

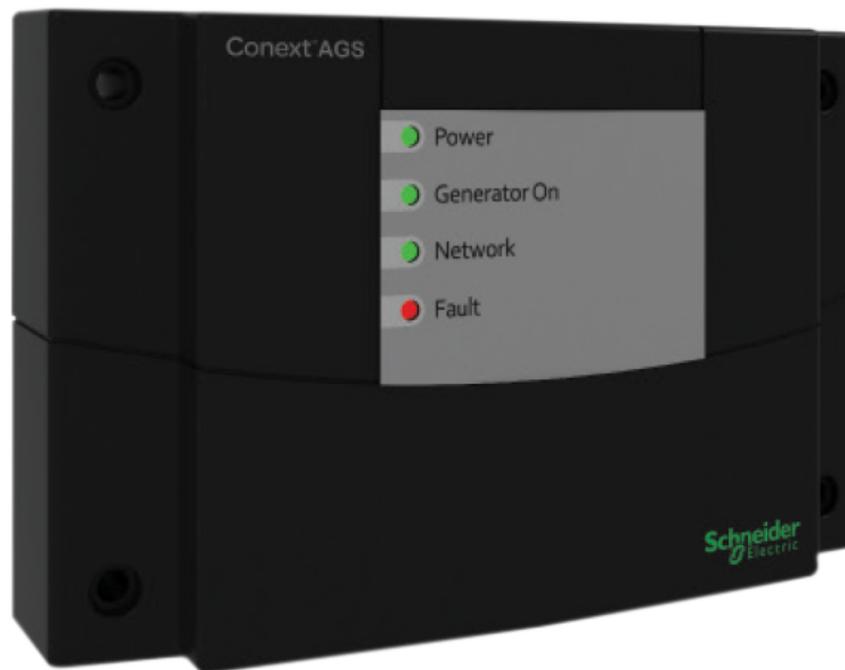
Conext™ Gateway

Modbus Interface Specification (503)

Conext™ Automatic Generator Start (AGS)

990-6274A

Feb 13, 2020



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Contact Information

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Revision History

Rev	Date	Description of Change
A	Feb 13, 2020	v1.06 Firmware Release

Document Applicability

This Modbus map applies to the following products:

Product ID	Product Description
809-0915	AGS
865-1060	AGS
865-1060-01	AGS

⚠ WARNING**UNINTENDED OPERATION**

The use of this product with Modbus communications requires expertise in the design, operation, and programming of the device. Only qualified personnel should program, install, alter, and commission this product. Unless specified, information on safety, specifications, installation and operation is as shown in the primary documentation received with the product. Qualified personnel must be familiar with that information before proceeding. When writing values to the device, you must ensure other persons are not working with the device.

Failure to follow these instructions can result in death or serious injury, and/or equipment damage.

⚠ WARNING**LOSS OF CONTROL**

Do not assign the same address to two Modbus devices. The entire serial bus may behave unexpectedly if the master device cannot communicate with all the slave devices on the bus.

Failure to follow these instructions can result in death or serious injury, and/or equipment damage.

Overview

This document describes the structure of the Modbus register address map, which is used to configure, control, and monitor the device. Use this document in conjunction with the device Owner's Guide. The information in this document is intended for use only by qualified personnel who have a detailed technical understanding of the Modbus protocol. The Modbus map is divided into rows of Modbus registers. Each row indicates the Modbus register address, its name, data type, access type, units, scale, offset, and applicable notes as required. External Modbus master devices, such as the Schneider Electric M340 PLC, can read and write the Modbus registers to configure, control, or monitor the device remotely.

Writing Modbus Registers

Modbus does not provide an error response when data written to a Modbus register is out of range or invalid. To confirm that a Modbus register is correctly written, you should read it back and compare it with the expected value. For descriptions of settings and their valid values, refer to the product's Owner's Guide.

Supported Modbus Data Types

Data Type	Description
uint16	unsigned 16-bit integer [0,65535]
sint16	signed 16-bit integer [-32768,32767]
uint32	unsigned 32-bit integer [0,4294967295]
sint32	signed 32-bit integer [-2147483648,2147483647]
str<nn>	packed 8-bit character string, where <nn> is the length of characters in the string. Two characters are packed into each Modbus register. Example: str20 = 20-character string (packed into 10 Modbus registers) str16 = 16-character string (packed into 8 Modbus registers)

Modbus Device Addressing

The Modbus slave address registers are automatically assigned on a first come, first served basis. The first detected device is assigned to the start of the address range. Subsequently added devices are assigned the next available address in the range.

Once assigned, the modbus slave address is associated to the serial number of the device, ensuring the consistency of the modbus address for the lifetime of the installation.

If Modbus slave addresses need to be changed, the Conext Gateway can be reset to its factory defaults and devices added one by one to establish the desired modbus address mapping.

ModbusTCP port	503
Modbus Slave Address Range	[50 .. 69]

Modbus Register Addressing

The Register Number is the 1-based register identifier. Some 3rd party Modbus tools require 1-based register addressing.

The Register Address is the zero-based register address representing the register address as it is transmitted on-the-wire inside the Modbus data frame.

Modbus Error Response

The Modbus Server will respond with a 02 ILLEGAL DATA ADDRESS error if an attempt is made to read/write registers which don't exist or if a request is made to read only part of a 32-bit register. This error will also be thrown if a read/write address range contains a data point which does not exist, or if the read/write address range starts or ends halfway through a 32-bit word.

A blank row in the Modbus Register map indicates a boundary between sets of contiguous registers. Multi-register reads/writes across these boundaries will result in a 02 ILLEGAL DATA ADDRESS error

Modbus Cybersecurity Considerations

WARNING

CYBERSECURITY RISK: POTENTIAL COMPROMISE OF SYSTEM AVAILABILITY, INTEGRITY, AND CONFIDENTIALITY

Always secure the Local Area Network on which the Conext Gateway is connected. Modbus TCP must NEVER be routed over a public network. Use cybersecurity best practices to help prevent unauthorized access.

Failure to follow these instructions can result in unintended access to sensitive or secure customer data, permanent loss of data, and equipment damage.

Modbus TCP is a legacy protocol in widespread use within the Solar industry. It is appreciated by system operators due to its simplicity and ease of use in control and monitoring applications. However, Modbus TCP is an insecure protocol which does not provide any data security, encryption, or authentication.

Anyone with access to the local area network on which the Conext Gateway is connected can monitor and control the power conversion devices attached to the Conext Gateway.

Modbus TCP should only be used on trusted, private, and highly secure local area networks for local control and monitoring applications only. Failure to properly secure the Local Area Network on which the Conext Gateway is connected can allow a remote attacker to compromise your power system installation.

1 Register Map for Conext™ Automatic Generator Start (AGS)

Reg. No.	Reg. Addr.	Name	Type	R/W	Units	Scale	Offset	Notes
1	0x0000	Device Name	str16	r				
9	0x0008	reserved	uint16	r				
10	0x0009	reserved	uint16	r				
11	0x000A	FGA Number	str20	r				
21	0x0014	Unique ID Number	uint32	r				
31	0x001E	Firmware Version	uint32	r				
41	0x0028	Modbus Slave Address (Port 503)	uint16	rw		1.0	0.0	
42	0x0029	Device Number	uint16	r		1.0	0.0	
43	0x002A	System Instance	uint16	r		1.0	0.0	
44	0x002B	Hardware Serial Number	str20	r				
54	0x0035	Configuration Status	uint16	r		1.0	0.0	0=Refreshing 1=Done
55	0x0036	Configuration Refresh Counter	uint32	r		1.0	0.0	
65	0x0040	Device State	uint16	r		1.0	0.0	See section 2.1
66	0x0041	Device Present	uint16	r		1.0	0.0	0=Inactive (all data invalid) 1=Active (data valid)
67	0x0042	Auto Generator State	uint16	r		1.0	0.0	See section 2.2
68	0x0043	Auto Generator Action	uint16	r		1.0	0.0	See section 2.3
69	0x0044	Generator On Reason	uint16	r		1.0	0.0	See section 2.4
70	0x0045	Generator Off Reason	uint16	r		1.0	0.0	See section 2.5
71	0x0046	Active Faults Flag	uint16	r		1.0	0.0	0=No Active Faults 1=Has Active Faults
72	0x0047	Active Warnings Flag	uint16	r		1.0	0.0	0=No Active Warnings 1=Has Active Warnings

Reg. No.	Reg. Addr.	Name	Type	R/W	Units	Scale	Offset	Notes
73	0x0048	Fault Bitmap 0	uint16	r		1.0	0.0	See section 2.6
74	0x0049	Warning Bitmap 0	uint16	r		1.0	0.0	See section 2.7
75	0x004A	Configuration Errors	uint32	r		1.0	0.0	
77	0x004C	Operating Mode	uint16	rw		1.0	0.0	2=Standby 3=Operating
78	0x004D	Generator Mode	uint16	rw		1.0	0.0	0=Off 1=On 2=Automatic 3=Force On Auto Off
79	0x004E	Reset	uint16	rw		1.0	0.0	0=Reboot 2=Reset to Factory
80	0x004F	Clear	uint16	rw		1.0	0.0	See section 2.8
81	0x0050	Generator Quiet Time Start	uint16	rw	min	1.0	0.0	
82	0x0051	Generator Quiet Time Stop	uint16	rw	min	1.0	0.0	
83	0x0052	Generator Quiet Time Enable / Disable	uint16	rw		1.0	0.0	0=Disabled 1=Enabled
84	0x0053	Generator Auto Start On DC V	uint16	rw		1.0	0.0	0=Disabled 1=Enabled
85	0x0054	Generator Auto Stop On DC V	uint16	rw		1.0	0.0	0=Disabled 1=Enabled
86	0x0055	Generator Auto Start On Battery SOC	uint16	rw		1.0	0.0	0=Disabled 1=Enabled
87	0x0056	Generator Auto Stop On Battery SOC	uint16	rw		1.0	0.0	0=Disabled 1=Enabled
88	0x0057	Inverter Load Start/Stop Triggers	uint16	rw		1.0	0.0	0=Disabled 1=Enabled
89	0x0058	Generator Auto Stop On AC I	uint16	rw		1.0	0.0	0=Disabled 1=Enabled
90	0x0059	Generator Stop At Absorption Stage	uint16	rw		1.0	0.0	0=Disabled 1=Enabled

Reg. No.	Reg. Addr.	Name	Type	R/W	Units	Scale	Offset	Notes
91	0x005A	Generator Stop At Float Stage	uint16	rw		1.0	0.0	0=Disabled 1=Enabled
92	0x005B	Maximum Automatic Cycles with No User Intervention	uint16	rw		1.0	0.0	
96	0x005F	Thermostat 1 Start/Stop	uint16	rw		1.0	0.0	0=Disabled 1=Enabled
97	0x0060	Thermostat 2 Start/Stop	uint16	rw		1.0	0.0	0=Disabled 1=Enabled
98	0x0061	Generator Type	uint16	rw		1.0	0.0	Only Generator types 1 through 14 are supported.
99	0x0062	reserved	uint16	r				
100	0x0063	Generator Preheat Time	uint16	rw	s	1.0	0.0	
101	0x0064	Generator Crank Start Delay	uint16	rw	s	1.0	0.0	
102	0x0065	Generator Crank Time	uint16	rw	s	1.0	0.0	
103	0x0066	Shutdown Bypass Time	uint16	rw	s	1.0	0.0	
104	0x0067	Starter Cool Down Time	uint16	rw	s	1.0	0.0	
105	0x0068	Generator Crank Retry Time	uint16	rw	s	1.0	0.0	
106	0x0069	Generator Warmup Time	uint16	rw	s	1.0	0.0	
107	0x006A	Maximum Generator Run Time	uint16	rw	hours	0.016667	0.0	
108	0x006B	Generator Cool Down Time	uint16	rw	s	1.0	0.0	
109	0x006C	Generator Spin Down Time	uint16	rw	s	1.0	0.0	
110	0x006D	Generator Stop Timeout	uint16	rw	s	1.0	0.0	
111	0x006E	Generator Start Tries	uint16	rw		1.0	1.0	
112	0x006F	Generator Exercise Period	uint16	rw	days	1.0	0.0	
113	0x0070	Generator Exercise Duration	uint16	rw	min	1.0	0.0	

Reg. No.	Reg. Addr.	Name	Type	R/W	Units	Scale	Offset	Notes
114	0x0071	Generator Exercise Start Time	uint16	rw	min	1.0	0.0	
115	0x0072	Generator Run Signal Hold Time	uint16	rw	s	0.01	0.0	
116	0x0073	Relay 3 Function	uint16	rw		1.0	0.0	See section 2.9
117	0x0074	AC Current Level to Stop	uint32	rw	A	0.001	0.0	
119	0x0076	AC Current Level to Start	uint32	rw	A	0.001	0.0	
121	0x0078	Starting Battery Voltage (30 Seconds)	sint32	rw	V	0.001	0.0	
123	0x007A	Starting Battery Voltage (15 Minutes)	sint32	rw	V	0.001	0.0	
125	0x007C	Starting Battery Voltage (2 Hours)	sint32	rw	V	0.001	0.0	
127	0x007E	Starting Battery Voltage (24 Hours)	sint32	rw	V	0.001	0.0	
129	0x0080	Stop Voltage	sint32	rw	V	0.001	0.0	
131	0x0082	Refresh Configuration Data	uint16	rw		1.0	0.0	1=Refresh
132	0x0083	Generator Association	uint16	rw		1.0	0.0	See section 2.10
133	0x0084	AC Output Association	uint16	rw		1.0	0.0	See section 2.11
134	0x0085	AC Input Association	uint16	rw		1.0	0.0	See section 2.12
135	0x0086	DC Input Association	uint16	rw		1.0	0.0	See section 2.13
136	0x0087	State of Charge Level to Stop Generator	uint16	rw	%	1.0	0.0	
137	0x0088	State of Charge Level to Start Generator	uint16	rw	%	1.0	0.0	
138	0x0089	Identify Enable	uint16	rw		1.0	0.0	0=Disabled 1=Enabled

2 Data Point Enumerations

2.1 AGS Operating States

Valid Operating States are:

0=Hibernate
1=Power Save
2=Safe Mode
3=Operating
4=Diagnostic Mode
5=Remote Power Off
255=Data Not Available

2.2 Generator State

Valid Generator States are:

0=Quiet Time
1=Auto On
2=Auto Off
3=Manual On
4=Manual Off
5=Gen Shutdown
6=Ext Shutdown
7=AGS Fault
8=Suspend
9=Not Operating

2.3 Generator Actions

Valid Generator Actions are:

0=Preheating
1=Start Delay
2=Cranking
3=Starter Cooling
4=Warming Up
5=Cooling Down
6=Spinning Down
7=Shutdown Bypass
8=Stopping
9=Running
10=Stopped
11=Crank Delay

2.4 Generator On Reason

Valid Generator On Reasons are:

- 0=Not On
- 1=DC Voltage Low
- 2=Battery SOC Low
- 3=AC Current High
- 4=Contact Closed
- 5=Manual On
- 6=Exercise
- 7=Non Quiet Time
- 8=Ext On via AGS
- 9=Ext On via Gen
- 10=Unable To Stop
- 11=AC Power High
- 12=DC Current High

2.5 Generator Off Reasons

Valid Generator Off Reasons are:

- 0=Not Off
- 1=DC Voltage High
- 2=Battery SOC High
- 3=AC Current Low
- 4=Contact Opened
- 5=Reached Absorp
- 6=Reached Float
- 7=Manual Off
- 8=Max Run Time
- 9=Max Auto Cycle
- 10=Exercise Done
- 11=Quiet Time
- 12=Ext Off via AGS
- 13=Safe Mode
- 14=Ext Off via Gen
- 15=Ext Shutdown
- 16=Auto Off
- 17=Fault
- 18=Unable To Start
- 19=Power Low

20=DC Current Low

21=AC Good

2.6 AGS Fault Status

The AGS Fault Bitmap indicates the causes of the AGS faults. One or more of the following bits indicate the cause(s) of the fault(s):

bit0=F69:Node Instance Duplicated

bit1=F200:Exceeded max number of start tries

bit2=F201:Unable to stop gen

bit3=F203:Gen Stopped by ext sensor

bit4=F500:Serial Number Failure

bit5=F501:Memory Failure

bit6=F505:Internal Failure

2.7 AGS Warning Bits

The AGS Warning Bitmap indicates the causes of the AGS warnings. One or more of the following bits indicate the cause(s) of the warning(s):

bit0=W200:Generator was stopped manually

bit1=W201:Generator was started manually

bit2=W202:Unable to start generator

bit3=W203:Manual Off

bit4=W204:Max Genset Cycle with no user intervention

bit5=W205:Generator started by its switch

bit6=W206:Mismatched triggers

bit7=W207:Mismatched triggers

bit8=W208:Automatic start and stop triggers not enabled

bit9=W209:Generator external stop

bit10=W250:Value failed to change

bit11=W500:Network connection lost

bit12=W501:Memory problem - cleared memory

bit13=W599:Invalid Associations

2.8 Clear Command

The Clear Command can be used to clear the fault; warning; event; and communication logs. The following values are supported:

- 1=Fault Log
- 2=Active Faults
- 4=Warning Log
- 8=Active Warnings
- 16=State Event Log
- 32=Communication Statistics
- 64=Statistics
- 128=User Statistics
- 255=All

2.9 Relay 3 Functions

The following functions are supported for use with Relay3:

- 0=Not Used
- 1=Run
- 2=Glow and Stop
- 3=Glow stop with Shutdown bypass
- 4=Crank
- 5=Preheat
- 6=Warm Up and Cool Down
- 7=Start and Stop
- 8=Preheat with Shutdown Bypass
- 9=Momentary Run
- 10=Pulse Stop

2.10 Generator Association

The following associations are supported:

- 19=Generator 1
- 20=Generator 2
- 21=Generator 3
- 22=Generator 4
- 23=Generator 5
- 24=Generator 6
- 25=Generator 7
- 26=Generator 8
- 27=Generator 9
- 28=Generator 10

2.11 AC Load Association

The following associations are supported:

1=None
51=AC Load 1
52=AC Load 2
53=AC Load 3
54=AC Load 4
55=AC Load 5
56=AC Load 6
57=AC Load 7
58=AC Load 8
59=AC Load 9
60=AC Load 10

2.12 AC Input Association

The following associations are supported:

1=None
67=Grid 1
68=Grid 2
69=Grid 3
70=Grid 4
71=Grid 5
72=Grid 6
73=Grid 7
74=Grid 8
75=Grid 9
76=Grid 10
19=Generator 1
20=Generator 2
21=Generator 3
22=Generator 4
23=Generator 5
24=Generator 6
25=Generator 7
26=Generator 8
27=Generator 9
28=Generator 10

2.13 DC Input Association

The following associations are supported:

- 1=None
- 3=House Battery Bank 1
- 4=House Battery Bank 2
- 5=House Battery Bank 3
- 6=House Battery Bank 4
- 7=House Battery Bank 5
- 252=All Battery Banks