

T1DP 0v High Voltage Desk Top Power Supply

Operators Manual

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WARNING!

- It is not allowed to use the unit if the covers have been removed.
- It is not allowed to connect or disconnect the HV cable if HV is ON !
- We decline all responsibility for damages and injuries caused by an improper use of the module. It is highly recommended to read the operators manual before any kind of operation.

Note

The information in this manual is subject to change without notice. We take no responsibility for any error in the document. We reserve the right to make changes in the product design without reservation and without notification to the users.

Filename T1DP0x_RS232_FAST_eng.____; Version 3.0 as of 07-05-25

1. General information

The model T1DP 0vv is a high voltage desk top supply which offer a very stable output voltage up to 6 kV for use in industry and research. The output is generated by means of a high voltage module of the DPS-series, which is supplied by means of an AC/DC converter.

Main Characteristics:

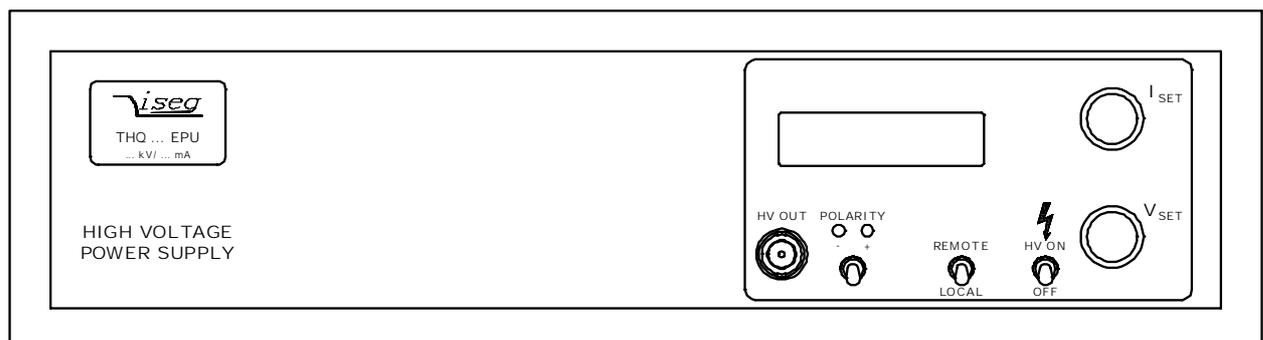
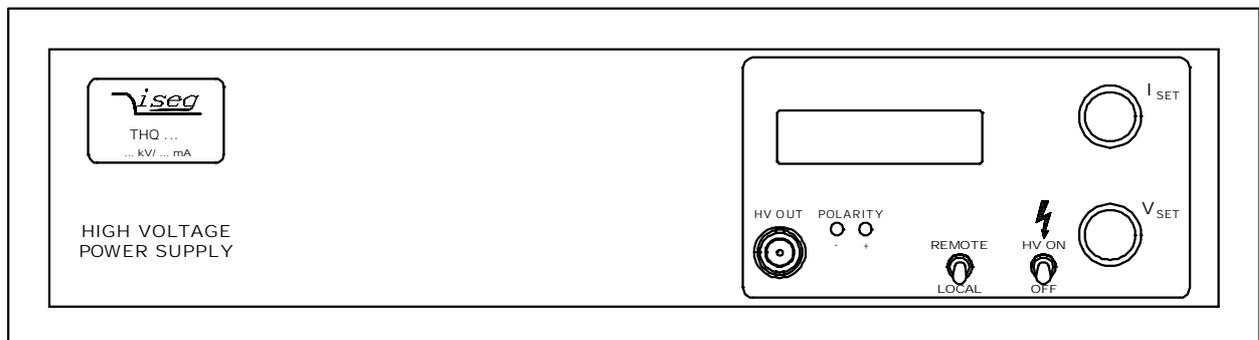
- High voltage desk top power supplies with either front-panel or remote control via analogue I/O
- Output voltages with very low ripple and noise
- Compact and ruggedized enclosure
- Polarity reversible
- Output short circuit and overload protected
- Control manually, via analogue I/O and RS232 Interface

2. Technical Data

One channel HV-PS	T1DP005	T1DP01	T1DP02	T1DP03	T1DP04	T1DP05	T1DP06
Output voltage V_{Onom}	500 V	1 kV	2 kV	3 kV	4 kV	5 kV	6 kV
Output current I_{Onom}	10 mA	10 mA	6 mA	4 mA	3 mA	2 mA	1,5 mA
Output polarity	Positive or negative, switchable mechanically or electronically (with option EPU, only up to 5kV)						
Ripple and noise	typical $< 2 \text{ mV}_{P-P}$, max. 7 mV_{P-P}						
Stability: $\frac{\Delta V_O}{\Delta V_{INPUT}}$	$< 1 * 10^{-5}$						
ΔV_O (no load/ load)	$< 5 * 10^{-5}$						
Temperature coefficient	$< 5 * 10^{-5}/K$						
Voltage measurement	resolution: 1 V / 4-digit LCD display						
	accuracy: $\pm (1\% * V_{Onom})$ (for one year)						
Voltage settings	manual: via 10-turn potentiometer (" LOC ")						
	REMOTE: via analog I/O with $V_{SET/MON} = 0$ to 5 V (" REM ") or RS232 (" RS232 ")						
Current measurement	resolution: 1 μA / 4-digit LCD display						
	accuracy: $\pm (1\% * I_{Onom})$ (for one year)						
Current settings	manual: via 10-turn potentiometer						
	REMOTE: via analog I/O with $V_{SET/MON} = 0$ to 5 V (" REM ") or RS232 (" RS232 ")						
Rate of change of output voltage	fixed: $V_{Onom} / 4\text{s}$ (at HV-ON/OFF)						
Protection	Output short circuit and overload protected. Attention ! There is only one short circuit or arc per second allowed! The integral output current must limited to the max. output current of the module external otherwise.						
REMOTE control	via analog I/O or RS232 interface						
Line voltage AC (V_{INPUT})	100 to 240 V-AC; 50/60 Hz; fused with 2 A-slow						

1 channel HV-PS T1DP		T1DP 0v	
Connectors		HV output: analogue I/O:	SHV-Connector 9-pin male D-Sub connector
Desk case		Size (W/H/D) : (310/90/280, 310 with SHV) mm	
Operating temperature		0 ... +50 °C	
Storage temperature		-20 ... +60 °C	
9-pin male D-Sub connector "analog I/O" and 9-pin female D-Sub connector "RS232" on the rear side			
PIN	Name	Description 9-pin male D-Sub connector "analog I/O"	
1	n.c.		
2	V_I _{MON}	Monitor voltage corresponding I _O : I _O = 0 to I _{Onom} (R _i = 10 kΩ) ⇒ V ₂₋₆ = 0 to 5 V	
3	INH	INHIBIT (TTL level, LOW ⇒ V _O = 0, [LOW to] HIGH or open ⇒ V _O = V _{SET} with ramp)	
4	V_I _{SET}	Setting current (R _{IN} = 10 kΩ): V ₄₋₆ = 0 to 5 V ⇒ I _O = 0 to I _{Onom} n.c. ⇒ I _{Onom} is possible	
5	V_Pol	Setting polarity only with option EPU : (TTL level, LOW ⇒ negative, HIGH ⇒ positive)	
6	GND	GND = V _{SET_0V}	Signal 0 V (connected to the metal module box)
7	V_V _{MON}	Monitor voltage corresponding V _O : V _O = 0 to V _{Onom} (R _{OUT} = 10 kΩ) ⇒ V ₇₋₆ = 0 to 5 V	
8	V_V _{SET}	Setting voltage: V ₈₋₆ = 0 to 5 V ⇒ V _O = 0 to V _{Onom} (R _{IN} ≈ 300kΩ)	
9	V _{REF}	V ₉₋₆ = 5 V (1 mA) Reference voltage for a external potentiometer (Sliding contact on V_V _{SET} and/or V_I _{SET})	

3. Front panel



4. Operation

The state-of-readiness of the unit is detected by monitoring the AC line voltage on the rear. Switch "Power On" at the rear side of the unit. The displays light up at the front and the chosen polarity is displayed on the according polarity LED.

With the pushbutton "REMOTE/LOCAL" the CONTROL mode of output voltage and/or current via the 10-turn potentiometers on the front panel (local mode, "LOC" on the display) or via the analogue I/O (remote mode, "REM" on the display) will be chosen. The chosen mode will be stored internal at "Power Off" also.

High voltage output of the channel is switched on with the according HV-ON switch on the front panel.

WARNING! It is not allowed to connect or disconnect the HV cable on the HV-output if HV-ON switch is ON !

WARNING! If the CONTROL mode is "LOC" (manual control), high voltage is generated at HV-output with a ramp speed from $V_{Onom} / 4s$ (hardware ramp) to the set voltage chosen via the 10-turn potentiometer V_{SET} subject to the set current chosen via the 10-turn potentiometer I_{SET} .

If the CONTROL mode is "REM" (remote control), high voltage will be activated only after connecting the set-voltages via the analogue I/O.

If the unit receive the RS232 commands D1=, C1= and P1= RS232 control mode will be chosen automatically. With the pushbutton "REMOTE/LOCAL" the user switch back to the CONTROL mode "LOC" or "REM". The unit will start in RS232 control mode after power ON only if it was in RS232 control mode and the RS232 control mode was activated with the A1 command before power OFF

If working with manual control, output voltage and current can be set via 10-turn potentiometer in a range from 0V to the nominal values.

The display will indicate the actually output voltage and the actually output current.

WARNING! The displays use the analogue monitor voltages from the analogue I/O therefore. If these voltages ($R_i = 10\text{ k}\Omega$) will be load with external loads on the analogue I/Os the displayed values will be change also.

Switching HV-ON to "OFF" and an active INHIBIT-signal only switches off the high voltage generator, however, the output is not put to ground. The internal and external capacitors discharge via an internal 50 M Ω measurement resistor and via the external load. Therefore, extended discharge times may occur. Be careful!

5. Polarity and Limit setting

The output polarity is selected with help of the rotary switch on the built-in module if unit is not equipped with EPU option. The chosen polarity is displayed on the polarity LED's on the front panel. You can open the desk and switch up the polarity (see point 7).

WARNING! Please open the desk after disconnecting load and main voltage only !!

An undefined switch setting (not at one of the end positions) will cause no output voltage.

Option _EPU

The output polarity is selected with help of the POLARITY switch on the front panel at $V_{OUT} = 0$ normally! The chosen polarity is displayed on the polarity LED's on the front panel.

If the POLARITY switch will be operated, the generation of output voltage stops for ca. one second before the polarity will be changed internally. The unit will be ready to deliver the output voltage with the changed polarity after an internal switch time from ca. one second.

Don't use the POLARITY switch if any output voltage > 300 V is displayed!

Maximum output voltage and current can be selected by hardware with help of the potentiometer Limit V and Limit I on the built-in DPS module. The THQ has to be opened therefore. The output voltage and current will be limited to this setting values under operation.

The hardware limit will decrease with setting the potentiometer clock wisely.

6. Control via RS232 Interface

The most important parameters of the high voltage supply can be set and read under computer control via the RS232 interface.

- 1st Write function: set voltage; set current; set polarity (if HV module with option _EPU built-in), set interface active after power ON
- 2nd Switch function: output voltage = set voltage, output voltage = 0
- 3rd Read function: set voltage; actual output voltage; set current; actual output current; status polarity, identifier, interface active after power ON

Manual control mode

During manual control, RS232 read cycles are interpreted only. Commands are accepted, but do not result into a change of the output voltage.

Specification RS232 interface

The data exchange is character based, synchronisation between the computer and the unit interface input is performed by using echo. The data transfer to the computer (output) is asynchronous.

The hardware setting of the RS232 interface is 9600 bit/s, 8 bit/character, no parity, 1 stop bit.

Signal transmission is performed indirect coupled via the RxD and TxD, relative to GND.

Table 1:

Signal RS 232	HV-supply DSUB9		PC DSUB9	PC DSUB25	Connection 3-lead cable
		Int.			
RxD	2		2	3	
TxD	3		3	2	
GND	5		5	7	
	4	⌋	4	20	⌋
	6	⌋	6	6	⌋
	8	⌋	8	5	⌋

The interface is on a 9 pin female D-Sub connector, the connection can be set up using a 1:1 extension cord (no null modem cable) if a PC is connected. The pin assignment is given in table 1. Control signals which should be bridged on the PC side if a three-conductor cable is used, are given in table 1.

Syntax

The commands are transmitted in ASCII. The end of command is formed by the sequence <CR> <LF> (0x0D 0x0A, 13 10 respectively). Leading zeroes can be omitted on input, output is in fixed format.

At first a <CR><LF> has to be sent in order to synchronise the computer and the unit.

Command set

Command	Computer	HV-supply	
Read module identifier	# 1 *	# * nnnnnn ; n.nn ; U ; I * (unit number ; software-rel. ; V _{nom} ; I _{nom})	
Read actual voltage channel 1	U1 *	{voltage} * (in V)	
Read actual current channel 1	I1 *	{mantisse / exp. with sign} * (in A)	
Read set voltage channel 1	D1 *	{set voltage} * (in V)	
Write set voltage channel 1	D1= {voltage} *	D1={set voltage} * (in V according to the voltage resolution)	
Read set current channel 1	C1 *	{set current} * (I _{nom} ≥ 1 mA in mA ; I _{nom} < 1 mA in µA)	
Write set current channel 1	C1= {current} *	C1={set current} * (I _{nom} ≥ 1 mA in mA ; I _{nom} < 1 mA in µA according to the current resolution)	
Read polarity channel 1	P1 *	P1 * {+ or -} * (positive or negative polarity)	
Write polarity channel 1	P1= {+ or -} *	P1= {+ or -} * (set positive or negative polarity, only with option _EPU)	
Read RS232 active channel 1	A1 *	A1 * {1 or 0} * (1 = RS232 is active after power ON 0 = Local mode after power ON)	
Write RS232 active channel 1	A1= {1 or 0} *	A1= {1 or 0} * (set 1 = RS232 is active after power ON set 0 = Local mode after power ON)	
Read module status channel 1	S1 *	S1 * HL * (hex code ⇒ Module status)	

* = <CR><LF>

The second channel of the supply is addressed by replacing 1 with 2 !

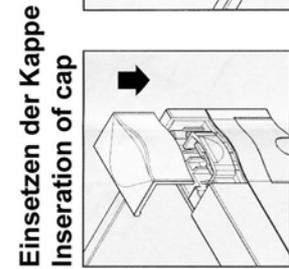
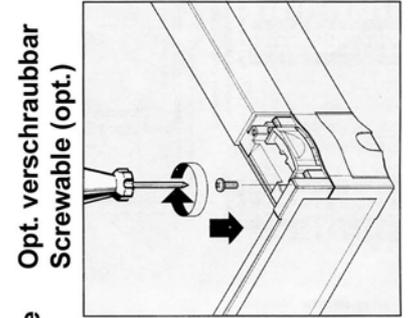
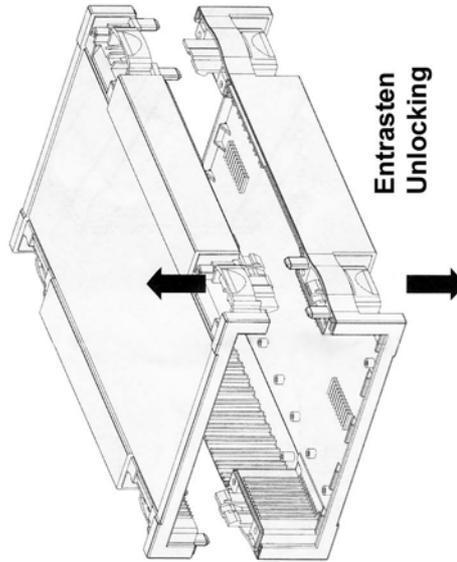
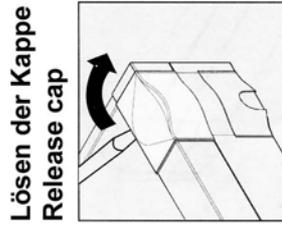
Error codes:

???? Syntax error

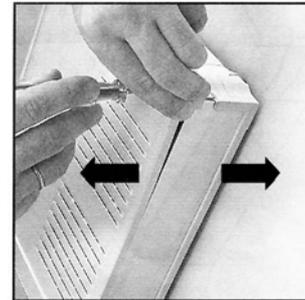
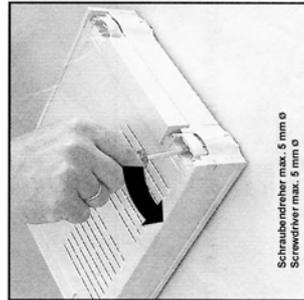
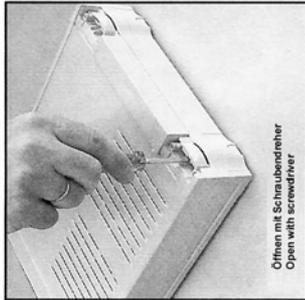
Module status:

Status	Description		Bit	value	
			7=1	8	H
			6=1	4	
INH	INHIBIT	HV-ON	5=1	2	
		HV-OFF		0	
POLN	Polarity negative	negative	4=1	1	
		(positive / unknown)		0	
POLP	Polarity positive	positive	3=1	8	L
		(negative / unknown)		0	
A	RS232 active after power On	active	2=1	4	
		not active		0	
MODE	Controlmode	via analogue I/O (REM)	1=1	3	
		manual (LOC)		2	
		via RS 232 interface (RS232)	0=1	1	
		reserved		0	

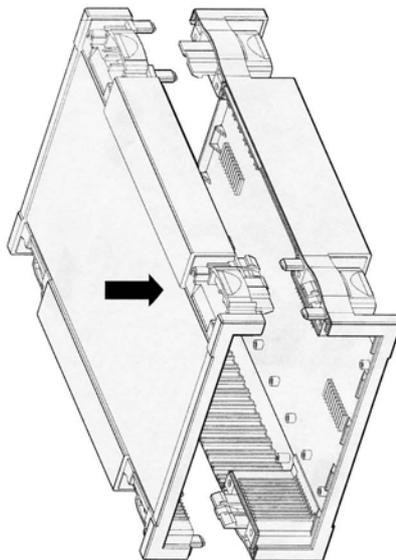
7. Desk information



Halbschalen-Demontage
Half-shell disassembly



Halbschalen-Montage
Half-shell assembly



Montage der Aufbausätze
Assembly of extension sets

