YASKAWA

GPD315/V7 DeviceNet ™ Technical Manual

TM 4320

Preface

This instruction manual explains the specifications and handling the DeviceNet Communication Interface Unit for the Yaskawa GPD315/V7 inverter. This Option Card connects the inverter to the DeviceNet open field network and communicates to exchange data.

Fully read and comprehend this manual to ensure proper operation of the product.
For further instructions on handling the inverter, see the GPD315/V7 Technical Manual (TM4315).

YASKAWA ELECTRIC AMERICA INC.

General Cautionary Items

- For purposes of detailed explanation, some figures in this technical manual are drawn with covers or safety shields removed. When operating the inverter, be sure that all covers and shields are returned to their proper locations as directed, and operate in accordance with the technical manual.
- Modifications may be made to this manual as needed due to product improvements or changes in specifications, as well as for improvement in ease-of-use of this manual. These modifications will be reflected in the updating of the document number and its issuance as a revision.
- Please contact a Yaskawa representative or the nearest Yaskawa sales office listed on the back of this manual with the document number on the cover to order a manual should this copy be damaged or misplaced.
- Yaskawa assumes no responsibility for modifications made to the product by the user as they fall outside the scope of the warranty.

Safety Precautions

Read this instruction manual and other related documentation thoroughly before installation, operation, maintenance or inspection of the DeviceNet communication interference unit. Use the equipment only after having completely master knowledge of the machine, the safety information, and the precautions.
In this manual, SAFETY PRECAUTIONS are classified as either a “WARNING” or a “CAUTION.”

⚠ WARNING Indicates a potentially hazardous situation, which could result in death or serious injury to personnel if not avoided.

⚠ CAUTION Indicates a potentially hazardous situation, which may result in minor or moderate injury to personnel and damage to equipment. Items described may result in a serious accident in some situations. In any case, read and obey these important notes.

⚠ CAUTION

- **Do not install or operate any option unit, which is damaged or has missing parts.**
  Failure to observe this warning can result in personal injury or equipment damage.

⚠ WARNING

- **Never touch anything inside the inverter.**
  Failure to observe this warning can result in an electrical shock.
- **For installation, removal and wiring of the option card, turn OFF the inverter power and after all inverter displays have gone OFF, wait the prescribed period of time indicated on the inverter front enclosure, and then perform the installation and wiring.**
  Failure to observe this warning can result in an electrical shock.
- **Do not damage, put excess stress on, place heavy objects on, or pinch the cable.**
  Failure to observe this warning can result in an electrical shock, erroneous operation, and equipment damage.

⚠ WARNING

- **Do not touch directly the components on the option card.**
  Failure to observe this warning can result in damages by static electricity.
- **Insert connectors fully into position.**
  Failure to observe this warning can result in personal injury or erroneous operation and equipment damage.

⚠ CAUTION

Do not change inverter settings without adequate preparation.
Failure to observe this warning can result in personal injury and equipment damage.

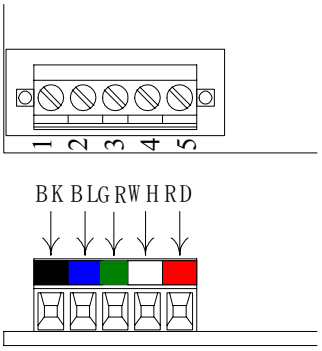
GPD315/V7 DeviceNet Table of Contents

DeviceNet Simplified Startup Procedure

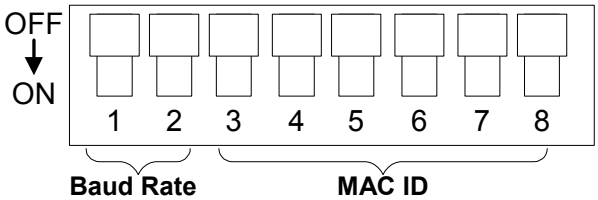
The following is a quick reference guide to install and configure the GPD315/V7 DeviceNet option kit. For more details please refer to the GPD315/V7 DeviceNet Technical Manual sections referenced.

1. Verify that the GPD315/V7 functions properly without the communications interface unit. This includes running the inverter from the operator keypad, without communications.
2. Turn off the GPD315/V7 power supply and wait for at least 1 minute for the charge lamp to be completely out before removing the operator and front cover.
3. Install the DeviceNet option kit on to GPD315/V7. Fasten the stabilizing hardware and ground wire provided. Mount the DeviceNet unit onto the GPD315/V7 making sure to connect CN1 and CN2 securely. Install the LED operator and front cover back onto the unit after securing the DeviceNet unit with screw. (Section 2.2 Installation and Wiring)
4. Connect the DeviceNet communication wires on the screw terminal on the DeviceNet option card. (Section 2.4 Cable Installation)

Terminal No.	Terminal Color	Name	Wiring Color	Content
1	Black	V-	Black	Communication power supply GND
2	Blue	CAN_L	Blue	Communication data low side
3	Grey	Shield	Bare	Shield wire
4	White	CAN_H	White	Communication data high side
5	Red	V+	Red	Communication power supply DC+24V



5. Using the dipswitch bank on the DeviceNet option kit, set communication baud rate (switch 1, 2) and MAC ID (switch 3 – 8). Be sure to verify that no devices on the network have duplicate MAC ID's. (Section 2.6 Baud Rate and Address Configuration).



Baud Rate

1	2	
OFF	OFF	125kbps
OFF	**ON**	250kbps
ON	OFF	500kbps
ON	**ON**	Not Allowed

MAC ID

3	4	5	6	7	8	
OFF	OFF	OFF	OFF	OFF	OFF	**0**
OFF	OFF	OFF	OFF	OFF	**ON**	**1**
OFF	OFF	OFF	OFF	**ON**	OFF	**2**
OFF	OFF	OFF	OFF	**ON**	**ON**	**3**
ON	**ON**	**ON**	**ON**	**ON**	OFF	**62**
ON	**ON**	**ON**	**ON**	**ON**	**ON**	**63**

Note: Setting the "Not Allowed" baud rate configuration (Switch 1 and 2 ON) causes a "BUS" fault on the digital operator.

6. Power up the GPD315/V7 and set the number of motor poles in parameter n035 to read and set the speed in RPM's. Also verify the frequency reference unit in parameter n152. (Section 3.1 Initial Settings)
7. Set the inverter's run/stop and frequency reference to meet the application requirements as explained below. (Section 3.2 Run / Stop and Frequency Selection)
   Example 1. Control from DeviceNet network
   When the inverter is set to be controlled by the DeviceNet network the frequency and the start/stop commands are issued through the master device. Set the GPD315/V7 parameters B1-01 and B1-02 as shown in the table.

Parameter	Display Text	Value	Description
n003	Run Source Option PCB	3	Sets the frequency reference to come from the DeviceNet option card.
n004	Reference Source Option PCB	9	Sets the sequence to come from the DeviceNet option card.

   Example 2. Monitor only
   The GPD315/V7 can be connected to the DeviceNet network and not be controlled by it. The motor speed and the status of the inverter can be monitored via DeviceNet while controlling the inverter from another source specified by parameters n003 and n004.
   Please refer to the GPD315/V7 Technical Manual for the proper settings of parameters n003 and n004.
8. Download the proper EDS file for the corresponding GPD315/V7 model number from www.odva.org in the "Downloads" area or www.drives.com in the "Technical Manuals" area. Refer to Section 3.4.1 Table of EDS Files and Product Codes for a complete list of EDS files with the model number of the GPD315/V7. Each GPD315/V7 inverter capacity has its own EDS file, so it is important to select the EDS file that matches the inverter capacity. The EDS file is necessary to map the DeviceNet and inverter parameters into the configuration tool where the user can access the parameters through DeviceNet. Install the EDS file in the configuration tool software, such as DeviceNet Manager or RSNetworx from Rockwell Software. (Appendix B DeviceNet Configuration for RSNetWorx and DeviceNet Manager)
   Note: The EDS files will be zip format, so you must un-zip the file before installing in the configuration tool.

End of DeviceNet Simplified Startup Procedure

1 Introduction

This manual is intended to provide information necessary to set-up and operate Yaskawa's GPD 315/V7 DeviceNet Interface Unit. This assumes knowledge of the parameters and functions of the Yaskawa GPD315/V7 inverter as well as the DeviceNet Industrial Networks and DeviceNet AC Drive profile. Please refer to GPD315/V7 Technical Manual, available for download on www.drives.com, for details on the inverter. For more information on DeviceNet contact the Open DeviceNet Vendor Association (ODVA).

Yaskawa's GPD315/V7 DeviceNet Interface Unit plugs into the CN2 port on the control board of the inverter with software number S0020 and after. Yaskawa utilizes a dual port RAM link between the inverter and the DeviceNet option assembly. The DeviceNet option card assembly supports 4 different Input Assemblies (4 to 8 bytes) and 4 different Output Assemblies (4 to 8 bytes), which two of the Input and two of the Output are inverter specific. All DeviceNet objects required to meet the AC Drive profile are supported. The GPD315/V7 communicates through DeviceNet as a Group 2 only server.

Supported Message Types:

Explicit Messages;	Fragmentation is supported.
	Up to 32 bytes can be input and output.
Polled I/O Messages;	Fragmentation is not supported.
	Up to 8 bytes can be input and output.

1.1 Inspection Checkpoints

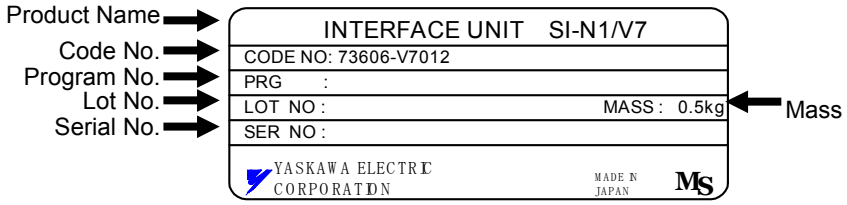
Receiving Checkpoints

Checkpoints	Description
Does the Interface Unit SI-N1/V7 model number comply with the purchase order?	Check the model number on the nameplate on the side of the interface unit. （See 1.2）
Are any parts damaged?	Visually check the exterior and verify that there was no damage during transport.
Are all parts included?	Check with Parts Table （See 1.3）

If any of the above checkpoints are not satisfactory, contact YASKAWA representative.

1.2 Nameplate

An example of the DeviceNet communication interface unit nameplate is as follows:



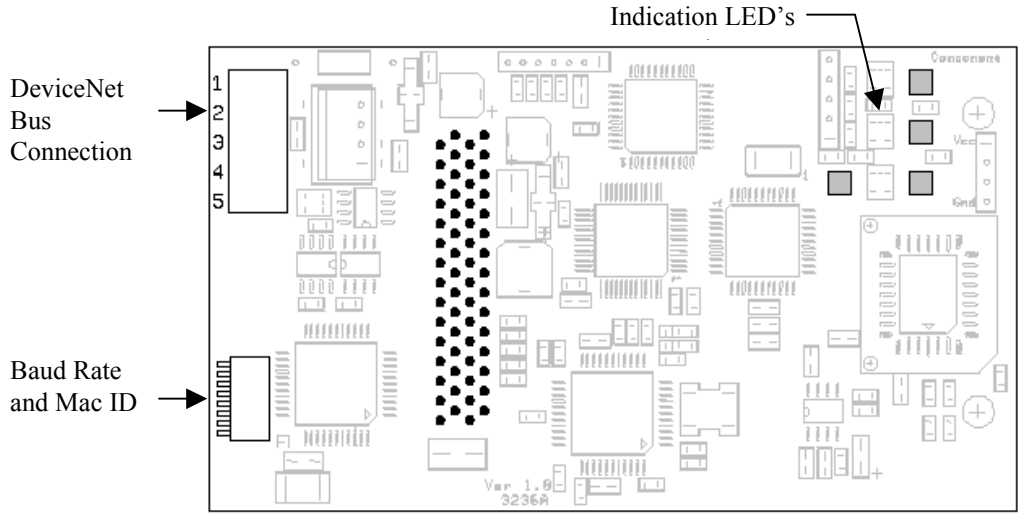
1.3 Table of Parts

Following parts are included with the communication interface unit.

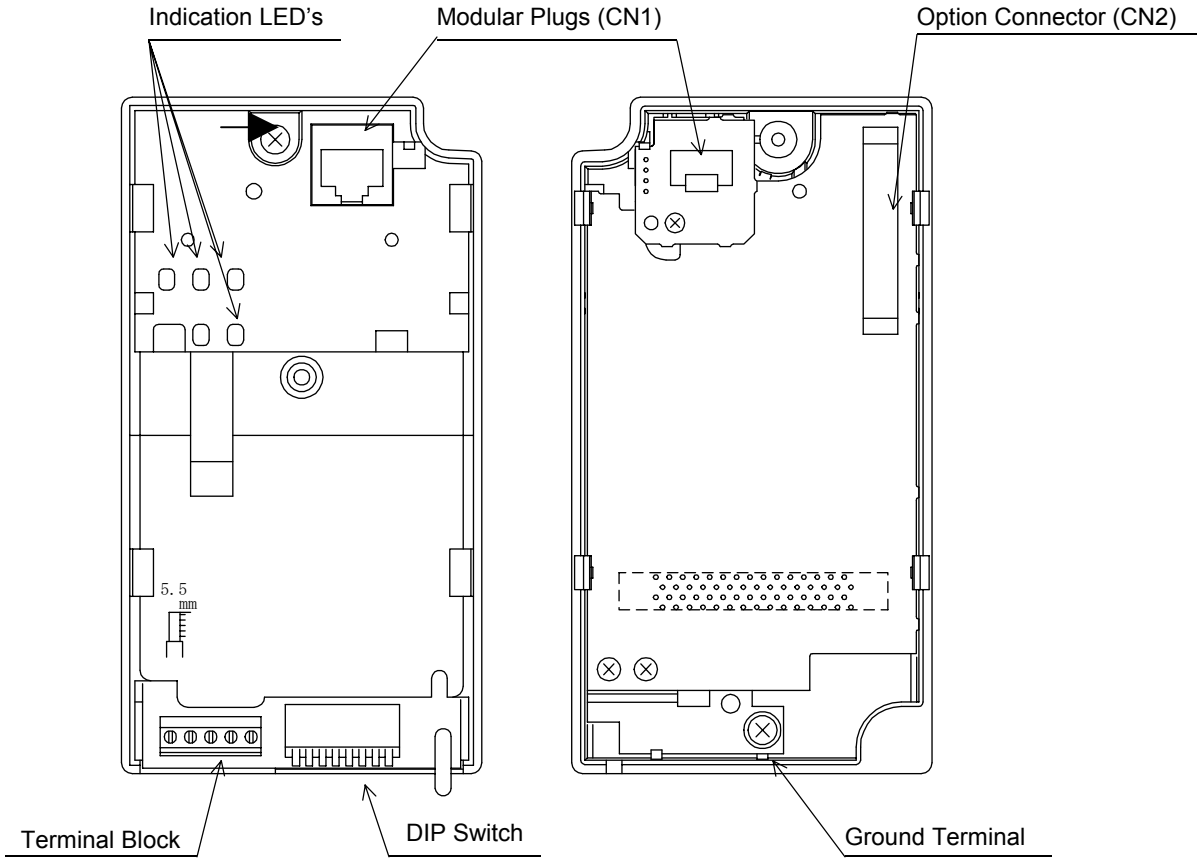
Parts Name	Quantity
DeviceNet communication interface unit	1
Stabilizing hardware	1
M3×8 SW screw	1
Ground wiring (small)	1
Ground wiring (Medium)	1
Ground wiring (Large)	1

2 Board Installation and Set-up

2.1 DeviceNet Board Overview



The above DeviceNet option card is assembled into a DeviceNet Interface Unit assembly, which fits over the GPD315/V7 inverter, with the front panel and digital operator removed. The front panel and digital operator of the inverter are then reassembled into the Communications Interface Unit Assembly. Please refer to the following diagram for an example of the Communications Interface Unit Assembly. Interface unit component names are as follows:



Communication Interface Unit Front View Communication Interface Unit Back View

2.2 Installation and Wiring

The communication interface unit is installed where the GPD315/V7 LED operator and the front cover are removed. Before installing any communications Interface Unit, verify that the GPD315/V7 functions properly without the Interface Unit. Install the unit according to the following procedures.

1) Turn OFF inverter power supply. Wait for at least one minute after the charge LED has turned off. Then, remove the operator and front cover.
2) Cut protective tab on the CN2 connector of the inverter according to Fig. 1. (Be careful not to drop the protective tab into the inverter. If the protective tab falls into the inverter be sure to remove it.)
3) Fasten the metal stabilizing hardware attachment as shown in Fig. 1.
4) Before installing the DeviceNet interface unit onto the inverter, connect the ground wiring to the ground screw of the DeviceNet unit as shown in Fig.3 (There are three different ground wires supplied according to the inverter capacity. Apply one crimp-style terminal wiring to match the inverter capacity.)
5) Mount the DeviceNet interface unit onto the inverter carefully. During installation, make sure to connect CN1 and CN2 correctly.（Complete all wiring to the inverter before installing the DeviceNet interface unit. After the unit is installed, inverter terminals are obstructed.）
6) Mount the interface unit to the inverter with the screw according to Fig. 2. (The screw is attached)
7) Connect the ground wire from Step 4 to the ground terminal on the GPD315/V7.
8) Install the LED operator and front cover back onto the unit.

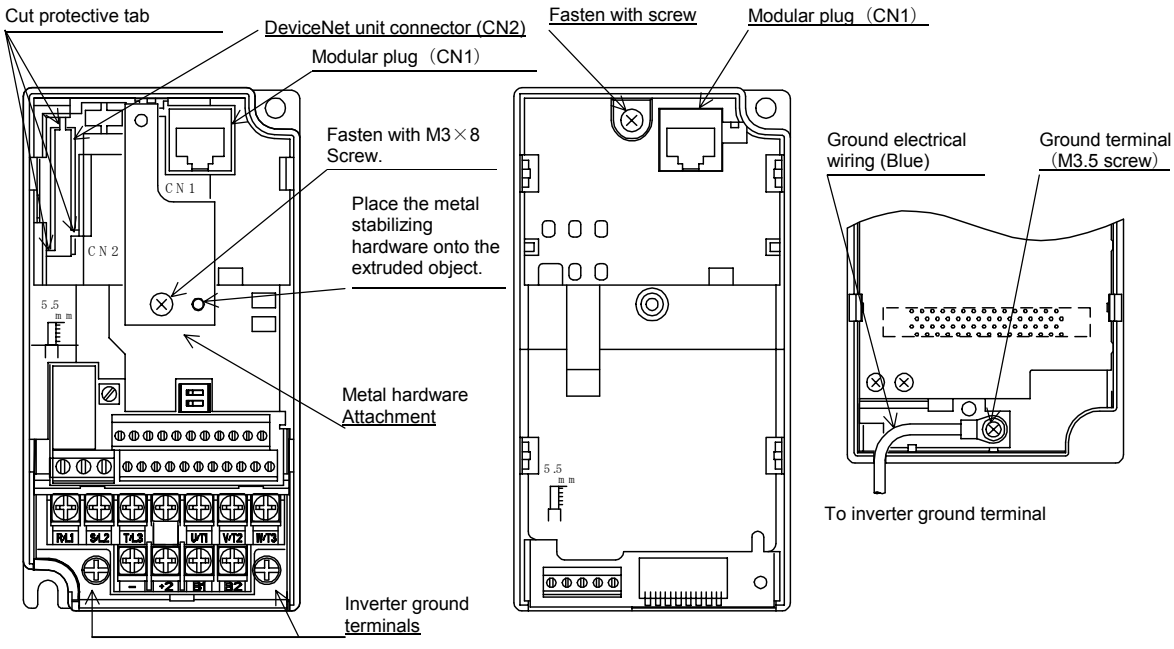


Fig. 1 Inverter Front View

Fig. 2 Communication Interface Unit Front View

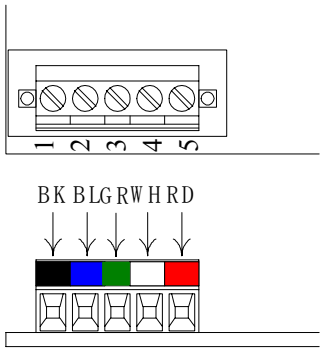
Fig. 3 Communication Interface Unit Back View

Grounding Wire	Size of Inverter
Grounding Line (small): 150mm	200V(Single-Phase): 0.1kW~0.4kW, 200V(3-Phase): 0.1kW~0.75kW
Grounding Line (medium): 220mm	200V(Single-Phase): 0.75kW~3.7kW, 200V(3-Phase): 1.5kW~3.7kW, 400V(3-Phase): 0.2kW~3.7kW
Grounding Line (large): 300mm	200V(Single-Phase): 4.0kW~7.5kW, 200V(3-Phase): 4.0kW~7.5kW, 400V(3-Phase): 4.0kW~7.5kW

2.3 DeviceNet Connectors and Cabling

This terminal block connects DeviceNet communication line.

Terminal No.	Terminal Color	Name	Wiring Color	Content
1	Black	V-	Black	Communication power supply GND
2	Blue	CAN_L	Blue	Communication data low side
3	Gray	Shield	Bare	Shield wire
4	White	CAN_H	White	Communication data high side
5	Red	V+	Red	Communication power supply DC+24V



2.3.1 DeviceNet Thick Cable

Thick cable consists of two shielded pairs twisted on a common axis with a drain wire in the center covered with an overall braid shield and is commonly used as trunk line when length is important.

The thick cable specified for DeviceNet network connections consists of:

- One twisted signal pair (#18): blue/white
- One twisted power pair (#15): black/red
- Separate aluminized Mylar shields around power pair and signal pair
- Overall foil/braid shield with drain wire (#18): bare

2.3.2 DeviceNet Thin Cable

Thin Cable is smaller and more flexible than Thick Cable. It is commonly used for drop lines, but can also be used, for shorter distances, as trunk line.

The thin cable specified for DeviceNet network connections consists of:

- One twisted signal pair (#24): blue/white
- One twisted power pair (#22): black/red
- Separate aluminized Mylar shields around power pair and signal pair
- Overall foil/braid shield with drain wire (#22): bare

2.3.3 Cable Vendors

DeviceNet cables are available from various vendors. Two sources are listed below:

Belden Wire & Cable Company				
Part #	Pair	AWG	Insulation	Outer Jacket
3082A thick	Data	18	Datalene	Lt. Gray PVC
	Power	15	PVC/Nylon	
3084A thin	Data	24	Datalene	Lt. Gray PVC
	Power	22	PVC/Nylon	
3083A thick	Data	18	Datalene	Yellow CPE
	Power	15	PVC/Nylon	
3085A thin	Data	24	Datalene	Yellow CPE
	Power	22	PVC/Nylon	

Berk-Tek				
Part #	Pair	AWG	Insulation	Outer Jacket
210051 thick	Data	18	FPE/HDPE	Lt. Gray PVC
	Power	15	PVC/Nylon	
210144 thin	Data	24	FPE/HDPE	Lt. Gray PVC
	Power	22	PVC/Nylon	

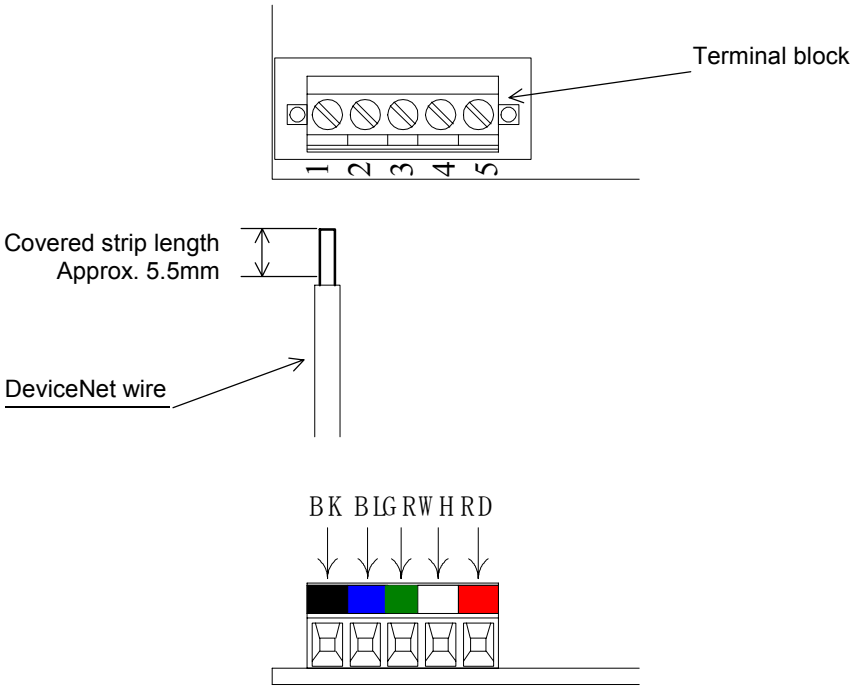
2.4 Cable Installation

Wire the DeviceNet communication cable to the terminal block according to the following procedures:

1) Loosen terminal screws using a slotted screwdriver.
2) Insert the DeviceNet wires into corresponding terminals.
3) Fasten wires by tightening terminal screws.

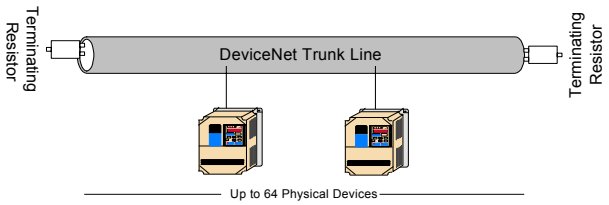
(Tightening torque: 0.22～0.25 [N・m])

Note: The shield is daisy chained between devices and should be grounded at the 24 VDC power supply as specified by the Open DeviceNet Vendor Association (ODVA).



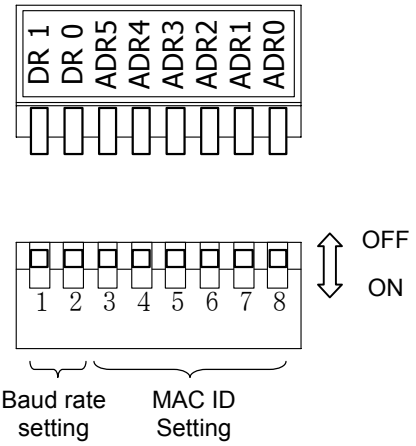
2.5 Termination Resistors

Terminating resistors must be mounted on the first and last node in a DeviceNet network, at both furthest ends of the cable. The value of the Terminating resistor is specified by the ODVA (Open DeviceNet Vendors Association) and is a value of 121 Ohms, 1% tolerance, and ¼ watt. Terminating resistors can be found in the ODVA product catalogue.



2.6 Baud Rate and Address Configuration

The board is equipped with one 8-bit DIP switch for baud rate and node address set-up. The DIP switches are located next to the DeviceNet connector on the short side of the communication option card.



2.6.1 Baud Rate Setting Switch

Switch	500 kbps	250 kbps	125 kbps	Setting Prohibited
DR1	ON	OFF	OFF	ON
DR0	OFF	ON	OFF	ON

* If DR1 and DR0 are ON and set to Setting Prohibited, both MS and NS LED's light up solid red.

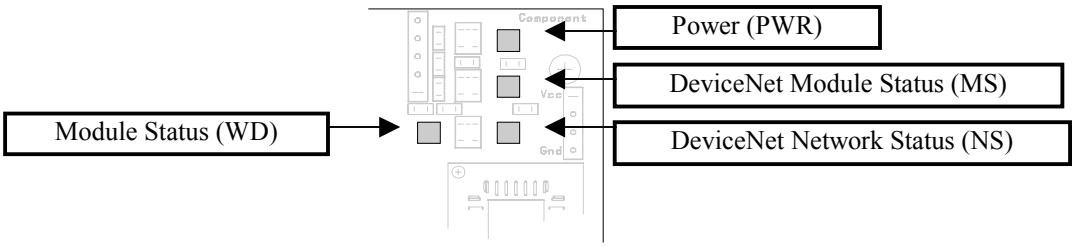
2.6.2 MAC ID Setting Switch

DIP Switch	MAC ID											
	0	1	2	3	4	5	6	7	8	・・・	62	63
ADR5	―	―	―	―	―	―	―	―	―	・・・	○	○
ADR4	―	―	―	―	―	―	―	―	―	・・・	○	○
ADR3	―	―	―	―	―	―	―	―	○	・・・	○	○
ADR2	―	―	―	―	○	○	○	○	―	・・・	○	○
ADR1	―	―	○	○	―	―	○	○	―	・・・	○	○
ADR0	―	○	―	○	―	○	―	○	―	・・・	―	○

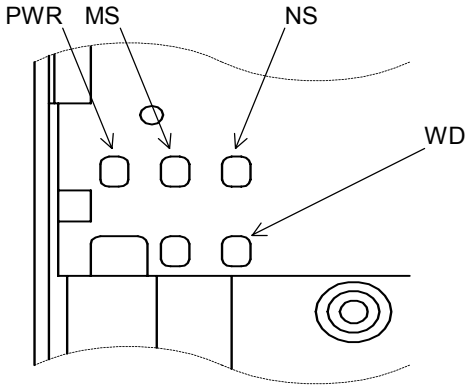
" ○" : ON
" ―" : OFF

2.7 DeviceNet Option Card Indication LED's

The DeviceNet Option Card is equipped with four indication LED's for module and DeviceNet status indication. The LED's are located on the board according to the figure's below.



The above figure shows the indication LED's as they are located directly on the DeviceNet option card, and the below shows the indication LED's as they are seen through the DeviceNet Interface Unit Assembly.



2.8 DeviceNet Option Card Status Indications

2.8.1 DeviceNet Indication LED's

The table below describes the function of DeviceNet specific LED's. See Section 4.2 DeviceNet Communication LED Faults and Operation for more details.

LED Name	Display		Operation Status	Description
	Color	Status		
MS	Green	Lit	During interface card operation	The interface card is operating normally.
	Green	Flashing	During interface card preparation	Initial setting status or communication is not ready.
	Red	Lit	Recovery from fault impossible	Impossible recovery fault occurred in the interface card.
	Red	Flashing	Recovery from fault possible	Possible recovery fault such as switch settings occurred.
	—	Not lit	Power OFF	Power is not being supplied to the inverter. Interface card has not been properly connected. Therefore, the power is not being supplied to the interface card.
NS	Green	Lit	Online-Communication is taking place	DeviceNet is communicating normally.
	Green	Flashing	Online- Communication is not taking place.	DeviceNet network is normal, but is not communicating with the master.
	Red	Lit	Communication fault	A fault that makes it impossible for the DeviceNet to communicate has occurred. ・MAC ID overlap ・Bus-off detection
	Red	Flashing	Communication timeout	Communication time out with master occurred.
	—	Not lit	Offline, Power OFF	DeviceNet is not set to Online. Power is not being supplied to the interface card. Mismatch of baud rate.

If the baud rate configuration is set for "Not Allowed", both the NS and MS diagnostic LED's will be Solid RED.

2.8.2 Interface board Module status indications

The following LED's indicates the module (interface board) status. See Section 4.2 DeviceNet Communication LED Faults and Operation for more details.

LED Name	Display		Operation Status	Description
	Color	Status		
PWR	Green	Lit	Power ON	Power to the interface card is supplied from the inverter.
	—	Not lit	Power OFF	Power is not being supplied to the inverter. The interface card has not been properly connected. Therefore, the power is not supplied to the interface card.
WD	Green	Flashing	During CPU operation	CPU of the interface card is operating normally.
	Red	Lit	CPU fault	Option card CPU is being ready or has fault.
	—	Not lit	Power OFF	Power is not being supplied to the inverter. Option card has not been properly connected. Therefore, power is not being supplied to the interface card.

Note: The LED's will flash red once (100 ms) during initialization. This is used in the internal testing process to verify that the red LED is working properly.

2.9 EDS File

The EDS files for the GPD315/V7 are required for DeviceNet configuration. DeviceNet configuration refers to the parameter settings of the DeviceNet interface card and the GPD315/V7. Reading the EDS file into the DeviceNet configuration tool makes it possible to read and set each parameter of the inverter from the configuration tool. Two examples of DeviceNet configuration tools from Rockwell Software are DeviceNet Manager and RSNetWorx. See Appendix B for details on installing EDS files and configuration on DeviceNet Manager and RSNetWorx.

The Code Number of the SI-N1/V7DeviceNet Interface Unit and the GPD315/V7 Model Number or capacity is necessary to select the correct EDS file. The Code Number and Model Number can be found on the nameplates on the side of the respective units.

To obtain the EDS file for the GPD315/V7, go to from www.odva.org in the "Downloads" area or www.drives.com in the "Technical Manuals" area and download the EDS file for the proper interface unit Code Number and inverter capacity. Each GPD315/V7 inverter capacity has its own EDS file, so it is very important to download the EDS file that matches the inverter capacity for correct scaling of parameters. Refer to the Table of EDS Files and Product Codes in Section 3.4.1 Identity Object Class (01Hex) for a full list of GPD315/V7 capacities and their corresponding EDS file names.

Note: The EDS files will be zip format, so you must un-zip the file before installing in the configuration tool.

3 DeviceNet Functions

The SI-N1/V7 DeviceNet Communications Interface Unit complies with the AC Drive profile designated by the DeviceNet Specification and the ODVA. It allows communication with a Master (PLC or PC) for AC drive control functions such as, inverter operation ,adjustment and monitoring. The DeviceNet interface works as a Group 2 Only Server (DeviceNet Slave) on the control network. Polled I/O based messaging and Explicit messaging are supported when communicating to the master controller or PLC.

3.1 Initial Settings

Since the DeviceNet interface utilizes the AC drive for many of its calculations, such as speed please check the following parameters to verify the correct setting.

3.1.1 Parameter n035 – Digital Operator Display Mode

Setting No.	Name	Description
n035	Frequency reference set / display unit selection	Make sure to set number of motor poles (2 ~ 39) to input and output motor speed in RPM's on DeviceNet control and operator display. DeviceNet indicates the motor speed unit as RPM. n035 setting value is used since the option card converts frequency to RPM. Initial value is 0 for frequency reference in Hz.

Note: The GPD315/V7 requires power to be cycled to the inverter for the changed parameter to take affect. Please perform a power cycle when making changes to parameter in the inverter that are stored.

3.1.2 Parameter n152 - Frequency Reference Unit

Parameter n152 selects the frequency resolution in the frequency reference and the output frequency monitor when received from the PLC. The output frequency resolution of the GPD315/V7's digital operator is settable via n035, Frequency Reference Unit Selection. If the digital operator resolution is set to 0.1 Hz (n035=0), and the Modbus resolution is changed to 0.01 Hz in n152, the value in the hundredths digit of 0.01 Hz of the received frequency reference is rounded off when displayed on the digital operator.

Frequency Reference Unit Selection

Parameter n152 Setting	Frequency Reference Unit Selection
0	0.1 Hz
1	0.01 Hz
2	100% / 30,000
3	0.1%

The default setting of parameter n152 is '0'.

3.2 Run/Stop and Frequency Selection

The run/stop commands and frequency reference command can originate from serial communication, the digital operator, the external terminals, or the DeviceNet interface board. The origin of the run/stop command does not have to be the same as the origin for the frequency reference command. Parameter n004 (Reference Selection) allows you to set up the origin of the frequency reference and parameter n003 (Operation Method Selection) sets up the origin of the run/stop commands. Parameter n003 is Modbus register number 103h, and parameter n004 is Modbus register number 104h (see Appendix A GPD315/V7 Memobus Registers). When the DeviceNet network is connected to the GPD315/V7, the motor speed and the status of the inverter can be monitored via DeviceNet while controlling the inverter from another source specified by parameters n003 and n004. The chart shown below illustrates the possible frequency reference and run/stop selections.

Parameter n004 (104h) Setting	Frequency Reference Selection
0	Digital Operator Pot
1	Digital Operator
2	Voltage Reference (0-10V)
3	Current Reference (4 to 20 mA)
4	Current Reference (0 to 20 mA)
5	Pulse Train Reference
6	Serial Communications (Modbus)
7	Multi- Function Analog Input (0 to 10V)
8	Multi-Function Analog Input (4 to 20mA)
9	**Option Card**

The default setting of parameter n004 is ‘2’. For DeviceNet Operation use Setting ‘9’ – Option Card.

Parameter n003 (103h) Setting	Operation Method Selection (Run/Stop)
0	Digital Operator
1	External Terminals
2	Serial Communication (Modbus)
3	**Option Card**

The default setting of parameter n003 is ‘1’. For DeviceNet Operation use Setting ‘3’ – Option Card.

3.3 DeviceNet Polled I/O Messaging Communications

DeviceNet Communications between a Master (PLC or PC) and the GPD 315 (Slave) uses Polled I/O messaging, based from the following I/O Assemblies to transfer control and diagnostic information to and from the GPD315/V7. The “Input Data Assemblies” or “Polled Consuming Assemblies (PCA)”refers to a message sent from the Master to the GPD315/V7. The “Output Data Assemblies” or “Polled Producing Assemblies (PPA)” refers to the response from the inverter back to the Master. The factory default of the GPD315/V7 DeviceNet is Extended Speed Control Input Instance 21 and Extended Speed Control Output Instance 71 (see section 3.3.3 and 3.3.4). Changing the PCA and PPA (Input/Output Data Assemblies) can be done in two ways.

The first way to change the PCA and PPA is to use the EDS file with the configuration software. By accessing the EDS file through configuration software, the PCA and PPA can be accessed under the DeviceNet Parameter Group “Polled Consuming Assembly” and “Polled Producing Assembly”. Set the appropriate value using the table below and save changes to device.

The second way to change the PCA and PPA is to send an explicit message to Class 101, Instance 1, Attribute 1 for PPA and Attribute 2 for PCA with data matching the desired Assembly Instance. See table below. (Refer to Section 3.4 for details on DeviceNet Explicit Messaging Communications)

Be sure to power down the GPD315/V7, then power up to store the changes made to the PCA and PPA.

Supported Service

Service Code (Hex)	Service Name	Description of Service
0E	Get_Attribute_Single	Designated attribute content is read.
10	Set_Attribute_Single	Designated attribute content is changed.

Class	Instance	Attribute	Type	Data	Description
101 (65Hex)	1	1	PPA (Output Data Assembly)	70 (46Hex)	Basic Speed Control Output Instance 70 (Section 3.3.2)
				71 (47Hex)	Extended Speed Control Output Instance 71 (Section 3.3.4)***default***
				150 (96Hex)	GPD315/V7 Memobus I/O Control Output Instance 150 (Section 3.3.6)
				151 (97Hex)	GPD315/V7 Standard Drive Control Output Instance 151 (Section 3.3.8)
		2	PCA (Input Data Assembly)	20 (14Hex)	Basic Speed Control Input Instance 20 (Section 3.3.1)
				21 (15Hex)	Extended Speed Control Input Instance 21 (Section 3.3.3) ***default***
				100 (64Hex)	GPD315/V7 Memobus I/O Control Input Instance 100 (Section 3.3.5)
				101 (65Hex)	GPD315/V7 Standard Drive Control Input Instance 101 (Section 3.3.7)

The tables in the following pages indicate the format and structure of the I/O Assemblies.

Note: 1. Regardless if I/O Data Exchange is enabled or disabled, communications will occur at the determined intervals set by the Master.

2. Input Data Assemblies = Polled Consuming Assemblies
Output Data Assemblies = Polled Producing Assemblies

3.3.1 Basic Speed Control Input Instance 20 (14Hex)

This function is the basic I/O instance of Assembly Object Class (04Hex) Attribute (03Hex), which defines DeviceNet AC drive profile. Both input/output use 4 bytes each.

GPD315/V7 Basic Speed Control Instance 20 (14 Hex) (INPUT ASSEMBLY)

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0						*Fault Reset*		*Fwd Run*
1								
2	*Speed Reference (Lower Byte)*							
3	*Speed Reference (Upper Byte)*							

Data	Name	Description
Byte 0, Bit 0	*Run Fwd*	The inverter runs forward - 0: Stop 1: FWD run
Byte 0, Bit 2	*Fault Reset*	The inverter from fault detection status is reset. - 0: Fault reset off 1: Fault reset
Byte 2, 3	*Speed Reference*	The inverter speed reference is set. Speed command data: Frequency reference [RPM] × 1 / 2^{SS} SS: Speed Scale*1 Setting range: 0xFFFF Hex*2 Example: When setting 1800r/min reference, (Speed scale = 0) Speed reference data: 1800 X 1 / 2^0 = 0708 Hex Lower Byte (byte 2) = 08Hex, Upper Byte (byte 3) = 07Hex

*1 Speed scale can be set by explicit messaging communication AC/DC Drive Object (Class 2A Hex) attribute 16.
*2 Setting of a speed exceeding the inverter maximum output frequency (n011) will be limited by the maximum output frequency (n011).
*3 When applying a speed reference make sure to set No. of poles (2 ~ 39) to the inverter parameter n035 (frequency reference set/display unit selection). See Section 3.1.1 for details.

3.3.2 Basic Speed Control Output Instance 70 (46Hex)

This function is the basic I/O instance of Assembly Object Class (04Hex) Attribute (03Hex), which defines DeviceNet AC drive profile. Both input/output use 4 bytes each.

GPD315/V7 Basic Speed Control Instance 70 (46 Hex) (OUTPUT ASSEMBLY)

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0						*During FWD Run (Fwd)*		*Fault*
1								
2	*Speed Monitor (Lower Byte)*							
3	*Speed Monitor (Upper Byte)*							

Data	Name	Description
Byte 0, Bit 0	*Fault*	The inverter fault detection status is displayed. - 0: Normal 1: During fault detection
Byte 0, Bit 2	*During FWD*	The inverter run status is displayed. - 0: During Stop/REV. 1: During FWD/AC braking
Byte 2, 3	*Speed Monitor*	The inverter speed is displayed. Speed monitor data : Frequency monitor [r/min] × 1 / 2^{SS} SS: Speed Scale*1 Example: If speed monitor data is 1000RPM (03E8Hex), speed scale = 0 Lower Byte (byte 2) = E8Hex, Upper Byte (byte 3) = 03Hex Frequency monitor: 03E8 Hex X 1 / 2^0 X = 1000r/min.

*1 Speed scale can be set by explicit messages communication AC/DC Drive Object (Class 2A Hex) attribute 16.
*2 When applying a speed reference make sure to set No. of poles (2 ~ 39) to the inverter parameter n035 (frequency reference set/display unit selection). See Section 3.1.1 for details.

3.3.3 Extended Speed Control Input Instance 21 (15Hex)

This function is the basic I/O instance of Assembly Object Class (04Hex) Attribute (03Hex), which is defined by the DeviceNet AC drive profile. This is the Factory Default. Both I/O Assemblies use 4 bytes.

GPD315/V7 Extended Speed Control Instance21 (15 Hex) (INPUT ASSEMBLY)

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0		*NetRef*	*NetCtrl*			*Fault Reset*	*Rev Run*	*Fwd Run*
1								
2	*Speed Reference (Lower Byte)*							
3	*Speed Reference (Upper Byte)*							

Data	Name	Description
Byte 0, Bit 0	*Fwd Run*	The inverter runs forward. - 0: Stop 1: Fwd run
Byte 0, Bit 1	*Rev Run*	The inverter runs reverse. - 0: Stop 1: Rev. run
Byte 0, Bit 2	*Fault Reset*	The inverter resets at fault detection status. - 0: Fault reset off 1: Fault reset
Byte 0, Bit 5	*NetCtrl*	Run command rights are set. 0: Run command input procedures are set by set run command selection (n003 1: Run command (Byte 0 – Bit0, 1) through DeviceNet enabled.
Byte 0, Bit 6	*NetRef*	Frequency reference rights are set. 0: Frequency reference input procedures set by frequency reference selection (n004) 1: Frequency reference (Byte 2, 3) through DeviceNet enabled.
Byte 2, 3	*Speed Reference*	The inverter speed reference is set. This function is the same as the Speed Reference in Section 3.3.1 Basic Speed Control Input Instance 20 (14Hex).

3.3.4 Extended Speed Control Output Instance 71 (47Hex)

This function is the basic I/O instance of Assembly Object Class (04Hex) Attribute (03Hex), which is defined by the DeviceNet AC drive profile. This is the Factory default. Both I/O Assemblies use 4 bytes.

GPD315/V7 Extended Speed Control Instance 71 (47 Hex) (OUTPUT ASSEMBLY)

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	*Speed Agree*	*Ref From Net*	*Ctrl From Net*	*Inverter Ready*	*During Reverse Run*	*During Forward Run*	*Alarm*	*Fault*
1								
2	*Speed Monitor (Lower Byte)*							
3	*Speed Monitor (Upper Byte)*							

Data	Name	Description
Byte 0, Bit 0	*Fault*	The inverter fault detection status is displayed. - 0: Normal 1: During fault detection
Byte 0, Bit 1	*Alarm*	The inverter alarm detection status is displayed - 0: Normal 1: During alarm detection
Byte 0, Bit 2	*During Fwd Run*	The inverter run status is displayed. - 0: During stop/reverse 1: During forward run/DC braking
Byte 0, Bit 3	*During Rev Run*	The inverter run status is displayed - 0: During stop/forward run/DC brake 1: During reverse run
Byte 0, Bit 4	*Inverter Ready*	The inverter ready status is displayed. - 0: During fault detection/ready 1: Ready
Byte 0, Bit 5	*Ctrl From Net*	The inverter run command input selection status is displayed. 0: Run command input is enabled other than the DeviceNet. 1: Run command input is enabled from the DeviceNet.
Byte 0, Bit 6	*Ref From Net*	The inverter frequency input selection status is displayed. 0: Run command input is enabled other than the DeviceNet. 1: Run command input is enabled from the DeviceNet.
Byte 0, Bit 7	*Speed Agree*	The inverter frequency agree detection status is displayed. 0: During stop/acceleration deceleration 1: Frequency agree
Byte 2, 3	*Speed Monitor*	The inverter speed is displayed. This function is the same as the Speed Monitor in Section 3.3.2 Basic Speed Control Output Instance 70 (46Hex).

3.3.5 GPD315/V7 Memobus I/O Control Input Instance 100 (64Hex)

This I/O instance allows all inverter parameters and monitors to be read/set. This instance is for GPD315/V7 series inverters only, and is not interchangeable with other DeviceNet inverters, Assembly Object Class (04Hex) Attribute (03Hex). Both input/output use 5 bytes each. Refer to the Appendix A for a list of Modbus Registers for GPD315/V7.

GPD315/V7 Memobus I/O Control Instance 100 (64 Hex) (INPUT ASSEMBLY)

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	*Function Code*							
1	*Register Number (Upper Byte)*							
2	*Register Number (Lower Byte)*							
3	*Register Data (Upper Byte)*							
4	*Register Data (Lower Byte)*							

Data	Name	Description
Byte 0	*Function Code*	MEMOBUS (reference message) function code is set. 03 Hex: Read 10 Hex: Write 00 Hex: Undetermined
Byte 1, 2	*Register Number (Upper and Lower Byte)*	An inverter MEMOBUS register No. is set.
Byte 3, 4	*Register Data (Upper and Lower Byte)*	The write data at MEMOBUS write command is set.

3.3.6 GPD315/V7 Memobus I/O Control Output Instance 150 (96Hex)

This I/O instance allows all inverter parameters and monitors to be read/set. This instance is for GPD315/V7 series inverters only, and is not interchangeable with other DeviceNet inverters, Assembly Object Class (04Hex) Attribute (03Hex). Both input/output use 5 bytes each. Refer to the Appendix A for a list of Modbus Registers for GPD315/V7.

GPD315/V7 Memobus I/O Control Instance 150 (96 Hex) (OUTPUT ASSEMBLY)

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	*Function Code*							
1	*Register Number (Upper Byte)*							
2	*Register Number (Lower Byte)*							
3	*Register Data (Upper Byte)*							
4	*Register Data (Lower Byte)*							

Data	Name	Description
Byte 0	*Function Code*	The MEMOBUS (response message) function code No. is displayed. 03 Hex: Read normal 10 Hex: Write normal 83 Hex: Read fault 90 Hex: Write fault
Byte 1, 2	*Register Number (Upper and Lower Byte)*	The processed MEMOBUS register No. is displayed. For Read/write faults, MEMOBUS error code is displayed.
Byte 3, 4	*Register Data (Upper and Lower Byte)*	The read data at MEMOBUS read command is displayed.

Note: The GPD315/V7 has two types of memory: 'Volatile' and 'Non-Volatile'. Data held in the Volatile memory will be lost when power is removed from the drive. Data held in Non-Volatile memory will be retained when power is removed from the drive. Different types of MEMOBUS registers are stored in different areas of memory. GPD315/V7 MEMOBUS monitor and command registers 001-03Dhex (Appendix A) are always stored in Volatile memory. Any data read or written from these registers will not be retained during a power loss situation. MEMOBUS parameter registers 101h to 1D2h (Appendix A) are stored in Volatile memory until the 'ENTER' command is applied. When writing new data to parameter registers, the 'ENTER' command must be given for the new data to become stored in Non-Volatile memory. If the 'ENTER' command is not used, the changed data will not be retained during power loss. An 'ENTER' command is executed by writing the value of '0' to MEMOBUS register 0900h. If a power loss occurs after the ENTER command has been issued and accepted, the data will be retained in the GPD315/V7.

WARNING!

Use the ENTER command 0900h only when necessary! The life of the EEPROM (Non-Volatile memory) on the GPD315/V7 will support a finite number of operations. This means that the ENTER command, value '0' written to register 0900h, can only be used a maximum of a 100,000 times to store data in the EEPROM. After the specified number of operations, the EEPROM may fault **(ERR)** requiring the GPD315/V7 control board to be replaced.

3.3.7 GPD315/V7 Standard Drive Control Input Instance 101 (65Hex)

This I/O instance is for the GPD315/V7 series inverter only, and can apply to all GPD315/V7 input / output functions as well as the expansion I/O instance functions. This instance is for GPD315/V7 Series inverters only, and is not interchangeable with other DeviceNet inverters, Assembly Object Class (04Hex) Attribute (03Hex). Both input and output use 8 bytes each.

GPD315/V7 Standard Drive Control Instance 101 (65 Hex) (INPUT ASSEMBLY)

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0		*Terminal S7*	*Terminal S6*	*Terminal S5*	*Terminal S4*	*Terminal S3*	*Rev Run*	*Fwd Run*
1	*Terminal P2*	*Terminal P1*	*Terminal MA*				*Fault Reset*	*External Fault*
2	*Speed Reference (Lower Byte)*							
3	*Speed Reference (Upper Byte)*							
4								
5								
6								
7								

Data	Name	Description
Byte 0, Bit 0	*Forward Run*	The inverter runs forward. 0: Stop 1: Forward run
Byte 0, Bit 1	*Reverse Run*	The inverter runs reverse. 0: Stop 1: Reverse run
Byte 0, Bit 2	*Terminal S3*	Functions set in the inverter multi-function input terminal S3 is input. The inverter parameter 052 sets multi-function input terminal S3 functions. 0: Terminal S3 multi-function OFF 1: Terminal S3 multi-function ON
Byte 0, Bit 3	*Terminal S4*	Functions set in the inverter multi-function input terminal S4 is input. The inverter parameter 053 sets multi-function input terminal S4 functions. 0: Terminal S4 multi-function OFF 1: Terminal S4 multi-function ON
Byte 0, Bit 4	*Terminal S5*	Functions set in the inverter multi-function input terminal S5 is input. The inverter parameter 054 sets multi-function input terminal S5 functions. 0: Terminal S5 multi-function OFF 1: Terminal S5 multi-function ON
Byte 0, Bit 5	*Terminal S6*	Functions set in the inverter multi-function input terminal S6 is input. The inverter parameter 055 sets multi-function input terminal S6 functions. 0: Terminal S6 multi-function OFF 1: Terminal S6 multi-function ON
Byte 0, Bit 6	*Terminal S7*	Functions set in the inverter multi-function input terminal S7 is input. The inverter parameter 056 sets multi-function input terminal S7 functions. 0: Terminal S7 multi-function OFF 1: Terminal S7 multi-function ON
Byte 1, Bit 0	*External Fault*	External fault (EP0) is input from option. 0: External Fault Off 1: External fault (EF0)
Byte 1, Bit 1	*Fault Reset*	The inverter is reset at fault detection status. 0: Fault reset Off 1: Fault reset
Byte 1, Bit 5	*Terminal MA*	The inverter multi-function output terminal MA is operated. Only when “18” is set to the inverter parameter No. n057 becomes enabled. 0: Terminal MA OFF 1: Terminal MA ON
Byte 1, Bit 6	*Terminal P1*	The inverter multi-function output terminal P1 is operated. Only when “18” is set to the inverter parameter No. n058 becomes enabled. 0: Terminal P1 OFF 1: Terminal P1 ON
Byte 1, Bit 7	*Terminal P2*	The inverter multi-function output terminal P2 is operated. Only when “18” is set to the inverter parameter No. n059 becomes enabled. 0: Terminal P2 OFF 1: Terminal P2 ON
Byte 2, 3	*Speed Reference*	Inverter speed reference is set. This function is the same as the Speed Reference in Section 3.3.1 Basic Speed Control Input Instance 20 (14Hex).

3.3.8 GPD315/V7 Standard Drive Control Output Instance 151 (97Hex)

This I/O instance is for the GPD315/V7 series inverter only, and can apply to all GPD315/V7 input / output functions as well as the expansion I/O instance functions. This instance is for GPD315/V7 Series inverters only, and is not interchangeable with other DeviceNet inverters, Assembly Object Class (04Hex) Attribute (03Hex). Both input and output use 8 bytes each.

GPD315/V7 Standard Drive Control Instance 151 (97 Hex) (OUTPUT ASSEMBLY)

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	*Fault*	*Alarm*	*Inverter Ready*	*Speed Agree*	*During reset*	*During reverse*	*During zero speed*	*During Run*
1			*Terminal P2*	*Terminal P1*	*Terminal MA*	*Local/Remote*	*During UV*	*During OPE*
2	*Speed Actual (Lower Byte)*							
3	*Speed Actual (Upper Byte)*							
4								
5								
6	*Output Current Monitor (Lower Byte)*							
7	*Output Current Monitor (Upper Byte)*							

Data	Name	Description
Byte 0, Bit 0	*During Run*	The inverter run status is displayed. 0: During stop 1: During Forward/reverse/DC braking
Byte 0, Bit 1	*During Zero Speed*	The inverter run status is displayed. 0: During forward/reverse 1: During stop/DC braking
Byte 0, Bit 2	*During Reverse Run*	The inverter run status is displayed. 0: During forward run 1: During reverse run/reverse command input
Byte 0, Bit 3	*During Reset Input*	The inverter reset signal input status is displayed. 0: Off 1: During reset signal input
Byte 0, Bit 4	*Speed Agree*	The inverter frequency agree detection status is displayed. 0: During stop/acceleration and deceleration 1: Frequency agree
Byte 0, Bit 5	*Inverter Ready*	The inverter run prepare status is displayed. 0: During fault detection/prepare 1: Ready
Byte 0, Bit 6	*Alarm*	The inverter alarm detection status is displayed. 0: Normal 1: During alarm detection
Byte 0, Bit 7	*Fault*	The inverter fault detection status is displayed. 0: Normal 1: During fault detection
Byte 1, Bit 0	*During OPE*	The inverter MEMOBUS parameter setting error (OPE) detection status is displayed. 0: Normal 1: During OPE,(OP1-OP5) detection
Byte 1, Bit 1	*During UV*	The inverter low voltage error (UV) detection status is displayed. 0: Normal 1: During UV detection
Byte 1, Bit 2	*Local/Remote*	The inverter run command input selection status is displayed. 0: Run command input is enabled other than the DeviceNet. 1: Run command input is enabled from DeviceNet.
Byte 1, Bit 3	*Terminal MA*	The inverter multi-function output terminal MA output status is displayed. 0: Terminal MA OFF 1: Terminal MA ON
Byte 1, Bit 4	*Terminal P1*	The inverter multi-function output terminal P1 output status is displayed. 0: Terminal P1 OFF 1: Terminal P1 ON
Byte 1, Bit 5	*Terminal P2*	The inverter multi-function output terminal P2 output status is displayed. 0: Terminal P2 OFF 1: Terminal P2 ON
Byte 2, 3	*Speed Monitor*	The inverter speed is displayed. This function is the same as the Speed Monitor in Section 3.3.2 Basic Speed Control Output Instance 70 (46Hex).
Byte 6, 7	*Output Current Monitor*	The inverter output current is displayed. The unit (0.1A) is fixed. There is no effect on the current scale setting.

3.4 DeviceNet Explicit Messaging Communications

The DeviceNet communications may also be accomplished by utilizing an "Explicit Message" to communicate with the master PLC or controller. The Explicit messaging communications is performed differently than Polled I/O type messaging in that commands are not sent cyclically in the scan of the controlling master, but one message is sent and one response is received. See table below for details on Explicit Message Format.

・Explicit Message Format

Header	MAC ID	Service Code	Class	Instance	Attribute	Data	Footer

Item	Description
Header	Since it is automatically set, there is no need to do anything.
MAC ID	Master / slave MACID is input for communication.
Service Code	Code, which shows data write/read, is input in the requested message. Also, the requested service code MSB (the most significant bit) inputs "1" at normal response, and "94" at fault. Example) 0E: Read request 8E: Read normal response 10: Write request 90: Write normal response 94: Fault response
Class Instance Attribute	Each function of DeviceNet is classified by three codes. When you wish to designate data, use these 3 codes to do so.
Data	Request: Write data is input. Response: Read data and error code are input.
Footer	Since it is automatically set, there is no need to do anything.

The following pages define the supported DeviceNet implemented objects and services for the GPD315/V7 DeviceNet Option Card.

3.4.1 Identity Object Class (01Hex):

The Identity object stores DeviceNet product information.

Supported Services

Service Code (Hex)	Service Name	Description of Service
0E	Get_Attribute_Single	Designated attribute content is returned.
05	Reset	Option unit status is reset. (returns to initial status)

Object Content

Instance (Hex)	Attribute (Hex)	Name	Description	Initial Value (Hex)	Read	Write	Size
00	01	*Object Software Revision*	Identity object software revision is displayed.	0001	*		Word
01	01	*Vendor ID*	Manufacturer code No. is displayed. 44 (2C Hex): Yaskawa Electric	002C	*		Word
	02	*Device Type*	Device profile of the compatible DeviceNet is displayed. The DeviceNet product is compatible with AC drive profile. 2: AC drive	0002	*		Word
	03	*Product Code*	Manufacturer's code.	(See Table of EDS Files and Product Codes in the following page)	*		Word
	04	*Revision*	Option unit software revision	0201	*		Word
	05	*Status*	Option unit communication status is displayed.	0000	*		Word
	06	*Serial Number*	Option unit serial number	Depends on product	*		Long
	07	*Product Name*	Product model is displayed. V7 SI-N	(See Table of EDS Files and Product Codes in the following page)	*		String
	08	*Present Status*	Inverter status is displayed. 3: Inverter ready	03	*		Byte

Table of EDS Files and Product Codes For Code Number 73606-V7012

Inverter Model Number	Inverter Description	EDS File Names	Inverter Capacity GPD315/V7 Parameter n210 Memobus # 1D2H	Product Code 01/01/03	Product Name
CIMR-V7*20P1	3 Phase 230V, 0.13HP, 0.8A	CIMR_V7_20P1.EDS	00	2100	CIMR-V7*20P1,SI-N1
CIMR-V7*20P2	3 Phase 230V, 0.25HP, 1.6A	CIMR_V7_20P2.EDS	01	2101	CIMR-V7*20P2,SI-N1
CIMR-V7*20P4	3 Phase 230V, 0.5HP, 3A	CIMR_V7_20P4.EDS	02	2102	CIMR-V7*20P4,SI-N1
CIMR-V7*20P7	3 Phase 230V, 1HP, 5A	CIMR_V7_20P7.EDS	03	2103	CIMR-V7*20P7,SI-N1
CIMR-V7*21P5	3 Phase 230V, 2HP, 8A	CIMR_V7_21P5.EDS	04	2104	CIMR-V7*21P5,SI-N1
CIMR-V7*22P2	3 Phase 230V, 3HP, 11A	CIMR_V7_22P2.EDS	05	2105	CIMR-V7*22P2,SI-N1
CIMR-V7*23P0	3 Phase 230V, 4HP, 11A	CIMR_V7_23P0.EDS	06	2106	CIMR-V7*23P0,SI-N1
CIMR-V7*23P7	3 Phase 230V, 5HP, 17.5A	CIMR_V7_23P7.EDS	07	2107	CIMR-V7*23P7,SI-N1
CIMR-V7*24P0	3 Phase 230V, 5HP, 17.5A	CIMR_V7_24P0.EDS	08	2108	CIMR-V7*24P0,SI-N1
CIMR-V7*25P5	3 Phase 230V, 7.5HP, 25A	CIMR_V7_25P5.EDS	09	2109	CIMR-V7*25P5,SI-N1
CIMR-V7*27P5	3 Phase 230V, 10HP, 33A	CIMR_V7_27P5.EDS	0A	210A	CIMR-V7*27P5,SI-N1
CIMR-V7*40P1	3 Phase 460V, 0.25HP, 1.2A	CIMR_V7_40P1.EDS	28	2128	CIMR-V7*40P1,SI-N1
CIMR-V7*40P2	3 Phase 460V, 0.25HP, 1.2A	CIMR_V7_40P2.EDS	29	2129	CIMR-V7*40P2,SI-N1
CIMR-V7*40P4	3 Phase 460V, .5HP, 1.8A	CIMR_V7_40P4.EDS	2A	212A	CIMR-V7*40P4,SI-N1
CIMR-V7*40P7	3 Phase 460V, 1HP, 3.4A	CIMR_V7_40P7.EDS	2B	212B	CIMR-V7*40P7,SI-N1
CIMR-V7*41P5	3 Phase 460V, 2HP, 4.8A	CIMR_V7_41P5.EDS	2C	212C	CIMR-V7*41P5,SI-N1
CIMR-V7*42P2	3 Phase 460V, 3HP, 5.5A	CIMR_V7_42P2.EDS	2D	212D	CIMR-V7*42P2,SI-N1
CIMR-V7*43P0	3 Phase 460V, 4HP, 7.2A	CIMR_V7_43P0.EDS	2E	212E	CIMR-V7*43P0,SI-N1
CIMR-V7*43P7	3 Phase 460V, 5HP, 8.6A	CIMR_V7_43P7.EDS	2F	212F	CIMR-V7*43P7,SI-N1
CIMR-V7*44P0	3 Phase 460V, 5.3HP, 9.2A	CIMR_V7_44P0.EDS	30	2130	CIMR-V7*44P0,SI-N1
CIMR-V7*45P5	3 Phase 460V, 5.5HP, 14.8A	CIMR_V7_45P5.EDS	31	2131	CIMR-V7*45P5,SI-N1
CIMR-V7*47P5	3 Phase 460V, 7.5HP, 18A	CIMR_V7_47P5.EDS	32	2132	CIMR-V7*47P5,SI-N1
CIMR-V7*B0P1	1 Phase 230V, 0.13HP, 0.8A	CIMR_V7_B0P1.EDS	14	2114	CIMR-V7*B0P1,SI-N1
CIMR-V7*B0P2	1 Phase 230V, 0.25HP, 1.6A	CIMR_V7_B0P2.EDS	15	2115	CIMR-V7*B0P2,SI-N1
CIMR-V7*B0P4	1 Phase 230V, 0.5HP, 3A	CIMR_V7_B0P4.EDS	16	2116	CIMR-V7*B0P4,SI-N1
CIMR-V7*B0P7	1 Phase 230V, 1HP, 5A	CIMR_V7_B0P7.EDS	17	2117	CIMR-V7*B0P7,SI-N1
CIMR-V7*B1P5	1 Phase 230V, 2HP, 8A	CIMR_V7_B1P5.EDS	18	2118	CIMR-V7*B1P5,SI-N1
CIMR-V7*B2P2	1 Phase 230V, 3HP, 11A	CIMR_V7_B2P2.EDS	19	2119	CIMR-V7*B2P2,SI-N1
CIMR-V7*B3P0	1 Phase 230V, 3HP, 11A	CIMR_V7_B3P0.EDS	1A	211A	CIMR-V7*B3P0,SI-N1
CIMR-V7*B3P7	1 Phase 230V, 5HP, 17.5A	CIMR_V7_B3P7.EDS	1B	211B	CIMR-V7*B3P7,SI-N1
CIMR-V7*B4P0	1 Phase 230V, 5HP, 17.5A	CIMR_V7_B4P0.EDS	1C	211C	CIMR-V7*B4P0,SI-N1
CIMR-V7*B5P5	1 Phase 230V, 7.5HP, 25A	CIMR_V7_B5P5.EDS	1D	211D	CIMR-V7*B5P5,SI-N1
CIMR-V7*B7P5	1 Phase 230V, 10HP, 33A	CIMR_V7_B7P5.EDS	1E	211E	CIMR-V7*B7P5,SI-N1

Note: The EDS files will be zip format, so you must un-zip the file before installing in the configuration tool.

3.4.2 Message Router Object Class (02Hex):

The Message Router object has the function of routing DeviceNet communication information to the correct object. DeviceNet messages are routed to each function through this object. The Message Router object itself performs the internal processes only.

Supported Service

Service Code (Hex)	Service Name	Description of Service
0E	Get_Attribute_Single	Designated attribute content is returned.

Object Content

Instance (Hex)	Attribute (Hex)	Name	Description	Setting Range	Initial Value (Hex)	Read	Write	Size
00	01	*Object Software Revision*	Message Router object software revision is displayed.		0001	*		Word

3.4.3 DeviceNet Object Class (03Hex):

This object is for the DeviceNet communication information / functions.

Supported Service

Service Code (Hex)	Service Name	Description of Service
0E	Get_Attribute_Single	Designated attribute content is returned.
10	Set_Attribute_Single	Designated attribute content is changed.

Object Contents

Instance (Hex)	Attribute (Hex)	Name	Description	Setting Range	Initial Value (Hex)	Read	Write	Size
00	01	*Object Software Revision*	DeviceNet object software revision is displayed.		0002	*		Word
01	01	*MAC ID*	MAC ID setting value is displayed according to the DIP switch setting.	0x63	00	*		Byte
	02	*Baud Rate*	Baud rate setting value is displayed according to the DIP switch settings. 0: 125kbps 1: 250kbps 2: 500kbps	0x02	00	*		Byte
	05	*Allocation Information*	DeviceNet communication connection information is displayed.		00,00	*		Byte ×2

3.4.4 Assembly Object Class (04Hex):

The Assembly object is for the polled I/O message functions.

Supported Service

Service Code (Hex)	Service Name	Description of Service
0E	Get_Attribute_Single	Designated attribute content is returned.
10	Set_Attribute_Single	Designated attribute content is changed.

Object Content

Instance (Hex)	Attribute (Hex)	Name	Description	Setting Range	Initial Value (Hex)	Read	Write	Size
00	01	*Object Software Revision*	Assembly object software revision is displayed.		0002	*		Word
14	03	*I/O Data*	Same function as the basic I/O instance 20 (input / PCA)	*1		*	*	Byte ×4
15	03	*I/O Data*	Same function as the extended I/O instance 21 (input / PCA)	*1		*	*	Byte ×4
46	03	*I/O Data*	Same function as the basic I/O instance 70 (output / PPA)			*		Byte ×4
47	03	*I/O Data*	Same function as the extended I/O instance 71 (output / PPA)			*		Byte ×4
64	03	*I/O Data*	Same function as the MEMOBUS I/O instance 100 (input / PCA)	*1		*	*	Byte ×5
65	03	*I/O Data*	Same function as the GPD315/V7 standard control I/O instance 101 (input / PCA / PPA)	*1		*	*	Byte ×8
96	03	*I/O Data*	Same function as the MEMOBUS I/O instance 150 (output / PPA)			*		Byte ×5
97	03	*I/O Data*	Same function as the GPD315/V7 standard control I/O instance 151 (output / PPA)			*		Byte ×8

*1 Setting range is the same as the individual I/O message function.

3.4.5 DeviceNet Connection Object Class (05Hex):

The DeviceNet Connection object has the function of keeping track of the DeviceNet communication connection information/functions. On initialization the communication connection with the master is established by using information and functions from this object. Please note that Instance 2 of DeviceNet Object Class 05Hex supports only polled messaging.

Supported Service

Service Code (Hex)	Service Name	Description of Service
0E	Get_Attribute_Single	Designated attribute content is returned.
10	Set_Attribute_Single	Designated attribute content is changed.

Object Content

Instance (Hex)	Attribute (Hex)	Name	Description	Setting Range	Initial Value (Hex)	Read	Write	Size
00	01	*Object Software Revision*	DeviceNet connection object software revision is displayed.		0001	*		Word
01 Explicit Message	01	*Instance State*	This instance status is displayed. 00: It does not exist in the Network yet, and being prepared. 01: On-line status and waiting for the connection from the master. 02: Waiting for the connection ID write. 03: Connection is completed. 04: Time out.		03	*		Byte
	02	*Instance type*	This instance type is displayed. 00: Explicit message 01: I/O message		00	*		Byte
	03	*Connection operation*	The option unit communication status is displayed by a code.		83	*		Byte
	04	*Output (PPA) connection ID*	The level used by the option unit communication header is displayed.			*		Word
	05	*Input (PCA) connection ID*	This function is set when communication connection is completed.			*		Word
	06	*Message group*	The option unit communication status is displayed by a code.		21	*		Byte
	07	*No. of Max. output (PPA) bytes*	No. of Max. output (PPA) bytes is displayed.		0020	*		Word
	08	*No. of Max. input (PCA) bytes*	No. of Max. input (PCA) bytes is displayed.		0020	*		Word
	09	*Timeout time*	Internal process timeout time is displayed when communication request is received. (Round up 10ms unit)	65535 (ms)	09C4 (2500ms)	*	*	Word
	0C	*Watchdog timeout process*	Timeout internal process regarding communication is displayed. 00: Holds until reset/shut off 01: Automatically shut off 02: Restart with connected status.		01	*		Byte
	0D	*No. of output (PPA) connection bus bytes*	No. of output (PPA) connection bus bytes is displayed.		0000	*		Word
	0E	*Output (PPA) Connection Bus*	The application object received the data through this instance is displayed.			*		Array
	0F	*No. of input (PCA) connection bus bytes*	No. of input (PCA) connection bus bytes is displayed.		0000	*		Word
	10	*Input (PCA) connection bus*	The application object received the data through this instance is displayed.			*		Array
02 Polled Message Only	01	*Instance status*	This instance status is displayed. 00: It does not exist in the Network yet, and being prepared. 01: On-line status and waiting for the connection from the master. 02: Waiting for the connection ID write. 03: Connection is completed. 04: Time out.		03	*		Byte

Instance (Hex)	Attribute (Hex)	Name	Description	Setting Range	Initial Value (Hex)	Read	Write	Size
02 Polled Message	02	*Instance type*	This instance type is displayed. 00: Explicit message 01: I/O message		01	*		Byte
	03	*Connection operation*	The option unit communication status is displayed by a code.		82	*		Byte
	04	*Output (PPA) Connection ID*	The level used by the option unit communication header is displayed. This function is set when communication connection is completed.			*		Word
	05	*Input (PCA) connection ID*				*		Word
	06	*Message group*	The option unit communication status is displayed by the code.		01	*		Byte
	07	*No. of Max. output (PPA) bytes*	No. of max. output (PPA) bytes is displayed.		0004	*		Word
	08	*No. of Max. input (PCA) bytes*	No. of max. input (PCA) bytes is displayed.		0004	*		Word
	09	*Timeout time*	Internal process timeout time is displayed when communication request is received. (Round up 10ms unit)	65535 (ms)	0000 (0ms)	*	*	Word
	0C	*Watchdog timeout process*	Timeout internal process regarding communication is displayed. 00: Holds until reset/shut off 01: Automatically shut off 02: Restart with connected status.		01	*	*	Byte
	0D	*No. of output (PPA) connection path bytes*	No. of output (PPA) connection path bytes is displayed.		0003	*		Word
	0E	*Output communication path Polled Producing Assembly (PPA)*	The application object received the data through this instance is displayed.		62 34 37	*	*	Array
	0F	*No. of input (PCA) communication path bytes*	No. of input (PCA) connection bus bytes is displayed.		0003	*		Word
	10	*Input communication path Polled Consuming Assembly (PCA)*	The application object received the data through this instance is displayed.		62 31 35	*	*	Array

3.4.6 Motor Data Object Class (28Hex):

The motor data object is for the information and functions related to the motor connected to the inverter. Motor rated current and rated voltage can be set and read.

Supported Service

Service Code No. (Hex)	Service Name	Description of Service
0E	Get_Attribute_Single	Designated attribute content is returned.
10	Set_Attribute_Single	Designated attribute content is changed.

Object Content

Instance (Hex)	Attribute (Hex)	Name	Description	Setting Range	Initial Value (Hex)	Read	Write	Size
00	01	*Object Software Revision*	Motor Data object software revision is displayed.		0001	*		Word
01	03	*Motor Type*	Used motor type is displayed, 7: Squirrel-cage induction motor		07	*		Byte
	06	*Motor Rated Current*	Motor rated current can be set and read. Setting unit: 0.1A	10 ~ 20% of inverter rated current	*1	*	*	Word
	07	*Motor Rated Voltage*	Motor rated voltage can be set and read. Setting unit: 1V	255V *2	00C8 *2	*	*	Word

*1 The motor rated current initial value varies according to inverter capacity.

*2 The initial value and setting range are for the 200V class. For the 400V class, the value is twice that of the 200V class.

3.4.7 Control Supervisor Object Class (29Hex):

The control supervisor object is dedicated to the information and services related to the inverter control functions. The basic control functions such as, inverter run, stop, and fault detect are implemented. The control supervisor object functions are commonly used with polled I/O messaging functions.

Support Service

Service Code No. (Hex)	Service Name	Description of Service
0E	Get_Attribute_Single	Designated attribute content is returned.
10	Set_Attribute_Single	Designated attribute content is changed.
05	Reset	Option unit status is reset. (returns to initial status)

Object Content

Instance (Hex)	Attribute (Hex)	Name	Description	Setting Range	Initial Value (Hex)	Read	Write	Size
00	01	*Object Software Revision*	Control supervisor object software revision is displayed.		0001	*		Word
01	03	*Forward Run*	The inverter runs forward. 00: Stop 01: Forward run	00,01	00	*	*	Byte
	04	*Reverse Run*	The inverter runs reverse. 00: Stop 01: Reverse run	00,01	00	*	*	Byte
	05	*NetCtrl*	Run command rights displayed. *1 00: Run command input method set by run command selection (n003) 01: Run command (byte 0 – bit0, 1) is enabled through DeviceNet.	00,01	00	*	*	Byte
	06	*Inverter Status*	The inverter status is displayed. 03: Inverter ready		03	*		Byte
	07	*During Forward Run*	The inverter run status is displayed. 00: During stop/reverse 01: During forward run/DC braking		00	*		Byte
	08	*During Reverse Run*	The inverter run status is displayed. 00: During stop/forward/DC braking 01: During reverse		00	*		Byte
	09	*Inverter Ready*	The inverter operation preparing status is displayed. 00: During fault detection/preparation 01: Ready		00	*		Byte
	0A	*Fault*	The inverter fault detection status is displayed. 00: Normal 01: During fault detection		00	*		Byte
	0B	*Alarm*	The inverter alarm detection status is displayed. 00: Normal 01: During alarm detection		00	*		Byte
	0C	*Fault Reset*	The inverter is reset through fault detection status. 00: Fault reset off 01: Fault reset	00,01	00	*	*	Byte
	0D	*Fault Code*	The inverter fault detection content is displayed by the code listed in the table below. *3		0000	*		Word
	0F	*Ctrl From Net*	The inverter run command input selection status is displayed.*1 00: Run command input other than the DeviceNet is enabled. 01: Run command input is enabled through DeviceNet.		00	*		Byte
	10	*DeviceNet Fault Mode*	Mode selection is displayed when DeviceNet becomes fault.*2 02: Manufacturer		02	*		Byte
	11	*External Fault from Option*	External fault (EF0) is input 00: EF0 Not Active 01: External fault (EF0)	00,01	00	*	*	Byte
	12	*External Fault Input Status from Option*	External fault (EF0) input status is displayed. 00: EF0 Not Active 01: During external fault (EF0) input		00	*		Byte

3.4.7 Control Supervisor Object Class (29Hex) (cont.)

Notes:
*1 A setting during inverter operation cannot be changed.
*2 DeviceNet communication fault cannot be set. The inverter detects fault and stops at DeviceNet communication fault.
The inverter stopping method at communication fault can be selected by time-over detection selection parameter (n151).
*3 Fault Code (See below table for interpretation)

Table of DeviceNet Fault Codes

DeviceNet Fault Code No. (Hex)	Operator Fault Display	Content
0000	–	Inverter normal
2200	OL2	Inverter overload
2220	OL1	Motor overload
2221	OL3	Overtorque 1
2300	OC	Overcurrent
3210	OV	Main circuit overvoltage
3220	UV1	Main circuit low voltage
4200	OH	Overheat fin
5110	UV2	Power fault
5300	OPR	Operator disconnection
7500	BUS	Option communication error
9000	EF3	External fault (Input terminal S3)
	EF4	External fault (Input terminal S4)
	EF5	External fault (Input terminal S5)
	EF6	External fault (Input terminal S6)
	EF7	External fault (Input terminal S7)
	EF0	Option external fault

3.4.8 AC/DC Drive Object Class (2Ahex):

The AC/DC drive object is also dedicated to the information and function related to the inverter operation. Frequency reference settings, individual monitor parameters, and data unit settings can be changed. The AC/DC drive object function is commonly used with I/O message functions for setting or returning drive status information.

Supported Services

Service Code No. (Hex)	Service Name	Description of Service
0E	Get_Attribute_Single	Designated attribute content is returned.
10	Set_Attribute_Single	Designated attribute content is changed.

Object Content

Instance (Hex)	Attribute (Hex)	Name	Description	Setting Range	Initial Value (Hex)	Read	Write	Size
00	01	*Object Software Revision*	AC/DC drive object software revision is displayed.		0001	*		Word
01	03	*Speed agree*	Inverter frequency agree detection status is displayed. 00: During stop/ decel /accel 01: Frequency agree		00	*		Byte
	04	*NetRef*	Frequency reference rights is set.*1 00: Frequency reference input method set by frequency reference selection (n004). 01: Frequency reference (byte 2, 3) through DeviceNet is enabled.	00,01	00	*	*	Byte
	06	*Control mode*	Inverter control mode is set.*3 00: V/F control 01: Vector control	00,03	01	*	*	Byte
	07	*Speed monitor*	Inverter speed is displayed.*2 Min. unit: [r/min/2^{SS}] ^{SS}: Speed scale : attribute 16		0000	*		Word
	08	*Speed reference*	Frequency Reference is set/read*2 Min. unit: [r/min/2^{SS}] ^{SS}: Speed scale : attribute 16	0- n011	0000	*	*	Word
	09	*Output current*	Inverter output current is displayed:*2 Current Unit: [0.1A/2^{CS}] ^{CS}: Current scale : attribute 17		0000	*		Word
	0F	*Output power*	Inverter output power is displayed:*2 Power Unit: [W/2^{PS}] ^{PS}:Power scale : attribute 1A		0000	*		Word
	10	*Input Voltage*	Inverter input voltage is displayed: Min. Unit: [V/2^{VS}] ^{VS}:Voltage scale : attribute 1B		0000	*		Word
	11	*Output Voltage*	Inverter output voltage is displayed: Min. Unit: [V/2^{VS}] ^{VS}:Voltage scale : attribute 1B		0000	*		Word
	12	*Accel Time*	Acceleration time 1 is set / read. Min. Unit: [ms/2^{TS}] ^{TS}:Time scale : attribute 1C	0-655.35s	0x2710 (10.0s)	*	*	Word
	13	*Decel Time*	Deceleration time 1 is set / read. Min. : Unit: [ms/2^{TS}] ^{TS}:Time scale : attribute 1C	0-655.35s	0x2710 (10.0s)	*	*	Word
	14	*Low Speed Limit*	Inverter Frequency Reference lower limit value is set / read.*2 *3 Min. : Unit : [r/min/2^{SS}] ^{SS}:Speed scale : attribute 16	0-100.0%	0000	*	*	Word
	15	*High Speed Limit*	Inverter Frequency Reference upper limit value is set / read.*2 *3 Min. :Unit : [r/min/2^{SS}] ^{SS}:Speed scale : attribute 16	0-100.0%	0x0708 (1800r/m)	*	*	Word
	16	*Speed Scale*	Data unit coefficient regarding speed is set / read. Min. Unit : 1 [r/min]$\times 1/2^{SS}$ ^{SS}: Speed scale setting value	-15-15 (F1-0F)	00	*	*	Byte
	17	*Current Scale*	Data Coefficient regarding current is set / read. Current Unit: 0.1 [A]$\times 1/2^{CS}$ ^{CS}: Current scale setting value	-15-15 (F1-0F)	00	*	*	Byte

Instance (Hex)	Attribute (Hex)	Name	Description	Setting Range	Initial Value (Hex)	Read	Write	Size
01	1A	*Power Scale*	Data Coefficient regarding power is set / read. Power Unit: 1 [W]×1/2^{PS} ^{PS}: Power scale setting value	-15-15 (F1-0F)	00	*	*	Byte
	1B	*Voltage Scale*	Data unit coefficient regarding voltage is set / read. Voltage Unit: 1 [V]×1/2^{VS} ^{VS}: Voltage scale setting value	-15-15 (F1-0F)	00	*	*	Byte
	1C	*Time Scale*	Data unit coefficient regarding time is set and read. Time Unit: 1 [ms]×1/2^{TS} ^{TS}: Time scale setting value	-15-15 (F1-0F)	00	*	*	Byte
	1D	*Ref From Net*	Inverter frequency reference input selection status is displayed*1 00: Frequency Reference input other than DeviceNet is enabled. 01: Frequency Reference input from DeviceNet is enabled.	00,01	00	*		Byte

*1 A setting during inverter operation can not be changed.

*2 An application of speed command, speed monitor, speed lower limit value, and speed upper limit value must be set as a motor pole value (2~39) to the inverter parameter no. n035 (frequency reference set/display unit selection)

*3 Control mode, speed lower limit, and speed upper limit cannot be set during inverter operation.

^{SS}; Speed Scale (AC/DC Drive Object Attr. 22)

^{CS}; Current Scale (AC/DC Drive Object Attr. 23)

^{PS}; Power Scale (AC/DC Drive Object Attr. 26)

^{VS}; Voltage Scale (AC/DC Drive Object Attr. 27)

^{TS}; Time Scale (AC/DC Drive Object Attr. 28)

3.4.9 GPD315/V7 Drive Parameters Object Class 100 (64hex):

This Object Class is dedicated to accessing the parameters in the GPD315/V7 inverter. It allows all inverter parameters to be read and set. This instance is for Yaskawa GPD315/V7 inverters only and is not interchangeable with other DeviceNet inverters. Appendix A in the back portion of this manual lists Attributes (Class 100, Instance 1) with their corresponding GPD315/V7 parameter numbers. The data size for each Attribute is 2 bytes each.
Refer to the GPD315/V7 Technical Manual for description on the parameters.
Note: Object Class 100 Attribute addresses are the same as the corresponding GPD315/V7 inverter parameter numbers converted to Hexadecimal value, except for parameter n128 and n129, which is 00D3h for parameter n128 and 00D4h for parameter n129.

Supported Services

Service Code No. (Hex)	Service Name	Description of Service
0E	Get_Attribute_Single	Designated attribute content is returned.
10	Set_Attribute_Single	Designated attribute content is changed.

Example 1:

To read parameter n004 Reference Selection, send an explicit message with Service Code 0Ehex (Get Attribute Single) to *Class 1 / Instance 1 / Attribute 04hex*. If the returned value is *0006hex*, then Reference Selection is set to Parameter Setting 6, Serial Communications.

CLASS 100 Attribute (hex)	REGISTER (hex)	PARAMETER	PARAMETER FUNCTION	PARAMETER SETTING	LIMITS / DESCRIPTION
04h	104h	n004	Reference Selection	0	Digital Operator Pot
				1	Digital Operator
				2	Voltage Reference (0-10V)
				3	Current Reference (4-20 mA)
				4	Current Reference (0-20 mA)
				5	Pulse Train Reference
				6	Serial Communication

Example 2:

To set parameter n019 Acceleration Time 1 to 3.5 seconds, send an explicit message with Service Code 10hex (Set Attribute Single) to *Class 1 / Instance 1 / Attribute 13hex*, with the data field as *23hex (35)*. The data field does not recognize decimal places, so the data must be written as a whole number. Also, in reading and setting to parameters n019 to n022 and n041 to n044 Acceleration/Deceleration 1 - 4, be sure to check the setting of parameter n018 Accel / Decel Time Setting Unit. For instance, in the above example, if n018 is set to value of 1 (0.01 – two decimal places) instead of the default value of parameter n018, which is 0 (0.1 - one decimal place), the data field to set acceleration time to 3.50 seconds would be *15Ehex (350)*. Please refer to the GPD315/V7 Technical Manual for further descriptions.

CLASS 100 Attribute (hex)	REGISTER (hex)	PARAMETER	PARAMETER FUNCTION	PARAMETER SETTING	LIMITS / DESCRIPTION
12h	112h	n018	Accel / Decel Time Setting Unit	0	0.1 (one decimal place)
				1	0.01 (two decimal places)
13h	113h	n019	Acceleration Time 1	0.00 to 600.00 or 0.0 to 6000.0 seconds	

4 DeviceNet Fault Diagnostics

4.1 Inverter Faults

The following is a table of faults caused by the Communications Interface Unit that will be displayed on the GPD315/V7 Digital Operator, their causes, and possible solutions. For any fault displayed on the operator that is not listed in the following table, please see the GPD315/V7 Technical Manual, TM4315.

Fault Display	Content	Cause	Solution
BUS	Option Communication error	Communication is not established between DeviceNet master and the inverter.	Check DeviceNet communication LED display and connection at DeviceNet terminal. The network and/or 24V power supply may be down.
EF0	External Fault from Option	External fault is active from DeviceNet option.	Turn OFF external fault input.
F06	Option Connection Fault	The inverter and communication are not correctly connected.	Turn OFF the inverter power supply. Check the connection of the option unit and inverter, and then, turn ON the inverter power supply. If the fault persists, change the option unit.
F21	Communication Option Self-diagnostic Fault	Communication option is not working.	Turn the inverter power supply back. If the fault persists, change the option unit.
F22	Communication Option Model Code No. Fault		
F23	Communication Option Mutual Diagnostic Fault		

4.2 DeviceNet Communication LED Faults and Operation

LED Display				Content	Cause	Solution
PWR	MS	NS	WD			
Not Lit	Not Lit	Not Lit	Not Lit	Power OFF	The inverter is not powered	Check the inverter main circuit wiring, and then turn ON the power.
					The communication option card is not correctly connected, thus, the power does not supply to the option unit.	Turn Off the inverter power, check the connection of the option unit and the inverter, and re-power the inverter.
Solid Green	Not Lit	Not Lit	Solid Red	CPU Fault	The option unit CPU is being initialized or has a fault.	Re-cycle inverter power. If the fault persists, change the option unit.
Solid Green	Flash Green	Not Lit	Flash Green	During Option Unit Preparation	Initial setting status or the communication is being initialized.	Re-Cycle inverter power. If the fault persists, change the option unit.
Solid Green	Flash Red	Not Lit	Flash Green	Option Unit Possible Fault	A wrong setting of a switch or a recovery fault is occurring.	Check baud rate setting (DIP switch, DR1 and DR0), and then re-cycle the power. If the fault persists, change the option unit.
Solid Green	Solid Red	Not Lit	Flash Green	Option Unit Unrecoverable Fault	An Un-recoverable fault is occurring to the option unit.	Recycle inverter power. If the fault persists, change the option unit.
Solid Green	Solid Red	Solid Red	Flash Green	Baud Rate Setting Fault	Baud rate settings (DIP switch, DR1 and DR0) are both ON.	Set the baud rate switches correctly, and re-cycle the inverter power.
Solid Green	Solid Green	Flash Red	Flash Green	Communication Timeout	A master communication timeout occurred.	Check if the end termination resistor is correctly connected to the communication bus. Check if the communication device is correctly connected per wiring diagrams. Check if the communication bus wiring is separated from the main circuit wiring.
Solid Green	Solid Green	Solid Red	Flash Green	Communication Error	Communication Unrecoverable fault occurred.	Check if other device's MACID is not unique per the network. Check if the master is correctly configured. Check if the end termination resistor is correctly connected to the communication bus. Check if the communication device is correctly connected per wiring diagrams. Check if the communication bus wiring is separated from the main circuit wiring.
Solid Green	Solid Green	Flash Green	Flash Green	Normal (Communication data: No)	Although the fault does not occur, it is connected to the master controller	Send explicit message or I/O message from the master as necessary.
Solid Green	Solid Green	Solid Green	Flash Green	Normal (Communication data: Yes)	Inverter is communicating normally.	

4.3 Explicit Message Communication Error

If a requested message has a error response from the master when performing Explicit message communication, the communication option sends a response message which the following error code shown in the table, is attached as data, as well as the service code “94”.

Error Code	Content	Cause	Solution
08FF	*Service not requested*	Wrong service code	Correct service code.
09FF	*Invalid attribute value detection*	Wrong attribute value	Correct attribute value.
0CFF	*Executing requested service is impossible*	A non run-operative inverter parameter is being attempted to be set during inverter operation.	Stop inverter operation.
0EFF	*Setting prohibit attribute*	Cannot write to Attribute.	Correct service code and attribute value.
13FF	*Not enough data*	Data size is not matched.	Correct data size.
14FF	*Unauthorized Attribute*	Unauthorized service was attempted to operate on the attribute.	Correct service code and attribute value.
15FF	*Excessive data*	Data size is not matched.	Correct data size.
16FF	*Object does not exist*	Object is not defined in interface.	Correct class and interface value.
1FFF	*Manufacturer specific error*	An un-settable inverter setting was attempted to be written to during inverter operation. An inverter setting is attempted to be written outside the setting range.	Stop the inverter. Correct the data within the setting range.
20FF	*Parameter fault*	A data write is attempted that is outside of the setting range.	Correct the data within the setting range.

4.4 I/O Message Communication MEMOBUS I/O Instance Errors

Error Code	Content	Causes
01 Hex	Function code error	Function code from the master was other than 00 Hex, 03 Hex, and 10 Hex.
02 Hex	Register No. error	A register # was not found. Enter command (0900H) registered for write started to read.
21 Hex	Data setting error	Parameter setting error occurred by a parameter write. Upper and lower byte values were out of alignment, swapped.
22 Hex	Write mode error	A parameter was attempted to write from the master during run. Enter command was attempted write from the master during UV. A parameter was attempted to write from the master during UV. Enter command was attempted to write from the master during UV. A parameter was attempted to write from the master during data store. Data for read only was attempted to write from the master.

Appendix A

GPD315/V7 Memobus and Class 100 Registers

- Command Registers
- Monitor Registers
- Drive Parameter Registers

These Memobus registers reference GPD315/V7 with software S0024 or S0103.

Command Registers (Read / Write)

CLASS 100 Attribute (hex)	REGISTER (hex)	FUNCTION	BIT NO.	DESCRIPTION
N/A	001h	Operational Signals	0	Forward Run
			1	Reverse Run
			2	External Fault
			3	Fault Reset
			4	Multi-function Input 1 (Closed external terminal S1)
			5	Multi-function Input 2 (Closed external terminal S2)
			6	Multi-function Input 3 (Closed external terminal S3)
			7	Multi-function Input 4 (Closed external terminal S4)
			8	Multi-function Input 5 (Closed external terminal S5)
			9	Multi-function Input 6 (Closed external terminal S6)
			A	Multi-function Input 7 (Closed external terminal S7)
			B-F	(not used)
N/A	002h	Frequency Reference / Output		Frequency ***(1) (2)***
N/A	003h	V/f gain		1000 / 100% (setting value 2.0% - 200.0%)
N/A	004-008h	N/A		return zeros
N/A	009h	Multi-function Output Setting	0	Multi-function Output Reference 1 ***(3)*** (MA Contact ON)
			1	Multi-function Output Reference 2 ***(4)*** (Photo coupler P1 ON)
			2	Multi-function Output Reference 3 ***(5)*** (Photo coupler P2 ON)
			3-F	not used
N/A	00A-00Fh	Reserved		return all zeros

Notes:
(1). When a value greater than the maximum frequency is entered, the maximum frequency will be used.
(2).Scaling depends on the setting of n152.
(3).Effective when n057 = 18.
(4).Effective when n058 = 18.
(5).Effective when n059 = 18.

Monitor Registers (Read only)

CLASS 100 Attribute (hex)	REGISTER (hex)	FUNCTION	BIT NO.	DESCRIPTION
N/A	020h	Status Signal	0	Run Command
			1	Reverse Operation
			2	Inverter Ready
			3	Fault
			4	Data Setting Error
			5	Multi-function Output 1
			6	Multi-function Output 2
			7	Multi-function Output 3
			8-F	not used
N/A	021h	Fault Content	0	Overcurrent (OC)
			1	Overvoltage (OV)
			2	Inverter Overload (OL2)
			3	Inverter Overheat (OH1)
			4	not used
			5	not used
			6	PID Feedback Loss (FbL)
			7	External Fault (EF, EFO), Emergency Stop (STP)
			8	Hardware Fault (Fxx)
			9	Motor Overload (OL1)
			A	Overtorque Detection (OL3)
			B	Undertorque Detection (UL3)
			C	Power Loss (UV1)
			D	Control Power Supply Undervoltage (UV2)
			E	MEMOBUS Communication Time out (CE)
			F	Operator Connection Fault (OPR)

CLASS 100 Attribute (hex)	REGISTER (hex)	FUNCTION	BIT NO.	DESCRIPTION
N/A	022h	Data Link Status	0	During Data Write-in
			1	not used
			2	not used
			3	Upper / Lower Limit Fault
			4	Matching Fault
			5	not used
			6-F	not used
N/A	023h	Frequency Reference		unit depends upon n152. ***(1)***
N/A	024h	Output Frequency		unit depends upon n152.
N/A	025h	Reserved		
N/A	026h	Reserved		
N/A	027h	Output Current		10/1A
N/A	028h	Output Voltage		1/1V
N/A	029h	Reserved		
N/A	02Ah	Reserved		
N/A	02Bh	External Input Status	0	Terminal S1 closed
			1	Terminal S2 closed
			2	Terminal S3 closed
			3	Terminal S4 closed
			4	Terminal S5 closed
			5	Terminal S6 closed
			6	Terminal S7 closed
			7	not used
			8-F	not used

Notes:
(1). Value goes to zero without a run command.

Monitor Registers (continued)

CLASS 100 Attribute (hex)	REGISTER (hex)	FUNCTION	BIT NO.	DESCRIPTION
N/A	02Ch	Inverter Status	0	Running
			1	During zero speed
			2	Speed Agree
			3	Minor Fault
			4	Frequency Detection 1 (output frequency < n095)
			5	Frequency Detection 2 (output frequency >;= n095)
			6	Inverter Ready
			7	Under voltage
			8	Baseblock 1
			9	Frequency Reference from: 1=Serial communications; 2=n011 or analog input
			A	Run Signal from: 1=Serial communications; 2=digital oper. or external terminals
			B	Overtorque Detection
			C	Undertorque Detection
			D	During Fault Retry
			E	Fault
			F	Time out Communication Fault
N/A	02Dh	External Terminal Output Status	0	Output Contact (MA, MB, MC) ON
			1	Photo coupler 1 (P1, PC) ON
			2	Photo coupler 2 (P2, PC) ON
			3	not used
N/A	02Eh	Reserved		
N/A	031h	DC bus Voltage		1 / 1V
N/A	032h	Torque monitor		1 / 1%; (100% / motor rated torque)
N/A	033h	Reserved		
N/A	034h	Reserved		
N/A	035h	Reserved		
N/A	036h	Reserved		
N/A	037h	Output Power		100 / 1kW ; with sign

CLASS 100 Attribute (hex)	REGISTER (hex)	FUNCTION	BIT NO.	DESCRIPTION
N/A	038h	PID Feedback		+/-100% /Equivalent to Max. Output Frequency Input; 10 / 1% without sign
N/A	039h	PID Input		+/-100% /Equivalent to Max. Output Frequency Input; 10 / 1% without sign
N/A	03Ah	PID Output		+/-100% /Equivalent to Max. Output Frequency; 10 / 1% with sign
N/A	03Bh-03Ch	Reserved		
N/A	03Dh	Communication Error ***(1)***	0	CRC Error
			1	Data Length Error
			2	not used
			3	Parity Error
			4	Overrun Error
			5	Framing Error
			6	Timeover
			7	not used
			8-F	not used
N/A	03E-FFh	Reserved		not used

(1). The contents of a communications error is held unless a fault reset is input (can be reset during running).

Inverter Parameter Registers (Read/Write)

CLASS 100 Attribute (hex)	REGISTER (hex)	PARAMETER	PARAMETER FUNCTION	PARAMETER SETTING	LIMITS / DESCRIPTION	INITIAL VALUE
01h	101h	n001	Parameter Selection / Initialization	0	n001 can be read and set; n002-n179 others read only	1
				1	n001-n039 can be read and set	
				2	n001-n067 can be read and set	
				3	n001-n113 can be read and set	
				4	n001-n179 can be read and set	
				5	not used	
				6	Clear fault record only	
				7	not used	
				8	not used	
				9	not used	
				10	2-wire initialization	
				11	3-wire initialization	
02h	102h	n002	Control Method Selection	0	V/f Control	1
				1	Open Loop Vector	
03h	103h	n003	Operation Method Selection	0	Digital Operator	1
				1	Terminal	
				2	Serial Communication	
04h	104h	n004	Reference Selection	0	Digital Operator Pot	2
				1	Digital Operator	
				2	Voltage Reference (0-10V)	
				3	Current Reference (4-20 mA)	
				4	Current Reference (0-20 mA)	
				5	Pulse Train Reference	
				6	Serial Communication	
05h	105h	n005	Stop Method	0	Ramp to stop	0
				1	Coast to stop	

(1) Even when settable parameters are limited by the setting of n001, all parameters can be read and set via serial communications.

Inverter Parameter Registers (Read/Write) (continued)

CLASS 100 Attribute (hex)	REGISTER (hex)	PARAMETER	PARAMETER FUNCTION	PARAMETER SETTING	LIMITS / DESCRIPTION	INITIAL VALUE
06h	106h	n006	Reverse Prohibit	0	Reverse Run enabled	0
				1	Reverse Run disabled	
07h	107h	n007	Stop Key Function	0	Stop key is effective regardless of programming of n003.	
				1	Stop key is effective only when n003 is set up from digital operator.	0
08h	108h	n008	Reference Selection - Digital Operator	0	Frequency Ref. from digital oper. pot.	0
				1	Frequency Ref. from n024	
09h	109h	n009	Frequency Reference Setting Method from Digital Operator	0	Enter key must be pressed to write-in	
				1	Enter key is not needed to activate new value	0
0Ah	10Ah	n010	Operator Selection when Digital Operator is disconnected	0	Disabled (operation continues)	0
				1	Enabled (motor coasts to stop and faults.	
0Bh	10Bh	n011	Frequency – Maximum	50.0 to 400.0		60.0
0Ch	10Ch	n012	Voltage – Maximum	0.1 to 255.0 (230V inverter) 0.2 to 510.0 (460 V inverter)		230/460
0Dh	10Dh	n013	Frequency – Max. Voltage Point	0.2 to 400.0		60
0Eh	10Eh	n014	Frequency – Midpoint	0.1 to 399.9		***(1)***
0Fh	10Fh	n015	Voltage – Midpoint	0.1 to 255.0 (230V inverter) 0.2 to 510.0 (460 V inverter)		***(1)***
10h	110h	n016	Frequency – Minimum	0.1 to 10.0		***(1)***
11h	111h	n017	Voltage – Minimum	0.1 to 50.0 (230V inverter) 0.2 to 100.0 (460V inverter)		***(1)***
12h	112h	n018	Accel / Decel Time Setting Unit	0	0.1 (one decimal place)	0
				1	0.01 (two decimal places)	
13h	113h	n019	Acceleration Time 1	0.00 to 600.00 or 0.0 to 6000.0 seconds ***(2)***		10.0 ***(2)***
14h	114h	n020	Deceleration Time 1	0.00 to 600.00 or 0.0 to 6000.0 seconds ***(2)***		10.0 ***(2)***
15h	115h	n021	Acceleration Time 2	0.00 to 600.00 or 0.0 to 6000.0 seconds ***(2)***		10.0 ***(2)***
16h	116h	n022	Deceleration Time 2	0.00 to 600.00 or 0.0 to 6000.0 seconds ***(2)***		10.0 ***(2)***

Note:
(1) Factory Setting differs depending upon control method selected (n002).
(2) Values are dependent on setting of n018, the Accel / Decel Time Setting Unit.

CLASS 100 Attribute (hex)	REGISTER (hex)	PARAMETER	PARAMETER FUNCTION	PARAMETER SETTING	LIMITS / DESCRIPTION	INITIAL VALUE
17h	117h	n023	S-curve Selection	0	No S-curve	0
				1	0.2 second	
				2	0.5 second	
				3	1.0 second	
18h	118h	n024	Frequency Reference 1	0.00 to 400.00 Hz ***(1)***		6.00
19h	119h	n025	Frequency Reference 2	0.00 to 400.00 Hz ***(1)***		0.00
1Ah	11Ah	n026	Frequency Reference 3	0.00 to 400.00 Hz ***(1)***		0.00
1Bh	11Bh	n027	Frequency Reference 4	0.00 to 400.00 Hz ***(1)***		0.00
1Ch	11Ch	n028	Frequency Reference 5	0.00 to 400.00 Hz ***(1)***		0.00
1Dh	11Dh	n029	Frequency Reference 6	0.00 to 400.00 Hz ***(1)***		0.00
1Eh	11Eh	n030	Frequency Reference 7	0.00 to 400.00 Hz ***(1)***		0.00
1Fh	11Fh	n031	Frequency Reference 8	0.00 to 400.00 Hz ***(1)***		0.00
20h	120h	n032	Jog Frequency Reference	0.00 to 400.00 Hz ***(1)***		6.00
21h	121h	n033	Frequency Reference Upper Limit	0.0 to 110.0%		100.0
22h	122h	n034	Frequency Reference Lower Limit	0.0 to 110.0 %		0.0
23h	123h	n035	Frequency Reference Unit Selection	0	0.01 Hz (< 100Hz); 0.1Hz (100 Hz >=100Hz)	0
				1	0.1%	
				2-39	RPM	
				40-3999	User setting	
24h	124h	n036	Motor Rated Current	0-150% of inverter rated output current		***(2)***
25h	125h	n037	Electronic Thermal Overload Protection for (OL1 fault)	0 1 2	Standard Motor Standard Motor – short term Disabled	0
26h	126h	n038	Electronic Thermal Overload Protection Time Constant	1 to 60 minutes		8
27h	127h	n039	Cooling Fan Operation Selection	0	Operates only when inverter is running	0
				1	Operates with power applied to inverter	

(1) Scaling depends upon the setting of n035.
(2) Factory setting differs depending upon the GPD315/V7 capacity.

Inverter Parameter Registers (Read/Write) (continued)

CLASS 100 Attribute (hex)	REGISTER (hex)	PARAMETER	PARAMETER FUNCTION	PARAMETE SETTING	LIMITS / DESCRIPTION	INITIAL VALUE
0028h	128h	n040	Motor Rotation Selection	0	Counter Clockwise	0
				1	Clockwise	
29h	129h	n041	Acceleration Time 3	0 to 6000 seconds ***(1)***		10.0
2Ah	12Ah	n042	Deceleration Time 3	0 to 6000 seconds ***(1)***		10.0
2Bh	12Bh	n043	Acceleration Time 4	0 to 6000 seconds ***(1)***		10.0
2Ch	12Ch	n044	Deceleration Time 4	0 to 6000 seconds ***(1)***		10.0
2D-31h	12D-131h	n045-n049	RESERVED			

Note:
(1) Values are dependent on setting of n018, the Accel / Decel Time Setting Unit.

Inverter Parameter Registers (Read/Write) (continued)

CLASS 100 Attribute (hex)	REGISTER (hex)	PARAMETER	PARAMETER FUNCTION	PARAMETER SETTING	LIMITS / DESCRIPTION	INITIAL VALUE
32h	132h	n050	Multi-function Input (terminal S1)	0 to 1Bh		1
33h	133h	n051	Multi-function Input (terminal S2)	0 to 1Bh		2
34h	134h	n052	Multi-function Input (terminal S3)	0 to 1Bh		3 (or 0) **(1)**
35h	135h	n053	Multi-function Input (terminal S4)	0 to 1Bh		5
36h	136h	n054	Multi-function Input (terminal S5)	0 to 1Bh		6
37h	137h	n055	Multi-function Input (terminal S6)	0 to 1Bh		7
38h	138h	n056	Multi-function Input (terminal S7)	0 to 1Bh		10
39h	139h	n057	Multi-function Output (terminals MA, MB, MC)	0 to 15h		0
3Ah	13Ah	n058	Multi-function Output (term. P1 & PC)	0 to 15h		1
3Bh	13Bh	n059	Multi-function Output (term. P2 & PC)	0 to 15h		2
3Ch	13Ch	n060	Analog Frequency Ref. Gain	0 – 255%		100%
3Dh	13Dh	n061	Analog Frequency Ref. Bias	-100% - +100%		0%
3Eh	13Eh	n062	Analog Frequency Ref. Time Constant	0.00 – 2.00 seconds (0.00 = disabled)		0.10
3Fh	13Fh	n063	Reserved			
40h	140h	n064	Operation Method For Frequency Reference Loss Detection	0 1	Detection not provided Continue to run at 80% of previous freq. ref.	0
41h	141h	n065	Monitor Output Type Selection	0 1	Analog monitor output Pulse monitor output ***(2)***	0
42h	142h	n066	Monitor Item Selection ***(5)***	0 1 2 3 4 5 6	Output frequency (10V / Max. output freq.) Output current (10V / inverter rated current) DC bus voltage (10V / 400 (800)VDC ***(3)*** Torque monitor (10V / motor rated torque) Output power (10V / inverter kW capacity) ***(4)*** Output voltage reference Frequency reference	0
43h	143h	n067	Monitor Gain	0.01 to 2.00		1.00

(1) Initial value in parentheses are obtained at a 3-wire initialization.
(2) Output voltage is +/- 12V; +/-10%. Maximum of 20mA. Duty cycle 30-70%.
(3) 400VDC value is for 230V inverter. 800VDC value is for 460V inverter.
(4) OV is output at regenerative mode.
(5) Enabled only when n065 is “0” (analog monitor output).

CLASS 100 Attribute (hex)	REGISTER (hex)	PARAMETER	PARAMETER FUNCTION	PARAMETER SETTING	LIMITS / DESCRIPTION	INITIAL VALUE
44h	144h	n068	Analog Frequency Ref. Gain (Voltage reference input)	-255% to +255%		100%
45h	145h	n069	Analog Frequency Ref. Bias (Voltage reference input)	-100% to +100%		0%
46h	146h	n070	Analog Frequency Ref. Filter Time Constant (Voltage ref. input)	0.0 to 2.00 seconds (0.00 = filter disabled)		0.10
47h	147h	n071	Analog Frequency Ref. Gain (Current reference input)	-255% to +255%		100%
48h	148h	n072	Analog Frequency Ref. Bias (Current reference input)	-100% to +100%		0%
49h	149h	n073	Analog Frequency Ref. Filter Time Constant (Current ref. input)	1.0 to 2.00 seconds (0.00 = filter disabled)		0.10
4Ah	14Ah	n074	Pulse String Freq. Ref. Gain	-255% to +255%		100%
4Bh	14Bh	n075	Pulse String Freq. Ref. Bias	-100% to +100%		0%
4Ch	14Ch	n076	Pulse String Frequency Reference Filter Time Constant	2.0 to 2.00 seconds (0.00 = filter disabled)		0.10
4Dh	14Dh	n077	Multi-function Analog Input Selection	0	Multi-function analog input disabled	0
				1	Aux. frequency reference	
				2	Frequency gain	
				3	Frequency bias	
				4	Voltage bias	
4Eh	14Eh	n078	Multi-function Analog Input Signal	0	0 – 10 V (operator terminal)	0
				1	4 – 20 mA (operator terminal)	
4Fh	14Fh	n079	Multi-function Analog Frequency Bias	0 – 50%		10%
50h	150h	n080	Carrier Frequency	1 to 4 (x2.5 kHz); 7 to 9 (synchronous)		***(1)***

Notes:
(1) The initial value varies depending upon the inverter capacity (kVA).

CLASS 100 Attribute (hex)	REGISTER (hex)	PARAMETER	PARAMETER FUNCTION	PARAMETER SETTING	LIMITS / DESCRIPTION	INITIAL VALUE
51h	151h	n081	Momentary Power Loss Selection	0	Not provided	0
				1	Operation continues with power recovered within 2 seconds	
				2	Continuous operation (no fault)	
52h	152h	n082	No. of Restart Attempts	0 to 10 attempts		0
53h	153h	n083	Jump Frequency 1	0.00 to 400.0 Hz (0.00 = disabled) ***(1)***		0.00
54h	154h	n084	Jump Frequency 2	0.00 to 400.0 Hz (0.00 = disabled) ***(1)***		0.00
55h	155h	n085	Jump Frequency 3	0.00 to 400.0 Hz (0.00 = disabled) ***(1)***		0.00
56h	156h	n086	Jump Frequency Range	0.00 to 25.50 Hz (0.00 = n083-n085 are disabled)		0.00
57h	157h	n087	Elapsed Time Function Selection	0	Operation time elapses when power is on.	0
				1	Operation time elapses when inverter is running	
58h	158h	n088	Elapsed Operation Time (Initial Value)	0 to 9999 hours		0
59h	159h	n089	DC Injection Current	0 – 100% (0% = baseblock is performed)		50%
5Ah	15Ah	n090	DC Injection Time at Stop	0.0 to 25.5 seconds (0.0 = disabled)		0.0
5Bh	15Bh	n091	DC Injection Time as Start	0.0 to 25.5 seconds (0.0 = disabled)		0.0
5Ch	15Ch	n092	Stall Prevention during Decel	0	enabled	0
				1	disabled	
5Dh	15Dh	n093	Stall Prevention during Accel	30 to 200% (200% = disabled) ***(2)***		170%
5Eh	15Eh	n094	Stall Prevention during Run	30 to 200% (200% = disabled)		160%
5Fh	15Fh	n095	Frequency Detection Level	0.00 to 400.0 Hz ***(1)***		0.00
60h	160h	n096	Overtorque Detection (OL3)	0	Detection disabled.	0
				1	Detects only at set frequency; operation continues	
				2	Detects only at set frequency; coast to stop	
				3	Detects at all frequency; operation continues	
				4	Detects at all frequency; coast to stop	

Notes:
(1) The setting unit is 0.01 Hz when value is less than 100 Hz, but 0.1 Hz when value is 100 Hz or greater.
(2) The operation level is automatically reduced in the voltage saturation range.

Inverter Parameter Registers (Read/Write) (continued)

CLASS 100 Attribute (hex)	REGISTER (hex)	PARAMETER	PARAMETER FUNCTION	PARAMETER SETTING	LIMITS / DESCRIPTION	INITIAL VALUE
61h	161h	n097	Overtorque Detection Selection during Open Loop Vector Mode	0	Detected by output torque	0
				1	Detected by output current	
62h	162h	n098	Overtorque Detection Level	30 to 200%		160%
63h	163h	n099	Overtorque Detection Time	0.1 to 10.0 seconds		0.1
64h	164h	n100	Up/Down Memory Hold	0	Disabled	0
				1	Enabled	
65h	165h	n101	Speed Search Deceleration Time	0.0 to 10.0 seconds Deceleration time used during a speed search		2.0
66h	166h	n102	Speed Search Operation Level (Current Level)	0 to 200% Sets the percentage of inverter rated current speed search uses to detect that it has “caught” the coasting motor		150%
67h	167h	n103	Torque Compensation Gain	0.0 to 2.5		1.0
68h	168h	n104	Torque Compensation Time Constant	0.0 to 25.5 seconds (When 0.0 is set; the primary delay filter is disabled.)		0.3 ***(1)***
69h	169h	n105	Torque Compensation Iron Loss	0.0 to 6550		***(2) (3)***
6Ah	16Ah	n106	Motor Rated Slip	0.0 to 20.0 Hz		***(3)***
6Bh	16Bh	n107	Motor Line-to-line Resistance	0.0 to 65.50 Ohms		***(3) (4)***
6Ch	16Ch	n108	Motor Leakage Inductance	0.00 to 655.0 mH		***(2) (3) (5)***
6Dh	16Dh	n109	Torque Boost	0 to 250%		150% ***(2)***
6Eh	16Eh	n110	Motor no-load Current	0 to 99%		***(3)***
6Fh	16Fh	n111	Slip Compensation Gain	0.0 to 2.5		0.0 ***(6)***
70h	170h	n112	Slip Compensation Primary Delay Time	0.0 to 25.5 seconds (When 0.0 is set; the primary delay filter is disabled.)		2.0 ***(1)***
71h	171h	n113	Slip Compensation Selection during Regen	0	Disabled	0 ***(2)***
				1	Enabled	
72h	172h	n114	Reserved			

Notes:
(1) The initial value is only 0.2 seconds when the vector control mode is selected.
(2) Valid only when in the vector control mode.
(3) The value differs according to inverter capacity (kVA).
(4) Setting units are 0.001, when less than 10, and 0.01, when equal to or greater than 10 Ohms.
(5) Setting units are 0.01, when less than 100, and 0.1, when equal to or greater than 100 mH.
(6) The initial value is 1.0 seconds when the vector control mode is selected.

CLASS 100 Attribute (hex)	REGISTER (hex)	PARAMETER	PARAMETER FUNCTION	PARAMETER SETTING	LIMITS / DESCRIPTION	INITIAL VALUE
73h	173h	n115	Stall Prevention during Run	0	Disabled (level based on n094)	0
				1	Enabled (level at Fmax is n094 x 0.4)	
74h	174h	n116	Stall Prevention during Run Accel/Decel Time Select	0	Accel/decel selectable via multi-function	0
				1	Accel/decel via n021, n022	
75h	175h	n117	Undertorque Detection Selection	0	Not provided	0
				1	During speed agree, alarm only	
				2	During speed agree, fault	
				3	During run, alarm only	
				4	During run, fault	
76h	176h	n118	Undertorque Detection Level	0 to 200% Sets the percentage of inverter rated current/torque used for undertorque detection – Note that parameter n097 (Overtorque detection function selection 2) applies for both overtorque and undertorque detection		10%
77h	177h	n119	Undertorque Detection Time	0.1 to 10.0 seconds Sets the time between the detection of undertorque and the action selected by parameter n117		0.1
78h	178h	n120	Frequency Reference 1	0.00 to 400.00 Hz ***(1)***		0.00
79h	179h	n121	Frequency Reference 2	0.00 to 400.00 Hz ***(1)***		0.00
7Ah	17Ah	n122	Frequency Reference 3	0.00 to 400.00 Hz ***(1)***		0.00
7Bh	17Bh	n123	Frequency Reference 4	0.00 to 400.00 Hz ***(1)***		0.00
7Ch	17Ch	n124	Frequency Reference 5	0.00 to 400.00 Hz ***(1)***		0.00
7Dh	17Dh	n125	Frequency Reference 6	0.00 to 400.00 Hz ***(1)***		0.00
7Eh	17Eh	n126	Frequency Reference 7	0.00 to 400.00 Hz ***(1)***		0.00
7Fh	17Fh	n127	Frequency Reference 8	0.00 to 400.00 Hz ***(1)***		0.00

Notes:
(1) Scaling depends upon the setting of n035.

CLASS 100 Attribute (hex)	REGISTER (in hex)	PARAMETER	PARAMETER FUNCTION	PARAMETER SETTING	LIMITS / DESCRIPTION	INITIAL VALUE
D3h (1)	180h	n128	PID Control Selection	0	PID Disabled	0
				1	PID Enabled (D=Feed Forward)	
				2	PID Enabled (D=Feedback)	
				3	PID Enabled, Reference +PID (D=Feed Forward)	
				4	PID Enabled, Reference +PID (D=Feedback)	
				5	Inverted PID Enabled (D=Feed Forward)	
				6	Inverted PID Enabled (D=Feedback)	
				7	Inverted PID Enabled, Ref. +PID (D=Feed Forward)	
				8	Inverted PID Enabled, Ref. +PID (D=Feedback)	
D4h (1)	181h	n129	PID Feedback Gain	0.00 to 10.00		1.00
82h	182h	n130	Proportional Gain (P)	0.0 to 25.0 (when 0.0 is set, P control is disabled)		1.0
83h	183h	n131	Integral Time (I)	0.0 to 360.0 (when 0.0 is set, I control is disabled)		1.0
84h	184h	n132	Derivative Time (D)	0.00 to 2.50 (when 0.0 is set, D control is disabled)		0.00
85h	185h	n133	PID Offset Adjustment	-100 to +100% (100% of Max. output frequency)		0%
86h	186h	n134	Integral (I) Upper limit	-100 to +100% (100% of Max. output frequency)		100%

Notes:
(1). Class 100 Attribute addresses are the same as the corresponding GPD315/V7 inverter parameter numbers converted in Hexadecimal, except for parameter n128 and n129. The Class 100 Attribute number for parameter n128 is 00D3h and for parameter n129 is 00D4h.

Inverter Parameter Registers (Read/Write) (continued)

CLASS 100 Attribute (hex)	REGISTER (hex)	PARAMETER	PARAMETER FUNCTION	PARAMETER SETTING	LIMITS / DESCRIPTION	INITIAL VALUE
87h	187h	n135	PID Output Primary Delay Time	0.0 to 10.0 seconds		0.0
88h	188h	n136	PID Feedback Loss Detection Selection	0 1 2	Disabled Enabled (Operation continues: Fbl alarm) Enabled (Inverter shuts down: Fbl fault)	0
89h	189h	n137	PID Feedback Loss Detection Level	0 to 100% (100% of Max. output frequency)		0%
8Ah	18Ah	n138	PID Feedback Loss Detection Time	0.0 to 25.5 seconds		1.0
8Bh	18Bh	n139	Energy-saving Control Selection	0 1	Disabled Enabled (must be in V/f control mode)	0
8Ch	18Ch	n140	Energy-saving Coefficient K2	0.0 to 6550 ***(1)***		***(2)***
8Dh	18Dh	n141	Energy-saving Voltage Low Limiter @60 Hz	0 to 120%		50%
8Eh	18Eh	n142	Energy-saving Voltage Low Limiter @6 Hz	0 to 25%		12%
8Fh	18Fh	n143	Power Supply Average Time	1 to 200 (1 = 24 ms)		1
90h	190h	n144	Search Operation Voltage Limiter	1 to 100%		0
91h	191h	n145	Search Operation Voltage Step @ 100%	0.1 to 10.0%		0.5
92h	192h	n146	Search Operation Voltage Step @ 5%	0.1 to 10.0%		0.2
93h	193h	n147	Motor Rated Voltage	150.0 to 255.0 Volts ***(3)***		230 ***(3)***
94h	194h	n148	Reserved			
95h	195h	n149	Pulse Input Scaling ***(4)***	100 to 3300 (1=10 Hz)		3072

Notes:
(1) The setting unit is 0.1 for values less than 1000, and 1 for values equal to or greater than 1000.
(2) The initial value differs with inverter capacity (kVA) setting, and the motor code (n158) setting.
(3) The upper limit and initial value are doubled for the 460 volt inverter.
(4) For a pulse input which exceeds 60 Hz; it is treated as within 0.1 Hz.

Inverter Parameter Registers (Read/Write) (continued)

CLASS 100 Attribute (hex)	REGISTER (hex)	PARAMETER	PARAMETER FUNCTION	PARAMETER SETTING	LIMITS / DESCRIPTION	INITIAL VALUE
96h	196h	n150	Pulse Monitor Output Frequency Selection	0	1440 Hz / Max. output frequency	0
				1	1f output	
				6	6f output	
				12	12f output	
				24	24f output	
				36	36f output	
				40	1440Hz / Max frequency (n011)	
				41	Frequency reference x 1	
				42	Frequency reference x 6	
				43	Frequency reference x 12	
				44	Frequency reference x 24	
				45	Frequency reference x 36	
97h	197h	n151	Modbus Time Out Detection Selection ***(1)***	0	Enabled (coast to stop)	0
				1	Enabled (Ramp to stop - n020)	
				2	Enabled (Ramp to stop - n022)	
				3	Enabled (Operation continues, alarm)	
				4	Disabled	
98h	198h	n152	Modbus Frequency Reference Unit ***(1)***	0	0.1 Hz / 1	0
				1	0.01 Hz / 1	
				2	100% / 3000	
				3	0.1% / 1	
99h	199h	n153	Modbus Slave Address ***(1)***	0 to 32		0
9Ah	19Ah	n154	Modbus Baud Rate ***(1)***	0	2400 bps	2
				1	4800 bps	
				2	9600 bps	
				3	19200 bps	
9Bh	19Bh	n155	Modbus Parity Selection ***(1)***	0	Even parity	2
				1	Odd parity	
				2	No parity	
9Ch	19Ch	n156	Modbus Send Waiting Time ***(1)***	10 to 65 msec		10
9Dh	19Dh	n157	Modbus RTS Control ***(1)***	0	Enabled	0
				1	Disabled (RS-422; 1 to 1 communication)	

Notes:
(1) To make parameter settings valid, it is necessary to turn power off and then on again.

CLASS 100 Attribute (hex)	REGISTER (hex)	PARAMETER	PARAMETER FUNCTION	PARAMETER SETTING	LIMITS / DESCRIPTION	INITIAL VALUE
9Eh	19Eh	n158	Motor Code (Energy-savings control)	0 to 70		*(1)*
9Fh	19Fh	n159	Energy-saving Voltage Limit @60Hz	0 to 120%		120
A0h	1A0h	n160	Energy-saving Voltage Limit @6Hz	0 to 25%		16
A1h	1A1h	n161	Search Operation Power Supply Detection Hold Width	0 to 100%		10
A2h	1A2h	n162	Power Detection Filter Time Constant	0 to 255 (1 = 4ms)		5
A3h	1A3h	n163	PID Output Gain	0.0 to 25.0		1.0
A4h	1A4h	n164	PID Feedback Selection	0	0 – 10V on terminal FR	0
				1	4 – 20mA on terminal FR	
				2	0 – 20mA on terminal FR	
				3	0 – 10V on operator terminal	
				4	4 – 20mA on operator terminal	
				5	Pulse input	
A5h	1A5h	n165	Reserved			
A6h	1A6h	n166	Input Phase Loss Detection Level	0 to 100% 400.0V/100% (200V class); 800.0V/100% (400V class) Recommended set value n166=7%. Not detected if set to 0%.		0%
A7h	1A7h	n167	Input Phase Loss Detection Time	0 to 255 seconds Recommended set value n167=10sec. Not detected if set to 0.0sec.		0
A8h	1A8h	n168	Output Phase Loss Detection Level	0 to 100% Inverter rated output current value/100% Recommended set value n166=5%. Not detected if set to 0%.		0%
A9h	1A9h	n169	Output Phase Loss Detection Time	0.0 to 2.0 seconds Recommended set value n167=0.2sec. Not detected if set to 0.0sec.		0.0

CLASS 100 Attribute (hex)	REGISTER (hex)	PARAMETER	PARAMETER FUNCTION	PARAMETER SETTING	LIMITS / DESCRIPTION	INITIAL VALUE
AA-ACh	1AA-1ACh	n170-n172	Reserved			
ADh	1ADh	n173	DC Injection P Gain	1 to 999 (1=.001) Adjusts the proportional gain of the DC injection current loop		83 (=.083)
AEh	1AEh	n174	DC Injection I Time	1 to 250 (1=4ms) Adjusts the integral time of the DC injection current loop		25 (=100ms)
B0h	1B0h	n175	Carrier Frequency Deceleration Selection at Low Speed	0	Disabled	0
				1	Enabled	
B1h	1B1h	n176	Parameter Copy Function Selection ***(1)***	rdY	READY status	rdY
				rEd	READ executes	
				CPY	COPY executes	
				vFY	VERIFY executes	
				uA	Inverter capacity display	
				Sno	Software No. display	
B2h	1B2h	n177	Parameter Read Out Prohibit Selection ***(1)***	0	READ prohibited	0
				1	READ allowed	
B3h	1B3h	n178	Fault History ***(2)***	Four newest events are displayed.		-
B4h	1B4h	n179	Software No. ***(2)***	Lower four digits of software numbers are displayed.		-

Notes:
(1) Parameters n176 and n177 cannot be set through Modbus communication.
(2) Parameters n178 and n179 are display only, which are not user settable.

Inverter Parameter Registers (Read/Write) (continued)

CLASS 100 Attribute (hex)	REGISTER (hex)	PARAMETER	PARAMETER FUNCTION	PARAMETER SETTING	LIMITS / DESCRIPTION	INITIAL VALUE
B4h	1B4h	n180	Output Voltage Limiter Selection	0 1	Enabled Disabled	0
B5h	1B5h	n181	Electronic Thermal Protection (OL2)	0 1	Enabled Disabled	0
B6h	1B6h	n182	Simple AVR Selection	0 1	Enabled Disabled	0
B7h	1B7h	n183	RS485 Terminal Communication Monitor Selection	0	Modbus Communication at PC connection	0
				1	Modbus Communication test mode at PC	
B8h	1B8h	n184	Hunting Prevention Gain	0.00 to 2.55 (V/f control mode only)		***(1)***
B9h	1B9h	n185	Hunting Prevention Time Constant	1 to 255 (1 = 2ms)		***(1)***
BAh	1BAh	n186	Magnetic Flux Hunting Prevention Gain	0.00 to 1.00 (Vector control mode only)		0.05
BBh	1BBh	n187	d-axis Hunting Prevention Gain	0.00 to 2.55 (Vector control mode only)		***(1)***
BCh	1BCh	n188	q-axis Hunting Prevention Gain	0.00 to 2.55 (Vector control mode only)		***(1)***
BDh	1BDh	n189	Power Factor Angle Detection Filter Time (during accel/decel)	1 to 255 (1 = 4ms)		***(1)***
BEh	1BEh	n190	Power Factor Angle Detection Filter Time (during speed agree)	1 to 255 (1 = 4ms)		***(1)***
BFh	1BFh	n191	IGBT Voltage Drop	0.0 to 10.0V (Vector control / Speed)		***(1)***
C0h	1C0h	n192	On-delay Compensation Value	0 to 255 (1 = 62.5 ns)		***(1)***
C1h	1C1h	n193	R1 Auto-tuning Selection (Vector mode / Speed)	0	Enabled (Time constant 0.6s)	0
				1	Enabled (Time constant 2.0s)	
				2	Disabled	
C2h	1C2h	n194	Factory Setting MNTR Display Selection	0 1	Disabled Enabled	0
C3-C6h	1C3-1C6h	n195-n198	Reserved			
C7h	1C7h	n199	Current Detection Adjustment Gain (U-phase)	0.000 to 2.000		***(1)***

Notes:
(1) The value differs according to inverter capacity (kVA).

Inverter Parameter Registers (Read/Write) (continued)

CLASS 100 Attribute (hex)	REGISTER (hex)	PARAMETER	PARAMETER FUNCTION	PARAMETER SETTING	LIMITS / DESCRIPTION	INITIAL VALUE
C8h	1C8h	n200	Current Detection Adjustment Gain (V-Phase)	0.000 to 2.000		*(1)*
C9h	1C9h	n201	Current Detection Adjustment Gain (W-Phase)	0.000 to 2.000		*(1)*
CAh	1CAh	n202	Current Detection Delay Compensation	-999 to 999 (1 = 1 μs)		10
CBh	1CBh	n203	Rated Current Conversion Coefficient	0.000 to 2.000		*(1)*
CCh	1CCh	n204	2/3 Phase Modulation Switchover Level (Modulation factor)	0 to 110% (when set to 0, all areas become 2 phase modulation)		30
CDh	1CDh	n205	CLB Selection	0 1	Enabled Disabled	0
CEh	1CEh	n206	OC Number of Retries	0 to 9 times		4
CFh	1CFh	n207	Display Mode at Power Off	Setting Disabled		-
D0h	1D0h	n208	Memory Hold Output Frequency	Setting Disabled		-
D1h	1D1h	n209	Order Selection Parameter (Fc Setting Range Selection)	0 to 100		0
D2h	1D2h	n210	kVA Selection	0 to 255		*(1)*

Notes:
(1) The value differs according to inverter capacity (kVA)

Appendix B

DeviceNet Configuration for RSNetWorx and DeviceNet Manager

- How to Configure Yaskawa GPD315/V7

DeviceNet Configuration

The DeviceNet configuration refers to properly setting the DeviceNet slave in a network system through its parameter settings. The GPD315/V7 has DeviceNet parameters and inverter parameters accessible through its EDS file. The configuration software uses the EDS file to map the DeviceNet and inverter parameters, so the user can access them easily. The configuration software that this document will address is DeviceNet Manager and RSNetWorx.

Note: This section is only intended to be used as a guide for configuration of the Yaskawa GPD315/V7 on DeviceNet using configuration tool software DeviceNet Manager and RSNetWorx. Any updates to the two configuration tool software will not be noted in this section. Please use the user's manual of the configuration tool as the primary reference and use the contents of this section only as a general guide.

1. Install EDS files.

   EDS files can be downloaded from the internet at www.odva.org or www.drives.com. Be sure to select the version of EDS file that matches the DeviceNet card version and the inverter capacity of the GPD315/V7 for correct scaling of parameters. Refer to the Table of EDS Files and Product Codes in Section 3.4.1 for a full list of EDS files.
   Install the EDS files in a subdirectory of the PC where the configuration software is located.

   To install follow these steps:

   a. For RSNetWorx.
      i. Run RSNetWorx for DeviceNet.
      ii. From the *Tools* menu select *EDS Wizard.*
      iii. Press the *Next* button.
      iv. Select *Register EDS Files* from the options and press *Next*.
      v. Select *Register a directory of EDS files* from the options.
      vi. In the Named area enter the location of the files (i.e. C:\eds) and press *Next*.
      vii. After the files are analyzed (test results) press *Next*.
      viii. Do not change the default icon, press *Next*.
      ix. At the final task summary press *Next* to register the devices.
      x. To complete the wizard, press the *Finish* button.

   b. For DeviceNet Manager.
      i. Run DeviceNet Manager.
      ii. From the *Utilities* menu select *Install EDS Files.*
      iii. Select the directory where the EDS files were installed and press the *Select All* button and press *OK*.
      iv. At the *Set Device Bitmap* prompt press *No*.

2. Add the inverter to the network by dragging it from the AC Drives folder or other location (depending on the software).

   At this point there should be at least two items on the network, a master device, such as a scanner module, and the GPD315/V7 inverter.

3. Add the inverter to the scanner module's scan list.
    a. For RSNetWorx.
        i. Double click on the scanner icon. This will open the scanner's configuration screen.
        ii. Select the *Scanlist* tab.
        iii. Deselect the *Automap on Add* option.
        iv. From the column on the left side select the inverter and press the arrow  button to insert on the scan list column on the right.
        v. Press the *Edit I/O* button.
        vi. The *Polled option* is automatically selected. The *Tx and Rx sizes* are set to 4 bytes, and the *Poll Rate* is set to *Every Scan*. The size of Tx and Rx will depend on what assembly is chosen. Refer to the GPD315/V7 DeviceNet Technical Manual, Appendix B for a list of available assemblies.

            The default assemblies are 21 and 71 (DeviceNet Extended Speed Control, 4 bytes each).

        vii. Once the polled information is entered press *OK*.

    b. For DeviceNet Manager.
        i. Select and drag the inverter icon onto the scanner's icon.
        ii. At the *Do you really want to add device Node x[x] to scan list of Master Node y[y]* press *Yes*.
        iii. Double click on the scanner's icon. This will bring up the scanner's configuration screen. Press the *Select Scan List* button.
        iv. Select the inverter from the list and press the *Edit I/O Parameters* button.
        v. The *Polled option* is automatically selected. The *Tx and Rx sizes* are set to 4 bytes and the *Poll Rate* is set to *Every Scan*. The size of Tx and Rx will depend on what assembly is chosen. Refer to the GPD315/V7 DeviceNet Technical Manual, Appendix B for a list of available assemblies.

            The default assemblies are 21 and 71 (DeviceNet Extended Speed Control, 4 bytes each).

        vi. Once the polled information is entered press *OK*.

4. Map the inverter.
    a. For RSNetWorx.
        i. Select the *Input* tab from the scanner's configuration screen.
        ii. Select the inverter to map from the list.
        iii. Select the memory area to map the inverter.

    The memory area depends on the type of scanner module being used. For example if the scanner is the Allen-Bradley 1747-SDN there are two sections where it can be mapped: the discrete and the m file.
    Please refer to the master device technical manual for the available mapping locations.

        iv. Press the *AutoMap* button.
        v. Select the *Output* tab from the scanner's configuration screen and repeat steps ii through iv.
        vi. Press the *OK* button.

    b. For DeviceNet Manager.
        i. Select the inverter to map from the list.
        ii. Press the *Auto Map* button from the *Scan List Tools*.

iii. In the Regions of Map/Unmap area select the memory area to map the inverter.

The memory area depends on the type of scanner module being used. For example if the scanner is the Allen-Bradley 1747-SDN there are two sections where it can be mapped: the discrete and the m file.
Please refer to the master device technical manual for the available mapping locations.

iv. Press the Map button. This will map both the input and the output.

5. Download configuration to scanner.

If the scanner module is from Allen-Bradley, then the processor must be set to program mode, by means of the key, prior to downloading. If the scanner or master device is from a different manufacturer refer to the technical manual for specific configuration requirements.

a. For RSNetWorx.
   i. If the RSNetWorx was online during the configuration period, then at the moment the OK button was pressed after mapping the inverter the information was downloaded.
   ii. If the configuration was done offline, press the online speed button. Note: make sure RSLinx has been configured, connected to the network, and running in the background.
   iii. Right click on the scanner's icon and select *Download to Device*.

b. For DeviceNet Manager.
   i. If DeviceNet Manager was online during the configuration then press the *SDN* button located on the *Save to* area of the window.
   ii. If the configuration was done offline, press the online button.
   iii. Select the appropriate driver to communicate with the network and configure its settings.
   iv. Double click on the scanner's icon.
   v. Press the *Edit Scan List* button.
   vi. Press the *SDN* button located on the *Save to* area of the window.

Refer to RSNetWorx and/or DeviceNet Manager manuals for additional information on configuration.

Appendix C
Command Priority

- How to Use Command Priority
- Table B-1. Set up for DeviceNet Control
- Table B-2. Set up for External Terminal Control
- Table B-3. Set up for Digital Operator Control

Command Priority

The Command Priority section will outline the behavior of the standard GPD315/V7 controls when using DeviceNet communications. Two parameters affect the behavior of the GPD315/V7 when communicating via DeviceNet, parameter n003 Operation Method Selection and parameter n004 Frequency Reference Selection. These parameters were discussed in detail in Section 3. Some commands to the GPD315/V7 may be accessed by a source other than the one set up by parameter n003. These other sources can be external terminals or the LED operator keypad. The behavior of these sources when during DeviceNet communication is illustrated in the tables 1, 2, and 3 on the following pages.

How to use the Command Priority Tables:

1. Determine the source of control you wish to use for your GPD315/V7 inverter.
2. Set parameter n003 for the desired control you have chosen. (See the table below for parameter settings.)
3. Select the appropriate Command Priority Table on the following pages based upon what type of operation your inverter is set up for.

Operation Method Selection			
n003	Run/Stop from:	Use Table:	On page #:
3	Option PCB (DeviceNet)	1	48
2	Serial Communication	n/a	-
1	External Terminals	2	49
0	Digital Operator	3	50

Table 1: Set up for DeviceNet Control

Table 1 indicates the functions or commands that can be accessed via DeviceNet, external terminals, or the digital operator when the inverter's parameter n003 Operation Method Selection is set up for option pcb (n003 = 3). The "O" indicates that the function is operable from that source and "n/a" indicates that the function is not available from that source.

Command Source	Memobus Data Code	Bit No.	Data Description	Function Availability
DEVICENET	001h	0	Forward Run/Stop	O
		1	Reverse Run/Stop	O
		2	Multi-function Input Terminal S3	(2)
		3	Multi-function Input Terminal S4	(2)
		4	Multi-function Input Terminal S5	(2)
		5	Multi-function Input Terminal S6	(2)
		6	Multi-function Input Terminal S7	(2)
		7	Unused	-
		8	External Fault	O
		9	Fault Reset	O (1)
		10-15	Unused	-
	006h	0-15	Unused	-
	007h	0-15	Unused	-
	008h	0	Multi-function Output (terminal MA, MB - MC)	O (3)
		1	Multi-function Output (terminal P1 – PC)	O (4)
		2	Multi-function Output (terminal P2 – PC)	O (5)
		3-5	Unused	-
		6	Fault Contact (terminal MA, MB - MC)	O
		7	Fault Contact Closed (effective when bit 6=1)	O
EXTERNAL TERMINALS	Forward Run (2 wire); Run Command (3 wire)			n/a
	Reverse Run (2 wire); Stop Command (3 wire)			n/a
	Multi-function Input Terminal S3			(2)
	Multi-function Input Terminal S4			(2)
	Multi-function Input Terminal S5			(2)
	Multi-function Input Terminal S6			(2)
	Multi-function Input Terminal S7			(2)
	Not Used			-
DIGITAL OPERATOR	Run Command			n/a
	Stop Command			O (7)
	Reverse Run Command			n/a
	Local / Remote			O
	Jog Command			n/a
	Fault Reset			O (1)

Notes:

1. Fault Reset is only effective when run command received is "0" while in stopped condition.
2. The availability of the multi-function input terminals vary depending upon the settings of n050, n051, n052, n053, n054, n055, n056 (the multi-function input settings). See GPD/315/V7 Technical Manual.
3. Effective when n057 is "18".
4. Effective when n058 is "18".
5. Effective when n059 is "18".
6. Effective only when in the stopped condition.
7. Effective when n007 is "0".

Table 2: Set up for External Terminals Control

Table 2 indicates the functions or commands that can be accessed via DeviceNet, external terminals, or the digital operator when the inverter's parameter n003 Operation Method Selection is set up for external terminal control (n003 = 1). The "O" indicates that the function is operable from that source, and "n/a" indicates that the function is not available from that source.

Command Source	Memobus Data Code	Bit No.	Data Description	Function Availability
DEVICENET	001h	0	Forward Run/Stop	n/a
		1	Reverse Run/Stop	n/a
		2	Multi-function Input Terminal S3	(2)
		3	Multi-function Input Terminal S4	(2)
		4	Multi-function Input Terminal S5	(2)
		5	Multi-function Input Terminal S6	(2)
		6	Multi-function Input Terminal S7	(2)
		7	Unused	-
		8	External Fault	O
		9	Fault Reset	O (1)
		10-15	Unused	-
	006h	0-15	Unused	-
	007h	0-15	Unused	-
	008h	0	Multi-function Output (terminal MA, MB – MC)	n/a
		1	Multi-function Output (terminal P1 – PC)	n/a
		2	Multi-function Output (terminal P2 – PC)	n/a
		3-5	Unused	-
		6	Fault Contact (terminal MA, MB – MC)	n/a
		7	Fault Contact Closed (effective when bit 6 =1)	n/a
EXTERNAL TERMINALS	Forward Run (2 wire); Run Command (3 wire)			O
	Reverse Run (2 wire); Stop Command (3 wire)			O
	Multi-function Input Terminal S3			(2)
	Multi-function Input Terminal S4			(2)
	Multi-function Input Terminal S5			(2)
	Multi-function Input Terminal S6			(2)
	Multi-function Input Terminal S7			(2)
	Not Used			-
DIGITAL OPERATOR	Run Command			n/a
	Stop Command			O (4)
	Reverse Run Command			n/a
	Local / Remote			O
	Jog Command			n/a
	Fault Reset			O (1)

Notes:

1. Fault Reset is only effective only when external terminal satisfies the following conditions:
   2 wire mode - Both forward run and reverse run commands are open in stopped condition.
   3 wire mode - Run command or stop command are open in stopped condition.
2. The availability of the multi-function input terminals vary depending upon the setting of Parameters n050, n051, n052, n053, n054, n055, n056 See GPD/315/V7 Technical Manual.
3. Effective only when in stopped condition.
4. Effective only when n007 is "0".

Table 3: Set up for Digital Operator Control

Table three indicates the functions or commands that can be accessed via DeviceNet, external terminals, or the digital operator when the inverter's parameter n003 Operation Method Selection is set up for digital operator control (n003 = 0). The "O" indicates that the function is operable from that source, and "n/a" indicates that the function is not available from that source.

Command Source	Memobus Data Code	Bit No.	Data Description	Function Availability
DEVICENET	001h	0	Forward Run/Stop	n/a
		1	Reverse Run/Stop	n/a
		2	Multi-function Input Terminal S3	(2)
		3	Multi-function Input Terminal S4	(2)
		4	Multi-function Input Terminal S5	(2)
		5	Multi-function Input Terminal S6	(2)
		6	Multi-function Input Terminal S7	(2)
		7	Unused	-
		8	External Fault	O
		9	Fault Reset	O (1)
		10-15	Unused	-
	006h	0-15	Unused	n/a
	007h	0-15	Unused	n/a
	008h	0	Multi-function Output (terminal MA, MB – MC)	n/a
		1	Multi-function Output (terminal P1 – PC)	n/a
		2	Multi-function Output (terminal P2 – PC)	n/a
		3-5	Unused	-
		6	Fault Contact (terminal MA, MB – MC)	n/a
		7	Fault Contact Closed (effective when bit 6 =1)	n/a
EXTERNAL TERMINALS	Forward Run (2 wire); Run Command (3 wire)			n/a
	Reverse Run (2 wire); Stop Command (3 wire)			n/a
	Multi-function Input Terminal S3			(2)
	Multi-function Input Terminal S4			(2)
	Multi-function Input Terminal S5			(2)
	Multi-function Input Terminal S6			(2)
	Multi-function Input Terminal S7			(2)
	Unused			-
DIGITAL OPERATOR	Run Command			O
	Stop Command			O
	Reverse Run Command			O
	Local / Remote			n/a
	Jog Command			O (3)
	Fault Reset			O (1)

Notes:

1. Fault Reset is only effective only when in stopped condition.
2. The availability of the multi-function input terminals vary depending upon the settings of n050, n051, n052, n053, n054, n055, n056 (the multi-function input settings). See GPD315/V7 Technical Manual.
3. The jog command is only effective when in the stop condition.

Appendix D
Product Specifications

GPD315/V7 DeviceNet Interface Unit	
Ambient Temperature	-10 to +45^{O}C (14 to 113^{O}F)
Storage Temperature	-20 to +60^{O}C (-4 to 140^{O}F)
Relative Humidity	Not to exceed 90% RH (non-condensing)
Altitude	Not to exceed 1000m (3280ft)
Vibration	1G (9.8m/s^{2}) at 10 to 20Hz. 0.2G (2m/s^{2}) at 20 to 50Hz.
Input Power	Voltage: 11 to 25VDC Current: 40mAmps
DeviceNet Specification	Conformance level 14: Passed
DeviceNet Profile	AC Drive Conforming
Connector Type	5-pin open-style screw connector
Physical Layer Type	Isolated Physical Layer CAN transceiver + photocoupler
Mac ID Setting	5 dip-switches: Mac ID 0 to 63
Baud Rate	2 dip-switches: 125/250/500 kbaud
Supported Message	Group 2 only server Explicit and Polled I/O messaging
I/O Assembly Instance	Input: 4 types (4-8 bytes) Output: 4 types (4-8 bytes)

Appendix E
DeviceNet Troubleshooting

- Installation of DeviceNet Interface Unit
- Wiring and Cabling
- DeviceNet Configuration and GPD315/V7 Diagnosis
- DeviceNet System Checks
- DeviceNet Troubleshooting Check-off Sheet

DeviceNet Troubleshooting

The following is a short guide to troubleshooting a Yaskawa GPD315/V7 DeviceNet installation. It highlights some of the most common issues when diagnosing and correcting issues associated with the startup and operation of a Yaskawa GPD315/V7 in a DeviceNet industrial network. Further information on the features of each interface can be found in the GPD315/V7 DeviceNet Technical Manual. While most of this information is centered on the application of GPD315/V7, most of the guidelines presented are applicable in most DeviceNet Networks.

Diagnosis of network fault issues will typically fall into three categories, Installation of the DeviceNet option card, Wiring and Cabling issues, and Network Configuration / Diagnostics. Each of these areas will be discussed in the following document to help resolve common problems associated in DeviceNet network troubleshooting.

Installation of DeviceNet Interface Unit:

1. Before installing any communications option kit, **verify that the Yaskawa inverter works correctly without the communications interface unit**. Follow Yaskawa Inverter's Quick start and Technical Manual procedures to validate that the inverter's operation and installation is correct before introducing any further issues. This will also help determine if the problem is associated with the network controls system or the inverter applications.

2. **Determine that the DeviceNet Interface Unit is installed properly into the GPD315/V7**. Be sure that the CN1 and CN2 are connected securely to the interface unit. The interface unit should mount flush on top of the GPD315/V7 without any gaps or much shifting.

3. **Verify and write down the Code Number of the DeviceNet Interface Unit**. The Code Number can be found on the nameplate on the side of the interface unit and specifies the version of the interface unit. The Code Number along with the GPD315/V7 Model Number or capacity is necessary to select the proper EDS file. It will also be useful to have for further technical support.

4. **Verify that the Inverter Run/Stop Operation Method Selection parameter is set per the application requirements**. For Example: If the GPD315/V7 will be receiving the Run/Stop command from the DeviceNet network, the parameter n003 in the GPD315/V7 must be set to '3 – Option Card'. See GPD315/V7 technical manual for further explanation of this parameter.

5. **Verify that the Inverter Frequency Reference Selection parameter is set per the application requirements**. For Example: If the GPD315/V7 will be receiving the Frequency Reference from the DeviceNet network, the parameter n004 in the GPD315/V7 must be set to '9 – Option Card'. See GPD315/V7 technical manual for further explanation of this parameter.

GPD315/V7 Programming required for DeviceNet Control

Parameter	Value	Description
n003	3	Sets the Run/Stop to come from the Option Card.
n004	9	Sets the frequency reference to come from the Option Card.

6. **Verify that the DIP Switch Position DR1 and DR0 is set correctly on the DeviceNet Option Board**. The first two switches DR1 and DR0 set the Baud Rate to either (125 Kbps, 250 Kbps, or 500 Kbps). The Baud Rate on a DeviceNet network is global; therefore, the setting should match the Baud Rates on all of the devices on the network.

DeviceNet Baud Rate (KBaud)	DIP Switch	
	DR 1	DR 0
125	Off	Off
250	Off	On
500	On	Off
Setting Prohibited	On	On

* If DR1 and DR0 are ON and set to Setting Prohibited, both MS and NS LED's light up solid red.

7. **Verify that the Network Address set for the GPD315/V7 by ADR0 - ADR5, switches 3-8.** Each address for EACH DEVICE ADDRESS MUST BE UNIQUE on the network segment. (Valid addresses are 0 to 63). Typically, address '0' is reserved for the DeviceNet master node and address '62' or '63' is left open for a configuration tool connection. Check that all devices are addressed and each node has a different address versus all other devices on the network. The following table summarizes the DIP Switch settings for the GPD315/V7 DeviceNet Interface Unit.

DIP Switch	Switch Function for GPD315/V7
DR1 (1)	Baud Rate, Bit 1
DR0 (2)	Baud Rate, Bit 0
ADR5 (3)	Node Number, Bit 5, MSB
ADR4 (4)	Node Number, Bit 4
ADR3 (5)	Node Number, Bit 3
ADR2 (6)	Node Number, Bit 2
ADR1 (7)	Node Number, Bit 1
ADR0 (8)	Node Number, Bit 0, LSB

Wiring and Cabling:
Several of all serial communications troubleshooting issues can be traced to cabling, grounding, or power supply issues. DeviceNet utilizes a linear differential bus topology, and specifies the cable to be used, the cable length requirements, and termination requirements. The following describes the items that should be checked in the network installation to verify correct cabling and grounding.

1. **Verify that the correct type of compliant cable is being utilized in the installation**. There are typically two types of cable used for DeviceNet Networks, Thick and Thin.

   Thick Cable Specification:
   This cable consists of two shielded pairs twisted on a common axis with a drain wire in the center covered with an overall braid shield and is commonly used as trunk line when length is important.

   The thick cable specified for DeviceNet network connections consists of:
   - One twisted signal pair (#18): blue/white
   - One twisted power pair (#15): black/red
   - Separate aluminized mylar shields around power pair and signal pair
   - Overall foil/braid shield with drain wire (#18): bare

   Further specifications dictate the the Data pair has a 120 ohm impedance, with 12pf capacitance between conductors, (24pf between one conductor and the other connected to shield) and a maximum of 6.9 ohms/1000 ft. max. DC resistance.

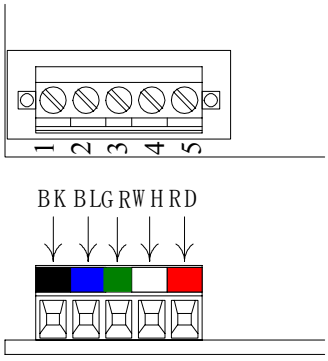
   Thin Cable Specification:
   Thin Cable is smaller and more flexible than Thick Cable. It is commonly used for drop lines, but can also be used, for shorter distances, as trunk line.

   The thin cable specified for DeviceNet network connections consists of:
   - One twisted signal pair (#24): blue/white
   - One twisted power pair (#22): black/red
   - Separate aluminized mylar shields around power pair and signal pair
   - Overall foil/braid shield with drain wire (#22): bare

   Further specifications dictate that the Data pair has a 120 ohm impedance, with 12pf capacitance between conductors, (24pf between one conductor and the other connected to shield) and a maximum of 28 ohms/1000 ft. max. DC resistance.

2. **Verify cable connections at EACH node connecting to the DeviceNet Bus.** Check for shorts, broken wires, loose connections, and that the signal, power, and shield wires are connected into the correct pin outs on the interface unit terminal block with the corresponding color code specified. See

Pin	Terminal Color	Definition	Wire Color
1	Black	V-, Common	Black
2	Blue	CL, CAN Data Signal Low	Blue
3	Green	SH, Shield/Drain Connection	Bare
4	White	CH, CAN Data Signal High	White
5	Red	V+, +24 VDC	Red

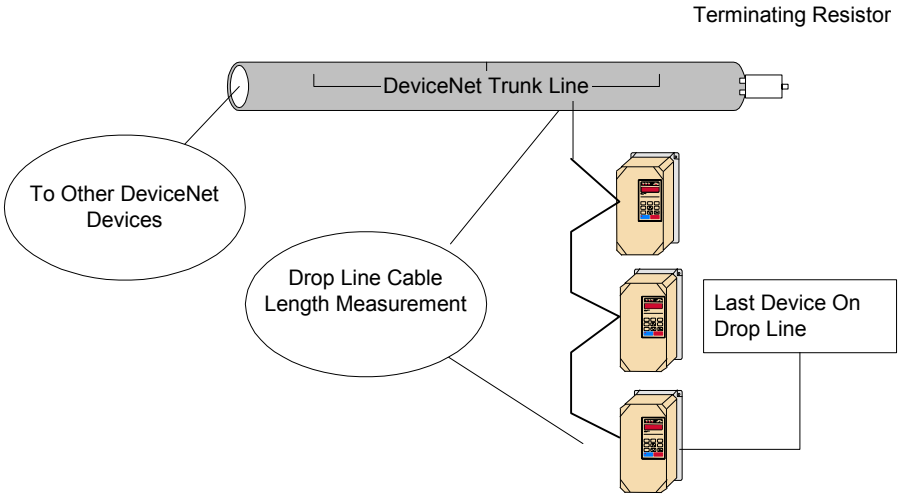


Verify that the DeviceNet cable lengths are within the specified requirements. Both baud rate and cable type used affect the total amount of allowable network length. The total amount of measured linear cable allowed between any two points on the network must be within the following tables specification:

Baud Rate	Maximum Cable Distance for 100% Thick Cable	Maximum Cable Distance for 100% Thin Cable
125 Kbaud	500 meters (1640 feet)	
250 Kbaud	250 meters (820 feet)	100 meters (328 feet)
500 Kbaud	100 meters (328 feet)	

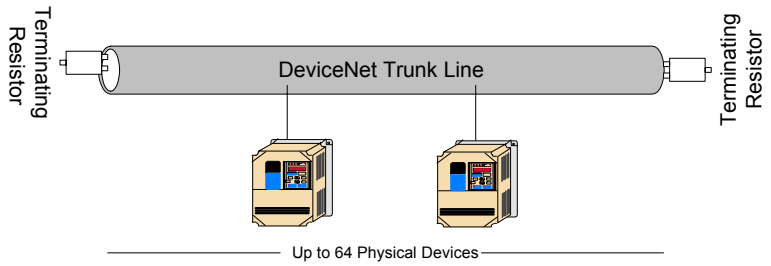
In addition, **verify that the node drop lengths are within the specified drop length requirements of the DeviceNet specification.** The total amount of measured linear cable allowed between the point of the drop connection (from the main trunk line cable) to the end of the last node connection on the drop line, along with the cumulative total or sum of all drop cable length(s) must not exceed the maximum specified. The following table and diagram specifies these requirements:

Baud Rate	Drop Length	
	Maximum Between Nodes	Cumulative
125 Kbaud		156 meters (512 feet)
250 Kbaud	6 meters (20 ft)	78 meters (256 feet)
500 Kbaud		39 meters (128 feet)



3. **There should be no more than 64 total nodes on the network segment, which means only 64 physical addresses can be assigned on one DeviceNet network.** Verify that there are no more than 64 physical nodes on the network segment, which includes all Master/PLC connections, Slave devices, and Configuration nodes for all trunk line and drop line connections. If there are more than 64 devices, divide the network into two separate segments. Additional PLC scanner or DeviceNet Master interface may be needed for the second network segment.

4. **Verify that the DeviceNet network is terminated correctly.** A DeviceNet network is based on a linear bus topology and requires **two** termination resistors of 120 ohms, ¼ watt (Note: 121 ohm resistors will also work as specified in the GPD315/V7 DeviceNet Technical Manuals) at each of the furthest ends of the Trunk Line cabling. The reason for this is for matching the impedance of the cabling such that transmission signal distortion is kept to a minimum along all sections of the network bus. Please see the diagram below to illustrate.



5. **Verify with a voltmeter that the 24 volt power supply voltage measurement at each GPD315/V7 nodes on DeviceNet is greater than 11 VDC. Also verify that the voltage drop between each node and its power supply is less than 5 VDC.** If the voltage is less than 11 Vdc, the reason could be an undersized power supply or a broken or loose connection in either the DC common bus or +24 VDC bus cabling. Correct by fixing connections or resizing the power supply as required for the total cumulative load of all the devices on the DeviceNet network.

6. **Verify that the common DC voltage drop between any two points on the DeviceNet network cabling measures less than 5 VDC**. The DeviceNet requires that the common mode voltage is less than 5 volts and can be caused by drawing too much current for too long of a distance. To correct this either centralize the power supply in the center of the network or place a large equalization conductor to bring the voltage potentials across the network back to a central point. Typically, this is at the power supply, which is single point grounded. Note, placement of the network power supply can affect common mode voltage requirements; therefore, please take this into account when locating the power supply equipment in the system.

7. **Verify that the shield is continuous throughout the entire DeviceNet networking cabling installation**. This means that the shields on each of the cable segments, between nodes, from one extreme end of the network to the other extreme end of the network shall be connected to form a single conduction path throughout the span of the network cabling. The shield should then be single point grounded at the power supply ground connection.

8. **Verify that a Single Point ground is used in the network system power supply equipment, and the ground conductor coming from the power service entrance is of adequate size.** The grounding system approach utilized in network systems is of primary importance to provide not only system safety ground considerations, but also a path for unwanted noise to be flushed from the system. A single point common voltage potential (i.e. Ground) is to be seen across the span of the networked system. Therefore the power supply for the DeviceNet network should be grounded at a single point to minimize the problems associated with ground loops, etc.

9. **Verify that the DeviceNet cabling clearances are followed throughout the network cabling installation.** DeviceNet cabling should not be routed parallel or close to high power or high frequency cables, and should adhere to Category 2 distances from high voltage cables. Typically a rule is 4” – 10” minimum clearance is required, depending on the level of voltage or signals in the cables. Also, network cables should be routed across any high power or high frequency cables at 90 degree angles.

Cabling related issues seem to be more of the common incidents associated with malfunctioning DeviceNet networks. When wiring the network please follow the guidelines set by the Open DeviceNet Vendor Association (ODVA) because deviation from these rules typically causes more problems than benefits. Please see www.odva.org for more details.

DeviceNet Configuration and GPD315/V7 Diagnostics:

In order for a GPD315/V7 to operate in a DeviceNet networked system, the inverter requires some configuration after all of the above issues have been addressed. Typically, configuration of devices is performed with a DeviceNet configuration tool such as Allen Bradleys' "RS Networx for DeviceNet" (previously "DeviceNet Manager") or Cutler Hammers "NetView" product for example. These tools along with others allow the user to configure each device on the DeviceNet network. The GPD315/V7 AC inverter requires a master DeviceNet scanner to facilitate the distribution and retrieval of control information to and from all of the devices on a DeviceNet network. Therefore, the control information types and sizes must be known in the networked device and the network scanner/controller, to transfer the information and verify that the network is operating correctly by receiving and producing the correct type and amount of control information for each networked device. Also, the GPD315/V7 and all other DeviceNet devices must conform to a set of LED diagnostic standards. These issues will be discussed in the following points, which should help with troubleshooting various device configuration and operational issues.

1. **Verify that the Polled Producing Assembly and the Polled Consuming Assembly is set in the GPD315/V7 DeviceNet Option Card**: The PPA (Polled Producing Assembly) and the PCA (Polled Consuming Assembly) determine the data format and size of how the inverter status information and inverter control information is transmitted to / and from the DeviceNet master (i.e. controller or PLC). Please write down what each of these values are set to PPA = _____ and PCA = _____ for each Yaskawa DeviceNet inverter on the network. PCA is also referred to as Input Data Assembly and PPA as Output Data Assembly. For Example: This can be determined by utilizing a configuration tool (as mentioned above) and checking either EDS for PCA "Polled Consuming Assembly" and PPA "Polled Producing Assembly" in the GPD315/V7 or reading DeviceNet explicit message path, PPA – (Class = 101, Instance = 1, Attribute = 1) and PCA – (Class = 101, Instance = 1, Attribute = 2).

   Note: Each of the parameters, PPA and PCA must be set to one of the following values. The following is a list and summary of valid values for these two DeviceNet parameters.
   Be sure to cycle power to the inverter to save changes to PPA and PCA.

Polled Consuming Assemblies (PCA) Refer to Section 3.3.1 – 3.3.8 for details.

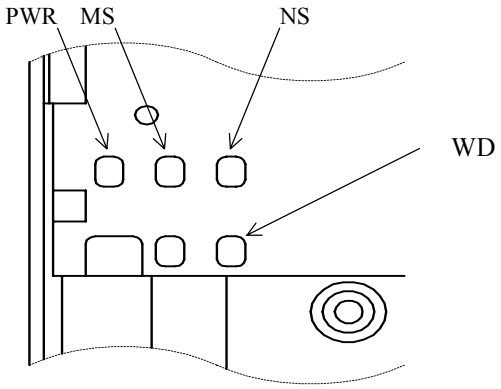
Assembly Number	Assembly Definition	# of Data Bytes
20	Basic Speed Control Input This assembly provides run forward, fault reset, and speed reference.	4
21 (default)	Extended Speed Control Input This assembly provides run forward, run reverse, fault reset, network control enable, network reference enable, and speed reference.	4
100	GPD315/V7 Memobus Message (Vendor-Specific Yaskawa Assembly) This I/O instance allows all inverter parameters and monitors to be read/set by accessing the Memobus area.	5
101	GPD315/V7 Standard Inverter Control (Vendor-Specific Yaskawa Assembly) This assembly provides access to Multi-function input terminals S3 to S7, Multi-function output contact MA, Multi-function photocoupler output P1 and P2, and speed reference.	8

Polled Producing Assemblies (PPA) Refer to Section 3.3.1 – 3.3.8 for details.

Assembly Number	Assembly Definition	# of Data Bytes
70	Basic Speed Control This assembly provides inverter fault, running forward, and actual speed.	4
71 (default)	Extended Speed Control This assembly provides inverter fault, inverter alarm, running forward, running reverse, inverter ready, network control enabled, network reference enabled, at reference, inverter state, and actual speed.	4
150	GPD315/V7 Memobus I/O Control (Vendor-Specific Yaskawa Assembly) This I/O instance allows all inverter parameters and monitors to be read/set by accessing the Memobus area.	5
151	GPD315/V7 Standard Drive Control (Vendor-Specific Yaskawa Assembly) This assembly provides access to status of the inverter including during run, during zero speed, during reverse, during reset, speed agree, inverter ready, fault, alarm, terminals MA, P1, P2, actual speed, and output current.	8

2. **Verify that the DeviceNet Master (Controller or PLC) scan list is configured to receive and transfer the correct amount of polled data to each node on the DeviceNet network:** There are several master devices on the market today. Some support the configuration tools mentioned above and some have their own configuration tools. Please refer to the manufacturer's documentation for determining how to verify and program the scan list settings in the master, for PPA and PCA sizes, for each device on the DeviceNet network. Note, the data information size that is expected, from the master to the device must match in size, and the data information that is expected, from the device to the master must match in size.

3. Verify that the DeviceNet option card on the GPD315/V7 is operating correctly by reporting the state of the LED's on the Option Kit. During normal operation when the GPD inverter is correctly transferring control data, to and from a DeviceNet master (controller or PLC), the NS, MS, and PWR LED's will be ON solid green, and WD LED will be flashing green. This is a quick check to verify the operation of the network, note all DeviceNet devices conform to this standard. See the following table for additional states the LED's may be indicating. Refer to the following tables for the status of the LED's.



Indication LEDs as seen through DeviceNet Interface Unit Assembly

DeviceNet Communication LED Faults and Operation

LED Display				Content	Cause	Solution
PWR	MS	NS	WD			
Not Lit	Not Lit	Not Lit	Not Lit	Power OFF	The inverter is not powered	Check the inverter main circuit wiring, and then turn ON the power.
					The communication option card is not correctly connected, thus, the power does not supply to the option unit.	Turn Off the inverter power, check the connection of the option unit and the inverter, and re-power the inverter.
Solid Green	Not Lit	Not Lit	Solid Red	CPU Fault	The option unit CPU is being initialized or has a fault.	Re-cycle inverter power. If the fault persists, change the option unit.
Solid Green	Flash Green	Not Lit	Flash Green	During Option Unit Preparation	Initial setting status or the communication is being initialized.	Re-Cycle inverter power. If the fault persists, change the option unit.
Solid Green	Flash Red	Not Lit	Flash Green	Option Unit Possible Fault	A wrong setting of a switch or a recovery fault is occurring.	Check baud rate setting (DIP switch, DR1 and DR0), and then re-cycle the power. If the fault persists, change the option unit.
Solid Green	Solid Red	Not Lit	Flash Green	Option Unit Unrecoverable Fault	An Un-recoverable fault is occurring to the option unit.	Recycle inverter power. If the fault persists, change the option unit.
Solid Green	Solid Red	Solid Red	Flash Green	Baud Rate Setting Fault	Baud rate settings (DIP switch, DR1 and DR0) are both ON.	Set the baud rate switches correctly, and re-cycle the inverter power.
Solid Green	Solid Green	Flash Red	Flash Green	Communication Timeout	A master communication timeout occurred.	Check if the end termination resistor is correctly connected to the communication bus. Check if the communication device is correctly connected per wiring diagrams. Check if the communication bus wiring is separated from the main circuit wiring.
Solid Green	Solid Green	Solid Red	Flash Green	Communication Error	Communication Unrecoverable fault occurred.	Check if other device's MACID is not unique per the network. Check if the master is correctly configured. Check if the end termination resistor is correctly connected to the communication bus. Check if the communication device is correctly connected per wiring diagrams. Check if the communication bus wiring is separated from the main circuit wiring.
Solid Green	Solid Green	Flash Green	Flash Green	Normal (Communication data: No)	Although the fault does not occur, it is connected to the master controller	Send explicit message or I/O message from the master as necessary.
Solid Green	Solid Green	Solid Green	Flash Green	Normal (Communication data: Yes)	Inverter is communicating normally.	

DeviceNet System Checks:
Other issues may also come into play with respect to operation of the network. If all of the above is completed and there are still issues with the DeviceNet installation some other items to check are:

a.) Verify that the total network utilized bandwidth is less than 100%. Typically a DeviceNet analyzer is required to check this.
b.) Sometimes the EPR (Expected Packet Rate) setting in the Master/Scanner requires an increase.
c.) On a Polled network, the ISD (InterScan Delay) may need adjustment in the Master/Scanner.
d.) Verify that the devices on the DeviceNet network have been properly conformance tested, by checking for the DeviceNet Conformance Tested Logo.

In Summary:
The above should have given a good starting point on troubleshooting DeviceNet networks and GPD315/V7 installations, however sometimes the need for escalation of a problem arises. Please contact Yaskawa Technical Support for further questions or issues regarding the Yaskawa DeviceNet installation.

When Calling Technical Support:
Using the following DeviceNet Troubleshooting Check-off Sheet, please have available the inverter model number, software number, and record any fault information displayed on the GPD315/V7 digital operator, when calling for additional technical support. This will help to provide the base required information that may be asked if engineering escalation is required to resolve the issue.

Additional Technical Information is available at: www.drives.com

Yaskawa Technical Support Phone: 1-800-541-0939

DeviceNet Troubleshooting Check-off Sheet

INVERTER Checklist:

- ❑ Inverter Model Number: _____
- ❑ The inverter works correctly without the DeviceNet Kit installed.
- ❑ DeviceNet Interface Unit is correctly installed on the inverter. *Refer note 3 in drive option unit installation for correct installation instructions.*
- ❑ The DeviceNet Interface Unit Code Number: _____
- ❑ The DeviceNet baud rate settings are correct.
  - o DR1 On Off
  - o DR0 On Off
- ❑ The DeviceNet Node Address is set to:_____.
  - o ADR0 On Off
  - o ADR1 On Off
  - o ADR2 On Off
  - o ADR3 On Off
  - o ADR4 On Off
  - o ADR5 On Off
- ❑ The Option Card, Network Frequency Reference and RUN/STOP method are set.
  - o Run/Stop n003= _____
  - o Frequency Reference n004= _____

CABLING Checklist:

- ❑ The correct type of cabling is used throughout the DeviceNet network installation.
- ❑ The Cable Connections at EACH NODE have been verified for solid connections.
- ❑ The Cable Lengths are within DeviceNet specification requirements.
- ❑ The DeviceNet Cabling node drop lengths are within the specification requirements.
- ❑ There are NO MORE than 64 nodes connected on the DeviceNet network.
- ❑ There are ONLY two termination resistors (which are 120 ohms) installed at each of the furthest ends of the DeviceNet Cabling installation.
- ❑ There is 24 volts measured at each node of the DeviceNet installation across Pins 1 and 5 of the DeviceNet connector.
- ❑ The DC common voltage drop measures less than 5 volts between any two points on the DeviceNet network cabling.
- ❑ The shield is continuous throughout the DeviceNet cabling installation and is connected at the Power Supply at one single point.
- ❑ The DeviceNet recommended clearances and routing procedures are followed in the cable paths throughout the network cabling installation.
- ❑ The 24 volt power supply is grounded at only one point in the installation.

CONFIGURATION and DIAGNOSTICS Checklist:

- ❑ The Polled producing Assembly and Polled Consuming Assembly have been set in the Inverter.
  - o Polled Producing Assembly: PPA = _____.
  - o Polled Consuming Assembly: PCA = _____.
- ❑ The DeviceNet master (PLC or Controller) is configured to receive and transmit the corresponding number of bytes of information dependant on the assemblies programmed.
- ❑ The DeviceNet Option Card is indicating the correct LED status. The NS, MS, and PWR LED's will be ON solid green, and WD LED will be flashing green when operating with the PLC or Controller.
- ❑ All of the DeviceNet nodes on the network have the DeviceNet Conformance Tested check mark.

GPD315/V7 DeviceNet ™

Yaskawa Technical Support *is available to provide telephone assistance for installation, programming and troubleshooting of Yaskawa Drives. All support is available during normal business hours.* ***Emergency breakdown support is available on a 24 hour /7 day basis.***

Help us help you. When you call, please have the following information available:

- *Have this manual at hand. The support associate will refer to it.*
- *Drive model and all nameplate data*
- *Motor type, brand, and nameplate data*

In USA, please phone 1-800-541-0939 for technical support.

Additional information is available at www.drives.com

Yaskawa Electric America
16555 W. Ryerson Rd
New Berlin, WI 53151
(800) 541-0939, Fax (262) 782-3418
www.drives.com www.yaskawa.com

TM 4320 © 2001 Yaskawa 11/1/01