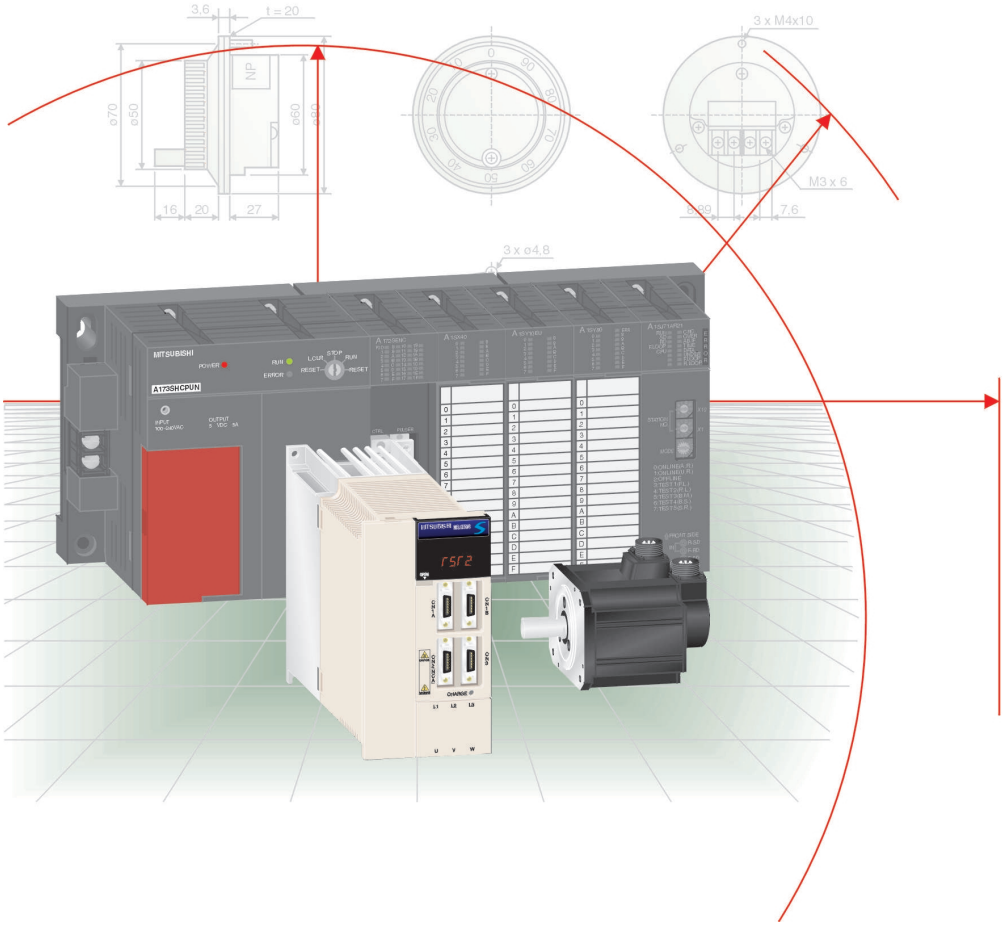
MITSUBISHI ELECTRIC

Controllers,
Servo Amplifiers
& Motors

Motion Controller MELSEC A



Technical Catalogue

2002/2003

Return

Mitsubishi Electric Motion Controllers

Motion Control Systems MELSEC A

Today's mechanical engineers demand superior motion control systems to keep pace with the rapidly-growing use of automation in modern plants and machinery.

Mitsubishi motion controllers are capable of controlling up to 32 servo axes using our reliable high speed SSCNET. With reduced wiring and easy connections, a very simple and flexible but powerful system can be achieved.

Mitsubishi motion systems give you the accuracy, power and high response that are critical to the success and profitability of your business. They enhance your machines' flexibility, reduce down times, optimise your machine administration and make it possible to achieve shorter delivery periods.

Further Publications within the Factory Automation Range

Technical Catalogues

Technical Catalogues Servo Amplifiers

Product catalogues for servo amplifiers, motors and accessories

Technical Catalogues MOTION System Q

Product catalogues for motion controller and accessories for the MELSEC System Q

Technical Catalogues Inverters

Product catalogues for frequency inverters, control panels, and accessories

Technical Catalogues PLCs

Product catalogues for programmable logic controllers and accessories for the MELSEC series

Technical Catalogue Networks

Product catalogue for Master and Slave modules as well as accessories for the use of programmable logic controllers in open networks and MELSEC networks

Technical Catalogue HMI

Product catalogue for operator terminals, process visualisation and programming software as well as accessories

Additional Services

You will find current information on updates, alterations, new items, and technical support on MITSUBISHI ELECTRIC's web pages (www.mitsubishi-automation.com).

The products section of the MITSUBISHI home site includes various documentations of the whole product range by MITSUBISHI ELECTRIC as well as the current version of this catalogue on hand. All manuals and catalogues can be downloaded. The content is updated daily and to date is provided in English and German.

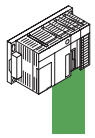
About this catalogue

Due to the constantly growing product range, technical alteration, and new or changed characteristical features, this catalogue is updated frequently.

Texts, figures and diagrams shown in this product catalogue are intended exclusively for explanation and assistance in planning and ordering the motion controllers and the associated accessories. Only the manuals supplied with the units are relevant for installation, commissioning and handling of the units and the accessories. The information given in these documentations must be read before installation and commissioning of the units or software.

Should questions arise with regard to the planning of modules described in this product catalogue, do not hesitate to contact the German branch of MITSUBISHI ELECTRIC EUROPE B.V. in Ratingen or one of its distributors (see cover page).

MOTION CONTROLLERS



Mitsubishi Motion Control

Motion control geared to the needs of your specific application

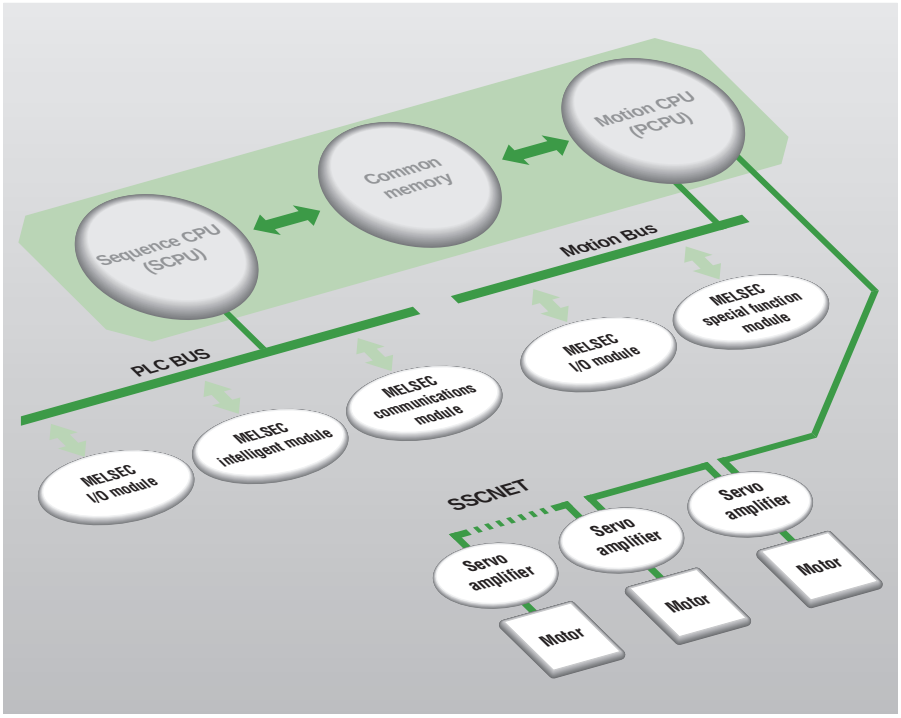
Now you can have a motion control CPU and a PLC CPU in one integrated unit!

While the motion CPU (PCPU) handles the motion control via a connected servo amp of the MR-J2S-□B series and motors of the HC-xxx□□ series the PLC CPU (SCPU) communicates with the programmer and the other system modules – for example I/O modules and special function modules of the MELSEC AnS/QnAS series. Both CPUs share common registers and memory, which drastically enhances efficiency and overall system performance.

Motion controllers can tap huge performance reserves for optimising production processes and improving product quality.

Today, motion controller systems play a dominant role in machine tools, printing and paper processing machines, modern packaging machines, filling and canning machines in the food industry, grinding, polishing and engraving machines, X-Y-Z indexing tables and many automation and handling systems in semiconductor production lines.

Mitsubishi motion controllers can contol 4 (A171CPUN), 8 (A172CPUN) or even up to 32 servo axes (A173UHCPU) simultaneously.



High speed synchronous communication network: SSCNET

SSCNET (Servo System Controller NETwork) is a high-speed synchronous serial communication network that delivers better performance and more reliability than conventional control networks. SSCNET supports batch control of up to 32 axes and fast and simple connections with one-touch bus cabling.

Powerful programming environment and programming tools

A powerful, Windows-based programming environment ensures a fast learning curve for new users, despite the power and complexity of the system.

The comprehensive range of standardised software tools cuts programming time. All parameters and settings are configured with a standard software package; no separate servo setup software is required!

The motion controller and its associated servo drives and motors are also configured directly on the computer screen. The individual combinations of system components are checked through automatically and any errors are signalled immediately, thus eliminating the possibility of system crashes!

Mitsubishi Electric's specially-developed SFC sequential function chart language isolates the system's multitasking operation from external influences. This means drastically faster servo amp response times and ultra-short movement cycles.

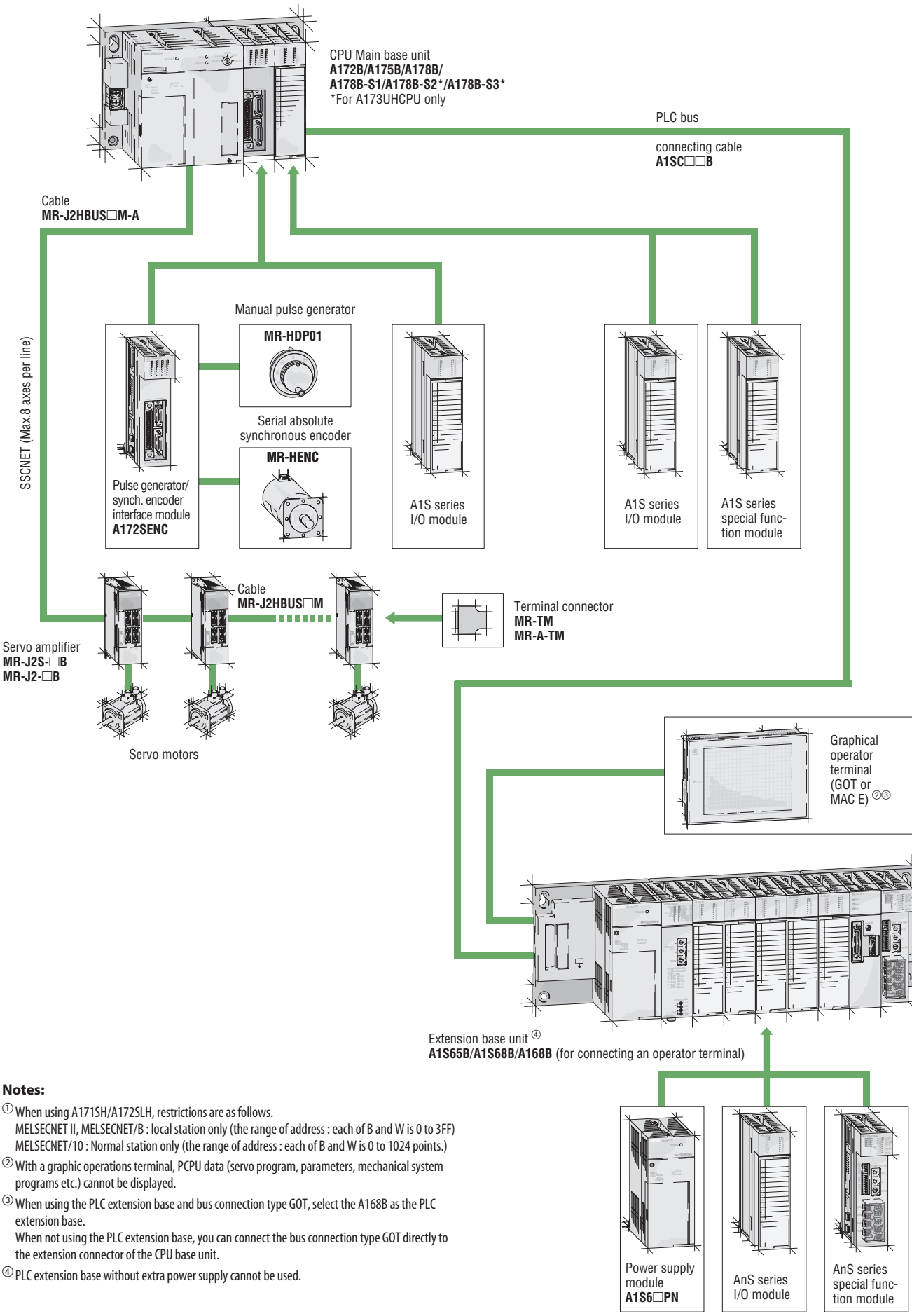
Mitsubishi motion controllers can synchronise up to 32 axes simultaneously. Programming is performed quickly and efficiently online with a Virtual Mechanical Editor. Mechanical master shafts, clutches and gears can be replaced by more efficient electronic versions. And you can forget about time-consuming text programming!

Complex mechanical processes can be solved with graphical cam disks (CAM). The logic of the motion controller is programmed in instruction list (IL), ladder diagram (LD), function block diagram (FBD) or in IEC 1131.3-compatible structured text.

System configuration (see figure on the right)

- The motion controller integrates motion and sequence control functionality in a single compact package. (220mm wide, 130mm high and 110mm deep) (A172B CPU base use).
- I/O capabilities can be expanded as follows by adding PLC extension units A 171SH : max. 512 points, A172SH : max. 1024* points and A173UH : max. 2048* points. One extension unit can be connected.
  *The real I/O points can be used within the range of the main base unit and one extension unit.
- Supports MELSECNET II, MELSECNET/B, MELSECNET/10 and CC-Link networks ①
- Batch control of 50 W – 7 kW servo motors is possible in combination with the MR-J2-B servo amps in an SSCNET communications network. A171SH: max. 4 axes; A172SH: max. 8 axes; A173UH: max. 32 axes.

System Overview (Configuration Example)



Notes:

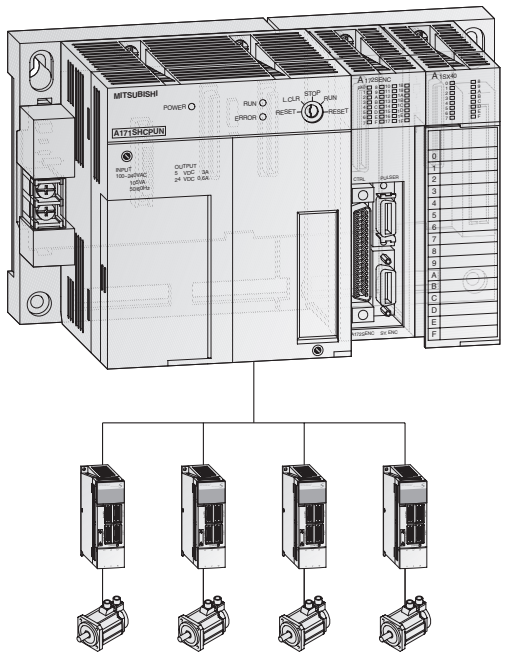
① When using A171SH/A172SLH, restrictions are as follows.
MELSECNET II, MELSECNET/B : local station only (the range of address : each of B and W is 0 to 3FF)
MELSECNET/10 : Normal station only (the range of address : each of B and W is 0 to 1024 points.)

② With a graphic operations terminal, PCPU data (servo program, parameters, mechanical system programs etc.) cannot be displayed.

③ When using the PLC extension base and bus connection type GOT, select the A168B as the PLC extension base.
When not using the PLC extension base, you can connect the bus connection type GOT directly to the extension connector of the CPU base unit.

④ PLC extension base without extra power supply cannot be used.

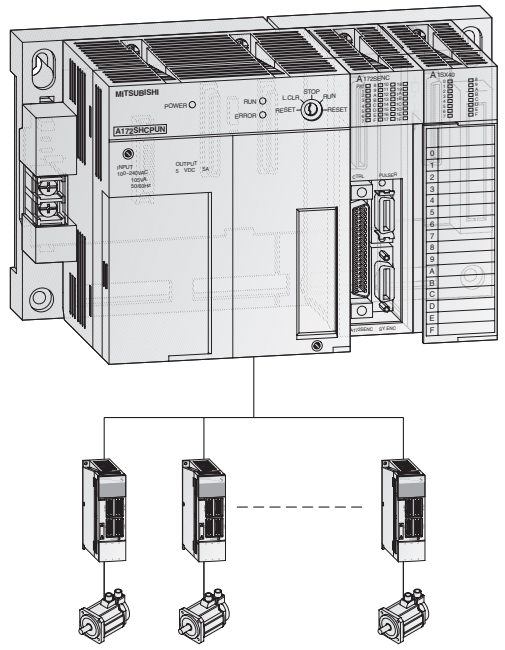
■ Motion Controller A171SHCPUN



Specifications	A171SHCPUN
PLC CPU	A2SHCPU equivalent
PLC program capacity	14 k steps
Real I/O points	512 points
Processing speed (sequence command)	0.25 µs/step
Control axes	Max. 4
Servo program capacity	13 k steps
Servo amplifier	External servo amplifier connected by SSCNET
Servo motor capacity	50 W to 7 kW
Network	MELSECNET II/B (local station only) MELSECNET/10 (normal station only) CC-LINK
PLC extension	Max. 1 base unit

Order information	Art. no.	103872

■ Motion Controller A172SHCPUN

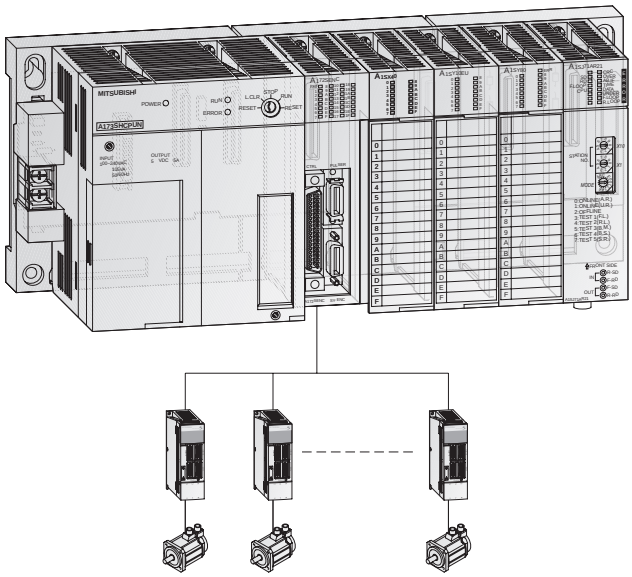


Specifications	A172SHCPUN
PLC CPU	A2SHCPU equivalent, but extended memory and extended I/O range
PLC program capacity	30 k steps
Real I/O points	1024 points ①
Processing speed (sequence command)	0.25 µs/step
Control axes	Max. 8
Servo program capacity	13 k steps
Servo amplifier	External servo amplifier connected by SSCNET
Servo motor capacity	50 W to 7 kW
Network	MELSECNET II/B (local station only) MELSECNET/10 (normal station only) CC-LINK
PLC extension	Max. 1 base unit

Order information	Art. no.	104173

① The real I/O points can be used within the range of CPU base and one extension base unit.

Motion Controller A173UHCPU

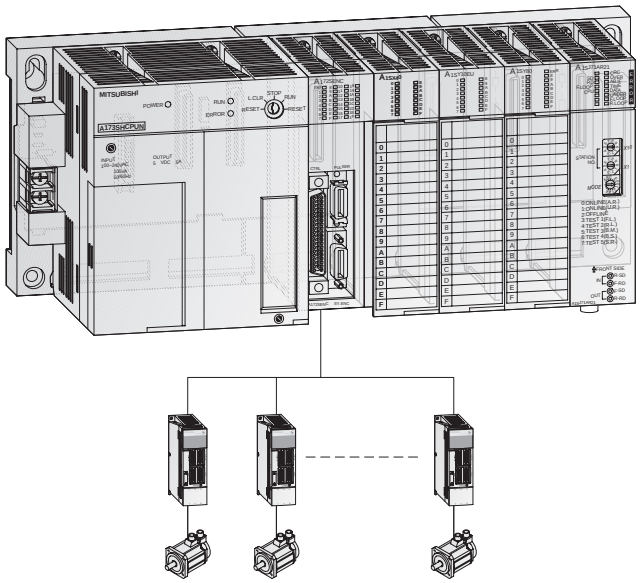


Specifications	A173UHCPU
PLC CPU	A3UCPU equivalent (192 kB RAM)
PLC program capacity	30 k steps x 2
Real I/O points	2048 points ①
Processing speed (sequence command)	0.15 µs/step
Control axes	Max. 32
Servo program capacity	13 k steps
Servo amplifier	External servo amplifier connected by SSCNET
Servo motor capacity	50 W to 7 kW
Network	MELSECNET II/B (local station only) MELSECNET/10 (normal station only) CC-LINK
PLC extension	Max. 1 base unit

Order information	Art. no.	130121

① The real I/O point can be used within the range of CPU base and one extension base.

Motion Controller A173UHCPU-S1



Specifications	A173UHCPU-S1
PLC CPU	A3UCPU equivalent (768 kB RAM)
PLC program capacity	30 k steps x 2
Real I/O points	2048 points ①
Processing speed (sequence command)	0.15 µs/step
Control axes	Max. 32
Servo program capacity	13 k steps
Servo amplifier	External servo amplifier connected by SSCNET
Servo motor capacity	50 W to 7 kW
Network	MELSECNET II/B (local station only) MELSECNET/10 (normal station only) CC-LINK
PLC extension	Max. 1 base unit

Order information	Art. no.	130153

① The real I/O point can be used within the range of CPU base and one extension base.

Overview on Hardware Components and Accessories

Item	Model	Description		Standard	Order no.
CPU module	A171SHCPUN	Sequence program capacity Servo program capacity PLC control real I/O point Internal power supply 5 V DC internal consumption current	Max. 14 k steps Max. 13 k steps Max. 512 Input: 100 to 240 V AC, output: 5 V DC 3 A, 24 V DC 0.6 A 1.63 A	UL/cUL CE marks	103872
	A172SHCPUN	Sequence program capacity Servo program capacity PLC control real I/O point Internal power supply 5 V DC internal consumption current	Max. 30 k steps Max. 13 k steps Max. 1024 Input: 100 to 240 V AC, output: 5 V DC 5 A 1.63 A		104173
	A173UHCPU	Sequence program capacity Servo program capacity PLC control real I/O point Internal power supply 5 V DC internal consumption current	Max. 60 k steps Max. 14 k steps Max. 2048 Input: 100 to 240 V AC, output: 5 V DC 5 A 1.90 A		103121
	A173UHCPU-S1				130153
CPU base unit	A172B	1 motion module slot and 1 PLC module slot can be fitted.		UL/cUL	86313
	A175B	1 motion module slot and 4 PLC module slots can be fitted.			125554
	A178B	1 motion module slot and 7 PLC module slots can be fitted.			104174
	A178B-S1	2 motion module slots and 6 PLC module slots can be fitted.			129431
	A178B-S2 ①	4 motion module slots and 4 PLC module slots can be fitted.			131239
	A178B-S3 ①	6 motion module slots can be fitted.			131240
Power supply module	A1S61PN	Input: 100 to 240 V AC, output: 5 V DC 5 A		UL/cUL CE marks	65051
	A1S62PN	Input: 100 to 240 V AC, output: 3 V DC 5 A, 24 V DC 0.6 A			65052
PLC extension base unit	A1S65B-S1	For extension power supply and 5 slots, compatible with system up to one extension stage.			38071
	A1S68B-S1	For extension power supply and 8 slots, compatible with system up to one extension stage.			38070
	A168B-S1	For extension power supply and 8 slots, compatible with system to bus-connected one extension stage and GOT.			137680
Extension cable	A1SC01B	Length: 55 mm		UL/cUL	24979
	A1SC03B	Length: 300 mm			24980
	A1SC12B	Length: 1200 mm			24981
	A1SC30B	Length: 3000 mm			24982
	A1SC60B	Length: 6000 mm			68294
	A1S05NB	Length: 450 mm			24983
Pulse generator/ synchronous encoder interface unit	A172SENC	I/O signal 33 points (FLS, RLS, STOP, DOG/CHANGE: 8 points each tracking input: 1 point) Dynamic brake command output: 1 point Manual pulse generator/synchronous encoder interface: 1 Serial absolute synchronous encoder interface: 1		UL/cUL	86621
Transistor output modules	A1SY□□	Please refer to the AnS/QnAS technical catalogue for further details			—
Digital input modules	A1SX□□	Please refer to the AnS/QnAS technical catalogue for further details			—
Battery	A6BAT	Replacement battery for CPU			4077
Manual pulse generator	MR-HDP01	5 V DC 25 pulses/rev, 100 pulses/rev at magnification of 4			128728
Serial absolute synchro-nous encoder cable	MR-HENC	Resolution: 16384 pulses/rev, permissible rotation speed: 4300 r/min, absolute type		UL/cUL	138304
Serial absolute synchro-nous encoder cables	MR-HSCBL□M	For connection of MR-HENC and A172SENC 2 m, 5 m, 10 m, 20 m, 30 m (please refer to the MR-J2S technical catalogue for further details)			—
SSC interface (ISA)	A30BD-PCF	ISA bus loaded type 2CH/board			134153
SSC interface (PCMCIA)	A30CD-PCF	PCMCIAI Type II 1CH/card			131237
Cable for ISA board	A270BDCBL03M	For A30BD-PCF, 3 m			134154
	A270BDCBL05M	For A30BD-PCF, 5 m			134155
	A270BDCBL10M	For A30BD-PCF, 10 m			134156
Cable for PCMCIA card	A270CDCBL03M	For A30CD-PCF, 3 m			131212
	A270CDCBL05M	For A30CD-PCF, 5 m			131213
	A270CDCBL10M	For A30CD-PCF, 10 m			131214

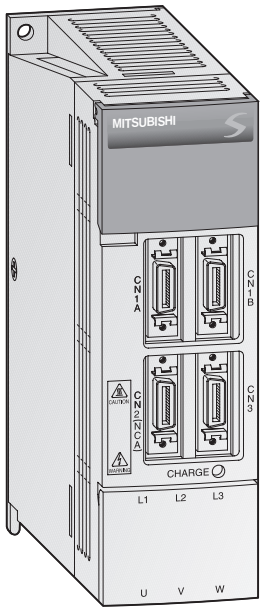
① For A173UHCPU only

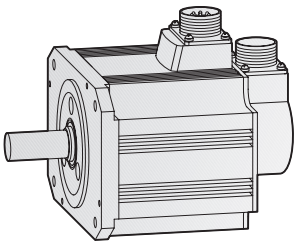
Overview on Servo Amplifiers and Motors

MELSERVO MR-J2S□B

The recommended combinations of servo amplifiers and servo motors are listed in the tables below.

For further details to the servo amplifiers please refer to the MELSERVO Technical Catalogue. There you can find detailed specifications to all servo motors .

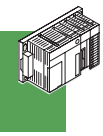




Motor Series	Rated Speed [r/min]	Rated Output Capacity [kW]	Servo Motor Model	Servo Motor Type: With Electromagnetic Brake (B) and Absolute Encoder	Protective Structure	Amplifier Pairing MR-J2S: 10B	20B	40B	60B	70B	100B	200B	350B	500B	700B
HC-KFS K	3000	0.05	HC-KFS053	●	IP55	●									
		0.1	HC-KFS13			●									
		0.2	HC-KFS23				●								
		0.4	HC-KFS43					●							
		0.75	HC-KFS73							●					
HC-MFS M	3000	0.05	HC-MFS053	●	IP55	●									
		0.1	HC-MFS13			●									
		0.2	HC-MFS23				●								
		0.4	HC-MFS43					●							
		0.75	HC-MFS73							●					
HC-SFS S	2000	0.5	HC-SFS52	●	IP65				●						
		1.0	HC-SFS102								●				
		1.5	HC-SFS152									●			
		2.0	HC-SFS202									●			
		3.5	HC-SFS352										●		
		5.0	HC-SFS502											●	
		7.0	HC-SFS702												●
HC-RFS R	3000	1.0	HC-RFS103	●	IP65							●			
		1.5	HC-RFS153									●			
		2.0	HC-RFS203										●		
		3.5	HC-RFS353											●	
		5.0	HC-RFS503											●	

For further details please refer to the MR-J2-Super Technical Catalogue.

CPU Specifications



The motion control systems A171SHCPU for up to 4 axes, A172SHCPUN for up to 8 axes and A173UHCPU (-S1) for up to 32 axes all have an integrated CPU that functions as a positioning unit (PCPU). This CPU controls all the movement functions, such as absolute and incremental positioning, multi-axis interpolation, zero point return and servo status monitoring.

The logic CPU (SCPU) of the motion controller system can be programmed in instruction list (IL), ladder diagram (LD), function block diagram (FBD), structured text or the motion sequential function chart (SFC) IEC 1131.3 standard-compliant sequencing language.

■ PCPU Motion SFC Specifications

Item			A172SHCPUN	A173UHCPU (-S1)
Program capacity	Code total (Motion SFC chart+Operation control+Transition)		287 kbytes	
	Text total (Operation control+Transition)		224 kbytes	
	Motion control program		52 kbytes	Approx. 56 kbytes
Program storage area	Code•Motion control program		PCPU SRAM	
	Text		PCPU SRAM	
Motion SFC program	Number of Motion SFC programs		256 (No- 0 to 255)	
	Number of Motion SFC steps/all programs (1 step + 1 transition)		Max. approx. 7.5 k steps (varies with the number of operationcontrol program and transition program steps)	
	Motion SFC program name/program		16 bytes (program name is used as a file name)	
	Motion SFC chart size/programs		Max. 64 kbytes (included Motion SFC chart comments)	
	Motion SFC steps/program		Max. 4094 steps	
	Motion SFC chart comments		Max. 80 characters/symbol	
Operation control program (F/FS) Transition program (G)	Number of operation control programs	Once execution type	4096 (F0 to F4095)	4096 with F and FS combined (F/FS0 to F/FS4095)
		Scan execution type	4096 (FS0 to FS4095)	
	Number of transition programs		4096 (G0 to G4095)	
	Code-size/program		Max. approx. 64 kbytes (32766 steps)	
	Text-size/program		Max. approx. 64 kbytes	
	Number of blocks (lines)/program		Max. 8192 blocks (in the case of 4 steps(min)/block)	
	Number of characters/block (line)		Max. 128 characters (comment included)	
	Number of operand/block (line)		Max. 64 (operand: constants, word devices, bit devices)	
Motion control program	Number of servo programs		4096 (K0 to K4095)	
	Program steps/all programs		13312	14334
	Program steps/program		Max. 13312 steps (Speed control, speed change control)	
	Positioning points		Approx. 800 points/axis	Approx. 400 points/axis
Executed specification	Number of multi executed programs		Max. 256	
	Number of multi active steps		Max. 256 steps/all programs	
	Executed task	Normal task	Executed in motion main cycle	
		Event task	Fixed cycle (1.7 ms, 3.5 ms, 7.1 ms, 14.2 ms) 16 external interrupt points (input from interrupt input module installed in motion slot.) Execute with interrupt from PLC 1 point (when PLC dedicated instruction [ITP] is executed.)	
		NMI task	16 external interrupt points (input from interrupt input module installed in motion slot.) Add event task and NMI task 16 points (set in SFC parameter)	
Device	Number of motion register (#0)		8192 points (#0 to #8191) (#8000 to #8191 is dedicated device)	
	Number of coasting timer (FT)		1 point (FT) (888 µs timer (32 bit))	
	Number of motion slot I/O (PX/PY)		Total 64 points	Total 256 points

■ SCPUs (PLC) Specifications

Specifications			A171SH	A172SH	A173UH	A173UH-S1
Control method			Related operation using stored program			
I/O control method			Refresh mode/direct mode (possible to select)		Refresh mode (direct mode can be used partially in accordance with the instruction	
Programming language			Sequence control dedicated language (relay symbol language, logic symbol language, MELSAP II (SFC))			
Number of instructions	Sequence instructions		26	26	22	22
	Basic instructions		131	131	252	252
	Applied instructions		106	106	204	204
	Motion instructions		4	4	4	4
Processing speed (Sequece instruction)	Direct mode		0.25 to 1.9 µs/step	0.25 to 1.9 µs/step	—	—
	Refresh mode		0.25 µs/step	0.25 µs/step	0.15 µs/step	0.15 µs/step
I/O points ①			2048 (X/Y0 to 7FF)	2048 (X/Y0 to 7FF)	8192 (X/Y0 to 1FFF)	8192 (X/Y0 to 1FFF)
Real I/O points			512 (X/Y0 to 1FF)	1024 (X/Y0 to 3FF)	2048 (X/Y0 to 7FF) (within the range of 1 extension base)	2048 (X/Y0 to 7FF) (within the range of 1 extension base)
Watchdog timer (WDT)			10 to 2000 ms	10 to 2000 ms	200 ms	200 ms
Memory capacity (built-in RAM			64 kbytes	192 kbytes	192 kbytes	768 kbytes
Program capacity	Main sequence		Max. 14 k steps	Max. 30 k steps	Max. 30 k steps	Max. 30 k steps
	Sub sequence		—	—	Max. 30 k steps	Max. 30 k steps
	Microcomputer program		Max. 26 kbytes	Max. 58 kbytes	—	—
Device	Internal relay (M) ①		1000 points (M0 to M999)	Total 2048 points (set in parameters)	Total 8191 points (set in parameters)	Total 8191 points (set in parameters)
	Latch relay (L)		1048 points (L1000 to L2047)			
	Step relay (S)		0 point (none at initial)			
	Link relay (B)		1024 points (B0 to B3FF)	1024 points (B0 to B3FF)	8192 points (B0 to B1FFF)	8192 points (B0 to B1FFF)
	Timer (T)	Points	256	256	2048 (default 256)	2048 (default 256)
		Specifications	100 ms timer 10 ms timer 100 ms timer retentive timer Set in parameter **Setting time** 0.1 to 3276.7 s 0.01 to 327.67 s 0.1 to 3276.7 s **Device** T0 to T199 T200 to T255 None at initial		100 ms timer 10 ms timer 100 ms timer retentive timer Extension timer Set in parameter	0.1 to 3276.7 s 0.01 to 327.67 s 0.1 to 3276.7 s Time set by word device (D, W and R) **Setting time** **Device** T0 to T199 T200 to T255 None at initial T256 to T2047
	Counter (C)	Points	256	256	1024 (default 256)	1024 (default 256)
		Specifications	Normal counter Interrupt program counter Set in parameter **Setting range** 1 to 32767 1 to 32767 **Device** C0 to C255 None at initial		Normal counter Interrupt program counter Extension counter Set in parameter	1 to 32767 1 to 32767 Count value set by word device (D, W and R) **Setting range** **Device** C0 to C255 None at initial C256 to C1023
	Data register (D) ①		1024 points (D0 to D1023)	1024 points (D0 to D1023)	8192 points (D0 to D8191)	8192 points (D0 to D8191)
	Link register (W)		1024 points (W0 to W3FF)	1024 points (W0 to W3FF)	8192 points (W0 to W1FFF)	8192 points (W0 to W1FFF)
	Annunciator (F)		256 points (F0 to F255)	256 points (F0 to F255)	2048 points (F0 to F2047)	2048 points (F0 to F2047)
	File register (F)		Max. 8192 points (R0 to R8191) (set in paramater)			
	Accumulator (A)		2 points (A0, A1)	2 points (A0, A1)	2 points (A0, A1)	2 points (A0, A1)
	Index register (V, Z)		2 points (V, Z)	2 points (V, Z)	14 points (V, V1 to V6, Z, Z1 to Z6)	
	Pointer (P)		256 points (P0 to P255)	256 points (P0 to P255)	256 points (P0 to P255)	256 points (P0 to P255)
	Interrupt pointer (I)		32 points (I0 to I31)	32 points (I0 to I31)	32 points (I0 to I31)	32 points (I0 to I31)
	Special relay (M)		256 points (M9000 to M9255)	256 points (M9000 to M9255)	256 points (M9000 to M9255)	256 points (M9000 to M9255)
	Special register (D)		256 points (D9000 to D9255)	256 points (D9000 to D9255)	256 points (D9000 to D9255)	256 points (D9000 to D9255)
Extension file register blocks ②			—	—	Max. 10 blocks (depends on memory size)	Max. 46 blocks (depends on memory size)
Comment points			Max. 4032 points (64 kbytes), 1 point = 16 kbytes; set in 64 points unit			
Extension comment points ②			Max. 3968 points (63 kbytes), 1 point = 16 kbytes; set in 64 points unit			
Self-diagnostic function			Operation error monitoring and detection of errors in CPU, I/O, battery etc.			
Operation mode in error			Select of stop or continue			
Output mode when switching from STOP to RUN			Select of re-output operation status before STOP (default) or output after operation execution			
Clock function ③			Year, month, day, hour, minute, weekday (automatic leap year adjustment)			
Program/parameter conversion to ROM			Not available			

① The positioning dedicated device range varies with the positioning software.

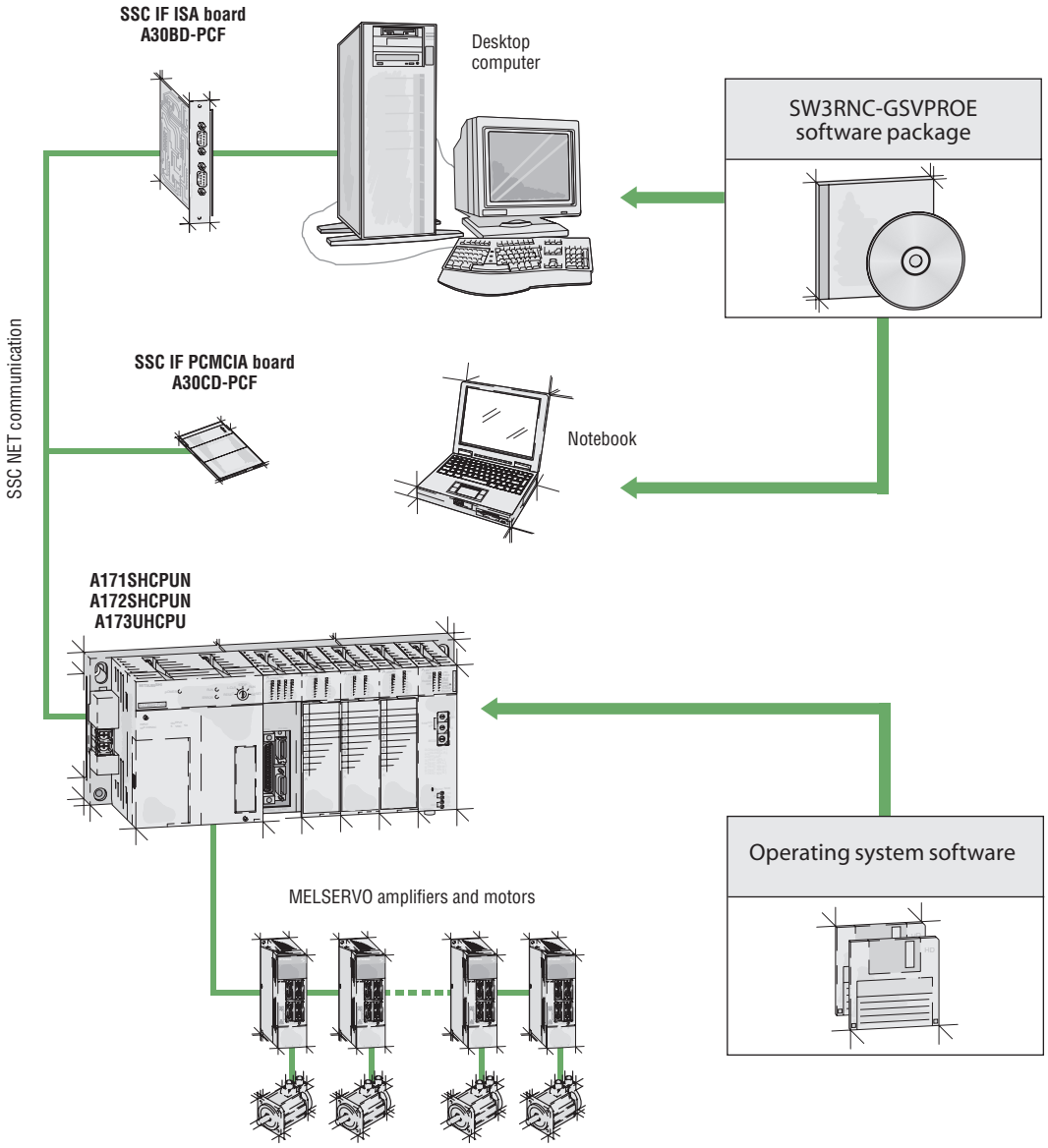
② This changes depending on the sequence parameter.

③ The year data by the clock element is only the lower two digits of the year. When used in sequence control, the data must be compensated for the sequence program in some applications of using the data.

Components for Motion Controller Programming

The motion controller supports any of the personal computers on the market and an general use, so it can be used with familiar environment. The most appropriate programming environment for users is provided.

On the following pages you can find an overview on all hardware and software peripheral equipment.



■ System Requirements

A PC/AT compatible personal computer with Windows operationg system an the specifications listed in the table is needed to operate the software properly.

Specifications	Description
Operating system	Windows NT 4.0, Windows 98, WIN2000
CPU	133 MHz Pentium or higher
Memory capacity	32 MB or more
Hard disk capacity	About 150 MB free space
Display	Standard graphics adapter with 800 x 600 pixles and minimum 256 colours
Application software	Microsoft Word 97 and Excel 97 (for document printing)

■ Operating System Software Packages

The following table lists an overview of the required operating system for the motion CPUs.

The systems are chosen on the basis of the operating mode and the number of axes to be controlled.

Application	Peripheral device	Model A171SHCPUN	Order no.	Model A172SHCPUN	Order no.	Model A173UHCPUN	Order no.
Software **SV13** (Motion-SFC)	PC/AT compatible	—	—	SW3RN-SV13D	137346	SW3RN-SV13B	137343
Software **SV22** (Motion-SFC)		—	—	SW3RN-SV22C	137344	SW3RN-SV22A	137342
Software **SV13** (without Motion-SFC)		SW0SRX-SV13G	127843	SW0SRX-SV13D	127844	SW2SRX-SV13B	137337
Software **SV22** (without Motion-SFC)		SW0SRX-SV22F	139766	SW0SRX-SV22C	86757	SW2SRX-SV22A	137341

■ Programming Software Package

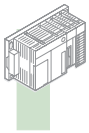
The programming software package includes all the programs listed in the table below for effective programming of your motion control system.

The package also includes a separate CD-ROM with a comprehensive online help function (SW3RNC-GSVE-HELP).

SW3RNC-GSVE Software Package Contents		Description	Order no.
SW3RN-GSV13P **SW3RN-GSV22P**	Installation	Installation of motion OS Comparision of the motion OS	132876
	Project management	New creation, setting and reading of projects Batch management of user files in project units	
	System setting	Setting of system configuration (motion module/servo amplifier/servo motor, etc.) Setting of high-speed read data	
	Servo data setting	Setting of servo parameters and fixed parameters, etc. (Explenatory diagrams displayed with one-touch help) Setting of limit switch output data (Output pattern displayed with waveform display function)	
	Program editing	Editing of the Motion SFC program, setting of the Motion SFC parameters Reduced display of the Motion SFC program, display of comments, enlarged display Monitor of the Motion SFC, debugging of the Motion SFC	
	Mechanical system editing (GSV22P only)	Editing of mechanical system program Monitoring of mechanical system program execution state	
	Communication	Setting of SSCNET communication CH. Writing , reading and coparision of programs and parameters in respect to the motion controller.	
	Monitoring	Current value monitor, axis monitor, error history Servo monitor, limit switch output monitor	
	Testing	Servo start-up, servo diagnosis Jog operation, manual pulser operation, zeroing test, program operation Teaching, error reset, current value change	
	Backup	Backup of motion controller programs and parameters in file Batch writing of backed up files into the motion CPU	
Cam data creation software **SW3RN-CAMP**	Cam data creation	Backup of motion creation wit Cam pattern selection and free curve setting Graphic display of Cam control status	
Digital oscilloscope software **SW3RN-DOSCP**	Digital oscilloscope	Data sampling synchronized to operation cycle Waveform display, dump display and file saving of collected data	
Communication system software **SW3RN-SNETP**	Communication system Communication API	Communication task, communication manager, common memory server, SSCNET communication driver Support of cyclic communication, transient communication, high-speed refresh communication Communication API functions compatible with VC++/VB	
Document printing software **SW3RN-SNETP** ①	Printing	Printing of program, parameter and system settings (Convert into Word 97 or Excel 97 document form, and print)	
Ladder editing software **SW3RN-LADDEP**	Ladder editing	Editing of sequence program Monitoring of sequence program execution	

① Microsoft Word 97 and Excel 97 or above are required.

Software Contents and Functionality



Software: conveyor assembly (SV13)

The SV13 software includes functions for speed control, linear interpolation of up to 4 axes, circular interpolation of 2 axes etc. This software is particularly well suited for controlling standard conveyor and production systems.

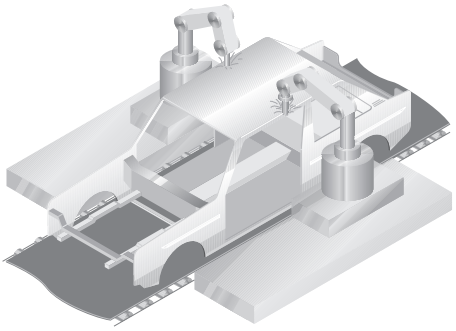
Software: virtual mechanical system environment (SV22)

The SV22 software supports synchronous control of multiple servo motors and electronic cam disk programming. The SV22 software can also be used to replace mechanical master shafts, clutches and gears with electronic equivalents. Virtual and real master axes are also supported.

Specifications		SV13	SV22
Number of control axes		A173UHCPU (-S1): max. 32 axes A172SHCPUN: max. 8 axes A171SHCPUN: max. 4 axes	
Interpolation function		Linear interpolation (max. 4 axes) Circular interpolation (2 axes)	
Control method		PTP (point to point), speed control, fixed-pitch feed, speed position control, constant speed control, speed-switching control, position follow-up control, high speed oscillation	PTP (point to point), speed control, synchronouos control, fixed-pitch feed, speed position control, constant speed control, speed-switching control, position follow-up control
Control unit		mm, inch, degree, pulse	
Positioning	Method	PTP: Constant-speed, speed-position-switching control: Fixed-pitch feed, speed-position control: Position follow-up control	Absolute method/select of absolute or incremental method Absolute method/both absolute and incremental method can be used together Incremental method Absolute method
	Position command	Control units mm inches degrees pulse	Command units x 10^{-1} µm x 10^{-5} inches x 10^{-5} degrees pulses	Address setting range -2147483648 to 2147483647 -2147483648 to 2147483647 0 to 35999999 -2147483648 to 2147483647
	Speed command	Control units mm inches degrees pulses	Speed setting range 0.01 to 6000000.00 mm/min 0.001 to 600000.000 inches/min 0.001 to 2147483.647 degrees/min 1 to 10000000 pulses/s	
	Acceleration/ deceleration control	Automatic trapezoidal acceleration/deceleration	Acceleration fixed acceleration/deceleration Acceleration time: 1 to 65535 ms Deceleration time: 1 to 65535 ms	Time fixed acceleration/deceleration Acceleration/deceleration time: 1 to 50000 ms (only constant-speed control)
		S-curve acceleration/deceleration	S-curve ratio: 0 to 100 %	
Compensation	Backlash compensation	(0 to 65535) x Position command unit (0 to 65535 pulses with unit converted into pulses)	
	Electronic gear	Function to compensate for real travel error against command value	
Program	Language	Dedicated instructions (Motion SFC, servo program)	Dedicated instructions (Motion SFC, servo program, mechanical support language)
	Capacity	A173UHCPU (-S1): 14 k steps (14336 steps) A172SHCPUN: 13 k steps (13312 steps) A171SHCPUN: 13 k steps (13312 steps)	
	Number of positioning point	A173UHCPU (-S1): 100 points/axis A172SHCPUN: 400 points/axis A171SHCPUN: 800 points/axis Positioning data can be designated indirectly.	
	Tool	PC/AT compatible computer or notebook	
Zeroing function		Absolute positioning system is not necessary: Absolute positioning system is recommended:	Proximity dog type or count can be selected. Data setting type, proximity dog type or count can be selected.
JOG operation function		Available	
Manual pulse generator operation function		A173UHCPU (-S1): 3 units A172SHCPUN: 1 unit A171SHCPUN: 1 unit All units can be connected.	
M-function		M-code output function	
Limit switch output function		ON/OFF settings can be made for each axis up to 10 points, 8 output points for each axis	
Absolut position system		Made compatible by fitting battery to servo amplifier (absolute or incremental system can be specified per axis)	

Application Ranges of the Programming Software Packages

SW3RN-GSV13P Motion SV13



Software: conveyor assembly

With this software constant-speed control, speed control, 1 to 4-axes linear interpolation and 2-axes circular interpolation, etc are possible. Ideal for use in standard conveyors and assembly machines.

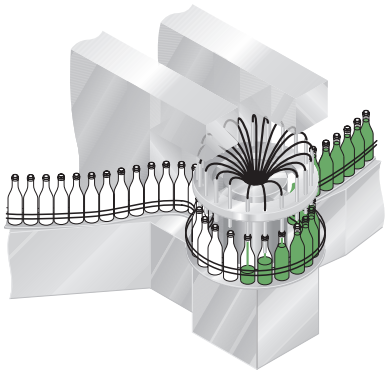
Application examples:

- Electronic component assembly
- Inserter
- Feeder
- Molder
- Conveying equipment
- Paint applicator
- Chip mounter
- Wafer slicer
- Loader/Unloader
- Bonding machine
- X-Y table

Special features:

- Linear interpolation (1 to 4-axes)
- Circular interpolation (1 to 2-axes)
- Constant-speed control
- Fixed-pitch feed
- Speed change control
- Speed control
- Speed-positionswitching
- Teaching function

SW3RN-GSV22P Motion SV22



Software with virtual mechanical system environment and cam control

This software package provides simultaneous control of multiple servo motors and offers software cam control. Ideal for use in automatic machinery. The software provides the option to replace formerly used mechanical vertical shafts, clutches, and gearings by electronic systems. Moreover, virtual and real master axes can be realized.

Application examples:

- Press feeder
- Food processing
- Food packaging
- Winding machine
- Spinning machine
- Textile machine
- Printing machine
- Book binder
- Tire molder
- Paper-making machine

Special features:

- Synchronous control
- Electronic shaft
- Electronic clutch
- Electronic cam
- Draw Control

Application Ranges for Motion SV13 Software Environment

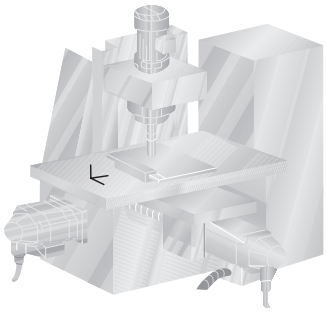
Simple programming using dedicated commands

By using easily understood dedicated servo command and sequence commands positioning and locus control can be programmed for your needs.

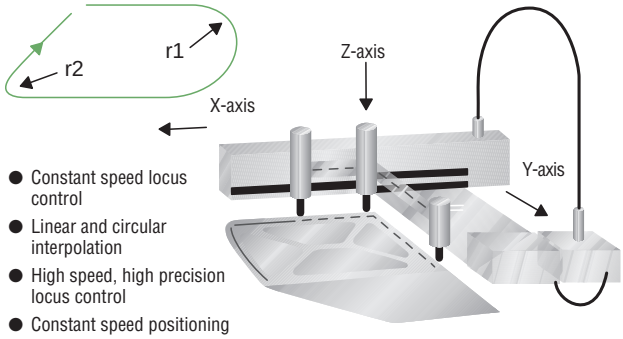
Control which is considered difficult and complex can be carried out simply using a variety of canned motion control functions.

X-Y table control

- 2-axes linear interpolation
- 3-axes linear interpolation
- 2-axes circular interpolation
- Constant speed locus control

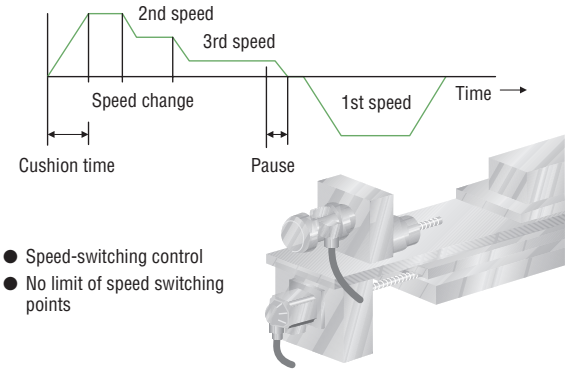


Sealing



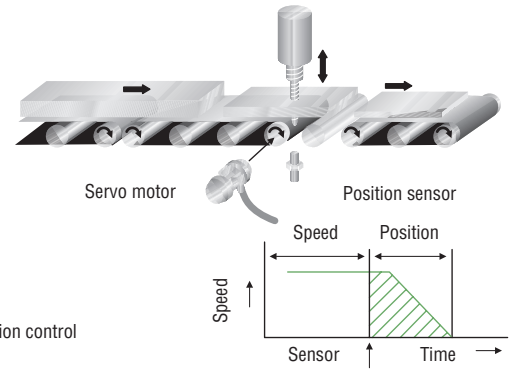
- Constant speed locus control
- Linear and circular interpolation
- High speed, high precision locus control
- Constant speed positioning

Feed control



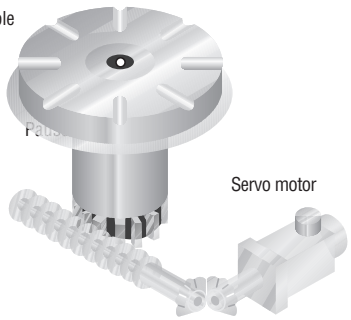
- Speed-switching control
- No limit of speed switching points

Fixed-pitch hole drilling



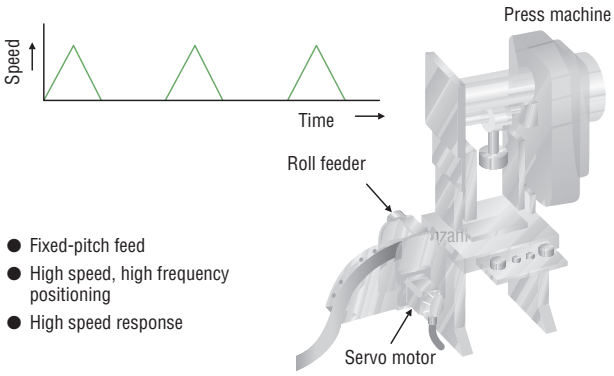
- Speed-position control

Rotary table indexing



- Control unit: degree setting
- Shorter indexing
- Rotation direction indexing

Roll feeder



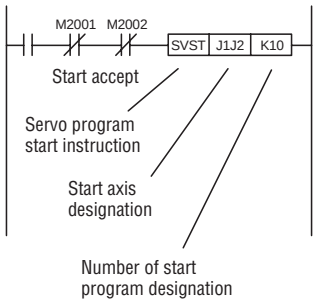
- Fixed-pitch feed
- High speed, high frequency positioning
- High speed response

Motion SV13 Software Functionality

SCPU control range (Sequence CPU)

PCPU control range (Motion CPU)

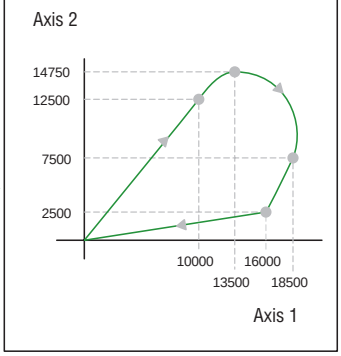
Sample sequence program



Please refer to page 22 regarding control flow of "Motion SFC SV13".

Sample servo program

```
<K10>
5 CPSTART2                                  ---------- 2-axes constant-speed control
    Axis        1,
    Axis        2,
    Speed               1000.00 (mm/min.)   -- Combined speed
1 ICN-2                                     ---------- Incremental linear interpolation
    Axis        1,      10000.0 (µm)
    Axis        2,      12500.0 (µm)
2 ABS                                       ---------- Absolute auxiliary point setting
    Axis        1,      18500.0 (µm)                   Circular interpolation
    Axis        2,       7500.0 (µm)
    Auxiliary   P 1,    13500.0 (µm)
    Auxiliary   P 2,    14750.0 (µm)
    M-code              10                  ---------- M code output
3 ABS-2
    Axis        1,      D2000   (µm)        ---- Indirect designation
    Axis        2,      D2002   (µm)
    M-code              11
4 ABS-2
    Axis        1,      0.0     (µm)
    Axis        2,      0.0     (µm)
    Speed               800.00  (mm/min.)
    M-code              12
5 CPEND
```



Positioning parameter

System setting
Servo parameters
Fixed parameters
Parameter block
JOG operation data
Limit switch output data

SV22 Software with Virtual Mechanical System Environment and Software Cam Curve Control

Software is used for mechanism operation

Control of hardware such as main shafts, gears, cluthes and cams is handled by the software mechanical modules, conventional problems ar solved.

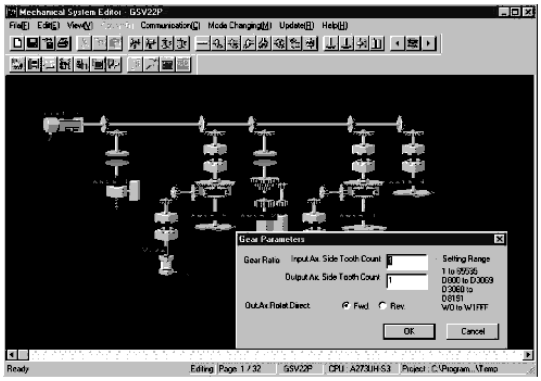
- The machine is more compact and costs are lower.
- There no worries over friction and service life of main shafts, gear and clutches.
- Changing initial setup is simple.
- Eliminating mechanical precision errors and boosting system performance.

Control through advanced software cam

Since cam control is handled by software, there are no problems with error caused by conventional cam control. The ideal cam pattern control can be achieved. Ideal in applications such as raising or lowering control of nozzles in contact with liquid surfaces, control of amount of filler or smooth conveyance control. Changing of cams when product types alter is also easy to handle by simply adjusting the cam pattern.

Easy programming on sceen by using a mouse

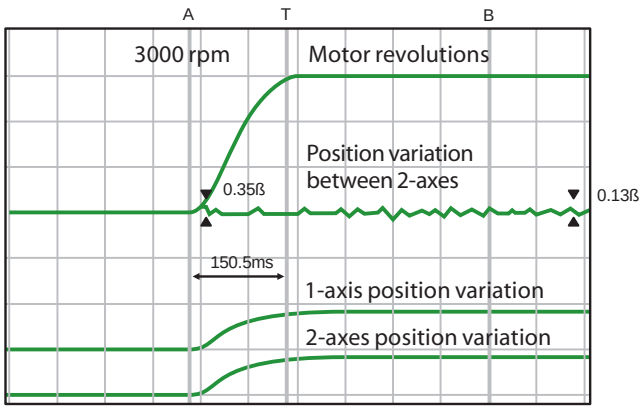
The screenshot below shows an typical example of an monitor screen with mechanical support language.



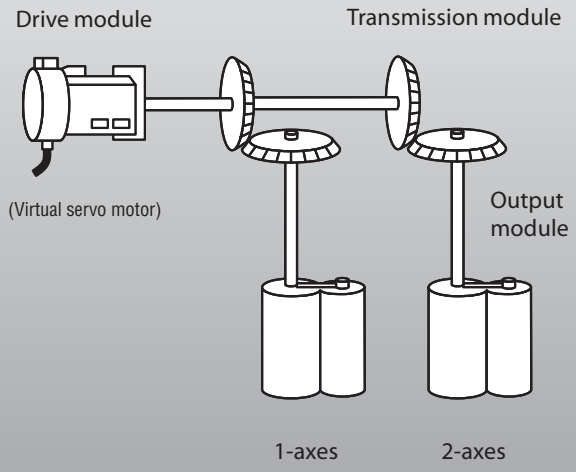
Simplified Synchronous Control

The servo motor can be operated simultaneously with other motor control conditions. Using the mechanical support language, synchronous control settings can be made simply, and synchronous operation is carried out with little traching delay.

Position variation between 2-axes during synchronous control is shown in the diagram below.



Synchronous control mechanical system program



Application Ranges for Motion SV22 Software Environment

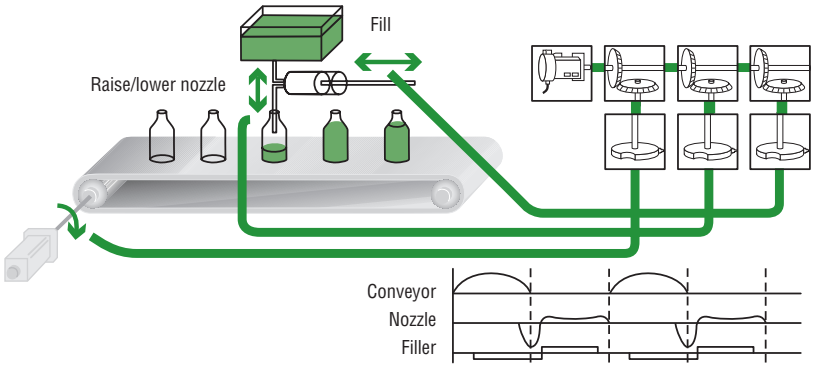
Easy on-screen programming using the mechanical support language.

Loaded with a mechanical support language that allows easy programming of the machine mechanism. Ideal for controlling automated machines such as food machines and wrappers.

By freely combining a variety of software mechanism modules and cam patterns, complex synchronization control and coordinated control can be achieved easily and low cost.

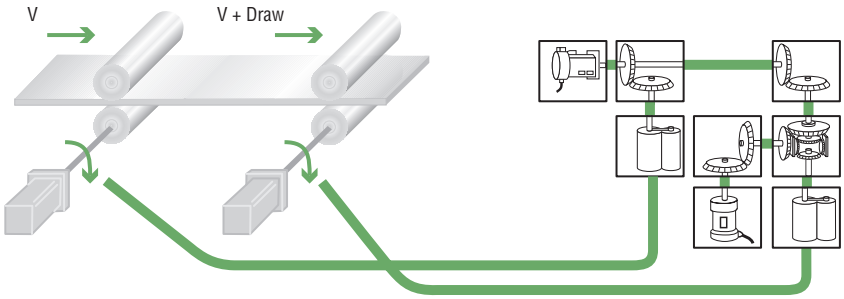
Filling machine

The extremely high-speed controllers and ultra-precision positioning performance of these Mitsubishi systems make them ideal for dynamic filling processes. The flexibility of the system – for the example the ability to choose from a variety of movement profiles and cam disks – enables quick format changes, which means you can fill different containers on a single machine.



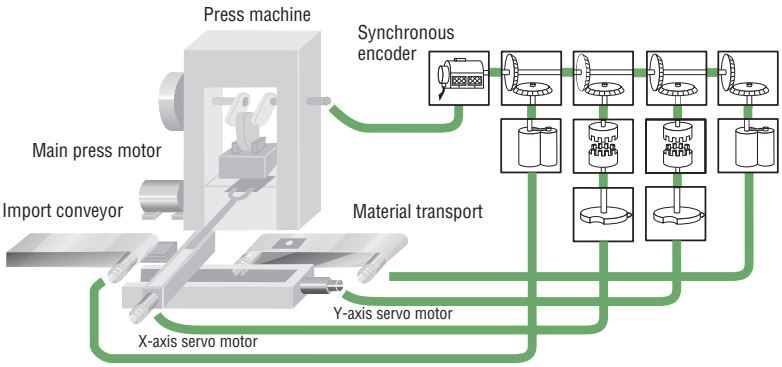
Rolling mill

The ability to synchronise the speeds of multiple motors is essential for maintaining the synchronised feed rates needed to keep the rolling mill output thickness precisely constant.



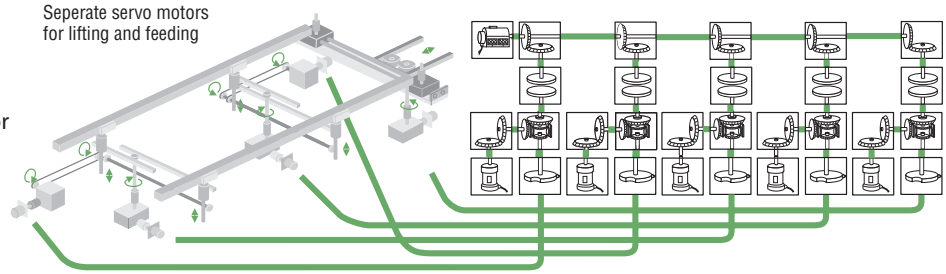
Press conveyor

Mitsubishi motion controllers are also the ideal solution in applications where a large number of different axes need to be synchronised for optimum performance. In addition to precisely synchronising multiple axes (see example on the right) they guarantee smooth, jerk-free and extremely high-precision positioning.

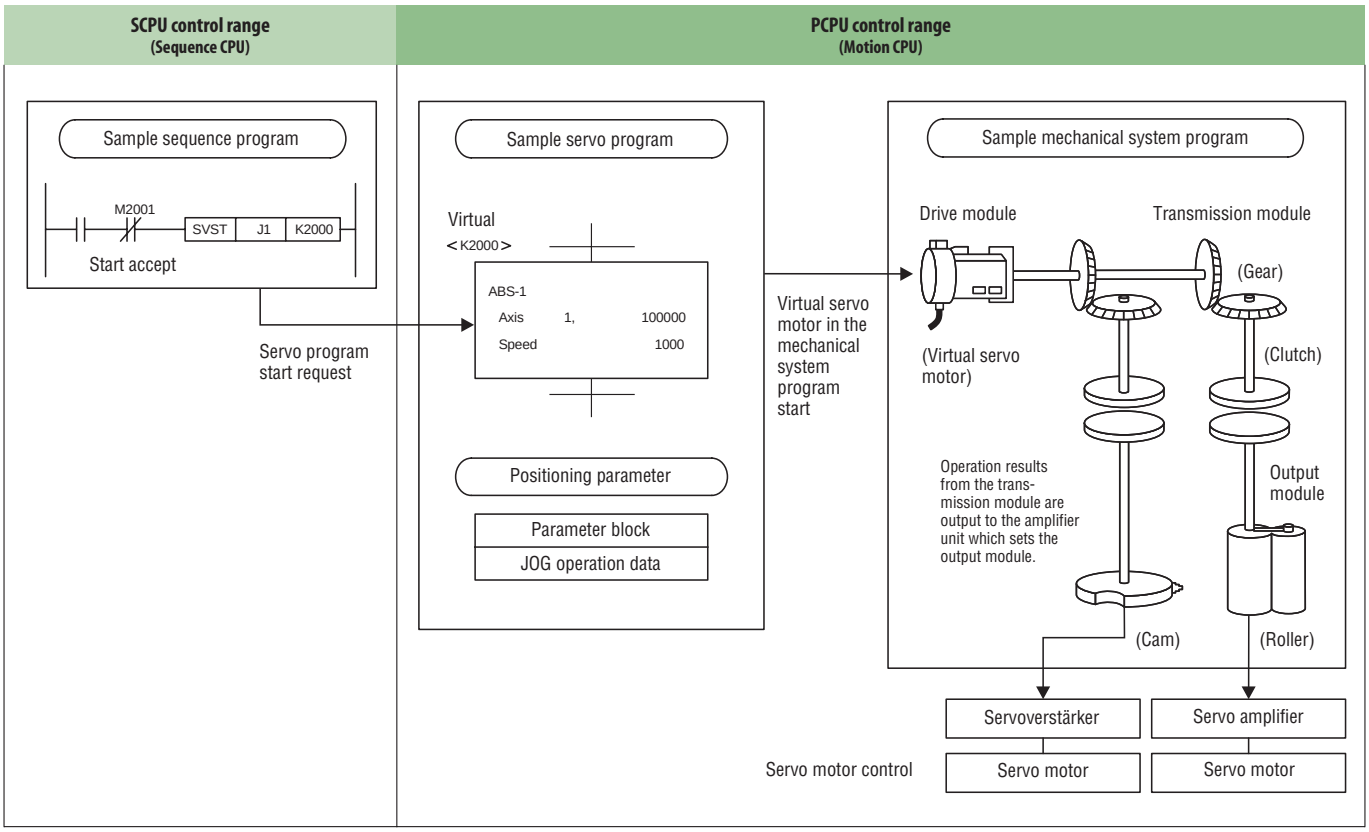


Palletising and sorting

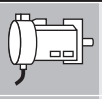
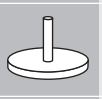
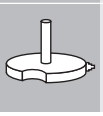
At the press of a button the system sorts and stacks the chosen stacking plan, supporting a choice of different stacking and warehousing plans. Curve interpolation for single or multiple axes enables dynamic positioning performance.

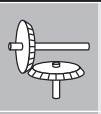
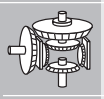
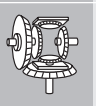


Motion SV22 Software Functionality



Mechanical Module List

Mechanism Section	Mechanical Module Name	Mechanical Module Appearance	Function
Drive module	Virtual servo motor		Used to drive the virtual axis in the mechanical system program by the servo program or JOG start.
	Synchronous encoder		Used to drive the virtual axis by input pulse from an external synchronous encoder.
Virtual axis	Virtual main shaft	—	This is a virtual "link shaft". The rotation of the drive module is transferred to the transmission module.
	Virtual auxiliary input axis	—	This is the auxiliary input axis for input to the transmission module "differential gear". It is automatically displayed when the differential gear and the gear are connected.
Output module	Roller		Used when the speed control occurs at the final output.
	Ball screw		Used when the liner positioning occurs at the final output.
	Rotary table		Used when the angle control occurs at the final output.
	Cam		Used when the control other than those shown above occurs based on the cam pattern setting data. There are two cam control modes: the two-way cam mode and the feed cam mode.

Mechanism Section	Mechanical Module Name	Mechanical Module Appearance	Function
Transmission module	Gear		Transfers the drive module rotation to the output axis. The travel valve input from the drive module multiplied by the set gear ratio, and transferred to the output axis so that it moves in the set direction.
	Direct clutch		Engages/disengages the output module with the drive module rotation. When switching the clutch ONN/OFF, there is a direct clutch for direct tranfer and a smoothing clutch for acceleration/deceleration processing which occurs in accordance with the smoothing time constant setting. Depending on the application, ON/OFF mode, address mode or external input mode can be selected. As the smoothing method, the time constant setting mode or degree of slippage setting method can be selected.
	Smoothing clutch		
	Speed change gear		Used to change the speed of the output module. The speed from the input axis side multiplied by the set speed change ratio and transferred to the output axis.
	Differential gear		The rotation of the auxiliary input axis substracted from the rotation of the virtual main shaft and transferred to the output axis.
			The rotation of the auxiliary input axis substracted from the rotation of the virtual main shaft and transferred to the output axis. (for connection to the virtual main shaft)

Virtual Mechanical System Environment (SV22)

Item		Mechanical Modules	A171SH		A172SH		A173UH		A173UH-S1	
Control units	Drive module	Virtual servo motor	Pulses							
		Synchronous encoder								
	Output module	Roller	mm, inches							
		Ball srew								
		Rotary table	Fixed as "degree"							
		Cam	mm, inches, pulses							
Mechanical system program	Drive module	Virtual servo motor	4	Total 5	8	Total 9	32	Total 36	32	Total 36
		Synchronous encoder	1		1		4		4	
	Virtual axis	Virtual main shaft	4	Total 8	8	Total 16	32	Total 64	32	Total 64
		Virtual auxiliary input shaft	4		8		32		32	
	Transmission module	Gear ①	8		16		64		64	
		Clutch ①	8		16		64		64	
		Speed change gear ①	8		16		64		64	
		Differential gear ①	4		8		32		32	
		Differential gear (for the virtual main shaft) ②	4		8		32		32	
	Output module	Cam	4	Total 4	8	Total 8	32	Total 32	32	Total 32
		Roller	4		8		32		32	
		Ball screw	4		8		32		32	
		Rotary table	4		8		32		32	
Cam	Types		Max. 64							
	Resolution per cycle		256, 512, 1024, 2048,							
	Memory capacity		32 kbytes				32 kbytes ③		132 kbytes ③	
	Stroke resolution		32767							
	Control mode		Two-way cam, feed cam							

① One gear, speed-change gear or differential gear can be used per module.
② One differential gear connected to the virtual main gear can be used per virtual servo motor.
③ With extended file registers from the tenth block.

Motion SFC Programming

The Motion SFC function to describes the motion control program in flow chart form. By describing the program of the CPU (PCPU) which controls the motion in a suitable Motion SFC for the event processing, serial operation of the machine is controlled by PCPU, aiding the event response.

Easy-to-read and comprehend flow chart description.

- Programming can be carried out with an image that describes the flow chart with the machine operation procedures.
- A process control program can be created easily, and the control details can be visualized.

Multi-task processing

- The Motion SFC allows for multi-task program operation.
- By using parallel distribution in one program, multiple steps can be executed simultaneously.

Controlling the series of machine operations with PCPU

- Using the Motion SFC, the servo control, operation and I/O control can be carried out in a batch with the PCPU.
- There is no need to start the servo program from CPU (SCPU) that controls the sequence.

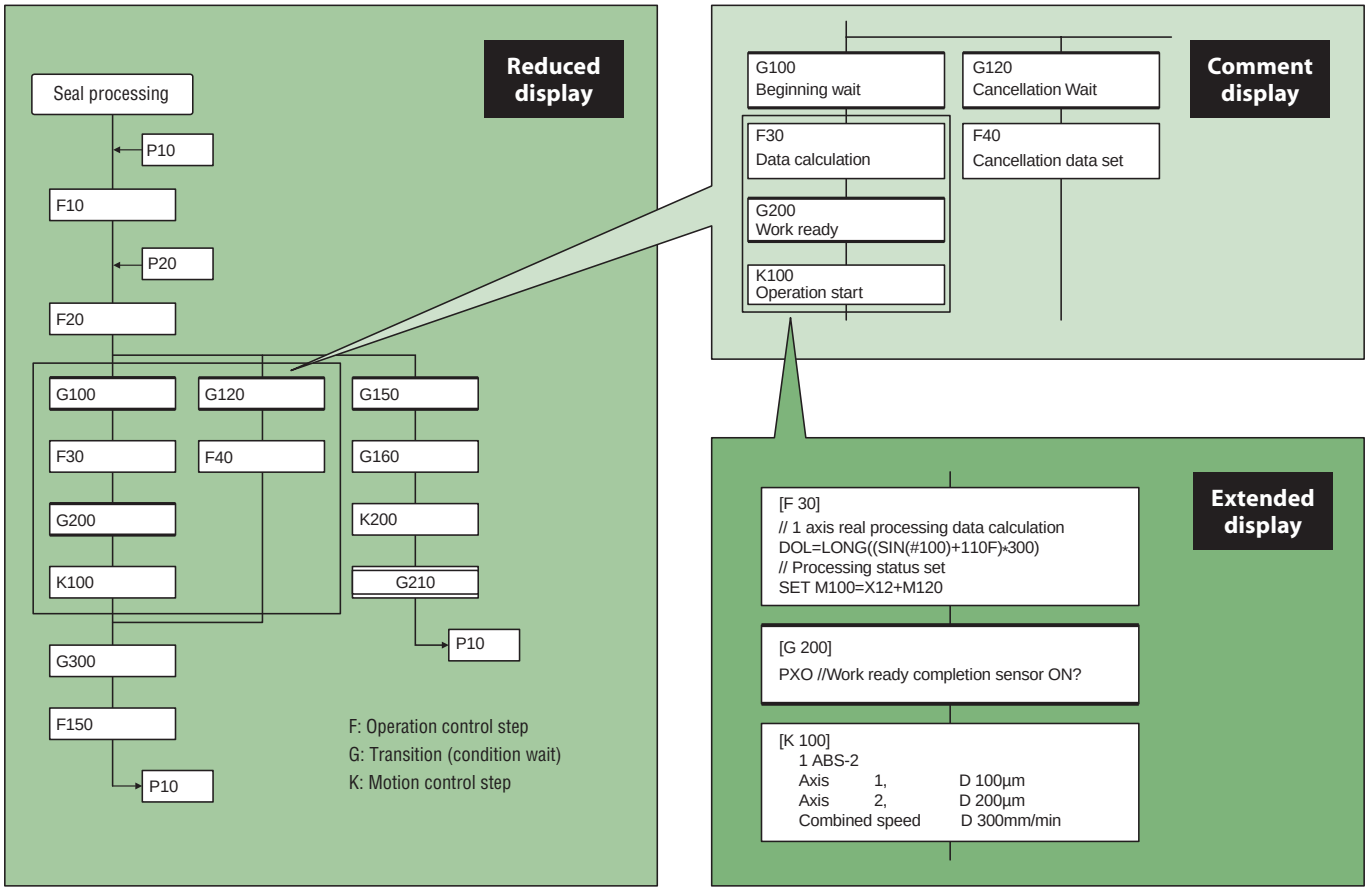
Motion SFC description

Flow chart description which is easy-to-view and understand

- As the outline operation of the process control is described as a flow chart, the entire operations can be viewed at a glance.
- The operation details can be described as a comment so an easy-to-understand program can be created.
- The program has a hierarchical structure, so detailed operations can be described for each step.

Enhanced operation function

- The operation expression can be described in the original state.
- Compatible with 64-bit floating point operation.
- Various arithmetic functions including trigonometric functions, square root and natural logarithm are provided.
- The motion registers (#0 to #8191) have been added for Motion SFC operations.



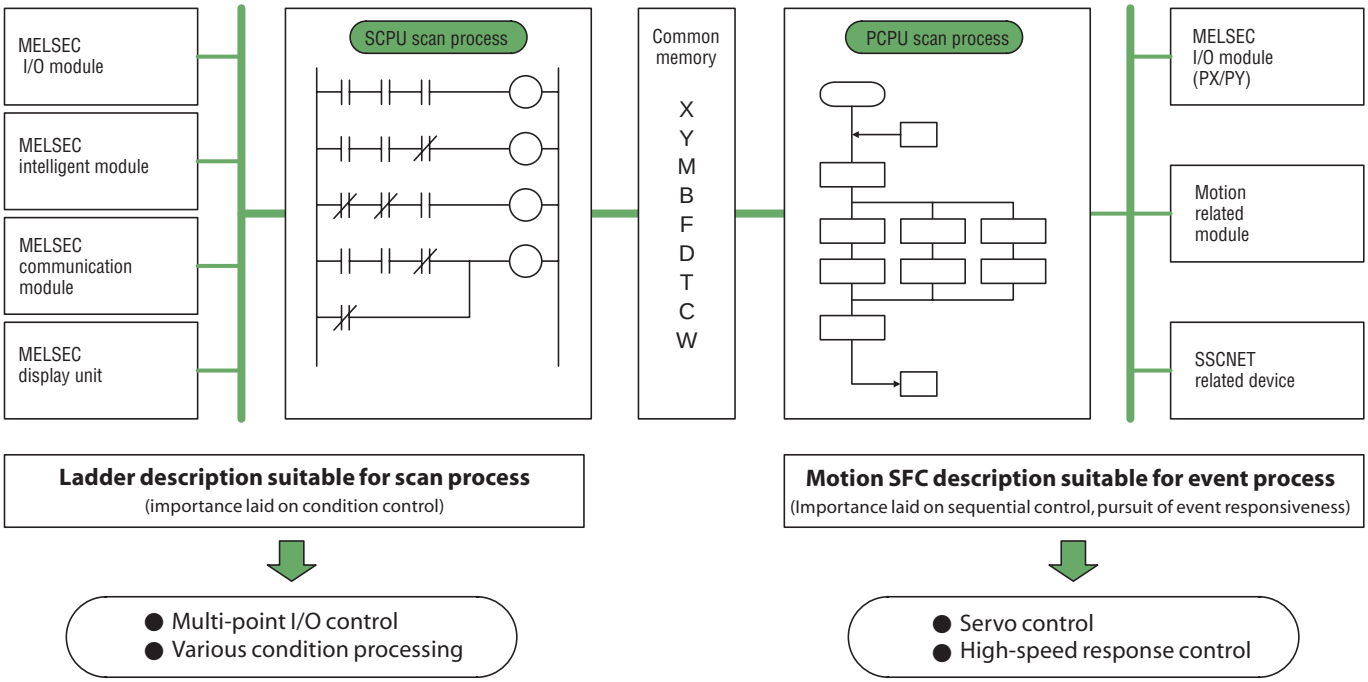
Powerful event processing functions

Minimized variation in control response time

With the conventional SV13/SV22, the series of machine operations were controlled by the SCPU so a variation occured in the response time per seguence scan. However, this can be minimized by the strengthened Motion SFC event processing function, so the scan time can be suppressed, and variations in product machining can be reduced.

Multi-CPU method that strengthens event processing function

The multi-point I/O control and monitoring operations can be appointed to the SCPU by the ladder program, and the servo control and high-speed response control can be appointed to the PCPU by the Motion SFC program. This balances the scan process and event process, and further utilizes the multi-CPU configuration.



Event processing

This process waits for the conditions to be established (event to occur) with the changes in the input signal state or device value, and carries out high-speed response control (signal output control, servo motor start and speed change, etc.) when the conditions are established.

Examples of events

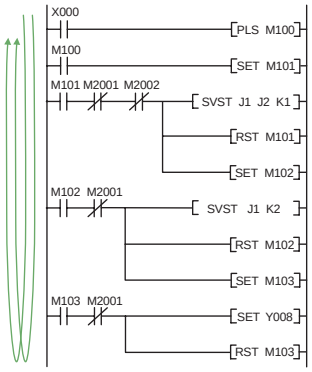
- Input signal turned ON.
- Operation results reached constant value.
- Set time elapsed.
- Positioning was completed.

Selective Functions

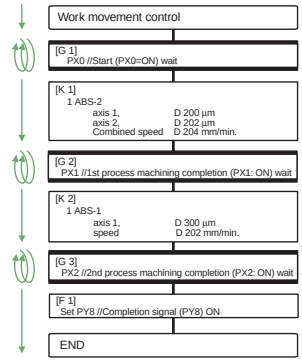
High-speed response using step execution method

The sequence program uses a scan execution method to execute all steps with constant scanning. However, with the Motion SFC, the step execution method executes only the active steps following the shift conditions. Thus, the operation process can be reduced, and processing and response control can be realized.

Sequence program
All steps are executed with constant scan



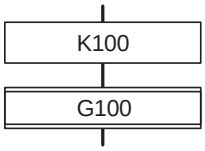
Motion SFC program
Only active steps are executed following shift conditions



Exclusive shifting unique to motion control

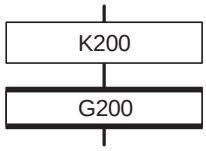
- If shift is applied immediately after the motion control step, the shift will be executed without waiting for the motion control operation to end.
- If WAIT is executed immediately after the motion control step, WAIT will executed after waiting for the motion control operation to end.
- If WAIT ON/WAIT OFF is commanded just before the motion control step, the details of the motion control will be pre-read, and preparation for starting will be carried out. The operation will start immediately when the designated bit device turns ON/OFF.

Shift



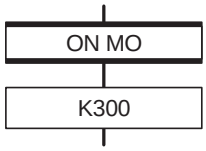
Execute G100 without waiting for K100 operation to end

WAIT



Execute G100 after waiting for K200 operation to end

WAIT ON/OFF



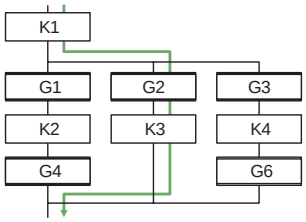
Pre-read K300 and prepare to start

Start immediately when designated bit (M0) turns ON

Selective branching and parallel branching

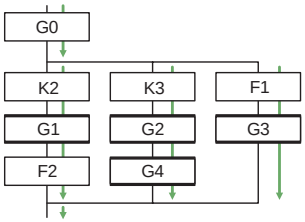
- When all routes shift after branch, or WAIT is issued for all routes, selective branching will be applied. Parallel branching is applied in all other cases.
- With selective branchinf, the route for which the shift conditions are established first are executed.
- With parallel branching, several routes connected in parallel are executed simultaneously. The process waits at the connection point, and shifts to the next process after execution of all routes is completed.

Selective branching



Judge G1 to G3 conditions, and execute only established route

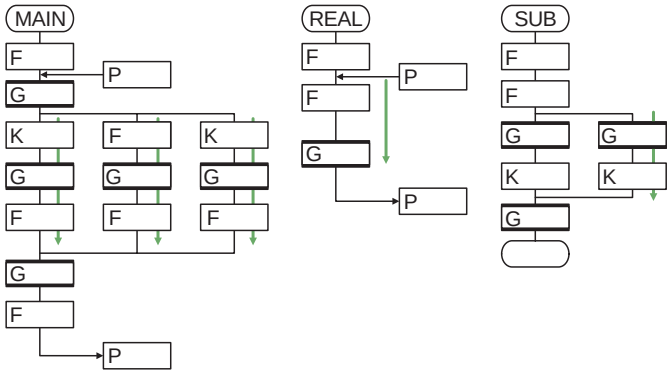
Parallel branching



Simultaneously execute all routes for step K2 to F1 in parallel

Multi-task processing

- With the Motion SFC, when several programs are started, the process is carried out with multi-task operation.
- Multiple steps can be simultaneously executed with parallel branching even within one program.
- A program that excutes multiple processes simultaneously, or a program that groups the control axis for independent movements can be created easily.
- A highly independent programming is possible according to the process details, so an easy-to-comprehend program can be created.



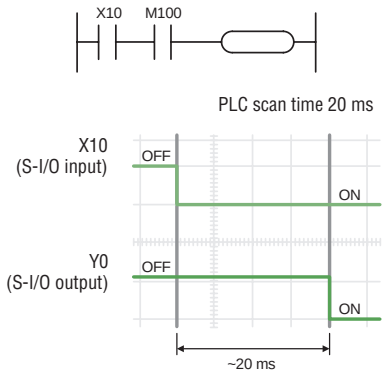
High-response to external inputs

I/O output

- This is used to measure the response time of the output signal in respect to the input signal from an external source.
- With the sequence program, there is a delay and variation equal to the response time 20 ms and approximately the scan time.
- With the Motion SFC, the response time and variation are approximately 3 ms.

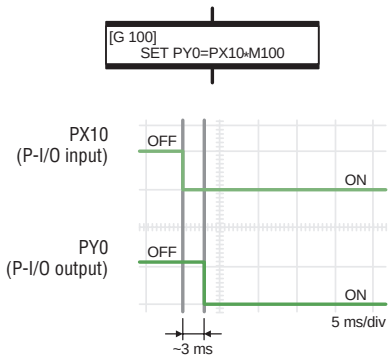
Applicable CPU: A172SHCPUN
Input module: A1SX40-S1 (OFF->ON response: up to 0.1 ms)
Output module; A1SY40 (OFF->ON response: up to 2 ms)

Sequence program



(approx. PLC scan time)

Motion SFC program



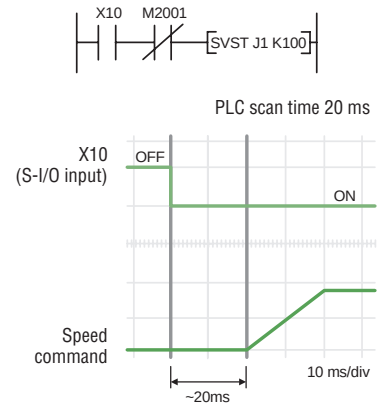
Great reduction in servo program start time

Start up of servo program

- This is an example of starting the servo program using the input signal from an external source as a trigger.
- When starting with the sequence program, a delay and variation equal to 20 ms and approximately the scan time occurs from the input of the external signal to start-up of the speed command.
- With the Motion SFC, the speed command will start up with a response time of less than 10 ms and variation of approximately 3 ms.

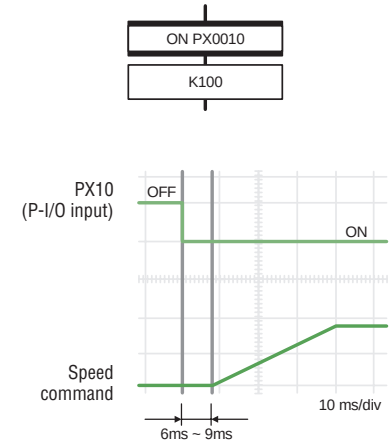
Applicable CPU: A172SHCPUN
Input module: A1SX40-S1 (OFF->ON response: up to 0.1 ms)

Sequence program



(approx. PLC scan time)

Motion SFC program

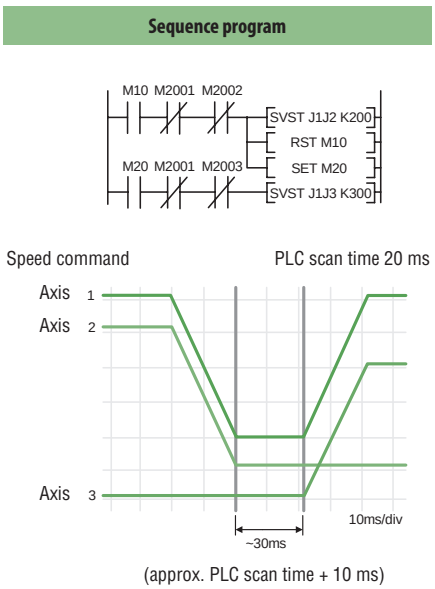


Continuous start-up of servo program

- This shows an example of starting-up the 1-axis and 3-axes linear interpolation program K300 immediately after starting-up the 1-axis and 2-axes linear interpolation program K200.
- When continuously starting-up the servo program with the sequence program, a delay and variation of approximately 30 ms will occur. This is because the PLC scan time is 20ms, and the refresh cycle for the start acceptance flag M2001, which is the interlock is 10 ms.
- An interlock is not required with the Motion SFC, and the start delay will be approximately 7 ms.

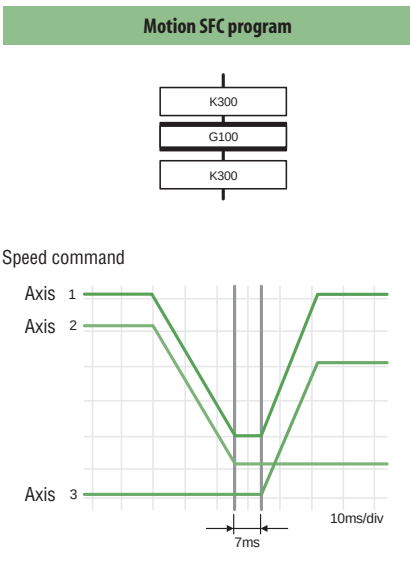
Applicable CPU: A172SHCPUN
Input module: A1SX40-S1 (OFF->ON response: up to 0.1 ms)

Sequence program

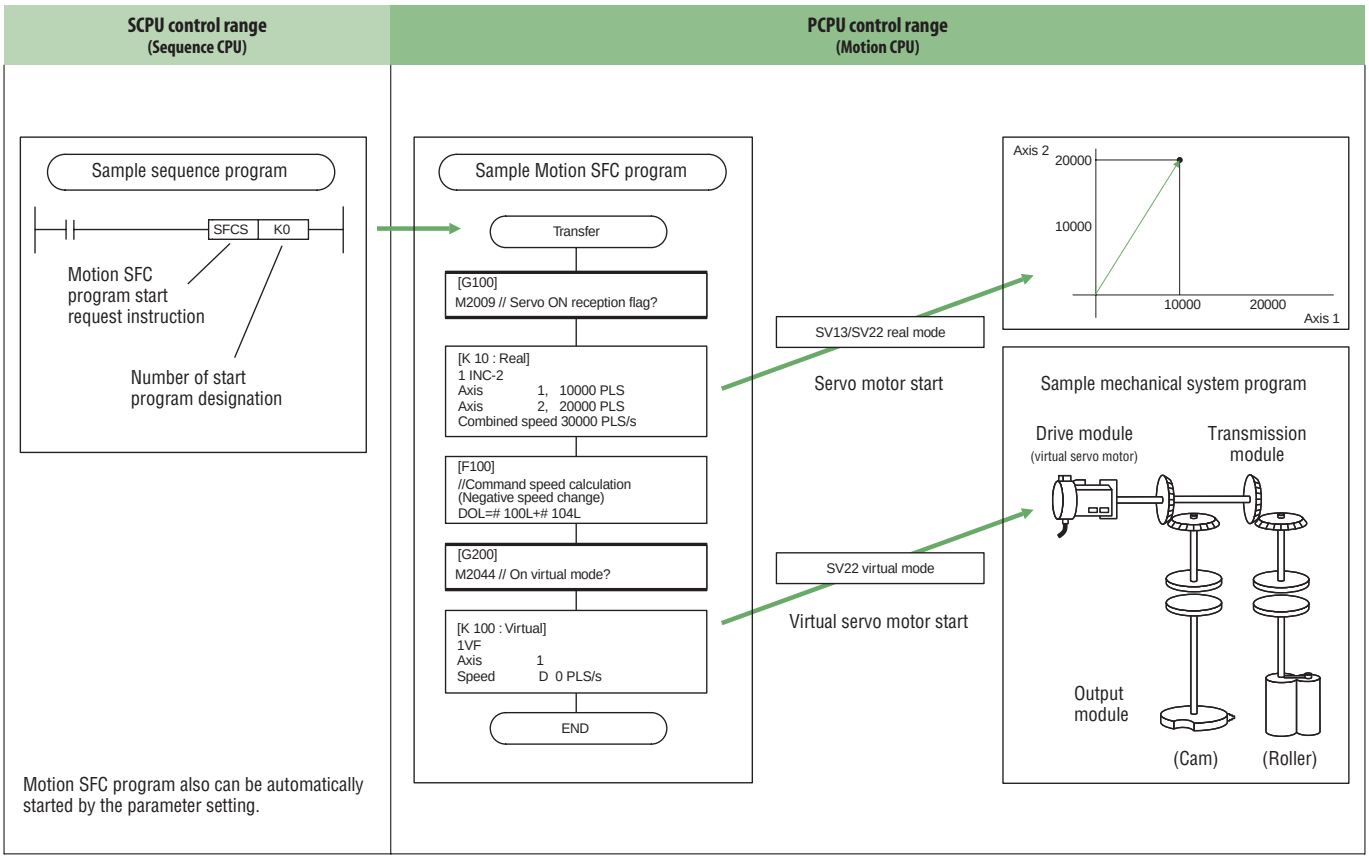


(approx. PLC scan time + 10 ms)

Motion SFC program



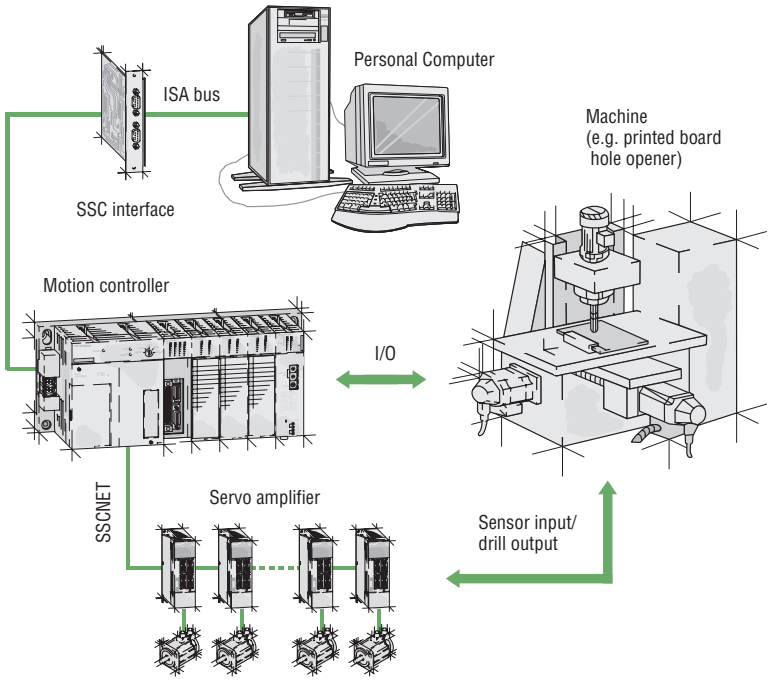
Operation (SV13/SV22 with Motion SFC)

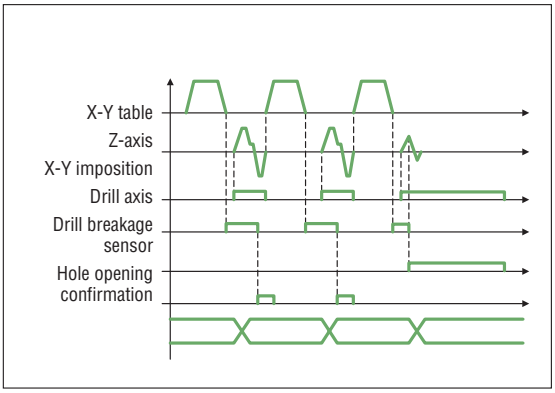


Please refer to pages 17 and 20 regarding control flow of
"SV13 (without Motion SFC)" and control flow of "SV22 (without Motion SFC)".

Application examples

System configuration

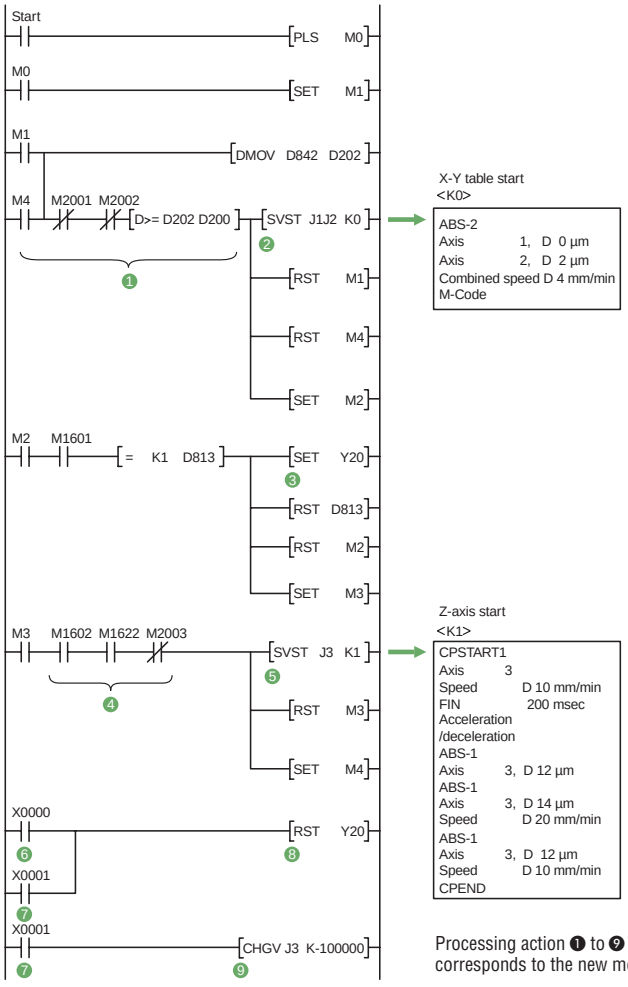




Machine's key points

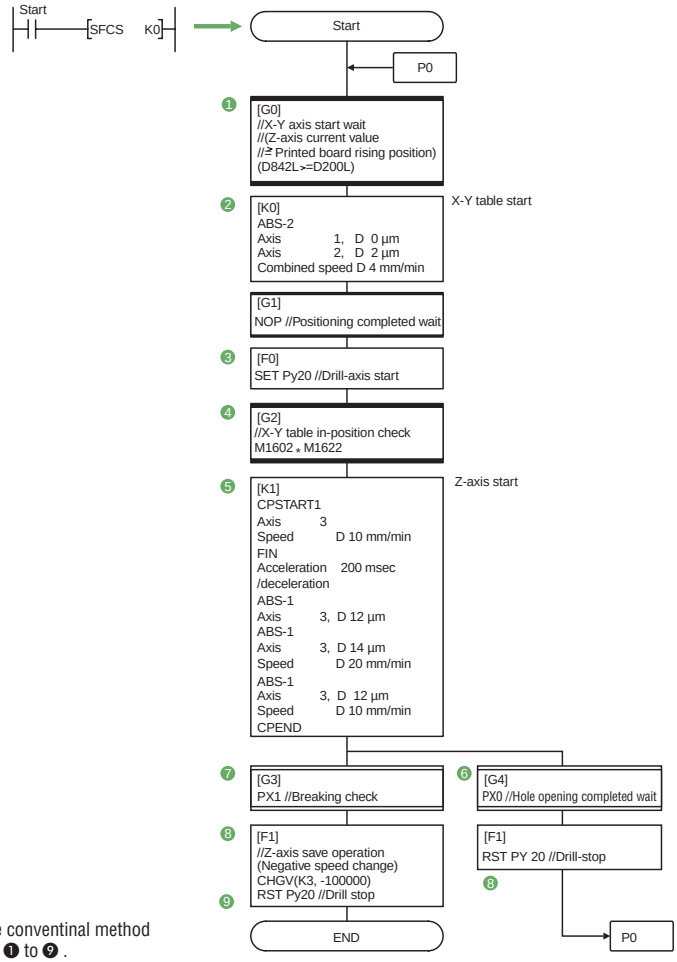
1. High-speed forwarding of a hole breakage data from a personal computer.
2. High-speed monitor function in a personal computer.
3. High-speed start of Z-axis after X-Y table positioning is completed.
4. High-speed start of X-Y axis after printed a board hole opening (Z-axis rises from printed board position).
5. High-speed save operation when drill breakage.

Conventional programming method (SV13)



Processing action ❶ to ❾ of the conventinal method corresponds to the new method ❶ to ❾ .

Programming method with Motion SFC SV13

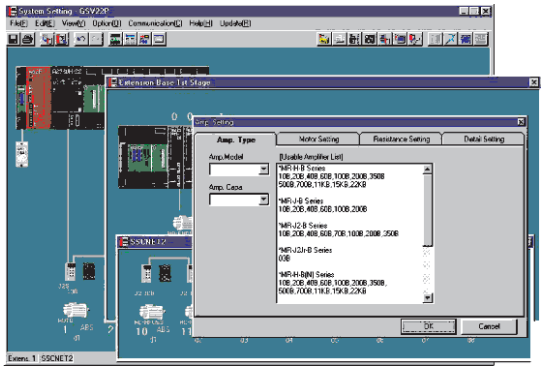


Overview of the different System Software Packages

System Setting

System configuration

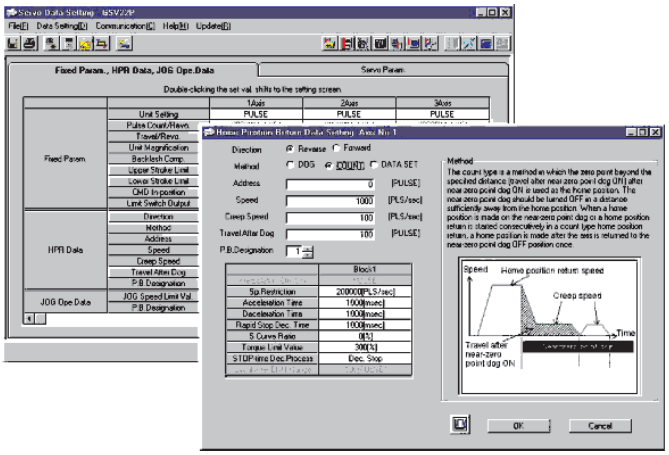
Set the system configuration (motion module, servo amplifier, servo motor) from the menu selection.



Servo data setting

Set the servo parameter and fixed parameters, etc.

Display explanations of parameters with one.point help.

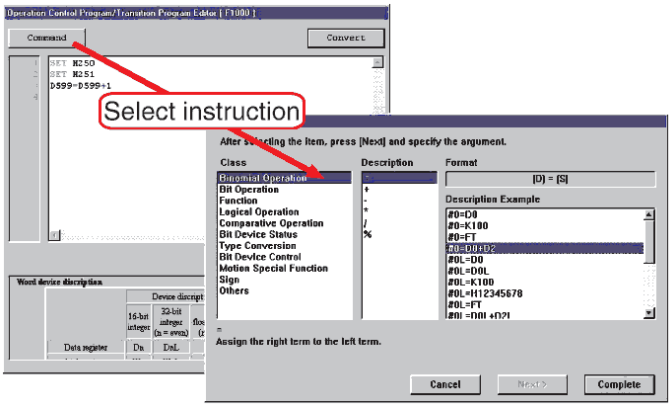


Programming

Program editing/instruction wizard

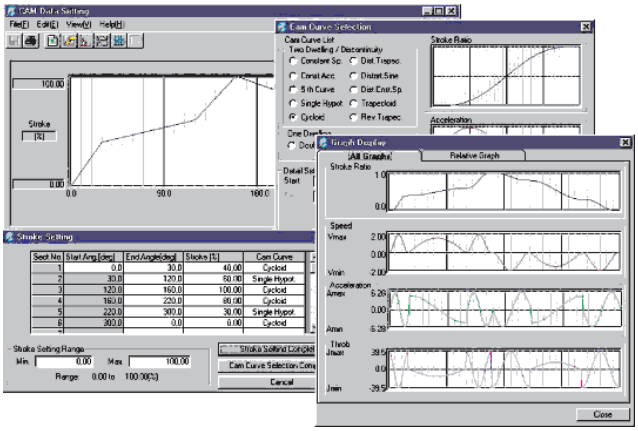
Program for each step and transition

Selection from menu using command wizard is also possible



Cam curve programming

Create cam data with cam pattern selection and free curve setting; display cam control status waveform



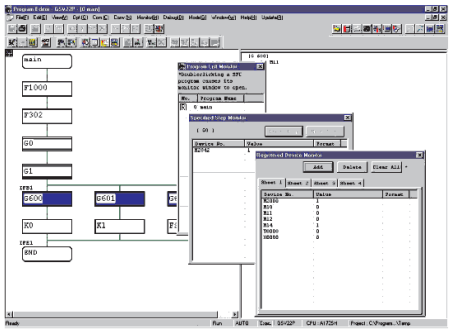
GX (IEC) Developer

Program editing and monitoring is possible with the proven programming software GX (IEC) Developer.

Debugging

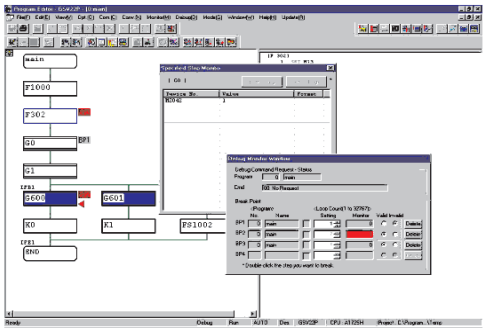
Motion SFC monitor

Color display of step in execution on flow chart
Device monitoring and testing of execution and designated step



Motion SFC debugging mode

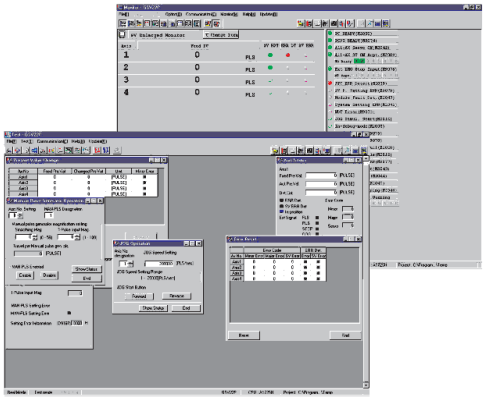
Greatly reduced debugging time with powerful debug function (one-step execution, forced shift, brake, forced end)



Start-up adjustment and monitoring

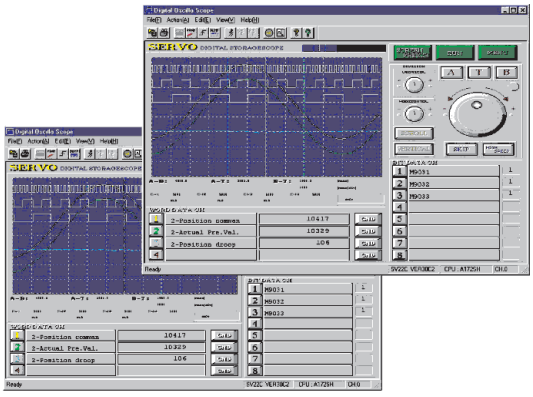
Status display and test operation

Current value monitor, axis monitor, error history monitor
Various tests suchs as zeroing and JOG with a simple mouse click



Digital oscilloscope

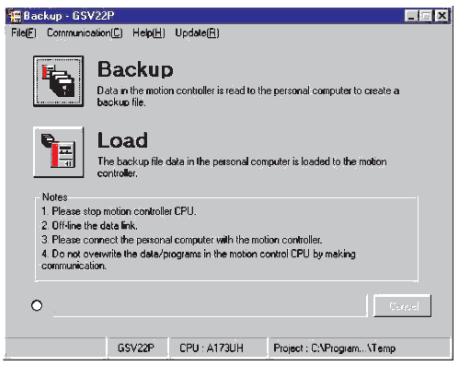
Data sampling synchronized with motion control cycle
Waveform display, dump display, file save, printing



Operation and maintenance

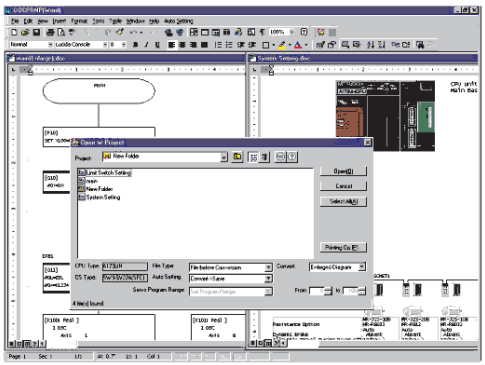
Data back-up

Back-up motion controller programs, parametersw and internal information in a abatch as a file

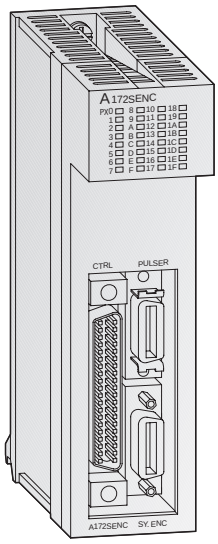


Document printing

Conversion of system settings, programs and parameters int Word or Excel file and printimg



■ Pulse generator/synchronouos encoder interface unit



A172SENC

The pulse generator/synchronouos encoder interface unit A172SENC is used for input of an external Encoder (e.g. Encoder of master drive) or an manual pulse generator. In addition this module processes the signals from the limit and dog switches which are connected to this module.

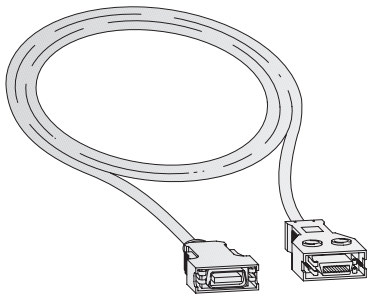
Special features:

- Loaded in motion slot
- One point each is built in for the various input on the 8 axes, and for the tracking input, manual pulse generator and synchronous encoder

Specifications			A172SENC
Motion control signal input, tracking input	Input point		Motion signal: 32 points (8 points each for upper limit switch, lower limit switch, STOP signal, proximity dog) Tracking input: 1 point
	Range of voltage used	V DC	10.2 to 26.4
	ON voltage/current		Min. 7 V / min. 1.0 mA
	OFF voltage/current		Max. 1.8 V / max. 0.18 mA
	Response time		Motion control signal input OFF → ON: max. 2 ms, ON → OFF: max. 3 ms Tracking input OFF → ON: max. 0.5 ms, ON → OFF: max 0.5 ms
Dynamic brake command output	Output point		1 point
	Range of load voltage used	V DC	21.6 to 30
	Max. load current	mA	100
	Response time		OFF → ON: max. 2 ms, ON → OFF: max. 2 ms
Manual pulse generator/synchronous encoder input	Usable unit		1
	Adaptive type		Voltage output type (5 V DC) / differential outout type (26L31 or equivalent) possible to select by connector wiring
	Heigh level voltage	V DC	3.0 to 5.25
	Low level voltage	V DC	0 to 1
	Input frequency		Max. 100 k pulses/s (magnification of 4)
Synchronous encoder input	Usable unit		1
	Adaptive type		Serial absolute synchronous encoder input (MR-HENC)
Internal consumption current (5 V DC)		mA	420 (Manual pulse generator / synchronous encoder is contained)
Weight		kg	
Dimensions (W x H x D)		mm	

Order information	Art. no.	86313

Connection Cables



Connection Cables

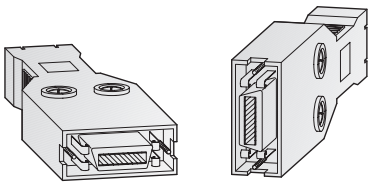
The cable MR-J2HBUS□M-A connects the motion controller to the servo amplifier.

For the connection of servo amplifier to servo amplifier the cableMR-J2HBUS□M is required.

For detailled informations please refer to the technical catalogue MR-J2-Super.

Specifications		MR-J2HBUS□M-A	MR-J2HBUS□M
Type of cable		SSCNET cable	SSCNET cable
For connection		CPU unit to MR-J2S-B/MR-J2-B	MR-J2S-B/MR-J2-B to MR-J2S-B/MR-J2-B
Available lengths	m	0.5 / 1.0 / 5.0	0.5 / 1.0 / 5.0
Order information	Art. no.	70009 / 86733 / 70006	70014 / 70012 / 70011

Terminal Connectors

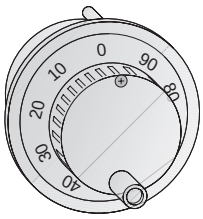


Connectors

By this bus end plug the SSCNET is terminated. The termination is required to ensure a faultless network operation. The plug is connected to the end of the bus on the last servo amplifier.

Specifications	MR-A-TM
Connector type	SSCNET connector for the last servo amplifier (MR-J2S-B/MR-J2-B)
Order information Art. no.	70004

Manual Pulse Generator

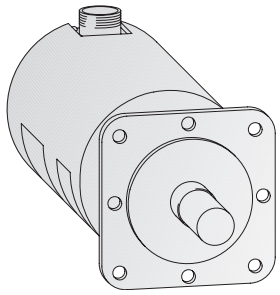


MR-HDP01

By this serial handwheel an external incremental setting value can be generated.

Specifications	MR-HDP01
Pulse resolution	25 pls/rev (100 pls/rev at magnification of 4)
Output voltage	Input voltage > 1 V
Consumtion current	Max. 60 mA
Weight kg	0.4
Order information Art. no.	128728

Serial absolute synchronous encoder

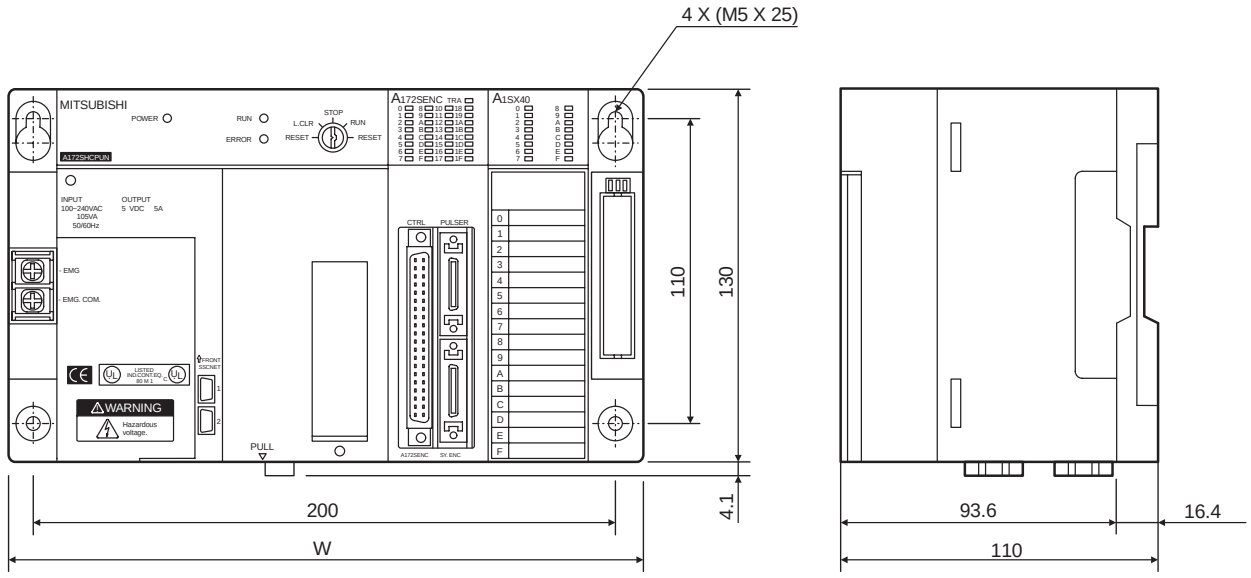


MR-HENC

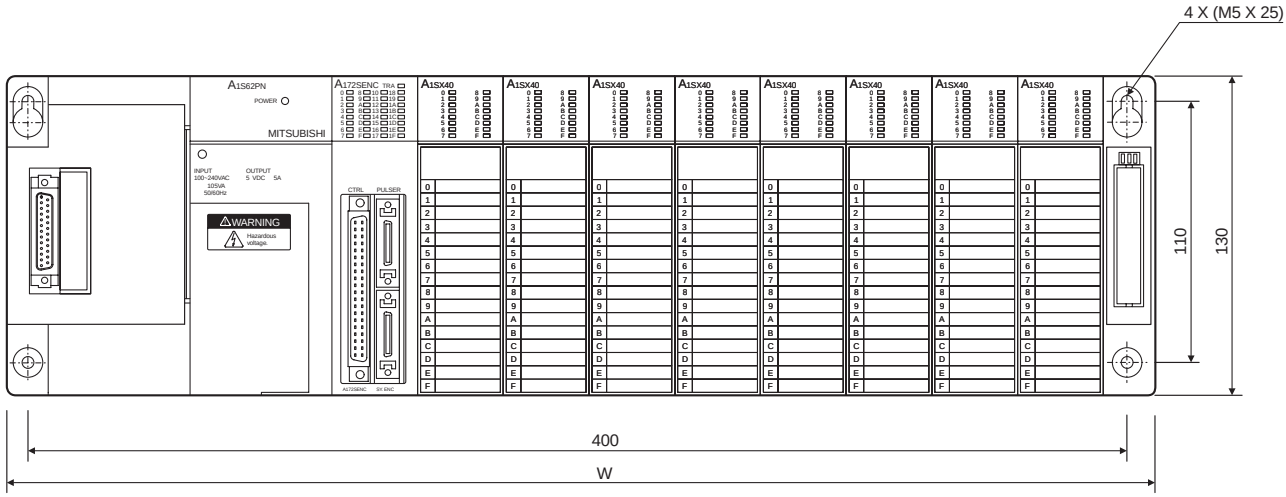
This serial absolute synchronous encoder facilitates the integration of an external system (e. g. frequency inverter) in a motion system. The inverter is operated as real master axis, e. g. synchronized in a group.

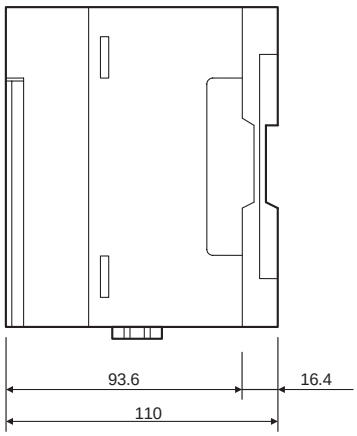
Specifications	MR-HENC
Resolution	16384 pls/rev.
Direction on increase	Counter clockwise
Protection	IP52
Permissible rotation speed	4300 r/min
Perm. angular acceleration	4000 rad/s
Weight kg	1.5
Order information Art. no.	138304

Motion Controller A171SH/A172SH/A173UH



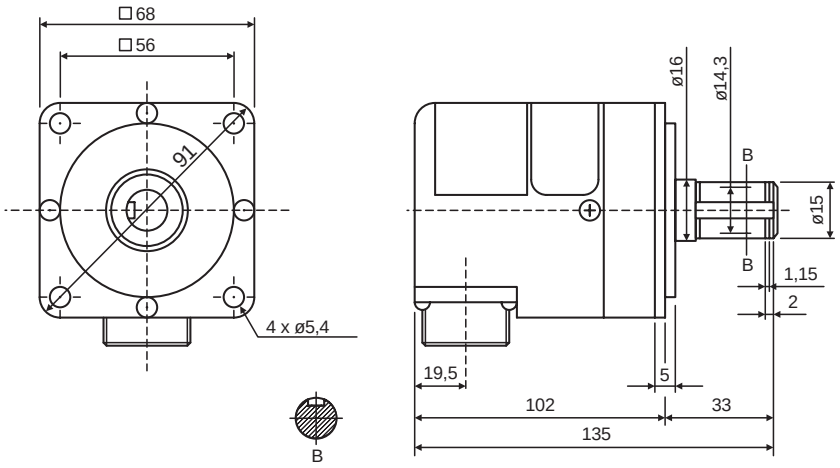
Extension Base Units



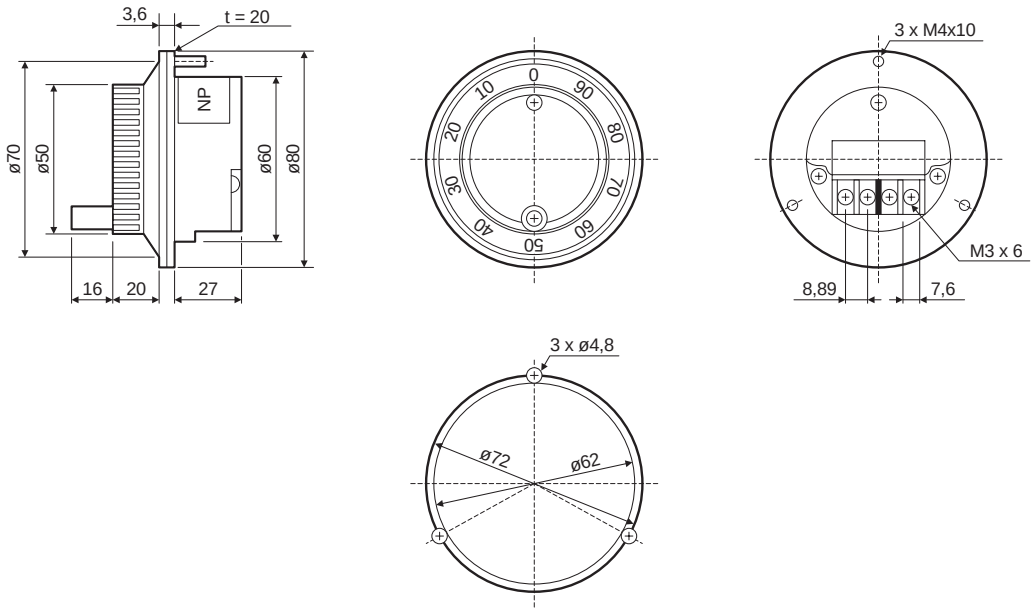


Type	W (in mm)
A172B	220
A175B	325
A178B A178B-S1 A178B-S2 A178B-S3	430
A175B	315
A1S68B A168B	420

Serial Absolute Synchronous Encoder MR-HENC



Manual Pulse Generator MR-HDP01



MITSUBISHI ELECTRIC EUROPE B.V.
Industrial Automation / German Branch
Gothaer-Str. 8
D-40880 Ratingen

Fax: +49 2102 486-7170

Company: . . . . . .
Department: . . . . . .
Street: . . . . . .
Address: . . . . . .
Phone: . . . . . .
Fax: . . . . . .

Order declaration

Pos.	Number	Item (type)	Article number	Description	Remarks

Notes when ordering:
When ordering, please use only the type designations and order numbers shown in this catalogue.

HEADQUARTERS

MITSUBISHI ELECTRIC EUROPE B.V.
German Branch
Gothaer Straße 8
D-40880 Ratingen
Phone: +49 (0) 21 02 / 486-0
Fax: +49 (0) 21 02 / 4 86-1 12
e mail: megfa-mail@meg.mee.com
EUROPE

MITSUBISHI ELECTRIC EUROPE B.V.
French Branch
25, Boulevard des Bouvets
F-92741 Nanterre Cedex
Phone: +33 1 55 68 55 68
Fax: +33 1 49 01 07 25
e mail: factory.automation@fra.mee.com
FRANCE

MITSUBISHI ELECTRIC EUROPE B.V.
Italian Branch
C.D. Colleoni - P. Perseo Ing. 2
Via Paracelso 12
I-20041 Agrate Brianza (MI)
Phone: +39 039 / 60 53 1
Fax: +39 039 / 60 53 312
e mail: factory.automation@it.mee.com
ITALY

MITSUBISHI ELECTRIC EUROPE B.V.
Spanish Branch
Carretera de Rubí 76-80
E-08190 Sant Cugat del Vallés
Phone: +34 (9) 3 / 565 31 60
Fax: +34 (9) 3 / 589 15 79
e mail: —
SPAIN

MITSUBISHI ELECTRIC EUROPE B.V.
UK Branch
Travellers Lane
GB-Hatfield Herts. AL10 8 XB
Phone: +44 (0) 1707 / 27 61 00
Fax: +44 (0) 1707 / 27 86 95
e mail: —
UK

MITSUBISHI ELECTRIC CORPORATION
Office Tower "Z" 14 F
8-12,1 chome, Harumi Chuo-Ku
TOKYO 104-6212
Phone: +81 3 / 622 160 60
Fax: +81 3 / 622 160 75
JAPAN

MITSUBISHI ELECTRIC AUTOMATION
500 Corporate Woods Parkway
Vernon Hills, Illinois 60061
Phone: +1 (0) 847 / 478 21 00
Fax: +1 (0) 847 / 478 22 83
USA

EUROPEAN REPRESENTATIVES

GEVA
Wiener Straße 89
A-2500 Baden
Phone: +43 (0) 2252 / 85 55 20
Fax: +43 (0) 2252 / 488 60
e mail: office@geva.at
AUSTRIA

Getronics b.v.
Control Systems
Pontbeeklaan 43
B-1731 Asse-Zellik
Phone: +32 (0) 2 / 4 67 17 51
Fax: +32 (0) 2 / 4 67 17 45
e mail: infoautomation@getronics.com
BELGIUM

TELECON CO.
4, A. Ljapchev Blvd.
BG-1756 Sofia
Phone: +359 (0) 2/ 97 44 05 8
Fax: +359 (0) 2/ 97 44 06 1
e mail: —
BULGARIA

INEA CR d.o.o.
Drvinje 63
HR-10000 Zagreb
Phone: +385 (0)1/ 3667140
Fax: +385 (0)1/ 3667140
e mail: —
CROATIA

AutoCont
Control Systems s.r.o.
Nemocnicni 12
CZ-70200 Ostrava 2
Phone: +420 (0) 69 / 615 21 11
Fax: +420 (0) 69 / 615 25 62
e mail: consys@autocont.cz
CZECHIA

louis poulsen
industri & automation
Geminivej 32
DK-2670 Greve
Phone: +45 (0) 43 / 95 95 95
Fax: +45 (0) 43 / 95 95 91
e mail: lpia@lpmail.com
DENMARK

UTU Elektrotehnika AS
Pärnu mnt.160i
EE-11317 Tallinn
Phone: +372 (0) 6 / 51 72 80
Fax: +372 (0) 6 / 51 72 88
e mail: utu@utu.ee
ESTONIA

UTO ELEC OY
Box 199
FIN-28101 Pori
Phone: +358 (0) 9 / 550 800
Fax: +358 (0) 9 / 550 8880
e mail: —
FINLAND

UTECO A.B.E.E.
5, Mavrogenous Str.
GR-18542 Piraeus
Phone: +30 10 / 42 10 050
Fax: +30 10 / 42 12 033
e mail: uteco@uteco.gri
GREECE

EUROPEAN REPRESENTATIVES

Meltrade Automatika Kft.
55, Harmat St.
HU-1105 Budapest
Phone: +36 (0)1 / 2605 602
Fax: +36 (0)1 / 2605 602
e mail: office@meltrade.hu
HUNGARY

MITSUBISHI ELECTRIC EUROPE B.V. – Irish Branch
Westgate Business Park
Ballymount
IRL-Dublin 24
Phone: +353 (0) 1 / 419 88 00
Fax: +353 (0) 1 / 419 88 90
e mail: sales.info@meir.mee.com
IRELAND

Getronics b.v.
Control Systems
Donauweg 2 B
1043 AJ Amsterdam
Phone: +31 (0) 20 / 587 6700
Fax: +31 (0) 20 / 587 6839
e mail: info.gia@getronics.com
NETHERLANDS

MPL Technology Sp. z o.o.
ul. Sliczna 36
PL-31-444 Kraków
Phone: +48 (0) 12 / 632 28 85
Fax: +48 (0) 12 / 632 47 82
e mail: krakow@mpl.pl
POLAND

Sirius Trading & Services srl
Bd. Lacul Tei nr. 1 B
RO-72301 Bucuresti 2
Phone: +40 (0) 1 / 201 7147
Fax: +40 (0) 1 / 201 7148
e mail: sirius_t_s@fx.ro
ROMANIA

INEA d.o.o.
Stegne 11
SI-1000 Ljubljana
Phone: +386 (0) 1- 513 8100
Fax: +386 (0) 1- 513 8170
e mail: inea@inea.si
SLOWENIA

ARATRON AB
Box 20087
S-16102 Bromma
Phone: +46 (0) 8/ 40 41 600
Fax: +46 (0) 8/ 98 42 81
e mail: —
SWEDEN

ECONOTEC AG
Postfach 282
CH-8309 Nürensdorf
Phone: +41 (0) 1 / 838 48 11
Fax: +41 (0) 1 / 838 48 12
e mail: info@econotec.ch
SWITZERLAND

GTS
Darülaceze Cad. No. 43A KAT: 2
TR-80270 Okmeydani-Istanbul
Phone: +90 (0) 212 / 320 1640
Fax: +90 (0) 212 / 320 1649
e mail: gts@turk.net
TURKEY

MIDDLE EAST REPRESENTATIVE

SHERF Motion Techn. LTD
Rehov Hamerkava 19
IL-58851 Holon
Phone: +972 (0) 3 / 559 54 62
Fax: +972 (0) 3 / 556 01 82
ISRAEL

EURASIAN REPRESENTATIVES

Avtomatika Sever
Krapivnij Per. 5, Of. 402
RUS-194044 St Petersburg
Phone: +7 812- 5418418
Fax: +7 812 1183239
e mail: pav@avtsev.spb.ru
RUSSIA

CONSYS
Promyshlennaya St. 42
RUS-198099 St Petersburg
Phone: +7 812/ 325 36 53
Fax: +7 812/ 325 36 53
e mail: consys@consys.spb.ru
RUSSIA

ICOS
Ryazanskij Prospekt, 8A, Of. 100
RUS-109428 Moscow
Phone: +7 095/232-0207
Fax: +7 095/232-0327
e mail: mail@icos.ru
RUSSLAND

NPP Uralelektra
Sverdlova 11A
RUS-620027 Ekaterinburg
Phone: +7 34 32 / 53 27 45
Fax: +7 34 32 / 53 24 61
e mail: elektra@etel.ru
RUSSIA

STC Drive Technique
Poslannikov per., 9, str.1
RUS-107005 Moscow
Phone: +7 095 / 786 21 00
Fax: +7 095 / 786 21 01
e mail: info@privod.ru
RUSSIA

JV-CSC Automation
15, M. Raskovoyi St., Floor 10,
Office 1010
U-02002 Kiev
Phone: +380 44 / 238 83 16
Fax: +380 44 / 238 83 17
e mail: mkl@csc-a.kiev.ua
UKRAINE

TEHNIKON
Oktjabrskaya 16/5, Ap 704
BY-220030 Minsk
Phone: +375 (0)17/ 2275704
Fax: +375 (0)17/ 2276669
e mail: tehnikon@belsonet.net
BELARUS

AFRICAN REPRESENTATIVE

CBI Ltd
Private Bag 2016
ZA-1600 Isando
Phone: +27 (0) 11 928 2000
Fax: +27 (0) 11 392 2354
e mail: cbi@cbi.co.za
SOUTH AFRICA

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