TABLE OF CONTENTS

INTRODUCTION.................................................................................1

ELECTRICAL SPECIFICATIONS FOR D3001 TRANSLATOR..................15
  1. Input Power Connections..................................................15
  2. Output Motor Connections.............................................15
  3. Temperature Ratings (Ambient).........................................15
  4. Angular Stepping Resolution (Based on 1.8°/full ste.)...........15

ELECTRICAL SPECIFICATIONS FOR DM4001 TRANSLATOR...............16
  1. Input Power Connections..................................................16
  2. Output Motor Connections.............................................16
  3. Temperature Ratings (Ambient).........................................16
  4. Angular Stepping Resolution (Based on 1.8°/full ste.)...........16

ELECTRICAL SPECIFICATIONS FOR DM4005 TRANSLATOR...............17
  1. Input Power Connections..................................................17
  2. Output Motor Connections.............................................17
  3. Temperature Ratings (Ambient).........................................17
  4. Angular Stepping Resolution (Based on 1.8°/full ste.)...........17

ELECTRICAL SPECIFICATIONS FOR DM6006 TRANSLATOR...............18
  1. Input Power Connections..................................................18
  2. Output Motor Connections.............................................18
  3. Temperature Ratings (Ambient).........................................18
  4. Angular Stepping Resolution (Based on 1.8°/full ste.)...........18

ELECTRICAL SPECIFICATIONS FOR DM8010 TRANSLATOR...............19
  1. Input Power Connections..................................................19
  2. Output Motor Connections.............................................19
  3. Temperature Ratings (Ambient).........................................19
  4. Angular Stepping Resolution (Based on 1.8°/full ste.)...........19
LIST OF ILLUSTRATIONS

1: 45SM MOTOR / D3001 TRANSLATOR ........................................ 2
2: 50SM MOTOR / DM4001 TRANSLATOR .................................... 3
3: 101SM MOTOR / DM4005 TRANSLATOR ................................... 4
4: 300SM MOTOR / DM6006 TRANSLATOR ................................... 5
5: 310SM MOTOR / DM8010 TRANSLATOR ................................... 6
6: 510SM MOTOR / DM8010 TRANSLATOR ................................... 7
7: 1010SM MOTOR / DM16010 TRANSLATOR ................................. 8
8: DIMENSIONS OF THE 45SM, 50SM AND 100SM MOTOR ................. 10
9: 45SM, 50SM AND 100SM DIMENSIONS, CONTINUED .................... 11
10: DIMENSIONS OF THE 300SM AND 310SM MOTOR ...................... 12
11: 300SM AND 310SM DIMENSIONS, CONTINUED ......................... 13
12: DIMENSIONS OF THE 510SM AND 1010 SM MOTOR .................... 14
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
AMPS/PHASE
TRANSLATOR
STEPS/REV.
MAXIMUM INPUT POWER
MOTOR INERTIA

45SM
.5
D3001
HALF STEP (1.8° PER FULL STEP)
5 WATTS
1.66x10⁻⁸ OZ-IN-SEC²
(11.6x10⁻⁸ KG M²)

TORQUE VS SPEED

MOTOR TORQUE (Ncm)
MOTOR TORQUE (OZ-IN)

OUTPUT POWER VS SPEED

MOTOR OUTPUT POWER (WATTS)

MOTOR SPEED (RPM)
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: 4.97x10^-3 OZ-IN-SEC^2
(35x10^-6 Kg M^2)

GRAPH: Torque vs Speed
Output Power vs Speed

Motor Speed (RPM)
Motor Torque (Ncm)
Motor Torque (Oz-in)
Motor Output Power (Watts)
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-SEC²
               (197x10^-6 Kg M²)

TORQUE VS SPEED

OUTPUT POWER VS SPEED

MOTOR TORQUE (Ncm)
MOTOR TORQUE (OZ-IN)

MOTOR SPEED (RPM)

0  50  100  150  200  250  300  350  400  247  212  177  141  106  71  35
0  25  50  75  100  125  150  175  200

0  200  400  600  800  1000  1200  1400  1600  1800  2000  2200  2400  2600  2800  3000

MOTOR OUTPUT POWER (WATTS)
310SM MOTOR

- MOTOR TYPE: 310SM
- AMPS/PHASE: 6.0
- TRANSLATOR: DM8010
- STEPS/REV.: 4000 (1.8° PER FULL STEP)
- MAXIMUM INPUT POWER: 285 WATTS
- MOTOR INERTIA: 26.5x10^-3 OZ-IN-SEC² (167.1x10^-6 Kg M²)

**Torque vs Speed**

**Output Power vs Speed**

**Graphs:**
- Motor torque (Ncm) vs motor speed (RPM)
- Motor torque (OZ-IN) vs motor speed (RPM)
- Motor output power (Watts) vs motor speed (RPM)
510SM MOTOR

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

510SM (wound bipolar, parallel)
8.64
DM3010
4000 (1.8° PER FULL STEP)
240 WATTS
55x10^-8 OZ-IN-SEC^2
(388.4x10^-6 Kg M^2)

TORQUE VS SPEED

OUTPUT POWER VS SPEED

MOTOR SPEED (RPM)

MOTOR TORQUE (Ncm)

MOTOR TORQUE (OZ-IN)

MOTOR OUTPUT POWER (WATTS)
1010SM MOTOR (Available in Mid August, 1987)

Motor Type: 1010SM (wound bipolar, parallel)
Amps/Phase: 8.64
Translator: DM16010 *
Steps/Rev: 4000 (1.8° per full step)
Watts: 400
Maximum Input Power: 114x10^-3 oz-in-sec^2
Motor Inertia: (805x10^-9 kg m^2)

Torque vs Speed
Output Power vs Speed

* DM16010 AVAILABLE IN MID AUGUST, 1987
This page reserved for DM16010/ 510SM Torque-Speed Specifications
45SM MOTOR
50SM MOTOR
100SM MOTOR

SHAFT DIA. - .250 (6.35)
FLAT LENGTH - .62 (15.8)
(2 FLATS AS SHOWN)

ACCESS HOLE
FOR EXTERNAL
LIMIT WIRING
(B2-HM OPTIONS ONLY)

DIMENSION "A"
45SM - 2.00 (50.8)
50SM - 2.00 (50.8)
101SM - 4.00 (101.6)

NOTE: THE OUTLINE ABOVE
SHOWS A 23 FRAME
STYLE MOTOR WITH
A CABLE CONNECTION
AND HOME MARKER
OPTION. EXAMPLE
P/N:
101SM B2-HM
WITH "HOME" MARKER OPTION
WITH CABLE CONNECTION OPTION
STANDARD MOTOR ("FLYING"
LEADS ONLY)
MECHANICAL SPECIFICATIONS (All Motors):

- End Play: \(0.005 (0.12)\) max at 16 Oz (0.45 Kg) Load
- Radial Play: \(0.001 (0.03)\) max at 16 Oz (0.45 Kg) Load
- Shaft Runout: \(0.002 (0.05)\) max
- Bearing Type: Ball Bearing, stainless steel, grease packed double shielded
- Shaft Concentricity With Dia.: \(0.003 (0.077)\) T.I.R.
- Perpendicularity of Surface to Shaft: \(0.003 (0.077)\) 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

NOTE: THE OUTLINE ABOVE SHOWS A23 FRAME STYLE MOTOR WITH THE CABLE CONNECTION OPTION ONLY. EXAMPLE P/N:

101SM  E2  WITH CABLE CONNECTION OPTION

STANDARD MOTOR ("FLYING" LEADS ONLY)
300SM MOTOR
310SM MOTOR

SHAFT DIA. - .375 (9.53)
FLAT LENGTH - .63 (16.0)
(2 FLATS AS SHOWN)

ACCESS HOLE
FOR EXTERNAL LIMIT WIRING
(B3-HM OPTIONS ONLY)

2.740
69.59

1.19
30.2

DIMENSION "A"

3.10
78.7

2.875
73.03

3.75
95.3

NOTE: THE OUTLINE ABOVE SHOWS A 34 FRAME STYLE MOTOR WITH A CABLE CONNECTION AND HOME MARKER OPTION. EXAMPLE P/N:

300SM B3 - HM
WITH "HOME" MARKER OPTION
WITH CABLE CONNECTION OPTION
STANDARD MOTOR ("FLYING" LEADS ONLY)

MOTOR CONNECTOR. ALLOW AN ADDITIONAL 3 INCHES (76.2) CLEARANCE

BACK COVER REMOVABLE. SCREW TERMINAL STRIP FOR EXTERNAL LIMIT WIRING.
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

Bearings 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)

NOTE: THE OUTLINE ABOVE SHOWS
A 34 FRAME STYLE MOTOR
WITH THE CABLE CONNECTION
OPTION ONLY. EXAMPLE P/N:

STANDARD MOTOR ("FLYING" LEADS ONLY)

INTEGRAL PVC
JACKET CABLE,
36" IN LENGTH
(B3 OPTION ONLY)
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:

\[ \frac{22}{25 + R \text{ phase (ohms)}} \] ~ I 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

<table>
<thead>
<tr>
<th>Operation</th>
<th>Voltage</th>
<th>Frequency</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>115 VAC Operation:</td>
<td>95 VAC</td>
<td>50/400 Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>125 VAC</td>
<td>50/400 Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>230VAC Operation:</td>
<td>190 VAC</td>
<td>50/400 Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>250 VAC</td>
<td>50/400 Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Power:</td>
<td></td>
<td></td>
<td>150 Watts</td>
<td></td>
</tr>
</tbody>
</table>

2. Output Motor Connections

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor Phase Inductance *</td>
<td>.75mH/phase</td>
</tr>
<tr>
<td>Motor Phase Resistance:</td>
<td>0 Ohms</td>
</tr>
<tr>
<td>Driver Type:</td>
<td>Switching, Bipolar</td>
</tr>
<tr>
<td>Driver Voltage:</td>
<td>60 VDC</td>
</tr>
<tr>
<td>Driver Switch Frequency:</td>
<td>20 KHz</td>
</tr>
<tr>
<td>Driver Output Current:</td>
<td>2 to 6 Amps DC</td>
</tr>
<tr>
<td>Driver Output Power:</td>
<td>135 Watts</td>
</tr>
</tbody>
</table>

3. Temperature Ratings (Ambient)

<table>
<thead>
<tr>
<th>Temperature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature:</td>
<td>0 °C</td>
</tr>
<tr>
<td></td>
<td>50 °C</td>
</tr>
<tr>
<td>Storage Temperature:</td>
<td>0 °C</td>
</tr>
<tr>
<td></td>
<td>75 °C</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum Resolution:</td>
<td>200 Steps/rev</td>
</tr>
<tr>
<td>Maximum Resolution:</td>
<td>50,000 Steps/rev</td>
</tr>
</tbody>
</table>

* 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 DM18010 Translator