

Understanding Gearmotor “System Power” for Application Optimization

TIP:

When specifying and selecting a gearmotor, it is critical to know and understand the gearmotor system power, not just the motor power.

WHY:

Typically gearmotor manufacturers publish the specified motor output power, which most likely does not accurately convey the actual *gearmotor output power*. A gearmotor is, quite obviously, a motor combined with a gearbox (or speed reducer) to achieve the desired output specifications of speed, power and torque. When specifying or selecting a gearmotor for an OEM application, relying on the published motor power specification (HP) alone can be deceiving. To achieve a truly optimized gearmotor solution, it is important to know the SYSTEM output power. The SYSTEM output power represents the resulting gearmotor power after calculating the efficiency of the motor, AND the efficiency of the gearbox.

“The published motor output power basically makes the gearmotor specification look better than it really is,” said Ron Didier, VP-Engineering at Groschopp. “The gearmotor System Power specifications on the Groschopp website take into consideration the efficiency of the gearbox and factor that into the overall System Power rating so that a truly accurate SYSTEM power specification is available for designers to make accurate comparisons.”

Understanding the System Power and knowing the efficiency ratings of the motor and gearbox separately also gives the engineer/ designer important data to make comparisons. For example, comparing the efficiencies of a planetary gearmotor to a parallel shaft gearmotor allows product choices to be made based on overall efficiency, performance and cost – and thus optimize the application/solution. “With OEM applications this is particularly critical,” added Didier. “Oversizing or more likely, **undersizing** the gearmotor at OEM volumes can be costly in terms of overall product life, premature failure, poor performance and the resulting expense.”

HOW TO DO IT RIGHT:

When selecting a gearmotor, determine if the published Power or Output Power specification is for the motor only, or if this specification also includes the gearbox/speed reducer efficiency. The gearmotor vendor should be able to provide both motor and gearbox efficiency ratings, and if not calculated as System Power, you can calculate the gearmotor System Power by multiplying motor output power by the appropriate gearbox efficiency.

RESOURCES:

Groschopp’s gearmotor power specifications are published as System Power and represent the true gearmotor output power, including gearbox efficiency in the specification calculation.

Groschopp’s STP Design Search™ is a tool that relates the “fit” of a motor or gearmotor to an application’s performance specifications. The “fit” is determined by closest match to speed, torque, motor efficiency and gearbox efficiency (thus,

simple. smart. **STP** SPEED TORQUE POWER MOTOR & GEARMOTOR Design Search

Choose parameters and enter application values:
 Speed & Torque Speed & Power Torque & Power

Speed 87 rpm Torque 162.997 lb-in Power 0.225 hp

Search Reset Search

Gearmotor System Power

**Click column header to sort by parameter value

Rank	Product #	Model #	Motor Type	Gearbox	Ratio	Speed (RPM)	Torque (lb-in)	System Power (HP)	Details	RFQ
1	42703	PM10818-RA4020T	DC Motor	Right Angle	20	83	157.1	0.2069	Details >>	<input type="checkbox"/>
2	42733	PM10818-RA4020T	DC Motor	Right Angle	20	87	151.4	0.2085	Details >>	<input type="checkbox"/>
3	42250	PM10818-RA4025T	DC Motor	Right Angle	25	65	147.4	0.1526	Details >>	<input type="checkbox"/>
4	42704	PM10818-RA5025T	DC Motor	Right Angle	25	66	185.8	0.1958	Details >>	<input type="checkbox"/>
5	42734	PM10818-RA5025T	DC Motor	Right Angle	25	69	200	0.2183	Details >>	<input type="checkbox"/>
6	42223	PM10818-RA4025T	DC Motor	Right Angle	25	63	146.3	0.1461	Details >>	<input type="checkbox"/>
7	42725	PM10818-RA4025T	DC Motor	Right Angle	25	59	148.6	0.1386	Details >>	<input type="checkbox"/>
8	42735	PM10818-RA5030T	DC Motor	Right Angle	30	58	193.2	0.1781	Details >>	<input type="checkbox"/>
9	42716	PM10818-RA4020T	DC Motor	Right Angle	20	55	177.3	0.1547	Details >>	<input type="checkbox"/>
10	42224	PM10818-RA5030T	DC Motor	Right Angle	30	52	147.7	0.1229	Details >>	<input type="checkbox"/>

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system power). It can also present various gearmotor types (right angle, planetary, etc. based on the search parameters entered), allowing comparisons to be made.

The MOTORTEC™ Data Sheets for each gearmotor on Groschopp's website (PDF-Product Details) detail all three efficiency specifications: motor, gearbox and system.

EXAMPLES :

As an example, assume you have selected a 1/8 HP DC Right Angle Gearmotor with a published speed of 60 RPM and torque of 60 in-lbs. Typically, the published output power (HP) specification would be 1/8 HP (0.125). In reality, the efficiency of the motor alone is 74.6%, and efficiency of the RA gearbox is only 42.2%, which is fairly significant. The system power (the actual gearmotor output HP) is actually 0.057 HP, less than one-half of the published 0.125 HP "motor only" specification. This example underscores how important it is to understand that both the motor efficiency and the gearbox efficiency affect the overall system power specification and how this particular product would meet the application requirements.

A right angle (RA) gearbox is the least efficient of all gearbox types. In this example, if the application allows, other gearbox types – planetary or parallel shaft – or a combined planetary right-angle – might be considered to evaluate performance and optimization for the application.

Typical failures would range from a complete stall, to the motor overheating and completely failing because it is so significantly undersized for the application. Other undesirable results would be the gearmotor drawing too much current and overheating.

