TM3000 STEP MOTOR DRIVER

- ! Requires 12-28VAC or 10-40VDC
- ! 0.3 - 5.0 Amperes/phase Operating Current
- ! 0.15 - 2.5 Amperes/phase Standstill Motor Current
- ! Open Frame Circuit Board Mounts on Snaptrack
- ! Higher Torque/Speed Output
- ! Improved Start-Stop Speeds
- ! Reduced Power Requirements
- ! Positive or Negative Going Clock Input
- ! Full and Half-Step Operation
- ! Motor Turn-Off Provisions
- ! TTL-CMOS Compatible Inputs
- ! No RFI or EMI Problems

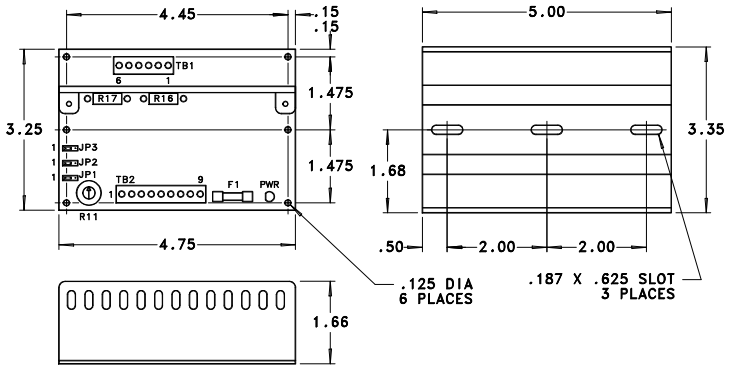

FIGURE 1: DIMENSIONS 0F TM3000

GENERAL DESCRIPTION

The ANAHEIM AUTOMATION TM3000 is a low cost, bilevel step motor driver to be used with 4-phase step motors. The TM3000 comes mounted on easy to use snaptrack, available in lengths up to 6 feet.

BILEVEL DRIVE

The basic function of a step motor driver is to control the motor winding currents. Motor performance is determined by how fast the driver can increase and decrease the winding currents. A rapid rise in winding current is achieved by applying a high voltage directly to a motor winding. This rapid rise of current is also referred to as the "kick" or operating current. When a desired current level is reached, the high voltage is turned off and a low voltage is applied to maintain a suitable holding current level. When a motor winding is turned off, a rapid decrease in winding current is achieved by routing the energy in the collapsing field back to the power supply through a high voltage path. The high voltage supply furnishes the energy necessary to maintain motor output torque at high step rates thus providing high mechanical power output. The low voltage supply provides much of the current needed at low step rates and all of the holding current.

Bilevel drivers do not use high frequency switching techniques as chopper drivers do. Consequently, they do not create the EMI, RFI, and motor heating problems that are associated with chopper drivers.

EXCITATION MODE SELECTION

Users have a choice of dual-phase, Full-step operation or Half-step operation. Dual-phase, Full-step operation occurs by energizing two phases at a time, rotating a typical motor 1.8 degrees per step. Half-step operation occurs by alternately energizing one, and then two, phases at a time, rotating the motor 0.9 degrees per step. Full-step operation is only for applications that specifically require that mode, such as when retrofitting existing full-step systems.

MOTOR ON/OFF

The Motor On/Off feature allows de-energizing a motor without disturbing the positioning logic. After re-energizing the motor, a routine can continue. This reduces motor heating and conserves power, especially in applications where motors are stopped for long periods.

CLOCK, CCW AND DIRECTION

Pulses applied to the CLOCK input cause the motor to step in the clockwise direction if the DIRECTION Control input is a logic "1" (or No connection), and in the counterclockwise direction if the DIRECTION Control input is a logic "0". Pulses applied to the CCW input cause the motor to step in the counterclockwise direction. Positive or negative going pulses may be used (see Table 2).

PHASE INPUTS

The TM3000 has the ability to accept phase inputs to control each of the 4 motor phases. For example, a microcontroller can be used to control the motor phases. Terminals 1,2, 3, and 4 of TB2 are used as the inputs for Phase 1, Phase 2, Phase 3, and Phase 4 respectively. Either Positive True Phase Inputs or Negative True Phase Inputs may be used (see Table 2 and Figure 1).

MODEL	DESCRIPTION
TM3000HV	HIGH VOLTAGE DRIVER (60 VDC)
TM3000	DRIVER w/ TRACK
TM3000-T1	DRIVER w/ TRACK and 100VA TRANSFORMER
TM3000-T2	DRIVER w/ TRACK and 200VA TRANSFORMER
TM3000-1	DRIVER w/ MOUNTING PLATE
TM3000-1-T1	DRIVER w/ MOUNTING PLATE and 100VA TRANSFORMER

TABLE 1: ORDERING INFORMATION

ANAHEIM AUTOMATION
910 East Orangefair Lane, Anaheim, CA 92801 (714) 992-6990 fax: (714) 992-0471
e-mail: info@anaheimautomation.com website: www.anaheimautomation.com

MOTOR CONNECTIONS

Figure 2 is a hookup diagram for typical driver applications. Wiring connected to inputs must be separated from motor connections and all other possible sources of interference.

IMPORTANT NOTE: When the wiring from the driver to the step motor extends beyond 25 feet, consult the factory.

CURRENT SETTING

The potentiometer on the driver is used to set the motor current. See Table 3. The pot should be set according to the motor's rated current. This will produce a standstill current of 70% of the rated current and a kick current of 1.4x the rated motor current. Example: For a motor rated at 2.0 amps per phase, the POT should be set between 50 and 60.

POWER REQUIREMENTS

The TM3000 can be powered up by an AC or DC voltage (see specifications). For AC operation, the driver may be purchased with a transformer (see Table 1). A single transformer may be used to power up several drivers.

HEATING CONSIDERATIONS

The temperature of the heatsink should never be allowed to rise above 60 degrees Celsius. If necessary, air should be blown across the heatsink to maintain suitable temperatures.

TM3000-1

The TM3000 is available with a mounting plate for those who do not use "track" systems. The model number for this driver with the mounting plate is the TM3000-1. Dimensions are shown in figure 3.

OPERATING MODE JUMPER SELECTION	JP1	JP2	JP3
POSITIVE GOING CLOCK INPUT	1 TO 2	2 TO 3	1 TO 2
NEGATIVE GOING CLOCK INPUT	1 TO 2	1 TO 2	1 TO 2
POSITIVE TRUE PHASE INPUTS	2 TO 3	2 TO 3	2 TO 3

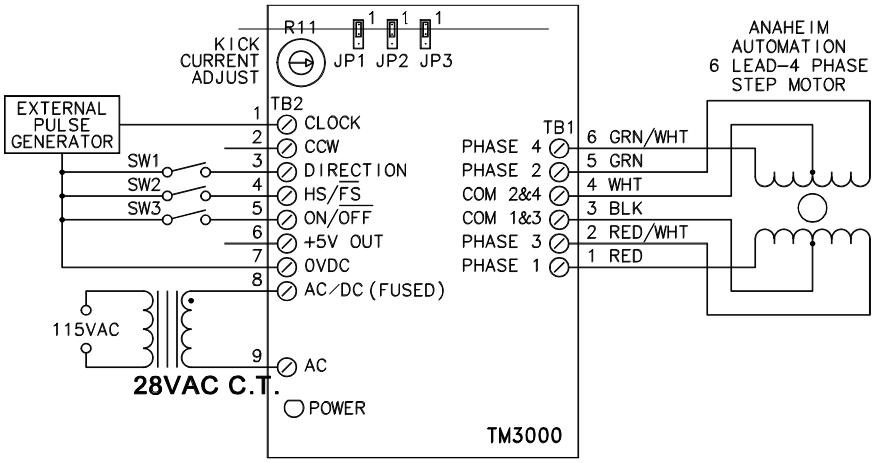

FIGURE 2: HOOKUP DIAGRAM.

POT	RATED MOTOR CURRENT	ACTUAL STANDSTILL CURRENT	KICK CURRENT
0	0.21	0.15	0.3
10	0.55	0.385	0.77
20	0.89	0.62	1.24
30	1.22	0.855	1.71
40	1.56	1.09	2.18
50	1.89	1.33	2.66
60	2.23	1.56	3.12
70	2.56	1.8	3.6
80	2.9	2.03	4.06
90	3.24	2.27	4.54

SPECIFICATIONS

CONTROL INPUTS: (Terminals 1-5, TB2)
TTL-CMOS Compatible
Logic "0"=0 to 0.8 Vdc
Logic "1"=3.5 to 5.0 Vdc
Terminals 1-4 are pulled up or down (depending on Jumpers) through 10k ohm resistors. Terminal 5 is pulled up through a 10k ohm resistor.

CLOCK, CCW:
(Terminals 1 and 2 of TB2)
15 microseconds minimum pulse width, positive or negative going (see Table 2).

DIRECTION CONTROL:
(Terminal 3 of TB2)
Logic "1"(open)-clockwise
Logic "0"-counterclockwise

MODE SELECT:
(Terminal 4 of TB2)
Logic "1"(open)-half-step
Logic "0"-dual full-step

MOTOR ON/OFF:
(Terminal 5 of TB2)
Logic "1"(open)-motor energized
Logic "0"-motor de-energized

OUTPUT CURRENT RATING: (TB1)
5.0 Amperes per phase maximum operating current; 2.5 Amperes per phase maximum standstill current, over the operating voltage and temperature range. Motor phase ratings of 0.5 Amperes minimum are required to meet the minimum kick level.

+5VDC OUTPUT: (Terminal 6, TB2)
100mA maximum

POWER REQUIREMENTS: (Terminals 8 & 9, TB2)
12 Vac(min)-28 Vac(max)
12 Vac(min) -42.5 Vac(max) {60 Vdc Version}
10 Vdc(min)-40 Vdc(max)
Use Terminal 8 for DC input with Terminal 7 as the 0Vdc reference.

OPERATING TEMPERATURE:
Heatsink - 0E to 60EC

FUSE: 5 Amp Fast Blow, 5mm

PIN	DESCRIPTION
1	PHASE 1 (RED)
2	PHASE 3 (RED/WHT)
3	COM PHASE 1 & 3 (BLK)
4	COM PHASE 2 & 4 (WHT)
5	PHASE 2 (GRN)
6	PHASE 4 (GRN/WHT)

PIN	DESCRIPTION
1	CLOCK INPUT (PHASE 1)
2	CCW INPUT (PHASE 2)
3	DIRECTION CONTROL (PHASE 3)
4	HALFSTEP/FULLSTEP (PHASE 4)
5	MOTOR ON/OFF
6	+5VDC OUTPUT
7	0VDC
8	AC/DC POWER INPUT (FUSED)
9	AC POWER INPUT

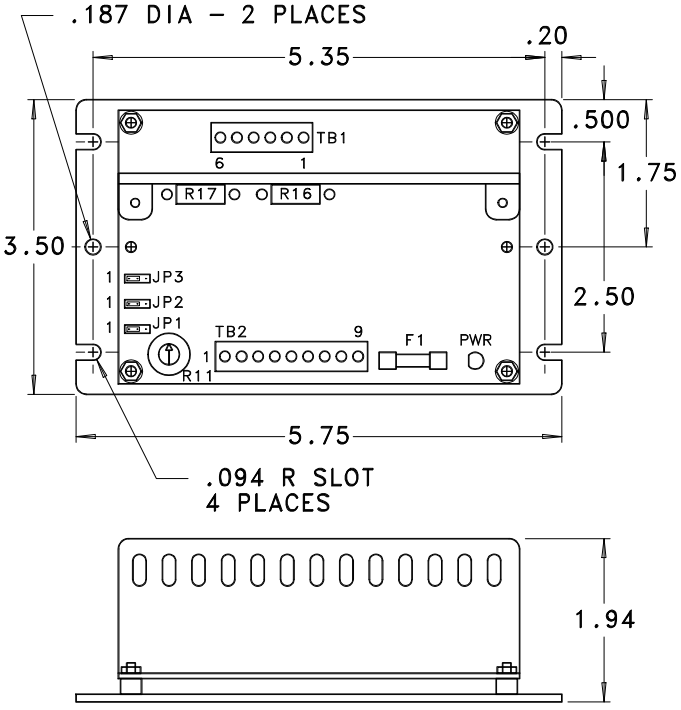

FIGURE 3: DIMENSIONS OF TM3000-1.

TORQUE CURVES

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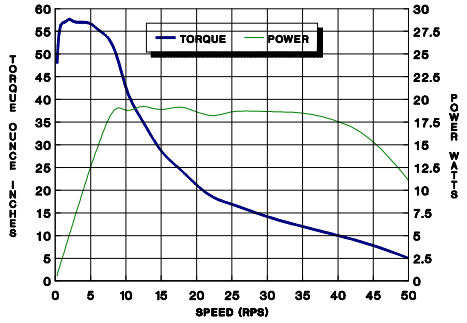

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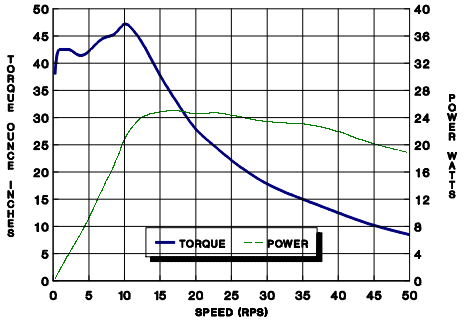

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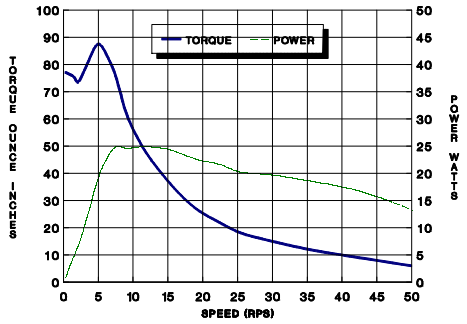

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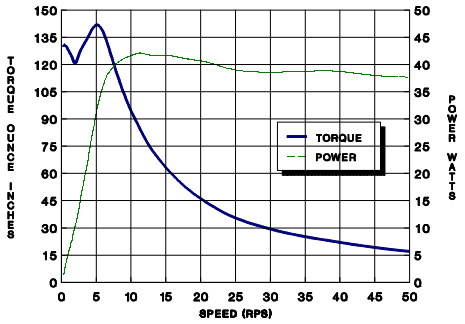

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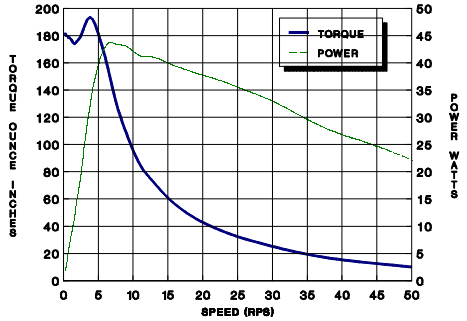

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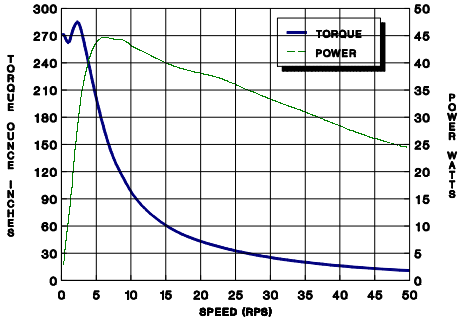

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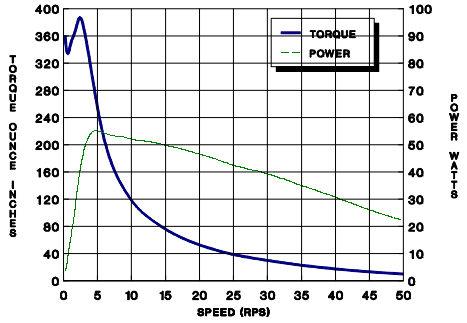

Note: All Torque Curves were taken with an AA2295 (28Vac) Transformer.
Standstill Current = 0.7 x Rated Motor Current
Kick Current = 1.4 x Rated Motor Current.