TopCon Quadro Power Supply

Programmable High-Power DC Supply

32 kW / 800 VDC / 50 A

TC.P.32.800.400.S

TopCon Quadro Power Supply unit with optional front panel control unit HMI

- Constant voltage (0 – 100 %), constant current (0 – 100 %) and constant power operation (5 – 100%) with automatic and fast crossover and mode indication. Internal resistance simulation.
- Finely graduated product line: 52, 65, 100,130, 200, 400, 500, 600, 800, 1000, 1200 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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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 60 Arms[1)]
Leakage current L to PE ..... < 20 mA

Output ratings

Output power range .....0 – 32 kW
Output voltage range .....0 – 800 VDC
Output current range.....0 – 50 A [2)]
Internal resistance range ..... 0 – 16000 mΩ [3)]

Operating modes

Voltage regulation (CV).....0 – 100 % Umax
Current regulation (CC)..... 0 – 100 % Imax
Power regulation (CP).....5 – 100 % Pmax

Static accuracy

Load regulation CV, CC .....< ± 0.1 % FS [4)]
Line regulation CV, CC .....< ± 0.1 % FS [5)]

Transient response time

Load regulation CV, CC .....< 2 ms [6)]
Set value tracking CV, CC .....< 2 ms [7)]

Stability

CV, CC.....< ± 0.05 % FS [8)]

Temperature coefficient

CV.....< 0.02 % FS / °C [9)]
CC.....< 0.03 % FS / °C [9)]

Output ripple

300 Hz Vpp ..... < 1.1 % FS [10)]
300 Hz Vrms ..... < 0.4 % FS [10)]

Output noise

40 kHz – 1 MHz Vpp .....< 1.5 V [10)]
40 kHz – 1 MHz Vrms .....< 0.1 V [10)]

Remote sensing

Terminals on rear side ..... Line voltage drop compensation

General specifications

Efficiency at nominal power ..... 95 %
Weight.....64 kg
Width front panel.....483 mm
Width housing ..... (19“) 444 mm
Height front panel.....399 mm
Height housing .....(9 U) 394 mm
Depth with output terminals.....570 mm
Depth housing.....525 mm
Line input connections: .....terminal block 4 x 25 mm^2
Output terminals: ..... nickel–plated copper bars, length: 40 mm, 1 hole 9 mm ∅ 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) Current according to the given power limit of the corresponding units.(P=Uout * Iout ≤ 32 kW; for Iout > 40 A --> Uout < 800 V). Current derating: max. permanent output current at 640 VDC / 25°C: 50 A, at 640 VDC / 30°C: 50 A, at 640 VDC / 35°C: 45 A, at 640 VDC / 40°C: 40 A. Higher current if CDF < 100%, no derating if unit equipped with optional liquid cooling.
3) The maximum value of the internal resistance is automatically calculated via the DC nominal values (Ri [mΩ] = V_{Load} / I_{Load} = 800 VDC / 50 A) or limited by the maximum Ri-value: 32000 [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 < ± 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 < ± 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 Vrms.

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

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Ambient conditions
Operating temperature ..... 5 – 40°C [11)]
Storage temperature..... -25 – 70°C
Relative air humidity (non-condensing) ..... 0 – 95 %
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: G 1/2"

Protection

Built-in protection
Overvoltage protection (programmable) ..... 0 – 110 % Umax
Overcurrent protection (programmable) ..... 0 – 110 % Imax
Max. reactive load voltage ..... ≤ 110 % Umax
Short circuit protection ..... Cont. 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 60529)
Basic construction ..... IP 20 (current bars on rear side excluded)
Mounted in cabinet ..... Up to IP 53

Conformity CE-Marking

EMC Directive
EMC emission ..... EN 61000-6-4
EMC immunity ..... EN 61000-6-2
Low Voltage Directive
Electronic equipment for use in power installations ..... EN 50178

Isolation
Line to case/ logic ..... 1670 VDC 1s
Output to case/ logic ..... 2540 VDC 1s
Output to case ..... > 10 MΩ
per DC bar ..... 13.6 nF
- bar [16)] ..... + 1000 VDC / - 1000 VDC
+ bar [16)] ..... + 1000 VDC / - 1000 VDC

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 [12)]
Interlock circuit..... 0 / 24 VDC
Voltage setting 0 – 100 % ..... 0 – 10 V
Current setting 0 – 100 % ..... 0 – 0 V
Power setting 0 – 100 % ..... 10 – 0 V
Int. resistance setting 0 – 100% [3)] ..... 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 [3)] ..... 0.2 % FS

Standard programming interfaces (continued)

RS232
9 pin D-sub connector, female, on front panel
Isolation to electronics and earth ..... 125 Vrms
Baud rate ..... 38400 baud
Resolution (programming and readback):
U, I ..... 0.025 % FS
P, Ri ..... 0.1 % FS

Ordering Information

Ordering code
TC.P.32.800.400.S(.Option)

Standard 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)

Options

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

Further options
TFEAAP ..... Function Generating Engine Time-based and parametric programming
SASControl [12)] ..... SAS application program including TFEAAP
BatControl [12)] ..... Battery application program
BatSim [12)] ..... Battery simulation program
CapSim [12)] ..... Capacitor simulation program
RS232REAR [13)] ..... RS-232 on front and rear panel
USB [14)] ..... USB on rear panel
RS422 [13)] ..... RS-422 on rear panel
ETHERNET [14)] ..... Ethernet on rear panel
IEEE [14)] ..... GPIB/ IEEE488.2/ SCPI on rear panel
....cannot be combined with CANOPEN nor with USB
CANOPEN [14)] ..... CAN/ CANOPEN on rear panel
CANmp ..... CANmp on rear panel
OptoLink [14)] ..... OptoLink on rear panel
CANCABLE..... Connecting cable
..... for Multi-Unit Operation or RCU: 2, 5, 10 m
PACOB ..... Protection against accidental contact
LCAL ..... Integrated liquid cooling of the power stage, inlet / outlet on rear side, size G 1/2"
AIRFILTER ..... Front panel airfilter 9 U
ISR ..... 2 channel Integrated Safety Relay
NSOV ..... Non-Standard output voltage

11) Ambient temperature or CDF restrictions: refer to output ratings.
12) Customer-specificly programmable.
13) This option and RS232: time-shared mode required, if used together.
14) RS232 only on Rear Panel.
15) Please order option RS232REAR separately.
16) Peak Voltage including DC-Output Voltage.

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