

Operation on 1 kV / 16,7 Hz UIC-level

Frontend-unit on UIC-high voltage bus with series connected functional units such as 3ph-inverters, single/double phase inverters or battery chargers

Last year SYKO finished the engineering work for the system concept of a power unit for 1000V-16,7 Hz UIC-high voltage bus or for 1200V DC traction line with series connected functional units such as three phase inverters with f/U-control single or double phase inverters or battery chargers with isolation. Now ready for series production and shipped for customer integration is the following series: **DRR 1000.400/440-70/50**.

The FE 1000 AC.700 front end unit works with active power factor correction (SYKO-Patent) on UIC-high voltage 700 - 1350 V AC / 16,7 Hz including turn-off point at 2300 Vs / 650 V AC as well as hysteresis with turn-on point 690 V AC respectively 1900 Vs. Monitored are turn-on point, turn-off point, over voltage, and over load. Disturbances acc. EN50121-3-2 are covered with a pre-filter and can deal with transients of 12kV / 1ms and 2450V / 20ms (prove by calculation). For test voltage of 4,6kV AC the power stage works with air and creepage distances of 40/20/5 mm. An Input sided fuse works as emergency protection.

The power topology is realised with pre-filter as well as power cascaded and four-times voltage cascaded Regenerator-topology (SYKO-Patent) with series connected current and voltage resonant push-pull step as electronic transformer. The output is increase isolated 700V and output power of 7 KW. The dynamic short circuit current is limited at 15A. The clock frequency is approx. 60 - 100 kHz and the efficiency at about >90 %. This front end power unit FE 1000 works in an ambient temperature range -40°C/+60°C and the derating of 2%/°C starts at >60°C. To improve the MTBF values temperature controlled and functionally monitored fans are used.

The converter is equipped with turn-on monitoring and changes into sleep mode after three non-successfull turn-on trials. The power activating is realised with integral current run-up and start delayed about approx. 40s after connecting high voltage input level. Over the input voltage the power factor of >0,89 is reached.

The pre-regulated output voltage is stable with $\Sigma f(U_{in}+I_{out}+T_a)$ of $\pm 5\%$ and the dynamical U_{out} offset is $\pm 15V$ at load steps of 0,4 - 0,9 Pmax. The status LED signals power-good and a second LED signals fan error as well as output voltage failure. Data sheets and manual hand books are available on request.

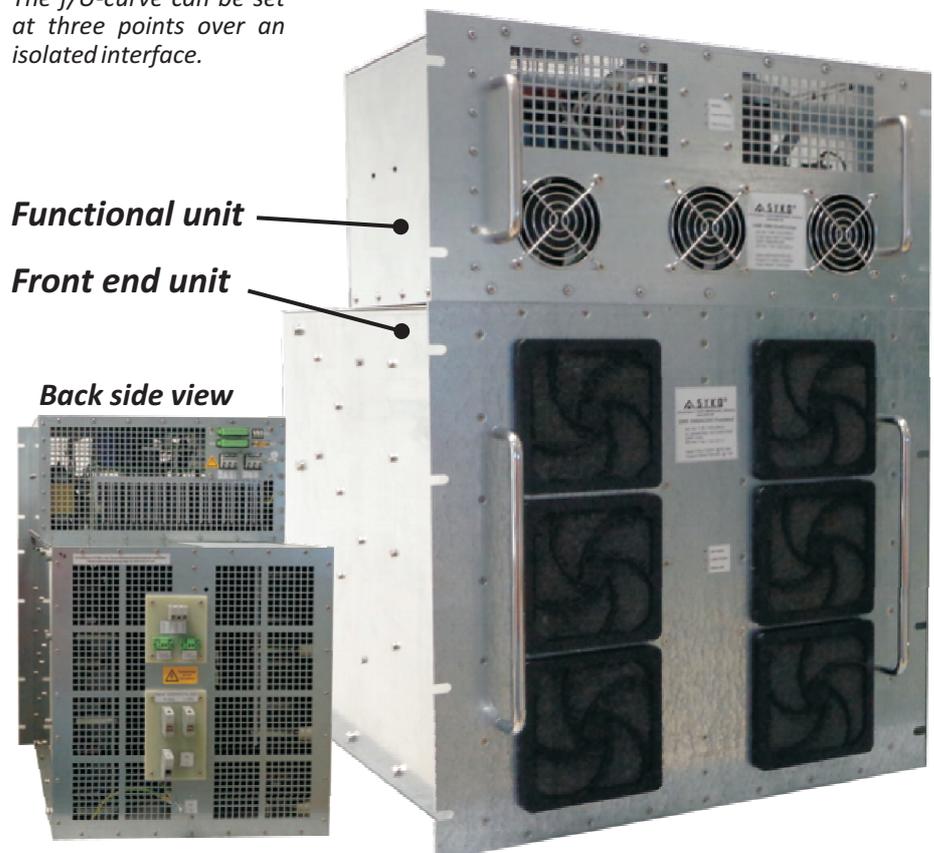
Output functional unit: In the here shown unit the output functional unit is a three phase inverter with f/U-control and 230 V/50 Hz output level. The 230V output is turned-on when the three phase fan-supplz output is ramping up and reaches about 45Hz. .

Functional input and output interfaces are communication isolated to the customer side. Based on the internally generated 5V with 0-5V over potentiometer or test resistors the f/U-curve can be set.

The f/U-curve can be set at three points over an isolated interface.

Currently we work on the extension for torque control. The three phase output can be de-activated with a floating inhibit input. Over an additional double phase transformer galvanically isolated 230V / 46-50 Hz at 2,5 kVA are generated.

Further functional power units: the 700V output can supply the intelligent battery charger HBL.M, which generates 6kW. Alternatively together with the three phase inverter the lower power 2kW BLG.M battery charger can be supplied. Further more it is possible to generate independent single phase networks of 230V if the intermediate level is adjusted to 370 V DC. This illustrates SYKO's competence range for the power segment of >5 KW. SYKO offers functional solutions. Usually the standard layouts can be modified as customised solutions.



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