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SCPI COMMAND REFERENCE

TH8400 Series

Companion to the TH8400 Series Operation Manual. Full SCPI command syntax, parameters and examples for remote control of the TH8400 series programmable DC electronic load over RS-232C.

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TH8400 Series SCPI Command Reference

Remote Control Commands — TH8401 / TH8402A / TH8402 / TH8411 / TH8412 / TH8403 / TH8404 / TH8405

This document lists the SCPI (Standard Commands for Programmable Instruments) command set for the TH8400 series programmable DC electronic load, for use over the instrument's RS-232C interface. For interface wiring, connector pinout and communication parameters (baud rate, data/stop bits, parity), see Chapter 6 of the companion *TH8400 Series Operation Manual*. SCPI is a standard capability across the TH8400 range and is not model-specific.

> **NOTE — LAN INTERFACE**
>
> TH8403/TH8404/TH8405 (full-rack platform) are additionally fitted with a LAN port (Operation Manual §2.5). The LAN interface uses the same SCPI command set documented in this reference.

Notation & syntax conventions

Symbol	Meaning
NR1	Integer, e.g. `123`
NR2	Fixed-point number, e.g. `12.3`
NR3	Floating-point number, e.g. `12.3E+5`
NL	Line feed, ASCII 10 — terminates both a sent command string and a returned query result
^END	EOI (end) signal of the IEEE-488 bus
`< >`	Pointed brackets mark a parameter that must be given a value; the brackets themselves are not sent.
`[ ]`	Square brackets mark an optional element; `[,<value>*]` means the bracketed item may repeat up to a maximum count. If omitted, the instrument uses its default.
`{ }`	Curly brackets enclose a set of alternatives, of which only one may be selected.
`:`	Colon — separates one command level from the next
`*`	Asterisk prefix — marks an IEEE 488.2 common command
`?`	Question mark — queries the command instead of setting it
`,`	Comma — separates multiple parameters in one command
`" "`	Quoted text is taken literally; the instrument does not process its contents

Commands are case-insensitive, including units. A command's short form is the first three characters of the long name — four if the fourth character is not a vowel — unless noted otherwise (e.g. `FUNCtion` may be sent as `FUNC`; `TRIGger` as `TRIG`; `LEVel` as `LEV`; `FREQuency` as `FREQ`). A command or parameter made of more than one word abbreviates to the first character of the first word plus the full abbreviated form of the last word — e.g. Percent TOLerance (PTOLerance) abbreviates to `PTOL`. Spaces separate a command from its parameter, and must not appear immediately before or after a colon.

No hardware handshake is used on RS-232C: the instrument echoes each received character back to the host, which should wait for that echo before sending the next character. A command string is terminated with NL; a query result is also terminated with NL and should be read before the next command is sent. Only one query is recommended per command string.

1

Common Commands & Basic Control

1.1 IEEE 488.2 common commands

Command	Function	Example
`*IDN?`	Reads the instrument's version/identification string.	`*IDN?`
`*RST`	Resets and restarts the instrument.	`*RST`
`*TRG`	Sends the instrument a trigger command, equivalent to the front-panel **TRIG** key.	`*TRG`

1.2 INPut subsystem

Command	Function	Parameters	Example
`INPut[:STATe]` `INPut[:STATe]?`	Opens/closes the load (starts/stops pulling current), or queries its state. Equivalent to the front-panel **ON/OFF** key.	ON | OFF | 0 | 1	`INP 1`; `INP?`
`INPut:SHORt` `INPut:SHORt?`	Opens/closes the short-circuit test, or queries its state. Equivalent to the front-panel **SHORT** key.	ON | OFF | 0 | 1	`INP:SHOR 1`; `INP:SHOR?`

1.3 FUNCtion subsystem (mode selection)

Command	Function	Parameters	Example
`FUNCtion` `FUNCtion?`	Selects the instrument's active test mode, or queries it. Equivalent to selecting a mode from the **DISP** softkey bar.	CURR | VOLT | RES | POW | DYN | LIST | LED | BAT | TIM | OCP	`FUNC CURR`; `FUNC?`

2

System Configuration — SYStem subsystem

Command	Function	Parameters	Example
`SYStem:VOICe` `SYStem:VOICe?`	Sets/queries the key-press buzzer.	ON | OFF | 0 | 1	`SYS:VOIC 1`
`SYStem:REMOTe` `SYStem:REMOTe?`	Sets/queries the remote-compensation (SENSE) switch.	ON | OFF | 0 | 1	`SYS:REMOT 1`
`SYStem:PMem` `SYStem:PMem?`	Sets/queries whether the instrument loads the previous session's parameters or the factory defaults at power-on.	DEFault | USER	`SYS:PM USER`
`SYStem:DISPlay` `SYStem:DISPlay?`	Sets/queries the sampling display parameters shown (§4.1.5 of the Operation Manual).	NR1 — 0–4	`SYS:DISP 0`
`SYStem:SOURce` `SYStem:SOURce?`	Sets/queries the output type of the device under test (important in CR/CP and similar modes).	CURRent | VOLTage	`SYS:SOUR CURR`
`SYStem:TLATch` `SYStem:TLATch?`	Sets/queries the test-pull (load) latch switch.	ON | OFF | 0 | 1	`SYS:TLAT 1`
`SYStem:EPRo` `SYStem:EPRo?`	Sets/queries the external analog (HANDLER EXT-PROG) input switch.	ON | OFF | 0 | 1	`SYS:EPR 1`

All commands above return 0 | 1 (or `default` | `user` for PMem, or `CURRent` | `VOLTage` for Source) on query.

3

Static Mode — CURRent / VOLTage / RESistance / POWer

3.1 CURRent (CC mode)

Command	Function	Parameters	Example
`CURRent:RANGe` `CURRent:RANGe?`	Sets/queries the current range, by the breakpoint of the set value.	0–MAX | MINimum | MAXimum	`CURR:RANG MIN`
`CURRent` `CURRent?`	Sets/queries the working current in static CC mode.	0–MAX | MINimum | MAXimum	`CURR 1.5`
`CURRent:SLEW[:BOTH]` `CURRent:SLEW?`	Sets/queries the same rising and falling slope in static CC mode.	0–MAX | MINimum | MAXimum	`CURR:SLEW 0.5` → returns `<NR2>,<NR2>`
`CURRent:SLEW:RISE` `CURRent:SLEW:RISE?`	Sets/queries the rising slope in static CC mode.	0–MAX | MINimum | MAXimum	`CURR:SLEW:RISE 0.5`
`CURRent:SLEW:FALL` `CURRent:SLEW:FALL?`	Sets/queries the falling slope in static CC mode.	0–MAX | MINimum | MAXimum	`CURR:SLEW:FALL 0.5`

3.2 VOLTage (CV mode)

Command	Function	Parameters	Example
`VOLTage:RANGe` `VOLTage:RANGe?`	Sets/queries the voltage range, by the breakpoint of the set value.	0–MAX | MINimum | MAXimum	`VOLT:RANG MIN`
`VOLTage` `VOLTage?`	Sets/queries the working voltage in static CV mode.	0–MAX | MINimum | MAXimum	`VOLT 1.5`
`VOLTage:SLEW` `VOLTage:SLEW?`	Sets/queries the slope in static CV mode.	0–MAX | MINimum | MAXimum	`VOLT:SLEW 1.5`
`VOLTage:ON` `VOLTage:ON?`	Sets/queries the load-on voltage (Von, §3.14 of the Operation Manual).	0–MAX | MINimum | MAXimum	`VOLT:ON 0.2`
`VOLTage:OFF` `VOLTage:OFF?`	Sets/queries the load-unloading voltage (Voff, §3.14 of the Operation Manual).	0–MAX | MINimum | MAXimum	`VOLT:OFF 0.1`

3.3 RESistance (CR mode)

Command	Function	Parameters	Example
`RESistance` `RESistance?`	Sets/queries the working resistance in static CR mode.	0–MAX | MINimum | MAXimum	`RES 100`

3.4 POWer (CP mode)

Command	Function	Parameters	Example
`POWer` `POWer?`	Sets/queries the working power in static CP mode.	0–MAX | MINimum | MAXimum	`POW 100`

4

Dynamic & List Mode

4.1 DYNamic (Dynamic mode)

Command	Function	Parameters
`DYNamic:ALEVel / ?`	Current level A.	0–MAX | MIN | MAX
`DYNamic:BLEVel / ?`	Current level B.	0–MAX | MIN | MAX
`DYNamic:AWIDth / ?`	Duration held at level A.	0.00001–60 s | MIN | MAX
`DYNamic:BWIDth / ?`	Duration held at level B.	0.00001–60 s | MIN | MAX
`DYNamic:SLEW[:BOTH] / ?`	Same rising/falling slope.	0–MAX | MIN | MAX — returns two values
`DYNamic:SLEW:RISE / ?`	Rising slope.	0–MAX | MIN | MAX
`DYNamic:SLEW:FALL / ?`	Falling slope.	0–MAX | MIN | MAX
`DYNamic:REPeat / ?`	Repeat count in continuous mode.	0–MAX | MIN | MAX (returns NR1)
`DYNamic:MODE / ?`	Dynamic mode type.	CONTinuous | PULSe | TOGGle

Example: `DYN:ALEV 1; DYN:BLEV 2; DYN:AWID 10; DYN:BWID 10; DYN:SLEW 0.5; DYN:REP 10; DYN:MODE PULS`

4.2 LIST (List mode)

Command	Function	Parameters
`LIST:FILE / ?`	Selects the List file to edit/run.	1–10 | MIN | MAX
`LIST:MODE / ?`	Working mode of the selected file.	CONT | COUNT | STEP
`LIST:COUNT / ?`	Number of cycles in Counting mode.	0–100 | MIN | MAX
`LIST:ADD`	Adds a step to the current List file.	—
`LIST:CLEAr`	Clears the current List file's data.	—
`LIST:DONE`	Completes/confirms the current List file.	—
`LIST:LEVel<n> <current>,<duration>,<slope>` `LIST:LEVel<n>?`	Sets/queries one step's data, by step number.	n = step number (NR1); current, duration, slope = NR2

Example: `LIST:FILE 1; LIST:MODE STEP; LIST:COUNT 20; LIST:LEV:5 2,20,0.2` (step 5: 2 A, 20 s, slope 0.2) — query: `LIST:LEVel:5?`

5

CR-LED, Battery & Time Test

5.1 LED (CR-LED mode)

Command	Function	Parameters
`LED:VOLTage / ?`	LED turn-on voltage (Vo).	0–MAX | MIN | MAX
`LED:CURRent / ?`	LED conduction current (Io).	0–MAX | MIN | MAX
`LED:RCOeff / ?`	Rd coefficient.	0–MAX | MIN | MAX

Example: `LED:VOLT 5; LED:CURR 2; LED:RCO 0.5`

5.2 BATtery (Battery test)

Command	Function	Parameters
`BATtery:MODE / ?`	Discharge mode.	CURRent | RESistance | POWer
`BATtery:CONDition / ?`	Stop condition.	VOLTage | TIMe | AH | WH
`BATtery:VALue / ?`	Load value of the test.	0–MAX | MIN | MAX
`BATtery:LEVel / ?`	Threshold for the selected stop condition.	0–MAX | MIN | MAX

Example: `BAT:MODE CURR; BAT:COND VOLT; BAT:VAL 5; BAT:LEV 5`

5.3 TIMing (Time test)

Command	Function	Parameters
`TIMing:LOAD:MODE / ?`	Load mode during the test.	CURR | VOLT | POW | RES | OFF
`TIMing:LOAD:VALue / ?`	Load value during the test.	0–MAX | MIN | MAX
`TIMing:TSTart:SOURce / ?`	Start-trigger source.	VOLT | CURR | EXT
`TIMing:TSTart:EDGe / ?`	Start-trigger edge.	RISE | FALL
`TIMing:TSTart:LEVel / ?`	Start-trigger threshold.	0–MAX | MIN | MAX
`TIMing:TEND:SOURce / ?`	End-trigger source.	VOLT | CURR | EXT
`TIMing:TEND:EDGe / ?`	End-trigger edge.	RISE | FALL
`TIMing:TEND:LEVel / ?`	End-trigger threshold.	0–MAX | MIN | MAX
`TIMing:RESult?`	Queries the time-test result.	—

Example: `TIM:LOAD:MODE CURR; TIM:LOAD:VAL 1; TIM:TST:SOUR VOLT; TIM:TST:EDG RISE; TIM:TST:LEV 1; TIM:TEND:SOUR VOLT; TIM:TEND:EDG RISE; TIM:TEND:LEV 1; TIM:RES?`

6

Protection Tests — OCP / OVP / OPP

6.1 OCP (Over-current protection test)

Command	Function	Parameters
`OCP:ISTart / ?`	Starting current.	0–MAX | MIN | MAX
`OCP:IEND / ?`	Cut-off current.	0–MAX | MIN | MAX
`OCP:STEP / ?`	Number of incremental steps.	1–1000 | MIN | MAX
`OCP:DWELl / ?`	Dwell time per step.	0.00001–0.99999 s | MIN | MAX
`OCP:VTRig / ?`	Trigger (protection-confirmation) voltage level.	0–MAX | MIN | MAX
`OCP:RESult[:OCP]?`	Queries the measured over-current protection point.	—
`OCP:RESult:PMAX?`	Queries the maximum-power point reached during the test (power, voltage, current).	— returns NR2, NR2, NR2

Example: `OCP:IST 3; OCP:IEND 3; OCP:STEP 100; OCP:DWELL 0.1; OCP:VTR 3; OCP:RES?; OCP:RES:PMAX?`

6.2 OVP (Over-voltage protection test)

Command	Function	Parameters
`OVP:VTRig / ?`	Trigger voltage level.	0–MAX | MIN | MAX
`OVP:RESult[:OVP]?`	Queries the measured over-voltage protection point.	—
`OVP:RESult:TIME?`	Queries the OVP response time (Tovp).	—

Example: `OVP:VTR 3; OVP:RES?; OVP:RES:TIME?`

6.3 OPP (Over-power protection test)

Command	Function	Parameters
`OPP:PSTart / ?`	Starting power.	0–MAX | MIN | MAX
`OPP:PEND / ?`	Cut-off power.	0–MAX | MIN | MAX
`OPP:STEP / ?`	Number of incremental steps.	1–1000 | MIN | MAX
`OPP:DWELl / ?`	Dwell time per step.	0.00001–0.99999 s | MIN | MAX
`OPP:VTRig / ?`	Trigger voltage level.	0–MAX | MIN | MAX
`OPP:RESult[:OPP]?`	Queries the measured over-power protection point.	—
`OPP:RESult:PMAX?`	Queries the maximum-power point reached during the test.	— returns NR2, NR2, NR2

Example: `OPP:PST 3; OPP:PEND 3; OPP:STEP 100; OPP:DWELL 0.1; OPP:VTR 3; OPP:RES?; OPP:RES:PMAX?`

7

Load Effect & Frequency Sweep

7.1 LEFFect (Load Effect)

Command	Function	Parameters
`LEFFect:IMIN / ?`	Low-level load current.	0–I-Normal | MIN | MAX
`LEFFect:IMAX / ?`	High-level load current.	I-Normal–MAX | MIN | MAX
`LEFFect:INORMal / ?`	Normal (reference) load current.	IMIN–IMAX | MIN | MAX
`LEFFect:DELay / ?`	Duration held at each current step.	0–MAX | MIN | MAX
`LEFFect:RESult:VOLTage?`	Queries ΔV (difference between the maximum and minimum voltage readings).	—
`LEFFect:RESult:RESistance?`	Queries the calculated internal resistance (Rs).	—
`LEFFect:RESult:REGulation?`	Queries the calculated load-regulation rate.	—

Example: `LEFF:IMIN 2; LEFF:IMAX 5; LEFF:INORM 2; LEFF:DEL 20; LEFF:RES:VOLT?; LEFF:RES:RES?; LEFF:RES:REG?`

7.2 SWEEP (Frequency sweep)

Command	Function	Parameters
`SWEEP:MODE / ?`	Working mode.	AUTO | MANual
`SWEEP:IMIN / ?`	Minimum current.	0–MAX | MIN | MAX
`SWEEP:IMAX / ?`	Maximum current.	0–MAX | MIN | MAX
`SWEEP:SLEW[:BOTH] / ?`	Same rising/falling slope.	0–MAX | MIN | MAX
`SWEEP:SLEW:RISE / ?`	Rising slope.	0–MAX | MIN | MAX
`SWEEP:SLEW:FALL / ?`	Falling slope.	0–MAX | MIN | MAX
`SWEEP:FSTArt / ?`	Start frequency.	0.01–25,000 Hz | MIN | MAX
`SWEEP:FEND / ?`	Cutoff frequency.	0.01–25,000 Hz | MIN | MAX
`SWEEP:FSTEp / ?`	Step frequency.	0.01–25,000 Hz | MIN | MAX
`SWEEP:DWELl / ?`	Duration at each frequency point.	0.001–99.999 s | MIN | MAX
`SWEEP:DUTY / ?`	Duty cycle.	1–99 | MIN | MAX (NR1)

Example: `SWEEP:MODE AUTO; SWEEP:IMIN 1; SWEEP:IMAX 2; SWEEP:SLEW 0.5; SWEEP:FST 100; SWEEP:FEND 1000; SWEEP:FSTEP 10; SWEEP:DWELL 10; SWEEP:DUTY 50`

8

Automatic Test — AUTO subsystem

Configures the multi-step pass/fail production-test program (Operation Manual §3.12). Up to 10 files, each with up to 50 steps.

Command	Function	Parameters
`AUTO:FILE / ?`	Selects the file and step number.	<file number>,<serial number> (NR1,NR1)
`AUTO:COUNT / ?`	Loop count for the selected file.	0–MAX | MIN | MAX (NR1)
`AUTO:ADD`	Adds a step to the selected file.	—
`AUTO:CLEAr`	Clears the selected file's data.	—
`AUTO:DONE`	Completes/confirms the selected file's data.	—
`AUTO:MODE / ?`	Working mode for the selected file/step.	CURRent | VOLTage | RESistance | POWer
`AUTO:LEVel / ?`	Working value for the selected file/step.	0–MAX | MIN | MAX
`AUTO:SLEW[:BOTH] / ?`	Same rising/falling slope.	0–MAX | MIN | MAX
`AUTO:SLEW:RISE / ?`	Rising slope.	0–MAX | MIN | MAX
`AUTO:SLEW:FALL / ?`	Falling slope.	0–MAX | MIN | MAX
`AUTO:IRANGe / ?`	Current range.	0–MAX | MIN | MAX
`AUTO:VRANGe / ?`	Voltage range.	0–MAX | MIN | MAX
`AUTO:LIMIT / ?`	Limit (judgement) type.	CURRent | VOLTage | POWer | NONE
`AUTO:UPPer / ?`	Upper limit.	0–MAX | MIN | MAX
`AUTO:LOWer / ?`	Lower limit.	0–MAX | MIN | MAX
`AUTO:FAIL / ?`	Action on step failure.	CONTINuous | ABORT
`AUTO:TYPe / ?`	Delay type before the next step.	TIMe | TRIG
`AUTO:TIMe / ?`	Delay time (when Type = TIMe).	0–MAX | MIN | MAX

Example (file 1, step 1): `AUTO:FILE 1,1; AUTO:COUNT 10; AUTO:MODE CURR; AUTO:LEVel 5; AUTO:SLEW 3; AUTO:IRANGE MAX; AUTO:VRANGE MAX; AUTO:LIMIT CURR; AUTO:UPPER 3; AUTO:LOWER 0; AUTO:FAIL CONTIN; AUTO:TYP TIM; AUTO:TIM 3; AUTO:DONE`

APPENDIX

Related Documents & Contact

Related documents

- TH8400 Series Datasheet (Techmize)
- TH8400 Series Operation Manual (Techmize) — interface wiring, communication parameters and front-panel operation

> **CAUTION**
> Command behavior may vary with the firmware version installed on the instrument. Users should validate command behavior against the firmware version installed on their instrument.

Contacting Techmize

For technical support, accessories or service, contact Techmize directly or through your authorized Techmize distributor.

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