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OM

OPERATION MANUAL

TH9130S Series

Multi-Channel High-Power Withstand-Voltage & Ground-Bond Tester — TH9130S / TH9131S. Covers safety precautions, front-panel operation, measurement setup and system configuration; see the companion SCPI Command Reference for the full remote-command set.

Techmize Electronic GmbH · Ismaning, Germany
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TH9130S Series Operation Manual

Multi-Channel High-Power Withstand-Voltage & Ground-Bond Tester — TH9130S / TH9131S

This manual describes the setup, operation and maintenance of the TH9130S/TH9131S Series. The structure follows the TH9130 Series Operation Manual, on which the series is based. The remote-command set is published separately — see the companion *TH9130S Series SCPI Command Reference*.

Part I — Operation	
1. Safety & Compliance	4 pages
2. Operating Procedures & Safety Precautions	4 pages
3. Getting to Know the Instrument	4 pages
4. Measurement Setup & Operation	5 pages
5. File Storage & HANDLER Interface	3 pages
6. Performance & Specifications	2 pages
Part II — Remote Control	
7. Interfaces & Remote Control	2 pages
Appendix — Warranty & Quick Reference	2 pages

The full remote-command set is published separately as the companion TH9130S Series SCPI Command Reference.

CHAPTER 1

Safety & Compliance

1.1 About this manual

This is the English edition of the operation manual for the Techmize TH9130S series multi-channel high-power withstand-voltage & ground-bond tester, covering models **TH9130S** and **TH9131S**. TH9130S/TH9131S is the multi-channel derivative of the TH9130/TH9131 platform, built for production-line testing where several DUTs or test points are scanned in sequence. Where this manual and the instrument itself appear to disagree, or where a described function is not present on your particular model or scanning-module configuration, contact Techmize or your authorized distributor using the details in §1.9 before relying on the instrument for a test decision.

The TH9130S series generates hazardous test voltages up to **5 kV AC** or **6 kV DC**. Incorrect or careless operation can cause serious injury or death. Read this chapter and Chapter 2 in full, and keep this manual available to every operator, before the instrument is put into service.

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.

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, in particular from the instrument's high-voltage test output.

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

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

Protective ground — this terminal must be connected to protective earth. Also printed on the instrument's chassis ground terminal.

> **WARNING**
>
> This instrument outputs test voltages up to 5 kV AC or 6 kV DC. Incorrect or careless operation can cause an accident, including fatal electric shock. Read Chapter 2 (Operating Procedures & Safety Precautions) in full before energizing the high-voltage output for the first time.

1.3 Conditions of use

1.3.1 Power source

Parameter	Rating
Supply voltage	100–240 VAC
Supply frequency	47–63 Hz
Rated power	1200 W

Input voltage range	Frequency	Fuse (slow-blow)	Rated power
110 VAC class (100–120 VAC)	47–63 Hz	10 A	1200 VA
220 VAC class (200–240 VAC)	47–63 Hz	10 A	1200 VA

1.3.2 Ambient temperature and humidity

Condition	Temperature	Humidity
Normal operating	0–45 °C	20–90% RH
Reference operating	20 °C ± 8 °C	< 80% RH
Storage	−10–55 °C	< 90% RH

1.3.3 Warm-up

Allow at least **20 minutes** warm-up after power-on before relying on the instrument's specified accuracy.

1.3.4 Points of attention

- Do not use the instrument in a dusty or vibrating location, in direct sunlight, or where corrosive or flammable gases are present.
- If the instrument is not used for an extended period, store it in its original packaging (or similar) in a dry, well-ventilated room at a suitable temperature, free of corrosive contaminants and direct sunlight.
- Before switching on, confirm that the supply voltage and the fitted fuse match the ratings in §1.3.1, including fuse shape, rating and characteristics — a different fuse type, or a short-circuited fuse holder, can damage the instrument.
- The instrument is designed to minimize AC-line-borne interference, but should still be used in as low-noise an environment as practical; fit a power-line filter if this cannot be achieved.
- Do not use the instrument near strong magnetic or electric fields — electromagnetic pulses can cause a malfunction and, in the worst case, a fire hazard.
- Do not operate the instrument close to sensitive test or receiving equipment. Above 3 kV, the electric field between test leads can ionize the surrounding air (corona), generating broadband RF interference; keep test leads well separated from each other and from conductive surfaces, especially sharp metal edges.
- The instrument is cooled by a rear fan and side ventilation slots; ensure good airflow around the case to prevent an internal temperature rise from degrading accuracy.
- Do not cycle the power switch rapidly. After switching off, wait several seconds before switching on again — repeated rapid on/off cycling, especially while a high-voltage output is active, can prevent the instrument's protection circuits from operating correctly. Do not switch off while a test voltage is being generated, except in an emergency.
- Use the INTERLOCK function whenever practical. In a confined workspace, build an enclosure around the DUT; for large or complex DUTs, fence off the test area and route the fence's safety switch into the INTERLOCK loop so that opening the enclosure immediately removes the high-voltage output.

1.4 Volume and weight

Parameter	Value
Dimensions (W×H×D)	430 mm × 132 mm × 550 mm
Weight	40 kg (TH9130S, all modules) · 38 kg (TH9131S, all modules)

1.5 Electrical safety test data

Test	Requirement
Insulation resistance	≥ 50 MΩ between the power-supply terminals and the chassis, under reference operating conditions; ≥ 2 MΩ under humid transport conditions
Dielectric strength	Withstands 1.5 kV AC, 50 Hz, for 1 minute between the power-supply terminals and the chassis, with no breakdown or flashover
Leakage current	≤ 3.5 mA

1.6 Low Voltage & EMC compliance

The TH9130S series is designed and tested to meet the essential requirements of the following EU directives:

Directive	Harmonised standard(s)
Low Voltage Directive 2014/35/EU	EN 61010-1:2010+A1:2019
EMC Directive 2014/30/EU	EN 61326-1:2021; CISPR 11:2015+A1:2016+A2:2019 (Group 1, Class A); EN 61000-4-2:2009, EN 61000-4-3:2020, EN 61000-4-4:2012, EN 61000-4-5:2014+A1:2017, EN 61000-4-6:2014, EN 61000-4-11:2020; EN 61000-3-2:2019+A1:2021, EN 61000-3-3:2013+A1:2019+A2:2021

> **NOTE**
>
> As a Class A / Group 1 ISM-adjacent instrument, the TH9130S series is intended for industrial/laboratory environments; it may not provide adequate protection against radio interference in a residential setting.

The CE mark on the rear-panel nameplate indicates conformity with the directives above. A full EU Declaration of Conformity is available from Techmize on request (see §1.9).

1.7 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.

1.8 RoHS compliance

The TH9130S series is designed to comply with Directive 2011/65/EU (RoHS), as amended, restricting the use of certain hazardous substances in electrical and electronic equipment. Supporting documentation is available from Techmize on request.

1.9 Manufacturer & EU contact

For warranty terms, see the Appendix. For service, calibration or accessories, contact Techmize using the details below.

Techmize Electronic GmbH

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

Contact

Mobile: +49 171 4981898
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Registration

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

CHAPTER 2

Operating Procedures & Safety Precautions

This chapter describes the procedures and precautions to be followed while operating the instrument. Pay particular attention to safety whenever the instrument is in use.

> **WARNING**
> This instrument outputs a test voltage of up to 5 kV AC or 6 kV DC. Incorrect or careless operation can cause an accident, including fatal electric shock. For your own safety, read this chapter carefully and keep its precautions in mind at all times.

2.1 Operating procedures

1) Insulating gloves

Wearing insulating gloves while operating the instrument helps protect against contact with high voltage — but avoid touching a live conductor by hand during a high-voltage test even when wearing them.

2) Grounding

A protective-ground terminal is provided on the rear panel. Use a suitable tool to connect this terminal to electrical ground (protective earth). Without a reliable ground connection, a short circuit between the supply and ground, or between any connected cable and ground, can leave the instrument's chassis at a hazardous voltage — anyone touching the chassis under that condition risks electric shock. Always confirm the protective-ground connection before use.

3) Connecting test leads

Press STOP and confirm the DANGER indicator is off before connecting test leads. When connecting leads to the DUT, connect the Return-terminal lead to the DUT first — an incomplete or disconnected Return lead is dangerous, since the entire DUT can then become charged to a high voltage. Insert the high-voltage test lead's plug fully into the HV terminal and turn it 90° clockwise to lock it in place, preventing accidental disconnection. Before every test, check that both the HV and Return leads are properly seated, with no looseness.

4) Stopping or pausing a test

To change test conditions, press STOP first so the instrument exits the test-ready state, and confirm the DANGER indicator is off. If you will be away from the instrument for a period, switch off the power to prevent an accidental start.

5) Remote control

Take particular care during remote-control operation: the high-voltage output is started and stopped remotely, and the operator cannot see the instrument's actual working state from the interface alone. In particular:

- The STOP control must be reliably connected; press it before changing the DUT.
- In a workspace with several people present, the INTERLOCK loop and protective ground must both be in place, together with a high-voltage indicator lamp. Open the INTERLOCK loop before changing the DUT.
- While a test voltage is being output, no one may touch the DUT, test leads, probes, output terminals, or the surrounding area.

6) Confirming a test has finished

If you must touch the DUT, test leads, probes or output terminals — for example to reconnect a DUT — first confirm that the power switch is off, or that the instrument's displayed state is not a test-in-progress state, and that the DANGER indicator is off. Even then, be aware the DUT may still hold a residual charge after a test and check that it has fully discharged.

7) High-voltage discharge after a test

During a high-voltage test, the test leads, probes and DUT are all charged to the test voltage. The instrument includes a discharge circuit, but discharging can take a short time even after the output has been cut off — this remains a shock hazard, so do not touch any part that could carry residual charge. At the end of a test, the discharge circuit begins forced discharge automatically; do not disconnect the DUT during the test or before discharge is complete.

Discharge time: the time needed for a full discharge depends on the test voltage used and the characteristics of the DUT. During a test, the DUT discharges through the transformer secondary (approximately 2 kΩ); a 10 µF capacitor charged to 6000 V discharges to 30 V in about 0.1 s, and the instrument's fixed 0.2 s discharge time is sufficient to complete this. The instrument's internal filter capacitors are discharged through the same circuit, also within 0.2 s.

For a DUT modeled as a 0.01 µF capacitor in parallel with a 100 MΩ resistor, if the DUT is disconnected during the test or before discharge completes, discharging to a safe 30 V takes approximately 5 s at a 5000 V test voltage, or approximately 3.5 s at 1000 V.

$$t = -\ln(30 / U) \times R \times C$$

where t is the discharge time, 30 is the residual safe voltage in volts, U is the test voltage set, R is the DUT's discharge resistance (approximately 2 kΩ), and C is the DUT's capacitance. If the DUT's time constant is known, the discharge time to 30 V after the output is cut off can be calculated from this formula.

8) Switching the power on or off

After switching off, wait several seconds before switching on again. Never cycle the power switch repeatedly — this is especially dangerous while a high-voltage output is active. Do not connect anything to the high-voltage output terminals while switching the power on or off, to avoid a hazard from an abnormal output transient.

9) Do not touch the high-voltage area during a test

While the instrument is in a test state, the output terminals, high-voltage test leads, probes, the DUT, and any exposed conductors around them all carry a hazardous voltage — do not approach or touch these areas.

> **WARNING**
> Never touch the alligator clips on the test leads while the instrument is in a test state — the rubber insulation on the clips is not sufficient to make this safe.

10) Do not short the test output to ground

Do not allow the instrument's high-voltage output lead or ground lead to short against the ground conductor of a transmission line, another connector, or the AC mains supply — this can charge the entire instrument chassis to a hazardous voltage. If the HV and Return terminals must be shorted together deliberately, first confirm the instrument's chassis is reliably connected to protective earth.

11) Do not connect external voltage to the test terminals

Do not connect any external voltage source to the instrument's output terminals. Outside a discharge cycle, the instrument's output is not designed to sink external voltage, and doing so can damage the instrument.

2.2 Handling emergency and fault conditions

1) Emergency situations

If an emergency occurs (such as an electric shock or the DUT catching fire) and the instrument has not removed the high-voltage output, perform both of the following:

1. Switch off the instrument's power switch.
2. Unplug the instrument's power cord from the outlet.

2) A faulty instrument in a hazardous state

The following conditions are hazardous even after STOP is pressed, because a high-voltage output may still be present at the terminals:

- The DANGER indicator stays lit continuously after STOP is pressed.
- The voltage reading shows no value, but the DANGER indicator is lit.

> **WARNING**
>
> If either condition above occurs, switch off the power immediately and unplug the power cord, then move away from the instrument and keep others away as well. Do not attempt to disassemble the test circuit yourself — hazardous voltage may remain inside the instrument, and this is dangerous for anyone without the proper training. Contact your Techmize distributor immediately. Either have a qualified technician confirm the circuit is safe, or leave the instrument powered off and undisturbed for at least one hour and confirm there is no output voltage at the test terminals, before removing any connections and returning the instrument to Techmize for service.

3) DANGER indicator fault

If pressing START produces a voltage reading but the DANGER indicator does not light, this may indicate a fault in the indicator itself. Switch off the instrument immediately and return it to Techmize or your local office for service.

4) Extended fault-free use

If the withstand-voltage current limit is set to 100.0 mA, watch the ambient temperature during extended use. If it exceeds 40 °C, pause testing until the temperature has returned to normal before continuing, and inspect the instrument as a precaution.

5) Replacing the fuse

To prevent electric shock, switch off the power and unplug the AC power cord before inspecting or replacing the fuse. Remove the fuse holder from the power inlet, take out the old fuse, press the new fuse into the holder, then refit the holder into the power inlet.

> **WARNING**
>
> Use only a replacement fuse matching the rating in §1.3.1, including shape, rating and characteristics. A different fuse type, or a short-circuited fuse holder, can damage the instrument.

6) AC supply quality

The instrument's AC input accepts 100–240 VAC at 47–63 Hz. A very unstable supply can cause incorrect or erratic operation — use a suitable line conditioner, such as a voltage regulator, if supply quality is in doubt.

7) 500 VA output capability

If the DUT draws a large current, a brief inrush (on the order of tens of amperes, for up to a few tens of milliseconds) can occur before a fail judgment or output cutoff takes effect, and the same can happen before a test begins. Size the supply cable and any shared connections accordingly.

8) Keep test leads clear of the panel

Keep high-voltage leads and the DUT at least 30 cm from the instrument's front panel during operation, to avoid interfering with the display.

9) Connecting automated equipment

- The instrument's and the automated equipment's grounding systems must be bonded together.
- Fit ferrite suppression rings, with at least one turn, at both ends (instrument output and DUT end) of the high-voltage lead and the Return lead.
- Route the high-voltage and Return leads separately from control lines.
- Keep the high-voltage and Return leads an adequate distance from the instrument chassis and front panel.

CHAPTER 3

Getting to Know the Instrument

This chapter introduces the front panel, the four rear-panel scanning-module configurations, and the overall structure of the touchscreen user interface.

3.1 Front panel



TH9130S front panel

1 **POWER** — mains switch. Pressed in = on, released = off.

2 **START** (green) / **STOP** (red) — START begins a test (the DANGER indicator lights once testing starts); STOP halts a test in progress and can also clear a PASS/FAIL prompt.

3 **USB** — front-panel USB port for a USB storage device.

4 Instrument logo and model designation.

5 **PrtScn** — captures the current screen to the USB storage device (must already be plugged into the front-panel port).

6 **F1–F6** — context-sensitive soft keys; the corresponding on-screen label at the right edge of the display shows each key's current function. A blank or greyed-out label means that key is inactive on the current screen.

7 **FILE** — shortcut to browse internal and external (USB) files.

8 **FUNCTION** keys — **TEST** (lit = test-ready state), **SETUP** (lit = parameter-setup screen), **SYSTEM** (lit = system-setup screen).

9 Arrow keys — move the on-screen cursor; the selected parameter is highlighted with an orange background.

10 Numeric keypad — enters numeric values, and characters such as file names when needed.

11 Indicators — **PASS** (all readings within the configured limits), **FAIL** (a reading exceeded a configured limit), **DANGER** (lit throughout a test — a high-voltage output is present).

12 **HV** — high-voltage output terminal (front-panel, single-point). Never touch while the DANGER indicator is lit.

13 **Return** — high-voltage reference (low-potential) terminal.

14 Ground-bond test terminals (front-panel, single-point) — four terminals: **Current** output, **Return** current-return, and the voltage-sense pair **Sense+** / **Sense−**.

15 Touchscreen LCD — displays test information and is also used to make settings directly.

> **NOTE**
>
> The front-panel HV and ground-bond terminals are single-point connections for bench use or setup. Production-line multi-point testing uses the rear-panel scanning-module terminals instead — see §3.2.

3.2 Rear panel & scanning modules

The rear panel carries the common interfaces (HANDLER, RS232C, LAN, USB Device, power inlet, protective ground, INTERLOCK) plus a user-selected scanning module that provides the high-voltage (HV) and ground-bond (GB) channel terminals. Four module configurations are available, common to both TH9130S and TH9131S:



TH9130S rear panel — shown fitted with the TH9130S8VG (module -001) configuration: 8 HV channels + 8 two-wire GB channels

1 **HV** — high-voltage output terminal (front-panel style, single point), duplicated on the rear panel. Never touch while the DANGER indicator is lit.

2 Ground-bond test terminals — **Current**, **Return**, **Sense+**, **Sense−** (single-point set, same as front panel).

3 **Return** — high-voltage reference (low-potential) terminal.

4 **INTERLOCK** — the high-voltage output is enabled only while these two terminals are shorted together (e.g. through a safety-fence switch).

5 **HANDLER** — starts/stops the instrument and outputs test results to automated equipment; see Chapter 5.

6 **RS-232C** — serial communication interface to a PC.

7 **LAN** — network communication interface to a PC.

8 **USB DEVICE** — lets a PC control the instrument using the remote command set.

9 AC inlet — 3-wire power inlet with integrated fuse holder.

10 Protective-ground terminal — connect reliably to electrical ground using a suitable tool.

11 **HV1–HV8** — the scanning module's high-voltage channels (count depends on module, §3.2.1). Never touch while the DANGER indicator is lit.

12, GB1–GB8 — the scanning module's ground-bond channels: two-wire modules bring out one terminal per channel (shown); four-wire modules bring out a CURRENT/RETURN pair per channel instead (§3.2.1).

3.2.1 Scanning module options

Module	Model suffix	HV channels	GB channels	GB wiring	Contact check (CK)
-001	·VG8 / 8VG	8	8	Two-wire	✓
-002	·V8 / 8V	8	—	—	✓
-003	·G8 / 8G	—	8	Four-wire	—
-004	·VG4 / 4VG	4	4	Four-wire	✓



Module -004 (4VG)



Module -001 (8VG)



Module -002 (8V)



Module -003 (8G)

A scanning module must be selected at the time of ordering — the base instrument does not ship without one. Module -004 offers fewer channels with four-wire (Kelvin) ground-bond wiring for the highest accuracy; module -001 maximises channel count with two-wire ground bond; module -002 is high-voltage scanning only (no ground bond); module -003 is ground-bond scanning only (no high-voltage channels, no CK). See the TH9130S/TH9131S European datasheet for the full channel/model matrix (TH9130S-001…004, TH9131S-001…004).

3.3 User-interface structure overview

The three **FUNCTION** keys — TEST, SETUP and SYSTEM — select which of the instrument's three main screens is shown; the key for the active screen lights up.

Screen	What it shows	How it behaves
TEST	The active test file's steps, live readings, and PASS/FAIL/step status.	Read-only during a test — parameters cannot be edited from this screen; press START / STOP to run or halt testing.
SETUP	The parameters for the currently selected test step and test mode (e.g. `STEP 01/01`, mode `AC` with its AC withstand-voltage parameters).	Selecting a different test mode (e.g. changing `AC` to `DC`) switches the whole parameter set shown — the same screen area now displays the DC withstand-voltage parameters instead.
SYSTEM	Test-related, environment-related and communication-related system settings (§3.4).	Settings here apply globally, independent of the currently selected test file or step.

Within SETUP, each test file holds one or more sequential steps (`STEP nn/NN`); each step is independently assigned a test mode — **AC** (AC withstand voltage), **DC** (DC withstand voltage), **IR** (insulation resistance), **GB** (ground bond), **Cont** (continuity) or **OSC** (open/short-circuit detection) — with that mode's own parameter set, including its scanning-channel configuration (§4.1–§4.6). Steps can be inserted, deleted, and saved to a file from the SETUP screen; see §3.8 for file storage.

3.4 System settings (SYSTEM)

3.4.1 Test-related system settings

1. Press [SYSTEM] to open the system-settings screen.
2. Use the [▲]/[▼] arrow keys, the rotary knob, or the touchscreen directly to change test-, environment- or communication-related settings.
3. Move the cursor to the parameter to change, then set it via the touchscreen, the [F1]–[F6] keys, or the numeric keypad. The same screen also offers firmware update, factory reset and save.
4. For a numeric entry, press [ENTER] to confirm, [ESC] to re-enter it, or [←] to delete a mistyped character.

Setting	Range	Default	Description
Trigger source	Manual / External / Bus	Manual	Only a trigger signal matching the selected source starts a test.
Trigger delay	0.0–99.9 s	0.0 s	Delay between receiving the trigger and the start of measurement.
Test mode	Normal / Repeat / Loop / Single-step / Breakdown	Normal	Normal: runs the file once. Repeat: runs a set number of times. Loop: repeats continuously. Single-step: runs only the current step. Breakdown: sweeps to find the DUT's insulation breakdown point (§4.7).
Repeat count	0–999	0	Number of repetitions, for Repeat test mode.
Test interval	0.0–99.9 s	0.0 s	Time between successive tests, for Repeat and Loop test modes.
On test failure	Continue / Retest / Stop / Lock	Continue	After a FAIL result: continue to the next step, wait for START to retest, wait for STOP then START, or lock the instrument until a password is entered.
Pass-buzzer time	0.2–99.9 s	0.5 s	Duration of the buzzer tone on a PASS result.
Inter-step hold	0.1–99.9 s / key	0.2 s	Delay between test steps; "key" means the instrument waits at STOP for START to continue.
Shock protection	Off / On	On	Enables the electric-shock protection function.
Output level	Low / High	Low	Sets the active logic level of the HANDLER output channels.

WARNING

This instrument can output up to 500 VA at up to 100 mA (AC withstand-voltage mode) — an electric shock at this level is severe and can cause unconsciousness or death. With shock protection **On**, if an operator contacts the high-voltage output, the instrument compares two current readings around the contact point; the current actually flowing through the body is their difference (i3 = i2 − i1). If i3 exceeds the configured limit, the high-voltage output is cut off immediately.

3.4.2 Environment-related system settings

Setting	Range	Default
Key click	Off / On	Off
Buzzer volume	Off / Low / Medium / High	High
Pass tone / Fail tone	Off / Long / Double-short	Long
Screen brightness	1–100	50
Key-lock source	Manual / Bus	Manual
Date / Time	—	—

The system language is fixed at English on the units Techmize ships.

3.4.3 Communication-related system settings

This section of the SYSTEM screen shows the status of the instrument's communication interfaces — **RS232C**, **GPIB** (optional), **USB** and **LAN** — and lets you configure each one. See Chapter 7 (Interfaces & Remote Control) for full configuration details and the companion SCPI Command Reference for the remote-command set.

CHAPTER 4

Measurement Setup & Operation

Press SETUP to open the parameter-setup screen for the currently selected test step. Touch the test-mode field (or the ▶ arrow key) to choose the step's test mode — **AC**, **DC**, **IR**, **GB**, **Cont**, or **OSC** — and set the cursor on any field to change it. This chapter covers each test mode's parameters (§4.1–§4.6), the Breakdown voltage test (§4.7), the TEST screen (§4.8), and the step-by-step test procedure (§4.9).

4.1 AC withstand-voltage (ACW) setup

Parameter	Range	Default	Description
Test voltage	0.050–5.000 kV, 0 = off	Off	AC withstand-voltage test level.
Current upper limit	0.001–120.0 mA	0.500 mA	Up to 120 mA at ≤4 kV; up to 100 mA above 4 kV.
Current lower limit	0.001 mA – upper limit, 0 = off	Off	Must not exceed the upper limit.
Arc limit	1–20 mA, 0 = off	Off	Arc-current threshold; off = no arc requirement.
Test frequency	50 Hz or 60 Hz	50 Hz	Withstand-voltage test frequency.
Rise time	0.1–999.9 s, 0 = off	Off	Time to ramp to the set voltage; off = ramps within the first test cycle.
Test time	0.3–999.9 s, 0 = continuous	3.0 s	0 runs continuously until STOP is pressed.
Fall time	0.1–999.9 s, 0 = off	Off	Time to ramp down after the test; off = output is cut immediately.
Contact check (CK)	Off / On	Off	Checks that the configured HV channel(s) actually make contact with the DUT before applying full test voltage — available on modules with CK (§3.2.1).
Channel setting	Per channel: H / L / O	O	H = channel is the high-potential (HV) output; L = channel is the low-potential (Return) reference; O = channel is open (unused). Exactly the channels you wire to the DUT should be set to H or L — see §4.1.1.

4.1.1 Channel setting & contact check

Each step's HV channels are configured individually as **H** (high), **L** (low/Return) or **O** (open/unused). A common pattern is to set every channel you will use to **H** and return the DUT's low side to the module's shared **Return** terminal, so one step tests every wired channel together; alternatively set only one channel to **H** per step to test channels one at a time. With **Contact check** On, the instrument first confirms a reliable connection on every channel set to H or L before applying the full test voltage — if a channel set to H or L is not properly connected, the step fails immediately rather than energizing an open circuit.

Channel setting and contact check work the same way in DCW, IR and OSC modes (§4.2, §4.3, §4.6) — this section is referenced there rather than repeated.

4.2 DC withstand-voltage (DCW) setup

Parameter	Range	Default	Description
Test voltage	0.050–6.000 kV, 0 = off	Off	DC withstand-voltage test level.
Current upper limit	0.0001–20 mA	0.500 mA	
Current lower limit	0 – upper limit, 0 = off	Off	
Rise time	0.1–999.9 s, 0 = off	Off	Time to ramp to the set voltage.
Test time	0.3–999.9 s, 0 = continuous	3.0 s	0 runs continuously until STOP is pressed.
Fall time	0.1–999.9 s, 0 = off	Off	Time to ramp down after the test; off = output is cut immediately (the DUT may remain charged).
Contact check (CK)	Off / On	Off	See §4.1.1.
Channel setting	Per channel: H / L / O	O	See §4.1.1.

4.3 Insulation resistance (IR) setup

Parameter	Range	Default	Description
Test voltage	0.050–6.000 kV, 0 = off	Off	Insulation-resistance test voltage.
Resistance lower limit	0.05 MΩ – 50 GΩ	1.000 MΩ	
Resistance upper limit	lower limit – 50 GΩ, 0 = off	Off	
Rise time	0.1–999.9 s, 0 = off	Off	Time to ramp to the set voltage.
Test time	0.3–999.9 s, 0 = continuous	3.0 s	0 runs continuously until STOP is pressed.
Fall time	0.1–999.9 s, 0 = off	Off	Time to ramp down after the test.
Contact check (CK)	Off / On	Off	See §4.1.1.
Channel setting	Per channel: H / L / O	O	See §4.1.1.

To choose the current range, estimate the DUT's insulation resistance and compute I = U/R to find the expected current, then pick the range that covers it:

Current range	Resistance @ 50–499 V	Resistance @ 500–6000 V
10 mA (3–10 mA)	0.05–1 MΩ	0.05–4.5 MΩ (≤1000 V) / 1.0–4.5 MΩ (>1000 V)
3 mA (0.3–3 mA)	0.5–4.5 MΩ	3.0–15.0 MΩ
300 µA (30–300 µA)	3.0–15.0 MΩ	10.0–45 MΩ
30 µA (3–30 µA)	10.0–45 MΩ	35.0–450 MΩ
3 µA (0.3–3 µA)	45 MΩ – 0.45 GΩ	0.40–4.5 GΩ
300 nA (20–300 nA)	0.40–4.9 GΩ	4.0–50.0 GΩ

4.4 Ground bond (GB) setup

Parameter	Range	Default	Description
Test current	1.00–40.00 A	25.00 A	
Test voltage	3.00–8.00 V	5.00 V	Limits the open-circuit output voltage in this constant-current test; raise toward 8 V if the set current cannot be reached.
Test time	0.5–999.9 s, 0 = continuous	3.0 s	0 runs continuously until STOP is pressed.
Test frequency	50 Hz / 60 Hz	50 Hz	
Resistance upper limit	0–600 mΩ	100 mΩ	0–600 mΩ (1.00–10.00 A) · 0–200 mΩ (10.01–30.00 A) · 0–150 mΩ (30.01–40.00 A)
Resistance lower limit	0 mΩ – upper limit	0 mΩ	
Synchronous test	Off / ACW / DCW	Off	Runs ground bond at the same time as a withstand-voltage test — the instrument automatically adds a withstand-voltage sub-step, which you then configure as usual (§4.1/ §4.2); the TEST screen shows both readings together.
Offset	0–200 mΩ	0 mΩ	Manual zero-offset value; auto-zero is available from the TEST screen.
Channel setting	Per channel: C / O	O	C = channel is the active Current-measurement channel; O = channel is open (unused). Exactly one channel is set to C per step.

Ground-bond channel wiring depends on the fitted module: four-wire modules (-003, -004) bring out an independent CURRENT/RETURN pair per channel for Kelvin (4-wire) measurement; the two-wire module (-001) shares a common Return across all GB channels, with each channel contributing only its Current connection.

4.5 Continuity setup

Parameter	Range	Default	Description
Resistance upper limit	0.00–10,000 Ω	1000 Ω	
Resistance lower limit	0.00 Ω – upper limit	0.00 Ω	
Test time	0.3–999.9 s, 0 = continuous	3.0 s	0 runs continuously until STOP is pressed.
Channel setting	Per channel: C / O	O	Same convention as ground bond (§4.4) — C selects the active channel.

4.6 Open/short-circuit detection (OSC) setup

Parameter	Range	Default	Description
Open-circuit threshold	10–100%, step 1%	50%	Reading as a percentage of the sampled reference capacitance.
Short-circuit threshold	0, 100–500% (0 = off)	300%	0 disables short-circuit judgment.
Reference sample	0.001–40.000 nF	10.000 nF	Enter a known value directly, or obtain one by sampling (below).
Contact check (CK)	Off / On	Off	See §4.1.1.
Channel setting	Per channel: H / L / O	O	Same convention as ACW/DCW/IR (§4.1.1).

Sampling a reference value: move the cursor to the reference-sample field and press the on-screen Sample key. The instrument outputs a 100 V, 600 Hz AC signal and measures the current through the DUT for 1 s (this output is live — observe normal high-voltage precautions). The displayed value is not the DUT's true capacitance but the impedance-derived equivalent, which approximates the actual capacitance across the test terminals.

4.7 Breakdown voltage test

The Breakdown voltage test sweeps the withstand-voltage output upward in steps to find a DUT's insulation breakdown point — a destructive test of the DUT's ultimate withstand capability. Select **Breakdown** as the SYSTEM test mode (§3.4.1), then press TEST to open the breakdown setup screen. Breakdown testing is available with DC output only.

Parameter	Range	Default	Description
Start voltage	0.05 kV – end voltage	0.05 kV	
End voltage	0.05–6 kV	0.1 kV	
Step voltage	0.005–0.5 kV	0.05 kV	Voltage increase per step.
Number of steps	2–999	2	Determined automatically from start/end/step voltage, or set directly.
Continue on completion	Off / On	Off	Whether testing continues after every step has run.
Rise time	0–999 s, 0 = off	Off	Rise time per step.
Test time	0.3–999 s	3.0 s	Test time per step.
Current upper limit	0–20 mA	0.500 mA	Leakage-current upper limit.
Current lower limit	0 – upper limit, 0 = off	Off	
Arc limit	0–10 mA (0 = off)	Off	

4.8 The TEST screen

Press TEST to open the measurement screen for the active file. The screen's left side shows the test step and mode; the upper-centre area shows that mode's configured parameters; the centre shows the live voltage, current or resistance reading in large digits; the lower-centre area shows test status and PASS/FAIL result; the right side holds the zero (offset) and page controls.

Press START to begin — the DANGER indicator lights for as long as a hazardous output is present. Press the "List mode" soft key to switch to the list display, which shows every step's step number, mode, up to three parameters, and result in one screen — press "Step" to return to the single-step view.

4.9 How to run a test

4.9.1 Zeroing test-lead/fixture offset

1. Remove the DUT from the test leads or fixture, and confirm the test conditions are as intended.
2. Press TEST, then the "Zero" soft key, then START. The instrument measures the test leads' own leakage current and stores this reading as the zero offset.

4.9.2 Sampling a reference capacitance (for OSC)

1. Before an OSC test — or whenever the DUT type changes — take a fresh reference-capacitance sample, or enter one manually.
2. Zero the test leads first (§4.9.1); repeat this any time the leads or fixture are changed.
3. Connect a known-good sample of the DUT, then run the Sample function under OSC setup (§4.6) to measure and store its capacitance as the reference value.

4.9.3 Connecting the DUT

1. Confirm the instrument has no voltage output and the DANGER indicator is off (not flashing).
2. For front-panel (single-point) testing: connect the low-potential lead to the Return terminal first, then the high-potential lead to the DUT.
3. For rear-panel scanning: wire each channel you have set to H (or C, for GB/Continuity) to its DUT test point, and route the DUT's low side to the module's shared Return/Low reference. Confirm the channel settings (§4.1.1, §4.4) match your wiring before testing.
4. For a ground-bond test, connect the Return lead first, then the Current lead, to the DUT.

4.9.4 Running the test

1. Connect the DUT as in §4.9.3. Press TEST — the configured step is shown as described in §4.8.
2. Press STOP to arm the instrument, then START to begin. A hazardous voltage or current is now present and the DANGER indicator flashes.
3. **PASS:** once every configured step completes within limits, the instrument shows PASS at bottom right, cuts the high-voltage output, asserts the rear-panel PASS signal, and sounds the buzzer.
4. **FAIL:** if a reading falls outside its configured limit — or, with Contact check on, if a configured channel is not properly connected — the instrument shows FAIL, cuts the output immediately, asserts the rear-panel FAIL signal, and sounds the buzzer continuously until STOP is pressed.

Press STOP at any time to abort a test in progress.

CHAPTER 5

File Storage & HANDLER Interface

5.1 File storage

Press FILE to open the file-management screen. Use the arrow keys, the rotary knob, or the touchscreen to move between the internal file list (Files) and an external USB drive (usb), then press OK or touch a file entry and use F1–F6 for the operations below.

Function	Description
New folder	Creates a new folder.
Delete folder	Deletes the currently selected folder.
Rename	Renames the selected file or folder.
Save to internal	Stores the current file in internal memory.
Save to USB	Stores the current file to the USB drive.
Copy to USB	Copies an internal file to the USB drive.
Copy to internal	Copies a USB file into internal memory.
Load file	Loads the selected file into the instrument as the active file.
Delete file	Deletes the selected file.
New configuration	Creates a new file containing a single default ACW step.

Internal storage holds up to 100 files, 50 steps per file. Each stored file keeps its own complete step sequence, per-step test-mode parameters, and channel configuration, so a saved file can be reloaded to reproduce an entire multi-step, multi-channel test program instantly.

5.2 HANDLER interface overview

The HANDLER interface is the instrument's primary link into an automated test system: it accepts start/stop control from external automation and outputs the test result for each step — including, on this multi-channel series, a separate pass/fail signal for each individual HV, ground-bond and contact-check channel.

Signal group	Specification
Internal output signals	DC 24 V, 20–40 mA
External input signals	DC 3–26 V (HIGH), 10 mA ± 4 mA

The connector is a female D-sub type; consult the physical connector on your unit or Techmize to confirm the exact pin count and shell size before designing a mating cable.

5.3 HANDLER pin assignment

Common signals (fixed function)

Pin(s)	Signal	I/O	Description
1	/HV	Output	LOW when ACW / DCW / IR / OSC fails.
2	/CONT (or /CK on modules -001/-002/-004)	Output	LOW when continuity fails; on modules with contact check (-001, -002, -004), this pin is reused as the overall contact-check fail signal instead.
3	/GB	Output	LOW when ground bond fails.
4	/FAIL	Output	LOW when the step result is FAIL.
5	/PASS	Output	LOW when the step result is PASS.
16	/EOT	Output	HIGH while the test programme is running; LOW once it has finished or while idle.
17	/EOS	Output	HIGH while the current step is running; LOW once that step has finished or once all steps are complete.
8	/EXT_STOP	Input	External STOP; active LOW.
9	/EXT_START	Input	External START; active LOW.
10, 11	$+V_{EXT}$ (EXT_DCV)	Input	External DC supply input, +3 V to +26 V.
12, 13	+24 V	Output	Instrument's internal DC supply output.
22, 23	COM	—	Common low-reference for the I/O signals.
24, 25	GND	—	Return for the +24 V internal supply output.

Per-channel signals (pins 6, 7, 14, 15, 18–21)

These six pins carry a separate pass/fail signal for each of up to 8 HV, ground-bond, or contact-check channels — which signal appears on a given pin depends on the fitted scanning module and the active test mode. Each is an output, active LOW (FAIL); HIGH indicates PASS or an unused/unconfigured channel.

Pin	Channel	GB signal (modules -001/-003/-004)	CK signal (modules -001/-002/-004)	HV signal (modules -001/-002/-004)
6	8	/GB8	/CK8	/HV8
7	7	/GB7	/CK7	/HV7
14	6	/GB6	/CK6	/HV6
15	5	/GB5	/CK5	/HV5
18	4	/GB4	/CK4	/HV4
19	3	/GB3	/CK3	/HV3
20	2	/GB2	/CK2	/HV2
21	1	/GB1	/CK1	/HV1

Channels 5–8 apply only to the 8-channel modules (-001, -002, -003 as applicable); channels 1–4 apply to all modules, including the 4-channel -004. A given pin carries whichever of GB/CK/HV applies to the fitted module and active test mode — never more than one at a time.

Example — ACW with contact check: on module -001 (TH9130S8VG) with channels 1 and 6 set to H, channel 8 set to L, and contact check on, a contact-check failure asserts pins 17 (/EOS), 1 (/HV), 2 (/CK), 21 (/HV1), 14 (/HV6) and 6 (/HV8) LOW. With contact check off and the test itself failing, pins 17, 1, 21, 14 and 6 go LOW. On a PASS, only pin 17 goes LOW.

Example — Ground bond: on module -001 with channel 1 set to C, a FAIL asserts pins 17 (/EOS), 3 (/GB) and 21 (/GB1) LOW.

5.4 Connecting to automated equipment

HANDLER wiring can use the instrument's own internal +24 V supply (pins 12/13, referenced to COM/GND) or an external DC supply fed into pins 10/11 ($+V_{EXT}$). Bond the instrument's and the automated equipment's grounding systems together, and keep control wiring separated from the high-voltage test leads (§2.2.9).

CHAPTER 6

Performance & Specifications

Specifications below apply after the warm-up period in §1.3.3, at the reference operating condition in §1.3.2, unless noted otherwise. They match the confirmed figures in the TH9130S/TH9131S Series European datasheet.

6.1 AC / DC withstand voltage (ACW / DCW)

Parameter	TH9130S	TH9131S
AC voltage range	0.05–5.0 kV, 50/60 Hz ± 0.1% sine wave	
AC output power	500 VA (5.0 kV/100 mA)	200 VA (5.0 kV/40 mA)
DC voltage range	0.05–6.0 kV	
DC output power	120 VA (6.0 kV/20 mA)	
Voltage accuracy	± (1% set value + 5 V); resolution 2 V	
AC current range	0.001–120 mA (V≤4 kV) / 100 mA (V>4 kV)	0.001–40 mA
DC current range	0.0001–20 mA	
Test / rise / fall / wait time	0.3–999 s / 0.1–999 s / 0.1–999 s / 0.1–999 s (0 = continuous / off)	
Arc detection (AC / DC)	1.0–20.0 mA / 1.0–10.0 mA	1.0–20.0 mA / —
Max short-circuit current (AC)	200 mA	80 mA
Fast discharge	Automatic discharge after DC withstand-voltage test	

6.2 Insulation resistance (IR)

Parameter	Value
Output voltage	DC 0.05–6.0 kV, resolution 2 V, accuracy ± (1% reading + 5 V)
Resistance range	0.05 MΩ – 50.0 GΩ
Accuracy (V ≥ 1 kV, and 500 V ≤ V < 1 kV)	1 MΩ–1 GΩ: ± (3% reading + 1 MΩ) · 1–10 GΩ: ± (7% reading + 0.2 GΩ) · 10–50 GΩ: ± (10% reading + 0.5 GΩ)
Accuracy (V < 500 V)	1 MΩ – 1 GΩ: ± (5% reading + 100 V/V_s × 10 MΩ)

6.3 AC ground bond (GB)

Parameter	Value
Output current	1.00–40.00 A, ± (2% set value + 2 digits)
Test voltage	3.00–8.00 V, 50/60 Hz ± 0.1%
Resistance range / accuracy	0–600 mΩ (1–10 A) · 0–200 mΩ (10–30 A) · 0–150 mΩ (30–40 A); accuracy ± (2–3% reading + 2–3 digits)
Synchronous ACW+GB test	5 kVac/30 mAac & 30 Aac/150 mΩ

6.4 Continuity

Parameter	Value
Test current / resistance	0.0001–0.1 A / 0.00–10,000 Ω; accuracy ± (1% reading + 3–10 digits)

6.5 OSC open/short-circuit detection

Parameter	Value
Sample capacitance / thresholds	0.001–40 nF · open 10–100% · short 100–500%

6.6 Channels & scanning

Parameter	Value
HV channels (ACW/DCW/IR)	4 (module -004) or 8 (modules -001/-002); module -003 has none
Ground-bond channels	4 (module -004, four-wire) / 8 (module -001, two-wire) / 8 (module -003, four-wire); none on module -002
Contact check (CK)	Standard on modules -004 / -001 / -002; not available on module -003

6.7 Safety & general

Parameter	Value
Electric-shock protection	0.5 mA ± 0.25 mA, selectable on/off; Interlock pin must be pulled low to enable HV output
Alarm / lock	Pass: short tone + green light · Fail: long tone + red light · lock-on-fail, panel key-lock
Storage	100 files, 50 steps/file
Standard interfaces	RS232, USB Device, USB Host, LAN, HANDLER — SCPI standard
Optional interface	GPIB
Operating temp. / humidity	0–45 °C, 20–90% RH (comparison ref. 18–28 °C, 30–70% RH)
Storage temp. / humidity	−10–55 °C, < 80% RH
Power supply / power	100–240 VAC, 47–63 Hz · no-load < 100 W, rated 1200 W
Dimensions (W×H×D)	430 × 132 × 550 mm
Weight	40 kg (TH9130S, all modules) · 38 kg (TH9131S, all modules)

CHAPTER 7

Interfaces & Remote Control

The instrument can be remote-controlled over RS232C (standard) or GPIB (optional) — not simultaneously — using the same command set on different hardware and transport. USB Device and LAN are also available for remote control and file transfer. This chapter covers interface setup; the full command syntax is in the companion *TH9130S Series SCPI Command Reference*.

7.1 RS232C

The instrument implements a minimal 3-wire subset of RS-232 — transmit data (TXD, connector pin 3), receive data (RXD, pin 2) and signal ground (GND, pin 5) — on a 9-pin male D-sub connector, pinned the same as a standard IBM-AT-compatible 9-pin serial port. Use a standard 9-pin female D-sub cable to connect directly.

Parameter	Setting
Transfer mode	Full-duplex asynchronous, with start and stop bits
Baud rate	9600 / 19200 / 38400 / 115200 bps
Data bits	7 or 8
Stop bits	1 or 2
Parity	None / Odd / Even
Terminator	NL (line feed, ASCII 10)
Handshake	Software (character echo — see below)
Connector	9-pin D-sub

To select RS232C as the active bus, press SYSTEM, then F3, then set the port type to RS232C and configure the parameters above from the same screen.

> **WARNING**
> Switch the instrument off before connecting or disconnecting the RS232C cable, to avoid an electrical shock hazard. Never short an output terminal to another terminal or to the chassis — this can damage the instrument.

Software handshake protocol

RS232C on this instrument uses no hardware handshake lines; instead, it uses character-echo software handshaking to reduce data loss or corruption:

- Commands are sent as ASCII text terminated by NL (line feed, ASCII 10); the instrument begins executing only once it has received the terminator.
- The instrument echoes each character back immediately on receipt; the host should wait for that echo before sending the next character. A missing echo usually means a cabling fault, RS232C not enabled on the instrument, or the instrument busy executing a bus command (in which case resend the un-echoed character to keep the command intact).
- The instrument sends data only in response to a received character (echo) or a query command's result.
- A query's result is sent immediately once that query executes, even mid-command-string — so a command string may contain multiple queries, but the host must perform a matching number of reads; one query per command string is recommended.
- Query results are ASCII text terminated by NL, sent continuously (~1 ms between characters) — the host must be ready to receive or data can be lost.
- Before sending a new query, make sure any previous query result has been fully read (through its terminating NL) to avoid a collision between that result and subsequent echoes; likewise clear any pending echo characters before reading a query result.
- For commands that take longer to complete (e.g. a zero/offset operation), the host should wait for completion rather than sending the next command immediately.

Implement RS232C control with a standard serial library for your platform (e.g. PySerial for Python, or your language's equivalent), applying the handshake rules above and the command syntax in the SCPI Command Reference.

7.2 GPIB (optional)

The optional GPIB (IEEE 488.2) interface board lets the instrument join a shared bus with a controller PC and other GPIB instruments for automated test systems. Up to 15 instruments can share one bus; total cable length must not exceed 2 m × (number of instruments on the bus), and must never exceed 20 m overall. Cables can be connected in any topology, but no more than 4 piggyback connectors should be stacked on any one instrument.

Code	Function
SH1	Full source-handshake capability
AH1	Full acceptor-handshake capability
T5	Basic talker; talk-only; talker cancelled on MLA; no serial poll
L4	Basic listener; listener cancelled on MTA; no listen-only
RL1	Remote/local capability
DC1	Device clear
DT1	Device trigger
C0	No controller capability
E1	Open-collector driver

The instrument uses single-address addressing (no secondary address), 0–30, factory default 1; the address is retained in non-volatile memory. To set it: press SYSTEM, then F3, select port type GPIB, move to the address field, and enter the address on the numeric keypad.

Supported GPIB bus commands: **IFC** (interface clear), **SDC/DCL** (device clear — clears the I/O buffers and readies the interface), **GTL** (go to local — returns front-panel control, keys become active), **LLO** (local lockout — disables all front-panel keys until GTL is issued), **RMT** (remote).

7.3 Command syntax overview

- Only the actual characters sent or received by the instrument are described in the command reference; all command characters are ASCII.
- A command's data field, shown as `<????>`, is an ASCII string — typically an integer or floating-point number in the instrument's default unit for that parameter (units are not included in the command itself).
- Every command must end with a terminator: **NL** (line feed, decimal 10 / 0x0A) over RS232C/USB/LAN, or the IEEE-488 **EOI** signal over GPIB. Without a terminator, the instrument does not parse the command.

For fast, single-command step configuration, each of the 6 test modes also has a compact multi-parameter "CAL" command that sets every parameter for a step in one line, including that mode's channel configuration — see the companion SCPI Command Reference for the full per-mode syntax and worked examples.

APPENDIX

Warranty & Quick Reference

A.1 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 (Chapter 1).

This warranty does not cover: damage from misuse, accident, unauthorized modification or repair; consumable/wear items such as fuses and connectors; or damage from operation outside the environmental limits given in §1.3. Standard test fixtures and cables are covered by their own applicable warranty terms.

A.2 Limitation of liability

Except as expressly stated in §A.1, 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.

A.3 Related documents

The remote-command set is published separately in the *TH9130S Series SCPI Command Reference*.

A.4 Front-panel key quick reference

Key	Function
TEST	Opens the measurement/run screen (§4.8)
SETUP	Opens the per-step parameter setup screen (Chapter 4)
SYSTEM	Opens system settings — test, environment, communication (§3.4)
FILE	Opens file management, internal and USB (§5.1)
START	Begins a test; DANGER indicator lights/flashes while hazardous output is present
STOP	Halts a test in progress; also clears a PASS/FAIL prompt
PrtScn	Captures the current screen to a USB storage device
F1 – F6	Context-sensitive soft keys, labelled on-screen

A.5 Common remote commands

Task	Command
Identify the instrument	`*IDN?` → manufacturer, model, firmware version
Set the test mode for a step	`FUNC:SOUR:STEP <sn>:PRJ <mode>` (AC/DC/IR/GB/CONT/OSC)
Configure a step's parameters	`FUNC:SOUR:STEP <sn>:<mode>:<param> <value>` — see Chapter 4 and the SCPI Command Reference
Start / stop a test	`FUNC:START` · `*STOP`
Read the test result	`FETCh?`
Save / load a setup file	`MMEM:SAVE <name>.sta` · `MMEM:LOAD <name>.sta`

See the companion *TH9130S Series SCPI Command Reference* for the complete command set.

A.6 Manufacturer & EU contact

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