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# Silicon Disk Unit for PC CPU Module Compatible with MELSEC-Q Series PPC-SDD(MS)-32, 64, 128, 192, 320, 500, 1000 User's Guide CONTEC CO.,LTD.

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Thank you for purchasing the silicon disk unit for PC CPU Module. Follow the instructions in this guide to use the product.

## **Notes!**

- *Silicon disks limit the maximum number of writes (rewrites) due to the characteristics of memory used. See the "Average Rewritable Life" section for details to check whether the silicon disk unit satisfies your operating conditions and needs.*
- *Do not touch the interface connector of the silicon disk unit.*
- *Before plugging to or unplugging from the connector on the silicon disk unit, be sure to turn off the power unit.*
- CONTEC assumes no liability for any loss or destruction of data recorded by this product regardless of the attribute of the causing fault or failure. Be sure to back up important data.

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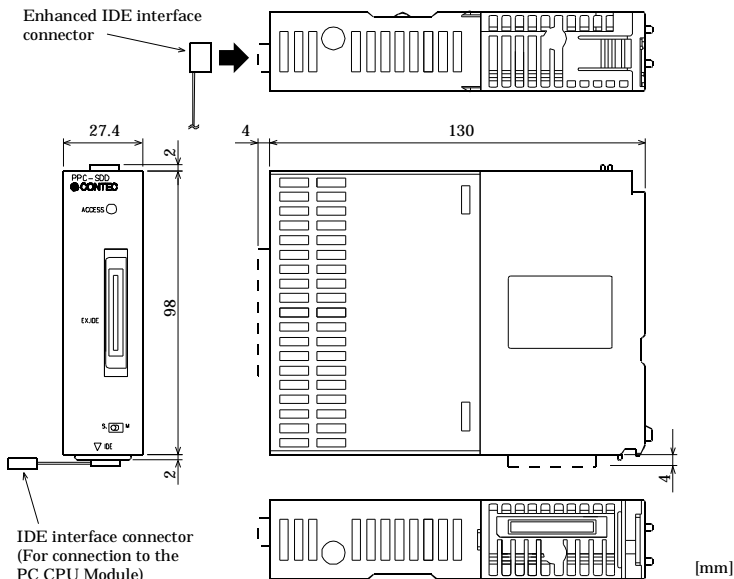
## About the PPC-SDD(MS)-x

- This product is the silicon disk unit dedicated to the PC CPU module (PPC-CPU686(MS)) compatible with the MELSEC-Q Series manufactured by Mitsubishi Electric Corporation.
- The drive in the silicon disk unit is a silicon disk drive function-compatible with a 2.5-inch IDE hard disk.
- Superior in environmental resistance (to vibration and shock), best suited for FA applications requiring high reliability.
- Lower power consumption than by hard disks.
- Silent without motor noise as generated by hard disk drives.
- For configuration of the system using the silicon disk unit and its connection, refer to the PPC-CPU686(MS) user's manual.

## Product Configuration

- Unit...1
- User's Guide (this booklet)...1
- IDE connection cable...1

## External Dimensions



# Specifications

## Function Specifications

Item	Specification (PPC-SDD(MS)-xxx)						
	-32	-64	-128	-192	-320	-500	-1000
Memory capacity *1	32MB	64MB	128MB	192MB	320MB	512MB	1GB
Bus interface	IDE						
Internal drive	2.5-inch silicon disk drive using flash memory						
Transfer rates							
ATA interface transfer rate	8.0 MB/sec (Read/Write)						
Memory transfer rate (Read)	5.0MB/sec						
Memory transfer rate (Write)	0.71MB/sec	1.5MB/sec	3.0MB/sec				
Access speed (Read) *2	2.0MB/sec						
Access speed (Write) *2	0.5MB/sec	1.0MB/sec	1.5MB/sec				
Reliability	1/10 <sup>14</sup> bits read						
ECC	64bits/Sector						
Maximum number of erase/write cycles	300,000						
Connection to PC CPU Module	Dedicated 40-pin cable bundled						
Extension	40-pin half-pitch connector for connecting slave IDE device Capable of connecting one IDE device with master/slave selector switch						
Access indicator *4	Front-panel LED(red)						
Power consumption	+5VDC, 0.09A (Max)						
External dimensions (mm)	27.4 (W) × 130.0 (D) × 98.0 (H) (Excluding protrusions)						
Weight	250g						

\*1 1 MB = 1,000,000 bytes. 1 GB = 1,000,000,000 bytes

\*2 The access speeds are reference values; they depend on operating conditions.

\*3 When the silicon disk unit is set as the master device, neither the hard disk unit nor the CD-ROM drive can be used as the slave device.

\*4 When two disk units (hard disk and/or silicon disk units) are connected in a master/slave arrangement, they have common access indication. When either of the master and slave devices is accessed, therefore, both of their access lamps come on at the same time.

## General Specifications

Item	Specification				
Operating ambient temperature	0 to 55°C				
Storage ambient temperature	-25 to 75°C				
Operating ambient humidity	5 to 95% RH (No condensation allowed)				
Storage ambient humidity	5 to 95% RH (No condensation allowed)				
Vibration resistance	Conforming to JIS B3502 and IEC 61131-2	With intermittent vibration			Tested 10 times (for 80 minutes) in each of the X, Y, and Z directions
		Frequency	Acceleration	Amplitude	
		10 to 57Hz	---	0.075mm	
		57 to 150Hz	9.8m/s <sup>2</sup>	---	
		With continuous vibration			
		Frequency	Acceleration	Amplitude	
10 to 57Hz	---	0.035mm			
57 to 150Hz	4.9m/s <sup>2</sup>	---			
Shock resistance	Conforming to JIS B3502 and IEC 61131-2 (147 m/s <sup>2</sup> 3times in each of three directions)				
Operating ambience	No corrosive gas				
Operating altitude	2000m or less *3				
Installation location	Inside the control panel				
Overvoltage category *1	II or lower				
Pollution degree *2	2 or less				

\*1 The overvoltage category of a device indicates which distributor in the range from public distribution network to machinery the device is assumed to be connected to. Category II applies to devices to which power is supplied from fixed facilities. The surge voltage of those devices is 2500 V whose rated voltage is 300 V.

\*2 The index indicating the degree to which conductive substances are generated in the operating environment. Pollution level 2 indicates the environment that generates only nonconductive pollutants while allowing accidental condensation to cause temporary conduction.

\*3 The silicon disk unit may fail and cannot be used in an environment in which the air is compressed to over the atmospheric pressure generated at an altitude of around 0 m.

## Installing the Hardware

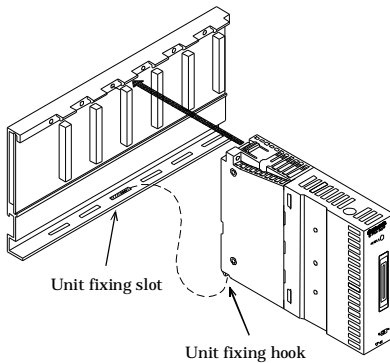
### Notes on Use

Install the silicon disk unit on the MELSEC-Q Series base unit before it can be used.

For the specifications and installation of the base unit, refer to the "Mitsubishi General-purpose Sequencer QCPU (Q Mode) User's Manual (Hardware Design, Maintenance and Inspection)".

### Fastening the Silicon Disk Unit

- Fit the unit fixing hook in the unit fixing slot in the base unit, then push the silicon disk unit in the direction of the arrow to set the silicon disk unit on the base unit.

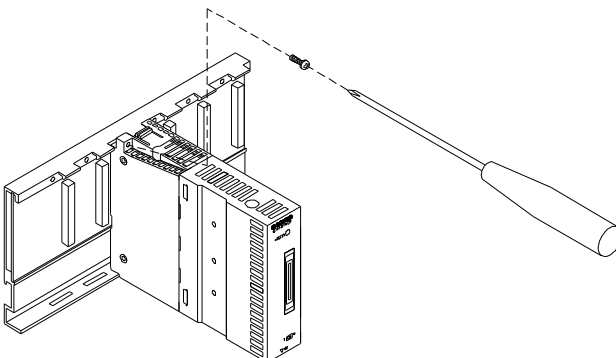


- After setting the silicon disk unit on the base unit, use two screws to fasten the silicon disk unit to the base unit.

**Unit fixing screws: M3 x 12 (prepared by the user)**

Tighten the screws within the following torque range.

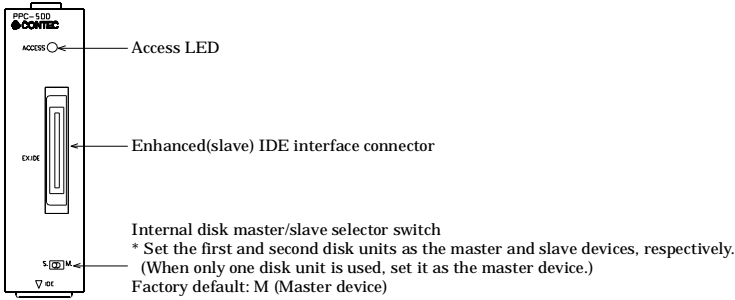
**Tightening torque range: 36 to 48N·cm**



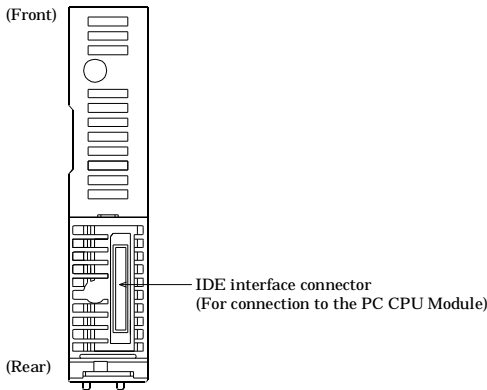
# Functions of Components

## Component Locations

### Front panel



### Bottom



For the pin assignments in the IDE interface and Enhanced IDE interface connectors, refer to the user's manual for the PC CPU Module.

## Related Options

- PPC-HDD(MS)      Hard disk unit
- IPC-CDD-02      CD-ROM/DVD-ROM drive

## Average Rewritable Life of Silicon Disk Drive

The silicon disk unit uses flash memory for retaining data. Flash memory is limited in life, or in the number of times it can be rewritten to. The lifespan of the flash memory used in this disk unit is 300,000 rewrites. The lifespan of the entire unit should be considered with those alternate sectors in mind which substitute for error sectors when the flash memory has run out of life.

When the same file is rewritten, access takes place usually to physically the same sectors. If a write error occurs, however, alternate sectors (a total of 290 sectors) are used. The average rewritable life is therefore the time taken to use up these alternate sectors.

Note, also, that the relevant equations differ depending on whether the total size of files rewritten is less than 32 MB as shown below.

(1) The total size of files rewritten is less than 32 MB.

$$\text{Average number of rewrites allowed} = 3.87 \times 10^8 \times \left( -\ln\left(1 - \frac{32[\text{MB}]}{0.576 [\text{MB}] + \text{Total size of files rewritten} [\text{MB}]} \right) \times 0.018 \right)^{\frac{1}{0.795}}$$

Note: The above expression is an empirical formula.

$$\text{Average rewritable life [hours]} = \frac{\text{Average number of rewrites allowed}}{\text{Number of rewrites allowed per hour}}$$

(2) When the total size of files rewritten is 32 MB or more.

$$\text{Average number of rewrites allowed} = 3.87 \times 10^8 \times \left( -\ln(0.982) \right)^{\frac{1}{0.795}} = 2,444,585 \text{ (Fixed value)}$$

Note: The above expression is an empirical formula.

$$\text{Average rewritable life [hours]} = \frac{2,444,585}{\text{Number of rewrites allowed per hour}}$$

Example 1) Assume that files amounting to 9.6 MB are rewritten every five minutes. This example corresponds to case (1) above and the average rewritable life is obtained as follows:

Average number of rewrites allowed = 10,834,313

Number of rewrites allowed per hour = 12 (Once per five minutes)

**Average rewritable life [hours] = 10,834,313/12 = 902,859 (= about 103 years)**

Example 2) Assume that files amounting to 40 MB are rewritten every five minutes. This example corresponds to case (2) above and the average rewritable life is obtained as follows:

Average number of rewrites allowed = 2,444,585

Number of rewrites allowed per hour = 12 (Once per five minutes)

**Average rewritable life [hours] = 2,444,585/12 = 203,715 (= about 23 years)**

Example 3) When swapping (32 MB or more) occurs, the number of times of swapping per hour and the swap interval are obtained as follows assuming the life is 10 years (87,600 hours).

This example corresponds to case (2) above.

Number of times of swapping per hour =  $2,444,585/87,600 = 27.9$

Swap interval [minutes per swapping] =  $60/27.9 = 2.15$

**If the measured swap interval is 2.15 minutes or more, a life of at least 10 years can be expected.**

## Restriction on Master/Slave Arrangement

If the silicon disk unit (SDD) set as the master is connected with the hard disk unit (HDD) or CD-ROM drive (CDD) as the slave, the slave device cannot be recognized normally.

Master	Slave	Validity
SDD	HDD	×
SDD	CDD	×
HDD	SDD	○
CDD	SDD	○
SDD	SDD	○

To use the silicon disk unit in combination with the hard disk unit (PPC-HDD(MS)) or CD-ROM drive (IPC-CDD-02), set the hard disk unit or CD-ROM drive as the master device and the silicon disk unit as the slave device.

## Note on the OS Pre-installed Model

When the Windows NT Embedded 4.0 pre-installed model (PPC-SDD(MS)-320/x) is used, the OS cannot be started up normally if you either reset the BIOS settings of the PC CPU module to the defaults or change the master/slave setting of the silicon disk unit. If this is the case, invoke BIOS Setup on the PC CPU module and make the following changes to the BIOS settings. For how to invoke BIOS Setup and to change BIOS settings, refer to the PC CPU Module user's manual (PPC-CPU686(MS)-MU, separately priced).

- Silicon disk unit set as master

[Main] → [Primary Master]

Type : [User]

LBA Mode Control : [Disabled]

[Main] → [Primary Slave]

Type : [Auto]

- Silicon disk unit set as slave

[Main] → [Primary Master]

Type : [Auto]

[Main] → [Primary Slave]

Type : [User]

LBA Mode Control : [Disabled]

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