

High-performance power supplies



TOE 8872-40

TOE 8871 – 1000 W
TOE 8872 – 1500 W

Special features

- Autoranging
- Active PFC
- High rise and fall rates
- High endurance, even under extreme load conditions
- Best EMC characteristics
- Low noise voltage, optionally approx. 1 mV_{rms}
- GPIB, RS 232, analog interfaces
- Arbitrary function (option)
- Brief load current 1.5 x I_{rated} for approx. 20 ms (option)

High performance and easy-to-use

An output power up to 1500 W is provided by the power supplies belonging to the TOE 8871 and TOE 8872 series; at the same time, output voltages can be generated up to 400 V and output currents up to 100 A depending on the model. As a result of state-of-the-art switching controller technology and proven microprocessor control, these devices are suitable for completely universal application. Together with a high efficiency, the power supplies are characterized by permanent load resistance, autoranging and a low weight.

PFC

A highly effective power factor corrector (PFC) ensures that the TOE 8871 and TOE 8872 power supplies react with respect to the mains source like a resistance without any capacitive, inductive or non-linear components whatsoever. The mains current input is therefore sinusoidal, in-phase with the line voltage, and thus free of reactive current components.

Easy-to-use

The devices are extremely easy-to-use, and the specifications are exceptional. Superb processing quality together with a large number of special functions mean that the power supplies of the TOE 8871 and TOE 8872 series can be counted among the very best currently available.

Integrated measurement

A further significant characteristic is the high-resolution measurement of the voltage, current and power values; these are output on 4-digit LED displays and can be read at a high rate in bus mode. This means that additional measuring instruments are usually superfluous.

Adjustment using incremental spinwheel

The output values are set using a wear-free incremental spinwheel with selectable sensitivity, thus guaranteeing reliable, exact setting of the output voltage, current and power even after many years of use.

Remote control: GPIB, RS 232 and analog

All devices can be remote-controlled as standard in analog mode, and optionally via GPIB and RS 232 interfaces with the standardized SCPI command set (SCPI: Standard Commands for Programmable Instruments). The system interfaces are characterized by a high setting rate and a high measuring rate. In addition to this, device driver software under "LabView" is also available. Furthermore, all devices can be controlled at high precision via an electrically isolated analog controller (option).

Automatic calibration

Fast and convenient calibration of all output parameters is possible externally within a few minutes without having to adjust any trimmers or make any interventions in the device. This "Autocalibration" can be carried out simply using the control elements or with computer support within a test system. An autocalibration function provides significant advantages, particularly when considering the increasing importance of regular calibration intervals as a result of quality assurance systems.

Voltage source, current source and automatic power control

Depending on the set values for voltage, current and power, each power supply can be operated, depending on the load conditions, as a constant voltage source, constant current source, or as a source with a constant output power.

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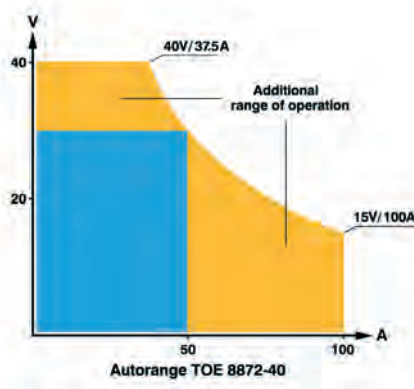
Overview

1000 W	Voltage	Current	Power
TOE 8871-40	0- 40 V	0- 50 A	1000 W
TOE 8871-60	0- 60 V	0- 35 A	1000 W
TOE 8871-80	0- 80 V	0- 25 A	1000 W
TOE 8871-130	0- 130 V	0- 16 A	1000 W
TOE 8871-200	0- 200 V	0- 10 A	1000 W
TOE 8871-400	0- 400 V	0- 5 A	1000 W

1500 W	Voltage	Current	Power
TOE 8872-40	0- 40 V	0-100 A	1500 W
TOE 8872-60	0- 60 V	0- 65 A	1500 W
TOE 8872-80	0- 80 V	0- 50 A	1500 W
TOE 8872-130	0- 130 V	0- 25 A	1500 W
TOE 8872-200	0- 200 V	0- 15 A	1500 W
TOE 8872-400	0- 400 V	0- 7.5 A	1500 W

Autoranging

The TOELLNER TOE 8871 and TOE 8872 series are extremely rugged high-performance power supplies with autoranging up to 1500 W. Just one unit of this series provides what otherwise has to be covered by several powerful power supplies of different voltage/current versions: low voltage range with increased current, extended upper voltage range with low current. This is easy to understand using the example of the TOE 8872-40: the instrument delivers 40 V or 100 A. For a square characteristic, either a 4 kW unit with 3-phase connection or two single units with different voltage/current versions would be required.



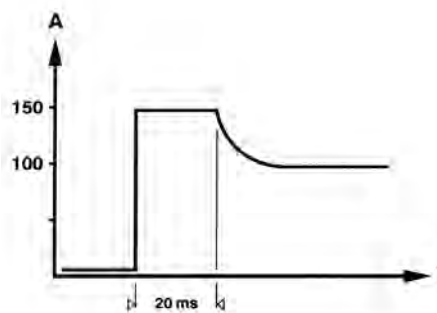
Extremely quiet

The intelligent, thermostatically controlled fan technology with integrated, extremely quiet fan means that the units are extremely suitable for laboratory workstations. Optimum cooling of the units is thus provided in addition, resulting in an extension of the service life on the one hand and guaranteeing of a high endurance even under extreme load conditions on the other.

Brief load current

With the TOE 8872-40 and TOE 8872-60 models, the TOE 8871/022 option allows a brief increase in the output current by approx. 50 %.

Thus approx. 150 A or 100 A can be drawn for 20 ms.



Brief load current with TOE 8872-40 (TOE 8871/022 option)

Special features

- Autoranging
- Analog interface as standard
- Floating analog interface with monitor outputs for voltage and current optional
- RS 232, GPIB interfaces optional
- Sensing
- 19" adapter included as standard in scope of delivery
- Free LabView™ driver
- Can be used as constant voltage, constant current and constant power source (CV/CC/CP)
- Extremely quiet thanks to excellent thermostatically controlled fan technology
- Master/slave operation
- High endurance, even under extreme load conditions
- Best EMC characteristics, residual ripple < 5 mV_{rms} up to 10 MHz, optional 1 mV_{rms}
- Arbitrary function (option)

High-performance power supplies

TOE 8871 – 1000 W
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Rear view of TOE 8872-40, -60, -80, -130

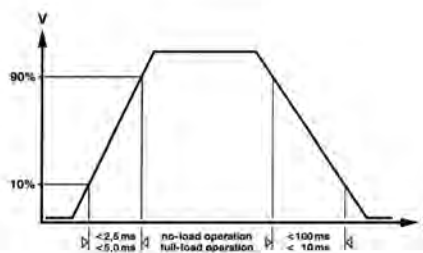
High regulation rate

The superb regulation rate makes these units the masters in their class.

In contrast to other switched-mode power supplies, the TOE 8870 series permits generation of voltage/current curves at high speed without reducing the output capacitance. This would result in over-voltages and current peaks at the output and destroy the device-under-test. A wide range of curves can therefore be generated via the analog control, e.g. as required in the standards of the automotive industry.

Simulation of the starting curve (cranking) of a vehicle is thus possible without problem.

Extremely short rise and fall times of the output voltage – also at no-load (TOE 8872-40)



Extremely short rise and fall times of the output voltage – also at no-load (TOE 8872-40)

Master/slave operation

Up to three units from the same series can be operated in parallel to increase the output power without limitations in the regulation rate or other parameters. Optionally available parallel mounting sets take into consideration the appropriate safety standards and also provide simple data linking between the master and the slave units.

Standby/execute

A convenient detail of the functionality is the output switch-off which allows immediate switching-off of the voltage and current values to 0 V or 0 A at standby. When activating the execute key, the set or programmed values for voltage and current are present without delay. Switching over can be carried out manually, using a remote control command from the PC, by means of an external TTL signal, or via an external switch contact.

Sensor lines

An innovative sensing circuit not only keeps the power supplied to your load extremely constant, it even protects sensitive loads if there is a break in a sensor line. The sensing inputs are available at the rear and can be activated/deactivated using a key on the front panel.

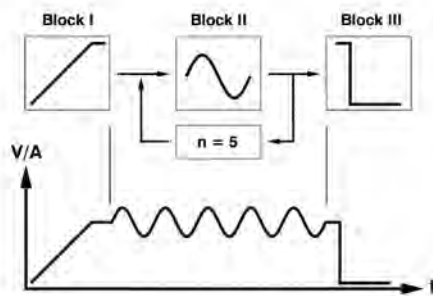
Arbitrary function (option)

TOE 9671 for TOE 8871 series
TOE 9672 for TOE 8872 series

Arbitrary function

The power supplies of these series can be optionally equipped with an arbitrary function (curve memory integrated in the unit). The units execute an entered curve autonomously, even without a PC connection. A burst function defines the number of desired curve sweeps.

In addition, the curve memory can be divided into up to 3 blocks. Each individual block can be used repeatedly. The advantage is to be found in the extremely efficient use of memory space.



Technical specifications

Number of steps	255
Step data	Voltage, current, step time
Step time	50 ms to 100 s, resolution 10 ms
Curve triggering	
Internal	Manual with key or over bus with remote control command
External	Via TTL signal or switch contact
Number of blocks	3
Max. block sweeps	1 to 65535 or ∞

Arbitrary function

- 255 interpolation points
- 3 blocks with repeat function
- $50 \text{ ms} < t < 100 \text{ s}$ per interpolation point
- Burst function (also for each individual block)

Software for arbitrary function

- Graphic and tabular input of curve
- Data input from oscilloscopes
- Library with standard curves for automotive industry

Curve input options

- Manual
- Via RS 232 or GPIB interface programming
- Convenient TOELLNER software with graphic curve input option

Technical specifications

TOE 8871 – 1000 W

Output		TOE 8871-40	TOE 8871-60	TOE 8871-80	TOE 8871-130	TOE 8871-200	TOE 8871-400	
Voltage		0 - 40 V	0 - 60 V	0 - 80 V	0 - 130 V	0 - 200 V	0 - 400 V	
Current		0 - 50 A	0 - 35 A	0 - 25 A	0 - 16 A	0 - 10 A	0 - 5 A	
Power adjustable in range		100 - 1000 W	100 - 1000 W	100 - 1000 W	100 - 1040 W	100 - 1000 W	100 - 1000 W	
Setting resolution	Voltage	10 mV	20 mV	20 mV	100 mV	100 mV	100 mV	
	Current	10 mA	10 mA	10 mA	10 mA	5 mA	2 mA	
	Power							
	< 1000 W > 1000 W	0.1 W 1 W	0.1 W	0.1 W	0.1 W 1 W	0.1 W	0.1 W	
Setting accuracy	Voltage	0.1 % + 20 mV	0.1 % + 30 mV	0.1 % + 40 mV	0.1 % + 100 mV	0.1 % + 100 mV	0.1 % + 100 mV	
	Current	0.2 % + 40 mA	0.2 % + 40 mA	0.2 % + 20 mA	0.2 % + 20 mA	0.2 % + 20 mA	0.2 % + 20 mA	
	Power	0.4 % + 1 W	0.4 % + 1 W	0.4 % + 1 W	0.4 % + 1 W	0.4 % + 1 W	0.4 % + 1 W	
Deviation in regulation with 100 % change in load	Voltage	1 x 10 ⁻⁴ + 5 mV	1 x 10 ⁻⁴ + 5 mV	1 x 10 ⁻⁴ + 5 mV	1 x 10 ⁻⁴ + 10 mV	1 x 10 ⁻⁴ + 10 mV	1 x 10 ⁻⁴ + 10 mV	
	Current	5 x 10 ⁻⁴ + 25 mA	5 x 10 ⁻⁴ + 20 mA	5 x 10 ⁻⁴ + 12 mA	5 x 10 ⁻⁴ + 8 mA	5 x 10 ⁻⁴ + 2.5 mA	5 x 10 ⁻⁴ + 2.5 mA	
With change in line voltage ± 10 %		5 x 10 ⁻⁵	5 x 10 ⁻⁵	5 x 10 ⁻⁵	5 x 10 ⁻⁵	5 x 10 ⁻⁵	5 x 10 ⁻⁵	
Regulation time with change in load from 20 % to 100 % I _{rated} Tolerance: 0.2 % V _{rated}		400 µs	400 µs	400 µs	500 µs	500 µs	500 µs	
Setting time of output voltage with change in setpoint 0 V to V _{rated} no-load/full load V _{rated} to 1 V no-load/full load		2.5 ms/5 ms 100 ms/10 ms	5 ms/10 ms 120 ms/12 ms	10 ms/15 ms 200 ms/20 ms	10 ms/15 ms 200 ms/20 ms	10 ms/10 ms < 5 s/20 ms	15 ms/20 ms < 3 s/60 ms	
Residual ripple (rms) 10 Hz to 10 MHz	Voltage	5 mV	8 mV	10 mV	15 mV	15 mV	20 mV	
	Current	25 mA	20 mA	20 mA	20 mA	20 mA	15 mA	
Measuring accuracy	Voltage	0.1 % + 30 mV	0.1 % + 40 mV	0.1 % + 60 mV	0.1 % + 100 mV	0.1 % + 200 mV	0.1 % + 300 mV	
	Current	0.2 % + 60 mA	0.2 % + 50 mA	0.2 % + 40 mA	0.2 % + 40 mA	0.2 % + 40 mA	0.2 % + 40 mA	
	Power	0.4 % + 1 W	0.4 % + 1 W	0.4 % + 1 W	0.4 % + 1 W	0.4 % + 1 W	0.4 % + 1 W	
Temperature coefficient	Voltage	10 ⁻⁴ /K	10 ⁻⁴ /K	10 ⁻⁴ /K	10 ⁻⁴ /K	10 ⁻⁴ /K	10 ⁻⁴ /K	
	Current	10 ⁻⁴ /K	10 ⁻⁴ /K	10 ⁻⁴ /K	10 ⁻⁴ /K	10 ⁻⁴ /K	10 ⁻⁴ /K	
Analog interface Control voltage (reference potential is the negative pole of the output)		0 - 10 V for 0 - 10 V for	0 - 40 V 0 - 50 A	0 - 60 V 0 - 35 A	0 - 80 V 0 - 25 A	0 - 130 V 0 - 16 A	0 - 200 V 0 - 10 A	0 - 400 V 0 - 5 A
Floating analog interface Control voltage		0 - 10 V for 0 - 10 V for	0 - 40 V 0 - 50 A	0 - 60 V 0 - 35 A	0 - 80 V 0 - 25 A	0 - 130 V 0 - 16 A	0 - 200 V 0 - 10 A	0 - 400 V 0 - 5 A
Insulation: 1 kV DC								
Accuracy	Voltage	0.2 % + 50 mV	0.2 % + 50 mV	0.2 % + 100 mV	0.2 % + 100 mV	0.2 % + 200 mV	0.2 % + 400 mV	
	Current	0.3 % + 50 mA	0.3 % + 20 mA	0.3 % + 20 mA	0.3 % + 20 mA	0.3 % + 10 mA	0.3 % + 5 mA	

Technical specifications

TOE 8872 – 1500 W

Output		TOE 8872-40	TOE 8872-60	TOE 8872-80	TOE 8872-130	TOE 8872-200	TOE 8872-400	
Voltage		0 - 40 V	0 - 60 V	0 - 80 V	0 - 130 V	0 - 200 V	0 - 400 V	
Current		0 - 100 A	0 - 65 A	0 - 50 A	0 - 25 A	0 - 15 A	0 - 7.5 A	
Power adjustable in range		100 - 1500 W	100 - 1500 W	100 - 1500 W	100 - 1500 W	100 - 1500 W	100 - 1500 W	
Setting resolution	Voltage	10 mV	20 mV	20 mV	100 mV	100 mV	100 mV	
	Current	50 mA	20 mA	10 mA	10 mA	10 mA	2 mA	
	Power							
< 1000 W		0.1 W	0.1 W	0.1 W	0.1 W	0.1 W	0.1 W	
	> 1000 W	1 W	1 W	1 W	1 W	1 W	1 W	
Setting accuracy	Voltage	0.1 % + 20 mV	0.1 % + 30 mV	0.1 % + 40 mV	0.1 % + 100 mV	0.1 % + 100 mV	0.1 % + 100 mV	
	Current	0.2 % + 50 mA	0.2 % + 50 mA	0.2 % + 30 mA	0.2 % + 20 mA	0.2 % + 20 mA	0.2 % + 20 mA	
	Power	0.4 % + 1.5 W	0.4 % + 1.5 W	0.4 % + 1.5 W	0.4 % + 1.5 W	0.4 % + 1 W	0.4 % + 1.5 W	
Deviation in regulation with 100 % change in load	Voltage	1 x 10 ⁻⁴ + 5 mV	1 x 10 ⁻⁴ + 5 mV	1 x 10 ⁻⁴ + 5 mV	1 x 10 ⁻⁴ + 10 mV	1 x 10 ⁻⁴ + 10 mV	1 x 10 ⁻⁴ + 15 mV	
	Current	5 x 10 ⁻⁴ + 50 mA	5 x 10 ⁻⁴ + 30 mA	5 x 10 ⁻⁴ + 25 mA	5 x 10 ⁻⁴ + 12 mA	5 x 10 ⁻⁴ + 2.5 mA	5 x 10 ⁻⁴ + 3.5 mA	
With change in line voltage ± 10 %		5 x 10 ⁻⁵	5 x 10 ⁻⁵	5 x 10 ⁻⁵	5 x 10 ⁻⁵	5 x 10 ⁻⁵	5 x 10 ⁻⁵	
Regulation time with change in load from 20 % to 100 % I _{rated} Tolerance: 0.2 % V _{rated}		400 µs	400 µs	400 µs	500 µs	500 µs	500 µs	
Setting time of output voltage with change in setpoint 0 V to V _{rated} no-load/full load V _{rated} to 1 V no-load/full load		2.5 ms/5 ms 150 ms/15 ms	5 ms/10 ms 200 ms/20 ms	10 ms/15 ms 300 ms/30 ms	10 ms/20 ms 400 ms/40 ms	15 ms/15 ms < 5 s/15 ms	15 ms/20 ms < 3 s/40 ms	
Residual ripple (rms) 10 Hz to 10 MHz	Voltage	10 mV	12 mV	15 mV	15 mV	15 mV	20 mV	
	Current	50 mA	50 mA	40 mA	40 mA	20 mA	20 mA	
Measuring accuracy	Voltage	0.1 % + 30 mV	0.1 % + 40 mV	0.1 % + 60 mV	0.1 % + 100 mV	0.1 % + 200 mV	0.1 % + 300 mV	
	Current	0.2 % + 100 mA	0.2 % + 80 mA	0.2 % + 60 mA	0.2 % + 40 mA	0.2 % + 40 mA	0.2 % + 40 mA	
	Power	0.4 % + 1.5 W	0.4 % + 1.5 W	0.4 % + 1.5 W	0.4 % + 1.5 W	0.4 % + 1.5 W	0.4 % + 1.5 W	
Temperature coefficient	Voltage	10 ⁻⁴ /K	10 ⁻⁴ /K	10 ⁻⁴ /K	10 ⁻⁴ /K	10 ⁻⁴ /K	10 ⁻⁴ /K	
	Current	10 ⁻⁴ /K	10 ⁻⁴ /K	10 ⁻⁴ /K	10 ⁻⁴ /K	10 ⁻⁴ /K	10 ⁻⁴ /K	
Analog interface Control voltage (reference potential is the negative pole of the output)		0 - 10 V for 0 - 10 V for	0 - 40 V 0 - 100 A	0 - 60 V 0 - 65 A	0 - 80 V 0 - 50 A	0 - 130 V 0 - 25 A	0 - 200 V 0 - 15 A	0 - 400 V 0 - 7.5 A
Floating analog interface Control voltage		0 - 10 V for 0 - 10 V for	0 - 40 V 0 - 100 A	0 - 60 V 0 - 65 A	0 - 80 V 0 - 50 A	0 - 130 V 0 - 25 A	0 - 200 V 0 - 15 A	0 - 400 V 0 - 7.5 A
Insulation: 1 kV DC								
Accuracy	Voltage	0.2 % + 50 mV	0.2 % + 50 mV	0.2 % + 100 mV	0.2 % + 100 mV	0.2 % + 200 mV	0.2 % + 400 mV	
	Current	0.3 % + 100 mA	0.3 % + 50 mA	0.3 % + 50 mA	0.3 % + 20 mA	0.3 % + 15 mA	0.3 % + 7.5 mA	

General data

TOE 8871 TOE 8872

General data

Output

Output terminals
Insulation

Floating and electrically isolated
At rear; optionally at front
± 250 V against ground

Overvoltage protection

Resolution

3 V to $1.25 \times U_{MAX}$
100 mV

Overcurrent protection

Resolution

10 ms to 100 s switch-off delay
10 ms/100 ms/1 s

Line voltage

230 V ± 10 %, 47 to 63 Hz

Power consumption

TOE 8871

TOE 8872

Approx. 1250 W/1250 VA at rated load

Approx. 1900 W/1900 VA at rated load

Protective measures

Protection class 1 in accordance with
DIN VDE 0411, Part 1

EMC

DIN VDE 0871 Class B
DIN VDE 0843 T2, IEC 801-2

Operating temperature

0 °C to 40 °C

Storage temperature

-20 °C to 70 °C

Reference temperature

23 °C ± 1 °C

Cooling

By thermostatically controlled fan

Warm-up time

Approx. 30 min

Dimensions (W x H x D)

With handles and feet

445 x 134 x 515 mm

445 x 147 x 557 mm

Weight

Approx. 15 kg

Housing

Aluminium

Ordering data/options

TOE 8870



TOE 8872

Ordering data

1000 W output power

TOE 8871-40	Power supply	40 V / 50 A
TOE 8871-60	Power supply	60 V / 35 A
TOE 8871-80	Power supply	80 V / 25 A
TOE 8871-130	Power supply	130 V / 16 A
TOE 8871-200	Power supply	200 V / 10 A
TOE 8871-400	Power supply	400 V / 5 A

1500 W output power

TOE 8872-40	Power supply	40 V / 100 A
TOE 8872-60	Power supply	60 V / 65 A
TOE 8872-80	Power supply	80 V / 50 A
TOE 8872-130	Power supply	130 V / 25 A
TOE 8872-200	Power supply	200 V / 15 A
TOE 8872-400	Power supply	400 V / 7.5 A

Options

Interfaces

TOE 8871/015	GPIB/RS 232 interfaces
TOE 8871/016	Floating analog remote control with monitor outputs for U/I
TOE 8871/017 ¹⁾	Output at front
TOE 8871/018 ¹⁾	Low noise output
TOE 8871/019	Correctable voltage drop 3 V per line
TOE 8871/022 ²⁾	Brief load current approx. 1.5 x I _{rated}

Arbitrary function in the unit

TOE 9171	For TOE 8871-xx
TOE 9172	For TOE 8872-xx

PC software for curve generation

TOE 9671 ³⁾	For TOE 8871-xx
TOE 9672 ³⁾	For TOE 8872-xx

Cables and adapters

TOE 8870/102	Parallel switching adapter 2 x TOE 8871 / TOE 8872
TOE 8870/103	Parallel switching adapter 3 x TOE 8871 / TOE 8872
TOE 9101	GPIB controller for USB
TOE 9104	GPIB controller for Ethernet
TOE 9009	GPIB cable, 2 m

¹⁾ Only 40 V / 60 V / 80 V / 130 V devices

²⁾ Only TOE 8872-40 and TOE 8872-60

³⁾ TOE 8871/015 option and TOE 9171 or TOE 9172 required