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GSD8 Series DC Drives User Manual

User Manual Number: GSD8_UMP

~ Warning ~

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Publication History

User Manual Publication History		
Issue	***Date***	***Description***
First Edition	08/06/19	Initial Release
First Edition, Rev. A	10/15/19	Revised specifications and Parameter table
First Edition, Rev. B	03/18/21	Corrected GSD8-240-10NX series dimensional drawing
First Edition, Rev. C	01/31/24	Added display code and error message information to troubleshooting.

Contents

GSD8 DC Drives User Manual Overview

Overview of this Publication

The IronHorse GSD8 Series DC Drives User Manual describes the installation, configuration, and methods of operation of the GSD8 Series DC Drives.

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Who Should Read This User Manual

This manual contains important information for those who will install, maintain, and/or operate any of the GSD8 Series DC Drives.

Technical Support

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

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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.

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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 GSD8 Series DC Drives General Information

Introduction

The GSD8 series DC drives are compact, microprocessor based motor controllers capable of factory or field configurations for a variety of industrial applications. GSD8 DC drives make use of either a pulse accumulation algorithm (GSD8-240-5C drive) or a velocity PID algorithm (all other GSD8 drives) that can be easily configured for operation as a speed controller, time-based process controller, or follower drive in a master-slave application. Using modular design techniques, the GSD8 drives are perfect for applications that require specialized I/O. GSD8 DC drives are ideal for applications such as:

- *Water and Waste Water Treatment Systems*
- *Conveyor Oven Controllers*
- *Synchronized Conveyor Lines*

The GSD8's durable aluminum housings can be easily mounted in a panel or control cabinet. The pluggable terminal block allows for easier wiring and quick replacement without the need to remove and reattach wiring.

Standard Features

- *Microprocessor-based design combines the ultimate in responsiveness and accuracy in one package*
- *Digital closed-loop algorithm ensures long-term accuracy of ± ½ RPM of set speed or equivalent*
- *Non-volatile memory stores adjustable parameters even when power has been removed*
- *Factory or field programmable via front-panel keypad*
- *Adjustable parameters include min, max, accel, decel, display options, alarm options, etc.*
- *Internal program-enable jumper selectively prevents tampering with unit's configuration*
- *Universal power supply accepts line voltages inputs from 85-265 VAC @ 50-60 Hz without switches or jumpers. The unit automatically adjusts as needed.*
- *Transient voltage protection prolongs unit's life in harsh industrial environments*
- *Compatible with a variety of signal input types including: Hall-Effect Pickups, Photoelectric, TTL, etc.*

NOTE: Open collector devices must be capable of sinking 3mA. Encoder signal specifications are incremental, 5-24 VDC, open collector/sinking source.

- *Self-contained power supply for external sensor, limited to 5V @ 50mA*
- *Programmable alarm output with Form C contacts rated to 250VAC @ 5A*
- *Flexible user inputs support inhibit, emergency stop, and jog functionality*
- *Standard 1/8 DIN panel mounting for the GSD8-240-5C and GSD8-240-5D*
- *Standard 1/4 DIN panel mounting for the GSD240-10C-D*
- *Large 4 digit, ½" LED display*
- *G.E. Lexan membrane and gasket (which are included) meet NEMA 4X standards when used with NEMA 4X enclosures*
- *European terminal block*
- *UL Listed #E333109, RoHS*
- *Wide operating ambient temperature range of -10°C to 45°C (14°F to 113°F)*
- *Multiple operating modes including:*
    - *Master, Rate Mode – Controls in rate unit such as RPM, gallons per minute, etc.*
    - *Master, Time Mode – Controls in time unit such as HH:MM, MM:SS, SS:TT, or other unit*
    - *Follower Mode – Controls in percentage of master rate. This mode allows the GSD8 drive to precisely follow the actions of a master process without any long-term loss of position*

Carefully check the DC Drive for shipping damage. Report any damage to the carrier immediately. Do not attempt to operate the drive if visible damage is evident to either the circuit or to the electronic components.

Selection and Specifications

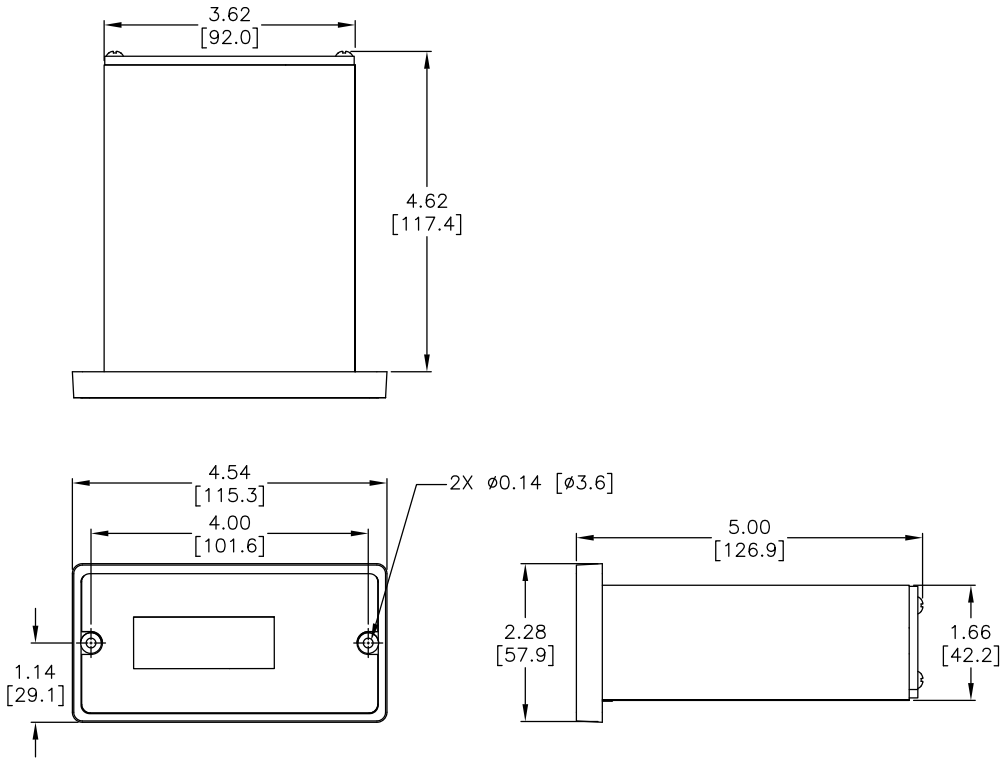
GSD8 Series DC Drives – Selection & Specifications							
Model		GSD8-240-5C	GSD8-240-5C-D	GSD8-240-10C-D	GSD8-240-10N4X	GSD8-240-10N4X-A	GSD8-240-10N4X-U
Housing Type		NEMA 4X					
Input Voltage@ 50-60 Hz		85–265 VAC					
Input Frequency		48–62 Hz					
Output Voltage @120VAC (@240VAC)		90VDC (180VDC)					
Max Output H.P. @120VAC (@240VAC)		½ (1)		1 (2)			
Max Continuous Armature DC Amps		5		10			
Pickup or Encoder Required?		Yes					
Speed Adjustment	**Default Mode**	Front Panel Display					
	Current	n/a	4–20 mA with opp acc GSDA-AI-A8 or -CM8			4–20 mA	
	Voltage	n/a	0-5 VDC with opp acc GSDA-CM-8				0–5 VDC
	Potentiometer	n/a	500W to 5kW Pot type, with opp acc GDA-CM-8				500W to 5kW
	Remote Comm	n/a	ASCII with opp acc GSDA-CM-8				ASCII
Signal Input Voltage Range		0–5 VDC to 0–24 VDC square wave					
Signal Input Frequency Range		500–50,000 pulses/minute*	250–600,000 pulses/minute @5V square wave**				
Display Range		0.001–9,999					
Units of Operation		User programmable, any Unit					
Sensor/Pickup Power Supply		5V @ 50mA					
Isolated Alarm Relay Output Ratings		250VAC @ 5A					
Average Armature Output Voltage		5A		10A			
Design Overload Capacity		200% for 1 minute					
Display Type		LED, Red, 4 digit, 1/2" height					
Connector Style		12-position 5mm European style					
Terminal Block Torque Setting		4.4 in-lb maximum (0.5 N·m)					
Operating Temperature Range		-10°C to 45°C (15°F to 115°F)					
Operating Humidity Range		95%, non-condensing					
Faceplate Material		Polycarbonate with GE Lexan overlay					
Housing Material		Aluminum					
Weight		13.48 oz (382.14 g)	14.94 oz (423.43 g)	25.78 oz (730.85 g)	27.85 oz (789.53 g)		
Agency Approvals		UL Recognized #E333109					
GSD8 Series DC Drives - Recommended Accessories							
Incremental Encoder* **		GSDA-PU2E or GSDA-PU2R					
Analog Module		n/a	GSDA-AI-A8			included	GSDA-AI-A8
ASCII Communications Module		n/a	GSDA-CM-8				included
Manual Reverse Switch		GSDA-MREV****					

** 500 pulses/minute minimum required for proper operation. Higher frequency possible with internal frequency divisor/prescaler.*
*** 250 pulses/minute minimum required for proper operation.*
****GSDA-MREV switch requires external user provided enclosure for NEMA4X*
*****Hall-Effect pickup, single channel encoder. 1/10/20 PPR*

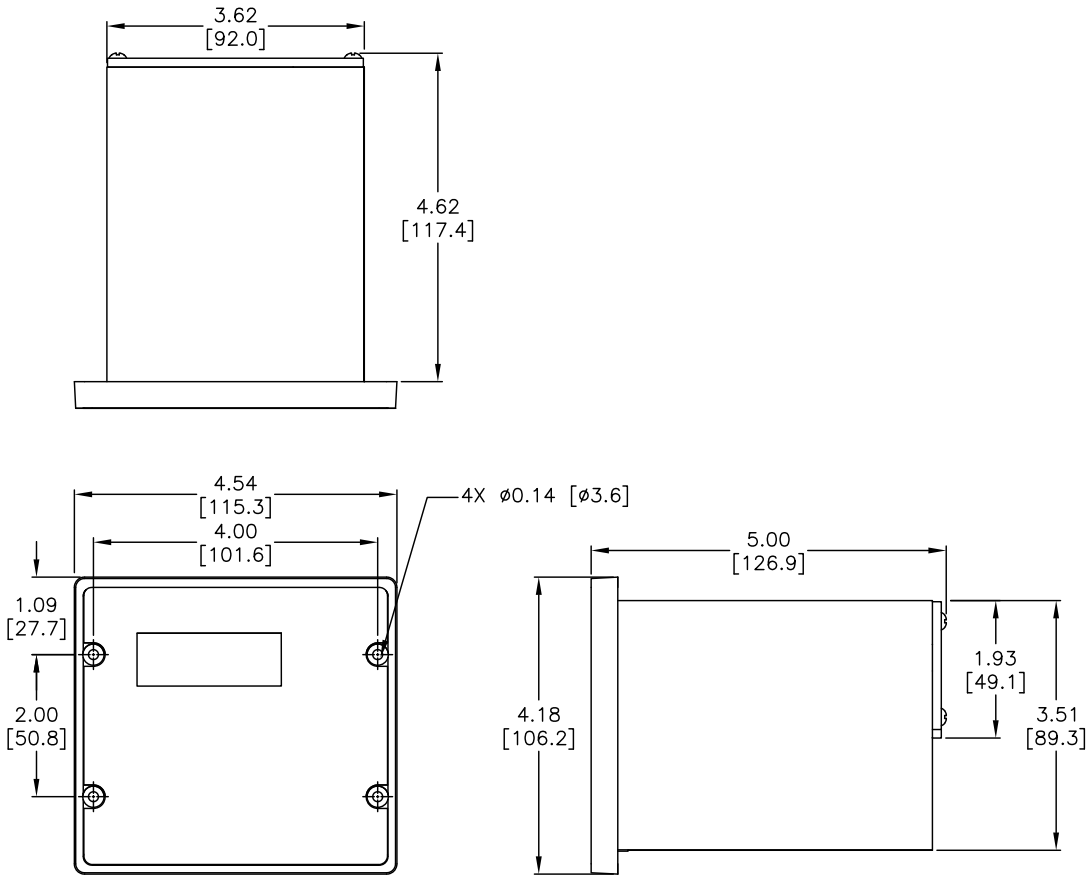
Dimensions

inches [mm]

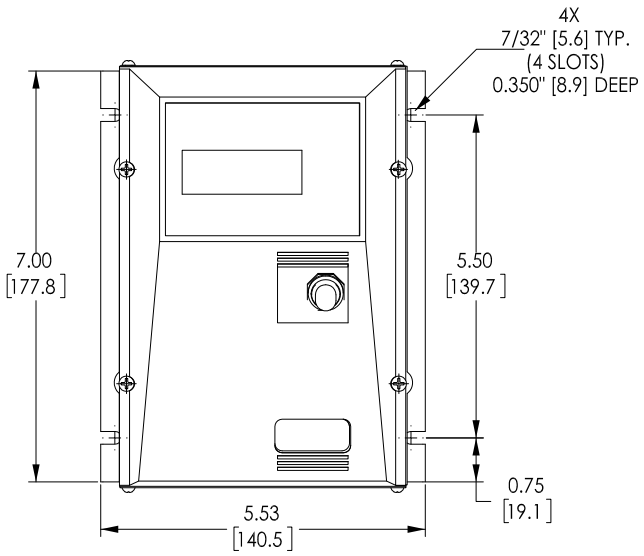
GSD8-240-5C, GSD8-240-5C-D

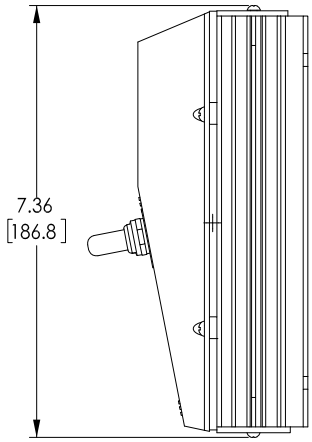


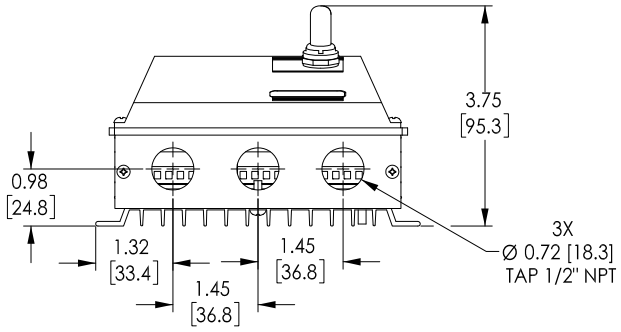
GSD8-240-10C-D



GSD8-240-10N4X, GSD8-240-10N4X-A, GSD8-240-10N4X-U







Installation and Wiring

Do not mount controller where ambient temperature is outside the range of -10 to 45 ˚C (14-113 ˚F).

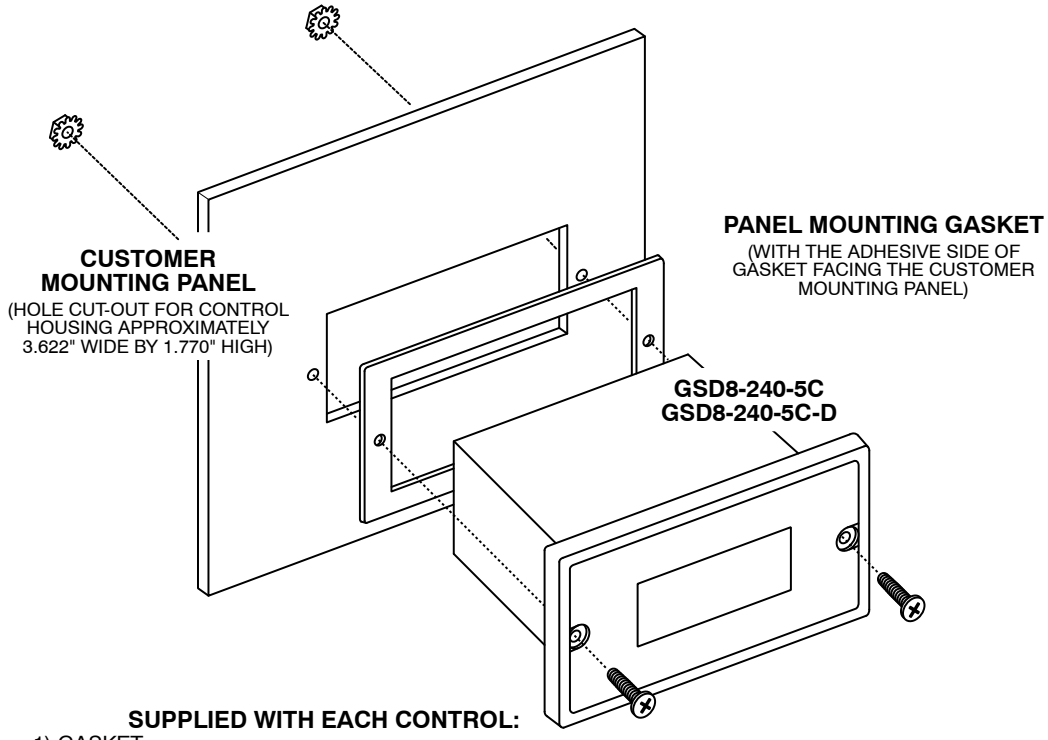
Improper installation or operation of this GSD8 Drive may cause injury to personnel or drive failure. The drive must be installed in accordance with local, state, and national safety codes. Make certain that the power supply is disconnected before attempting to service or remove any components!!! If the power disconnect point is out of sight, lock it in disconnected position and tag it to prevent unexpected application of power. Only a qualified electrician or service personnel should perform any electrical troubleshooting or maintenance. At no time should circuit continuity be checked by shorting terminals with a screwdriver or other metal device.

Before attempting to wire the GSD8 Drive, make sure all power is disconnected. Recheck code designation to assure proper voltage is present for the drive. Caution should be used in selecting proper wire size for current and voltage drop; minimum wire size 14AWG for both 5 and 10 amp models.

Do not reverse positive and negative / power leads, as this will damage the GSD8 Drive.
To change motor direction, interchange the positive and negative motor armature leads.

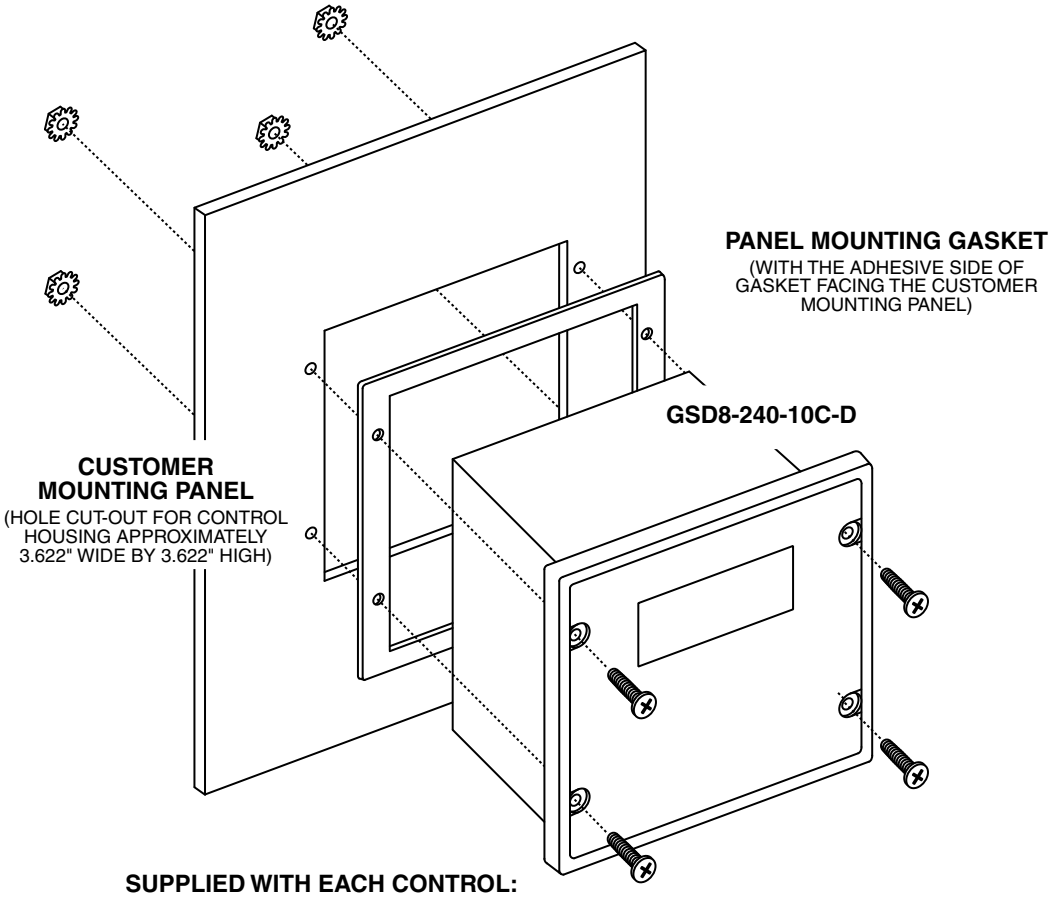
CAUTION!! Turn power OFF while making wiring connections.

Panel Mounting Diagrams



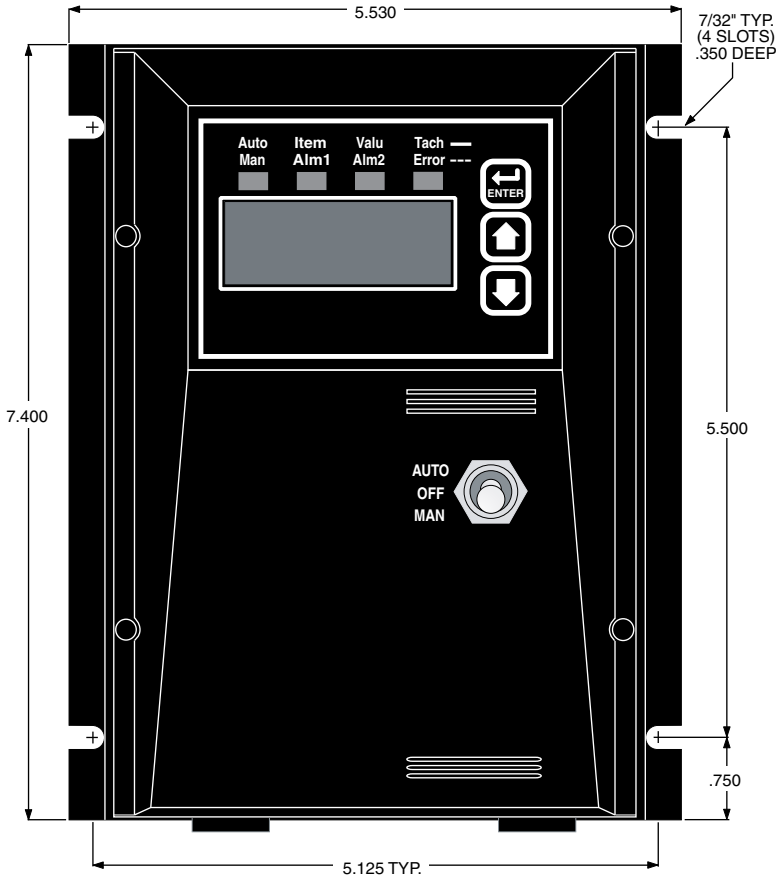
SUPPLIED WITH EACH CONTROL:

1) GASKET
2) (2) 6-32 X 3/4 PANHEAD BLACK OXIDE STAINLESS SCREWS
3) (2) #6 NUT WITH LOCKWASHER



SUPPLIED WITH EACH CONTROL:

1) GASKET
2) (4) 6-32 X 3/4 PANHEAD BLACK OXIDE STAINLESS SCREWS
3) (4) #6 NUT WITH LOCKWASHER



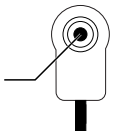
GSDA-PU2x Encoder Installation

The GSDA-PU2x encoder is an economical way to monitor motor speed. The unique design makes installation easy where space is limited or where the mounting location is difficult to reach. The GSDA-PU2x is powered from a +5V power supply and produces a 5 volt square wave with a frequency that is proportional to motor shaft speed. The resulting pulse train signal is used by the GSD8-240-5C drive as a speed or position reference for the drive microprocessor.

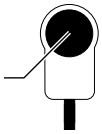
CAUTION!! The GSDA-PU2x cord should not be grouped with other wires or cords. For applications where the GSDA-PU2x cable length will exceed 6 feet, or in electrically noisy environments; a shielded cable is recommended. Connect the shield to the common terminal on the GSD8 Drive and leave the shield on the GSDA-PU2x disconnected and insulated to prevent accidental grounding of the shield wire.

Step 1 Tap motor shaft end for 10-32 screw, 1/2" deep

Step 2 Remove cap from screw



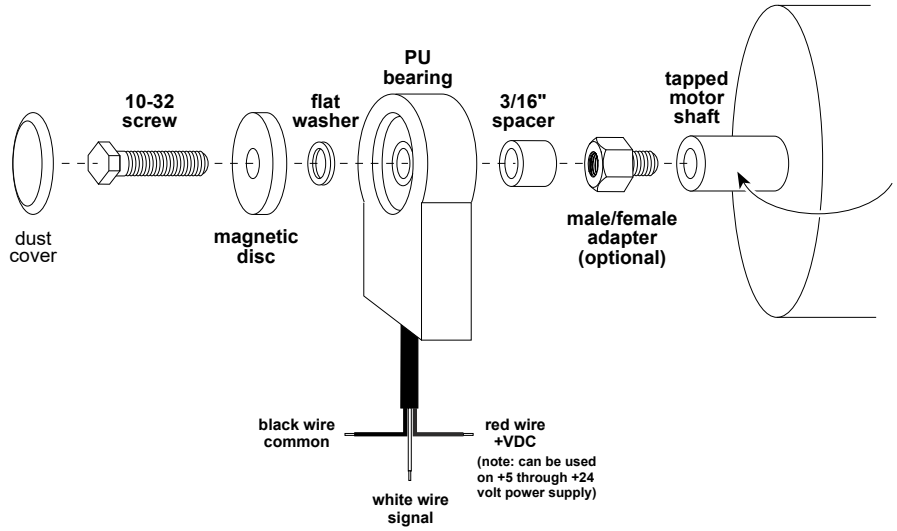
Step 3 Remove black dust cover



Step 4 Install and tighten PU assembly

Step 5 Secure black cover onto housing

- *No other screws are necessary, as the cord will keep the unit from rotating.*
- *The PU gives a high signal when the North Pole in the magnet crosses the hall-effect transistor. The signal is switched off when the South Pole crosses the hall-effect transistor. The result is a square wave whose frequency is proportional to the speed of the shaft on which the PU is mounted. The number of North/South Pole pairs directly affects the output.*



The following Ironhorse, MTPM motors are drilled and tapped 10-32 for use with these encoders:
MTPM-P75-1L18 & 1M18,
MTPM-001-1L18 & 1M18,
MTPM-1P5-1L18 & 1M18,
MTPM-002-1M18

Note: All other Ironhorse, MTPM, TENV motors are NOT drilled and tapped for use with encoders.

GSDA-PU2x Parts List

(1) PU sensor body with 6' cord and dust cap

(1) Magnetic disc[1] (#2, 1PPR)

(1) Magnetic disc[1] (#20, 10PPR)

(1) Magnetic disc[1] (#40, 20PPR) (installed)

(1) 3/16" spacer

(1) male/female adapter[2]

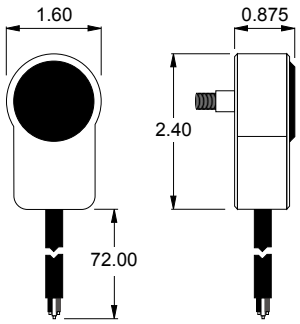
(1) Flat washer

(1) 10-32 screw[3,4]

Notes:

1. Magnetic discs are included with the kit and are NOT available separately.
2. Use of the threaded adapter is optional, depending on the distance between the end of the motor shaft and the fan shroud. If the supplied 10-32 screw and 3/16" spacer are insufficient in length to bridge that gap, the threaded adapter should be used in addition to the screw and spacer.
3. Torque 10-32 screw to 10-12 in-lbs.
4. Use thread locker on 10-32 threaded connection

Dimensions

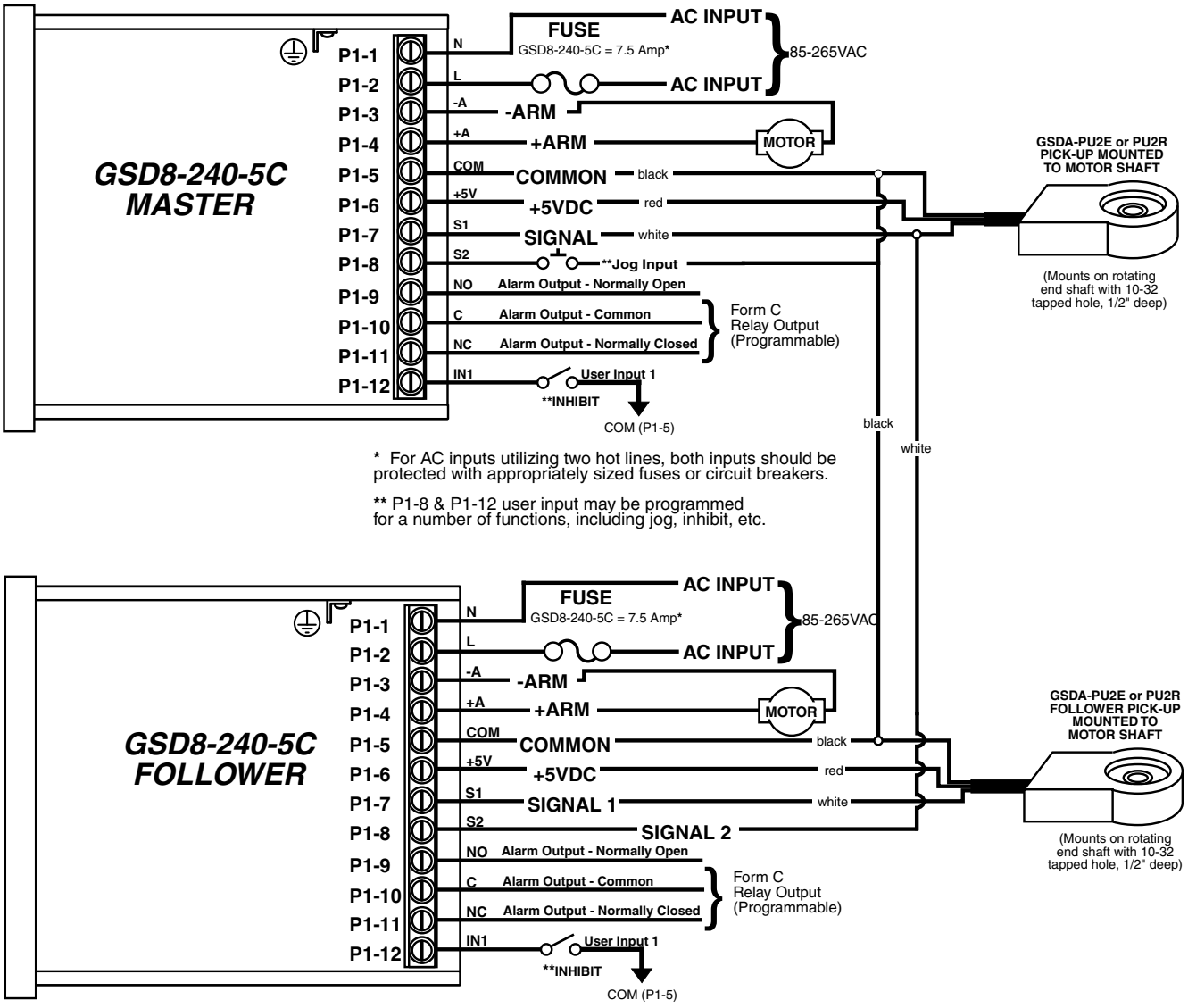


Wiring

Refer to the following wiring diagrams for proper connection of DC Voltage, Armature, and Speed Pot wiring to the GSD8 drive.

Basic Wiring Diagrams

GSD8-240-5C P1 Terminal Block Hook-Up Diagram



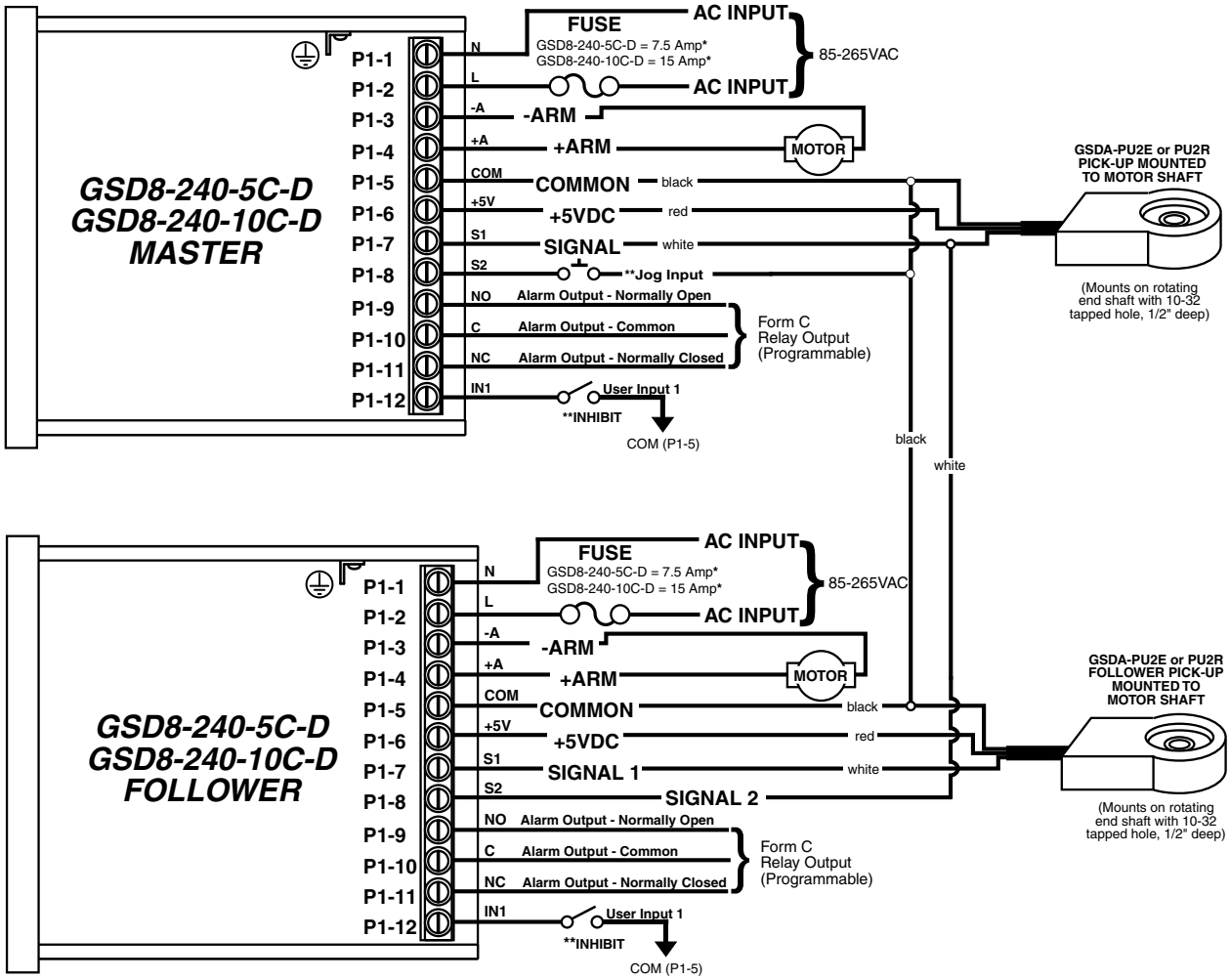
* For AC inputs utilizing two hot lines, both inputs should be protected with appropriately sized fuses or circuit breakers.

** P1-8 & P1-12 user input may be programmed for a number of functions, including jog, inhibit, etc.

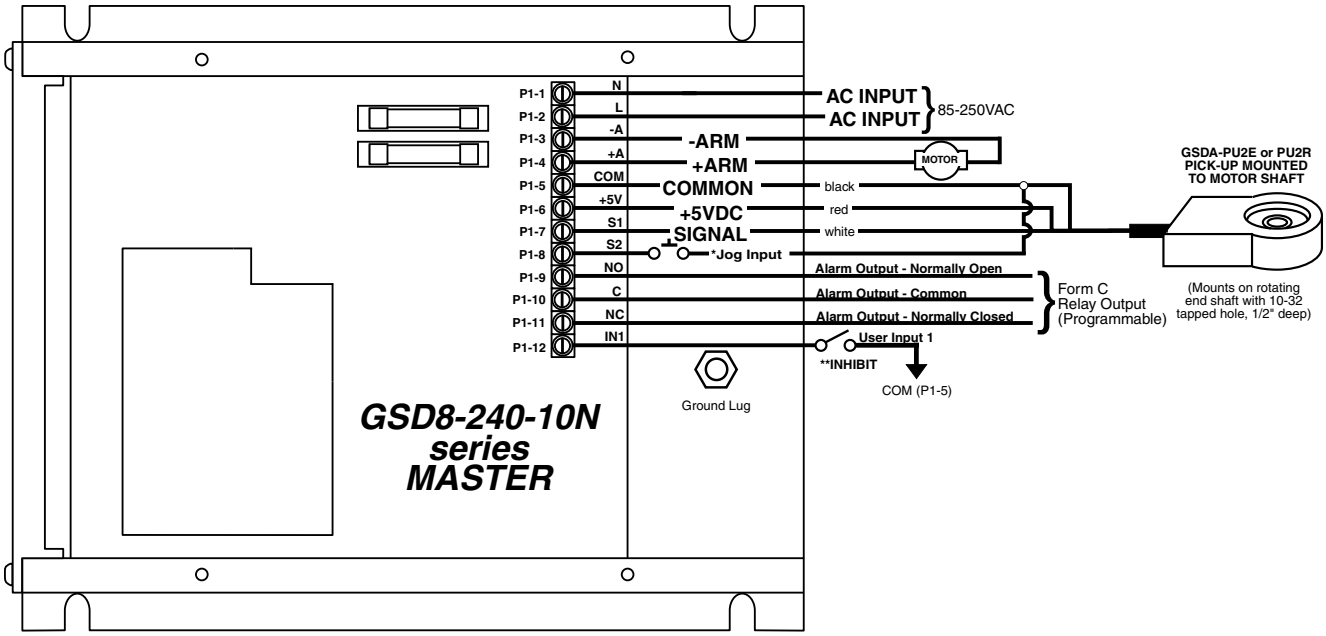
* For AC inputs utilizing two hot lines, both inputs should be protected with appropriately sized fuses or circuit breakers.

** P1-8 & P1-12 user input may be programmed for a number of functions, including jog, inhibit, etc.

GSD8-240-5C-D, GSD8-240-10C-D P1 Terminal Block Hook-Up Diagram



GSD8-240-10N4X, GSD8-240-10N4X-A, GSD8-240-10N4X-U Terminal Block Hook-Up Diagram



* For AC inputs utilizing two hot lines, both inputs should be protected with appropriately sized fuses or circuit breakers.

** P1-8(Master) & P1-12 user input may be programmed for a number of functions, including jog, inhibit, etc.

GSD8 Series Terminals		
Terminal Number	***Description***	***Terminal Marking***
P1-1	For single phase AC lines connect the Neutral side of the AC line to this terminal. For systems with two hot AC lines, connect either of the Hot AC lines to this terminal.	AC/N
P1-2	For single phase AC lines connect the Hot side of the AC line to this terminal. For systems with two hot AC lines, connect either of the Hot AC lines to this terminal.	AC/L
P1-3	The -Armature terminal. For normal rotation of the motor, the -Armature lead of the motor should be connected to this terminal. The +Armature lead of the motor will be connected here when a reverse directional rotation of the armature is desired.	-A
P1-4	The +Armature terminal. For normal rotation of the motor, the +Armature lead of the motor should be connected to this terminal. The -Armature lead of the motor will be connected here when a reverse directional rotation of the armature is desired.	+A
P1-5	Common point for the control logic. The speed sensor common lead as well as any other source needing to reference the control common will be connected to this terminal.	COM
P1-6	Self-contained +5VDC power supply capable of up to 50mA. The speed sensor supply lead can be connected to this terminal for its power source.	+5V
P1-7	Signal input terminal for the motor's digital pickup or encoder. This signal is internally "pulled-up" to +5VDC via a 2.2K ohm resistor.	S1
P1-8	This input can be programmed to perform a number of advanced functions. In Follower Mode, this input is the signal input terminal for the master's digital pickup or encoder. In Master modes (Rate and Time), this input can be configured to function as an emergency stop, inhibit or jog (preset speed) command. This signal is internally "pulled-up" to +5VDC via a 2.2K ohm resistor.	S2
P1-9	The normally-open contact of the user assignable relay output.	NO
P1-10	The common contact of the user assignable relay.	C
P1-11	The normally-closed contact of the user assignable relay output.	NC
P1-12	This input can be programmed to perform a number of advanced functions. It can be configured to function as an emergency stop, inhibit or jog (preset speed) command. This signal is internally "pulled-up" to +5VDC via a 2.2K ohm resistor.	IN1

Basic Operating Instructions

Control Algorithm Discussion

GSD8-240-5C

The GSD8-240-5C DC drive controls are based on a pulse-accumulation algorithm. The advantage of this algorithm is that it allows the GSD8 drive to follow a master process with exceptional accuracy. The GSD8 drive has three parameters which allow the user to adjust how tightly the GSD8 drive will control the motor to achieve the target speed. These 3 parameters are as follows:

- *P Gain - Is the proportional gain for the control loop. In pulse-accumulation algorithms, there is no error on which to calculate proportion output response; therefore, the GSD8 drive estimates error based on several factors. Those familiar with PID tuning should be aware that the GSD8 drive's P Gain is different than that of typical velocity control PID algorithms. P Gain is a function of the instantaneous error between the target (desired) speed and the present speed of the motor.*
- *I Gain -This is the integral gain for the control loop. The I Gain is a function of accumulated error, a measure of the difference between the target (desired) speed and the current speed of the motor.*
- *Pulse Accumulation Limit - This parameter allows the user to limit the maximum number of pulses the drive will accumulate prior to intentionally losing count and therefore long-term accuracy. See the details for parameter 29 in the Parameter Description section.*

All other GSD8 Drives

A true P-I-D speed control algorithm is employed in the GSD8-240-5C-D, GSD8-240-10 series, and GSD8-10N4X series drives which allows precise and quick response to set speed or load changes. Three parameters, 26, 27 and 28 (Proportional, Integral, Derivative, respectively) are adjustable as shown in the parameter table on page 24. P-I-D can be tuned to get precise speed response and regulation.

When adjusting P-I-D, begin by using the factory defaults: Proportional (parameter 26) to 150, Integral (parameter 27) to 20 and Derivative (parameter 28) to 10. If further adjustment of P-I-D is needed, follow the steps below.

- *To adjust Proportional (Parameter 26):*
  Run the motor from zero speed to the set speed. If the start up response of the motor is too slow, increase "P" in increments of 20 until the desired start up response time is obtained. If the start up response time is too fast, decrease "P" in increments of 10 until the desired response is reached. "P" is used to adjust the start up response time only. The start up response time is approximately 0 to 60% of the set speed. "I" can be used if adjustment of the upper response time (60 to 100% of the set speed) is needed.
- *To adjust Integral (Parameter 27):*
  Run the motor from zero speed to the set speed. If the upper response time (60 to 100% of the set speed) has any hesitation or has too slow of a response, then increase "I" in increments of 5 until the hesitation is eliminated and/or the desired upper response time is obtained. If the upper response time is too fast or has too much overshoot, decrease "I" in increments of 3 until the overshoot is eliminated and/or the desired upper response time is reached.
- *To adjust Derivative (Parameter 28):*
  "D" can be used to dampen the effect of "P". By making "D" too large, the response time of the control can be reduced, so keep "D" as small as possible on non-regenerative controls.

NOTE: The overall proportions of each P-I-D parameter seems to be more critical than the individual values, i.e. values of 50-50-50 will achieve virtually the same results as 999-999-999.

Pulse-Accumulation Loop PI Tuning

Many applications do not require tuning of the P and I Gain parameters beyond the supplied factory default settings. If more responsiveness is desired or if the motor oscillates an unacceptable amount when changing speeds, it may be necessary to adjust the P and I gains to obtain optimal performance.

Increasing the P and/or I gains will cause the control to drive the motor more aggressively. Decreasing the P and/or I gains will cause the control to perform more sluggishly. Properly tuning the P and I gains encompasses more than independently adjusting the P and I. The ratio between the two is very important as well. Although initial tuning can be a time-consuming task, here is a basic outline of how to proceed:

Test Procedure:

Adjust the target (displayed) speed as expected during normal operation, including testing inhibit and jog transitions if applicable.

Tuning Method:

1) Step 1 - Connect the GSD8 drive to the motor. For realistic tuning, insure that the motor is operating with the anticipated load for the application.
2) Step 2 - Perform test procedure as described above.
3) Step 3 - If the GSD8 drive performs adequately, stop tuning and record settings
4) Step 4 - If the GSD8 drive response is too sluggish or takes too long to reach the target speed, then increase I Gain slightly (add 250), and perform the test procedure again. Continue increasing I Gain until the motor begins to oscillate slightly or become unstable. At this point, decrease the I Gain by 250.
5) Step 5 - If the GSD8 drive performance is too aggressive or is causing the motor to oscillate or become unstable, then decrease I Gain slightly (subtract 250) and perform the test procedure again. Continue decreasing I Gain until speed stabilizes with the desired response and accuracy.
6) Step 6 - Once I is set, adjust P Gain and perform the test procedure. In the GSD8 drive, additional P Gain may have little effect on response or stability.

Accel and decel settings have a small impact on PI tuning as well. Extreme accel and decel settings may result in sluggish performance of the PI control loop. PI tuning can affect accel and decel times. A PI loop that is sluggish may result in accel and decel times that are longer than expected, while an aggessively tuned loop may result in accel and decel times shorter than expected. Acceptable performance is best achieved by balancing PI tuning, accel, and decel settings.

Master (Rate and Time) and Follower (Ratio) Modes Explained

The GSD8 drives have two basic modes of operation, master and follower. In Master mode, the drives are capable of operating independently; whereas, in Follower Mode, the drives require a signal from a master to operate. Follower Mode is used in applications which require the GSD8 to closely follow a master process.

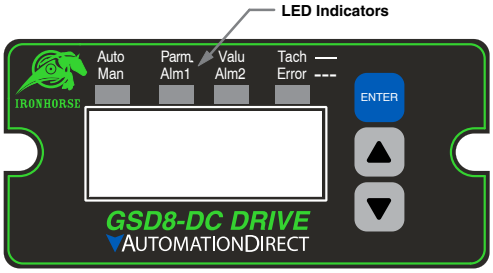
In Master Rate Mode, the GSD8 drive controls the motor speed by tracking the motor's pickup pulses which are applied to signal input 1 (S1). In this mode, the display indicates in rate units such as Gallons-per-minute, feet-per-second, or RPM.

In Master Time Mode, the GSD8 drive controls process time by tracking the motor's pickup pulses which are applied to signal input 1 (S1). In this mode, the display indicates in time units such as HH:MM or MM:SS, where HH is hours, MM is minutes, and SS is seconds. This mode is most commonly used in time sensitive processes such as conveyor ovens and plating applications.

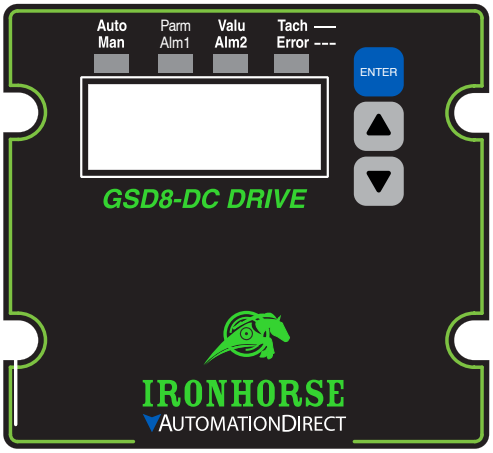
In Follower Mode, the GSD8 drive tracks the rate of the pulses which are applied to the master signal input (S2). From these pulses, it calculates the speed of the master process in RPMs. This rate is then multiplied by the percentage which is displayed on the user interface. The display is in 0.1% of master units. For example, 675 = 67.5 percent of master speed. A master running at 1350 RPM, would cause the follower to run its motor at 67.5% * 1350 RPM or 911.25 RPM. Typical follower applications include synchronized rotation, synchronized conveyors, and some web-material processes.

Visual Reference

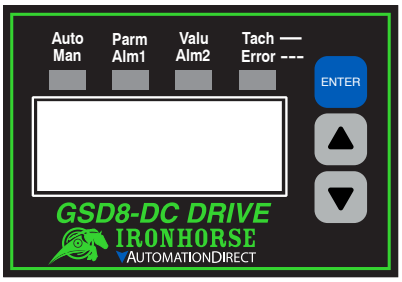
GSD8-240-5C



GSD8-240-5C-D



GSD8-240-10C-D



GSD8-240-10N4X, 10N4X-A, & 10N4X-U

JP1 (Program Enable Jumper)

The JP1 jumper is located under the dust cover on the back end of the upper board. When the jumper is set to the "Off" position, all programming features are "locked out" from the front panel user. When the jumper is in the "On" position, the programming Items are open to change. JP1 is shipped from the factory set in the "On" position.

Changing a Parameter Value (Quick Start)

1) Press and hold the Enter button until Parameter Mode is entered. The 'Parm' LED indicator will light up.
2) Using the Up and Down arrow buttons, move to the desired parameter number you wish to view or edit.
3) Press the Enter button to change the value of the selected parameter. The 'Valu' LED indicator will light up.
4) Using the Up and Down arrow buttons, change the parameter setting to the desired value.
5) Press the Enter button to accept the new parameter value. (Returns to Parameter Mode).
6) Select parameter Zero ("0") and press the Enter button to return to Run Mode.

Operating the User Interface

Although the GSD8 user interface is very versatile, it is also simple to setup and operate. With just a few button presses, it allows the user to configure a number of adjustable Parameters. The LED display has three basic operating modes: Run Mode, Parameter-Selection Mode, and Value Mode. "Parameter" and "Value" modes have LED indicators that aid the user in determining the current state or mode of the user interface.

NOTE: Parameter and Value Modes can only be entered if the Program Enable jumper (JP1) is in the "On" position.

Run Mode is the default display mode when power is applied. The GSD8 drive will spend the majority of its time in this mode. In Run Mode, the display shows the Target or Actual ("Tach") speed value in the user-defined Engineering Units format for rate, time, or percentage of Master if in "Follower" mode. The GSD8 drive control algorithm will continuously adjust motor speed to achieve the Target value. In Run mode, the Up and Down buttons increase or decrease the displayed target within the display minimum and maximum limits. Depending on the alarm configuration, these buttons may also serve as alarm-silence or alarm-reset buttons. For example, displays for rate, time, and follower operating modes could be 13.60, 45:30, and 1000, respectively.

Additionally, the GSD8-240-5C-D, 10C-10 and 10N4X when equipped with the GSDA-AI-A8 option, have an "Auto/Manual" Annunciator which displays a "solid" light if the source of the Target Setting comes from the 4-20mA input ("Auto"), or a "blinking" light if the Target Setting comes from the "front panel" Target setting ("Manual").

Parameter Mode can be entered by pressing and holding the Enter button down for three seconds. Once in Parameter Mode, the "Parm" LED will illuminate. The display will indicate the currently selected parameter number for editing purposes. Pressing the Up or Down button will increase or decrease the selected parameter number on the display. Although the parameter numbers are in numerical order, some numbers are skipped. These numbers represent reserved Parameters that are not yet implemented and are not displayed.

Further, parameter numbers above 999 are actually located on the option card(s) that are installed in the GSD8 Drive. The numbering scheme is the "slot number (100, 200 or 500) times 10, plus the parameter number. Once the desired parameter number is displayed, a press of the Enter button will change the display to Value Mode. So, for example, to view/edit Parameter 20 on an option card in Slot 200, "Browse" to parameter number 2020 (200 X 10 + 20).

NOTE: When in Parameter Mode, pressing the Enter button with parameter 0 selected will return to Run Mode. Consult the parameter map for a complete list of GSD8 parameters.

Value Mode is used to modify the value of the selected parameter. When in Value Mode, the "Valu" LED will illuminate. Pressing the Up or Down button will increase or decrease the selected parameter's value. With the exception of parameter 10, changes in parameter values are processed by the drive as the value changes and without pressing the Enter button. For example, when adjusting P-I-D settings, the change in response can be observed "live", which greatly facilitates the P-I-D "tuning" process. Once the desired value is showing in the display window, pressing the Enter button again will return to Parameter-Selection Mode and the new value will be saved in permanent memory. Removing power from the unit while in Value Mode will result in the specified new value being lost, and the previous (old) value being used. This can be used as an "undo", for example, during editing a value that is being edited in the wrong Parameter.

NOTE: Changes to Parameter 10, Operating Mode, do not take effect until power is removed and re-applied to the GSD8 drive.

Detailed Configuration Instructions

Default Configuration

When shipped from the factory, the following basic settings are in place:

GSD8-240-5C

- *Rate Mode Operation in RPM*
- *S1 and S2 Signal Input Pulses per Revolution: 1*
- *Decimal Point Display: Off*
- *Display Range: 0 - 2400*
- *Speed Range: 0 - 2400 RPM*
- *Accel and Decel: 2500 RPM per second*
- *Signal Input 2 (S2) Mode: Jog @ 1000 RPM when Low*
- *User Input 1 (UIN1) Mode: Emergency Stop when Low*
- *Alarm Outputs: Disabled*

All other GSD8 drives

- *Rate Mode Operation in RPM*
- *S1 and S2 Signal Input Pulses per Revolution: 1, 10, or 20 (depending on magnet in PU2x)*
- *Decimal Point Display: None*
- *Display Range: 0 - 2400*
- *Speed Range: 0 - 2400 RPM*
- *Accel and Decel: 9999 RPM per second*
- *Signal Input 2 (S2) Mode: Jog @ 1000 RPM when Low*
- *User Input 1 (UIN1) Mode: Emergency Stop when Low*
- *Alarm 1 and Alarm 2 Outputs: Disabled*

Resetting the GSD8 to Factory Defaults

The factory-default settings can be easily restored using either of two methods. Both methods require the Program Enable jumper to be in the "On" position. The first is to apply power to the unit with both the Enter and Down buttons pressed for 3 seconds. The second is to change the value of Parameter 95 to 5.

Setting and Reading "SoftSwitches"

The GSD8 drive has the ability to select between a number of "yes/no" or "on/off" options, depending upon the application. Traditionally, this sort of option-selecting was done with some sort of physical switch or switches (such as a "DIP switch"), or by other means, such as the "jumper block" used to enable/disable Programming on the GSD8.

It is easiest to think of a parameter containing SoftSwitches as a DIP switch containing from one to thirty-two switches. But instead of actually flipping a switch "on" or "off", you can set and read these "switches" as a decimal number. Each "switch", from #1 through #32, has been assigned a decimal number that represents its position in the assembly. When that number is used, it means that the switch is "on". For example, the decimal number that represents switch #4 is 8, the number that represents switch #6 is 32, and so on. See the table below for a full explanation of these values. Note: Due to display limitations, switches 15 through 32 are currently unused.

Switch Number	Decimal Value
1	1
2	2
3	4
4	8
5	16
6	32
7	64
8	128
9	256
10	512
11	1024
12	2048
13	4096

So, the decimal number contained in a SoftSwitch Parameter is the sum of the numbers representing the "on" switches. For example, if you wanted to set switches #1, #4, and #7 to the "on" position, you would place the number 73 (1 + 8 + 64) into the Parameter containing those SoftSwitches; if you wanted to set switches #5 and #6 "on", you would place the number 48 (16 + 32) into the Parameter. Simply "add-up" the decimal values of the switches you wish to "turn on", and place the total, or "sum", into the Parameter containing the SoftSwitches.

The settings of the SoftSwitches can also be read the same way: For example, if a parameter containing the SoftSwitches has been set to the number 11, you can tell that switches #1, #2 and #4 are "on" by subtracting the values, from highest to lowest, starting at the highest value that is less than or equal to the "total". Continue subtracting, avoiding negative numbers until you reach zero.

Generating Alarms from Drive Condition Flags

The GSD8 drives include two alarm outputs which can be independently set to activate on any of the available drive condition flags. By default, all alarms are deactivated. To enable alarms, enter a decimal value into Parameter 50 that represents the drive conditions under which Alarm 1 should activate. For Alarm 2, write the value into Parameter 70. (see Table 1)

Table 1: Alarm Parameters

Type	Alarm Logic	Alarm 1	Alarm 2
Drive Condition Flags	Enable Alarm(s)	Parameter 50	Parameter 70
	Invert Alarm Flag(s)	Parameter 51	Parameter 71
	Logically [AND] Enable and Invert Flag(s)	Parameter 52	Parameter 72
Option Card Faults	Enable Alarm(s)	Parameter 65	Parameter 85
	Invert Alarm Flag(s)	Parameter 66	Parameter 86
	Logically [AND] Enable and Invert Flag(s)	Parameter 67	Parameter 87

NOTE: See the full parameter table on page 24 for all parameters associated with alarm conditions and control.

If multiple alarm conditions are enabled by the value in parameter 50(70), each are logically [OR] together so any of the enabled conditions will trigger the alarm. Parameters 51(71) & 52(72) provide some advanced features. When used together, the Invert [AND] logic created with these two parameters provides additional filtering and alarm activation control. The table below shows the possible states of an alarm of a given drive condition flag. For most applications you simply need to enable the alarm(s) you're wanting to monitor in parameter 50(70).

Table 2: Possible States of a Single Alarm Bit

Parameter	Alarm off NOR off AND off	Alarm off NOR off AND on	Alarm off NOR on AND off	Alarm off NOR on AND on	Alarm on NOR off AND off	Alarm on NOR off AND on	Alarm on NOR on AND off	Alarm on NOR on AND on	Logic	Notes
50 (70)	0	0	0	0	1	1	1	1	***[OR]***	If=1, this drive condition will generate an alarm
51 (71)	0	0	1	1	0	0	1	1	***Invert Control***	If=1, inverts the state of parameter 50 (for use with parameter 52)
	0	0	1	1	1	1	0	0	***Invert State***	= alarm state based on parameter 50 status + invert status
52* (72)	0	1	0	1	0	1	0	1	***[AND]***	1=enable [AND] (if 52=0, then 51 is also disabled)
Result	***0***	***0***	***0***	***0***	***1***	***1***	***1***	***0***	***Alarm 1 Active***	

** When parameter 52=1, it will logically [AND] parameters 50 and 51.*

- *Parameter 50 (70): decimal value that represents the Drive Condition Flag(s) you wish to generate an alarm. For example, a value of 64 will generate an alarm if the Jog function is activated (Logical "1").*
- *Parameter 51 (71): decimal value that represents the Drive Condition Flag(s) you wish to invert. For example, a value of 64 will invert parameter 50 if the Jog function is activated (Logical "0").*
- *Parameter 52 (72): decimal value that represents the Drive Condition Flag(s) you wish to [AND] parameters 50 and 51. For example, a value of 64 will logically [AND] 50 and 51.*

This means there are three possible scenarios that can generate a Jog Function Activated alarm.

Table 3: Jog Function Activation Example								
Parameter	**Decimal Value**							
50 (70)	64	64	64	64	0	0	0	0
51 (71)	0	0	64	64	0	64	0	64
52 (72)	0	64	0	64	0	0	64	64
Generates Alarm	✓	✓	✓	–	–	–	–	–

NOTE: Replace 64 with the value that represents the sum of all drive condition flags you want to generate an alarm.

Table 4: Drive Condition Flag Values																		
Parameter 50 (70)	**BIN**																**Decimal**	
	16	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**		
No Flag (no alarms enabled)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Accel/Decel Ramp in Progress	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	1	
S1 (Main) Actual Speed (Tach) is outside alarm limits	0	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	0	2	
Target Speed is outside alarm limits	0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	0	0	4	
Target Speed = 0	0	0	0	0	0	0	0	0	0	0	0	0	**1**	0	0	0	8	
S1 (Main) Pickup is stalled	0	0	0	0	0	0	0	0	0	0	0	**1**	0	0	0	0	16	
S2 (Leader) Pickup is stopped (valid only in Follower mode)	0	0	0	0	0	0	0	0	0	0	**1**	0	0	0	0	0	32	[OR}
Jog function is activated	0	0	0	0	0	0	0	0	0	**1**	0	0	0	0	0	0	64	
Inhibit function is activated	0	0	0	0	0	0	0	0	**1**	0	0	0	0	0	0	0	12	
E-Stop function is activated	0	0	0	0	0	0	0	**1**	0	0	0	0	0	0	0	0	256	
Drive is at maximum output	0	0	0	0	0	0	**1**	0	0	0	0	0	0	0	0	0	512	
"Run" condition	0	0	0	0	0	**1**	0	0	0	0	0	0	0	0	0	0	1024	
Reserved	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2048	
Reserved	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4096	
Results						***1***	***1***	***1***	***1***	***1***	***1***	***1***	***1***	***1***	***1***	***1***	***0=Disabled***	

NOTE: To enable multiple alarms, enter the sum of those drive condition flags into parameter 50. For example, 'Drive is at Max Output' (512) and 'Target Speed = 0' (8) results in 512+8=520.

"Alarm" Output Routing

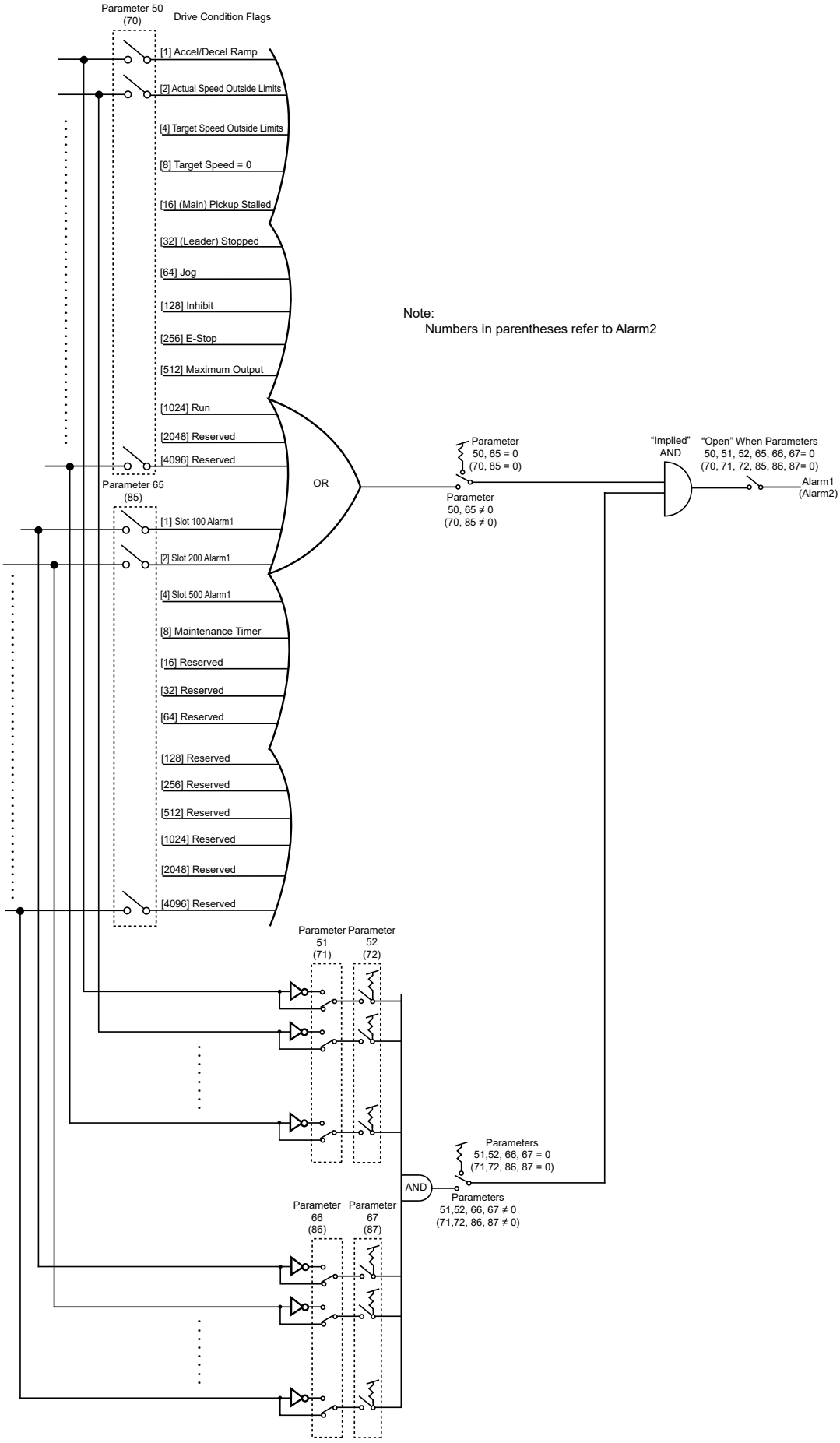
The "output" of Alarm1 is permanently "routed" to drive the Form-C Relay output on the GSD8 drive (see Hook-up Diagram, P1-9 through P1-11). The "output" of Alarm2, however, can be Routed (using Parameter 81) to any one of the three Modbus "slots", 100, 200 or 500.

GSD8 Alarm "Logic"

NOTE: The "circuitry" shown on the next page is actually implemented in software, not hardware.

Also note that the "switches" on the outputs of the "OR gate", the "AND gate", and the "Implied AND" gate are only under indirect user control. That is, they are set automatically by the action of other settings that are under user control. For example, the switch on the output of the "OR gate" is automatically set to the uppermost position as shown on the drawing when Parameter 50 (or 70 for Alarm2) is set to zero. See the Alarm Logic Application Example on the next page for further details.

Alarm Logic Application Example



GSD8 Software Parameters

Parameter	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-P, 10C-P, 10N4X, 10N4X-A, 10N4X-U		10 45	✓	✓
2	Software Build	1-9999		n/a	✓	✓
3	Hardware Version	1-9999		n/a	✓	✓
4	Serial Number - Major (Reserved)	N/A		n/a	✓	
	Software Version (Mark Reserved)	1-9999		n/a		✓
5	Serial Number - Minor (Reserved)	N/A		n/a	✓	
	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)	Decimal	n/a		✓
9	Drive Condition Flags	(See "Flags" - Table #2 Below)	Decimal	n/a		✓
		General Setup Parameters				
10	Operating Mode*	1 = Rate Mode 2 = Time Mode 3 = Follower Mode (see also parameter 35)		1	✓	✓
	*Power must be removed and re-applied to the GSD8 for a change in Operating Mode to take effect					
11	Display Intensity Display Brightness	0-31 - (Dim-Bright)		20 26	✓	✓
12	Display Mode	1 = Target Speed 2 = S1 Actual Speed 3 = S2 (Leader) Speed		1		✓
13	Decimal Point Position	0 = Disabled - (XXXX) 1 = X.XXX 2 = XX.XX 3 = XXX.X 4 = XXXX		0	✓	✓
14	Keypad Mode	1 = Linear - Constant Rate 2 = Non-Linear - Accelerating Rate		2	✓	✓
15	Keypad Scroll Delay	0-30 - (Fast-Slow)		10	✓	✓
16	Power-Up Target Speed	1 = Force Zero Speed 2 = Force Power-up Value 3 = Use Previous Target Speed		3		✓
	S1 / S2 Input Edge & Prescaler Configuration	0 = S1 Rising / 1 - S2 Rising / 1 1 = S1 Falling / 1 - S2 Rising / 1 2 = S1 Falling / 4 - S2 Rising / 1 3 = S1 Falling / 16 - S2 Rising / 1 4 = S1 Rising / 1 - S2 Falling / 1 5 = S1 Falling / 1 - S2 Falling / 1 6 = S1 Falling / 4 - S2 Falling / 1 7 = S1 Falling / 16 - S2 Falling / 1 8 = S1 Rising / 1 - S2 Falling / 4 9 = S1 Falling / 1 - S2 Falling / 4 10 = S1 Falling / 4 - S2 Falling / 4 11 = S1 Falling / 16 - S2 Falling / 4 12 = S1 Rising / 1 - S2 Falling / 16 13 = S1 Falling / 1 - S2 Falling / 16 14 = S1 Falling / 4 - S2 Falling / 16 15 = S1 Falling / 16 - S2 Falling / 16		0	✓	
17	Power-Up Value	0-9999	(Eng. units)	0		✓

Parameter	Description	Value Range	Units	Default	GSD8-240-5C	All other GSD8 drives
18	Power-Up Mode	1 = Default to Zero Display 2 = Default to Power-up Value 3 = Default to Previous Running Value		3	✓	
	Front-Panel Double-Click Destination	0 = Double-Click Ignored 1 = Inhibit 2 = Estop 3 = Jog1 4 = Jog2 5 = Auto/Man - 4 to 20mA Card		0		✓
19	Power-Up Value	0-9999	(Display units)	0	✓	
	Reserved	n/a				✓
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 1 = Gain Tracking On, Low Spd Mode Off 2 = Gain Tracking Off, Low Spd Mode On 3 = Gain Tracking On, Low Spd Mode On		1		✓
23	Accel Setting	1-9999	(Display units)	2500	✓	
				9999		✓
24	Decel Setting	1-9999	(Display units)	2500	✓	
				9999		✓
26	Proportional Gain	0-9999	(Non Unit Specific)	0	✓	
				150		✓
27	Integral Gain	1-9999 0-9999	(Non Unit Specific)	5000	✓	
				20		✓
28	Derivative Gain	0-9999		10		✓
29	Pulse Accumulation Limit	2-5000	(Non Unit Specific)	15	✓	
	Startup Lag Compensation	0-5000		0		✓
Signal Input #1 (S1) Setup Parameters						
30	S1 Display Reference	0-9999 1-9999	(Eng. Units)	2400	✓	✓
31	S1 Reference RPM	0-9999 1-9999	RPM	2400	✓	✓
32	S1 Pulses Per Revolution	1-2048 1-9999	PPR	1 20	✓	✓
33	S1 Deadband - (Follower Mode Only)	0-1000		0	✓	
	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) 2 = E-Stop - S2 High 3 = E-Stop - S2 Low 4 = Inhibit - S2 High 5 = Inhibit - S2 Low 6 = Jog - S2 High 7 = Jog - S2 Low		7	✓	✓
36	S2 Setpoint Setpoint for Jog1 Function	1-9999	(Eng. Units)	1000	✓	✓

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

Parameter	Description	Value Range	Units	Default	GSD8-240-5C	All other GSD8 drives
54	Alarm 1 Pulse ON Time	1-3600	Seconds	1	✓	
	Alarm1 Reset Configuration	1 = No Silencing - Reset on Enter Button 2 = No Silencing - Reset on S2 High 3 = No Silencing - Reset on S2 Low 4 = Silencing - Reset on Enter Button 5 = Silencing - Reset on S2 High 6 = Silencing - Reset on S2 Low		1		✓
55	Alarm 1 Pulse OFF Time	1-3600	Secs	1	✓	
	Annunciator Alm1 Flash On Active Alarm1	0 = No Annunicator Flash 1 = Annunicator Flash		0		✓
56	Alarm 1 Pulse Count	0-9999	(Eng. Units)	0	✓	
	Alarm1 Output Pulse ON Time	1-3600	Secs.	1		✓
57	Alarm 1 Lower Limit	0-9999	(Eng. Units)	0	✓	
	Alarm1 Output Pulse OFF Time	1-3600	Secs.	1		✓
58	Alarm 1 Upper Limit	0-9999	(Eng. Units)	9999	✓	
	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)	Decimal	0		✓
66	Alarm1 Logical Inverters	(See "Flags" - Table 2 Below)	Decimal	0		✓
67	Alarm1 Logical "AND" Activation Conditions	(See "Flags" - Table 2 Below)	Decimal	0		✓
Alarm Output #2 Setup Parameters						
70	Alarm2 Logical "OR" Activation Conditions	(See "Flags" - Table 1 Below)	Decimal	0		✓
71	Alarm2 Logical Inverters	(See "Flags" - Table 1 Below)	Decimal	0		✓
72	Alarm2 Logical "AND" Activation Conditions	(See "Flags" - Table 1 Below)	Decimal	0		✓
73	Alarm2 Output Style & Reset Mode	1 = Constant & Auto Reset 2 = Constant & Manual Reset 3 = Pulsed & Auto Reset 4 = Pulsed & Manual Reset		1		✓
74	Alarm2 Reset Configuration	1 = No Silencing - Reset on Enter Button 2 = No Silencing - Reset on S2 High 3 = No Silencing - Reset on S2 Low 4 = Silencing - Reset on Enter Button 5 = Silencing - Reset on S2 High 6 = Silencing - Reset on S2 Low		1		✓
75	Annunciator Alm2 Flash On Active Alarm2	0 = No Annunicator Flash 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		✓

Parameter	Description	Value Range	Units	Default	GSD8-240-5C	All other GSD8 drives
81	Alarm2 Output Routing	1 = Reserved 2 = Use Slot 100 Alarm1 Output 3 = Use Slot 200 Alarm1 Output 4 = Use Slot 500 Alarm1 Output		3		✓
85	Alarm2 Logical "OR" Activation Conditions	(See "Flags" - Table 2 Below)	Decimal	0		✓
86	Alarm2 Logical Inverters	(See "Flags" - Table 2 Below)	Decimal	0		✓
87	Alarm2 Logical "AND" Activation Conditions	(See "Flags" - Table 2 Below)	Decimal	0		✓
Parameter Memory Command Parameters						
95	Restore to Factory Defaults (Affects Drive Settings Only)	0 = Abort & Exit 5 = Restore Factory Default Settings		0	✓	✓
96	Restore Modbus Card(s) Settings to Factory Defaults - (Card Settings Only)	0 = Abort & Exit 100 = Restore Slot 100 Default Settings 200 = Restore Slot 200 Default Settings 500 = Restore Slot 500 Default Settings		0		✓
98	Save to User Default Memory Save "Environment" (Drive & All Modbus Card Settings) to "User Save" Storage Area	0 = Abort & Exit 5 = Save User Settings 5 = Copy current Settings TO "Settings2" (or "Settings1" if using "Settings2")		0	✓	✓
99	Restore From User Default Memory Restore / Swap "Environment" (Drive & All Modbus Card Settings) from "User Save" Storage Area	0 = Abort & Exit 1 = Restore User Default Settings 5 = Copy (Restore) current Settings FROM "Settings2" (or "Settings1" if using "Settings2") 10 = Swap Between "Settings1" & "Settings2"		0	✓	✓
Maintenance Timer Setup Parameters						
100	Activate Maintenance Message - (After this amount of time)	0 = Off 1 = 1 ~ 9999	Hours	0		✓
101	Reset Maintenance Timer	0 = Abort & Exit 5 = Reset		0		✓
102	Current Value of Maintenance Timer	Read Only	Hours	0		✓
103	Scale Timer	0 = Disabled 1-9999 = Scale Factor		0		✓
120	Auto/Manual Slot Control	0 = Slot 100 1 = Slot 200 2 = Slot 500		1		✓
121	Follower Target Source	1 = Pickup 2 = Slot 100 3 = Slot 200 4 = Slot 500		1		✓
122	Follower Percent Source	1 = Slot 100 2 = Slot 200 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					✓

Parameter	Description	Value Range	Units	Default	GSD8-240-5C	All other GSD8 drives
128	Inhibit Function Activated					✓
256	E-Stop Function Activated					✓
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 Modbus Card Installed)				✓
2	Slot 200 Alarm1 Activated	(Valid Only if Modbus Card Installed)				✓
4	Slot 500 Alarm1 Activated	(Valid Only if Modbus Card Installed)				✓
8	Maintenance Timer					✓
16	Reserved					✓
32	Reserved					✓
64	Reserved					✓
128	Reserved					✓
256	Reserved					✓
512	Reserved					✓
1024	Reserved					✓
2048	Reserved					✓
4096	Reserved					✓

GSD8 Software Parameter Descriptions

Parameter	Parameter Name	Description	GSD8-240-5C	All other GSD8 drives
0	Exit to Running Mode	When Parameter 0 is selected in Parameter-Selection Mode, the unit will return to Running Mode and, depending on the value of Parameter 12, will display the running (Target) or actual (Tach) value. This should be selected once changes to Parameters are completed.	✓	✓
		Read-Only Identification Parameters		
1	Model Number	This number represents the base model number for the product.	✓	✓
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	Modbus Protocol Version	The Modbus protocol version is a code which identifies the highest (most-recent) version of the Modbus protocol with which this unit is compatible.	✓	✓
5	Serial Number (Major)	These Parameters are reserved for future use as an electronic serial number and are unique to each manufactured unit.	✓	✓
6	Serial Number (Minor)	These Parameters are reserved for future use as an electronic serial number and are unique to each manufactured unit.	✓	✓
8	Drive Condition Flags	This is a decimal representation of the currently active "Flags" representing certain real-time conditions and/or modes in which the drive is operating. This display is updated several times per second to reflect the up-to-the-second status of the drive and its Modbus cards, if any. See "Flags" table 1 in the Software Parameters (Parameters) table for the decimal values	✓	✓
9	Drive Condition Flags, Table 2	This is a decimal representation of the currently active "Flags" representing certain real-time conditions and/or modes in which the drive is operating.This display is updated several times per second to reflect the up-to-the-second status of the drive and its Modbus cards, if any. See "Flags" table 2 in the Software Parameters (Parameters) table for the decimal values.	✓	✓
		General Setup		
10	Operating Mode	This Parameter defines the operating mode for the entire unit. There are two basic modes of operation, master and follower. In master modes, the unit controls the load using either rate or time units. In follower mode, the unit controls the load in percentage of master rate. *NOTE: Power must be removed and re-applied to the GSD8 for a change in Operating Mode to take effect. It is also strongly suggested the Target Speed be reduced to zero and the setting of Parameters 16, 17, 20, 21, 30 & 31 be reviewed carefully prior to doing so.* The following Operating Modes are available for the GSD8: • Mode 1 – Master, Rate Mode In Rate Mode, the GSD8 displays in user-defined rate "Engineering Units" such as RPM, Gallons per Hour, or Feet per Second. • Mode 2 – Master, Time Mode In Time Mode, the GSD8 displays in time units using the format AA:BB. By default AA:BB represents minutes (AA) and seconds (BB). Optionally, it can be configured to represent hours (AA) and minutes (BB) or other user-defined units with a 1:60 relationship. When setting Parameters which are configured in engineering units, the programmed value is the determined by the formula (AA * 60) + BB. In HH:MM displays, this is the total number of minutes. In MM:SS displays, this is the total number of seconds. • Mode 3 – Follower Mode In Follower Mode, the GSD8 displays in percentage units, where 1000 equals 100.0 percent of the master rate. For example, if the display indicates 985, 98.5, or 9.85, the GSD8 will attempt to run at exactly 98.5 percent of the master rate. Display settings are always entered ignoring the decimal point's position.	✓	✓

Parameter	Parameter Name	Description	GSD8-240-5C	All other GSD8 drives
11	Display Intensity	This Parameter adjusts the intensity of the LED display digits in the front panel of the unit. The values of 0 – 31 correspond to a gradual change from very dim to very bright. This is often useful when the GSD8 is used in the same panel as other pieces of equipment with LED displays and a uniform display brightness is desired. Simply adjust the GSD8 to match its surroundings.	✓	✓
12	Display Mode	This Parameter selects what the GSD8 will show on its display during Run Mode. Note that it can "toggle" between whatever the Display Mode is set to and its "opposite" by briefly pressing and releasing the ENTER button (does not apply to GSD8-240-5C). For example, if this Parameter is set to 1 (Target Speed/Time), pressing the ENTER button will briefly show the Actual (Tach) Display (and illuminate the "Tach" LED Annunciator). Conversely, if this Parameter is set to 2 or 3 (Main Tach or Leader Tach, respectively), pressing the ENTER button will briefly show the Target Speed/Time. The following Display Modes are available for the GSD8: • Mode 1 – Target Speed/Time Display In Rate Mode, the GSD8 displays the Target Speed in user-defined rate Engineering Units such as RPM, Gallons per Hour, or Feet per Second. In Time Mode, the GSD8 displays the Target Time in time units using the format AA:BB. In Follower Mode, the GSD8 displays the Target Speed in percentage units, where 1000 equals 100.0 percent of the Master rate. • Mode 2 – S1 (Main Pickup) Actual Speed (Tach) Display In Rate Mode, the GSD8 displays the Actual Speed in user-defined rate Engineering Units such as RPM, Gallons per Hour, or Feet per Second. In Time Mode, the GSD8 displays the Actual Time in time units using the format AA:BB. In Follower Mode, the GSD8 displays the Actual Speed in percentage units, where 1000 equals 100.0 percent of the Master rate. • Mode 3 – S2 (Leader) Actual Speed (Tach) Display Mainly useful for diagnosing and setup of Master-Follower applications, selecting this Mode shows the Leader Speed (on the S2 Input) in RPM Units (only).	✓	✓
13	Decimal Point (DP) Position (used in Rate and Follower Modes Only)	This selects the format of the display with respect to the decimal point's position. This Parameter does not effect the value entry for other Parameters. For example, if the user desires to display 10.00 at 300RPM, then Parameter 30 would be set to 1000, Parameter 31 would be set to 300, and Parameter 13 would be set to 2. • Mode 0: Fixed XXXX • Mode 1: Fixed X.XXX • Mode 2: Fixed XX.XX • Mode 3: Fixed XXX.X • Mode 4: Fixed XXXX.	✓	✓
14	Keypad Mode	This Parameter selects the operating mode of the front-panel push buttons. In some applications, increasing or decreasing the scroll rate provides the user more controllability when entering settings. Parameters 14 and 15 affect only the Up and Down buttons when the user interface is in Running Mode. These settings also apply to remote Up / Down buttons which are attached via the -1 option board. • Mode 1: Linear, Constant Rate In linear mode, pressing and holding the Up or Down buttons will cause the display to continuously change value in the requested direction until either the Display Minimum or Display Maximum is reached. The displayed value will scroll at a constant rate which is specified using Parameter 15. • Mode 2: Non-linear, Accelerating Rate In non-linear mode, pressing and holding the Up or Down buttons will cause the display to continuously change value in the requested direction until either the Display Minimum or Display Maximum is reached. The displayed value will initially scroll at a slow rate and increase in speed until the maximum scroll rate is achieved. The initial scroll rate is specified using Parameter 15.	✓	✓
15	Keypad Scroll Delay	This Parameter sets the scroll speed for the front-panel push buttons. The function of this Parameter varies slightly depending on the Keypad Mode. See Parameter 14 for more details.	✓	✓

<table>
<tr><th>Parameter</th><th>Parameter Name</th><th>Description</th><th>GSD8-240-5C</th><th>All other GSD8 drives</th></tr>
<tr><td rowspan="2">16</td><td>S1/S2 Input Edge and Prescaler Configuration</td><td>This parameter determines how the GSD8-240-5C processes the S1 and S2 signal input. It specifies which signal edge is used for measurements and the value of the internal frequency dividers or prescalers. Modes with prescalers greater than 1 should only be used if the input pulse rate on S1 or S2 exceeds the unit's maximum native pulse rate (see specifications for details); otherwise, the control loop may become sluggish and unnecessarily inaccurate. Use the following chart to configure this parameter. As an example, assume an application requires input pulse rates on S1 of 120,000 pulses-per-minute and S2 of 35,000 pulses-per-minute. According to the electrical specifications, the unit can only accept 50,000 pulses-per-minute on each of the S1 and S2 inputs. With this in mind, the S1 and S2 prescalers should be selected as Falling/4 (120,000/4 = 30,000, below the 50,000 limit) and Rising/1 (no change needed for S2). In this case, parameter 16 would be set to 2.
<table>
<tr><th colspan="2" rowspan="2">Selection Chart</th><th colspan="4">S1 Input Edge and Prescaler</th></tr>
<tr><th>Rising/1</th><th>Falling/1</th><th>Falling/4</th><th>Falling/16</th></tr>
<tr><td rowspan="4">S2 Input Edge and Prescaler</td><td>Rising/1</td><td>0</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>Falling/1</td><td>4</td><td>5</td><td>6</td><td>7</td></tr>
<tr><td>Falling/4</td><td>8</td><td>9</td><td>10</td><td>11</td></tr>
<tr><td>Falling/16</td><td>12</td><td>13</td><td>14</td><td>15</td></tr>
</table>
See "Parameter 16 Encoder/Motor Assignment Table" on page 47 for Parameter 16 values based on installed encoder PPR and motor RPM ratings.</td><td>✓</td><td></td></tr>
<tr><td>Power-up Target Speed</td><td>This Parameter determines the default Running Value when power is initially applied to the GSD8.
• Mode 1: Default to Zero
When in this mode, the unit will default to zero (engineering units).
• Mode 2: Default to Power-Up Value
When in this mode, the unit will default to the Power-up Value, Parameter 17.
• Mode 3: Default to Previously Running Value
When in this mode, the unit will default to the previous running value before power was removed. A previous running value must have been active for at least 3 seconds to be recalled after power has been disconnected and reapplied.</td><td></td><td>✓</td></tr>
<tr><td>17</td><td>Power-up Value</td><td>When Power-up Mode is set to 2, this Parameter will designate the default display value at power-up in the user's desired units of measure ("engineering units"), e.g. RPM, GPM, FPM, etc.</td><td>✓</td><td>✓</td></tr>
</table>

Parameter	Parameter Name	Description	GSD8-240-5C	All other GSD8 drives
18	Power-up Mode	This parameter defines the mode which determines the default Running Value when power is initially applied to the MDP. • Mode 1: Default to Zero When in this mode, the unit will default to zero (display units). • Mode 2: Default to Power-Up Value When in this mode, the unit will default to the Power-up Value, parameter 19. • Mode 3: Default to Previously Running Value When in this mode, the unit will default to the previous running value before power was removed. *NOTE: A previous running value must have been active for at least 3 seconds to be recalled after power has been disconnected and reapplied.*	✓	
	Front Panel DoubleClick Routing	This Parameter determines what happens if the user "Double-Clicks" the Enter Button (two button presses quickly) on the front panel of the GSD8 (does not apply to GSD8-240-5C). • Mode 0: DoubleClick Ignored When in this mode, DoubleClicking on the Enter Button will have no effect. • Mode 1: Route DoubleClick to Inhibit When in this mode, Double-Clicking on the Enter Button when the drive is "running" will place the Drive in Inhibit, obeying the "acel/decel rules" found in Parameter 42. Additionally, if the S2 and/or UIN1 inputs are set up to provide Inhibit control, they are active as well, with the following rules. Either the DoubleClick and/or S2/UIN1 can cause the control to go into Inhibit, but both the DoubleClick AND S2/UIN1 have to be "negated" (set to allow the control to "run") before the control will exit "Inhibit" mode and begin to "run" normally again. Note that the DoubleClick action works as a "toggle", so the operation could be somewhat confusing if S2/UIN1 are "routed" to the Inhibit, along with the DoubleClick, but this behavior is necessary for "safety" reasons. • Mode 2: Route DoubleClick to EStop Same as Mode 1, but DoubleClick is Routed to the E-Stop function. • Mode 3: Route DoubleClick to Jog1 Same as Mode 1, but DoubleClick is Routed to the Jog1 function, causing the control to temporarily run at the Target Speed in Parameter 36. See, also, Parameter 36. • Mode 4: Route DoubleClick to Jog2 Same as Mode 1, but DoubleClick is Routed to the Jog2 function, causing the control to temporarily run at the Target Speed in Parameter 41. See, also, Parameter 41. • Mode 5: Auto/Manual 4-20mA Card Same as Mode 1, but DoubleClick switches the drive from manual to auto or vice versa and in manual mode the front keypad has control. The Auto/Man Annunciator indicates what mode the control is operating.		✓
19	Power-up Value	When Power-up Mode is set to 2, this parameter will designate the default display value at power-up in display units.	✓	
	Reserved	n/a		✓
Display and Control/PID Setup Parameters				
20	Display Minimum	This Parameter defines the lower end of the display range. This is the value which limits how low the user is able to scroll the displayed value in Running Mode. In Rate and Time modes, this value is set in engineering units. In Follower Mode, this is set in percentage (actually, 10ths of percentage) of the master rate. For example, in Follower Mode, a Target of 150 represents 15.0 percent of the master rate.	✓	✓
21	Display Maximum	This Parameter defines the upper end of the display range. This is the value which limits how high the user is able to scroll the displayed value in Running Mode. In Rate and Time modes, this value is set in engineering units. In Follower Mode, this is set in percentage (actually, 10ths of percentage) of the master rate. For example, in Follower Mode, a Target of 1250 represents 125.0 percent of the master rate.	✓	✓

Parameter	Parameter Name	Description	GSD8-240-5C	All other GSD8 drives
22	Motor Control Method	This Parameter controls two behaviors in the GSD8, Low-Speed "Gain-Tracking", and Ultra-Low-Speed Control Mode ("gearbox" mode). When set to a value of 1 (or 3), this parameter automatically (and proportionally) reduces the "gain" of the PID values when the Target Speed (in RPMs) is less than 200. This greatly increases the overall stability at low speeds in applications that require a very wide range of Target Speeds, without having to unduly compromise control responsiveness at higher speeds. When set to a value of 2 (or 3), this Parameter adjusts the speed-control characteristics of the GSD8 to enhance the smoothness of speed control when in a situation where the "tach pickup" must be installed on the "low speed side" of a very slowly turning gear-motor output shaft. A rule of thumb would probably be that you may consider enabling this Mode if that shaft is turning less than 10 RPM, and the pickup produces less than 10 Pulses Per Revolution (PPR). Use this Mode only if speed stability can not be achieved by adjusting the PID settings (Parameters 26 – 28). • Mode 0: Disabled Both Low-Speed-Gain-Tracking and Ultra-Low-Speed Control Mode are Defeated. • Mode 1: Low-Speed-Gain-Tracking (Only) Enabled Low-Speed-Gain-Tracking is Enabled, Ultra-Low-Speed Control Mode is Defeated. • Mode 2: Ultra-Low-Speed Control Mode (Only) Enabled Low-Speed-Gain-Tracking is Defeated, Ultra-Low-Speed Control Mode is Enabled. • Mode 3: Low-Speed-Gain-Tracking and Ultra-Low-Speed Control Mode (Both) Enabled Both Low-Speed-Gain-Tracking and Ultra-Low-Speed Control Mode are Enabled.	✓	✓
23	Acceleration Setting	This Parameter determines how fast the GSD8 will accelerate toward the displayed target setting. This Parameter is set in engineering units of change per second, such as RPM, GPM, or feet per second. In Follower Mode, this Parameter is set in RPM units.	✓	✓
24	Deceleration Setting	This Parameter determines how fast the GSD8 will decelerate toward the displayed target setting. This Parameter is set in engineering units of change per second, such as RPM, GPM, or feet per second. In Follower Mode, this Parameter is set in RPM units.	✓	✓
26	Proportional (P) Gain	The Proportional Gain is the first of three Parameters which define the responsiveness of the control with respect to how fast it responds to changing loads. Because the GSD8 controls are true velocity-form PID control, the higher the P Gain, the more aggressively the unit will respond to a change in load or target speed. See the "Basic Operating Instructions" section of the manual for more details.	✓	✓
27	Integral (I) Gain	The Integral Gain is the second of two Parameters which define the responsiveness of the control with respect to how fast it responds to changing loads. The higher the I Gain, the more aggressively the unit will drive the load. However, it will sometimes be necessary to decrease the I Gain and/or increase the P Gain to prevent unwanted oscillation and instabilities. See the "Basic Operating Instructions" section of the manual for more details.	✓	✓
28	Derivative (D) Gain	The Derivative Gain is the third of the three Parameters which define the responsiveness of the control with respect to how fast it responds to changing loads. Although most applications will run fine with the D Gain set to zero, sometimes adding a little "D" will help minimize overshoot and undershoot. See the "Basic Operating Instructions" section of the manual for more details.	✓	✓

Parameter	Parameter Name	Description	GSD8-240-5C	All other GSD8 drives
29	Pulse Accumulation Limit	This parameter sets the limit for the maximum number of pulses the drive will accumulate prior to intentionally losing count and therefore long-term accuracy. The GSD8-240-5C is a pulse-accumulation drive, able to accurately track a master (in Follower Mode) pulse-by-pulse. Able to run for days, weeks, or months and remain in sync with a master drive or process; but this functionality comes at a small cost. By default, if the main pickup signal is lost and then recovered, the drive may run at high speed attempting to make-up lost pulses. Once caught up, the drive returns to normal operation. This change in speed may be a nuisance and if so, the Pulse Accumulation Limit, parameter 29, can be lowered to limit the maximum number of pulses the drive will remember. This parameter is set from 0 to 9999, where 0 is no accumulation and 9999 is maximum accumulation. As this value approaches zero, the unit will gradually lose its ability to drive the motor and eventually stop the motor completely. It may be necessary to increase the value of this parameter for applications that demand higher long-term accuracy.	✓	
	Startup Lag Compensation	Somewhat analogous to a "Min. Speed" control on analog motor speed controls, this sets a "minimum output" that is applied as soon as the Target Speed is above Zero RPM. Careful use of this setting can help with "stiction" (the tendency for motors to require a bit more power to "break free" when starting from a dead stop). However, values that are too high will make the motor "creep" or even be unable to attain a desired target speed. In Follower Mode, this setting can also help the Follower start up in better "sync" with the Leader.		✓
Signal Input #1 Setup Parameters				
30	Signal Input 1 (S1) (Main Pickup) Display Reference	This is the number to be displayed when at the user-specified motor Reference RPM. In Rate Mode, this value represents rate units such as feet, ounces, or revolutions. In Time Mode, this value represents the reference time measured in seconds or minutes. If the desired display is HH:MM, then all values should be entered in minutes. If MM:SS is desired, then all values should be entered in seconds. In Follower Mode, this value is the percentage of the master rate in 0.1% units. For example, 1000 equates to 100%.	✓	✓
31	Signal Input 1 (S1) Reference RPM	This is the reference RPM at which the Display Reference value should be displayed. In Rate and Time Modes, this value represents the RPM of the encoder to which the Display Reference corresponds. In Follower Mode, this value is not used.	✓	✓
32	Signal Input 1 (S1) Pulses per Revolution	This is the number of pulses per revolution for the signal input 1 (S1). The GSD8 supports pickups and encoders from 1 to 9999 pulses per revolution.	✓	✓
33	Signal Input 1 (S1) Deadband (Follower Mode Only)	When in Follower Mode, it is often desirable for the follower to slowly makeup any small pickup pulse differential between the master and follower's position. Depending on the application, it may not be necessary for the follower to seek the master's exact pulse position when the master rate is zero. In these cases, Deadband, parameter 33, can be set above zero forcing the GSD8-240-5C drive to stop driving the motor and instead inhibit the drive until the master begins rotating again, when the follower will automatically make-up the pulse differential as it starts to rotate. The deadband is disabled by setting it to zero seconds.	✓	
	Signal Input 1 (S1) Initial Stall Timeout	When the Target Speed is above zero RPM, this Parameter determines the maximum time in seconds until the first S1 pickup pulse occurs before the GSD8 considers itself in a "Stall" Condition. It is not advisable to set this lower than approximately 10 seconds (a value of 10), or it may be difficult to achieve startup in a low-speed application. A value of zero defeats this timeout. (Note: This parameter will only work if the alarm is set for stall on any of the parameters 50, 51, 52, 70, 71, or 72.)		✓

Parameter	Parameter Name	Description	GSD8-240-5C	All other GSD8 drives
34	Signal Input 1 (S1) Running Stall Timeout	When the Target Speed is above zero RPM, this Parameter determines the maximum time in units of 0.1 Seconds that can elapse between S1 pickup pulses before the GSD8 considers itself in a "Stall" Condition. It is not advisable to set this lower than approximately 10 seconds (a value of 100), or it may be difficult to achieve startup in a low-speed application. Also note that the S1 Pulses Per Revolution (PPR) must be taken into account when determining the proper setting for this timeout. A value of zero defeats this timeout. (Note: This parameter will only work if the alarm is set for stall on any of the parameters 50, 51, 52, 70, 71, or 72.)	✓	✓
		Signal Input #2 Setup Parameters		
35	Signal Input 2 (S2) Input Configuration	This Parameter determines the operating mode of signal input 2 (S2). • Mode 1: Disabled (Follower Mode) The S2 input is inactive. This is the required setting for Follower Mode. • Mode 2: Emergency Stop When S2 High (Not Wired To Common) When the S2 input is at an electrically high (+5V) state or allowed to float disconnected, the GSD8 will enter emergency-stop mode. While in this mode, the armature output will immediately be turned off. Once the S2 input returns to an electrically low state or wired to the unit's common, the output will become active. • Mode 3: Emergency Stop When S2 Low (Wired To Common) When the S2 input is at an electrically low state or wired to the unit's common, the GSD8 will enter emergency-stop mode. While in this mode, the armature output will immediately be turned off. Once the S2 input returns to an electrically high (+5V) state or allowed to float disconnected, the output will become active. • Mode 4: Inhibit When S2 High (Not Wired To Common) When the S2 input is at an electrically high (+5V) state or allowed to float disconnected, the GSD8 will enter inhibit mode. While inhibited, the armature output will decrease according to the decel setting until zero output is reached. Once the S2 input returns to an electrically low state or is wired to the unit's common, the output will start to accelerate toward the previous running value. • Mode 5: Inhibit When S2 Low (Wired To Common) When the S2 input is at an electrically low state or wired to the unit's common, the GSD8 will enter inhibit mode. While inhibited, the armature output will decrease according to the decel setting until zero output is reached. Once the S2 input returns to an electrically high (+5V) state or allowed to float disconnected, the output will start to accelerate toward the previous running value. • Mode 6: (JOG1) Jog When S2 High (Not Wired To Common) When the S2 input is at an electrically high (+5V) state or allowed to float disconnected, the GSD8 will enter JOG1 mode. While in JOG1 mode, the speed will immediately change to the programmed JOG1 setpoint, Parameter 36. The unit will start accelerating or decelerating toward the JOG1 setting at the configured accel and decel rates. Once the S2 input returns to an electrically low state or is wired to the unit's common, the output will start to accelerate or decelerate toward the previous running value. In Follower Mode, the unit will operate as its own master. This allows an application to jog by overriding a stopped master. • Mode 7: (JOG1) Jog When S2 Low (Wired To Common) When the S2 input is at an electrically low state or wired to the unit's common, the GSD8 will enter JOG1 mode. While in JOG1 mode, the speed will immediately change to the programmed JOG1 setpoint, Parameter 36. The unit will start accelerating or decelerating toward the JOG1 setting at the configured accel and decel rates. Once the S2 input returns to an electrically high (+5V) state or allowed to float disconnected, the output will start to accelerate or decelerate toward the previous running value. In Follower Mode, the unit will operate as its own master. This allows an application to jog by overriding a stopped master.	✓	✓
36	Signal Input 2 (S2) Setpoint for JOG1 Function	When the S2 configuration, Parameter 35, is set to one of the JOG1 modes, this Parameter defines the JOG1 setpoint in engineering units. If the GSD8 operating mode is set to Follower Mode, then this Parameter is set in RPM units. This allows a follower control to be jogged when the master is stopped.	✓	✓

Parameter	*Parameter Name*	*Description*	*GSD8-240-5C*	*All other GSD8 drives*
37	Signal Input 2 (S2) ("Leader") Pulses per Revolution (for Follower Mode Only)	When in Follower Mode, this is the number of pulses per revolution for the signal input 2 (S2) used as the "Leader" input. The GSD8 supports pickups and encoders from 1 to 9999 pulses per revolution (PPR).	✓	✓
38	Front Panel Double-Click Mode	When this parameter is set to a value of 1, Parameter 35, (input S2) and/ or Parameter 40, (input UIN1) in Mode 4 or 5 (Inhibit), have no effect; instead, "clicking" the ENTER Button twice in rapid succession ("Double-Clicking") will TOGGLE the GSD8-240-5C drive in and out of "Inhibit" mode. When in DoubleClick mode, the Motor will decelerate to a stop, and the Display will show 4 dashes "----" DoubleClicking again will cause the motor to accelerate up to the Target speed/time, and the Display to return to its normal condition. When set to a value of Zero, the Inhibit function is controlled exclusively by the signal level on the S2 and/ or UIN1 Input(s), and the setting of Parameters 35 and/or 40, and the "DoubleClick" function will have no effect. Note also that the DoubleClick Inhibit is only enabled in "Run" mode.	✓	
	Signal Input 2 (S2) ("Leader") Stopped Timeout (for Follower Mode Only)	When the Target Speed (percentage) is above zero, this Parameter determines the maximum time in units of 0.1 seconds that can elapse after the last S2 (Leader) pickup pulse before the GSD8 considers the Leader as "stopped". Setting this value too low may result in unstable low-speed "following". Setting it too high may result in Follower "run-on". A value of zero defeats this timeout.		✓
39	Disable Signal Input 2 (S2) in Manual Mode	When setting this parameter to a value of 1, the S2 will be disabled when the unit is put into manual mode. If the value is set to 0 then the S2 will work in both manual and auto modes.	✓	✓

Parameter	Parameter Name	Description	GSD8-240-5C	All other GSD8 drives
User Input #1 (UIN1) Setup Parameters				
40	User Input 1 (UIN1) Configuration	This Parameter determines the operating mode of user input 1 (UIN1). • Mode 1: Disabled The UIN1 input is inactive. • Mode 2: Emergency Stop When UIN1 High (Not Wired To Common) When the UIN1 input is at an electrically high (+5V) state or allowed to float disconnected, the GSD8 will enter emergency-stop mode. While in this mode, the armature output will immediately be turned off. Once the UIN1 input returns to an electrically low state or wired to the unit's common, the output will become active. • Mode 3: Emergency Stop When UIN1 Low (Wired To Common) When the UIN1 input is at an electrically low state or wired to the unit's common, the GSD8 will enter emergency-stop mode. While in this mode, the armature output will immediately be turned off. Once the UIN1 input returns to an electrically high (+5V) state or allowed to float disconnected, the output will become active. • Mode 4: Inhibit When UIN1 High (Not Wired To Common) When the UIN1 input is at an electrically high (+5V) state or allowed to float disconnected, the GSD8 will enter inhibit mode. While inhibited, the armature output will decrease according to the decel setting until zero output is reached. Once the UIN1 input returns to an electrically low state or is wired to the unit's common, the output will start to accelerate toward the previous running value. • Mode 5: Inhibit When UIN1 Low (Wired To Common) When the UIN1 input is at an electrically low state or wired to the unit's common, the GSD8 will enter inhibit mode. While inhibited, the armature output will decrease according to the decel setting until zero output is reached. Once the UIN1 input returns to an electrically high (+5V) state or allowed to float disconnected, the output will start to accelerate toward the previous running value. • Mode 6: (JOG2) Jog When UIN1 High (Not Wired To Common) When the UIN1 input is at an electrically high (+5V) state or allowed to float disconnected, the GSD8 will enter JOG2 mode. While in JOG2 mode, the display will immediately change to the programmed JOG2 setpoint, Parameter 41. The unit will start accelerating or decelerating toward the JOG2 setting at the configured accel and decel rates. Once the UIN1 input returns to an electrically low state or is wired to the unit's common, the output will start to accelerate or decelerate toward the previous running value. In Follower Mode, the unit will operate as its own master. This allows an application to jog by overriding a stopped master. • Mode 7: (JOG2) Jog When UIN1 Low (Wired To Common) When the UIN1 input is at an electrically low state or wired to the unit's common, the GSD8 will enter JOG2 mode. While in JOG2 mode, the display will immediately change to the programmed JOG2 setpoint, Parameter 41. The unit will start accelerating or decelerating toward the JOG2 setting at the configured accel and decel rates. Once the UIN1 input returns to an electrically high (+5V) state or allowed to float disconnected, the output will start to accelerate or decelerate toward the previous running value. In Follower Mode, the unit will operate as its own master. This allows an application to jog by overriding a stopped master.	✓	✓
41	User Input 1 (UIN1) Setpoint for JOG2 Function	When the UIN1 configuration, Parameter 40, is set to one of the JOG2 modes, this Parameter defines the JOG2 setpoint in engineering units. If the GSD8 operating mode is set to Follower Mode, then this Parameter is set in RPM units. This allows a follower control to be jogged when the master is stopped.	✓	✓

Parameter	*Parameter Name*	*Description*	*GSD8-240-5C*	*All other GSD8 drives*
42	Inhibit Configuration	This Parameter determines the accel/decel profile of the GSD8 when it is going into and out of "Inhibit" Mode. There are 4 possible settings: • Mode 0: No Accel/Decel When going into Inhibit, the GSD8 will immediately shut off its output, disregarding any Decel setting, and when coming out of Inhibit, the GSD8 will immediately return to its Target Speed, disregarding any Accel setting. This is exactly like the "E-Stop" behavior. • Mode 1: Decel Only, No Accel When going into Inhibit, the GSD8 will Decel to a stop using the setting in Parameter 24, but when coming out of Inhibit, the GSD8 will immediately return to its Target Speed, disregarding any Accel setting. • Mode 2: Accel Only, No Decel When going into Inhibit, the GSD8 will immediately shut off its output, disregarding any Decel setting, but when coming out of Inhibit, the GSD8 will Accelerate to its Target Speed, using the Accel setting in Parameter 23. • Mode 3: Use Both Accel and Decel When going into Inhibit, the GSD8 will Decel to a stop using the setting in Parameter 24, and when coming out of Inhibit, the GSD8 will Accelerate to its Target Speed, using the Accel setting in Parameter 23.	✓	✓
43	Disable User Input 1 (IN1) in Manual Mode	When setting this parameter to a value of 1, the IN1 will be disabled when the unit is put into manual mode. If the value is set to 0 then the IN1 will work in both manual and auto modes.	✓	✓
Alarm Output #1 Setup Parameters				

Parameter	Parameter Name	Description	GSD8-240-5C	All other GSD8 drives
50	Alarm Activation Condition	This defines which conditions will result in the alarm 1 output being activated. • Mode 0: Always Inactive The alarm output will remain in an inactive state. In this state, the NC and C contacts will be internally electrically connected. • Mode 1: Always Active (When Power Is Applied) • The alarm output will become active when the power is applied to the unit. In this state, the NO and C contacts will be internally electrically connected. • Mode 2: Active When Display Value Above Limit The alarm output will activate when the displayed value is above the upper limit setting, parameter 58. • Mode 3: Active When Display Value Below Limit The alarm output will activate when the displayed value is below the lower limit setting, parameter 57. • Mode 4: Active When Display Value Inside Range The alarm output will activate when the displayed value is greater than or equal to lower limit settings and less than or equal to the upper limit setting. • Mode 5: Active When Display Value Outside Range The alarm output will activate when the displayed value is less than the lower limit setting or greater than upper limit setting. • Mode 6: Active When Target (Display) = Zero The alarm output will activate when the displayed value is equal to zero. This allows the alarm output to be used to drive a mechanical brake to decrease stopping time or to provide holding torque at zero speed. • Mode 7: Active When Main Pickup Signal (S1) Stalled or stopped The alarm output will activate when the main pickup signal input (S1) has stalled or stopped. The alarm lower limit (Parameter 57) is used to specify the stall timeout, in seconds, under a motor stall condition. When using the lower limit to set the stall timeout, an inhibit command or zero speed command will not be recognized as a stall condition. The pickup is considered to have stalled if the timeout passes with no pickup pulses when the target (displayed) value is greater than zero and the control has not been given an inhibit command. The alarm upper limit (Parameter 58) is used to specify a zero speed or stopped timeout condition in seconds. When using the upper limit to set a zero speed or stopped timeout, an inhibit command, a zero speed command or a motor stall condition will all be recognized as a stopped condition. The pickup is considered to have stopped after the timeout passes with no pickup pulses. *NOTE: When using the upper limit to set a stopped timeout the lower limit should be set to zero.* • Mode 8: Active When Driving At Maximum Conduction Angle The alarm output will activate when the control is driving the motor at the maximum conduction angle. This can be used to determine if the control is running away due to a broken pickup signal wire when stall-detection is not desired.	✓	
	Alarm 1 Logical "OR" Activation Conditions (Flags Table 1)	This Parameter, in conjunction with Parameters 51 & 52, defines which conditions will result in the Alarm 1 output being activated. The function is that of a Logical "OR"ing of the selected Drive Condition Flags. A setting of zero defeats this "OR" function entirely. Please see the sections "Setting and Reading Softswitches" and "Setting Alarm Conditions" for further details.		✓

Parameter	Parameter Name	Description	GSD8-240-5C	All other GSD8 drives
51	Alarm 1 Output Style & Reset Mode	This setting configures the output mode and reset method for the alarm output. • Mode 1: Constant & Auto Reset In this mode, the alarm output will remain active until the alarm condition ceases to exist. The alarm will automatically reset when the conditions return to normal. • Mode 2: Constant & Manual Reset In this mode, the alarm output will remain active until the alarm is reset manually. See parameter 52 for details. • Mode 3: Pulse & Auto Reset In this mode, the alarm output will pulse on and off until the alarm condition ceases to exist. The pulsed modes are commonly used for audible alarms where a constant output would be considered distracting or awkward. The alarm will automatically reset when the conditions return to normal. • Mode 4: Pulse & Manual Reset In this mode, the alarm output will pulse on and off until the alarm is reset manually. See parameter 52 for reset details. The pulsed modes are commonly used for audible alarms where a constant output would be considered distracting or awkward.	✓	
	Alarm 1 Logical Activation Condition Inverters (Flags Table 1)	This Parameter, in conjunction with Parameters 50 & 52, defines which conditions will result in the Alarm 1 output being activated. The function allows selected Drive Condition Flags to be "inverted" before being presented to the "inputs" of the "AND" function (see Parameter 52). Please see the sections "Setting and Reading Softswitches" and "Setting Alarm Conditions" for further details.		✓
52	Alarm 1 Reset Configuration	This setting determines which actions will cause an active alarm to be silenced or reset. • Mode 1: No Silencing, Reset On Any Button Press In this mode, an active alarm cannot be silenced. Once the alarm condition ceases to exist, however, any user-interface button may be pressed to cause a manual reset. • Mode 2: No Silencing, Reset On S2 Input High (Not Wired To Common) Similar to Mode 1. Once the alarm condition ceases to exist, setting the S2 input to a high (+5V) state or allowing it to float disconnected will cause a manual reset. • Mode 3: No Silencing, Reset On S2 Input Low (Wired To Common) Similar to Mode 1. Once the alarm condition ceases to exist, setting the S2 input to a low (COM) state or wiring it to common will cause a manual reset. • Mode 4: Silencing Enabled, Reset On Any Button Press When the conditions for an active alarm persist, pressing any user-interface button will result in the alarm being silenced or deactivated, but not reset. A second attempt to reset the alarm must be made after the condition cease to exist to clear the alarm. • Mode 5: Silencing Enabled, Reset On S2 Input High (Not Wired To Common) Similar to Mode 4. Setting the S2 input to a high (+5V) state or allowing it to float disconnected will cause the alarm to be silenced or reset depending on the current state of the alarm conditions. • Mode 6: Silencing Enabled, Reset On S2 Input Low (Wired To Common) Similar to Mode 4. Setting the S2 input to a low (COM) state or wiring it to common will cause the alarm to be silenced or reset depending on the current state of the alarm conditions.	✓	
	Alarm 1 Logical "AND" Activation Conditions (Flags Table 1)	This Parameter, in conjunction with Parameters 50 & 51, defines which conditions will result in the Alarm 1 output being activated. The function is that of a Logical "AND"ing of the selected Drive Condition Flags. A setting of zero defeats this "AND" function entirely. Please see the sections "Setting and Reading Softswitches" and "Setting Alarm Conditions" for further details.		✓

Parameter	Parameter Name	Description	GSD8-240-5C	All other GSD8 drives
53	Alarm 1 Display Flash On Active Alarm	This will cause the display to flash when an alarm condition is active.	✓	
	Alarm 1 Output Style & Reset Configuration	This setting configures the output mode and reset method for the Alarm 1 output. • Mode 1: Constant & Auto Reset In this mode, the alarm output will remain active until the alarm condition ceases to exist. The alarm will automatically reset when the conditions return to normal. • Mode 2: Constant & Manual Reset In this mode, the alarm output will remain active until the alarm is reset manually. See Parameter 54 for details. • Mode 3: Pulse & Auto Reset In this mode, the alarm output will pulse on and off until the alarm condition ceases to exist. The pulsed modes are commonly used for audible alarms where a constant output would be considered distracting or awkward. The alarm will automatically reset when the conditions return to normal. • Mode 4: Pulse & Manual Reset In this mode, the alarm output will pulse on and off until the alarm is reset manually. See Parameter 54 for reset details. The pulsed modes are commonly used for audible alarms where a constant output would be considered distracting or awkward.		✓
54	Alarm 1 Pulse ON Time	This parameter defines the number of seconds the output should be enabled during the 'on' phase of an active pulsing alarm's output.	✓	
	Alarm 1 Reset Configuration	This setting determines which actions will cause an active alarm to be silenced or reset. • Mode 1: No Silencing, Reset On ENTER Button Press In this mode, an active alarm cannot be silenced. Once the alarm condition ceases to exist, however, the ENTER button may be pressed to cause a manual reset. • Mode 2: No Silencing, Reset On S2 Input High (Not Wired To Common) Similar to Mode 1. Once the alarm condition ceases to exist, setting the S2 input to a high (+5V) state or allowing it to float disconnected will cause a manual reset. • Mode 3: No Silencing, Reset On S2 Input Low (Wired To Common) Similar to Mode 1. Once the alarm condition ceases to exist, setting the S2 input to a low (COM) state or wiring it to common will cause a manual reset. • Mode 4: Silencing Enabled, Reset On ENTER Button Press When the conditions for an active alarm persist, pressing any user-interface button will result in the alarm being silenced or deactivated, but not reset. A second attempt to reset the alarm must be made after the condition ceases to exist to clear the alarm. • Mode 5: Silencing Enabled, Reset On S2 Input High (Not Wired To Common) Similar to Mode 4. Setting the S2 input to a high (+5V) state or allowing it to float disconnected will cause the alarm to be silenced or reset depending on the current state of the alarm conditions. • Mode 6: Silencing Enabled, Reset On S2 Input Low (Wired To Common Similar to Mode 4. Setting the S2 input to a low (COM) state or wiring it tocommon will cause the alarm to be silenced or reset depending on the current state of the alarm conditions.		✓
55	Alarm 1 Pulse OFF Time	This parameter defines the number of seconds the output should be disabled during the 'off' phase of an active pulsing alarm's output.	✓	
	Alarm 1 Annunciator Flash On Alarm	When set to 1, this will cause the "Alm1" LED Annunciator to flash when an alarm 1 condition is active. A setting of zero defeats this function.		✓
56	Alarm 1 Pulse Count	This setting determines how many pulses are output when the alarm is activated and is configured in pulse output style. *NOTE: When 0 is entered, the unit will be set for continuous pulses while the alarm is active.*	✓	
	Alarm 1 Pulse "ON" Time	This Parameter defines the number of seconds the output should be enabled during the 'on' phase of an active pulsing alarm's output.		✓

Parameter	Parameter Name	Description	GSD8-240-5C	All other GSD8 drives
57	Alarm 1 Lower Limit	This setting defines either the lower limit, the lower end of a range for the alarm region or a stall timeout. Alarm limits are set in display units without regard to decimal point or colon position. In Rate and Follower Modes, a limit of 123 could represent a display value of 123, 12.3, 1.23, or 0.123. When in Time Mode, a limit of 123 would represent 1:23 on the display. When the lower limit is being used to set a stall timeout for parameter 50 mode 7, the setting is in seconds.	✓	
	Alarm 1 Pulse "OFF" Time	This Parameter defines the number of seconds the output should be disabled during the 'off' phase of an active pulsing alarm's output.		✓
58	Alarm 1 Upper Limit	This setting defines either the upper limit, the upper end of a range for the alarm region or a stop timeout. Alarm limits are set in display units without regard to decimal point or colon position. In Rate and Follower Modes, a limit of 123 could represent a display value of 123, 12.3, 1.23, or 0.123. When in Time Mode, a limit of 123 would represent 1:23 on the display. When the upper limit is being used to set a stop timeout for parameter 50 mode 7, the setting is in seconds.	✓	
	Alarm 1 Pulse Count	This setting determines how many pulses are outputted when the alarm is activated and is configured in the pulse output style. When 0 is entered, the unit will be set for continuous pulses while the alarm is active.		✓
59	Alarm 1 Lower Limit	This setting defines either the lower limit or the lower end of a range for the alarm region. Alarm limits are set in engineering units without regard to decimal point or colon position. In Rate and Follower Modes, a limit of 123 could represent a display value of 123, 12.3, 1.23, or 0.123. When in Time Mode, a limit of 123 would represent 1:23 on the display.	✓	✓
60	Alarm 1 Upper Limit	This setting defines either the upper limit or the upper end of a range for the alarm region. Alarm limits are set in engineering units without regard to decimal point or colon position. In Rate and Follower Modes, a limit of 123 could represent a display value of 123, 12.3, 1.23, or 0.123. When in Time Mode, a limit of 123 would represent 1:23 on the display.	✓	✓
65	Alarm 1 Logical "OR" Activation Conditions (Flags Table 2)	This Parameter, in conjunction with Parameters 66 & 67, defines which conditions will result in the Alarm 1 output being activated. The function is that of a Logical "OR"ing of the selected Drive Condition Flags Table 2. A setting of zero defeats this "OR" function entirely. Please see the sections "Setting and Reading Softswitches" and "Setting Alarm Conditions" for further details.	✓	✓
66	Alarm 1 Logical Activation Condition Inverters (Flags Table 2)	This Parameter, in conjunction with Parameters 65 & 67, defines which conditions will result in the Alarm 1 output being activated. The function allows selected Drive Condition Flags Table 2 to be "inverted" before being presented to the "inputs" of the "AND" function (see Parameter 67). Please see the sections "Setting and Reading Softswitches" and "Setting Alarm Conditions" for further details.	✓	✓
67	Alarm 1 Logical "AND" Activation Conditions (Flags Table 2)	This Parameter, in conjunction with Parameters 65 & 66, defines which conditions will result in the Alarm 1 output being activated. The function is that of a Logical "AND"ing of the selected Drive Condition Flags Table 2. A setting of zero defeats this "AND" function entirely. Please see the sections "Setting and Reading Softswitches" and "Setting Alarm Conditions" for further details.	✓	✓
Alarm Output #2 Setup Parameters				
70	Alarm 2 Logical "OR" Activation Conditions (Flags Table 1)	This Parameter, in conjunction with Parameters 71 & 72, defines which conditions will result in the Alarm 2 output being activated. The function is that of a Logical "OR"ing of the selected Drive Condition Flags. A setting of zero defeats this "OR" function entirely. Please see the sections "Setting and Reading Softswitches" and "Setting Alarm Conditions" for further details.		✓
71	Alarm 2 Logical Activation Condition Inverters (Flags Table 1)	This Parameter, in conjunction with Parameters 70 & 72, defines which conditions will result in the Alarm 2 output being activated. The function allows selected Drive Condition Flags to be "inverted" before being presented to the "inputs" of the "AND" function (see Parameter 72). Please see the sections "Setting and Reading Softswitches" and "Setting Alarm Conditions" for further details.		✓

Parameter	Parameter Name	Description	GSD8-240-5C	All other GSD8 drives
72	Alarm 2 Logical "AND" Activation Conditions (Flags Table 1)	This Parameter, in conjunction with Parameters 70 & 71, defines which conditions will result in the Alarm 2 output being activated. The function is that of a Logical "AND"ing of the selected Drive Condition Flags. A setting of zero defeats this "AND" function entirely. Please see the sections "Setting and Reading Softswitches" and "Setting Alarm Conditions" for further details.		✓
73	Alarm 2 Output Style & Reset Configuration	This setting configures the output mode and reset method for the Alarm 2 output. • Mode 1: Constant & Auto Reset In this mode, the alarm output will remain active until the alarm condition ceases to exist. The alarm will automatically reset when the conditions return to normal. • Mode 2: Constant & Manual Reset In this mode, the alarm output will remain active until the alarm is reset manually. See Parameter 74 for details. • Mode 3: Pulse & Auto Reset In this mode, the alarm output will pulse on and off until the alarm condition ceases to exist. The pulsed modes are commonly used for audible alarms where a constant output would be considered distracting or awkward. The alarm will automatically reset when the conditions return to normal. • Mode 4: Pulse & Manual Reset In this mode, the alarm output will pulse on and off until the alarm is reset manually. See Parameter 74 for reset details. The pulsed modes are commonly used for audible alarms where a constant output would be considered distracting or awkward.		✓
74	Alarm 2 Reset Configuration	This setting determines which actions will cause an active alarm to be silenced or reset. • Mode 1: No Silencing, Reset On ENTER Button Press In this mode, an active alarm cannot be silenced. Once the alarm condition ceases to exist, however, the ENTER button may be pressed to cause a manual reset. • Mode 2: No Silencing, Reset On S2 Input High (Not Wired To Common) Similar to Mode 1. Once the alarm condition ceases to exist, setting the S2 input to a high (+5V) state or allowing it to float disconnected will cause a manual reset. • Mode 3: No Silencing, Reset On S2 Input Low (Wired To Common) Similar to Mode 1. Once the alarm condition ceases to exist, setting the S2 input to a low (COM) state or wiring it to common will cause a manual reset. • Mode 4: Silencing Enabled, Reset On ENTER Button Press When the conditions for an active alarm persist, pressing any user-interface button will result in the alarm being silenced or deactivated, but not reset. A second attempt to reset the alarm must be made after the condition ceases to exist to clear the alarm. • Mode 5: Silencing Enabled, Reset On S2 Input High (Not Wired To Common) Similar to Mode 4. Setting the S2 input to a high (+5V) state or allowing it to float disconnected will cause the alarm to be silenced or reset depending on the current state of the alarm conditions. • Mode 6: Silencing Enabled, Reset On S2 Input Low (Wired To Common) Similar to Mode 4. Setting the S2 input to a low (COM) state or wiring it to common will cause the alarm to be silenced or reset depending on the current state of the alarm conditions.		✓
75	Alarm 2 Annunciator Flash On Alarm	When set to 1, this will cause the "Alm2" LED Annunciator to flash when an alarm 2 condition is active. A setting of zero defeats this function.		✓
76	Alarm 2 Pulse on Time	This Parameter defines the number of seconds the output should be enabled during the 'on' phase of an active pulsing alarm's output.		✓
77	Alarm 2 Pulse off Time	This Parameter defines the number of seconds the output should be disabled during the 'off' phase of an active pulsing alarm's output.		✓
78	Alarm 2 Pulse Count	This setting determines how many pulses are outputted when the alarm is activated and is configured in pulse output style. When 0 is entered, the unit will be set for continuous pulses while the alarm is active.		✓

Parameter	Parameter Name	Description	GSD8-240-5C	All other GSD8 drives
79	Alarm 2 Lower Limit	This setting defines either the lower limit or the lower end of a range for the alarm region. Alarm limits are set in engineering units without regard to decimal point or colon position. In Rate and Follower Modes, a limit of 123 could represent a display value of 123, 12.3, 1.23, or 0.123. When in Time Mode, a limit of 123 would represent 1:23 on the display.		✓
80	Alarm 2 Upper Limit	This setting defines either the upper limit or the upper end of a range for the alarm region. Alarm limits are set in engineering units without regard to decimal point or colon position. In Rate and Follower Modes, a limit of 123 could represent a display value of 123, 12.3, 1.23, or 0.123. When in Time Mode, a limit of 123 would represent 1:23 on the display.		✓
81	Alarm 2 Output Routing	This setting allows the GSD8 to control the "Alarm 1" output of a selected Modbus "Slot", provided of course that there is a Modbus card that supports this function installed in the selected slot. The valid values for this Parameter are: • Mode 1: Not Used • Mode 2: Route Alarm 2 Output to Modbus Slot 100 Alarm 1 Output In this mode, the GSD8 Alarm 2 output will directly control the Alarm 1 output of a Modbus Card installed in Slot 100, if that card supports this feature. • Mode 3: Route Alarm 2 Output to Modbus Slot 200 Alarm 1 Output In this mode, the GSD8 Alarm 2 output will directly control the Alarm 1 output of a Modbus Card installed in Slot 200, if that card supports this feature. • Mode 4:Route Alarm 2 Output to Modbus Slot 500 Alarm 1 Output In this mode, the GSD8 Alarm 2 output will directly control the Alarm 1 output of a Modbus Card installed in Slot 500, if that card supports this feature.		✓
85	Alarm 2 Logical "OR" Activation Conditions (Flags Table 2)	This Parameter, in conjunction with Parameters 86 & 87, defines which conditions will result in the Alarm 2 output being activated. The function is that of a Logical "OR"ing of the selected Drive Condition Flags Table 2. A setting of zero defeats this "OR" function entirely. Please see the sections "Setting and Reading Softswitches" and "Setting Alarm Conditions" for further details.		✓
86	Alarm 2 Logical Activation Condition Inverters (Flags Table 2)	This Parameter, in conjunction with Parameters 85 & 87, defines which conditions will result in the Alarm 2 output being activated. The function allows selected Drive Condition Flags Table 2 to be "inverted" before being presented to the "inputs" of the "AND" function (see Parameter 87). Please see the sections "Setting and Reading Softswitches" and "Setting Alarm Conditions" for further details.		✓
87	Alarm 2 Logical "AND" Activation Conditions (Flags Table 2)	This Parameter, in conjunction with Parameters 85 & 86, defines which conditions will result in the Alarm 2 output being activated. The function is that of a Logical "AND"ing of the selected Drive Condition Flags Table 2. A setting of zero defeats this "AND" function entirely. Please see the sections "Setting and Reading Softswitches" and "Setting Alarm Conditions" for further details.		✓
Parameter Memory Command Parameters				
Rather than being a "setting" or a "switch" type Parameter, Parameters 95 through 99 are used to trigger a certain "Action" or "Script" that generally performs some Utility function for the GSD8, and/or a Modbus card installed in the drive. The "value" settings are used as a kind of "key" to make sure these functions are not accidentally "triggered".				✓
95	Factory Default Drive Command	When set to a value of 5, and then pressing the ENTER button, the GSD8 (Drive only) will be reset to factory default settings. THIS ACTION CANNOT BE UNDONE! This Command can also be achieved by applying power to the unit with both the Enter and Down buttons depressed. The programming jumper must be in the "On" position for this Command to function. Any Modbus card settings are unaffected.	✓	✓

Parameter	Parameter Name	Description	GSD8-240-5C	All other GSD8 drives
96	Factory Default Modbus Card Command	When set to the desired Modbus Slot number (100, 200, 500) and the ENTER button is pressed, the Default settings for that Modbus card's Parameters will be copied to the selected Slot's "partition" in the non-volatile storage of the GSD8. THIS ACTION CANNOT BE UNDONE! Note that the Parameter settings for a particular Modbus card are actually stored on its "host" GSD8, rather than on the Modbus card itself. The advantage of this is that if a Modbus card fails, a replacement can be quickly installed without having to be (re)configured, provided it is installed in the same Slot. The valid values for this Parameter are: • Mode 100: Restore Factory Defaults for card in Modbus Slot 100 Assumes there is a card in Slot 100. • Mode 200: Restore Factory Defaults for card in Modbus Slot 200 Assumes there is a card in Slot 200. • Mode 500: Restore Factory Defaults for card in Modbus Slot 500 Assumes there is a card in Slot 500.	✓	✓
98	Save (copy) current "Environment" Settings TO User Save Area	When set to a value of 5, and then pressing the ENTER button, the GSD8 will prompt the user to Save the current "environment" (Settings for the drive and all installed Modbus cards) TO whichever User Save area ("Settings1" or "Settings2") that is not currently being used as the "Working" Settings. *NOTE: THIS ACTION CANNOT BE UNDONE!* Pressing the "Up" button will Save the settings; pressing any other button will Cancel the operation. TIP: This feature is often used by OEMs to save their customized settings to a "safe" area, that later can be easily Restored if the need arises. *NOTE: Unless a "Swap" command has been used (see Parameter 99), the "Working" area is "Settings1". Therefore, this command will normally Save to "Settings2".*	✓	✓
99	Restore/Swap current "Environment" Settings FROM User Save Area	When set to a value of 5 (for "Restore") or 10 (for "Swap"), and then pressing the ENTER button, the GSD8 will prompt the user to Copy the current "environment" (Settings for the drive and all installed Modbus cards) FROM whichever User Save area ("Settings1" or "Settings2") that is not currently being used as the "Working" Settings. or to "Change" (Swap) between using "Settings1" and "Settings2" as the "Working" Settings area. The "Copy" (Restore) is "destructive", but the "Change" (Swap) is not. The valid values for this Parameter are: • Mode 5: Restore Environment from whichever User Save area is not "Current" Will copy "Settings2" (or "Settings1") settings to the Current ("Working") settings. If the "Working" Settings are coming from "Settings1", then the values in "Settings2" will be used. If the "Working" Settings are coming from "Settings2", then the values in "Settings1" will be used. Either way, the result is that "Settings1" and "Settings2" will end up containing the same values. *NOTE: THIS ACTION CANNOT BE UNDONE!* • Mode 10: Swap "Working" Settings between "Settings1" and "Settings2" Non-Destructively "swaps" the "Working" Settings between using "Settings1" and "Settings2". This allows the user to easily play "what-if" type of speculation with one or more Parameters, without fear of "losing" their current settings. THE SWAP CAN BE DONE AS MANY TIMES AS DESIRED. TIP: The easiest way to find out which area "Settings1 or Settings2" is the "Working" (current) settings, is to enter this mode, and watch the "prompt" to see which area is being offered to "Change to". The current "Working" settings area is the one that is "opposite". For example, if the "prompt" offers to Change to "Settings2", then the GSD8 (and any Modbus cards) are currently using "Settings1" as the "Working" area, and vice versa. Then, "Cancel" the "Swap".	✓	✓
Maintenance Timer Setup Parameters				

Parameter	Parameter Name	Description	GSD8-240-5C	All other GSD8 drives
100	Maintenance Timer ON/OFF	This parameter is used to turn on/off the maintenance timer and setting the length of time before the timer will trip. By setting this parameter to 0, the timer is disabled. By setting this parameter to a value of greater than 0, indicates the time (in hours) when the maintenance timer will trip. The display will show "MAIn" when the maintenance timer has exceeded it's set time (Parameter 100).	✓	✓
101	Reset Maintenance Timer	When the maintenance timer has reached its time limit, this parameter is used to reset the timer and start the timer from zero by setting this parameter to a value of 5.	✓	✓
102	Current Time (In Hours)	This displays the current time in hours that the unit has been running.	✓	✓
103	Timer Scaler	This option can be used to extend the maintenance time of the device when the system is not working as hard as it could. Scaling allows the timer to be scaled when the motor is running below a pre-set value. If the value is set to 0, then the scaler is disabled. The timer will be scaled from 0 to 100% based on the speed from 0 to the value placed in Parameter 103. When the motor speed is at or above the pre-set value, the timer will be incremented at a 1:1 ratio (100% or one hour for each hour). If the motor is running below the pre-set value, then the overall percentage that the motor is running with respect to the pre-set value, will be used as the percentage when accumulating the time. Example: Parameter 103 set for 1600, motor is running at 800 RPM (50% of Parameter 103), then every 2 hours that the motor is running at 800 RPM will be 1 hour added to the maintenance timer.	✓	✓
120	Auto/Manual Slot Control	This setting determines what slot controls the Auto setting when switched to the Auto Mode. Power must be cycled Off/On after selection changes and Parameter 81 must match same slot selection.	✓	✓
121	Follower Target Source	This setting defines where the follower gets its target speed.	✓	✓
122	Follower Percent Source	When the control is in follower mode, this determines what controls the percent of Master setting.	✓	✓

Parameter 16 Encoder/Motor Assignment Table

S1 RPM	Enc 1 PPR	Parameter 16 Value											
3600	1	0	0	8	0	0	0	0	0	0	0	0	0
	10	0	0	8	0	0	0	0	0	0	0	0	0
	20	2	2	10	2	2	2	2	2	2	2	2	2
1800	1	0	0	8	0	0	0	0	0	0	0	0	0
	10	0	0	8	0	0	0	0	0	0	0	0	0
	20	0	0	8	0	0	0	0	0	0	0	0	0
1200	1	0	0	8	0	0	0	0	0	0	0	0	0
	10	0	0	8	0	0	0	0	0	0	0	0	0
	20	0	0	8	0	0	0	0	0	0	0	0	0
900	1	0	0	8	0	0	0	0	0	0	0	0	0
	10	0	0	8	0	0	0	0	0	0	0	0	0
	20	0	0	8	0	0	0	0	0	0	0	0	0
Enc 2 PPR		1	10	20	1	10	20	1	10	20	1	10	20
S2 RPM		3600			1800			1200			900		

Application Examples

SCADA-driven Pump Controller with 4-20mA I/O, plus "Fault" and "Run" Relay Outputs

Description:

A GSD8 drive (with GSDA-AI-A8 installed) operating a waste pump control receives a target speed setting from the SCADA system, 4-20 mA output. The GSD8 drive will display the actual pump rate in liters per minute, and will continuously report the pump's actual flow rate to the SCADA system using the GSDA-AI-A8's 4-20 mA output. The display will indicate in the format "xxx.x" (LPM).

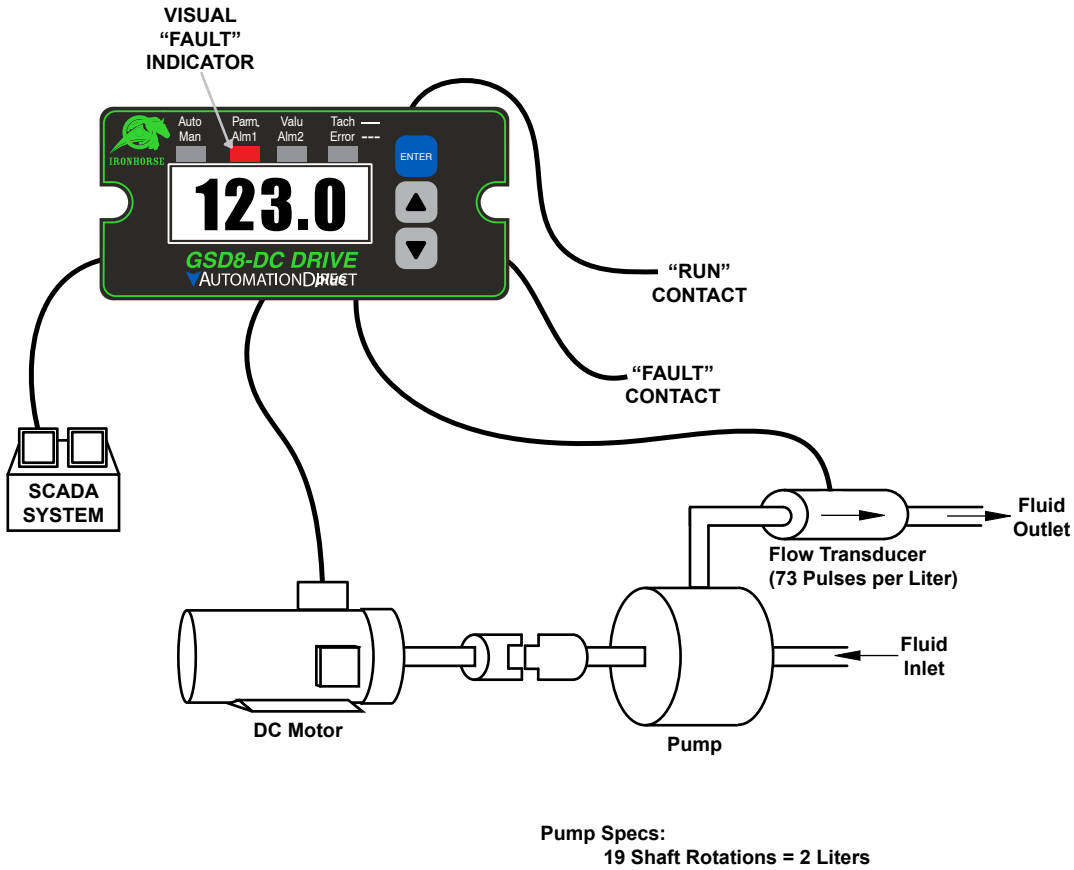
The system features a visual alarm (Annunciator) and dry relay contact output to warn the operator if any of the following "Fault" conditons have occurred: Actual or Target speed is outside specified limits, the waste flow has stopped, the GSD8 is at maximum output, or the 4-20 mA input signal has dropped below about 3mA (loop broken). Additionally, the "Fault" alarm will not activate if the Target speed is zero, the "Inhibit" input is active, or an accel/decel ramp is in progress. The alarm cannot be silenced but will reset automatically when flow rates have returned to normal.

Additionally, the system will provide a "Run" signal (as a dry relay contact) back to the SCADA to signal that the pump is running (or not, as commanded by the SCADA).

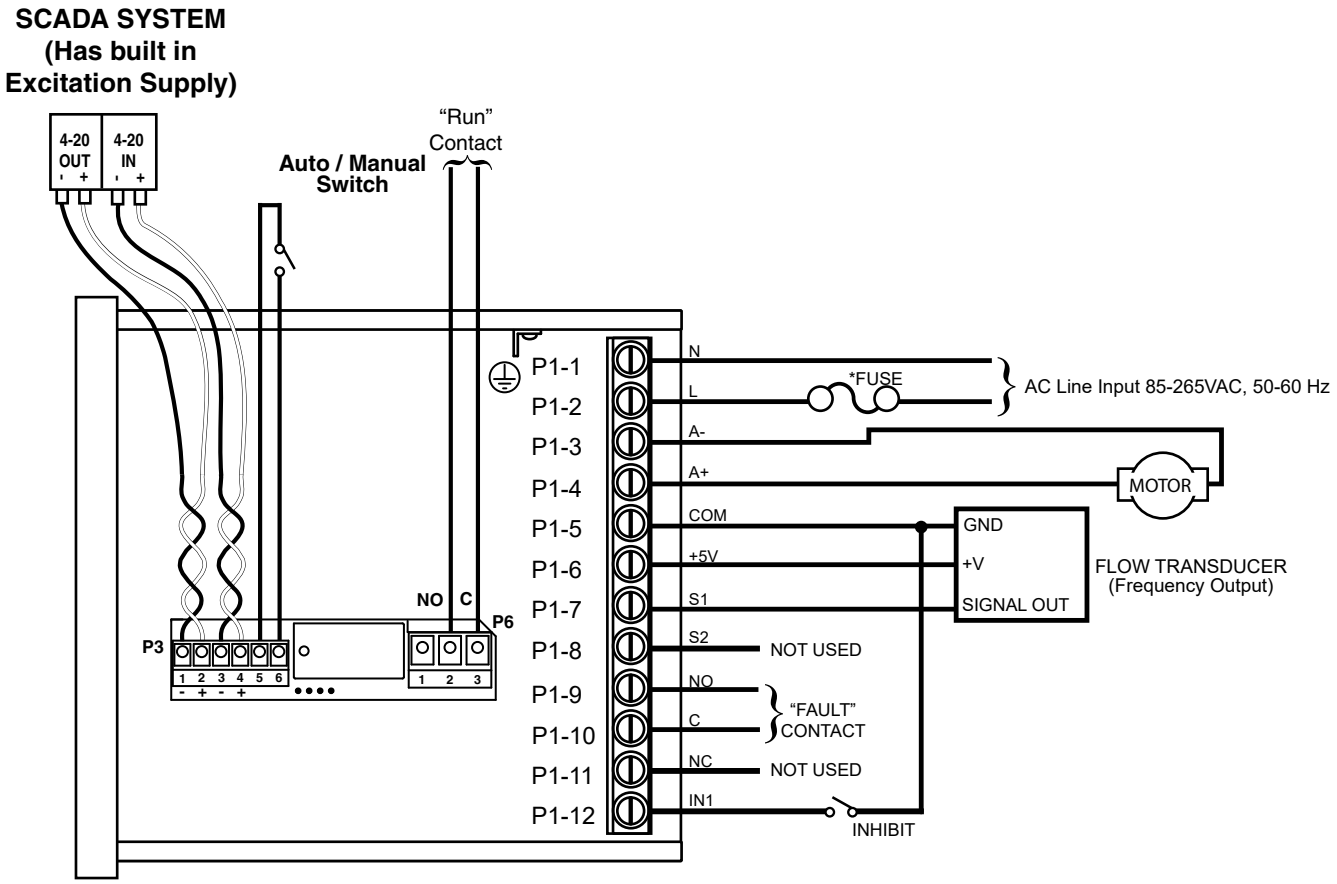
Motor, Pump and Flowmeter Specifications and Alarm Limits:

- *Pump Output: 9.5 shaft rotations/liter*
- *Flow Transducer: 73 pulses/liter*
- *Desired Min. Flow Rate: 20 liters/minute, Max: 150 liters/minute*
- *Alarm Min.10 liters/minute, Max: 180 liters/minute*
- *Accel Rate: 100 liters/minute, Decel Rate: 50 liters/minute*
- *SCADA 4-20 mA scaling (both input and output): 4mA = zero LPM, 20mA = 200 LPM*

Application Diagram:



Wiring Diagram



GSD8-240-5C-D w/GSDA-AI-A8
GSD8-240-10C-D w/GSDA-AI-A8
GSD8-240-10N4X-A

* Size fuse according to unit and application. See electrical specifications for maximums.

Relevant Math and Various Settings for this Application:

In this example, the pump turns 9.5 "shaft rotations" per liter. The maximum desired flow rate is 150.0 LPM, and the motor drives the pump at a 1:1 ratio, such that the motor speed at 150.0 LPM will be 9.5 x 150.0, or 1,425 RPM. Set parameter 31, S1 Reference RPM to 1425.

Set Parameter 30, Display Reference to 1500, which is the maximum flow rate (150.0 LPM, minus the decimal point) when the motor is running at the Reference speed of 1,425 RPM.

The Flow Transducer has a pulse output rate of 73 pulses per liter. Set Parameter 32, S1 Pulses Per Revolution to 73. The controller is "thinking" in LITERS per minute, but "controlling" the motor in REVOLUTIONS per minute.

The Accel and Decel rates are expressed in "Display Units" (Engineering Units) per second, so we have to divide our desired accel and decel rates by 60. Set Parameter 23, Accel Setting, to 17 (1000 / 60 and rounded up), and set Parameter 24, Decel Setting, to 8 (500 / 60).

The settings for the "Fault" conditions are used to control the Alarm1 relay. The application requires that a "Fault" condition is "true" (active) when Actual Speed is Outside Limits, or Target Speed is Outside Limits, or waste flow has stopped (Main Pickup (Flowmeter) Stalled), or the GSD8 drive is at Max. Output, or the 4-20 mA Input loop appears "broken". Set Parameter 50, Alarm1 OR Activation Conditions, to a value of 2 + 4 + 16 + 512, which equals 534. Set Parameter 65, Alarm1 OR Activation Conditions, to a value of 2.

Conversely, we do NOT want "Fault" output to activate if any of the following conditions are true: Target speed (either through the 4-20 mA input or the "front panel") is set to zero, or an accel/decel ramp is in progress, or an "Inhibit" input is active (UIN1 will be set for use as an Inhibit input).

The programming for Alarm2, which we are using to control the relay on the GSDA-AI-A8 to form a "Run" output, is much simpler. The GSD8 drive has a "Run" condition, which is true (active) when the Target Speed is greater than zero, AND the main pickup has received at least one pulse. Therefore, set Parameter 70, the Alarm2 "OR", to the "Run" condition's decimal value, 1024. Set Parameters 71 and 72 to zero. To have the GSDA-AI-A8's relay output to be controlled by our "Run" condition (Alarm2), set Parameter 81, Alarm2 Output Routing, at its default value of 3 (assuming the GSDA-AI-A8 is in slot 200).

In addition to these settings, there are various other Parameters that control the Alarm Limits, Alarm "Reset" behavior, the Alarm1 "Annunciator", the Displayed Decimal Point position, etc. See the Parameter Configuration table below for further details

Table: Parameter Configuration

All other parameters may be set to factory defaults, or as desired.

NOTE: Parameter numbers above 999 are located in the GSDA-AI-A8 Modbus Card Options manual.

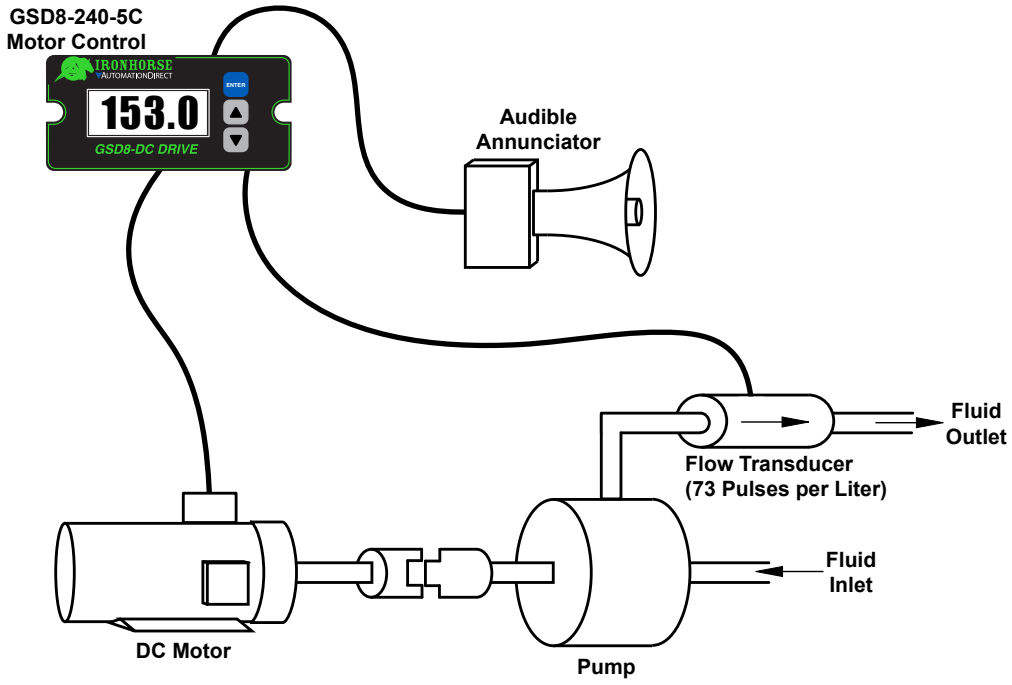
Parameter	Value	Notes
12	2	Set the Display to show ACTUAL (not "Target") Liters per Minute flow through the pump
13	3	Desired Decimal Point Display is XXX.X
20	200	Minimum Rate (Target Speed) is 20.0 LPM ("200" on the display)
21	1500	Maximum Rate is 150.0 LPM ("1500" on the display)
23	17	Accel rate is 17 Liters per SECOND, or 100 Liters per MINUTE
24	8	Decel rate is 8 Liters per SECOND, or 50 Liters per MINUTE
30	1500	This is the Display Reference value. 150.0 LPM ("1500" on the display)
31	1425	This is the calculated RPM speed of the pump motor at the Display Reference value, above
32	73	Flow Transducer pulse output rate of 73 pulses per liter
33	10	Number of Seconds for "Initial" Stall Timeout
34	100	Number of tenths-of-seconds for the "Running" Stall Timeout
40	5	Using the UIN1 Input for an Active "Low" Inhibit Input (See Wiring Diagram, above)
42	3	Motor will decel to zero speed upon Inhibit, and accel back to speed when Inhibit released
50	534	"Fault" (Alarm1) will Activate on several conditions. See "Description", above, for details.
51	137	Along with Parameter 52, forms conditions that will SUPPRESS the "Fault" (Alarm1) from Activating
52	137	This "AND", with Parameter 51, forms a Neg. Logic "OR" to Suppress "Fault" (Alarm1) Activation
59	100	"Fault" (Alarm1) needs to Activate when Target or Actual "Speed" is less than 10.0 LPM.
60	1800	"Fault" (Alarm1) needs to Acivate when Target of Actual "Speed" is greater than 180.0 LPM
65	2	"Fault" (Alarm1) will Activate on several conditions. (See "Description" above for details.)
70	1024	"Run" (Alarm2) is being used to reflect the "Run" condition Flag (Routed to GSDA-AI-A8 Relay)
71	0	No conditions set
72	0	No conditions set
81	3	Use the GSDA-AI-A8 card for alarm output
2021	2000	Value to send from GSDA-AI-A8 to Host Drive when GSDA-AI-A8 receives 20mA on its Input terminals
2041	2000	Value from Host Drive to GSDA-AI-A8 that will cause 20mA to flow across its Output terminals

Pump Controller with Audible and Visual Alarm

Description:

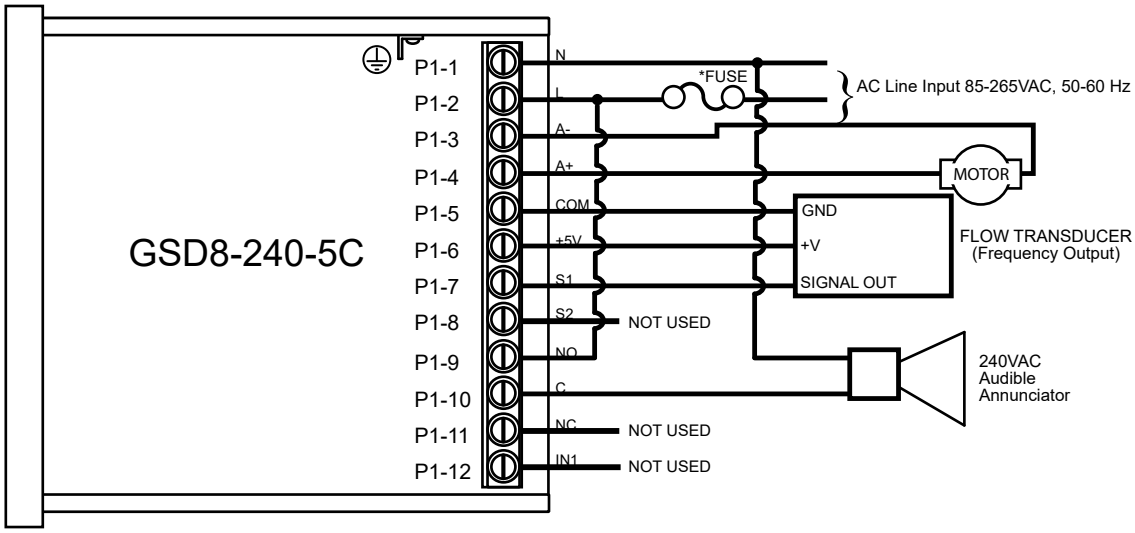
A waste pump control which displays the pump rate in liters per minute with an audible and visual alarm output which will warn the operator if the waste flow has stopped. The alarm should not be able to be silenced and should automatically reset when flow rates have returned to normal. The display should indicate in the format "xxx.x" (LPM).

Application Diagram:



Pump Specs:
19 Shaft Rotations = 2 Liters

Wiring Diagram



* Size fuse according to unit and application. See electrical specifications for maximums.

Parameter Configuration:

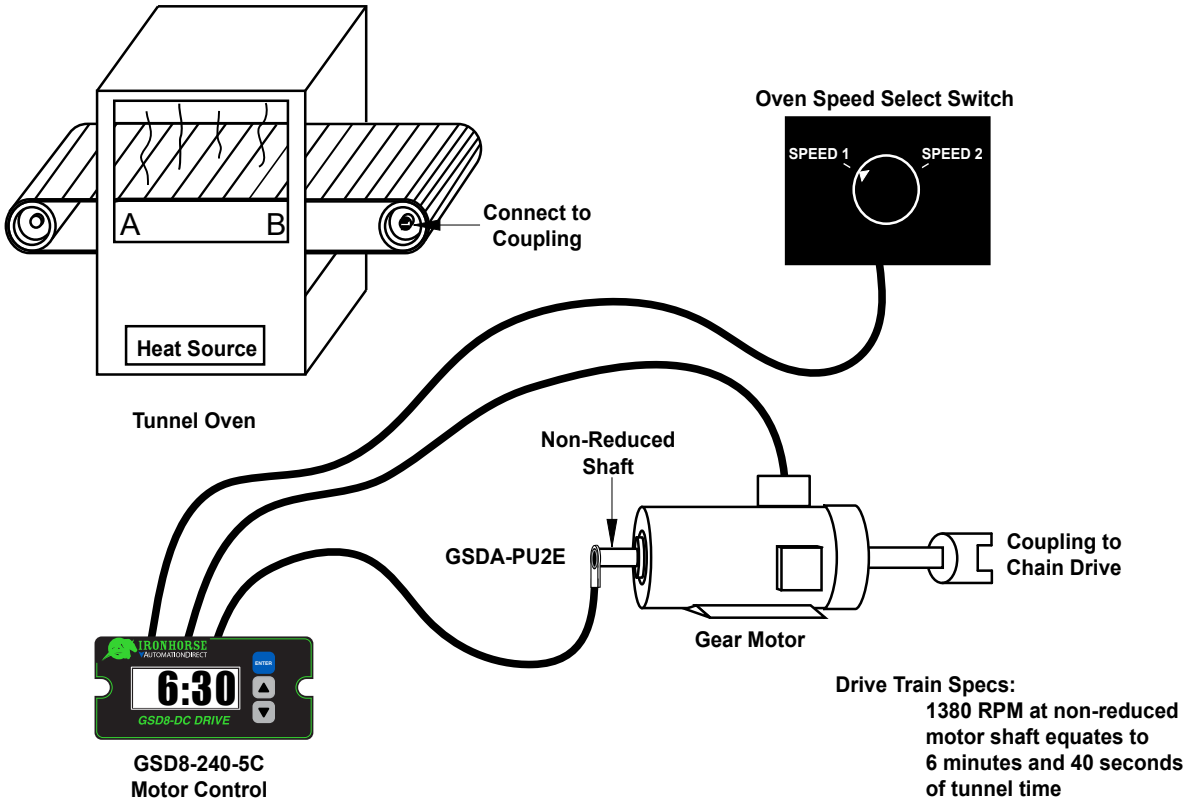
Parameter	*Value*	*Notes*
10	1	Master, Rate Mode Setting (LPM is a rate-based unit)
13	3	Decimal point position set to XXX.X on display
30	10	Display should indiciate 1.0 LPM (10) when pickup at Reference RPM, parameter 31
31	73	This is the RPM at which the Display Reference, parameter 30, should be displayed
32	1	Pulses per revolution of shaft encoder or pickup is 1 PPR
50	7	Alarm active when pickup stalled
53	1	Flash display when alarm is active
57	10	Lower limit setting for pickup stall timeout. Set for 10 seconds.

Conveyor Oven Controller with Two Preset Process Times

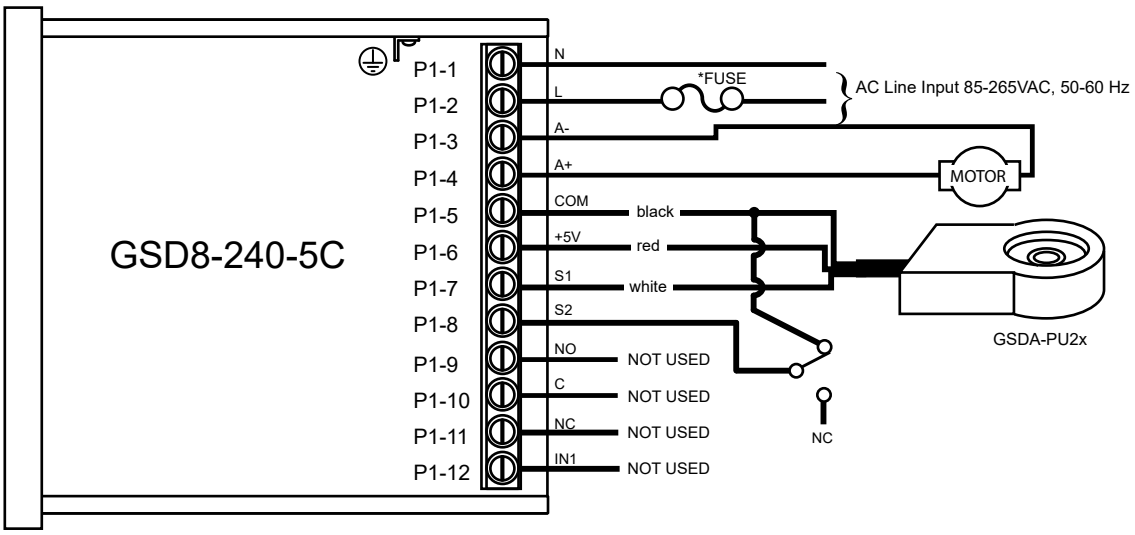
Description:

An oven monitor displaying the “tunnel” time in minutes and seconds. The tunnel time is defined as the time it takes for the heated object on the conveyor to travel from point A to point B in the application diagram below. An external time-select switch should allow the user to choose between the displayed process time or a second fixed process time. The time should be displayed in MM:SS (minutes:seconds) format. The process time should only be allowed to be adjusted between 6:30 and 12:15.

Application Diagram:



Wiring Diagram



* Size fuse according to unit and application. See electrical specifications for maximums.

Parameter Configuration:

Parameter	Value	Notes
10	2	Time Mode Setting (MM:SS is a time-based unit)
20	390	Display minimum set to 6:30 (MM:SS) For example: (6 minutes x 60 seconds per minute) + 30 seconds = 390 seconds
21	735	Display maximum set to 12:15 (MM:SS) For exampe: (12 minutes x 60 seconds per minute) + 15 seconds = 735 seconds
30	400	Display should indicate 6:40 (MM:SS) when motor at Reference RPM, parameter 31 For example: (6 minutes x 60 seconds per minute) + 40 seconds = 400 seconds
31	1380	This is the RPM at which the Display Reference, parameter 30, should be displayed
32	1	Pulses per revolution of shafter encoder or pickup is 1 PPR
35	7	Set S2 input mode to jog when low
36	530	Set fixed process time during jog to 8:50 (MM:SS) For example: (8 minutes x 60 seconds per minute) + 50 seconds = 530 seconds

Setting up a stock GSD8-240-5C for Pizza Ovens

Setting up the GSD8-240-5C control for your oven requires two pieces of information:

1) The number of pulses / revolution generated by the motor speed sensor.
2) The desired display at a known motor RPM.

Sensor Pulses / Revolution

The sensor is typically installed directly on the back of the oven conveyor drive motor. Remove the black dust cap and read the number printed or stamped into the magnetic disc inside. Refer to the table below:

Magnetic DIsc Number	Pulses/Revolution (Parameter 32)
2	1
20	10
40	20

If the magnetic disc shows any number other than “2”, you **must** go in and modify the factory default programming before proceeding. If the GSD8-240-5C drive is new, the factory default is to display motor speed in RPM based upon a 1 pulse/revolution sensor. If you have anything else, change Parameter 32 value to the Pulses/Rev value as shown in the table above. Programming is covered in the GSD8-240-5C manual but here is the short course:

1) With power on to the control, press and hold “Enter” button on front panel until display changes to P0.
2) Press the Up Arrow until P32 shows in the window, and press “Enter”.
3) Press the Up or Down Arrow until the number displayed in the window = Pulses/Rev number from table above, press “Enter”.
4) P32 should show in the window; Press the Down Arrow until P0 shows in the window, and press “Enter”.

You are now ready for the next step.

Desired Display at Known Motor RPM

Typically you do not know the desired display (minutes and seconds) at a known RPM in advance. If you do, you can skip down to the next programming section. If not, you have to measure it.

Using the arrows on the front of the GSD8-240-5C drive, increase the motor speed until the number is high, like 1500. The conveyor belt should be moving along pretty fast. Take an object (pizza pan) and using a watch, place the pan on the conveyor belt. Start timing just as the front edge of the pan just enters the

baking chamber. Stop timing just as the front edge of the pan emerges from the baking chamber. Repeat 1-2 times to verify. This is the Desired Display (bake time in minutes:seconds) at a known RPM (1500 in this case). Let's assume your time comes out to 6 minutes and 40 seconds.

Final Programming Steps

1) With power on to the control, press and hold "Enter" button on front panel until display changes to P0.
2) Press the Up Arrow until P30 shows in the window, and press "Enter".
3) Press the Up or Down Arrow until the number displayed in the window = the measured time in seconds (400 in our example), press "Enter".
4) P30 should show in the window; Press the Up Arrow until P31 shows in the window, and press "Enter".
5) Press the Up or Down Arrow until the number displayed in the window = 1500, press "Enter".
6) P31 should show in the window; Press the Down Arrow until P10 shows in the window, and press "Enter".
7) Press the Up or Down Arrow until the number displayed in the window = 2 (Time Mode), press "Enter".
8) P10 should show in the window; Press the Down Arrow until P0 shows in the window, and press "Enter".
9) Cycle the power after changing P10.

The unit is now programmed to display bake time in MM:SS display format. Optional programming includes Parameters 20 and 21 – Display Minimum and Maximum. These values must be entered in seconds like above. This would establish a minimum and maximum oven bake time.

The Final Step is to move the JP1 jumper (located in the top circuit board inside the control) from On to Off position – the jumper is a sleeve that only connects 2 of 3 pins at a time. Please do this with power OFF.

Troubleshooting

Problem	*Possible Cause*	*Solution*
Display is blank	Power not applied	Using a volt meter, verify that a voltage between 85 and 250 VAC is measure between the L and N terminal block positions.
	Defective unit	Contact AutomationDirect to return the defective unit: https://www.automationdirect.com/adc/return/return
Display is dim	Display intensity parameter is too low	Editing and increasing the display intensity parameter should cause the display digits to become brighter.
When power is applied, "LF-L" is displayed	AC line supplying power to unit has too much noise	Review routing of power wires in machine to minimize electrical noise. Look for other devices which share the same circuit which may be producing unacceptable levels of line noise. In some applications, such as welding equipment, a careful regiment of applying an AC line filter, re-routing wires, dividing circuits, using shielded cable and properly grounding devices will usually solve the problem.
	AC line supplying power to unit has an abnormally low frequency	The unit is designed to operate with AC lines from 48-62 Hz (cycles per second). This is typically not a problem because international standards are 50 and 60 Hz.
When power is applied, "LF-H" is displayed	AC line supplying power to unit has too much noise	Review routing of power wires in machine to minimize electrical noise. Look for other devices which share the same circuit which may be producing unacceptable levels of line noise. In some applications, such as welding equipment, a careful regiment of applying an AC line filter, re-routing wires, dividing circuits, using shielded cable and properly grounding devices will usually solve the problem.
	AC line supplying power to unit has an abnormally high frequency	The unit is designed to operate with AC lines from 48-62 Hz (cycles per second). This is typically not a problem because international standards are 50 and 60 Hz.
The alarm output does not seem to function	Alarm output parameters not configured properly	Review alarm output parameters. The alarm relay output can be tested by selecting the "Always On" value for the Activation Condition parameters for the alarm output. When doing this, the relay click should be audible and the NC (Normally Closed) and C (Common) terminal should become internally shorted at the terminal block.
Cannot control motor speed / Motor running at full speed.	Drive not receiving encoder signal	Check encoder to drive wiring; verify power supply to encoder. Encoder may need replacmement.

GSD8-240-5C and GSDA-DP Display Codes

- ***CorP:*** *This message appears when a core factory reset has been performed by entering 1445 into parameter 95. This erases the EEPROM, disables triggers and alarms, and clears the watchdog timer. The unit will display this message until it is power cycled.*
- ***CorE:*** *This message appears on initial power up after programming units in factory or after a core reset has been initiated by entering 1445 in parameter 95. The unit is initializing and setting factory default settings. The message will disappear on its own after it finishes initializing.*
- ***init:*** *This message will appear when the down and enter buttons are pressed simultaneously on powerup and the programming enable jumper is in the enabled position. This performs a parameter area factory initialization to load the factory defaults into the parameter area of the EEPROM.*
- ***- - :*** *This message will appear after a core reset, parameter area factory initialization, factory reset, or when restoring/swapping environments. During any of those actions the unit must measure the AC line frequency to determine internal time-based constants. This message will disappear on its own.*

NOTE: The above four display codes are not error codes and with the exception of '- -' should only ever display due to a core reset or parameter area factory initialization. A standard factory default reset as explained under parameter 95 should be effective in most user cases.

Error Messages

Error	Possible Cause	Solution
LF-L	The AC line supplying power to unit has too much noise. The AC line supplying power to the unit has an abnormally low frequency.	Review routing of power wires in machine to minimize electrical noise. Look for other devices which share the same circuit which may be producing unacceptable levels of line noise. In some applications, such as welding equipment, a careful regiment of applying an AC line filter, re-routing wires, dividing circuits, using shielded cable, and properly grounding devices will usually solve the problem. The unit is designed to operate with AC lines from 48-62 Hertz (cycles per second). This is typically not a problem because the international standards are 50 and 60 Hertz.
LF-H	The AC line supplying power to unit has too much noise. AC line supplying power to the unit has an abnormally high frequency.	Review routing of power wires in machine to minimize electrical noise. Look for other devices which share the same circuit which may be producing unacceptable levels of line noise. In some applications, such as welding equipment, a careful regiment of applying an AC line filter, re-routine wires, dividing circuits, using shielded cable, and properly grounding devices will usually solve the problem. The unit is designed to operate with AC lines from 48-62 Hertz (cycles per second). This is typically not a problem because the international standards are 50 and 60 Hertz.

GSD8-240-5C-D, GSD8-240-10C and GSD8-240-10N4X Display Codes

- ***CorE:*** *This message appears on initial power up after programming units in factory or after a core reset has been initiated by entering 1445 in parameter 95. The unit is initializing and setting factory default settings. The message will disappear on its own after it finishes initializing.*
- ***init:*** *This message will appear when the down and enter buttons are pressed simultaneously on powerup and the programming enable jumper is in the enabled position. This performs a parameter area factory initialization to load the factory defaults into the parameter area of the EEPROM.*
- ***wait:*** *This message will appear when saving parameter settings for the base control and any option cards. It will disappear after the parameters have been saved.*

NOTE: The above display codes are not error codes and should only ever display due to a core reset or parameter area factory initialization. Both of those options erase the EEPROM and any saved user settings. A standard factory default reset as explained under parameter 95 should be effective in most user cases.

The following messages are alarm messages, and only display if the control is set up to look for those conditions.

- ***StAL:*** *This message will appear when the drive has detected a motor stall. Verify that the motor pickup is wired correctly, and that motor is running.*

- ***JOG:*** *The unit is in Jog mode. For the ASP40, refer to parameters 18 and 35. For the MD40/50, refer to parameters 18, 35, and 40. For the BLM, refer to parameter 18.*
- ***Inh:*** *The unit is in Inhibit mode. For the ASP40, refer to parameters 18, 35, and 42. For the MD40/50, refer to parameters 18, 35, 40. For the BLM, refer to parameter 18.*
- ***StOP:*** *The unit is in Estop mode. For the ASP40, refer to parameters 18 and 35. For the MD40/50, refer to parameters 18, 35, and 40. For the BLM, refer to parameter 18.*
- ***MAin:*** *The maintenance message will activate after a set amount of time using parameter 100. Note: The BLM series does not have a maintenance timer.*
- ***Err1:*** *Front-Panel DoubleClick Destination error. This error appears when the doubleclick function is active and the user attempts to change the parameter value. (e.g. P18 = 1 and the user activates inhibit by double clicking the enter button. If the user attempts to change P18 to another value while the unit is still inhibited, the display will read Err1)*

Error Messages

Error	Possible Cause	Solution
LF-L	The AC line supplying power to unit has too much noise. The AC line supplying power to the unit has an abnormally low frequency.	Review routing of power wires in machine to minimize electrical noise. Look for other devices which share the same circuit which may be producing unacceptable levels of line noise. In some applications, such as welding equipment, a careful regiment of applying an AC line filter, re-routing wires, dividing circuits, using shielded cable, and properly grounding devices will usually solve the problem. The unit is designed to operate with AC lines from 48-62 Hertz (cycles per second). This is typically not a problem because the international standards are 50 and 60 Hertz.
LF-H	The AC line supplying power to unit has too much noise. AC line supplying power to the unit has an abnormally high frequency.	Review routing of power wires in machine to minimize electrical noise. Look for other devices which share the same circuit which may be producing unacceptable levels of line noise. In some applications, such as welding equipment, a careful regiment of applying an AC line filter, re-routine wires, dividing circuits, using shielded cable, and properly grounding devices will usually solve the problem. The unit is designed to operate with AC lines from 48-62 Hertz (cycles per second). This is typically not a problem because the international standards are 50 and 60 Hertz.
LF-E	The control is not reading an AC line frequency.	This is most commonly caused by the lack of a line_sync signal at the controller's input. Verify that the AC line input is running between 48-62 Hertz (cycles per second).