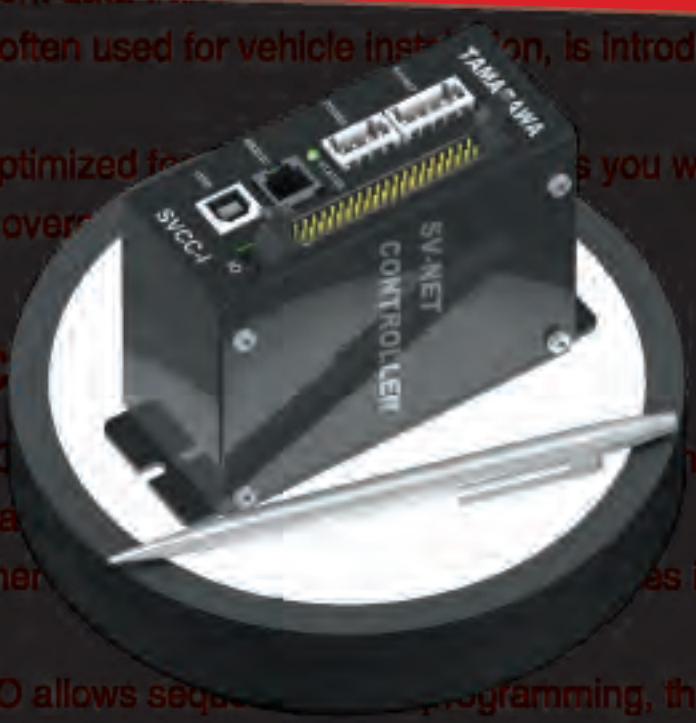
New Network Servo System



SV-NET

Tamagawa TAMAGAWA SEIKI CO., LTD.

Network Servo

Making your small-scale system even more compact !

A debut of an agile network motion control providing up to 8-axis simultaneous control

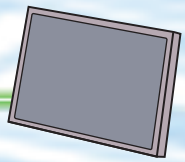
SV-NET, an original network system based on Controller Area Network (CAN)(in-vehicle LAN type), realizes total compactness for your small-scale systems.
With motors incorporating an almost trouble-free and capable sensor you can set up a simple, compact and highly reliable network servo system only Tamagawa can offer.

Compact

Reliability

PC

USB connection



Touch panel (to be developed)
[Recommended model : VT-2 (Keyence),
GOT-10 (Mitsubishi)]

Controller

Handy terminal (to be developed)

Driver

TBL-V Series motor

TBL-i Ⅱ Series motor

System

A novel proposition for compact network servos

Answers to your questions :
SV-NET motion controller network

Simple

Isn't your current system too large ?

- Compact system priced reasonably
- Compact size and volume
- Compact system of sequencer-less configuration
- Compact system offering a rich variety of commands

Isn't your motor prone to troubles ?

- A tough sensor nearly free from troubles
- Resolvers having proven its performance on vehicles, incorporated as the sensor
- Resolvers' MTBF being 1 million hours

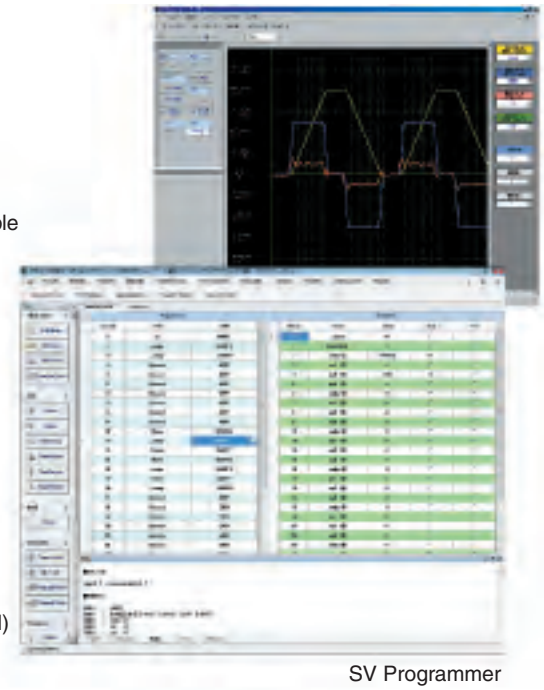
Don't you want to reduce the number of cables ?

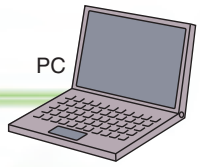
- Network system designed to reduce amount of wiring

Compact
Reliability
Simple

Controller

Dedicated programming software
Offered free of charge : Free upgrading possible



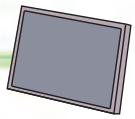


PC

USB connection

"Control tower" for servo control
(Standard I/O 32/64)

Control power :
24VDC



RS-232C

Controller

Touch panel (to be developed)
[Recommended model :
VT-2 (Keyence),
GOT-10 (Mitsubishi)]

SV Programmer

Handy terminal
(to be developed)

Driver

motor

Driver

Driver

Driver

Max. 8 axes connectable

- 8-axis synchronous control
- S-curve / trapezoidal acceleration and deceleration control
- Linear / circular interpolation
- Pass motions
- 8 user tasks

Applications

- Small to medium-size X-Y tables
- Belt conveyor units
- Handling units between equipments
- Automatic drilling and tapping machines
- Packing and packaging machines
- Food processing machines
- Automatic sorting machines
- Measuring and inspection systems
- Robots
- Textile and sewing machines
- AGV systems, automatic warehousing, etc.

TBL-i II Series

For the users who are planning "heavy-duty applications" for AC servo motors

- Heavy-load applications
- Z-axis applications
- IP 65 demanding applications

High-accuracy resolver mounted.
A rich lineup with options of speed reducer, brake, etc.

Applications

- Multiaxis robots
- Physical distribution machinery
- Food and packaging machinery
- Measuring equipment and the like
- Training equipment, medical and healthcare equipment

Optimal for speed control of equipment with simple positioning and large load torque variation

TBL-V Series

For users who desire faster motion than with stepping motors

- Light-load applications
- Flanges of the same size as stepping motors

VR resolver mounted

Applications

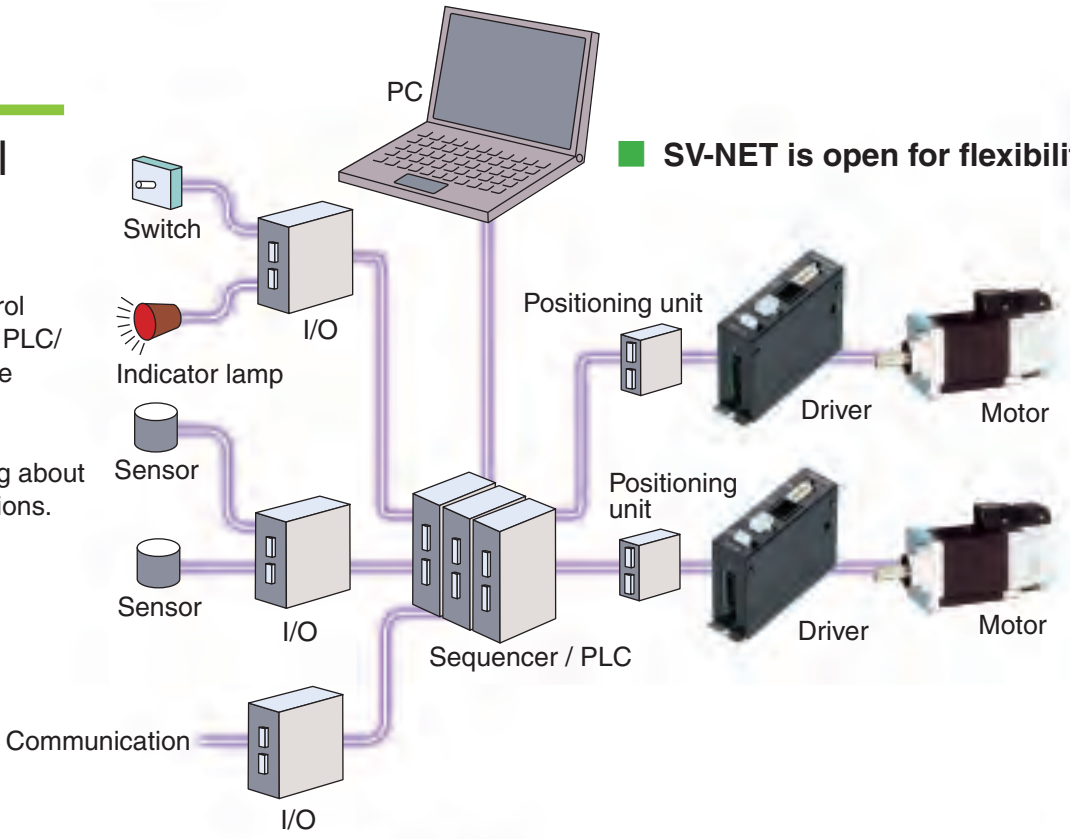
- Weaving machines, embroidering machines
- Conveyance equipment, packaging equipment
- Uniaxial actuators
- Pumping equipment
- XY table / bench machine tools, etc.

Optimal for simple positioning and speed control applications

Servo System Configuration

Conventional System

Conventional motion control systems centered around PLC/ sequencers require a large number of units.
Thus the users have to take the trouble of learning about their functions and operations.



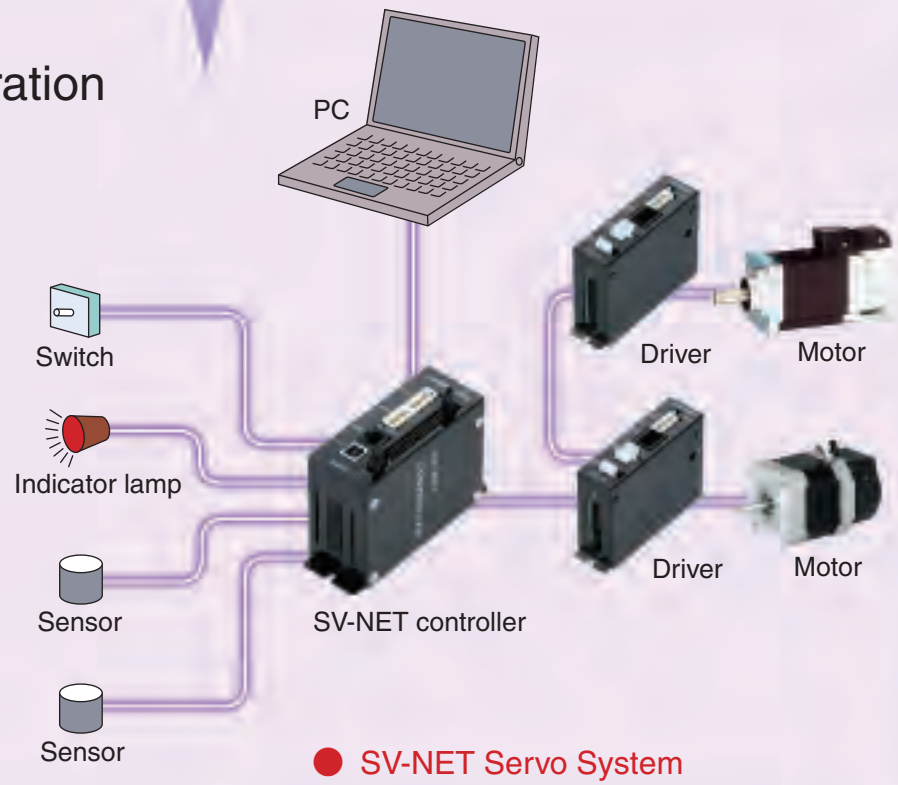
SV-NET is open for flexibility

SV-NET reduces components

SV-NET also works under RS-232C

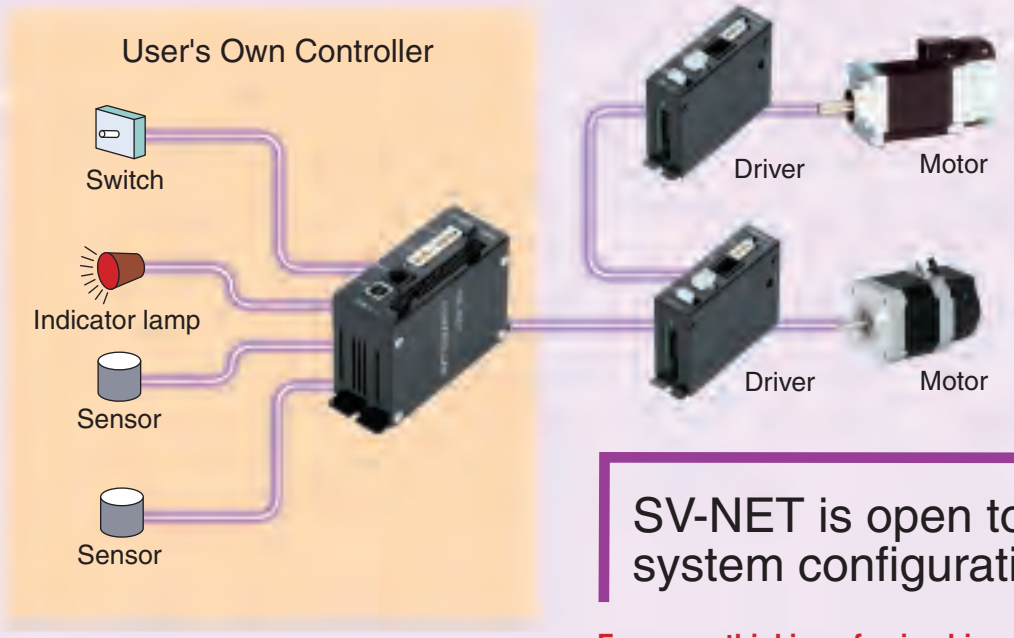
SV-NET Servo System Configuration

The SV-NET servo system employs a controller with standard I/O interfaces and network commands. With high-performance drivers and rich motor variation, you can structure a simple yet highly functional motion control system. The SV-NET not only provides optimal performance and function to small to medium-size systems but also helps reduce overall cost reduction.



● SV-NET Servo System

Servo System

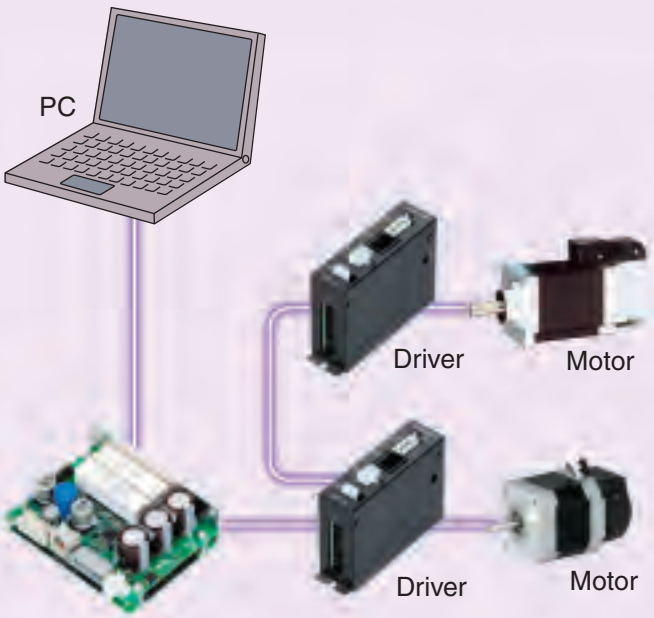


● SV-NET Servo System

SV-NET is open to customized system configuration

For users thinking of using his own host controller
SV-NET, using a CAN in the physical layer, provides a network featuring excellent general-purpose properties. Any customer who already has a host controller for CAN or is now developing one can use this system quite easily.

Note : Communication specifications are disclosed under a separate agreement.



Communication unit or
Regenerative communication unit

● SV-NET Servo System

Simple motion control by RS232C communication

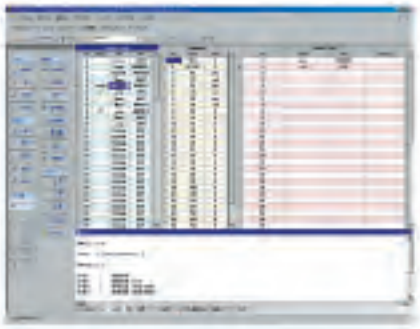
In applications where high speed and complex motions are not primary requirements and multiaxial synchronous control is not necessary, SV-NET drivers can be controlled via RS232C serial data communication.
PC application software "Master of SV-NET II" helps you to check and simulate simple motions, and to manage system and motion parameters.

Note : Communication specifications are disclosed under a separate agreement.

Product Lineup

SV-NET Controller

	TA8440 series	
Model	SVCC-I	SVCC-II
Appearance		
Supply voltage	DC24V	
I/O points	32	64
Page	11〜12	

	SV Programmer
Model	Programming software
Appearance	 Free of charge (Download from our website)
Page	13〜14

SV-NET Driver

		TA8410 series	TA8411 series					
Appearance								
Combination motor series		TBL-iⅡ / TBL-V	TBL-iⅡ / TBL-V					
Combination motor output		〜200W	〜100W	〜200W	〜400W	〜200W	〜400W	〜750W
Control power source		DC24V	DC24V					
Drive power source		DC24V/48V	AC100V			AC200V		
Communication specifications		SV-NET	SV-NET					
External connection I/O		○	○					
Angle sensor	Resolver	○	○					
	Encoder	○	○					
Regenerative capability		×	○					
Dynamic brake		×	○					
Mechanical brake output		○	○					
Page		15〜18	19〜22					

SV-NET Related Products

	Regenerative communication unit	Communication unit	Master of SV-NETII	Power supply unit	SV-NET training pack
Model	TA8413	TA8433	Software	TA8430	TA8425
Related equipment	TA8410 series	All SV-NET drivers	All SV-NET drivers	TA8420 series	———
Function	Regen. com. function for DC24V/DC48V units	SV-NET com. Function	Programming tool	DC288V 4-axis power + Regen. Function	Controller + 3 sets of motors & drivers
Page	25	25	26	23	26

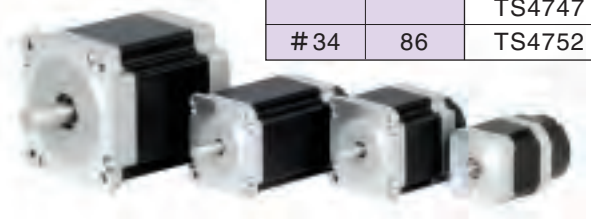
AC Servo Motor

TBL-i Ⅱ Series

Mounting flange [mm]	Model	Output [W]	Driver supply voltage [V]	Page
□40	TS4601	30	DC24, DC48, AC100, AC200	27～34
	TS4602	50	DC24, DC48, AC100, AC200	
	TS4603	100	DC24, DC48, AC100, AC200	
□60	TS4606	100	DC24, DC48, AC100, AC200	
	TS4607	200	(DC24), DC48, AC100, AC200	
	TS4609	400	AC100, AC200	
□80	TS4611	200	AC100,AC200	
	TS4612	400	AC200	
	TS4613	600	AC200	
	TS4614	750	AC200	

TBL-V Series

Mounting flange [inch]	Mounting flange [mm]	Model	Output [W]	Driver supply voltage [V]	Page
#17	42	TS4742	50	DC24, DC48, AC100, AC200	35～36
#23	56.4	TS4746	100	(DC24), DC48, AC100, AC200	
		TS4747	200	(DC24), DC48, AC100, AC200	
#34	86	TS4752	400	(AC100), AC200	



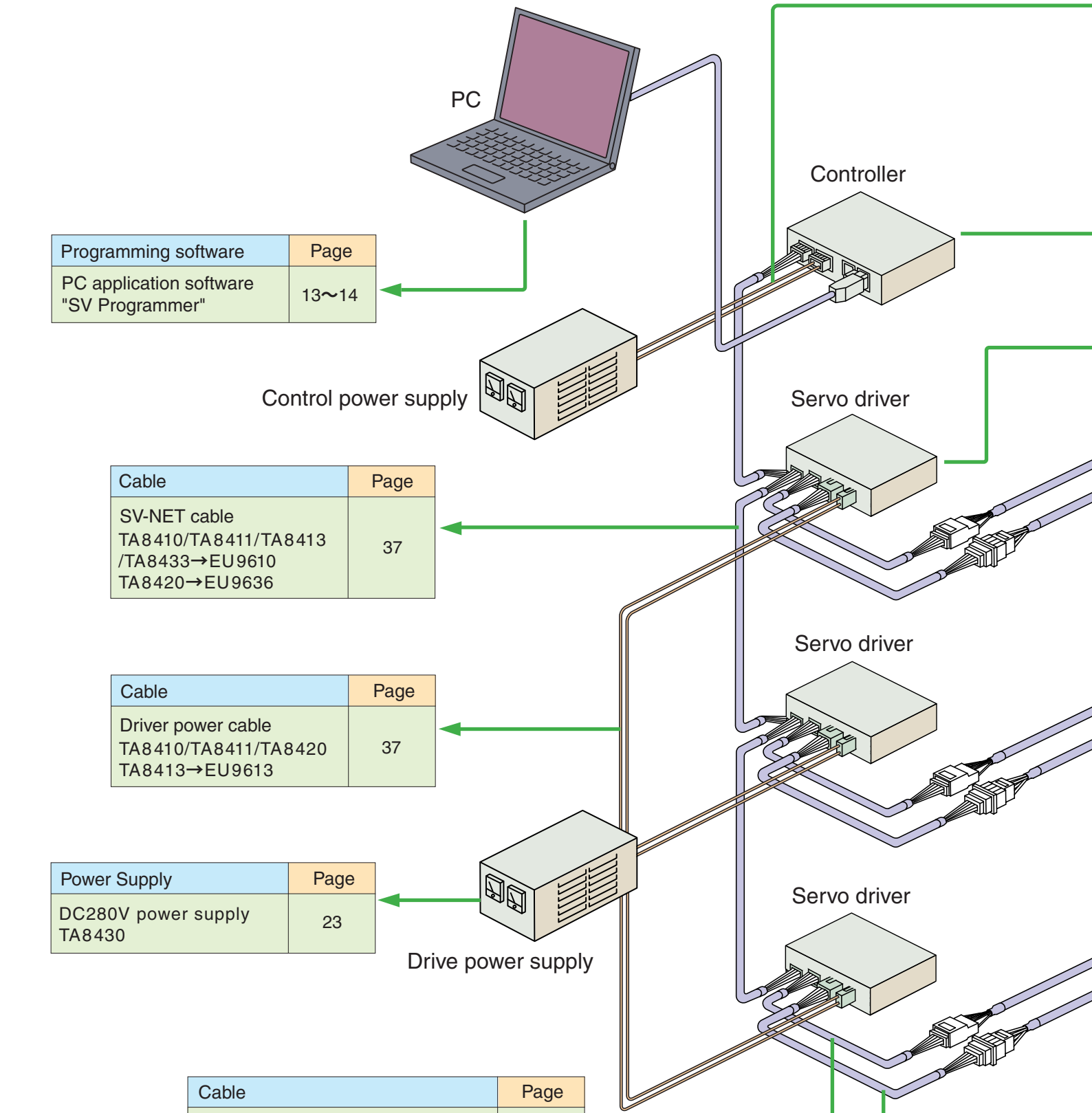
Cables & Accessories

Product type	Model	Related equipment	Page
Controller power cable	EU9611	TA8440	37～38
SV-NET cable	EU9610	TA8440 / TA8410 / TA8411 / TA8413 / TA8433	
	EU9636	TA8420	
Driver power cable	EU9613	TA8410 / TA8411 / TA8420 / TA8413	
Serial communication cable	EU6517	TA8440 (for upgrading firmware), TA8413 / TA8433	
Motor cable	EU9614	Combination of TA8410 / TA8420 and motor TBL-i Ⅱ series	
	EU9621	Combination of TA8410 / TA8420 and motor TBL-i Vseries	
	EU9635	Combination of TA8411and motor TBL-i Ⅱ series	
	EU9638	Combination of TA8411and motor TBL-i V series	
Sensor cable	EU9615	Combination of TA8410 / TA8411 and motor TBL-i Ⅱ series	
	EU9622	Combination of TA8410 / TA8411 and motor TBL-i V series	
	EU9645	Combination of TA8420 and motor TBL-i V series	
	EU9646	Combination of TA8420 and motor TBL-i Ⅱ series	

Product type	Model	Related equipment
SV-NET terminating resistor unit	EU9637	For TA8420

※Cable length can be specified by "N-number" in 10cm unit. (except for EU6517 : in 1m unit)

Product Categories



Programming software	Page
PC application software "SV Programmer"	13〜14

Cable	Page
SV-NET cable TA8410/TA8411/TA8413 /TA8433→EU9610 TA8420→EU9636	37

Cable	Page
Driver power cable TA8410/TA8411/TA8420 TA8413→EU9613	37

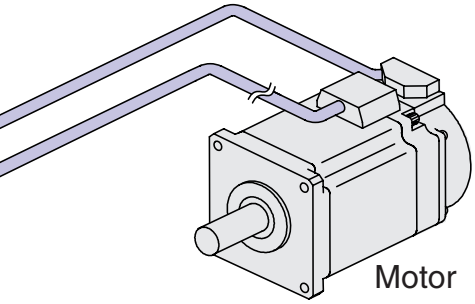
Power Supply	Page
DC280V power supply TA8430	23

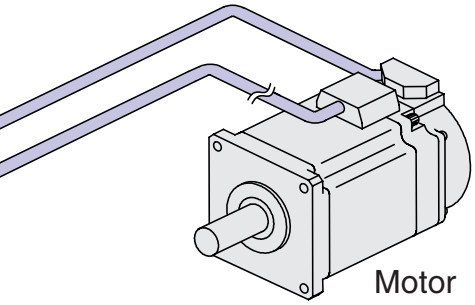
Cable	Page
Sensor Cable TA8410/TA8411 →EU9615 (for TBL-iⅡconnection) TA8410/TA8411 →EU9622 (for TBL-V connection) TA8420 →EU9645 (for TBL-V connection) TA8420 →EU9646 (for TBL-iⅡconnection)	38

Cable	Page
Controller power cable TA8440 series →EU9611	37

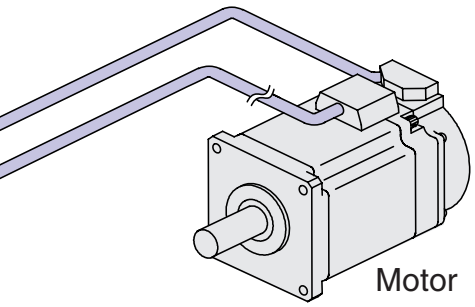
Controller	Page
SV-NET controller TA8440 series SVCC-I/SVCC-II	11～12

Servo driver	Page
SV-NET driver DC24/48V ～200W TA8410 series AC100/200V ～750W TA8411 series DC280～320V 750/400W TA8420 series	15～24





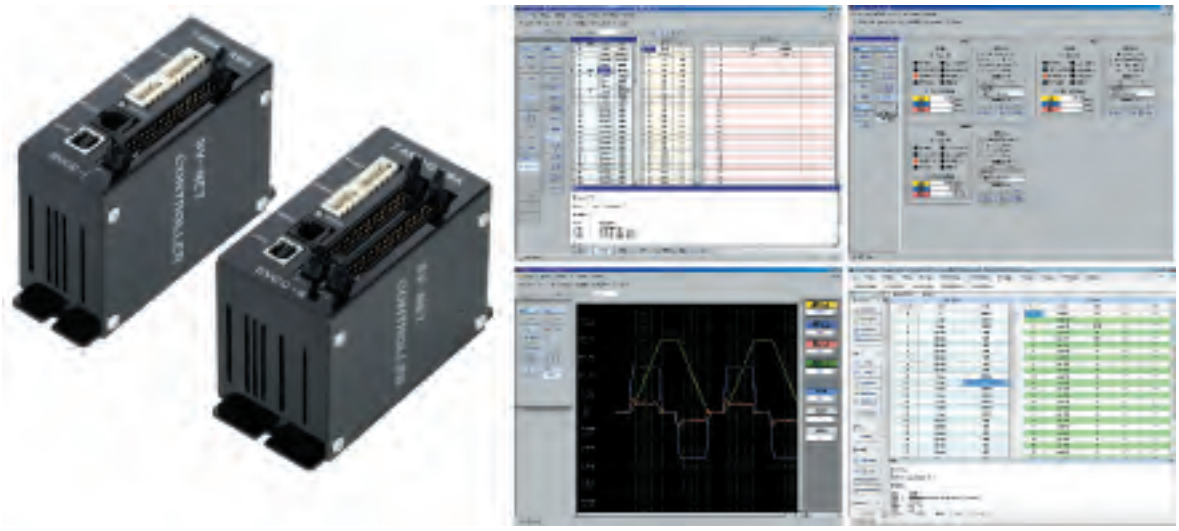
AC servo motor	Page
TBL-iⅡ series □40 30W TS4601 □40 50W TS4602 □40 100W TS4603 □60 100W TS4606 □60 200W TS4607 □60 400W TS4609 □80 200W TS4611 □80 400W TS4612 □80 600W TS4613 □80 750W TS4614	27～34
TBL-V series #17 50W TS4742 #23 100W TS4746 #23 200W TS4747 #34 400W TS4752	35～36



Cable	Page
Motor Cable TA8410/TA8420 →EU9614 (for TBL-iⅡconnection) TA8410/TA8420 →EU9621 (for TBL-V connection) TA8411 →EU9635 (for TBL-iⅡconnection) TA8411 →EU9638 (for TBL-V connection)	38

Compact
Reliability
Simple

SV-NET Controller TA8440



SV-NET Controller "TA8440" and PC Software "SV Programmer" being the Mainstay of your Motion Control System

USB

Easy USB connection to PC.

Control power (DC24V)

Control power is supplied from the controller to all the drivers via SV-NET cables.

Max. 8-axis control

Up to 8 axes controllable. Also synchronous operation for 8 axes. Linear interpolation (8 axes), circular interpolation (2 axes)

Stand-alone operation

The system can operate on a prepared program without connecting PC.
Flexible system structuring possible by various I/O combinations.

I/O interfaces up to 64 points

16 input points/16 output points : Total 32 points (SVCC-I)
32 input points/32 output points : Total 64 points (SVCC-II)

Main functions of TA8440

- SV-NET port ×1
- USB port ×1
- Power supply DC24V
- I／O 32 or 64 points
- Stand-alone operation
- Max. connectable axes : 8
- 8-axis synchronous operation
- Program memory capacity 640 KB
- Interpolation cycle 4 ms
- Transmission cycle 2 ms

PC application

- SV Programmer (programming software)

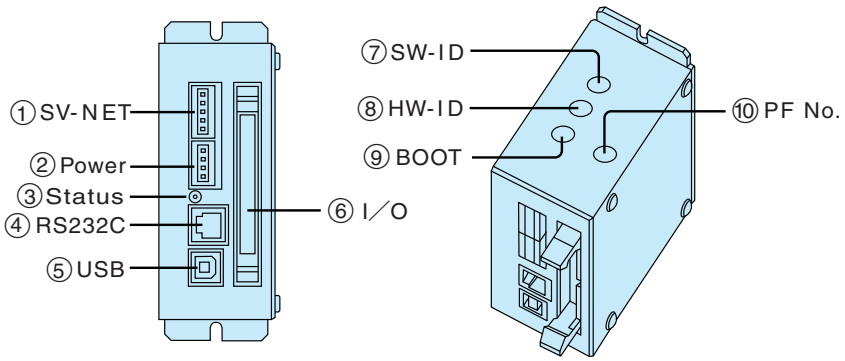
  You can download the programming software from the following website free of charge :

  http : //sv-net.tamagawa-seiki.com

Accessories

- USB cable (for PC connection)

Names of TA8440 parts



① SV-NET : CAN Connector
② Power : Power input connector
③ Status : LED
④ RS232C : For upgrading firmware
⑤ USB : For PC connection
⑥ I／O : Connector
⑦ SW-ID : Set at factory
⑧ HW-ID : Set at factory
⑨ BOOT : Used for upgrading firmware
⑩ PF No. : Set at factory

TA8440 Model Designation

T A 8 4 4 0 N □ □ □ □ E □ □ □

Product type	Cover color	Other option	Software specification
10 : SVCC-I 20 : SVCC-I	0 : Black (standard) 1 : Black (standard) 2 : Red 3 : Silver 4 : Green 5 : Blue 6 : White	0 : Standard	100 : Standard

TA8440 Basic Specifications

Unit specifications

■ **Power input**
DC24V±10%
Current consumption 0.3A Max.

■ **SV-NET**
Number of ports ×1
Communication protocol SV-NET
Physical layer : CAN
Control power output DC24V

■ **USB**
Number of ports ×1 for PC connection

■ **I／O**
1 port 32 points (16 input points, 16 output points)
SVCC-I ×1 port
SVCC-II ×2 ports

■ **Program memory capacity** 640 KB

Motion control specifications

■ **Number of control axes** : 8

■ **Transmission cycle** : 4ms

Software

■ **PC application**
SV Programmer

Environmental specifications

■ **Operation environment** 0～40℃ 90%RH Max.
No condensation

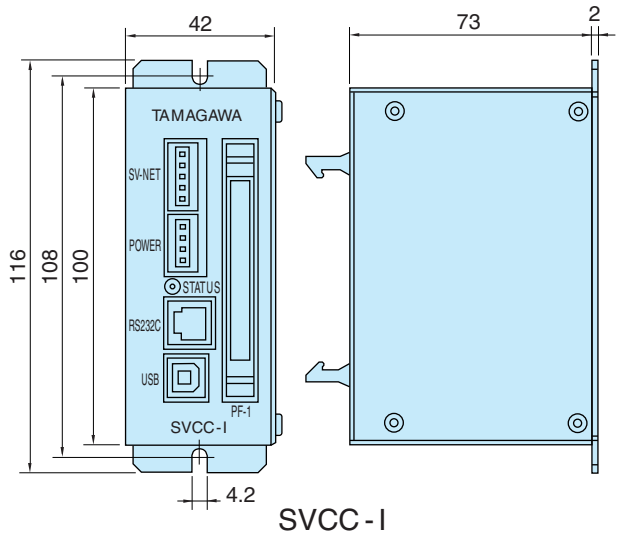
■ **Storage temperature** −10～85℃

■ **Applicable standard** RoHS Directive

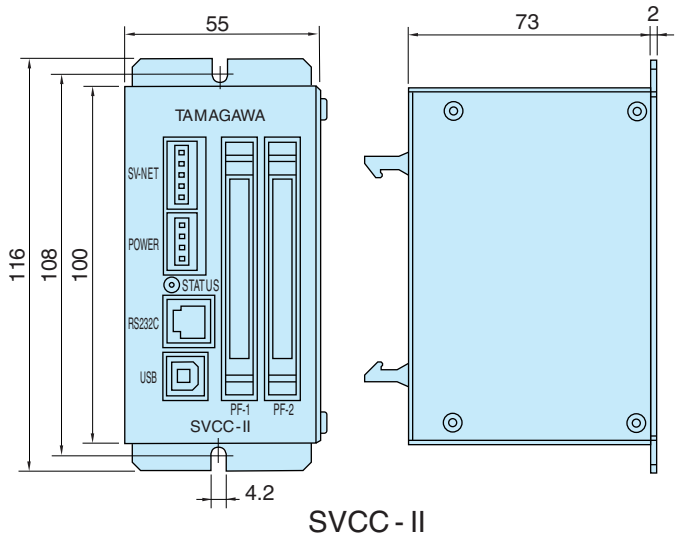
Accessories

■ **USB cable** (for PC connection)

■ **SV Programmer**
Installation CD for a charge is available.
Free download is available from web site.
http : //sv-net.tamagawa-seiki.com

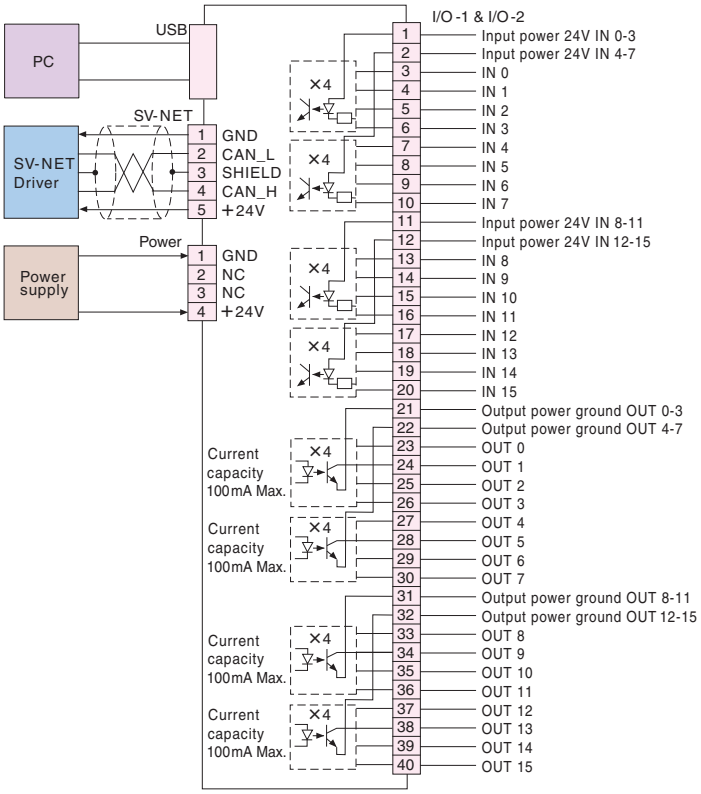


SVCC-I



SVCC-II

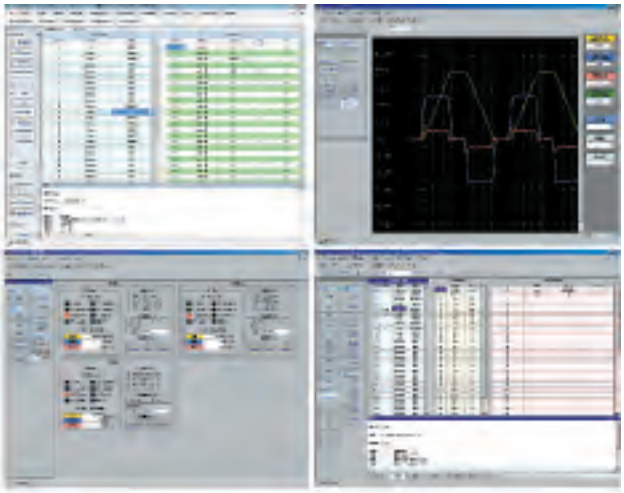
External Connection Diagram



Compact
Reliability
Simple

SV Programmer

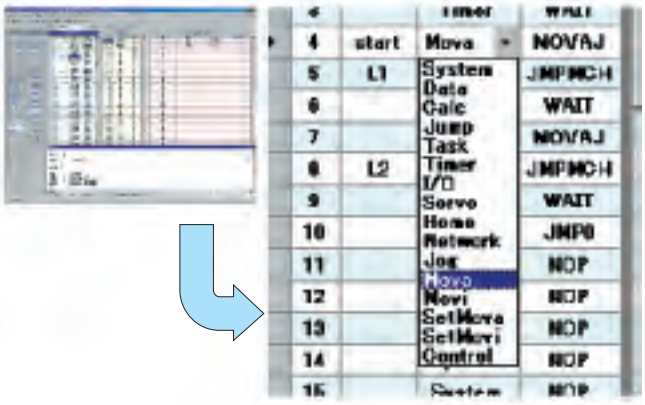
Programming	Servo monitor
Jog operation	Parameter management



Up-to-date programming with a rich supply of commands realizing a speedy and flexible system development for you !

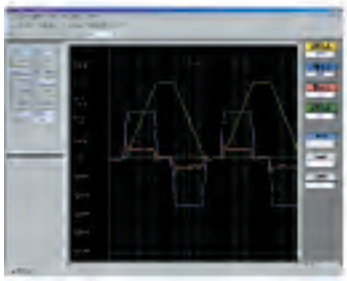
Programming tool "Program Grid"

Programming is done in Tamagawa's original language.
That is, you select a command from the pull-down menu in each step and enter an argument in correspondence to the command.
The up-to-date programming is quite easy.



"Servo Monitor" for graphical view of operation

Positions, speeds, and currents are logged and displayed in graphs.
Axes of the graphs are scalable as you like.



"Jog Operation" for trial run

Constant speed operation or step operation can be performed for each individual axis.
In JOG operation, you can operate the motor without programming, just by selecting menu.

Main Functions of SV Programmer

■ **Program Grid**
- Tamagawa's original language
- Max. 5000 steps
- Program memory capacity 640 KB
- Variables capacity 32KB

■ **Jog operation**
- Constant speed operation and step operation possible
- Override function usable

■ **Servo monitor function**
- Monitored items : Position, speed, and feedback current
- Time axis and measurement axis scale changeable

■ **Device setup**
- Device (driver) parameter management
- Display in list or in category
- Changing and saving parameters
- Upload/Download, storage, printing, etc. of parameter data

■ **Controller setup**
- Parameter information management for SV-NET controller
- Display in list or in category
- Changing and saving parameters
- Upload/Download, storage, printing, etc. of parameter data

"Device Setup" for collective parameter management

The parameters for the connected devices (drivers) can be managed collectively.
The parameter settings can be loaded, stored, and printed. The category display facilitates adjustments with its easy-to-understand display of parameters such as control modes, servo commands, and servo gains.

Unique programming commands

■The user can customize the acceleration /deceleration pattern, using composite commands. In addition to movement patterns, such as trapezoidal and S-curve patterns, you can create your own acceleration / deceleration patterns optimum for the system.

■Monitor commands for checking status of the controller or drivers set specified data in variables. You can use these variables in the program to make the motion so flexible.

■Use of indirect reference to variables enhances the efficiency of programming.
You can accomplish a speedy system development.

Basic Specifications

■ PC environment

Applicable model	PC/AT compatible machine
Applicable OS	Windows 2000, XP, Vista
Necessary memory	256MB Min.
Hard disk	500MB Min.

■ USB

USB 2.0 Full Speed

■ Programming specifications

Language	Tamagawa's original language
Program capacity	640KB
Program steps	Max. 5000 steps
User tasks	Max. 8 tasks
Variables capacity	32KB
Variables type	32-Bit signed integer (−2147483648〜2147483647)
Arithmetic operation	Substitution, unary, addition, subtraction, multiplication, division, remainder
Logical operation	Logical inversion, logical multiplication (AND), logical addition (OR), exclusive OR, logical shift
Jump instructions	Unconditional jump, unary, AND, equality sign, inequality sign, less or equal, more or equal, small, large
Subroutines	Call instruction available

■ Motion control specifications

Number of control axes	Max. 8
Transmission cycle	2ms
Interpolation cycle	4ms
Interpolation function	Linear interpolation (8axes)／Circular interpolation (2axes)
Control system	Position control, speed control, current control
Compensation function	Electronic gear
Command units	mm/deg (in position control)
Acceleration/deceleration	S-curve and trapezoidal control
Home position return function	
Jog operation	
Override function	
SV-NET	1 system

Compact
Reliability
Simple

SV-NET Driver TA8410 Series

AC Servo Drivers running on 24V/48VDC and max. 200W Powerful functions within a compact body !

SV-NET in daisy chain

Daisy chain connection minimizes wiring requirement.

Powerful functions

The functions packed into the small framework facilitate not only network connection, but also easy external signal inputs such as pulse commands or analog commands through the use of an I/O connector.
The extension board built-in type SVD-DW has add-on functions, which can interface with A/B/Z outputs and encoder as well.

Resolver

The standard brushless resolver is employed as a high-reliability angle sensor.

Compatible with a variety of encoders

The drivers interface not only with the resolver but also with various encoders.
(SVD-DW with built-in extension board only)

Drive power DC24/48V

Main Functions of TA8410

■ **Control commands**

Position command input SV-NET/pulse command
Speed command input SV-NET/analog command
Current command input SV-NET/analog command

■ **Parameter setting functions**

Control mode, Position loop gain, Speed loop gain, Speed integration gain,
Feed forward, Resonance control filter, Analog command scale setting, Electronic gear setting, Smoothing, Acceleration limit, etc.

■ **Protective functions**

Sensor error, Drive power error,
Over-heat, Over-speed, Overload,
Excessive deviation, etc.

■ **Applicable sensors**

Brushless resolver (Smartsyn/Singlsyn)
Encoder 17BIT-INC/ABS (SVD-DW only)
Encoder Minimal wiring incremental (SVD-DW only)

■ **Input and output signals**

Servo ON input, Alarm reset input, Alarm output, In-the-position output, A/B/Z output
(SVD-DW with built-in extension board only), etc.

Product & Accessories

■TA8410 unit only

TA8410 Model Designation

TA8410 N □○○○ E □ ◇◇

Software specifications
100～：See list of motor-driver combinations.

Sensor specifications
N1 * * * E5 * * ：2048 C/T
Minimal wiring incremental (∗1)
N3 * * * E6 * * ：17 BIT-ABS (∗1)
N3 * * * E7 * * ：17 BIT-INC (∗1)
N7 * * * E1 * * / E2 * * ：Brushless resolver
(Singlsyn/Smartsyn)
(∗1) SVD-DW type

I/O specifications, etc.
0：I/O I/F absent (standard, network connection only)
1：I/O I/F present (right angle type/with lock)
2：I/O I/F present (straight type/with lock) (∗2)
3：I/O I/F present (right angle type/without lock)
4：Extension board (open collector output)＋I/O I/F absent (∗3)
5：Extension board (open collector output)
＋ I/O I/F present (right angle/with lock) (∗3)
6：Extension board (open collector output)
＋ I/O I/F present (right angle/without lock) (∗3)
7：Extension board (line driver output)＋I/O I/F absent (∗3)
8：Extension board (line driver output)
＋ I/O I/F present (right angle/with lock) (∗3)
9：Extension board (line driver output)
＋ I/O I/F present (right angle/without lock) (∗3)
(∗2) Setting possible for open frame type only
(∗3) SVD-DW type

Casing specifications, etc.
1：Covered type (BLACK：standard)
2： 〃 (RED)
3： 〃 (SILVER)
4： 〃 (GREEN)
5： 〃 (BLUE)
6： 〃 (WHITE)

※…… 0 as per separate product specifications
0：Open frame

Continuous rating output current specifications
3：4 Arms (12 Arms Max.)
5：8 Arms (24 Arms Max.)

Basic model
TA8410 (low-voltage drive) series

Basic Specifications

Item	TA8410 series		
Control power voltage ※1	DC24V ±10%		
Drive power voltage ※1	DC24～48V ±10%		
Control power current	0.1 A		
Drive power capacity	As per motor combination		
Communication specifications	Communication protocol：SV-NET Physical layer：CAN		
Sensor	Brushless resolver (Singlsyn/Smartsyn)	17BIT-ABS/ 17BIT-INC	Min.wiring incremental encoder
Driver internal resolution	2048 (1/rev)	2^{17} (1/rev)	2048 (1/rev)
Combination motors	TBL-V series ／ TBL-iⅡ series		
Combination motor output [W]	～200W		
Operating temperature range	0～＋40℃		
Storage temperature range	−10～＋85℃		
Operating humidity	90%RH Max. (no condensation)		
Definition of rotating direction	CW rotation as viewed from motor shaft end : Forward rotation ※2		
Recommended load inertia	30 times the motor inertia Max.		
Mass	Approx. 0.3kg		
Directive	Complying with RoHS Directive		

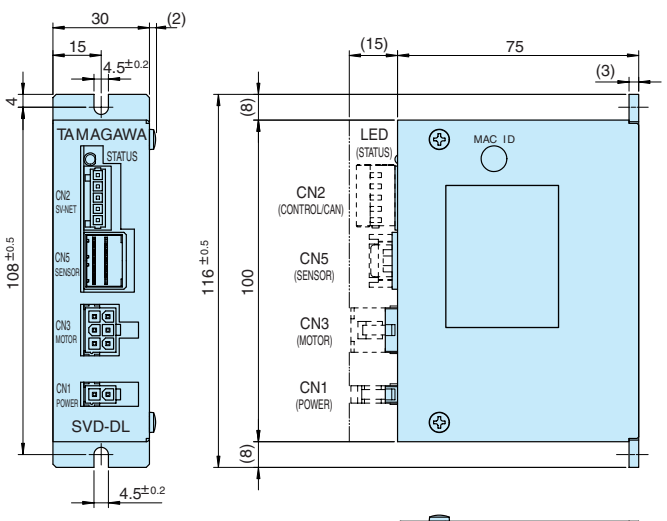
※1…Do not use the same power supply for the control power and the drive power (when the drive power is DC24V). Otherwise, troubles may occur. When the use of the same power supply is inevitable, take precautions, such as inserting a diode, so that the voltage variation on the drive power side may not adversely affect the control power side.
※2…Definition of rotating direction can be changed by parameter.

Control Specifications

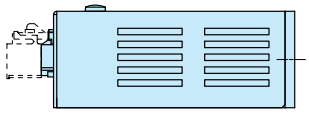
Control specifications	As per separate communication specifications
Baud rate	1 Mbps (factory set value : changeable by parameter)
MAC ID	31 (factory set value : changeable by rotary SW or by parameter)

External View & Dimensions

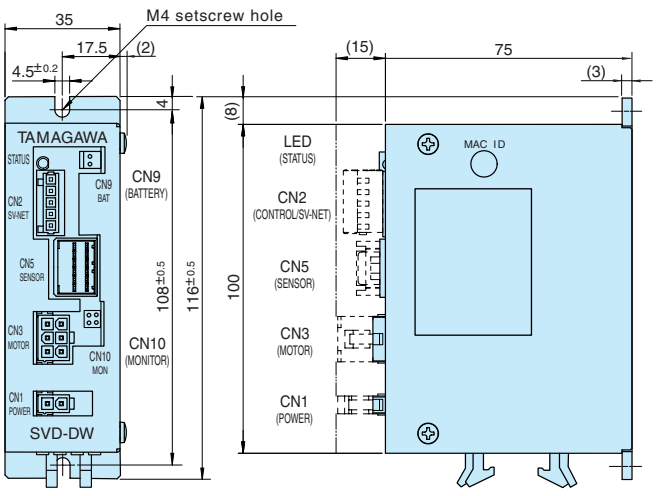
SVD-DL



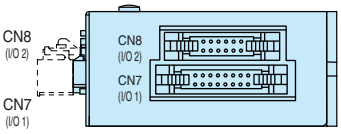
Resolver type



SVD-DW



Built-in extension board type
Resolver type
Encoder 17Bit ABS/INC
Encoder 2048C/T INC



Compact
Reliability Simple

Connection

CN1 (main power)

Connector for supplying main power (drive power).

CN1 Pin number

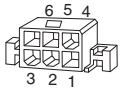
●Header：5569-02A1 (MOLEX)

PIN No.	FUNCTION
1	GND(main)
2	DC24V/DC48V(main)

Mating connector (not supplied as accessory)
• Receptacle housing：5557-02R (MOLEX)
• Terminal ：5556-TL (MOLEX)

CN3 (motor connection)

Connector for connecting motor cable



CN3 Pin number

●Header：5569-06A1 (MOLEX)

PIN No.	FUNCTION
	Standard
1	U
2	V
3	W
4	F • G
5	(BK)……motors with brake only
6	(BK)……motors with brake only

Mating connector (not supplied as accessory)
• Receptacle housing：5557-06R (MOLEX)
• Terminal ：5556-TL (MOLEX)

CN7 (I/O connection)

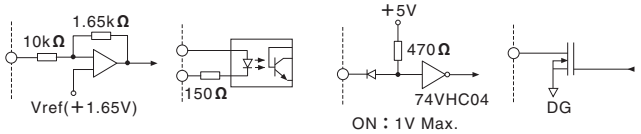
Connectors for connecting I/O input/output signals.
Connector types vary depending on "N-number."

●N＊＊＊1 header：HIF3BA-16PA-2.54DS (HIROSE)…right angle, with lock
●N＊＊＊2 header：HIF3BA-16PA-2.54DSA (HIROSE)…straight, with lock
●N＊＊＊3 header：HIF3F-16PA-2.54DS (HIROSE)…right angle, without lock

PIN No.	I/O	FUNCTION	
1		GND	
2	A-In	AIN (Analog command input)	See Fig. ①
3	D-In	Reverse-PLS＋ (Reverse command pulse input＋)	See Fig. ②
4	D-In	Reverse-PLS－ (Reverse command pulse input－)	
5	D-In	Forward-PLS＋ (Forward command pulse input＋)	
6	D-In	Forward-PLS－ (Forward command pulse input－)	
7		GND	
8	D-In	AUX (Auxiliary)	See Fig. ③
9	D-In	C-RST (Counter reset input)	
10	D-In	RST (Reset input)	
11	D-In	Reverse-LMT (Reverse drive disable input)	
12	D-In	Forward-LMT (Forward drive disable input)	
13	D-In	SVON (Servo ON input)	
14	D-In	INP (In-the-position signal output)	See Fig. ④
15	D-Out	ALM (Alarm signal output)	
16		＋24V	

※「A-In」：Analog signal input,「D-In」：Signal input,「D-Out」：Digital signal output

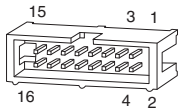
① Analog signal input — MCP604 equivalent
② Digital signal input — TLP112A equivalent
③ Digital signal input — 1SS388 equivalent
④ Digital signal output — SSM5N15FE equivalent



I/O internal circuit

ON：1V Max.
OFF：open or 3.5V Min.
(Reverse voltage of diode : 40V)

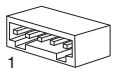
※Mating connector (to be prepared by users)
• Socket：HIF3BA-16D-2.54R (HIROSE)



CN7 Pin number

CN2 (control signal)

Connector for connecting control power (DC24V) and communication (CAN). Even when communication (CAN) is not used, be sure to input control power (DC24V) between PIN 1 and PIN 5 of the CN2.



CN2 Pin number

●Header：734-165 (WAGO)

PIN No.	FUNCTION
1	GND (control)
2	CAN L (－)
3	GND (SHIELD)
4	CAN H (＋)
5	DC24V (control)

Mating connector (not supplied as accessory)
• Connector plug：734-105 (WAGO)

CN5 (sensor connection)

Connector for connecting sensor cable

●Tab header：1376020-1 (Tyco Electronics AMP)

PIN No.	FUNCTION		
	Min. wiring	17BIT-ABS/INC	Resolver
A1	A	－	S2 (output)
B1	A/	－	S4 (output)
A2	B	－	S1 (output)
B2	B/	－	S3 (output)
A3	Z	SD	R1 (excitation)
B3	Z/	SD/	R2 (excitation)
A4	－	VB	－
B4	－	GND-VB	－
A5	VCC	VCC	－
B5	GND	GND	－
A6	－	－	－
B6	GND (SHIELD)	GND (SHIELD)	GND (SHIELD)

Mating connector (not supplied as accessory)
• Receptacle housing：1-1318118-6 (Tyco Electronics AMP)
• Terminal ：1318108-1 (Tyco Electronics AMP)

CN8 (I/O connection) SVD-DW only

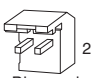
●Header：HIF3BAF-14PA-2.54DS (HIROSE)

PIN No.	I/O	FUNCTION	
1	D-Out	Open cnnector	Line driver
		LEAD	LEAD ＋
2	D-Out	NC	LEAD －
3	D-Out	LAG	LAG ＋
4	D-Out	NC	LAG －
5	D-Out	Z	Z＋
6	D-Out	NC	Z－
7		GND	
8		GND	
9	A-Out	Monitor output 1 (factory setting：motor current)	
10	A-Out	Monitor output 2 (factory setting：speed feedback)	
11		GND	
12		GND	
13		NC	
14		NC	

※「D-Out」：Digital signal output,「A-Out」：Analog signal output

CN9 (backup battery connection connector) SVD-DW only

※Used with 17B-ABS encoder only



CN9 Pin number

●Connector：IL-2P-S3FP2-1 (JAE)

PIN No.	FUNCTION
1	GND (－)
2	VB (＋)

Battery：ER17500VC (Toshiba Battery)

List of Motor / Driver Combinations

●TBL-V Series (E1◇◇)

DC24V system ／ DC48V system	
Motor model	Driver model to be combined
TS4742 (50W/50W-□42)	TA8410N∗5∗∗E111
TS4746 (98W/100W-□56.4)	TA8410N∗5∗∗E112
TS4747 (92W/200W-□56.4)	TA8410N∗5∗∗E113

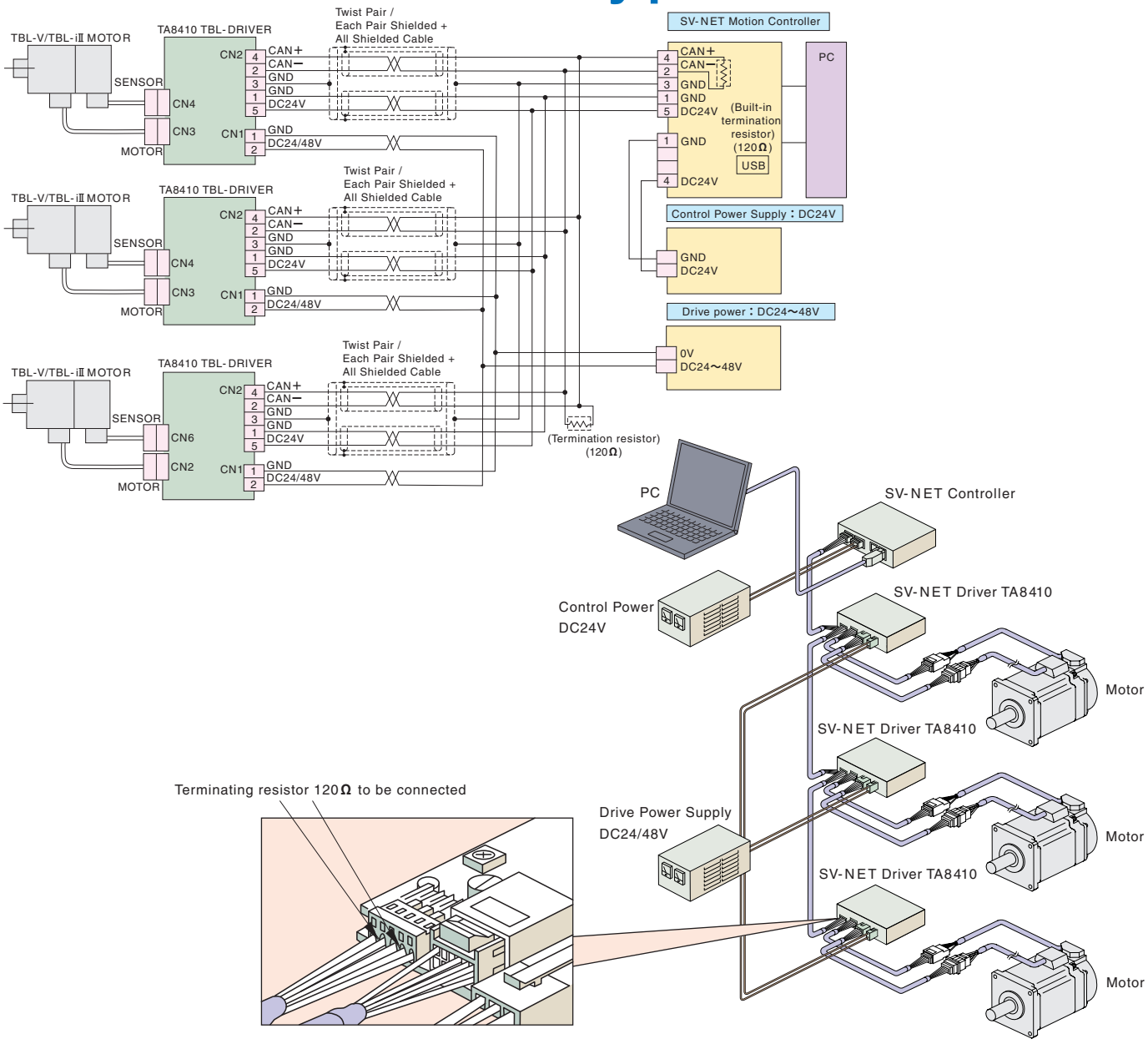
Note) TBL-V series employs the resolver (Singlsyn) only.

●TBL- iⅡ Series (E2◇◇)

DC24V system		DC48V system	
Motor model	Driver model to be combined	Motor model	Driver model to be combined
TS4601 (30W-□40)	TA8410N∗3∗∗E241	TS4601 (30W-□40)	TA8410N∗3∗∗E281
TS4602 (50W-□40)	TA8410N∗3∗∗E242	TS4602 (50W-□40)	TA8410N∗3∗∗E282
TS4603 (100W-□40)	TA8410N∗5∗∗E243	TS4603 (100W-□40)	TA8410N∗3∗∗E283
TS4606 (100W-□60)	TA8410N∗5∗∗E256	TS4606 (100W-□60)	TA8410N∗3∗∗E296
TS4607 (100W-□60)	TA8410N∗5∗∗E257	TS4607 (200W-□60)	TA8410N∗5∗∗E297

Compact Reliability Simple

System Configuration
DC24/48 Type



Compact
Reliability
Simple

SV-NET Driver TA8411 Series

AC Servo Drivers running on 100V/200VAC outputs up to 750W within a compact body.

SV-NET in daisy chain

The daisy chain connection minimizes wiring requirement.

Powerful functions

The functions packed into the small framework facilitate not only network connection, but also easy external signal inputs such as pulse commands or analog commands through the use of an I/O connector. It outputs A/B/Z signals and interfaces with encoders as well.

Resolver

Brushless resolver is used as the standard high-reliability angle sensor.

Compatible with a variety of encoders

The drivers are compatible not only with the resolver but also with various encoders.

Drive power AC100/200V

Single-phase, AC90~115V/AC180~253V, 50Hz/60Hz

Dynamic brake and regenerative circuit are built

Product & Accessories

■TA8411 unit only

TA8411 Model Designation

TA8411 N □○○○ E □◇◇

Software specifications
100～ : Standard specifications

Sensor specifications
N1 * * * E5 * * : 2048 C/T
Minimal wiring incremental
N3 * * * E6 * * : 17 BIT-ABS
N3 * * * E7 * * : 17 BIT- INC
N7 * * * E1 * * / E2 * * : Brushless resolver
(Singlsyn/Smartsyn)

Mechanical specifications, etc.
1 : Extension board (open collector output)
2 : Extension board (line driver output)

Casing specifications, etc.
1 : Covered type (BLACK : standard)
2 : 〃 (RED)
3 : 〃 (SILVER)
4 : 〃 (GREEN)
5 : 〃 (BLUE)
6 : 〃 (WHITE)

Input voltage / output current specifications
2 : AC100V ／ 2 Arms (6 Arms Max.)
3 : AC100V ／ 4 Arms (8 Arms Max.)
4 : AC100V ／ 6 Arms (12 Arms Max.)
6 : AC200V ／ 2 Arms (6 Arms Max.)
7 : AC200V ／ 4 Arms (8 Arms Max.)
8 : AC200V ／ 6 Arms (12 Arms Max.)

Basic model
TA8411 (high-voltage drive) series

Main Functions of TA8411

■ **Control commands**
Position command input SV-NET/pulse command
Speed command input SV-NET/analog command
Current command input SV-NET/analog command

■ **Parameter setting functions**
Control mode, Position loop gain, Speed loop gain,
Speed integration gain,
Feed forward, Resonance control filter, Analog command scale setting, Electronic gear setting,
Encoder output resolution setting, Acceleration limit, etc.

■ **Regenerative function** Built-in circuit

■ **Dynamic brake function** Built-in circuit

■ **Mechanical brake drive output** DC24V-0.4A Max.

■ **Protective functions**
Sensor error, Drive power error,
Over-heat, EEPROM error, Over-speed
Overload, Excessive deviation, etc.

■ **Applicable sensors**
Brushless resolver (Smartsyn/Singlsyn)
Encoder 17BIT-INC/ABS
Encoder Minimal wiring incremental

■ **Input and output signals**
Servo ON input, Alarm reset input, Alarm output,
In-the-position output, A/B/Z output
(built-in extension board type only), etc.

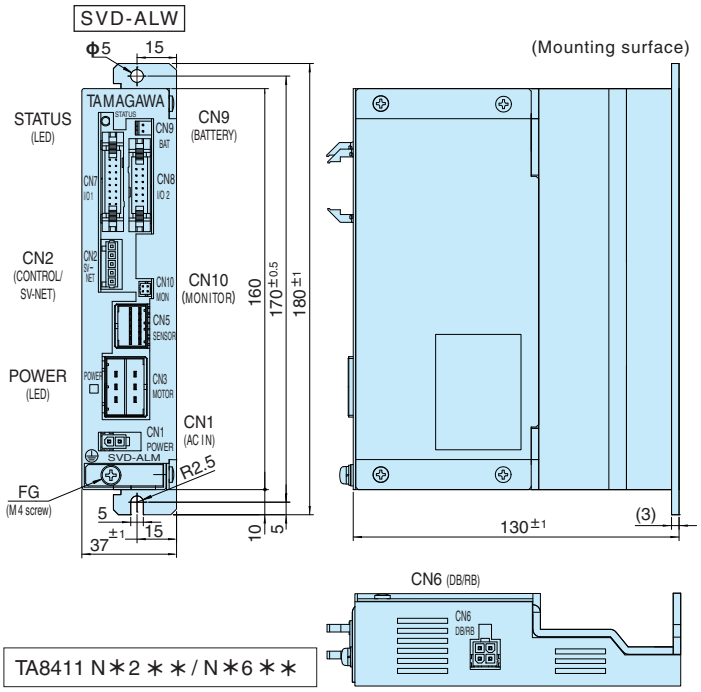
Basic Specifications

Item	TA8411 series		
Control power voltage	DC24V ±10%		
Drive power voltage	Single-phase, AC90～115V ／ AC180～253V 50/60 Hz		
Control power current	0.1 A (fan type：+0.1A / brake type：+0.4A)		
Drive power capacity	As per motor combination		
Communication specifications	Communication protocol：SV-NET Physical layer：CAN		
Sensor	Brushless resolver (Singlsyn/Smartsyn)	17BIT-ABS/ 17BIT-INC	Min. wiring incremental encoder
Driver internal resolution	2048 (1/rev)	2^{17} (1/rev)	2048 (1/rev)
Combination motor	TBL-V series ／ TBL-iⅡ series		
Combination motor output [W]	～400W (drive power AC100V) ～750W (drive power AC200V)		
Operating temperature range	0～+40℃		
Storage temperature range	−10～+85℃		
Operating humidity	90%RH Max. (no condensation)		
Definition of rotating direction	CW rotation as viewed from motor shaft end : Forward rotation		
Recommended load inertia	30 times the motor inertia Max.		
Mass	Approx. 0.6kg		
Directive	Complying with RoHS Directive		

Control Specifications

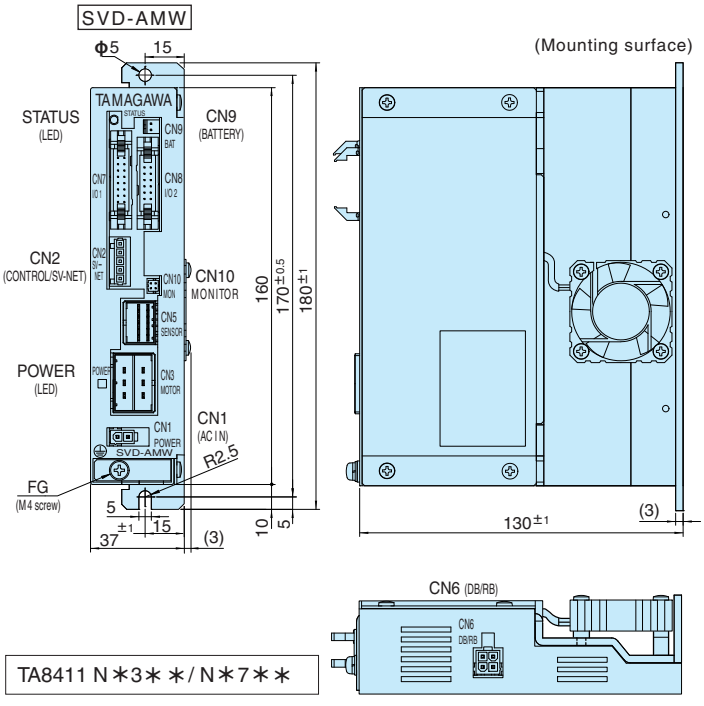
Control specifications	As per separate communication specifications
Baud rate	1 Mbps (factory set value : changeable by parameter)
MAC ID	31 (factory set value : changeable by rotary SW or by parameter)

External View & Dimensions

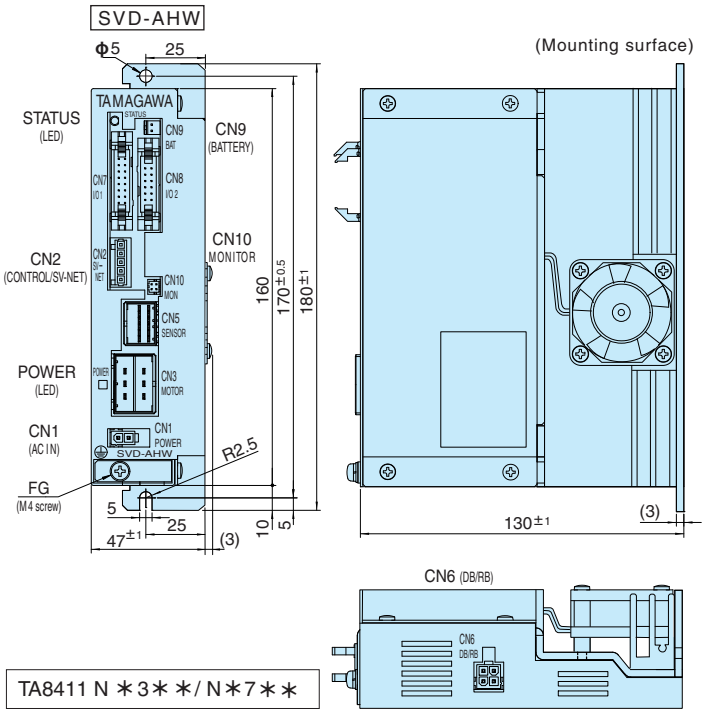


TA8411 N∗2∗∗/N∗6∗∗

External View & Dimensions



TA8411 N∗3∗∗/N∗7∗∗



TA8411 N∗3∗∗/N∗7∗∗

Connection

CN1 (main power)

Connector for supplying main power (drive power).

CN1 Pin number

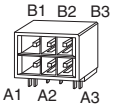
●Header：5569-02A1 (MOLEX)

PIN No.	FUNCTION
1	Single-phase AC100V / AC200～220V (main)
2	

Mating connector (not supplied as accessory)
- Receptacle housing：5557-02R (MOLEX)
- Terminal ：5556-TL (MOLEX)

CN3 (motor connection)

Connector for connecting motor cable



CN3 Pin number

●Header：1-178139-2 (Tyco Electronics AMP)

PIN No.	FUNCTION
	Standard
A1	U
A2	V
A3	W
B1	F・G
B2	(BK)……Motors with brake only
B3	(BK)……Motors with brake only

Mating connector (not supplied as accessory)
- Receptacle housing ：1-178129-6 (Tyco Electronics AMP)
- Receptacle contact ：175218-2 (Tyco Electronics AMP)

CN6 (External resistance)

Connectors for connecting external resistance.

CN6 Pin number

●Header：5569-04A1 (MOLEX)

PIN No.	FUNCTION
1	RG1 (regenerative resistance connection)
2	DB1 (dynamic brake resistance connection)
3	RG2 (regenerative resistance connection)
4	DB2 (dynamic brake resistance connection)

Mating connector (not supplied as accessory)
- Receptacle housing：5557-04R (MOLEX)
- Terminal ：5556TL (MOLEX)

CN7 (I/O connection)

Connectors for connecting I/O input/output signals.

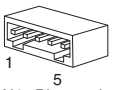
●Header：HIF3BAF-16PA-2.54DS (HIROSE)

PIN No.	I/O	FUNCTION	
1		GND	
2	A-In	AIN (Anglog command input)	See Fig. ①
3	D-In	Reverse-PLS＋ (Reverse command pulse input＋)	See Fig. ②
4	D-In	Reverse-PLS－ (Reverse command pulse input－)	
5	D-In	Forward-PLS＋ (Forward command pulse input＋)	
6	D-In	Forward-PLS－(Forward command pulse input－)	
7		GND	
8	D-In	AUX (Auxiliary input)	See Fig. ③
9	D-In	C-RST (Counter reset input)	
10	D-In	RST (Reset input)	
11	D-In	Reverse-LMT (Reverse drive disable input)	
12	D-In	Forward-LMT (Forward drive disable input)	
13	D-In	SVON (Servo ON input)	
14	D-In	INP (In-the-position signal output)	See Fig. ④
15	D-Out	ALM (Alarm signal output)	
16		＋24V	

※「A-In」：Analog signal,「D-In」：Signal input,「D-Out」：Digital signal output

CN2 (control signal)

Connector for connecting control power (DC24V) and communication (CAN). Even when communication (CAN) is not used, be sure to input control power (DC24V) between PIN 1 and PIN 5 of the CN2.



CN2 Pin number

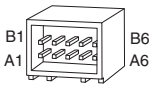
●Header：734-165 (WAGO)

PIN No.	FUNCTION
1	GND (control)
2	CAN L (－)
3	GND (SHIELD)
4	CAN H (＋)
5	DC24V (control)

Mating connector (not supplied as accessory)
- Connector plug：734-105 (WAGO)

CN5 (sensor connection)

Connector for connecting sensor cable



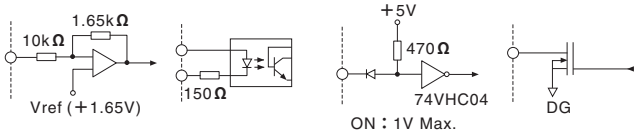
CN5 Pin number

●Tab header：1376020-1 (Tyco Electronics AMP)

PIN No.	FUNCTION		
	Min. wiring	17BIT-ABS/INC	Resolver
A1	A	－	S2 (output)
B1	A/	－	S4 (output)
A2	B	－	S1 (output)
B2	B/	－	S3 (output)
A3	Z	SD	R1 (excitation)
B3	Z/	SD/	R2 (excitation)
A4	－	VB	－
B4	－	GND-VB	－
A5	VCC	VCC	－
B5	GND	GND	－
A6	－	－	－
B6	GND (SHIELD)	GND (SHIELD)	GND (SHIELD)

Mating connector (not supplied as accessory)
- Receptacle housing：1-1318118-6 (Tyco Electronics AMP)
- Terminal ：1318108-1 (Tyco Electronics AMP)

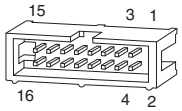
① Analog signal input — MCP604 equivalent
② Digital signal input — TLP112A equivalent
③ Digital signal input — 1SS388 equivalent
④ Digital signal output — SSM5N15FE equivalent



I/O Internal Circuit

ON：1V Max.
OFF：open or 3.5V Min.
(Reverse voltage of diode : 40V)

※Mating connector (not supplied as accessory)
- Socket：HIF3BA-16D-2.54R (HIROSE)



(PCB facing side)
CN1 Pin number

Connection

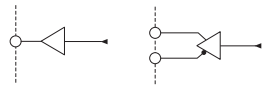
CN8 (I/O connection)

●Header : HIF3BAF-14PA-2.54DS (HIROSE)

PIN No.	I/O	FUNCTION		
1	D-Out	Open connector	Line driver	
		LEAD	LEAD +	See Figs.① and ②
2	D-Out	NC	LEAD −	
3	D-Out	LAG	LAG +	
4	D-Out	NC	LAG −	
5	D-Out	Z	Z+	
6	D-Out	NC	Z−	
7		GND		
8		GND		
9	A-Out	Monitor output **1** (factory setting : motor current)		
10	A-Out	Monitor output **2** (factory setting : speed feedback)		
11		GND		
12		GND		
13		NC		
14		NC		

※「D-Out」: Digital signal output, 「A-Out」: Analog signal output

① 7407 equivalent (open collector) ② AM26C31 equivalent (line driver)



I/O Internal Circuit

※Mating connector (not supplied as accessory)
• Socket : HIF3BA-14D-2.54R (HIROSE)

CN9 (backup battery connection connector)

※Used with 17B-ABS only

CN9 Pin number

●Connector : IL-2P-S3FP2-1 (JAE)

PIN No.	FUNCTION
1	GND
2	VB (+)

Battery : ER17500VC (Toshiba Battery)

List of Motor / Driver Combinations

●TBL-V Series (E1◇◇)

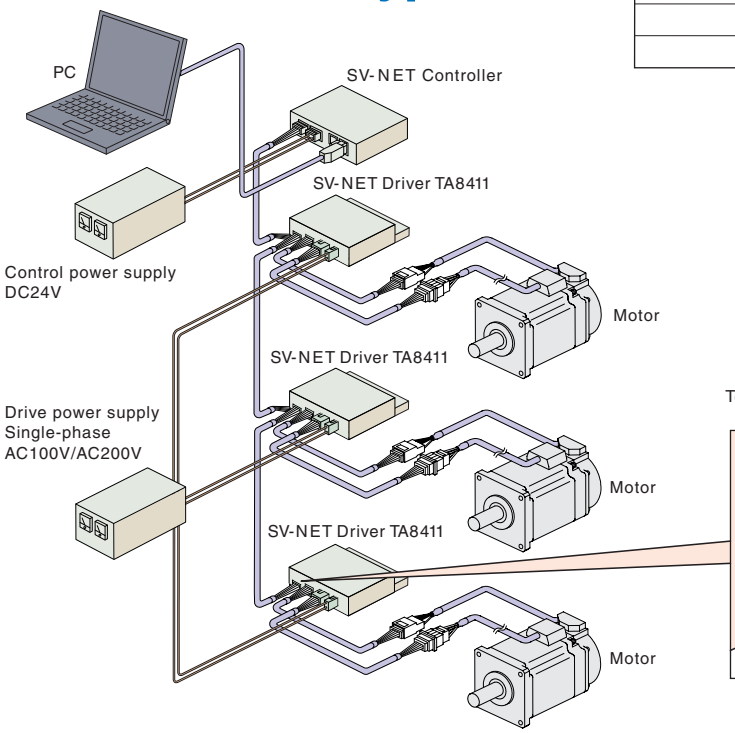
AC100V system ／ AC200V system	
Motor model	Driver model to be combined
TS4742 (50W/50W- □42)	TA8411N∗3∗∗E111/TA8411N∗7∗∗E111
TS4746 (100W/100W- □56.4)	TA8411N∗3∗∗E112/TA8411N∗7∗∗E112
TS4747 (200W/200- □56.4)	TA8411N∗3∗∗E113/TA8411N∗7∗∗E113
TS4752 (320W/400W- □86)	TA8411N∗3∗∗E114/TA8411N∗7∗∗E114

Note) TBL-V series employs the resolver (Singlsyn) only.

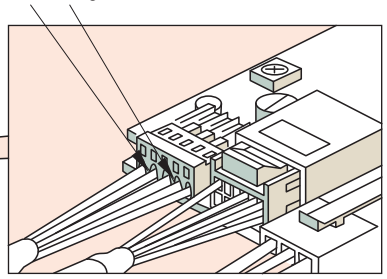
●TBL- i Ⅱ Series (E2◇◇)

AC100V system		AC200V system	
Motor model	E number	Motor model	E number
TS4601 (30W- □40)	TA8411N∗2∗∗E241	TS4601 (30W- □40)	TA8411N∗6∗∗E281
TS4602 (50W- □40)	TA8411N∗2∗∗E242	TS4602 (50W- □40)	TA8411N∗6∗∗E282
TS4603(100W- □40)	TA8411N∗2∗∗E243	TS4603 (100W- □40)	TA8411N∗6∗∗E283
TS4606 (100W- □60)	TA8411N∗2∗∗E256	TS4606 (100W- □60)	TA8411N∗6∗∗E296
TS4607 (200W- □60)	TA8411N∗3∗∗E257	TS4607 (200W- □60)	TA8411N∗6∗∗E297
TS4609 (400W- □60)	TA8411N∗4∗∗E259	TS4609 (400W- □60)	TA8411N∗7∗∗E299
TS4611 (200W- □80)	TA8411N∗3∗∗E271	TS4611 (200W- □80)	TA8411N∗6∗∗E201
		TS4612 (400W- □80)	TA8411N∗7∗∗E202
		TS4613 (600W- □80)	TA8411N∗8∗∗E203
		TS4614 (750W- □80)	TA8411N∗8∗∗E204

System Configuration
AC100V/200V Type



Terminating resistor 120Ω to be connected



SV-NET Driver TA8420 Series

DC280V to 325V, 400W/750W AC Servo Drivers
Small Size and Large Capacity

SV-NET Network Driver

Daisy chain connection minimizes wiring requirement.

Resolver

The angle sensor employed is a resolver featuring high environmental resistance.

Drive power : DC280V to 325V

Built-in dynamic brake control

※ These driver models are not equipped with a heat radiator. Please consult us about the details of your application.

Power Source Unit TA8430

Main Functions of TA8430 Power Source Unit

■ **AC-DC conversion**
Input rating AC200V/220V 3φ
Output rating About DC280/308V

■ **Number of connections**
4 systems

■ **Power capacity**
Max. 8A per system (TOTAL : 18A Max.)

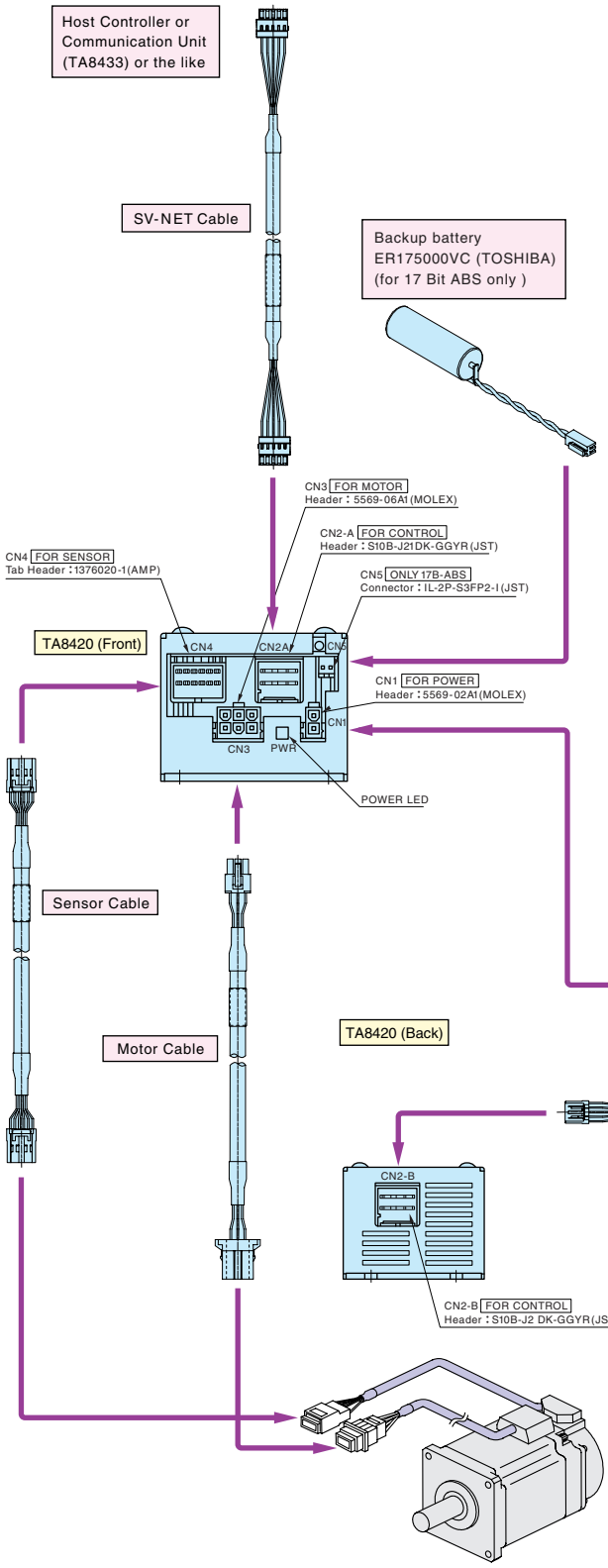
■ **Built-in regenerative function**
Regenerative resistance to be connected externally
(Option : EU6656N2)

■ **Compatible driver**
TA8420 series

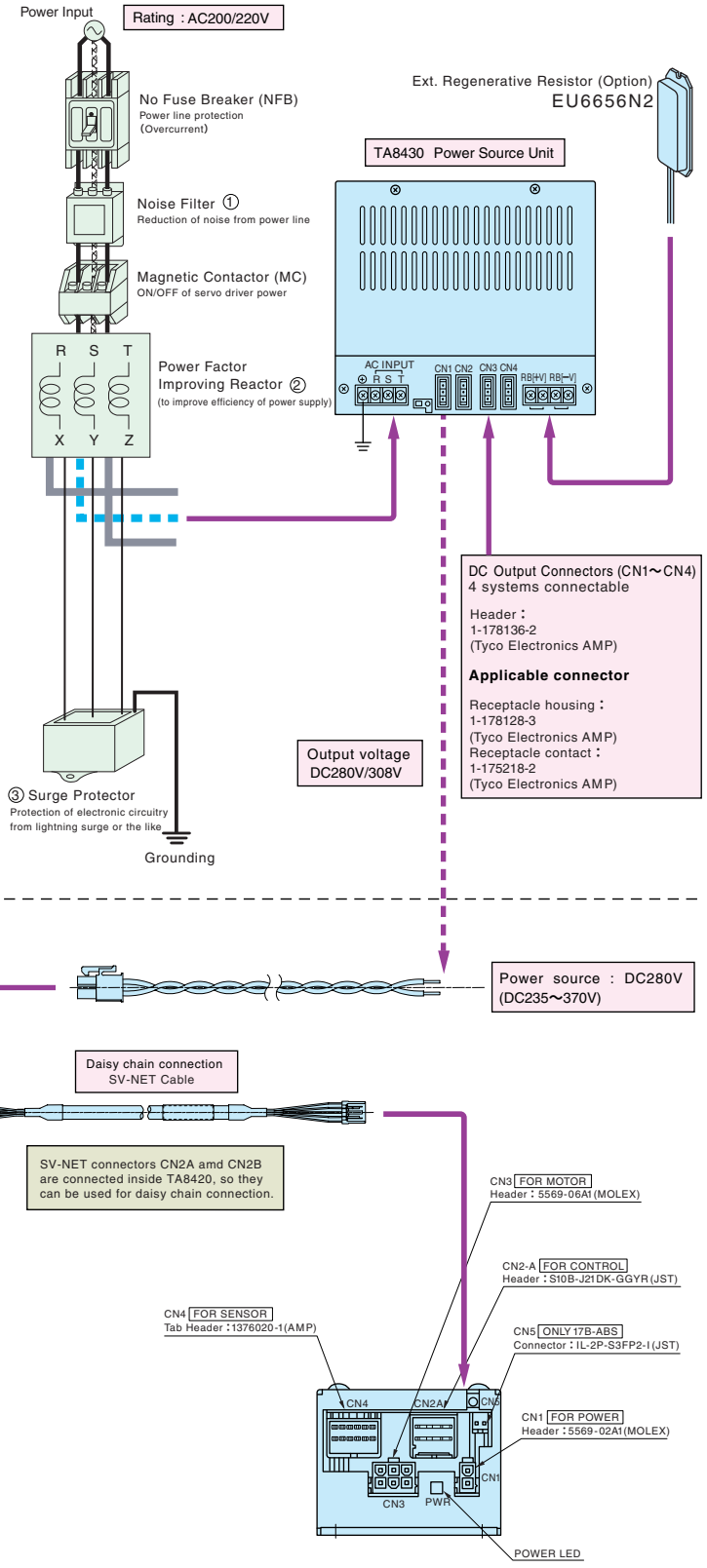
System Configuration
DC280V Type

System configuration using a power source unit

TA8420 System Configuration Diagram



When TA8430 power source unit used



SV-NET Regeneration & Communication Unit TA8413

Driver and motor protected against regenerative action

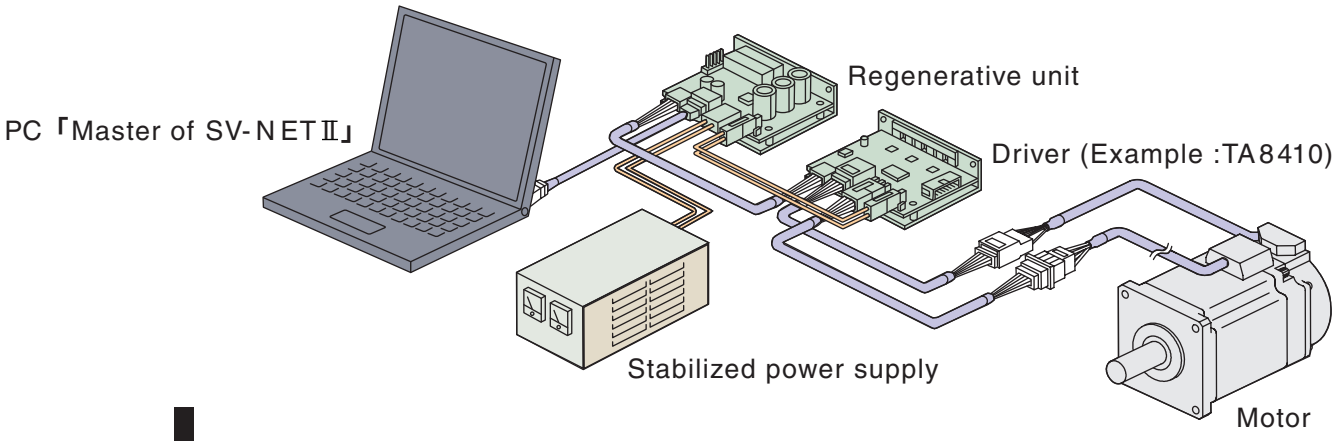
Main Functions of TA8413 Regeneration & Communication Unit

■ **Regenerative protection function**
Drivers and motors are protected by controlling the rise of drive voltage due to regenerative action.
A lineup of DC24/48V specifications with built-in regenerative resistor.

■ **SV-NET conversion function**
Conversion from RS232C to SV-NET

■ **Master of SV-NET Ⅱ**
PC application "Master of SV-NET Ⅱ" helps to enable parameter management of drivers and simple control from the personal computer.

■ **Compatible driver**
TA8410 series



SV-NET Communication Unit TA8433

Control of SV-NET drivers via RS232C/RS422/RS485

Main Functions of TA8433 Communication Unit

■ **SV-NET conversion function**
Conversion from RS232C/RS422/RS485 to SV-NET

■ **Master of SV-NET Ⅱ**
PC application "Master of SV-NET Ⅱ" helps to enable parameter management of drivers and simple control from the personal computer.

■ **Applicable drivers**
All SV-NET drivers

Master of SV-NETⅡ

Main Functions of Master of SV-NETⅡ

■ **Control mode**
Position control, Speed control, Current control

■ **Parameter management**
Reading and writing to/from parameter list

■ **Simple programming**
Programming in 20 steps Max. possible.

■ **Applicable drivers**
All SV-NET drivers

SV-NET Training Pack TA8425

With the 100VAC/200VAC power outlet and a PC connected, this training pack creates an environment for operating three axes of motors.

Configuration

■ **SV-NET controller**
TA8440 × 1

■ **Driver**
TA8410 × 3

■ **Motor**
TBL-iⅡ 100W TS4603 × 2
TBL-V 50W TS4742 × 1

■ **Power source**
AC100V/200V input
DC24V output 2.5A

■ **Accessories**
Power cable × 1
USB cable × 1
CD-ROM × 1

Compact
Reliability
Simple

Servo Motor

TBL-i II Series AC Servo Motor

Optimal for industrial robots, press machines, machine tools, weaving machines

Small size and high reliability

Rigidly built and highly reliable, incorporating thorough quality control.

A rich lineup of models

The angle sensor is a brushless resolver as standard.
Options include encoder 17BIT INC/ABS and incremental 2048 C/T (min. wiring) types.
Brake is also available.

Brushless Resolver Smartsyn®

The brushless resolver can withstand harsh environmental conditions
(high temperature, low temperature, vibration, shock).

Basic Specifications

Mounting flange [mm]	Model	Output [W]	Driver power voltage [V]	Rated torque [N•m]	Max. torque [N•m]	Rated rotation speed [min^{-1}]	Max. rotation speed [min^{-1}]
□40	TS4601	30	DC24 • DC48	0.095	0.29	3,000	5,000
			AC100 • AC200	0.095	0.29	3,000	5,000
	TS4602	50	DC24	0.159	0.48	3,000	4,600
			DC48	0.159	0.48	3,000	4,700
			AC100 • AC200	0.159	0.48	3,000	5,000
	TS4603	100	DC24	0.318	0.95	3,000	3,600
			DC48	0.318	0.95	3,000	4,600
			AC100 • AC200	0.318	0.95	3,000	5,000
□60	TS4606	100	DC24	0.318	0.95	3,000	3,600
			DC48	0.318	0.95	3,000	4,600
			AC100 • AC200	0.318	0.95	3,000	5,000
	TS4607	100	DC24	0.64	1.91	1,500	1,900
		200	DC48	0.64	1.91	3,000	3,900
		200	AC100 • AC200	0.64	1.91	3,000	5,000
	TS4609	400	AC100 • AC200	1.27	3.82	3,000	5,000
□80	TS4611	200	AC100 • AC200	0.64	1.91	3,000	5,000
	TS4612	400	AC200	1.27	3.82	3,000	5,000
	TS4613	600	AC200	1.91	5.73	3,000	5,000
	TS4614	750	AC200	2.39	7.16	3,000	5,000

TBL-i II Series

Motor Characteristics (without brake and oilseal)

Power supply voltage			Low-voltage type									
			DC24V (E520)					DC48V (E620)				
Motor flange size			□40			□60		□40			□60	
Motor model			TS4601	TS4602	TS4603	TS4606	TS4607	TS4601	TS4602	TS4603	TS4606	TS4607
Rated output	P_R	W	30	50	100	100	100	30	50	100	100	200
Rated torque	T_R	N・m	0.095	0.159	0.318	0.318	0.64	0.095	0.159	0.318	0.318	0.64
Stall torque	T_S	N・m	0.095	0.159	0.318	0.318	0.64	0.095	0.159	0.318	0.318	0.64
Momentary max. torque	T_P	N・m	0.29	0.48	0.95	0.95	1.91	0.29	0.48	0.95	0.95	1.91
Rated rotation speed	N_R	min^{-1}	3,000	3,000	3,000	3,000	1,500	3,000	3,000	3,000	3,000	3,000
Max. rotation speed	N_{MAX}	min^{-1}	5,000	4,600	3,600	3,600	1,900	5,000	4,700	4,600	4,600	3,900
Rotor inertia	J_M	$kg \cdot m^2$	0.013×10^{-4}	0.019×10^{-4}	0.035×10^{-4}	0.085×10^{-4}	0.018×10^{-4}	0.013×10^{-4}	0.019×10^{-4}	0.035×10^{-4}	0.085×10^{-4}	0.18×10^{-4}
Rated power rate	Q_R	kW/s	7.2	12.9	28.7	11.9	22.6	7.2	12.9	28.7	11.9	22.6
Mechanical time constant	τ_m	ms	1.4	0.9	0.7	1.4	1	1.4	0.9	0.7	1.2	1.0
Shaft friction torque	Tf	N•m MAX	0.02				0.04	0.02				0.04
Axial play		mm MAX	0.2									
Allowable radial load		N	78.4				196	78.4				196
Allowable axial load		N	39.2				68.6	39.2				68.6

Power supply voltage			High-voltage type																
			AC100V (E100)							AC200V (E200)									
Motor flange size			□40			□60			□80	□40			□60			□80			
Motor model			TS4601	TS4602	TS4603	TS4606	TS4607	TS4609	TS4611	TS4601	TS4602	TS4603	TS4606	TS4607	TS4609	TS4611	TS4612	TS4613	TS4614
Rated output	P_R	W	30	50	100	100	200	400	200	30	50	100	100	200	400	200	400	600	750
Rated torque	T_R	N・m	0.095	0.159	0.318	0.318	0.64	1.27	0.64	0.095	0.159	0.318	0.318	0.64	1.27	0.64	1.27	1.91	2.39
Stall torque	T_S	N・m	0.095	0.159	0.318	0.318	0.64	1,27	0.64	0.095	0.159	0.318	0.318	0.64	1,27	0.64	1.27	1.91	2.39
Momentary max. torque	T_P	N・m	0.29	0.48	0.95	0.95	※1.91	※3.82	※1.91	0.29	0.48	0.95	0.95	1.91	※3.82	1.91	※3.82	※5.73	※7.16
Rated rotation speed	N_R	min^{-1}	3,000							3,000									
Max. rotation speed	N_{MAX}	min^{-1}	5,000							5,000									
Rotor inertia	J_M	$kg \cdot m^2$	0.013×10^{-4}	0.019×10^{-4}	0.035×10^{-4}	0.085×10^{-4}	0.18×10^{-4}	0.34×10^{-4}	0.28×10^{-4}	0.013×10^{-4}	0.019×10^{-4}	0.035×10^{-4}	0.085×10^{-4}	0.18×10^{-4}	0.34×10^{-4}	0.028×10^{-4}	0.55×10^{-4}	0.86×10^{-4}	1.06×10^{-4}
Rated power rate	Q_R	kW/s	7.2	12.9	28.7	11.9	22.6	47.9	14.3	7.2	12.9	28.7	11.9	22.6	47.9	14.3	29.7	42.2	53.6
Mechanical time constant	τ_m	ms	1.5	0.9	0.7	1.2	0.9	0.6	1.0	1.5	0.9	0.7	1.2	0.9	0.6	1.0	0.6	0.6	0.6
Shaft friction torque	Tf	N•m MAX	0.02				0.04		0.06	0.02				0.04		0.06		0.08	
Axial play		mm MAX	0.2							0.2									
Allowable radial load		N	78.4				196			78.4				196				343	
Allowable axial load		N	39.2				68.6			39.2				68.6				98	

※The characteristic value is that with no brake or no oil seal. ※When combined with TA8411 driver, the momentary max. torque is reduced to two times the rated torque.

Model designation

TS □□□□ N □□□□ E □□□

Basic type

Shaft end specifications
00 : No oil seal Round shaft (standard)
01 : No oil seal Double-milled
02 : No oil seal Keyway
05 : Oil seal Round shaft
06 : Oil seal Double-milled
07 : Oil seal Keyway

10 : 17 bit INC-SE, No brake
15 : 2,048C/T (min. wiring) INC-SE, No brake
20 : 17/33 bit (17B) ABS-SE, No brake
30 : 1X Resolver, No brake (motor flange size □40)
33 : 1X Resolver, No brake (motor flange size □60, □80)
60 : 17 bit INC-SE, Brake
65 : 2,048C/T (min. wiring) INC-SE, Brake
70 : 17/33 bit (17B) ABS-SE, Brake
80 : 1X Resolver, Brake (motor flange size □40)
83 : 1X Resolver, Brake (motor flange size □60, □80)

Power source specifications
520 : DC24V
620 : DC48V
100 : AC100V
200 : AC200V

Compact Reliability Simple

Specifications

Common Specifications

Insulation classification	F class	Operating temperature range		0～+40(℃)
Withstand voltage	AC1500V, 1 minute	Storage temperature range		−10～+85(℃)
Insulation resistance	DC500V, 100 MΩ or above	Humidity		85% RH Max. (No condensation)
Protection	Fully-closed, self-cooling, IP65 (excl. connectors and shaft opening)			
Direction of rotation	CCW as viewed from shaft end when energized in sequence of U→V→W	Coating color	(□40～□80)	Not painted

Shaft Loading Conditions

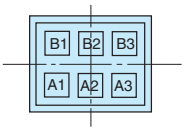
Motor model	Allowable radial load [N (kgf)]	Allowable axial load [N (kgf)]	Loading point
TS4601	78.4(8)	39.2(4)	20(mm) from flange face
TS4602			
TS4603			
TS4606			
TS4607	196(20)	68.6(7)	
TS4609			
TS4611			
TS4612			
TS4613	343(35)	98(10)	
TS4614			

Be sure to use your motors within the ranges specified in the above table. Please consult us about any of your applications outside the specified ranges.

Wire Connection Table

Applicable motor model TS4601～TS4614

Motor power line side

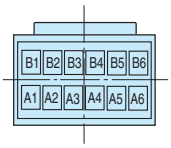


Tab housing (Tyco Electronics AMP)
: 178964−3
Tab contact
: 175289−2
: 175288−2(PIN No. B2, B3)

MOTOR & BRAKE CONNECTION

PIN No.	FUNUCTION	COLOR
A1	U	RED
A2	V	WHT
A3	W	BLK
B1	C.G	GRN／YEL
B2	(BRAKE)	(YEL)
B3	(BRAKE)	(BLU)

Sensor



Tab housing (Tyco Electronics AMP)
: 1−1318115−6
Tab contact
: 1318112−1

(1) 17 bit Incremental type

ENCODER CONNECTION

PIN No.	FUNUCTION	COLOR
A1	——	——
A2	——	——
A3	SD	BLU
A4	——	——
A5	Vcc	RED
A6	——	——
B1	——	——
B2	——	——
B3	$\overline{SD}$	BLU／BLK
B4	——	——
B5	GND	BLK
B6	SHIELD	SHIELD

(2) 17 bit ABS type

ENCODER CONNECTION

PIN No.	FUNUCTION	COLOR
A1	——	——
A2	——	——
A3	SD	BLU
A4	VB	BRW
A5	Vcc	RED
A6	——	——
B1	——	——
B2	——	——
B3	$\overline{SD}$	BLU／BLK
B4	GND	BRW／BLK
B5	GND	BLK
B6	SHIELD	SHIELD

(3) Min. wiring incremental

ENCODER CONNECTION

PIN No.	FUNUCTION	COLOR
A1	UE,A	BLU
A2	VE,B	GRN
A3	WE,Z	YEL
A4	——	——
A5	Vcc	RED
A6	——	——
B1	$\overline{UE}$,$\overline{A}$	BLU／BLK
B2	$\overline{VE}$,$\overline{B}$	GRN／BLK
B3	$\overline{WE}$,$\overline{Z}$	YEL／BLK
B4	——	——
B5	GND	BLK
B6	SHIELD	SHIELD

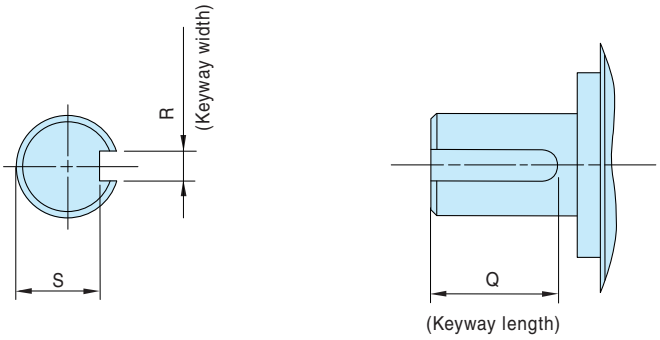
(4) Resolver

RESOLVER CONNECTION

PIN No.	FUNUCTION	COLOR
A1	S2	BLU
A2	S1	BRW
A3	R1	RED
A4	——	——
A5	——	——
A6	——	——
B1	S4	BLU／BLK
B2	S3	BRW／BLK
B3	R2	BLK
B4	——	——
B5	——	——
B6	SHIELD	SHIELD

Shaft Specifications

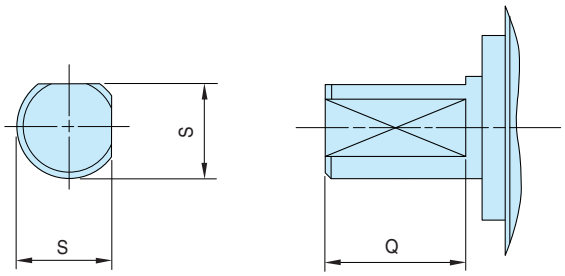
For motors with shaft keyway



Dimensions : mm

Motor model	Q (keyway length)	S	R (keyway)	Supplied key size
TS4601	16	6.2(0,−0.2)	3P9(−0.006,−0.031)	3×3×16 (half circle) (JIS B 1301)
TS4602				
TS4603				
TS4606				
TS4607	20	11(0,−0.2)	5P9(−0.012,−0.042)	5×5×20 (half circle) (JIS B 1301)
TS4609				
TS4611				
TS4612				
TS4613	25	15.5(0,−0.2)	6P9(−0.012,−0.042)	6×6×25 (half circle) (JIS B 1301)
TS4614				

For motors with double milled shaft

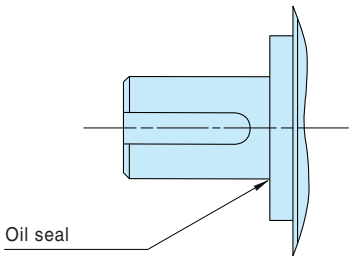


Motor model	Q (milling width)	S (milling width)
TS4601	16	7.5 (±0.2)
TS4602		
TS4603		
TS4606		
TS4607	20	13 (±0.2)
TS4609		
TS4611		
TS4612		
TS4613	25	17.5 (±0.2)
TS4614		

For motors with oil seal

When oil seal is provided, be sure to use under the following conditions :

- Keep the level of oil below the lip of the oil seal.
- Use the oil seal in a way that it is exposed to the spray of oil.



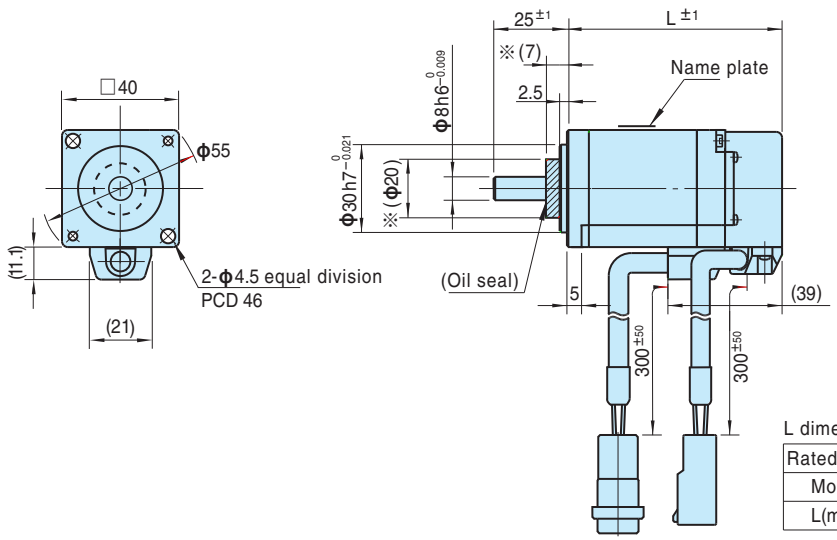
Compact Reliability Simple

Dimensional Outline (Standard Type)

●□40 (30W,50W,100W)

(Unit：mm)

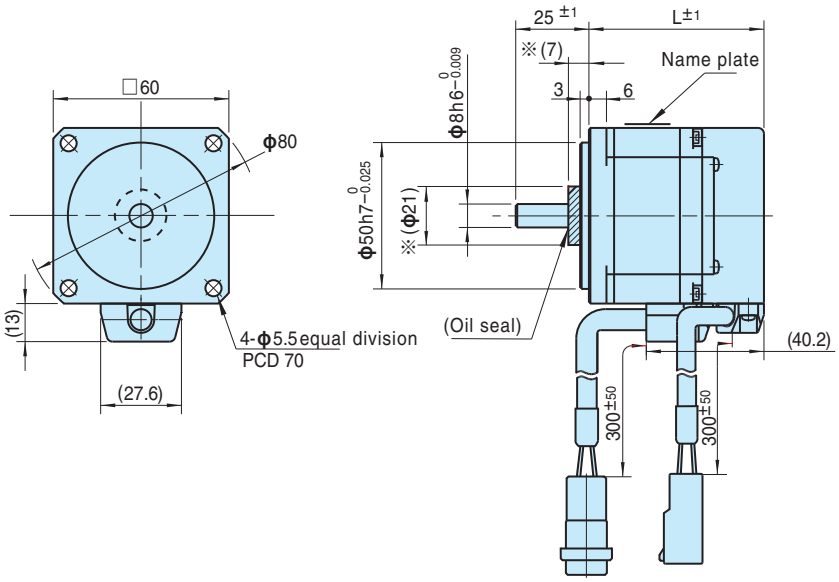
※Without oil seal, the shaded part is absent.



L dimension

Rated output	30W	50W	100W
Model	TS4601	TS4602	TS4603
L(mm)	53.5	59.5	73.5

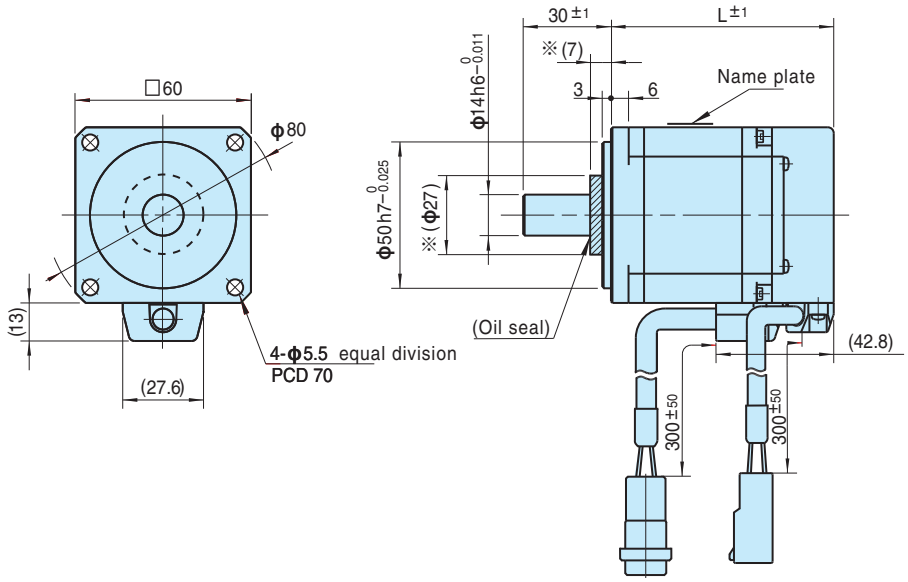
●□60 (100W)



L dimension

Rated output	100W
Model	TS4606
L(mm)	59.8

●□60 (200W,400W)



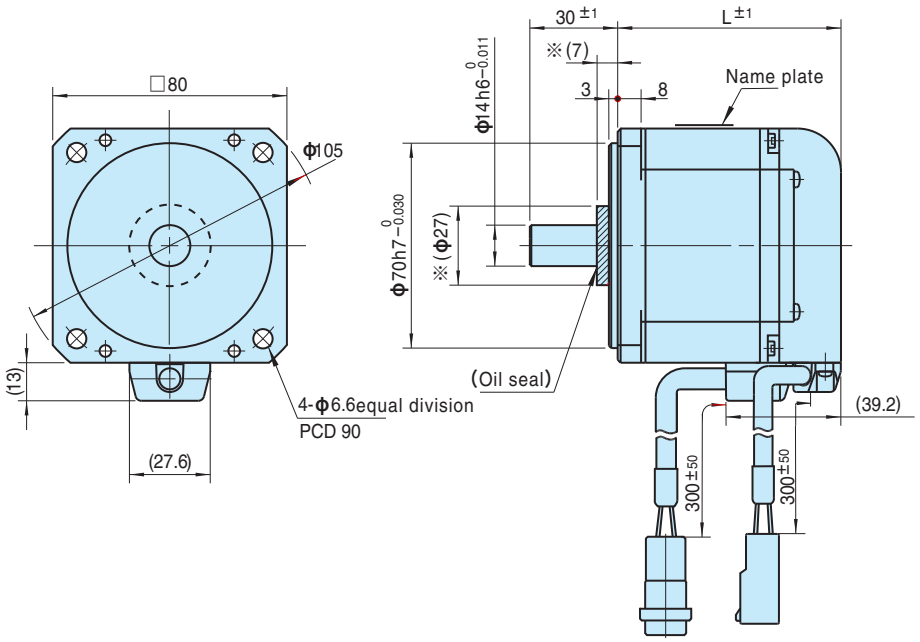
L dimension

Rated output	200W	400W
Model	TS4607	TS4609
L(mm)	76.1	98.1

●□80 (200W,400W)

(Unit：mm)

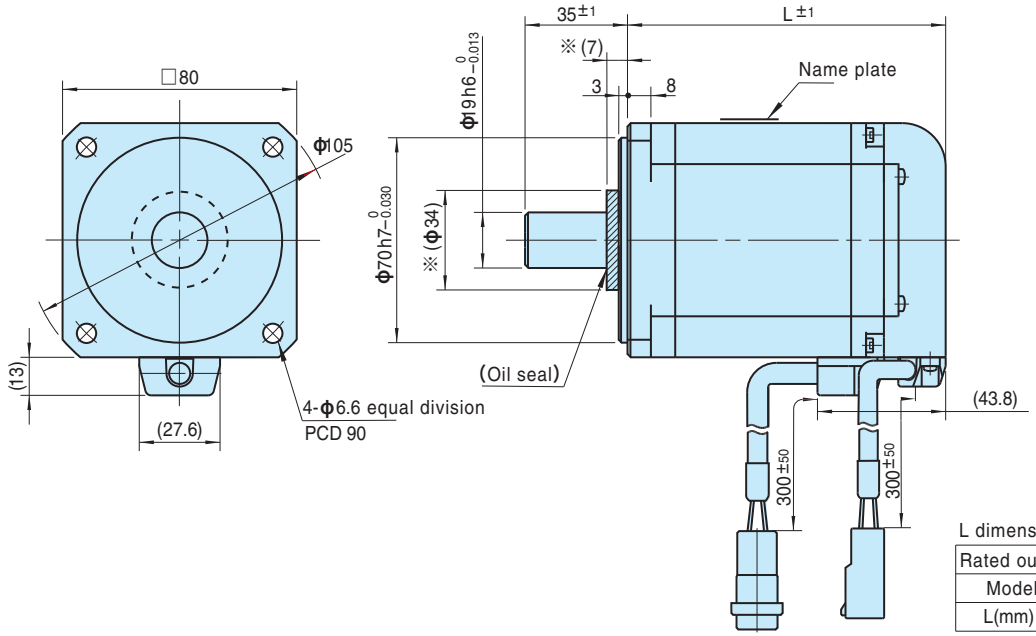
※Without oil seal, the shaded part is absent.



L dimension

Rated output	200W	400W
Model	TS4611	TS4612
L(mm)	64.3	76.3

●□80 (600W,750W)



L dimension

Rated output	600W	750W
Model	TS4613	TS4614
L(mm)	99.7	108.7

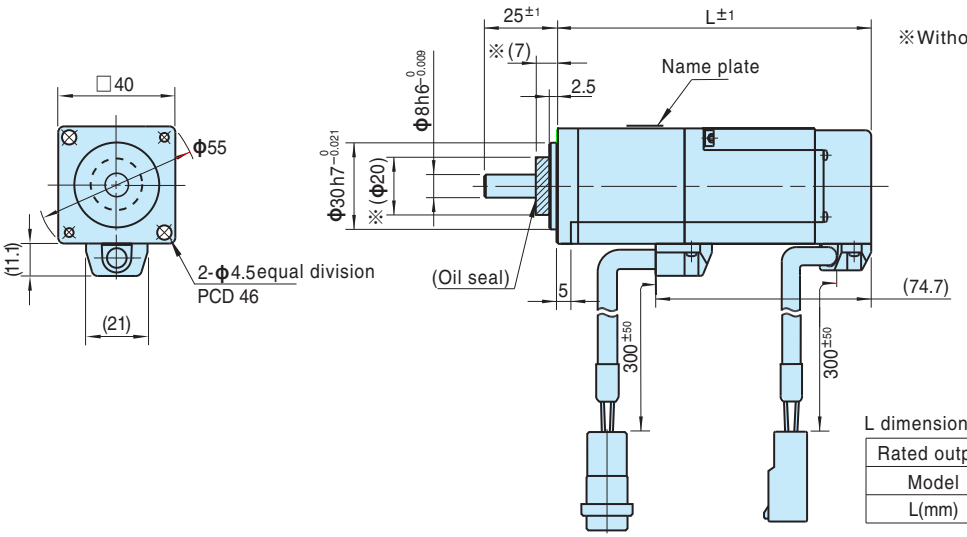
Compact
Reliability
Simple

Dimensional Outline (Brake Type)

●□40 (30W,50W,100W)

(Unit : mm)

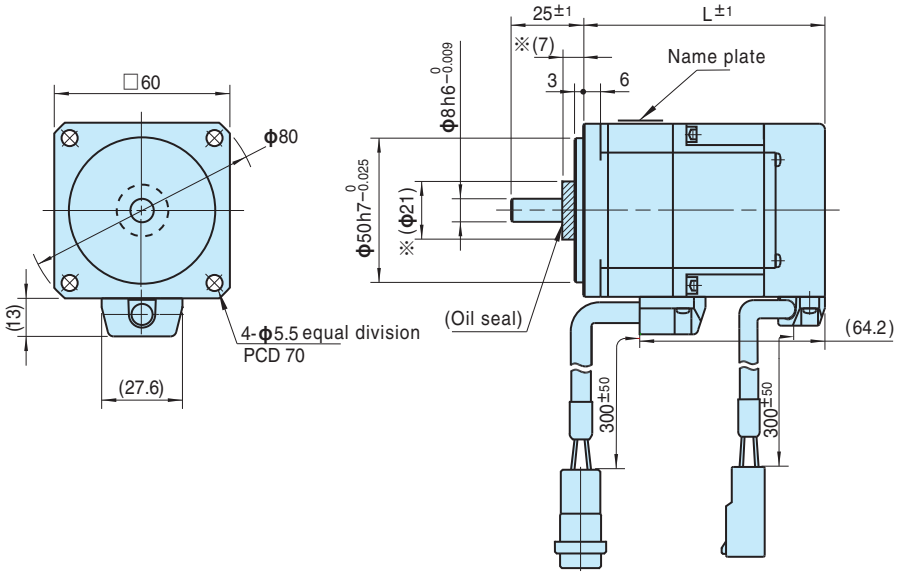
※Without oil seal, the shaded part is absent.



L dimension

Rated output	30W	50W	100W
Model	TS4601	TS4602	TS4603
L(mm)	89.1	95.1	109.1

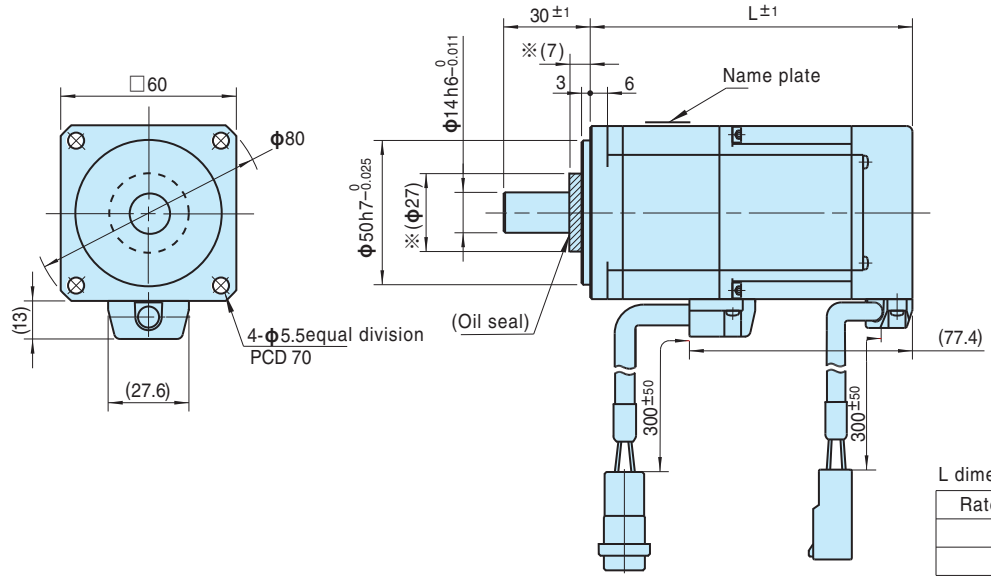
●□60 (100W)



L dimension

Rated output	100W
Model	TS4606
L(mm)	83.8

●□60 (200W,400W)

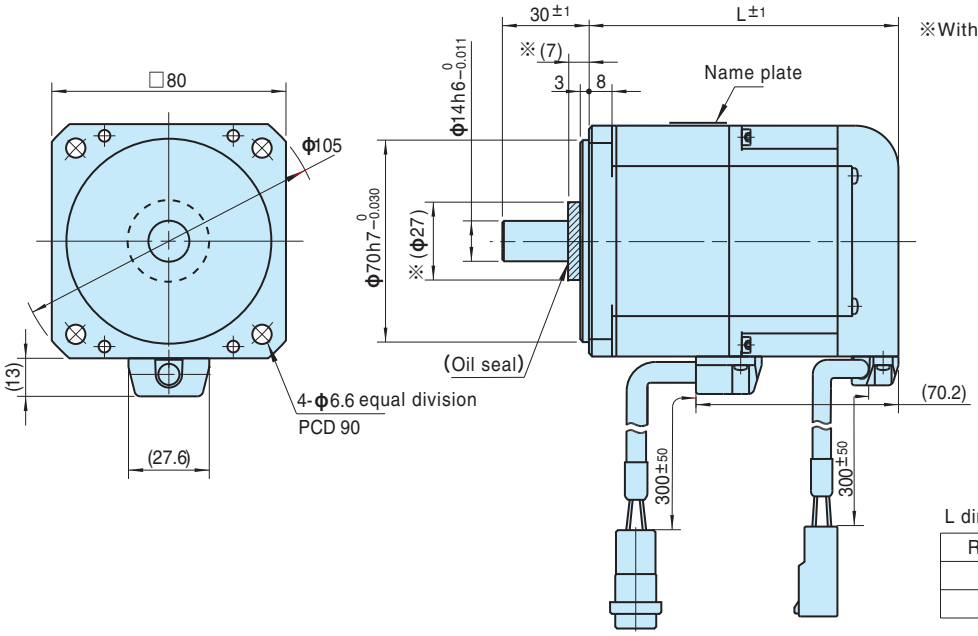


L dimension

Rated output	200W	400W
Model	TS4607	TS4609
L(mm)	110.7	132.7

●□80 (200W,400W)

(Unit : mm)

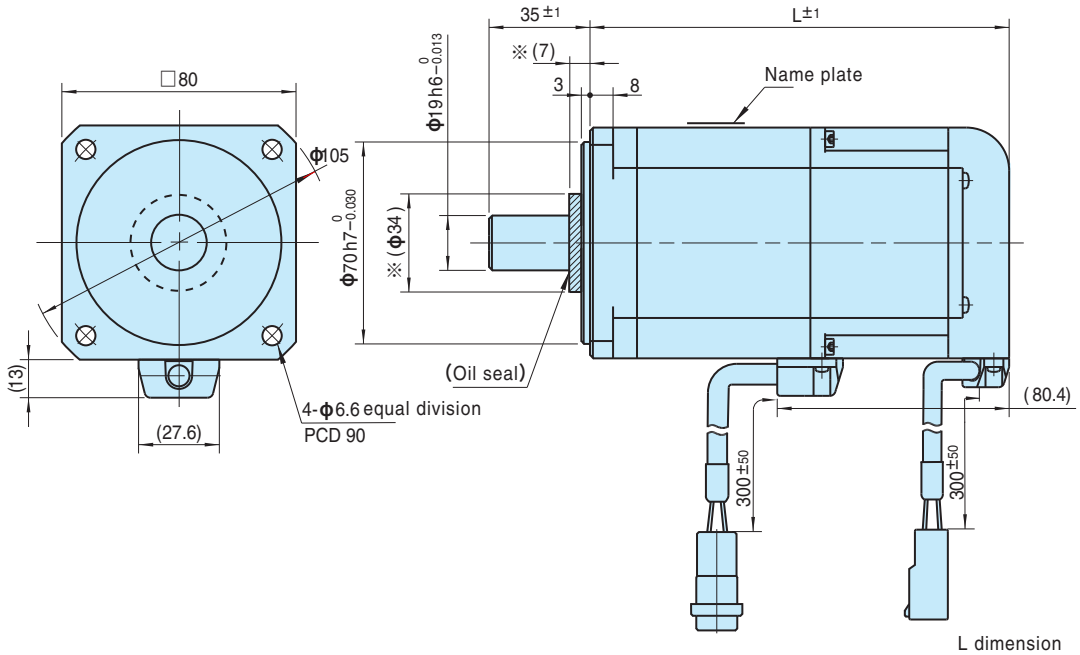


※Without oil seal, the shaded part is absent.

L dimension

Rated output	200W	400W
Model	TS4611	TS4612
L(mm)	95.3	107.3

●□80 (600W,750W)



L dimension

Rated output	600W	750W
Model	TS4613	TS4614
L(mm)	136.3	145.3

Compact Reliability Simple

AC Servo Motor

TBL-V Series AC Servo Motor

Optimal replacement for step motors

Servo motors mechanically compatible with step motors

The TBL-V series AC servo motors have the same flange size as that of step motors. Hence, they can be installed in replacement of such step motors.

(Note : The installation dimensions of step motors may vary by makers. Check the drawing for details.)

VR resolver Singlsyn®

The VR resolver is of a simple structure with fewer parts than the brushless resolver. It features lower cost and even higher reliability.

Motor Characteristics

Power supply voltage			Low-voltage type					
			DC24V (E500)			DC48V (E600)		
Motor flange size		inch	#17	#23		#17	#23	
		mm	42	56.4		42	56.4	
Motor model			TS4742	TS4746	TS4747	TS4742	TS4746	TS4747
Rated output	P_R	W	50	98	92	50	100	200
Rated torque	T_R	N • m	0.095	0.19	0.38	0.095	0.19	0.38
Stall torque	T_S	N • m	0.095	0.19	0.38	0.095	0.19	0.38
Momentary max. torque	T_P	N • m	0.29	0.57	1.15	0.29	0.57	1.15
Rated rotation speed	N_R	min^{-1}	5,000	4,900	2,300	5,000	5,000	5,000
Max. rotation speed	N_{MAX}	min^{-1}	8,000	6,200	2,900	8,000	8,000	5,900
Rotor inertia	J_M	$kg•m^2$	0.031×10^{-4}	0.093×10^{-4}	0.182×10^{-4}	0.031×10^{-4}	0.093×10^{-4}	0.182×10^{-4}
Rated power rate	Q_R	kW/s	3.0	3.9	8.0	3.0	3.9	8.0
Mechanical time constant	τ_m	ms	3.7	3.8	2.3	3.7	3.8	2.3
Shaft friction torque	T_f	N•m MAX	0.005	0.02	0.02	0.005	0.02	0.02
Axial play		mm MAX	0.1			0.1		
Allowable radial load		N	39.2	58.8	58.8	39.2	58.8	58.8
Allowable axial load		N	19.2	29.4	29.4	19.6	29.4	29.4

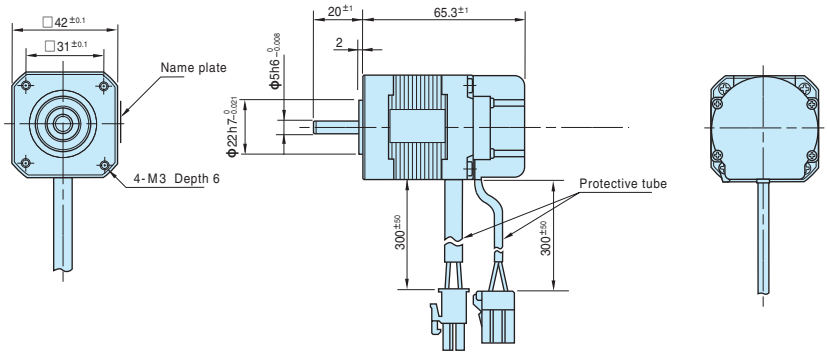
Power supply voltage			High-voltage type							
			AC100V (E100)				AC200V (E200)			
Motor flange size		inch	#17	#23		#34	#17	#23		#34
		mm	42	56.4		86	42	56.4		86
Motor model			TS4742	TS4746	TS4747	TS4752	TS4742	TS4746	TS4747	TS4752
Rated output	P_R	W	50	100	200	320	50	100	200	400
Rated torque	T_R	N • m	0.095	0.19	0.38	0.76	0.095	0.19	0.38	0.76
Stall torque	T_S	N • m	0.095	0.19	0.38	0.76	0.095	0.19	0.38	0.76
Momentary max. torque	T_P	N • m	0.29	0.57	1.15	2.29	0.29	0.57	1.15	2.29
Rated rotation speed	N_R	min^{-1}	5,000	5,000	5,000	4,000	5,000	5,000	5,000	5,000
Max. rotation speed	N_{MAX}	min^{-1}	8,000	8,000	8,000	4,400	8,000	8,000	8,000	8,000
Rotor inertia	J_M	$kg•m^2$	0.031×10^{-4}	0.093×10^{-4}	0.182×10^{-4}	1.02×10^{-4}	0.031×10^{-4}	0.093×10^{-4}	0.182×10^{-4}	1.02×10^{-4}
Rated power rate	Q_R	kW/s	3.0	3.9	8.0	5.7	3.0	3.9	8.0	5.7
Mechanical time constant	τ_m	ms	3.4	3.1	2.3	1.8	3.4	3.1	2.3	1.8
Shaft friction torque	T_f	N•m MAX	0.005	0.02	0.02	0.04	0.005	0.02	0.02	0.04
Axial play		mm MAX	0.1				0.1			
Allowable radial load		N	39.2	58.8	58.8	78.4	39.2	58.8	58.8	78.4
Allowable axial load		N	19.6	29.4	29.4	39.2	19.6	29.4	29.4	39.2

Basic Specifications

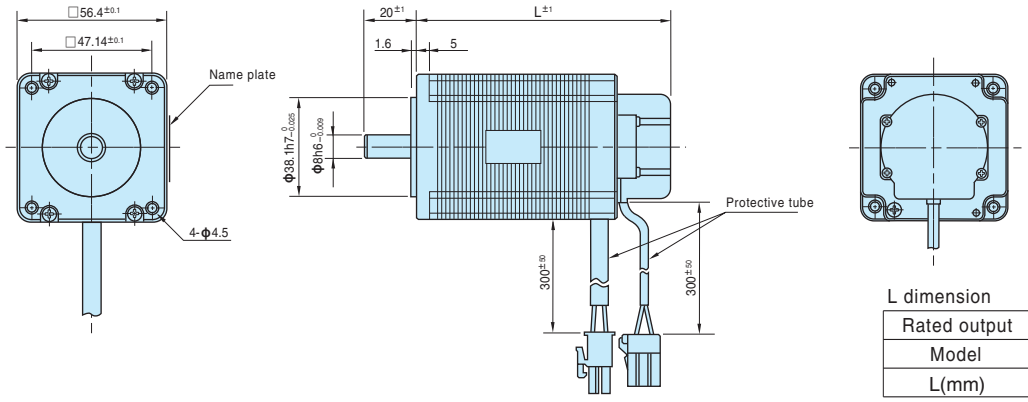
Mounting flange [inch]	Mounting flange [mm]	Model	Output [W]	Driver power voltage [V]	Rated torque [N•m]	Max. torque [N•m]	Rated rotation speed [min⁻¹]	Max. rotation speed [min⁻¹]
#17	□42	TS4742	50	DC24 • DC48	0.095	0.29	5,000	8,000
				AC100 • AC200	0.095	0.29	5,000	8,000
#23	□56.4	TS4746	98	DC24	0.19	0.57	4,900	6,200
			100	DC48	0.19	0.57	5,000	8,000
				AC100 • AC200	0.19	0.57	5,000	8,000
		TS4747	92	DC24	0.38	1.15	2,300	2,900
			200	DC48	0.38	1.15	5,000	5,900
				AC100 • AC200	0.38	1.15	5,000	8,000
#34	□86	TS4752	320	AC100	0.76	2.29	4,000	4,400
			400	AC200	0.76	2.29	5,000	8,000

●#17 □42 (50W)

(Unit : mm)



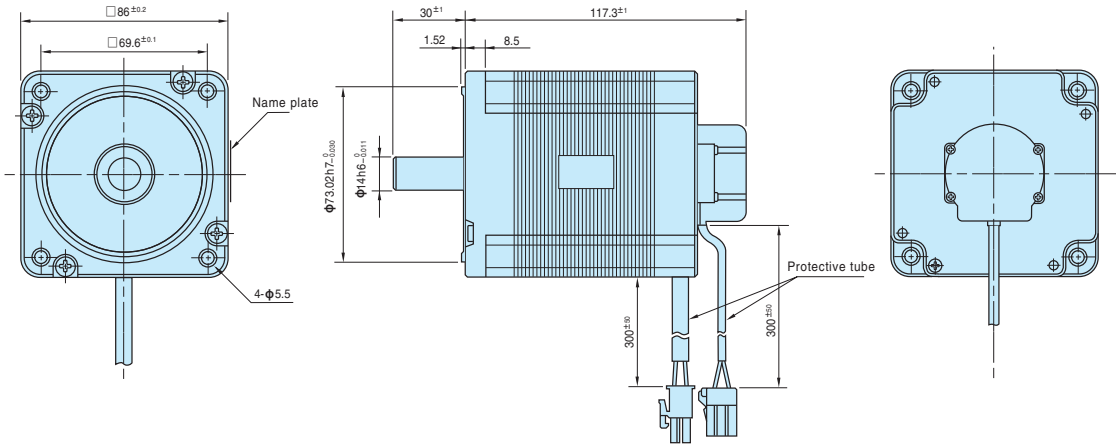
●#23 □56.4 (100W, 200W)



L dimension

Rated output	100W	200W
Model	TS4746	TS4747
L(mm)	72.6	98.6

●#34 □86 (400W)

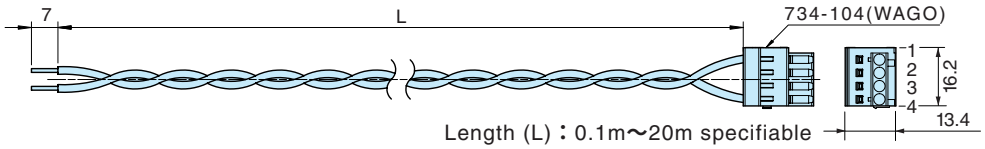


Compact Reliability Simple

Cables Specifications

(Unit : mm)

Controller Power Cable — EU9611

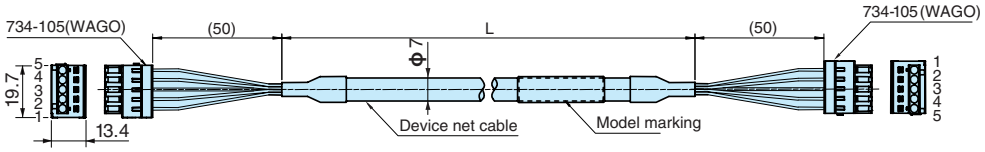


Length (L) : 0.1m～20m specifiable

Model	Length(L)
EU9611 N 1	0.1m
N 10	1m
N100	10m

SV-NET Cables — EU9610 • EU9636

● For TA8410/TA8411/TA8413/TA8433

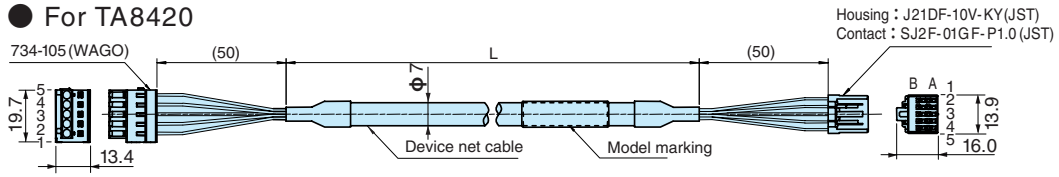


Length(L) : Up to 20m specifiable in 10cm unit. N∗001～N∗200

∗=1 : Connector on one end, ∗=2 : Connectors on both ends, ∗=0 : No connectors on both ends

Model	Length(L)
EU9610 N∗010	1m
N∗030	3m
N∗050	5m
N∗100	10m

● For TA8420

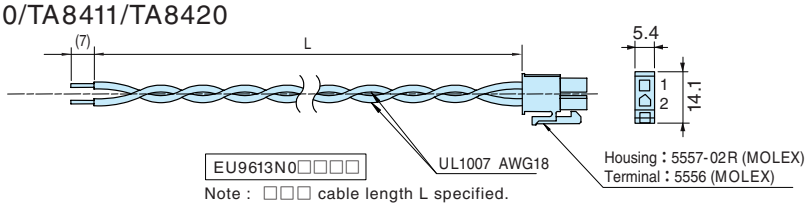


Length (L) : Up to 20m specifiable in 10cm unit. N1～N200

Model	Length(L)
EU9636 N 10	1m
N 30	3m
N 50	5m
N100	10m

Driver Drive Power Cables — EU9613

● For TA8410/TA8411/TA8420

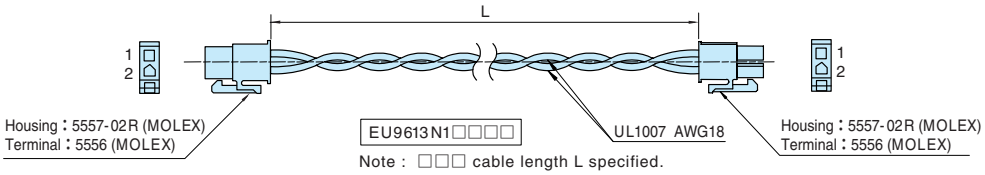


Note : □□□ cable length L specified.

Length (L) : Up to 20m specifiable in 10cm unit. N1～N200

Model	Length(L)
EU9613 N 10	1m
N 30	3m
N 50	5m
N100	10m

● For TA8410/TA8413



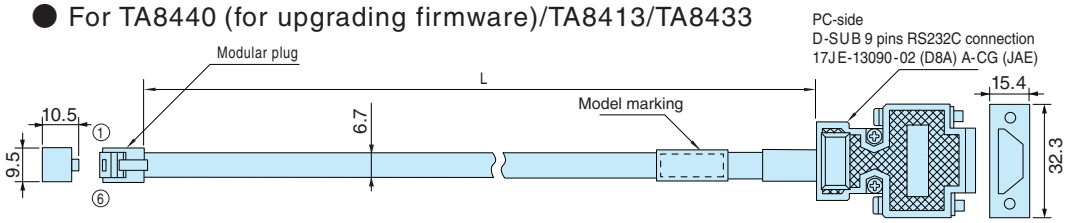
Note : □□□ cable length L specified.

Length (L) : Up to 20m specifiable in 10cm unit. N1001～N1200

Model	Length(L)
EU9613 N1010	1m
N1030	3m
N1050	5m
N1100	10m

Serial Communication Cable — EU6517

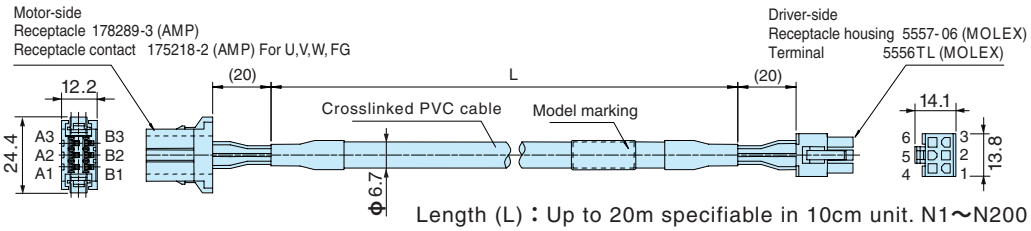
● For TA8440 (for upgrading firmware)/TA8413/TA8433



Model	Length(L)
EU6517 N2	2m
N3	3m
N5	5m

Motor Cable — EU9614

● For TA8410/TA8420 (Motor TBL-iⅡseries)



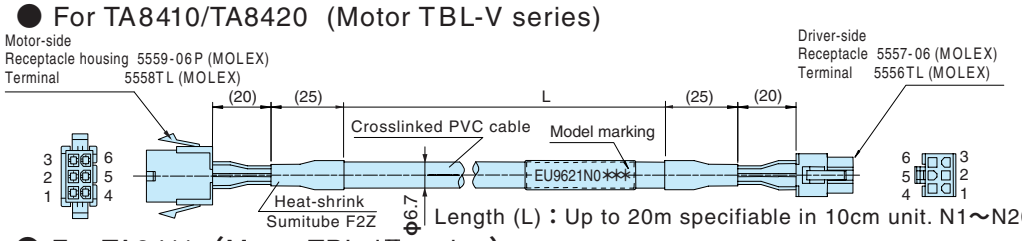
Length (L) : Up to 20m specifiable in 10cm unit. N1～N200

Model	Length(L)
EU9614 N 10	1m
N 30	3m
N 50	5m
N100	10m

(Unit：mm)

Motor Cables　EU9621 • EU9635 • EU9638

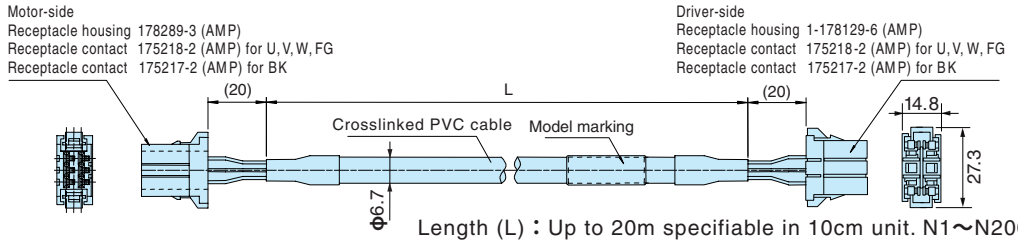
● For TA8410/TA8420 (Motor TBL-V series)



Length (L)：Up to 20m specifiable in 10cm unit. N1～N200

Model	Length(L)
EU9621 N 10	1m
N 30	3m
N 50	5m
N100	10m

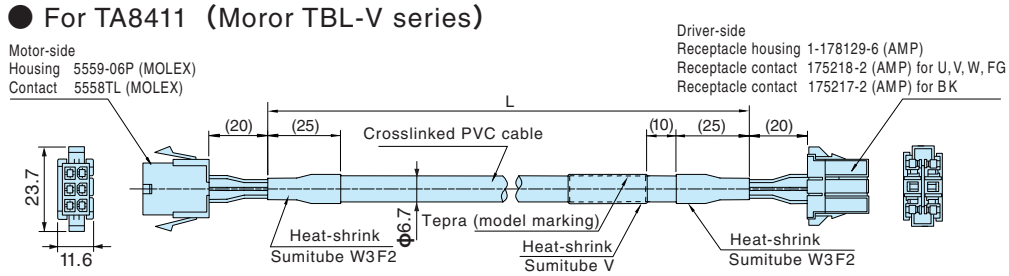
● For TA8411 (Motor TBL-iⅡ series)



Length (L)：Up to 20m specifiable in 10cm unit. N1～N200

Model	Length(L)
EU9635 N 10	1m
N 30	3m
N 50	5m
N100	10m

● For TA8411 (Moror TBL-V series)

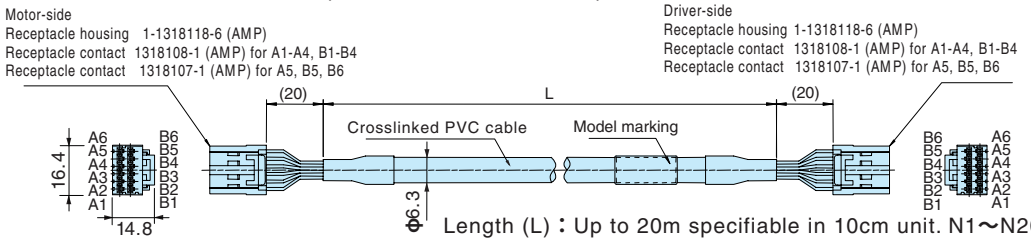


Length (L)：Up to 20m specifiable in 10cm unit. N1～N200

Model	Length(L)
EU9638 N 10	1m
N 30	3m
N 50	5m
N100	10m

Sensor Cables　EU9615 • EU9622 • EU9645 • EU9646

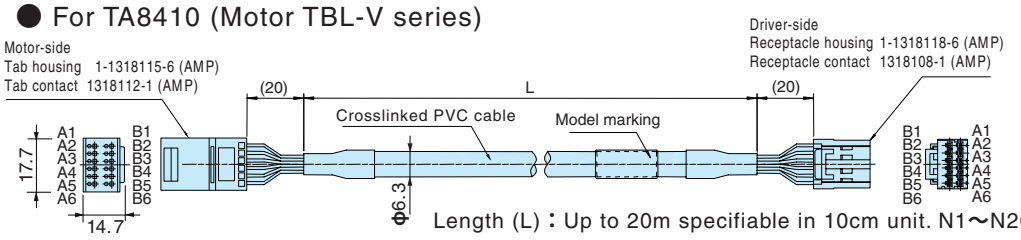
● For TA8410/TA8411 (Motor TBL-iⅡ series)



Length (L)：Up to 20m specifiable in 10cm unit. N1～N200

Model	Length(L)
EU9615 N 10	1m
N 30	3m
N 50	5m
N100	10m

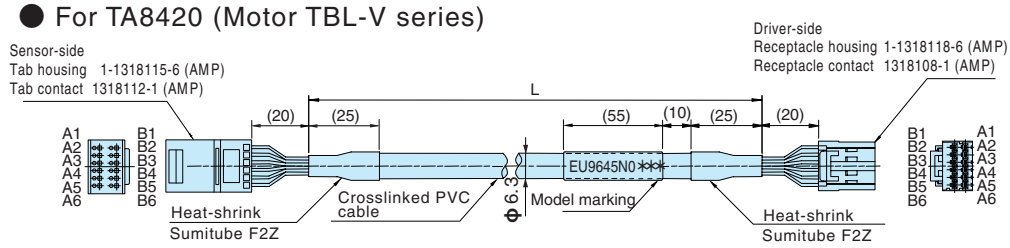
● For TA8410 (Motor TBL-V series)



Length (L)：Up to 20m specifiable in 10cm unit. N1～N200

Model	Length(L)
EU9622 N 10	1m
N 30	3m
N 50	5m
N100	10m

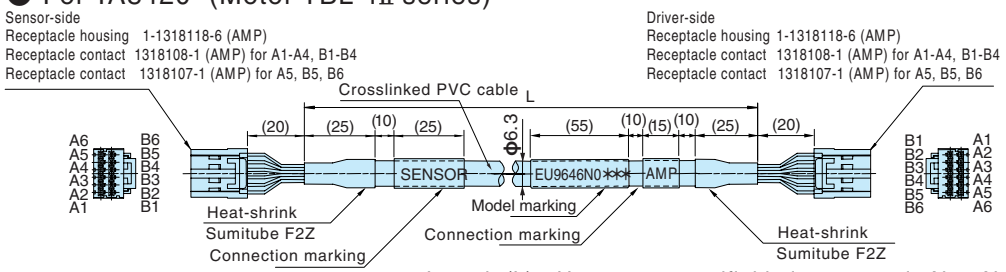
● For TA8420 (Motor TBL-V series)



Length (L)：Up to 20m specifiable in 10cm unit. N1～N200

Model	Length(L)
EU9645 N 10	1m
N 30	3m
N 50	5m
N100	10m

● For TA8420 (Motor TBL-iⅡ series)



Length (L)：Up to 20m specifiable in 10cm unit. N1～N200

形式	長さ(L)
EU9646 N 10	1m
N 30	3m
N 50	5m
N100	10m

Tamagawa

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