



LEGEND Digital Torque Amplifier SGDG User's Manual

Upon receipt of the product and prior to initial operation, read these instructions thoroughly, and retain for future reference.

Safety-Related Symbols

The following symbols are used in this manual according to the safety-related content. Be sure to observe text annotated with these safety symbols as their content is important.

WARNING

Mis-operation may result in a hazardous condition with the possibility of death or serious injury.



Mis-operation may result in a hazardous condition with the possibility of serious or light injury as well as material damage.

Furthermore, the items annotated with a **CAUTION** may result in serious consequences depending on the situation. Be sure to observe these as they highlight important content.



Icon Display

The following icons were designed so as to aid in understanding the type of descriptive content. The icons are displayed where needed to aid in comprehension.



Major items which should be memorized. In addition, this can be a minor item which does not reach the level of damage to the machine, such as the generation of an alarm display.



This shows programming, operation examples, etc.



This shows supplemental information and convenient functions to remember.

Terminology?? This explains difficult-to-understand technical terminology and technical terms which have not been previously explained.

上正科技有限公司 購買、維修 此手冊零組件 電話: 037-466333 Email: service@repairtw.com Line id: @zzzz www.repairtw.com

Outline of Manual

- Thank you for purchasing the LEGEND Digital torque amplifier.
- Use this product with a full understanding of conditions such as product specifications, usage limits, etc.
- This manual explains the following areas for users of the LEGEND Digital torque amplifier.
 - Methods for mounting and wiring servomotor and amplifiers
 - How to use the various functions
 - Ratings and specifications for standard device types
 - Maintenance and Inspection
- For additional information on Sigma II servomotor, please refer to the following documents:
 - Sigma II Servo System Product Catalog Supplement (Doc.# G-MI#99001D-Sigma II)
 - Sigma II Series Servo System User's Manual (Doc.# YEA-S800-32.2B)
 - Linear Servo Motor Product Catalog (Doc.#KAE-S800-39/10)支有限公司

購買、維修 此手冊零組件 電話: 037-466333 Email: service@repairtw.com Line id: @zzzz www.repairtw.com

Safety Notes

In this manual, we will describe important cautionary items which should always be observed regarding usage, inspection upon receipt of product, mounting, wiring, operation, and maintenance/inspection.

■ Inspection Upon Receipt of Product

• Use the servomotorservomotors and amplifiers in the designated combinations. (See "3.5 Combinations" on page 39.)

Failure to do so may result in fire or unit failure.

Mounting

CAUTION					
 Never use this product in an area where water may splash, in a corrosive or flammable atmosphere, or next to flammable items. Doing so may result in electric shock or fire. 					
■ Wiring	上正科技有限公司 購買、維修 叶毛冊零組件				
my 只 、 WL MO UL HIN					
Be sure to connect the ground terminal of the digital torque amplifier to a grounding					

electrode (100 Ω or less).

Failure to do so may result in electric shock or fire.

Wiring Precautions

- Do not bundle or run power and signal lines together in the same duct. Keep power and signal lines at least 11.81" (30cm) apart.
- Use twisted pair or shielded multi-core twisted pair wires for signal and encoder (PG) feedback lines.
- The maximum lengths for signal lines are as follows:
 - Maximum of 9.84ft (300cm) for reference input lines.
 - Maximum of 65.6ft (20m) for PG feedback lines.
 - Use a cable type UL20276-SB for distances over 65.6ft (20m).

CAUTION

- Do not connect a three-phase power supply to the digital torque amplifier output terminals U, V, and W.
 - Doing so may result in injury or fire.
- Securely fasten the screws for the power terminals and motor terminals.

Failure to do say may result in fire.

Operation

WARNING
• To prevent unexpected accidents, test the motor with the motor shaft not connected to a machine or load.
 To prevent unexpected accidents, run with limit switches or stoppers attached to both ends of the magnet track. Failure to do so may result in injury.
 Set parameters before operating the motor in connection with a machine Operating without making these settings may result in machine runaway and damage.
 After mounting on the machine, prior to the start of operation, make sure the emergency stop can be applied at any time.
Failure to do so may result in injury.
• Do not touch the heat sink while the unit is running.

The high temperature may result in burns.

■ Maintenance/Inspection @zzzz

WWW

• Never touch the inside of the digital torque amplifier.

Doing so may result in electrical shock.

- Be sure no wiring is exposed when power is turned ON. Failure to do so may result in electrical shock.
- Do not touch the terminals for five minutes following power OFF. Electrical shock may result due to residual voltage.

ACAUTION

• Do not change the wiring while power is ON.

Doing so may result in electrical shock or injury.

General Cautionary Items

Cautionary Items Regarding Usage

- The figures contained in this manual may, for purposes of detailed explanation, be drawn with covers and safety shields removed. When operating this product, be sure to return all standard covers and shields to their original locations, and operate the product in accordance with this manual.
- The figures contained in this manual are representative examples, and may differ from the product recieved.
- Appropriate modifications may be made to this manual due to improvements or specification changes in the product, or to improve the ease of use of the manual itself. In the event of such changes, the document number of the manual will be updated, and issued as a revision.
- To order additional copies of this manual, contact your Yasakwa representative, or the nearest Yaskawa sales office printed on the back of this manual with the document number written on the cover.
- Yaskawa assumes no responsibility for products modified by the customer as they fall outside the warranty.

Warning Label

た険 がのです。 おのには、 おのに、 おのに、 お
必ずアース線を接続せよ Use proper grounding techniques vice@repairtw.com
Www.repairt Warning Label
Ground Mark



Table Of Contents

Sa	fety-Related Symbolsi
lco	on Displayii
Οι	ıtline of Manual iii
Sa	fety Notesiv
	 Inspection Upon Receipt of Productiv Mountingiv
	 Wiringiv Operationv Maintenance/Inspectionv General Cautionary Items
	Warning Label
1. In	terpretation of Model Number1
1.1	Rotary Motor Type1
1.2	Linear Motor Type2 ■ Motor Coils
1.3	Core-less Type
1.4	T-Type Iron Core ^{購買、} 維修 此手冊零組件 3 ■ Motor Coil 電話: 037-466333 3
1.5	F-Type Iron Core mail:service@repairtw.com
1.6	Digital Torque Amplifier
1.7	Serial Converter Unit
2. W	iring9
2.1	Main Circuit Wiring9Main Circuit Terminal Names and Functions9Example of Typical Main Circuit Wiring12Power ON Sequence Design13Power Line Size and Peripheral Devices13Digital Torque Amplifier Power Loss13Main Circuit Terminal Block Wiring Method13Power Terminal Processing14Peripheral Device Types and Capacities15
2.2	Input Signals16Example of I/O Signal Connection16Connector (CN1) Terminal Array List17CN1 Specifications17I/O Signal Names and Their Functions18

	 Command Input Circuit and Interface Sequence Input Circuit and Interface Output Circuits and Interfaces 	20 20 21
2.3	Wiring to the Encoder	.22
2.4	Cable Specifications and Peripheral Devices	24
2.5	 Standard Connection Examples Single-phase Power Specification (SGDG-01GT, SGDG-04GT) 3-Phase Power Specification (SGDG-10GT, SGDG-15GT) 	26 26 27
3. Se	etup	29
3.1	Linear Motor Mounting	.29
3.2	Rotary Motor Mounting	.29
	Storage Temperature	30
	 Nounting Location Alignment 	. 30
	Mounting Direction	. 31
	Shaft Tolerance Ranges	. 31
	■ Cable Stress. 購買、維修 此手冊零組件	. 32
	■ Vibration Resistance:03.7-466333	. 33
3.3	Digital Torque Amplifier Installation	34
	Storage Conditions	.34
0.4		. 34
3.4	SWITCH Settings	37
	 SW2 Linear Scale Pitch Setting (rotary switch) 	37
	SW3 PG Divider Setting (rotary switch)	38
3.5	Combinations	39
	Combinations with Rotary Motors	39
	 Serial Conversion Unit and Applicable Motors 	40
4 De	escription of Functions	41
1 1	Torque/Force Control	/1
4.0		44
4.2	Servo ON Input	.41 42
	 DB OFF Input 	. 43
	RUN Signal Output	. 43

4.3	 Encoder Signal Output I/O Signals Output Phase Form PG Divider Setting 	44 45 45 46
4.4	Analog Monitor	47
4.5	 Regenerative Resistor Selection External Regen Resistors Connecting the Regen Resistor For Digital Torque Amplifiers of 400W Capacity or Less For Digital Torque Amplifiers of 500W Capacity or More Calculating Regen Energy 	47 48 48 48 48 48
5. Se	ervo System Maintenance/Inspection	49
5.1	Motor Inspection	49
5.2	Digital Torque Amplifier Inspection	50 50 50
5.3	Alarms	51 51 51
Apr	pendix A: Host Controller Connection Examples	53
- 1- 1	 A.1 Connecting the Galil IMC-1900/2900 A.2 Connecting the Delta Tau PMAC2 A.3 Connection the MELPCX/DSP A.4 Connection the Acroloop ACR-8010 	53 54 55 56
Ар	 pendix B: Installation Conditions for EMC Directives EMC Installation Conditions The Cable Core Cable Clamp 	57 57 60 60
I	Index	63

Notes:

上正科技有限公司 購買、維修 此手冊零組件 電話: 037-466333 Email: service@repairtw.com Line id: @zzzz www.repairtw.com

1. Interpretation of Model Number

1.1 Rotary Motor Type



©: Standard O: Option

*1. 100V is only for use with SGMAH, SGMPH servo motors of 0.2kW or less.

1.2 Linear Motor Type



1.3 Core-less Type



Model	Max.	Cont.	External Dimensions (mm)			Mass
SGLGW-	(N)	(N)	L1	L2	Н	(kg)
40A140A(P)	140	47	140	125	63	0.39
40A253A(P)	280	93	252.5	237.5	63	0.65
40A365A(P)	420	140	365	350	63	0.91
60A140A(P)	220	73	140	125	83	0.47
60A253A(P)	440	147	252.5	237.5	83	0.80
60A365A(P)	660	220	365	350	83	1.13

1.4 T-Type Iron Core

Motor Coil



Type: SGLTW-40A



www.repairtw.com

Model	Max.	Cont.	External	Dimension	s (mm)	Mass
SGLTW-	(N)	(N)	L	W	Н	(kg)
20A170A(P)	380	130	170	100	51	2.6
20A320A(P)	760	250	315	100	51	4.8
20A460A(P)	1140	380	460	100	51	7
35 A1 70 A(P)	660	220	170	100	66	3.7
35 A3 20 A(P)	1320	440	315	100	66	6.8
35 A460 A(P)	2000	670	460	100	66	10
40A400A(P)	2000	670	395	150	78	20
40A600A(P)	3000	1000	585	150	78	30
80A400A(P)	4000	1300	395	150	115	30
80A600A(P)	6000	2000	585	150	1 15	43

1.5 F-Type Iron Core





Hall Sensor

Model	Max. Cont.		External Dimensions (mm)			Mass
SGLFW-	(N)	(N)	L	W	Н	(kg)
20A090A(P)	86	25	91	40	34	0.7
20A120A(P)	125	40	127	40	34	0.9
35A120A(P)	220	止移0技行	月7月27~一	55	34	1.3
35A230A(P)	499買	、160修	此235冊3	零組4	34	2.3
50A200A(P)	600	. 200	215 L-466333	71.5	43	3.7
50A380A(P)	1200	400	395	71.5	43	6.9
1ZA200A(P)	1 <mark>2000</mark> ai	1: 400ser	vicegrep	paintny.co	DM43	6.4
1ZA380A(P)	2400 e	id: ⁸⁰⁰ @z	³⁹⁵	119	43	12.2

www.repairtw.com

1.6 Digital Torque Amplifier



Maximum Capacity of Applied Motor

Applied Motor Maximum Capacity Symbol	Capacity (kW)	
博員 №010 LJ- 電話: 04037-4663	111 ≈ <u>0.</u> 11 + 333 0.4	
10 Ermail: 15 ervice@	1.0 repa <u>i</u> stw.c	om

Note: Keep the following in mind in SGDG digital torque amplifier and SGD H/SGL W servomotor combinations:

The SGDG-01GT can drive motors of 30~200W rated output. The SGDG-04GT can drive motors of 100~750W rated output. The SGDG-10GT can drive motors of 300W~2kW rated output. The SGDG-15GT can drive motors of 750W~3kW rated output.

Since LEGEND servo drives are applicable to a wider range motor and driver combinations, the output power of the drive will dictate the available maximum motor power even if the maximum output power of the motor is larger than that of the connected drive.

Specific speed/torque performence will vary depending on such power supply conditions as voltage, number of available phases, etc.

1.7 Serial Converter Unit



Compatible Motor Numbers Varies according to compatible motors (see table below)

Serial Converter Unit Type Model Classifications

Model	Model	Usage Scale	Hall Sensor (Y/N?)
JZDP- A003		By Haidenhain 科技有限公司	Ν
JZDP- A004 (Note) US Market- dedicated	indid:	<mark>ByRenishaw</mark> 田学冊零 037-466333 service@repa @zzzz	組件 Y airtw.com
JZDP- A005		By Renishaw repairtw.com	N
JZDP- A006		By Haidenhain	Y
JZDP- A008		By Renishaw	Y

Serial Converter Unit Model JZDP-A00	Applied Motor	Serial Converter Unit Model JZDP-A00 □ - □□□	Applied Motor
001	SGLGW-40A140A(P)	013	SGLTW-20A460A(P)
002	SGLGW-40A253A(P)	014	SGLTW-35A170A(P)
003	SGLGW-40A365A(P)	015	SGLTW-35A320A(P)
004	SGLGW-60A140A(P)	016	SGLTW-35A460A(P)
005	SGLGW-60A253A(P)	017	SGLFW-20A090A(P)
006	SGLGW-60A365A(P)	018	SGLFW-20A120A(P)
007	SGLTW-40A400A(P)	019	SGLFW-35A120A(P)
008	SGLTW-40A600A(P)	020	SGLFW-35A230A(P)
009	SGLTW-80A400A(P)	021	SGLFW-50A200A(P)
010	SGLTW-80A600A(P)	022	SGLFW-50A380A(P)
011	SGLTW-20A170A(P)	023	SGLFW-1ZA200A(P)
012	SGLTW-20A320A(P)	024	SGLFW-1ZA380A(P)

Serial Converter Units and Applied Motors

上正科技有限公司

購買、維修 此手冊零組件

電話: 037-466333

Email: service@repairtw.com

Line id: @zzzz

www.repairtw.com

Notes:

上正科技有限公司 購買、維修 此手冊零組件 電話: 037-466333 Email: service@repairtw.com Line id: @zzzz www.repairtw.com

2. Wiring

2.1 Main Circuit Wiring

Here we will show representative examples of main circuit wiring, the functions of the main circuit terminals, as well as the power input sequence, etc. Observe the following cautionary items when wiring.

- Do not pass the power line and signal lines through the same duct or bundle them together. Keep the power line and signal lines at least 30cm apart when wiring.
- Use a twist pair wire or multi-core twisted-pair bundled shield wire for the signal and encoder lines. The maximum wiring length is 3m for the command input line, and 20m for the encoder feedback line.
- Do not touch the power terminal for 5 min. after power OFF as a high voltage may remain even after power OFF.

Perform inspection work after checking that the CHARGE lamp has gone out.

• Do not turn the power ON/OFF frequently. Limit ON/OFF repetition to one time per minute.

Because the digital torque amplifier has a capacitor in its power unit, a large charging current (charging time: 0.2sec.) will be fed at power ON. For this reason, frequent power ON/OFF switching degrades the main circuit element within the digital torque amplifier.

Main Circuit Terminal Names and Functions

Table 2.1 shows the names of the main circuit terminals and their functions.

Table 2.1: Main Circuit Terminal Names and their Functions

Terminal Code	Name	w.repairtw.com
		100W/400W
L1, L2 or L1,	Main Circuit Power	Single Phase 90~253 V
L2, L3	Input Terminal	1.0kW~1.5kW
		Three Phase 90~253 V
U, V, W	Motor Connection Terminal	Connected to motor.
L1C, L2C	Control Power Input Terminal	Single Phase 90~253 V
(2 places)	Ground Terminal	Perform "Ground Processing" by connecting with the power grounding terminal and the motor grounding terminal.

Terminal Code	Name	Function			
P1 P2 or	External Regen	100W/400W	Connection not normally needed. Connect an external regen resistor (provided by customer) between B1-B2 if regen capability is insufficient. (Note) There is no B3 terminal.		
B1, B2, B3	Resistor Connection Terminal	1.0kW/1.5kW	B2-B3 is normally shorted (using the integrated regen resistor)If the capacity of the internal regen resistor is insufficient, connect an external regen resistor (provided by customer) between B1-B2 with B2-B3 open (wiring removed).		
⊕ 1, ⊕ 2	High-Frequency Harmonic Suppressing DC Reactor Connection Terminal	This is normally frequency suppr between ⊕1-⊕	shorted between $\textcircled{1}$ - $\textcircled{2}$ 2. If harmonic ession is needed, connect a DC reactor 2.		
Main Circuit Load Connection is normally not needed. Terminal					

Table 2.1: Main Circuit Terminal Names and their Functions (Continued

電話: 037-466333

Email: service@repairtw.com

Line id: @zzzz

www.repairtw.com





Figure A Main Circuit Wiring Example

Power ON Sequence Design

Keep the following in mind when designing a Power ON Sequence.

- Design the power feed sequnce so that the power goes OFF if a "Servo Alarm" is output. See "Figure A Main Circuit Wiring Example" on page 12.
- Hold down the power ON button for at least two seconds. The digital torque amplifier will output a "Servo Alarm" signal for at most two seconds at power ON. This is necessary for digital torque amplifier initial setting.



Power Line Size and Peripheral Devices

See the Σ -II Series Servo System User's Manual: Servo Selection and Data Sheet edition. (Document Number: YEA-SIA-S800-32.2x)

Digital Torque Amplifier Power Loss

The digital torque amplifier power loss at continuous output is shown in Table 2.2 below.

Table 2.2: Digital Torque Amplifier Power Loss at Continuous Output

Main Circuit	Max. A pplied Motor Capacity	期見、細胞 Digital Torque O Amplifier Model Email: s	Output 3Current 3 (actual) erviAe@	Main 3 Circuit Power Loss Ww	Regen Resistor Power Loss W	Control Circuit Power Loss W	Total Power Loss W
Single-phase	0.10	SGDG-01GT	0.77 0.91	6.7	—	13	19.7
200V	0.40	SGDG-04GT	2.8	20	-	13	33
3-phase	1.0	SGDG-10GT PER)air t w.co	m 55	12	15	82
200V	1.5	SGDG-15GT	11.6	123	14	15	152

Note: The regen resistor power loss is the allowable power loss. Take the following measures if this value is exceeded. Remove the lead wire of the digital torque amplifier's integrated regen resistor. and install an external regen resistor. Furthermore, the external regen resistor is an option. For details on regen resistors, see "4.5 Regenerative Resistor Selection".

■ Main Circuit Terminal Block Wiring Method

Observe the following cautionary items when wiring.

ACAUTION

• Perform wiring after removing the terminal block from the digital torque amplifier unit.

- Insert one wire into each power line insertion aperture in the terminal block.
- When inserting the power lines, be sure that they do not short against the surrounding materialdue to exposed wire cores.
- Power lines that have been mistakenly pulled out by excessive force should be re-stripped then connected.

Servo amplifiers with capacities of 1.5kW or less consist of a connector-type terminal block for the main circuit. Wire the terminal block by the following procedure.

Connection Method

1. Strip the insulation of the power lines used.



- 2. Open the terminal block wiring insertion area with a tool. There are two opening methods as shown in figures A and B.
 - Figure A shows opening by prying with an accessory lever.
 - Figure B shows opening by forcibly pressing the driver insertion apeture with either a flathead screwdriver (head width 3.0~3.5mm (.118~.138 in.) or a 210-120J-type driver from Wago, Inc.

The work can be done using either of the methods in Figure A: or Figure B:.



3. Insert the core of the power line into the opening. Release the lever or the pressure on the driver after insertion.

Power Terminal Processing

Strip the insulation on the power line. The useable line sizes are as follows:

- Solid Conductor.. $\phi 0.5 \sim \phi 1.6$ mm
- Stranded Conductor .. AWG28~AWG12

■ Peripheral Device Types and Capacities Table 2.3 Shows Servopack device Types and capacities

Main Circuit	Model		Power Supply Capacity Per	MCCB or Fuse	Recommended Noise Filter*		Magnetic
Power Supply	Capacity (kW)	SGDG-	Amplifier Capacity (KVA) (Arms)		Model	Specifi- cations	Contactor
Sing le-Phase	0.1	01 GT	0.10	4	FN2070- 6/07	Single- Phase 250VAC 6A	HI–11J (20A) or Equivalent
200V	0.4	04GT	0.40	4	FN2070- 10/07	Single- Phase 250VAC 10A	HI–15J (35A) or Equivalent
	1.0	10GT	2.3	7		Three-	HI–15J
Three-Phase 200 V	1.5	15GT	3.2 正科技有限	10 公司	FN258L- P1 16/07 48	Phase 480V 16A	(35A) or Equivalent

Table 2.3: Peripheral Device Types and Capacities

* The FN \square \square \square \square noise filter is manufactured by Schaffner Corp.

電話: 037-466333

Email: service@repairtw.com

Line id: @zzzz

www.repairtw.com

2.2 Input Signals



Connector (CN1) Terminal Array List

The CN1 terminal array and its specifications are shown below.

CN1 Terminal Layout

1					19	GND	GND				
1			_			17	GILD				Encoder
	CMD	Torque⁄ Force	2	GND	GND		*	Encoder Dvided	20	PAO	Output A-
3	-IN	Reference				21	*PAO	Output A-			phase
		Input	$\frac{1}{2}$					phase Encoder			Encoder Dvided
5			4	GND	GND	22	*DD0	Dvided	22	РВО	Output B-
5			<u> </u>			23	*PB0	Output B-			phase
					C) Th			Encoder	~ (DCO	Divided
7	RUN	RUN Signal	6	GND	GND	25	*PCO	Divided	24	PCO	Output
<i>,</i>	+	Output				2.5	100	Output C-phase			C-phase
			8					C-phase	26	/S-ON5	Servo ON
9					一下科技有	限之	DB	DB OFF			Input
				購買	【、維修」	北手	OFF5 冊零約	Signal Input			Speed
			10	RUN	RUN Signal Output	466	333	Torque	28	SPD- MON	Monitor 1 V/1000
11				Ema	il: servi	ce @) Terque i r	tMotiom			RPM
			<u> </u>	Line	id: @zzz	Z	Mon	5 V/Max. Torq.			
			12		ww.repair	tw.c	om	·	30		
13	+24V	External Bower Input	<u> </u>			31					
	DB	DB OFF	14	/S-ON	Servo ON Signal Input				32		
15	OFF	Signal Input	16			33	GND	GND	34	ALM	Servo Alarm
								Servo	34	+	Output
17			18			35	ALM -	Alarm Output	36		
L	ļ		1						20		

Note 1 Do not use empty terminals for relays.

Note 2 Connect the I/O signal cable shield wire to the connector shell. This is connected to the frame ground on the digital torque amplifier side connector.

■ CN1 Specifications

Specification for	Applied Receptacle Model				
Digital Torque Amplifier	Soldering Type	Case	Manufacturer Name		
10236-52A2JL-type Right Angle36P	10136-3000VE	10336-52A0-008	Sumitomo 3M, Inc.		

■ I/O Signal Names and Their Functions

The names and functions of the digital torque amplifier I/O signals are shown below. **Input Signals**

Pin Signal Name Function No. /S-ON Servo ON 14 26 • The inverter output is enabled to provide power to the motor. DB – OFF DB Release Common 15 • A free run state has resulted by releasing the DB. +24VINSequence signal control power input 13 • +24V power supply provided by customer.? CMD-IN Torque/Force Reference Input Torque 3 • -10~+10VDC

Output Signals

Signal Name		Pin No.	Function				
	ALM+ ALM -	34 35	Servo Alarm : Turns OFF due to error detection.				
Common	PAO *PAO PBO *PBO PCO *PCO	購 20 電 21 電 22 Em 23 Lin 25 id:	A phase Signal 037-46633 2-phase pulse (A-phase, B-phase) B-phase Signal Conversion Encoder Output Signal Service@re pand origin puse (C-phase) signal C-phase Signal				
	RUN+	WWW	Base Block Release Signal				
	RUN -	10	: Output during base block release				
	SPD-MON	28	Speed Monitor (1 V/1000rpm), Linear Scale 1 V/1000mm/sec				
		29	Reserved				
	FG	Shell	The frame ground in connected upon connection of the I/O signal cable shield wire to the connector shell.				

Signa	ll Name	Pin No.	Function
Signa		Pm No. 1 5 8 9 11 12	Open Terminal
Reserved		16 17 18 30 31 32 36	(Note) Do not use empty terminals for relays, etc.

Output Signals (Continued)

上正科技有限公司

購買、維修 此手冊零組件 電話: 037-466333 Email: service@repairtw.com Line id: @zzzz www.repairtw.com

Interface Circuit

An example is given below of connection of the digital torque amplifier I/O signals to an upper level device.

Command Input Circuit and Interface

Analog Input Circuit

The analog signal is the torque reference signal. The input impedance is as follows.

• Command Input (CMD-IN): Approx. 14kΩ

The maximum allowable voltage for the input signal is $\pm 12V$.









This is connected by a relay or open collector transistor circuit. Select minute current relay when connecting by relay. If no minute current relay is established, this will cause a connection fault.

Output Circuits and Interfaces

The output signal circuits of the digital torque amplifier are of the three types shown below. Configure the input circuit on the upper-level device to match each of these output circuits.

- Connection with Line Driver Output Circuits
 - The output signals (PAO, *PAO, PBO, *PBO) where the encoder serial data was converter to a 2-phase (A-phase, B-phase) pulse, and the origin pulse signal (PCO, *PCO) are output by the line driver circuit. The upper-level device receives these through the line receiver circuit.

See "2.3 Wiring to the Encoder" for an example of the connection circuit.

• Connection with Photocoupler Output Circuit Servo alarms and other output signals for sequence use are configured in the photocoupler output circuit. They are connected through the relay and line driver circuits.



- Note: The maximum allowable voltage and current capacity of the photocoupler output circuit are as follows:
 - Voltage: Email: DC30V(Max.)
 Compared to the service @repairtw.com
 - Current: | DC50mA(Max))7777

www.repairtw.com

2.3 Wiring to the Encoder

The wiring of the digital torque amplifier to the encoder is described here.

 Connection to Encoder (CN2) and Output Signal Processing from Digital Torque Amplifier (CN1)



Encoder Connector (CN2) Terminal Array and Models The CN2 terminal arrays and models are shown below.

CN2 Terminal Array

1	PG5V	Encoder Power +5V	2	PG0V	Encoder Power 0V
5	PS	Encoder Serial Signal Input	6	*PS	Encoder Serial Signal Input

CN2 Connectors

Model of	Applied Plug (or socket) Model						
Connector Used in Digital Torque Amplifier	Plug, soldered type (digital torque amplifier- side connector)	Socket, soldered type, (motor-side connector)	Manufacturer Name				
53460-0611	55100-0600	54280-0600	Japan Molex, Inc.				

Note: The plug and socket on the digital torque amplifier side are a set product FA1394 from Japan Molex, Inc. 購買、維修 此手冊零組件

Note: The motor-side socket is connected to the connector for the SGMAH, SGMPH servomotor 037-466333 encoder.

Note: The SGMGH and SGMSH servomotor encoder connectors are shown below.

- Plug L-type: MS3108B20-29S or
- Straight: MS3106B20-295ZZZ
- Cable Clamp: MS3057-12A
 WWW.repairtw.com



Yaskawa provides a dedicated cable for the encoder. For details, see the following document.

• Σ -II Servo System Product Catalog Supplement (Doc.# G-MI#99001D-Sigma II)

2.4 Cable Specifications and Peripheral Devices

Ratings and specifications for peripheral devices, as well as cable specifications for digital torque amplifiers are summarized in the tables below.

CAUTION				
	Wiring Precautions			
•	 Do not bundle or run power and signal lines together in the same duct. Keep power and signal lines at least 11.81" (30cm) apart. Use twisted pair or shielded multi-core twisted pair wires for signal and encoder (PG) feedback lines. The maximum lengths for signal lines are as follows: Maximum of 9.84ft (300cm) for reference input lines. Maximum of 65.6ft (20m) for PG feedback lines. Use a cable with 164 ft (50m) specifications for distances over 65.6ft (20m). 			

Cable Specifications

The following table provides wire size specifications:

External Terminal Name	青 SGDG 此	f = ∰ The Size AWG [in ² (mm ²)]				
	音舌:Symbol ₇₋₄	66333 01GT	04GT			
Main circuit power input terminals	L1, L2 m (Single Phase)/ic	16 AWG [HIV 0.002 @repa(1125).com	14 AWG [0.003 (2.0)]			
Servomotor connection terminals	U, V, W	16 AWG [HIV 0.002 (1.25)]				
Control power supply terminals	L1C, L2C					
Control I\O signal connector	v ©N 1w.repairtv	. Twisted pair or shielded twisted pair wires				
PG signal connector	CN2	Core wire at least 28 AWG [0.0002 (0.12)], tinned, annealed copper twisted wires Finished cable dimensions: maximum Φ 0.63in (16mm) for CN1 and Φ 0.27in (6.8mm) for CN2.				
Ground terminal	e	14 AWG [HIV 0.003 (2.0)]				

Cable Specifications (cont'd)

Futomal Taminal Nama	SGDG Torminal	Wire Size AWG [in ² (mm ²)	
	Symbol	10GT	15GT
Main circuit power input terminals	L1, L2, L3 (Three-phase)	14 AWG [HIV 0.003 (2.0)	
Servomotor connection terminals	U, V, W		
Control power supply terminals	L1C, L2C	16 AWG [HIV 0.002 (1.25)]	
Control I\O signal connector	CN1	Twisted pair or shielded twisted pair wires	
PG signal connector	CN2	Core wire at least 28 AWG [0.0 copper twisted wires Finished cable dimensions: ma CN1 and Φ0.27in (6.8mm) for	0002 (0.12)], tinned, annealed ximum Φ0.63in (16mm) for CN2.
Ground terminal	Ð	14 AWG [HIV 0.003 (2.0)]	

Notes: 1. Wire sizes were selected for three cables per bundle at 40°C ambient temperature with the rated current. 2. Use cables with a minimum withstand voltage of 600V for main circuits.

3. If cables are bundled in PVC or metal ducts, consider the reduction ratio of the allowable current.

4. Use heat-resistant cable under high ambient or panel temperatures where normal vinyl cable will rapidly deteriorate.

The following table shows types of cables. It is used in conjunction with the preceding tables. 百舌: 037-466333

	Cable Type	Temperature Rating of Conductor
Name	Composition	.w.com °C
PVC	Standard polyvinyl chloride cable	
IV	600V PVC cable	60
HIV	Temperature resistant vinyl cable COM	75

The following table specifies the appropriate cables for CN1 and CN2 digital torque amplifier connectors.

Wire sizes were selected with the expectation of three cables per bundle, at an ambient temperature of 40° C, at the rated current level.

Connector Name	Signal	Description	Specification
	CN1	Cable	Use twisted pair or shielded twisted pair wire.
Control I/O Signal		Applicable wire	(AWG): 24, 26, 28, 30
Connector		Finished cable	Φ 0.63 (Φ 16.0) maximum
		Dimension	
	CN2	Cable	Use Yaskawa cable, or shielded twisted pair wire.
		Applicable wire	(AWG): 24, 26, 28, 30
DC Signal			Use 22 AWG $[0.0005in^2 (0.34mm^2)]$ for the encoder power supply and 26
			AWG $[0.0002 \text{ in}^2 (0.14 \text{mm}^2)]$ for other signals. These conditions permit
Connector			wiring distances up to 65.6ft (20m).
		Finished cable	Φ 0.27 (Φ6.8) maximum
		Dimension	
2.5 Standard Connection Examples





Notes:

上正科技有限公司 購買、維修 此手冊零組件 電話: 037-466333 Email: service@repairtw.com Line id: @zzzz www.repairtw.com

3. Setup

3.1 Linear Motor Mounting

CAUTION

• In the case of linear motors, various changes can occur according to the direction of the motor mounting and the direction of the encoder mounting. Therefore, perform setup carefully.

Careless setup may result in injury.

Motor Mounting and Encoder Mounting

Mount so that the motor forward direction matches the encoder forward direction.

Setting the Linear Encoder Scale Pitch

Upon completing mounting and wiring, feed control power only, input (SW2) the correct linear scale pitch used by each application. Alarm 0 (SW setting error) is output at the initial power ON because the initial value is assumed to be "0". This ceases occurring if the correct value is set in SW2 and the power cycled.

上正科技有限公司

3.2 Rotary Motor Mounting 手冊零組件

The SGM \square H servomotor can be mounted in both the horizontal or vertical direction. However, mistaking the mounting direction or mounting in an inappropriate location may shorten motor life or lead to unexpected accidents.

Correctly mount the motor according to the following cautionary items.





Before Mounting

The shaft end is treated with a rust-preventative agent. Before mounting the motor, wipe off this rust-preventative agent with a cloth soaked in thinner.

When removing the rust-preventative agent, be sure that the thinner does not contact any other parts of the servomotor.



Storage Temperature

Store the servomotor within the temperature range below when storing without electrical feed.

 $-20 \sim +60^{\circ}$ C Temperature Range

Mounting Location

The SGM \square H servomotor is intended for use indoors. Use in an environment meeting the following conditions.

- Indoors, in a location free from corrosive or explosive gas.
- A location with good ventilation, with little dust, grime, or steam
- A location with an ambient temperature between $0{\sim}40^{\circ}C$
- A location with a relative humidity of 20%~80%, no condensation
- A location easy to inspect and clean

www.repairtw.com

Alignment

Upon mating to the machine, make sure the motor shaft core and the machine shaft core are coupled in a straight line. Mount the servomotor so that it falls within the alignment accuracy in the figure below.





(1)Improper alignment can lead to vibration, which risks damaging the shaft coupling.

(2)When mounting the coupling, do not apply shock directly to the shaft. This may damage the encoder mounted on the shaft end opposite the load.

科技有限公司

、維修 此手冊零組件

Mounting Direction

The SGM \Box H servomotor can be mounted in either the horizontal or vertical directions.

service@repairtw.com

■ Shaft Tolerance Ranges

Design machine systems so that the thrust loads and radial loads¹ applied to the servomotor shaft during operation fall within the tolerances in Table 3.1. The allowable radial loads shown in the table are the maximum loads that can be applied to the end of the output shaft.

1. Thrust Load, Radial Load: Thrust Load (Fs): The shaft load applied parallel to the shaft core. Radial Load (Fr): Shaft load applied at a right angle to the shaft core.



Motor	Model	Allowable Serial Load Fr [N(kgf)]	Allowable Thrust Load Fs [N(kgf)]	LR [mm]	Reference Diagram
	A3	68(7)	54(5.5)		
	A5	68(7)	54(5.5)	20	L D
COMAIL	01	78(8)	54(5.5)	•	
SGMAH-	02	245(25)	74(7.5)	25	-fi fr
	04	245(25)	74(7.5)	- 25	Fs
	08	392(40)	147(7.5)	35	
SGMPH-	01	78(8)	49(5)	20	Y C
	02	245(25)	68(7)	25	
	04	245(25)	68(7)	- 25	
	08	392(40)	147(15)	25	
	15	490(50)	147(15)		
	05A 🗆 A	490(50)	98(10)		
SGMGH-	09A 🗆 A	490(50)- 禾二二	5有 98(10) -	58	
	13A 🗆 A	686 (70)	343(35)	14-	
COMU	10A	686(70) 686	196(20))	15	
SGMSH-	15A	686(70)	37-4696(20)8	43	

Table 3.4: Allowable MRadial Load/Allowable Thrust	Load for	r Servo Motors
--	----------	----------------

Oil and Water Countermeasures@repairtw.com

It is possible to take protective measures for motor operation in areas where water or oil may drip. However, use a motor with an oil seal attached when needed to set through to

the shaft section¹. www.repairtw.com

In addition, mount the motor with the connectors facing downward.



Cable Stress

Do not bend or stretch the power line.

In particular, be careful to wire the signal cable so that they are not subject to stress because its core is very thin (0.2, 0.3 mm).

^{1.} Through Shaft Section

This refers to the gap where the shaft protrudes from the end of the motor.

■ Vibration Resistance

Mount the servomotor with the shaft positioned horizontally. The servomotor will withstand the following levels of vibration on all three axes: front-to-back (X), vertical (Y), and side-to-side (Z).

- SGMAH, SGMPH: 49m/s² (5G)
- SGMSH, SGMGH, SGMDH, and SGMUH: 24.5m/s²(2.5G)



3.2.1 Vibration Class

上正科技有限公司 The vibration class for SGM□H servomotors operating at rated speed is 15µm (maximum). 購買、維修 此手冊零組件

Position for measuring vibration

Email: service@repairtw.com Line id: @zzzz www.repairtw.com

3.3 Digital Torque Amplifier Installation

The SGDG digital torque amplifier is a base-mounted digital torque amplifier. Mount it properly according to the following cautionary items as mistakes in the mounting method can lead to failure of the unit.

Storage Conditions

Store the digital torque amplifier within the temperature range below when storing without electrical feed.

Temperature Range: $-20 \sim +85^{\circ}C$



Mounting Conditions

www.repairtw.com

@zzzz

Location

The following points should be kept in mind with regard to the mounting location.

Installation Conditions	Cautions on Mounting
Mounted in a Control Panel	Design the control panel size, digital torque amplifier intallation, and cooling method so that the ambient temperature of the digital torque amplifier does not exceed 55°C.
Mounted Near a Heat- Generating Object	Suppress the temperature rise due to radiated heat and convection from the heat-generating object so that the ambient temperature of the digital torque amplifier does not exceed 55°C.
Mounted Near a Vibration Source	Attach vibration-preventative brackets to the digital torque amplifier mounting surface so that the vibrations are not communicated to the digital torque amplifier.
Mounted in a Location Exposed to Corrosive Gas	Take measures to prevent the influx of corrosive gas. The gass will have no immediate effect, but will lead to device failures in the electronic components and contact-related devices.

Installation Conditions	Cautions on Mounting
Others	Do not install in areas with high temperature or humidity, or where the atmosphere contains dust or iron particles.

Control Panel Environmental Conditions

- Digital Torque Amplifier Ambient Temperature: 0~55°C
- Humidity: 90% RH or less
- Vibration: 0.5G (4.9m/s²)
- Do not allow freezing or condensation to occur.
- Use an ambient temperature of 45°C or less to maintain long-term reliability.

Mounting Direction

Mount in a vertical direction on a wall as shown in the figure below. Cool the digital torque amplifier either with natural convection or a fan. Be sure to maintain this direction.

Securely fix the digital torque amplifier to the mounting surface by using the mounting holes at 2~4 locations (the number of holes will differ depending on capacity).



Cooling

Mount the amplifier with sufficient peripheral space around the digital torque amplifier consideration of the above figure so as to achieve sufficient cooling by either a fan or natural convection.

Digital Torque AmplifierMounting Standards

Observe the standards for mounting into a control panel shown in the figure below, including those cases where multiple digital torque amplifiers are installed in parallel within a control panel (hereafter referred to as a "parallel platform").



Mount the digital torque amplifier so that the front side faces the operator.

Side-by-side Installation

When installing digital torque amplifier side by side as shown in the figure above, allow at least 0.39 in (10mm) between and at least 1.97 in (50mm) above and below each digital torque amplifier. Install cooling fans above the digital torque amplifiers to avoid excessive temperature rise and to maintain even temperature inside the control panel.

Email: service@repairtw.com Line id: @zzzz www.repairtw.com

3.4 Switch Settings

Switch No.	Function	At OFF	At ON	Default Setting
1	Status After DB Stop During Base Block	Release DB after motor stop	Continue DB after motor stop	ON
2	Torque Reference Filter	No	Yes	ON
3	Input Power Selection	DC-Power Input Compatible	AC-Power Input Compatible	ON
4	Linear Scale Polarity Reversal	B-phase progression: U, V, W direction	A-phase progression: U, V, W direction	ON (enabled only when linear motor is used)
5	Regen Overload Alarm or Warning	No	Yes	ON
6	Feedback Pulse B-phase Reversal	Reversed	Not reversed	ON
7	Command Direction Reversal	Reversed	Not reversed	ON
8	Not used	正科技有限公司		ON

SW1 Function Selection Switch (dip switches)

SW2 Linear Scale Pitch Setting (rotary switch)

Setting	Linear Scale Pitch Setting 7-4	Setting	Linear Scale Pitch Setting
0*	E mun i: servic	e@r&pail	tw.com Not used
1	$2 \mu m$	9	Not used
2	$4 \mu \mathrm{m}$	А	Not used
3	20 yu/mvw.repairtv	V.COBN	Not used
4	40 <i>µ</i> m	С	Not used
5	800 µ m	D	Not used
6	1000μ m	Е	Not used
7	Not used	F	Not used

* The default setting is 0 (0 μ m).

SW3 PG Divider Setting (rotary switch)

PG Divider Setting**	Setting	PG Divider Setting**
8192 P/R	8	3000 P/R
8000 P/R	9	2500 P/R
7200 P/R	А	2048 P/R
6000 P/R	В	2000 P/R
5000 P/R	С	1800 P/R
4096 P/R	D	1600 P/R
4000 P/R	Е	1000 P/R
3600 P/R	F	Notused
	PG Divider Setting** 8192 P/R 8000 P/R 7200 P/R 6000 P/R 5000 P/R 4096 P/R 4000 P/R 3600 P/R	PG Divider Setting** Setting 8192 P/R 8 8000 P/R 9 7200 P/R A 6000 P/R B 5000 P/R C 4096 P/R D 4000 P/R E 3600 P/R F

For a 13-bit Rotary Motor

* The default setting is 0 (2048 \times 4).

*** *** 4× at host controller

For a 17-bit Rotary Motor

Setting	PG Divider Setting**	Setting	PG Divider Setting**
0*	65,536 P/R正科技有	限公司	30000 P/R
1	64.000 P/R 公在 (文)	上千 91 家	24000 P/R
2	60,000 P/R	A	16000 P/R
3	50,000 P/R 037-	466Эз33	131,072 P/R***
4	40,000 P/R	co@rona	120,000 P/R***
5	36,000 P/R	D	100,000 P/R***
6	32,768 P/R d: @ ZZZ	ΖE	80,000 P/R***
7	32,000 P/R	w.com	Not used

* The default setting is 0 (16384×4). * * $4 \times$ at host controller

* * * Overspeed alarm will activate at motor speeds of 2500rpm or higher.

For Linear Motors

Setting	PG Divider Setting	Setting	PG Divider Setting
0*	1/20	8	1/32
1	1/256	9	1/16
2	1/250	А	1/10
3	1/200	В	1/8
4	1/128	С	1/5
5	1/100	D	1/4
6	1/64	E	1/2
7	1/40	F	Not used

* The default setting is 0 (1/20).

3.5 Combinations

Digital Torque amplifier and motor combinations are shown below.

Combinations with Rotary Motors

SGMAH

Digital Torque Amplifier Model	Compatible Motor Models
SGDG-01GT	SGMAH-A3B
	SGMAH-A5B
	SGMAH-A3A
	SGMAH-A5A
	SGMAH-01A
SGDG-04GT	SGMAH-01B
	SGMAH-02B
	SGMAH-02A
	SGMAH-04A
SGDG-10GT	SGMAH-08A

上正科技有限公司

SGMPH

購買、維修 此手冊零組件

Digital Torque Amplifier Model	037 Compatible Motor Models
SGDG-01GT all:	scompa-opaepairtw.com
SGDG-04CThe id: www.re	SGMPH-01B SGMPH-02B SGMPH-02Am SGMPH-04A
SGDG-10GT	SGMPH-08A
SGDG-15GT	SGMPH-15A

SGMGH

Digital Torque Amplifier Model	Compatible Motor Models
SGDG-10GT	SGMGH-05 □ A SGMGH-09 □ A
SGDG-15GT	SGMGH-13 🗆 A

SGMSH

Digital Torque Amplifier Model	Compatible Motor Models
SGDG-10GT	SGMSH-10 🗆 A
SGDG-15GT	SGMSH-15 🗆 A

■ Linear Motor Combinations

Digital Torque Amplifier Model	Linear Motor Models
SGDG-04GT	SGLGW-40A140AP
	SGLGW-40A253AP
	SGLGW-40A365AP
	SGLGW-60A140AP
	SGLGW-60A253AP
	SGLGW-60A365AP
	SGLFW-20A090AP
	SGLFW-20A120AP
	SGLFW-35A120AP
医正利	SGLTW-20A170AP
SGDG-10GT	SGLT W-20A320AP
購買、維	SGLT W-35A170AP
	SGLT W-35A320AP
電話:	SGLFW-35A230AP
Energile	SGLFW-50A200AP
SGDG-15GT	SGLFW-50A380AP
Line id:	SGLFW-1ZA200AP

Serial Conversion Unit and Applicable Motors

Serial Conversion Unit Model JZDP-A00 🗆 - 🔲 🗖	Applicable Motors	Serial Conversion Unit Model JZDP-A00 🗆 - 🔲 🗖	Applicable Motors
001	SGLGW-40A140A(P)	013	SGLTW-20A460A(P)
002	SGLGW-40A253A(P)	014	SGLTW-35A170A(P)
003	SGLGW-40A365A(P)	015	SGLTW-35A320A(P)
004	SGLGW-60A140A(P)	016	SGLTW-35A460A(P)
005	SGLGW-60A253A(P)	017	SGLFW-20A090A(P)
006	SGLGW-60A365A(P)	018	SGLFW-20A120A(P)
007	SGLTW-40A400A(P)	019	SGLFW-35A120A(P)
008	SGLTW-40A600A(P)	020	SGLFW-35A230A(P)
009	SGLTW-80A400A(P)	021	SGLFW-50A200A(P)
010	SGLTW-80A600A(P)	022	SGLFW-50A380A(P)
011	SGLTW-20A170A(P)	023	SGLFW-1ZA200A(P)
012	SGLTW-20A320A(P)	024	SGLFW-1ZA380A(P)

4. Description of Functions

4.1 Torque/Force Control

This is the torque/force control-dedicated mode. This control mode inputs the torque/force reference from CMD-IN (CN1-3 & CN1-4).



4.2 Protection Sequence Design

This section describes the methods for integrating a protective sequence for safety purposes using I/O signals from the digital torque amplifier.



The basic method for continuing alarm-related "output signals" is shown below.

Prepare an external 24V usage power source. No 24V power source is integrated in the digital torque amplifier.

The photocoupler output signal is handled as follows:

Output \rightarrow ALM+ CN1-34	Servo Alarm Output
Output \rightarrow ALM- CN1-35	Signal ground for servo alarm output

The output is "ON" when the digital torque amplifier detects an error.

Be sure to configure the external circuit so that the main power to the digital torque amplifier goes OFF at alarm output.

ON State	CN 1–34, 35 is "closed", CN 1–34 is level "Low"	Normal State
OFF State	CN 1–34, 35 is "open", CN 1–34 is level "High"	Alarm State

Servo ON Input

Serial Input Signal: The basic connection method and for Servo ON (/S-ON) is displayed below. This is used to forcibly stop the servomotor in a "non-powered" state.



\rightarrow I nput/S-ON	CN1-14	Servo ON
		Serve on

Switches the motor between a powered and a non-powered state.

When ON	Sends power to the motor. This is	田零組件	Motor "Powered" State
CN1-14 is " L " level	the normal RUN state. (this is called the 4state)	3Servo ON	The motor runs according to the
	Email: service@	repairtw.co	input signals
When OFF CN1-14 is " H " level	Sets the motor to a "non-powered" state. Operation is not possible (this is the <u>Servo OFF</u> state). Do not perform <u>Servo OFF</u> while the motor is running except during an emergency stop.) Şervo OFF	Motor Non-Powered State Operation is not possible



Do not start/stop the motor by using the (/S-ON) signal. Always start/stop the motor with an input command.

DB OFF Input

Sequence Input Signal: The basic connection and handling method for the (DB OFF) signal is shown below. This is used to forcibly release the "DB stop state" during Servo OFF from the upper-level device.



\rightarrow Input/S-ON CN1-15 DB OFF

Switches the motor between a powered and a non-powered state.

When ONCN1-15 is "L" level	DB stop at Servo OFF	DB ON	DB Stop State DB stop at Servo OFF
When OFF CN 1-15 is "H" level	Releases the DB stop and goes to free run at Servo OFF 技有限公		DB Stop Release Release DB stop according to an input signal
	購頁、維修 此手	田琴組件	

RUN Signal Output

Photocoupler Output Signal: The basic connection method and handling method for the "RUN" signal is shown below. The output signal displays the base block release.



Output \rightarrow / V	-CMP	CN1-7	RUN Signal	Output
ON State	CN1– CN1–	-7, 10 is "c -7 is level	closeď" "L"	Base Block Released
OFF State	CN1– 7 is le	-7, 10 is "c evel "H"	open" CN 1–	Base Block State

4.3 Encoder Signal Output

The output signal following division within the digital torque amplifier of the encoder output¹ can be output to an external device.



The output circuit is a line driver output. Connect in consideration of the following circuit.



P: Shows a twist-pair wire.

Applied Line Reciever: TI SN75175 or MC3486-equivalent

R (Termination Resistance): 220~470 Ω C (Decoupling Capacitor) : 0.1 μ F

^{1.} After Division: This means the output converted to the set pulse ratio based on the pulse data from the encoder mounted on the motor. The unit here is "No. of Pulses/Rotation".

■ I/O Signals

The details on the output signal are as follows:

Output → PAO CN1-20	Encoder Output A-phase
Output → *PAO CN1-21	Encoder Output /A-phase
Output → PBO CN1-22	Encoder Output B-phase
Output → *PBO CN1-23	Encoder Output /B-phase
Output \rightarrow PCO CN1-24	Encoder Output C-phase
Output → *PCO CN1–25	Encoder Output /C-phase

The divided encoder signal is output.

The division ratio is set in the following switches.

Encoder Division Ratio	CW/2
Setting	3 10 3

Output Phase Form



www.repairtw.com

PG Divider Setting

Set the pulse division ratio by the following switches.

		TT '	Setting Range	Delivery Setting
SW3	PG Divider Setting	Unit P/R	16,000~131,072(Rotary 17-bit)	65,536
	~8	1/1	1000~8192 (Rotary 13-bit)	8192
			1/256~1/2 (Linear Motor)	1/20

Set the number of output pulses output by the encoder output signals (PAO, *PAO, PBO, *PBO).



This divides the pulses from the motor encoder (PG) by the number of pulses set there, then outputs it. $\Box I = I + I = I$

The setting value is the number of output pulses per motor rotation. Set this to match the command unit of the machine controller.

The setting range differs according to the encoder used.

Email: service@repairtw.com Line id: @zzzz www.repairtw.com

46

4.4 Analog Monitor

1CN Pin No.	Signal Name	Content
28	Analog Monitor 1	Motor speed : 1V/1000r/min or 1V/1000mm/sec
29	Analog Monitor 2	Torque = 5V/Max. Torque

The following signals can be monitored in the analog voltage form.

The analog monitor output voltage is 8VDC (Max.). The output voltage will invert if it exceeds 8VDC.

4.5 Regenerative Resistor Selection

When the servomotor is operated in electrical generator mode, the servo amplfier will absorb electrical power. This is called regnerative power. Although the regenerative power is absorbed by charging the smoothing capacitor of the digital torque amplifier, the regenerative power will be further consumed by the regen resistor if the chargeable energy limit of the capacitor is exceeded.

The servomotor is operated in the regen (electrical generator) mode in the following situations:

- · Deceleration to stop time during acceleration/deceleration operation
- Vertical axis load : 037-466333
- Continuous operation where the servomotor contines rotating from the load side (overhauling) load): service@repairtw.com

The capacity of the regenerative resistor integrated within the digital torque amplifier is designed for short-term operation only, such as the deceleration to stop period. Operation is not possible with an overhauling load integrated are completed with a statement of the stop period.

Install an external regen resistor if the regen power exceeds the processing capability of the digital torque amplifier. The specifications of regen resistors integrated in digital torque amplifiers and the regen power they can process (average) are shown below.

Applied Digital Torque	Integrated Regen Resistor Specifications		Regen Power Processed by	Minimum Total Desistance
Ampliner	Resistance (Ω)	Capacity (W)	Resistor (W)	(Ω)
SGDG-01GT/-04GT	_	_	-	40
SGDG-10GT	50	60	12	40
SGDG-15GT	30	70	14	20

* The regen capacity (average) which can be processed is a 20% rating of the regenerative resistor capacity integrated within the digital torque amplifier.

When installing an external regen resistor, make the resistance the same as that of the resistor integrated within the digital torque amplifier.

When using several resistors with small resistance combined in a group to increase the capacity (W) of the regen resistor, select resistors so that the value including the resistance error is equal to or greater than the "minimum allowable resistance" in the above table.

External Regen Resistors



(1) If the power resistor is used at the rated load rate, resistor temperatures will reach 200°C~300°C. Be sure to derate before using. Check with the manufacturer for the load characteristics of the resistor. Use at a load rating of 20% or less when using natural cooling (natural convection cooling), and at 50% or less when forced air cooling is used.

(2) For safety reasons, we recommend the use of resistors with thermostatic switches.

Connecting the Regen Resistor

The connection method for the regen resistor is shown below.

■ For Digital Torque Amplifiers of 400W Capacity or Less

Connect the regen resistor between terminals B1-B2 on the digital torque amplifier.



■ For Digital Torque Amplifiers of 500W Capacity or More Open terminals B2-B3 on the digital torque amplifier (remove the wire), and connect the regen resistor between terminals B1-B2.





The regen resistor reaches high temperatures. Use wires with high-temperature insulation, and make sure the wires do not come into contact with the regen resistor.

■Calculating Regen Energy

For the procedure to calculate regen resistor capacity, please refer to Chapter 5 of the Sigma II Series Servo System User's Manual (Doc.# YEA-S800-32.2x).

5. Servo System Maintenance/ Inspection

5.1 Motor Inspection

The procedures for simple daily maintenance of the servomotor are shown in Table 5.1. Because AC servomotors are brushless, simple daily inspection is sufficient. The inspection periods in the table are standard scales. Determine the usage conditions and environment, and then decide an appropriate inspection period.



Do not dissassemble the servomotor for maintenance/inspection. Contact your Yaskawa representative or sales office if the servomotor is to be disassembled.

Inspection Item	Inspection Period	Inspection/Work Content	Notes
Check for vibration or noise	期見、雑 Daily 雷託:	Inspect by touch or hearing.	The level should not be greater than normal.
External In spection	According to soiling conditions	Clean with cloth or air. ervice@repairtw.co	pm
Changing the oil seal	Once every 5,000 hours minimum	Remove from machine and replace.	Only for motors with oil seals.
Comprehensive Inspection	Every 20,000 hours e or 5 years, minimum	PContact your Yaskawa service department.	The customer should not disassemble/clean the servomotor.

Table 5.1: Servomotor Inspection

5.2 Digital Torque Amplifier Inspection

Digital torque amplifier inspection is summarized in the table below. Although there is no need for daily inspection, perform inspections at least once per year.

Inspection	Inspection	Inspection Content	Measures Taken at
Item	Period		Error
Unit, Board	Once per year	There should be no grime,	Clean with air or cloth.
Cleaning	minimum	dust, or oil on the unit.	
Loose Screws	Once per year minimum	There should be no looseness in the terminal block and connector mounting screws.	Tighten
Component Fault in Unit or Board	Once per year minimum	There should be no changes in coloration due to heat, damage, or wire breakage.	Consult Yaskawa.

Table 5.2: Digital Torque Amplifier Inspection

Component Replacement Timeline

The components in the table below are subject to mechanical wear or degradation over time. Inspect these periodically for purposes of preventative maintenance.

Digital torque amplifiers overhauled by Yaskawa are shipped with their system switches returned to their factory default settings. Be sure to verify these switches before operating.

電話: 037-466333

Table 5.3: Periodic Inspection of Components

Component Name ^{ne}	Standard Replacement Period	Replacement Method, Other
Cooling Fan	4 ~ 5 Years	Replace with a new item.
Smoothing Capacitor	7 ~ 8 Years	Replace with a new item. (determine by inspection)
Relays	—	Determine by inspection
Fuses	10 years	Replace with a new item.
Discharge Capacitor on Printed Circuit Board	5 years	Replace with a new board. (determine by inspection)

Use Conditions

- Ambient Temperature: Yearly average 30°C
- Load Ratio: 80% or less
- Operation Rate: 20 hours or less per day

5.3 Alarms

POWER ON: Green LED turns ON at control power ON. CHARGE LED: Red LED turns ON at main circuit power ON.

	7-Segment LED)
Normal	Base Block	
Status	Servo ON	

Alarm List		
Alarm Display	Alarm Name	Content
	Switch Setting Error 上下科技才	SW2, SW3 are not set during linear motor combination
	購買、維修 Overcurrent 電話: 037	山手冊委組件 Overcurrent flowed to IGBT -466333
	Email: ser	Regen resistor disconnection Regen transistor short
Ľ	Lîne îd: @zi	The regen energy exceeds the capacity of the regen resistor*#.
	Overvoltage	The main circuit voltage exceeds 420V*.
	Overspeed	Detected when the motor speed exceeds the maximum speed*.
	Undervoltage	The main circuit voltage is below 70 V*.
	Overload	Operation for several seconds or tens of seconds at a torque/force greatly in excess of the rating*#.
		Continuous operation above the rated torque/force*.

Alarm Display	Alarm Name	Content
	Fncoder	Communication error between encoder and digital torque amplifier.
	Communication Error	Communication between the encoder and digital torque amplifier failed three times in succession.
	Runaway Detection	Motor runaway*.
		Checksum error in EEPROM within encoder
	Encoder Failure	Error in the number of pulses in encoder rotation
		Error in EEPROM within encoder
		Error in communication data between encoder and digital torque amplifier.
	Main Circuit Power	DC input with AC input settings for main circuit power or AC input with DC input settings.
	購買、維修	Main circuit power was frequently tuned
	電話: 037	Improper combination of motor and digital torque amplifier capacities.
	Email: ser Combination Error	vice@repairtw.com
_	Line id: @z	Improper motor combination.
	www.repa	Failure of A/D converter used in command
	Digital Torque	input
	Amplifier Fault	Servo amplifier system error
	Linear Motor Scale Polarity Error	Polarity setting of the linear motor scale A, B-phases is reversed.

- * Reset at S-ON signal ON.
- # LED will blink at warning before alarm.

Appendix A: Host Controller Connection Examples

This appendix provides examples of SGDG digital torque amplifier connection to typical host controllers. Please refer to the manuals of the host controllers for more details before actually connecting to them.



A.1 Connecting the Galil IMC-1900/2900

Caution:

Galil motion controllers allow to reverse the loop and encoder polarity with the MT and CE commands. Check applicable Galil product manuals for the appropriate procedure on proper loop and encoder phasing. *Incorrect phasing may cause the motor to "run away!"*





Legend - Delta Tau PMAC2, Minimum Servo Interface

Jumper pin 1 to 2 on E1 to power ACC-8E digital 5V circuitry from PMAC2 through flat cable on JMACH port.

Jumper pin1 to 2 on E4 (axis n=1) and on E7 (axis n=2) for normally open relay contact between AMP_ENAn+ an AMP_ENAn-.





Signals may be from different connectors on MEI controller Consult *MEI DSP Series Motion Controller Installation Guide* for details.



A.4 Connection the Acroloop ACR-8010

Encoder type is Differential Line Driver (+5 Volt Outputs) so Pullups should be removed Encoders 0-3 are on P1A connector Encoders 4-7 are on P1B connector ASIG-0 and AGND-0 through ASIG-7 and GND-7 are on P2 connector AGND is on P2 connector OUT-32 through OUT-63 are on P3 connector

Appendix B:Installation Conditions for EMC Directives

The following conditions must be satisfied to adapt a combination SGM H servomotor and an SGDG digital torque amplifier to EMC directives (EN55011-2, and EN61000-6-2).

EMC Installation Conditions

This section describes the installation conditions that satisfy EMC guidelies for each model of the SGDG digital torque amplifier. The conditions required for standard type (base mounted) digital torque amplifiers are described.

This section describes the EMC installation conditions satisfied under test conditions prepared by Yaskawa. The actual EMC level may differ depending on actual system configuration, wiring, and other conditions.

上正科技有限公司 購買、維修 此手冊零組件 電話: 037-466333 Email: service@repairtw.com Line id: @zzzz www.repairtw.com



Clamps : Fix and ground the cable shield using a piece of conductive metal.

28



Clamps : Fix and ground the cable shield using a piece of conductive metal.

■ Cable Core and Cable Clamp

■ The Cable Core

Attach the core on the cable as shown below:

Cable Model	ESD-SR-25	Note: The diagram shows two turns of the cable
Quantity	1	Cable
Turn	2	
Manufacturer	Tokin Corp.	Core

The table below shows the cable and position where the core is attached.

Cable Name	Mounting Position of the Core
Controller Cable	Near the controller and digital torque ampli- fier.
Servomotor Cable	Near the digital torque amplifier and the ser- vomotor.
Encoder Cable	Near the digital torque amplifier and the ser- vomotor
	御修 此于而令怨情

■ Cable Clamp 電話: 037-466333 The table below shows the cable shield using a piece of conductive metal. <Example of Cable Claimp> service@repairtw.com





■ Noise Filter for Brake Power Supply

FN2070-6/07 (Made by Schaffner) for servomotors of 0.4kW or less.

Cable Specifications

Shielded cables should be used for the following cables:

AC power input line cable (between the power supply and the noise filter) Servo motor cable (between the digital torque amplifier and the servomotor) Encoder cable (between the digital torque amplifier and the servomotor) Controller cable (between the digital torque amplifier and the controller)

Recommended Ferrite Cores

Cable Name		Ferrite Cores	Manufacturer
Controller Cable		ESD-SR-25	Tokin
Encoder Cable		LOD SK 25	TORM
Servo Motor Cable	400W or lower	ESD-SR-25	Tokin
	1kW or higher	PC40T90×13.5×74	TDK

Shielded Box

A shielded box, a closed metallic enclosure, should be used for shielding electromagnetic interference. The structure of the box should allow the main body, door, cooling unit, etc., to be attached to the ground. The box opening should be as small as possible.

電話:	037-466333
Email:	service@repairtw.com
Line id:	@zzzz
www.r	epairtw.com
Notes:

上正科技有限公司 購買、維修 此手冊零組件 電話: 037-466333 Email: service@repairtw.com Line id: @zzzz www.repairtw.com

Index

A

Acroloop ACR-8	01056
Alarms	
7-Segment LED	51
Analog Monitor	

B

Brake Power	
Noise Filter	61

С

Cable61 Ferrite Cores61
Cable Clamp60
Cable Core Attachment60
Cables Specifications24
Capacity SGDG-04GT5 SGDG-10GT5 SGDG-15GT5
Combination Linear Motor40 Serial Conversion Unit40 SGMSH40
Combination Error52
Combinations SGMAH
Connection Examples 3-Phase Power27 Single Phase26
Connector Encoder Terminal Array23 Specification17 Terminal Array17
Control Panel Environment

Cooling Fan Replacement	50
Core-less Type	
Magnet Track	2

D

Delta Tau PMAC254 Digital Torque Amplifier Amplifier Fault52 Component Replacement50 Cooling35 Inspection50 Cleaning50 Component Fault50 Screws50 Model Number5 Mounting Direction35 Mounting Location34 Power Loss13 Use Conditions50 5 Discharge Capacitor 5 Email^{Replacement}ice@repairtw Line id: @zzzz SGDG-01GT, 04GT58 SGDG-10GT, 15GT59 Encoder Communication Error **Encoder Signal** Output44 Encoder Signals I/O Signals45 Output Phase Form45 PG Divider46

F

F-Type Iron Core Magnet Track4

Fuses

Doplacement	50
Replacement	

G Galil IMC-1900/290053

Ι

Input Circuits	
Command	20
Sequence	20
Input Signals	
Connection	16
DB OFF	
Functions	18
Names	18
Servo ON	

L

Linear Motor Mode	el
F-Type Iron Core	4
Magnet Track	2
T-Type Iron Core	3

Linear Motors	
Encoder	
Scale Pitch	29
Mounting	29
Encoder	29
Motor	29

Liner Motor Mod	lel
Core-less Type	2

Μ

Main Circuit	
Functions	9
Terminal Names	9
Main Circuit Power Error	.52
MEI PCX/DSP	55
Model	
Serial Converter Unit	6
Model Number	1
Linear Motor	2
Rotary Motor	1

0

Oil Seals	32
Output Circuits	21
Output Signals RUN	43
Overcurrent	51
Overload	51
Overspeed	51
Overvoltage	51

P

Peripherals	
Power Line	
Size	
Stripping	14
Terminal Processing	14
Power ON Sequence	13
Protection Sequence	
Design	41

R

Regen Circuit Error	ine id: _{Noise} zzzz
Regenerative Resistor	Oil Seal WWW.repairtW.coi Vibration
Selection47	Maximum Capacity
Regenerative Resistor Selec-	Vibration Resistance a
tion47	••••••
Regenerative Resistors	SGDG-01GT
-500W Capacity Amps48	SGLTW -35A
500W+ Capacity Amps48	SGLTW -80A
Energy Calculation	SGLTW-20A
External48	SGLTW-40A
Relays	Successfring Consisten
Replacement50	Replacement
Rotary Motor	C
Mounting29	Specifications
Rotary Motors	Storage Temperature
Alignment31	Switch Setting
Mounting	Function Selection
Direction31	Linear Scale Pitch
Location	PG Divider

Shaft Tolerance
Vibration Class
Vibration Resistance
SGMAH33
SGMDH33
SGMGH33
SGMPH33
SGMSH33
SGMUH33
Runaway52

S

Scale Polarity Error52
Serial Converter Applied Motor .7 JZDP-A003 .6 JZDP-A004 .6 JZDP-A005 .6 JZDP-A006 .6 JZDP-A008 .6 Servo Alarm
Servomotor 7-466333 Inspection
SGDG-01GT5
3 SGLTW -35A
SGLTW -80A3
3 SGLTW-20A
³ SGLTW-40A3
Smoothing Capacitor Replacement
Specifications61
Storage Temperature
Switch Setting
Function Selection

13-bit Rotary	
17-bit Rotary	
Linear Motor	
PG Divider Setting	
Switch Setting Error	51

Switch Settings37

Т

T-Type Iron Co	ore
Magnet Tracl	s3
Terminal Block	k
Connection	14
Torque Contro	l
Description	41

U

Undervoltage	51
--------------	----

W

Wiring	9
Encoder	22
Main Circuit	9
Example	12
Terminal Block	13



YASKAWA ELECTRIC AMERICA, INC. Chicago-Corporate Head quarters 2121 Norman Drive South, Waukegan, IL 60085, U.S.A. Phone: (847) 887-7000 Fax: (847) 887-7310 Internet: http://www.yaskawa.com MOTOMAN INC. 805 Liberty Lane, West Carrollton, OH 45449, U.S.A. Phone: (937) 847-6200 Fax: (937) 847-6277 Internet: http://www.motoman.com YASKAWA ELECTRIC CORPORATION New Pier Takeshiba South Tower, 1-16-1, Kaigan, Minatoku, Tokyo, 105-0022, Japan Phone: 81-3-5402-4511 Fax: 81-3-5402-4580 Internet http://www.yaskawa.co.jp YASKAWA ELETRICO DO BRASIL COMERCIO LTDA. Avenida Fagundes Filho, 620 Bairro Saude Sao Paolo-SP, Brasil CEP: 04304-000 Phone: 55-11-5071-2552 Fax: 55-11-5581-8795 Internet: http://www.yaskawa.com.br YASKAWA ELECTRIC EUROPE GmbH Am Kronberger Hang 2, 65824 Schwalbach, Germany Phone: 49-6196-569-300 Fax: 49-6196-888-301 Internet: http://www.yaskawa.de MOTOMAN ROBOTICS AB Box 504 S38525, Torsas, Sweden Phone: 46-486-48800 Fax: 46-486-41410 Internet: http://www.motoman.se MOTOMAN ROBOTEC Gmbн Kammerfeldstraβe 1,85391 Allershausen, Germany Phone: 49-8166-900 Fax: 49-8166-9039 Internet: http://www.motoman.de First Linited Kingdom 1 Hunt Hill Orchardton Woods Cumbernauld, G68 9LF, Scotland, United Kingdom Phone: 44-12-3673-5000 Fax: 44-12-3645-8182 Internet: http://www.yaskawa.co.uk YASKAWA ELECTRIC KOREA CORPORATION Paik Nam Bldg. 901 188-3, 1-Ga Euljiro, Joong-Gu, Seoul, Korea 037-466333 Phone: 82-2-776-7844 Fax: 82-2-753-2639 YASKAWA ELECTRIC (SINGAPORE) PTE. LTD. Head Office: 151 Lorong Chuan, #04-01, New Tech Park Singapore 556741, SINGAPORE ITTW. COM Phone: 65-282-3003 Fax: 65-289-3003 TAIPEI OF FICE (AND YATEC ENGINEERING CORPORATION) 10F 146 Sung Chiang Road, Taipei, Taiwan Phone: 886-2-2563-0010 Fax: 886-2-2567-4677 www.repairtw.com YASKAWA JASON (HK) COMPANY LIMITED Rm. 2909-10, Hong Kong Plaza, 186-191 Connaught Road West, Hong Kong Phone: 852-2803-2385 Fax: 852-2547-5773 **BEUING OFFICE** Room No. 301 Office Building of Beijing International Club, 21 Jianguomanwai Avenue, Beijing 100020, China Phone: 86-10-6532-1850 Fax: 86-10-6532-1851 **SHANGHALOFFICE** 27 Hui He Road Shanghai 200437 China Phone: 86-21-6553-6600 Fax: 86-21-6531-4242 SHANGHAI YASKAWA-TONJI M & E CO., LTD. 27 Hui He Road Shanghai 200437 China Phone: 86-21-6533-2828 Fax: 86-21-6553-6677 Internet: http://www.yaskawa-tongji.com BEIJING YASKAWA BEIKE AUTOMATION ENGINEERING CO., LTD. 30 Xue Yuan Road, Haidian, Beijing 100083 China Phone: 86-10-6232-9943 Fax: 86-10-6234-5002 SHOUGANG MOTOMAN ROBOT CO., LTD. 7, Yongcharg-North Street, Beijing Economic & Technological Development Area, Beijing 100076 China Phone: 86-10-6788-0551 Fax: 86-10-6788-2878 YEA, TAICHUNG OF FICE IN TAIWAIN B1, 6F, No.51, Section 2, Kung-Yi Road, Taichung City, Taiwan, R.O.C. Phone: 886-4-2320-2227 Fax:886-4-2320-2239