Cat. No. W543-E1-01

SYSMAC CJ Series

CJ1W-ADG41

High-speed Analog Input Unit

OPERATION MANUAL

OMRON

Trademarks

Introduction

Thank you for purchasing a SYSMAC CJ-series CJ1W-ADG41 High-speed Analog Input Unit.
This manual contains information that is necessary to use the product, such as the specifications of the Unit, the installation and wiring procedures, how to make the settings required for operation, and how to troubleshoot alarms that may occur.
Read and understand this manual before attempting to use the product. Keep this manual in a safe place where it will be available for reference during operation.

Intended Audience

This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent).

- Personnel in charge of installing FA systems
- Personnel in charge of designing FA systems
- Personnel in charge of managing FA systems and facilities

Terms and Conditions Agreement

Warranty, Limitations of Liability

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Programmable Products

Omron Companies shall not be responsible for the user's programming of a programmable Product, or any consequence thereof.

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Data presented in Omron Company websites, catalogs and other materials is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of Omron's test conditions, and the user must correlate it to actual application requirements. Actual performance is subject to the Omron's Warranty and Limitations of Liability.

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Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.

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Safety Precautions

The following notation is used in this manual to provide precautions required to ensure safe usage of the product. The safety precautions that are provided are extremely important to safety. Always read and heed the information provided in all safety precautions.

Definition of Precautionary Information

⚠WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury. Additionally, there may be severe property damage.
⚠ Caution	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury, or property damage.

Precautions for Safe Use

Indicates precautions on what to do and what not to do to ensure safe usage of the product.

Precautions for Correct Use

Indicates precautions on what to do and what not to do to ensure proper operation and performance.

Symbols

	The circle and slash symbol indicates operations that you must not do. The specific operation is shown in the circle and explained in text. This example indicates prohibiting disassembly.
	The triangle symbol indicates precautions (including warnings). The specific operation is shown in the triangle and explained in text. This example indicates a precaution for electric shock.
	The triangle symbol indicates precautions (including warnings). The specific operation is shown in the triangle and explained in text. This example indicates a general precaution.
	The filled circle symbol indicates operations that you must do. The specific operation is shown in the circle and explained in text. This example shows a general precaution for something that you must do.

Specific Safety Precautions

⚠ WARNING

Do not attempt to take the High-speed Analog Input Unit apart while power is being supplied.

Doing so may result in electric shock.

Do not touch any of the terminals while power is being supplied.

Doing so may result in electric shock.

Provide safety measures in external circuits (i.e., not in the Programmable Controller), including the following items, in order to ensure safety in the system if an abnormality occurs due to malfunction of the PLC or another external factor affecting the PLC operation. Not doing so may result in serious accidents due to incorrect operation.

1. Emergency stop circuits, interlock circuits, limit circuits, and similar safety measures must be provided in external control circuits.
2. The PLC will turn OFF all outputs when its self-diagnosis function detects any error or when a severe failure alarm (FALS) instruction is executed. As a countermeasure, safety measures must be provided outside of the PLC to ensure safe operation of the system.
3. The PLC outputs may remain ON or OFF due to deposition or burning of the output relays or destruction of the output transistors. As a countermeasure, safety measures must be provided outside of the PLC to ensure safe operation of the system.
4. When the 24-VDC output (service power supply) from the Power Supply Unit is overloaded or short-circuited, the voltage may drop and result in the outputs being turned OFF. As a countermeasure, external safety measures must be provided to ensure safety in the system.

You must take fail-safe measures to ensure safety in the event of incorrect, missing, or abnormal signals caused by broken signal lines, momentary power interruptions, or other causes.

Not doing so may result in serious accidents due to incorrect operation.

Make sure that the voltages and currents that are input to the High-speed Analog Input Unit are within the specified ranges.

Inputting voltages or currents that are outside of the specified ranges may cause accidents or fire.

⚠ Caution

Tighten the screws on the terminal block of the AC Power Supply Unit to the torque specified in this manual.

Loose screws may result in burning or malfunction.

Execute online editing only after confirming that no adverse effects will be caused by extending the cycle time. Otherwise, the input signals may not be readable.

Precautions for Safe Use

- You must take fail-safe measures to ensure safety in the event of incorrect, missing, or abnormal signals caused by broken signal lines, momentary power interruptions, or other causes.
- Always use the power supply voltage specified in this manual.
- Take appropriate measures to ensure that the specified power with the rated voltage and frequency is supplied. Be particularly careful in places where the power supply is unstable.
- Install external breakers and take other safety measures against short-circuiting in external wiring.
- Do not apply voltages to input sections in excess of the rated input voltage.
- Do not apply voltages or connect loads in excess of the maximum switching capacity to output sections.
- Always turn OFF the power supply to the PLC before attempting any of the following.
  - Mounting or dismounting I/O Units, CPU Units, Memory Cassettes, or any other Units.
  - Assembling Units.
  - Setting DIP switches or rotary switches.
  - Connecting or wiring cables.
- Tighten the screws on the terminal blocks to the torque specified in this manual.
- Wire connections correctly, as indicated in this manual.
- When wiring crossovers between terminals, the total current for both terminals will flow in the line. Check the current capacities of all wires before wiring crossovers.
- Do not attempt to disassemble, repair, or modify the High-speed Analog Input Unit.
- Be sure to confirm that the DIP switch and the data memory (DM) are properly set before you start operation.
- If a Unit comes with a label attached to the ventilation holes on the Unit, leave the label in place when wiring to prevent wire scraps from entering the Unit. Remove the label after the completion of wiring to ensure proper heat dissipation.
- Use crimp terminals for wiring. Do not connect bare stranded wires directly to terminals.
- Do not pull on cables and cords and do not bend them past their natural bending radius.
- Do not place any heavy objects on cables or cords.
- Mount the High-speed Analog Input Unit only after checking the terminal block completely.
- Be sure that the terminal blocks, Memory Units, expansion cables, and other items with locking devices are properly locked into place.
- Check the user program for proper execution before actually running it on the PLC.
- Double-check all wiring to make sure that it is correct before turning ON the power supply.
- Confirm that no adverse effects will occur in the system before attempting any of the following.
  - Changing the operating mode of the PLC (including the setting of the startup operating mode).
  - Force-setting or force-resetting any bit in memory.
  - Changing present values or set values.
- Touch a grounded metal object to discharge static electricity from your body before touching the High-speed Analog Input Unit.
- For safety, install interlock circuits, limit circuits, and other protective circuits outside of the PLC. Not doing so may result in serious accidents due to incorrect operation.

Precautions for Correct Use

- Install the High-speed Analog Input Unit correctly according to instructions in this manual.
- Do not install the High-speed Analog Input Unit in the following locations.
  - Locations subject to direct sunlight.
  - Locations subject to temperatures or humidity outside the ranges specified in the specifications.
  - Locations subject to condensation as the result of severe changes in temperature.
  - Locations subject to corrosive or flammable gases.
  - Locations subject to dust (especially iron dust) or salts.
  - Locations subject to exposure to water, oil, or chemicals.
  - Locations subject to shock or vibration.
- Take appropriate and sufficient countermeasures when installing systems in the following locations.
  - Locations subject to static electricity or other forms of noise.
  - Locations subject to strong electromagnetic fields.
  - Locations subject to possible exposure to radioactivity.
  - Locations close to power lines.
- Tighten the terminal block screws and cable screws to the torque specified in this manual.

Conformance to EC Directives

Applicable Directives

- EMC Directives
- Low Voltage Directives

Concepts

EMC Directives

OMRON devices that comply with EC Directives also conform to the related EMC standards so that they can be more easily built into other devices or the overall machine. The actual products have been checked for conformity to EMC standards.*1
Whether the products conform to the standards in the system used by the customer, however, must be checked by the customer. EMC-related performance of the OMRON devices that comply with EC Directives will vary depending on the configuration, wiring, and other conditions of the equipment or control panel on which the OMRON devices are installed.
The customer must, therefore, perform the final check to confirm that devices and the overall machine conform to EMC standards.

*1. Applicable EMC (Electromagnetic Compatibility) standards are as follows:
EMS (Electromagnetic Susceptibility): EN 61131-2 or EN 61000-6-2
EMI (Electromagnetic Interference): EN 61000-6-4 or EN 61131-2

Low Voltage Directives

Always ensure that devices operating at voltages of 50 to 1,000 VAC and 75 to 1,500 VDC meet the required safety standards. The applicable directive is EN 61131-2.

Conformance to EC Directives

The CJ-series products comply with EC Directives. To ensure that the machine or device in which the CJ-series product is used complies with EC Directives, the PLC must be installed as follows:

1. The CJ-series PLC must be installed within a control panel.
2. You must use reinforced insulation or double insulation for the DC power supplies used for the I/O power supplies.
3. CJ-series products conforming to EC Directives also conform to EN 61000-6-4 for EMI. Radiated emission characteristics (10-m regulations) may vary depending on the configuration of the control panel used, other devices connected to the control panel, wiring, and other conditions.

You must therefore confirm that the overall machine or equipment conforms to EC Directives.

Conditions for Conforming to EMC Directives

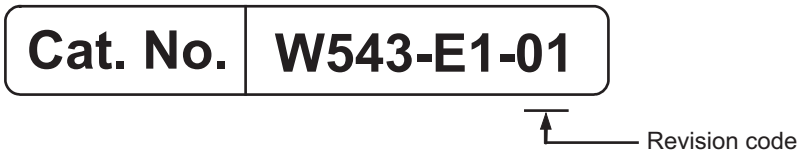
The following immunity test conditions apply to the CJ-series High-speed Analog Input Unit.

Overall Accuracy	High-speed Analog Input Unit	CJ1W-ADG41	+0.7%/–0.7%*1

*1. However, temporary fluctuations are allowed.

Revision History

A manual revision code appears as a suffix to the catalog number on the front and back covers of the manual.



Revision code	Date	Revised content
01	November 2014	Original production

Using this Manual

Manual Configuration

Refer to the following manuals as required when you use the CJ1W-ADG41.

Cat. No.	Model numbers	Manual name	Contents
W393	CJ1H-CPU□□H-R CJ1G/H-CPU□□H CJ1G-CPU□□P CJ1M-CPU□□ CJ1G-CPU□□	CJ Series Programmable Controllers Operation Manual	Provides an introduction to and the specifications of SYSMAC CJ-series PLCs and describes how to install and maintain them.
W394	CS1G/H-CPU□□H CS1G/H-CPU□□-V1 CS1D-CPU□□H CS1D-CPU□□S CJ1H-CPU□□H-R CJ1G/H-CPU□□H CJ1G-CPU□□P CJ1M-CPU□□ CJ1G-CPU□□ NSJ□-□□□□(B)-G5D NSJ□-□□□□(B)-M3D	CS/CJ Series Programmable Controllers Programming Manual	Describes how to use the SYSMAC CS/CJ-series PLCs.
W472	CJ2H-CPU6□-EIP CJ2H-CPU6□ CJ2M-CPU□□	CJ Series CJ2 CPU Unit Hardware User's Manual	Provides the basic specifications of the CJ2 CPU Units, including introductory information, designing, installation, and maintenance.
W473		CJ Series CJ2 CPU Unit Software User's Manual	Describes how to program and set up a CJ2 CPU Unit.
W474	CJ2H-CPU6□-EIP CJ2H-CPU6□ CJ2M-CPU□□ CS1G/H-CPU□□H CS1G/H-CPU□□-V1 CS1D-CPU□□H CS1D-CPU□□S CJ1H-CPU□□H-R CJ1G/H-CPU□□H CJ1G-CPU□□P CJ1M-CPU□□ CJ1G-CPU□□ NSJ□-□□□□(B)-G5D NSJ□-□□□□(B)-M3D	CS/CJ Series Programmable Controllers Instructions Reference Manual	Describes how to use the instructions for the SYSMAC CS/CJ-series PLCs.
W446	CXONE-AL□□C-V4 /AL□□D-V4	CX-Programmer Operation Manual	Describes how to use CX-Programmer (programming software).
W341	CQM1H-PRO01 CQM1-PRO01 C200H-PRO27 CS1W-KS001	CS/CJ Series Programming Consoles Operation Manual	Describes how to use the SYSMAC CS/CJ-series Programming Consoles.

Structure of this Manual

This manual consists of the following sections.
Use this information as reference and read the required parts of this manual.

Section 1	Features and System Configuration

This section describes the features, system configuration, and handling methods. Read this section when you use the High-speed Analog Input Unit for the first time.

Section 2	Component Names and Functions

This section describes the names of the components and the memory area allocations for CPU Bus Units.

Section 3	Specifications and Introductions to Functions

This section provides the performance specifications, the input conversion specifications, and introductions to functions.

Section 4	Wiring

This section describes the terminal block arrangements and provides input wiring examples.

Section 5	Memory Area Allocations to CPU Bus Units

This section describes the DM Area words for CPU Bus Units and the allocated operating data.

Section 6	Operating Procedures and Function Settings

This section describes the operating procedures and the function setting methods.

Section 7	Troubleshooting

This section describes error diagnosis with the alarm displays and suitable countermeasures.

Appendices

- Influence on Cycle Time
- Introduction to CX-Programmer Interface When Using CPS Files
- Frequency Response Performance

CONTENTS

Section 3 Specifications and Introductions to Functions

Section 4 Wiring

Section 5 Memory Area Allocations to CPU Bus Units

Section 6 Operating Procedures and Function Settings

Section 7 Troubleshooting

Appendix

1

Features and System Configuration

1-1 Features

1-1-1 Overview

The CJ1W-ADG41 is a SYSMAC CJ-series High-speed Analog Input Unit. Analog conversion is faster than previous Analog Input Units, and data buffering is supported to store data inside the Unit. You can also set an analog data comparator to generate interrupts in the CPU Unit, making this Unit easier to use.

1-1-2 Features

The CJ1W-ADG41 provides the following features.

● High-speed Analog Conversion

The CJ1W-ADG41 High-speed Analog Input Unit provides high-speed conversion of 80 μs for two inputs and 160 μs for four inputs.

● Data Buffering

You can use data buffering to store up to 30,000 words of data per input in internal memory in the Unit each specified buffering period.
You can transfer the data that is buffered in internal memory to the EM or DM Area in the CPU Unit by turning ON the Buffered Data Transfer Start Flag after buffering is completed. You can buffer data for all four inputs simultaneously.
You can select any of the following as a buffer trigger: external input, CPU Unit bit, or analog input level. You can also buffer data from before the trigger.

● Comparator

If the converted analog data exceeds a set value, an output is made to a preset location in the CIO Area.
You can set the following four values: comparator high high limit value, comparator high limit value, comparator low limit value, and comparator low low limit value. You can also set hysteresis.

● Comparator Interrupts

You can generate an interrupt in the CPU Unit when a comparator output turns ON.
When there is an interrupt request, the interrupt task for the specified interrupt task number is started at ultra-high speed as fast as 150 μs (for CJ1H-R).

● Zero and Span Adjustments

You can adjust the zero point and span point for the converted analog values.
The zero point is adjusted with an offset and the span point is used to adjust the gain using the minimum range value as the base point.

● Scaling

You can automatically convert the input analog values to user-specified values. Scaling eliminates the previous need to provide ladder programming (e.g., scaling using the SCL instruction) for numeric conversion.
You can scale the values between −32,768 and 32,767 decimal, and you can also perform reverse scaling to reverse the upper and lower limit values.

Mean Value Processing

You can find the moving average of the converted analog input values over the set number of previous cycles.
You can set the number of values to average to 2, 4, 8, 16, 32, or 64.

Input Disconnection Detection

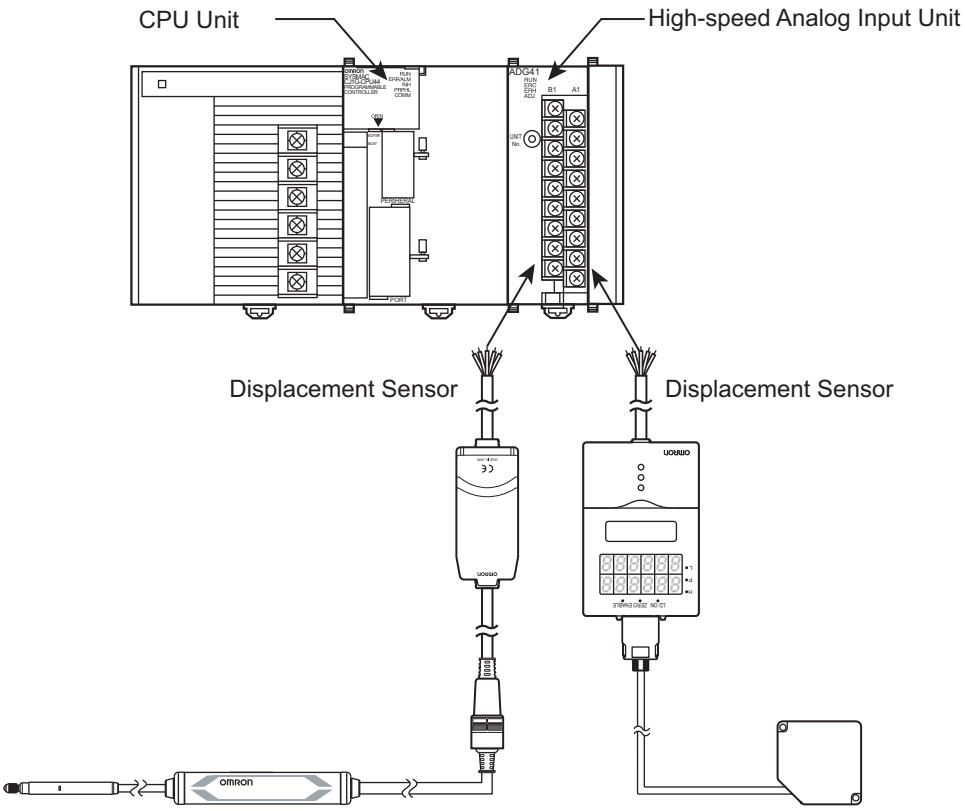
Input disconnection detection can be used for analog inputs within an input signal range of 1 to 5 V (4 to 20 mA).
Any input under 0.3 V (1.2 mA) will be regarded as a disconnection.

Adjustment Mode

You can set Adjustment Mode to adjust the zero point settings, span settings, analog input level trigger settings, comparator settings, and other settings during operation.

1-2 System Configuration

1-2-1 Basic System Configuration



1-2-2 Mounting Restrictions

- The CJ1W-ADG41 High-speed Analog Input Unit is a CJ-series CPU Bus Unit.
- You can mount up to 16 CPU Bus Units on the CJ-series CPU Rack and CJ-series Expansion Racks.
- The number of CPU Bus Units that you can mount on any one CPU Rack or Expansion Rack depends on the Power Supply Unit that is mounted and the current consumption of the other Units on the Rack.
  The maximum number of Units that can be mounted when only CJ1W-ADG41 Units are mounted is given below. (See note.)

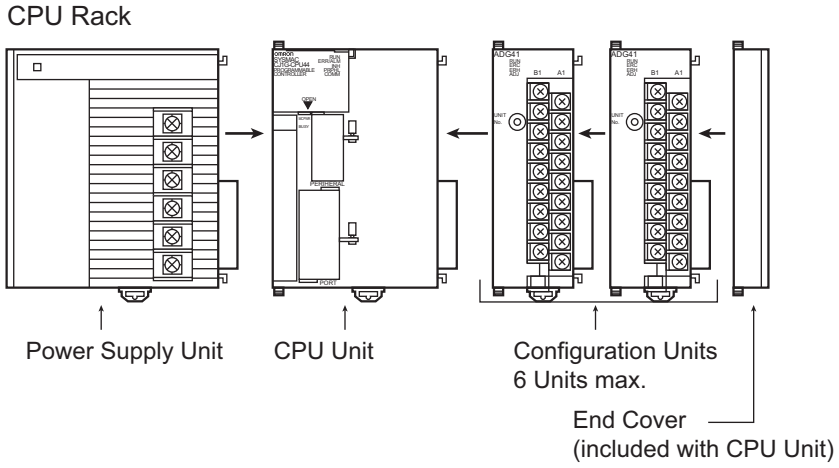
Power Supply Unit	Number of mountable Units		
	CPU Rack		Expansion Rack
	CJ1G, CJ1H, or CJ1H-R	CJ1M	
CJ1W-PA205R CJ1W-PA205C CJ1W-PD025 (5 VDC, 5.0 A)	6	6	7
CJ1W-PA202 (5 VDC, 2.8 A)	2	3	4
CJ1W-PD022 (5 VDC, 2.0 A)	1	2	2

Note The number of Units that can be mounted and the mounting locations are restricted if you use interrupts. Details are given in the following table.

Power Supply Unit	Number of mountable Units			Mounting locations	
	CPU Rack		Expansion Rack	CJ1G, CJ1H, or CJ1H-R	CJ1M
	CJ1G, CJ1H, or CJ1H-R	CJ1M			
CJ1W-PA205R CJ1W-PA205C CJ1W-PD025 (5 VDC, 5.0 A)	5	3	Not allowed.	Slots 0 to 4	Slots 0 to 2
CJ1W-PA202 (5 VDC, 2.8 A)	2	3	Not allowed.	Slots 0 to 4	Slots 0 to 2
CJ1W-PD022 (5 VDC, 2.0 A)	1	2	Not allowed.	Slots 0 to 4	Slots 0 to 2

1-2-3 Mounting the Unit

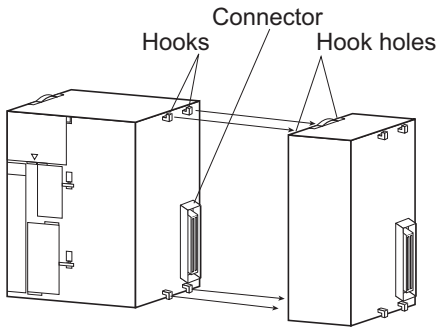
Connect the CJ1W-ADG41 as shown below.



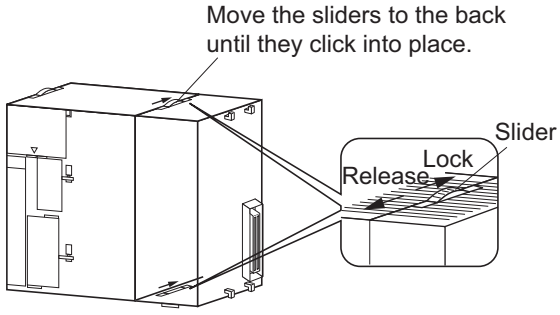
Mounting Procedure

Use the following procedure to mount the CJ1W-ADG41.

1 Align the connectors and press in firmly on the Units to connect them completely.



2 Move the yellow sliders on the top and bottom of the Unit to the lock position to secure the Units. The sliders should click into place.



3 Attach an End Cover to the Unit on the right end of the Rack.

Precautions for Safe Use

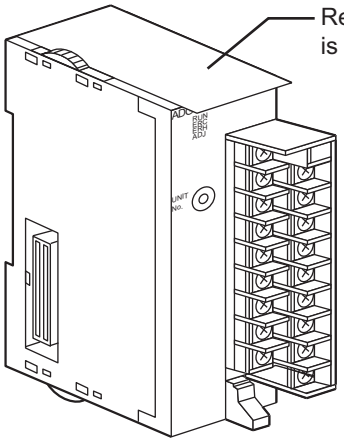
- Be sure that the sliders, terminal blocks, and other items with locking devices are properly locked into place.
- Mount the High-speed Analog Input Unit only after checking the terminal block completely.

Precautions for Correct Use

The CJ-series PLC may not operate properly if the sliders are not locked firmly into place.

1-2-4 Precautions

- Be sure to turn OFF the power supply to the PLC before connecting or removing the Unit or connecting wires.
- To reduce the risk of malfunctioning due to electrical noise, wire input and output lines in separate ducts from high-voltage and power lines.
- When wiring the Unit, leave the label in place on the top of the Unit to prevent wire scraps or other materials from getting inside the Unit. Remove the label after the completion of wiring to ensure proper heat dissipation.

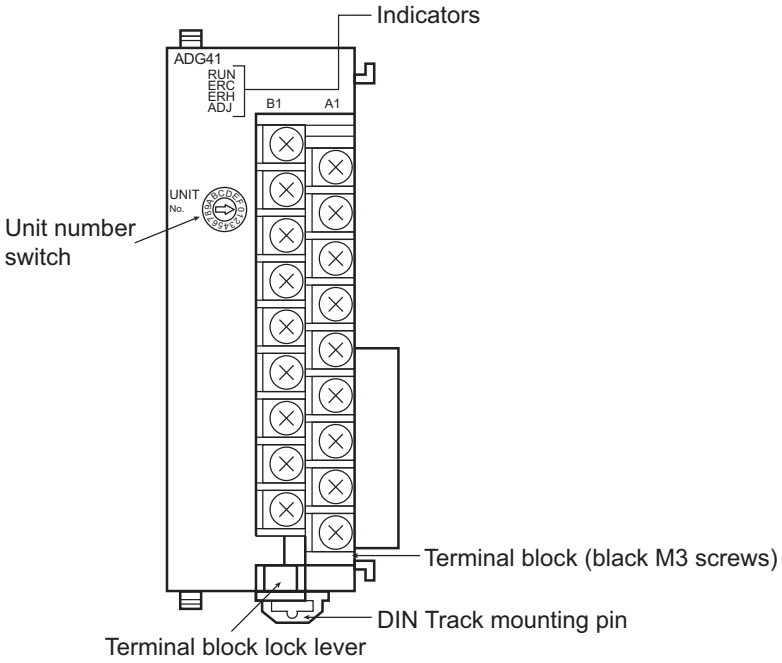


2

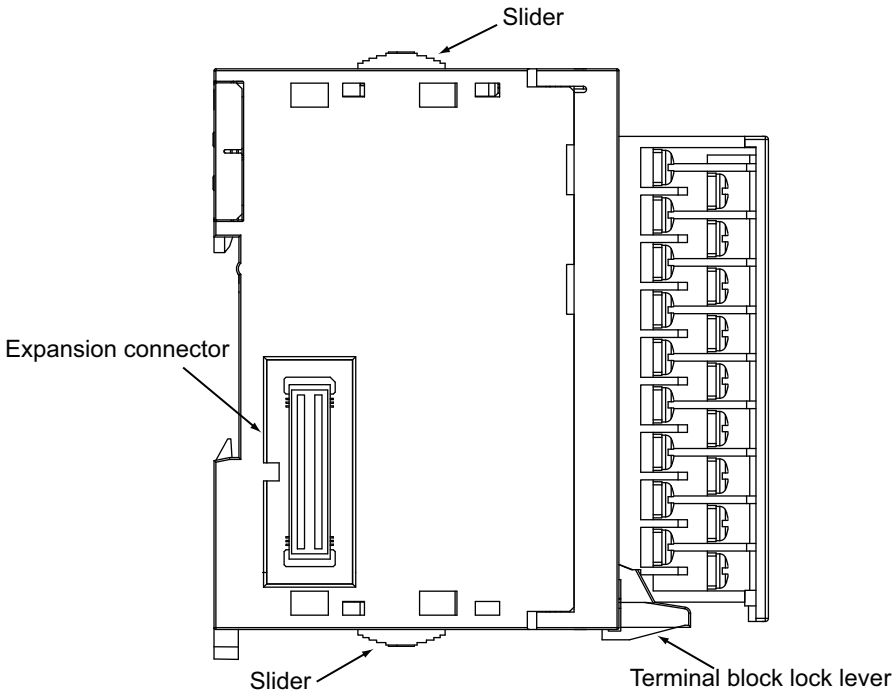
Component Names and Functions

2-1 Component Names

- **Front**

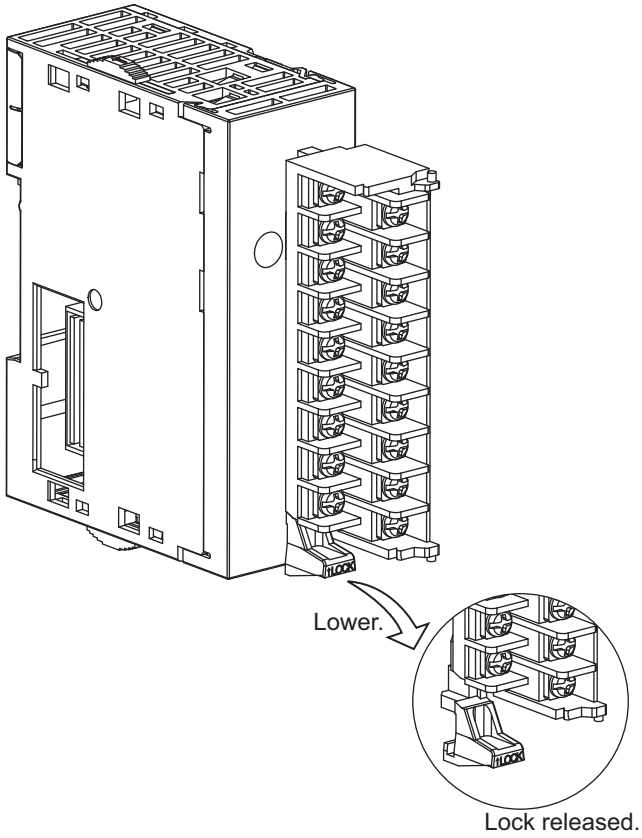


- **Side**



Additional Information

- The terminal block is attached using a connector. It can be removed by lowering the lever at the bottom of the terminal block.
- The lever must normally be in the raised position. Confirm this before operation.



Indicators

The indicators show the operating status of the CJ1W-ADG41. The following table gives the meanings of the indicators.

Indicator	Name	Indicator status	Operating status
RUN (green)	Operating	Lit	Operating normally.
		Not lit	Unit has stopped exchanging data with the CPU Unit.
ERC (red)	Error detected by Unit	Lit	Alarm has occurred (such as input disconnection detection) or initial settings are incorrect.
		Not lit	Operating normally.
ERH (red)	Error in CPU Unit or bus	Lit	Error has occurred during data exchange with the CPU Unit.
		Not lit	Operating normally.
ADJ (yellow)	Adjusting	Flashing	Operating in Adjustment Mode (D(m+99) = 0001).*1
		Not lit	Operating in normal operating mode.

*1. “m” in the DM Area equals 30000 + Unit number × 100.

2-2 Setting the Unit Number

You can mount more than one CPU Bus Unit in the same CJ-series PLC. The unit number is used to identify the CPU Bus Units when more than one High-speed Analog Input Unit or other CPU Bus Units are mounted. Set the unit number to between 0 and F hex on the rotary switch on the front of the CJ1W-ADG41.

The unit number is used to identify more than one High-speed Analog Input Unit or other CPU Bus Units in the same PLC, so each CPU Bus Unit in the same PLC must have a unique number.

Precautions for Correct Use

Make sure that the power supply is OFF when you set the unit number.

Word Allocations

The CIO Area words and DM Area words that are used by the CJ1W-ADG41 are determined by the unit number of the CJ1W-ADG41.

● CIO Area Words Allocated to CPU Bus Units (25 Words Starting from CIO 1500 + Unit Number × 25)

Each Unit is allocated 25 words starting from CIO 1500 according to the unit number. Specific word allocations are given in the following table.

Unit number	CIO Area	Unit number	CIO Area
0	CIO 1500 to CIO 1524	8	CIO 1700 to CIO 1724
1	CIO 1525 to CIO 1549	9	CIO 1725 to CIO 1749
2	CIO 1550 to CIO 1574	A	CIO 1750 to CIO 1774
3	CIO 1575 to CIO 1599	B	CIO 1775 to CIO 1799
4	CIO 1600 to CIO 1624	C	CIO 1800 to CIO 1824
5	CIO 1625 to CIO 1649	D	CIO 1825 to CIO 1849
6	CIO 1650 to CIO 1674	E	CIO 1850 to CIO 1874
7	CIO 1675 to CIO 1699	F	CIO 1875 to CIO 1899

● DM Area Words Allocated to CPU Bus Units (100 Words Starting from D30000 + Unit Number × 100)

Each Unit is allocated 100 words starting from D30000 according to the unit number. Specific word allocations are given in the following table.

Unit number	DM Area	Unit number	DM Area
0	D30000 to D30099	8	D30800 to D30899
1	D30100 to D30199	9	D30900 to D30999
2	D30200 to D30299	A	D31000 to D31099
3	D30300 to D30399	B	D31100 to D31199
4	D30400 to D30499	C	D31200 to D31299
5	D30500 to D30599	D	D31300 to D31399
6	D30600 to D30699	E	D31400 to D31499
7	D30700 to D30799	F	D31500 to D31599

3

Specifications and Introductions to Functions

3-1 Performance Specifications

General Specifications

Item	Specification
Ambient operating temperature	0 to 55°C (with no condensation)
Ambient operating humidity	10% to 90% (with no condensation)
Atmosphere	Must be free from corrosive gases.
Ambient storage temperature	–20 to 75°C
Enclosure	Mounted in a panel

Specifications

Item	Specification
Unit model	CJ1W-ADG41
Unit group	CJ-series CPU Bus Units
Isolation	i-Coupler isolation between input signals and PLC signals
External terminals	18-point detachable terminal block (M3 screws)
Affect on CPU Unit cycle time	0.14 ms max. when mounted to CJ1H-R (In Adjustment Mode: 0.2 ms max.)
Internal current consumption	650 mA
Dimensions	31 × 90 × 65 (W × H × D)
Weight	150 g max.
Unit mounting locations	CJ-series CPU Rack or CJ-series Expansion Rack*1
Maximum number of mounted Units	CPU Rack: 6 Units, Expansion Rack: 7 Units, All Racks: 16 Units
Data exchange with CPU Unit	Words Allocated to CPU Bus Unit Area in CIO Area (CIO 1500 to CIO 1899) 25 words/Unit Words Allocated to CPU Bus Unit Area in DM Area (D30000 to D31599) 100 words/Unit

*1. The Units must be mounted in slots 0 to 4 on the CPU Rack to use interrupts. (They must be mounted in slots 0 to 2 on a CJ1M CPU Rack.)

Input Specifications

Item		Specification
Analog inputs	Number of inputs	4
	Signal ranges and resolutions	−10 to 10 V (1/60,000 resolution) 0 to 10 V or 0 to 5 V (1/30,000 resolution) 1 to 5 V or 4 to 20 mA (1/24,000 resolution)
	Conversion period	80 μs max. for two inputs*1 or 160 μs max. for four inputs
	Overall accuracy	±0.05% of F.S. at 25°C or ±0.1% of F.S. at 0 to 55°C
	Maximum ratings	Voltage inputs: ±15 V, Current inputs: ±30 mA
	Input impedance	Voltage inputs: 1 MΩ min., Current inputs: 250 Ω (typical)
External trigger inputs	Number of inputs	4
	Input voltage	24 VDC
	Allowable input voltage range	20.4 to 26.4 VDC
	Input impedance	3.3 kΩ
	Input current	7 mA typical (at 24 VDC)
	ON voltage/ON current	14.4 VDC min./3 mA min.
	OFF voltage/OFF current	5 VDC max./1 mA max.
	ON response time	0.05 ms max.
	OFF response time	0.5 ms max.
	Minimum readable pulse width	160 μs

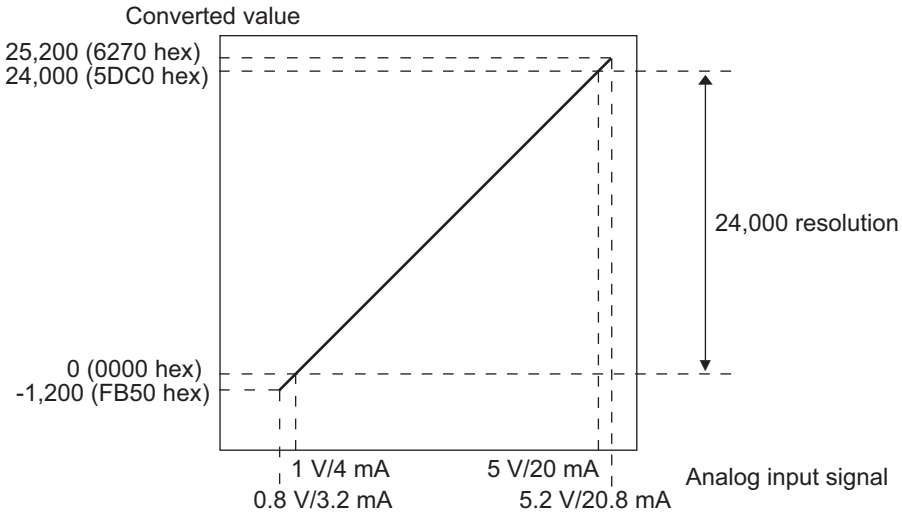
*1. Applicable only when input 1 and input 2 are used.

3-2 Input Conversion Specifications

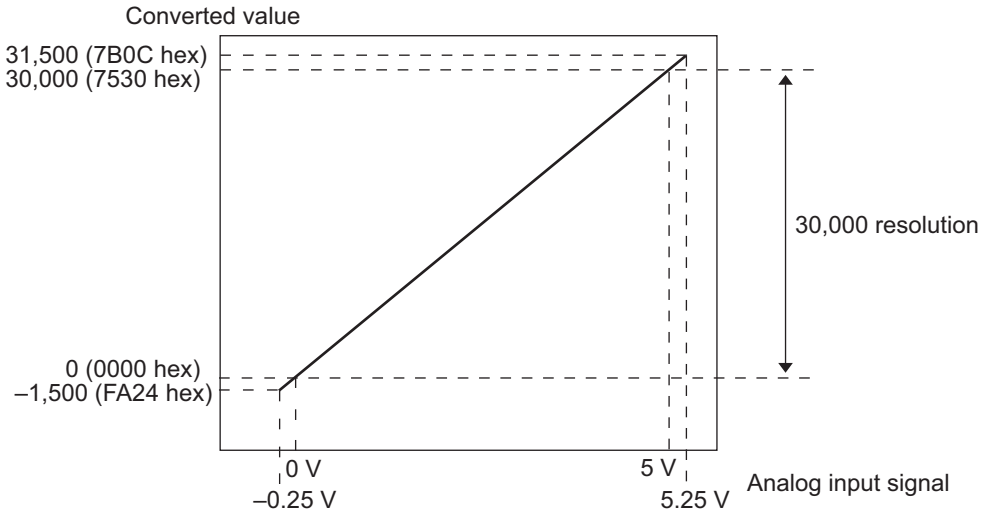
3-2-1 Input Conversion Specifications

If signals that are outside the specified range given below are input, the converted values (16-bit binary data) used will be either the maximum or minimum value.

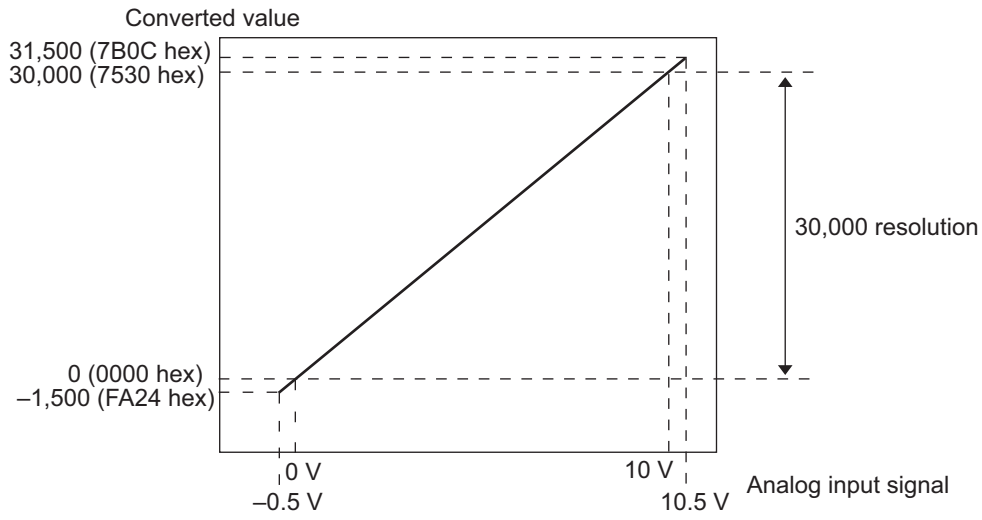
Range: 1 to 5 V or 4 to 20 mA



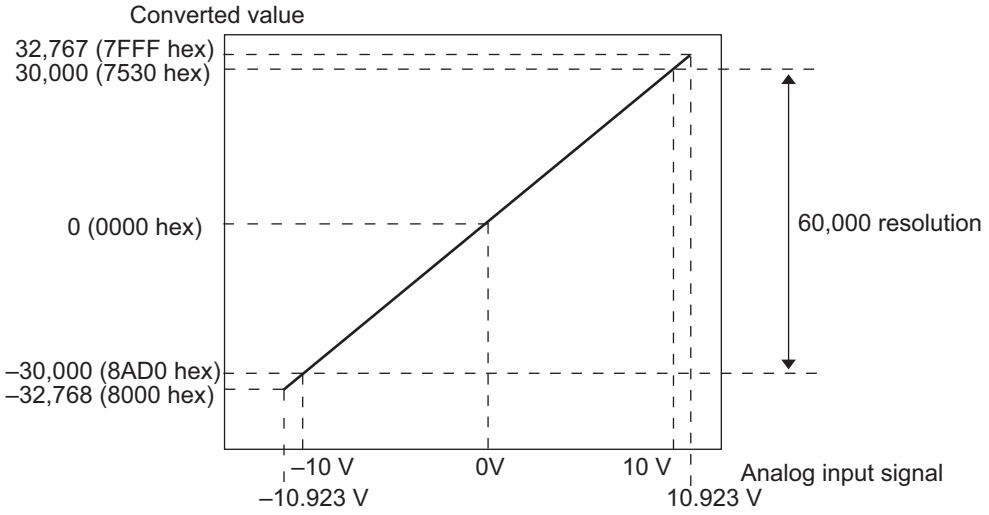
Range: 0 to 5 V



Range: 0 to 10 V

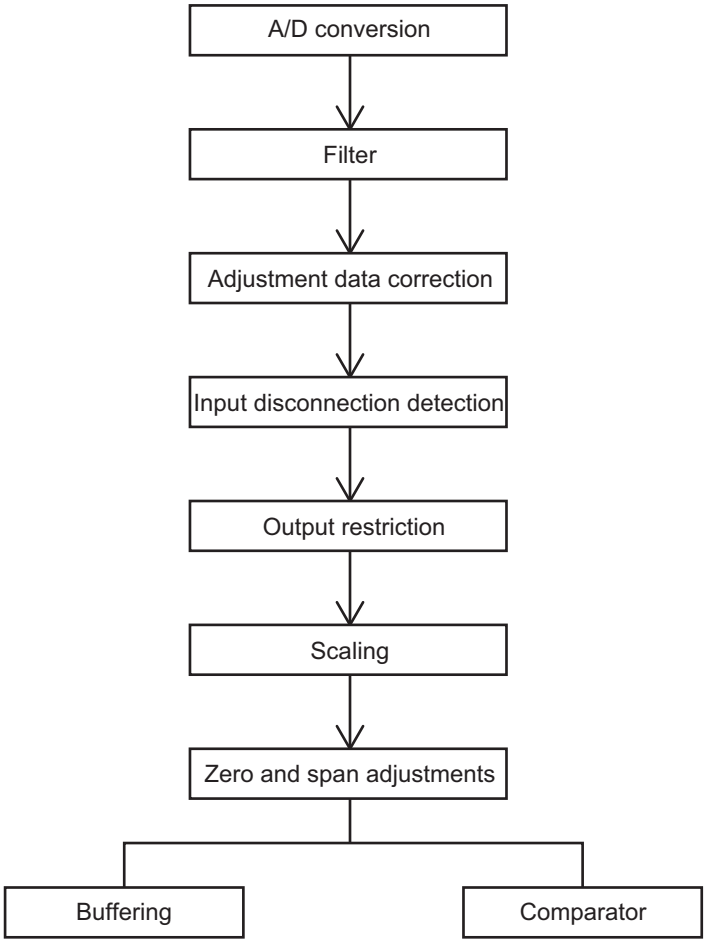


Range: –10 to 10 V



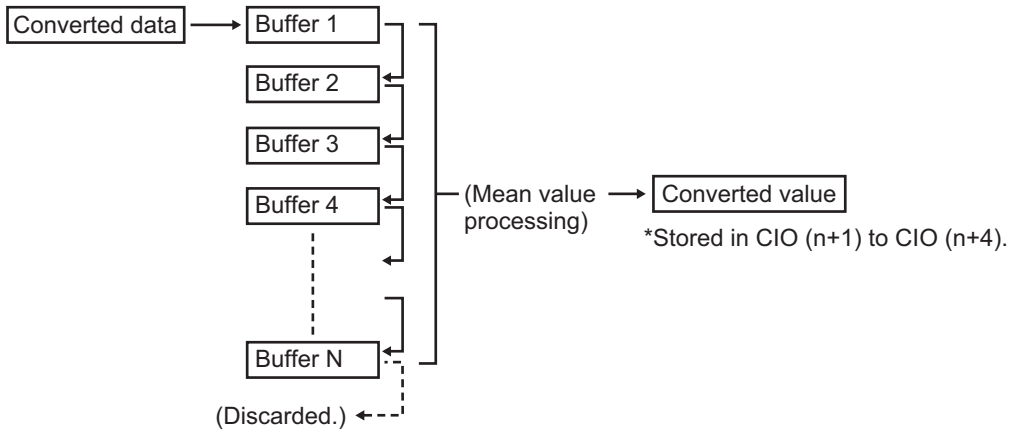
3-3 Introductions to Functions

The order of function processing is given below.



3-3-1 Mean Value Processing

The CJ1W-ADG41 can average the converted values of the analog inputs that have been previously sampled. This helps reduce the influence of noise.
Mean value processing involves taking the moving average of buffer data, so it has no effect on the data refresh cycle. (The number of buffers that can be set to use for mean value processing is 2, 4, 8, 16, 32, or 64.)



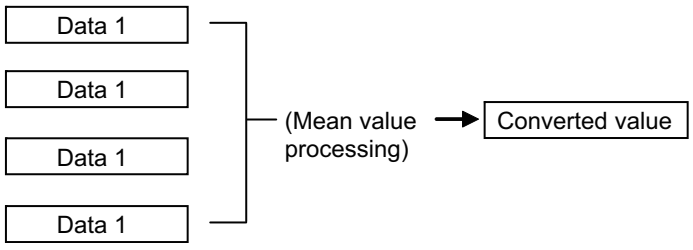
Additional Information

When "N" buffers are being used, the first converted data will be stored in all "N" buffers immediately after data conversion has started or after a disconnection is restored.

● Example

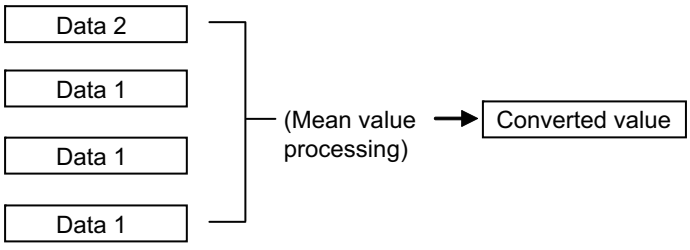
- Mean value processing is performed as shown below. (In this example, there are four buffers.)

1 In the first cycle, data 1 is stored in all of the buffers.



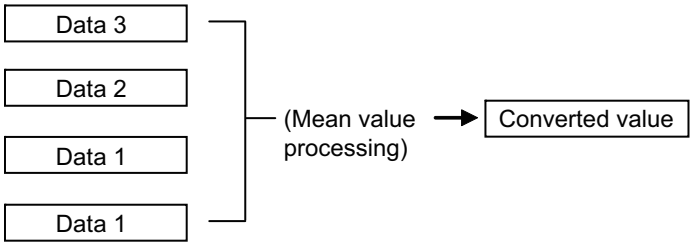
Mean value = (Data 1 + Data 1 + Data 1 + Data 1) ÷ 4

2 In the second cycle, data 2 is stored in the first buffer.



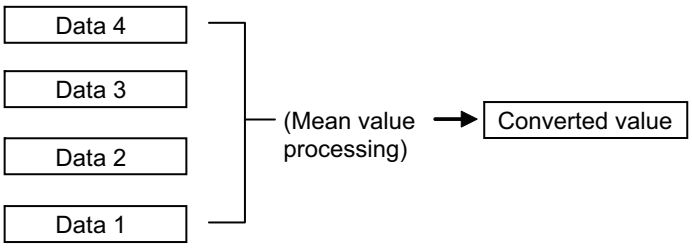
Mean value = (Data 2 + Data 1 + Data 1 + Data 1) ÷ 4

3 In the third cycle, data 3 is stored in the first buffer.



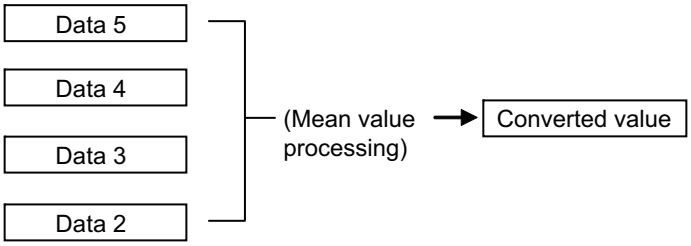
Mean value = (Data 3 + Data 2 + Data 1 + Data 1) ÷ 4

4 In the fourth cycle, data 4 is stored in the first buffer.



Mean value = (Data 4 + Data 3 + Data 2 + Data 1) ÷ 4

5 In the fifth cycle, data 5 is stored in the first buffer.



Mean value = (Data 5 + Data 4 + Data 3 + Data 2) ÷ 4

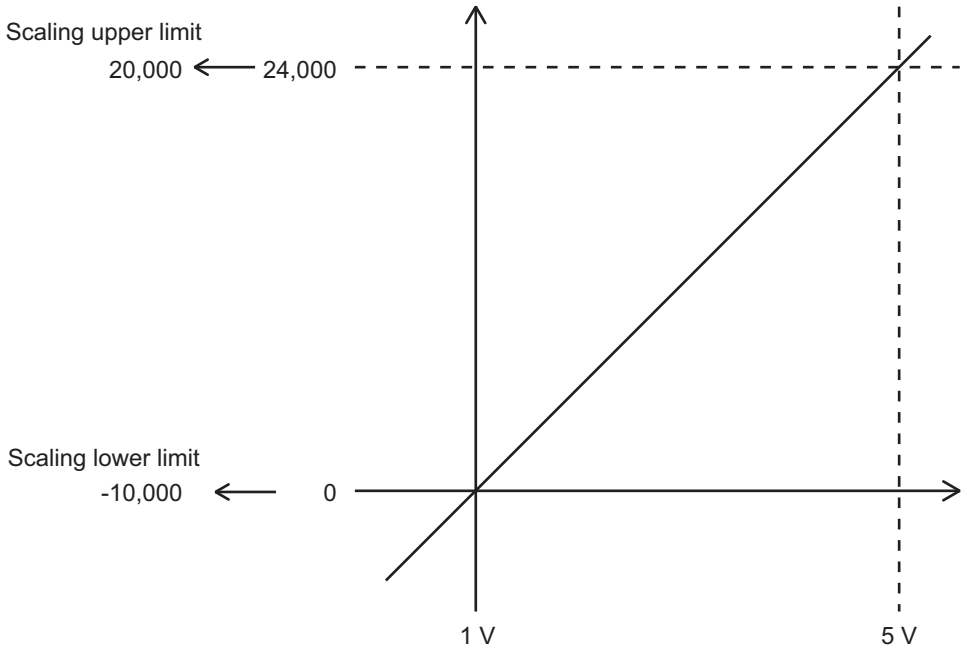
- When a disconnection line is restored, mean value processing starts again from step 1.

3-3-2 Scaling

You can use scaling to convert the analog input values to values in a range between specified upper and lower limits.
You can set the upper and lower limits for scaling to between –32,768 (8000 hex) and 32,767 (7FFF hex).
You can also perform reverse scaling by reversing the upper and lower limit settings.
If both the upper and lower scaling limits are set to 0 (0000 hex), scaling will not be performed (i.e., normal operation without scaling will be performed).

● Example

Range: 1 to 5 V, Scaling Upper Limit: 20,000, Scaling Lower Limit: –10,000



- If the scaling upper limit equals the scaling lower limit, normal scaling will not be preformed and the A/D converted value will always be the set upper/lower limit value.
- The actual converted value will be between –5% and 105% of the scaling upper/lower limits. However, the converted values will not exceed –32,768 (8000 hex) to 32,767 (7FFF hex).
- Even if the scaling width exceeds the valid resolution, the actual valid resolution will not change.

3-3-3 Comparator

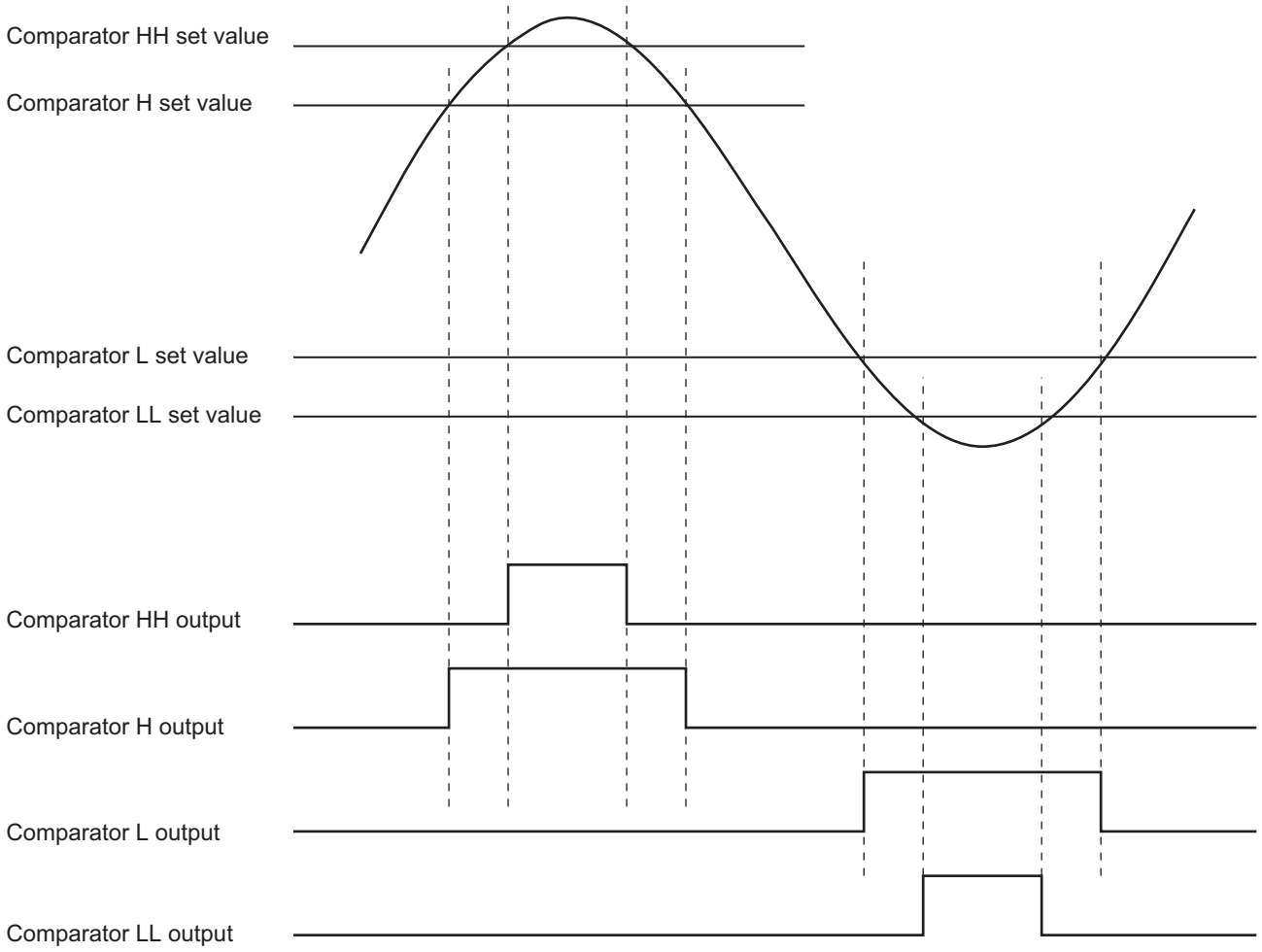
The comparator compares the converted analog input value with the comparator HH, H, L, and LL set values and turns the comparator outputs (HH bit, H bit, L bit, and LL bit) ON and OFF.

ON Conditions

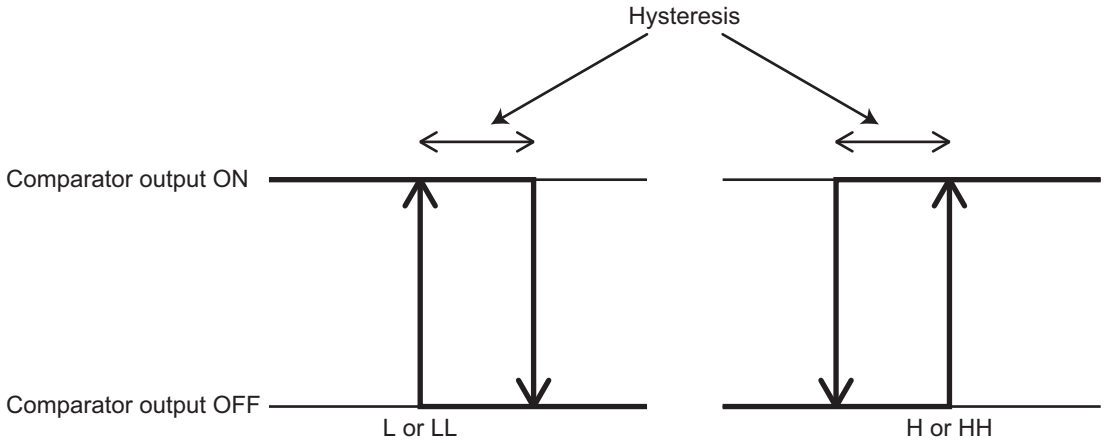
HH: A/D converted value > Comparator HH set value
H: A/D converted value > Comparator H set value
L: A/D converted value < Comparator L set value
LL: A/D converted value < Comparator LL set value

OFF Conditions

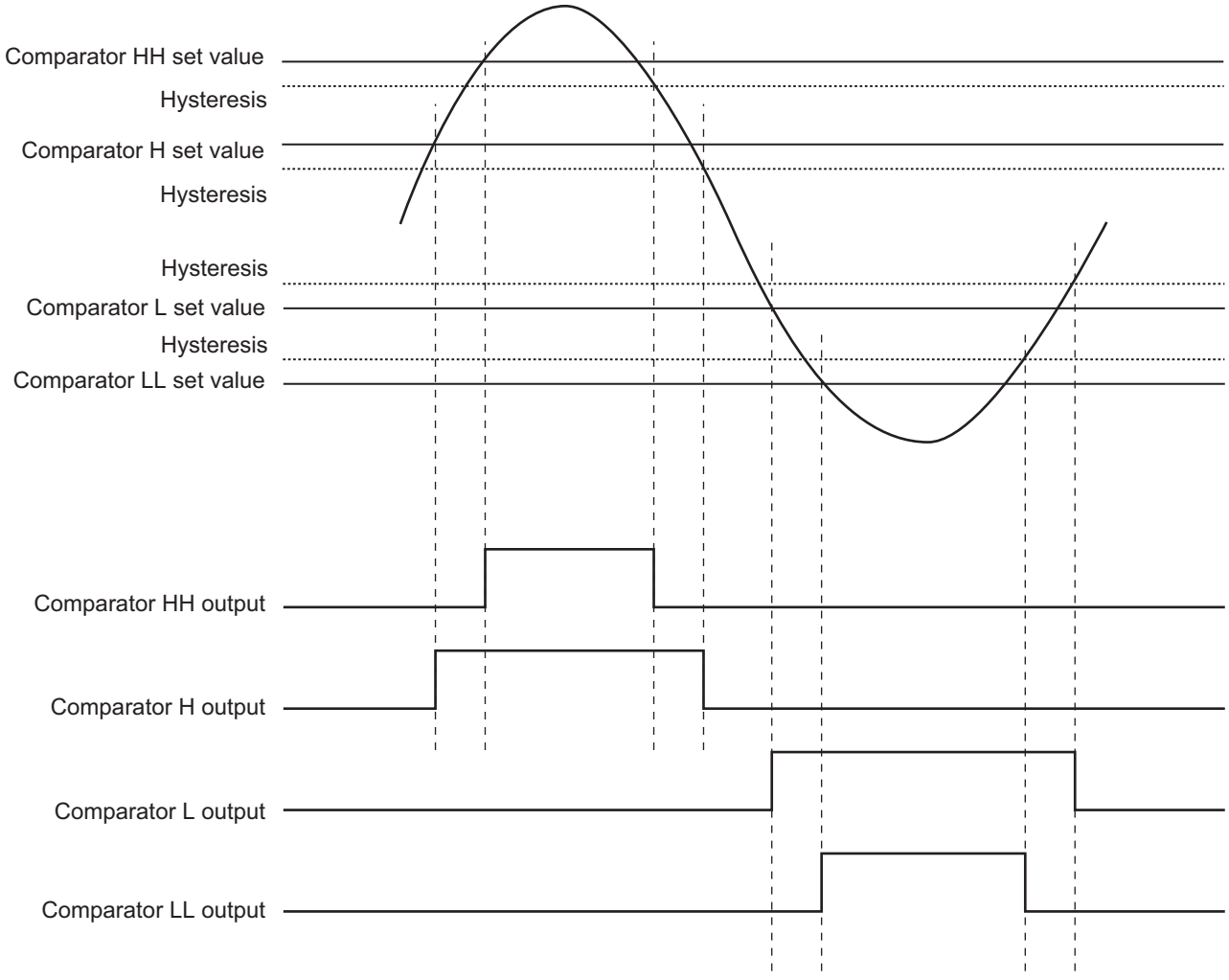
HH: A/D converted value ≤ Comparator HH set value − Hysteresis
H: A/D converted value ≤ Comparator H set value − Hysteresis
L: A/D converted value ≥ Comparator L set value + Hysteresis
LL: A/D converted value ≥ Comparator LL set value + Hysteresis



You can also set hysteresis.

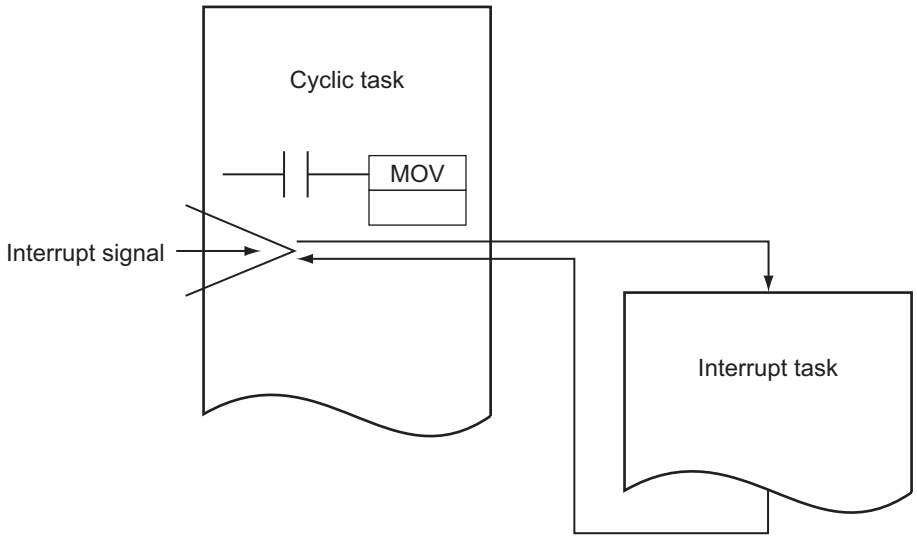


In any case, you set the width between the comparator output turning ON and OFF.



3-3-4 Comparator Interrupts

You can generate an interrupt in the CPU Unit when a comparator output bit turns ON.
You can start an interrupt task at an ultra-high speed of up to 150 μs (when mounted to a CJ1H-R CPU Rack) without being influenced by the CPU Unit cycle time.
When the specified interrupt input turns ON, the cyclic task (which contains normal programming) in the CPU Unit is interrupted and an interrupt task (specified with interrupt task number 0 to 255) is executed. After execution of the interrupt task is completed, execution of the cyclic task is started again from the instruction that was interrupted.



Interrupt Task Priority

● When Multiple Interrupt Factors Occur Simultaneously in the High-speed Analog Input Unit

The High-speed Analog Input Unit can record up to four interrupt factors. The priority when more than one interrupt factor occurs simultaneously in the High-speed Analog Input Unit is given below. Any interrupt factor that occurs for the same input number when an interrupt factor is being processed or waiting to be processed is discarded.

Input 1 HH > Input 1 H > Input 1 L > Input 1 LL > Input 2 HH ·····> Input 4 L > Input 4 LL

Example 1: When HH for Input 1 and HH for Input 2 Occur Simultaneously

Interrupt processing for input 1 HH is executed.

When the above processing is completed, interrupt processing for input 2 HH is executed.

Example 2: When HH and H for Input 1 Occur Simultaneously

Interrupt processing for only input 1 HH is executed.

(Interrupt processing for input 1 H is discarded.)

● When Another Interrupt Factor Occurs in the CPU Unit

If another interrupt factor occurs in the CPU Unit, the priority of the interrupt factors (I/O interrupt tasks) for the High-speed Analog Input Unit is conditional as described below.

- When the Interrupt Factor for the High-speed Analog Input Unit Occurs during Execution of Another Interrupt Task
  If another task is being executed in the CPU Unit, the interrupt task (I/O interrupt task) for the High-speed Analog Input Unit is executed after execution of the other task is completed.

- When More Than One Interrupt Factor Occurs Simultaneously
  The order of interrupt task execution when more than one interrupt factor occurs simultaneously is as follows:

  Power OFF interrupt task > I/O interrupt task > External interrupt task > Scheduled interrupt task

  If more than one interrupt factor for the same type of interrupt task occur simultaneously, the interrupt tasks are executed in ascending order of the task numbers.

Additional Information

Refer to the *CS/CJ/NSJ-series Programmable Controllers Programming Manual* (Cat. No. W394) or the *CJ-series CJ2 CPU Unit Software User's Manual* (Cat. No. W473) for details on interrupt tasks.

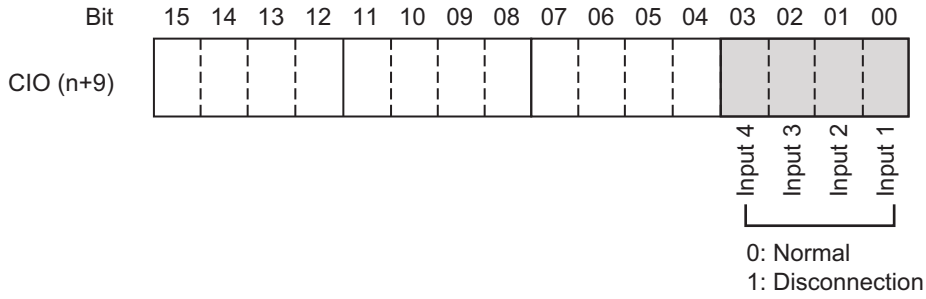
3-3-5 Input Disconnection Detection

When an input signal range of 1 to 5 V (4 to 20 mA) is used, input circuit disconnections can be detected. The detection condition for each of the input signal ranges is shown in the following table.

Input signal range	Voltage/current for input disconnection detection*1
1 to 5 V	Less than 0.3 V
4 to 20 mA	Less than 1.2 mA

*1. The voltage/current level for input disconnection detection is not affected by the zero and span adjustments.

The Disconnection Detection Flags for the inputs are stored in bits 00 to 03 in CIO (n+9). Specify these bits as execution conditions to use input disconnection detection in user programming.



The corresponding bit turns ON when a disconnection is detected for a given input. When the disconnected line is restored, the bit turns OFF.

Additional Information

- In CIO Area addresses, "n" equals 1500 + Unit number × 25.
- The converted value during a disconnection will be 7FFF hex.
- If mean value processing is being performed, input disconnection detection is performed for the data after mean value processing. That means that a disconnection will not be detected by the High-speed Analog Input Unit even if a signal that is below the input disconnection detection level is input temporarily.

3-3-6 Data Buffering

You can use data buffering to store the specified number of samples (up to 30,000 words of data per input) in internal memory in the High-speed Analog Input Unit each specified buffering period (80 μs min.). You can transfer the data that is buffered in internal memory to the EM or DM Area in the CPU Unit by turning ON the Buffer Transfer Flag after buffering is completed.
Data buffering is performed inside the High-speed Analog Input Unit, so it is not affected by the cycle time of the CPU Unit. This provides the following features.

- Buffering can be performed for a period as short as 80 μs for two inputs.
- The buffering interval is constant.

Data buffering is supported only in Normal Mode. Data is not buffered in Adjustment Mode even if a trigger is input.
You can select any of the following as a buffer trigger: external input, CPU Unit bit, or analog input level. You can also buffer data from before the trigger.

- Buffering is not performed in Adjustment Mode. If the specified number of buffered data is exceeded, buffering is stopped even if the buffering trigger condition is still met. If the specified number of data is not buffered while the CPU Unit bit trigger or external input trigger is ON and the trigger goes OFF, buffering is stopped and 0000 hex is stored for the remaining buffered data.

*1. When you transfer buffered data to the DM Area, the total number of buffered data and number of buffered data to transfer must be 30,000 words maximum total for all inputs.

Precautions for Correct Use

When you transfer buffered data to the DM Area, set the number of buffered data to transfer for unused inputs to 0. If you set the number of buffered data to transfer to any other value, that data will be included in the total number of buffered data to transfer even if the input is not used.

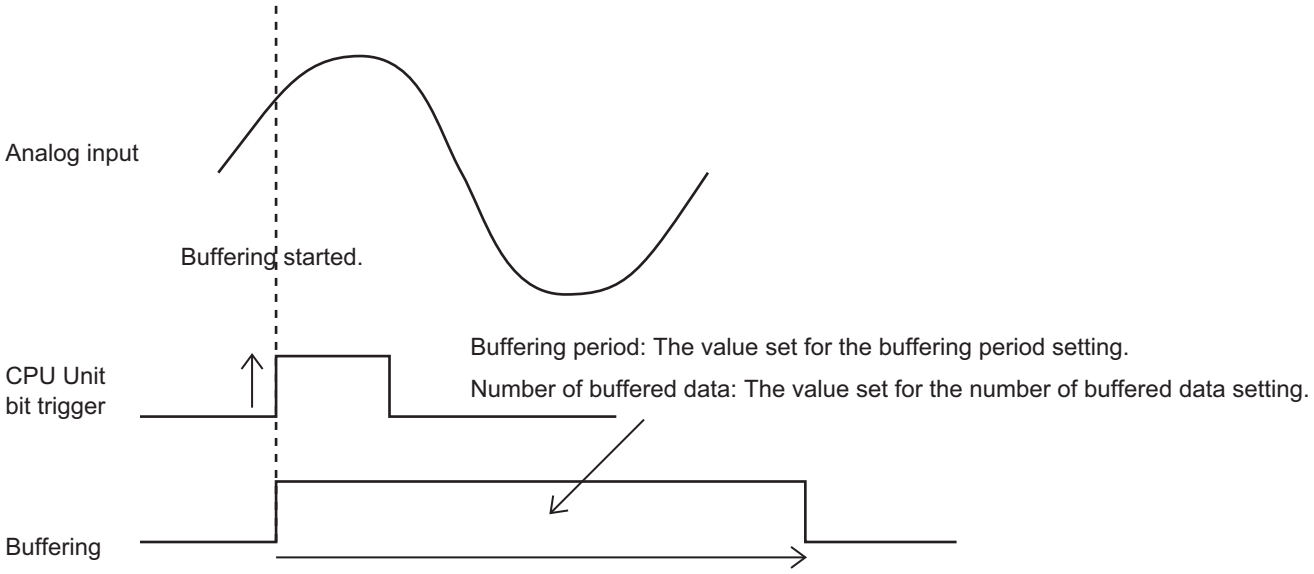
Buffering Triggers

Data is buffered when the buffering trigger condition is met.
There are three types of buffering triggers: CPU Unit bit triggers, external input triggers, and analog input level triggers. You can set the buffering trigger individually for each input.

● CPU Unit Bit Triggers

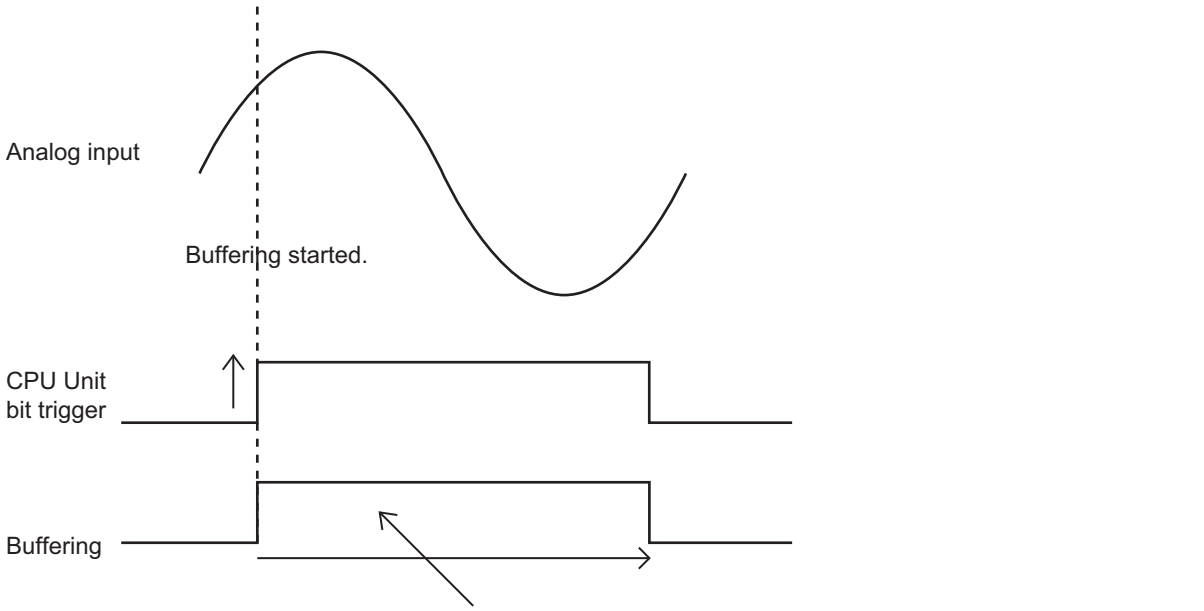
A CPU Unit bit trigger is the only one of the three types of buffering triggers that you can use to start buffering data with an independent signal input.
There are two methods to start buffering: when the bit trigger in the CPU Unit turns ON or continuously while the bit trigger is ON.

- Buffering When the Trigger Turns ON



Buffering is not started again even if the CPU Unit bit trigger turns ON again while data is being buffered (i.e., while the Buffering Flag is ON).

- Buffering While the Trigger Is ON

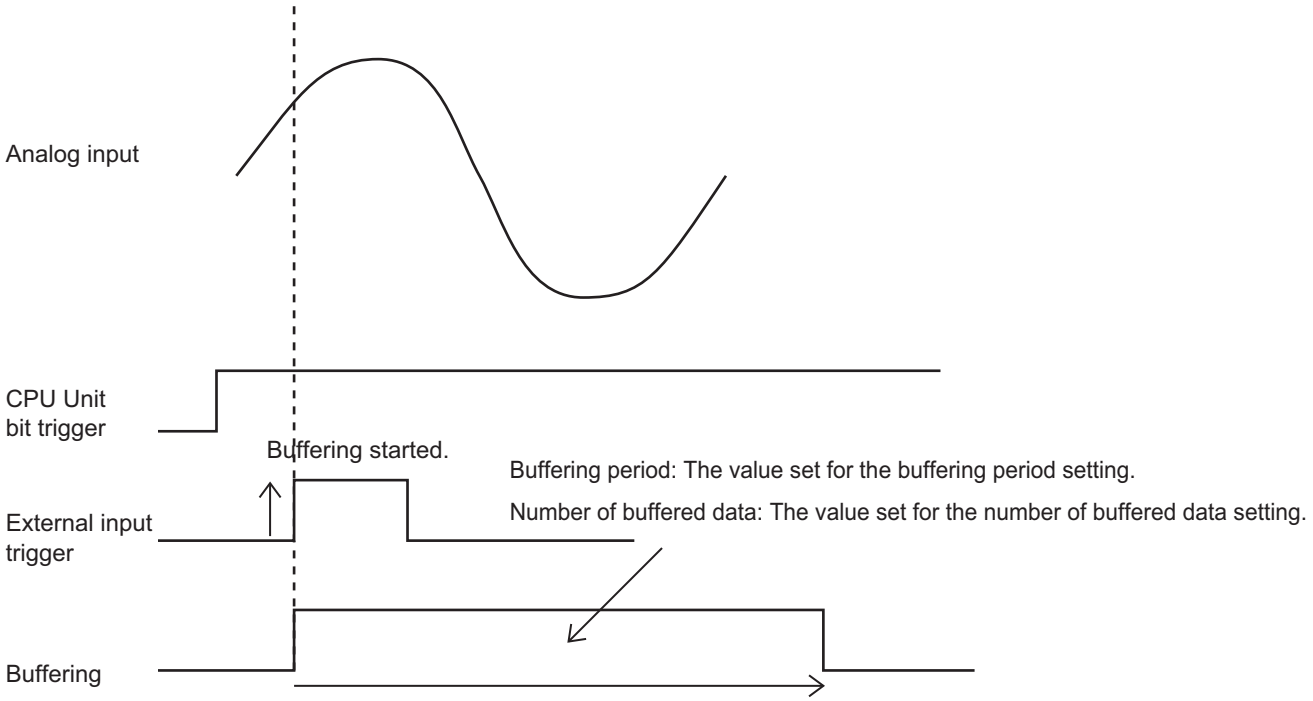


Buffering is not performed again even if the CPU Unit bit trigger (relevant bit in CIO n) is ON when buffering is completed. You must turn the CPU Unit bit trigger OFF and then ON again. Buffering will be stopped if the CPU Unit bit trigger is turned OFF before buffering is completed.

External Input Triggers

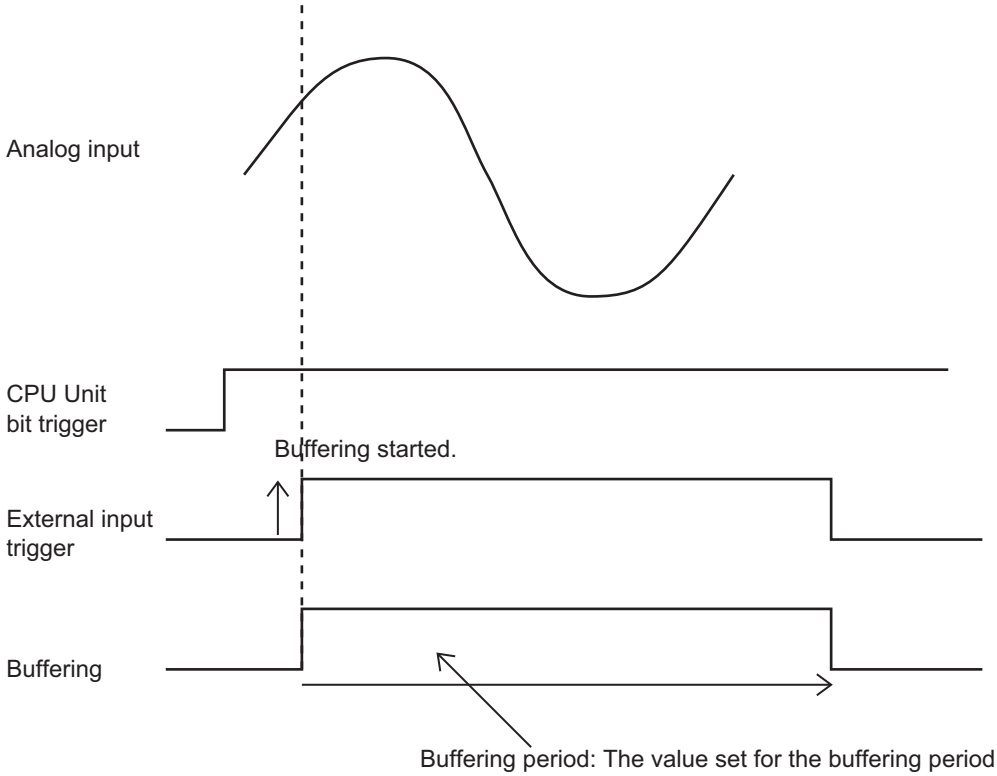
Inputting the external input trigger signal alone will not start buffering. The external input trigger signal must be input while the CPU Unit bit trigger is ON.
In the same way as for a CPU Unit bit trigger, there are two methods to start buffering: when the external input trigger turns ON or continuously while external input trigger is ON.

- Buffering When the Trigger Turns ON



Buffering is not started again even if the external input trigger turns ON again while data is being buffered (i.e., while the Buffering Flag is ON).

- Buffering While the Trigger Is ON

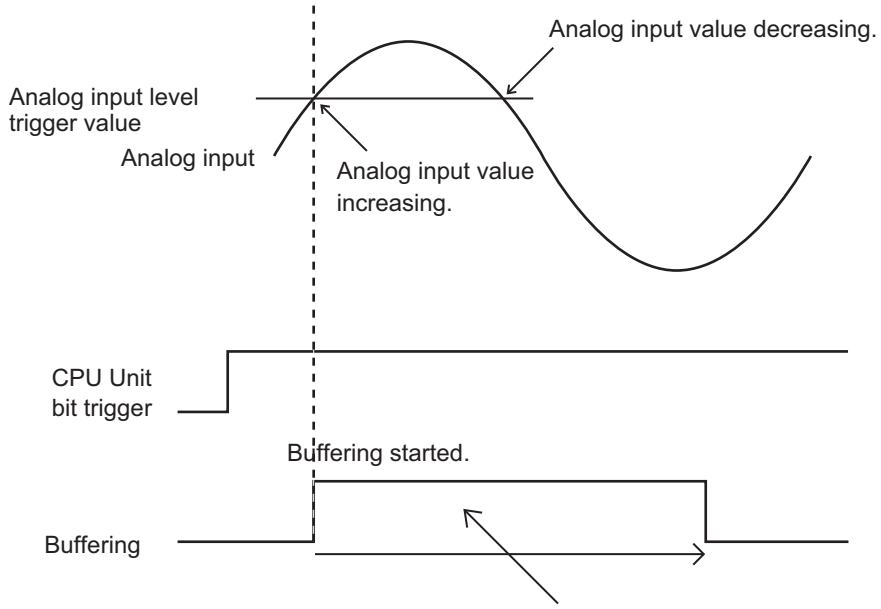


Buffering period: The value set for the buffering period setting.

Number of buffered data: Buffering is stopped if the specified number of buffered data is exceeded while the bit trigger is ON.

● Analog Input Level Triggers

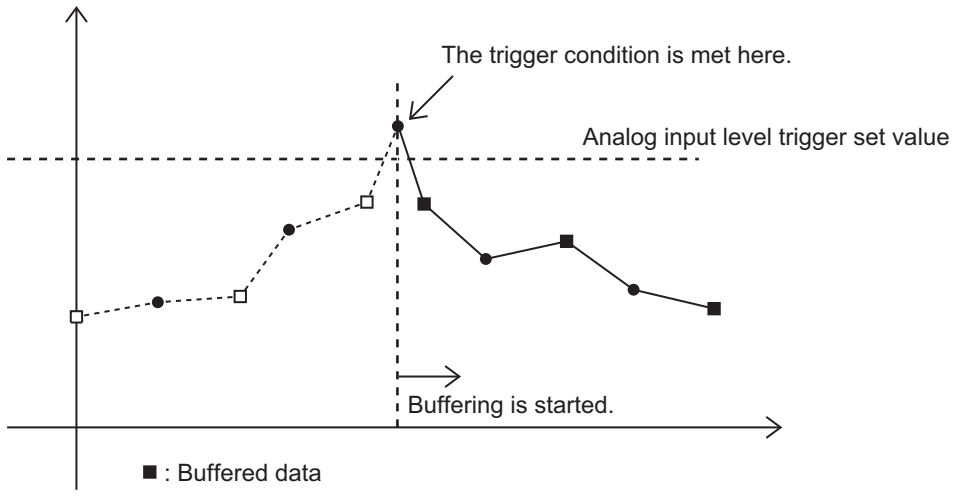
Buffering is started when the analog input passes the analog input level trigger value while the CPU Unit bit trigger is ON.
In the buffering trigger settings, you can set whether the analog input level trigger is valid when the analog input value is increasing or when it is decreasing.
(The following diagrams show when the trigger is valid while the analog input value is increasing.)
Buffering is not started again even if the analog input value passes the analog input level trigger value again while data is being buffered (i.e., while the Buffering Flag is ON).



Buffering period: The value set for the buffering period setting.
Number of buffered data: The value set for the number of buffered data setting.

If the buffering period is set to any value except for 1 and the Buffering Trigger Setting is set to the analog input level trigger, the data may not be read when the trigger condition is met.

Example: Buffering Period = 2



■ : Buffered data
● : Discarded data
□ : Data that would have been buffered if the trigger condition had been met (not buffered because the trigger condition was not met).

Buffering Period

You can set the buffering period individually for each input to a multiple of the conversion period (80 μs for 2 inputs or 160 μs for 4 inputs).

Conversion period = 80 μs: 80 μs to 10 ms

Conversion period = 160 μs: 160 μs to 20 ms

Buffering Data from before the Trigger

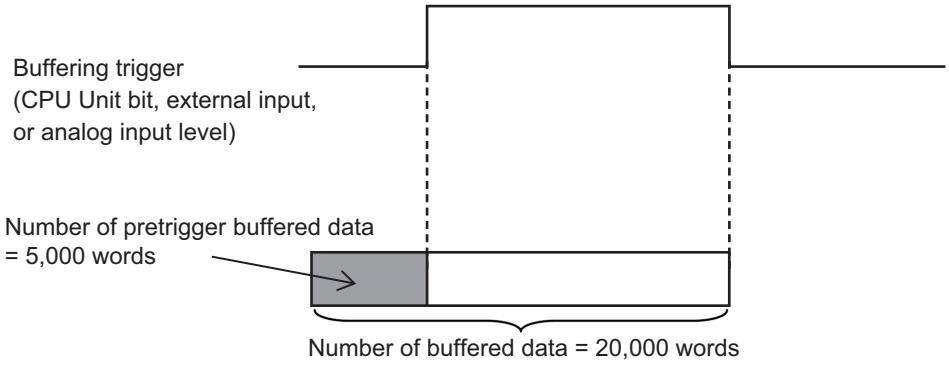
You can also buffer the data from just before the trigger for the number of data specified in the Number of Pretrigger Buffered Data (D(m+31) to D(m+34)).

● Relation to Number of Buffered Data

The Number of Buffered Data (D(m+27) to D(m+30)) includes all of the data that is buffered both before and after the trigger, including the Number of Pretrigger Buffered Data (D(m+31) to D(m+34)). In other words, subtract the number of pretrigger buffered data from the number of buffered data to get the number of data buffered after the trigger.
Always set the Number of Pretrigger Buffered Data to a smaller value than the Number of Buffered Data.

● Example

Number of Buffered Data = 20,000 and Number of Pretrigger Buffered Data = 5,000



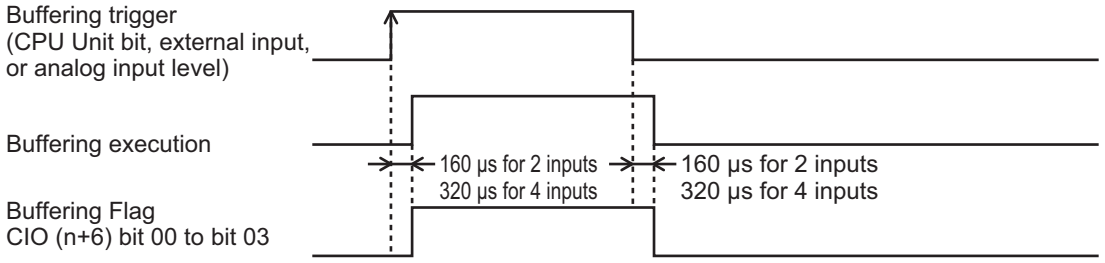
In the above example, the total number of buffered data is 20,000 words and the number of pretrigger buffered data is 5,000 words, so 15,000 words of data are buffered after the trigger.

● Pretrigger Buffering Enabled Flags

When the CJ1W-ADG41 has not yet stored the specified number of pretrigger buffered data, the Pretrigger Buffering Enabled Flag will turn OFF. When more than the specified number of data has been stored, the Pretrigger Buffering Enabled Flag turns ON.
If the trigger turns ON while the Pretrigger Buffering Enabled Flag is OFF, the pretrigger buffered data that was not stored will be 0000 hex.

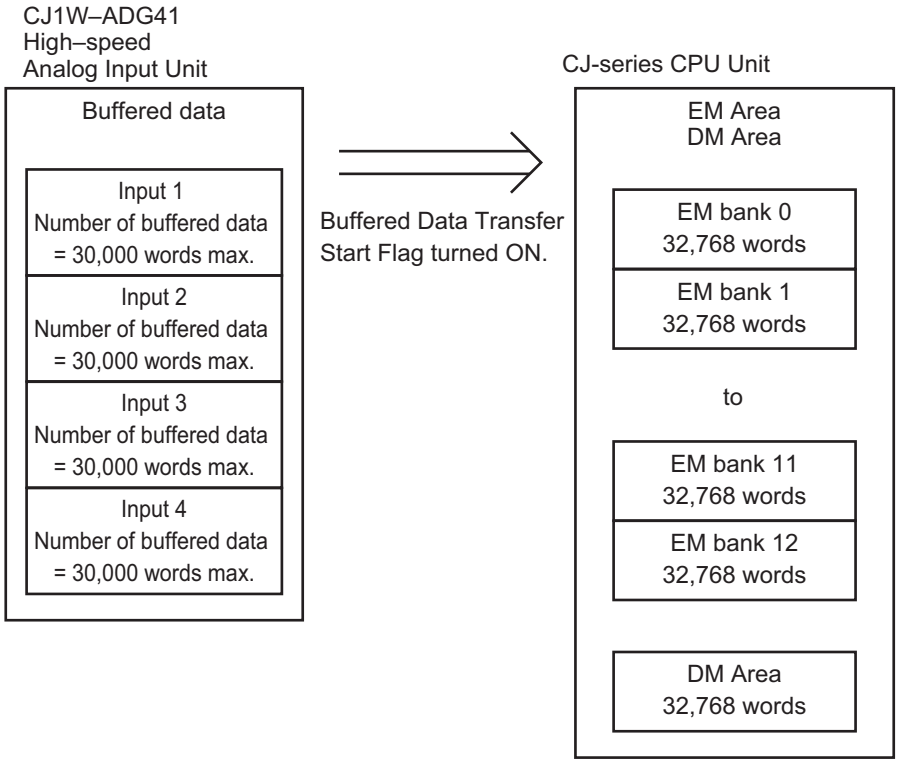
Executing Data Buffering

The timing of data buffering in the CJ1W-ADG41 is shown below.

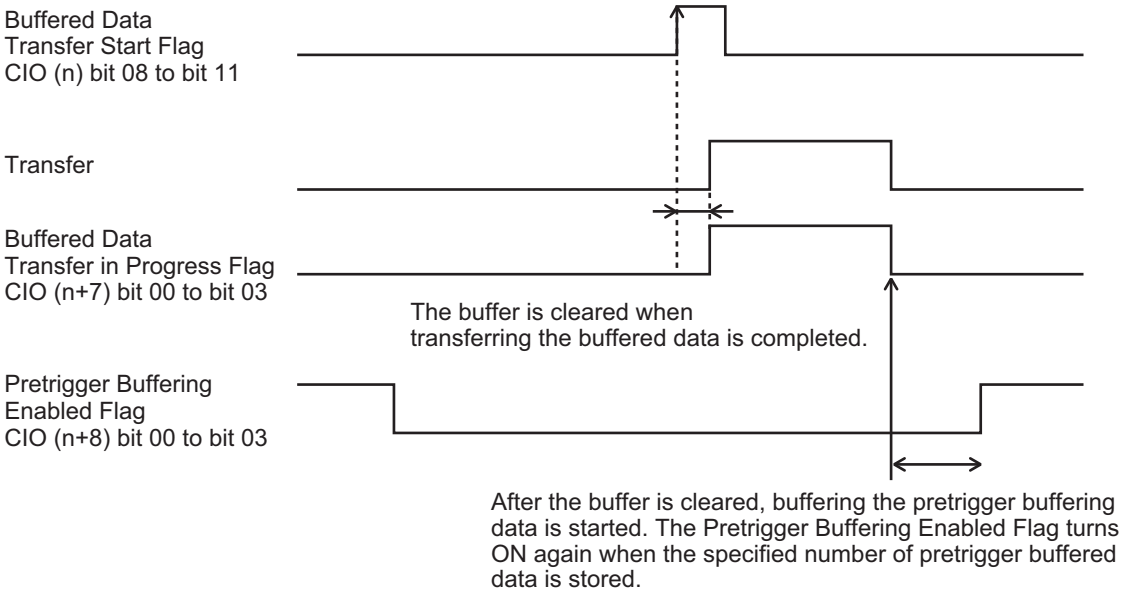


Transferring Buffered Data

To transfer the buffered data to the EM or DM Area in the CPU Unit, turn ON the Buffered Data Transfer Start Flag.



● Transfer Timing



Precautions for Correct Use

- The buffer is cleared after transferring the buffered data is completed.
- Make sure to use unique transfer destination banks and addresses for the buffered data. Even if you use the same transfer destination for different buffered data, the High-speed Analog Input Unit will not detect an error. If you specify the same transfer destination more than once, the previous data will be overwritten and lost. Check the transfer destination banks and addresses before you make the settings.
- No data will be transferred if the buffer memory is empty.
- If you set a transfer address or transfer quantity that causes the destination memory range to be exceeded, an error will occur and no data will be transferred.

  Example: Setting EM bank 0, a first address of 20000, and a number of buffered data to transfer of 30,000 would exceed the memory range.
- If you continue buffering without transferring the buffered data, the previous buffered data will all be cleared.

3-3-7 Zero and Span Adjustments

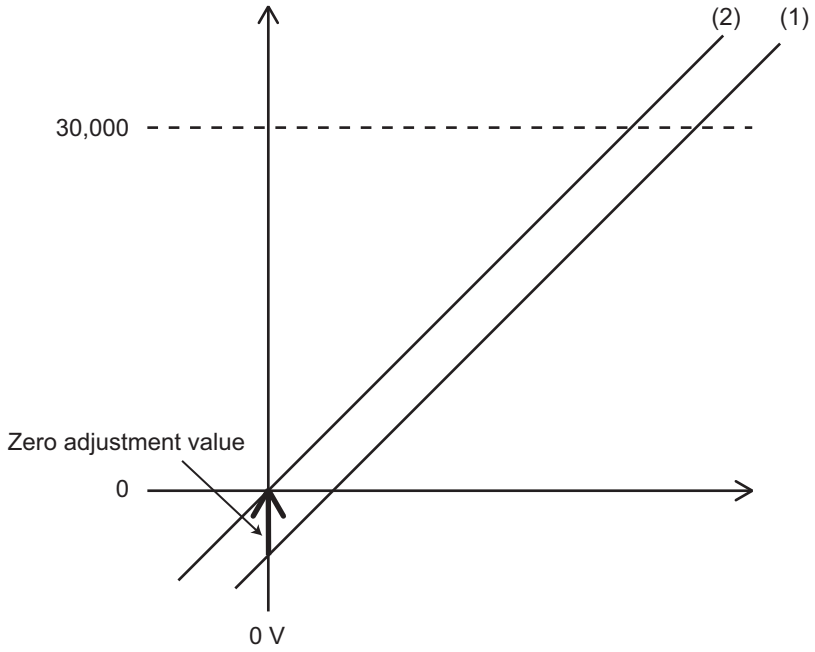
You can adjust the zero point and span point for the converted analog values. The zero point is adjusted with an offset and the span point is used to adjust the gain using the minimum range value as the base point.

Zero Adjustment

You can set an offset for the 0% input value.
Refer to *6-9-2 Zero Adjustment Procedure* on page 6-24 for the setting procedure.

● Example

Using a 0 to 10 V Range and Adjusting the 0% Input to the Zero Point



The line moves in parallel from (1) to (2).

For the ±10 V range, the −0% input value is −10 V.

Range	Adjustment base point (0% input)	Adjustable range	Setting range	
			Decimal	Hexadecimal
−10 to 10 V	−10 V	−11 V to −9 V	−3,000 to 3,000	F448 to 0BB8
0 to 10 V	0 V	−0.5 V to 0.5 V	−1,500 to 1,500	FA24 to 05DC
1 to 5 V	1 V	0.8 V to 1.2 V	−1,200 to 1,200	FB50 to 04B0
0 to 5 V	0 V	−0.25 V to 0.25 V	−1,500 to 1,500	FA24 to 05DC
4 to 20 mA	4 mA	3.2 mA to 4.2 mA	−1,200 to 1,200	FB50 to 04B0

Precautions for Correct Use

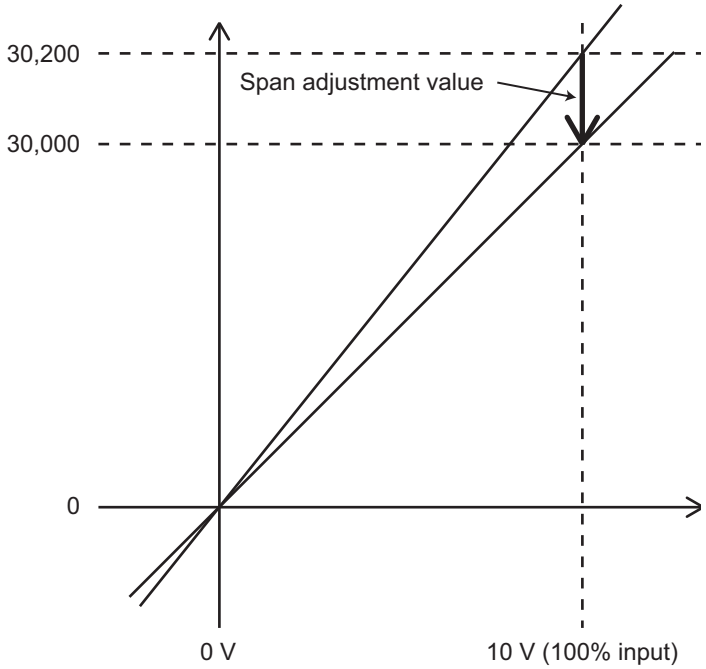
If a setting range is exceeded in Adjustment Mode, an alarm will occur and the A/D converted value will be 0000.

Span Adjustment

You can set the gain to adjust the span using the minimum range value as the base point.
Refer to *6-9-3 Span Adjustment Procedure* on page 6-25 for the setting procedure.

● Example

Using a 0 to 10 V Range and Adjusting a 10 V Input to the 100% Input Value



Range	Adjustment base point (0% input)	Setting range	
		Decimal	Hexadecimal
−10 V to 10 V	−10 V	9,089 to 11,112	2381 to 2B68
0 to 10 V	0 V	9,089 to 11,112	2381 to 2B68
1 to 5 V	1 V	9,089 to 11,112	2381 to 2B68
0 to 5 V	0 V	9,089 to 11,112	2381 to 2B68
4 to 20 mA	4 mA	9,089 to 11,112	2381 to 2B68

Precautions for Correct Use

If a setting range is exceeded in Adjustment Mode, an alarm will occur and the A/D converted value will be 0000.

4

Wiring

4-1 Terminal Arrangement

The signal names that correspond to the connecting terminals are shown in the following diagram.

Input I 2+	B1
Input V 2+	B2
Input 2 −	B3
Input I 4+	B4
Input V 4+	B5
Input 4 −	B6
External input trigger 2	B7
External input trigger 4	B8
COM	B9

A1	Input I 1+
A2	Input V 1+
A3	Input 1 −
A4	Input I 3+
A5	Input V 3+
A6	Input 3 −
A7	External input trigger 1
A8	External input trigger 3
A9	COM

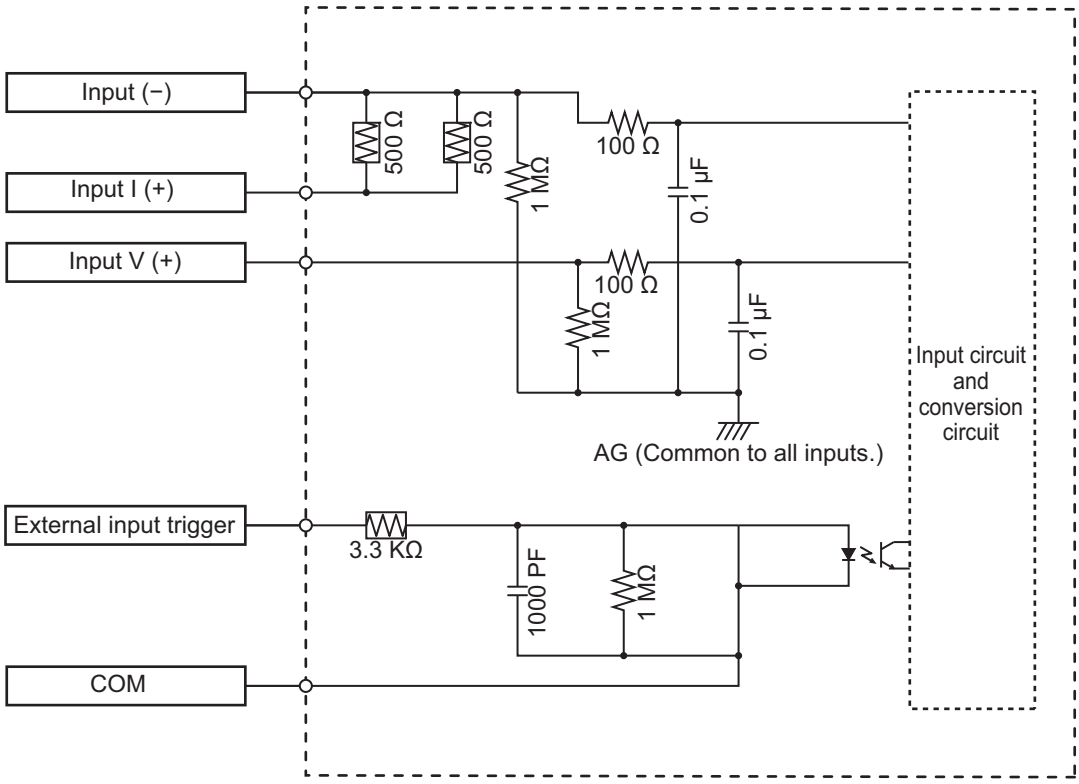
Additional Information

- If you use only one or two inputs, use input 1 and/or input 2. The analog input conversion period will be 80 μs.
- If you use input 3 and/or input 4 when you use only one or two inputs, the analog input conversion period will be 160 μs.
- If you use inputs 1 and 3, 1 and 4, 2 and 3, or 2 and 4 when you use two inputs, the analog input conversion period will be 160 μs.
- If you use three or more inputs, the analog input conversion period will also be 160 μs.
- If you set the Input Use Settings to 0 (not used), the set values in the DM Area for this Unit will be disabled.

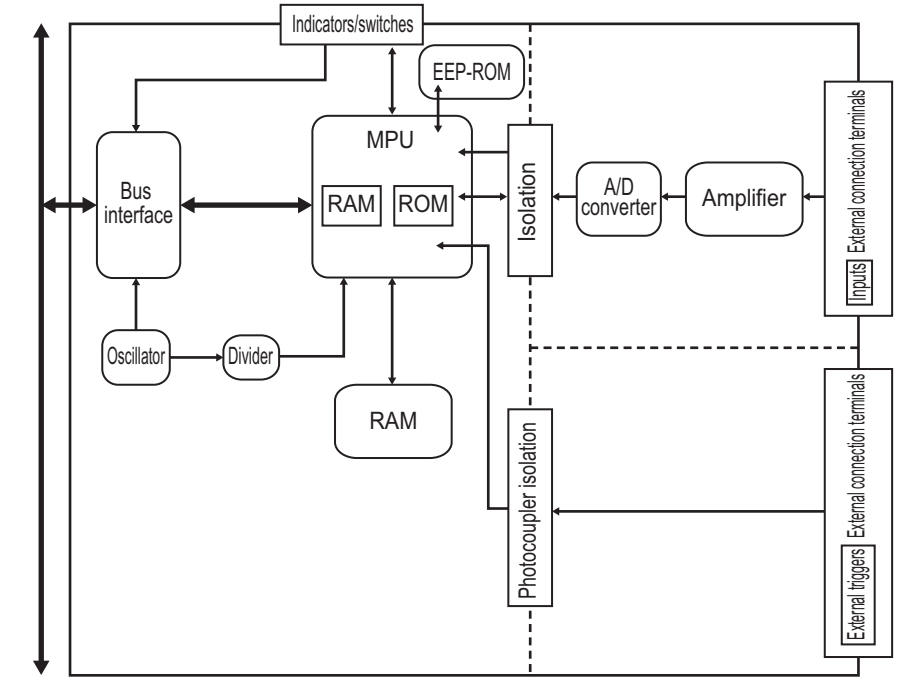
4-2 Internal Circuits

The internal circuits of the analog input section are shown below.

4-2-1 Input Circuit Diagram

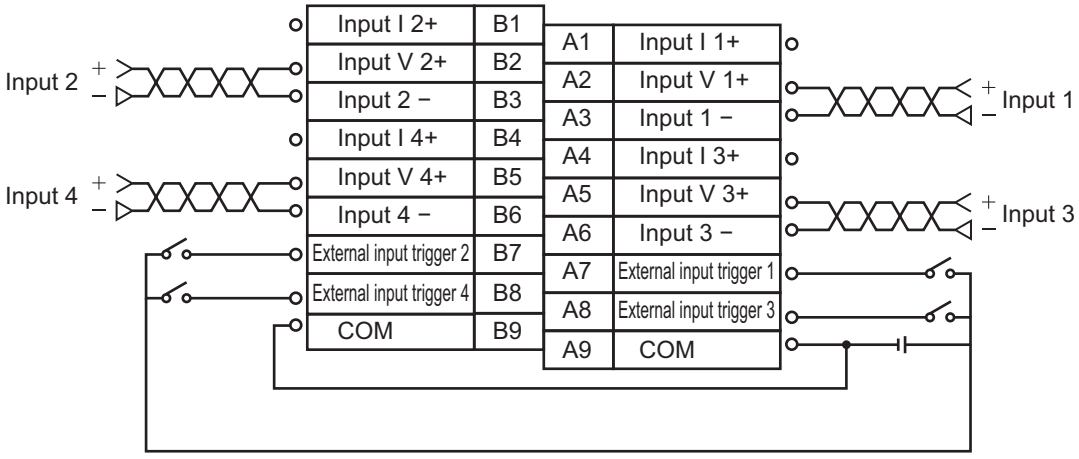


4-2-2 Internal Configuration Diagram

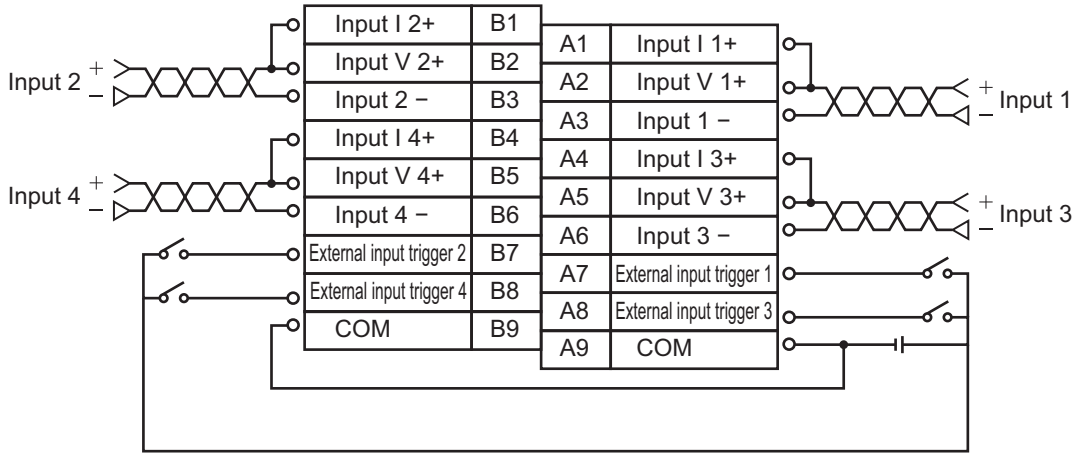


4-3 Input Wiring Examples

4-3-1 Voltage Input Wiring Example



4-3-2 Current Input Wiring Example

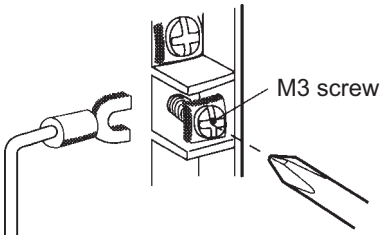


Note Use the enclosed short pins to short between input I and input V terminals.

4-3-3 Wiring Precautions

Observe the following precautions when you wire the CJ1W-ADG41 to ensure application of CJ1W-ADG41 functions in the best conditions.

- Set the Input Use Settings for any unused inputs to 0 (not used).
  If you specify using an input that is actually not used, the data for the input that is not used may not be stable. You can short the positive and negative terminals to prevent this. However, if you short the positive and negative terminals when the 1 to 5 V or 4 to 20 mA range is set, the Disconnection Detection Flag will turn ON.
- If you use a current input, set the Voltage/Current Range Setting (D(m+98)).
  If you short the I (+) and V (+) terminals, use the enclosed short pins.
- Use two-core twisted pair cables to connect the inputs.
- Wire the input lines separately from AC or other power lines.
  Do not place them in the same duct.
- If noise enters on the power supply line (e.g., if the same power supply is used for electric welders or electric discharge machines, or if there are sources of high frequency interference nearby), insert a noise filter into the power supply input section.
- The inputs are not isolated inside the High-speed Analog Input Unit.
  Use the same ground for all of the connected devices to prevent unwanted current paths between the connected devices.
- This High-speed Analog Input Unit is a high-resolution device that performs A/D conversion at an extremely high speed. To prevent superimposition of inductive noises, keep the distances between the High-speed Analog Input Unit and the connected devices as short as possible.



Precautions for Safe Use

- Always confirm that the terminal block is locked before you use the High-speed Analog Input Unit.
- Do not apply voltages to input sections in excess of the rated input voltage.
- Double-check all wiring to make sure that it is correct before turning ON the power supply.
- Always connect crimp terminals when you connect wires to the terminals. Also, tighten the terminal screws securely. M3 screws are used for the screw terminals. Do not connect bare stranded wires directly to terminals.
- Leave the label on top of the Unit in place when wiring to prevent wire scraps from entering the Unit.
- Remove the label from the top of the Unit after the completion of wiring to ensure proper heat dissipation.
- Do not pull on cables and do not bend them past their natural bending radius.
- Do not place any heavy objects on cables or cords.

5

Memory Area Allocations to CPU Bus Units

5-1 Outline of Data Exchange

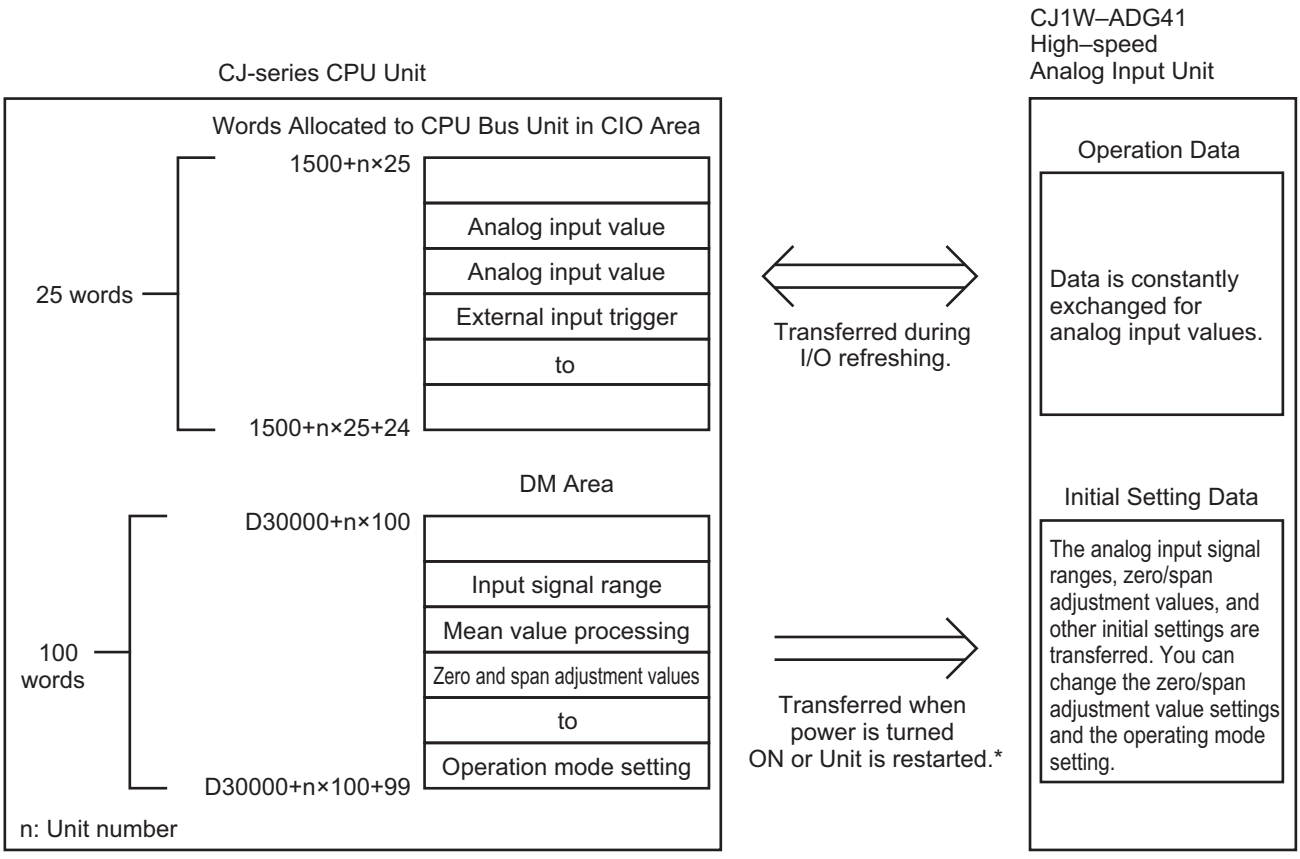
Data is exchanged between the CPU Unit and the CJ1W-ADG41 High-speed Analog Input Unit via the words allocated to the CPU Bus Unit in the CIO Area (for data used to operate the Unit) and the words allocated to the CPU Bus Unit in the DM Area (for data used for initial settings).

● Operation Data

Converted analog input values, which are used for Unit operation, are stored in words allocated to the CPU Bus Unit in the CIO Area of the CPU Unit according to the unit number. Data is exchanged during I/O refreshing.

● Initial Setting Data

The analog input signal ranges, numbers of buffered data, and other settings are stored as initial setting data in words allocated to the CPU Bus Unit in the DM Area of the CPU Unit according to the unit number. Data is exchanged when the power supply is turned ON or when the Unit is restarted.

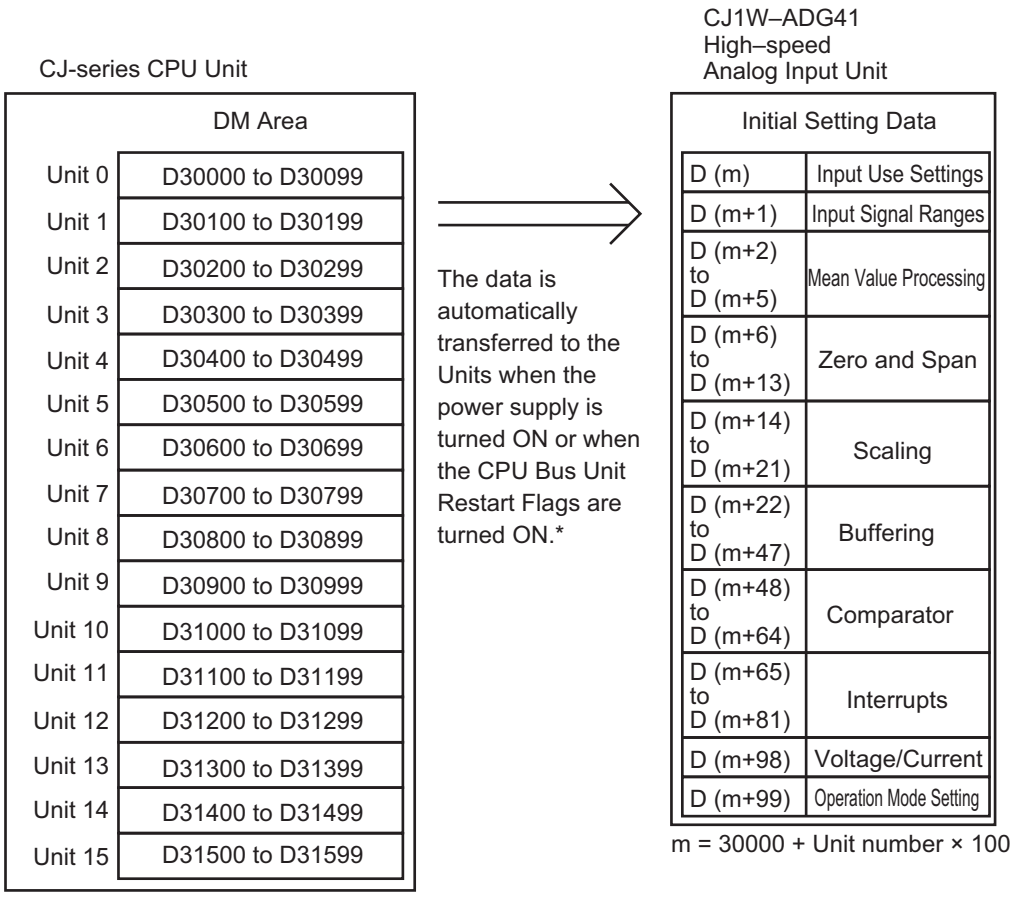


*The following data is transferred during I/O refreshing if it is set in Adjustment Mode.
- Zero and span adjustment values
- Analog input level trigger set value
- Comparator set values

5-2 Allocations for Initial Setting Data

5-2-1 DM Area

The initial settings for the CJ1W-ADG41 are set in the words allocated to the CPU Bus Unit in the DM Area. In particular, you must set the Input Use Settings and Input Signal Range Settings.



*The following data is transferred during I/O refreshing if it is set in Adjustment Mode.
- Zero and span adjustment values
- Analog input level trigger set value
- Comparator set values

5-2-2 DM Area Allocations

The following table shows how words in the DM Area are allocated to the CJ1W-ADG41.

DM Area address*1	Bit															
	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
D(m)	Not used.								Not used.				Input Use Settings			
													Input 4	Input 3	Input 2	Input 1
D(m+1)	Not used.								Input Signal Range Settings							
									Input 4		Input 3		Input 2		Input 1	
D(m+2)	Not used.								Not used.				Input 1 Mean Value Processing Setting			
D(m+3)	Not used.								Not used.				Input 2 Mean Value Processing Setting			
D(m+4)	Not used.								Not used.				Input 3 Mean Value Processing Setting			
D(m+5)	Not used.								Not used.				Input 4 Mean Value Processing Setting			
D(m+6)	Input 1 Span Adjustment Value (set value × 0.0001)															
D(m+7)	Input 1 Zero Adjustment Value															
D(m+8)	Input 2 Span Adjustment Value (set value × 0.0001)															
D(m+9)	Input 2 Zero Adjustment Value															
D(m+10)	Input 3 Span Adjustment Value (set value × 0.0001)															
D(m+11)	Input 3 Zero Adjustment Value															
D(m+12)	Input 4 Span Adjustment Value (set value × 0.0001)															
D(m+13)	Input 4 Zero Adjustment Value															
D(m+14)	Input 1 Scaling Lower Limit								Setting range: 8000 hex to 7FFF hex (–32,768 to 32,767)							
D(m+15)	Input 1 Scaling Upper Limit								Setting range: 8000 hex to 7FFF hex (–32,768 to 32,767)							
D(m+16)	Input 2 Scaling Lower Limit								Setting range: 8000 hex to 7FFF hex (–32,768 to 32,767)							
D(m+17)	Input 2 Scaling Upper Limit								Setting range: 8000 hex to 7FFF hex (–32,768 to 32,767)							
D(m+18)	Input 3 Scaling Lower Limit								Setting range: 8000 hex to 7FFF hex (–32,768 to 32,767)							
D(m+19)	Input 3 Scaling Upper Limit								Setting range: 8000 hex to 7FFF hex (–32,768 to 32,767)							
D(m+20)	Input 4 Scaling Lower Limit								Setting range: 8000 hex to 7FFF hex (–32,768 to 32,767)							
D(m+21)	Input 4 Scaling Upper Limit								Setting range: 8000 hex to 7FFF hex (–32,768 to 32,767)							
D(m+22)	Buffering Trigger Settings															
	Input 4				Input 3				Input 2				Input 1			
D(m+23)	Input 1 Analog Input Trigger Level															
D(m+24)	Input 2 Analog Input Trigger Level															
D(m+25)	Input 3 Analog Input Trigger Level															
D(m+26)	Input 4 Analog Input Trigger Level															
D(m+27)	Input 1 Number of Buffered Data								Setting range: 0001 hex to 7530 hex (1 to 30,000)							
D(m+28)	Input 2 Number of Buffered Data								Setting range: 0001 hex to 7530 hex (1 to 30,000)							
D(m+29)	Input 3 Number of Buffered Data								Setting range: 0001 hex to 7530 hex (1 to 30,000)							
D(m+30)	Input 4 Number of Buffered Data								Setting range: 0001 hex to 7530 hex (1 to 30,000)							
D(m+31)	Input 1 Number of Pretrigger Buffered Data								Setting range: 0000 hex to 752F hex (0 to 29,999)							
D(m+32)	Input 2 Number of Pretrigger Buffered Data								Setting range: 0000 hex to 752F hex (0 to 29,999)							
D(m+33)	Input 3 Number of Pretrigger Buffered Data								Setting range: 0000 hex to 752F hex (0 to 29,999)							
D(m+34)	Input 4 Number of Pretrigger Buffered Data								Setting range: 0000 hex to 752F hex (0 to 29,999)							
D(m+35)	Input 1 Buffering Period								Setting range: 0001 hex to 007D hex (1 to 125)							
D(m+36)	Input 2 Buffering Period								Setting range: 0001 hex to 007D hex (1 to 125)							
D(m+37)	Input 3 Buffering Period								Setting range: 0001 hex to 007D hex (1 to 125)							
D(m+38)	Input 4 Buffering Period								Setting range: 0001 hex to 007D hex (1 to 125)							
D(m+39)	Input 1 Number of Buffered Data to Transfer								Setting range: 0001 hex to 7530 hex (1 to 30,000)							
D(m+40)	Input 2 Number of Buffered Data to Transfer								Setting range: 0001 hex to 7530 hex (1 to 30,000)							
D(m+41)	Input 3 Number of Buffered Data to Transfer								Setting range: 0001 hex to 7530 hex (1 to 30,000)							
D(m+42)	Input 4 Number of Buffered Data to Transfer								Setting range: 0001 hex to 7530 hex (1 to 30,000)							

DM Area address*1	Bit															
	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
D(m+43)	Buffered Data Transfer Destination Bank Settings															
	Input 4				Input 3				Input 2				Input 1			
D(m+44)	Input 1 First Destination Address for Buffered Data Transfer								Setting range: 0000 hex to 7FFF hex (0 to 32,767)							
D(m+45)	Input 2 First Destination Address for Buffered Data Transfer								Setting range: 0000 hex to 7FFF hex (0 to 32,767)							
D(m+46)	Input 3 First Destination Address for Buffered Data Transfer								Setting range: 0000 hex to 7FFF hex (0 to 32,767)							
D(m+47)	Input 4 First Destination Address for Buffered Data Transfer								Setting range: 0000 hex to 7FFF hex (0 to 32,767)							
D(m+48)	Hysteresis Setting								Setting range: 0000 hex to 7D00 hex (0 to 32,000)							
D(m+49)	Input 1 Comparator HH Value															
D(m+50)	Input 1 Comparator H Value															
D(m+51)	Input 1 Comparator L Value															
D(m+52)	Input 1 Comparator LL Value															
D(m+53)	Input 2 Comparator HH Value															
D(m+54)	Input 2 Comparator H Value															
D(m+55)	Input 2 Comparator L Value															
D(m+56)	Input 2 Comparator LL Value															
D(m+57)	Input 3 Comparator HH Value															
D(m+58)	Input 3 Comparator H Value															
D(m+59)	Input 3 Comparator L Value															
D(m+60)	Input 3 Comparator LL Value															
D(m+61)	Input 4 Comparator HH Value															
D(m+62)	Input 4 Comparator H Value															
D(m+63)	Input 4 Comparator L Value															
D(m+64)	Input 4 Comparator LL Value															
D(m+65)	Interrupt Settings															
	Input 4				Input 3				Input 2				Input 1			
D(m+66)	Input 1 Comparator HH Interrupt Task Number								Setting range: 0000 hex to 00FF hex (0 to 255)							
D(m+67)	Input 1 Comparator H Interrupt Task Number								Setting range: 0000 hex to 00FF hex (0 to 255)							
D(m+68)	Input 1 Comparator L Interrupt Task Number								Setting range: 0000 hex to 00FF hex (0 to 255)							
D(m+69)	Input 1 Comparator LL Interrupt Task Number								Setting range: 0000 hex to 00FF hex (0 to 255)							
D(m+70)	Input 2 Comparator HH Interrupt Task Number								Setting range: 0000 hex to 00FF hex (0 to 255)							
D(m+71)	Input 2 Comparator H Interrupt Task Number								Setting range: 0000 hex to 00FF hex (0 to 255)							
D(m+72)	Input 2 Comparator L Interrupt Task Number								Setting range: 0000 hex to 00FF hex (0 to 255)							
D(m+73)	Input 2 Comparator LL Interrupt Task Number								Setting range: 0000 hex to 00FF hex (0 to 255)							
D(m+74)	Input 3 Comparator HH Interrupt Task Number								Setting range: 0000 hex to 00FF hex (0 to 255)							
D(m+75)	Input 3 Comparator H Interrupt Task Number								Setting range: 0000 hex to 00FF hex (0 to 255)							
D(m+76)	Input 3 Comparator L Interrupt Task Number								Setting range: 0000 hex to 00FF hex (0 to 255)							
D(m+77)	Input 3 Comparator LL Interrupt Task Number								Setting range: 0000 hex to 00FF hex (0 to 255)							
D(m+78)	Input 4 Comparator HH Interrupt Task Number								Setting range: 0000 hex to 00FF hex (0 to 255)							
D(m+79)	Input 4 Comparator H Interrupt Task Number								Setting range: 0000 hex to 00FF hex (0 to 255)							
D(m+80)	Input 4 Comparator L Interrupt Task Number								Setting range: 0000 hex to 00FF hex (0 to 255)							
D(m+81)	Input 4 Comparator LL Interrupt Task Number								Setting range: 0000 hex to 00FF hex (0 to 255)							
D(m+82 to m+97)	Not used.															
D(m+98)	Not used.								Not used.				Voltage/Current Range Settings			
													Input 4	Input 3	Input 2	Input 1
D(m+99)	Default Value Batch Read Command								Operation Mode Setting							

*1. “m” in the DM Area equals 30000 + Unit number × 100.

Set Values and Default Values

Name	Set values or setting range	Default value[*1]	Changes during Adjustment Mode[*2]
Input Use Setting	0: Not used. 1: Used.	0000 hex (0)	
Input Signal Range	00: −10 to 10 V 01: 0 to 10 V 10: 1 to 5 V or 4 to 20 mA 11: 0 to 5 V	0000 hex (0)	
Mean Value Processing Setting	0000 hex: No mean value processing. 0001 hex: Mean value processing with 2 buffers. 0002 hex: Mean value processing with 4 buffers. 0003 hex: Mean value processing with 8 buffers. 0004 hex: Mean value processing with 16 buffers. 0005 hex: Mean value processing with 32 buffers. 0006 hex: Mean value processing with 64 buffers.	0000 hex (0)	
Span Adjustment Value	Setting range: 9,089 (2381 hex) to 11,112 (2B68 hex) Set value × 0.0001	2710 hex (10,000)	Allowed
Zero Adjustment Value	Setting range: Depends on input signal range. −10 to 10 V: −3,000 (F448 hex) to 3,000 (0BB8 hex) 0 to 10 V: −1,500 (FA24 hex) to 1,500 (05DC hex) 1 to 5 V: −1,200 (FB50 hex) to 1,200 (04B0 hex) 0 to 5 V: −1,500 (FA24 hex) to 1,500 (05DC hex) 4 to 20 mA: −1,200 (FB50 hex) to 1,200 (04B0 hex)	0000 hex (0)	Allowed
Scaling Upper/Lower Limit	Setting range: −32,768 (8000 hex) to 32,767 (7FFF hex)	0000 hex (0)	
Buffering Trigger Settings	0000: No buffering. 0010: External input trigger and buffering starts on rising edge 0011: External input trigger and buffering is performed while input is ON 0100: CPU Unit bit trigger and buffering starts on rising edge 0101: CPU Unit bit trigger and buffering is performed while input is ON 1000: Analog input level trigger while analog input data is increasing 1001: Analog input level trigger while analog input data is decreasing	0000 hex (0)	
Analog Input Level Trigger Value	10 to 10 V: 32,768 (8000 hex) to 32,767 (7FFF hex) 0 to 10 V or 0 to 5 V: −1,500 (FA24 hex) to 31,500 (7B0C hex) 1 to 5 V or 4 to 20 mA: −1,200 (FB50 hex) to 25,200 (6270 hex)	7530 hex (30,000)	Allowed
Number of Buffered Data	Setting range: 1 (0001 hex) to 30,000 (7530 hex)	7530 hex (30,000)	
Number of Pretrigger Buffered Data	Setting range: 0 (0000 hex) to 29,999 (752F hex) (Always set a value that is smaller than the Number of Buffered Data.)	0000 hex (0)	
Buffering Period	Setting range: 1 (0001 hex) to 125 (007D hex) Two inputs used:[*3] 80 μs to 10 ms, Four inputs used: 160 μs to 20 ms	0001 hex (1)	
Number of Buffered Data to Transfer	Setting range: 1 (0001 hex) to 30,000 (7530 hex)	1F40 hex (8,000)	
Buffered Data Transfer Destination Bank Setting	0000: Bank 0 of EM Area 0001: Bank 1 of EM Area 0010: Bank 2 of EM Area 0011: Bank 3 of EM Area to 1100: Bank 12 of EM Area 1111: DM Area	0000 hex (0)	

Name	Set values or setting range	Default value*1	Changes during Adjustment Mode*2
First Destination Address for Buffered Data Transfer	Specify the EM Area or DM Area address. Setting range: 0 (0000 hex) to 32,767 (7FFF hex)	Input 1: 0000 hex (0) Input 2: 1F40 hex (8,000) Input 3: 3E80 hex (16,000) Input 4: 5DC0 hex (24,000)	
Hysteresis Setting	Setting range: 0 (0000 hex) to 32,000 (7D00 hex)	0000 hex	Allowed
Comparator Set Values	−10 to 10 V: −32,768 (8000 hex) to 32,767 (7FFF hex) 0 to 10 V or 0 to 5 V: −1,500 (FA24 hex) to 31,500 (7B0C hex) 1 to 5 V or 4 to 20 mA: −1,200 (FB50 hex) to 25,200 (6270 hex)	H or HH: 7530 hex (30,000) L or LL: 0000 hex (0)	Allowed
Comparator Interrupt Setting	0: Not used. 1: Interrupt used.	0000 hex (0)	
Comparator Interrupt Task Number	Setting range: 0 (0000 hex) to 255 (00FF hex)	Input 1 HH: 0000 hex (0) Input 1 H: 0001 hex (1) Input 1 L: 0002 hex (2) Input 1 LL: 0003 hex (3) Input 2 HH: 0004 hex (4) Input 2 H: 0005 hex (5) Input 2 L: 0006 hex (6) Input 2 LL: 0007 hex (7) Input 3 HH: 0008 hex (8) Input 3 H: 0009 hex (9) Input 3 L: 000A hex (10) Input 3 LL: 000B hex (11) Input 4 HH: 000C hex (12) Input 4 H: 000D hex (13) Input 4 L: 000E hex (14) Input 4 LL: 000F hex (15)	
Voltage/Current Range Setting	0: Voltage range 1: Current range	000F hex (15)	
Operation Mode Setting/Default Value Batch Read Command	Operation Mode Setting: Set this word to 0001 hex and cycle the power supply or turn ON the CPU Bus Unit Restart Flag to go to Adjustment Mode. (If this word is set to 0000 hex, operation will change to Normal Mode.) Default Value Batch Read Command: Set this word to 0100 hex and cycle the power supply or turn ON the CPU Bus Unit Restart Flag to transfer the default values*1 of the High-speed Analog Input Unit to addresses m to m+99 in the DM Area in the CPU Unit and to the initial settings in the High-speed Analog Input Unit.	0000 hex (0)	

*1. The default values are the data that is transferred from the High-speed Analog Input Unit to the CPU Unit when the Default Value Batch Read Command (D(m+99) is used.

*2. In Adjustment Mode (set with D(m+99)), you can change settings during operation.

*3. Applicable only when input 1 and input 2 are used.

5-3 Allocations for Operation Data

5-3-1 Words Allocated to CPU Bus Units in CIO Area

The operation data for the CJ1W-ADG41 is exchanged via the words allocated to the CPU Bus Unit in CIO Area.

CJ-series CPU Unit

Words Allocated to CPU Bus Units in CIO Area	
Unit 0	CIO 1500 to CIO 1524
Unit 1	CIO 1525 to CIO 1549
Unit 2	CIO 1550 to CIO 1574
Unit 3	CIO 1575 to CIO 1599
Unit 4	CIO 1600 to CIO 1624
Unit 5	CIO 1625 to CIO 1649
Unit 6	CIO 1650 to CIO 1674
Unit 7	CIO 1675 to CIO 1699
Unit 8	CIO 1700 to CIO 1724
Unit 9	CIO 1725 to CIO 1749
Unit 10	CIO 1750 to CIO 1774
Unit 11	CIO 1775 to CIO 1799
Unit 12	CIO 1800 to CIO 1824
Unit 13	CIO 1825 to CIO 1849
Unit 14	CIO 1850 to CIO 1874
Unit 15	CIO 1875 to CIO 1899

During I/O refreshing

CJ1W–ADG41
High–speed
Analog Input Unit

Operation Data

CIO n	Output refreshing
CIO n+1 to CIO n+11	Input refreshing

n = 1500 + Unit number × 25

I/O refreshing for the PLC is performed every cycle. Outputs (from CPU Unit to High-speed Analog Input Unit) are refreshed first, and then inputs (from High-speed Analog Input Unit to CPU Unit) are refreshed.

5-3-2 CIO Area Allocations

The following table shows how words in the CIO Area are allocated to the CJ1W-ADG41.

I/O	Word address*1	Bit															
		15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Outputs (from CPU Unit to High-speed Analog Input Unit)	n	Buffered Data Transfer Start Flags								CPU Unit Bit Triggers							
		Not used.				Input 4	Input 3	Input 2	Input 1	Not used.				Input 4	Input 3	Input 2	Input 1
Inputs (from High-speed Analog Input Unit to CPU Unit)	n+1	Input 1 Converted Value (hexadecimal)															
	n+2	Input 2 Converted Value (hexadecimal)															
	n+3	Input 3 Converted Value (hexadecimal)															
	n+4	Input 4 Converted Value (hexadecimal)															
	n+5	Not used.								Not used.				External Input Trigger Flags			
														Input 4	Input 3	Input 2	Input 1
	n+6	Not used.								Not used.				Buffering Flags			
														Input 4	Input 3	Input 2	Input 1
	n+7	Not used.								Not used.				Buffered Data Transfer in Progress Flags			
														Input 4	Input 3	Input 2	Input 1
	n+8	Not used.								Not used.				Pretrigger Buffering Enabled Flags			
														Input 4	Input 3	Input 2	Input 1
	n+9	Not used.								Not used.				Disconnection Detection Flags			
														Input 4	Input 3	Input 2	Input 1
Inputs (from High-speed Analog Input Unit to CPU Unit)	n+10	Alarm Flags															
	n+11	Comparator Outputs															
		Input 4				Input 3				Input 2				Input 1			
		HH	H	L	LL	HH	H	L	LL	HH	H	L	LL	HH	H	L	LL
	n+12	Not used.															
	n+13	Not used.															
	n+14	Not used.															
	n+15	Not used.															
	n+16	Not used.															
	n+17	Not used.															
	n+18	Not used.															
	n+19	Not used.															
	n+20	Not used.															
	n+21	Not used.															
	n+22	Not used.															
	n+23	Not used.															
	n+24	Not used.															

*1. “n” in the CIO Area equals 1500 + Unit number × 25

Set Values and Stored Values

Name	Set value/stored value
CPU Unit Bit Trigger	0: Stop Buffering 1: Start Buffering
Buffered Data Transfer Start Flag	0: Stop Transferring Buffered Data 1: Start Transferring Buffered Data
Converted Value	16-bit binary data
	−10 to 10 V: −32,768 (8000 hex) to 32,767 (7FFF hex) 0 to 10 V or 0 to 5 V: −1,500 (FA24 hex) to 31,500 (7B0C hex) 1 to 5 V or 4 to 20 mA: −1,200 (FB50 hex) to 25,200 (6270 hex)
External Input Trigger Flag	0: No External Trigger Input 1: External Trigger Input
Buffering Flag*1	0: Buffering is stopped 1: Buffering is in progress
Buffered Data Transfer in Progress Flag	0: Buffered data transfer is stopped 1: Buffered data transfer is in progress
Pretrigger Buffering Enabled Flag	0: Pretrigger buffering is not possible 1: Pretrigger buffering is possible
Disconnection Detection Flag*2	0: Normal 1: Disconnection
Alarm Flags	Bit 5: Buffering Bank/Address Setting Error
	Bit 6: Number of Buffered Data to Transfer Setting Error
	Bit 7: Mean Value Processing Setting Error
	Bit 14: A/D Conversion Error
Alarm Flags for Adjustment Mode	Bit 8: Comparator Setting Error
	Bit 9: Buffering Analog Input Level Trigger Setting Error
	Bit 10: Zero/span Adjustment Value Error
Comparator Output	0: Within Setting Range 1: Outside of Setting Range

*1. The flag remains ON for one cycle even if the buffering execution time is shorter than the cycle time.

*2. You can use input disconnection detection when the input signal range is 1 to 5 V or 4 to 20 mA.

Input signal range	Voltage/current for input disconnection detection
1 to 5 V	Less than 0.3 V
4 to 20 mA	Less than 1.2 mA

5-3-3 CPU Bus Unit Restart Flags

To restart the High-speed Analog Input Unit after changing the contents of the DM Area or removing the cause of an error, either cycle the power supply to the PLC or turn ON the CPU Bus Unit Restart Flag. The flag will be automatically turned OFF by the system when restarting the High-speed Analog Input Unit is completed.

Address	Function	
A50100	Unit 0 Restart Flag	Turn ON the corresponding flag to restart a Unit.
A50101	Unit 1 Restart Flag	
A50102	Unit 2 Restart Flag	
A50103	Unit 3 Restart Flag	
A50104	Unit 4 Restart Flag	
A50105	Unit 5 Restart Flag	
A50106	Unit 6 Restart Flag	
A50107	Unit 7 Restart Flag	
A50108	Unit 8 Restart Flag	
A50109	Unit 9 Restart Flag	
A50110	Unit 10 Restart Flag	
A50111	Unit 11 Restart Flag	
A50112	Unit 12 Restart Flag	
A50113	Unit 13 Restart Flag	
A50114	Unit 14 Restart Flag	
A50115	Unit 15 Restart Flag	

6

Operating Procedures and Function Settings

6-1 Operating Procedures

This section provides the operating procedures of the CJ1W-ADG41.

6-1-1 Installation and Settings

Setting the Unit Number	Set the unit number switches on the front panel of the High-speed Analog Input Unit.
↓	
Wiring	
↓	
Turning ON the PLC Power Supply	
↓	
Creating the I/O Tables	
↓	
Setting the Default Values for the CJ1W-ADG41	Set D(m+99) in the DM Area to 0100 hex.
↓	
Turning the PLC Power Supply OFF and ON	Or, turn ON the CPU Bus Unit Restart Flag.
↓	The default values for the CJ1W-ADG41 will be transferred.
Setting the Parameters for the CJ1W-ADG41	
↓	
Turning the PLC Power Supply OFF and ON	Or, turn ON the CPU Bus Unit Restart Flag.

*1. “m” in the DM Area equals 30000 + Unit number × 100.

6-1-2 Adjusting the Zero and Span

You can adjust the zero point and span point for the converted analog values.
The zero point is adjusted with an offset and the span point is used to adjust the gain using the minimum range value as the base point.

Procedure When the Input Must Be Adjusted for the Connected Device

Turning ON the PLC Power Supply	
↓	
Setting Operation Mode Setting to Adjustment Mode	Set D(m+99) in the DM Area to 0001 hex (Adjustment Mode).*1
↓	
Turning the PLC Power Supply OFF and ON	Or, turn ON the CPU Bus Unit Restart Flag.
↓	
Adjusting Zero	Adjust the offset for the zero point.
↓	
Adjusting the Span	Adjust the gain of the span point.
↓	
Setting Operation Mode Setting to Normal Mode	Set D(m+99) in the DM Area to 0000 hex (Normal Mode).*1
↓	
Turning the PLC Power Supply OFF and ON	Or, turn ON the CPU Bus Unit Restart Flag.

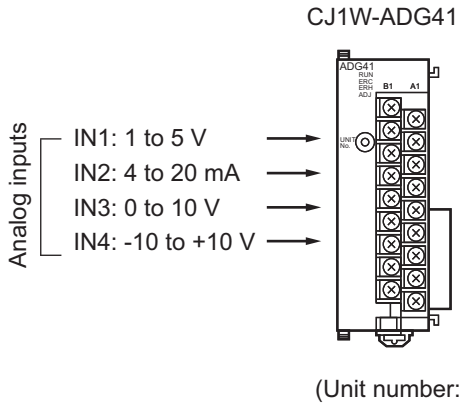
*1. “m” in the DM Area equals 30000 + Unit number × 100.

6-1-3 Operation

Turning ON the PLC Power Supply	
↓	
Ladder Programming	• Read the buffered data and write set values with the MOV(021) or XFER(070) instruction. • Read comparator outputs. • Read the Disconnection Detection Flag, error flags, and other status information.

6-2 Examples of Application Procedures

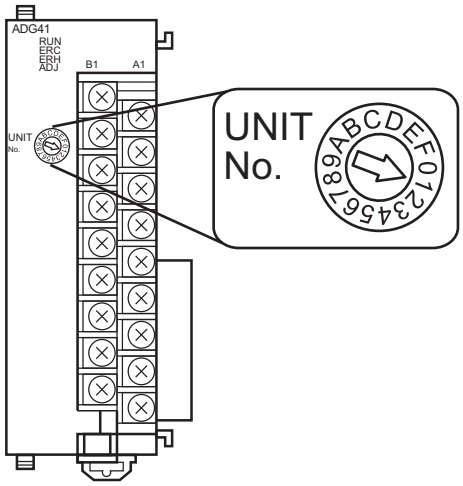
This section provides operating procedures with examples.



(Unit number: 1)

6-2-1 Analog Input Unit Settings

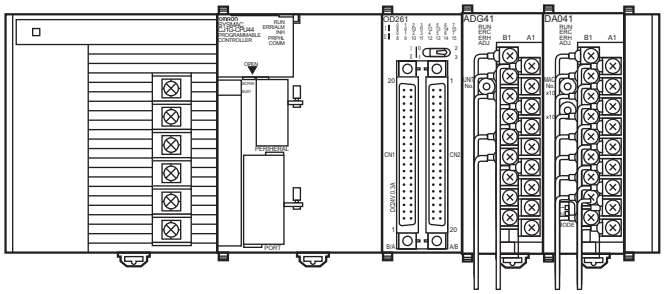
1 Set the unit number.



When you set the unit number to 1, the following words are allocated.

- CIO Area: CIO 1525 to CIO 1549
- DM Area: D30100 to D30199

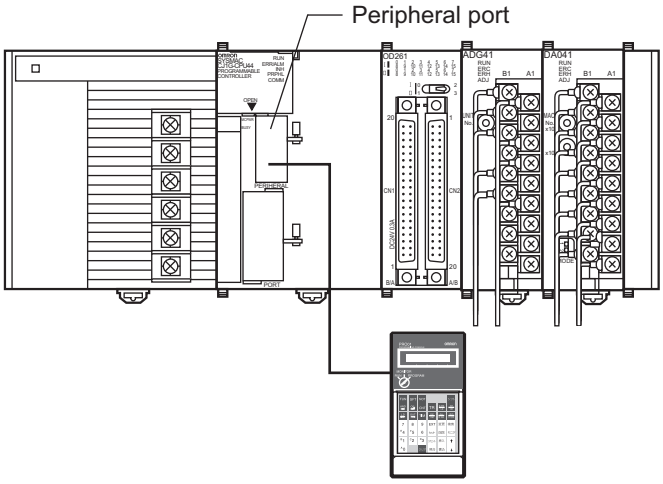
2 Install and wire the High-speed Analog Input Unit.



3 Turn ON the power to the PLC.

6-2-2 Creating the I/O Tables

After you turn ON the power supply to the PLC, always create the I/O tables.



6-2-3 Setting the Parameters

Set the parameters in the DM Area words that were allocated to the High-speed Analog Input Unit as a CPU Bus Unit according to the analog input specifications.

● Settings

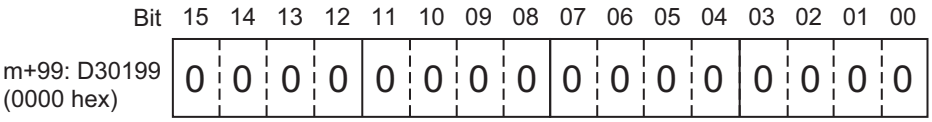
- Unit number: 1
- Analog input 1: 1 to 5 V
- Analog input 2: 4 to 20 mA
- Analog input 3: 1 to 10 V
- Analog input 4: –10 to 10 V

● Transferring the Default Values for the Initial Setting Data of the High-speed Analog Input Unit

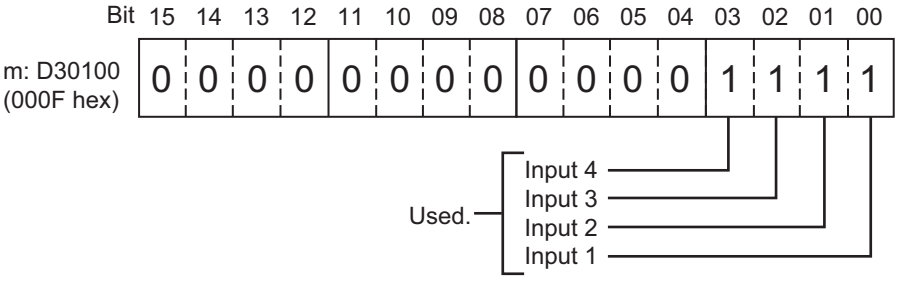
When you use the High-speed Analog Input Unit for the first time, you will find it convenient to transfer the default values for the initial setting data from the High-speed Analog Input Unit to the words allocated to the CPU Bus Unit in the DM Area before you set the parameters.
Set m+99 in the DM Area to 0100 hex and cycle the power supply to the PLC or turn ON the CPU Bus Unit Restart Flag to transfer the default values for the initial setting data[*1] of the High-speed Analog Input Unit to addresses m to m+99 in the DM Area in the CPU Unit and to the initial setting data in the High-speed Analog Input Unit.
Refer to *Set Values and Default Values* on page 5-6 for the default values.

1 Operation Mode Setting

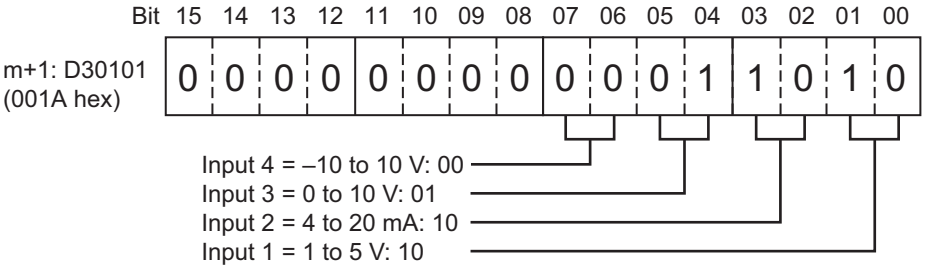
Set D(m+99) in the DM Area to 0000 hex (Normal Mode) to set the Operation Mode Setting to Normal Mode.
In this example, the unit number is 1, so the address in the DM Area is D30199.



2 Input Use Settings

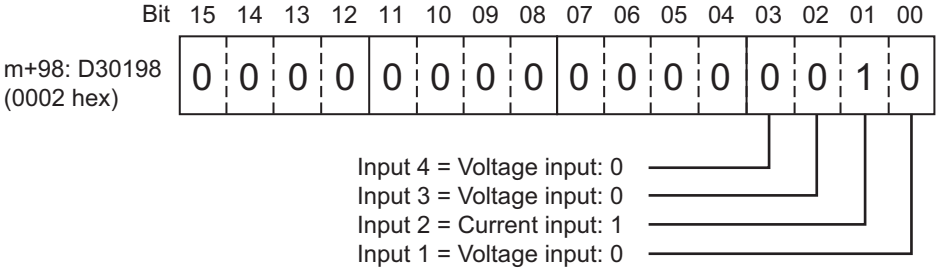


3 Input Signal Range Settings



4 Voltage/Current Range Settings

Set the voltage/current range settings in D(m+98) in the DM Area.
In this example, the DM Area address is D30198.



5 Restarting the Analog Input Unit

Cycle the power supply to the PLC or turn ON the CPU Bus Unit Restart Flag.

Additional Information

- If you use only one or two inputs, use input 1 and/or input 2. The analog input conversion period will be 80 μs.
- If you use input 3 and/or input 4 when you use only one or two inputs, the analog input conversion period will be 160 μs.
- If you use inputs 1 and 3, 1 and 4, 2 and 3, or 2 and 4 when you use two inputs, the analog input conversion period will be 160 μs.
- If you use three or more inputs, the analog input conversion period will also be 160 μs.
- If you set the Input Use Settings to 0 (not used), the set values in the DM Area for this Unit will be disabled.

6-2-4 Ladder Programming

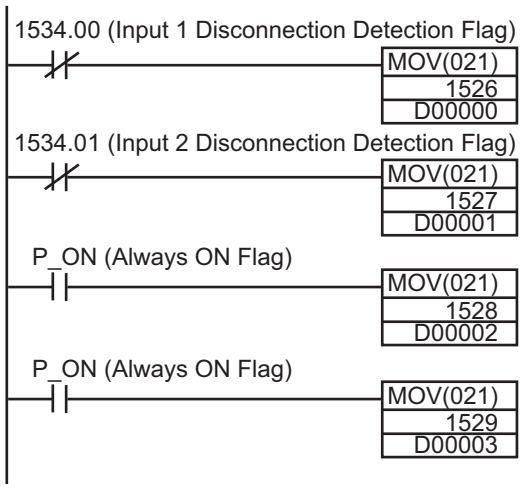
The data converted from analog to digital that is in CIO (n+1) to CIO (n+4) of the words allocated to the CPU Bus Unit in the CIO Area is stored in the specified addresses (D00000 to D00003).
In this example, the unit number is 1 so n is 1525. Therefore, the data is moved from CIO 1526 through CIO 1529 to D00000 through D00003.

● Analog Inputs

Input	Input signal range	Converted input value address (n = 1525)*1	Converted data storage address*2
1	1 to 5 V	(n+1) = CIO 1526	D00000
2	4 to 20 mA	(n+2) = CIO 1527	D00001
3	0 to 10 V	(n+3) = CIO 1528	D00002
4	−10 to 10 V	(n+4) = CIO 1529	D00003

*1. The addresses are determined by the unit number of the High-speed Analog Input Unit as a CPU Bus Unit.

*2. Any addresses can be set for these.



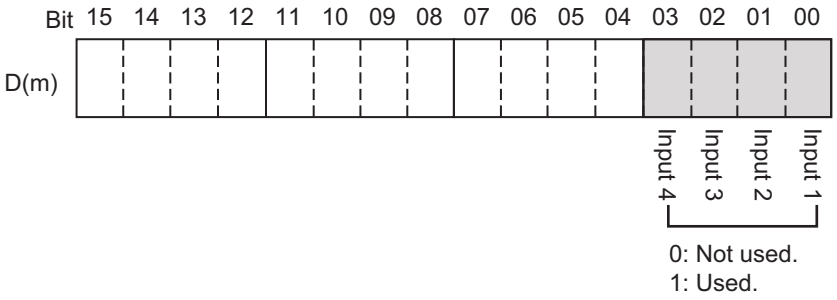
Additional Information

- Input disconnection detection is possible for the 1 to 5-V and 4 to 20-mA ranges.
- The Disconnection Detection Flag for input 1 is CIO 1534.00, and it turns ON if a disconnection is detected. In the above programming, the content of CIO 1526 is stored in D00000 only when a disconnection is not detected.
- In the same way, the Disconnection Detection Flag for input 2 is CIO 1534.01, and it turns ON if a disconnection is detected. In the above programming, the content of CIO 1527 is stored in D00001 only when a disconnection is not detected.

6-3 Reading Input Settings and Converted Values

6-3-1 Input Use Settings

The CJ1W-ADG41 converts only the specified inputs from inputs 1 to 4. To specify the analog inputs to use, set the corresponding bit shown below in D(m) in the DM Area to 1.



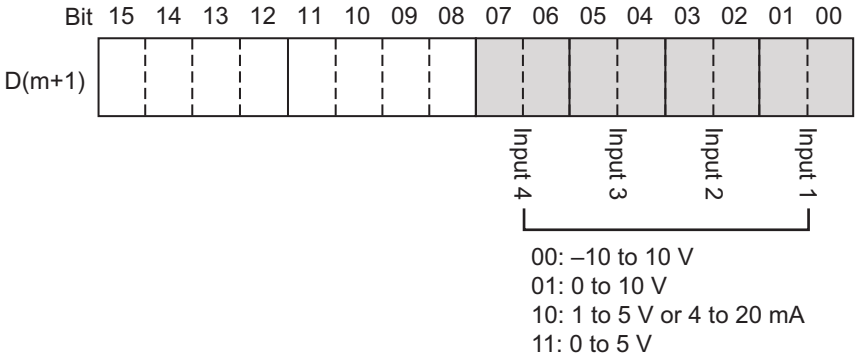
- "m" in the DM Area equals 30000 + Unit number × 100.

Additional Information

- If you use only one or two inputs, use input 1 and/or input 2. The analog input conversion period will be 80 μs.
- If you use input 3 and/or input 4 when you use only one or two inputs, the analog input conversion period will be 160 μs.
- If you use inputs 1 and 3, 1 and 4, 2 and 3, or 2 and 4 when you use two inputs, the analog input conversion period will be 160 μs.
- If you use three or more inputs, the analog input conversion period will also be 160 μs.
- If you set the Input Use Settings to 0 (not used), the set values in the DM Area for this Unit will be disabled.

6-3-2 Input Signal Range Settings

You can select any of the following ranges for each of inputs 1 to 4: –10 to 10 V; 0 to 10 V; 1 to 5 V or 4 to 20 mA; and 0 to 5 V. Set the input signal ranges in D(m+1) in the DM Area as shown below.



Precautions for Correct Use

- After you make the settings in the DM Area, always cycle the power supply to the PLC or turn ON the CPU Bus Unit Restart Flag. The settings in the DM Area are transferred to the CPU Bus Units when the power supply is turned ON or when the CPU Bus Unit Restart Flags are turned ON.
- If you use a current input, set the Voltage/Current Specification (D(m+98)). The High-speed Analog Input Unit is adjusted for both voltage ranges and current ranges before the Unit is shipped. If you change this setting to 1, the adjustment values for a current range are used to improve accuracy.

Additional Information

“m” in the DM Area equals 30000 + Unit number × 100.

6-3-3 Reading Converted Values

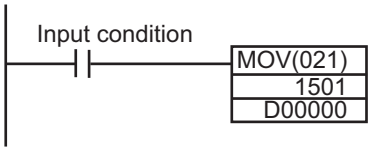
The converted analog input values are stored in CIO (n+1) to CIO (n+4) for individual inputs.

CIO Area address*1	Function	Stored value
n+1	Input 1 Converted Value	16-bit binary data
n+2	Input 2 Converted Value	
n+3	Input 3 Converted Value	
n+4	Input 4 Converted Value	

*1. “n” in the CIO Area equals 1500 + Unit number × 25

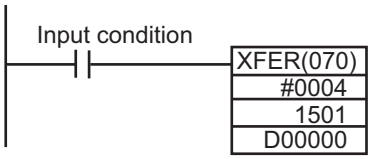
Use the MOV(021) or XFER(070) instruction to read the converted values into the program.

● Example 1: Reading the Converted Value for Only One Input (Unit Number = 0)



Moves the converted value in CIO 1501 (input 1) to D00000.

● Example 2: Reading the Converted Values for More Than One Input (Unit Number = 0)



Moves the converted values in CIO 1501 to CIO 1504 (inputs 1 to 4) to D00000 to D00003.

6-4 Mean Value Processing Settings

To specify whether to perform mean value processing and the number of buffers to use for when mean value processing is performed, set D(m+2) to D(m+5) in the DM Area.

DM Area address*1	Function	Set value
D(m+2)	Input 1 Mean Value Processing Setting	0000 hex: No mean value processing (default value). 0001 hex: Mean value processing with 2 buffers. 0002 hex: Mean value processing with 4 buffers. 0003 hex: Mean value processing with 8 buffers. 0004 hex: Mean value processing with 16 buffers. 0005 hex: Mean value processing with 32 buffers. 0006 hex: Mean value processing with 64 buffers.
D(m+3)	Input 2 Mean Value Processing Setting	
D(m+4)	Input 3 Mean Value Processing Setting	
D(m+5)	Input 4 Mean Value Processing Setting	

*1. “m” in the DM Area equals 30000 + Unit number × 100

Precautions for Correct Use

After you make the settings in the DM Area, always cycle the power supply to the PLC or turn ON the CPU Bus Unit Restart Flag. The settings in the DM Area are transferred to the CPU Bus Unit when the power supply is turned ON or when the CPU Bus Unit Restart Flags are turned ON.

6-5 Scaling Settings

To specify whether to scale the inputs and the settings for when you do scale them, set in D(m+14) to D(m+21) in the DM Area.

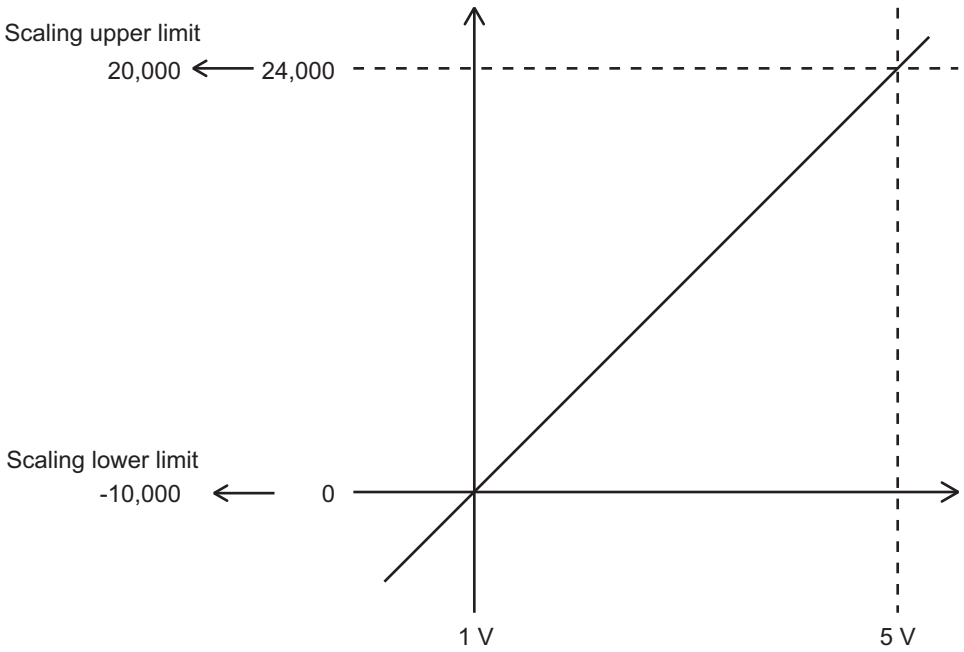
DM Area address*1	Function	Set value
D(m+14)	Input 1 Scaling Lower Limit	–32,768 to 32,767 (8000 hex to 7FFF hex)*2
D(m+15)	Input 1 Scaling Upper Limit	
D(m+16)	Input 2 Scaling Lower Limit	
D(m+17)	Input 2 Scaling Upper Limit	
D(m+18)	Input 3 Scaling Lower Limit	
D(m+19)	Input 3 Scaling Upper Limit	
D(m+20)	Input 4 Scaling Lower Limit	
D(m+21)	Input 4 Scaling Upper Limit	

*1. “m” in the DM Area equals 30000 + Unit number × 100

*2. Scaling is not performed if both the upper and lower limits are set to 0000 hex.

● Example

Range: 1 to 5 V, Scaling Upper Limit: 20,000, Scaling Lower Limit: –10,000



The settings in the DM Area are given in the following table.

DM Area address*1	Function	Set value
D(m+14)	Input 1 Scaling Lower Limit	D8F0 hex (–10,000)
D(m+15)	Input 1 Scaling Upper Limit	4E20 hex (20,000)

*1. “m” in the DM Area equals 30000 + Unit number × 100

The scaled data for input 1 is output to CIO (n+1). Refer to *6-3-3 Reading Converted Values* on page 6-11 for information on reading the converted values.

Precautions for Correct Use

After you make the settings in the DM Area, always cycle the power supply to the PLC or turn ON the CPU Bus Unit Restart Flag. The settings in the DM Area are transferred to the CPU Bus Unit when the power supply is turned ON or when the CPU Bus Unit Restart Flags are turned ON.

6-6 Comparator Settings

Set the hysteresis and comparator settings in D(m+48) to D(m+64) in the DM Area.

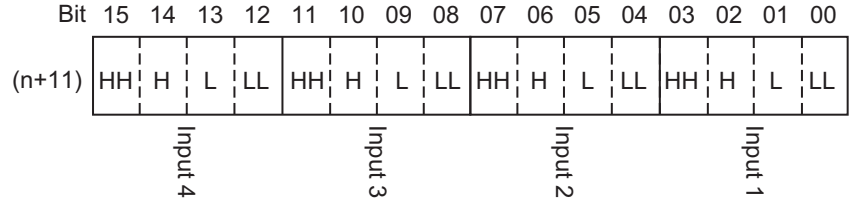
DM Area address*1	Function	Set value	
D(m+48)	Hysteresis Setting	0000 hex to 7D00 hex (default: 0000 hex)	
D(m+49)	Input 1 Comparator HH Value		
D(m+50)	Input 1 Comparator H Value		
D(m+51)	Input 1 Comparator L Value		
D(m+52)	Input 1 Comparator LL Value	–10 to 10 V:	8000 hex to 7FFF hex (–32,768 to 32,768)
D(m+53)	Input 2 Comparator HH Value	0 to 10 V or 0 to 5 V:	FA24 hex to 7B0C hex (–1,500 to 31,500)
D(m+54)	Input 2 Comparator H Value	1 to 5 V or 4 to 20 mA:	FB50 hex to 6270 hex (–1,200 to 25,200)
D(m+55)	Input 2 Comparator L Value		
D(m+56)	Input 2 Comparator LL Value		
D(m+57)	Input 3 Comparator HH Value		
D(m+58)	Input 3 Comparator H Value		
D(m+59)	Input 3 Comparator L Value		
D(m+60)	Input 3 Comparator LL Value	Default	
D(m+61)	Input 4 Comparator HH Value	HH: 7530 hex	
D(m+62)	Input 4 Comparator H Value	H: 7530 hex	
D(m+63)	Input 4 Comparator L Value	L: 0000 hex	
D(m+64)	Input 4 Comparator LL Value	LL: 0000 hex	

*1. “m” in the DM Area equals 30000 + Unit number × 100

Additional Information

- The same hysteresis setting is used for HH, H, L, and LL for inputs 1 and 4.
- If you use scaling, set the comparator values to the scaled values.

The Comparator Outputs for the inputs are stored in bits 00 to 15 in CIO (n+11). Specify these bits to use the comparator outputs in the user program.

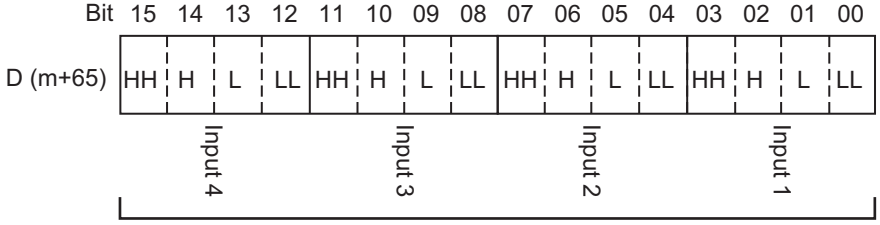


“n” in the CIO Area equals 1500 + Unit number × 25

6-7 Comparator Interrupt Settings

Set whether to use comparator interrupts and the interrupt task numbers in D(m+65) to D(m+81) in the DM Area.

● Comparator Interrupt Usage Settings



0: Not used
1: Used

● Interrupt Task Numbers

The lower task numbers are executed first (given priority) for the interrupt tasks from the High-speed Analog Input Unit. If factors occur for more than one interrupt task at the same time, up to four tasks from the highest priority are recorded for the interrupts.

DM Area address*1	Function	Set value	Default
D(m+66)	Input 1 Comparator HH Interrupt Task Number	0000 hex to 00FF hex (0 to 255)	0000 hex (0)
D(m+67)	Input 1 Comparator H Interrupt Task Number		0001 hex (1)
D(m+68)	Input 1 Comparator L Interrupt Task Number		0002 hex (2)
D(m+69)	Input 1 Comparator LL Interrupt Task Number		0003 hex (3)
D(m+70)	Input 2 Comparator HH Interrupt Task Number		0004 hex (4)
D(m+71)	Input 2 Comparator H Interrupt Task Number		0005 hex (5)
D(m+72)	Input 2 Comparator L Interrupt Task Number		0006 hex (6)
D(m+73)	Input 2 Comparator LL Interrupt Task Number		0007 hex (7)
D(m+74)	Input 3 Comparator HH Interrupt Task Number		0008 hex (8)
D(m+75)	Input 3 Comparator H Interrupt Task Number		0009 hex (9)
D(m+76)	Input 3 Comparator L Interrupt Task Number		000A hex (10)
D(m+77)	Input 3 Comparator LL Interrupt Task Number		000B hex (11)
D(m+78)	Input 4 Comparator HH Interrupt Task Number		000C hex (12)
D(m+79)	Input 4 Comparator H Interrupt Task Number		000D hex (13)
D(m+80)	Input 4 Comparator L Interrupt Task Number		000E hex (14)
D(m+81)	Input 4 Comparator LL Interrupt Task Number		000F hex (15)

*1. “m” in the DM Area equals 30000 + Unit number × 100

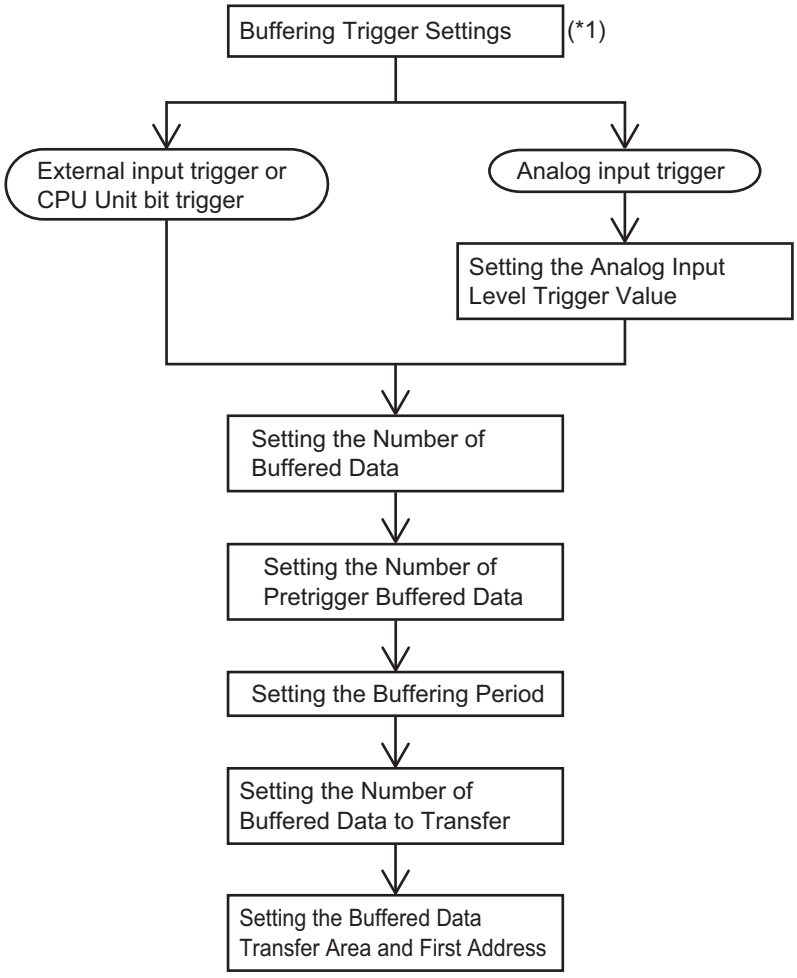
Precautions for Correct Use

After you make the settings in the DM Area, always cycle the power supply to the PLC or turn ON the CPU Bus Unit Restart Flag. The settings in the DM Area are transferred to the CPU Bus Unit when the power supply is turned ON or when the CPU Bus Unit Restart Flags are turned ON.

6-8 Data Buffering Settings

6-8-1 Setting Procedure

Use the following procedure to set data buffering.



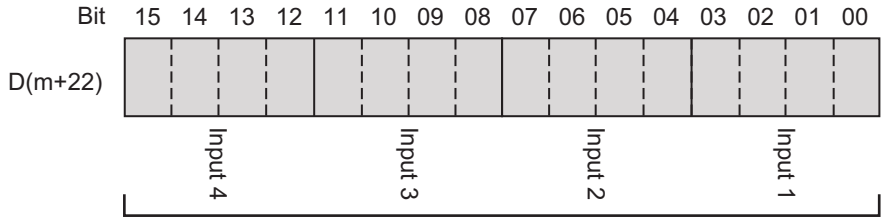
*1. You can set a buffering trigger independently for each input.

Precautions for Correct Use

After you make the settings in the DM Area, always cycle the power supply to the PLC or turn ON the CPU Bus Unit Restart Flag. The settings in the DM Area are transferred to the CPU Bus Unit when the power supply is turned ON or when the CPU Bus Unit Restart Flags are turned ON.

6-8-2 Buffering Trigger Settings

Specify whether to use data buffering and the trigger conditions in D(m+22) in the DM Area.

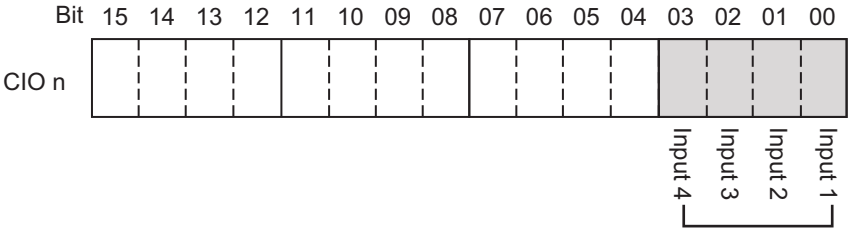


0000: Not used
0010: External input trigger and buffering starts on rising edge
0011: External input trigger and buffering is performed while input is ON
0100: CPU Unit bit trigger and buffering starts on rising edge
0101: CPU Unit bit trigger and buffering is performed while input is ON
1000: Analog input level trigger while increasing
1001: Analog input level trigger while decreasing

"m" in the DM Area equals 30000 + Unit number × 100

6-8-3 CPU Unit Bit Trigger

A CPU Unit bit trigger is the only one of the three types of buffering triggers that you can use to start buffering data with an independent signal input. (Buffering starts when bits 00 to 03 in CIO n turn ON.)



0: Stop Buffering
1: Start Buffering

6-8-4 Setting the Analog Input Trigger Level

To use an analog input level trigger, make the following settings in D(m+23) to D(m+26) in the DM Area.

DM Area address*1	Function	Set value	
D(m+23)	Input 1 Analog Input Trigger Level	Default:	7530 hex (30,000)
D(m+24)	Input 2 Analog Input Trigger Level	–10 to 10 V:	8000 hex to 7FFF hex (–32,768 to 32,767)
D(m+25)	Input 3 Analog Input Trigger Level	0 to 10 V or 0 to 5 V:	FA24 hex to 7B0C hex (–1,500 to 31,500)
D(m+26)	Input 4 Analog Input Trigger Level	1 to 5 V or 4 to 20 mA:	FB50 hex to 6270 hex (–1,200 to 25,200)

*1. “m” in the DM Area equals 30000 + Unit number × 100

6-8-5 Setting the Number of Buffered Data

Set the number of data to buffer in D(m+27) to D(m+30) in the DM Area.

DM Area address*1	Function	Set value
D(m+27)	Input 1 Number of Buffered Data	Default: 7530 hex (30,000) 0000 hex to 7530 hex (0 to 30,000)
D(m+28)	Input 2 Number of Buffered Data	
D(m+29)	Input 3 Number of Buffered Data	
D(m+30)	Input 4 Number of Buffered Data	

*1. “m” in the DM Area equals 30000 + Unit number × 100

Additional Information

- If the buffering trigger is too long and the specified number of data is buffered, no further data will be buffered. (This applies when buffering is performed while a CPU Unit bit trigger or external input trigger is ON.)
- The buffered data is cleared when the power supply to the PLC is turned ON, after the buffered data is transferred to the CPU Unit, and when buffering is started again.
- If you transfer the buffered data to EM Area banks, you can buffer up to 30,000 words for each input.
- When you transfer buffered data to the DM Area, you can set the number of buffered data to up to 30,000 words total for all of the inputs.

6-8-6 Setting the Number of Pretrigger Buffered Data

You can also buffer the data from just before the trigger for the number of data specified in the Number of Pretrigger Buffered Data (D(m+31) to D(m+34)).

DM Area address*1	Function	Set value
D(m+31)	Input 1 Number of Pretrigger Buffered Data	Default: 0000 hex (0) 0000 hex to 752F hex (0 to 29,999)
D(m+32)	Input 2 Number of Pretrigger Buffered Data	
D(m+33)	Input 3 Number of Pretrigger Buffered Data	
D(m+34)	Input 4 Number of Pretrigger Buffered Data	

*1. “m” in the DM Area equals 30000 + Unit number × 100

Additional Information

Always set the Number of Pretrigger Buffered Data to a smaller value than the Number of Buffered Data.

6-8-7 Setting the Buffering Periods

The buffering periods must be a multiple (1 to 125) of the analog input conversion period (80 μs for 2 inputs and 160 μs for 4 inputs). In other words, you can set the buffering periods to between 80 μs and 10 ms if one or two analog inputs are used, and to between 160 μs and 20 ms if three or four analog inputs are used.
Make the following settings in D(m+35) to D(m+38) in the DM Area.

DM Area address*1	Function	Set value
D(m+35)	Input 1 Buffering Period	Default: 0001 hex (1) 0001 hex to 007D hex (1 to 125)
D(m+36)	Input 2 Buffering Period	
D(m+37)	Input 3 Buffering Period	
D(m+38)	Input 4 Buffering Period	

*1. “m” in the DM Area equals 30000 + Unit number × 100

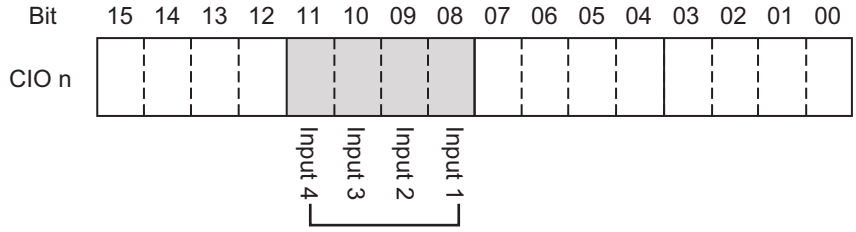
Additional Information

- If you use only one or two inputs, use input 1 and/or input 2. The analog input conversion period will be 80 μs.
- If you use input 3 and/or input 4 when you use only one or two inputs, the analog input conversion period will be 160 μs.
- If you use inputs 1 and 3, 1 and 4, 2 and 3, or 2 and 4 when you use two inputs, the analog input conversion period will be 160 μs.
- If you use three or more inputs, the analog input conversion period will also be 160 μs.
- If you set the Input Use Settings to 0 (not used), the set values in the DM Area for this Unit will be disabled.

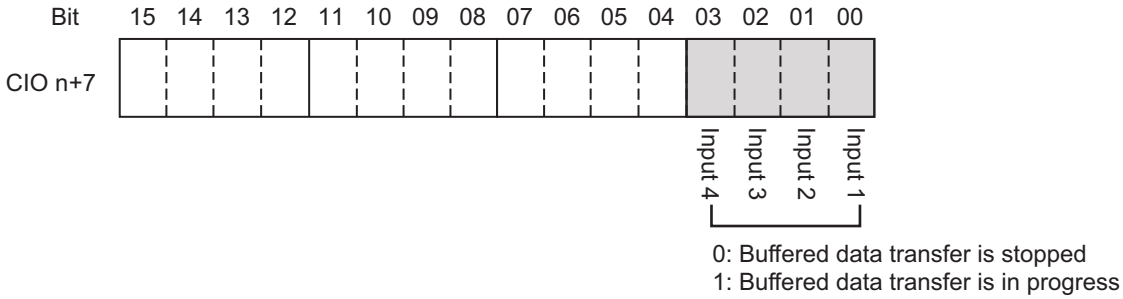
6-8-8 Transferring Buffered Data

Transferring Buffered Data

You can transfer the buffered data to an EM Area bank or the DM Area in the CPU Unit.
The number of buffered data to transfer that is set for each input is transferred to the specified buffered data transfer destination bank starting from the specified first address in the EM Area bank or DM Area.
Transferring the buffered data for an input is started when the Buffered Data Transfer Start Flag (bits 08 to 11 in CIO n) for the input is turned ON.



While the buffered data is being transferred, the Buffered Data Transfer in Progress Flag (bits 00 to 03 in CIO (n+7)) will be ON.



Setting the Number of Buffered Data to Transfer

Of the buffered data, only the specified number of data will be transferred to the EM Area bank or DM Area in the CPU Unit. Set the number of data to transfer in D(m+39) to D(m+42) in the DM Area.

DM Area address*1	Function	Set value
D(m+39)	Input 1 Number of Buffered Data to Transfer	Default: 1F40 hex (8,000) 0001 hex to 7530 hex (1 to 30,000)
D(m+40)	Input 2 Number of Buffered Data to Transfer	
D(m+41)	Input 3 Number of Buffered Data to Transfer	
D(m+42)	Input 4 Number of Buffered Data to Transfer	

*1. “m” in the DM Area equals 30000 + Unit number × 100

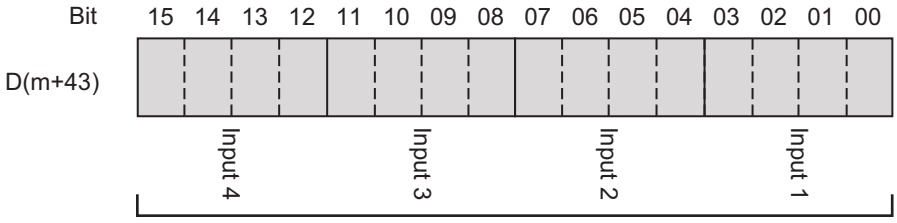
If you transfer the buffered data to EM banks, you can buffer up to 30,000 words of data for each input. When you transfer buffered data to the DM Area, you can set the number of buffered data to transfer to up to 30,000 words total for all of the inputs.

Setting the Buffered Data Transfer Destination Bank

As the buffered data transfer destination, you must set the EM Area bank or DM Area and the first destination address within the bank or DM Area.

● Setting the Buffered Data Transfer Destination Bank

Set the EM Area bank in D(m+43) in the DM Area as shown below.



0000: EM Area bank 0	0111: EM Area bank 7
0001: EM Area bank 1	1000: EM Area bank 8
0010: EM Area bank 2	1001: EM Area bank 9
0011: EM Area bank 3	1010: EM Area bank 10
0100: EM Area bank 4	1011: EM Area bank 11
0101: EM Area bank 5	1100: EM Area bank 12
0110: EM Area bank 6	1111: DM Area

● Setting the First Destination Address for Buffered Data Transfer

In D(m+44) to D(m+47) in the DM Area, specify the first transfer destination address in the EM Area bank or DM Area that you specified in D(m+43) in the DM Area.

DM Area address*1	Function	Set value	Default
D(m+44)	Input 1 First Destination Address for Buffered Data Transfer	0000 hex to 7FFF hex (0 to 32,767)	0000 hex (0)
D(m+45)	Input 2 First Destination Address for Buffered Data Transfer		1F40 hex (8,000)
D(m+46)	Input 3 First Destination Address for Buffered Data Transfer		3E80 hex (16,000)
D(m+47)	Input 4 First Destination Address for Buffered Data Transfer		5DC0 hex (24,000)

*1. “m” in the DM Area equals 30000 + Unit number × 100

Note When you specify first transfer destination addresses for more than one input in the same EM Area bank or in the DM Area, make sure that the same addresses will not be used more than once.

6-9 Zero and Span Adjustment Settings

6-9-1 Adjustment Procedure

You can adjust the zero point and span point for the converted analog values.
The zero point is adjusted with an offset and the span point is used to adjust the gain using the minimum range value as the base point.

Procedure When the Input Must Be Adjusted for the Connected Device

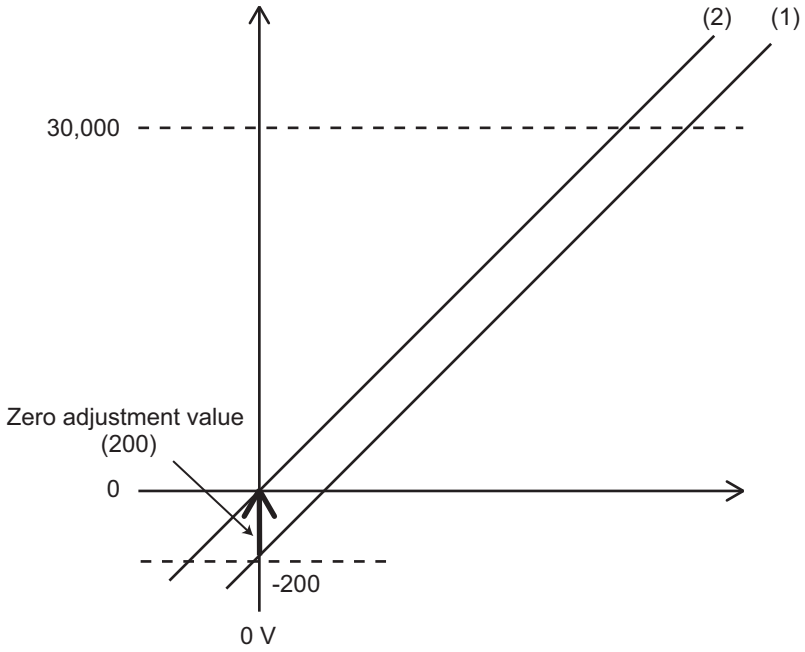
Turning ON the PLC Power Supply	
↓	
Setting Operation Mode Setting to Adjustment Mode	Set D(m+99) in the DM Area to 0001 hex (Adjustment Mode).*1
↓	
Turning the PLC Power Supply OFF and ON	Or, turn ON the CPU Bus Unit Restart Flag.
↓	
Adjusting Zero	Adjust the offset for the zero point.
↓	
Adjusting the Span	Adjust the gain of the span point.
↓	
Setting Operation Mode Setting to Normal Mode	Set D(m+99) in the DM Area to 0000 hex (Normal Mode).*1
↓	
Turning the PLC Power Supply OFF and ON	Or, turn ON the CPU Bus Unit Restart Flag.

*1. “m” in the DM Area equals 30000 + Unit number × 100.

6-9-2 Zero Adjustment Procedure

● Example

Using a 0 to 10-V Range and Adjusting the 0% Input to the Zero Point
If the read value is –200, the zero adjustment value would be set to 200.



Range	Adjustment base point (0% input)	Adjustable range	Setting range	
			Decimal	Hexadecimal
–10 V to 10 V	–10 V	–11 V to –9 V	–3,000 to 3,000	F448 to 0BB8
0 to 10 V	0 V	–0.5 V to 0.5 V	–1,500 to 1,500	FA24 to 05DC
1 to 5 V	1 V	0.8 V to 1.2 V	–1,200 to 1,200	FB50 to 04B0
0 to 5 V	0 V	–0.25 V to 0.25V	–1,500 to 1,500	FA24 to 05DC
4 to 20 mA	4 mA	3.2 mA to 4.2 mA	–1,200 to 1,200	FB50 to 04B0

Adjustment Procedure

1. Input the 0% output from the external analog output device to the CJ1W-ADG41.
2. Read the input value. Refer to *6-3-3 Reading Converted Values* on page 6-11 for information on reading the value.
3. Set a zero adjustment value that cancels the value read in step 2 in the DM Area as shown in the following table.

DM Area address*1	Function	Set value
D(m+7)	Input 1 Zero Adjustment Value	Default: 0000 hex (0) Set value: Refer to the table on the previous page.
D(m+9)	Input 2 Zero Adjustment Value	
D(m+11)	Input 3 Zero Adjustment Value	
D(m+13)	Input 4 Zero Adjustment Value	

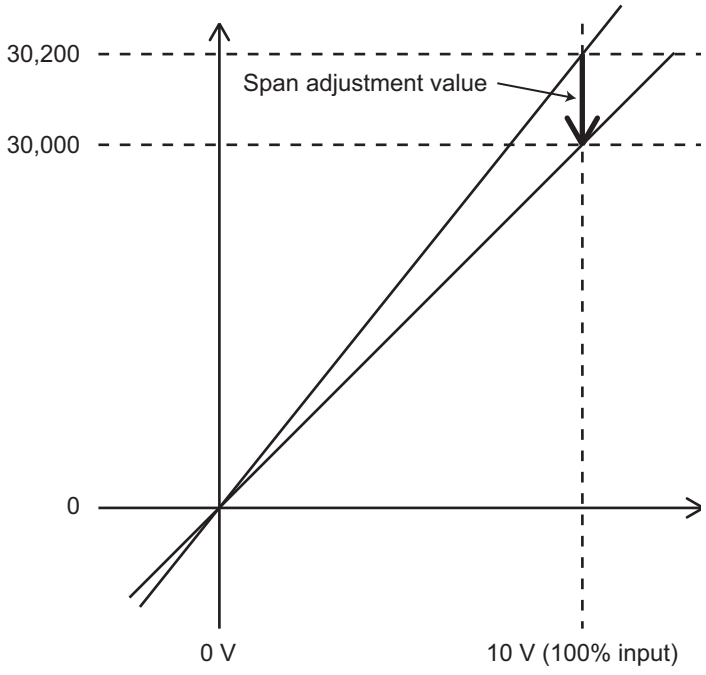
*1. “m” in the DM Area equals 30000 + Unit number × 100

6-9-3 Span Adjustment Procedure

The setting procedure is described based on the following example.

● Example

Using a 0 to 10-V Range and Adjusting a 10-V Input to the 100% Input Value



Range	Adjustment base point (0% input)	Setting range	
		Decimal	Hexadecimal
−10 V to 10 V	−10 V	9,089 to 11,112	2381 to 2B68
0 to 10 V	0 V	9,089 to 11,112	2381 to 2B68
1 to 5 V	1 V	9,089 to 11,112	2381 to 2B68
0 to 5 V	0 V	9,089 to 11,112	2381 to 2B68
4 to 20 mAt	4 mA	9,089 to 11,112	2381 to 2B68

Adjustment Procedure

1 Input the 10-V output from the external analog output device to the CJ1W-ADG41.

2 Read the input value. Refer to *6-3-3 Reading Converted Values* on page 6-11 for information on reading the value. Here, we will assume that 30,200 was read.

3 Calculate the gain between the read value (30,200) and the actual 100% data (30,000) and set it in the DM Area as the span adjustment value.

Calculation Method

30000÷30200=0.9934

Therefore, set 9934 (26CE hex) in the DM Area as shown in the following table.

DM Area address*1	Function	Set value*2
D(m+6)	Input 1 Span Adjustment Value	Default: 2710h Set value: Refer to the table on the previous page.
D(m+8)	Input 2 Span Adjustment Value	
D(m+10)	Input 3 Span Adjustment Value	
D(m+12)	Input 4 Span Adjustment Value	

*1. “m” in the DM Area equals 30000 + Unit number × 100

*2. The gain will be the set value × 0.0001.

7

Troubleshooting

7-1 Error List

If an error is found in the CJ1W-ADG41 or CPU Unit, an indicator will flash on the front of the CJ1W-ADG41 and an error will be recorded in the error log in non-volatile memory in the CJ1W-ADG41. Also, if an error occurs in the CJ1W-ADG41, the Alarm Bit in the CIO Area will turn ON.

The following table gives the error types, causes, and correction.

Indicator status	Type	Bit that turns ON	Description	Correction	Error log	Converted data
RUN: Lit ERC: Lit ERH: Not lit ADJ: Not lit	Initial setting errors	CIO (n+10) bit 05	Buffering Bank/Address Setting Error There is a mistake in the buffered data transfer destination EM bank and address settings.	Check the settings. Correct the settings and cycle the power supply or restart the High-speed Analog Input Unit. Refer to *Setting the Buffered Data Transfer Destination Bank* on page 6-22.	---	Always 0000 hex.
		CIO (n+10) bit 06	Number of Buffered Data to Transfer Setting Error There is a mistake in the setting for the number of buffered data to transfer.	Check the settings. Correct the settings and cycle the power supply or restart the High-speed Analog Input Unit. Refer to *Setting the Number of Buffered Data to Transfer* on page 6-21.	---	Always 0000 hex.
		CIO (n+10) bit 07	Mean Value Processing Setting Error There is a mistake in the number of samplings that is specified for mean processing.	Check the settings. Correct the settings and cycle the power supply or restart the High-speed Analog Input Unit. Refer to *6-4 Mean Value Processing Settings* on page 6-12.	---	Always 0000 hex.
	Communications errors	CIO (n+9) bit 00 to bit 03	Disconnection Detection Flag Disconnection of an input signal was detected.	The input may be disconnected. Check the input and correct it if necessary.	---	Always 7FFF hex.
		CIO (n+10) bit 14	A/D Conversion Error	Cycle the power supply. If the error persists, replace the High-speed Analog Input Unit.	0330 hex	Always 0000 hex.
RUN: Not lit ERC: Not lit ERH: Lit ADJ: Not lit	Unit number setting errors	None	Duplicate Unit Number The same unit number has been assigned to another CPU Bus Unit or the unit number was set to a value other than 0 to F.	Check the unit number, correct the settings, and cycle the power supply or restart the High-speed Analog Input Unit.	---	Always 0000 hex.
		None	CPU Bus Unit Setting Error The CPU Bus Units registered in the I/O tables are different from the ones actually mounted.	Check the unit number, correct the settings, and cycle the power supply or restart the High-speed Analog Input Unit. Or, create the I/O tables again.	---	Always 0000 hex.

Lit: ☐, Not lit: ■, Flashing: ◪

Indicator status	Type	Bit that turns ON	Description	Correction	Error log	Converted data
RUN ☐ ERC ■ ERH ☐ ADJ ■	CPU Unit operation errors	None	PC21 Bus Error An I/O bus error occurred, causing an error in data exchange between the CPU Unit and High-speed Analog Input Unit.	Cycle the power supply or restart the High-speed Analog Input Unit. Refer to the *CJ Series Programmable Controllers Operation Manual* (Cat. No. W398) for details.	---	Always 0000 hex.
		None	CPU Unit Initialization Error An error occurred during initialization.*1	Cycle the power supply or restart the High-speed Analog Input Unit. Refer to the *CJ Series Programmable Controllers Operation Manual* (Cat. No. W398) for details.	---	Always 0000 hex.
		None	CPU Unit Service Monitoring Error A CPU Unit monitoring error occurred and a response was not received from the CPU Unit for a specific period of time.	Cycle the power supply or restart the High-speed Analog Input Unit. Refer to the *CJ Series Programmable Controllers Operation Manual* (Cat. No. W398) for details.	0002 hex	The value from just prior to the error is retained.
		None	CPU Unit WDT Error A WDT error occurred in the CPU Unit.	Cycle the power supply or restart the High-speed Analog Input Unit. Refer to the *CJ Series Programmable Controllers Operation Manual* (Cat. No. W398) for details.	0001 hex	The converted data will be unstable.
RUN ☐ ERC ☐ ERH ■ ADJ ◪	Adjustment operation errors	CIO (n+10) bit 8	Comparator Setting Error There is a mistake in the comparator settings.	Check and correct the settings. Refer to *6-6 Comparator Settings* on page 6-15.	---	Always 0000 hex.
		CIO (n+10) bit 9	Buffering Analog Input Level Trigger Setting Error There is a mistake in the analog input level trigger setting for buffering.	Check and correct the settings. Refer to *6-8-4 Setting the Analog Input Trigger Level* on page 6-19.	---	Always 0000 hex.
		CIO (n+10) bit 10	Zero/Span Adjustment Value Error There is a mistake in the zero or span adjustment value setting.	Check and correct the settings. Refer to *6-9 Zero and Span Adjustment Settings* on page 6-23.	---	Always 0000 hex.

Lit: ☐, Not lit: ■, Flashing: ◪

*1. If the CPU Unit is on standby, the RUN indicator on the High-speed Analog Input Unit will not be lit.

Precautions for Correct Use

To restart the High-speed Analog Input Unit after changing the contents of the DM Area or removing the cause of an error, either cycle the power supply to the PLC or turn ON the CPU Bus Unit Restart Flag.

7-2 Troubleshooting

This section describes how to troubleshoot problems that may occur.

Converted Data Does Not Change

Cause	Correction	Reference
The Input Use Setting is set to 0 (not used).	Set the Input Use Setting to 1 (used).	*6-3 Reading Input Settings and Converted Values* on page 6-9
The input device is faulty, the input wiring is incorrect, or the input wiring is broken.	Use a circuit tester to see if the input voltage or current changes.	*4-3 Input Wiring Examples* on page 4-5
	Check the Alarm Flag for the High-speed Analog Input Unit to see if a disconnection was detected.	*3-3-5 Input Disconnection Detection* on page 3-13 and *5-3-2 CIO Area Allocations* on page 5-9

Converted Values Are Not as Expected

Cause	Correction	Reference
The signal range of the input device does not match the input signal range setting of the corresponding input to this Unit.	Check the specifications of the input device and align the input signal range.	*6-3 Reading Input Settings and Converted Values* on page 6-9
The voltage/current range setting was not made to use a 4 to 20-mA range.	Set the Voltage/Current Range Setting to 1.	*6-3 Reading Input Settings and Converted Values* on page 6-9

Converted Value Fluctuates

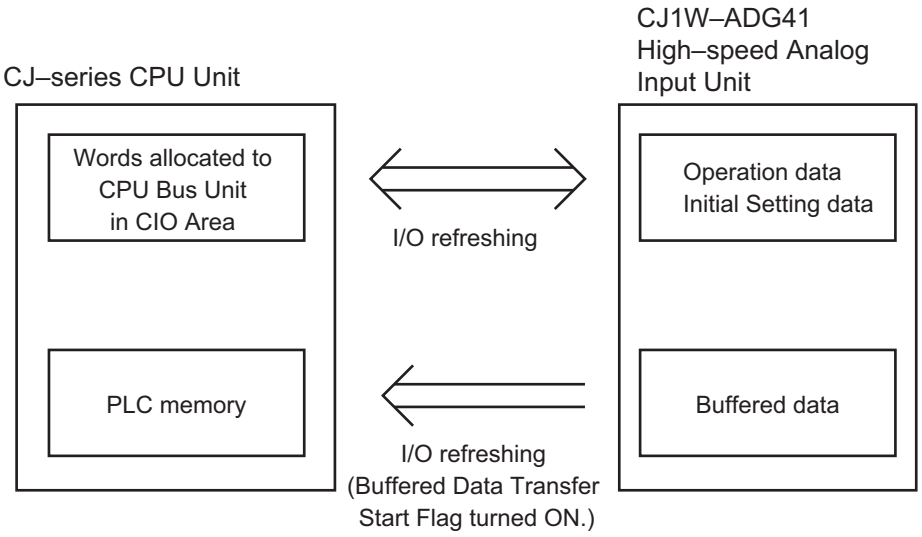
Cause	Correction	Reference
External noise is affecting the input signal.	Check the information in *4-3 Input Wiring Examples* on page 4-5.	*4-3 Input Wiring Examples* on page 4-5
	Try inserting a 0.01 to 0.1-μF ceramic capacitor or film capacitor between the positive and negative input terminals.	*4-3 Input Wiring Examples* on page 4-5
	Try increasing the number of buffers for mean value processing.	*6-4 Mean Value Processing Settings* on page 6-12

A

Appendix

A-1 Influence on Cycle Time

The CPU Unit and CJW-ADG41 High-speed Analog Input Unit can exchange data both through words allocated in the CIO Area and through data buffering.



I/O Refreshing Time

● Operation Data and Initial Setting Data

The I/O refreshing times when operation data and initial setting data are exchanged are given in the following table.

Mode	CJ1M	CJ1G	CJ1H	CJ1H-R	CJ2H	CJ2M
Normal	0.16	0.15	0.14	0.12	0.12	0.15
Adjustment	0.22	0.21	0.20	0.18	0.18	0.21

Unit: ms

Data Buffering

The I/O refreshing times when data buffering is performed are given in the following table.

CPU Unit	Formula to calculate approximate I/O refreshing time
CJ1M, CJ1-H, CJ1H-R, CJ2H, or CJ2M	0.1 ms + Number of transferred words × 0.7 μs

The number of data processed during one data exchange is given in the following table.

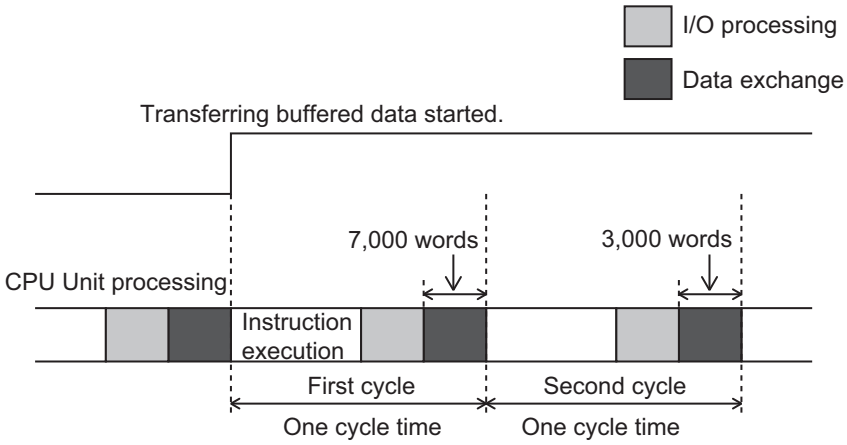
CPU Unit	Number of words processed for one data exchange
CJ1M, CJ1-H, CJ1H-R, CJ2H, or CJ2M	7,000

Processing data exchange for 10,000 words is performed over two I/O refresh cycles (i.e., two cycles).

Example for a CJ1-H CPU Unit

I/O Refreshing Time during First Cycle
0.1 ms + 7,000 x 0.7 μs = 5.0 ms

I/O Refreshing Time during Second Cycle
0.1 ms + 3,000 x 0.7 μs = 2.2 ms

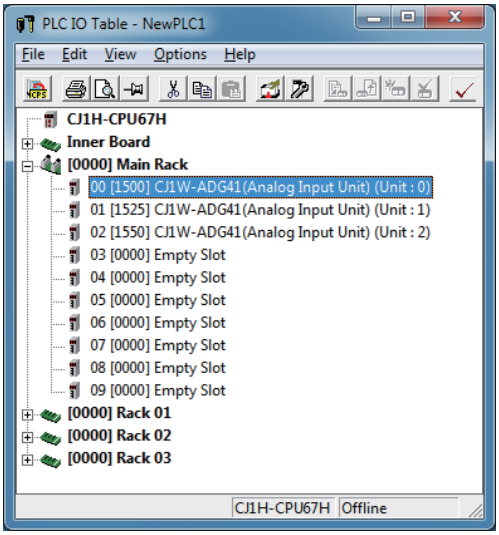


A-2 Introduction to CX-Programmer Interface When Using CPS Files

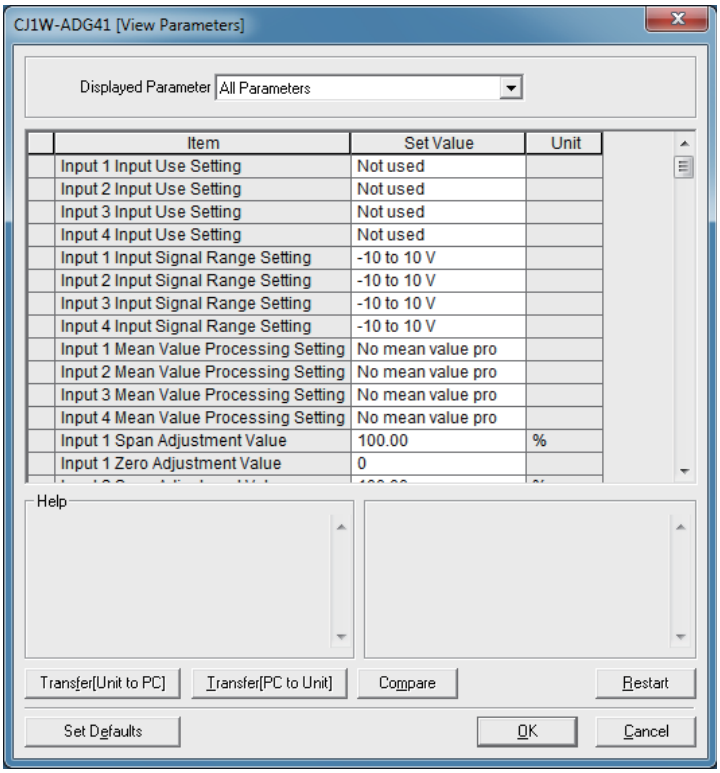
If you install the CPS file for the CJ1W-ADG41 in the CX-Programmer, you can use the CX-Programmer to easily make settings without worrying about unit numbers or data memory addresses.

Examples of the main windows and dialog boxes are given below.

CJ1W-ADG41 Setting Status

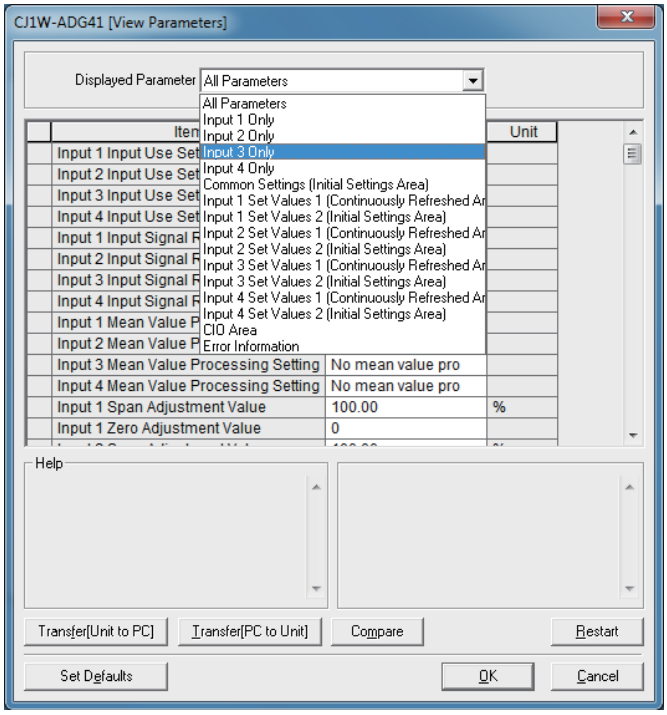


Dialog Box with CPS File Open



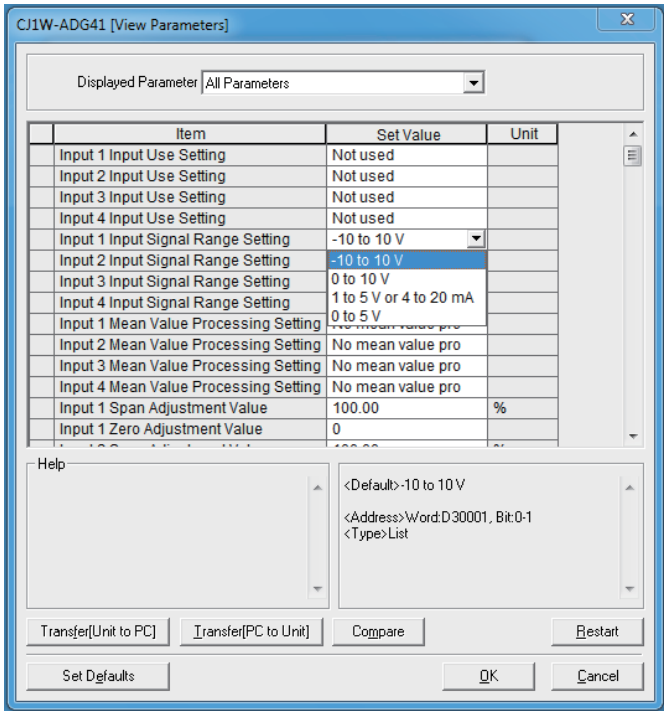
Display Parameter Groups

You can select the parameter group to display from a pull-down list.

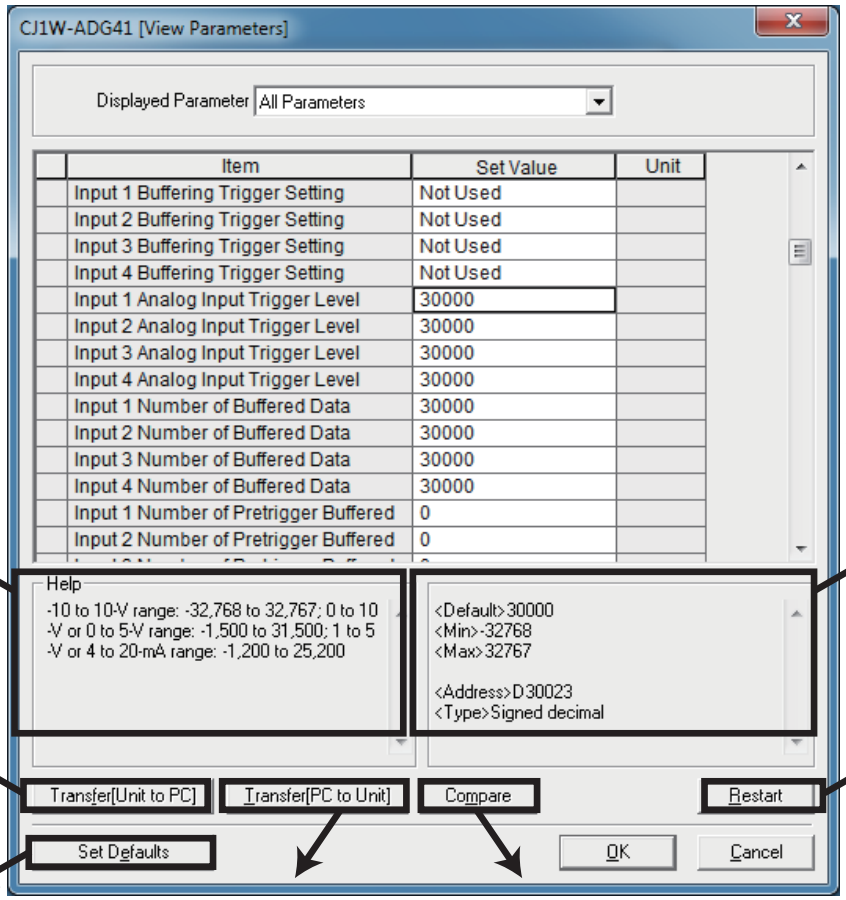


Input Signal Range Settings

You can select the set values for the input signal ranges from pull-down lists.



Analog Input Level Trigger Value



Help is displayed when a different parameter setting is used for each input signal range.

The default values and setting ranges are displayed.

Transfers the set values from the PLC to the computer.

Restarts the CJ1W-ADG41.

Resets the data memory values to the CJ1W-ADG41 default values.

Transfers the set values edited in the CPS file to the PLC.

Compares the various data.

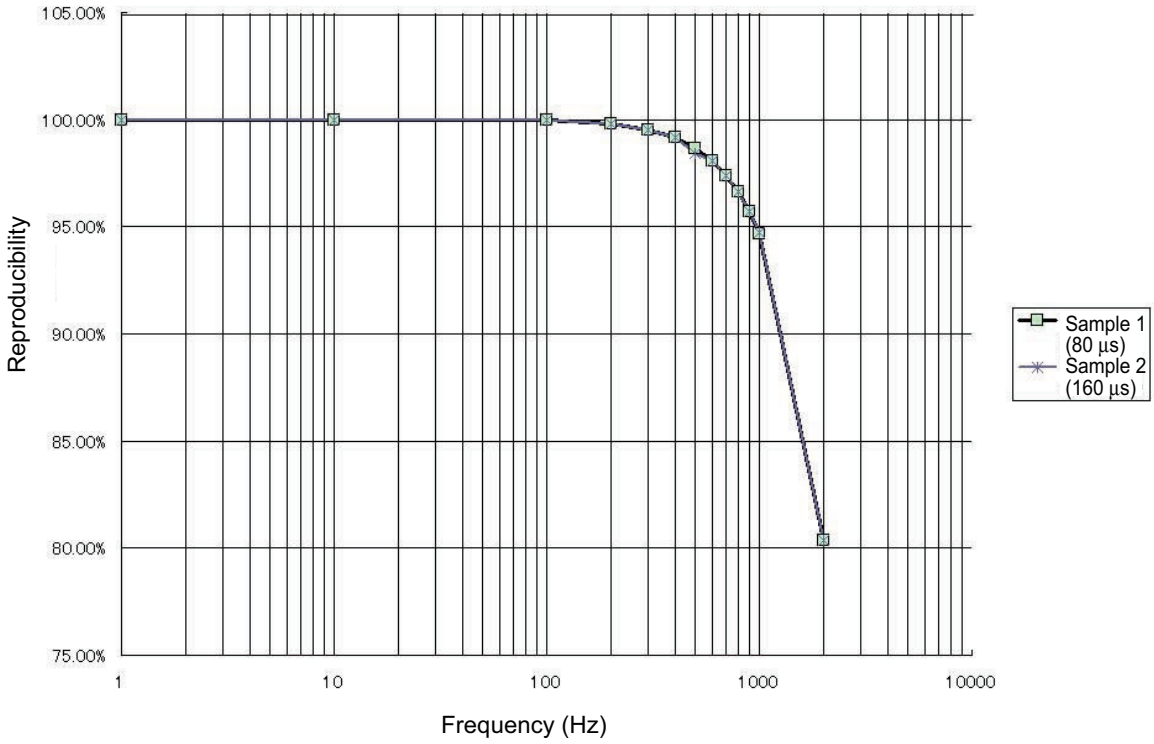
A-3 Frequency Response Performance

Measured values for the input frequency response performance of the CJ1W-ADG41 were obtained under the following conditions and are displayed in the following figure.

Measurement conditions: Room temperature and humidity

Vpp = Peak value of the waveform reproduced from the buffered data that was generated by applying a sine wave of 20 V (±10 V)

Reproducibility = Maximum value of sine wave input ÷ A/D converted value for application of 10 VDC × 100 (%)



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