Modbus TCP Protocol for BlueArk X5

Version:1.0

2026/01/27

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1 Overview

1.1 Introduction

This chapter describes the command control and data exchange specification between the EMS and the host computer based on the Modbus protocol. The protocol mainly implements the following functions:

1. Data Read Function: The host computer obtains system-related data by sending read commands.
2. Parameter Setting and Control Function: The host computer configures system parameters and controls device actions by sending write commands.

2 Communication Protocol

2.1 Protocol Interface

2.2 Modbus TCP

Slave Address	Slave Station: 1
IP	Default 192.168.254.5
Port	502

2.3 Data Format Definition

This protocol adopts the standard Modbus TCP protocol.

2.3.1 Data Type

Data is transmitted in big-endian format, with the high byte first and the low byte last.

- UInt16: Unsigned 16-bit integer data.
- Int16: Signed 16-bit integer data.
- UInt32: Unsigned 32-bit integer data.
- Int32: Signed 32-bit integer data.
- UInt64: Unsigned 64-bit integer data.

For example: UInt16 data 0x0102, transmission order is 01, 02.
For example: UInt32 data 0x01020304, transmission order is 01, 02, 03, 04.

For example: UInt64 data 0x0102030405060708, transmission order is 01, 02, 03, 04, 05, 06, 07, 08.

2.3.2 Value Description

Parameters with decimal precision are multiplied to become integers before transmission. For example: 66.34kw, transmit 6634. Negative numbers are transmitted as two's complement. For example: 0xFFFF represents –1.

2.3.3 Check Type

CRC16 check, with the low byte first and the high byte last.

2.3.4 Function Code

This protocol supports the following function codes:

Function Code	Meaning	Register Type
0x03	Read Registers	Holding
0x10	Write Multiple Registers	Holding

3 Register Address

Address	Description	Note	R/W	Size	Precision	Unit	Format
0	EMS SN		R	10	1	s	ASCII
10	Version Number		R	10	1		ASCII
1004	Average SOH		R	1	0.1	%	UInt16
1005	Average SOC		R	1	0.1	%	UInt16
1006	Battery Total Power		R	2	0.001	kW	Int32
1008	Battery Discharge Power		R	2	0.001	kW	Int32
1010	Battery Charge Power		R	2	0.001	kW	Int32
1012	System Maximum Dischargeable Power		R	2	0.001	kW	UInt32
1014	System Maximum Chargeable Power		R	2	0.001	kW	UInt32
1016	System Active Power		R	2	0.001	kW	Int32
1018	PV Total Output Power		R	2	0.001	kW	Int32
1020	INV Rated Power		R	2	0.001	kW	UInt32

1022	INV Operating Status	0: Standby 1: Grid-tied 2: Off-grid 3: Fault 4: Programmin g	R	1	1		UInt16
1023	EMS Operating Status	0: Self Mode 1: Remote Control Mode	R	1	1		UInt16
1024	Battery Max Charge Power Limit	0~100	R	1	0.01	%	UInt16
1025	Battery Max Discharge Power Limit	0~100	R	1	0.01	%	UInt16
1026	Inverter AC Power Percentage	0~100	R	1	0.01	%	Int16
1027	Inverter Max Output Power Limit	0~100	R	1	0.01	%	UInt16
1028	Inverter Max Input Power Limit	0~100	R	1	0.01	%	UInt16
1029	EMS Current Policy Status	0: Stop 1: Load-Priority 2: Battery Priority 3: Grid Priority 4: PV Only 7: Peak & Valley - Charging 8: Peak & Valley - Discharging 9: TOU – Load Priority 10: TOU - Battery Priority 11: TOU - Grid Priority"	R	1	1		UInt16

1030	Generator Output Power		R	2	0.001	kW	Int32
1500	Meter Frequency		R	2	1	HZ	UInt32
1502	Meter Active Power		R	2	0.001	kW	Int32
1506	Meter R-phase Active Power		R	2	0.001	kW	Int32
1508	Meter S-phase Active Power		R	2	0.001	kW	Int32
1510	Meter T-phase Active Power		R	2	0.001	kW	Int32
1512	Meter R-phase Voltage		R	1	1	V	Int16
1513	Meter S-phase Voltage		R	1	1	V	Int16
1514	Meter T-phase Voltage		R	1	1	V	Int16
1515	Meter R-phase Current		R	1	1	A	Int16
1516	Meter S-phase Current		R	1	1	A	Int16
1517	Meter T-phase Current		R	1	1	A	Int16
1518	Total Load Active Power		R	2	0.001	kW	Int32
3000	Inverter ON/OFF	0:OFF 1:ON	R/W	1	1		UInt16
3001	EMS Heartbeat Interval		R/W	1	1	s	UInt16
10000	Battery Total Discharge Energy		R	2	0.001	kWh	UInt32
10002	Battery Daily Discharge Energy		R	2	0.001	kWh	UInt32
10004	Battery Total Charge Energy		R	2	0.001	kWh	UInt32
10006	Battery Daily Charge Energy		R	2	0.001	kWh	UInt32
10008	PV Total Generation		R	2	0.001	kWh	UInt32
10010	PV Daily Generation		R	2	0.001	kWh	UInt32
10012	Grid Total Purchased Energy		R	4	0.001	kWh	UInt64
10016	Grid Daily Purchased Energy		R	2	0.001	kWh	UInt32
10018	Grid Total Sold Energy		R	4	0.001	kWh	UInt64
10022	Grid Daily Sold Energy		R	2	0.001	kWh	UInt32
10024	Load Total Consumption		R	4	0.001	kWh	UInt64
10028	Load Daily Consumption		R	2	0.001	kWh	UInt32
10034	Generator Total Consumption		R	4	0.001	kWh	UInt64
10038	Generator Daily Consumption		R	2	0.001	kWh	UInt32

3002	Grid-tied Stop Discharge SOC	0~100	R/W	1	0.1	%	UInt16
3003	Off-grid Stop Discharge SOC	0~100	R/W	1	0.1	%	UInt16
3004	Grid-tied Stop Charge SOC	0~100	R/W	1	0.1	%	UInt16
3005	Set Battery Max Charge Power Limit	0~110	R/W	1	0.01	%	UInt16
3006	Set Battery Max Discharge Power Limit	0~110	R/W	1	0.01	%	UInt16
3007	Set Inverter AC Power Percentage	-110~110	R/W	1	0.01	%	Int16
3008	Set Inverter Max Output Power Limit	0~110	R/W	1	0.01	%	UInt16
3009	Set Inverter Max Input Power Limit	0~110	R/W	1	0.01	%	UInt16
6000	Anti-Reverse Enable	0: Disable 1: Enable	R/W	1	1		UInt16
6001	Anti-Reverse Limit Percentage	0~100	R/W	1	0.1	%	UInt16
6002	EMS Policy Mode Setting	1:Load Priority 2: Battery Priority 3: Grid Priority 4: PV Only 5: Peak & Valley 6: TOU"	R/W	1	1		UInt16
6010	Peak & Valley Time Period 1 Enable	0: Disable 1: Enable	R/W	1	1		UInt16
6011	Peak & Valley Time Period 1 - Start Time	The day's hour, minute, second converted to seconds. e.g., 8:00:00 -> 8 * 3600 = 28800	R/W	2	1		UInt32
6013	Peak & Valley Time Period 1 - End Time	The day's hour, minute,	R/W	2	1		UInt32

		second converted to seconds. e.g., 8:00:00 -> 8 * 3600 = 28800					
6015	Peak & Valley Time Period 1 - SOC Upper Limit	0~100	R/W	1	1	%	UInt16
6016	Peak & Valley Time Period 1 - SOC Lower Limit	0~100,< SOC Upper Limit	R/W	1	1	%	UInt16
6017	Peak & Valley Time Period 1 - Power Limit	0~100	R/W	1	1	%	UInt16
6018	Peak & Valley Time Period 1 - Operating Mode	0: Charging 1: Discharging	R/W	1	1		UInt16
6020	Peak & Valley Time Period 2 Enable	0: Disable 1: Enable	R/W	1	1		UInt16
6021	Peak & Valley Time Period 2 - Start Time	Same description as Peak & Valley Time Period 1	R/W	2	1		UInt32
6023	Peak & Valley Time Period 2 - End Time	Same description as Peak & Valley Time Period 1	R/W	2	1		UInt32
6025	Peak & Valley Time Period 2 - SOC Upper Limit	Same description as Peak & Valley Time Period 1	R/W	1	1	%	UInt16
6026	Peak & Valley Time Period 2 - SOC Lower Limit	Same description as Peak & Valley Time Period 1	R/W	1	1	%	UInt16
6027	Peak & Valley Time Period 2 - Power Limit	Same description as Peak & Valley Time Period 1	R/W	1	1	%	UInt16

6028	Peak & Valley Time Period 2 - Operating Mode	Same description as Peak & Valley Time Period 1	R/W	1	1		UInt16
	...						
6100	Peak & Valley Time Period 10 Enable	0: Disable 1: Enable	R/W	1	1		UInt16
6101	Peak & Valley Time Period 10 - Start Time	Same description as Peak & Valley Time Period 1	R/W	2	1		UInt32
6103	Peak & Valley Time Period 10 - End Time	Same description as Peak & Valley Time Period 1	R/W	2	1		UInt32
6105	Peak & Valley Time Period 10 - SOC Upper Limit	Same description as Peak & Valley Time Period 1	R/W	1	1	%	UInt16
6106	Peak & Valley Time Period 10 - SOC Lower Limit	Same description as Peak & Valley Time Period 1	R/W	1	1	%	UInt16
6107	Peak & Valley Time Period 10 - Power Limit	Same description as Peak & Valley Time Period 1	R/W	1	1	%	UInt16
6108	Peak & Valley Time Period 10 - Operating Mode	0: Charging 1: Discharging	R/W	1	1		UInt16
6200	TOU Mode Time Period 1 Enable	0: Disable 1: Enable	R/W	1	1		UInt16
6201	TOU Mode Time Period 1 - Start Time	The day's hour, minute, second converted to seconds.	R/W	2	1		UInt32

		e.g., 8:00:00 -> 8 * 3600 = 28800					
6203	TOU Mode Time Period 1 - End Time	The day's hour, minute, second converted to seconds. e.g., 8:00:00 -> 8 * 3600 = 28800	R/W	2	1		UInt32
6205	TOU Mode Time Period 1 - Operating Mode	0: Grid Priority 1: Battery Priority 2: Load Priority	R/W	1	1		UInt16
6206	TOU Mode Time Period 1 - AC Max Power Limit	0~100	R/W	1	1	%	UInt16
6207	TOU Mode Time Period 1 - Grid-tied Discharge Stop SOC	0~100	R/W	1	1	%	UInt16
6208	TOU Mode Time Period 1 - Off-grid Discharge Stop SOC	0~100	R/W	1	1	%	UInt16
6209	TOU Mode Time Period 1 - Battery Charge Stop SOC	0~100	R/W	1	1	%	UInt16
	...						
6240	TOU Mode Time Period 5 Enable	0: Disable 1: Enable	R/W	1	1		UInt16
6241	TOU Mode Time Period 5 - Start Time	The day's hour, minute, second converted to seconds. e.g., 8:00:00 -> 8 * 3600 = 28800	R/W	1	1		UInt32
6243	TOU Mode Time Period 5 - End Time	The day's hour,	R/W	1	1		UInt32

		minute, second converted to seconds. e.g., 8:00:00 -> 8 * 3600 = 28800					
6245	TOU Mode Time Period 5 - Operating Mode	0: Grid Priority 1: Battery Priority 2: Load Priority	R/W	1	1		UInt16
6246	TOU Mode Time Period 5 - AC Max Power Limit	0~100	R/W	1	1	%	UInt16
6247	TOU Mode Time Period 5 - Grid-tied Discharge Stop SOC	0~100	R/W	1	1	%	UInt16
6248	TOU Mode Time Period 5 - Off-grid Discharge Stop SOC	0~100	R/W	1	1	%	UInt16
6249	TOU Mode Time Period 5 - Battery Charge Stop SOC	0~100	R/W	1	1	%	UInt16