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SCPI COMMAND REFERENCE

TH6400 Series

Remote command set for the TH6400 series linear multi-channel programmable DC power supplies — TH6402A, TH6402B, TH6402, TH6412 and TH6413. Command syntax, parameters and return values for RS232, USB and GPIB control. Companion to the *TH6400 Series Operation Manual*.

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TH6400 Series SCPI Command Reference

Linear Multi-Channel Programmable DC Power Supply

This document lists the remote commands of the TH6400 series: 61 commands in 12 SCPI subsystems plus the two supported common commands. The command set is identical for all interfaces (RS232, USB-TMC, USB-CDC and GPIB) and applies to the whole series; ranges that depend on the model (maximum voltage, maximum current, over-voltage protection) are given in the specifications chapter of the *TH6400 Series Operation Manual*.

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CHAPTER 1

Introduction

1.1 Interfaces

The TH6400 series is controlled remotely through RS232, USB (USB-TMC or USB-CDC) or the optional GPIB interface. Only one interface can be used at a time; select it in **MENU SET → Bus Mode**. Interface settings and cabling are described in Chapter 5 of the Operation Manual. The TH6402A has no RS232 interface and no USB DEVICE port.

Interface	Settings
RS232	9600 bit/s (4800 / 19200 / 38400 / 57600 / 115.2k selectable), 8 data bits, 1 stop bit, no parity, terminator NL (line feed, ASCII 10), software handshake
USB-TMC	USBTMC-USB488 and USB 2.0
USB-CDC	Virtual serial port (VCOM)
GPIB	IEEE 488.2, address 1–32, default 8

1.2 Command syntax

SCPI commands have a tree structure of at most three levels. The top level is the subsystem command; a lower level is valid only after its subsystem has been selected. Levels are separated by a colon.

- Commands are not case-sensitive. The lower-case part of a command in the tables may be omitted (for example `VOLTage` = `VOLT`).
- A space separates the command from its parameter. The command comes first; the parameter follows the space. Some commands have no parameter.
- No space may be placed before or after a colon.
- A question mark directly after a command executes a query.
- In the parameter column, the angle brackets `< >` only enclose the parameter and are not entered; a vertical bar `|` separates alternative parameters.
- Commands that set several values at once (`APPLy` commands) take comma-separated parameters.

1.3 Channel selection

Most single-channel commands (`OUTPut`, `VOLTage`, `CURRent`, `TIMer`, `MEASure`, `FUNCtion`) act on the channel that was selected last with `INSTrument:NSELect`. Select the channel first, then send the command. The `APPLy` and `MEASure…:ALL` commands address all channels at once.

1.4 MODBUS

MODBUS protocol description (register map, function codes) — [To be added].

1.5 Common commands

Command	Description
`*RST`	Resets the instrument.
`*IDN?`	Queries the model information.

Of the IEEE 488.2 common commands, only the two listed above are supported.

CHAPTER 2

Command Reference

2.1 SYSTem — system commands

Command	Parameter	Description
`SYSTem:LOCK`	—	Sets remote control. The front-panel keys are disabled, except the LOCK/LOCAL key.
`SYSTem:LOCal`	—	Sets local operation. The front-panel keys are enabled.
`SYSTem:BEEPer`	—	Tests whether the beeper works.
`SYSTem:LOCK?`	—	Queries the control status. Returns `lock` or `local`.
`SYSTem:ADDRess?`	—	Queries the GPIB address of the instrument. Returns an address value, for example `8`.

2.2 DISPlay — display page commands

Command	Parameter	Description
`DISPlay:PAGE`	<OPD | CHn | MEND>	Switches the display page. **OPD**: OUTPUT DISPLAY page. **CHn**: CH SET page of channel n (n = 1, 2 or 3). **MEND**: MENU SET page. Example: `disp:page opd` switches to the OUTPUT DISPLAY page.
`DISPlay:PAGE`	<SRD1 | SRD2 | SRD3>	Switches to the CH RECALL (setting file) page; the number selects channel 1, 2 or 3.
`DISPlay?`	—	Queries the current page. Returns the page abbreviation.

2.3 INSTrument — channel selection

Command	Parameter	Description
`INSTrument:NSELect`	<1 | 2 | 3>	Selects the channel to be operated (TH6402B CH4: [To be added]). The channel selection is the basis for the commands that act on the selected channel (OUTPut, VOLTage, CURRent, TIMer, FUNCtion).
`INSTrument:NSELect?`	—	Queries the currently selected channel.

2.4 OUTPut — output control

Command	Parameter	Description
`OUTPut`	<0 | 1 | ON | OFF>	Switches the output of the selected channel on or off.
`OUTPut?`	—	Queries the output status of the selected channel. Returns 0 or 1.

2.5 CURRent — current setting

Command	Parameter	Description
`CURRent`	<value | MIN | MAX>	Sets the current of the selected channel. **value**: the current in A. **MIN**: minimum value, 0. **MAX**: the maximum value, determined by the model.
`CURRent?`	—	Queries the current set value of the selected channel.

2.6 VOLTage — voltage setting

Command	Parameter	Description
`VOLTage`	<value | MIN | MAX>	Sets the voltage of the selected channel. **value**: the voltage in V. **MIN**: minimum value, 0. **MAX**: the maximum voltage that can be set.
`VOLTage?`	—	Queries the voltage set value of the selected channel.
`VOLTage:PROTection`	<value | MIN | MAX>	Sets the over-voltage protection value of the selected channel. The minimum is 0; the maximum is determined by the model.
`VOLTage:PROTection?`	—	Queries the over-voltage protection value of the selected channel.

2.7 TIMer — timer setting

Command	Parameter	Description
`TIMer`	<0 | 1 | ON | OFF>	Switches the timer of the selected channel on or off.
`TIMer?`	—	Queries the timer status. Returns 0 or 1.
`TIMer:DATA`	<0 … 99999.9>	Sets the timer time of the selected channel, in seconds. Minimum 0, maximum 99999.9 s.
`TIMer:DATA?`	—	Queries the timer time of the selected channel.

2.8 FUNCtion — setting-file (recall) commands

Command	Parameter	Description
`FUNCtion SAVe`	—	Saves the set voltage, current, over-current protection value and over-voltage protection value to the setting-file list.
`FUNCtion:RECall`	<1 … 40>	Loads one group of the CH RECALL list.
`FUNCtion:RECall?`	<1 … 40>	Queries one group of the CH RECALL list.
`FUNCtion:DELete`	<1 … 40 | ALL>	Deletes one group, or clears the whole list.

2.9 APPLy — multi-channel commands

The `APPLy` commands set or query a parameter of all channels with a single command; the parameters are given in channel order CH1, CH2, CH3. TH6402B CH4 — [To be added].

Command	Parameter	Description
`APPLy:VOLTage`	<v1>,<v2>,<v3>	Sets the voltage of the three channels.
`APPLy:VOLTage?`	—	Queries the voltage set values of the three channels.
`APPLy:OVP`	<v1>,<v2>,<v3>	Sets the over-voltage protection value of the three channels.
`APPLy:OVP?`	—	Queries the over-voltage protection values of the three channels.
`APPLy:PROTection`	<0|1|ON|OFF>,<0|1|ON|OFF>, <0|1|ON|OFF>	Switches the protection function (OVP/OCP) of the three channels on or off.
`APPLy:PROTection?`	—	Queries the protection switch status of the three channels.
`APPLy:CURRent`	<i1>,<i2>,<i3>	Sets the current of the three channels.
`APPLy:CURRent?`	—	Queries the current set values of the three channels.
`APPLy:OCP`	<i1>,<i2>,<i3>	Sets the over-current protection value of the three channels.
`APPLy:OCP?`	—	Queries the over-current protection values of the three channels.
`APPLy:TIMer:DATA`	<t1>,<t2>,<t3>	Sets the timer time of the three channels.
`APPLy:TIMer:DATA?`	—	Queries the timer times of the three channels.
`APPLy:OUT`	<0|1|ON|OFF>,<0|1|ON|OFF>, <0|1|ON|OFF>	Switches the output of the three channels on or off.
`APPLy:OUT?`	—	Queries the output status of the three channels.

2.10 MEASure — measurement queries

Command	Parameter	Description
`MEASure:VOLTage?`	—	Queries the measured voltage of the selected channel.
`MEASure:CURRent?`	—	Queries the measured current of the selected channel.
`MEASure:TIMer?`	—	Queries the current timer value of the selected channel.
`MEASure:POWer?`	—	Queries the measured power of the selected channel.
`MEASure:VOLTage:ALL?`	—	Queries the measured voltage of all channels.
`MEASure:CURRent:ALL?`	—	Queries the measured current of all channels.
`MEASure:TIMer:ALL?`	—	Queries the timer value of all channels.
`MEASure:POWer:ALL?`	—	Queries the measured power of all channels.

2.11 MENu — menu function commands

Command	Parameter	Description
`MENu:VOICe`	<0 | 1 | ON | OFF>	Switches the key sound (beeper) on or off.
`MENu:VOICe?`	—	Queries the key-sound status.
`MENu:PMEM`	<0 | 1 | DEFault | USER>	Sets the start-up state. 0 or DEFault: reset (factory settings); 1 or USER: load the saved data.
`MENu:PMEM?`	—	Queries the start-up memory status.
`MENu:RWAIT`	<0s | 5s | 30s | 60s>	Sets the R-Wait time (automatic return to the main display).
`MENu:RWAIT?`	—	Queries the R-Wait time.
`MENu:COMBine`	<0 … 7>	Sets the combine mode, 0 to 7. Assignment of the numbers to the combine modes — [To be added].
`MENu:COMBine:<PARallel | TRACk>`	<1 | 2 | 3>	Sets the combine mode: parallel or track.
`MENu:COMBine?`	—	Queries the combine mode.

2.12 DATe — real-time clock

Command	Parameter	Description
`DATe:<YEAR | MONth | DATe | HOUR | MIN | SEC>`	<value>	Sets the real-time clock. The first field selects year, month, day, hour, minute or second; the parameter is the value.
`DATe?`	—	Queries the current date and time.

2.13 Command index

All commands by subsystem:

SYSTem — `SYSTem:LOCK`, `SYSTem:LOCal`, `SYSTem:BEEPer`, `SYSTem:LOCK?`, `SYSTem:ADDRess?`

DISPlay — `DISPlay:PAGE`, `DISPlay:PAGE`, `DISPlay?`

INSTrument — `INSTrument:NSELect`, `INSTrument:NSELect?`

OUTPut — `OUTPut`, `OUTPut?`

VOLTage — `VOLTage`, `VOLTage?`, `VOLTage:PROTection`, `VOLTage:PROTection?`

CURRent — `CURRent`, `CURRent?`

TIMer — `TIMer`, `TIMer?`, `TIMer:DATA`, `TIMer:DATA?`

APPLy — `APPLy:VOLTage`, `APPLy:VOLTage?`, `APPLy:OVP`, `APPLy:OVP?`, `APPLy:PROTection`, `APPLy:PROTection?`, `APPLy:CURRent`, `APPLy:CURRent?`, `APPLy:OCP`, `APPLy:OCP?`, `APPLy:TIMer:DATA`, `APPLy:TIMer:DATA?`, `APPLy:OUT`, `APPLy:OUT?`

MEASure — `MEASure:VOLTage?`, `MEASure:CURRent?`, `MEASure:TIMer?`, `MEASure:POWer?`, `MEASure:VOLTage:ALL?`, `MEASure:CURRent:ALL?`, `MEASure:TIMer:ALL?`, `MEASure:POWer:ALL?`

FUNCtion — `FUNCtion SAVe`, `FUNCtion:RECall`, `FUNCtion:RECall?`, `FUNCtion:DELete`

MENu — `MENu:VOICe`, `MENu:VOICe?`, `MENu:PMEM`, `MENu:PMEM?`, `MENu:RWAIT`, `MENu:RWAIT?`, `MENu:COMBine`, `MENu:COMBine:<PARallel | TRACk>`, `MENu:COMBine?`

DATe — `DATe:<YEAR | MONth | DATe | HOUR | MIN | SEC>`, `DATe?`