## MicroSmart Performance

**Features:**

- Available in 10, 16, 20, 24, and 40 I/O CPUs.
- PID Controls
  -Program up to 14 PID loops
- High Speed I/O
  -Built-in 4 high speed inputs
  -Single or Dual Phase
  -Max. 20KHz frequency
- Built-in 2 High speed outputs (Slim model only)
- Configure up to 264 I/O Points
- Data link up to 32 MicroSmart and Pentra CPUs
- Using RS485 communication module/port, you can create a network of up to 32 CPUs.
- Worldwide Approvals
  -cULus listed, CE marked
  -Class 1 Div. 2 for hazardous locations
  -Lloyds Registered and ABS approved for shipping industry

## MicroSmart CPU Part Numbers

**All-in-One**

| Appearance | Part Number | Power | I/O Points | Input | Output | Expandability |
|---|---|---|---|---|---|---|
|  | FC4A-C10R2C | 24V DC | 10 (6 in/ 4 out) | 24V DC (Sink/Source) | Relay | N/A |
| | FC4A-C10R2 | 100-240V AC | | | | |
|  | FC4A-C16R2C | 24V DC | 16 (9 in/ 7 out) | | | |
| | FC4A-C16R2 | 100-240V AC | | | | |
|  | FC4A-C24R2C | 24V DC | 24 (14 in/ 10 out) | | | 88 Maximum I/O (up to 4 expansion modules) |
| | FC4A-C24R2 | 100-240V AC | | | | |

## MicroSmart CPU Part Numbers

### Slim

| Appearance | Part Number | Power | I/O Points | Input | Output | Expandability |
|---|---|---|---|---|---|---|
|  | FC4A-D20RK1 | 24V DC | 20 (12 in/8 out) | 24V DC (Sink/Source) | 6 Relays, 2 Transistor Sink | 244 Maximum I/O (up to 7 expansion modules) |
| | FC4A-D20RS1 | | | | 6 Relays, 2 Transistor Source | |
|  | FC4A-D20K3 | | | | Transistor Sink | 148 Maximum I/O (up to 7 expansion modules) |
| | FC4A-D20S3 | | | | Transistor Source | |
|  | FC4A-D40K3 | | 40 (24 in/16 out) | | Transistor Sink | 264 Maximum I/O (up to 7 expansion modules) |
| | FC4A-D40S3 | | | | Transistor Source | |

# Digital I/O Expansion Modules

**Features:**

- 15 modules to choose from
- Available with Screw or MIL connectors
- Easy snap-on
- Available 8, 16 or 32 point modules
- Up to 512 I/O can be configured in the Pentra and 264 I/O in the MicroSmart system

## Input Modules

| Appearance | Part Number | Input | Input Points | Terminal |
|---|---|---|---|---|
|  | FC4A-N08A11 | 100-120V AC | 8 | Removable Screw Terminals |
|  | FC4A-N08B1 | 24V DC | | |
|  | FC4A-N16B1 | | 16 | |
|  | FC4A-N16B3 | | | MIL Connector (ribbon cable) |
|  | FC4A-N32B3 | | 32 | |

# Digital I/O Expansion Modules

## Output Modules

| Appearance | Part Number | Output | Output Points | Terminal |
|---|---|---|---|---|
|  | FC4A-R081 | Relay | 8 | Removable Screw Terminals |
|  | FC4A-R161 | | 16 | |
|  | FC4A-T08K1 | Transistor Sink | 8 | |
|  | FC4A-T16K3 | | 16 | MIL Connector (ribbon cable) |
|  | FC4A-T32K3 | | 32 | |

# Digital I/O Expansion Modules

## Output Modules (cont.)

| Appearance | Part Number | Output | Output Points | Terminal |
|---|---|---|---|---|
|  | FC4A-T08S1 | Transistor Source | 8 | Removable Screw Terminals |
|  | FC4A-T16S3 | | 16 | MIL Connector (ribbon cable) |
|  | FC4A-T32S3 | | 32 | |

## Combination I/O Modules

| Appearance | Part Number | Input | Output | I/O Points | Terminal |
|---|---|---|---|---|---|
|  | FC4A-M08BR1 | 24V DC (Sink/Source) | Relay | 8 (4 in/4 out) | Removable Screw Terminals |
|  | FC4A-M24BR2 | | | 24 (16 in/ 8 out) | Wire Spring Clamp |

# Analog I/O Expansion Modules

**Features:**

- 8 modules
- 0-10V, 4-20mA, RTD, Thermocouple, Thermistor inputs, 0-10V DC or -10V DC to 10V DC output
- 12 or 16-bit resolution
- Fast conversion time
- Maximum of 56 I/O can be configured in the MicroSmart Pentra system
- Easy to configure using a Macro instruction in WindLDR

## Modules

| Appearance | Part Number | I/O Points | Input | Output | Resolution | Terminal |
|---|---|---|---|---|---|---|
|  | FC4A-J8C1 | 8 (8 inputs) | 0-10V DC, 4-20mA | – | 16-bit (0-50000) | Removable Screw Terminals |
|  | FC4A-L03A1 | 3 (2 inputs, 1 output) | | 0-10V DC, 4-20mA | 12-bit (0-4095) | |
|  | FC4A-J2A1 | 2 (2 inputs) | | – | | |
|  | FC4A-J4CN1 | 4 (4 inputs) | 0-10V DC, 4-20mA, RTD, Thermocouple | – | 16-bit (0-50000) | |
|  | FC4A-L03AP1 | 3 (2 inputs, 1 output) | RTD, Thermocouple | 0-10V DC, 4-20mA | 12-bit (0-4095) | |

# Analog I/O Expansion Modules

## Modules (cont.)

| Appearance | Part Number | I/O Points | Input | Output | Resolution | Terminal |
|---|---|---|---|---|---|---|
|  | FC4A-J8AT1 | 8 (8 inputs) | Thermistor (NTC/PTC) | – | 12-bit (0-4000) | Removable Screw Terminals |
|  | FC4A-K2C1 | 2 (2 outputs) | – | -10 to 10V DC, 4-20mA | 16-bit (0-50000) | |
|  | FC4A-K1A1 | 1 (1 output) | – | 0-10V DC, 4-20mA | 12-bit (0-4095) | |

# Communication Modules

## Web Server Module

### Features:

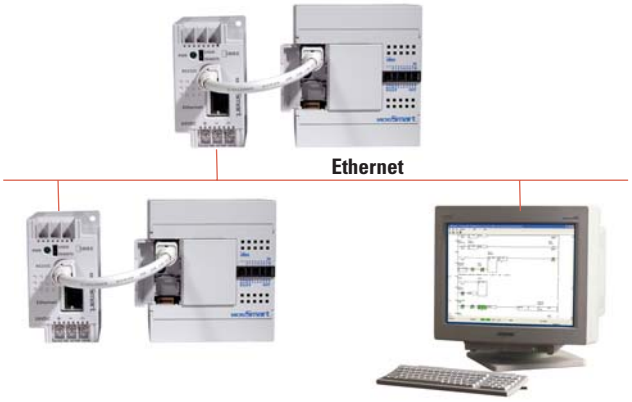
- Easy to configure
- Comes with interface cable and Quick Start Guide

### Part Numbers

| Appearance | Part Number | Description |
|---|---|---|
|  | FC4A-ENET | Web Server Module (includes cable and Quick Start Guide) |
|   | FC9Y-QS100-0 | Quick Start Guide |

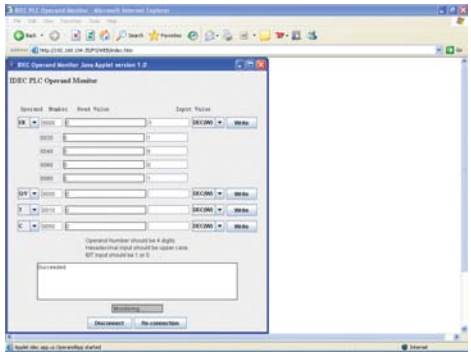
### Remote Maintenance

- Easily monitor machine conditions, change machine configurations, or upload and download user programs from anywhere, using IDEC WindLDR software over an Ethernet network.
- For a more graphical display and remote data archiving, OPC servers, such as IDEC WindSRV or standard SCADA software, can be used.
- Save time and money:
  -Access system parameters from your desk, conference room or home to check machine status without walking the factory floor.
  -If a machine is down, you no longer need to send someone with their laptop to debug or download a new user program.




### Web Server Functions

- Machine status can be monitored and controlled from any PC using standard internet browsers, such as Internet Explorer.
- A built-in custom template, which allows you to monitor and change system parameters, is included.
- Get more flexibility and control by creating your own custom webpage.



### Alarm Messaging

Real-time updates of error status or process conditions can be sent to an email address or cellular phone.

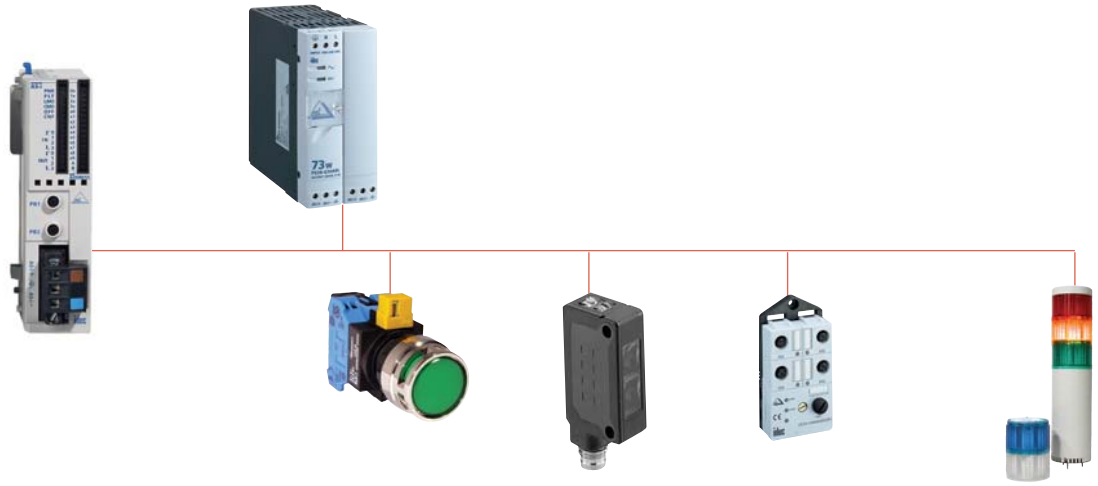
- A maximum of 32 customizable messages can be predefined with up to two email addresses each.

### O/I Connectivity

- Using the IDEC Web Server Module on an Ethernet network, an IDEC PLC can be configured as a host to an IDEC operator interface. This allows the touchscreen and PLC to be in separate locations.
- No longer hassle with specialized cables and serial connection limitations.

# Communication Modules

## AS-Interface Module



### AS-Interface Master Module

| Appearance | Part Number | Description |
|---|---|---|
|  | FC4A-AS62M | MicroSmart AS-Interface Master Module |

The Actuator Sensor-interface (AS-Interface) is the simplest and most cost-effective of the PLC-based , industrial-networking protocols. AS-Interface is a truly open, low-cost electromechanical connection system designed to operate over a two-wire cable carrying data and power over a distance of up to 100m. It is especially suitable for lower levels of plant automation where simple - often binary (On/Off) - field devices such as switches, sensors, and actuators need to interoperate in a local area automation network controlled by a PLC. IDEC supports this open technology.

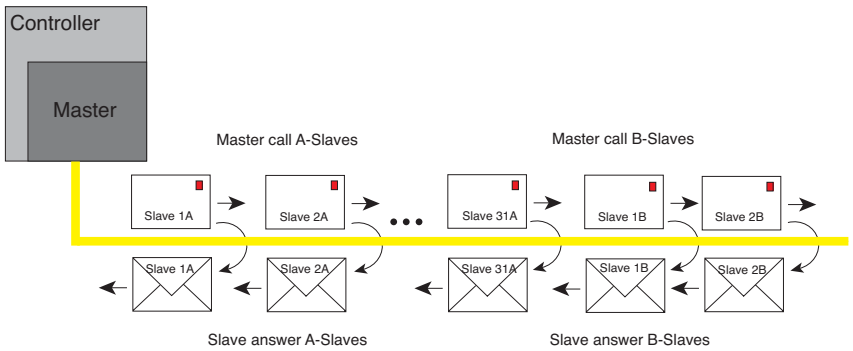
IDEC offers a plug-in AS-Interface master module (as well as other AS-Interface devices, please see AS-Interface Communication section) that is easy to configure; it can also connect up to 62 slaves. With this technology, you'll reduce the amount of engineering needed, simplify wiring and enhance your operations; requiring less maintenance. With an average cost of savings of 15 to 40% compared with traditional cabling methods, using an IDEC AS-Interface module is the easy choice.

### Master-Slave Principle

The AS-Interface master controls and monitors the status of slave devices connected to the AS-Interface bus. Normally, the AS-Interface master is connected to a PLC (sometimes called 'host') or a gateway.

Various types of slave devices can be connected to the AS-Interface bus, including sensors, actuators, and remote I/O devices. Analog slaves can also be connected to process analog data. Slaves are available in standard slaves and A/B slaves. Standard slaves have an address of 1 through 31 in the standard address range. A/B slaves have an address of 1A through 31A in the standard address range or 1B through 31B in the expanded address range. Among the A/B slaves, slaves with an address of

1A through 31A are called A slaves, and slaves with an address of 1B through 31B are called B slaves. (see AS-Interface Communication section for more details)



# Optional Modules

| Appearance | Part Number | Description | Usage |
|---|---|---|---|
|  | FC4A-HPH1 | HMI Base Module | For mounting HMI module and communication ports with slim model CPU module (HMI module is not included) |
|  | FC4A-PH1 | HMI Module | For displaying and changing operands |
|  | FC4A-PM32 | EEPROM memory cartridge | 32KB EEPROM memory cartridge |
|  | FC4A-PM64 | EEPROM memory cartridge | 64KB EEPROM memory cartridge |
|  | FC4A-PT1 | Clock cartridge | Real-time clock cartridge |

## Communication Ports

| Appearance | Part Number | Description | Terminal |
|---|---|---|---|
|  | FC4A-PC1 | RS232C | Mini DIN |
|  | FC4A-PC2 | RS485 | Mini DIN |
|  | FC4A-PC3 | RS485 | Screw Terminal |

# Optional Modules

## Communication Module — for Slim CPU

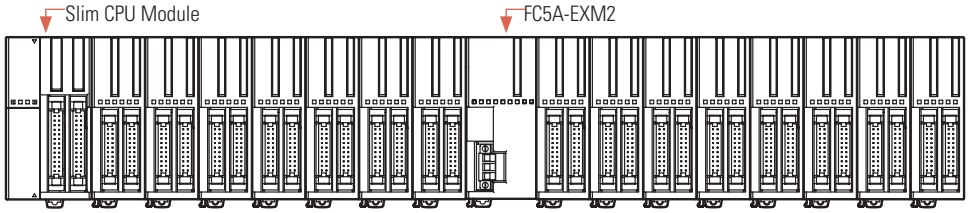
| Appearance | Part Number | Description | Terminal |
|---|---|---|---|
|  | FC4A-HPC1 | RS232C | Mini DIN |
|  | FC4A-HPC2 | RS485 | Mini DIN |
|  | FC4A-HPC3 | RS485 | Screw Terminal |

## Expansion Power Supply Module

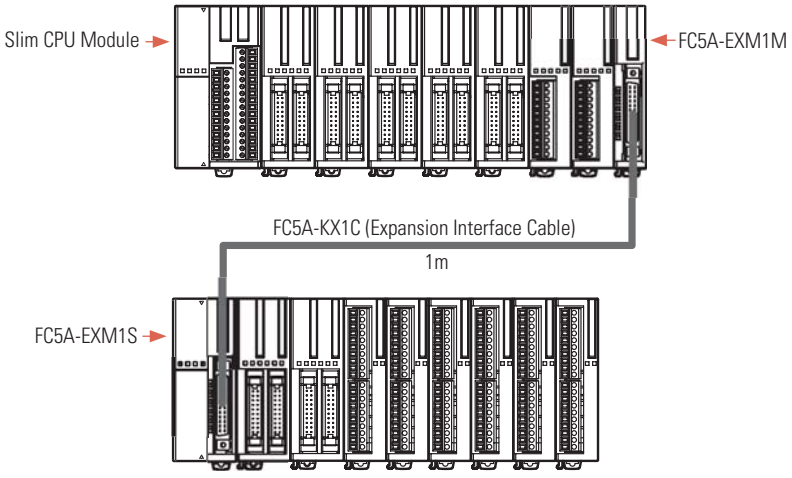
| Appearance | Part Number | Description |
|---|---|---|
|  | FC5A-EXM1M | Master Expansion Power Supply For MicroSmart Pentra |
|  | FC5A-EXM1S | Slave Expansion Power Supply For MicroSmart Pentra |
|  | FC5A-EXM2 | Expansion Power Supply For MicroSmart Pentra |

## Expansion Power Supply System Configuration

### FC5A-EXM2 (Expansion Interface Module)




### FC5A-EXM1M and FC5A-EXM1S (Expansion Interface Master & Salve Modules)



# Cables

## Communication Cables

| Appearance | Part Number | Length | Expanded Description |
|---|---|---|---|
|  | FC4A-KC4CA | 5ft. (1.53m) | Programming cable (Maintenance/User Communication Mode selectable) |
|  | FC4A-USB | 6ft. (1.83m) | USB to Serial Converter (for use with PC without serial port) |
|  | FC4A-KC3C | 0.33ft. (100mm) | Web Server Module interface cable |

| Appearance | Part Number | Length | Expanded Description |
|---|---|---|---|
|  | FC2A-KM1C | 9.84 Ft. (3m) | Modem cable. Used to connect a modem to the MicroSmart RS232C port. |
|  | FC2A-KP1C | 9.84 Ft. (3m) | User communication cable. Used to connect RS232C equipment to the MicroSmart RS232C port. |
|  | FC5A-KX1C | 3.28 Ft. (1m) | MicroSmart Pentra expansion power supply interface cable. Used to connect expansion interface master and expansion slave modules. |

## MIL Connector Cables (use with Breakout Modules)

| Use with | Part Number | Model | Length |
|---|---|---|---|
| CPU Module (26-wire) BX1D-S26A, BX1D-T26A | FC9Z-H050B26 | Non-shielded | 1.64ft. (0.5m) |
| | FC9Z-H100B26 | | 3.28ft. (1m) |
| | FC9Z-H200B26 | | 6.56ft (2m) |
| | FC9Z-H300B26 | | 9.85ft. (3m) |
| | FC9Z-H050A26 | Shielded | 1.64ft. (0.5m) |
| | FC9Z-H100A26 | | 3.28ft. (1m) |
| | FC9Z-H200A26 | | 6.56ft (2m) |
| | FC9Z-H300A26 | | 9.85ft. (3m) |
| | FC9Z-H100C26A | Shielded Single Connectors | 5ft. (1.5m) |

| Use with | Part Number | Model | Length |
|---|---|---|---|
| I/O Expansion Modules (20-wire) BX1D-S20A, BX1D-T20A | FC9Z-H050B20 | Non-shielded | 1.64ft. (0.5m) |
| | FC9Z-H100B20 | | 3.28ft. (1m) |
| | FC9Z-H200B20 | | 6.56ft (2m) |
| | FC9Z-H300B20 | | 9.85ft. (3m) |
| | FC9Z-H050A20 | Shielded | 1.64ft. (0.5m) |
| | FC9Z-H100A20 | | 3.28ft. (1m) |
| | FC9Z-H200A20 | | 6.56ft (2m) |
| | FC9Z-H300A20 | | 9.85ft. (3m) |
| | FC9Z-H100C20A | Shielded Single Connectors | 5ft. (1.5m) |

## Breakout Modules

| Use with | Part Number | Descrption |
|---|---|---|
| 26-wire MIL connector cable  | BX1D-S26A | 26-terminal breakout module |
| | BX1D-T26A | 26-terminal touch-down terminal breakout module |
| 20-wire MIL connector cable  | BX1D-S20A | 20-terminal breakout module |
| | BX1D-T20A | 20-terminal touch-down terminal breakout module |

## Accessories

| Part Number | Use with | Description |
|---|---|---|
| FC4A-PMT13P | CPU module | 13-position left-side terminal block for FC4A-D20RK1/-D20RS1 CPU |
| FC5A-PMT13P | | 13-position left-side terminal block for FC5A-D16RK1/-D16RS1 CPU |
| FC4A-PMTS16P | | 16-position right-side terminal block for FC4A-D20RS1 and FC5A-D16RS1 CPU |
| FC4A-PMTK16P | | 16-position right-side terminal block for FC4A-D20RK1 and FC5A-D16RK1 CPU |
| FC4A-PMT11P | I/O expansion modules | 11-position terminal block for 8-pt I/O expansion modules |
| FC4A-PMT10P | | 10-position terminal block for 16-pt I/O expansion modules |
| FC4A-PMC20P | | 20-position connector socket for MIL connector I/O expansion modules |
| FC4A-PMC26P | | 26-position connector socket for MIL connector CPU modules |
| FC4A-PSP1P | | Direct mounting strips for mounting on a panel |
| FC4A-PMAC2P | | Analog voltage input cable for slim CPU |
| FC4A-DS824-SW14 | | 14-pt input simulator switch for 24 I/O CPU |
| FC4A-DS824-SW9 | | 9-pt input simulator switch for 16 I/O CPU |
| FC4A-DS824-SW6 | | 6-pt input simulator switch for 10 I/O CPU |
| BNL6 | | End clips |
| BNDN1000 | | DIN Rail (1m/3.28' long, 10.5mm height) |
| BAA1000 | | DIN Rail (1m/3.28' long, 7.5mm height) |
| FC9Z-SD2 | | 2.5mm flathead IDEC screwdriver |
| FC9Y-B812-0A | | MicroSmart user manual |
| FC9Y-B927-0 | | MicroSmart Pentra user manual |
| FC9Y-B919 | | Web Server Module user manual |
| FC9Y-B969-0 | | FC5A-SIF2 Communication Module user manual |
| FC9Y-B902-0 | | Analog I/O user manual |
| FC9Y-LP2CDW | | WindLDR PLC programming software |

# Specifications

## All-in-One

| Part Number | AC Power | FC5A-C10R2 | FC5A-C16R2 | FC5A-C24R2 | FC4A-C10R2 | FC4A-C16R2 | FC4A-C24R2 |
|---|---|---|---|---|---|---|---|
| | DC Power | FC5A-C10R2C | FC5A-C16R2C | FC5A-C24R2C | FC4A-C10R2C | FC4A-C16R2C | FC4A-C24R2C |
| Rated Voltage | | AC power model: 100 to 240V AC, DC power model: 24V DC | | | | | |
| Allowable Voltage Range | | AC power model: 85 to 264V AC, DC power model: 20.4 to 28.8V DC (including ripple) | | | | | |
| Rated Power Frequency | | AC power model: 50/60 Hz (47 to 63 Hz) | | | | | |
| Maximum Input Current | | 250mA (85V AC)<br>160mA (24V DC) | 300mA (85V AC)<br>190mA (24V DC) | 450mA (85V AC) [1]<br>360mA (24V DC) [2] | 250mA (85V AC)<br>160mA (24V DC) | 300mA (85V AC)<br>190mA (24V DC) | 450mA (85V AC) [2]<br>360mA (24V DC) [3] |
| Maximum Power Consumption | AC Power | FC5A-C10R2/FC4A-C10R2: 30VA (264V AC) / 20VA (100V AC) [3]<br>FC5A-C16R2/FC4A-C16R2: 31VA (264 V AC) / 22VA (100V AC ) [3]<br>FC5A-C24R2/FC4A-C24R2: 40VA (264V AC) / 33VA (100V AC) [1] | | | | | |
| | DC Power | FC5A-C10R2C/FC4A-C10R2C: 3.9W (24V DC) [4]<br>FC5A-C16R2C/FC4A-C16R2C: 4.6W (24V DC) [4]<br>FC5A-C24R2C/FC4A-C24R2C: 8.7W (24V DC) [2] | | | | | |
| Allowable Momentary Power Interruption | | 10ms (rated power voltage) | | | | | |
| Dielectric Strength | | Between power and ⏚ or ⏥ terminals: 1500V AC, 1 minute<br>Between I/O and ⏚ or ⏥ terminals: 1500V AC, 1 minute | | | | | |
| Insulation Resistance | | Between power and ⏚ or ⏥ terminals: 10 MΩ minimum (500V DC megger)<br>Between I/O and ⏚ or ⏥ terminals: 10 MΩ minimum (500V DC megger) | | | | | |
| Noise Resistance | | AC power terminals: 1.5 kV, 50 ns to 1µs<br>DC power terminals: 1.0 kV, 50 ns to 1µs<br>I/O terminals (coupling clamp): 1.5 kV, 50 ns to 1µs | | | | | |
| Inrush Current | | 35A | | 40A | 35A | | 40A |
| Power Supply Wire | | UL1015 AWG22, UL1007 AWG18 | | | | | |
| Operating Temperature | | 0 to 55ºC | | | | | |
| Storage Temperature | | –25 to +70ºC (no freezing) | | | | | |
| Relative Humidity | | Level RH1 (IEC61131-2), 1 to 95% RH (no condensation) | | | | | |
| Altitude | | Operation: 0 to 2,000m, Transport: 0 to 3,000m | | | | | |
| Pollution Degree | | 2 (IEC60664-1) | | | | | |
| Corrosion Immunity | | Free from corrosive gases | | | | | |
| Degree of Protection | | IP20 (IEC60529) | | | | | |
| Grounding Wire | | UL1007, AWG16 | | | | | |
| Vibration Resistance | | When mounted on a DIN rail or panel surface:<br>5 to 9 Hz amplitude 3.5 mm, 9 to 150 Hz acceleration 9.8 $m/s^2$ (1G),<br>2 hours per axis on each of three mutually perpendicular axes (IEC61131-2) | | | | | |
| Shock Resistance | | 147 $m/s^2$ (15G), 11ms duration, 3 shocks per axis, on three mutually perpendicular axes (IEC61131) | | | | | |
| Weight | | AC: 230g<br>DC: 240g | AC: 250g<br>DC: 260g | AC: 305g<br>DC: 310g | AC: 230g<br>DC: 240g | AC: 250g<br>DC: 260g | AC: 305g<br>DC: 310g |

1. CPU module (including 250mA sensor power) + 4 I/O modules
2. CPU module + 4 I/O modules
3. CPU module (including 250mA sensor power)
4. CPU module (24V DC)

## Slim

| Part Number | | | FC5A-D16RK1 FC5A-D16RS1 | FC5A-D32K3 FC5A-D32S3 | FC4A-D20K3 FC4A-D20S3 | FC4A-D20RK1 FC4A-D20RS1 | FC4A-D40K3 FC4A-D40S3 |
|---|---|---|---|---|---|---|---|
| Control System | | | Stored program system | | | | |
| Instruction Words | | | 35 basic | | | | |
| | | | 88 advanced | 92 advanced | 55 advanced | 72 advanced | |
| Program Capacity [1] | | | 62.4 KB (10,400 steps) | | 27 KB (4,500 steps) | 31.2 KB (5,200 steps) [2] | |
| User Program Storage | | | EEPROM (10,000 times rewritable) | | | | |
| Processing Time | | Basic Instruction | 83µs (1,000 steps) | | 1.65ms (1,000 steps) | | |
| | | END Processing [3] | 0.35ms | | 0.64ms | | |
| Expandable I/O Modules | | | 7 modules + additional 8 modules using the expansion power supply module | | 7 modules | | |
| I/O Points | | Input | 8 Expansion: 224 | 16 Expansion: 224 | 12 Expansion: 128 | 12 Expansion: 224 | 24 Expansion: 224 |
| | | Output | 8 Additional: 256 | 16 Additional: 256 | 8 | 8 | 16 |
| Internal Relay | | | 2,048 points | | 1,024 points | | |
| Shift Register | | | 256 points | | 128 points | | |
| Data Register | | | 42,000 points [4] | | 1,300 points | | |
| Expansion Data Register | | | 6,000 points | | — | 6,000 points | |
| Counter | | | 256 points | | 100 points | | |
| Timer (1-sec, 100-ms, 10-ms, 1-ms) | | | 256 points | | 100 points | | |
| RAM Backup | | Backup Data | Internal relay, shift register, counter, data register, expansion data register | | | | |
| | | Backup Duration | Approx. 30 days (typical) at 25°C after backup battery fully charged | | | | |
| | | Battery | Lithium secondary battery | | | | |
| | | Charging Time | Approx. 15 hours for charging from 0% to 90% of full charge | | | | |
| | | Battery Life | 5 years | | | | |
| | | Replaceability | N/A | | | | |
| Self-diagnostic Function | | | Power failure, watchdog timer, data link connection, user program EPPROM 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 | | | Without filter or 3 to 15ms filter (selectable in increments of 1ms) | | | | |
| Catch Input/Interrupt Input | | | Four inputs (I2 through I5)<br>Minimum turn on pulse width: 5µs minimum<br>Minimum turn off pulse width: 5µs minimum | | Four inputs (I2 through I5)<br>Minimum turn on pulse width: 40µs minimum<br>Minimum turn off pulse width: 150µs minimum | | |
| High-speed Counter | | Maximum Counting Frequency and High-speed Counter Points | Total 4 points<br>Single/two-phase selectable: 100 KHz (2 points)<br>Single-phase:100 KHz (2 points) | | Total 4 points<br>Single/two-phase selectable: 20 KHz (2 points)<br>Single-phase: 5 KHz (2 points) | | |
| | | Counting Range | 0 to 4294967295 (32 bits) | | 0 to 65535 (16 bits) | | |
| | | Operation Mode | Rotary encoder mode and adding counter mode | | | | |
| Analog Potentiometer | | Number | 1 point | | | | |
| | | Data Range | 0 to 255 | | | | |
| Analog Voltage Input | | Number | 1 point | | | | |
| | | Input Voltage Range | 0 to 10V DC | | | | |
| | | Input Impedance | Approx. 100kΩ | | | | |
| | | Data Range | 0 to 255 (8 bits) | | | | |
| Pulse Output | | Number | 2 points | 3 points | 2 points | | |
| | | Maximum Frequency | 100KHz | | 20KHz | | |
| Sensor Power Supply | | Output Voltage Current | — | | | | |
| | | | | | | | |
| | | Isolation | | | | | |
| Port 1 | | | RS232C (maintenance communication, user communications) | | | | |
| Port 2 Communication Adapter (option) [5] | | | Possible | Possible | Possible | Possible | Possible |
| Clock Cartridge (option) | | | Possible | Possible | Possible | Possible | Possible |
| Memory Cartridge (option) | | | Possible | Possible | Possible | Possible | Possible |
| HMI Module (option) | | | Possible | Possible | Possible | Possible | Possible |

1. 1 step equals 6 bytes.
2. Expandable up to 64 KB when a memory cartridge is used.
3. Not including expansion I/O service time, clock function processing time, data link processing time, and interrupt processing time.
4. Extra data registers D10000 through D49999 are enabled using WindLDR Function Area Settings, then run-time program download cannot be used.
5. Maintenance communication, user communication, Modem communication, data link, Modbus master/slave communication (FC5A only).

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

## All-in-One

| Part Number | | | FC5A-C10R2<br>FC5A-C10R2C | FC5A-C16R2<br>FC5A-C16R2C | FC5A-C24R2<br>FC5A-C24R2C | FC4A-C10R2<br>FC4A-C10R2C | FC4A-C16R2<br>FC4A-C16R2C | FC4A-C24R2<br>FC4A-C24R2C |
|---|---|---|---|---|---|---|---|---|
| Control System | | | Stored program system | | | | | |
| Instruction Words | | | 35 basic | | | | | |
| | | | 76 advanced | 76 advanced | 81 advanced | 38 advanced | 40 advanced | 46 advanced |
| Program Capacity [1] | | | 13.8 KB (2,300 steps) | 27 KB (4,500 steps) | 54 KB (9,000 steps) | 4.8 KB (800 steps) | 15 KB (2,500 steps) | 27 KB (4,500 steps) |
| User Program Storage | | | EEPROM (10,000 times rewritable) | | | | | |
| Processing Time | Basic Instruction | | 1.16ms (1,000 steps) | | | 1.65ms (1,000 steps) | | |
| | END Processing [2] | | 0.64ms | | | 0.64ms | | |
| Expandable I/O Module | | | — | | 4 modules | — | | 4 modules |
| I/O Points | Input | | 6 | 9 | 14 | 6 | 9 | 14 |
| | Output | | 4 | 7 | 10 | 4 | 7 | 10 |
| | | | Expansion: 64 | | | Expansion: 64 | | |
| Internal Relay | | | 2,048 points | | | 256 points | 1,024 points | |
| Shift Register | | | 128 points | | | 64 points | 128 points | |
| Data Register | | | 2,000 points | | | 400 points | 1,300 points | |
| Extra Data Register | | | — | | | — | | |
| Counter | | | 256 points | | | 32 points | 100 points | |
| Timer (1-sec, 100-ms, 10-ms, 1-ms) | | | 256 points | | | 32 points | 100 points | |
| RAM Backup | Backup Data | | Internal relay, shift register, counter, data register | | | | | |
| | Backup Duration | | Approx. 30 days (typical) at 25°C after backup battery fully charged | | | | | |
| | Battery | | Lithium secondary battery | | | | | |
| | Charging Time | | Approx. 15 hours for charging from 0% to 90% of full charge | | | | | |
| | Battery Life | | 5 years | | | | | |
| | Replaceability | | N/A | | | | | |
| Self-diagnostic Function | | | Power failure, watchdog timer, data link connection, user program EPPROM 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 | | | Without filter or 3 to 15ms filter (selectable in increments of 1ms) | | | | | |
| Catch Input/Interrupt Input | | | Four inputs (I2 through I5)<br>Minimum turn on pulse width: 40µs minimum<br>Minimum turn off pulse width: 150µs minimum | | | | | |
| High-speed Counter | Maximum Counting Frequency and High-speed Counter Points | | Total 4 points<br>Single/two-phase selectable: 50KHz (1 point)<br>Single-phase: 5KHz (3 points) | | | Total 4 points<br>Single/two-phase selectable: 20KHz (1 point)<br>Single-phase: 5KHz (3 points) | | |
| | Counting Range | | 0 to 65535 (16 bits) | | | | | |
| | Operation Mode | | Rotary encoder mode and adding counter mode | | | | | |
| Analog Potentiometer | Number | | 1 point | | 2 points | 1 point | | 2 points |
| | Data Range | | 0 to 255 | | | | | |
| Analog Voltage Input | Number | | — | | | | | |
| | Input Voltage Range | | | | | | | |
| | Input Impedance | | | | | | | |
| | Data Range | | | | | | | |
| Pulse Output | Number | | — | | | | | |
| | Max. Frequency | | | | | | | |
| Sensor Power Supply (AC Power Only) | Output Voltage Current | | 24V DC (+10% to -15%), 250mA | | | | | |
| | Overload Detection | | N/A | | | | | |
| | Isolation | | Isolated from the internal circuit | | | | | |
| Port 1 | | | RS232C (maintenance communication, user communication) | | | | | |
| Port 2 Communication Adapter (option) [3] | | | 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 |

1. 1 step equals 6 bytes.
2. Not including expansion I/O service time, clock function processing time, data link processing time, and interrupt processing time.
3. Maintenance communication, user communication, Modem communication, datalink, Modbus master/slave communication (FC5A only).

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

### Communication Port (RS232C Port 1)

| Model | Slim CPU | All-in-One CPU |
|---|---|---|
| Standards | EIA RS232C | |
| Maximum Baud Rate | FC5A: 57,600 bps (maintenance communication)<br>FC4A: 19,200 bps (maintenance communication) | |
| Maintenance Communication | Possible | |
| User Communication | Possible | |
| Modem Communication | N/A | |
| Data Link | N/A | |
| Cable | Special cable (FC2A-KC4C, FC2A-KP1C, FC4A-KC1C, FC4A-KC2C) | |
| Isolation between Internal Circuit and Communication Port | Not isolated | |

### Input Specifications

| Part Number | – | FC5A-D16RK1<br>FC5A-D16RS1 | – | FC5A-D32K3<br>FC5A-D32S3 | – | FC5A-C10R2<br>FC5A-C10R2C | FC5A-C16R2<br>FC5A-C16R2C | FC5A-C24R2<br>FC5A-C24R2C |
|---|---|---|---|---|---|---|---|---|
| | FC4A-D20K3<br>FC4A-D20S3 | – | FC4A-D20RK1<br>FC4A-D20RS1 | – | FC4A-D40K3<br>FC4A-D40S3 | FC4A-C10R2<br>FC4A-C10R2C | FC4A-C16R2<br>FC4A-C16R2C | FC4A-C24R2<br>FC4A-C24R2C |
| Input Points | 12<br>(12/1 common) | 8<br>(8/1 common) | 12<br>(12/1 common) | 16<br>(8/1 common) | 24<br>(12/1 common) | 6<br>(6/1 common) | 9<br>(9/1 common) | 14<br>(14/1 common) |
| Input Voltage | 24V DC sink/source input signal | | | | | | | |
| Input Voltage Range | 20.4 to 26.4V DC | | | | | 20.4 to 28.8V DC | | |
| Input Current | FC5A I0, I1, I3, I4, I6, I7: 4.5mA/point (24V DC)<br>I2, I5, I10 to I17: 7mA/point (24V DC)<br>FC4A I0, I1, I6, I7: 5mA/point (24V DC)<br>I2 to I5, I10 to I27: 7mA/point (24V DC) | | | | | FC5A I0 and I1: 6.4mA/point<br>I2 to I7, I10 to I15: 7mA/point (24V DC)<br>FC4A I0 and I1: 11mA<br>I2 to I7, I10 to I15: 7mA/point (24V DC) | | |
| Input Impedance | FC5A I0, I1, I3, I4, I6, I7: 4.9kΩ<br>I2 to I5, I10 to I17: 3.4kΩ<br>FC4A I0, I1, I6, I7: 5.7kΩ<br>I2 to I5, I10 to I17: 3.4kΩ | | | | | FC5A I0 and I1: 3.7kΩ<br>I2 to I7, I10 to I15: 3.4kΩ<br>FC4A I0 and I1: 2.1kΩ<br>I2 to I7, I10 to I15: 3.4kΩ | | |
| Turn ON Time | FC5A I0, I1, I3, I4, I6, I7: 5µs + filter value<br>I2 and I5: 35µs + filter value<br>I10 to I17: 40µs + filter value<br>FC4A I0, I1, I6, I7: 35µs + filter value<br>I2 to I5: 35µs + filter value<br>I10 to I27: 40µs + filter value | | | | | FC5A I0 and I1: 2µs + filter value<br>I2 to I7: 35µs + filter value<br>I6, I7, I10 to I15: 40µs + filter value<br>FC4A I0 and I1: 35µs + filter value<br>I2 to I5: 35µs + filter value<br>I6, I7, I10 to I15: 40µs + filter value | | |
| Turn OFF Time | FC5A I0, I1, I3, I4, I6, I7: 5µs + filter value<br>I2 and I5: 150µs + filter value<br>I10 to I17: 150µs + filter value<br>FC4A I0, I1, I6, I7: 45µs + filter value<br>I2 to I5: 150µs + filter value<br>I10 to I27: 150µs + filter value | | | | | FC5A I0 and I1: 16µs + filter value<br>I2 to I7: 150µs + filter value<br>I6, I7, I10 to I15: 150µs + filter value<br>FC4A I0 and I1: 45µs + filter value<br>I2 to I5: 150µs + filter value<br>I6, I7, I10 to I15: 150µs + filter value | | |
| Connector — On Mother Board | FL26A2MA<br>(Oki Electric Cable) | MC1.5/18-G-3.81BK<br>(Phoenix Contact) | | FL26A2MA<br>(Oki Electric Cable) | | — | | |
| Connector — Insertion Durability | 100 times minimum | | | | | — | | |
| Isolation | Between input terminals: Photocoupler isolated<br>Internal circuit: Not isolated | | | | | | | |
| Input | Type 1 (IEC61131-2) | | | | | | | |
| External Load for I/O Interconnection | Not needed | | | | | | | |
| Single Determination Method | 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 | 3 m in compliance with electromagnetic immunity | | | | | | | |

## Transistor Sink and Source Output

| Part Number | | — | FC5A-D16RK1<br>FC5A-D16RS1 | FC5A-D32K3<br>FC5A-D32S3 |
|---|---|---|---|---|
| | | FC4A-D20RK1<br>FC4A-D20RS1 | — | FC4A-D40K3<br>FC4A-D40S3 |
| Output Points | | 2 (2/1 common) | 2 (2/1 common) | 16 (8/1 common) |
| Output | Transistor Sink | FC5A-D16K1/D32K3<br>FC4A-D20K3/D20RK1/D40K3 | | |
| | Transistor Source | FC5A-D16RS1/D32S3<br>FC4A-D20S3/D20RS1/D40S3 | | |
| Load Voltage | | 24V DC | | |
| Operating Load Voltage Range | | 20.4 to 28.8V DC | | |
| Load Current | | 0.3A per output point | | |
| Maximum Load Current | | 1A per common | | |
| Voltage Drop (ON Voltage) | | 1V maximum (voltage between COM and output terminals when output is on) | | |
| Inrush Current | | 1A | | |
| Leakage Current | | 0.1mA maximum | | |
| Clamping Voltage | | 39V±1V | | |
| Maximum Lamp Load | | 8W | | |
| Inductive Load | | L/R = 10ms (28.8V DC, 1 Hz) | | |
| External Current Draw | | Sink output: 100mA maximum, 24V DC (power voltage at the +V terminal)<br>Source output: 100mA maximum, 24V DC (power voltage at the –V terminal) | | |
| Isolation | | Between output terminal and internal circuit: Photocoupler isolated<br>Between output terminals: Not isolated | | |
| Connector on Mother Board | | FL26A2MA (Oki Electric Cable) | MC1.5/16-G-3.81BK (Phoenix Contact) | FL26A2MA (Oki Electric Cable) |
| Connector Insertion/ Removal Durability | | 100 times minimum | | |
| Output Delay | Turn ON Time | FC5A Q0 to Q2: 5µs max.<br>Q3 to Q7, Q10 to Q17: 300µs max.<br>FC4A Q0, Q1: 5µs max.<br>Q2 to Q7, Q10 to Q17: 300µs max. | | |
| | Turn OFF Time | FC5A Q0 to Q2: 5µs max.<br>Q3 to Q7, Q10 to Q17: 300µs max.<br>FC4A Q0, Q1: 5µs max.<br>Q2 to Q7, Q10 to Q17: 300µs max. | | |

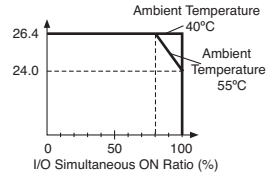
## Relay Output

| Part Number | | FC5A-C10R2<br>FC5A-C10R2C | FC5A-C16R2<br>FC5A-C16R2C | FC5A-C24R2<br>FC5A-C24R2C | FC5A-D16RK1<br>FC5A-D16RS1 |
|---|---|---|---|---|---|
| | | FC4A-C10R2<br>FC4A-C10R2C | FC4A-C16R2<br>FC4A-C16R2C | FC4A-C24R2<br>FC4A-C24R2C | FC4A-D20RK1<br>FC4A-D20RS1 |
| No. of Outputs | | 4 | 7 | 10 | 8 |
| Output Points per Common Line | COM0 | 3 | 4 | 4 | 2 (Transistor output) |
| | COM1 | 1 | 2 | 4 | 3 |
| | COM2 | — | 1 | 1 | 2 |
| | COM3 | — | — | 1 | 1 |
| Output | | 1 NO form A | | | |
| Maximum Load Current | | 2A per point<br>8A per common line | | | |
| Minimum Switching Load | | 0.1mA/0.1V DC (reference value) | | | |
| Initial Contact Resistance | | 30 mΩ maximum | | | |
| Electrical Life | | 100,000 operations minimum (rated load 1,800 operations/hour) | | | |
| Mechanical Life | | 20,000,000 operations minimum (no load 18,000 operations/hour) | | | |
| Rated Load | | 240V AC/2A (resistive load, inductive load cos ø = 0.4)<br>30V DC/2A (resistive load, inductive load L/R =7ms) | | | |
| Dielectric Strength | | Between output and ⏚ terminals: 1,500V AC, 1 minute<br>Between output terminal and internal circuit: 1,500V AC, 1 minute<br>Between output terminals (COMs): 1,500V AC, 1 minute | | | |
| Connector on Mother Board | | — | | | * |
| Connector Insertion/Removal Durability | | — | | | 100 times minimum |

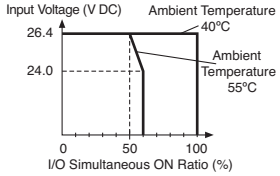
*MC1.5/16-G-3.81BK (Phoenix Contact)

## Input Usage Limits

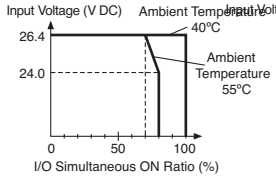
**FC5A-D16RK1/D16RS1**



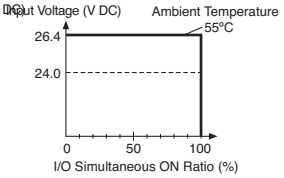

**FC5A-D32K3/D32S3**
**FC4A-D40K3/D40S3**




**FC4A-D20K3/D20S3**

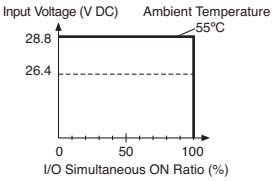



**FC4A-D20RK1/D20RS1**

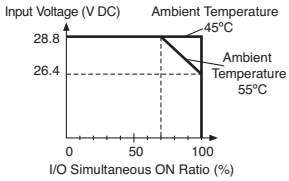



## All-in-One CPU

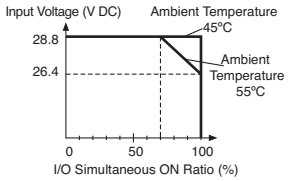
**FC5A-C10R2**
**FC5A-C10R2C**
**FC4A-C10R2**
**FC4A-C10R2C**




**FC5A-C16R2**
**FC5A-C16R2C**
**FC4A-C16R2**
**FC4A-C16R2C**




**FC5A-C24R2**
**FC5A-C24R2C**
**FC4A-C24R2**
**FC4A-C24R2C**

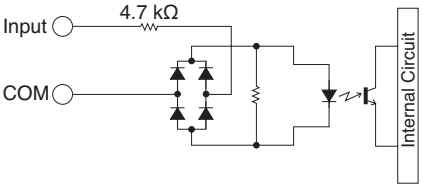



CAUTION: When using at an operating ambient temperature above 40°C, reduce the input voltage or the quantity of I/O points that turn on simultaneously.

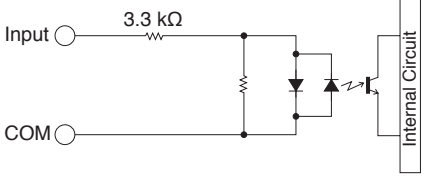
## Input Internal Circuit

### Slim CPU

FC5A: I0, I1, I3, I4, I6, I7
FC4A: I0, I1, I6, I7

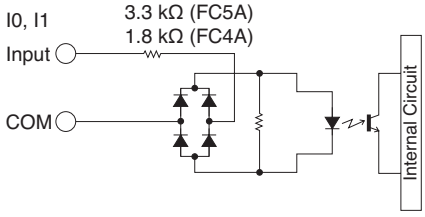



FC5A: I2, I5, I10 to I17
FC4A: I2 to I5, I10 to I27

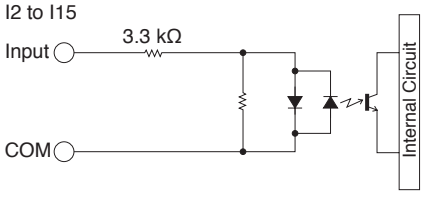



### All-in-One CPU

I0, I1



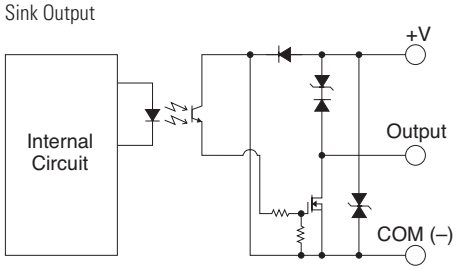

I2 to I15



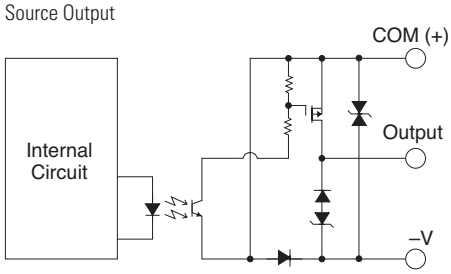

## Output Internal Circuit

### Slim CPU

Sink Output




Source Output



## Communication Adapter/Module

| Part Number | 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 | FC5A: 57600bps<br>FC4A: 19200bps | FC5A: 57600bps<br>FC4A: 19200bps | FC5A: 57600bps<br>FC4A: 19200bps<br>(38400 bps [1]) |
| Maintenance Communication | Possible | Possible | Possible |
| User Communication | Possible | — | Possible [2] |
| Data Link Communication | — | — | Possible |
| Half-duplex Communication | — | — | Possible |
| Maximum Cable Length | Special cable [3] | Special cable [4] | 200 m |
| Quantity 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 mm² |
| Conductor Resistance | | | 85Ω/km maximum |
| Shield Resistance | | | 20Ω/km maximum |

1. Maximum speed when data link is used.
2. FC5A (all types), FC4A-D20RK1, FC4A-D20RS1, FC4A-D40K3, FC4A-D40S3
3. FC2A-KC4C, FC2A-KM1C, FC4A-KC1C, FC4A-KC2C, FC2A-KP1C
4. FC2A-KP1C

## HMI Module (Optional)

| Part Number | FC4A-PH1 |
|---|---|
| Power Voltage | 5V DC (supplied from the CPU module) |
| Weight | 20g |

## Memory Cartridge Specifications (Optional)

| Part Number | FC4A-PM32 | FC4A-PM64 |
|---|---|---|
| Memory | EEPROM | |
| Accessible Memory Capacity | 32 KB | 64 KB |
| Hardware for Storing Data | CPU Module | |
| Software for Storing Data | WindLDR | |
| Quantity of Stored Programs | One user program can be stored on one memory cartridge | |

## Clock Cartridge (Optional)

| Part Number | 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 battery |
| Charging Time | Approx. 10 hours for charging from 0% to 90% of full charge |
| Replaceability | N/A |

# I/O Modules Specifications

## Input Module

| Part Number | | FC4A-N08B1 | FC4A-N16B1 | FC4A-N16B3 | FC4A-N32B3 | FC4A-N08A11 |
|---|---|---|---|---|---|---|
| Input Points | | 8 (8/1 common) | 16 (16/1 common) | | 32 (16/1 common) | 8 (4/1 common) |
| Input Voltage | | 24V DC sink/source input signal | | | | 100 to 120V AC (50/60 Hz) |
| Input Voltage Range | | 20.4 to 28.8V DC | | | | 85 to 132V AC |
| Input Current | | 7mA/point (24V DC) | | 5mA/point (24V DC) | | 17mA/point (120V AC, 60 Hz) |
| Input Impedance | | 3.4kΩ | | 4.4kΩ | | 0.8kΩ (60 Hz) |
| ON Voltage | | 15V minimum | | | | 9V minimum |
| OFF Voltage | | 5V maximum | | | | 20V maximum |
| ON Current | | 4.2mA minimum (at 15V DC) | | 3.2mA minimum (at 15V DC) | | — |
| OFF Current | | 1.2mA maximum | | 0.9mA maximum | | — |
| Turn ON Time | | 4ms | | | | 25ms |
| Turn OFF Time | | 4ms | | | | 30ms |
| Isolation | | Between input terminals: Not isolated<br>Internal circuit: Photocoupler isolated | | | | Between input terminals in the same common: Not isolated<br>Between input terminals in different commons: Isolated<br>Between input terminals and internal circuits: Photocoupler isolated |
| External Load for I/O Interconnection | | Not needed | | | | Not needed |
| Single Determination Method | | Static | | | | Static |
| Effect of Improper Input Connection | | Both sink and source input signals can be connected. If any input exceeding the rated value is applied, permanent damage may be caused. | | | | If any input exceeding the rated value is applied, permanent damage may be caused. |
| Cable Length | | 3m in compliance with electromagnetic immunity | | | | — |
| Connector on Mother Board | | MC1.5/10-G-3.81BK (Phoenix Contact) | | FL26A2MA (Oki Electric Cable) | | MC1.5/10-G-3.81BK (Phoenix Contact) |
| Connector Insertion/ Removal Durability | | 100 times minimum | | | | |
| Applicable Ferrule | | 1-wire: A1 0.5-8 WH<br>2-wire: A1-TWIN 2×0.5-8 WH | | — | | — |
| Internal Current Draw | All Inputs ON | 25mA (5V DC) | 40mA (5V DC) | 35mA (5V DC) | 65mA (5V DC) | 60mA (5V DC), 0mA (24V DC) |
| | All Inputs OFF | 5mA (5V DC) | 5mA (5V DC) | 5mA (5V DC) | 10mA (5V DC) | 30mA (5V DC), 0mA (24V DC) |
| Internal Power Consumption (at 24V DC while all inputs ON) | | 0.17W | 0.27W | 0.24W | 0.44W | — |
| Weight | | 85g | 100g | 65g | 100g | 80g |

## Transistor Output Modules

| Part Number | | FC4A-T08K1<br>FC4A-T08S1 | FC4A-T16K3<br>FC4A-T16S3 | FC4A-T32K3<br>FC4A-T32S3 |
|---|---|---|---|---|
| Output Points | | 8 (8/1 common) | 16 (16/1 common) | 32 (16/1 common) |
| Output | | FC4A-T®K®: Transistor sink output<br>FC4A-T®S®: Transistor source output | | |
| Load Voltage | | 24V DC | | |
| Operating Load Voltage Range | | 20.4 to 28.8V DC | | |
| Maximum Load Current | | 0.3A per point | 0.1A per point | |
| | | 3A per common | 1A per common | |
| Voltage Drop (ON Voltage) | | 1V maximum (voltage between COM and output terminals when output is on) | | |
| Inrush Current | | 1A maximum | | |
| Clamping Voltage | | 39V±1V | | |
| Maximum Lamp Load | | 8W | | |
| Inductive Load | | L/R = 10ms (28.8V DC) | | |
| External Current Draw | | FC4A-T®K®: 100mA maximum, 24V DC (power voltage at the +V terminal)<br>FC4A-T®S®: 100mA maximum, 24V DC (power voltage at the –V terminal) | | |
| Isolation | | Between output terminal and internal circuit: Photocoupler isolated<br>Between output terminals: Not isolated | | |

| Part Number | | FC4A-T08K1<br>FC4A-T08S1 | FC4A-T16K3<br>FC4A-T16S3 | FC4A-T32K3<br>FC4A-T32S3 |
|---|---|---|---|---|
| Connector on Mother Board | | MC1.5/10-G-3.81BK (Phoenix Contact) | FL26A2MA (Oki Electric Cable) | |
| Connector Insertion/ Removal Durability | | 100 times minimum | | |
| Applicable Ferrule | | 1-wire: A1 0.5-8 WH<br>2-wire: A1-TWIN 2×0.5-8 WH | | |
| Internal Current Draw | All outputs ON | 10mA (5V DC)<br>20mA (24V DC) | 10mA (5V DC)<br>40mA (24V DC) | 20mA (5V DC)<br>70mA (24V DC) |
| | All outputs OFF | 5mA (5V DC)<br>0mA (24V DC) | 5mA (5V DC)<br>0mA (24V DC) | 10mA (5V DC)<br>0mA (24V DC) |
| Internal Power Consumption (at 24V DC while all outputs ON) | | 0.55W | 1.03W | 1.82W |
| Output Delay | Turn ON Time | 300µs maximum | | |
| | Turn OFF Time | 300µs maximum | | |
| Weight | | 85g | 70g | 105g |

## Relay Output Module Specifications

| Part Number | | FC4A-R081 | FC4A-R161 |
|---|---|---|---|
| Output Points | | 8 (4/1 common) | 16 (8/1 common) |
| Output | | 1NO (form A) | |
| Maximum Load Current | | 2A per point | |
| | | 7A per common | 8A per common |
| Minimum Switching Load | | 0.1mA/0.1V DC (reference value) | |
| Initial Contact Resistance | | 30mΩ maximum | |
| Electrical Life | | 100,000 operations minimum<br>(rated load 1,800 operations/hour) | |
| Mechanical Life | | 20,000,000 operations minimum<br>(no load 1,8000 operations/hour) | |
| Rated Load | | 240V AC/2A (resistive load, inductive load cos ø = 0.4)<br>30V DC/2A (resistive load, inductive load L/R = 7ms) | |
| Dielectric Strength | | Between output and ⏚ or ⏚ terminals: 1,500V AC 1 minute<br>Between output terminal and internal circuit: 1,500V AC, 1 minute<br>Between output terminals (COMs): 1,500V AC, 1 minute | |
| Connector<br>On Mother Board | | MC1.5/11-G-3.81BK<br>(Phoenix Contact) | MC1.5/10-G-3.81BK<br>(Phoenix Contact) |
| Connector Insertion/<br>Removal Durability | | 100 times minimum | |
| Applicable Ferrule | | 1-wire: A1 0.5-8 WH<br>2-wire: A1-TWIN 2×0.5-8 WH | |
| Internal Current Draw | All outputs ON | 30mA (5V DC)<br>40mA (24V DC) | 45mA (5V DC)<br>75mA (24V DC) |
| | All outputs OFF | 5mA (5V DC)<br>0mA (24V DC) | 5mA (5V DC)<br>0mA (24V DC) |
| Internal Power Consumption (at 24V DC while all outputs ON) | | 1.16W | 2.10W |
| Weight | | 110g | 145g |

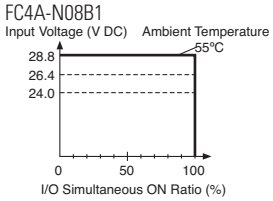
## Combination I/O Module Specifications

| Part Number | | FC4A-M08BR1 | FC4A-M24BR2 |
|---|---|---|---|
| Input Specifications | Input Points | 4 (4/1 common) | 16 (16/1 common) |
| | Input Voltage | 24V DC sink/source input signal | |
| | Input Voltage Range | 20.4 to 28.8V DC | |
| | Input Current | 7mA/point (24V DC) | |
| | Input Impedance | 3.4kΩ | |
| | ON Voltage | 15V minimum | |
| | OFF Voltage | 5V maximum | |
| | ON Current | 4.2mA minimum (at 15V DC) | |
| | OFF Current | 1.2mA maximum | |
| | Turn ON Time | 4ms (24V DC) | |
| | Turn OFF Time | 4ms (24V DC) | |
| | Isolation | Between input terminals: Not isolated<br>Internal circuit: Photocoupler isolated | |
| | 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.<br>If any input exceeding the rated value is applied, permanent damage may be caused. | |
| | Cable Length | 3m in compliance with electromagnetic immunity | |

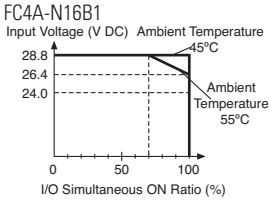
| Part Number | | FC4A-M08BR1 | FC4A-M24BR2 |
|---|---|---|---|
| Output Specifications | Output Points | 4 (4/1 common) | 8 (4/1 common) |
| | Output | 1NO (form A) | |
| | Maximum Load Current | 2A per point<br>7A per common | |
| | Minimum Switching Load | 0.1mA/0.1V DC (reference value) | |
| | Initial Contact Resistance | 30 mΩ maximum | |
| | Electrical Life | 100,000 operations minimum (rated load 1,800 operations/hour) | |
| | Mechanical Life | 20,000,000 operations minimum (no load 18,000 operations/hour) | |
| | Rated Load | 240V AC/2A (resistive load, inductive load cos ø = 0.4)<br>30V DC/2A (resistive load, inductive load L/R = 7ms) | |
| | Dielectric Strength | Between output and ⏚ or ⏚ terminals: 1,500V AC, 1 minute<br>Between output terminal and internal circuit: 1,500V AC, 1 minute<br>Between output terminals (COMs): 1,500V AC, 1 minute | |
| Connector on Mother Board | | MC1.5/11-G-3.81BK (Phoenix Contact) | Input: F6018-17P (Fujicon)<br>Output: F6018-11P (Fujicon) |
| Connector Insertion/Removal Durability | | 100 times minimum | Not removable |
| Internal Current Draw | All I/Os ON | 25mA (5V DC), 20mA (24V DC) | 65mA (5V DC), 45mA (24V DC) |
| | All I/Os OFF | 5mA (5V DC), 0mA (24V DC) | 10mA (5V DC), 0mA (24V DC) |
| Internal Power Consumption (at 24V DC while all I/Os are ON) | | 0.65W | 1.52W |
| Weight | | 95g | 140g |

## Input Usage Limits

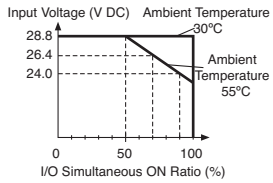
FC4A-N08B1



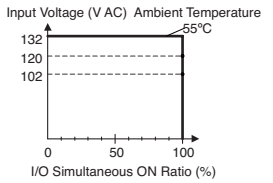

FC4A-N16B1



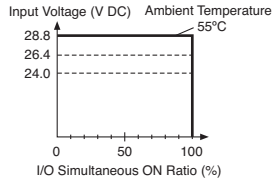

FC4A-N16B3/N32B3



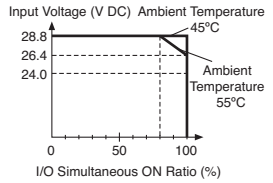

FC4A-N08A11




FC4A-M08BR1



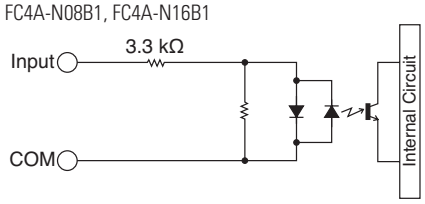

FC4A-M24BR2



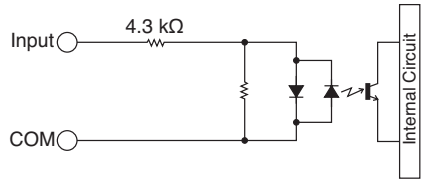

When using at an operating ambient temperature above 40°C, reduce the input voltage or the quantity of I/O points that turn on simultaneously.

## Input Internal Circuit

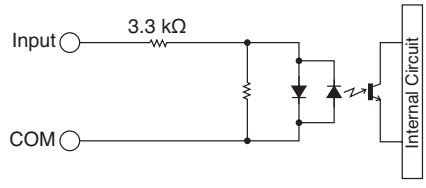
FC4A-N08B1, FC4A-N16B1



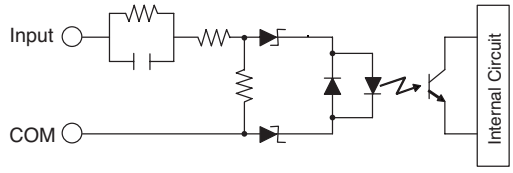

FC4A-N16B3, FC4A-N32B3




FC4A-M08BR1, FC4A-M24BR2

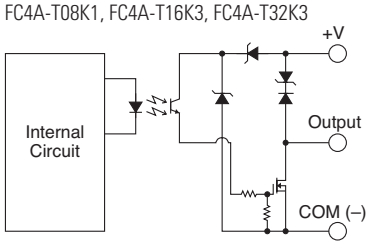



FC4A-N08A11

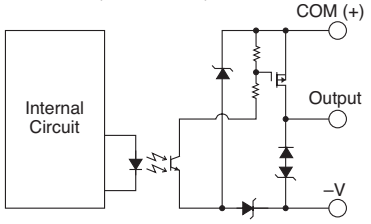



## Output Internal Circuit

FC4A-T08K1, FC4A-T16K3, FC4A-T32K3




FC4A-T08S1, FC4A-T16S3, FC4A-T32S3

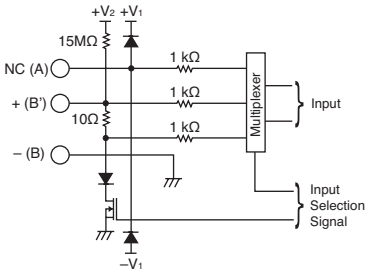


# Analog I/O Modules Specifications

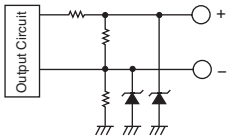
## Analog I/O Module Specifications

| Part Number | FC4A-L03A1 | FC4A-L03AP1 | FC4A-J2A1 | FC4A-K1A1 |
|---|---|---|---|---|
| Input Points | 2 | 2 | 2 | — |
| Input Signal | Voltage input (0 to 10V DC) Current input (4 to 20mA) | Thermocouple Resistance thermometer | Voltage input (0 to 10V DC) Current input (4 to 20mA) | — |
| Output Points | 1 | 1 | — | 1 |
| Output Signal | Voltage output (0 to 10V DC) Current output (4 to 20mA) | Voltage output (0 to 10V DC) Current output (4 to 20mA) | — | Voltage output (0 to 10V DC) Current output (4 to 20mA) |
| Power Voltage | 24V DC | | | |
| Allowable Voltage Range | 20.4 to 28.8V DC | | | |
| External Current Draw * | 45mA (24V DC) | 40mA (24V DC) | 35mA (24V DC) | 40mA (24V DC) |
| Connector on Mother Board | MC1.5/11-G-3.81BK (Phoenix Contact) | | | |
| Connector Insertion/Removal Durability | 100 times minimum | | | |
| Applicable Ferrule | 1 terminal: A1 0.5-8 WH, 2 terminals: A1-TWIN 2×0.5-8 WH | | | |
| Internal Current Draw | 50mA (5V DC) | | | |
| Internal Power Consumption | 0.34W (at 24V DC while all I/Os are ON) | | | |
| Weight | 85g | | | |

Input Circuit




Output Circuit




| Part Number | | FC4A-J4CN1 | FC4A-J8C1 | FC4A-J8AT1 | FC4A-K2C1 |
|---|---|---|---|---|---|
| I/O Points | | 4 inputs | 8 inputs | 8 inputs | 2 outputs |
| Power Voltage | | 24V DC | | | |
| Allowable Voltage Range | | 20.4 to 28.8V DC | | | |
| Connector on Mother Board | | MC1.5/11-G-3.81BK (Phoenix Contact) | | | |
| Connector Insertion/Removal Durability | | 100 times minimum | | | |
| Internal Current Draw | 5V DC | 30mA | 30mA | 30mA | 45mA |
| | 24V DC | 0mA | | | |
| External Current Draw * | | 50mA (24V DC) | 40mA (24V DC) | 25mA (24V DC) | 75mA (24V DC) |
| Weight | | 140g | 140g | 125g | 110g |

* The external current draw is the value when all the analog inputs are used and the analog output value is at 100%.

## Analog Input Specifications (1)

| Part Number | | FC4A-L03A1, FC4A-J2A1 | | FC4A-L03AP1 | |
|---|---|---|---|---|---|
| Input Signal | | Voltage Input<br>0 to 10V | Current Input<br>4 to 20mA | Thermocouple<br>Type K (0 to 1300°C)<br>Type J (0 to 1200°C)<br>Type T (0 to 400°C) | Resistance Thermometer<br>Pt100 3-wire type<br>(–100 to 500°C) |
| Input Impedance | | 1 MΩ minimum | 10Ω | 1 MΩ minimum | 1 MΩ minimum |
| Allowable Conductor Resistance (per wire) | | — | — | — | 200Ω maximum |
| Input Detection Current | | — | — | — | 1.0mA maximum |
| Sampling Duration Time | | 20ms maximum | | 20ms maximum | |
| Sampling Repetition Time | | 20ms maximum | | 20ms maximum | |
| Total Input System Transfer Time | | 105ms + 1 scan time | | 200ms + 1 scan time | |
| Input | | Single-ended | Differential | | |
| Operating Mode | | Self-scan | | | |
| Conversion Method | | ∑ Δ 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) | ±0.2% of full scale |
| | 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 | | | |
| Digital Resolution | | 4096 increments (12 bits) | | | |
| Output Value of LSB | | 2.5mV | 4µA | Type K: 0.325°C<br>Type J: 0.300°C<br>Type T: 0.100°C | 0.15°C |
| Data Type in Application Program | | Default: 0 to 4095 (12-bit data)<br>Optional: –32768 to 32767 (optional range designation) [1] | | | |
| Monotonicity | | Yes | | | |
| Input Data Out of Range | | Detectable [2] | | | |
| 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 | | | Accuracy is not assured when noise is applied. |
| | 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-isolated (between input and internal circuit) | | | |
| Effect of Improper Input Connection | | No damage | | | |
| Maximum Permanent Allowed Overload (No Damage) | | 13V DC | 40mA | — | |
| Selection of Analog Input Signal | | Using software programming | | | |
| Calibration or Verification to Maintain Rated Accuracy | | N/A | | | |

1: 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.
2: When an error is detected, a corresponding error code is stored to a data register allocated to analog I/O operating status.

## Analog Input Specifications (2)

| Part Number | FC4A-J4CN1, FC4A-J8C1 | | FC4A-J4CN1 | | FC4A-J8AT1 | |
|---|---|---|---|---|---|---|
| Input Signal | Voltage Input | Current Input | Thermocouple | Resistance Thermometer | NTC Thermistor | PTC Thermistor |
| Input Range | 0 to 10V | 4 to 20mA | Type K (0 to 1300°C)<br>Type J (0 to 1200°C)<br>Type T (0 to 400°C) | Pt100, Pt1000 3-wire type (–100 to 500°C)<br>Ni100, Ni1000 3-wire type (–60 to 180°C) | –50 to +150°C | |
| Input Impedance | 1 MΩ minimum | 12 Ω (FC4A-J4CN1) | 0.9 MΩ minimum | — | — | |
| | | 100Ω (FC4A-J8C1) | — | — | — | |
| Input Detection Current | — | — | — | 0.1mA | 0.1mA | |
| Sampling Duration Time | FC4A-J4CN1: 5ms maximum | | | | 1ms maximum | |
| | FC4A-J8C1: 1ms maximum | | — | — | | |
| Sampling Repetition Time | FC4A-J4CN1: 5ms maximum | | | | 10ms × channels | |
| | FC4A-J8C1: 1ms maximum | | — | — | | |
| Total Input System Transfer Time | FC4A-J4CN1: 40ms/ch + 1 scan time | | | | 10ms/ch + 1 scan time | |
| | FC4A-J8C1: 6ms/ch + 1 scan time | | — | — | | |
| Input | Single-ended input | | | | | |
| Operating Mode | Self-scan | | | | | |
| Conversion Method | ∑ Δ type ADC (FC4A-J4CN1), Successive approximation register method (FC4A-J8C1, FC4A-J8AT1) | | | | | |
| Input Error: Maximum Error at 25°C | — | | ±0.005% of full scale /°C | | | |
| Input Error: Plus Reference Junction Compensation Accuracy | — | — | — | ±2°C maximum | — | |
| Input Error: Temperature Coefficient | ±0.005% of full scale/°C | | | | | |
| Input Error: Repeatability after Stabilization Time | ±0.5% of full scale | | | | ±0.5% of full scale /°C | |
| Input Error: Non-linearity | ±0.04% of full scale | | | | Non-linear | |
| Input Error: Maximum Error | ±1% of full scale | | | | ±1% of full scale | |
| Digital Resolution | 50000 increments (16 bits) | | Type K: Approx. 24000 increments (15 bits)<br>Type J: Approx. 33000 increments (15 bits)<br>Type T: Approx. 10000 increments (14 bits) | Pt100: Approx. 6400 increments (13 bits)<br>Pt1000: Approx. 64000 increments (16 bits)<br>Ni100: Approx. 4700 increments (13 bits)<br>Ni1000: Approx. 47000 increments (16 bits) | Approx. 4000 increments (12 bits) | |
| Output Value of LSB | 0.2mV | 0.32µA | Type K: 0.058°C<br>Type J: 0.038°C<br>Type T: 0.042°C | Pt100: 0.086°C<br>Pt1000: 0.0086°C<br>Ni100: 0.037°C<br>Ni1000: 0.0037°C | 30Ω | |
| Data Type in Application Program | Default: 0 to 50000<br>Optional: –32768 to 32767 (optional range designation) [2] | | | | Default: 0 to 4000 | |
| | | | | | Optional: –32768 to 32767 (optional range designation) [1] | |
| | | | | | Temperature: C, °F | — |
| | — | | Temperature: °C, °F | | Resistance: 0 to 10000 | |
| Monotonicity | Yes | | | | | |
| Input Data Out of Range | Detectable | | | | | |
| Noise Resistance: Maximum Temporary Deviation during Electrical Noise Tests | Accuracy is not assured when noise is applied. | | | | | |
| Noise Resistance: Input Filter | Software selectable | | | | | |
| Noise Resistance: Cable | Twisted pair shielded cable is recommended for improved noise immunity | | — | | Twisted pair shielded cable is recommended for improved noise immunity | |
| Noise Resistance: Crosstalk | 2 LSB maximum | | | | | |
| Isolation | Between input and power circuit: Isolated<br>Between input and internal circuit: Photocoupler-isolated | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Effect of Improper Input Connection | No damage | | | | |
| Maximum Permanent Allowed Overload (No Damage) | 11V DC | 22mA DC | — | — | — |
| Selection of Analog Input Signal | Using software programming | | | | |
| Calibration or Verification to Maintain Rated Accuracy | N/A | | | | |

1: The 16-bit data (0 to 50000) 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.
2: When an error is detected, a corresponding error code is stored to a data register allocated to analog I/O operating status.

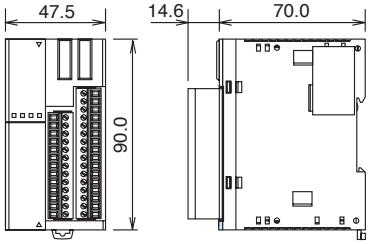
## Analog Output Specifications

| Part Number | | | FC4A-L03A1 | FC4A-L03AP1 | FC4A-K1A1 | FC4A-K2C1 |
|---|---|---|---|---|---|---|
| Output Voltage | | | 0 to 10V DC | | | –10 to +10V DC |
| Output Range | | | 4 to 20mA | | | |
| Load Impedance | | | Voltage Output: 2kΩ minimum<br>Current Output: 300kΩ maximum | | | |
| Load | | | Resistive load | | | |
| Settling Time | | | 50ms | 130ms | 50ms | 1ms/ch |
| Total Output Transfer Time | | | 50ms + 1 scan time | 130ms + 1 scan time | 50ms + 1 scan time | 1ms × channels+ 1 scan time |
| Output Error | Maximum Error at 25× C | | ±0.2% of full scale | | | |
| | Temperature Coefficient | | ±0.015% of full scale/°C | | | ±0.005% of full scale/°C |
| | Repeatability after Stabilization Time | | ±0.5% of full scale | | | |
| | Output Voltage Drop | | ±1% of full scale | | | |
| | Non-linearity | | ±0.2% of full scale | | | |
| | Output Ripple | | 1 LSB maximum | | | |
| | Overshoot | | 0% | | | |
| | Total Error | | ±1% of full scale | | | |
| Digital Resolution | | | 4096 increments (12 bits) | | | 50000 increments (16 bits) |
| Output Value of LSB | | Voltage | 2.5mV | | | 0.4mV |
| | | Current | 4µA | | | 0.32µA |
| Data Type in Application Program | | | Default: 0 to 4095 (standard) | | | –25000 to 25000 (voltage) |
| | | | | | | 0 to 50000 (current) |
| | | | Optional: –32768 to 32767 (optional range designation) [1] | | | |
| Monotonicity | | | Yes | | | |
| Current Loop Open | | | Undetectable | | | |
| 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 | | | Not assured |
| | Cable | | Twisted pair shielded cable is recommended for improved noise immunity | | | Twisted pair cable |
| | Crosstalk | | None | | | 2 LSB maximum |
| Isolation | Between output and power circuit | | 500V | | | Isolated |
| | Between output and internal circuit | | Photocoupler-isolated | | | |
| Effect of Improper Output Connection | | | No damage | | | |
| Selection of Analog Output Signal | | | Using software programming | | | |
| Calibration or Verification to Maintain Rated Accuracy | | | N/A | | | |

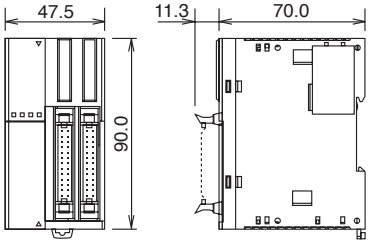
1. The 12-bit data (0 to 4095) processed in the analog I/O module can be linear-converted to a value between –32768 and 32767. The optional range designation, and analog I/O data minimum and maximum values can be selected using data registers allocated to analog I/O modules.

## Dimensions (mm)

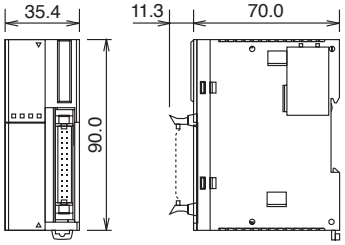
**FC5A-D16RK1, FC4A-D20RK1, FC5A-D16RS1 FC4A-D20RS1**



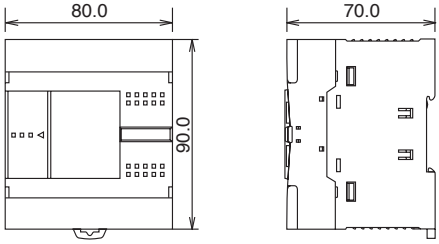

**FC5A-D32K3, FC5A-D32S3 FC4A-D40K3, FC4A-D40S3**



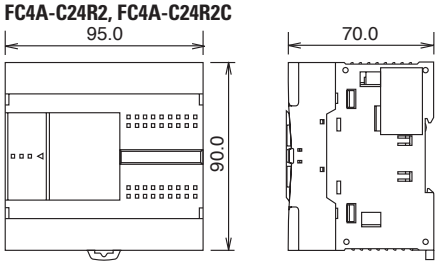

**FC5A-EXM1S FC4A-D20K3, FC4A-D20S3**



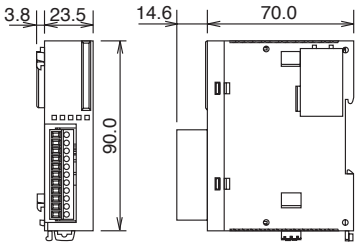

**FC5A-C10R2, FC5A-C10R2C, FC4A-C10R2, FC4A-C10R2C, FC5A-C16R2 FC5A-C16R2C FC4A-C16R2 FC4A-C16R2C**



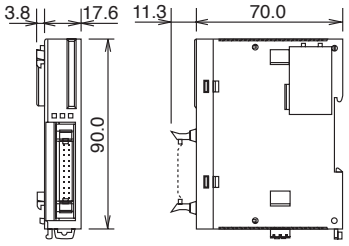

**FC5A-C24R2, FC5A-C24R2C FC4A-C24R2, FC4A-C24R2C**



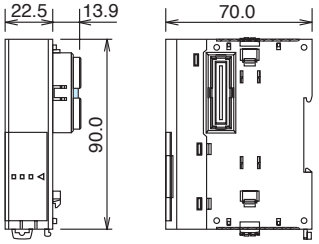

**FC4A-N08B1, FC4A-R081, FC4A-T08S1, FC4A-L03A1, FC4A-J2A1, FC4A-J4CN1, FC4A-J8AT1, FC4A-AS62M, FC4A-N08A11, FC4A-T08K1, FC4A-M08BR1, FC4A-L03AP1, FC4A-K1A1, FC4A-J8C1, FC4A-K2C1,**



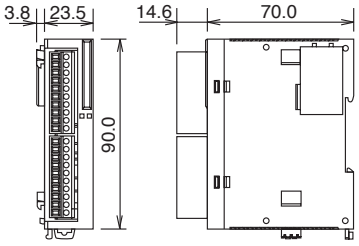

**FC4A-EXM1M FC4A-N16B3, FC4A-T16K3, FC4A-T16S3**



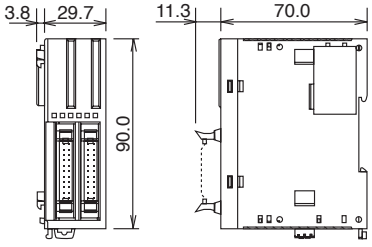

**FC4A-HPC1, FC4A-HPC2, FC4A-HPC3**



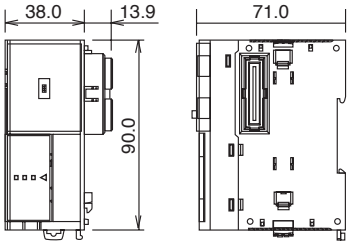

**FC4A-N16B1, FC4A-R161**



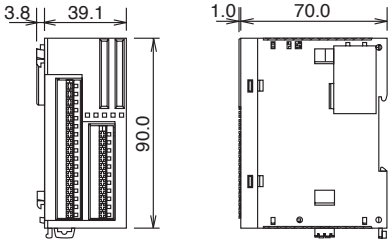

**FC4A-N32B3, FC4A-T32K3, FC4A-T32S3**



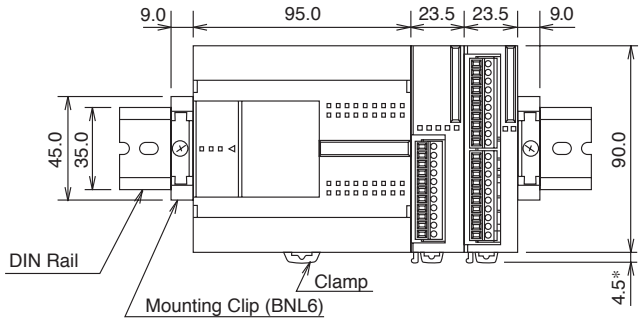

**FC4A-HPH1**




**FC5A-EXM2, FC4A-M24BR2**



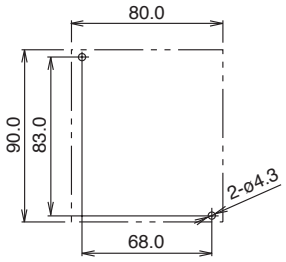

**Example**



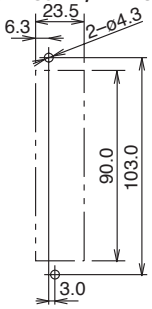

The figure illustrates a system setup consisting of the all-in-one 24-I/O CPU module, an 8-point relay output module, and a 16-point DC input module mounted on a 35-mm-wide-DIN rail using BNL6 mounting clips.

## Mounting Hole Layout (mm)

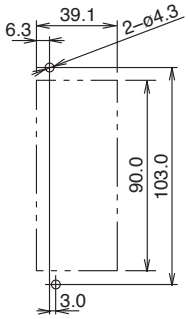
**FC5A-C10R2, FC5A-C16R2**
**FC5A-C10R2C, FC5A-C16R2C**
**FC4A-C10R2, FC4A-C16R2**
**FC4A-C10R2C, FC4A-C16R2C**



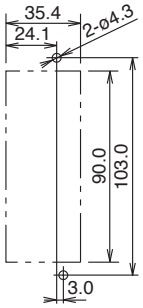

**FC4A-N08A11, FC4A-R081**
**FC4A-R161, FC4A-T08K1**
**FC4A-T08S1, FC4A-M08BR1**
**FC4A-L03A1, FC4A-L03AP1**
**FC4A-J2A1, FC4A-K1A1**
**FC4A-J4CN1, FC4A-T8C1**
**FC4A-J8AT1, FC4A-K2C1**



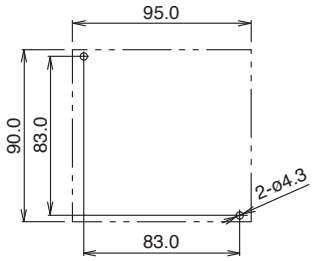

**FC5A-EXM2**
**FC4A-M24BR2**



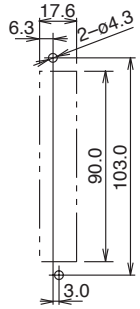

**FC5A-EXM1S, FC4A-D20K3**
**FC4A-D20S3**



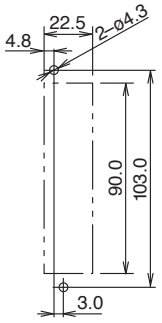

**FC5A-C24R2,**
**FC4A-C24R2C**
**FC4A-C24R2,**
**FC4A-C24R2C**



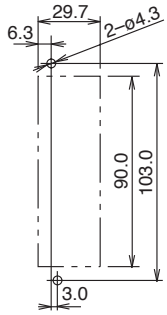

**FC5A-EXM1M**
**FC4A-N16B3, FC4A-T16K3,**
**FC4A-T16S3**



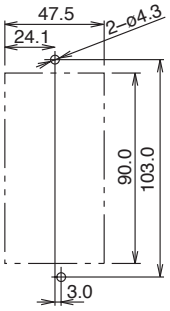

**FC4A-HPC1 FC4A-HPC2**
**FC4A-HPC3**



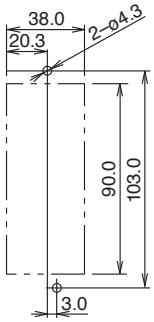

**FC4A-N32B3, FC4A-T32K3,**
**FC4A-T32S3**



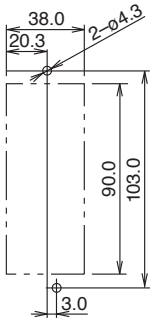

**FC5A-D16RK1**
**FC5A-D16RS1**
**FC5A-D32K3**
**FC5A-D32S3**
**FC4A-D20RK1**
**FC4A-D20RS1**
**FC4A-D40K3**
**FC4A-D40S3**




**FC4A-HPH1**

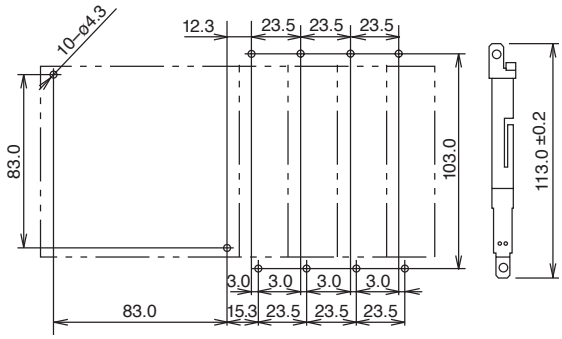



**FC4A-HPH1**




**Examples**

Mounting hole layout for FC5A-C24R2 or FC4A-C24R2 and four 23.5mm-wide I/O modules




Mounting hole layout from left, FC4A-HPH1, FC4A-D20K3, FC4A-N16B3, FC4A-N32B3, and FC4A-M24BR2 modules