

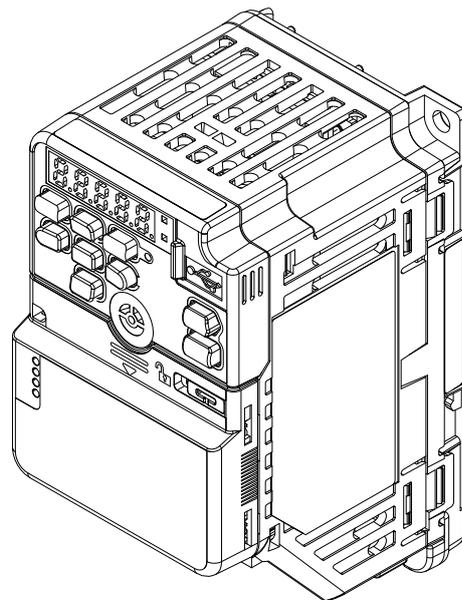
YASKAWA AC Drive GA501

BACnet/IP

Technical Manual

Model CIPR-GA51xxxxxxxxx

To correctly use the product, read this manual thoroughly and keep it for easy reference, inspection, and maintenance.
Make sure that the end user receives this manual.



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1 Preface and Safety

YASKAWA Electric supplies component parts for use in a wide variety of industrial applications. The selection and application of YASKAWA products remain the responsibility of the equipment designer or end user.

YASKAWA accepts no responsibility for the way its products are incorporated into the final system design. Under no circumstances should any YASKAWA product be incorporated into any product or design as the exclusive or sole safety control. Without exception, all controls should be designed to detect faults dynamically and fail safely under all circumstances. All products designed to incorporate a component part manufactured by YASKAWA must be supplied to the end user with appropriate warnings and instructions as to the safe use and operation of that part. Any warnings provided by YASKAWA must be promptly provided to the end user. YASKAWA offers an express warranty only as to the quality of its products in conforming to standards and specifications published in the manual. **NO OTHER WARRANTY, EXPRESS OR IMPLIED, IS OFFERED.** YASKAWA assumes no liability for any personal injury, property damage, losses, or claims arising from misapplication of its products.

◆ Applicable Documentation

Document	Description
YASKAWA AC Drive GA501 BACnet/IP Technical Manual Manual No.: SIEP C710617 4V (This book)	The Technical Manual contains detailed information about the BACnet/IP protocol. For questions, contact Yaskawa or a Yaskawa representative.
YASKAWA AC Drive GA501 Manuals	Drive manuals contain basic installation and wiring information in addition to detailed parameter setting, fault diagnostic, and maintenance information. The manuals also include important information about parameter settings and tuning the drive. The drive product Quick Setup Procedures/Quick Start Guides are packaged with the drive. The most recent versions of these documents are available for download on these documentation websites; U.S.: https://www.yaskawa.com/ga501manuals , Europe: https://www.yaskawa.eu.com/manuals/ga501 , China: https://yaskawa.com.cn/manual/ga501g5e.aspx?from=NTdfNF80 , Asia: https://dlc.e-mechatronics.com/dqr/qr/ga501en_AT.html . Refer to the back cover of these documents for other locations. For questions, contact Yaskawa or a Yaskawa representative.

◆ Glossary

Terms	Definition
Keypad	<ul style="list-style-type: none"> • HOA Operator • LCD Operator • LED Operator • HOA Keypad • LCD Keypad • LED Keypad
Hex. (Example: 900 (Hex.))	Identifies a unit for hexadecimal number format.

◆ Registered Trademarks

- Modbus TCP/IP is a trademark of Modbus-IDA.
- EtherNet/IP is a registered trademark of Open DeviceNet Vendor Association, Inc. (ODVA).
- EtherCAT® is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.
- PROFINET is a registered trademark of PROFIBUS Nutzerorganisation e.V. (PNO).
- BACnet is a trademark of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).
- MECHATROLINK-4 is a trademark of the MECHATROLINK Members Association (MMA).
- Ethernet is a registered trademark of FUJIFILM Business Innovation Corp.
- Trademarks are the property of their respective owners.

◆ Supplemental Safety Information

Read and understand this manual before installing, operating, or servicing this product. The product must be installed according to this manual and local codes.

The following conventions are used to indicate safety messages in this manual. Failure to heed these messages could result in serious or possibly even fatal injury or damage to the products or to related equipment and systems.

⚠ DANGER *This signal word identifies a hazard that will cause serious injury or death if you do not prevent it.*

⚠ WARNING *This signal word identifies a hazard that can cause death or serious injuries if you do not prevent it.*

⚠ CAUTION *This signal word identifies a hazard that can cause minor or moderate injuries if you do not prevent it.*

NOTICE *This signal word identifies a property damage message that is not related to personal injury.*

■ Section Safety

General Precautions

- The diagrams in this section may include options and drives without covers or safety shields to illustrate details. Be sure to reinstall covers or shields before operating any devices. The option should be used according to the instructions described in this manual.
- The diagrams in this manual are provided as examples only and may not pertain to all products covered by this manual.
- The products and specifications described in this manual or the content and presentation of the manual may be changed without notice to improve the product and/or the manual.
- Contact Yaskawa or a Yaskawa representative and provide the manual number shown on the front cover to order new copies of the manual.

⚠ DANGER *Do not ignore the safety messages in this manual. If you ignore the safety messages in this manual, it will cause serious injury or death. The manufacturer is not responsible for injuries or damage to equipment.*

⚠ WARNING *Electrical Shock Hazard. Do not modify the drive circuitry. Failure to obey can cause serious injury or death, or cause damage to the drive and will void warranty. Yaskawa is not responsible for modifications of the product made by the user.*

NOTICE *Damage to Equipment. Do not use steam or other disinfectants to fumigate wood for packaging the drive. Use alternative methods, for example heat treatment, before you package the components. Gas from wood packaging fumigated with halogen disinfectants, for example fluorine, chlorine, bromine, iodine or DOP gas (phthalic acid ester), can cause damage to the drive.*

2 Overview

This drive provides a communications connection between the drive and a BACnet/IP network.

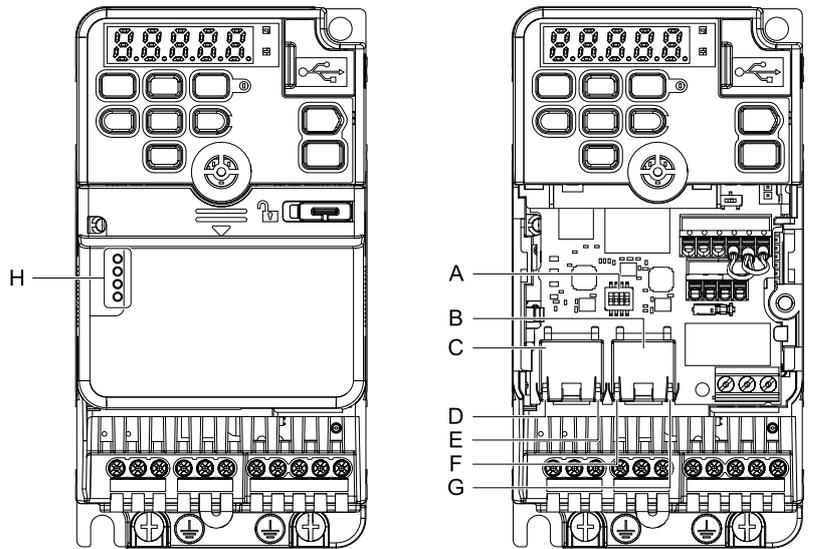
The controller can do these functions:

- Operate the drive
- Monitor the drive operation status
- Change drive parameter settings

BACnet/IP is a communications link to connect building automation devices (for example smart motor controllers, operator interfaces, and variable frequency drives) and control devices (for example, Building Automation Systems and computers) to a network. BACnet/IP is a simple networking solution. BACnet/IP decreases the cost and time to wire and install building automation devices, and it gives the drive to interchange like components from other vendors. BACnet/IP is an open network standard.

3 Component Names

◆ PCB



- A - DIP switch S1
- B - Ethernet connector CN1B (Port 2) (RJ45)
- C - Ethernet connector CN1A (Port 1) (RJ45)
- D - Port 1 LED (LINK/ACT) *1
- E - Port 1 LED (10/100) *1
- F - Port 2 LED (LINK/ACT) *1
- G - Port 2 LED (10/100) *1
- H - Communication status LEDs *1

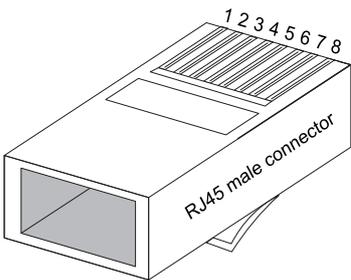
Figure 3.1 PCB Components

*1 Refer to [Communication LED States on page 8](#) for more information about the LEDs.

◆ Communication Connector

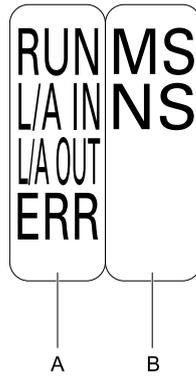
Ports CN1A (Port 1) and CN1B (Port 2) are connection points for male 8-way Ethernet modular RJ45 connectors on customer-supplied communication cables.

Table 3.1 Male 8-way Ethernet Modular Connector (Customer-Supplied)

Male 8-way Ethernet Modular Connector	Pin	Description
	1 (Pair 2)	Transmit data (TXD) +
	2 (Pair 2)	Transmit data (TXD) -
	3 (Pair 3)	Receive data (RXD) +
	4 (Pair 1)	Not used
	5 (Pair 1)	Not used
	6 (Pair 3)	Receive data (RXD) -
	7 (Pair 4)	Not used
	8 (Pair 4)	Not used

◆ Communication LED States

Use LED label B when you use BACnet/IP.



A - For EtherCAT

B - For Modbus TCP/IP, EtherNet/IP, PROFINET, BACnet/IP, MECHATROLINK-4

Figure 3.2 Communication LED Labels

Wait 2 seconds minimum for the power-up diagnostic process to complete before you verify the LED states. The Table 3.2 shows the operating status of the LEDs after the power-up diagnostic LED sequence is complete.

Refer to Table 3.3 for more information about the LEDs.

Table 3.2 Communication LED States

LED Name	Indication		Operating State	Description
	Color	Display		
MS	-	OFF	Power supply off	There is no power to the drive.
	Green	ON	Operating	The communication network is operating normally.
	Green	Flashing	Initializing	The communication network is configuring an IP address.
	Red	ON	Fatal error occurred	The drive detected a fatal (unrecoverable) error.
	Red	Flashing	Non-fatal error occurred	The drive detected a non-fatal (recoverable) error.
NS	-	OFF	Power supply OFF or no BACnet/IP traffic	The drive has not received a BACnet/IP message or command for 2 seconds or longer.
	Green	ON	BACnet/IP message(s) received	The drive received at least one BACnet/IP message in the last 2 seconds.
	Green	Flashing	BACnet/IP command(s) received	The drive received at least one Frequency Reference or Run/Stop BACnet/IP command in the last 2 seconds. This also includes gateway drive commands.
	Red	ON	Communications error (fatal)	The drive detected a duplicate IP address or has a bad IP address configuration.
10/100	Green	OFF	10 Mbps is established	
	Green	ON	100 Mbps is established	
LINK/ACT	-	OFF	Link is not established	
	Green	ON	Link is established	
	Green	Flashing	Link is established and there is network activity	

■ Power-Up Diagnostics

An LED test is performed each time the drive is powered up. The initial boot sequence can take several seconds. After the LEDs complete the diagnostic LED sequence, the drive is successfully initialized. The LEDs then assume operational conditions as shown in Table 3.3.

Table 3.3 Power-Up Diagnostic LED Sequence

Sequence	Module Status (MS)	Network Status (NS)	Time (ms)
1	Green	OFF	250
2	Red	OFF	250
3	Green	OFF	-
4	Green	Green	250
5	Green	Red	250
6	Green	OFF	-

4 Installation

◆ Section Safety

⚠ DANGER *Electrical Shock Hazard. Do not examine, connect, or disconnect wiring on an energized drive. Before servicing, disconnect all power to the equipment and wait for the time specified on the warning label at a minimum. The internal capacitor stays charged after the drive is de-energized. The charge indicator LED extinguishes when the DC bus voltage decreases below 50 Vdc. When all indicators are OFF, measure for dangerous voltages to make sure that the drive is safe. If you do work on the drive when it is energized, it will cause serious injury or death from electrical shock.*

⚠ WARNING *Electrical Shock Hazard. Do not operate the drive when covers are missing. Replace covers and shields before you operate the drive. Use the drive only as specified by the instructions. Some figures in this section include drives without covers or safety shields to more clearly show the inside of the drive. If covers or safety shields are missing from the drive, it can cause serious injury or death.*

⚠ WARNING *Electrical Shock Hazard. Only let approved personnel install, wire, maintain, examine, replace parts, and repair the drive. If personnel are not approved, it can cause serious injury or death.*

⚠ WARNING *Electrical Shock Hazard. Do not remove covers or touch circuit boards while the drive is energized. If you touch the internal components of an energized drive, it can cause serious injury or death.*

⚠ WARNING *Electrical Shock Hazard. Do not use damaged wires, put too much force on the wiring, or cause damage to the wire insulation. Damaged wires can cause serious injury or death.*

⚠ WARNING *Fire Hazard. Tighten all terminal screws to the correct tightening torque. Connections that are too loose or too tight can cause incorrect operation and damage to the drive. Incorrect connections can also cause death or serious injury from fire.*

NOTICE *Damage to Equipment. When you touch the product, make sure that you observe correct electrostatic discharge (ESD) procedures. If you do not follow procedures, it can cause ESD damage to the drive circuitry.*

NOTICE *Damage to Equipment. Do not de-energize the drive while the drive is outputting voltage. Incorrect equipment sequencing can cause damage to the drive.*

NOTICE *Do not operate a drive or connected equipment that has damaged or missing parts. You can cause damage to the drive and connected equipment.*

NOTICE *Use Yaskawa connection cables or recommended cables only. Incorrect cables can cause the drive to function incorrectly.*

NOTICE *Damage to Equipment. Correctly connect the connectors. Incorrect connections can cause malfunction or damage to the equipment.*

NOTICE *Damage to Equipment. Make sure that all connections are correct after you install the drive and connecting peripheral devices. Incorrect connections can cause damage to the product.*

◆ Settings for DIP Switch S1

Use DIP switch S1 on the PCB to select the communication protocol.

Use non-conductive tweezers or a tool with a tip width of approximately 0.5 mm (0.02 in) to set DIP switch S1.

Figure 4.1 shows the default settings for DIP switch S1.

Note:

Remove the front cover to set DIP switch S1.

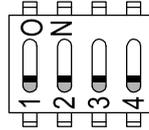


Figure 4.1 Default Settings for DIP Switch S1

When you use BACnet/IP, set DIP switch S1 as shown in [Figure 4.2](#).

Note:

If you set the DIP switch for a different protocol, it will erase all user-entered data from the drive, including the Device Object Name.

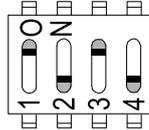


Figure 4.2 BACnet/IP Settings for DIP Switch S1

◆ Communication Cable Specifications

Yaskawa recommends using shielded Cat5e cable. The Yaskawa warranty does not cover other cable types.

Note:

The maximum Ethernet cable length is 100 m (328 ft).

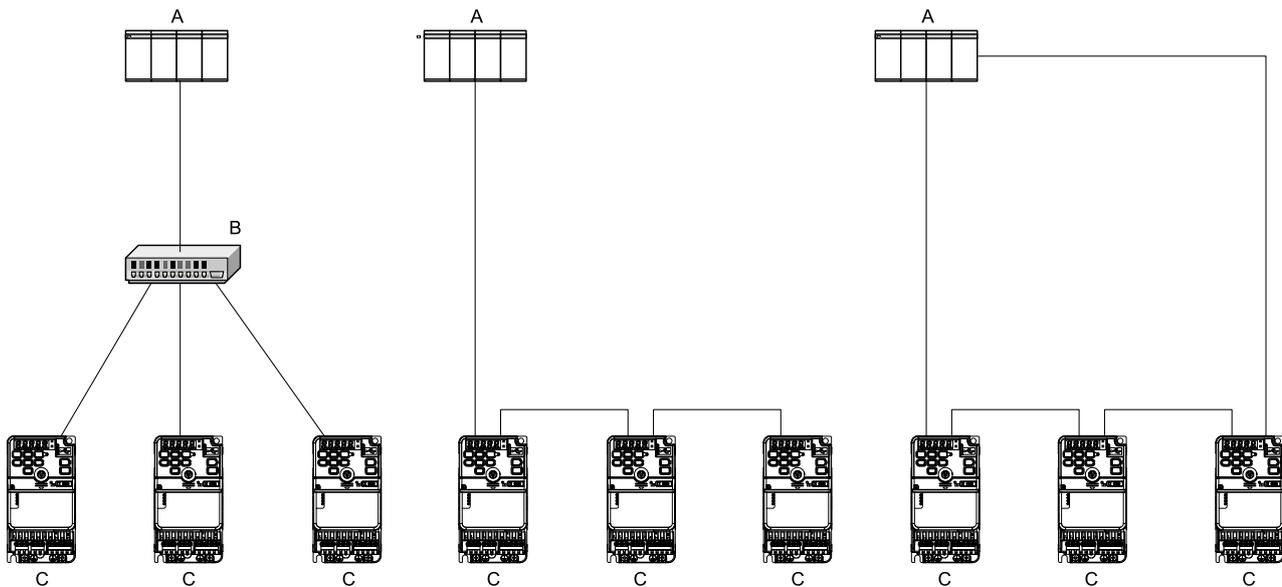
■ Communication Topology Specifications

When you use BACnet/IP, drives can be connected to network in a star, ring, or line topology.

- **Star Topology**
Use either one of the communication connectors CN1A (Port 1) or CN1B (Port 2).
- **Line Topology (Daisy-Chained)**
Use the communication connectors CN1A (Port 1) and CN1B (Port 2) at the same time. A switch is not necessary for this connection.
- **Ring Topology**
Use both communication connectors CN1A (Port 1) and CN1B (Port 2) to create a ring. Ring topologies will use the RSTP protocol.

Note:

For Ring Topology connections, enable the RSTP function with reference to [Rapid Spanning Tree Protocol \(RSTP\) on page 30](#). (The default setting is enabled.)



Star Topology

Line Topology (Daisy-Chained)

Ring Topology

A - Building Automation Controller C - Drive
B - Switch

Figure 4.3 Communication Cable Wiring

5 Related Drive Parameters

These parameters set the drive for operation with BACnet/IP. Make sure that the parameter settings in this table are correct before you start network communications.

Note:

- Hex.: MEMOBUS addresses that you can use to change parameters over network communication are represented in hexadecimal numbers.
- Expert: Some monitors are available in Expert Mode only. When $A1-01 = 3$ [Access Level Selection = Expert Level], Expert Mode monitors can be displayed on the keypad.

No. (Hex.)	Name	Description	Default (Range)
b1-01 (0180)	Frequency Reference Selection 1	Selects the input method for frequency reference. 0 : Keypad 1 : Analog Input 2 : USB 3 : Ethernet Note: Set $b1-01 = 3$ to use Ethernet to control the frequency reference of the drive.	3 (0 - 3)
b1-02 (0181)	Run Command Selection 1	Sets the input method for the Run command. 0 : Keypad 1 : Digital Input 2 : USB 3 : Ethernet Note: Set $b1-02 = 3$ to start and stop the drive with Ethernet.	3 (0 - 3)
F6-01 (03A2)	Communication Error Selection	Selects drive response when the drive detects a <i>bUS</i> [Ethernet Communication Error] error during communications. 0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use $C1-09$) 3 : Alarm Only 4 : Alarm (Run at $d1-04$) 5 : Alarm - Ramp Stop Note: • When you set this parameter to 3 or 4, the drive will continue operation after it detects a fault. Separately prepare safety protection equipment and systems, for example fast-stop switches. • Changes to this parameter take effect immediately. It is not necessary to cycle power on the drive.	1 (0 - 5)
F6-02 (03A3)	Comm External Fault (EF0) Detect	Selects the conditions at which <i>EF0</i> [Ethernet External Fault] is detected. 0 : Always Detected 1 : Detected during RUN Only	0 (0, 1)
F6-03 (03A4)	Comm External Fault (EF0) Select	Selects the operation of the drive when <i>EF0</i> [Ethernet External Fault] is detected. 0 : Ramp to Stop 1 : Coast to Stop 2 : Fast Stop (Use $C1-09$) 3 : Alarm Only Note: When you set this parameter to 3, the drive will continue operation after it detects a fault. Separately prepare safety protection equipment and systems, for example fast stop switches.	1 (0 - 3)
F6-07 (03A8)	Multi-Step Ref @ NetRef/ ComRef	Sets the function that enables and disables the multi-step speed reference when the frequency reference source is NetRef or ComRef (Ethernet or USB communications). 0 : Disable Multi-Step References 1 : Enable Multi-Step References	0 (0, 1)
F6-08 (036A)	Comm Parameter Reset @Initialize	Selects whether communication-related parameters $F6-xx$ and $F7-xx$ are set back to original default values when you use parameter $A1-03$ [Initialize Parameters] to initialize the drive. 0 : No Reset - Parameters Retained 1 : Reset - Back to Factory Default Note: When you set $F6-08$ to 1 and you then use $A1-03$ to initialize the drive, the drive will not change this setting value.	0 (0, 1)
F6-14 (03BB)	Bus Error Auto Reset	Sets the automatic reset function for <i>bUS</i> [Ethernet Communication Error]. 0 : Disabled 1 : Enabled Note: Changes to this parameter take effect immediately. It is not necessary to cycle power on the drive.	0 (0, 1)
F6-15 (0B5B)	Ethernet Parameters Reload	Sets when the drive will activate the $F6-xx/F7-xx$ communications-related parameters that you changed. Use this parameter as an alternative to cycling power to the drive to active parameters. 0 : Reload at Next Power Cycle	0 (0 - 2)

5 Related Drive Parameters

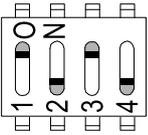
No. (Hex.)	Name	Description	Default (Range)
		1 : Reload Now 2 : Cancel Reload Request Note: <ul style="list-style-type: none"> • F6-15 is reset to 0 after setting 1 or 2. • Changes to this parameter take effect immediately. It is not necessary to cycle power on the drive. 	
F6-48 (02FE)	BACnet Device Object Identifier 0	Sets the Instance Identifier of the BACnet Device Object, where the F6-48 value is the least significant word. Note: This parameter and F6-49 set the Instance Identifier of the BACnet Device Object. Example 1: Set the Device Object Instance Identifier to 1234. 1234 decimal is equal to 4D2 (Hex.). Set F6-48 = 4D2 (Hex.) and F6-49 = 0 (Hex.). Example 2: Set the Device Object Instance Identifier to 1234567. 1234567 decimal is equal to 12D687 (Hex.). Set F6-48 = D687 (Hex.) and F6-49 = 12 (Hex.).	0 (0 - FFFF (Hex.))
F6-49 (02FF)	BACnet Device Object Identifier 1	Sets the Instance Identifier of the BACnet Device Object, where the F6-49 value is the most significant word. Note: This parameter and F6-48 set the Instance Identifier of the BACnet Device Object. Example 1: Set the Device Object Instance Identifier to 1234. 1234 decimal is equal to 4D2 (Hex.). Set F6-48 = 4D2 (Hex.) and F6-49 = 0 (Hex.). Example 2: Set the Device Object Instance Identifier to 1234567. 1234567 decimal is equal to 12D687 (Hex.). Set F6-48 = D687 (Hex.) and F6-49 = 12 (Hex.).	0 (0 - 3F (Hex.))
F7-01 (03E5)	IP Address 1	Sets the static/fixed IP address. Sets the most significant octet. Note: <ul style="list-style-type: none"> • This parameter is only effective when F7-13 = 0 [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set F6-15 = 1 [Ethernet Parameters Reload = Reload Now] for the change to take effect. 	192 (0 - 255)
F7-02 (03E6)	IP Address 2	Sets the static/fixed IP address. Sets the second most significant octet. Note: <ul style="list-style-type: none"> • This parameter is only effective when F7-13 = 0 [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set F6-15 = 1 [Ethernet Parameters Reload = Reload Now] for the change to take effect. 	168 (0 - 255)
F7-03 (03E7)	IP Address 3	Sets the static/fixed IP address. Sets the third most significant octet. Note: <ul style="list-style-type: none"> • This parameter is only effective when F7-13 = 0 [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set F6-15 = 1 [Ethernet Parameters Reload = Reload Now] for the change to take effect. 	1 (0 - 255)
F7-04 (03E8)	IP Address 4	Sets the static/fixed IP address. Sets the fourth most significant octet. Note: <ul style="list-style-type: none"> • This parameter is only effective when F7-13 = 0 [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set F6-15 = 1 [Ethernet Parameters Reload = Reload Now] for the change to take effect. 	20 (0 - 255)
F7-05 (03E9)	Subnet Mask 1	Sets the static/fixed Subnet Mask. Sets the most significant octet. Note: <ul style="list-style-type: none"> • This parameter is only effective when F7-13 = 0 [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set F6-15 = 1 [Ethernet Parameters Reload = Reload Now] for the change to take effect. 	255 (0 - 255)
F7-06 (03EA)	Subnet Mask 2	Sets the static/fixed Subnet Mask. Sets the second most significant octet. Note: <ul style="list-style-type: none"> • This parameter is only effective when F7-13 = 0 [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set F6-15 = 1 [Ethernet Parameters Reload = Reload Now] for the change to take effect. 	255 (0 - 255)
F7-07 (03EB)	Subnet Mask 3	Sets the static/fixed Subnet Mask. Sets the third most significant octet. Note: <ul style="list-style-type: none"> • This parameter is only effective when F7-13 = 0 [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set F6-15 = 1 [Ethernet Parameters Reload = Reload Now] for the change to take effect. 	255 (0 - 255)
F7-08 (03EC)	Subnet Mask 4	Sets the static/fixed Subnet Mask. Sets the fourth most significant octet. Note: <ul style="list-style-type: none"> • This parameter is only effective when F7-13 = 0 [Address Mode at Startup = Static]. • All IP Addresses must be unique. • You must cycle power to the drive or set F6-15 = 1 [Ethernet Parameters Reload = Reload Now] for the change to take effect. 	0 (0 - 255)
F7-09 (03ED)	Gateway Address 1	Sets the static/fixed Gateway address. Sets the most significant octet. Note: <ul style="list-style-type: none"> • This parameter is only effective when F7-13 = 0 [Address Mode at Startup = Static]. 	192 (0 - 255)

No. (Hex.)	Name	Description	Default (Range)
		<ul style="list-style-type: none"> All IP Addresses must be unique. You must cycle power to the drive or set $F6-15 = 1$ [Ethernet Parameters Reload = Reload Now] for the change to take effect. 	
F7-10 (03EE)	Gateway Address 2	<p>Sets the static/fixed Gateway address. Sets the second most significant octet.</p> <p>Note:</p> <ul style="list-style-type: none"> This parameter is only effective when $F7-13 = 0$ [Address Mode at Startup = Static]. All IP Addresses must be unique. You must cycle power to the drive or set $F6-15 = 1$ [Ethernet Parameters Reload = Reload Now] for the change to take effect. 	168 (0 - 255)
F7-11 (03EF)	Gateway Address 3	<p>Sets the static/fixed Gateway address. Sets the third most significant octet.</p> <p>Note:</p> <ul style="list-style-type: none"> This parameter is only effective when $F7-13 = 0$ [Address Mode at Startup = Static]. All IP Addresses must be unique. You must cycle power to the drive or set $F6-15 = 1$ [Ethernet Parameters Reload = Reload Now] for the change to take effect. 	1 (0 - 255)
F7-12 (03F0)	Gateway Address 4	<p>Sets the static/fixed Gateway address. Sets the fourth most significant octet.</p> <p>Note:</p> <ul style="list-style-type: none"> This parameter is only effective when $F7-13 = 0$ [Address Mode at Startup = Static]. All IP Addresses must be unique. You must cycle power to the drive or set $F6-15 = 1$ [Ethernet Parameters Reload = Reload Now] for the change to take effect. 	1 (0 - 255)
F7-13 (03F1)	Address Startup Mode	<p>Selects how the IP address is set.</p> <p>0 : Static 1 : [Not Used/No Function] BOOTP 2 : DHCP</p> <p>Note:</p> <ul style="list-style-type: none"> You must cycle power to the drive or set $F6-15 = 1$ [Ethernet Parameters Reload = Reload Now] for the change to take effect. The host controller will assign the IP addresses when $F7-13 = 1$ or 2. 	2 (0 - 2)
F7-14 (03F2)	Duplex Mode Selection	<p>Sets duplex mode settings (Port 1 (CN1A)/Port 2 (CN1B)).</p> <p>0 : Half/Half (Half Duplex/Half Duplex) 1 : Auto/Auto (Auto Negotiation/Auto Negotiation) 2 : Full/Full (Full Duplex/Full Duplex) 3 : Half/Auto (Half Duplex/Auto Negotiation) 4 : Half/Full (Half Duplex/Full Duplex) 5 : Auto/Half (Auto Negotiation/Half Duplex) 6 : Auto/Full (Auto Negotiation/Full Duplex) 7 : Full/Half (Full Duplex/Half Duplex) 8 : Full/Auto (Full Duplex/Auto Negotiation)</p> <p>Note:</p> <p>You must cycle power to the drive or set $F6-15 = 1$ [Ethernet Parameters Reload = Reload Now] for the change to take effect.</p>	1 (0 - 8)
F7-15 (03F3)	Communication Speed Selection	<p>Sets the communications speed (Port 1 (CN1A)/Port 2 (CN1B)).</p> <p>10 : 10/10 Mbps (10 Mbps/10 Mbps) 100 : 100/100 Mbps (100 Mbps/100 Mbps) 101 : 10/100 Mbps (10 Mbps/100 Mbps) 102 : 100/10 Mbps (100 Mbps/10 Mbps)</p> <p>Note:</p> <ul style="list-style-type: none"> $F7-15$ is only effective when the port is set to half or full duplex in $F7-14$ [Duplex Mode Selection]. You must cycle power to the drive or set $F6-15 = 1$ [Ethernet Parameters Reload = Reload Now] for the change to take effect. 	10 (10 - 102)
F7-50 (1BC1)	BACnet/IP Port	Sets the UDP port on which the drive will receive incoming BACnet messages.	47808 (1024 - 65535)
F7-51 (1BE9)	BBMD Foreign Register Addr 1	Sets the first octet of the IP Address of the BACnet Broadcast Management Device (BBMD) to which the drive will register as a foreign device.	0 (0 - 255)
F7-52 (1BEA)	BBMD Foreign Register Addr 2	Sets the second octet of the IP Address of the BACnet Broadcast Management Device (BBMD) to which the drive will register as a foreign device.	0 (0 - 255)
F7-53 (1BEB)	BBMD Foreign Register Addr 3	Sets the third octet of the IP Address of the BACnet Broadcast Management Device (BBMD) to which the drive will register as a foreign device.	0 (0 - 255)
F7-54 (1BEC)	BBMD Foreign Register Addr 4	Sets the fourth octet of the IP Address of the BACnet Broadcast Management Device (BBMD) to which the drive will register as a foreign device.	0 (0 - 255)
F7-55 (1BED)	BBMD Foreign Port #	Sets the UDP port of the BBMD device to which the drive will register.	47808 (1024 - 65535)
F7-56 (1BEE)	BBMD Foreign Register Time	Sets the time interval in which the drive will repeat BBMD foreign registration.	3600 s (0 - 65535 s)
F7-57 (1BEF)	BACnet/IP BUS Timeout Value	Sets the length of time that the drive will wait after it receives a Run command or frequency reference command before it detects a <i>bUS</i> fault.	3600 s (0 - 65535 s)

5 Related Drive Parameters

No. (Hex.)	Name	Description	Default (Range)
H5-11 (043C)	Communications ENTER Function Selection	Sets when an Enter command is necessary to use BACnet/IP communications to change parameter values. 0 : Parameter changes are activated when ENTER command is written 1 : Parameter changes are activated immediately. No ENTER command is necessary.	1 (0, 1)
o1-03 (0502)	Frequency Display Unit Selection	Sets the display units for the frequency reference and output frequency. Changes to this parameter take effect immediately. It is not necessary to cycle power on the drive. 0 : 0.01 Hz units 1 : 0.01% units 2 : min ⁻¹ (r/min) units 3 : User Units (o1-10 & o1-11)	0 (0 - 3)

Table 5.1 BACnet/IP Monitor

No.	Name	Description	Range
U4-75	Ethernet Protocol	Shows the setting of DIP switch S1. • 75 = Switches 1 and 3 ON, all other OFF (correct for BACnet/IP)  • 00 to 74, 76 to FF = Other switch positions that are incorrect for BACnet/IP Note: BACnet/IP will not operate with these setting values.	00 - FF (Hex.)
U4-76 - U4-78	MAC Address 1	Shows the Main MAC Address. • U4-76: First octet, Second octet • U4-77: Third octet, Fourth octet • U4-78: Fifth octet, Sixth octet	0000 - FFFF (Hex.)
U4-79 - U4-81 Expert	MAC Address 2	Shows the second MAC Address. • U4-79: First octet, Second octet • U4-80: Third octet, Fourth octet • U4-81: Fifth octet, Sixth octet	0000 - FFFF (Hex.)
U4-82 - U4-84 Expert	MAC Address 3	Shows the third MAC Address. • U4-82: First octet, Second octet • U4-83: Third octet, Fourth octet • U4-84: Fifth octet, Sixth octet	0000 - FFFF (Hex.)
U6-80 - U6-83	Ethernet IP Address 1 - 4	Shows the currently available local IP Address. • U6-80: First octet • U6-81: Second octet • U6-82: Third octet • U6-83: Fourth octet	0 - 255
U6-84 - U6-87	Ethernet Subnet 1 - 4	Shows the currently available subnet mask. • U6-84: First octet • U6-85: Second octet • U6-86: Third octet • U6-87: Fourth octet	0 - 255
U6-88 - U6-91	Ethernet Gateway 1 - 4	Shows the currently available gateway address. • U6-88: First octet • U6-89: Second octet • U6-90: Third octet • U6-91: Fourth octet	0 - 255
U6-92	Ethernet Speed	Shows CN1A Port 1 link speed.	10: 10 Mbps 100: 100 Mbps
U6-93	Online Duplex	Shows CN1A Port 1 duplex setting.	0: Half/Half 1: Full/Full
U6-94	Ethernet SPARE 1	Shows CN1B Port 2 link speed.	10: 10 Mbps 100: 100 Mbps
U6-95	Ethernet SPARE 2	Shows CN1B Port 2 duplex setting.	0: Half/Half 1: Full/Full
U6-96	Ethernet SPARE 3	RSTP Role and State. Refer to <i>RSTP Monitor U6-96 on page 31</i> for more information.	0000 - 9292
U6-97	Ethernet SPARE 4	Shows the BACnet/IP-specific software version. (when DIP switches are set for BACnet/IP) Shows overall communication software version (when DIP switches are all OFF)	-
U6-98	Ethernet First Fault	Shows first BACnet/IP fault.	-
U6-99	Ethernet Current Fault	Shows current BACnet/IP fault.	-

6 BACnet/IP Objects Supported

◆ BACnet Interoperability Building Blocks (BIBBs)

A BACnet interoperability building block is a collection of one or more services. [Table 6.1](#) shows the list of BIBBs that are supported by the GA501.

Table 6.1 BACnet Interoperability Building Blocks Supported

Item	Category	Description
DS-RP-B	Data Sharing	Read Property – B (Client)
DS-WP-B	Data Sharing	Write Property – B (Client)
DS-RPM-B	Data Sharing	Read Property Multiple – B (Client)
DS-WPM-B	Data Sharing	Write Property Multiple – B (Client)
DS-COV-B	Data Sharing	Change Of Value – B (Client)
DS-COVP-B	Data Sharing	Change Of Value Property – B (Client)
DM-DDB-B	Device Management	Dynamic Device Binding – B (Client)
DM-DOB-B	Device Management	Dynamic Object Binding – B (Client)
DM-DCC-B	Device Management	Device Communication Control – B (Client)
DM-RD-B	Device Management	Reinitialize Device – B (Client)
DM-TS-B	Device Management	Time Synchronization – B (Client)
DM-UTC-B	Device Management	UTC Time Synchronization – B (Client)

◆ PV Access

The Present Value (PV) of BACnet objects can always be read. Some PVs can also be written or commanded. A commandable PV is almost the same as the writable PV, but the value is actually written into a priority array. The value that has the highest priority in the array will be used by the drive.

Table 6.2 Present Value Access Types and Descriptions

PV Access	Name	Description
C	Commandable	Value written to a priority array. The highest priority value in the array is then written to the drive.
R	Readable	Value is read-only.
W	Writable	Value written to the drive

◆ Supported Properties of Objects

Table 6.3 Object Properties

Property	Object Type					
	Device	Analog Input (AI)	Analog Value (AV)	Binary Input (BI)	Binary Output (BO)	Binary Value (BV)
Active_COV_Subscriptions	Yes	-	-	-	-	-
Active_Text	-	-	-	Yes	Yes	Yes
APDU_Timeout	Yes	-	-	-	-	-
COV_Increment */	-	Yes	Yes	-	-	-
Current_Command_Priority	-	-	Yes	-	Yes	Yes
Database_Revision	Yes	-	-	-	-	-
Daylight_Savings_Status	Yes	-	-	-	-	-
Device_Address_Binding	Yes	-	-	-	-	-
Event_State	-	Yes	Yes	Yes	Yes	Yes
Firmware_Revision	Yes	-	-	-	-	-
Inactive_Text	-	-	-	Yes	Yes	Yes
Local Date	Yes	-	-	-	-	-

6 BACnet/IP Objects Supported

Property	Object Type					
	Device	Analog Input (AI)	Analog Value (AV)	Binary Input (BI)	Binary Output (BO)	Binary Value (BV)
Local Time	Yes	-	-	-	-	-
Location	Yes	-	-	-	-	-
Max_APDU_Length_Accepted	Yes	-	-	-	-	-
Model_Name	Yes	-	-	-	-	-
Number_Of_APDU_Retries	Yes	-	-	-	-	-
Object_Identifier	Yes	Yes	Yes	Yes	Yes	Yes
Object_List	Yes	-	-	-	-	-
Object_Name	Yes	Yes	Yes	Yes	Yes	Yes
Object_Type	Yes	Yes	Yes	Yes	Yes	Yes
Out_Of_Service	-	Yes	Yes	Yes	Yes	Yes
Polarity	-	-	-	Yes	Yes	-
Present_Value	-	Yes	Yes	Yes	Yes	Yes
Priority_Array	-	-	Yes *2	-	Yes	Yes *2
Property_List	Yes	Yes	Yes	Yes	Yes	Yes
Protocol_Object_Types_Supported	Yes	-	-	-	-	-
Protocol_Revision	Yes	-	-	-	-	-
Protocol_Services_Supported	Yes	-	-	-	-	-
Protocol_Version	Yes	-	-	-	-	-
Reliability	-	-	-	-	-	-
Relinquish_Default	-	-	Yes *2	-	Yes	Yes *2
Segmentation_Supported	-	-	-	-	-	-
Status_Flags	-	Yes	Yes	Yes	Yes	Yes
System_Status	Yes	-	-	-	-	-
Units	-	Yes	Yes	-	-	-
UTC_Offset	Yes	-	-	-	-	-
Vendor_Identifier	Yes	-	-	-	-	-
Vendor_Name	Yes	-	-	-	-	-

*1 COV function is only available on objects that are not commandable and not writable.

*2 For Commandable Object Instances only.

◆ Analog Input Objects

Object ID	Object Name (Network Display, if Different)	Modbus Register (Hex.)	Range	Unit	PV Access
A11	Drive Analog Input 1 Level (Drv Anlg In 1 Level)	004E	0 - 100.0	%	R
A16	Display Format o1-03	0502	0 - 65535	-	R
A17	Scale Format b5-20	01E2	0 - 65535	-	R
A18	Inverter Model o2-04	0508	0 - 65535	-	R
A19	Rated Current n9-01	05D0	0 - 6553.5 (for drives rated higher than 11 kVA) 0 - 655.35 (for drives rated 11 kVA or lower)	A	R

◆ Analog Value Objects

Object ID	Object Name (<i>Network Display, if Different</i>)	Modbus Register (Hex.)	Range	Unit	PV Access
AV1 *1	Drive Operation Command (<i>Operation Cmd</i>)	0001	0 - 65535	Bitmap	C
AV2	Frequency Cmd	0002	0 - 600.00	Determined by o1-03	C
AV3	PI Setpoint Cmd	0006	0 - 100.00	%	C
AV4	Drive Multi-Function Output Command (<i>MF Output Cmd</i>) <ul style="list-style-type: none"> Bit 0: Multi-Function Digital Output 1 (terminal MA-MB-MC) Bit 1: Multi-Function Digital Output 2 (Ethernet DO1) Bit 2: Multi-Function Digital Output 3 (Ethernet DO2) Bit 3 to F: Reserved Note: When using AV4, do not use BO1 to BO3.	0009	0 - 255	Bitmap	C
AV5	Drive Reference Select Command (<i>Reference Select Cmd</i>) <ul style="list-style-type: none"> Bit 0: Reserved Bit 1: PID Setpoint Input Bit 2: Reserved Bit 3: Reserved Bit 4: PI2 Target Input Bit 5 to B: Reserved Bit C: Multi-Function Input 5 (Ethernet DI5) Bit D: Multi-Function Input 6 (Ethernet DI6) Bit E: Multi-Function Input 7 (Ethernet DI7) Bit F: Reserved Note: When you use AV5, you must not use AV1, BO4, or BV9 to BV11.	000F	0 - 32767	Bitmap	C
AV6	System Status <ul style="list-style-type: none"> Bit 0: During Run Bit 1: During Reverse Bit 2: System Ready Bit 3: System Faulted Bit 4: Data Setting Error Bit 5: Multi-Function Digital Output 1 (terminal MA-MB-MC) Bit 6: Multi-Function Digital Output 2 (Ethernet DO1) Bit 7: Multi-Function Digital Output 3 (Ethernet DO2) Bit 8 to D: Reserved Bit E: ComRef status Bit F: ComCtrl status 	0020	0 - 65535	Bitmap	R
AV7	Fault Details <ul style="list-style-type: none"> Bit 0: oC [Overcurrent], GF [Ground Fault] Bit 1: ov [Overvoltage] Bit 2: oL2 [Drive Overload] Bit 3: oH1 [Heatsink Overheat], oH2 [External Overheat (H1-XX=B)] Bit 4 to 6: Reserved Bit 7: EF to EF7 [External Fault] Bit 8: CPFxx [Hardware Fault] (includes oAxx) Bit 9: oL1 [Motor Overload], oL3 [Overtorque Detection 1], UL3 [Undertorque Detection 1] Bit A: Reserved Bit B: Uv [Undervoltage] Bit C: Uv1 [DC Bus Undervoltage], Uv2 [Control Power Undervoltage], Uv3 [Soft Charge Answerback Fault] Bit D: LF [Output Phase Loss], PF [Input Phase Loss] 	0021	0 - 65535	Bitmap	R

6 BACnet/IP Objects Supported

Object ID	Object Name (<i>Network Display, if Different</i>)	Modbus Register (Hex.)	Range	Unit	PV Access
	<ul style="list-style-type: none"> • Bit E: CE [Modbus Communication Error], bUS [Ethernet Communication Error] • Bit F: oPr [Keypad Connection Fault] 				
AV8	Data Link Status <ul style="list-style-type: none"> • Bit 0: Writing Data • Bit 1: Reserved • Bit 2: Reserved • Bit 3: Upper or lower limit error • Bit 4: Data conformity error • Bit 5: Writing to EEPROM • Bit 6 to F: Reserved 	0022	0 - 63	Bitmap	R
AV9	Frequency Reference	0040	0 - 600.00	Determined by o1-03	R
AV10	Output Frequency	0041	0 - 600.00	Determined by o1-03	R
AV11	Output Voltage	0045	0 - 6553.5	V	R
AV12	Output Current	0026	0 - 6553.5	A	R
AV13	Output Power	0047	0 - 6553.5 > 11 kVA 0 - 655.35 ≤ 11 kVA	KW	R
AV14	Torque Reference	0048	0 - 100.0	%	R
AV15	Drive Multi-Function Input Status (<i>MF Input Status</i>)	002B	0 - 255	Bitmap	R
AV16	Drive Status 2	002C	0 - 65535	Bitmap	R
AV17	Drive Multi-Function Output Status (<i>MF Output Status</i>)	002D	0 - 135	Bitmap	R
AV18	DC Bus Voltage	0031	0 - 6553.5	V	R
AV19	PI Feedback Level	0038	0 - 100.0	%	R
AV20	PI Input Level	0039	0 - 100.0	%	R
AV21	PI Output Level	003A	0 - 100.0	%	R
AV22	CPU Software	005B	0 - 65535	-	R
AV23	Flash Number	004D	0 - 65535	-	R
AV25	KVA Setting	0508	-	Enumerated Data Vendor Specific	R
AV26	Control Method	0043	-	Enumerated Data Vendor Specific	R
AV27	Accel Time	0200	0 - 6000.0	Sec	W
AV28	Decel Time	0201	0 - 6000.0	Sec	W
AV29	Parameter Number	#### Register number to access	0 - 65535	-	W
AV30	Parameter Data	#### Write data or read data of the register set in AV29	0 - 65535	-	W
AV33	Drive kWh consumed (<i>kWh consumed</i>)	005C - 005D	0 - 999999999	kWh	R
AV35	Drive Run Time	004C	0 - 65535	Hours	R
AV36	Output Freq in %	003F	0 - 100.00	%	R
AV37	Output Freq in RPM	003E	0 - 65535	RPM	R
AV38	Torque Iq (U6-01)	0051	0 - 6553.5	%	R
AV39	Drive Lo/Re Status	004B	0 - 2	-	R
AV40	Last Drive Fault	0081	0 - 65535	-	R
AV42	Current Sys Fault (<i>Current Sys Flt</i>)	0080	0 - 65535	-	R

*1 Use with caution because bits 4 to A of AV1 will be logically ORed with the physical digital inputs. This can cause hard-wired Normally Closed inputs to operate incorrectly.

◆ Binary Input Objects

Object ID	Object Name (Network Display, if Different)	Modbus Register (Hex.)	Active Text	Inactive Text	PV Access
BI1	Drive Input Terminal 1 (Input Terminal 1)	002B: Bit 0	ON	OFF	R
BI2	Drive Input Terminal 2 (Input Terminal 2)	002B: Bit 1	ON	OFF	R
BI3	Drive Input Terminal 3 (Input Terminal 3) Monitors the Ethernet DI3 state.	002B: Bit 2	ON	OFF	R
BI4	Drive Input Terminal 4 (Input Terminal 4) Monitors the Ethernet DI4 state.	002B: Bit 3	ON	OFF	R
BI5	Drive Input Terminal 5 (Input Terminal 5) Monitors the Ethernet DI5 state.	002B: Bit 4	ON	OFF	R
BI6	Drive Input Terminal 6 (Input Terminal 6) Monitors the Ethernet DI6 state.	002B: Bit 5	ON	OFF	R
BI7	Drive Input Terminal 7 (Input Terminal 7) Monitors the Ethernet DI7 state.	002B: Bit 6	ON	OFF	R
BI8	Drive MF Output 1 (Multi Function Out 1)	0020: Bit 5	ON	OFF	R
BI9	Drive MF Output 2 (Multi Function Out 2) Monitors the Ethernet DO1 state.	0020: Bit 6	ON	OFF	R
BI10	Drive MF Output 3 (Multi Function Out 3) Monitors the Ethernet DO2 state.	0020: Bit 7	ON	OFF	R
BI28	Drive Fault Status	004B: Bit 7	FAULT	OK	R
BI29	Drive Alarm Status	004B: Bit 6	ALARM	OK	R
BI31	Safe Torque Off HW Status (Saf Trq Off Hw Stat)	0020: Bit 12	ALARM	OK	R
BI32	Safe Torque Off Status (Saf Trq Off Stat)	0020: Bit 13	ALARM	OK	R

◆ Binary Output Objects

Object ID	Object Name	Modbus Register (Hex.)	Active Text	Inactive Text	PV Access
BO1	MF Output, MA-MB-MC Set H2-01 = F to use	0009: Bit 0	ON	OFF	C
BO2	MF Output, P1-C1 Set H2-02 = F to use Sets Ethernet DO1.	0009: Bit 1	ON	OFF	C
BO3	MF Output, P2-C2 Set H2-03 = F to use Sets Ethernet DO2.	0009: Bit 2	ON	OFF	C
BO4	Ref Sel: PI Setpoint	000F: Bit 1	ON	OFF	C
BO5	Ref Sel:Term S5 IN Sets Ethernet DI5.	0001: Bit 8	ON	OFF	C
BO6	Ref Sel:Term S6 IN Sets Ethernet DI6.	0001: Bit 9	ON	OFF	C
BO7	Ref Sel:Term S7 IN Sets Ethernet DI7.	0001: Bit A	ON	OFF	C

◆ Binary Value Objects

Object ID	Object Name (Network Display, if Different)	Modbus Register (Hex.)	Active Text	Inactive Text	PV Access
BV1	Run FWD Cmd	0001: Bit 0	RUN	OFF	C
BV2	Run REV Cmd	0001: Bit 1	REV	OFF	C
BV3	Drive EF0 (Ext Fault Cmd)	0001: Bit 2	FAULT	OFF	C
BV4	Drive Fault Reset (Fault Reset Cmd)	0001: Bit 3	RESET	OFF	C
BV5	Drive Com Net Command (Com Net Cmd)	-	COM	LOCAL	C
BV6	Drive Com Control Command (Com Control Cmd)	-	COM	LOCAL	C
BV7	Drive Multi-Function Input 3 Command (MF Input 3 Cmd) Accesses Ethernet DI3.	0001: Bit 6	ON	OFF	C
BV8	Drive Multi-Function Input 4 Command (MF Input 4 Cmd) Accesses Ethernet DI4.	0001: Bit 7	ON	OFF	C
BV9	Drive Multi-Function Input 5 Command (MF Input 5 Cmd) Accesses Ethernet DI5.	0001: Bit 8	ON	OFF	C
BV10	Drive Multi-Function Input 6 Command (MF Input 6 Cmd) Accesses Ethernet DI6.	0001: Bit 9	ON	OFF	C
BV11	Drive Multi-Function Input 7 Command (MF Input 7 Cmd) Accesses Ethernet DI7.	0001: Bit A	ON	OFF	C
BV13	RUN-STOP	0020: Bit 0	RUN	OFF	R
BV14	REV-FWD	0020: Bit 1	REV	FWD	R
BV15	READY	004B: Bit 5	READY	OFF	R
BV16	FAULT	0020: Bit 3	FAULTED	OFF	R
BV17	Data Set Error	004B: Bit 8	ERROR	OFF	R
BV18	Overcurrent – Ground Fault (Overcurrent– Gnd Flt)	0021: Bit 0	OC – GF	OFF	R
BV19	Main Circuit Overvoltage (Main Ckt Overvoltage)	0021: Bit 1	OV	OFF	R
BV20	Drive Overload	0021: Bit 2	OL2	OFF	R
BV21	Drive Overheat	0021: Bit 3	OH1-OH2	OFF	R
BV22	Fuse Blown	0021: Bit 5	PUF	OFF	R
BV23	PI Feedback Loss	0021: Bit 6	FBL	OFF	R
BV24	External Fault	0021: Bit 7	EF0 – EF	OFF	R
BV25	Hardware Error	0021: Bit 8	CPF	OFF	R
BV26	Motor Overload – Overtorque (Mtr OvrLd – OvrTorque)	0021: Bit 9	OL1 – OL3	OFF	R
BV27	Overspeed	0021: Bit A	OS –DEV	OFF	R
BV28	Main Circuit Undervoltage (Main Ckt Undrvoltage)	0021: Bit B	UV	OFF	R
BV29	MCU, Control Power Supply Error (MCU Cntrl Pwr Sy Err)	0021: Bit C	UV1-2-3	OFF	R
BV30	Output Phase Loss	0021: Bit D	LF	OFF	R
BV31	BUS Fault	0021: Bit E	BUS	OFF	R
BV32	Operator Disconnect	0021: Bit F	OPR	OFF	R
BV33	Operating	002C: Bit 0	OPERATING	OFF	R
BV34	Zero Speed	002C: Bit 1	ON	OFF	R

Object ID	Object Name (Network Display, if Different)	Modbus Register (Hex.)	Active Text	Inactive Text	PV Access
BV35	Frequency Agree	002C: Bit 2	ON	OFF	R
BV36	Desired Frequency Agree (Desired Freq Agree)	002C: Bit 3	ON	OFF	R
BV37	Frequency Detect 1	002C: Bit 4	ON	OFF	R
BV38	Frequency Detect 2	002C: Bit 5	ON	OFF	R
BV39	Drive Startup Complete (Drv Startup Complete)	002C: Bit 6	ON	OFF	R
BV40	Low Voltage Detect	002C: Bit 7	ON	OFF	R
BV41	Base Block	002C: Bit 8	ON	OFF	R
BV42	Frequency Reference Mode (Frequency Ref Mode)	002C: Bit 9	LOCAL	COM	R
BV43	Run Command Mode	002C: Bit A	LOCAL	COM	R
BV44	Over Torque Detect	002C: Bit B	ON	OFF	R
BV45	Frequency Reference Loss (Frequency Ref Loss)	002C: Bit C	ON	OFF	R
BV46	Retry Error	002C: Bit D	ON	OFF	R
BV55	Parameter Accept	Executes the RAM enter command.	ON	OFF	W
BV56	Parameter Enter	Executes the ROM enter command.	ON	OFF	W

◆ Device Object

Table 6.4 Device Objects

Property	Description
Active COV Subscriptions	Contains a list of all active COV subscriptions
APDU Timeout	10000 milliseconds (fixed)
Application Software Version	"VST9070xx" (fixed)
Database Revision	0
Daylight Savings Status	TRUE or FALSE
Device Address Binding	-
Firmware Revision	3.0x (fixed)
Local Date	Read from the drive (if available). Can also be set over the network.
Local Time	Read from the drive (if available). Can also be set over the network.
Location	Settable via the network. If not set, it will default to the drive model number and serial number. Example: "CIPR-GA51U4005 S/N:1W221325769xxxx"
Max APDU Length Accepted	1476 bytes (fixed)
Model Name	Drive model number and serial number. Example: "CIPR-GA51U4005 S/N:1W221325769xxxx"
Number of APDU Retries	0 (fixed)
Object Identifier	Instance: Numeric value set by F6-49 and F6-48 Type: "OBJECT_DEVICE" (fixed)
Object List	<List of all available objects>
Object Name	Settable via the network. If not set, it will default to: "Yaskawa" + "VFD" or "BYP" + "ID" + F6-49 (Hex.) + F6-48 (Hex.) Example: "Yaskawa VFD ID092A5A"
Object Type	8: Object Device (fixed)
Protocol Object Types Supported	Analog Input, Analog Value, Binary Input, Binary Output, Binary Value, Device, Network Port
Protocol Revision	19 (fixed)
Protocol Services Supported	Subscribe COV, Read Property, Read Property Multiple, Write Property, Write Property Multiple, Device Communication Control, Reinitialize Device, Time Synchronization, Who Has, Who Is, UTC Time Synchronization, Subscribe COV Property

Property	Description
Protocol Version	1 (fixed)
Segmentation Supported	3: None
System Status	0: Operational 4: Non Operational (faulted)
UTC Offset	Settable from the network. Units are "minutes".
Vendor Identifier	141 (fixed)
Vendor Name	Yaskawa (fixed)

◆ Network Port Object

Table 6.5 Network Port Objects

Property	Description
APDU Length	1476 (fixed)
BACnet IP Mode	0: Normal or 1: Foreign
BACnet IP UDP Port	Set by F7-50
Changes Pending	TRUE or FALSE
Foreign Device BBMD Address	Settable over network or using drive parameters: IP Address: Set by F7-51 to F7-54 Port: Set by F7-55
Foreign Device Subscription Lifetime	Settable over network or using F7-56 (seconds)
IP Address	Settable over network, set by F7-01 to F7-04, or set by DHCP server
IP Default Gateway	Settable over network, set by F7-09 to F7-12, or set by DHCP server
IP DHCP Enable	Settable over network or set by F7-13 (0 = FALSE, 1 or 2 = TRUE).
IP DNS Server	DNS server address assigned from DHCP server.
IP Subnet Mask	Settable over network, set by F7-05 to F7-08, or set by DHCP server
Link Speed	Network speed (bits per second)
MAC Address	Current IP address and port (IP1 : IP2 : IP3 : IP4 : Port Byte H : Port Byte L)
Network Number	-
Network Number Quality	-
Network Type	5: IPV4 (fixed)
Object Identifier	Instance: 1 (fixed) Type: OBJECT_NETWORK_PORT 1 (fixed)
Object Type	56: Object Network Port (fixed)
Out Of Service	FALSE (fixed)
Protocol Level	2: BACnet Application (fixed)
Reference Port	4194303 (fixed)
Reliability	0: No Fault Detected (fixed)
Status Flags	0000 (fixed)

7 Web Interface

The drive contains a series of web pages that let you use a standard web browser to view status and diagnostic information.

You can access the web page through a self-contained web server at port 80. Type the IP address of the drive into a web browser to access the Home page.

Example: <http://192.168.1.20>

If you do not know the IP address, use monitors *U6-80 to U6-83 [Ethernet IP Address 1 to Ethernet IP Address 4]* on the keypad to read the IP address of the drive. Refer to [Table 5.1](#) for more information.

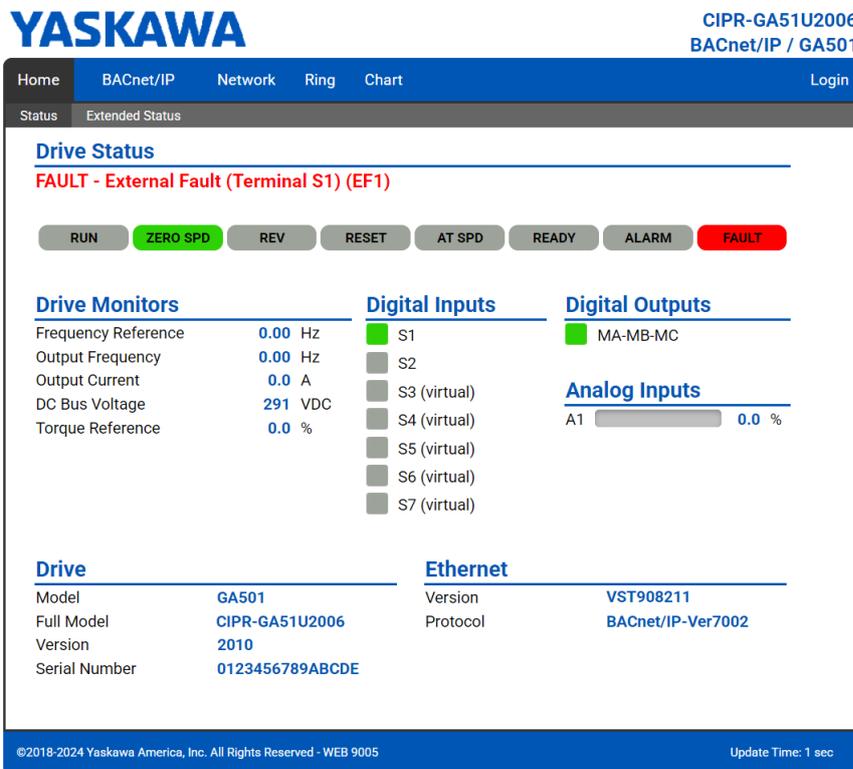
◆ Home Page

The Home page shows the status of the drive and the I/O. It also shows identifying information about the drive.



Figure 7.1 Home Page View

When a fault or minor fault occurs in the drive, the details of the fault or minor fault are displayed on the Home page.



If a fault or minor fault occurs in the drive and only the fault or minor fault code is displayed on the Home page, refer to the drive manuals for details on the fault or minor fault.

YASKAWA CIPR-GA51U2006
BACnet/IP / GA501

Home BACnet/IP Network Ring Chart Login

Status Extended Status

Drive Status

FAULT - Code 71H

RUN ZERO SPD REV RESET AT SPD READY ALARM FAULT

Drive Monitors		Digital Inputs		Digital Outputs	
Frequency Reference	0.00 Hz	<input type="checkbox"/> S1	<input checked="" type="checkbox"/> MA-MB-MC		
Output Frequency	0.00 Hz	<input type="checkbox"/> S2			
Output Current	0.0 A	<input type="checkbox"/> S3 (virtual)			
DC Bus Voltage	291 VDC	<input type="checkbox"/> S4 (virtual)			
Torque Reference	0.0 %	<input type="checkbox"/> S5 (virtual)			
		<input type="checkbox"/> S6 (virtual)			
		<input type="checkbox"/> S7 (virtual)			

Drive		Ethernet	
Model	GA501	Version	VST908211
Full Model	CIPR-GA51U2006	Protocol	BACnet/IP-Ver7002
Version	2010		
Serial Number	0123456789ABCDE		

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◆ BACnet/IP Page

The BACnet/IP page shows basic information about the protocol.

YASKAWA CIPR-GA51U2006
BACnet/IP / GA501

Home BACnet/IP Network Ring Chart Login

BACnet/IP Device Object

ID # 16
Name Yaskawa VFD ID000010
Location CIPR-GA51U2006 S/N:0123456789ABCDE

Current BACnet/IP Settings		System	
Address	192.168.1.20	Status	Ready
Port	47808	Current Time	12:08 AM
Bus Timeout (secs)	3600	Current Date	1/01/2016

Time of Last	
Operation Command	-None-
Speed Command	-None-
Seconds Since Last Command Received	519

BBMD		Counters	
IP Mode	Normal	BACnet Commands Rx	0
Address	192.168.1.68	BACnet Messages Rx	125
Port	47808	BACnet Messages Tx	126
Foreign Register Time (secs)	3600	COV Subscriptions	0

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Figure 7.2 BACnet/IP Page View

◆ Network Page

The Network page shows the status of the drive network traffic and the status of open I/O connections.

CIPR-GA51U2006
BACnet/IP / GA501

YASKAWA

Home BACnet/IP **Network** Ring Chart Login

Identity		Packet Counters		
IP Address	192.168.1.20	Ok	Tx	Rx
Subnet Mask	255.255.255.0	Errors	849	1015
Gateway Address	192.168.1.1	Dropped	0	0
MAC Address	00:20:B5:52:01:1C			
Address Mode	Static			
Status		Interface Counters		
		Port 1	Port 2	
Link Status	Active	Active		
Speed	100 Mbps	100 Mbps	In Octets	137089 0
Duplex	Full	Full	In Ucast Packets	925 0
Auto-Negotiation	Successful	Successful	In NUCast Packets	192 0
			Out Octets	336720 21044
			Out Ucast Packets	845 0
			Out NUCast Packets	46 238
Misc		Media Counters		
		Port 1	Port 2	
Retry	0	Alignment Errors	0	0
Collisions	0	FCS Errors	0	0
Current Connections	0	Single Collisions	0	0
		Multiple Collisions	0	0
		Late Collisions	0	0
		Deferred Collisions	0	0
		Excessive Collisions	0	0
		Frame Too Large	0	0

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Figure 7.3 Network Page View

Table 7.1 Network Monitor Descriptions

Name	Description
Address Mode	Either static IP address or DHCP.
Alignment Errors	Cumulative number of errors for uneven packets lengths.
Auto-Negotiation	If auto-negotiation is enabled, this will show the status of the negotiation.
Collisions	Cumulative number of collisions (half duplex only) reported by the MAC/PHY (Media Access Control/Physical Layer).
Current Connections	Current number of open connections.
Deferred Collisions	Cumulative number of deferred collisions.
Duplex	Display either Full or Half.
Excessive Collisions	Cumulative number of excessive collisions.
FCS Errors	Cumulative number of frame check sequence errors.
Frame Too Large	Cumulative number of frames that exceed the maximum frame size.
Gateway Address	The Gateway IP Address.
In NUCast Packets	Cumulative number of non-unicast packets received.
In Octets	Cumulative number of incoming octets.
In Ucast Packets	Cumulative number of unicast packets received.
IP Address	IP Address.
Late Collisions	Cumulative number of late collisions.
Link Status	Active if the cable is plugged in, or inactive if no cable.
MAC Address	MAC Address.
Msg Rx Dropped	Cumulative number of messages dropped due to input network buffer being full and unable to hold the new message.
Msg Rx Errors	Cumulative number of receive errors reported by the MAC/PHY (Media Access Control/Physical Layer).
Msg Rx OK	Cumulative number of messages received successfully.
Msg Tx Dropped	Cumulative number of messages dropped due to output network buffer being full and unable to hold the new message.
Msg Tx Errors	Cumulative number of transmit errors reported by the MAC/PHY (Media Access Control/Physical Layer).
Msg Tx OK	Cumulative number of messages transmit successfully.
Multiple Collisions	Cumulative number of multiple collisions.

Name	Description
Out NUcast Packets	Cumulative number of non-unicast packets sent.
Out Octets	Cumulative number of outgoing octets.
Out Ucast Packets	Cumulative number of unicast packets sent.
Single Collisions	Cumulative number of single collisions.
Speed	Connection speed, either 10 Mbps or 100 Mbps.
Subnet Mask	Subnet Mask.
Tx Retry	Cumulative number of retransmits due to busy medium reported by the MAC/PHY (Media Access Control/Physical Layer).

Note:

Cumulative counters are reset when the power supply is cycled.

◆ Ring Page

The Ring page shows the status of the RSTP network. RSTP can be enabled and disabled from this page, and the priority can be modified. To change either of these values, you must be logged into the page first.

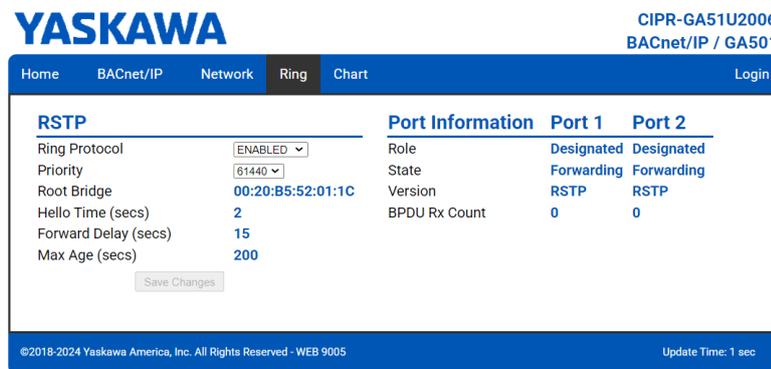


Figure 7.4 Ring Page View

■ RSTP

Ring Protocol

After setting the setting value to [ENABLED], click [Save Changes] to enable RSTP.

Priority

The RSTP Priority controls which bridge in the network becomes the root bridge. A lower value in the [Priority] field indicates a higher priority. The [Priority] field ranges from 0 to 61440 in increments of 4096. The drive defaults to the lowest priority, 61440. Refer to [Table 7.2](#) for information on [Priority] field setting.

Table 7.2 Priority Values

0	16384	32678	49152
4096	20480	36864	53248
8192	24576	40960	57344
12288	28672	45056	61440

To change the priority in [Priority] field, select the desired priority from [Table 7.2](#) and click [Save Changes].

Root Bridge

This field displays the MAC address of the root bridge on the network.

Hello Time (secs)

This field displays and indicates how often the bridge packets will be sent out. This value is set by the root bridge.

Forward Delay (secs)

The Forward Delay is displayed in seconds. This value is set by the root bridge.

Max Age (secs)

The Max Age is displayed in seconds. This value is set by the root bridge and indicates how long a message can be passed along before being discarded.

■ Port Information

Role

The Role field shows how the port is being used. Refer to [Table 7.3](#) for the seven settings in the [Role] field.

Table 7.3 Port Role Values

Port Role	Description
Unknown	An unknown error has occurred within RSTP.
Root	This port leads to the root bridge.
Designated	This port leads away from the root bridge.
Alternate	This port is an alternate path to the root bridge.
Backup	This port is an alternate path away from the root bridge.
Disabled	This port does not have an active link.
N/A	RSTP is disabled.

State

The [State] field indicates if the port is accepting and sending messages. The four possible values for [State] field and the features of each state are shown in [Table 7.4](#).

Table 7.4 State Values

State	Accept Packets	Forward Packets	Learn MAC Addresses
Discarding	NO	NO	NO
Learning	NO	NO	YES
Forwarding	YES	YES	YES
Disabled	RSTP is disabled.		

Version

In the [Version] field, when an STP-only node is detected on the network, this port operates in STP mode and displays [STP]. [RSTP] will be displayed in all other cases. RSTP supports normal RSTP mode or STP mode.

Port BPDU Rx Count

The [Port BPDU Rx Count] field shows the number of BPDU packets received on that port. In general, root ports receive far more BPDU packets than designated ports.

◆ Chart Page

The Chart page can be used to monitor one signal from a predefined list.

- Frequency Reference
- Output Frequency
- Output Current
- Motor Speed
- Torque Reference
- DC Bus Voltage
- Terminal Analog Input 1

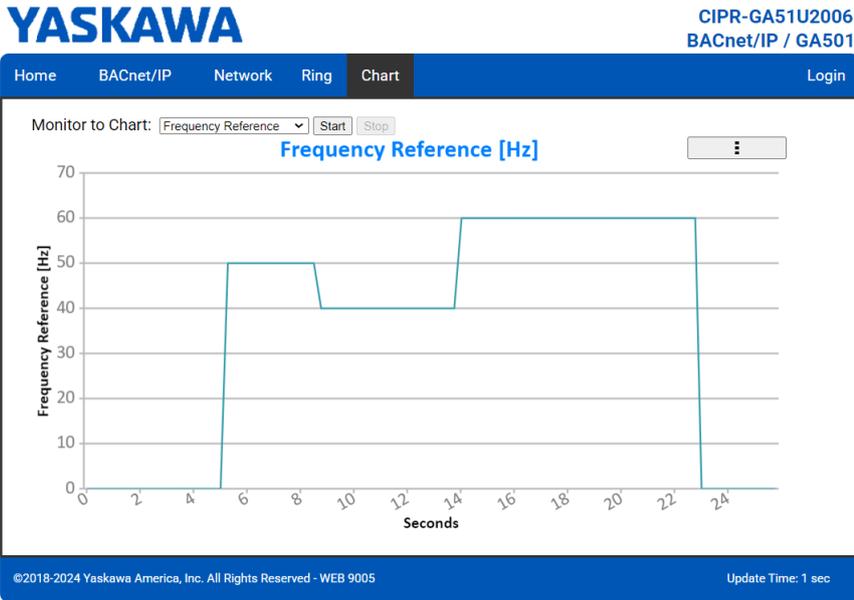


Figure 7.5 Chart Page View

◆ Email Alerts Page

The Email Alerts page allows the user to configure four Email Fault/Alarm conditions. When the condition is true, one email will be sent to the provided email address. Another email will not be sent until the condition becomes false and then true again. A 30-second timer prevents emails from being sent when conditions reoccur immediately after being removed. The timer helps limit the amount of emails sent regarding the same intermittent condition and helps to reduce network traffic by reducing emails about reoccurring errors.

Click [Save Email Settings] when you save the entered information.

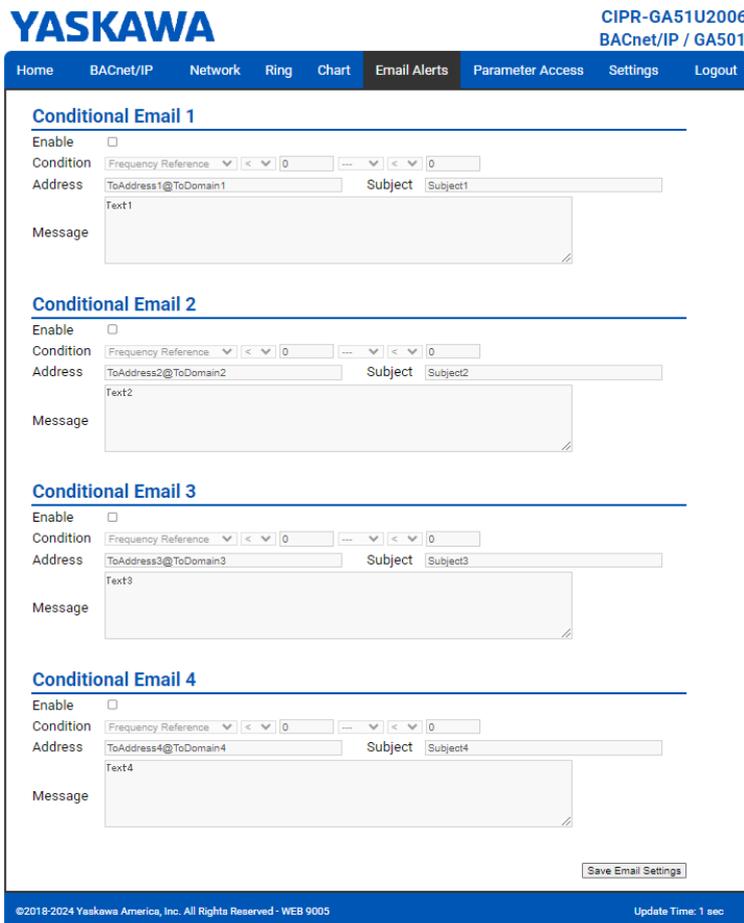


Figure 7.6 Email Alerts Page View

■ Procedure: Conditional Email Set-up

1. Click the “Enable” check box to enable the alert.
2. Define the condition that will trigger the email by selecting a monitor parameter, a comparator, and a value.
Set the conditions to send alerts from the “Condition” drop-down selection. If choosing only one condition and no OR or AND are needed, set the “OR/AND” drop-down selection to “—”.
3. Enter the email address where the alert will be sent.
4. Enter the message that will appear in the email contents.
5. Enter the email subject.

◆ Parameter Access Page

The Parameter Access page lets you read and write parameters, monitors and other MEMOBUS/Modbus registers from the drive.

Figure 7.7 Parameter Access Page View

The MEMOBUS/Modbus address for the drive parameter being accessed must be entered in hexadecimal.

Clicking [Read] will load and display the current value of the given MEMOBUS/Modbus Address.

Clicking [Set] will save the given value to the given MEMOBUS/Modbus address.

After a [Read] or [Set] command is given, Status will display [Waiting] while the action is being carried out, then [Read Successful] or [Write Successful] is displayed when finished.

◆ Settings Page

The Settings page sets web page behavior parameters. Access is restricted unless a valid password is entered. The default password is yaskawa.

Figure 7.8 Settings Page View

■ Security Login

Click “Login” and enter a valid password. The button text will change to “Log out” and the status will change to “Logged in”.

Note:

The default security password is “yaskawa”.

This password can be changed in the “Change Password” section of the Settings page.

Entering a valid password allows access to the settings in the Settings page, Email Alerts page, and the Parameter Access page.

■ Webpage Password

To change the password, enter the new password in the “New Password:” and “Confirm Password:” text boxes. Click “Save password”.

■ Webpage Settings

The values displayed in the various tabs are refreshed at the rate defined in the “Data Update Time” select box. The Data Update Time can be set to 250 ms, 500 ms, 1 second, 2 seconds, or 5 seconds.

■ Email Settings

The “Email Server IP Address” text box must contain the IP address of the email server. The subnet address is configured in drive parameters *F7-05* through *F7-08*. The configured email alerts will use the server at this address when sending emails.

Enter the email server port in the “Email Server Port” text box.

The value in the “From Email Address” text box identifies the origin of the email alerts to the recipient.

To save the entered information, click “Save Email Settings”.

8 Rapid Spanning Tree Protocol (RSTP)

Rapid Spanning Tree Protocol (RSTP) is a mechanism that allows an Ethernet network to be configured as a ring or other topology that may have more than one pathway to each node. The RSTP protocol automatically determines the most efficient pathway to each node and disables any redundant pathways.

If one path fails, RSTP activates another pathway to keep the network traffic flowing. After restoring the failed path, RSTP disables any redundant paths without disrupting network traffic.

◆ Convergence Time

Convergence is the process that RSTP performs to identify the root node and which pathways to disable. Convergence occurs on power up and when the network changes (e.g., path failures and restorations).

Take special care when using parameter *F7-57 [BACnet/IP bUS Timeout Value]*, Communication Timeout Loss, and be sure to give RSTP enough time for convergence. When *F7-57* is set too short, convergence will not be able to complete before it expires. The complexity of the network and the number of drives on the network will both factor into the value of the timeout.

◆ Topology

BACnet/IP is ideal for use in ring topologies. With RSTP enabled, a ring topology provides redundancy to the network. RSTP determines the fastest paths to each node on the network and virtually splits the ring by disabling one port on one node to prevent data from being transmitted endlessly around the ring. If a path on the ring fails, RSTP re-enables the disabled port and reconnects the split. All nodes on the network remain accessible without any interruptions.

◆ Enabling RSTP

RSTP is enabled from the webpage on the drive.

1. Use the keypad to read the IP address values from monitors *U6-80*, *U6-81*, *U6-82*, and *U6-83*. The IP address is necessary to access the webpage. Refer to [Table 8.1](#) for example values of the monitors for an IP address of 192.168.1.20.

Table 8.1 Example IP Address Monitor Values

Monitor	Value
U6-80	192
U6-81	168
U6-82	1
U6-83	20

- Enter the IP address to address bar of your web browser (Ex. <http://192.168.1.20>) and press the Enter key.
The Home page will be loaded. Refer to [Home Page on page 23](#) for more information about the Home page.
- Click [Ring] tab on top of the webpage.
The Ring page is displayed with the [Ring Protocol] label in the [RSTP] field set to [DISABLED].
- After changing the setting value of the [Ring Protocol] label to [ENABLED], click [Save Changes].
The Ring page is automatically updated and RSTP is enabled.

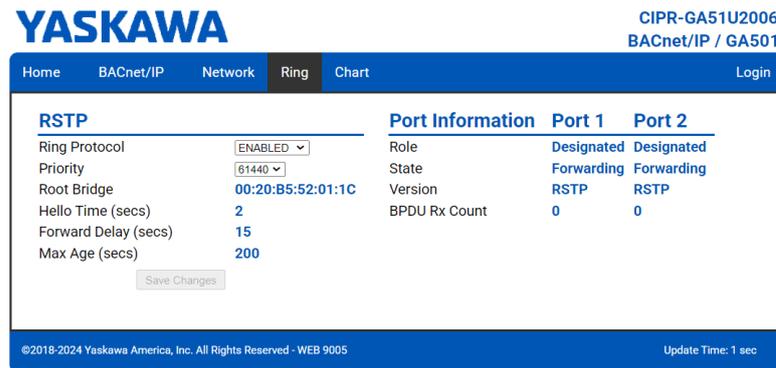


Figure 8.1 Ring Page View

◆ RSTP Monitor U6-96

Monitor *U6-96* is dedicated to RSTP. Shows the role and state for each port.

The displayed value has four digits. The first two digits belong to port 1 and the last two digits belong to port 2. The first and third digits represent port role while the second and fourth digits represent port state.

The possible port role and state values are shown in [Figure 8.2](#).

3	2	2	2
---	---	---	---

Port 1 Role		Port 1 State		Port 2 Role		Port 2 State	
0	Unknown	0	Discarding	0	Unknown	0	Discarding
2	Root	1	Learning	2	Root	1	Learning
3	Designated	2	Forwarding	3	Designated	2	Forwarding
4	Alternate			4	Alternate		
5	Backup			5	Backup		
6	Disabled			6	Disabled		
9	RSTP Disabled			9	RSTP Disabled		

Figure 8.2 U6-96 Monitor Values

Refer to [Table 7.3](#) for descriptions of the port role values.

Refer to [Table 7.4](#) for descriptions of the port state values.

Below are a few examples:

- 9292 = RSTP is disabled and both ports are forwarding.
- 3222 = Port 1 is forwarding and is the designated port. Port 2 is forwarding and is the root port.
- 2232 = Port 1 is forwarding and is the root port. Port 2 is forwarding and is the designated port.
- 3232 = Both ports are forwarding and are designated ports. This occurs when the drive is the root bridge.
- 4022 = Port 1 is discarding and is the alternate port. Port 2 is forwarding and is the root port.

- 2260 = Port 1 is forwarding and is the root port. Port 2 is discarding and is the disabled port.

9 Troubleshooting

◆ Drive-Side Error Codes

Drive-side error codes appear on the drive keypad. *Fault on page 32* lists causes of the errors and possible corrective actions. Refer to the drive manuals for additional error codes that may appear on the drive keypad.

■ Fault

A *bUS* [Ethernet Communication Error] and *EF0* [Ethernet External Fault] can appear as a fault. When a fault occurs, the keypad ALM LED stays lit. When an alarm occurs, the ALM LED flashes.

If communication stops while the drive is running, use these questions as a guide to help remove the fault:

- Is the communication line connected correctly to the drive?
- Is the PLC program working? Is the controller/PLC CPU stopped?
- Did a momentary power loss interrupt communications?

Code	Name	Causes	Possible Solutions
bUS	Ethernet Communication Error	The drive did not receive a signal from the controller.	<ul style="list-style-type: none"> • Check for wiring errors. • Correct the wiring.
		The communications cable wiring is incorrect.	
		An existing short circuit or communications disconnection	Check disconnected cables and short circuits and repair as needed
		A data error occurred due to electric interference	<ul style="list-style-type: none"> • Prevent noise in the control circuit, main circuit, and ground wiring. • If you identify a magnetic contactor as a source of noise, install a surge absorber to the contactor coil. • Use only recommended cables or other shielded line. Ground the shield on the controller side or the drive input power side. • Separate all communication wiring from drive power lines. Install an EMC noise filter to the drive power supply input. • Decrease the effects of electrical interference from the controller.
		Connection Time-out	Check if the CPU of the controller stopped.
		Duplicate IP Address found on network	Change to a different IP address. If $F7-13 = 0$ [Address Mode at Startup = Static], change parameters $F7-01$ to $F7-04$ [IP Address 1 to 4].
		IP Configuration Error	<p>IP Address Setting/Gateway Setting</p> <p>If $F7-13 = 0$ [Address Mode at Startup = Static], change the settings of $F7-01$ to $F7-12$ [IP Address 1 to 4, Subnet Mask 1 to 4, Gateway Address 1 to 4] to align with the network part of IP address and the gateway address, then cycle power.</p> <p>If $F7-13 = 1$ or 2 [Address Startup Mode = BOOTP (Use network address.) or DHCP (Use network address.)], check the configuration of your BOOTP or DHCP server.</p>
EF0	Ethernet External Fault	The drive received an external fault from the controller.	<ol style="list-style-type: none"> 1. Find the device that caused the external fault and remove the caus. 2. Clear the external fault input from the controller.
		A programming error occurred on the controller side.	Examine the operation of the controller program.
oFA00	Ethernet HW Error	Invalid DIP switch S1 setting	Check if the DIP switch S1 setting is correct for the communication protocol you are using.
PSE	Protocol Set Error	Invalid DIP switch S1 setting	Check if the DIP switch S1 setting is correct for the communication protocol you are using.

◆ bUS Fault Tolerance

■ bUS Fault Auto-Restart

Setting $F6-14 = 0$ [Disabled] or $F6-01 = 3, 4, 5$ [Alarm Only, Alarm (Run at d1-04), Alarm - Ramp Stop] will not affect standard default drive behavior.

Setting $F6-14 = 1$ [Enabled] AND $F6-01 \leq 2$ [Fast Stop (Use C1-09)] will cause the following operation:

1. The *bUS* fault occurs after the time set in $F7-57$ [BACnet/IP *bUS* Timeout Value].
2. When the condition is removed, a fault reset is commanded and the control of the drive is returned to the BACnet/IP network.

Note:

A change of *F6-14* does not require a power cycle or parameter reload.

When $F7-57 > 0$ [*BACnet/IP BUS Timeout Value > 0 seconds*], the BACnet/IP controller must periodically send a Frequency Reference Command (AV2), or a Run/Stop command (AV1, BV1 and BV2). If the BACnet/IP controller does not send a command for the length of time set in *F7-57* and the drive is running, the drive will detect a *bUS* [*Ethernet Communication Error*] fault.

To disable BACnet/IP Timeout detection, set $F7-57 = 0$. When this parameter is set to 0, a periodic command from the BACnet/IP controller is not necessary.

◆ BACnet/IP Error Codes

■ Fault Monitors *U6-98* and *U6-99*

If any faults occur with BACnet/IP, you can check error/warning conditions via drive monitor parameters on the drive keypad as shown in [Table 9.1](#).

Table 9.1 Fault Monitor Descriptions

Status	Fault Declared	Status Value (U6-98/U6-99)	Description
No faults	-	0	No faults
Fatal error occurred	<i>EF0</i>	3	Network sent a message to force this node to the fault state.
Communications time-out (nonfatal)	<i>bUS</i>	1101	The drive has not received a BACnet/IP command for the length of time set in <i>F7-57</i> .
Duplicate IP Address	<i>bUS</i>	1102	This node and at least one other node have the same IP Address.
Default MAC Address	-	1103	Programmed MAC Address is not at factory default setting. Note: Return the drive to Yaskawa or your nearest sales representative and request the setting change.
Network Link Down	<i>bUS</i>	1104	Neither of the two network Ethernet ports has a link. This will only happen when a link is established, then lost.
Bad IP Configuration	<i>bUS</i>	1106	<i>F7-13 = 0</i> [<i>Address Mode at Startup = Static</i>] is set and <i>F7-01</i> to <i>F7-12</i> [<i>IP Address 1 to 4, Subnet Mask 1 to 4, Gateway Address 1 to 4</i>] are set to an invalid configuration. If <i>F7-13 = 1</i> or <i>2</i> [<i>Address Startup Mode = BOOTP (Use network address.) or DHCP (Use network address.)</i>], your BOOTP or DHCP server is not configured correctly. Set the parameters to the correct values and cycle power on the drive.
Web Interface Setting Error	-	1110	Failure to read the web interface setting.

Two drive monitors, *U6-98* [*Ethernet First Fault*] and *U6-99* [*Ethernet Current Fault*] assist the user in network troubleshooting.

- *U6-98* displays the first declared fault since the last power cycle. *U6-98* is only cleared upon drive power-up.
- *U6-99* displays the present network status. *U6-99* is cleared upon a network-issued fault reset and upon power-up.

If another fault occurs while the original fault is still active, parameter *U6-98* retains the original fault value and *U6-99* stores the new fault status value.

◆ Communication Error

If there are no problems with the drive, but you cannot communicate with other devices, try the possible solution below.

Status	Possible Solutions
The LINK/ACT LED will not illuminate.	Set $F7-14 = 1$ [<i>Duplex Mode Selection = Auto/Auto (Auto Negotiation/Auto Negotiation)</i>].

◆ Self RAM Check

Use these procedures to do a self RAM check for all areas including unused areas.

Note:

- The self RAM check completes in approximately 1.5 minutes.
- When you start the self RAM check, the drive will detect *oFA00* [*Ethernet HW Error*].

1. Set DIP switch S1 as shown in [Figure 9.1](#).

Note:

Use non-conductive tweezers or a tool with a tip width of approximately 0.5 mm (0.02 in) to set DIP switch S1.

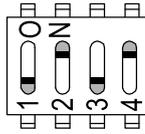


Figure 9.1 DIP Switch S1 Settings for the Self RAM Check

2. Apply power to the drive.
This will start the self RAM check.
3. Look at the LEDs to see the status of the self RAM check.
Refer to [Table 9.2](#) for more information.

Table 9.2 LED States during Self RAM Check

Self RAM Check Status	LED States	
	MS	NS
Checking	Lit in green	OFF
Successful termination	Lit in green	Lit in green
Abnormal termination	Lit in red	Lit in red

10 Specifications

◆ Specifications

Table 10.1 BACnet/IP Specifications

Items	Specifications
BACnet/IP Specification	BACnet Version 1 revision 19 (135-2016)
BACnet Device Profile	Basic Application Specific Controller (B-ASC)
IP Address Setting	Programmable from drive keypad or network
Communication Speed	Programmable from drive keypad or network: 10/100 Mbps, auto-negotiate.
Duplex Mode	Half-forced, Auto-negotiate, Full-forced
Address Startup Mode	Static or DHCP Assigned. (BOOTP not compatible)

11 BACnet Protocol Implementation Conformance Statement

- Date: 07/16/2025
- Vendor Name: Yaskawa
- Product Name: AC Motor Controller
- Product Model Number: GA501
- Application Software Version: VST9070xx
- Firmware Revision: 3.02
- BACnet Protocol Revision: 19
- Product Description:
The GA501 is a world-class quality microdrive that is designed around the ideals of sustainability, flexibility, and ease of use. Its compact design means it can fit into tight spaces and have the capabilities to make any space comfortable for those occupying it. These products may be fully controlled and monitored over BACnet/IP. All drive parameters are available for reading and writing.
- BACnet Standardized Device Profile (Annex L):
 - BACnet Cross-Domain Advanced Operator Workstation (B-XAWS)
 - BACnet Advanced Operator Workstation (B-AWS)
 - BACnet Operator Workstation (B-OWS)
 - BACnet Operator Display (B-OD)
 - BACnet Advanced Life Safety Workstation (B-ALSWS)

- BACnet Life Safety Workstation (B-LSWS)
- BACnet Life Safety Annunciator Panel (B-LSAP)
- BACnet Advanced Access Control Workstation (B-AACWS)
- BACnet Access Control Workstation (B-ACWS)
- BACnet Access Control Security Display (B-ACSD)
- BACnet Building Controller (B-BC)
- BACnet Advanced Application Controller (B-AAC)
- BACnet Application Specific Controller (B-ASC)
- BACnet Smart Actuator (B-SA)
- BACnet Smart Sensor (B-SS)
- BACnet Advanced Life Safety Controller (B-ALSC)
- BACnet Life Safety Controller (B-LSC)
- BACnet Advanced Access Control Controller (B-AACC)
- BACnet Access Control Controller (B-ACC)
- BACnet Router (B-RTR)
- BACnet Gateway (B-GW)
- BACnet Broadcast Management Device (B-BBMD)
- BACnet Access Control Door Controller (B-ACDC)
- BACnet Access Control Credential Reader (B-ACCR)
- BACnet General (B-GENERAL)
- List all BACnet Interoperability Building Blocks Supported (Annex K):
 - Data Sharing-ReadProperty-B (DS-RP-B)
 - Data Sharing-WriteProperty-B (DS-WP-B)
 - Data Sharing-ReadPropertyMultiple-B (DS-RPM-B)
 - Data Sharing-WritePropertyMultiple-B (DS-WPM-B)
 - Data Sharing-Change Of Value-B (DS-COV-B)
 - Data Sharing-Change Of Value Property-B (DS-COVP-B)
 - Device Management-Dynamic Device Binding-B (DM-DDB-B)
 - Device Management-Dynamic Object Binding-B (DM-DOB-B)
 - Device Management-DeviceCommunicationControl-B (DM-DCC-B)
 - Device Management-ReinitializeDevice-B (DM-RD-B)
 - Device Management-TimeSynchronization-B (DM-TS-B)
 - Device Management-UTCTimeSynchronization-B (DM-UTC-B)
- Segmentation Capability:
 - Able to transmit segmented messages / Window Size:
 - Able to receive segmented messages / Window Size:
- Standard Object Types Supported:

Object Types	Descriptions
Device Object	Optional Writeable: – Max_Info_Frames – Max_Master
Analog Input Object	Optional properties supported: – COV_Increment Optional Writeable: – COV_Increment - supported on various instances
Analog Output Object	-
Analog Value Object	Optional properties supported: – COV_Increment Optional Writeable: – COV_Increment - supported on various instances
Binary Input Object	-
Binary Output Object	-
Binary Value Object	-
Network Port Object	-

- Data Link Layer Options:
 - ARCNET (ATA 878.1), 2.5 Mb. (Clause 8)
 - ARCNET (ATA 878.1), EIA-485 (Clause 8), baud rate(s):
 - BACnet IP, (Annex J)
 - BACnet IP, (Annex J), BACnet Broadcast Management Device (BBMD)
 - BACnet IP, (Annex J), Network Address Translation (NAT Traversal)
 - BACnet IPv6, (Annex U)
 - BACnet IPv6, (Annex U), BACnet Broadcast Management Device (BBMD)
 - BACnet/ZigBee (Annex O)
 - Ethernet, ISO 8802-3 (Clause 7)
 - LonTalk, ISO/IEC 14908.1 (Clause 11), medium:
 - MS/TP master (Clause 9), baud rate(s): 9600, 19200, 38400, 76800
 - MS/TP slave (Clause 9), baud rate(s):
 - Point-To-Point, EIA 232 (Clause 10), baud rate(s):
 - Point-To-Point, modem, (Clause 10), baud rate(s):
 - Other:
- Device Address Binding:

Is static device binding supported? (This is currently necessary for two-way communication with MS/TP slaves and certain other devices.) Yes No
- Networking Options:
 - Router, Clause 6 - List all routing configurations, e.g., ARCNET-Ethernet, Ethernet-MS/TP, etc.
 - Annex H, BACnet Tunneling Router over IP
- Character Sets Supported:

Indicating support for multiple character sets does not imply that they can all be supported simultaneously.

 - ISO 10646 (UTF-8)
 - IBM/Microsoft DBCS
 - ISO 8859-1
 - ISO 10646 (UCS-2)
 - ISO 10646 (UCS-4)
 - JIS X 0208
- Gateway Options:

If this product is a communication gateway, describe the types of non-BACnet equipment/networks(s) that the gateway supports:
Not supported

If this product is a communication gateway which presents a network of virtual BACnet devices, a separate PICS shall be provided that describes the functionality of the virtual BACnet devices. That PICS shall describe a superset of the functionality of all types of virtual BACnet devices that can be presented by the gateway.
- Network Security Options:
 - Non-secure Device - is capable of operating without BACnet Network Security
 - Secure Device - is capable of using BACnet Network Security (NS-SD BIBB)
 - Multiple Application-Specific Keys
 - Supports encryption (NS-ED BIBB)
 - Key Server (NS-KS BIBB)

Revision History

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YASKAWA AC Drive GA501

BACnet/IP

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In the event that the end user of this product is to be the military and said product is to be employed in any weapons systems or the manufacture thereof, the export will fall under the relevant regulations as stipulated in the Foreign Exchange and Foreign Trade Act. Therefore, be sure to follow all procedures and submit all relevant documentation according to any and all rules, regulations and laws that may apply.

Specifications are subject to change without notice for ongoing product modifications and improvements.

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