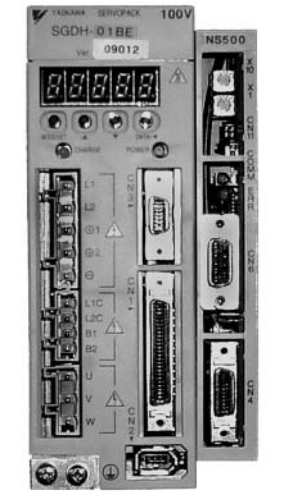
SIGMA II - Profibus DP™ Connectivity for Single-Axis Positioning



Used for a wide variety of applications, including:

- **Point-to-Point Positioning**
- **Precise Velocity Control**
- **Conditional Profile Execution in response to an external input**

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**Sigma II Servo System Product Catalog Supplement* G-MI#99001x-Sigma II

For more information about Profibus™, visit www.profibus.com

Design Features

1. Simplified Control System
- Conformance Tested Profibus DP™ (EN50170), Device type: Generic I/O
- Supports Profibus™ cyclic data transfer
- Baud Rates: Autobaud detect sets the application module speed to 9600bps to 12Mbps

2. Easy to Set Up and Use
- Just snap the JUSP-NS500 application module onto any Sigma II SGDH servo amplifier
- No programming required: Configure with Profibus™ conformance tested GSD file

3. Various Motion Control Functions
- Point table positioning
  - Edit up to 50 positions and corresponding speeds to the NS500's set of parameters via either Profibus™ or Yaskawa's NSXXX pc setup utility
- External input positioning
- Station number input (indexing a rotary table)
- Positioning moves with up to 16 stages of speed changes
- Homing: choice of four styles

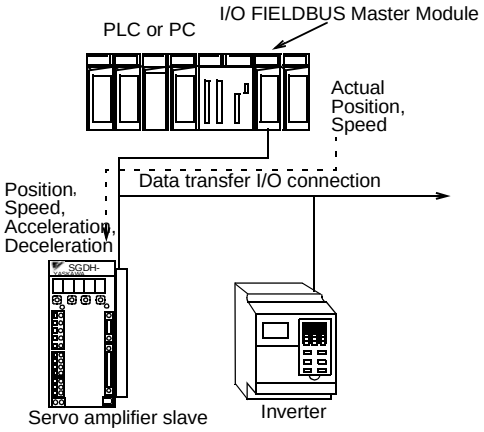
4. Applications
- Semiconductor fabrication, test, and assembly equipment
- Food processing and packaging
- Pharmaceutical packaging and test equipment
- Automotive assembly and test equipment
- Material handling, pick and place, linear motor
- Machine tool (tool changers, sheet feeders, etc.)

5. Certified International Standards
- UL, cUL recognized (File #: E165827), CE compliance

Sigma II Profibus Communication

The Sigma II Indexer is a compact, cost-effective solution for the needs of both the machine OEM and the end user. All servo loops and positioning functions are included in a self-contained servo amplifier/indexer package. Machine controller to servo axis interfacing simplifies to Profibus DP™ communications and wiring.

Control System Architecture



Profibus Protocol

- The Profibus DP™ specification divides network transmissions into three phases:
  - Parameterization: specifies DP services.
  - Configuration: the master transfers application setup files to each node.
  - Data transfer: cyclic data exchange
- Data transfer communication messages are suitable for time-critical, control-oriented data.
- The Sigma II messages are eight bytes long, embedded within the data unit of the **Profibus™ FDL Frame Format.**

Profibus™ FDL Frame Overview

Profibus™ FDL Frame Format

SD	DA/SA	FC	DATA UNIT	FCS	ED

FDL Telegram

Where:

SD = Start Delimiter Data Link
SA = Source Address
DATA_UNIT=Data Field Length
ED = End Diameter
CRC = Cyclic Redundancy Code
DA = Destination Address
FC = Function Code
FCS = Frame Check Sequence

Using the Eight-Byte Data Field

- Sigma II with Profibus™ accepts two types of messages in the **Data Unit Field** for positioning applications:
  - Move commands (monitor and control)
  - Set/Read commands (setup and troubleshooting)

Sigma II Move Commands

Command Message Format

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	0	ALRST	ESTP	0	0	SVON	C_STRT
1	Response type				Command code			
2	HOME	PTBL	STN	STEP	FEED	0	HOLD	CANCEL
3	0	0	0	0	0	0	DIR	INC
4	Command data							
5								
6								
7								

Refer to the Profibus™ Interface Unit User's Manual (SIE-C718-8) for a detailed description of the command bits.

Using move command messages

- Initiate positioning or speed control moves
- Communicate positioning move variables
- Activate point tables of index moves
- Activate homing, alarm reset, emergency stop, feed hold, and servo amplifier functions
- **Example of Command Execution:**
- Set the positioning command code and data
- Change the Command Start(C-Start), byte 0, bit 0, from 0 to 1

Positioning Command Codes	Operation
0000	No operation
0001	Simple positioning
0010	External positioning
0011	Positioning with notch signal outputs
0100	Multi-speed positioning

Sigma II Responses to Move Commands

Response Messages

- Reports the status of the current positioning move , i.e., in position, near position, home, overtravel, alarm, etc.
- Move data can be collected in the response. See the response type table at the right.
- The data requirements in the response message are specified in the command message, byte 1, bits 4 through 7, (as shown on the Command Message Format table on the previous page).
- Response codes are returned in the response message (byte 1, bits 4 through 7) along with the data.

Response Message Format

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	0	READY	PWRON	ESTP_R	ALRM	WARN	SVON_R	C_STRT_R
1	Response type				Command code			
2	HOME_R	PTBL_R	STN_R	STEP_R	FEED_R	0	HOLD_R	PRGS
3	POT	NOT	INPOS	NEAR	HOME_P	0	DIR_R	INC_R
4	Response data							
5								
6								
7								

Response Type	Response Data Reference Units (RU)
0000	Command position (RU)
0001	Current position (RU)
0010	Following error (RU)
0011	Command speed (1000RU/ min.)
0100	Current speed (1000RU/min.)
0101	Torque (%)
1010	Station number
1011	Point table number

Refer to the Profibus DP™ Interface Unit User's Manual (SIE-C718-8) for a detailed description of the status bits.

Sigma II Set/Read Commands and Command Codes

Set/Read messages enable user friendly network routines that can reconfigure machine positioning variables, initialize setup routines, enable auto-tuning, source alarm and warning data, etc. These functions are available to any master on the network.

Uses of Set/Read Messages

- Set up and configuration data
- Edit parameters
- Set/edit preprogrammed point tables of index moves
- Report alarm codes
- Use with data transfer I/O communication

Defining Set/Read Messages (versus move command messages)

- Set by byte 0, bit 7 = 1
- It is not necessary to specify response type for Set/Read commands

Command Codes

- Set "No Operation" to prevent execution of commands.
- Out-of-range parameters generate a setting error (WARN bit)

Command Message Format

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	0	ALRST	ESTP	0	0	SVON	C_STRT
1	0				Command code			
2	Command number							
3								
4	Command message							
5								
6								
7								

Command Code	Operation
0000	No operation
1000	Read parameter
1001	Write parameter
1010	Set current position
1011	Set zero point
1100	Read alarm
1110	Reset Unit

Response Message Format

Byte	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
0	1	READY	PWRON	ESTP_R	ALRM	WARN	SVON_R	C_STRT_R
1	0				Command code			
2	Command number							
3								
4	response data							
5								
6								
7								

Sigma II Profibus™ Functional Features and Capabilities

Sigma II Profibus™ acts as a servo position or velocity controller slave to a master controller. For application flexibility, use a data transfer connection from the applications software to dynamically load incremental or absolute point-to-point positioning data. For these applications use:

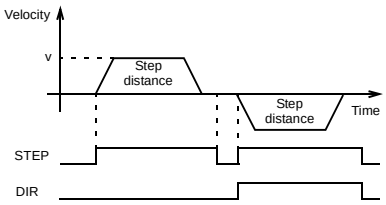
- Simple positioning
- Simple positioning with notch outputs
- External input positioning
- Multistage velocity positioning

For precise velocity control only, use Feed operation. For applications where the parameters of the positioning moves can be preset, use:

- Stepping operation
- Point-table positioning
- Station number positioning (rotary table operation)

Note: Establish or change parameters of a preset move with an GSD file configuration, Yaskawa's Windows NSXXX software utility, or a dynamic Sigma II data transfer of Set/Read Commands. For more permanent settings, recycle the power or issue a unit reset command (to move the parameters into non-volatile memory).

Stepping Operation



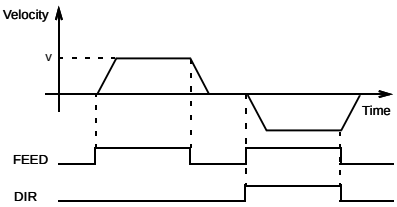
STEP bit: Refer to the Move Command message format, byte 2, bit 4.

DIR bit: Refer to the Move Command message format, byte 3, bit 1.

How it works:

- When the STEP bit turns ON, the axis moves in the specified direction (DIR bit).
- Use command data to select one of four preset parameters that define the step distance. Moves can be incremental or absolute.
- When the STEP bit turns OFF during movement, step movement is cancelled.
- Additional parameters to help define the stepping operation are preset to determine:
  - Approach velocity (v) and acceleration/deceleration type (eight types are available, including S-curve)
  - Acceleration/deceleration values

Feed Operation



FEED bit: Refer to the Move Command message format, byte 3, bit 3.

How it works:

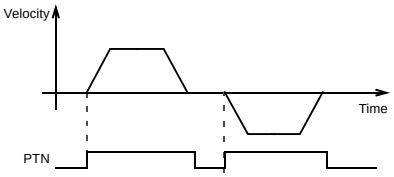
- While the FEED bit is ON, the axis jogs in the direction specified.
- Use command data during movement to set or override the preset velocity feed.
- Parameters are preset to determine:
  - Feed velocity (v)
  - Acceleration/deceleration type
  - Acceleration/deceleration rate

Point Table Positioning

How it works:

- Use command data to select point table number and then the PTN bit to initiate positioning.
- Fifty positioning points are available.
- Point table parameters are preset to determine:
  - Target position
  - Positioning velocity

PRESET INDEX MOVES		
POINT TABLE NUMBER	TARGET POSITION	POSITIONING VELOCITY
1	X1	V1
:	—	—
50	X50	V50

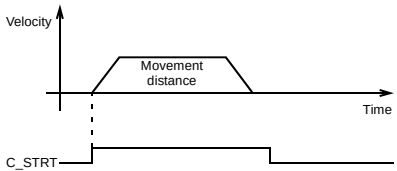


PTN bit: Refer to the Move Command message format, byte 2, bit 6.

Simple Positioning

How it works:

- Use simple positioning to receive target position data from a Profibus™ master controller's application software.
- When the C_STRT bit turns ON, the system moves from the current position to the target position.
- Communicate target positions with a move command message* using the positioning command code (set to 0001) and command data set with the target position.
- Velocity, acceleration type, and acceleration rate work the same way as in stepping operation.



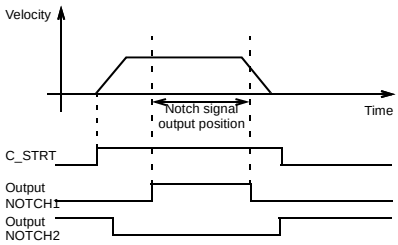
C-STRT bit: Refer to the Move Command message format, byte 0, bit 0.

* Refer to the Move Command Message Format on page 40.

Positioning with Notch/Zone (PLS) Outputs

How it works:

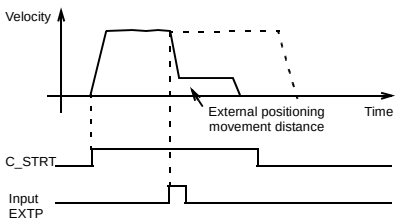
- Use the same procedure as simple positioning, except the positioning command code is to 0011.
- Two settable notch signal outputs are available.
- Notch signal output ON and OFF positions can be incremental or absolute.



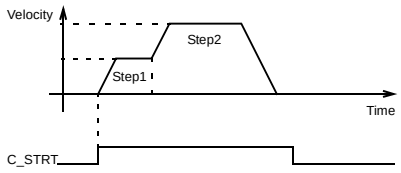
External Input Positioning

How it works:

- Use the same procedure as simple positioning, except the positioning command code is 0010.
- When the EXTP (external input signal) is activated during a move, the system will perform the final positioning.
- Parameters determine:
  - External positioning distance
  - External positioning velocity



Multi-Stage Velocity Positioning

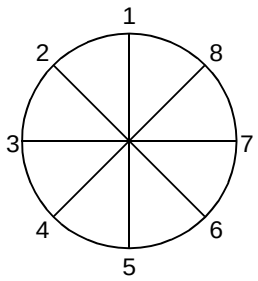


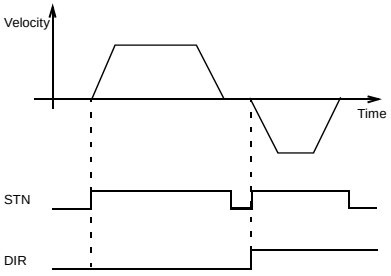
C_STRT bit: Refer to the Move Command message format, byte 0, bit 0.

How it works:

- Use the same procedure as simple positioning, except the positioning command code is 0100.
- During axis movement, after reaching the parameter's initial target position, the axis switches to the next speed and moves to the position specified in the next step.
- A maximum of 16 steps are available.
- Parameters set:
  - The number of steps
  - Reference velocity
  - Acceleration/deceleration

Station Number Positioning



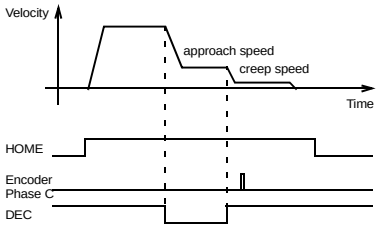


STN bit: Refer to the Move Command message format, byte 2, bit 5.

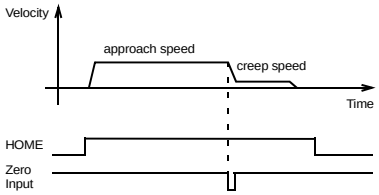
How it works:

- The system will index to the prescribed station number when the STN command bit is turned ON. The target station is defined with command data in the move command message (refer to page 36).
- Define (by parameter) up to 32,767 equidistant stations per rotation.
- Set the direction of rotation with the DIR bit or set the system (by a parameter) to automatically select the shortest distance.
- Set acceleration and deceleration with parameters.
- Accommodate rotary systems with gearing or belt ratios with parameters for electronic gear ratios.

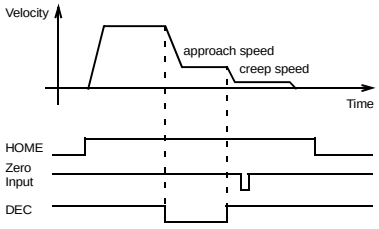
Homing type 0



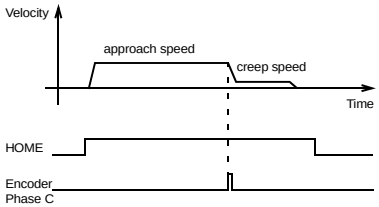
Homing type 1



Homing type 2



Homing type 3



How it works:

When the HOME bit turns ON, the system returns to the home position at the programmed speed and direction. After reaching home, the position of the Sigma II Profibus™ resets to zero.

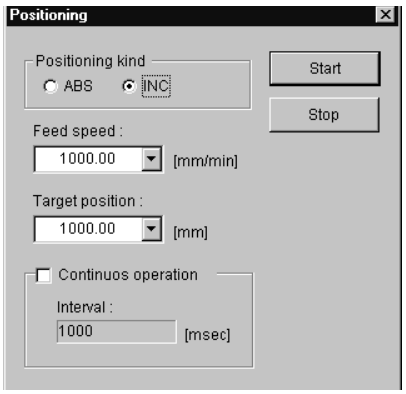
- If the HOME bit turns OFF during the procedure, the rest of the homing operation is cancelled.
- Homing methods:
  - Type 0: DEC and Encoder Phase C
  - Type 1: Zero Input
  - Type 2: DEC and Zero Input
  - Type 3: Encoder Phase C
- Use parameters to set:
  - Homing direction
  - Homing approach and creep speed
  - Acceleration/deceleration velocity
  - Acceleration/deceleration type
  - Home offset (zero-point return final travel distance).

Sigma II Profibus™ Software Utility

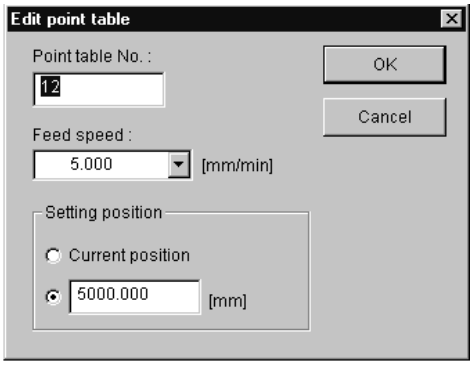
The Electronic Data Sheet (GSD) file is the recommended setup utility to configure Sigma II Profibus™ from the network software manager. Use Yaskawa's NSXXX software for local setup of the Sigma II Profibus™ via personal computer. The following are examples of this software and the utilities available through the GSD file.

Monitoring/Setup Software

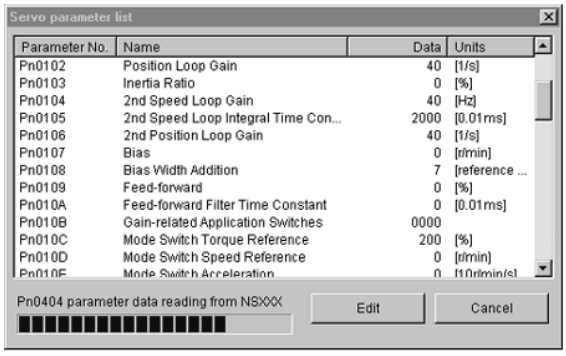
Positioning Setup



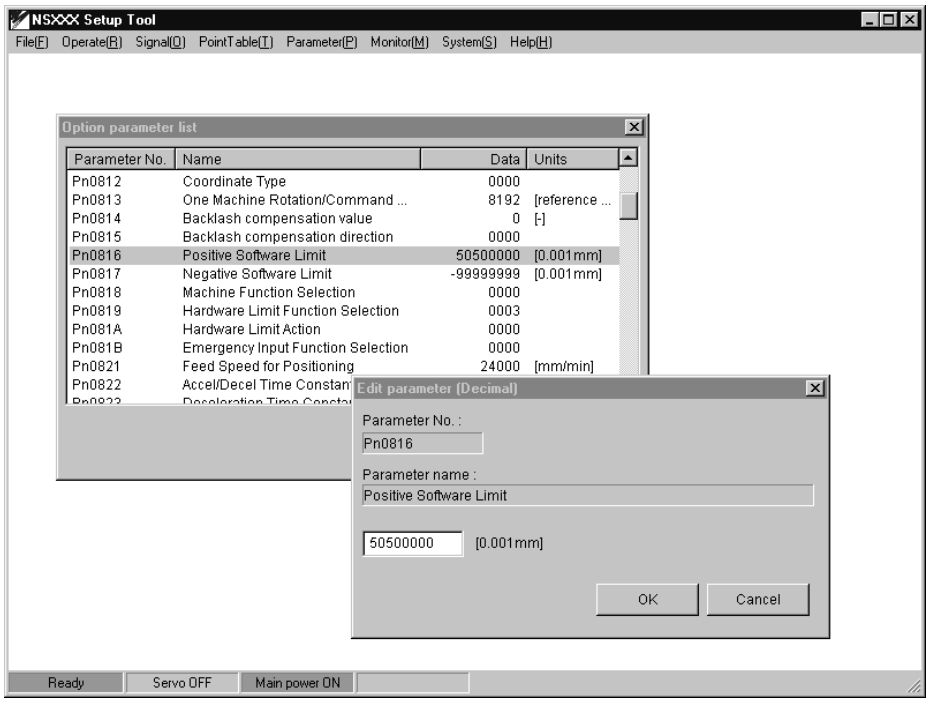
Point Table Positioning Setup



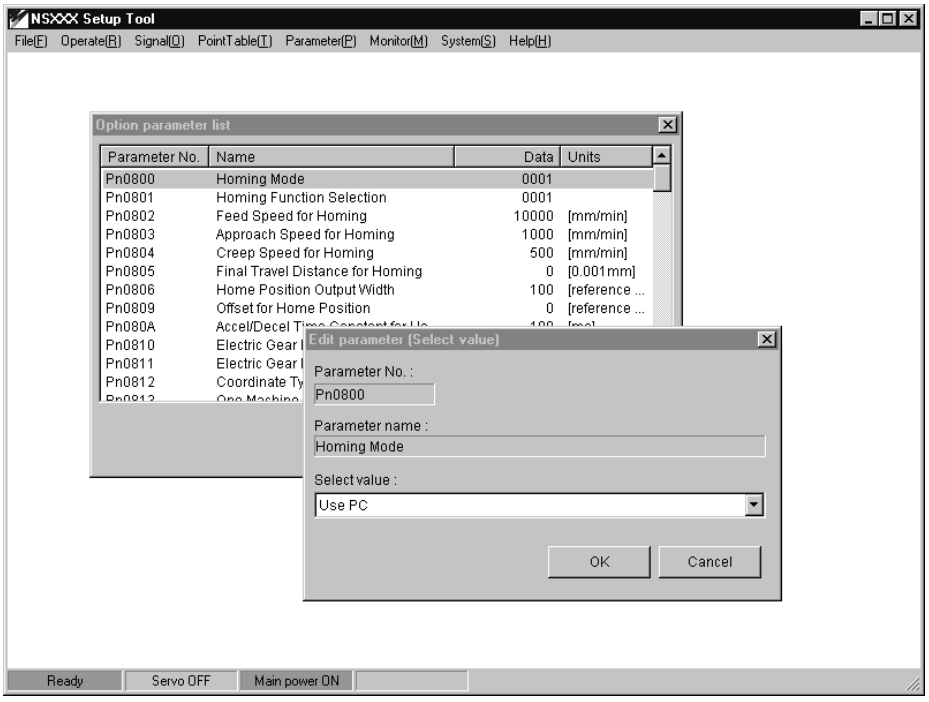
Settings and Parameters Editing



Overtravel Configuration

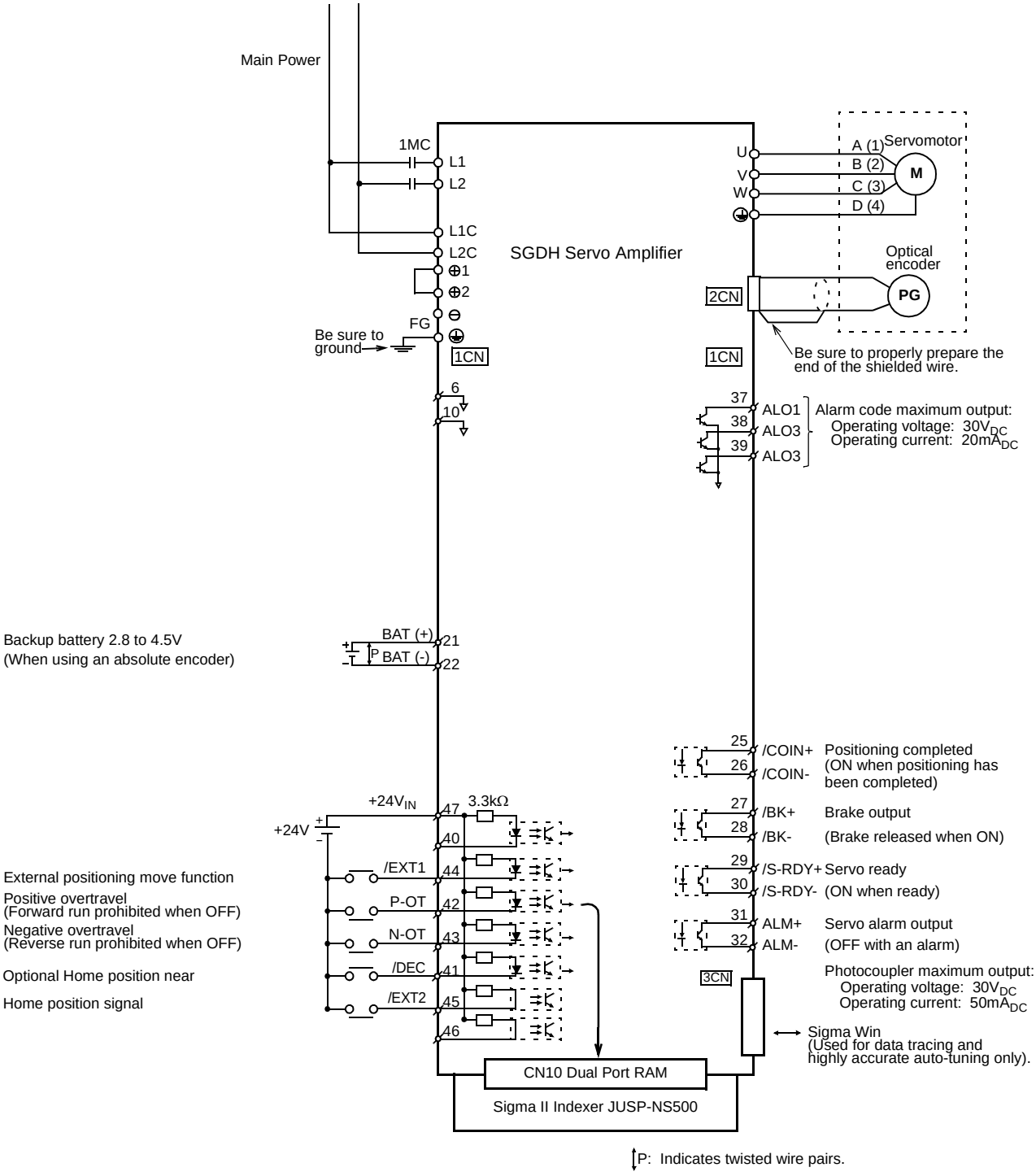


Homing Setup

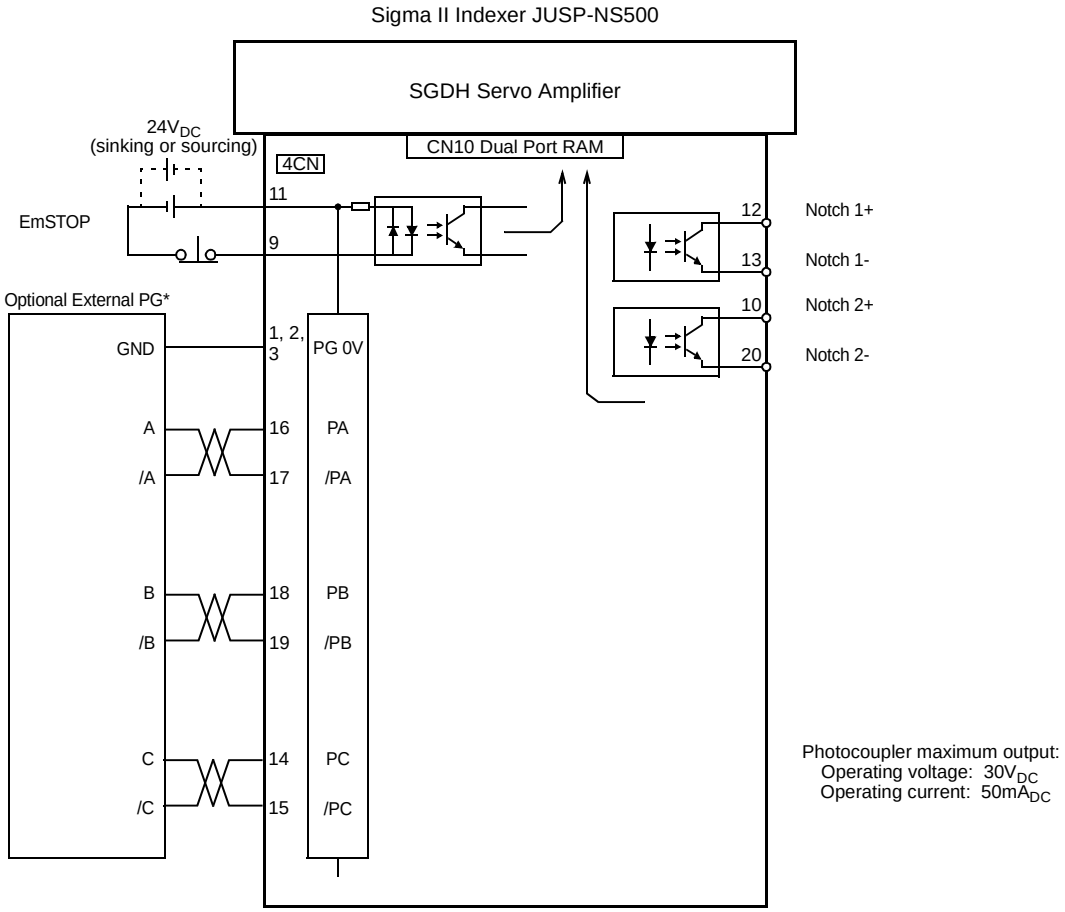


I/O Connections

Example of I/O Signal Connector (CN1)



Sigma II Indexer Application Module I/O (CN4)

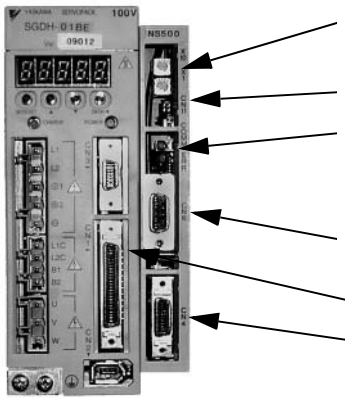


*Use for "Full Closed Loop " function (alternative position loop feedback). Refer to the User's Manual for details.

Sigma II Indexer with Profibus™ JUSP-NS500					
Pin Number	Signal	Description	Pin Number	Signal	Description
1	PG0V	signal ground	11	+24V	24V shared terminal for external inputs
2	PG0V	signal ground	12	NOTCH1+	Notch output 1
3	PG0V	signal ground	13	NOTCH1-	—
4	—	—	14	PC	Phase C input
5	—	—	15	/PC	—
6	—	—	16	PA	Phase B input
7	—	—	17	/PA	—
8	—	—	18	PB	Phase A input
9	EMSTOP		19	/PB	—
10	NOTCH2+		20	NOTCH2-	Notch output 2

Indexer Ratings and Specifications

The JUSP-NS500 application module uses Profibus™ Standard network connector, LED status indicators, and address and baud rate settable switches.



Rotary switches (two)
- Station Addresses 0 - 126

CN11: Setting up, commissioning, and monitoring port

LEDs
- Module Status (ERR)
- Network Status (COMM)

CN6: Profibus™ network port

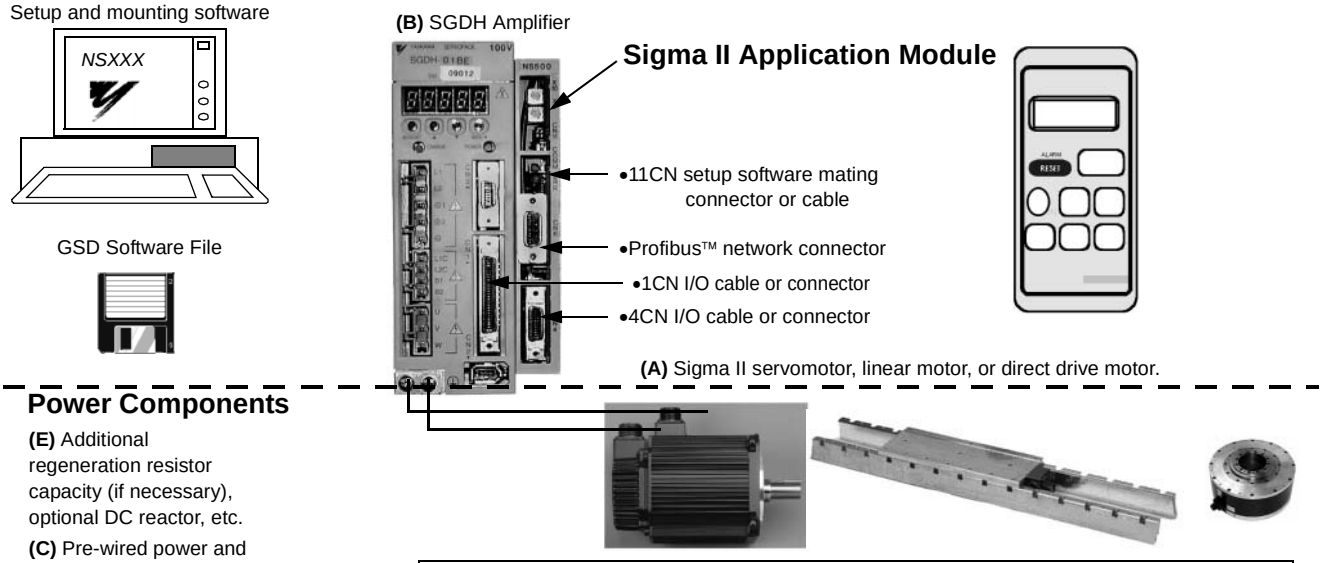
Local node I/O
- CN1 (Refer to connections on previous page)
- CN4: Two optically isolated notch outputs

Profibus™ Application Module Specifications: JUSP-NS500	
Power Supply Method	Supplied from the SGDH power supply.
Power Consumption	1.3W
Consumption Current	250mA
External Dimensions (w, h, d) inches (mm)	0.79 × 5.59 × 5.04 (20 × 142 × 128)
Approximate Mass in lb. (kg)	0.441 (0.2)
Local Node Inputs and Outputs (Combined with the Amplifier's I/O)	
Digital Inputs	Six optically isolated $24V_{DC}$ inputs: Emergency Stop (E Stop), latch, home near (DEC) switch, forward overtravel, reverse overtravel, and inputs for an optional full closed loop feedback.
Digital Outputs	Ten optically isolated $24V_{DC}$ outputs: alarm out, servo-ready, servo warning, holding brake, in-position, 3 alarm codes, and 2 notch settable outputs. Also included: a scalable encoder position output.
Servo System Specifications	
Motor feedback resolution / standard	13-bit incremental encoder (8,192PPR) for motors below 1hp
	17-bit incremental encoder (16,384PPR) for motors above 1hp
Motor feedback resolution / optional	16-bit absolute encoder for motors below 1hp
	17-bit incremental/absolute for motors above 1hp
Linear motor feedback resolution / standard	0.078 micron (using 20 micron linear scale pitch)
Choice of Amplifier sizes	115 V_{ac} single-phase, 30 to 200W
	230 V_{ac} single-phase, 30W to 1.5kW
	230 V_{ac} three-phase, 500W to 15kW
	480 V_{ac} three-phase, 500W to 15kW
Environmental	
Ambient/Storage Temperature	0° to 55°C / -20° to 85°C
Global Safety Certifications	UL, CUL, CE, TUV

Selecting Your Sigma II Indexer System

Specify part number JUSP-NS500, the indexer add-on application module.
Use the tables beginning on the following page to specify choice of indexer interface cables, mating connectors only, set-up and monitoring tools, and software.

System Configuration



Specify a technical manual, if it is needed, on your servo system purchase order:
Profibus™ Interface Unit Users Manual: SIE-C718-8
Linear Motor Users Manual: YEA-SIA-S800-39.11
(Manual provided at no charge with a purchase order, but must be requested).

Power Components

(motor, amplifier, and connections for power and feedback)

Select the required power components (servomotor, power and feedback connectors or pre-wired cables, amplifier, regenerative packs, etc.) from the following catalog pages.

Use this table or the Yaskawa publications referenced below to determine which catalog section describes the best servomotor for the application.

Application Requirements (Maximum)			Number of Motor Sizes	System Voltage and Sigma II Servomotor Series				Selection Guide for Power Components Page Number *
Speed (rpm)	Rated Torque oz • in [lb • in]	Peak Torque oz • in [lb • in]		$100V_{ac}$ Single-phase	$200V_{ac}$ Single-phase	$200V_{ac}$ Three-phase	$480V_{ac}$ Three-phase	
5000	338	1010	6	SGMAH	SGMAH	—	—	11
5000	676	2027	5	SGMPH	SGMPH	—	—	29
3000	[845]	[1988]	10	—	—	SGMGH	—	57
5000	[140]	[422]	6	—	—	SGMSH	—	85
3000	[845]	[1988]	10	—	—	—	SGMGH	127
5000	[140]	[422]	6	—	—	—	SGMSH	139
6000	[43]	[190]	2	—	—	—	SGMUH	139
2000	[1240]	[6120]	5	—	—	—	SGBH	165

* Yaskawa publication: *Sigma II Servo System Product Catalog Supplement* G-MI#99001x-Sigma II,
Linear Motor Catalog KAE-S800-39.10, Direct Drive Motor Catalog YEA-KAA-DDM-1.

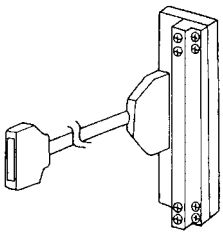
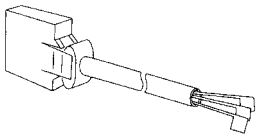
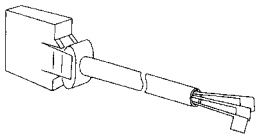
Sigma II Indexer Selection

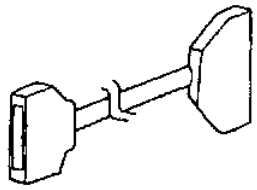
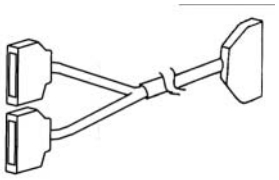
Use the servomotor and amplifier selection of this catalog for specification and selection of Sigma II servomotor and servo amplifier.

Component Description	Part Number	Comments	Item Class
Sigma II Add-on Indexer Application Module	JUSP-NS500	Mounting hardware requirements: one ground strap mounting screw. (See supplementary information on the next page.)	Stock

Use the Sigma II Application Module Mounting Dimensions on pages 75 to 82 for determining overall indexer panel space requirements. For 480VAC large capacity amplifiers (22 - 55kW), refer to the Sigma II catalog for amp dimensions.

Indexer I/O Interface Cable Selection

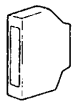
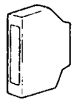
Component Description **(E)**		Part Number	Comments	Item Class
Input/Output 1CN Cable & Transition Terminal Block		JUSP-TA50P	35mm DIN rail mountable; the cable length is 0.5m.	Stock
Input/Output 1CN Cable with Pigtail Leads		JZSP-CKI01-□(A)*	Use the following key to specify required cable length (last digit of the part number): 1: 1m (standard) 2: 2m 3: 3m	
Input/Output 4CN Cable with Pigtail Leads		CKI-NS300-□□	Use the following key to specify required cable length (last two digits of the part number): 01: 1m (standard) 02: 2m 03: 3m	

Input/Output 1CN Cable Cable with Female D-Sub output Connector*		JZSP-CKI0D-□□**	Use the following key to specify required cable length (last two digits of the part number): D50: 0.5m 01: 1m (standard) 02: 2m 03: 3m	
Input/Output 1CN+4CN Cable with Female D-Sub output Connector* Applicable only for SGDH-1E (15 kW) and below.		CKI-NS300D-□□** (for use with NS500 Indexer)	Use the following key to specify required cable length (last two digits of the part number): D50: 0.5m 01: 1m (standard) 02: 2m 03: 3m	

* The "(A)" at the end of the cable part number indicates the revision level. Revision level may be subject to change prior to this catalog reprinting.

** 50 Pin Female D-Sub output connector mates to customer supplied third party terminal block. (e.g., Wago #289-449, Weidmuller #919658, Phoenix #2283647, Amphenol/Sine #20-51039, and many others).

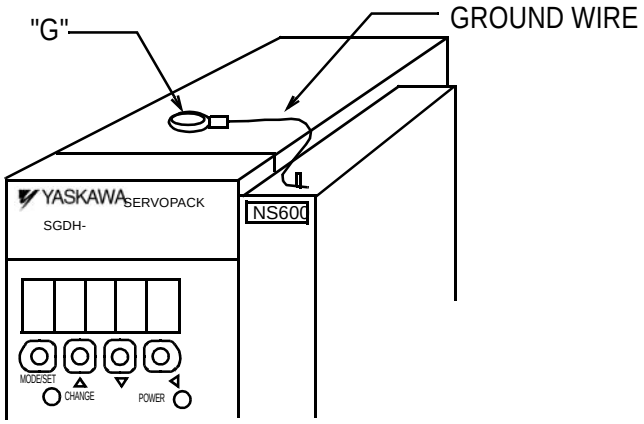
Mating Connector Selection

Component Description **(E)**		Part Number	Comments	Item Class
1CN Mating Connector		JZSP-CKI9	for SGDH I/O 50-pin	Stock
4CN Mating Connector		DE-9406973	Solder type with cover	
3CN Peripheral Mating Connector	—	YSC-1	—	
CN11 Setup Software Mating Connector	—	DE9404559	Strongly advised: YS-16 cable (next page)	
Profibus Mating Connector	—		Standard 9-pin male D-Sub connector. (Note: termination resistors are required for the end of the network.)	

Supplementary Information

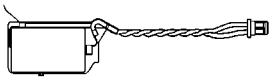
For grounding, connect the ground wire of the Sigma II Indexer application module to the point marked "G" on the SGDH servo amplifier. Refer to the following table for the proper screw size.

Servo Amplifier	"G" Screw	Comments
SGDH-A3-02BE SGDH-A3-10AE	M3 x 10 (round head phillips with split lock washer and flat washer	One supplied with NS500
SGDH-15-50AE SGDH-15-50DE	M4 x 10 (round head phillips with split lock washer and flat washer	One supplied with NS500
SGDH-60-1EAE SGDH-60-1EDE	M4 x 8 (round head phillips with split lock washer and flat washer	One supplied with NS500 Use front panel side screw hole.

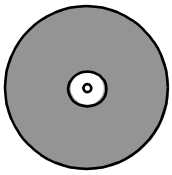


Example: For SGDH (30W to 5.0kW)

Peripheral Device Selection

Component Description **(E)**		Part Number	Comments	Item Class
Hand-held Digital Operator Panel		JUSP-OP02A-1 and JZSP-CMS00-1	Portable unit with 1m adapter cable for Sigma II Indexer	Stock
Absolute Encoder Battery		JZSP-BA01	3.6V, 1000mAh (lithium battery)	
Setup Software Interface Cable for CN10	—	YS-16	Pre-wired 1.5m cable with 9-pin connector (RS232) for NSXXX software	

Sigma II Network Tools and Documentation

Component Description **(E)**		Publication Number*	Comments	Item Class
Fieldbus Tools and documentation*		YEA-CD-S800-34.1	Includes : • Yaskawa's NSXXX monitoring and set-up software for Windows 95, Windows 98, and Windows NT. • Electronic Data Sheet (GSD) software for Profibus™ configuration software manager. • NS500 User's Manual.pdf.	Stock

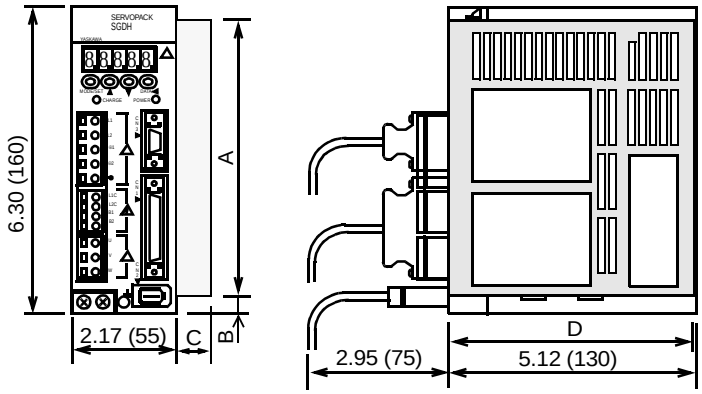
*Available by request. Contact: literature@yaskawa.com.

NOTES

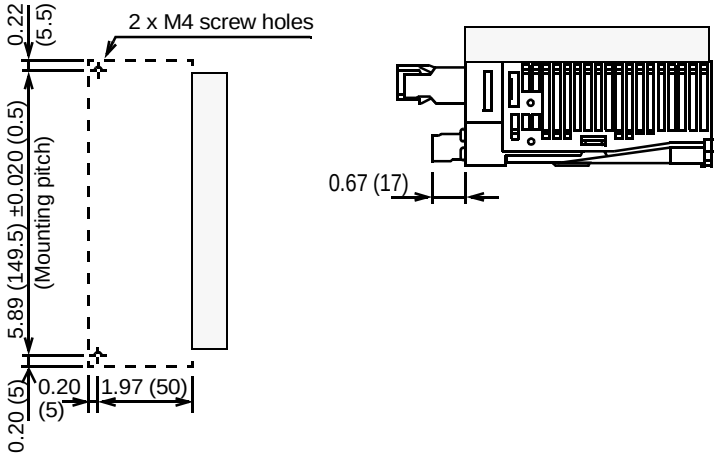
Dimensions in inches (mm)

SGDH Servo Amplifier/Application Modules

- **SGDH-A3AE to -02AE (200V Single-phase, 30 to 200W) and**
- **SGDH-A3BE to -01BE (100V Single-phase, 30 to 100W)**



Mounting Hole Diagram



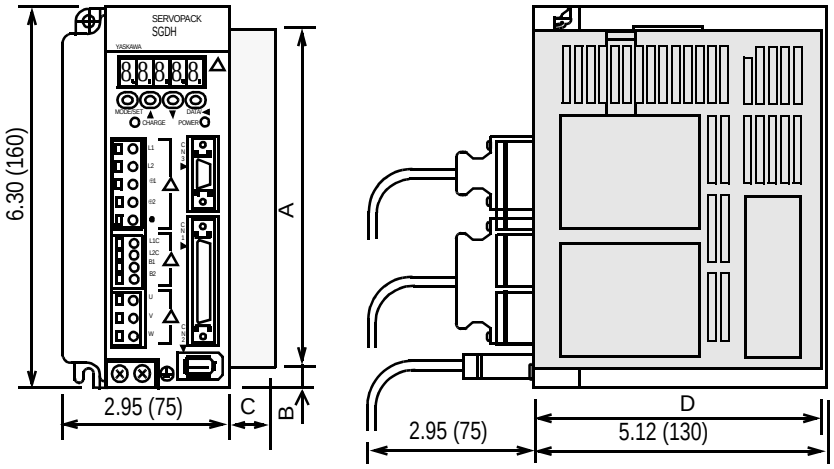
Part Number	SGDH Option Description	A	B	C	D	Approximate Mass** lb (kg)
JUSP-NS100	Mechatrolink	5.59 (142)	0.35 (9)	0.79 (20)	5.08 (129)	0.44 (0.2)
JUSP-NS300	Indexer with DeviceNet™					
JUSP-NS310	Indexer with DeviceNet™	5.67 (144)	0.32 (8)		5.24 (133)**	0.7 (0.32)
JUSP-NS500	Profibus	5.59 (142)	0.35 (9)		5.08 (129)	0.44 (0.2)
JUSP-NS600	Indexer					
JUSP-FC100	Full Closed Loop					
MP940	Single Axis Control			1.22 (31)***		0.89 (0.40)

* Option card only.

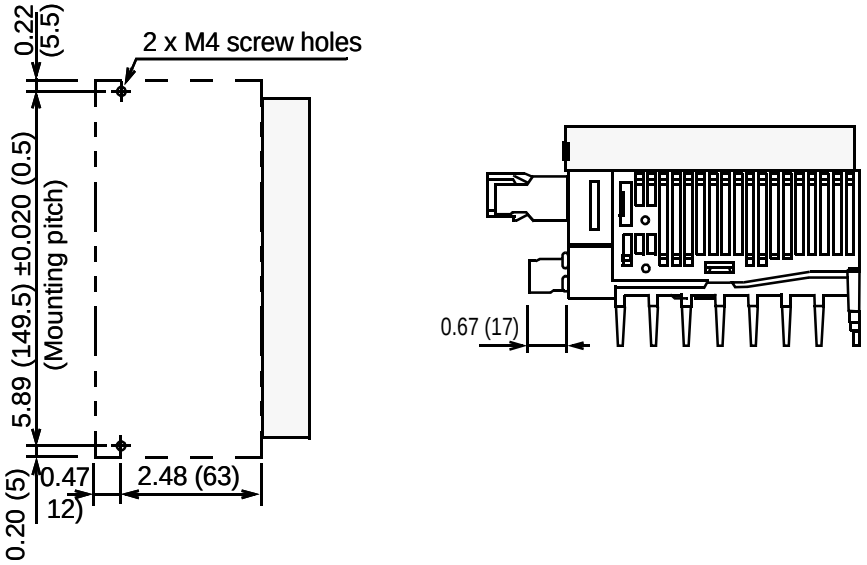
** Add 0.75in (19mm) to front end of card for micro connector.

*** Add approx. 0.75in (19mm) for optional back-up battery.

- **SGDH-04AE (200V Single-phase, 400W),**
- **SGDH-02BE (100V Single-phase, 200W) and**
- **SGDH-04FE (100V Single-phase, 400W)**



Mounting Hole Diagram



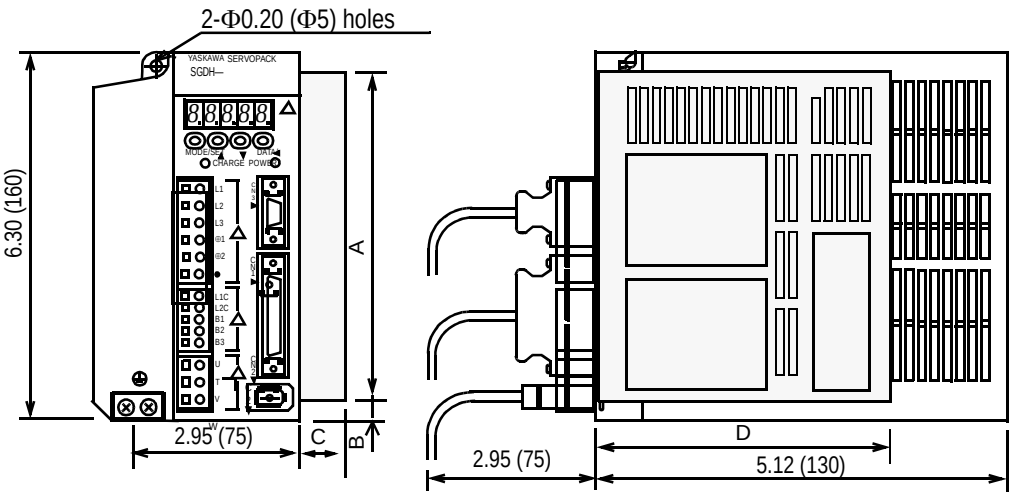
Part Number	SGDH Option Description	A	B	C	D	Approximate Mass** lb (kg)
JUSP-NS100	Mechatrolink	5.59 (142)	0.35 (9)	0.79 (20)	5.08 (129)	0.44 (0.2)
JUSP-NS300	Indexer with DeviceNet™					
JUSP-NS310	Indexer with DeviceNet™	5.67 (144)	0.32 (8)		5.24 (133)**	0.7 (0.32)
JUSP-NS500	Profibus	5.59 (142)	0.35 (9)		5.08 (129)	0.44 (0.2)
JUSP-NS600	Indexer					
JUSP-FC100	Full Closed Loop					
MP940	Single Axis Control			1.22 (31)***		0.89 (0.40)

* Option card only.

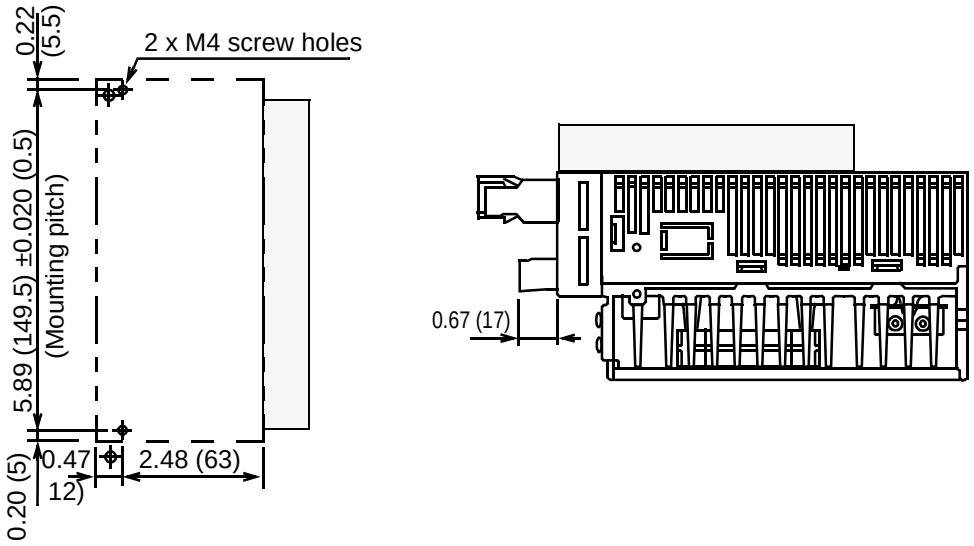
** Add 0.75in (19mm) to front end of card for micro connector.

*** Add approx. 0.75in (19mm) for optional back-up battery.

- **SGDH-05AE to -10AE (200V Three-phase, 0.5 to 1.0kW)**
- **SGDH-08AE-S (200V* Single-phase, 750W)**



Mounting Hole Diagram

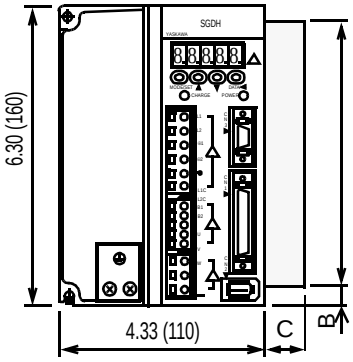


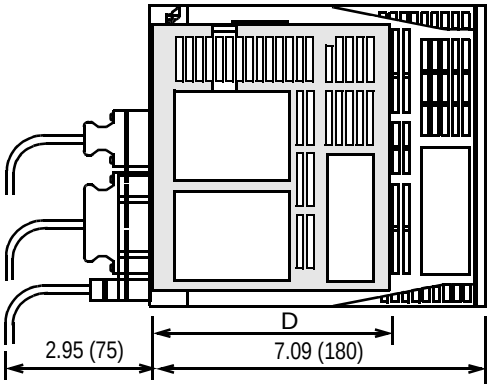
Part Number	SGDH Option Description	A	B	C	D	Approximate Mass* lb (kg)
JUSP-NS100	Mechatrolink	5.59 (142)	0.35 (9)	0.79 (20)	5.08 (129)	0.44 (0.2)
JUSP-NS300	Indexer with DeviceNet™					
JUSP-NS310	Indexer with DeviceNet™	5.67 (144)	0.32 (8)		5.24 (133)**	0.7 (0.32)
JUSP-NS500	Profibus	5.59 (142)	0.35 (9)		5.08 (129)	0.44 (0.2)
JUSP-NS600	Indexer					
JUSP-FC100	Full Closed Loop					
MP940	Single Axis Control			1.22 (31)***		0.89 (0.40)

* Option card only.
** Add 0.75in (19mm) to front end of card for micro connector.
*** Add approx. 0.75in (19mm) for optional back-up battery.

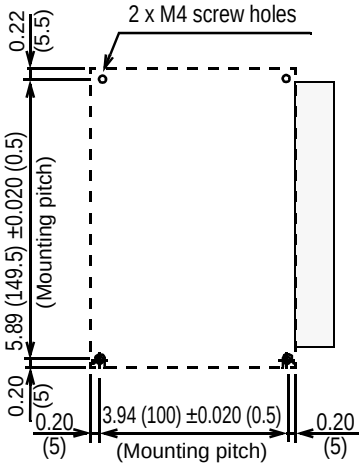
* Rating 200 to 230V_{ac} +10% -5%

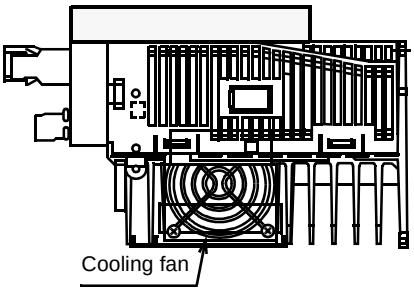
- **SGDH-15AE (200V Three-phase, 1.5kW)**
- **SGDH-05DE (400V Three-phase, 0.5kW to 1.5kW)**





Mounting Hole Diagram





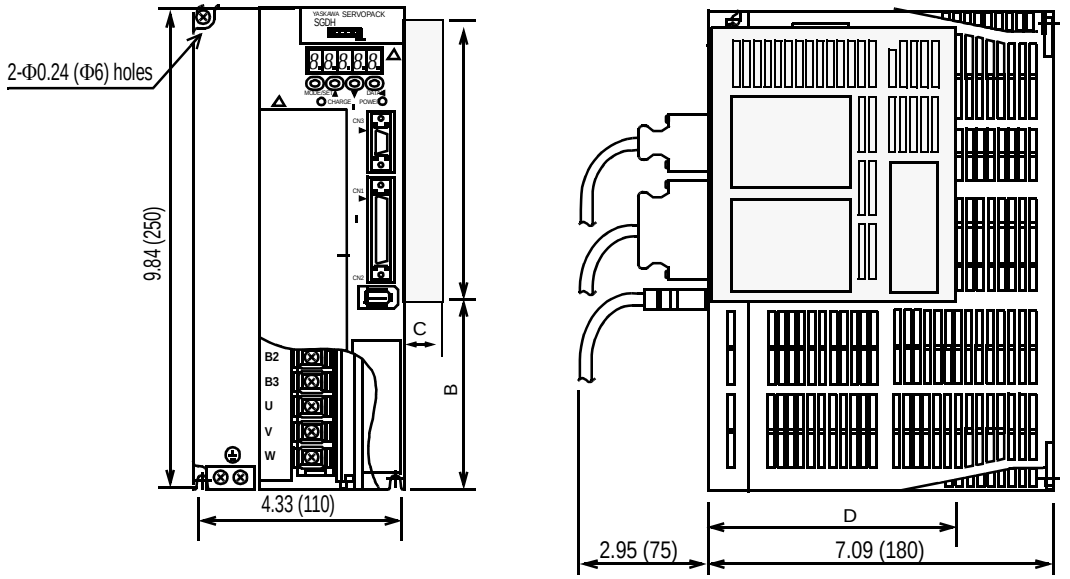
Part Number	SGDH Option Description	A	B	C	D	Approximate Mass** lb (kg)
JUSP-NS100	Mechatrolink	5.59 (142)	0.35 (9)	0.79 (20)	5.08 (129)	0.44 (0.2)
JUSP-NS300	Indexer with DeviceNet™					
JUSP-NS310	Indexer with DeviceNet™	5.67 (144)	0.32 (8)		5.24 (133)**	0.7 (0.32)
JUSP-NS500	Profibus	5.59 (142)	0.35 (9)		5.08 (129)	0.44 (0.2)
JUSP-NS600	Indexer					
JUSP-FC100	Full Closed Loop					
MP940	Single Axis Control			1.22 (31)***		0.89 (0.40)

* Option card only.

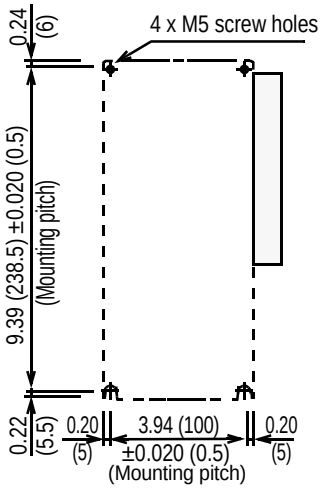
** Add 0.75in (19mm) to front end of card for micro connector.

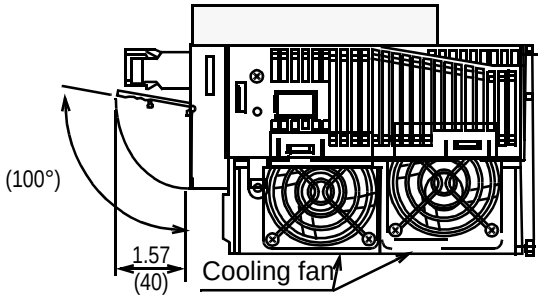
*** Add approx. 0.75in (19mm) for optional back-up battery.

- **SGDH-20AE, 30AE (200V Three-phase, 2.0kW, 3.0kW)**
- **SGDH-15AE-S (200V Single-phase, 1.5 kW)***
- **SGDH-20DE, 30DE (400V Three-phase, 2.0kW, 3.0kW)**



Mounting Hole Diagram





Part Number	SGDHG Option Description	A	B	C	D	Approximate Mass** lb (kg)
JUSP-NS100	Mechatrolink	5.59 (142)	3.9 (99)	0.79 (20)	5.08 (129)	0.44 (0.2)
JUSP-NS300	Indexer with DeviceNet™					
JUSP-NS310	Indexer with DeviceNet™	5.67 (144)	3.86 (98)		5.24 (133)**	0.7 (0.32)
JUSP-NS500	Profibus	5.59 (142)	3.9 (99)		5.08 (129)	0.44 (0.2)
JUSP-NS600	Indexer					
JUSP-FC100	Full Closed Loop					
MP940	Single Axis Control			1.22 (31)***		0.89 (0.40)

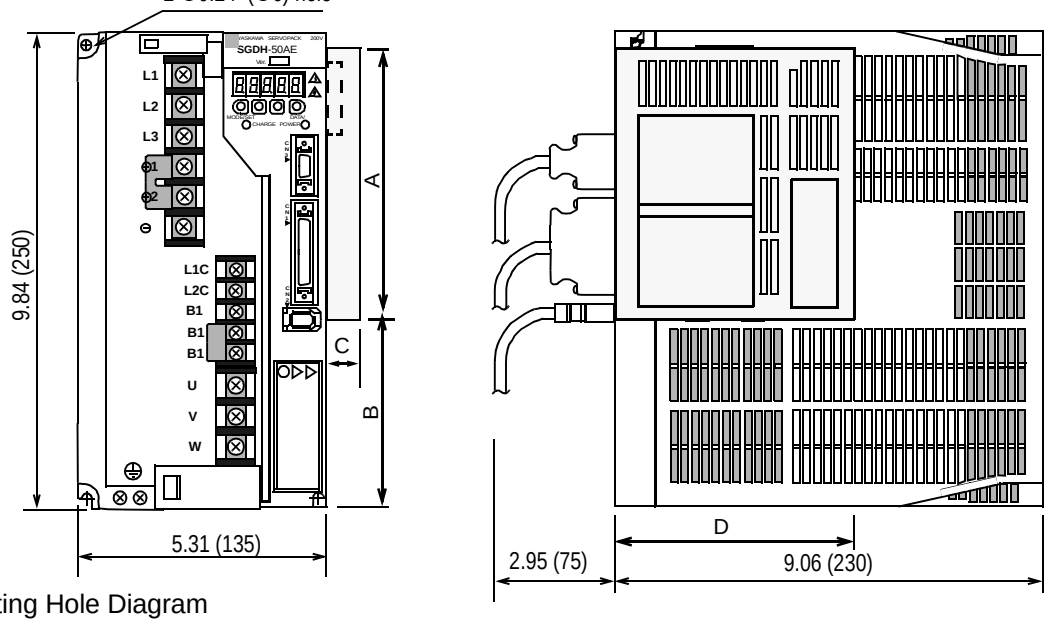
* Option card only.

** Add 0.75in (19mm) to front end of card for micro connector.

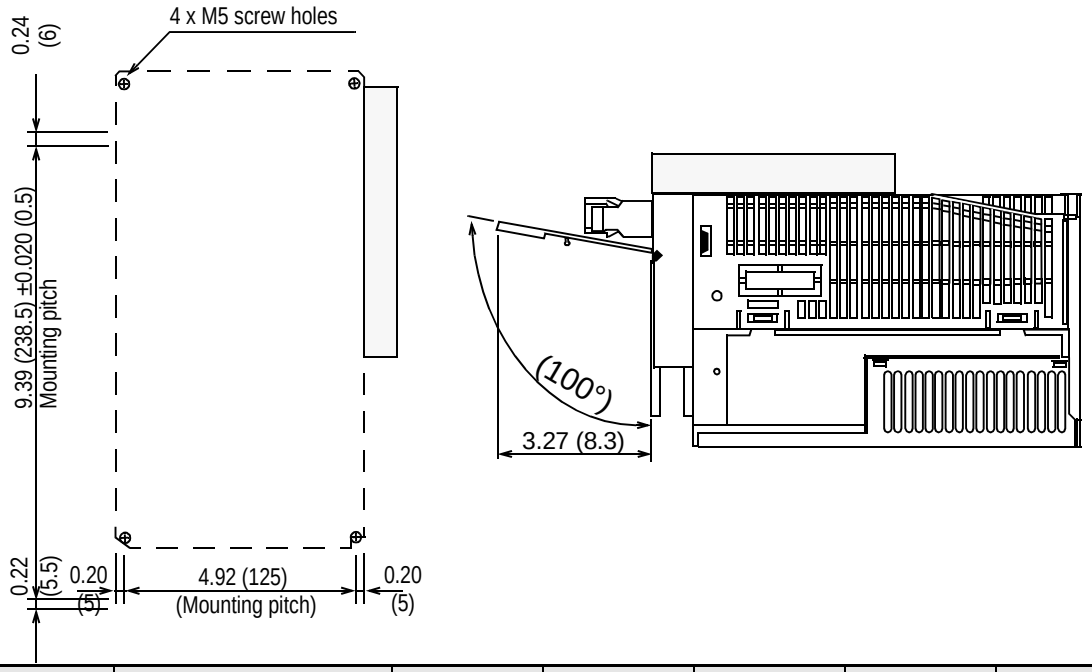
*** Add approx. 0.75in (19mm) for optional back-up battery.

* Rating: 200 to 230V_{ac} +10%, -5%

- **SGDH-50AE (200V Three-phase, 5.0kW)**
- **SGDH-50DE (400V Three-phase, 5.0kW to 1.5kW)**



Mounting Hole Diagram



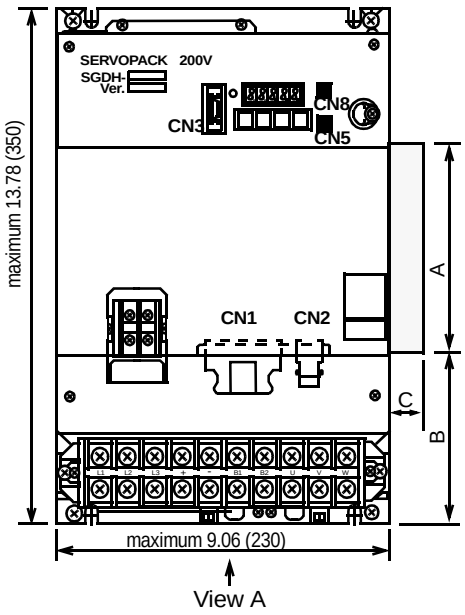
Part Number	Description	A	B	C	D	Approximate Mass** lb (kg)
JUSP-NS100	Mechatrolink	5.59 (142)	3.9 (99)	0.79 (20)	5.08 (129)	0.44 (0.2)
JUSP-NS300	Indexer with DeviceNet™					
JUSP-NS310	Indexer with DeviceNet™	5.67 (144)	3.86 (98)		5.24 (133)**	0.7 (0.32)
JUSP-NS500	Profibus	5.59 (142)	3.9 (99)		5.08 (129)	0.44 (0.2)
JUSP-NS600	Indexer					
JUSP-FC100	Full Closed Loop					
MP940	Single Axis Control			1.22 (31)***		0.89 (0.40)

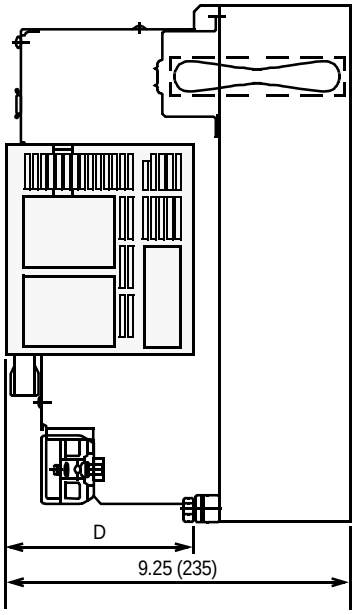
** Option card only.

** Add 0.75in (19mm) to front end of card for micro connector.

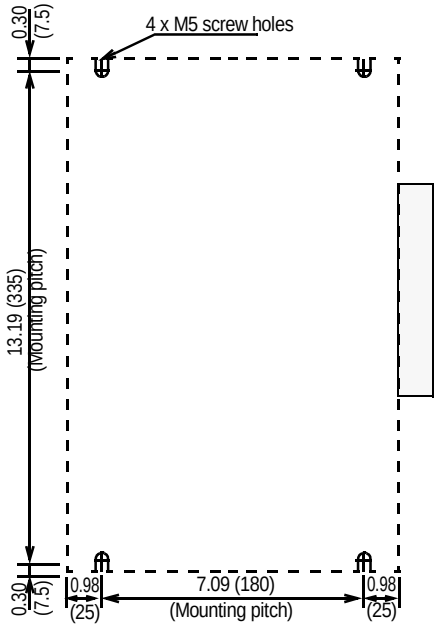
*** Add approx. 0.75in (19mm) for optional back-up battery.

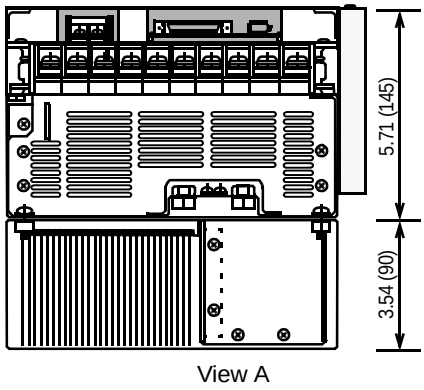
- **SGDH-60AE, SGDH-75AE (200V Three-phase, 6.0kW, 7.5kW)**
- **SGDH-60DE, SGDH-75DE (400V Three-phase, 6.0kW, 7.5kW)**





Mounting Hole Diagram





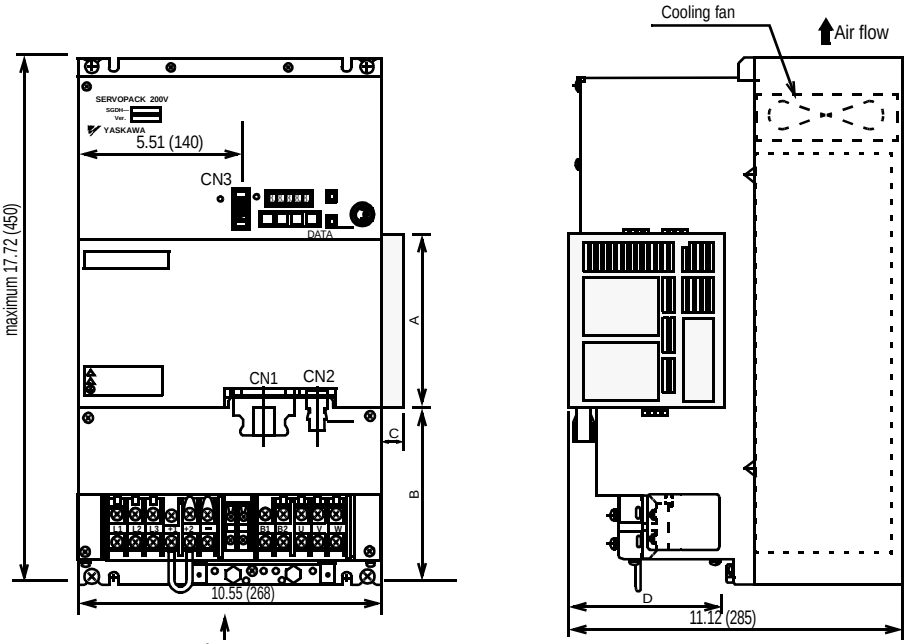
Part Number	SGDH Option Description	A	B	C	D	Approximate Mass* lb (kg)
JUSP-NS100	Mechatrolink	5.59 (142)	4.5 (114.5)	0.79 (20)	5.08 (129)	0.44 (0.2)
JUSP-NS300	Indexer with DeviceNet™					
JUSP-NS310	Indexer with DeviceNet™	5.67 (144)	4.47 (113.5)		5.24 (133)**	0.7 (0.32)
JUSP-NS500	Profibus	5.59 (142)	4.5 (114.5)		5.08 (129)	0.44 (0.2)
JUSP-NS600	Indexer					
JUSP-FC100	Full Closed Loop					
MP940	Single Axis Control			1.22 (31)***		0.89 (0.40)

* Option card only.

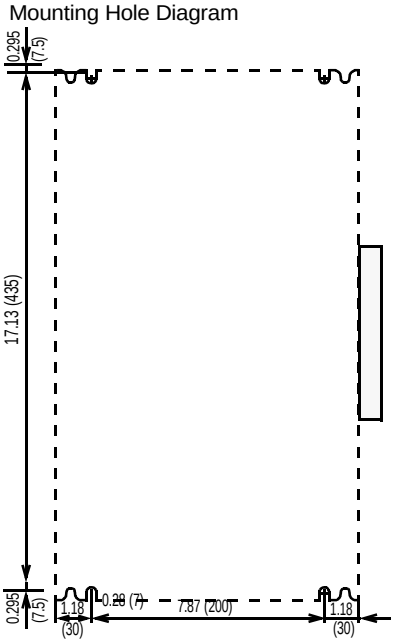
** Add 0.75in (19mm) to front end of card for micro connector.

*** Add approx. 0.75in (19mm) for optional back-up battery.

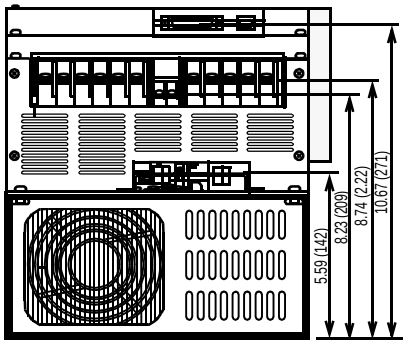
- **SGDH-1AAE, SGDH-1EAE (200V Three-phase, 11.0kW, 15.0kW)**
- **SGDH-1ADE, SGDH-1EDE (400V Three-phase, 11.0kW, 15.0kW)**



Mounting Hole Diagram



View A:



Part Number	SGDH Option Description	A	B	C	D	Approximate Mass* lb (kg)
JUSP-NS100	Mechatrolink	5.59 (142)	4.5 (114.5)	0.79 (20)	5.08 (129)	0.44 (0.2)
JUSP-NS300	Indexer with DeviceNet™					
JUSP-NS310	Indexer with DeviceNet™	5.67 (144)	4.47 (113.5)		5.24 (133)**	0.7 (0.32)
JUSP-NS500	Profibus	5.59 (142)	4.5 (114.5)		5.08 (129)	0.44 (0.2)
JUSP-NS600	Indexer					
JUSP-FC100	Full Closed Loop					
MP940	Single Axis Control			1.22 (31)***		0.89 (0.40)

* Option card only.

** Add 0.75in (19mm) to front end of card for micro connector.

*** Add approx. 0.75in (19mm) for optional back-up battery.

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