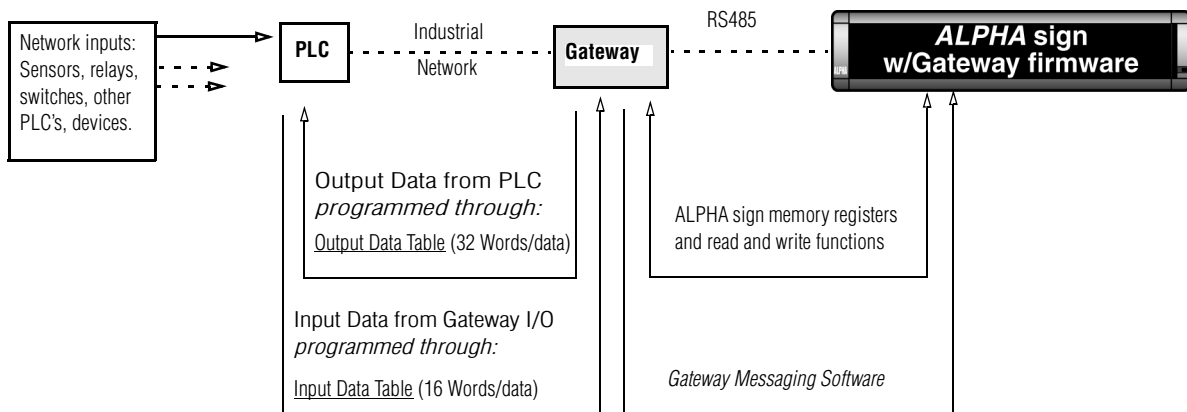


### Technical support

For additional information, programming examples and other data that may be available for your specific network configuration, check the Adaptive website, at: [www.ams-i.com/Pages/techdocs.htm](http://www.ams-i.com/Pages/techdocs.htm), in the Support, Technical Documentation area, and in the Gateway Forum section, under Support, Discussion Forums, at: [www.ams-i.com/cgi/wwwthreads/wwwthreads.pl](http://www.ams-i.com/cgi/wwwthreads/wwwthreads.pl)

### Introduction

This document outlines preliminary connection requirements for setting up a Gateway I/O device to act as an interface between a DeviceNet industrial network and an ALPHA sign network (as illustrated below).



**INFORMATION FLOW**—In a DeviceNet 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 Gateway interface, one sign), the PLC, Gateway interface, and sign are all capable of both sending and receiving data signals.

**NOTE: In the event of a communication failure between any two points of the information pathway (in the flow chart, above) messages may fail to display on a sign. See Related documents in the table, next page, for more information regarding initial setup and installation.**

If you are adding ALPHA signs to your network for the first time, it is recommended that you perform this installation sequence in the following order:

- Assemble connections between the ALPHA sign network and Gateway I/O device, so that you can begin using the *Gateway Messaging Software* to program your new displays. The basics of this procedure are outlined on Page 2 of the *Gateway Messaging Software* manual. This will allow you, at the same time, to get acquainted with the software, before you begin to install the Gateway I/O device and ALPHA signs on your DeviceNet network.
- Depending upon the distances between points of the network and the complexity of your mounting requirements, you might choose to complete full installation of the ALPHA network right away, or you may choose to finish that task in increments, connecting only a few signs at first, so that you can begin to initialize the messaging system to the PLC network.

**NOTE:** It is not particularly difficult to add extra signs to a network (see *Gateway Messaging Software* manual, page 4).

- Before you start programming the DeviceNet PLC to control message displays on the ALPHA network, complete the necessary sequence of steps to install the Gateway I/O device on your network. (Refer to the Adaptive website, addresses listed above, for more information and required reference data.)

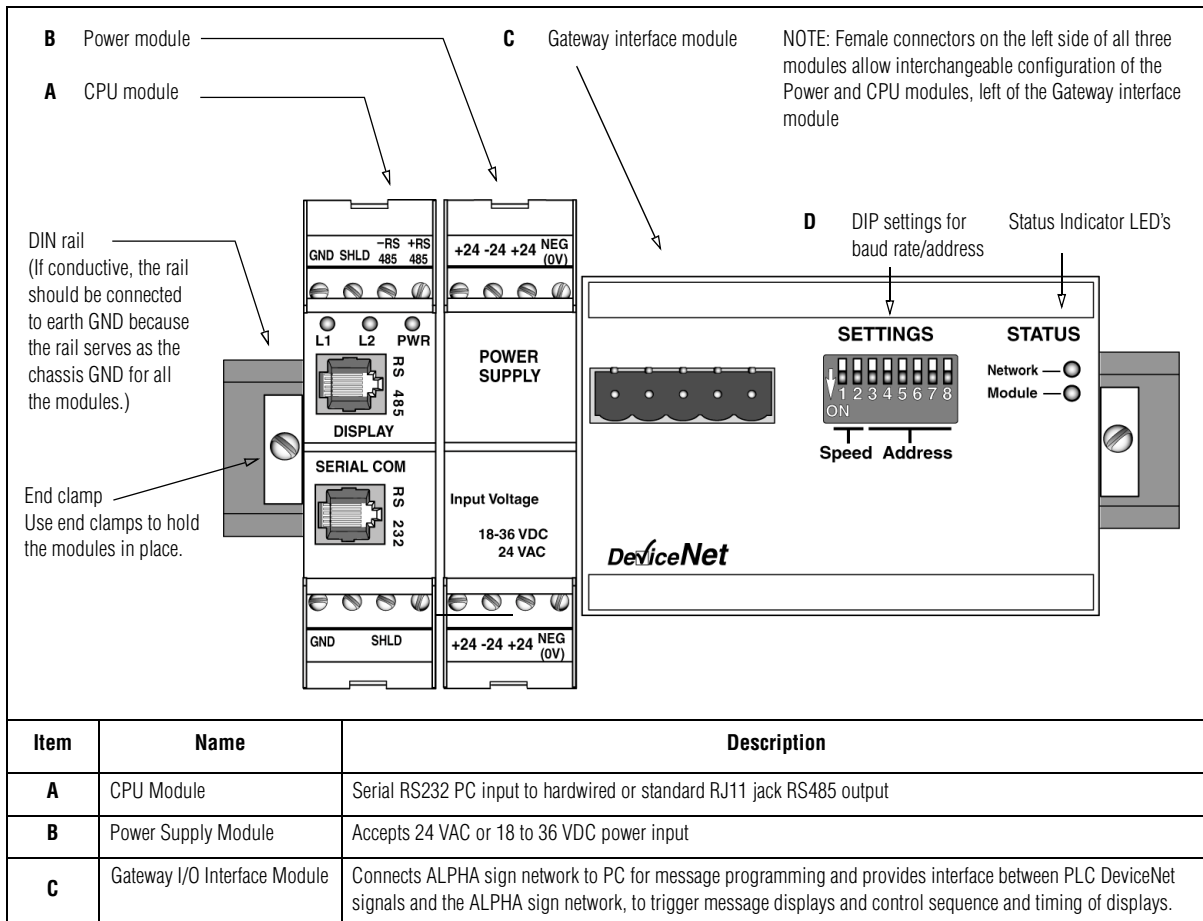
## Related documents

Document name	Part number	Description
Gateway Messaging Software User Manual	9711-8808	Describes how to use Adaptive's Gateway Messaging Software to store messages in ALPHA signs.
Network Configurations	9708-8046A	Explains how to network ALPHA signs. <i>NOTE:</i> For specific information on routing long distance RS-485 network connections, see <i>Appendix G</i> of the <i>Network Configurations</i> manual.
Also check the Adaptive website, <a href="http://www.ams-i.com/Pages/techdocs.htm">www.ams-i.com/Pages/techdocs.htm</a> , in the Support, Technical Documentation area, and in the Gateway Forum section, under Support, Discussion Forums, at: <a href="http://www.ams-i.com/cqi/wwwthreads/wwwthreads.pl">www.ams-i.com/cqi/wwwthreads/wwwthreads.pl</a>		

## Gateway interface

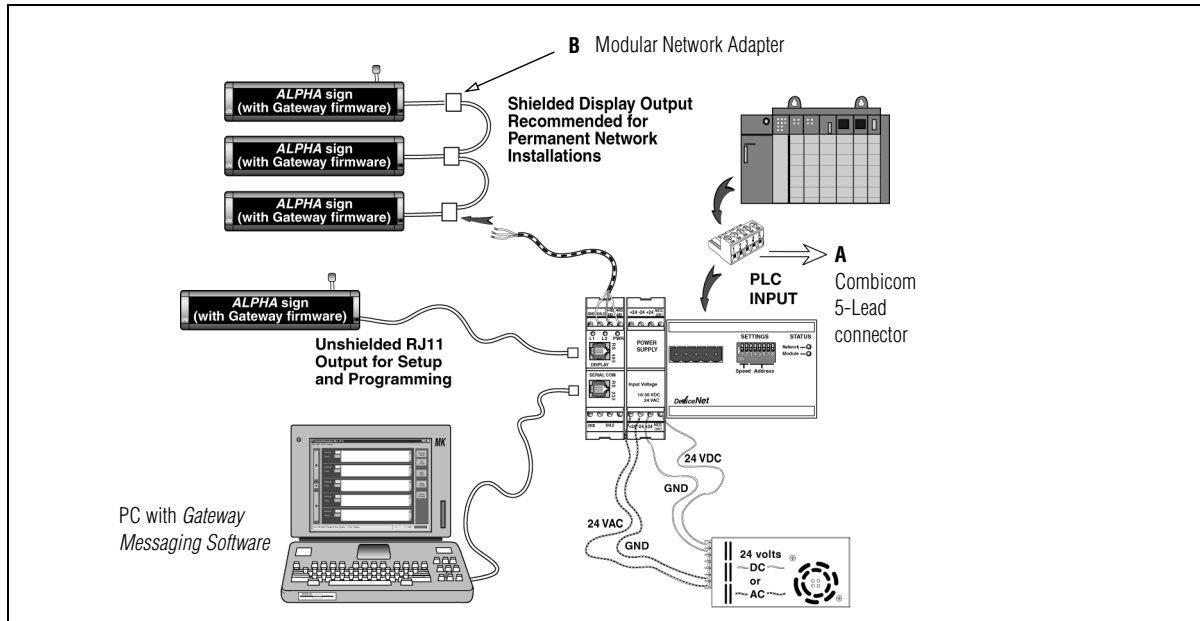
The Gateway interface is a 3-module unit allowing DeviceNet-to-serial communication interface unit. It allows data exchange between a DeviceNet host and ALPHA signs equipped with the Gateway firmware option.

- *Configuration*—CPU and power supply modules are configured interchangeably, always on the left side of the Gateway Interface module.
- *Set up*—DIP switches on the front of the Gateway Interface module are used to set the data transfer baud rate for data speed (switches 1 and 2) and set the specific node address (0 to 63). See tables, next page.
- *Status indicators*—Network and Module LEDs on the front panel of the Gateway Interface module provide status and diagnostic information. See table, below.

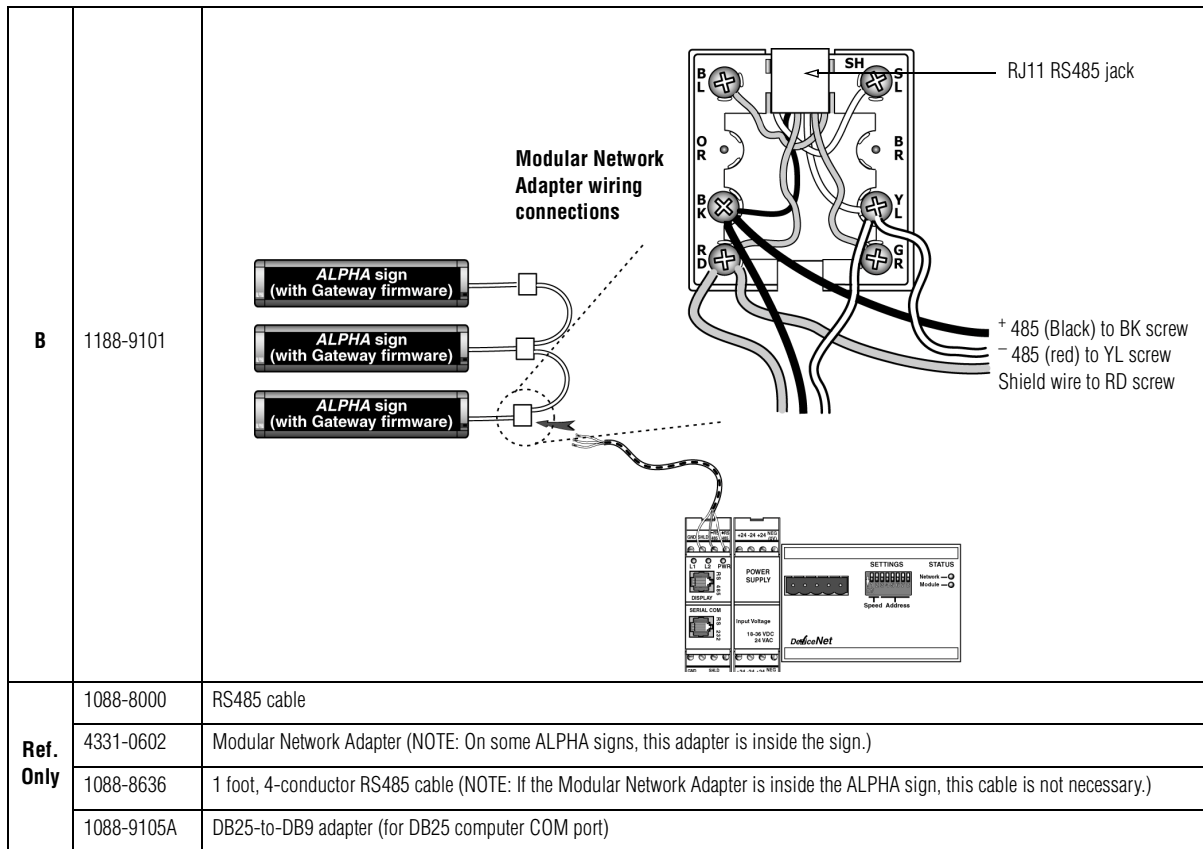


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	DIP Switch Address Setting Table	Used to set data transfer (baud) rate.  (See preceding table DIP 1-2, above.)																																																																																																																																																																																																																																																																																																																																																																																																			

# Gateway DeviceNET ALPHA network interconnection diagram



Item	Part #	Description																		
A	1188-0005	<p>Pin-out Diagram for DeviceNET "Combiom" style 5 lead connector (left).</p>																		
— (Ref. only)	—	<p>The standard DeviceNet DB9 serial interface configuration is shown below, for reference, in the event that other devices in the industrial network are configured for the DB9 serial connection.</p> <table border="1"> <tr><td>Pin 1</td><td>No connection</td></tr> <tr><td>Pin 2</td><td>Can_L</td></tr> <tr><td>Pin 3</td><td>V -</td></tr> <tr><td>Pin 4</td><td>No connection</td></tr> <tr><td>Pin 5</td><td>Shield</td></tr> <tr><td>Pin 6</td><td>Optional Ground (V-)</td></tr> <tr><td>Pin 7</td><td>Can_H</td></tr> <tr><td>Pin 8</td><td>No connection</td></tr> <tr><td>Pin 9</td><td>V +</td></tr> </table> <p>NOTE: REFERENCE-ONLY Other devices in your network may have DB9 DeviceNET connections.</p>	Pin 1	No connection	Pin 2	Can_L	Pin 3	V -	Pin 4	No connection	Pin 5	Shield	Pin 6	Optional Ground (V-)	Pin 7	Can_H	Pin 8	No connection	Pin 9	V +
Pin 1	No connection																			
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Pin 7	Can_H																			
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## Component Modules

The ALPHA Gateway I/O interface is built with three distinct modules that are described in the tables that follow. Note that the CPU module and Power module are physically interchangeable. Either one can be mounted next to the Gate3way Interface Module

- CPU Module — serves as an interface between the Gateway Module and ALPHA signs
- Power Module — supplies power to the CPU Module and Gateway Modules
- Gateway Module — I/O interface between the PLC and ALPHA network.

## Technical specifications

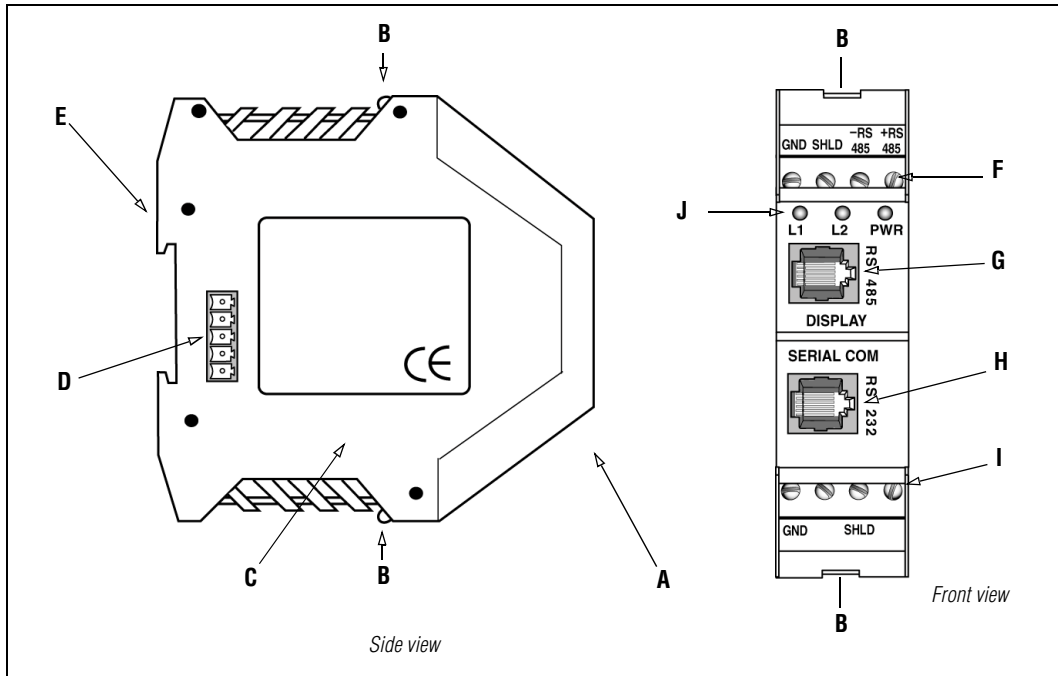
CPU and Power Modules Physical Data	
Dimensions:	2.75"W x 4.25"H x 1"D
Weight:	4 oz. per module
Operating temperature:	60°C
Humidity range:	10 – 95% non-condensing
Mounting:	DIN rail 35 x 7 mm
Power Module Operating Specifications	
AC input voltage <sup>1</sup>	
Max. AC voltage:	25 Vrms
Min. AC voltage: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

## Module descriptions

### CPU Module

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

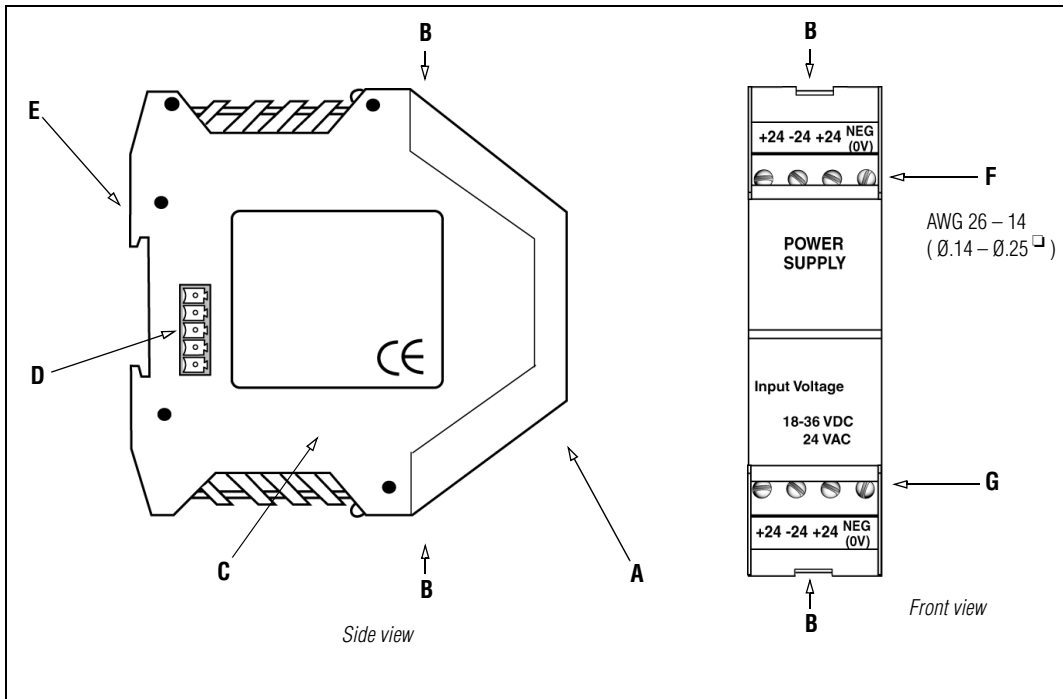


Item	Name	Description
A	Module Top	The internal PCB is attached to the Module Top.
B	Release Button	Depress each Release Button to remove the Module Bottom.
C	Module Bottom	Can be removed to expose internal PCB.
D	Intermodule Connector	Used to pass power and signals between modules. When attached to 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.  <b>Because of the signal protection afforded by shielding, this is the recommended way of connecting ALPHA signs to the CPU Module.</b>            To connect ALPHA signs, see "Creating messages using ALPHA Messaging software" on page 23.</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"> <li>• program messages into a sign</li> <li>• trigger messages already in a sign</li> </ul> <p><b>NOTE—See connection diagram on page 4 (This is not a telephone connector.)</b></p>

<b>H</b>	SERIAL COM	<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.  <b>This is not a telephone connector.</b>
<b>I</b>	SERIAL Input	<i>NOT USED.</i>
<b>J</b>	LED FUNCTIONS	Description:
L1 (Red)	Passthrough mode	Flashes once a second while downloading data to the Alpha sign network.
	Receiving data	Flashes briefly when receiving data from an Alpha sign
	Fault indication	Flashes when the Gateway encounters a fault.
L2 (Yellow)	Clearing variable data	Flashes continuously after power is cycled, clearing variable data/Alpha sign registers.
	Heartbeat	Flashes once every 500 ms to indicate that the Heartbeat is enabled.
Power/L3 (Green)	Transmitting data	Flashes when transmitting data to an Alpha display.
	Power Indicator	Always green while unit has power

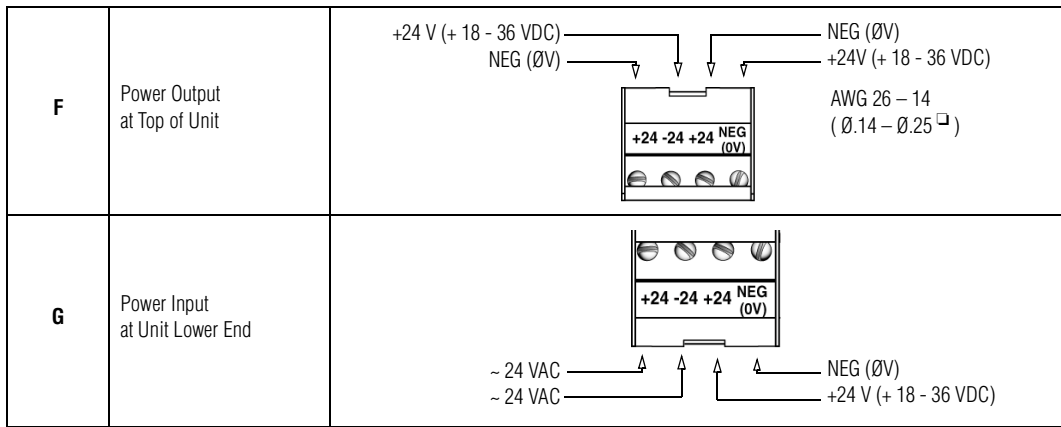
### Power Module

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

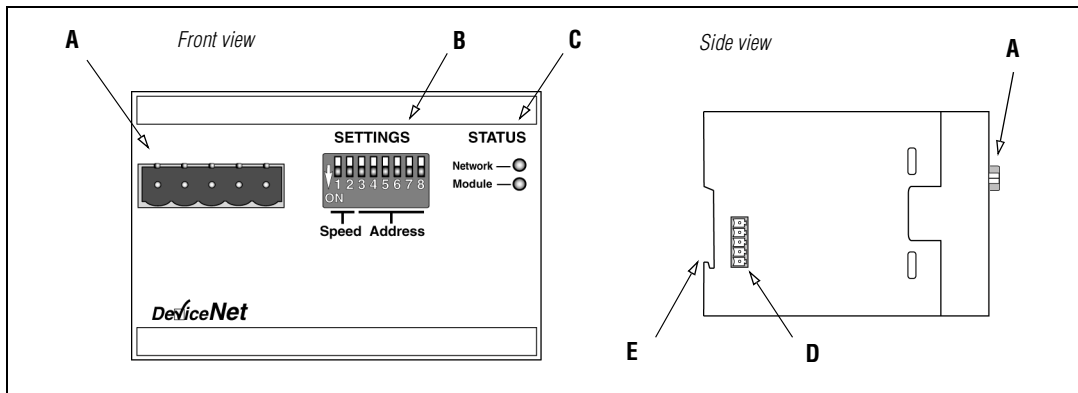


Item	Name	Description
<b>A</b>	Module Top	The internal PCB is attached to the Module Top.
<b>B</b>	Release Button	Depress each Release Button to remove the Module Bottom.
<b>C</b>	Module Bottom	Can be removed to expose the internal PCB.
<b>D</b>	Intermodule Connector	Used to pass power and signals between modules.
<b>E</b>	DIN rail latch	Used to attach the module to a DIN EN 50 Ø22 mounting rail.





### Gateway interface module



Item	Name	Description
<b>A</b>	DB9 female port	Connecting point to the PLC network
<b>B</b>	Baud Rate/Address DIP	Sets data transfer baud rate and network address. NOTE: See Address Configuration Info, item D in the description of the "Gateway interface" on page 2
<b>C</b>	Status	Network and module LED error indicators provide system status information. See LED status table in the description of the "Gateway interface" on page 2
<b>D</b>	Intermodule Connector	Used to pass power and signals between modules.
<b>E</b>	DIN rail latch	Used to attach the module to a DIN EN 5Ø Ø22 mounting rail.

<b>Spec. Table</b>	<b>Specification</b>	<b>Description</b>
	Dimensions	Width = 90mm x Height = 75mm x Depth = 105mm
	Weight	190 grams
	Voltage	Min = 4.75Volts; Typical = 5.00Volts; Max = 5.25Volts
	Current	Min = 300mA; Typical = 350 mA; Max = 450 mA
	Ambient Environmental Conditions	Temperature Range: 5° C– 60° C Humidity: 10%–95% (No condensation)
	Protection	In accordance with DeviceNet standards
	DeviceNET:	<ul style="list-style-type: none"> <li>• DeviceNet certification</li> <li>• Bus powered by embedded +5V supply</li> </ul>
	EMC Compliance	CE compliant
<b>Data Transfer</b>	Baud rates supported by DeviceNet: 125 kbit/s, 250 kbit/s, 500 kbit/s	

## Safety and troubleshooting

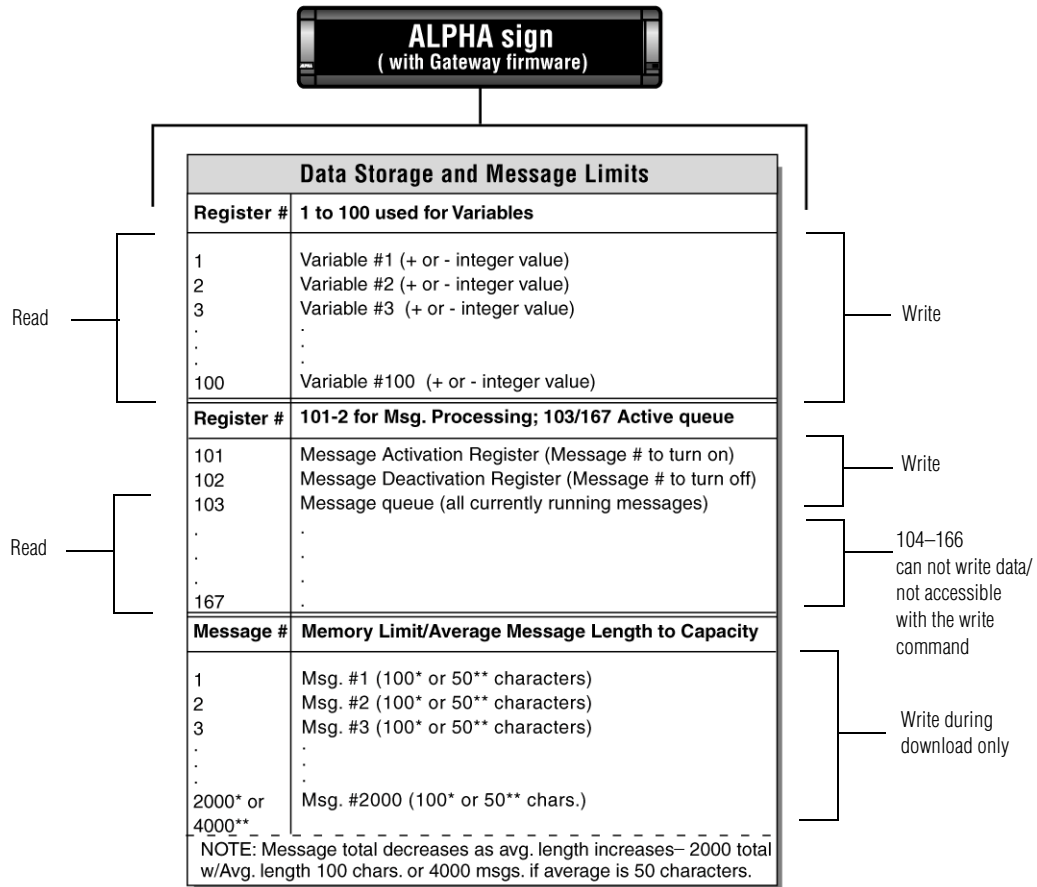
When successfully connected to a DeviceNET industrial network, there should **always** be some type of message on each ALPHA sign connected to this network:

PROBLEM:	No message appears on ALPHA sign	“No Network Activity” message appears on ALPHA sign	“NO BACKGROUND MESSAGE” <sup>1</sup> appears on ALPHA sign	Message Error—Specific message number is displayed, for example “Message # 0024”																							
Possible Causes	<ul style="list-style-type: none"> <li>Network wiring fault</li> <li>PLC fault</li> <li>ALPHA sign fault possible sign hardware failure or a PLC is trying to display a message that was not programmed into the sign.</li> <li>Message(s) too long for preset file size</li> <li>Not switched on/plugged</li> <li>The only character programmed into the message is a “space”.</li> </ul>	<ul style="list-style-type: none"> <li>Network wiring fault</li> <li>PLC fault</li> <li>ALPHA sign fault</li> <li>ALPHA sign timeout because there was no network activity for at least 3 seconds</li> <li>Gateway offline</li> </ul>	<ul style="list-style-type: none"> <li>Sign address not correct.</li> <li>The sign has not received any message to display. (This is not an error condition).</li> <li>Sign is receiving information, but the information is not for this sign.</li> <li>Sign has not received any valid serial data</li> </ul>	<ul style="list-style-type: none"> <li>“Blank message”: Either this message was never edited and never downloaded to the display, or</li> <li>Messages that are invalid (with <i>Gateway Messaging Software</i> syntax errors) never make it to the display, they can not be downloaded with invalid content.</li> </ul> <p>NOTE: The sign does not display “blank message” error (“Message # 0024”, for example), if another, valid message is already running. The sign will only display the “blank message” error code when display memory has no other valid content.</p>																							
<sup>1</sup> This is called the “background message”. The <i>Gateway Messaging Software</i> can be used to change the wording of this message.																											
LED Indicators Status Info	<table border="1"> <thead> <tr> <th>Module OFF</th> <th>Module Red</th> <th>Module Green</th> <th>Module Flashing</th> <th>Network OFF</th> <th>Network Red</th> <th>Network Green</th> <th>Network FlashGrn</th> <th>Network FlashRed</th> </tr> </thead> <tbody> <tr> <td>No power</td> <td>FAULT (Fatal)</td> <td>OK</td> <td>fault (minor)</td> <td>Off/offline or no pwr</td> <td>Critical link failure</td> <td>OK/Online Connected</td> <td>Online/no connect</td> <td>Connect TimeOut</td> </tr> </tbody> </table>									Module OFF	Module Red	Module Green	Module Flashing	Network OFF	Network Red	Network Green	Network FlashGrn	Network FlashRed	No power	FAULT (Fatal)	OK	fault (minor)	Off/offline or no pwr	Critical link failure	OK/Online Connected	Online/no connect	Connect TimeOut
Module OFF	Module Red	Module Green	Module Flashing	Network OFF	Network Red	Network Green	Network FlashGrn	Network FlashRed																			
No power	FAULT (Fatal)	OK	fault (minor)	Off/offline or no pwr	Critical link failure	OK/Online Connected	Online/no connect	Connect TimeOut																			

## Network/Gateway data pathway

The Adaptive Gateway allows for the exchange of data between a PLC and an ALPHA sign(s) to activate messages and show real-time data on a system. The Gateway 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 displays can be addressed from 001 to 255 by using the handheld remote control. (See the *Gateway Messaging Software* manual; messages are created in *Gateway Messaging Software*, 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 roller coaster link following table shows signs memory allocations and meaning.

### How messages and variables are stored inside ALPHA signs



### Installing the Gateway I/O interface

Before you configure the Gateway on the network, set the node address with the two rotary switches on the face of the module (available addresses from 1 to 99; 0 is not a valid address for the Gateway interface module.) Once the Gateway is configured, the node address can't be changed during operation.

### DeviceNet .EDS file.

Each device on a DeviceNet network is associated with an \*.eds file, which contains all the necessary information about the Gateway. This file is used when configuring the Gateway on a DeviceNet network. After the *Gateway Messaging Software* is installed on your system (for example, to your c: drive), the file can be located under C:\Program Files\Adaptive Micro Systems\Gateway Messaging Software\\*.eds. When loading the.esd file 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.