
**AEROTECH
STEPPING MOTOR
TORQUE-SPEED
SPECIFICATIONS**

MAY, 1987



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INTRODUCTION

Specifications for Aerotech "standard" Stepping Motor/Translator matched pairs have just been finalized. General information for each translator and motor combination is presented in this document. To this date, six (6) recommended motor/translator combinations have been released. (Note (1) that the DM4003/100SM combination has been deleted, and (2) that the DM4001 will shortly be phased out.) The DM4005 will be modified to allow an adjustable current range of 1 through 5 amps. This will cover the 50SM and 101SM motors. Aerotech price lists will continue to list the DM4001 and the DM4005 as separate units, even though production will be making only the DM4005.

Future plans include the addition of a new translator (proposed DM16010, 160 volt off-line at 10 amps) to be mated with the new 1010SM (1000 Oz-In, bipolar stepping motor) or 510SM stepping motor. Preliminary tests of the DM16010 show very good performance with these latest motors. The proposed DM16010 will be physically and electrically identical to the existing DM8010, with the exception of a higher bus voltage (derived directly off-line from 115VAC). The DM16010 will have a much higher output power rating than the DM8010.

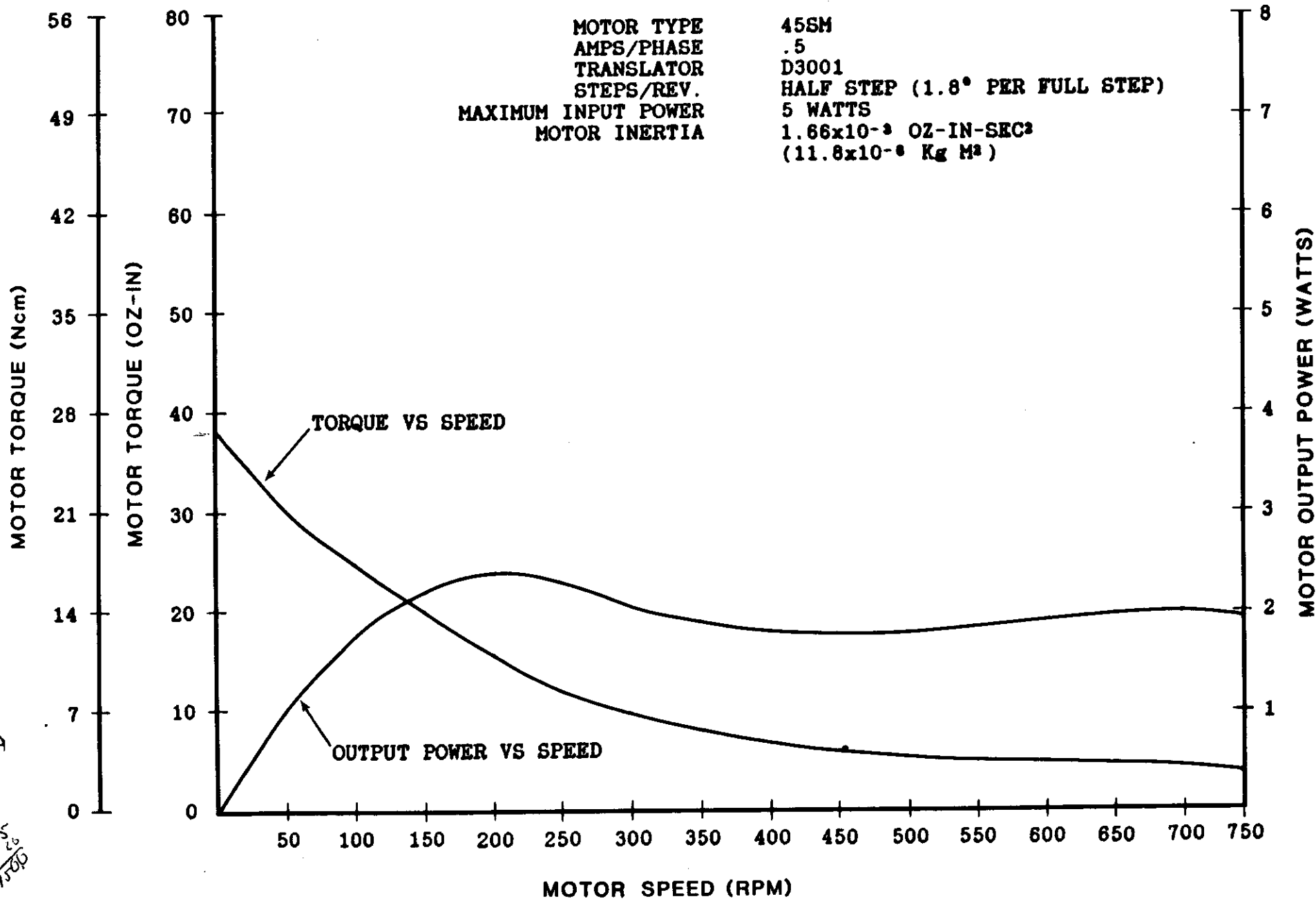
Speed and torque specifications for the six standardized motors and translators are shown on pages 2 through 7. Page 8 shows the torque speed curve for the proposed DM16010 and 1010SM combination. (The data on page 8 was derived from actual measurements of a prototype DM16010 and is considered to be accurate.) An analysis of the 510SM will also be made using the DM16010. We expect very good performance with this combination as well.

Mechanical specifications for the six standardized motors are shown on pages 10 through 14. Note that the home marker and cable connection options for the 510SM and 1010SM will be available in mid August, 1987.

Electrical specifications for stepping motor translators D3001, DM4001, DM4005, DM6006 and DM8010 are listed on pages 15 through 19. These specifications are provided to summarize general operating parameters for each translator. Detailed information for each translator can be found in the appropriate operator's manual.

45SM MOTOR

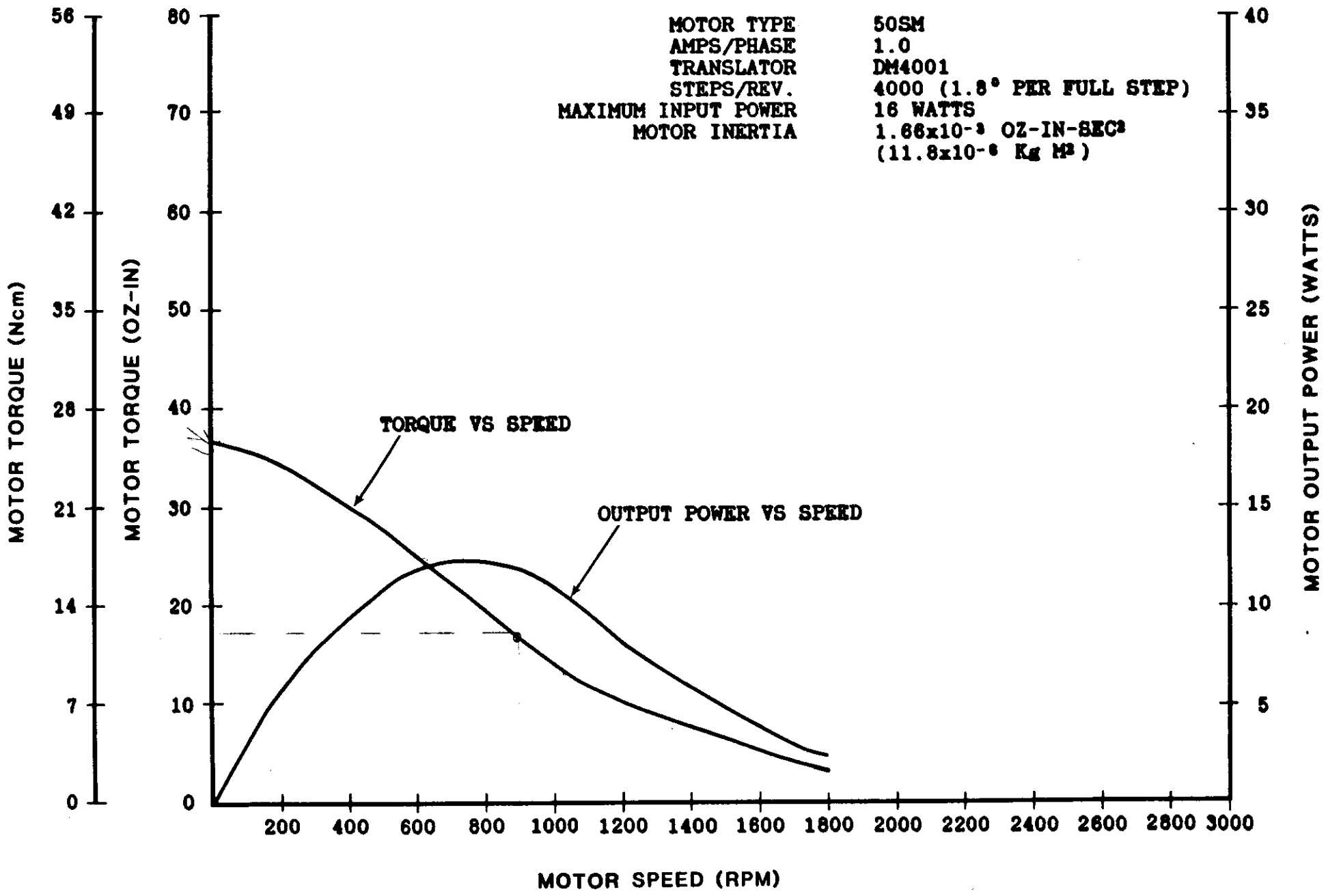
MOTOR TYPE 45SM
 AMPS/PHASE .5
 TRANSLATOR D3001
 STEPS/REV. HALF STEP (1.8° PER FULL STEP)
 MAXIMUM INPUT POWER 5 WATTS
 MOTOR INERTIA 1.66×10^{-3} OZ-IN-SEC²
 (11.8×10^{-6} Kg M²)



7.5
 4500
 7.5
 4500

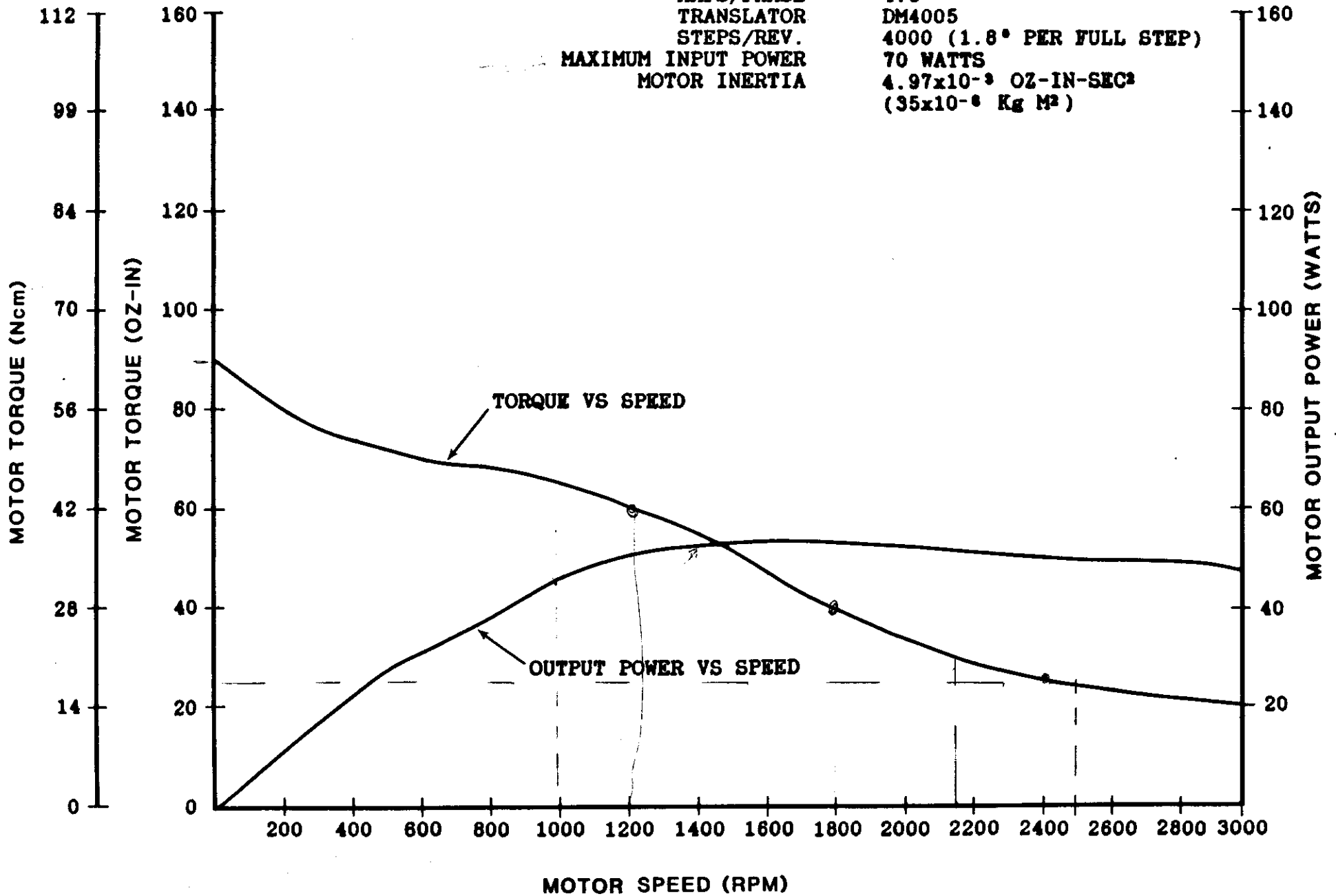
50SM MOTOR

MOTOR TYPE	50SM
AMPS/PHASE	1.0
TRANSLATOR	DM4001
STEPS/REV.	4000 (1.8° PER FULL STEP)
MAXIMUM INPUT POWER	16 WATTS
MOTOR INERTIA	1.66x10 ⁻³ OZ-IN-SEC ² (11.8x10 ⁻⁶ Kg M ²)



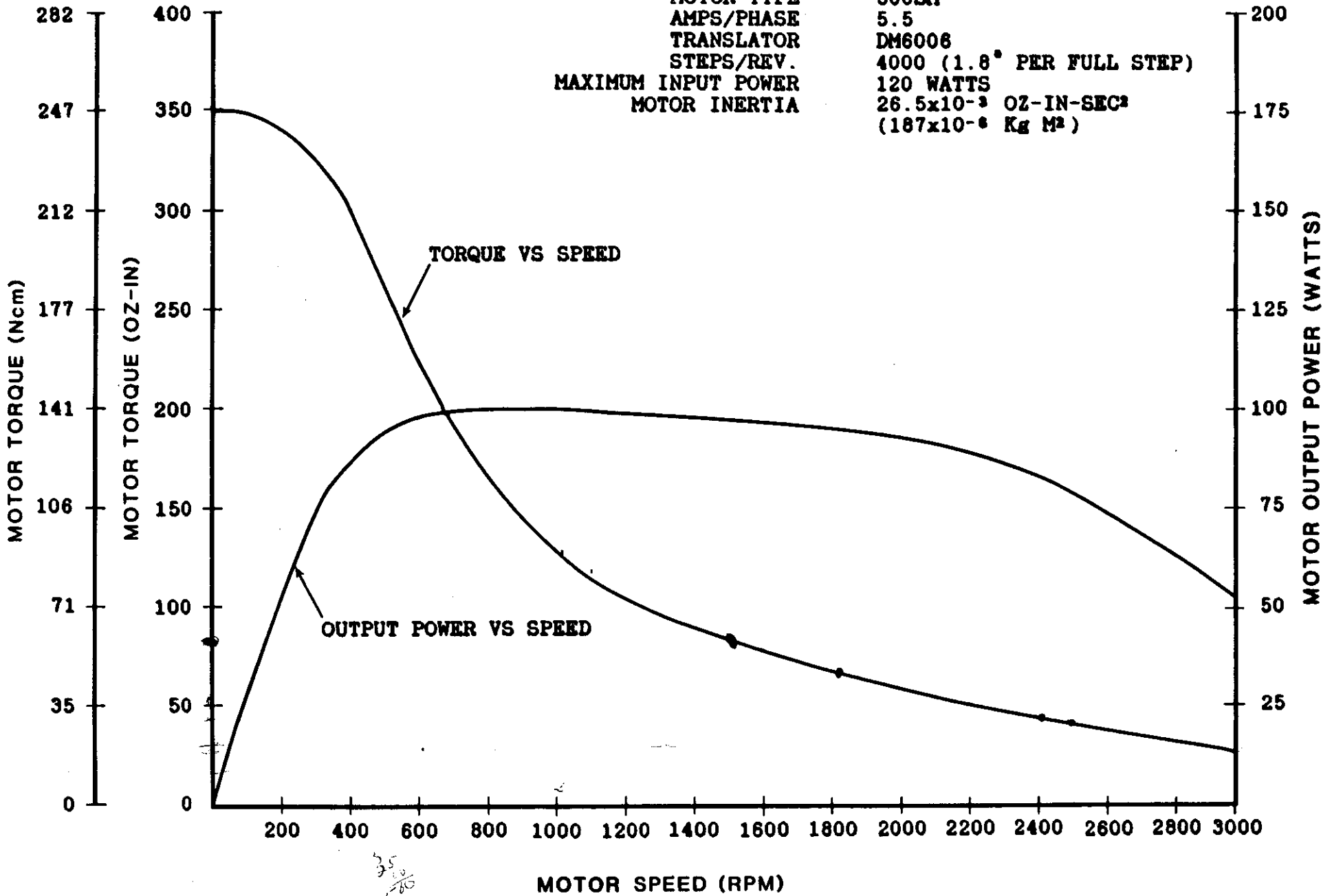
101SM MOTOR

MOTOR TYPE 101SM
AMPS/PHASE 4.6
TRANSLATOR DM4005
STEPS/REV. 4000 (1.8° PER FULL STEP)
MAXIMUM INPUT POWER 70 WATTS
MOTOR INERTIA 4.97×10^{-3} OZ-IN-SEC²
(35×10^{-6} Kg M²)



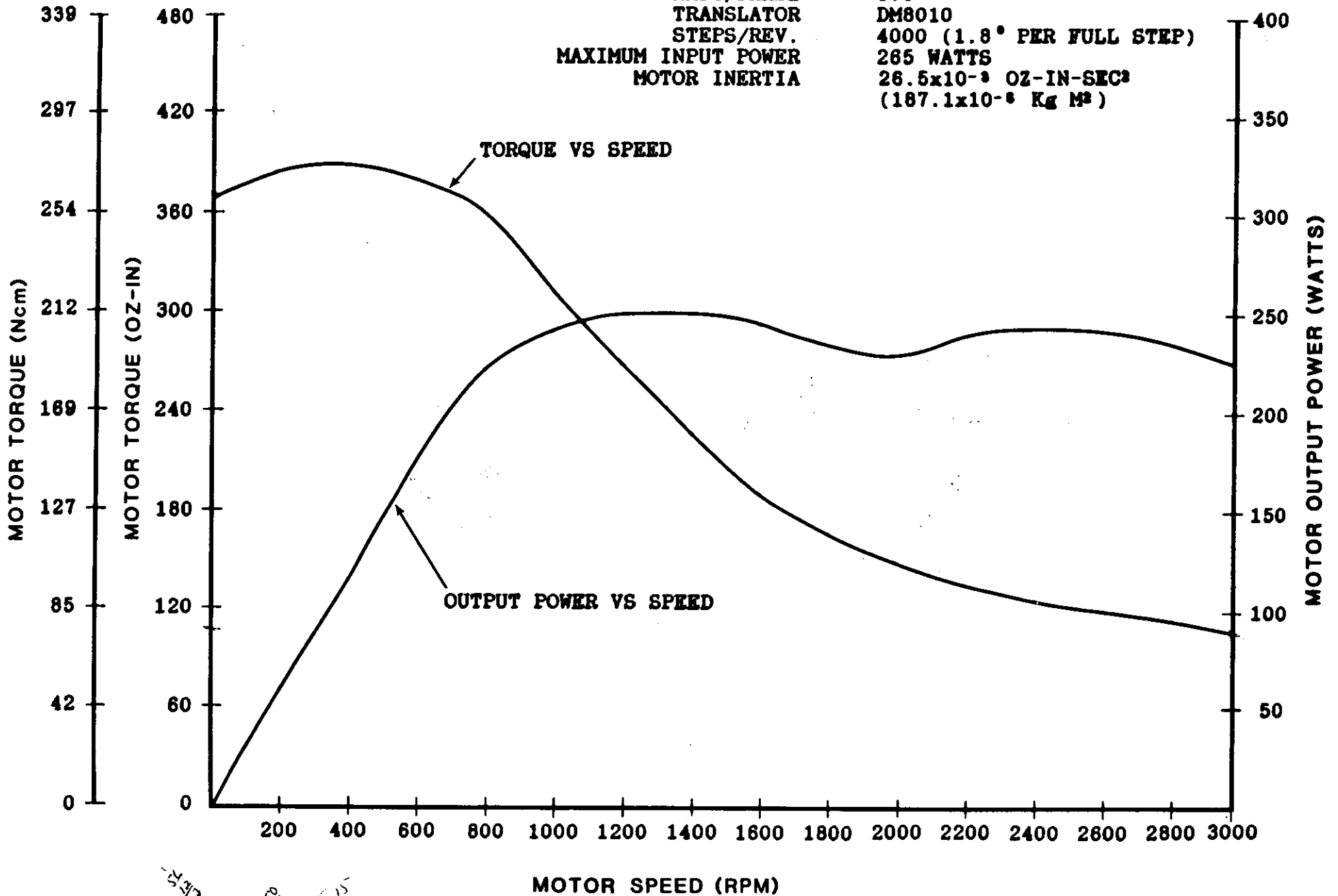
300SM MOTOR

MOTOR TYPE	300SM
AMPS/PHASE	5.5
TRANSLATOR	DM6006
STEPS/REV.	4000 (1.8° PER FULL STEP)
MAXIMUM INPUT POWER	120 WATTS
MOTOR INERTIA	26.5x10 ⁻³ OZ-IN-SEC ² (187x10 ⁻⁶ Kg M ²)



310SM MOTOR

MOTOR TYPE	310SM
AMPS/PHASE	6.0
TRANSLATOR	DM8010
STEPS/REV.	4000 (1.8° PER FULL STEP)
MAXIMUM INPUT POWER	265 WATTS
MOTOR INERTIA	26.5x10 ⁻³ OZ-IN-SEC ² (187.1x10 ⁻⁶ Kg M ²)



Handwritten calculations:

$$\frac{250}{1000} = \frac{25}{100}$$

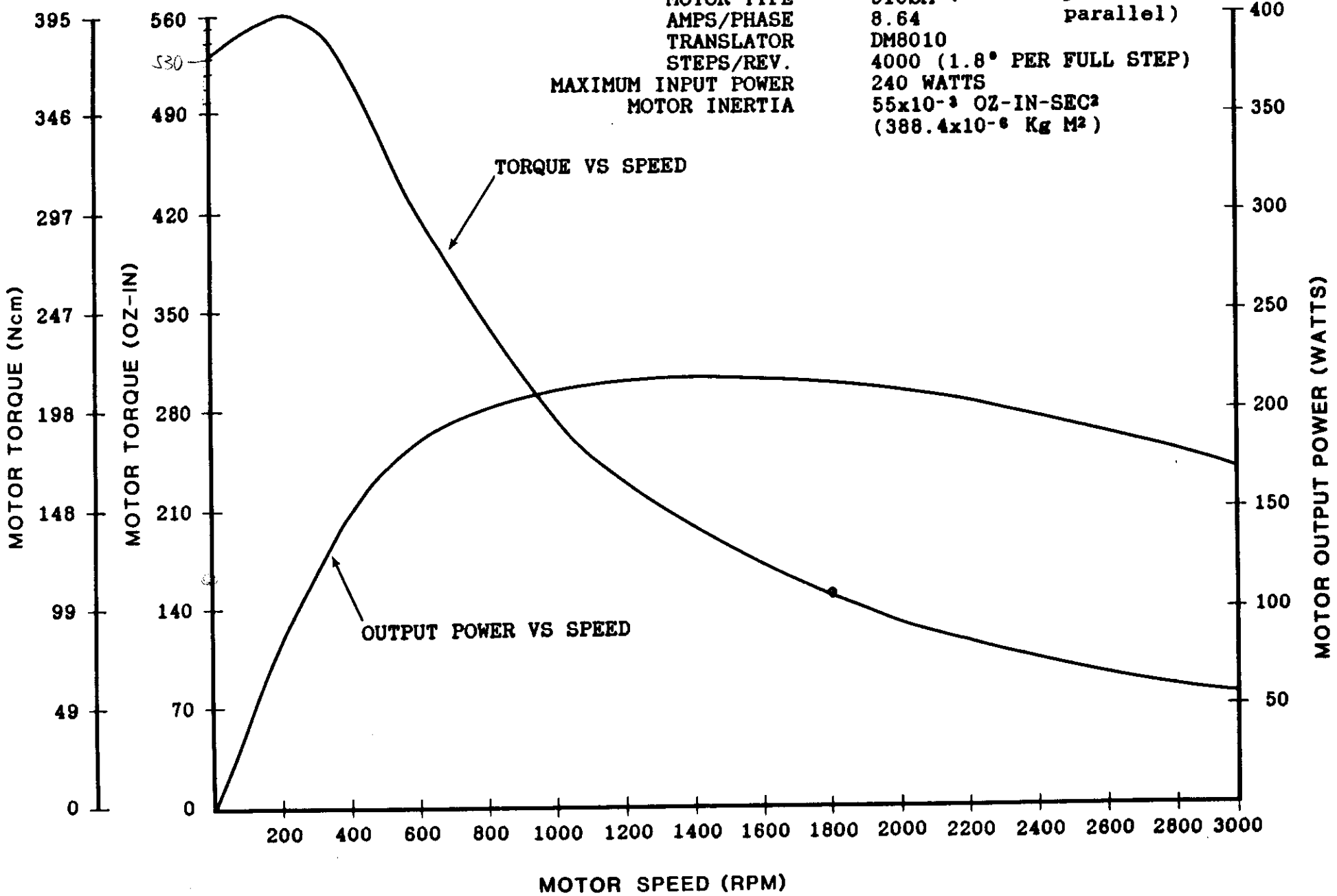
$$\frac{250}{1000} = \frac{25}{100}$$

$$\frac{115}{1000} = \frac{11.5}{100}$$

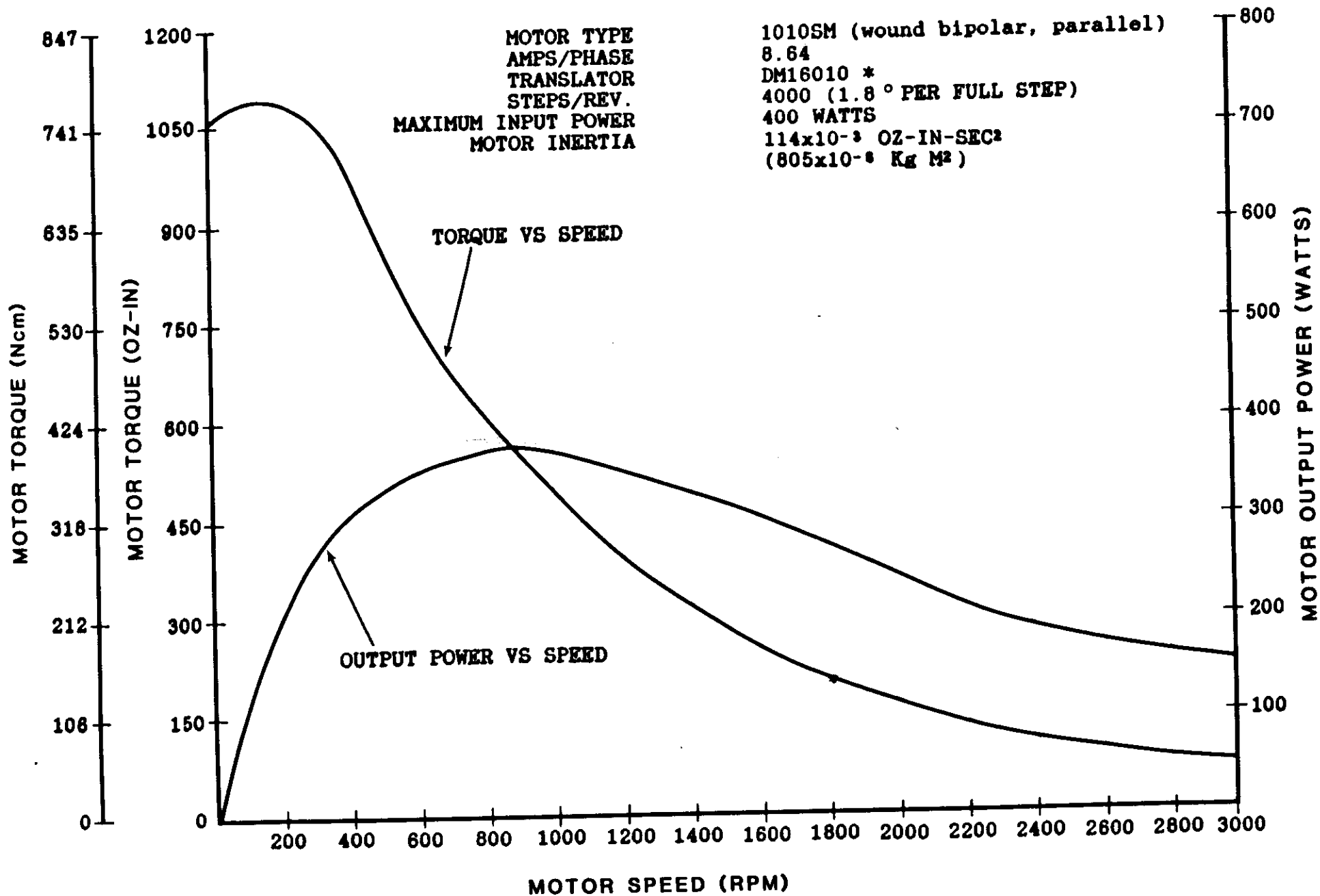
510SM MOTOR

MOTOR TYPE
 AMPS/PHASE
 TRANSLATOR
 STEPS/REV.
 MAXIMUM INPUT POWER
 MOTOR INERTIA

510SM (wound bipolar,
 8.64 parallel)
 DM8010
 4000 (1.8° PER FULL STEP)
 240 WATTS
 55x10⁻³ OZ-IN-SEC²
 (388.4x10⁻⁶ Kg M²)



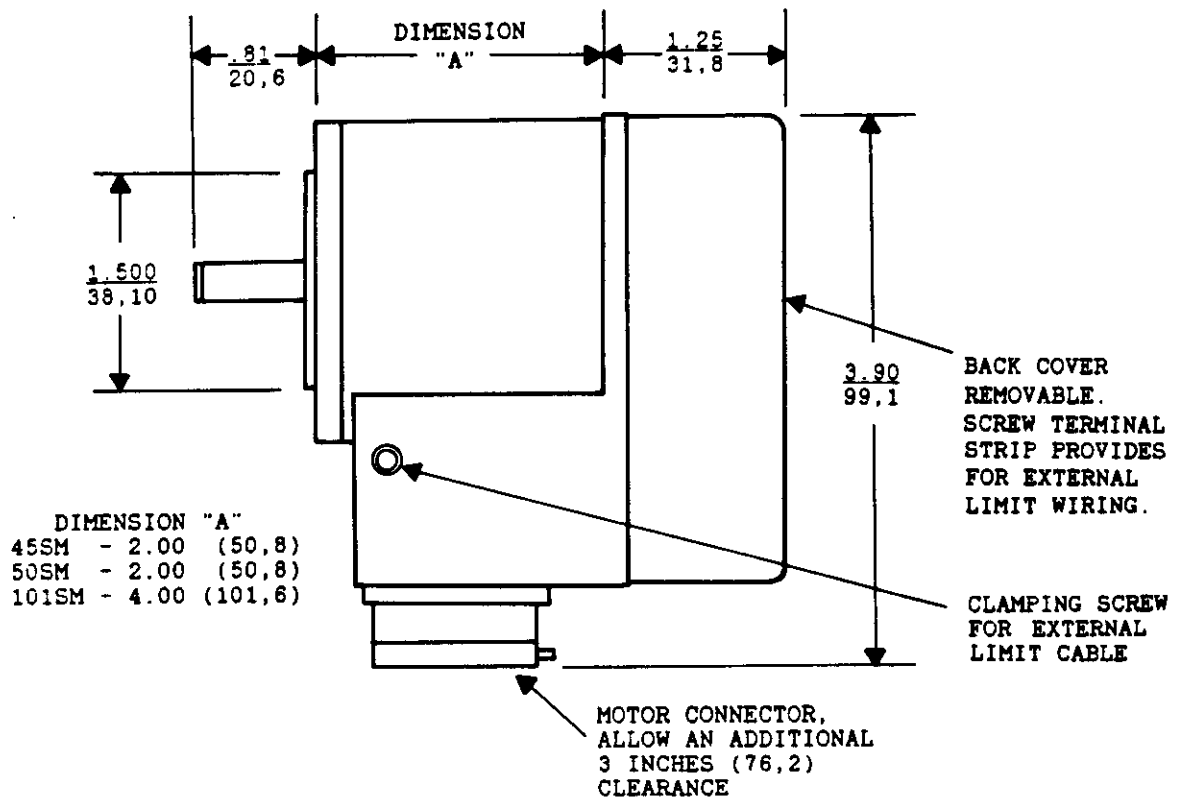
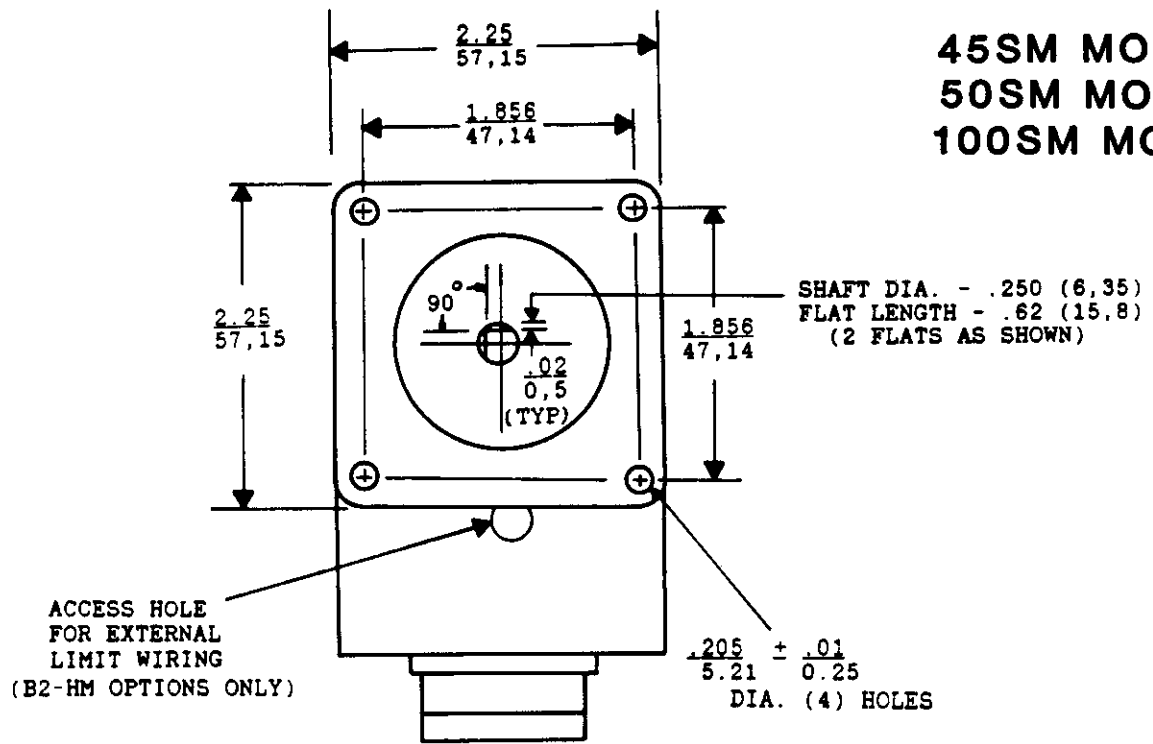
1010SM MOTOR (Available In Mid August, 1987)



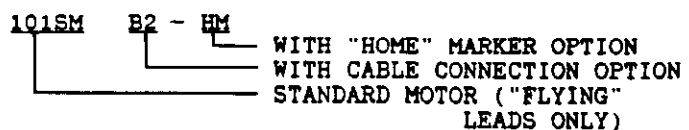
* DM16010 AVAILABLE IN MID AUGUST, 1987

This page reserved
for DM16010/ 510SM
Torque-Speed
Specifications

**45SM MOTOR
50SM MOTOR
100SM MOTOR**



NOTE: THE OUTLINE ABOVE SHOWS A 23 FRAME STYLE MOTOR WITH A CABLE CONNECTION AND HOME MARKER OPTION. EXAMPLE P/N:

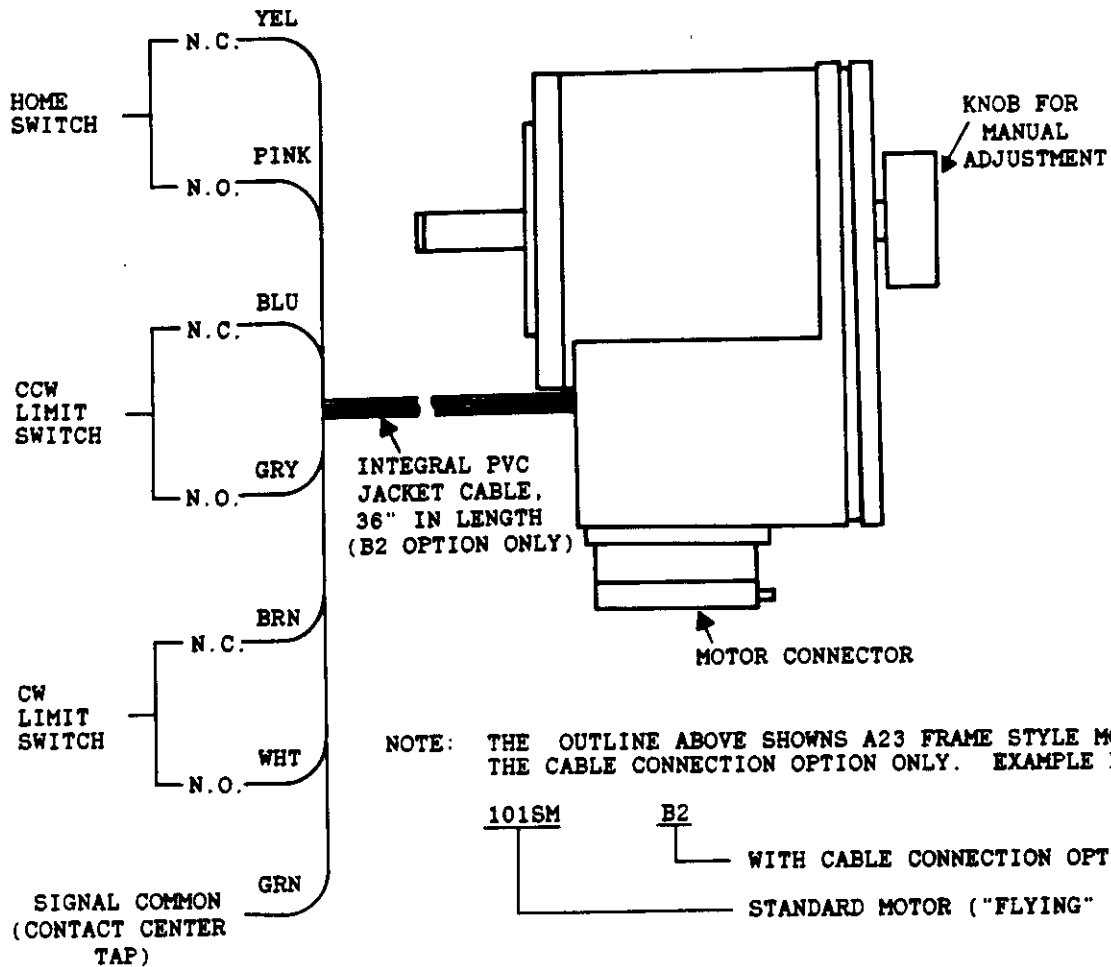


**45SM MOTOR
50SM MOTOR
100SM MOTOR
(Continued)**

MECHANICAL SPECIFICATIONS (All Motors):

End Play - .005 (0,12) max at 16 Oz (.45 Kg) Load
 Radial Play - .001 (0,03) max at 16 Oz (.45 Kg) Load
 Shaft Runout - .002 (0,05) max
 Bearing Type - Ball Bearing, stainless steel, grease packed
 double shielded
 Shaft Concentricity
 With Dia. - .003 (0,077) T.I.R.
 Perpendicularity of
 Surface to Shaft - .003 (0,077) T.I.R.
 Weight (all Options) - 45SM - 2.26 Lb (1,02 Kg)
 50SM - 2.26 Lb (1,02 Kg)
 101SM - 3.56 Lb (1,60 Kg)

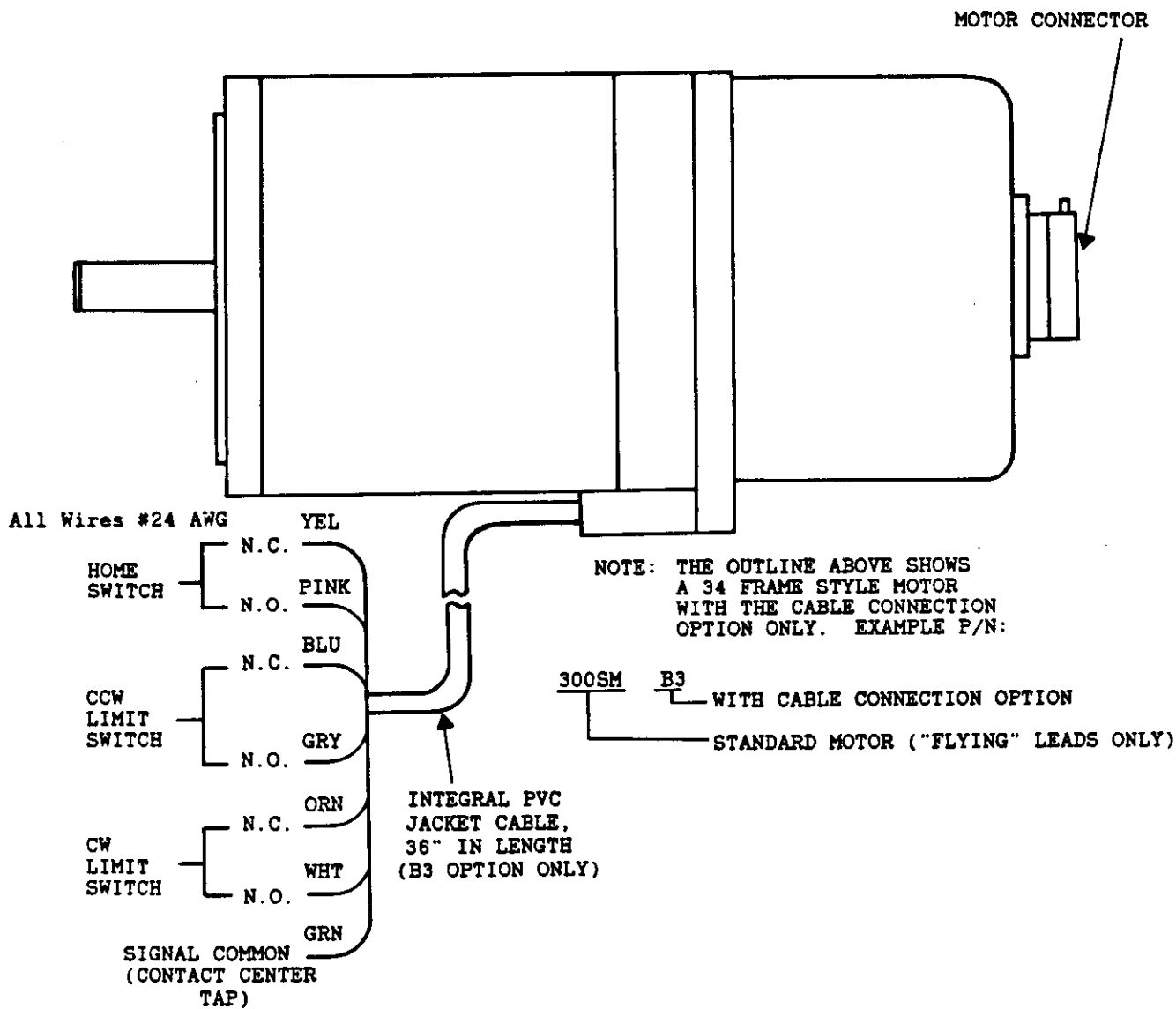
All wires #24 AWG



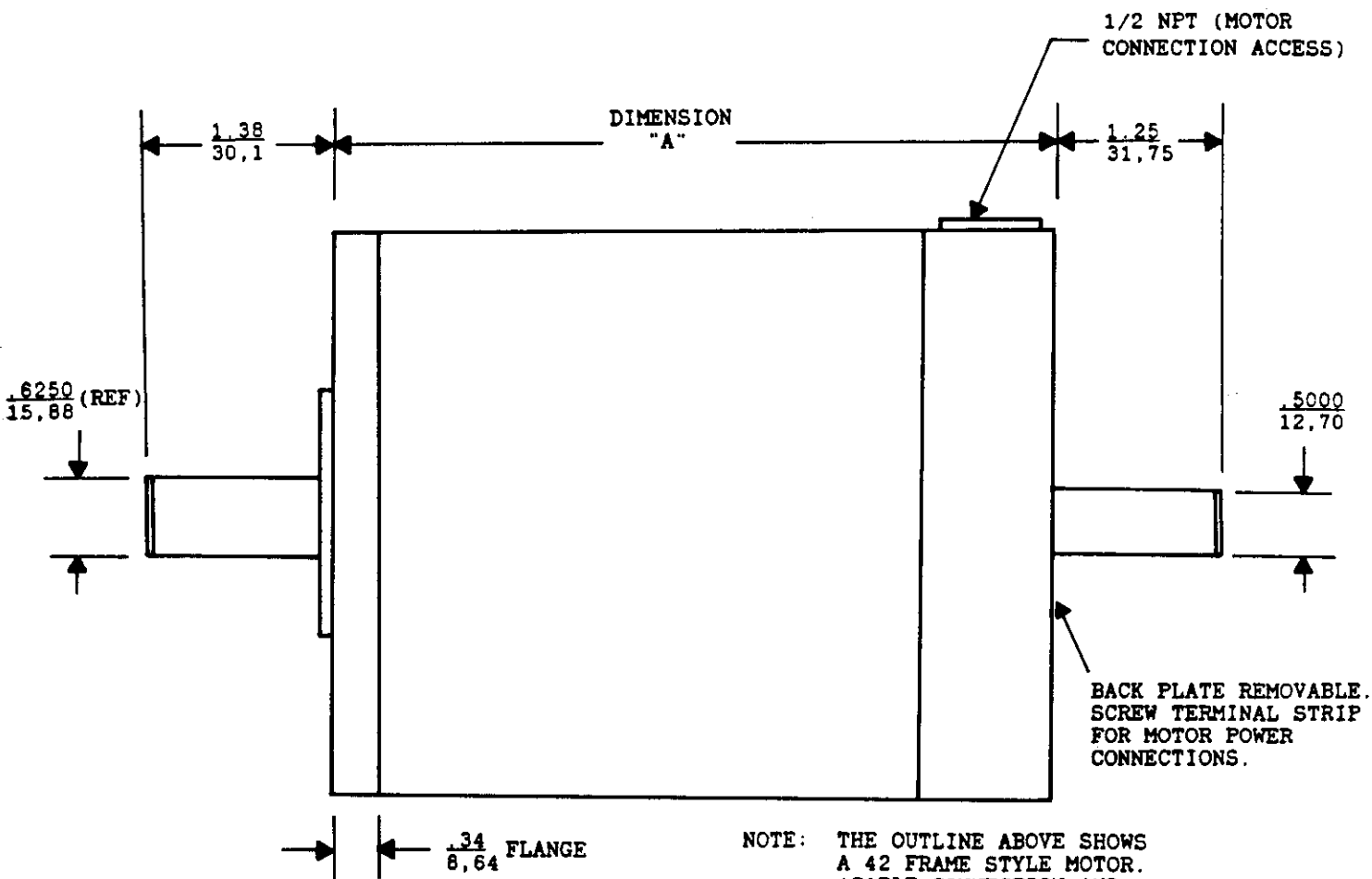
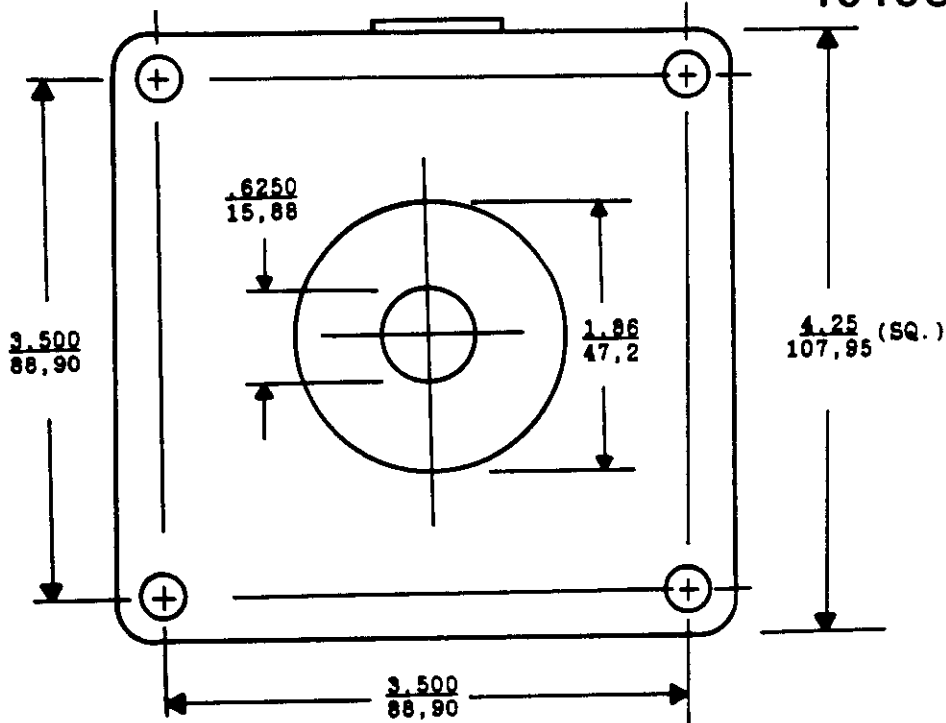
300SM MOTOR 310SM MOTOR (Continued)

MECHANICAL SPECIFICATIONS (All Motors):

- End Play - .005 (0,12) max at 16 Oz (.45 Kg)
- Radial Play - .001 (0,03) max at 16 Oz (.45 Kg)
- Shaft Runout - .002 (0,05) max
- Bearing Type - Ball bearing, stainless steel, grease packed,
double shielded
- Shaft Concentricity
With Dia. - .003 (0,077) T.I.R.
- Perpendicularity of
Surface to Shaft - .003 (0,077) T.I.R.
- Weight (All Options) - 300SM - 8.10 Lb (3,65 Kg)
310SM - 8.10 Lb (3,65 Kg)



510SM MOTOR
1010SM MOTOR



DIMENSION "A"
510SM - 5.40 (137,16)
1010SM - 7.50 (190,50)*

NOTE: THE OUTLINE ABOVE SHOWS
A 42 FRAME STYLE MOTOR.
(CABLE CONNECTION AND
MARKER OPTION AVAILABLE,
MID AUGUST, 1987

* 1010SM MOTOR AVAILABLE
IN MID AUGUST, 1987

ELECTRICAL SPECIFICATIONS FOR D3001 TRANSLATOR

1. Input Power Connections

115 VAC Operation:	95 VAC, 50/400 Hz	Minimum
	125 VAC, 50/400 Hz	Maximum
230VAC Operation:	190 VAC, 50/400 Hz	Minimum
	250 VAC, 50/400 Hz	Maximum
Input Power:	26 Watts	Maximum

2. Output Motor Connections

Motor Phase Inductance:	0	Minimum
Motor Phase Resistance *	17 Ohms	Minimum
Driver Type:	R-L, Unipolar	
Driver Voltage:	30 VDC	Nominal
Driver Switch Frequency:	N/A	Nominal
Driver Output Current **	.5 Amps	Maximum
Driver Output Power:	10 Watts	Maximum

3. Temperature Ratings (Ambient)

Operating Temperature:	0° C	Minimum
	50° C	Maximum
Storage Temperature:	0° C	Minimum
	75° C	Maximum

4. Angular Stepping Resolution (Based on 1.8°/ full step)

Minimum Resolution:	200 Steps/rev	Minimum
Maximum Resolution:	400 Steps/rev	Maximum

* Phase resistance viewed from center tap to end connection.

** Driver current dependent on phase resistance of motor:

$$22 / [25 + R \text{ phase (ohms)}] \sim I \text{ phase (amps)}$$

ELECTRICAL SPECIFICATIONS FOR DM4001 TRANSLATOR

1. Input Power Connections

115 VAC Operation:	95 VAC, 50/400 Hz	Minimum
	125 VAC, 50/400 Hz	Maximum
230VAC Operation:	190 VAC, 50/400 Hz	Minimum
	250 VAC, 50/400 Hz	Maximum
Input Power:	40 Watts	Maximum

2. Output Motor Connections

Motor Phase Inductance *	.5mH/phase	Minimum
Motor Phase Resistance:	0 Ohms	Minimum
Driver Type:	Switching, Unipolar	
Driver Voltage:	40 VDC	Nominal
Driver Switch Frequency:	30 KHz	Nominal
Driver Output Current:	.3 to 1 Amps DC	Adjustable
Driver Output Power:	37 Watts	Maximum

3. Temperature Ratings (Ambient)

Operating Temperature:	0° C	Minimum
	50° C	Maximum
Storage Temperature:	0° C	Minimum
	75° C	Maximum

4. Angular Stepping Resolution (Based on 1.8°/ full step)

Minimum Resolution:	200 Steps/rev	Minimum
Maximum Resolution:	50,000 Steps/rev	Maximum

* Measured center-tap to end connection.

ELECTRICAL SPECIFICATIONS FOR DM4005 TRANSLATOR

1. Input Power Connections

115 VAC Operation:	95 VAC, 50/400 Hz	Minimum
	125 VAC, 50/400 Hz	Maximum
230VAC Operation:	190 VAC, 50/400 Hz	Minimum
	250 VAC, 50/400 Hz	Maximum
Input Power:	80 Watts	Maximum

2. Output Motor Connections

Motor Phase Inductance *	.5mH/phase	Minimum
Motor Phase Resistance:	0 Ohms	Minimum
Driver Type:	Switching, Unipolar	
Driver Voltage:	40 VDC	Nominal
Driver Switch Frequency:	30 KHz	Nominal
Driver Output Current:	1 to 5 Amps DC	Adjustable
Driver Output Power:	72 Watts	Maximum

3. Temperature Ratings (Ambient)

Operating Temperature:	0° C	Minimum
	50° C	Maximum
Storage Temperature:	0° C	Minimum
	75° C	Maximum

4. Angular Stepping Resolution (Based on 1.8° / full step)

Minimum Resolution:	200 Steps/rev	Minimum
Maximum Resolution:	50,000 Steps/rev	Maximum

* Measured center-tap to end connection.

ELECTRICAL SPECIFICATIONS FOR DM6006 TRANSLATOR

1. Input Power Connections

115 VAC Operation:	95 VAC, 50/400 Hz	Minimum
	125 VAC, 50/400 Hz	Maximum
230VAC Operation:	190 VAC, 50/400 Hz	Minimum
	250 VAC, 50/400 Hz	Maximum
Input Power:	150 Watts	Maximum

2. Output Motor Connections

Motor Phase Inductance *	.75mH/phase	Minimum
Motor Phase Resistance:	0 Ohms	Minimum
Driver Type:	Switching, Bipolar	
Driver Voltage:	60 VDC	Nominal
Driver Switch Frequency:	20 KHz	Nominal
Driver Output Current:	2 to 6 Amps DC	Adjustable
Driver Output Power:	135 Watts	Maximum

3. Temperature Ratings (Ambient)

Operating Temperature:	0° C	Minimum
	50° C	Maximum
Storage Temperature:	0° C	Minimum
	75° C	Maximum

4. Angular Stepping Resolution (Based on 1.8° /full step)

Minimum Resolution:	200 Steps/rev	Minimum
Maximum Resolution:	50,000 Steps/rev	Maximum

* Measured center-tap to end connection.

ELECTRICAL SPECIFICATIONS FOR DM8010 TRANSLATOR

1. Input Power Connections

115 VAC Operation:	95 VAC, 50/400 Hz	Minimum
	125 VAC, 50/400 Hz	Maximum
230VAC Operation:	190 VAC, 50/400 Hz	Minimum
	250 VAC, 50/400 Hz	Maximum
Input Power:	275 Watts	Maximum

2. Output Motor Connections

Motor Phase Inductance	1 mH/phase	Minimum
Motor Phase Resistance:	0	Minimum
Driver Type:	Switching, Bipolar	
Driver Voltage:	80 VDC	Nominal
Driver Switch Frequency:	20 KHz	Nominal
Driver Output Current:	4 to 10 Amps DC	Adjustable
Driver Output Power:	250 Watts	Maximum

3. Temperature Ratings (Ambient)

Operating Temperature:	0° C	Minimum
	50° C	Maximum
Storage Temperature:	0° C	Minimum
	75° C	Maximum

4. Angular Stepping Resolution (Based on 1.8° / full step)

Minimum Resolution:	200 Steps/rev	Minimum
Maximum Resolution:	50,000 Steps/rev	Maximum

This page reserved
for Electrical Specifications
for DM16010 Translator