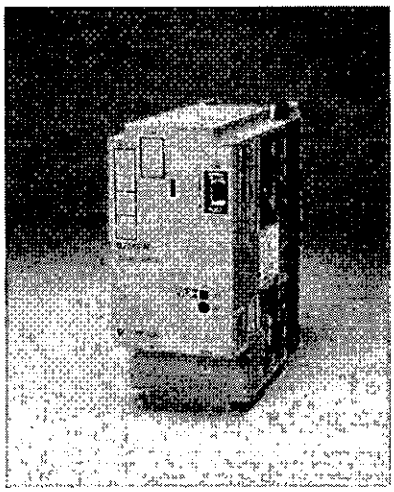
SGDB Servo Amplifier

- All Digital for Speed, Torque & Position Control
- With Incremental / Absolute Encoder

efesotomasyon.com



For Additional Information	Page(s)
SGDB Ratings & Specifications	129 - 130
SGDB Dimensions	131 - 137
SGDB Internal Connections	138 - 140
SGMG Sigma Servo System	79 - 108
SGMS Sigma Servo System	109 - 116

Design Features

1. Improved Performance
   - Stability
     Increased 2 to 3 times.
   - Positioning settling time
     Shortened to 1/2 to 1/3.
   - Speed loop frequency characteristics
     Enhanced to 2 to 3 times.
   - Servo rigidity
     Enhanced 2 to 3 times.
2. Easy Operation
   - All-in-one model (speed, torque and position control)
     All-in-one model, yet common to incremental and absolute encoders.
   - PC monitoring function
     Can be found in standard applications.
   - Auto-tuning function
     Included in its specifications.
   - Multi-axis communication
     Also installed as standard specification. One personal computer can communicate with 14 (max) SGDB models by parameter setting.
   - Main circuit and control circuit
     Both are separated.
   - Speed command power supply output
     ±12V / ±30mA is included as standard specification.

Model Number Designation

SGDB - □□ A D □

Sigma Series
SGDB Servo
Amplifier

Rated Output

Type	Capacity kW (HP)
05	0.5 (0.67)
10	1.0 (1.3)
15	1.5 (2.0)
20	2.0 (2.7)
30	3.0 (4.0)
44	4.4 (5.9)
60	6.0 (8.0)
75	7.5 (10)
1A	11.0 (15)

Applicable Motor Series

[G] : Standard SGMG (1500 rpm)

Note: Amplifiers are also compatible with SGMS, SGM and SGMP motors via digital field parameter adjustment.

Model

[D] : Speed, Torque and Position Control

Power Supply

[A] : 200V

[V] : 200V optional CE

SGDB Amplifier Ratings and Specifications

Basic Specifications	Input Power Supply		Main Circuit *1	Three-phase 200 to 230 VAC +10% to -15%, 50/60 Hz
			Control Circuit *1	Single-phase 200 to 230 VAC +10% to -15%, 50/60 Hz
	Control Mode			Three-phase, full-wave rectification IGBT PWM (sine-wave driven)
	Feedback			Incremental encoder, absolute encoder
	Location	Ambient/Storage Temp. *2		0 to 55°C / -20 to 85°C
		Ambient/Storage Humidity		90% or less (no-condensing)
		Vibration/Shock Resistance		4.9m/s^2/19.6m/s^2
	Structure			Base mounted (duct ventilation available as option) and flat mount type
	Approx. mass			03 to 15: 4.0kg (9 lbs), 20 to 30: 5.0kg (11 lbs) 44 to 50 : 8kg (18 lbs), 60 to 75: 15.5kg (33 lbs), 1A: 23kg (51 lbs)
Speed/Torque Control Mode	Performance	Speed Control Range		1 : 5000 (Provided that the lower limit of the speed control range does not cause the motor to stop when the rated torque load is applied)
		Speed Regulation *3	Load Regulation	0% to 100%: 0.01% max. (at rated speed)
			Voltage Regulation	Rated voltage ±10% : 0% (at rated speed)
			Temperature Regulation	25 ± 25°C : 0.1% max. (at rated speed)
		Frequency Characteristics		250Hz (at $J_L = J_M$)
		Accel/Decel Time Setting		0 to 10s
	Input Signal	Speed Reference	Reference Voltage *4	±6VDC (variable setting range: ±2 to ±10VDC) at rated speed (forward rotation with positive reference)
			Input Impedance	Approx. 30kΩ
			Circuit Time Constant	Approx. 47μs
		Torque Reference	Reference Voltage *4	±1 to ±10V at rated speed (forward rotation with positive reference)
			Input Impedance	Approx. 30kΩ
			Circuit Time Constant	Approx. 47μs
		Built-in Reference Power Supply		±12V, ±30mA
		Contact Speed Reference	Rotation Direction Selection	Uses P control signal
			Speed Selection	Forward/reverse rotation current control signals are used (1st to 3rd speed selection). When both signals are OFF, the motor stops or enters another control mode.
Positioning Control Mode	Performance	Bias Setting		0 to 450 rpm (setting resolution: 1 rpm)
		Feed-forward Compensation		0 to 100% (setting resolution: 1%)
		Position Complete Width Setting		0 to 250 reference units (setting resolution: 1 reference unit)
	Input Signal	Reference Signal	Type	SIGN + PULSE train, 90° phase difference 2-phase pulse (phase A + phase B), or CCW + CW pulse train
			Pulse Buffer	Line driver (+5V level), open collector (+5V or +12V level)
			Pulse Frequency	Max. 450/200 kpps (line driver/open collector)
		Control Signal		CLEAR (input pulse form identical to reference pulse)
		Built-in Open Collector Power Supply *5		+12V (With built-in 1kΩ resistor)

Ratings and Specifications (cont'd)

I/O Signals	Position Output	Output Form	Phases A, B and C: Line driver output Phase S: Line driver output (Only when 12-bit absolute encoder is used)
		Frequency Dividing Ratio	(16 to N) /N (N: Number of encoder pulses)
	Sequence Input		Servo ON, P control (or forward/reverse rotation in contact input speed control mode), forward rotation prohibited (P-OT), reverse rotation prohibited (N-OT), alarm reset, forward rotation current limit and reverse rotation current limit (or contact input speed control)
	Sequence Output		Servo alarm, 3-bit alarm codes
		Any 3 of those signals	Positioning complete (speed coincidence), TGON, servo ready, current limit, brake release, overload detected
	Analog Monitor Output	Any 2 of those signals	Speed: 2V/1000 rpm or 1V/1000 rpm Torque: 2V/rated torque Error: 0.05V/reference unit or 0.05 V/100 reference units
Built-in Functions	Dynamic Brake (DB)		Activated at main power OFF, servo alarm, servo OFF or overtravel
	Regenerative Processing		Incorporated. For 60 to 1A types, external regenerative resistor must be mounted.
	Overtravel (OT) Prevention		Motor is stopped by dynamic brake, decelerates to a stop, or coasts to a stop when P-OT or N-OT is activated.
	Protection		Overcurrent, overload, regenerative error, main circuit voltage error, heat sink overheat, power open phase, overflow, overspeed, encoder error, encoder disconnected, overrun, CPU error, parameter error.
	LED Display		POWER, ALARM, CHARGE
	Analog Monitor (5CN)		Same analog monitor signal as 1CN is available.
	Communication	Interface	Digital Operator (mount type or hand type) RS422A port such as person computer (RS232C port can be used if some conditions are met).
		1 : N Communication	N can be up to 14 when RS422A port is used.
		Axis Address Setting *6	Hexadecimal rotary switch (1SW) 1 : 1: N communication, 0 : 1 : 1 communication
		Functions	Status display, user constant setting, monitor display, alarm traceback display, jogging, autotuning, etc.
	Others		Zero-clamp, reverse rotation connection

*1 The power voltage must not exceed 230V + 10% (253V). If it is likely that it will exceed this limit, use a stepdown transformer.

*2 The ambient temperature must be within the specified range. Even if the Servo Amplifier is installed in a box, the temperature inside the box must not exceed the range.

*3 Speed regulation can be calculated using the following formula:

$$\left(\text{Speed regulation} = \frac{\text{(no-load motor speed - full-load motor speed)}}{\text{rated motor speed}} \times 100\%\right)$$

Under actual operating conditions, voltage or temperature fluctuation causes drift to the amplifier or changes the operating resistance, resulting in the motor speed being changed. The percentage of the motor speed change to the rated motor speed is called "speed regulation".

*4 Forward rotation is defined as the clockwise rotation when viewed from the motor on the opposite side of the load. (It is the counterclockwise rotation when viewed from the load or shaft).

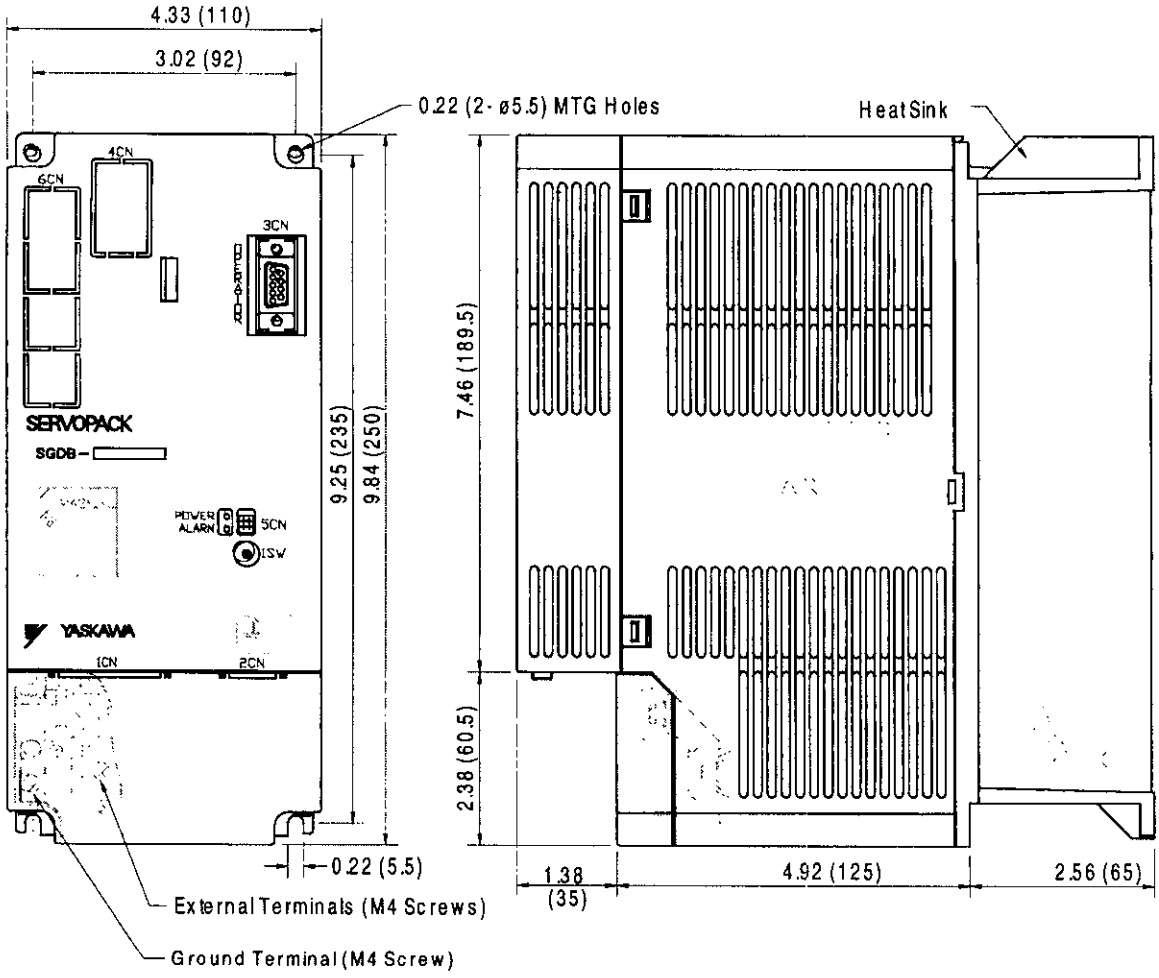
*5 Built-in open collector power supply is not electrically isolated from the control circuit inside the Servo Amplifier.

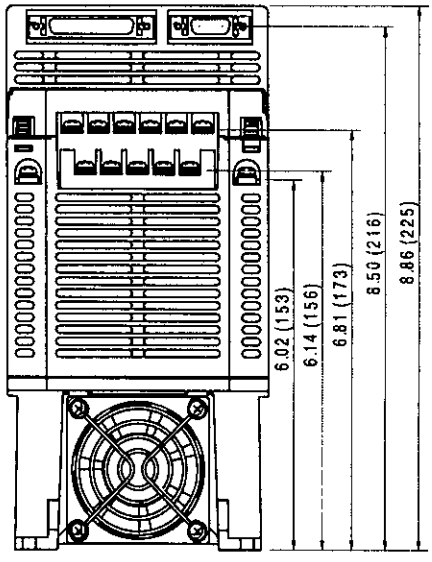
*6 For 1 : 1 communication, set the rotary switch to "0".

Dimensions in inches (mm)

SGDB Servo Amplifier (Standard)

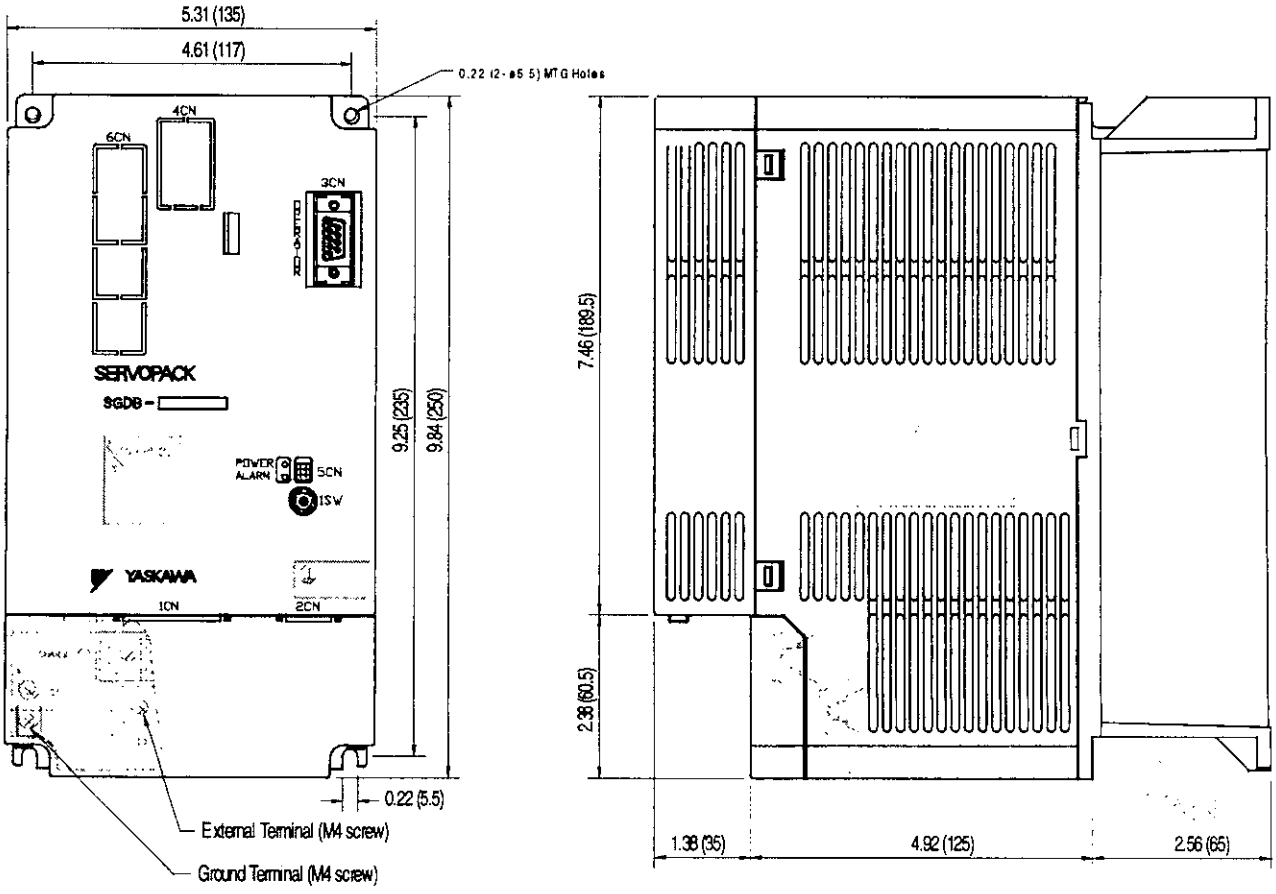
(1) SGDB-03 to 15AD□

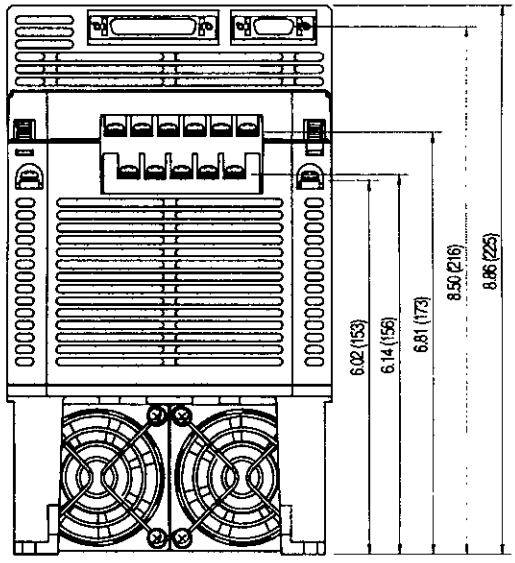




SGDB

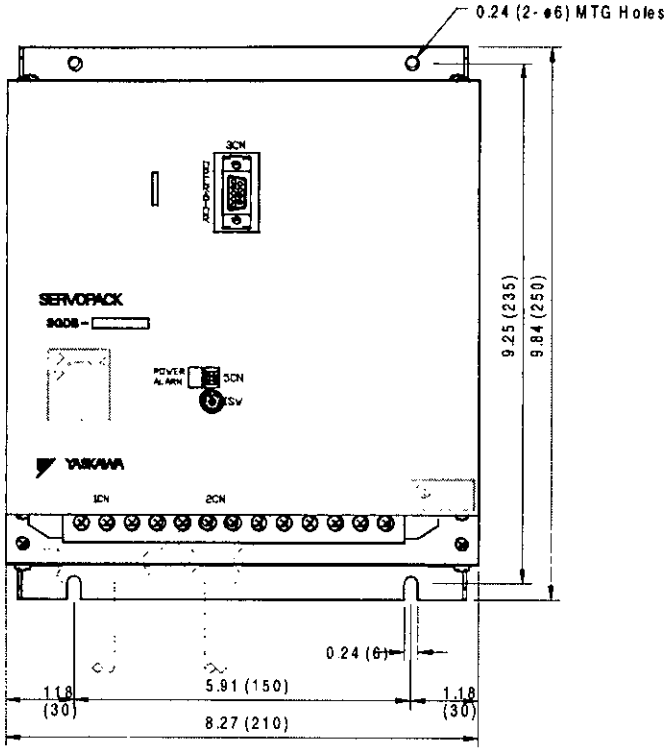
(2) SGDB-20 to 30AD□

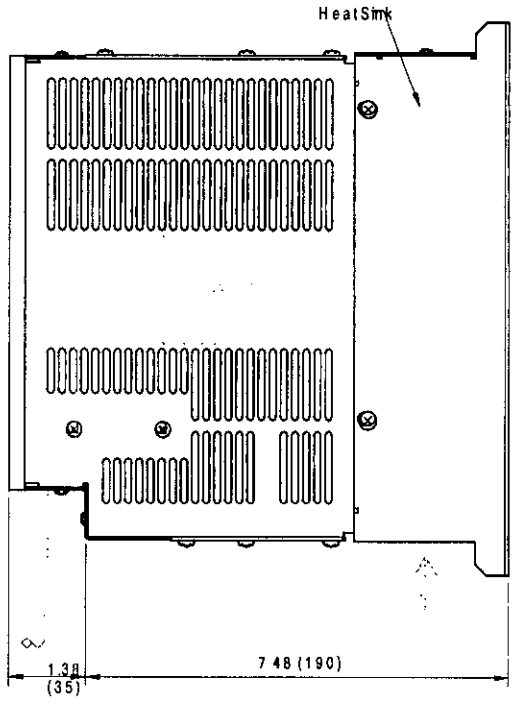


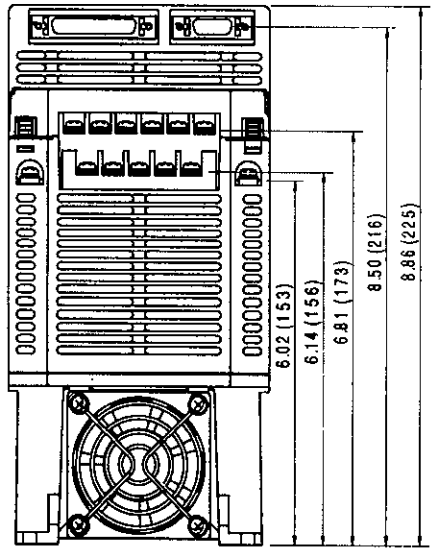


efesotomasyon.com

(3) SGDB-44 to 50AD□

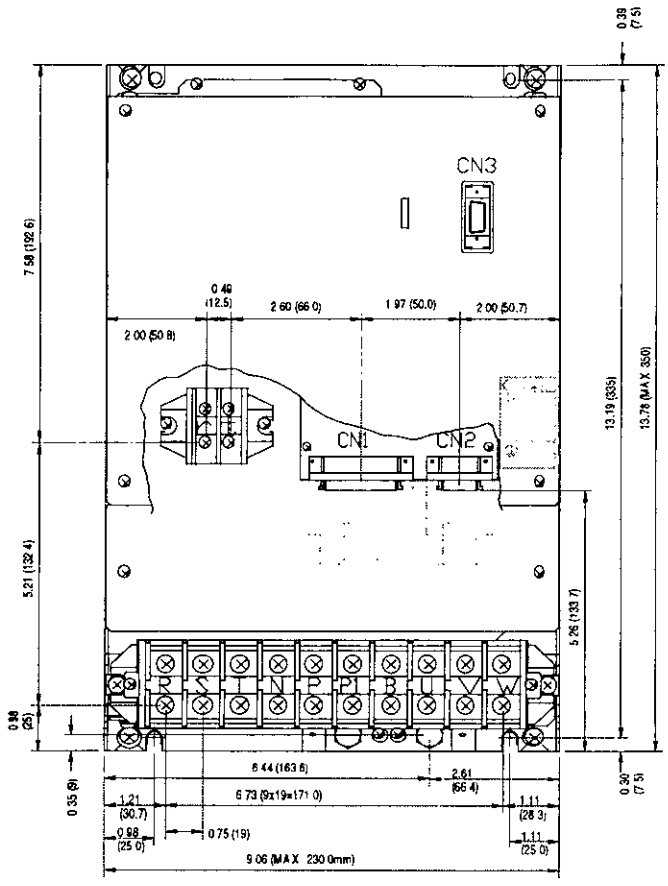


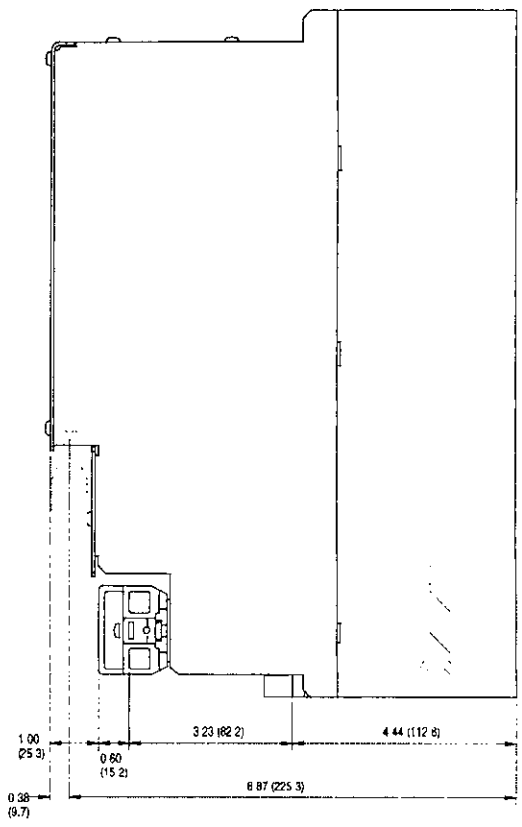


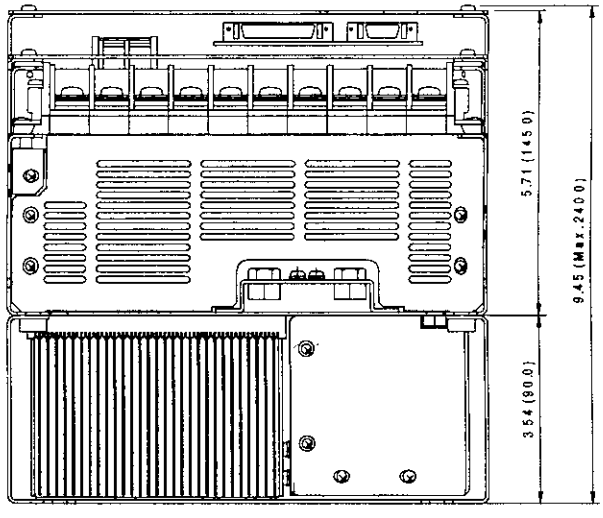


SGDB

(4) SGDB-60 to 75AD□

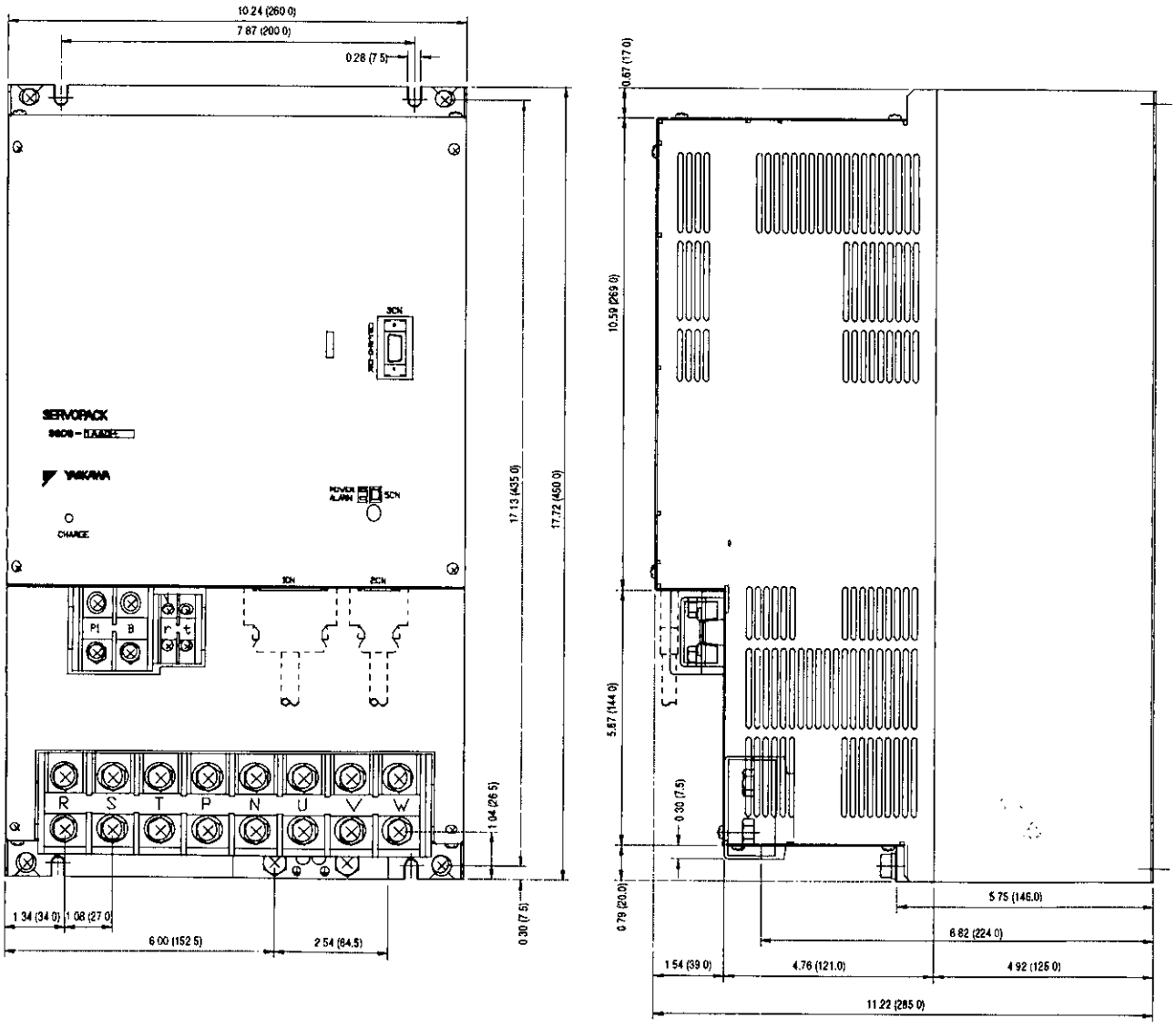


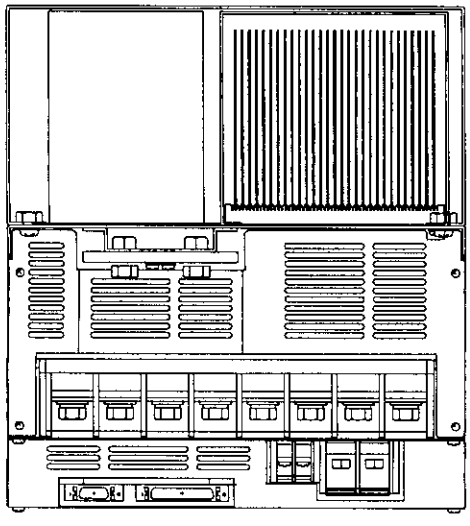




SGDB

(5) SGDB-1AADㅁ



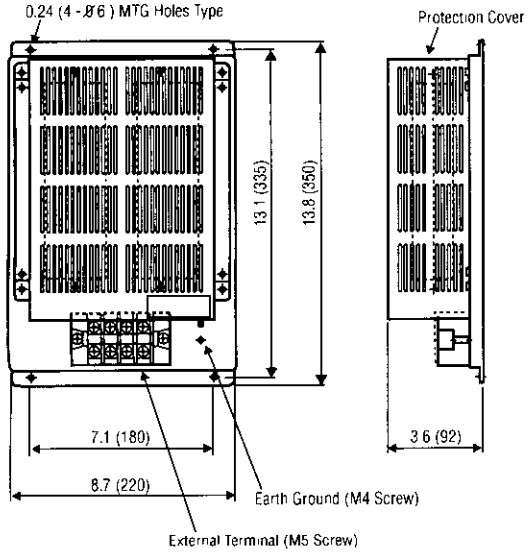


- SGDB-03 to 1AAㅁ

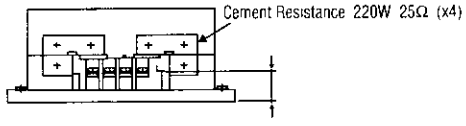
Symbols	Connector on Servo Amplifier Side	Note
1CN	10250-52A2JL	Manufactured by 3M
2CN	10220-52A2JL	
3CN	17JE-13090-37 (D2B)	Manufactured by Daiichi Denshi Kogyo K.K.
5CN	DF11-4DP-2DSA	Manufactured by Hirose Denki

Regenerative Resistance (JUSP-RA□□)

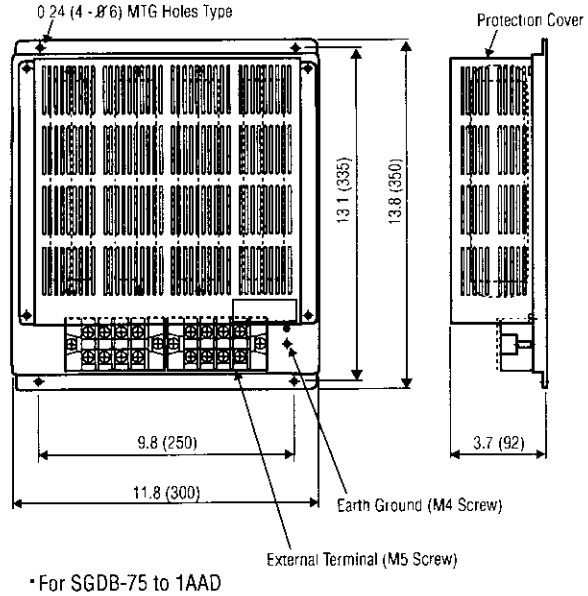
• Type JUSP-RA04



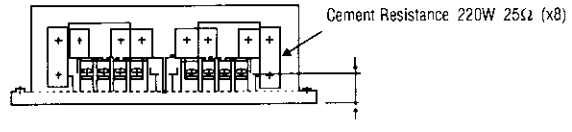
• For SGDB-60AD



• Type JUSP-RA05



• For SGDB-75 to 1AAD



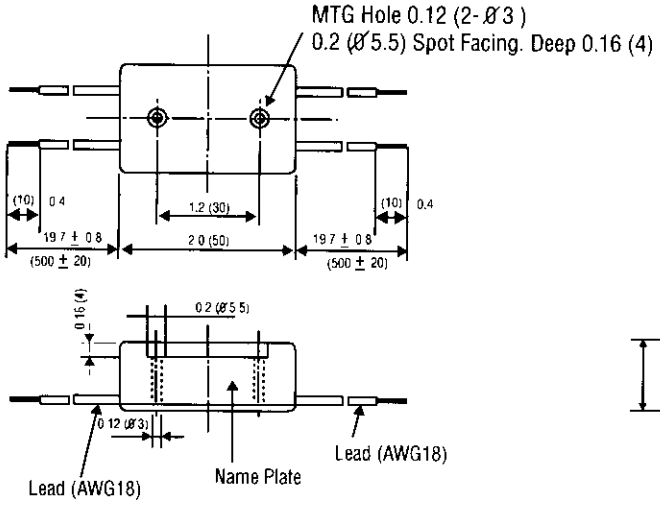
SGDB

Braking Power Supply (LPSE-2H01, LPDE-1H01) Spec.

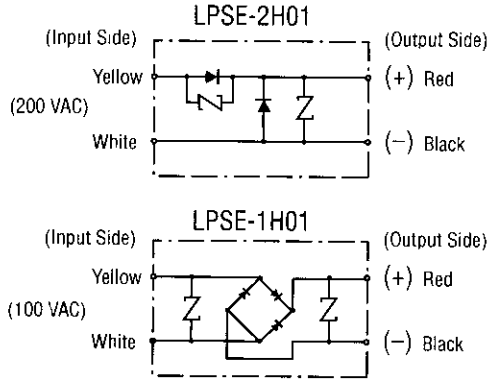
For Optional CE products (motors with 90VDC/brake)

Type	Rated		Read Connection	
	Input Power Supply	Output Power Supply	Input Side	Output Side
LPSE-SH01	50/60Hz 200VAC (180 to 230VAC)	90 VDC	Yellow, White	Red (+) Black (-)
LPDE-1H01	50/60Hz AC100VAC (90 to 120VAC)		Blue, White	

(Note) 1. Insulation Resistance: 100MΩ or more at 500V Megger.
2. Withstand Voltage: 1500VAC for a minute or 1800VAC for a second.
3. Operating Voltage: 90VDC Max. 1ADC.
4. Ambient Temperature: Max. 60°C.



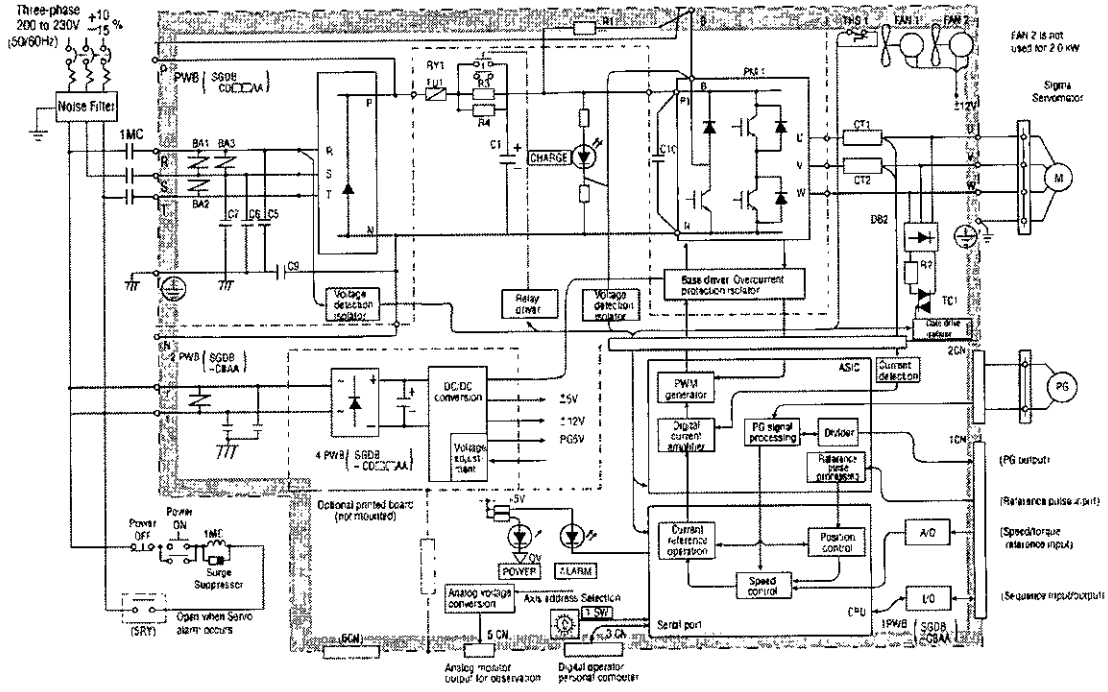
< Circuit Diagram >



SGDB

Internal Connection Diagram

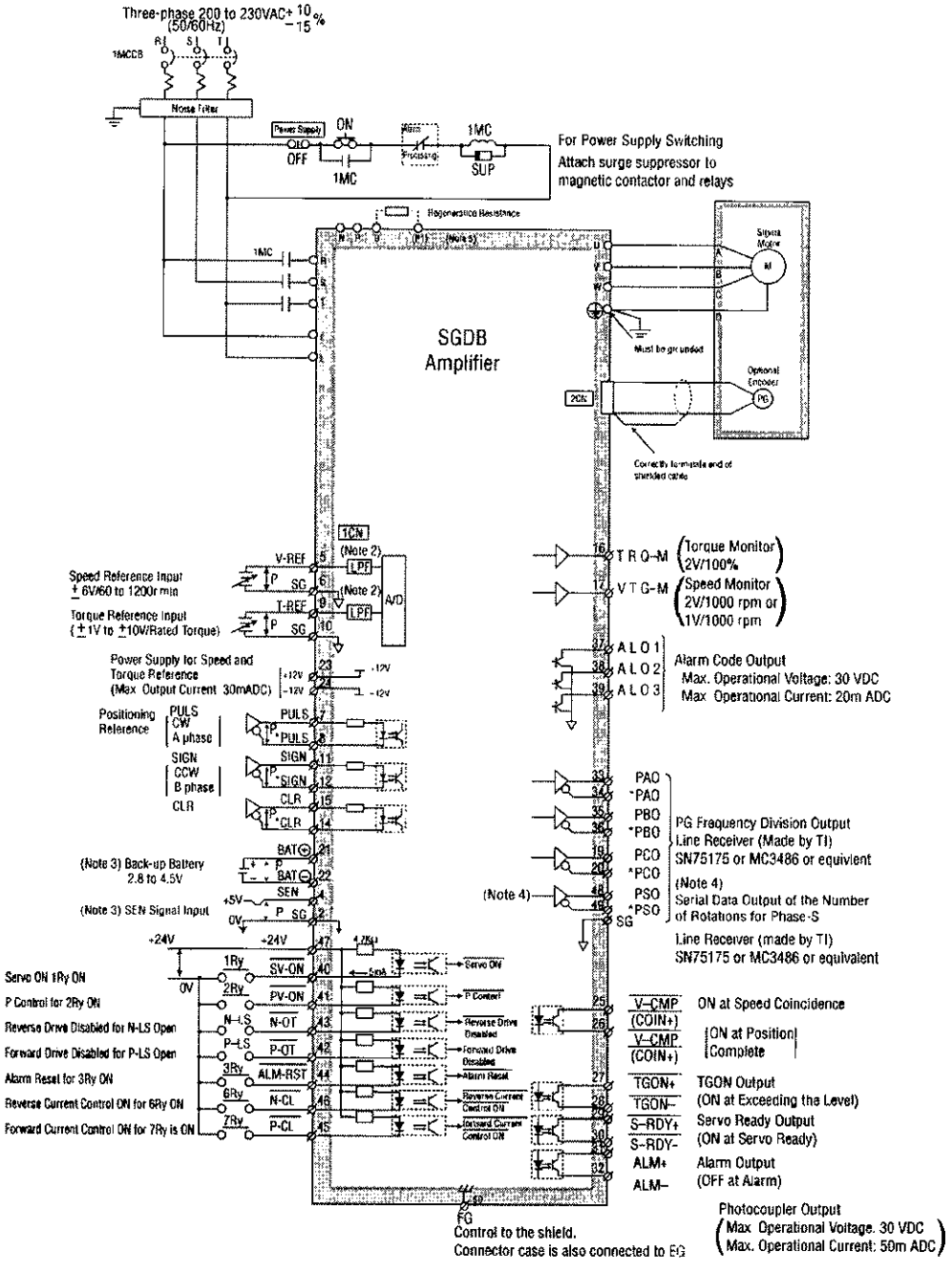
- **2.0kW to 3.0kW (2.7 to 4.0HP)**



SGDB

Internal Connection Diagram

Connection Example

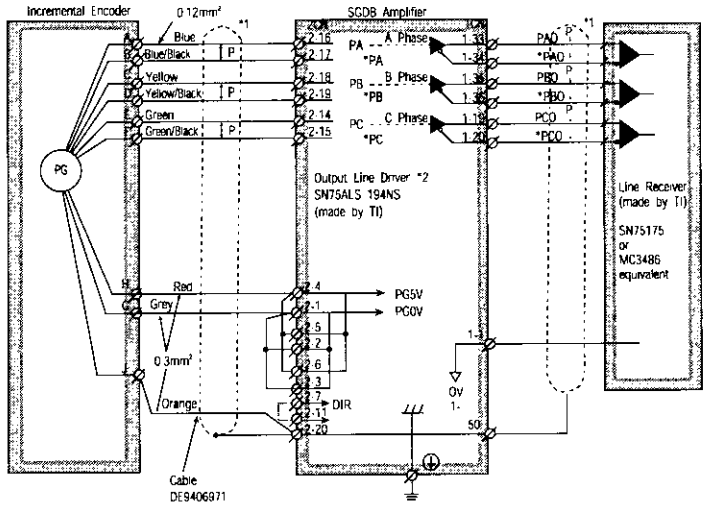


Note: 1 TP : Twisted pair cable.
2 Constant number at primary filter is 47
3 Connects when using absolute encoder
4 Effective when using 12-bit absolute encoder
5 Type SGDB-60 to 1A needs regenerative resistance (external type, option).
TI Texas Instruments Inc.

Internal Connection Diagram

Encoder Signal (2CN) Connections

- **Connector 2CN for Incremental Encoder Connection and 1CN Output Processing**

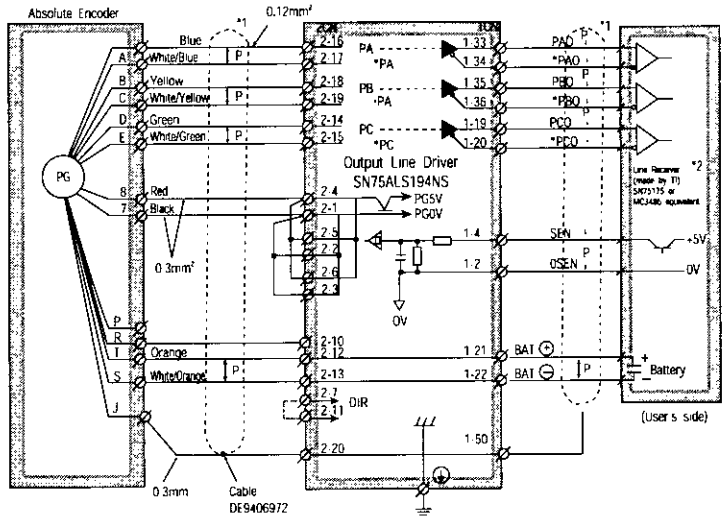


Notes. *1 P : Twisted pair cable.

*2 Made by Texas Instruments Inc

*3 Connector number changes when connecting with SGMP-15A motor
Refer to the SGMP section (P44 to 63) for detail

- **Connector 2CN for Absolute Encoder Connection and 1CN Output Processing**



Notes *1 P : Twisted pair cable.

*2 TI Made by Texas Instruments Inc

*3 Connector number changes when connecting with SGMP-15A motor
Refer to the SGMP section (P44 to 63) for detail