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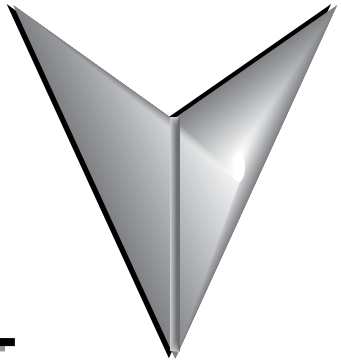
IRONHORSE®
GEAR MOTORS

IronHorse® DC Gearmotors User Manual

User Manual Number: IH-MTG-DC_UMW

IRONHORSE® DC GEARMOTORS USER MANUAL



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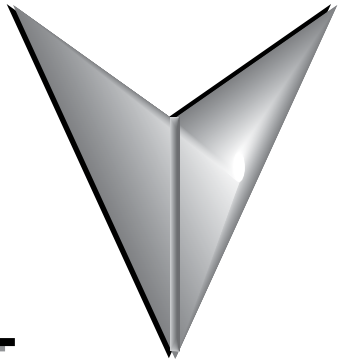

REVISION HISTORY OF THIS USER MANUAL

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

Manual Number: **IH-MTG-DC_UMW**
Issue: **Second Edition**
Issue Date: **05/07/2025**

Revision History		
Issue	***Date***	***Description of Changes***
First Edition	03/04/2014	Original Issue
1st Ed, Rev A	11/17/2017	Added resistance and inductance values. Added axial load (thrust) ratings.
1st Ed, Rev B	05/16/2018	Mounting information; Right-angle dual-shaft dimensions
1st Ed, Rev C	04/28/2020	Mounting Illustrations
1st Ed, Rev D	06/30/2020	Drawing Update
1st Ed, Rev E	09/30/2020	Drawing Update
1st Ed, Rev F	05/26/2021	Drawing Update
1st Ed, Rev G	01/24/2023	Mounting Illustration Update
2nd Ed	05/07/2025	Added VP1 Gearmotors

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Manual Overview

Overview of this Publication

The IronHorse® series DC Gearmotors User Manual describes the installation, maintenance and use of all IronHorse series DC Gearmotors.

Who Should Read This Manual

This manual contains important information for those who will install, maintain, use, and/or resell any of the IronHorse DC Gearmotors.

Technical Support

By Telephone: **770-844-4200**
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When you see the "notepad" icon in the left-hand margin, the paragraph to its immediate right will be a special note.

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).*

Purpose of Gearmotors

Gearboxes are mechanical drive components that can be installed between a motor and a load to drive the 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). 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. Gearmotors combine both the motor and the gearbox in one single component.

We offer parallel gearmotors with the gearbox output shaft in the same direction as the motor shaft, and right-angle gearmotors with the gearbox output shaft at a 90° angle to the motor shaft.

IronHorse DC gearmotors are manufactured in the U.S.A. by a leading motor supplier with over 75 years experience delivering high-quality motors and gearmotors to the demanding U.S. market. Our supplier does 100% dynamic testing of the gearmotors before shipment.

IronHorse DC gearmotors are designed for use on unfiltered SCR (Thyristor) type rectified AC input. They may also be used with PWM (pulse-width modulated) type DC adjustable-speed drives, and in across-the-line applications.

Receiving and Inspection

Unpacking

After receiving an IronHorse gearmotor, please:

- Open the motor packaging and inspect for damage during shipment.
- Make sure the part number indicated on the motor nameplate corresponds with the part number on your order.

Available Models

- MTGP parallel shaft gearmotors
- MTGR right-angle shaft gearmotors
- VP1 parallel shaft gearmotors

IronHorse Gearmotors Part Number Information

VP1 Series

VP1A - 90V - 2034

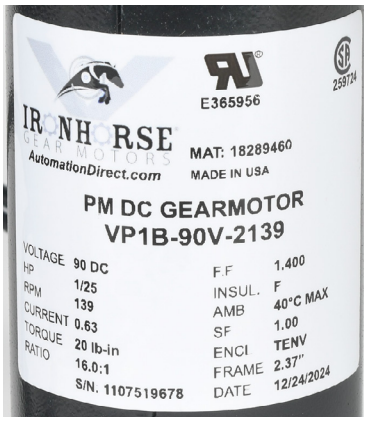
- **RPM**
- **HP**
  - 1: 1/50 – 1/32
  - 2: 1/25 – 1/20
  - 4: 1/17
  - 5: 1/11
  - 7: 1/8
  - 8: 1/4
- **DC Motor Voltage**
- **Size**
- **IronHorse Gearmotors Series Designation**

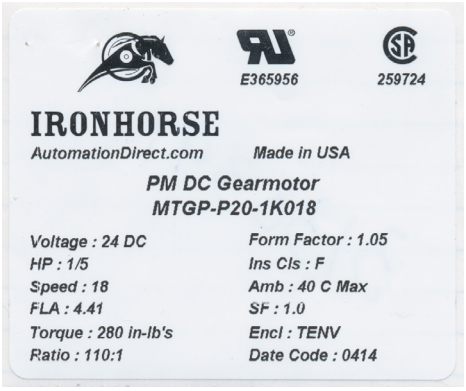
MTG Series

MTG P - P20 - 1 J 026

- **Optional Identifier**
  - 1: Accessory kit for gearmotors
- **Nominal RPM**
  - Three digits representing nominal rpm
- **Voltage Class** (multiple letters possible)
  - J: 12 VDC
  - K: 24 VDC
  - L: 90 VDC
- **Phase**
  - 1: Single phase
- **Rated Horsepower / Accessory Type**
  - P: Decimal point
  - # left of P: Rated full hp
  - # right of P: Rated fractional hp (expressed as decimal)
  - K: Replacement parts kit
- **Gear Type**
  - A: Accessory
  - P: Parallel
  - R: Right angle
- **IronHorse Gearmotors Series Designation**

Nameplate Information





IronHorse VP1 Gearmotor Specifications

General Specifications and Features for VP1 Motors

VP1A Features:

- Torque range: 28 - 280 in-lbs
- Speed range: 18 - 165 RPM
- Permanent lubrication (oil)
- 36” jacketed power cord
- Foot or Face mount

VP1B Features

- Torque range: 20 - 100 in-lbs
- Speed range: 20 - 139 RPM
- Permanent lubrication (oil)
- 36” jacketed power cord
- Face mount only

VP1C Features

- Torque range: 13 - 50 in-lbs
- Speed range: 7 - 94 RPM
- Permanent lubrication (grease)
- 18” flying leads
- Face mount only

VP1A Parallel Shaft Gearmotors Specifications

Gearmotor Specifications – VP1A Series Parallel Shaft												
Part Number	Voltage (VDC)	Motor HP	Speed (rpm)	Gear Ratio	F/L Torque (lb-in)	F/L Current (A) *	Shaft Dia (in)	Overhung Load (lb)	Axial/Thrust Load (lb)	Replacement Brush	Weight (lb)	Drawing Link
VP1A-90V-2034	90	1/20	34	57.7:1	82	0.94	5/8	150	75	MTPM-BRUSH-6	9	PDF
VP1A-90V-2051			51	34:1	55							PDF
VP1A-90V-2111			111	17.5:1	28	0.97						PDF
VP1A-90V-7018		1/8	18	103:1	150	0.82						PDF
VP1A-90V-7021			21	88:1	280	1.30					12	PDF
VP1A-90V-7026			26	69:1		1.58						PDF
VP1A-90V-7032			32	58:1	220	1.50						PDF
VP1A-90V-7054			54	34:1	138	1.51						PDF
VP1A-90V-7061			61	30:1	113	1.42						PDF
VP1A-90V-7091			91	20:1	86	1.58						PDF
VP1A-90V-7165			165	11:1	47	1.57						PDF
VP1A-90V-8042		1/4	42	57.7:1	280	2.45					13	PDF
VP1A-90V-8083			83	30:1	160	2.53						PDF

** Current must be limited so that it does not exceed 125% of the gearmotor rated current.*

IRONHORSE MTG GEARMOTOR SPECIFICATIONS (CONTINUED)

VP1B AND VP1C PARALLEL SHAFT GEARMOTORS SPECIFICATIONS

Gearmotor Specifications – VP1B and VP1C Series Parallel Shaft												
Part Number	*Voltage (VDC)*	*Motor HP*	*Speed (rpm)*	*Gear Ratio*	*F/L Torque (lb-in)*	*F/L Current (A) **	*Shaft Dia (in)*	*Overhung Load (lb)*	*Axial/Thrust Load (lb)*	*Replacement Brush*	*Weight (lb)*	*Drawing Link*
VP1B-90V-2037	90	1/25	37	79:1	74	0.67	1/2	150	75	MTPM-BRUSH-5	6	PDF
VP1B-90V-2139			139	16:1	20	0.63						PDF
VP1B-90V-4020		1/17	20	102:1	100	0.50						PDF
VP1B-90V-4071			71	31:1	40	0.64						PDF
VP1B-90V-5071		1/11		52:1	83	1.29						PDF
VP1B-90V-5139			139	24:1	42	1.19						PDF
VP1C-90V-1007	90	1/50	7	386:1	50	0.15	5/16	150	75	MTPM-BRUSH-7	6	PDF
VP1C-90V-1011			11	269:1		0.19						PDF
VP1C-90V-1021		1/32	21	120:1		0.28						PDF
VP1C-90V-2029		1/25	29	83.5:1	40	0.31						PDF
VP1C-90V-2047			47	55:1	26	0.33						PDF
VP1C-90V-2094			94	26:1	13	0.31						PDF
** Current must be limited so that it does not exceed 125% of the gearmotor rated current.*												

IronHorse MTG Gearmotor Specifications

General Specifications and Features for all MTG Gearmotors

- TENV enclosure
- IP40 environmental rating
- Class F insulation
- SCR rated
- Externally-replaceable brushes
- Double-shielded bearings
- Permanently-lubricated
- Dynamically-balanced armature
- Reversible design
- Can be mounted in any orientation
- Not intended for DC power generation
- UL recognized (E365956), CSA certified (259724), RoHS compliant

MTGP Parallel Shaft Gearmotors Specifications

Gearmotor Specifications – MTGP Series Parallel Shaft Gearmotors

Part Number	Voltage (VDC)	Motor HP	Speed (rpm)	Gear Ratio	F/L Torque (lb·in)	F/L Current (A) *	Resistance (ohms)	Inductance (mH)	Shaft Dia (in)	Overhung Load (lb)	Axial/ Thrust Load (lb)	Weight (lb)	Gearbox Features	Dimension Draning #
MTGP-P06-1J008	12	1/16	7.9	386:1	50	1.39	0.372	0.804	0.3125	50	None	4.0	Grease lubrication** Sleeve bearings 18-inch wiring leads Face mounted	P-A
MTGP-P06-1J024			24	120:1	50	2.41								
MTGP-P06-1J034			34	83:1	45	2.86								
MTGP-P06-1J050			50	55:1	45	3.88								
MTGP-P06-1J097			97	26:1	36	5.68								
MTGP-P06-1L008	90	1/17	8.4	386:1	50	0.19	17.0	41.0						
MTGP-P06-1L012			12	269:1	50	0.23								
MTGP-P06-1L037			37	83:1	45	0.40								
MTGP-P06-1L055			55	55:1	45	0.54								
MTGP-P06-1L114			114	26:1	26	0.61								
MTGP-P14-1L026	90	1/7	26	69:1	280	1.58	5.17	0.041	0.625	150	200	11.4	Oil lubrication** Needle bearings Junction box with 8-inch wiring leads Face or foot mounted Designed to AGMA standards	P-B
MTGP-P14-1L039			39	46:1	189	1.59								
MTGP-P14-1L061			61	30:1	130	1.59								
MTGP-P14-1L091			91	20:1	86	1.58								
MTGP-P14-1L165			165	11:1	47	1.57								
MTGP-P20-1J026	12	1/5	26	69:1	280	12.60	0.101	0.472						
MTGP-P20-1J037			37	46:1	245	15.80								
MTGP-P20-1J056			56	30:1	168	15.70								
MTGP-P20-1J084			84	20:1	112	15.70								
MTGP-P20-1J154			154	11:1	61	15.60								
MTGP-P20-1K018	24	1/5	18	110:1	280	4.41	0.405	1.89						
MTGP-P20-1K036			36	46:1	245	7.89								
MTGP-P20-1K084			84	20:1	112	7.87								
MTGP-P20-1K153			153	11:1	61	7.81								

** Current must be limited so that it does not exceed 125% of the gearmotor rated current.*
*** Permanently lubricated.*

NOTE: Replacement parts are available; refer to the "Accessories" section of this user manual.

IRONHORSE MTG GEARMOTOR SPECIFICATIONS (CONTINUED)

MTGR RIGHT-ANGLE SHAFT GEARMOTORS SPECIFICATIONS

Gearmotor Specifications – MTGR Series Right-Angle Shaft Gearmotors														
Part Number	***Voltage (VDC)***	***Motor HP***	***Speed (rpm)***	***Gear Ratio***	***F/L Torque (lb·in)***	***F/L Current (A) ****	***Resistance (ohms)***	***Inductance (mH)***	***Shaft***	***Overhung Load (lb)***	***Axial/ Thrust Load (lb)***	***Weight (lb)***	***Gearbox Features***	***Dimension Drawing #***
MTGR-P05-1L038	90	1/19	38	50.0:1	42	0.68	17.0	66.4	Dual shaft 0.5 in dia	200	150	8.3	Grease lubrication** Ball bearings Junction box with 8-inch wiring leads Foot or face mounted Single worm	R-A
MTGR-P05-1L053			53	36.0:1	33	0.68								
MTGR-P05-1L093			93	20.5:1	23	0.68								
MTGR-P05-1L132			132	14.5:1	17	0.67								
MTGR-P05-1L197			197	9.75:1	12	0.68								
MTGR-P07-1J036	12	1/15	36	50:1	50	5.69	0.284	1.20						
MTGR-P07-1J084			84	20.5:1	34	6.78								
MTGR-P07-1J177			177	9.75:1	18	6.78								
MTGR-P14-1L022	90	1/7	22	82:1	280	1.41	4.73	25.4	Single shaft 0.625 in dia	150	200	14.4	Double shielded ball bearings Junction box with 8-inch wiring leads Foot mounted Bevel gears 80 – 90% efficient Can be backdriven***	R-B
MTGR-P14-1L040			40	44:1	185	1.64								
MTGR-P14-1L064			64	28:1	116	1.65								
MTGR-P14-1L077			77	23:1	97	1.65								
MTGR-P14-1L178			178	10:1	44	1.64								
MTGR-P20-1K023	24	1/5	23	82:1	280	5.64	0.294	1.59						
MTGR-P20-1K039			39	44:1	263	8.74								
MTGR-P20-1K075			75	23:1	137	8.72								
MTGR-P20-1K174			174	10:1	63	8.75								

** Current must be limited so that it does not exceed 125% of the gearmotor rated current.*

*** Permanently lubricated.*

**** Not intended for DC power generation.*

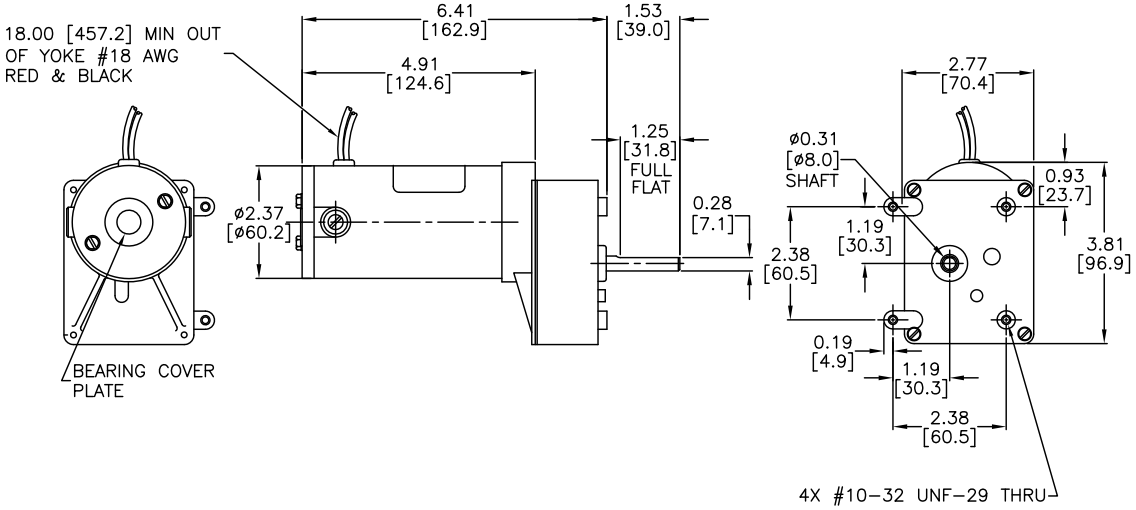
NOTE: Replacement parts are available; refer to the "Accessories" section of this user manual.

IRONHORSE MTG GEARMOTOR DIMENSIONS

MTGP PARALLEL SHAFT GEARMOTORS DIMENSIONS (in [mm])

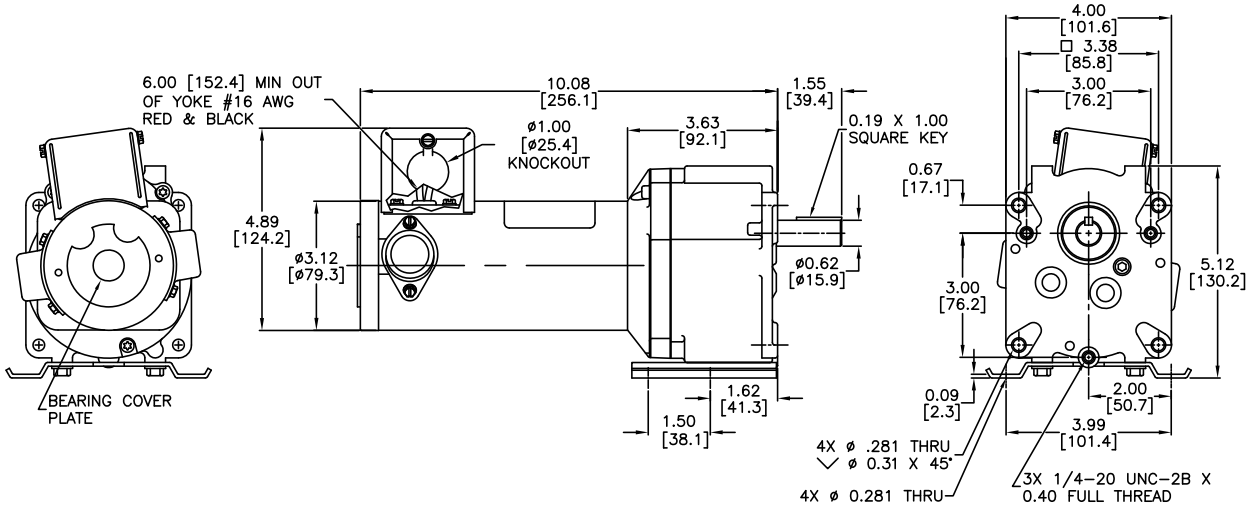
DRAWING # P-A

- We recommend that MTGP gearmotors of this type be mounted using the four 10-32 threaded holes shown in the front view.



DRAWING # P-B

- MTGP gearmotors of this type can be either foot-mounted or face-mounted. In applications involving overhung loads, foot mounting is recommended. When face-mounting the gearmotor, the 0.281" through-holes are preferred.

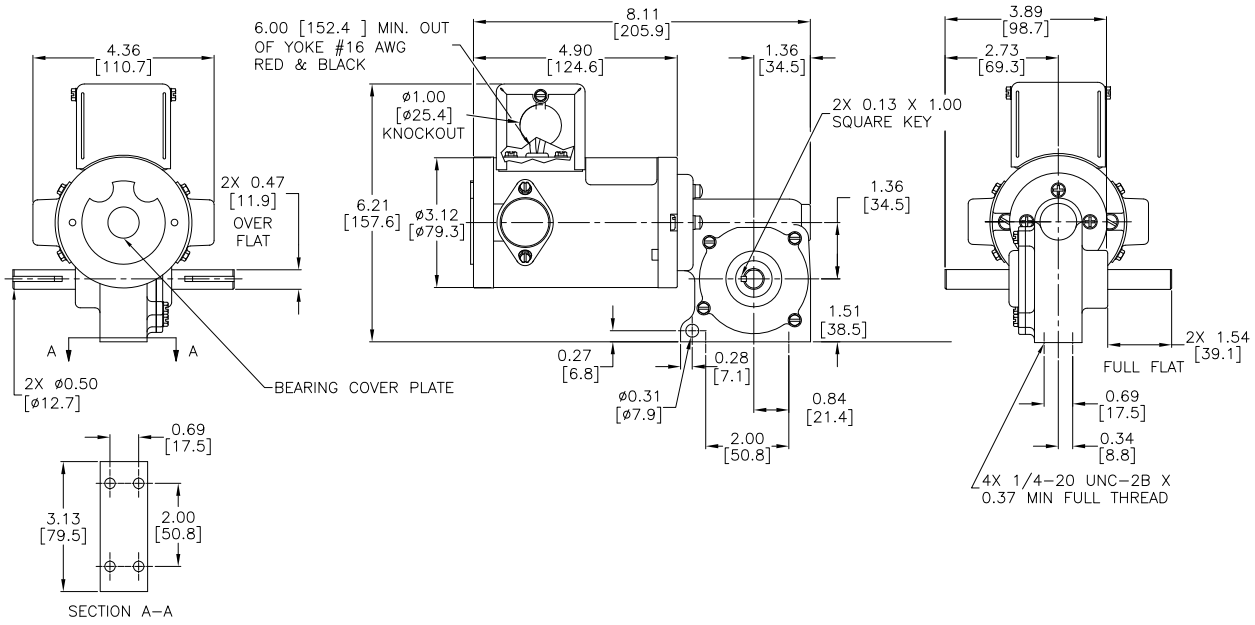


IRONHORSE MTG GEARMOTOR DIMENSIONS (CONTINUED)

MTGR RIGHT-ANGLE SHAFT GEARMOTORS DIMENSIONS (in [mm])

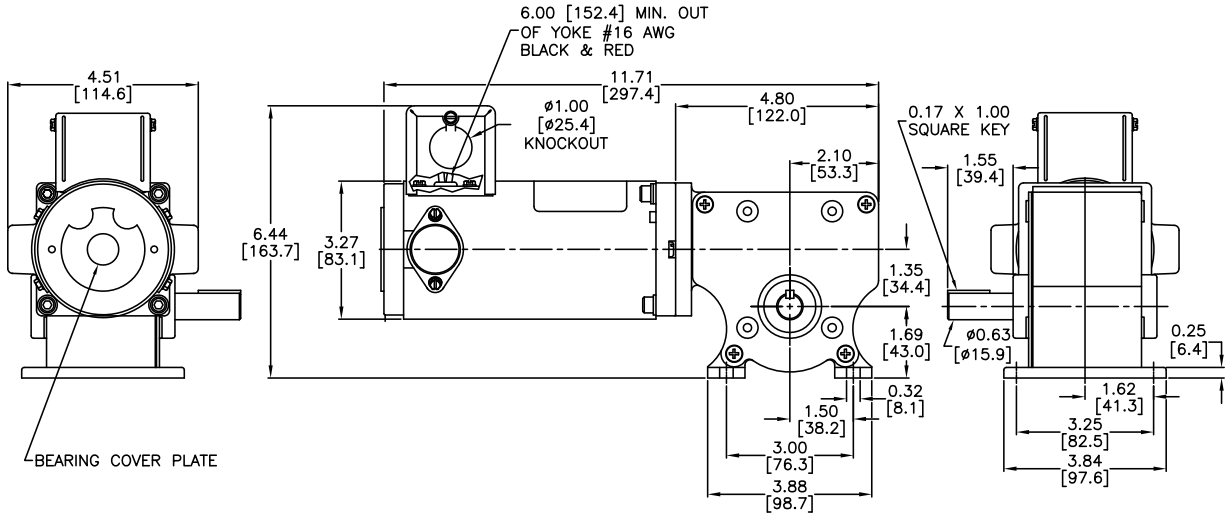
DRAWING # R-A

- We recommend that MTGR gearmotors of this type be foot mounted (see section A-A). If shaft mounted, secure the gearmotor using the 0.31" through hole shown in the side view.



DRAWING # R-B

- We recommend that MTGR gearmotors of this type be foot mounted. There are no through holes or threaded holes for face mounting this gearmotor.

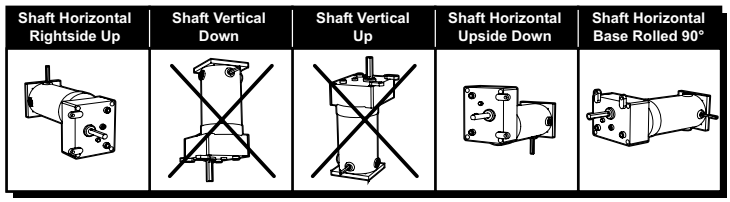
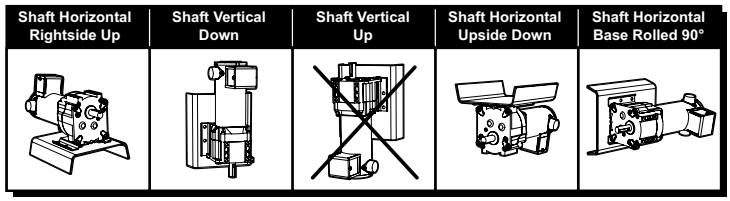
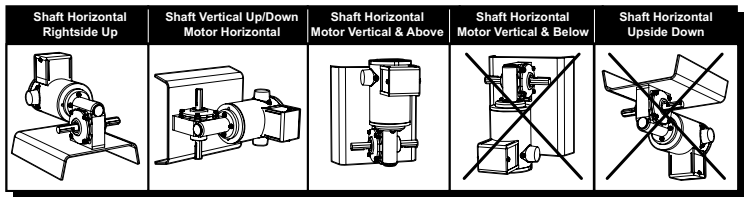
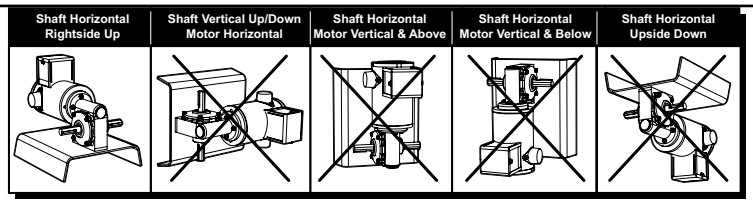


Motor Mounting

To avoid premature motor and/or bearing failure, IronHorse gearmotors should be installed in accordance with the guidelines listed here, as well as the recommendations on the previous dimension-drawing pages.

Orientation restrictions vary depending on model. See illustrations for details.

Mounting Orientations

VP1B ***VP1C*** ***MTGP-P06***	
VP1A ***MTGP-P14*** ***MTGP-P20***	
MTGR-P05 ***MTGR-P07***	
MTGR-P14 ***MTGR-P20***	

When necessary, use shims at the mounting bolt holes to ensure that the equipment surface is parallel to the gearmotor mounting surface. Use proper diameter bolts of the highest grade material available for the application, as shown on the dimension diagrams.

A mounted gearmotor must operate vibration free. Each gearmotor installation should be checked for potential vibration situations.

Proper Installation Conditions

Mount IronHorse gearmotors so that they do not contact a wall or structure that would prevent proper ventilation of the motor. The installation area should be free of dust and smoke particles. Maximum ambient temperature should not exceed 40°C [104°F].

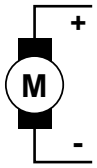
Coupling Alignment

Correct coupling alignment is very important to the life of the gearmotor. Coupling misalignment is the major cause of bearing failure. In belt driven applications, pulleys should be installed correctly. Belt tension, alignment and wear should be checked at installation and at regular maintenance intervals. Install couplings per the manufacturers instructions. Whenever possible, direct couple or flange mount IronHorse gearmotors in their application. Doing so can greatly extend the bearing life.

Terminal Diagram and Wiring

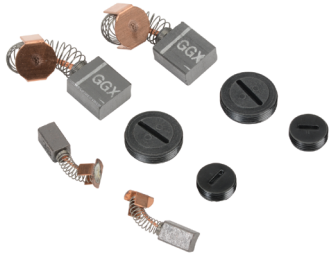
DC motors are very easy to wire. There are only two terminals; one for the positive lead and one for the negative lead.

If wired correctly, the motor will turn clockwise when you are facing the gearmotor shaft. If the gearmotor turns counterclockwise, reverse the positive and negative leads.



Accessories

Replacement DC Motor Brushes



Spare Parts Kit

Replacement brushes and spare parts can be ordered at www.automationdirect.com.

Replacement DC Gearmotor Brushes

Match the replacement brush part number against the motor horsepower carefully to ensure you order the correct brushes for your motor. When replacing brushes, pay special attention that the correct brush is inserted into the motor (especially if you have multiple motor sizes at your facility). Verify that the width of the brush you remove matches the width of the replacement brush. DO NOT install smaller brushes into a larger motor.

DC Gearmotor Replacement Brushes					
Part Number	***Description***	***Gearmotor Type***	***Rated Voltage***	***Motor HP***	***Brush Materials***
MTPM-BRUSH-4	Brushes with springs and caps; (one set of 2)	MTGx-P20-1Jxxx MTGx-P20-1Kxxx	12VDC 24VDC	1/5	Copper graphite
MTPM-BRUSH-5		VP1B MTGx-P06-1Jxxx MTGx-P07-1Jxxx	12VDC 12VDC	1/16 1/15	
MTPM-BRUSH-6		VP1A MTGx-P14-1Lxxx	90VDC	1/7	Carbon graphite
MTPM-BRUSH-7		VP1C MTGx-P05-1Lxxx MTGx-P06-1Lxxx	90VDC 90VDC	1/19 1/17	
All IronHorse DC gearmotors ship with one set of brushes installed.					

Spare Parts Kit

DC Gearmotor Spare Parts Kit		
Part Number	***Description***	***For Gearmotors***
MTGA-KIT-1	DC motor spare parts kit, for certain MTGP and all MTGR series DC gearmotors as listed. Includes: two metal brush cap covers, one terminal box, one 1/8 (0.125 inch) shaft key, and one 3/16 (0.187 inch) shaft key.	MTGP-P14-1xxxx, MTGP-P20-1xxxx; MTGR-Pxx-1xxxx
All IronHorse DC gearmotors ship with a brush cap cover, a terminal box, and a shaft key installed (if required, depending on model #).		

Replacing Brushes

Warning: To prevent serious personal injury and damage to your equipment, always disconnect input power before replacing brushes.

Brushes should be replaced after every 2500 hours of operation. If you visually inspect the brushes, the minimum acceptable length is 6mm.

Make sure you install the correct replacement brushes; check the part numbers carefully. Ensure that the replacement brushes are the same width as the brushes being removed from the motor. DO NOT install smaller brushes in a larger motor. There is no break-in period with new brushes.

Replacement brush and spring assembly set:

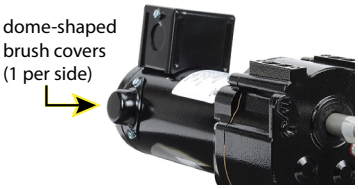
Note: The brushes are spring-loaded. Be careful when removing the brush cover.

Motor has two brushes: one on each side of the motor.
Always replace the brushes in pairs.

1) Remove the brush cover using a flathead screwdriver as shown. Turn the brush cover counterclockwise to remove.
2) Carefully remove the old brush and spring assembly and install the replacement.
3) Reinstall the brush cover, turning clockwise.
4) Replace the other motor brush and spring following the same steps.

Typical for VP1 series and MTGP-P06-1xxxx

Typical for: MTGR-Pxx-1xxxx
MTGP-P14-1xxxx, MTGP-P20-1xxxx



Routine Maintenance

A routine maintenance schedule should be developed for every IronHorse gearmotor installation based on the individual application. Gearmotors installed in a harsh running environment should be serviced more frequently than those installed in a clean, climate controlled area. The following list should be used as a basis for creating the routine maintenance schedule.

1) Clean the gearmotor housing using a brush, soft cloth or compressed air.
2) Frequently monitor the motor temperature. It should not exceed 60°C [140°F].
3) Measure and record the motor running current, and verify that it is below the rated FLA. If not, check for an overload situation (coupling issues, binding, too much load, etc.).
4) Bearings are permanently lubricated and do not require maintenance.

Troubleshooting

To prevent serious damage, faults observed when a motor first goes into service or during subsequent operation should be investigated and repaired immediately. These troubleshooting tables cover most common PMDC motor problems.

Warning: To prevent serious personal injury and damage to your equipment, always disconnect input power before inspecting or repairing your motor.

Mechanical Problems – Noise While Running Problems		
Problem	***Possible Causes***	***Solutions***
Motor vibrates or runs noisily when coupled up, but runs okay when uncoupled.	Defective transmission components, or problem with the machine being driven.	Inspect transmission and drive components. Check alignment.
	Foundation has become unlevel.	Realign machine set. Check and repair foundation level.
	Problem with gear drive.	Align drive, check driving and driven gear pitch circles.
	Incorrectly balanced drive or driven machine components.	Re-balance drive and/or driven components.
Motor runs rough when uncoupled.	Bearing damage.	See Bearing Problems troubleshooting table.
	Mounting bolts are loose.	Tighten and lock mounting bolts.
	Fitted drive components (coupling or pulleys) affecting rotor balance.	Balance rotor with coupling or pulley fitted.

Mechanical Problems – Bearing Problems		
Problem	***Possible Causes***	***Solutions***
Scratching, rubbing, or rumbling noise from bearing.	Bearing is defective.	Replace gearmotor.
Whistling noise from bearing.	Bearing has run dry.	Replace gearmotor.
	Faulty cage.	Replace gearmotor.
Excessive bearing wear.	Bearing overloaded.	Check alignment, belt tension, gear pressure, coupling thrust. Reduce bearing load. If needed, reduce additional axial load.
Scoring when motor is inoperative.	Bearing is being subjected to vibration from outside source.	Isolate motor from source of vibration or keep motor turning over.

TROUBLESHOOTING (CONTINUED)

Electrical Problems		
Problem	***Possible Causes***	***Solutions***
Motor shaft rotates in wrong direction (should rotate clockwise when facing shaft).	Positive (+) and negative (-) input power leads are reversed.	Switch the input power connections.
Motor fails to start off-load.	Break in the armature supply.	Check and repair connection.
	Fuse is blown.	Replace fuse.
	Controller damaged or incorrectly connected.	Check starter for break in circuit and repair break.
	Armature coils burned out or short-circuiting.	Correct short circuit. This may require bringing the motor to a repair shop.
	Brushes not bearing down correctly.	Check brush position and bearing pressure. Replace worn brushes.
Jerky starting.	Break in starter circuit.	Repair break.
	Armature short circuit.	Correct short circuit. This may require bringing the motor to a repair shop.
	Commutator short circuit.	Check commutator and repair short circuit.
Motor will not run under load.	Short circuit in the supply.	Locate short circuit and repair.
	Overloading.	Check current input and remedy overload.
	Voltage drop.	Increase supply line cross section.
Motor overspeeding and hunting while under load.	Controller.	Decrease IR compensation. Check speed potentiometer wiring and signal, and repair if needed.
Motor overheating.	Overloading.	Check voltage and current levels, and correct overload condition.
	Insufficient airflow.	Improve cooling conditions.
	Cooling air temperature too high.	If TEFC model, inspect the fan for damage.
	Armature winding short circuit.	Check windings and soldered connections. Repair coils or windings.