

FnIO G-Series

GN-9222

GN-9222 (PROFIBUS Network Adapter)

Date: 2022.09.15

Table of Contents

Date: 2020. 4.21	1
Table of Contents	2
History	4
1.Environment Specification	5
2.GN-9222 (PROFIBUS Network Adapter)	6
2.1.GN-9222 Specification	6
2.2.GN-9222 Wiring Diagram	8
2.3.GN-9222 LED Indicator	9
2.3.1.LED Indicator	9
2.3.2.MOD (Module Status LED)	9
2.3.3.NET (Network Status LED)	9
2.3.4.DIA (Diagnostic Status LED)	9
2.3.5.IOS LED (Expansion Module Status LED)	10
2.3.6.Field Power, System Power LED (Field Power, System Power Status LED)	10
2.4.GN-9222 Electrical Interface	11
2.4.1.PROFIBUS Connector	11
2.4.2.Dip Switch	11
2.4.3.RS232 Port for MODBUS/RTU, Touch Panel or IOGuide	11
2.5.I/O Process Image Map	12
2.5.1.Example of Input Process Image (Input Register) Map	13
2.5.2.Example of Output Process Image (Output Register) Map	14
3.Parameter	15
3.1.GN-9222	15
4.DPV1 Service	15
4.1.MSAC1 Read(PROFIBUS-DP Extensions to EN50170)	15
4.2.MSAC1 Write(PROFIBUS-DP Extensions to EN50170)	15
4.3.Error Decode (PROFIBUS-DP Extensions to EN50170)	16
4.4.Error Code_1 (PROFIBUS-DP Extensions to EN50170)	16
5.Diagnostics	17
6.MODBUS Interface	18
6.1.MODBUS Interface Register/Bit Map	18
6.2.Surpported MODBUS Function Codes	18
6.2.1.8 (0x08) Diagnostics	20
6.2.2.Error Response	21
6.3.MODBUS Special Register Map	21
6.3.1.Adapter Identification Special Resgister (0x1000, 4096)	21

6.3.2.Adapter Information Special Register (0x1100, 4352).....	22
6.3.3.Expasion Slot Information Special Resister (0x2000, 8192).....	22
6.4.MODBUS Reference.....	23

History

REV.	PAGES	REMARKS	DATE	Editor
1.00		Preliminary	Nov 30, 2016	GWLEE
1.01		I/O Process Image Map	Feb 15, 2017	GWLEE
1.02		Operating temperature comment	Feb 16, 2017	GWLEE
1.03		MODBUS Special Register Map	Feb 20, 2017	GWLEE
1.06		IOS LED Status	Aug 28, 2018	GWLEE
1.07		Revision related to UL certification	Mar 10, 2020	GWLEE
1.07	22	Modbus special register map Update(0x1119)	July 07, 2020	JHPark
1.08	15	Parameter Data Offset 5	Sep 15, 2022	SAHwang

1. Environment Specification

Environmental specification	
Operating Temperature	60°C~ 70°C: Power dissipation is limited to 0.8A. -40°C~ 60°C: 1.5A full load is allowed.
UL Temperature	-20°C~60°C
Storage Temperature	-40°C~85°C
Relative Humidity	5% ~ 90% non-condensing
Mounting	DIN rail
General specification	
Shock Operating	IEC 60068-2-27
Vibration Resistance	Based on IEC 60068-2-6 DNVGL-CG-0039 : Vibration Class B, 4g
Industrial Emissions	EN 61000-6-4/A11 : 2011
Industrial Immunity	EN 61000-6-2 : 2005
Installation Position	Vertical and horizontal installation is available.
Product Certifications	CE, UL, FCC

2. GN-9222 (PROFIBUS Network Adapter)

2.1. GN-9222 Specification

Items	Specification
Communication Interface Specification	
Redundancy	Not supported
Repeater Control Signal	RS-485 Signal
Freeze mode	Support
Sync mode	Support
Auto baudrate	Support
Fail safe mode	Support
Station type	Slave
FMS support	Not supported
Max. Network Node	125 Nodes
Max. Expansion Slot	63 Slots
I/O Data Size	Input : 244bytes / Output : 244bytes
Indicators	6 Status LED 1 Green/Red, Module Status (MOD) 1 Green/Red, Network Status (NET) 1 Red, Diagnostic Status (DIA) 1 Green/Red Expansion I/O Module Status (IOS) 1 Green, System Power Status 1 Green, Field Power Status
Communication Rate	9.6K ~ 12M (1.2Km~100m)
Communication Speed	9.6 ~ 12000K bps (Auto baud rate selection)
Bus Connection	9 Pin D-Sub Connector
Other Serial Port	RS232 for MODBUS/RTU, Touch Panel or IOGuide
Serial Configuration (RS232)	Node : 1 (Fixed) Baud Rate : 115200 (Fixed) Data bit : 8 (Fixed) Parity bit : No parity (Fixed) Stop bit : 1 (Fixed)
Module Location	Starter module left side of G-Series system
Field Power Detection	About 14Vdc
General Specification	
UL System Power	Supply voltage : 24Vdc nominal, Class 2
System Power	Supply voltage : 24Vdc nominal Supply voltage range : 16~30Vdc Protection : Output current limit (Min. 1.5A) Reverse polarity protection
Power Dissipation	Max. 100mA @ 24Vdc
Current for I/O Module	1.5A @ 5Vdc
Isolation	System power to internal logic : Non-Isolation System power I/O driver : Isolation
UL Field Power	Supply voltage : 24Vdc nominal, Class 2
Field Power	Supply voltage : 24Vdc typical (Max. 30Vdc) Field Power range is different depending on IO module series. Refer to IO module's specification.
Max. Current Field Power Contact	DC 10A Max
Wiring	I/O Cable Max. 2.0mm ² (AWG 14)
Torque	0.8Nm(7 lb-in)
Weight	163g
Module Size	54mm x 99mm x 70mm
Environment Condition	Refer to '1. Environment Specification'

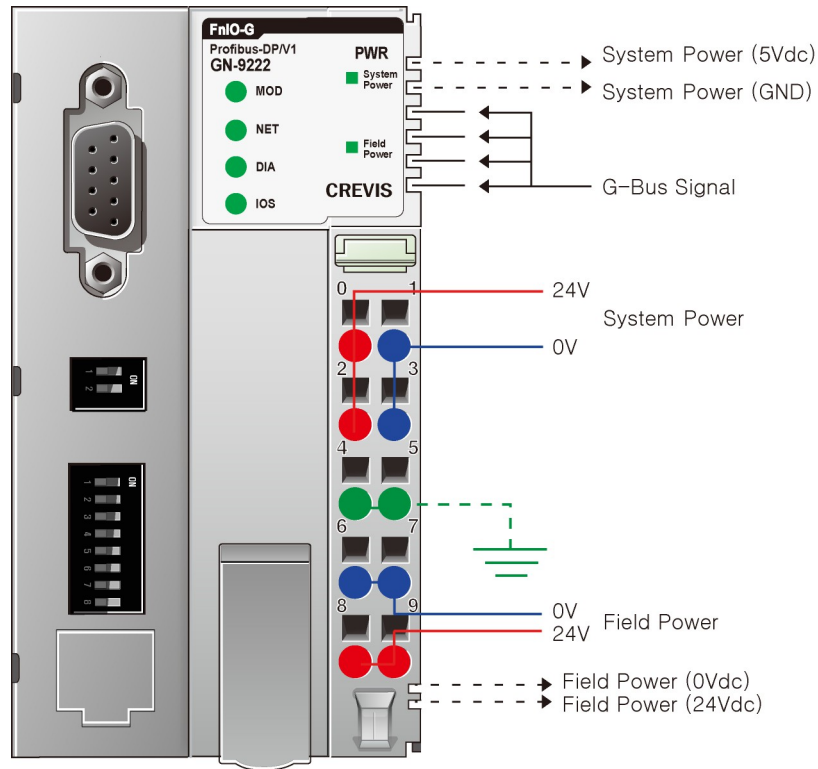
* Operating temperature

-40 ~ 70 temperature range specification can be guaranteed °C under the following conditions.

- Current for I/O Modules : 0.8A below.

- Otherwise, temperature specification can be guaranteed with -40 ~ 60°C.

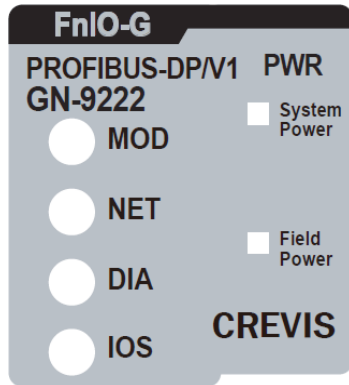
2.2. GN-9222 Wiring Diagram



Pin No.	Signal Description	Signal Description	Pin No.
0	System Power, 24V	System Power, Ground	1
2	System Power, 24V	System Power, Ground	3
4	F.G	F.G	5
6	Field Power, Ground	Field Power, Ground	7
8	Field Power, 24V	Field Power, 24V	9

2.3. GN-9222 LED Indicator

2.3.1. LED Indicator



LED No.	LED Function / Description	LED Color
MOD	Module Status	Green/Red
NET	Network Status	Green/Red
DIA	Diagnostic Status	Red
IOS	Expansion Module Status	Green/Red
System Power	System Power Enable	Green
Field Power	Field Power Enable	Green

2.3.2. MOD (Module Status LED)

Status	LED	To indicate
Not Powered	OFF	Power is not supplied to the unit.
Normal, Operational	Green	The unit is operating in normal condition.
Device in Standby	Flashing Green	The EEPROM parameter is not initialized yet. Serial Number is zero value (0x00000000)
Minor Fault	Flashing Red	The unit has occurred recoverable fault in self-testing. - EEPROM checksum fault.
Unrecoverable Fault	Red	The unit has occurred unrecoverable fault in self-testing. - Firmware fault

2.3.3. NET (Network Status LED)

Status	LED	To indicate
Not Powered Not On-line	OFF	Device is not on-line or may not be powered
On-line, Not connected	Flashing Green	Device is on-line but has no connections in the established state. - Not allocated to a master
On-line, Connected	Green	Device is on-line and allocated to a master
Connection Time-out	Flashing Red	One or more I/O connections are in the time-out state.
Critical Communication Failure	Red	Failed communication

2.3.4. DIA (Diagnostic Status LED)

Status	LED	To indicate
Hardware Error	Flashing Red	Device has hardware checking error. (with MOD led is red.)
Expansion Module Error	Flashing Red	Device has expansion module error. (with IOS led is red.)
IO Configuration Error	Flashing Red	Failed to initialize expansion module - Overflow Input/Output size. (244bytes / 244bytes) - Overflow Configuration data size. (244bytes / 244bytes) - Too many expansion module. (Max 63 slot) - Mismatch vendor code between adapter and expansion module.

2.3.5. IOS LED (Expansion Module Status LED)

Status	LED	To indicate
Not Powered No Expansion Module	OFF	Device has no expansion module or may not be powered.
On-line, Do not Exchanging I/O	Flashing Green	I/O Communication is normal but does not exchanging I/O data. (Passed the expansion module configuration)
Connection, Run Exchanging I/O	Green	Exchanging I/O data.
Connection Fault during Exchanging I/O	Red	One or more expansion module occurred in fault state. <ul style="list-style-type: none"> - Changed expansion module configuration. - Communication failure. - Mismatch vendor code between adapter and expansion module.
Expansion Configuration Failed	Flashing Red	Failed to initialize expansion module. <ul style="list-style-type: none"> - Detect invalid expansion module ID. - Overflow Input/Output size. (244bytes / 244bytes) - Too many expansion module. - Initial protocol failure.

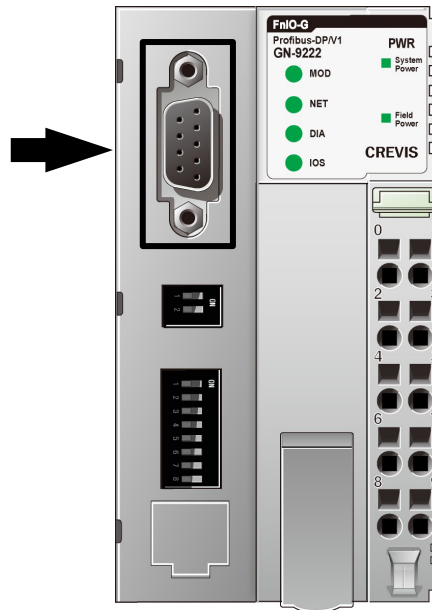
2.3.6. Field Power, System Power LED (Field Power, System Power Status LED)

Status	LED	To indicate
Not supplied field, system power	OFF	Not supplied 24Vdc field power, 5Vdc system power.
Supplied field, system power	Green	Supplied 24Vdc field power, 5Vdc system power.

2.4. GN-9222 Electrical Interface

2.4.1. PROFIBUS Connector

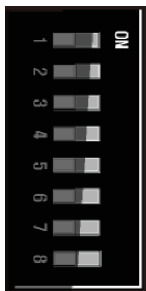
Pin No.	Description
3	RxD / TxD-P
4	CNTR-P
5	DGND
6	VP
8	RXD / TxD-N



2.4.2. Dip Switch

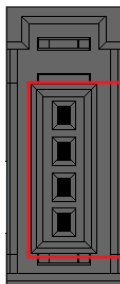


Terminating Resistance	1	2
Applied	On	On
Not applied	Off	Off



Node ID	1	2	3	4	5	6	7	8
1	On	Off	Off	Off	Off	Off	Off	Off
2	Off	On	Off	Off	Off	Off	Off	Off
~								
125	On	Off	On	On	On	On	On	Off

2.4.3. RS232 Port for MODBUS/RTU, Touch Panel or IOGuide

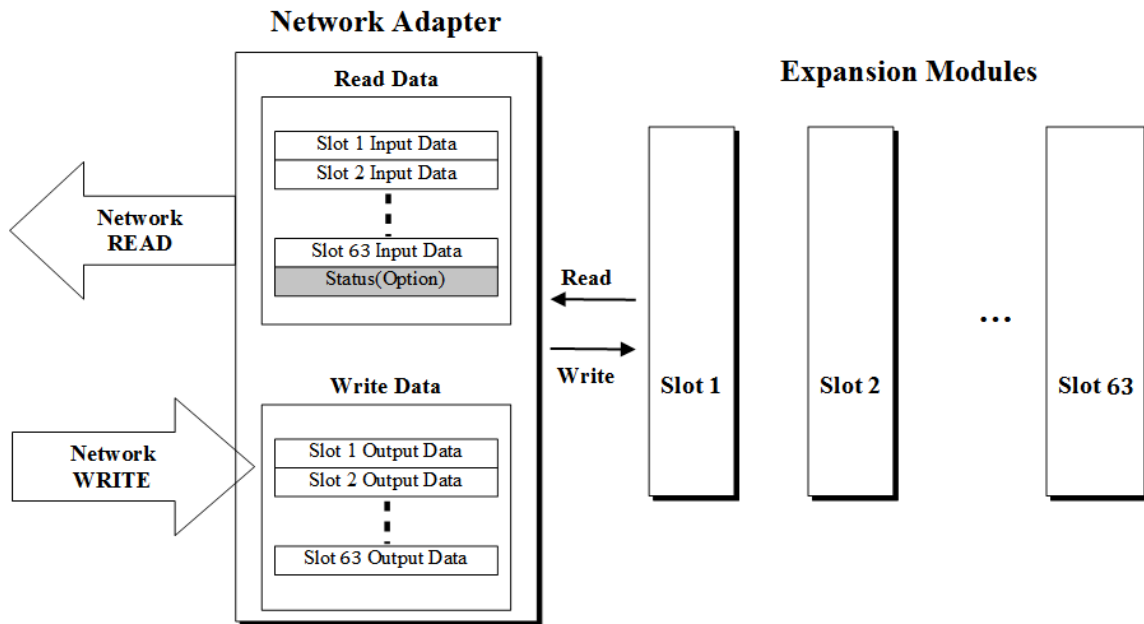


Pin #1
Pin #2
Pin #3
Pin #4

RS232 (37204-62A3-004PL/3M)		
Pin#	Signal Name	Description
1	Reserved	----
2	TXD	RS232 TXD
3	RXD	RS232 RXD
4	GND	RS232 GND

2.5. I/O Process Image Map

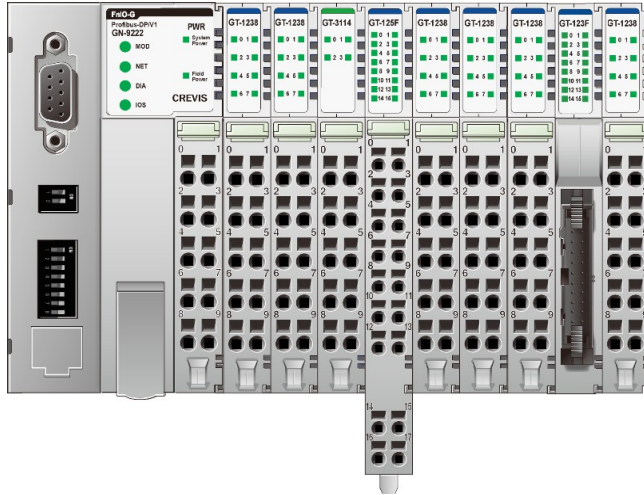
An expansion module may have 3 types of data as I/O data, configuration parameter and memory register. The data exchange between network adapter and expansion modules is done via an I/O process image data by G-Series Internal Bus protocol. The following figure shows the data flow of process image between network adapter and expansion modules.



2.5.1. Example of Input Process Image (Input Register) Map

Input image data depends on slot position and expansion slot data type. Input process image data is only ordered by expansion slot position.

- For example slot configuration



Slot Address	Module Description
#0	PROFIBUS Adapter
#1	8-discrete input
#2	8-discrete input
#3	4-analog input
#4	16-discrete input
#5	8-discrete input
#6	8-discrete input
#7	8-discrete input
#8	16-discrete input
#9	8-discrete input

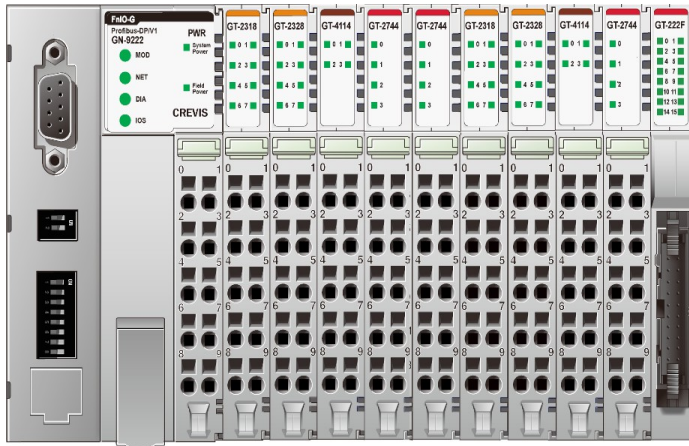
- Input Process Image

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Discrete Input 8 pts (Slot#1)							
1	Discrete Input 8 pts (Slot#2)							
2	Analog Input Ch0 low byte (Slot#3)							
3	Analog Input Ch0 high byte (Slot#3)							
4	Analog Input Ch1 low byte (Slot#3)							
5	Analog Input Ch1 high byte (Slot#3)							
6	Analog Input Ch2 low byte (Slot#3)							
7	Analog Input Ch2 high byte (Slot#3)							
8	Analog Input Ch3 low byte (Slot#3)							
9	Analog Input Ch3 high byte (Slot#3)							
10	Discrete Input 8 pts (Slot#4)							
11	Discrete Input 8 pts (Slot#4)							
12	Discrete Input 8 pts (Slot#5)							
13	Discrete Input 8 pts (Slot#6)							
14	Discrete Input 8 pts (Slot#7)							
15	Discrete Input 8 pts (Slot#8)							
16	Discrete Input 8 pts (Slot#8)							
17	Discrete Input 8 pts (Slot#9)							

2.5.2. Example of Output Process Image (Output Register) Map

Output image data depends on slot position and expansion slot data type. Output process image data is only ordered by expansion slot position.

For example slot configuration



Slot Address	Module Description
#0	PROFIBUS Adapter
#1	8-discrete output
#2	8-discrete output
#3	4-analog output
#4	4-relay output
#5	4-relay output
#6	8-discrete output
#7	8-discrete output
#8	4-analog output
#9	4-relay output
#10	16-discrete output

- **Output Process Image**

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	Discrete Output 8 pts (Slot#1)							
1	Discrete Output 8 pts (Slot#2)							
2	Analog Output Ch0 low byte (Slot#3)							
3	Analog Output Ch0 high byte (Slot#3)							
4	Analog Output Ch1 low byte (Slot#3)							
5	Analog Output Ch1 high byte (Slot#3)							
6	Analog Output Ch2 low byte (Slot#3)							
7	Analog Output Ch2 high byte (Slot#3)							
8	Analog Output Ch3 low byte (Slot#3)							
9	Analog Output Ch3 high byte (Slot#3)							
10	Discrete Output low 4 pts (Slot#4)							
12	Discrete Output low 4 pts (Slot#5)							
13	Discrete Output low 8 pts (Slot#6)							
14	Discrete Output low 8 pts (Slot#7)							
15	Analog Output Ch0 low byte (Slot#8)							
16	Analog Output Ch0 high byte (Slot#8)							
17	Analog Output Ch1 low byte (Slot#8)							
18	Analog Output Ch1 high byte (Slot#8)							
19	Analog Output Ch2 low byte (Slot#8)							
20	Analog Output Ch2 high byte (Slot#8)							
21	Analog Output Ch3 low byte (Slot#8)							
22	Analog Output Ch3 high byte (Slot#8)							
24	Discrete Output low 8 pts (Slot#9)							
25	Discrete Output low 8 pts (Slot#10)							
26	Discrete Output high 8 pts (Slot#10)							

3. Parameter

3.1. GN-9222

- Parameter length: 3 bytes
- Parameter Data:

Offset	Access	Decimal Bit	Description	Default Value
3	R/W	00-01	Word Data Format 0: Little-Endian(INTEL) 1: Big-Endian (MOTOROLA)	1 (Motorola)
		02-07	Reserved	0
4	R/W	00-04	Reserved	0
		05	PROFIBUS Disconnection 0: Fault values are switched 1: Hold last state	1
		06-07	Reserved	0
5	R/W	00-07	Reserved	0

4. DPV1 Service

4.1. MSAC1 Read(PROFIBUS-DP Extensions to EN50170)

■ MSAC1 Read request

Parameter	Description
Remote Address	Slave Address(0~99)
Slot Number	Slot Number : 0(GN-9222)
Index	253 : FW revision (Data size : 4 bytes) 254 : Vendor code (Data size : 1 byte)
Length	1~128

■ MSAC1 Read Confirm(+)

Parameter	Description
Remote Address	Slave Address(0~99)
Length	1~128
Data	User Data

■ MSAC1 Read Confirm (-)

Parameter	Description
Remote Address	Slave Address(0~99)
Error Decode	-
Error code 1	-
Error code 2	Reserved

4.2. MSAC1 Write(PROFIBUS-DP Extensions to EN50170)

■ MSAC1 Write request

Parameter	Description
Remote Address	Slave Address(0~99)
Slot Number	Slot Number : 0(GN-9222)
Index	254 : Vendor code (Data size : 5 bytes)
Length	1~128
Data	Vendor(Don't mention this to the User manual) - Data[0] : 0xAE - Data[1] : 0xBE - Data[2] : 0xCE - Data[3] : 0xDE - Vendor code

■ **MSAC1 Write Confirm(+)**

Parameter	Description
Remote Address	Slave Address(0~99)
Length	1~128

■ **MSAC1 Write Confirm (-)**

Parameter	Description
Remote Address	Slave Address(0~99)
Error Decode	-
Error_code 1	-
Error_code 2	Reserved

Parameter	Description
C Ref	Communication-Reference
Error Decode	-
Error_code 1	-
Error_code 2	Reserved

4.3. Error Decode (PROFIBUS-DP Extensions to EN50170)

- ▶ 0~127 : Reserved
- ▶ 128 : DPV1
- ▶ 129 ~253 : Reserved
- ▶ 254 : FMS
- ▶ 255 : HART

4.4. Error Code_1 (PROFIBUS-DP Extensions to EN50170)

Bit	7	6	5	4	3	2	1	0
1	<ul style="list-style-type: none"> ● Error Class ✓ 0xA : Application class 				<ul style="list-style-type: none"> ● Error code 0 : Read Error 1 : Write Error 2 : Module Failure 3 ~7 : Reserved 8 : Version conflict 9 : Feature not supported 10~15 : User specific 			
2	<ul style="list-style-type: none"> ● Error Class ✓ 0xB : Access class 				<ul style="list-style-type: none"> ● Error code 0 : Invalid index 1 : Write length error 2 : Invalid slot 3 : Type conflict 4 : Invalid area 5 : state conflict 6 : access denied 7 : invalid range 8 : invalid parameter 9 : invalid type 10~15 : User specific 			
3	<ul style="list-style-type: none"> ● Error Class ✓ 0xC : Resource class 				<ul style="list-style-type: none"> ● Error code 0 : read constrain conflict 1 : Write constrain conflict 2 : Resource busy 3 : Resource unavailable 4 ~7 : Reserved 8~15 : User specific 			
4	<ul style="list-style-type: none"> ● Error Class ✓ 0xD : GN-9222 Specific Class 				<ul style="list-style-type: none"> ● Error code 1 : Slot Parameter write error 2 : Read memory error 3 : Write memory error 			

5. Diagnostics

Byte	Item	Description
0	Station status 1	PROFIBUS Standard Diagnostic
1	Station status 2	
2	Station status 3	
3	Master Address	
4	PNO Ident Number High	
5	PNO Ident Number Low	

- **Station Status 1~3**

Station status			
1	Bit 7	Master_Lock	Slave is parameterized by another master
	Bit 6	Prm_Fault	Last parameter telegram faulty
	Bit 5	Inv_Sl_Res.	Implausible response of the slave
	Bit 4	Not_Supp.	Unknown command detected by the slave
	Bit 3	Ext_Diag	The area Ext_Diag is used for extended diagnostic
	Bit 2	Cfg_Fault	Slave is wrong parameterized
	Bit 1	Sta_Not_Rdy	Slave not ready
	Bit 0	Sta_Non_Exist.	Slave not responding
2	Bit 7	Deactivated	Slave not projected
	Bit 6	Reserved	Reserved
	Bit 5	Sync_Mode	Sync-command active
	Bit 4	Freeze_Mode	Freeze-command active
	Bit 3	WD_On	Watchdog activated
	Bit 2	1	Always 1
	Bit 1	Stat_Diag	Get diagnostic from slave, till bit is released
	Bit 0	Prm_	Slave must be parameterized
3	Bit 7	Ext_Diag_Ovfl.	The slave has more diagnostic data available than it can send
-	Bit 6~0	Reserved	Reserved

6. MODBUS Interface

6.1. MODBUS Interface Register/Bit Map

- Register Map

Start Address	Read/Write	Description	Func. Code
0x0000 ~	Read	Process input image registers (Real Input Register)	3,4,23
0x0800 ~	Read/Write	Process output image registers (Real Output Register)	3,16,23
0x1000 *	Read	Adapter Identification special registers.	3,4,23
0x1020 *	Read/Write	Adapter Watchdog, other time special register.	3,4,6,16,23
0x1100 *	Read/Write	Adapter Information special registers.	3,4,6,16,23
0x2000 *	Read/Write	Expansion Slot Information special registers.	3,4,6,16,23

* The special register map must be accessed by read/write of every each address (one address).

- Register Map

Start Address	Read/Write	Description	Func. Code
0x0000~	Read	Process input image bits All input registers area are addressable by bit address. Size of input image bit is size of input image register * 16.	2
0x1000~	Read/Write	Process output image bits All output registers area are addressable by bit address. Size of output image bit is size of output image register * 16.	1,5,15

6.2. Supported MODBUS Function Codes

Function Code	Function	Description
1(0x01)	Read Coils (Read output bit)	This function code is used to read from 1 to 2000 contiguous status of coils in a remote device. The Request PDU specifies the starting address, i.e. the address of the first coil specified, and the number of coils. In the PDU Coils are addressed starting at zero. Therefore coils numbered 1-16 are addressed as 0-15. The coils in the response message are packed as one coil per bit of the data field. Status is indicated as 1= ON and 0= OFF.
2(0x02)	Read Discrete Inputs (Read input bit)	This function code is used to read from 1 to 2000 contiguous status of discrete inputs in a remote device. The Request PDU specifies the starting address, i.e. the address of the first input specified, and the number of inputs. In the PDU Discrete Inputs are addressed starting at zero. Therefore Discrete inputs numbered 1-16 are addressed as 0-15. The discrete inputs in the response message are packed as one input per bit of the data field. Status is indicated as 1= ON; 0= OFF.
3(0x03)	Read Holding Registers (Read output word)	This function code is used to read the contents of a contiguous block of holding registers in a remote device. The Request PDU specifies the starting register address and the number of registers. The register data in the response message are packed as two bytes per register, with the binary contents right justified within each byte. For each register, the first byte contains the high order bits and the second contains the low order bits.

4(0x04)	Read Input Registers (Read input word)	This function code is used to read from 1 to approx. 125 contiguous input registers in a remote device. The Request PDU specifies the starting register address and the number of registers. The register data in the response message are packed as two bytes per register, with the binary contents right justified within each byte. For each register, the first byte contains the high order bits and the second contains the low order bits.
5(0x05)	Write Single Coil (Write one bit output)	This function code is used to write a single output to either ON or OFF in a remote device. The requested ON/OFF state is specified by a constant in the request data field. A value of FF 00 hex requests the output to be ON. A value of 00 00 requests it to be OFF. All other values are illegal and will not affect the output.
6(0x06)	Write Single Register (Write one word output)	This function code is used to write a single holding register in a remote device. Therefore register numbered 1 is addressed as 0. The normal response is an echo of the request, returned after the register contents have been written.
8(0x08)	Diagnostics (Read diagnostic register) *Refer to the 6.2.1	MODBUS function code 08 provides a series of tests for checking the communication system between a client (Master) device and a server (Slave), or for checking various internal error conditions within a server. The function uses a two-byte sub-function code field in the query to define the type of test to be performed. The server echoes both the function code and sub-function code in a normal response. Some of the diagnostics cause data to be returned from the remote device in the data field of a normal response.
15(0x0F)	Write Multiple Coils (Write a number of output bits)	This function code is used to force each coil in a sequence of coils to either ON or OFF in a remote device. The Request PDU specifies the coil references to be forced. Coils are addressed starting at zero. A logical '1' in a bit position of the field requests the corresponding output to be ON. A logical '0' requests it to be OFF. The normal response returns the function code, starting address, and quantity of coils forced.
16(0x10)	Write Multiple registers (Write a number of output words)	This function code is used to write a block of contiguous registers (1 to approx. 120 registers) in a remote device. The requested written values are specified in the request data field. Data is packed as two bytes per register. The normal response returns the function code, starting address, and quantity of registers written.
23(0x17)	Read/Write Multiple registers (Read a number of input words /Write a number of output words)	Read a number of input words /Write a number of output words This function code performs a combination of one read operation and one write operation in a single MODBUS transaction. The write operation is performed before the read. The request specifies the starting address and number of holding registers to be read as well as the starting address, number of holding registers, and the data to be written. The byte count specifies the number of bytes to follow in the write data field. The normal response contains the data from the group of registers that were read. The byte count field specifies the quantity of bytes to follow in the read data field.

– Refer to MODBUS APPLICATION PROTOCOL SPECIFICATION V1.1a

6.2.1. 8 (0x08) Diagnostics

Sub-function 0x0000(0) Return Query Data

The data passed in the request data field is to be returned (looped back) in the response.
The entire response message should be identical to the request.

Sub-function	Data Field (Request)	Data Field (Response)	Description
0x0000(0)	Any	Echo Request Data	

Sub-function 0x0001(1) Restart Communications Option

The remote device could be initialized and restarted, and all of its communications event counters are cleared. Especially, data field 0x55AA make the remote device to restart with factory default setup of EEPROM.

Sub-function	Data Field (Request)	Data Field (Response)	Description
0x0001(1)	0x0000, 0xFF00	Echo Request Data	Reset Only

Sub-function 0x000A(10) Clear Counters and Diagnostic Register

The goal is to clear all counters and the diagnostic register. Counters are also cleared upon power-up.

Sub-function	Data Field (Request)	Data Field (Response)	Description
0x000A(10)	0x0000	Echo Request Data	

Sub-function 0x000B(11) Return Bus Message Count

The response data field returns the quantity of messages that the remote device has detected on the communications system since its last restart, clear counters operation, or power-up.

Sub-function	Data Field (Request)	Data Field (Response)	Description
0x000B(11)	0x0000	Total Message Count	

Sub-function 0x000D(13) Return Bus Exception Error Count

The response data field returns the quantity of MODBUS exception responses returned by the remote device since its last restart, clear counters operation, or power-up.

Exception responses are described and listed in section 3.2.11.

Sub-function	Data Field (Request)	Data Field (Response)	Description
0x000D(13)	0x0000	Exception Error Count	

Sub-function 0x000E(14) Return Slave Message Count

The response data field returns the quantity of messages addressed to the remote device, or broadcast, that the remote device has processed since its last restart, clear counters operation, or power-up.

Sub-function	Data Field (Request)	Data Field (Response)	Description
0x000E(14)	0x0000	Slave Message Count	

Sub-function 0x000F(15) Return Slave No Response Count

The response data field returns the quantity of messages addressed to the remote device for which it has returned no response (neither a normal response nor an exception response), since its last restart, clear counters operation, or power-up.

Sub-function	Data Field (Request)	Data Field (Response)	Description
0x000F(15)	0x0000	Slave No Response Count	

Sub-function 0x0064(100) Return Slave ModBus, Expansion Module Status

The response data field returns the status of ModBus and expansion module addressed to the remote device. This status values are identical with status 1 word of input process image. Refer to 2.4.2.

Sub-function	Data Field (Request)	Data Field (Response)	Description
0x0064(100)	0x0000	ModBus, RBUS Status	Same as status 1 word

6.2.2. Error Response

In an exception response, the server sets the MSB of the function code to 1. This makes the function code value in an exception response exactly 80 hexadecimal higher than the value would be for a normal response.

- **Exception Codes**

Exception Code	Name	Description
01	Illegal Function	The function code received in the query is not an allowable action for the server (or slave).
02	Illegal Data Address	The data address received in the query is not an allowable address for the server (or slave).
03	Illegal Data Value	A value contained in the query data field is not an allowable value for server (or slave).
04	Slave Device Failure	An unrecoverable error occurred while the server (or slave) was attempting to perform the requested action.
05	Acknowledge	The server (or slave) has accepted the request and is processing it, but a long duration of time will be required to do so.
06	Slave Device Busy	Specialized use in conjunction with programming commands. The server (or slave) is engaged in processing a long-duration program command. The client (or master) should retransmit the message later when the server (or slave) is free.
08	Memory Parity Error	The server (or slave) attempted to read record file, but detected a parity error in the memory. The client (or master) can retry the request, but service may be required on the server (or slave) device.
0A	Gateway Path Unavailable	Specialized use in conjunction with gateways, indicates that the gateway was unable to allocate an internal communication path from the input port to the output port for processing the request.

6.3. MODBUS Special Register Map

The special register map can be accessed by function code 3, 4, 6 and 16. Also the special register map must be accessed by read/write of every each address (one address).

6.3.1. Adapter Identification Special Resgister (0x1000, 4096)

Address	Access	Type, Size	Description
0x1000(4096)	Read	1word	Vendor ID = 0x029D(669), Crevis. Co., Ltd.
0x1001(4097)	Read	1word	Device type = 0x000C, Network Adapter
0x1002(4098)	Read	1word	Product Code = 0x9040
0x1003(4099)	Read	1word	Firmware revision, if 0x0100, revision 1.00
0x1004(4100)	Read	2words	Product unique serial number
0x1005(4101)	Read	String up to 34bytes	Product name string (ASCII) "GN-9222 Profibus,G-Series"
0x1006(4102)	Read	1word	Sum check of EEPROM
0x1010(4112)	Read	2words	Firmware release date
0x101E(4126)	Read	7words - 1word - 1word - 1word - 1word - 1word - 2words	Composite Id of following address 0x1100(4352), Modbus Node. (Fixed 0x0001) 0x1000(4096), Vendor ID 0x1001(4097), Device type 0x1002(4098), Product code 0x1003(4099), Firmware revision 0x1004(4100), Product serial number

- String Type consists of valid string length (first 1word) and array of characters

6.3.2. Adapter Information Special Register (0x1100, 4352)

Address	Access	Type, Size	Description																								
0x1102(4354)	Read	1 word	Start address of input image word register. =0x0000																								
0x1103(4355)	Read	1 word	Start address of output image word register. =0x0800																								
0x1104(4356)	Read	1 word	Size of input image word register.																								
0x1105(4357)	Read	1 word	Size of output image word register.																								
0x1106(4358)	Read	1 word	Start address of input image bit. = 0x0000																								
0x1107(4359)	Read	1 word	Start address of output image bit. =0x1000																								
0x1108(4360)	Read	1 word	Size of input image bit.																								
0x1109(4361)	Read	1 word	Size of output image bit.																								
0x110D(4365)	Read	1 word	Field Power & Node ID Dip Switch State. ex) Field Power ON, Dip SW On = 10000000 11111111																								
0x110E(4366)	Read	upto 33words	Expansion slot's GT-number including GN First 1 word is adapter's number, if GN-9289, then 0x9289																								
0x1110(4368)	Read	1 word	Number of expansion slot																								
0x1113(4371)	Read	upto 33word	Expansion slot Module Id. Refer to Appendix A.1 Product List. First 1 word is adapter's module id.																								
0x1119(4377)	Read	1 word	Hi byte is ModBus status, low byte is internal status. Zero value means 'no error'. <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">ModBus status</th> <th style="width: 50%;">Internal bus status(G-Bus)</th> </tr> </thead> <tbody> <tr> <td></td> <td>0x00 : OPERATING</td> </tr> <tr> <td></td> <td>0x01 : COMMUNICATION_FAULT</td> </tr> <tr> <td></td> <td>0x02 : CONNECT_FAULT</td> </tr> <tr> <td></td> <td>0x03 : CONFIG_FAULT</td> </tr> <tr> <td></td> <td>0x04 : NO_EXPANSION</td> </tr> <tr> <td></td> <td>0x05 : NVALID_ATTR_VALUE</td> </tr> <tr> <td></td> <td>0x06 : TOO_MUCH_DATA</td> </tr> <tr> <td></td> <td>0x07 : VENDOR_ERROR</td> </tr> <tr> <td></td> <td>0x08 : NOT_EXPECTED_SLOT</td> </tr> <tr> <td></td> <td>0x09 : CRC_ERROR</td> </tr> <tr> <td></td> <td>0x80 : NO FIELD POWER</td> </tr> </tbody> </table>	ModBus status	Internal bus status(G-Bus)		0x00 : OPERATING		0x01 : COMMUNICATION_FAULT		0x02 : CONNECT_FAULT		0x03 : CONFIG_FAULT		0x04 : NO_EXPANSION		0x05 : NVALID_ATTR_VALUE		0x06 : TOO_MUCH_DATA		0x07 : VENDOR_ERROR		0x08 : NOT_EXPECTED_SLOT		0x09 : CRC_ERROR		0x80 : NO FIELD POWER
ModBus status	Internal bus status(G-Bus)																										
	0x00 : OPERATING																										
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	0x05 : NVALID_ATTR_VALUE																										
	0x06 : TOO_MUCH_DATA																										
	0x07 : VENDOR_ERROR																										
	0x08 : NOT_EXPECTED_SLOT																										
	0x09 : CRC_ERROR																										
	0x80 : NO FIELD POWER																										
0x111D(4381)	Read	1 word	Adapter G-Series Revision. If 0x013C, G-Series Revision is 1.60																								

*** After the system is reset, the new "Set Value" action is applied.

** If the slot location is changed, set default value automatically (all expansion slot are live).

6.3.3. Expansion Slot Information Special Resister (0x2000, 8192)

Each expansion slot has 0x20(32) address offset and same information structure.

Slot#1 0x2000(8192)~0x201F(8223)	Slot#2 0x2020(8224)~0x203F(8255)
Slot#3 0x2040(8256)~0x205F(8287)	Slot#4 0x2060(8288)~0x207F(8319)
Slot#5 0x2080(8320)~0x209F(8351)	Slot#6 0x20A0(8352)~0x20BF(8383)
Slot#7 0x20C0(8384)~0x20DF(8415)	Slot#8 0x20E0(8416)~0x20FF(8447)
Slot#9 0x2100(8448)~0x211F(8479)	Slot#10 0x2120(8480)~0x213F(8511)
Slot#11 0x2140(8512)~0x215F(8543)	Slot#12 0x2160(8544)~0x217F(8575)
Slot#13 0x2180(8576)~0x219F(8607)	Slot#14 0x21A0(8608)~0x21BF(8639)
Slot#15 0x21C0(8640)~0x21DF(8671)	Slot#16 0x21E0(8672)~0x21FF(8703)
Slot#17 0x2200(8704)~0x221F(8735)	Slot#18 0x2220(8736)~0x223F(8767)
Slot#19 0x2240(8768)~0x225F(8799)	Slot#20 0x2260(8800)~0x227F(8831)
Slot#21 0x2280(8832)~0x229F(8863)	Slot#22 0x22A0(8864)~0x22BF(8895)
Slot#23 0x22C0(8896)~0x22DF(8927)	Slot#24 0x22E0(8928)~0x22FF(8959)
Slot#25 0x2300(8960)~0x231F(8991)	Slot#26 0x2320(8992)~0x233F(9023)
Slot#27 0x2340(9024)~0x235F(9055)	Slot#28 0x2360(9056)~0x237F(9087)
Slot#29 0x2380(9088)~0x239F(9119)	Slot#30 0x23A0(9120)~0x23BF(9151)
Slot#31 0x23C0(9152)~0x23DF(9183)	Slot#32 0x23E0(9184)~0x23FF(9215)
Slot#33 0x2400(9216)~0x241F(9247)	Slot#34 0x2420(9248)~0x243F(9279)
.....	
Slot#63 0x27C0(10176)~0x27DF(10207)	

Address Offset	Expansion Slot#1	Expansion Slot#2	Expansion Slot#3	Expansion Slot#4	.....	Expansion Slot#63
+ 0x00(+0)	0x2000(8192)	0x2020(8224)	0x2040(8256)	0x2060(8288)	.....	0x27C0(10176)
+ 0x01(+1)	0x2001(8193)	0x2021(8225)	0x2041(8257)	0x2061(8289)	.....	0x27C1(10177)
+ 0x02(+2)	0x2002(8194)	0x2022(8226)	0x2042(8258)	0x2062(8290)	.....	0x27C2(10178)
+ 0x03(+3)	0x2003(8195)	0x2023(8227)	0x2043(8259)	0x2063(8291)	.....	0x27C3(10179)
+ 0x04(+4)	0x2004(8196)	0x2024(8228)	0x2044(8260)	0x2064(8292)	.....	0x27C4(10180)
+ 0x05(+5)	0x2005(8197)	0x2025(8229)	0x2045(8261)	0x2065(8293)	.....	0x27C5(10181)
+ 0x06(+6)	0x2006(8198)	0x2026(8230)	0x2046(8262)	0x2066(8294)	.....	0x27C6(10182)
+ 0x07(+7)	0x2007(8199)	0x2027(8231)	0x2047(8263)	0x2067(8295)	.....	0x27C7(10183)
+ 0x08(+8)	0x2008(8200)	0x2028(8232)	0x2048(8264)	0x2068(8296)	.....	0x27C8(10184)
+ 0x09(+9)	0x2009(8201)	0x2029(8233)	0x2049(8265)	0x2069(8297)	.....	0x27C9(10185)
+ 0x0A(+10)	0x200A(8202)	0x202A(8234)	0x204A(8266)	0x206A(8298)	.....	0x27CA(10186)
+ 0x0B(+11)	0x200B(8203)	0x202B(8235)	0x204B(8267)	0x206B(8299)	.....	0x27CB(10187)
+ 0x0C(+12)	0x200C(8204)	0x202C(8236)	0x204C(8268)	0x206C(8300)	.....	0x27CC(10188)
+ 0x0D(+13)	0x200D(8205)	0x202D(8237)	0x204D(8269)	0x206D(8301)	.....	0x27CD(10189)
+ 0x0E(+14)	0x200E(8206)	0x202E(8238)	0x204E(8270)	0x206E(8302)	.....	0x27CE(10190)
+ 0x0F(+15)	0x200F(8207)	0x202F(8239)	0x204F(8271)	0x206F(8303)	.....	0x27CF(10191)
+ 0x10(+16)	0x2010(8208)	0x2030(8240)	0x2050(8272)	0x2070(8304)	.....	0x27D0(10192)
+ 0x11(+17)	0x2011(8209)	0x2031(8241)	0x2051(8273)	0x2071(8305)	.....	0x27D1(10193)
+ 0x12(+18)	0x2012(8210)	0x2032(8242)	0x2052(8274)	0x2072(8306)	.....	0x27D2(10194)
+ 0x13(+19)	0x2013(8211)	0x2033(8243)	0x2053(8275)	0x2073(8307)	.....	0x27D3(10195)
+ 0x14(+20)	0x2014(8212)	0x2034(8244)	0x2054(8276)	0x2074(8308)	.....	0x27D4(10196)
+ 0x15(+21)	0x2015(8213)	0x2035(8245)	0x2055(8277)	0x2075(8309)	.....	0x27D5(10197)
+ 0x16(+22)	0x2016(8214)	0x2036(8246)	0x2056(8278)	0x2076(8310)	.....	0x27D6(10198)
+ 0x17(+23)	0x2017(8215)	0x2037(8247)	0x2057(8279)	0x2077(8311)	.....	0x27D7(10199)
+ 0x18(+24)	0x2018(8216)	0x2038(8248)	0x2058(8280)	0x2078(8312)	.....	0x27D8(10200)
+ 0x19(+25)	0x2018(8217)	0x2038(8249)	0x2058(8281)	0x2078(8313)	.....	0x27D9(10201)
+ 0x1A(+26)	0x201A(8218)	0x203A(8250)	0x205A(8282)	0x207A(8314)	.....	0x27DA(10202)
+ 0x1B(+27)	0x201B(8219)	0x203B(8251)	0x205B(8283)	0x207B(8315)	.....	0x27DB(10203)
+ 0x1C(+28)	0x201C(8220)	0x203C(8252)	0x205C(8284)	0x207C(8316)	.....	0x27DC(10204)
+ 0x1D(+29)	0x201D(8221)	0x203D(8253)	0x205D(8285)	0x207D(8317)	.....	0x27DD(10205)
+ 0x1E(+30)	0x201E(8222)	0x203E(8254)	0x205E(8286)	0x207E(8318)	.....	0x27DE(10206)
+ 0x1F(+31)	0x201F(8223)	0x203F(8255)	0x205F(8287)	0x207F(8319)	.....	0x27DF(10207)

Address Offset	Access	Type, Size	Description
+ 0x02(+2) **	Read	1 word	Input start register address of input image word this slot.
+ 0x03(+3) **	Read	1 word	Input word's bit offset of input image word this slot.
+ 0x04(+4) **	Read	1 word	Output start register address of output image word this slot.
+ 0x05(+5) **	Read	1 word	Output word's bit offset of output image word this slot.
+ 0x06(+6) **	Read	1 word	Input bit start address of input image bit this slot.
+ 0x07(+7) **	Read	1 word	Output bit start address of output image bit this slot.
+ 0x08(+8) **	Read	1 word	Size of input bit this slot
+ 0x09(+9) **	Read	1 word	Size of output bit this slot
+ 0x0A(+10)**	Read	n words	Read input data this slot
+ 0x0B(+11)**	Read/Write	n words	Read/write output data this slot
+ 0x0E(+14)	Read	1 word	RT-number, if RT-1238, returns 0x1238
+ 0x0F(+15)	Read	String up to 74bytes	First 1 word is length of valid character string. If RT-1238, returns "00 1E 52 54 2D 31 32 33 38 2C 20 38 44 49 2C 20 32 34 56 64 63 2C 20 55 6E 69 76 65 72 73 61 6C 00 00" Valid character size = 0x001E =30 characters, "RT-1238, 8DI, 24Vdc, Universal"
+ 0x10(+16)	Read	1 word	Size of configuration parameter byte
+ 0x11(+17)**	Read/Write	n words	Read/write Configuration parameter data, up to 8byte. Refer to A.2 ***
+ 0x17(+23)**	Read/Write	2 words	Firmware Revision
+ 0x19(+25)**	Read/Write	2 words	Firmware release date.

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- * After the system is reset, the new “Set Value” action is applied.
 - ** Nothing of output, input, memory or configuration parameter corresponding slot returns Exception 02.

6.4. MODBUS Reference

MODBUS Reference Documents

<http://www.modbus.org>

MODBUS Tools

<http://www.modbustools.com>, modbus poll

<http://www.win-tech.com>, modscan32