DC Power Source System
for
Hydrogen Eectrolizer

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Preface

AFE(active front end) IGBT Power Source for electrolizer provides a satisfactory solution for the shortcomings of conventional SCR power source as listed below:

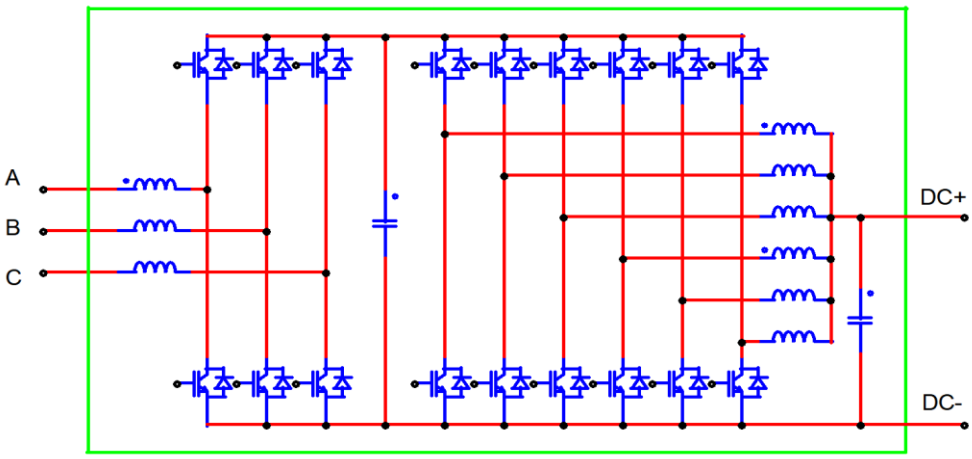
- low PF (0.65 for reference) inherent with the nature of SCR
- high THDi (35% for reference) inherent with nature of SCR
- low efficiency (65~75% for reference) due to heat loss

Features of AFE IGBT Power Source

1. High efficiency: ≥98% (at full load)
2. High power supply actor (PF) ≥0.99 (at full load)
3. Low THDi (total harmonic distortion): ≤ 5% (at full load)
4. Free from flicker with technology of constant current control
5. Stability and Reliability attributed to modular redundancy design with faulty module to be bypassed
6. Dual control mode to enable remote and local monitoring & operation
7. Saving capital investment by avoidance of power factor correction equipment as well as avoidance of harmonic filter equipment
8. Saving energy by lower power consumption attributed to high efficiency of ≥98%

1MW DC Power Source Module

1MW AFE IGBT Power Module



Technical parameter

Item	Parameter
Equipment Model	ZQDM-1M-600V-3334A
Rated power of a single module	1MW
Input electrical specifications	AC480V, 50Hz
Output voltage adjustment range	DC 0~648V continuously adjustable
Rated output current	1543A @ DC648V
Maximum output current	3334A @ DC300V
Voltage regulation accuracy	≤±0.5%
Steady flow accuracy	≤±0.5%
Output current ripple coefficient	≤1%
Module conversion efficiency	≥98 % (rated operating condition)
Module parallel current sharing accuracy	≤±2%
Protection function	Input overvoltage/undervoltage protection, output
Cooling method	[Air-cooled/water-cooled, customizable to suit the project site
Protection level	IP20 (cabinet installation)

10MW Power Source Cabinet

10MW modular AFE IGBT Power Source

1. Modular parallel power supply architecture

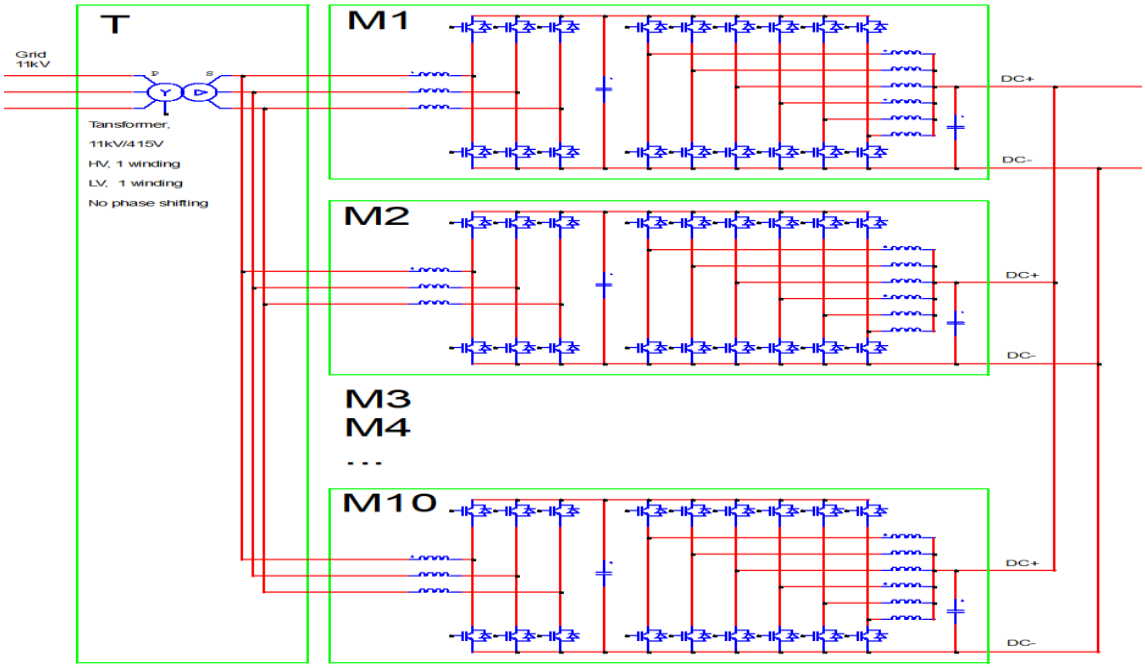
The entire unit uses 10 1MW rectifier modules connected in parallel, with each module having independent power supply and control, and online hot-swappable capability. In the event of a single module failure, it can quickly shut down, and the remaining modules can automatically share the load without affecting the overall power supply of the system, achieving N+1 redundancy operation, significantly improving system reliability, and facilitating daily maintenance and fault diagnosis, while reducing downtime losses.

2. Two-stage power conversion topology

The single module adopts a two-stage topology of "diode uncontrolled rectification + IGBT chopper step-down": the front stage rectifies AC480V to DC648V DC bus through a three-phase diode rectifier bridge, and the rear stage achieves wide-range step-down regulation through IGBT high-frequency chopper circuit, outputting a continuously adjustable DC voltage of DC0~648V, taking into account both wide voltage regulation range and high conversion efficiency, adapting to the power supply requirements of different operating conditions of electrolyzers, and ensuring the stability of hydrogen production process.

3. High-precision dual-mode control system

The system is equipped with a centralized monitoring unit and module local control units, supporting seamless switching between voltage and current stabilization modes. It can automatically adjust output parameters according to the hydrogen production system process instructions, has a fast response capability, no overshoot and no oscillation, ensures stable operation of the electrolyzer, and adapts to the dynamic adjustment requirements of the hydrogen production process.



Technical parameter

Item	Parameter
Equipment Model	ZQDC-10M-600V-33340A
Total rated power of the whole machine	10MW
Power grid input specifications	3 phase, 3 wire, AC 11kV, 50Hz
Rectifier unit configuration	10 ZQDM-1M-600V-3334A rectifier modules, with their outputs
Rated output voltage	DC 600V
Output voltage adjustment range	DC 0~648V continuously adjustable
Rated total output current	33340A
Grid-side current THDi	≤3% (rated operating condition)
Overall efficiency	≥96.5 % (rated operating condition)
Control Mode	Automatic switching between voltage regulation and current
Communication interface	RS485/Ethernet, supports Modbus-RTU/Modbus-
Protection level	IP30 (Indoor Installation)
Operating ambient temperature	-10℃~+45℃

Standard Adopted & Working Environment

Standard Adopted

- IEC60947-1:2007
- IEC61439-1:2009
- CE marking
- IEC61000-6
- IEC61000-4
- IEC61000-3

Working Environment

- Ambient temperature: -10℃~50℃
- Temperature for storage: -40℃~65℃
- Relative humidity: up to 99%
- Altitude above sea: 1000 meters

Applications

- Industrial fuel
- Energy Storage and Power Generation
- Vehicle fuel
- Protective gas