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Technical support

For additional information, programming examples and other data that may be available for your specific network configuration, check the Adaptive® Web site: <http://www.adaptivedisplays.com>.

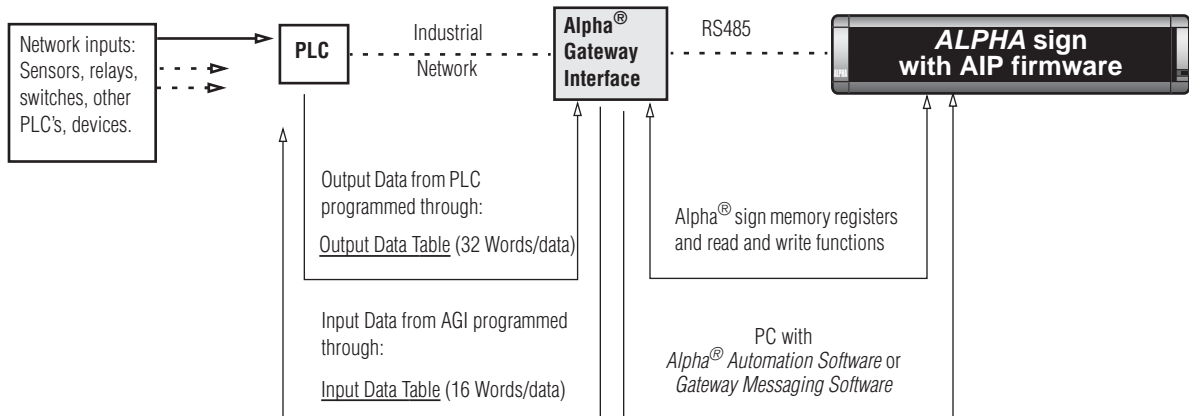
Introduction

The Alpha® Gateway Interface (the “AGI”) allows for the exchange of data between a Profibus-DP PLC and Alpha® signs to display messages and real-time data on a system.

This document outlines preliminary connection requirements for setting up an AGI between a Profibus-DP industrial network and an Alpha® sign network.

Below is a high-level diagram of how the AGI works.

NOTE: In the event of a communication failure between any two points of the information pathway in the diagram, messages may fail to display on a sign.



INFORMATION FLOW—In a Profibus-DP network, a “device” is any point in the information pathway capable of sending or receiving a data signal. In the most basic network configuration, above (one input, one PLC, one Alpha® Gateway Interface, one sign), the PLC, Alpha® Gateway Interface, and sign are all capable of both sending and receiving data signals.

Basic setup procedure

Follow these basic steps to set up the AGI in an Alpha[®] sign and Profibus-DP industrial network.

1. Create sign messages using a computer with the Alpha[®] Automation Software or Gateway Messaging Software. (Refer to the software's online Help.)
2. Connect the computer, Alpha[®] sign(s), and, if needed, the Alpha[®] Gateway Interface, using one of the "Interconnection diagram" on page 6.
3. Download the sign messages to one or all of the signs on the network using the messaging software.
4. Determine the node addresses for the AGI. (See "ADDRESS" in the "Network Interface Module operation" section on page 4.)
5. Program the PLC for the AGI Input and Output data tables required. See page 12.
6. Program the PLC to trigger messages and update variables. (Refer to Tech Memo 00-0006, "Configuration Data for Alpha[®] Gateway Networks" for additional information on Gateway parameters and programming a PLC to control message display on the Alpha[®] network.)

Related documents

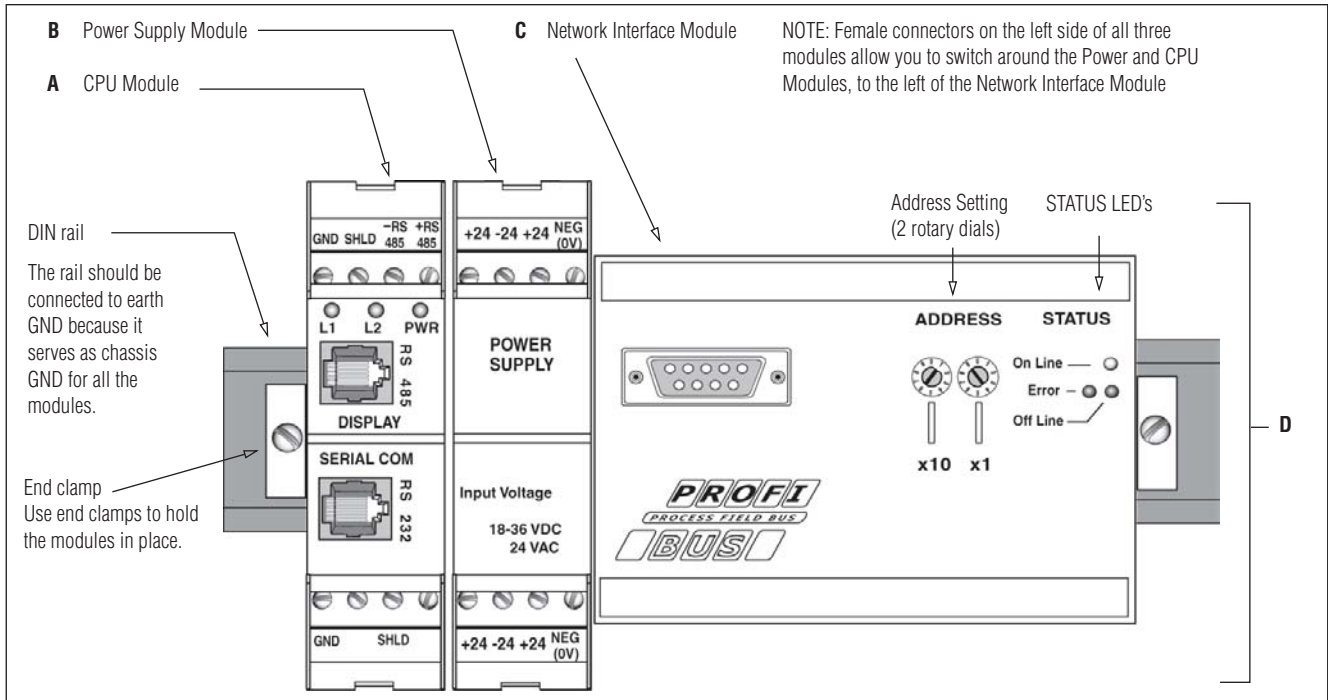
Most of this document is available in PDF format on the Adaptive[®] Web site:
<http://www.adaptivedisplays.com>.

Document name	Part number	Description
Alpha [®] Automation Software online Help system	—	Describes how to use the Alpha [®] Automation Software to compose and display messages on Alpha [®] signs.
Configuration Data for Alpha [®] Gateway Networks	Tech Memo 00-0006	Operating summary, programming reference
Network Configurations	9708-8046	How to network Alpha [®] signs. NOTE: Specific information on routing long distance RS485 connections in <i>Appendix G</i> of this manual.
Alpha [®] Sign Industrial Protocol	9711-8814	Describes how the Modbus protocol is incorporated into the Alpha [®] Industrial Protocol firmware. This firmware allows signs to connect to a Modbus communications network.

Alpha[®] Gateway Interface

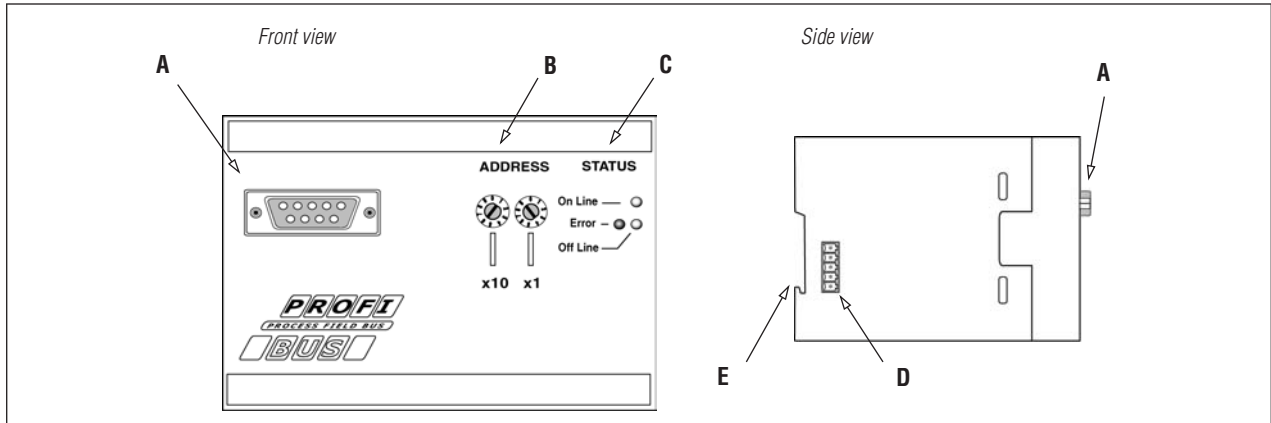
The Alpha[®] Gateway Interface is a 3-module unit: The Network Interface Module is the interface between the PLC and Alpha[®] network. The Power Supply Module supplies power for both the CPU Module and Network Interface Module. The CPU Module is the interface between the Network Interface Module and Alpha[®] signs. For more information on individual modules, see "Technical specifications" on page 19.

- *Assembly*—CPU/Power Supply Module/Network Interface Module *or* Power Supply Module/CPU/Network Interface Module.
- *Address*—Rotary dials on the Network Interface Module set specific node address.
- *Status indicators*—Online/Offline/Error LEDs provide status and diagnostic information.



Item	Part Number	Name	Description
A	E9920-1116	CPU Module	Serial RS232 input to hardwired or standard RJ11 jack RS485 output
B	E9920-1113	Power Supply Module	Accepts 24 VAC or 18 to 36 VDC power input
C	E9920-1115 — Must specify network	Network Interface Module	Connects Alpha [®] sign network to PC and provides the connection between the Profibus-DP PLC and Alpha [®] sign network. NOTE: All Network Interface Modules have the same Adaptive [®] part number. Specify your network when ordering.
D	1188-9203	Complete assembly	All three component modules for Profibus-DP network. See "Technical specifications" on page 19 for full description.

Network Interface Module






Item	Name	Description
A	DB9 connection (female)	Connecting point to the PLC network. (Female socket mates to cable end pins.)
B	ADDRESS	Sets unit address in range between 1 and 99.
C	STATUS	Online, offline and error indicators provide system status information. See LED status table, page 5
D	Intermodule Connector	Used to pass power and signals between modules.
E	DIN rail latch	Used to attach the module to a DIN EN 50 Ø22 mounting rail.

Network Interface Module operation

Item	Name	Description																																	
A	DB9 connection	<p>Profibus-DP DB9 serial interface configuration, per EN 50 170 (since 1996)/DIN19245 (since 1989). Cabling must conform to these standard. NOTE: If alternative connectors are used termination requirements may need to be met.</p> <table border="1"> <thead> <tr> <th>Pin</th> <th>Name</th> <th>Function</th> </tr> </thead> <tbody> <tr> <td>Housing</td> <td>Shield</td> <td>Connected to PE</td> </tr> <tr> <td>Pin 1</td> <td>No connection</td> <td></td> </tr> <tr> <td>Pin 2</td> <td>No connection</td> <td></td> </tr> <tr> <td>Pin 3</td> <td>B-Line</td> <td>+ RxD/TxD, RS485</td> </tr> <tr> <td>Pin 4</td> <td>RTS</td> <td>Request to Send</td> </tr> <tr> <td>Pin 5</td> <td>GND BUS</td> <td>Isolated GND/RS485</td> </tr> <tr> <td>Pin 6</td> <td>+ 5V BUS</td> <td>Isolated + 5V/RS485</td> </tr> <tr> <td>Pin 7</td> <td>No connection</td> <td></td> </tr> <tr> <td>Pin 8</td> <td>A-Line</td> <td>- RxD/TxD/RS485</td> </tr> <tr> <td>Pin 9</td> <td>No connection</td> <td></td> </tr> </tbody> </table>	Pin	Name	Function	Housing	Shield	Connected to PE	Pin 1	No connection		Pin 2	No connection		Pin 3	B-Line	+ RxD/TxD, RS485	Pin 4	RTS	Request to Send	Pin 5	GND BUS	Isolated GND/RS485	Pin 6	+ 5V BUS	Isolated + 5V/RS485	Pin 7	No connection		Pin 8	A-Line	- RxD/TxD/RS485	Pin 9	No connection	
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Pin 7	No connection																																		
Pin 8	A-Line	- RxD/TxD/RS485																																	
Pin 9	No connection																																		
B	ADDRESS	<p>Set the flat part of the dial screw on the number corresponding to the address you wish to select. For example, the example below shows an address set to the number "14". Permitted range:1 to 99. New address settings become valid only after power is cycled once (turned off and then on, again).</p> <p>WARNING: Do NOT change an address while the unit is powered ON. An internal error could occur, causing the Alpha® Gateway Interface to be disconnected from the network.</p>																																	

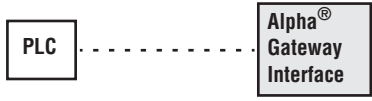
Network Interface Module operation

Item	STATUS (Front LEDs)	LED Color	LED Activity	Meaning
c STATUS On Line —  Error —  Off Line — 	On-Line Status	Green	Steady ON	IF LED is on, module is On-Line on the fieldbus and data exchange is possible. If LED is off, the module is not On-line.
	Error Status	Red	Flashing Red, 1 pulse per second: Flashing Red, 2 pulses per second: Flashing Red, 4 pulses per second:	Configuration Error—IN and/or OUT length set during initialization of the module is not equal to the length set during configuration of the network. Error in User Parameter data set during initialization of the module is not equal to the length/contents set during configuration of the network. Error in initialization of the Profibus communication ASIC.
	OFF-Line Status	Red	Steady ON	Module is Off-Line on the fieldbus. Data exchange not possible.

If the red "Error" LED is turned off, diagnostic functions are not required or unavailable. If the red "Off-Line" LED is turned off, the module is not off-line.

Data transmission baud rate

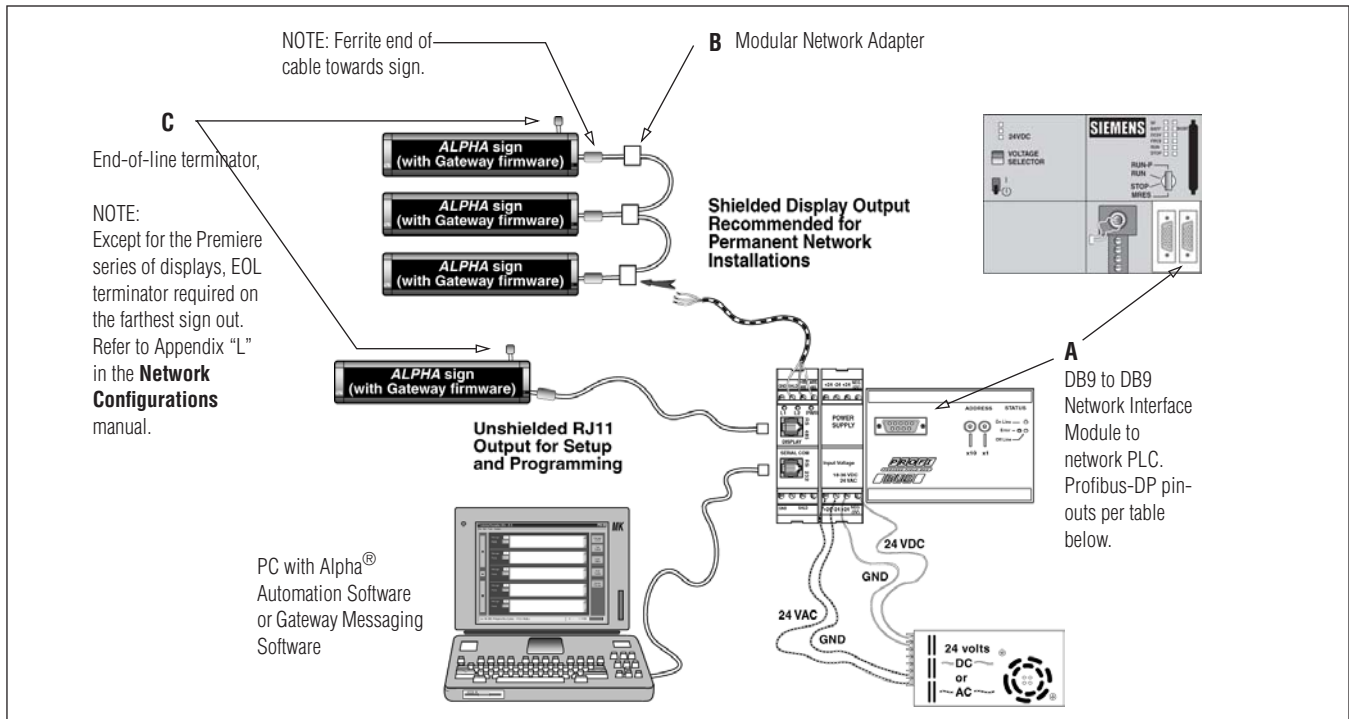
Available baud rates are shown in the table, below.

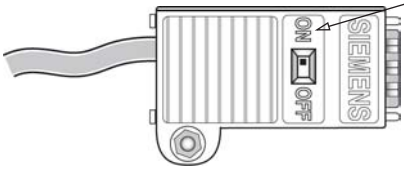
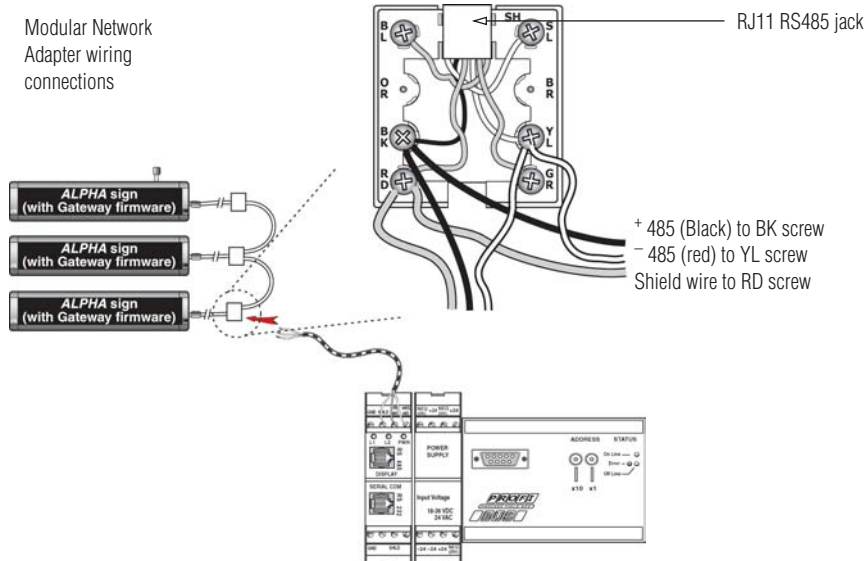
Supported Baud Rates	
	9.6 kBit/second
	19.2 kBit/second
	45.45 kBit/second
	93.75 kBit/second
	187.5 kBit/second
	500 kBit/second
	1.5 MBit/second
	3 MBit/second
	6 MBit/second
	12 MBit/second

To manually configure a specific data transmission baud rate, a PC using software such as Siemens Step 7™, Simatic Manager™ can be connected to the Alpha® Gateway Interface network. (See "Interconnection diagram" on page 6.) Refer to the "Profibus-DP required initialization sequence, on page 8, which uses Siemens Step 7™, Simatic Manager™ software.

NOTE: Installations requiring longer cable lengths may not support fastest data transmission baud rates. Refer to the "Cabling guidelines" on page 18 for recommended cable specifications.

Interconnection diagram



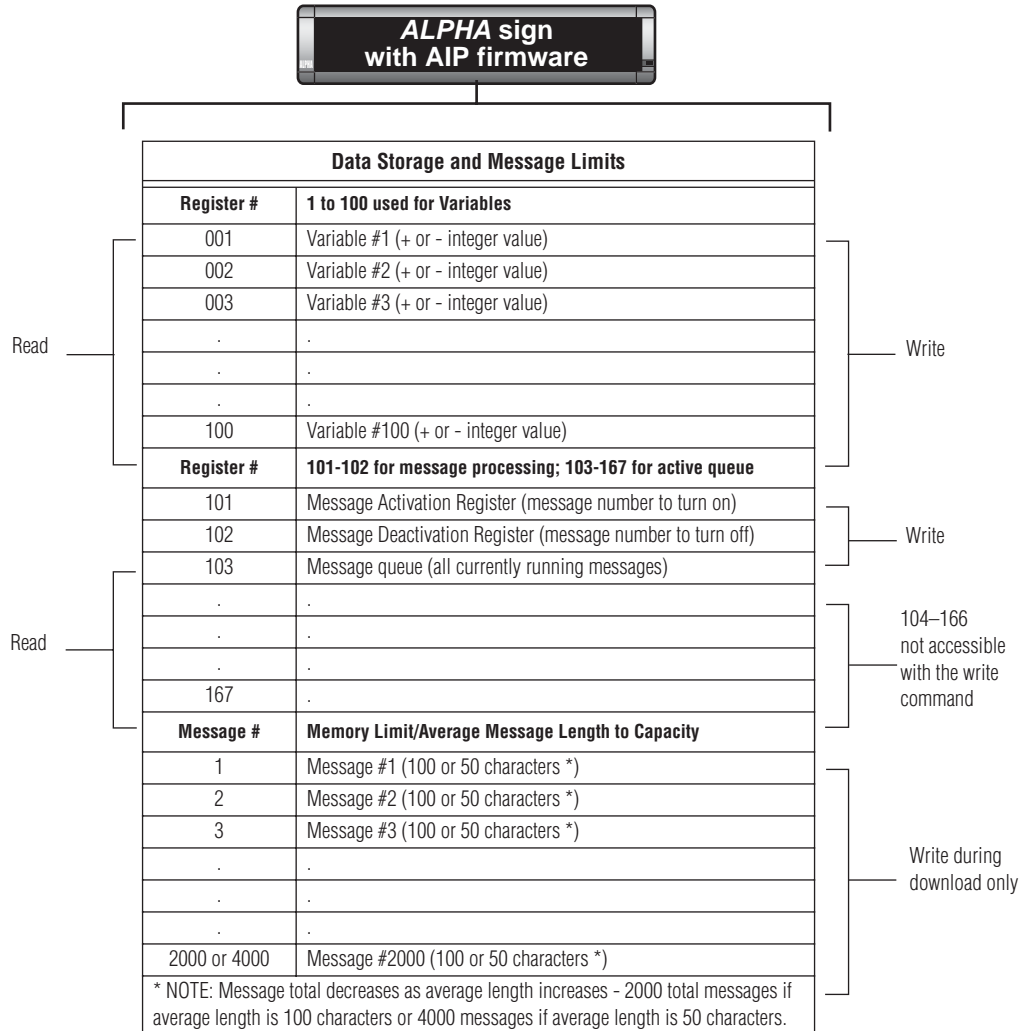
Item	Name	Description
A	PLC input	<p>Profibus-DP DB9 serial connection requires Profibus-DP EN 50 170 cable. The slide switch in the end of the cable shown includes a termination circuit, to attenuate reflection signals where the AGI station is the beginning or at the end of a network drop line.</p>  <p>NOTE: Set slide switch to ON to activate termination circuit, to attenuate reflections on the bus line.</p> <p>Set this switch to the OFF position only if the AGI station is on a network trunk line, and <i>not</i> at the end of a line.</p> <p>Cables used must conform to specifications defined by the PROFIBUS-DP EN 50 170 standard.</p>
B	Modular Network Adapter	<p>Modular Network Adapter wiring connections</p>  <p>RJ11 RS485 jack</p> <p>+ 485 (Black) to BK screw</p> <p>- 485 (red) to YL screw</p> <p>Shield wire to RD screw</p>
C	EOL	<p>Except for the Premiere series of displays (which use DIP switches to control that function), an end-of-line terminator (PN 1088-9107) is required on the last sign in the network, even if there's only one. See Appendix "L" in the Network Configurations manual for more information.</p>

Network/Gateway data pathway

The Alpha[®] Gateway Interface allows for the exchange of data between a PLC and an Alpha[®] sign to show messages and real-time data on a system. The Alpha[®] Gateway Interface is connected to Alpha[®] signs via a multi-drop (RS485) network. This network will support up to 32 drops before requiring a repeater. These displays can be addressed from 001 to 254 by using Alpha[®] Automation Software. (See the Alpha[®] Automation Software online Help system. Messages are created in Alpha[®] Automation Software and then they are stored in the sign's memory.) The Alpha[®] sign can store up to 4000 messages (1-4000) and can support up to 100 variables (1-100). The "memory map" table that follows shows sign's memory allocations and function.

Alpha[®]
sign
memory
map

How messages and variables are stored inside Alpha[®] signs



Profibus-DP .GSD file.

Each device on a Profibus-DP network is associated with a *.gsd file, which is installed by the Alpha[®] Automation Software. This file contains all of the parameters, such as baud rate and table formats, along with all of the other necessary data required by the network PLC when the AGI is configured on a Profibus-DP network. When loading the .gsd file to your system, the input and output parameters are set to the following:

32 Words (64 Bytes) out for the PLC Output Data table from the PLC to the AGI.

16 Words (32 Bytes) in for the PLC Input Data table from the AGI to the PLC.

The Profibus-DP initialization sequence in the following section explains how to load the required .gsd file.

Profibus-DP required initialization sequence

In order to add an Alpha[®] Gateway Interface to a Profibus-DP network, you must have a PC with a software application such as Siemens Step 7[™], Simatic Manager, which will allow the Profibus-DP PLC and Alpha[®] Gateway Interface to exchange data. Because Profibus-DP is an “open” protocol there are a range of available interface options, from third party vendors as well as from Siemens.

NOTE: Whichever type of software application is selected, these are the three basic steps needed for initialization on the Profibus-DP network:

1. **Connect the Alpha[®] Gateway Interface to the network and verify network address.**
2. **Load configuration properties to the initialization software and transfer to the PLC.**
3. **Install the *.gsd file, and map I/O data table properties to the AGI.**

The sequence and some instructions may differ, depending upon the Profibus-DP PLC and the communication interface that is selected, but these same tasks will need to be implemented regardless of other network considerations.

Step 1.) Before you begin the initialization sequence, verify all hard-wired connections and the Network Interface Module address settings:

- Make sure that all network cables being used have been installed correctly, satisfying Profibus-DP guidelines for the data transmission baud rate(s) required. See “Cabling guidelines” on page 18.
- Set the Node Address for the Alpha[®] Gateway Interface. See information on setting a network node “ADDRESS” on page 4.
- Cycle power, or perform these two steps before you power up your network. Address settings take effect only after power is switched off and turned back on. The software used during initialization must detect these values as you want them to be set.

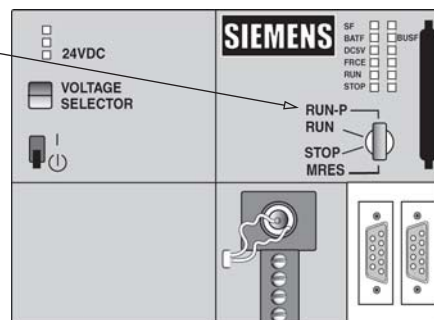
The address should never be changed during operation. If the address is modified while the Network Interface Module is powered On, an internal error could be generated. and the module is disconnected from the network.

NOTE: Profibus-DP is an open protocol which has been designed to provide very flexible network solutions. There may be network and configuration issues relevant to your installation that are beyond the scope of this basic guideline. To obtain more information and to find lists of links to other sources of information, you may wish to check the website at <http://www.profibus.com>.

- Complete any other configuration that may be required to allow the software initialization. In the example shown below, a Siemens PLC has a “mode” switch which must be turned to the “run program” mode.

In this example, the PLC must be put in PROGRAM mode. The Siemens PLC shown at right has a 4-position switch.

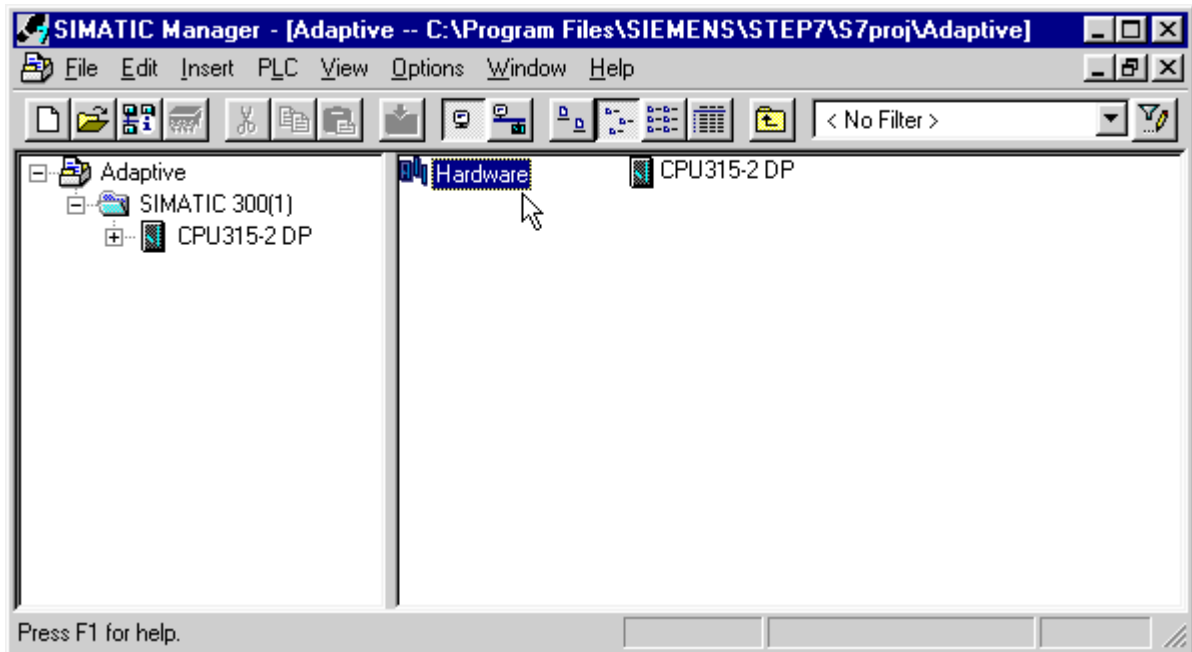
Check the documentation for your network for any additional settings or intermediate devices that must also be activated.



Profibus-DP required initialization sequence

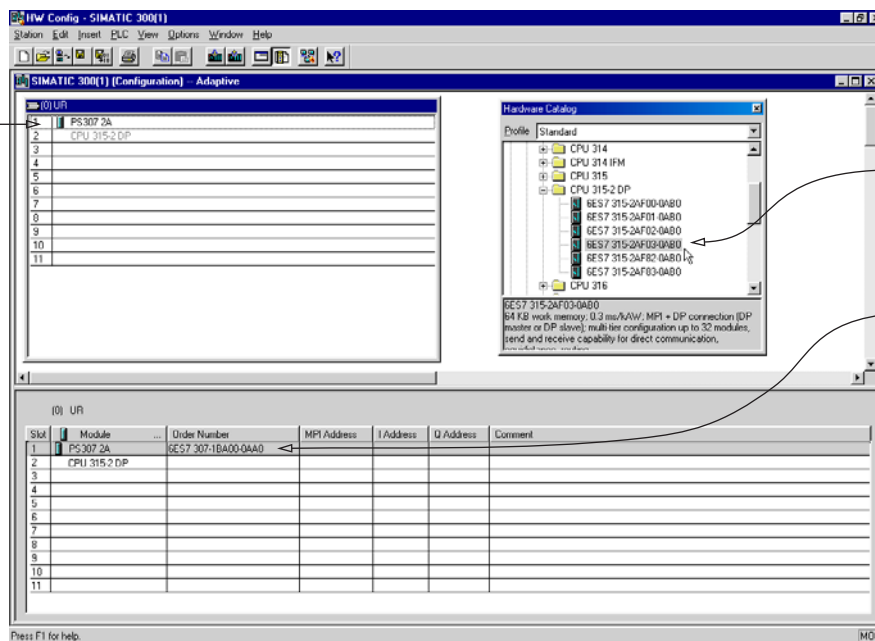
Step 2.) Whichever software application you choose to select, follow the required procedure to load and transfer the configuration properties to the Profibus-DP CPU.

- In the example below, Siemens Step 7™, Simatic Manager is being used to start the initialization sequence. Double click the “Hardware” icon to bring up available options for the parameters that must be defined for the AGI station.



- In this example, a power supply has already been selected, dragged and dropped to “Slot 1”. From the Hardware configuration list, select a CPU, as shown below. Drop it into “Slot 2”.

In this example the power supply has already been placed into Slot 1

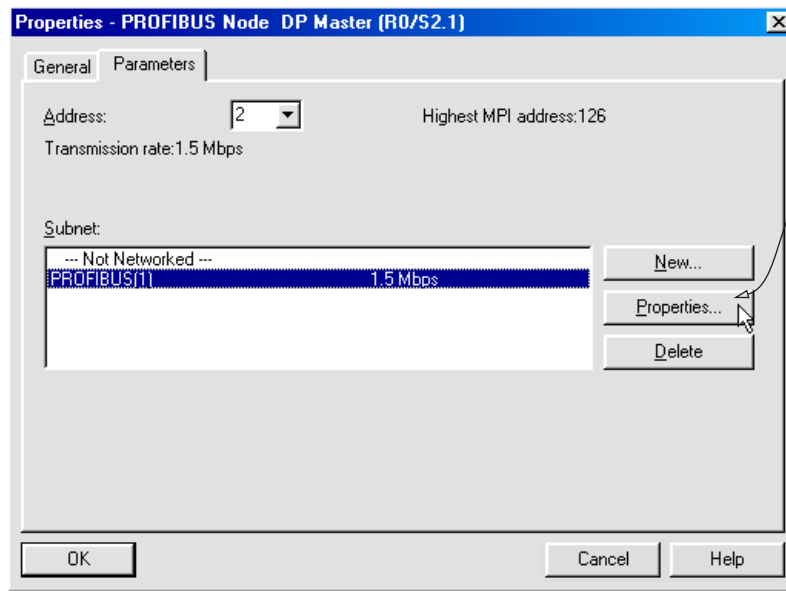


When you identify the CPU model, a sub-list will open below it. Double-click correct CPU.

After you have double-clicked the CPU (above) it will appear in the slot shown. Double-click on that slot to configure the CPU.

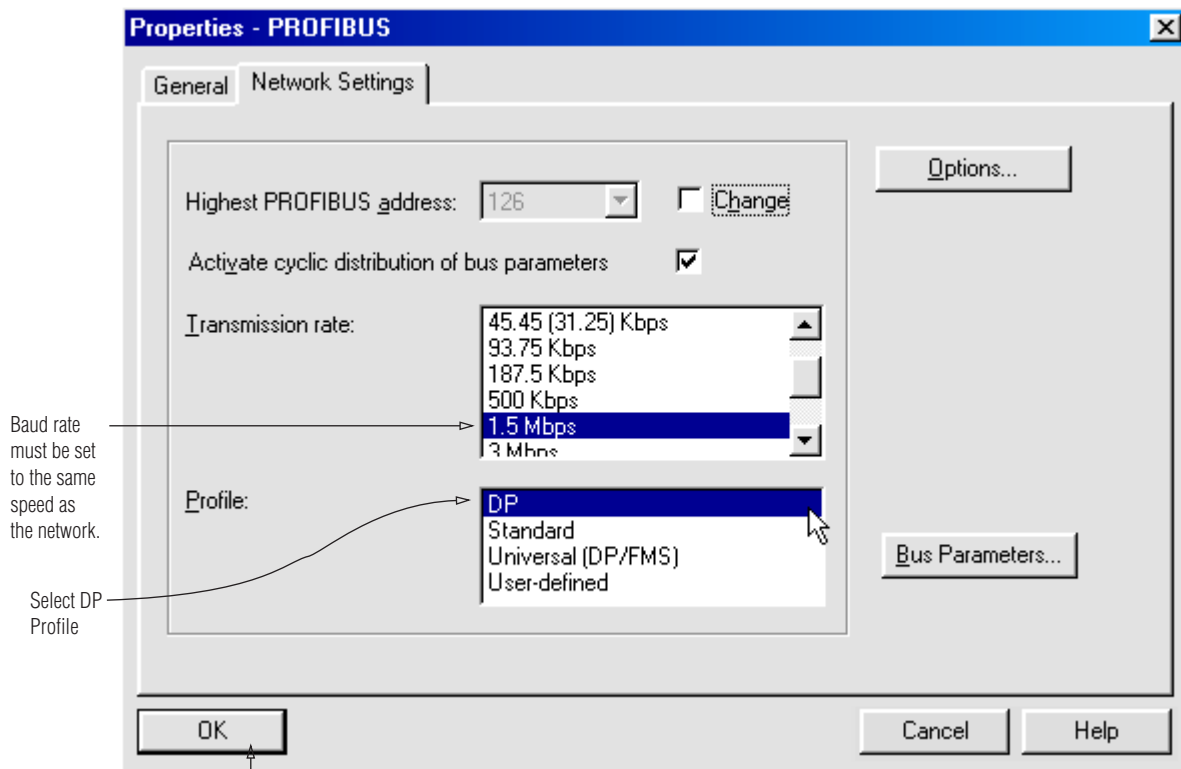
Profibus-DP required initialization sequence

- The "Properties" dialogue box will open after the CPU has been placed in "Slot 2".



Click "Properties" if you wish to check or to alter the default configuration.

- Set properties for the data transmission rate and Profibus profile. For "Profile" you *must* select Profibus-DP, the performance optimized version of Profibus. Baud rate must match network.



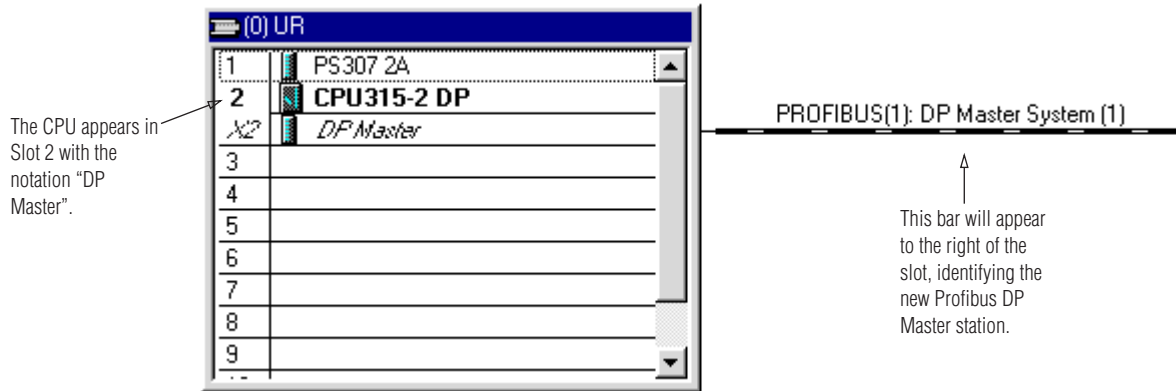
Baud rate must be set to the same speed as the network.

Select DP Profile

Click "OK" when parameters are correct.

Profibus-DP required initialization sequence

- When you have defined properties for the CPU, the following screen appears.

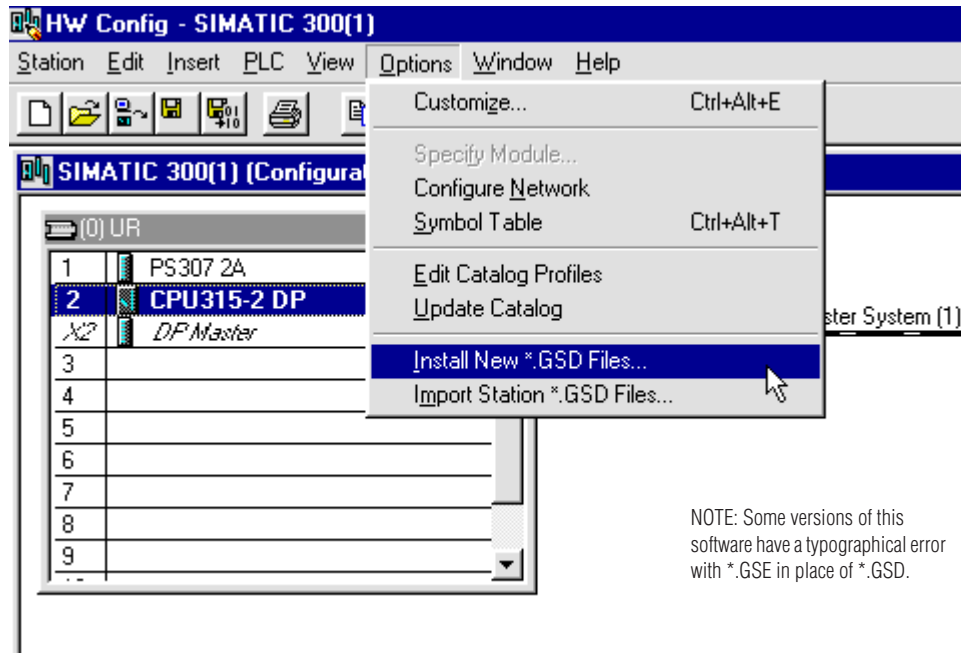


- This completes Step 2; loading configuration properties to the initialization software and transferring them to the PLC.

Profibus-DP required initialization sequence

Step 3.) You are now ready to install the Alpha[®] Gateway Interface *.gsd file to the Profibus-DP network, and map I/O data table properties.

- Insert the CD-ROM with the *.gsd file into your PC and select the “Options” pull down menu.

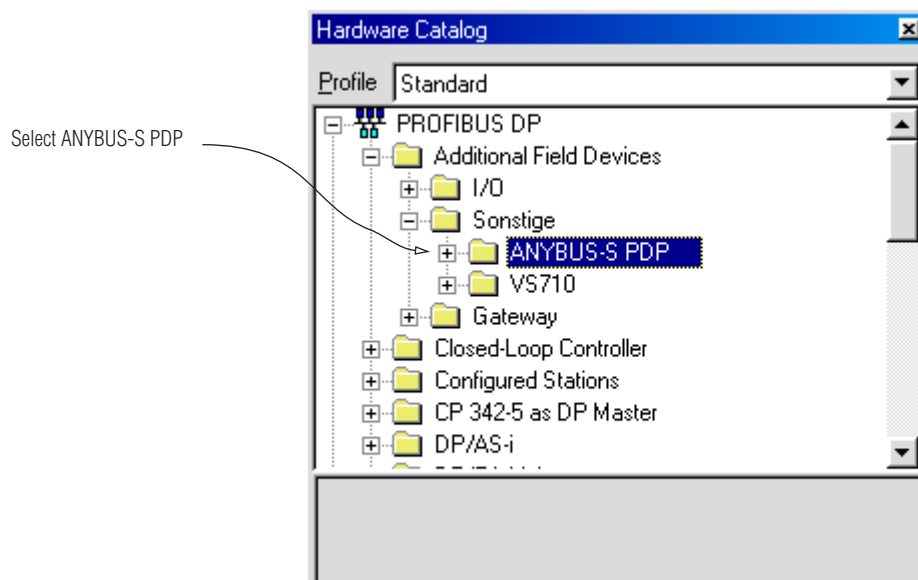


- You must select the *.gsd file provided. In this example, it is “hms_1003.gsd”.

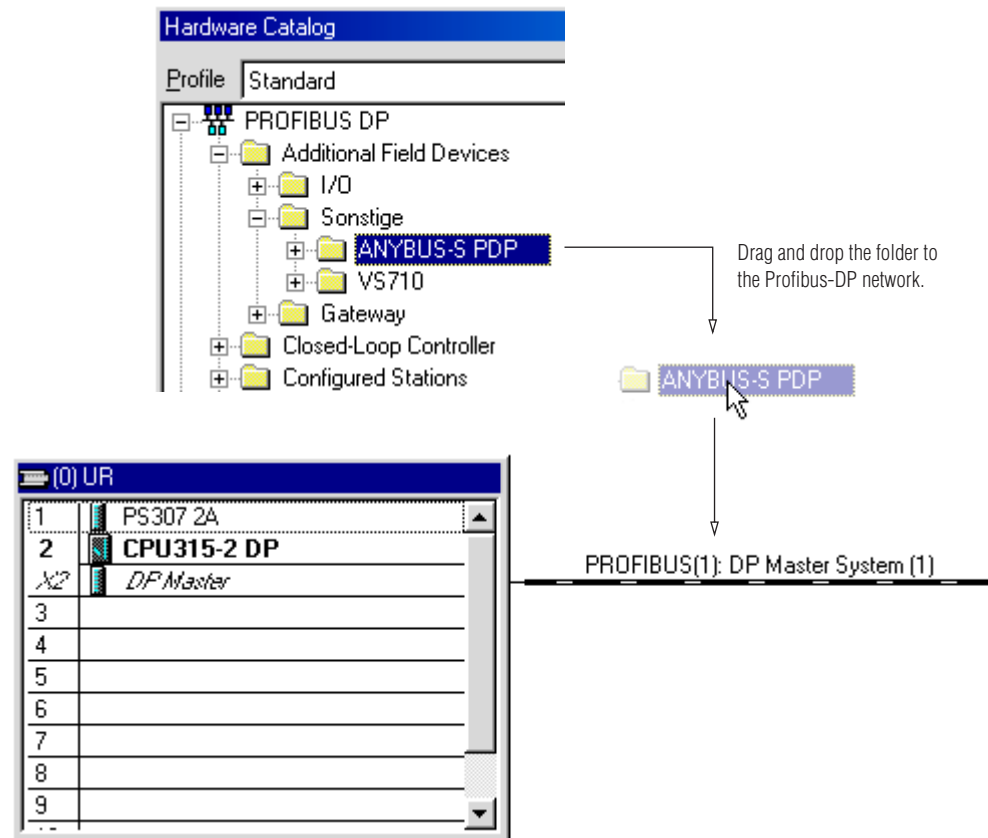


Profibus-DP required initialization sequence

- The following screen will appear in the “Hardware Catalog” window. Select Anybus-S PDP, as shown.

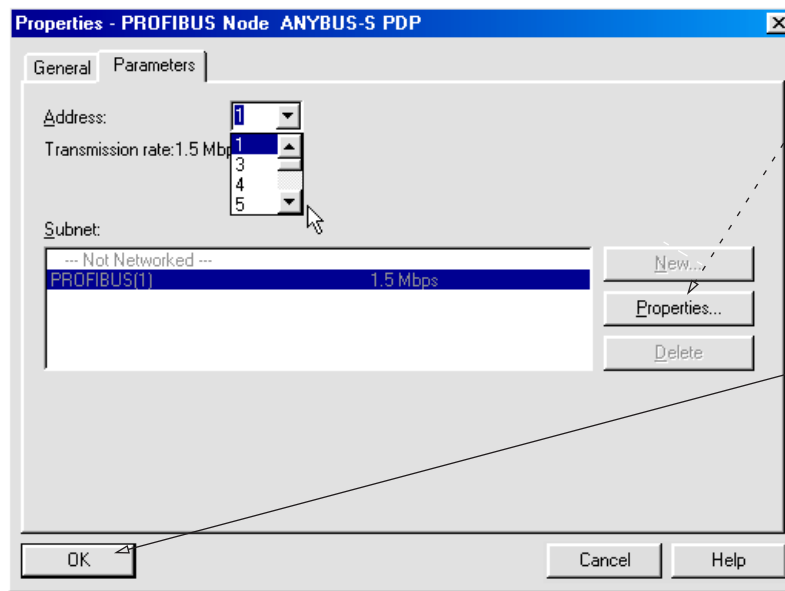


- Click on the Anybus-S PDP folder and drag and drop it to the Profibus DP Master System bar that you just configured.

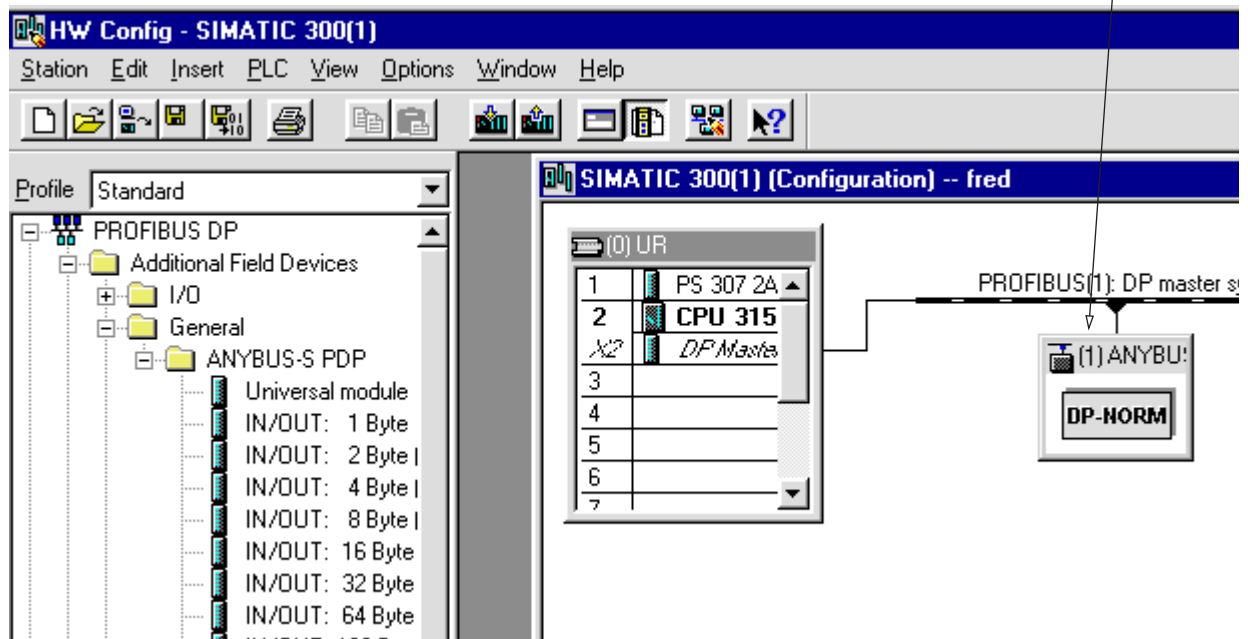


Profibus-DP required initialization sequence

- The following “properties” screen appears. In this case it is letting you know that the Alpha[®] Gateway Interface is set at Address 1. Set an appropriate address to suit your network.



After you have click “OK” to verify settings the Alpha[®] Gateway Interface will appear as a new station located at address 1.



Profibus-DP required initialization sequence

HW Config - SIMATIC 300(1)

Station Edit Insert PLC View Options Window Help

Profile Standard

SIMATIC 300(1) (Configuration) -- fred

(0) UR

1	PS 307 2A
2	CPU 315
X2	DP Master
3	
4	
5	
6	
7	

PROFIBUS(1): DP master system (1)

(1) ANYBU:
DP-NORM

(3) ANYBUS-S PDP

Slot	Module / ...	Order number	I Address	Q Address	Comment
1	16AI	INPUT: 32 Byte (16 word) ←	256...287		
2	128	OUTPUT: 64 Byte (32 word) ←		256...319	
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					

Insertion possible

From the Hardware Catalog you must select, drag and drop the correct I/O parameters for the Alpha® Gateway Interface, for both Input and Output

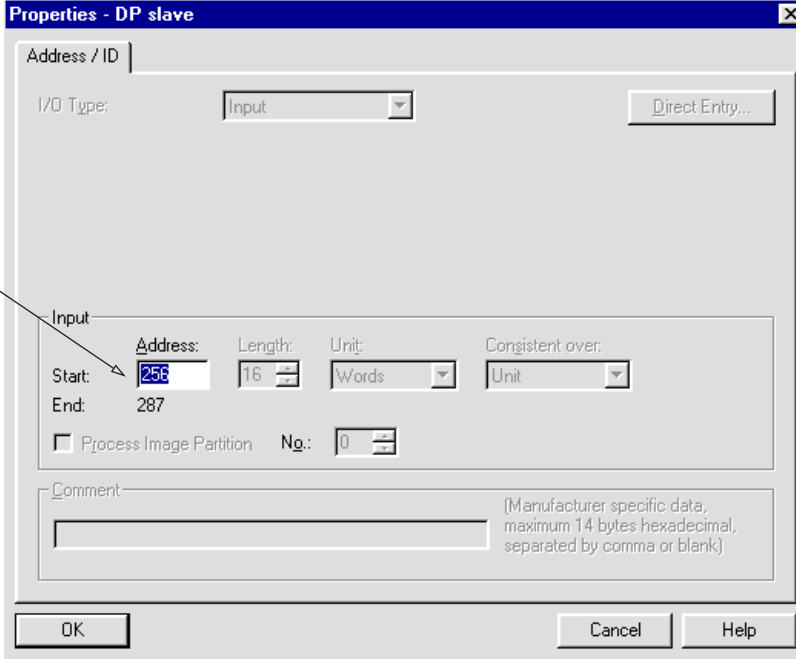
The I/O parameters configuration selected must correspond to:
Output: 32 Word (64 bytes)
Input: 16 Word (32 bytes)

Profibus-DP required initialization sequence

- Verify properties in the dialogue box that opens up for Input parameters.

Based on your network configuration select an appropriate starting address for the Input data table.

NOTE: The Input data table corresponds to the Input words PIW--- or PEW--- of the PLC

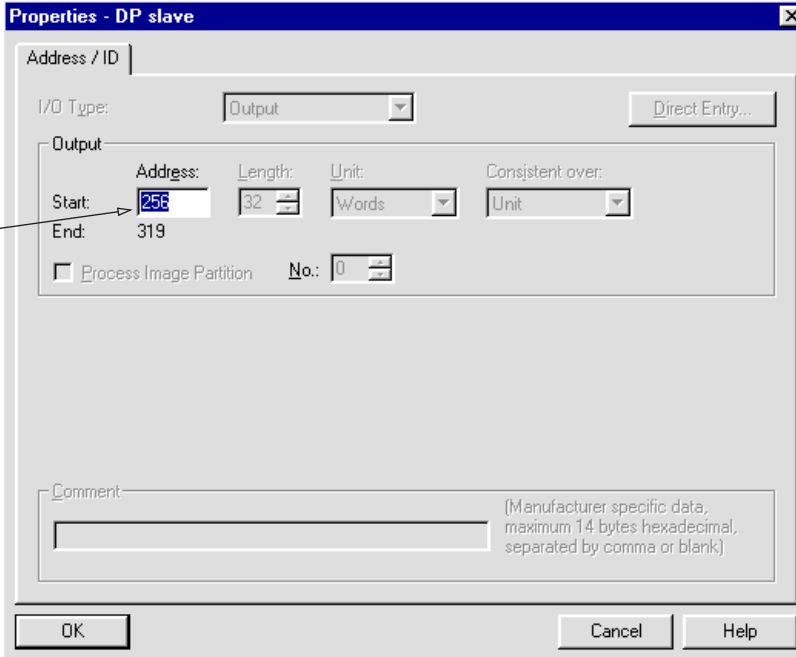


The screenshot shows the 'Properties - DP slave' dialog box. The 'I/O Type' is set to 'Input'. The 'Start' address is 256, 'End' is 287, 'Length' is 16, and 'Unit' is 'Words'. There is a 'Direct Entry...' button and a 'Comment' field.

- Verify properties in the dialogue box that opens up for Output parameters.

Based on your network configuration select an appropriate starting address for the Output data table.

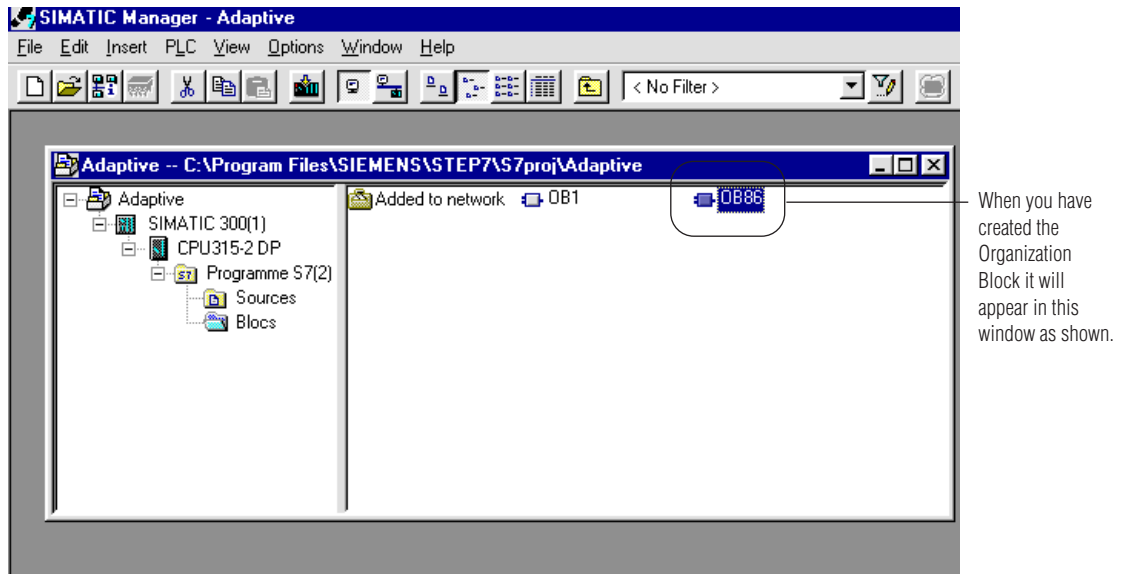
NOTE: The Output data table corresponds to the Output words PQW--- or PAW--- of the PLC.



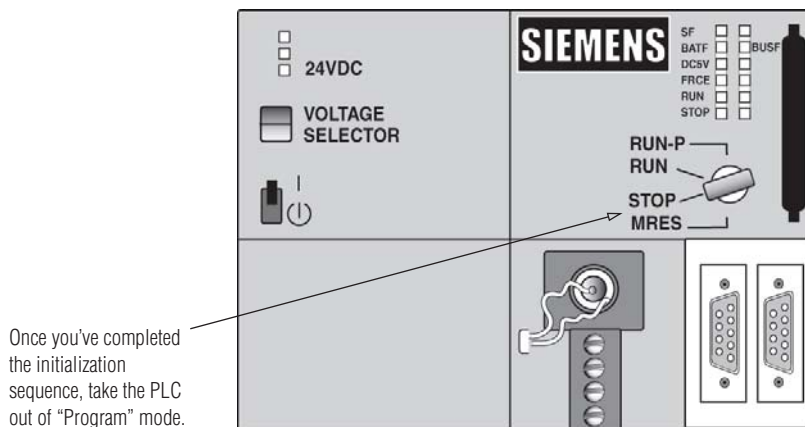
The screenshot shows the 'Properties - DP slave' dialog box. The 'I/O Type' is set to 'Output'. The 'Start' address is 256, 'End' is 319, 'Length' is 32, and 'Unit' is 'Words'. There is a 'Direct Entry...' button and a 'Comment' field.

Profibus-DP required initialization sequence

- Before you can begin any programming operations to control messaging through the Alpha[®] Gateway Interface, you must create an “Organization Block”, an identifier that goes in the first rung of every PLC program for the AGI. This allows the PLC to continue running even if an error occurs on the PLC network.
- In this example, from the “Insert” pull-down menu of Simatic Manager, you select “New object”, and then “Insert new block”. The Organization Block in this example is given the designation OB86.



- Whichever type of PLC is being programmed, turn the mode switch out of programming mode, to make sure that inadvertent actuation won't affect normal operation.



Safety and troubleshooting

When successfully connected to a Profibus-DP industrial network, there should *always* be some type of message on each Alpha[®] sign connected to this network:

PROBLEM:	No message appears on Alpha [®] sign	“No Network Activity” message on Alpha [®] sign	“NO BACKGROUND MESSAGE” ¹ appears on Alpha [®] sign	Message Error—Specific message number is displayed, for example “Message # 0024”
Possible Causes	<ul style="list-style-type: none"> Network wiring fault PLC fault Alpha[®] sign fault possible sign hardware failure or a PLC is trying to display a message that was not programmed into the sign. Message(s) too long for preset file size Not switched on/plugged in The only character programmed into the message is a “space”. 	<ul style="list-style-type: none"> Network wiring fault PLC fault Alpha[®] sign fault Alpha[®] sign timeout— no network activity for at least 3 seconds AGI offline/ configured for RS232 data 	<ul style="list-style-type: none"> Sign address not correct. The sign has not received any message to display. (This is not an error condition). Sign is receiving information, but the information is not for this sign or is invalid. Sign has not received any valid serial data 	<ul style="list-style-type: none"> “Blank message”: Either this message was never edited (and never downloaded to the display), or Messages that are invalid (with syntax errors) never make it to the display; they can not be downloaded with invalid content. Message length exceeds number of bytes the sign has been configured to accept. Messages that are too long will not display properly.
¹ This is called the “background message”. The Alpha [®] Automation Software can be used to change the wording of this message.				

Cabling guidelines

In a Profibus-DP network the *Trunk Line* is the main network cable. The *Trunk Line* anchors the two ends of the network. A *Drop Line* is the network branching cable between the trunk line tap or junction box and the individual network station. There maybe a trade-off between the longest length of *Trunk* and *Drop* cable that you can use, and the selected data transfer speed. The baud rate selected can affect, and/or restrict, each of the following variables:

- The available number of network nodes,
- the total overall length of the *Trunk Line*,
- the type of cable used for the *Trunk Line*, and
- the sum total length of all individual *Drop Lines*

Cable specification

The Profibus standard defines Type A cable with the specifications given in the table, below. This type of cable is recommended for transmission speeds above 500k baud, and any long distance installations.

Impedance:	35 up to 165 ohm at frequencies from 3 to 20 Mhz
Cable capacity	< 30 pF per meter
Core diameter	> 0. 34 mm2, corresponds to AWG 22
Cable type	Twisted pair cable, 1 x 2, or 2 x 2, or 1 x 4 lines.
Resistance	< 110 ohm per km.
Signal attenuation	max 9dB over total length of line section
Shielding	CU shielding braid or shielding braid and shielding foil
Max bus length	200 m at 1500 kbit/second; up to 1.2 km at 93.75 kbit/second. Maximum length may be extended with installation of repeater devices.

Technical specifications

Component modules

The Alpha[®] Gateway Interface is assembled with three modules that are described in the tables that follow. Note that the CPU Module and Power Supply Module are physically interchangeable. Either one can be mounted next to the Network Interface Module.

- CPU Module — interface between the AGI and Alpha[®] signs.
- Power Supply Module — supplies power to the CPU Module and Network Interface Module.
- Network Interface Module — interface between the PLC and the Alpha[®] sign network.

CPU and Power Supply Modules

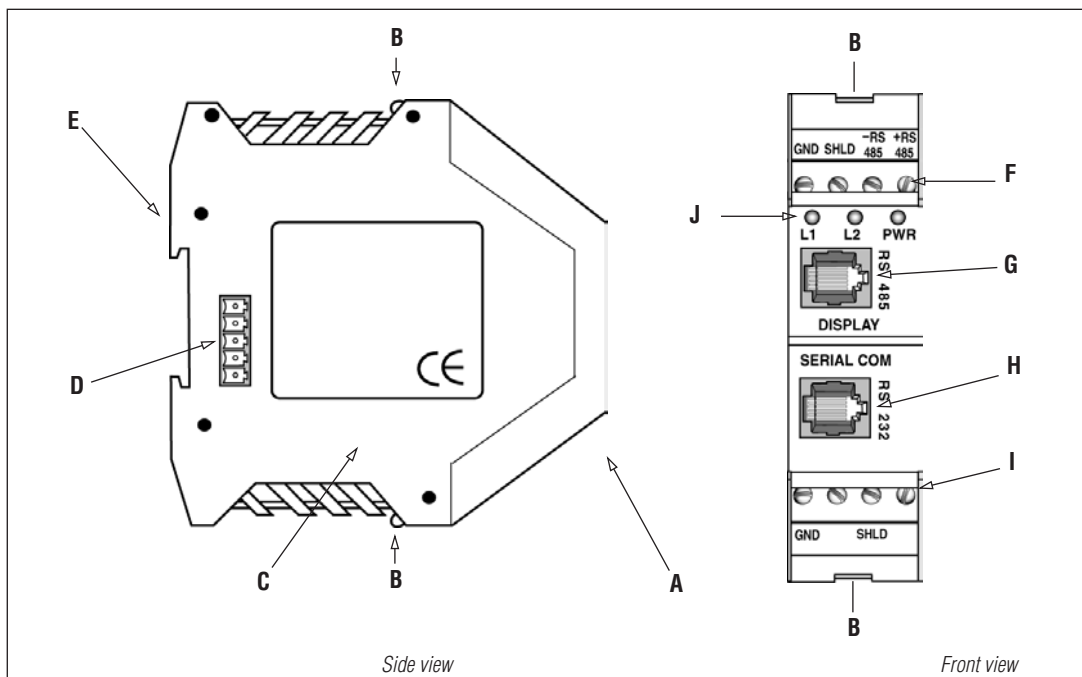
CPU and Power Supply Modules Physical Data	
Dimensions:	2.75"W x 4.25"H x 1"D
Weight:	4 oz. per module
Operating temperature:	60°C
Humidity range:	10 – 95% non-condensing
Mounting:	DIN rail 35 x 7 mm
CPU Module Communications	
Serial (in):	Communication type: RS232 Terminal type: RJ11 Protocol: EZ95 (modified)
Display (out):	Communication type: RS485 Terminal type: RJ11 Protocol: Modbus ASCII
Terminals (out):	Communication type: RS485 Terminal type: Screw Wire size: AWG 26 - 14 (US) / 0, 14-2, 5 ² (Europe) Protocol: Modbus ASCII Max. number of drops: 32 Max. distance: 4000 ft (1200 m)
Power Supply Module Operating Specifications	
AC input voltage ¹	
Max. AC voltage:	25 Vrms
Min. AC voltage:	14 Vrms
Power consumption:	15W @ 24 Vrms
DC input voltage	
Max. DC voltage:	36 VDC
Min. DC voltage:	18 VDC
Output voltage 24 VDC	
Max. voltage:	36 VDC
Min. voltage:	18 VDC
Max. current:	700 mA
Bus output voltage 5 VDC	
Max. voltage:	5.05 V
Min. voltage:	4.95 V
Max. current:	500 mA
Protection	
Type:	Poly switch
Self-resetting:	Yes
Terminals	
Type:	Screw
Wire size:	US spec:AWG 26 - 14/Euro spec: 0, 14-2, 5 ²
Operating voltage:	5 V
Current draw:	150 mA
Power consumption:	0.75 W
¹ Only one power supply, 18 – 36 VDC or 24 VAC, can be used to power this product.	

Network Interface Module

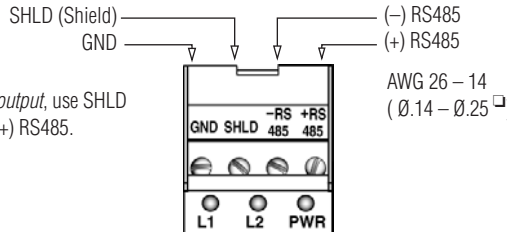
Network Interface Module Physical Data and Operating Specifications	
Dimensions:	Width = 90mm x Height = 75mm x Depth = 105mm
Weight:	190 grams
Voltage	Min = 4.75 Volts; Typical = 5.00 Volts; Max = 5.25 Volts
Current	Min = 300 mA; Typical = 350 mA; Max = 450 mA
Ambient Environmental Conditions	Temperature Range: 5° C– 60° C Humidity: 10%–95% (No condensation)
Protection	In accordance with Profibus-DP standards
Profibus-DP:	<ul style="list-style-type: none"> • Profibus-DP certification • Bus powered by embedded +5V supply
EMC Compliance	CE compliant
Mounting:	DIN rail 35 x 7 mm

CPU Module

NOTE: Only one CPU Module can be used at a time.

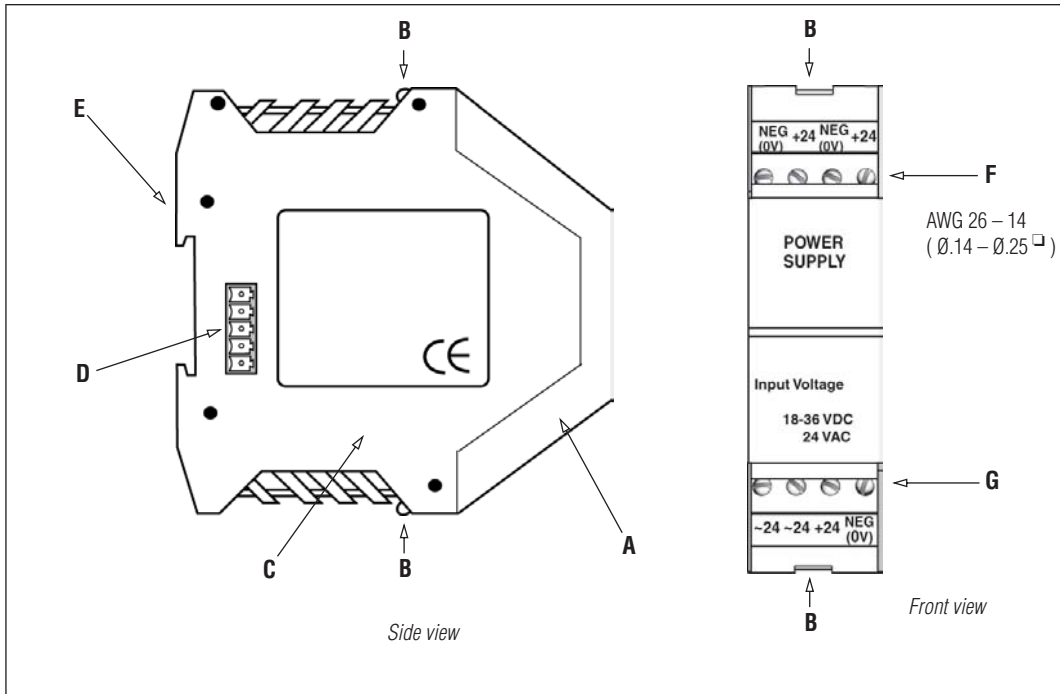


Item	Name	Description
A	Module Top	The internal PCB is attached to the Module Top.
B	Release Buttons	Use a pen tip or other pointed tool to push Release Buttons and pull off the Module Bottom.
C	Module Bottom	After Release buttons (Item B) are unlatched, can be pulled away to expose internal PCB.
D	Intermodule Connector	Used to pass power and signals between modules. When attached to a conductive DIN rail, the rail serves as the CHASSIS GND for all modules connected to the DIN rail.
E	DIN rail latch	Used to attach the module to a DIN EN 50 Ø22 mounting rail.

F	Serial Output	<p>Shielded RS485 output to one or more Alpha[®] signs. <i>Because of the signal protection afforded by shielding, this is the recommended way of connecting Alpha[®] signs to the CPU Module.</i></p>  <p>For <i>shielded RS485 output</i>, use SHLD with (-) RS485 and (+) RS485.</p>	
G	Display	<p>Unshielded RS485 output to a single Alpha[®] sign or display. Quick-connect jack is used to:</p> <ul style="list-style-type: none"> • program messages into a sign • trigger messages already in a sign <p><i>NOTE—See connection diagram on page 7 (This is not a telephone connector.)</i></p>	
H	SERIAL COM	<p><i>Unshielded RS232 input</i> from a PC. Used to program messages and send them to a CPU Module that is <i>no farther than 50 feet</i> from the PC. Use 6-conductor RS232 cable such as Adaptive[®] PN 1088-8625 (25 feet) or 1088-8627 (50 feet) <i>This is not a telephone connector.</i></p>	
I	SERIAL Input	<i>NOT USED.</i>	
J	LED FUNCTIONS	LED:	Description:
	Passthrough mode Receiving data	L1 (Red)	Flashes once a second while downloading data to the Alpha [®] sign network. Flashes briefly when receiving data from an Alpha [®] sign
	Fault indication Clearing variable data	L2 (Yellow)	Flashes when the AGI encounters a fault. Flashes continuously when power is cycled, clearing variable data/Alpha [®] sign registers.
	Heartbeat		Flashes once every 500 ms to indicate that the Heartbeat is enabled.
	Transmitting data		Flashes when transmitting data to an Alpha [®] display.
	Power Indicator	Power/ L3 (Green)	Always green while unit has power
NOTE: CPU Module operating specifications: 5 volts, 0.75 W power consumption, 150 mA current draw			

Power Supply Module

NOTE: Only one Power Supply Module can be used at a time.



Item	Name	Description
A	Module Top	The internal PCB is attached to the Module Top.
B	Release Buttons	Use a pen tip or other pointed tool to push Release Buttons and pull off the Module Bottom.
C	Module Bottom	After Release buttons (Item B) are unlatched, can be pulled away to expose internal PCB.
D	Intermodule Connector	Used to pass power and signals between modules.
E	DIN rail latch	Used to attach the module to a DIN EN 5Ø Ø22 mounting rail.
F	Power Output	<p> </p> <p>NOTE: If you need to power other devices, a second set of output taps (4 total) is provided.</p> <p>AWG 26 - 14 (Ø.14 - Ø.25 □)</p>
G	Power Input	<p> </p> <p> </p>

CPU and Power Supply Modules Technical Data

CPU and Power Supply Modules Physical Data	
Dimensions:	2.75"W x 4.25"H x 1"D
Weight:	4 oz. per module
Operating temperature:	60°C
Humidity range:	10 – 95% non-condensing
Mounting:	DIN rail 35 x 7 mm
Power Supply Module Operating Specifications	
AC input voltage ¹	
Max. AC voltage:	25 Vrms
Min. AC voltage:	14 Vrms
Power consumption:	15W @ 24 Vrms
DC input voltage	
Max. DC voltage:	36 VDC
Min. DC voltage:	18 VDC
Output voltage 24 VDC	
Max. voltage:	36 VDC
Min. voltage:	18 VDC
Max. current:	700 mA
Bus output voltage 5 VDC	
Max. voltage:	5.05 V
Min. voltage:	4.95 V
Max. current:	500 mA
Protection	
Type:	Poly switch
Self-resetting:	Yes
Terminals	
Type:	Screw
Wire size:	US spec:AWG 26 - 14/Euro spec: 0, 14-2, 5 ²
CPU Module Operating Specifications	
Operating voltage:	5 V
Current draw:	150 mA
Power consumption:	0.75 W
Communications	
Serial (in):	Communication type: RS232 Terminal type: RJ11 Protocol: EZ95 (modified)
Display (out):	Communication type: RS485 Terminal type: RJ11 Protocol: Modbus ASCII
Terminals (out):	Communication type: RS485 Terminal type: Screw Wire size: AWG 26 - 14 (US) / 0, 14-2, 5 ² (Europe) Protocol: Modbus ASCII Max. number of drops: 32 Max. distance: 4000 ft (1200 m)
¹ Only one power supply, 18 – 36 VDC or 24 VAC, can be used to power this product.	

Configuration data for Alpha® Gateway networks

Overview

The Alpha® Gateway Interface maps Output and Input Data tables in the PLC to the Gateway interface's Input and Output Data tables. Once mapped, the PLC, operating through the Alpha® Gateway Interface (the "AGI"), controls the function and operations of the Alpha® sign network.

The Gateway network is configured to allow two different types of messaging, "Add/remove messages" and "Priority messaging".

- "Add/remove messages" allows several different messages to all be active at once. The messaging control function allows different priority levels to be applied to the messages that are programmed with *Alpha® Automation Software* (or *Gateway Messaging Software*.)
- "Priority messaging" activates only one message at a time, leaving full control of messaging display with the PLC.

Variable data corresponding to values in the Output Data Table and in the *Alpha® Automation Software* (or *Gateway Messaging Software*) may be included in any message.

NOTE: All Alpha® signs used in a Gateway network must have Alpha Industrial Protocol firmware.

Information flow

In an Alpha® sign network, a device is any point in the information pathway that is capable of sending and receiving a data signal.

In the most basic network configuration (one input, one PLC, one AGI, and one sign), the PLC, AGI, and sign are all capable of both sending and receiving data.

See the illustration in "Introduction" on page 1 for a description of information flow.

Functional capacity

Data mapping between the PLC and AGI allows the industrial network to control the following operations of an Alpha® sign network:

- Priority messaging
- Add/remove messages in queue
- Read currently-running messages in a sign
- Read variable data
- Update variable data
- Monitor the status of signs on the network, individually or all at once
- Determine if the AGI is processing data
- Clear any status bits set by the AGI
- Clear all messages currently being displayed

Alpha® sign network data storage

An Alpha® Gateway Interface is connected to the Alpha® signs via a multi-drop RS485 network. This network will support up to 32 drops before requiring a repeater. These signs can be addressed from 001 to 254 by using *Alpha® Automation Software* (see the *Alpha® Automation Software* online Help system) or through each sign's internal DIP switches. See "Network/Gateway data pathway" on page 7 to see how information is stored in an Alpha® sign.

Network device GSD and EDS files

The AGI operating on an industrial network may need to be identified to the network using an initialization file. For example, Profibus DP networks use *.gsd files. DeviceNet networks use *.eds files. Check your network documentation.

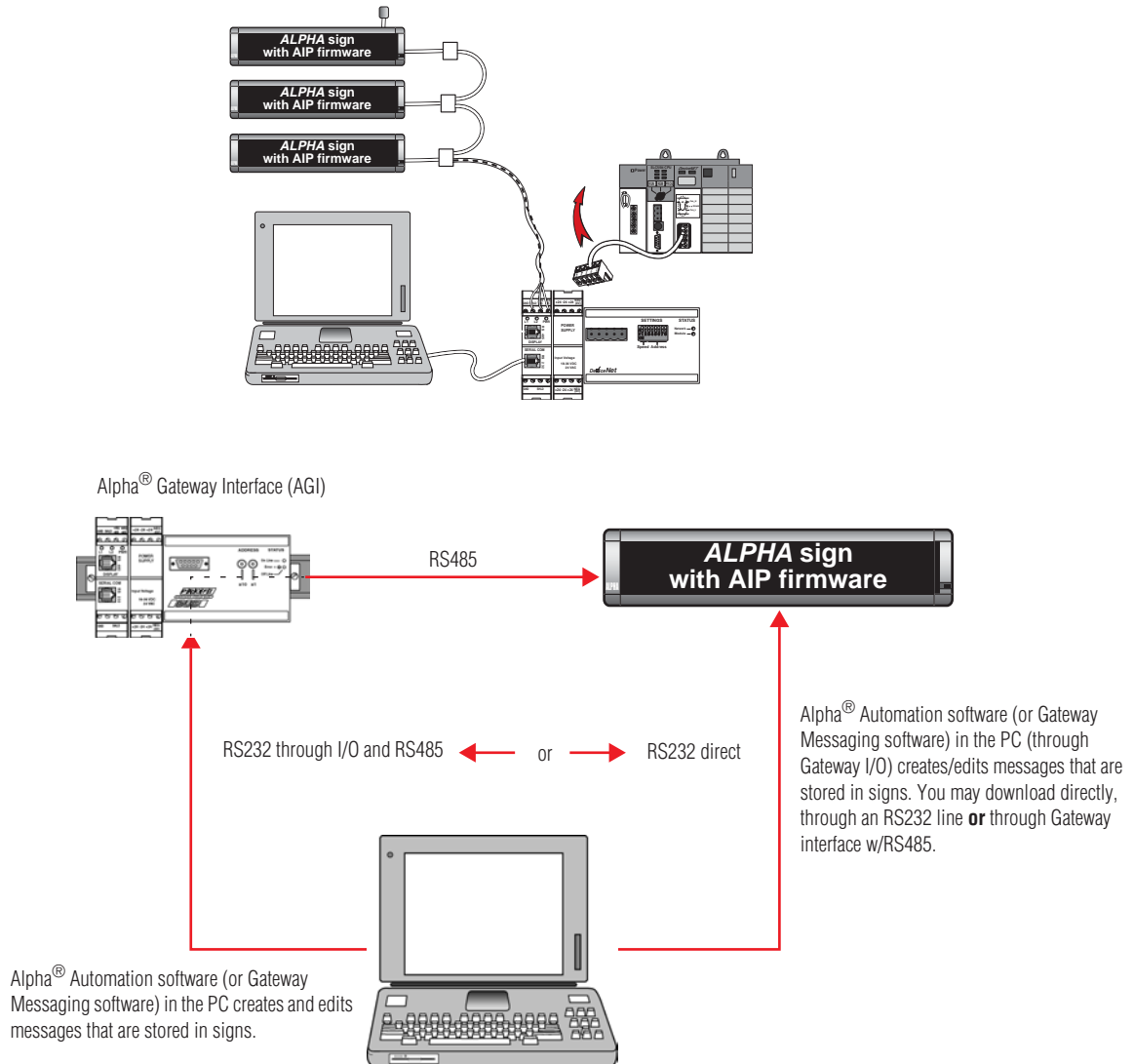
Look for GSD and EDS files in the same directory path used to install *Alpha[®] Automation Software* (or *Gateway Messaging Software*.) When loading the GSD or EDS files to your system, set the input and output parameters as follows:

- 32 Words (64 Bytes) out for the PLC Output Data table from the PLC to the Gateway
- 16 Words (32 Bytes) in for the PLC Input Data table from the Gateway to the PLC

Downloading messages to an Alpha[®] sign network

To download messages from the *Alpha[®] Automation Software* (or *Gateway Messaging Software*) to the Alpha[®] sign network, *physically disconnect the Network Interface Module from the industrial network*. Reconnect the network input to the Network Interface Module only after you have completed all downloads.

Also, you could bypass the Network Interface Module and physically connect your PC to the Alpha[®] sign network directly via an RS232 connection:



Output Data table

The Output Data table mapped in the PLC to the AGI Input Data table is used to control and execute all available operations of the message sign network.

The Output Data table consists of 32 words, reserved for the functions described in the table below. Valid values are listed for each word. (Invalid values are shown in Table 9 on page 33.)

Table 1: Output Data table

Word	Description	Valid values (decimal)
0	Control Word	2 = Write 3 = Read Message Queue 4 = Read Variable Data -1 = Clear Status bits
1	Sign Address (SA)	1 – 254, 255 is broadcast address.
2	Add Message Number to queue (AM) (When the Control Word is a 2)	1 – 4000 and 4095 are valid message numbers; 4001–4094 are <i>not</i> valid. (4095 identifies the background message.)
	Clearing a single bit in Words 1 and 2 of the Input Data table (CB) (When the Control Word is a -1)	0 = Used for clearing a Status bit for an individual sign address
	Starting Register Index (RI) (When the Control Word is a 3)	1-6 when reading Message queue data
	Starting Register Index (RI) (When the Control Word is a 4)	1-9 when reading Variable data.
3	Remove Message Number from queue (When the Control Word is a 2)	0 = Used for adding multiple messages to the queue 1 – 4000 and 4095 valid Message Numbers: 4001–4094 <i>not</i> valid. 4095 always used to identify the background message -1 = Used for priority messaging and clearing the message queue
4	Variable data #0	0 – 65535
5	Variable data #1	0 – 65535
6	Variable data #2	0 – 65535
7	Variable data #3	0 – 65535
8	Variable data #4	0 – 65535
9	Variable data #5	0 – 65535
10	Variable data #6	0 – 65535
11	Variable data #7	0 – 65535
12	Variable data #8	0 – 65535
13	Variable data #9	0 – 65535
14	Variable data #10	0 – 65535
15	Variable data #11	0 – 65535
16	Variable data #12	0 – 65535
17	Variable data #13	0 – 65535
18	Variable data #14	0 – 65535
19	Variable data #15	0 – 65535
20	User defined Variable ID #1	16 – 99
21	Variable data	0 – 65535
22	User defined Variable ID #2	16 – 99
23	Variable data	0 – 65535
24	User defined Variable ID #3	16 – 99
25	Variable data	0 – 65535
26	User defined Variable ID #4	16 – 99
27	Variable data	0 – 65535
28	User defined Variable ID #5	16 – 99
29	Variable data	0 – 65535
30	User defined Variable ID #6	16 – 99
31	Variable data	0 – 65535

Displaying messages on Alpha® signs

There are three different ways in which messages can be displayed or managed on an Alpha® sign:

- **Add/remove messages** — Allows more than one message to be displayed at a time, with priority levels set for each message. This allows the ability to manage display sequences and timing.
- **Priority messaging** — Used to display one message at a time.
- **Clearing the Message Queue** — Removes messages from the message queue, to display the background message.

Table 2: Messaging methods

Method	Description	Examples	Benefit	Valid values
Add/remove messages	Allows multiple messages to run concurrently on the same sign(s). When this method is used it also allows the use of priority levels to control the timing and display sequence for all the messages in the queue.	<ul style="list-style-type: none"> • Table 3 on page 28 • Table 4 on page 28 	Allows some scheduling of messaging display during initial creation of the message.	<ul style="list-style-type: none"> • Word 0 = 2 (only valid) • Word 1 = 1-255d* • Word 2** = 1-4000, 4095d • Word 3** = 1-4000, 4095d
Priority messaging	Allows one message number to be used to show a single message while automatically removing the single message that was running previously. This frees you from having to remove the message that was running before you display a new message	<ul style="list-style-type: none"> • Table 5 on page 29. 	This method allows the PLC to have full control of message display.	<ul style="list-style-type: none"> • Word 0 = 2 • Word 1 = 1-255d* • Word 2** = 1-4000, 4095d • Word 3** = 0xFFFF(-1d)
Clearing the Message Queue	Allows you to clear all currently running messages on a sign, by storing 0 in word 2 and -1d (0xFFFF) in word 3, as shown in Table 2 on page 27. When this is done, the background message that was programmed using the Alpha® Automation software (or Gateway Messaging software) is displayed. (This is the default background message "NO BACKGROUND MESSAGE" if no other has been programmed.)	<ul style="list-style-type: none"> • Table 12 on page 34. 	Clears all message queue data.	<ul style="list-style-type: none"> • Word 0 = 2 • Word 1 = 1-255d* • Word 2** = 0 (only valid) • Word 3** = 0xFFFF(-1d)
<p>* When the sign address is 255 decimal/0xFFFF hexadecimal, this is a broadcast message. There is NO reply from sign(s) on the network. ** The value of Words 2 and 3 can not be the same. The Gateway will not process the information. See Output Data Table Integrity Bit Table.</p>				

Add/remove messages example 1

This is an example of the steps required to add three different messages, one at a time, on the same Alpha[®] sign with *Add/remove messages* method.

In this example, we want to display messages 40, 42, and 500 individually on the same sign. The sign address is 6 (decimal).

Using information found in Table 1 on page 26, store the desired message numbers and sign information into words 0-3 of the Output Data table.

Table 3: Add/Remove messages: Example 1

Word	Step 1	Step 2	Step 3	Step 4
0	2	2	2	2
1	6	6	6	6
2	0	40	42	500
3	-1	0	40	42
Result	Message queue is cleared and the background message is displayed.	Message 0 is removed and Message 40 is added to the queue.	Message 40 is removed and Message 42 is added to the queue.	Message 42 is removed and Message 500 is added to the queue.
NOTE: All values for words 0 through 3 are shown in decimal.				

Add/remove messages example 2

This example shows how to add three different messages to the queue at the same time on an Alpha[®] sign. This requires that each message be added without removing the previous message.

In this example, we want to display messages 84, 589 and 34 at the same time on a sign. The sign address is 55 (decimal).

Using information found in Table 1 on page 26, store the desired message numbers and sign information into words 0-3 of the Output Data table.

Table 4: Add/Remove messages: Example 2

Word	Step 1	Step 2	Step 3	Step 4
0	2	2	2	2
1	55	55	55	55
2	0	84	589	34
3	-1	0	0	0
Result	Message queue is cleared and the background message is displayed.	Message 0 is removed and message 84 is displayed.	Message 0 is removed and messages 84 and 589 are displayed.	Message 42 is removed and messages 84, 589, and 34 are displayed.
NOTE: All values for words 0 through 3 are shown in decimal.				

NOTE: Messages can be removed individually (see steps 3 and 4 in Table 3) or all at the same time (step 1 in Table 5).

Priority messaging example

This example shows how to display individual messages using *Priority messaging*, and the steps required to add three different messages on an Alpha[®] sign with *Priority messaging*. This means that only the number of the message to be displayed is stored in word 2.

In this example, we want to display messages 954, 26, and 50 individually on the same sign. The sign address is 3 (decimal). Using information found in Table 1, store the desired message numbers and sign information into words 0-3 of the Output Data table.

Table 5: Priority Message example

Word	Step 1	Step 2	Step 3	Step 4
0	2	2	2	2
1	3	3	3	3
2	0	954	26	50
3	-1	-1	-1	-1
Result	Message Queue is Cleared and the background message is displayed.	Message 954 is displayed.	Message 26 is displayed.	Message 50 is displayed.
NOTE: All values shown in decimal.				

Displaying variable data on Alpha® signs

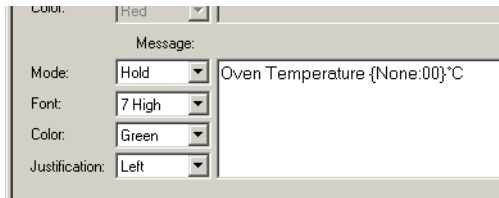
An Alpha® sign has the capability to store up to 100 variables in its memory. These variables are stored in a sign’s memory register (001 to 100) corresponding to the variable number (0 to 99) used in the Alpha® Automation software (or Gateway Messaging software.)

There are 16 words in the Output Data table that are reserved for variable numbers 0-15. Words 20-31 are used to allow access to variable numbers 16-99. Variable data stored in words 4-31 are sent to all signs by using defined variable ID numbers and variable data in the next word following (see Output Data Table, odd-numbered variable data in words 20-31 must correspond to even-numbered variable ID numbers in the preceding word), once the Gateway receives the change of state for a particular variable.

The two examples that follow show display of messages containing embedded variable data.

Displaying variable data example 1

In this first example, message 5 contains variable 0, used for a processor’s oven temperature. Message 5 is created in Alpha® Automation software (or Gateway Messaging software) in this format:



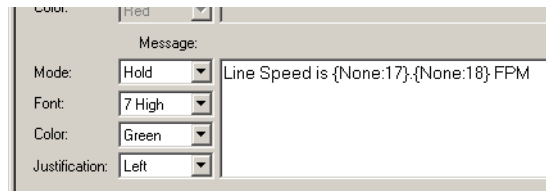
We want to display this on the sign with address 20 using the *Add/remove messages* method. This only requires that the message be triggered once and the variable data that is required stored in word 4 of the Output Data table.

Table 6: Displaying Variable data: Example 1

Word	Step 1	Step 2	Step 3	Step 4
0	2	2	2	2
1	20	20	20	20
2	0	5	5	5
3	-1	0	0	0
4	0	30	31	32
Result	Message queue is cleared and the background message is displayed.	Message 0 is removed and message 5 is displayed as "Oven Temperature 30°C".	Message 0 is removed and message 5 is displayed as "Oven Temperature 31°C".	Message 0 is removed and message 5 is displayed as "Oven Temperature 32°C".
NOTE: All values shown in decimal.				

Displaying variable data example 2

In this second example, message 30 contains variables 17 and 18 that are used for a manufacturer’s production line speed in XX.X FPM. Message 30 is created using the Alpha® Automation software (or Gateway Messaging software) in a format that will look like this:



We want to display this message on the sign with address 4 using the *Priority messaging* method. This only requires that the message be triggered once, with variable data stored in the appropriate words of the Output Data table (in this case words 20–23).

Table 7: Displaying Variable data: Example 2

Word	Step 1	Step 2	Step 3	Step 4
0	2	2	2	2
1	4	4	4	4
2	0	30	30	30
3	-1	-1	-1	-1
20	17	17	17	17
21	6	14	14	14
22	18	18	18	18
23	0	3	2	4
Result	Message queue is cleared and the background message is displayed.	Message 30 is displayed as “Line Speed is 14.3 FPM”.	Message 30 is displayed as “Line Speed is 14.2 FPM”.	Message 30 is displayed as “Line Speed is 14.4 FPM”.
NOTE: All values shown in decimal.				

Input Data table from the AGI to the PLC

The Input Data table consists of 16 words that are used in conjunction with the Output Data table for the function that is being used.

Various words are used to determine the status of a sign, the status of the Gateway and requested data.

The Input Data table also gives feedback to the PLC. If there is a problem trying to communicate with a specific sign address (1-31), it will alert the PLC if there is a major fault and store data values requested by the PLC.

The functions/features in the Input Data table are:

- Operation Counter
- Operation Status of the Gateway
- Output Data Table Integrity (O.D.T.I.)
- Sign Status
- Requested Data

Table 8: Input Data table

Word	Meaning	Valid data (decimal)
0	Operation Counter	0 – 65535
1	Error Status (sign address #1-15) / Output Data Table Integrity	Output Data Table Integrity bit (Bit 0) 0 = Gateway completed processing of data or no error 1 = Improper data in Output Data Table Error Status (Bits 1-15) 0 = Gateway received a response from a sign 1 = Gateway did not receive a response from a sign
2	Error Status (sign address #16-31)	Error Status (Bits 0-15) 0 = Gateway received a response from a sign 1 = Gateway did not receive a response from a sign
3	Reserved	Reserved for future use
4	Requested Data #1	0 – 65535
5	Requested Data #2	
6	Requested Data #3	
7	Requested Data #4	
8	Requested Data #5	
9	Requested Data #6	
10	Requested Data #7	
11	Requested Data #8	
12	Requested Data #9	
13	Requested Data #10	
14	Requested Data #11	
15	Requested Data #12	

Operation Counter/Output Data table Integrity bit (ODTI)

The Operation Counter (word 0) is used to let the PLC know that it has completed a task. When the Gateway receives data from the PLC, it begins to process the operation immediately. Once it has successfully completed the operation, the Operation Counter is incremented by 1. The counter automatically resets itself back to zero when it reaches 65,535 (0xFFFF).

The Output Data Table Integrity bit (or ODTI, word 1, bit 0) is similar to the Operation Counter, but it lets the PLC know that the Gateway is currently processing data. If the bit is set high (1), it indicates that the Gateway is processing data. If the bit is set low (0), it indicates that the Gateway has completed processing of data. If the Gateway encounters a problem, such as invalid data sent by the PLC, it will also set this bit high (1). This will remain high until the Gateway receives valid information. The Operation Counter is then incremented.

Table 9: ODTI bit invalid data

If Output Data table Word 0 is:	Then Word(s):	(whose function is:)	will have Word 1, Bit 0 set to 1 (invalid data) if:
2	1	Sign Address (SA)	SA > 255 OR SA = 0
	2	Add Message (AM)	AM < 1 or (≥ 4001 and ≤ 4094) or ≥ 4096
	3	Remove Message (RM)	RM (> -1 and < 1) or (≥ 4001 and ≤ 4094) or ≥ 4096
	2, 3	Add Message / Remove Message	AM = RM
	20, 22, 24, 26, 28, 30	Valid Variable ID (VID)	VID = 0 or < 0 or > 100
3	1	Read message queue for Sign Address (SA)	SA > 254 or SA = 0
	2	Read Register Index (RI) for message queue	RI > 6 or RI = 0
4	1	Read variable data for Sign Address (SA)	SA > 254 or SA = 0
	2	Read Register Index (RI) for variable data	RI > 9 or RI = 0

Sign Status

The Sign Status bit consists of two words that indicate whether the sign gave an acknowledge back to the Gateway.

When the Gateway receives an acknowledgement, it will clear (0) the appropriate bit. The Gateway will set the bit if the sign does not give an acknowledgement back after two attempts, 500 milliseconds apart.

- Word 1 — Bit 0 of the word is for the Output Data Table Integrity bit (ODTI). Bits 1-15 of the word contain the Error Status for sign addresses 1-15.
- Word 2 — Bits 0-15 of the word contain the Error Status for sign addresses 16-31.

Table 10: Word 1 of Input Data table

Word 1	Most Significant Byte								Least Significant Byte (ODTI = Output Data Table Integrity bit)							
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Sign Number	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	ODTI
Data	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 11: Word 2 of Input Data table

Word 2	Most Significant Byte								Least Significant Byte							
	Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Sign Number	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16
Data	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Clearing the Sign Status bits

There are two ways to clear the bits in words 0-2: all at once or individually:

- To clear all the bits in words 0-2, configure the Output Data table using the information found in step 1 of Table 12.
- To clear a bit in words 1 and 2 representing a specific sign address, configure the information in the Output Data table using the information found in step 2 of Table 12:

Table 12: Methods of clearing the Sign Status bits

Word	Step 1	Step 2
0	-1 (0xFFFF)	-1 (0xFFFF)
1	3	3
2	1-4000, 4095	0
Result	Clears words 0-2 of the Input Data table. Sets all bits to 0.	Clears only bit 3 in word 1 representing sign number 3.

Input Data table words 0 - 2 example

The following table shows information relating to Words 0, 1 and 2 in the Input Data table.

In this example, the Gateway has completed 100 operations (word 0). Bit 0 word 1 is set high (1) and is indicating that the Gateway is currently processing data or that the PLC sent invalid data. Bit 8 of word 1 and bits 1 and 2 of word 2 are set high (1) representing that the Gateway did not receive any response from sign numbers 8, 17, and 18:

Table 13: Input Data table example

Word	Decimal	MSB	LSB	MSB	LSB	Meaning
0	00100 operations	00	64	0000 0000	0110 0100	Operation Process Counter
1	00257	01	01	0000 0001	0000 0001	Error Status (#1-15) /Process Status
2	00006	00	06	0000 0000	0000 0110	Error Status (#16-31)

Requesting data from an Alpha[®] sign

When data is requested by the PLC, the PLC stores the requested information in words 4-15 of the Input Data table.

This data can either be currently running messages (in the Message Queue) or variable data from a sign. These words are reserved in the Input Data table that the Alpha[®] Gateway Interface uses only for returning message information or variable data to the PLC.

Requesting currently running messages in a sign

The Alpha[®] Gateway Interface allows you to read currently running messages in a sign's queue by using the Read Message Queue function.

The message queue allows for up to 64 messages running at one time on any given sign. These message numbers are stored in the sign's memory from registers 103 to 166. Register 103 represents the most recent

message number to be added. Register 166 represents the message number that has not been activated for the longest interval.

Since there are only 12 words available in the Input Data table for the requested data, the data is returned to the PLC in 6 groups of 12 words.

The group of 12 words that are returned to the PLC is determined by the Starting index (word 3 of the Output Data table). The Starting Index value and the associated registers that will be returned to the PLC are shown in the following section of the Output Data table.

Table 14: Requesting Message Queue data (Output Data table)

Word	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7
0	Control Word	3	3	3	3	3	3
1	Sign #	6	6	6	6	6	6
2	Starting Index	1	2	3	4	5	6
Meaning	Read registers from sign #6	Read registers 103-114	Read registers 115-126	Read registers 127-138	Read registers 139-150	Read registers 151-162	Read registers 163-166 NOTE: Words 8–15 set to -1d (0xFFFF)

The requested data is stored in the Input Data table in words 4 through 15.

Requesting variable data from a sign

The Gateway allows you to read the variable data that is currently stored in a sign.

All signs on the network will have the same variable data. There are 100 variable registers in a sign. This variable data is stored in the sign memory from registers 001 to 100. Since there are only 12 words available in the Input Data table for the requested data, the data is returned to the PLC in one of 9 groups of 12 words.

The group of 12 words that are returned to the PLC is determined by the Starting index (word 3 of the Output Data table).

The Starting index value and the associated registers that will be returned to the PLC are shown in the following section of the Output Data table:

Table 15: Requesting variable data (Output Data table)

Word	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8	Case 9
0	Control Word	4	4	4	4	4	4	4	4
1	Sign #	6	6	6	6	6	6	6	6
2	Starting Index	1	2	3	4	5	6	7	8
Meaning	Read registers from sign #6	Read registers 001-013	Read registers 014-026	Read registers 027-039	Read registers 040-052	Read registers 053-065	Read registers 066-078	Read registers 079-091	Read registers 092-100 NOTE: Words 13–15 set to -1d (0xFFFF)

The data requested will be sent back to the PLC using words 4–15 in the Input Data table.

