TopCon TC.GSS.32.65.4WR.S

Programmable Grid-tie Source − Sink Bidirectional Regenerative 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 line filters
- Constant voltage, constant current and constant power operation. Internal resistance simulation.
- Graduated product line: 65 V_{DC}, 130 V_{DC}, 400 V_{DC}, 500 V_{DC}, 600 V_{DC}, higher voltages by series connection up to 1500 V_{DC}. Power categories of 20 kW and 32 kW are available for each nominal output voltage.
- Modular concept for easy power increase: Parallel, series, matrix or multiload master-slave-operation
- Optional extras and accessories available
- High efficiency by innovative IGBT technology. Primary switched. Galvanic isolation. Full digital control and regulation.
- User-friendly control and service software TopControl is included in scope of delivery.
- LabVIEW® and C/C++ C#/.NET API (DLL file) are included in the scope of delivery.
- CE conformity declaration
- Swiss made: Development, manufacturing and testing

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32 kW / 65 VDC / 600 A

Mains requirements and output specifications

AC widerange lineside ratings

Line voltage / Line current relationship
.....3 x 380 V_{AC} ± 10 % / 54 Arms[1) 3)]
.....3 x 400 V_{AC} ± 10 % / 51 Arms[1)]
.....3 x 415 V_{AC} ± 10 % / 49 Arms[1)]
.....3 x 440 V_{AC} ± 10 % / 47 Arms[1)]
.....3 x 460 V_{AC} ± 10 % / 45 Arms[1)]
.....3 x 480 V_{AC} ± 10 % / 43 Arms[1)]
Line frequency.....48 – 62 Hz
Mains connection type.....3L+PE (no neutral)
Protective conductor current @ 50/60 Hz ...< 20 mA[2)]
Powerfactor Q1/ Q4-mode ..... ≥ 0.99
(At nominal power)

DC loadside ratings

Power range ..... 0 kW – +/- 32 kW [3)]
Voltage range ..... 0 VDC – 65 VDC
Current range ..... 0 A – +/- 600 A [3)]
Internal resistance range ..... 0 mΩ – 110 mΩ [4)]
Switchable output capacitance .....6 mF/ 17.2 mF

Operating modes

Q1 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 [5)]
Line regulation CV, CC..... < ± 0.1 % FS [6)]

Transient response time

Load regulation CV..... < 1.5 ms [7)]
Set value tracking CV ..... < 1.5 ms [8) 11)]
Set value tracking CC:
-With quadrant change ..... < 2 ms [8)]
-Without quadrant change ..... < 2 ms [8)]

Stability

CV, CC ..... < ± 0.05 % FS [9)]

Temperature coefficient

CV .....< 0.02 % FS / °C [10)]
CC .....< 0.03 % FS / °C [10)]

DC-side ripple Q1 / Q4 Mode

≤ 300 Hz Vpp.....< 0.2 % FS [11)]
≤ 300 Hz Vrms.....< 0.05 % FS [11)]

DC-side noise Q1 / Q4 Mode

40 kHz – 1 MHz Vpp..... < 0.2 V [11)]
40 kHz – 1 MHz Vrms..... < 0.05 V [11)]

Remote sensing

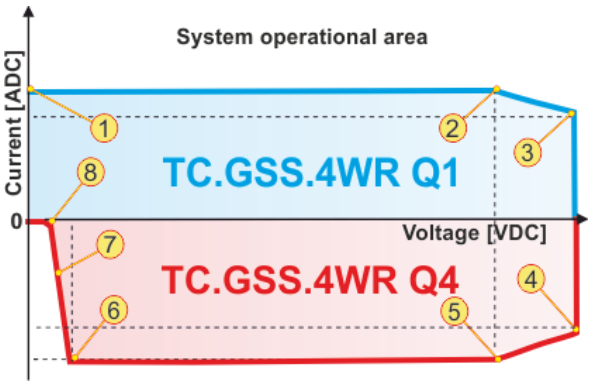
Terminals on rear side.....Load line voltage drop compensation

1) At nominal output power in 1st quadrant. Soft-start to limit turn-on surge currents.
2) According to IEC60990: Protective conductor current: 50/60Hz component @ 380 VAC - 480 VAC and P_{nom}
For weighted touch current: Measured for perception/reaction
3) Information about derating and the device operating range can be found on page 2.
4) The maximum value of the internal resistance is automatically calculated via the DC nominal values
Optional available Ri-value: 32000 mΩ max
5) Typical value for 0 – 100 % load variation, at constant line input and temperature conditions.
6) Typical value for input voltage variation within 380 VAC ± 10 % – 480 VAC ± 10 %, at constant load and temperature conditions.
7) 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.
8) Rise/ fall time for 10%-90% of a set step.
9) Maximum drift over 8 hours after 30 minute warm-up time, at constant line input, load and temperature conditions.
10) Typical change of output values versus ambient temperature, at constant line input and load conditions.
11) Typical value at nominal ohmic load, line asymmetry < 1 Vrms.

General specifications

Efficiency at nominal power Q1/Q4 .....90 %/ 91 %[1)]
Weight ..... 97 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, one hole 9 mm ∅ in each bar
Operating orientation ..... upside
Storage, transport orientation ..... upside

Operating range



Q1 and Q4 range of device TC.GSS.32.65.4WR.S.

-1- : .....0 V / 600 A
-2- : .....53 V / 600 A
-3- : .....65 V / 492 A
.....
.....
-4- : ..... 65 V / -492 A
-5- : ..... 53 V / -600 A
-6- : ..... 6 V / -600 A
-7- : ..... 4 V / -300 A
-8-: ..... 2 V / 0 A

Derating (only in Q1)

Current derating

Max. permanent output source current
up to 53 VDC / < 35 °C: 600 ADC
up to 53 VDC / < 40 °C: 540 ADC.
NOTE: If the airfilter option is used, the temperature limits are diminished by 3°C.

Power derating

Note a linear power derating at very low input voltages: 32 kW at 360VAC; 30kW at 340VAC

Insulation

Line to case/logic..... 1670 VDC 1 s
Output to case/logic..... 2060 VDC 1 s
Transformer ..... 4800 VAC
Output to case ..... > 10 MΩ
per DC bar..... 35 nF
- bar [2)]..... +680 VDC / -680 VDC
+ bar [2)]..... +680 VDC / -680 VDC

Protection

Built-in protection

Overvoltage protection
(programmable)..... 0 – 110 % Umax
Overcurrent protection
(programmable)..... 0 – 110 % Imax
Max. reactive load voltage..... ≤ 110 % Umax
Reverse Polarity Protection RPP..... optional
Short circuit protection..... Cont. short circuit allowed

Requirements for the connection of micro-generators in public grid according to UL1741/IEEE1547/ harmonized to VDE0126.

Internal diagnostics

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

Type of protection (according EN60529)

Basic construction ..... IP20 (current bars on rear side excluded)
Mounted in cabinet ..... Up to IP 54

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

Ambient conditions

Operating temperature ..... 5 – 40 °C
Storage temperature..... -18 – 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: External liquid cooling system of the power stage with completely integrated liquid to liquid heat-exchange system.

Heat exchanger
Material ..... Stainless steel[3)]
Inlet/outlet on rear side size: ..... G ½“
Liquid temperature..... 15 – 35 °C[4)]
Flow..... ≥ 3 l/min
Pressure max. ..... 10 bar
Pressure drop..... 50 mbar@3 l/min

1) At 15 kHz switching frequency of line side inverter.
2) Maximum working voltage including DC-Output Voltage.
3) Ni brazed, ready to use with deionized water.
4) Avoid bedewing of cooling fluid tubing.

Standard programming interfaces

Control port

Isolation to electronics and earth: 125 Vrms on 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 [1)]
Interlock circuit.....0 / 24 VDC
Voltage setting 0 – 100 %.....0 V – 10 V
Current setting -100% – 100 %..... -10 V – 10 V
Power setting 0 – 100 %..... +10 V – 0 V [4)]
Int. resistance setting 0% – 100% .....0 V – 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 V – 10 V
Actual current readback -100 % – 100 %
..... -10 V – 10 V
Internal resolution (programming and readback):
U, I, P, Ri .....0.05 % FS

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..... 0.025 % FS
I, P, Ri..... 0.05 % FS

Ordering Information

Ordering code

TC.GSS.32.65.4WR.S(.Option)

Standard Scope of delivery

TC.GSS unit ready to install, including:
.....Operating manual (English or German)
.....RS232 cable 1.8 m
.....Installation disc TopControl,
..... LabVIEW® and C/C++; C#/.NET 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

TFEAAP .....Function Generating Engine
Time-based and parametric programming
SASControl .....SAS application program
including TFEAAP
BatControl ..... Battery cycling program
BatSim ..... Battery simulation program
CapSim ..... Capacitor simulation program
RS232REAR .....RS-232 on front and rear panel[2)]
USB .....USB on rear panel[3)]
RS422 ..... RS-422 on rear panel[2)]
ETHERNET (tunnel).....Ethernet on rear panel[3)]
IEEE ..... GPIB/ IEEE488.2/ SCPI on rear panel[3)]
cannot be combined with CANOPEN nor with USB
CANOPEN ..... CAN/ CANOPEN on rear panel[3)]
CANmp.....Fast multi-protocol CAN on rear panel
OptoLink .....OptoLink on rear panel[3)]
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 (if possible)
RUGG.SAV.G.....Ruggedized shock and vibration
RUGG.ENV.G.....Ruggedized humidity and pollution

1) Customer-specifically programmable
2) RS232: time-shared mode required, if used together with either RS232REAR or RS422
3) RS232 available only on rear panel
4) Bipolar power settings -10 V... +10 V possible with software configuration change