

INGECON SUN® EMS – Modbus MAP

Functionality Specifications

Contents

1	About this document	3
1.1	Symbols	3
2	Modbus TCP Communication requerimets	4
3	Strategy Control Type	5
3.1	STRATEGY DYNAMIC CONTROL	5
3.2	MODBUS CONTROL MODE	5
3.3	MODBUS CONTROL DEVICES	5
4	EMS Configuration	6
5	Modbus MAP	7
5.1	Input registers - Online information.....	7
5.2	Holding registers - Configuratipon and Setpoint parameters	9

1 About this document

This document describes the range of input registers describing the so-called Online data for every application, and the holding registers used as command interface with the EMS. With this information, it is possible to do a BASIC EMS remote control using the Modbus TCP communication standard.



To download the last version of this document visit www.ingeteam.com.

1.1 Symbols

Throughout this document, we include warnings to highlight certain information. Relative to the nature of the text, there are three types of warnings:



This indicates a hazard to personnel or the device.



Indicates importance.



Additional information or references to other parts of the document or documents.

2 Modbus TCP Communication requerimets

The Modbus TCP communication requerimets are the next ones:

- The port used by the EMS as Modbus TCP Server is **522**.
- The Modbus ID is **01**.

 **CAUTION**

The Modbus TCP client must follow these connection requerimets when connects to INGECON SUN® EMS Modbus TCP Server.

3 Strategy Control Type

There are three ways to control EMS via Modbus TCP.

- STRATEGY DYNAMIC CONTROL
- MODBUS CONTROL MODE
 - FIXED SETPOINT
 - OVERRIDE
- MODBUS CONTROL DEVICES

3.1 STRATEGY DYNAMIC CONTROL

This control mode allows a dynamic control over some of the most important control parameters of the EMS strategies.

3.2 MODBUS CONTROL MODE

Under this mode, the EMS acts as a Setpoint Gateway between the external Modbus TCP client controller and the inverters defined in the plant. It has 2 working modes, FIXED SETPOINT and OVERRIDE. On FIXED SETPOINT the EMS resend the Setpoint received every 1,15 seconds and it does not stop sending a setpoint. In OVERRIDE mode, the EMS does not send the setpoint periodically and resends the Setpoint everytime a new Setpoint is received for Modbus.

3.3 MODBUS CONTROL DEVICES

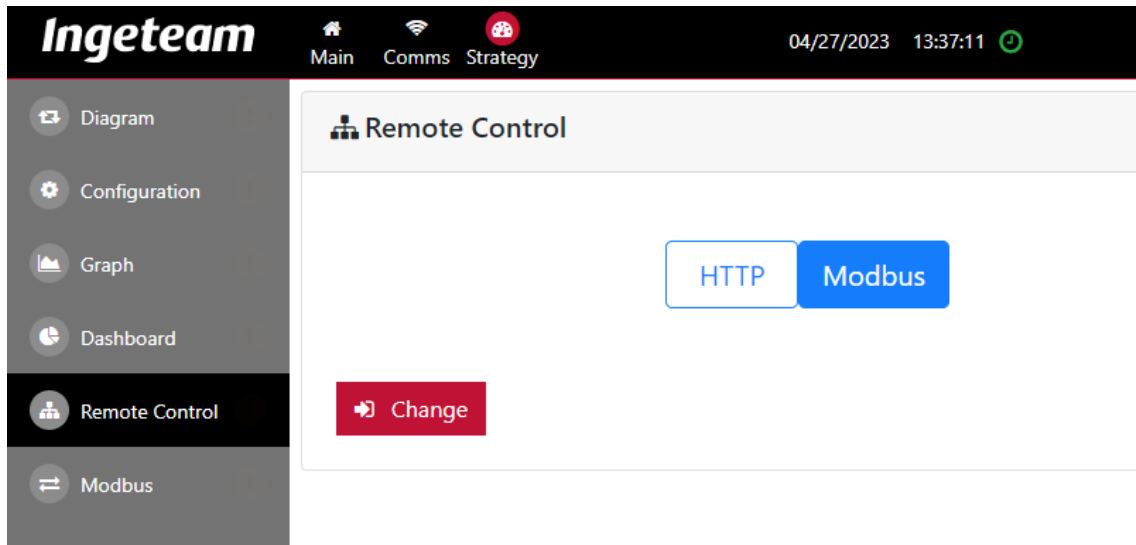
Those registers are only used under FIXED SETPOINT or OVERRIDE control mode. They are used to defined which devices will receive the setpoint sent by the external Modbus TCP client controller to the EMS.

The devices have been defined in 4 different sections:

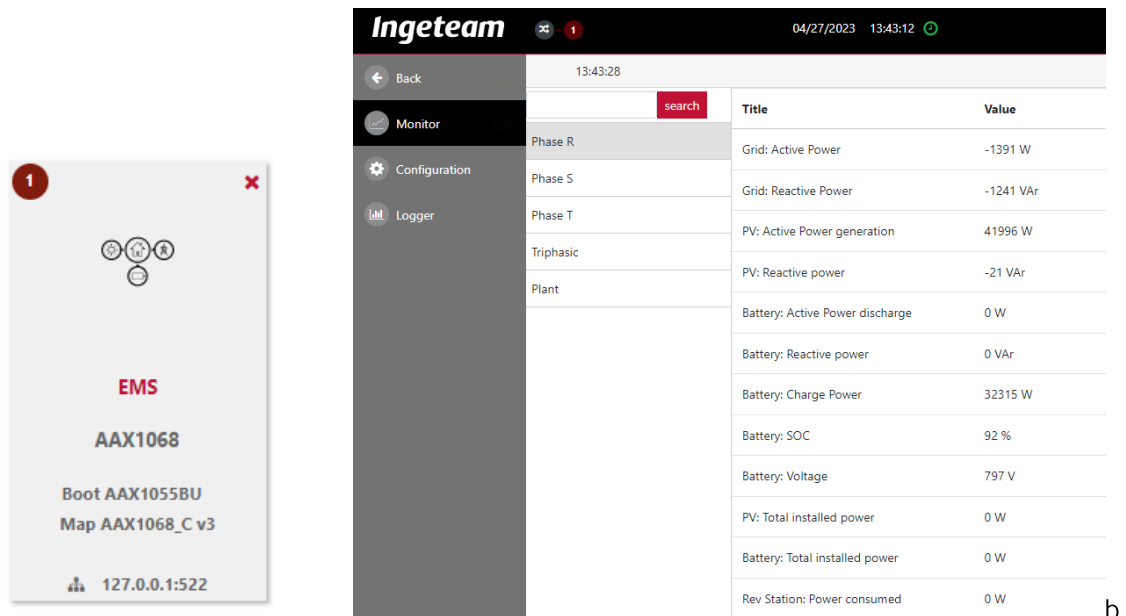
- Active setpoint for PV Inverters
- Charge / Discharge setpoint for Battery Inverters
- Reactive setpoint for Inverters
- Available power for ReV Charger

4 EMS Configuration

In order to activate the control of the EMS strategies the user must go to Strategy->Remote Control and activate the Modbus option shown below.



Once the Modbus option is active, the EMS can be controlled and configured using Modbus TCP and also using the Main menu, and clicking on the EMS box displayed.



5 Modbus MAP

5.1 Input registers - Online information

Start Address	Modbus Register	Description	Type	Magnitud	Category
0	30001	Grid: Active Power	int32	W	Phase R
2	30003	Grid: Reactive Power	int32	VAr	Phase R
4	30005	PV: Active Power generation	int32	W	Phase R
6	30007	PV: Reactive power	int32	VAr	Phase R
8	30009	Battery: Active Power discharge	int32	W	Phase R
10	30011	Battery: Reactive power	int32	VAr	Phase R
12	30013	Battery: Charge Power	int32	W	Phase R
14	30015	Battery: SOC	uint16	%	Phase R
15	30016	Battery: Voltage	uint16	V	Phase R
16	30017	PV: Total installed power	uint32	W	Phase R
18	30019	Battery: Total installed power	uint32	W	Phase R
20	30021	Rev Station: Power consumed	int32	W	Phase R

40	30041	Grid: Active Power	int32	W	Phase S
42	30043	Grid: Reactive Power	int32	VAr	Phase S
44	30045	PV: Active Power generation	int32	W	Phase S
46	30047	PV: Reactive power	int32	VAr	Phase S
48	30049	Battery: Active Power discharge	int32	W	Phase S
50	30051	Battery: Reactive power	int32	VAr	Phase S
52	30053	Battery: Charge Power	int32	W	Phase S
54	30055	Battery: SOC	uint16	%	Phase S
55	30056	Battery: Voltage	uint16	V	Phase S
56	30057	PV: Total installed power	uint32	W	Phase S
58	30059	Battery: Total installed power	uint32	W	Phase S
60	30061	Rev Station: Power consumed	int32	W	Phase S

80	30081	Grid: Active Power	int32	W	Phase T
82	30083	Grid: Reactive Power	int32	VAr	Phase T
84	30085	PV: Active Power generation	int32	W	Phase T
86	30087	PV: Reactive power	int32	VAr	Phase T
88	30089	Battery: Active Power discharge	int32	W	Phase T
90	30091	Battery: Reactive power	int32	VAr	Phase T
92	30093	Battery: Charge Power	int32	W	Phase T
94	30095	Battery: SOC	uint16	%	Phase T
95	30096	Battery: Voltage	uint16	V	Phase T
96	30097	PV: Total installed power	uint32	W	Phase T
98	30099	Battery: Total installed power	uint32	W	Phase T
100	30101	Rev Station: Power consumed	int32	W	Phase T

Start Address	Modbus Register	Description	Type	Unit	Category
200	30201	Grid: Active Power	int32	W	Triphasic
202	30203	Grid: Reactive Power	int32	VAr	Triphasic
204	30205	PV: Active Power generation	int32	W	Triphasic
206	30207	PV: Reactive power	int32	VAr	Triphasic
208	30209	Battery: Active Power discharge	int32	W	Triphasic
210	30211	Battery: Reactive power	int32	VAr	Triphasic
212	30213	Battery: Charge Power	int32	W	Triphasic
214	30215	Battery: SOC	uint16	%	Triphasic
215	30216	Battery: Voltage	uint16	V	Triphasic
216	30217	PV: Total installed power	uint32	W	Triphasic
218	30219	Battery: Total installed power	uint32	W	Triphasic
220	30221	Rev Station: Power consumed	int32	W	Triphasic
300	30301	Alarms	flags		Plant
		Power meter lost for more than 15 minutes	bit		Plant
		Battery inverter lost for more than 15 minutes	bit		Plant
		PV inverter lost between 10:00 and 15:00	bit		Plant
301	30302	Status	flags		Plant
		Power meter meter lost	bit		Plant
		Battery inverter lost	bit		Plant
		PV inverter lost	bit		Plant
		Battery inverter with alarms	bit		Plant
		PV inverter with alarms	bit		Plant

5.2 Holding registers - Configuratiopn and Setpoint parameters

Start Address	Modbus Register		Description	Type	Unit	Min	Max	Category
0	40001		Status config flags					1 - MODBUS CONTROL MODE
		Bit 1-0	Control mode					1 - MODBUS CONTROL MODE
			• 00 : STRATEGY DYNAMIC					1 - MODBUS CONTROL MODE
			• 01 : FIXED SETPOINT					1 - MODBUS CONTROL MODE
			• 10 : OVERRIDE					1 - MODBUS CONTROL MODE
		Bit 2	PV Active Control					1 - MODBUS CONTROL MODE
			• 0 : Disable					1 - MODBUS CONTROL MODE
			• 1 : Enable					1 - MODBUS CONTROL MODE
		Bit 3	Battery Control					1 - MODBUS CONTROL MODE
			• 0 : Disable					1 - MODBUS CONTROL MODE
			• 1 : Enable					1 - MODBUS CONTROL MODE
		Bit 4	Reactive Control					1 - MODBUS CONTROL MODE
			• 0 : Disable					1 - MODBUS CONTROL MODE
			• 1 : Enable					1 - MODBUS CONTROL MODE
		Bit 5	Rev Station available power update					1 - MODBUS CONTROL MODE
			• 0 : Disable					1 - MODBUS CONTROL MODE
			• 1 : Enable					1 - MODBUS CONTROL MODE
20	40021		Active Power: Grid Target	int32	W			2 - STRATEGY DYNAMIC CONTROL
22	40023		Reactive Control: Cosine of Phi	int16		-1000	1000	2 - STRATEGY DYNAMIC CONTROL
23	40024		Reactive Control					2 - STRATEGY DYNAMIC CONTROL

		Bit 0	Reactive Control: Status					2 - STRATEGY DYNAMIC CONTROL
			• 0 : Disable					2 - STRATEGY DYNAMIC CONTROL
			• 1 : Enable					2 - STRATEGY DYNAMIC CONTROL
24	40025		Reactive Control: Zones					2 - STRATEGY DYNAMIC CONTROL
			• 0 : All					2 - STRATEGY DYNAMIC CONTROL
			• 1 : Positive					2 - STRATEGY DYNAMIC CONTROL
			• 2 : Negative					2 - STRATEGY DYNAMIC CONTROL
40	40041		PV: Active Power	int16	%	0	100	3 - SETPOINT: PV INVERTER
41	40042		Battery: Charge	int16	%	0	100	4 - SETPOINT: BATT INVERTER
42	40043		Battery: Discharge	int16	%	0	100	4 - SETPOINT: BATT INVERTER
43	40044		Inductive	int16	%	0	100	5 - R SETPOINT: INVERTER
44	40045		Capacitive	int16	%	0	100	5 - R SETPOINT: INVERTER
70	40071		PV: Active Power R	int16	%	0	100	3 - SETPOINT: PV INVERTER
71	40072		PV: Active Power S	int16	%	0	100	3 - SETPOINT: PV INVERTER
72	40073		PV: Active Power T	int16	%	0	100	3 - SETPOINT: PV INVERTER
73	40074		Battery: Charge R	int16	%	0	100	4 - SETPOINT: BATT INVERTER
74	40075		Battery: Charge S	int16	%	0	100	4 - SETPOINT: BATT INVERTER
75	40076		Battery: Charge T	int16	%	0	100	4 - SETPOINT: BATT INVERTER
76	40077		Battery: Discharge R	int16	%	0	100	4 - SETPOINT: BATT INVERTER
77	40078		Battery: Discharge S	int16	%	0	100	4 - SETPOINT: BATT INVERTER
78	40079		Battery: Discharge T	int16	%	0	100	4 - SETPOINT: BATT INVERTER
79	40080		Available Power R	int32	W			6 - AVAILABLE: REV CHARGE
81	40082		Available Power S	int32	W			6 - AVAILABLE: REV CHARGE
83	40084		Available Power T	int32	W			6 - AVAILABLE: REV CHARGE