TECHMIZE by TONGHUI

OM

OPERATION MANUAL

TH7200 Series

Covers the TH7205 and TH7210 single-phase, linear-amplifier programmable AC/DC power sources: front-panel operation, Basic/Step/Simulate modes, system functions, protection, and remote-control interfaces.

Techmize Electronic GmbH · Ismaning, Germany · an international subsidiary of Changzhou Tonghui Electronic Co., Ltd.

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TH7200 Series Operation Manual

Single-Phase Programmable AC/DC Power Source — TH7205 / TH7210

Both models share an identical control platform, front-panel layout, display, menu structure and communication interfaces; they differ only in rated power and current capacity (500 VA AC / 350 W DC for the TH7205, 1000 VA AC / 700 W DC for the TH7210). Where this manual gives a setting range that differs between models, each model's exact figures are listed in Chapter 7, Technical Specifications. Where this manual and the instrument itself appear to disagree, or a described function is not present on your unit, contact Techmize or your authorized distributor using the details in the Appendix before relying on the instrument for a test or production decision.

Chapter	
1. Safety & Operating Conditions	3 pages
2. Overview	2 pages
3. Operation & Configuration	7 pages
4. File Management	1 page
5. Functions	3 pages
6. Remote Control & Communication Interface	2 pages
7. Technical Specifications	2 pages
Appendix — Packing, Warranty & Contact	2 pages

The full SCPI and MODBUS command tables are issued as a separate companion document, TH7200 Series SCPI & MODBUS Command Reference, in line with Techmize's standard practice for command sets of this size. Chapter 6 of this manual covers the remote interfaces and protocol overview only.

CHAPTER 1

Safety & Operating Conditions

1.1 About this manual

This manual covers both members of the TH7200 series: the TH7205 (500 VA AC / 350 W DC) and TH7210 (1000 VA AC / 700 W DC) single-phase, linear-amplifier programmable AC/DC power sources. Both models share the same 0–300 V output range, front-panel controls, display, menu structure and communication interfaces — only the rated power and current capacity differ. Techmize continually improves the performance, features and construction of its instruments; content, specifications and accessories described here are subject to change without notice.

> **WARNING — HAZARDOUS OUTPUT VOLTAGE**
>
> The TH7200 series can output up to **300 V AC** or **±424 V DC** at its front and rear panel output terminals. This is a shock hazard. Never touch the output terminals, output cable or the device under test while the output is on (ON/OFF indicator lit). Disconnect the AC supply cord before opening the instrument or changing internal wiring; there are no operator-serviceable parts inside.

1.2 Power connection

Before connecting the AC supply cord:

1. Confirm that the local mains voltage (100–120 V AC or 200–240 V AC) and frequency (47–63 Hz) are within the instrument's rated AC input range (Chapter 7).
2. TH7205: use the supplied EU power cable (Schuko, CEE 7/7); confirm the cable and plug are undamaged. TH7210: wire the AC input through the rear-panel terminal block, using the supplied circuit breaker, and confirm the wiring before switching on.
3. Connect the AC supply to a properly earthed source. The protective-earth conductor must not be defeated or bypassed.
4. Switch the instrument on only after the output terminals are wired to the device under test, or left unconnected and safe to energize.

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

1.3 Operating conditions

Item	Requirement
Operating temperature	0–40 °C
Operating humidity	20–80% RH, non-condensing
Storage temperature	−20–70 °C
Altitude	Up to 2000 m (operating)
Pollution degree	2
Safety class	Class I (protective earth)

Do not use the instrument in a dusty, vibrating, direct-sunlight or corrosive-gas environment. Keep the side and rear cooling-fan openings clear at all times: the cooling fan speed is temperature-controlled and increases once the internal heatsink exceeds 60 °C, and the instrument shuts down its output automatically if the heatsink exceeds 130 °C (over-temperature protection, §5.5).

1.4 Precautions

- Do not use the instrument if the enclosure, output cable or supply cord shows signs of damage.
- Do not exceed the current rating of the output cable and any connected fixture; every load conductor must safely carry the instrument's maximum short-circuit output current.
- Do not modify the instrument or attempt unauthorized internal repairs.
- Do not operate the instrument with any cover removed or loosened.
- This instrument is not designed or certified for life-support or other safety-critical applications.
- Keep the ventilation openings clear; do not block the cooling-fan airflow.
- Clean the enclosure with a soft, dry cloth only; do not clean the interior.
- Avoid frequent power-cycling, to prevent loss of stored settings.
- Do not operate the instrument in a strong electromagnetic-interference or noisy electrical environment; fit a mains line filter if this cannot be avoided.
- If the instrument will not be used for an extended period, store it in its original packaging in a well-ventilated room at 5–40 °C, ≤85% RH, away from direct sunlight.
- Discharge any charged or capacitive device under test before connecting it to the output terminals.

CAUTION — WARM-UP

Allow at least **30 minutes** of warm-up after switch-on before relying on the instrument for a measurement or production decision.

1.5 Safety symbols

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

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

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

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

The on/off switch symbols (● for on, ○ for off) and an electric-shock warning triangle also appear on the front and rear panels, next to the power switch and output/input terminals respectively.

1.6 CE marking

The TH7205 and TH7210 carry the CE mark, as shown on the instrument's rear-panel nameplate, supported by the following EU certificates of conformity:

Directive	Harmonized standard	Certificate
Low Voltage Directive 2014/35/EU	EN 61010-1:2010+A1:2019	No. MTZS25034230, issued 2025-03-27
EMC Directive 2014/30/EU	EN IEC 61326-1:2021	No. MTZS25034030, issued 2025-03-13

Certificates issued by Shenzhen Most Technology Service Co., Ltd., covering the TH7205 and TH7210 models.

1.7 RoHS compliance

The TH7200 series complies with Directive 2011/65/EU (RoHS); supporting documentation is available from Techmize on request.

1.8 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.

1.9 Warranty

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

This warranty does not cover damage from misuse, accident, unauthorized modification or repair, or damage from operation outside the environmental limits given in §1.3. Repair must be carried out by qualified technical personnel.

1.10 Manufacturer & EU contact

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Registration

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

CHAPTER 2

Overview

2.1 Front panel

USB port — for a USB drive (file save/load) or firmware update.

Trademark & model label.

Display — 4.3″ colour TFT LCD, 480 × 272 resolution.

Function keys — four screen-labelled softkeys, to the right of the display.

Display / **Setup** / **System** — select the Measurement Display, Measurement Setup or System Setup page.

V-Set / **I-Set** / **F-Set** — quick-set keys for output voltage, current limit and output frequency.

Esc — exits or cancels an entry.

File — quick access to the Internal File page.

Lock — locks the front-panel keypad against accidental changes.

Numeric keypad — direct numeric entry, with a backspace/delete key.

Adjustment knob — scrolls through menu fields or adjusts a value.

Arrow keys and OK — menu navigation and selection.

Enter — confirms a value or selection.

On/Off — turns the output on or off.

AC output socket — front-panel output terminal, rated 300 VAC max.

2.2 Rear panel

Item	Description
LAN interface	Network interface (§7.2)
Device interface	USB CDC and USB TMC interface
RS-232C interface	Host-PC serial port (§7.1)
Output terminal	Rear-panel output terminal block (L, N, G)
Input terminal	AC mains input terminal block (L, N, G)
Power switch	Mains power switch
Fan outlet	Cooling-fan exhaust — keep clear (§1.3)

2.3 Display layout

The 4.3″ colour TFT display (480 × 272) is divided into six regions: a **main-menu zone** across the top, naming the current page; a **setting-parameter zone**, used to edit the active test parameters; a **status zone**, showing system status information; a **measurement-result zone**, showing up to four readings simultaneously — display 1 is output voltage, display 2 is output current, display 3 is output power, and display 4 is peak current, each in its own colour; a **softkey zone** along the right edge, whose labels change according to the active page; and a **prompt zone**, showing status messages and alerts during a test.

> **CAUTION — TOUCHSCREEN**
> Never use a sharp object or a fingernail on the touchscreen; this can damage it. Techmize is not responsible for damage caused in this way.

2.4 Basic operation

2.4.1 Basic mode — quick start

1. Press [Setup], then the **Basic Setup** softkey.
2. Move the cursor to Voltage Mode and use the softkeys to select AC, DC+AC or DC.
3. Move the cursor to AC Voltage (or DC Voltage) and enter the output voltage with the numeric keypad and [Enter].
4. Move the cursor to Output Frequency and enter the output frequency with the numeric keypad and [Enter].
5. Press [Display], then [On/Off], to energize the output.

2.4.2 Step mode — quick start

1. Press [Setup], then the **Step Setup** softkey.
2. Move the cursor to the step number field and enter the step to edit with the numeric keypad and [Enter].
3. Set that step's DC voltage, AC voltage, output frequency, step output, time and other fields (§3.2.2).
4. Repeat steps 2–3 for each additional step required.
5. Press [Display], then [On/Off], to run the sequence.

2.4.3 Simulate mode — quick start

1. Press [Setup], then the **SIM Setup** softkey.
2. Move the cursor to AC Voltage and enter the output voltage; move to T3 Voltage and enter the voltage the waveform settles to during the disturbance (§3.2.3).
3. Move the cursor to Output Frequency and enter the output frequency.
4. Set T1–T5 time (or phase) and Cycle Count to shape the disturbance (§5.2).
5. Press [Display], then [On/Off], then the **RUN** softkey, to output the simulated waveform.

2.5 Power-on

The power switch is at the lower-left of the front panel. On switch-on, the boot screen shows the Techmize/Tonghui logo, model name and firmware version. If a startup password has been set (§3.3.1), the instrument prompts for it before continuing; the factory default ships with no password set. Allow at least 30 minutes of warm-up (§1.4) before relying on the instrument for a test or production decision.

CHAPTER 3

Operation & Configuration

3.1 Measurement Display page

Press [Display] to open <Measurement Display>, the instrument's default working page. Its content depends on which mode (Basic, Step or Simulate) is active.

3.1.1 Basic MEAS

Field	Description
Voltage mode	AC, DC+AC or DC.
AC voltage	0.0–150.0 V (LOW range) or 0.0–300.0 V (HIGH range).
Output frequency	1.00–1000 Hz; resolution 0.01 Hz below 100 Hz, 0.1 Hz from 100 Hz up, 1 Hz exactly at 1000 Hz.
Start / stop phase angle	0–359° — the output waveform's starting and stopping phase point.
Waveform library number	Selects the waveform (System Setup → Waveform Setup, §3.3.5) used for the output.

The softkey area offers quick-set keys [V-Set], [I-Set] and [F-Set]: pressing [V-Set] opens a selector for AC Voltage and/or DC Voltage depending on the active voltage mode, which can then be adjusted directly with the numeric keypad or (while the output is on) the adjustment knob; [I-Set] opens a pop-up to set the current limit; [F-Set] moves the cursor straight to Output Frequency (inactive in DC mode). From the Measurement Display page, pressing [On/Off] also cycles the measurement-result readout between the available parameters (Urms, Irms, P, PF and more, as listed in Chapter 7).

3.1.2 Step MEAS

Field	Description
Step number	0–599 — the active step. With the cursor on this field, steps can be deleted, inserted or copied.
DC voltage	0.0–212.0 V (LOW) or 0.0–424.0 V (HIGH).
AC voltage	0.0–150.0 V (LOW) or 0.0–300.0 V (HIGH).
Output frequency	1.00–1000 Hz, same resolution rule as Basic MEAS.

3.1.3 SIM MEAS

Simulate mode outputs AC only. The Measurement Display page shows AC Voltage (0.0–150.0 or 0.0–300.0 V) and Output Frequency, plus the disturbance-shaping fields covered in §3.2.3 and §5.2: cycle count, start/stop phase angle, and T1–T5 timing.

3.2 Measurement Setup page

Press [Setup] to open <Measurement Setup>. Each mode (Basic, Step, Simulate) has its own setup page, with a mode-specific tab and a **General** tab for settings shared across the whole mode.

3.2.1 Basic Setup

Basic tab. The fields shown depend on the voltage mode:

Voltage mode	Fields
AC	Voltage Mode, AC Voltage, Output Frequency, Start Phase Angle, Stop Phase Angle, Waveform Library No.
DC+AC	Voltage Mode, DC Voltage (0.0–212.0 V LOW / 0.0–424.0 V HIGH), AC Voltage, Output Frequency, Start/Stop Phase Angle, Waveform Library No.
DC	Voltage Mode, DC Voltage (−212.0–212.0 V LOW / −424.0–424.0 V HIGH)

General tab.

Field	Description
Current limit	0.01 A up to the model's maximum output current for the active voltage range, mode and output stage (AC or DC/DC+AC) — see Chapter 7, Technical Specifications. Tripping this limit displays "HI-A" and switches the output off.
Over-voltage setting (OVP)	DC or DC+AC mode: −262.0–262.0 V (LOW) or −474.0–474.0 V (HIGH). AC mode: 0.0–200.0 V (LOW) or 0.0–350.0 V (HIGH). If the output voltage rises above this value, OVP trips and the output switches off.
Low-voltage setting (LVP)	Same ranges as the Over-voltage Setting above. If the output voltage falls below this value, LVP trips and the output switches off.
+Ipk limit	1.0–44.0 A (TH7210) or 1.0–22.0 A (TH7205). Tripping this limit displays "OCKP" and switches the output off.
−Ipk limit	−44.0–−1.0 A (TH7210) or −22.0–−1.0 A (TH7205). Tripping this limit displays "OCKP" and switches the output off.
Average count	0–30 — number of readings averaged for the measurement result.
Trip time	0–10 s (AC mode only) — how long the output current may exceed the Current Limit before the output switches off; 0 switches off immediately.
OCP time	1–3 s (AC mode only) — how long the output current may exceed the instrument's rated current before OCP trips.

3.2.2 Step Setup

Step tab (per-step fields; up to 600 steps, numbered 0–599):

Field	Description
Step number	0–599. With the cursor here, a step can be deleted, inserted or copied.
DC voltage, AC voltage, output frequency	As in Basic Setup (§3.2.1), set independently for each step.
Start phase angle, stop phase angle	0–359°, set independently for each step.
Time	This step's output duration, in hours : minutes : seconds . milliseconds.
Step cycle	1–99999 — number of times this step repeats before the sequence advances.
DC change, AC change	On/off — when on, the DC or AC voltage ramps smoothly from the previous step's voltage (or from 0.0 V, for step 1) to this step's set voltage over the step's duration, advancing one increment per output cycle; when off, the voltage steps immediately to the new value.
Frequency change	On/off — the same ramping behaviour as DC/AC Change, applied to Output Frequency (ramping from the previous step's output frequency, or from the frequency step increment for step 1).
Waveform library no.	As in Basic Setup, set independently for each step.
Step output	On/off — whether this step is included when the sequence runs.
Phase jump	Off: this step's stop phase angle is taken from the *next* step's start phase angle. On: this step's stop phase angle is its own, set value, independent of the next step.

General tab (shared across all steps):

Field	Description
Start step, end step	0–599 — the range of steps the sequence runs through.
Total cycle count	1–99999 — number of times the start-to-end step range repeats; 99999 runs continuously.
Current limit, ±Ipk limit, over-voltage / low-voltage setting	Shared protection settings; same behaviour as Basic Setup's General tab (§3.2.1). The current-limit ceiling here is 0.01 A up to the model's maximum DC/DC+AC output current (Chapter 7).

3.2.3 SIM Setup

Simulate mode produces AC-only output, shaping a five-segment voltage disturbance (T1–T5) used to reproduce events such as a brief outage or a controlled voltage rise/fall (worked examples in §5.2).

SIM tab:

Field	Description
AC voltage	0.0–150.0 V (LOW) or 0.0–300.0 V (HIGH) — the normal (pre/post-disturbance) output voltage.
Output frequency	1.00–1000 Hz, same resolution rule as Basic MEAS.
T1 time / T1 phase	When the voltage disturbance begins, as a time (0.0–999.9 ms) or a phase angle (0–359°), depending on T1 Type (General tab).
T2 time	0–99999 ms — time for the voltage to rise/fall from the normal voltage to T3 Voltage.
T3 time	1.0–9999.9 ms — duration the output is held at T3 Voltage.
T3 voltage	0.0–150.0 V (LOW) or 0.0–300.0 V (HIGH) — the disturbance voltage (0.0 V simulates an outage).
T4 time	0–99999 ms — time for the voltage to rise/fall from T3 Voltage back to the normal voltage.
T5 time / T5 cycle	How long the output holds at the normal voltage after recovery before the sequence can repeat — as a time (0–9999 ms) or a number of cycles at the current frequency (0–9999), depending on T5 Type.
Cycle count	1–9999 — number of times the T1–T5 sequence repeats.
Start / stop phase angle	0–359°.

General tab:

Field	Description
Cross polarity	Positive / negative — the disturbance's starting polarity. Negative shifts the phase by 180°.
T1 type	Time or Phase — whether T1 is entered as a time or a phase angle.
T5 type	Time or Cycle — whether T5 is entered as a time or a number of cycles.
Current limit	0.01–10.0 A (LOW) or 0.01–5.0 A (HIGH) on the TH7210, scaled to the TH7205's rating. Tripping this limit displays "HI-A" and switches the output off.
Over-current output	On/off — when on, the output voltage folds back under heavy load to hold the output current at the Current Limit value, once the output current has first exceeded that limit; when off, the output switches off instead (per Trip Time/OCP Time below).
Over-voltage / low-voltage setting	0.0–200.0 V (LOW) or 0.0–350.0 V (HIGH) — OVP/LVP trip thresholds for Simulate mode.
+Ipk limit, −Ipk limit	As in Basic Setup's General tab (§3.2.1): 1.0–44.0 A / −44.0–−1.0 A (TH7210) or 1.0–22.0 A / −22.0–−1.0 A (TH7205).
Trip time	0–10 s — as in Basic Setup's General tab.
OCP time	1–3 s — as in Basic Setup's General tab.

3.3 System Setup page

Press System to open <System Setup>, with tabs for Environment, Function, Communication, Limit, Waveform and Tools settings.

3.3.1 Environment

Field	Description
Password	On/off — a startup password; no password is set from the factory. Record any password you set, as a lost password requires Techmize/Tonghui support to clear.
Alarm beep, key beep	On/off — audible feedback for a protection alarm, and for front-panel key presses, respectively.
Date, time	System clock.
Power-on load	User: restarts with the settings active before the last power-off. Default: restarts with factory-default settings.

3.3.2 Function

Field	Description
Voltage range	LOW or HIGH. The HIGH range's voltage ceiling is twice the LOW range's, and its current ceiling is half the LOW range's. Can only be changed while the output is off.
Soft start	0.0–3.0 s — the time the output voltage takes to ramp up from zero once switched on, to suppress inrush current (§5.3).
Response speed	FAST / MED / SLOW — the internal amplifier's response speed (§5.4).
Internal VCC	Fixed or Auto-tracking (§5.5). When fixed, the internal VCC voltage should be set above the output voltage, or a protection trip can result.
Timer	Sets an output duration; the output switches off automatically once the countdown reaches 000:00:00. Leave unset (0) to show an elapsed-time counter instead, and run continuously.

3.3.3 Communication

Bus Mode selects the active communication interface: RS232, LAN, USB TMC or USB CDC (Chapter 6).

Field	Options
Bus protocol (RS232 mode)	SCPI or MODBUS
Baud rate (RS232 mode)	4800 / 9600 / 14400 / 19200 / 38400 / 57600 / 96000 / 115200 bit/s
Network protocol (LAN mode)	TCP/IP (standard TCP/IP v4 networking) or LXI (requires LabVIEW on the host PC)
TCP port (LAN mode)	0–65535
IP address, subnet mask, default gateway (LAN mode)	Entered byte-by-byte, 1–255 per byte; default subnet mask 255.255.255.0. The gateway's fourth byte is fixed at 1, and its third byte always matches the IP address's third byte.

3.3.4 Limit

Restricts the range of values that can be entered elsewhere for DC voltage, AC voltage and output frequency — useful for preventing an operator from setting the output outside a safe or approved window.

Field	Description
DCV upper / lower limit	DCV Lower Limit to 212.0 V (LOW) or to 424.0 V (HIGH) / −212.0 V (LOW) or −424.0 V (HIGH) to DCV Upper Limit.
ACV upper / lower limit	ACV Lower Limit to 150.0 V (LOW) or to 300.0 V (HIGH) / 0.0 V to ACV Upper Limit.
Frequency upper / lower limit	Frequency Lower Limit to 1000 Hz / 1.0 Hz to Frequency Upper Limit.

3.3.5 Waveform

Field	Description
Waveform library no.	0–63. Library 0 is fixed to a sine wave and cannot be changed; all 64 libraries hold sine-wave data from the factory.
Waveform type	SIN, CUT (Clip), SQUARE, TRI (Triangle), S/T (Surge/Notch), DIMMER — see §5.3 for the full waveform set.
Clip factor *(CUT type)*	1.2–1.4 — the clipped waveform's crest factor (peak/RMS); an unclipped sine wave has a crest factor of 1.41.
Duty cycle *(SQUARE type)*	1.0–99.9%.
Surge/notch voltage *(S/T type)*	0.001–999.9 — a multiplier applied to the AC Voltage setting. A value ≤1 produces a notch (notch voltage = AC Voltage × value); a value >1 produces a surge (surge voltage = AC Voltage, and the output voltage equals the surge voltage × the reciprocal of the value).
Surge/notch position *(S/T type)*	0 to (1023 − Surge/Notch Width). One cycle is divided into 1024 points: point 256 is 90°, point 512 is 180°.
Surge/notch width *(S/T type)*	0 to (1023 − Surge/Notch Position).
Surge/notch period *(S/T type)*	1–9999 — the surge/notch event repeats every this many output cycles.
Dimmer type *(DIMMER type)*	FRONT (leading-edge) or BACK (trailing-edge) phase-cut dimming.

3.3.6 Tools

Field	Description
System version	Shows the CPU firmware version; a softkey launches the CPU firmware update (Appendix §A.6).
DSP version	Shows the DSP firmware version; a softkey launches the DSP firmware update (Appendix §A.6).
Factory reset	Restores all settings to factory defaults; the instrument must be restarted to confirm.

CHAPTER 4

File Management

The TH7200 series can save the complete set of user parameters to a file, so a configuration can be recalled later without re-entering it manually. Press System, then **Internal File** (instrument flash storage, up to 54 files) or **External File** (a connected USB drive).

File type	Extension	Loadable	Purpose
Configuration (internal)	`.STA`	Yes	Saves the instrument's parameter settings to internal flash
Configuration (external)	`.STA`	Yes	Saves the instrument's parameter settings to a USB drive
Measurement data (external)	`.CSV`	No	Saves recorded measurement results to a USB drive

4.1 Operations

- **Save** — move to an empty file slot, press Save, enter a file name on the character-selection panel, and confirm with Enter. An unnamed file defaults to `UNNAMExx.STA`.
- **Load** — select a file and press Load to recall it into the active instrument settings.
- **Copy** — copy a file between internal storage and a USB drive (Copy to E: / Copy to I:).
- **Delete** — select a file and press Delete.

> NOTE
> Use a USB drive with a USB 2.0 interface, formatted as FAT32. Back up data on the USB drive before connecting it to the instrument — Techmize/Tonghui is not responsible for USB-drive data loss. Keep the number of files and folders on the drive low for reliable performance.

CHAPTER 5

Functions

5.1 Step function (STEP)

Step mode runs a pre-configured sequence of output voltage, frequency and timing settings automatically, one step at a time, from a specified start step to a specified end step. Pressing **On/Off** begins execution at the start step; the instrument then advances through each subsequent step in order until the end step completes one pass.

Example. With Start Step set to 000 and End Step set to 007, the eight steps below produce a stepped AC voltage ramp with two different output durations and AC Change enabled partway through:

Field	Step 0	Step 1	Step 2	Step 3	Step 4	Step 5	Step 6	Step 7
DC voltage	0.0 V (all steps)							
AC voltage	50.0 V	100.0 V	150.0 V	50.0 V	100.0 V	100.0 V	50.0 V	50.0 V
Output frequency	50.00 Hz (all steps)							
Start / stop phase	000° / 000° (all steps)							
Time	0.180 s	0.180 s	0.180 s	0.080 s	0.080 s	0.140 s	0.200 s	0.080 s
Step cycle	1	1	1	2	1	1	1	1
AC change	off	off	off	off	on	off	on	off
Step output	on (all steps)							

5.2 Power anomaly simulation function (SIM)

Simulate mode outputs AC only, and can reproduce outage, voltage-rise and voltage-fall disturbances for testing switch-mode power supplies and other electronic equipment.

5.2.1 Outage example

AC voltage	100.0 V	Output frequency	50.00 Hz
T1 time	5.0 ms	T2 time	00000 ms
T3 time	40.0 ms	T3 voltage	0.0 V
T4 time	00000 ms	T5 time	0040 ms
Cycle count	1	Start / stop phase	090° / 090°

With T2 and T4 time both at 0 ms, the voltage steps directly to 0.0 V (T3 Voltage) and back, simulating an instantaneous mains outage.

5.2.2 Voltage rise/fall example

AC voltage	100.0 V	Output frequency	50.00 Hz
T1 time	5.0 ms	T2 time	00040 ms
T3 time	40.0 ms	T3 voltage	50.0 V
T4 time	00040 ms	T5 time	0040 ms
Cycle count	1	Start / stop phase	000° / 000°

Here T2 and T4 time are set to 40 ms, so the voltage ramps smoothly from 100.0 V down to the T3 Voltage of 50.0 V over 40 ms, holds there for the T3 Time, then ramps back up to 100.0 V over another 40 ms — simulating a controlled voltage sag and recovery rather than a hard outage.

5.3 Output waveform library

The instrument generates its output voltage reference waveform by digital-to-analogue conversion of waveform data held in internal memory, and can produce sine, square, triangle, clip, surge, notch and dimmer waveforms.

5.3.1 Built-in waveforms

Eight standard waveforms are available: Sine, Square, Clip, Triangle, Surge, Notch, Pre-dimmer (leading-edge) and Post-dimmer (trailing-edge).

5.3.2 Custom waveforms

A user-defined waveform can be created by computing 1024 integer sample points (each in the range −6074001 to 6074001) with software such as MATLAB, saving them as a CSV file to a USB drive, and loading that file into one of the instrument's internal waveform libraries (§3.3.5).

5.4 Soft start function

Soft start ramps the output voltage up gradually once the output is switched on, to suppress inrush current and avoid a voltage sag caused by a load's startup surge exceeding the instrument's rated capacity. Set the ramp time (0.0–3.0 s) under System Setup → Function (§3.3.2); while active, "RISE" appears in the prompt zone of the Measurement Display page.

> **NOTE**
> The Start Phase Angle setting has no effect while soft start is active.

5.5 Response speed

The internal amplifier's response speed can be set to match the load and test purpose:

- **FAST** — for development and research work requiring a fast output rise/fall time. Depending on the load, the output may become unstable; switch to MED or SLOW if this occurs.
- **MED** — suited to low-frequency disturbance testing and general-purpose power-quality work.
- **SLOW** — provides the most stable output, suited to EMC test setups. In particular, this setting helps keep the output stable when a large capacitive load is connected.

5.6 Internal VCC

To minimise losses in the linear amplifier, the internal VCC (amplifier rail) voltage is normally set to Auto, tracking the output voltage. It can instead be fixed, which shortens the output's voltage-change settling time at the cost of higher internal power dissipation; when fixed, check the VCC setting against the expected output voltage, load and ambient temperature before testing, since a VCC set too low relative to these conditions can trigger a protection trip.

CHAPTER 6

Remote Control & Communication Interface

The TH7200 series can be controlled remotely over RS232, LAN, USB TMC or USB CDC, using either the SCPI or MODBUS protocol (RS232/USB CDC). SCPI and MODBUS are standard capabilities across the full TH7200 range — not exclusive to any one model. Only one interface is active at a time, selected under System Setup → Communication (§3.3.3). For the complete command syntax, registers and parameter ranges, see the companion *TH7200 Series SCPI & MODBUS Command Reference*.

6.1 RS232

The instrument's RS232 interface implements a minimal subset of the full RS-232 standard: transmit data (TXD), receive data (RXD) and signal ground (GND) only — no hardware flow-control lines.

Signal	Connector pin
TXD (transmit)	2
RXD (receive)	3
GND	5

Baud rate (4800–115200 bit/s, §3.3.3) and protocol (SCPI or MODBUS, no parity, 8 data bits, 1 stop bit) are configured under System Setup → Communication. A SCPI command string is terminated with an LF character (0x0A); the instrument accepts up to 2 KB per command string.

6.2 LAN

Configure the network under System Setup → Communication (§3.3.3): select TCP/IP for standard IPv4 networking, or LXI if the host software is LabVIEW-based. Set the TCP port (0–65535), IP address, subnet mask (default 255.255.255.0) and default gateway as required for the local network.

6.3 USB TMC

The rear-panel USB device interface also supports USBTMC-USB488 over USB 2.0. Connect it to the host PC with a USB cable; Windows will prompt to install the USBTMC driver on first connection, after which the interface appears in Device Manager as a USB test-and-measurement device. Programming is typically done through LabVIEW or an equivalent VISA-based environment.

6.4 USB CDC (virtual COM port)

Selecting USB CDC as the bus mode (§3.3.3) configures the same USB port as a virtual serial (COM) port. Install the TH7200 USB virtual-COM driver, available from Techmize/Tonghui on request, after which the port appears in Device Manager as a USB VCOM port and can be used by any serial-communication software exactly like a physical RS232 port, with the same SCPI/MODBUS, baud-rate and parameter settings as §6.1.

6.5 SCPI

The SCPI command set addresses the instrument's display (`DISPlay`), basic/program/simulate setup (`BASIC` , `PROG` , `SIM`), measurement (`FETCh`), system (`SYSTem`), function (`FUNCtion`), limit (`LIMIT`), waveform (`WAVE`), output (`OUTPut`) and alarm (`ALM`) subsystems, plus the standard SCPI common commands. The full command list, syntax and examples are published in the companion SCPI & MODBUS Command Reference.

6.6 MODBUS

The MODBUS protocol exposes the same parameter set as a set of holding/input registers, read and written using standard MODBUS read and write function codes with CRC-16 frame checking. The full register map is published in the companion SCPI & MODBUS Command Reference.

CHAPTER 7

Technical Specifications

Specifications are guaranteed for the operating conditions in §1.3, after the warm-up period in §1.4, unless noted otherwise. Specifications are subject to change without notice.

Parameter	TH7205	TH7210
AC input		
Phase	1Ø / 2-wire	
Voltage	100–120 V AC, 200–240 V AC	
Frequency	47–63 Hz	
Max. input current	11.3 A / 5.5 A	22.5 A / 10.8 A
Power factor	0.7	
AC output		
Rated power	500 VA	1000 VA
Output voltage range	LOW: 1.0–150.0 V | HIGH: 2.0–300.0 V	
Output voltage resolution	0.1 V	
Output voltage accuracy	±(0.3% of set voltage + 0.6 V)	
Output frequency range	1 Hz – 1000 Hz	
Output frequency resolution	0.01 Hz (1.00–99.99 Hz) | 0.1 Hz (100.0–999.9 Hz)	
Max. current (RMS)	5.0 A (LOW) / 2.5 A (HIGH)	10.0 A (LOW) / 5.0 A (HIGH)
Max. instantaneous current	Max. RMS current × 4 (TYP)	
Power factor (load)	0–1	
DC / AC+DC output		
Rated power	350 W	700 W
Output voltage range	LOW: 1.4–212.0 V | HIGH: 2.8–424.0 V	
Output voltage resolution	0.1 V	
Output voltage accuracy	LOW: ±(0.05% of set voltage + 0.05 V) | HIGH: ±(0.05% of set voltage + 0.1 V)	
Max. current (peak)	3.5 A (LOW) / 1.75 A (HIGH)	7.0 A (LOW) / 3.5 A (HIGH)
Max. instantaneous current	Max. peak current × 3.6 (TYP)	
Ripple noise	≤ 0.15 Vrms	
Additional output parameters		
Line regulation	±0.1%	
Load regulation	LOW: ±0.1 V | HIGH: ±0.2 V	
Total harmonic distortion (THD)	≤ 0.2%	
Response time	30 µs (TYP)	
Energy efficiency	≥ 55%	
Start / end phase setting	0–359°, 1° resolution	
AC+DC superposition limit	LOW: √2 × Vac + |Vdc| ≤ 212.0 V | HIGH: √2 × Vac + |Vdc| ≤ 424.0 V	

Parameter	TH7205	TH7210
Measurement		
Voltage range	AC: 0–300 Vac | DC / AC+DC: −424 to 424 V	
Voltage resolution / accuracy	0.1 V | ±(1% of reading + 2 counts)	
Frequency range / accuracy	1 Hz – 1000 Hz | ±(1% of reading + 2 counts)	
Current range (peak)	22 A	44 A
Current resolution	0.01 A	
Current accuracy	RMS: ±(1% of reading + 2 counts) | Peak: ±(5% of reading + 2 counts)	
Power range	0–500 W	0–1000 W
Power resolution / accuracy	0.1 W | ±(1% of reading + 3 counts)	
Power factor resolution / accuracy	0.001 | Calculated and displayed to 3 significant digits	
Measured parameters (full-display mode, 14 simultaneous)	Urms, Udc, Upk+, Upk−, Irms, Idc, Ipk+, Ipk−, CFu, CFi, P, S, Q, PF	
General		
Display	4.3″ colour TFT LCD, 480 × 272, English UI	
Operating modes	Basic (single AC/DC/AC+DC output) · Step (up to 600 steps) · Simulate (AC-only anomaly simulation)	
Waveform library	8 built-in waveforms; custom waveforms importable via CSV; up to 64 sets stored	
Internal file storage	54 files	
Interfaces	RS232, USB Device, USB Host, LAN	
Programming protocol	SCPI, MODBUS	
Protection	HI-A (over set current), OVP (over-voltage), LVP (low-voltage), OCP (over-current), OCKP (over-peak-current), OPP (over-power), OTP (over-temperature)	
Dimensions (W × H × D)	430 × 177 × 610 mm	
Weight	27.5 kg	

The 14 parameters above are shown together on the Measurement Display page's full-display mode. In partial-display mode, each of the 4 readout slots can instead be set individually to any of 16 parameters, including Uac, Iac and the peak-current maximum-hold values Ipkmax+/Ipkmax−. A remote `FETC?` query returns all 18 measured values in a single call. See the companion SCPI & MODBUS Command Reference for the full parameter lists.

APPENDIX

Packing, Warranty & Related Documents

A.1 Standard accessories

Model	Standard accessory
TH7205	EU power cable (Schuko, CEE 7/7)
TH7210	Circuit breaker (no power cable supplied — AC input is wired via the rear-panel terminal block)

This operation manual is issued in PDF only and is not included as a printed item.

A.2 Transport & storage

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

A.3 Nameplate & markings

Each instrument's rear-panel nameplate carries: the manufacturer's name/trademark, product name and model, serial number and date of manufacture, the supply-voltage rating, and the CE mark.

A.4 Related documents

- TH7200 Series Datasheet (Techmize)
- TH7200 Series SCPI & MODBUS Command Reference (Techmize, companion to this manual)

A.5 Firmware update

1. Copy the firmware file (`TH7205.sec` or `TH7210.sec` , as supplied by Techmize/Tonghui, matching your model) to a USB drive and insert it into the front-panel USB port.
2. Press **System**, then **More**, to open <System Update>.
3. Use the CPU Upgrade softkey to update the CPU firmware, and the DSP Upgrade softkey to update the DSP firmware.

> **NOTE**
> If the update reports "Load *.SEC File failed!", reformat the USB drive as FAT32 (default allocation unit size, quick format) and keep only the one update file matching your model on the drive.

A.6 Contacting Techmize

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

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