HAT9420LT
ATS CONTROLLER
COMMUNICATION PROTOCOL
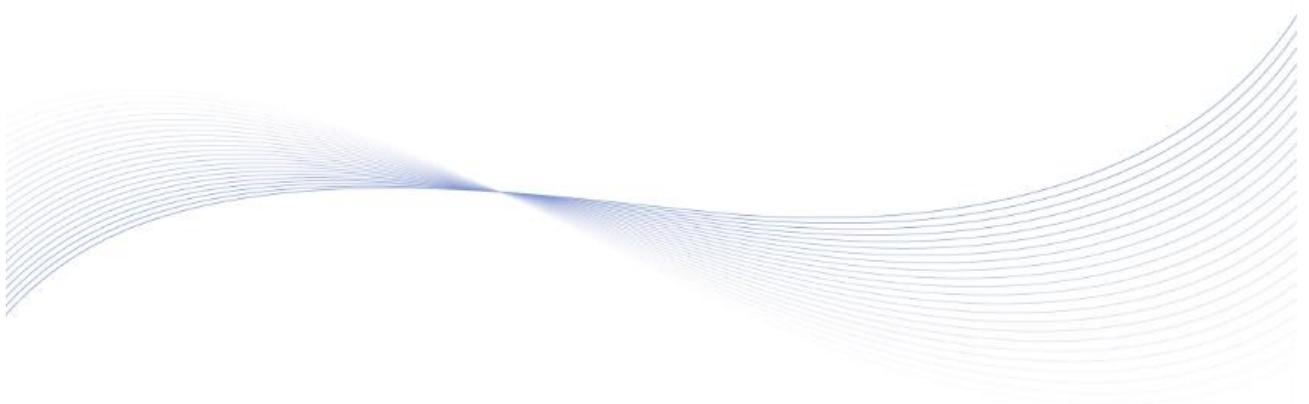
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Table 1 Software Version

Date	Version	Content
2024-06-19	V1.0	Original release.
2025-04-07	V2.0	1. Remove the USB import/export function. 2. Modify the logic and display to general dual power type.

CONTENTS

SmartGen

1 ADDRESS AND DATA OF CONTROLLER INTERNAL REGISTERS

In the table below, S1 refers to the first power supply, S2 refers to the second power supply, and the slash mark ("/") means the address is reserved.

1.1 FUNCTION CODE 03H MAPPING ALARM AND COIL STATUS OF DATA FIELD

Table 2 Alarm and Status Coil of Data Field

Modbus Address	PLC Address	Item	Description
500.0	40501.0	Common Alarm	"0" means there is no common alarm "1" means there are common alarms (500.0 means the Boolean value of bit 0 at address 500) The content listed below follows the same rule
500.1	40501.1	Common Warning	
500.2	40501.2	Common Fault Alarm	
500.3	40501.3	/	
500.4	40501.4	/	
500.5	40501.5	/	
500.6	40501.6	Audible Alarm	
500.7	40501.7	Reserved	
500.8	40501.8	Auto Mode	0: Manual Mode 1: Auto Mode
500.9	40501.9	Local Mode	
500.10	40501.10	S1 Master	S1 means the first power supply "1" means S1 works as the master power supply "0" means S1 works as the standby power supply
500.11	40501.11	S2 Master	S2 means the second power supply "1" means S2 works as the master power supply "0" means S2 works as the standby power supply
500.12	40501.12	/	
500.13	40501.13	/	
500.14	40501.14	/	
500.15	40501.15	Genset Start Output	"0" means genset start signal doesn't output "1" means genset start signal outputs
501.0	40502.0	S1 Voltage Normal	
501.1	40502.1	S1 Voltage Abnormal	
501.2	40502.2	S1 Transient Voltage Abnormal	

Modbus Address	PLC Address	Item	Description
501.3	40502.3	S1 Transient Voltage Normal	
501.4	40502.4	/	
501.5	40502.5	/	
501.6	40502.6	/	
501.7	40502.7	S1 Genset Start Output	
501.8	40502.8	S1 Voltage None	
501.9	40502.9	S1 Overvoltage	
501.10	40502.10	S1 Undervoltage	
501.11	40502.11	S1 Overfrequency	
501.12	40502.12	S1 Underfrequency	
501.13	40502.13	S1 Loss of Phase	
501.14	40502.14	S1 Reverse Phase Sequence	
501.15	40502.15	/	
502.0	40503.0	S2 Voltage Normal	
502.1	40503.1	S2 Voltage Abnormal	
502.2	40503.2	S2 Transient Voltage Abnormal	
502.3	40503.3	S2 Transient Voltage Normal	
502.4	40503.4	/	
502.5	40503.5	/	
502.6	40503.6	/	
502.7	40503.7	S2 Genset Start Output	
502.8	40503.8	S2 Voltage None	
502.9	40503.9	S2 Overvoltage	
502.10	40503.10	S2 Undervoltage	
502.11	40503.11	S2 Overfrequency	
502.12	40503.12	S2 Underfrequency	
502.13	40503.13	S2 Loss of Phase	
502.14	40503.14	S2 Reverse Phase Sequence	
502.15	40503.15	/	
503.0	40504.0	Switch Transfer Fault	
503.1	40504.1	S1 Fail to Close	
503.2	40504.2	S1 Fail to Open	
503.3	40504.3	/	
503.4	40504.4	S2 Fail to Close	
503.5	40504.5	S2 Fail to Open	
503.6	40504.6	/	
503.7	40504.7	/	
503.8	40504.8	S1 Overcurrent Trip	
503.9	40504.9	S2 Overcurrent Trip	
503.10	40504.10	Forced Open Fault	
503.11	40504.11	S1 Genset Fault	
503.12	40504.12	S2 Genset Fault	
503.13	40504.13	Switch Trip Fault	

Modbus Address	PLC Address	Item	Description
503.14	40504.14	Fail to Sync. Fault	
503.15	40504.15	S1/S2 Close Simultaneously Fault	
504.0	40505.0	S1 Overcurrent Warning	
504.1	40505.1	S2 Overcurrent Warning	
504.2	40505.2	Forced Open Warning	
504.3	40505.3	Battery Undervoltage Warning	
504.4	40505.4	Battery Overvoltage Warning	
504.5	40505.5	Fail to Sync. Warning	
504.6	40505.6	S1 Load Side No Power (Fault)	
504.7	40505.7	S2 Load Side No Power (Fault)	
504.8	40505.8	Switch Output Voltage Abnormal Fault	
504.9	40505.9	S1 Switch Trip Fault	
504.10	40505.10	S2 Switch Trip Fault	
504.11	40505.11	/	
504.12	40505.12	/	
504.13	40505.13	/	
504.14	40505.14	Busbar Voltage Abnormal	
504.15	40505.15	Switch Output Voltage Abnormal Warning	
505.0	40506.0	Aux. Input 1 Status	"0" means there is no signal input. "1" means there is signal input.
505.1	40506.1	Aux. Input 2 Status	Follow the same rule of "Aux. Input 1 Status"
505.2	40506.2	Aux. Input 3 Status	
505.3	40506.3	Aux. Input 4 Status	
505.4	40506.4	Aux. Input 5 Status	
505.5	40506.5	Aux. Input 6 Status	
505.6	40506.6	Aux. Input 7 Status	
505.7	40506.7	Aux. Input 8 Status	
505.8	40506.8	Aux. Input 9 Status	
505.9	40506.9	Aux. Input 10 Status	
505.10	40506.10	Aux. Input 11 Status	
505.11	40506.11	Aux. Input 12 Status	
505.12	40506.12	Aux. Input 13 Status	
505.13	40506.13	Aux. Input 14 Status	
505.14	40506.14	Aux. Input 15 Status	
505.15	40506.15	Aux. Input 16 Status	
506.0	40507.0	Aux. Output 1 Status	"1" means there is signal output. "0" means there is no signal output.
506.1	40507.1	Aux. Output 2 Status	Follow the same rule of "Aux. Output 1 Status"
506.2	40507.2	Aux. Output 3 Status	
506.3	40507.3	Aux. Output 4 Status	
506.4	40507.4	Aux. Output 5 Status	

Modbus Address	PLC Address	Item	Description
506.5	40507.5	Aux. Output 6 Status	
506.6	40507.6	Aux. Output 7 Status	
506.7	40507.7	/	
506.8	40507.8	/	
506.9	40507.9	/	
506.10	40507.10	/	
506.11	40507.11	/	
506.12	40507.12	/	
506.13	40507.13	/	
506.14	40507.14	/	
506.15	40507.15	/	
507.0	40508.0	S1 Close Control Output	
507.1	40508.1	S1 Open Control Output	
507.2	40508.2	S2 Close Control Output	
507.3	40508.3	S2 Open Control Output	
507.4	40508.4	S1 Switch Close Status	
507.5	40508.5	S2 Switch Close Status	
507.6	40508.6	/	
507.7	40508.7	/	
507.8	40508.8	/	
507.9	40508.9	/	
507.10	40508.10	/	
507.11	40508.11	/	
507.12	40508.12	Remote Start On Load	
507.13	40508.13	Remote Start Off Load	
507.14	40508.14	Mains Abnormal Gen Start	
507.15	40508.15	Scheduled Start	
508.0	40509.0	Cyclic Start	
508.1	40509.1	Equalized Runtime Start	
508.2	40509.2	Master/Slave Start	
508.3	40509.3	/	
508.4	40509.4	Scheduled Not Start	
508.5	40509.5	/	
508.6	40509.6	/	
508.7	40509.7	/	
508.8	40509.8	/	
508.9	40509.9	/	
508.10	40509.1	Start Inhibit	
508.11	40509.11	/	
508.12	40509.12	S1 Close Inhibit	
508.13	40509.13	S2 Close Inhibit	
508.14	40509.14	/	
508.15	40509.15	/	

Modbus Address	PLC Address	Item	Description
509.0	40510.0	/	
509.1	40510.1	/	
509.2	40510.2	/	
509.3	40510.3	/	
509.4	40510.4	/	
509.5	40510.5	Elevator Control	
509.6	40510.6	Fire Control Linkage Output	

EXAMPLE:

If "Aux. Output 1 Status" and "S1 Switch Close Status" need to be read, check the table above and find their Modbus addresses are 506.0 and 507.4, so it needs to read two data addresses.

Assuming the slave (controller) address is 01, the master/host (could be PC) request command is as following:

Table 3 Master (PC) Request Frame

Slave Address	Function Code	Start Address (506)		Request Data Length (2)		CRC 16	
		MSB	LSB	MSB	LSB	LSB	MSB
01	03	01	FA	00	02	E5	C6

The slave response is as following:

Table 4 Slave (Controller) Response Frame

Slave Address	Function Code	Data Length (Bytes)	Data				CRC 16	
			Data of Address 506 MSB	Data of Address 506 LSB	Data of Address 507 MSB	Data of Address 507 LSB	LSB	MSB
01	03	04	00	01	00	10	AA	3F

Table 5 Data Analysis

Address	Data Received (Hexadecimal)	Convert to Binary	Meaning
506	0001H	0000 0000 0000 0001 (Mapping to 506.15, 506.14, ..., 506.1, 506.0 respectively)	Data of Bit 0 is 1, which means there is signal output in the Aux. Output 1.
507	0010H	0000 0000 0001 0000 (Mapping to 507.15, 507.14, ..., 507.1, 507.0 respectively)	Data of 507.4 is 1, which means S1 switch is closed.

1.2 FUNCTION CODE 03H MAPPING PARAMETERS OF DATA FIELD

Table 6 Parameters of Data Field

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
1000	41001	UAB1 (S1 Line A-B Voltage)	0~65000	1	V	16-bit Unsigned	
1001	41002	UBC1 (S1 Line B-C Voltage)	0~65000	1	V	16-bit Unsigned	
1002	41003	UCA1 (S1 Line C-A Voltage)	0~65000	1	V	16-bit Unsigned	
1003	41004	UA1 (S1 Phase A Voltage)	0~65000	1	V	16-bit Unsigned	
1004	41005	UB1 (S1 Phase B Voltage)	0~65000	1	V	16-bit Unsigned	
1005	41006	UC1 (S1 Phase C Voltage)	0~65000	1	V	16-bit Unsigned	
1006	41007	UA1 Phase (S1 Phase A Angle)	0~360.0	0.1	°	16-bit Unsigned	
1007	41008	UB1 Phase (S1 Phase B Angle)	0~360.0	0.1	°	16-bit Unsigned	NOTE 3
1008	41009	UC1 Phase (S1 Phase C Angle)	0~360.0	0.1	°	16-bit Unsigned	
1009	41010	Frequency 1 (S1 Frequency)	0~100.00	0.01	Hz	16-bit Unsigned	
1010	41011	LCD Temp.	-32768~+32767	1	°C	16-bit Signed	
1011	41012	Battery Voltage	0~32767	0.1	V	16-bit Signed	
1012	41013	Heating Percentage	0~65000	1	%	16-bit Unsigned	
1013	41014	/					
1014	41015	/					
1015	41016	/					
1016	41017	/					
1017	41018	/					
1018	41019	/					
1019	41020	/					
1020	41021	UAB2 (S2 Line A-B Voltage)	0~65000	1	V	16-bit Unsigned	
1021	41022	UBC2 (S2 Line B-C Voltage)	0~65000	1	V	16-bit Unsigned	
1022	41023	UCA2 (S2 Line C-A Voltage)	0~65000	1	V	16-bit Unsigned	
1023	41024	UA2	0~65000	1	V	16-bit	

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
		(S2 Phase A Voltage)				Unsigned	
1024	41025	UB2 (S2 Phase B Voltage)	0~65000	1	V	16-bit Unsigned	
1025	41026	UC2 (S2 Phase C Voltage)	0~65000	1	V	16-bit Unsigned	
1026	41027	UA2 Phase (S2 Phase A Angle)	0~360.0	0.1	°	16-bit Unsigned	
1027	41028	UB2 Phase (S2 Phase B Angle)	0~360.0	0.1	°	16-bit Unsigned	
1028	41029	UC2 Phase (S2 Phase C Angle)	0~360.0	0.1	°	16-bit Unsigned	
1029	41030	Frequency 2 (S2 Frequency)	0~100.00	0.01	Hz	16-bit Unsigned	
1030	41031	S1/S2 Voltage Difference (Voltage Difference between S1 and S2)	-32768~ +32767	1	V	16-bit Signed	
1031	41032	S1/S2 Frequency Difference (Frequency Difference between S1 and S2)	-100.00~ +100.00	0.01	Hz	16-bit Signed	NOTE 4
1032	41033	S1/S2 Phase Difference (Phase Difference between S1 and S2)	-180.0~ +180.0	0.1	°	16-bit Signed	
1033	41034	/					
1034	41035	/					
1035	41036	/					
1036	41037	/					
1037	41038	/					
1038	41039	/					
1039	41040	/					
1040	41041	Phase A Current	-32768~ +32767	1	A	16-bit Signed	
1041	41042	Phase B Current	-32768~ +32767	1	A	16-bit Signed	
1042	41043	Phase C Current	-32768~ +32767	1	A	16-bit Signed	
1043	41044	Reserved					
1044	41045	Phase A Current Angle	-32768~ +32767	1		16-bit Signed	
1045	41046	Phase B Current	-32768~	1		16-bit	

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
		Angle	+32767			Signed	
1046	41047	Phase C Current Angle	-32768~ +32767	1		16-bit Signed	
1047	41048	Reserved					
1048	41049	Phase A Active Power	-2147483648- 2147483647	1	kW	32-bit Signed	
1049	41050						
1050	41051	Phase B Active Power	-2147483648- 2147483647	1	kW	32-bit Signed	
1051	41052						
1052	41053	Phase C Active Power	-2147483648- 2147483647	1	kW	32-bit Signed	
1053	41054						
1054	41055	Total Active Power	-2147483648- 2147483647	1	kW	32-bit Signed	
1055	41056						
1056	41057	Phase A Reactive Power	-2147483648- 2147483647	0.1	kvar	32-bit Signed	
1057	41058						
1058	41059	Phase B Reactive Power	-2147483648- 2147483647	0.1	kvar	32-bit Signed	
1059	41060						
1060	41061	Phase C Reactive Power	-2147483648- 2147483647	0.1	kvar	32-bit Signed	
1061	41062						
1062	41063	Total Reactive Power	-2147483648- 2147483647	0.1	kvar	32-bit Signed	
1063	41064						
1064	41065	Phase A Apparent Power	-2147483648- 2147483647	1	kVA	32-bit Signed	
1065	41066						
1066	41067	Phase B Apparent Power	-2147483648- 2147483647	1	kVA	32-bit Signed	
1067	41068						
1068	41069	Phase C Apparent Power	-2147483648- 2147483647	1	kVA	32-bit Signed	
1069	41070						
1070	41071	Total Apparent Power	-2147483648- 2147483647	1	kVA	32-bit Signed	
1071	41072						
1072	41073	Phase A Power Factor	-32768~ +32767	0.01	PF	16-bit Signed	
1073	41074	Phase B Power Factor	-32768~ +32767	0.01	PF	16-bit Signed	
1074	41075	Phase C Power Factor	-32768~ +32767	0.01	PF	16-bit Signed	
1075	41076	Average Power Factor	-32768~ +32767	0.01	PF	16-bit Signed	
1076	41077	/					
1077	41078	/					
1078	41079	/					
1079	41080	/					
1080	41081	/					
1081	41082	/					
1082	41083	/					

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
1083	41084	/					
1084	41085	/					
1085	41086	/					
1086	41087	/					
1087	41088	/					
1088	41089	S1 Power Status	0~65535	No.		16-bit Unsigned	See details in S1 Power Supply Status
1089	41090	S1 Power Status Delay	0~65535	1	s	16-bit Unsigned	
1090	41091	S2 Power Status	0~65535	No.		16-bit Unsigned	See details in S2 Power Supply Status
1091	41092	S2 Power Status Delay	0~65535	1	s	16-bit Unsigned	
1092	41093	Genset Status	0~65535	No.		16-bit Unsigned	See details in Genset Status
1093	41094	Genset Status Delay	0~65535	1	s	16-bit Unsigned	
1094	41095	ATS Status	0~65535	No.		16-bit Unsigned	See details in ATS Status
1095	41096	ATS Status Delay	0~65535	1	s	16-bit Unsigned	
1096	41097	/					
1097	41098	Mutual Backup Active	0~1	1		16-bit Unsigned	
1098	41099	/					
1099	41100	Auto Transfer/Auto Restore Setting	0~1	1		16-bit Unsigned	
1100	41101	Controller Date: Year	0~100	1	Year	16-bit Unsigned	
1101	41102	Controller Date: Month	1~12	1	Month	16-bit Unsigned	
1102	41103	Controller Date: Day	1~31	1	Day	16-bit Unsigned	
1103	41104	Controller Date: Week	0~6	/		16-bit Unsigned	0: Sun. 1~6: Mon. to Sat.
1104	41105	Controller Time: Hour	0~23	1	Hour	16-bit Unsigned	
1105	41106	Controller Time: Minute	0~59	1	Min.	16-bit Unsigned	

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
1106	41107	Controller Time: Second	0~59	1	Sec.	16-bit Unsigned	
1107	41108	S1 PF Delay	0~20.0	0.1	Sec.	16-bit Unsigned	
1108	41109	S2 PF Delay	0~20.0	0.1	Sec.	16-bit Unsigned	
1109	41110	/					
1110	41111	/					
1111	41112	Continuous Powered Time/Hour	0~65535	1	Hour	16-bit Unsigned	
1112	41113	Continuous Powered Time/Minute	0~59	1	Min.	16-bit Unsigned	
1113	41114	Continuous Powered Time/Second	0~59	1	Sec.	16-bit Unsigned	
1114	41115	Last Continuous Powered Time/Hour	0~65535	1	Hour	16-bit Unsigned	
1115	41116	Last Continuous Powered Time/Minute	0~59	1	Min.	16-bit Unsigned	
1116	41117	Last Continuous Powered Time/Second	0~59	1	Sec.	16-bit Unsigned	
1117	41118	S1 Total Powered Time/Hour (LSB)	0~4294967295	1	Hour	32-bit Unsigned	NOTE 2
1118	41119	S1 Total Powered Time/Hour (MSB)					
1119	41120	S1 Total Powered Time/Minute	0~59	1	Min.	16-bit Unsigned	
1120	41121	S1 Total Powered Time/Second	0~59	1	Sec.	16-bit Unsigned	
1121	41122	S2 Total Powered Time/Hour (LSB)	0~4294967295	1	Hour	32-bit Unsigned	NOTE 2
1122	41123	S2 Total Powered Time/Hour (MSB)					
1123	41124	S2 Total Powered Time/Minute	0~59	1	Min.	16-bit Unsigned	
1124	41125	S2 Total Powered Time/Second	0~59	1	Sec.	16-bit Unsigned	
1125	41126	S1 Total Active Power/kWh (LSB)	-2147483648- 2147483647	1	kW	32-bit Signed	
1126	41127	S1 Total Active Power/kWh (MSB)					
1127	41128	S1 Total Reactive Power/kvarh (LSB)	-2147483648- 2147483647	0.1	kvar	32-bit Signed	
1128	41129	S1 Total Reactive					

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
		Power/kvarh (MSB)					
1129	41130	S1 Total Close Times (LSB)	0~4294967295	1	Time	32-bit Unsigned	NOTE 2
1130	41131	S1 Total Close Times (MSB)					
1131	41132	S2 Total Active Power/kWh (LSB)	-2147483648-2147483647	1	kW	32-bit Signed	
1132	41133	S2 Total Active Power/kWh (MSB)					
1133	41134	S2 Total Reactive Power/kvarh (LSB)	-2147483648-2147483647	0.1	kvar	32-bit Signed	
1134	41135	S2 Total Reactive Power/kvarh (MSB)					
1135	41136	S2 Total Close Times (LSB)	0~4294967295	1	Time	32-bit Unsigned	NOTE 2
1136	41137	S2 Total Close Times (MSB)					
1137	41138	/					
1138	41139	/					
1139	41140	/					
1140-1149	41141-41150	UA1 Harmonic Ratio (3-21 Times)	0-100	1	%	16-bit Unsigned	
1150-1159	41151-41160	UB1 Harmonic Ratio (3-21 Times)	0-100	1	%	16-bit Unsigned	
1160-1169	41161-41170	UC1 Harmonic Ratio (3-21 Times)	0-100		%	16-bit Unsigned	
1170-1179	41171-41180	UA2 Harmonic Ratio (3-21 Times)	0-100	1	%	16-bit Unsigned	
1180-1189	41181-41190	UB2 Harmonic Ratio (3-21 Times)	0-100	1	%	16-bit Unsigned	
1190-1199	41191-41200	UC2 Harmonic Ratio (3-21 Times)	0-100	1	%	16-bit Unsigned	
1200-1209	41201-41210	IA Harmonic Ratio (3-21 Times)	0-100	1	%	16-bit Unsigned	
1210-1219	41211-41220	IB Harmonic Ratio (3-21 Times)	0-100	1	%	16-bit Unsigned	
1220-1229	41221-41230	IC Harmonic Ratio (3-21 Times)	0-100	1	%	16-bit Unsigned	
1230	41231	UA1 THD	0-100	1	%	16-bit Unsigned	
1231	41232	UB1 THD	0-100	1	%	16-bit Unsigned	
1232	41233	UC1 THD	0-100	1	%	16-bit	

Modbus Address	PLC Address	Item	Range (Decimal)	Ratio	Unit	Description	Remarks
						Unsigned	
1233	41234	UA2 THD	0-100	1	%	16-bit Unsigned	
1234	41235	UB2 THD	0-100	1	%	16-bit Unsigned	
1235	41236	UC2 THD	0-100	1	%	16-bit Unsigned	
1236	41237	IA THD	0-100	1	%	16-bit Unsigned	
1237	41238	IB THD	0-100	1	%	16-bit Unsigned	
1238	41239	IC THD	0-100	1	%	16-bit Unsigned	
1239	41240	/					
1240	41241	/					
1241	41242	/					
1242	41243	/					
1243	41244	Load Percentage	0-100	1	%	16-bit Unsigned	

NOTE 1: Actual value = data received * ratio. Take the Frequency as the example: if the data received is 5000 (1388H), ratio is 0.01Hz, then the actual frequency value is 50.00Hz (5000*0.01Hz).

NOTE 2: If there are 4 bytes in the data, the actual value = high order bits of data received * 65536 + low order bits of data received.

NOTE 3: If data received is 32766, it means there is no normal data, and "###" will be shown.

NOTE 4: Definition of signed number: Take the data received "8000H" as the example, convert it to binary number "1000 0000 0000 0000b". The MSB is 1, which means it is negative. The number minus 1 will get its 1's complement, then inverting it will get the absolute value of the negative number. Finally convert the absolute value to decimal number -32768.

EXAMPLE:

If "S1 Total Close Times" (current value is 123456 times) needs to be read, check the table above and find its Modbus address is 1129 and 1130, so it needs to read two bytes addresses.

Assuming the slave address is 01, the master request command is as following:

Table 7 Master Request Command

Slave Address	Function Code	Start Address (1129)		Request Data Length (2)		CRC 16	
		MSB	LSB	MSB	LSB	LSB	MSB
01	**03**	**04**	**69**	**00**	**02**	**15**	**27**

The slave response command is as following:

Table 8 Slave Response Command

Slave Address	Function Code	Data Length (Bytes)	Data				CRC 16	
			Data of Address 1129 MSB	Data of Address 1129 LSB	Data of Address 1130 MSB	Data of Address 1130 LSB	LSB	MSB
01	03	04	E2	40	00	01	0C	5F

Fill the data received into the address respectively, as shown in the table below.

Table 9 Data Analysis

Address	Data Received (Hex)	Data Combined (Hex)	S1 Total Close Times (Decimal)
1129	E240H	0001E240H	123456
1130	0001H		

1.3 FUNCTION CODE 05H MAPPING REMOTE COIL FIELD

Table 10 Remote Coil Field

Modbus Address	PLC Address	Item	Description
15000	15001	Remote S1 Close	Active only when sending FF00H
15001	15002	Remote Open	Active only when sending FF00H
15002	15003	Remote S2 Close	Active only when sending FF00H
15003	15004	/	
15004	15005	Auto/Manual Mode	Manual Mode: Active only when sending 0000H Auto Mode: Active only when sending FF00H
15005	15006	S1 Master Set	Active only when sending FF00H
15006	15007	S2 Master Set	Active only when sending FF00H
15007	15008	Alarm Reset	Active only when sending FF00H
15008	15009	Remote Genset 1 Start	Active only when sending FF00H
15009	15010	Remote Genset 1 Stop	Active only when sending FF00H
15010	15011	Remote Genset 2 Start	Active only when sending FF00H
15011	15012	Remote Genset 2 Stop	Active only when sending FF00H
15012	15013	/	Active only when sending FF00H
15013	15014	/	Active only when sending FF00H
15014	15015	/	Active only when sending FF00H
15015	15016	Remote Output 1	Active only when sending FF00H
15016	15017	Remote Output 2	Active only when sending FF00H
15017	15018	Remote Output 3	Active only when sending FF00H
15018	15019	Remote Output 4	Active only when sending FF00H
15019	15020	Remote Output 5	Active only when sending FF00H
15020	15021	Remote Output 6	Active only when sending FF00H
15021	15022	Remote Output 7	Active only when sending FF00H

NOTE: The remote command in the table above only needs to be sent once.

EXAMPLE:

If the remote controller is in auto mode, check the table first and find its remote address is 15004.

Assuming the slave address is 01, the master request command is as following:

Table 11 Master Request Command

Slave Address	Function Code	Remote Address (15004)		Remote Data		CRC 16	
		MSB	LSB	MSB	LSB	LSB	MSB
01	**05**	**3A**	**9C**	**FF**	**00**	**40**	**CC**

The slave response command is as following:

Table 12 Slave Response Command

Slave Address	Function Code	Remote Address (15004)		Remote Data		CRC 16	
		MSB	LSB	MSB	LSB	LSB	MSB
01	05	3A	9C	FF	00	40	CC

Whether the remote command is active and executed can be checked by sending function code 03H to read auto mode status of address 500.8.

1.4 S1 POWER SUPPLY STATUS

Table 13 S1 Power Supply Status

Value (No.)	Item	Delay
0	S1 Normal Identify	With delay, Unit: Second
1	S1 Abnormal Identify	With delay, Unit: Second
2	S1 Voltage Normal	No Delay
3	S1 Voltage None	No Delay
4	S1 Overvoltage	No Delay
5	S1 Undervoltage	No Delay
6	S1 Overfrequency	No Delay
7	S1 Underfrequency	No Delay
8	S1 Loss of Phase	No Delay
9	S1 Reverse Phase Sequence	No Delay

EXAMPLE:

If the value of address 1088 is 1, the value of address 1089 is 5, that means the delay of S1 Abnormal Identify is underway, and its countdown is 5s.

If the value of address 1088 is 4, that means the voltage of S1 is over the set value.

1.5 S2 POWER SUPPLY STATUS

Table 14 S2 Power Supply Status

Value (No.)	Status	Delay
0	S2 Normal Identify	With delay, Unit: Second
1	S2 Abnormal Identify	With delay, Unit: Second
2	S2 Voltage Normal	No Delay
3	S2 Voltage None	No Delay
4	S2 Overvoltage	No Delay
5	S2 Undervoltage	No Delay
6	S2 Overfrequency	No Delay
7	S2 Underfrequency	No Delay
8	S2 Loss of Phase	No Delay
9	S2 Reverse Phase Sequence	No Delay

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1.6 GENSET STATUS

Table 15 Genset Status

Value (No.)	Status	Delay
0	Start Delay	With delay, Unit: Second
1	Stop Delay	With delay, Unit: Second
2	Scheduled Not Start	With delay, Unit: Second
3	Scheduled Start	With delay, Unit: Second
4	S1 Cyclic Start	With delay, Unit: Second
5	S2 Cyclic Start	With delay, Unit: Second
6	S1 Genset Start	No Delay
7	S2 Genset Start	No Delay
8	S1&S2 Genset Start	No Delay
9	Genset Start	No Delay
10	Genset Standby	No Delay

EXAMPLE:

If the value of address 1092 is 1, the value of address 1093 is 50, that means the genset is going to start, and its countdown is 50s.

If the value of address 1092 is 6, that means the genset of S1 has already started.

1.7 ATS STATUS

Table 16 ATS Status

Value (No.)	Status	Delay
0	Ready to Transfer	No Delay
1	S1 Closing	With delay, Unit: Second
2	S1 Opening	With delay, Unit: Second
3	S2 Closing	With delay, Unit: Second
4	S2 Opening	With delay, Unit: Second
5	Transfer Interval	With delay, Unit: Second
6	S1 Closing Again	With delay, Unit: Second
7	S1 Opening Again	With delay, Unit: Second
8	S2 Closing Again	With delay, Unit: Second
9	S2 Opening Again	With delay, Unit: Second
10	Wait for Sync.	With delay, Unit: Second
11	S1 Sync. Close	With delay, Unit: Second
12	S2 Sync. Close	With delay, Unit: Second
13	Wait for S1 PF Input	With delay, Unit: Second
14	Wait for S2 PF Input	With delay, Unit: Second
15	Elevator Delay	With delay, Unit: Second
16	S1 On-load	No Delay
17	S2 On-load	No Delay
18	Off-load	No Delay

2 FAQ

2.1 SOLUTIONS FOR COMMUNICATION FAILURE

1) When using function code 03, the maximum data length to be read is 120 addresses, and the ending address can't exceed the greatest Modbus communication address. Please note that for the 06 function code mapping parameters data field, only one address can be written at a time;

2) If there is offset address in the Modbus communication address, the actual Modbus communication address equals to the base address plus offset address;

3) Function code 05 adopts Modbus address to communicate: Although 1 means active, and 0 means inactive, it needs to send FF00H to load corresponding bit as 1, and send 0000H to load corresponding bit as 0. If function code 05 adopts PLC address to communicate: It needs to send 1 to load corresponding bit as 1, and send 0 to load corresponding bit as 0.

4) As for CRC-16, the low-order byte is checked first, the high-order byte is checked later.

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