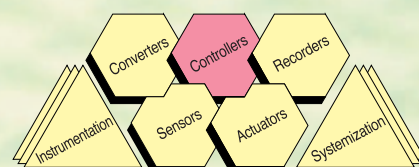
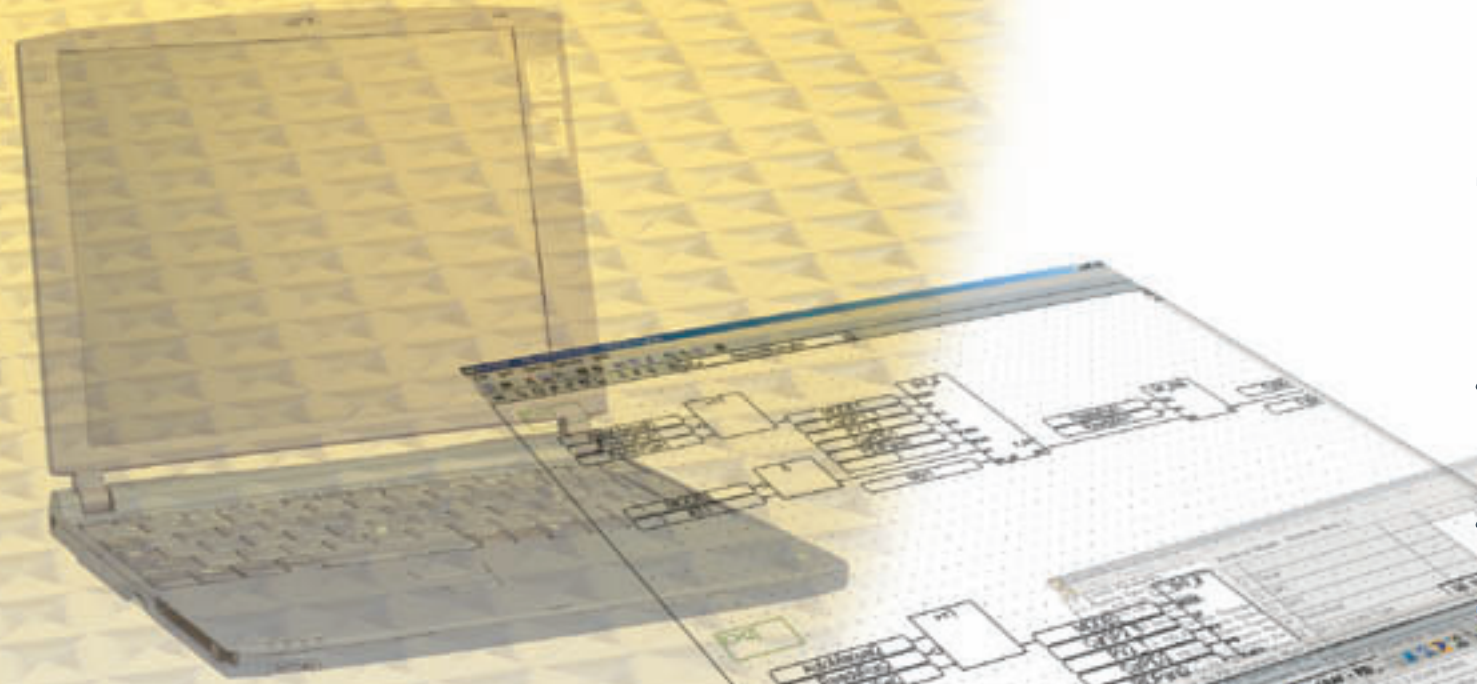


Module Type Controller

# AHC2001

*Proposal of  
High Function and  
High Value Addition  
to Process Equipment Control*



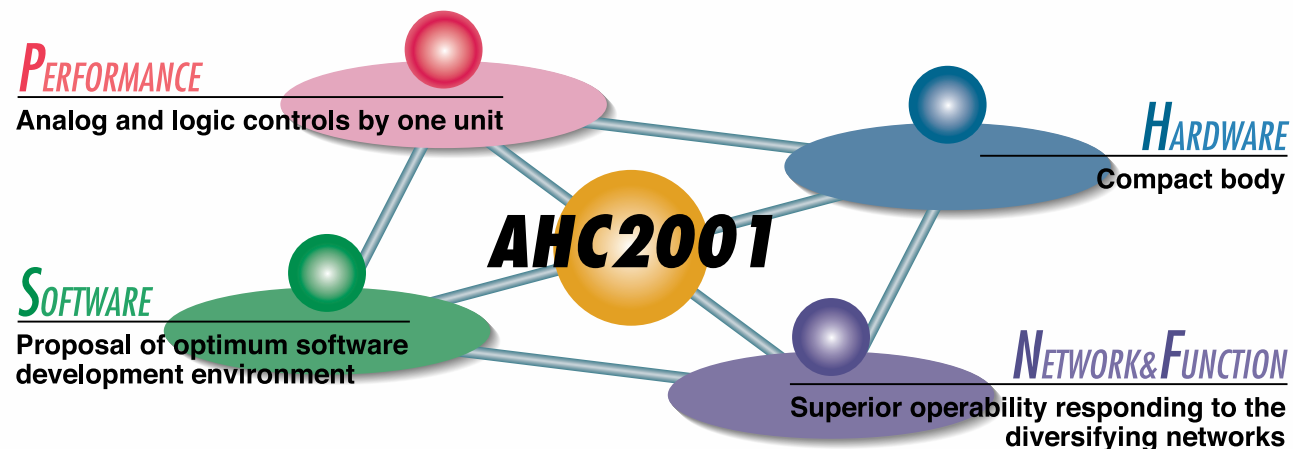


# Creation of new stage for equipment control

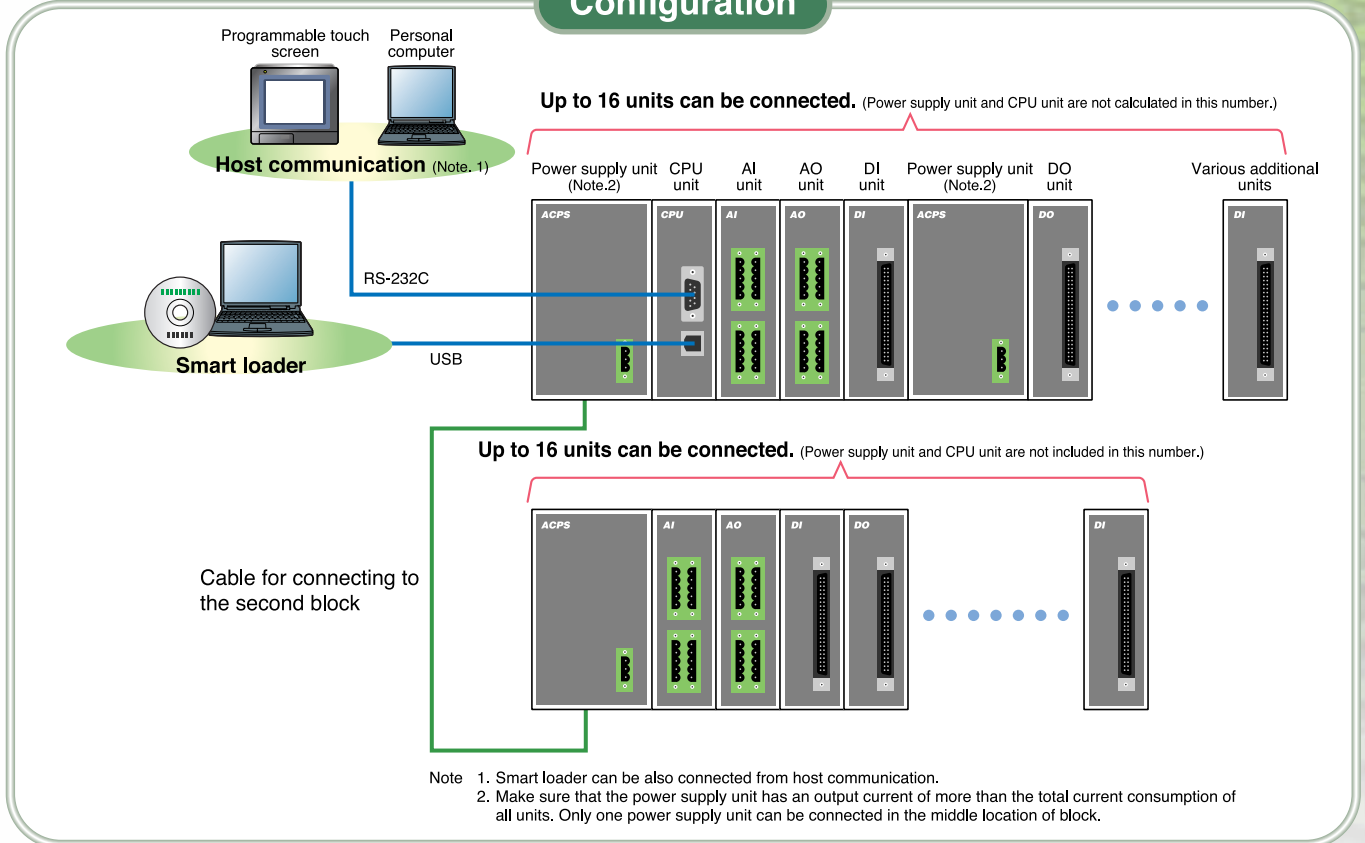
*The know-how of analog value process control is packaged in this compact controller.*

The equipment control centering around the analog value control must also progress in order to meet the demands of the diversification and high functionality of equipment which have been changing rapidly year by year. The AHC2001 can offer the solution to the issue of how the response should be made to the equipment instrumentation which is becoming more and more complicated and the demand for compactness and cost reduction. The know-how of analog value control which Yamatake has cultivated for many years is condensed in this compact controller.

This AHC2001 is a completely new concept, high performance controller developed by thoroughly considering the solution one-step ahead for future requirements. The AHC2001 offers the proposal of new value addition to the equipment which is becoming more and more complex.



## Configuration



# HARDWARE

High function, compact and easy-to-install module type structure

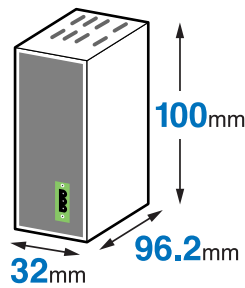
## Module type structure for maximizing space-efficiency

This module type structure is effective to consider the optimum construction for equipment by pursuing low cost and space saving.  
Easy mounting on DIN rail.



## High function in a space-saving compact body

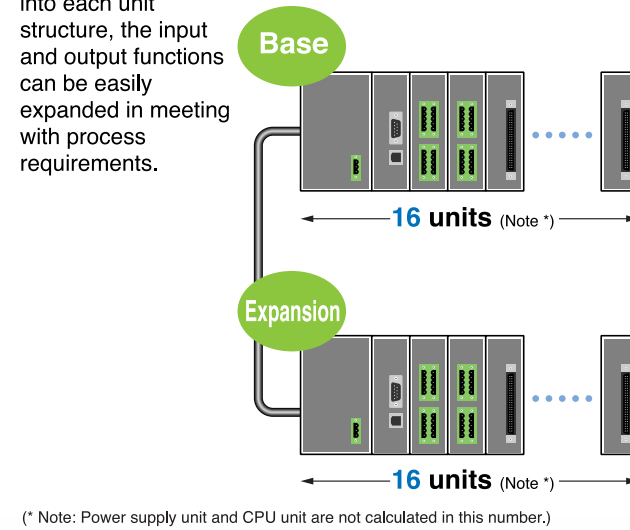
PID calculation function and logic control function are all packaged in a compact body. This design is ideal for mounting with much space-saving.



(Example: The width of all modules is 32mm except for AHC2001PSA and PSD power supply units.)

## Flexible unit structure for multi-loop application

By separating the input and output functions of the conventional controller and also by packaging into each unit structure, the input and output functions can be easily expanded in meeting with process requirements.

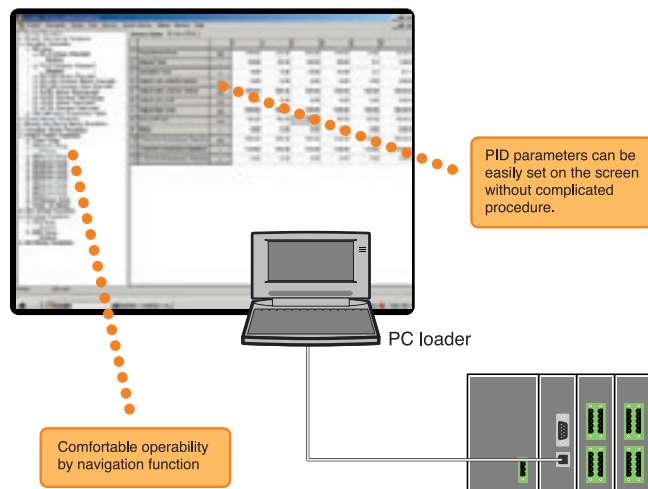


# SOFTWARE

More familiar software, offering comfortable development environment

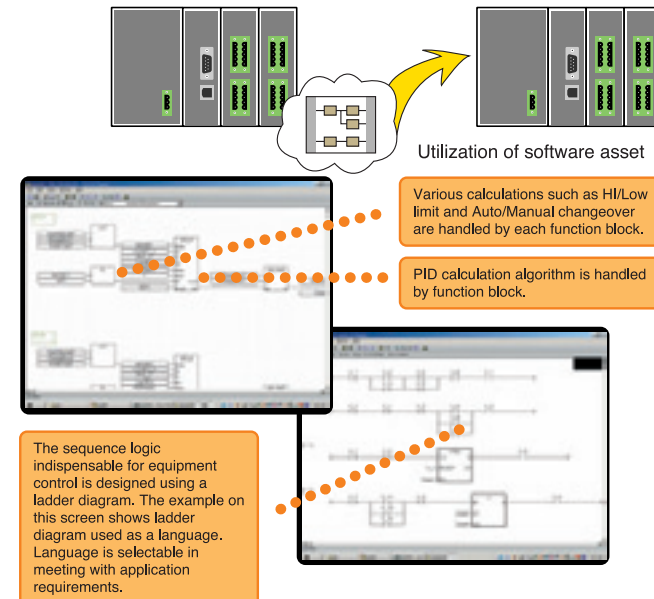
## Easy setup by PC loader

Input/output range setting of each channel, PID parameter setting and others can be easily performed by a PC loader. As a monitoring function convenient for adjustment, the group monitoring, tuning trend and sampling trace (CSV output possible) functions are provided.



## Optimum program development environment for process control

The program language conforming to IEC61131-3 (ISaGRAF) is adopted. Individual multiple programs can be executed at a time. This allows easy individual programming for logic control and analog value control without mixing them. The program language suitable for application can be selected.



# PERFORMANCE

Superb performance responding to various application requirements

## Great harmony of analog control and logic control

The PID control command is provided as a function block (FB) in the CPU unit. By processing the PID control and the process logic control in unified method, the various processing which is required for process and equipment control such as equipment sequence control, multi-variable control (incorporating special algorithms), AUTO/MANUAL changeover, manual output, error-processing sequence and interlock conditions can be executed in this unified method.

## High-performance and cost efficient process control analog input and output units

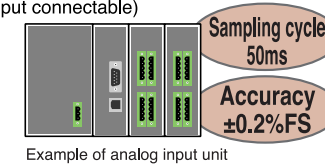
Input and output update cycle of 50ms is realized up to 32 loops with high accuracy and high response speed.

### Analog input unit

- Input accuracy:  $\pm 0.2\%$ FS
- Full multi-input (different type input connectable)
- Isolation between channels
- Resolution: 1/10,000

### Analog output unit

- Output accuracy:  $\pm 0.1\%$ FS
- Update cycle: 50ms
- Resolution: 1/5,000



## Multiple control modes and advanced control algorithm

The AHC2001 has the functions of deviation derivative type PID, cascade control and "JUST-FITTER" control algorithm which can recover from the overshoot suppression to the stable state in a short time when returning against intermittent disturbance. The controller also has the program pattern setting function indispensable for batch processing equipment and the various calculation functions such as compensation, square root extraction and linearization used for input processing.

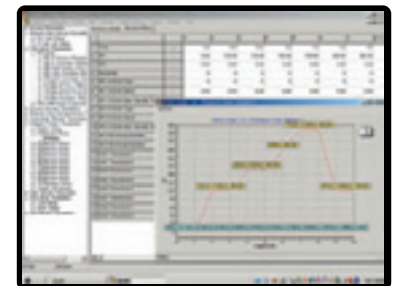
## Logic control function equivalent to a small PLC

The AHC2001 has the logic control function equivalent to a small PLC in addition to the analog control function. It can handle maximum 256 input and output points, and can construct a sequence logic for the interlock signals, indispensable for analog variable control like a PLC. Mechanical control logic and analog value control can be totally controlled for a small scale equipment.



## Program setting function

The AHC2001 has the program setting function indispensable for batch processing. This program setting function is developed including the know-how cultivated by long technical experience on Yamatake programmable controllers for the guaranteed soak time and event output of each segment. Maximum 99 program patterns can be stored. Two loops such as temperature and pressure can be simultaneously operated.

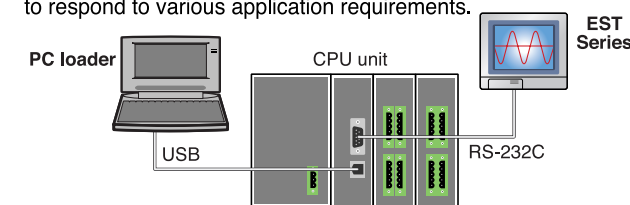


# NETWORK & FUNCTION

Can flexibly respond to diversifying equipment control requirements

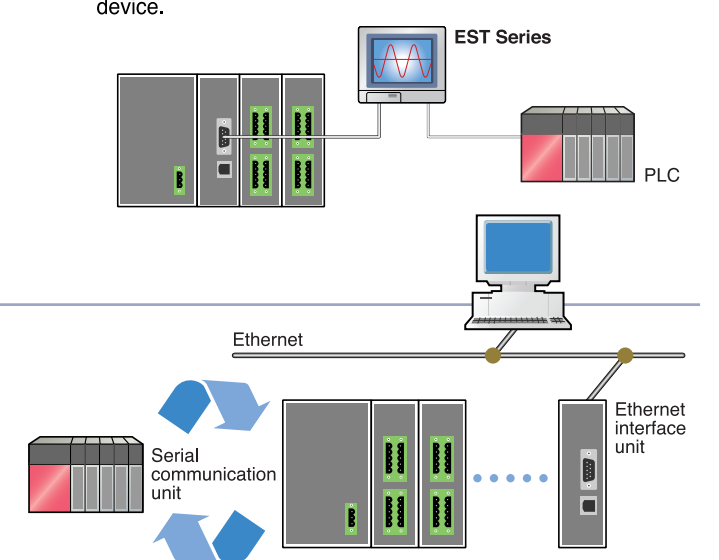
## USB and RS-232C ports are incorporated in CPU unit

The AHC2001 has a standard USB port convenient for connecting with a personal computer loader. The connection can be easily made using a plug-in method. The RS-232C port is also provided for use with a touch screen display or a personal computer. These ports are effective to respond to various application requirements.



## EST Series for easy data exchange with PLC

The EST Series can be used as an indication and setting device for each parameter setting of each control loop. The EST Series can function as an indicator and also can exchange the data between AHC2001 and PLC. The EST is a high function indicator having both functions of indicator and data exchanging device.



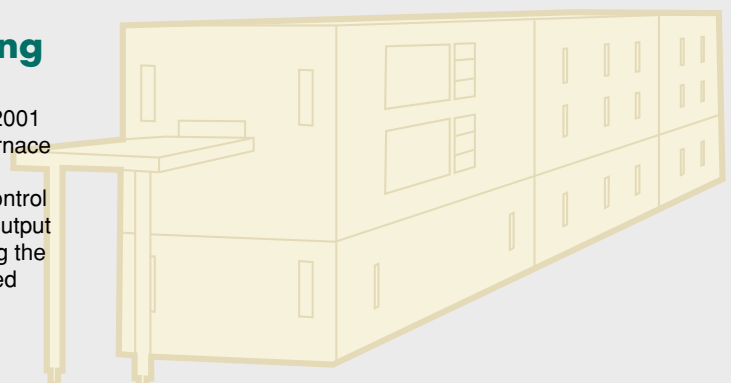
## Advanced communication functions

More functions are available other than the logic control and heat process control. Since Ethernet interface unit indispensable for connection with SCADA is available, the connection with a computer or PLC is possible. The RS-232C is used for the connection with PLC or electronic devices. A serial communication unit can exchange the data.

# Advanced functions to support a wide variety of applications

## Carburizing and burning furnaces

The program setting function of the AHC2001 can realize the instrumentation of both furnace temperature control and gas flow control (including mixing). Since the sequence control can be made up to 256 digital input and output points, the integrated processing including the mechanical controls can also be performed according to the equipment scale.

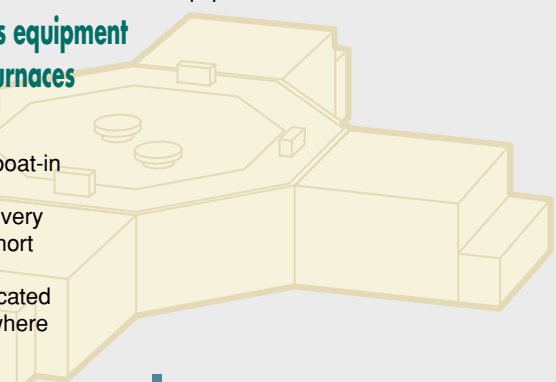


## Culture equipment

The AHC2002 features the function that the analog values can be controlled up to 32 loops. All the analog values such as temperature, pressure, PH and Air/O<sub>2</sub> ratio of the culture equipment can be controlled.

## Various semiconductor heating process equipment such as CVD and oxidation diffusion furnaces

The AHC2001 has the advanced control algorithm to rapidly recover from the temperature suddenly dropped by wafer boat-in to the film formation temperature without generating overshoot in temperature recovery processing, thus enabling realization of short tact time and controllability improvement. Since the AHC2001 also has the sophisticated algorithm dedicated for cascade control where the master is the internal temperature of chamber and the slave is the heater temperature, the analog value control ranging from single loop control to cascade control can be made.



## Compounding equipment

Total control can be made for chemical liquid injection/compounding (flow integration, instantaneous flow control, flow rate control, compensating calculation based on density change), changeover of each process, discharging, and measuring logic control.



# LINEUP

## AC input power supply unit (Model No.: AHC2001PSA)



Item	Specifications
Input voltage range	85 to 250Vac 50/60±3Hz
Inrush current	50A max.
Allowable instantaneous stop time	10ms max. (at 100Vac input)
Efficiency	60% typ.
Output capacity	5V, 3A and 24V, 1A (dedicated for internal supply)
Dielectric strength	1500Vac 1min between input (LN) and LFG terminals, and between input (LN) and internal power supply
Insulation resistance	10MΩ min between input (LN) and LFG terminals, and between input (LN) and internal power supply (by 500Vdc megger)
Fuse	Built-in (cannot be replaced by user)
Grounding (LFG)	Grounding of more than class D

## DC input power supply unit (Model No.: AHC2001PSD)



Item	Specifications
Input voltage range	20.4 to 26.4Vdc
Inrush current	50A max.
Allowable instantaneous stop time	10ms max. (at 24Vdc input)
Efficiency	60% typ.
Output capacity	5V, 2A and 24V, 0.7A (dedicated for internal supply)
Dielectric strength	500Vac 1min between input (LN) and LFG terminals, and between input (LN) and internal power supply
Insulation resistance	10MΩ min between input (LN) and LFG terminals, and between input (LN) and internal power supply (by 500Vdc megger)
Fuse	Built-in (cannot be replaced by user)
Grounding (LFG)	Grounding of more than class D

## CPU unit (Model No.: AHC2001CPA)



Item	Specifications
Communication port	USB slave (12Mbps for loader connection): Dedicated for SLP RS-232C (for connection of various devices, 9600 to 57.6kbps): For SLP and display unit
Number of loops	Max. 32 loops
Number of inputs and outputs	Max. 256 actual input and output points (one point each for analog, and additional max. 100k byte for internal contacts and memory)
Control synchronization	Logic control: 25ms Analog input/output PID control: 50ms or 100ms (for the number of connecting units more than 8 units)
Battery life	5 years (at 25°C ambient temperature)

## 4-point analog input unit (Model No.: AHC2001AD4)



Item	Specifications
Number of inputs	4 points
Type of inputs	T/C, RTD, linear voltage, linear current
Input accuracy	T/C, RTD, linear small voltage: ±0.2%FS Linear voltage and current: ±0.1%FS
Input sampling cycle	50ms (8 units)

## 4-point analog output unit (Model No.: AHC2001DA4)



Item	Specifications
Number of outputs	4 points
Type of outputs	Linear outputs (0 to 20mA <sub>dc</sub> , 4 to 20mA <sub>dc</sub> , 0 to 5V <sub>dc</sub> , 1 to 5V <sub>dc</sub> , 0 to 10V <sub>dc</sub> ), time proportional current output
Output accuracy	4 to 20mA <sub>dc</sub> : ±0.1%FS 0 to 20mA <sub>dc</sub> : ±0.1%FS (not specified for the value below 1mA) 0 to 5V <sub>dc</sub> , 0 to 10V <sub>dc</sub> : ±0.1%FS (not specified for the value below 0.1V)
Output resolution	1/5000

## 24Vdc bi-directional 32-point input unit (Model No.: AHC2001DX3)



Item	Specifications
Number of inputs	32 points
Input method	Photo-coupler input (bi-directional)
Input voltage range	21.6 to 26.4Vdc
Input current	3.4mA (at 24Vdc)
Input impedance	Approx. 6.8kΩ
Max. ON voltage / ON current	18Vdc min. / 2.5mA <sub>dc</sub> min.
Max. OFF voltage / OFF current	10Vdc max. / 1.5mA <sub>dc</sub> max.
Common method	32 points / common

## 24Vdc 32-point output unit (Model No.: AHC2001DY3)



Item	Specifications
Number of outputs	32 points
Output method	Transistor output (sink type)
External supply voltage	21.6 to 26.4Vdc
Max. output current	0.1A/point, 1.2A/common
Leakage current at OFF	0.3mA max.
Max. voltage drop at ON	1.5V max.
Common method	32 points / common

## 24Vdc 32-point source output unit (Model No.: AHC2001DS3)



Item	Specifications
Number of outputs	32 points
Output method	Transistor output (source type)
External supply voltage	21.6 to 26.4Vdc
Max. output current	0.1A/point, 1.2A/common
Leakage current at OFF	0.3mA max.
Max. voltage drop at ON	1.5V max.
Common method	32 points / common

## 16-point relay output unit (Model No.: AHC2001DR1)



Item	Specifications
Number of outputs	16 points
Max. switching voltage	250Vac / 30Vdc
Max. switching current	2A/point, 4A/common
Min. switching current	10mA 5Vdc
Max. switching frequency	60 times/min
Relay life	Mechanical: 50 million cycles or more Electrical: 200 thousand cycles or more (resistive load 250Vac 2A)
Common method	4 points per one common

## Ethernet interface unit (Model No.: AHC2001ENU)



Item	Specifications
Communication port	10Base-T Ethernet: 8-pin modular jack RS-232C (9600 to 57.6kbps): For ENI unit setting
Communication protocol	TCP/IP

## Serial communication unit (Model No.: AHC2001SCU)



Item	Specifications
Communication port	RS-232C (9600 to 38400kbps): RS-232C compliant various communication RS-485 (9600 to 38400kbps): RS-485 compliant full or half-duplex various communication
Communication protocol	Loader communication, general-purpose communication

## FL-net (OPCN-2) interface unit (Model No.: AHC20021FLU)



Item	Specifications
Max. number of connectable units	1 unit per CPU unit
Transmission speed	10Mbps
Electrical interface	IEEE8.2.3 compliant (CSMA/CD compliant)
Transmission protocol	UDP/IP, FA link protocol
Number of connectable units	254 units (max. 12 units and up to 4 stages for hub)
Connector	10BASE-T
Message data volume	Max. 1024 bytes
Token cycle time	50ms/32nodes (2K bits + 2K words/all nodes)

# Selection Guide

## Body

I II III IV Example: AHC2001PSA0000

Table	Selection	Description
I	Basic model No. <b>AHC2001</b>	Module type controller
II	Module model No.	<b>PSA</b> AC input power supply unit
		<b>PSD</b> DC input power supply unit
		<b>CPA</b> CPU unit
		<b>AD4</b> 4-point analog input unit
		<b>DA4</b> 4-point analog output unit
		<b>DX3</b> 32-point 24Vdc input unit
		<b>DY3</b> 32-point 24Vdc output unit
		<b>DS3</b> 32-point 24Vdc source output unit
		<b>DR1</b> 16-point relay output unit
		<b>ENU</b> Ethernet interface unit
		<b>SCU</b> Serial communication unit
<b>FLU</b> FL-net (OPCN-2) interface unit		
III	Option (1)	<b>0</b> None
		<b>T</b> Tropicalization
		<b>D</b> With inspection certificate
	Option (2)	<b>B</b> Tropicalization + inspection certificate
		<b>0</b> None
		<b>Y</b> Complying with traceability certification
IV	Option (3)	<b>00</b> None

## Smart loader package

I II Example: SLP-H21J50

Table	Selection	Description
I	Basic model No. <b>SLP-H21</b>	PC loader (CD-ROM) for AHC2001
II	Option <b>J50</b>	Japanese version

## Optional Parts

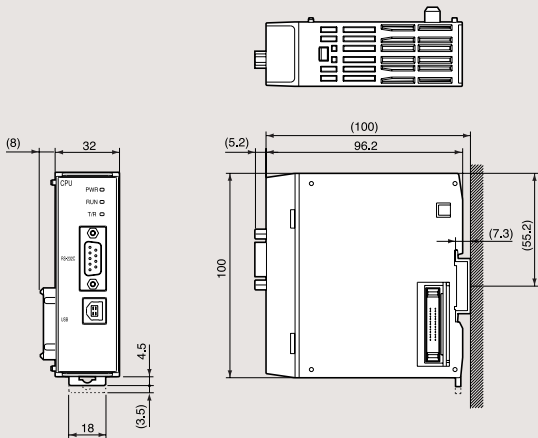
Part No.	Description
<b>81446848-001</b>	Power supply connector for AC/DC input power supply unit: 1 unit
<b>81440792-001</b>	Connector set for AD4, DA4, DR1 and SCU: 4 units/set
<b>81446847-001</b>	Connector set for DX3, DY3 and DS3: 1 unit
<b>81446849-001</b>	Electric wire assembly for additional 2nd stage: 50cm long



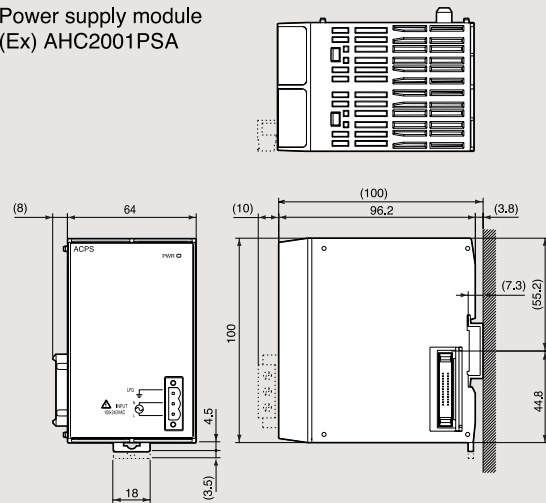
(Unit: mm)

## Dimensions

### ● Various modules (Ex) AHC2001CPA



### ● Power supply module (Ex) AHC2001PSA



- Note:
- Ethernet** is the registered trademark of Fuji Xerox Co., Ltd.
  - ISaGRAF** is the registered trademark of ALTER system Co., Ltd.
  - Windows** is the registered trade mark of US Microsoft Corporation.
  - FL-net (OPCN-2)** is the FA network which was developed by Japan Manufacturing and Science Technology Center (JMTC) of the outside organization of Ministry of Economy, Trade and Industry, and of which standardization is being promoted by Japan Electrical Manufacturer's Association (JEMA).

### ⚠ RESTRICTIONS ON USE

This product has been designed, developed and manufactured for general-purpose application in machinery and equipment. Accordingly, when used in applications outlined below, special care should be taken to implement a fail-safe and/or redundant design concept as well as a periodic maintenance program.

- Safety devices for plant worker protection
- Start/stop control devices for transportation and material handling machines
- Aeronautical/aerospace machines
- Control devices for nuclear reactors

Never use this product in applications where human safety may be put at risk.

Specifications are subject to change without notice.

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