

IG9190 Geared Servo Actuator

Ultra-Compact Precision Geared Servo Actuator

IG9190 Comprising ...

- Precision Dual-Stage Planetary Gear 110
- Integrated Low-Voltage DC Brushless Pancake Motor
- High Resolution Encoder Plus Halls

Actuator Options ...

- Gearbox Ratio Options: 16:1, 20:1, 25:1, 50:1 & 100:1
- Motor Voltage Options: 24 VDC, 48 VDC & 72 VDC
- Motor Rated Power Options: 0.5 kW, 1.0 kW & 1.5 kW
- Backlash Specification Options: ≤ 3 Arc Min & ≤ 5 Arc Min
- IP Rating Options: IP65
- Output Bearing Configuration Options: Ball Bearing or High-Capacity Roller Bearing
- Holding Brake Option: 24VDC
- Low Temperature Grease Option



Part Number Nomenclature

IG9190	-	XXX	-	XXX	-	XXX	-	XXX	-	XXX	-	XXX	-	XXX
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Configuration Options

Actuator OD	110	-	Nominal Actuator Diameter (mm)
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Actuator Gear Type	SPT ULT	-	SPT - Backlash <8 Arc Min - IP54 - Ball Output Bearing - Straight Gears - NOT CURRENTLY AVAILABLE ULT - Backlash <5 Arc Min - IP65 - Standard Ball Output Bearing - Option for Roller Bearing - Helical Gears
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Actuator Gear Configuration	STD CPT HTQ	-	Standard - Available for SPT only - NOT CURRENTLY AVAILABLE Compact - Future Option for ULT only - NOT CURRENTLY AVAILABLE High Torque - Available for ULT only
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Actuator Output Bearing	OBB ORB	-	Output Ball Bearing Output Roller Bearing - Option available for ULT only
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Actuator Gear Ratio	016 020 025 050 100	-	16:1 (SPT & ULT) 20:1 (SPT & ULT) 25:1 (SPT & ULT) 50:1 (SPT & ULT) 100:1 (SPT & ULT)
Additional Ratio Options Available on Request			

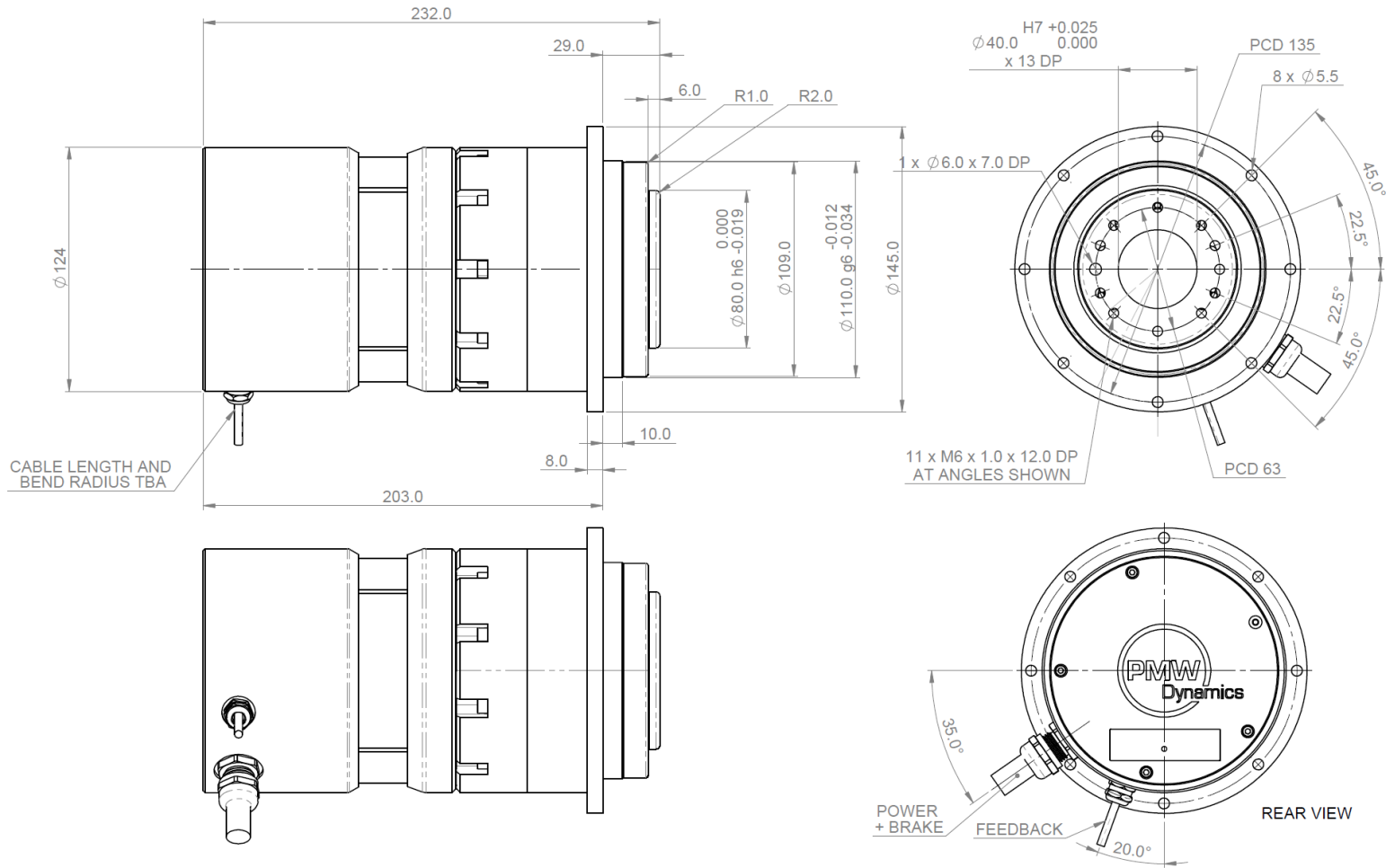
Motor Rated Power	050 100 150	-	500W - 24V, 48V & 72V 1,000W - 48V & 72V Only 1,500W - 72V Only
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Motor Voltage Designation	024 048 072	-	24V 48V 72V
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Holding Brake	No Holding Brake Holding Brake 24V	-	NBK BK2
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Outline Drawing High Performance ULT - HTQ Gearbox Variant - 500W Motor

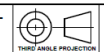
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DO NOT SCALE IF IN DOUBT - ASK CONFORMS TO BS 8888 TOLERANCING TO ISO 9015	
DRAWN BY PK	DATE 16/10/2023
CHECKED BY RB	DATE 17/06/2024
APPROVED BY RB	DATE 17/06/2024

GENERAL TOLERANCES TO DIN ISO 2768-1 LINEAR, ANGULAR, CHMF & RADS UNLESS STATED - CLASS f (FINE) DIN ISO 2768-2 FOR FORM & POSITION - CLASS H

UNLESS SPECIFIED SHAFT CENTRES SHALL CONFORM TO BS EN ISO 6411-1997 TYPE A. CENTRE DRILL TO CONFORM TO ISO 866 ALL METRIC THREADS TO BE COARSE CLASS 6H OR 6g HOLE POSITION ± 0.2 UNLESS STATED SURFACE FINISH
 $\sqrt{Ra 3.2}$ MILLING $\sqrt{Ra 1.6}$ TURNING
 REMOVE BURRS & SHARP EDGES. DIMENSIONS APPLY AFTER PLATING



MATERIAL SEE NOTE

FINISH SEE NOTE

DIMENSIONS mm

ESTIMATED MASS TBAg

SCALE 1:2

PMW DYNAMICS
ALTON, HAMPSHIRE, GU34 2QW, UK

TITLE
IG9190- MOTOR GEARBOX - 500W - OUTLINE

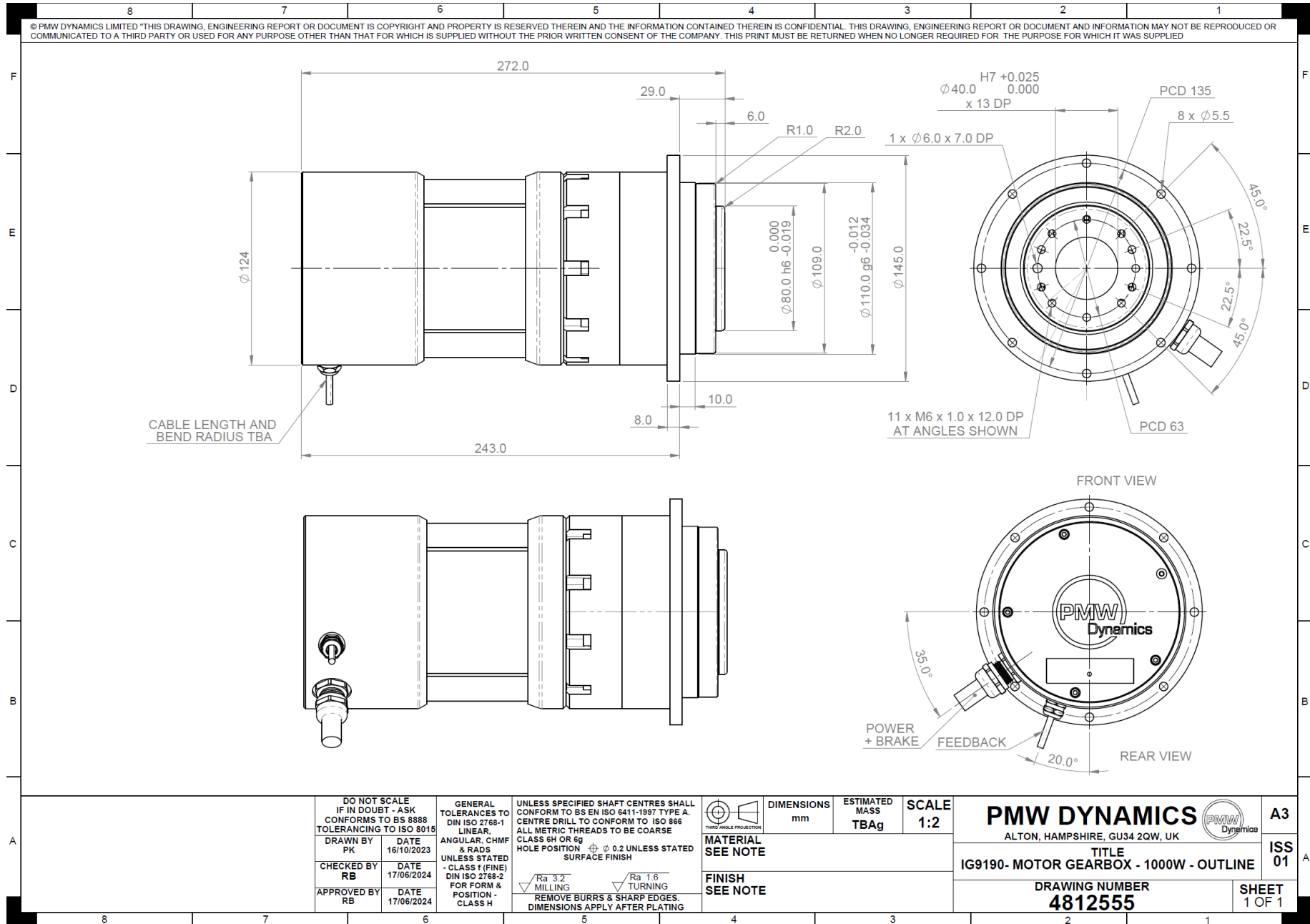
DRAWING NUMBER
4812554

A3

ISS 01

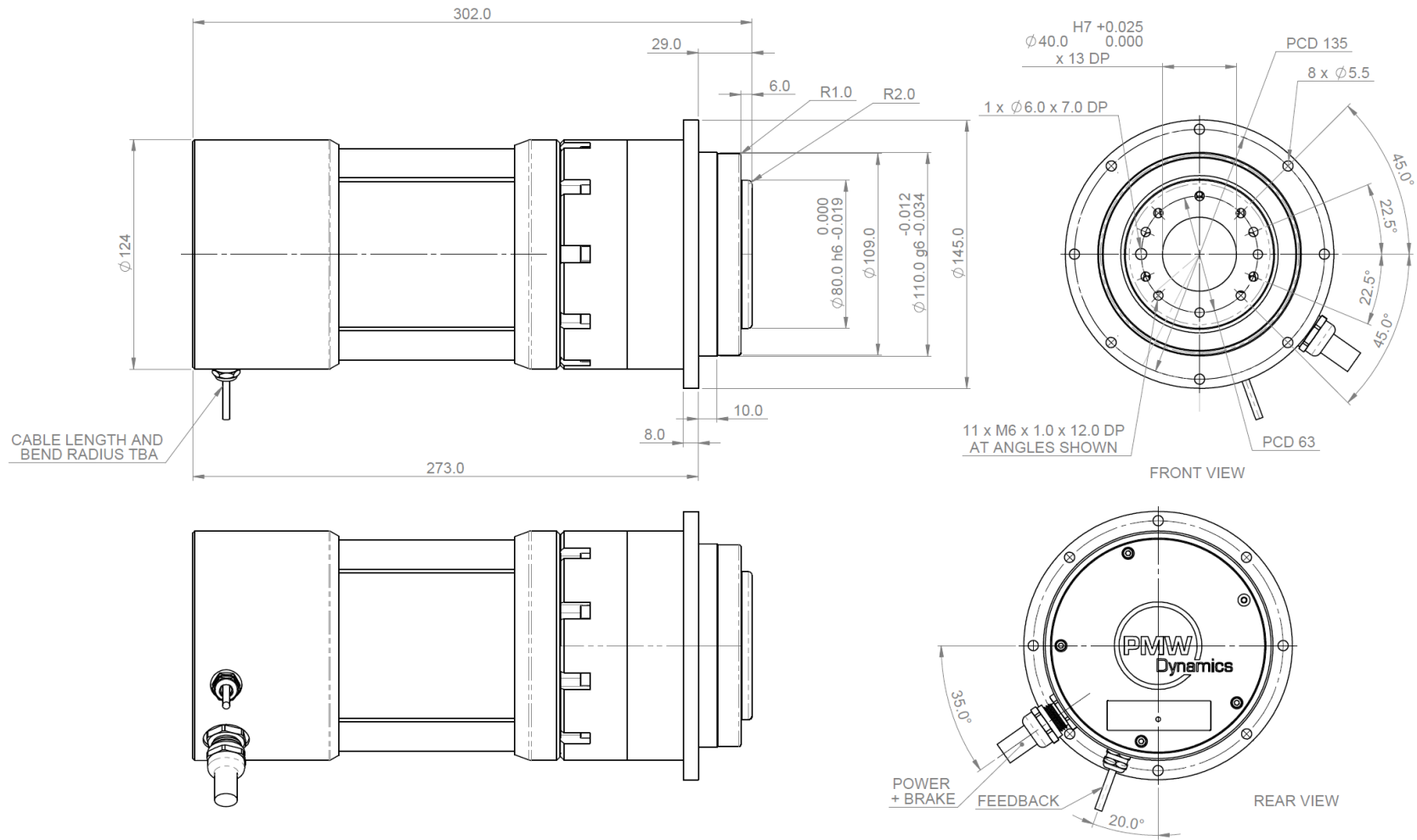
SHEET 1 OF 1

Outline Drawing High Performance ULT - HTQ Gearbox Variant - 1,000W Motor



Outline Drawing High Performance ULT - HTQ Gearbox Variant - 1,500W Motor

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GENERAL TOLERANCES TO DIN ISO 2768-1 LINEAR, ANGULAR, CHMF & RADS UNLESS STATED - CLASS 1 (FINE) DIN ISO 2768-2 FOR FORM & POSITION - CLASS H

UNLESS SPECIFIED SHAFT CENTRES SHALL CONFORM TO BS EN ISO 6411-1897 TYPE A. CENTRE DRILL TO CONFORM TO ISO 866 ALL METRIC THREADS TO BE COARSE CLASS 6H OR 6g HOLE POSITION $\phi 0.2$ UNLESS STATED SURFACE FINISH

✓ Ra 3.2 MILLING
 ✓ Ra 1.6 TURNING
 REMOVE BURRS & SHARP EDGES. DIMENSIONS APPLY AFTER PLATING



MATERIAL SEE NOTE

FINISH SEE NOTE

DIMENSIONS mm

ESTIMATED MASS TBAg

SCALE 1:2

PMW DYNAMICS
 ALTON, HAMPSHIRE, GU34 2QW, UK

TITLE
IG9190- MOTOR GEARBOX - 1500W - OUTLINE

DRAWING NUMBER
4812556

A3

ISS 01

SHEET 1 OF 1

High Performance ULT - HTQ Gearbox Variant

Gearbox Type	ULT							
Actuator Ratio	016	020	025	050	100		:1	
Motor Rated Power	0.5							kW
Rated Output Torque ⁷	23.0	28.8	36.0	72.0	144.0		Nm ²	
Rated Output Speed	187.5	150.0	120.0	60.0	30.0		RPM	
Peak Output Torque ⁷	46.1	57.6	72.0	144.0	288.0		Nm	
Speed at Peak Torque	175.0	140.0	112.0	56.0	28.0		RPM	
Rated Current	22.3 (24V Motor) 11.0 (48V Motor) 7.4 (72V Motor)							A RMS
Motor Ke/Kt - 24V Rated Voltage Winding (+/- 10%)	Ke 0.0610 VS/Rad Kt 0.0520 Nm/Arms							
Motor Ke/Kt - 48V Rated Voltage Winding (+/- 10%)	Ke 0.1220 VS/Rad Kt 0.1040 Nm/Arms							
Motor Ke/Kt - 72V Rated Voltage Winding (+/- 10%)	Ke 0.1830 VS/Rad Kt 0.1560 Nm/Arms							
24V Motor Inductance (mH) & Resistance (+/- 10%)	0.082 mH 0.028 Ω							
48V Motor Inductance (mH) & Resistance (+/- 10%)	0.327 mH 0.110 Ω							
72V Motor Inductance (mH) & Resistance (+/- 10%)	0.736 mH 0.248 Ω							
Motor Rated Power	1.0							kW
Rated Output Torque ⁷	46.1	57.6	72.0	144.0	147.0 ¹		Nm	
Rated Output Speed	187.5	150.0	120.0	60.0	30.0		RPM	
Peak Output Torque ⁷	92.2	115.0	144.0	288.0	353.0 ¹		Nm	
Speed at Peak Torque	175.0	140.0	112.0	56.0	28.0		RPM	
Rated Current	23.9 (48V Motor) 14.9 (72V Motor)							A RMS
Motor Ke/Kt - 48V Rated Voltage Winding (+/- 10%)	Ke 0.1169 VS/Rad Kt 0.0997 Nm/Arms							
Motor Ke/Kt - 72V Rated Voltage Winding (+/- 10%)	Ke 0.1880 VS/Rad Kt 0.1595 Nm/Arms							
48V Motor Inductance (mH) & Resistance (+/- 10%)	0.134 mH 0.035 Ω							
72V Motor Inductance (mH) & Resistance (+/- 10%)	0.342 mH 0.089 Ω							
Motor Rated Power	1.5							kW
Rated Output Torque ⁷	69.0	86.2	107.8	190.0 ¹	147.0 ¹		Nm	
Rated Output Speed	187.5	150.0	120.0	60.0	30.0		RPM	
Peak Output Torque ⁷	138.0	172.4	215.6	380.0 ¹	353.0 ¹		Nm	
Speed at Peak Torque	175.0	140.0	112.0	56.0	28.0		RPM	
Rated Current	24.0 (72V Motor)							A RMS
Motor Ke/Kt - 72V Rated Voltage Winding (+/- 10%)	Ke 0.1720 VS/Rad Kt 0.1470 Nm/Arms							
72V Motor Inductance (mH) & Resistance (+/- 10%)	0.179 mH 0.047 Ω							
Electrical Properties								
Motor Pole Pairs	5							Poles Pairs
Encoder	Differential Output ABI Output - 1,024 Pulse Per Revolution (4,096 Counts Per Revolution)							PPR
Thermistor	NTC							
Brake Voltage	24.0							VDC
Brake Current	0.63							A
Mechanical Properties								
Max. Backlash	≤5 (Standard) ≤3 (Option)							Arc Minutes
Torsional Stiffness	82.0							Nm/min
Tilting Moment	335 (Standard Output Ball Bearing) 675 (Option Output Tapered Roller Bearing)							Nm
Max Axial Load	5,700 (Standard Output Ball Bearing) 6,210 (Option Output Tapered Roller Bearing)							N
Max Radial Load	3,960 (Standard Output Ball Bearing) 7,850 (Option Output Tapered Roller Bearing)							N
Brake Holding Torque	4.0							Nm
Operating Life	20,000 ⁴							Hours
Operating Temperature	-15 to +45							Degs C
Protection Class	IP65							
Efficiency	> 94% @ Full Rated Gearbox Torque							
Lubrication	Lifetime lubrication (Grease)							

Engineering Notes

1. Torque limited by gearbox capacity. Drive current should be de-rated accordingly
2. Rated output torque calculated at 90% gearbox efficiency
3. Applied to front face of output flange at 100 RPM
4. Life calculated at nominal rated gearbox torque & speed
5. Rating based upon minimum continuous heatsinking capacity of 22W for 0.5kW, 44W for 1.0kW & 71W for 1.5kW
6. Output flange is precision steel hub for accurate alignment. Flange should be protected to avoid corrosion
7. Torque ratings valid if less than 10% of the radial load is applied to output flange – Please discuss with our Application Team

Motor Performance

500 Watt Motor | Rated Torque 1.6 Nm | Rated Speed 3,000 RPM | Peak Torque 3.2 Nm | Speed at Peak Torque 2,800 RPM

1,000 Watt Motor | Rated Torque 3.2 Nm | Rated Speed 3,000 RPM | Peak Torque 6.4 Nm | Speed at Peak Torque 2,800 RPM

1,500 Watt Motor | Rated Torque 4.79 Nm | Rated Speed 3,000 RPM | Peak Torque 9.58 Nm | Speed at Peak Torque 2,800 RPM

Please note that motor voltage designations are maximum charge voltages for battery packs. Nominal operating DC BUS voltage are as follows ...

24V Motor – 21V DC (i.e. published motor rated performance achieved @ 21V DC BUS)

48V Motor – 42V DC (i.e. published motor rated performance achieved @ 42V DC BUS)

72V Motor – 63V DC (i.e. published motor rated performance achieved @ 63V DC BUS)

Please note that motors are available without gearhead and as frameless component sets. Please ask our Application Team for further details

Important Notice

Provisional Datasheet: Contents subject to change without notice

Please contact PMW Dynamics to confirm specific performance and/or physical properties that are critical for your application

IG9190 Electrical Connections

Encoder	
+5V	RED
Gnd	BLUE
A	PINK
\overline{A}	GREY
B	GREEN
\overline{B}	YELLOW
Z	WHITE
\overline{Z}	BROWN
HALL U	BLACK
HALL V	PURPLE
HALL W	PINK & GREY
SCREEN	BRAID

Motor Phase Wire IDENTs	
Phase U	U or 1
Phase V	V or 2
Phase W	W or 3
SCREEN	BRAID

Thermistor	
NTC +	YELLOW
NTC -	YELLOW

Brake	
+24V	WHITE
Gnd	WHITE

Motor Power
Thermistor
Brake



Encoder