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Subject: SUMMARY: Conversion from Sigma to Sigma II

Product: SGDA and SGMP → SGDH and SGMPH

Introduction:

The Sigma servo line, including SGMP[1] motors and SGDA amplifiers, was upgraded in 1998 with newer technology (Sigma II product line: SGMPH motors and SGDH amplifiers). Yaskawa will continue to make the original Sigma series products available, though delivery times may be longer than those for the Sigma II products. Some users will find it advantageous to upgrade to Sigma II products. This document will provide users of the original Sigma series with a summary guideline of requirements to upgrade to Sigma II technology[2,3].

Motor Replacement: SGMP to SGMPH

- **Part Number:** Sigma motor type SGMP can be directly replaced with Sigma II motor type SGMPH. The SGMPH motors have the same or better performance than the SGMP motors. *The original motor and drive must both be replaced when upgrading to Sigma II technology.*
- **Mounting:** All mounting dimensions of the SGMPH motor are the same as the SGMP motor. See Appendix A for a typical motor size comparison.

Amplifier Replacement: SGDA to SGDH

- **Part Number:** Sigma amplifier type SGDA can be directly replaced with Sigma II amplifier SGDH. SGDH replaces both SGDA-XXXS and SGDA-XXXP amplifiers. *The original motor and drive must both be replaced when upgrading to Sigma II technology.*
- **Mounting:** SGDH amplifiers are the same size as the SGDA. Mounting hole locations are the same for all models except the SGDH-08A. Appendix A shows typical size and mounting differences.
- **Parameters:** The SGDA and SGDH have different parameter sets. SigmaWin Lite can be used to communicate to both amplifiers for parameter setting. Yaskawa provides a spreadsheet utility to help with parameter conversion.

Wiring

- **Motor Wiring:** Yaskawa highly recommends the purchase of new pre-wired cables for the upgrade installation. In most cases, it is more cost effective and less time consuming to run the new cables than to modify existing cables. While it is possible to re-wire with the existing cables in place, this will require soldering both in the cabinet and at the motor. In addition, rewiring cables may require the purchase of special connector crimping tools[2]. Again, it is *highly recommended* to purchase and install new pre-wired cables.
- **I/O Signal Wiring:** I/O wiring varies between SGDA and SGDH. If the amplifier being replaced is an analog speed/torque type (P/N SGDA-XXXS), then Yaskawa can provide a special adapter cable *for temporary use* to get the machine running. See Appendix B.

[1] For upgrade of SGMP-15 with SGDB series amplifier, a separate document has been created. It is available at http://faq.yaskawa.com in an FAQ titled "Is upgrading from Sigma to Sigma II the best option?".

[2] Sigma II motors and amplifiers provide high performance motion control in combination. Therefore, a SGMP (Sigma) motor cannot be used with a SGDH (Sigma II) amplifier, and a SGMPH (Sigma II) motor cannot be used with a SGDA (Sigma) amplifier. Replacement of the motor and amplifier must be made simultaneously.

[3] If the decision is made to upgrade, a detailed step-by-step planning guide is available.

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Appendix A – Motor and Amplifier Dimensions

The following pages offer a reference for a typical size comparison between Sigma and Sigma II motors and amplifiers. If the Sigma II upgrade is desired, Yaskawa can provide a detailed step-by-step worksheet as a planning guide.

This upgrade documentation is designed to upgrade standard equipment only. For motors with custom OEM modifications, reference document **Service Options for Customized Servos**, available on Yaskawa's FAQ site: http://faq.yaskawa.com. Custom motors and amps can be identified by a special code at the end of the part number. The Part Number Converter that is offered as a companion to this document can be used to determine if a motor is custom.

Example Custom Motors

- SGMP-02AW**YR12**
- SGMP-08A3**FJ73**

Example Custom Amplifiers

- SGDA-08AS**Y134**
- SGDA-03BS**Y92**

Motor

The SGMPH series of motors have the same mounting dimensions and length as their SGMP predecessors. Therefore, upgrading to the Sigma II technology can be done with little difficulty. As noted in the summary, there are differences in the motor power and encoder connectors, so cables will need to be reworked or replaced.

In the interest of convenience, the following page shows a typical size comparison between SGMP and SGMPH motors. If the exact motor model is not shown and more detailed information is required, consult the Sigma II Product Catalog.

Amplifier

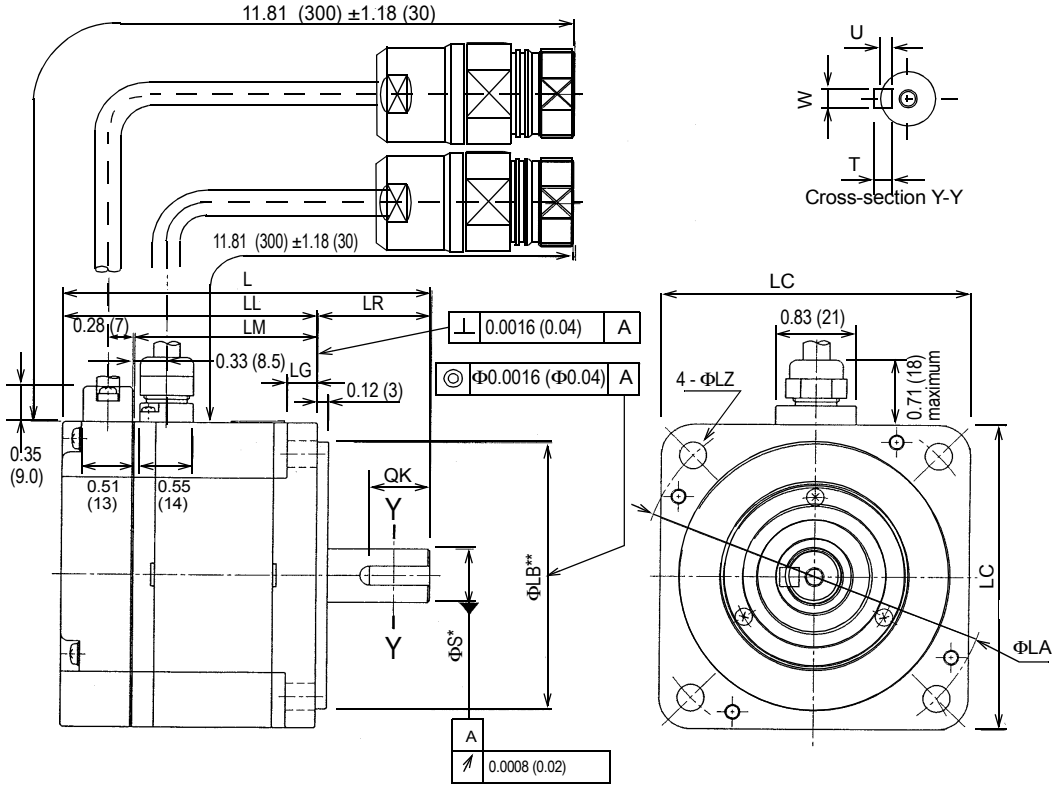
SGDH amplifiers generally have the same mounting and overall dimensions as their SGDA predecessors. If the recommended amplifier spacing of 10 mm was maintained in the original panel design, the new SGDH amplifiers will fit into the same panel space, and in most cases into the same mounting holes. The SGDH-08 has mounting dimensions that are different than those of the equivalent SGDA amplifier, while all others can make use of existing mounting holes. On all sizes, the SGDH amplifier is now mounted with two screws instead of three.

The following pages (just after the motor comparison) show the typical size difference between SGDA and SGDH amplifiers, including the SGDH-08 amplifier. If your exact amplifier model is not shown and more detailed information is required, consult the Sigma II Product Catalog.

Reference:
Sigma II Product Catalog, document number **G-MI#99001E-SigmaII**
Sigma II User's Manual, document number **YEA-SIA-S800-32.2C**

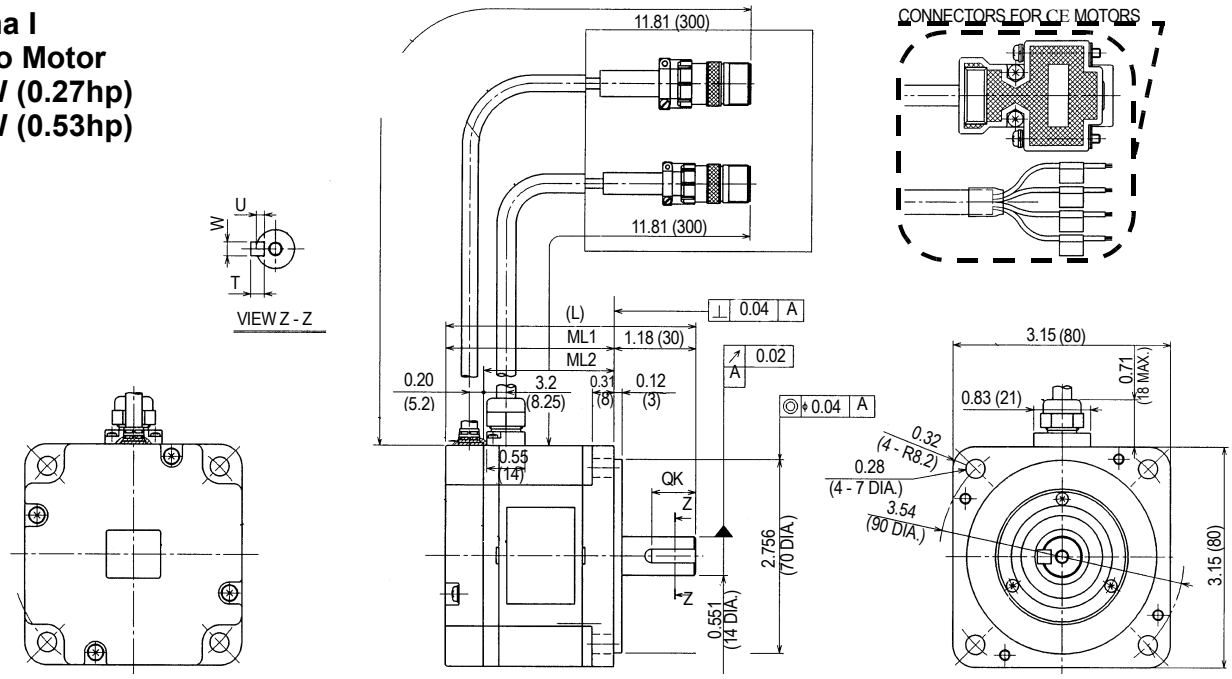
These documents are available on the Yaskawa website at http://www.yaskawa.com on the Sigma II product page. They can also be ordered from Yaskawa by calling 1-800-YASKAWA or by e-mailing literature@yaskawa.com.

Sigma II
Servo Motor
200W (0.27hp)
400W (0.53hp)



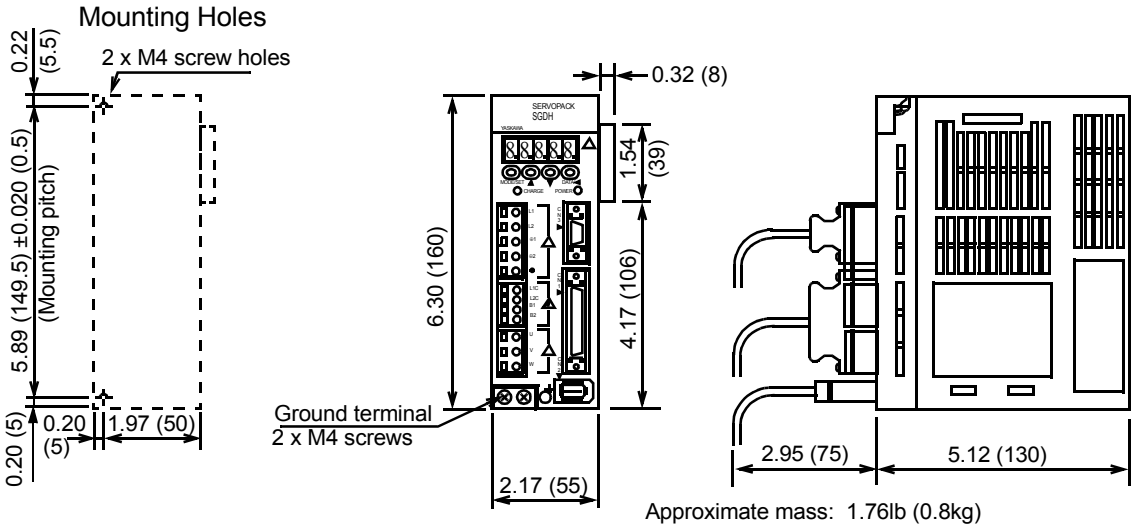
Type SGMPH-	L	LL	LM	LR	LG	LC	ΦLA	ΦLZ	ΦS*	ΦLB**	Key				Voltage	Output	Torque in•lb (N•m)	Time Rating	Rated Speed (rpm)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
											QK	U	W	T	V	W (hp)						
02□□E41D	3.82 (97)	2.64 (67)	1.89 (48.1)	1.18 (30)	0.31 (8)	3.15 (80)	3.54 (90)	0.28 (7)	0.551 (14)	2.76 (70)	0.63 (16)	0.12 (3)	0.20 (5)	0.20 (5)	200	200 (0.27)	5.64 (0.637)	Continu-ous	3000	3.09 (1.4)	55.1 (245)	15.4 (68)

Sigma I
Servo Motor
200W (0.27hp)
400W (0.53hp)



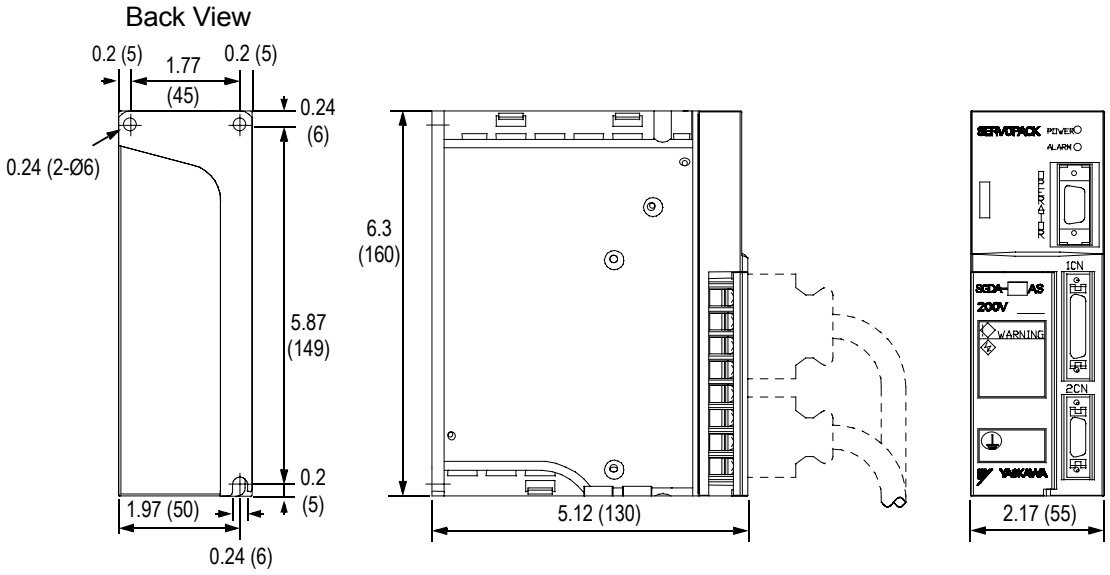
Type SGMP-	L	LL	LM	Key				Voltage V	Output W (HP)	Torque N•m (kgf •cm)	Time Rating	Rated Speed (rpm)	Approx Mass lb (kg)	Allowable Radial Load lb (N)	Allowable Thrust Load lb (N)
				QK	U	W	T								
02□314M	3.62 (92)	2.44 (62)	1.89 (48.1)	Without Keyway				200	200 (0.27)	0.637 (6.49)	Continuous	3000	3.09 (1.4)	55 (245)	15 (68)
				0.63 (16)	0.12 (3)	0.20 (5)	0.20 (5)								

Sigma II
Servo Amplifier
SGDH-A3 □
SGDH-A5 □
SGDH-01 □



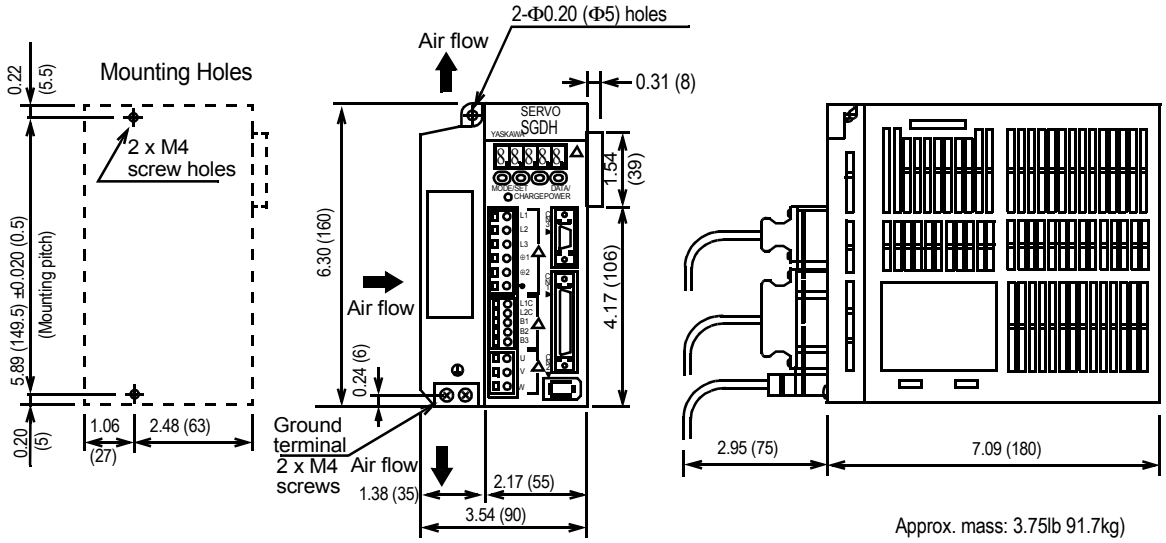
Approximate mass: 1.76lb (0.8kg)

Sigma I
Servo Amplifier
SGDA-A3 □
SGDA-A5 □
SGDA-01 □



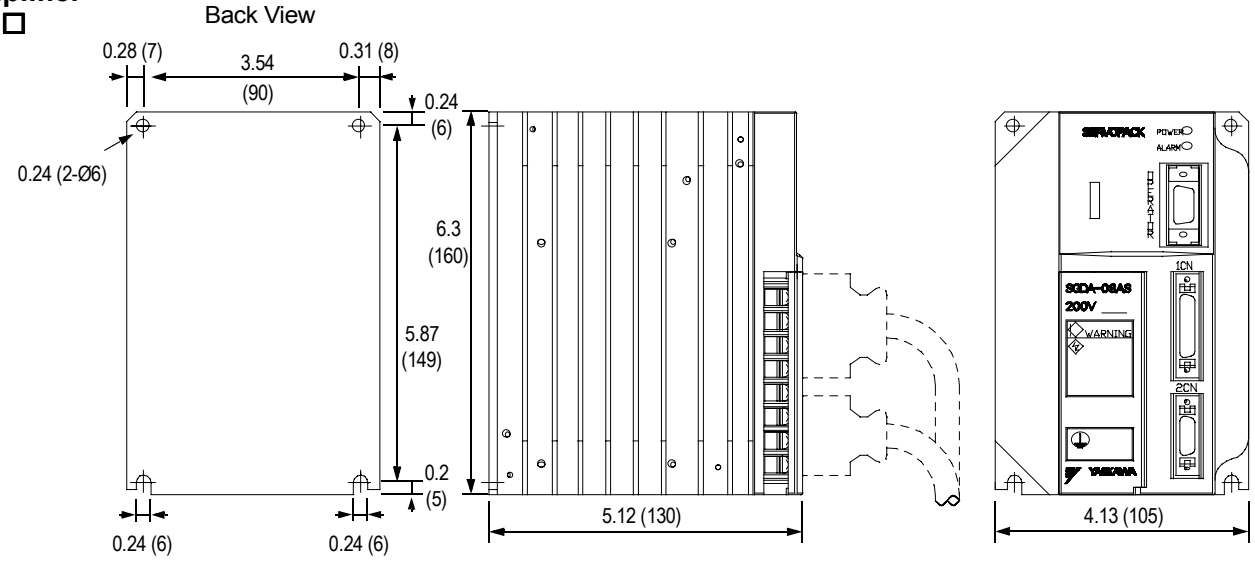
Approximate mass: 1.98lb (0.9kg)

Sigma II ServoAmplifier SGDH-08AE-S



Approx. mass: 3.75lb 91.7kg)

Sigma I ServoAmplifier SGDA-08□



Approx. mass: 3.31 lb (1.5 kg)

Appendix B – I/O interface wiring

The SGDH amplifier has a different wiring configuration than the SGD and SGDA amplifiers. The following page shows the I/O wiring for Sigma amplifiers (both speed/torque control SGD- or SGDA-XXXS amplifiers and the position control SGD- or SGDA-XXXP amplifiers) as well as the SGDH Sigma II amplifier.

For situations where it is imperative to minimize downtime, Yaskawa offers an adapter cable to convert I/O interface wiring from SGD(A) speed/torque amplifiers to SGDH amplifiers. This is a *temporary solution only* and plans should be made for a permanent wiring change during the next regularly scheduled machine shutdown for maintenance.

If the Sigma II upgrade is desired, Yaskawa can provide a detailed step-by-step worksheet as a planning guide.

Signal Name		SGDA-XXXS Pin No.	SGDA-XXXP Pin No.	SGDH Pin No.
T-REF	Torque Reference	1	-	9
SG-T	Signal Ground for T-REF	2	-	10
V-REF	Velocity Reference	3	-	5
SG-V	Signal Ground for V-REF	4	-	6
SEN	Abs. Enc. Sync signal	5	-	4
SEN0	Signal Ground for SEN	6	-	2
/BK	Brake Output	7	7	29,30*
/V-CMP	(or /COIN) Coincidence Output	8	8	25,26*
/TGON	Rotation Detection	9	9	27,28*
SG-COM	Signal Ground for 24V ref	10	10	-
/P-CL	Fwd. Current Limit	11	11	45
/N-CL	Rev. Current Limit	12	12	46
+24VIN	I/O Pwr. Supply	13	13	47
/S-ON	Servo ON	14	14	40
/P-CON	Proportional Control	15	15	41
P-OT	Fwd. Overtravel	16	16	42
N-OT	Rev. Overtravel	17	17	43
/ALMRST	Alarm Reset	18	18	44
SG-PG	Signal Ground for enc. output	19	19	1
PAO	Encoder output	20	20	33
∗PAO	Encoder output	21	21	34
PBO	Encoder output	22	22	35
∗PBO	Encoder output	23	23	36
PCO	Encoder output	24	24	19
∗PCO	Encoder output	25	25	20
PSO	Abs. Encoder output	26	26	48
∗PSO	Abs. Encoder output	27	27	49
BAT+	Abs. Enc. Battery +	28	28	21
BAT-	Abs. Enc. Battery -	29	29	22
ALO1	Alarm code output 1	30	30	37
ALO2	Alarm code output 2	31	31	38
ALO3	Alarm code output 3	32	32	39
SG-AL	Signal Ground for alarm codes	33	33	1
ALM+	Alarm Output	34	34	31
ALM-	Signal Ground (Alarm Output)	35	35	32
FG	Frame Ground	36	36	Screw Terminal
PULS	Ref. Pulse Input 1	-	1	7
∗PULS	Ref. Pulse Input 1 (invert)	-	2	8
SIGN	Ref. Pulse Input 2	-	3	11
∗SIGN	Ref. Pulse Input 2 (invert)	-	4	12
CLR	Error Counter Clear Signal	-	5	15
∗CLR	Error Counter Clear (invert)	-	6	14

*SGDH Outputs are configurable with Pn50E-Pn510 and have individual signal ground wiring. These parameters will need to be set to activate brake output. Please consult SGDH User's Manual.

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