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SCPI & MODBUS COMMAND REFERENCE

TH2515

Touch-screen Micro-Ohm DC Resistance Meter

Companion document to the TH2515 Operation Manual — DC Resistance Meter. Full remote-control command set for the SCPI and MODBUS protocols, organized by subsystem.

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TH2515 SCPI & MODBUS Command Reference

DC Resistance Meter

This document lists the full remote-control command set for the TH2515. It is the companion reference to the *TH2515 Operation Manual*, which covers front-panel operation, the physical remote interfaces (RS232/USB/Handler) and general operating procedures. SCPI commands are sent over the interface selected as Bus Mode (RS232C, GPIB option, LAN, USBTMC or USBVCOM; Operation Manual Chapter 6). MODBUS is available over RS232C only; on RS232C the active protocol (SCPI or MODBUS) is selected on the System Setup page (Operation Manual §3.8).

Section	
1. Conventions & Reference Tables	1 page
2. IEEE 488.2 Common Commands & DISPlay Subsystem	1 page
3. FUNCtion Subsystem	2 pages
4. APERture & TRIGger Subsystem	1 page
5. FETCh Subsystem & Measurement Workflow	1 page
6. TEMPerature Correction Subsystem	1 page
7. COMParator Subsystem	1 page
8. BIN Subsystem	2 pages
9. STATistics Subsystem	1 page
10. IO & MEMory Subsystem	1 page
11. SYSTem Subsystem	1 page
12. MODBUS Protocol	6 pages

SCPI commands conform to the SCPI standard; short (capitalized) or long form may be sent — this reference uses short form in command syntax lines. MODBUS register addresses and SCPI commands address the same underlying settings; §12.3 cross-references each MODBUS register to its SCPI equivalent.

SECTION 1

Conventions & Reference Tables

1.1 SCPI syntax conventions

- Commands are ASCII, hierarchical (tree-structured); related commands share a root, forming a subsystem (e.g. all `FUNC:...` commands).
- Commands may be sent in short (capitalized) or long form; this reference uses short form in the syntax lines.
- `< >` — a value you must supply. `|` — separates alternative parameter values. `[ ]` — an optional, omissible node (defaults apply if omitted).
- A query form ends in `?` and returns the current value; the same root without `?`, followed by a parameter, sets the value.
- SCPI commands are accepted over the interface selected as Bus Mode (see Operation Manual Chapter 6); they are not available over the Handler/EXT I/O interface. MODBUS (Section 12) is available over RS232C only.

1.2 Protocol selection

The TH2515's RS232C port carries either SCPI or MODBUS, never both at once. The active protocol, baud rate and bus address are all set on the instrument's System Setup page (front panel) — see Operation Manual §3.8. This reference documents both protocols; choose the section matching the instrument's current configuration.

1.3 Measurement-page tool scope

Several subsystems below (FUNCtion, COMParator, BIN, STATistics) configure a "tool" shown on the instrument's Measurement Setup / Comparator Setup / Bin Setup / Statistics pages. Settings apply to whichever tool page is referenced by the command root, independent of which page is currently displayed on the front panel.

1.4 AUTO/ON and OFF return values

For `FUNC:IMP:RES:RANG:AUTO`, `FUNC:IMP:LPR:RANG:AUTO`, `FUNC:FDET:AUTO`, `TRIG:DELAY:AUTO` and `FETC:AUTO`, the query returns `1` when the setting is AUTO (ON) and `0` when it is OFF (HOLD / manual / value / no automatic return).

> **CAUTION — VERIFY BEFORE PRODUCTION USE**
>
> Users should verify command behaviour against the firmware version installed on their instrument. Please report any discrepancy to Techmize.

SECTION 2

IEEE 488.2 Common Commands & DISPlay Subsystem

2.1 IEEE 488.2 common commands

Command	Details
`*RST`	Reset the instrument to factory-default settings.
`*TRG`	Trigger a measurement and return the result. Only effective when the Measurement Setup page's trigger source is set to `BUS` (see `TRIG:SOUR`, §4.2).
`*IDN?`	Query the instrument identification. Returns three comma-separated fields — manufacturer, model and firmware version — e.g. `Techmize,TH2515,Version:1.6.4D`.

2.2 DISPlay subsystem

Command	Details
`DISP:PAGE?` `DISP:PAGE <page>`	Query/switch the active display page. `page`: `MEAS` (Measurement Display), `COMP` (Comparator Display), `BIN` (Bin Display), `MSET` (Measurement Setup), `BSET` (Bin Setup), `TSET` (TC/Δt Setup), `STAT` (Statistics Display), `SYST` (System Setup), `FLIS` (Internal File). The query returns the same token as a string. Example: `DISP:PAGE MEAS`.
`DISP:STAT?` `DISP:STAT <ON|OFF>`	Result display on/off for the Measurement, Comparator and Bin Display pages (whether the page shows the measurement result). Query returns `0` (OFF) or `1` (ON).

SECTION 3

FUNCtion Subsystem

Controls the Measurement Setup page: measurement parameter and range, 200 mΩ range test current, zero adjustment (0 ADJ), measurement mode, DEFECT detection time, calibration mode and OVC.

3.1 Parameter & range

Command	Details
`FUNC:IMP?` `FUNC:IMP <R|RT|T|LPR|LPRT>`	Measurement parameter: `R` resistance; `RT` resistance and temperature (R-T); `T` temperature; `LPR` low-current resistance; `LPRT` low-current resistance and temperature (LPR-T). Query returns the same token as a string. Example: `FUNC:IMP R`.
`FUNC:IMP:RES:RANG?` `FUNC:IMP:RES:RANG <value>`	Fixed range for parameter `R` or `RT`. `value`: 0 to 110E+6 (Ω); the instrument selects the range that contains the value (source example: `FUNC:IMP:RES:RANG 123` selects the 200 Ω range). Query returns the range as a float in scientific notation, one of: `20.0000E-3`, `200.000E-3`, `2000.00E-3`, `20.0000E+0`, `200.000E+0`, `2000.00E+0`, `20.0000E+3`, `110.000E+3`, `1100.00E+3`, `11.0000E+6`, `110.000E+6`.
`FUNC:IMP:RES:RANG:AUTO?` `FUNC:IMP:RES:RANG:AUTO <ON|OFF>`	Auto-ranging for `R`/`RT`: `ON` = AUTO, `OFF` = HOLD. Query returns `1` = AUTO, `0` = HOLD (§1.4).
`FUNC:IMP:LPR:RANG?` `FUNC:IMP:LPR:RANG <value>`	Fixed range for parameter `LPR` or `LPRT`. `value`: 0 to 2000 (Ω). Query returns one of: `2000.00E-3`, `20.0000E+0`, `200.000E+0`, `2000.00E+0`. Example: `FUNC:IMP:LPR:RANG 15`.
`FUNC:IMP:LPR:RANG:AUTO?` `FUNC:IMP:LPR:RANG:AUTO <ON|OFF>`	Auto-ranging for `LPR`/`LPRT`: `ON` = AUTO, `OFF` = HOLD. Query returns `1` = AUTO, `0` = HOLD.

3.2 Test current (200 mΩ range)

Command	Details
`FUNC:CURR?` `FUNC:CURR <1A|0.1A>`	Test current of the 200 mΩ range: `1A` or `0.1A`. Query returns the string `1A` or `0.1A`. Example: `FUNC:CURR 0.1A`.

3.3 Zero adjustment (0 ADJ)

Command	Details
`FUNC:ADJ:EXE`	Set ADJ to ON and perform the short-circuit zero adjustment.
`FUNC:ADJ:STAT?`	Query the ADJ state. Returns `0` (OFF) or `1` (ON).
`FUNC:ADJ:SUCC?`	Query whether the adjustment succeeded. Returns `0` (failed) or `1` (succeeded).
`FUNC:ADJ:CLEAR`	Set ADJ to OFF and clear the stored base data from the last 0 ADJ.

3.4 Measurement mode, DEFECT time & calibration mode

Command	Details
`FUNC:MEASMODE?` `FUNC:MEASMODE <SLOW|FAST>`	Measurement mode on the Measurement Setup page. Query returns `SLOW` or `FAST`.
`FUNC:FDET?` `FUNC:FDET <value>`	DEFECT (measurement-error detection time) on the Measurement Setup page. `value`: 0 to 9.998 s; query returns a float in the same range. The DEFECT value must be smaller than the measurement delay (`TRIG:DELAY`). Example: `FUNC:FDET 0.02` (0.020 s).
`FUNC:FDET:AUTO?` `FUNC:FDET:AUTO <ON|OFF>`	DEFECT automatic (`ON`) or manual (`OFF`). Query returns `1` = automatic, `0` = manual.
`FUNC:CAL:MODE?` `FUNC:CAL:MODE <AUTO|MANU>`	Calibration mode on the Measurement Setup page: automatic or manual. Query returns `AUTO` or `MANU`.

3.5 OVC

Command	Details
`FUNC:OVC?` `FUNC:OVC <ON|OFF>`	OVC function of the Measurement Display page on/off. Query returns `0` (OFF) or `1` (ON).

SECTION 4

APERture & TRIGger Subsystem

Controls test speed and averaging (APERture) and the trigger source and delay (TRIGger). Results are read back with the FETCh commands (§5).

4.1 APERture (speed & averaging)

Command	Details
`APER?` `APER <FAST|MED|SLOW1|SLOW2>`	Test speed of the Measurement Display page. Query returns the same token as a string. Example: `APER SLOW1`.
`APER:AVER?` `APER:AVER <value>`	Averaging count on the Measurement Setup page. `value`: integer 1 to 255; query returns an integer in the same range. Example: `APER:AVER 10`.

4.2 TRIGger

Command	Details
`TRIG`	Trigger one measurement. Effective only when the trigger source is `BUS`.
`TRIG:SOUR?` `TRIG:SOUR <INT|MAN|EXT|BUS>`	Trigger source: `INT` internal; `MAN` TRIGGER key; `EXT` external; `BUS` host command (`TRIG` or `*TRG`). Query returns the same token as a string. Example: `TRIG:SOUR BUS`.
`TRIG:DELAY?` `TRIG:DELAY <value>`	Measurement delay. `value`: 0 to 9.999 s; query returns a float in the same range. Example: `TRIG:DELAY 0.01` (10 ms).
`TRIG:DELAY:AUTO?` `TRIG:DELAY:AUTO <ON|OFF>`	Measurement delay automatic (`ON`) or fixed value (`OFF`). Query returns `1` = automatic, `0` = fixed value.

SECTION 5

FETCh Subsystem & Measurement Workflow

5.1 FETCh commands

Command	Details
`FETC?`	Returns the last measurement result and the system status. Data is returned only while the Measurement, Comparator, Bin or Statistics Display page is shown; other pages return nothing. Format depends on the parameter: **single-parameter** (`R`, `T`, `LPR`): `<primary>,<status>`, e.g. `+2.434457E+01,+0` (24.34457 Ω, valid); **dual-parameter** (`RT`, `LPRT`): `<primary>,<secondary>,<status>`, e.g. `+2.434709E+01,+9.205499E+01,+0` (resistance in Ω, temperature in ℃). Primary/secondary are floats; `+9.900000E+37` is returned on over-range or measurement error. Status: `-1` no data in buffer, `0` normal, `+1` measurement error.
`FETC:AUTO?` `FETC:AUTO <ON|OFF>`	Automatic result return after each measurement (`ON`) or not (`OFF`). Query returns `1` = automatic return, `0` = no automatic return.

5.2 Measurement-result retrieval workflow

1. **No automatic return** — either `TRIG:SOUR BUS` (omit if already BUS), then `TRIG`, then `FETC?`; or `TRIG:SOUR BUS`, then `*TRG` (returns the result). Repeat the trigger and fetch commands for each new reading.
2. **Semi-automatic return** — `TRIG:SOUR BUS` (omit if already BUS), `FETC:AUTO ON` (omit if already ON), then `TRIG`. The result is returned automatically; send `TRIG` again for each new reading.
3. **Fully automatic return** — `TRIG:SOUR INT` (omit if already INT) and `FETC:AUTO ON` (omit if already ON). The instrument sends the result after every completed measurement.

SECTION 6

TEMPerature Correction Subsystem

Controls the TC/Δt Setup page: temperature-coefficient (TC) correction, Δt correction and the temperature sensor input. The TC/Δt parameter is TC, Δt or OFF.

6.1 TC correction

Command	Details
`TEMP:CORR:STAT?` `TEMP:CORR:STAT <ON|OFF>`	`ON`: TC/Δt parameter = TC; `OFF`: = OFF. Query returns `0` (OFF) or `1` (TC).
`TEMP:CORR:PAR?` `TEMP:CORR:PAR <t0>,<αt0>`	`t0`: −10.0 to 99.9 °C; `αt0`: −99999 to 99999 ppm. Query returns floats. Example: `TEMP:CORR:PAR 10,3930`.

6.2 Δt correction

Command	Details
`TEMP:CON:DELT:STAT?` `TEMP:CON:DELT:STAT <ON|OFF>`	`ON`: TC/Δt parameter = Δt; `OFF`: = OFF. Query returns `0` (OFF) or `1` (Δt).
`TEMP:CON:DELT:PAR?` `TEMP:CON:DELT:PAR <R1>,<t1>,<k>`	`R1` (initial resistance): 0 to 110.000E+6 Ω; `t1` (initial temperature): −10.0 to 99.9 °C; `k` (constant): −999.9 to 999.9 (source unit: °C). Query returns floats. Example: `TEMP:CON:DELT:PAR 100,20,235`.

6.3 Temperature sensor

Command	Details
`TEMP:SENS?` `TEMP:SENS <PT|ANAL>`	T.SENS: `PT` (Pt sensor) or `ANAL` (AnLG_In analog input). Query returns `PT` or `ANAL`.
`TEMP:PAR?` `TEMP:PAR <V1>,<T1>,<V2>,<T2>`	Analog-input scaling points on the TC/Δt Setup page. `V1`, `V2`: 0 to 2 V; `T1`, `T2`: −99.9 to 999.9 °C. Query returns floats. Example: `TEMP:PAR 0,0,1,500`.

SECTION 7

COMParator Subsystem

Controls the single-limit comparator on the Comparator Display page: enable, beeper, tolerance mode, limits and result readback.

Command	Details
`COMP:STAT?` `COMP:STAT <ON|OFF>`	Comparator on/off. Query returns `0` (OFF) or `1` (ON).
`COMP:BEEP?` `COMP:BEEP <HL|IN|OFF>`	Comparator beeper: `HL` beeps on NG, `IN` beeps on GD, `OFF` disables. Query returns the same token.
`COMP:MODE?` `COMP:MODE <ATOL|PTOL>`	Comparison mode: `ATOL` absolute upper/lower limits (ABS); `PTOL` percentage of nominal (%).
`COMP:UPP?` `COMP:UPP <value>`	Upper limit, 0 to 2.2E+6 Ω. Example: `COMP:UPP 2000`.
`COMP:LOW?` `COMP:LOW <value>`	Lower limit, 0 to 2.2E+6 Ω. Example: `COMP:LOW 1800`.
`COMP:REF?` `COMP:REF <value>`	Nominal value, 0 to 2.2E+6 Ω.
`COMP:PERC?` `COMP:PERC <value>`	Percentage tolerance, 0 to 99.999 %. Example: `COMP:PERC 10`.
`COMP:RES?`	Comparator result string: `HL` (above upper limit, shown HI), `IN` (within limits, shown GD), `LO` (below lower limit), `OFF` (comparator off), `ERR` (comparator on but measurement error).

SECTION 8

BIN Subsystem

Controls the 10-bin (BIN0–BIN9) sorting on the Bin Display/Bin Setup pages: enable, beeper, mode, colours, per-bin limits, enable mask and result.

8.1 General bin settings

Command	Details
`BIN:STAT?` `BIN:STAT <ON|OFF>`	Bin function on/off. Query returns `0` (OFF) or `1` (ON).
`BIN:BEEP?` `BIN:BEEP <NG|GD|OFF>`	Bin beeper: `NG` beeps when one or more bins fail; `GD` beeps when all bins pass; `OFF` disables. Query returns the same token.
`BIN:MODE?` `BIN:MODE <ATOL|PTOL>`	Bin mode: `ATOL` upper/lower limits (ABS); `PTOL` percentage of nominal (%).
`BIN:COLOR:NG?` `BIN:COLOR:NG <OFF|GRAY|RED|GREEN>`	Indicator colour shown for an NG bin result.
`BIN:COLOR:GD?` `BIN:COLOR:GD <OFF|GRAY|RED|GREEN>`	Indicator colour shown for a GD bin result.

8.2 Per-bin limit values

In all commands below `bin` is the bin number 0 to 9. Queries take `bin` as argument (e.g. `BIN:UPP? 1`) and return a float, or `+9.90000E+37` if the value does not exist.

Command	Details
`BIN:UPP <bin>,<value>` `BIN:UPP? <bin>`	Upper limit, Ω (query range 0 to 2.2E+6). Example: `BIN:UPP 1,1000`.
`BIN:LOW <bin>,<value>` `BIN:LOW? <bin>`	Lower limit, Ω (query range 0 to 2.2E+6). Example: `BIN:LOW 1,500`.
`BIN:REF <bin>,<value>` `BIN:REF? <bin>`	Nominal value, Ω (query range 0 to 2.2E+6). Example: `BIN:REF 1,1000`.
`BIN:PERC <bin>,<value>` `BIN:PERC? <bin>`	Upper percentage (above nominal), 0 to 99.999 %. Example: `BIN:PERC 1,10`.
`BIN:PERCLO <bin>,<value>` `BIN:PERCLO? <bin>`	Lower percentage (below nominal), 0 to 99.999 %. Example: `BIN:PERCLO 1,10`.

8.3 Bin enable mask & result

Command	Details
`BIN:ENAB?` `BIN:ENAB <value>`	Bin enable mask, integer 0 to 1023, 8421-coded, one bit per bin; a bit set to 1 enables that bin, 0 disables it. Example: `BIN:ENAB 6`.
`BIN:RES?`	Bin comparison result as an integer 0 to 1023 using the same bit coding: a bit is 1 when the result of that bin is GD, 0 when NG or when the bin is OFF. Example: `BIN:RES?` returns `3`.

EXAMPLES

`BIN:ENAB 6` (decimal 6 = binary 0110) enables bins 1 and 2. `BIN:RES?` returning `3` (binary 0011) means bins 0 and 1 are GD. Bit 0 corresponds to bin 0, bit 1 to bin 1, and so on up to bin 9.

SECTION 9

STATistics Subsystem

Controls the Statistics Display page (shown as STATIS DISP on the instrument): enabling statistics, its own tolerance-limit setting (independent of §7/§8), and reading back the computed statistical quantities (count, mean, max/min, standard deviation, variance, process capability).

Command	Details
`STAT?` `STAT <ON|OFF>`	Statistics function on/off.
`STAT:MODE?` `STAT:MODE <ATOL|PTOL>`	Statistics boundary mode: `ATOL` upper/lower limits (ABS) or `PTOL` percentage of nominal (%). `STAT:MODE <ATOL|PTOL>`.
`STAT:UPP?` `STAT:UPP <value>`	Upper limit, 0 to 2.2E+6 Ω; must be ≥ the lower limit. Ignored while the statistics function is ON. Query returns `+9.90000E+37` if not set. Example: `STAT:UPP 1000`.
`STAT:LOW?` `STAT:LOW <value>`	Lower limit, 0 to 2.2E+6 Ω; must be ≤ the upper limit. Ignored while statistics is ON. Example: `STAT:LOW 500`.
`STAT:REF?` `STAT:REF <value>`	Nominal value, 0 to 2.2E+6 Ω. Ignored while statistics is ON. Example: `STAT:REF 1000`.
`STAT:PERC?` `STAT:PERC <value>`	Percentage tolerance, 0 to 99.999 % (± around nominal). Ignored while statistics is ON. Example: `STAT:PERC 10`.
`STAT:CLEAR`	Clear the accumulated statistics results. Ignored while the statistics function is ON.
`STAT:NUMB?`	Query the total sample count and valid sample count, as 2 integers: `num,valn` — `num`: total number of samples taken; `valn`: number of valid samples used in the statistics calculation.
`STAT:MEAN?`	Query the mean (average) of the measured results. Returns a float; returns `+9.90000E+37` if `valn` < 1 (no valid samples yet).
`STAT:MAX?`	Query the maximum result and its sample index, as 2 values: `max,maxIndex`. Returns `+9.90000E+37,0` if `valn` < 1.
`STAT:MIN?`	Query the minimum result and its sample index, as 2 values: `min,minIndex`. Returns `+9.90000E+37,0` if `valn` < 1.
`STAT:COUN?`	Query the Hi, Lo and In counts and the measurement-error count (integers).
`STAT:DEV?`	Query the standard deviation (σ) of the measured results. Returns a float.
`STAT:VAR?`	Query the variance of the measured results. Returns a float.
`STAT:CP?`	Query the process capability indices Cp and Cpk, as 2 floats.

SECTION 10

IO & MEMory Subsystem

IO drives/reads the Handler interface's general-purpose EXT I/O lines; MEMory saves and recalls up to 20 measurement results on-instrument.

10.1 IO command set (Handler EXT I/O)

Command	Details
`IO:OUT <value>`	Write an 8-bit output pattern to the Handler EXT I/O port. `value`: 0–255. Each bit drives one output line (OUT0–OUT7, Handler pins 22–25 and 47–50): bit = 1 drives that pin low, bit = 0 drives it high. Only effective when the bin/comparator output mode is set to `BIN` (see `SYST:EXT`, §11.2); otherwise ignored. Example: `IO:OUT 66` → binary `0100 0010` → OUT6 and OUT1 driven low, all other outputs high.
`IO:IN?`	Read the 2-bit Handler EXT I/O input state (PRINT = bit 1 / Handler pin 5, TRIG = bit 0 / Handler pin 4). Returns an integer 0–3. Each bit latches to 1 on a falling edge at its pin and clears to 0 once read.

10.2 MEMory command set

Command	Details
`MEM?` `MEM <ON|OFF>`	Result-saving function on/off for the current display page's tool; when on, up to 20 measurement results are stored and can be recalled.
`MEM:CLEAR`	Clear the currently stored resistance-measurement results.
`MEM:COUN?`	Query the number of currently stored results. Returns an integer 0–20; once 20 results are stored, new measurements are not saved until `MEM:CLEAR` is issued.
`MEM:DATA?`	Query the stored measurement results. Returns one `<index>,<value>` pair per stored result, terminated by the literal string `END`. If no results are stored, returns only `END`.

SECTION 11

SYSTem Subsystem

System-level settings: touch beeper, power-line frequency, internal settings files, measurement-error output timing, bin/comparator output format, EOC (end-of-conversion) signal behaviour, and factory reset.

11.1 Beeper, line frequency & settings files

Command	Details
`SYST:BEEP?` `SYST:BEEP <ON|OFF>`	Touch (key-press) beeper on/off.
`SYST:LFR?` `SYST:LFR <50|60>`	Power-line frequency, 50 Hz or 60 Hz. Example: `SYST:LFR 50`.
`SYST:SAVE <n>,<name>`	Save the instrument's current settings to internal file slot `n` (1–30) under `name` (max. 8 characters, no `.STA` extension needed). Example: `SYST:SAVE 2,abc` → saves as file `abc` in internal-file slot 2.
`SYST:LOAD <n>`	Load the settings file previously saved to internal file slot `n` (1–30). Ignored if slot `n` has nothing saved. Example: `SYST:LOAD 2`.

11.2 Error output, bin output format & EOC

Command	Details
`SYST:ERR?` `SYST:ERR <SYNC|ASYN>`	Measurement-status error output timing: `SYNC` (synchronous) or `ASYN` (asynchronous).
`SYST:EXT?` `SYST:EXT <BIN|BCD>`	Bin/comparator sorting-result output format on the Bin Setup tool: `BIN` (bitmask, required for `IO:OUT`, §10.1, to be active) or `BCD` (BCD-coded output).
`SYST:EOC:MODE?` `SYST:EOC:MODE <HOLD|PULS>`	EOC (end-of-conversion) signal output mode: `HOLD` (level held) or `PULS` (pulsed).
`SYST:EOC:PULS <value>`	EOC pulse width in seconds, 0.001–0.100, when `SYST:EOC:MODE` is set to `PULS`. Example: `SYST:EOC:PULS 0.02` → 20 ms pulse.
`SYST:RESET`	Trigger the System Setup page's reset function (system-level reset, distinct from `*RST`'s full factory-default reset — see §2.1).

> **NOTE**
> The RS232 protocol (SCPI or MODBUS), baud rate and bus address must be set on the instrument’s System Setup page before any command is sent; they cannot be changed by remote command (Operation Manual §3.8).

SECTION 12

MODBUS Protocol

The TH2515 supports MODBUS as an alternative to SCPI over the same RS232C port (never simultaneously — see §1.2). Every setting reachable by a SCPI command in Sections 2–11 is also reachable as a MODBUS register; §12.3 gives the full address cross-reference.

12.1 Frame format

Write frame (host → instrument), function code 0x10:

Byte 0	1	2–3	4–5	6	7…7+n−1	last−1…last
Send address	Function code `0x10`	Register address (hi,lo)	Register count (hi,lo)	Byte count	Data byte 1…n	CRC (lo,hi)

Read frame (host → instrument), function code 0x03:

Byte 0	1	2–3	4–5	6–7
Send address	Function code `0x03`	Register address (hi,lo)	Register count (hi,lo)	CRC (lo,hi)

Read response (instrument → host):

Byte 0	1	2	3…3+n−1	last−1…last
Send address	Function code `0x03`	Byte count	Data byte 1…n	CRC (lo,hi)

12.2 Field reference

- **Send address** — the instrument's bus address, set on the System Setup page, range 1–31.
- **Register address** — the storage address of the data inside the instrument (the addresses listed in §12.3).
- **Register count** — number of 16-bit registers involved: 1 register for a 2-byte (16-bit integer) value, 2 registers for a 4-byte (32-bit float) value, 4 registers for two consecutive 4-byte floats (8 bytes).
- **Byte count** — total data bytes transferred; always 2× the register count.
- **Data bytes** — big-endian (high byte first). A 2-byte field is a 16-bit integer; a 4-byte field is an IEEE-754 float, data byte 1 = most-significant byte. Example: decimal 25.16 → hex `41 C9 47 AE` → data byte 1= `0x41`, byte 2= `0xC9`, byte 3= `0x47`, byte 4= `0xAE` (little-endian in-memory: `a[0]=0xAE, a[1]=0x47, a[2]=0xC9, a[3]=0x41`). An 8-byte field is two consecutive 4-byte floats.
- **CRC** — CRC-16/MODBUS (polynomial 0xA001 in reflected form, initial value 0xFFFF), transmitted low byte first. It is computed over all preceding bytes of the frame, either bitwise or with the usual 256-entry lookup tables. Example: for the request `08 03 00 19 00 04` the CRC is `95 57`.

> **CAUTION**
> MODBUS is available only when the instrument's bus mode is set to RS232C (the MODBUS protocol applies only when the bus mode is RS232C).

12.3 Register map

Register addresses are given in hex (as used in the frame's address field). Each register's function corresponds directly to the SCPI command listed; see that command's own entry (Sections 2–11) for value ranges, units and return-format detail, which this reference does not repeat per-register. R/W: `R` = read-only (function code `0x03` only), `R/W` = read and write (function codes `0x03` / `0x10`).

Address	R/W	Function	Equivalent SCPI
0x0001	W	Reset	`*RST`
0x0002	R	Trigger and return measurement (auto-return mode)	`*TRG`
0x0003	R	Instrument identification	`*IDN?`
0x0004	R/W	Display page	`DISP:PAGE`
0x0005	R/W	Result display on/off	`DISP:STAT`
0x0007	R/W	Measurement parameter	`FUNC:IMP`
0x0008	R/W	R-mode range	`FUNC:IMP:RES:RANG`
0x0009	R/W	R-mode auto-range	`FUNC:IMP:RES:RANG:AUTO`
0x000A	R/W	LPR-mode range	`FUNC:IMP:LPR:RANG`
0x000B	R/W	LPR-mode auto-range	`FUNC:IMP:LPR:RANG:AUTO`
0x000C	R/W	200 mΩ range test current (0.1 or 1)	`FUNC:CURR`
0x000D	W	0 ADJ (zero adjustment)	`FUNC:ADJ:EXE` / `FUNC:ADJ:CLEAR`
0x000E	R/W	Measurement mode	`FUNC:MEASMODE`
0x000F	R/W	DEFECT time	`FUNC:FDET`
0x0010	R/W	DEFECT automatic	`FUNC:FDET:AUTO`
0x0011	R/W	Calibration mode	`FUNC:CAL:MODE`
0x0012	R/W	Offset-voltage compensation (OVC)	`FUNC:OVC`
0x0013	R/W	Test speed	`APER`
0x0014	R/W	Averaging count	`APER:AVER`

Address	R/W	Function	Equivalent SCPI
0x0015	W	Trigger one measurement	`TRIG`
0x0016	R/W	Trigger source mode	`TRIG:SOUR`
0x0017	R/W	Measurement delay	`TRIG:DELAY`
0x0018	R/W	Measurement delay auto	`TRIG:DELAY:AUTO`
0x0019	R	Read single-parameter measurement value	`FETC?` (single-parameter form)
0x001A	R	Read dual-parameter measurement value	`FETC?` (dual-parameter form)
0x001B	R/W	Automatic result return	`FETC:AUTO`
0x001C	R/W	TC on/off	`TEMP:CORR:STAT`
0x001D	R/W	t0 and αt0	`TEMP:CORR:PAR`
0x001E	R/W	Δt on/off	`TEMP:CON:DELT:STAT`
0x001F	R/W	R1, t1, k	`TEMP:CON:DELT:PAR`
0x0020	R/W	T.SENS (Pt / AnLG_In)	`TEMP:SENS`
0x0021	R/W	V1, T1, V2, T2	`TEMP:PAR`
0x0022	R/W	Comparator enable	`COMP:STAT`
0x0023	R/W	Comparator beeper	`COMP:BEEP`
0x0024	R/W	Comparator tolerance mode	`COMP:MODE`
0x0025	R/W	Comparator upper limit	`COMP:UPP`
0x0026	R/W	Comparator lower limit	`COMP:LOW`
0x0027	R/W	Comparator nominal value	`COMP:REF`
0x0028	R/W	Comparator percentage tolerance	`COMP:PERC`
0x0029	R	Comparator result	`COMP:RES?`

Address	R/W	Function	Equivalent SCPI
0x002A	R/W	Bin master switch	`BIN:STAT`
0x002B	R/W	Bin beeper	`BIN:BEEP`
0x002C	R/W	Bin tolerance mode	`BIN:MODE`
0x002D	R/W	NG display colour	`BIN:COLOR:NG`
0x002E	R/W	GD display colour	`BIN:COLOR:GD`
0x002F–0x0038	R/W	Bin 0–9 upper limit	`BIN:UPP` (one address per bin)
0x0039–0x0042	R/W	Bin 0–9 lower limit	`BIN:LOW` (one address per bin)
0x0043–0x004C	R/W	Bin 0–9 nominal value	`BIN:REF` (one address per bin)
0x004D–0x0056	R/W	Bin 0–9 upper percentage	`BIN:PERC` (one address per bin)
0x0057	R/W	Bin enable mask	`BIN:ENAB`
0x0058	R	Bin sorting result	`BIN:RES?`
0x0071–0x007A	R/W	Bin 0–9 lower percentage	`BIN:PERCLO` (one address per bin)
0x0059	R/W	Statistics enable	`STAT`
0x005A	R/W	Statistics tolerance mode	`STAT:MODE`
0x005B	R/W	Statistics upper limit	`STAT:UPP`
0x005C	R/W	Statistics lower limit	`STAT:LOW`
0x005D	R/W	Statistics nominal value	`STAT:REF`
0x005E	R/W	Statistics percentage	`STAT:PERC`
0x005F	W	Clear statistics count	`STAT:CLEAR`
0x0060	R	Sample count (num, valn)	`STAT:NUMB?`

Address	R/W	Function	Equivalent SCPI
0x0061	R	Mean	`STAT:MEAN?`
0x0062	R	Max and MaxIndex	`STAT:MAX?`
0x0063	R	Min and MinIndex	`STAT:MIN?`
0x0064	R	Hi / Lo / In / Err counts	`STAT:COUN?`
0x0065	R	Standard deviation (σ)	`STAT:DEV?`
0x0066	R	Variance (s)	`STAT:VAR?`
0x0067	R	Cp and Cpk	`STAT:CP?`
0x0068–0x0069	R/W	Handler read/write	`IO:OUT` / `IO:IN?`
0x006A	R/W	Touch beeper	`SYST:BEEP`
0x006B	R/W	Power-line frequency	`SYST:LFR`
0x006C	R/W	Error output mode	`SYST:ERR`
0x006D	R/W	Bin output format (BIN/BCD)	`SYST:EXT`
0x006E	R/W	EOC output mode	`SYST:EOC:MODE`
0x006F	R/W	EOC pulse width	`SYST:EOC:PULS`
0x0070	W	System reset	`SYST:RESET`

NOTE

Every register listed above is accessed with the write (0x10) and read (0x03) frame formats described in Section 12.1. Floating-point values are IEEE-754 single precision, big-endian; the SCPI command shown for each register gives its meaning and value range.

12.4 Measurement-result retrieval workflow

As with SCPI (§5.2), 3 workflows are available, using register 0x0016 (trigger source), 0x001B (auto-return) and 0x0015/0x0002/0x0019 (trigger and read):

1. **Non-automatic:** write `0x0016 = 0x03` (trigger source = BUS, skip if already set); write `0x0015 = 0x00` (trigger one measurement); read `0x0019` (4 registers) for the result; repeat from the trigger step for each new reading.
2. **Semi-automatic** (most commonly used): write `0x0016 = 0x03` (trigger source = BUS, skip if already set); write `0x001B = 0x01` (enable auto-return, skip if already on); read `0x0002` (4 registers) to trigger and read the result in one step; repeat the read for each new reading.
3. **Fully automatic:** write `0x0016 = 0x00` (trigger source = INT, skip if already set); write `0x001B = 0x01` (enable auto-return, skip if already on); the instrument then pushes a result frame to the host after every completed measurement, with no further host action.

12.4.1 Worked example — reading the result (step 3 of the non-automatic workflow)

Send (read register `0x0019`, 4 registers, from bus address 8):

```
08 03 00 19 00 04 95 57
```

Response:

```
08 03 08 41 C1 22 EB 00 00 00 00 8C EE
```

Decoding: byte count `0x08` (8 data bytes = 2 floats); data bytes 1–4 = `41 C1 22 EB` → the measured resistance value, IEEE-754 float = 24.14204978942871 Ω; data bytes 5–8 = `00 00 00 00` → result-status code 0 (valid measurement).

> **NOTE**
>
> The result-status field (data bytes 5–8 in the example above) uses the same status values as the SCPI `FETC?` command: `-1` no data in buffer, `0` normal measurement data, `+1` measurement error.

Contact, support & related documents

This command reference is the companion to the *TH2515 Operation Manual* (front-panel operation, remote-interface wiring, Handler interface) and the *TH2515 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.

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