

FC6A SERIES

**MICROSmart**

Digital I/O Cartridges  
User's Manual Supplement



# ***ABOUT THIS MANUAL***

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Thank you for purchasing the FC6A Series MicroSmart manufactured by IDEC Corporation.

This manual describes the specifications and functions of the digital I/O cartridges, which are optional modules for the FC6A Series MicroSmart. Read this manual carefully before using the digital I/O cartridges. Fully understand the functions and capabilities of the digital I/O cartridges and use them correctly.

## **Publication History**

February 2017    First Edition

## **Safety Precautions**

See "Safety Precautions" in the "FC6A Series MicroSmart All-in-One Type User's Manual" before starting installation, wiring, operation, maintenance, and inspection of the digital I/O cartridges.

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## **Trademarks**

FC6A Series MicroSmart is a trademark of IDEC Corporation.

# NAMES AND ABBREVIATIONS USED IN THIS MANUAL

## Model Names

Name Used in This Manual		Type Number, Part Code, or Official Name	
FC6A Series MicroSmart		FC6A Series MICROSmart	
CPU module	All-in-One Type	FC6A-C16R1AE, FC6A-C16R1CE, FC6A-C16K1CE, FC6A-C16P1CE, FC6A-C24R1AE, FC6A-C24R1CE, FC6A-C24K1CE, FC6A-C24P1CE, FC6A-C40R1AE, FC6A-C40R1CE, FC6A-C40K1CE, FC6A-C40P1CE, FC6A-C40R1DE, FC6A-C40R1DE, FC6A-C40K1DE, FC6A-C40P1DE	
	CAN J1939 All-in-One Type	FC6A-C40R1AEJ, FC6A-C40R1CEJ, FC6A-C40K1CEJ, FC6A-C40P1CEJ, FC6A-C40R1DEJ, FC6A-C40K1DEJ, FC6A-C40P1DEJ	
	16-I/O type	The general term for the model with 16 I/O points (FC6A-C16R1AE, FC6A-C16R1CE, FC6A-C16K1CE, FC6A-C16P1CE)	
	24-I/O type	The general term for the model with 24 I/O points (FC6A-C24R1AE, FC6A-C24R1CE, FC6A-C24K1CE, FC6A-C24P1CE)	
	40-I/O type	The general term for the model with 40 I/O points (FC6A-C40R1AE, FC6A-C40R1CE, FC6A-C40K1CE, FC6A-C40P1CE, FC6A-C40R1DE, FC6A-C40R1DE, FC6A-C40K1DE, FC6A-C40P1DE, FC6A-C40R1AEJ, FC6A-C40R1CEJ, FC6A-C40K1CEJ, FC6A-C40P1CEJ, FC6A-C40R1DEJ, FC6A-C40K1DEJ, FC6A-C40P1DEJ)	
	AC power type		FC6A-C16R1AE, FC6A-C24R1AE, FC6A-C40R1AE, FC6A-C40R1AEJ
	DC power type	24V DC power type	FC6A-C16R1CE, FC6A-C24R1CE, FC6A-C40R1CE, FC6A-C16K1CE, FC6A-C24K1CE, FC6A-C40K1CE, FC6A-C16P1CE, FC6A-C24P1CE, FC6A-C40P1CE, FC6A-C40R1CEJ, FC6A-C40K1CEJ, FC6A-C40P1CEJ
		12V DC power type	FC6A-C40R1DE, FC6A-C40K1DE, FC6A-C40P1DE, FC6A-C40R1DEJ, FC6A-C40K1DEJ, FC6A-C40P1DEJ
	Relay output type		FC6A-C16R1AE, FC6A-C16R1CE, FC6A-C24R1AE, FC6A-C24R1CE, FC6A-C40R1AE, FC6A-C40R1CE, FC6A-C40R1DE, FC6A-C40R1AEJ, FC6A-C40R1CEJ, FC6A-C40R1DEJ
	Transistor output type	Transistor sink output type	FC6A-C16K1CE, FC6A-C24K1CE, FC6A-C40K1CE, FC6A-C40K1DE, FC6A-C40K1CEJ, FC6A-C40K1DEJ
Transistor protection source output type		FC6A-C16P1CE, FC6A-C24P1CE, FC6A-C40P1CE, FC6A-C40P1DE, FC6A-C40P1CEJ, FC6A-C40P1DEJ	
Expansion module		Expansion I/O module, functional module	
Expansion I/O module		Input module, output module, mixed I/O module	
Functional module		Analog module, PID module	
Analog module		Analog input module, analog output module, mixed analog I/O module	
Option module		HMI module, expansion interface module, analog cartridge, communication cartridge	
Cartridge		Analog cartridge, communication cartridge	
WindLDR		WindLDR application software	
USB cable		USB maintenance cable (HG9Z-XCM42), USB Mini-B extension cable (HG9Z-XCE21)	
SmartAXIS		Another name for the SmartAXIS FT1A Series.	
Touch		The generic term for the SmartAXIS FT1A-M12RA-W, FT1A-M12RA-B, FT1A-M12RA-S, FT1A-C12RA-W, FT1A-C12RA-B, FT1A-C12RA-S, FT1A-M14KA-W, FT1A-M14KA-B, FT1A-M14KA-S, FT1A-C14KA-W, FT1A-C14KA-B, FT1A-C14KA-S, FT1A-M14SA-W, FT1A-M14SA-B, FT1A-M14SA-S, FT1A-C14SA-W, FT1A-C14SA-B and FT1A-C14SA-S.	
Touch (relay output type)		The generic term for the SmartAXIS FT1A-M12RA-W, FT1A-M12RA-B, FT1A-M12RA-S, FT1A-C12RA-W, FT1A-C12RA-B and FT1A-C12RA-S.	
Touch (transistor output type)		The generic term for the SmartAXIS FT1A-M14KA-W, FT1A-M14KA-B, FT1A-M14KA-S, FT1A-C14KA-W, FT1A-C14KA-B, FT1A-C14KA-S, FT1A-M14SA-W, FT1A-M14SA-B, FT1A-M14SA-S, FT1A-C14SA-W, FT1A-C14SA-B and FT1A-C14SA-S.	

Name Used in this Manual	WindLDR Operating Procedure
Function area settings	<b>Configuration</b> tab > <b>Function Area Settings</b> group
Monitors	Select <b>Online</b> > <b>Monitor</b> > <b>Start Monitor</b> .
PLC status	Select <b>Online</b> > <b>PLC</b> > <b>Status</b> .
Communication settings	Select <b>Online</b> > <b>Communication</b> > <b>Set Up</b> .
Modbus master request table	On the <b>Configuration</b> tab, in <b>Function Area Settings</b> , click <b>Communication Ports</b> , and in the displayed <b>Function Area Settings</b> dialog box, for <b>Communication Mode</b> under <b>Communication Ports</b> , select <b>Modbus RTU Master</b> or <b>Modbus TCP Client</b>
Application button	The button displayed on the left side of the menu bar. Click to display the menu with <b>New</b> , <b>Save</b> , and <b>Save As</b> , recent projects, <b>WindLDR Options</b> , and <b>Exit WindLDR</b> .

# ***SAFETY PRECAUTIONS***

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In this manual, safety precautions are categorized in order of importance:



**Warning** Warning notices are used to emphasize that improper operation may cause severe personal injury or death.



**Caution** Caution notices are used where inattention might cause personal injury or damage to equipment.

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## ***C*** **CHAPTER 1:**

### ***Digital I/O Cartridges***

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# 1: DIGITAL I/O CARTRIDGES

This chapter provides an overview of the digital I/O cartridges, their specifications, and also describes parameter settings and configuration methods.

## Overview of Digital I/O Cartridges

Digital I/O cartridges are available in two types of cartridges: digital input cartridges equipped with input terminals and digital output cartridges equipped with output terminals.

Digital I/O cartridges can be installed in the FC6A Series MicroSmart and SmartAXIS Touch.

## Cartridge Slots

### FC6A Series MicroSmart

The CPU module of the FC6A Series MicroSmart is equipped with a maximum of two cartridge slots that are used to install cartridges. Digital inputs or digital outputs can be increased to a maximum of 8 points by installing digital I/O cartridges in the cartridge slots.

A digital I/O cartridge will not function in Cartridge Slot 3 on the HMI module (FC6A-PH1) of the FC6A Series MicroSmart.

For how to install cartridges in the CPU module of the FC6A Series MicroSmart, see Chapter 3 "Mounting on DIN Rail" in the "FC6A Series MicroSmart All-in-One Type User's Manual".

		CPU Module		HMI Module
		Cartridge Slot 1	Cartridge Slot 2	Cartridge Slot 3
All-in-One Type	16-I/O type	Yes	—	No
	24-I/O type	Yes	—	No
	40-I/O type	Yes	Yes	No
CAN J1939 All-in-One Type		Yes	Yes	No

### SmartAXIS Touch

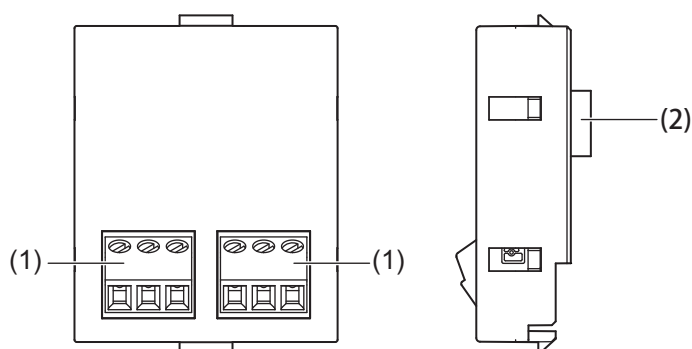
Cartridges can be installed in only the SmartAXIS Touch (Transistor Output Type). Cartridges cannot be installed in the SmartAXIS Touch (Relay Output Type). The SmartAXIS Touch (Transistor Output Type) is equipped with a maximum of two cartridge slots that are used to install cartridges. Digital inputs or digital outputs can be increased to a maximum of 8 points by installing digital I/O cartridges in the cartridge slots.

For how to install cartridges in the SmartAXIS Touch (Transistor Output Type), see Chapter 29 "1.8 Attaching Cartridges (FT1A-\*14KA/SA Only)" in the "FT1A Series SmartAXIS Touch User's Manual".

		Touch	
		Cartridge Slot 1	Cartridge Slot 2
Transistor output type	FT1A-*14KA-*	Yes	Yes
	FT1A-*14SA-*		
Relay output type	FT1A-*12RA-*	—	—

## Digital I/O Cartridge Specifications

### Part Names and Functions



#### (1) Terminals

These terminals connect the cartridge to the power supply and to input or output devices. The devices that can be connected differ by the type of digital I/O cartridge.

#### (2) Connector

This connector connects the cartridge to Cartridge Slot 1 or 2 of the CPU module.

### Model List

Cartridge Type	I/O Points		I/O Signal	Type No.
Digital input cartridge	Input	4	DC input (shared sink/source): 12/24V DC	FC6A-PN4
Digital output cartridge	Output	4	Transistor sink output: 12/24V DC	FC6A-PTK4
			Transistor source output: 12/24V DC	FC6A-PTS4

### Function Specifications

Type No.	FC6A-PN4	FC6A-PTK4	FC6A-PTS4
<b>Rated Power Voltage</b>	5.0 V, 3.3 V (supplied from FC6A Series MicroSmart CPU module/SmartAXIS Touch (Transistor Output Type))		
<b>Current Draw</b>	5.0 V: 0 mA 3.3 V: 35 mA		
<b>Weight</b>	15 g		

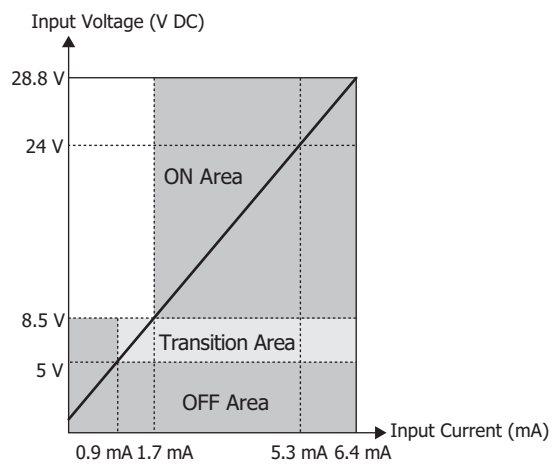


### Digital Input Specifications

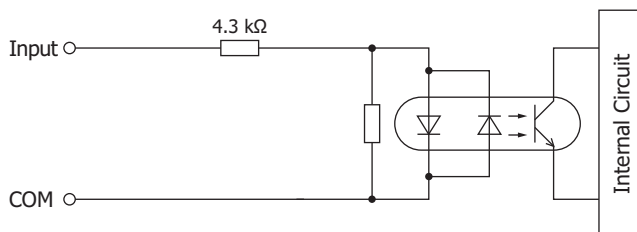
<b>Type No.</b>	<b>FC6A-PN4</b>	
<b>Rated Input Voltage</b>	12/24V DC (shared sink/source)	
<b>Operating Load Voltage Range</b>	0 to 28.8V DC	
<b>Rated Input Current</b>	5 mA/1 point (when 24V DC) 2.5 mA/1 point (when 12V DC)	
<b>Terminal Arrangement</b>	See page 1-5	
<b>Input Impedance</b>	4.4 kΩ	
<b>Input Delay Time (24V DC)</b>	<b>Turn ON Time</b>	0.5 ms
	<b>Turn OFF Time</b>	0.5 ms
<b>External Load for I/O Interconnection</b>	Not needed	
<b>Signal Determination Method</b>	Static	
<b>Effect of Improper Input Connection</b>	Both sinking and sourcing connections are allowed. If any input exceeding the rated value is applied, permanent damage may be caused.	
<b>Cable Length</b>	3 m	

### Input Operating Range

The operating range of Type 1 (IEC 61131-2) input modules is as follows.



### Input Internal Circuit



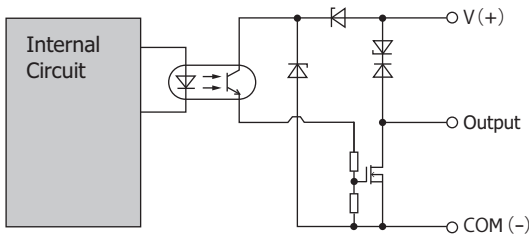
# 1: DIGITAL I/O CARTRIDGES

## Digital Output Specifications

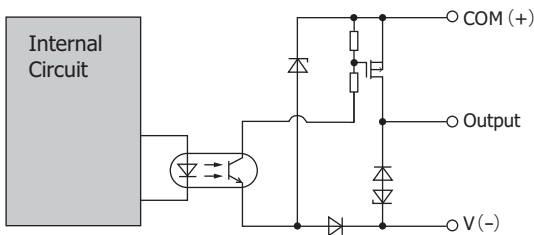
Type No.	FC6A-PTK4	FC6A-PTS4
Output Signal	Transistor sink output	Transistor source output
Rated Load Voltage	12/24V DC	
Operating Load Voltage Range	10.2 to 28.8V DC	
Output Points	4 (4 points in 1 common line)	
Rated Load	0.1 A 1 point	
Terminal Arrangement	See page 1-5	
Voltage Drop (ON Voltage)	0.4 V or less, voltage between COM and output terminal when ON	
Allowed Inrush Current	1 A maximum	
Leakage Current	0.1 mA maximum	
Clamping Voltage	50 V	
Lamp Load	2.4 W maximum	
Inductive Load	L/R = 10 ms (28.8V DC, 1 Hz)	
Protection Operation	None	
External Current Draw	100 mA maximum, 24V DC (+V terminal supply power)	
Output Delay Time (24V DC)	Turn ON Time	450 $\mu$ s maximum
	Turn OFF Time	450 $\mu$ s maximum

### Output Internal Circuit

#### FC6A-PTK4

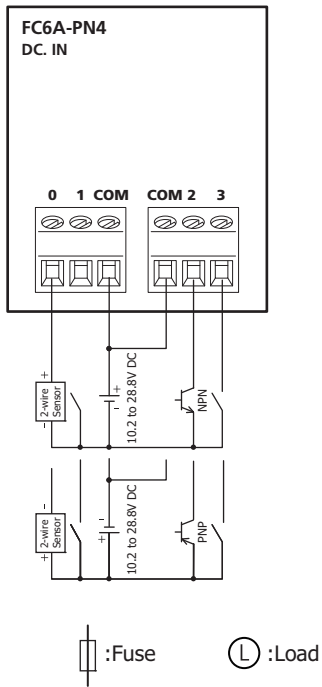


#### FC6A-PTS4

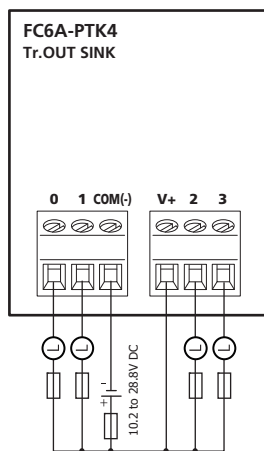


Wiring Arrangement and Wiring Examples

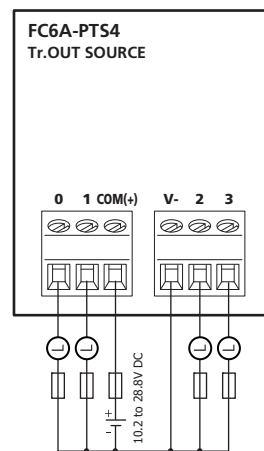
FC6A-PN4



FC6A-PTK4



FC6A-PTS4



Insert a fuse that corresponds to the load.

## 1: DIGITAL I/O CARTRIDGES

### Digital Input and Output Assignments

The digital inputs or digital outputs are assigned as follows.

#### When Installed in the FC6A Series MicroSmart

	Digital I/O Cartridge	
	Cartridge Slot 1	Cartridge Slot 2
Input device range	I630 to I633	I634 to I637
Output device range	Q630 to Q633	Q634 to Q637

#### Assignment Example

When a digital input cartridge is installed in Cartridge Slot 1 and a digital output cartridge is installed in Cartridge Slot 2 of a 40-I/O type CPU module

	CPU Module 40-I/O Type	Digital I/O Cartridge	
		Cartridge Slot 1	Cartridge Slot 2
Input device range	I0 to I27	I630 to I633	–
Output device range	Q0 to Q27	–	Q634 to Q637

#### When Installed in the SmartAXIS Touch

	Digital I/O Cartridge	
	Cartridge Slot 1	Cartridge Slot 2
Input device range	I10 to I13	I14 to I17
Output device range	Q04 to Q7	Q10 to Q13

#### Assignment Example

When a digital input cartridge is installed in Cartridge Slot 1 and a digital output cartridge is installed in Cartridge Slot 2 of the SmartAXIS Touch (Transistor Output Type) FT1A-\*14\*A-\*

	SmartAXIS Touch (Transistor Output Type) FT1A-*14*A-*	Digital I/O Cartridge	
		Cartridge Slot 1	Cartridge Slot 2
Input device range	I0 to I7	I10 to I13	–
Output device range	Q0 to Q3	–	Q10 to Q13

**Digital I/O Cartridge Parameters**

Input filter settings are the only parameters available.  
 Parameters can be configured for only digital input cartridges.  
 Input filter settings can be configured for each digital input.

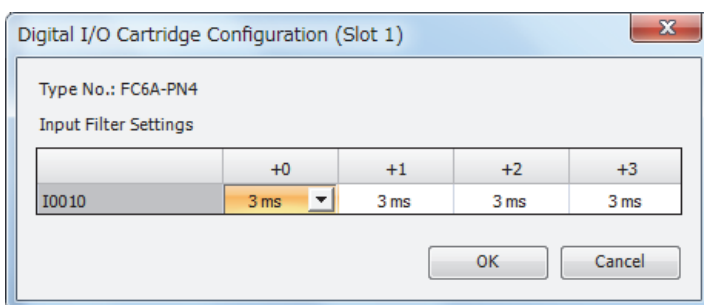
**Input Filter**

The input filter is used to adjust the filter width according to the width of the input signal in order to decrease the effects of input contact bounce and noise.

The filter width can be adjusted to a value of 0 ms (no input filter) and 3 to 15 ms (1-ms increments) for each digital input.

For details on the input filter, see Chapter 5 "Functions and Settings" in the "FC6A Series MicroSmart All-in-One Type User's Manual".

**Settings**



Filter Time (ms)	Description
0	No input filtering
3 to 15	Set the digital input filter time in 1-ms increments.

## Setting Procedure

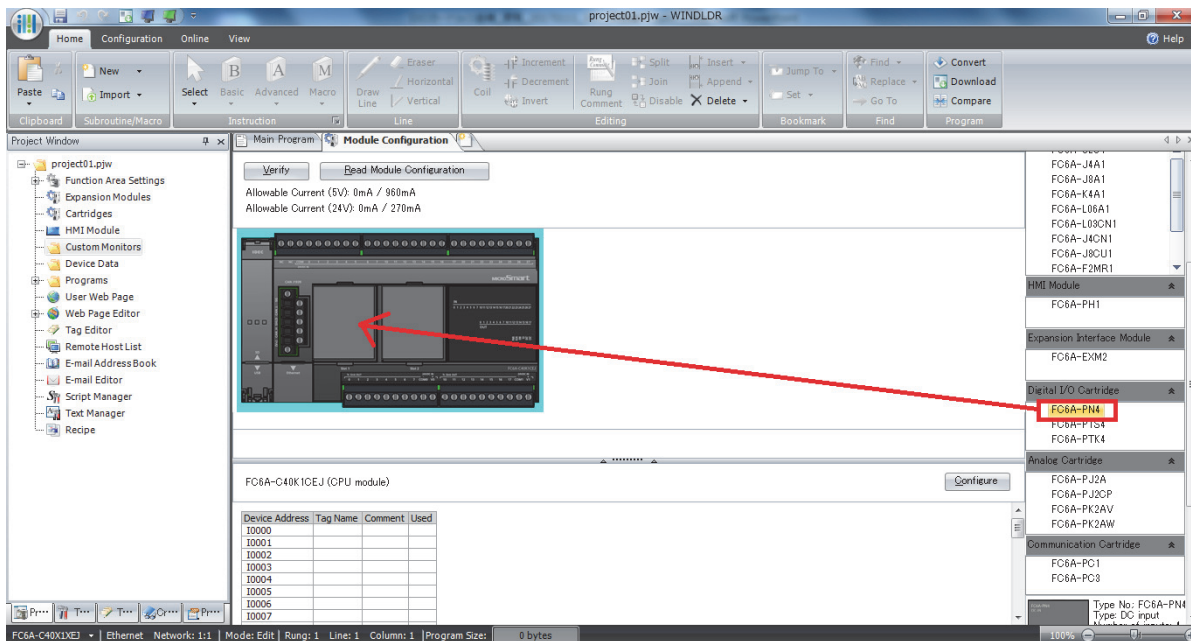
### FC6A Series MicroSmart

To use digital I/O cartridges, you must configure the digital I/O cartridges that will be used with the Module Configuration Editor in WindLDR and download the user program to the FC6A.

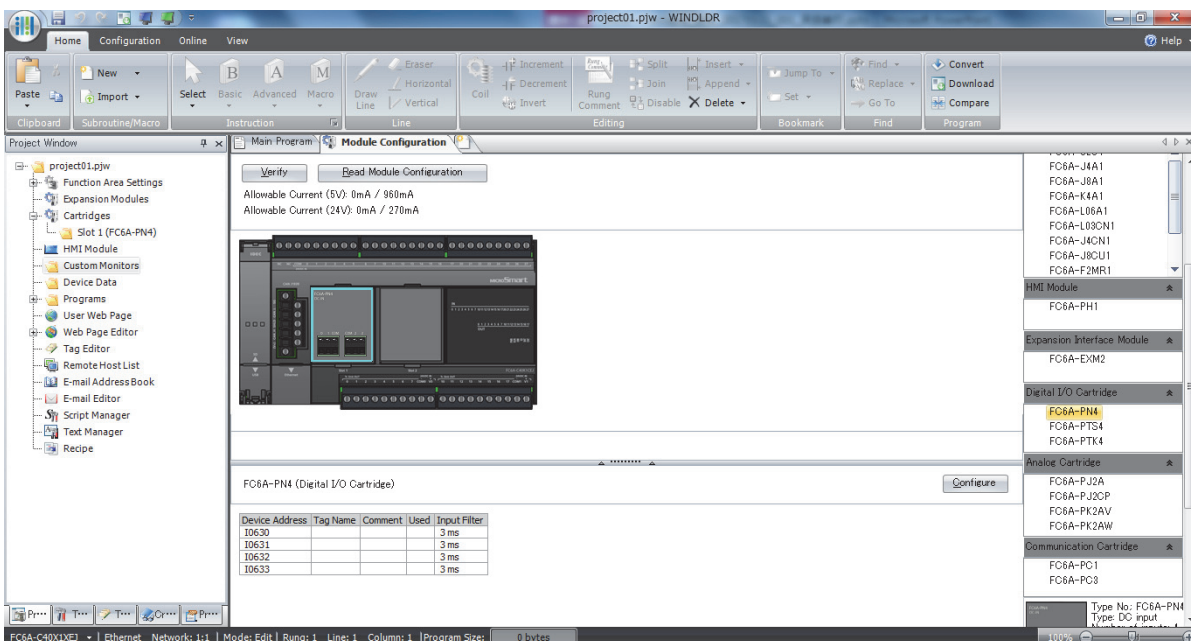
For basic Module Configuration Editor operations, see Chapter 12 "Expansion Module and Cartridge Settings" in the "FC6A Series MicroSmart All-in-One Type User's Manual".

This section describes how to insert digital I/O cartridges into the module configuration area and how to configure the input filter.

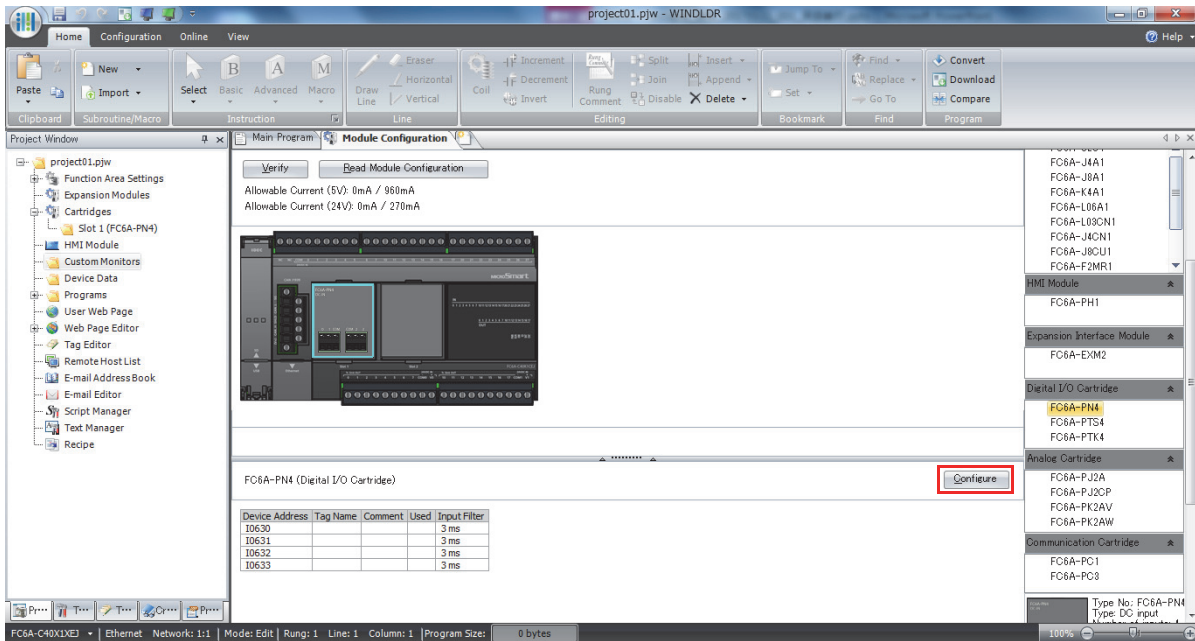
1. Select the digital I/O cartridge in the expansion modules and cartridges list and drag and drop it to the module configuration area.



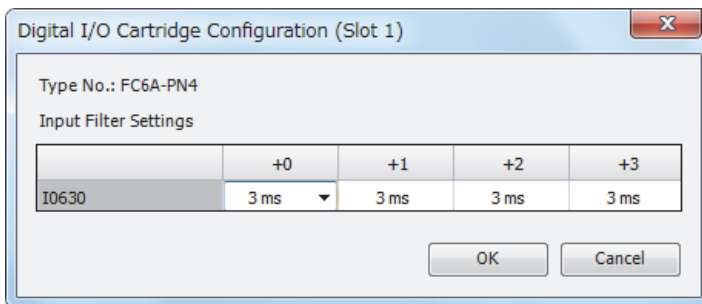
The applicable cartridge is inserted into the module configuration area.



- Click the inserted digital I/O cartridge in the module configuration area and click **Configure**. The configuration dialog box that corresponds to the digital I/O cartridge is displayed.



- Enter the filter settings.



- Click **OK** to close the **Digital I/O Cartridge Configuration** dialog box.
- Click **OK**.

This concludes configuring the settings in the application.  
Download the user program to the FC6A to enable the settings.

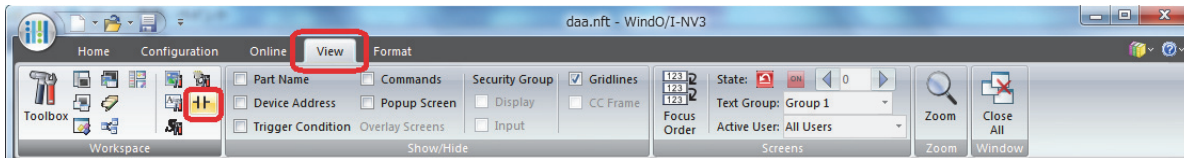
## 1: DIGITAL I/O CARTRIDGES

### SmartAXIS Touch

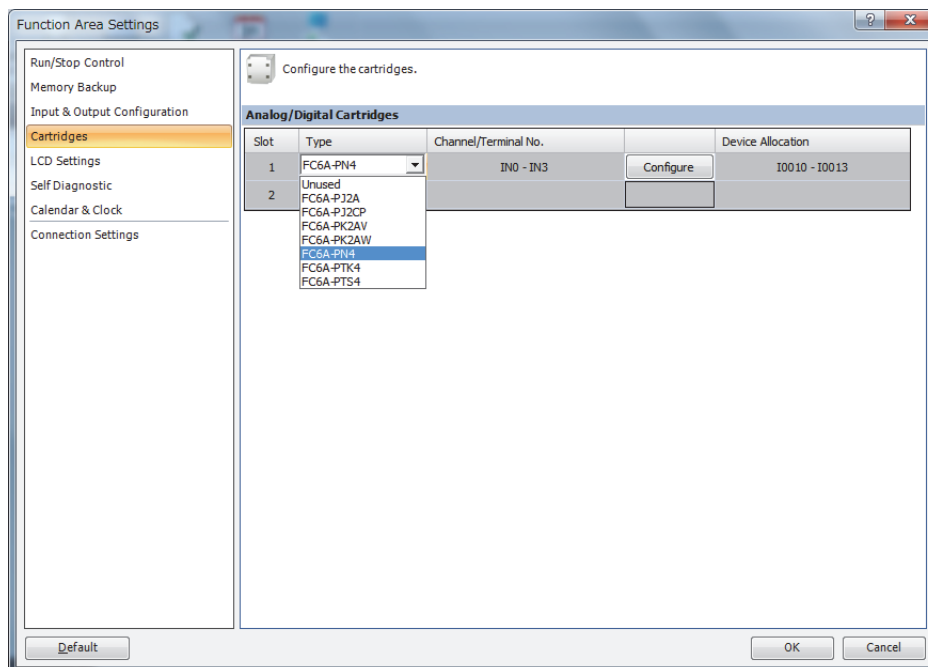
To use digital I/O cartridges, you must configure the **Cartridges** tab in the WindLDR **Function Area Settings** dialog box, and then download the project data to the Touch.

This section describes the procedure to configure digital I/O cartridges in the Function Area Settings.

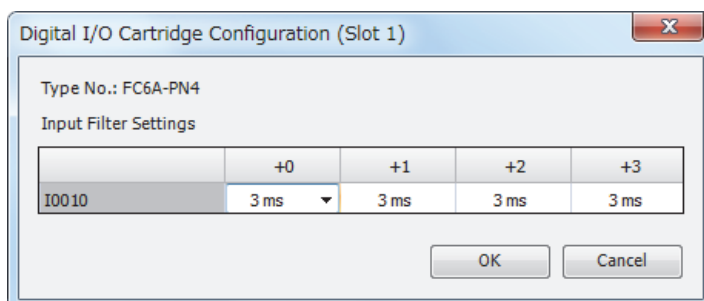
1. On the WindO/I-NV3 **View** tab, in the **Workspace** group, click  (Control Functions). WindLDR will start.



2. On the WindLDR **Configuration** tab, in the **Function Area Settings** group, click **Cartridges**. The **Function Area Settings** dialog box is displayed.
3. Select the type of digital I/O cartridge with **Type** for the applicable **Slot** where the digital I/O cartridge is connected.



4. Enter the filter settings.



5. Click **OK** to close the **Digital I/O Cartridge Configuration** dialog box.
6. Click **OK**.

This concludes configuring the settings in the application.

Download the project data to the SmartAXIS Touch to enable the settings.



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Specifications and other descriptions in this manual are subject to change without notice.



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