



TD250 V8 Six Channel +/-250V Amplifier Manual and Specifications

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1 Introduction

The TD250 is an ultra-low noise, six-channel voltage amplifier with +/-250V output range. The six channels can be ordered as either independent (TD250-SGL), or as three channels with non-inverting and inverting outputs (TD250-INV), which are ideal for driving piezoelectric tube scanners. The inverting configuration can also be used to obtain +/-500V with a bridged load.

The TD250 can drive unlimited capacitive loads such as piezoelectric tubes, stack actuators, standard piezoelectric actuators, and bender actuators. Applications include nanopositioning, microscopy, electro-optics, and vibration control.

The input and output connectors are industry standard 9-Pin D-Sub connectors. The amplifier is supplied with two 90cm DSUB cables and two breakout boxes that include BNC connectors and plug-in screw-terminals. OEM and customized versions are also available.

The TD250 Version 8 provides a number of improvements over previous hardware:

- The enclosure contains no fans and generates zero mechanical noise,
- Increased output current from 22 to 28 mArms,
- Improved noise performance, particularly in the DC to 100 Hz region,
- Complete electrical isolation from the mains and DC-DC power supply
- Remote status monitoring and remote shutdown.

Example applications include:

Compatible Actuators	
Piezoelectric tubes	+/-250V
Piezoelectric plates and other actuators	+/-250V with a grounded load, or +/-500V in bridged configuration
Two wire benders	+/-250V with one electrode grounded (six actuators), or +/-500V in bridged configuration (three actuators)
Three wire benders	+/-250V on each electrode (3 actuators), or up to +/-250V on 5 actuators + HV Bias.

2 Warnings / Notes

This device produces hazardous potentials and requires qualified personnel and observation of mandatory safety protocols. Do not operate the device with exposed conductors.



3 Specifications

Electrical Specifications	
Output voltage range	+/-250 V Six Channels
RMS current	28 mA
Peak current	100 mA
Gain	25 V/V
Slew rate	20 V/us
Signal bandwidth	20 kHz
Power bandwidth	15 kHz
Noise	150 uVrms (100 nF Load)
Protection	Short-circuit, temperature, under-voltage
Input impedance	1 MOhm
Input connector	9 Pin D-sub Female
Output connector	9 Pin D-sub Female
Power Supply	15V, 3A Minimum

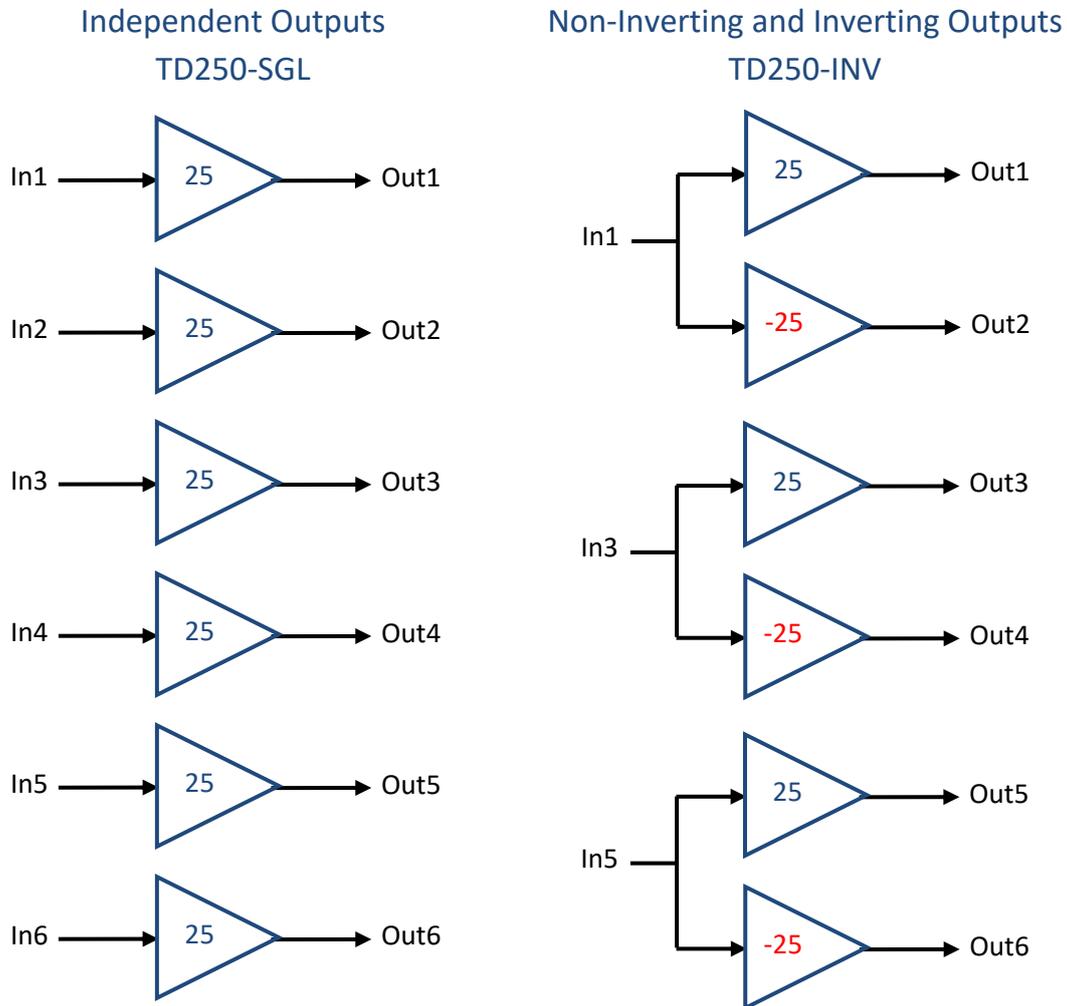
Mechanical Specifications	
Environment	0-40 C (32-104 F) Non-condensing humidity
Dimensions	216 x 108 x 48 mm (8.5 x 4.3 x 1.9 in)
Weight	1 kg (2.2 lb)

4 Delivery Contents

- TD250 amplifier
- Two breakout boxes with BNC connectors and plug-in screw-terminals
- Two 90cm DSUB9 cables, Male-Male, with straight-through wiring
- Universal power supply 90 Vac to 250 Vac, 15V 3A output
- IEC C13 power cable, suited to the shipping destination

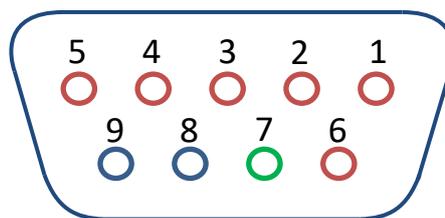
5 Channel Configurations

The TD250 can be ordered with six independent channels (TD250-SGL) or three non-inverting and inverting pairs for driving piezoelectric tubes and bridged loads (TD250-INV). The connection diagrams are shown below.



6 Front Panel

The input and output connectors are 9-pin DSUB receptacles. The recommended mating connectors are 9-pin DSUB male cable plugs (with one-to-one wiring). The connector pins on the amplifier are listed below.



Front view of amplifier connector numbering

Connector Pin	Input Connector	Output Connector
1 to 6	Inputs 1 to 6	Outputs 1 to 6
7	Signal Ground	Signal Ground
8	Status	Signal Ground
9	Disable	Signal Ground
Connector shield	Chassis Earth	Chassis Earth

Front panel D-sub connector pin-out

Input Signals

The standard input voltage is +/-10V and the absolute maximum input voltage is +/-20V. Use the signal ground not chassis earth. The input impedance is 1 MOhm when the amplifier is powered on and approximately 1.5 kOhm when the amplifier is off. For the inverting configuration (TD250-INV), only inputs 1, 3 and 5 are active.

Disable Input

The amplifier internal HV power supply is disabled by applying +3V to +5V (relative to signal ground) to the disable input. The input impedance is approximately 2 kOhm. The absolute maximum input voltage is +/-10V.

Status Output

A +5V output (relative to signal ground) on the status pin indicates that the high-voltage power supplies are both active and not effected by any overload or disable conditions. The output impedance is 100 kOhm. The output voltage can be reduced to 3V by shunting the output to signal ground with any 3V Zener diode.

Output Signals

The load should be connected between each output and signal ground. Do not operate the amplifier with exposed conductors.

Status Indicator

Green indicates that the amplifier is on and the high-voltage power supply is active. Red indicates that the amplifier is on, but the high-voltage power supplies are less than +250V and -250V which indicates a shutdown or overload condition. A mixture of red and green indicates that the amplifier is on the verge of overload.

7 Rear Panel



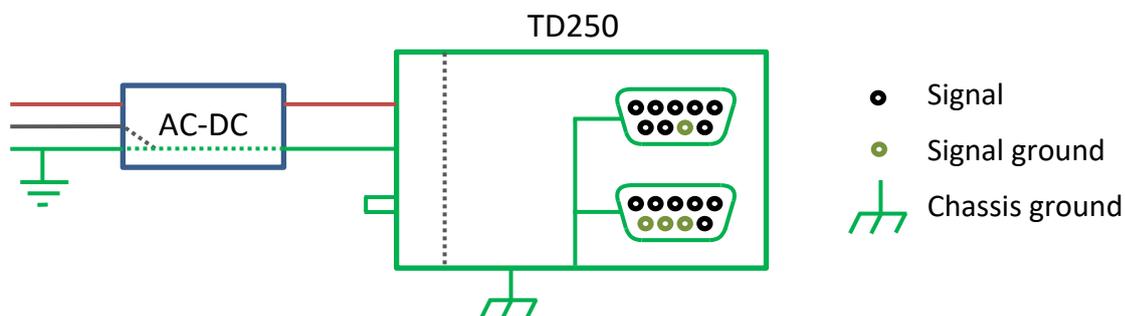
The rear panel includes a chassis earth connector that can be used to improve shielding, particularly when using an alternative power supply with an isolated output. This connector will accept a wire lug, 4mm plug, or stripped wire. The negative terminal of the power input connector is also connected to the chassis. Since the negative output terminal of the included power supply is connected to earth, the chassis is normally earthed.

The included power supply is Meanwell GST120A15-R7B. The power input connector is CUI PD-40S, which suits a 4-pin DIN male plug,

8 Grounding and Earthing

The TD250 internal power supplies provide electrical isolation from the AC-DC converter and mains power. This attenuates common-mode noise from the mains supply and eliminates ground loops. The chassis can be earthed by connecting the earthing lug and/or negative power supply terminal to earth. When using the included GST120A15-R7B supply, the negative terminal is already connected to earth. The use of an alternative AC-DC converter may require the chassis to be independently connected to earth.

The input signals should be connected between an input pin (pin 1-6) and signal ground (pin 7). The load should be connected between an output pin (pin 1-6) and signal ground (pin 7-9). The connector bodies are connected to chassis ground, which may be connected to signal ground if desired.



TD250 Chassis and signal ground configuration

9 Breakout Box

The TD250 is supplied with two identical breakout boxes that simplify input and output connection when using BNC cables or free wires. The header installed in the breakout box (Amphenol OQ1032510000G) suits a 10-Way 3.81mm plug-in screw terminal (Amphenol TJ1031530000G) which is also supplied but not pictured below.

Each breakout box is connected to the amplifier with a 9-Pin male-male D-sub cable with one-to-one (straight through) wiring.



Front and rear views of the breakout box

DSUB9 Connector Pin	BNC	Plug-in Screw Terminals
1 to 6	1 to 6	Outputs 1 to 6
7	BNC Shields	7
8		8
9		9
Shield and chassis		10

Breakout box connectivity

10 Warranty

The TD250 is guaranteed for 12 months. The warranty does not cover damage due to misuse.