

# MicroSmart

EXPANDING YOUR CONTROL



idec

# MICROSmart FC4A Series Micro PLC

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## MICROSmart

IDEC Corporation, a pioneer in the micro-PLC field, is proud to offer the MicroSmart series of programmable logic controllers, the latest in the Micro family of PLCs. These flexible, adaptable PLCs are as compact as they are powerful, so you can create the system you need without increasing your space requirements or your budget.

### The CPU That's Right For You

MicroSmart CPUs are available in two types of modules, All-in-One and Slim. The All-in-One type has models with 10, 16, or 24 I/O points; the Slim type is available in four different 20 I/O modules and two 40 I/O modules. Each CPU module is only 90mm in height and 70mm deep, but it has built-in inputs and outputs as well as standard features like high-speed counters, a RS-232C port and an analog potentiometer. Choose the CPU that's right for you and see what else MicroSmart has to offer.

### Expand Your Control

The Slim type and the 24 I/O All-in-One type CPUs can expand into the ideal system using the optional expansion modules. Need more inputs? More outputs? Some of both? There are 18 available expansion modules, including four analog I/O modules. Depending on your CPU, you can create a system with as many as 264 I/O points (40 I/O Slim type CPU with seven expansion modules).

### Customize Your System

Once you have all the control you need, select the features you want. Store and transfer programs on the memory cartridge or install a real-time clock and calendar cartridge. Add another communications port or an HMI module — it's all possible with MicroSmart. It's even UL-1604 listed, Class 1—Div. 2 for hazardous locations. Create the perfect solution for all of your applications, exactly the way you want it.

# Multiple Standard Features

## Pulse Output/Trapezoidal Control

Independent dual-axis control is available with two pulse outputs. Locational values can be easily defined for precise positional (trapezoidal) control.

\* Pulse output instruction

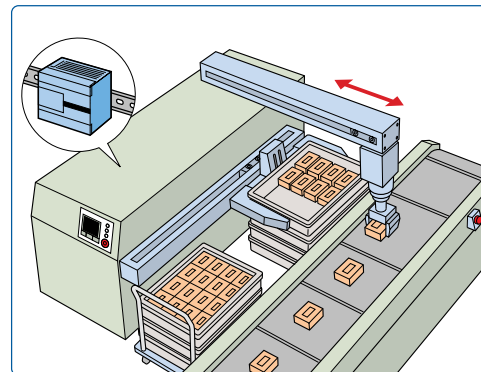
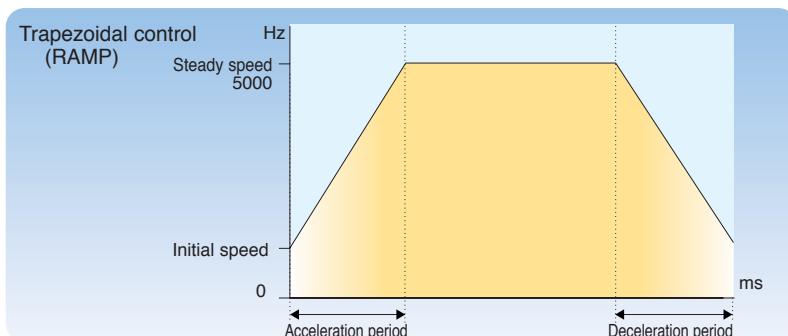
\* PWM instruction

(Pulse Width Modulation control)

### Pulse Output Function Specifications

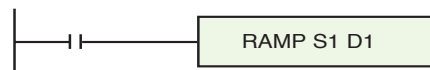
|                          |        |
|--------------------------|--------|
| Number of output points  | 2      |
| Maximum output frequency | 20 kHz |

\*Only one point of trapezoidal control is available.



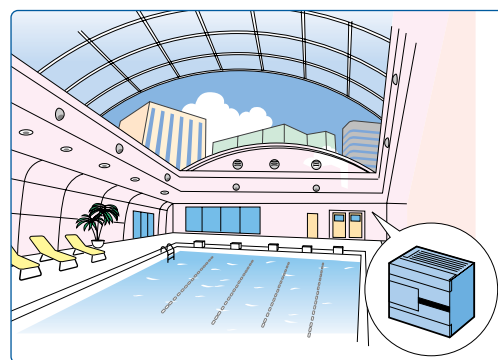
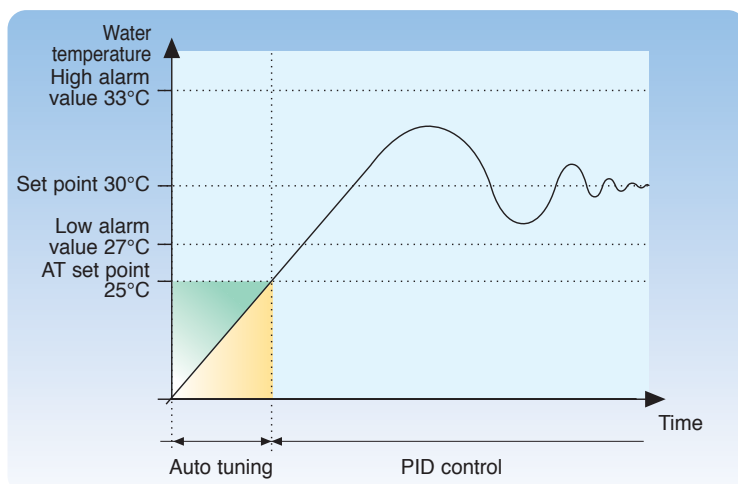
Setting the desired values enables you to precisely manage the trapezoidal control

|                                  |        |
|----------------------------------|--------|
| Operation mode (S1)              | 1      |
| Steady pulse frequency (S1 + 1)  | 50     |
| Initial pulse frequency (S1 + 2) | 10     |
| Frequency change rate (S1 + 3)   | 2      |
| Preset value (S1 + 6, 7)         | 10,000 |

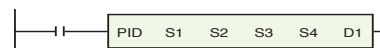


## PID Control

To automatically maintain a target water temperature (PID control), use the auto tuning function to perform sampling. Based on the determined PID parameters, PID control is executed automatically. (Slim type CPU units only.)



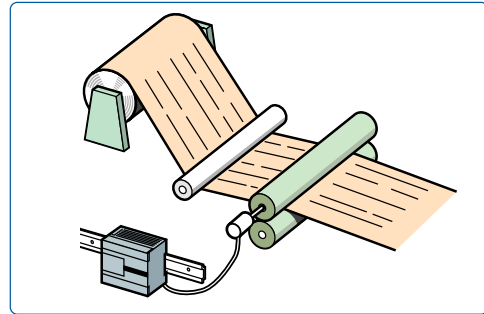
|                  |    |
|------------------|----|
| Set point        | 30 |
| AT set point     | 25 |
| High alarm value | 35 |
| Low alarm value  | 27 |



## High-speed Counters

The MicroSmart has four built-in high speed counters. One high speed counter (all-in-one type) or two high speed counters (slim type) can be used as either two-phase or single-phase high speed counters at a maximum of 20kHz. The other three (all-in-one type) or two (slim type) have a maximum frequency of 5kHz. High speed counters are used for simple positioning and motor control.

| Type                    | Single-phase                                                                     | Two-phase                                                                        |
|-------------------------|----------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| Maximum Input Frequency | HSC1 and 4: 20 kHz                                                               | HSC1: 20 kHz                                                                     |
| Counting Range          | HSC2 and 3: 5 kHz                                                                | HSC4: 20 kHz (SlimType CPU)                                                      |
| Operation Mode          | Adding counter                                                                   | Rotary encoder (phases A, B, Z)                                                  |
| Gate Input              | Enable/disable counting                                                          | Enable/disable counting                                                          |
| Current Value Reset     | Current value is reset to zero when the current value reaches the pre-set value. | Current value is reset to a given value when overflow or underflow has occurred. |

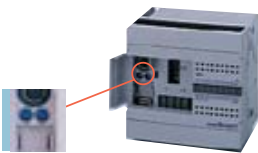


The rotary encoder can connect directly to the paper feeder. The high-speed counter receives and reads output pulses from the rotary encoder.

## Analog Potentiometer

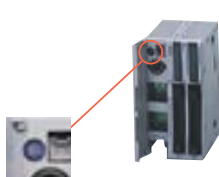
The analog potentiometer built into the CPU module enables settings to be adjusted without special tools.

All-in-One Type

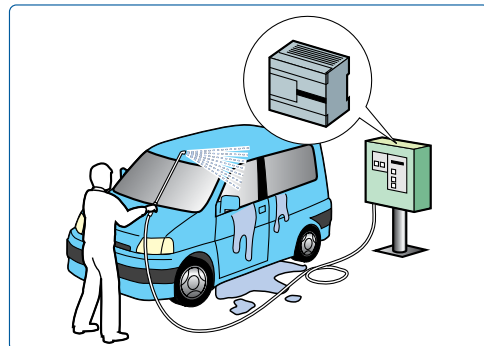


Two built-in 24-I/O type  
One built-in 10/16-I/O types

Slim Type



Standard on all models

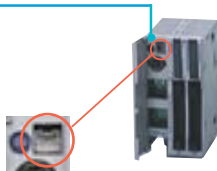


After installation the analog potentiometer in the CPU module allows you to easily change values such as timer preset values or the volume of water.

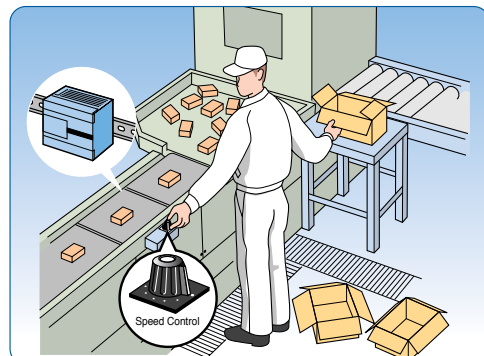
## Built-in Analog Voltage Input

Ready for connecting 0 to 10V DC from an external device directly to the built-in analog voltage input connector (Slim type CPU modules only).

External Device



Slim Type

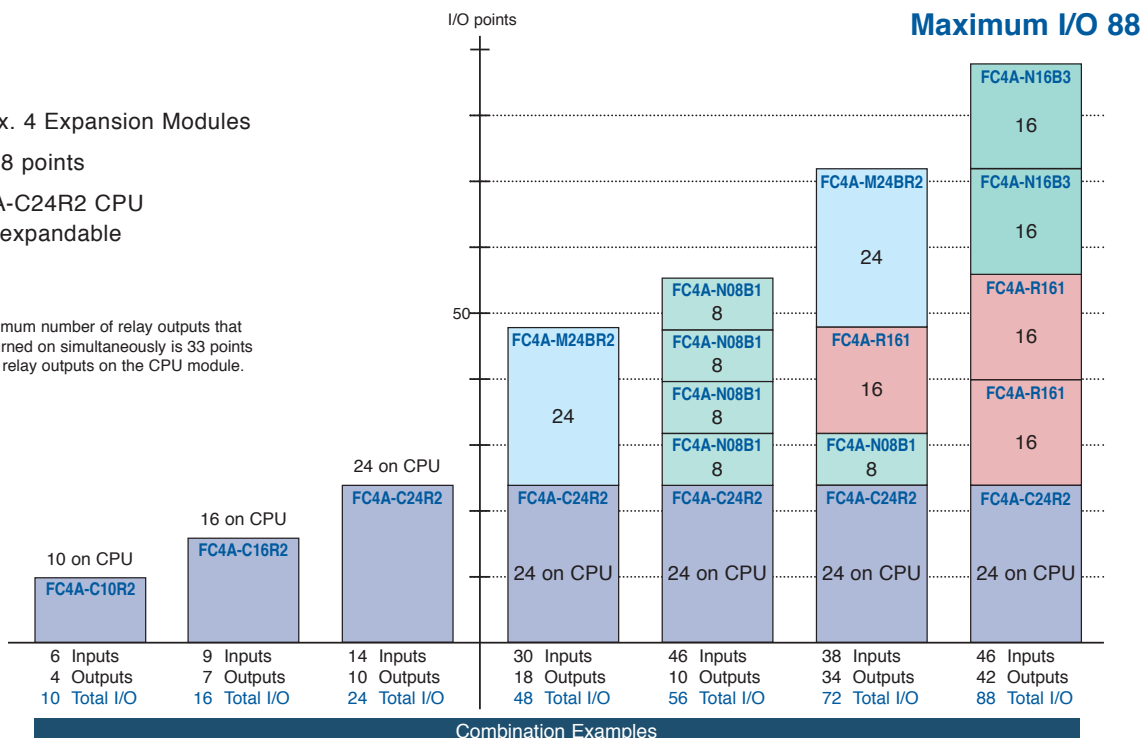


# Add And Combine Modules

## All-In-One Type

- Attach Max. 4 Expansion Modules
- Max. I/O 88 points
- Only FC4A-C24R2 CPU Module is expandable

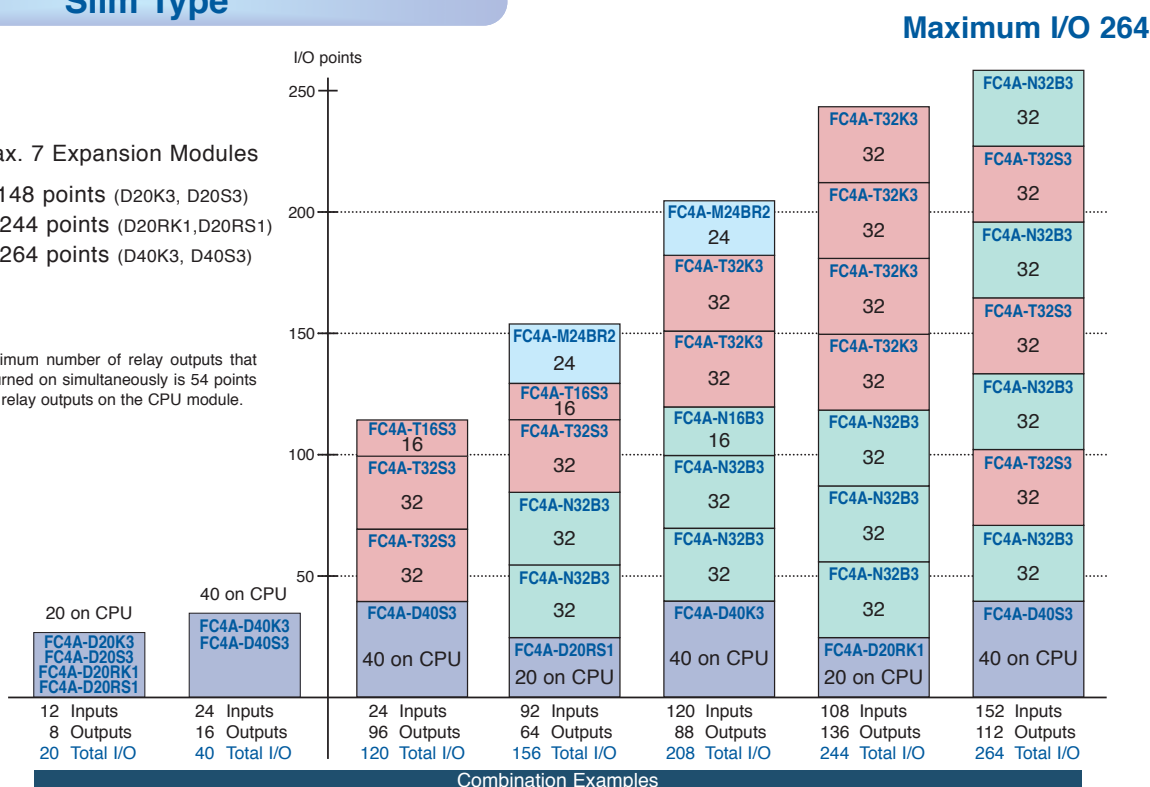
Note: The maximum number of relay outputs that can be turned on simultaneously is 33 points including relay outputs on the CPU module.



## Slim Type

- Attach Max. 7 Expansion Modules
- Max. I/O 148 points (D20K3, D20S3)  
244 points (D20RK1, D20RS1)  
264 points (D40K3, D40S3)

Note: The maximum number of relay outputs that can be turned on simultaneously is 54 points including relay outputs on the CPU module.

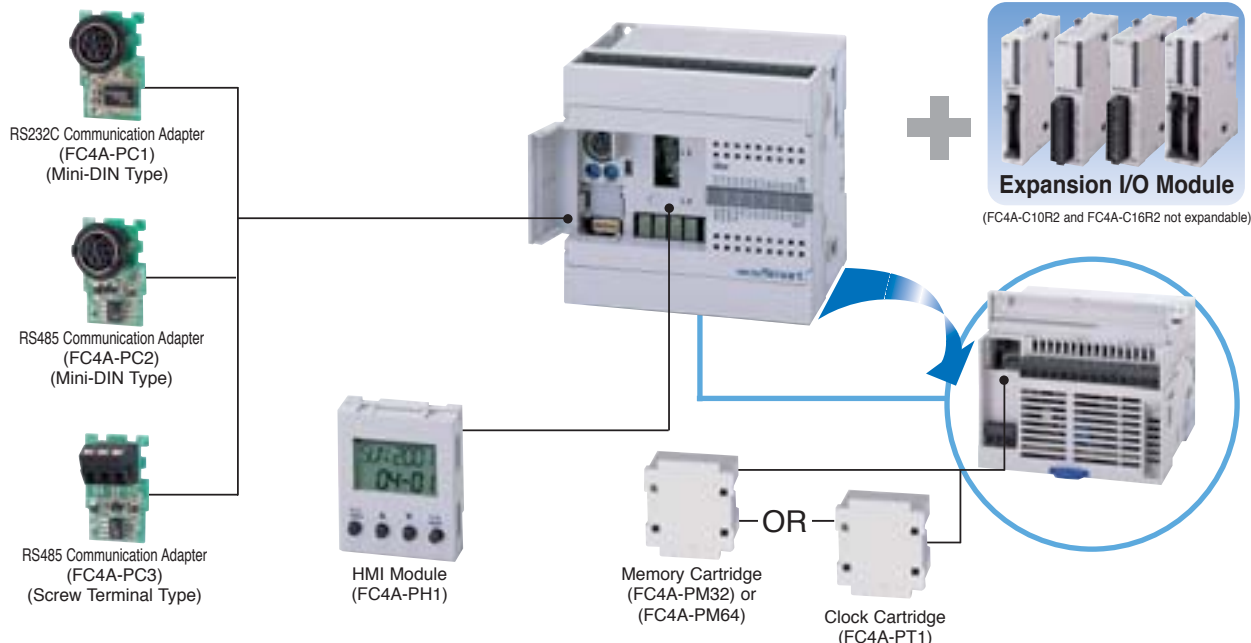


# Customize MicroSmart To Meet Your Needs

## All-in-One Type

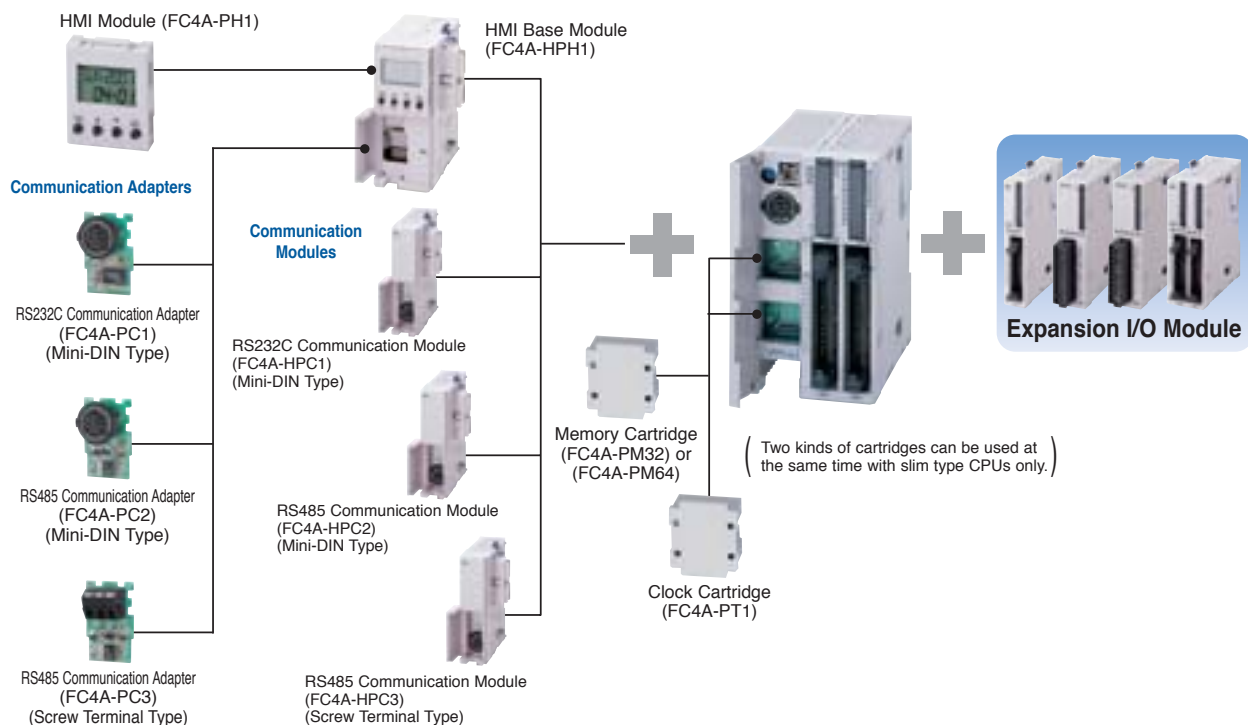
**FC4A-C10R2, FC4A-C16R2, FC4A-C24R2**

**Communication Adapters** (FC4A-C10R2 not applicable)



## Slim Type

**FC4A-D20K3, FC4A-D20S3, FC4A-D20RK1  
FC4A-D20RS1, FC4A-D40K3, FC4A-D40S3**



# CPU Modules

## CPU Modules



### FC4A-C10R2

6 input points  
4 output points  
Relay output  
100 to 240V AC  
4.8KB memory



### FC4A-C16R2

9 input points  
7 output points  
Relay output  
100 to 240V AC  
15KB memory

I/O modules not applicable to these two models



### FC4A-C24R2

14 input points  
10 output points  
Relay output  
100 to 240V AC  
27KB memory  
88 max I/O expandability



### FC4A-D20K3

12 input points  
8 output points  
0.3A transistor sink output  
24V DC  
27KB memory  
148 max I/O expandability



### FC4A-D20RK1

12 input points  
8 output points  
0.3A transistor sink output  
24V DC  
31.2KB memory  
244 max I/O expandability  
240V AC-2A/30V DC-2A relay output

\*Transistor output 2 points and relay output 6 points



### FC4A-D40K3

24 input points  
16 output points  
0.3A transistor sink output  
24V DC  
31.2KB memory  
264 max I/O expandability



### FC4A-D20S3

12 input points  
8 output points  
0.3A transistor source output  
24V DC  
27KB memory  
148 max I/O expandability



### FC4A-D20RS1

12 input points  
8 output points  
0.3A transistor source output  
24V DC  
31.2KB memory  
244 max I/O expandability  
240V AC-2A/30V DC-2A relay output

\*Transistor output 2 points and relay output 6 points



### FC4A-D40S3

24 input points  
16 output points  
0.3A transistor source output  
24V DC  
31.2KB memory  
264 max I/O expandability

# Expansion Modules And Options

## DC Input Modules - 4 Types



**8-point DC Input Module**  
**FC4A-N08B1**  
8 input points  
24V DC sink/source input  
Removable screw terminal



**16-point DC Input Module**  
**FC4A-N16B1**  
16 input points  
24V DC sink/source input  
Removable screw terminal



**16-point DC Input Module**  
**FC4A-N16B3**  
16 input points  
24V DC sink/source input  
MIL connector



**32-point DC Input Module**  
**FC4A-N32B3**  
32 input points  
24V DC sink/source input  
MIL connector

## Output Modules - 8 Types



**8-point Relay Output Module**  
**FC4A-R081**  
8 output points  
Relay output (1NO contact)  
Removable screw terminal



**16-point Relay Output Module**  
**FC4A-R161**  
16 output points  
Relay output (1NO contact)  
Removable screw terminal



**8-point Transistor Sink Output Module**  
**FC4A-T08K1**  
8 output points  
0.3A transistor sink output  
Removable screw terminal



**8-point Transistor Source Output Module**  
**FC4A-T08S1**  
8 output points  
0.3A transistor source output  
Removable screw terminal



**16-point Transistor Sink Output Module**  
**FC4A-T16K3**  
16 output points  
0.1A transistor sink output  
MIL connector



**16-point Transistor Source Output Module**  
**FC4A-T16S3**  
16 output points  
0.1A transistor source output  
MIL connector



**32-point Transistor Sink Output Module**  
**FC4A-T32K3**  
32 output points  
0.1A transistor sink output  
MIL connector



**32-point Transistor Source Output Module**  
**FC4A-T32S3**  
32 output points  
0.1A transistor source output  
MIL connector

# Expansion Modules And Options Cont.

## Combination I/O Modules - 2 Types



**4 Input/4 Output  
Combination Module  
FC4A-M08BR1**  
4 input points/4 output points  
24V DC sink/source input  
240V AC-2A/30V DC-2A relay output  
Removable screw terminal



**16 Input/8 Output  
Combination Module  
FC4A-M24BR2**  
16 input points/8 output points  
24V DC sink/source input  
240V AC-2A/30V DC-2A relay output  
Wire-clamp terminal

## Analog Modules - 4 Types



**1 Output  
Analog Module  
FC4A-K1A1**  
1 analog output (voltage/current)  
Removable screw terminal



**2 Input  
Analog Module  
FC4A-J2A1**  
2 analog input (voltage/current)  
Removable screw terminal



**2 Input/1 Output  
Analog Module  
FC4A-L03AP1**  
2 analog input (thermocouple/RTD)  
1 analog output (voltage/current)  
Removable screw terminal



**2 Input/1 Output  
Analog Module  
FC4A-L03A1**  
2 analog input (voltage/current)  
1 analog output (voltage/current)  
Removable screw terminal

## Expansion Module Examples



(Example 1)

| Module       | Type No.   | Input | Output |
|--------------|------------|-------|--------|
| CPU          | FC4A-C24R2 | 14    | 10     |
| DC Input     | FC4A-N16B1 | 16    | 0      |
| DC Input     | FC4A-N16B1 | 16    | 0      |
| Relay Output | FC4A-R161  | 0     | 16     |
| Relay Output | FC4A-R161  | 0     | 16     |
| Total        |            | 46    | 42     |



(Example 2)

| Module                 | Type No.    | Input | Output |
|------------------------|-------------|-------|--------|
| CPU                    | FC4A-C24R2  | 14    | 10     |
| DC Input               | FC4A-N08B1  | 8     | 0      |
| DC Input/Relay Output  | FC4A-M08BR1 | 4     | 4      |
| Relay Output           | FC4A-R081   | 0     | 8      |
| Transistor Sink Output | FC4A-T08K1  | 0     | 8      |
| Total                  |             | 26    | 30     |

## Option Modules



HMI Base Module  
(FC4A-HPH1)



HMI Module  
(FC4A-PH1)



Memory Cartridge  
(FC4A-PM32)  
(FC4A-PM64)



Clock Cartridge  
(FC4A-PT1)

## Communication Adapters



(FC4A-PC1)



(FC4A-PC2)



(FC4A-PC3)

## Slim Type Communication Modules



(FC4A-HPC1)



(FC4A-HPC2)



(FC4A-HPC3)

| Type            | CPU Module | HMI Module             | Memory Cartridge            | Clock Cartridge | Communication Adapter |
|-----------------|------------|------------------------|-----------------------------|-----------------|-----------------------|
| All-in-one Type | 24         | YES                    | YES<br>Select one cartridge |                 | YES                   |
|                 | 16         |                        |                             |                 | YES                   |
|                 | 10         |                        |                             |                 | —                     |
| Slim Type       | 40         | YES<br>HMI Base Module | YES                         | YES             | YES*                  |
|                 | 20         |                        |                             |                 |                       |

\*Communication module or combination of communication adapter mounted on HMI base module

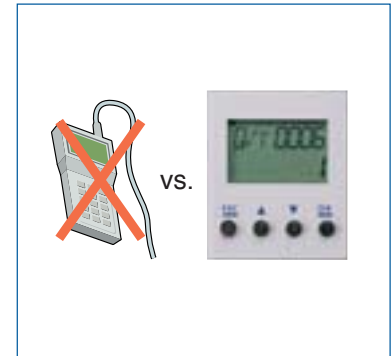
# Easy Operation Using The HMI Module



Easy mounting



Ease of operation and compact size



No need for special tools



Recover a system failure immediately by reading the error codes.



Set the time and calendar with optional clock cartridge

## The HMI Module allows you to access the following menus

- Timer Menu
- Counter Menu
- Data Register Menu
- Input Menu
- Output Menu
- Internal Relay Menu
- Shift Register Menu
- Error Menu
- Run/Stop Menu
- Calendar Menu
- Clock Menu



Clock Cartridge



Monitor and change the status and setup of your CPU while the system is in operation

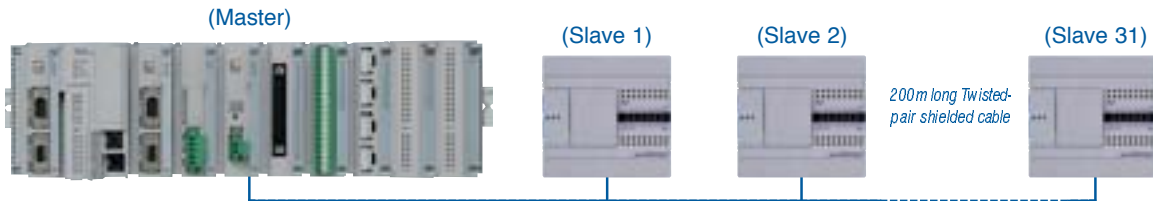
# Communication Capabilities Expand The Network Of Control Systems

## Serial Communication Functions

### Data Link System

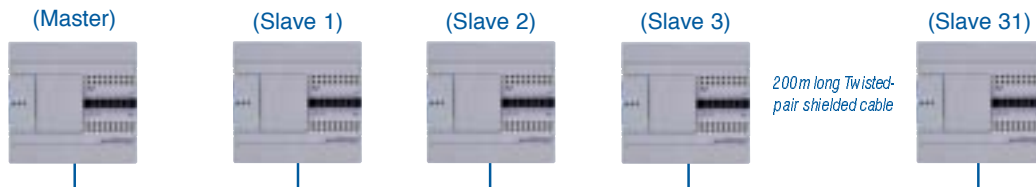
(The Data Link System is not available for the All-in-One 10 I/O module)

#### OpenNet Controller (Master) and MicroSmart (Slave)



Establishes a data link system using the OpenNet Controller as a master and a maximum of 31 MicroSmart CPU modules as slaves. Distributed control on an RS485 network is made possible without the need for communication programs.  
(RS485 communication adapter is required to set up a data link system.)

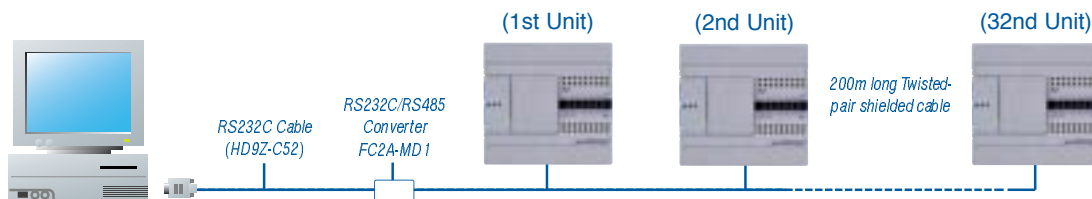
#### MicroSmart (Master) and MicroSmart (Slave)



Distributed MicroSmart CPU modules at each processing stage can be controlled as one integrated system without a host. One MicroSmart as a master interface with up to 31 MicroSmart modules on an RS485 network without the need for communication programs.  
(RS485 communication adapter is required to set up a data link system.)

## Computer Link System (1:N)

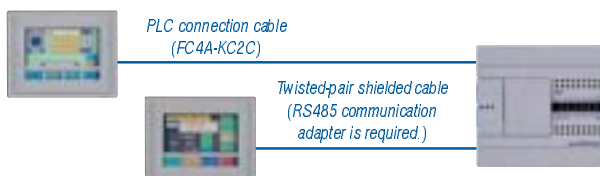
#### MicroSmart (Master) and MicroSmart (Slave)



Up to 32 MicroSmart modules can be connected to a PC. The values of timers and counters, data of data registers, and I/O status can be monitored on the PC. Also, user programs can be downloaded to the MicroSmart to establish a total supervisory system.

(RS485 communication adapter is required to set up a 1:N computer link system.)

## Connecting to Operator Interface



The MicroSmart can be connected to IDEC's HG series Operator Interface. The HG series can exchange data with each device in the MicroSmart. Also, the HG can graphically display the values of timers and counters, data of data register, and I/O status.

# Windows Compatible Programming Software

## WindLDR® for Windows



WindLDR® is a software package to program the MicroSmart and all of IDEC's other programmable logic controllers. Upgraded WindLDR® version 4.0 or higher supports new functions incorporated in the MicroSmart, such as partial download (16 and 24 I/O type units only) and comment download functions.

**Note:** Please use WindLDR® 4.0 or higher for programming MicroSmart.

### System Requirements

OS: Windows 2000, Windows 98, Windows 95, Windows NT4.0 (Service Pack 3 or higher)

CPU: Pentium 75MHz or higher

Memory: 24MB of available RAM on Windows 95 and Windows 98, 32MB of available RAM on Windows NT

HD: 20MB of available hard-disk space

The WindLDR® modem communication function cannot be used on Windows 95.

### 1. Improved Operation of the Ladder Program Editor



The right power rail can be fixed. When a program line exceeds the right power rail, a connection line is automatically inserted. Also, the ladder program can be printed out with a fixed power rail for clear viewing.

### 2. Cache Function in Ladder to Mnemonic Conversion



When a user program is modified, WindLDR® 4.0 or higher converts only the modified portion of the program, saving conversion time when modification and downloading are repeated during debugging.

### 3. Comment Download Function



The MicroSmart can store comments attached to the user program. Since a user program can be downloaded to the MicroSmart with comments attached to operands and rungs, the recorded comments can be restored from the MicroSmart without a ladder file. This function is also available on the OpenNet Controller.

### 4. Modem Communication



WindLDR® can supervise operation and collect data from a remote PLC via modem and phone line. Control possibilities can be expanded by using the modem control function of the MicroSmart or OpenNet Controller.

### 5. Cover Page



A cover page editor is provided to record the program name and creation date. The cover page stores information on each user program to help archive many user programs.

# MICROSmart Product Selection List

## The Next Generation of PLC

- Compact CPU modules available in All-in One or Slim types with 10, 16, 20, 24, or 40 I/O
- DC Input, Relay Output, Transistor Output, Combination I/O and Analog I/O expansion modules
- 24 I/O All-in-One CPU expandable to 88 I/O points; 20 I/O slim types expandable up to 148 or 244 I/O; 40 I/O slim type expandable up to 264 I/O
- Standard RS232C port, optional plug-in RS485/RS232C port
- Optional memory cartridge or real-time clock and calendar cartridge
- UL listed for hazardous locations



### CPU Modules (All-in-One Type)

| Power Voltage           | Input Type              | Output Type                        | I/O Points                   | Part No.   |
|-------------------------|-------------------------|------------------------------------|------------------------------|------------|
| 100-240V AC<br>50/60 Hz | 24V DC<br>(Sink/Source) | Relay Output<br>240V AC/30V DC, 2A | 10-I/O Type ( 6 in / 4 out)  | FC4A-C10R2 |
|                         |                         |                                    | 16-I/O Type ( 9 in / 7 out)  | FC4A-C16R2 |
|                         |                         |                                    | 24-I/O Type (14 in / 10 out) | FC4A-C24R2 |

### CPU Modules (Slim Type)

| Power Voltage | Input Type              | Output Type                        | High-speed Transistor Output | I/O Points          | Part No.    |
|---------------|-------------------------|------------------------------------|------------------------------|---------------------|-------------|
| 24V DC        | 24V DC<br>(Sink/Source) | Transistor Sink Output 0.3A        |                              | 20 (12 in / 8 out)  | FC4A-D20K3  |
|               |                         | Transistor Source Output 0.3A      |                              |                     | FC4A-D20S3  |
|               |                         | Relay Output<br>240V AC/30V DC, 2A | Sink Output 0.3A             | 20 (12 in / 8 out)* | FC4A-D20RK1 |
|               |                         | Transistor Sink Output 0.3A        | Source Output 0.3A           |                     | FC4A-D20RS1 |
|               |                         | Transistor Sink Output 0.3A        |                              | 40 (24 in / 16 out) | FC4A-D40K3  |
|               |                         | Transistor Source Output 0.3A      |                              |                     | FC4A-D40S3  |

Note \*: Two points are transistor outputs, and six points are relay outputs.

### Input Modules

| Input Type              | Input Points | Terminal                    | Part No.   |
|-------------------------|--------------|-----------------------------|------------|
| 24V DC<br>(Sink/Source) | 8 points     | Removable<br>Terminal Block | FC4A-N08B1 |
|                         | 16 points    |                             | FC4A-N16B1 |
|                         | 16 points    | MIL Connector               | FC4A-N16B3 |
|                         | 32 points    |                             | FC4A-N32B3 |

### Output Modules

| Output Type                   | Output Points | Terminal                    | Part No.   |
|-------------------------------|---------------|-----------------------------|------------|
| Relay Output                  | 8 points      | Removable<br>Terminal Block | FC4A-R081  |
| 240V AC/30V DC, 2A            | 16 points     |                             | FC4A-R161  |
| Transistor Sink Output 0.3A   | 8 points      |                             | FC4A-T08K1 |
| Transistor Source Output 0.3A |               |                             | FC4A-T08S1 |
| Transistor Sink Output 0.1A   | 16 points     | MIL Connector               | FC4A-T16K3 |
| Transistor Source Output 0.1A |               |                             | FC4A-T16S3 |
| Transistor Sink Output 0.1A   | 32 points     |                             | FC4A-T32K3 |
| Transistor Source Output 0.1A |               |                             | FC4A-T32S3 |

### Combination I/O Modules

| Input Type              | Output Type                        | I/O Points         | Terminal                     | Part No.    |
|-------------------------|------------------------------------|--------------------|------------------------------|-------------|
| 24V DC<br>(Sink/Source) | Relay Output<br>240V AC/30V DC, 2A | 8 (4 in / 4 out)   | Removable Terminal Block     | FC4A-M08BR1 |
|                         |                                    | 24 (16 in / 8 out) | Non-removable Terminal Block | FC4A-M24BR2 |

### Analog I/O Modules

| Name                 | Input Type                             | Output Type                            | I/O Points           | Terminal                    | Part No.    |
|----------------------|----------------------------------------|----------------------------------------|----------------------|-----------------------------|-------------|
| Analog I/O Module    | Voltage (0-10V DC)<br>Current (4-20mA) | Voltage (0-10V DC)<br>Current (4-20mA) | 2 inputs<br>1 output | Removable Terminal<br>Block | FC4A-L03A1  |
|                      | Thermocouple<br>Resistance thermometer |                                        |                      |                             | FC4A-L03AP1 |
| Analog Input Module  | Voltage (0-10V DC)<br>Current (4-20mA) | -                                      | 2 inputs             |                             | FC4A-J2A1   |
| Analog Output Module | -                                      | Voltage (0-10V DC)<br>Current (4-20mA) | 1 output             |                             | FC4A-K1A1   |

### HMI Module

| Name            | Description                                       | Part No.  |
|-----------------|---------------------------------------------------|-----------|
| HMI Module      | For displaying and changing required operands     | FC4A-PH1  |
| HMI Base Module | For mounting HMI module with slim type CPU module | FC4A-HPH1 |

### For Slim Type CPU Module

| Name                        | Description                                      | Part No.  |
|-----------------------------|--------------------------------------------------|-----------|
| RS232C Communication Module | Mini DIN connector type for slim type CPU module | FC4A-HPC1 |
| RS485 Communication Module  | Mini DIN connector type for slim type CPU module | FC4A-HPC2 |
|                             | Terminal block type for slim type CPU module     | FC4A-HPC3 |

### Programming Software

| Name                                                     | Part No.    |
|----------------------------------------------------------|-------------|
| Programming and Monitoring Software<br>[WindLDR Ver.4.*] | FC9Y-LP2CDW |

# MICROSmart

## Product Selection List Cont. / Specifications

| Miscellaneous Accessories                     |                            | Part No.                     |
|-----------------------------------------------|----------------------------|------------------------------|
| Communication Adapter                         | RS232C, Mini DIN           | FC4A-PC1                     |
|                                               | RS485, Mini DIN            | FC4A-PC2                     |
|                                               | RS485, Screw terminal Type | FC4A-PC3                     |
| Clock Cartridge                               |                            | FC4A-PT1                     |
| Memory Cartridge (32KB)                       |                            | FC4A-PM32                    |
| Memory Cartridge (64KB)                       |                            | FC4A-PM64                    |
| RS232C/RS485 Converter                        |                            | FC2A-MD1                     |
| MIL Connector Breakout Modules                | 20 pt. Module              | BX1D-S20A                    |
|                                               | 26 pt. Module              | BX1D-S26A                    |
| MIL Connector Socket                          | 20 wire for I/O Modules    | FC4A-PMC20P                  |
|                                               | 26 wire for CPU I/O        | FC4A-PMC26P                  |
| I/O Terminal Blocks (package qty 2)           | 10 pt. Block               | FC4A-PMT10P                  |
|                                               | 11 pt. Block               | FC4A-PMT11P                  |
|                                               | 13 pt. Block               | FC4A-PMT13P                  |
|                                               | 16 pt. Block               | FC4A-PMTK16P<br>FC4A-PMTS16P |
| Analog Voltage Input Cable (1m/3.28 ft. long) |                            | FC4A-PMAC2P                  |
| Direct Mounting Strips                        |                            | FC4A-PSP1P                   |
| 35mm Aluminum DIN Rails (1.5m/3.28 ft. long)  |                            | BAA1000<br>BNDN1000          |
| Mounting Clips                                |                            | BNL6                         |

| Cable Accessories                                  |                                           |                                   |      | Part No.     |
|----------------------------------------------------|-------------------------------------------|-----------------------------------|------|--------------|
| Programming Cable, CPU to PLC RS232 (3m)           |                                           |                                   |      | FC2A-KC4C    |
| User Communication Cable, RS232 (2.4m)             |                                           |                                   |      | FC2A-KP1C    |
| Combo Prog./User Comm. Cable, port 1 only (3m)     |                                           |                                   |      | FC4A-KC4C    |
| Modem Cable, PLC to Modem RS232 (3m)               |                                           |                                   |      | FC2A-KM1C    |
| O/I Communication Cable for HG Series RS232 (5m)   |                                           |                                   |      | FC4A-KC1CA   |
| O/I Communication Cable for HG2F, port 1 only (5m) |                                           |                                   |      | FC4A-KC2CA   |
| I/O Cables for MIL Connector                       | 16pt. and 32pt.<br>I/O Modules<br>20-wire | Non-shielded                      | 0.5m | FC9Z-H050B20 |
|                                                    |                                           |                                   | 1m   | FC9Z-H100B20 |
|                                                    |                                           |                                   | 2m   | FC9Z-H200B20 |
|                                                    |                                           |                                   | 3m   | FC9Z-H300B20 |
|                                                    |                                           | Shielded                          | 0.5m | FC9Z-H050A20 |
|                                                    |                                           |                                   | 1m   | FC9Z-H100A20 |
|                                                    |                                           |                                   | 2m   | FC9Z-H200A20 |
|                                                    |                                           |                                   | 3m   | FC9Z-H300A20 |
|                                                    |                                           | Shielded w/Single wire Connectors |      | 1.52m        |
|                                                    | 20pt. and 40pt.<br>CPU Modules<br>26-wire | Non-shielded                      | 0.5m | FC9Z-H050B26 |
|                                                    |                                           |                                   | 1m   | FC9Z-H100B26 |
|                                                    |                                           |                                   | 2m   | FC9Z-H200B26 |
|                                                    |                                           |                                   | 3m   | FC9Z-H300B26 |
|                                                    |                                           | Shielded                          | 0.5m | FC9Z-H050A26 |
|                                                    |                                           |                                   | 1m   | FC9Z-H100A26 |
|                                                    |                                           |                                   | 2m   | FC9Z-H200A26 |
|                                                    |                                           |                                   | 3m   | FC9Z-H300A26 |
|                                                    |                                           | Shielded w/Single wire Connectors |      | 1.52m        |

### CPU General Specifications

| Part No.                                  | FC4A-C10R2                                                                                                          | FC4A-C16R2                                                                                                       | FC4A-C24R2                      | FC4A-D20K3<br>FC4A-D20S3                                                                                   | FC4A-D20RK1<br>FC4A-D20RS1 | FC4A-D40K3<br>FC4A-D40S3 |
|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------|---------------------------------|------------------------------------------------------------------------------------------------------------|----------------------------|--------------------------|
| Type                                      | All-in-one Type CPU Module                                                                                          |                                                                                                                  |                                 | Slim Type CPU Module                                                                                       |                            |                          |
| Rated Power Voltage                       | 100 to 240V AC                                                                                                      |                                                                                                                  |                                 | 24V DC                                                                                                     |                            |                          |
| Allowable Voltage Range                   | 85 to 264V AC                                                                                                       |                                                                                                                  |                                 | 20.4 to 26.4V DC (including ripple)                                                                        |                            |                          |
| Rated Power Frequency                     | 50/60Hz (47 to 63Hz)                                                                                                |                                                                                                                  |                                 | -                                                                                                          |                            |                          |
| Maximum Input Current                     | 0.25A (85V AC)                                                                                                      | 0.30A (85V AC)                                                                                                   | 0.45A (85V AC) *2               | 0.56A (26.4V DC)*3                                                                                         | 0.70A (26.4V DC)*3         |                          |
| Maximum Power Consumption                 | 30VA/264V AC *1<br>20VA/100V AC                                                                                     | 31VA/264V AC *1<br>22VA/100V AC                                                                                  | 40VA/264V AC *2<br>33VA/100V AC | 15W/26.4V DC *3                                                                                            | 19W/26.4V DC *3            |                          |
| Allowable Momentary Power Interruption    | 20 msec (at the rated inputs and outputs)                                                                           |                                                                                                                  |                                 | 10 msec (at 24V DC)                                                                                        |                            |                          |
| Dielectric Strength                       | Between power and ⊕ terminals: 1500V AC, 1 minute                                                                   |                                                                                                                  |                                 | Between power and ⊕ terminals: 500V AC, 1 minute                                                           |                            |                          |
|                                           | Between I/O and ⊕ terminals: 1500V AC, 1 minute                                                                     |                                                                                                                  |                                 | Between I/O and ⊕ terminals: 1500V AC, 1 minute                                                            |                            |                          |
| Insulation Resistance<br>(500V DC megger) | Between power and ⊕ terminals: 10 MΩ minimum                                                                        |                                                                                                                  |                                 | Between power and ⊕ terminals: 10 MΩ minimum                                                               |                            |                          |
|                                           | Between I/O and ⊕ terminals: 10 MΩ minimum                                                                          |                                                                                                                  |                                 | Between I/O and ⊕ terminals: 10 MΩ minimum                                                                 |                            |                          |
| Noise Resistance                          | AC power terminals: 1.5 kV, 50 nsec to 1 μsec<br>I/O terminals (coupling clamp): 1.5 kV, 50 nsec to 1 μsec          |                                                                                                                  |                                 | DC power terminals: 1.0 kV, 50 nsec to 1 μsec<br>I/O terminals (coupling clamp): 1.5 kV, 50 nsec to 1 μsec |                            |                          |
| Inrush Current                            | 35A maximum                                                                                                         | 35A maximum                                                                                                      | 40A maximum                     | 50A maximum (24V DC)                                                                                       |                            |                          |
| Power Supply Wire                         | UL1015 AWG22, UL1007 AWG18                                                                                          |                                                                                                                  |                                 |                                                                                                            |                            |                          |
| Operating Temperature                     | 0 to 55°C                                                                                                           |                                                                                                                  |                                 |                                                                                                            |                            |                          |
| Storage Temperature                       | -25 to +70°C                                                                                                        |                                                                                                                  |                                 |                                                                                                            |                            |                          |
| Relative Humidity                         | Level RH1, 30 to 95% (non-condensing)                                                                               |                                                                                                                  |                                 |                                                                                                            |                            |                          |
| Altitude                                  | Operation: 0 to 2,000m (0 to 6,565 feet)<br>Transport: 0 to 3,000m (0 to 9,840 feet)                                |                                                                                                                  |                                 |                                                                                                            |                            |                          |
| Pollution Degree                          | 2 (IEC 60664)                                                                                                       |                                                                                                                  |                                 |                                                                                                            |                            |                          |
| Corrosion Immunity                        | Free from corrosive gases                                                                                           |                                                                                                                  |                                 |                                                                                                            |                            |                          |
| Degree of Protection                      | IP20                                                                                                                |                                                                                                                  |                                 |                                                                                                            |                            |                          |
| Grounding Wire                            | UL1007 AWG16                                                                                                        |                                                                                                                  |                                 | UL1015 AWG22, UL1007 AWG18                                                                                 |                            |                          |
| Vibration Resistance                      | DIN rail mounted                                                                                                    | 10 to 57 Hz amplitude 0.075 mm, 57 to 150 Hz acceleration 9.8 m/sec <sup>2</sup> (1G) 2 hours in each of 3 axes  |                                 |                                                                                                            |                            |                          |
|                                           | Direct mounted                                                                                                      | 2 to 25 Hz amplitude 1.6 mm, 25 to 100 Hz acceleration 39.2 m/sec <sup>2</sup> (4G) 90 minutes in each of 3 axes |                                 |                                                                                                            |                            |                          |
| Shock Resistance                          | 147 m/sec <sup>2</sup> (15G) ,11 msec duration, 3 shocks per axis, on three mutually perpendicular axes (IEC 61131) |                                                                                                                  |                                 |                                                                                                            |                            |                          |
| Weight                                    | 230g                                                                                                                | 250g                                                                                                             | 305g                            | 140g                                                                                                       | 185g                       | 180g                     |

\*1 The CPU module power consumption includes 250 mA sensor power

\*2 CPU module (including 250 mA sensor power) + 4 I/O modules

\*3 CPU module + 7 I/O modules

# Specifications Cont.

## CPU Function Specifications

| Part No.                                              |                                                          | FC4A-C10R2                                                                                                                                                                                                                                                                   | FC4A-C16R2                                                                      | FC4A-C24R2                                   |            | FC4A-D20K3<br>FC4A-D20S3      |                                                | FC4A-D20RK1<br>FC4A-D20RS1                                                       |            | FC4A-D40K3<br>FC4A-D40S3 |            |
|-------------------------------------------------------|----------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------|----------------------------------------------|------------|-------------------------------|------------------------------------------------|----------------------------------------------------------------------------------|------------|--------------------------|------------|
| Control System                                        |                                                          | Stored program system                                                                                                                                                                                                                                                        |                                                                                 |                                              |            |                               |                                                |                                                                                  |            |                          |            |
| Instruction Words                                     |                                                          | 35 basic                                                                                                                                                                                                                                                                     |                                                                                 |                                              |            |                               |                                                |                                                                                  |            |                          |            |
|                                                       |                                                          | 38 advanced                                                                                                                                                                                                                                                                  | 40 advanced                                                                     | 46 advanced                                  |            | 53 advanced                   |                                                | 70 advanced                                                                      |            |                          |            |
| Program Capacity <sup>*4</sup>                        |                                                          | 4,800 bytes<br>(800 steps)                                                                                                                                                                                                                                                   | 15,000 bytes<br>(2,500 steps)                                                   | 27,000 bytes<br>(4,500 steps)                |            | 27,000 bytes<br>(4,500 steps) |                                                | 31,200 bytes<br>(5,200 steps)                                                    |            |                          |            |
| User Program Storage                                  |                                                          | EEPROM                                                                                                                                                                                                                                                                       |                                                                                 |                                              |            |                               |                                                |                                                                                  |            |                          |            |
| Processing Time                                       | Basic Instruction                                        | 1.65 msec (1000 steps)                                                                                                                                                                                                                                                       |                                                                                 |                                              |            |                               |                                                |                                                                                  |            |                          |            |
|                                                       | END processing <sup>*5</sup>                             | 0.64 msec                                                                                                                                                                                                                                                                    |                                                                                 |                                              |            |                               |                                                |                                                                                  |            |                          |            |
| Expandable I/O Modules                                |                                                          | —                                                                                                                                                                                                                                                                            |                                                                                 | 4 modules                                    |            | 7 modules                     |                                                |                                                                                  |            |                          |            |
| I/O Points                                            | Input                                                    | 6                                                                                                                                                                                                                                                                            | 9                                                                               | 14                                           | Expansion: | 12                            | Expansion:                                     | 12                                                                               | Expansion: | 24                       | Expansion: |
|                                                       | Output                                                   | 4                                                                                                                                                                                                                                                                            | 7                                                                               | 10                                           | 64         | 8                             | 128                                            | 8                                                                                | 224        | 16                       | 224        |
| Internal Relay                                        |                                                          | 256                                                                                                                                                                                                                                                                          | 1024                                                                            |                                              |            |                               |                                                |                                                                                  |            |                          |            |
| Shift Register                                        |                                                          | 64                                                                                                                                                                                                                                                                           | 128                                                                             |                                              |            |                               |                                                |                                                                                  |            |                          |            |
| Data Register                                         |                                                          | 400                                                                                                                                                                                                                                                                          | 1300                                                                            |                                              |            |                               |                                                |                                                                                  |            |                          |            |
| Expansion Data Register                               |                                                          | —                                                                                                                                                                                                                                                                            |                                                                                 |                                              |            |                               |                                                | 6000                                                                             |            |                          |            |
| Counter                                               |                                                          | 32                                                                                                                                                                                                                                                                           | 100                                                                             |                                              |            |                               |                                                |                                                                                  |            |                          |            |
| Timer(1-sec, 100-msec, 10-msec, 1-msec)               |                                                          | 32                                                                                                                                                                                                                                                                           | 100                                                                             |                                              |            |                               |                                                |                                                                                  |            |                          |            |
| RAM Backup                                            | Backup Duration                                          | Approx. 30 days (typical) at 25°C after backup battery fully charged                                                                                                                                                                                                         |                                                                                 |                                              |            |                               |                                                |                                                                                  |            |                          |            |
|                                                       | Backup Data                                              | Internal relay, shift register, counter, data register, expansion data register                                                                                                                                                                                              |                                                                                 |                                              |            |                               |                                                |                                                                                  |            |                          |            |
|                                                       | Battery                                                  | Lithium secondary battery                                                                                                                                                                                                                                                    |                                                                                 |                                              |            |                               |                                                |                                                                                  |            |                          |            |
|                                                       | Charging Time                                            | Approx. 15 hours for charging from 0% to 90% of full charge                                                                                                                                                                                                                  |                                                                                 |                                              |            |                               |                                                |                                                                                  |            |                          |            |
|                                                       | Battery Life                                             | 5 years when charging for 9 hours and discharging for 15 hours                                                                                                                                                                                                               |                                                                                 |                                              |            |                               |                                                |                                                                                  |            |                          |            |
|                                                       | Replaceability                                           | Impossible to replace battery                                                                                                                                                                                                                                                |                                                                                 |                                              |            |                               |                                                |                                                                                  |            |                          |            |
| Self-diagnostic Function                              |                                                          | Power failure, watchdog timer, data link connection, user program EEPROM sum check, timer/counter preset value sum check, user program RAM sum check, keep data, user program syntax, user program writing, CPU module, clock IC, I/O bus initialize, user program execution |                                                                                 |                                              |            |                               |                                                |                                                                                  |            |                          |            |
| Input Filter                                          |                                                          | 3 to 15 msec (1-msec increments)                                                                                                                                                                                                                                             |                                                                                 |                                              |            |                               |                                                |                                                                                  |            |                          |            |
| Catch Input/Interrupt Input                           |                                                          | Four Inputs (I2 through I5)                                                                                                                                                                                                                                                  |                                                                                 | Minimum turn on pulse width: 40 μsec maximum |            |                               | Minimum turn off pulse width: 150 μsec maximum |                                                                                  |            |                          |            |
| High-speed Counter                                    | Maximum Counting Frequency and High-speed Counter Points | Total 4 points                                                                                                                                                                                                                                                               | Single/two-phase selectable: 20 kHz (1 point)<br>Single-phase: 5 kHz (3 points) |                                              |            | Total 4 points                |                                                | Single/two-phase selectable: 20 kHz (2 points)<br>Single-phase: 5 kHz (2 points) |            |                          |            |
|                                                       | Counting Range                                           | 0 to 65535 (16 bits)                                                                                                                                                                                                                                                         |                                                                                 |                                              |            |                               |                                                |                                                                                  |            |                          |            |
|                                                       | Operation Mode                                           | Rotary encoder mode and adding counter mode                                                                                                                                                                                                                                  |                                                                                 |                                              |            |                               |                                                |                                                                                  |            |                          |            |
| Analog Potentiometer                                  | Quantity                                                 | 1 point                                                                                                                                                                                                                                                                      |                                                                                 | 2 points                                     |            | 1 point                       |                                                |                                                                                  |            |                          |            |
|                                                       | Data Range                                               | 0 to 255                                                                                                                                                                                                                                                                     |                                                                                 |                                              |            |                               |                                                |                                                                                  |            |                          |            |
| Analog Voltage Input                                  | Quantity                                                 | —                                                                                                                                                                                                                                                                            |                                                                                 |                                              |            | 1 point                       |                                                |                                                                                  |            |                          |            |
|                                                       | Input Voltage Range                                      |                                                                                                                                                                                                                                                                              |                                                                                 |                                              |            | 0 to 10V DC                   |                                                |                                                                                  |            |                          |            |
|                                                       | Input Impedance                                          |                                                                                                                                                                                                                                                                              |                                                                                 |                                              |            | Approx. 100 kΩ                |                                                |                                                                                  |            |                          |            |
|                                                       | Data Range                                               |                                                                                                                                                                                                                                                                              |                                                                                 |                                              |            | 0 to 255 (8 bit)              |                                                |                                                                                  |            |                          |            |
| Pulse Output                                          | Quantity                                                 | —                                                                                                                                                                                                                                                                            |                                                                                 |                                              |            | 2 points                      |                                                |                                                                                  |            |                          |            |
|                                                       | Maximum Frequency                                        |                                                                                                                                                                                                                                                                              |                                                                                 |                                              |            | 20 kHz                        |                                                |                                                                                  |            |                          |            |
| Sensor Power Supply                                   | Output Voltage/Current                                   | 24V DC (+10% to -15%), 250 mA                                                                                                                                                                                                                                                |                                                                                 |                                              |            | —                             |                                                |                                                                                  |            |                          |            |
|                                                       | Overload Detection                                       | Not available                                                                                                                                                                                                                                                                |                                                                                 |                                              |            |                               |                                                |                                                                                  |            |                          |            |
|                                                       | Isolation                                                | Isolated from the internal circuit                                                                                                                                                                                                                                           |                                                                                 |                                              |            |                               |                                                |                                                                                  |            |                          |            |
| Port 1                                                |                                                          | RS232C Maintenance Communication, User Communication                                                                                                                                                                                                                         |                                                                                 |                                              |            |                               |                                                |                                                                                  |            |                          |            |
| Port 2 / Communication Adapter (option) <sup>*6</sup> |                                                          | —                                                                                                                                                                                                                                                                            | Possible                                                                        | Possible                                     |            | Possible                      |                                                | Possible                                                                         |            | Possible                 |            |
| Clock Cartridge (Option)                              |                                                          | Possible                                                                                                                                                                                                                                                                     | Possible                                                                        | Possible                                     |            | Possible                      |                                                | Possible                                                                         |            | Possible                 |            |
| Memory Cartridge (Option)                             |                                                          | Possible                                                                                                                                                                                                                                                                     | Possible                                                                        | Possible                                     |            | Possible                      |                                                | Possible                                                                         |            | Possible                 |            |
| HMI Module (Option)                                   |                                                          | Possible                                                                                                                                                                                                                                                                     | Possible                                                                        | Possible                                     |            | Possible                      |                                                | Possible                                                                         |            | Possible                 |            |

## Communication Port (RS232C Port 1)

| Type                                                      | All-in-one Type             | Slim Type |
|-----------------------------------------------------------|-----------------------------|-----------|
| Standards                                                 | EIA RS232C                  |           |
| Maximum Baud Rate                                         | 19200 bps                   |           |
| Maintenance Communication                                 | Possible                    |           |
| User Communication                                        | Possible                    |           |
| Modem Communication                                       | Impossible                  |           |
| Data Link Communication                                   | Impossible                  |           |
| Cable                                                     | Special Cable <sup>*7</sup> |           |
| Isolation between Internal Circuit and Communication Port | Not isolated                |           |

\*4 1 step equals 6 bytes

\*5 Not including expansion I/O service, clock function processing, data link processing, and interrupt processing

\*6 RS232C: Maintenance Communication, User Communication, Modem Communication

RS485: Maintenance Communication, Data Link

\*7 FC2A-KC4C, FC2A-KP1C, FC4A-KC1C, FC4A-KC2C

# Specifications Cont.

## DC Input Specifications

| Part No.                              |                              | FC4A-C10R2                                                                                                                                   | FC4A-C16R2                                        | FC4A-C24R2       | FC4A-D20K3<br>FC4A-D20S3                 | FC4A-D20RK1<br>FC4A-D20RS1                        | FC4A-D40K3<br>FC4A-D40S3         |
|---------------------------------------|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|------------------|------------------------------------------|---------------------------------------------------|----------------------------------|
| Rated Input Voltage                   |                              | 24V DC sink/source input signal                                                                                                              |                                                   |                  |                                          |                                                   |                                  |
| Input Voltage Range                   |                              | 20.4 to 28.8V DC                                                                                                                             |                                                   |                  | 20.4 to 26.4V DC                         |                                                   |                                  |
| Rated Input Current                   |                              | I0 and I1:<br>I2 to I7, I10 to I15:                                                                                                          | 11 mA<br>7 mA/point (24V DC)                      |                  | I0, I1, I6, I7:<br>I2 to I5, I10 to I27: | 5 mA/point (24V DC)<br>7 mA/point (24V DC)        |                                  |
| Input Impedance                       |                              | I0 and I1:<br>I2 to I7, I10 to I15:                                                                                                          | 2.1 kΩ<br>3.4 kΩ                                  |                  | I0, I1, I6, I7:<br>I2 to I5, I10 to I27: | 5.7 kΩ<br>3.4 kΩ                                  |                                  |
| Turn ON Time                          |                              | I0 to I5:<br>I6, I7, I10 to I15:                                                                                                             | 35 μsec + filter value<br>40 μsec + filter value  |                  | I0 to I7:<br>I10 to I27:                 | 35 μsec + filter value<br>40 μsec + filter value  |                                  |
| Turn OFF Time                         |                              | I0 and I1:<br>I2 to I7, I10 to I15:                                                                                                          | 45 μsec + filter value<br>150 μsec + filter value |                  | I0, I1, I6, I7:<br>I2 to I5, I10 to I27: | 45 μsec + filter value<br>150 μsec + filter value |                                  |
| Input Points                          |                              | 6 (6/1 common)                                                                                                                               | 9 (9/1 common)                                    | 14 (14/1 common) | 12 (12/1 common)                         | 12 (12/1 common)                                  | 24 (12/1 common)                 |
| Connector                             | On Mother Board              | —                                                                                                                                            |                                                   |                  | FL26A2MA<br>(Oki Electric Cable)         | MC1.5/13-G-3.81BK<br>(Phoenix Contact)            | FL26A2MA<br>(Oki Electric Cable) |
|                                       | Insertion/Removal Durability | —                                                                                                                                            |                                                   |                  | 100 times minimum                        |                                                   |                                  |
| Isolation                             | Between input terminals      | Not isolated                                                                                                                                 |                                                   |                  |                                          |                                                   |                                  |
|                                       | Internal circuit             | Photocoupler isolated                                                                                                                        |                                                   |                  |                                          |                                                   |                                  |
| Input Type                            |                              | Type1 (IEC61131)                                                                                                                             |                                                   |                  |                                          |                                                   |                                  |
| External Load for I/O Interconnection |                              | Not needed                                                                                                                                   |                                                   |                  |                                          |                                                   |                                  |
| Signal Determination Method           |                              | Static                                                                                                                                       |                                                   |                  |                                          |                                                   |                                  |
| Effect of Improper Input Connection   |                              | Both sinking and sourcing input signals can be connected. If any input exceeding the rated value is applied, permanent damage may be caused. |                                                   |                  |                                          |                                                   |                                  |
| Cable Length                          |                              | 3m (9.84 ft.)                                                                                                                                |                                                   |                  |                                          |                                                   |                                  |

## Transistor Sink and Source Output Specifications

| Part No.                      | FC4A-D20K3<br>FC4A-D20S3                                                       | FC4A-D20RK1<br>FC4A-D20RS1                    | FC4A-D40K3<br>FC4A-D40S3               |
|-------------------------------|--------------------------------------------------------------------------------|-----------------------------------------------|----------------------------------------|
| Output Points and Common Line | 8<br>(8/1 common)                                                              | 2<br>(2/1 common)                             | 16<br>(8/1 common)                     |
| Output Type                   | FC4A-D20K3/D20RK1/D40K3: Sink output<br>FC4A-D20S3/D20RS1/D40S3: Source output |                                               |                                        |
| Rated Load Voltage            | 24V DC                                                                         |                                               |                                        |
| Operating Load Voltage Range  | 20.4 to 28.8V DC                                                               |                                               |                                        |
| Rated Load Current            | 0.3A per output point                                                          |                                               |                                        |
| Maximum Load Current          | 1A per common line                                                             |                                               |                                        |
| Voltage Drop (ON Voltage)     | 1V maximum (voltage between COM and output terminals when output is on)        |                                               |                                        |
| Inrush Current                | 1A maximum                                                                     |                                               |                                        |
| Leakage Current               | 0.1 mA maximum                                                                 |                                               |                                        |
| Clamping Voltage              | 39V±1V                                                                         |                                               |                                        |
| Maximum Lamp Load             | 8W                                                                             |                                               |                                        |
| Inductive Load                | L/R = 10 ms (28.8V DC, 1Hz)                                                    |                                               |                                        |
| External Current Draw         | 100mA maximum, 24V DC<br>(power voltage at the +V or -V terminal)              |                                               |                                        |
| Isolation                     | Between output terminal and internal circuit                                   | Photocoupler isolated                         |                                        |
|                               | Between output terminals                                                       | Not isolated                                  |                                        |
| Connector                     | On Mother Board                                                                | FL26A2MA<br>(Oki Electric Cable)              | MC1.5/16-G-3.81BK<br>(Phoenix Contact) |
|                               | Insertion/Removal Durability                                                   | 100 times minimum                             |                                        |
| Output Delay                  | Turn ON time                                                                   | 5μs (Q0,Q1), 300μs max (Q2 to Q7, Q10 to Q17) |                                        |
|                               | Turn OFF time                                                                  | 5μs (Q0,Q1), 300μs max (Q2 to Q7, Q10 to Q17) |                                        |

## Relay Output Specifications

| Part No.                         | FC4A-C10R2                                                        | FC4A-C16R2          | FC4A-C24R2 | FC4A-D20RK1<br>FC4A-D20RS1 |
|----------------------------------|-------------------------------------------------------------------|---------------------|------------|----------------------------|
| No. of Outputs                   | 4                                                                 | 7                   | 10         | 8                          |
| Output Points per Common Line    | COM0                                                              | 3                   | 4          | 4                          |
|                                  | COM1                                                              | 1                   | 2          | 4                          |
|                                  | COM2                                                              | —                   | 1          | 1                          |
|                                  | COM3                                                              | —                   | —          | 1                          |
| Output Type                      | 1NO                                                               |                     |            |                            |
| Maximum Load Current             | 2A per point                                                      |                     |            |                            |
|                                  | 8A per common line                                                |                     |            |                            |
| Minimum Switching Load           | 0.1 mA/0.1V DC (reference value)                                  |                     |            |                            |
| Initial Contact Resistance       | 30 mΩ maximum                                                     |                     |            |                            |
| Electrical Life                  | 100,000 operations minimum<br>(rated load 1,800 operations/hour)  |                     |            |                            |
| Mechanical Life                  | 20,000,000 operations minimum<br>(no load 18,000 operations/hour) |                     |            |                            |
| Rated Load (resistive/inductive) | 240V AC/2A, 30V DC/2A                                             |                     |            |                            |
| Dielectric Strength              | Between output and ⊕ terminals                                    | 1,500V AC, 1 minute |            |                            |
|                                  | Between output terminal and internal circuit                      | 1,500V AC, 1 minute |            |                            |
|                                  | Between output terminals (COMs)                                   | 1,500V AC, 1 minute |            |                            |
| Connector                        | On Mother Board                                                   | —                   |            | *9                         |
|                                  | Insertion/Removal Durability                                      | —                   |            | 100 times minimum          |

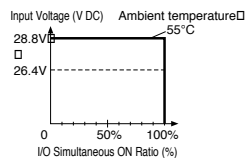
\*9 MC1.5/16-G-3.81BK (Phoenix Contact)

# Specifications Cont.

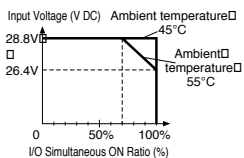
## I/O Usage Limits

(All-in-one Type)

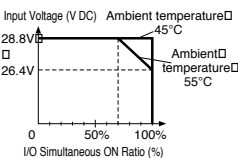
### FC4A-C10R2



### FC4A-C16R2

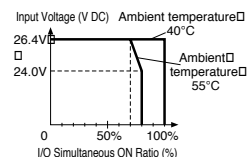


### FC4A-C24R2

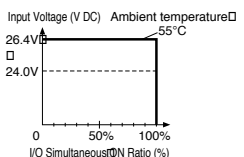


(Slim Type)

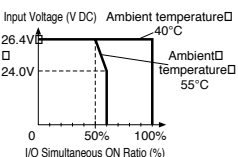
### FC4A-D20K3/D20S3



### FC4A-D20RK1/D20RS1



### FC4A-D40K3/D40S3

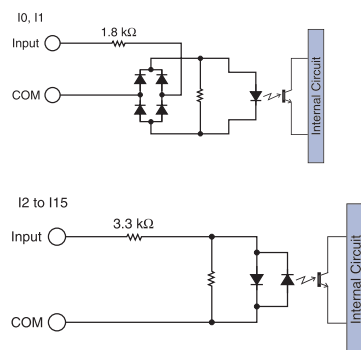


## Warning

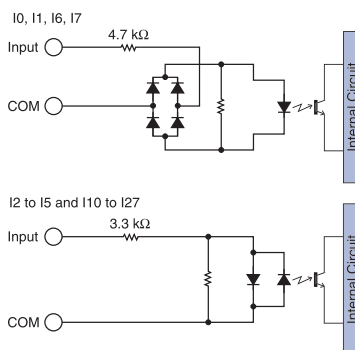
- When using at an operating ambient temperature above 40°C, reduce the input voltage or the quantity of I/O points that turn on simultaneously.

## Input Internal Circuit

(All-in-one Type)



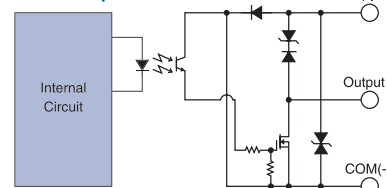
(Slim Type)



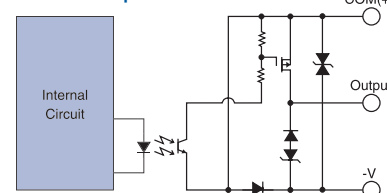
## Output Internal Circuit

(Slim Type)

### • Sink Output



### • Source Output



## Communication Adapter and Communication Module Specifications

| Part No.                                                  | FC4A-PC1<br>FC4A-HPC1                                                       | FC4A-PC2<br>FC4A-HPC2 | FC4A-PC3<br>FC4A-HPC3                              |
|-----------------------------------------------------------|-----------------------------------------------------------------------------|-----------------------|----------------------------------------------------|
| Standards                                                 | EIA RS232C                                                                  | EIA RS485             | EIA RS485                                          |
| Maximum Baud Rate                                         | 19200 bps                                                                   | 19200 bps             | Computer link: 19,200 bps<br>Data link: 38,400 bps |
| Maintenance Comm.                                         | Possible                                                                    | Possible              | Possible                                           |
| User Comm.                                                | Possible                                                                    | N/A                   | N/A                                                |
| Modem Comm.                                               | Possible                                                                    | N/A                   | N/A                                                |
| Data Link Comm.                                           | N/A                                                                         | N/A                   | Possible                                           |
| Max Cable Length                                          | Special cable *10                                                           | Special cable *11     | 200m                                               |
| No. of Slave Stations                                     | —                                                                           | —                     | 31                                                 |
| Isolation between Internal Circuit and Communication Port | Not isolated                                                                |                       |                                                    |
| Recommended Cable for RS485                               | Twisted-pair shielded cable with a minimum core wire of 0.3 mm <sup>2</sup> |                       |                                                    |
| Conductor Resistance                                      | 85 Ω/km maximum                                                             |                       |                                                    |
| Shield Resistance                                         | 20 Ω/km maximum                                                             |                       |                                                    |

\*10 FC2A-KC4C, FC2A-KM1C, FC4A-KC1C, FC4A-KC2C

\*11 FC2A-KP1C

## HMI Module Specifications (Option)

| Part No.      | FC4A-PH1                             |
|---------------|--------------------------------------|
| Power Voltage | 5V DC (supplied from the CPU module) |
| Weight        | 20g                                  |

## Memory Cartridge Specifications (Option)

| Part No.         | FC4A-PM32                                               | FC4A-PM64  |
|------------------|---------------------------------------------------------|------------|
| Memory Type      | EEPROM                                                  | EEPROM     |
| Memory Capacity  | 32 KB                                                   | 64 KB      |
| Storage Hardware | CPU module                                              | CPU module |
| Storage Software | WindLDR                                                 | WindLDR    |
| Program Storage  | One user program can be stored on one memory cartridge. |            |

## Clock Cartridge Specifications (Option)

| Part No.        | FC4A-PT1                                                             |
|-----------------|----------------------------------------------------------------------|
| Accuracy        | ±30 sec/month (typical) at 25°C                                      |
| Backup Duration | Approx. 30 days (typical) at 25°C after backup battery fully charged |
| Battery         | Lithium secondary batt (non replaceable)                             |
| Charging Time   | Approx. 10 hours for charging from 0% to 90% of full charge          |

# Specifications Cont.

## Specifications (Expansion I/O Module)

### DC Input Module Specifications

| Part No.                              | FC4A-N08B1                                                                                                                                      | FC4A-N16B1                             | FC4A-N16B3                     | FC4A-N32B3                       |                                |
|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|--------------------------------|----------------------------------|--------------------------------|
| Input Points                          | 8<br>(8/1 common)                                                                                                                               | 16<br>(16/1 common)                    |                                | 32<br>(16/1 common)              |                                |
| Rated Input Voltage                   | 24V DC sink/source input signal                                                                                                                 |                                        |                                |                                  |                                |
| Input Voltage Range                   | 20.4 to 28.8V DC                                                                                                                                |                                        |                                |                                  |                                |
| Rated Input Current                   | 7 mA/point (24V DC)                                                                                                                             |                                        | 5 mA/point (24V DC)            |                                  |                                |
| Input Impedance                       | 3.4 kΩ                                                                                                                                          |                                        | 4.4 kΩ                         |                                  |                                |
| Turn ON Time (24V DC)                 | 4 msec                                                                                                                                          |                                        |                                |                                  |                                |
| Turn OFF Time (24V DC)                | 4 msec                                                                                                                                          |                                        |                                |                                  |                                |
| Isolation                             | Between input terminals: Not isolated<br>Internal circuit: Photocoupler isolated                                                                |                                        |                                |                                  |                                |
| External Load for I/O Interconnection | Not needed                                                                                                                                      |                                        |                                |                                  |                                |
| Signal Determination                  | Static                                                                                                                                          |                                        |                                |                                  |                                |
| Effect of Improper Input Connection   | Both sinking and sourcing input signals can be connected.<br>If any input exceeding the rated value is applied, permanent damage may be caused. |                                        |                                |                                  |                                |
| Cable Length                          | 3m (9.84 ft.) in compliance with electromagnetic immunity                                                                                       |                                        |                                |                                  |                                |
| Connector                             | on Mother Board                                                                                                                                 | MC1.5/10-G-3.81BK<br>(Phoenix Contact) |                                | FL20A2MA<br>(Oki Electric Cable) |                                |
|                                       | Insert/Remove Durability                                                                                                                        | 100 times minimum                      |                                |                                  |                                |
| Internal Current Draw                 | All Inputs ON                                                                                                                                   | 25 mA (5V DC)<br>0 mA (24V DC)         | 40 mA (5V DC)<br>0 mA (24V DC) | 35 mA (5V DC)<br>0 mA (24V DC)   | 65 mA (5V DC)<br>0 mA (24V DC) |
|                                       | All Inputs OFF                                                                                                                                  | 5 mA (5V DC)<br>0 mA (24V DC)          | 5 mA (5V DC)<br>0 mA (24V DC)  | 5 mA (5V DC)<br>0 mA (24V DC)    | 10 mA (5V DC)<br>0 mA (24V DC) |
| Weight                                | 85g                                                                                                                                             | 100g                                   | 65g                            | 100g                             |                                |

### Transistor Output Module Specifications

| Part No.               | FC4A-T08K1<br>FC4A-T08S1                                                                                    | FC4A-T16K3<br>FC4A-T16S3               | FC4A-T32K3<br>FC4A-T32S3        |
|------------------------|-------------------------------------------------------------------------------------------------------------|----------------------------------------|---------------------------------|
| Output/Common Lines    | 8 (8/1 common)                                                                                              | 16 (16/1 common)                       | 32 (16/1 common)                |
| Output Type            | FC4A-T□K□: Transistor sink output<br>FC4A-T□S□: Transistor source output                                    |                                        |                                 |
| Rated Load Voltage     | 24V DC                                                                                                      |                                        |                                 |
| Oper. Load Volt. Range | 20.4 to 28.8V DC                                                                                            |                                        |                                 |
| Rated Load Current     | 0.3A/output pt. (@ 28.8V DC)                                                                                |                                        |                                 |
| Maximum Load Current   | 0.1A/output pt. (@ 28.8V DC)                                                                                |                                        |                                 |
| Maximum Load Current   | 0.1A/output pt. (@ 28.8V DC)                                                                                |                                        |                                 |
| Maximum Load Current   | 0.1A/output pt. (@ 28.8V DC)                                                                                |                                        |                                 |
| Voltage Drop (ON)      | 1V max (voltage between COM & output terminals - output on)                                                 |                                        |                                 |
| Inrush Current         | 1A maximum                                                                                                  |                                        |                                 |
| Leakage Current        | 0.1 mA maximum                                                                                              |                                        |                                 |
| Clamping Voltage       | 39V±1V                                                                                                      |                                        |                                 |
| Maximum Lamp Load      | 8W                                                                                                          |                                        |                                 |
| Inductive Load         | L/R = 10 msec (28.8V DC, 1Hz)                                                                               |                                        |                                 |
| External Current Draw  | FC4A-T□K□:100 mA max, 24V DC (power voltage at +V)<br>FC4A-T□S□:100 mA max, 24V DC (power voltage at -V)    |                                        |                                 |
| Isolation              | Between output terminal and internal circuit:Photocoupler isolated<br>Between output terminals:Not isolated |                                        |                                 |
| Connector              | on Mother Board                                                                                             | MC1.5/10-G-3.81BK<br>(Phoenix Contact) | FL20A2MA (Oki Electric Cable)   |
|                        | Insert/Remove Durability                                                                                    | 100 times minimum                      |                                 |
| Internal Current Draw  | All Inputs ON                                                                                               | 10 mA (5V DC)<br>20 mA (24V DC)        | 10 mA (5V DC)<br>40 mA (24V DC) |
|                        | All Inputs OFF                                                                                              | 5 mA (5V DC)<br>0 mA (24V DC)          | 10 mA (5V DC)<br>0 mA (24V DC)  |
| Output Delay           | Turn ON time                                                                                                | 300 μsec maximum                       |                                 |
|                        | Turn OFF time                                                                                               | 300 μsec maximum                       |                                 |
| Weight                 | 85g                                                                                                         | 70g                                    | 105g                            |

### Relay Output Module Specifications

| Part No.                         | FC4A-R081                                                   | FC4A-R161                              |
|----------------------------------|-------------------------------------------------------------|----------------------------------------|
| Outputs/Common Lines             | 8 (4/1 common)                                              | 16 (8/1 common)                        |
| Output Type                      | 1NO                                                         |                                        |
| Maximum Load Current             | 2A                                                          |                                        |
| Min. Switching Load              | 0.1 mA/0.1V DC (reference value)                            |                                        |
| Contact Resistance               | 30 mΩ maximum                                               |                                        |
| Electrical Life                  | 100,000 operations min. (rated load 1,800 operations/hour)  |                                        |
| Mechanical Life                  | 20,000,000 operations min. (no load 18,000 operations/hour) |                                        |
| Rated Load (resistive/inductive) | 240V AC/2A, 30V DC/2A                                       |                                        |
| Dielectric Strength              | Between output and ⊕ or ⊖ terminals:                        | 1,500V AC, 1 min.                      |
|                                  | Between output term. and internal circuit:                  | 1,500V AC, 1 min.                      |
| Connector                        | on Mother Board                                             | MC1.5/11-G-3.81BK<br>(Phoenix Contact) |
|                                  | Insert/Remove Durability                                    | MC1.5/10-G-3.81BK<br>(Phoenix Contact) |
| Internal Current Draw            | All Inputs ON                                               | 30 mA (5V DC)<br>40 mA (24V DC)        |
|                                  | All Inputs OFF                                              | 5 mA (5V DC)<br>0 mA (24V DC)          |
| Weight                           | 110g                                                        | 145g                                   |

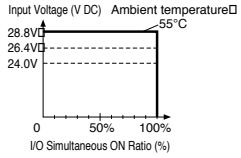
### Combination I/O Module Specifications

| Part No.                    | FC4A-M08BR1                           | FC4A-M24BR2                                                                                                                                                                 |
|-----------------------------|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| DC Input Specifications     | Input Points                          | 4 (4/1 common)                                                                                                                                                              |
|                             | Rated Input Voltage                   | 24V DC sink/source input signal                                                                                                                                             |
|                             | Input Voltage Range                   | 20.4 to 28.8V DC                                                                                                                                                            |
|                             | Rated Input Current                   | 7 mA/point (24V DC)                                                                                                                                                         |
|                             | Input Impedance                       | 3.4 kΩ                                                                                                                                                                      |
|                             | Turn ON Time                          | 4 msec (24V DC)                                                                                                                                                             |
|                             | Turn OFF Time                         | 4 msec (24V DC)                                                                                                                                                             |
|                             | Isolation                             | Between input terminals: Not isolated<br>Internal circuit: Photocoupler isolated                                                                                            |
|                             | External Load for I/O Interconnection | Not needed                                                                                                                                                                  |
|                             | Signal Determination                  | Static                                                                                                                                                                      |
| Relay Output Specifications | Effect of Improper Input Connection   | Both sinking and sourcing input signals can be connected.<br>If any input exceeding the rated value is applied, permanent damage may be caused.                             |
|                             | Cable Length                          | 3m (9.84 ft.) in compliance with electromagnetic immunity                                                                                                                   |
|                             | Output Points                         | 4 (4/1 common)                                                                                                                                                              |
|                             | Output Type                           | 1NO                                                                                                                                                                         |
|                             | Maximum Load Current                  | 2A                                                                                                                                                                          |
|                             | Min. Switching Load                   | 0.1 mA/0.1V DC (reference value)                                                                                                                                            |
|                             | Contact Resistance                    | 30 mΩ maximum                                                                                                                                                               |
|                             | Electrical Life                       | 100,000 operations min. (rated load 1,800 operations/hour)                                                                                                                  |
|                             | Mechanical Life                       | 20,000,000 operations min. (no load 18,000 operations/hour)                                                                                                                 |
|                             | Rated Load (resistive/inductive)      | 240V AC/2A, 30V DC/2A                                                                                                                                                       |
| Relay Output Specifications | Dielectric Strength                   | Between out and ⊕ or ⊖ terminals: 1,500V AC, 1 minute<br>Between out terminal and internal circuit: 1,500V AC, 1 minute<br>Between out terminal (COMs): 1,500V AC, 1 minute |
|                             | Connector                             | on Mother Board                                                                                                                                                             |
|                             | Insert/Remove Durability              | MC1.5/11-G-3.81BK<br>(Phoenix Contact)                                                                                                                                      |
|                             | Internal Current Draw                 | 25 mA (5V DC)<br>20 mA (24V DC)                                                                                                                                             |
|                             | Output Delay                          | 300 μsec maximum                                                                                                                                                            |
|                             | Weight                                | 95g                                                                                                                                                                         |
|                             | Internal Current Draw                 | 5 mA (5V DC)<br>0 mA (24V DC)                                                                                                                                               |
|                             | Output Delay                          | 300 μsec maximum                                                                                                                                                            |
|                             | Weight                                | 140g                                                                                                                                                                        |
|                             | Internal Current Draw                 | 65 mA (5V DC)<br>45 mA (24V DC)                                                                                                                                             |
|                             | Output Delay                          | 10 mA (5V DC)<br>0 mA (24V DC)                                                                                                                                              |

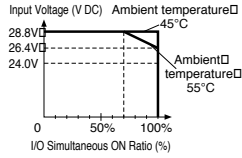
# Specifications Cont.

## Input Usage Limits

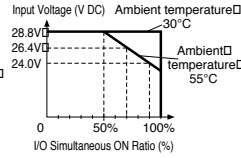
(FC4A-N08B1)



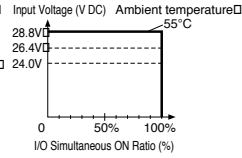
(FC4A-N16B1)



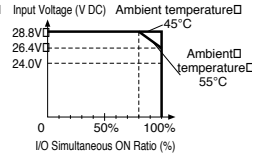
(FC4A-N16B3/N32B3)



(FC4A-M08BR1)

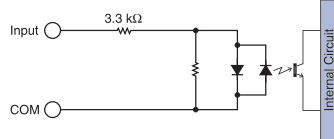


(FC4A-M24BR2)

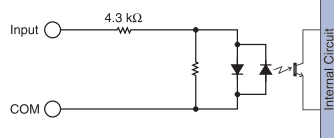


## Input Internal Circuit

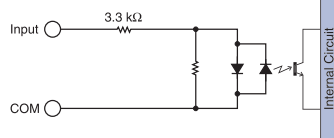
(FC4A-N081, FC4A-N16B1)



(FC4A-N16B3, FC4A-N32B3)

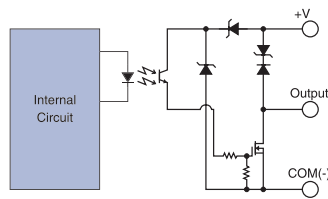


(FC4A-M08BR1, FC4A-M24BR2)

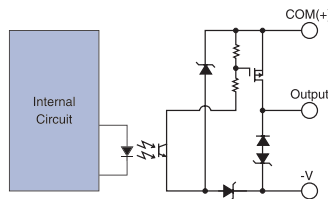


## Output Internal Circuit

(FC4A-T08K1, FC4A-T16K3, FC4A-T32K3)



(FC4A-T08S1, FC4A-T16S3, FC4A-T32S3)



## Warning

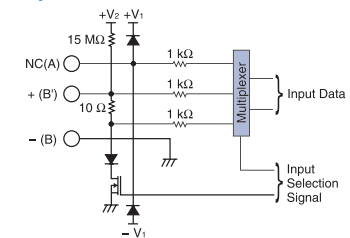
- When using at an operating ambient temperature above 40°C, reduce the input voltage or the quantity of I/O points that turn on simultaneously.

## Specifications (Analog I/O Module)

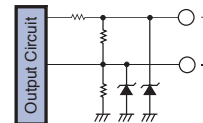
### Analog I/O Module Specifications

| Part No.                                       | FC4A-L03A1                                       | FC4A-L03AP1                                      | FC4A-J2A1                                        | FC4A-K1A1                                        |
|------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|
| Input Points                                   | 2                                                | 2                                                | 2                                                | —                                                |
| Input Signal Type                              | Voltage (0 to 10V DC)<br>Current (4 to 20 mA DC) | Thermocouple<br>Resistance<br>Thermometer        | Voltage (0 to 10V DC)<br>Current (4 to 20 mA DC) | —                                                |
| Output Points                                  | 1                                                | 1                                                | —                                                | 1                                                |
| Output Signal Type                             | Voltage (0 to 10V DC)<br>Current (4 to 20 mA DC) | Voltage (0 to 10V DC)<br>Current (4 to 20 mA DC) | —                                                | Voltage (0 to 10V DC)<br>Current (4 to 20 mA DC) |
| Rated Power Voltage                            | 24V DC                                           |                                                  |                                                  |                                                  |
| Allowable Voltage Range                        | 20.4 to 28.8V DC                                 |                                                  |                                                  |                                                  |
| Connector                                      | MC1.5/11-G-3.81BK (Phoenix Contact)              |                                                  |                                                  |                                                  |
| On Mother Board<br>Insert/Remove<br>Durability | 100 times minimum                                |                                                  |                                                  |                                                  |
| Internal<br>Current<br>Draw                    | Internal Power                                   | 50 mA (5V DC)<br>0 mA (24V DC)                   | 50 mA (5V DC)<br>0 mA (24V DC)                   | 50 mA (5V DC)<br>0 mA (24V DC)                   |
|                                                | External Power                                   | 40 mA (24V DC)                                   | 40 mA (24V DC)                                   | 40 mA (24V DC)                                   |
| Weight                                         | 85g                                              |                                                  |                                                  |                                                  |

## Input Circuit



## Output Circuit



## Analog Input Specifications

| Part No.                         | FC4A-L03A1, FC4A-J2A1, FC4A-L03AP1 |  | FC4A-L03AP1 only                      |                                                                     |
|----------------------------------|------------------------------------|--|---------------------------------------|---------------------------------------------------------------------|
| Input Signal Type                | Voltage Input                      |  | Resistance Thermometer                | Thermocouple                                                        |
| Input Range                      | 0 to 10V DC                        |  | Pt 100 3-wire type<br>(-100 to 500°C) | Type K (0 to 1300°C)<br>Type J (0 to 1200°C)<br>Type T (0 to 400°C) |
| Input Impedance                  | 1 MΩ minimum                       |  | 1 MΩ minimum                          | 1 MΩ minimum                                                        |
| Allowable Conductor Resistance   | —                                  |  | 200Ω maximum                          | —                                                                   |
| Input Detection Current          | —                                  |  | 1.0 mA maximum                        | —                                                                   |
| Sample Duration Time             | 16 msec maximum                    |  | 50 msec maximum                       |                                                                     |
| Sample Repetition Time           | 16 msec maximum                    |  | 50 msec maximum                       |                                                                     |
| Total Input System Transfer Time | 32 msec + 1 scan time (Note 1)     |  | 100 msec + 1 scan time (Note 1)       |                                                                     |
| Type of Input                    | Single-ended input                 |  | Differential input                    |                                                                     |

(Continued)

# Specifications Cont.

## Analog Input Specifications (Continued)

| Part No.                                       |                                                           | FC4A-L03A1, FC4A-J2A1, L03AP1                                                         |               | FC4A-L03AP1 Only       |                                                                                  |
|------------------------------------------------|-----------------------------------------------------------|---------------------------------------------------------------------------------------|---------------|------------------------|----------------------------------------------------------------------------------|
| Input Signal Type                              |                                                           | Voltage Input                                                                         | Current Input | Resistance Thermometer | Thermocouple                                                                     |
| Operating Mode                                 |                                                           | Self-scan                                                                             |               |                        |                                                                                  |
| Conversion Method                              |                                                           | ΣΔ type ADC                                                                           |               |                        |                                                                                  |
| Input Error                                    | Maximum Error at 25°C                                     | ±0.2% of full scale                                                                   |               |                        | ±0.2% of full scale plus reference junction compensation accuracy (±4°C maximum) |
|                                                | Temperature Coefficient                                   | ±0.006% of full scale /°C                                                             |               |                        |                                                                                  |
|                                                | Repeatability after Stabilization Time                    | ±0.5% of full scale                                                                   |               |                        |                                                                                  |
|                                                | Non-linearity                                             | ±0.2% of full scale                                                                   |               |                        |                                                                                  |
|                                                | Maximum Error                                             | ±1% of full scale                                                                     |               |                        |                                                                                  |
| Data                                           | Digital Resolution                                        | 4096 increments (12 bits)                                                             |               |                        |                                                                                  |
|                                                | Input Value of LSB                                        | 2.5 mV                                                                                | 4 μA          | 0.15 °C                | K: 0.325°C<br>J: 0.300°C<br>T: 0.100°C                                           |
|                                                | Data Type in Application Program                          | 0 to 4095 (12-bit data) -32768 to 32767 (optional range designation) (Note 2)         |               |                        |                                                                                  |
|                                                | Monotonicity                                              | Yes                                                                                   |               |                        |                                                                                  |
|                                                | Input Data Out of Range                                   | Detectable (Note 3)                                                                   |               |                        |                                                                                  |
| Noise Resistance                               | Maximum Temporary Deviation during Electrical Noise Tests | ±3% maximum when a 500V clamp voltage is applied to the power and I/O wiring (Note 4) |               |                        |                                                                                  |
|                                                | Common Mode Characteristics                               | Common mode reject ratio (CMRR): -50 dB                                               |               |                        |                                                                                  |
|                                                | Common Mode Voltage                                       | 16V DC                                                                                |               |                        |                                                                                  |
|                                                | Input Filter                                              | No                                                                                    |               |                        |                                                                                  |
|                                                | Cable                                                     | Twisted pair shielded cable is recommended for improved noise immunity                |               |                        | —                                                                                |
|                                                | Crosstalk                                                 | 2 LSB maximum                                                                         |               |                        |                                                                                  |
| Dielectric Strength                            |                                                           | 500V between input and power circuit                                                  |               |                        |                                                                                  |
| Type of Protection                             |                                                           | Photocoupler between input and internal circuit                                       |               |                        |                                                                                  |
| Effect of Improper Input Connection            |                                                           | No damage                                                                             |               |                        |                                                                                  |
| Maximum Permanent Allowed Overload (No Damage) |                                                           | 13V DC                                                                                | 40 mA DC      | —                      |                                                                                  |
| Selection of Analog Input Signal Type          |                                                           | Using software programming                                                            |               |                        |                                                                                  |
| Method of Input Type Selection                 |                                                           | Programming Software Configured                                                       |               |                        |                                                                                  |

Note 1: Total input system transfer time = Sample repetition time  $\times 2 + 1$  scan time

Note 2: The 12-bit data (0 to 4095) processed in the analog I/O module can be linear-converted to a value between -32768 and 32767. The optional range designation, and analog I/O data minimum and maximum values can be selected using data registers allocated to analog I/O modules.

Note 3: When an error is detected, a corresponding error code is stored to a data register allocated to analog I/O operating status.

Note 4: Accuracy of the resistance thermometer is not assured when noise is applied.

## Analog Output Specifications

| Part No.                               |                                                           | FC4A-L03A1, FC4A-L03AP1, FC4A-K1A1                                                 |                      |
|----------------------------------------|-----------------------------------------------------------|------------------------------------------------------------------------------------|----------------------|
| Output Signal Type                     |                                                           | Voltage Output                                                                     | Current Output       |
| Output Range                           |                                                           | 0 to 10V DC                                                                        | 4 to 20 mA DC        |
| Load Impedance                         |                                                           | 2 k $\Omega$ minimum                                                               | 300 $\Omega$ maximum |
| Applicable Load Type                   |                                                           | Resistive load                                                                     |                      |
| Settling Time                          |                                                           | 20 msec                                                                            |                      |
| Total Output System Transfer Time      |                                                           | 20 msec + 1 scan time                                                              |                      |
| Output Error                           | Maximum Error at 25°C                                     | $\pm 0.2\%$ of full scale                                                          |                      |
|                                        | Temperature Coefficient                                   | $\pm 0.015\%$ of full scale / $^\circ\text{C}$                                     |                      |
|                                        | Repeatability after Stabilization Time                    | $\pm 0.5\%$ of full scale                                                          |                      |
|                                        | Output Voltage Drop                                       | $\pm 1\%$ of full scale                                                            | —                    |
|                                        | Non-linearity                                             | $\pm 0.2\%$ of full scale                                                          |                      |
|                                        | Output Ripple                                             | 1 LSB maximum                                                                      |                      |
|                                        | Overshoot                                                 | 0%                                                                                 |                      |
|                                        | Total Error                                               | $\pm 1\%$ of full scale                                                            |                      |
| Data                                   | Digital Resolution                                        | 4096 increments (12 bits)                                                          |                      |
|                                        | Output Value of LSB                                       | 2.5 mV                                                                             | 4 $\mu\text{A}$      |
|                                        | Data Type in Application Program                          | 0 to 4095 (12-bit data) -32768 to 32767 (optional range designation) (Note 5)      |                      |
|                                        | Monotonicity                                              | Yes                                                                                |                      |
|                                        | Current Loop Open                                         | —                                                                                  | Detectable (Note 6)  |
| Noise Resistance                       | Maximum Temporary Deviation during Electrical Noise Tests | $\pm 3\%$ maximum when a 500V clamp voltage is applied to the power and I/O wiring |                      |
|                                        | Cable                                                     | Twisted pair shielded cable is recommended for improved noise immunity             |                      |
|                                        | Crosstalk                                                 | No crosstalk because of 1 channel output                                           |                      |
| Dielectric Strength                    |                                                           | 500V between output and power circuit                                              |                      |
| Type of Protection                     |                                                           | Photocoupler between output and internal circuit                                   |                      |
| Effect of Improper Output Connection   |                                                           | No damage                                                                          |                      |
| Selection of Analog Output Signal Type |                                                           | Using software programming                                                         |                      |
| Method of Output Type Selection        |                                                           | Programming Software Configured                                                    |                      |

Note 5: The 12-bit data (0 to 4095) processed in the analog I/O module can be linear-converted to a value between -32768 and 32767. The optional range designation, and analog I/O data minimum and maximum values can be selected using data registers allocated to analog I/O modules.

Note 6: When an error is detected, a corresponding error code is stored to a data register allocated to analog I/O operating status.

# Programming Instruction Commands

## Basic Instruction List

| Symbol    | Function                                                                 | Qty of Bytes |
|-----------|--------------------------------------------------------------------------|--------------|
| LOD       | Stores intermediate results and reads contact status                     | 6            |
| LODN      | Stores intermediate results and reads inverted contact status            | 6            |
| OUT       | Outputs the result of bit logical operation                              | 6            |
| OUTN      | Outputs the inverted result of bit logical operation                     | 6            |
| SET       | Sets output, internal relay, or shift register bit                       | 6            |
| RST       | Resets output, internal relay, or shift register bit                     | 6            |
| AND       | Series connection of NO contact                                          | 4            |
| ANDN      | Series connection of NC contact                                          | 4            |
| OR        | Parallel connection of NO contact                                        | 4            |
| ORN       | Parallel connection of NC contact                                        | 4            |
| AND · LOD | Series connection of circuit blocks                                      | 5            |
| OR · LOD  | Parallel connection of circuit blocks                                    | 5            |
| BPS       | Saves the result of bit logical operation temporarily                    | 5            |
| BRD       | Reads the result of bit logical operation which was saved temporarily    | 3            |
| BPP       | Restores the result of bit logical operation which was saved temporarily | 2            |
| TML       | Subtracting 1-sec timer (0 to 65535 sec)                                 | 4            |
| TIM       | Subtracting 100-msec timer (0 to 6553.5 sec)                             | 4            |
| TMH       | Subtracting 10-msec timer (0 to 655.35 sec)                              | 4            |
| TMS       | Subtracting 1-msec timer (0 to 65.535 sec)                               | 4            |
| CNT       | Adding counter (0 to 65535)                                              | 4            |
| CDP       | Dual pulse reversible counter (0 to 65535)                               | 4            |
| CUD       | Up/down selection reversible counter (0 to 65535)                        | 4            |
| CC=       | Equal to comparison of counter current value                             | 7            |
| CC≥       | Greater than or equal to comparison of counter current value             | 7            |
| DC=       | Equal to comparison of data register value                               | 8            |
| DC≥       | Greater than or equal to comparison of data register value               | 8            |
| SFR       | Forward shift register                                                   | 6            |
| SFRN      | Reverse shift register                                                   | 6            |
| SOTU      | Rising-edge differentiation output                                       | 5            |
| SOTD      | Falling-edge differentiation output                                      | 5            |
| JMP       | Jumps a designated program area                                          | 4            |
| JEND      | Ends a jump instruction                                                  | 4            |
| MCS       | Starts a master control                                                  | 4            |
| MCR       | Ends a master control                                                    | 4            |
| END       | Ends a program                                                           | 2            |

## Advanced Instruction List

| Symbol | Function                                  | Qty of Bytes | All-in-One Type |            |            | Slim Type                |                                                        |
|--------|-------------------------------------------|--------------|-----------------|------------|------------|--------------------------|--------------------------------------------------------|
|        |                                           |              | FC4A-C10R2      | FC4A-C16R2 | FC4A-C24R2 | FC4A-D20K3<br>FC4A-D20S3 | FC4A-D20RK1<br>FC4A-D20RS1<br>FC4A-D40K3<br>FC4A-D40S3 |
| NOP    | No Operation                              | 2            | ○               | ○          | ○          | ○                        | ○                                                      |
| MOV    | Move                                      | 16           | ○               | ○          | ○          | ○                        | ○                                                      |
| MOVN   | Move Not                                  | 16           | ○               | ○          | ○          | ○                        | ○                                                      |
| IMOV   | Indirect Move                             | 24-28        | ○               | ○          | ○          | ○                        | ○                                                      |
| IMOVN  | Indirect Move Not                         | 24-28        | ○               | ○          | ○          | ○                        | ○                                                      |
| IBMV   | Indirect Bit Move                         | 24           | —               | —          | —          | —                        | ○                                                      |
| IBMVN  | Indirect Bit Move Not                     | 24           | —               | —          | —          | —                        | ○                                                      |
| BMOV   | Block Move                                | 18           | —               | —          | —          | —                        | ○                                                      |
| CMP=   | Compare Equal To                          | 20           | ○               | ○          | ○          | ○                        | ○                                                      |
| CMP≠   | Compare Unequal To                        | 20           | ○               | ○          | ○          | ○                        | ○                                                      |
| CMP<   | Compare Less Than                         | 20           | ○               | ○          | ○          | ○                        | ○                                                      |
| CMP>   | Compare Greater Than                      | 20           | ○               | ○          | ○          | ○                        | ○                                                      |
| CMP≤   | Compare Less Than or Equal To             | 20           | ○               | ○          | ○          | ○                        | ○                                                      |
| CMP≥   | Compare Greater Than or Equal To          | 20           | ○               | ○          | ○          | ○                        | ○                                                      |
| ICMP≥  | Interval Compare Greater Than or Equal To | 22           | —               | —          | —          | —                        | ○                                                      |
| ADD    | Addition                                  | 20           | ○               | ○          | ○          | ○                        | ○                                                      |
| SUB    | Subtraction                               | 20           | ○               | ○          | ○          | ○                        | ○                                                      |
| MUL    | Multiplication                            | 20           | ○               | ○          | ○          | ○                        | ○                                                      |
| DIV    | Division                                  | 20           | ○               | ○          | ○          | ○                        | ○                                                      |

(Continued)

# Programming Instruction Commands Cont.

Advanced Instruction List (continued)

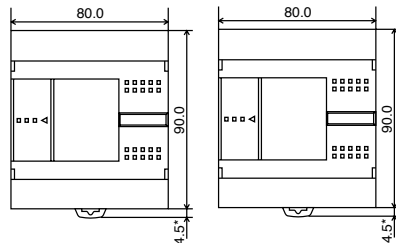
| Symbol | Name                     | Qty of Bytes | All-in-One Type |            |            | Slim Type                |                                                        |
|--------|--------------------------|--------------|-----------------|------------|------------|--------------------------|--------------------------------------------------------|
|        |                          |              | FC4A-C10R2      | FC4A-C16R2 | FC4A-C24R2 | FC4A-D20K3<br>FC4A-D20S3 | FC4A-D20RK1<br>FC4A-D20RS1<br>FC4A-D40K3<br>FC4A-D40S3 |
| ANDW   | AND Word                 | 20           | ○               | ○          | ○          | ○                        | ○                                                      |
| ORW    | OR Word                  | 20           | ○               | ○          | ○          | ○                        | ○                                                      |
| XORW   | Exclusive OR Word        | 20           | ○               | ○          | ○          | ○                        | ○                                                      |
| SFTL   | Shift Left               | 12           | ○               | ○          | ○          | ○                        | ○                                                      |
| SFTR   | Shift Right              | 12           | ○               | ○          | ○          | ○                        | ○                                                      |
| BCDLS  | BCD Left Shift           | 14           | —               | —          | —          | —                        | ○                                                      |
| WSFT   | Word Shift               | 18           | —               | —          | —          | —                        | ○                                                      |
| ROTL   | Rotate Left              | 12           | ○               | ○          | ○          | ○                        | ○                                                      |
| ROTR   | Rotate Right             | 12           | ○               | ○          | ○          | ○                        | ○                                                      |
| HTOB   | Hex to BCD               | 14           | *               | *          | *          | ○                        | ○                                                      |
| HTOA   | Hex to ASCII             | 18           | *               | *          | *          | ○                        | ○                                                      |
| BTOH   | BCD to Hex               | 14           | *               | *          | *          | ○                        | ○                                                      |
| BTOA   | BCD to ASCII             | 18           | *               | *          | *          | ○                        | ○                                                      |
| ATOH   | ASCII to Hex             | 18           | *               | *          | *          | ○                        | ○                                                      |
| ATOB   | ASCII to BCD             | 18           | *               | *          | *          | ○                        | ○                                                      |
| ENCO   | Encode                   | 16           | —               | —          | —          | —                        | ○                                                      |
| DECO   | Decode                   | 16           | —               | —          | —          | —                        | ○                                                      |
| TXD1   | Transmit 1               | 21-819       | ○               | ○          | ○          | ○                        | ○                                                      |
| TXD2   | Transmit 2               | 21-819       | —               | ○          | ○          | ○                        | ○                                                      |
| RXD1   | Receive 1                | 21-819       | ○               | ○          | ○          | ○                        | ○                                                      |
| RXD2   | Receive 2                | 21-819       | —               | ○          | ○          | ○                        | ○                                                      |
| LABEL  | Label                    | 8            | ○               | ○          | ○          | ○                        | ○                                                      |
| LJMP   | Label Jump               | 10           | ○               | ○          | ○          | ○                        | ○                                                      |
| LCAL   | Label Call               | 10           | ○               | ○          | ○          | ○                        | ○                                                      |
| LRET   | Label Return             | 6            | ○               | ○          | ○          | ○                        | ○                                                      |
| ROOT   | Root                     | 14           | *               | *          | *          | ○                        | ○                                                      |
| DISP   | Display                  | 16           | —               | —          | *          | ○                        | ○                                                      |
| DGRD   | Digital Read             | 20           | —               | —          | *          | ○                        | ○                                                      |
| WKTBL  | Week Table               | 13-89        | *               | *          | *          | ○                        | ○                                                      |
| WKTIM  | Week Timer               | 24           | *               | *          | *          | ○                        | ○                                                      |
| PULS1  | Pulse Output 1           | 12           | —               | —          | —          | ○                        | ○                                                      |
| PULS2  | Pulse Output 2           | 12           | —               | —          | —          | ○                        | ○                                                      |
| PWM1   | Pulse Width Modulation 1 | 24           | —               | —          | —          | ○                        | ○                                                      |
| PWM2   | Pulse Width Modulation 2 | 24           | —               | —          | —          | ○                        | ○                                                      |
| RAMP   | Ramp Pulse Output        | 14           | —               | —          | —          | ○                        | ○                                                      |
| ZRN1   | Zero Return 1            | 18           | —               | —          | —          | —                        | ○                                                      |
| ZRN2   | Zero Return 2            | 18           | —               | —          | —          | —                        | ○                                                      |
| XYFS   | XY Format Set            | 24-124       | —               | —          | *          | ○                        | ○                                                      |
| CVXTY  | Convert X to Y           | 18           | —               | —          | *          | ○                        | ○                                                      |
| CVYTX  | Convert Y to X           | 18           | —               | —          | *          | ○                        | ○                                                      |
| PID    | PID Control              | 26           | —               | —          | *          | ○                        | ○                                                      |
| IOREF  | I/O Refresh              | 16           | ○               | ○          | ○          | ○                        | ○                                                      |
| BCNT   | Bit Count                | 18           | —               | —          | —          | —                        | ○                                                      |
| ALT    | Alternate Output         | 10           | —               | —          | —          | —                        | ○                                                      |
| DTML   | 1-sec Dual Timer         | 22           | —               | —          | —          | —                        | ○                                                      |
| DTIM   | 100-msec Dual Timer      | 22           | —               | —          | —          | —                        | ○                                                      |
| DTMH   | 10-msec Dual Timer       | 22           | —               | —          | —          | —                        | ○                                                      |
| DTMS   | 1-msec Dual Timer        | 22           | —               | —          | —          | —                        | ○                                                      |
| TTIM   | Teaching Timer           | 10           | —               | —          | —          | —                        | ○                                                      |
| DI     | Disable Interrupt        | 8            | —               | —          | —          | —                        | ○                                                      |
| EI     | Enable Interrupt         | 8            | —               | —          | —          | —                        | ○                                                      |

\* Not applicable to the previously released FC4A-C10R2B, FC4A-C16R2B, and FC4A-C24R2B.

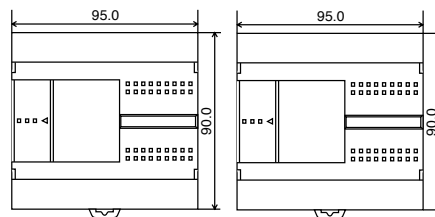
# Dimensions

## Dimensions

### FC4A-C10R2, FC4A-C16R2

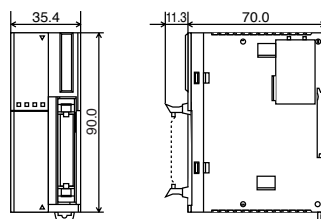


### FC4A-C24R2

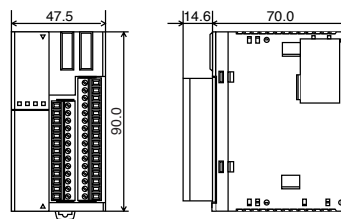


All dimensions in mm

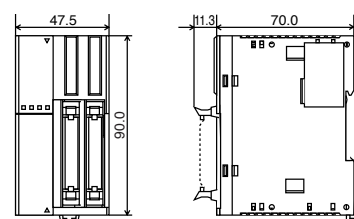
### FC4A-D20K3, FC4A-D20S3



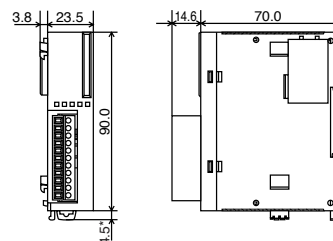
### FC4A-D20RK1, FC4A-D20RS1



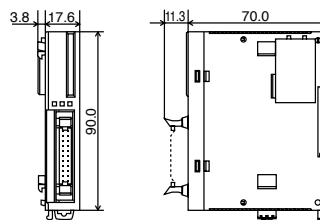
### FC4A-D40K3, FC4A-D40S3



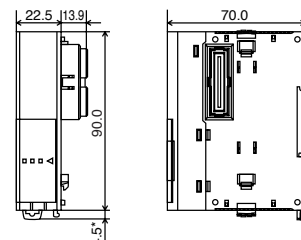
### FC4A-N08B1, FC4A-R081, FC4A-T08K1, FC4A-T08S1, FC4A-M08BR1, FC4A-L03A1, FC4A-L03AP1, FC4A-J2A1, FC4A-K1A1



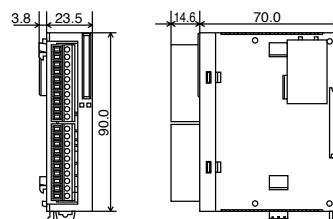
### FC4A-N16B3, FC4A-T16K3, FC4A-T16S3



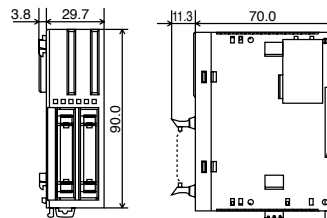
### FC4A-HPC1, FC4A-HPC2, FC4A-HPC3



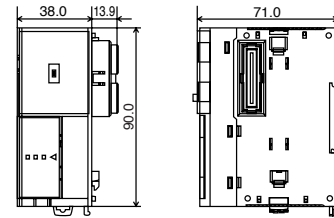
### FC4A-N16B1, FC4A-R161



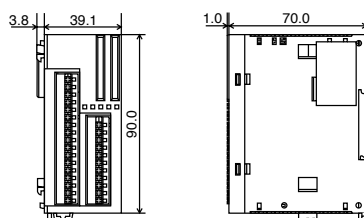
### FC4A-N32B3, FC4A-T32K3, FC4A-T32S3



### FC4A-HPH1

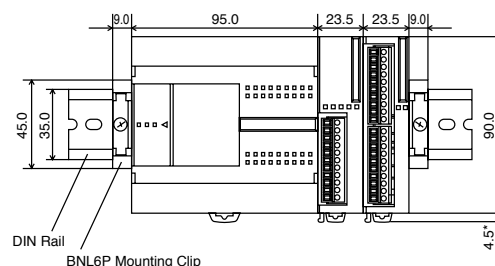


### FC4A-M24BR2



## Example

The figure below illustrates a system setup consisting of the all-in-one 24-I/O type CPU module, an 8-point relay output module, and a 16-point DC input module mounted on a 35-mm-wide DIN rail using BNL6P mounting clips.

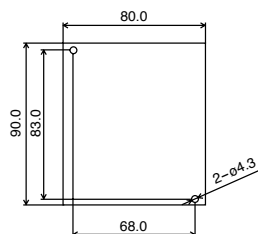


\*85mm when the clamp is pulled out

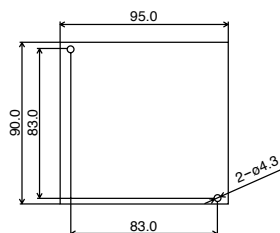
# Dimensions

## Mounting Hole Layout

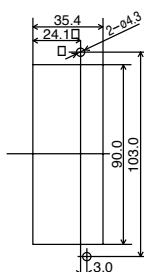
FC4A-C10R2, FC4A-C16R2



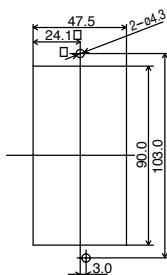
FC4A-C24R2



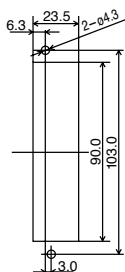
FC4A-D20K3, FC4A-D20S3



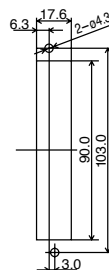
FC4A-D20RK1, FC4A-D20RS1,  
FC4A-D40K3, FC4A-D40S3



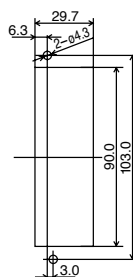
FC4A-N081B1, FC4A-N16B1,  
FC4A-R081, FC4A-R161,  
FC4A-T08K1, FC4A-T08S1,  
FC4A-M08BR1, FC4A-L03A1,  
FC4A-L03AP1, FC4A-J2A1,  
FC4A-K1A1



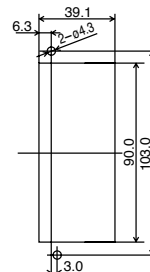
FC4A-N16B3, FC4A-T16K3,  
FC4A-T16S3



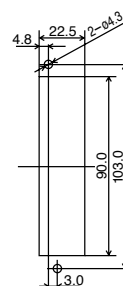
FC4A-N32B3, FC4A-T32K3,  
FC4A-T32S3



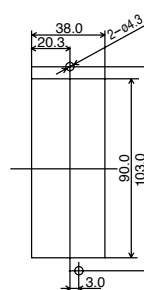
FC4A-M24BR2



FC4A-HPC1, FC4A-HPC2,  
FC4A-HPC3



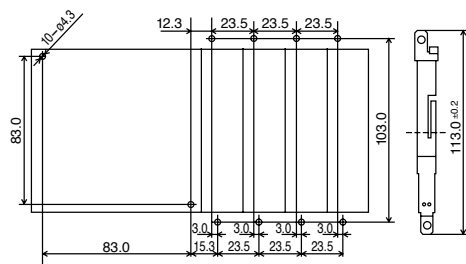
FC4A-HPH1



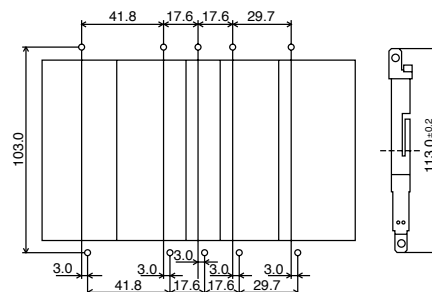
All dimensions in mm

## Example

Mounting hole layout for FC4A-C24R2 and 23.5-mm-wide I/O modules



Mounting hole layout for, from left, FC4A-HPH1, FC4A-D20K3, FC4A-N16B3,  
FC4A-N32B3, and FC4A-M24R2 modules



# Accessories



## Computer Link Cable

3m/9.84 ft. long FC2A-KC4C

## O/I Communication Cable

1.52m/5 ft. long FC4A-KC1C



## Modem Cable

3m/9.84 ft. long FC2A-KM1C

## O/I Communication Cable

1.52m/5 ft. long FC4A-KC2C



## User Communication Cable

2.4m/7.87 ft. long FC2A-KP1C



## RS232C/RS485 Converter

FC2A-MD1



## 20-wire shielded I/O Cable

FC9Z-H□□□A20

## 26-wire shielded I/O Cable

FC9Z-H□□□A26

□□□Cable length  
0.5m/1.64 ft.: 050, 1m/3.28 ft.: 100,  
2m/6.56 ft.: 200, 3m/9.84 ft.: 300

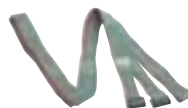


## 20-wire shielded with single connector

1.52m/5 ft. long FC9Z-H100C20A

## 26-wire shielded with single connector

1.52m/5 ft. long FC9Z-H100C26A



## 20-wire non-shielded I/O Cable

FC9Z-H□□□B20

## 26-wire non-shielded I/O Cable

FC9Z-H□□□B26

□□□Cable length  
0.5m/1.64 ft.: 050, 1m/3.28 ft.: 100,  
2m/6.56 ft.: 200, 3m/9.84 ft.: 300



## 20-position Connector Socket

Pkg. qty. 2 FC4A-PMC20P

## 26-position Connector Socket

Pkg. qty. 2 FC4A-PMC26P



## 20-point Breakout Modules

For 16 and 32 I/O Expansion Modules  
BX1D-S20A



## 26-point Breakout Modules

For 20 I/O and 40 I/O CPU Modules  
BX1D-S26A



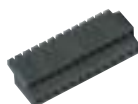
## 13-position Terminal Blocks for slim type CPU modules

Pkg. qty. 2 FC4A-PMT13P



## 16-position Terminal Blocks for slim type CPU modules

Pkg. qty. 2 FC4A-PMTS16P for FC4A-D20RS1



## 16-position Terminal Blocks for slim type CPU modules

Pkg. qty. 2 FC4A-PMTK16



## 11-position Terminal Blocks for I/O modules

Pkg. qty. 2 FC4A-PMT11P



## 10-position Terminal Blocks for I/O modules

Pkg. qty. 2 FC4A-PMT10P



## Analog Voltage Input Cables (supplied w/slim type CPU)

Pkg. qty. 2  
1m/3.28 ft. FC4A-PMAC2P



## Direct Mounting Strips

For direct mounting of slim type CPU or I/O modules on a panel.  
Pkg. qty. 5 FC4A-PSP1P



## End Clips

BNL6



## DIN Rails (1m/3.28 ft. long)

Aluminum  
7.5mm height (BAA1000) or  
10.5mm height (BNDN1000)



## IDEC Screwdrivers

Blue 2.5mm (FC9Z-SD2) or  
larger white 3.5mm (FC9Z-SD1)

**UNITED STATES****IDEC CORPORATION**

1175 Elko Drive  
 Sunnyvale, CA 94089-2209, USA  
 Tel (408) 747-0550  
 Toll Free (800) 262-IDEC  
 Fax (408) 744-9055  
 Fax (800) 635-6246  
 E-mail: [opencontact@idec.com](mailto:opencontact@idec.com)  
[www.idec.com](http://www.idec.com)

**IDEC CANADA LIMITED**

Unit 22-151 Brunel Road  
 Mississauga, Ontario, L4Z 1X3, Canada  
 Tel (905) 890-8561  
 Toll Free (888) 317-4332  
 Fax (905) 890-8562

**IDEC AUSTRALIA PTY. LTD.**

2/3 Macro Court  
 Rowville, Victoria 3178, Australia  
 Toll Free 1-800-68-4332  
 Fax +61-3-9763-3255  
 E-mail: [sales@au.idec.com](mailto:sales@au.idec.com)

**IDEC IZUMI CORPORATION**

7-31, Nishi-Miyahara  
 1-Chome, Yodogawa-ku  
 Osaka 532-8550, Japan  
 Tel +81-6-6398-2571  
 Fax +81-6-6392-9731  
[www.izumi.com](http://www.izumi.com)

**IDEC EUROPEAN HEADQUARTERS**

Unit 2 Beechwood  
 Chineham Business Park  
 Basingstoke  
 Hampshire RG24 8WA, United Kingdom  
 Tel +44-1256-321000  
 Fax +44-1256-327755  
 E-mail: [idec@uk.idec.com](mailto:idec@uk.idec.com)

**IDEC ELEKTROTECHNIK GmbH**

Wendenstraße 331  
 D-20537 Hamburg, Germany  
 Tel +49-40-253054-0  
 Fax +49-40-25305424  
 E-mail: [service@idec.de](mailto:service@idec.de)

**IDEC IZUMI (H.K.) CO., LTD.**

Room No.1409, Tower 1 Silvercord  
 30 Canton Road, Tsimshatsui  
 Kowloon, Hong Kong  
 Tel +852-2-376-2823  
 Fax +852-2-376-0790

**IDEC IZUMI ASIA PTE. LTD.**

No. 31, Tannery Lane #05-01  
 Dragon Land Building,  
 Singapore 347788  
 Tel +65-6746-1155  
 Fax +65-6844-5995

**IDEC TAIWAN CORPORATION**

8F-1, No.79, Hsin Tai Wu Road, Sec. 1  
 Hsi-Chih, Taipei County, Taiwan, (ROC)  
 Tel +886-4-2301-0809  
 Fax +886-4-2301-1110  
 E-mail: [idectpe@idectwn.hinet.net](mailto:idectpe@idectwn.hinet.net)

**IDEC IZUMI (SHANGHAI) CO., LTD.**

Room E, 15F, Majesty Building  
 No. 138 Pudong Avenue  
 Shanghai 200120, P.R.C.  
 Tel +86-21-5887-9181  
 Fax +86-21-5887-8930  
 E-mail: [idec@cn.idec.com](mailto:idec@cn.idec.com)

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**Safety  
Precautions**

All MicroSmart modules are manufactured under IDEC's rigorous quality control system, but users must add a backup or failsafe provision to the control system using the MicroSmart in applications where heavy damage or personal injury may be caused in case the MicroSmart should fail.

Turn off the power to the MicroSmart before starting installation, removal, wiring, maintenance, and inspection of the MicroSmart. Failure to turn power off may cause electrical shocks or fire hazard.

Special expertise is required to install, wire, program, and operate the MicroSmart. People without such expertise must not use the MicroSmart.

Read the safety precautions described in the user's manual to make sure of correct operation of the MicroSmart.

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Catalog No. EP938-1 06/03 10K