



Programming Manual

UT5400 Series Electrical Safety Analyzers

V1.0

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1. SCPI

SCPI (Standard Commands for Programmable Instruments) is a standardized instrument programming language that builds on existing standards IEEE 488.1 and IEEE 488.2 and follows the floating-point rules of IEEE 754 standard, ISO 646 message exchange 7-bit encoding notation (equivalent to ASCII programming) and many other standards.

This section introduces the format, symbols, parameters, and abbreviations of the SCPI command.

1.1 Command Parsing

The host computer can send command strings to the instrument. The instrument's command parser begins processing when it detects the message terminator.

Example: Valid Command Format:
AAA:BBB CCC;DDD EEE;:FFF

The command parser interprets and executes all commands. Understanding the command syntax rules is essential before writing your program.

1.1.1 Command Parser Rules

1. The command parser processes ASCII data only.
2. The parser begins processing upon receiving the termination character. This instrument recognizes the following three termination characters:
 - CR (Carriage Return)
 - CR+LF (Carriage Return + Line Feed)
 - LF (Line Feed)
3. The parser terminates processing immediately if an invalid command is detected; the command is then discarded.
4. The parser is case-sensitive.
5. The parser supports command abbreviation; see the following section for formats.
6. In RS485 mode, prefix the SCPI command with ADDR□Local Address::□, where the local address ranges from 1 to 255.
7. This enables communication with multiple devices via the SCPI protocol.
For example, ADDR□1::□IDN? (□ represents a space character)
8. The instrument terminates responses with 0x0D0A (CR+LF) by default.
9. Multiple commands may be sent on a single line, separated by semicolons (;).

1.1.2 Notation and Definitions

This section describes symbols used to clarify command syntax. These symbols are not part of the command tree itself.

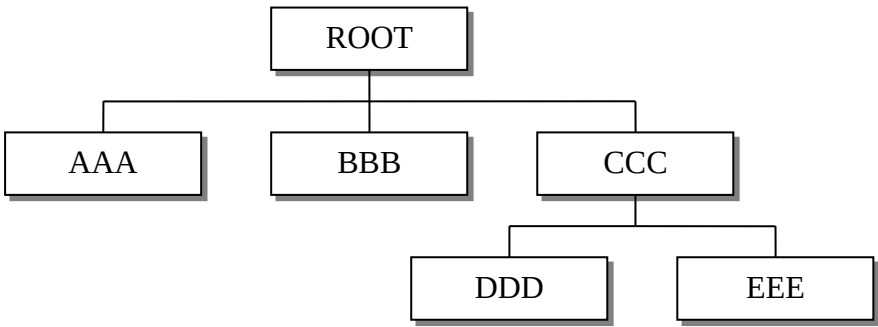
Symbol	Description
<.....>	Angle brackets indicate a command parameter. For example, <float> represents a floating-point parameter <integer> represents an integer parameter
[.....]	Square brackets indicate optional commands or parameters.
{.....}	Braces enclose a selection of parameters; only one may be chosen.
Capital letter	Uppercase letters indicate the abbreviated form of a command.
□	Space character. Represents a required space; shown for readability.

1.1.3 Command Tree Structure

SCPI commands follow a tree-structured hierarchy with three levels. (Note: The parser supports access to any level of the command tree.)

The top level consists of subsystem commands. Subordinate commands are accessible only after entering the parent subsystem. Colons (:) delimit successive levels in the command path.

Figure 1-1 Command Tree Structure



Example

```
ROOT:CCC:DDD ppp
ROOT      Subsystem command
  CCC      Second level
    DDD      Third level
      ppp      Parameter
```

1.2 Command and Parameter

A command consists of a **Command** and [**Parameter**], separated by a space (ASCII:20H).

Example

AAA:BBB□1.234

Command [Parameter]

1.2.1 Command

The command header may be in long form or abbreviated form. The long form enhances readability. The abbreviated form improves programming efficiency.

1.2.2 Parameter

1. No parameters required: Some commands consist of headers only.
For example, AAA:BBB
2. Character data: Parameters may be character strings. Abbreviated forms shall conform to the Command Abbreviation Rules defined previously.
For example, AAA:BBB□1.23
3. Numeric values: Parameters may be set numeric values.

<integer>	Decimal integer: 123, +123, -123
<float>	Floating-point numbers in multiple formats: <Fixed> (Floating-point number): 1.23, -1.23 <Scientific> (Scientific notation): 1.23E+4, +1.23e-4 <Suffix>: 1.23k, 1.23MA, 1.23G, 1.23u

Table 1-1 Metric Prefixes (Unit Multipliers)

Numeric Value	Symbol
1E18 (EXA)	EX
1E15 (PETA)	PE
1E12 (TERA)	T
1E9 (GIGA)	G
1E6 (MEGA)	MA
1E3 (KILO)	K
1E-3 (MILLI)	M
1E-6 (MICRO)	U
1E-9 (NANO)	N
1E-12 (PICO)	P
1E-15 (PEMTO)	F
1E-18 (ATTO)	A



Because SCPI is case-sensitive, the abbreviated form differs from the full command

name.

For example:

- "1M" indicates 1 milli (10^{-3}), not 1 mega (10^6).
 - "1MA" indicates 11 mega (10^6).
-

1.2.3 Separator

The command parser accepts only specified separators; all others generate an Invalid Separator error.

;	Semicolon: Separates multiple commands For example, AAA:BBB 100.0;CCC:DDD
:	Colon: Separates hierarchy levels; resets to root For example, AAA:BBB:CCC 123.4;DDD:EEE 567.8
?	Question mark: Indicates query commands For example, AAA?
□	Space: Separates header from parameters For example, AAA:BBB□1.234

1.2.4 Error Code

Error Code	Description
*E00	No error
*E01	Unknown command
*E02	Parameter error
*E03	Missing parameter
*E04	Buffer overrun
*E05	Syntax error
*E06	Invalid separator
*E07	Invalid multiplier
*E08	Numeric data error
*E09	Value too long
*E10	Invalid command
*E11	Unknow error

1.3 Command Reference

All commands are organized by subsystem, as listed below.

- **MEASure** Measurement Subsystem

- **FILE** File Subsystem
- **LIST** List Subsystem
- **SYStem** System Subsystem
- **ADDR** Device Address Subsystem

Common Commands

- **IDN?** Query instrument identification
- ***RST** Reset the instrument to default state

1.4 TEST Subsystem

1.4.1 TEST

Description: Executes the test.

Command Syntax	TEST
Examples	Request> TEST // Executes the test.
Query Syntax	TEST?
Query Response	{0,1} // 0: Stop (Reset state); 1: Testing

1.4.2 RESET

Description: Stops the test.

Command Syntax	RESET
Examples	Request> RESET // Stops the test.

1.4.3 TEST:DATA?

Description: Queries the test results.

Query Syntax 1	TEST:DATA? // Queries the current step data.	
Query Syntax 2	TEST:DATA? <integer> // Range: 1-200. Queries the specified step data.	
Query Syntax 3	TEST:DATA? 0 // Queries all step data (The data is returned only after all test steps have been completed.)	
Query Response	<Test step>,<Test mode>,<Test state>,<Test data>,<Duration>	
Description	<Test step>	<integer (1-200)>
	<Test mode>	{ACW,DCW,IR,GND, CONT,OSC,WAIT}
	<Test state>	{ Ramp Up, Dwell Time, Ramp Down, Delay Time, PASS, ABORT, OUTPUT-ERROR, LO-LIMIT, HI-LIMIT, LO-LIMIT T, HI-LIMIT T, LO-LIMIT R, HI-LIMIT R, LO-LIMIT V, HI-LIMIT V, Charge-LO, Ramp-HI, Breakdown, Short, GND-Fault, Over-Temp, CONT-Fail, ARC-Fail, OTP-Fail, Discharge, OSC-OPEN, OSC-SHORT}

	<Test data>	ACW: <Test voltage (kV)>,< Test current (mA)> DCW: <Test voltage (kV)>,< Test current (uA)> IR: <Test voltage (kV)>,< Test resistance (MΩ)> GND: <Test current (A)>,< Test resistance (mΩ)> CONT: < Test resistance (Ω)> OSC: < Equivalent capacitance (nF)> WAIT: None
	<Duration>	<float>, default unit: s
	Notes	1. The delimiter between data items within the same step is a comma (,). 2. The delimiter between different steps is a semicolon (;). 3. The default data terminator is 0x0A (LF).
Examples	Request> TEST:DATA? // Queries the current step data. Response> 01,ACW,Dwell Time,3.00,0.002,0.000,0.4 Request> TEST:DATA? 1 // Queries the Step 1 test results. Response> 01,ACW,PASS,3.00,0.003,0.000,0.0 Request> TEST:DATA? 0 // Queries all step data. Response> 01,ACW,PASS,3.00,0.003,0.000,0.0;02,GND,HI-LIMIT,0.04,800,0.0	

1.5 FILE Subsystem

1.5.1 NEW File

Description: Creates a new file and clears the current project settings.

Command Syntax	NEW <integer>,<string> // File number range: 1-128. Filename: string, up to 14 characters
ExampIs	Request> NEW 1,"test1" // Creates a new file named "test1" with file number 1.

1.5.2 LOAD

Description: Loads the file to the system.

Command Syntax	LOAD <integer> // File number range: 1-128.
ExampIs	Request> LOAD 1 // Loads File 1 to the system.

1.5.3 DEL

Description: Deletes the specified file.

Command Syntax	DEL <integer> // File number range: 1-128.
ExampIs	Request> DEL 5 // Deletes File 5.

1.5.4 SAVE

Description: Saves the current settings to the specified file.

Command Syntax	SAVE
Examples	Request> SAVE // Stores the settings to the current file.

1.5.5 STEP:TOT?

Description: Queries the total number of test stpes in a specified file.

Query Syntax 1	STEP:TOT? // Queries the total number of test stpes in the current file.
Query Syntax 2	STEP:TOT? <index> // File number range: 1-128. Queries the total number of test stpes in a specified file.
Query Response	{1-200} // Returns the total number of test steps in a specified file, ranging from 1-200.
Examples	Request> STEP:TOT? 1 // Queries the total number of test stpes in File 1. Response> 1

1.5.6 FILE:TOT?

Description: Queries the total number of files.

Query Syntax	FILE:TOT?
Query Response	{1-128} // Returns the total number of files, ranging from 1-128.

1.5.7 FILE:INFO?

Description: Queries the file information.

Query Syntax 1	FILE:INFO? // Queries information for the current file.
Query Syntax 2	FILE:INFO? <integer> // File number range: Queries information for the specified file.
Query Response	<File number>,< Test step number in file >,<File name>
Examples	Request> FILE:INFO? 4 // Queries information for File 4 Response> 4,3,test4 //4 indicates the file number; 3 indicates the number of test steps in the file; test4 indicates the file name.

1.6 LIST Subsystem

1.6.1 ADD:STEP

Description: Adds a new test step to the list.

Command Syntax	ADD:STEP
ExampIs	Request> ADD:STEP // Adds a default ACW test step to the end of the list.

1.6.2 DEL:STEP

Description: Deletes test steps from the list.

Command Syntax 1	DEL:STEP 0 // Deletes all test steps in the current file.
------------------	---

Command Syntax 2	DEL:STEP <index> // Step index: 1-200. Deletes the specified test step.
Examples	Request> DEL:STEP 0 // Deletes all test steps in the current file.
	Request> DEL:STEP 2 // Deletes Step 2 in the current file.

1.6.3 SEL:STEP

Description: Sets the starting step for list test.

Command Syntax	SEL:STEP <index>
Parameter	<index> // Step index: 1-200.
Examples	Request> SEL:STEP 3 // Sets the starting step to 3 for the list test.
Query Syntax	SEL:STEP? // Queries the current starting step.
Examples	Request> SEL:STEP?
	Response> 4

1.6.4 MODIfy:STEP:MODE

Description: Sets the test mode for the specified step. Command names are case-insensitive.

Command Syntax	MODIfy:STEP:MODE <index>,<mode>
Parameter	<index> // Step index: 1-200.
	<mode> // Test mode: ACW,DCW,IR,GB,CONT,OSC,WAIT
Examples	Request>MODIfy:STEP:MODE 1,ACW // Sets the test mode of the Step 1 to ACW.
Query Syntax	MODIfy:STEP:MODE? <index>
Examples	Request> MODIf:STEP:MODE? 1 // Queries the the test mode of the Step 1.
	Response> ACW

1.6.5 ADD:ACW

Description: Adds ACW (AC Withstand) test parameter settings. **This command is recommended for global configuration of ACW parameters.**

Command Syntax	ADD:ACW <volt>,<hi_tot>,<lo_tot>,<rise_t>,<dwel_t>,<fall_t>,<arc_level>,<hi_real>,<lo_real>,<zero_offset>,<freq>,<arc_detect>,<continuity>,<curr_range>
Parameter	volt: // Output voltage: 0-5000 V. Default: 1240 V
	hi_tot: // Upper limit of total current: Refer to model specifications. Default: 10.00 mA
	lo_tot: // Lower limit of total current: Refer to model specifications. Default: 0.00 mA
	rise_t: // Rise time: 0.1-999.9 s. Default: 0.1 s
	dwel_t: // Dwell time: 0.2-999.9 s; 0 = Continuous test. Default: 1.0 s
	fall_t: // Fall time: 0.0-999.9 s. Default: 0.0 s

	arc_level: // Arc detection level: 1-9. 9 = Maximum sensitivity. Default: 5 hi_real: // Upper limit of resistance: Refer to model specifications. Default: 10.00 mA lo_real: // Lower limit of resistance: Refer to model specifications. Default: 0.00 mA zero_offset: // Zero compensation offset: 0.000 mA (default) freq: // Output frequency: 50 Hz, 60 Hz. Default: 50 Hz arc_detect: // Arc detection state: ON, OFF. Default: OFF continuity: // Continuity test state: ON, OFF. Default: OFF curr_range: // Range mode: Auto, fixed. Default: Auto
Examples	Request>ADD:ACW 2000,10,0,1.0,1.0,1.0,5,10,0,0,60,OFF,OFF,AUTO

1.6.6 MODIfy:ACW

Description: Sets the ACW test parameters. Command names are case-insensitive.

Command Syntax	MODIfy:ACW <index><volt>,<hi_tot>,<lo_tot>,<rise_t>,<dwll_t>,<fall_t>,<arc_lvl>,<hi_real>,<lo_real>,<zero_offset>,<freq>,<arc_detect>,<continuity>,<curr_range>
Parameter	Index // Step index: 1-200. volt: // Output voltage: 0-5000 V. Default: 1240 V hi_tot: // Upper limit of total current: Refer to model specifications. Default: 10.00 mA lo_tot: // Lower limit of total current: Refer to model specifications. Default: 0.00 mA rise_t: // Rise time: 0.1-999.9 s. Default: 0.1 s dwll_t: // Dwell time: 0.2-999.9 s; 0 = Continuous test. Default: 1.0 s fall_t: // Fall time: 0.0-999.9 s. Default: 0.0 s arc_level: // Arc detection level: 1-9. 9 = Maximum sensitivity. Default value: 5 hi_real: // Upper limit of resistance: Refer to model specifications. Default: 10.00mA lo_real: // Lower limit of resistance: Refer to model specifications. Default: 0.00 mA zero_offset: // Zero compensation offset: 0.000 mA (default) freq: // Output frequency: 50 Hz, 60 Hz. Default: 50 Hz arc_detect: // Arc detection state: ON, OFF. Default: OFF continuity: // Continuity test state: ON, OFF. Default: OFF

	curr_range: // Range mode: Auto, fixed. Default: Auto
Examples	Request>MODIfy:ACW:1,2000,10,0,1.0,1.0,1.0,5,10,0,0,60,OFF,OFF,AUTO

1.6.7 MODIfy:ACW:VOLTage

Description: Sets the output voltage for ACW. Command names are case-insensitive.

Command Syntax	MODIfy:ACW:VOLTage <index>,<volt>
Parameter	<index> // Step index: 1-200. <volt> // Output voltage: 0-5000 V. Default: 1240 V
Examples	Request>MODIfy:ACW:VOLTage 1,2000 // Sets the output voltage for ACW Step 1 to 2000 V.
Query Syntax	MODIfy:ACW:VOLTage? <index>
Examples	Request>MODIfy:ACW:VOLTage? 1 // Queries the output voltage for ACW Step 1.

1.6.8 MODIfy:ACW:FREQuency

Description: Sets the output frequency for ACW. Command names are case-insensitive.

Command Syntax	MODIfy:ACW:FREQuency <index>,<freq>
Parameter	<index> // Step index: 1-200. <freq> // Output frequency: 50, 60 Hz
Examples	Request>MODIfy:ACW:FREQ 1,50 // Sets the output frequency for ACW Step 1 to 50 Hz.
Query Syntax	MODIfy:ACW:FREQuency? <index>
Examples	Request>LIST:MODIfy:ACW:FREQuency? 1 // Queries the output frequency for ACW Step 1.

1.6.9 MODIfy:ACW:LIMIT:TOTal:CURrent:UPper

Description: Sets the upper limit of total current for ACW.

Command Syntax	MODIfy:ACW:LIMIT:TOTal:CURrent:UPper <index>,<hi_tot>
Parameter	<index> // Step index: 1-200. <hi_tot> // Upper limit of total current: Refer to model specifications. Default: 10.00 mA
Examples	Request> MODIfy:ACW:LIMIT:TOTal:CURrent:UPper 1,30 // Sets the upper limit of total current for ACW Step 1 to 30 mA.
Query Syntax	MODIfy:ACW:LIMIT:TOTal:CURrent:UPper? <index>
Examples	Request> MODIfy:ACW:LIMIT:TOTal:CURrent:UPper? 1 // Queries the upper limit of total current for ACW Step 1.

1.6.10 MODIfy:ACW:LIMIT:TOTal:CURrent:LOWer

Description: Sets the lower limit of total current for ACW.

Command Syntax	MODIfy:ACW:LIMIT:TOTal:CURrent:LOWer <index>,<lo_tot>
----------------	---

Parameter	Index: // Step index: 1-200. lo_tot: // Lower limit of total current: Refer to model specifications. Default: 0.00 mA
Examples	Request>MODIfy:ACW:LIMIT:TOTal:CURrent:LOWer 1,30 // Sets the lower limit of total current for ACW Step 1 to 30 mA.
	Request>MODIfy:ACW:LIMIT:TOTal:CURrent:LOWer? 1 // Queries the lower limit of total current for ACW Step 1.

1.6.11 MODIfy:ACW:LIMIT:REAL:CURrent:UPer

Description: Sets the upper limit of resistance for ACW.

Command Syntax	MODIfy:ACW:LIMIT:REAL:CURrent:UPer <index>,<hi_real>
Parameter	Index: // Step index: 1-200. hi_real: // Upper limit of resistance, default: 10.00 mA
Examples	Request>MODIfy:ACW:LIMIT:REAL:CURrent:UPper 1,30 // Sets the upper limit of resistance for ACW Step 1 to 30 mA.
	Request>MODIfy:ACW:LIMIT:REAL:CURrent:UPper? 1 // Queries the upper limit of resistance for ACW Step 1.

1.6.12 MODIfy:ACW:LIMIT:REAL:CURrent:LOWer

Description: Sets the lower limit of resistance for ACW.

Command Syntax	MODIfy:ACW:LIMIT:REAL:CURrent:LOWer <index>,<lo_real>
Parameter	Index: // Step index: 1-200. lo_real: // Lower limit of resistance, default: 0.00 mA
Examples	Request>MODIfy:ACW:LIMIT:REAL:CURrent:LOWer 1,30 // Sets the lower limit of resistance for ACW Step 1 to 30 mA.
	Request>MODIfy:ACW:LIMIT:TOTal:CURrent:LOWer? 1 // Queries the lower limit of resistance for ACW Step 1.

1.6.13 MODIfy:ACW:ARC

Description: Sets the Arc detection state for ACW.

Command Syntax	MODIfy:ACW:ARC <index>,<arc_detect>
Parameter	Index: // Step index: 1-200. arc_detect: // Arc detection state: ON, OFF. Default: OFF
Examples	Request>MODIfy:ACW:ARC 1,OFF // Sets the Arc detection state for ACW Step 1 to OFF.
	Request>MODIfy:ACW:ARC? 1 // Queries the Arc detection state for ACW Step 1.

1.6.14 MODIfy:ACW:ARC:LEVel

Description: Sets the Arc detection level for ACW.

Command Syntax	MODIfy:ACW:ARC:LEVel <index>,<arc_level>
Parameter	Index: // Step index: 1-200. arc_level: // Arc detection level: 0-9. Default: 5
Examples	Request>MODIfy:ACW:ARC:LEVel 1,3 // Sets the Arc detection level for ACW Step 1 to 3.
	Request>MODIfy:ACW:ARC:LEVel? 1 // Queries the Arc detection level for ACW Step 1.

1.6.15 MODIfy:ACW:RISE:TIME

Description: Sets the rise time for ACW.

Command Syntax	MODIfy:ACW:RISE:TIME <index>,<rise_t>
Parameter	Index: // Step index: 1-200. rise_t: // Rise time: 0.1-999.9 s. Default: 0.1 s
Examples	Request>MODIfy:ACW:RISE:TIME 1,3.0 // Sets the rise time for ACW Step 1 to 3.0 s.
	Request>MODIfy:ACW:RISE:TIME? 1 // Queries the rise time for ACW Step 1.

1.6.16 MODIfy:ACW:FALL:TIME

Description: Sets the fall time for ACW.

Command Syntax	MODIfy:ACW:FALL:TIME <index>,<fall_t>
Parameter	Index: // Step index: 1-200. fall_t: // Fall time: 0.1-999.9 s. Default: 0.0 s
Examples	Request>MODIfy:ACW:FALL:TIME 1,3.0 // Sets the fall time for ACW Step 1 to 3.0 s.
	Request>MODIfy:ACW:FALL:TIME? 1 // Queries the rise time for ACW Step 1.

1.6.17 MODIfy:ACW:DWELL:TIME

Description: Sets the dwell time for ACW.

Command Syntax	MODIfy:ACW:DWELL:TIME <index>,<dwell_t>
Parameter	Index: // Step index: 1-200. dwell_t: // Dwell time: 0.2-999.9 s; 0 = Continuous test. Default: 1.0 s
Examples	Request>MODIfy:ACW:DWELL:TIME 1,3.0 // Sets the dwell time for ACW Step 1 to 3.0 s.
	Request>MODIfy:ACW:DWELL:TIME? 1 // Queries the dwell time for ACW Step 1.

1.6.18 MODIfy:ACW:MAKE:ZERO

Description: Sets the zero compensation offset for ACW.

Command Syntax	MODIfy:ACW:MAKE:ZERO <index>,<zero_offset>
----------------	--

Parameter	Index: // Step index: 1-200. zero_offset: // Zero compensation offset: 0.000 mA (default)
Examples	Request>MODIfy:ACW:MAKE:ZERO 1,2.000 // Sets the zero compensation for ACW Step 1 to 2.000 mA.
	Request>MODIfy:ACW:MAKE:ZERO? 1 // Queries the zero compensation for ACW Step 1.

1.6.19 MODIfy:ACW:CURRent:RANGe

Description: Sets the range mode for ACW.

Command Syntax	MODIfy:ACW:CURRent:RANGe <index>,<curr_range>
Parameter	Index: // Step index: 1-200. curr_range: // Range mode: Auto, fixed. Default: Auto
Examples	Request>MODIfy:ACW:CURRent:RANGe 1,AUTO // Sets the range mode for ACW Step 1 to Auto.
	Request>MODIfy:ACW:CURRent:RANGe? 1 // Queries the range mode for ACW Step 1.

1.6.20 MODIfy:ACW:CONTInuity

Description: Sets the continuity test state for ACW.

Command Syntax	MODIfy:ACW:CONTInuity <index>,<continuity>
Parameter	Index: // Step index: 1-200. continuity: // Continuity test state: ON, OFF. Default: OFF
Examples	Request>MODIfy:ACW:CONTInuity 1,ON // Sets the continuity test state for ACW Step 1 to ON.
	Request>MODIfy:ACW:CONTInuity? 1 // Queries the continuity test state for ACW Step 1.

1.6.21 MODIfy:ACW:PROMp

Description: Sets the prompt message for ACW.

Command Syntax	MODIfy:ACW:PROMp <index>,<str>
Parameter	Index: // Step index: 1-200. str: // Prompt message
Examples	Request>MODIfy:ACW:PROMp 1,"test sleep" // Sets the prompt message for ACW Step 1 to "test sleep".
	Request>MODIfy:ACW:PROMp? 1 // Queries the prompt message for ACW Step 1.

1.6.22 STEP:ACW?

Description: Queries the ACW parameter settings for the specified step.

Query Syntax	STEP:ACW? <index>
Parameter	Index: // Step index: 1-200.
Examples	Request>STEP:ACW? 1 // Queries the parameter settings of ACW Step 1. Response> 1,1240,10.00,0.00,0.1,1.0,0.0,5,10.00,0.00,0.0000,50,0,0,0

1.6.23 ADD:DCW

Description: Adds DCW (DC Withstand) test parameter settings. **This command is recommended for global configuration of DCW parameters.**

Command Syntax	ADD:DCW <volt>,<hi_limit>,<lo_limit>,<rise_t>,<dwel_t>,<fall_t>,<lo_limit_charge>,<arc_level>,<zero_offset>,<hi_limit_ramp>,<arc_detect>,<continuity>,<curr_range>,<low_curr_range>
Parameter	volt: // Output voltage: 0-6000 V. Default: 1500 V hi_limit: // Upper limit of current: Refer to model specifications. Default: 10000 uA lo_limit: // Lower limit of current: Refer to model specifications. Default: 0.0 uA rise_t: // Rise time: 0.4-999.9 s. Default: 0.4 s dwel_t: // Dwell time: 0.4-999.9 s; 0 = Continuous test. Default: 1.0 s fall_t: // Fall time: 1.0-999.9 s; 0 = OFF. Default: 0.0 s lo_limit_charge: // Lower limit of charging current: 0.0000-350.0 uA. Low range: off, default: 0.0 uA. Low range: on, default: 0.0 uA arc_level: // Arc detection level: 1-9. 9 = Maximum sensitivity. Default: 5 zero_offset: // Zero compensation offset: 0.0000 uA (default) hi_limit_ramp: // Ramp upper limit: 0.0000-10000 uA; 0 = OFF. Default: 10000 uA arc_detect: // Arc detection state: ON, OFF. Default: OFF continuity: // Continuity test state: ON, OFF. Default: OFF curr_range: // Range mode: Auto, fixed. Default: Auto
Examples	Request> ADD:DCW 1500,10,0,0.5,1.0,1.0,0.0,5,0,0,OFF,OFF,AUTO,OFF

1.6.24 MODIfy:DCW

Description: Sets the DCW test parameters.

Command Syntax	MODIfy:DCW <index>,<volt>,<hi_limit>,<lo_limit>,<rise_t>,<dwel_t>,<fall_t>,<lo_limit_charge>,<arc_level>,<zero_offset>,<hi_limit_ramp>,<arc_detect>,<continuity>,<curr_range>,<low_curr_range>
Parameter	index: // Step index: 1-200 volt: // Output voltage: 0-6000 V. Default: 1500 V hi_limit: // Upper limit of current: Refer to model specifications. Default: 10000 uA lo_limit: // Lower limit of current: Refer to model specifications. Default: 0.0 uA rise_t: // Rise time: 0.4-999.9 s. Default: 0.4 s dwel_t: // Dwell time: 0.4-999.9 s; 0 = Continuous test. Default: 1.0 s fall_t: // Fall time: 1.0-999.9 s; 0 = OFF. Default: 0.0 s lo_limit_charge: // Lower limit of charging current: 0.0000-350.0 uA. Low range: off, default: 0.0 uA. Low range: on, default: 0.0 uA arc_level: // Arc detection level: 1-9. 9 = Maximum sensitivity. Default: 5 zero_offset: // Zero compensation offset: 0.0000 uA (default) hi_limit_ramp: // Ramp upper limit: 0.0000-10000 uA; 0 = OFF. Default: 10000 uA arc_detect: // Arc detection state: ON, OFF. Default: OFF continuity: // Continuity test state: ON, OFF. Default: OFF curr_range: // Range mode: Auto, fixed. Default: Auto low_curr_range: // Low range mode: ON, OFF. Default: OFF
Examples	Request> MODIfy:DCW 1,1500,10,0,0.5,1.0,1.0,0.0,5,0,0,OFF,OFF,AUTO,OFF

1.6.25 MODIfy:DCW:VOLTage

Description: Sets the output voltage for DCW.

Command Syntax	MODIfy:DCW:VOLTage <index>,<volt>
Parameter	Index: // Step index: 1-200. volt: // Output voltage: 0-6000 V. Default: 1500 V
Examples	Request>MODIfy:DCW:VOLTage 1,2000 // Sets the output voltage for DCW Step 1 to 2000 V.
	Request>MODIfy:DCW:VOLTage? 1 // Queries the output frequency for DCW Step 1.

1.6.26 MODIfy:DCW:LIMIT:REAL:CURrent:UPer

Description: Sets the upper limit of resistance for DCW.

Command Syntax	MODIfy:DCW:LIMIT:REAL:CURrent:UPer <index>,<hi_limit>
Parameter	Index: // Step index: 1-200. hi_limit: // Upper limit of resistance: Refer to model specifications. Default: 10000 uA
Examples	Request> MODIfy:DCW:LIMIT:REAL:CURrent:UPer 1,1000 // Sets the upper limit of resistance for DCW Step 1 to 1000 uA.
	Request> MODIfy:DCW:LIMIT:REAL:CURrent:UPer? 1 // Queries the upper limit of resistance for DCW Step 1.

1.6.27 MODIfy:DCW:LIMIT:REAL:CURrent:LOWer

Description: Sets the lower limit of resistance for DCW.

Command Syntax	MODIfy:DCW:LIMIT:REAL:CURrent:LOWer <index>,<lo_limit>
Parameter	Index: // Step index: 1-200. lo_limit: // Lower limit of resistance: Refer to model specifications. Default: 0.00 uA
Examples	Request> MODIfy:DCW:LIMIT:REAL:CURrent:LOWer 1,30 // Sets the lower limit of resistance for DCW Step 1 to 30 uA.
	Request> MODIfy:DCW:LIMIT:REAL:CURrent:LOWer? 1 // Queries the lower limit of resistance for DCW Step 1.

1.6.28 MODIfy:DCW:ARC

Description: Sets the Arc detection state for DCW.

Command Syntax	MODIfy:DCW:ARC <index>,<arc_detect>
Parameter	Index: // Step index: 1-200. arc_detect: // Arc detection state: ON, OFF. Default: OFF
Examples	Request>MODIfy:DCW:ARC 1,OFF // Sets the Arc detection state for DCW Step 1 to OFF.
	Request>MODIfy:DCW:ARC? 1 // Queries the Arc detection level for DCW Step 1.

1.6.29 MODIfy:DCW:ARC:LEVel

Description: Sets the Arc detection level for DCW.

Command Syntax	MODIfy:DCW:ARC:LEVel <index>,<arc_level>
Parameter	Index: // Step index: 1-200. arc_level: // Arc detection level: 0-9. Default: 5
Examples	Request>MODIfy:DCW:ARC:LEVel 1,3 // Sets the Arc detection level for ACW Step 1 to 3.

	Request>MODIfy:DCW:ARC:LEVel? 1 // Queries the Arc detection level for DCW Step 1.
--	--

1.6.30 MODIfy:DCW:RISE:TIME

Description: Sets the rise time for ACW.

Command Syntax	MODIfy:DCW:RISE:TIME <index>,<rise_t>
Parameter	Index: // Step index: 1-200. rise_t: // Rise time: 0.4-999.9 s. Default: 0.4 s
Examples	Request> MODIfy:DCW:RISE:TIME 1,3.0 // Sets the rise time for DCW Step 1 to 3.0 s.
	Request> MODIfy:DCW:RISE:TIME? 1 // Queries the rise time for DCW Step 1.

1.6.31 MODIfy:ACW:FALL:TIME

Description: Sets the fall time for ACW.

Command Syntax	MODIfy:DCW:FALL:TIME <index>,<fall_t>
Parameter	Index: // Step index: 1-200. fall_t: // Fall time: 1.0-999.9 s; 0 = OFF. Default: 0.0 s
Examples	Request>MODIfy:DCW:FALL:TIME 1,3.0 // Sets the fall time for DCW Step 1 to 3.0 s.
	Request>MODIfy:DCW:FALL:TIME? 1 // Queries the fall time for DCW Step 1.

1.6.32 MODIfy:DCW:DWELL:TIME

Description: Sets the dwell time for DCW.

Command Syntax	MODIfy:DCW:DWELL:TIME <index>,<dwell_t>
Parameter	Index: // Step index: 1-200. dwell_t: // Dwell time: 0.4-999.9 s; 0 = OFF. Default: 1.0 s
Examples	Request> MODIfy:DCW:DWELL:TIME 1,3.0 // Sets the dwell time for DCW Step 1 to 3.0 s
	Request> MODIfy:DCW:DWELL:TIME? 1 // Queries the dwell time for DCW Step 1.

1.6.33 MODIfyDCW:LIMIT:CHARGE:LOWer

Description: Sets the lower limit of charging current for DCW.

Command Syntax	MODIfy:DCW:LIMIT:CHARGE:LOWer <index>,<lo_limit_charge>
Parameter	Index: // Step index: 1-200. lo_limit_charge: // Lower limit of charging current: 0.0000-350.0 uA. Low range: off, default: 0.0 uA. Low range: on, default: 0.0 uA
Examples	Request> MODIfy:DCW:LIMIT:CHARGE:LOWer 1,3.0 // Sets the lower limit of charging current for DCW Step 1 to 3.0 uA.
	Request> MODIfy:DCW:LIMIT:CHARGE:LOWer? 1 // Queries the lower limit of charging current for DCW Step 1.

1.6.34 MODIfy:DCW:MAKE:ZERO

Description: Sets the zero compensation offset for DCW.

Command Syntax	MODIfy:DCW:MAKE:ZERO <index>,<zero_offset>
Parameter	Index: // Step index: 1-200. zero_offset: // Zero compensation offset: 0.000 uA (default)
Examples	Request> MODIfy:DCW:MAKE:ZERO 1,2.000 // Sets the zero compensation offset for DCW Step 1 to 2.000 uA.
	Request> MODIfy:DCW:MAKE:ZERO? 1 // Queries the zero compensation offset for DCW Step 1.

1.6.35 MODIfy:DCW:LIMIT:RAMP:UPper

Description: Sets the ramp upper limit for DCW.

Command Syntax	MODIfy:DCW:LIMIT:RAMP:UPper <index>,<zero_offset>
Parameter	Index: // Step index: 1-200. zero_offset: // Ramp upper limit: 0.0000-10000 uA; 0 = OFF. Default: 10000 uA
Examples	Request> MODIfy:DCW:LIMIT:RAMP:UPper 1,2.000 // Sets the ramp upper limit for DCW Step 1 to 2.000 uA.
	Request> MODIfy:DCW:LIMIT:RAMP:UPper? 1 // Queries the ramp upper limit for DCW Step 1

1.6.36 MODIfy:DCW:CURRent:RANGe

Description: Sets the range mode for DCW.

Command Syntax	MODIfy:DCW:CURRent:RANGe <index>,<curr_range>
Parameter	Index: // Step index: 1-200. curr_range: // Range mode: Auto, fixed. Default: Auto
Examples	Request> MODIfy:DCW:CURRent:RANGe 1,AUTO // Sets the range mode for DCW Step 1 to Auto.
	Request> MODIfy:DCW:CURRent:RANGe? 1 // Queries the range mode for DCW Step 1

1.6.37 MODIfy:DCW:CONTInuity

Description: Sets the continuity test state for DCW.

Command Syntax	MODIfy:DCW:CONTInuity <index>,<continuity>
Parameter	Index: // Step index: 1-200. continuity: // Continuity test state: ON, OFF. Default: OFF
Examples	Request> MODIfy:DCW:CONTInuity 1,ON // Sets the continuity test state for DCW Step 1 to ON.

	Request> MODIfy:DCW:CONTInuity? 1 // Queries the continuity test state for DCW Step 1.
--	--

1.6.38 MODIfy:DCW:PROMpt

Description: Sets the prompt message for DCW.

Command Syntax	MODIfy:DCW:PROMpt <index>,<str>
Parameter	Index: // Step index: 1-200. str: // Prompt message
Examples	Request> MODIfy:DCW:PROMpt 1,"test sleep" // Sets the prompt message for DCW Step 1 to "test sleep".
	Request> MODIfy:DCW:PROMpt? 1 // Queries the prompt message for DCW Step 1.

1.6.39 STEP:DCW?

Description: Queries the DCW parameter settings for the specified step.

Command Syntax	STEP:DCW? <index>
Parameter	Index: // Step index: 1-200.
Examples	Request> STEP:DCW? 1 // Queries the parameter settings of ACW Step 1. Response> 1,1500,10000.000,0.000,0.4,1.0,0.0,0.000,5,0.0000,10000.000,0,0,0,0

1.6.40 ADD:IR

Description: Adds IR (Insulation Resistance) test parameter settings. **This command is recommended for global configuration of IR parameters.**

Command Syntax	ADD:IR <volt>,<hi_limit_res>,<lo_limit_res>,<rise_t>,<delay_t>,<dwel_t>,<fall_t>,<lo_limit_charge>
Parameter	volt: // Output voltage: 10-6000 V. Default: 500 V hi_limit_res: // Upper limit of resistance: 0.1-50000 MΩ; 0 = OFF. Default: 0.00 MΩ lo_limit_res: // Lower limit of resistance: 0.1-50000 MΩ; 0 = OFF. Default: 0.10 MΩ rise_t: // Rise time: 0.5-999.9 s. Default: 0.1 s delay_t: // Delay time: 0.5-999.9 s. Default: 0.5 s dwel_t: // Dwell time: 0.5-999.9 s. 0 = Continuous test. Default: 0.5 s fall_t: // Fall time: 1.0-999.9 s. 0 = OFF. Default: 0.0 s lo_limit_charge: // Lower limit of charging current: 0.0000-10000 uA. Default: 0.0 uA
Examples	Request> ADD:IR 1500,50000,0,0.5,1.0,2.0,1.0,0.0

1.6.41 MODIfy:IR

Description: Sets the IR test parameters.

Command Syntax	MODIfy:IR <index><volt>,<hi_limit_res>,<lo_limit_res>,<rise_t>,<delay_t>,<dwel_t>,<fall_t>,<lo_limit_charge>
Parameter	Index: // Step index: 1-200. volt: // Output voltage: 10-6000 V. Default: 500 V hi_limit_res: // Upper limit of resistance: 0.1-50000 MΩ; 0 = OFF. Default: 0.00 MΩ lo_limit_res: // Lower limit of resistance: 0.1-50000 MΩ; 0 = OFF. Default: 0.10 MΩ rise_t: // Rise time: 0.5-999.9 s. Default: 0.1 s delay_t: // Delay time: 0.5-999.9 s. Default: 0.5 s dwel_t: // Dwell time: 0.5-999.9 s. 0 = Continuous test. Default: 0.5 s fall_t: // Fall time: 1.0-999.9 s. 0 = OFF. Default: 0.0 s lo_limit_charge: // Lower limit of charging current: 0.0000-10000 uA. Default: 0.0 uA zero_offset: // Zero compensation offset: 0.0000 uA (default) continuity: // Continuity test state: ON, OFF. Default: OFF
Examples	Request> MODIfy:IR 1,1500,50000,0,0.5,1.0,2.0,1.0,0.0

1.6.42 MODIfy:IR:VOLTage

Description: Sets the output voltage for IR.

Command Syntax	MODIfy:IR:VOLTage <index>,<volt>
Parameter	Index: // Step index: 1-200. volt: // Output voltage: 10-6000 V. Default: 500 V
Examples	Request>MODIfy:IR:VOLTage 1,2000 // Sets the output voltage for IR Step 1 to 2000 V.
	Request>MODIfy:IR:VOLTage? 1 // Queries the output voltage for IR Step 1.

1.6.43 MODIfy:IR:LIMIT:RESistance:UPper

Description: Sets the upper limit of resistance for IR.

Command Syntax	MODIfy:IR:LIMIT:RESistance:UPper <index>,<hi_limit_res>
Parameter	Index: // Step index: 1-200. hi_limit_res: // Upper limit of resistance: 0.1-50000 MΩ; 0 = OFF. Default: 0.00 MΩ
Examples	Request> MODIfy:IR:LIMIT:RESistance:UPper 1,2000 // Sets the upper limit of resistance

	for IR Step 1 to 2000 MΩ.
	Request> MODIfy:IR:LIMIT:RESistance:UPper? 1 // Queries the upper limit of resistance for IR Step 1.

1.6.44 MODIfy:IR:LIMIT:RESistance:LOWer

Description: Sets the lower limit of resistance for IR.

Command Syntax	MODIfy:IR:LIMIT:RESistance:LOWer <index>,<lo_limit_res>
Parameter	Index: // Step index: 1-200. lo_limit_res: // Lower limit of resistance: 0.1-50000 MΩ; 0 = OFF. Default: 0.10 MΩ
Examples	Request> MODIfy:IR:LIMIT:RESistance:LOWer 1,2000 // Sets the lower limit of resistance for IR Step 1 to 2000 MΩ.
	Request> MODIfy:IR:LIMIT:RESistance:LOWer? 1 // Queries the lower limit of resistance for IR Step 1.

1.6.45 MODIfy:IR:RISE:TIME

Description: Sets the rise time for IR.

Command Syntax	MODIfy:IR:RISE:TIME <index>,<lo_limit_res>
Parameter	Index: // Step index: 1-200. lo_limit_res: // Rise time: 0.5-999.9 s. Default: 0.1 s
Examples	Request> MODIfy:IR:RISE:TIME 1,30.0 // Sets the rise time for IR Step 1 to 30.0 s.
	Request> MODIfy:IR:RISE:TIME? 1 // Queries the rise time for IR Step 1.

1.6.46 MODIfy:IR:DELAY:TIME

Description: Sets the delay time for IR.

Command Syntax	MODIfy:IR:DELAY:TIME <index>,<delay_t>
Parameter	Index: // Step index: 1-200. delay_t: // Delay time: 0.5-999.9 s. Default: 0.5 s
Examples	Request> MODIfy:IR:DELAY:TIME 1,30.0 // Sets the delay time for IR Step 1 to 30.0 s.
	Request> MODIfy:IR:DELAY:TIME? 1 // Queries the delay time for IR Step 1.

1.6.47 MODIfy:IR:DWELL:TIME

Description: Sets the dwell time for IR.

Command Syntax	MODIfy:IR:DWELL:TIME <index>,<dwell_t>
Parameter	Index: // Step index: 1-200. dwell_t: // Dwell time: 0.5-999.9 s. 0 = Continuous test. Default: 0.5 s
Examples	Request> MODIfy:IR:DWELL:TIME 1,30 // Sets the dwell time for IR Step 1 to 30.0 s.

	Request> MODIfy:IR:DWELL:TIME? 1 // Queries the dwell time for IR Step 1.
--	---

1.6.48 MODIfy:IR:FALL:TIME

Description: Sets the fall time for IR.

Command Syntax	MODIfy:IR:FALL:TIME <index>,<fall_t>
Parameter	Index: // Step index: 1-200. fall_t: // Fall time: 1.0-999.9 s. 0 = OFF. Default: 0.0 s
Examples	Request> MODIfy:IR:FALL:TIME 1,30.0 // Sets the fall time for IR Step 1 to 30.0 s.
	Request> MODIfy:IR:FALL:TIME? 1 // Queries the fall time for IR Step 1.

1.6.49 MODIfy:IR:LIMIT:CHARGE:LOWer

Description: Sets the lower limit of charging current for IR.

Command Syntax	MODIfy:IR:LIMIT:CHARGE:LOWer <index>,<lo_limit_charge>
Parameter	Index: // Step index: 1-200. lo_limit_charge: // Lower limit of charging current: 0.0000-10000 uA. Default: 0.0 uA
Examples	Request> MODIfy:IR:LIMIT:CHARGE:LOWer 1,30.0 // Sets the lower limit of charging current for IR Step 1 to 30.0 uA.
	Request> MODIfy:IR:LIMIT:CHARGE:LOWer? 1 // Queries the lower limit of charging current for IR Step 1.

1.6.50 MODIfy:IR:PROMpt

Description: Sets the prompt message for IR.

Command Syntax	MODIfy:IR:PROMpt <index>,<str>
Parameter	Index: // Step index: 1-200. str: // Prompt message
Examples	Request> MODIfy:IR:PROMpt 1,"test sleep" // Sets the prompt message for IR Step 1 to "test sleep".
	Request> MODIfy:IR:PROMpt? 1 // Queries the prompt message for IR Step 1.

1.6.51 STEP:IR?

Description: Queries the IR parameter settings for the specified step.

Command Syntax	STEP:IR? <index>
Parameter	Index: // Step index: 1-200.
Examples	Request> STEP:IR? 1 // Queries the parameter settings of ACW Step 1.

	Response> 1,500,0.0,0.1,0.1,0.5,0.5,0.0,0.000,0
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1.6.52 ADD:GB

Description: Adds GB (Ground Bond) test parameter settings. **This command is recommended for global configuration of GB parameters.**

Command Syntax	LIST:ADD:GB <current>,<volt>,<hi_limit_res>,<lo_limit_res>,<hi_limit_vol>,<lo_limit_volt>,<dwel_t>,<zero_offset>,<zero_offset_v>,<freq>
Parameter	current: // Output current: 1.00-40.00 A. Default: 25.00 A volt: // Test voltage: 3-8 V. Default: 8 V hi_limit_res: // Upper limit of resistance: 0-600 mΩ, 1.00-10.00 A, default: 100 mΩ; 0-200 mΩ, 10.00-30.00 A, default: 100 mΩ; 0-150 mΩ, 30.00-40.00 A, default: 100 mΩ lo_limit_res: // Lower limit of resistance: 0-600 mΩ, 1.00-10.00 A, default: 0 mΩ; 0-200 mΩ, 10.00-30.00 A, default: 0 mΩ; 0-150mΩ, 30.00-40.00 A, default: 0 mΩ hi_limit_volt: // Upper limit of voltage: Disabled lo_limit_volt: // Lower limit of voltage: Disabled dwel_t: // Dwell time: 0.5-999.9 s; 0 = Continuous test. Default: 1.0 s zero_offset: // Zero compensation offset: 0.000 mΩ (default) zero_offset_v: // Voltage zero compensation offset: Disabled freq: // Test frequency: 50 Hz, 60 Hz. Default: 50 Hz
Examples	Request> ADD:GB 25,8,600,100,6,1,2.0,0.0,0.0,60

1.6.53 MODIfy:GB

Description: Sets the GB test parameters.

Command Syntax	MODIfy:GB <index>,<current>,<volt>,<hi_limit_res>,<lo_limit_res>,<hi_limit_vol>,<lo_limit_volt>,<dwel_t>,<zero_offset>,<zero_offset_v>,<freq>
Parameter	index: // Step index: 1-200 current: // Output current: 1.00-40.00 A. Default: 25.00 A volt: // Test voltage: 3-8 V. Default: 8 V hi_limit_res: // Upper limit of resistance: 0-600 mΩ, 1.00-10.00 A, default: 100 mΩ; 0-200 mΩ, 10.00-30.00A, default: 100 mΩ; 0-150 mΩ, 30.00-40.00 A, default: 100 mΩ lo_limit_res: // Lower limit of resistance: 0-600 mΩ, 1.00-10.00A, default: 0 mΩ; 0-200 mΩ, 10.00-30.00 A, default: 0 mΩ; 0-150 mΩ, 30.00-40.00 A, default: 0 mΩ hi_limit_volt: // Upper limit of voltage: Disabled

	lo_limit_volt: // Lower limit of voltage: Disabled
	dwelLt: // Dwell time: 0.5-999.9 s; 0 = Continuous test.
	Default: 1.0 s
	zero_offset: // Zero compensation offset: 0.000 mΩ (default)
	zero_offset_v: // Voltage zero compensation offset: Disabled
	freq: // Test frequency: 50 Hz, 60 Hz. Default: 50 Hz
Examples	Request> MODIfy:GB 1,25,8,600,100,6,1,2.0,0.0,0.0,60

1.6.54 MODIfy:GB:VOLTage

Description: Sets the output voltage for GB.

Command Syntax	MODIfy:GB:VOLTage <index>,<volt>
Parameter	Index: // Step index: 1-200. volt: // Output voltage: 3-8 V. Default: 8 V
Examples	Request> MODIfy:GB:VOLTage 1,5 // Sets the output voltage for GB Step 1 to 5 V.
	Request> MODIfy:GB:VOLTage? 1 // Queries the output voltage for GB Step 1.

1.6.55 MODIfy:GB:CURREnt

Description: Sets the output current for GB.

Command Syntax	MODIfy:GB:CURREnt <index>,<current>
Parameter	Index: // Step index: 1-200. current: // Output current: 1.00-40.00 A. Default: 25.00 A
Examples	Request> MODIfy:GB:CURREnt 1,20.00 // Sets the output current for GB Step 1 to 20.00 A.
	Request> MODIfy:GB:CURREnt? 1 // Queries the output current for GB Step 1.

1.6.56 MODIfy:GB:LIMIT:RESistance:UPper

Description: Sets the upper limit of resistance for GB.

Command Syntax	MODIfy:GB:LIMIT:RESistance:UPper <index>,<hi_limit_res>
Parameter	Index: // Step index: 1-200. hi_limit_res: // Upper limit of resistance: 0-600 mΩ, 1.00-10.00 A, default: 100 mΩ; 0-200 mΩ, 10.0-30.00 A, default: 100 mΩ; 0-150 mΩ, 30.00-40.00 A, default: 100 mΩ
Examples	Request> MODIfy:GB:LIMIT:RESistance:UPper 1,10 // Sets the upper limit of resistance for GB Step 1 to 10 mΩ.
	Request> MODIfy:GB:LIMIT:RESistance:UPper? 1 // Queries the upper limit of resistance for GB Step 1.

1.6.57 MODIfy:GB:LIMIT:RESistance:LOWer

Description: Sets the lower limit of resistance for GB.

Command Syntax	MODIfy:GB:LIMIT:RESistance:LOWer <index>,<lo_limit_res>
Parameter	Index: // Step index: 1-200. lo_limit_res: // Lower limit of resistance: 0-600 mΩ, 1.00-10.00 A, default: 0 mΩ; 0-200 mΩ, 10.00-30.00 A, default: 0 mΩ; 0-150 mΩ, 30.00-40.00 A, default: 0 mΩ
Examples	Request> MODIfy:GB:LIMIT:RESistance:LOWer 1,10 // Sets the lower limit of resistance for GB Step 1 to 10 mΩ.
	Request> MODIfy:GB:LIMIT:RESistance:LOWer? 1 // Queries the lower limit of resistance for GB Step 1.

1.6.58 MODIfy:GB:DWELL:TIME

Description: Sets the dwell time for GB.

Command Syntax	MODIfy:GB:DWELL:TIME <index>,<dwell_t>
Parameter	Index: // Step index: 1-200. dwell_t: // Dwell time: 0.5-999.9 s; 0 = Continuous test. Default: 1.0 s
Examples	Request> MODIfy:GB:DWELL:TIME 1,100 // Sets the dwell time for GB Step 1 to 100.0 s.
	Request> MODIfy:GB:DWELL:TIME? 1 // Queries the dwell time for GB Step 1.

1.6.59 MODIfy:GB:MAKE:ZERO

Description: Sets the zero compensation offset for GB.

Command Syntax	MODIfy:GB:MAKE:ZERO <index>,<zero_offset>
Parameter	Index: // Step index: 1-200. zero_offset: // Zero compensation offset: 0.000 mΩ (default)
Examples	Request> MODIfy:GB:MAKE:ZERO 1,2.000 // Sets the zero compensation offset for GB Step 1 to 2.000 mΩ.
	Request> MODIfy:GB:MAKE:ZERO? 1 // Queries the zero compensation offset for GB Step 1

1.6.60 MODIfy:GB:FREQuency

Description: Sets the frequency for GB.

Command Syntax	MODIfy:GB:FREQuency <index>,<volt>
Parameter	Index: // Step index: 1-200. freq: // Output frequency: 50 Hz, 60 Hz
Examples	Request> MODIfy:GB:FREQuency 1,50 // Sets the output frequency for GB Step 1 to 50 Hz. Request> MODIfy:GB:FREQuency? 1 // Queries the output frequency for GB Step 1.

1.6.61 MODIfy:GB:PROMpt

Description: Sets the prompt message for GB.

Command Syntax	MODIfy:GB:PROMpt <index>,<str>
Parameter	Index: // Step index: 1-200. str: // Prompt message
Examples	Request> MODIfy:GB:PROMpt 1,"test sleep" // Sets the prompt message for GB Step 1 to "test sleep". Request> MODIfy:GB:PROMpt? 1 // Queries the prompt message for GB Step 1.

1.6.62 STEP:GB?

Description: Queries the GB parameter settings for the specified step.

Command Syntax	STEP:GB? <index>
Parameter	Index: // Step index: 1-200.
Examples	Request> STEP:GB? 1 // Queries the parameter settings of GB Step 1. Response> 1,25.0,100,0,8.0,1.0

1.6.63 ADD:CONT

Description: Adds CONT (Continuity) test parameter settings. **This command is recommended for global configuration of CONT parameters.**

Command Syntax	ADD:CONT <hi_limit_res>,<lo_limit_res>,<dwel_t>,<zero_offset>
Parameter	hi_limit_res: // Upper limit of resistance: 0.000-10000 Ω. Default: 1000 Ω lo_limit_res: // Lower limit of resistance: 0.000-10000 Ω. Default: 0.000 Ω dwel_t: // Dwell time: 0.4-999.9 s; 0 = Continuous test.

	Default: 1.0 s zero_offset: // Zero compensation offset: 0.000 Ω (default)
Examples	Request> ADD:CONT 900,100,3,0.0

1.6.64 MODIfy:CONT

Description: Sets the CONT test parameters.

Command Syntax	MODIfy:CONT <index><hi_limit_res>,<lo_limit_res>,<dwelLt>,<zero_offset>
Parameter	index: // Step index: 1-200 hi_limit_res: // Upper limit of resistance: 0.000-10000 Ω . Default: 1000 Ω lo_limit_res: // Lower limit of resistance: 0.000-10000 Ω . Default: 0.000 Ω dwelLt: // Dwell time: 0.4-999.9 s; 0 = Continuous test. Default: 1.0 s zero_offset: // Zero compensation offset: 0.000 Ω (default)
Examples	Request> MODIfy:CONT 1,900,100,3,0.0

1.6.65 MODIfy:CONT:LIMit:HIGH

Description: Sets the upper limit of resistance for CONT.

Command Syntax	MODIfy:CONT:LIMit:HIGH <index>,<hi_limit_res>
Parameter	Index: // Step index: 1-200. hi_limit_res: // Upper limit of resistance: 0.000-10000 Ω . Default: 1000 Ω
Examples	Request> MODIfy:CONT:LIMit:HIGH 1,100.00 // Sets the upper limit of resistance for CONT Step 1 to 100.00 Ω .
	Request> MODIfy:CONT:LIMit:HIGH? 1 // Queries the upper limit of resistance for CONT Step 1.

1.6.66 MODIfy:CONT:LIMit:LOW

Description: Sets the lower limit of resistance for CONT.

Command Syntax	MODIfy:CONT:LIMit:LOW <index>,<lo_limit_res>
Parameter	Index: // Step index: 1-200. Lo_limit_res: // Lower limit of resistance: 0.000-10000 Ω . Default: 0 Ω
Examples	Request> MODIfy:CONT:LIMit:LOW 1,10.00 // Sets the lower limit of resistance for CONT Step 1 to 10.00 Ω .
	Request> MODIfy:CONT:LIMit:LOW? 1 // Queries the lower limit of resistance for CONT Step 1.

1.6.67 MODIfy:CONT:DWELL:TIME

Description: Sets the dwell time for CONT.

Command Syntax	MODIfy:CONT:DWELL:TIME <index>,<dwell_t>
Parameter	Index: // Step index: 1-200. dwell_t: // Dwell time: 0.4-999.9 s; 0 = OFF. Default: 1.0 s
Examples	Request> MODIfy:CONT:DWELL:TIME 1,100 // Sets the dwell time for CONT Step 1 to 100.0 s.
	Request> MODIfy:CONT:DWELL:TIME? 1 // Queries the dwell time for CONT Step 1.

1.6.68 MODIfy:CONT:MAKE:ZERO

Description: Sets the zero compensation offset for CONT.

Command Syntax	MODIfy:CONT:MAKE:ZERO <index>,<zero_offset>
Parameter	Index: // Step index: 1-200. zero_offset: // Zero compensation offset: 0.000 Ω (default)
Examples	Request> MODIfy:CONT:MAKE:ZERO 1,2.000 // Sets the zero compensation offset for CONT Step 1 to 2.000 $\mu\Omega$.
	Request> MODIfy:CONT:MAKE:ZERO? 1 // Queries the zero compensation offset for CONT Step 1.

1.6.69 MODIfy:CONT:PROMpt

Description: Sets the prompt message for CONT.

Command Syntax	MODIfy:CONT:PROMpt <index>,<str>
Parameter	Index: // Step index: 1-200. str: // Prompt message
Examples	Request> MODIfy:CONT:PROMpt 1,"test sleep" // Sets the prompt message for CONT Step 1 to "test sleep".
	Request> MODIfy:CONT:PROMpt? 1 // Queries the prompt message for CONT Step 1.

1.6.70 STEP:CONT?

Description: Queries the CONT parameter settings for the specified step.

Command Syntax	STEP:CONT? <index>
Parameter	Index: // Step index: 1-200.
Examples	Request> STEP:CONT? 1 // Queries the parameter settings of CONT Step 1. Response> 1,1000.0,0.0,1.0,0.0000

1.6.71 ADD:OSC

Description: Adds OSC (Open/Short-Circuit) test parameter settings. **This command is recommended for global configuration of OSC parameters.**

Command Syntax	ADD:OSC <open_ratio>,<short_ratio>,<sampling standard>	
Parameter	open_ratio:	// Open-circuit ratio: 10-100%. Default: 50%
	short_ratio:	// Short-circuit ratio: 100-500%. Default: 300%
	sampling_standard:	// Sampling standard: 0.001-40 nF. Default:
	10.000 nF	
Examples	Request> ADD:OSC 30,300,0.330	

1.6.72 MODIfy:OSC

Description: Sets the OSC test parameters.

Command Syntax	MODIfy:OSC <index>,<open_ratio>,<short_ratio>,<sampling standard>	
Parameter	index:	// Step index: 1-200
	open_ratio:	// Open-circuit ratio: 10-100%. Default: 50%
	short_ratio:	// Short-circuit ratio: 100-500%. Default: 300%
	sampling_standard:	// Sampling standard: 0.001-40 nF. Default:
	10.000 nF	
Examples	Request> MODIfy:OSC 1,30,300,0.330	

1.6.73 MODIfy:OSC:OPEN

Description: Sets the open-circuit ratio for OSC.

Command Syntax	MODIfy:OSC:OPEN <index>,<open_ratio>	
Parameter	Index:	// Step index: 1-200.
	open_ratio:	// Open-circuit ratio: 10-100%. Default: 50%
Examples	Request> MODIfy:OSC:OPEN 1,20 // Sets the open-circuit ratio for OSC	
	Step 1 to 20%.	
	Request> MODIfy:OSC:OPEN? 1 // Queries the open-circuit ratio for OSC	
	Step 1.	

1.6.74 MODIfy:OSC:SHORT

Description: Sets the short-circuit ratio for OSC.

Command Syntax	MODIfy:OSC:SHORT <index>,<short_ratio>	
Parameter	Index:	// Step index: 1-200.
	short_ratio:	// Short-circuit ratio: 100-500%. Default:

	300%
Examples	Request> MODIfy:OSC:SHORT 1,200 // Sets the short-circuit ratio for OSC Step 1 to 200%
	Request> MODIfy:OSC:SHORT? 1 // Queries the short-circuit ratio for OSC Step 1.

1.6.75 MODIfy:OSC:SAMPLing

Description: Sets the sampling standard for OSC.

Command Syntax	MODIfy:OSC:SAMPLing <index>,<sampling_standard>
Parameter	Index: // Step index: 1-200. sampling_standard: // Sampling standard: 0.001-40 nF. Default: 10.000 nF
Examples	Request> MODIfy:OSC:SAMPLing 1,20 // Sets the sampling standard for OSC Step 1 to 20nF
	Request> MODIfy:OSC:SAMPLing? 1 // Queries the sampling standard for OSC Step 1.

1.6.76 MODIfy:OSC:PROMpt

Description: Sets the prompt message for OSC.

Command Syntax	MODIfy:OSC:PROMpt <index>,<str>
Parameter	Index: // Step index: 1-200. str: // Prompt message
Examples	Request> MODIfy:OSC:PROMpt 1,"test sleep" // Sets the prompt message for OSC Step 1 to "test sleep".
	Request> MODIfy:OSC:PROMpt? 1 // Queries the prompt message for OSC Step 1.

1.6.77 STEP:OSC?

Description: Queries the OSC parameter settings for the specified step.

Command Syntax	STEP:OSC? <index>
Parameter	Index: // Step index: 1-200.
Examples	Request> STEP:OSC? 1 // Queries the parameter settings of OSC Step 1. Response> 1,50,300,10.00

1.6.78 ADD:WAIT

Description: Adds WAIT test parameter settings. **This command is recommended for global configuration of WAIT parameters.**

Command Syntax	ADD:WAIT <delay_t>
Parameter	delay_t: // Delay time: 0.1-999.9 s; 0 = Continuous test. Default: 1.0 s
Examples	Request> ADD:WAIT 10

1.6.79 MODIfy:WAIT

Description: Sets the WAIT test parameters.

Command Syntax	MODIfy:WAIT <index>,<delay_t>
Parameter	index: // Step index: 1-200 delay_t: // Delay time: 0.1-999.9 s; 0 = Continuous test. Default: 1.0 s
Examples	Request> MODIfy:WAIT 1,10

1.6.80 MODIfy:WAIT:DELAy

Description: Sets the dwell time for WAIT.

Command Syntax	MODIfy:WAIT:DELAy <index>,<delay_t>
Parameter	Index: // Step index: 1-200. dwell_t: // Delay time: 0.1-999.9 s; 0 = Continuous test. Default: 1.0 s
Examples	Request> MODIfy:WAIT:DELAy 1,100 // Sets the output voltage for WAIT Step 1 to 100.0 s.
	Request> MODIfy:WAIT:DELAy? 1 // Queries the output voltage for WAIT Step 1.

1.6.81 MODIfy:WAIT:PROMpt

Description: Sets the prompt message for WAIT.

Command Syntax	MODIfy:WAIT:PROMpt <index>,<str>
Parameter	Index: // Step index: 1-200. str: // Prompt message
Examples	Request> MODIfy:WAIT:PROMpt 1,"test sleep" // Sets the prompt message for WAIT Step 1 to "test sleep".
	Request> MODIfy:WAIT:PROMpt? 1 // Queries the prompt message for WAIT Step 1.

1.6.82 STEP:WAIT?

Description: Queries the WAIT parameter settings for the specified step.

Command Syntax	STEP:WAIT? <index>
Parameter	Index: // Step index: 1-200.
Examples	Request> STEP:WAIT? 1 // Queries the parameter settings of WAIT Step 1. Response> 1,50.0

1.7 SYStem Subsystem

1.7.1 SYStem:WARNIng:BEEP

Description: Sets the beeper state. Command names are case-insensitive.

Command Syntax	SYStem:WARNIng:BEEP <NRF+> // State: 0(Off), 1(On)
Examples	Request> SYStem:WARNIng:BEEP 1 // Enables the beeper. SYStem:WARNIng:BEEP 0 // Disables the beeper.
Query Syntax	SYStem:WARNIng:BEEP?
Query Response	{0,1} // Returns the current beeper state (default: 1), indicating that the beeper is enabled.

1.7.2 SYStem:WARNIng:BEEP:LEVel

Description: Sets the beeper volume. Command names are case-insensitive.

Command Syntax	SYStem:WARNIng:BEEP:LEVel <NRF+> // Level: 1-9
Examples	Request> SYStem:WARNIng:BEEP:LEVel 6 // Sets the beeper volume to 6.
Query Syntax	SYStem:WARNIng:BEEP:LEVel?
Query Response	{1-9} // Returns the current beeper volume (default: 5).

1.7.3 SYStem:GFI:CURRent

Description: Sets the GFI (Ground Fault Interrupt) current. Command names are case-insensitive.

Command Syntax	SYStem:GFI:CURRent <NRF+> // Current range: 0, 0.4-5.0. Unit: mA
Examples	Request> SYStem:GFI:CURRent 1.0 // Sets the GFI current to 1.0 mA.
Query Syntax	SYStem:GFI:CURRent?
Query Response	{0.4-5.0} // Returns the GFI current (default: 0.0 mA)

1.7.4 SYStem:REMOtE:CONTRol

Description: Sets the remote control state. Command names are case-insensitive.

Command Syntax	SYStem:REMOtE:CONTRol <NRF+> // State: 0(Off), 1(On)
Examples	Request> SYStem:REMOtE:CONTRol 1 // Enables the remote control. SYStem:REMOtE:CONTRol 0 // Disables remote control.
Query Syntax	SYStem:REMOtE:CONTRol?
Query Response	{0,1} // Returns the remote control state (default: 0), indicating that the remote control is disabled.

1.7.5 SYStem:SINGle:STEP

Description: Sets the single step test state. Command names are case-insensitive.

Command Syntax	SYStem:SINGle:STEP <NRF+> // State: 0(Off), 1(On)
Examples	Request> SYStem:SINGle:STEP 1 // Enables the single step test. SYStem:SINGle:STEP 0 // Disables single step test.
Query Syntax	SYStem:SINGle:STEP?
Query Response	{0,1} // Returns the single step test state (default: 0), indicating that the single step test is disabled.

1.7.6 SYStem:FAILure:STOP

Description: Sets the system failure stop state. Command names are case-insensitive.

Command Syntax	SYStem:FAILure:STOP <NRF+> // State: 0(Off), 1(On)
Examples	Request> SYStem:FAILure:STOP 1 // Enables system failure stop. SYStem:FAILure:STOP 0 // Disables system failure stop.
Query Syntax	SYStem:FAILure:STOP?
Query Response	{0,1} // Returns the system failure stop state (default: 1), indicating that the system failure stop is enabled.

1.7.7 SYStem:CONTInous:OUTput

Description: Sets the system continuous output state. Command names are case-insensitive.

Command Syntax	SYStem:CONTInous:OUTput <NRF+> // State: 0(Off), 1(On)
Examples	Request> SYStem:CONTInous:OUTput 1 // Enables the system continuous output. SYStem:CONTInous:OUTput 0 // Disables the system continuous output.
Query Syntax	SYStem:CONTInous:OUTput?
Query Response	{0,1} // Returns the system continuous output state (default: 0), indicating that the system continuous output is disabled.

1.7.8 SYStem:SCREEN:SAVER

Description: Sets the screen saver state. Command names are case-insensitive.

Command Syntax	SYStem:SCREEN:SAVER <NRF+> // State: 0 (Off), 1 (On)
Examples	Request> SYStem:SCREEN:SAVER 1 // Enables the screen saver. SYStem:SCREEN:SAVER 0 // Disables the screen saver.
Query Syntax	SYStem:SCREEN:SAVER?
Query Response	{0,1} // Returns the screen saver state (default: 1), indicating that the screen saver is enabled.

1.7.9 SYStem:PROTocol:TYPE

Description: Sets the system protocol compatibility type. Command names are case-insensitive.

Command Syntax	SYStem:PROTocol:TYPE <NRF+> //Type: PROTOCOL_DEFAULT, PROTOCOL_A, PROTOCOL_E
Examples	Request> SYStem:PROTocol:TYPE PROTOCOL_A // Sets the system protocol compatibility type to PROTOCOL_A. SYStem:PROTocol:TYPE PROTOCOL_E // Sets the system protocol compatibility type to PROTOCOL_E. SYStem:PROTocol:TYPE PROTOCOL_DEFAULT // Sets the system protocol compatibility type to PROTOCOL_DEFAULT.
Query Syntax	SYStem:PROTocol:TYPE?
Query Response	{ PROTOCOL_DEFAULT ,PROTOCOL_A, PROTOCOL_E } // Returns the system protocol compatibility type PROTOCOL_DEFAULT.

1.8 ADDR Device Address Subsystem (Only for RS485)

Description: Sets multiple-device control via RS485.

Command Syntax	ADDR<addr>::[cmd] <NRF+> // Device address: 1-254 //cmd: SCPI
Examples	Request> ADDR 1::MODify:WAIT 1,3.0 // Sets the WAIT parameter setting for Device 1. ADDR 3::MODify:CONT 1,900,100,3,0.0 // Sets the CONT parameter setting for Device 3. ADDR 5::ADD:OSC 30,300,0.330 // Sets the OSC parameter setting for Device 5.

1.9 IDN? Subsystem

Description: Queries the instrument information.

Query Syntax	IDN?
Query Response	<Manufacturer>,<MODEL>,<SN>,<Revision>
Examples	Request> IDN? Response> UNI-T,UT5440,CES40253100001,HT_Unprotected

2. Modbus (RTU) Protocol

2.1 Data Format

Following the Modbus (RTU) communication protocol, the instrument responds to commands from the host computer and returns a standard response frame.

2.1.1 Command Frame

Figure 2 -1 Modbus Command Frame Format

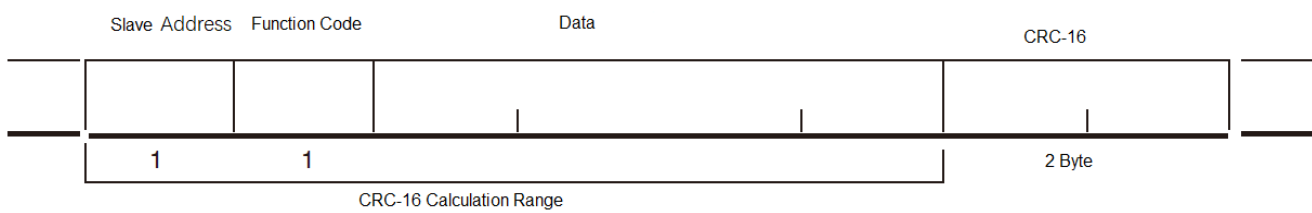


Table 2-1 Command Code

	A minimum silent interval of 3.5-character times is required between frames.
Slave Address	1 byte - Modbus supports 00-0x63 slave station 0x00 is used for broadcast (unified command) - If the instrument does not include an optional RS-485 interface, the default slave address is 0x01.
Function Code	1 byte 0x03: Read holding registers (multiple registers) 0x04: =03H, not used 0x06: Write single register (can be replaced by 0x10) 0x08: Diagnostic Echo Test (debug only) 0x10: Write holding registers (multiple registers)
Data	Specifies the register address, quantity, and contents
CRC-16	2 bytes, LSB - CyclicRedundancy Check (CRC-16): The CRC is calculated over all data starting from the slave address up to the last data byte.
	A minimum silent interval of 3.5-character times is required between frames.

2.1.2 Response Frame

Except for broadcast commands (slave address 0x00), all other slave addresses will return a response frame.

Figure 2-2 Normal Response Frame Format

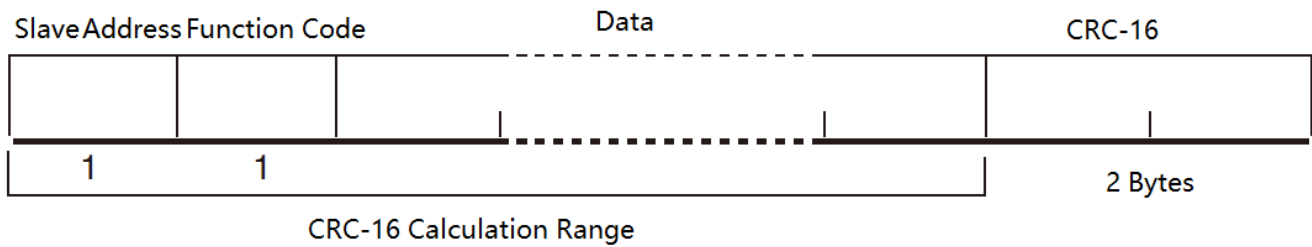


Figure 2-3 Exception Response Frame Format

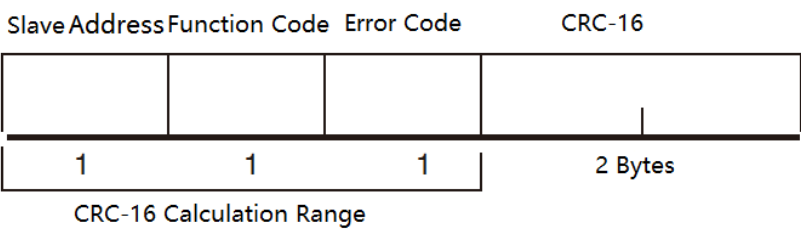


Table 2-2 Exception Response Code

Slave Address	1 byte - Returns the original slave address
Function Code	1 byte - In an exception response, the function code equals the request function code with Bit 7 set (logically ORed with 0x80). For example, 0x03 OR 0x80 = 0x83
Error Code	Exception Code: 0x01: Illegal function (function code not supported) 0x02: Illegal data address (register address does not exist) 0x03: Illegal data value (invalid data) 0x04: Device failure (execution error)
CRC-16	2 bytes, LSB - CyclicRedundancy Check (CRC-16): The CRC is calculated over all data starting from the slave address up to the last data byte.

2.1.3 No Response

The instrument does not process or return a response in the following cases. A communication timeout may occur.

- Slave address error: The received slave address does not match the configured device address.

2. Transmission error: Data corruption occurs during communication.
3. CRC-16 error: CRC checksum verification fails.
4. Frame format error

Example: For function code 0x03, the expected frame length is 8 bytes; if the received frame length is less or greater than 8 bytes, it is considered invalid.

5. Broadcast address (0x00): When the slave address is 0x00, the command is treated as a broadcast message. The instrument does not return any response.

2.1.14 Error Code

Table 2-3 Error Code

Code	Name	Description	Priority
0x01	Illegal function	Function code does not exist	1
0x02	Illegal data address	Register does not exist	2
0x03	Illegal data value	Invalid register count or byte number	3
0x04	Device failure (execution error)	Illegal data, written data outside valid range	4

2.2 Function Code

The instrument currently supports only the following codes. Other codes are not supported.

Table 2-4 Function Code

Function Code	Name	Description
0x03	Read holding registers	Reads data from multiple consecutive holding registers
0x10	Write holding registers	Writes data to multiple consecutive holding registers

2.3 Register and Data Format

Register size: 16 bits (2 bytes) per register.

For example, for the speed register (0x3002), the data is 2 bytes, and the numerical value must be written as 0x0001.

Data Format

The instrument supports the following data formats:

1. 1 register (16-bit integer)

For example, 0x64 → 00 64

2. 2 register (32-bit integer)
For example, 0x12345678 → 12 34 56 78
3. 2 register (32-bit float)
For example, 3.14 → 40 48 F5 C3

2.4 Read Holding Registers

Figure 2-4 Read Holding Registers (0x03) Request Frame Format

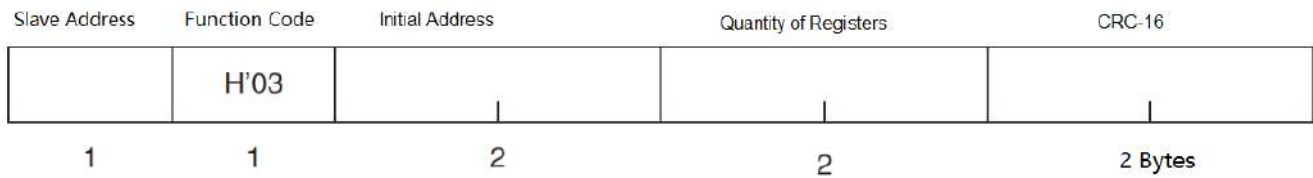
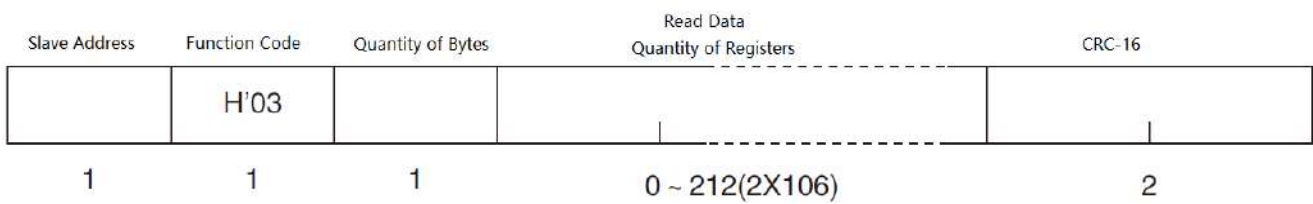


Table 2-5 Read Holding Registers (0x03) Request Fields

Code	Field	Description
	Slave address	If the RS485 address is not specified, the default value is 0x01.
0x03	Function code	
	Starting address	The starting address of register. Refer to the Modbus instruction set for valid address ranges.
	Quantity of registers	Number of registers to read: 0x0001-0x006A (1-106). Ensure all requested registers exist; otherwise returns exception code 0x02.
CRC-16	Check code	The CRC-16 checksum is used to verify data integrity in the Modbus frame.

Figure 2-5 Read Holding Register (0x03) Response Frame Format



Code	Field	Description
	Slave address	Returns the original slave address
0x03 or 0x83	Function code	Normal: 0x03 Exception: 0x83
	Byte count	Data bytes to follow = 2 × register quantity For example, reading 1 register returns Byte Count =

		0x02, followed by 2 data bytes.
	Data	Register values
CRC-16	Check code	The CRC-16 checksum is used to verify data integrity in the Modbus frame.

2.5 Write Holding Registers

Figure 2-6 Write Holding Registers (0x10) Request Frame Format

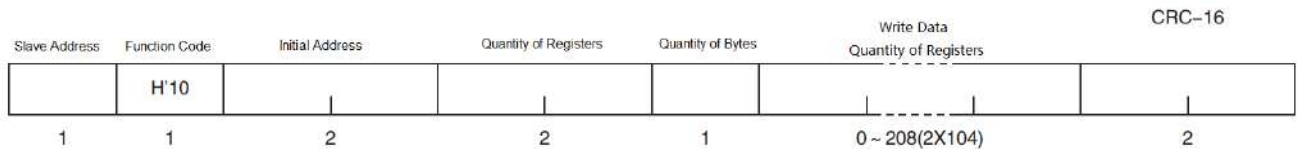
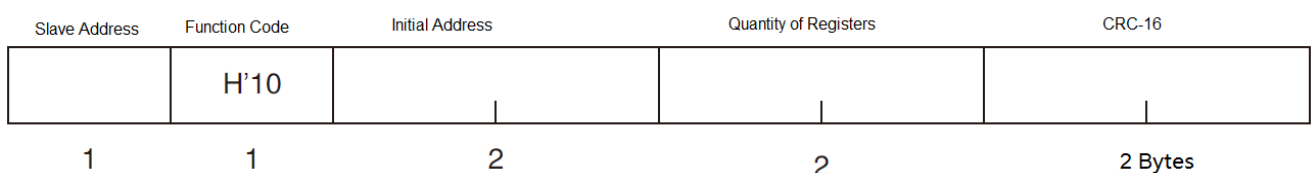


Table 2-6 Write Holding Registers (0x10) Request Fields

Code	Field	Description
	Slave address	If the RS485 address is not specified, the default value is 0x01.
0x10	Function code	
	Starting address	The starting address of register. Refer to the Modbus instruction set for valid address ranges.
	Quantity of registers	Number of registers to write: 0x0001-0x0068 (1-104). Ensure all requested registers exist; otherwise returns exception code 0x02.
	Byte count	Data bytes to follow = 2 × register quantity
CRC-16	Check code	The CRC-16 checksum is used to verify data integrity in the Modbus frame.

Figure 2-7 Write Holding Registers (0x10) Response Frame Format



Code	Field	Description
	Slave address	Returns the original slave address
0x10 or 0x90	Function code	Normal: 0x10 Exception: 0x90
	Starting address	The starting address of register. Refer to the Modbus instruction set for valid address ranges.
	Quantity of registers	
CRC-16	Check code	The CRC-16 checksum is used to verify data integrity in the Modbus frame.

3. Modbus(RTU) Set

3.1 Register Overview

1. Unless otherwise specified, all values in request and response frames are hexadecimal.
2. For online floating-point conversion: http://www.binaryconvert.com/convert_float.html

Table 3-1 Register Overview

Register		Byte Count	Function	Data Format (Hexadecimal)	Description
Address	Number of Registers				
0200	1	2	Start/Stop test	16-bit (2 bytes) integer 0000: Stop 0000: Start	Read/write register, data occupies 1 register. Used for polling to obtain the test state.
0201	1	2	Beeper	16-bit (2 bytes) integer 0000: OFF 0000: ON	Read/write register, data occupies 1 register. Used for polling to obtain the beeper state.
0202	1	2	Beeper volume	16-bit (2 bytes) integer Level: 0001-0009	Read/write register, data occupies 1 register. Used for polling to obtain the beeper volume.
0203	1	2	Remote control	16-bit (2 bytes) integer 0000: OFF 0000: ON	Read/write register, data occupies 1 register. Used for polling to obtain the remote control state.
0204	1	2	Single step test	16-bit (2 bytes) integer 0000: OFF 0000: ON	Read/write register, data occupies 1 register. Used for polling to obtain the single test state.
0205	1	2	Failure stop state	16-bit (2 bytes) integer 0000: OFF 0000: ON	Read/write register, data occupies 1 register. Used for polling to obtain the failure stop state.
0206	1	2	Continuous output state	16-bit (2 bytes) integer 0000: OFF 0000: ON	Read/write register, data occupies 1 register. Used for polling to obtain the

					continuous output state.
0207	1	2	Screen saver	16-bit (2 bytes) integer 0000: OFF 0000: ON	Read/write register, data occupies 1 register. Used for polling to obtain the screen saver state.
0208	1	2	Test result	16-bit (2 bytes) integer 0000: Final step 0001: All 0002: Pass/Fail	Read/write register, data occupies 1 register. Used for polling to obtain the test results.
0220	1	2	New test file	16-bit (2 bytes) integer File number: 0001-0080	Read/write register, data occupies 1 register.
0221	1	2	Load test file	16-bit (2 bytes) integer File number: 0001-0080	Read/write register, data occupies 1 register. Used for polling to obtain the load the test file.
0222	1	2	Delete test file	16-bit (2 bytes) integer File number: 0001-0080	Read/write register, data occupies 1 register.
0223	1	2	Save test file	16-bit (2 bytes) integer Fixed value: 1	Read/write register, data occupies 1 register.
0224	1	2	Total number of test steps	16-bit (2 bytes) integer Test step: 0001-00C8	Read/write register, data occupies 1 register.
0225	1	2	Add test step	16-bit (2 bytes) integer Test step: 0001-00C8	Read/write register, data occupies 1 register.
0226	1	2	Test step	16-bit (2 bytes) integer Test step: 0001-00C8	Read/write register, data occupies 1 register. Used for polling to obtain the current test step.
0230	1	2	Test mode	16-bit (2 bytes) integer 0000: ACW 0001: DCW 0002: IR 0003: GND 0004: CONT 0005: OSC 0006: WAIT	Read/write register, data occupies 1 register. Used for polling to obtain the current test step.
0231	1	2	Output frequency	16-bit (2 bytes) integer 0000: 50Hz 0001: 60Hz	Read/write register, data occupies 1 register. Used for polling to obtain the output frequency, ACW(On),

					and GND (On).
0232	1	2	Arc detection state	16-bit (2 bytes) integer 0000: OFF 0000: ON	Read/write register, data occupies 1 register. Used for polling to obtain the arc detection state, ACW (On), and DCW (On).
0233	1	2	Arc detection level	16-bit (2 bytes) integer 0001-0009	Read/write register, data occupies 1 register. Used for polling to obtain the arc detection level, ACW (On), and DCW (On).
0234	1	2	Range mode	16-bit (2 bytes) integer 0000: Auto 0001: Fixed	Read/write register, data occupies 1 register. Used for polling to obtain the range mode, ACW (On), and DCW (On).
0235	1	2	Continuity test	16-bit (2 bytes) integer 0000: OFF 0000: ON	Read/write register, data occupies 1 register. Used for polling to obtain the continuity test state, ACW (On), and DCW (On).
0236	1	2	Low range	16-bit (2 bytes) integer 0000: OFF 0000: ON	Read/write register, data occupies 1 register. Used for polling to obtain the low range mode, ACW (On), and DCW (On).
0238	2	4	Output voltage	32-bit (4 bytes) integer ACW: 0-5000.0 (float-point number) DCW: 0-6000.0 (float-point number) IR: 0-6000.0 (float-point number) GND: 3-8 (float-point number)	Write/read register, data occupies 2 registers. Used for polling to obtain the output voltage, ACW (On), DCW (On), IR (On), and GND (On).
023A	2	4	Uppr limit of total current / Upper limit of	32-bit (4 bytes) integer ACW: 0-40.0 (float-point number) DCW: 0-10000.0 (float-point number)	Write/read register, data occupies 2 registers. Used for polling to obtain the upper limit, ACW (On), DCW (On), IR (On), CONT (On), and

			resistance	IR: 0-50000.0 (float-point number) CONT: 0-10000.0 (float-point number) GND: 1-600.0 (float-point number)	GND (On).
023C	2	4	Lower limit of total current / Lower limit of resistance	32-bit (4 bytes) integer ACW: 0-40.0 (float-point number) DCW: 0-10000.0 (float-point number) IR: 0-50000.0 (float-point number) CONT: 0-10000.0 (float-point number) GND: 1-600.0 (float-point number)	Write/read register, data occupies 2 registers. Used for polling to obtain the lower limit, ACW (On), DCW (On), IR (On), CONT (On), and GND (On).
023E	2	4	Uppr limit of resistance / Ramp upper limit / Open-circuit threshold	32-bit (4 bytes) integer ACW: 0-40.0 (float-point number) DCW: 0-10000.0 (float-point number) OSC: 10.0-100.0 (float-point number, only integer values are valid)	Write/read register, data occupies 2 registers. Used for polling to obtain the upper limit, open-circuit threshold, ACW (On), DCW (On), and OSC (On).
0240	2	4	Lower limit of resistance / Lower limit of charging current / Short-circuit threshold	32-bit (4 bytes) integer ACW: 0-40.0 (float-point number) DCW: 0-10000.0 (float-point number) IR: 0-10000.0 (float-point number) OSC: 100.0-500.0 (float-point number, only integer values are valid)	Write/read register, data occupies 2 registers. Used for polling to obtain the lower limit, short-circuit threshold, ACW (On), DCW (On), IR (On), and OSC (On).
0242	2	4	Rise time	32-bit (4 bytes) integer ACW: 0.1-999.9 (float-point number) DCW: 0.4-999.9 (float-point	Write/read register, data occupies 2 registers. Used for polling to obtain the rise time, ACW, DCW, and IR.

				number) IR: 0.5-999.9(float-point number)	
0244	2	4	Dwell time	32-bit (4 bytes) integer ACW: 0.2-999.9(float-point number) DCW: 0.4-999.9(float-point number) IR: 0.5-999.9(float-point number) GND: 0.5-999.9(float-point number) WAIT: 0.1-999.9(float-point number)	Write/read register, data occupies 2 registers. Used for polling to obtain the dwell time, ACW, DCW, IR, GND, and WAIT.
0246	2	4	Fall time	32-bit (4 bytes) integer ACW: 0.0-999.9(float-point number) DCW: 1.0-999.9(float-point number); 0 = OFF IR: 1.0-999.9(float-point number); 0 = OFF	Write/read register, data occupies 2 registers. Used for polling to obtain the fall time, ACW, DCW, and IR.
0248	2	4	Delay time / Sampling standard	32-bit (4 bytes) integer IR: 0.5-999.9(float-point number) OSC: 0.001-40.0(float-point number)	Write/read register, data occupies 2 registers. Used for polling to obtain the delay time, sampling standard, IR, and OSC.
024A	2	4	Zero compensation offset	32-bit (4 bytes) integer ACW: 0 = CLEAR DCW: 0 = CLEAR GND: 0 = CLEAR CONT: 0 = CLEAR	Write/read register, data occupies 2 registers. Used for polling to obtain the zero compensation offset, ACW, DCW, GND, and CONT.
0260	1	2	Final test sorting results	16-bit (2 bytes) integer 0000: Stop 0001: Rising 0002: Testing 0003: Falling 0004: Delaying 0005: Stop 0006: Pass 0007: Output voltage error	Read/write register, data occupies 1 register. Used for polling to obtain the final test sorting results.

				0008: Upper limit of total current alarm 0009: Lower limit of total current alarm 000A: Upper limit of resistance alarm 000B: Lower limit of resistance alarm 000C: Arc detection alarm 000D: Ground protection alarm 000E: Short-circuit protection alarm 000F: Over-temperature protection alarm 0010: Overrange alarm 0011: Ramp upper limit alarm 0012: Lower limit of charging current alarm 0013: Breakdown alarm 0014: Continuity test alarm 0015: Upper limit of insulation resistance alarm 0016: Lower limit of insulation resistance alarm 0017: Upper limit of continuity resistance alarm 0018: Lower limit of continuity resistance alarm 0019: Upper limit of grounding resistance alarm 001A: Lower limit of grounding resistance alarm 001B: Ground current over-limit alarm 001C: Open-circuit detection alarm 001D: Short-circuit detection alarm	
0261	1	2	Final	16-bit (2 bytes) integer	Quickly search the final test

			sorting step	1-200 (integer)	step
0300	1	2	001 Step (test mode)	16-bit (2 bytes) integer 0000: ACW 0001: DCW 0002: IR 0003: GND 0004: CONT 0005: OSC 0006: WAIT	Read/write register, data occupies 1 register. Used for polling to obtain the test mode of 001 step.
0301	1	2	001 Step (test sorting result)	16-bit (2 bytes) integer 0000: Stop 0001: Rising 0002: Testing 0003: Falling 0004: Delaying 0005: Stop 0006: Pass 0007: Output voltage error 0008: Upper limit of total current alarm 0009: Lower limit of total current alarm 000A: Upper limit of resistance alarm 000B: Lower limit of resistance alarm 000C: Arc detection alarm 000D: Ground protection alarm 000E: Short-circuit protection alarm 000F: Over-temperature protection alarm 0010: Overrange alarm 0011: Ramp upper limit alarm 0012: Lower limit of charging current alarm 0013: Breakdown alarm 0014: Continuity test alarm	Read/write register, data occupies 1 register. Used for polling to obtain the test sorting result of 001 step.

				0015: Upper limit of insulation resistance alarm 0016: Lower limit of insulation resistance alarm 0017: Upper limit of continuity resistance alarm 0018: Lower limit of continuity resistance alarm 0019: Upper limit of grounding resistance alarm 001A: Lower limit of grounding resistance alarm 001B: Ground current over-limit alarm 001C: Open-circuit detection alarm 001D: Short-circuit detection alarm	
0302	2	4	001 Step (test voltage)	32-bit (4 bytes) integer ACW: 0-5000.0 (float-point number) DCW: 0-6000.0 (float-point number) IR: 0-6000.0 (float-point number)	Read/write register, data occupies 2 registers. Used for polling to obtain the output voltage of 001 step, ACW (On), DCW (On), and IR (On).
0304	2	4	001 Step (test current)	32-bit (4 bytes) integer ACW: 0-40.0 (float-point number) DCW: 0-10000.0 (float-point number) GND: 1.0-40.0 (float-point number)	Read/write register, data occupies 2 registers. Used for polling to obtain the output current of 001 step, ACW (On), DCW (On), and GND (On).
0306	2	4	001 Step (test resistance / capacitance)	32-bit (4 bytes) integer IR: 0-50000.0 (float-point number) CONT: 0-10000.0 (float-point number) GND: 1-600.0 (float-point number)	Read/write register, data occupies 2 registers. Used for polling to obtain the resistance/capacitance of 001 step, IR (On), CONT (On), GND (On), and OSC (On).

				OSC: 0.001-40.0 (float-point number)	
0308	2	4	001 Step (dwell time)	32-bit (4 bytes) integer 0.0-999.9 (float-point number)	Read/write register, data occupies 2 registers. Used for polling to obtain the dwell time.
.....			2-199 Step		
OAC6	1	2	200 Step (test mode)	16-bit (2 bytes) integer 0000: ACW 0001: DCW 0002: IR 0003: GND 0004: CONT 0005: OSC 0006: WAIT	Read/write register, data occupies 1 register. Used for polling to obtain the test mode of 200 step.
OAC7	1	2	200 Step (test sorting results)	16-bit (2 bytes) integer 0000: Stop 0001: Rising 0002: Testing 0003: Falling 0004: Delaying 0005: Stop 0006: Pass 0007: Output voltage error 0008: Upper limit of total current alarm 0009: Lower limit of total current alarm 000A: Upper limit of resistance alarm 000B: Lower limit of resistance alarm 000C: Arc detection alarm 000D: Ground protection alarm 000E: Short-circuit protection alarm 000F: Over-temperature protection alarm 0010: Overrange alarm	Read/write register, data occupies 1 register. Used for polling to obtain the test sorting results of 200 step.

				0011: Ramp upper limit alarm 0012: Lower limit of charging current alarm 0013: Breakdown alarm 0014: Continuity test alarm 0015: Upper limit of insulation resistance alarm 0016: Lower limit of insulation resistance alarm 0017: Upper limit of continuity resistance alarm 0018: Lower limit of continuity resistance alarm 0019: Upper limit of grounding resistance alarm 001A: Lower limit of grounding resistance alarm 001B: Ground current over-limit alarm 001C: Open-circuit detection alarm 001D: Short-circuit detection alarm	
OAC8	2	4	200 Step (test voltage)	32-bit (4 bytes) integer ACW: 0-5000.0 (float-point number) DCW: 0-6000.0 (float-point number) IR: 0-6000.0 (float-point number)	Read/write register, data occupies 2 registers. Used for polling to obtain the output voltage of 200 step, ACW (On), DCW (On), and IR (On).
OACA	2	4	200 Step (test current)	32-bit (4 bytes) integer ACW: 0-40.0 (float-point number) DCW: 0-10000.0 (float-point number) GND: 1.0-40.0 (float-point number)	Read/write register, data occupies 2 registers. Used for polling to obtain the output current of 200 step, ACW (On), DCW (On), and GND (On).
OACC	2	4	200 Step (test resistance)	32-bit (4 bytes) integer IR: 0-50000.0 (float-point number)	Read/write register, data occupies 2 registers. Used for polling to obtain the

			/ capacitance)	CONT: 0-10000.0(float-point number) GND: 1-600.0(float-point number) OSC: 0.001-40.0(float-point number)	resistance/capacitance of 200 step, IR (On), CONT (On), GND (On), and OSC (On).
OACE	2	4	200 Step (dwell time)	32-bit (4 bytes) integer 0.0-999.9(float-point number)	Read/write register, data occupies 2 registers. Used for polling to obtain the dwell time of 200 step.

3.2 General Register

◆ Start/Stop Test

Write Request

1	2	3	4	5	6	7	8	9	10	11
01	06	02	00				00	00	88	72
01	10	02	00	00	01	02	00	01	44	50
Slave Address	Write	Register		Register Quantity		Byte Count	Data		CRC16	

Write Response

1	2	3	4	5	6	7	8
01	06	02	00	00	00	88	72
01	10	02	00	00	01	00	71
Slave Address	Write	Register		Register Value/Register Quantity		CRC16	

Read Request

1	2	3	4	5	6	7	8
01	03	02	00	00	01	85	B2
Slave Address	Read	Register		Register Quantity		CRC16	

Read Response

1	2	3	4	5	6	7
01	03	02	00	00	B8	44
Slave	Read	Byte	Data		CRC16	

Address		Count		
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Numeric Value

Data	Function	Description
0000	Stop the test	
0001	Start the test	

◆ Beeper

Write Request

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
Slave Address	Write	Register		Register Quantity		Byte Count	Data		CRC16	

Write 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
Slave Address	Write	Register		Register Value/Register Quantity			CRC16

Read Request

1	2	3	4	5	6	7	8
01	03	02	01	00	01	D4	72
Slave Address	Read	Register		Register Quantity		CRC16	

Read Response

1	2	3	4	5	6	7
01	03	02	00	01	79	84
Slave Address	Read	Byte Count	Data		CRC16	

Numeric Value

Data	Function	Description
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0000	Beeper (off)	
0001	Beeper (on)	Default: Beeper (on)

◆ Beep Volume

Write Request

1	2	3	4	5	6	7	8	9	10	11
01	06	02	02				00	07	68	70
01	10	02	02	00	01	02	00	08	85	B4
Slave Address	Write	Register		Register Quantity		Byte Count	Data		CRC16	

Write Response

1	2	3	4	5	6	7	8
01	06	02	02	00	07	68	70
01	10	02	02	00	01	A1	B1
Slave Address	Write	Register		Register Value/ Register Quantity			CRC16

Read Request

1	2	3	4	5	6	7	8
01	03	02	02	00	01	24	72
Slave Address	Read	Register		Register Quantity		CRC16	

Read Response

1	2	3	4	5	6	7
01	03	02	00	05	78	47
Slave Address	Read	Byte Count		Data		CRC16

Numeric Value

Data	Function	Description
0001	Volume 1	
0002	Volume 2	
0003	Volume 3	
0004	Volume 4	
0005	Volume 5	Default volume: 5

0006	Volume 6	
0007	Volume 7	
0008	Volume 8	
0009	Volume 9	

◆ Remote Control

Write Request

1	2	3	4	5	6	7	8	9	10	11
01	06	02	03				00	00	78	72
01	10	02	03	00	01	02	00	01	44	63
Slave Address	Write	Register		Register Quantity		Byte Count	Data		CRC16	

Write Response

1	2	3	4	5	6	7	8
01	06	02	03	00	00	78	72
01	10	02	03	00	01	F0	71
Slave Address	Write	Register		Register Value/Register Quantity		CRC16	

Read Request

1	2	3	4	5	6	7	8
01	03	02	03	00	01	75	B2
Slave Address	Read	Register		Register Quantity		CRC16	

Read Response

1	2	3	4	5	6	7
01	03	02	00	00	B8	44
Slave Address	Read	Byte Count	Data		CRC16	

Numeric Value

Data	Function	Description
0000	Remote control (off)	Default: Remote control (off)
0001	Remote control (on)	

◆ Sinle Step Test

Write Request

1	2	3	4	5	6	7	8	9	10	11
01	06	02	04				00	00	C9	B3
01	10	02	04	00	01	02	00	01	45	D4
Slave Address	Write	Register		Register Quantity		Byte Count	Data		CRC16	

Write Response

1	2	3	4	5	6	7	8
01	06	02	04	00	00	C9	B3
01	10	02	04	00	01	41	B0
Slave Address	Write	Register		Register Value/Register Quantity		CRC16	

Read Request

1	2	3	4	5	6	7	8
01	03	02	04	00	01	C4	73
Slave Address	Read	Register		Register Quantity		CRC16	

Read Response

1	2	3	4	5	6	7
01	03	02	00	00	B8	44
Slave Address	Read	Byte Count		Data		CRC16

Numeric Value

Data	Function	Description
0000	Sinle step test (off)	Default: Single step test (off)
0001	Sinle step test (on)	

◆ Failure Stop

Write Request

1	2	3	4	5	6	7	8	9	10	11
01	06	02	05				00	00	98	73

01	10	02	05	00	01	02	00	01	44	05
Slave Address	Write	Register	Register Quantity	Byte Count	Data	CRC16				

Write Response

1	2	3	4	5	6	7	8
01	06	02	05	00	00	98	73
01	10	02	05	00	01	10	70
Slave Address	Write	Register	Register Value/Register Quantity	CRC16			

Read Request

1	2	3	4	5	6	7	8
01	03	02	05	00	01	95	B3
Slave Address	Read	Register	Register Quantity	CRC16			

Read Response

1	2	3	4	5	6	7
01	03	02	00	01	79	84
Slave Address	Read	Byte Count	Data	CRC16		

Numeric Value

Data	Function	Description
0000	Failure stop (off)	
0001	Failure stop (on)	Default: Failure stop (on)

◆ Continuous Test (No-Power-Off Connection)

Write Request

1	2	3	4	5	6	7	8	9	10	11
01	06	02	06				00	00	68	73
01	10	02	06	00	01	02	00	01	44	36
Slave Address	Write	Register		Register Quantity		Byte Count	Data		CRC16	

Write Response

1	2	3	4	5	6	7	8
01	06	02	06	00	00	68	73
01	10	02	06	00	01	E0	70
Slave Address	Write	Register		Register Value/Register Quantity			CRC16

Read Request

1	2	3	4	5	6	7	8
01	03	02	06	00	01	65	B3
Slave Address	Read	Register		Register Quantity		CRC16	

Read Response

1	2	3	4	5	6	7
01	03	02	00	00	B8	44
Slave Address		Read	Byte Count	Data		CRC16

Numeric Value

Data	Function	Description
0000	Continuous test (off)	Default: Continuous test (off)
0001	Continuous test (on)	

◆ Screen Saver

Write Request

1	2	3	4	5	6	7	8	9	10	11
01	06	02	07				00	00	39	B3
01	10	02	07	00	01	02	00	01	45	E7
Slave Address	Write	Register		Register Quantity		Byte Count	Data		CRC16	

Write Response

1	2	3	4	5	6	7	8
01	06	02	07	00	00	39	B3
01	10	02	07	00	01	B1	B0
Slave Address	Write	Register		Register Value/Register Quantity		CRC16	

Read Request

1	2	3	4	5	6	7	8
01	03	02	07	00	01	34	73
Slave Address	Read	Register		Register Quantity		CRC16	

Read Response

1	2	3	4	5	6	7
01	03	02	00	01	79	84
Slave Address		Read	Byte Count	Data	CRC16	

Numeric Value

Data	Function	Description
0000	Screen saver (off)	
0001	Screen saver (on)	Default: Screen saver (on)

◆ Test Results

Write Request

1	2	3	4	5	6	7	8	9	10	11
01	06	02	08				00	00	09	B0
01	10	02	08	00	01	02	00	01	45	18

Slave Address	Write	Register	Register Quantity	Byte Count	Data	CRC16
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Write Response

1	2	3	4	5	6	7	8
01	06	02	08	00	00	09	B0
01	10	02	08	00	01	81	B3
Slave Address	Write	Register	Register Value/Register Quantity			CRC16	

Read Request

1	2	3	4	5	6	7	8
01	03	02	08	00	01	04	70
Slave Address	Read	Register	Register Quantity			CRC16	

Read Response

1	2	3	4	5	6	7
01	03	02	00	00	B8	44
Slave Address	Read	Byte Count	Data		CRC16	

Numeric Value

Data	Function	Description
0000	Final step	Default: Final step
0001	All	
0002	Pass/Fail	

◆ New File

New File 3

1	2	3	4	5	6	7	8	9	10	11
01	06	02	20				00	03	C9	B9
01	10	02	20	00	01	02	00	03	C2	F1
Slave Address	Write	Register	Register Quantity		Byte Count	Data	CRC16			

File Number: 1-128

Write Response

1	2	3	4	5	6	7	8
01	06	02	20	00	03	C9	B9
01	10	02	20	00	01	01	BB
Slave Address	Write	Register		Register Value/Register Quantity		CRC16	

◆ Load File

Load File 3

1	2	3	4	5	6	7	8	9	10	11
01	06	02	21				00	03	98	79
01	10	02	21	00	01	02	00	03	C3	20
Slave Address	Write	Register		Register Quantity		Byte Count	Data		CRC16	

File Number: 1-128

Write Response

1	2	3	4	5	6	7	8
01	06	02	21	00	03	98	79
01	10	02	21	00	01	50	7B
Slave Address	Write	Register		Register Value/Register Quantity		CRC16	