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COMMAND REFERENCE

TH2840 Series SCPI & MODBUS Command Reference

Precision LCR Digital Bridge — TH2840A / TH2840B / TH2840BL. The full remote-control command set: every SCPI subsystem, the MODBUS register map, and programming examples. Companion to the TH2840 Series Operation Manual.

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TH2840 Series SCPI & MODBUS Command Reference

Precision LCR Digital Bridge — TH2840A / TH2840B / TH2840BL

This document is the complete remote-control reference for the TH2840 series, covering both supported protocols: SCPI (plain-text ASCII commands) and MODBUS (register-based). It is the companion to, and referenced from, Chapter 8 of the *TH2840 Series Operation Manual*. As with the Operation Manual, this reference covers the TH2840A/TH2840B/TH2840BL LCR-bridge models only — the TRAN and TRS (transformer single-test / transformer-scan) command sets belong to the TH2840X series and are documented separately.

GPIB is standard on TH2840BL only (§5.1.1 of the Operation Manual); all SCPI and MODBUS commands in this reference are otherwise identical across all three models unless a command description says otherwise.

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CHAPTER 1

Overview & Syntax Conventions

1.1 Remote interfaces

The TH2840 series can be addressed over RS-232C, USB (USBTMC/USBCDC), LAN, RS-485 (via converter) and — on TH2840BL only — GPIB. The bus mode and command protocol (SCPI or MODBUS) are selected under <System Setup> (Operation Manual §5.1.1, §5.1.3); when using RS-485 or GPIB, the instrument uses its RS-232 bus address (1–32) as its device address.

1.2 GPIB common commands

Command	Description
`*RST`	Resets the instrument
`*TRG`	Triggers a measurement and returns the result — format depends on the active page, see §1.3
`*IDN?`	Returns the instrument ID as `<model>,<firmware>,<date>,<sn>`: instrument model, firmware version, software release date and serial number
`*TST`	Self-test
`*ESE` , `*ESR`	Standard event status enable / event status register
`*SRE` , `*STB`	Service request enable / status byte query
`*OPC`	Operation complete
`*CLS`	Clears the status registers

1.3 *TRG / FETCh? result format by active page

The result format returned by a trigger-and-read depends on the page active when it runs (§2.16 covers `FETCh?` in detail):

Active page	Returned format
Meas Display (bridge)	`P1,P2,P3,P4,bin` — e.g. `1.12345E2,1.23456E-2,1.11023E2,-1.12345E2,1`. `bin` = 0 (out of tolerance) or 1–10 (bin 1–10); shown only when the comparator is ON.
List Display, Step mode	`pt,P1,P2,P3,P4,comp` — e.g. `2,1.12345E2,1.23456E-2,1.11023E2,-1.12345E2,1`. `comp` = 0 (not compared), 1 (pass) or other (fail).
List Display, Sequence mode	Same row format as Step mode, for every point, returned together once the whole sweep finishes
Trace Display, Step mode	`pt,P1,P2,P3,P4` — e.g. `2,1.12345E2,1.23456E-2,1.11023E2,-1.12345E2`
Trace Display, Sequence mode	Same row format, for every point, returned together once the sweep finishes

1.4 SCPI syntax conventions

SCPI (Standard Commands for Programmable Instruments) is an ASCII-based instrument command language built on a hierarchical ("tree") structure, where related commands share a common node or root, forming a subsystem. Commands are written in mixed case by convention — the upper-case letters are the command's short form; either the short or the long form may be sent. To avoid ambiguity, this series mostly spells out commands in their short form directly in this reference, rather than listing multiple optional abbreviations.

Example	Meaning
`[SOURce[1|2]:]VOLTage:UNIT {VPP|VRMS|DBM}`	—
`[SOURce[1|2]:]FREQuency:CENTer {<frequency>|MINimum|MAXimum|DEFault}`	—

Notation	Meaning
`{ }`	Braces enclose the parameter choices for a command; not sent literally
`|`	Separates alternative parameter choices, e.g. `{VPP|VRMS|DBM}` means "VPP", "VRMS" or "DBM"; not sent literally
`< >`	Angle brackets mark a required value, e.g. `<frequency>`; not sent literally — a value must be supplied unless another listed option (e.g. MIN) is used instead
`[ ]`	Square brackets mark an optional node/parameter that may be omitted, in which case the instrument uses its default — e.g. `SOURce[1|2]` lets you address channel 1 as "SOURce", "SOURce1", "SOUR" or "SOUR1", and omitting the SOURce node entirely still addresses channel 1 (the default); channel 2 must be addressed explicitly as "SOURce2"/"SOUR2"
`^END`	The IEEE-488 bus EOI (end) signal

> **NOTE**
> This reference lists the documented command set of the TH2840A, TH2840B and TH2840BL LCR-bridge models.

CHAPTER 2

SCPI Command Reference

All commands below are shown in their short (abbreviated) form as used by the instrument. Each row gives the query form (where applicable, ending "?"), the set form, and a description with example(s). Operation-Manual cross-references point to the matching menu field.

2.1 DISPlay — page switching

Command	Description
`:DISP:PAGE?` `:DISP:PAGE <PageName>`	Switches/queries the active page. `PageName`: MEASurement, LIST, TSMEas (trace), MSETup, LTABle (limit setup), LSETup (list setup), TSSEtup (trace setup), CSETup (user correction), SYSTem, FLISt (file list). Ex: `:DISP:PAGE MEAS` → Meas Display; `:DISP:PAGE MSET` → Meas Setup.

2.2 FREQuency

Command	Description
`:FREQ?` `:FREQ <float|MIN|MAX>`	Sets/queries test frequency (OM §4.4.2). Ex: `:FREQ 1200`, `:FREQ 1200HZ`, `:FREQ 1.2K` all set 1200 Hz.

2.3 VOLTage

Command	Description
`:VOLT?` `:VOLT <float|MIN|MAX>`	Sets/queries AC test voltage (OM §4.4.3). Ex: `:VOLT 1.2` → 1.2 V.
`:VOLT:DC?` `:VOLT:DC <float|MIN|MAX>`	Sets/queries DC test voltage (OM §4.4.3). Ex: `:VOLT:DC 1.2` → 1.2 V.

2.4 CURRent

Command	Description
`:CURR?` `:CURR <float|MIN|MAX>`	Sets/queries the AC test level in current (OM §4.4.3). Ex: `:CURR 0.01` → 10 mA.

2.5 APERture — speed & averaging

Command	Description
`:APER?` `:APER <FAST+|FAST|MED|SLOW>[,int]`	Sets/queries measurement speed and, optionally, averaging count (`int` = 1–255) in one command (OM §4.4.4, §4.4.9). Ex: `:APER FAST+` → Fast+; `:APER FAST,2` → Fast speed with 2-reading averaging.

2.6 OUTPut — bias source & DCI isolation

Command	Description
`:OUTP:HPOW?` `:OUTP:HPOW <INT|OPT|EXT>`	Sets/queries the bias source (OM §4.4.6). INT = internal 100 mA, OPT = internal 2 A, EXT = external (TH1778A). Ex: `:OUTP:HPOW OPT` → internal 2 A source.
`:OUTP:DC:ISOL?` `:OUTP:DC:ISOL <0|1|ON|OFF>`	Sets/queries DCI (DC-current) isolation (OM §4.4.6).

2.7 BIAS — DC bias voltage/current/polarity

Command	Description
`:BIAS:STAT?` `:BIAS:STAT <0|1|ON|OFF>`	Enables/disables DC bias output — equivalent to the front-panel `DC Bias` key.
`:BIAS:VOLT?` `:BIAS:VOLT <float|MIN|MAX>`	Sets/queries internal bias voltage. Ex: `:BIAS:VOLT 1.2` → 1.2 V.
`:BIAS:CURR?` `:BIAS:CURR <float|MIN|MAX>`	Sets/queries bias current. Ex: `:BIAS:CURR 0.01` → 10 mA.
`:BIAS:POL:AUTO?` `:BIAS:POL:AUTO <0|1|AUTO|FIX>`	Sets/queries bias polarity mode (OM §4.4.6).

Not applicable on TH2840BL, which has no built-in DC bias/current source.

2.8 TRIGger

Command	Description
`:TRIG`	Triggers one measurement (see §1.3 for the result format by page).
`:TRIG:SOUR?` `:TRIG:SOUR <CONT|SING>`	Sets/queries trigger source mode (OM §4.4.8): CONT = continuous, SING = single/manual.
`:TRIG:DEL?` `:TRIG:DEL <float|MIN|MAX>`	Sets/queries trigger delay (OM §4.4.8). Ex: `:TRIG:DEL 1ms`, `:TRIG:DEL 1` (=1 s).
`:TRIG:STAT?`	Queries trigger/run status: returns `RUN 0` (idle/finished) or `RUN 1` (test in progress). Useful for polling long tests before fetching results — poll until `RUN 0`, then fetch.
`:TRIG:RST`	Equivalent to the front-panel **Reset** key — pauses or stops the running test.

2.9 AMPLitude — automatic level control (ALC)

Command	Description
`:AMPL:ALC?` `:AMPL:ALC <0|1|ON|OFF>`	Enables/disables ALC (OM §4.4.10).

2.10 Output RESistance — source resistance

Command	Description
`:ORES?` `:ORES <100|30>`	Sets/queries the output (source) resistance in Ω, for the internal 100 mA bias source (OM §4.4.11). Not applicable on TH2840BL.

2.11 FUNCtion — test parameters, range, monitors, deviation

Function parameters

Command	Description

`:FUNC:IMP[1|2|3|4]?`
`:FUNC:IMP <p1,p2,p3,p4>`
`:FUNC:IMP<1|2|3|4> <p>`
	Sets/queries the 4 result parameters, all at once or individually (OM §4.4.1). Parameter names: CP, CS, LP, LS, RP, RS, GP, BP, Z, Y, D, Q, ZTD/DZ (θz°), ZTR/RZ (θz rad), YTD/DY (θy°), YTR/RY (θy rad), X, RD. Ex: `:FUNC:IMP CP,CS,LP,LS`; `:FUNC:IMP1 RP`.

`:FUNC:IMPSW?` `:FUNC:IMPSW <0|1>,<0|1>,<0|1>,<0|1>`	Sets/queries the 4 parameters' individual display on/off switches. Ex: `:FUNC:IMPSW 1,1,0,0` → params 1–2 on, 3–4 off.

Range

Command	Description
`:FUNC:IMP:RANG?` `:FUNC:IMP:RANG <float>`	Sets/queries the AC range, by selecting the best range for a given equivalent-resistance value (OM §4.4.5). Ex: `:FUNC:IMP:RANG 1k` selects the best range for 1 kΩ.
`:FUNC:IMP:RANG:AUTO?` `:FUNC:IMP:RANG:AUTO <0|1|OFF|ON>`	Enables/disables AC auto-ranging.
`:FUNC:DCR:RANG?` `:FUNC:DCR:RANG <float>`	Sets/queries the DC range, same selection logic as AC. Ex: `:FUNC:DCR:RANG 1k`.

2.11 FUNCtion — test parameters, range, monitors, deviation (continued)

Level monitors

Command	Description
`:FUNC:SMON:VAC?` `:FUNC:SMON:VAC <0|1|OFF|ON>`	Enables/disables the voltage monitor (OM §4.4.7).
`:FUNC:SMON:IAC?` `:FUNC:SMON:IAC <0|1|OFF|ON>`	Enables/disables the current monitor (OM §4.4.7).

Deviation & reference

Command	Description
`:FUNC:DEV[1|2|3|4]:MODE?` `:FUNC:DEV[1|2|3|4]:MODE <ABS|PER|OFF>`	Sets/queries deviation mode per parameter (OM §4.4.12): ABS = Δ, PER = Δ%. Ex: `:FUNC:DEV:MODE OFF,PER,ABS,OFF` sets all 4 at once.

`:FUNC:DEV[1|2|3|4]:REF?`
`:FUNC:DEV[1|2|3|4]:REF <float>`
`:FUNC:DEV<1|2|3|4>:REF:FILL`
	Sets/queries the deviation reference value; `:FILL` runs one measurement and stores its result as the reference. Ex: `:FUNC:DEV:REF 10,11,12,13` sets all 4 at once.

Step delay

Command	Description
`:FUNC:SDEL?` `:FUNC:SDEL <float|MIN|MAX>`	Sets/queries step delay (OM §4.4.8). Ex: `:FUNC:SDEL 1ms`.

2.12 COMParator — bin-sort comparator

Command	Description

`:COMP?`
 	
`:COMP <0|1|ON|OFF>`
	Enables/disables the comparator (OM §4.5.1).

`:COMP:COUN?`
 	
`:COMP:COUN <0|1|ON|OFF>`
	Enables/disables bin counting (OM §4.5.2).

`:COMP:COUN:DATA?`	Returns the per-bin count results.
`:COMP:COUN:CLE`	Clears all bin counts.

`:COMP:MODE?`
 	
`:COMP:MODE <TOL|SEQ>`
	Sets/queries the limit mode (OM §4.5.3): TOL = Tolerance, SEQ = Continuous.

`:COMP:TOL:BIN<n>?`
 	
`:COMP:TOL:BIN<n> <loA,hiA>[…][,loD,hiD]`
	Sets/queries bin n's (1–10) tolerance-mode limits, up to 4 parameter pairs (low,high). Ex: `:COMP:TOL:BIN1 1,2` sets bin 1 parameter-1 limits; `:COMP:TOL:BIN10 1,2,3,4,5,6,7,8` sets bin 10's full 4-parameter limits.

`:COMP:SEQ:BIN[A|B|C|D]?`
 	
`:COMP:SEQ:BIN[A|B|C|D] <lo1>[,hi1…hi10]`
	Sets/queries continuous-mode limits for parameter A/B/C/D (1st–4th): one low limit for bin 1, then up to 10 ascending high limits. Ex: `:COMP:SEQ:BINC 1,2,…,11` sets parameter 3's full 10-bin range.

`:COMP:BIN:CLE`	Clears all bin limit data.

`:COMP:BIN<n>:SW?`
 	
`:COMP:BIN:SW <0|1|ON|OFF>`
	Enables/disables comparison for bin n (1–10) individually (OM §4.5.6).

2.13 LIST — list sweep

Command	Description

`:LIST:TOTAL?`
 	
`:LIST:TOTAL <int>`
	Sets/queries the total sweep points, 1–201 (OM §4.6.1).

`:LIST:MODE?`
 	
`:LIST:MODE <SEQ|STEP>`
	Sets/queries sweep mode (OM §4.6.3): SEQ = Sequence, STEP = Step.

`:LISTDELTA:SWitch?`
 	
`:LISTDELTA:SWitch <0|1|ON|OFF>`
	Enables/disables difference mode for parameter 1 (OM §4.6.4).

`:LISTDELTA:MODE[n]?`
 	
`:LISTDELTA:MODE[n] <0–9>`
	Sets/queries point n's (1–201) difference formula: 0 (Pn−P1), 1 ((Pn−P1)/P1), 2 (×100%), 3 ((Pn−P1)/Pn), 4 (×100%), 5 (Pn), 6 ((Pn−P2)/P2), 7 (×100%), 8 ((Pn−P2)/Pn), 9 (×100%).

`:LISTDELTA:LOW[n]?`
`/`
`:LISTDELTA:HIGH[n]?`
 	
with
`<value>`
	Sets/queries the difference low/high limit for point n (3–201 for LOW; 1–201 for HIGH).

`:LIST:DISP:PARA?`
 	
`:LIST:DISP:PARA <0|1>,<0|1>,<0|1>,`
`<0|1>`
	Sets/queries the 4 parameters' List Display on/off switches (OFF = not shown, saved or reported).

`:LIST:DISP:FREQ?`
`/`
`:ACLV?`
`/`
`:BIAS?`
 	
with
`<0|1>`
	Shows/hides the frequency, AC-level and bias columns on List Display (OM §4.6.5).

`:LIST:CLE [n|ALL]`	Clears sweep-point setup data for point n or all points.

2.13 LIST — list sweep (continued)

Command	Description

`:LIST:FREQ[n]?`
 	
`:LIST:FREQ[n] <fn>[,fn+1]…`
	Sets/queries frequency starting from point n, for as many consecutive points as values given. Ex: `:LIST:FREQ6 20,30,40,1k,2k` sets points 6–10.

`:LIST:VOLT[n]?`
`/`
`:LIST:CURR[n]?`
	Same pattern as `:LIST:FREQ`, for level voltage/current per point.

`:LIST:BIAS:VOLT[n]?`
`/`
`:LIST:BIAS:CURR[n]?`
	Same pattern, for bias voltage/current per point.

`:LIST:FUNC:IMP<n>?`
 	
`:LIST:FUNC:IMP<n> <p1,p2,p3,p4>`
	Sets/queries all 4 parameter functions for point n (1–201). Parameter name list as in §2.11.

`:LIST:FUNC:IMP<A|B|C|D><n>?`
 	
`:LIST:FUNC:IMP<A|B|C|D><n> <pn>[,pn+1,pn+2…]`
	Sets/queries one parameter (A–D, i.e. the 1st–4th) for a run of consecutive points starting at n. Ex: `:LIST:FUNC:IMPA 1,3,CP,CS,LP` sets parameter 1's function for points 1–3; `:LIST:FUNC:IMPB5 CP,CS` sets parameter 2's function for points 5–6.

`:LIST:FUNC:LIN<A|B|C|D>` `<start,stop,para>`	Fills parameter A–D's function across points `start-stop` with one value. Ex: `:LIST:FUNC:LINA 1,15,LP` sets parameter 1 to LP for points 1–15.

`:LIST:BAND<n>?`
 	
`:LIST:BAND<n> OFF`
 	
`:LIST:BAND<n> <A|B|C|D,lo,hi>`
	Sets/clears/queries point n's limit data for one parameter. Ex: `:LIST:BAND2 A,1,2`; `:LIST:BAND1 OFF` clears point 1's limits for all 4 parameters.

`:LIST:LOW<n> <A|B|C|D,lon>[,lon+1…]`
 	
`:LIST:HIGH<n> <A|B|C|D,hin>[,hin+1…]`
	Sets a parameter's low/high limits for a run of consecutive points starting at n. Ex: `:LIST:LOW1 A,1,2,3,4` sets points 1–4's low limit for parameter A.

`:LIST:DEL[n]?`
 	
`:LIST:DEL[n] <fn>[,fn+1]…`
	Sets/queries per-point delay (OM §4.6.9), same fill pattern as `:LIST:FREQ`.

2.14 TRACe — graphical (trace) sweep

Trace-sweep commands use the `:TSSE` root (short for Trace SEtup).

Command	Description
`:TSSE:POINT?` `:TSSE:POINT <51|101|201|401|801>`	Sets/queries sweep point count (OM §4.7.4).
`:TSSE:MODE?` `:TSSE:MODE <FREQ|VOLT|CURR|BVOL|BCUR>`	Sets/queries the sweep condition type (OM §4.7.5): frequency, level-V, level-I, bias-V, bias-I.
`:TSSE:SWEEP?` `:TSSE:SWEEP <start,stop>`	Sets/queries the sweep start/stop value. Ex: `:TSSE:SWEEP 1,100`.
`:TSSE:SMODE?` `:TSSE:SMODE <SEQ|STEP>`	Sets/queries trace mode (OM §4.7.6): Sequence or Step.
`:TSSE:FORMat?` `:TSSE:FORMat <LIN|LOGX>`	Sets/queries X-axis format (OM §4.7.7): linear or log-X.
`:TSSE:LIMIt?` `:TSSE:LIMIt <0|1|OFF|ON>`	Enables/disables Max-Min display (OM §4.7.8).

`:TSSE:IMP[1|2|3|4]?`
`:TSSE:IMP <p1,p2,p3,p4>`
`:TSSE:IMP<1|2|3|4> <p>`
	Sets/queries the 4 trace parameters (OM §4.7.2) — same parameter name list as §2.11, except Rd is not selectable here.

`:TSSE:SCALe?` `:TSSE:SCALe <AUTO|HOLD>`	Sets/queries Y-axis scale mode (OM §4.3.2).
`:TSSE:<A|B|C|D>?` `:TSSE:<A|B|C|D> <min,max>`	Sets/queries the Y-axis min/max for trace A–D (the 1st–4th parameter). Ex: `:TSSE:A 10,1000`.
`:TSSE:SPLIt?` `:TSSE:SPLIt <1|2|4>`	Sets/queries split-screen mode (OM §4.7.3).
`:TSSE:SW?` `:TSSE:SW[1|2|3|4] <0|1|2>[,0|1|2]…`	Sets/queries each trace's display state: 0 = off, 1 = on, 2 = hold. Omitting the trace index sets up to 4 traces at once. Ex: `:TSSE:SW 0,1,0,1` shows only traces 2 and 4; `:TSSE:SW4 0` turns off trace 4 only.

2.15 Handler — LCR HANDLER mode

Command	Description
`:HAND:STAT?` `:HAND:STAT <0|1|2|OFF|ON|BUS>`	Sets/queries HANDLER mode: 0/OFF = default, 1/ON = custom, 2/BUS = bus-controlled output level.
`:HAND:STAT:OFfLO/OFfHI/LVLO/LVHI/PUHI/PULO <list>`	In custom mode, assigns the listed signal-table positions (e.g. `1,3,5,9`) to: constant-low, constant-high, active-low level, active-high level, active-high pulse, or active-low pulse respectively.
`:HAND:OUTP:LVHI <list>` `:HAND:OUTP:LVLO <list>`	In bus mode, drives the listed signal positions high or low.

2.16 FETCh? — result queries

Command	Description
`:FETCh?`	Returns the last measurement's result for the active mode — see §1.3 for the exact format per page.
`:FETCh:SMON:VAC?` / `:FETCh:SMON:IAC?`	Returns the voltage/current level-monitor reading.
`:FETCh:AUTO <?|0|OFF|1|ON|2>`	Sets/queries auto-return of test results (not retained after power-off): 0/OFF off; 1/ON returns the result automatically after each trigger (same format as FETCh?); 2 returns only end-of-test status — `"Trig Eom"` (finished) or `"Trig Pause"` (paused, transformer paged-scan use).
`:FETCh:LIST:PARA<1-4>?`	Returns one parameter's results for every list-sweep point.
`:FETCh:LIST:PT<1-201>?`	Returns all 4 parameters' results at one sweep point.
`:FETCh:LIST:COMP[1-201]?`	Returns the comparison result for one point, or all points if the index is omitted.
`:FETCh:LIST[1-201]?`	Returns one point's (or, with no index, all points') 4 parameter results plus comparison result, comma-separated. Ex full-list reply: `P1.1,P1.2,P1.3,P1.4,P1.cmp,P2.1,…` — a parameter that is display-off leaves an empty field between commas.
`:FETCh:TRACE:X[1-801]?`	Returns the trace sweep's X-axis value(s) — one point or the full list.
`:FETCh:TRACE:Y<1-4>?`	Returns one trace's results for every sweep point.
`:FETCh:TRACE:PT<1-801>?`	Returns `(x,y1,y2,y3,y4)` at one sweep point.
`:FETCh:TRACE:MARK?`	Returns `(x,y1,y2,y3,y4)` at the on-screen cursor position.
`:FETCh:TRACE:YMAX<1-4>?` / `:YMIN<1-4>?`	Returns trace 1–4's maximum/minimum as `(x,y)`.

> **NOTE**
> With auto-return enabled, a continuous sweep reports all point data together at the end, with a final appended `"CtDt Ct,Dt,Kp,Qm,deltaF"` field (the ultrasonic-device parameters of OM §4.3.8).

2.17 CORRection — user correction (zeroing)

Command	Description
`:CORR:OPEN [ACK]`	Runs full-range open correction at all fixed points (OM §4.8.1). With ACK, returns 1 (success) or 0 (fail); without it, no reply.

`:CORR:OPEN:STAT?`
 	
`:CORR:OPEN:STAT <0|1|ON|OFF>`
	Enables/disables open correction.

`:CORR:SHOR [ACK]`
 	
`:CORR:SHOR:STAT?`
`/`
`<0|1|ON|OFF>`
	Same pattern as OPEN, for short correction (OM §4.8.2).

`:CORR:LOAD:STAT?`
 	
`:CORR:LOAD:STAT <0|1|ON|OFF>`
	Enables/disables load correction (OM §4.8.3).

`:CORR:LOAD:TYPE?`
 	
`:CORR:LOAD:TYPE <LSRS|LSQ|CPD>`
	Sets/queries load type (OM §4.8.4): LSRS = Ls-Rs, LSQ = Ls-Q, CPD = Cp-D.

`:CORR:LENG?`
 	
`:CORR:LENG <0|1>`
	Sets/queries cable length: 0 or 1 m (OM §4.8.5).

`:CORR:CLE [pt]`	Clears user correction data — all points, or one point (1–10) if `pt` is given.
`:CORR[:USE]:DATA[n]?`	Returns correction data. With no index: every point's open/short/load A&B values in sequence. With index n (1–10): that point's index, frequency, open A/B, short A/B, load A/B, reference A/B.

`:CORR:DATE`
`<LAST|OPEN|SHORT|DCR|DCROPEN|DCRSHORT>`
 	
`:CORR:DATE<n> <OPEN|SHORT|LOAD>`
	Queries the timestamp of the last correction operation, globally (LAST/OPEN/SHORT/DCR variants) or for point-frequency point n (1–10). Returns `"yyyy-MM-dd hh:mm:ss"`, or `"----"` if that correction has never been run.

`:CORR:SPOT<n>:STAT?`
 	
`:CORR:SPOT<n>:STAT <0|1|ON|OFF>`
	Enables/disables point-frequency correction for point n (1–10) (OM §4.8.6).

`:CORR:SPOT<n>:FREQ?`
 	
`:CORR:SPOT<n>:FREQ <float|MIN|MAX>`
	Sets/queries point n's correction frequency.

`:CORR:SPOT<n>:OPEN [ACK]`
`/`
`:SHOR [ACK]`
`/`
`:LOAD [ACK]`
	Runs open/short/load correction at point n's frequency only.

`:CORR:SPOT<n>:LOAD:STAN?`
 	
`:CORR:SPOT<n>:LOAD:STAN <refA,refB>`
	Sets/queries point n's load-correction reference values.

2.18 MassMEMory — file load/save

Command	Description

`:MMEM:LOAD?`
 	
`:MMEM:LOAD <file>`
	Loads a saved setup file. `file` is either a full relative path, or an internal-file index 1–50 (LCR bridge mode: `files/LCR.sta`, `LCR2.sta` … map to indices 1, 2…). Ex: `:MMEM:LOAD 1` loads `LCR.sta`; `:MMEM:LOAD usb/sss.sta` loads from USB.

`:MMEM:STOR <n>[,file]`	Saves the current setup. n is the index used for the default filename (same mapping as LOAD); an explicit `file` path overrides the default name. Ex: `:MMEM:STOR 1` saves as `LCR.sta`; `:MMEM:STOR5,usb/sss.sta` saves to USB under a custom name.

2.19 SYSTem — system configuration

Command	Description

`:SYST:BUSMODE?`
 	
`:SYST:BUSMODE <RS232|LAN|USBTMC|USBCDC|AUTO>`
	Sets/queries bus mode (OM §5.1.1): AUTO auto-selects; any other value locks to that interface.

`:SYST:BEEP?`
 	
`:SYST:BEEP <0|OFF|1|ON>`
	Sets/queries the key-beep mode (OM §5.1.2).

`:SYST:BEEP:PASS?`
 	
`:SYST:BEEP:PASS <OFF|TS|LL|HS|HL>`
	Sets/queries the pass-tone (OM §5.1.2): OFF, TS=Two Short, LL=Low Long, HS=High Short, HL=High Long.

`:SYST:BEEP:FAIL?`
 	
`:SYST:BEEP:FAIL <OFF|TS|LL|HS|HL>`
	Sets/queries the fail-tone, same option set as PASS.

`:SYST:DATETIME?`
 	
`:SYST:DATETIME <Y,M,D,h,m,s>`
	Sets/queries the system clock. Year range 2018–2999. Ex: `:SYST:DATETIME 2026,10,02,12,35,56`.

`:SYST:RS232:BAUD?`
 	
`:SYST:RS232:BAUD <4800|9600|19200|38400|57600|115200>`
	Sets/queries RS-232 baud rate (OM §5.1.3).

`:SYST:RS232:ADDR?`
 	
`:SYST:RS232:ADDR <1–32>`
	Sets/queries the instrument's bus address — also used for RS-485, GPIB and MODBUS.

`:SYST:RS232:CMDMODE?`
 	
`:SYST:RS232:CMDMODE <SCPI|MODBUS>`
	Sets/queries the active command protocol (OM §5.1.3).

`:SYST:LAN:PORT?`
 	
`:SYST:LAN:PORT <int>`
	Sets/queries the LAN port number (default 45454).

`:SYST:LAN:UDhcPc?`	Triggers a one-time automatic network-configuration attempt (DHCP).

`:SYST:LAN:IPADdress?`
 	
`:SYST:LAN:IPADdress <ip>`
	Sets/queries the LAN IP address. Ex: `:SYST:LAN:IPAD 192.168.22.209`.

`:SYST:LAN:GATeway?`
 	
`:SYST:LAN:GATeway <ip>`
	Sets/queries the gateway address.

`:SYST:LAN:SMASK?`
 	
`:SYST:LAN:SMASK <mask>`
	Sets/queries the subnet mask. Ex: `:SYST:LAN:SMASK 255.255.255.0`.

`:SYST:LAN:DNS?`
 	
`:SYST:LAN:DNS <primary>,<secondary>`
	Sets/queries primary/secondary DNS addresses.

`:SYST:LAN:MAC?`	Queries the LAN MAC address (read-only).
`:SYST:UPDATE APP`	Triggers a firmware update from the default USB path (`usb/update2840.sec`) — equivalent to the front-panel one-touch update (OM §5.1.5). A Techmize-supplied PC utility can also push an update file directly without a USB drive; the delivered file is stored internally (e.g. `update2840.sec`) and can be deleted periodically to free space.

CHAPTER 3

MODBUS Reference

The TH2840 series implements MODBUS as an alternative to SCPI, selected via `:SYST:RS232:CMDMODE MODBUS` or the <System Setup> Command Mode field (Operation Manual §5.1.3). The frame format follows the manufacturer's internal version 2.0 standard described below.

3.1 Command format

Write command (function code 0x10)

Device addr	Func code	Addr hi	Addr lo	Reg count hi	Reg count lo	Byte count	Data byte 1...n	CRC lo	CRC hi

Reply: Device addr, Func code, Addr hi, Addr lo, Reg count hi, Reg count lo, CRC lo, CRC hi.

- **Device address** — the instrument's bus address, set under <System Setup> (OM §5.1.3), range 1–32.
- **Function code** — `0x10` (write one or more registers).
- **Address hi/lo** — the register's storage address (may be a real or mapped address).
- **Register count hi/lo** — number of 2-byte registers written in this operation.
- **Byte count** — total bytes written.
- **Data byte 1...n** — the data to write.
- **CRC hi/lo** — 16-bit CRC, computed with the lookup-table method (§3.2).

Example: setting voltage range to range index 2 (300 V) at register `0x0003`, device address 8:

```
0x08  0x10  0x00  0x03  0x00  0x01  0x01  0x02  0xC5  0xFD
```

(The third-from-last byte, 0x02, is the 1-byte range-index value being written.) Reply: `0x08 0x10 0x00 0x03 0x00 0x01 0xF1 0x50`

Read command (function code 0x03)

Device addr	Func code	Addr hi	Addr lo	Reg count hi	Reg count lo	CRC lo	CRC hi

Reply: Device addr, Func code, Byte count, Data byte 1...n, CRC lo, CRC hi.

Example: reading the current voltage test value at register `0x00A0`, device address 8:

```
Send: 0x08  0x03  0x00  0xA0  0x00  0x02  0xC4  0xB0
Reply: 0x08  0x03  0x04  <data byte 1…4>  <CRC lo>  <CRC hi>
```

3.2 CRC16 calculation

The instrument uses the standard **CRC-16/MODBUS** algorithm (polynomial 0xA001, initial value 0xFFFF), computed via the conventional lookup-table method:

```
WORD CRC16(BYTE* pchMsg, WORD wDataLen) {
BYTE chCRCHi = 0xFF, chCRCLo = 0xFF; // init
WORD wIndex;
while (wDataLen--) {
wIndex = chCRCLo ^ *pchMsg++;
chCRCLo = chCRCHi ^ chCRCHTable[wIndex];
chCRCHi = chCRCLTable[wIndex];
}
return (chCRCHi << 8) | chCRCLo;
}
```

> **NOTE**
> This is the standard, widely published CRC-16/MODBUS lookup-table pair (256 bytes each for the high- and low-byte tables); any standard CRC-16/MODBUS library implementation is compatible with this instrument. Techmize can supply the exact tables on request.

3.3 Register map

Register addresses below are hexadecimal; "Regs" is the register count for that address (each register is 2 bytes). Function-parameter code tables (used by several registers) are given once here:

Code	Param	Code	Param	Code	Param
0	CP	6	X (Xs)	12	Q
1	CS	7	G (Gp)	13	dZ (θz°)
2	LP	8	B (Bp)	14	rZ (θz rad)
3	LS	9	Z	15	dY (θy°)
4	RP	10	Y	16	rY (θy rad)
5	RS	11	D	17	RD

3.3.1 General measurement

Addr	R/W	Regs	Description
0x0000	R	—	Instrument IDN query — returns model, e.g. "TH2840"
0x0001–0x0004	R/W	1 each	Function parameter 1–4 — one register per parameter, value = function code (table above)
0x0002	R/W	4	Frequency (float, Hz)
0x0003	R/W	1	Speed: 0=FAST, 1=MED, 2=SLOW, 3=SFAST (Fast+)
0x0004	R/W	1	Trigger source: 0=CONT, 1=SINGLE
0x0005	R/W	1	ALC (constant level): 0=OFF, 1=ON
0x0006	R/W	4	Trigger delay (float, 0–60.000 s)
0x0007	R/W	4	Step delay (float, 0–60.000 s)
0x0008	R/W	1	Voltage monitor: 0=OFF, 1=ON
0x0009	R/W	1	Current monitor: 0=OFF, 1=ON
0x000A	R/W	5	AC level — float value + 1 char (0=V, 1=I)
0x000B	R/W	1	AC range, 0–14: 0=100k, 1=50k, 2=20k, 3=10k, 4=5k, 5=2k, 6=1k, 7=500, 8=200, 9=100, 10=50, 11=20, 12=10, 13=0.1 [Ω]. Index 14 is reserved (unused) — do not write it.
0x000C–0x000D	R/W	5	DC bias — float value + 1 char (0=V, 1=I)
0x000E	R/W	1	Averaging count, 1–256
0x000F	R/W	1	Bias polarity: 0=Auto, 1=Fixed
0x0010	R/W	1	DC range, 0–14 — same index table as AC range (0x000B)
0x0011–0x0012	R/W	4	DC level (float)
0x0013	R/W	1	DCI isolation: 0=OFF, 1=ON
0x0014	R/W	1	Deviation mode, parameter 1: 0=OFF, 1=ABS, 2=PER
0x0015	R/W	1	Deviation mode, parameter 2 — same codes as 0x0014
0x0016	R/W	4	Reference value, parameter 1 (float)
0x0017	R/W	4	Reference value, parameter 2 (float)
0x0019	R/W	4×n	Reference values for parameters 1–n in one write, n=1–4 (float×n)
0x1000	R/W	1	Deviation mode, parameter 3 — same codes as 0x0014
0x1001	R/W	1	Deviation mode, parameter 4 — same codes as 0x0014
0x1002	R/W	4	Reference value, parameter 3 (float)
0x1003	R/W	4	Reference value, parameter 4 (float)
0x1022	R	n=2/4/6/8/9	Returns the measurement result for 1–4 open parameters: n=2→1 param (float×1), n=4→2 params, n=6→3 params, n=8→4 params, n=9→4 params + bin result (float×4+bin)

3.3.2 Batch read/write of measurement parameters

Two addresses provide a single read/write covering up to 45/51 consecutive measurement-related registers, each register mapped to a fixed position. 1 register = 2 bytes; the write data length must be exactly 2× the register count; reads/writes of 1–45 (0x1020) or 1–51 (0x1021) registers are allowed, always starting from position 1 (cannot start mid-table).

Addr	R/W	Regs	Description
0x1020	R/W	n (1–45)	Batch measurement-parameter read/write: covers the same parameters as the individual registers in §3.3.1 in one transaction, each at a fixed position 1–45. The position layout is complex and the address is rarely needed — use the individually addressed registers in §3.3.1 instead.
0x1021	R/W	n (1–51)	Same purpose as 0x1020, with a different 51-position field order. Likewise rarely needed — use the individually addressed registers in §3.3.1 instead.

NOTE

Registers 0x1020/0x1021 allow a full test configuration to be written in one transaction, but their fixed-position layout is complex and offers little benefit over the individually addressed registers, which are unambiguous and recommended.

3.3.3 Comparator setup

Addr	R/W	Regs	Description
0x001A–0x001B	R/W	1	Comparator limit mode: 0=TOL (Tolerance), 1=SEQ (Continuous)
0x001C	R/W	1	Comparator switch: 0=OFF, 1=ON
0x001D–0x0030	R/W	4 each	Bin 1–10 low/high limits (float) — bin *k*'s low limit at 0x001D+4(k−1), high limit at 0x001E+4(k−1); e.g. bin 1 low=0x001D, high=0x001E; bin 2 low=0x001F, high=0x0020; … bin 10 low=0x002F, high=0x0030
0x1004	R/W	6	Bin 1–10 low limits, batch form: char (bin index 0–9) + char (parameter A–D index 0–3) + float (value)
0x1005	R/W	6	Bin 1–10 high limits, batch form — same structure as 0x1004

3.3.4 List (sweep) setup

Addr	R/W	Regs	Description
0x0050	R/W	1	Total sweep points, 1–201
0x0051	R/W	1	Sweep mode: 0=SEQ, 1=STEP
0x0052–0x0054	R/W	1	Current sweep-point index in the setup table, 0–200
0x0055	R/W	4	Sweep-point frequency (float)
0x0056–0x0057	R/W	5	Sweep-point AC level — float + 1 char (0=V, 1=I)
0x0058	R/W	5	Sweep-point DC bias — float + 1 char (0=V, 1=I)
0x0059–0x005A	R/W	1–4	Sweep-point function 1–4 — code per the function table in §3.3
0x005C	R/W	4	Sweep-point step delay (float)
0x1006	R/W	6	Sweep-point low limits, batch form: char (point index 0–200) + char (parameter A–D index 0–3) + float (value)
0x1007	R/W	6	Sweep-point high limits, batch form — same structure as 0x1006
0x100B	R	9×n	Reads all results for n sweep points; each point = 2Reg(P1)+2Reg(P2)+2Reg(P3)+2Reg(P4)+1Reg(comp)
0x100C–0x100F	R	2×n	Reads one parameter's (1–4, selected by address) result for n points; each point = 2Reg
0x1010	R	n	Reads the comparison result for n points; each point = 1Reg, value 0=not compared, 1=pass, other=fail
0x1011	R/W	4	Sets the reported data magnitude for the 4 result parameters: 0=default (absolute value), 1=×10^3, 2=×10^6 (one `short` code per parameter)

3.3.5 List (sweep) batch per-point arrays

These addresses batch-read or batch-write one quantity across a run of *n* consecutive sweep points. Write: 1 register (u16 start-point index `pt`, 0–200) followed by 2×n registers (n float values, for points pt…pt+n−1). Read: always starts at point 0, returns 2×n registers (n float values, for points 0…n−1).

Addr	R/W	Regs	Description
`0x3000`	R/W	W(1+2n) / R(2n)	Sweep-point frequency array
`0x3001`	R/W	W(1+2n) / R(2n)	Sweep-point level-voltage array
`0x3002`	R/W	W(1+2n) / R(2n)	Sweep-point level-current array
`0x3003`	R/W	W(1+2n) / R(2n)	Sweep-point bias-voltage array
`0x3004`	R/W	W(1+2n) / R(2n)	Sweep-point bias-current array
`0x3005`	R/W	W(1+2n) / R(2n)	Sweep-point step-delay array
`0x3006–0x3009`	R/W	W(1+2n) / R(2n)	Sweep-point high-limit array for parameter 1(A)/2(B)/3(C)/4(D) respectively — address selects the parameter
`0x300A–0x300D`	R/W	W(1+2n) / R(2n)	Sweep-point low-limit array for parameter 1(A)/2(B)/3(C)/4(D) respectively
`0x300E–0x3011`	R/W	W(1+n) / R(n)	Sweep-point function array for parameter 1(A)/2(B)/3(C)/4(D) respectively — 1 register per point (function code, hex, per the table in §3.3), not 2

3.3.6 Trace (graphical sweep) setup

Addr	R/W	Regs	Description
`0x0090`	R/W	1	Y-axis scale: 0=AUTO, 1=HOLD
`0x0092`	R/W	1	X-axis coordinate: 0=linear, 1=log
`0x0094`	R/W	1	Trace mode: 0=SEQ, 1=STEP
`0x0096`	R/W	1	Sweep points: 0=51, 1=101, 2=201, 3=401, 4=801
`0x0097`	R/W	1	Max-Min display: 0=OFF, 1=ON
`0x0098`	R/W	1	Sweep start value (float)
`0x0099`	R/W	1	Sweep stop value (float)

3.3.7 User correction

Addr	R/W	Regs	Description
`0x0031`	R/W	1	Open correction: 0=OFF, 1=ON, 2=full-range open-zero, 3=DCR zero
`0x0032`	R/W	1	Short correction: 0=OFF, 1=ON, 2=full-range short-zero, 3=DCR zero
`0x0033`	R/W	1	Load correction: 0/1
`0x0034`	R/W	1	Cable length: 0/1
`0x0035–0x0036`	R/W	1	Correction point index, 0–9 (point-frequency correction, 10 points)
`0x0037`	R/W	4	Correction-point frequency (float)
`0x0038`	R/W	1	Correction-point switch/action: 0=OFF, 1=ON, 2=single-frequency open-zero, 3=single-frequency short-zero, 4=single-frequency load
`0x0039`	R/W	4	Correction-point reference A (float)
`0x003A`	R/W	4	Correction-point reference B (float)

3.3.8 System setup

Addr	R/W	Regs	Description
0x0040	W	1	Start test — equivalent to the front-panel **Trigger** key; write value 1
0x0041	W	1	Stop test — equivalent to the front-panel **Reset** key; write value 1
0x0042	R	2/4/6/8/9	Read result — on Meas Display, returns every open parameter's result; register count varies (2/4/6/8/9) with how many parameters are shown
0x0043	R/W	1	Page switch (char): 0=Measure, 1=List, 2=Trace, 3=Meas Setup, 4=Limit Setup, 5=List Setup, 6=Trace Setup, 7=System Setup, 8=File Management, 9=User Correction, 10=Handler
0x0045	R/W	1	Key beep: 0=OFF, 1=ON
0x0046	R/W	1	Pass tone: 0=OFF, 1=Two Short, 2=Two Long, 3=High Short, 4=High Long
0x0047	R/W	1	Fail tone — same code table as 0x0046
0x0048	R/W	1	Display language: 0 = English. Techmize instruments have an English-only user interface (Operation Manual §5.1.2); keep this register at 0.
0x004E	R/W	1	Bias source: 0=internal 100 mA, 1=internal 2 A, 2=external TH1778A. Not applicable on TH2840BL.
0x2007	R	1	Trigger-running status: 0=idle/finished, 1=test in progress — same purpose as SCPI `:TRIG:STAT?`

3.3.9 File

Addr	R/W	Regs	Description
0x1008	W	1	Test-result USB auto-save switch: 0=OFF, 1=ON (Operation Manual §4.1.5)
0x1009	W	1	List-result USB auto-save switch: 0=OFF, 1=ON (OM §4.2.1)
0x100A	W	1	Trace-result USB auto-save switch: 0=OFF, 1=ON (OM §4.3.7)
0x2005	R/W	1	Load a setup file from the internal `files` root, by index 0–50 (LCR bridge mode: `LCR1.sta`, `LCR2.sta` … `LCRn.sta`). Reading this register returns the index `n` of the currently loaded internal file, if any; if no internal file is loaded, the reply omits `n` — e.g. `08 03 00 F0 F2`.
0x2006	W	1	Load a setup file from the external USB `usb` root, by index 0–50, same naming convention as 0x2005

> **NOTE**
> Registers not listed in §3.3.1–3.3.9 that may appear in older firmware or factory-test builds are reserved/internal — do not write to undocumented addresses.

CHAPTER 4

Programming Examples

4.1 Graphical (trace) sweep example

Sweeps impedance (Z), Cs, Ls and D from 1 kHz to 1 MHz across 101 points, at 1 V AC, no bias, then reads back parameter 1 and parameter 3's full result sets.

Step	Commands
1. General setup	`DISP:PAGE TSME` (open Trace Display) · `TRIG:SOUR SING` (single trigger) · `FREQ 1000` (nominal frequency — the sweep's own start/stop values govern the actual swept frequency) · `VOLT 1` (1 V AC) · `BIAS:VOLT 0` (bias voltage; if bias is needed, send `BIAS:STAT ON` before testing and `BIAS:STAT OFF` after)
2. Trace setup	`TSSE:POINT 101` · `TSSE:SMODE SEQ` · `TSSE:MODE FREQ` (sweep condition = frequency, i.e. X-axis) · `TSSE:FORM LIN` · `TSSE:SWEEP 1e3,1e6` (X-axis start/stop) · `TSSE:IMP Z,CS,LS,D` (the 4 Y-axis result parameters)
3. Trigger	`TRIG` (runs one sweep) · `TRIG:STAT?` (poll; returns `RUN 1` while running, `RUN 0` once finished)
4. Read results	Once `RUN 0` is returned, fetch only the data actually needed (result sets can be large) — e.g. `FETCH:TRACE:Y1?` for parameter 1's (Z) full result set, `FETCH:TRACE:Y3?` for parameter 3 (Ls). See §2.16 for the full set of `FETCh:TRACE` queries (single point, cursor, max/min, etc.).

4.2 General pattern for a single-point bridge measurement

Step	Commands
1. Configure	`FUNC:IMP CP,D,,` → e.g. `FUNC:IMP1 CP`, `FUNC:IMP2 D` · `FREQ 1000` · `VOLT 1` · `APERMED`
2. Zero (if needed)	`CORR:OPEN:STAT ON` / `CORR:SHOR:STAT ON`, after running `CORR:OPEN` / `CORR:SHOR` with the fixture open/shorted as appropriate (Operation Manual §6.1)
3. Trigger & read	`TRIG:SOUR SING` · `TRIG` · `FETCh?` — returns `P1,P2,P3,P4,bin` per §1.3

APPENDIX

Contact & Support

For the complete 256-entry CRC-16/MODBUS lookup tables (§3.2), or any other item in this reference, contact Techmize using the details below.

This reference is the companion to the *TH2840 Series Operation Manual*; see that document for front-panel operation, specifications and the HANDLER interface.

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