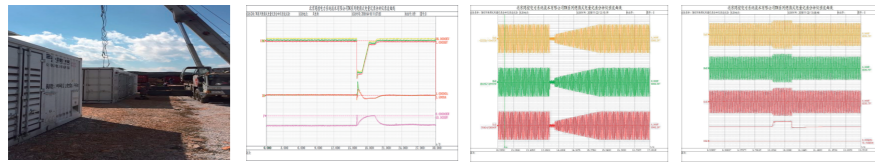


## 应用案例 Applications

### 35kV/4MVA新能源测试平台 35kV/4MVA New Energy Test Platform

2018年,智光电气研制的储能与新能源移动测试平台(35kV/4MVA)在西南地区某风电厂成功投运,并成功完成了对单台容量为2MW风机机组进行多项性能指标测试。平台输出频率精度高,操作灵活简单,功能完善。平台采用移动式结构设计,能够在高海拔、大湿度等户外环境下可靠运行。

In 2018, the Mobile Storage Platform for Energy Storage and New Energy (35kV / 4MVA) developed by Zhiguang was successfully put into operation in a wind power plant in the southwest region, and successfully achieved a number of performance indicators for a single 2MW wind turbine unit. The output frequency of the platform has high precision, flexible and simple operation, and perfect functions. The platform adopts a mobile structure design, which can operate reliably in outdoor environments such as high altitude and high humidity.



### 6/10/35kV/8MVA 储能测试平台 6/10/35kV/8MVA Energy Storage System Test Platform

2019年,智光电气研制的8MVA兼容6/10/35kV的储能测试平台在广东某电厂成功运行。该电厂新建2x4.5MW储能电站,用来承担调节电能质量和一次调频等多项工作,顺应储能电站并网要求,依据相关国标需对储能电站进行入网前并网实验。

通过8MVA的储能测试平台分别对A、B两段母线上的4.5MW储能进行了电能质量适应性检测、电网适应性检测、低电压穿越检测、高电压穿越检测和一次调频逻辑与死区检测等多个检测项目。整个测试过程,测试平台运行稳定,很好地完成了各项测试工作任务,确定储能系统是否满足并网条件及一次调频逻辑的正确性,确保并网安全。

In 2019, the 8MVA compatible 6/10/35kV energy storage system test platform developed by Zhiguang was successfully operated in a power plant in Guangdong. The newly built 2x4.5MW energy storage power plant of the power plant is used to undertake various tasks such as adjusting power quality and primary frequency modulation, etc., to comply with the grid connection requirements of the energy storage power plant, and to conduct the grid connection experiment of the energy storage power plant according to the relevant national standard.

Through the 8MVA energy storage test platform, multiple tests were carried out on the 4.5MW energy storage system on the A and B bus-bars, including power quality adaptability detection, power grid adaptability detection, low voltage ride-through detection, high voltage ride-through detection, primary frequency modulation logic and dead zone detection, etc. Throughout the testing process, the test platform operated stably, completed all test tasks well, and determined whether the energy storage system met the grid connection conditions and the correctness of the primary frequency modulation logic to ensure grid connection safety.



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储能与新能源装备移动测试平台  
Mobile Test Platform for Energy Storage  
System and New Energy Apparatus

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Guangzhou Zhiguang Energy Storage Technology Co., Ltd.



## 介绍 Introduction

移动式储能和新能源测试平台以四象限变流器为核心,具有高低电压穿越能力测试、电网适应性测试和一次调频测试等功能,主要应用于风机发电机组、光伏电站和电化学储能系统等并网性能测试。

移动式储能和新能源测试平台采用了多级H桥级联拓扑结构,输出电压的幅值和频率精度高、谐波含量低,平台采用了特殊的防雨结构设计,不受雨雪天气影响可全天候运行。操作台预留了电压电流采集接口,可将试验录波仪与自动生成试验报告分析软件集成一体方便测试,同时系统采用一体化集装箱式设计,具有很好的车载可移动性能。

The mobile energy storage and new energy test platform is based on a four-quadrant converter and has functions such as high and low voltage ride-through capability test, power grid adaptability test and primary frequency modulation test, mainly used in grid-connected performance testing of wind turbine generator set, photovoltaic power station and electrochemical energy storage system.

The mobile energy storage and new energy test platform uses a multi-level H-bridge cascade topology, with high amplitude and frequency accuracy and low harmonic of the output voltage. The platform adopts a special rainproof structure, which can operate 24 hours regardless of the weather. The operation platform reserves a voltage and current acquisition interface, which can integrate the test recorder and the automatically generated test report analysis software to facilitate the test. At the same time, the system adopts an integrated container design, which has good vehicle-movable performance.

## 测试功能 Test Function

- ✓ 电压偏差适应性  
Voltage deviation adaptability
- ✓ 频率偏差适应性  
Frequency deviation adaptability
- ✓ 三相电压不平衡适应性  
Three-phase voltage unbalance adaptability
- ✓ 电压波动及闪变适应性  
Voltage fluctuation and flicker adaptability
- ✓ 谐波电压适应性  
Harmonic voltage adaptability
- ✓ 高电压穿越能力  
High voltage ride through capability
- ✓ 三相对称低电压穿越能力  
Three-phase symmetrical low voltage ride through capability
- ✓ 两相低电压穿越能力  
Two-phase low voltage ride through capability
- ✓ 单相低电压穿越能力  
Single-phase low voltage ride through capability
- ✓ 系统旁路运行  
System bypass operation
- ✓ 一次调频试验  
Primary Frequency Modulation Test

## 产品性能指标 Product Performance Index

序号 NO.	参数名称 Parameter	规格 Specification
<b>系统参数 System Parameters</b>		
1	额定电压 Rated Voltage	400V、690V、6kV、10kV、35kV, 偏差 Deviation <0.2%
2	输出频率 Output Frequency	50Hz, 偏差 Deviation <0.005Hz
3	三相电压不平衡 Three-phase Voltage Unbalance	不平衡度 Imbalance $\leq 0.05\%$ 相位偏差 Phase Deviation $\leq 1.2$
4	输出电压谐波 Output Voltage Harmonics	总谐波畸变率 $\leq 1.5\%$ , 奇次谐波电压畸变率 $<1\%$ , 偶次谐波电压畸变率 $<0.2\%$ Total voltage harmonic distortion rate $\leq 1.5\%$ , odd-order $<1\%$ , even-order $<0.2\%$
5	频率调节能力 Frequency Adjustment Capability	20ms 内进行 $\pm 0.1\%$ 额定频率 $f_N$ 的调节能力 Adjustability of $\pm 0.1\% f_N$ within 20ms
6	电压调节能力 Voltage Regulation Capability	20ms 内进行 $\pm 1\%$ 额定电压 $U_N$ 的调节能力 Adjustability of $\pm 0.1\% U_N$ within 20ms
<b>功能参数 Function Parameter</b>		
7	电压偏差适应性 Voltage Deviation Adaptability	0.8p.u. < UT < 1.2p.u.
8	频率偏差适应性 Frequency Deviation Adaptability	40 ~ 70Hz
9	三相电压不平衡度 Three-phase Voltage Unbalance	0 ~ 30%
10	电压波动及闪变 Voltage Fluctuation and Flicker	幅值 Amplitude: -30%~30% 频率 Frequency: 0.5~25Hz
11	谐波电压适应性 Harmonic Voltage Adaptability	2-25 次谐波, 谐波电压百分比可达到 10% 2-25th harmonic, harmonic voltage percentage can reach 10%.
12	高电压穿越 High-voltage Ride Through	三相对称电压幅值 110%~130% Three-phase symmetrical voltage amplitude 110%~130%
13	三相对称低电压穿越 Three-phase Symmetrical Low-voltage Ride Through	三相电压跌落幅值 0%~90% Three-phase voltage drop amplitude 0%~90%
14	两相低电压穿越 Two-phase Low-voltage Ride Through	两相电压跌落幅值 0%~90% Two-phase voltage drop amplitude 0%~90%
15	单相低电压穿越 Single-phase low-voltage Ride Through	单相电压跌落幅值 0%~90% Single-phase voltage drop amplitude 0%~90%
16	一次调频逻辑测试 Primary Frequency Modulation Logic Test	多频率点连续测试, 含: 一次调频特性测试、一次调频死区测试、一次调频 AGC 闭锁逻辑测试。 Continuous testing of multiple frequency points, including: primary frequency modulation characteristic test, primary frequency modulation dead zone test, and primary frequency modulation AGC interlocking logic test.