TopCon TC.GSS

Programmable Grid-tie Source − Sink Bidirectional High-Power DC Supply

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

- TopCon Grid-tie Source Sink technology enables full bidirectional operation
- Compact design with integrated EMI - and Sine filters
- 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.
- Graduated product line: 400, 500, 600V DC, higher Voltages with series connection up to 1500V_{DC}. Power categories of 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: Developed, manufactured and tested in Switzerland by Regatron AG.

20 kW / 400 VDC / 63 A

Mains requirements and output specifications

AC line

Line voltage ..... 3 x 360 – 440 V_{AC}
Line frequency ..... 48 – 62 Hz
Mains connection type .....3L+PE (no neutral)
Input current Q1 active mode..... 3 x 32 Arms [1)]
Leakage current L to PE ..... < 20 mA
Powerfactor Q1 active- / Q4-mode.....≥ 0.99
(At nominal power)

DC-side ratings

Power range.....0 – +/- 20 kW
Voltage range.....0 – 400 VDC
Current range.....0 – +/- 63 A [2)]
Internal resistance range ..... 0 – 1000 mΩ [3)]

Operating modes

Q1 active mode.....source mode
Q4 mode ..... regenerative/sink mode
Voltage regulation (CV).....0 – 100 % Umax
Current regulation (CC).....0 - ± 100 % Imax
Power regulation (CP)..... 0 - ± 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)]
Quadrant change time 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)]

DC-side ripple Q1 / Q4 Mode

300 Hz Vpp ..... < 0.5% FS [10)]
300 Hz Vrms ..... < 0.1% FS [10)]

DC-side noise Q1 / Q4 Mode

40 kHz – 1 MHz Vpp .....< 1 V [10)]
40 kHz – 1 MHz Vrms .....< 0.2 V [10)]

Remote sensing

Terminals on rear side ..... Load voltage drop Compensation

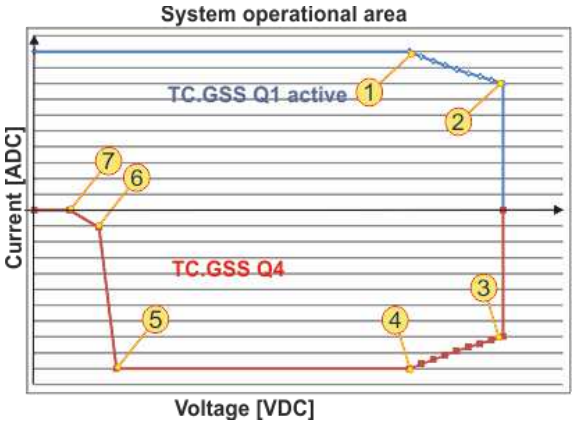
1) At nominal output power and line input voltage 3 x 400 VAC / 50 Hz. Soft-start to limit turn-on surge currents.
2) Current according to the given power limit of the corresponding units. (P=Uout * Iout ≤ 20 kW; for Iout > 50 A --> Uout < 400 V). No current derating.
3) Optionally extendable to a maximum of 12000 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.

General specifications

Efficiency at nominal power ..... 92 %[16)]
Weight ..... 90 kg
Width front panel ..... 483 mm
Width housing ..... (19") 444 mm
Height front panel ..... 399 mm
Height housing ..... (9U) 394 mm
Depth with output terminals ..... 634 mm
Depth housing ..... 594 mm
Input connections: ..... terminal block 4 x 25 mm^2
DC terminals: .....nickel–plated copper bars, length: 40 mm, 1 hole 9 mm ∅ in each bar
Operating orientation ..... upside
Storage, transport orientation ..... upside

Operating range



Q1 and Q4 range of device TC.GSS.20.400.400.S

-1- :.....320 V / 63 A
-2- :.....400 V / 50 A
-3- :..... 400 V / -50 A
.....
-4-: ..... 320 V / -63 A
-5-: ..... 65 V / -63 A
-6-: ..... 55 V / -11 A
-7-: ..... 30 V / 0 A

Ambient conditions

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

Cooling

Standard: Internal liquid cooling with completely integrated liquid to air heat-exchange system using temperature-controlled fans.

Optional: Integrated liquid cooling system of the power stage with completely integrated liquid to liquid heat-exchange system.

Heat exchanger
Material..... Stainless steel
Inlet/outlet on rear side size: ..... G ½“
Liquid temperature..... 15 [18)] – 35 °C
Flow.....≥ 3 l/min
Pressure max. .....≤ 10 bar
Pressure drop.....50 mbar@3 l/min

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
Islandig, grid off, requirements for the connection of micro-generators in public grid according VDE 0126/EN 50438.

Internal diagnostics

line input conditions, transformer primary current, temperature conditions, processor idle time, system configuration, system communication, sensor signals, power semiconductor temperatures.

Type of protection (according EN 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 output ..... 4000 Vrms
Line to case..... 2500 Vrms
Output to case .....> 10 MΩ
per DC output ..... 13.6 nF
- bar [15)]..... + 1000 VDC / - 1000 VDC
+ bar [15)]..... + 1500 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 off / on..... 0 / 24 VAC / DC
2 digital application inputs.....0 / 24 VAC / DC [11)]
Interlock circuit ..... 0 / 24 VDC
Voltage setting 0 – 100 % .....0 – +10 V
Current setting -100% – 100 % ..... -10 – +10 V
Power setting 0 – ±100 %.....+10 – 0 V
Int. resistance setting 0 – 1000 mΩ [3)].....0 – +10 V

Control port output functions

Unit ready / error ..... Relay contact
Output voltage on..... Relay contact
Warnings..... Relay contact
Actual voltage readback 0 – 100 %.....0 – 10 V
Actual current readback -100% – 100 %. -10 V – 10 V
Resolution (programmingand readback):
U, I, P, Ri.....0.2 % FS

3) Optionally extendable to a maximum of 12000 mΩ.
11) Customer-specificly programmable.
15) Peak Voltage including DC-Output Voltage.
16) At 8kHz switching frequency line side inverter.
17) Ni brazed, ready to use with deionized water.
18) 21 °C ambient ≤ 70 °C humidity.

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.GSS.20.400.400.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 88 (2 U) x 290 mm

Further options

TFEAAPControl ..... Function Generating Engine Time-based and parametric pr.
SASControl ..... SAS application program including TFEAAP
AccuControl ..... Battery application program
RS232REAR[12] ..... RS232 on front and rear panel
USB[13] ..... Interface USB on rear panel
RS422[12] ..... RS422 on rear panel
TCEthernet[14] ..... Ethernet to RS232 on rear panel
IEEE[13] ..... GPIB/ IEEE488.2/ SCPI on rear panel
..... cannot be combined
..... with CANOPEN nor with USB
CANOPEN[13] ..... CAN/ CANOPEN on rear panel
PROFIBUS[14] .... Profibus DP 485 to RS232 converter
..... external unit for low level programming
CANCABLE ..... Connecting cable
..... for Multi-Unit Operation or RCU: 2, 5, 10 m
PACOB ..... Protection against accidental contact
IRXTS [3] ..... Internal resistance range extension
LCAL ..... Integrated liquid cooling of the power stage, inlet / outlet on rear side, size G 1/2"
AIRFILTER ..... Front panel airfilter 6 U / 9 U
ISR ..... Integrated safety relay
NSOV ..... Non-Standard output voltage (if possible)

3) Optionally extendable to a maximum of 12000 mΩ
11) Customer-specificly programmable.
12) This option and RS232: time-shared mode required, if used together.
13) RS232 only on Rear Panel.
14) Please order option RS232REAR separately.

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