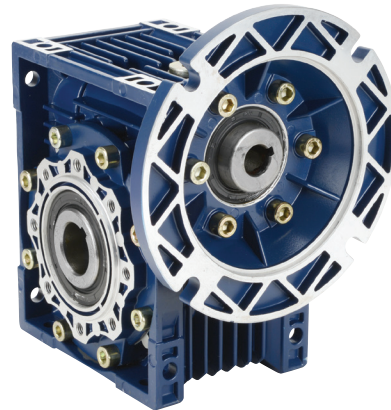


## ***IRONHORSE® WORM GEARBOX USER MANUAL***

---

***IH-WG\_UMW***



**BLANK  
PAGE**

## WARNINGS AND TRADEMARKS

### ~ WARNING ~

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

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

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

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

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

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

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

### TRADEMARKS

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

***Copyright 2008, 2009, 2014, 2016, 2019 Automationdirect.com® Incorporated  
All Rights Reserved***

No part of this manual shall be copied, reproduced, or transmitted in any way without the prior, written consent of Automationdirect.com® Incorporated. AutomationDirect retains the exclusive rights to all information included in this document.

## ~ AVERTISSEMENT ~

Nous vous remercions d'avoir acheté l'équipement d'automatisation de Automationdirect.com®, en faisant des affaires comme AutomationDirect. Nous tenons à ce que votre nouvel équipement d'automatisation fonctionne en toute sécurité. Toute personne qui installe ou utilise cet équipement doit lire la présente publication (et toutes les autres publications pertinentes) avant de l'installer ou de l'utiliser.

Afin de réduire au minimum le risque d'éventuels problèmes de sécurité, vous devez respecter tous les codes locaux et nationaux applicables régissant l'installation et le fonctionnement de votre équipement. Ces codes diffèrent d'une région à l'autre et, habituellement, évoluent au fil du temps. Il vous incombe de déterminer les codes à respecter et de vous assurer que l'équipement, l'installation et le fonctionnement sont conformes aux exigences de la version la plus récente de ces codes.

Vous devez, à tout le moins, respecter toutes les sections applicables du Code national de prévention des incendies, du Code national de l'électricité et des codes de la National Electrical Manufacturer's Association (NEMA). Des organismes de réglementation ou des services gouvernementaux locaux peuvent également vous aider à déterminer les codes ainsi que les normes à respecter pour assurer une installation et un fonctionnement sûrs.

L'omission de respecter la totalité des codes et des normes applicables peut entraîner des dommages à l'équipement ou causer de graves blessures au personnel. Nous ne garantissons pas que les produits décrits dans cette publication conviennent à votre application particulière et nous n'assumons aucune responsabilité à l'égard de la conception, de l'installation ou du fonctionnement de votre produit.

Nos produits ne sont pas insensibles aux défaillances et ne sont ni conçus ni fabriqués pour l'utilisation ou la revente en tant qu'équipement de commande en ligne dans des environnements dangereux nécessitant une sécurité absolue, par exemple, l'exploitation d'installations nucléaires, les systèmes de navigation aérienne ou de communication, le contrôle de la circulation aérienne, les équipements de survie ou les systèmes d'armes, pour lesquels la défaillance du produit peut provoquer la mort, des blessures corporelles ou de graves dommages matériels ou environnementaux («activités à risque élevé»). La société AutomationDirect nie toute garantie expresse ou implicite d'aptitude à l'emploi en ce qui a trait aux activités à risque élevé.

Pour des renseignements additionnels touchant la garantie et la sécurité, veuillez consulter la section Modalités et conditions de notre documentation. Si vous avez des questions au sujet de l'installation ou du fonctionnement de cet équipement, ou encore si vous avez besoin de renseignements supplémentaires, n'hésitez pas à nous téléphoner au **770-844-4200**.

Cette publication s'appuie sur l'information qui était disponible au moment de l'impression. À la société AutomationDirect, nous nous efforçons constamment d'améliorer nos produits et services. C'est pourquoi nous nous réservons le droit d'apporter des modifications aux produits ou aux publications en tout temps, sans préavis ni quelque obligation que ce soit. La présente publication peut aussi porter sur des caractéristiques susceptibles de ne pas être offertes dans certaines versions révisées du produit.

## MARQUES DE COMMERCE

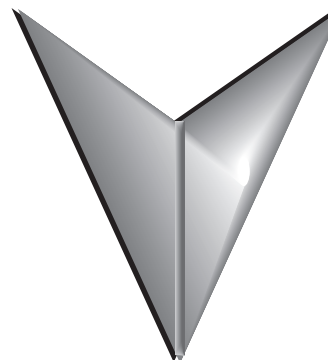
La présente publication peut contenir des références à des produits fabriqués ou offerts par d'autres entreprises. Les désignations des produits et des entreprises peuvent être des marques de commerce et appartiennent exclusivement à leurs propriétaires respectifs. AutomationDirect nie tout intérêt dans les autres marques et désignations.

**Copyright 2008, 2009, 2014, 2016, 2019 Automationdirect.com® Incorporated**

**Tous droits réservés**

Nulle partie de ce manuel ne doit être copiée, reproduite ou transmise de quelque façon que ce soit sans le consentement préalable écrit de la société Automationdirect.com® Incorporated. AutomationDirect conserve les droits exclusifs à l'égard de tous les renseignements contenus dans le présent document.

# IRONHORSE WORM GEARBOX USER MANUAL REVISION HISTORY



**Please include the Manual Number and the Manual Issue, both shown below, when communicating with AutomationDirect Technical Support regarding this publication.**

**MANUAL NUMBER:**        **IH-WG\_UMW**  
**ISSUE:**                    **FOURTH EDITION, REVISION H**  
**ISSUE DATE:**            **09/13/2021**

Publication History		
<b>Issue</b>	<b>Date</b>	<b>Description of Changes</b>
First Edition	06/2008	Original Issue
1st Ed, Rev A	06/2008	Gearbox mounting orientation (Chapter 2)
Second Edition	04/2009	Added cast-iron hollow-bore gearboxes
Third Edition	10/2014	Changed User Manual file name/number to IH-WG-User-M-WO (was WG-User-M-WO) Added aluminum gearboxes Rearranged chapters Revised output shaft dimensions for cast-iron solid-shaft gearboxes (Chapter 2)
3rd Ed, Rev A	06/2016	Ch2: WG cast-iron gearbox dimensions Ch3: WGA aluminum gearbox dimensions Ch4: Lubricant capacities and mounting orientations
3rd Ed, Rev B	11/2017	Changed User Manual file name/number to IH-WG_UMW (was IH-WG-User-M-WO) Changed description and image for WGA nameplate.
Fourth Edition	02/01/2019	Ch2: Added left-hand shaft gearbox information Throughout: Added Frame Size 325 gearboxes (WG-325-xxx-xx)
4th Ed, Rev A	02/22/2019	AppxB: Gearbox Selection Example, step #3, pulley ratio
4th Ed, Rev B	06/14/2019	Ch2: Added Actual Ratio specs Ch4: Added seal sizes
4th Ed, Rev C	08/08/2019	Ch2 & Ch3: Added backlash data
4th Ed, Rev D	09/18/2019	Ch3: WGA-30M-xxx-H1 dimension G
4th Ed, Rev E	05/22/2020	Ch4: Added notes concerning mounting position restrictions when using a vent plug
4th Ed, Rev F	05/19/2021	Ch4: Added note concerning oil supply when shipped
4th Ed, Rev G	05/27/2021	Ch3: Added output shaft thrust load specifications to aluminum worm gearboxes
4th Ed, Rev H	09/13/2021	Ch4: Changed Pre-filled oil type

**BLANK  
PAGE**

# IRONHORSE WORM GEARBOX USER MANUAL TABLE OF CONTENTS



## CONTENTS

### IRONHORSE WORM GEARBOXES USER MANUAL TOC

IRONHORSE® WORM GEARBOX USER MANUAL . . . . .	CF-1
WARNINGS AND TRADEMARKS . . . . .	W-1
Warnings and Trademarks . . . . .	W-1
IRONHORSE WORM GEARBOX USER MANUAL REVISION HISTORY . . . . .	H-1
IRONHORSE WORM GEARBOX USER MANUAL TABLE OF CONTENTS . . . . .	TOC-1
CHAPTER 1: GETTING STARTED. . . . .	1-1
User Manual Overview . . . . .	1-2
Overview of This Publication . . . . .	1-2
Who Should Read This Manual. . . . .	1-2
Technical Support . . . . .	1-2
Special Symbols . . . . .	1-2
IronHorse® Worm Gearbox Introduction . . . . .	1-3
Purpose of Worm Gearboxes. . . . .	1-3
Package Contents . . . . .	1-3
Part Number Explanation. . . . .	1-4
Nameplate Information. . . . .	1-4
CHAPTER 2: CAST-IRON WORM GEARBOXES . . . . .	2-1
IronHorse® Cast-Iron Worm Gearboxes . . . . .	2-2
Gearbox Selection Factors . . . . .	2-2
Service Factors and K Factors. . . . .	2-2
IronHorse® Cast-Iron Worm Gearbox Specifications . . . . .	2-3
IronHorse® Cast-Iron Worm Gearbox Dimensions. . . . .	2-8
Solid-Shaft Output Gearboxes WG-xxx-xxx-D/L/R . . . . .	2-8
Hollow-Bore Output Gearboxes WG-xxx-xxx-H. . . . .	2-9
IronHorse® Cast-Iron Worm Gearbox Accessory Mounting Bases . . . . .	2-10
Mounting Base Selection and Dimensions . . . . .	2-10
CHAPTER 3: ALUMINUM WORM GEARBOXES. . . . .	3-1
IronHorse® Aluminum Worm Gearboxes . . . . .	3-2
Gearbox Selection Factors . . . . .	3-2
Service Factors and K Factors. . . . .	3-2
IronHorse® Aluminum Worm Gearbox Specifications . . . . .	3-3
Frame Sizes 30, 40, 50 mm Specifications . . . . .	3-3
Frame Sizes 63, 75 mm Specifications . . . . .	3-4
IronHorse® Aluminum Worm Gearbox Dimensions . . . . .	3-5
IronHorse® Aluminum Worm Gearbox Accessories . . . . .	3-6
CHAPTER 4: INSTALLATION, LUBRICATION, SEALS. . . . .	4-1

<i>IronHorse® Worm Gearbox Installation . . . . .</i>	<i>4-2</i>
<i>Installation Instructions . . . . .</i>	<i>4-2</i>
<i>Vent Plug Installation . . . . .</i>	<i>4-2</i>
<i>IronHorse® Worm Gearbox Lubrication &amp; Mounting Orientations. . . . .</i>	<i>4-3</i>
<i>Lubrication Instructions . . . . .</i>	<i>4-3</i>
<i>Lubricant Capacities and Mounting Orientations. . . . .</i>	<i>4-4</i>
<i>IronHorse® Worm Gearbox Seal Sizes . . . . .</i>	<i>4-4</i>
<i>Aluminum Worm Gearbox Input and Output Seal Sizes . . . . .</i>	<i>4-4</i>
<i>Cast-Iron Worm Gearbox Input Seal Sizes. . . . .</i>	<i>4-5</i>
<b>APPENDIX A: GLOSSARY OF TERMS. . . . .</b>	<b>A-1</b>
<i>Glossary of Gearbox Terms . . . . .</i>	<i>A-2</i>
<b>APPENDIX B: GEARBOX SELECTION. . . . .</b>	<b>B-1</b>
<i>Gearbox Selection Procedure . . . . .</i>	<i>B-2</i>
<i>Gearbox Selection Steps . . . . .</i>	<i>B-2</i>
<i>Gearbox Selection Example. . . . .</i>	<i>B-2</i>



# GETTING STARTED

---



## TABLE OF CONTENTS

<i>User Manual Overview</i> . . . . .	1-2
<i>Overview of This Publication</i> . . . . .	1-2
<i>Who Should Read This Manual</i> . . . . .	1-2
<i>Technical Support</i> . . . . .	1-2
<i>Special Symbols</i> . . . . .	1-2
<i>IronHorse® Worm Gearbox Introduction</i> . . . . .	1-3
<i>Purpose of Worm Gearboxes</i> . . . . .	1-3
<i>Package Contents</i> . . . . .	1-3
<i>Part Number Explanation</i> . . . . .	1-4
<i>Nameplate Information</i> . . . . .	1-4

---

## USER MANUAL OVERVIEW

### OVERVIEW OF THIS PUBLICATION

The IronHorse Worm Gearbox User Manual describes the installation, operation, and preventative maintenance of IronHorse Worm Gearboxes.

### WHO SHOULD READ THIS MANUAL

This manual contains important information for people who will install, maintain, and/or operate any of the IronHorse Worm Gearboxes.

### TECHNICAL SUPPORT

Our technical support group is glad to work with you to answer your questions. Please call the technical support group if you need technical assistance, or visit our web site. Our website contains technical and non-technical information about our products and our company.

**BY TELEPHONE:** (770) 844-4200 (Mon – Fri, 9:00 am – 6:00 pm ET)

**ON THE WEB:** [www.automationdirect.com](http://www.automationdirect.com)

### SPECIAL SYMBOLS



---

*NOTE: When you see the “notepad” icon in the left-hand margin, the paragraph to its immediate right will be a special note which presents information that may make your work quicker or more efficient.*

---



---

*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). ANY WARNING IN THIS MANUAL SHOULD BE REGARDED AS CRITICAL INFORMATION THAT SHOULD BE READ IN ITS ENTIRETY.*

---

## IRONHORSE® WORM GEARBOX INTRODUCTION

### **PURPOSE OF WORM GEARBOXES**

Gearboxes, also known as enclosed gear drives or speed reducers, are mechanical drive components that can control a load at a reduced fixed ratio of the motor speed. The output torque is also increased by the same ratio, while the horsepower remains the same (less efficiency losses). For example, a 10:1 ratio gearbox outputs approximately the same motor output horsepower, but motor speed is divided by 10, and motor torque is multiplied by 10.

Worm gearboxes contain a worm-type gear on the input shaft, and a spur-type mating gear on the output shaft. Worm gearboxes also change the drive direction by 90 degrees. IronHorse worm gearboxes are manufactured in an ISO9001 certified plant by one of the leading and most internationally acclaimed gearbox manufacturers in the world today. Only the highest quality materials are tested, certified, and used in the manufacturing process. Strict adherence to and compliance with the toughest international and U.S. testing standards and manufacturing procedures assure you the highest quality products.

We offer right-angle worm gearboxes with aluminum frames and with cast-iron frames. The output shafts are perpendicular to the inputs, and change the drive direction(s) by 90°. Our gearboxes utilize C-face mounting interfaces for C-face motors.

Our cast-iron gearboxes feature right-hand and dual (both right and left) output shafts, and with hollow-bore outputs (all the way through from one side to the other). We also offer optional gearbox mounting bases for ease of installation of these cast-iron gearboxes.

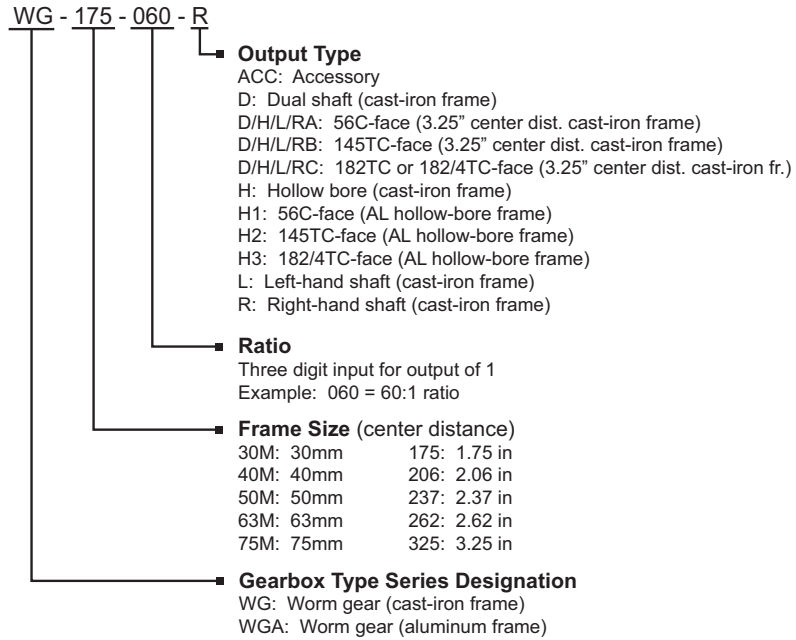
Our aluminum gearboxes feature hollow-bore outputs (all the way through from one side to the other). We also offer optional single and double output shafts, output flanges, torque arms, and output covers.

### **PACKAGE CONTENTS**

After receiving the IronHorse Worm Gearbox, please check for the following:


- *Make sure the package includes the speed reducer and the vent plug.*
- *Inspect the unit to insure it was not damaged during shipment.*
- *Make sure that the part number on the gearbox nameplate is the same as the part number that you ordered.*

### PART NUMBER EXPLANATION




### NAMEPLATE INFORMATION

#### WG Cast-Iron Gearbox

 <b>SPEED REDUCER</b> <small>WWW.AUTOMATIONDIRECT.COM</small>		Gearbox Frame Size (center distance) & Gearbox Ratio
Gearbox Model #	Gearbox Serial #	Country of Origin
MFG NO. 70606827		Made in Taiwan

#### WGA Aluminum Gearbox

 <b>SPEED REDUCER</b> <b>IRONHORSE</b>		Country of Origin
Gearbox Model #	Gearbox Serial #	Made in Taiwan
M.F.G.: 140607652		

# CAST-IRON WORM GEARBOXES

---



## CHAPTER

# 2

### TABLE OF CONTENTS

<i>IronHorse® Cast-Iron Worm Gearboxes. . . . .</i>	<i>.2-2</i>
<i>Gearbox Selection Factors . . . . .</i>	<i>.2-2</i>
<i>Service Factors and K Factors. . . . .</i>	<i>2-2</i>
<i>IronHorse® Cast-Iron Worm Gearbox Specifications. . . . .</i>	<i>.2-3</i>
<i>IronHorse® Cast-Iron Worm Gearbox Dimensions. . . . .</i>	<i>.2-8</i>
<i>Solid-Shaft Output Gearboxes WG-xxx-xxx-D/L/R . . . . .</i>	<i>2-8</i>
<i>Hollow-Bore Output Gearboxes WG-xxx-xxx-H. . . . .</i>	<i>2-9</i>
<i>IronHorse® Cast-Iron Worm Gearbox Accessory Mounting Bases . . . . .</i>	<i>.2-10</i>
<i>Mounting Base Selection and Dimensions . . . . .</i>	<i>.2-10</i>

# IRONHORSE® CAST-IRON WORM GEARBOXES



## GEARBOX SELECTION FACTORS

### SERVICE FACTORS AND K FACTORS

Service Factors for Selecting Gearboxes (when used with electric motors)				
Service Continuity (per day)	Load Characteristics			
	Uniform	Moderate Shock*	Heavy Shock*	Extreme Shock*
Occasional 1/2 hour	1.00	1.00	1.00	1.25
Less than 3 hours	1.00	1.00	1.25	1.50
3-10 hours	1.00	1.25	1.50	1.75
More than 10 hours	1.25	1.50	1.75	2.00
* Shock results from sudden increases in the torque demand of the load, such as: sudden stopping, restarting, and/or reversing; significantly heavy loads dropped onto a moving conveyor; impact loads such as punch press operations.				
Depending upon the load characteristics, divide the gearbox HP, Overhung Load, and Maximum Mechanical Capacity ratings by the applicable service factor.				

Overhung Load K Factors for Various Drive Types	
Chain & Sprocket	1.00
Gear	1.25
V-belt	1.50
Flat Belt	2.50
Variable Pitch Belt	3.50
Divide gearbox OHL ratings by the applicable OHL K factors.	

# IRONHORSE® CAST-IRON WORM GEARBOX SPECIFICATIONS

IronHorse Cast-Iron Worm Gearbox Specifications																			
Part Number	Nominal Ratio	Actual Ratio	Output RPM @ 1750 rpm Input	Nominal Motor HP 1 @ 1800 rpm	NEMA Motor Frame	Output Type 2	Center Distance 3 (in)	Overhung Load 4 (lb)	Thrust Load 5 (lb)	Efficiency (%)	Approx Weight (lb)	Maximum Ratings @ 1750 rpm Input						Maximum Input Speed (rpm)	Maximum Backlash (arc-minute)
												Mechanical 6			Thermal 7				
												Input Power (hp)	Output Power (hp)	Output Torque (lb-in)	Input Power (hp)	Output Power (hp)	Output Torque (lb-in)		
<b>Gearbox Frame Size 175</b>																			
WG-175-005-D	5:1	5.25:1	350	1-1/2	56C	D	1.75	650	550	93	23	2.83	2.62	499	2.28	2.11	402	2500	20
WG-175-005-H						H													
WG-175-005-L						L													
WG-175-005-R	R																		
WG-175-010-D	10:1	10.33:1	175	1	56C	D													
WG-175-010-H						H													
WG-175-010-L						L													
WG-175-010-R	R																		
WG-175-015-D	15:1	14.5:1	117	3/4	56C	D													
WG-175-015-H						H													
WG-175-015-L						L													
WG-175-015-R	R																		
WG-175-020-D	20:1	19.5:1	88	3/4	56C	D													
WG-175-020-H						H													
WG-175-020-L						L													
WG-175-020-R	R																		
WG-175-040-D	40:1	40:1	44	1/3	56C	D													
WG-175-040-H						H													
WG-175-040-L						L													
WG-175-040-R	R																		
WG-175-060-D	60:1	60:1	29	1/4	56C	D													
WG-175-060-H						H													
WG-175-060-L						L													
WG-175-060-R	R																		

- 1) Nominal Motor HP is the highest HP 1800 rpm motor to be used with the gearbox under conditions of 1.0 service factor. Gearbox input power capacity decreases as motor speed decreases and as service factor increases.
- 2) Output Type: D = Dual Shaft; H = Hollow Bore; L = Left-Hand Shaft; R = Right-Hand Shaft.
- 3) Center Distance is the distance between the centerlines of the input and output shafts/bore; serves as the gearbox frame size.
- 4) Overhung Load ratings are for forces perpendicular to the output shaft and located at the shaft midpoint, such as from a gear, pulley, or sprocket with a belt or chain. Divide OHL ratings by the applicable OHL K factors shown separately in the Selection Factors tables. OHL ratings should also be divided by applicable service factors.
- 5) Thrust Load ratings are for forces along the axis of the output shaft, usually encountered in vertical-drive applications from agitators, mixers, fans, blowers, etc.
- 6) Maximum Mechanical Ratings are limits based on strength and durability of gearbox components; applicable when operating time is short and stopped time is greater than or equal to operating time. These ratings are applicable for 1.0 service factor loads, and may require modification depending upon characteristics of the applicable driven loads. Refer to the "Service Factors" table for more information.
- 7) Maximum Thermal Ratings are limits for gearbox continuous use without overheating.

( table continued next page )

IronHorse Cast-Iron Worm Gearbox Specifications – (continued from previous page)																				
Part Number	Nominal Ratio	Actual Ratio	Output RPM @ 1750 rpm Input	Nominal Motor HP 1 @ 1800 rpm	NEMA Motor Frame	Output Type 2	Center Distance 3 (in)	Overhung Load 4 (lb)	Thrust Load 5 (lb)	Efficiency (%)	Approx Weight (lb)	Maximum Ratings @ 1750 rpm Input								
												Mechanical 6			Thermal 7			Maximum Input Speed (rpm)	Maximum Backlash (arc-minute)	
												Input Power (hp)	Output Power (hp)	Output Torque (lb-in)	Input Power (hp)	Output Power (hp)	Output Torque (lb-in)			
<b>Gearbox Frame Size 206</b>																				
WG-206-005-D	5:1	5.75:1	350	2	56C	D	2.06	700	750	92	28	3.62	3.33	925	2.57	2.36	657	2500	21	
WG-206-005-H						H														28
WG-206-005-L						L														27
WG-206-005-R						R														27
WG-206-010-D	10:1	10.33:1	175	1-1/2	56C	D				90	28	2.77	2.50	935	2.10	1.89	708			
WG-206-010-H						H														28
WG-206-010-L						L														27
WG-206-010-R						R														27
WG-206-015-D	15:1	15.5:1	117	1	56C	D				85	28	2.09	1.78	1002	1.40	1.20	673			
WG-206-015-H						H														28
WG-206-015-L						L														27
WG-206-015-R						R														27
WG-206-020-D	20:1	19.5:1	88	1	56C	D				82	28	1.57	1.29	914	1.17	0.96	681			
WG-206-020-H						H														28
WG-206-020-L						L														27
WG-206-020-R						R														27
WG-206-040-D	40:1	40:1	44	1/2	56C	D	71	28	1.09	0.77	1120	0.71	0.50	726						
WG-206-040-H						H									28					
WG-206-040-L						L									27					
WG-206-040-R						R									27					
WG-206-060-D	60:1	60:1	29	1/3	56C	D	58	28	0.60	0.35	750	0.48	0.28	606						
WG-206-060-H						H									28					
WG-206-060-L						L									27					
WG-206-060-R						R									27					

1) Nominal Motor HP is the highest HP 1800 rpm motor to be used with the gearbox under conditions of 1.0 service factor. Gearbox input power capacity decreases as motor speed decreases and as service factor increases.  
 2) Output Type: D = Dual Shaft; H = Hollow Bore; L = Left-Hand Shaft; R = Right-Hand Shaft.  
 3) Center Distance is the distance between the centerlines of the input and output shafts/bores; serves as the gearbox frame size.  
 4) Overhung Load ratings are for forces perpendicular to the output shaft and located at the shaft midpoint, such as from a gear, pulley, or sprocket with a belt or chain. Divide OHL ratings by the applicable OHL K factors shown separately in the Selection Factors tables. OHL ratings should also be divided by applicable service factors.  
 5) Thrust Load ratings are for forces along the axis of the output shaft, usually encountered in vertical-drive applications from agitators, mixers, fans, blowers, etc.  
 6) Maximum Mechanical Ratings are limits based on strength and durability of gearbox components; applicable when operating time is short and stopped time is greater than or equal to operating time. These ratings are applicable for 1.0 service factor loads, and may require modification depending upon characteristics of the applicable driven loads. Refer to the "Service Factors" table for more information.  
 7) Maximum Thermal Ratings are limits for gearbox continuous use without overheating.

( table continued next page )



IronHorse Cast-Iron Worm Gearbox Specifications – (continued from previous page)																				
Part Number	Nominal Ratio	Actual Ratio	Output RPM @ 1750 rpm Input	Nominal Motor HP 1 @ 1800 rpm	NEMA Motor Frame	Output Type 2	Center Distance 3 (in)	Overhung Load 4 (lb)	Thrust Load 5 (lb)	Efficiency (%)	Approx Weight (lb)	Maximum Ratings @ 1750 rpm Input								
												Mechanical 6			Thermal 7			Maximum Input Speed (rpm)	Maximum Backlash (arc-minute)	
												Input Power (hp)	Output Power (hp)	Output Torque (lb-in)	Input Power (hp)	Output Power (hp)	Output Torque (lb-in)			
<b>Gearbox Frame Size 237</b>																				
WG-237-005-D	5:1	5.25:1	350	3	56C	D	2.37	900	900	93	38	4.32	4.02	766	3.56	3.31	630	2500	17	
WG-237-005-H						H														36
WG-237-005-L						L														37
WG-237-005-R						R														37
WG-237-010-D	10:1	10.33:1	175	1-1/2		D				89	38	3.47	3.09	1158	2.24	1.99	746			
WG-237-010-H						H														36
WG-237-010-L						L														37
WG-237-010-R						R														37
WG-237-015-D	15:1	15.5:1	117	1		D				84	38	2.64	2.22	1249	1.55	1.30	732			
WG-237-015-H						H														36
WG-237-015-L						L														37
WG-237-015-R						R														37
WG-237-020-D	20:1	20:1	88	1		D				82	38	2.06	1.69	1195	1.36	1.12	791			
WG-237-020-H						H														36
WG-237-020-L						L														37
WG-237-020-R						R														37
WG-237-040-D	40:1	40:1	44	1/2		D				71	38	1.45	1.02	1483	0.83	0.58	845			
WG-237-040-H						H														36
WG-237-040-L						L														37
WG-237-040-R						R														37
WG-237-060-D	60:1	60:1	29	1/2	D	61	38	0.86	0.53	1149	0.63	0.39	844							
WG-237-060-H					H									36						
WG-237-060-L					L									37						
WG-237-060-R					R									37						

1) Nominal Motor HP is the highest HP 1800 rpm motor to be used with the gearbox under conditions of 1.0 service factor. Gearbox input power capacity decreases as motor speed decreases and as service factor increases.  
 2) Output Type: D = Dual Shaft; H = Hollow Bore; L = Left-Hand Shaft; R = Right-Hand Shaft.  
 3) Center Distance is the distance between the centerlines of the input and output shafts/bores; serves as the gearbox frame size.  
 4) Overhung Load ratings are for forces perpendicular to the output shaft and located at the shaft midpoint, such as from a gear, pulley, or sprocket with a belt or chain. Divide OHL ratings by the applicable OHL K factors shown separately in the Selection Factors tables. OHL ratings should also be divided by applicable service factors.  
 5) Thrust Load ratings are for forces along the axis of the output shaft, usually encountered in vertical-drive applications from agitators, mixers, fans, blowers, etc.  
 6) Maximum Mechanical Ratings are limits based on strength and durability of gearbox components; applicable when operating time is short and stopped time is greater than or equal to operating time. These ratings are applicable for 1.0 service factor loads, and may require modification depending upon characteristics of the applicable driven loads. Refer to the "Service Factors" table for more information.  
 7) Maximum Thermal Ratings are limits for gearbox continuous use without overheating.

( table continued next page )

IronHorse Cast-Iron Worm Gearbox Specifications – (continued from previous page)																				
Part Number	Nominal Ratio	Actual Ratio	Output RPM @ 1750 rpm Input	Nominal Motor HP 1 @ 1800 rpm	NEMA Motor Frame	Output Type 2	Center Distance 3 (in)	Overhung Load 4 (lb)	Thrust Load 5 (lb)	Efficiency (%)	Approx Weight (lb)	Maximum Ratings @ 1750 rpm Input								
												Mechanical 6			Thermal 7			Maximum Input Speed (rpm)	Maximum Backlash (arc-minute)	
												Input Power (hp)	Output Power (hp)	Output Torque (lb-in)	Input Power (hp)	Output Power (hp)	Output Torque (lb-in)			
<b>Gearbox Frame Size 262</b>																				
WG-262-005-D	5:1	5.25:1	350	3	182TC	D	2.62	1000	1000	93	57	5.24	4.86	924	4.32	4.00	761	2500	17	
WG-262-005-H						H														58
WG-262-005-L						L														56
WG-262-005-R						R														56
WG-262-010-D	10:1	10.67:1	175	2	182TC	D	2.62	1000	1000	90	57	4.17	3.74	1445	3.06	2.75	1061	2500	17	
WG-262-010-H						H														56
WG-262-010-L						L														56
WG-262-010-R						R														56
WG-262-015-D	15:1	15.5:1	117	2	56C	D	2.62	1000	1000	87	50	3.22	2.81	1577	2.47	2.16	1212	2500	17	
WG-262-015-H						H														49
WG-262-015-L						L														49
WG-262-015-R						R														49
WG-262-020-D	20:1	19.5:1	88	1-1/2	56C	D	2.62	1000	1000	83	50	2.67	2.21	1563	1.84	1.53	1078	2500	17	
WG-262-020-H						H														49
WG-262-020-L						L														49
WG-262-020-R						R														49
WG-262-040-D	40:1	40:1	44	3/4	56C	D	2.62	1000	1000	72	50	1.85	1.32	1919	1.11	0.80	1153	2500	17	
WG-262-040-H						H														49
WG-262-040-L						L														49
WG-262-040-R						R														49
WG-262-060-D	60:1	60:1	29	3/4	56C	D	2.62	1000	1000	66	50	1.16	0.77	1670	0.94	0.62	1346	2500	17	
WG-262-060-H						H														49
WG-262-060-L						L														49
WG-262-060-R						R														49

1) Nominal Motor HP is the highest HP 1800 rpm motor to be used with the gearbox under conditions of 1.0 service factor. Gearbox input power capacity decreases as motor speed decreases and as service factor increases.  
 2) Output Type: D = Dual Shaft; H = Hollow Bore; L = Left-Hand Shaft; R = Right-Hand Shaft.  
 3) Center Distance is the distance between the centerlines of the input and output shafts/bores; serves as the gearbox frame size.  
 4) Overhung Load ratings are for forces perpendicular to the output shaft and located at the shaft midpoint, such as from a gear, pulley, or sprocket with a belt or chain. Divide OHL ratings by the applicable OHL K factors shown separately in the Selection Factors tables. OHL ratings should also be divided by applicable service factors.  
 5) Thrust Load ratings are for forces along the axis of the output shaft, usually encountered in vertical-drive applications from agitators, mixers, fans, blowers, etc.  
 6) Maximum Mechanical Ratings are limits based on strength and durability of gearbox components; applicable when operating time is short and stopped time is greater than or equal to operating time. These ratings are applicable for 1.0 service factor loads, and may require modification depending upon characteristics of the applicable driven loads. Refer to the "Service Factors" table for more information.  
 7) Maximum Thermal Ratings are limits for gearbox continuous use without overheating.

( table continued next page )

IronHorse Cast-Iron Worm Gearbox Specifications – (continued from previous page)																											
Part Number	Nominal Ratio	Actual Ratio	Output RPM @ 1750 rpm Input	Nominal Motor HP 1 @ 1800 rpm	NEMA Motor Frame	Output Type 2	Center Distance 3 (in)	Overhung Load 4 (lb)	Thrust Load 5 (lb)	Efficiency (%)	Approx Weight (lb)	Maximum Ratings @ 1750 rpm Input															
												Mechanical 6			Thermal 7			Maximum Input Speed (rpm)	Maximum Backlash (arc-minute)								
												Input Power (hp)	Output Power (hp)	Output Torque (lb-in)	Input Power (hp)	Output Power (hp)	Output Torque (lb-in)										
<b>Gearbox Frame Size 325</b>																											
WG-325-010-DC	10:1	10.33:1	175	3	182/4TC	D	3.25	1200	1100	90	91	7.19	6.46	2419	4.63	4.16	1558	2500	15								
WG-325-010-HC						H																					
WG-325-010-LC						L																					
WG-325-010-RC						R																					
WG-325-015-DC	15:1	15.5:1	117	5	182/4TC	D	3.25	1200	1100	85	91	5.45	4.65	2611	3.19	2.72	1527	2500	15								
WG-325-015-HC						H																					
WG-325-015-LC						L																					
WG-325-015-RC						R																					
WG-325-020-DC	20:1	19.5:1	88	3	182TC	D	3.25	1200	1100	86	91	4.74	4.07	2875	3.31	2.85	2011	2500	15								
WG-325-020-HC						H																					
WG-325-020-LC						L																					
WG-325-020-RC						R																					
WG-325-030-DA	30:1	30:1	58	2	56C	D	3.25	1200	1100	77	88	3.66	2.80	3045	2.00	1.53	1661	2500	15								
WG-325-030-DB					145TC	D																					
WG-325-030-HA					56C	H																					
WG-325-030-HB					145TC	H																					
WG-325-030-LA					56C	L																					
WG-325-030-LB					145TC	L																					
WG-325-030-LC				3	182TC	L																					
WG-325-030-RA				2	56C	R																					
WG-325-030-RB				2	145TC	R																					
WG-325-030-RC				3	182TC	R																					
WG-325-040-DA				40:1	40:1	44				1.5	56C	D	3.25	1200	1100	76	88			3.35	2.55	3692	1.96	1.49	2156	2500	15
WG-325-040-DB											145TC	D															
WG-325-040-HA	56C	H																									
WG-325-040-HB	145TC	H																									
WG-325-040-LA	56C	L																									
WG-325-040-LB	145TC	L																									
WG-325-040-RA	56C	R																									
WG-325-040-RB	145TC	R																									
WG-325-060-DA	60:1	60:1	29				1.5	56C	D	3.25	1200	1100				71	88	2.03	1.44	3127	1.61	1.14	2476	2500	15		
WG-325-060-DB								145TC	D																		
WG-325-060-HA								56C	H																		
WG-325-060-HB								145TC	H																		
WG-325-060-LA				56C	L																						
WG-325-060-LB				145TC	L																						
WG-325-060-RA				56C	R																						
WG-325-060-RB				145TC	R																						

1) Nominal Motor HP is the highest HP 1800 rpm motor to be used with the gearbox under conditions of 1.0 service factor. Gearbox input power capacity decreases as motor speed decreases and as service factor increases.

2) Output Type: D = Dual Shaft; H = Hollow Bore; L = Left-Hand Shaft; R = Right-Hand Shaft.

3) Center Distance is the distance between the centerlines of the input and output shafts/bores; serves as the gearbox frame size.

4) Overhung Load ratings are for forces perpendicular to the output shaft and located at the shaft midpoint, such as from a gear, pulley, or sprocket with a belt or chain. Divide OHL ratings by the applicable OHL K factors shown separately in the Selection Factors tables. OHL ratings should also be divided by applicable service factors.

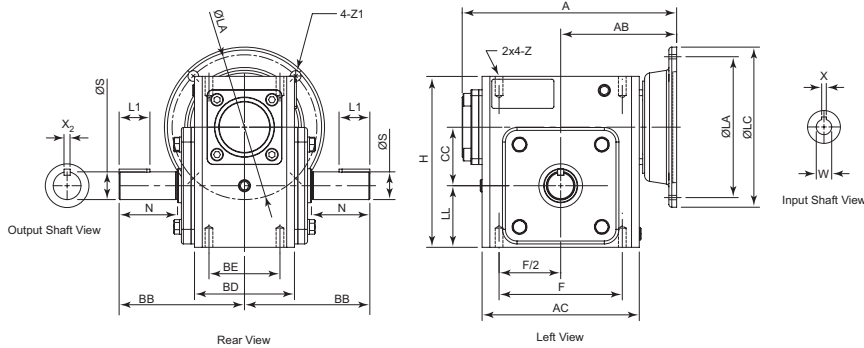
5) Thrust Load ratings are for forces along the axis of the output shaft, usually encountered in vertical-drive applications from agitators, mixers, fans, blowers, etc.

6) Maximum Mechanical Ratings are limits based on strength and durability of gearbox components; applicable when operating time is short and stopped time is greater than or equal to operating time. These ratings are applicable for 1.0 service factor loads, and may require modification depending upon characteristics of the applicable driven loads. Refer to the "Service Factors" table for more information.

7) Maximum Thermal Ratings are limits for gearbox continuous use without overheating.

# IRONHORSE® CAST-IRON WORM GEARBOX DIMENSIONS

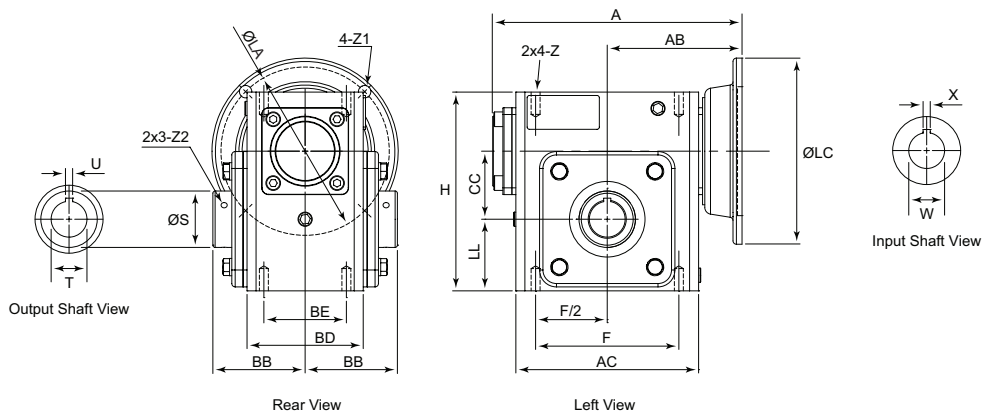
## SOLID-SHAFT OUTPUT GEARBOXES WG-xxx-xxx-D/L/R



Dimensions (inches) – IronHorse Cast-Iron Worm Gearboxes – Solid-Shaft Outputs																
Part Number	Frame	A	AB	AC	BB	BD	BE	CC	F	H	LL	Z (UNC)				
WG-175-xxx-D/L/R	56C	7.29	4.035	5.06	4.311	3.56	2.75	1.75	4.188	5.75	2.062	5/16-18				
WG-206-xxx-D/L/R		7.95	4.37	5.75	4.69	3.82	2.88	2.062	5	6.38	2.281	3/8-16				
WG-237-xxx-D/L/R		8.71	4.705	6.38	5.087	4.06	2.88	2.375	5	6.94	2.5					
WG-262-005-D/L/R	182TC	10.57	6.24	7.17	5.63	4.69	3.375	2.625	6.375	8	2.938					
WG-262-010-D/L/R	56C	9.41	5.059													
WG-262-015-D/L/R																
WG-262-020-D/L/R	182/4TC	12.60	7.24	9.02	7.06	5.75	4.00	3.25	7.50	9.38	3.50	7/16-14				
WG-325-030-xA													56C	11.42	6.06	
WG-325-030-xB													145TC	11.42	6.06	
WG-325-030-xC	182TC															
WG-325-040-xA	56C	11.42	6.06	9.02	7.06	5.75	4.00	3.25	7.50	9.38	3.50	7/16-14				
WG-325-040-xB	145TC															
WG-325-040-xC	56C															
WG-325-060-xA	56C	11.42	6.06	9.02	7.06	5.75	4.00	3.25	7.50	9.38	3.50	7/16-14				
WG-325-060-xB	145TC															
WG-325-060-xC	145TC															
Part # (repeated)	Frame	Flange		Input Shaft			Output Shaft									
		LA	LC	Z1	W	X	L1	N	S	X2						
WG-175-xxx-D/L/R	56C	5.875	6.496	0.433	5/8	3/16	1	1.781	7/8	3/16	1/4					
WG-206-xxx-D/L/R							1.25	2.09	1							
WG-237-xxx-D/L/R							1.25	2.37								
WG-262-005-D/L/R	182TC	7.25	9	0.551	1-1/8	1/4	2	2.626	1-1/8	5/16						
WG-262-010-D/L/R	56C	5.875	6.496	0.433	5/8	3/16										
WG-262-015-D/L/R																
WG-262-020-D/L/R	182/4TC	7.25	9.00	0.55	1-1/8	1/4	2.44	3.25	1-3/8	5/16						
WG-325-030-xA											56C	5.875	6.50	0.41	5/8	3/16
WG-325-030-xB											145TC	5.875	6.50	0.41	7/8	3/16
WG-325-030-xC	182TC	7.25	9.00	0.55	1-1/8	1/4										
WG-325-040-xA	56C	5.875	6.50	0.41	5/8	3/16	2.44	3.25	1-3/8	5/16						
WG-325-040-xB	145TC				7/8											
WG-325-040-xC	56C				5/8											
WG-325-060-xA	56C	5.875	6.50	0.41	5/8	3/16	2.44	3.25	1-3/8	5/16						
WG-325-060-xB	145TC				7/8											
WG-325-060-xC	145TC				7/8											

Dual-shaft output gearboxes have output shafts on both sides (dimensions BB, L1, N, S, & X2).  
 Left-hand shaft gearboxes have output shafts only on the left side, as viewed looking into the input shaft.  
 Right-hand shaft gearboxes have output shafts only on the right side, as viewed looking into the input shaft.  
 See our website: [www.AutomationDirect.com](http://www.AutomationDirect.com) for complete engineering drawings.

**IRONHORSE® CAST-IRON WORM GEARBOX DIMENSIONS (CONTINUED)**  
**HOLLOW-BORE OUTPUT GEARBOXES WG-XXX-XXX-H**

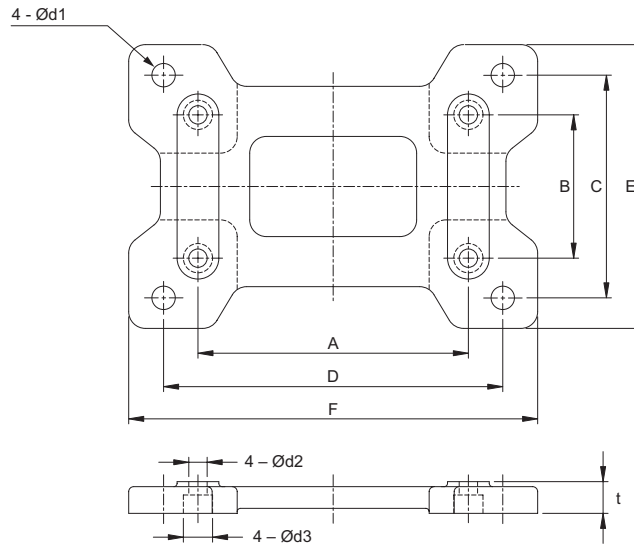


Dimensions (inches) – IronHorse Cast-Iron Worm Gearboxes – Hollow-Bore Outputs												
Part Number	Frame	A	AB	AC	BB	BD	BE	CC	F	H	LL	Z (UNC)
WG-175-xxx-H	56C	7.28	4.035	5.059	3.091	3.563	2.750	1.75	4.188	5.75	2.062	3/8-16
WG-206-xxx-H		7.95	4.370	5.748	3.219	3.819	2.880	2.062	5.000	6.375	2.281	
WG-237-xxx-H		8.68	4.705	6.378	3.220	4.055	2.880	2.375	5.000	6.937	2.500	
WG-262-005-H	182TC	10.59	6.240	7.165	3.500	4.685	3.375	2.625	6.375	8.000	2.938	7/16-14
WG-262-010-H	56C	9.41	5.059									
WG-262-015-H												
WG-262-020-H	182/4TC	12.60	7.24	9.02	4.375	5.75	4.00	3.25	7.50	9.38	3.50	
WG-262-040-H												
WG-262-060-H												
WG-325-010-HC												
WG-325-015-HC	182TC	11.42	6.06	5.88	6.50	0.41	5/8	3/16	2.76	1.938	1/2	5/16-24
WG-325-020-HC												
WG-325-030-HA												
WG-325-030-HB												
WG-325-040-HA	56C	5.88	6.50	0.41	5/8	3/16	5/8	7/8	2.76	1.938	1/2	5/16-24
WG-325-040-HB												
WG-325-060-HA												
WG-325-060-HB												
WG-325-060-HB	145TC	5.88	6.50	0.41	5/8	3/16	5/8	7/8	2.76	1.938	1/2	5/16-24
WG-325-010-HC												
WG-325-015-HC												
WG-325-020-HC												
Part # (repeated)	Frame	Flange			Input Shaft		Output Bore					
		LA	LC	Z1	W	X	S	T	U	Z2 (UNF)		
WG-175-xxx-H	56C	5.875	6.496	0.433	5/8	3/16	1.575	1.0	1/4	#10-32		
WG-206-xxx-H							1.772	1.125				
WG-237-xxx-H							1.969	1.250				
WG-262-005-H	182TC	7.25	9.000	0.551	1-1/8	1/4	2.362	1.437	3/8	1/4-28		
WG-262-010-H	56C	5.875	6.496	0.433	5/8	3/16						
WG-262-015-H												
WG-262-020-H	182/4TC	7.25	9.00	0.55	1-1/8	1/4	2.76	1.938	1/2	5/16-24		
WG-262-040-H												
WG-262-060-H												
WG-325-010-HC												
WG-325-015-HC	182TC	5.88	6.50	0.41	5/8	3/16	5/8	7/8	2.76	1.938	1/2	5/16-24
WG-325-020-HC												
WG-325-030-HA												
WG-325-030-HB												
WG-325-040-HA	56C	5.88	6.50	0.41	5/8	3/16	5/8	7/8	2.76	1.938	1/2	5/16-24
WG-325-040-HB												
WG-325-060-HA												
WG-325-060-HB												
WG-325-060-HB	145TC	5.88	6.50	0.41	5/8	3/16	5/8	7/8	2.76	1.938	1/2	5/16-24
WG-325-010-HC												
WG-325-015-HC												
WG-325-020-HC												

See our website: [www.AutomationDirect.com](http://www.AutomationDirect.com) for complete engineering drawings.

# IRONHORSE® CAST-IRON WORM GEARBOX ACCESSORY MOUNTING BASES

## MOUNTING BASE SELECTION AND DIMENSIONS



IronHorse Worm Gearbox Mounting Bases												
Part Number	Fits Gearbox Numbers	Approx Weight (lb)	Dimensions (in)									
			A	B	C	D	E	F	t	d1	d2	d3
WG-175-BASE	WG-175-xxx-x	4.0	4.19	2.76	4.50	5.75	5.69	7.00	0.69	0.43	0.35	0.55
WG-206-BASE	WG-206-xxx-x	4.8	5.00	2.88	4.69	6.38	5.91	7.76	0.72	0.47	0.43	0.69
WG-237-BASE	WG-237-xxx-x	6.2	5.00	2.88	4.88	7.06	6.22	8.50	0.75	0.47	0.43	0.69
WG-262-BASE	WG-262-xxx-x	7.5	6.38	3.38	5.25	8.00	6.69	9.65	0.75	0.55	0.43	0.69
WG-325-BASE	WG-325-xxx-xx	12.0	7.50	4.00	6.13	9.50	7.66	11.19	0.88	0.50	0.47	0.71

# ALUMINUM WORM GEARBOXES

---



## CHAPTER

# 3

### TABLE OF CONTENTS

<i>IronHorse® Aluminum Worm Gearboxes . . . . .</i>	<i>. . . . .3-2</i>
<i>Gearbox Selection Factors . . . . .</i>	<i>. . . . .3-2</i>
<i>Service Factors and K Factors . . . . .</i>	<i>. . . . .3-2</i>
<i>IronHorse® Aluminum Worm Gearbox Specifications . . . . .</i>	<i>. . . . .3-3</i>
<i>Frame Sizes 30, 40, 50 mm Specifications . . . . .</i>	<i>. . . . .3-3</i>
<i>Frame Sizes 63, 75 mm Specifications . . . . .</i>	<i>. . . . .3-4</i>
<i>IronHorse® Aluminum Worm Gearbox Dimensions . . . . .</i>	<i>. . . . .3-5</i>
<i>IronHorse® Aluminum Worm Gearbox Accessories . . . . .</i>	<i>. . . . .3-6</i>

**IRONHORSE® ALUMINUM WORM GEARBOXES**



**GEARBOX SELECTION FACTORS**

**SERVICE FACTORS AND K FACTORS**

Service Factors for Selecting Gearboxes (when used with electric motors)				
Service Continuity (per day)	Load Characteristics			
	Uniform	Moderate Shock*	Heavy Shock*	Extreme Shock*
Occasional 1/2 hour	1.00	1.00	1.00	1.25
Less than 3 hours	1.00	1.00	1.25	1.50
3-10 hours	1.00	1.25	1.50	1.75
More than 10 hours	1.25	1.50	1.75	2.00

\* Shock results from sudden increases in the torque demand of the load, such as: sudden stopping, restarting, and/or reversing; significantly heavy loads dropped onto a moving conveyor; impact loads such as punch press operations.

Depending upon the load characteristics, divide the gearbox HP, Overhung Load, and Maximum Mechanical Capacity ratings by the applicable service factor.

Overhung Load K Factors for Various Drive Types	
Chain & Sprocket	1.00
Gear	1.25
V-belt	1.50
Flat Belt	2.50
Variable Pitch Belt	3.50

Divide gearbox OHL ratings by the applicable OHL K factors.



# IRONHORSE® ALUMINUM WORM GEARBOX SPECIFICATIONS

## FRAME SIZES 30, 40, 50 MM SPECIFICATIONS

IronHorse Aluminum Worm Gearbox Specifications – Frame Sizes 30, 40, 50 mm																	
Part Number	Nominal / Actual Ratio	Output RPM @ 1750 rpm Input	Nominal Motor HP 1 @ 1800 rpm	NEMA Motor Frame	Output Type 2	Center Distance 3 (mm)	Overhung Load 4 (lb)	Output Shaft Thrust Load (lb)	Efficiency (%)	Approx Weight (lb)	Maximum Ratings @ 1750 rpm Input			Maximum Input Speed (rpm)	Maximum Backlash (arc-minute)		
											Mechanical 5						
											Input Power (hp)	Output Power (hp)	Output Torque (lb-in)				
<b>WGA-30M-010-H1</b>	10:1	175	0.5	56C	H	30	142	31	80	3	0.54	0.43	150	2,000	28.8		
<b>WGA-30M-020-H1</b>	20:1	88	0.25				179	40	72		0.30	0.22	150		28.2		
<b>WGA-30M-030-H1</b>	30:1	58	0.25				205	45	62		0.25	0.16	177		28.8		
<b>WGA-30M-040-H1</b>	40:1	44	0.2				225	50	55		0.19	0.10	150		28.2		
<b>WGA-30M-060-H1</b>	60:1	29	0.12				259	54	46		0.12	0.06	142		25.8		
<b>WGA-40M-010-H1</b>	10:1	175	1			56C	H	40	279	60	83	5	1.15	0.95	354	2,000	24.0
<b>WGA-40M-020-H1</b>	20:1	88	0.5						350	76	78		0.61	0.48	345		
<b>WGA-40M-030-H1</b>	30:1	58	0.5						403	87	68		0.53	0.36	389		
<b>WGA-40M-040-H1</b>	40:1	44	0.33						441	96	65		0.39	0.25	363		
<b>WGA-40M-060-H1</b>	60:1	29	0.25						507	110	56		0.25	0.14	319		
<b>WGA-40M-080-H1</b>	80:1	22	0.12					556	121	50	0.19	0.10	283	21.6			
<b>WGA-40M-100-H1</b>	100:1	17.5	0.12					595	130	47	0.15	0.07	257				
<b>WGA-50M-010-H1</b>	10:1	175	2					50	406	83	84	2.06	1.73		628	19.2	
<b>WGA-50M-020-H1</b>	20:1	88	1						510	104	78	1.13	0.88		646	17.4	
<b>WGA-50M-030-H1</b>	30:1	58	0.75						586	120	70	0.95	0.67		734	19.2	
<b>WGA-50M-040-H1</b>	40:1	44	0.75	643	132				65	0.70	0.46	664	17.4				
<b>WGA-50M-060-H1</b>	60:1	29	0.33	739	151				57	0.46	0.26	602	16.2				
<b>WGA-50M-080-H1</b>	80:1	22	0.33	810	166				50	0.38	0.19	566					
<b>WGA-50M-100-H1</b>	100:1	17.5	0.25	866	179				46	0.28	0.13	487					

- 1) Nominal Motor HP is the highest HP 1800 rpm motor to be used with the gearbox under conditions of 1.0 service factor. Gearbox input power capacity decreases as motor speed decreases and as service factor increases.
- 2) Output Type: H = Hollow Bore.
- 3) The Center Distance is the distance between the centerlines of the input and output shafts/bores; serves as the gearbox frame size.
- 4) Overhung Load ratings are for forces perpendicular to the output shaft and located at the shaft midpoint, such as from a gear, pulley, or sprocket with a belt or chain. Divide OHL ratings by the applicable OHL K factors shown separately in the Selection Factors tables. OHL ratings should also be divided by applicable service factors.
- 5) Maximum Mechanical Ratings are limits based on strength and durability of gearbox components; applicable when operating time is short and stopped time is greater than or equal to operating time. These ratings are applicable for 1.0 service factor loads, and may require modification depending upon characteristics of the applicable driven loads. Refer to the "Service Factors" table for more information.

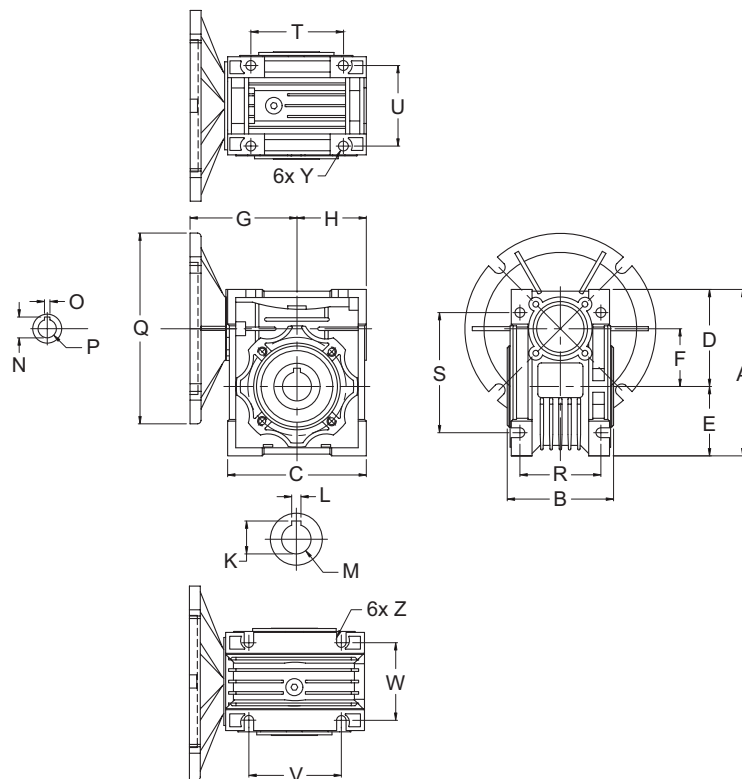
**IRONHORSE® ALUMINUM WORM GEARBOX SPECIFICATIONS (CONTINUED)**

**FRAME SIZES 63, 75 MM SPECIFICATIONS**

IronHorse Aluminum Worm Gearbox Specifications – Frame Sizes 63, 75 mm															
Part Number	Nominal / Actual Ratio	Output RPM @ 1750 rpm Input	Nominal Motor HP 1 @ 1800 rpm	NEMA Motor Frame	Output Type 2	Center Distance 3 (mm)	Overhung Load 4 (lb)	Output Shaft Thrust Load (lb)	Efficiency (%)	Approx Weight (lb)	Maximum Ratings @ 1750 rpm Input			Maximum Input Speed (rpm)	Maximum Backlash (arc-minute)
											Mechanical 5				
											Input Power (hp)	Output Power (hp)	Output Torque (lb-in)		
<b>WGA-63M-010-H1</b>	10:1	175	3	56C	H	63	510	108	86	13	3.67	3.16	1141	2,000	17.4
<b>WGA-63M-010-H2</b>	10:1	175	3	145TC			510	108	86		3.67	3.16	1141		
<b>WGA-63M-020-H1</b>	20:1	88	2	56C			641	137	80		2.04	1.63	1186		16.2
<b>WGA-63M-020-H2</b>	20:1	88	2	145TC			641	137	80		2.04	1.63	1186		
<b>WGA-63M-030-H1</b>	30:1	58	1.5	56C			736	156	73		1.76	1.28	1416		17.4
<b>WGA-63M-040-H1</b>	40:1	44	1	56C			807	172	70		1.26	0.88	1274		16.2
<b>WGA-63M-060-H1</b>	60:1	29	0.75	56C			928	197	59		0.86	0.51	1141		13.8
<b>WGA-63M-080-H1</b>	80:1	22	0.5	56C			1017	217	53		0.67	0.36	1071		
<b>WGA-63M-100-H1</b>	100:1	18	0.5	56C			1088	234	48		0.57	0.27	1035		
<b>WGA-75M-010-H1</b>	10:1	175	5	56C			H	75	604		128	86	19		5.44
<b>WGA-75M-010-H2</b>	10:1	175	5	145TC	604	128			86	5.44	4.68	1717			
<b>WGA-75M-010-H3</b>	10:1	175	5	182/4TC	604	128			86	5.44	4.68	1717		14.4	
<b>WGA-75M-020-H1</b>	20:1	88	3	56C	759	161			79	3.14	2.48	1849			
<b>WGA-75M-020-H2</b>	20:1	88	3	145TC	759	161			79	3.14	2.48	1849		16.2	
<b>WGA-75M-030-H1</b>	30:1	58	2	56C	873	185			72	2.48	1.79	2026			
<b>WGA-75M-040-H1</b>	40:1	44	1.5	56C	957	203			68	1.88	1.28	1947		14.4	
<b>WGA-75M-060-H1</b>	60:1	29	1	56C	1099	232			62	1.26	0.78	1770		12.6	
<b>WGA-75M-080-H1</b>	80:1	22	0.75	56C	1205	256			58	0.97	0.56	1672			
<b>WGA-75M-100-H1</b>	100:1	18	0.75	56C	1289	276			52	0.80	0.42	1593			

- 1) Nominal Motor HP is the highest HP 1800 rpm motor to be used with the gearbox under conditions of 1.0 service factor. Gearbox input power capacity decreases as motor speed decreases and as service factor increases.
- 2) Output Type: H = Hollow Bore.
- 3) The Center Distance is the distance between the centerlines of the input and output shafts/bores; serves as the gearbox frame size.
- 4) Overhung Load ratings are for forces perpendicular to the output shaft and located at the shaft midpoint, such as from a gear, pulley, or sprocket with a belt or chain. Divide OHL ratings by the applicable OHL K factors shown separately in the Selection Factors tables. OHL ratings should also be divided by applicable service factors.
- 5) Maximum Mechanical Ratings are limits based on strength and durability of gearbox components; applicable when operating time is short and stopped time is greater than or equal to operating time. These ratings are applicable for 1.0 service factor loads, and may require modification depending upon characteristics of the applicable driven loads. Refer to the "Service Factors" table for more information.




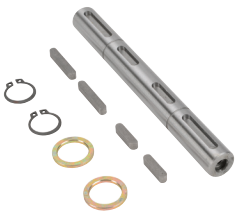

**IRONHORSE® ALUMINUM WORM GEARBOX DIMENSIONS**



Dimensions (inches) – IronHorse Aluminum Worm Gearboxes																
Part Number	NEMA Motor Face	A	B	C	D	E	F	G	H	Output Bore			Input Shaft			
										K	L	ØM	N	O	ØP	ØQ
<b>WGA-30M-xxx-H1</b>	56C	3.82	2.48	3.15	2.24	1.57	1.18	3.19	1.57	0.720	0.20	0.625	0.73	0.19	0.625	6.50
<b>WGA-40M-xxx-H1</b>		4.78	3.07	3.94	2.81	1.97	1.57	3.18	1.97	0.840	0.20	0.750	0.71	0.19	0.625	6.50
<b>WGA-50M-xxx-H1</b>		5.67	3.62	4.72	3.31	2.36	1.97	3.58	2.36	1.110	0.24	1.000	0.71	0.19	0.625	6.50
<b>WGA-63M-xxx-H1</b>		6.87	4.42	5.69	4.00	2.87	2.48	4.06	2.84	1.250	0.31	1.125	0.71	0.19	0.625	6.50
<b>WGA-63M-xxx-H2</b>	145TC	6.87	4.42	5.69	4.00	2.87	2.48	4.06	2.84	1.250	0.31	1.125	0.97	0.19	0.875	6.50
<b>WGA-75M-xxx-H1</b>	56C	8.07	4.72	6.77	4.69	3.39	2.95	4.68	3.39	1.375	0.31	1.250	0.71	0.19	0.625	6.50
<b>WGA-75M-xxx-H2</b>	145TC	8.07	4.72	6.77	4.69	3.39	2.95	4.68	3.39	1.375	0.31	1.250	1.24	0.25	1.125	6.50
<b>WGA-75M-xxx-H3</b>	182/4TC	8.07	4.72	6.77	4.69	3.39	2.95	4.68	3.39	1.375	0.31	1.250	1.24	0.25	1.125	8.97
Part Number	NEMA Motor Face	R	S	T	U	V	W	Y	Z							
<b>WGA-30M-xxx-H1</b>	56C	1.73	2.80	2.13	1.73	2.13	1.73	0.26 x 0.33	0.26 x 0.33							
<b>WGA-40M-xxx-H1</b>		2.36	3.57	2.76	2.37	2.76	2.37	0.26	0.24 x 0.33							
<b>WGA-50M-xxx-H1</b>		2.76	4.09	3.16	2.74	3.15	2.65	0.33	0.33 x 0.48							
<b>WGA-63M-xxx-Hx</b>	56C, 145TC	3.35	5.12	3.94	3.35	3.94	3.35	0.33	0.33							
<b>WGA-75M-xxx-Hx</b>	56C, 145TC, 182/4TC	3.54	6.02	4.72	3.54	4.72	3.54	0.43	0.43							

See our website: [www.AutomationDirect.com](http://www.AutomationDirect.com) for complete Engineering drawings.

## IRONHORSE® ALUMINUM WORM GEARBOX ACCESSORIES

IronHorse Aluminum Worm Gearbox Accessories		
Part Number	Description	Typical Photo
<b>WGA-30M-ACC1</b>	Output flange, for aluminum WGA-30M series gearboxes. Includes (4) mounting screws.	
<b>WGA-40M-ACC1</b>	Output flange, for aluminum WGA-40M series gearboxes. Includes (4) mounting screws.	
<b>WGA-50M-ACC1</b>	Output flange, for aluminum WGA-50M series gearboxes. Includes (4) mounting screws.	
<b>WGA-63M-ACC1</b>	Output flange, for aluminum WGA-63M series gearboxes. Includes (8) mounting screws.	
<b>WGA-75M-ACC1</b>	Output flange, for aluminum WGA-75M series gearboxes. Includes (8) mounting screws.	
<b>WGA-30M-ACC2</b>	Torque arm, for aluminum WGA-30M series gearboxes. Includes (4) mounting screws.	
<b>WGA-40M-ACC2</b>	Torque arm, for aluminum WGA-40M series gearboxes. Includes (4) mounting screws.	
<b>WGA-50M-ACC2</b>	Torque arm, for aluminum WGA-50M series gearboxes. Includes (4) mounting screws.	
<b>WGA-63M-ACC2</b>	Torque arm, for aluminum WGA-63M series gearboxes. Includes (8) mounting screws.	
<b>WGA-75M-ACC2</b>	Torque arm, for aluminum WGA-75M series gearboxes. Includes (8) mounting screws.	
<b>WGA-30M-ACC3</b>	Single output shaft, Ø0.625 in, for aluminum WGA-30M series gearboxes. Includes (3) keys, (1) spacer, and (1) retaining ring.	
<b>WGA-40M-ACC3</b>	Single output shaft, Ø0.75 in, for aluminum WGA-40M series gearboxes. Includes (3) keys, (1) spacer, and (1) retaining ring.	
<b>WGA-50M-ACC3</b>	Single output shaft, Ø1.0 in, for aluminum WGA-50M series gearboxes. Includes (3) keys, (1) spacer, and (1) retaining ring.	
<b>WGA-63M-ACC3</b>	Single output shaft, Ø1.125 in, for aluminum WGA-63M series gearboxes. Includes (3) keys, (1) spacer, and (1) retaining ring.	
<b>WGA-75M-ACC3</b>	Single output shaft, Ø1.25 in, for aluminum WGA-75M series gearboxes. Includes (3) keys, (1) spacer, and (1) retaining ring.	
<b>WGA-30M-ACC4</b>	Double output shaft, Ø0.625 in, for aluminum WGA-30M series gearboxes. Includes (4) keys, (2) spacers, and (2) retaining rings.	
<b>WGA-40M-ACC4</b>	Double output shaft, Ø0.75 in, for aluminum WGA-40M series gearboxes. Includes (4) keys, (2) spacers, and (2) retaining rings.	
<b>WGA-50M-ACC4</b>	Double output shaft, Ø1.0 in, for aluminum WGA-50M series gearboxes. Includes (4) keys, (2) spacers, and (2) retaining rings.	
<b>WGA-63M-ACC4</b>	Double output shaft, Ø1.125 in, for aluminum WGA-63M series gearboxes. Includes (4) keys, (2) spacers, and (2) retaining rings.	
<b>WGA-75M-ACC4</b>	Double output shaft, Ø1.25 in, for aluminum WGA-75M series gearboxes. Includes (4) keys, (2) spacers, and (2) retaining rings.	
<b>WGA-30M-ACC5</b>	Output cover, for aluminum WGA-30M series gearboxes. Includes (4) mounting screws.	
<b>WGA-40M-ACC5</b>	Output cover, for aluminum WGA-40M series gearboxes. Includes (4) mounting screws.	
<b>WGA-50M-ACC5</b>	Output cover, for aluminum WGA-50M series gearboxes. Includes (4) mounting screws.	
<b>WGA-63M-ACC5</b>	Output cover, for aluminum WGA-63M series gearboxes. Includes (4) mounting screws.	
<b>WGA-75M-ACC5</b>	Output cover, for aluminum WGA-75M series gearboxes. Includes (4) mounting screws.	

# INSTALLATION, LUBRICATION, SEALS

---



## CHAPTER

# 4

### TABLE OF CONTENTS

<i>IronHorse® Worm Gearbox Installation . . . . .</i>	<i>4-2</i>
<i>Installation Instructions . . . . .</i>	<i>4-2</i>
<i>Vent Plug Installation . . . . .</i>	<i>4-2</i>
<i>IronHorse® Worm Gearbox Lubrication &amp; Mounting Orientations. . . . .</i>	<i>4-3</i>
<i>Lubrication Instructions . . . . .</i>	<i>4-3</i>
<i>Lubricant Capacities and Mounting Orientations. . . . .</i>	<i>4-4</i>
<i>IronHorse® Worm Gearbox Seal Sizes. . . . .</i>	<i>4-4</i>
<i>Aluminum Worm Gearbox Input and Output Seal Sizes . . . . .</i>	<i>4-4</i>
<i>Cast-Iron Worm Gearbox Input Seal Sizes. . . . .</i>	<i>4-5</i>

## IRONHORSE® WORM GEARBOX INSTALLATION

Read these instructions thoroughly before installing or operating the gearbox.

### INSTALLATION INSTRUCTIONS

- Leave the protective shaft sleeves in place for safe handling of the gearbox during installation.
- Add or partially drain oil as needed depending upon the mounting orientation. (Refer to the lubrication section of this chapter for more information.)
- Install the vent plug.
- Align all shafts accurately, since improper alignment can result in premature failure. Use flexible couplings to compensate for slight misalignment.
- For hollow-bore output gearboxes – Use anti-seize compound when inserting the load shaft into the hollow output shaft. It is preferable to size the load shaft with sufficient length to allow complete insertion through the hollow output shaft of the gearbox. This allows equal support of the load shaft by both of the output shaft bearings, and permits the use of the output shaft setscrews to lock the two shafts together on both sides of the gearbox. At minimum, the load shaft should be inserted at least half way into the hollow output shaft, and secured with the setscrews on the insertion end of the gearbox.
- Mount the gearbox to a rigid foundation, and use the maximum possible bolt size. Periodically inspect the mounting bolts. (Do NOT mount gearbox vertically with input shaft pointing downward. Refer to the lubrication section of this chapter for allowable mounting orientations.)
- Optional gearbox and motor mounting bases are available for ease of mounting and alignment.
- Mount auxiliary drive components such as sprockets, gears and pulleys on the gearbox shaft as close to the housing as possible in order to minimize the effects of overhung loads. Avoid force fits that might damage bearings or gears.
- Check and record gear backlash at installation and again at regular intervals. This should be done by measuring the rotary movement of the output shaft, rotating the shaft alternately clockwise and counterclockwise at a suitable radius while holding the input shaft stationary. The gearbox should be replaced when the backlash exceeds four times the measurement taken at installation.
- Gear drives are rated for 1750 input rpm and Class I Service (Service Factor 1.0), using Mobil synthetic lubricant. Units manufactured with first 4 serial numbers up to 2108 filled with Mobil SHC634 synthetic oil. Units manufactured with first 4 serial numbers from 2109 are filled with SHC632 synthetic oil.
- Initial operating temperatures may be higher than normal during the break-in period of the gear set. For maximum life, DO NOT ALLOW THE GEARBOX TO OPERATE CONTINUOUSLY ABOVE 225°F at the gear case. In the event of overheating, check for overloads or high ambient temperatures. Keep shafts and vent plugs clean to prevent foreign particles from entering seals or gear housing.

### VENT PLUG INSTALLATION

All IronHorse Worm Gearboxes are tested and filled with Mobil synthetic lubricant prior to shipment. All vent openings are plugged by the manufacturer to prevent the loss of lubricant in shipment. The vent plug is shipped loose in the package with all gearboxes. Cast iron gearboxes require a vent plug be installed prior to placing the gearbox in operation. Vent plug use with aluminum gearboxes is not required, but is optional. If a vent plug is used for the aluminum gearbox, the gearbox mounting position is restricted to position “A” for WGA-30M through WGA-50M and position “A” and “C” for WGA-63M through WGA-75M gearboxes.

- The vent plug should be installed in the uppermost position.
- For all mounting positions where the vent plug is located in a horizontal plane, the vent hole must point upward.
- For all mounting positions where the vented plug is located in a vertical plane, the vent hole must point toward the center of the gearbox housing.
- Failure to properly install the vent plug can lead to pressurization of the gearbox housing as operating temperature rises, resulting in leakage at the shaft seals.

---

## IRONHORSE® WORM GEARBOX LUBRICATION & MOUNTING ORIENTATIONS

Lubricant selection is important to all gearboxes, and it is particularly critical for the worm gear type. An oil with special characteristics and a relatively high viscosity is required due to sliding action between the gear teeth where they mesh. Aside from improper gearbox selection, inadequate lubrication is the greatest factor contributing to premature worm gearbox failures. Improper lubrication also causes reduced gearbox performance.

### **LUBRICATION INSTRUCTIONS**

IronHorse Worm Gearboxes are shipped to you filled with Mobil synthetic oil. Oil must be added or partially drained depending upon your mounting orientation, as shown in the Lubricant Capacities table.

Since many oils are not suitable for worm gears, it is very important to use the proper lubricant type. It is also very important to keep the oil free from oxidation and contamination by water or debris. For longer service life, the gearbox should be periodically drained (preferably while warm) and refilled to the proper level with a recommended gear oil. Non-synthetic oils should be changed every 6 months or 250 hours of operation under normal operating conditions. However, synthetic lubricants have increased resistance to thermal and oxidation degradation, and do not need to be changed as frequently.

Synthetic lubricant should be changed every 6,000 hours of operation or every two years, whichever ever comes first.



---

**WARNING:** *SOME LUBRICANTS CONTAIN NON-CORROSIVE EXTREME PRESSURE ADDITIVES. DO NOT USE LUBRICANTS THAT CONTAIN SULPHUR AND/OR CHLORINE, WHICH ARE CORROSIVE TO BRONZE GEARS. ALSO, SOME EXTREME PRESSURE LUBRICANTS CONTAIN MATERIALS THAT ARE TOXIC. AVOID THE USE OF THESE LUBRICANTS WHERE HARMFUL EFFECTS CAN OCCUR.*

---

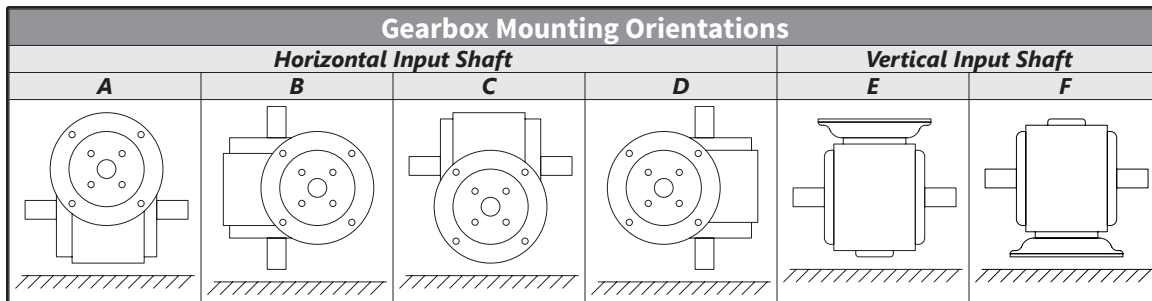
**LUBRICANT CAPACITIES AND MOUNTING ORIENTATIONS**



**WARNING:** TOO MUCH OIL WILL CAUSE OVERHEATING, AND TOO LITTLE OIL WILL RESULT IN GEAR FAILURE. CHECK OIL LEVEL REGULARLY. MORE FREQUENT OIL CHANGES ARE RECOMMENDED WHEN OPERATING CONTINUOUSLY, AT HIGH TEMPERATURES, OR UNDER CONDITIONS OF EXTREME DIRT OR DUST.

IronHorse Aluminum Worm Gearbox Lubricant Capacities						
Gearbox Mounting Orientation	A	B	C	D	E	F
<b>Gearbox Part Number</b>	<b>Approx Capacity (fl oz)</b>					
WGA-30M-xxx-xx	1.35	1.18	1.01	1.18	1.69	
WGA-40M-xxx-xx	2.71	2.37	2.03	2.37	3.38	
WGA-50M-xxx-xx	3.38	2.87	2.54	2.87	4.23	
WGA-63M-xxx-xx	8.45	7.44	6.43	7.44	10.48	
WGA-75M-xxx-xx	16.91	14.54	12.51	14.54	20.97	
Position "A" only if vent plug is used for WGA-30M through WGA-50M. Position "A" and "C" only if vent plug is used for WGA-63M through WGA-75M. *Gearboxes are shipped filled with oil sufficient for mounting orientation "A". Oil must be added to gearboxes installed in other mounting orientations.						

IronHorse Cast-Iron Worm Gearbox Lubricant Capacities						
Gearbox Mounting Orientation	A*	B	C	D	E	F
<b>Gearbox Part Number</b>	<b>Approx Capacity* (fl oz)</b>					
WG-175-xxx-x	11.64	18.74	18.74	17.24	15.14	Not Allowed
WG-206-xxx-x	19.41	28.41	28.41	26.71	21.81	
WG-237-xxx-x	24.07	35.17	35.17	33.77	29.67	
WG-262-xxx-x	34.55	48.25	48.25	45.85	41.05	
WG-325-xxx-xx	73.75	102.55	102.55	97.75	88.05	
*Gearboxes are shipped filled with oil sufficient for mounting orientation "A". Oil must be added to gearboxes installed in other mounting orientations.						



**IRONHORSE® WORM GEARBOX SEAL SIZES**

**ALUMINUM WORM GEARBOX INPUT AND OUTPUT SEAL SIZES**

Aluminum Worm Gearbox Seal Sizes		
Model #	Input Seals (mm)	Output Seals (mm)
WGA-30M-xxx-xx	25 x 62 x 7	25 x 47 x 7
WGA-40M-xxx-xx	25 x 35 x 7	30 x 40 x 7
WGA-50M-xxx-xx	30 x 47 x 7	40 x 62 x 8
WGA-63M-xxx-xx	35 x 52 x 8	45 x 65 x 10
WGA-75M-xxx-xx	45 x 60 x 10	50 x 72 x 8



**CAST-IRON WORM GEARBOX INPUT SEAL SIZES**

Gearbox Sizes		Cast-Iron Worm Gearbox Input Seal Sizes		
		WG-xxx-xxx-D/H/L/R Input Seals (mm)	WG-xxx-xxx-D/L/R Output <u>Shaft</u> Seals (mm)	WG-xxx-xxx-H Output <u>Hollow Bore</u> Seals (mm)
175	(56C input)	30 x 42 x 8	24 x 45 x 8	40 x 62 x 9
206			30 x 47 x 6	45 x 68 x 10
237			35 x 55 x 8	50 x 72 x 12
262	60 x 82 x 12			
325	(56C input)	45 x 62 x 8	40 x 55 x 8	70 x 95 x 13
	(182/4TC input)	30 x 42 x 8		
	(145TC input)	35 x 42 x 8		
	(182/4TC input)	45 x 62 x 8		



**APPENDIX**

**A**

**GLOSSARY OF TERMS**

---

TABLE OF CONTENTS

*Glossary of Gearbox Terms* . . . . . A-2

## GLOSSARY OF GEARBOX TERMS

### **AXIAL MOVEMENT**

Often called “endplay.” The endwise movement of motor or gear shafts. Usually expressed in thousandths of an inch.

### **BACK DRIVING**

Driving the output shaft of a gearbox to increase speed rather than reduce speed. Worm gearboxes are not suitable for service to increase speed.

### **BACKLASH**

Rotational movement of the output shaft clockwise and counter clockwise, while holding the input shaft stationary. Usually expressed in thousandths of an inch and measured at a specific radius at the output shaft.

### **CENTER DISTANCE**

A basic measurement or size reference for worm gearboxes. The distance between the centerlines of the input and output shafts.

### **EFFICIENCY**

A ratio of the input power compared to the output power, usually expressed as a percentage.

### **FLANGED REDUCER**

Usually used to refer to a gearbox having provisions for close coupling of a motor either via a hollow (quill) shaft or flexible coupling. Most often a NEMA C-face motor is used.

### **GEARBOX**

Also called a Speed Reducer. An enclosed set of gears used in mechanical power transmission to reduce speed and increase torque.

### **INPUT POWER**

The power applied to the input shaft of a gearbox. There are separate ratings for Mechanical Input Power, Thermal Input Power, and Nominal Motor Horsepower.

### **K FACTOR**

Also called an Overhung Load Factor. A constant used to modify the overhung load rating of a gearbox based on the type of load applied on the shaft. Use the K factor either to increase the calculated overhung load, or to reduce the gearbox overhung load rating.

### **MECHANICAL RATINGS**

The maximum power or torque a gearbox can transmit based on the strength and durability of its components. Some applications require the gearbox Mechanical Ratings to be reduced by a Service Factor.

### **MOUNTING POSITION**

The relationship of the input and output shafts of a gearbox relative to horizontal.

### **NOMINAL MOTOR HORSEPOWER**

The highest horsepower 1800 rpm motor that can be used with the gearbox under 1.0 service factor conditions. This rating decreases as the motor speed decreases, and as the service factor increases.

### **OUTPUT HORSEPOWER**

The amount of horsepower available at the output shaft of a gearbox. Output horsepower is always less than the input horsepower due to the efficiency of the gearbox.

**OVERHUNG LOAD**

A force applied at right angles to a shaft beyond its outermost bearing. This shaft-bending load must be supported by the bearing. Overhung load ratings are listed for each gearbox size, and should not be exceeded. Some applications require the gearbox Overhung Load rating to be reduced by a K Factor and/or a Service Factor.

**OVERHUNG LOAD FACTOR**

K Factor.

**PRIME MOVER**

In industry, the prime mover is most often an electric motor. Occasionally engines, hydraulic or air motors are used. Special considerations are called for when other than an electric motor is the prime mover.

**SELF-LOCKING**

The inability of a reducer to be driven backwards by its load. No IronHorse worm gearbox should be considered self-locking.

**SERVICE FACTOR (FOR GEARBOX)**

A constant used to modify the Mechanical Rating of a gearbox based on the duration of service and characteristics of the driven load. Use the Service Factor either as a multiplier to increase the calculated loads, or as a divisor to reduce the gearbox Mechanical and Overhung Load ratings.

**SERVICE FACTOR (FOR MOTORS)**

Refers to a motor's ability to handle a load greater than the motor's rated horsepower on a continuous basis.

**SPEED REDUCER**

Gearbox.

**THERMAL RATINGS**

The power or torque a gearbox can transmit continuously. These ratings are based upon the cast-iron gearbox's ability to dissipate the heat caused by friction. (Not applicable for aluminum-frame gearboxes, due to their inherently better ability to dissipate heat.)

**THRUST LOAD**

Forces along the axis of the output shaft, usually encountered in vertical-drive applications.

**WORM GEAR**

A set of threads, similar to a thread screw, that advance as they rotate around their axis. The advancing threads cause the mating gear to turn, and also slide against the gear teeth.

BLANK  
PAGE

# GEARBOX SELECTION

---



## APPENDIX

# B

### TABLE OF CONTENTS

<i>Gearbox Selection Procedure</i> . . . . .	B-2
<i>Gearbox Selection Steps</i> . . . . .	B-2
<i>Gearbox Selection Example</i> . . . . .	B-2

## GEARBOX SELECTION PROCEDURE

### GEARBOX SELECTION STEPS

- 1) Determine the torque and speed required for the load.
- 2) Determine the overall speed ratio of motor speed to load speed.
- 3) Determine the gearbox ratio as well as any reduction outside the gearbox (pulleys, gears, etc.).
- 4) Determine the applicable service factor and overhung load K factor.
- 5) Determine the gearbox real output torque required, and select a gearbox with a higher Maximum Thermal output Torque rating (for WG cast-iron gearboxes; not applicable for WGA aluminum gearboxes).
- 6) Determine the gearbox design output torque required (torque with service factor applied), and select a gearbox with a higher Maximum Mechanical Output Torque rating. (Gearbox must also meet requirement #5.)
- 7) Determine the required sizes of pulleys, gears, etc., and determine the overhung load force. Select a gearbox with a higher Overhung Load rating. (Gearbox must also meet requirements #5 & #6.)
- 8) Confirm that the selected gearbox meets the applicable system requirements.
- 9) Select a compatible motor.

### GEARBOX SELECTION EXAMPLE

**(Refer to the specifications tables for gearbox specifications, service factors, and K factors.)**

A conveyor will run 10 hours/day with moderate shock loading. The conveyor will be driven by a V-belt and needs to be driven at approximately 20 rpm. The motor to be used will have a nominal speed of 1800 rpm (1725 rpm actual speed). The conveyor will require 2700 in·lb of torque.

- 1) Required **torque** = 2700 in·lb; required **speed** = 20 rpm.
- 2) Determine the **overall speed ratio** of motor speed to load speed:  
Overall speed ratio = motor speed / load speed = 1725 / 20 = 86.25 [about 86:1]
- 3) Determine pulley ratios at available gearbox ratios:  

$$\text{Gearbox ratio} = (\text{overall speed ratio}) / (\text{pulley ratio})$$

$$\text{Pulley ratio} = (\text{overall speed ratio}) / (\text{gearbox ratio})$$

$$= (\text{conveyor pulley diameter}) / (\text{gearbox pulley diameter})$$
  - For **5:1 gearbox**: pulley ratio = 86.25 / 5 = **17.25** [17.25" pulley ratio is prohibitively large]
  - For 10:1 gearbox: pulley ratio = 86.25 / 10 = 8.63
  - For 15:1 gearbox: pulley ratio = 86.25 / 15 = 5.75
  - For 20:1 gearbox: pulley ratio = 86.25 / 20 = 4.31
  - For 30:1 gearbox: pulley ratio = 86.25 / 30 = 2.88
  - For 40:1 gearbox: pulley ratio = 86.25 / 40 = 2.16
  - For 60:1 gearbox: pulley ratio = 86.25 / 60 = 1.44
  - For 80:1 gearbox: pulley ratio = 86.25 / 80 = 1.08
- 4) Determine **service factor (SF)** and **overhung load factor (K)** from applicable tables:  
 SF = 1.25                      due to moderate shock loading and 3-10 hours/day operation  
 K = 1.5                         due to V-belt

- 5) Use specifications table to select gearbox with

**Max Thermal\* Torque rating > required real torque:**

*Gearbox required real torque = (final torque) / (pulley ratio)*

For 10:1 gearbox:	(2700 in·lb) / 8.63 = 312.86 in·lb;	use WG-175-x or larger
For 15:1 gearbox:	(2700 in·lb) / 5.75 = 469.57 in·lb;	use WG-175-x or larger
For 20:1 gearbox:	(2700 in·lb) / 4.31 = 626.45 in·lb;	use WG-206-x or larger
For 30:1 gearbox:	(2700 in·lb) / 2.88 = 937.50 in·lb;	use WG-325-x or WGA-63M*
For 40:1 gearbox:	(2700 in·lb) / 2.16 = 1250.0 in·lb;	use WG-325-x
For 60:1 gearbox:	(2700 in·lb) / 1.44 = 1875.0 in·lb;	use WG-325-x

\* Aluminum gearboxes do not have thermal ratings; use mechanical ratings.

- 6) Use specifications table to select gearbox with Max Mechanical Torque rating > required design torque:

*Gearbox required design torque = (real gearbox torque)(service factor)*

For 10:1 gearbox:	(312.86 in·lb)(1.25) = 391.08 in·lb;	use WG-175-x or larger
For 15:1 gearbox:	(469.57 in·lb)(1.25) = 586.96 in·lb;	use WG-206-x or larger
For 20:1 gearbox:	(626.45 in·lb)(1.25) = 783.06 in·lb;	use WG-206-x or larger
For 30:1 gearbox:	(937.50 in·lb)(1.25) = 1171.88 in·lb;	use WG-325-x or WGA-63M
For 40:1 gearbox:	(1250.0 in·lb)(1.25) = 1562.50 in·lb;	use WG-325-x
For 60:1 gearbox:	(1875.0 in·lb)(1.25) = 2343.75 in·lb;	use WG-325-x

- 7) Use the gearbox overhung load ratings from the specifications table to determine the minimum allowable pulley diameters. Select gearbox with **Overhung Load rating > overhung load force:**

*Gearbox required OHL rating = (gearbox real torque)(K)(SF)/(gearbox pulley diameter / 2)*

*Minimum gearbox pulley diameter = (T)(K)(SF)(2)/(OHL rating)*

*Conveyor pulley diameter = (gearbox pulley diameter)(pulley ratio)*

For 10:1, WG-175-010-x gearbox:

Minimum gearbox pulley diameter = (312.86 in·lb)(1.5)(1.25)(2)/(650 lb) = 1.8" [use 2"]

Conveyor pulley diameter = (2")(8.63) = ~~17.26"~~ [17.26" pulley size is prohibitively large]

Determine pulley sizes and OHL for next larger gearbox ratio.

For 15:1, WG-206-015-x gearbox:

Minimum gearbox pulley diameter = (469.57 in·lb)(1.5)(1.25)(2)/(700 lb) = 2.5" [use 2.5"]

Conveyor pulley diameter = (2.5")(5.75) = 14.38" [use 14.4"]

Select **WG-206-015-x gearbox, 2.5" gearbox pulley, and 14.4" conveyor pulley.**

For 20:1, WG-206-020-x gearbox:

N/A – All gearboxes of the same frame size are the same price, yet the smaller ratio gearboxes offer higher efficiency and power characteristics than higher ratio gearboxes. Therefore, the WG-206-015-x gearbox is preferable over the WG-206-020-x gearbox for this application.

For 30:1, WGA-63M-030-H1 gearbox:

Minimum gearbox pulley diameter = (937.50 in·lb)(1.5)(1.25)(2)/(736 lb) = 4.78" [use 5"]

Conveyor pulley diameter = (5")(2.88) = 14.40" [use 14.4"]

N/A – WGA-63M & WG-325-x gearboxes cost more than WG-206

For 40:1, WG-325-040-x gearbox:

N/A – WG-325-xxx gearboxes cost more than WG-206 at any ratio

For 60:1, WG-325-060-x gearbox:

N/A – WG-325-xxx gearboxes cost more than WG-206 at any ratio



- 8) **Check results** against original speed and torque requirements:
- Conveyor speed = (motor speed) / (gearbox ratio)(pulley ratio)  
= (1725 rpm) / (15)(14.4"/2.5") = 20 rpm
  - Maximum real torque available at conveyor = (gearbox thermal torque)(pulley ratio)  
= (673 in·lb)(14.4"/2.5") = 3876 in·lb
  - Maximum design torque available at conveyor  
= (gearbox mechanical torque)(pulley ratio) / (service factor)  
= (1002 in·lb)(14.4"/2.5") / 1.25 = 4617 in·lb

*The speed is correct as required, and both maximum torque values are greater than the 2700 in·lb required by the load.*

- 9) **Select a motor** and check torque transmitted to the load:  
From the gearbox spec tables, WG-206-015-x efficiency = 85%.  
maximum thermal input power = 1.40 hp  
maximum mechanical input power @ 1.0 SF = 2.09 hp  
maximum mechanical input power @ 1.25 SF  
= (rated max mechanical input power) / (SF) = 2.09 hp / 1.25 = 1.67 hp  
maximum allowable motor power = 1.40 hp; select nominal 1hp motor

Select **1hp motor**, and check for adequate torque at the load:

$$\text{Torque} = \text{Power} / \text{Speed} \quad [\text{conversion factor: } (1\text{hp}) = (63,025 \text{ in}\cdot\text{lb}\cdot\text{rpm})]$$

$$\begin{aligned} \text{Torque}_{\text{load}} &= (63,025 \text{ in}\cdot\text{lb}\cdot\text{rpm}/\text{hp})(\text{gearbox input hp})(\text{gearbox efficiency}) / (\text{motor rpm} / \\ &(\text{gearbox ratio})(\text{pulley ratio})) \\ &= (63,025)(1)(0.85) / (1725 / (15/1)(14.4/2.5)) = \mathbf{2683 \text{ in}\cdot\text{lb}} \quad [\text{insufficient torque at load}] \end{aligned}$$

This torque value is less than the 2700 in·lb required by the load.

So, select and check the next larger nominal motor size, which is 1-1/2 hp.

Since the 206 frame size, 15-ratio gearbox does not meet the required 1-1/2 hp thermal rating, choose the WG-237-015-x gearbox.

Select **1-1/2 hp motor** and **WG-237-015-x gearbox**, and check for adequate torque:

WG-237-015-x gearbox efficiency = 84%

maximum thermal input power = 1.55 hp

maximum mechanical input power @ 1.25 SF = 2.64 hp / 1.25 = 2.11 hp

maximum allowable motor power = 1.55 hp; nominal 1-1/2 hp motor

gearbox ratio is still 15:1, and OHL rating is increased to 900 lb,

so the previous pulley calculations [step 7] remain sufficient

[smaller pulleys can be calculated and selected for this gearbox, if desired]

$$\text{Torque} = \text{Power} / \text{Speed} \quad [\text{conversion factor: } (1\text{hp}) = (63,025 \text{ in}\cdot\text{lb}\cdot\text{rpm})]$$

$$\begin{aligned} T_{\text{load}} &= (63,025 \text{ in}\cdot\text{lb}\cdot\text{rpm}/\text{hp})(1.5\text{hp})(84\%) / (1725 \text{ rpm} / (15/1)(14.4/2.5)) \\ &= 3977 \text{ in}\cdot\text{lb} > 2700 \text{ in}\cdot\text{lb}; \quad \mathbf{\text{sufficient torque at load}} \end{aligned}$$

**Final gearbox and motor selection: 1-1/2 hp motor**

**WG-237-015-x gearbox**

**BLANK  
PAGE**

