TECHMIZE by TONGHUI

OM

OPERATION MANUAL

TH2518 Series

DC Resistance / Temperature Scanner — TH2518 / TH2518A. Covers front-panel operation, scan-mode and stand-alone measurement, system configuration and file management; see Chapter 7 for the remote-control interfaces and Chapter 8 for the HANDLER interface.

Techmize Electronic GmbH · Ismaning, Germany

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TH2518 Series Operation Manual

DC Resistance / Temperature Scanner — TH2518 / TH2518A

This is the English-language edition of the TH2518 Series Operation Manual. **TH2518** measures resistance and temperature (R, R-T, T); **TH2518A** is a resistance-only variant (parameter R) without temperature measurement. Both models share the same synchronous plug-in scanning platform: up to six hot-swappable test units, 15 channels per unit, for up to 90 resistance/temperature scanning channels.

Part I — Operation	
1. Safety & Compliance	3 pages
2. Out of the Box	2 pages
3. Getting to Know the Instrument	3 pages
4. Basic Operation	7 pages
5. System Setup & File Management	3 pages
6. Performance & Specifications	2 pages
Part II — Remote Control & Handler	
7. Remote Control	2 pages
8. Handler Interface & Sorting Board	3 pages
Appendix — Packing, Warranty & Firmware	2 pages

The full SCPI/MODBUS command reference is issued as a separate companion document, TH2518 Series SCPI/MODBUS Command Reference, in line with Techmize's standard practice for command sets of this size (the source chapter runs to roughly 84 pages). Chapter 7 of this manual covers the remote interfaces and command structure only.

CHAPTER 1

Safety & Compliance

1.1 About this manual

This is the original-language (English) edition of the operation manual for the Techmize TH2518 series DC resistance/temperature scanner, covering models **TH2518** and **TH2518A**. Where this manual and the instrument itself appear to disagree, or where a described function is not present on your particular model or configuration, contact Techmize or your authorized distributor using the details in §1.10 before relying on the instrument for measurement or sorting decisions.

Techmize continually improves the performance, features and construction of its instruments; content, specifications and accessories described here are subject to change without notice. This manual does not necessarily describe every optional accessory or every firmware revision; it applies to firmware version 1.4.4 and later.

1.2 Safety symbols used in this manual

The following symbols and signal words appear in this manual and on the instrument itself:

WARNING — a hazard that, if not avoided, could result in personal injury or death.

CAUTION — a hazard that, if not avoided, could damage the instrument or the device under test, or invalidate a measurement.

NOTE — supplementary information that helps with correct or efficient use, but is not itself a hazard.

Protective ground — this terminal must be connected to protective earth. Also printed next to the instrument's rear-panel ground terminal.

1.3 General safety requirements

The TH2518 series is a **Protection Class I** instrument: protective earthing of the chassis, via the three-wire AC power cord, is essential to safety and must not be defeated.

> **WARNING — ELECTRIC SHOCK**
>
> Always use a supply outlet with a protective earth contact. Never connect the AC supply, or operate the instrument, with the protective ground disconnected or with a two-wire (ungrounded) adapter.

The instrument's AC inlet accepts a nominal **90–125 V** or **190–250 V** supply, at **50 Hz or 60 Hz**; power consumption ≤ 30 VA. A voltage-range selector switch next to the rear-panel power inlet must be set to match the actual supply voltage before connecting power. For the EU market, set the switch to the **190–250 V** position.

> **WARNING — VOLTAGE SELECTOR**
>
> Confirm the rear-panel voltage-range selector switch is set correctly for the local supply *before* connecting the power cord. Connecting the instrument to a 230 V supply while the switch is set to the 90–125 V position can damage the instrument.

> **CAUTION — FUSE RATING**
>
> The instrument fuse is a factory-fitted standard part (1 A). Replace it only with a fuse of the same rating and type supplied by Techmize/Tonghui, and disconnect the power cord first.

Environment. Normal operation: 0–40 °C, ≤80% RH, no condensation (reference condition for rated accuracy: 23 °C ±5 °C, ≤80% RH). Storage: −10–50 °C, ≤90% RH, no condensation. Avoid dusty, vibrating, direct-sunlight or corrosive-gas environments. Keep the side ventilation opening clear for accurate, stable operation, and keep test leads/cables away from strong electromagnetic fields.

General specifications	
Overall dimensions (W×H×D)	280 mm × 88 mm × 440 mm
Weight	≈ 7.5 kg (main unit, 1 test unit fitted)

WARNING — TEST TERMINALS

The front-panel FRONT INPUT connector (DRIVE HI/LO, SENSE HI/LO) and the rear-panel scanning-unit plug-in boards source test current into the device under test. Always use the test cable or fixture supplied or specified by Techmize/Tonghui, matching the plug colour and arrow marking to the panel socket — a mismatched connection can cause abnormal measurement results. Disconnect the device under test before changing wiring.

Test fixtures and cables. Use only the test fixture or cable supplied by Techmize/Tonghui (TH26050S 4-terminal test cable, junction box, or an equivalent Techmize-specified fixture); a user-made or third-party fixture or cable can produce incorrect measurement results. Keep the fixture, cable and the leads of the device under test clean to ensure good contact.

Warm-up. Allow at least **30 minutes** of warm-up after switch-on before relying on the rated accuracy given in Chapter 6. Do not power-cycle the instrument frequently, as this may cause internal data confusion.

1.4 Electrical safety test data

Dielectric-withstand, insulation-resistance and leakage-current test figures are not published in the operation manual for this series. Contact Techmize/Tonghui engineering if a formal electrical safety test report is required.

1.5 CE marking

The TH2518 series carries the CE mark.

1.6 WEEE — disposal of electrical and electronic equipment



This symbol indicates that the instrument must not be disposed of as unsorted municipal waste at the end of its service life. Within the European Union, return the instrument to Techmize, your distributor, or a designated collection point for electrical and electronic equipment, in accordance with the WEEE Directive (2012/19/EU) and its national transposition in your country. Correct disposal helps prevent potential harm to the environment and human health from uncontrolled waste handling.

1.7 RoHS compliance

The TH2518 series is covered by Techmize's own RoHS (Directive 2011/65/EU, as amended) self-declaration. No independent third-party RoHS certificate is currently available for this series.

1.8 Warranty

Techmize warrants this instrument to be free from defects in material and workmanship for a period of **two (2) years** from the date of delivery to the original purchaser. During the warranty period, Techmize will repair or replace, at its discretion, a product that proves defective, provided it has been used within the specified operating conditions. A warranty card is required to claim warranty service.

This warranty does not cover: damage from misuse, accident, unauthorized modification or repair; consumable/wear items such as the fuse; or damage from operation outside the environmental limits given in §1.3. Repair must be carried out by qualified technical personnel; do not replace internal components without authorization. After any repair, the instrument must be recalibrated before further use.

1.9 Limitation of liability

Except as expressly stated in §1.8, Techmize makes no other warranty, express or implied, regarding this instrument or its documentation. Techmize is not liable for indirect, incidental or consequential damages arising from the use of this instrument, to the extent permitted by applicable law. Techmize is not responsible for data loss on a USB storage device used with the instrument — back up USB data before connecting it.

1.10 Manufacturer & EU contact

Techmize Electronic GmbH

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Registration

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

CHAPTER 2

Out of the Box

2.1 Unpacking

Inspect the shipping container for damage after unpacking. It is not recommended to power on the instrument if the container shows signs of damage — contact your carrier and your Techmize distributor before proceeding. Check the contents against the packing list below; if anything does not conform, notify Techmize or your distributor promptly.

Item	Qty
TH2518-series instrument (model as ordered)	1
TH2518-MS test scanning board (1 unit, 15 channels)	1
TH26050S 4-terminal test cable	1 set
EU power cable (Schuko, CEE 7/7)	1
40-core flat cable	1
Spare fuse, 1 A	2
This operation manual	1
Certificate of conformity	1
Test report	1
Warranty card	1

Keep the original packaging — it is the recommended way to store or return the instrument. Store the instrument in a dry, well-ventilated room at 5–40 °C and ≤85% RH when not in use for an extended period, away from corrosive gases.

2.2 Connecting the power supply

Item	TH2518 / TH2518A
Supply	90–125 V or 190–250 V (set the rear-panel voltage selector switch to match), 50/60 Hz
Power consumption	≤ 30 VA
Power switch	Front-panel POWER switch, bottom-left of the front panel

Match the L (line), N (neutral) and E (earth) conductors of the supply cable to the instrument's rear-panel power inlet, and confirm reliable grounding before switching on. If mains conditions are noisy, fitting a power-line filter ahead of the instrument is recommended.

> **WARNING**
>
> Make sure the protective-earth conductor is reliably grounded before connecting the power cable, to prevent electric shock from leakage current. Confirm the voltage-range selector switch next to the power inlet is set correctly before connecting power (§1.3). Disconnect the power cable before replacing the fuse.

2.3 Connecting the device under test

For stand-alone (Alone) measurement, connect the TH26050S 4-terminal test cable (or an equivalent Techmize-specified fixture) to the front-panel FRONT INPUT connector, matching the plug colour and arrow marking to the panel socket. The instrument uses true 4-terminal (Kelvin) connection: **DRIVE HI/LO** source the test current and **SENSE HI/LO** sense the voltage drop across the device under test, eliminating lead and contact-resistance error from the reading. When the measured parameter is T with an analog-voltage temperature sensor, only the two SENSE terminals are used — the high side of the input to the red (HI) terminal, the low side to the black (LO) terminal.

For scan-mode measurement, connect each device under test to the rear-panel plug-in test units (UNIT1–UNIT6), directly or through a junction box, following the channel assignment configured on the <Channel Setup> page (§4.4).

> **CAUTION**
>
> A user-made or third-party test fixture or cable can produce incorrect measurement results. Keep the fixture/cable and the device-under-test leads clean for good contact, and keep test leads away from strong electromagnetic fields.

2.4 Starting the instrument for the first time

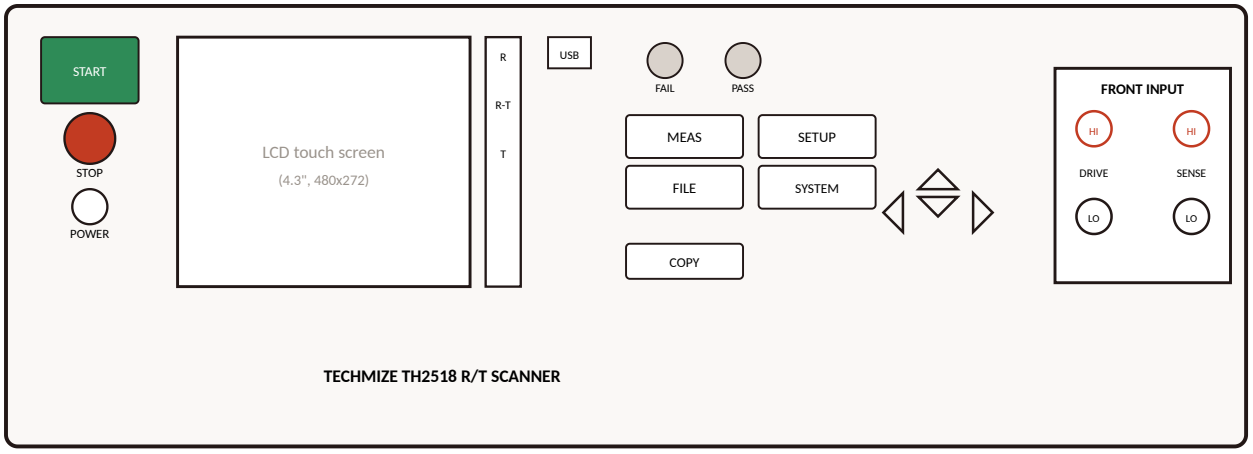
1. Connect the EU power cable to the rear-panel inlet, confirming reliable earth-ground connection and that the voltage selector switch is set correctly (§1.3, §2.2).
2. Press the front-panel **POWER** switch (bottom-left of the front panel).
3. The instrument displays a startup screen showing the Tonghui trademark, model and firmware version.
4. If password protection is enabled, the instrument prompts for the startup password before continuing (factory default: `2518`).
5. The display opens on the default <Measurement Display> page.

Allow at least 30 minutes of warm-up before relying on the rated accuracy (§1.3). For an overview of the front panel, rear panel and screen layout, continue to Chapter 3.

CHAPTER 3

Getting to Know the Instrument

3.1 Front panel



Simplified front-panel layout (schematic, not to scale) — see the legend below for the full item list

1 **START** / **STOP** — in Scan mode with INT or MAN trigger, START begins a scan, STOP stops it and returns the instrument to idle; in Alone mode with MAN trigger, START begins one stand-alone measurement (STOP has no function in Alone mode).

2 **POWER switch.**

3 **LCD display** — 4.3" 24-bit colour TFT touch screen, 480×272 resolution.

4 **Option soft keys** — five keys matched to the on-screen menu beside the display; the same functions are also reachable by touch.

5 **USB HOST port** — for USB flash-drive storage.

6 **PASS / FAIL indicators.**

7 **MEAS** / **SETUP** / **FILE** / **SYSTEM** — the four backlit main-menu keys (§3.4).

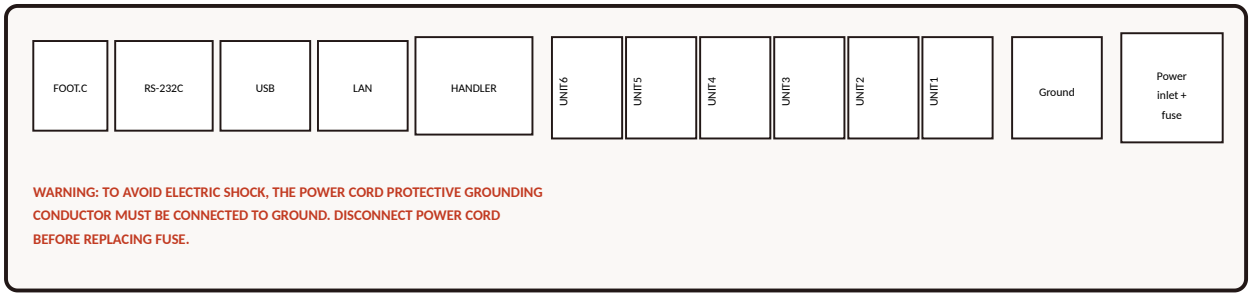
8 **Arrow keys** — up/down/left/right, for field navigation and selection.

9 **COPY** — captures the current screen to a connected USB drive.

10 **FRONT INPUT (4-terminal test port)** — DRIVE HI/LO, SENSE HI/LO; connects the test cable or fixture for stand-alone (Alone) measurement, matching plug colour and arrow marking to the panel socket.

11 **Trademark & model.**

3.2 Rear panel



Simplified rear-panel layout (schematic, not to scale) — see the legend below for the full item list

1 **FOOT.C** — foot-switch jack, triggers one measurement.

2 **RS-232C port** — serial communication with a host PC (Chapter 7).

3 **USB DEVICE port** — PC control over USBTMC or USBVCOM (§6.3, §6.4).

4 **LAN port** — network control and communication (§6.2).

5 **HANDLER port** — outputs the comparator/sorting result and interlock signals, and accepts an external trigger, for automatic test-system integration (Chapter 8).

6 **UNIT1–UNIT6 scanning-board slots** — up to six hot-swappable test units; each supports up to 15 scanning channels, user-programmable in any combination, for up to 90 resistance/temperature channels total (§3.5, §4.4).

7 **Ground terminal** — connected to the instrument's metal chassis, for protective/shielding ground.

8 **Power inlet, fuse & voltage selector** — AC power inlet, fuse holder and the 90–125 V / 190–250 V voltage-range selector switch (§1.3, §2.2).

9 **Nameplate** (not shown) — production date, serial number and manufacturer details.

3.3 Screen display

The TH2518 series uses a 24-bit colour, 4.3" touch screen at 480×272 resolution, with two display layouts depending on the selected measurement mode (<System Setup> → Measurement Mode, §5.1.1):

Mode	Layout
Alone (stand-alone)	Main menu area · function area (test mode/parameters) · soft-key area · message area · large-digit measurement result area (resistance and/or temperature)
Scan (scanning)	Channel-status grid (green = channel on, white = channel off) · main menu area · Tools (scan-result display ON/OFF, 0 ADJ ON/OFF, execute 0 ADJ, save data) · page-turn arrows (up to 90 channels, 16 per page, 6 pages) · per-channel result grid with HI/LO/GD comparator colour coding

In Scan mode with temperature compensation off, R and R-T both show the rear-panel scanning channel's resistance value. With temperature compensation on, under R or R-T, channel CH01 becomes the temperature-reference channel used to compensate the resistance readings of the remaining channels; under T, every channel reads temperature.

3.4 Main menu keys

Key	Opens
MEAS	<Measurement Display> page — Alone or Scan layout per §3.3 (Chapter 4)
SETUP	<Parameter Setup>, with sub-pages <Measurement Setup>, <Channel Setup> (Scan mode) and <Boundary Setup> — contents differ between Alone and Scan mode (Chapter 4)
SYSTEM	<System Setup> page (Chapter 5)
FILE	<File> management: internal file · external file (§5.2)

3.5 Basic operation

1. Use the main-menu keys (MEAS, SETUP, SYSTEM, FILE) and the soft-key touch area to reach the page you want, or touch the screen directly — the 4.3" display is fully touch-operated.
2. Use the arrow keys to move the cursor to a field (the selected field is highlighted); the corresponding function menu appears in the soft-key area.
3. Touch the required soft key, or press the hardware key beside it, to apply the setting.

> **CAUTION**
>
> Never use a sharp object or a fingernail on the touch screen — this can damage it. Techmize/Tonghui is not responsible for damage caused this way.

3.6 Starting the instrument

Confirm reliable earth-ground connection and the correct voltage-selector setting, then press POWER (§2.4). The instrument shows a startup screen (trademark, model, firmware version), then opens on the default <Measurement Display> page. If password protection is enabled, enter the startup password when prompted (factory default: `2518`; see §5.1). Allow at least 30 minutes of warm-up before relying on rated accuracy (§1.3, Chapter 6).

CHAPTER 4

Basic Operation

This chapter describes stand-alone (Alone) and scanning (Scan) measurement, the measurement and boundary (comparator) setup pages, channel setup for scanning, and the junction box accessory. TH2518A does not have the R-T or T parameters, or temperature-related settings — references to temperature measurement below apply to TH2518 only.

4.1 <Measurement Display> page — Alone mode

Opened with MEAS when <System Setup> → Measurement Mode = Alone. Displays the live measured value(s) from the front-panel FRONT INPUT connector.

Field	Options / range
Parameter	R · R-T · T (R-T and T not available on TH2518A)
Range	AUTO · HOLD (lock current range, step with ↑/↓) · NOMINAL (use the range containing the channel's configured nominal value, §4.3) · ↑ / ↓
Unit	Selects which of the 6 test units (1–6) supplies the Alone-mode measurement
Speed	FAST · MED · SLOW
Temperature compensation	ON · OFF
Comparator	ON · OFF
Resolution	Resistance: 5-digit floating decimal · Temperature: 4-digit, 1 decimal place

With parameter R or T, the displayed value is read directly from the selected test unit's front-panel input. With R-T, R is read from the front-panel FRONT INPUT and T is read from rear-panel channel CH01.

The **Tools** area provides: Display ON/OFF; **0 ADJ** validity ON/OFF, and **execute 0 ADJ** (short-circuit zero correction — short the test leads correctly, red S+ to black S−, white D+ to blue D−, then execute); and a **Save Data** toggle, which when switched ON writes every measurement continuously to a new *.CSV file on a connected USB drive (§5.2.4).

> **NOTE — ZERO-CORRECTION THRESHOLD**
>
> 0 ADJ succeeds only while the measured baseline is within a threshold of the current range value: 20% of range for resistance R; for temperature T, 20 Ω (PT100 sensor), 100 Ω (PT500 sensor), or 0.4 V (analog input). The zero baseline is not retained across power-off (unless Base-value Save is ON, §5.1), and must be re-executed after switching between Alone/Scan mode or between test units.

4.2 <Measurement Display> page — Scan mode

Opened with MEAS when <System Setup> → Measurement Mode = Scan. Each of the up to 6 scanning-board test units supports up to 15 channels, user-programmable in any combination, for up to 90 resistance/temperature channels in total. The display shows results 16 channels per page, across up to 6 pages, with page-turn arrows. Test units measure in parallel (synchronized); within a unit, channels are scanned sequentially in ascending order — overall scan time is set by whichever unit has the most channels enabled. The Tools area is the same as Alone mode, with 0 ADJ applying across all configured scanning channels.

Per-channel comparator results are colour-coded: **HI** (red, above the upper limit), **LO** (red, below the lower limit), **GD** (green, within limits); **NC** when the comparator is off for that channel.

4.3 Measurement settings

Reached with SETUP → <Measurement Setup>; some fields differ between Alone and Scan mode.

Field	Options / range
Parameter	R · R-T · T (R-T, T not on TH2518A)
Speed	FAST · MED · SLOW
Trigger	INT (continuous internal trigger) · MAN (front-panel START key) · EXT (HANDLER input) · BUS (remote command)
0 ADJ	ON · OFF — whether the stored zero-correction baseline is applied
Measurement delay	Automatic (fixed internal default, 5 ms) · Manual, 0–9999 ms user-set
Range (R)	7 ranges: 200 mΩ, 2 Ω, 20 Ω, 200 Ω, 2 kΩ, 20 kΩ, 200 kΩ; AUTO · HOLD · NOMINAL · ↑ / ↓ (§6.1)
Temperature compensation	ON · OFF — see §4.3.1 for probe wiring when enabled
Average	1–255, programmable; a higher value improves accuracy at the cost of measurement time
Sensor (temperature)	PT100 · PT500 · AnLG_In (analog voltage input), §4.3.2
Sorting mode (Scan only)	OneToOne · Shift — HANDLER shift-register output mapping, §8.3

4.3.1 Temperature-probe wiring with compensation on

The temperature-reference channel is always CH01. If CH01 is wired as test-unit U1's high end T01 / low end T02, connect the temperature probe to the first scanning board's S1/D1 and S2/D2 terminals; if CH01 is wired as U3's T09/T10, connect it to the third board's S9/D9 and S10/D10 terminals, and so on.

4.3.2 Temperature sensor (TH2518 only)

Sensor	Description
PT100 / PT500	Platinum resistance-temperature sensor. The instrument converts the resistance measured at the present ambient temperature to the equivalent resistance at a user-set reference temperature, using: $R_{t0} = R_t / [1 + \alpha_{t0} \times (t - t0)]$, where t0 and α_{t0} (material temperature coefficient) are set on the <Measurement Setup> page. *Worked example: 100 Ω measured at 20 °C with α_{t0} = 3930 ppm converts to ≈96.22 Ω at 10 °C.* Allow the instrument and probe to warm up (≈30 min) and keep the probe close to, but not touching, the device under test; wait for the reading to stabilize before recording it.
AnLG_In	0–2 V analog voltage input, linearized against two user-defined calibration points (V1,T1) and (V2,T2), V1/V2 in 0.00–2.00 V, T1/T2 in −99.9–999.9 °C: $T = [(T2-T1)/(V2-V1)] \times V_{in} + [(T1 \cdot V2 - T2 \cdot V1)/(V2-V1)]$

4.4 <Boundary Setup> page (comparator limits)

Reached with SETUP → <Boundary Setup>. Alone mode sets one set of limits; Scan mode sets limits independently for each of the up to 90 channels, 12 pages of 8 channels each (nominal / upper limit / lower limit columns), navigated with the left/right arrow keys.

Field	Options / range
Comparator	ON · OFF
Limit mode	ABS · Perc · AbsDev — see below
Beep	ON · OFF, with mode NG (beep on fail) or GD (beep on pass)

Limit mode	Behaviour
ABS (absolute)	Only upper and lower limits are set (nominal is not used); the measured value is compared directly against them. Upper limit must be ≥ lower limit.
Perc (percentage deviation)	Nominal, %upper and %lower are all set. Highest = nominal×(1+%upper), lowest = nominal×(1+%lower). *Example: nominal 1 Ω, upper 5%, lower −3% → limits 0.97–1.05 Ω.*
AbsDev (absolute deviation)	Nominal, upper and lower limits are all set, as signed absolute offsets from nominal (the lower offset is normally negative). Highest = nominal+upper, lowest = nominal+lower. *Example: nominal 10 Ω, upper 5 Ω, lower −3 Ω → limits 7–15 Ω.*

A measurement outside the limits is flagged **HI** (above) or **LO** (below); within limits, **GD** (good).

4.5 <Channel Setup> page (Scan mode)

Reached with SETUP → <Channel Setup> (available in Scan mode). Configures, per channel, 6 pages of 16 channels each:

Field	Description
Channel ON/OFF	Enables/disables each of the up to 90 scanning channels independently.
Test unit	Assigns the channel to any of the 6 test units (U1–U6), freely configurable per channel.
High-side terminal	e.g. T01 selects the high-side drive (D+) and sense (S+) terminals for CH01 together.
Low-side terminal	e.g. T02 selects the low-side drive (D−) and sense (S−) terminals for CH02 together.

Each test unit has 16 terminal positions, T01–T16. One position is used as the common terminal, so each unit can connect up to 15 devices under test (up to 90 across six units). Any of the 16 positions can serve as the common terminal. The high-side and low-side terminal of each channel are selected on the touchscreen from these positions.

4.6 Junction box and scanning

4.6.1 Junction box (accessory)

Each junction box has four terminals, each independently assignable to any of the T01–T16 channel positions. In principle, any channel can be wired in combination with any of the other 15 channels on the same board. Wiring must match the channel assignment configured on the <Channel Setup> page, terminal for terminal. For a custom test fixture rather than the junction-box accessory, use 18–26 AWG wire with a 4.5 mm strip length — see §8.5 for the scanning-board connector pinout.

4.6.2 Scanning behaviour

Up to 15 channels per board, up to 6 boards, up to 90 channels total. Channels within one board are measured sequentially; test units scan in parallel (synchronized) with each other. All 90 channel results can be displayed simultaneously, with page-turning. Scanning proceeds as follows: (1) channels are grouped by test unit (U1–U6); (2) within a unit, enabled channels (CHxx) are measured in ascending order; (3) units scan in parallel, so total scan time is governed by whichever unit has the largest number of enabled channels.

> **NOTE**
> Each test unit is hot-swappable, so the configuration can be scaled from 1 to 6 boards as needed, and the instrument supports stand-alone and scanning measurement side by side — switching between R, R-T and T measurement and between Alone and Scan mode on the same unit.

CHAPTER 5

System Setup & File Management

5.1 <System Setup> page

Field	Options / range
Measurement mode	Scan · Alone
Touch tone	ON · OFF
Password	OFF · Lock system · Lock file · Modify (factory default: `2518`)
Bus mode	RS232C · LAN · USBTMC · USBVCOM
Baud rate	9600 · 19200 · 28800 · 38400 · 96000 · 115200
AC frequency	50 Hz · 60 Hz — matched to the local mains frequency, to reject supply-frequency interference
Handler power	External · Internal
Shift output	Uses the HANDLER interface's SER/RCK/SCLK signals to shift out the up-to-90-channel comparator result (§8.1–8.2)
232 address	MODBUS send/bus address, used when the RS232C protocol is MODBUS
Base-value save	ON · OFF — when ON, the 0 ADJ baseline is retained across a power cycle
Base-value threshold ratio	1–100 — the measured baseline must fall within (current range × ratio) for 0 ADJ to succeed; otherwise the instrument reports a zero-clear failure
Date / time	Format YY-MM-DD HH:MM:SS; adjustable with ++ / + / − / −− and « / » cursor keys
FetcAuto	ON · OFF — whether measurement data is returned to the host automatically without an explicit fetch command
232 protocol	SCPI · MODBUS — selects the RS232C communication protocol. LAN, USBTMC and USBVCOM always use SCPI.
HdlTime	Delays the hold time of the HANDLER interface's and sorting board's comparator output signals
Auto zero	ON · OFF — for automated 4-terminal test setups; when ON, 0 ADJ is not required before each test, only that the function is enabled and the DUT is connected
Resistance offset / resistance factor	User-set correction pair; measured value = measured value × factor + offset

The Tools area on this page also provides **System Reset** (power-cycle equivalent), **Default Settings** (restores all parameters to factory defaults) and **Network Settings** (LAN configuration, §6.2).

> **NOTE**
>
> The startup password and the system/file lock password are factory-set to `2518`. Record any password you change it to — a lost password requires Techmize/Tonghui support to clear.

5.2 File management

Reached with FILE. Configuration settings can be saved to and recalled from a file, so a complete instrument setup does not need to be re-entered manually.

5.2.1 Storage types

Type	Format	Recallable	Purpose
Config save (internal)	*.STA	Yes	Saves the instrument's configuration state to internal flash memory
Config save (USB)	*.STA	Yes	Saves the instrument's configuration state to a USB drive
Data save (USB)	*.CSV	No	Saves measurement results to a USB drive
Screen save (USB)	*.gif	No	Saves a screen snapshot to a USB drive

5.2.2 USB folder structure

Folder	Max files	Contents
CSV	999	Measurement-result *.CSV files
STA	999	Instrument configuration *.STA files
IMAGE	20	Screen-snapshot *.gif files

The CSV and STA folders are created automatically when a USB drive is connected. Use a USB2.0 drive formatted as FAT16 or FAT32 (FAT32 recommended above 512 MB), and avoid storing an excessive number of files or folders on it for best save/load performance. Back up data on the USB drive before connecting it to the instrument — Techmize/Tonghui is not responsible for USB-drive data loss.

5.2.3 File operations

Operation	Effect
Load	Recalls the selected file's saved settings into the active configuration (confirm with Yes/No)
Save	Saves the current configuration under a new file name entered on the on-screen keyboard; saving to an already-used file number overwrites the existing file
Delete	Deletes the selected file (confirm with Yes/No)
Copy to USB	Copies the selected internal file(s) to a connected USB drive
Select	Marks a file for a multi-file operation; the TH2518 supports copying multiple selected files to USB in one operation

To save measurement results continuously: on the <Measurement Display> page, open the Tools area and toggle **Save Data** to ON; toggle it back to OFF to stop — always stop logging explicitly, or the last block of data can be lost. To capture a screenshot, use the front-panel COPY key.

5.3 Network settings (LAN)

Reached from <System Setup> → Tools → Network Settings.

Field	Options / range
Network protocol	TCP/IP (TCP/IP V4) · LXI (requires a LabVIEW-based host application)
DHCP	ON · OFF — when ON, port number, IP address, subnet mask and gateway are assigned automatically once the instrument is connected to a router
Port number	0–65535 (well-known 0–1023, registered 1024–49151, dynamic/private 49152–65535)
IP address	Each octet 1–255
Subnet mask	Each octet 1–255, default 255.255.255.000
Gateway	Each octet 1–255; the 4th octet is fixed at 001, and the 3rd octet always matches the IP address's 3rd octet

CHAPTER 6

Performance & Specifications

6.1 Measurement function

Item	Specification
Parameters	R (resistance) · T (temperature, TH2518 only) · R-T (TH2518 only)
Parameter combinations	TH2518: R, R-T, T · TH2518A: R
Measurement mode	Alone (stand-alone) · Scan (scanning)
Range	AUTO · HOLD · NOMINAL · ↑ / ↓
Trigger	Internal (continuous) · Manual (START key) · External (HANDLER input) · Bus (remote command)
Test-terminal configuration	4-terminal: DRIVE HI, DRIVE LO, SENSE HI, SENSE LO — front panel for Alone mode, rear scanning boards for Scan mode
Average	1–255, programmable

6.2 Resistance test ranges

Range	Measurement range	Resolution	Multiplier	Current
200 mΩ	10 µΩ – 210 mΩ	10 µΩ	×100	100 mA
2 Ω	190 mΩ – 2.1 Ω	100 µΩ	×10	100 mA
20 Ω	1.9 Ω – 21 Ω	1 mΩ	×10	10 mA
200 Ω	19 Ω – 210 Ω	10 mΩ	×10	1 mA
2 kΩ	190 Ω – 2.1 kΩ	100 mΩ	×10	100 µA
20 kΩ	1.9 kΩ – 21 kΩ	1 Ω	×1	100 µA
200 kΩ	19 kΩ – 200 kΩ	10 Ω	×1	10 µA

Both TH2518 and TH2518A offer the same 7 resistance ranges, with a measurement-display range of 10 µΩ–200 kΩ and range current 10 µA–100 mA.

6.3 Temperature measurement (TH2518 only)

Sensor	Specified measurement range
PT100	−10.0–99.9 °C
PT500	−10.0–99.9 °C
Analog input	0–2 V input, displayed as −99.9–999.9 °C

Display range of the measurement page: R, 10 µΩ–200 kΩ; T, −99.9–999.9 °C. The accuracy stated in §6.5.2 applies only within the specified measurement range of the selected sensor.

6.4 Open-circuit output voltage

Range	Open-circuit voltage
200 mΩ – 2 Ω	0.7 V
20 Ω – 200 kΩ	2.7 V

6.5 Measurement accuracy

Basic accuracy applies at 23 °C ±5 °C, ≤80% RH, after ≥30 minutes warm-up, with the test cable correctly short-circuited and 0 ADJ performed (0 ADJ = ON). Outside this temperature range, multiply the basic accuracy by the temperature-correction factor K (§6.5.4).

6.5.1 Resistance scanning accuracy — 1 year, TH2518 / TH2518A

Range	200 mΩ	2 Ω	20 Ω	200 Ω	2 kΩ	20 kΩ	200 kΩ
Current	100 mA	100 mA	10 mA	1 mA	100 µA	100 µA	10 µA
Open-circuit V	0.7 V		2.7 V				
Resolution	10 µΩ	100 µΩ	1 mΩ	10 mΩ	100 mΩ	1 Ω	10 Ω
Temp. coefficient	300 ppm (200 mΩ) · 100 ppm (2 Ω–200 kΩ)						
Accuracy	0.05% + 5 digits, all ranges						

Accuracy example: for a 1 kΩ standard resistor measured on the 2 kΩ range (4 decimal digits), the allowed band is 1000 Ω ± (1000 Ω×0.05% + 5 digits×0.1 Ω) = 1000 Ω ± 1 Ω (0.5 Ω + 0.5 Ω), i.e. 999 Ω to 1001 Ω (resolution on the 2 kΩ range: 0.1 Ω).

6.5.2 Temperature accuracy — PT500 / PT100 sensor (TH2518 only)

Temperature range	Resolution	6-month accuracy	1-year accuracy
−10.0–39.9 °C	0.1 °C	±0.30% Rd ± 0.5 °C	±0.45% Rd ± 0.8 °C
40.0–99.9 °C	0.1 °C	±0.30% Rd ± 1.0 °C	±0.45% Rd ± 1.5 °C

Accuracy is specified for the PT100 / PT500 measurement range of −10.0–99.9 °C. Rd = displayed reading.

6.5.3 Temperature accuracy — analog voltage input (TH2518 only) — 1 year

Input voltage range	Displayed temperature range	Resolution	Accuracy
0–2 V	−99.9–999.9 °C	1 mV	±1% Rd ± 3 mV

6.5.4 Temperature-correction factor K

Multiply the basic 1-year accuracy figures above by K when operating outside 23 °C ±5 °C (but within the 0–40 °C operating range of §1.3):

Ambient temperature	K
0–5 °C	4
5–18 °C	2
18–28 °C	1
28–35 °C	2
35–40 °C	4

PART II

Remote Control & Handler

Covers the RS232C, LAN, USBTMC and USBVCOM remote interfaces and the HANDLER interface for automated test integration, including the TH2518-01 channel comparator sorting board. The full SCPI and MODBUS command tables are issued separately as the *TH2518 Series SCPI/MODBUS Command Reference*.

CHAPTER 7

Remote Control

The TH2518 series can be controlled remotely over RS232C (SCPI or MODBUS protocol), LAN, USBTMC, or USBVCOM. For the complete SCPI command set, MODBUS register map and protocol-debugging walkthroughs, see the companion *TH2518 Series SCPI/MODBUS Command Reference*.

7.1 RS232C

Item	Specification
Pin assignment	TXD = pin 2, RXD = pin 3, GND = pin 5
Baud rate	9600 / 19200 / 28800 / 38400 / 96000 / 115200 (§5.1)
Data format	No parity, 8 data bits, 1 stop bit
Protocol	SCPI or MODBUS, selectable (§5.1) — note this selection applies to RS232C only; LAN, USBTMC and USBVCOM always use SCPI
SCPI command termination	LF (0x0A)
Max. command length	2 KB per command string

7.2 LAN

Configured from <System Setup> → Tools → Network Settings (§5.3): network protocol (TCP/IP or LXI), DHCP, port number, IP address, subnet mask and gateway. With DHCP enabled and the instrument connected to a router, all network parameters are assigned automatically.

7.3 USBTMC

USBTMC-USB488 and USB2.0 compliant, over the rear-panel USB DEVICE port. Requires a LabVIEW-compatible VISA/USBTMC driver on the host PC; once installed, the instrument appears in Windows Device Manager as a USB test and measurement device.

7.4 USBVCOM

Presents a virtual COM port over the rear-panel USB DEVICE connector, selected via Bus Mode = USBVCOM (§5.1). Requires the Tonghui USB-VCOM driver for the TH2518 (available from the Tonghui website, Support & Downloads); once installed, the instrument appears as a "usbVCOM PORT" in Device Manager and can be addressed as an ordinary serial port — useful when the host PC has no physical serial port.

7.5 Command-set overview

The instrument supports both SCPI and MODBUS command sets over RS232C (selectable via <System Setup>, §5.1); LAN, USBTMC and USBVCOM carry SCPI only. SCPI commands are organized into subsystems — display (`DISP`), function/range (`FUNC`), aperture/averaging (`APER`), trigger (`TRIG`), fetch (`FETC`), temperature (`TEMP` , TH2518 only), comparator (`COMP`), per-channel configuration (`CHAN<n>`), and system (`SYST`) — plus the SCPI common commands. MODBUS access uses a fixed holding-register map covering the same functions.

FetcAuto (§5.1) controls whether measurement results are pushed to the host automatically after each measurement, or must be explicitly requested with a fetch command/register read. For the full command syntax, parameter ranges, the complete MODBUS register map, the CRC16 calculation, and worked communication examples, see the *TH2518 Series SCPI/MODBUS Command Reference*.

CHAPTER 8

Handler Interface & Sorting Board

The rear-panel HANDLER interface lets the TH2518 series integrate into an automatic test system: it accepts trigger and key-lock inputs and outputs the comparator/sorting result, together with interlock and shift-register signals for reading back all up to 90 channel results with a single physical connector.

8.1 HANDLER connector pin assignment

Pin	Signal	Pin	Signal
1	Reserved	14	Reserved
2	EXT_GND	15	EXT_VCC
3	INT_VCC (internal +5 V output)	16	INT_GND
4	NC	17	NC
5	NC	18	RCK (shift latch)
6	SCLK (shift clock)	19	SER (shift data)
7	PUMP (air-pump control, `SYST:PUMP`)	20	/EOT
8	/EOC (end of conversion)	21	/PASS6
9	/PASS5	22	/PASS4
10	/PASS3	23	/PASS2
11	/PASS1	24	/PASS_TOTAL
12	/KEYLOCK	25	/STOP
13	/START		

All /PASS*n* and /PASS_TOTAL signals are active-low: low = every enabled channel in that unit (or, for PASS_TOTAL, every enabled unit) passed; high = at least one failed. In Alone mode, /PASS_TOTAL reflects the single comparator result. EXT_VCC/EXT_GND accept an external +5–30 V supply when Handler Power (§5.1) is set to External; when set to Internal, these pins connect to the instrument's own INT_VCC/INT_GND. **Note:** once the TH2518-01 sorting board (§8.4) is fitted, pins 3/15 and 2/16 always carry the internal supply/ground regardless of the Handler Power setting — external power and ground are then supplied through the sorting board's own EXT_VCC/EXT_GND terminals instead.

8.2 Timing

8.2.1 Alone mode

Symbol	Meaning	Min.	Max.
t1	Trigger pulse width	1 µs	—
t2	One measurement time	t3+t4	—
t3	Measurement delay	per §4.3 setting	—
t4	One measurement's sampling time	Sampling Time (§8.2.3)	—
t5	Result formatting & display time	display ON: 17 ms · display OFF: 2.5 ms	—
t6	Data-processing / sorting-output time	50 µs	—

8.2.2 Scan mode

Symbol	Meaning	Min.	Max.
t1	Trigger pulse width	1 µs	—
t2	One measurement time	t3+t4×(N−1)+tt+ta1+…+taN	—
t3	Measurement delay	per §4.3 setting	—
t4	Single-step data processing, display, unit switching & delay	8 ms + t3	—
t5	Shift-output time of the up-to-90-channel result	shift ON: 10 ms · shift OFF: 0 ms	—
t6	Data-processing / sorting-output time	4 ms	—
ta1…taN	Per-step sampling time during a scan	Sampling Time (§8.2.3)	—
tt	Temperature-measurement time	Sampling Time (§8.2.3)	—

N = the largest number of enabled channels on any single test unit. Example: units with 6, 5, 7, 8, 9 and 8 channels enabled give N = 9. All figures above are measured with the range locked; add extra time for AUTO range-seeking.

8.2.3 Sampling time by speed setting

Speed	50 Hz	60 Hz
FAST	6 ms × Average	5 ms × Average
MED	21 ms × Average	16.6 ms × Average
SLOW	105 ms × Average	110 ms × Average

Average = the <Measurement Setup> Average field (§4.3).

8.3 Shift-register output of per-channel results

With Sorting Mode set to Shift (§4.3), the comparator results are shifted out serially on SER, clocked by SCLK and latched by RCK. **Frame length is variable:** one bit is shifted per enabled (ON) channel, so the number of bits equals the number of enabled channels (at most 90, one per channel); a disabled (OFF) channel contributes no bit and does not occupy a position. The MSB is the result of the lowest-numbered enabled channel and the LSB is the result of the highest-numbered enabled channel. A result bit is active-low (0 = pass, 1 = fail); an enabled channel whose comparator is OFF or not enabled is shifted out as fail (1). The instrument adds no filler bits; on the TH2518-01 sorting board the last bit shifted always appears on PASS-CH16, so the PASS-CH assignment of each channel depends on how many channels are enabled (§8.4). Pulse width tw = 50 µs. SCLK/RCK/SER are routed from the CPU to the HANDLER connector directly, without opto-isolation or pull-up resistors, specifically to drive the TH2518-01 sorting board.

8.4 TH2518-01 channel comparator sorting board

The TH2518-01 is an optional accessory that plugs directly into the HANDLER port and expands the standard PASS_TOTAL / PASS1–PASS6 (board-level) comparator signals into individual per-channel PASS/FAIL outputs, up to 16 channels per board, with up to 6 boards cascaded for the full 90-channel system.

Port	Signal	Description
J501-1	PASS-TOTAL	Overall sort result: active-low, as HANDLER pin 24
J501-2...7	PASS1...PASS6	Per-unit sort result, as HANDLER pins 11/23/10/22/9/21
J502-1 / 2	EOC / EOT	End-of-conversion / end-of-AD, active-low, as HANDLER pins 8/20
J502-3	PUMP	Air-pump control, as HANDLER pin 7
J502-5 / 6	START / STOP	External trigger input / scan-stop input, as HANDLER pins 13/25
J502-7	KEYLOCK	Active-low panel lock input, as HANDLER pin 12
J502-8 / 9	EXT_VCC / EXT_GND	External supply input, typically +24 V
J503/J504	PASS-CH01...PASS-CH16	Per-channel sort output for this board; low = pass, high = fail

With one board (≤16 channels enabled), OneToOne mode maps CH01–CH16 directly to PASS-CH01–PASS-CH16. With the Shift sorting mode and fewer than 16 channels enabled, the mapping shifts toward the highest-numbered PASS-CH output (e.g. 8 channels enabled map to PASS-CH09–PASS-CH16); with cascaded boards and more than 16 channels enabled, results overflow onto the next board's PASS-CH outputs in the same shift order.

> **NOTE — USE WITH EXTERNAL POWER ONLY**
>
> The TH2518-01 sorting board requires an external supply connected to its own EXT_VCC/EXT_GND terminals. Once it is fitted, the HANDLER port's own Handler Power setting (§5.1) no longer controls pins 3/15/2/16 — those always carry the instrument's internal supply/ground once the board is attached (§8.1).

APPENDIX

Packing, Warranty & Firmware

A.1 Standard accessories

See §2.1 for the full packing list (instrument, TH2518-MS test scanning board, TH26050S test cable, EU power cable, 40-core flat cable, spare fuses, documentation).

A.2 Optional accessories

Item	Description
TH2518-MS	Additional test scanning board, 15 channels/unit (up to 6 units total)
TH2518-01	Channel comparator sorting board, see §8.4
TH26056	Junction box, see §4.6.1

A.3 Transport & storage

Store the instrument in its original packaging, in a dry, well-ventilated location at 5–40 °C and ≤85% RH, away from corrosive gases, for any extended period of non-use. During transport, protect the instrument from shock, vibration and moisture.

A.4 Firmware upgrade

Firmware is upgraded from a FAT32 USB drive using a model-specific upgrade file (`TH2518.sec` or `TH2518A.sec`). Contact Techmize for the upgrade file and the step-by-step upgrade procedure, including the temporary system-lock password required during the upgrade. This manual applies to firmware version 1.4.4 and later.

> **CAUTION**
> Do not interrupt power during a firmware upgrade. If the instrument reports "Load *.SEC File failed!", reformat the USB drive as FAT32 (default allocation unit size, quick format) and keep only the correct model's upgrade file on it.

A.5 Model quick-reference

Model	Parameters	Temperature	Max. channels	Basic accuracy
TH2518	R, R-T, T	PT100 / PT500 / Analog	90	0.05%
TH2518A	R	— (not fitted)	90	0.05%

A.6 Related documents

- TH2518 Series Datasheet (Techmize)
- TH2518 Series SCPI/MODBUS Command Reference (Techmize, companion to this manual)

A.7 Contacting Techmize

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

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