Bidirectional Power Supplies - General Product Specifications

Functionality

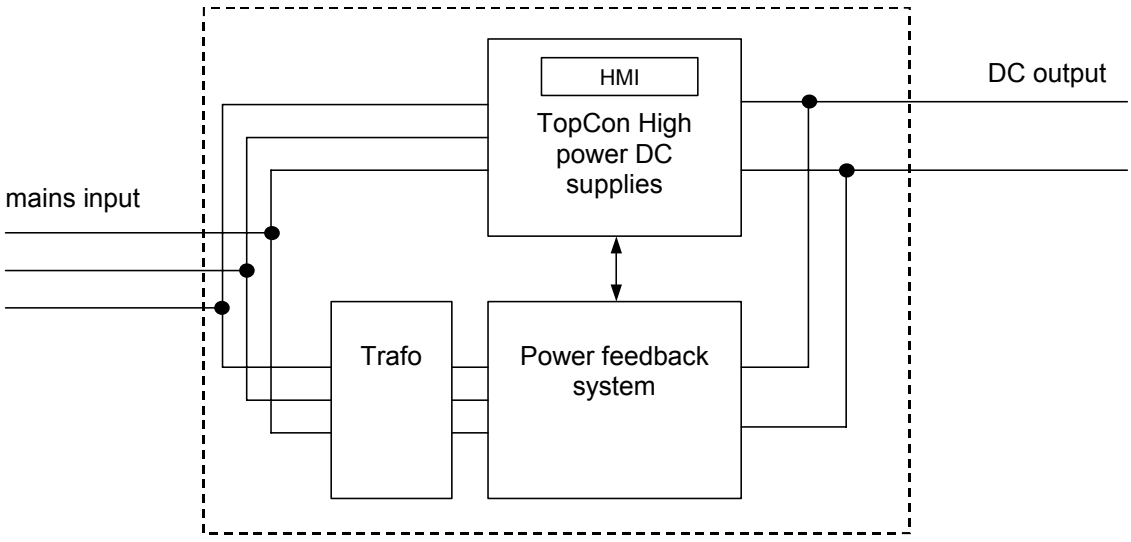
TopCon ReGen is a bi-directional power supply system, able to feed the specified DC power into a load and regenerating reactive energy from the load into the mains. The system is therefore best suited to substitute any type of rechargeable batteries, for automotive equipment testing, for running complete cycle programs of electrical drives and a wide variety of bipolar DC loads.

The system consists of two main functional blocks:

a) A programmable DC power supply made-up of a number of TopCon power supply units

b) A power feed-back system able to convert reactive energy directly into the mains with a very high efficiency. If a complete galvanic isolation from mains potential is required, then this system part can be equipped with an isolation transformer.

Control and monitoring of the system is performed by the TopCon Master unit. This eliminates the well-known zero-crossing distortions which are typical in other multi-quadrant arrays.



Basic system diagram of REGATRON ReGen system

Operation modes

Nr	Mode	Functionality	Set values			Remarks
			U	I	P	
1	Constant voltage	System holds voltage, current limit active, ReGen action automatically started if needed	≥ 0	X	X	Voltage set range from 0 to $U_{Dcmax(1Q)}$, feeding quadrant $U_{Dcmin(4Q)}$ to $U_{Dcmax(4Q)}$ in ReGen mode Current limit set value is positive for feeding; negative for ReGen
2	Constant current, feeding	System holds current in feeding mode No ReGen mode provided	X	≥ 0	X	Current set value positive range from 0 to $I_{Dcmax(1Q)}$ Values < 0 lead to mode 3
3	Constant current, ReGen	System holds current in ReGen mode	X	≤ 0	X	Current set value negative range from 0 to $I_{Dcmax(4Q)}$ Values > 0 lead to mode 2
4	Constant power	System holds preset power. Current limit active	X	X	≥ 0	Constant power 0 to $P_{Dcmax(1Q)}$ Controller bandwith slightly reduced / stacked controllers
5	Follow external analogue set values	Set values for U / I / P given by external analogue peripheral (e.g. PLC / PCI computer card, potmeters)	Set values for U / I / P; sample rate 5 kHz U: 0..10V -> 0.. $U_{Dcmax(1Q)}$ I: -10..+10V -> -$I_{DCmax\ (4Q)}$ .. $I_{DCmax\ (1Q)}$ P: 0..10V -> 0.. $P_{DCmax\ (1Q)}$			
6	Follow external digital set values	Set values for U / I / P given by external digital peripheral equipment through RS-232 or IEEE - ports	Digital values for RS-232: U: 4000 -> $U_{Dcmax(1Q)}$ I: 4000 -> $I_{DCmax\ (1Q)}$ P: 4000 -> $P_{DCmax\ (1Q)}$ Baud rate RS232: 9.6kBd; Refresh-cycle 5ms			
7	Follow an internal programmed TFE - function	A TopCon **TFE** arbitrary time-domain function has been called out from memory and controls the process (**T**opCon **F**unction **E**ngine)	• Sine / triangle / square functions, programmable via TopControl and HMI (selectable: amplitude, offset, symmetry, frequency, #repeat cycles) • Arbitrary time-domain functions with 1000 points and selectable time-base; programmable and editable via TopControl service software, residently stored in TopCon flash-memory			
8	AAP functionality mode	AAP-> **A**pplication **A**rea **P**rogramming Internally stored application curve, which expresses the reliance of system output versus any other electrical quantity (U, I, P)	• The system output (U, I, P) is an arbitrary function of the 2 remaining quantities out of U, I, P --> storage of a real device characteristic • Programmable low-pass filtering of input variables to increase stability • 64 freely programmable coordinate points per characteristic, linear interpolation in between. • Programmable and editable via TopControl service software, residently stored in TopCon flash-memory			

ReGen: **Regen**erative operation X: insignificant as long as no controller limit is reached

Technical Data

AC line input	Data
Line voltage and frequency	3 x 400VAC +10% / -10% 48Hz..62Hz
Mains connection type	3L + N + PE
DC output 1st quadrant	
Mains filter	Integrated in each power supply unit
Set value regulation	Set value step 10-90%: typ. 1-3ms[1)]
Load regulation	Load step 10-90%: typ. 1-3ms[1)]
Static accuracy DC current	< 0.5% FS
DC output 4th quadrant	
Set value regulation	Set value step 10-90%: typ 3-5ms[1)]
Static accuracy DC current	< 1.0% FS
Static accuracy voltage	< 0.1% FS
Quadrant cross over	
Load step with quadrant cross over	typ 15ms[1)]
Programming	
User interface (see also TopCon operating manual)	Front panel control unit HMI (Human Maschine Interface), built into the TopCon master unit for programming of both quadrants: • Start / stop • Set value setting • Selection of predefined set value patterns as a function of time (function generator) • Selection of predefined voltage / current curves as a function of parametric value table (function generator) • Setting of important parameters
Alternative interface	RS232
Parameterisation	With PC software TopControl through RS232 (see also TopControl operating manual)
Operating modes	See chapter operating modes
Standards	
Interference immunity	EN61000-4-2; EN6100-4-4
Interference emission	EN55011 class A, group 1
Approbation devices	CE
Ambient conditions	
Max. ambient temperature	40°C, above 30°C derating according datasheets
Min. temperature	0°C
Storage temperature range	-10°..60°C
Relative air humidity	<95% non-condensing
Cooling	Forced air cooling with device internal fans Additional cabinet fan (mains feedback unit)
Positioning directives	
Distance to nearest wall or big surface element in front of cabinet	min 850mm [2)]
Distance to nearest wall or big surface element behind cabinet	min 850mm [3)]
Air pollution degree	Pollution degree 1; none or only minor, dry, not conducting pollution

All technical data are subject to change.

1) Within tolerance band of +/- 5% , ohmic load
2) For accessibility of cabinet doors and inlet of cooling air
3) For accessibility of cabinet doors and outlet of cooling air. Care must be taken in order to avoid an „air short circuit“ (direct intake of output air).