

## Regatron Power Supplies

Programmable High-Power DC Power Supplies



TopCon power supply unit with optional front panel control unit HMI

- Constant voltage (0-100%), constant current (0-100%) and constant power (5-100%) operation with automatic and fast crossover and mode indication. Internal resistance simulation.
- Finely graduated product line: 50, 60, 100, 200, 400, 500, 600, 1000 VDC. Power categories of 10, 16, 20 and 32 kW are available for each nominal output voltage.
- Optional extras and accessories complete the product line of power supply units.
- Modular concept for easy power increase: Parallel, series or multiload master-slave-operation for up to eight power supply units.
- High efficiency at a low cost, resulting from the application of innovative IGBT and transformer technology. Primary switched. Galvanic isolated. Full digital control and regulation.
- A user-friendly PC program, the operating and service software TopControl, enables the user to communicate with the power supply.
- TopControl installation file, LabVIEW® and C/C++ API (DLL file) are included in the scope of delivery.
- CE conformity
- Swiss made: Further developed, manufactured and tested in Switzerland by Regatron AG.

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## 20 kW / 1000 VDC / 25 A

TC.P.20.1000.400.S

### Mains requirements and output specifications

#### AC line input

Line voltage	3 x 360 – 440 VAC
Line frequency	48 – 62 Hz
Mains connection type	3L+PE (no neutral)
Input current	3 x 40 Arms <sup>1)</sup>
Leakage current L to PE	< 10 mA

#### Output ratings

Output power range	0 – 20 kW
Output voltage range	0 – 1000 VDC
Output current range	0 – 25 A <sup>2)</sup>
Internal resistance range	0 – 1000 mΩ <sup>3)</sup>

#### Operating modes

Voltage regulation (CV)	0 – 100 % U <sub>max</sub>
Current regulation (CC)	0 – 100 % I <sub>max</sub>
Power regulation (CP)	5 – 100 % P <sub>max</sub>

#### Static accuracy

Load regulation CV, CC	< ± 0.1 % FS <sup>4)</sup>
Line regulation CV, CC	< ± 0.1 % FS <sup>5)</sup>

#### Transient response time

Load regulation CV, CC	< 2 ms <sup>6)</sup>
Set value tracking CV, CC	< 2 ms <sup>7)</sup>

#### Stability

CV, CC	< ± 0.05 % FS <sup>8)</sup>
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#### Temperature coefficient

CV	< 0.02 % FS / °C <sup>9)</sup>
CC	< 0.03 % FS / °C <sup>9)</sup>

#### Output ripple

300 Hz V <sub>pp</sub>	< 1.1 % FS <sup>10)</sup>
300 Hz V <sub>rms</sub>	< 0.4 % FS <sup>10)</sup>

#### Output noise

40 kHz – 1 MHz V <sub>pp</sub>	< 1.5 V <sup>10)</sup>
40 kHz – 1 MHz V <sub>rms</sub>	< 0.1 V <sup>10)</sup>

#### Remote sensing

Terminals on rear side	Line voltage drop compensation
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### General specifications

Efficiency at nominal power	93 %
Weight	64 kg
Width front panel	483 mm
Width housing	444 mm (19")
Height front panel	399 mm
Height housing	394 mm (9 U)
Depth with output terminals	570 mm
Depth housing	525 mm
Line input connections:	4 x 25 mm <sup>2</sup> (terminal block)
Output terminals:	nickel-plated copper bars, length: 45 mm, 1 hole 9 mmØ in each bar

- 1) At nominal output power and line input voltage 3 x 390 VAC / 50 Hz. Soft-start to limit turn-on surge currents.
- 2) For output current > 20 A:  $U < 1000 \text{ V}$  ( $P = U \cdot I \leq 20 \text{ kW}$ ).
- 3) Optionally extendable to a maximum of 12'000 mΩ.
- 4) Typical value for 0 – 100 % load variation, at constant line input and temperature conditions.
- 5) Typical value for input voltage variation within 360 – 440 VAC, at constant load and temperature conditions.
- 6) Typical recovery time to within  $\pm 5 \%$  band of set value for a load step 10 – 90 %, ohmic load, at constant line input and temperature conditions. Transient response time can be slightly affected by multi-unit operation.
- 7) Typical recovery time to within  $\pm 5 \%$  band of set value for a set value step 10 – 90 %, ohmic load, at constant line input and temperature conditions. Transient response time can be slightly affected by multi-unit operation.
- 8) Maximum drift over 8 hours after 30 minute warm-up time, at constant line input, load and temperature conditions.
- 9) Typical change of output values versus ambient temperature, at constant line input and load conditions.
- 10) Typical value at nominal ohmic load, line asymmetry < 1 V<sub>rms</sub>.

Non-ohmic loads can lead to deviations in the technical data. All product specifications are subject to change without notification.

**Ambient conditions**

Operating temperature	5 – 40°C
Storage temperature	–25 – 70°C
Relative air humidity	0 – 95 % (non-condensing)

**Cooling**

Standard: internal temperature-controlled fans  
 Optional: integrated liquid cooling of the power stage, heat exchanger material: AC100 (Al-Ti-alloy), inlet / outlet on rear side, size: R 1/4"

**Safety****Built-in protection**

Overvoltage protection (programmable)	0 – 110 % U <sub>max</sub>
Overcurrent protection (programmable)	0 – 110 % I <sub>max</sub>
Max. reactive load voltage	≤ 110 % U <sub>max</sub>
Short circuit protection	Continuous short circuit allowed

Internal diagnostics: line input conditions, transformer primary current, temperature conditions, processor idle time, system configuration, system communication, sensor signals, power semiconductors

**Type of protection (IEC 529)**

Basic construction	IP 20 (current bars on rear side excluded)
Mounted in cabinet	IP 43

**Standards**

EMC emission	EN 50081-2, EN 55011
EMC immunity	EN 50082-2
Safety	EN 60204, IEC204-1 mod.
Interlock circuit	EN 60204-1995

**Isolation**

Line to output	4000 Vrms
Line to case	2500 Vrms
Output to case:	± 1000 VDC, > 10 MΩ / 2 x 6.8 nF

**Standard programming interfaces****Control port**

Isolation to electronics and earth: 125 Vrms  
 25 pin D-sub connector, female, on rear panel

**Control port input functions**

Output voltage on / off	0 / 24 VAC / DC
2 digital application inputs	0 / 24 VAC / DC <sup>11)</sup>
Interlock circuit	0 / 24 VDC
Voltage setting 0 – 100 %	0 – 10 V
Current setting 0 – 100 %	0 – 10 V
Power setting 0 – 100 %	10 – 0 V
Int. resistance setting 0 – 1000 mΩ <sup>3)</sup>	0 – 10 V

**Control port output functions**

Unit ready / error	Relay contact
Output voltage on	Relay contact
Temperature warning	Relay contact
Actual voltage readback 0 – 100 %	0 – 10 V
Actual current readback 0 – 100 %	0 – 10 V
Resolution (programming and readback): U, I, P, Ri	0.2 % FS

11) Customer-specificly programmable

12) This option and RS232: time-shared mode required, if used together

**Standard programming interfaces (continued)****RS232**

Isolation to electronics and earth:	125 Vrms
9 pin D-sub connector, female, on front panel	
Baud rate	9600 baud
Resolution (programming and readback):	
U, I	0.025 % FS
P, Ri	0.1 % FS

**Optional programming interfaces****Front panel control unit HMI**

Integrated control, programming and display unit with graphic LC-Display, select wheel, push buttons and interactive text menus

Languages (switchable)	English, German
Display resolution:	
U	4 digits
I	3 digits
P	Kilowatt + 1 decimal digit
Ri	1 mΩ

**Remote control unit RCU**

Specifications same as HMI, available in 2 versions: desk top and 19" rackmount

max. cable length	40 m
Desk top W x H x D	355 x 100 x 290 mm
19" rackmount W x H x D	483 x 133 (3 U) x 290 mm

**IEEE 488.2 <sup>12)</sup>**

GPIB (IEEE 488.2) to RS232 converter unit, connected to power supply unit via RS232 interface

Dimensions W x H x D	120 x 30 x 80 mm
Converter AC line input	1 x 230 VAC

**RS422 <sup>12)</sup>**

9 pin D-sub connector, male, on rear panel

Isolation, resolution and Baud rate same as RS232

**Ordering information****Options**

HMI	Front panel control unit HMI
RS422	Differential serial interface RS422
IRXTS <sup>3)</sup>	Internal resistance range extension
LC	Integrated liquid cooling of the power stage, heat exchanger material: AC100 (Al-Ti-alloy), inlet / outlet on rear side, size R 1/4"

**Accessories**

TC.RCU	Remote control unit RCU
TC.IEEE	Parallel interface IEEE488.2 (GPIB)
TC.CANCABLE	Connecting cable for multi-unit operation
TC.CANOPEN	Field bus interface
TC.INTERBUS	Field bus interface
TC.PROFIBUS	Field bus interface
TC.DEVICENET	Field bus interface
Contact factory for optional accelerated down programming and voltage overshoot clipping.	

**Ordering code**

TC.P.20.1000.400.S(.Option)

**Scope of delivery**

TopCon power supply unit ready to install, including: Operating manual (English or German), RS232 cable 1.8 m, installation disc TopControl, LabVIEW® and C/C++ API (DLL file)