

For Various Analog I/Os

- Analog Input Units for converting analog input signals into binary data
- Analog Output Units for converting binary data into analog output signals



CJ1W-AD081-V1

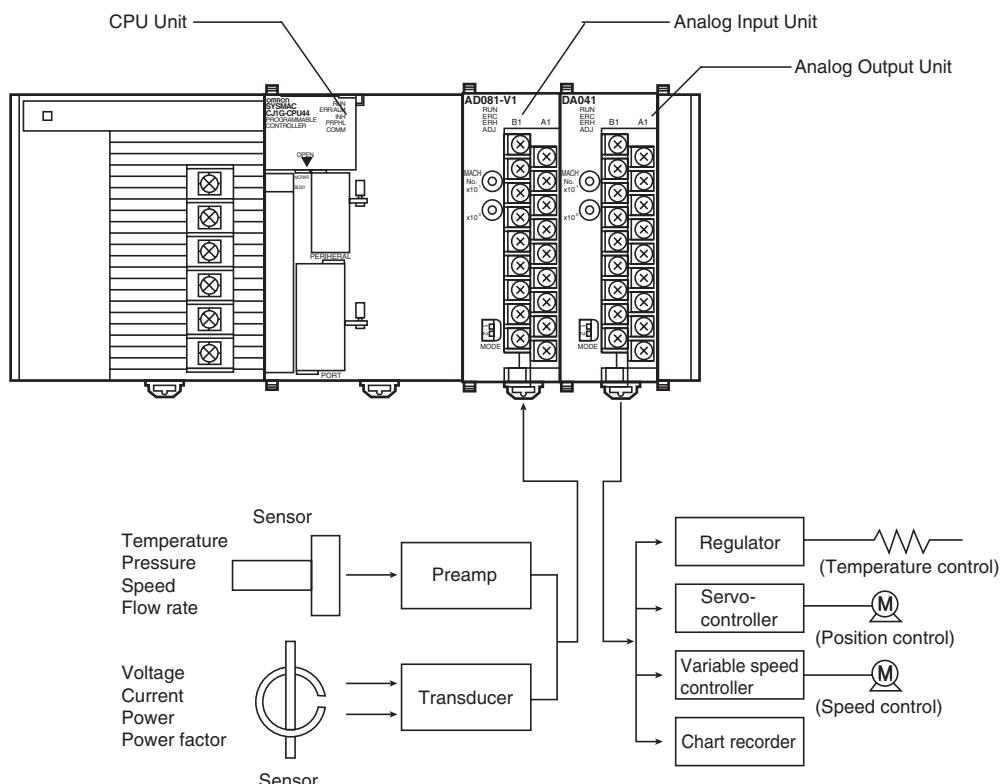


CJ1W-DA08V

Features

- Holds a maximum of 8 analog input signals in 1 unit.
- With functions including line disconnection detection, peak value holding, as well as offset and gain adjustment.
- Outputs a maximum of 8 output signals with 1 unit.
- With functions including output hold, offset and gain adjustment, as well as scaling (CJ1W-DA08V/08C).

System Configuration



Note: The above diagram is an installation example for the CJ1W-AD041-V1/081-V1 Analog Input Units and CJ1W-DA021/041 Analog Output Units.

Ordering Information

Analog Input Units

| Unit classification | Product name | I/O points | Signal range selection | Signal range | Resolution | Conversion Speed | Accuracy at ambient temperature of 25°C) | External connection | No. of unit numbers allocated | Current consumption (A) | | Model | Standards |
|-----------------------|--------------------|------------|-------------------------------|--|---|--|---|--------------------------|-------------------------------|-------------------------|------|---------------|---------------|
| | | | | | | | | | | 5 V | 24 V | | |
| CJ1 Special I/O Units | Analog Input Units | 8 inputs | Set separately for each input | 1 to 5 V, 0 to 5 V, 0 to 10 V, ±10 V, 4 to 20 mA | 1/8,000 (Settable to 1/4,000) (See note 1.) | 250 µs/point max. (Settable to 1 ms/point) (See note 1.) | Voltage: ±0.2% of F.S. Current: ±0.4% of F.S. (See note 2.) | Removable terminal block | 1 | 0.42 | — | CJ1W-AD081-V1 | UC1, N, L, CE |
| | | 4 inputs | Set separately for each input | | | | | | | | | CS1W-AD041-V1 | |

Note: 1. The resolution and conversion speed cannot be set independently. If the resolution is set to 1/4,000, then the conversion speed will be 1 ms/point.

2. At 23 ±2°C

3. For products manufactured from August 2007 onwards.

Analog Output Units

| Unit classification | Product name | I/O points | Signal range selection | Signal range | Resolution | Conversion Speed | Accuracy at ambient temperature of 25°C) | External connection | External power supply | No. of unit numbers allocated | Current consumption (A) | | Model | Standards |
|-----------------------|---------------------|------------|-------------------------------|--|---|--|---|--------------------------|---|-------------------------------|-------------------------|------------|---------------|-----------|
| | | | | | | | | | | | 5 V | 24 V | | |
| CJ1 Special I/O Units | Analog Output Units | 8 outputs | Set separately for each input | 1 to 5 V, 0 to 5 V, 0 to 10 V, -10 to 10 V | 1/4,000 (Settable to 1/8,000) (See note.) | 1 ms/point (Settable to 250 µs/point max.) | ±0.3% of F.S. | Removable terminal block | 24 VDC +10% -15% , 140 mA max. | 0.14 | 0.14 (See note.) | CJ1W-DA08V | UC1, N, L, CE | |
| | | 8 outputs | | 4 to 20 mA | | | | | 24 VDC +10% -15% , 170 mA max. | | 0.17 (See note.) | CS1W-DA08C | UC1, N, CE | |
| | | 4 outputs | | 1 to 5 V, 0 to 5 V, 0 to 10 V, -10 to 10 V, 4 to 20 mA | 1/4,000 | 1 ms/point max. | Voltage: ±0.3% of F.S. Current: ±0.5% of F.S. | | 24 VDC +10% -15% , 200 mA max. | 0.12 | 0.2 (See note.) | CJ1W-DA041 | UC1, N, L, CE | |
| | | 2 outputs | | | | | | | 24 VDC +10% -15% , 140 mA max. | | 0.14 (See note.) | CS1W-DA021 | | |

Note: This is for an external power supply, and not for internal current consumption.

Analog I/O Units

| Unit classification | Product name | I/O points | Signal range selection | Signal range | Resolution | Conversion Speed | Accuracy at ambient temperature of 25°C) | External connection | No. of unit numbers allocated | Current consumption (A) | | Model | Standards |
|-----------------------|------------------|------------|-------------------------------|--|-------------------------------|--|---|--------------------------|-------------------------------|-------------------------|------|------------|---------------|
| | | | | | | | | | | 5 V | 24 V | | |
| CJ1 Special I/O Units | Analog I/O Units | 4 inputs | Set separately for each input | 1 to 5 V, 0 to 5 V, 0 to 10 V, -10 to 10 V, 4 to 20 mA | 1/4,000 (Settable to 1/8,000) | 1 ms/point (Settable to 500 µs/point max.) | Voltage: ±0.2% of F.S. Current: ±0.2% of F.S. | Removable terminal block | 1 | 0.58 | — | CJ1W-MAD42 | UC1, N, L, CE |
| | | 2 outputs | | | | | Voltage: ±0.3% of F.S. Current: ±0.3% of F.S. | | | | | | |

Note: The resolution and conversion speed cannot be set independently. If the resolution is set to 1/4,000, then the conversion speed will be 1 ms/point.

Accessories

There is no accessory for the CJ Series Analog I/O Units.

International Standards

- The standards indicated in the "Standards" column are those current for UL, CSA, cULus, NK, and Lloyd standards and EC Directives as of the end of February 2008. The standards are abbreviated as follows: U: UL, U1: UL (Class I Division 2 Products for Hazardous Locations), C: CSA, US: cULus, UC1: cULus (Class I Division 2 Products for Hazardous Locations), CU: cUL, N: NK, L: Lloyd, and CE: EC Directives.
- Ask your OMRON representatives for the conditions under which the standards were met.

Individual Specifications

Analog Input Units CJ1W-AD041-V1/AD081-V1

Specifications

| Item | CJ1W-AD041-V1 | CJ1W-AD081-V1 | |
|--|--|---|-------------|
| Unit type | CJ-series Special I/O Unit | | |
| Isolation | Between I/O and PLC signals: Photocoupler *1 (No isolation between each I/O signals.) | | |
| External terminals | 18-point detachable terminal block (M3 screws) | | |
| Affect on CPU Unit cycle time | 0.2 ms | | |
| Power consumption | 420 mA max. at 5 VDC | | |
| Dimensions | 31 × 90 × 65 mm (W × H × D) | | |
| Weight | 140 g max. | | |
| General specifications | Conforms to general specifications for SYSMAC CJ Series. | | |
| Mounting position | CJ-series CPU Rack or CJ-series Expansion Rack | | |
| Maximum number of Units | Units per Rack (CPU Rack or Expansion Rack): 4 to 10 Units max. *2 | | |
| Data exchange with CPU Units *3 | Special I/O Unit Area in CIO Area (CIO 2000 to CIO 2959): 10 words per Unit Special I/O Unit Area in DM Area (D20000 to D29599): 100 words per Unit | | |
| Input specifications *6 | Number of analog inputs | 4 | 8 |
| | Input signal range *4 | 1 to 5 V 0 to 5 V 0 to 10 V -10 to 10 V 4 to 20 mA | |
| | Maximum rated input (for 1 point) | Voltage Input: ±15 V Current Input: ±30 mA *5 | |
| | Input impedance | Voltage Input: 1 MΩ min. Current Input: 250 Ω (rated value) | |
| | Resolution *7 | 4,000/8,000 | 4,000/8,000 |
| | Converted output data | 16-bit binary data | |
| | Accuracy *8 | Voltage Input: ±0.2% of F.S. Current Input: ±0.4% of F.S. | |
| | | Voltage Input: ±0.4% of F.S. Current Input: ±0.6% of F.S. | |
| | A/D conversion time *9 | 1 ms/250 μs | 1 ms/250 μs |
| Input functions | Mean value processing | Stores the last "n" data conversions in the buffer, and stores the mean value of the conversion values. Buffer number: n = 2, 4, 8, 16, 32, 64 | |
| | Peak value holding | Stores the maximum conversion value while the Peak Value Hold Bit is ON. | |
| | Input disconnection detection | Detects the disconnection and turns ON the Disconnection Detection Flag. *10 | |

*1. Do not apply a voltage higher than 600 V to the terminal block when performing withstand voltage test on this Unit. Otherwise, internal elements may deteriorate.

*2. The maximum number of Analog Input Units that can be mounted to one Rack varies depending on the current consumption of the other Units mounted to the Rack.

| Power Supply Unit | Rack | CJ1W-DA021 CJ1W-DA041 (5 VDC 120 mA) CJ1W-DA08V CJ1W-DA08C (5 VDC 140 mA) | CS1W-AD041-V1 CJ1W-AD081-V1 (5 VDC 420 mA) | CJ1W-MAD42 (5 VDC 580 mA) |
|--|----------------|--|--|------------------------------|
| CJ1W-PA205R CJ1W-PA205C CJ1W-PD025 (5.0 A at 5 VDC) | CPU Rack | 10 | 9 | 7 |
| | Expansion Rack | 10 | 10 | 8 |
| CJ1W-PA202 (2.8 A at 5 VDC) | CPU Rack | 10 | 4 | 3 |
| | Expansion Rack | 10 | 6 | 4 |
| CJ1W-PD022 (2.0 A at 5 VDC) | CPU Rack | 7 | 2 | 1 |
| | Expansion Rack | 10 | 4 | 3 |

*3. Data Transfer with the CPU Unit

| Special I/O Unit Area in CIO Area (CIO 2000 to CIO 2959, CIO 200000 to CIO 295915) | 10 words per Unit refreshed cyclically | CPU Unit to Analog Input Unit | Peak hold values |
|--|--|-------------------------------|--|
| | | Analog Input Unit to CPU Unit | Analog input values Line disconnection detection Alarm flags Etc. |
| Special I/O Unit Area in DM Area (D20000 to D29599) | 100 words per Unit refreshed cyclically | CPU Unit to Analog Input Unit | Input signal conversion settings Signal range settings Averaging function Resolution/conversion time settings Operation mode settings |

*4. Input signal ranges can be set for each input.

*5. Voltage input or current input are chosen by using the voltage/current switch at the back of the terminal block.

*6. The Analog Input Unit must be operated according to the input specifications provided here. Operating the Unit outside these specifications will cause the Unit to malfunction.

*7. The resolution can be set to 8,000 and the conversion time to 250 μ s in the DM Area (m+18). There is only one setting for both of these, i.e., they are both enabled or disabled together.

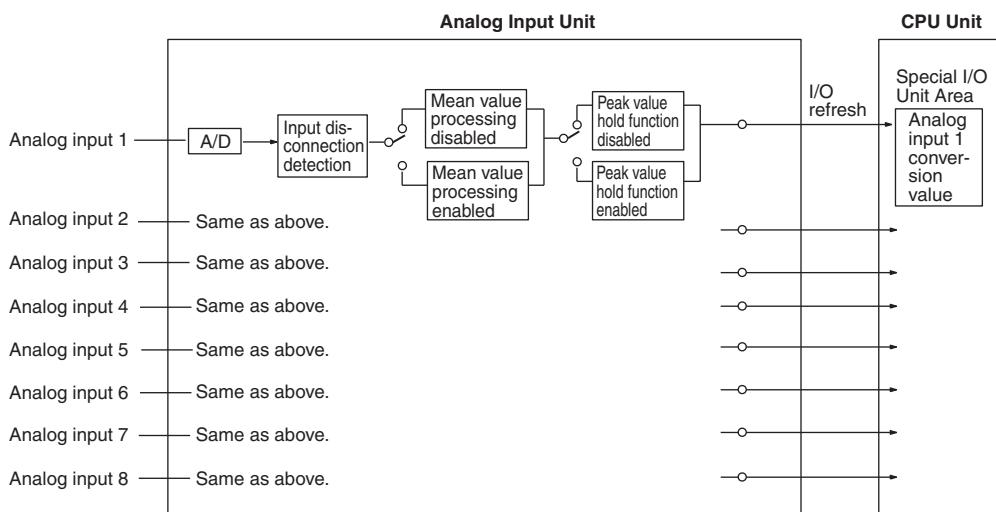
*8. The accuracy is given for full scale. For example, an accuracy of $\pm 0.2\%$ means a maximum error of ± 8 (BCD).

The default setting is adjusted for voltage input. To use current input, perform the offset and gain adjustments as required.

*9. A/D conversion time is the time it takes for an analog signal to be stored in memory as converted data after it has been input. It takes at least one cycle before the converted data is read by the CPU Unit.

*10. Line disconnection detection is supported only when the range is set to 1 to 5 V or 4 to 20 mA. If there is no input signal when the 1 to 5 V or 4 to 20 mA range is set, the Line Disconnection Flag will turn ON.

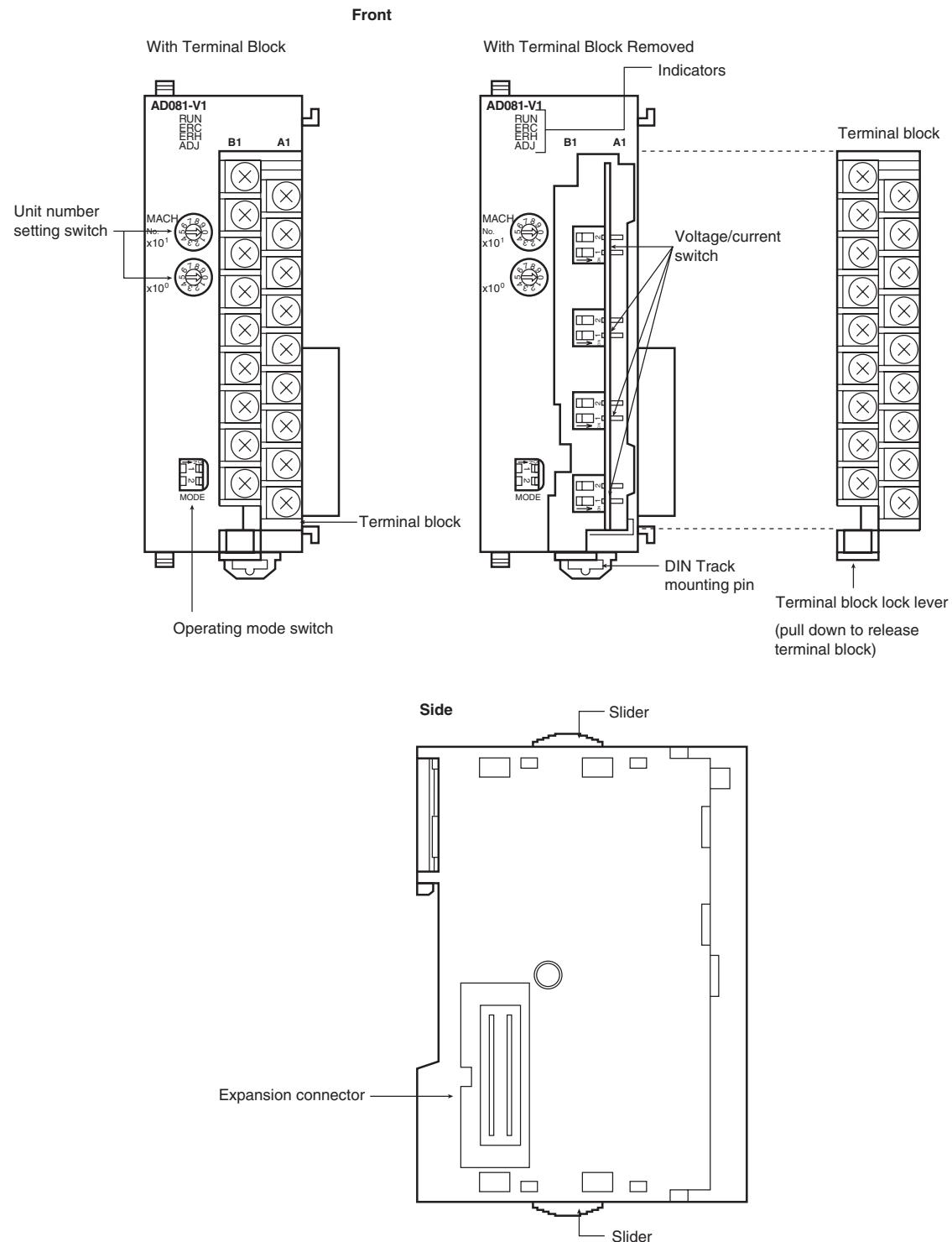
Input Function Block Diagram



Note: There are only four analog inputs for the CJ1W-AD041-V1.

External Interface

CJ1W-AD041-V1
CJ1W-AD081-V1



Indicators

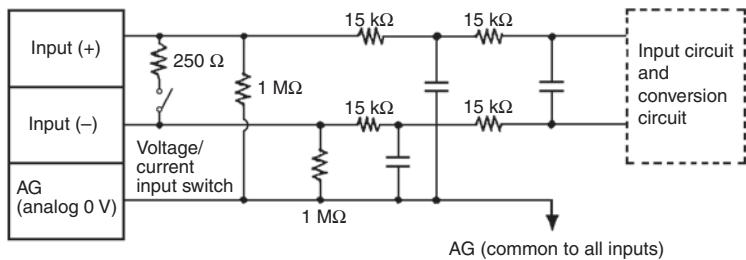
The indicators show the operating status of the Unit. The following table shows the meanings of the indicators.

| LED | Meaning | Indicator | Operating status |
|--------------|------------------------|-----------|---|
| RUN (green) | Operating | Lit | Operating in normal mode. |
| | | Not lit | Unit has stopped exchanging data with the CPU Unit. |
| ERC (red) | Error detected by Unit | Lit | Alarm has occurred (such as disconnection detection) or initial settings are incorrect. |
| | | Not lit | Operating normally. |
| ERH (red) | Error in the CPU Unit | Lit | Error has occurred during data exchange with the CPU Unit. |
| | | Not lit | Operating normally. |
| ADJ (yellow) | Adjusting | Flashing | Operating in offset/gain adjustment mode. |
| | | Not lit | Other than the above. |

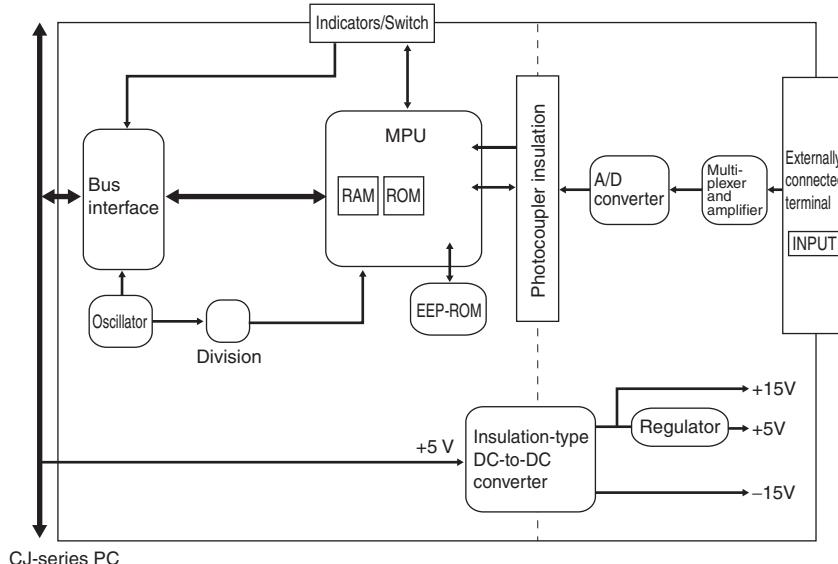
Internal Circuit

The following diagrams show the internal circuit of the analog input section.

Input Circuits



Internal Configuration



Terminal Arrangement

The signal names corresponding to the connecting terminals are as shown in the following diagram.

CJ1W-AD041-V1

| | | | |
|-------------|----|----|-------------|
| Input 2 (+) | B1 | A1 | Input 1 (+) |
| Input 2 (-) | B2 | A2 | Input 1 (-) |
| Input 4 (+) | B3 | A3 | Input 3 (+) |
| Input 4 (-) | B4 | A4 | Input 3 (-) |
| AG | B5 | A5 | AG |
| N.C. | B6 | A6 | N.C. |
| N.C. | B7 | A7 | N.C. |
| N.C. | B8 | A8 | N.C. |
| N.C. | B9 | A9 | N.C. |

CJ1W-AD081-V1

| | | | |
|-------------|----|----|-------------|
| Input 2 (+) | B1 | A1 | Input 1 (+) |
| Input 2 (-) | B2 | A2 | Input 1 (-) |
| Input 4 (+) | B3 | A3 | Input 3 (+) |
| Input 4 (-) | B4 | A4 | Input 3 (-) |
| AG | B5 | A5 | AG |
| Input 6 (+) | B6 | A6 | Input 5 (+) |
| Input 6 (-) | B7 | A7 | Input 5 (-) |
| Input 8 (+) | B8 | A8 | Input 7 (+) |
| Input 8 (-) | B9 | A9 | Input 7 (-) |

Note:

1. The analog input numbers that can be used are set in the Data Memory (DM).
2. The input signal ranges for each input are set in the Data Memory (DM). They can be set in units of input numbers.
3. The AG terminals are connected to the 0 V analog circuit in the Unit. Connecting shielded input lines can improve noise resistance.
4. Do not connect anything to NC terminals.

Analog Output Units CJ1W-DA021/DA041/DA08V/DA08C

Specifications

| Item | CJ1W-DA021 | CJ1W-DA041 | CJ1W-DA08V | CJ1W-DA08C |
|---------------------------------------|--|--------------------|-------------|-------------|
| Unit type | CJ-series Special I/O Unit | | | |
| Isolation *1 | Between I/O and PLC signals: Photocoupler (No isolation between each I/O signals.) | | | |
| External terminals | 18-point detachable terminal block (M3 screws) | | | |
| Affect on CPU Unit cycle time | 0.2 ms | | | |
| Power consumption | 5 VDC, 120 mA max. | 5 VDC, 140 mA max. | | |
| External power supply | 24 VDC $^{+10\%}_{-15\%}$ (inrush current: 20 A max., pulse width: 1 ms max.) | | | |
| | 140 mA max. | 200 mA max. | 140 mA max. | 170 mA max. |
| Dimensions | 31 × 90 × 65 mm (W × H × D) | | | |
| Weight | 150 g max. | | | |
| General specifications | Conforms to general specifications for SYSMAC CJ-series Series. | | | |
| Mounting position | CJ-series CPU Rack or CJ-series Expansion Rack | | | |
| Maximum number of Units | Units per Rack (CPU Rack or Expansion Rack): 10 Units max. *2 | | | |
| Data exchange with CPU Unit *3 | Special I/O Unit Area CIO 200000 to CIO 295915 (Words CIO 2000 to CIO 2959) Internal Special I/O Unit DM Area (D20000 to D29599) | | | |

Output Specifications and Functions

| Item | CJ1W-DA021 | CJ1W-DA041 | CJ1W-DA08V | CJ1W-DA08C |
|--|---|--|---|---------------------|
| Number of analog outputs | 2 | 4 | 8 | 8 |
| Output signal range *4 | 1 to 5 V/4 to 20 mA 0 to 5 V 0 to 10 V -10 to +10 V | 1 to 5 V 0 to 5 V 0 to 10 V -10 to +10 V | 1 to 5 V 0 to 5 V 0 to 10 V -10 to +10 V | 4 to 20 mA |
| Output impedance | 0.5 Ω max. (for voltage output) | | | |
| Max. output current (for 1 point) | 12 mA (for voltage output) | | 2.4 mA (for voltage output) | — |
| Maximum permissible load resistance | 600 Ω (current output) | | — | 350 Ω |
| Resolution | 4,000 (full scale) | | | |
| Set data | 16-bit binary data | | | |
| Accuracy *5 | 25°C | Voltage output: $\pm 0.3\%$ of F.S. Current output: $\pm 0.5\%$ of F.S. | $\pm 0.3\%$ of F.S. | $\pm 0.3\%$ of F.S. |
| | 0°C to 55°C | Voltage output: $\pm 0.5\%$ of F.S. Current output: $\pm 0.8\%$ of F.S. | $\pm 0.5\%$ of F.S. | $\pm 0.6\%$ of F.S. |
| D/A conversion time *6 | 1.0 ms max. per point | | | |
| Output hold function | Outputs the specified output status (CLR, HOLD, or MAX) under any of the following circumstances. When the Conversion Enable Bit is OFF. *7 In adjustment mode, when a value other than the output number is output during adjustment. When output setting value error occurs or PLC operation stops. When the CPU Unit is on standby. When the Load is OFF. | | | |
| Scaling function | Setting values in any specified unit within a range of $\pm 32,000$ as the upper and lower limits allows D/A conversion to be executed and analog signals to be output with these values as full scale. (With the CJ1W-DA08V/DA08C, this function is enabled only for a conversion time of 1.0 ms and a resolution of 4,000.) | | | |

*1. Do not apply a voltage higher than 600 V to the terminal block when performing withstand voltage test on this Unit.

*2. The maximum number of Analog Output Units that can be mounted to one Rack varies depending on the current consumption of the other Units mounted to the Rack.

Select a 24-VDC power supply based on the surge current. The following OMRON external power supplies are recommended.

| Manufacturer | Model number | Specifications |
|--------------|--------------|-----------------------|
| OMRON | S8VS-06024 | 100 to 240 VAC, 60 W |
| | S8VS-12024 | 100 to 240 VAC, 120 W |
| | S8VM-05024 | 100 to 240 VAC, 50 W |
| | S8VM-10024 | 100 to 240 VAC, 100 W |

*3. Data exchange methods with the CPU Unit are as follows:

| | | | |
|--|--|-----------------------------|---|
| Special I/O Unit Area in CIO Area CIO 2000 to CIO 2959 (CIO 200000 to CIO 295915) | 10 words per Unit Refreshed cyclically | CPU Unit to Analog I/O Unit | Analog output values Conversion enable bits |
| | | Analog I/O Unit to CPU Unit | Alarm flags |
| Special I/O Unit Area in DM Area D20000 to D29599 | 100 words per Unit Refreshed at power ON or restart | CPU Unit to Analog I/O Unit | Output signal conversion settings and signal range settings Output status when holding outputs |

*4. Output signal ranges can be set for each output.

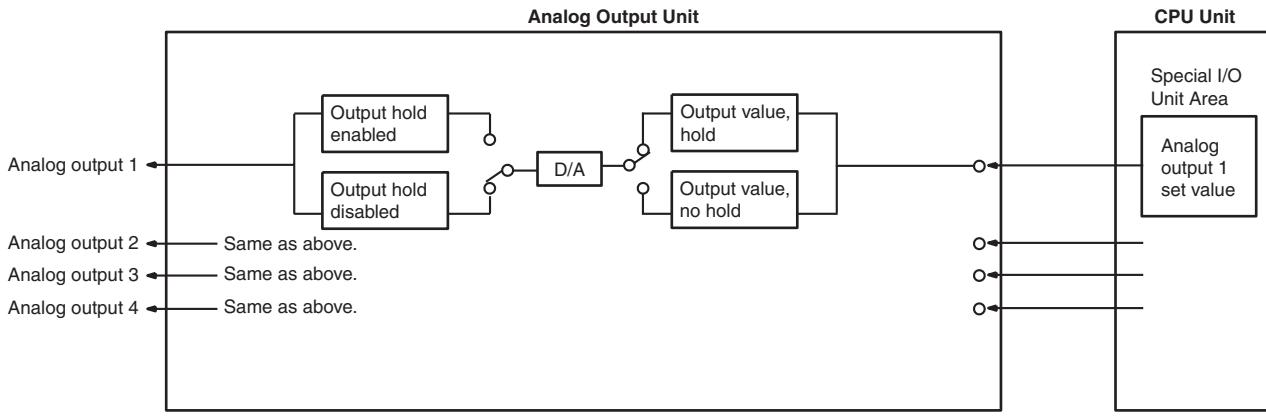
*5. The accuracy is given for full scale. For example, an accuracy of $\pm 0.3\%$ means a maximum error of ± 12 (BCD) at a resolution of 4,000. For the CJ1W-DA021/041, the accuracy is at the factory setting for a current output. When using a voltage output, adjust the offset gain as required.

*6. D/A conversion time is the time required for converting and outputting the PLC data. It takes at least one cycle for the data stored in the PLC to be read by the Analog Output Unit.

*7. When the operation mode for the CPU Unit is changed from RUN mode or MONITOR mode to PROGRAM mode, or when the power is turned ON, the Output Conversion Enable Bit will turn OFF. The output status specified according to the output hold function will be output.

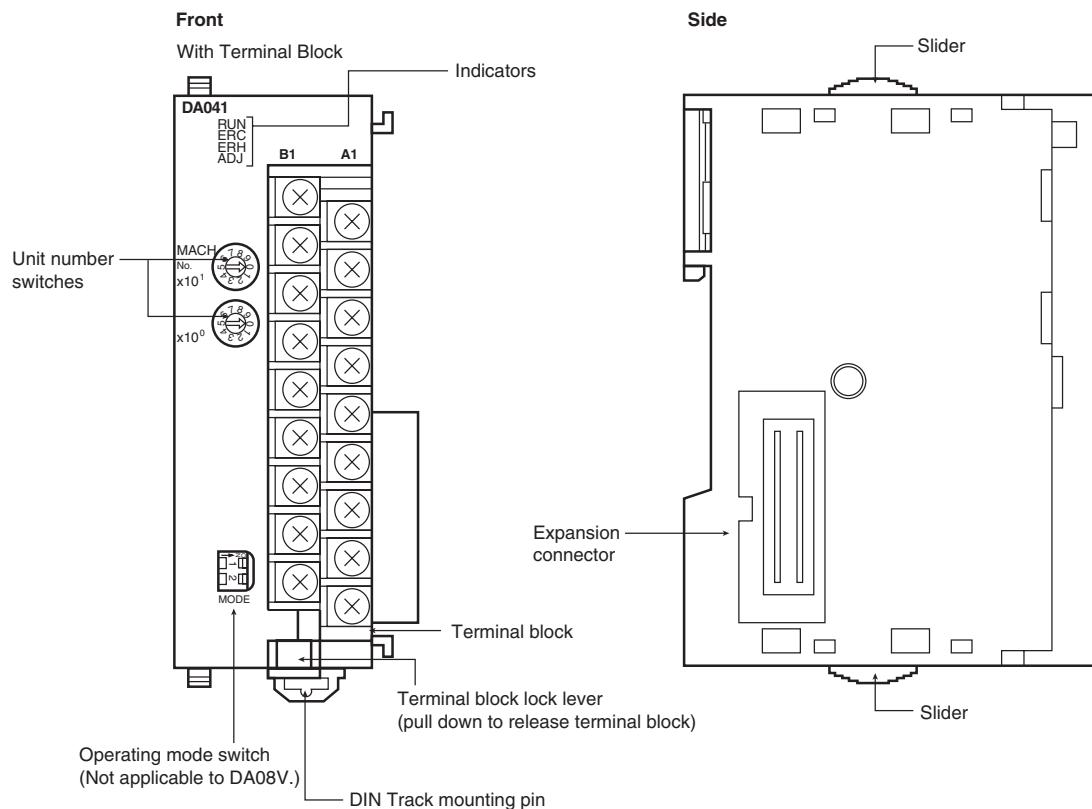
*8. The CJ1W-DA08V/08C can be set to a conversion cycle of 250 μ s and a resolution of 8,000 using the setting in D(m+18).

Output Function Block Diagram



External Interface

CJ1W-DA021/041/08V/08C



The terminal block is attached by a connector. It can be removed by pressing down on the lever at the bottom of the terminal block. Be sure that this lever is raised during normal operation.

Indicators

The indicators show the operating status of the Unit. The following table shows the meanings of the indicators.

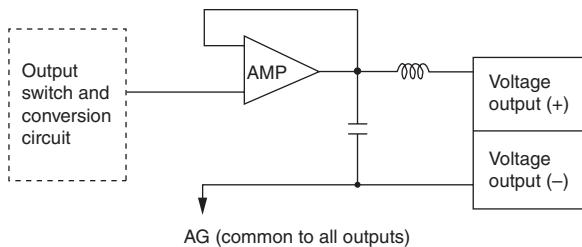
| LED | Meaning | Indicator | Operating status |
|--------------|------------------------|-----------|---|
| RUN (green) | Operating | Lit | Operating in normal mode. |
| | | Not lit | Unit has stopped exchanging data with the CPU Unit. |
| ERC (red) | Error detected by Unit | Lit | Alarm has occurred (such as disconnection detection) or initial settings are incorrect. |
| | | Not lit | Operating normally. |
| ERH (red) | Error in the CPU Unit | Lit | Error has occurred during data exchange with the CPU Unit. |
| | | Not lit | Operating normally. |
| ADJ (yellow) | Adjusting | Flashing | Operating in offset/gain adjustment mode. |
| | | Not lit | Other than the above. |

Internal Circuit

The following diagrams show the internal circuit of the analog output section.

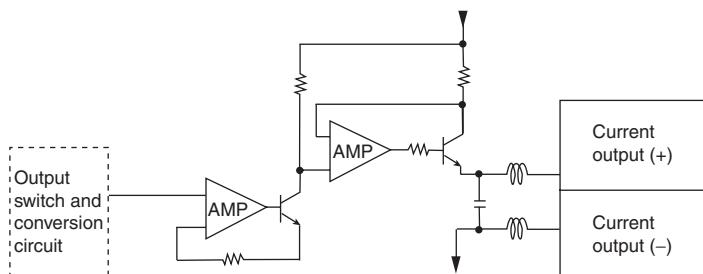
Voltage Output Circuits

Voltage output section

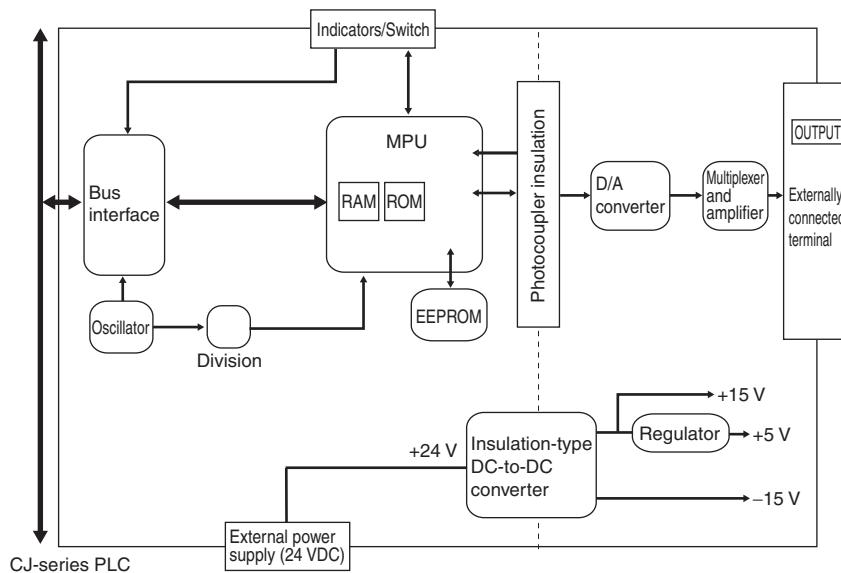


Current Output Circuit

Current output section



Internal Configuration



Terminal Arrangement

The signal names corresponding to the connecting terminals are as shown in the following diagram.

CJ1W-DA021

| | | | |
|----------------------|----|----|----------------------|
| Voltage output 2 (+) | B1 | A1 | Voltage output 1 (+) |
| Output 2 (-) | B2 | A2 | Output 1 (-) |
| Current output 2 (+) | B3 | A3 | Current output 1 (+) |
| N.C. | B4 | A4 | N.C. |
| N.C. | B5 | A5 | N.C. |
| N.C. | B6 | A6 | N.C. |
| N.C. | B7 | A7 | N.C. |
| N.C. | B8 | A8 | N.C. |
| 0 V | B9 | A9 | 24 V |

CJ1W-DA041

| | | | |
|----------------------|----|----|----------------------|
| Voltage output 2 (+) | B1 | A1 | Voltage output 1 (+) |
| Output 2 (-) | B2 | A2 | Output 1 (-) |
| Current output 2 (+) | B3 | A3 | Current output 1 (+) |
| Voltage output 4 (+) | B4 | A4 | Voltage output 3 (+) |
| Output 4 (-) | B5 | A5 | Output 3 (-) |
| Current output 4 (+) | B6 | A6 | Current output 3 (+) |
| N.C. | B7 | A7 | N.C. |
| N.C. | B8 | A8 | N.C. |
| 0 V | B9 | A9 | 24 V |

CJ1W-DA08V (Voltage Output) and CJ1W-DA08C (Current Output)

| | | | |
|--------------|----|----|--------------|
| Output 2 (+) | B1 | A1 | Output 1 (+) |
| Output 2 (-) | B2 | A2 | Output 1 (-) |
| Output 4 (+) | B3 | A3 | Output 3 (+) |
| Output 4 (-) | B4 | A4 | Output 3 (-) |
| Output 6 (+) | B5 | A5 | Output 5 (+) |
| Output 6 (-) | B6 | A6 | Output 5 (-) |
| Output 8 (+) | B7 | A7 | Output 7 (+) |
| Output 8 (-) | B8 | A8 | Output 7 (-) |
| 0 V | B9 | A9 | 24 V |

Note:

1. The analog output numbers that can be used are set in the Data Memory (DM).
2. The output signal ranges for each output are set in the Data Memory (DM). They can be set in units of output numbers.
3. The N.C. terminals are not connected to internal circuit.
4. The following OMRON external power supplies are recommended.

| Manufacturer | Model number | Specifications |
|--------------|--------------|-----------------------|
| OMRON | S8VS-06024 | 100 to 240 VAC, 60 W |
| | S8VS-12024 | 100 to 240 VAC, 120 W |
| | S8VM-05024 | 100 to 240 VAC, 50 W |
| | S8VM-10024 | 100 to 240 VAC, 100 W |

5. Use a separate power supply from the one used for Basic I/O Units. Faulty Unit operation may be caused by noise if power is supplied from the same source.

Analog I/O Unit CJ1W-MAD42**Specifications**

| Item | CJ1W-MAD42 |
|-------------------------------------|--|
| Unit type | CJ-series Special I/O Unit |
| Isolation | Between I/O and PLC signals: Photocoupler (No isolation between each I/O signals.) |
| External terminals | 18-point detachable terminal block (M3 screws) |
| Current consumption | 580 mA max. at 5 V DC |
| Dimensions | 31 × 90 × 65 mm (W × H × D) |
| Weight | 150 g max. |
| General specifications | Conforms to general specifications for SYSMAC CJ-series Series. |
| Mounting position | CJ-series CPU Rack or CJ-series Expansion Rack (Cannot be mounted to a C200H Expansion I/O Rack or a SYSMAC BUS Slave Rack.) |
| Maximum number of Units * | CPU Rack: 7 Units max. Expansion Rack: 8 Units max. Overall system: (7 Units max. on CPU Rack) + (8 Units per Expansion Rack × 3 Racks) = 31 Units max. |
| Data exchange with CPU Units | Special I/O Unit Area CIO 200000 to CIO 295915 (Words CIO 2000 to CIO 2959): Exchanges 10 words of data per Unit. Internal Special I/O Unit DM Area (D20000 to D29599) |

*The maximum number of Analog I/O Units that can be mounted to one Rack will varies depending on the Power Supply Unit model and the current consumption of the other Units mounted to the Rack.

| Power Supply Units | Maximum number of Units |
|--------------------|--|
| CJ1W-PA205R/PD025 | CPU Rack: 7 Units max. Expansion Racks: 8 Units/Rack max. |
| CJ1W-PA202 | CPU Rack: 3 Units max. Expansion Racks: 4 Units/Rack max. |

Input Specifications and Functions

| Item | Voltage input | Current input |
|--|---|---------------------|
| Number of analog inputs | 4 | |
| Input signal range * 1 | 1 to 5 V 0 to 5 V 0 to 10 V -10 to 10 V | 4 to 20 mA *2 |
| Maximum rated input (for 1 point) * 3 | ±15 V | ±30 mA |
| External input impedance | 1 MΩ min. | 250 Ω (rated value) |
| Resolution | 4,000/8,000 (full scale) *6 | |
| Converted output data | 16-bit binary data | |
| Accuracy * 4 | 25°C ±0.2% of F.S. | |
| | 0°C to 55°C ±0.4% of F.S. | |
| A/D conversion time * 5 | 1.0 ms/500 μs max. per point | |
| Mean value processing | Stores the last "n" data conversions in the buffer, and stores the mean value of the conversion values. Buffer number: n = 2, 4, 8, 16, 32, 64 | |
| Peak value holding | Stores the maximum conversion value while the Peak Value Hold Bit is ON. | |
| Scaling | Enabled only for conversion time of 1 ms and resolution of 4,000. Setting any values within a range of ±32,000 as the upper and lower limits allows the A/D conversion result to be output with these values as full scale. | |
| Input disconnection detection | Detects the disconnection and turns ON the Disconnection Detection Flag. | |

*1. Input and output signal ranges can be set for each input and output.

*2. Voltage input or current input are chosen by using the voltage/current switch at the back of the terminal block.

*3. The Analog I/O Unit must be operated according to the input specifications provided here. Operating the Unit outside these specifications will cause the Unit to malfunction.

*4. The accuracy is given for full scale. For example, an accuracy of ±0.2% means a maximum error of ±8 (BCD) at a resolution of 4,000.

*5. A/D conversion time is the time it takes for an analog signal to be stored in memory as converted data after it has been input. It takes at least one cycle before the converted data is read by the CPU Unit.

*6. By means of the D(m+18) setting, the resolution can be changed to 8,000, and the conversion time can be changed to 500 μs.

Output Specifications

| Item | Voltage output | Current output |
|---|---|----------------|
| Number of analog outputs | 2 | |
| Output signal range *1 | 1 to 5 V 0 to 5 V 0 to 10 V –10 to 10 V | 4 to 20 mA |
| External output impedance | 0.5 Ω max. | – |
| Maximum external output current (for 1 point) | 2.4 mA | – |
| Maximum allowed load resistance | – | 600 Ω |
| Resolution | 4,000/8,000 (full scale) *5 | |
| Set data | 16-bit binary data | |
| Accuracy *2 | 25°C ±0.3% of F.S. | ±0.3% of F.S. |
| | 0°C to 55°C ±0.5% of F.S. | ±0.6% of F.S. |
| D/A conversion time *3 | 1.0 ms/500 μs max. per point | |
| Output hold function | Outputs the specified output status (CLR, HOLD, or MAX) under any of the following circumstances. When the Conversion Enable Bit is OFF. *4 In adjustment mode, when a value other than the output number is output during adjustment. When output setting value error occurs or PLC operation stops. When the CPU Unit is on standby. When the Load is OFF. | |
| Scaling | Enabled only for conversion time or 1 ms and resolution of 4,000. Setting any values within a range of ±32,000 as the upper and lower limits allows D/A conversion to be executed and analog signals to be output with these values as full scale. | |
| Ratio conversion function *5 | Stores the results of positive and negative gradient analog inputs calculated for ratio and bias as analog output values. Positive gradient: Analog output = A × Analog input + B (A: 0 to 99.99, B: 8,000 to 7FFF hex) Negative gradient: Analog output = F – A × Analog input + B (A: 0 to 99.99, B: 8,000 to 7FFF hex, F: Output range maximum value) | |

*1. Input and output signal ranges can be set for each input and output.

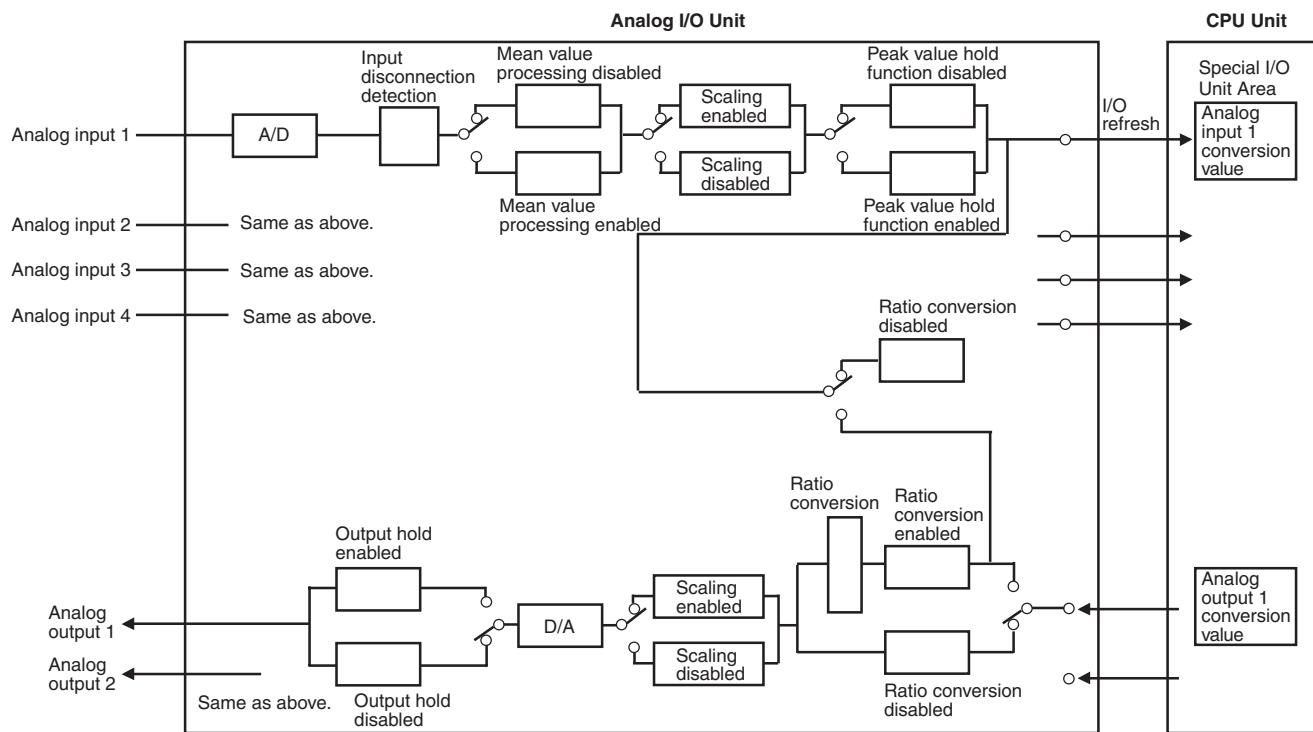
*2. The accuracy is given for full scale. For example, an accuracy of ±0.2% means a maximum error of ±8 (BCD) at a resolution of 4,000.

*3. D/A conversion time is the time required for converting and outputting the PLC data. It takes at least one cycle for the data stored in the PLC to be read by the Analog I/O Unit.

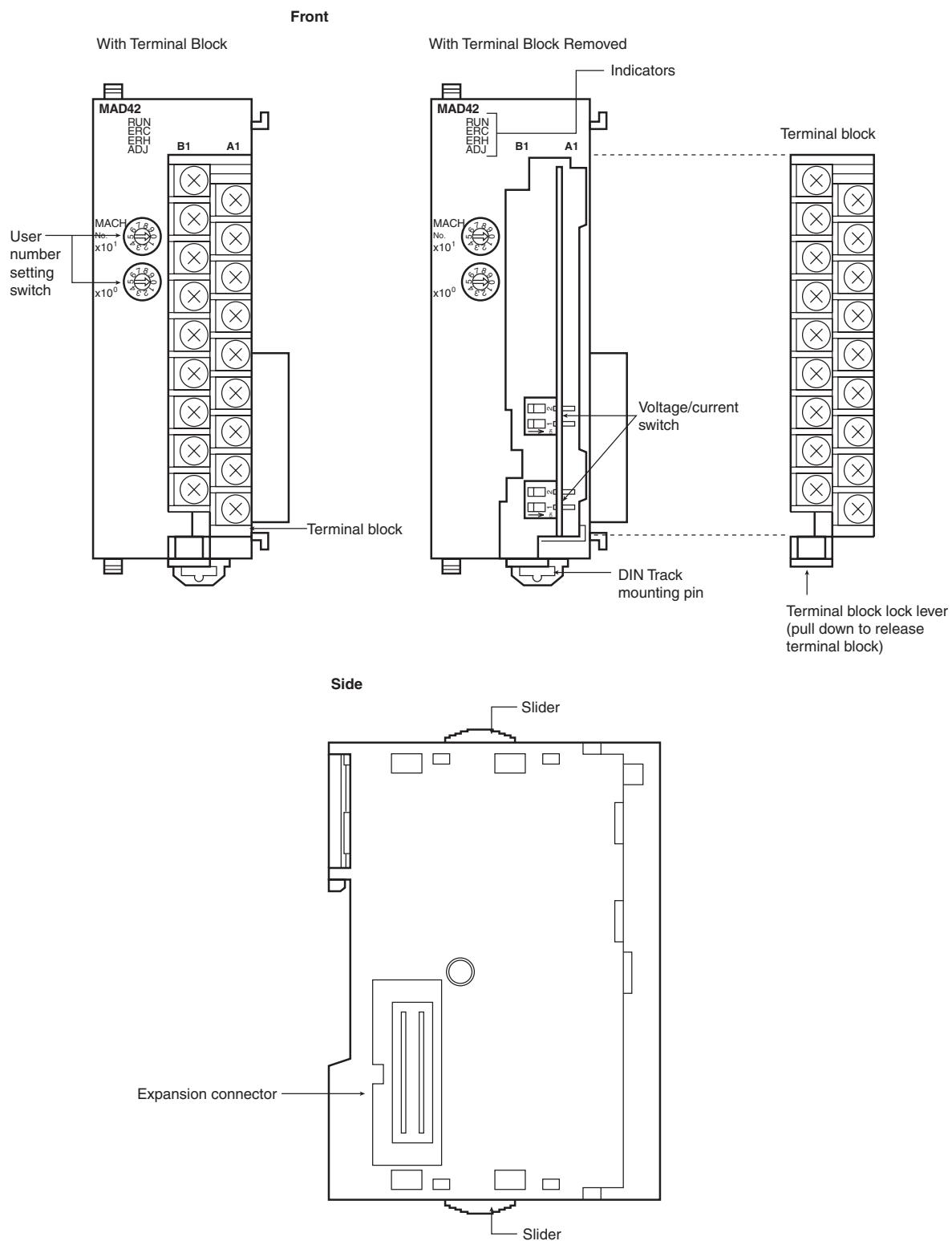
*4. When the operation mode for the CPU Unit is changed from RUN mode or MONITOR mode to PROGRAM mode, or when the power is turned ON, the Output Conversion Enable Bit will turn OFF. The output status specified according to the output hold function will be output.

*5. By means of the D(m+18) setting, the resolution can be changed to 8,000, and the conversion time can be changed to 500 μs.

I/O Function Block Diagram



External Information



Indicators

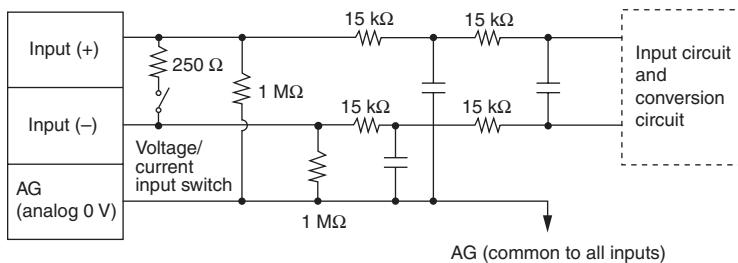
The indicators show the operating status of the Unit. The following table shows the meanings of the indicators.

| LED | Meaning | Indicator | Operating status |
|--------------|------------------------|-----------|---|
| RUN (green) | Operating | Lit | Operating in normal mode. |
| | | Not lit | Unit has stopped exchanging data with the CPU Unit. |
| ERC (red) | Error detected by Unit | Lit | Alarm has occurred (such as disconnection detection) or initial settings are incorrect. |
| | | Not lit | Operating normally. |
| ADJ (yellow) | Adjusting | Flashing | Operating in offset/gain adjustment mode. |
| | | Not lit | Other than the above. |
| ERH (red) | Error in the CPU Unit | Lit | Error has occurred during data exchange with the CPU Unit. |
| | | Not lit | Operating normally. |

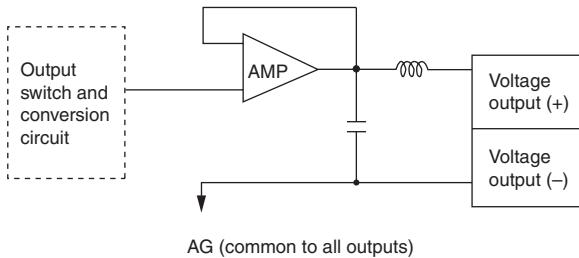
Internal Circuit

The following diagrams show the internal circuit of the analog I/O section.

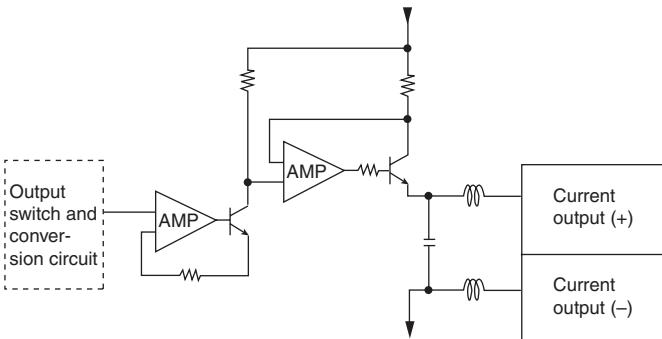
Input Circuits



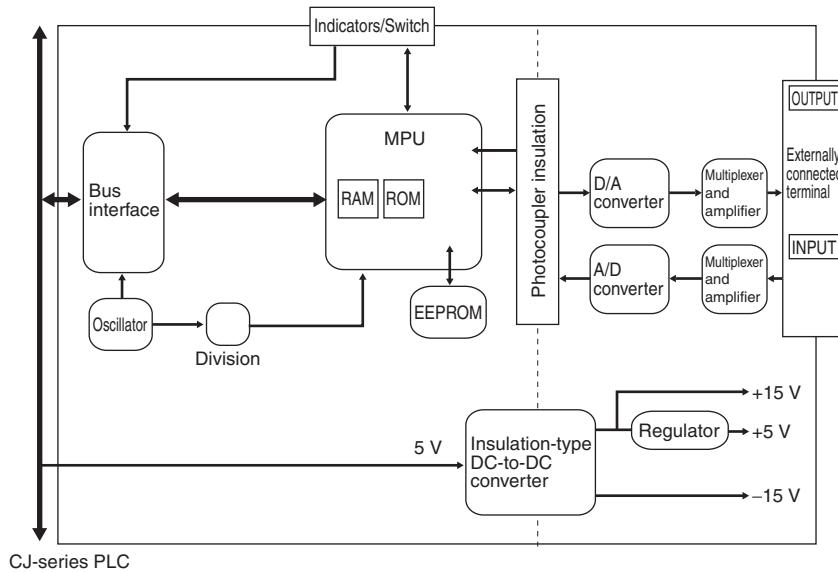
Output Circuits



Current Output Circuits



Internal Configuration



Terminal Arrangement

The signal names corresponding to the connecting terminals are as shown in the following diagram.

CJ1W-MAD42

| | | | |
|----------------------|----|----|----------------------|
| Voltage output 2 (+) | B1 | A1 | Voltage output 1 (+) |
| Output 2 (-) | B2 | A2 | Output 1 (-) |
| Current output 2 (+) | B3 | A3 | Current output 1 (+) |
| N.C. | B4 | A4 | N.C. |
| Input 2 (+) | B5 | A5 | Input 1 (+) |
| Input 2 (-) | B6 | A6 | Input 1 (-) |
| AG | B7 | A7 | AG |
| Input 4 (+) | B8 | A8 | Input 3 (+) |
| Input 4 (-) | B9 | A9 | Input 3 (-) |

Note:

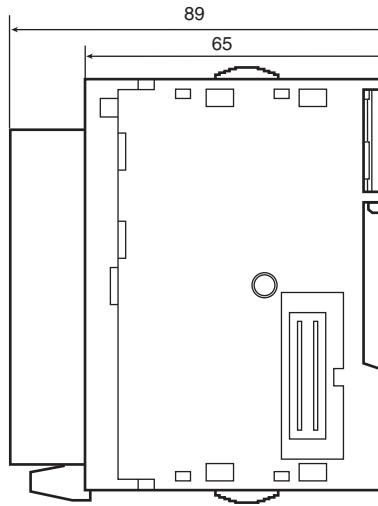
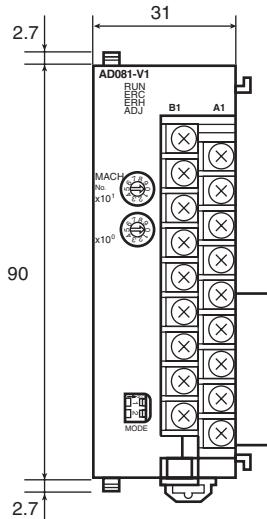
1. The analog I/O numbers that can be used are set in the Data Memory (DM).
2. The I/O signal ranges for each input and output are set in the Data Memory (DM). They can be set in units of I/O numbers.
3. The AG terminal (A7, B7) is connected to the 0 V analog circuit in the Unit. Connecting shielded input lines can improve noise resistance.
4. The N.C. terminals (A4, B4) are not connected to internal circuit.

Dimensions

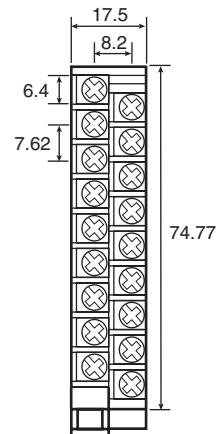
(Unit: mm)

CJ-series

CJ1W-AD041-V1/081-V1
 CJ1W-DA021/041/08V/08C
 CJ1W-MAD42



Terminal Block Dimensions



Note: The appearance varies with the model.

About Manuals

| Cat. No | Model | Manual name | Application | Contents |
|---------|---|--|--|---|
| W345 | SYSMAC CS/CJ Series CS1W-AD041-V1/081-V1/161 CS1W-DA041/08V/08C CS1W-MAD44 CJ1W-AD041-V1/081-V1 CJ1W-DA021/041/08V/08C CJ1W-MAD42 | CS/CJ-series Analog I/O Units Operation Manual | Information on using the Analog I/O Units. | Provides information on using the CS/CJ-series Analog Input, Analog Output, and Analog I/O Units. |

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