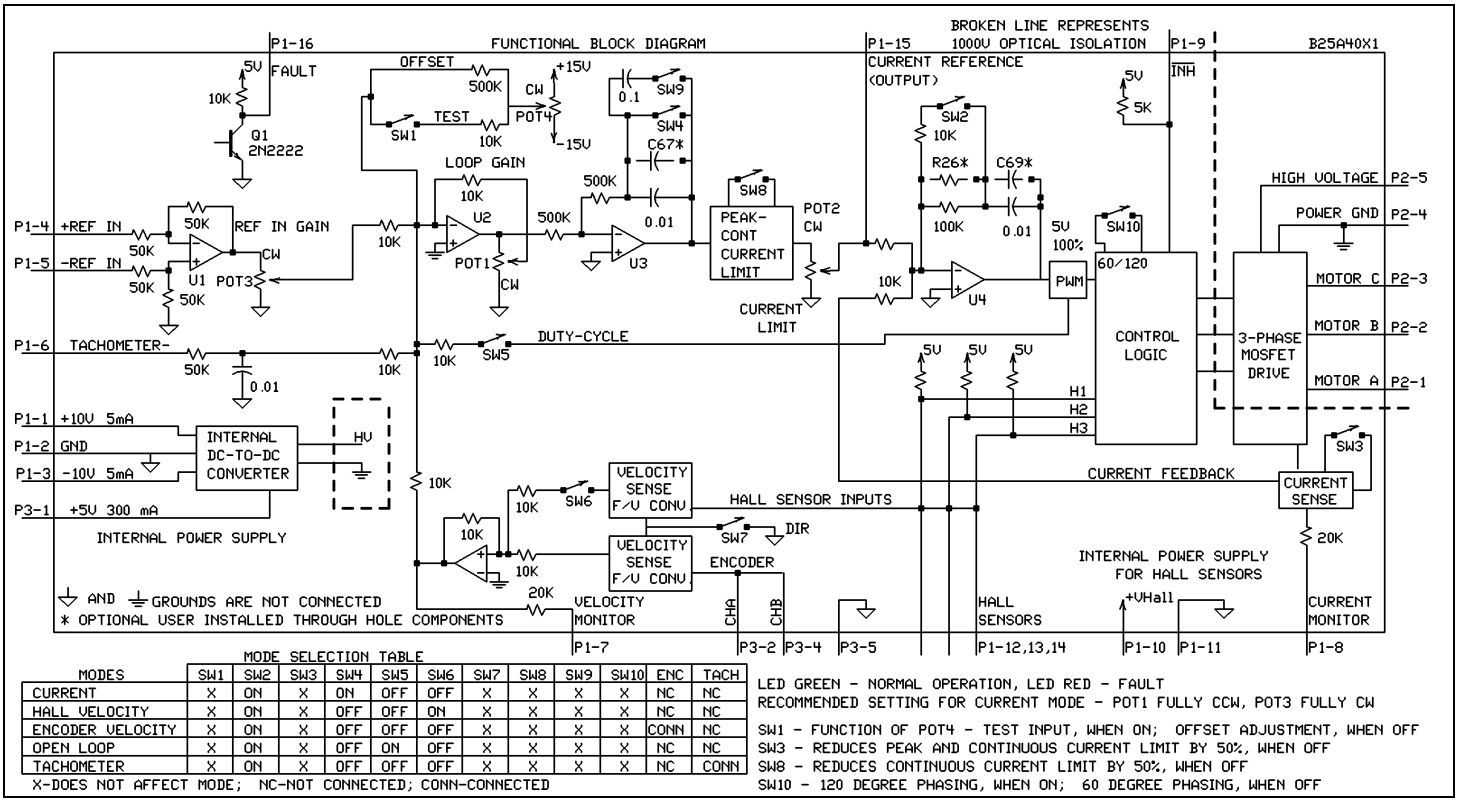
B25A40 SERIES BRUSHLESS SERVO AMPLIFIERS
Model: B25A40

FEATURES:

* Surface-mount technology
* Small size, low cost, ease of use
* Optical isolation, see block diagram
* DIP switch selectable modes: current, open loop, tachometer, **HALL velocity and encoder velocity**
* Four quadrant regenerative operation

DESCRIPTION: B25A40 Series PWM servo amplifiers are designed to drive brushless DC motors at a high switching frequency. The B25A40 is fully protected against over-voltage, under-voltage, over-current, over-heating and short-circuits. This model interfaces with digital controllers or can be used as stand-alone drive and requires only a single unregulated DC power supply. A single red/green LED and a single digital output indicate operating status. Loop gain, current limit, input gain and offset can be adjusted using 14-turn potentiometers. The offset adjusting potentiometer can also be used as an on-board input signal for testing purposes when SW1 (DIP switch) is ON.



MODE SELECTION TABLE

MODES	SW1	SW2	SW3	SW4	SW5	SW6	SW7	SW8	SW9	SW10	ENC	TACH
CURRENT	X	ON	X	ON	OFF	OFF	X	X	X	X	NC	NC
HALL VELOCITY	X	ON	X	OFF	OFF	ON	X	X	X	X	NC	NC
ENCODER VELOCITY	X	ON	X	OFF	OFF	OFF	X	X	X	X	CONN	NC
OPEN LOOP	X	ON	X	OFF	ON	OFF	X	X	X	X	NC	NC
TACHOMETER	X	ON	X	OFF	OFF	OFF	X	X	X	X	NC	CONN

X-DOES NOT AFFECT MODE; NC-NOT CONNECTED; CONN-CONNECTED

LED GREEN - NORMAL OPERATION, LED RED - FAULT
RECOMMENDED SETTING FOR CURRENT MODE - POT1 FULLY CCW, POT3 FULLY CW

SW1 - FUNCTION OF POT4 - TEST INPUT, WHEN ON; OFFSET ADJUSTMENT, WHEN OFF
SW3 - REDUCES PEAK AND CONTINUOUS CURRENT LIMIT BY 50%, WHEN OFF
SW8 - REDUCES CONTINUOUS CURRENT LIMIT BY 50%, WHEN OFF
SW10 - 120 DEGREE PHASING, WHEN ON; 60 DEGREE PHASING, WHEN OFF

ADVANCED MOTION CONTROLS
3629 Vista Mercado, Camarillo, CA 93012 Tel: (805) 389-1935, Fax: (805) 389-1165

	MODEL
POWER STAGE SPECIFICATIONS	**B25A40**
DC SUPPLY VOLTAGE	120 - 400 V
PEAK CURRENT (2 sec. max., internally limited)	± 25 A
MAXIMUM CONTINUOUS CURRENT (internally limited)	± 12.5 A
MINIMUM LOAD INDUCTANCE*	600 µH
SWITCHING FREQUENCY	20 KHz ± 15%
HEATSINK (BASE) TEMPERATURE RANGE	0^{o} to $+65^{o}$C, disables if $>65^{o}$C
POWER DISSIPATION AT CONTINUOUS CURRENT	115 W
OVER-VOLTAGE SHUT-DOWN (self reset)	420 V
BANDWIDTH	2.5 KHz

MECHANICAL SPECIFICATIONS	
POWER CONNECTOR	Screw terminals
SIGNAL CONNECTOR	Molex connector
SIZE	8.0 x 6.26 x 1.36 inches 203.2 x 159.1 x 34.6 mm
WEIGHT	2 lb. 0.91 kg

* Low inductance motors require external inductors.

PIN FUNCTIONS

CONNECTOR	PIN	NAME	DESCRIPTION / NOTES	I/O
P2	1	MOTOR A	Motor phase A connection	O
	2	MOTOR B	Motor phase B connection	O
	3	MOTOR C	Motor phase C connection	O
	4	POWER GND	Power ground	GND
	5	HIGH VOLTAGE	DC power input	I
P1	1	+10 V, 5 mA OUT	For customer use	O
	2	SIGNAL GND	Reference ground	GND
	3	-10 V, 5 mA OUT	For customer use	O
	4	+REF IN	Differential reference input, maximum ±15 V, 50K input resistance	I
	5	-REF IN		
	6	-TACH IN	Tachometer input, max. ±60 VDC, 60K input resistance	I
	7	VELOCITY MONITOR OUT	Hall-velocity mode: 1 V = 100 Hz Hall sensor frequency. Encoder velocity mode: 1V = 25KHz encoder frequency	O
	8	CURRENT MONITOR OUT	SW3=OFF , 1 V = 2 A SW3=ON , 1 V = 4 A	O
	9	$\overline{\text{INHIBIT IN}}$	Pull to ground to inhibit. For inverted inhibit inputs, see section "G".	I
	10	+V HALL 30mA OUT	Power for HALL sensors, short circuit protected, +6 V @ +30 mA	O
	11	GND		GND
	12	HALL 1	HALL sensor inputs, logic levels, internal 2 KΩ pull-up. Maximum low level input is 1.5 V, minimum high level input is 3.5 V.	I
	13	HALL 2		
	14	HALL 3		
	15	CURRENT REFERENCE OUT	Monitors the input signal connected directly to the internal current amplifier. 7.5 V = maximum peak set current. See page C-37.	O
	16	FAULT OUT (LED red)	TTL level output. Becomes high during output short circuit, over-voltage, under voltage inhibit, and during power-up reset. Fault condition indicated by red LED.	O
P3 ENCODER	1	+ 5 V, 300 mA OUT	Encoder Power	O
	2	CHANNEL A	TTL level quadrature encoder input	I
	3	NC	Not connected	NC
	4	CHANNEL B	TTL level quadrature encoder input	I
	5	GND	Encoder common	GND

NOTE: All circuits on connectors P1 and P3 are optically isolated from all circuits on connector P2.

SWITCH FUNCTIONS

SWITCH	FUNCTION DESCRIPTION	SETTING	
		ON	OFF
1	Test / Offset. Sensitivity of the "offset" pot. Used as an on-board reference signal in test mode.	Test	Offset
2	Current loop gain	Decrease	Increase
3	Current scaling. When OFF, increases sensitivity of current sense thus reducing both peak and continuous current limit by 50%.	100%	50%
4	Loop integrator. This capacitor normally ensures "error-free" operation in velocity mode by reducing the error signal (output of summing amplifier) to zero.	Shorts out the velocity/voltage loop integrator capacitor	Velocity/voltage loop integrator operating
5	Internal duty-cycle feedback for open loop mode	Open loop	No effect
6	Velocity feedback. Connects the internally generated velocity signal from HALL sensors.	On	Off
7	Velocity direction. Changes the polarity of the velocity signal.	Normal	Inverted
8	Current reduction. Reduces continuous current limit by 50%.	Continuous / peak current limit ratio is 50%	Continuous / peak current limit ratio is 25%
9	Integrator capacitor. Adjusts the value of the integrator capacitor in velocity mode.	Increase	Decrease
10	60/120 degree commutation phasing setting	120 degree phasing	60 degree phasing

POTENTIOMETER FUNCTIONS

POTENTIOMETER	DESCRIPTION	TURNING CW
Pot 1	Loop gain adjustment in open loop & velocity modes. Voltage to current scaling factor adjustment in current mode.	Increases loop gain
Pot 2	Current limit. It adjusts both continuous and peak current limit while maintaining selected ratio.	Increases current limit
Pot 3	Reference in gain. It adjusts the ratio between input signal and output variables (voltage, current, velocity).	Increases reference input gain
Pot 4	Test / Offset. Used to adjust any imbalance in the input signal or in the amplifier. When SW1 (DIP switch) is ON, the sensitivity of this pot is greatly increased thus it can be used as an on-board signal source for testing purposes. See section "G".	N/A

TEST POINTS FOR POTENTIOMETERS

See section "G".

OPERATING MODE SELECTION

These modes can be selected by the DIP switches according to the chart in the functional block diagram:

* Current mode
* Open loop mode
* Tachometer mode
* HALL velocity mode
* Encoder velocity model

See section "G" for more information.

SET-UP

See section "G" for engineering and installation notes.

CURRENT LIMIT ADJUSTMENTS

These amplifiers feature separate peak and continuous current limit adjustments. The current limit adjustment Pot 2 adjusts both peak and continuous current limit at the same time. It has 12 active turns plus 1 inactive turn at each end and is approximately linear. Thus, to adjust the current limit turn the potentiometer counter-clockwise to zero (using ohmmeter), then turn clockwise to the appropriate value.

In many applications it is sufficient to use only the DIP switches for current limit adjustments. SW3 reduces both peak and continuous current limit by 50% when OFF. SW8 reduces only the continuous current limit by 50% when OFF:

SW8	CONTINUOUS / PEAK CURRENT LIMIT RATIO
ON	50%
OFF	25%

P1-15 is the input to the internal current amplifier stage. Since the output current is proportional to P1-15, the adjusted current limit can easily be observed at this pin without connecting the motor. Note that a command signal must be applied to the reference inputs to obtain a reading on P1-15. The maximum peak current value equals 7.5 V at this pin. If SW3=ON, peak rated amplifier current = 7.5 V. If SW3=OFF, ½ peak rated amplifier current =7.5 V. Example: using the B25A40 with SW3=ON, 25A=7.5V and with SW3=OFF, 12.5A=7.5V.

The actual output current can be monitored at pin P1-8.

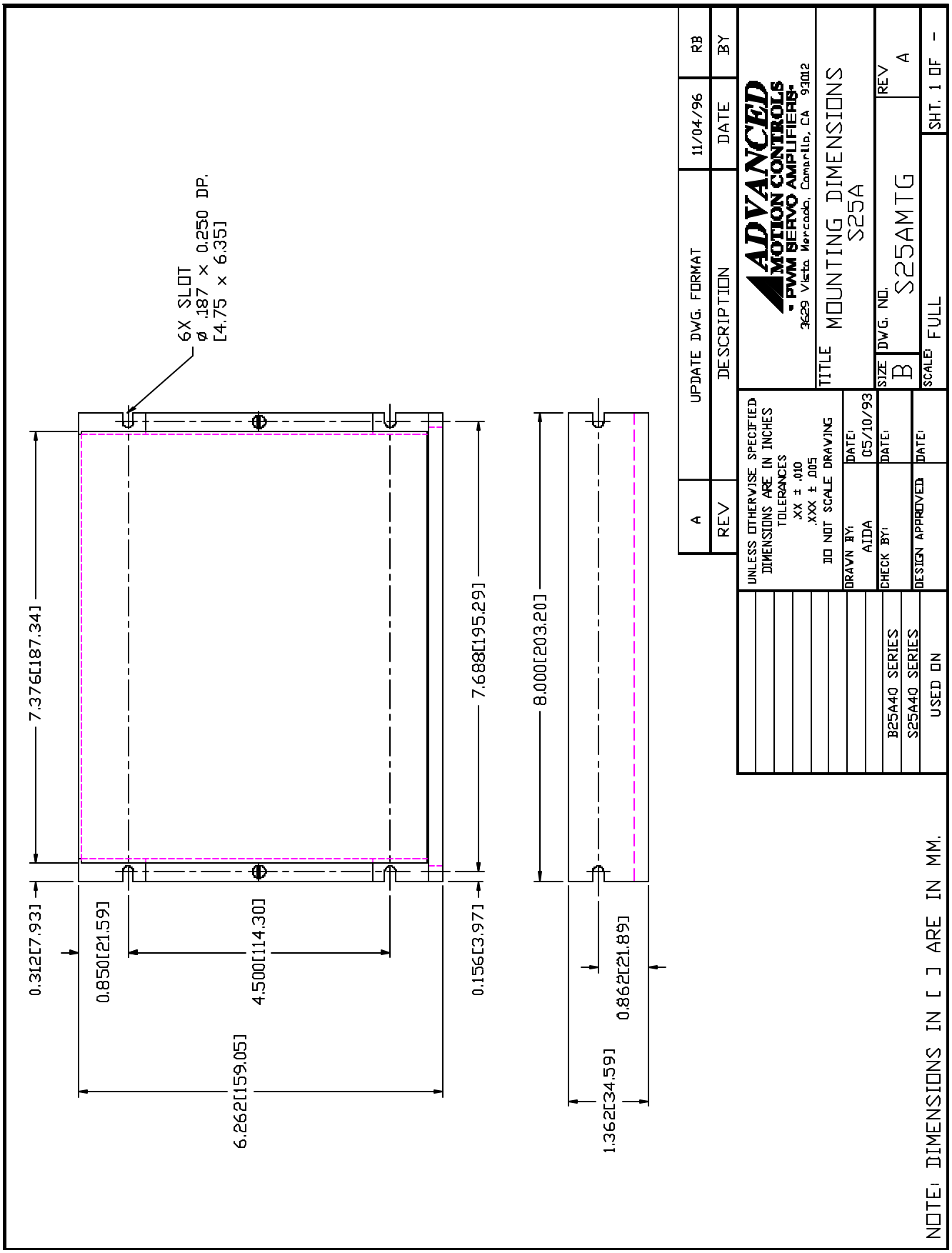
ORDERING INFORMATION

Models: B25A40X

X indicates the current revision letter.

TYPICAL SYSTEM WIRING: See section "G".

MOUNTING DIMENSIONS:


6X SLOT
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[4.75 x 6.35]
7.376[187.34]
7.688[195.29]
8.000[203.20]
0.312[7.93]
0.850[21.59]
4.500[114.30]
0.156[3.97]
6.262[159.05]
0.862[21.89]
1.362[34.59]
A
REV
UPDATE DWG. FORMAT
DESCRIPTION
11/04/96
DATE
RB
BY
ADVANCED MOTION CONTROLS
• PWM SERVO AMPLIFIERS •
3629 Vista Mercado, Camarillo, CA 93012
UNLESS OTHERWISE SPECIFIED
DIMENSIONS ARE IN INCHES
TOLERANCES
.XX ± .010
.XXX ± .005
DO NOT SCALE DRAWING
DRAWN BY: AIDA
DATE: 05/10/93
CHECK BY:
DATE:
DESIGN APPROVED
DATE:
TITLE MOUNTING DIMENSIONS S25A
SIZE B
DWG. NO. S25AMTG
REV A
SCALE: FULL
SHT. 1 OF -
B25A40 SERIES
S25A40 SERIES
USED ON
NOTE: DIMENSIONS IN [ ] ARE IN MM.