TECHMIZE by TONGHUI

OPERATION MANUAL

TH6900 Series

Wide-Range Programmable DC Power Supply

TH6935 / TH6940 / TH6980 / TH69200 / TH69360 / TH69500 / TH69750 / TH691000 — 750 W / 1.5 kW / 3 kW · Rev. 2026-09 · English edition

Techmize Electronic GmbH — an international subsidiary of Changzhou Tonghui Electronic Co., Ltd.

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CHAPTER 1

Safety & Compliance

1.1 About this manual

This is the English edition of the operation manual for the Techmize TH6900 series wide-range programmable DC power supply, covering all 21 models across the 750 W, 1.5 kW and 3 kW power classes (model list in Chapter 9). Where this manual and the instrument itself appear to disagree, or where a described function is not present on your particular model, contact Techmize or your authorized distributor using the details in §1.10 before relying on the instrument for measurement or test decisions.

Techmize continually improves the performance, features and construction of its instruments; content, specifications and accessories described here are subject to change without notice.

1.2 Safety symbols

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

Symbol / word	Meaning
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 connected load.
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.
High voltage	Marks a terminal or area carrying hazardous voltage during operation.
Indoor use only	The instrument is designed for indoor use and must not be exposed to rain or moisture.

1.3 General safety requirements

The TH6900 series is a bench/rack-mount Protection Class I instrument: protective earthing of the chassis, via the power cord or the rear-panel ground terminal, 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. Disconnect the power supply before opening the case; internal voltages remain present even when the front-panel Power switch is off. Do not open the case yourself — refer servicing to qualified Techmize/Tonghui personnel.

> **WARNING — HAZARDOUS OUTPUT VOLTAGE**
>
> Once voltage and current are set and the output is switched on, the output terminals carry a hazardous voltage. Do not touch the output terminals or connected wiring while the output is enabled.

Before switching on, confirm the AC supply matches the instrument's rated input (§2.3) and that a suitably rated circuit breaker or fuse is fitted upstream, sized at 1.25× the unit's maximum input current. Use only the supplied power cable, or a replacement of at least 2.5 mm² cross-section.

> **CAUTION**
>
> Do not operate the instrument in an explosive or corrosive atmosphere. Do not let liquids or metal objects enter the case. Product damage caused by an incorrect mains supply is outside the scope of the warranty.

Environment. Operate indoors only, at 0–50 °C and 10–95% relative humidity (non-condensing), away from direct sunlight, strong vibration, dust and corrosive gases. Keep at least 30 cm of clearance around the ventilation openings. Store at −20 to 70 °C, ≤80%

relative humidity; in humid storage conditions, power the unit on periodically (about 20 minutes) to prevent condensation.

Handling. Units heavier than 20 kg (the 3 kW models) should be moved by two or more people. Switch off and disconnect all cabling before relocating the instrument.

1.4 Electrical safety data

Test	Requirement
AC input to chassis	Withstands 2500 VDC
AC input to DC output	Withstands 2500 VDC
DC output to chassis (PE)	Negative output terminal: max. 400 VDC. Positive output terminal: max. 400 VDC + output voltage.

1.5 Low Voltage & EMC compliance

The TH6900 series has been tested and found in compliance with the essential requirements of the following EU directives. The CE mark on the rear-panel nameplate indicates conformity with these directives.

Directive	Harmonised standard(s)
Low Voltage Directive 2014/35/EU Test report DLS-250806005R	EN 61010-1:2010+A1:2019
EMC Directive 2014/30/EU Test report DLE-250806038R	EN IEC 61326-1:2021, EN IEC 61326-2-2:2021, EN IEC 61000-3-2:2019+A1:2021+A2:2024, EN 61000-3-3:2013+A1:2019+A2:2021, EN 61000-4-2:2009, EN IEC 61000-4-3:2020, EN 61000-4-4:2012, EN 61000-4-5:2014+A1:2017, EN IEC 61000-4-6:2023, EN 61000-4-8:2010, EN IEC 61000-4-11:2020+AC:2022

1.6 WEEE

Within the European Union, return the instrument at end of life 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.

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.

This warranty does not cover: damage from misuse, accident, unauthorized modification or repair; consumable/wear items; or damage from operation outside the environmental limits given in §1.3, or from an incorrect mains supply.

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. Repairs must be carried out by qualified personnel; after any repair, the instrument should be recalibrated before being relied on for measurement accuracy.

1.10 Manufacturer & EU contact

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CHAPTER 2

Out of the Box

2.1 Unpacking

Check the shipping carton for transport damage before use; if damage is visible, do not power on the instrument — contact your carrier and your Techmize distributor before proceeding.

1. Unpack the instrument following the markings on the outer carton.
2. Check the nameplate against your order, and check the carton contents against the packing list. Contact Techmize or your distributor if anything does not match.
3. Inspect for visible damage (scratches, dents, loose fasteners). Report any damage to Techmize or your distributor before returning the product.
4. Do not open the top cover yourself. If the instrument appears faulty, contact Techmize or an authorized distributor for support.

Standard accessory: one EU power cable (Schuko, CEE 7/7).

2.2 Installation location & environment

Choose a location with good ventilation; keep at least 30 cm clearance between the intake/exhaust openings and any wall or obstruction. Avoid direct sunlight, damp or corrosive environments, and never allow the unit to be splashed with water.

Condition	Value
Operating temperature	0–50 °C
Operating humidity	10–95% RH, non-condensing
Storage temperature	−20 to 70 °C
Storage humidity	≤80% RH (run the unit periodically, ≈20 min, if stored in humid conditions)
Altitude	<2000 m
Location	Indoor use only; not for outdoor installation

Do not install the instrument where the mains plug or a disconnect switch cannot be easily reached, so the supply can always be isolated quickly.

2.3 Input wiring

Connect the instrument to mains using the supplied power cable. If a different AC cable is used, its conductors must be at least 2.5 mm² in cross-section. The series' default rated input is **220 V AC ±10 V, 16 A, 50 Hz** (see §9 for the full electrical specification, including the wider input ranges available on the 1.5 kW and 3 kW models).

> **WARNING**
> Confirm the supply is disconnected before wiring. Leakage current can make the chassis live if the ground terminal is not properly earthed — always connect protective earth before connecting the AC supply.

> **CAUTION**
> Fit a circuit breaker or fuse rated at 1.25× the instrument's maximum input current in the supply line feeding the unit.

2.4 Output wiring

2.4.1 Basic connection

Two connection methods are available at the rear-panel output and remote-sense (S+/S–) terminals:

- **Without lead-drop compensation:** connect the load directly to the output terminals, and short S+ to the positive output terminal and S– to the negative output terminal. The display then shows the voltage at the power supply's own output terminals, not at the load.
- **With lead-drop compensation:** connect S+ and S– directly at the load, alongside the output leads. The display then shows the actual voltage present at the load, compensating for voltage dropped in the output leads.

> **CAUTION**
>
> Never connect only the SENSE leads without also connecting the main output leads to the load — current would then flow through the SENSE leads and damage internal components.

2.4.2 Battery-load wiring

When charging a battery, fit a diode or DC contactor (a diode module is recommended) in series between the power supply and the battery to prevent damage to either device.

- Diode reverse voltage rating: at least 2–3× the power supply's rated output voltage.
- Diode forward current rating: at least 1.5× the power supply's maximum output current.
- If using a contactor: connect all wiring with the contactor open; close the contactor only after the power supply's output is enabled; when stopping, open the contactor before disabling the power supply's output.

2.4.3 Inductive-load wiring

For inductive loads, fit a diode (or diode module, recommended) across the load, with the same reverse-voltage and forward-current sizing as for battery loads above, to protect the power supply and the load from switching transients.

2.4.4 Output wire gauge

Current	Input lead gauge (incl. ground)	Output lead gauge
10 A	BVR 2.5 mm²	BVR 2 mm²
15 A		BVR 2 mm²
20 A	BVR 2.5 mm²	BVR 2.5 mm²
30 A	BVR 2.5 mm²	BVR 6 mm²
60 A	—	BVR 16 mm²
120 A	—	BVR 50 mm²

Do not use undersized wire, which can overheat and create a hazard. For the ground lead, a braided copper strand no larger than 0.15 mm per strand is recommended.

2.5 First power-on

1. Confirm the power cable and all output wiring are correctly connected.
2. Switch on the rear-panel supply and then the front-panel Power switch.
3. A splash screen appears for approximately 5–10 seconds while the instrument performs a self-test, then the standby screen is displayed. If the self-test finds a fault, the instrument enters the corresponding alarm state instead (see §4.6).

CHAPTER 3

Getting to Know the Instrument

All TH6900 series models share the same 2U front and rear panel layout; only the rated voltage, current and power differ between models. This chapter is a general overview — see Chapter 4 onward for detailed operating instructions.

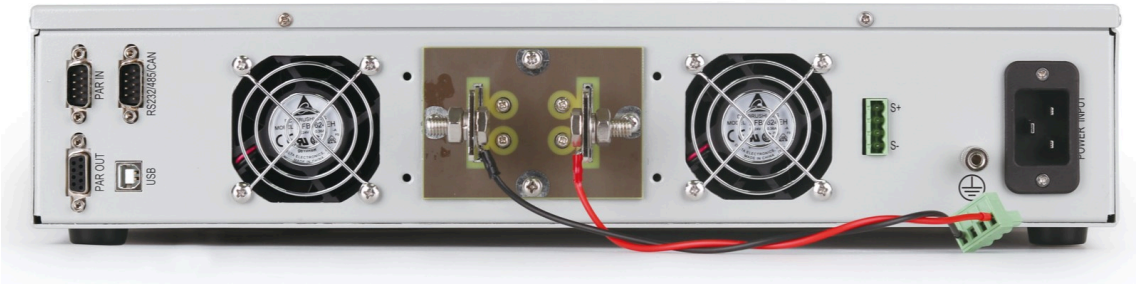
3.1 Front panel



TH6900 series front panel

#	Item	Description
1	Power switch	Mains on/off for the instrument.
2	LCD display	Colour LCD showing output readings, set values and status.
3	Softkeys (F1–F4)	Context-sensitive; function shown on screen next to each key (Recall, Remote, Alarm, System on the standby screen — §4.4–4.7).
4	Status LEDs	RMT (remote mode), CV, CC, CP — indicate the current operating mode (§3.3).
5	Rotary knob	Adjusts the value at the cursor position; moves the cursor in setup screens.
6	Home / V-Set / I-Set / P-Set / ▲ ▼ / ON-OFF	Home returns to the standby screen; V-Set, I-Set, P-Set select the voltage, current or power field for editing; ▲/▼ navigate menus; ON/OFF starts or stops the output.
7	Numeric keypad	Digits 0–9, decimal point, Enter and Cancel, for direct numeric entry.

3.2 Rear panel



TH6900 series rear panel

#	Item	Description
1	PAR IN	Master-slave parallel bus input (used when this unit is a slave). 9-pin connector.
2	Communication port	RS232, or a factory-fitted RS485 or CAN alternative — one interface is fitted per unit, not all three simultaneously (§4.5, §6.2).

3	PAR OUT	Master-slave parallel bus output (used when this unit is a master). 9-pin connector.
4	USB device port	USB communication interface, standard on all models.
5	Output terminals	DC output, positive and negative.
6	Remote sense terminals (S+/S–)	For lead-drop compensation at the load (§2.4.1).
7	AC power input (POWER INPUT)	IEC AC inlet.
8	Cooling fans	Temperature-controlled; keep the rear clearance free of obstructions.

> NOTE
> No analog control interface is fitted on this series; the communication port (§3.2, item 2) is the only remote-control interface available.

3.3 Status indicators

LED	Meaning when lit
CV	Output is regulating in constant-voltage mode.
CC	Output is regulating in constant-current mode.
CP	Output is regulating in constant-power mode.
RMT	Instrument is in remote (communication-bus) control mode.

> WARNING
> Switching off the front-panel Power switch does not disconnect the AC input; hazardous voltage remains present inside the chassis. Never open the case yourself; disconnect the AC supply cable first if service access is required.

3.4 Key function quick reference

Key	Function
ON/OFF	Starts or stops the DC output.
VOLT / CURR / POWER (V-Set / I-Set / P-Set)	Selects the voltage, current or power field for editing on the standby screen.
MENU / Home	Opens the main menu / returns to the standby screen.
▲ / ▼	Moves the selection between menu items or fields.
Rotary knob	Adjusts the value at the cursor; in run mode, directly adjusts voltage or current depending on context.
0–9, decimal point	Direct numeric entry.
Enter	Confirms an entered value or menu selection.
Cancel	Returns to the previous menu level without applying the change.

> NOTE
> The Menu, VOLT, CURR and POWER keys do not respond while a sequence test is running, paused, or single-stepping, or while constant-power mode is actively executing.

CHAPTER 4

Basic Operation

4.1 Power-on & standby screen

After the self-test completes (§2.5), the instrument opens on the standby screen, showing the present output voltage, current and power readings, the corresponding set values, and the F1–F4 softkey labels: **Recall**, **Remote**, **Alarm**, **System**.

4.2 Starting and stopping the output

Press **ON/OFF** to enable the output; the key's built-in LED lights red, and the CV, CC or CP status LED indicates the active regulation mode. Press **ON/OFF** again to disable the output.

4.3 Setting voltage, current and power

From the standby screen, press **VOLT**, **CURR** or **POWER** to select the corresponding field (a white underline marks the selected field), then enter the value with the numeric keypad or adjust it with the rotary knob.

4.4 System settings

Press **F4 (System)** from the standby screen to open the system settings screen, where the following can be configured:

- LCD brightness (adjust with the rotary knob, F1 to save)
- Key-press sound on/off
- Display language
- Keypad lock (while locked, only F4 responds, to unlock)
- System information (F3): model, last calibration date, firmware version

4.5 Communication settings

Press **F2 (Remote)** from the standby screen to open the communication settings screen. Select the interface fitted to your unit — **RS232**, or the factory-fitted **RS485** or **CAN** alternative — and set its parameters (baud rate, address). The bus address range is **1–255**.

Press **LOCAL** to switch back to local (front-panel) control. When the instrument is addressed over its communication interface, it enters remote mode automatically and the front-panel keys stop responding (except LOCAL).

> **CAUTION**
> When using remote control, the instrument and the controlling computer must share a common ground, and hot-plugging the communication cable is not permitted — doing so can damage the instrument or the computer.

> **NOTE**
> Only one of RS232, RS485 or CAN is fitted per unit, as a factory option set at the time of order (not user-switchable). USB is a separate, always-fitted port and is not affected by this choice.

4.6 Alarm settings

All alarm conditions are shown on the LCD with an audible tone, and immediately disable the DC output. Alarms are grouped into hardware alarms (power fault, over-temperature) and software alarms (voltage/current/power limits, master-slave protection). The software alarm limits are configured on the alarm settings screen (**F3 — Alarm** on the standby screen).

Code	Alarm	Trigger condition
PF	Power fault	AC supply over- or under-voltage, or an interruption of the supply.
BUCK	Hardware fault	Internal supply-conversion circuit fault.
OT	Over-temperature	Internal temperature exceeds a safe limit.
MSP	Master/slave protection	An initialized master-slave system loses connection to any unit.
OVP	Voltage upper-limit	Output voltage exceeds the configured upper limit.
OCP	Current upper-limit	Output current exceeds the configured upper limit.
OPP	Power upper-limit	Output power exceeds the configured upper limit.
UVP	Voltage lower-limit	Output voltage falls below the configured lower limit.
UCP	Current lower-limit	Output current falls below the configured lower limit.
UPP	Power lower-limit	Output power falls below the configured lower limit.

> **NOTE**
> Switching the instrument off at the front-panel Power switch cannot be distinguished internally from a mains interruption, so a PF alarm is shown at every power-down; this can be ignored.

4.7 Quick-group save & recall

Press **F1 (Recall)** from the standby screen, then **F1** again to edit a quick-group slot: select the Volt/Curr/Power fields with the cursor keys or rotary knob, enter the desired values, then press **F1** to save. Ten quick-group slots (0–9) are available, stored in non-volatile memory so they survive a power cycle.

To recall a saved quick group, press **F1** from the standby screen, browse the ten slots with ▲/▼, and press **F2** to apply the selected slot. Press **Menu** or **Cancel** to leave without recalling.

CHAPTER 5

Advanced Functions

5.1 Sequence test

Sequence test lets the instrument automatically step through a programmed series of voltage, current and power outputs — useful for automated test and burn-in applications. The instrument stores **50 sequences**, each with **20 steps**, in non-volatile memory; each step's function is configured independently, from **12** available step functions.

5.1.1 Basic operation

Open the sequence test main screen from the standby screen (via the Menu system). Select one of the 50 sequences (named 00–49) with the numeric keypad or rotary knob. From this screen: **F1** starts the sequence, **F2** runs it in single-step mode, **F3** opens the step editor, **F4** deletes the sequence (resetting every step to NOP).

> **CAUTION**
> Avoid frequent, rapid voltage switching in a sequence — this can damage internal components. When designing a sequence, keep the ratio of peak-to-peak voltage swing (as a percentage of the model's maximum voltage) within the following limits at the corresponding switching frequency: 25% at 10 Hz, 5.0% at 50 Hz, 2.5% at 100 Hz, 1.67% at 150 Hz, 1.25% at 200 Hz. Also allow for the instrument's actual output rise/fall time (§5.5) when setting a step's duration, or the output waveform may not match what was intended.

5.1.2 Step functions

Function	Behaviour
NOP	No operation — skipped during execution; unused steps should be left at this default.
VI Mode	Outputs a fixed voltage, current and power for a set duration.
Ramp V	Ramps the output voltage from an initial value (Vi) to a final value (Vf) over a set duration, with a current limit.
Ramp I	Ramps the output current from an initial value (Ii) to a final value (If) over a set duration, with a voltage limit.
Repeat	Jumps back to the start of the sequence (or branch) and re-executes the preceding steps once; a second Repeat encountered on that pass is skipped. For more than one repetition, use Loop/Next instead.
Subcall	Calls another sequence as a subroutine; if that sequence contains a Return step, execution resumes after the Subcall step.
Return	Returns immediately to the sequence that last called Subcall. If no Subcall is active, the sequence test stops.
Loop	Repeats every step between this Loop and the matching Next up to 65535 times.
Next	Marks the end of a Loop block. If no matching Loop precedes it, the sequence test stops.
Stop	Stops the sequence test and holds the last output value; typically the final step of a sequence.
Goto	Exits the current sequence and starts another, chosen sequence — used to link sequences together.
Pause	Pauses the sequence test.

In the step editor, **F1 Copy** copies the current step's parameters to a buffer, **F2 Paste** pastes them into the current step, **F3 Insert** inserts a step before the current position, and **F4 Delete** removes the current step. After editing, **Cancel** opens a save prompt (F1 to save, F4 to discard).

> **CAUTION**
> If controlling sequence test over RS232, use only the sequence-test-related commands (§6.3/§6.4) while a sequence is active, and avoid sending them at other times.

5.1.3 Running and single-stepping a sequence

Press **F1** on the sequence main screen to run a sequence; the execution screen shows the running sequence/step number (e.g. `SEQ00:00`), the active step function, the V/I/P values and the remaining time for the current step (format `ss.sss`). While running, **F1** pauses and **F2** stops the test (holding the last output value); **F1** resumes from pause.

Press **F2** on the sequence main screen to single-step instead: each press of **F1** advances to the next step once the current one finishes; **F2** stops and returns to the main screen.

> **NOTE**
>
> The DC output itself is still controlled by **ON/OFF** during sequence test — press ON/OFF to enable the output after starting a sequence, and again to disable it after pausing or stopping.

5.1.4 Worked example — a burn-in voltage profile

A typical burn-in test ramps the voltage up at a set slope, holds it, steps to another level, holds again, and finally ramps back down to zero — sometimes followed by a voltage on/off cycling sequence. The example below builds this with two linked sequences.

Sequence	Step	Action
TEST00	1	Ramp V: 0 V → 20 V over 1 s
	2	VI Mode: hold 20 V for 2 s
	3	Ramp V: 20 V → 40 V over 500 ms
	4	VI Mode: hold 40 V for 2.5 s
	5	Ramp V: 40 V → 0 V over 2 s
	6	VI Mode: hold 0 V for 2 s
	7	Goto TEST01
TEST01	1	Loop: 5 repetitions
	2	VI Mode: 40 V for 2 s
	3	VI Mode: 0 V for 2 s
	4	Next (closes the Loop)
	5	Stop

Current limit for the Ramp V and VI Mode steps is set according to the actual load (1 A is used in this example for a light load). After deleting any existing content in TEST00/TEST01 (F4 on the sequence main screen, which resets every step to NOP) and editing the steps as above, running TEST00 (F1) executes the full profile in roughly 30 seconds.

5.2 Function / waveform generator

The instrument includes a built-in function generator that can output sine, rectangle (square), triangle and trapezoid waveforms on either the output voltage or output current, useful for dynamic load or transient-response testing.

Waveform	Parameters
Sine	Amp (amplitude), Offset (from zero), Value (current limit), Freq (frequency).
Triangle	Amplitude, offset from the waveform's base, positive-slope time, negative-slope time (their sum sets the period; its reciprocal is the frequency).
Rectangle	Amplitude, offset from the base, peak-value time, base-value time (sum sets the period/frequency); duty cycle follows from the two times.
Trapezoid	Amplitude, offset from the base, negative-slope time, top (peak) hold time, positive-slope time, base hold time — these four times set the period and repetition frequency.

Up to ten waveform steps can be chained into a single output sequence, each with its own waveform type and duration. **Copy/Paste/Insert/Delete** soft keys manage the step list, matching the sequence-test editor conventions in §5.1.2.

5.3 Solar Array Simulation (SAS)

The TH6900 series has a built-in model for simulating the output curve of a solar (PV) array. In addition to the built-in model, CC, CV and EN50530 output modes are available through host-computer software.

The built-in model follows the standard single-diode I–V curve:

$$I = Isc \times [\ 1 - C1 \times (e^{V\ /\ (C2 \cdot Voc)} - 1)\ ]$$

where **Voc** = open-circuit voltage, **Isc** = short-circuit current, **Vmp** = voltage at maximum power point, **Imp** = current at maximum power point, and C1, C2 are coefficients the instrument derives internally from Voc, Isc, Vmp and Imp. Because of the model's shape, the Vmp/Imp point you enter and the actual maximum-power point of the resulting curve can differ slightly; the difference grows as the fill factor (FF = Vmp×Imp / (Voc×Isc)) gets smaller.

Parameter constraints: Voc > Vmp > 0; Isc > Imp > 0; Vmp > Voc×(1 – Imp/Isc). The instrument checks these and shows an error, refusing the keypress, if a setting is out of range.

To use SAS: open the SAS function screen from the standby screen (Menu system), set Voc, Isc, Vmp and Imp with the rotary knob or numeric keypad, and confirm with Enter. Once configured, press **ON/OFF** to start the simulated output; while SAS output is active, all keys except **ON/OFF** are locked. Press **ON/OFF** again to stop.

5.4 Master-slave parallel operation

Up to **10 units of the same model** can be connected in a true master-slave configuration to increase available output current and power, using the digital **PAR IN** / **PAR OUT** bus (§3.2) and the supplied parallel-connection cable. Set the output wire diameter to suit the combined maximum current, and keep runs as short as practical.

1. Choose one unit as master. Connect its **PAR OUT** to the first slave's **PAR IN**.
2. Chain further units by connecting each slave's **PAR OUT** to the next slave's **PAR IN**, up to 10 units total.
3. Connect all units' positive output terminals together, and to the load; likewise for the negative terminals. Check there is no short between positive and negative.
4. Connect SENSE wiring: every slave's S+/S– go directly to its own output terminals. The master's S+/S– either go to its own output terminals (no lead-drop compensation) or to the load (with compensation, using twisted-pair wiring kept as short as possible). When compensation is used, slave units will display a slightly higher voltage than the master.

Each unit's parallel-mode screen sets it to **single** (not paralleled), **master** or **slave**. In master mode, the unit auto-detects connected slaves on initialization and reports their count, addresses, and the combined current/power; re-check wiring and repeat initialization if the reported slave count is wrong. In slave mode, each unit needs a unique slave address. Save the configuration with **F4**.

> NOTE
> An alarm on any slave is reported on the master and must be acknowledged there before operation continues, since it disables the DC output; a loose connection on any unit trips the whole parallel system's output and the master reports the fault, requiring the system to be re-initialized.

5.5 Output slope (rise/fall time)

Rise and fall time are independently adjustable for voltage, current and power, in every operating mode (CV, CC, CP), over a range of **0.01–999.99 s**:

- **V-Rise / V-Fall** — voltage rise/fall slope
- **I-Rise / I-Fall** — current rise/fall slope
- **P-Rise / P-Fall** — power rise/fall slope

Rise/fall time is the time taken, with the output enabled, to move from one set point to another. For example, to observe the fall slope down to 0 V, set the voltage to 0 V via V-Set and press Enter — the output then ramps down at the configured fall rate.

CHAPTER 6

Remote Operation

6.1 Local vs. remote mode

In local mode, the instrument is controlled entirely from the front panel. In remote mode, it is controlled only through its communication interface; front-panel keys (other than LOCAL) do not respond. The instrument enters remote mode automatically as soon as it is addressed over the bus, and returns to local mode when **LOCAL** is pressed.

6.2 Communication settings

Setting	Value
Interface	RS232, or a factory-fitted RS485 or CAN alternative (one per unit — §4.5). Default: RS232.
Baud rate (custom protocol)	1200, 9600, 19200 or 38400. Default: 38400.
Address range	1–255 (custom protocol and SCPI); 1–32 (Modbus).
Frame format (custom protocol)	1 start bit, data bits, 1 stop bit.

> **CAUTION**
> When operating remotely, the instrument and the host computer must share a common ground, and the communication cable must not be hot-plugged.

Three remote protocols are available: a legacy binary frame protocol (§6.3), SCPI text commands (§6.4), and Modbus RTU (§6.5). The interface fitted (RS232/RS485/CAN) carries whichever of these protocols the host software uses; consult Techmize if you need help selecting a protocol for a new integration.

6.3 Legacy binary protocol

A compact binary frame protocol is available over RS232/RS485. The host (PC) is always master; the instrument is a slave and only replies to frames addressed to it (except broadcast).

6.3.1 Frame format

Field	Size	Description
`Header`	1 byte	Fixed `0x7B` (ASCII ‘{’)
`Length`	2 bytes	Total byte count of the whole frame, high byte first
`Address`	1 byte	Slave address; `0x00` = broadcast (control commands only, no reply)
`Command type`	1 byte	`0x0F` control · `0xF0` query · `0xA5` query-setting · `0x5A` set
`Command code`	1 byte	Identifies the specific command within its type
`Parameter`	varies	Command-specific; numeric values in hex, at the parameter's native resolution (no unit, no decimal point), high byte first
`Checksum`	1 byte	Low byte of the sum of (length + address + command type + command code + parameter)
`Tail`	1 byte	Fixed `0x7D` (ASCII ‘}’)

6.3.2 Command table

Type	Code	Function
Control (0x0F)	0x00	Stop output
	0x01	Start output
	0x03	Clear alarm
Query (0xF0)	0x00	Query instrument status (returns 1 byte — see status table below)
	0x10	Query output voltage
	0x11	Query output current
	0x12	Query output power
	0x80	Query voltage, current and power together
Query setting (0xA5)	0x00	Query set voltage
	0x01	Query set current
	0x02	Query set power
Set (0x5A)	0x00	Set voltage
	0x01	Set current
	0x02	Set power

Status byte	Meaning	Status byte	Meaning
0xFF	Standby	0x05	OT alarm
0x00	CC mode	0x06	Voltage upper-limit alarm
0x01	CV mode	0x07	Current upper-limit alarm
0x02	CP mode	0x08	Power upper-limit alarm
0x03	PF alarm	0x09	Voltage lower-limit alarm
0x04	BUCK alarm	0x0A / 0x0B / 0x0C	Current / power lower-limit alarm; MSP parallel-communication fault

Example — stop output, address 1: request `7B 00 08 01 0F 00 18 7D`; reply `7B 00 09 01 0F 00 00 19 7D`.

6.4 SCPI command reference

The instrument accepts SCPI-style text commands. Numeric parameters use standard SCPI notation (`<NRf>` — any numeric format); a query form appends `?`.

Command	Description
`*CLS`	Clears the current alarm state.
`*RST`	Resets the instrument to its factory-default state.
`MEASure:VOLTage[:DC]?`	Returns the latest measured DC output voltage, in V.
`MEASure:CURRent[:DC]?`	Returns the latest measured DC output current, in A.
`MEASure[:SCALar]:POWer[:DC]?`	Returns the latest measured output power, in kW.
`MEASure?`	Returns voltage, current and power together: `<NRf>,<NRf>,<NRf>`.
`[SOURce:]VOLTage <NRf>`	Sets the output voltage.
`[SOURce:]CURRent <NRf>`	Sets the output current.
`[SOURce:]POWer <NRf>`	Sets the output power.
`[SOURce:]OUTPut <bool>`	Enables/disables the DC output.
`[SOURce:]VOLTage:MINimum / :MAXimum <NRf>`	Sets the voltage lower/upper alarm limit.
`[SOURce:]CURRent:MINimum / :MAXimum <NRf>`	Sets the current lower/upper alarm limit.
`[SOURce:]POWer:MINimum / :MAXimum <NRf>`	Sets the power lower/upper alarm limit.
`[SOURce:]VOLTage:RISE / :FALL <NRf>`	Sets the voltage rise/fall slope time, in seconds.
`[SOURce:]CURRent:RISE / :FALL <NRf>`	Sets the current rise/fall slope time, in seconds.
`[SOURce:]POWer:RISE / :FALL <NRf>`	Sets the power rise/fall slope time, in seconds.

Example: `VOLT 20` sets the output voltage to 20 V; `MEAS?` reads back the present voltage, current and power.

6.5 Modbus RTU protocol

The instrument also supports Modbus RTU over its fitted serial interface. Instrument address range: **1–32** (set on the communication settings screen, §4.5). Supported function codes:

Code	Function
`0x01`	Read coil(s) — bit-addressed read
`0x05`	Write coil — bit-addressed write
`0x03`	Read register(s) — word-addressed read
`0x10`	Write register(s) — word-addressed write

Frames follow standard Modbus RTU structure (address, function code, address/count fields, data, CRC16 — low byte then high byte). Float values occupy 2 consecutive registers (4 bytes); U16 values occupy 1 register (2 bytes); multi-byte values are high-byte first. When writing a coil, the data value must be exactly `0x0000` (off) or `0xFF00` (on) — any other value is invalid. CRC16 follows the standard Modbus polynomial (0xA001); consult a standard Modbus CRC16 reference or contact Techmize for the full lookup table.

6.5.1 Coil addresses

Coil	R/W	Function
0x0001	R/W	Local (0) / remote (1) control
0x0002	W	Stop (0) / start (1) output
0x0003	W	Clear alarm (write 0)

6.5.2 Register addresses

Register	Type	R/W	Function
0x000A	Float	R/W	Set voltage
0x000B	Float	R/W	Set current
0x000C	Float	R/W	Set power
0x000D–0x0012	Float	R/W	Voltage/current/power lower and upper alarm limits (min V, max V, min I, max I, min P, max P, in that address order)
0x0013–0x0018	Float	R/W	Rise/fall time for voltage, current, power (V-rise, V-fall, I-rise, I-fall, P-rise, P-fall, in that address order)
0x0019	Float	R	Measured output voltage
0x001A	Float	R	Measured output current
0x001B	Float	R	Measured output power
0x001C	U16	R	Instrument status (same code table as §6.3.2)

Example — read coil 0x0001 (control mode) at address 1: request `01 01 00 01 00 01 AC 0A`; a reply of `01 01 01 01 51 88` indicates remote control is active.

6.6 Analog control interface

No analog control interface is available on this series. Voltage, current, power and on/off control are provided over the fitted communication port (RS232, or the factory-fitted RS485/CAN alternative) using the protocols in §6.3–6.5.

CHAPTER 7

Troubleshooting & Maintenance

7.1 Routine maintenance

If the instrument is not used for extended periods, power it on at least once a month for a minimum of 30 minutes. At least once a year:

- Check the insulation of input/output leads and terminals for damage; replace immediately if damaged, to avoid electric shock.
- Check that input/output wiring connections are secure, to prevent overheating from a loose connection.
- Check that all warning labels on the instrument are present and legible; replace any that are not.
- Visually inspect all exposed components.

7.2 User maintenance restrictions

> **WARNING**
> Do not open the case yourself — risk of electric shock. Do not modify the instrument's wiring or components; doing so voids the warranty. If unauthorized modification is found, Techmize will restore the instrument to its original condition and charge for the work.

Before long-term storage: review the storage environment (§8.1); before returning to use, clean any dust from the exterior, repeat the pre-power-on checks of §2.5, and watch for abnormal behaviour at power-on. If anything seems wrong, stop use immediately, disconnect the supply, and do not use the instrument again until it has been repaired.

7.3 Troubleshooting

> **WARNING**
> Repairs must be carried out by experienced, qualified personnel. Repair or maintenance by untrained personnel can result in injury or death.

Symptom	Possible cause	What to check / do
OVP alarm	Actual output exceeds the configured OVP limit; or the S-terminal sense leads are reversed	Reconfigure the OVP limit to a suitable value; check the S+/S− connections for a reversed polarity
Hardware-fault alarm	Internal over-temperature; internal function-module failure	Clear the alarm and check whether the ambient temperature is too high; if the alarm persists, contact Techmize or your local distributor
No display at power-on	Abnormal AC supply (missing phase, over/under-voltage); ambient temperature too low	Check the AC wiring and confirm the supply meets specification; allow the unit to reach room temperature before restarting
Large error in actual output voltage	Instrument has entered current-limit mode; S-terminal sense leads not connected	Check the front-panel CV/CC indicator; connect the S-terminal sense leads to the DC output or load

CHAPTER 8

Storage & Transport

8.1 Storage

Condition	Value
Storage temperature	−20 to 70 °C
Storage humidity	≤80% RH (run the unit periodically, ≈20 min, in humid conditions)

> **CAUTION**
> Protect the stored instrument from dust, and do not stack anything on top of it.

8.2 Packaging

Use the original packaging for service returns or transport wherever possible. If it is unavailable, package as follows:

1. Seal the instrument in a plastic bag.
2. Place it in a wooden crate or multi-layer cardboard box rated for at least 50 kg.
3. Pack with shock-absorbing material approximately 60 mm thick; protect the front panel with thick foam.
4. Seal the box securely and mark it clearly “Fragile — handle with care”.

> **NOTE**
> For a service return, include the power cable and any test leads together with the instrument, and describe the fault clearly.

8.3 Transport

Avoid severe shock, rough handling, exposure to rain, and inverted orientation during transport.

CHAPTER 9

Performance & Specifications

This chapter summarizes the series' key ratings. For the complete model-by-model specification table, see the *TH6900 Series Datasheet*.

9.1 Model ratings by power class

Power class	Models & ratings
750 W (7 models)	TH6940-60 (40V/60A) · TH6980-30 (80V/30A) · TH69200-12.5 (200V/12.5A) · TH69360-7.5 (360V/7.5A) · TH69500-5 (500V/5A) · TH69750-3 (750V/3A) · TH691000-2.5 (1000V/2.5A)
1.5 kW (7 models)	TH6935-100 (35V/100A) · TH6980-60 (80V/60A) · TH69200-25 (200V/25A) · TH69360-15 (360V/15A) · TH69500-10 (500V/10A) · TH69750-6 (750V/6A) · TH691000-5 (1000V/5A)
3 kW (7 models)	TH6935-200 (35V/200A) · TH6980-120 (80V/120A) · TH69200-50 (200V/50A) · TH69360-30 (360V/30A) · TH69500-20 (500V/20A) · TH69750-12 (750V/12A) · TH691000-10 (1000V/10A)

9.2 General specifications

Parameter	All models
Operating modes	Constant voltage (CV), constant current (CC), constant power (CP)
Load regulation	Voltage ≤0.05%FS (0–100% load) · Current ≤0.15%FS (0–100% ΔU_{DC})
Line regulation	Voltage ≤0.02%FS · Current ≤0.05%FS (both at ±10% ΔU_{AC} input)
Set / readback accuracy	Voltage ≤±(0.05%+0.04%FS) · Current ≤±(0.15%+0.1%FS) · Power ≤±0.8%FS
Rise time	≤2 ms, 10–100% no load · ≤30 ms, 10–90% full load
Rise/fall edge speed	Adjustable in all modes; settable range 0.01–999.99 s
Protection	OTP, OVP, OCP, OPP, PF (input under-voltage), SENSE reverse-connection protection
OVP range	Adjustable, 0–110% of rated output voltage
Discharge circuit	Brings output below 10 V within 1 s at no-load/light-load shutdown
Master-slave parallel	True master-slave via shared digital bus, up to 10 units of the same model, active current sharing
Sequence test	50 sequences (non-volatile), 20 steps/sequence, 12 step functions
Function generator	Sine, square, triangle, trapezoid, on output voltage or current
Solar-array simulation	Built-in output-curve model; CC/CV/EN50530 also via host software
Display	Colour LCD, English UI
Communication	RS232 (default), USB — RS485 or CAN available as a factory-fitted alternative to RS232 (§4.5)
Isolated withstand voltage	AC input to chassis: 2500 VDC · AC input to DC output: 2500 VDC · DC output to chassis (PE): negative max. 400 VDC, positive max. 400 VDC + output voltage
AC input	220 V AC ±10%, 45–66 Hz, 1ph+N+PE, power factor ≥0.99
Operating conditions	Indoor use; 0–50 °C, <80% RH non-condensing, altitude <2000 m

Storage temperature	–20 to 70 ℃
Dimensions (W×H×D)	482×88×455 mm, standard 2U rack chassis
Net weight	9.6 kg (750 W) · 10.8 kg (1.5 kW) · 13.5 kg (3 kW)

9.3 Efficiency & ripple by voltage class

Voltage class	40 V	80 V	200 V	360 V	500 V	750 V	1000 V
Efficiency	≤92%			≤93%			
Ripple RMS (20Hz–300kHz)	10mVrms	10mVrms	20mVrms	40mVrms	50mVrms	75mVrms	100mVrms
Ripple P-P (20Hz–2MHz)	75mVpp	100mVpp	175mVpp	250mVpp	325mVpp	500mVpp	650mVpp

APPENDIX

Terms, Quick Reference & Version History

A.1 Terms & symbols

Term	Meaning	Term	Meaning
V / I / P	Voltage / current / power	CV / CC / CP	Constant voltage / current / power mode
OVP / OCP / OPP	Over-voltage / -current / -power protection	OTP	Over-temperature protection
PF	Power fault (AC supply)	MSP	Master/slave protection
UVP / UCP / UPP	Under-voltage / -current / -power alarm	SAS	Solar Array Simulation
S+ / S–	Remote sense terminals (positive/negative)	RMT	Remote-mode status LED

A.2 Front-panel key quick reference

Key	Function
ON/OFF	Starts/stops the DC output (§4.2)
VOLT / CURR / POWER	Select the field to edit on the standby screen (§4.3)
F1 Recall · F2 Remote · F3 Alarm · F4 System	Standby-screen softkey functions (§4.4–4.7)
Home / Menu	Returns to the standby screen / opens the main menu
LOCAL	Switches from remote to local control (§4.5, §6.1)

A.3 Common remote commands

Task	Command
Clear alarm	`*CLS`
Reset to factory state	`*RST`
Set voltage / current / power	`VOLTage / CURRent / POWer <NRf>`
Enable / disable output	`OUTPut <bool>`
Read voltage / current / power	`MEASure:VOLTage? / :CURRent? / :POWer?`
Read all three together	`MEASure?`

See Chapter 6 for the full command reference, including the legacy binary protocol and Modbus RTU register map.

A.4 Version history

Revision	Date	Changes
Rev. 2026-09	September 2026	First English edition for the European market

NOTE

Techmize may improve this product's performance, features, software, construction, appearance, accessories, packaging or documentation without separate notice. Contact Techmize with any questions.

A.5 Contact, warranty and support

Warranty: two years from delivery, per §1.8. For service, calibration, accessories, an EU Declaration of Conformity, or any item flagged for confirmation throughout this manual, contact Techmize using the details below.

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