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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 CJSC  24 Ibraimov str., Bishkek  720031, Kyrgyz Republic  Main 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. |
|  | 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. |
|  | 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. |