**CPU Module: NP1P1-□□**

**Features**
- **Ultra-high-speed processing**
  The CPU module carries out ultra high-speed processing as below:
  - The SPH3000 processes basic instructions in 9ns, the SPH4000 processes basic instructions in 20ns, the SPH2000 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 standby feature and N-to-1 backup feature improves the system safety and reliability.
  (The SPH-2000 will soon support the redundancy.)
- **IEC 61131-3**
  Complete compliance with the IEC 61131-3 International standard languages enables programming understood worldwide.

**Performance specifications**

<table>
<thead>
<tr>
<th>CPU Module</th>
<th>SPH2000</th>
<th>SPH3000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>NP1P1-□□</td>
<td>NP1P1-□□</td>
</tr>
<tr>
<td>Control system</td>
<td>8-bit microprocessor, 8-bit microprocessor</td>
<td>16-bit OS processor, 16-bit execution processor</td>
</tr>
<tr>
<td>I/O control system</td>
<td>Direct connection I/O (See chart), Direct connection I/O (See chart), and other remote I/O links (See chart)</td>
<td>Direct connection I/O (See chart), Direct connection I/O (See chart), and other remote I/O links (See chart)</td>
</tr>
<tr>
<td>Input / Output connection method</td>
<td>Direct connection I/O (See chart), Direct connection I/O (See chart), and other remote I/O links (See chart)</td>
<td>Direct connection I/O (See chart), Direct connection I/O (See chart), and other remote I/O links (See chart)</td>
</tr>
<tr>
<td>CPU</td>
<td>8-bit microprocessor, 8-bit microprocessor</td>
<td>16-bit OS processor, 16-bit execution processor</td>
</tr>
<tr>
<td>Internal current consumption</td>
<td>24V DC 85mA or less</td>
<td>24V DC 200mA or less</td>
</tr>
<tr>
<td>No. of tasks</td>
<td>20480 steps</td>
<td>20000 (including POUs in the library)</td>
</tr>
<tr>
<td>No. of POUs in program</td>
<td>32768 words/Task, 4096 words/POU</td>
<td>32768 words/Task, 4096 words/POU</td>
</tr>
<tr>
<td>Available basic data type</td>
<td>BOOL, INT, DINT, UINT, UDINT, REAL, TIME, DATE, TOD, DT, STRING, WORD, DWORD</td>
<td>BOOL, INT, DINT, UINT, UDINT, REAL, TIME, DATE, TOD, DT, STRING, WORD, DWORD</td>
</tr>
<tr>
<td>Available optional data type</td>
<td>* 25600 points, * 8192 words, * 4096 steps</td>
<td>* 51200 points, * 16384 words, * 8192 steps</td>
</tr>
<tr>
<td>Internal memory capacity</td>
<td>32768 words</td>
<td>66560 words</td>
</tr>
<tr>
<td>System Memory (M)</td>
<td>32768 words</td>
<td>8192 words</td>
</tr>
<tr>
<td>Retained memory (M)</td>
<td>32768 words</td>
<td>8192 words</td>
</tr>
<tr>
<td>External memory for system FB (M)</td>
<td>16 points</td>
<td>16 points</td>
</tr>
<tr>
<td>Calendar</td>
<td>312 steps</td>
<td>128 steps</td>
</tr>
<tr>
<td>User's data can be saved in user ROM card (compact flash card).</td>
<td>User's data can be saved in user ROM card (compact flash card).</td>
<td>User's data can be saved in user ROM card (compact flash card).</td>
</tr>
<tr>
<td>Replacement time (at 25˚C):</td>
<td>Within 5 minutes</td>
<td>Within 5 minutes</td>
</tr>
</tbody>
</table>

**Programmable Controllers MICROX-SX series SPH CPU Module**

- **Compatibility with USB and user ROM**
  - The SPH300/SPH2000/SPH3000 of the USB and user ROM versions with separate formats are offered (NP1P1-32R/74R/117R/245R, NP1P1-48R/48E/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.

- **Battery Backup**: Large-capacity battery (optionally available).
- **Internal current consumption**:
  - 24V DC 200mA or less
  - 24V DC 200mA or less

**Note:**
1. The area sizes of general memory, retain memory, the instance memory for user FBs, and the instance memory for system FBs can be increased or decreased. Default values are shown in the above table.
2. “□□” represents the number of CPUs in a CPU module.
3. -“□□” indicates a small-sized CPU module.
4. Specification of USB:
   - Applicable standard of USB: USB 2.0

**Terminal connection**:
- Opto-coupled input (NP1P1-□□-□□□)
- 24V DC 200mA or less
- 24V DC 200mA or less

**Input / Output connection method**:
- Direct connection I/O (See chart), Direct connection I/O (See chart), and other remote I/O links (See chart)
- Direct connection I/O (See chart), Direct connection I/O (See chart), and other remote I/O links (See chart)
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.
**SPH2000 Redundant System**

**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.

**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.

---

### Comparing SPH redundancy performance

<table>
<thead>
<tr>
<th>SPH2000 NP1PM-256H</th>
<th>SPH300 NP1PS-256H</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum equalization capacity</td>
<td>320K words</td>
</tr>
<tr>
<td>Equalization performance</td>
<td>20ms/8K words</td>
</tr>
<tr>
<td>Equalization bus</td>
<td>Ethernet (for only)</td>
</tr>
<tr>
<td>Equalization timing</td>
<td>Setting task (multiple)</td>
</tr>
</tbody>
</table>
Programmable Controllers

MICREX-SX series SPH

CPU Module

■ Outer view

- SPH200 (NP1PH-08/NP1PH-16)
  - Key switch
  - Loader connector
  - User ROM card (option)
  - Version display
  - Data backup battery

- SPH300 (NP1PS-32)
  - Status LED indicator
  - CPU No. setup switch
  - Specification name plate (side panel of module)
  - Loader connector
  - Loader connector cover
  - Blank cover A
  - Data display
  - Data backup battery
  - Battery cover

- SPH300EX (NP1PS-74D)
  - Status indication LED of the basic CPU
  - Status indication LED of the expanded CPU
  - CPU No. selection key switch
  - Expansion SX bus
  - User ROM card (option)
  - User ROM card connector cover
  - User ROM card eject switch
  - Version display
  - Data backup battery
  - Battery cover

- SPH3000 (NP1PU-048E/NP1PU-256E)
  - User ROM card (option)
  - User ROM card connector
  - Status LED indicator
  - CPU No. setup switch
  - Specification name plate (side panel of module)
  - Loader connector
  - Loader connector cover
  - USB-B connector (Loader connector)
  - USB connector cover
  - Battery cover

- SPH2000 (NP1PM-48R/NP1PM-48E/NP1PM-256E/NP1PM-256H)
  - User ROM card (option)
  - User ROM card connector
  - Key switch
  - Status LED indicator
  - CPU No. setup switch
  - Specification name plate (side panel of module)
  - Loader connector
  - Loader connector cover
  - USB connector (Loader connector)
  - USB connector cover
  - Battery cover

- Mounting of the battery box (optional)
  - Up mounting
  - Low mounting

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-74R), SPH3000 (NP1PU-48E/NP1PU-256E/NP1PU-256H), and SPH3000 (NP1PU-048E/NP1PU-256E).