TECHMIZE by TONGHUI

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OPERATION MANUAL

TH6400 Series

Linear multi-channel programmable DC power supplies — TH6402A, TH6402B, TH6402, TH6412 and TH6413. Front-panel operation, communication interfaces and specifications. The remote command set is described in the companion *TH6400 Series SCPI Command Reference*.

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

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TH6400 Series Operation Manual

Linear Multi-Channel Programmable DC Power Supply

This manual describes installation, front-panel operation, communication interfaces and technical specifications of the Techmize TH6400 series. The series comprises five models that share one operating concept and differ in channel count, per-channel voltage/current rating and precision class:

Model	Channels	Output channels (rated)	Class
TH6402A	3	CH1/CH2 0–30 V / 3 A · CH3 0–5 V / 3 A	Economy
TH6402B	4	CH1/CH2 0–30 V / 3 A · CH3 0–10 V / 3 A · CH4 0–5 V / 1 A	High precision
TH6402	3	CH1/CH2 0–30 V / 3 A · CH3 0–6 V / 5 A	High precision
TH6412	3	CH1/CH2 0–30 V / 6 A · CH3 0–6 V / 5 A	High current
TH6413	3	CH1/CH2 0–60 V / 3 A · CH3 0–6 V / 5 A	High voltage

Where a function, interface or value applies to specific models only, the text says so; everything else applies to the whole series.

Contents	Page
1. Safety & Compliance	3
2. Out of the Box	7
3. Getting to Know the Instrument	9
4. Operation	11
5. Remote Control	14
6. Specifications	16
Appendix	18

The complete SCPI command set is issued as a separate document, the *TH6400 Series SCPI Command Reference*. Chapter 5 of this manual describes the physical interfaces and command syntax only.

CHAPTER 1

Safety & Compliance

1.1 About this manual

Thank you for choosing a Techmize instrument. This manual applies to the TH6400 series linear programmable DC power supplies. Techmize continually improves the performance, functions, construction, appearance, accessories and packaging of its products; the content of this manual and the specifications it contains are subject to change without notice. If you find that this manual does not match your instrument, please contact Techmize or your authorized distributor (§1.8).

1.2 Safety symbols used in this manual

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 load, or invalidate a result.

NOTE — supplementary information that helps with correct or efficient use.

Protective earth — connect to protective earth. The supply cord provides the protective-earth connection for the chassis.

WARNING — ELECTRIC SHOCK

The protective-earth conductor of the power cord must be connected to earth. Never operate the instrument from an ungrounded outlet or through a two-wire adapter. Disconnect the power cord before replacing the fuse or opening the instrument; there are no operator-serviceable parts inside.

WARNING — OUTPUT TERMINALS

Do not short-circuit the output terminals or connect them to the chassis; components can be damaged. Switch the instrument off before connecting or disconnecting an interface connector.

1.3 General precautions

- Do not use the instrument in dusty, vibrating, direct-sunlight or corrosive-gas environments.
- The instrument is designed to limit interference entering through the AC supply. It should still be used in a low-noise environment; if that cannot be avoided, install a power-line filter.
- A cooling fan is fitted on the rear panel and ventilation openings are provided on the left and right of the case. Keep them unobstructed so that internal temperature rise does not affect accuracy.
- Do not switch the instrument on and off frequently; stored data can be lost.
- If the instrument will not be used for a long time, store it in its original box or a similar box in a ventilated room at 5–40 °C and no more than 85 % RH, free of corrosive impurities and out of direct sunlight.

1.4 Operating conditions

Item	Requirement
Supply voltage	220 V AC ±10 %
Supply frequency	50 Hz / 60 Hz ±5 %
Power consumption	[To be added]
Normal working conditions	0–40 °C, < 90 % RH
Reference working conditions	20 °C ±8 °C, < 80 % RH
Transport conditions	0–55 °C, 93 % RH
Warm-up time	≥ 20 minutes

> **CAUTION — WARM-UP**
> Allow at least **20 minutes** of warm-up after switch-on before relying on the output accuracy given in Chapter 6.

1.5 Electrical safety

The TH6400 series is a Class I (protectively earthed) instrument that meets the safety requirements of EN 61010-1:2010+A1:2019 (safety requirements for electrical equipment for measurement, control and laboratory use).

Test	Requirement
Insulation resistance	Between the power terminals and the case: not less than 50 MΩ under reference working conditions, and not less than 2 MΩ under hot and humid transport conditions
Dielectric strength	Between the power terminals and the case: withstands 1.5 kV AC, 50 Hz for one minute with no breakdown or flashover (reference working conditions)
Leakage current	Not greater than 3.5 mA (AC, rms)

1.6 Electromagnetic compatibility and CE marking

The TH6400 series carries the CE mark, shown on the rear-panel nameplate. Electromagnetic compatibility is assessed against EN 61326-1:2021 (EMC requirements for electrical equipment for measurement, control and laboratory use) and the basic standards listed below.

Standard	Subject
CISPR 11:2015+A1:2016+A2:2019	Radiated and conducted emissions, Group 1, Class A
EN 61000-4-2:2009	Electrostatic discharge immunity
EN 61000-4-3:2020	Radiated radio-frequency electromagnetic field immunity
EN 61000-4-4:2012	Electrical fast transient/burst immunity
EN 61000-4-5:2014+A1:2017	Surge immunity on the power line
EN 61000-4-6:2014	Immunity to conducted disturbances induced by radio-frequency fields
EN 61000-4-11:2020	Voltage dips and interruptions immunity
EN 61000-3-2:2019+A1:2021	Harmonic current emissions on the AC supply
EN 61000-3-3:2013+A1:2019+A2:2021	Voltage changes, voltage fluctuations and flicker

> **NOTE — CLASS A EQUIPMENT**
>
> Group 1, Class A equipment is intended for use in industrial and laboratory environments. In a residential environment it may cause radio interference.

1.7 WEEE, warranty and service

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.

Warranty

Techmize warrants the instrument against defects in material and workmanship for a period of **two (2) years** from the date of shipment. A warranty card is required to claim warranty service. Damage caused by incorrect operation during the warranty period is repaired at the user's expense.

Repairs must be carried out by qualified technical personnel; do not replace internal components yourself. After any repair the instrument must be recalibrated so that accuracy is not affected. Damage caused by unauthorized repair or component replacement is not covered by the warranty. Protect the instrument from sunlight and moisture, use it only within the conditions given in §1.4, and pack it in its original box if it is to be stored for a long period.

1.8 Manufacturer & EU contact

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
Email: dx.han@tonghui.com.cn
Web: en.tonghui.com.cn
Or contact your authorized Techmize
distributor

Registration

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

CHAPTER 2

Out of the Box

2.1 Unpacking

Inspect the packaging for damage after unpacking. If the packaging is damaged, do not switch the instrument on; contact the carrier and your Techmize distributor first. Check the contents against your order and notify Techmize or your distributor promptly if anything does not match.

Item	Description	Supply
TH6400 series instrument	TH6402A, TH6402B, TH6402, TH6412 or TH6413 as ordered	Standard
EU power cable	EU power cable (Schuko, CEE 7/7)	Standard
YT3007	Test cable	Standard
YT3008	Test cable	Standard
TH26035D	High-current test lead	Optional
TH26035E	High-current test lead	Optional
GPIB interface	Factory-fitted option, all models	Optional

This operation manual is issued as a PDF document only. Keep the original packaging; it is the recommended way to store or return the instrument.

2.2 Connecting the power supply

Item	Specification
Supply	220 V AC ±10 %, 50 Hz / 60 Hz ±5 %
Power switch	Front-panel switch — pressed in = on, popped out = off
AC inlet	Three-pin socket on the rear panel
Power consumption	[To be added]

> **WARNING**
> Make sure the protective-earth conductor of the supply is reliably grounded before connecting the power cord.

2.3 Connecting the load

Connect the load to the **[+]** and **[−]** output terminals of the channel to be used, with a cable of suitable cross-section for the output current. The terminals on the front panel and the terminal block on the rear panel carry the same outputs; the rear-panel terminals additionally provide the four-terminal (remote sense) sampling connections.

- **Combine mode.** When channels are combined in series or in parallel (Menu Set → Combine, §4.4), the output terminals must also be wired externally in series or in parallel to match. Use the same wiring on the rear panel if it is used.
- **Remote sense.** With high output current and long, thin leads, part of the output voltage is lost across the leads. Connect the rear-panel sense terminals directly to the load so that the voltage at the load equals the set voltage. Sense terminals are provided on the rear panel only.

2.4 Switching on for the first time

1. Connect the EU power cable to the rear-panel inlet and confirm the protective-earth connection.
2. Press the front-panel power switch. The instrument starts on the **OUTPUT DISPLAY** page.
3. Allow 20 minutes of warm-up (§1.4).
4. Connect the load, set the working mode and output parameters (Chapter 4), then press the channel key to switch an individual channel on, or **ON/OFF** to switch all channels on together.

CHAPTER 3

Getting to Know the Instrument

3.1 Front panel

This chapter gives a short overview; operation is described in detail in Chapter 4.

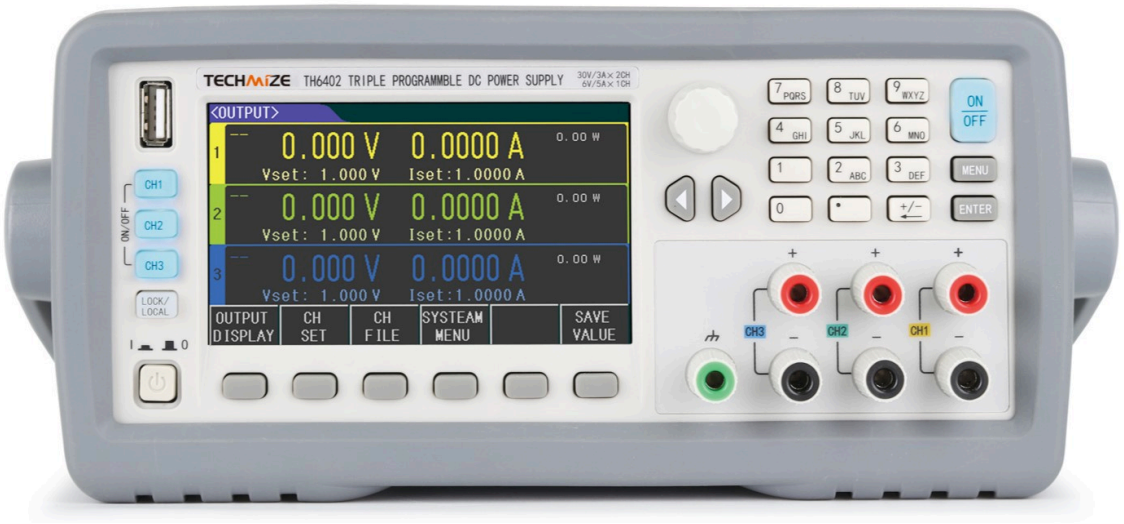

Figure 3-1 Front panel (TH6402 shown)

1 **USB port** — USB Host port for a USB drive (data logging, screen capture, firmware upgrade).

2 **Trademark and model** label.

3 **LCD** — 4.3″ colour TFT, 480×272 pixels; shows settings, measured values and status.

4 **Knob** — adjusts a value or moves the cursor.

5 **Arrow keys (CURSOR)** — left/right, move the cursor.

6 **Numeric keys** — enter values directly.

7 **ON/OFF** — switches all channel outputs on or off together.

8 **MENU** — opens the menu setting page directly.

9 **ENTER** — confirms an entered value. Together with **LOCK/LOCAL** it takes a screenshot.

10 **Output terminals** — [+] / [−] output terminal pair per channel, plus the earth terminal.

11 **Softkeys** — six keys whose function changes with the page; the current function is shown in the softkey area under the display.

12 **Power switch (POWER)** — pressed in = on, popped out = off.

13 **LOCK/LOCAL** — locks the keypad / switches between remote and local control. When its lamp is lit the keypad is locked and the instrument can only be controlled remotely.

14 **CH3 ON/OFF** — switches the CH3 output on or off; the lamp is lit while the output is on.

15 **CH2 ON/OFF** — switches the CH2 output on or off.

16 **CH1 ON/OFF** — switches the CH1 output on or off.

3.2 Rear panel

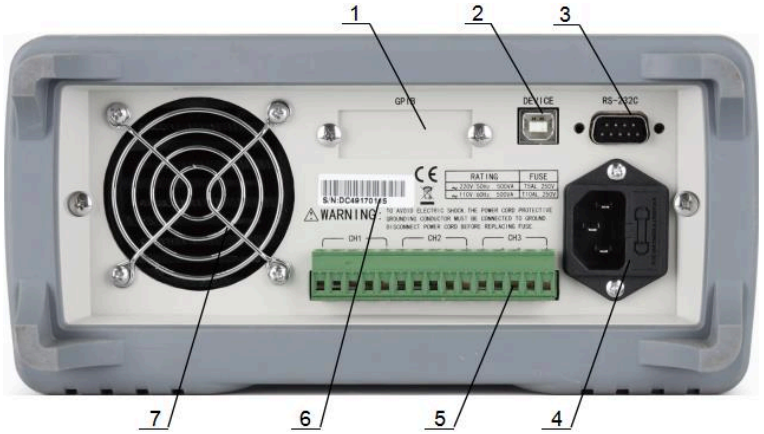

Figure 3-2 Rear panel

No.	Item	Function
1	GPIB	Optional. Connects to a computer to build a GPIB test system.
2	USB DEVICE	Computer control through the USB DEVICE port.
3	RS232	Serial communication interface; same function as the USB DEVICE port.
4	AC power socket	Connects the AC supply (220 V / 50 Hz).
5	Remote sense terminals	Same function as the front-panel output terminals, with the additional four-terminal sampling (remote sense) function.
6	Nameplate	Production date, model, batch and manufacturer.
7	Fan	Temperature control of the instrument.

> **NOTE — TH6402A INTERFACES**
>
> The TH6402A has a USB Host port only; it has no RS232 interface and no USB DEVICE port. All other models provide RS232, USB Host and USB Device as standard. GPIB is optional on all models.

3.3 Display areas

1. **Display menu area** — shows the name of the current page.
2. **Status and error area** — shows error messages or the current working status.
3. **Quick setting and display area** — sets voltage and current quickly; shows the real-time sampled values, the working mode and the timer.
4. **Softkey area** — shows the function of the six softkeys for the current page.

3.4 Display pages

Page	Purpose
OUTPUT DISPLAY	Default page after switch-on. Quick setting of the output values and display of the measured values (§4.1).
CH SET	Detailed parameter setting for one channel (§4.2).
CH RECALL	Per-channel list in which settings are saved and from which they are recalled (§4.3).
MENU SET	Working mode of the instrument (§4.4).

CHAPTER 4

Operation

4.1 OUTPUT DISPLAY

Press the softkey for **OUTPUT DISPLAY** to open the output page. On this page the voltage and current of every channel can be set quickly; the measured voltage, current and power, the output time and the output status of each channel are displayed.

4.1.1 Setting values

The setting range of voltage and current for each channel is from 0 to the maximum output value, which depends on the model (see Chapter 6). Move the cursor to the item to be set with the arrow keys, then use one of two methods:

1. **Knob.** Press the knob or an arrow key to move the cursor to the digit to be changed, then turn the knob to adjust the value.
2. **Numeric keys.** Type the value, then select the unit in the softkey area or press ENTER.

4.1.2 Output

The channel keys (CH1, CH2, CH3) on the left of the front panel switch the output of the corresponding channel on or off. After the parameters of a channel are set, press its key to switch the output on; the key lamp lights. Press the key again to switch the output off; the lamp goes out. The ON/OFF key on the right of the front panel switches all channel outputs on or off together.

TH6402B (4 channels): operation of CH4 — [To be added].

4.2 CH SET

Press the softkey for **CH SET** to open the setting page of channel 1. Use the channel softkeys to move to another channel. The following can be set on this page:

- Voltage and current
- OCP current
- OVP Volt
- Time Set
- OVP / OCP switch
- Timer switch
- Save Value

4.2.1 Voltage and current

The setting range is from 0 to the maximum output value of the model. Select the item with the arrow keys and set the value with the knob or the numeric keys, as described in §4.1.1.

4.2.2 OCP current

Sets the over-current protection point, from 0 to the maximum set value (the maximum depends on the model). When the OCP function is on and the current exceeds this point, the power supply cuts the output of the channel and an over-protection message is shown.

4.2.3 OVP Volt

Sets the over-voltage protection point, from 0 to the maximum value of the model (Chapter 6). When the voltage exceeds this point, the power supply cuts the output and OVP is displayed.

4.2.4 Time Set and Timer

The output timer can be set from 0 to 99999.9 s. When the timer is on and the channel is switched on, the timer starts and the remaining time counts down on the display. When it reaches zero the output of the channel is switched off.

4.2.5 OVP/OCP switch and Timer switch

Press the softkey **MORE 1/2** to show the second softkey row. Use the protection softkey to switch the OVP and OCP functions of the channel on or off, and the **TIMER** softkey to switch the timer function on or off. While the timer is on, the channel box on the OUTPUT DISPLAY page shows “TIMER”.

4.2.6 Save Value

Saves the voltage, current, OCP current and OVP Volt of the channel to its recall list. Pressing **SAVE VALUE** on the OUTPUT DISPLAY page saves the settings of all channels into the same file; pressing it on a CH SET page saves the settings of that channel only.

4.3 CH RECALL (setting files)

Press the softkey for **CH RECALL** to open the recall list of channel 1; use the channel softkeys to switch channels. Each channel has its own list that holds **40 groups** of voltage, current, OCP current and OVP Volt values, arranged in 4 pages of 10 groups. Page through the list with the arrow keys or the PAGE UP / PAGE DOWN softkeys.

- **Recall.** Turn the knob to point the cursor at a group and select **RECALL**; the group replaces the current settings.
- **Delete.** Select **DELETE** to delete the group. The groups behind it move forward to fill the gap.

> NOTE — KEEPING SAVED DATA
>
> Data saved on this page is held temporarily and is cleared when the instrument is switched off. To have saved data available after the next start, write it to flash memory with the **P-Mem** function (§4.4).

4.4 MENU SET

Press MENU, or the softkey for **MENU SET**, to open the system page that sets the working mode of the instrument. Move the cursor to an item with the arrow keys, then choose the option with the softkeys.

Item	Options and function
Key Voice	On / Off — key sound.
P-Mem	Selects the settings loaded at start-up. **Default**: the instrument starts with factory settings. **User Data**: writes the current settings, saved values and system settings to flash memory so that they are loaded at the next start. After any change, press User Data again to rewrite the data to flash.
R-Wait	Return to the main display automatically after a period without operation. **Off** disables the function; **5 s**, **30 s**, **60 s** select the waiting time before the instrument returns to the OUTPUT DISPLAY page.
Bus Mode	Communication port: RS232, GPIB, USB-CDC or USB-TMC (Chapter 5).
Baud Rate	Serial baud rate: 4800, 9600, 19200, 38400, 57600 or 115.2k.
GPIB-Addr	GPIB address 1–32 (default 8); set it when several instruments communicate on one bus.
Bus Protocol	Communication protocol used with external devices: SCPI or Modbus. MODBUS protocol description — [To be added].
Combine	Combination of channels (§4.5).
Date	Real-time clock. Move the cursor to the Date item and press the SET softkey to set the year, month, day, hour, minute and second.

4.5 Combine

The **Combine** item sets how the channels are combined. While a combine mode is active, saving and recalling data are not available.

Mode	Function
Off	Combine function off.
Series	CH1 and CH2 in series; the set current of the two channels is the same.
Parallel	CH1+CH2, CH2+CH3 or all channels in parallel; the set voltage of the selected channels is the same.
Track	CH1+CH2, CH2+CH3 or all channels in synchronous operation: the set voltage and current of the selected channels change in proportion. Set the voltage and current values before selecting this mode.

Combine mode numbers used by the remote command `MENu:COMBine` (0–7) — [To be added].

Track example. Set CH1 to 2 V / 0.1 A and CH2 to 1 V / 0.3 A, then select CH1+CH2 Track. If CH1 is now changed to 3 V / 0.2 A, CH2 changes to 1.5 V / 0.6 A. If a selected channel has a set voltage or current of 0 before Track is selected, tracking cannot be started.

4.6 Data logging

The instrument can record voltage and current data to a CSV file on a USB drive (about 100 ms sampling interval, up to 15000 rows per recording).

1. Insert a USB drive in the front-panel USB port.
2. Press LOCK/LOCAL, then the ← key: recording starts.
3. Press →: recording stops and the file is saved.

> NOTE
> The data logging function is not available on the TH6402B.

4.7 Screenshot

Press ENTER together with LOCK/LOCAL to save a screenshot to the USB drive. The message “Save completed” is displayed when it is done.

4.8 Firmware upgrade

1. Insert the USB drive that contains the upgrade file.
2. Press and hold LOCK/LOCAL while switching the power on; the upgrade screen appears.
3. Press the **Update** softkey and confirm to start the upgrade.

> CAUTION
> The upgrade slows down at around 10 %. Do not remove the USB drive; wait until the instrument has restarted.

CHAPTER 5

Remote Control

The TH6400 series can be controlled from a computer through the RS232 serial interface, the USB DEVICE port (USB-TMC or USB-CDC) or the optional GPIB interface. Only one interface can be used at a time. All interfaces use the same command set; hardware configuration and communication protocol differ. Select the interface in **MENU SET → Bus Mode** (§4.4). Through the interfaces, almost every front-panel operation can be performed remotely.

Models: RS232 and USB DEVICE are available on TH6402B, TH6402, TH6412 and TH6413. The TH6402A has no RS232 interface and no USB DEVICE port (§3.2).

5.1 RS232

Like most serial interfaces, the serial interface of the TH6400 series does not implement the complete RS-232 standard but only the minimum subset below, which is the simplest and least costly way to communicate. The instrument uses a 9-pin DB socket; a standard 9-pin DB plug can be connected directly.

Signal	Code	Connector pin
Transmitted data	TXD	3
Received data	RXD	2
Signal ground	GND	5

The pin assignment is compatible with the 9-pin serial port of an IBM-AT-compatible computer. Use a three-wire cable (a standard DB9 crossover cable, or a self-made cable of double-core shielded wire shorter than 1.5 m). When making your own cable, short pins 4 and 6, and pins 7 and 8, on the computer connector.

Parameter	Value
Transmission mode	Full-duplex asynchronous communication with start and stop bits
Baud rate	9600 bit/s; 4800, 19200, 38400, 57600 and 115.2k bit/s can be selected in Menu Set (§4.4)
Data bits	8
Stop bits	1
Parity	None
Terminator	NL (line feed, ASCII 10)
Handshake	Software
Connector	DB9

> **WARNING**
> Switch the power off before connecting or disconnecting the connector, to avoid electric shock. Do not short-circuit the output terminals or connect them to the chassis.

5.2 USB

The USB DEVICE port on the rear panel can be operated in two modes, selected with **Bus Mode**:

- **USB-TMC** — USB remote control according to USBTMC-USB488 and USB 2.0. Connect the rear-panel USB port to the computer with a USB cable. When the instrument is first connected, the computer reports new hardware; install the driver provided by Techmize. Afterwards a *USB Test and Measurement Device* entry appears in the device manager.
- **USB-CDC** — the USB port is configured as a virtual serial port (VCOM). Install the driver as for USB-TMC. The virtual port can then be used like a serial port by any serial-port-based communication software, also on computers that have no physical serial port.

5.3 Installing the USB driver

1. Connect the instrument USB port to the computer and open the device manager; the instrument appears as an unknown device.
2. Right-click the unknown device and choose **Update driver software**.
3. Choose **Browse my computer for driver software**.
4. Select the folder that contains the driver file supplied by Techmize and click **Next**.
5. When prompted, choose **Always install this driver software**. When the installation has finished, the instrument is listed in the device manager.

5.4 GPIB (optional)

IEEE 488 (GPIB) is an international parallel bus standard for intelligent instruments. Through this interface the instrument can communicate with a computer or other intelligent devices and be combined with other test instruments into an automatic test system. The instrument applies IEEE 488.2; the interface board is a factory option. The GPIB address is set in **MENU SET → GPIB-Addr**. The GPIB uses single addressing without secondary addresses; addresses 1–32 can be used, and the default is 8.

Observe the following when building a GPIB system:

- The total cable length of one bus system must not exceed 2 m multiplied by the number of connected devices (the GPIB controller counts as one device), and must not exceed 20 m.
- A maximum of 15 devices can be connected on one bus.
- There are no restrictions on how cables are connected together, but no more than four piggyback connectors should be stacked on any one device.

Code	Function
SH1	Supports all source-handshake functions
AH1	Supports all acceptor-handshake functions
T5	Basic talker; talker cancelled on MLA; serial poll is not supported
L4	Basic listener; listener cancelled on MTA; no listen-only function
RL1	Remote/local function
DC1	Device clear function
DT1	Device trigger function
C0	No controller function
E1	Open-collector drivers

5.5 Command structure

The instrument supports the GPIB common commands `*RST` (reset the instrument) and `*IDN?` (query the model information), and SCPI (Standard Commands for Programmable Instruments). SCPI commands have a tree structure of at most three levels; the top level is the subsystem command, and a lower level is valid only after its subsystem has been selected. Levels are separated by a colon.

- Commands are not case-sensitive.
- A space separates the command from its parameter.
- Some commands have no parameter.
- No space may be placed before or after a colon.
- Commands can be abbreviated or written in full; the abbreviation is shown in capital letters in the command tables.
- A question mark after a command executes a query.

The complete command tables, parameter ranges and return values are given in the *TH6400 Series SCPI Command Reference*.

CHAPTER 6

Specifications

6.1 Rated output and over-voltage protection (0–40 °C)

Model	CH1	CH2	CH3	CH4	Total power
TH6402A	0–30 V / 0–3 A 90 W · OVP 0–36 V	0–30 V / 0–3 A 90 W · OVP 0–36 V	0–5 V / 0–3 A 15 W · OVP 0–10 V	—	195 W
TH6402B	0–30 V / 0–3 A 90 W · OVP 0–36 V	0–30 V / 0–3 A 90 W · OVP 0–36 V	0–10 V / 0–3 A 30 W · OVP 0–16 V	0–5 V / 0–1 A 5 W · OVP 0–10 V	215 W
TH6402	0–30 V / 0–3 A 90 W · OVP 0–36 V	0–30 V / 0–3 A 90 W · OVP 0–36 V	0–6 V / 0–5 A 30 W · OVP 0–11 V	—	210 W
TH6412	0–30 V / 0–6 A 180 W · OVP 0–36 V	0–30 V / 0–6 A 180 W · OVP 0–36 V	0–6 V / 0–5 A 30 W · OVP 0–11 V	—	390 W
TH6413	0–60 V / 0–3 A 180 W · OVP 0–65 V	0–60 V / 0–3 A 180 W · OVP 0–65 V	0–6 V / 0–5 A 30 W · OVP 0–11 V	—	390 W

Total power is the sum of the per-channel ratings.

6.2 Regulation, resolution, accuracy and noise

Parameter	TH6402A	TH6402B	TH6402	TH6412	TH6413
Load regulation / line regulation — V	≤ 0.01 % + 3 mV				
Load regulation / line regulation — I	≤ 0.1 % + 3 mA			≤ 0.01 % + 3 mA	
Set-value resolution — V / I	10 mV / 1 mA	1 mV / 0.1 mA			
Read-back resolution — V / I	10 mV / 1 mA	1 mV / 0.1 mA			
Set-value and read-back accuracy — V (25 °C ±5 °C)	≤ 0.05 % + 20 mV	≤ 0.1 % + 20 mV	≤ 0.03 % + 10 mV		
Set-value and read-back accuracy — I (25 °C ±5 °C)	≤ 0.2 % + 5 mA	≤ 0.2 % + 5 mA	≤ 0.1 % + 5 mA	≤ 0.1 % + 8 mA[1]	≤ 0.1 % + 5 mA
Ripple and noise — V (20 Hz–20 MHz)	3 mVp-p / 1 mVrms	3 mVp-p / 1 mVrms	4 mVp-p / 1 mVrms	4 mVp-p / 1 mVrms	4 mVp-p / 1 mVrms
Ripple and noise — I (rms)	3 mA	3 mA	5 mA	4 mA	5 mA
Series synchronization error	≤ 0.02 % + 5 mA	≤ 0.2 % + 10 mA	≤ 0.05 % + 10 mA		
Parallel set-value accuracy — V	≤ 0.02 % + 20 mV	≤ 0.02 % + 5 mV			≤ 0.02 % + 10 mV
Parallel set-value accuracy — I	≤ 0.1 % + 30 mA	≤ 0.1 % + 20 mA			≤ 0.1 % + 30 mA

[1] TH6412: ≤ 0.1 % + 8 mA on CH1 and CH2, ≤ 0.1 % + 5 mA on CH3.

6.3 Memory, timer, environment

Item	TH6402A	TH6402B	TH6402	TH6412	TH6413
Memory (store / recall)	40 setting files per channel				
Timer function	Switches the output off after a set time				
Timer setting range / resolution	0.1 s–99999.9 s / 0.1 s				
Working temperature	0 ℃–40 ℃				

6.4 Mechanical

Item	TH6402A	TH6402B	TH6402	TH6412	TH6413
Rack mount (W×H×D)	215×88×412 mm	215×88×473 mm	215×88×412 mm	215×88×473 mm	
Outline (W×H×D)	235×111×440 mm	235×111×501 mm	235×111×440 mm	235×111×501 mm	
Net weight	8.1 kg	12 kg	8.1 kg	13 kg	
Display	4.3″ colour TFT LCD, 480×272 pixels, 24-bit colour				

6.5 Interfaces

Interface	TH6402A	TH6402B	TH6402	TH6412	TH6413
RS232	—	Standard			
USB Host	Standard				
USB Device	—	Standard			
GPIB	Optional				
Command protocols	SCPI and MODBUS				

APPENDIX

Messages, Packing & Related Documents

A.1 Messages

Message	Meaning
U disk is available!	A USB drive is available.
U disk is removed!	The USB drive has been removed.
No data	The recalled data is empty.
Data out of range	The entered value exceeds the upper setting limit.
Over voltage protect	The sampled voltage exceeded the protection limit.
CombState	Some functions are not available in the current combine state.
Save completed	The screenshot has been saved to the USB drive.
Reset...	Factory settings are being restored; data is reset.

A.2 Related documents

- TH6400 Series Datasheet (Techmize)
- TH6400 Series SCPI Command Reference (Techmize, companion to this manual)

A.3 Contacting Techmize

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

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