

IronHorse GSD Series DC Drives

GSD Series DC Drives Overview and Selection Guide



GSD DC Drives – Series Comparisons

Series	GSD1	GSD3	GSD4 & 4A	GSD5	GSD6	GSD7	GSD8
Package Configurations Available	Open frame NEMA 4X	Open frame NEMA 4	Open frame NEMA 4X	Open frame NEMA 4/12	Open frame	Open frame	NEMA 4X
Power Quality Form Factor	1.05	1.4					1.36
Input Voltages	12/24/36/48 VDC	12/24 VAC 120/240 VAC	24/36 VAC 120/240 VAC	120/240 VAC	115/230 VAC	120VAC 240VAC	85-265 VAC
Output Voltages	0–12 VDC 0–24/36 VDC 0–12/24/36/48 VDC	0–12/24 VDC 0–90/180 VDC	0–24/36 VDC 0–90/180 VDC	0–90/180 VDC	0–90/180 VDC	0–90/180 VDC	0–90/180 VDC
Shunt Field Voltages (Currents)	–	10/20 VDC 100/200 VDC (0.75–1A)	20/30 VDC 100/200 VDC (0.5–1A)	100/200 VDC (1A)	100/200 VDC (1.5A)	100/200 VDC (1A)	–
Motor Ratings (hp)	1/50–1	1/50–2/3	1/50–2	1/8–2	1/8–3	1/50–2	1/2–2
Max Output Current (continuous)	10–20 A (DC)	0.15–3 A (DC)	1.2–10 A (DC)	0.15–10.8 A (DC)	15A (DC)	0.5–10 A (DC)	5–10 A
Current Overload Capacity	150% for 60s	200% for 60s	200% for 60s	150% for 60s	200% for 60s	200% for 60s	200% for 60s
Current Limit	Adjustable 0-200%	None	Adjustable 1–2.5A (DC) 1–15A (DC)	Adjustable 1–15A (DC)	Adjustable 2–30A (DC)	Adjustable 0.3–18A (DC)	None
Transient Protection	None	Metal Oxide Varistor (MOV)					MOV and X2 Cap.
I.R. Compensation	Adjustable	Adjustable	Adjustable	Adjustable	Adjustable	Adjustable	n/a
Speed Adjustment	5kΩ pot or 0–10 VDC input signal **	5kΩ pot	5kΩ pot or Optional 0–5/10/250 VDC or 4–20 mA input signal	5kΩ pot or 0–10 VDC input signal	5kΩ pot or Optional 4–20 mA input signal	5kΩ pot or 0–10 VDC input signal	Front panel / analog option
Speed Range	30:1	25:1	50:1	50:1	50:1	50:1	100:1
Speed Regulation	±1% of base speed						0.1%***
Maximum Speed	Adjustable 50–100%	Adjustable 40–120%	Adjustable 60–100%	Adjustable 66–110%	Adjustable 60–120%	Adjustable 60–110%	Non-adjustable 0–100%
Minimum Speed	Adjustable 0–30%						
Acceleration	Adjustable 0–10s	0.5s (fixed)	GSD4: 0.5s (fixed) GSD4A: Adjustable 0.5–8s	Adjustable 0.5–8s	Adjustable 0.3–12s	0.5s (fixed)	1-9999****
Deceleration	0.5s (fixed)	n/a (follows ramp of the reference)	Adjustable 0.5–8s	Adjustable 0.06–80s	Adjustable 0.6–12s	0.5s (fixed)	1-9999****
Plugging* / Dynamic Braking	No					Yes	No
Operating Temperature	-10–45 °C [14–113 °F]	-10–45 °C [14–113 °F] -10–40 °C [14–104 °F]	-10–45 °C [14–113 °F] -10–40 °C [14–104 °F]	-10–45 °C [14–113 °F]	-10–45 °C [14–113 °F]	-10–45 °C [14–113 °F]	-10–45 °C [14–113 °F]

* Plugging is a method of rapidly changing motor direction by reversing motor armature polarity, while the motor is still running.

** For 0–10 VDC input signal to GSD1, please refer to "Operational Description – GSD1 – 0 to 10 VDC Analog Reference Signal" in the GSD1 section.

*** Sensor PPR/application dependent

**** Change per second in engineering units, dependent on mode.

GSD1 Series DC Drives

GSD1 Introduction



GSD1-48-10N4X



GSD1-48-xxC



GSD1-24-15N4X-R

GSD1 Series DC Drives

12VDC @ 10A	1/50 – 1/8 hp motor
24VDC @ 10A	1/50 – 1/4 hp motor
36VDC @ 10A	1/50 – 3/8 hp motor
48VDC @ 10A	1/50 – 1/2 hp motor
12VDC @ 20A	1/50 – 1/4 hp motor
24VDC @ 20A	1/50 – 1/2 hp motor
36VDC @ 20A	1/50 – 3/4 hp motor
48VDC @ 20A	1/50 – 1 hp motor

Overview

IronHorse GSD1 series DC drives are high-performance Pulse-Width-Modulated (PWM) controllers for 12- to 48-volt equipment, providing smooth control with high-efficiency operation.

The advanced design permits a substantial increase in equipment running time between charges compared to systems using conventional techniques.

Features include adjustable maximum speed, minimum speed, current limit, I.R. compensation, and acceleration. The adjustable current-limit feature protects the control, battery, and motor from sustained overloads.

GSD1 series DC drives are available in open-frame and NEMA 4X enclosed styles, and all come standard with a speed pot, knob, and dial plate.

GSD1 series DC drives are available in 10A and 20A versions. A jumper on the drive selects 12, 24, 36 or 48V operating voltage.

Features

- Provides smooth variable speed capability for mobile equipment
- Automatic compensation holds motor speed steady even if the load varies or battery voltage declines.
- Speed regulation is $\pm 1\%$ of base speed
- Adjustable maximum speed
- Adjustable minimum speed
- Adjustable IR compensation
- Adjustable current limit
- Adjustable acceleration speed
- 5k Ω speed pot with leads, knob and dial included
- Speed adjustment using 5k Ω speed pot or optional 0–10VDC* analog input signal
- Inhibit terminal permits optional start-stop without breaking battery / power line

* For 0–10 VDC input signal to GSD1, please refer to "Operational Description – GSD1 – 0 to 10 VDC Analog Reference Signal" at the end of this GSD1 section.

Accessories

- Replacement speed potentiometer kit
- Digital speed potentiometer (120-240 VAC only)

Detailed descriptions and specifications for GSD accessories are available in the "GSD Series DC Drives Accessories" section.

Typical Applications

- Auger feeders
- Automated door actuators
- Commercial cooking equipment
- Commercial lifts
- Food production
- Industrial pumping systems
- Measurement instruments
- Miniature lathes and mills
- Packaging / material-handling equipment
- Printing and labeling machines
- Small shop machine tools
- Spray / print reciprocating heads

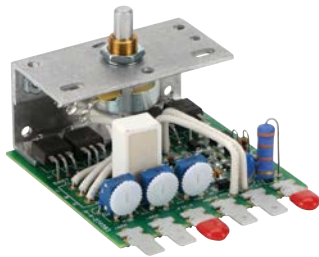
GSD1 Series DC Drives

GSD1 Selection and Specifications

GSD1 Series DC Drives – Selection & Specifications				
Model	GSD1-24-15N4X-R	GSD1-48-10C	GSD1-48-10N4X	GSD1-48-20C
Price	\$566.00	\$224.00	\$490.00	\$259.00
Package Configuration	NEMA 4X	open frame	NEMA 4X	open frame
Power Quality Form Factor	1.05			
Input Voltage **	12–24 VDC ±15%	12/24/36/48 VDC ±15% (jumper selectable)		
Output Voltage	0–12/24 VDC	0–12/24/36/48 VDC		
Motor Rating (hp)	1/50–5/16	1/50–1/2		1/50–1
Output Current (continuous)	15A (DC)	10A (DC)		20A (DC)
Current Overload Capacity	200% for 10s; 150% for 60s			
Current Limit	Adjustable to 200% of motor Full Load Current, up to 200% of control current rating			
Speed Adjustment ***	5kΩ potentiometer or 0–10VDC*** input signal			
Speed Range	30:1			
Speed Regulation	1% of base speed via adjustable IR compensation trim pot			
Maximum Speed	Adjustable from 50% to 100% of base speed			
Minimum Speed	0–30% of adjustable maximum speed			
Acceleration	Adjustable from 0–10s			
Deceleration	0.5s (non-adjustable)			
Dynamic Braking	No			
Plugging Capability ****	No			
Internal Operating Frequency	18kHz			
Power Connections (P1)	Euro-style terminal block (10–14 AWG)	Euro-style terminal block (14–28 AWG)		Euro-style terminal block (10–14 AWG)
Signal Connections (P2)	Euro-style terminal block (14–28 AWG)			
External Fusing Required	DC-rated @ 150% motor Full Load Current (up to 150% Continuous Output Current rating of drive)			
Operating Temperature	-30 to 65°C [-22 to 140°F] for Chassis -15 to 60°C [5 to 140°F] for Enclosed			
Thermal Protection	None			
Mounting Orientation	Can be mounted in any orientation			
Corrosive Gases	NOT compatible with any corrosive gases			
Package Configuration	Black anodized aluminum extrusion			
Weight	40oz [1049g]	8oz [227g]	40oz [1049g]	8oz [227g]
Agency Approvals	RoHS			
Optional Accessories *				
Replacement Potentiometer	GSDA-5K			
Digital Potentiometer	GSDA-DP / GSDA-DP-D / GSDA-DP-S			
Manual Reverse Switch	GSDA-MREV	n/a		
* For accessories details, refer to the "GSD Series DC Drives Accessories" section.				
** Input power supply must not exceed recommended voltage, or it may damage the GSD1 drive. Linear power supply can be sized per drive voltage and motor full load current. Switched power supply should be sized per drive voltage and double the motor full load current.				
*** For 0–10 VDC input signal to GSD1, please refer to "Operational Description – GSD1 – 0 to 10 VDC Analog Reference Signal" at the end of this GSD1 section.				
**** Plugging is a method of rapidly changing motor direction by reversing motor armature polarity, while the motor is still running.				

GSD3 Series DC Drives

GSD3 Introduction



GSD3-xxx-2CJ



GSD3-xxx-2CL



GSD3-24x-3N4

GSD3 Series DC Drives

Motor Rating Range @ 12/24 VAC_{IN}	1/50 – 1/12 hp
Motor Rating Range @ 120/240 VAC_{IN}	1/50 – 2/3 hp

Overview

IronHorse GSD3 series DC drives are general-purpose, economical variable-speed controllers for small DC and universal motor applications.

Models are offered with dual input voltages of 12/24 VAC or 120/240 VAC with a DC output current rating of 2 Amps, adjustable trim pot settings, and quick-connect terminal pins.

GSD3 series DC drives are available in two compact panel-mount styles – open-frame and NEMA 4 enclosed.

Features

- Dual input voltage models of 12/24 VAC or 120/240 VAC
- Full-wave bridge power supply
- Adjustable minimum speed
- Adjustable maximum speed
- Adjustable IR compensation
- Fixed acceleration (0.5 seconds)
- 5kΩ speed potentiometer with leads, knob and dial included
- 25:1 speed range
- 1% speed regulation
- Shunt field supply provided (1 Amp max):
 - 10V for 12VAC; 20V for 24VAC input, 100V for 120VAC; 200V for 240VAC input
- Overload capacity of 200% for one minute
- Transient voltage protection
- Power on/off switch (enclosed models)
- AC line fuse (120–240 VAC NEMA 4 only)

Accessories

- Replacement speed potentiometer kit
- Detailed descriptions and specifications for GSD accessories are available in the "GSD Series DC Drives Accessories" section.*

Typical Applications

- Auger feeders
- Automated door actuators
- Commercial cooking equipment
- Commercial lift
- Food production
- Industrial pumping systems
- Measurement instruments
- Miniature lathes and mills
- Packaging / material-handling equipment
- PLC-controlled reversing
- Printing and labeling machines
- Small shop machine tools
- Spray / print reciprocating head

GSD3 Series DC Drives

GSD3 Selection and Specifications

GSD3 Series DC Drives – Selection & Specifications						
Model	GSD3-24A-2CJ	GSD3-24A-2CL	GSD3-24A-3N4	GSD3-240-2CJ	GSD3-240-2CL	GSD3-240-3N4
Price	\$104.00	\$100.00	\$193.00	\$99.00	\$97.00	\$199.00
Package Configuration	Open frame		NEMA 4	Open frame		NEMA 4
Power Quality Form Factor	1.4					
Input Voltage	12/24 VAC ±10% @ 50/60 Hz			120/240 VAC ±10% @ 50/60 Hz		
Output Voltage	0–12 or 0–24 VDC			0–90 or 0–180 VDC		
Shunt Field Voltage & Current	10VDC @ 12 VAC 20VDC @ 24 VAC (1A max)		10VDC @ 12 VAC 20VDC @ 24 VAC (0.75A max)	100VDC @ 120 VAC 200VDC @ 240 VAC (1A max)		100VDC @ 120 VAC 200VDC @ 240 VAC (0.75A max)
Motor Rating (hp)	1/50–1/40 @ 11V 1/25–1/20 @ 22V		1/50–1/25 @ 11V 1/25–1/12 @ 22V	1/50–1/6 @ 90V 1/25–1/3 @ 180V		1/50–1/3 @ 90V 1/25–2/3 @ 180V
Output Current (continuous)	150 mA to 2A (DC)		150 mA to 3A (DC)	150 mA to 2A (DC)		150 mA to 3A (DC)
Current Overload Capacity	200% for 60s					
Current Limit	None					
Transient Protection	Metal Oxide Varistor (MOV)					
I.R. Compensation	Adjustable – full range					
Speed Adjustment	5kΩ potentiometer					
Speed Range	25:1					
Speed Regulation	±1% of base speed					
Maximum Speed	Adjustable from 40% to 120% of base speed					
Minimum Speed	Adjustable from 0% to 30% of maximum speed					
Acceleration	0.5s (fixed)					
Deceleration	n/a (follows the ramp of the reference)					
Dynamic Braking	No					
Plugging Capability **	No					
Electrical Connections	Spade-connector lugs					
External Fusing Required	Bussman ABC or Littlefuse 314 series ceramic fuses or equivalent GSD3-240-3N4 includes internal fusing adequate for 120 VAC line and neutral inputs Refer to wiring diagrams for external fusing requirements for other wiring configurations					
Operating Temperature	-10 to 45 °C [14 to 113 °F]		-10 to 40 °C [14 to 104 °F]	-10 to 45 °C [14 to 113 °F]		-10 to 40 °C [14 to 104 °F]
Thermal Protection	None					
Mounting Orientation	Can be mounted in any orientation					
Corrosive Gases	NOT compatible with any corrosive gases					
Weight	2.9 oz [83g]	2.6 oz [75g]	20.3 oz [575g]	2.9 oz [83g]	2.6 oz [75g]	20.3 oz [575g]
Agency Approvals	RoHS			cUL _{US} listed (E333109), RoHS		
Optional Accessories *						
Replacement Potentiometer	GSDA-5K					
Manual Reverse Switch	GSDA-MREV***					
* For accessories details, refer to the "GSD Series DC Drives Accessories" section.						
** Plugging is a method of rapidly changing motor direction by reversing motor armature polarity, while the motor is still running.						
***To meet NEMA4 requirements, GSDA-MREV requires a user provided external enclosure.						

GSD4 Series DC Drives

GSD4 Introduction



GSD4-24x-xC



GSD4-240-10N4X



GSD4A-240-xC

GSD4 Series DC Drives

Motor Rating Range @ 24/36 VAC _{IN}	1/50 – 1/6 hp
Motor Rating Range @ 120/240 VAC _{IN}	1/50 – 2 hp

Overview

IronHorse GSD4 series DC drives provide cost efficient, reliable control for permanent magnet, shunt wound, and universal motors. The drives incorporate up-to-date design and engineering in a compact package.

Installation and field adjustments are facilitated using a barrier type terminal strip and large, easily adjustable trim pots to adjust horsepower ranges.

The GSD4-24A-5C model operates on a low input voltage of 24/36 VAC with an output of 1/50 – 1/6 hp.

Standard features include 1% speed regulation over a 50:1 speed range, plus an inhibit circuit for start-stop operation. Dual voltage 120/240 VAC or 24/36 VAC models are available.

Long life and quality are assured by 100% full load testing.

Features

- Dual input voltage 120/240 VAC or 24/36 VAC, 50/60Hz
- Adjustable horsepower settings
- Barrier terminal strip
- Full-wave bridge supply
- 1% speed regulation with armature voltage feedback ($\pm 1/2\%$ with tach feedback)
- Adjustable minimum speed
- Adjustable maximum speed
- Adjustable IR compensation
- Adjustable current limit
- Adjustable acceleration and deceleration (enclosed and GSD4A models)
- Line voltage compensation
- 5k Ω speed potentiometer with leads, dial and knob included
- 50:1 speed range
- Overload capacity: 200% for one minute
- Transient voltage protection
- Voltage following mode or DC tachometer follower by supplying ungrounded analog input signal
- DC tachometer feedback
- Inhibit circuit – permits start and stop without breaking AC lines
- Shunt field supply provided

Accessories

- Replacement speed potentiometer kit
- Digital potentiometer
- Manual reverse switch
- Accel/Decel adjustment card
- Analog current input card
- Analog voltage input card
- Heatsink

Detailed descriptions and specifications for GSD accessories are available in the "GSD Series DC Drives Accessories" section.

Typical Applications

- Auger feeders
- Automated door actuators
- Commercial cooking equipment
- Commercial lifts
- Food production
- Industrial pumping systems
- Measurement instruments
- Miniature lathes and mills
- Packaging / material-handling equipment
- Printing and labeling machines
- Small shop machine tools
- Spray / print reciprocating heads

GSD4 Series DC Drives

GSD4 Selection and Specifications

GSD4 Series DC Drives – Selection & Specifications				
Model	GSD4-24A-5C	GSD4-240-1C	GSD4-240-5C	GSD4-240-10N4X
Price	\$145.00	Retired	Retired	\$389.00
Package Configuration	Open frame			NEMA 4X
Power Quality Form Factor	1.4			
Input Voltage (@50/60Hz)	24/36 VAC ±10%	120/240 VAC ±10%		
Output Voltage	0–24/36 VDC	90VDC @ 120VAC input / 180 VDC @ 240VAC input		
Shunt Field Voltage	20VDC @ 24VAC in 30VDC @ 36VAC in (1A max)	100VDC @ 120VAC in 200VDC @ 240VAC in (1A max)		100VDC @ 120VAC in 200VDC @ 240VAC in (0.5A max)
Motor Rating @ Low V (hp) Motor Rating @ High V (hp)	1/50 – 1/6	1/50 – 1/8 1/25 – 1/4	1/8 – 1/2 1/4 – 1	1/8 – 1 1/4 – 2
Output Current (continuous) **	5.5A (DC)	1.2A (DC)	5.5A (DC)	10A (DC)
Current Overload Capacity	200% for 60s			
Current Limit (adjustable)	1–15A (DC)	0.3–2.5A (DC)	1–15A (DC)	
Transient Protection	None	Metal Oxide Varistor (MOV)		
I.R. Compensation	Adjustable			
Speed Adjustment	Potentiometer	5kΩ potentiometer or 0-10 VDC**** isolated input signal		
	Current	4–20mA with opt acc GSDA-AI-A		n/a
	Voltage	n/a	0–5 VDC thru 0–250 VDC, 4–20 mA with optional accessory GSDA-AI-V4	
Speed Range	50:1			
Speed Regulation	±1% of base speed			
Maximum Speed	Adjustable from 60% to 110% of base speed			
Minimum Speed	0–30% of adjustable maximum speed			
Acceleration	0.5s (fixed)			adjustable from 0.5–8s
Deceleration				
Dynamic Braking	No			
Plugging Capability **	No			
Electrical Connections	8-position terminal strip; 22–14 AWG			
External Fusing Required	Bussman ABC or Littelfuse 314 series ceramic fuses or equivalent Refer to wiring diagrams for details			
Operating Temperature	-10 to 45 °C [14 to 113 °F]			-10 to 40 °C [14 to 104 °F]
Thermal Protection	Current limiting			
Mounting Orientation	Can be mounted in any orientation			
Corrosive Gases	NOT compatible with any corrosive gases			
Weight	8.0 oz [203g]	37 oz [1049g]	10.5 oz [297g]	59.5 oz [1687g]
Agency Approvals	RoHS, CE	cUL _{US} listed (E198015), RoHS, CE		cUL _{US} listed (E198015), RoHS
Optional Accessories*				
Replacement Potentiometer	GSDA-5K			
Digital Potentiometer	GSDA-DP			
Manual Reverse Switch	GSDA-MREV****			
Accel/Decel Adjustment Card	GSDA-ACCDEC-4			–
Analog Current Input Card	GSDA-AI-A			–
Analog Voltage Input Card	–	GSDA-AI-V4		–
Heatsink	GSDA-HTSNK-4			–
* For accessories details, refer to the "GSD Series DC Drives Accessories" section.				
** Plugging is a method of rapidly changing motor direction by reversing motor armature polarity, while the motor is still running.				
*** For 0-10 VDC input signal, please refer to "Operational Description: 0 to 10 VDC Analog Reference Signal to GSD4" in the users manual.				
**** To meet NEMA4 requirements, GSDA-MREV requires a user provided external enclosure.				

GSD4 Series DC Drives

GSD4A Selection and Specifications

GSD4A Series DC Drives – Selection & Specifications			
Model		GSD4A-240-2C	GSD4A-240-6C
Price		\$137.00	\$149.00
Package Configuration		Open frame	
Power Quality Form Factor		1.4	
Input Voltage (@50/60Hz)		120/240VAC, jumper selectable (Note: 90VDC output voltage is available with both 120VAC and 240VAC input voltage levels.)	
Output Voltage		0–90VDC @ 120 VAC input /180 VDC @ 240 VAC input	
Shunt Field Voltage		100VDC @ 120VAC in / 200VDC @ 240VAC in (7Adc Max shunt field amperage)	
Motor Rating	@ Low V (hp)	1/50–1/8 (without heatsink) 1/50–1/4 (with heatsink)	1/8–1/2 (without heatsink) 1/8–1 (with heatsink)
	@ High V (hp)	1/25–1/4 (without heatsink) 1/25–1/2 (with heatsink)	1/4–1 (without heatsink) 1/4–2 (with heatsink)
Output Current (continuous) **		2A (DC) / 6A (DC) with GSDA-HTSNK-4A	6A (DC) / 10A (DC) with GSDA-HTSNK-4A
Current Overload Capacity		200% for 60s	
Current Limit (adjustable)		0.3–2.5A (DC)	1–15A (DC)
Transient Protection		Metal Oxide Varistor (MOV)	
I.R. Compensation		Adjustable	
Speed Adjustment	Potentiometer	5kΩ potentiometer or 0–10 VDC**** isolated input signal	
	Current	4–20mA with option GSDA-AI-V4A	
	Voltage	0–5VDC thru 0–250VDC with option GSDA-AI-V4A	
Speed Range		50:1	
Speed Regulation		±1% of base speed	
Maximum Speed		Adjustable from 60% to 110% of base speed	
Minimum Speed		0–30% of adjustable maximum speed	
Acceleration		Adjustable from 0.5 to 8.0 seconds	
Deceleration		Adjustable from 0.5 to 6.0 seconds	
Dynamic Braking		no	
Plugging Capability **		no	
Electrical Connections		11-position terminal strip; 22–14 AWG	
External Fusing Required		Fuse Amperages are based on motor HP; see "Fusing"	
Operating Temperature		-10 to 45 °C [14 to 113 °F]	
Thermal Protection		Current limiting	
Mounting Orientation		Can be mounted in any orientation	
Corrosive Gases		NOT compatible with any corrosive gases	
Weight		7.12 oz [202g]	7.12 oz [202g]
Agency Approvals		cUL _{US} Listed (E198015), RoHS, CE	
Optional Accessories* (Some accessories are NOT compatible with GSD4 series drives)			
Replacement Potentiometer		GSDA-5K	
Digital Potentiometer		GSDA-DP	
Manual Reverse Switch		GSDA-MREV	
Signal Conditioner		GSDA-DP-S	
Closed loop digital potentiometer		GSDA-DP-D	
Isolated Current/Voltage Analog Input Module		GSDA-AI-V4A **** (for GSD4A drives only)	
Heatsink		GSDA-HTSNK-4A (for GSD4A drives only)	
* For accessories details, refer to the "GSD Series DC Drives Accessories" section.			
** Plugging is a method of rapidly changing motor direction by reversing motor armature polarity, while the motor is still running.			

* For accessories details, refer to the “GSD Series DC Drives Accessories” section.

** Plugging is a method of rapidly changing motor direction by reversing motor armature polarity, while the motor is still running.

GSD5 Series DC Drives

GSD5 Introduction



GSD5-240-10C



GSD5-240-10N4-x

GSD5 Series DC Drives

Motor Rating Range @ 120/240 VAC_{IN}

1/8 – 2 hp

Overview

IronHorse GSD5 series DC drives offer superb flexibility, reliability, and value. A general purpose, economical line of drives rated to 2 horsepower, it provides the ultimate in standard features and versatility, offered in open-frame and NEMA 4/12 enclosed models.

A logical, easily-accessible layout simplifies installation and adjustment. Clean design, quality components and careful assembly are trademarks of IronHorse GSD DC drives.

Features

- Dual input voltage – 120/240 VAC, 50/60Hz
- Adjustable horsepower settings
- Barrier terminal strip
- Packaged bridge supply (full wave)
- 1% speed regulation with armature voltage feedback ($\pm 1/2\%$ with tach feedback)
- Adjustable minimum speed
- Adjustable maximum speed
- Adjustable IR compensation
- Adjustable linear acceleration
- Adjustable current limit
- Line voltage compensation
- 5k Ω speed potentiometer with leads, knob, and dial included
- Power on/off switch (enclosed models)
- 50:1 speed range
- Overload capacity: 150% for one minute
- Transient voltage protection
- Voltage following mode or DC tachometer follower by supplying ungrounded analog input signal
- DC tachometer feedback
- Inhibit circuit – permits start and stop without breaking AC lines
- Remote start/stop via pot circuit or inhibit circuit
- Shunt field supply provided
- AC line fuse
- Enclosed models rated NEMA 4/12 with threaded conduit holes

Accessories

- Replacement speed potentiometer kit
- Digital potentiometer
- Manual reverse switch
- Analog current input card
- Analog voltage input card

Detailed descriptions and specifications for GSD accessories are available in the "GSD Series DC Drives Accessories" section.

Typical Applications

- Auger feeders
- Automated door actuators
- Commercial cooking equipment
- Commercial lift
- Food production
- Industrial pumping systems
- Measurement instruments
- Miniature lathes and mills
- Packaging / material-handling equipment
- Printing and labeling machines
- Small shop machine tools
- Spray / print reciprocating head

GSD5 Series DC Drives

GSD5 Selection and Specifications

GSD5 Series DC Drives – Selection & Specifications						
Model	GSD5-240-10C	GSD5-240-10N4	GSD5-240-10N4-A	GSD5-240-10N4-R	GSD5-240-10N4-V	
Price	\$191.00	\$341.00	\$397.00	\$431.00	\$476.00	
Package Configuration	open frame	NEMA 4/12				
Power Quality Form Factor	1.4					
Special Features	None		Current follower	Manual reversing	Voltage follower	
Input Voltage (@50/60Hz)	120/240 VAC ±10%					
Output Voltage	0-90/180 VDC					
Shunt Field Voltage	100VDC @ 120VAC input; 200VDC @ 240VAC input; (1A max)					
Motor Rating (hp)	1/8 – 1 hp @ 90VDC ; 1/4 – 2 hp @ 180VDC					
Output Current (continuous)	150mA – 10.8A (DC)					
Current Overload Capacity	150% for 60s					
Current Limit (adjustable)	1–15A (DC)					
Transient Protection	Metal Oxide Varistor (MOV)					
I.R. Compensation	Adjustable					
Speed Adjustment	Potentiometer	5kΩ 2W potentiometer or 0–10VDC isolated input signal				
	Current	4–20mA with option GSDA-AI-A or -V5	n/a	4–20mA	n/a	4–20mA
	Voltage	0-5VDC, 0-250VDC with option GSDA-AI-V5	n/a	n/a	n/a	0-5VDC, 0-250VDC
Speed Range	50:1					
Speed Regulation	±1% of base speed (0.5% with tachometer feedback)					
Maximum Speed	Adjustable from 66% to 110% of base speed					
Minimum Speed	Linear ramp 0–30% of adjustable maximum speed					
Acceleration	Linear ramp adjustable 0.5–8s					
Deceleration	Follows acceleration setting					
Dynamic Braking	No					
Plugging Capability **	No					
Electrical Connections	Barrier-type terminal strip; 26–12 AWG					
External Fusing Required	Bussman ABC or Littelfuse 314 series ceramic fuses or equivalent Refer to wiring diagrams for details					
Operating Temperature	-10 to 45 °C [14 to 113 °F]					
Thermal Protection	Current limiting					
Mounting Orientation	Can be mounted in any orientation					
Corrosive Gases	NOT compatible with any corrosive gases					
Weight	16.25 oz [413g]	25.50 oz [723g]				
Agency Approvals	cUL _{US} listed (E333109), RoHS					RoHS
Optional Accessories *						
Replacement Potentiometer	GSDA-5K					
Digital Potentiometer	GSDA-DP					
Manual Reverse Switch	GSDA-MREV ***			Included	GSDA-MREV ***	
Analog Current Input Card	GSDA-AI-A	–	Included	–	–	
Analog Voltage Input Card	GSDA-AI-V5	–	–	–	Included	
* For accessories details, refer to the "GSD Series DC Drives Accessories" section.						
** Plugging is a method of rapidly changing motor direction by reversing motor armature polarity, while the motor is still running.						
***To meet NEMA4 requirements, GSDA-MREV requires a user provided external enclosure.						

GSD6 Series DC Drives

GSD6 Introduction



GSD6-240-15C

GSD6 Series DC Drives

Motor Rating Range @ 115/230 VAC_{IN}	1/8 – 3 hp
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Overview

The reliable, versatile, and economical GSD6 DC drive is the most fully-featured IronHorse analog DC drive.

It provides many standard features typically offered as options by other DC drives.

By combining advanced engineering design, quality component selection, and rigorous quality control, the GSD6 DC drive offers an excellent off-the-shelf SCR control device. Its dependable, time-proven circuitry offers performance characteristics previously available only in more costly drives.

Features

- Dual input voltage 115/230 VAC, 50/60 Hz via slide selector switch
- Adjustable horsepower settings
- Barrier terminal strip
- Packaged bridge supply (full wave)
- 1% speed regulation with armature voltage feedback ($\pm 1/2\%$ with tach feedback)
- Adjustable minimum speed
- Adjustable maximum speed
- Adjustable IR compensation
- Adjustable linear acceleration
- Adjustable linear deceleration
- Adjustable current limit
- Line voltage compensation
- 5k Ω speed potentiometer with leads, dial, and knob included
- 50:1 speed range
- Overload capacity: 200% for one minute
- Transient voltage protection
- Voltage following mode or DC tachometer follower by supplying ungrounded analog input signal
- DC tachometer feedback (jumper selectable)
- Inhibit circuit – permits start and stop without breaking AC lines
- Shunt field supply provided
- AC line fuses
- +12 VDC, 12mA power supply, user accessible

Accessories

- Replacement speed potentiometer kit
- Digital potentiometer
- Analog current input card

Detailed descriptions and specifications for GSD accessories are available in the "GSD Series DC Drives Accessories" section.

Typical Applications

- Auger feeders
- Automated door actuators
- Commercial cooking equipment
- Commercial lift
- Food production
- Industrial pumping systems
- Measurement instruments
- Miniature lathes and mills
- Packaging / material-handling equipment
- Printing and labeling machines
- Small shop machine tools
- Spray / print reciprocating head

GSD6 Series DC Drives

GSD6 Selection and Specifications

GSD6 Series DC Drives – Selection & Specifications		
Model		GSD6-240-15C
Price		\$440.00
Package Configuration		Open frame
Power Quality Form Factor		1.4
Input Voltage (@50/60Hz)		115/230 VAC $\pm 10\%$
Output Voltage		0–90 @ 115 VAC INPUT / 0–180 VDC @ 230 VAC input
Shunt Field Voltage		100VDC @ 115VAC input ; 200VDC @ 230VAC input ; (1.5A max)
Motor Rating (hp)		1/8 – 1.5 hp @ 90VDC ; 1/4 – 3 hp @ 180VDC
Output Current (continuous)		15A (DC)
Current Overload Capacity		200% for 60s
Current Limit (adjustable)		2–30A (DC)
Transient Protection		Metal Oxide Varistor (MOV)
I.R. Compensation		Adjustable
Speed Adjustment	Potentiometer	5k Ω 2W potentiometer
	Current	4–20mA with option GSDA-AI-A
	Voltage	n/a
Speed Range		50:1
Speed Regulation		$\pm 1\%$ of base speed
Maximum Speed		Adjustable from 60% to 120% of base speed
Minimum Speed		Linear ramp 0–30% of adjustable maximum speed
Acceleration		Linear ramp adjustable 0.3–12s
Deceleration		Adjustable 0.6–12s
Dynamic Braking		No
Plugging Capability **		No
Electrical Connections		Barrier-type terminal strip; 26–12 AWG
Fusing		(2) 20A fuses included (Bussman ABC-20 or Littlefuse 314020 ceramic fuses or equivalent)
Operating Temperature		-10 to 45 °C [14 to 113 °F]
Thermal Protection		Not available
Mounting Orientation		Can be mounted in any orientation
Corrosive Gases		NOT compatible with any corrosive gases
Weight		40 oz [1134g]
Agency Approvals		RoHS
Optional Accessories*		
Replacement Potentiometer		GSDA-5K
Digital Potentiometer		GSDA-DP
Analog Current Input Card		GSDA-AI-A
* For accessories details, refer to the "GSD Series DC Drives Accessories" section.		
** Plugging is a method of rapidly changing motor direction by reversing motor armature polarity, while the motor is still running.		

GSD7 Series DC Drives

GSD7 Introduction



GSD7-xxx-xCR3



GSD7-xxx-xCR30

GSD7 Series DC Drives	
Motor Rating Range @ 120 VAC _{IN}	1/50 – 1 hp
Motor Rating Range @ 240 VAC _{IN}	1/25 – 2 hp

Overview

Instant reversing, quick stopping, rapid cycling... The IronHorse GSD7 series DC drives outperform other dynamic braking and reversing drives by utilizing unique zero-speed detect and dynamic braking circuits.

These circuits eliminate the contact arcing and failed braking problems associated with other reversing and dynamic braking drives. The GSD7 zero-speed detect circuit also eliminates motor plug reversing problems.

In the event of a power loss or emergency stop condition, the GSD7 Series DC drives will drop into a dynamic brake condition to safely and quickly bring the motor to a stop.

Features

- Adjustable horsepower settings
- Barrier terminal blocks
- Full-wave bridge supply
- Adjustable minimum speed
- Adjustable maximum speed
- Adjustable IR compensation
- Adjustable current limit
- Fixed acceleration (0.5 sec)
- Line voltage compensation
- 5kΩ pot with leads, dial, and knob included
- 50:1 speed range
- Overload capacity: 200% for one minute
- Transient voltage protection
- Shunt field supply provided
- Onboard dynamic brake resistor
- Automatic dynamic braking on power loss
- 1% speed regulation with armature voltage feedback

Accessories

- Replacement speed potentiometer kit
- Digital potentiometer

Detailed descriptions and specifications for GSD accessories are available in the "GSD Series DC Drives Accessories" section.

Typical Applications

- Auger feeders
- Automated door actuators
- Commercial cooking equipment
- Commercial lift
- Food production
- Industrial pumping systems
- Measurement instruments
- Miniature lathes and mills
- Packaging / material-handling equipment
- PLC-controlled reversing
- Printing and labeling machines
- Small shop machine tools
- Spray / print reciprocating head

GSD7 Series DC Drives

GSD7 Selection and Specifications

GSD7 Series DC Drives – Selection & Specifications							
Model	<u>GSD7-120-1CR3</u>	<u>GSD7-120-1CR30</u>	<u>GSD7-120-5CR3</u>	<u>GSD7-120-10CR30</u>	<u>GSD7-240-1CR3</u>	<u>GSD7-240-5CR3</u>	<u>GSD7-240-10CR30</u>
Price	\$276.00	\$332.00	\$276.00	\$333.00	\$301.00	\$300.00	\$338.00
Package Configuration	Open frame						
Power Quality Form Factor	1.4						
Input Voltage (@50/60Hz)	120 VAC ±10%				240 VAC ±10%		
Output Voltage	0–90 VDC				0–180 VDC		
Shunt Field Voltage	100 VDC (1A max)				200 VDC (1A max)		
Motor Rating (hp)	1/15 – 1/8		1/8 – 1/2	1/8 – 1	1/25 – 1/4	1/4 – 1	1/4 – 2
Output Current (continuous)	500mA–1.2A (DC)		500mA–5.5A (DC)	500mA–10A (DC)	500mA–1.2A (DC)	500mA–5.5A (DC)	500mA–10A (DC)
Current Overload Capacity	200% for 60s						
Current Limit (adjustable)	0.3–3A (DC)		1–18A (DC)		0.3–3A (DC)	1–18A (DC)	
Cycling Rate (cycles/min)	3	30	3	30	3	3	30
Transient Protection	Metal Oxide Varistor (MOV)						
I.R. Compensation	Adjustable						
Speed Adjustment	5kΩ 0.5W potentiometer or 0–10VDC isolated input signal						
Speed Range	50:1						
Speed Regulation	±1% of base speed						
Maximum Speed	Adjustable from 60% to 110% of base speed						
Minimum Speed	Linear ramp 0–30% of adjustable maximum speed						
Acceleration	0.5s fixed						
Deceleration	0.5s fixed						
Dynamic Braking	Yes						
Plugging Capability **	Yes						
Electrical Connections	Barrier-type terminal blocks; 22–14 AWG						
External Fusing Required	Bussman ABC or Littelfuse 314 series ceramic fuses or equivalent Refer to “Installation and Wiring” section of user manual for details						
Operating Temperature	-10 to 45 °C [14 to 113 °F]						
Thermal Protection	Current limiting						
Mounting Orientation	Can be mounted in any orientation						
Corrosive Gases	NOT compatible with any corrosive gases						
Weight	1.1 lb [490g]	3.3 lb [1497g]	1.1 lb [490g]	3.3 lb [1497g]	1.1 lb [490g]	1.1 lb [490g]	3.3 lb [1497g]
Agency Approvals	cUL _{US} (E333109), RoHS						
Optional Accessories*							
Replacement Potentiometer	<u>GSDA-5K</u>						
Digital Potentiometer	<u>GSDA-DP</u>						
* For accessories details, refer to the "GSD Series DC Drives Accessories" section.							
** Plugging is a method of rapidly changing motor direction by reversing motor armature polarity, while the motor is still running.							

GSD8 Series DC Drives

GSD8 Introduction



GSD8-240-5C



GSD8-240-10N4X-xx



GSD8-240-10C-D



GSD8-240-5C-D

GSD8 Series DC Drives

Motor Rating Range @ 120 VAC_{IN}	1/2 – 1 hp
Motor Rating Range @ 240 VAC_{IN}	1 – 2 hp

Overview

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) 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.

Features

- Microprocessor-based design
- Digital closed-loop algorithm
- Non-volatile memory storage
- Factory or field programmable
- Adjustable parameters
- Programmable alarm output
- Universal power supply accepts 85-265 VAC at 50-60 Hz without switches or jumpers
- Self-contained 5V power supply for external sensor
- Large 4-digit 1/2 inch LED display
- European terminal block
- Standard 1/8 or 1/4 DIN panel mounting
- Meets NEMA 4X standards when used with NEMA 4X enclosures

Accessories

- Hall-effect pickup, single-channel
- Input/Output option card
- Serial communications option card

Detailed descriptions and specifications for GSD accessories are available in the "GSD Series DC Drives Accessories" section.

Typical Applications

- Water and wastewater treatment systems
- Conveyor oven controllers
- Synchronized conveyer lines

GSD8 Series DC Drives

GSD8 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	
Price	\$471.00	\$487.00	\$587.00	\$679.00	\$1,011.00	\$877.00	
Package Configuration	NEMA 4X						
Power Quality Form Factor	1.36						
Input Voltage (@50/60Hz)	85–265 VAC						
Input Frequency	48–62 Hz						
Output Voltage @120VAC (@240VAC)	90VDC (180VDC)						
Max Output hp @120VAC (@240VAC)	½ (1)		1 (2)				
Max Continuous Output Current	5A		10A				
Transient Protection	Metal Oxide Varistor (MOV) and X2 Cap.						
Pickup or Encoder Required	Yes						
Speed Adjustment	Default Mode	Front panel display					
	Current	n/a	4–20 mA with optional accessory GSDA-AI-A8 or -CM8			4–20 mA	
	Voltage	n/a	0–5 VDC with optional accessory GSDA-CM-8				0–5 VDC
	Potentiometer	n/a	500W to 5kW Pot type, with optional accessory GSDA-CM-8				500W to 5kW
	Remote Comm	n/a	ASCII with optional accessory GSDA-CM-8				ASCII
Signal Input Voltage Range	0–5 VDC to 0–24 VDC square wave						
Signal Input Frequency Range	0–50,000 pulses/minute***	0–600,000 pulses/minute @5V square wave					
Speed Regulation	0.1% (sensor PPR/application dependent)						
Maximum Speed	0–100% (max and min speeds are NOT individually adjustable)						
Minimum Speed							
Acceleration	1–9999 (change per second in engineering units, dependent on mode)						
Deceleration	1–9999 (change per second in engineering units, dependent on mode)						
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 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 Listed #E333109, RoHS						
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.							
***Hall-Effect pickup, single channel encoder. 1/10/20 PPR							
****To meet NEMA4 requirements, GSDA-MREV requires a user provided external enclosure.							

GSD Series DC Drives Accessories

GSDA Accessories for GSD Series DC Drives – Selection & Specifications

GSDA Accessories for GSD Series DC Drives			
<i>Model</i>	<i>Price</i>	<i>Description</i>	<i>For Use With</i>
<u>GSDA-5K</u>	\$22.00	IronHorse GSD series speed potentiometer kit, replacement, output up to input voltage, 5k ohm, 0.5W. For use with all GSD series DC drives. Includes potentiometer, knob, 0-100% dial and mounting hardware.	GSD - all
<u>GSDA-ACCDEC-4</u>	\$27.00	IronHorse GSD4 series acceleration/deceleration module, for use with GSD4 series DC drives.	GSD4-xxx-xC
<u>GSDA-AI-A</u>	\$64.00	IronHorse GSD series analog input module, 1-channel, current, isolated, input current signal range(s) of 4-20 mA.	GSD4-24x-xC (open-frame) GSD5-240-10C (open-frame) GSD6 (open-frame)
<u>GSDA-AI-A8</u>	\$202.00	IronHorse GSD8 series relay/analog combo module, Analog Input: 1-channel, current, Analog Output: 1-channel, current, Discrete Output: 1-point, relay, (1) Form C (SPDT) relay. For use with multiple GSD8 series DC drives.	All GSD8 drives except GSD8-240-5C
<u>GSDA-AI-V4</u>	\$106.00	IronHorse GSD4 series analog input module, 1-channel, current/voltage, isolated, input current signal range(s) of 4-20 mA, input voltage signal range(s) of 0-5 VDC, 0-250 VDC.	GSD4-240-xC (240V open-frame)
<u>GSDA-AI-V4A</u>	\$106.00	IronHorse GSD4A series analog input module, 1-channel, current/voltage, isolated, input current signal range(s) of 4-20 mA, input voltage signal range(s) of 0-5 VDC, 0-250 VDC.	All GSD4A drives
<u>GSDA-AI-V5</u>	\$105.00	IronHorse GSD5 series analog input module, 1-channel, current/voltage, isolated, input current signal range(s) of 4-20 mA, input voltage signal range(s) of 0-5 VDC, 0-250 VDC.	GSD5-240-10C (open-frame)
<u>GSDA-CM-8</u>	\$155.00	IronHorse GSD8 series communication module, ASCII, 1 port, (1) RS-232/RS-485 (RJ45) port(s). For use with IronHorse GSD8-240-5C-D and GSD8-240-10C-D DC drives.	All GSD8 drives except GSD8-240-5C
<u>GSDA-DP</u>	\$429.00	IronHorse GSD series digital potentiometer, 120/240 VAC input, bipolar/unipolar, NEMA 4X, aluminum housing. For use with multiple AC and DC drives.	GSD1, GSD4(A), GSD5, GSD6, GSD7
<u>GSDA-DP-D</u>	\$493.00	IronHorse GSD series PID digital potentiometer, 120/240 VAC input, voltage, NEMA 4X, IP67, aluminum housing. For use with multiple AC and DC drives.	GSD1 - all, GSD3-24A-xxx (12-24V), GSD4 - all, GSD5 - all, GSD6 - all, GSD7 - all
<u>GSDA-DP-S</u>	\$410.00	IronHorse signal conditioner, isolated, Input: 1-channel, current/voltage, Output: 1-channel, current/voltage, 120/240 VAC operating voltage, IP67, 1/8 DIN mount.	GSD1 - all, GSD3-24A-xxx (12-24V), GSD4 - all, GSD5 - all, GSD6 - all, GSD7 - all
<u>GSDA-MREV</u>	\$126.00	IronHorse GSD series manual reverse switch, 10A, field installable, screw terminals. For use with all GSD series DC drives.	GSD3 - all GSD4/4A - all GSD5 - all GSD8 - all
<u>GSDA-HTSNK-4</u>	\$42.00	IronHorse GSD series heatsink, for use with GSD4 series DC drives.	GSD4-24x-xC (open-frame)
<u>GSDA-HTSNK-4A</u>	\$25.00	IronHorse GSD4A series heatsink, for use with IronHorse GSD4A-240-2C and GSD4A-240-6C DC drives.	All GSD4A drives
<u>GSDA-PU2E</u>	\$86.00	IronHorse encoder, 5-24 VDC, NPN open collector output, 1/10/20 ppr, 61mm diameter body, NEMA 12, IP52, 6ft cable length, pigtail. For use with GSD8 series DC drives. Mounting hardware and (3) magnets included.	All GSD8 drives and GSDA-DP-D
<u>GSDA-PU2R</u>	\$179.00	IronHorse encoder, 5-24 VDC, NPN open collector output, 1/10/20 ppr, 61mm diameter body, NEMA 3R, IP14, 6ft cable length, pigtail. For use with GSD8 series DC drives. Mounting hardware and (3) magnets included.	All GSD8 drives and GSDA-DP-D
NOTE: All GSDA Accessories are RoHS compliant.			