Programmable Controllers
MICREX-SX series SPH
CPU Module

CPU Module: NP1P □ - □□

■ Features

- Ultra high-speed processing
  The CPU module carries out ultra high-speed processing as bellow;
  The SPH3000 processes basic instructions in 9ns,
  the SPH300 processes basic instructions in 20ns,
  the SPH200 processes basic instructions in 70ns,
  and the SPH2000 processes basic instructions in 30ns.
- Multi-CPU configuration (SPH300/SPH2000/SPH3000)
  Up to 8 CPUs can be configured, effective for high-speed control by load distribution.
- Redundancy (SPH300/SPH2000)
  1-to-1 hot standby feature and N-to-1 backup feature improves the system safety and reliability.
  (The SPH2000 will soon support the redundancy)
- IEC 61131-3
  Complete compliance with the IEC 61131-3 international standard languages enables programming understood worldwide.
- Compatible with USB and user ROM
  The SPH300/SPH2000/SPH3000 of the USB and user ROM versions with separate formats are offered (**NP1PS-32R/74R/117R/245R, NP1PM-48R/48E/256E, NP1PU-048E/256E**).
- Large-capacity battery (optionally available)
  SPH300 (74K/117K/245K steps) can extend the memory backup time to 3.5 years (25˚C) by adding the large-capacity battery as an option.

SPH200 SPH300 SPH300EX SPH2000

■ Performance specifications

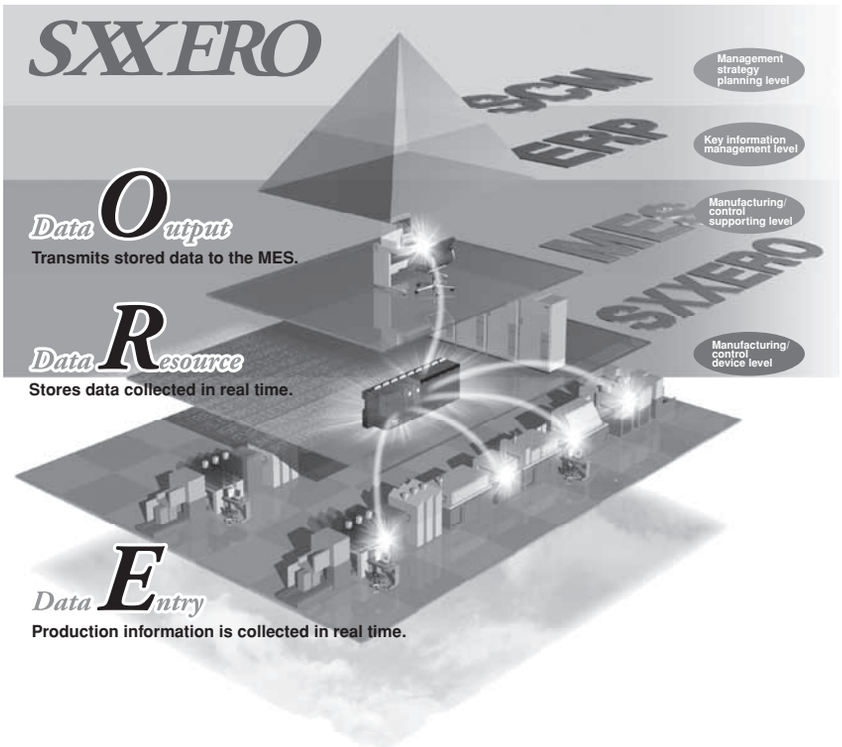
		SPH200		SPH300				SPH300	SPH300EX	SPH2000				SPH3000			
Type		**NP1PH-08**	**NP1PH-16**	**NP1PS-32**	**NP1PS-32R**	**NP1PS-74R**	**NP1PS-117R**	**NP1PS-245R**	**NP1PS-74D**	**NP1PM-48R**	**NP1PM-48E**	**NP1PM-256E**	**NP1PM-256H**	**NP1PU-048E**	**NP1PU-256E**	Type	
Control system		Stored program, Cyclic scanning system (default task), periodic task, event task						Stored program, Cyclic scanning system (default task), periodic task, event task								Control system	
Input / Output connection method		Direct connection I/O (SX bus), remote I/O (DeviceNet, OPCN-1, and other remote I/O links)						Direct connection I/O (SX bus), remote I/O (DeviceNet, OPCN-1, and other remote I/O links)								Input / Output connection method	
I/O control system		SX bus: Tact synchronization refresh. Remote I/O link: Refresh at 10-ms fixed intervals (not synchronized with scan)						SX bus: Tact synchronization refresh. Remote I/O link: Refresh at 10-ms fixed intervals (not synchronized with scan)								I/O control system	
CPU		16-bit OS processor, 16-bit execution processor		32-bit OS processor, 32-bit execution processor				32-bit OS processor, 32-bit execution processor	32-bit OS processor							CPU	
Programming language		IL language (Instruction List), ST language (Structured Text), LD language (Ladder Diagram) FBD language (Function Block Diagram), SFC elements (Sequential Function Chart) To IEC 61131-3						IL language (Instruction List), ST language (Structured Text), LD language (Ladder Diagram) FBD language (Function Block Diagram), SFC elements (Sequential Function Chart) To IEC 61131-3								Programming language	
Instruction execution speed	Sequence instruction	70ns or more/instruction		20ns or more/instruction				20ns or more/instruction	30ns or more/instruction					9ns or more/instruction		Sequence instruction	Instruction execution speed
	Applied instruction	140ns or more/instruction		40ns or more/instruction				40ns or more/instruction	40ns or more/instruction					8ns or more/instruction		Applied instruction	
Program memory capacity		8192 steps	16384 steps	32768 steps		75776 steps	119808 steps	250880 steps	75776 steps x 2	49152 steps		262144 steps		49152 steps	262144 steps	Program memory capacity	
Program steps in a POU		4096 steps		8192 steps				8192 steps		16384 steps						Program steps in a POU	
Memory * 1	I/O memory (I/Q)	512 words (Max. 8192 points)		512 words (Max. 8192 points)				512 words (Max. 8192 points)	512 words x 2 (Max. 8192 points x 2)	512 words (Max. 8192 points)						I/O memory (I/Q)	Memory * 1
	General memory (M)	4096 words	8192 words	8192 words		32768 words	131072 words	262144 words	32768 words x 2	65536 words		1703936 words		98034 words	1703936 words	General memory (M)	
	Retain memory (M)	2048 words	4096 words	4096 words		16384 words	32768 words	130048 words	8192 words x 2	8192 words		262144 words		40960 words	237568 words	Retain memory (M)	
	Instance memory for User FB (M)	2048 words	4096 words	4096 words		16384 words	32768 words	66560 words	16384 words x 2	8192 words		65536 words		40960 words	73728 words	Instance memory for User FB (M)	
	Instance memory for system FB (M)	4096 words	8192 words	16384 words		65536 words		65536 words	65536 words x 2	16384 words		65536 words		81920 words			
	Timer	128 points	256 points	512 points		2048 points		2048 points	2048 points x 2	512 points		2048 points		2560 points		Timer	Instance memory for system FB (M)
	Integrating timer	32 points	64 points	128 points		512 points		512 points	512 points x 2	128 points		512 points		640 points		Integrating timer	
	Counter	64 points	128 points	256 points		1024 points		1024 points	1024 points x 2	256 points		1024 points		1280 points		Counter	
	Edge detection	256 points	512 points	1024 points		4096 points		4096 points	4096 points x 2	1024 points		4096 points		5120 points		Edge detection	
	Others	2048 words	4096 words	8192 words		32768 words		32768 words	32768 words x 2	8192 words		32768 words		40960words		Others	
	System memory (M)	512 words		512 words				512 words	512 words x 2	512 words						System memory (M)	
Temporary area		4096 words		8192 words				8192 words	8192 words x 2	32768 words/Task, 4096 words/POU						Temporary area	
Available basic data type * 2		BOOL, INT, DINT, UINT, UDINT, REAL, TIME, DATE, TOD, DT, STRING, WORD, DWORD						BOOL, INT, DINT, UINT, UDINT, REAL, TIME, DATE, TOD, DT, STRING, WORD, DWORD								Available basic data type * 2	
No. of tasks		Default tasks (Cyclic scanning): 1, Periodic tasks: 4, Event tasks: 4 (Total of 4 tasks when Periodic task is used)						Default tasks (Cyclic scanning): 1, Periodic tasks: 4, Event tasks: 4 (Total of 4 tasks when Periodic task is used)								No. of tasks	
No. of POUs in program		2000 (including POUs in the library)						2000 (including POUs in the library)								No. of POUs in program	
Interface * 3	User ROM card (CF/SD)	ROM for SPH200	ROM for SPH200	–	○ CF CARD	○ CF CARD	○ CF CARD	○ CF CARD	○ CF CARD	○ CF CARD	○ CF CARD	○	○ CF CARD	○ SD CARD	○ SD CARD	User ROM card (CF/SD)	Interface * 3
	USB * 4	–	–	–	○	○	○	○	–	○	○	○	○	○	○	USB * 4	
	Ethernet * 5	–	–	–	–	–	–	–	–	–	–	○	○ * 6	○	○	Ethernet * 5	
Diagnostic function		Self-diagnosis (memory check, ROM sum check), System configuration supervising, Module fault monitoring						Self-diagnosis (memory check, ROM sum check), System configuration supervising, Module fault monitoring								Diagnostic function	
Security function		Set limits to download/upload of the projects, reference, and clear etc,. by the password.						Set limits to download/upload of the projects, reference, and clear etc,. by the password.								Security function	
Calendar		Up to 31 Dec. 2069 23:59:59 27sec/month (when active)		Up to 31 Dec. 2069 23:59:59 27sec/month (when active) When multi-CPU system is used, time is synchronized.				Up to 31 Dec. 2069 23:59:59 27sec/month (when active). When multi-CPU system is used, time is synchronized.								Calendar	
Battery backup * 7		Backup range: Application programs, system definitions, ZIP files, data memory, calendar IC memory Battery used: Lithium primary battery Backup time (at 25˚C): 5 years Replacement time (at 25˚C): Within 5 minutes		Backup range: Data memory, calendar IC memory Battery used: Lithium primary battery Backup time (at 25˚C) **NP1PS-32**/**32R**: 5 years, **NP1PS-74R**/**117R**: Approx. 1.3 years Replacement time (at 25˚C): within 5 minutes				Backup range: Data memory, calendar IC memory Battery used: Lithium primary battery Backup time (at 25˚C) **NP1PS-245R**: Approx. 0.7 years, **NP1PS-74D**: Approx. 0.65 years, **NP1PM-48R/48E/256E/256H**: 5 years **NP1PU-048E/256E**: 5 years Replacement time (at 25˚C): within 5 minutes								Battery backup * 7	
Memory backup by flash ROM (contained in CPU module)		Application programs, system definitions, and ZIP files can be saved in the user ROM card.		Application programs, system definitions, and ZIP files can be saved in the flash memory built in the CPU.				Application programs, system definitions, and ZIP files can be saved in the flash memory built in the CPU.								Memory backup by flash ROM (contained in CPU module)	
Memory backup by user ROM card (optional)		Application programs, system definitions, and ZIP files can be saved in the user ROM card.		Application programs, system definitions, zip files, compressed projects and User's data can be saved in user ROM card (compact flash card).				Application programs, system definitions, zip files, compressed projects and User's data can be saved in user ROM card (compact flash card).								Memory backup by user ROM card (optional)	
Internal current consumption		24V DC 85mA or less		24V DC 200mA or less				24V DC 200mA or less								Internal current consumption	
Mass		Approx. 170g		Approx. 200g (**NP1PS-32**/**NP1PS-74**) Approx. 220g (**NP1PS-32R**/**NP1PS-74R**)			Approx. 220g	Approx. 220g	Approx. 410g	Approx. 200g				Approx. 220g		Mass	

Note: * 1 The area sizes of general memory, retain memory, the instance memory for user FBs, and the instance memory for system FBs can freely be increased or decreased. Default values are shown in the above table.
* 2 This depends on each instruction.
* 3 O: Standard equipment, –: No equipment
* 4 Specification of USB
Applicable standard of USB: USB1.1
USB connector: USB-B type (**NP1PS-32R/74R/117R/245R**), USB-miniB type (**NP1PM-48R/48E/256E/256H,NP1PU-048E/256E**).
* 5 The Ethernet interface is 10Base-T/100Base-TX.
* 6 Ethernet interface is for equalization only during redundancy, so it is not available for general-purpose communications.
* 7 Backup time (25˚C) when a large-capacity battery (optionally available) is used:
NP1PS-74R: approx. 3.5 years, **NP1PS-117R**: approx. 3.5 years, **NP1PS-245R**: approx. 2 years, **NP1PS-74D**: approx. 1.75 years.
(No large-capacity battery can be mounted on **NP1PH-08/16**, **NP1PS-32/32R**, and **NP1PM-48R/48E, NP1PM-256E/256H,NP1PU-048E/256E**.)

SPH2000

■ Features

- CPU with Built-in Ethernet Capability
  Compared with conventional types, the SPH2000 enables host communications more economically, enabling use as an intelligent Ethernet module.
- FTP server and client function
  Data files (e.g., production control and operation history files) can be easily uploaded and downloaded between host devices and the CPU with built-in Ethernet capability.
- SNTP client function
  Allows you to correct the time by retrieving current time from NTP server.
- Provided with a CompactFlash slot as standard equipment
  CompactFlash (CF) memory with a storage capacity up to 2GB can be used as an auxiliary memory device for storing programs and data.
- Easy data exchange in CSV format
  Dedicated function block (FB) ready for long filenames lets you easily read/write files in CSV format.
- The largest data memory capacity in this class
  The 48K-step types hold up to 96K words, giving them the highest capacity in this class, and 256K-step types hold up to 2M words, which greatly exceeds the memory capacity of conventional PLCs.
- USB interface as standard equipment
  A USB-miniB connector for PC connection is included as standard equipment.
- Double-precision floating point calculation function
  Functions (FCT) especially for double-precision floating point calculations afford highly precise calculations.

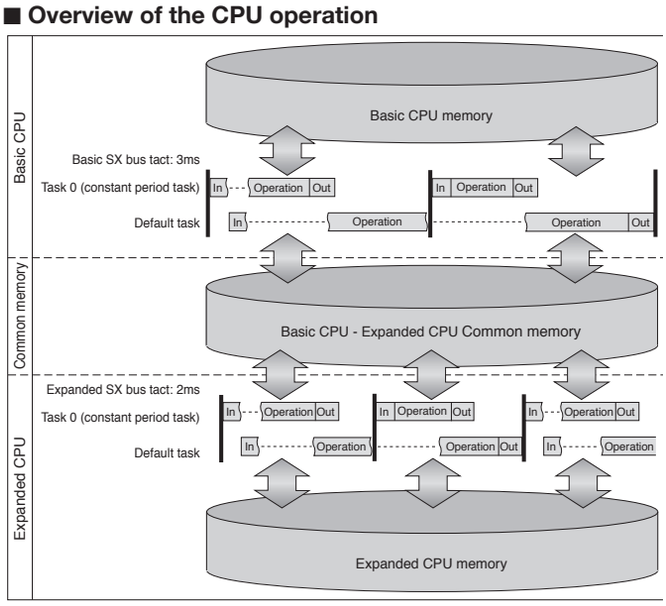


SPH300EX

■ Features

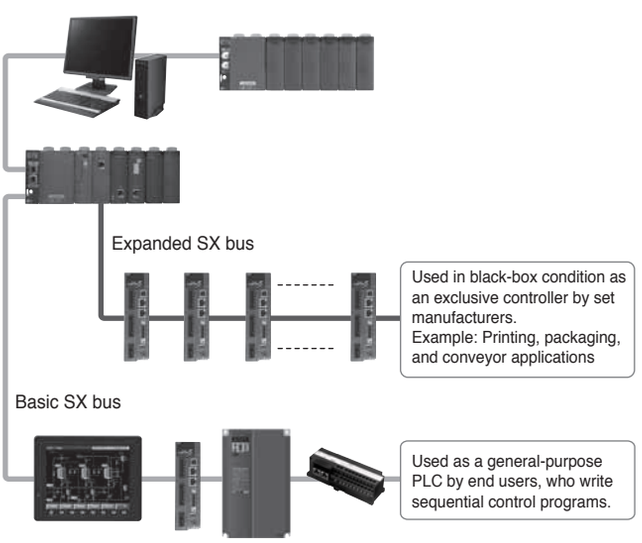
- Features dual control CPUs as standard equipment
  The basic CPU for ordinary sequential processing is used together with an expanded CPU for high-speed processing, to disperse the work load.
- Application to multi-axis servo systems
  The CPU and expanded CPU operate asynchronously, allowing the expanded CPU to provide high-speed control of inverters and servomotors.
  Controls up to 63 axes at the fastest I/O refresh rate of 0.5ms.

■ Overview of the CPU operation



The basic CPU and expansion CPU operate asynchronously in each SX bus cycle.

■ Example of system configuration



SPH2000 Redundant System

Models to be used: NP1PM-256H

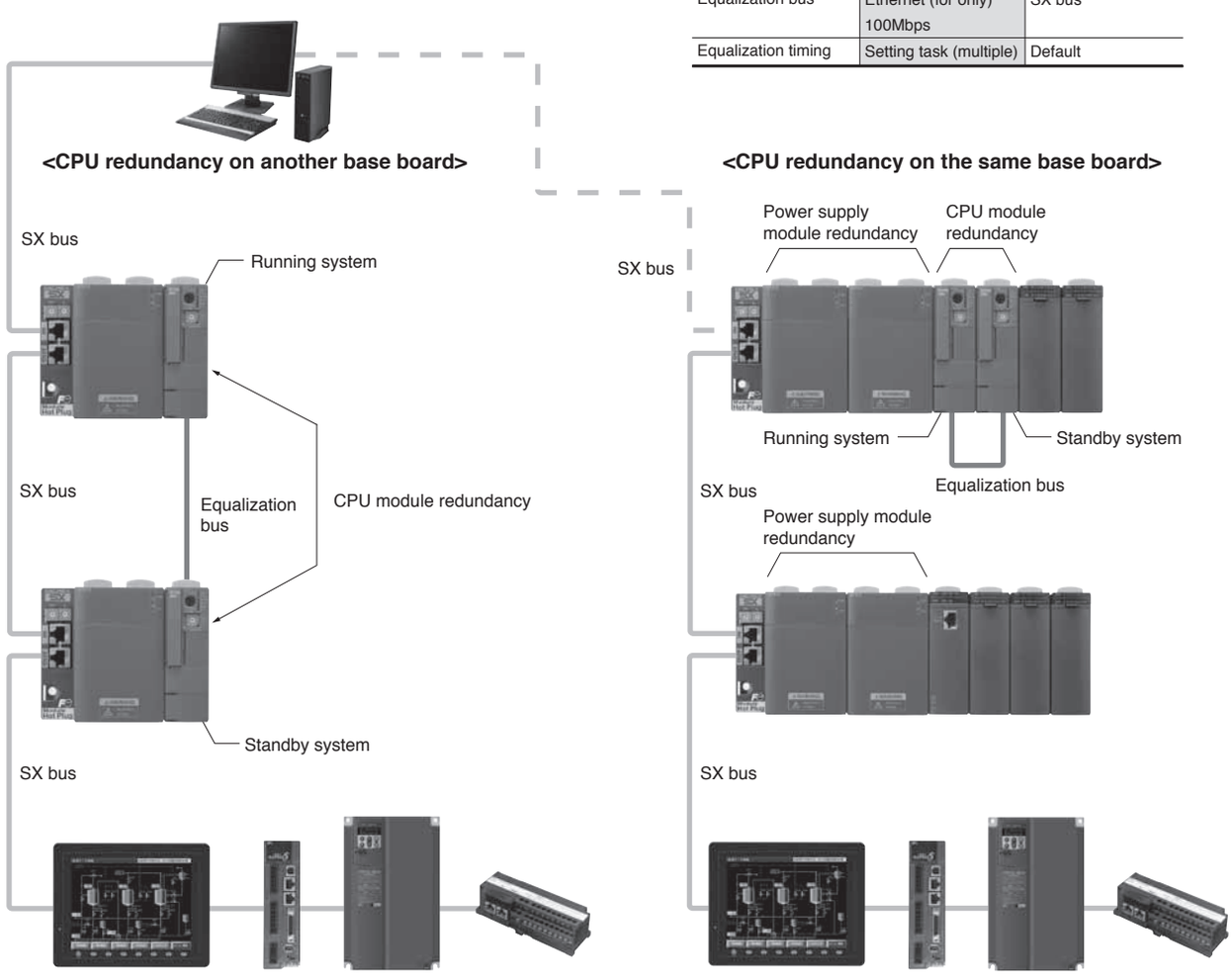
■ Features

- Mass equalization data
  Up to 320K words of data can be equalized.
- High-speed transmission through dedicated equalization bus
  100Mbps dedicated equalization bus transmits the equalization data.
  Also, as a connection cable, a commercially available LAN cable (shielded category 5, cross connect cable) is used.
- Module exchangeable during running CPU
  Failed CPU module can be exchanged without stopping the system by using hot pluggable base board.
- Redundant multi-CPU system enabled
  Up to 4 multi-CPUs can be used for redundancy in multi-CPU (distributed processing) systems.
- Easy equalization setting
  Equalization area can be set up on a per-FB instance basis in addition to on a per-variable basis.
- System configuration with standard modules enabled
  Standard modules allow you to construct systems such as power supplies, base boards and I/O modules.

Comparing SPH redundancy performance

	SPH2000 **NP1PM-256H**	SPH300 **NP1PS-□□**
Maximum equalization capacity	320K words	8K words
Equalization performance	20ms/8K words 250ms/320K words	200ms/8K words
Equalization bus	Ethernet (for only) 100Mbps	SX bus
Equalization timing	Setting task (multiple)	Default

■ System configuration example

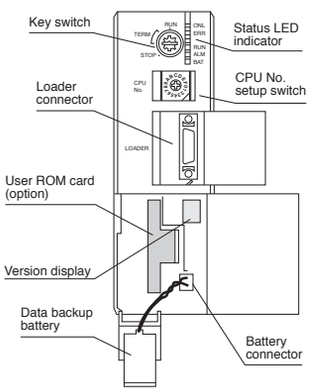


<Operation overview>

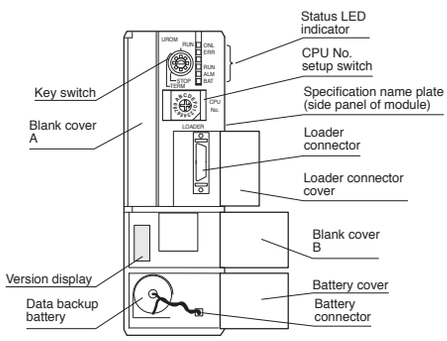
- CPU module redundancy
  SPH2000 supports “1:1 redundancy” which allows you to equalize the data and continue operation without stopping the system. Data equalization rate is up to 320k words/250ms (equalization bus transmission rate: 100Mbps) using dedicated “equalization bus”.
- Power supply module redundancy
  When two power supply modules are mounted on the same base board, the power supply modules run in parallel, and each module supplies 50% of electric power. When an error occurs in one of power supply modules, the normally running power supply module supplies 100% of electric power.

■ Outer view

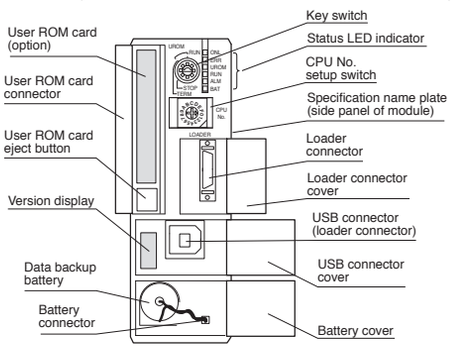
• SPH200 (**NP1PH-08**/**NP1PH-16**)



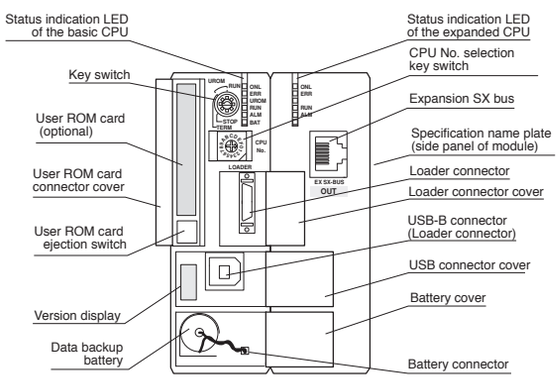
• SPH300 (**NP1PS-32**)



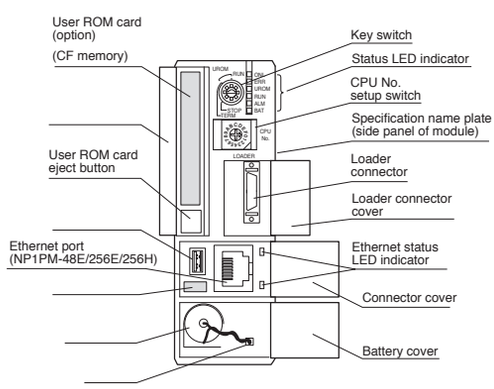
• SPH300 (**NP1PS-32R**/**NP1PS-74R**/**NP1PS-117R**/**NP1PS-245R**)



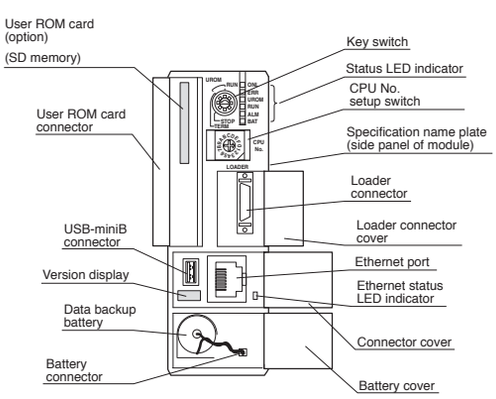
• SPH300EX (**NP1PS-74D**)



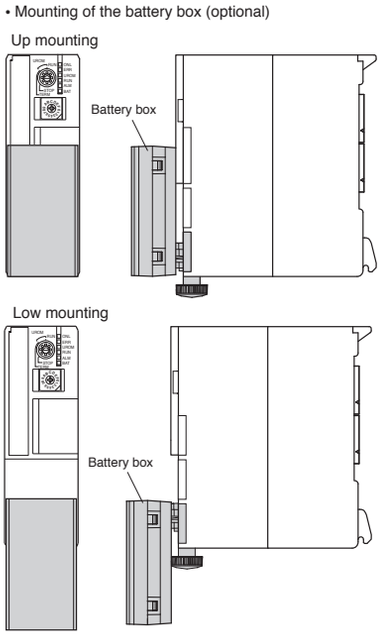
• SPH2000 (**NP1PM-48R**/**NP1PM-48E**/**NP1PM-256E**/**NP1PM-256H**)



・SPH3000 (NP1PU-048E/NP1PU-256E)



• Mounting of the battery box (optional)



Note: 1) Note that, if the battery box is up-mounted, the loader cannot be connected.
2) No battery box can be mounted on SPH200 (NP1PH-08/NP1PH-16), SPH300 (NP1PS-32/ NP1PS-32R), SPH2000 (NP1PM-48R/NP1PM-48E/ NP1PM-256E/NP1PM-256H), and SPH3000 (NP1PU-048E/ NP1PU-256E).