PR

SCPI COMMAND REFERENCE

TH9130S Series

Multi-Channel High-Power Withstand-Voltage & Ground-Bond Tester — TH9130S / TH9131S. Complete remote-command set for RS232C, GPIB, USB Device and LAN control. Companion to the TH9130S Series Operation Manual.

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TH9130S Series SCPI Command Reference

Multi-Channel High-Power Withstand-Voltage & Ground-Bond Tester — TH9130S / TH9131S

This reference is the companion volume to the *TH9130S Series Operation Manual*, covering every remote command supported over RS232C, GPIB (optional), USB Device and LAN. Command syntax is presented as compact reference tables.

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CHAPTER 1

Introduction & Command Syntax

The instrument can be remote-controlled over RS232C (standard) or GPIB (optional) — not simultaneously — using the same command set on different hardware and transport; USB Device and LAN are also available. See the Operation Manual, Chapter 7, for interface setup (baud rate, GPIB address, etc.).

1.1 Command subsystems

Commands are grouped into five subsystems:

Subsystem	Purpose
DISPlay	Selects the instrument's displayed screen and measurement-page view mode.
FUNCtion	Configures test-step programs and every test mode's parameters, including the Breakdown voltage test.
SYSTem	Test-related and environment-related system settings.
MMEM / USB	File management on internal storage and on a USB drive.
FETCh	Retrieves measurement results.

A small set of common commands outside these subsystems is covered in Chapter 9 (`*IDN?` , `FUNC:START` , `*STOP`).

1.2 Syntax rules

- Only the literal characters sent or received by the instrument are shown; all command text is ASCII.
- A data field shown as `<value>` is an ASCII string, typically an integer or floating-point number in the instrument's default unit for that parameter — the unit itself is not included in the command.
- Every command must end with a terminator: **NL** (line feed, decimal 10 / 0x0A) over RS232C/USB/LAN, or the IEEE-488 **EOI** signal over GPIB. Without a terminator, the instrument does not parse the command.
- Most FUNCtion:SOURce commands address a specific test step with `<sn>` , an integer step number (range 1–50, matching the 50-steps-per-file storage limit).
- A trailing `?` turns a setting command into a query, returning the current value in the same units/encoding as the set command's parameter.
- Where a keyword is shown in mixed case (e.g. `FUNC:SOURce:STEP`), the capitalised part (`SOUR`) is the minimum the instrument accepts; the lower-case remainder is an optional long-form spelling. Both `FUNC:SOUR:STEP` and `FUNC:SOURCE:STEP` are valid — this reference uses the short form in every worked example for brevity.
- Every test mode also has a `CHAN` command for its scanning-channel configuration — an H/L/O string for ACW/DCW/IR/OSC, or a single channel number for GB/CONT — whose exact form depends on the fitted scanning module; see §4.7 for the full convention.

> **NOTE**
>
> RS232C on this instrument uses software (character-echo) handshaking rather than hardware handshake lines — see Operation Manual §7.1 for the full protocol. Implement RS232C control with a standard serial library for your platform (e.g. PySerial for Python), applying the handshake rules in the Operation Manual together with the command syntax in this reference.

CHAPTER 2

DISPlay Subsystem

Sets which screen the instrument shows and how the measurement screen is laid out.

Command	Query	Parameter / Range	Description
`DISP:PAGE <page>`	`DISP:PAGE?`	`TEST` / `SETUP` / `SYST` / `FILE`	Switches the active screen to the measurement (TEST), parameter setup (SETUP), system settings (SYST) or file list (FILE) page.
`DISP:MODE <mode>`	`DISP:MODE?`	`0` = step mode, `1` = list mode	Sets the measurement-screen display layout.
`DISP:STEP <sn>:OFFSET <mode>`	`DISP:STEP <sn>:OFFSET?`	`0` = zero off, `1` = zero on	Controls the zero/offset operation for the given step.

Example — switch to the measurement screen: set `DISP:PAGE TEST`; query `DISP:PAGE?` returns `TEST`.

CHAPTER 3

FUNCtion Subsystem — Program Control

These commands manage the step list of the active test program, independent of any one test mode's parameters.

Command	Parameter	Description
`FUNC:SOUR:STEP?`	—	Query only — returns the number of steps in the active program.
`FUNC:SOUR:STEP <sn>:INS`	`<sn>`: 1–50	Inserts a new step after the given step number.
`FUNC:SOUR:STEP <sn>:DEL`	`<sn>`: 1–50	Deletes the given step from the active program.
`FUNC:SOUR:STEP <sn>:NEW`	`<sn>`: 1–50	Creates a new, empty test program for editing from scratch.
`FUNC:SOUR:STEP <sn>:COPY`	`<sn>`: 1–50	Copies step `<sn>`; use `INS` to paste the copied step in.
`FUNC:SOUR:STEP <sn>:PRJ <mode>` `FUNC:SOUR:STEP <sn>:PRJ?`	`<sn>`: 0–7 `<mode>`: `0`(AC) / `1`(DC) / `2`(IR) / `3`(GB) / `4`(CONT) / `7`(OSC)	Sets or queries the test mode assigned to a step.

Example — set step 1 to Insulation Resistance mode: set `FUNC:SOUR:STEP 1:PRJ IR`; query `FUNC:SOUR:STEP 1:PRJ?` returns `2`.

Once a step's mode is set, configure that step's parameters using the mode-specific commands in Chapter 4 (or Chapter 5 for Breakdown), all addressed the same way: `FUNC:SOURce:STEP <sn>:<mode>:<parameter> <value>`. Most modes also take a `CHECK` (contact check) and/or `CHAN` (channel configuration) command — see §4.7.

CHAPTER 4

FUNCtion Subsystem — Test-Mode Parameters

All commands below take the form `FUNC:SOURce:STEP <sn>:<mode>:<param> <value>` to set, or the same with a trailing `?` to query. `<sn>` is the step number (1–50). Compare each parameter's range and default against Operation Manual Chapter 4 for context.

4.1 AC withstand-voltage (ACW) — `:AC:`

Parameter (command)	Type	Range	Precision / Unit
`VOLT` — test voltage	Float	0.050–5.000	0.001 kV
`UPPC` — current upper limit	Float	0.001–120.000 (V≤4kV) / 0.001–100.000 (V>4kV)	0.001 mA
`LOWC` — current lower limit	Float	0 – upper limit (0 = off)	0.001 mA
`ARC` — arc-current limit	Float	0, 1.0–20.0 (0 = off)	0.1 mA
`FREQ` — test frequency	Char	50 / 60	Hz
`RTIM` — rise time	Float	0–999.0 (0 = off)	0.1 s
`TTIM` — test time	Float	0, 0.3–999.0 (0 = off)	0.1 s
`FTIM` — fall time	Float	0–999.0 (0 = off)	0.1 s
`CHECK` — contact check (CK)	Char	0 (off) / 1 (on)	—
`CHAN` — channel setting	String	`0000`–`HHHH` (module -004) / `00000000`–`HHHHHHHH` (modules -001/-002); each character H/L/O	—

`UPPC`'s documented range is the shared hardware/firmware range across both models; the current actually achievable is lower on TH9131S, limited by its rated AC output power (200 VA vs 500 VA — see the datasheet).

Example — set step 1's ACW voltage to 1 kV, channels 1 and 6 to H, channel 8 to L, rest open (8-channel module): `FUNC:SOUR:STEP 1:AC:VOLT 1.000` then `FUNC:SOUR:STEP 1:AC:CHAN HOOOOHOL`.

4.2 DC withstand-voltage (DCW) — `:DC:`

Parameter (command)	Type	Range	Precision / Unit
`VOLT` — test voltage	Float	0.050–6.000	0.001 kV
`UPPC` — current upper limit	Float	0.0001–25.000 (V≥1.5kV) / 0.0001–20.000 (V<1.5kV)	0.0001 mA
`LOWC` — current lower limit	Float	0 – upper limit (0 = off)	0.0001 mA
`RAMP` — ramp-up judgment	Char	OFF(0) / ON(1)	—
`RAMPARC` — ramp arc limit	Float	0, 1.0–10.0 (0 = off)	0.1 mA
`ARC` — arc-current limit	Float	0, 1.0–10.0 (0 = off)	0.1 mA
`RTIM` — rise time	Float	0–999.0 (0 = off)	0.1 s
`WTIM` — wait time	Float	0–999.0 (0 = off)	0.1 s
`TTIM` — test time	Float	0, 0.3–999.0 (0 = off)	0.1 s
`FTIM` — fall time	Float	0–999.0 (0 = off)	0.1 s
`CHECK` — contact check (CK)	Char	0 (off) / 1 (on)	—
`CHAN` — channel setting	String	Same convention as ACW	—

4.3 Insulation resistance (IR) — `:IR:`

Parameter (command)	Type	Range	Precision / Unit
`VOLT` — test voltage	Float	0.050–6.000	0.001 kV
`UPPR` — resistance upper limit	Float	0, lower limit – 50.0 GΩ (0 = off)	0.001 MΩ
`LOWR` — resistance lower limit	Float	0.05 MΩ – 50.0 GΩ	0.001 MΩ
`TTIM` — test time	Float	0, 0.3–999.0 (0 = continuous)	0.1 s
`RTIM` — rise time	Float	0–999.0 (0 = off)	0.1 s
`WTIM` — delay time	Float	0–999.0 (0 = off)	0.1 s
`FTIM` — fall time	Float	0–999.0 (0 = off)	0.1 s
`RANG` — current range	Integer	0–6 (0:auto, 1:10mA, 2:3mA, 3:300µA, 4:30µA, 5:3µA, 6:300nA)	—
`CHECK` — contact check (CK)	Char	0 (off) / 1 (on)	—
`CHAN` — channel setting	String	Same convention as ACW (§4.1)	—

4.4 Ground bond (GB) — `:GB:`

Parameter (command)	Type	Range	Precision / Unit
`CURRent` — test current	Float	1.00–40.00	0.01 A
`VOLT` — test voltage	Float	3.00–8.00	0.01 V
`UPPR` — resistance upper limit	Integer	0–600	1 mΩ
`LOWR` — resistance lower limit	Integer	0 – upper limit	1 mΩ
`TTIM` — test time	Float	0, 0.5–999.9 (0 = continuous)	0.1 s
`FREQ` — test frequency	Char	50 / 60	Hz
`DUAL` — synchronous test	Char	0–2 (0:OFF, 1:AC, 2:DC)	—
`OFFSET` — zero offset	Integer	0–200	mΩ
`CHAN` — active channel	Integer	0–4 (module -004) / 0–8 (modules -001/-003); 0 = not set	—

Unlike ACW/DCW/IR/OSC, GB's `CHAN` takes a single channel **number** (the one active Current channel for that step), not an H/L/O string. 1–8 selects that physical channel; 0 leaves no channel selected.

4.5 Continuity (CONT) — `:CONT:`

Parameter (command)	Type	Range	Precision / Unit
`UPPR` — resistance upper limit	Float	0.00–10000.00	0.01 Ω
`LOWR` — resistance lower limit	Integer	0 – upper limit	1 Ω
`TTIM` — test time	Float	0, 0.5–999.9 (0 = continuous)	0.1 s
`CHAN` — active channel	Integer	0–4 (module -004) / 0–8 (modules -001/-003); 0 = not set	—

4.6 Open/short-circuit detection (OSC) — `:OSC:`

Parameter (command)	Type	Range	Precision / Unit
`OPEN` — open-circuit threshold	Integer	10–100	10 %, step 10
`SHOT` — short-circuit threshold	Integer	0, 100–500 (0 = off)	10 %, step 10
`GET` — sample reference capacitance	—	No parameter — triggers an auto-sample of the impedance-derived reference value	—
`STAND` — reference capacitance	Float	0.001–40.000	0.001 nF
`CHECK` — contact check (CK)	Char	0 (off) / 1 (on)	—
`CHAN` — channel setting	String	Same convention as ACW (§4.1)	—

Example — sample a reference capacitance for step 1: `FUNC:SOUR:STEP 1:OSC:GET`; then read it back with `FUNC:SOUR:STEP 1:OSC:STAND?`.

4.7 Channel-setting conventions summary

Modes	CHAN format	Meaning
AC, DC, IR, OSC	String, one H/L/O character per channel	H = high-potential (HV) output on that channel; L = low-potential (Return) reference; O = channel unused. String length matches the fitted module (4 or 8 channels).
GB, CONT	Integer, single channel number	The one active Current-measurement (GB) or test (CONT) channel for that step; 0 or omitted = channel not set.

CHAPTER 5

FUNCtion Subsystem — Breakdown Voltage Test

The Breakdown voltage test sweeps the withstand-voltage output upward in steps to find a DUT's insulation breakdown point (referenced as "Breakdown" in the SYSTem test-mode setting — Operation Manual §3.4.1). These commands are not addressed by step number — they configure a single, instrument-wide breakdown-test setup for DC.

5.1 DC breakdown — `FUNC:BREAKdown:DC:`

Parameter (command)	Type	Range	Precision / Unit
`VOLTStart` — start voltage	Float	0.050 – end voltage	0.001 kV
`VOLTEnd` — end voltage	Float	0.05–6.000	0.001 kV
`STEPVOLT` — voltage step size	Float	0.005–0.500	0.001 kV
`STEP` — number of steps	Integer	2–999	1
`UPPC` — current upper limit	Float	0.0001–20	0.0001 mA
`LOWC` — current lower limit	Float	0 – upper limit (0 = off)	0.0001 mA
`TTIM` — test time (per step)	Float	0, 0.3–999.0 (0 = off)	0.1 s
`RTIM` — rise time	Float	0–999.0 (0 = off)	0.1 s
`WTIM` — wait time	Float	0–999.0 (0 = off)	0.1 s
`ARC` — arc-current limit	Float	0, 1.0–10.0 (0 = off)	0.1 mA
`CONTinue` — continue-on-breakdown	Integer	0–1 (0:OFF, 1:ON)	—
`SAVE` — save the breakdown setup	—	No parameter	—

Example — sweep 1 kV to 5 kV DC in 50 V steps: `FUNC:BREAK:DC:VOLTS 1.000`, `FUNC:BREAK:DC:VOLTE 5.000`, `FUNC:BREAK:DC:STEPVOLT 0.050`, then `FUNC:BREAK:SAVE`.

CHAPTER 6

Multi-Parameter (CAL) Quick-Set Commands

Each of the 6 test modes also has a single "CAL" command that configures every one of that step's parameters — including its channel configuration — in one line, instead of issuing one command per parameter. Its general form is:

```
FUNC:SOUR:STEP <sn>:CAL <mode> <param1> <param2> …
```

The first number after `CAL` is always the test-mode code (`0`:AC, `1`:DC, `2`:IR, `3`:GB, `4`:CONT, `7`:OSC); every subsequent value is a parameter for that mode, in a fixed order — all parameters must always be supplied, in order, even ones you don't need to change.

6.1 ACW — `CAL 0 …`

Parameter order: voltage (0.050–5.000 kV) · current upper limit · current lower limit · arc limit · frequency (0:50Hz, 1:60Hz) · rise time · test time · fall time · contact check (0:OFF, 1:ON) · channel string (H/L/O).

```
FUNC:SOUR:STEP 1:CAL 0 1.5 1 0 0 0 1 3 1 1 HOOOOHOL
```

6.2 DCW — `CAL 1 …`

Parameter order: voltage (0.050–6.000 kV) · current upper limit · current lower limit · ramp-up judgment (0/1) · ramp arc · arc limit · rise time · wait time · test time · fall time · contact check (0/1) · channel string.

```
FUNC:SOUR:STEP 1:CAL 1 2 0.05 0 0 0 0 3 0 3 3 1 HOOOOHOL
```

6.3 IR — `CAL 2 …`

Parameter order: voltage (0.050–6.000 kV) · resistance upper limit · resistance lower limit · range (0–6, 0:auto) · rise time · delay time · test time · fall time · contact check (0/1) · channel string.

```
FUNC:SOUR:STEP 1:CAL 2 1.5 0 1000 0 0 0 6 0 1 HOOOOHOL
```

6.4 GB — `CAL 3 …`

Parameter order: test voltage (3.00–8.00 V) · test current (1.00–40.00 A) · resistance upper limit · resistance lower limit · test frequency (0:50Hz, 1:60Hz) · test time · manual zero offset · synchronous test (0:OFF, 1:AC, 2:DC) · active channel number.

```
FUNC:SOUR:STEP 1:CAL 3 8 40 150 0 0 3 0 0 1
```

6.5 CONT — `CAL 4 …`

Parameter order: resistance upper limit (0–10000 Ω) · resistance lower limit · test time · active channel number.

```
FUNC:SOUR:STEP 1:CAL 4 5000 0 3 1
```

6.6 OSC — `CAL 7 …`

Parameter order: open-circuit threshold (10–100%) · short-circuit threshold (0, 100–500%) · reference sample capacitance (0.001–40.000 nF) · contact check (0/1) · channel string.

```
FUNC:SOUR:STEP 1:CAL 7 20 300 10 1 HOOOOHOL
```

Channel-string length (4 or 8 characters) matches the fitted scanning module — see §4.7. All worked examples above use an 8-channel string; shorten to 4 characters for module -004.

CHAPTER 7

SYSTem Subsystem

These commands mirror the SYSTEM-key settings in Operation Manual §3.4, split into test-related (`SYSTem:MEA:`) and environment-related (`SYSTem:ENV:`) groups. None take a step-number argument — they apply instrument-wide.

7.1 Test-related settings — `SYSTem:MEA:`

Parameter (command)	Type	Range
`TRGMODE` — trigger source	Char	0–2 (0:manual, 1:external, 2:bus)
`TRGDLY` — trigger delay	Float	0.0–99.9 s, 0.1 s precision
`MEAMODE` — test mode	Char	0–4 (0:normal, 1:repeat, 2:loop, 3:single-step, 4:breakdown)
`RPTCNT` — repeat count	Integer	0–999
`RPTINT` — test interval	Float	0.0–99.9 s, 0.1 s precision
`AFTERFAIL` — on-failure behaviour	Char	0–2 (0:continue, 1:retest, 2:stop)
`PASSHOLD` — pass-buzzer time	Float	0.2–99.9 s, 0.1 s precision
`STEPHOLD` — inter-step hold	Float	0.1–99.9 s, or `KEY`; 0.1 s precision
`GFI` — shock protection	Char	ON/OFF or 1/0
`OUTLEL` — HANDLER output level	Char	0–1 (0:Low, 1:High)

Example — set trigger source to bus and trigger delay to 0.5 s: `SYSTem:MEA:TRGMODE 2` then `SYSTem:MEA:TRGDLY 0.5`.

7.2 Environment-related settings — `SYSTem:ENV:`

Parameter (command)	Type	Range
`KEYVOL` — key-click sound	Char	ON/OFF or 1/0
`BEEPVOL` — buzzer volume	Char	0–3 (0:off, 1:low, 2:medium, 3:high)
`PASSVOL` — pass-tone type	Char	0–2 (0:off, 1:long, 2:double-short)
`FAILVOL` — fail-tone type	Char	0–2 (0:off, 1:long, 2:double-short)
`LANGuage` — UI language	Char	1 (English)
`KEYLOCK` — key-lock source	Char	0–1 (0:manual, 1:bus)
`KEYLOCK:UNLOCK` — release key lock	—	No parameter — releases a bus-sourced key lock
`BRIght` — screen brightness	Integer	20–100
`SOFTKEY` — on-screen keyboard	Char	0–1 (0:off, 1:on)
`DATE` — system date	Char	`<year> <month> <day>`, 2017 1 1 – 9999 12 31
`TIME` — system time	Char	`<hour> <minute> <second>`, 0 0 0 – 23 59 59

Example — set the system date to 17 Nov 2021: `SYSTem:ENV:DATE 2021 11 17`; query returns `2021,11,17`.

CHAPTER 8

MMEM & USB Subsystems

`MMEM` commands act on internal storage; `USB` commands are identical in syntax but act on a USB drive plugged into the front-panel port. Folder and file names are case-sensitive.

8.1 Folder operations

Command	Parameter	Returns
`MMEM:NEW <folder>` / `USB:NEW <folder>`	Folder name	`OK`
`MMEM:DEL <folder>` / `USB:DEL <folder>`	Folder name	`OK` or `ERROR`
`MMEM:RENAME <old> <new>` / `USB:RENAME <old> <new>`	Old name, new name	`OK` or `ERROR`
`MMEM:COPY <folder>`	Folder name	Copies an internal folder to USB. `OK` or `ERROR`
`USB:COPY <folder>`	Folder name	Copies a USB folder to internal storage. `OK` or `ERROR`

Example — create an internal folder named "TH9130Stest": `MMEM:NEW TH9130Stest` → `OK`.

8.2 File operations

Command	Parameter	Returns
`MMEM:NEW <name>.sta` / `USB:NEW <name>.sta`	File name	`OK`
`MMEM:DEL <name>.sta` / `USB:DEL <name>.sta`	File name	`OK` or `ERROR`
`MMEM:RENAME <old>.sta <new>.sta` / `USB:RENAME …`	Old, new file names	`OK` or `ERROR`
`MMEM:COPY <name>.<ext>`	File name + extension	Copies an internal file to USB. `OK` or `ERROR`
`USB:COPY <name>.<ext>`	File name + extension	Copies a USB file to internal storage. `OK` or `ERROR`
`MMEM:SAVE <name>.sta` / `USB:SAVE <name>.sta`	File name	Saves the current settings. `OK`
`MMEM:LOAD <name>.sta` / `USB:LOAD <name>.sta`	File name	Loads the file as the active setup. `OK` or `ERROR`
`MMEM:LIST <path>` / `MMEM:LIST?`	Folder path (or none, for root)	Semicolon-separated list of `.sta` files, or `ERROR` if the folder doesn't exist
`USB:LIST <path>` / `USB:LIST?`	Folder path (or none, for root)	Same, for the USB drive

Example — save the current setup internally as "TH9130STEST", then reload it: `MMEM:SAVE TH9130STEST.sta` → `OK`; `MMEM:LOAD TH9130STEST.sta` → `OK`.

CHAPTER 9

FETCh Subsystem & Common Commands

9.1 FETCh subsystem

Retrieves measurement results. Issued after a test starts, until the test ends or another command interrupts it.

Command	Parameter	Description
`FETCh:AUTO <mode>` / `FETCh:AUTO?`	`OFF(0)` / `ON(1)` / `EOM(2)`	OFF: no automatic result return. ON: results stream back in real time. EOM: results return automatically once the measurement ends.
`FETCh?`	Query only	Returns the results for every step, one line per step, until the test ends — see the return format below.

Return format (fields vary by test mode):

Mode	Return format
AC / DC	`STEP n:MODE,voltage(kV),current(A),result;`
IR	`STEP n:MODE,voltage(kV),resistance(Ω),result;`
GB	`STEP n:MODE,current(A),resistance(Ω),result;`
CONT	`STEP n:MODE,resistance(Ω),result;`
OSC	`STEP n:MODE,capacitance(F),result;`

Example return: `STEP 1:AC,1.000,1.000e-3,PASS; STEP 2:IR,1.500,1.000e+7,PASS; STEP 3:GB,2.500e+1,1.000e-1,PASS; STEP 4:CONT,9.000e+2,PASS;` — by default, the instrument automatically returns every step's result as it completes.

9.2 Common (non-subsystem) commands

Command	Description
`*IDN?`	Returns `<manufacturer>,<model>,<firmware>`, e.g. `Tonghui,TH9130S,Ver1.02`.
`FUNC:START`	Starts the test program from step 1.
`FUNC:START <num>`	In single-step test mode, starts only the specified step.
`*STOP`	Stops the test in progress.

Example — identify the instrument and run a test: `*IDN?` → `Tonghui,TH9130S,Ver1.02`; then `FUNC:START`.

APPENDIX

Contact

For questions about any command in this reference, or for support integrating the TH9130S series into a test system, contact Techmize using the details below.

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