CR

SCPI COMMAND REFERENCE

# TH9120 Series

## AC/DC Withstand Voltage & Insulation Resistance Tester

Companion document to the TH9120 Series Operation Manual. Full remote-control SCPI command set over RS232C, USB and the optional GPIB interface, covering display, test-control, per-mode test-parameter (AC/DC/IR/PA/OSC/CK/Breakdown-Voltage), system and file-handling subsystems for TH9120 / TH9120A / TH9120D.

Techmize Electronic GmbH · Ismaning, Germany
Rev. 2026-10

# TH9120 Series SCPI Command Reference

## TH9120 (AC/DC/IR/OSC) / TH9120A (AC/OSC) / TH9120D (DC/IR)

This document lists the full remote-control command set for the TH9120 series AC/DC withstand-voltage and insulation-resistance tester. It is the companion reference to the *TH9120 Series Operation Manual*. SCPI is available over RS232C, USB (USB Device) and the optional GPIB interface.


| Section | |
|---|---|
| **1. Conventions** | 1 page |
| **2. DISPlay Subsystem** | 1 page |
| **3. FUNCtion Subsystem — Test Control & Step Editing (PROG)** | 1 page |
| **4. FUNCtion Subsystem — AC / DC Parameters** | 2 pages |
| **5. FUNCtion Subsystem — IR / PA / OSC Parameters** | 2 pages |
| **6. FUNCtion Subsystem — CK & Breakdown-Voltage Parameters** | 2 pages |
| **7. SYSTem Subsystem** | 2 pages |
| **8. MMEM & USB Subsystems** | 1 page |
| **9. Other Commands & FETCh Data Format** | 1 page |


*Commands only describe the actual characters received or sent; all characters are ASCII. Unlabelled numeric data defaults to integer or floating-point format, with no unit shown in the command itself. Every command string must end with the termination tag NL (newline, decimal 10); without it the instrument will not parse the command.*

SECTION 1

# Conventions

## 1.1 Command subsystems

| Subsystem | Covers |
|---|---|
| **`DISPlay`** | Active display page (§2) |
| **`FUNCtion`** | Test start/stop, step/file editing (PROG), and the per-mode test-parameter trees for AC/DC/IR/PA/OSC/CK and the Breakdown-Voltage test (§3–6) |
| **`SYSTem`** | Test-safety settings (MEA) and environment settings (ENV) (§7) |
| **`MMEM`** | Internal test-file store/load/delete/copy-to-USB (§8) |
| **`USB`** | External (USB-drive) test-file store/load/delete/copy-to-internal (§8) |
| ***Other*** | `*IDN?`, `FUNC:STARt`, `*STOP`, `FETCh` (§9) |

## 1.2 Syntax rules

- Command keywords use mixed-case notation: the capitalized portion of a keyword is mandatory, the lower-case portion optional. The instrument does not distinguish upper and lower case on received commands.
- Every command string must end with a command-end tag: `NL` (newline, decimal 10) is the mandatory terminator over RS232C and USB.
- Most `FUNCtion` test-parameter commands address a specific test step with `STEP<sn>`, where `<sn>` is an integer step number, **1–50**, matching the instrument's 50-steps-per-file capacity (Operation Manual §4.7). This underscore in examples below (`_`) denotes a space and is not itself part of the command syntax.

SECTION 2

# DISPlay Subsystem

Sets or queries the instrument's active display page and measurement display mode.

| Command | Details |
| --- | --- |
| `DISP:PAGE?`<br>`DISP:PAGE <page name>` | Query/switch the active display page. `page name`: `TEST` (<TEST> measurement page), `SETUP` (<SETUP> parameter page), `SYST` (<SYSTEM> settings page), `FILE` (<FILE> file-list page), `MAIN` (standby main page). Example: `DISP:PAGE TEST` · query returns `TEST`. |
| `DISP:MODE?`<br>`DISP:MODE <0/1>` | Measurement-page display mode. `0` = step display (one step at a time), `1` = list display (all steps of the current file). Example: `DISP:MODE 0` · query returns `0`. |

SECTION 3

# FUNCtion Subsystem — Test Control & Step Editing (PROG)

## 3.1 Test control

| Command | Details |
|---|---|
| `FUNC:STARt` | Start the current test file. Equivalent to the front-panel START button (requires the rear-panel INTER LOCK terminals shorted). No query form. |
| `*STOP` | Stop the test in progress. Equivalent to the front-panel STOP button. No query form. |

## 3.2 Step/file editing (PROG)

Edits the current test file's step list. Issued under the `FUNC:SOURce:STEP_<sn>` path.

| Command | Details |
|---|---|
| `FUNC:SOUR:STEP_<sn>:INS` | Insert a new, blank test step after step `<sn>`. No query form. |
| `FUNC:SOUR:STEP_<sn>:DEL` | Delete test step `<sn>` from the current file. No query form. |
| `FUNC:SOUR:STEP_<sn>:NEW` | Create a brand-new, empty test plan (replacing the current file). No query form. |
| `FUNC:SOUR:STEP_<sn>:PRJ <code>` | Change the test mode (function) assigned to step `<sn>` in an existing file. `<code>`: integer, 0–5 — `0` AC, `1` DC, `2` IR, `3` PA (pause), `4` OS (OSC open/short), `5` CK (pin-check). **TH9120A** accepts only `0`, `3`, `4`, `5`; **TH9120D** accepts only `1`, `2`, `3`, `5` — matching each model's supported test modes (Operation Manual §3.4). No query form. |

*`<sn>` (step number, 1–50) addresses a step within the currently selected test file; it is a separate value from the file name used by the `MMEM` / `USB` subsystems (§8). Each file can hold up to 50 steps, any combination of the modes supported by the connected model.*

### Worked example

Changing step 1 of the current file to an AC withstand-voltage step, then setting its test voltage to 1000 V:

```
FUNC:SOUR:STEP_1:PRJ_0
FUNC:SOUR:STEP_1:AC:VOLT_1000
```

SECTION 4

# FUNCtion Subsystem — AC / DC Parameters

Issued as `FUNC:SOUR:STEP_<sn>:AC:<field>` or `...:DC:<field>` (§3.2) — **TH9120, TH9120A** for AC; **TH9120, TH9120D** for DC. Ranges match Operation Manual §4.3.1–4.3.2.

## 4.1 AC fields

| Field | Data format / range / unit | Description |
|---|---|---|
| `VOLT` | float, 50–10000, V, precision 1 V | AC test voltage |
| `UPPC` | float, 0.001–20.000, mA, precision 0.001 mA | Upper current limit |
| `LOWC` | float, 0, 0.001–upper limit, mA (0 = OFF) | Lower current limit |
| `TTIM` | float, 0, 0.3–999.0, s (0 = continuous), precision 0.1 s | Test time |
| `RTIM` | float, 0–999.0, s (0 = OFF), precision 0.1 s | Voltage rise time |
| `FTIM` | float, 0–999.0, s (0 = OFF), precision 0.1 s | Voltage fall time |
| `ARC` | float, 0, 1.0–20.0, mA (0 = OFF), precision 0.1 mA | Arc-current upper limit |
| `FREQ` | character, 50 / 60, Hz | Test frequency |

### Worked example

```
FUNC:SOUR:STEP_1:AC:VOLT_1000  →  sets STEP 1 ACW voltage to 1000 V
FUNC:SOUR:STEP_1:AC:UPPC_1  →  sets STEP 1 ACW upper current limit to 1 mA
FUNC:SOUR:STEP_1:AC:TTIM_1  →  sets STEP 1 ACW test time to 1 s
```

*Query form:* `FUNC:SOUR:STEP_1:AC:VOLT?` *→ returns* `1000`.

## 4.2 DC fields

| Field | Data format / range / unit | Description |
|---|---|---|
| VOLT | float, 50–12000, V, precision 1 V | DC test voltage |
| UPPC | float, 0.0001–10.000, mA, precision 0.0001 mA | Upper current limit |
| LOWC | float, 0, 0.0001–upper limit, mA (0 = OFF) | Lower current limit |
| TTIM | float, 0, 0.3–999.0, s (0 = continuous), precision 0.1 s | Test time |
| RTIM / FTIM | float, 0–999.0, s (0 = OFF), precision 0.1 s | Rise / fall time |
| WTIM | float, 0–999.0, s (0 = OFF), precision 0.1 s | Charging wait time |
| ARC | float, 0, 1.0–10.0, mA (0 = OFF), precision 0.1 mA | Arc-current upper limit |
| RAMPARC | float, 0, 1.0–10.0, mA (0 = OFF), precision 0.1 mA | Arc-current limit applied only during the voltage rise |
| RAMP | character, ON/OFF (1/0) | Judge the current upper limit during the voltage-rise period |

### Worked example — configuring a 2-step file

```
FUNC:SOUR:STEP_1:PRJ_0;AC:VOLT_1000;UPPC_1;TTIM_3
FUNC:SOUR:STEP_1:INS
FUNC:SOUR:STEP_2:PRJ_1;DC:VOLT_1000;UPPC_1;TTIM_3
```

*Configures STEP 1 as a 1000 V AC test (1 mA upper limit, 3 s test time), inserts a new step after it, then configures the new STEP 2 as the DC equivalent.*

SECTION 5

# FUNCtion Subsystem — IR / PA / OSC Parameters

Issued as `FUNC:SOUR:STEP_<sn>:IR:<field>`, `...:PA:<field>` or `...:OS:<field>` (§3.2). Ranges match Operation Manual §4.3.3–4.3.5.

## 5.1 IR (insulation resistance) fields — TH9120, TH9120D

| Field | Data format / range / unit | Description |
|---|---|---|
| `VOLT` | float, 50–12000 (TH9120), 50–5000 (TH9120D), V, precision 1 V | IR test voltage |
| `UPPR` | float, 0, lower limit–50.0, GΩ (0 = OFF), precision 0.1 MΩ | Upper resistance limit |
| `LOWR` | float, 0.1 MΩ–50.0 GΩ, precision 0.1 MΩ | Lower resistance limit |
| `TTIM` | float, 0, 0.3–999.0, s (0 = continuous), precision 0.1 s | Test time |
| `RTIM` / `FTIM` | float, 0–999.0, s (0 = OFF), precision 0.1 s | Rise / fall time |
| `RANG` | integer, 0–6 (`0` Auto, `1` 10 mA, `2` 3 mA, `3` 300 µA, `4` 30 µA, `5` 3 µA, `6` 300 nA) | Fixed/auto current range (Operation Manual §4.3.3 table) |

*Example:* `FUNC:SOUR:STEP_1:IR:LOWR_1` *sets STEP 1's IR lower resistance limit to 1 MΩ;* `FUNC:SOUR:STEP_1:IR:RANG_1` *fixes STEP 1's IR current range to 10 mA.*

## 5.2 PA (pause) fields — all models

| Field | Data format / range / unit | Description |
|---|---|---|
| `MESSAge` | character string, up to 16 characters | Prompt message shown during the pause step |
| `TIME` | float, 0, 0.3–999.0, s (0 = continue on trigger), precision 0.1 s | Pause duration |

*Example:* `FUNC:SOUR:STEP_1:PA:MESSAge_HELLO!` *sets STEP 1's pause message to "HELLO!";* `FUNC:SOUR:STEP_1:PA:TIME_1` *sets a 1 s pause.*

## 5.3 OSC (open/short-circuit detection) fields — TH9120, TH9120A

| Field | Data format / range / unit | Description |
|---|---|---|
| OPEN | integer, 10–100, %, 1% step, default 50% | Open-circuit threshold, as a percentage of the standard capacitance (STAND) |
| SHOT | integer, 0, 100–500, % (0 = OFF), default 300% | Short-circuit threshold |
| STAND | float, 0.001–40.000, nF, precision 0.001 nF, default 10.0 nF | Standard capacitance value |
| GET | — (command, no data) | Samples the standard capacitance value. Applies a 100 V, 600 Hz AC signal for 1 s and stores the resulting value — voltage is present while sampling, observe the usual precautions. |

*Example:* `FUNC:SOUR:STEP_1:OS:STAND_10` *sets STEP 1's OSC standard capacitance to 10 nF;* `FUNC:SOUR:STEP_1:OS:OPEN_50` *sets the open-circuit threshold to 50%.*

SECTION 6

# FUNCtion Subsystem — CK & Breakdown-Voltage Parameters

## 6.1 CK (pin/contact check) fields — all models

Issued as `FUNC:SOUR:STEP_<sn>:CK:<field>` (§3.2). Ranges match Operation Manual §4.3.6.

| Field | Data format / range / unit | Description |
|---|---|---|
| `VOLT` | float, 100–500, V, precision 1 V | Pin/contact-check test voltage |
| `LOWC` | float, 0.001–5, mA, precision 0.001 mA | Current lower limit (basis for judging an open/unreliable contact) |

*Example: `FUNC:SOUR:STEP_1:CK:VOLT_100` sets STEP 1's pin-check voltage to 100 V.*

## 6.2 Breakdown-voltage test fields — all models

Issued as `FUNC:BREAKdown:<field>` — this test is configured once per instrument, not per step (Operation Manual §4.6). **TH9120** can select either test mode; **TH9120A** is fixed to AC; **TH9120D** is fixed to DC.

| Field | Data format / range / unit | Description |
|---|---|---|
| `STEPMODE` | integer, 0–1 (`0` normal step, `1` voltage step) | Step-progression mode |
| `STEP` | integer, 2–999 | Number of test steps (normal step mode only) |
| `MODE` | integer, 0–1 (`0` AC, `1` DC) | Test mode |
| `VOLTStart` | float, 50–10000, V, precision 1 V | Start voltage |
| `VOLTEnd` | float, 50–10000, V, precision 1 V | Terminating voltage |

## 6.2 Breakdown-voltage test fields (continued)

| Field | Data format / range / unit | Description |
|---|---|---|
| STEPVOLT | float, 10–500, V, precision 10 V | Voltage increment per step (voltage-step mode only) |
| UPPC | float, 0.0001–10 mA (DC), 0.001–20 mA (AC), precision 0.0001 mA (DC) / 0.001 mA (AC) | Current upper limit |
| LOWC | float, 0–upper limit (0 = OFF), same precision as UPPC | Current lower limit |
| TTIM | float, 0, 0.3–999.0, s (0 = continuous), precision 0.1 s | Test time (dwell per step) |
| RTIM | float, 0–999.0, s (0 = OFF), precision 0.1 s | Rise time per step |
| WTIM | float, 0–999.0, s (0 = OFF), precision 0.1 s | Wait time — DC test mode only (MODE = 1); not available in AC test mode |
| ARC | float, 0, 1.0–10.0 mA (DC), 1.0–20.0 mA (AC), precision 0.1 mA | Arc-current upper limit |
| CONTinue | integer, 0–1 (0 = OFF, 1 = ON) | Continue testing once all steps have run |
| SAVE | — (command, no data) | Saves the current breakdown-voltage test settings |

### Worked example

```
FUNC:BREAK:STEPMODE_0;STEP_50;MODE_0;VOLTS_1000;VOLTE_5000;TTIM_1
```

*Configures a normal-step breakdown-voltage sweep of 50 AC steps from 1000 V to 5000 V, 1 s dwell per step.*

SECTION 7

# SYSTem Subsystem

## 7.1 MEA Setup — test-safety settings

Issued as `SYSTem:MEA:<field>`. Matches Operation Manual §4.2.1.

| Field | Data format / range | Description |
|---|---|---|
| `TRGMODE` | character, 0–2 (`0` manual, `1` external, `2` bus) | Trigger mode |
| `TRGDLY` | float, 0.0–99.9 s, precision 0.1 s | Trigger delay |
| `MEAMODE` | character, 0–2 (`0` normal, `1` repeat, `2` continuous) | Test-run mode |
| `RPTCNT` | integer, 0–999, precision 1 | Repeat count (Repeat mode) |
| `RPTINT` | float, 0.0–99.9 s, precision 0.1 s | Test interval (Repeat / Continuous mode) |
| `AFTERFAIL` | character, 0–2 (`0` continue, `1` restart, `2` stop) | Behaviour after a failed step |
| `PASSHOLD` | float, 0.2–99.9 s, precision 0.1 s | PASS buzzer response/hold time |
| `STEPHOLD` | float, 0.1–99.9 s, or character `KEY` | Inter-step hold time, or wait for a key press |
| `HARDAGC` / `SOFTAGC` | character, ON/OFF (1/0) | Hardware / software output-voltage compensation (Operation Manual §4.2.1.3) |
| `AUTORANGE` | character, ON/OFF (1/0) | ACW/DCW current autorange (Operation Manual §4.2.1.4) |
| `GFI` | character, ON/OFF (1/0) | Shock protection (Operation Manual §4.2.1.5, §5.5) |

## 7.2 ENV Setup — environment settings

Issued as `SYSTem:ENV:<field>`. Matches Operation Manual §4.2.2.

| Field | Data format / range | Description |
|---|---|---|
| `KEYVOL` | character, ON/OFF (1/0) | Key-press sound |
| `BEEPVOL` | character, 0–3 (`0` OFF, `1` LOW, `2` MED, `3` HIGH) | Alarm/buzzer volume |
| `PASSVOL` / `FAILVOL` | character, ON/OFF (1/0) | PASS / FAIL audible alarm |
| `KEYLOCK` | character, 0/1 (`0` manual unlock, `1` bus unlock) | Key-lock unlock mode |
| `KEYLOCK:UNLOCK` | — (command, no data) | Releases the key lock when it is set to bus-unlock mode |
| `BRIght` | integer, 1–10 | Display backlight brightness |
| `DATE` | character, `<year> <month> <day>`, 2017 1 1–9999 12 31 | System date |
| `TIME` | character, `<hour> <minute> <second>`, 0 0 0–23 59 59 | System time (24-hour) |

SECTION 8

# MMEM & USB Subsystems

Both subsystems address a test file by name (character string), matching the <FILE> interface (Operation Manual §4.7). `MMEM` addresses the instrument's 100 internal file slots; `USB` addresses files on a connected USB storage device.

## 8.1 MMEM — internal file storage

| Command | Details |
|---|---|
| `MMEM:SAVE <file name>` | Save the current settings to an internal file. No query form; returns `OK`. Example: `MMEM:SAVE_TESTFILE1`. |
| `MMEM:LOAD <file name>` | Load an internal file as the current settings. No query form; returns `OK` on success, `ERROR` on failure. |
| `MMEM:DEL <file name>` | Delete an internal file. No query form; returns `OK` on success, `ERROR` on failure. |
| `MMEM:COPY <file name>` | Copy an internal file to the connected USB storage device. No query form; returns `OK` on success, `ERROR` on failure. |

## 8.2 USB — external (USB-drive) file storage

| Command | Details |
|---|---|
| `USB:SAVE <file name>` | Save the current settings to a file on USB storage. No query form; returns `OK`. |
| `USB:LOAD <file name>` | Load a file from USB storage as the current settings. No query form; returns `OK` on success, `ERROR` on failure. |
| `USB:DEL <file name>` | Delete a file from USB storage. No query form; returns `OK` on success, `ERROR` on failure. |
| `USB:COPY <file name>` | Copy a file from USB storage to internal storage. No query form; returns `OK` on success, `ERROR` on failure. |

*File names are limited to 8 characters, matching the <FILE> interface (Operation Manual §4.7). Example: `USB:SAVE_BATCH01` · `USB:COPY_BATCH01` copies it back to internal storage.*

SECTION 9

# Other Commands & FETCh Data Format

## 9.1 *IDN? — instrument identification

| Command | Details |
|---|---|
| `*IDN?` | Query the instrument manufacturer, model and firmware version. Returns `<manufacturer>,<model>,<firmware><NL>`. `<manufacturer>`: `Tonghui`; `<model>`: `TH9120` / `TH9120A` / `TH9120D`; `<firmware>`: e.g. `Ver1.05`. Example: `*IDN?` → `Tonghui,TH9120A,Ver1.05`. |

## 9.2 FETCh — retrieving measurement results

| Command | Details |
|---|---|
| `FETCh:AUTO?`<br>`FETCh:AUTO <ON/OFF> or <1/0>` | Automatic result-return on/off. When ON, the instrument automatically sends each step's result as it completes, with no separate query needed. Example: `FETCh:AUTO_ON`. |
| `FETCh?` | Requests the measurement result(s). On receiving this command, the instrument automatically sends the results for all steps, up to the end of the current test. |

### Return data format

Results are returned one step per line, in the format:

```
STEP:test mode,test voltage(kV),measured current(A),result;
```

*All characters are ASCII; each result line is terminated with NL. Voltage is reported in kV and current in A — both different from the kV/mA/MΩ units used in the corresponding `FUNC:SOUR:STEP` setting commands.*

### Worked example

For a 2-step file (STEP 1 = AC 1000 V, STEP 2 = DC 1500 V, both PASS at 1 mA / 0.1 mA respectively), the returned data is:

```
STEP 1:AC,1.000,1.000e-3,PASS;STEP 2:DC,1.500,0.100e-3,PASS;
```

## Contact, support & related documents

This command reference is the companion to the *TH9120 Series Operation Manual* (front-panel operation, test-parameter setup, breakdown-voltage test and HANDLER interface) and the *TH9120 Series Datasheet* (specifications). For questions about any command's exact behaviour, or to report a discrepancy against your instrument's firmware, contact Techmize using the details below.

**Techmize Electronic GmbH**

Office 125–126, Regus
Carl-Zeiss-Ring 15a, 85737 Ismaning,
Germany
An international subsidiary of Changzhou
Tonghui Electronic Co., Ltd. (China)

**Contact**

Mobile: +49 171 4981898
Email: dx.han@tonghui.com.cn
Web: en.tonghui.com.cn

**Registration**

Managing Director: Haohua Zhao
Register Court: Amtsgericht München
HRB 312530 · VAT ID DE463170824