DPMLPPG1
Driver Pack with Pulse Generator

User's Guide

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Electrical Specifications

Power Requirements:
90-132 VAC 60Hz

Operating Temperature:
0 to 60 degrees C

Output Current Rating:
8.0 A/phase maximum running
5.6 A/phase maximum standstill

BASE/MAX Input: pin 7
(10k ohm pullup)
Base speed - Logic “1” or open
Max speed (single input running) - Logic 0”

STOP/RUN Input: pin 6
(10k ohm pullup)
Stop - Logic “1” or open
Run - Logic “0”

DIRECTION

SPEED RANGES, approximate:
Low: BASE SPEED 50 - 500 pulses/sec
MAX SPEED 50 - 5,000 pulses/sec
High: BASE SPEED 200 - 2,000 pulses/sec
MAX SPEED 200 - 20,000 pulses/sec

RAMP TIMES: Time to ramp from lowest BASE to highest MAX: 50 milliseconds to 1.0 seconds

ACCELERATION/DECELERATION RATES:
5,000 - 100,000 pulses/s^2 for the Low speed range
20,000 - 400,000 pulses/s^2 for the High speed range

POWER SUPPLY OUTPUTS:
+5VDC output: 50mAmps absolute maximum *
+12VDC unregulated output: 50mAmps maximum *
This output is acutally at around +8VDC in this unit with everything connected

* No more than 50mA total can be drawn from both of these outputs simultaneously.

Terminal Descriptions - Driver

Position	Description - Motor Connection
1	Phase A: Phase 1 of the Step Motor
2	Phase $\overline{A}$: Phase 3 of the Step Motor
3	Phase B: Phase 2 of the Step Motor
4	Phase $\overline{B}$: Phase 4 of the Step Motor
5	Motor Ground

Terminal Descriptions - Pulse Generators

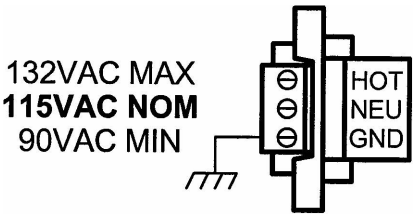
Position	Description - Pulse Generator Connection
1	12VDC Unregulated
2	0VDC (Ground)
3	5VDC Out (Internally Connected to Driver)
4	Clock Output (Internally Connected to Driver)
5	Direction Input (Internally Connected to Driver)
6	Stop/Run
7	Base/Max

Motor Ground

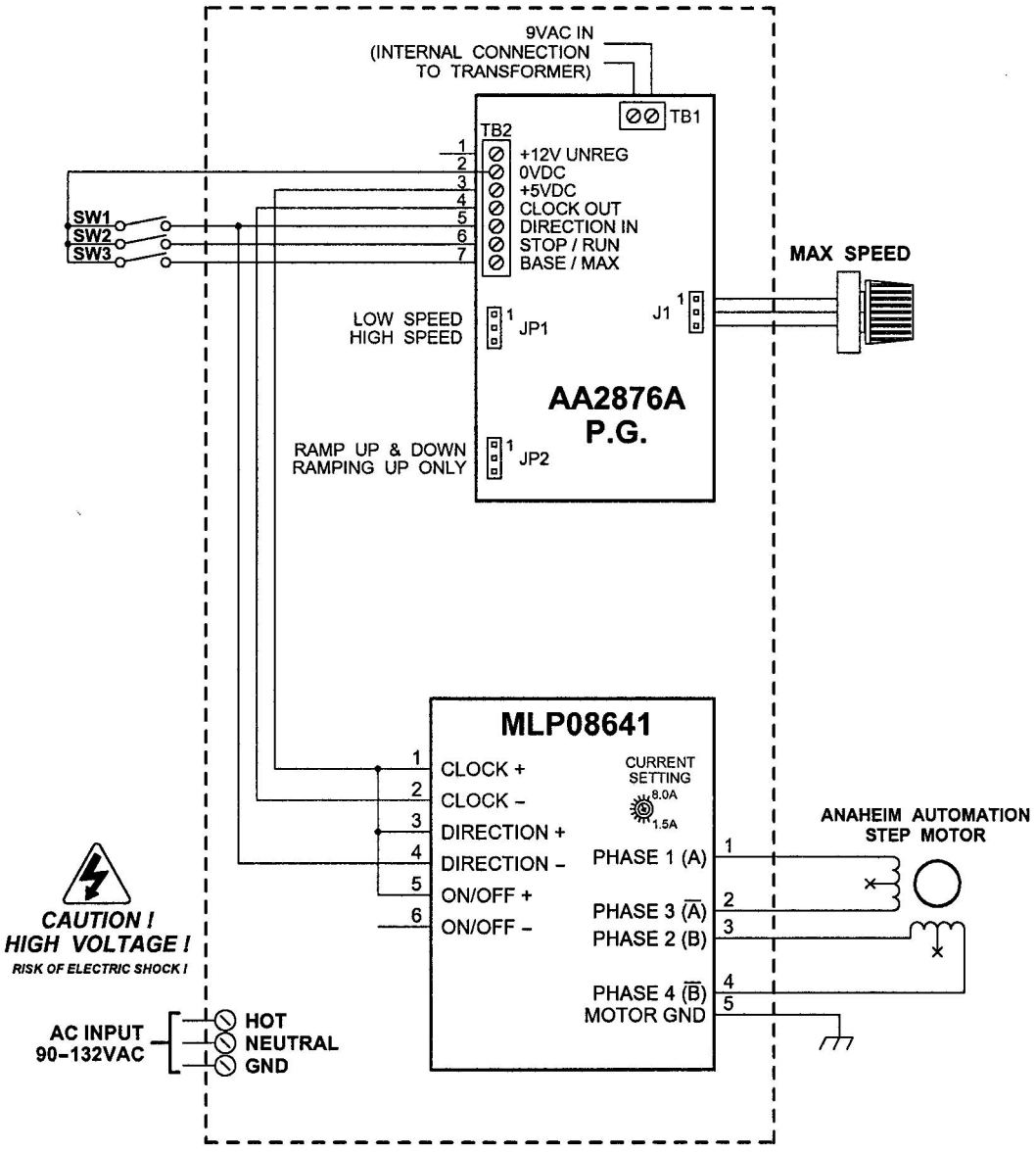
Meant to be used in conjunction with the motor cable ground wire. Make sure the connection is only on one end of the motor cable ground wire. If no motor shield is available, and if the motor has no ground wire, the motor ground pin can be left with no connection.

Terminal Descriptions - Power

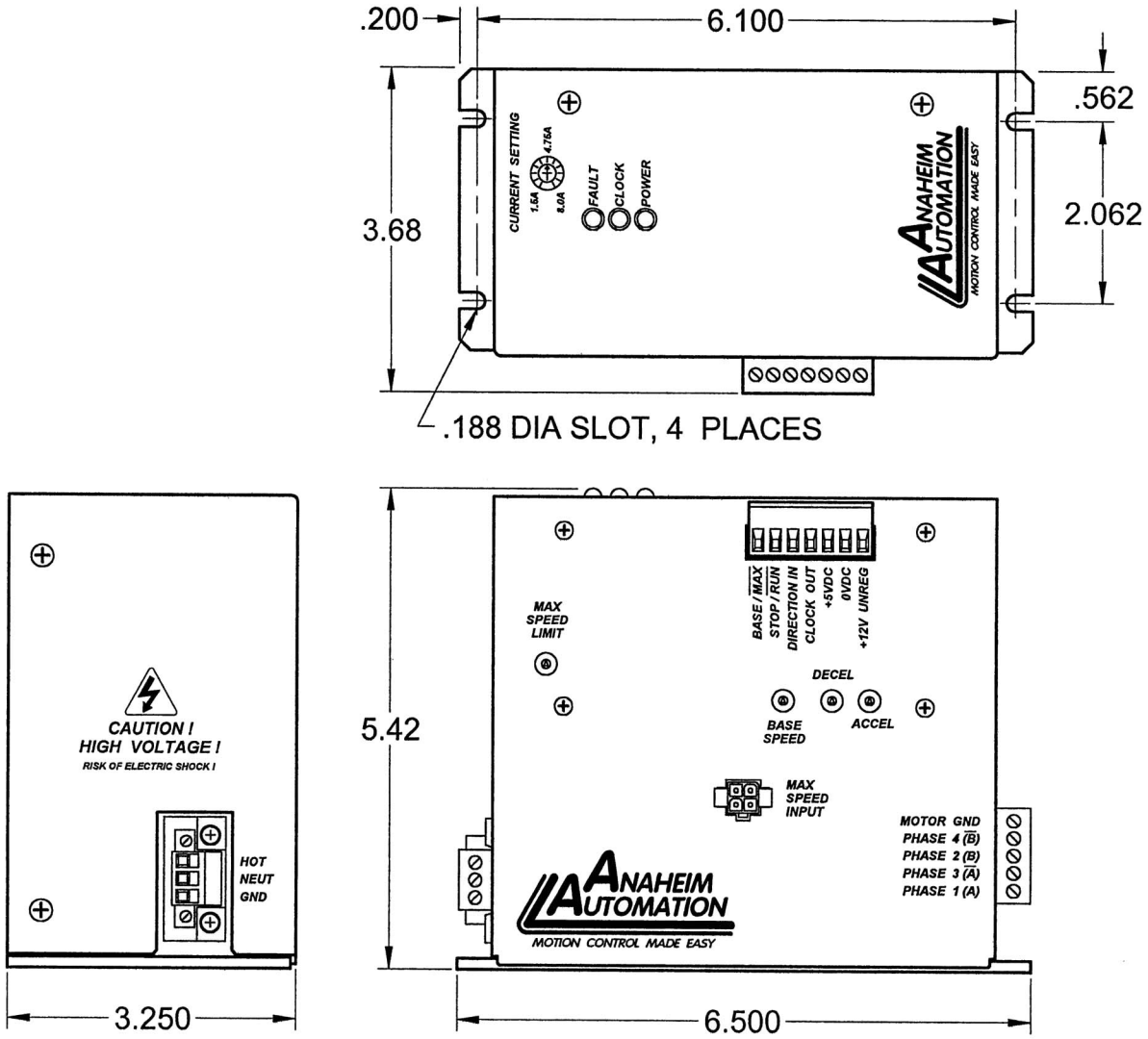
The DPMLPPG1 is powered by an AC line voltage ranging from 90-132VAC. The following figure shows the wiring for the power connection terminal block.



Wiring/Hook-up Diagram



Dimensions


.200
6.100
.562
2.062
3.68
.188 DIA SLOT, 4 PLACES
CURRENT SETTING
1.5A
4.75A
8.0A
FAULT
CLOCK
POWER
ANAHEIM AUTOMATION
MOTION CONTROL MADE EASY
CAUTION !
HIGH VOLTAGE !
RISK OF ELECTRIC SHOCK !
HOT
NEUT
GND
3.250
5.42
MAX SPEED LIMIT
BASE / MAX
STOP / RUN
DIRECTION IN
CLOCK OUT
+5VDC
0VDC
+12V UNREG
DECEL
BASE SPEED
ACCEL
MAX SPEED INPUT
MOTOR GND
PHASE 4 (B)
PHASE 2 (B)
PHASE 3 (A)
PHASE 1 (A)
ANAHEIM AUTOMATION
MOTION CONTROL MADE EASY
6.500

Driver Functions

Motor Selection

The DPMLPPG1 incorporates a Bipolar Microstep Driver that is compatible with both Bipolar and Unipolar Motor Configurations, (i.e. 8 and 4 lead motors, and 6 lead center tapped motors).

Step motors with low current ratings and high inductance will perform better at low speeds, providing higher low-end torque. Motors with high current ratings and low inductance will perform better at higher speeds, providing more high-end torque.

Since the DPMLPPG1 is a constant current source, it is not necessary to use a motor that is rated at the same voltage as the supply voltage. What is important is that the driver is set to the appropriate current level based on the motor being used. Refer to the following chart for setting the current potentiometer based on the current code in the part number of the motor. Examples of motor part numbers are shown below. Anaheim Automation offers a comprehensive line of step motors in 14, 17, 23, 34 and 42 frame sizes. Contact the factory to verify motor compatibility with the DPMLPPG1.

Step Motor Current Setting Guide

Motor Example	Motor Current Number Code	Unipolar Rating	Series Peak Rating	Parallel Peak Rating	Series Current Setting	Parallel Current Setting
23D102S	02	1.0A	1.0A	2.0A	----	15%
23L303D-LW8	03	1.5A	1.5A	3.0A	0%	33%
34N104S-LW8	04	2.0A	2.0A	4.0A	15%	45%
23L4005D-LW8	05	2.5A	2.5A	5.0A	25%	58%
34A106B	06	3.0A	3.0A	6.0A	33%	70%
34N207S-LW8	07	3.5A	3.5A	7.0A	38%	83%
34K108S-LW8	08	4.0A	4.0A	8.0A	45%	98%
42N209S-CB	09	4.5A	4.5A	9.0A	52%	100%
23L310S-LW8	10	5.0A	5.0A	10.0A	58%	100%
34D311D	11	5.5A	5.5A	11.0A	63%	100%
42K112S-CB	12	6.0A	6.0A	12.0A	70%	100%
34D213S	13	6.5A	6.5A	13.0A	77%	100%
34N314S-LW8	14	7.0A	7.0A	14.0A	83%	100%
42N115D-CB	15	7.5A	7.5A	15.0A	88%	----
34K416S-LW8	16	8.0A	8.0A	16.0A	98%	----
42D119D	19	9.5A	9.5A	19.0A	100%	----
42N322S-CB	22	11.0A	11.0A	22.0A	100%	----
42D225S	25	12.5A	12.5A	25.0A	100%	----

Anaheim Automation offers motor cable, making hook-ups quick and easy!
Contact the factory or visit our website for more motor and cable offerings.

Setting the Output Current

The output current on the DPMLPPG1 is set by an onboard potentiometer. This potentiometer determines the per phase peak output current of the driver. The relationship between the output current and the potentiometer value is as follows:

Peak Current	Potentiometer Setting	Peak Current	Potentiometer Setting
1.50A	0%	5.25A	60%
1.75A	10%	6.00A	70%
2.38A	20%	6.87A	80%
2.94A	30%	7.63A **	90%
3.69A	40%	8.13A **	100%
4.44A	50%	----	----

Reducing Output Current

Reducing the output current is accomplished automatically and occurs approximately 1 second after the last positive going edge of the step clock input. The amount of current per phase in the reduction mode is approximately 50% of the set current. When the current reduction circuit is activated, the current reduction resistor is paralleled with the current adjustment potentiometer. This lowers the total resistance value, and thus lowers the per Phase output current.

Connecting the Step Motor

Phase 1 and 3 of the Step Motor is connected between pins 1 and 2 on the motor connector (TB2). Phase 2 and 4 of the Step Motor is connected between pins 3 and 4 on the motor connector (TB2). The motors case can be grounded to pin 5 on the motor connector (TB2). Refer to Figures 2, 3 & 4 for TYPICAL APPLICATION HOOK-UP.

NOTE: The physical direction of the motor with respect to the direction input will depend on the connection of the motor windings. To reverse the direction of the motor with respect to the direction input, switch the wires on Phase 1 and Phase 3.

WARNING: Do not connect or disconnect motor wires while power is applied!

Short-Circuit, Mis-Wire, and Over-Current Conditions

If it is found that there is a condition that causes on over current in the driver phase transistors, the Red LED will turn on solid and power will be shut off to the motor. To reset the drive turn power off, check wiring, and turn power back on.

Over-Temperature and Over-Voltage Conditions

If it is found that there is an over temperature on the internal heat sink, or an over voltage on the motor bus voltage, the Red LED will blink and power will be shut off to the motor. To reset the drive turn power off, check wiring, and turn power back on.

Determining Output Current

The output current for the motor used when microstepping is determined differently from that of a full/half step unipolar driver. In the DPMLPPG1, a sine/cosine output function is used in rotating the motor. The output current for a given motor is determined by the motors current rating and the wiring configuration of the motor. There is a current adjustment potentiometer used to set the output current of the DPMLPPG1. This sets the peak output current of the sine/cosine waves. The specified motor current (which is the unipolar value) is multiplied by a factor of 1.0, 1.4, or 2.0 depending on the motor configuration (series, half-coil, or parallel).

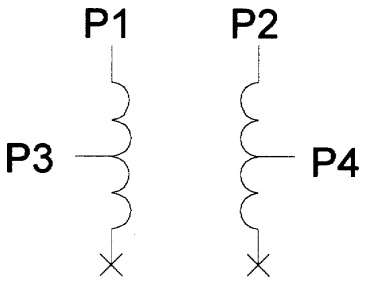
Step Motor Configurations

Step motors can be configured as 4, 6, or 8 leads. Each configuration requires different currents. Refer to the lead configurations and the procedures to determine their output current.

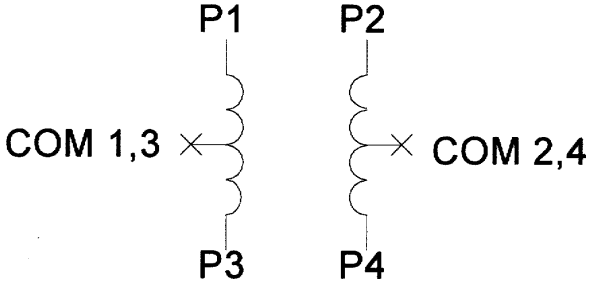
WARNING! Step motors will run hot even when configured correctly. Damage may occur to the motor if a higher than specified current is used. Most specified motor currents are maximum values. Care should be taken to not exceed these ratings.

6 Lead Motors

When configuring a 6 lead motor in a ***half-coil configuration*** (connected from one end of the coil to the center tap), multiply the specified per Phase (or unipolar) current rating by 1.4 to determine the current setting potentiometer value. This configuration will provide more torque at higher speeds when compared to the series configuration.

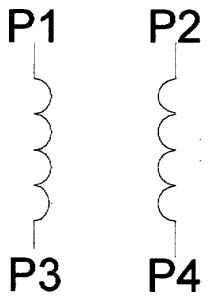


When configuring the motor in a ***series configuration*** (connected from end to end with the center tap floating) use the specified per Phase (or unipolar) current rating to determine the current setting potentiometer value.



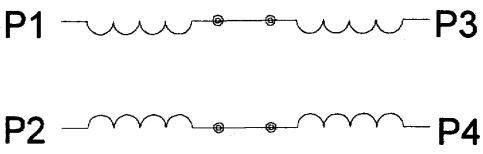
4 Lead Motors

Multiply the specified ***series*** motor current by 1.4 to determine the current adjustment potentiometer value. Four Lead Motors are usually rated with their appropriate series current, as opposed to the *Phase Current*, which is the rating for 6 and 8 lead motors.

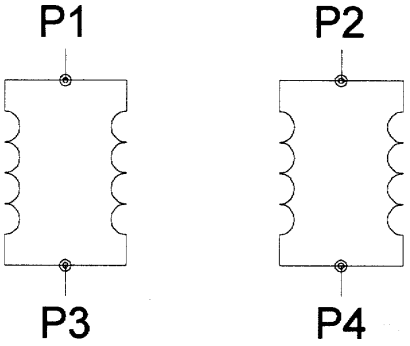


8 Lead Motors

Series Connection: When configuring the motor windings in series, use the per Phase (or unipolar) current rating to determine the current setting potentiometer value.



Parallel Connection: When configuring the motor windings in parallel, multiply the per Phase (or unipolar) current rating by 2.0 to determine the current setting potentiometer value.



NOTE: After the current has been determined, according to the motor connections above, use Table 3 to choose the proper setting for the current setting potentiometer.

Pulse Generator Functions

GENERAL DESCRIPTION

The pulse generator inside the DPMLPPG1 is a linear ramping pulse generator (PG) designed to be used with Anaheim Automation's Step Motor Drivers. It has adjustable BASE and MAX speeds and independent adjustments for acceleration (ramping up) and deceleration (ramping down).

SPEED RANGES

The pulse generator has an adjustable BASE speed (starting speed) and an adjustable MAX speed (running speed). There are two speed ranges that are jumper selectable, on JP1. For the low speed range, the BASE speed can be adjusted from 50 pulses/sec to 500 pulses/sec and the MAX speed can be adjusted from 50 pulses/sec to 5,000 pulses/sec. For the high speed range, the BASE speed can be adjusted from 200 pulses/sec to 2,000 pulses/sec and the MAX speed can be adjusted from 200 pulses/sec to 20,000 pulses/sec. Note: it is possible to have a MAX speed that is lower than the BASE speed. The BASE speed potentiometer is on-board; the MAX speed potentiometer is external.

LIMITING THE MAX SPEED

In some applications, it may be necessary to limit the MAX speed so that the operator does not run the "machine" or system too fast. The Max Speed Limit potentiometer can be adjusted to limit the top speed. Please note that this only affects the MAX speed; the BASE speed is unaffected.

RAMPING

There are separate adjustments for acceleration and deceleration . The ramp times are adjustable from 50 milliseconds to 1.0 seconds. This is the time it takes to ramp from the lowest BASE speed to the highest MAX speed. In terms of acceleration units, the accel/decel rates are adjustable from 5,000 to 100,000 steps/s^2 on the low speed range and 20,000 to 400,000 steps/s^2 on the high speed range.

INPUTS

STOP/RUN: When this input is open or logic "1", the PG is stopped and will not output any pulses. When this input is pulled low to a logic "0", the PG will output pulses at the BASE speed rate if the BASE/MAX input is left open, or logic "1". If both the STOP/RUN and the BASE/MAX inputs are at a logic "0", the PG will ramp up and output pulses at the MAX speed rate. This input is only used in the "Two-input" operation.

BASE/MAX: This input has two functions. In the Two-input operation, this input selects either BASE speed (logic "1") or MAX speed (logic "0"). When this input changes, the PG will ramp from one speed to the other.

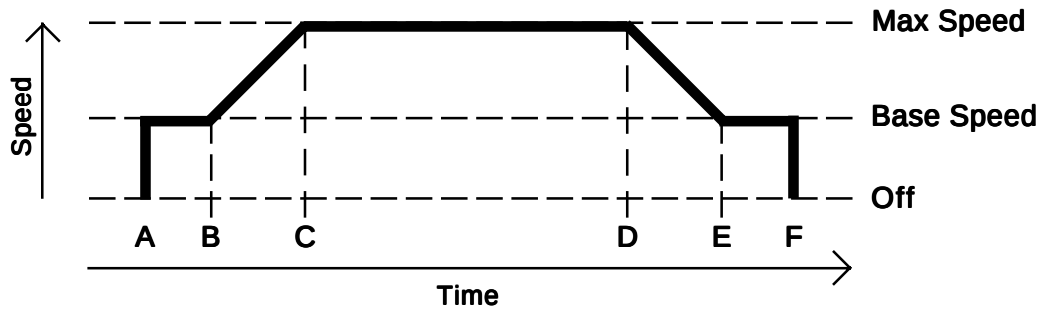
In the Single-input operation, this input is used to start and stop the PG (logic "1"=stop, logic "0"=run). Upon starting, the PG will start running at BASE speed but immediately ramp up to the MAX speed and keep running at the Max speed while this input is logic "0". When this input goes back to logic "1", the PG will either stop immediately, or it will ramp down and stop when it reaches BASE speed (depending on JP2 setting). With Single-input operation, the PG only uses BASE speed as a starting speed; it cannot run at BASE speed "for a while". The STOP/RUN input is NOT used with Single-input operation.

Direction: This input is used to change the direction of the motor. Physical direction also depends on the connection of the motor windings.

OPERATING MODES

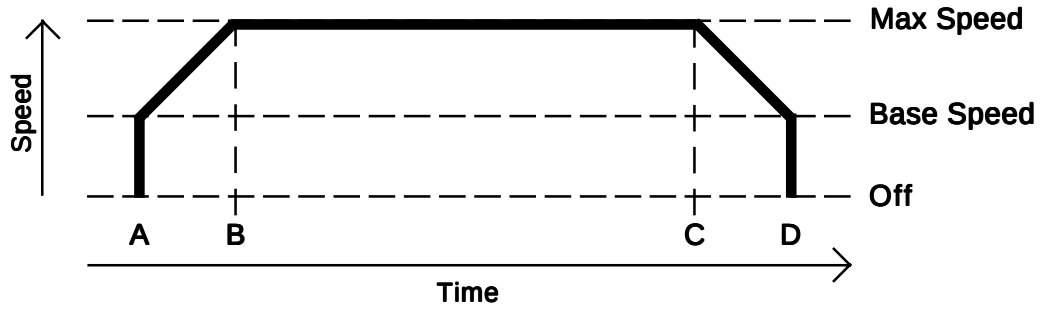
TWO INPUT OPERATION

A. STOP/RUN is pulled low; Start at BASE speed and run for a while at BASE speed
B. BASE/MAX is pulled low; Ramp up to MAX speed
C. Both inputs are still low; MAX speed is reached (keep running at MAX speed)
D. BASE/MAX input is let go, or pulled high and STOP/RUN is still low; Ramp down to BASE speed
E. STOP/RUN is still low; BASE speed is reached
F. STOP/RUN input is let go, or pulled high; STOP



SINGLE INPUT OPERATION

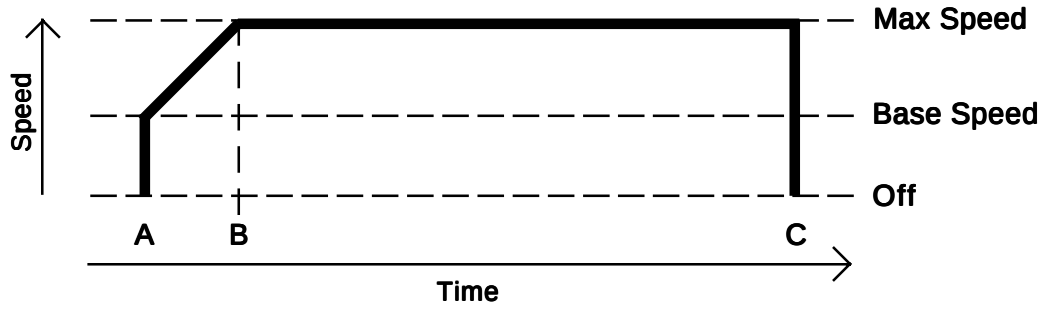
A. BASE/MAX input is pulled low; Start at BASE speed and immediately ramp up to MAX speed
B. MAX speed is reached
C. BASE/MAX input is let go or pulled high; Ramp down
D. Automatically stop when BASE speed is reached.



SINGLE INPUT OPERATION WITH NO RAMPING DOWN

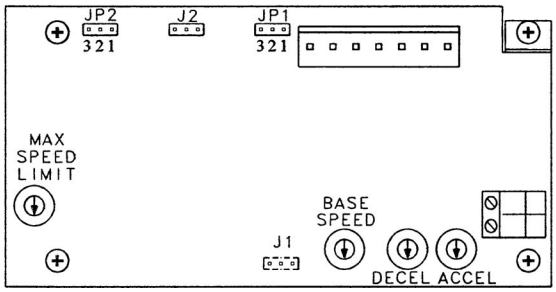
A. Base/Max is active; Starts at base speed and immediately ramps up to max speed.
B. Base/Max is still active; Max speed is reached (keeps running at max speed).
C. Base/Max is inactive; Pulses stop.

Note: In this mode, the PG still ramps down internally even though pulses stop; so before ramping again, 50 milliseconds must be allowed for the PG to ramp back down to base speed with the decel adjustment set for the fastest ramp down.



****WARNING! BEFORE OPENING UNIT, CONSULT FACTORY****

Pulse Generator Jumper Options (Inside Unit)



Function	Jumper JP1	Jumper JP2
Low Speed Range	1-2	---
High Speed Range	2-3	---
Ramp Up Only	---	2-3
Ramp Up and Down	---	1-2
Default Values	**2-3**	**1-2**

Driver Microstep Selection (SW1 Settings inside unit)

Switches 2, 3 and 4, of the DIP switch select the microstep resolution of the driver. Table 6 shows the standard resolution values along with the associated positions for the select switches. The standard waveforms are sinusoidal. The steps/rev are based on a 200 step/rev motor.

Resolution	Steps/Rev	Select 1	Select 2	Select 3	Select 4	Auto Reduce Current
1	200	OFF	ON	ON	ON	Disabled
2	400	OFF	ON	ON	OFF	Disabled
5	1000	OFF	ON	OFF	ON	Disabled
8	1600	OFF	ON	OFF	OFF	Disabled
10	2000	OFF	OFF	ON	ON	Disabled
16	3200	OFF	OFF	ON	OFF	Disabled
32	6400	OFF	OFF	OFF	ON	Disabled
64	12800	OFF	OFF	OFF	OFF	Disabled
1	200	ON	ON	ON	ON	Enabled
2 (Default)	**400**	**ON**	**ON**	**ON**	**OFF**	**Enabled**
5	1000	ON	ON	OFF	ON	Enabled
8	1600	ON	ON	OFF	OFF	Enabled
10	2000	ON	OFF	ON	ON	Enabled
16	3200	ON	OFF	ON	OFF	Enabled
32	6400	ON	OFF	OFF	ON	Enabled
64	12800	ON	OFF	OFF	OFF	Enabled

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All Anaheim Automation, Inc. products are warranted against defects in workmanship, materials and construction, when used under Normal Operating Conditions and when used in accordance with specifications. This warranty shall be in effect for a period of twelve months from the date of purchase or eighteen months from the date of manufacture, whichever comes first. Warranty provisions may be voided if the products are subjected to physical damage or abuse.

Anaheim Automation, Inc. will repair or replace at its option, any of its products which have been found to be defective and are within the warranty period, provided that the item is shipped freight prepaid, with RMA (return material authorization), to Anaheim Automation's plant in Anaheim, California.

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