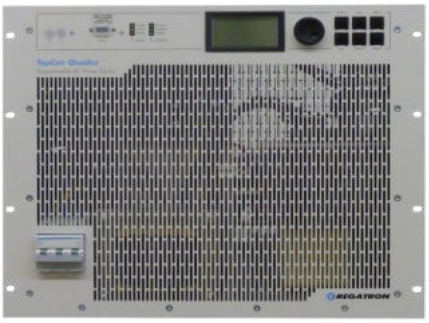
TC.P.32.320.400.S

Programmable DC Power Supply (TopCon Quadro)

- 32 kW
- 320 V
- 125 A

Features

- Unidirectional power supply
- Proven dynamics
- Cost effective
- TopControl operating SW + API



Key Values

Power		32 kW
Voltage DC	limited by P_{max}	320 V
Current	limited by P_{max} and ambient temperature	125 A
Autoranging factor *Figure 1*	$U_{max} \times I_{max} / P_{max}$	1.25
Master-slave / multi-device configuration		parallel, series, mixed
Max. number of devices in system	may be extended by TC.MAC	16
Max. number in parallel	may be extended by TC.MAC	16
Max. number in series	with midpoint earthing limited by output isolation to PE	6
Case		19" / 9U

AC Lineside Rating

Mains connection type	delta	3L + PE (no neutral necessary)
Rated voltage		3x400 V ±10%
Rated current	@nominal 3× 360 VAC	59 A_{rms}
	@nominal 3× 380 VAC	56 A_{rms}
	@nominal 3× 400 VAC	53 A_{rms}
	@nominal 3× 415 VAC	51 A_{rms}
	@nominal 3× 440 VAC	48 A_{rms}
Rated frequency		50/60 Hz
Power factor	@P_{max}	0.94
THDi	@90% P_{max}	32%
Input stage		6 pulse bridge rectifier
Efficiency	P_{max} @U_{max}	94%
Input insulation test voltage	line to case/logic	1670 VDC (1 s)
Protective earth conductor current	According to IEC 60990	<10 mA
Touch current unweighted		20 mA
Touch current weighted		2 mA
Input filter discharge *to <60 V*	L-PE / L-L	56s/72s
	with option XCD	<1 s

DC Operation

Operation modes		Source
Voltage regulation	CV	0...100% U_{max}
Current regulation	CC	0...100% I_{max}
Power regulation	CP	5...100% P_{max}
Internal resistance simulation	programmable	0...2560 mΩ
Load regulation *0...100% load* *At 25° ambient temperature, constant line input*	voltage	0.1% FS
	current	0.1% FS

DC Operation (continued)

Line regulation *-10%...+10% line voltage* *At 25° ambient temperature, constant load*	voltage	0.1% FS
	current	0.1% FS
HMI meter resolution	programming/reading	0.1 V 0.1 A
Output capacitance	X-capacitor Y-capacitor @DC	154 µF 13.6 nF
Ripple, voltage	output voltage ripple 300 Hz Vpp ohmic load, CV mode typical value at nominal ohmic load, line asymmetry <1 V_{rms}	≤0.4% FS
	output voltage ripple 300 Hz Vpp ohmic load, CV mode typical value at nominal ohmic load, line asymmetry <1 V_{rms}	≤1.1% FS
Noise	noise 40 kHz...1 MHz V_{rms} ohmic load, CV mode typical value at nominal ohmic load, line asymmetry <1 V_{rms}	< 0.1 V
	noise 40 kHz...1 MHz Vpp ohmic load, CV mode typical value at nominal ohmic load, line asymmetry <1 V_{rms}	< 1.5 V
Stability/drift *8h, after 1h warm up time in output on state,* *at constant line input, load and temp. conditions*	voltage	≤0.05% FS
	voltage sense current	≤0.05% FS ≤0.05% FS
Temperature coefficient *At constant line and load conditions*	voltage	≤0.02% FS/°C
	current	≤0.03% FS/°C
Rise/fall time (10...90% of step) *Voltage set-value step, const. ohmic load*	voltage step (10...90% U_{max} / 10...90% P_{max}) can be affected in multi-unit operation	<2 ms
Rise/fall time (10...90% of step) *Current set-value step, const. ohmic load*	current step (10...90% I_{max}) 10...90% of step can be affected in multi-unit operation	<2 ms
Transient response time *Load step, ohmic load*	CV, recovery within 5% set voltage 10...90% P_{max} can be affected in multi-unit operation	<2 ms
Transient response time *Load step, ohmic load*	CC, recovery within 5% of set current 10...90% P_{max} can be affected in multi-unit operation	<2 ms
Protection	OVP (over voltage protection) programmable OCP (over current protection) programmable OPP (over power protection) programmable OTP (over temperature protection)	0...110% FS 0...110% FS 0...110% FS ✓
Output discharge *to <60V*		<129ms
Sense voltage compensation		Programmable Uout + Udrop limited by Uout $_{max}$
Sense input impedance		340 kΩ
Ballast resistor DC power port	@output off	500 Ω
Resistance	DC+/DC- output to PE X109 jumper inserted	10.8 MΩ
	DC+/DC- output to PE X109 jumper removed	open
Absolute maximum ratings	Voltage Current	352 138

DC Operation (continued)

Absolute maximum ratings	DC+ output to PE DC- output to PE	+1320 V / -1000V +1000 V / -1000V
Input insulation test voltage	line to case/logic	1670 VDC (1 s)
Output insulation test voltage	output to case/logic	2540 VDC (1 s)

Various

Case dimensions *Figure 2*	H × W × D without terminals	400 × 483 × 525 mm 15 3/4" × 19" × 20 3/4"
Weight		64 kg /141 lbs
AC terminals	screw terminals	25 mm^2
DC terminals		Output bars for M8 bolts
Enclosure	rating current bars on rear side excluded	IP20
Communication interface		RS232 (38400 baud)
	isolation to electronics and case	125 V
	resolution, programming and readback U, I	0.025% FS
	resolution, programming and readback P, Ri	0.1% FS
Option cards	# of free slots	1

Analog Inputs

Number of inputs	setvalues for voltage, current, power, and internal resistance	4
Resolution		12 Bit
Sampling rate		20 kHz
Input voltage range	0…100% FS	0…10 V
Isolation	to electronics and case	125 V
Input impedance		20 kΩ (typ.)
Absolut max. input voltage		30 VDC
Input filter	bandwith programmable	OFF, 0.1…400Hz
Delay analog in to power out	can be affected in multi-unit operation	200 µs (typ.)

Analog Outputs

Number of outputs	voltage, current readback	2
Resolution		12 Bit
Update rate		10 kHz
output filter	bandwidth programmable	OFF, 0.1…400Hz
Output voltage range	0…100% FS	0…10 V
Isolation	to electronics and case	125 V
Output impedance		535 Ω (typ.)
Max. output current	short-circuit proof	28 mA
Delay power out to analog out	can be affected in multi-unit operation	200 µs (typ.)

Digital I/O

Number of digital inputs		6 (4 inputs programmable, + voltage on, +interlock)
Output voltage supplied for digital I/O		24 VDC (-15% / +20%)
Input impedance		4.7 kΩ
Max. voltage digital inputs		30 VDC
Sampling rate digital inputs		1 kHz
Max total output current all channels		200 mA
Max output current per channel	short-circuit proof	200 mA
Update rate digital outputs		10 kHz

Relay Outputs

Number of relay outputs	Error: SPST(NO) Run: SPST(NO) Warn: 1× SPDT	3
Load type		ohmic, inductive, lamp load
Max. switching voltage		30 VDC
Max. switching current		1 A
Switching time		20 ms (typ.)

Ambient

Operating altitude	above sea level above 1000 m / 3280 ft, slight temp. derating possible	≤2000 m / ≤6562 ft
Operating temperature	 with airfilter	5…40 °C -10 °C
Current derating	max. continuous output current @ temperature: higher current if CDF <100% no derating if equipped with optional liquid cooling	35°C: 112 A 40°C: 100 A
Storage temperature		-25…+70 °C
Installation	IEC 60721-3-3	indoor, air-conditioned in protected 19" switch cabinet
Orientation	storage, installation, operation	upright
Relative humidity	non-condensing	0…95%
Vibration	IEC 60068-2-6	Test Fc
Cooling		direct forced air, front to back optional liquid cooling (85%), AC100 (Al-Ti-alloy)
Acoustic noise level *1 m dist. front (typ.)*	90% P_{max}, 90% I_{max} @25 °C ambient	69 dB(A)

Standards

Protection class	EN 62477-1	1
Degree of pollution	EN 60664-1	2
Overvoltage category	mains input, EN 60664-1 / EN 62477-1 other interfaces	III II
Area of application		industrial
Approval		CE marking, UKCA
EN 62477-1:2012 *+ A11:2014 + A1:2017 + A12:2021*	Low Voltage Directive 2014/35/EU	✓
BS EN 62477-1:2012 *+ A11:2014 + A1:2017 + A12:2021*	Electrical Equipment (Safety) Regulations 2016	✓
EN ISO 13849-1:2015	w/o ISR with ISR 2-channel with ISR 2-channel and external safety relay	- PL c PL e
EN 61000-6-4:2007 A1:2011 / EN61000-6-4:2019	Directive 2014/30/EU EMC emission (industrial)	✓
BS EN 61000-6-4:2007 A1:2011 / *BS EN61000-6-4:2019*	Electromagnetic Compatibility Regulations 2016 EMC emission (industrial)	✓
EN 61000-6-2:2005 / EN 61000-6-2:2019	Directive 2014/30/EU EMC immunity (industrial)	✓
BS EN 61000-6-2:2005 / BS EN 61000-6-2:2019	Electromagnetic Compatibility Regulations 2016 EMC immunity (industrial)	✓
EN IEC 63000:2018	RoHS Directive	✓
BS EN IEC 63000:2018	The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012	✓

Ordering Information

Order Code

Power Supply Unit	TC.P.32.320.400.S
with HMI	TC.P.32.320.400.S.HMI
with liquid cooling	TC.P.32.320.400.S.LC
with liquid cooling and HMI	TC.P.32.320.400.S.LC.HMI

Standard Scope of Delivery

Power Supply Unit	ready to install
Operating Manual	English or German
RS232 Cable	1.8 m / 5.9 ft
Operating and Service Software	TopControl
API	LABView and C/C++ (DLL file)

Available Options

Display

HMI	Front panel integrated control unit with LCD-Display, selector wheel, and push buttons
RCU.RM	19-Inch rack-mount remote control Unit with same specs as HMI
RCU.RM.2CH	19-Inch rack-mount remote control Unit with same specs as HMI and E-Stop button (2-Channel)
RCU.DT.1CH	Desktop remote control unit with stop switch (1-Channel)

Control Interfaces

CANmp	Rear panel integrated CAN interface
CANOpen	Rear panel integrated CAN/CANopen interface
USB	Rear panel integrated USB interface
CANOpen + USB	Rear panel integrated CANOpen and USB interface
ETHERNET	Rear panel integrated Ethernet interface
LXI	Rear panel integrated LXI interface
IEEE / GPIB	Rear panel integrated GPIB / IEEE488.2 / SCPI interface
RS232REAR	Rear panel integrated RS-232 interface
RS422	Rear panel integrated RS-422 interface

Application Software + Functions

BatControl	Battery testing and cycling software (for development and process automation)
BatSim	Battery simulation software (for development and process automation)
SASControl	Solar Array Simulation software (for development and process automation)
TFEAAPControl	Function generating engine, time-based and parametric programming

User Safety & Operational Safety

PAC.P9.DC	DC terminal protective cover (for TopCon Quadro 9U)
PAC.P9.AC	AC terminal protective cover (for TopCon Quadro 9U)
XCD	Integrated fast discharge of AC filter, required for plugged use of the unit
ISR	Integrated Safety Relay for increased emergency stop reliability

Environmental Conditions

AIRFILTER.9	Front panel airfilter (for power supplies 9U)
LC	Liquid Cooling
LIQLOCK.9	Liquid lock, water stop valve (for TopCon Quadro 9U)
RUGG.SAV.P	Ruggedization against shock and vibration (for TopCon Quadro)
RUGG.ENV.P	Protection against humidity and pollution (for TopCon Quadro)

Operating area

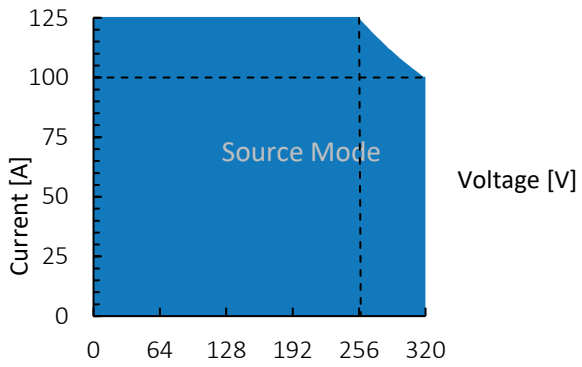


Figure 1: TC.P.32.320.400.S, voltage / current operating area.
Max.current up to 256 V
Max.Voltage up to 100 A

Dimensions

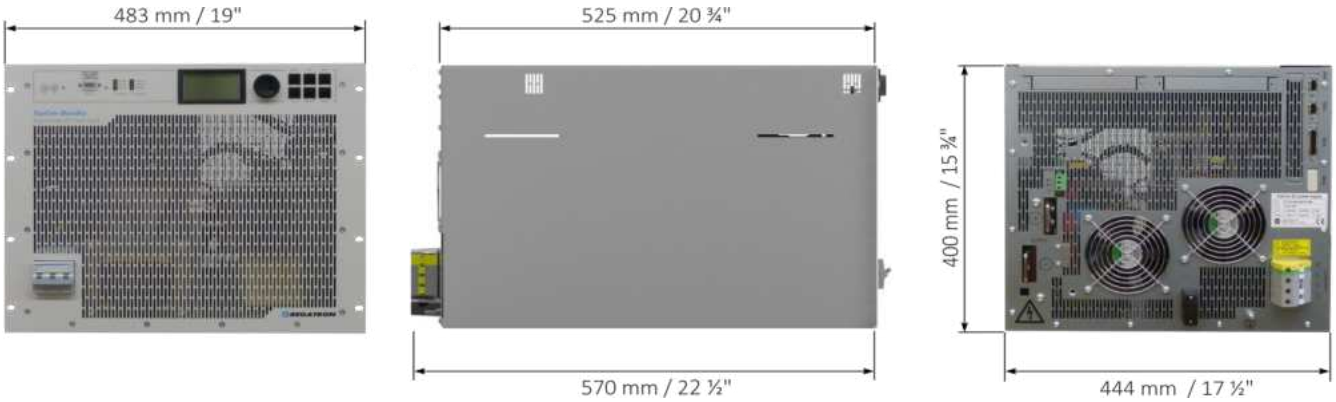


Figure 2: Front, side, and rear view. 19-inch module with 9 units in height.
Add 74 mm / 2 ⅞" to case depth for protective cover.

This product is developed, produced and tested according to ISO 9001 by REGATRON.

For detailed technical information, contact REGATRON or your local sales partner.

Regatron AG
Feldmuehlestrasse 50
9400 Rorschach
SWITZERLAND

sales@regatron.com
www.regatron.com

Regatron Inc.
100 Overlook Center, 2nd Floor
Princeton, NJ 08540
USA

inquiries@us.regatron.com
www.us.regatron.com

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