Arbitrary power supplies with output power from 160 W to 1920 W, high resolution and GPIB remote control from TOELLNER®

TOE 8805 to 8865 series

In these extremely universal units, the major features of a high-speed power supply have been optimally combined with those of an arbitrary function generator. Using an additional analog input, it is also possible to superimpose an AC voltage (50 Hz to 20 kHz) on a previously set DC voltage.

Voltage characteristics of any type

Almost any power supply characteristics can be generated using the power supplies of the **TOE 8805 to TOE 8865 series.** Amongst other functions, these units deliver extremely precise DC voltages, permit short, defined voltage dips, or permit spikes superimposed on a previously set DC voltage up to an output power of 1920 W.

These power supplies work like an arbitrary function generator, although they are unipolar with a high output power up to 1920 W. All models have a modular design consisting of an intelligent control unit with power boosters connected in parallel, each with an output power of 320 W.

Operating modes

Based on a two-processor architecture, the power supplies provide a range of operating modes.

In the “power supply“ function, these units can be used to generate extremely exact DC voltages and direct currents up to 80 V and 100 A. The maximum resolution is 1 mV or 1 mA.

In the “arbitrary“ function, these units can be used to generate any voltage and current curves with a maximum of 1,000 turning points.

Arbitrary function

In arbitrary mode, any voltage or current characteristics can be generated, where a curve is defined by min. 2 and max. 1000 points.

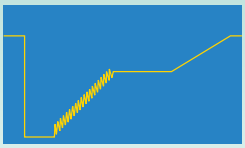
The duration of the turning points can vary between 200 µs and 100 s. Periods between 400 µs and 100,000 s (28 h) can thus be achieved. Permanent holding at one turning point is also possible.

It is appropriate that different hold times can be assigned to each waveform memory location within a period.

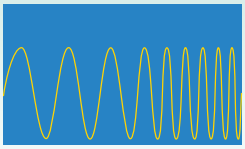
In continuous mode, the instrument repeats a saved function any number of times; in burst mode, the execution of curves can be selected between 1 (single shot) and 255.

General data
Arbitrary power supplies from TOELLNER®

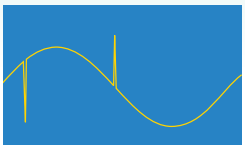
TOE 8805 to 8865



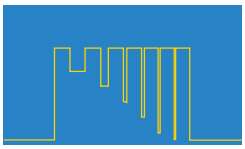
Simulation of starting pulse in motor vehicle



Simulation of vehicle electrics ripple, e.g. sine, sweep, 50 Hz to 20 kHz, 3 V_{pp}



Generation of any type of signal waveform



Testing for undervoltages and brief voltage dips down to 200 µs

Generation of curves

Almost any power supply characteristic can be generated in a few minutes without any special preliminary knowledge. For example, the vehicle electrics characteristic during starting-up of an internal combustion engine according to DIN 40839 can be manually programmed and saved within a few minutes.

Programming via the IEEE interface is equally possible, but unnecessary in this application since the integral interpolation function carries out all required calculations.

A further possibility for generating curves is using the supplementary TOE 9030 memory card drive.

This drive can be used for easy programming of curve characteristics for all arbitrary TOELLNER power supplies.

By means of an easy-to-use Windows program, it is possible in the TOE 9030 memory card drive to program SRAM memory cards according to the Jeida standard 4.0 (PCMCIA cards) with a capacity of up to 2 Mbyte.

The memory cards can be subsequently inserted into the Toellner arbitrary power supplies to import the data.

Memory card

The programmed function can be saved on a memory card with a capacity of up to 2 MB for later use.

A maximum of 128 curves with 1000 turning points each can therefore be saved on one single card.

Display

The voltage and current values are displayed on two 5-digit 7-segment displays, and are also available as a standardized variable in the form of monitor voltages.

Remote control: GPIB and analog

All units can be remote-controlled as standard in analog mode and via GPIB interfaces. Up to 12 data sets can be read per second; driver software for LabView permits problem-free integration into systems and convenient operation.

Applications

The possible applications for these versatile power supplies are just as comprehensive as their functions.

They can be used wherever the response of electronic systems is to be checked for irregularities in the supply voltage. In a vehicle, for example, the individual units or modules must not be affected whatsoever by any voltage dips during the start-up procedure or voltage peaks when switching off inductive loads.

Further applications include the EMC testing of components or modules, the testing of electromagnetic relays, contactors or heavy-duty relays, the testing of anti-skid and airbag systems, and the checking of start-up electronics.

All instruments from the TOE 8805 to 8865 range can provide all required voltage characteristics without problem, where short-circuit currents can be drawn up to three times the rated current.

Display

Voltage/current: separately on two 5-digit displays

Address: IEEE device address or memory address

Memory for instrument settings

Memory locations: 100 complete instrument settings for power supply mode and one setting in the non-volatile memory for the instrument status when switching off

Arbitrary function

Turning points: 2 to 1000

Turning point data: Voltage, current and step size

Step size: 200 µs to 100 s and ∞, separately adjustable for each turning point.

Sequence mode: Continuous or burst with 1 to 255 cycles

Triggering: Manually on keypad, remote controlled by bus command, or external trigger (TTL)

Saving: 1 complete function sequence with the data for 1000 turning points is saved in the non-volatile memory; external saving of function sequences on SRAM memory card according to JEIDA 4.0 standard with max. capacity of 2 Mbyte

IEEE bus control

Interface standard: Electrically isolated; according to IEEE 488.1

Software standard:
According to IEEE 488.2

Functions: AH1, SH1, L4, T6, SR1, PP1, RL1, DC1, DT1, E1, C0

Device address: 0 to 30

Measuring rate: > 8 measurements/s for voltage and current,
> 12 measurements/s for voltage or current

Setting times: With a measurement taking place, extension of setting times by up to 100 ms

General data
Arbitrary power supplies from TOELLNER®

TOE 8805 to 8865

Voltage/ current: < 50 ms

Capacitor: < 2 s (because of charging and discharging)

Power supply memory: < 150 ms for storage; < 50 ms (< 2 s with capacitor switching) for recalling

Relay matrix: < 30 ms

Arbitrary function: < 30 ms for start;
< 30 ms for stop;
< 5 s for linear curve calculation, dependent on number of turning points;
< 200 ms for direct turning point storage;
< 50 ms for direct turning point recalling

Memory card: < 5 s for storage;
< 5 s for recalling

Other: < 60 ms

Relay matrix

Trigger:
Manually on keypad or remote controlled by IEEE bus command

Number of relays: 4 relays with one NO contact each

Contact rating:
≤ 10 W; ≤ 200 V and ≤ 0.5 A

General data

Power output:
Floating and electrically isolated; standby/execute directly selectable

Output terminals:
TOE 8805, TOE 8815: at front, and parallel at rear

TOE 8825, TOE 8835, TOE 8845, TOE 8855, TOE 8865: at rear

Insulation: ± 250 V against earth

Mains voltage:
115 V/230 V ± 10%, 48 Hz to 65 Hz

Power consumption:

TOE 8805:	Approx.	360 VA
TOE 8815:	Approx.	750 VA
TOE 8825:	Approx.	1,500 VA
TOE 8835:	Approx.	2,250 VA
TOE 8845:	Approx.	3,000 VA
TOE 8855:	Approx.	3,750 VA
TOE 8865:	Approx.	4,500 VA

Protective measures:
Protection class I
to DIN 57411/VDE 0411 Part 1

Mains fusing:

115 V, T4L; 230 V, T2.5L for 8805
115 V, T8L; 230 V, T4L for each 320 W of output power to IEC 127-2/III, DIN 41662

Operating temperature: 0 °C to 40 °C

Reference temperature: 23 °C

Storage temperature: -20 °C to 70 °C

Warm-up time: Approx. 30 min.

Dimensions:
TOE 8805 (W x H x D):
216 x 132 x 437 mm
(height with feet 147 mm)

TOE 8815 ... TOE 8865
(W x H x D): 434 x 134.5 x 437 mm;
per 320 W of output power

TOE 8805: 19“ system:
system-compatible with 1/2 19“, 3HU

TOE 8815 to TOE 8865:
system-compatible with 19“,
3HU per 320 W output power

Housing: Aluminium

Weight: TOE 8805: Approx. 9.5 kg
TOE 8815 to TOE 8865: Approx. 23 kg per 320 W output power

Ordering data

Power supply	16 V/10 A	TOE 8805-16
Power supply	24 V/6.7 A	TOE 8805-24
Power supply	32 V/5 A	TOE 8805-32
Power supply	40 V/4 A	TOE 8805-40
Power supply	48 V/3.3 A	TOE 8805-48
Power supply	64 V/2,5 A	TOE 8805-64
Power supply	80 V/2 A	TOE 8805-80
Power supply	16 V/20 A	TOE 8815-16
Power supply	24 V/14 A	TOE 8815-24
Power supply	32 V/10 A	TOE 8815-32
Power supply	40 V/8 A	TOE 8815-40
Power supply	48 V/6.5 A	TOE 8815-48
Power supply	64 V/5 A	TOE 8815-64
Power supply	80 V/4 A	TOE 8815-80
Power supply	16 V/40 A	TOE 8825-16
Power supply	24 V/27 A	TOE 8825-24
Power supply	32 V/20 A	TOE 8825-32
Power supply	40 V/16 A	TOE 8825-40
Power supply	48 V/14 A	TOE 8825-48
Power supply	64 V/10 A	TOE 8825-64
Power supply	80 V/8 A	TOE 8825-80
Power supply	16 V/60 A	TOE 8835-16
Power supply	24 V/40 A	TOE 8835-24
Power supply	32 V/30 A	TOE 8835-32
Power supply	40 V/24 A	TOE 8835-40
Power supply	48 V/20 A	TOE 8835-48
Power supply	64 V/15 A	TOE 8835-64
Power supply	80 V/12 A	TOE 8835-80
Power supply	16 V/80 A	TOE 8845-16
Power supply	24 V/54 A	TOE 8845-24
Power supply	32 V/40 A	TOE 8845-32
Power supply	40 V/32 A	TOE 8845-40
Power supply	48 V/27 A	TOE 8845-48
Power supply	64 V/20 A	TOE 8845-64
Power supply	80 V/16 A	TOE 8845-80
Power supply	16 V/100 A	TOE 8855-16
Power supply	24 V/67 A	TOE 8855-24
Power supply	32 V/50 A	TOE 8855-32
Power supply	40 V/40 A	TOE 8855-40
Power supply	48 V/34 A	TOE 8855-48
Power supply	64 V/25 A	TOE 8855-64
Power supply	80 V/20 A	TOE 8855-80
Power supply	32 V/60 A	TOE 8865-32
Power supply	40 V/48 A	TOE 8865-40
Power supply	48 V/40 A	TOE 8865-48
Power supply	64 V/30 A	TOE 8865-64
Power supply	80 V/24 A	TOE 8865-80

Options / accessories

Polarity switchover of output with TOE 8815	**TOE 8810/101**
Vehicle electric systems ripple Superimposition 50 Hz to 20 kHz / 4 Vss	**TOE 8810/102**
Short-circuit current 2 to 3 x I_{rated} for 5 to 10 ms	**TOE 8810/103**
Dynamic current sink	**TOE 8810/104**
Vehicle electric systems ripple, Master Superimposition 20 Hz...70 kHz / 4 Vss act. Sink-mode up to 1kW	**TOE 8810/107M**
Vehicle electric systems ripple, Booster Superimposition 20 Hz...70 kHz / 4 Vss act. Sink-mode up to 1 kW	**TOE 8810/107B**
Software driver under LabView	**TOE 9060/015**
Memory-card 256 kByte	**TOE 9032**
Memory-card 512 kByte	**TOE 9033**
Memory-card 1 MByte	**TOE 9034**
Memory-card 2 MByte	**TOE 9035**

All devices upwards TOE 8835 are delivered in a mobile equipment carrier.

Supplied accessories
Mains cable
Instruction Manual
Memory card 256 Kbyte

Specifications
Arbitrary power supplies from TOELLNER®

TOE 8805 series

Model Output power	8805-16 160 W	8805-24 160 W	8805-32 160 W	8805-40 160 W	8805-48 160 W	8805-64 160 W	8805-80 160 W
Output values Voltage	0 ... 16 V	0 ... 24 V	0 ... 32 V	0 ... 40 V	0 ... 48 V	0 ... 64 V	0 ... 80 V
Current	0 ... 10 A	0 ... 6.7 A	0 ... 5 A	0 ... 4 A	0 ... 3.3 A	0 ... 2.5 A	0 ... 2 A
Constant voltage mode Resolution	1 mV	2 mV	2 mV	5 mV	5 mV	5 mV	5 mV
Setting accuracy: 0.025 % +	10 mV	10 mV	10 mV	20 mV	20 mV	20 mV	20 mV
Voltage regulation With change in load 0 ... 100 %	10^{-4}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}
With change in mains voltage ± 10 %	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}
With change in temperature	0.01 %/K	0.01 %/K	0.01 %/K	0.01 %/K	0.01 %/K	0.01 %/K	0.01 %/K
Residual ripple V_{rms}	0.5 mV	0.5 mV	0.5 mV	1.0 mV	1.0 mV	1.2 mV	1.2 mV
Drift within 8 hours	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %
Regulation time for a load transition from 20 to 100 % and setting to within 0.2 % of rated voltage	< 600 µs	< 500 µs	< 300 µs	< 200 µs	< 200 µs	< 100 µs	< 100 µs
Controllable voltage drop on lines to consumers	0.5 V	0.5 V	0.5 V	0.5 V	0.5 V	0.5 V	0.5 V
Setting time of output voltage with change in setpoint, C = off 0 V to V_{rated} no-load/nominal load, t_r (10 ... 90 %) typ.	100 µs	100 µs	100 µs	100 µs	200 µs	200 µs	200 µs
V_{rated} to 0 V no-load/nominal load, t_f (90 ... 10 %) typ.	100 µs	100 µs	100 µs	100 µs	200 µs	200 µs	200 µs
Constant current mode Resolution	1 mA	1 mA	1 mA	1 mA	1 mA	1 mA	1 mA
Setting accuracy: 0.1 % +	20 mA	20 mA	10 mA	10 mA	10 mA	5 mA	5 mA
Current stabilization With change in load 0 ... 100 %	5×10^{-4}	5×10^{-4}	2×10^{-4}	2×10^{-4}	2×10^{-4}	2×10^{-4}	2×10^{-4}
With change in mains voltage ± 10 %	10^{-4}	10^{-4}	10^{-4}	10^{-4}	10^{-4}	10^{-4}	10^{-4}
With change in temperature	0.02 %/K	0.02 %/K	0.02 %/K	0.02 %/K	0.02 %/K	0.02 %/K	0.02 %/K
Residual ripple I_{rms}	1 mA	1 mA	0.5 mA	0.5 mA	0.5 mA	0.3 mA	0.3 mA
Drift within 8 hours	0.05 %	0.05 %	0.05 %	0.05 %	0.05 %	0.05 %	0.05 %
Setting time of output current with change in setpoint, C = off 0 A to I_{rated}, t_r (10 ... 90 %) typ.	< 200 µs	< 200 µs	< 150 µs	< 250 µs	< 250 µs	< 250 µs	< 250 µs
I_{rated} to 0 A, t_f (90 ... 10 %) typ.	< 200 µs	< 200 µs	< 150 µs	< 250 µs	< 250 µs	< 250 µs	< 250 µs
Voltage measurement Resolution	1 mV	2 mV	2 mV	5 mV	5 mV	5 mV	5 mV
Accuracy: 0.1 % +	5 mV	10 mV	10 mV	20 mV	20 mV	20 mV	20 mV
Monitor voltage 0 ... 10 V	0 ... 16 V	0 ... 24 V	0 ... 32 V	0 ... 40 V	0 ... 48 V	0 ... 64 V	0...80 V
Accuracy: 0.1 % +	10 mV	20 mV	20 mV	30 mV	30 mV	30 mV	30 mV
Output impedance	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω
Current measurement Resolution	1 mA	1 mA	1 mA	1 mA	1 mA	1 mA	1 mA
Accuracy: 0.1 % +	20 mA	20 mA	10 mA	10 mA	10 mA	5 mA	5 mA
Monitor voltage 0 ... 10 V	0 ... 10 A	0 ... 6.7 A	0 ... 5 A	0 ... 4 A	0 ... 3.3 A	0 ... 2.5 A	0 ...2 A
Accuracy: 0.1 % +	10 mA	10 mA	10 mA	10 mA	10 mA	10 mA	10 mA
Output impedance	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω
External voltage control Control voltage 0 ... 10 V	0 ...16 V	0 ... 24 V	0 ... 32 V	0 ... 40 V	0 ... 48 V	0 ... 64 V	0 ... 80 V
Accuracy: 0.1 % +	10 mV	20 mV	20 mV	30 mV	30 mV	30 mV	30 mV
Cut-off frequency (–3 dB), C = off, typ.	3.5 kHz	3.5 kHz	3.5 kHz	3.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz
External current control Control voltage 0 ... 10 V	0 ... 10 A	0 ... 6.7 A	0 ... 5 A	0 ... 4 A	0 ... 3.3 A	0 ... 2.5 A	0 ... 2 A
Accuracy: 0.4 % +	20 mA	20 mA	10 mA	10 mA	10 mA	10 mA	10 mA
Cut-off frequency (–3 dB), C = off, typ.	3.5 kHz	3.5 kHz	3.5 kHz	3.5 kHz	1.5 kHz	1.5 kHz	1.5 kHz

Specifications
Arbitrary power supplies from TOELLNER®

TOE 8815 series

Model Output power	8815-16 320 W	8815-24 320 W	8815-32 320 W	8815-40 320 W	8815-48 320 W	8815-64 320 W	8815-80 320 W
Output values Voltage	0 ... 16 V	0 ... 24 V	0 ... 32 V	0 ... 40 V	0 ... 48 V	0 ... 64 V	0 ... 80 V
Current	0 ... 20 A	0 ... 14 A	0 ... 10 A	0 ... 8 A	0 ... 6.5 A	0 ... 5 A	0 ... 4 A
Constant voltage mode Resolution	1 mV	2 mV	2 mV	5 mV	5 mV	5 mV	5 mV
Setting accuracy: 0.025 % +	10 mV	10 mV	10 mV	20 mV	20 mV	20 mV	20 mV
Voltage regulation With change in load 0 ... 100 %	10^{-4}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}
With change in mains voltage ± 10 %	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}
With change in temperature	0.01 %/K	0.01 %/K	0.01 %/K	0.01 %/K	0.01 %/K	0.01 %/K	0.01 %/K
Residual ripple V_{rms}	0.8 mV	0.8 mV	0.8 mV	1.0 mV	1.0 mV	1.2 mV	1.2 mV
Drift within 8 hours	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %
Regulation time for a load transition from 20 to 100 % and setting to within 0.2 % of rated voltage	< 300 µs	< 300 µs	< 300 µs	< 300 µs	< 300 µs	< 100 µs	< 100 µs
Controllable voltage drop on lines to consumers	0.5 V	0.5 V	0.5 V	0.5 V	0.5 V	0.5 V	0.5 V
Setting time of output voltage with change in setpoint, C = off 0 V to V_{rated} no-load/nominal load, t_r (10 ... 90 %) typ.	100 µs	100 µs	100 µs	100 µs	200 µs	200 µs	200 µs
V_{rated} to 0 V no-load/nominal load, t_f (90 ... 10 %) typ.	100 µs	100 µs	100 µs	100 µs	200 µs	200 µs	200 µs
Constant current mode Resolution	2 mA	1 mA	1 mA	1 mA	1 mA	1 mA	1 mA
Setting accuracy: 0.1 % +	20 mA	20 mA	10 mA	10 mA	10 mA	5 mA	5 mA
Current stabilization With change in load 0 ... 100 %	5×10^{-4}	2×10^{-4}	2×10^{-4}	2×10^{-4}	2×10^{-4}	2×10^{-4}	2×10^{-4}
With change in mains voltage ± 10 %	10^{-4}	10^{-4}	10^{-4}	10^{-4}	10^{-4}	10^{-4}	10^{-4}
With change in temperature	0.02 %/K	0.02 %/K	0.02 %/K	0.02 %/K	0.02 %/K	0.02 %/K	0.02 %/K
Residual ripple I_{rms}	2 mA	2 mA	1 mA	1 mA	1 mA	0.8 mA	0.8 mA
Drift within 8 hours	0.05 %	0.05 %	0.05 %	0.05 %	0.05 %	0.05 %	0.05 %
Setting time of output current with change in setpoint, C = off 0 A to I_{rated}, t_r (10 ... 90 %) typ.	< 200 µs	< 200 µs	< 150 µs	< 200 µs	< 250 µs	< 250 µs	< 250 µs
I_{rated} to 0 A, t_f (90 ... 10 %) typ.	< 200 µs	< 200 µs	< 150 µs	< 200 µs	< 250 µs	< 250 µs	< 250 µs
Voltage measurement Resolution	1 mV	2 mV	2 mV	5 mV	5 mV	5 mV	5 mV
Accuracy: 0.1 % +	5 mV	10 mV	10 mV	20 mV	20 mV	20 mV	20 mV
Monitor voltage 0 ... 10 V	0...16 V	0 ... 24 V	0 ... 32 V	0 ... 40 V	0 ... 48 V	0 ... 64 V	0 ... 80 V
Accuracy: 0.1 % +	10 mV	20 mV	20 mV	30 mV	30 mV	30 mV	30 mV
Output impedance	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω
Current measurement Resolution	2 mA	1 mA	1 mA	1 mA	1 mA	1 mA	1 mA
Accuracy: 0.1 % +	20 mA	20 mA	10 mA	10 mA	10 mA	5 mA	5 mA
Monitor voltage 0 ... 10 V	0 ... 20 A	0 ... 14 A	0 ... 10 A	0 ... 8 A	0 ... 6.5 A	0 ... 5 A	0 ... 4 A
Accuracy: 0.1 % +	10 mA	10 mA	10 mA	10 mA	10 mA	10 mA	10 mA
Output impedance	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω
External voltage control Control voltage 0 ... 10 V	0...16 V	0 ... 24 V	0 ... 32 V	0 ... 40 V	0 ... 48 V	0 ... 64 V	0 ... 80 V
Accuracy: 0.1 % +	10 mV	20 mV	20 mV	30 mV	30 mV	30 mV	30 mV
Cut-off frequency (–3 dB), C = off, typ.	3.5 kHz	3.5 kHz	3.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz
External current control Control voltage 0 ... 10 V	0...20 A	0 ... 14 A	0 ... 10 A	0 ... 8 A	0 ... 6.5 A	0 ... 5 A	0 ... 4 A
Accuracy: 0.4 % +	20 mA	20 mA	10 mA	10 mA	10 mA	10 mA	10 mA
Cut-off frequency (–3 dB), C = off, typ.	3.5 kHz	3.5 kHz	3.5 kHz	1.5 kHz	1.5 kHz	1.5 kHz	1.5 kHz

Specifications
Arbitrary power supplies from TOELLNER®

TOE 8825 series

Model Output power	8825-16 640 W	8825-24 640 W	8825-32 640 W	8825-40 640 W	8825-48 640 W	8825-64 640 W	8825-80 640 W
Output values Voltage	0 ... 16 V	0 ... 24 V	0 ... 32 V	0 ... 40 V	0 ... 48 V	0 ... 64 V	0 ... 80 V
Current	0 ... 40 A	0 ... 27 A	0 ... 20 A	0 ... 16 A	0 ... 14 A	0 ... 10 A	0 ... 8 A
Constant voltage mode Resolution	1 mV	2 mV	2 mV	5 mV	5 mV	5 mV	5 mV
Setting accuracy: 0.025 % +	10 mV	15 mV	15 mV	20 mV	20 mV	20 mV	20 mV
Voltage regulation With change in load 0 ... 100 %	10^{-4}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}
With change in mains voltage ± 10 %	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}
With change in temperature	0.01 %/K	0.01 %/K	0.01 %/K	0.01 %/K	0.01 %/K	0.01 %/K	0.01 %/K
Residual ripple V_{rms}	1.5 mV	1.5 mV	1.5 mV	1.5 mV	1.5 mV	1.5 mV	1.5 mV
Drift within 8 hours	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %
Regulation time for a load transition from 20 to 100 % and setting to within 0.2 % of rated voltage	300 µs	300 µs	200 µs	200 µs	200 µs	100 µs	100 µs
Controllable voltage drop on lines to consumers	0.5 V	0.5 V	0.5 V	0.5 V	0.5 V	0.5 V	0.5 V
Setting time of output voltage with change in setpoint, C = off 0 V to V_{rated} no-load/nominal load, t_r (10 ... 90 %) typ.	100 µs	100 µs	100 µs	200 µs	200 µs	200 µs	200 µs
V_{rated} to 0 V no-load/nominal load, t_f (90 ... 10 %) typ.	100 µs	100 µs	100 µs	200 µs	200 µs	200 µs	200 µs
Constant current mode Resolution	5 mA	2 mA	2 mA	1 mA	1 mA	1 mA	1 mA
Setting accuracy: 0.1 % +	40 mA	40 mA	20 mA	20 mA	20 mA	10 mA	10 mA
Current stabilization With change in load 0 ... 100 %	5×10^{-4}	5×10^{-4}	2×10^{-4}	2×10^{-4}	2×10^{-4}	2×10^{-4}	2×10^{-4}
With change in mains voltage ± 10 %	10^{-4}	10^{-4}	10^{-4}	10^{-4}	10^{-4}	10^{-4}	10^{-4}
With change in temperature	0.02 %/K	0.02 %/K	0.02 %/K	0.02 %/K	0.02 %/K	0.02 %/K	0.02 %/K
Residual ripple I_{rms}	3 mA	3 mA	3 mA	3 mA	3 mA	2 mA	2 mA
Drift within 8 hours	0.05 %	0.05 %	0.05 %	0.05 %	0.05 %	0.05 %	0.05 %
Setting time of output current with change in setpoint, C = off 0 A to I_{rated}, t_r (10 ... 90 %) typ.	300 µs	300 µs	200 µs	250 µs	250 µs	250 µs	250 µs
I_{rated} to 0 A, t_f (90 ... 10 %) typ.	300 µs	300 µs	200 µs	250 µs	250 µs	250 µs	250 µs
Voltage measurement Resolution	1 mV	2 mV	2 mV	5 mV	5 mV	5 mV	5 mV
Accuracy: 0.1 % +	5 mV	10 mV	10 mV	20 mV	20 mV	20 mV	20 mV
Monitor voltage 0 ... 10 V	0 ... 16 V	0 ... 24 V	0 ... 32 V	0 ... 40 V	0 ... 48 V	0 ... 64 V	0 ... 80 V
Accuracy: 0.1 % +	10 mV	20 mV	20 mV	30 mV	30 mV	30 mV	30 mV
Output impedance	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω
Current measurement Resolution	5 mA	2 mA	2 mA	1 mA	1 mA	1 mA	1 mA
Accuracy: 0.1 % +	40 mA	40 mA	20 mA	20 mA	20 mA	10 mA	10 mA
Monitor voltage 0 ... 10 V	0 ... 40 A	0 ... 27 A	0 ... 20 A	0 ... 16 A	0 ... 14 A	0 ... 10 A	0 ... 8 A
Accuracy: 0.1 % +	10 mA	10 mA	10 mA	10 mA	10 mA	10 mA	10 mA
Output impedance	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω
External voltage control Control voltage 0 ... 10 V	0 ... 16 V	0 ... 24 V	0 ... 32 V	0 ... 40 V	0 ... 48 V	0 ... 64 V	0 ... 80 V
Accuracy: 0.1 % +	10 mV	20 mV	20 mV	30 mV	30 mV	30 mV	30 mV
Cut-off frequency (–3 dB), C = off, typ.	3.5 kHz	3.5 kHz	3.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz
External current control Control voltage 0 ... 10 V	0 ... 40 A	0 ... 27 A	0 ... 20 A	0 ... 16 A	0 ... 14 A	0 ... 10 A	0 ... 8 A
Accuracy: 0.4 % +	80 mA	80 mA	40 mA	40 mA	40 mA	20 mA	20 mA
Cut-off frequency (–3 dB), C = off, typ.	3.5 kHz	3.5 kHz	3.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz

Specifications
Arbitrary power supplies from TOELLNER®

TOE 8835 series

Model Output power	8835-16 960 W	8835-24 960 W	8835-32 960 W	8835-40 960 W	8835-48 960 W	8835-64 960 W	8835-80 960 W
Output values Voltage	0 ... 16 V	0 ... 24 V	0 ... 32 V	0 ... 40 V	0 ... 48 V	0 ... 64 V	0 ... 80 V
Current	0 ... 60 A	0 ... 40 A	0 ... 30 A	0 ... 24 A	0 ... 20 A	0 ... 15 A	0 ... 12 A
Constant voltage mode Resolution	1 mV	2 mV	2 mV	5 mV	5 mV	5 mV	5 mV
Setting accuracy: 0.025 % +	10 mV	15 mV	15 mV	20 mV	20 mV	20 mV	20 mV
Voltage regulation With change in load 0 ... 100 %	10^{-4}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}
With change in mains voltage ± 10 %	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}
With change in temperature	0.01 %/K	0.01 %/K	0.01 %/K	0.01 %/K	0.01 %/K	0.01 %/K	0.01 %/K
Residual ripple V_{rms}	2 mV	2 mV	2 mV	2 mV	2 mV	2 mV	2 mV
Drift within 8 hours	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %
Regulation time for a load transition from 20 to 100 % and setting to within 0.2 % of rated voltage	300 µs	300 µs	200 µs	200 µs	200 µs	100 µs	100 µs
Controllable voltage drop on lines to consumers	0.5 V	0.5 V	0.5 V	0.5 V	0.5 V	0.5 V	0.5 V
Setting time of output voltage with change in setpoint, C = off 0 V to V_{rated} no-load/nominal load, t_r (10 ... 90 %) typ.	100 µs	100 µs	100 µs	200 µs	200 µs	200 µs	200 µs
V_{rated} to 0 V no-load/nominal load, t_f (90 ... 10 %) typ.	100 µs	100 µs	100 µs	200 µs	200 µs	200 µs	200 µs
Constant current mode Resolution	5 mA	5 mA	2 mA	2 mA	2 mA	1 mA	1 mA
Setting accuracy: 0.1 % +	60 mA	60 mA	30 mA	30 mA	30 mA	15 mA	15 mA
Current stabilization With change in load 0 ... 100 %	8×10^{-4}	5×10^{-4}	2×10^{-4}	2×10^{-4}	2×10^{-4}	2×10^{-4}	2×10^{-4}
With change in mains voltage ± 10 %	10^{-4}	10^{-4}	10^{-4}	10^{-4}	10^{-4}	10^{-4}	10^{-4}
With change in temperature	0.02 %/K	0.02 %/K	0.02 %/K	0.02 %/K	0.02 %/K	0.02 %/K	0.02 %/K
Residual ripple I_{rms}	4 mA	4 mA	4 mA	4 mA	4 mA	3 mA	3 mA
Drift within 8 hours	0.05 %	0.05 %	0.05 %	0.05 %	0.05 %	0.05 %	0.05 %
Setting time of output current with change in setpoint, C = off 0 A to I_{rated}, t_r (10 ... 90 %) typ.	400 µs	400 µs	250 µs	300 µs	300 µs	300 µs	300 µs
I_{rated} to 0 A, t_f (90 ... 10 %) typ.	400 µs	400 µs	250 µs	300 µs	300 µs	300 µs	300 µs
Voltage measurement Resolution	1 mV	2 mV	2 mV	5 mV	5 mV	5 mV	5 mV
Accuracy: 0.1 % +	5 mV	20 mV	10 mV	20 mV	20 mV	20 mV	20 mV
Monitor voltage 0 ... 10 V	0 ... 16 V	0 ... 24 V	0 ... 32 V	0 ... 40 V	0 ... 48 V	0 ... 64 V	0 ... 80 V
Accuracy: 0.1 % +	10 mV	20 mV	20 mV	30 mV	30 mV	30 mV	30 mV
Output impedance	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω
Current measurement Resolution	5 mA	5 mA	2 mA	2 mA	2 mA	1 mA	1 mA
Accuracy: 0.1 % +	60 mA	60 mA	30 mA	30 mA	30 mA	15 mA	15 mA
Monitor voltage 0 ... 10 V	0 ... 60 A	0 ... 40 A	0 ... 30 A	0 ... 24 A	0 ... 20 A	0 ... 15 A	0 ... 12 A
Accuracy: 0.1 % +	10 mA	10 mA	10 mA	10 mA	10 mA	10 mA	10 mA
Output impedance	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω
External voltage control Control voltage 0 ... 10 V	0 ... 16 V	0 ... 24 V	0 ... 32 V	0 ... 40 V	0 ... 48 V	0 ... 64 V	0 ... 80 V
Accuracy: 0.1 % +	10 mV	20 mV	20 mV	30 mV	30 mV	30 mV	30 mV
Cut-off frequency (–3 dB), C = off, typ.	3.5 kHz	3.5 kHz	3.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz
External current control Control voltage 0 ... 10 V	0 ... 60 A	0 ... 40 A	0 ... 30 A	0 ... 24 A	0 ... 20 A	0 ... 15 A	0 ... 12 A
Accuracy: 0.4 % +	120 mA	120 mA	60 mA	60 mA	60 mA	30 mA	30 mA
Cut-off frequency (–3 dB), C = off, typ.	3.5 kHz	3.5 kHz	3.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz

Specifications
Arbitrary power supplies from TOELLNER®

TOE 8845 series

Model Output power	8845-16 1280 W	8845-24 1280 W	8845-32 1280 W	8845-40 1280 W	8845-48 1280 W	8845-64 1280 W	8845-80 1280 W
Output values							
Voltage	0 ... 16 V	0 ... 24 V	0 ... 32 V	0 ... 40 V	0 ... 48 V	0 ... 64 V	0 ... 80 V
Current	0 ... 80 A	0 ... 54 A	0 ... 40 A	0 ... 32 A	0 ... 27 A	0 ... 20 A	0 ... 16 A
Constant voltage mode							
Resolution	1 mV	2 mV	2 mV	5 mV	5 mV	5 mV	5 mV
Setting accuracy: 0.025 % +	10 mV	15 mV	15 mV	20 mV	20 mV	20 mV	20 mV
Voltage regulation							
With change in load 0 ... 100 %	10^{-4}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}
With change in mains voltage ± 10 %	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}
With change in temperature	0.01 %/K	0.01 %/K	0.01 %/K	0.01 %/K	0.01 %/K	0.01 %/K	0.01 %/K
Residual ripple V_{rms}	2 mV	2 mV	2 mV	2 mV	2 mV	2 mV	2 mV
Drift within 8 hours	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %
Regulation time for a load transition from 20 to 100 % and setting to within 0.2 % of rated voltage	300 µs	300 µs	200 µs	200 µs	200 µs	100 µs	100 µs
Controllable voltage drop on lines to consumers	0.5 V	0.5 V	0.5 V	0.5 V	0.5 V	0.5 V	0.5 V
Setting time of output voltage with change in setpoint, C = off 0 V to V_{rated} no-load/nominal load, t_r (10 ... 90 %) typ.	100 µs	100 µs	100 µs	200 µs	200 µs	200 µs	200 µs
V_{rated} to 0 V no-load/nominal load, t_f (90 ... 10 %) typ.	100 µs	100 µs	100 µs	200 µs	200 µs	200 µs	200 µs
Constant current mode							
Resolution	5 mA	5 mA	5 mA	2 mA	2 mA	2 mA	1 mA
Setting accuracy: 0.1 % +	80 mA	80 mA	40 mA	40 mA	40 mA	20 mA	20 mA
Current stabilization							
With change in load 0 ... 100 %	8×10^{-4}	8×10^{-4}	8×10^{-4}	8×10^{-4}	8×10^{-4}	8×10^{-4}	8×10^{-4}
With change in mains voltage ± 10 %	10^{-4}	10^{-4}	10^{-4}	10^{-4}	10^{-4}	10^{-4}	10^{-4}
With change in temperature	0.02 %/K	0.02 %/K	0.02 %/K	0.02 %/K	0.02 %/K	0.02 %/K	0.02 %/K
Residual ripple I_{rms}	5 mA	5 mA	5 mA	5 mA	5 mA	4 mA	4 mA
Drift within 8 hours	0.05 %	0.05 %	0.05 %	0.05 %	0.05 %	0.05 %	0.05 %
Setting time of output current with change in setpoint, C = off 0 A to I_{rated}, t_r (10 ... 90 %) typ.	450 µs	450 µs	300 µs	350 µs	350 µs	350 µs	350 µs
I_{rated} to 0 A, t_f (90 ... 10 %) typ.	450 µs	450 µs	300 µs	350 µs	350 µs	350 µs	350 µs
Voltage measurement							
Resolution	1 mV	2 mV	2 mV	5 mV	5 mV	5 mV	5 mV
Accuracy: 0.1 % +	5 mV	20 mV	10 mV	20 mV	20 mV	20 mV	20 mV
Monitor voltage 0 ... 10 V	0 ... 16 V	0 ... 24 V	0 ... 32 V	0 ... 40 V	0 ... 48 V	0 ... 64 V	0 ... 80 V
Accuracy: 0.1 % +	10 mV	20 mV	20 mV	30 mV	30 mV	30 mV	30 mV
Output impedance	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω
Current measurement							
Resolution	5 mA	5 mA	5 mA	2 mA	2 mA	2 mA	1 mA
Accuracy: 0.1 % +	80 mA	80 mA	40 mA	40 mA	40 mA	20 mA	20 mA
Monitor voltage 0 ... 10 V	0 ... 80 A	0 ... 54 A	0 ... 40 A	0 ... 32 A	0 ... 27 A	0 ... 20 A	0 ... 16 A
Accuracy: 0.1 % +	10 mA	10 mA	10 mA	10 mA	10 mA	10 mA	10 mA
Output impedance	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω
External voltage control							
Control voltage 0 ... 10 V	0 ... 16 V	0 ... 24 V	0 ... 32 V	0 ... 40 V	0 ... 48 V	0 ... 64 V	0 ... 80 V
Accuracy: 0.1 % +	10 mV	20 mV	20 mV	30 mV	30 mV	30 mV	30 mV
Cut-off frequency (–3 dB), C = off, typ.	3.5 kHz	3.5 kHz	3.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz
External current control							
Control voltage 0 ... 10 V	0 ... 80 A	0 ... 54 A	0 ... 40 A	0 ... 32 A	0 ... 27 A	0 ... 20 A	0 ... 16 A
Accuracy: 0.4 % +	160 mA	160 mA	80 mA	80 mA	80 mA	40 mA	40 mA
Cut-off frequency (–3 dB), C = off, typ.	3.5 kHz	3.5 kHz	3.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz

Specifications
Arbitrary power supplies from TOELLNER®

TOE 8855 series

Model Output power	8855-16 1600 W	8855-24 1600 W	8855-32 1600 W	8855-40 1600 W	8855-48 1600 W	8855-64 1600 W	8855-80 1600 W
Output values							
Voltage	0 ... 16 V	0 ... 24 V	0 ... 32 V	0 ... 40 V	0 ... 48 V	0 ... 64 V	0 ... 80 V
Current	0 ... 100 A	0 ... 67 A	0 ... 50 A	0 ... 40 A	0 ... 34 A	0 ... 25 A	0 ... 20 A
Constant voltage mode							
Resolution	1 mV	2 mV	2 mV	5 mV	5 mV	5 mV	5 mV
Setting accuracy: 0.025 % +	15 mV	15 mV	15 mV	20 mV	20 mV	20 mV	20 mV
Voltage regulation							
With change in load 0 ... 100 %	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}
With change in mains voltage ± 10 %	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}
With change in temperature	0.01 %/K	0.01 %/K	0.01 %/K	0.01 %/K	0.01 %/K	0.01 %/K	0.01 %/K
Residual ripple V_{rms}	2 mV	2 mV	2 mV	2 mV	2 mV	2 mV	2 mV
Drift within 8 hours	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %
Regulation time for a load transition from 20 to 100 % and setting to within 0.2 % of rated voltage	300 µs	300 µs	200 µs	200 µs	200 µs	100 µs	100 µs
Controllable voltage drop on lines to consumers	0.5 V	0.5 V	0.5 V	0.5 V	0.5 V	0.5 V	0.5 V
Setting time of output voltage with change in setpoint, C = off 0 V to V_{rated} no-load/nominal load, t_r (10 ... 90 %) typ.	100 µs	100 µs	200 µs	200 µs	200 µs	200 µs	300 µs
V_{rated} to 0 V no-load/nominal load, t_f (90 ... 10 %) typ.	100 µs	100 µs	200 µs	200 µs	200 µs	200 µs	300 µs
Constant current mode							
Resolution	10 mA	5 mA	5 mA	5 mA	5 mA	2 mA	2 mA
Setting accuracy: 0.1 % +	50 mA	50 mA	50 mA	25 mA	25 mA	25 mA	25 mA
Current stabilization							
With change in load 0 ... 100 %	10^{-3}	10^{-3}	10^{-3}	10^{-3}	10^{-3}	10^{-3}	10^{-3}
With change in mains voltage ± 10 %	10^{-4}	10^{-4}	10^{-4}	10^{-4}	10^{-4}	10^{-4}	10^{-4}
With change in temperature	0.02 %/K	0.02 %/K	0.02 %/K	0.02 %/K	0.02 %/K	0.02 %/K	0.02 %/K
Residual ripple I_{rms}	6 mA	6 mA	6 mA	5 mA	5 mA	5 mA	5 mA
Drift within 8 hours	0.05 %	0.05 %	0.05 %	0.05 %	0.05 %	0.05 %	0.05 %
Setting time of output current with change in setpoint, C = off 0 A to I_{rated}, t_r (10 ... 90 %) typ.	350 µs	350 µs	350 µs	400 µs	400 µs	400 µs	400 µs
I_{rated} to 0 A, t_f (90 ... 10 %) typ.	350 µs	350 µs	350 µs	400 µs	400 µs	400 µs	400 µs
Voltage measurement							
Resolution	1 mV	2 mV	2 mV	5 mV	5 mV	5 mV	5 mV
Accuracy: 0.1 % +	10 mV	10 mV	10 mV	20 mV	20 mV	20 mV	20 mV
Monitor voltage 0 ... 10 V	0 ... 16 V	0 ... 24 V	0 ... 32 V	0 ... 40 V	0 ... 48 V	0 ... 64 V	0 ... 80 V
Accuracy: 0.1 % +	20 mV	20 mV	20 mV	30 mV	30 mV	30 mV	30 mV
Output impedance	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω
Current measurement							
Resolution	10 mA	5 mA	5 mA	5 mA	5 mA	2 mA	2 mA
Accuracy: 0.1 % +	50 mA	50 mA	50 mA	25 mA	25 mA	25 mA	25 mA
Monitor voltage 0 ... 10 V	0 ... 100 A	0 ... 67 A	0 ... 50 A	0 ... 40 A	0 ... 34 A	0 ... 25 A	0 ... 20 A
Accuracy: 0.1 % +	10 mA	10 mA	10 mA	10 mA	10 mA	10 mA	10 mA
Output impedance	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω
External voltage control							
Control voltage 0 ... 10 V	0 ... 16 V	0 ... 24 V	0 ... 32 V	0 ... 40 V	0 ... 48 V	0 ... 64 V	0 ... 80 V
Accuracy: 0.1 % +	20 mV	20 mV	20 mV	30 mV	30 mV	30 mV	30 mV
Cut-off frequency (–3 dB), C = off, typ.	3.5 kHz	3.5 kHz	3.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz
External current control							
Control voltage 0 ... 10 V	0 ... 100 A	0 ... 67 A	0 ... 50 A	0 ... 40 A	0 ... 34 A	0 ... 25 A	0 ... 20 A
Accuracy: 0.4 % +	100 mA	100 mA	100 mA	100 mA	100 mA	50 mA	50 mA
Cut-off frequency (–3 dB), C = off, typ.	3.5 kHz	3.5 kHz	3.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz

Specifications
Arbitrary power supplies from TOELLNER®

TOE 8865 series

Model Output power	8865-32 1920 W	8865-40 1920 W	8865-48 1920 W	8865-64 1920 W	8865-80 1920 W
Output values Voltage	0 ... 32 V	0 ... 40 V	0 ... 48 V	0 ... 64 V	0 ... 80 V
Current	0 ... 60 A	0 ... 48 A	0 ... 40 A	0 ... 30 A	0 ... 24 A
Constant voltage mode Resolution	2 mV	5 mV	5 mV	5 mV	5 mV
Setting accuracy: 0.025 % +	20 mV	20 mV	20 mV	20 mV	20 mV
Voltage regulation With change in load 0 ... 100 %	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}
With change in mains voltage ± 10 %	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}	5×10^{-5}
With change in temperature	0.01 %/K	0.01 %/K	0.01 %/K	0.01 %/K	0.01 %/K
Residual ripple V_{rms}	2 mV	2 mV	2 mV	2 mV	2 mV
Drift within 8 hours	0.01 %	0.01 %	0.01 %	0.01 %	0.01 %
Regulation time for a load transition from 20 to 100 % and setting to within 0.2 % of rated voltage	200 µs	200 µs	200 µs	100 µs	100 µs
Controllable voltage drop on lines to consumers	0.5 V	0.5 V	0.5 V	0.5 V	0.5 V
Setting time of output voltage with change in setpoint, C = off 0 V to V_{rated} no-load/nominal load, t_r (10 ... 90 %) typ.	200 µs	200 µs	200 µs	300 µs	300 µs
V_{rated} to 0 V no-load/nominal load, t_f (90 ... 10 %) typ.	200 µs	200 µs	200 µs	300 µs	300 µs
Constant current mode Resolution	5 mA	5mA	5 mA	2 mA	2 mA
Setting accuracy: 0.1 % +	50 mA	50 mA	25 mA	25 mA	25 mA
Current stabilization With change in load 0 ... 100 %	10^{-3}	10^{-3}	10^{-3}	10^{-3}	10^{-3}
With change in mains voltage ± 10 %	10^{-4}	10^{-4}	10^{-4}	10^{-4}	10^{-4}
With change in temperature	0.02 %/K	0.02 %/K	0.02 %/K	0.02 %/K	0.02 %/K
Residual ripple I_{rms}	6 mA	5 mA	5 mA	5 mA	5 mA
Drift within 8 hours	0.05 %	0.05 %	0.05 %	0.05 %	0.05 %
Setting time of output current with change in setpoint, C = off 0 A to I_{rated}, t_r (10 ... 90 %) typ.	400 µs	400 µs	400 µs	400 µs	400 µs
I_{rated} to 0 A, t_f (90 ... 10 %) typ.	400 µs	400 µs	400 µs	400 µs	400 µs
Voltage measurement Resolution	2 mV	5 mV	5 mV	5 mV	5 mV
Accuracy: 0.1 % +	20 mV	20 mV	20 mV	20 mV	20 mV
Monitor voltage 0 ... 10 V	0 ... 32 V	0 ... 40 V	0 ... 48 V	0 ... 64 V	0 ... 80 V
Accuracy: 0.1 % +	30 mV	30 mV	30 mV	30 mV	30 mV
Output impedance	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω
Current measurement Resolution	5 mA	5 mA	5 mA	2 mA	2 mA
Accuracy: 0.1 % +	50 mA	50 mA	25 mA	25 mA	25 mA
Monitor voltage 0 ... 10 V	0 ... 60 A	0 ... 48 A	0 ... 40 A	0 ... 30 A	0 ... 24 A
Accuracy: 0.1 % +	10 mA	10 mA	10 mA	10 mA	10 mA
Output impedance	600 Ω	600 Ω	600 Ω	600 Ω	600 Ω
External voltage control Control voltage 0 ... 10 V	0 ... 32 V	0 ... 40 V	0 ... 48 V	0 ... 64 V	0 ... 80 V
Accuracy: 0.1 % +	30 mV	30 mV	30 mV	30 mV	30 mV
Cut-off frequency (–3 dB), C = off, typ.	2.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz
External current control Control voltage 0 ... 10 V	0 ... 60 A	0 ... 48 A	0 ... 40 A	0 ... 30 A	0 ... 24 A
Accuracy: 0.4 % +	100 mA	100 mA	100 mA	100 mA	100 mA
Cut-off frequency (–3 dB), C = off, typ.	2.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz	2.5 kHz