Power Supply at the Nasmyth-2 Focus of the 6-m Telescope

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Abstract. Observations Support Laboratory (OSL) pay attention in development and production new 1m telescope BTA and 1-m telescope Zeiss-1000. In this work we describe a first part of providing power from solar panels to 6-m telescope BTA: at the Nasmyth-2 focus.

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1 Introduction

Uninterruptible power supplies (UPS) type UPS-1000 used at the primary and the Nasmyth-2 foci (PF and N2). They provided voltage ripple smoothing and, when emergency blackout, working condition of observational equipment in focus BTA for 10 - 15 minutes. However, this is not enough for longer periods of time break, so the task of providing uninterrupted power at the foci, both at night and during the day, is relevant now. A new system of uninterruptible power supply, based on UPStel-R 1500/48, what providing stable power for equipment at the N2, was created.

2 Description of Principle Operation

In standby mode, UPStel-R feeds the load from a single phase AC power supply via a bypass circuit, providing filtration and suppression of mains voltage emissions. In offline mode, when mains voltage disconnected or have unacceptable deviations parameters, UPStel-R switches the load to power from an inverter, that uses standby battery, that charging from solar panels located on the upper scientific platform of the BTA. See user manual for a brief description technical characteristics of the UPStel-R 1500/48[1].

[1] User manual – https://www.atsconvers.ru/media/dir/pdf/upstelr_ruk.pdf

Power Agent (PA) software[2] controlled the UPS by monitoring and configuring power and operation parameters. The PA also supports remote connection to UPS. The main working panel PA displays the input mains voltage 220 V, battery life approx 50 V (amperage charge both from the mains voltage 220V and solar panels), amperage from customers (equipment of the Main Stellar Spectrograph (MSS[3]) at the N2), power consumption approx 200 W. Green Line "standby mode" means, that power supply from the mains 220 V, switching to "Offline mode" means, that the power from the mains is stopped and the UPS gives energy to the connected consumers from the battery charge, what are connected with solar panels.

3 Results of Testing

Tests of UPS loads were carried out with connecting consumers (MSS equipment and 0.5 kW lamp) at 17.12.2019 for 1 hour; block of incandescent lamps with power of 750 W at 23.12.2019 for 4 hours. Testing results are shown in table 1. Approximate maximum power consumption at the N2 is 0.2-0.5 kW, at the PF – 0.5-0.6 kW. As a result, when the external power from mains is turned

Table 1. Testing results at the N2 focus for MSS.

Date	Start / End testing			Lost voltage, V
	Battery voltage, V	Output amperage, A	Power, kW	
17.12.2019	47.4 / 47.0	3.6 / 3.6	0.80 / 0.8	0.4 (1 hour)
23.12.2019	47.6 / 39.2	3.3 / 3.4	0.75 / 0.75	8.4 (4 hours)

off, it will continue provide power to the connected equipment for 4-6 hours. This is ensures uninterrupted operation for observational equipment at the N2, before switching on power supply source (diesel generator, etc.). Thus, in the near future, it is planned to connect this system of power supply at the PF and another equipment at N2.

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[2] Short description Power Agent 1.9.1 – https://www.atsconvers.ru/catalog/product/133/

[3] Main Stellar Spectrograph – https://www.sao.ru/hq/lizm/mss/en/index.html