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| **AGREED WITH:** Management Board Chairman,Kumtor Gold Company CJSC  B. Subanov \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, 2025 | **APPROVED BY:** Security Director, Kumtor Gold Company CJSC M. Dushebekov \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, 2025 |

**TERMS OF REFERENCE**

**for the purchase of power supply system components for the mine's perimeter security alarm systembased on solar power plant**

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| **Item****№** | **Name** | **Contents** |
|  | Client | Kumtor Gold Company CJSC24 Ibraimov str., Bishkek720031, Kyrgyz RepublicMain activity:* Commercial Gold Mining

Jeti Oguz district, Issyk Kul region |
|  | Name of service rendered | Supply of solar power plant system components to power the mine's perimeter security alarm system. |
|  | Purpose of service rendered | Provide uninterrupted and round-the-clock power supply to the perimeter security system in conditions of low ambient temperature and lack of wired power supply. |
|  | Name and volume of Goods to be supplied: | Components:1. Intelligent solar charge controller - 70 pcs.
2. Lithium-titanate battery (Li4Ti5O12) - 70 pcs.
3. USB interface cable for solar charge controller configuration - 2 pcs.
4. Expander for solar charge controller for connecting peripheral communication devices - 2 pcs.
5. Wi-Fi adapter for connecting to expander - 2 pcs.
6. BLE adapter for connecting to expander - 2 pcs.
7. Logger for collecting and capturing technical parameters and operation readings of solar power plants - 2 pcs.
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|  | General Characteristics: | The listed equipment shall be fully compatible with each other. |
|  | Charge controller | Solar controller with MPPT (Maximum Power Point Tracking) charging method. Availability of RS-485 interface with MODBUS communication protocol for connecting communication adapters for monitoring and control via mobile application and PC.**Main Functions:*** MPPT (Maximum Power Point Tracking) charging.
* Support for lead-acid and lithium-ion batteries.
* Lithium battery self-activation function.
* Multiple load control mode.
* Broad spectrum electronic protection.
* Configuration via PC and mobile app.
* Free software for PCs and mobile devices.
* Loading preset parameters via software.
* RS-485” communication, IoT monitoring support via software.
* IP68 protection.

**Parameters and Specifications:*** Rated system voltage: 12/24VDC (Auto).
* Input voltage of solar batteries: 8.5～32VDC.
* Charge/discharge current: 10A.
* Charging power: 130W at 12V/260W at 24 V.
* Maximum PV open circuit voltage: 60V at minimum ambient temperature, 46V at 25℃ ambient temperature.
* Type of batteries supported:
* Acid lead (closed, open)/gel/with custom settings.
* Lithium: LiFePO4 / Li-NiCoMn / with custom settings.
* For lead batteries:
* Equalizing charge voltage: for sealed batteries :14.6V, for gel batteries not required, for open type: 14.8V, user settings: 9-17V (×2/24V).
* Boost mode charge: for sealed batteries: 14.4V, for gel batteries: 14.2V, for open type: 14.8V, user settings: 9-17V (×2/24V).
* Idle charge: for sealed, gel and open type batteries: 13.8V, user settings: 9-17V (×2/24V).
* Low voltage shutdown: for sealed, gel and open type batteries: 12.6V, user setting: 9-17V (×2/24V).
* Battery reconnection voltage: for sealed, gel and open type batteries: 12.6V, user settings: 9-17V (×2/24V).
* For lithium batteries:
* Boost mode charge: LiFePO4: 14.5V, for Li-NiCoMn: 12.5V, user settings: 9-17V (×2/24V).
* Low voltage shutdown: LiFePO4: 12.8V, for Li-NiCoMn: 10.5V, user settings: 9-17V (×2/24V).
* Battery reconnection voltage: LiFePO4: 11.1V, for Li-NiCoMn: 9.5V, user settings: 9-17V (×2/24V).
* Temperature compensation: for lead battery -3mV/℃/2V, for lithium not required.
* Recharge cycle: at least 20,000.
* Communication interface: RS-485.
* Operating temperature: -40℃～+60℃.
* Enclosure: IP68.
* Connection: availability of all cables, connectors and plugs for connection.
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|  | Lithium titanate battery | **LTO Battery Parameters:**Cell charge controller configuration: 6S1P.Cell parameters: 2.5V, 20Ah.Charge voltage: 16.5V (2.75V for cell).Discharge shutdown: 9V (1.5V for cell).Rated voltage: 13.8V (2.3V cell).Minimum capacity: 20A, discharge 0.33C.Rated capacity: 20A, discharge 0.33C.Rated power: 276Wh, discharge 0.5C.Maximum charge current: 20A.Maximum discharge current: 20A.Operating temperature: when charging - -43°C to +65°C, when discharging - -43°C to +70°C.Connection: shall be available for connection to the main charge controller.Dimensions: max. 225x90x155 mm. |
|  | USB interface cable for customizing solar charge controller | Interface: USB-RS-485.USB standard: Type A.Cable length: at least 1.5 m.Connection: to PC. |
|  | Expander for solar charge controller for connecting peripheral communication devices | Interface: RS-485.Operating temperature: -20℃~ 85℃.Connectivity: support of BLE and Wi-Fi adapters to connect to charge controller via mobile device. |
|  | Wi-Fi adapter for connecting to extender | Operating frequency: 2.4 ~ 2.4835 GHz.Compatibility: Plug-and-Play.Operating temperature: -20℃~ 45℃.Power supply: no additional power required.Radio communication range: at least 5 meters. |
|  | BLE adapter for connecting to expander | Bluetooth standard: at least 5.0.Compatibility: Plug-and-Play.Operating temperature: -20℃~ 45℃.Power supply: no additional power required.Radio communication range: at least 5 meters. |
|  | Logger for collecting and capturing technical parameters and operation readings of solar power plants | Device for monitoring and recording operating data of solar power plant.Interface: RS-485.Connection: to PC via USB.Data processing: via free PC software.Operating temperature: -20℃~ 85℃.Recording interval: 10 minutes.Number of records: up to 20,000.Power supply: no additional power required. |