



TOE 7610

## 4-quadrant amplifiers DC to 100 kHz 150 W source and sink power

### TOE 7610

#### Special features

- 150 W source and sink power
- Brief load current  $3 \times I_{\text{rated}}$
- Analog control input 0 to 5 V or 0 to 10 V
- $\frac{1}{2}$  19" width, 3 HU  
→ parallel installation possible
- Slew (rise) rate approx.  $6 \text{ V}/\mu\text{s}$  to  $25 \text{ V}/\mu\text{s}$  (depends on model)
- Sensing
- Output at front, optional at rear
- Optimally suitable for electrical noise testing of components against vehicle electrics ripple

#### General

Power supplies for laboratory use are mostly only power sources. They are only able to deliver power with one single polarity, i.e. these instruments only work in one quadrant of the output voltage/current diagram. Common amplifiers deliver voltages with both polarities, but are generally unable to absorb power values in a range comparable to that which they are able to deliver. They therefore mainly work as two-quadrant devices. The TOE 7610 series of four-quadrant amplifiers is able to work as a power sink as well as a power source with equal values of delivered or absorbed power.

The **TOE 7610 series** is thus a voltage amplifier, bipolar voltage and current source, and current sink in one instrument. Having to combine different instruments, where problems frequently occur with the coordination of individual components and the tendency to oscillate, now belongs to the past.

#### Features of the standard delivery

##### Power Manager

A selectable Power Manager enables the maximum output power  $P_{\text{max}}$  to also be processed as a continuous sink power. Numerous setting options of the 4-quadrant amplifier allow optimum connection of the amplifier with the series-connected driving equipment, whether this is a laboratory power supply, a calibrator, a function generator or a signal source from a PC in the form of a D/A converter card.

##### Selectable input impedance

The input impedance can be switched between 50 Ohm and 100 kOhm and allows convenient selection of a function generator to be controlled and a signal source in the form of a D/A card in the PC without the need for external adaptation.

##### Selectable input voltage range

The adjustable input voltage range allows switching between an input voltage of  $\pm 5 \text{ V}$  or  $\pm 10 \text{ V}$ . Therefore no further external adaptation of the control voltage is necessary.

##### Variable DC offset

Using the adjustable DC offset it is possible to directly set a basic voltage (up to  $\pm V_{\text{rated}}$ ) on the 4-quadrant amplifier. This function is particularly suitable for superimposing an externally generated noise signal (e.g. from a function generator) on a constant voltage. This enables optimum simulation of the ripple on vehicle electrics.

##### Brief load current

All 4-quadrant amplifiers of the TOE 7610 series can be equipped with the TOE 7610/103 option. They are then able to deliver three times the rated current for approx. 3 ms.

##### Output ON/OFF

A convenient detail of the functionality is the output switch-off which allows immediate switching-off of the voltage and current when in the "Output OFF" position. The output signal path is then electrically interrupted!

# 150 W source and sink power

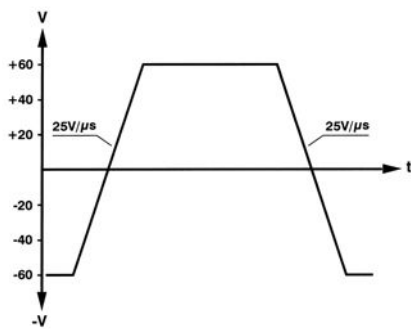
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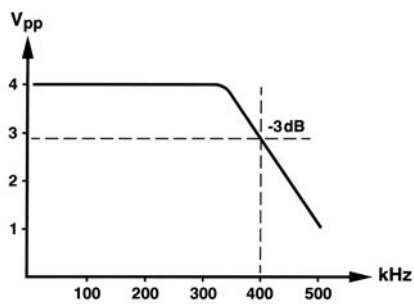
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### Overview

Model	Output voltage	Output current	Output power
TOE 7610-10	± 10 V	± 15 A	150 W
TOE 7610-20	± 20 V	± 7.5 A	150 W
TOE 7610-40	± 40 V	± 4 A	160 W
TOE 7610-60	± 60 V	± 2.5 A	150 W



Rise/fall rate with TOE 7610-60



Small signal bandwidth with TOE 7610



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#### Technical specifications

	TOE 7610-10	TOE 7610-20	TOE 7610-40	TOE 7610-60
<b>Output voltage</b>	± 10 V	± 20 V	± 40 V	± 60 V
<b>Output current</b>	± 15 A	± 7.5 A	± 4 A	± 2.5 A
Current limiting (Slow mode only)				
CURREN LIMIT POS	0 - +15 A	0 - +7.5 A	0 - +4 A	0 - +2.5 A
CURREN LIMIT NEG	0 - -15 A	0 - -7.5 A	0 - -4 A	0 - -2.5 A
<b>Power</b> (continuously at $I_{max}$ )				
Source mode		150 W	160 W	150 W
Sink mode with Power Manager on		150 W	160 W	150 W
<b>Frequency range</b>				
DC input coupling			0 Hz - 30 kHz	
Speed slow			0 Hz - 100 kHz	
Speed fast				
AC input coupling			2 Hz - 30 kHz	
Speed slow			2 Hz - 100 kHz	
Speed fast				
<b>Amplifier</b>				
Input V range ± 5 V				
var gain Off	6 dB	12 dB	18 dB	21.6 dB
var gain On	6 dB ± 1 dB	12 dB ± 1 dB	18 dB ± 1 dB	21.6 dB ± 1 dB
Input V range ± 10 V				
var gain Off	0 dB	6 dB	12 dB	15.6 dB
var gain On	0 dB ± 1 dB	6 dB ± 1 dB	12 dB ± 1 dB	15.6 dB ± 1 dB
<b>Input impedance</b>				
DC input coupling				
Input impedance 50 Ω			50 Ω	
Input impedance 100 kΩ			100 kΩ	
AC input coupling				
Input impedance 50 Ω			50 Ω	
Input impedance 100 kΩ			100 kΩ	
Max. input voltage (continuous)			12 V <sub>rms</sub>	
<b>Rise rate</b> (Fast mode only)	Approx. 6 V/μs	Approx. 10 V/μs	Approx. 16 V/μs	Approx. 25 V/μs
<b>Noise</b>				
Up to 1 kHz			< 0.1 mV <sub>rms</sub>	
Up to 10 MHz			< 1 mV <sub>rms</sub>	
<b>Harmonic distortion</b>				
Speed Slow				
Up to 1 kHz	< 0.25 %		< 0.10 %	
Up to 7 kHz	< 0.80 %		< 0.30 %	
Up to 10 kHz	< 1.00 %		< 0.50 %	
Speed Fast				
Up to 20 kHz	< 0.20 %		< 0.10 %	
Up to 40 kHz	< 0.30 %		< 0.30 %	
Up to 60 kHz	< 0.50 %		< 0.50 %	

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### General data

<b>Amplifier output</b>	Floating, insulation $\pm 260$ V against ground
<b>Line voltage</b>	115 V / 230 V $\pm 10$ %, 47 to 63 Hz
<b>Line fuse</b>	115 V: T4L; 230 V: T2L; in accordance with IEC 127-2/III, DIN 41662
<b>Power consumption</b>	Max. approx. 400 VA
<b>Protective measures</b>	Protection class I in accordance with DIN EN 61010-1
<b>Operating temperature</b>	0 °C to 40 °C
<b>Storage temperature</b>	-20 °C to 70 °C
<b>Reference temperature</b>	23 °C $\pm 1$ °C
<b>Cooling</b>	With thermostatically controlled fan
<b>Dimensions (W x H x D)</b>	216 x 132 x 429 mm
<b>With feet</b>	216 x 147 x 429 mm
<b>19" system</b>	Compatible with 1/2 19", 3 HU
<b>Weight</b>	Approx. 9 kg
<b>Housing</b>	Aluminium

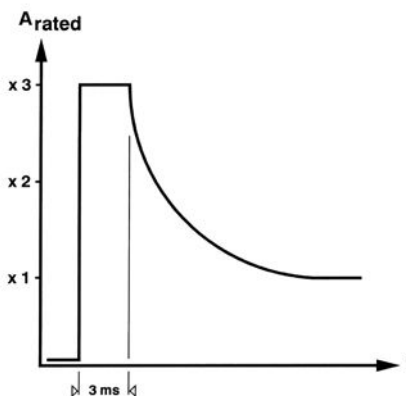
### Ordering data

#### Four-quadrant amplifier

TOE 7610-10	DC - 100 kHz, $\pm 10$ V / $\pm 15$ A
TOE 7610-20	DC - 100 kHz, $\pm 20$ V / $\pm 7.5$ A
TOE 7610-40	DC - 100 kHz, $\pm 40$ V / $\pm 4$ A
TOE 7610-60	DC - 100 kHz, $\pm 60$ V / $\pm 2.5$ A

### Options

TOE 9008	Carrying handle
TOE 9502	19" adapter, 3 HU for single installation
TOE 9508	19" adapter, 3 HU, parallel installation set for 2 units
TOE 7610/103	Brief load current $3 \times I_{rated}$ for approx. 3 ms



Brief load current  $3 \times I_{rated}$  for TOE 7610 (option TOE 7610/103)

### Supplied accessories

- 1 power cord
- 1 instruction manual