte	Register value		CRC-16		

Response

1	2	3	4	5	6	7	8
01	06	02	34	00	00	C9	BC
01	10	02	34	00	01	41	BF
Station address	Write	Register address	Register value/Number of registers		CRC-16		

2-byte integer

0000: Dull

0001: Vivid

2.2.26 Remote Control Setting

Read a Single Register

1	2	3	4	5	6	7	8
01	03	02	35	00	01	95	BC
Station address	Read	Register address	Number of registers		CRC-16		

Response

1	2	3	4	5	6	7
01	03	02	00	00	B8	44
Station address	Read	Byte	Register value		CRC-16	

Write a Single Register

1	2	3	4	5	6	7	8	9	10	11
01	06	02	35				00	01	59	BC
01	10	02	35	00	01	02	00	00	80	35
Station address	Write	Register address	Number of registers		Byte	Register value		CRC-16		

Response

1	2	3	4	5	6	7	8
01	06	02	35	00	01	59	BC
01	10	02	35	00	01	10	7F
Station address	Write	Register address	Register value/Number of registers		CRC-16		

2-byte integer

0000: Off

0001: On

2.2.27 Alarm Volume Setting

Read a Single Register

1	2	3	4	5	6	7	8
01	03	02	36	00	01	65	BC
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7
01	03	02	00	03	F8	45
Station address	Read	Byte	Register value		CRC-16	

Write a Single Register

1	2	3	4	5	6	7	8	9	10	11
01	06	02	36				00	00	68	7C
01	10	02	36	00	01	02	00	02	01	C7
Station address	Write	Register address		Number of registers		Byte	Register value		CRC-16	

Response

1	2	3	4	5	6	7	8
01	06	02	36	00	00	68	7C
01	10	02	36	00	01	E0	7F
Station address	Write	Register address		Number of registers		CRC-16	

2-byte integer

0000: Off

0001: Low

0002: Middle

0003: High

2.2.28 Test Step Serial Number

Read a Single Register

1	2	3	4	5	6	7	8
01	03	02	40	00	01	84	66
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7
01	03	02	00	01	79	84
Station address	Read	Byte	Register value		CRC-16	

2-byte integer

0001-064

2.2.29 Test Sorting Results

Read a Single Register

1	2	3	4	5	6	7	8
01	03	02	41	00	01	D5	A6
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7
01	03	02	00	02	39	85
Station address	Read	Byte	Register value		CRC-16	

2-byte integer

0001: Rise

0002: Hold

0003: Pass

0004: Abort

0005: Upper limit setting failed

0006: Lower limit setting failed

0007: Voltage upper limit setting failed

0008: Voltage lower limit setting failed

2.2.30 Output Mode

Read a Single Register

1	2	3	4	5	6	7	8
01	03	02	42	00	01	25	A6
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7
01	03	02	00	02	39	85
Station address	Read	Byte	Register value		CRC-16	

2-byte integer

0001: AC-50 Hz

0002: AC-60 Hz

0003: DC

2.2.31 Test Current

Read Two Registers

1	2	3	4	5	6	7	8
01	03	02	43	00	02	34	67
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7	8	9
01	03	04	40	9F	EE	9F	D2	15
Station address	Read	Byte	Register value1		Register value2		CRC-16	

4-byte integer

1.00-40.00 (floating-point number)

in which, the number of registers is 40 9F EE 9F, converts to the floating-point value: 0x409FEE9F = 4.998 (decimalism),

indicating that the test current is 4.998 A.

2.2.32 Test Voltage

Read Two Registers

1	2	3	4	5	6	7	8
01	03	02	45	00	02	D4	66
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7	8	9
01	03	04	3E	97	75	B0	61	13
Station address	Read	Byte	Register value1		Register value2		CRC-16	

4-byte integer

0.00-8.00 (floating-point number)

in which, the number of registers is 3E 97 75 B0, converts to the floating-point value: 0x3E9775B0 = 0.296 (decimalism),

indicating that the test current is 0.296 V.

2.2.33 Test Resistance

Read a Single Register

1	2	3	4	5	6	7	8
01	03	02	47	00	01	35	A7
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7
01	03	02	00	3B	F9	97
Station address	Read	Byte	Register value		CRC-16	

2-byte integer

0001-0258

2.2.34 Dwell time

Read Two Registers

1	2	3	4	5	6	7	8
01	03	02	48	00	0A	45	A5
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7	8	9
01	03	04	3F	F5	C2	8F	F6	D1
Station address	Read	Byte	Register value1		Register value2		CRC-16	

4-byte integer

0.00-999.9(floating-point number)

in which, the number of registers is 3F F5 C2 8F, converts to the floating-point value: 0x3FF5C28F = 1.92 (decimalism),

indicating that the test current is 1.92 s.

2.2.35 001 Step Test Sorting Results

Read a Single Register

1	2	3	4	5	6	7	8
01	03	03	00	00	01	84	4E
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7
01	03	02	00	03	F8	45
Station address	Read	Byte	Register value		CRC-16	

2-byte integer

0001: Rise

0002: Hold

0003: Pass

0004: Abort

0005: Upper limit setting failed

0006: Lower limit setting failed

0007: Voltage upper limit setting failed

0008: Voltage lower limit setting failed

2.2.36 001 Step Output Mode

Read a Single Register

1	2	3	4	5	6	7	8
01	03	03	01	00	01	D5	8E
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7
01	03	02	00	02	39	85
Station address	Read	Byte	Register value		CRC-16	

2-byte integer

0001: AC-50 Hz

0002: AC-60 Hz

0003: DC

2.2.37 001 Step Test Current

Read Two Registers

1	2	3	4	5	6	7	8
01	03	03	02	00	02	65	8F
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7	8	9
01	03	04	40	9F	FF	89	5F	8B
Station address	Read	Byte	Register value1		Register value2		CRC-16	

4-byte integer

1.00-40.00 (floating-point number)

in which, the number of registers is 40 9F FF 89, converts to the floating-point value: 0x409FFF89 = 4.99 (decimalism),

indicating that the test current is 4.99 A.

2.2.38 001 Step Test Voltage

Read Two Registers

1	2	3	4	5	6	7	8
01	03	03	04	00	02	85	8E
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7	8	9
01	03	04	3E	96	AE	EF	2A	1B
Station address	Read	Byte	Register value1		Register value2		CRC-16	

4-byte integer

0.00-8.00 (floating-point number)

in which, the number of registers is 3E 96 AE EF, converts to the floating-point value: 0x3E96AE EF = 0.29 (decimalism),

indicating that the test current is 0.29 V.

2.2.39 001 Step Test Resistance

Read a Single Register

1	2	3	4	5	6	7	8
01	03	03	06	00	01	64	4F
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7
01	03	02	00	3A	38	57
Station address	Read	Byte	Register value		CRC-16	

2-byte integer

0001-0258

2.2.40 001 Step Dwell time

Read Two Registers

1	2	3	4	5	6	7	8
01	03	03	07	00	02	75	8E
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7	8	9
01	03	04	40	40	A3	D7	D6	89
Station address	Read	Byte	Register value1		Register value2		CRC-16	

4-byte integer

0.00-999.9(floating-point number)

in which, the number of registers is 40 40 A3 D7, converts to the floating-point value: 0x4040A3D7 = 3.01(decimalism),

indicating that the test current is 3.01 s.

2.2.41 100 Steps Test Sorting Results

Read a Single Register

1	2	3	4	5	6	7	8
01	03	06	7B	00	01	F4	9B
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7
01	03	02	00	03	F8	45
Station address	Read	Byte	Register value		CRC-16	

2-byte integer

0001: Rise

0002: Hold

0003: Pass

0004: Abort

0005: Upper limit setting failed

0006: Lower limit setting failed

0007: Voltage upper limit setting failed

0008: Voltage lower limit setting failed

2.2.42 100 Steps Output Mode

Read a Single Register

1	2	3	4	5	6	7	8
01	03	06	7C	00	01	45	5A
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7
01	03	02	00	02	39	85
Station address	Read	Byte	Register value		CRC-16	

2-byte integer

0001: AC-50 Hz

0002: AC-60 Hz

0003: DC

2.2.43 100 Steps Test Current

Read Two Registers

1	2	3	4	5	6	7	8
01	03	06	7D	00	02	54	9B
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7	8	9
01	03	04	3F	7F	83	E6	27	45
Station address	Read	Byte	Register value1		Register value2		CRC-16	

4-byte integer

1.00-40.00 (floating-point number)

in which, the number of registers is 3F 7F 83 E6, converts to the floating-point value: 0x3F7F83E6 = 0.998 (decimalism),

indicating that the test current is 0.998 A.

2.2.44 100 Steps Test Voltage

Read Two Registers

1	2	3	4	5	6	7	8
01	03	06	7F	00	02	F5	5B
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7	8	9
01	03	04	3D	A5	38	42	74	4D
Station address	Read	Byte	Register value1		Register value2		CRC-16	

4-byte integer

0.00-8.00(floating-point number)

in which, the number of registers is 3D A5 38 42, converts to the floating-point value: 0x3DA53842 = 0.08(decimalism),

indicating that the test current is 0.08 V.

2.2.45 100 Steps Test Resistance

Read a Single Register

1	2	3	4	5	6	7	8
01	03	06	81	00	01	D4	AA
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7
01	03	02	00	50	B8	78
Station address	Read	Byte	Register value		CRC-16	

2-byte integer

0001-0258

2.2.46 100 Steps Dwell time

Read Two Registers

1	2	3	4	5	6	7	8
01	03	06	82	00	02	64	AB
Station address	Read	Register address		Number of registers		CRC-16	

Response

1	2	3	4	5	6	7	8	9
01	03	04	3F	05	1E	B8	EF	F4
Station address	Read	Byte	Register value1		Register value2		CRC-16	

4-byte integer

0.00-999.9(floating-point number)

in which, the number of registers is 3F 05 1E B8, converts to the floating-point value: 0x3F051EB8 = 0.52(decimalism),

indicating that the test current is 0.52 s.