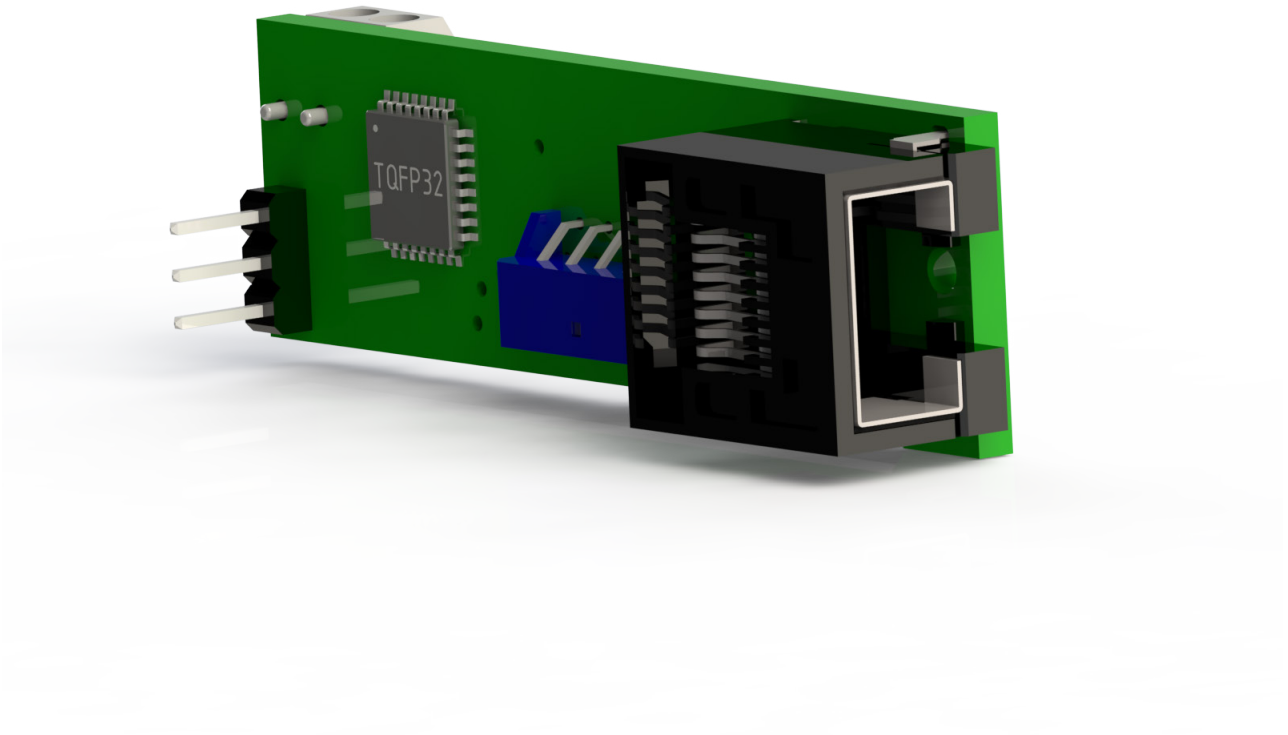
AUTOMATIONDIRECT.com

# IRONHORSE™

## GSDA-CM-8 ASCII Communications Module
## User Manual

***User Manual Number: GSDA-CM-8***



## ~ WARNING ~

Thank you for purchasing automation equipment from Automationdirect.com®, doing business as AutomationDirect. We want your new automation equipment to operate safely. Anyone who installs or uses this equipment should read this publication (and any other relevant publications) before installing or operating the equipment.

To minimize the risk of potential safety problems, you should follow all applicable local and national codes that regulate the installation and operation of your equipment. These codes vary from area to area and usually change with time. It is your responsibility to determine which codes should be followed, and to verify that the equipment, installation, and operation is in compliance with the latest revision of these codes.

At a minimum, you should follow all applicable sections of the National Fire Code, National Electrical Code, and the codes of the National Electrical Manufacturer's Association (NEMA). There may be local regulatory or government offices that can also help determine which codes and standards are necessary for safe installation and operation.

Equipment damage or serious injury to personnel can result from the failure to follow all applicable codes and standards. We do not guarantee the products described in this publication are suitable for your particular application, nor do we assume any responsibility for your product design, installation, or operation.

Our products are not fault-tolerant and are not designed, manufactured or intended for use or resale as on-line control equipment in hazardous environments requiring fail-safe performance, such as in the operation of nuclear facilities, aircraft navigation or communication systems, air traffic control, direct life support machines, or weapons systems, in which the failure of the product could lead directly to death, personal injury, or severe physical or environmental damage ("High Risk Activities"). AutomationDirect specifically disclaims any expressed or implied warranty of fitness for High Risk Activities.

For additional warranty and safety information, see the Terms and Conditions section of our catalog. If you have any questions concerning the installation or operation of this equipment, or if you need additional information, please call us at 770-844-4200.

This publication is based on information that was available at the time it was printed. At AutomationDirect we constantly strive to improve our products and services, so we reserve the right to make changes to the products and/or publications at any time without notice and without any obligation. This publication may also discuss features that may not be available in certain revisions of the product.

## Trademarks

This publication may contain references to products produced and/or offered by other companies. The product and company names may be trademarked and are the sole property of their respective owners. AutomationDirect disclaims any proprietary interest in the marks and names of others.



## Publication History

| User Manual Publication History | | |
|---|---|---|
| ***Issue*** | ***Date*** | ***Description*** |
| First Edition | 06/25/19 | Initial release |
| 1st Edition Rev. A | 10/15/19 | Minor revisions |
| 1st Edition Rev. B | 01/29/25 | Fix to page count |

## Contents

# GSDA-CM-8 User Manual Overview

## Overview of this Publication

The IronHorse GSDA-CM-8 User Manual describes the installation, configuration, and methods of operation of the GSDA-CM-8 ASCII Communications Module.

All information contained in this manual is intended to be correct. However, information and data in this manual are subject to change without notice. AutomationDirect (ADC) makes no warranty of any kind with regard to this information or data. Further, ADC is not responsible for any omissions or errors or consequential damage caused by the user of the product. ADC reserves the right to make manufacturing changes which may not be included in this manual.

## Who Should Read This User Manual

This manual contains important information for those who will install, maintain, and/or operate the GSDA-CM-8 ASCII Communications Module.

## Technical Support

**By Telephone: 800-633-0405 (Mon.–Fri., 9:00 a.m.–6:00 p.m. E.T.)**

**On the Web: www.automationdirect.com**

Our technical support group is glad to work with you in answering your questions. If you cannot find the solution to your particular application, or, if for any reason you need additional technical assistance, please call Technical Support at 800-633-0405. We are available weekdays from 9:00 a.m. to 6:00 p.m. Eastern Time.

We also encourage you to visit our web site where you can find technical and non-technical information about our products and our company. Visit us at www.automationdirect.com.

## Special Symbols

*NOTE: When you see the "notepad" icon in the left-hand margin, the paragraph to its immediate right will be a special note.*

***WARNING: When you see the "exclamation mark" icon in the left-hand margin, the paragraph to its immediate right will be a WARNING. This information could prevent injury, loss of property, or even death (in extreme cases).***

# IronHorse GSDA-CM-8 General Information

## Standard Features

- *RS-232 or RS-485 serial communications*
- *Auto/Manual Switch to enable/disable the option card*
- *Analog Input, potentiometer, 0 to +5VDC, 4 to 20mA*
- *Analog input configurable for Target Speed, % of Target, Frequency Generator Rate, Main Tach signal, or Leader Tach signal*
- *Frequency Generator Output, configurable as a general purpose output*
- *ASCII command and control of the GSD8 drive*

### Warranty

AutomationDirect, Inc. (ADC) warrants its products to be free from defects in material and workmanship. The exclusive remedy for this warranty is ADC factory replacement of any part or parts of such product which shall within 12 months after delivery to the purchaser be returned to ADC factory with all transportation charges prepaid and which ADC determines to its satisfaction to be defective. This warranty shall not extend to defects in assembly by other than ADC or to any article which has been repaired or altered by other than ADC or to any article which ADC determines has been subjected to improper use. ADC assumes no responsibility for the design characteristics of any unit or its operation in any circuit or assembly. This warranty is in lieu of all other warranties, express or implied; all other liabilities or obligations on the part of ADC, including consequential damages, are hereby expressly excluded.

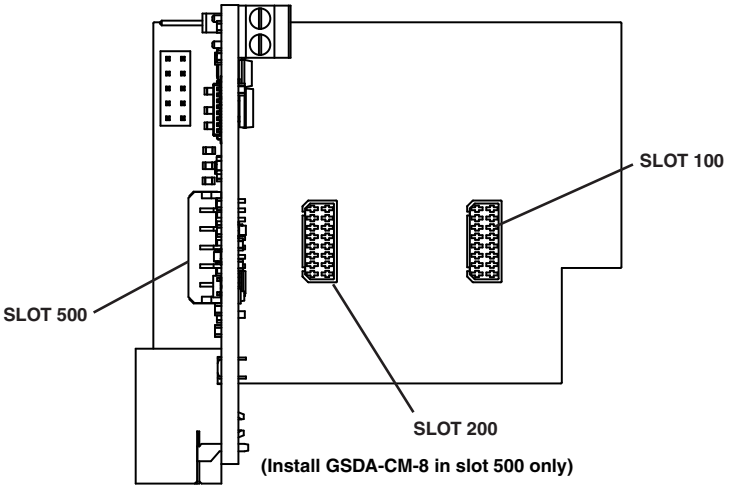
*NOTE: Carefully check the GSDA-CM-8 for shipping damage. Report any damage to the carrier immediately. Do not attempt to install the card if visible damage is evident to either the circuit or to the electronic components.*

## GSDA-CM-8 Overview

The GSDA-CM-8 is an AutomationDirect ASCII “option card” featuring RS-232 or RS-485 serial communications and additional features. RS-232 or RS-485 communication is controlled by the position of the P3 jumper and software parameter setup. Baud rate is configurable from 300 to 57600. In addition, the GSDA-CM-8 can output a square wave frequency from 4 pulses per minute to 9999 ppm. An analog input is also available which can be configured for several different functions. Additionally, the GSDA-CM-8 can drive the “Auto/Manual” LED Annunciator to display whether the source of the Target setting comes from the analog input or from the “Front Panel” (“Manual”).

In “Manual” mode, the GSD8 Drive uses the front panel display and the Up/Down buttons to set the Target Speed (or Time). The value in Parameter 120: Auto/Manual Master Slot, determines whether or not the GSD8 drive will follow the GSDA-CM-8 master reference. The Auto/Manual master can be assigned to any slot, with the card in the assigned slot is responsible for setting the “Auto/Manual” mode for the drive. If the GSDA-CM-8 option card is in the Auto/Manual master slot and the GSDA-CM-8 jumper is in place for Auto mode, then the drive will also be in Auto mode. The GSD8 drive will then accept the target speed setting from the option card. Whether or not the GSD8 drive follows the GSDA-CM-8 analog input source depends on the analog input routing option on the serial card. If the card is the Auto/Manual master and is in “Auto” mode, then there are several ways the GSDA-CM-8 can change the target speed. In Auto or Manual mode, the GSDA-CM-8 serial communications output provides a real time data stream that reports the GSD8 driven motor Actual (Tach) speed. This can be used by a SCADA system to provide “feedback” that the SCADA speed setting was received and acted upon by the GSD8 Drive.

### Installing the GSDA-CM-8 in Slot 500 of the GSD8 Drive



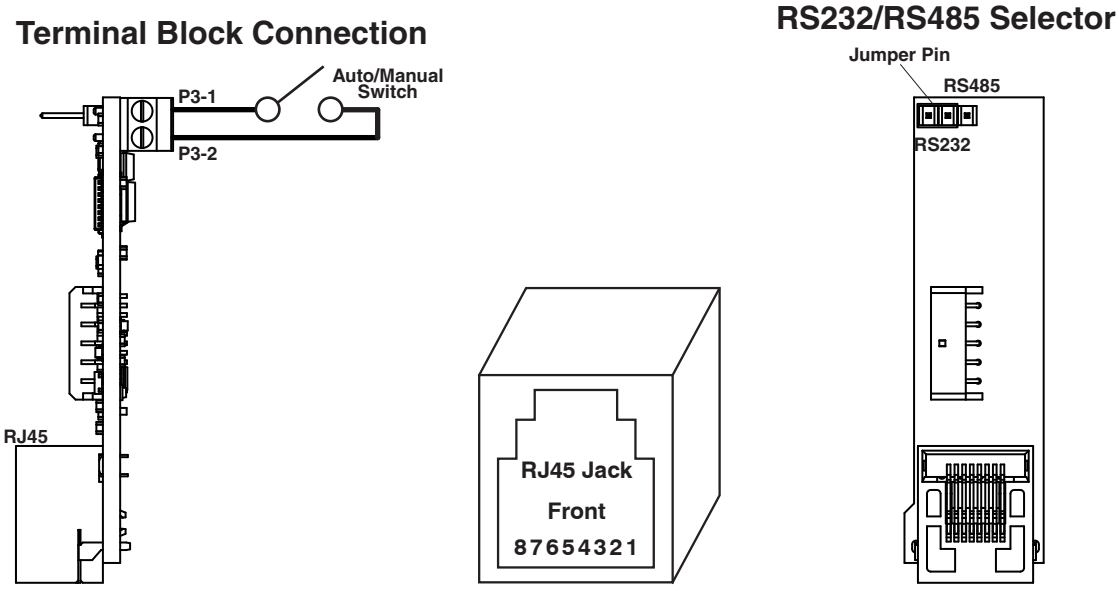

The GSDA-CM-8 is configured with default values that provide a checkout procedure to verify that the network is connected correctly and functioning. See the GSDA-CM-8 Item (Parameter) Table for further details.

When the GSDA-CM-8 is first installed, the following message will appear on the GSD8 drive display:

"Configuration Change -- Card in slot is different than stored configuration -- Up button to store factory defaults….Down button to ignore card."

If the Up button is pushed, the factory settings will be installed and the card will be initialized. If the Down button is pushed, the factory settings will NOT be installed and the card will NOT be initialized.

### GSDA-CM-8 P3 Terminal Block Hook-Up Diagram




### GSDA-CM-8 P3 Terminal Block Description

| Terminal Block Descriptions | |
|---|---|
| ***Terminal*** | ***Description*** |
| P3-1 | (COM) – This is common point for the control logic. |
| P3-2 | (SW) – In the open position, the control is in "Manual" mode. When this terminal is connected to common, the control is in "Auto" mode. |

## Using the Analog Input

The GSDA-CM-8 has a built-in analog to digital converter. This input may be used in lieu of a digital pick-up signal or to control Target speed, current program, or frequency generator output frequency. To use this input with a potentiometer source, connect a pot wiper to Pin 7 of the serial interface port, pot high to the +5V terminal, pot low to the Common terminal. The pot should have a resistance from 500 to 5k ohms. Parameters 5040-5043 set destination source type and range for the analog input. Adjusting the values in parameters 5042 and 5043 allows the pot source range to be scaled between the "Analog Input Minimum" and "Analog Input Maximum" values. A 0 to +5V signal may be used instead of a potentiometer, connect signal to pin 7 of RJ45 and common to pin 6 of the RJ45 (P2-6). Parameter 5041 should be set for source type.

| ***RJ45 Pin*** | ***Signal Description*** |
|---|---|
| 1 | RS232 Rx (Receive data) |
| 2 | No Connect |
| 3 | TxD+, RxD+ (+transmit/receive data line) |
| 4 | TxD-, RxD- (-transmit/receive data line) |
| 5 | Frequency generator out (Do not use for RS232 communications) |
| ***6*** | ***Circuit Common, Signal Ground*** |
| ***7*** | ***Analog Input (0 to 5 VDC)*** |
| 8 | RS232 Tx (Transmit data) |

### *Overview*

The GSDA-CM-8 analog input uses 2 pins on the RJ45 "modular" connector, and can be used with a variety of signals. The signal from the analog input source can be used to provide control or "feedback" information to the GSD8 drive. This application note will cover five major topics:

- *Types of Signal Sources*
- *Analog Source Signal Processing*
- *Analog Source Signal Assignment*
- *Analog Source Signal Configuration*
- *Analog Source Signal Processing*

### *Types of Signal Sources*

The analog input of the GSDA-CM-8 has been designed to use three types of analog signal sources:

- *Potentiometer (500W to 5kW only)*
- *0 to +5VDC Voltage Source (source impedance < 5kW)*
- *4 to 20mA Current Source (impedance = 250Ω 0.1%, customer supplied)*

*NOTE: Signals should be 0 to +5 VDC ONLY!*

### *Analog Source Signal Processing*

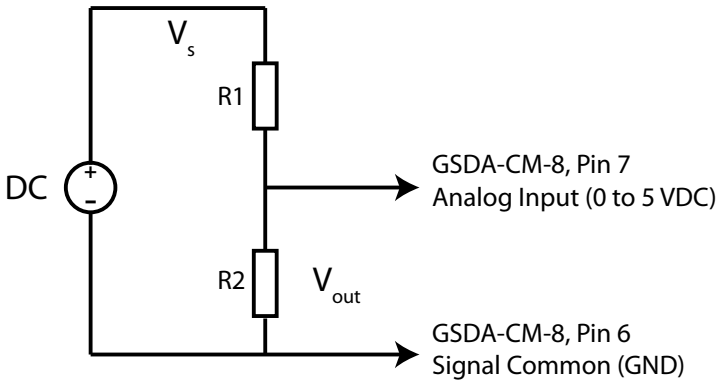
Correctly selecting the signal source type is important to insure optimum performance of the drive when using the signal. Processing of the signal source type by the GSDA-CM-8 is explained in the sections below.

#### *Potentiometer Input:*

Noise can be a problem when using a potentiometer input signal. In order to prevent the GSD8 drive from responding to such noise, the selection of the "Potentiometer" type of input sets a deadband that filters the potentiometer input. From zero speed, the deadband filters changes of less than 10%; requiring a change of 10% or more in the potentiometer input signal before the GSD8 drive will respond. With the drive running at speeds greater than zero, the deadband changes to filter input signal changes of less than 5%.

### *Voltage Source Input:*

By selecting the voltage source type, the GSD8 drive will track a rapidly changing analog input signal. The GSDA-CM-8 samples the analog input signal at the rate of 50 milliseconds. Intended primarily as a feedback signal, replacing an encoder feedback signal or a leader signal when in a master/follower application; voltage values tracked in this mode are not stored in non-volatile memory and so are lost when power to the drive is turned off. This should be considered when choosing this source type. Though designed for 0 to +5 VDC signals, other positive voltage ranges such as 0 to +10VDC can be accommodated through the use of an external voltage divider circuit. Input impedance is approximately 15.4 kohms.




Voltage Divider - Resistor Values

Formula: $V_{out} = V_s \times R2/(R1+R2)$

Where:
- $V_{out}$ = Desired output voltage
- $V_s$ = Source voltage
- R1 = Resistance of the 1st resistor in ohms
- R2 = Resistance of the 2nd resistor in ohms

| $V_s$ | R1* | R2* | $V_{out}$ | Watts |
|---|---|---|---|---|
| 0-10 | 20 | 20.00 | 0-5 | 0-0.5 |
| 0-12 | 24 | 17.14 | 0-5 | 0-0.5 |
| 0-14 | 28 | 15.56 | 0-5 | 0-0.5 |
| 0-16 | 32 | 14.55 | 0-5 | 0-0.5 |
| 0-18 | 36 | 13.85 | 0-5 | 0-0.5 |
| 0-20 | 40 | 13.33 | 0-5 | 0-0.5 |

** 0.5 W*

### *4 to 20mA Current Source Input:*

A 4 to 20 mA current source type is tracked by the GSD8 drive at a 50 millisecond sample rate; in the same way as the voltage source signal type. The 4 to 20 mA range of the signal is fixed such that values less than 4mA and greater than 20mA are treated as minimum and maximum values respectively. The use of a milliamp signal requires an external resistor, typically 250 ohms, with a precision of 0.1%. Resistors with higher precision values of 1% or 5% can affect accuracy and contribute to drift errors. Proper wiring and the correct resistance value are addressed in subsequent pages.

### *Analog Source Signal Assignment*

An analog input signal connected to the GSDA-CM-8 can be assigned to one of several different functions. With the exception of the “Frequency Generator”, there is no restriction on what type of signal source can be assigned to a given function. There are six possible analog input signal functions. They are:

- *NONE (Analog Input Ignored)*
- *Target “Speed” Setting*
- *Percent of Target Setting*
- *Frequency Generator Rate*
- *Main “Tach” signal (replaces regular pickup)*
- *Leader “Tach” signal (replaces regular signal)*

The possible types of analog input sources for each destination are shown below:

| Analog Input Sources | | | |
|---|---|---|---|
| ***Destination*** | ***Pot*** | ***Voltage*** | ***Current*** |
| ***Target Speed*** | Y | Y | Y |
| ***% of Target*** | Y | Y | Y |
| ***Freq. Gen.*** | Y | N | N |
| ***Main “Tach”*** | Y | Y | Y |
| ***Leader “Tach”*** | Y | Y | Y |

*NOTE: If the analog input is assigned to a function that can also be controlled from the front panel of the GSD8 drive or with serial communications messages, then any of those sources can change the value associated with that function. The value of that function will be the value written most recently from any source that has access to it. This flexibility should be considered when designing the system in which the GSD8 drive will be used. Reference the manual for the "Program Enable Jumper", JP1, for details on how to lock-out functions so that they cannot be changed from the GSD8 front panel.*

***WARNING: When an analog input source type is configured as "Main Tach" or "Leader Tach" signal; DO NOT connect a signal source to the GSD8 terminal strip, terminal P1-7. Connection to this terminal will not damage the GSD8 drive, but it will lead to unpredictable results due to the second signal.***

### Analog Source Signal Configuration

Configuring the GSD8 drive to use the analog source signal involves several steps; these are:

- *Analog Source Signal Destination*
- *Analog Source Signal Type*
- *Analog Source Signal Minimum Value*
- *Analog Source Signal Maximum Value*

***Minimum Value:***

"Minimum Value" refers to the lowest scaled value produced by the GSDA-CM-8, A to D converter when the analog source signal is at the lowest value.

- *For a potentiometer source signal, minimum value occurs with the potentiometer wiper at the closest position to the potentiometer terminal connected to the GSDA-CM-8, signal common; resulting in zero volts on the wiper.*
- *For a voltage source signal, minimum value equates to zero volts when measured between the analog voltage source and signal common.*
- *For current sources, the minimum value is obtained with a current of 4mA or less.*

***Maximum Value:***

"Maximum Value" refers to the highest scaled value produced by the GSDA-CM-8, A to D converter when the analog source signal is at the highest or most positive value.

- *For a potentiometer source signal, maximum value occurs with the potentiometer wiper at the closest position to the potentiometer terminal connected to the GSDA-CM-8, +5VDC connection; resulting in +5 volts on the wiper.*
- *For voltage sources, that means +5VDC measured between the analog input and signal common.*
- *For current sources, the maximum value is obtained with a current of 20mA.*

### Setting Minimum and Maximum Values

Analog input signals are typically scaled to engineering units that correspond to the engineering range of the signal.

Analog input signal resolution is a function of the A/D converter in the GSDA-CM-8 and that resolution varies depending on whether the analog input is a voltage or milliamp signal. For potentiometer and voltage sources, resolution is 1024 parts. For current source signals (4 to 20mA), resolution is 810 parts.

Resolution determines the smallest amount of change that can be processed by the A/D converter and as a result how closely the analog signal can be tracked.

For example, an analog input signal in the range of 0 to 5 VDC has a span of 5 volts, that span is divided into 1024 parts or counts by the A/D converter. Therefore, the A/D converter will process digital values equivalent to 0.00488 volts per count.

Applying an engineering range to the signal provides both the "Minimum Numeric Value" (parameter 42) and the "Maximimum Numeric Value" (parameter 43) that will be produced as a result of the A/D conversion.

If in this example the "Minimum Numeric Value" is zero (0) and the "Maximum Numeric Value" is 1000, then the A/D converter will produce the numeric value zero (0) with an analog input voltage of zero volts and a numeric value of 1000 with an analog input voltage of 5 volts.

The engineering range of 0 to 1000 results in an engineering span of 1000 units, divided by the A/D converter resolution of 1024 parts to produce a minimum engineering value of 0.976 per count.

The minimum engineering value represents the smallest amount of change that can be processed by the A/D converter.

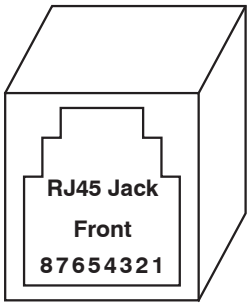
Mathematically, the example looks like this:

Analog input signal = 2.5V / 0.00488V (A/D converter minimum voltage per count) = 512 counts (digital equivalent) * 0.976 (minimum engineering value per count) = 499 engineering units.

Notice that the engineering value is 499 , rather than the expected 500. This is due to a rounding error that occurs in the analog to digital conversion. The actual conversion value of 512.29 cannot be produced by the A/D converter and is rounded down to 512.

### Analog Source Signal Connection

The drawing below of the female RJ45 "modular" connector on the GSDA-CM-8 describes the pins that are used for analog input as well as the other pins on the connector.



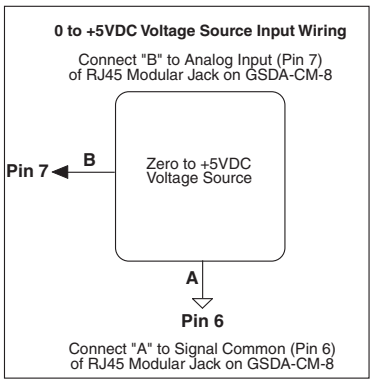

| RJ45 Pin | Signal Description |
|---|---|
| 1 | RS232 Rx (Receive data) |
| 2 | No Connect |
| 3 | TxD+, RxD+ (+transmit/receive data line) |
| 4 | TxD-, RxD- (-transmit/receive data line) |
| 5 | Frequency generator out (Do not use for RS232 communications) |
| ***6*** | ***Circuit Common, Signal Ground*** |
| ***7*** | ***Analog Input (0 to 5 VDC)*** |
| 8 | RS232 Tx (Transmit data) |

An eight conductor RJ45 male and an eight conductor modular cable are required to use the analog input (such as ZL-RTB-RJ45 available at www.automationdirect.com). A six position RJ12 connector may also be used as an alternative. An external resistor or an external potentiometer may be needed depending on the type of signal you will be using. Wiring for the various signal input configurations is shown below.

### Wiring Diagrams for Each Source Type

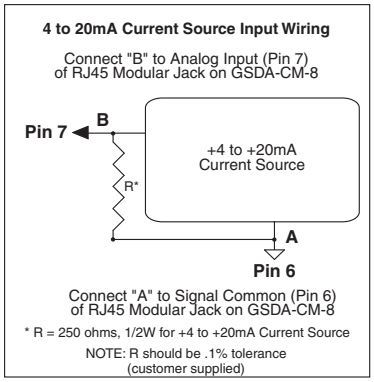
Below are three diagrams showing the basic input wiring necessary for each type of analog input source.

***WARNING:*** ***The optimum signal range that can be safely applied to the analog input is from 0.0VDC to +20VDC. Signals in excess of +20VDC can result in permanent damage to the GSDA-CM-8. For proper operation, the useful signal range is zero to +5VDC.***



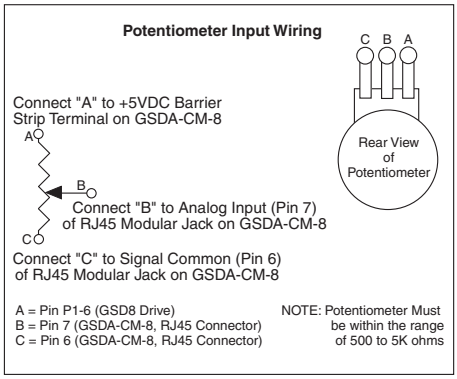

Mode: 0-5Vdc:

| Parameter | Value | Description |
|---|---|---|
| 120 | 2 | Slot 500 |
| 5040 | 1 | Target Speed |
| 5041 | 2 | 0-5Vdc Input |




Mode: 4-20mA:

| Parameter | Value | Description |
|---|---|---|
| 120 | 2 | Slot 500 |
| 5040 | 1 | Target Speed |
| 5041 | 3 | 4-20mA Input |




Mode: Potentiometer:

| Parameter | Value | Description |
|---|---|---|
| 120 | 2 | Slot 500 |
| 5040 | 1 | Target Speed |
| 5041 | 1 | Potentiometer Input |

*NOTE: All three of these Analog Inputs will retain their setting if the AC power is cycled OFF/ON.*

## User-Assignable Output

### Parameter 5030 = 4

The GSDA-CM-8 includes an advanced User-Assignable Output. This feature allows the user to customize the physical output circuit normally used as a Frequency Generator Output for use as a general-purpose output capable of driving LEDs, small relays, solid-state alarm modules, and similar devices. This output is an Open-Collector NPN transistor which is capable of sinking a maximum of 50mA up to 15 volts DC. Pin 5, "Frequency Generator Out" and pin 6, "Circuit Common" are used to connect the output to the desired output device. The output can be configured as up to eleven different conditions, such as "Pickup Stalled" and "Actual Speed Outside Limits" by using its assignment matrix switches. See main control manual Alarm Logic section. Through the use of the inverter matrix switches in the main control manual Alarm Logic section, the opposite of any condition(s) can be used instead ("Pickup not Stalled", "Actual Speed Limit not Exceeded", etc.) for even more flexibility. Additionally, the output can be set to either Normally Open (N.O.) or Normally Closed (N.C.) operation with the Output Selection Switch, parameter 5031. See the main control manual Item Descriptions section for details. This output arrangement provides the user with literally hundreds of possible combinations, while keeping the actual electronic complexity (and cost) of the control to a minimum.

There are two different ways that the circuitry of the User-Assignable Output can be expressed. For those familiar with digital logic symbols, please refer to the figure on the main control manual Alarm Logic section for a circuit description. Otherwise, you can use Ladder Logic symbology.

### Using the Frequency Generator Output

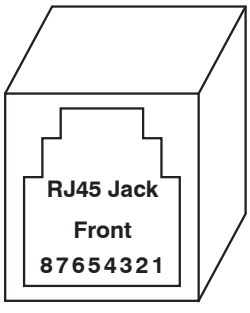
### Parameter 5030 = 1, 2, or 3

The GSDA-CM-8 has a frequency generator output that can be used as the leader signal to drive a network of followers. The GSDA-CM-8 that is generating this signal can even follow its own generator's output. This allows a ratio system to operate without a dedicated leader motor and pick-up. To follow this signal, connect pin 5 of the RJ45 connector to the spare input (P1-8) of the follower GSDA-CM-8 controls. This signal may also drive the master input of other ADC controls such as the GSDA-DP-D, GSD8-240-5C, and GSD8-240-5C-D.

The frequency generator output is available on pin 5 of the RJ45 connector. The common for this signal is available either from pin 6 of the RJ45 connector or from the main terminal block P1-5. Use only one of these common terminals to make electrical connections between devices. The output is an Open-Collector NPN transistor which is capable of sinking a maximum of 50mA up to 15 volts DC. The frequency of this output is set using parameters 5032, 5033, and 5034. The frequency, set in pulses per minute, has a range of 4 to 9999 PPM. To change this frequency using the front panel pushbuttons, parameter 5032 must be set to the new value.

Example: Parameter 5032 set for a value of 7200. (7200/60 secs = 120 pulses/sec)

The RJ45 connector pin out is as follows:




| RJ45 Pin | Signal Description |
|---|---|
| 1 | RS232 Rx (Receive data) |
| 2 | No Connect |
| 3 | TxD+, RxD+ (+transmit/receive data line) |
| 4 | TxD-, RxD- (-transmit/receive data line) |
| ***5*** | ***Frequency generator out (Do not use for RS232 communications)*** |
| ***6*** | ***Circuit Common, Signal Ground*** |
| 7 | Analog Input (0 to 5 VDC) |
| 8 | RS232 Tx (Transmit data) |

***WARNING: DO NOT CONNECT THE GSDA-CM-8 DIRECTLY TO THE PHONE SYSTEM! PERMANENT DAMAGE TO THE CONTROL WILL RESULT.***

## Communications and Networking

The GSDA-CM-8 can be connected through its built-in RS-232/422/485 serial port to a terminal, computer, process controller, or various other devices to greatly expand its ability to report in many ways. Communication with the GSDA-CM-8 requires only an ordinary serial port, rather than special network hardware or "transporter" cards. A convenient jumper block in the GSDA-CM-8 is used to select either RS-232 or RS-422/485 communications. This section discusses the hardware and software issues involved in communicating with the GSDA-CM-8.

## Commonly Used Software

When using a computer to configure the GSDA-CM-8 series controls, the following are required:

- *A computer with either an RS-232 or RS-485 communications port or with a USB serial adapter. The RS-232 or RS-485 port will typically be either a DB-9 or DB-25 male connector.*
- *A software package that allows the computer to communicate with a selected com port.*

You will need to configure the software to allow it to communicate with the GSDA-CM-8 Serial Card. These products ship with their serial communications port set at 9600 baud, 8 data bits, and 1 stop bit. Setting the terminal program to half duplex—sometimes called local echo—will allow the user to see the text as they type. It is also very important that the flow-control setting be set to OFF.

Read the next several pages for more information on serial communications.

## Hardware - Jumper Selection

### *RS-232 - RS-422/485 Jumper Selection*

To choose between RS-232 or RS-422/485 communications, make sure the 232/485 "Jumper" (JP1) is in the correct position. The drawing showing the location of this jumper is on page 6.

Once you have found the jumper, move it like this:

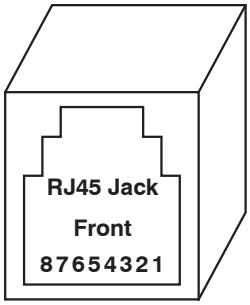
- *RS-422/485:Place the "jumper block" on pins 1 & 2 (Marked RS-485)*
- *RS-232: Place the "jumper block" on pins 2 & 3 (Marked RS-232)*

Connect the cable to the RJ45 "Modular" Jack. Now that you have selected which communications standard you wish to use, see following pages to help you wire the Modular Cable properly for RS-232 or RS-422/485 operation.

## RS-232 and RS-422/485 Connections to the RJ45 Modular Jack

The GSDA-CM-8 RS-232 and RS-422/RS-485 port uses a standard 8-pin RJ45 modular connector. A standard 4- or 6-pin RJ11 or RJ12 modular connector may also be used as an alternative when making RS-422/485 connections. When using RJ11 or RJ12 cable you are only connecting to the middle 4 or 6 pins of the RJ45 Modular Jack. A 4-pin modular connector uses the middle 4 pins, numbers 3 through 6 and the 6-pin modular connector uses the middle 6 pins, numbers 2 through 7. The use of an 8-pin RJ45 modular connector will be required when making connections for RS-232.

There is currently NO standard wiring format for a RJ45 Modular connector when used in RS-232 or RS-422/485 applications. We have chosen to allow the use of a standard 4-, 6-, or 8-pin modular connector in our wiring scheme. The RJ45 Modular Jacks pinout for the GSDA-CM-8 is as follows:




| *RJ45 Pin* | *Signal Description* |
|---|---|
| 1 | RS232 Rx (Receive data) |
| 2 | No Connect |
| 3 | TxD+, RxD+ (+transmit/receive data line) |
| 4 | TxD-, RxD- (-transmit/receive data line) |
| 5 | Frequency generator out (Do not use for RS232 communications) |
| 6 | Circuit Common, Signal Ground |
| 7 | Analog Input (0 to 5 VDC) |
| 8 | RS232 Tx (Transmit data) |

There are minor differences between RS-232 and RS-422/485. RS-232 is a point-to-point interface standard which is intended to allow two—and only two—devices to be attached to one another. RS-422 and RS-485 are multi-point interface standards supporting one master and as many as 32 devices on the same lines or bus. Another key difference is that RS-422 and RS-485 are considerably more tolerant to noisy environments. It is typically not recommended that RS-232 be run more than 50 feet. Specialty converters can be purchased to allow an RS-232 device to interface with one or more units on a shared multi-point bus. Once the desired interface standard has been selected, jumper JP1 should be positioned accordingly. Failing to do so will not damage the drive, but will result in a lack of communication.

When connecting a device with an RS-422 or RS-485 port to an GSDA-CM-8 unit, connect the multi-point bus in half-duplex mode. In this mode the Transmit+ and Receive+ are connected to the unit's RJ45 pin 3. The Transmit- and Receive- are connected to the unit's RJ45 pin 4. It may also be necessary to connect the unit's Signal Ground, RJ45 pin 6, to the remote device's Signal Ground. In this configuration, the RJ45 pins 1 and 8 should remain disconnected.

When connecting a computer with an RS-232 port to an GSDA-CM-8 unit, not all of the available wires have to be used. If a port with a DB-9 (9 pins) connector is used, then make the following connections:

- *DB9 pin 2 to RJ45 pin 8*
- *DB9 pin 3 to RJ45 pin 1*
- *DB9 pin 5 to RJ45 pin 6.*

If a port with a DB-25 (25 pins) connector is used, then make the following connections:

- *DB25 pin 2 to RJ45 pin 1*
- *DB25 pin 3 to RJ45 pin 8*
- *DB25 pin 7 to RJ45 pin 6*

In this configuration, the RJ45 pins 3 and 4 should remain disconnected.

### *Communications Troubleshooting*

If communications with a computer aren't working, there are a few things to check. First, make sure the terminal program is communicating with the correct port (ie: COM1, COM2, etc.). This can be difficult because the port numbers are not labeled on the back of most machines. Use the following outline when troubleshooting new connections:

1) *Set the terminal program to 9600 baud, 8 data bits, no parity, 1 stop bit, and half duplex.*
2) *Set the terminal program to the selected serial port: COM1, COM2, etc. (guess if unknown)*
3) *If necessary, unplug the cable from the selected serial port on the back of the computer.*

4) *Regardless of DB-9 or DB-25, carefully short pins 2 and 3 together on the computer.*
5) *Enter the following string of characters in the terminal window: 123123*
6) *112233112233 should be displayed in the terminal window. If 123123 was displayed instead, it is likely that the wrong serial port has been chosen. Go back to step 2.*
7) *Now that the correct port has been located on the computer, remove the short from pins 2 and 3.*
8) *Connect the cable to the back of the computer, but do not connect the other end to the GSD8 series control. Instead, temporarily short pins 1 and 8 of the RJ-45 plug on the cable.*
9) *Enter the following string of characters in the terminal window: 123123*
10) *112233112233 should be displayed in the terminal window. If 123123 was displayed instead, it is likely that either the cable is bad or pins 1 and 8 are not shorted correctly. Go back to step 8 and test again.*
11) *At this point, the computer is configured and cable is probably wired correctly. Remove the temporary short and plug the cable into the drive's modular jack.*
12) *Type the following command into the terminal window (using all capital letters): AS01 (followed by pressing the computer's Enter key)*
13) *The unit should respond with the actual speed, then the connection is complete and functional; otherwise, it will be necessary to double-check the wiring and repeat some of the above tests.*

*NOTE: Many of the commercially available modular connectors cables you buy off the shelf will invert the wires going between the two connectors on the ends of the cable. Improperly wiring the serial ports will not damage the control or the communications peripheral but the communications will not work. In case of difficulty, ADC's Technical Support Department will be happy to help you, or ask your computer dealer for assistance.*

***WARNING: DO NOT CONNECT THE GSDA-CM-8 DIRECTLY TO THE PHONE SYSTEM! PERMANENT DAMAGE TO THE CONTROL WILL RESULT.***

## Software - Data Format

The GSDA-CM-8 uses a standard serial interface protocol found on most computers, process controllers, terminals, etc. The format for data is as follows:

| | |
|---|---|
| ***Start Bits*** | 1 |
| ***Data Bits*** | 8 |
| ***Stop Bits*** | 1 |
| ***Parity*** | None |
| ***Duplex*** | Half (no echo) |
| ***Baud Rate*** | Selectable (see below) |

To avoid confusion, we suggest that you do not program two items that are involved with communications through the serial port. The items are as follows:

***Item 20:***

Network Address. This can be a value from 01 to 99. If you have more than one GSDA-CM-8 on your network, you should set each unit to a unique address. Commands sent to address "00" will be acted upon by every GSDA-CM-8 on your network. This can be helpful, for example, to do an "All Stop" command.

***Item 21:***

Baud Rate. This can be a value from 1 to 8. A table showing the baud rates for the possible values of this item is shown below:

| Value | Baud Rate |
|---|---|
| 1 | 300 |
| 2 | 1200 |
| 3 | 2400 |
| 4 | 4800 |
| 5 | 9600 |
| 6 | 19200 |
| 7 | 38400 |
| 8 | 57600 |

All of the members of a network should have the same baud rate.

*NOTE: Baud Rate changes take effect immediately.*

### Format for Messages

The GSDA-CM-8 has been designed to reject all but the following:

- *The Numbers from 0 thru 9*
- *UPPERCASE ONLY letters from A thru Z*
- *The "comma" (,) character (used to separate different parts of a message)*
- *The "carriage return" character (used to end each message)*

If invalid characters are used the command will fail. For numbers with a decimal point (or colon) in them, do not send the decimal point (or colon). Also, "leading zeroes" for a number are not needed. "0001", "001", "01", and "1" are all the same to the GSDA-CM-8.

*NOTE: All addresses must be two digits so 01 through 09 must have a leading zero.*

All messages sent to the GSDA-CM-8 follow a common structure, or "format". The command message format is shown below:

<command><address>,<"command stuff"><CR>

| Format | Description |
|---|---|
| <command> | A two-letter UPPERCASE command. There is NO comma between the command and the <address> |
| <address> | A number (01 thru 99) representing the device that this message is intended for. Using an address of "00" will cause all devices to react to the message. This number is followed by a comma. |
| <"command data"> | The portion of the command message that is unique to each command. See the details of the commands for this information. There is NO comma after the end of this portion of the message, although there may be commas within "command data". |
| <CR> | A "Carriage Return" character (ASCII 13 decimal {0D hexadecimal}). This means the end of this message. This is the character you get when you press "Return" or "Enter" on your computer keyboard. Some computers also send a "Linefeed" character (ASCII 10 decimal { 0A hex}). The GSDA-CM-8 will ignore linefeeds sent to it, and it will not send linefeeds after <CR> on its outgoing messages. |

***Example:***

"Set the speed of the GSDA-CM-8 addressed as "01" to 1000":

SP01,1000

Remember, there must be a "carriage return" character at the end of the message.

## Direct Commands from a Computer/PLC

The GSDA-CM-8 is configured with six commands (commands must be in upper case). These commands are discussed below and on the following pages:

| ***SP*** | ***Set Target Speed (or Time in seconds)*** |
|---|---|
| Description | Allows the setting of a desired speed (or Process Time) |
| Format | SP<address>,<speed><CR><br><br><speed> is usually scaled in Engineering Units; however, in Follower modes, the "speed" setting is always expressed as a "percent of leader". Additionally, <speed> is expressed as seconds when in Time mode. The current program's "Setting Limits" determine the lowest and highest values you can use for <speed>. |
| Example | Set the speed of the GSDA-CM-8 addressed as "03" to 500<br><br>SP03,500<CR> |
| Response if successful | Y<CR> |
| Response if unsuccessful | N<CR> |

*NOTE: The Set Target Speed commands are not stored in non-volatile memory, consequently upon power-up in Auto Mode, they will revert to zero. When powered-up in Manual Mode, they will revert to previous number stored in NOV-RAM.*

| ***SV*** | ***Set Variable*** |
|---|---|
| Description | Allows the setting of any parameter to any value within its range. |
| Format | SV<address>,<parameter>,<value><CR><br><br><item> and <value> are the same as if you were editing from the drive front panel. Reference control manual for "Item" and "Value" meanings. |
| Example | Set the GSDA-CM-8 addressed as "06" to set Display Maximum to 1750<br><br>SV06,21,1750<CR> |
| Response if successful | Y<CR> |
| Response if unsuccessful | N<CR> |

*NOTE: The SV command can actually be used to great advantage. For example, sending the message SV00,12,1 to a network of controls with multiple programs, would effectively switch all controls on the network to that program at one time. An example of such a usage might be in a multiple-auger materials blender.*

| RV | Read Variable |
|---|---|
| Description | Outputs the value of any item plus its decimal point location. |
| Format | RV<address>,<item><CR><br><br>These are ONLY available through the Serial Port. |
| Example | Read the GSDA-CM-8 addressed as "02" for the value of Item 10.<br><br>RV02,10<CR> |
| Response if successful | <value>,<dec. pt.><CR> |
| Response if unsuccessful | N<CR> |

*NOTE: In the response from the GSDA-CM-8, <value> and <dec. pt.> will ALWAYS be transmitted as 4 digits, with leading zeros present. <dec. pt.> is the location of the displayed decimal point for that variable. Its values are: xxxx. = 0, xxx.x = 1, xx.xx = 2, xxxx = 4.*

| TS | Get Target Speed |
|---|---|
| Description | This returns the target speed of the motor in the Engineering Units as defined by the drive. |
| Format | TS<address><CR> |
| Example | Read the GSDA-CM-8 addressed as "02" for the actual speed of the pickup, in Engineering Units.<br><br>TS02<CR> |
| Response if successful | <value><CR> |
| Response if unsuccessful | N<CR> |

| AS | Get Actual Speed |
|---|---|
| Description | This returns the actual speed of the motor in RPM's. |
| Format | AS<address><CR> |
| Example | Read the GSDA-CM-8 addressed as "07" for the actual speed of the pickup, in RPM.<br><br>AS07<CR> |
| Response if successful | <value><CR> |
| Response if unsuccessful | N<CR> |

| AL | Get Alarm State |
|---|---|
| Description | This returns the status of Alarms 1 and 2. The value is a binary number, please refer to Setting and Reading "Alarm" Conditions section of the drive manual. |
| Format | AL<address><CR> |
| Example | Read the GSDA-CM-8 addressed as "10" for getting the Alarm Status.<br><br>AL10<CR> |
| Response if successful | <Alarm1 state>, <Alarm2 state><CR> where the states are 0 for Off, 1 for On. |
| Response if unsuccessful | N<CR> |

# GSDA-CM-8 Software Parameters (Items)

*NOTE: Add the "Slot" Number (100, 200, 500) X 10 to the Item number below to determine the actual Item Number in the GSD8 Drive's Item-Numbering scheme. For example, to set Item 41 of an GSDA-CM-8 in Slot 500, you would select Item 5041 (500 X 10 +41).*

| Parameter (Item) | Description | Value Range | Units | Default | Parameter Used by: | |
|---|---|---|---|---|---|---|
| | | | | | GSD8-240-5C | All other GSD8 drives |
| 0 | Select parameter 0 to return to Run mode | n/a | – | n/a | ✓ | ✓ |
| Read-Only Parameters | | | | | | |
| 1 | Model Number | 10 = GSD8-240-5C, 45 = GSD8-240-5C-D, 10C-D, 10N4X, 10N4X-A, 10N4X-U | | 10<br>45 | ✓ | ✓ |
| 2 | Software Build | 1-9999 | | n/a | ✓ | ✓ |
| 3 | Hardware Version | 1-9999 | | n/a | ✓ | ✓ |
| 4 | Serial Number - Major (Reserved) | N/A | | n/a | ✓ | |
| 5 | Serial Number - Minor (Reserved) | N/A | | n/a | ✓ | |
| 4 | Software Version (Mark Reserved) | 1-9999 | | n/a | | ✓ |
| 5 | Serial Number - Major (Reserved) | 0-9999 | | n/a | | ✓ |
| 6 | Serial Number - Minor (Reserved) | 0-9999 | | n/a | | ✓ |
| 8 | Drive Condition Flags | (See "Flags" - Table #1 Below) | BCD | n/a | | ✓ |
| 9 | Drive Condition Flags | (See "Flags" - Table #2 Below) | BCD | n/a | | ✓ |
| General Setup Parameters | | | | | | |
| 10 | Operating Mode | 1 = Rate Mode<br>2 = Time Mode<br>3 = Follower Mode | | 1 | ✓ | ✓ |
| 11 | Display Intensity<br>Display Brightness" | 0-31 - (Dim-Bright) | | 20<br>26 | ✓ | ✓ |
| 12 | Display Mode | 1 = Target Speed<br>2 = S1 Actual Speed<br>3 = S2 (Leader) Speed | | 1 | | ✓ |
| 13 | Decimal Point Position | 0 = Disabled - (XXXX)<br>1 = X.XXX<br>2 = XX.XX<br>3 = XXX.X<br>4 = XXXX | | 0 | ✓ | ✓ |
| 14 | Keypad Mode | 1 = Linear - Constant Rate<br>2 = Non-Linear - Accelerating Rate | | 2 | ✓ | ✓ |
| 15 | Keypad Scroll Delay | 0-30 - (Fast-Slow) | | 10 | ✓ | ✓ |
| 16 | S1 / S2 Input Edge & Prescaler Configuration | 0 = S1 Rising / 1 - S2 Rising / 1<br>1 = S1 Falling / 1 - S2 Rising / 1<br>2 = S1 Falling / 4 - S2 Rising / 1<br>3 = S1 Falling / 16 - S2 Rising / 1<br>4 = S1 Rising / 1 - S2 Falling / 1<br>5 = S1 Falling / 1 - S2 Falling / 1<br>6 = S1 Falling / 4 - S2 Falling / 1<br>7 = S1 Falling / 16 - S2 Falling / 1<br>8 = S1 Rising / 1 - S2 Falling / 4<br>9 = S1 Falling / 1 - S2 Falling / 4<br>10 = S1 Falling / 4 - S2 Falling / 4<br>11 = S1 Falling / 16 - S2 Falling / 4<br>12 = S1 Rising / 1 - S2 Falling / 16<br>13 = S1 Falling / 1 - S2 Falling / 16<br>14 = S1 Falling / 4 - S2 Falling / 16<br>15 = S1 Falling / 16 - S2 Falling / 16 | | 0 | ✓ | |
| 16 | Power-Up Target Speed | 1 = Force Zero Speed<br>2 = Force Power-up Value<br>3 = Use Previous Target Speed | | 3 | | ✓ |

| Parameter (Item) | Description | Value Range | Units | Default | GSD8-240-5C | All other GSD8 drives |
|---|---|---|---|---|---|---|
| 17 | Power-Up Value | 0-9999 | (Eng. units) | 0 | | ✓ |
| 18 | Power-Up Mode | 1 = Default to Zero Display<br>2 = Default to Power-up Value<br>3 = Default to Previous Running Value | | 3 | ✓ | |
| 18 | Front-Panel Double-Click Destination | 0 = Double-Click Ignored<br>1 = Inhibit<br>2 = Estop<br>3 = Jog1<br>4 = Jog2<br>5 = Auto/Man - 4 to 20mA Card | | 0 | | ✓ |
| 19 | Power-Up Value | 0-9999 | (Display units) | 0 | ✓ | |
| 19 | Output Invert (Unused on GSD8-240-5C-D, 10C-D, 10N4X, 10N4X-A, 10N4X-U) | 0 = Normal<br>1 = Inverted | | 0 | | ✓ |
| Display and Control/PID Setup Parameters | | | | | | |
| 20 | Display Minimum | 0-9998 | (Display units) | 0 | ✓ | ✓ |
| 21 | Display Maximum | 1-9999 | | 2400 | ✓ | ✓ |
| 22 | Motor Control Method | 0 = Gain Tracking Off, Low Spd Mode Off<br>1 = Gain Tracking On, Low Spd Mode Off<br>2 = Gain Tracking Off, Low Spd Mode On<br>3 = Gain Tracking On, Low Spd Mode On | | 1 | | ✓ |
| 23 | Accel Setting | 1-9999 | (Display units) | 2500<br>9999 | ✓ | ✓ |
| 24 | Decel Setting | 1-9999 | (Display units) | 2500<br>9999 | ✓ | ✓ |
| 26 | Proportional Gain | 0-9999 | (Non Unit Specific) | 0<br>150 | ✓ | ✓ |
| 27 | Integral Gain | 1-9999<br>0-9999 | (Non Unit Specific) | 5000<br>20 | ✓ | ✓ |
| 28 | Derivative Gain | 0-9999 | | 10 | | ✓ |
| 29 | Pulse Accumulation Limit | 2-5000 | (Non Unit Specific) | 15 | ✓ | |
| 29 | Startup Lag Compensation | 0-5000 | | 0 | | ✓ |
| Signal Input #1 (S1) Setup Parameters | | | | | | |
| 30 | S1 Display Reference | 0-9999<br>1-9999 | (Eng. Units) | 2400 | ✓ | ✓ |
| 31 | S1 Reference RPM | 0-9999<br>1-9999 | RPM | 2400 | ✓ | ✓ |
| 32 | S1 Pulses Per Revolution | 1-2048<br>1-9999 | PPR | 1<br>20" | ✓ | ✓ |
| 33 | S1 Deadband - (Follower Mode Only) | 0-1000 | | 0 | ✓ | |
| 33 | S1 Initial Stall Timeout | 0, 5-9999 - (0 = Defeat) | Sec. | 0 | | ✓ |
| 34 | Signal Input (S1) Running Stall Timeout | 0-9999 - (0 = Defeat) | 0.10 Sec. | 0 | | ✓ |
| Signal Input #2 (S2) Setup Parameters | | | | | | |
| 35 | S2 Input Configuration | 1 = Disabled - (Follower Mode)<br>2 = E-Stop - S2 High<br>3 = E-Stop - S2 Low<br>4 = Inhibit - S2 High<br>5 = Inhibit - S2 Low<br>6 = Jog - S2 High<br>7 = Jog - S2 Low | | 7 | ✓ | ✓ |

| Parameter (Item) | Description | Value Range | Units | Default | GSD8-240-5C | All other GSD8 drives |
|---|---|---|---|---|---|---|
| 36 | S2 Setpoint<br>Setpoint for Jog1 Function | 1-9999 | (Eng. Units) | 1000 | ✓ | ✓ |
| 37 | S2 Pulses Per Revolution - (Follower Only) | 1-2048<br>1-9999 | PPR | 1<br>20" | ✓ | ✓ |
| 38 | Front Panel Double-Click Mode | 0 = Hardware Inhibit<br>1 = Double-Click Toggles Inhibit | | 0 | ✓ | |
| 38 | S2 Stopped Timeout - (Follower Mode Only) | 0-9999 - (0 = Defeat) | 0.10 Sec. | 0 | | ✓ |
| 39 | Disable S2 In Manual Mode | 0 = Disabled<br>1 = Enabled | | 0 | | ✓ |
| User Input #1 (UIN1) Setup Parameters | | | | | | |
| 40 | UIN1 Input Configuration | 1 = Disabled<br>2 = E-Stop - UIN1 High<br>3 = E-Stop - UIN1 Low<br>4 = Inhibit - UIN1 High<br>5 = Inhibit - UIN1 Low<br>6 = Jog - UIN1 High<br>7 = Jog - UIN1 Low | | 3 | ✓ | ✓ |
| 41 | UIN1 Setpoint For Jog<br>Setpoint for Jog2 Function | 1-9999 | (Eng. Units) | 1000 | ✓ | ✓ |
| 42 | Inhibit Configuration | 0 = No Accel/Decel<br>1 = Decel Only, No Accel<br>2 = Accel Only, No Decel<br>3 = Accel & Decel | (Eng. Units) | 0 | | ✓ |
| 43 | Disable U1 in Manual Mode | 0 = Disabled<br>1 = Enabled | (Eng. Units) | 0 | | ✓ |
| Alarm Output #1 Setup Parameters | | | | | | |
| 50 | Alarm Activation Condition | 0 = Always Off<br>1 = Always On<br>2 = Active > Upper Limit<br>3 = Active < Lower Limit<br>4 = Active - In Range<br>5 = Active - Out of Range<br>6 = Active - Target = 0<br>7 = Active - Max Conduction | | 0 | ✓ | |
| 50 | Alarm1 Logical "OR" Activation Conditions | (See "Flags" - Table 1 Below) | BCD | 0 | | ✓ |
| 51 | Output Style & Reset Mode | 1 = Constant & Auto Reset<br>2 = Constant & Manual Reset<br>3 = Pulsed & Auto Reset<br>4 = Pulsed & Manual Reset | | 1 | ✓ | |
| 51 | Alarm1 Logical Inverters | (See "Flags" - Table 1 Below) | BCD | 0 | | ✓ |
| 52 | Reset Configuration | 1 = No Silencing - Reset on Key<br>2 = No Silencing - Reset on S2 High<br>3 = No Silencing - Reset on S2 Low<br>4 = Silencing - Reset on Key<br>5 = Silencing - Reset on S2 High<br>6 = Silencing - Reset on S2 Low " | | 1 | ✓ | |
| 52 | Alarm1 Logical "AND" Activation Conditions | (See "Flags" - Table 1 Below) | BCD | 0 | | ✓ |
| 53 | Display Flash On Active Alarm | 0 = Flash Disabled<br>1 = Flash Enabled | | 0 | ✓ | |
| 53 | Alarm1 Output Style & Reset Mode | 1 = Constant & Auto Reset<br>2 = Constant & Manual Reset<br>3 = Pulsed & Auto Reset<br>4 = Pulsed & Manual Reset | | 1 | | ✓ |
| 54 | Pulse ON Time | 1-3600 | Seconds | 1 | ✓ | |

| Parameter (Item) | Description | Value Range | Units | Default | GSD8-240-5C | All other GSD8 drives |
|---|---|---|---|---|---|---|
| 54 | Alarm1 Reset Configuration | 1 = No Silencing - Reset on Enter Button<br>2 = No Silencing - Reset on S2 High<br>3 = No Silencing - Reset on S2 Low<br>4 = Silencing - Reset on Enter Button<br>5 = Silencing - Reset on S2 High<br>6 = Silencing - Reset on S2 Low | | 1 | | ✓ |
| 55 | Pulse OFF Time | 1-3600 | Secs | 1 | ✓ | |
| 55 | Annunciator Alm1 Flash On Active Alarm1 | 0 = No Annunicator Flash<br>1 = Annunicator Flash | | 0 | | ✓ |
| 56 | Pulse Count | 0-9999 | (Eng. Units) | 0 | ✓ | |
| 56 | Alarm1 Output Pulse ON Time | 1-3600 | Secs. | 1 | | ✓ |
| 57 | Lower Limit | 0-9999 | (Eng. Units) | 0 | ✓ | |
| 57 | Alarm1 Output Pulse OFF Time | 1-3600 | Secs. | 1 | | ✓ |
| 58 | Upper Limit | 0-9999 | (Eng. Units) | 9999 | ✓ | |
| 58 | Alarm1 Output Pulse Count | 0-9999 | | 0 | | ✓ |
| 59 | Alarm1 Lower Limit | 0-9999 | (Eng. Units) | 0 | | ✓ |
| 60 | Alarm 1 Upper Limit | 0-9999 | (Eng. Units) | 9999 | | ✓ |
| 65 | Alarm1 Logical "OR" Activation Conditions | (See "Flags" - Table 2 Below) | BCD | 0 | | ✓ |
| 66 | Alarm1 Logical Inverters | (See "Flags" - Table 2 Below) | BCD | 0 | | ✓ |
| 67 | Alarm1 Logical "AND" Activation Conditions | (See "Flags" - Table 2 Below) | BCD | 0 | | ✓ |
| Alarm Output #2 Setup Parameters | | | | | | |
| 70 | Alarm2 Logical "OR" Activation Conditions | (See "Flags" - Table 1 Below) | BCD | 0 | | ✓ |
| 71 | Alarm2 Logical Inverters | (See "Flags" - Table 1 Below) | BCD | 0 | | ✓ |
| 72 | Alarm2 Logical "AND" Activation Conditions | (See "Flags" - Table 1 Below) | BCD | 0 | | ✓ |
| 73 | Alarm2 Output Style & Reset Mode | 1 = Constant & Auto Reset<br>2 = Constant & Manual Reset<br>3 = Pulsed & Auto Reset<br>4 = Pulsed & Manual Reset | | 1 | | ✓ |
| 74 | Alarm2 Reset Configuration | 1 = No Silencing - Reset on Enter Button<br>2 = No Silencing - Reset on S2 High<br>3 = No Silencing - Reset on S2 Low<br>4 = Silencing - Reset on Enter Button<br>5 = Silencing - Reset on S2 High<br>6 = Silencing - Reset on S2 Low | | 1 | | ✓ |
| 75 | Annunciator Alm2 Flash On Active Alarm2 | 0 = No Annunicator Flash<br>1 = Annunicator Flash | | 0 | | ✓ |
| 76 | Alarm2 Output Pulse ON Time | 1-3600 | Secs. | 1 | | ✓ |
| 77 | Alarm2 Output Pulse OFF Time | 1-3600 | Secs. | 1 | | ✓ |
| 78 | Alarm2 Output Pulse Count | 0-9999 | | 0 | | ✓ |
| 79 | Alarm2 Lower Limit | 0-9999 | (Eng. Units) | 0 | | ✓ |
| 80 | Alarm2 Upper Limit | 0-9999 | (Eng. Units) | 9999 | | ✓ |
| 81 | Alarm2 Output Routing | 1 = Reserved<br>2 = Use Slot 100 Alarm1 Output<br>3 = Use Slot 200 Alarm1 Output<br>4 = Use Slot 500 Alarm1 Output | | 3 | | ✓ |

| Parameter (Item) | Description | Value Range | Units | Default | GSD8-240-5C | All other GSD8 drives |
|---|---|---|---|---|---|---|
| 85 | Alarm2 Logical "OR" Activation Conditions | (See "Flags" - Table 2 Below) | BCD | 0 | | ✓ |
| 86 | Alarm2 Logical Inverters | (See "Flags" - Table 2 Below) | BCD | 0 | | ✓ |
| 87 | Alarm2 Logical "AND" Activation Conditions | (See "Flags" - Table 2 Below) | BCD | 0 | | ✓ |
| Parameter Memory Command Parameters | | | | | | |
| 95 | Restore to Factory Defaults (Affects Drive Settings Only) | 0 = Abort & Exit<br>5 = Restore Factory Default Settings | | 0 | ✓ | ✓ |
| 96 | Restore ModularBus Card(s) Settings to Factory Defaults - (Card Settings Only) | 0 = Abort & Exit<br>100 = Restore Slot 100 Default Settings<br>200 = Restore Slot 200 Default Settings<br>500 = Restore Slot 500 Default Settings | | 0 | | ✓ |
| 98 | Save to User Default Memory<br>Save "Environment" (Drive & All ModularBus Card Settings) to "User Save" Storage Area | 0 = Abort & Exit<br>5 = Save User Settings<br>5 = Copy current Settings TO "Settings2" (or "Settings1" if using "Settings2") | | 0 | ✓ | ✓ |
| 99 | Restore From User Default Memory<br>Restore / Swap "Environment" (Drive & All ModularBus Card Settings) from "User Save" Storage Area | 0 = Abort & Exit<br>1 = Restore User Default Settings<br>5 = Copy (Restore) current Settings FROM "Settings2" (or "Settings1" if using "Settings2")<br>10 = Swap Between "Settings1" & "Settings2" | | 0 | ✓ | ✓ |
| Maintenance Timer Setup Parameters | | | | | | |
| 100 | Activate Maintenance Message - (After this amount of time) | 0 = Off<br>1 = 1 ~ 9999 | Hours | 0 | | ✓ |
| 101 | Reset Maintenance Timer | 0 = Abort & Exit<br>5 = Reset | | 0 | | ✓ |
| 102 | Current Value of Maintenance Timer | Read Only | Hours | 0 | | ✓ |
| 103 | Scale Timer | 0 = Disabled<br>1-9999 = Scale Factor | | 0 | | ✓ |
| Configuration Parameters | | | | | | |
| 120 | Auto/Manual Slot Control | 0 = Slot 100<br>1 = Slot 200<br>2 = Slot 500 | | 1 | | ✓ |
| 121 | Follower Target Source | 1 = Pickup<br>2 = Slot 100<br>3 = Slot 200<br>4 = Slot 500 | | 1 | | ✓ |
| 122 | Follower Percent Source | 1 = Slot 100<br>2 = Slot 200<br>3 = Slot 500 | | 1 | | ✓ |
| Flags - Table #1 | | | | | | |
| 0 | No Active Flags | | | | | ✓ |
| 1 | Accel/Decel Ramp in Progress | | | | | ✓ |
| 2 | S1 (Main) Act Spd (Tach) Outside Alm Limits | | | | | ✓ |
| 4 | Target Speet Outside Alarm Limits | | | | | ✓ |
| 8 | Target Speed = 0 | | | | | ✓ |
| 16 | S1 (Main) Pickup is Stalled | | | | | ✓ |
| 32 | S2 (Leader) Pickup is Stopped | (Valid Only in "Follower Mode") | | | | ✓ |
| 64 | Jog Function Activated | | | | | ✓ |
| 128 | Inhibit Function Activated | | | | | ✓ |
| 256 | E-Stop Function Activated | | | | | ✓ |

| Parameter (Item) | Description | Value Range | Units | Default | GSD8-240-5C | All other GSD8 drives |
|---|---|---|---|---|---|---|
| 512 | Drive is at Maximum Output | | | | | ✓ |
| 1024 | "Run" Condition | | | | | ✓ |
| 2048 | Reserved | | | | | ✓ |
| 4096 | Reserved | | | | | ✓ |
| Flags - Table #2 | | | | | | |
| 0 | No Active Flags | | | | | ✓ |
| 1 | Slot 100 Alarm1 Activated | (Valid Only if ModularBus Card Installed) | | | | ✓ |
| 2 | Slot 200 Alarm1 Activated | (Valid Only if ModularBus Card Installed) | | | | ✓ |
| 4 | Slot 500 Alarm1 Activated | (Valid Only if ModularBus Card Installed) | | | | ✓ |
| 8 | Maintenance Timer | | | | | ✓ |
| 16 | Reserved | | | | | ✓ |
| 32 | Reserved | | | | | ✓ |
| 64 | Reserved | | | | | ✓ |
| 128 | Reserved | | | | | ✓ |
| 256 | Reserved | | | | | ✓ |
| 512 | Reserved | | | | | ✓ |
| 1024 | Reserved | | | | | ✓ |
| 2048 | Reserved | | | | | ✓ |
| 4096 | Reserved | | | | | ✓ |
| GSD8-AI-A8 Option Card Read-Only Parameters | | | | | | |
| 1001<br>2001 | Model Number | 420 = GSD8-AI-A8 | | 420 | | ✓ |
| 1002<br>2002 | Software Version | 1-9999 | | N/A | | ✓ |
| 1003<br>2003 | Hardware Version | 1-9999 | | N/A | | ✓ |
| 1004<br>2004 | Device Type | 100 = Type 1 Card | | 100 | | ✓ |
| 1005<br>2005 | Minimum Supported Framework Version | 1-9999 | | N/A | | ✓ |
| 1006<br>2006 | Maximum Supported Protocol Version | 1- 9999 | | N/A | | ✓ |
| 1007<br>2007 | Serial Number - Major | 0-9999 | | N/A | | ✓ |
| 1008<br>2008 | Serial Number - Minor | 0-9999 | | N/A | | ✓ |
| 4-20mA Input Scaling Parameters | | | | | | |
| 1020<br>2020 | GSD8-AI-A8 - Target Drive Speed @ 4mA | 0-9999 (Limited by Drive Display Minimum Setting) | Drive Eng Units | 0 | | ✓ |
| 1021<br>2021 | GSD8-AI-A8 - Target Drive Speed @ 20mA | 0-9999 (Limited by Drive Display Minimum Setting) | Drive Eng Units | 2400 | | ✓ |
| 1022<br>2022 | 4mA Input Trim | -600 - +600 | | 0 | | ✓ |
| 1023<br>2023 | 20mA Input Trim | -600 - +600 | | 0 | | ✓ |
| 4-20mA Output Scaling Parameters | | | | | | |
| 1040<br>2040 | GSD8-AI-A8 - (S1 Tach) Actual Speed = 4mA | 0-9999 (Limited by Drive Display Minimum Setting) | Drive Eng Units | 0 | | ✓ |
| 1041<br>2041 | GSD8-AI-A8 - (S1 Tach) Actual Speed = 20mA | 0-9999 (Limited by Drive Display Minimum Setting) | Drive Eng Units | 2400 | | ✓ |
| 1042<br>2042 | 4mA Output Trim | -600 - +600 | | 0 | | ✓ |
| 1043<br>2043 | 20mA Output Trim | -600 - +600 | | 0 | | ✓ |

| Parameter (Item) | Description | Value Range | Units | Default | GSD8-240-5C | All other GSD8 drives |
|---|---|---|---|---|---|---|
| Real-Time Process Variable Parameters (Read Only) | | | | | | |
| 1070<br>2070 | GSD8-AI-A8 - Input Current | 0-4095 | DAC Steps | | | ✓ |
| 1071<br>2071 | GSD8-AI-A8 - Drive Target Speed | 0-9999 | | 3 | | ✓ |
| 1072<br>2072 | GSD8-AI-A8 - Drive Target Output Current | 0-4095 | DAC Steps | | | ✓ |
| 1073<br>2073 | GSDA-AI-A8 - Condition Flags - (Future) | 0 = No Active "Flags" | BDC | 0 | | ✓ |
| 1074<br>2074 | GSDA-AI-A8 - Auto/Manual Switch State | 0 = Manual<br>1 = Auto | | 0 | | ✓ |
| GSDA-CM-8 Option Card Read-Only Parameters | | | | | | |
| 5001 | Model Number | 51 = GSDA-CM-8 | | 51 | | ✓ |
| 5002 | Software Version | 1-9999 | | n/a | | ✓ |
| 5003 | Hardware Version | 1-9999 | | n/a | | ✓ |
| 5004 | Device Type | 100 = Type 1 Card | | 100 | | ✓ |
| 5005 | Minimum Supported Framework Version | 1-9999 | | n/a | | ✓ |
| 5006 | Reserved | 0 | | n/a | | ✓ |
| 5007 | Serial Number - Major | 0-9999 | | n/a | | ✓ |
| 5008 | Serial Number - Minor | 0-9999 | | n/a | | ✓ |
| Serial Communications Setup Parameters | | | | | | |
| 5020 | GSDA-CM-8 - Network Address | 1-99 | | 1 | | ✓ |
| 5021 | GSDA-CM-8 - Baud Rate | 1 = 300<br>2 = 1200<br>3 = 2400<br>4 = 4800<br>5 = 9600<br>6 = 19200<br>7 = 38400<br>8 = 57600 | | 5 | | ✓ |
| User Assignable Output Parameters | | | | | | |
| 5030 | GSDA-CM-8 - Output Function | 0 = Off<br>1 = Frequency Generator - Analog IN<br>2 = Frequency Generator - Motor Speed<br>3 = Frequency Generator - Fixed (Parm 32)<br>4 = Alarm Output | | 0 | | ✓ |
| 5031 | GSDA-CM-8 - Output Selector (N.O. / N.C.) | 0 = Normally Open (N.O.)<br>1 = Normally Closed (N.C.) | | 0 | | ✓ |
| 5032 | GSDA-CM-8 - Freq Generator - Output Freq | 0-3 = Disabled<br>4-9999 | Pulse/min | 0 | | ✓ |
| 5033 | GSDA-CM-8 - Freq Generator - Min Freq | 0-9999 | Pulse/min | 0 | | ✓ |
| 5034 | GSDA-CM-8 - Freq Generator - Max Freq | 4-9999 | Pulse/min | 2400 | | ✓ |
| Analog Input Parameters | | | | | | |
| 5040 | GSDA-CM-8 - Analog Input Destination | 0 = Off<br>1 = Target Speed<br>2 = Percent of Target Speed<br>3 = Reserved<br>4 = Frequency Generator Rate<br>5 = Main Tach Signal<br>6 = Leader Tach Signal | (Eng. Units)<br><br>Pulse/min<br>RPM<br>RPM | 0 | | ✓ |
| 5041 | GSDA-CM-8 - Analog Input Source Type | 1 = Potentiometer<br>2 = 0 to +5<br>3 = 4 to 20 | VDC<br>mA | 1 | | ✓ |

| Parameter (Item) | Description | Value Range | Units | Default | GSD8-240-5C | All other GSD8 drives |
|---|---|---|---|---|---|---|
| 5042 | GSDA-CM-8 - Analog Input Minimum Value | 0-9999 - (Min Value @ Min Analog Input) | | 0 | | ✓ |
| 5043 | GSDA-CM-8 - Analog Input Maximum Value | 0-9999 - (Max Value @ Max Analog Input) | | 2400 | | ✓ |

## GSDA-CM-8 Software Item (Parameter) Descriptions

| Item | Parameter Name | Description |
|---|---|---|
| | | Read-Only Identification Items |
| 1 | Model Number | This number represents the base model number for the product. The model code for the GSDA-CM-8 card is 51. In this manual, where appropriate, the "Drive" in which this GSDA-CM-8 card is installed is called the GSD8 Drive. |
| 2 | Software Version | The software version is a code which identifies the software "build number" of the unit. |
| 3 | Hardware Version | The hardware version is a code which identifies which hardware was used to build the unit. |
| 4 | Device Type | This value is primarily used to determine whether the particular card has on-board non- volatile storage for its Item settings. The GSDA-CM-8 is a "Type 1" card (value = 100), which does not have its own non-volatile storage. It depends on the GSD8 Drive to store its Item settings. This means that if an GSDA-CM-8 must be replaced in a GSD8 Drive, the "new" GSDA-CM-8 does not need to be configured. It will simply "inherit" the "old" GSDA-CM-8's Item settings, provided it is placed in the same Slot. |
| 5 | Minimum Supported Framework Version | The lowest software "framework" version that is compatible with this card. |
| 6 | Reserved | Reserved |
| 7 | Serial Number (Major) | These Items are reserved for future use as an electronic serial number and are unique to each manufactured unit. |
| 8 | Serial Number (Minor) | These Items are reserved for future use as an electronic serial number and are unique to each manufactured unit. |
| | | Serial Setup |
| 20 | Network Address | Sets the address for network identification. |
| 21 | Baud Rate | Sets the Baud Rate used for all communications to this card. |
| | | User Assignable Output |
| 30 | Output Function | Sets the function of the User-assignable-output.<br>• Mode 0: Off<br>This will cause the user-assignable output to be turned off and not used.<br>• Mode 1: Frequency Generator – Analog Input<br>This will set the frequency out to be controlled by the analog input. Note: when selecting this mode, the Analog Input Destination must also be set to frequency generator rate.<br>• Mode 2: Frequency Generator – Motor Speed<br>This will set the frequency out to be controlled by the motor speed.<br>• Mode 3: Frequency Generator – Fixed (Item 32)<br>This sets the Frequency Generator with a fixed output, the value is in PPM. The rate can be changed by setting a value in Item 32.<br>• Mode 4: Alarm Out<br>This will cause the output to be controlled by the Alarm 2 from the GSD8 drive.<br>  *NOTE: When using this function Item 81, Alarm 2 Output Routing, of the GSD8 drive must be set to Mode 4, Route Alarm 2 Output to Slot 500. Also by selecting this mode an alarm output trigger will be sent out to the serial GSD8 device, but only for alarm 2 and not alarm 1 from the GSD8 drive.* |
| 31 | Output Selector | Determines whether User Assignable Output is Normally Open (0) or Normally Closed (1). |

| Item | Parameter Name | Description |
|---|---|---|
| 32 | Frequency Generator Output Frequency | This sets the output frequency from the frequency generator.<br><br>Example: Set Item 32 to 7200 PPM and the square wave output frequency is 7200/60 equals 120Hz. |
| 33 | Frequency Generator MIN | This sets the lowest output frequency from the frequency generator. Note: if you are using mode 1 of Item 30 of the GSDA-CM-8 then this Item is controlled by Item 42 of the GSDA-CM-8. |
| 34 | Frequency Generator MAX | This sets the highest output frequency from the frequency generator. Note: if you are using mode 1 of Item 30 of the GSDA-CM-8 then this Item is controlled by Item 43 of the GSDA-CM-8. |
| | Analog Input | |
| 40 | Analog Input Destination Routing | This sets how the analog input is to be used in the GSD8 drive.<br>• Mode 0: Off<br>This will cause the input to not be used.<br>• Mode 1: Target Speed<br>This will allow the analog input to control the set speed of the GSD8 drive.<br>• Mode 2: Percent of Target<br>This will control a percentage of the set speed of the GSD8 drive.<br>• Mode 3: RESERVED<br>• Mode 4: Frequency Generator Rate<br>This will control the frequency output of the frequency generator. Note: When using this mode Item 30 of the serial communications board must be set to a mode of 1.<br>• Mode 5: Main Tach Signal<br>This can be used as a main tach signal from the GSD8 controlled motor instead of using a standard pickup on S1 of the GSD8 drive.<br>• Mode 6: Leader Tach Signal<br>This can be used as a master tach signal instead of a standard pickup on S2 of the GSD8 drive. |
| 41 | Analog Input Source Type | This identifies what type of input signal is being used.<br>• Mode 1: Potentiometer<br>• Mode 2: 0 to +5 VDC (Voltage)<br>• Mode 3: 4 to 20 mA (Current) |
| 42 | Minimum NUMERIC Value Sent Out by Analog Input | This sets the numeric value which will be created when the analog input is at its lowest voltage (or lowest current for 4-20 mA input source type). Note: if you are using mode 1 of Item 30 of the GSDA-CM-8 then this controls the Frequency Min. |
| 43 | Maximum NUMERIC Value Sent Out by Analog Input | This sets the numeric value which will be created when the analog input is at its highest voltage (or highest current for 4-20 mA input source type). Note: if you are using mode 1 of Item 30 of the GSDA-CM-8 then this controls the Frequency Max. |

# AutomationDirect PLC Example Programs for GSD8 DC Drive

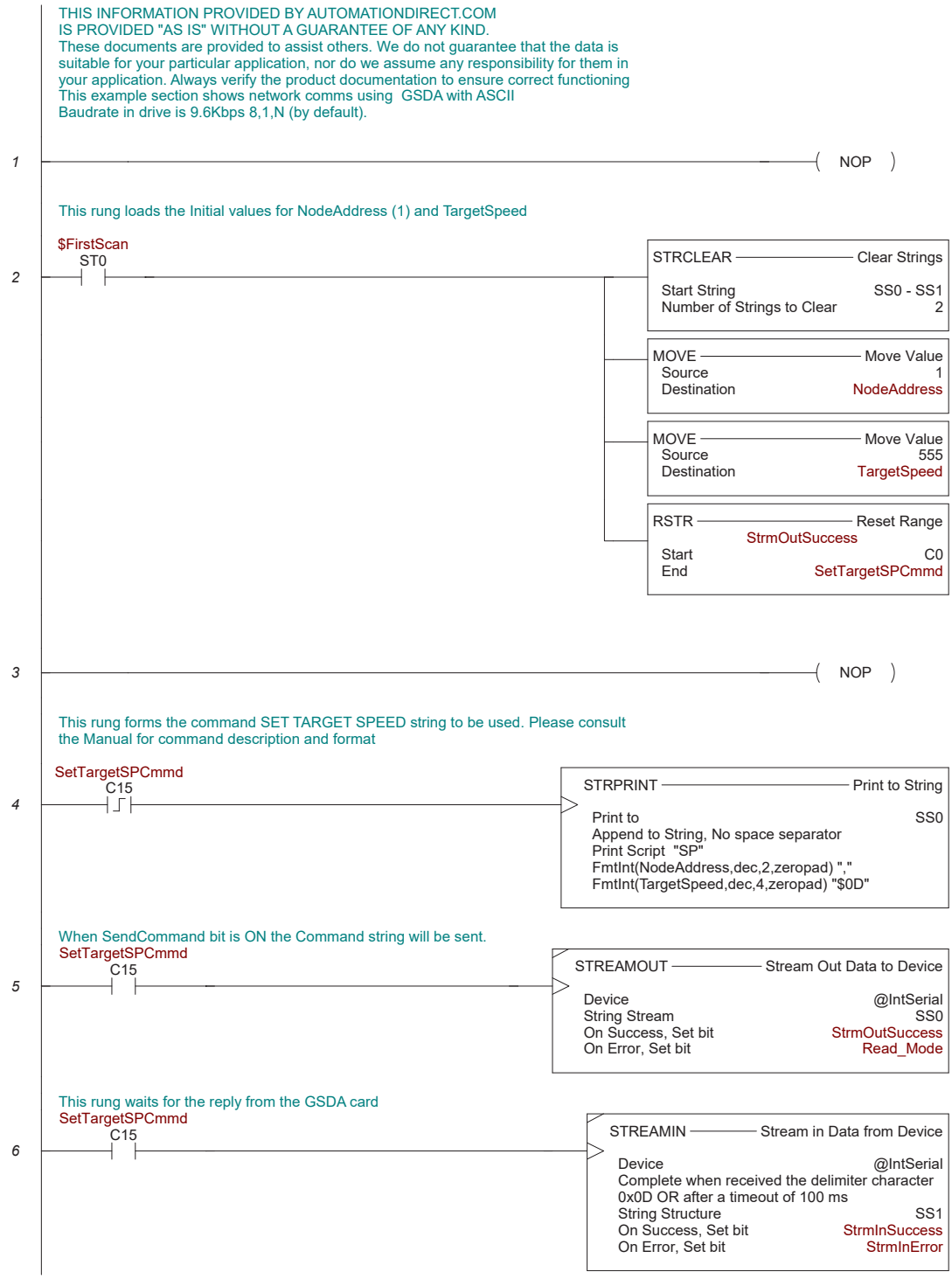
Example programs for various AutomationDirect PLCs are available for free download from AutomationDirect: https://support.automationdirect.com/examples.html.

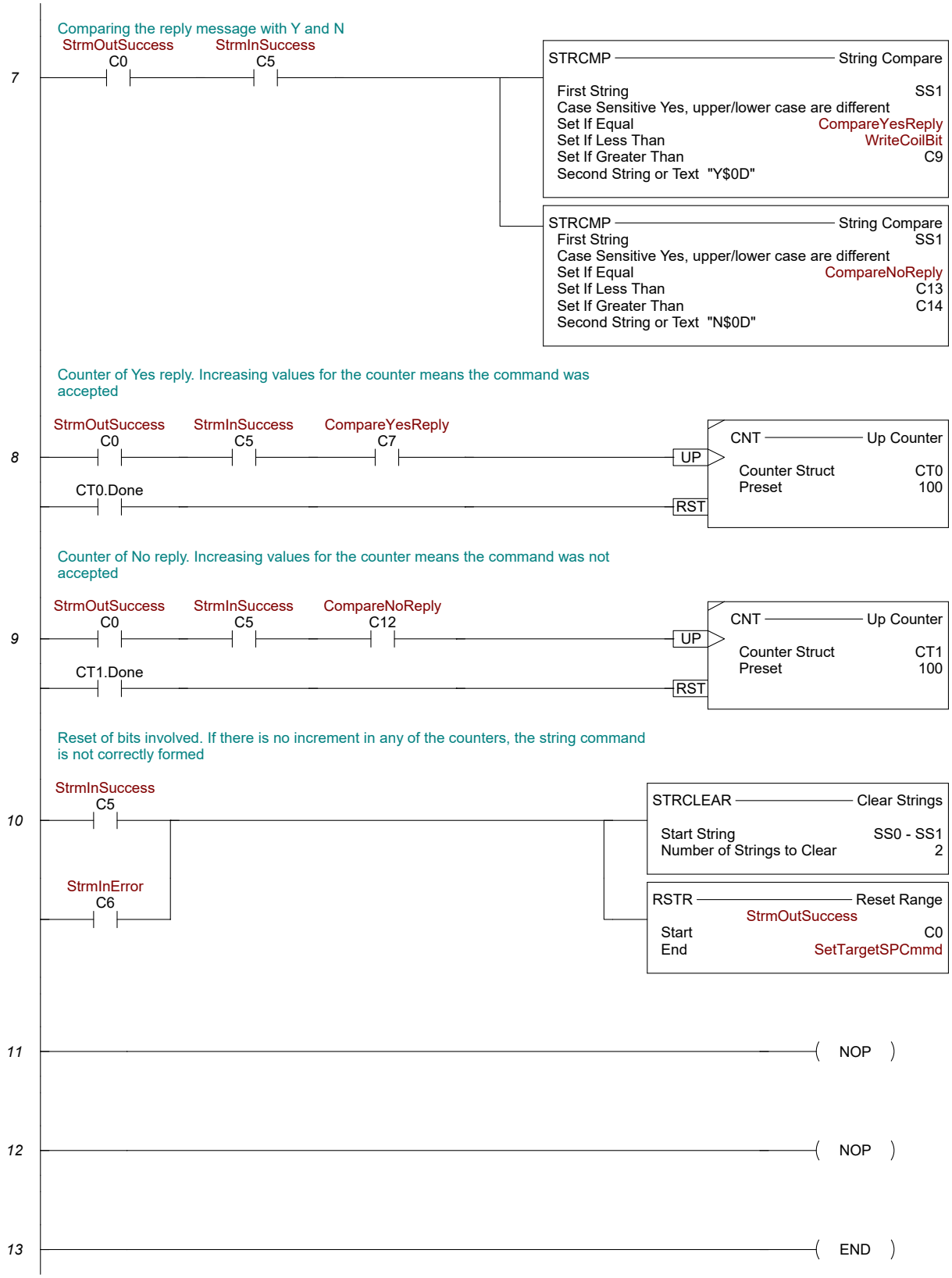
*Also, example PLC ladder diagrams are shown in the following section.*

## BRX PLC Example Program for GSD8 DC Drive

***THIS INFORMATION PROVIDED BY AUTOMATIONDIRECT.COM TECHNICAL SUPPORT IS PROVIDED "AS IS" WITHOUT ANY GUARANTEE OF ANY KIND.***

***These documents are provided by our technical support department to assist others. We do not guarantee that the data is suitable for your particular application, nor do we assume any responsibility for them in your application.***



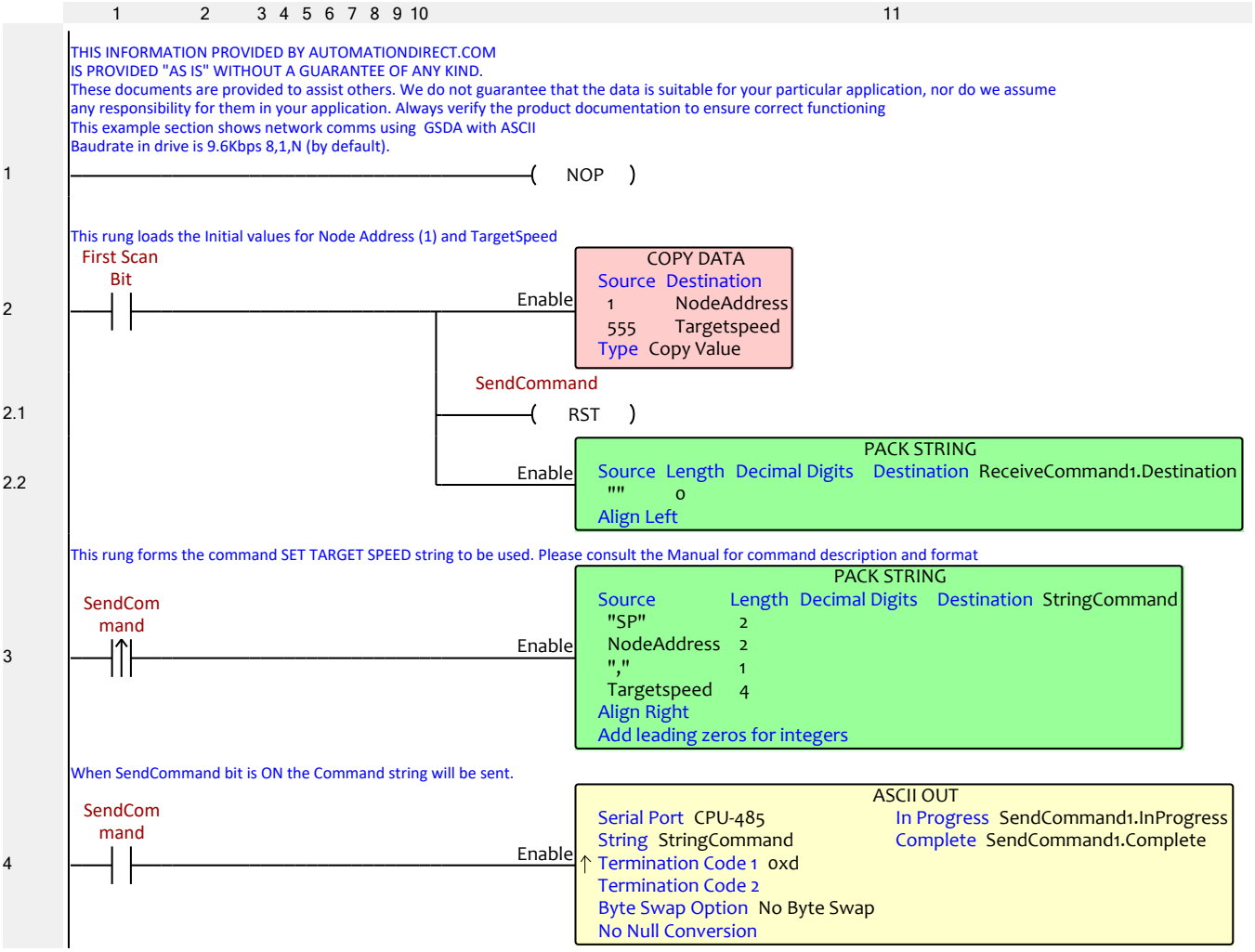

Comparing the reply message with Y and N
StrmOutSuccess
C0
StrmInSuccess
C5
7
STRCMP
String Compare
First String
SS1
Case Sensitive Yes, upper/lower case are different
Set If Equal
CompareYesReply
Set If Less Than
WriteCoilBit
Set If Greater Than
C9
Second String or Text "Y$0D"
STRCMP
String Compare
First String
SS1
Case Sensitive Yes, upper/lower case are different
Set If Equal
CompareNoReply
Set If Less Than
C13
Set If Greater Than
C14
Second String or Text "N$0D"
Counter of Yes reply. Increasing values for the counter means the command was accepted
StrmOutSuccess
C0
StrmInSuccess
C5
CompareYesReply
C7
8
CT0.Done
UP
RST
CNT
Up Counter
Counter Struct
CT0
Preset
100
Counter of No reply. Increasing values for the counter means the command was not accepted
StrmOutSuccess
C0
StrmInSuccess
C5
CompareNoReply
C12
9
CT1.Done
UP
RST
CNT
Up Counter
Counter Struct
CT1
Preset
100
Reset of bits involved. If there is no increment in any of the counters, the string command is not correctly formed
StrmInSuccess
C5
10
StrmInError
C6
STRCLEAR
Clear Strings
Start String
SS0 - SS1
Number of Strings to Clear
2
RSTR
Reset Range
StrmOutSuccess
Start
C0
End
SetTargetSPCmmd
11
NOP
12
NOP
13
END

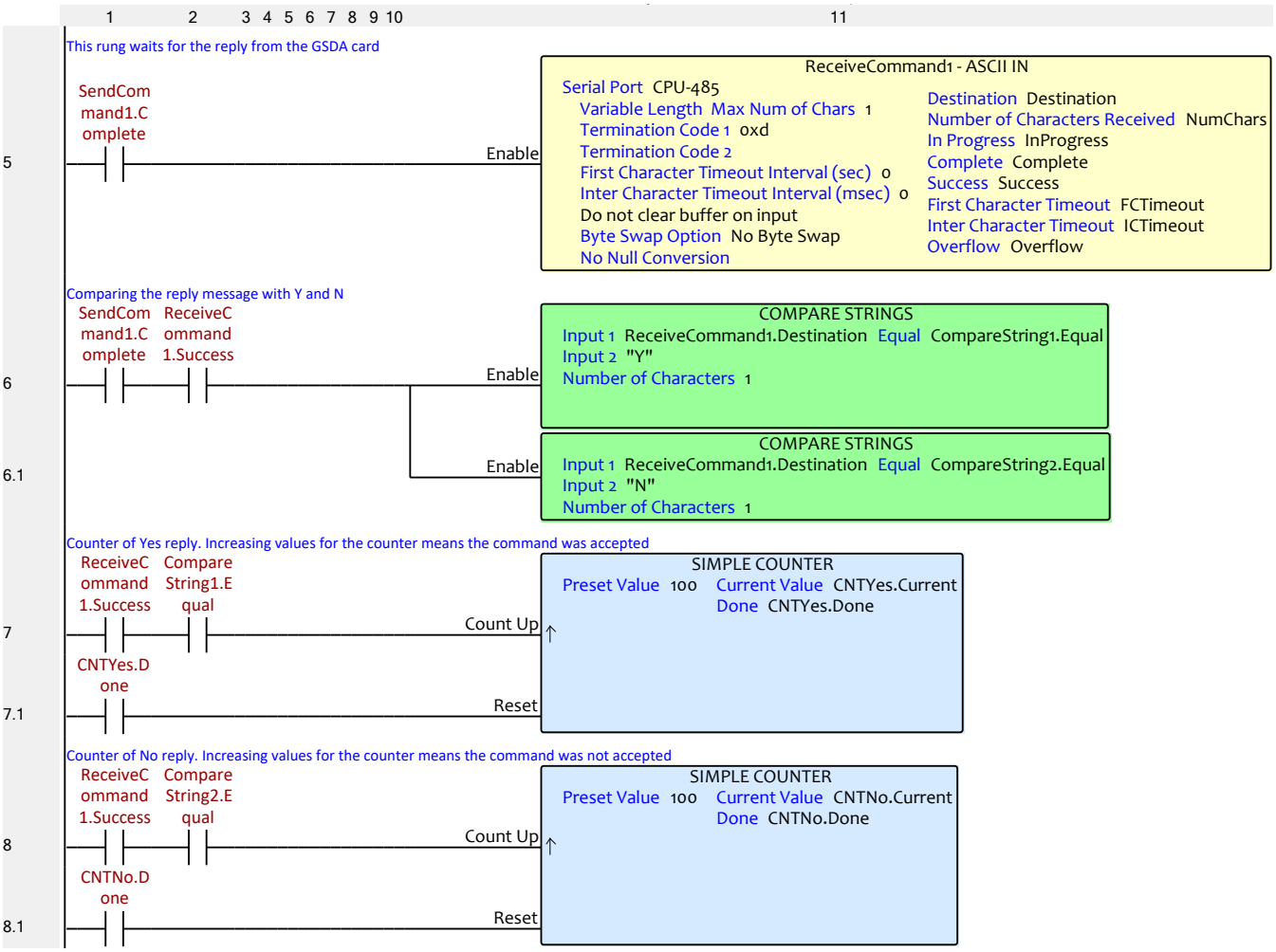
Page 2 $Main

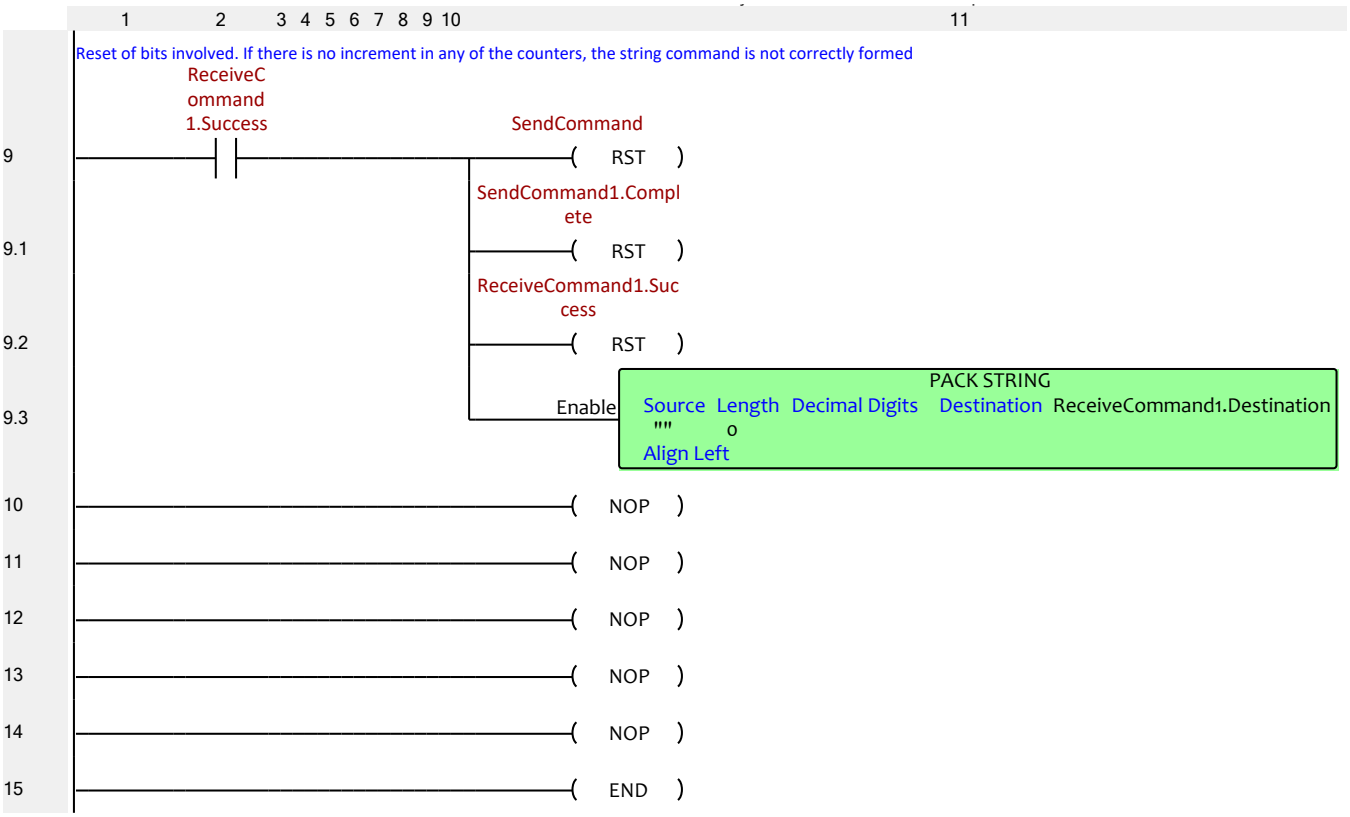
## Productivity PLC Example Program for GSD8 DC Drive

**THIS INFORMATION PROVIDED BY AUTOMATIONDIRECT.COM TECHNICAL SUPPORT IS PROVIDED "AS IS" WITHOUT ANY GUARANTEE OF ANY KIND.**

**These documents are provided by our technical support department to assist others. We do not guarantee that the data is suitable for your particular application, nor do we assume any responsibility for them in your application.**




1 2 3 4 5 6 7 8 9 10 11
This rung waits for the reply from the GSDA card
SendCom mand1.C omplete
5
Enable
ReceiveCommand1 - ASCII IN
Serial Port CPU-485
Variable Length Max Num of Chars 1
Termination Code 1 0xd
Termination Code 2
First Character Timeout Interval (sec) 0
Inter Character Timeout Interval (msec) 0
Do not clear buffer on input
Byte Swap Option No Byte Swap
No Null Conversion
Destination Destination
Number of Characters Received NumChars
In Progress InProgress
Complete Complete
Success Success
First Character Timeout FCTimeout
Inter Character Timeout ICTimeout
Overflow Overflow
Comparing the reply message with Y and N
SendCom mand1.C omplete
ReceiveC ommand 1.Success
6
Enable
COMPARE STRINGS
Input 1 ReceiveCommand1.Destination Equal CompareString1.Equal
Input 2 "Y"
Number of Characters 1
6.1
Enable
COMPARE STRINGS
Input 1 ReceiveCommand1.Destination Equal CompareString2.Equal
Input 2 "N"
Number of Characters 1
Counter of Yes reply. Increasing values for the counter means the command was accepted
ReceiveC ommand 1.Success
Compare String1.E qual
7
Count Up
SIMPLE COUNTER
Preset Value 100
Current Value CNTYes.Current
Done CNTYes.Done
CNTYes.D one
7.1
Reset
Counter of No reply. Increasing values for the counter means the command was not accepted
ReceiveC ommand 1.Success
Compare String2.E qual
8
Count Up
SIMPLE COUNTER
Preset Value 100
Current Value CNTNo.Current
Done CNTNo.Done
CNTNo.D one
8.1
Reset




Literature Number: LT181

Drawing Number: A-5-4166B