Optional I/O and Communication Cards

Appendix B

Table of Contents

Introduction

GS20(X) drives have two option cards that can be used to expand the functionality of the drive.

- *GS20A-CM-ENETIP/EIP2: Provides Modbus TCP or EtherNet/IP communication*
- *GS20A-BPS: Provides ability to keep drive control power on when main power is off.*

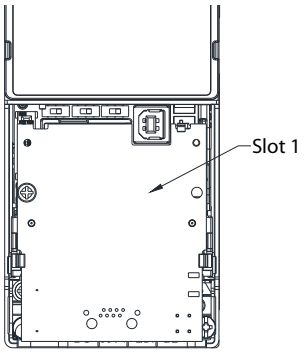
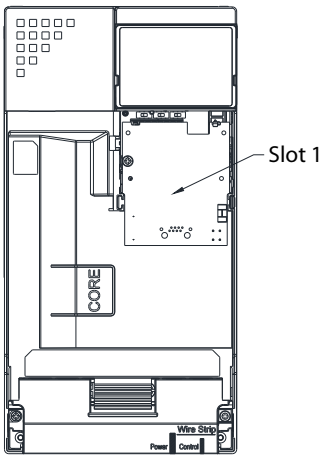
Only one option card can be installed in a GS20(X) drive at one time.

Option Card Installation

The option cards in this chapter are optional accessories. Select the applicable option cards for your GS20(X) drive, or contact AutomationDirect for suggestions. The option cards can significantly improve the functionality of the drive. To prevent damage to the GS20(X) drive during installation, remove the digital keypad and the cover before wiring.

Option Card Locations

Any optional comm card must be installed in Slot #1.

GS20(X) Optional I/O and Communication Cards			
Part Number	***Description***	***Placement***	***Reference Diagram***
GS20A-BPS	DURApulse GS20 series backup power supply module, for use with GS20 and GS20X series AC drives.	Slot 1	 ***Card Installed in Slot 1 of GS20 Frame A-D***
GS20A-CM-ENETIP	DURApulse GS20 series communication module, EtherNet/IP and ModbusTCP, 1 port, (1) Ethernet (RJ45) port. For use with GS20 and GS20X series AC drives.	Slot 1	
GS20A-CM-EIP2	DURApulse Gs20 series communication module, EtherNet/IP and Modbus TCP, 2 ports, (2) Ethernet (RJ45) port(s). For use with GS20 and GS20X series AC drives.	Slot 1	 ***Card Installed in Slot 1 of GS20 Frame E-F***

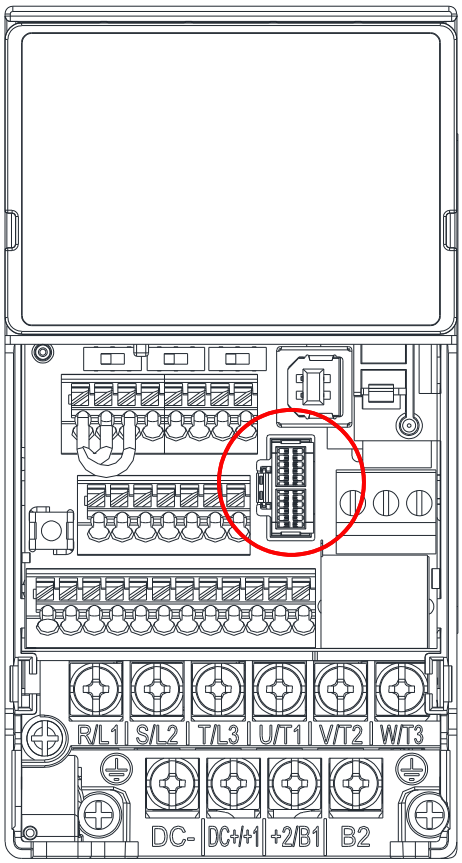
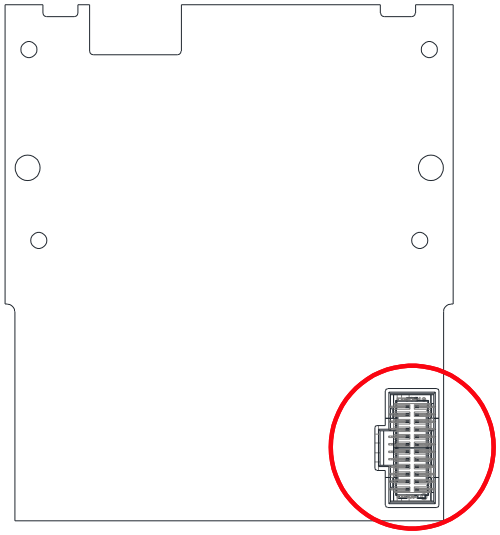
Removing the Card Slot Cover

WARNING: AC input power must be disconnected before performing any maintenance. Do not connect or disconnect wires or connectors while power is applied to the circuit. Maintenance must be performed only by a qualified technician.

WARNING: A CHARGE MAY STILL REMAIN IN THE DC-LINK CAPACITOR WITH HAZARDOUS VOLTAGES, EVEN IF THE POWER HAS BEEN TURNED OFF. TO AVOID PERSONAL INJURY, DO NOT REMOVE THE COVER OF THE AC DRIVE UNTIL ALL "DISPLAY LED" LIGHTS ON THE DIGITAL KEYPAD ARE OFF. PLEASE NOTE THAT THERE ARE LIVE COMPONENTS EXPOSED WITHIN THE AC DRIVE. DO NOT TOUCH THESE LIVE PARTS.

NOTE: To prevent damage during installation, remove the digital keypad and cover before option card installation. See "Chapter 2: Installation and Wiring" for instructions.

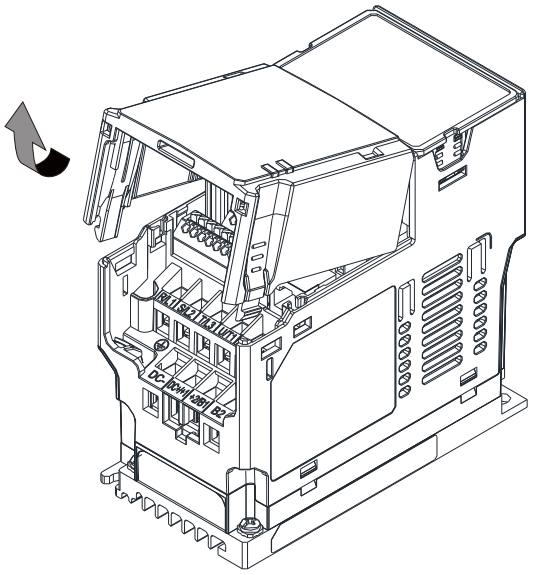
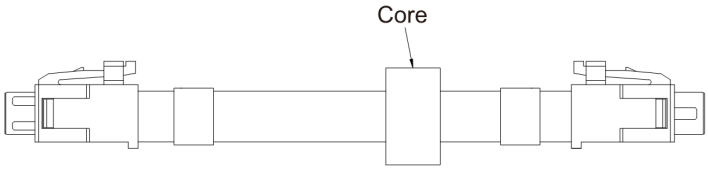
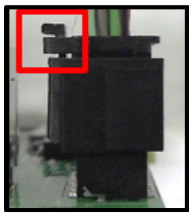
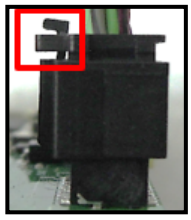
Option Card Wiring

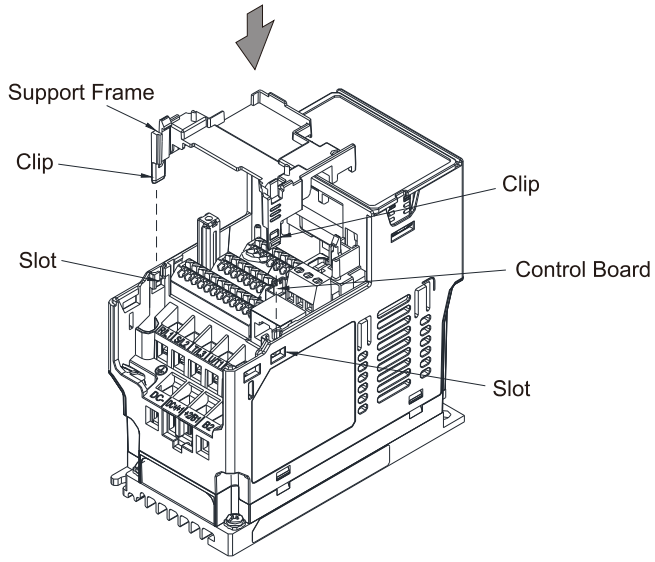
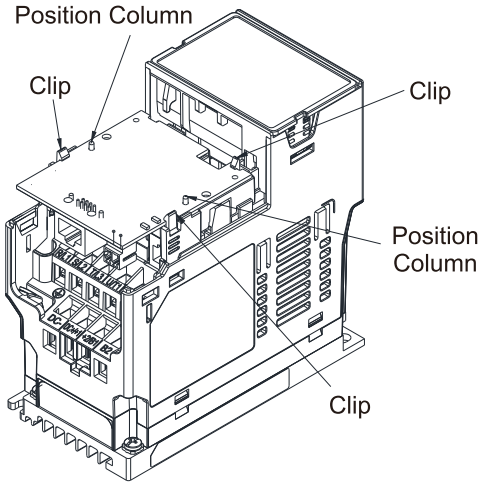
GS20(X) Card Wiring	
GS20(X) Control Board Connector	***Option Card Connector***
	

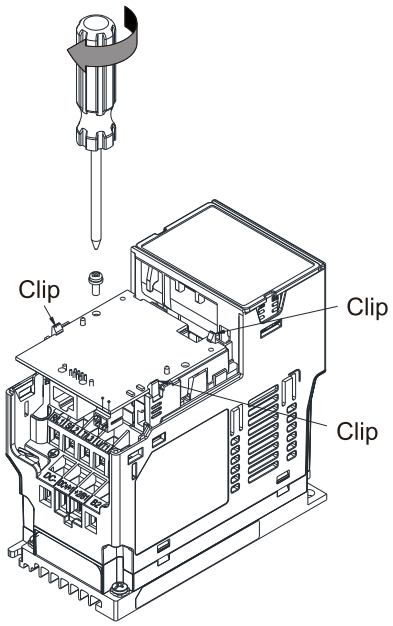
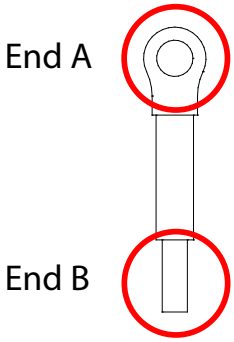
WARNING: PLEASE READ THE DESCRIPTIONS ON THE CONNECTING CABLES AND INSTALL CAREFULLY. USING INCORRECT CABLES CAN DAMAGE THE OPTION CARD OR THE DRIVE.

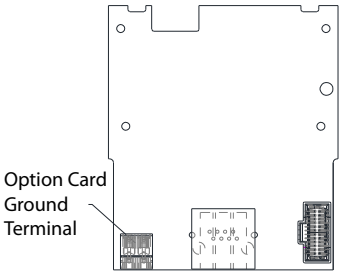
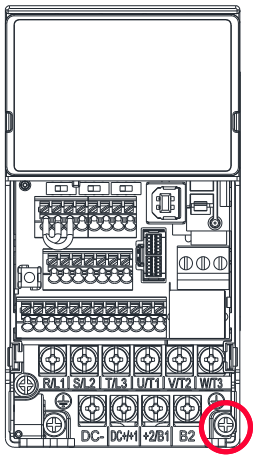
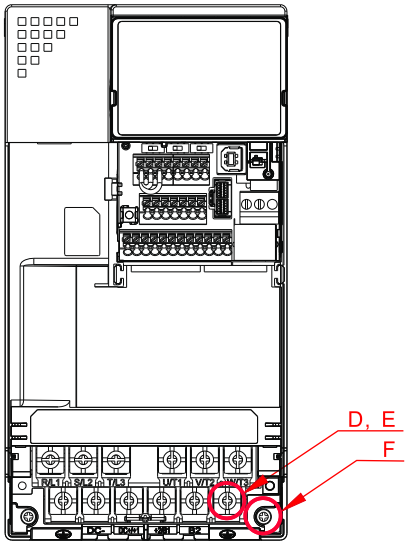
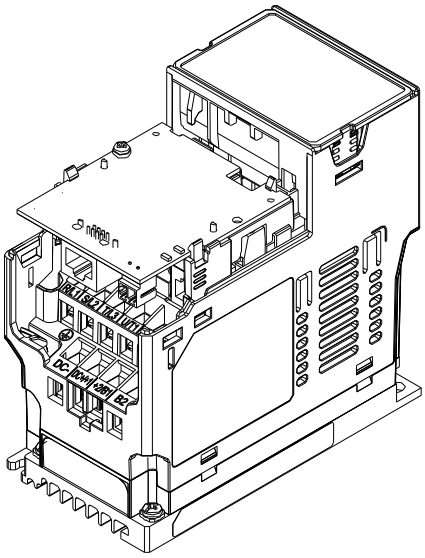
Install the Option Card

Installation method: Back-mount the option card by connecting flat cables to the control board.

GS20(X) Option Card Installation Steps	
Step	***Description***
1	Turn off the power of the motor drive, and then remove the front cover. 
2	Plug each end of the control board connector cable included with the option card into the appropriate slot on the card and the drive. Apply enough pressure to ensure the connector is properly locked into place.   **Locked**  **Unlocked**

GS20(X) Option Card Installation Steps (continued)	
Step	***Description***
3	Aim the two clips at the two slots on the motor drive, and then press downward to have the two clips engage the slots. 
4	Connect the connector at the other end of the connection cable to the connector of the option card.
5	With the terminal block and connector of the option card facing downward, aim the two holes of the option card to the position column and press downward so that the three clips engage the option card. 

GS20(X) Option Card Installation Steps (continued)	
Step	***Description***
6	Make sure the three clips properly engage the option card and then tighten the screws (suggested torque value: 4–6 kg-cm [3.5–5.2 lb-in.] [0.39–0.59 N•m]). 
7	Both the GS20A-BPS and GS20A-CM-ENETIP/EIP2 need to be grounded. The ground terminal is included in the option card package and looks like this: 

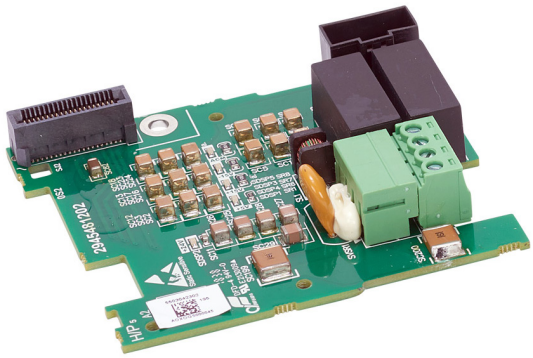
GS20(X) Option Card Installation Steps (continued)	
Step	***Description***
8	Connect the "B" end of the grounding wire to the ground terminal block of the option card, and the "A" end of the grounding wire to the grounding screw of the drive.   Frame A–C  Frame D–F
9	Assembly is completed and should look similar to the example below. 

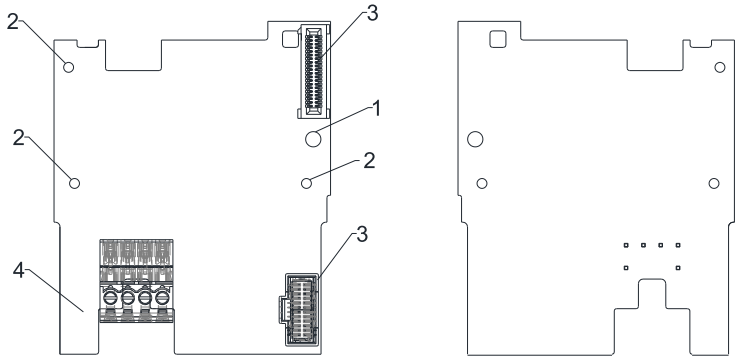
NOTE: See DURApulse GS20A Option Card Quick-Start Guide for more detailed installation.

GS20A-BPS

The GS20A-BPS is a backup power supply for GS20 and GS20X series AC drives that can be installed in Slot 1. If the GS20A-BPS is installed, no other option cards may be installed on the GS20(X) drive.

A backup power supply card allows external 24VDC to be connected to the drive, which keeps communications and some I/O of the drive active during main power downs. This is especially useful if frequent operator lockouts turn line power off to the drive. Network communications will remain active during power downs.





GS20A-BPS Overview			
Drawing Item	***Description***	***Wiring Info***	***Screw Torque***
1	Screw fixing hole	Wire gauge: 0.25–0.5 mm² [24–20 AWG] Stripping length: 7–8 mm	Screw torque: 2 kg-cm / [1.7 lb-in.] / [0.2 N•m]
2	Positioning hole		
3	AC motor drive connection port		
4	+24 V terminal block		

Features

- *Provides external power supply*
- *Supports 24 VDC input.*
- *Supports parameter reading and writing and status monitoring of the drive.*

Specifications

If the GS20(X) drive is running solely on power provided by the GS20A-BPS, GS20(X) communication works normally along with the following functions:

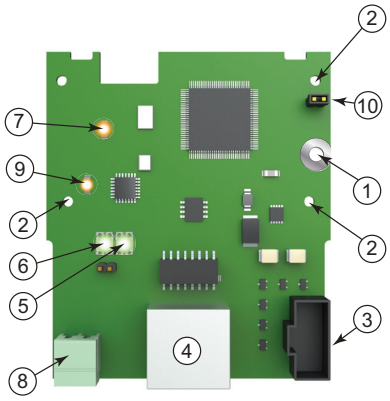
- *Parameter reading and writing*
- *Keypad display*
- *Keys on the keyboard panel (except the RUN key)*
- *Analog input with +10 V terminal supply power*
- *Multi-function inputs (FWD/DI1, REV/DI2, DI3–DI7) with +24V terminal or external power supply*
- *Relay output*
- *Pulse sequence frequency command*

The following functions are not supported when running on backup power only:

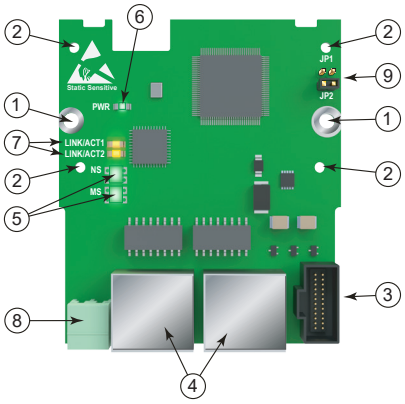
- *DO digital frequency signal output*
- *AO1 multi-function analog voltage output*
- *PLC functions*

GS20A-CM-ENETIP and GS20A-CM-EIP2

The GS20A-CM-ENETIP and GS20A-CM-EIP2 are communication cards for GS20 and GS20X series AC drives that enable Modbus TCP and EtherNet/IP communications, and can be installed in Slot 1. If the GS20A-CM-ENETIP/EIP2 is installed, no other option cards may be installed on the GS20(X) drive.



GS20A-CM-ENETIP



GS20A-CM-EIP2

GS20A-CM-ENETIP Overview			
Drawing Item	***Description***	***Wiring Info***	***Screw Torque***
1	Screw fixing hole	Wire gauge: 0.25–0.5 mm² [24–20 AWG] Stripping length: 7–8 mm	Screw torque: 2 kg-cm / [1.7 lb-in.] / [0.2 N•m]
2	Positioning hole		
3	AC motor drive connection port		
4	Communication port		
5	MS (module status) indicator		
6	NS (network status) indicator		
7	Power indicator		
8	Ground terminal block		
9	Link Inidcator		
10	Jumper J2 (for FW updates only)		

GS20A-CM-EIP2 Overview			
Drawing Item	***Description***	***Wiring Info***	***Screw Torque***
1	Screw fixing hole	Wire gauge: 0.25–0.5 mm² [24–20 AWG] Stripping length: 7–8 mm	Screw torque: 2 kg-cm / [1.7 lb-in.] / [0.2 N•m]
2	Positioning hole		
3	AC drive connection port		
4	Communication ports: Port 1, Port 2		
5	Indicator lights; NS, MS		
6	Power indicator		
7	Link indicator: ACT1 (Port 1), ACT2 (Port 2)		
8	Ground terminal block		
9	Jumper		

Features

- *Supports Modbus TCP and EtherNet/IP protocol*
- *User-defined corresponding parameters*
- *MDI / MDI-X auto-detect*
- *IP filter simple firewall function*

Specifications

GS20A-CM-ENETIP/EIP2 Specifications	
Network Interface	
Interface	RJ45 with Auto MDI/MDIX
Number of ports	GS20A-CM-ENETIP: 1 port GS20A-CM-EIP2: 2 ports
Transmission method	IEEE 802.3, IEEE 802.3u
Transmission cable	Category 5e shielding 100MHz
Transmission speed	10/100 Mbps Auto-Detect
Network protocol	ICMP, IP, TCP, UDP, DHCP, HTTP (FW update only), Modbus over TCP/IP, EtherNet/IP, BOOTP
Electrical	
Power supply voltage	15VDC (supplied by the AC motor drive)
Insulation voltage	500VDC
Power consumption	0.8W
Weight	GS20A-CM-ENETIP: 25g GS20A-CM-EIP2: 30g
Environment	
Noise immunity	ESD (IEC 61800-5-1, IEC 61000-4-2) EFT (IEC 61800-5-1, IEC 61000-4-4) Surge Test (IEC 61800-5-1, IEC 61000-4-5) Conducted Susceptibility Test (IEC 61800-5-1, IEC 61000-4-6)
Operation / storage	Operation: -10°C~50°C [14°F~122°F] (temperature), 90% (humidity) Storage: -25°C~70°C [-13°F~158°F] (temperature), 95% (humidity)
Vibration / shock immunity	International standard: IEC 61800-5-1, IEC 60068-2-6/IEC 61800-5-1, IEC 60068-2-27

Connecting Comm Card to PC

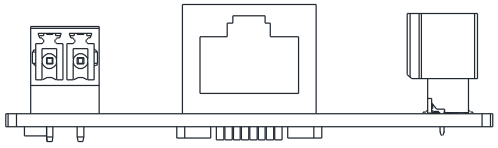
To connect the GS20A-CM-ENETIP/EIP2 to the network:

1) Turn off the power of the drive.

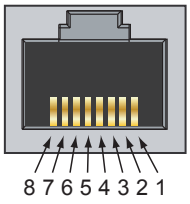
2) Open the front cover of the drive.

3) Connect the CAT-5e network cable to the RJ45 port of the GS20A-CM-ENETIP/EIP2 (as shown in the right figure).

Note: The GS20A-CM-EIP2 has two ports but steps are the same.



PIN Description for GS20A-CM-ENETIP/EIP2						
PIN	***Signal***	***Description***		***PIN***	***Signal***	***Description***
1	TX+	Transmit Data +		***5***	–	N/C
2	TX–	Transmit Data –		***6***	RX –	Receive Data –
3	RX+	Receive Data +		***7***	–	N/C
4	–	N/C		***8***	–	N/C



GS20A-CM-ENETIP/EIP2 LED Indicators and Troubleshooting

There are four LED indicators on the GS20A-CM-ENETIP/EIP2. The POWER LED displays the status of the power supply, and the LINK LED displays the communication status with the network. If any of these conditions exist and the cause cannot be determined, power down the drive, remove the comm card and reinstall it. Re-seating the card may eliminate certain problems.

GS20A-CM-ENETIP/EIP2 LED Indicators				
LED	***Status***		***Indication***	***How to correct it?***
POWER	Amber	On	Power supply in normal status	None
		Off	No power supply	Re-seat comm card connection and verify drive power
LINK	Amber	On	Network is connected	None
		Off	No network connection	Verify network cable is connected
MS (module status)	Off	Off	The device is powered off, or is powered on but with no IP address configured	Re-seat comm card connection cable and verify drive power
	Green	Flashes	Device in Standby, has not been configured	None
		On	Device Operational	None
	Red	Flashes	Major Recoverable Fault	An incorrect or inconsistent configuration. Update configuration settings.
		On	Major Unrecoverable Fault	Cycle power on the drive, reseat cables. If error doesn't clear, contact ADC Technical support
	Red/ Green	Flashes	Self-Test, Device is performing power up testing.	None
NS (network status)	Off	Off	The device is powered off, or is powered on but with no IP address configured	Re-seat comm card connection cable and verify drive power. Enter IP address in device
	Green	Flashes	Network in operation. An IP address is configured, but no CIP connections are established, and an Exclusive Owner connection has not timed out.	None
		On	IP address is configured, at least one CIP connection is established, and an Exclusive Owner connection has not timed out.	None
	Red	Flashes	Connection timeout- An IP address is configured, and an Exclusive Owner connection for which this device is the target has timed out.	Verify that the Originator is attempting communication with the target. Verify operation of network cabling and switches.
		On	Major Fault- Duplicate IP detected	Ensure no other device on the network has the same IP address
	Red/ Green	Flashes	Self-Test, , Device is performing power up testing.	Device is performing power up testing.

NOTE: If the communication card is not recognized by the drive (P09.60=0), try the following:
1) Ensure cable connector is in locked position on the card.
2) Ensure the J2 Jumper is removed from the card and then cycle power to the drive.

GS20A-CM-ENETIP/EIP2 LED Troubleshooting		
Abnormality	***Cause***	***How to correct it?***
POWER LED off	AC motor drive not powered	Check if AC motor drive is powered, and if the power supply is normal.
	GS20A-CM-ENETIP not connected to the AC drive	Make sure GS20A-CM-ENETIP is connected to the AC motor drive.
MS or NS LED off	GS20A-CM-ENETIP not connected to the network	Make sure the network cable is correctly connected to the network.
	Poor contact to RJ-45 connector	Make sure the RJ-45 connector is connected to the Ethernet port.
Cannot find communication card	The GS20A-CM-ENETIP is not connected to the network.	Ensure that the GS20A-CM-ENETIP is correctly connected to the network. Ensure Jumper J2 is not left in place on the ENETIP card after a FW update.
	The PC and the GS20A-CM-ENETIP are in different networks and blocked by network firewall.	Search by IP or set up relevant settings using the AC motor drive keypad.
Cannot open GS20A-CM-ENETIP setup page	The GS20A-CM-ENETIP is not connected to the network.	Ensure that the GS20A-CM-ENETIP is correctly connected to the network.
	Incorrect communication setting in GSoft2.	Ensure that the communication setting in GSoft2 is set to Ethernet.
	The PC and the GS20A-CM-ENETIP are in different networks and blocked by network firewall.	Use the drive keypad to set the ethernet card address.

GS20A-CM-ENETIP/EIP2 Error Codes		
ID	***Code***	***Definition***
71	ECLv	5V power that drive provides to the Comm card is too low
72	ECtt	Communication card is in test mode
75	ECFF	Incorrect default setting
76	ECiF	Serious internal error
80	ECEF	Ethernet connection error
81	ECto	Communication timeout between GS20A-CM-ENETIP and GS20(X)
82	ECCS	Checksum error in the communication between GS20A-CM-ENETIP and GS20(X)
83	ECrF	Reset GS20A-CM-ENETIP to default setting
84	ECo0	Exceeds max. number of communications in Modbus TCP
85	ECo1	Exceeds max. number of communications ini EtherNet/IP
86	ECiP	IP error: Default Gateway address must match subnet of IP address or be set to 0.0.0.0
87	EC3F	reserved
88	ECbY	GS20(X) is busy.
89	ECCb	ExCom card break

GS20A-CM-ENETIP/EIP2 IP Address and Network Configuration

Ethernet communication cards must have their own unique IP address. While the card addresses can be set for DHCP (IP address is set and can be changed by the network), we recommend using static IP addresses. That way, the IP address of the drive will stay fixed. Either method requires the IP addresses (and subnet masks) of the communication cards to be compatible with any other devices that want to connect to the drive. For an easy subnet mask calculator, please visit www.subnet-calculator.com.

NOTE: If at any point the communication card configuration becomes problematic, the communication card can always be reset to factory defaults by entering a "1" into P09.90 Com Card Factory Reset.

The following **example** will set the IP addresses of the PC and drive. **Your actual addresses may need to be different, depending on your local network.**

Set the IP address of the GS20(X) Drive

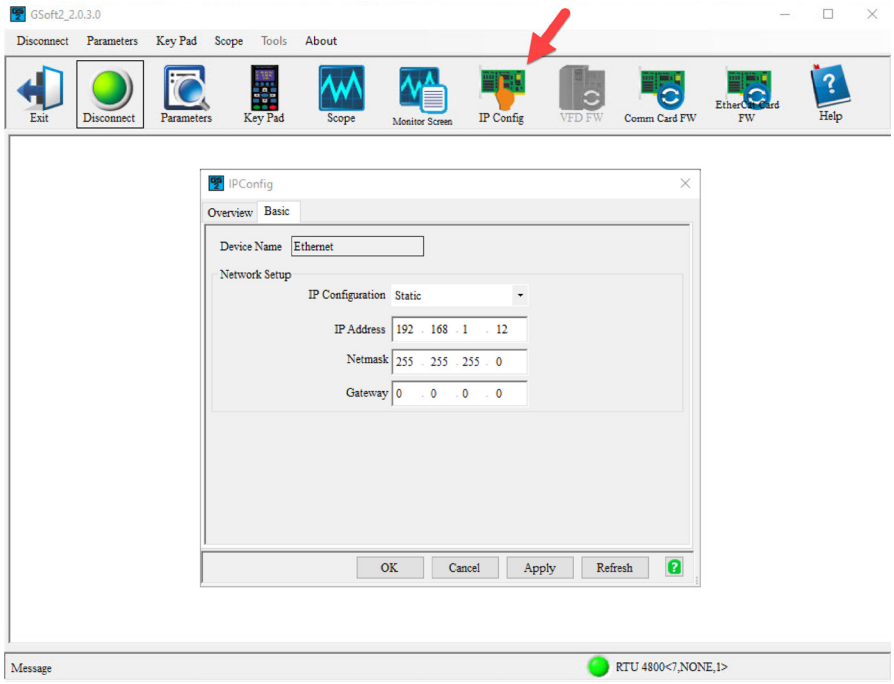
Set the IP address of the drive through GSoft2 software or by the drive keypad.

NOTE: Changing an Ethernet communication parameter in the drive does not immediately affect the communication card; there is a second set of registers in the comm card. Entering a value of 2 in parameter P09.91 causes the drive to push the P09 communication parameters to the card. Bits in P09.91 reset themselves automatically.

GSoft2 method

Connect to the drive thru the Type B serial port. Once connected, the "IP Config button" will become active. Click on it. The Overview tab that pops up shows the current drive configuration. Click on the Basic tab to edit the IP address. Enter the following:

IP Configuration = Static
IP Address = 192.168.1.10
Subnet Mask = 255.255.255.0
Gateway = 0.0.0.0 (or same as IP address 1st three octets; ex: 192.168.1.1)
Press Apply for the changes to take effect. (This effectively sets bit 1 in P09.91)



Keypad method

Enter the following parameter data in the drive keypad:

GS20(X) IP Configuration		
Parameter	***Set Value***	***Explanation***
P09.75	0	Set the IP to "Static"
P09.76	192	IP address 1
P09.77	168	IP address 2
P09.78	1	IP address 3
P09.79	10	IP address 4
P09.80	255	Subnet Mask 1
P09.81	255	Subnet Mask 2
P09.82	255	Subnet Mask 3
P09.83	0	Subnet Mask 4
P09.84	192	Gateway Address 1
P09.85	168	Gateway Address 2
P09.86	1	Gateway Address 3
P09.87	1	Gateway Address 4

Enter a "2" into P09.91 (sets bit 1 = 1) and press "Enter" to transfer the network parameters to the comm card. P09.91 will save the parameters to the card and will then reset P09.91 to zero.

GS20A-CM-ENETIP/EIP2 Common Parameters

When the GS20(X) drive is connected via Ethernet, please use the communication parameters in the table below to configure the drive. The master will be able to read/write the frequency word and control word for the GS20(X) drive after the communication parameters are set up.

GS20(X) Communication Parameters			
Parameter	***Function***	***Set Value (Dec)***	***Explanation***
P00.20	Source of frequency command setting	8	The frequency command is controlled by communication card.
P00.21	Source of operation command setting	5	The operation command is controlled by communication card.
P09.30	Communication decoding method	0	Set decoding method
P09.74	Set Comm Master Protocol	1	Set master
P09.75	IP setting	0	Static IP(0) / Dynamic distribution IP(1)
P09.76	IP address -1	192	IP address 192.168.1.5
P09.77	IP address -2	168	IP address 192.168.1.5
P09.78	IP address -3	1	IP address 192.168.1.5
P09.79	IP address -4	5	IP address 192.168.1.5
P09.80	Netmask -1	255	Netmask 255.255.255.0
P09.81	Netmask -2	255	Netmask 255.255.255.0
P09.82	Netmask -3	255	Netmask 255.255.255.0
P09.83	Netmask -4	0	Netmask 255.255.255.0
P09.84	Default gateway -1	192	Default gateway 192.168.1.1
P09.85	Default gateway -2	168	Default gateway 192.168.1.1
P09.86	Default gateway -3	1	Default gateway 192.168.1.1
P09.87	Default gateway -4	1	Default gateway 192.168.1.1
P09.93	ENETIP Comm Card Fault Select	3	Set communication timeout settings
P09.94	ENETIP Comm Card Time Out Detection	1	Set communication timeout settings
P09.95	ENETIP Comm Card Time Out Duration	3.0	Set communication timeout settings

Communication Card Special Function Parameters	
Parameter	***Explanation***
P09.90	Communication Card Factory Reset, 1 = Reset to factory defaults
P09.91	Communication Card Set, 2 = Write parameters to card

After changing any of the P09.xx communication card parameters, enter a "2" into P09.91 (Bit1 = 1). This will write any parameter changes from the drive into the communication card.

NOTE: The external controller's RPI must be set greater than 10ms.

Modbus TCP or EtherNet/IP Protocol Selection

The GS20A-CM-ENETIP/EIP2 card can communicate via Modbus TCP or EtherNet/IP protocols.

P09.74 defines the master protocol of the communication card and allows the user to define proper actions in the event of communication timeouts.

If P09.74 = 1: EtherNet/IP, in a timeout situation (defined by P09.93 – P09.95), only the EtherNet/IP connection (Implicit OR Explicit) will trigger the timeout, not Modbus TCP. A 'timeout situation' is defined by 5 different possibilities:

1) A TCP RST or FIN message from the Master in EtherNet/IP Explicit (no EtherNet/IP Implicit).
2) A Forward Close message in EtherNet/IP Implicit.
3) No data message received in the time duration specified in Pr09-95 on EtherNet/IP Explicit.
4) No data message received in the time duration specified in RPI timeout EtherNet/IP Implicit.
5) Physical connection loss (no link available on Ethernet interface).

If P09.74 = 2: Modbus TCP, in a timeout situation (defined by P09.93 – P09.95), only the Modbus TCP connection will trigger the timeout, not EtherNet/IP Explicit (Implicit won't be allowed in this case). A 'timeout situation' is defined by 3 different possibilities:

1) 1) A TCP RST or FIN message from the Master in Modbus TCP
2) 2) No data message received in the time duration specified in Pr09-95 on Modbus TCP
3) 3) Physical connection loss (no Link Good on Ethernet interface).

If P09.74 = 0: Ethernet/IP and Modbus TCP both on, a loss in either will cause a timeout.

Modbus TCP Protocol Configuration

GS20A-CM-ENETIP/EIP2 Control Words - Modbus Addressing

Modbus TCP Protocol Parameter Address Definitions			
Modbus Address		**Definition**	
Decimal	**Hex**		
48193	2000	bit 0~1	00: No function
			01: Stop
			10: Run
			11: Enable JOG
		bit 2~3	reserved
		bit 4~5	00B: No function
			01B: Forward command
			10B: Reverse command
			11B: no function
		bit 6~7	00B: 1st accel. / decel.
			01B: 2nd accel. / decel.
			10B: 3rd accel. / decel.
			11B: 4th accel. / decel.
		bit 8~11	000B: Master speed
			0001B: 1st step speed frequency
			0010B: 2nd step speed frequency
			0011B: 3rd step speed frequency
			0100B: 4th step speed frequency
			0101B: 5th step speed frequency
			0110B: 6th step speed frequency
			0111B: 7th step speed frequency
			1000B: 8th step speed frequency
			1001B: 9th step speed frequency
			1010B: 10th step speed frequency
			1011B: 11th step speed frequency
			1100B: 12th step speed frequency
			1101B: 13th step speed frequency
			1110B: 14th step speed frequency
			1111B: 15th step speed frequency
		bit 12	1: Enable bit 06-11 function. Must =1 to use above bits
		bit 13~14	00B: No function
			01B: No function
			10B: No function
			11B: No function
		bit 15	Reserved
48194	2001*	Frequency Command / PID Setpoint	6000 = 60.00Hz
48195	2002	bit 0	1: E.F. = ON (Trigger an External Fault)
		bit 1	1: Reset command
		bit 2	1: External interruption (B.B) = ON
		bit 3~5	reserved
***Note concerning 2001h: If the Frequency Command (via RS485, Ethernet, Keypad, analog, etc.) is set higher than P01.00 Max Frequency Output, the drive will limit the actual output to P01.00.*			

GS20A-CM-ENETIP/EIP2 Status Words - Modbus Addressing

Modbus TCP Protocol Parameter Address Definitions			
Modbus Address		**Definition**	
Decimal	**Hex**		
Status Monitor 1 – Warning Codes			
48449	2100	bit 0–7	Fault Code*
		bit 8–15	Warning Code*
		* Refer to Chapter 6: Maintenance and Troubleshooting for code definitions.	
Status Monitor 2 – Status of GS20(X) AC Drive			
48450	2101	bit 0~1	00: Stop
			01: Decel during stop
			10: Standby
			11: Run
		bit 2	1: JOG active
		bit 3~4	00: Forward
			01: Transition from Reverse to Forward
			10: Transition from Forward to Reverse
			11: Reverse
		bit 5~7	reserved
		bit 8	1: Main Frequency comes from Communication Interface
		bit 9	1: Main Frequency comes from Analog/External Terminal signal input
		bit 10	1: The Command is operated by Communication Interface (keypad)
		bit 11	1: Parameters have been Locked
		bit 12	Running Status [0 = Drive Stopped; 1 = Drive Running (including Standby)]
		bit 13~15	reserved
48451	2102	Frequency Command (F) / PID Setpoint	
48452	2103	Output Frequency (H)	
48453	2104	Output Current (A)	
48454	2105	DC Bus Voltage (U)	
48455	2106	Output Voltage (E)	
48456	2107	Multi Speed or PID Inputs current Step Number	
48457	2108	Reserved	
48458	2109	Digital Input Counter Value	
48459	210A	Power Factor Angle (cos Θ)	
48460	210B	Output torque (XXX.X%)	
48461	210C	Actual Motor Speed (rpm)	
48462	210D	reserved	
48463	210E	reserved	
48469	2114	Indicates one or decimal points for value in 210F.	
48464	210F	Power Output in kW	
48471	2116	Multi-function display P00.04	
48476	211B	Maximum Operation Frequency P01.00 or Maximum User- defined Value P00.26 When P00.26 is 0, this value is equal to P01.00 setting. When P00.26 is not 0, and the command source is keypad, this value = P00.24 * P00.26 / P01.00. When P00.26 is not 0, and the command source is 485, this value = P09.10 * P00.26 / P01.00.	
48480	211F	High byte: the decimal place of current value display	
48705	2200	Display the drive's output current XX.XX. When the current is higher than 655.35, it automatically shifts one decimal place as XXX.X. Refer to the high byte of 211F for information on the decimal places.	
48706	2201	Counter value	
48707	2202	Actual output frequency XXXXX Hz	
48708	2203	DC bus voltage XXX.X V	
48709	2204	Output voltage XXX.X V	

Continued on next page

Communication Protocol Parameter Address Definitions (continued)			
Modbus Address		***Definition***	
Decimal	***Hex***		
48710	2205	Power factor angle XXX.X	
48711	2206	Display the output power of U, V, W XXXX.X kW	
48712	2207	Display the motor speed estimated by the drive or encoder feedback XXXXX rpm	
48713	2208	Display the positive / negative output torque estimated by the drive +0.0: positive torque; -0.0: negative torque XXX.X%	
48714	2209	Reserved	
48715	220A	Display the P ID feedback value after enabling ID function XXX.XX%	
48716	220B	Display the AI1 analog input terminal signal, 0-10 V corresponds to 0.00-100.00% see Explanation 1 in P00.04	
48717	220C	Display the AI2 analog input terminal signal, 4-20 m / 0-10 V corresponds to 0.00-100.00% 2. See Explanation 2 in P00.04,	
48718	220D	Reserved	
48719	220E	IGBT temperature of the power module XXX.X °C	
48720	220F	Reserved	
48721	2210	The digital input status ON / OFF , refer to P02.12. See Explanation 2 in P00.04.	
48722	2211	The digital output status ON / OFF , refer to P02.18. See Explanation 3 in P00.04.	
48723	2212	Current step for the multi-step speed operation	
48724	2213	The corresponding PLC digital input pin status. See Explanation 3 in P00.04	
48725	2214	The corresponding PLC digital output pin status. See Explanation 4 in P00.04	
48726	2215	Reserved	
48727	2216	Pulse input frequency XXX.XX Hz	
48728	2217	Reserved	
48729	2218	Reserved	
48730	2219	Counter value of overload XXX.XX %	
48731	221A	GFF XXX.XX %	
48732	221B	DC bus voltage ripples XXX.X V	
48733	221C	PLC register D1043 data	
48734	221D	Magnetic field area of the synchronous motor	
48735	221E	User page displays the value in physical measure	
48736	221F	Output value of P00.05 XXX.XX Hz	
48737	2220	Reserved	
48738	2221	Reserved	
48739	2222	Reserved	
48740	2223	Control mode of the drive, 0: speed mode 1: torque mode	
48741	2224	Carrier frequency of the drive XX kHZ	
48742	2225	Reserved	
48743	2226	bit 1~0	Drive status
			00b: No direction
			01b: Forward
			10b: Reverse
		bit 3~2	01b: Drive ready
			10b: Error
		bit 4	0b: Motor drive does not output
			1b: Motor drive outputs
		bit 5	0b: No warning
			1b: Warning

Continued on next page

Communication Protocol Parameter Address Definitions (continued)		
Modbus Address		***Definition***
Decimal	***Hex***	
48744	2227	Drive's estimated output torque positive or negative direction XXXX N•m
48745	2228	Reserved
48746	2229	KWH display XXXX.X
48747	222A	Reserved
48748	222B	Reserved
48749	222C	Reserved
48750	222D	Reserved
48751	222E	PID target value XXX.XX %
48752	222F	PID offset XXX.XX %
48753	2230	PID output frequency XXX.XX Hz
48754	2231	Reserved
48755	2232	Display the auxiliary frequency
48756	2233	Display the master frequency
48757	2234	Display the frequency after adding and subtracting of the master and auxiliary frequencies.

Modbus TCP Communication

GS20A-CM-ENETIP/EIP2 Modbus Function Codes	
Code	***Definition***
0x03	Read register(s) from GS20(X)
0x06	Write single register to GS20(X)
0x10	Write multiple data registers to GS20(X)

EtherNet/IP Protocol

GS20A-CM-ENETIP/EIP2 EtherNet/IP I/O Messaging (Implicit Messaging)

- *Trigger type: Cyclic*
- *Transport class: 1*
- *Application connection type: Exclusive owner*

Parameter	O→T		T→O	
Data size		Fixed		Fixed
Connection type	Point-to-Point		Mulitcast, Point to Point	

GS20A-CM-ENETIP/EIP2 EtherNet/IP Communication Parameter

- *Input buffer register: In Assembly Instance = 101, Data Type = 16 bits, Size = 16*
- *Output buffer register: Out Assembly Instance = 100, Data Type = 16 bits, Size = 3*
- *Configuration: Instance = 102, Data Type = 8 bits, Size = 0*

GS20A-CM-ENETIP/EIP2 EtherNet/IP CIP Command Status Code

Status Code	Status	Definition
0x00	**Success**	Requested service is successfully executed.
0x01	**Connection failure**	Connected service fails.
0x04	**Path segment error**	Node in the program cannot identify the definition or syntax of a path segment. When this error takes place, the execution of program will be terminated.
0x05	**Path destination unknown**	The path is related to object type, but the node in the program does not cover or cannot identify the type or structure of the object. When this error takes place, the execution of program will be terminated.
0x08	**Service not supported**	The object does not support required service or has not yet defined the service.
0x0E	**Attribute not settable**	Receives request to modify unchangeable attribute
0x13	**Not enough data**	Receives insufficient data and therefore cannot execute command
0x14	**Attribute not supported**	Does not support requested attribute
0x 5	**Too much data**	The received data exceeds what the command execution requires.
0x20	**Invalid parameter**	The requested parameter is invalid, indicating that the parameter does not fit the definition of the requirement, or the requirement has been defined in “Application Object Specification”.
0x26	**Path size invalid**	The size of the path transmitting requested service cannot afford the request to the object or cover too much route data.

GS20A-CM-ENETIP/EIP2 EtherNet/IP Error Code for Monitor Request

Status Code	Extended Status Code	Definition
0x00	–	The execution of service is successful.
0x01	0x0100	The connection is in progress or the connection is re-opened. The code will be sent back when the source is trying to establish a connection to the target but the target has already been connected.
0x01	0x0103	Does not support the combination of this transmission type and trigger. The target does not support the defined combination of transmission type and trigger. The router will not teminate the connection, only the target end has to send back this extended status code.
0x01	0x0106	Clash of control right A connection takes the control, blocking the establishment of other connections. When this device occupies the connection in this way, only one connection will be allowed to control this device.
0x01	0x0107	Cannot find the corresponding target to connect
0x01	0x0108	Invalid network connection parameter When the application program in the target does not support the defined connection type, connection level, or there are too many users, the extended status code will be sent back. Only the node on target has to send back the extended status code.
0x01	0x0109	Invalid setting of the size of the on-line data exchange zone This device does not support the setting of the current data exchange zone. The setting can be too big or too small.
0x01	0x0111	RPI setting not supported
0x01	0x0112	RPI Value(s) Not Acceptable. Module requires an RPI of 10ms or greater.
0x01	0x0113	The number of connections exceeds the maximum. No further connections are able to connect to this device.
0x01	0x0114	The company ID does not match product code. The product code or company ID marked in the electronic key logic section does not match the record in the target device.
0x01	0x0115	Inconsistent product type The product type marked in the electronic key logic section does not match the record in the target device.
0x01	0x0116	Inconsistent version The primary and secondary revised versions marked in the electronic key logic section do not match the record in the target device.
0x01	0x0315	Invalid section exists in the path. The type or value of a section in the path is invalid. When the device cannot interpret the path, it will respond with this extended status code. Cause of this error: Unidentifiable path type, unexpected section type or other problems existing in the path.

GS20A-CM-ENETIP/EIP2 EtherNet/IP Communication Protocol Parameter Address Definitions

EtherNet/IP Communication Protocol Parameter Address Definitions				
Class Code (Parameter Content)	***Instance***	***Address***	***Definition***	
Class 4 (Commands to GS20(X))	Instance 100 (0x64)	0	bit 0~1	00: no function
				01: Stop
				10: Run
				11: Enable JOG
			bit 2~3	reserved
			bit 4~5	00: no function
				01: Forward command
				10: Reverse command
				11: no function
			bit 6~7	00B: 1st accel. / decel.
				01B: 2nd accel. / decel.
				10B: 3rd accel. / decel.
				11B: 4th accel. / decel.
			bit 8~11	0000B: Master speed
				0001B: 1st step speed frequency
				0010B: 2nd step speed frequency
				0011B: 3rd step speed frequency
				0100B: 4th step speed frequency
				0101B: 5th step speed frequency
				0110B: 6th step speed frequency
				0111B: 7th step speed frequency
				1000B: 8th step speed frequency
				1001B: 9th step speed frequency
				1010B: 10th step speed frequency
				1011B: 11th step speed frequency
				1100B: 12th step speed frequency
				1101B: 13th step speed frequency
				1110B: 14th step speed frequency
				1111B: 15th step speed frequency
			bit 12	1: Enable bit 06-11 function. Must =1 to use above bits
			bit 13~14	00B: No function
				01B: No function
				10B: No function
				11B: No function
			bit 15	Reserved
		1	Frequency command (6000 = 60.00Hz)	
		2	bit 0	1: E.F. = ON (trigger an External Fault)
			bit 1	1: Reset command
			bit 2	1: External interruption (B.B) = ON
			bit 3~15	reserved

Continued on next page

Communication Protocol Parameter Address Definitions (continued)				
Class Code (Parameter Content)	**Instance**	**Address**	**Definition**	
Class 4 (Monitor GS20(X) status)	Instance 101 (0x65)	0	bit 0–7	Fault Code*
			bit 8–15	Warning Code*
			*Refer to Chatper 6: Maintenance and Troubleshooting for code definitions.	
		1	bit 0~1	00: Stop
				01: Decel during Stop
				10: Standby
				11: Run
			bit 2	1: JOG active
			bit 3~4	00: Forward
				01: Transition from Reverse to Forward
				10: Transition from Forward to Reverse
				11: Reverse
			bit 5~7	reserved
			bit 8	1: Main frequency comes from communication interface
			bit 9	1: Main frequency comes from analog/external terminal signal input
			bit 10	1: The command is operated by communication interface (keypad)
			bit 11	1: Parameters have been locked
			bit 12	Running status 0: Drive stopped 1: Drive running (including standby)
			bit 13~15	reserved
		2	Frequency command (F) / PID Setpoint (6000 = 60.00Hz)	
		3	Output frequency (H) (6000 = 60.00Hz)	
		4	Output current (A)	
		5	DC bus voltage (U)	
		6	Output voltage (E)	
		7	Multi-speed or PID Inputs current Step Number	
		8	Reserved	
		9	Digital Input counter value	
		10	Power Factor angle (cosθ)	
		11	Output torque (XXX.X%)	
		12	Actual Motor Speed (rpm)	
		13	reserved	
		14	reserved	
		15	Power Output (kW)	

EtherNet/IP Communication Protocol Parameter Address Definitions – Class 300			
Class Code (Parameter Content)	***Instance***	***Attribute***	***Definition***
Explicit Class 0x300 (Monitor GS20x Status)	Instance 33 (0x21)	0x16	Multi-function display P00.04
		0x1B	Maximum Operation Frequency P01.00 or Maximum User-defined Value P00.26 When P00.26 is 0, this value is equal to P01.00 setting. When P00.26 is not 0, and the command source is keypad, this value = P00.24 * P00.26 / P01.00. When P00.26 is not 0, and the command source is 485, this value = P09.10 * P00.26 / P01.00.
		0x1F	High byte: the decimal place of current value display
	Instance 34 (0x22)	0x00	Display the drive's output current XX.XX. When the current is higher than 655.35, it automatically shifts one decimal place as XXX.X. Refer to the high byte of 211F for information on the decimal places.
		0x01	Counter value
		0x02	Actual output frequency XXXXX Hz
		0x03	DC bus voltage XXX.X V
		0x04	Output voltage XXX.X V
		0x05	Power factor angle XXX.X
		0x06	Display the output power of U, V, W XXXX.X kW
		0x07	Display the motor speed estimated by the drive or encoder feedback XXXXX rpm
		0x08	Display the positive / negative output torque estimated by the drive +0.0: positive torque; -0.0: negative torque XXX.X%
		0x09	Reserved
		0x0A	Display the P ID feedback value after enabling ID function XXX.XX%
		0x0B	Display the AI1 analog input terminal signal, 0-10 V corresponds to 0.00-100.00% see Explanation 1 in P00.04
		0x0C	Display the AI2 analog input terminal signal, 4-20 m / 0-10 V corresponds to 0.00-100.00%. See Explanation 2 in P00.04.
		0x0D	Reserved
		0x0E	IGBT temperature of the power module XXX.X °C
		0x0F	Reserved
		0x10	The digital input status ON / OFF , refer to P02.12. See Explanation 2 in P00.04
		0x11	The digital output status ON / OFF , refer to P02.18. See Explanation 3 in P00.04.
		0x12	Current step for the multi-step speed operation
		0x13	The corresponding PLC digital input pin status. See Explanation 3 in P00.04.
		0x14	The corresponding PLC digital output pin status. See Explanation 4 in P00.04.
		0x15	Reserved
		0x16	Pulse input frequency XXX.XX Hz
		0x17	Reserved
		0x18	Reserved
		0x19	Counter value of overload XXX.XX %
		0x1A	GFF XXX.XX %
		0x1B	DC bus voltage ripples XXX.X V
		0x1C	PLC register D1043 data
		0x1D	Magnetic field area of the synchronous motor
		0x1E	User page displays the value in physical measure
		0x1F	Output value of P00.05 XXX.XX Hz
		0x20	Reserved
		0x21	Reserved
		0x22	Reserved
		0x23	Control mode of the drive, 0: speed mode 1: torque mode
		0x24	Carrier frequency of the drive XX kHZ
		0x25	Reserved

Continued on next page

EtherNet/IP Communication Protocol Parameter Address Definitions – Class 300 (continued)				
Class Code (Parameter Content)	***Instance***	***Attribute***	***Definition***	
Explicit Class 0x300 (Monitor GS20x Status)	Instance 34 (0x22)	0x26		Drive status
			bit 1~0	00b: No direction
				01b: Forward
				10b: Reverse
			bit 3~2	01b: Drive ready
				10b: Error
			bit 4	0b: Motor drive does not output
				1b: Motor drive outputs
			bit 5	0b: No warning
				1b: Warning
		0x27	Drive's estimated output torque positive or negative direction XXXX N•m	
		0x28	Reserved	
		0x29	KWH display XXXX.X	
		0x2A	Reserved	
		0x2B	Reserved	
		0x2C	Reserved	
		0x2D	Reserved	
		0x2E	PID target value XXX.XX %	
		0x2F	PID offset XXX.XX %	
		0x30	PID output frequency XXX.XX Hz	
		0x31	Reserved	
		0x32	Display the auxiliary frequency	
		0x33	Display the master frequency	
		0x34	Display the frequency after adding and subtracting of the master and auxiliary frequencies.	

Class 4 Explicit Message Configuration

Get (Read) Message:

- *Service Code = 14 (0x0E)*
- *Class = 4 (0x04)*
- *Instance = 101 (0x65)*
- *Attribute = 3 (0x03)*
- *Data Size = 16 WORDS*

Set (Write) Message:

- *Service Code = 16 (0x10)*
- *Class = 4 (0x04)*
- *Instance = 100 (0x64)*
- *Attribute = 3 (0x03)*
- *Data Size = 3 WORDS*

GS20A-CM-ENETIP/EIP2 Explicit Messaging

EtherNet/IP Services and Objects

EtherNet/IP Objects Supported		
Object	***Class Code***	***Definition***
Identity Object	0x01	For device identity
Message Router Object	0x02	For message route
Assembly Object	0x04	For assembly
Connection Manager Object	0x06	For connection management
TCP/IP Interface Object	0xF5	For TCP/IP interface
Ethernet Link Object	0xF6	For Ethernet connection
BR Object	0x64	For basic control registers
AL Object	0x65	For alarm registers
AC Drive (VFD) Data Object	0x300	For any VFD parameter

EtherNet/IP Data Formats Supported	
Data Format	***Explanation***
BYTE	8-bit string
WORD	16-bit string
DWORD	32-bit string
STRING[n]	String composed of n bytes
SHORT_STRING	String combined from bytes (1 byte length indicator, 1 byte characters)
USINT	8-bit unsigned integer
UINT	16-bit unsigned integer
UDINT	32-bit unsigned integer

Identity Object (Class Code: 0x01)

Instance Code: 0x01

Instance Attributes

Attribute ID	***Access Rule***	***Name***	***Data Type***	***Description of Attribute***
0x01	Get	Vendor ID	UINT	660
0x02	Get	Device Type	UINT	Communications Adapter 12
0x03	Get	Product Code	UINT	Model code: 0x0104
0x04	Get	Revision	STRUCT of: USINT, USINT	Firmware version Major revision Minor revision
0x05	Get	Status	WORD	Summary status of devices.
0x06	Get	Serial Number	UDINT	32-bit serial number of device
0x07	Get	Product Name	SHORT_STRING	GS20A-CM-ENETIP/EIP2

Common Services

Service Code	***Implemented for***		***Service Name***	***Description of Service***
	Class	***Instance***		
0x05		✓	Reset	Resets device settings
0x0E		✓	Get Single Attribute	Sends back attribute of designated object

Message Router Object (Class Code: 0x02)

Instance Code: 0x01

Instance Attributes: None

Common Services

Service Code	Implemented for		Service Name	Description of service
	Class	Instance		
0x0E		✓	Get Single Attribute	Sends back attribute of designated object

Assembly Object (Class Code: 0x04)

Instance Code

Instance	Description
0x64	Corresponds to output buffer register
0x65	Corresponds to input buffer register
0x66	Corresponds to setup object

Instance Attributes

Attribute ID	Access Rule	Name	Data type	Description of attribute
0x03	Get / Set	Data	ARRAY of BYTE	Instance Code = 0x64 (Get/Set) Others Get only

Common Services

Service Code	Implemented for		Service Name	Description of service
	Class	Instance		
0x0E		✓	Get Single Attribute	Sends back attribute of designated object
0x10		✓	Set Single Attribute	Modifies attribute

Connection Manager Object (Class Code: 0x06)

Instance Code: 0x01

Instance Attributes: None

Services

Service Code	Implemented for		Service Name	Description of service
	Class	Instance		
0x4E		✓	Forward Close	Shuts down the connection
0x54		✓	Forward Open	Establishes the connection, max. 511 bytes per transmission.

TCP/IP Interface Object (Class Code: 0xF5)

Instance Code: 0x01

Instance Attributes

Attribute ID	Access Rule	Name	Data type	Description of attribute
0x01	Get	Status	DWORD	Interface status
0x02	Get	Configuration Capability	DWORD	Interface capability flags
0x03	Get / Set	Configuration Control	DWORD	Interface control flags
0x04	Get	Path Size, Path	STRUCT of: UINT, Padded EPATH	 Path size Path
0x05	Get / Set	Interface Configuration	STRUCT of: UDINT, UDINT, UDINT, UDINT, UDINT, STRING	 IP Address Network Mask Gateway Address Name Server Name Server 2 Domain Name
0x06	Get / Set	Host Name	STRING	Host name

Status Instance Attribute

Bits	Name	Description
0~3	Interface Configuration Status	0 = The Interface Configuration attribute has not been configured. 1 = The Interface Configuration attribute contains valid configuration obtained from BOOTP, DHCP or non-volatile storage. 2 = The IP address member of the Interface Configuration attribute contains valid configuration, obtained from hardware settings (e.g.: pushwheel, thumbwheel, etc.) 3-15 = reserved for future use.

Configuration Capability Attribute

Bits	Name	Description
2	DHCP Client	1 (TRUE) shall indicate the device is capable of obtaining its network configuration via DHCP.
4	Configuration Settable	1 (TRUE) shall indicate the Interface Configuration attribute is settable.

Configuration Control Attribute

Bits	Name	Description
0~3	Startup Configuration	0 = The device shall use the interface configuration values previously stored in non-volatile memory. 1 = The device shall obtain its interface configuration values via BOOTP. 2 = The device shall obtain its interface configuration values via DHCP upon start-up. 3-15 = reserved for future use.

Common Services

Service Code	Implemented for		Service Name	Description of service
	Class	Instance		
0x0E		✓	Get Single Attribute	Sends back attribute of designated object
0x10		✓	Set Single Attribute	Modifies attribute

Ethernet Link Object (Class Code: 0xF6)

Instance Code: 0x01

Instance Attributes

Attribute ID	Access Rule	Name	Data type	Description of attribute
0x01	Get	Interface Speed	UDINT	Interface speed currently in use Speed in Mbps (e.g., 0, 10, 100, 1000, etc.)
0x02	Get	Interface Flags	DWORD	Interface status flags
0x03	Get	Physical Address	USINT[6]	MAC address

Interface Flags

Bits	Name	Description
0	Link Status	0 indicates an inactive link; 1 indicates an active link.
1	Half/Full Duplex	0 indicates the interface is running half duplex; 1 indicates full duplex.
2-4	Negotiation Status	Indicates the status of link auto-negotiation 0 = Auto-negotiation in progress. 1 = Auto-negotiation and speed detection failed. Using default values for speed and duplex. defaults are 10Mbps and half duplex. 2 = Auto negotiation failed but detected speed. default is half duplex. 3 = Successfully negotiated speed and duplex. 4 = Auto-negotiation not attempted. Forced speed and duplex.

Services

Service Code	Implemented for		Service Name	Description of service
	Class	Instance		
0x0E		✓	Get Single Attribute	Sends back attribute of designated object

GS20A-CM-ENETIP/EIP2 EtherNet/IP Basic Registers

GS20A-CM-ENETIP/EIP2 Basic Registers			
BR#	**Read / Write**	**Content**	**Explanation**
#0	R	Model name	Set up by the system; read only. The model code of GS20A-CM-ENETIP/EIP2=0204H
#1	R	Firmware version	Displaying the current firmware version in hex, e.g. 0100H indicates the firmware version V1.00.
#2	R	Release date of the version	Displaying the data in decimal form. 10,000s digit and 1,000s digit are for "month"; 100s digit and 10s digit are for "day". For 1 digit: 0 = morning; 1 = afternoon.
#6	R	GS20(X) Drive station number	1 – 254
#11	R/W	Modbus Timeout	Pre-defined setting: 50 (ms)
#13	R/W	Keep Alive Time	Pre-defined setting: 30 (s)

BR#0 - Model Name: Model code for GS20A-CM-ENETIP/EIP2 is 0x0104. Read the model code to confirm connection with GS20A-CM-ENETIP/EIP2.

BR#1 - Firmware Version: The firmware version of GS20A-CM-ENETIP/EIP2 displayed in hexadecimal.
Example: 0100h indicates version V1.00.

BR#2 - Release Date of the Version: The date is displayed in decimal form. 10,000s digit and 1,000s digit are for "month;" 100s digit and 10 digit are for "day." For 1s digit: 0 = morning; 1 = afternoon.10
Example: 12191 indicates that the version was released the afternoon of December 19.

BR#6 - GS20(X) Drive Station Number: Station number of the GS20(X) series drive. Range 1~254.

BR#11 - Modbus Communication Timeout: Sets the communication timeout (ms) for Modbus TCP.

BR#13 - Modbus TCP Keep Alive Time: Range 5~65,535 seconds. If the connection idle time exceeds the keep alive time, GS20A-CM-ENETIP will cut the idling connection.

BR Object (Class Code: 0x64)

Instance Code

Instance	Description
0x01	Corresponds to BR0: Model name
0x02	Corresponds to BR1: Firmware version
0x03	Corresponds to BR2: Release date of the version
0x07	Corresponds to BR6: GS20(X) station No.
0x0C	Corresponds to BR11: MODBUS communication timeout
0x0E	Corresponds to BR13: Network keep alive time (TCP/IP)

Instance Attributes

Attribute ID	Access Rule	Name	Data type	Description of attribute
0x03	Get / Set	Data	UINT	Refer to 4.2 for corresponding value Instance Code = 0x0E Get/Set Others Get Only

Common Services

Service Code	Implemented for		Service Name	Description of service
	Class	Instance		
0x0E		✓	Get Single Attribute	Sends back attribute of designated object
0x10		✓	Set Single Attribute	Modifies attribute

GS20A-CM-ENETIP/EIP2 EtherNet/IP Alarm Register

GS20A-CM-ENETIP/EIP2 EtherNet/IP Alarm Register (Alarm Modbus Address Base – 0x0200, 40513)				
AL#	**Bit in each AL**	**Read / Write**	**Function**	**Explanation**
#0~#15	bit 15	R	Function enabling flag	bit 15 = 1 → Function enabled bit 15 = 0 → Function disabled
	bit 4~bit 14	R	reserved	
	bit 2~bit 3	R	Type of triggered event	bit 3 / bit 2: reserved 0 0; reserved 0 1; reserved 1 0; reserved 1 1
	bit 1	R	Status of trigger	bit 1 = 1 → Not yet triggered bit 1 = 0 → Already triggered
	bit 0	R	Type of trigger	bit 0 = 1 → Triggered by software bit 0 = 0 → Triggered by hardware

AL Object (Class Code: 0x65)

Instance Code

Instance	Description
0x01~0x10	Corresponds to AL0~AL15: Alarm register

Instance Attributes

Attribute ID	Access Rule	Name	Data type	Description of attribute
0x03	Get	Data	UINT	Refer to 4.3 for corresponding value

Common Services

Service Code	Implemented for		Service Name	Description of service
	Class	Instance		
0x0E		✓	Get Single Attribute	Sends back attribute of designated object

AC Drive (VFD) Data Object (Class Code: 0x300)

Class Attributes & Instance Attributes

- *Object Class = 0x300*
- *Instance = Parameter Group*
- *Attribute = Parameter Member*

Instance & Attributes					
Instance	**Attributes**	**Access Rule**	**Name**	**Data Type**	**Description of Attribute**
0x20	0x00~0x02	Get / Set	VFD Command	UINT	VFD Command Data
0x21	0x00~0x1F	Get	VFD Status	UINT	VFD Status Data
0x22	0x00~0x34	Get	VFD Status	UINT	VFD Status Data

Services

Instance & Attributes				
Service Code	**Implemented for**		**Service Name**	**Description of Service**
	Class	**Instance**		
0x0E	✓	✓	Get_Attribute_Single	Returns the attributes of a designated element
0x10	✓	✓	Set_Attribute_Single	Gets the attributes of a designated element

EtherNet/IP Communication Card Register Settings

The EtherNet/IP interface of the GS20(X) AC Drive supports the drive's various modes of control. The communication protocol provides support for two packet types for data exchange:

- *Explicit Message*
- *Implicit Message*

Explicit Message-based Data Exchange:

The host controller directly assigns values to the GS20(X) Drive. Therefore it is necessary for the EIP communication card to allocate a corresponding address for the Object Class.

Currently, the address of the Object Class occupied by the GS20(X) Drive is 0x300.

The regular correspondence between parameter addresses and explicit messages is as follows:

EIP Communication Data Format

Object Class	+	*Instance*	+	*Attribute*
0x300	+	Parameter Group #	+	Parameter Member #

For example:

If we wish to write a command for parameter P01.01 (to set Acceleration Time 1), proceed as follows:

Explicit Message Format to Write to P1.01

	Object Class	+	*Instance*	+	*Attribute*
=	0x300	+	Parameter Group #	+	Parameter Member #
=	0x300	+	1 [0x01]	+	1 [0x01]
=	0x300	+	0x01	+	0x01

Using Speed Mode as a Control Method

1) Setting the Target Frequency:
   Set (Object, Instance, Attribute) = (300h, 20h, 01h);
   Unit = Hz, with a decimal precision at the hundredths position;
   Example: 1000 represents 10.00.
2) Operation:
   Setting (Object, Instance, Attribute) = (300h, 20h, 00h) = 0002h indicates Run;
   Setting (Object, Instance, Attribute) = (300h, 20h, 00h) = 0001h indicates Stop.
3) Acceleration/Deceleration time Operations:
   If the first accel/decel section is used as the basis,
   the accel time is set to (Object, Instance, Attribute) = (300h, 01h, 01h),
   and the decel time is set to (Object, Instance, Attribute) = (300h, 01h, 02h),
   with unit = seconds and a decimal precision at the tenths position.
   Example: 100 represent 10.0 seconds.