YASKAWA ELECTRIC

SIE-C815-9·9D
DESCRIPTIVE INFORMATION

Memocon™-*SC* R84H, U84, U84S, 584

ANALOG MODULES

1000 SERIES

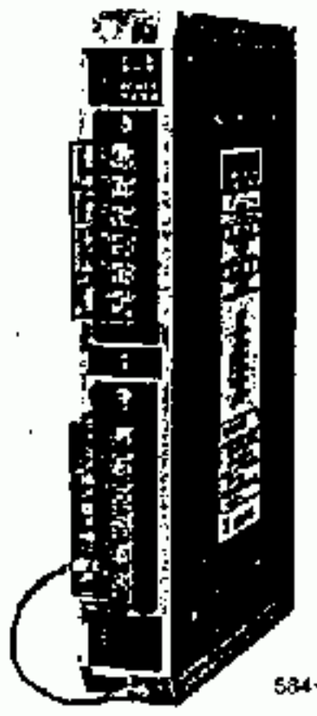
TYPE JAMSC-B1072B, -B1073, -B1074, -B1075

1000 series I/O analog modules used in conjunction with Memocon-SC R84H, U84, U84S and 584 include analog-to-digital (A/D) conversion module and digital-to-analog (D/A) conversion module. By using these modules, digital data which correspond to analog inputs (voltage signals) can be read in, and vice versa, analog outputs (voltage signals) which correspond to digital data can be outputted.

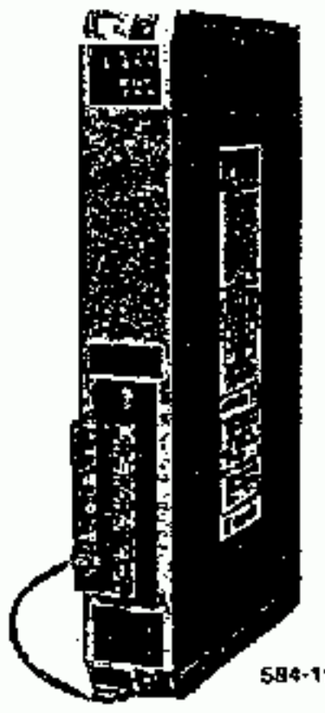
Since Memocon-SC R84H, U84, U84S and 584 have data processing functions such as addition, subtraction, multiplication, and division as well as data transmission, they can directly handle analog signals by the use of analog modules. This provides the R84H, U84, U84S and 584 with effective control and supervision of operation process.

For example, analog inputs are converted into the digital equivalents through an A/D converter, and determined for their size by subtracting the reference preset in the R84H, U84, U84S and 584, or changed for its scale by multiplying or dividing the reference. Another example is an operation using a D/A converter which transforms the result of the calculation in the R84H, U84, U84S and 584 into analog equivalent and gives a command directly to a speed regulator of motors or a valve regulator.

Dimensions of the analog modules are the same as other 1000 series I/O modules. The analog modules are mounted on the 1000 series mounting base. The A/D and D/A converters contain all logic circuits and elements necessary for operation such as isolator, buffer memory, and amplifier in addition to the converter, so that no additional circuits are required. However, if a 1000 series I/O modules are connected to the 584, J1040 adapters are needed.



A/D Conversion Module Types JAMSC -B1073 and -B1075



D/A Conversion Module Types JAMSC -B1072B and -B1074

CONTENTS

1. ANALOG MODULES

Table 1.1 Types of Analog Modules

Analog Modules	Type JAMSC–	Input	Output	Bit
A/D Conversion Module	B1073–1	0 to +10V	—	10
	B1073–2	+1 to +5V	—	
	B1075–1	0 to +10V	—	12
	B1075–2	+1 to +5V	—	
D/A Conversion Module	B1072B–1	—	0 to +10V	10
	B1072B–2	—	0 to +5V	
	B1072B–3	—	−5 to +5V	
	B1072B–4	—	−10 to +10V	
	B1074–1	—	0 to +10V	12
	B1074–2	—	0 to +5V	
	B1074–3	—	−5 to +5V	
	B1074–4	—	−10 to +10V	

Table 1.2 Applications of Analog Modules

Type JAMSC–	Bit	R84H	U84, U84S, 584
B1073	10	Usable	Usable*
B1072B			
B1075	12	Unusable	Usable
B1074			

*JAMSC-B1073, -B1072B are limited in numeric range. It is recommended that JAMSC-B1075, -B1074 of high resolution be used for U84, U84S, 584.

2. BASIC SPECIFICATIONS

2.1 ENVIRONMENTAL CONDITIONS

Ambient Temperature: 0°C to +55°C

Storage Temperature: −20°C to +85°C

Humidity: 5% to 95% relative(non-condensing)

2.2 DIMENTIONS AND WEIGHT

Approx Dimensions in mm : 35(W) × 250(H) × 200(D)

Approx Weight: 1kg

3. ANALOG MODULE SPECIFICATIONS AND USAGE

3.1 A/D CONVERSION MODULES (JAMSC-B1073)

Table 3.1 A/D Conversion Module Specifications

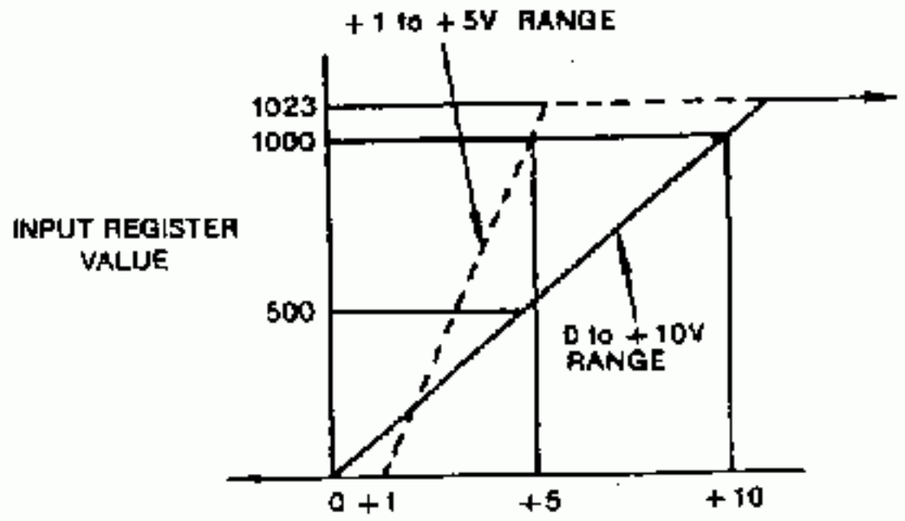
Item	Specifications
General Specifications	
Conversion Type	Successive approximation
Conversion Speed	Approx 70 μs/channel
Sampling Cycle	Every scan of mainframe
No. of Circuits	4 per module (All four inputs are updated on each controller scan.)
Indicators	• 1-BUS (while communicating with the processor) • 1-POWER (while external power supply is normal)
Protection Circuit	In the event of reverse polarity or overvoltage (18 V or more) from external power supply, fuse* (0.25 A) will blow.
External Power Supply	+15 VDC ±0.5 V, 120 mA −15 VDC ±0.5 V, 40 mA
Electrical Characteristics	
Input Range†	JAMSC-B1073-1 : 0 to +10V JAMSC-B1073-2 (optional) : +1 to +5V
Resolution	1 bit in 1024
Linearity Error	Less than 0.1 % of full scale
Temperature Coefficient	• 0 to +10V range Gain : 40 ppm/°C (full scale) offset : 10 ppm/°C (full scale) • +1 to +5V range Gain : 60 ppm/°C (full scale) Offset : 20 ppm/°C (full scale)
Accuracy	Less than 0.2 %, 25°C
Input Impedance	2MΩ (normal input)
Max Allowable Input	±15V
Cross Talk between Inputs	−70 dB or above
Isolation Resistance	• 2MΩ between inputs at 100 VAC • 50MΩ between input and internal circuit at 500 VDC
Isolation Voltage	500 VDC (continuous)

*LITTEL Fuse 275250

†Four inputs are in the same range.

3.1.1 Conversion Characteristics

Depending on an input range, the conversion characteristics of JAMSC-B1073 (abbreviated to B1073) vary as shown in Fig. 3.1.



Analog Input Voltage V		Input Register Value
0 to +10V Range	+1 to +5V Range	
≦ 0.00	≦1.000	000
5.00	3.000	500
9.99	4.996	999
10.00	5.000	1000*
10.23	5.092	1023*

*In the case of the R84H, "INV" will be displayed for input register 1000 and 1023 if monitoring is performed by programming panel P180.

Fig. 3.1 Conversion Characteristics of B1073

3.1.2 Function

Conforming to the characteristics shown in Fig. 1, the B1073 sequentially converts 4 analog inputs (voltage signals) to 10-bit binary numerical values. The converted numerical values are sent to the processor and are presented in up to 4 consecutive input registers. The Number of numerical values sent to the processor and the input register numbers are determined by the I/O allocation table.

In the case of the R84H, U84 and U84S the numerical values will be stored in connsecutively numbered input registers (up to 4) where the numerical value in the first circuit will be stored in the lowest numbered input register. In the case of the 584, depending on the setting of the I/O allocation table, numerical values are not always stored in consecutively numbered input registers. The numerical value in the first circuit will be stored in the input register which is assigned at the first position of the I/O allocation table among applicable slots for the B1073.

The B1073 automatically performs input signal conditioning, A/D conversion, and numerical value storing into the input register by the command from the processor so that, without adding any special control circuit, B1073 can be handled in the same way as discrete input modules.

3.1.3 Usage

The B1073 is mounted on the 1000 series mounting base like any other 1000 series I/O module. Following notes should be referred to when B1073 is used.

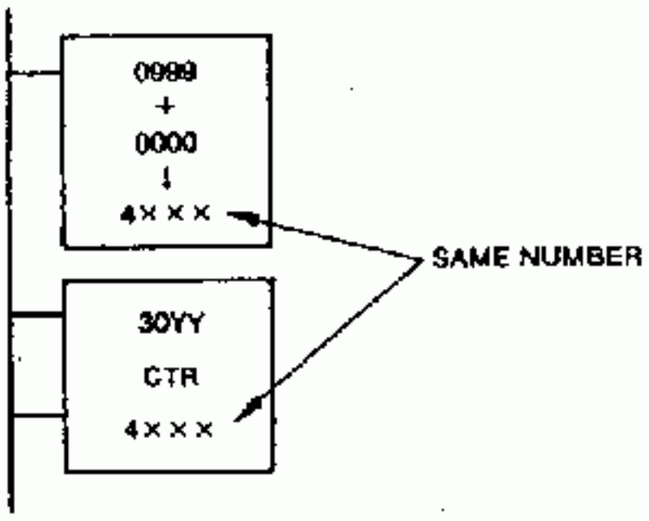
- B1073 can be installed in one slot space like other discrete I/O modules.
- Input registers used for B1073 should be specified as binary in the I/O allocation. B1073 occupies only the numbers of input registers assigned by the I/O allocation table.
- In the case of current input, a proper resistor should be connected between input terminals of the B1073. (e.g. 250Ω resistor converts 4 to 20 mA into 1 to 5 V.) The resistor should be more than or equal to 1/2 W with small temperature coefficient (less than 50 ppm/°C).
- B1073 needs +15V and -15V from external power supply.

  +15V: +15.00V ±0.5V, 120 mA
  -15V: -15.00V ±0.5V, 40 mA

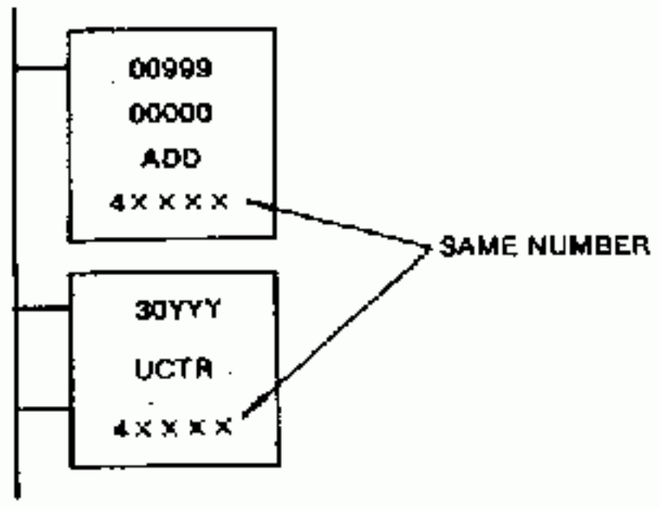
- Minimizing the variation of the ambient temperature should be considered. The accuracy of B1073 is 0.2% of full scale with the same input under the same temperature. Changes of the ambient temperature can directly affect the gain as well as offset as described in the specification. Therefore, ambient temperature changes should be kept to a minimum, especially for a work where high accuracy is required.
- The input range must be specified when ordering If an input range needs to be changed, it should be readjusted by Yaskawa representative. Note that all four input circuits must be in the same range.
- Depending on the input voltage, data of 0 to 1023 will be stored in the input register. It is usually necessary to transfer the contents of the input register into the holding register in order to perform a scale conversion, etc. In this case, R84H should employ subtraction or data transfer. If addition is used and the data is more than or equal to 1000, the amount of difference (over 1000) will be placed in the holding register, so that correct transfer cannot be made. The input register 3032 of R84H cannot be used for arithmetic functions.
- The program as shown in Fig. 3.2 should be made if necessary.

This program transfers the content of the input register 30YY(30YYY) to a holding register 4XXX (4XXXX). When the content of 30YY(30YYY) is more than or equal to 1000, the contents of 4XXX (4XXXX) is fixed at 999. Since a current value of the counter cannot exceed a preset value, the contents of 4XXX(4XXXX) becomes equal to the preset value when it temporarily becomes larger than the preset value in the other network. This program can also be used for the R84H input register 3032.

3.1.3 Usage (Cont'd)



(a) R84H



(b) U84, U84S and 584

Fig. 3.2 Ladder Circuit Example of B1073

3.1.4 Block Diagram

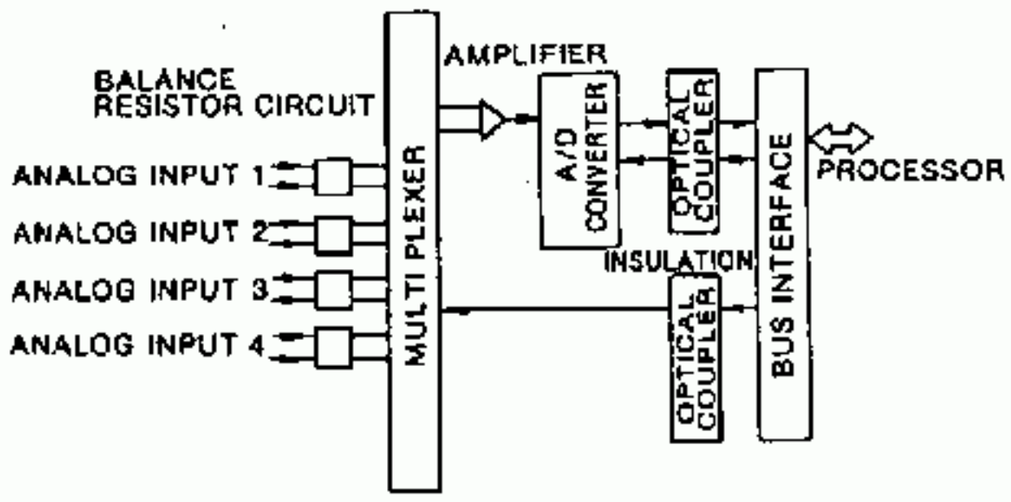
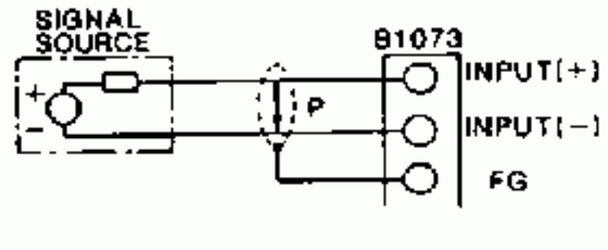


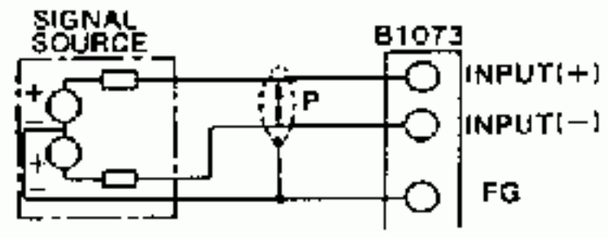
Fig. 3.3 Block Diagram of B1073

3.1.5 Connections

Input signals should be connected as shown in Fig. 3.4. The connection should be made by 2-core twisted shielded cable. Each input terminal of the B1073 is connected through resistors, to 0V (GND) of external power supply, however, this 0V is isolated from frame ground(FG). As a rule, all input signals should be floating relative to earth ground at signal source side, and 0V of external power supply should be grounded at one point. (Fig. 3.5)



(a) Single Ended Connection



(b) Differential Connection

Note:
1. Any unused circuit should have their input terminals jumpered together and connect to the shield terminal FG.
2. Connect the shield of cable to shield terminal FG of the B1073.
3. For connection across external power supply (±15 V) and module, use twisted cable larger than 1.25 mm². The wiring distance should be as short as possible. Do not run the cables and other control lines in the same duct. If they run through a dust, use shielded cables.

Fig. 3.4 Connection of B1073

3.1.6 Terminal Numbers

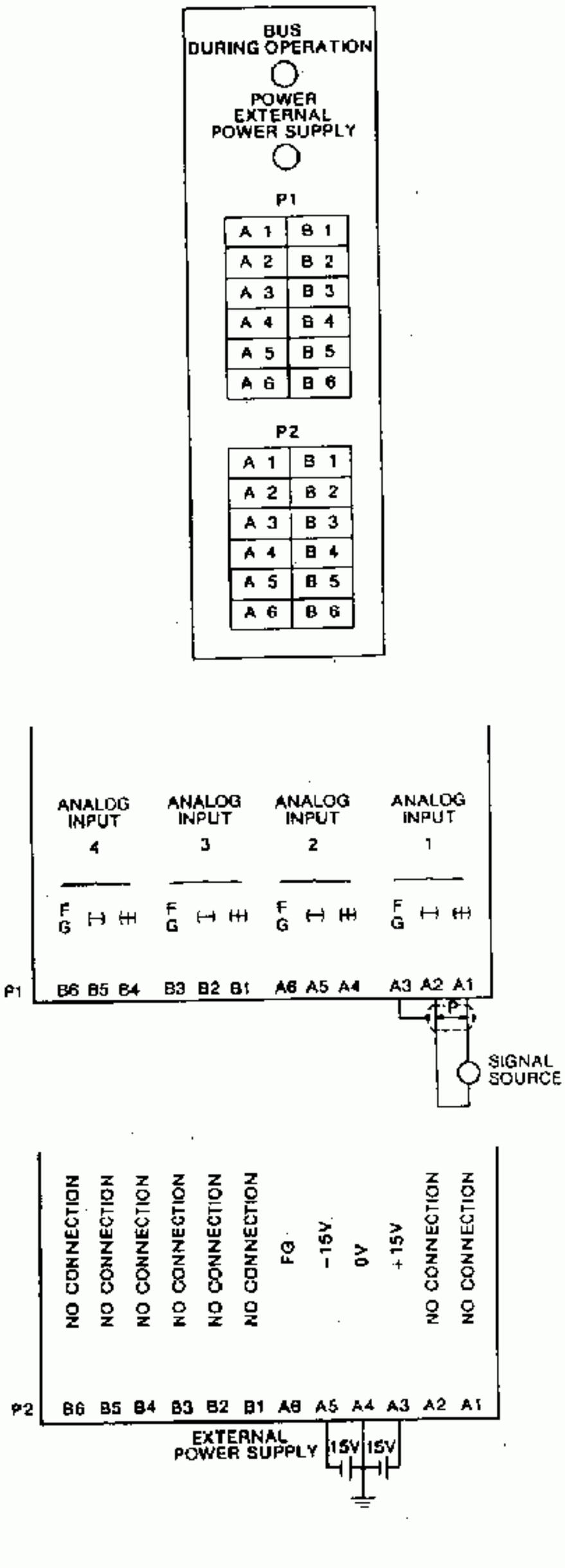


Fig. 3.5 Terminal Numbers of B1073

3.1.7 I/O Allocation

Table 3.2 shows an example of I/O allocation for input register, where B1073 is inserted into slot YY of the R84H.

Table 3.2 I/O Allocation Example of B1073 for R84H

R84H Register No.	Stored Digits	Analog Input	Input Register
41 YY	010	1	30 ××
	020	1	30 ××
		2	30 ×× +1
	030	1	30 ××
		2	30 ×× +1
		3	30 ×× +2
	040	1	30 ××
		2	30 ×× +1
		3	30 ×× +2
		4	30 ×× +3

3.2 D/A CONVERSION MODULES (JAMSC-B1072B)

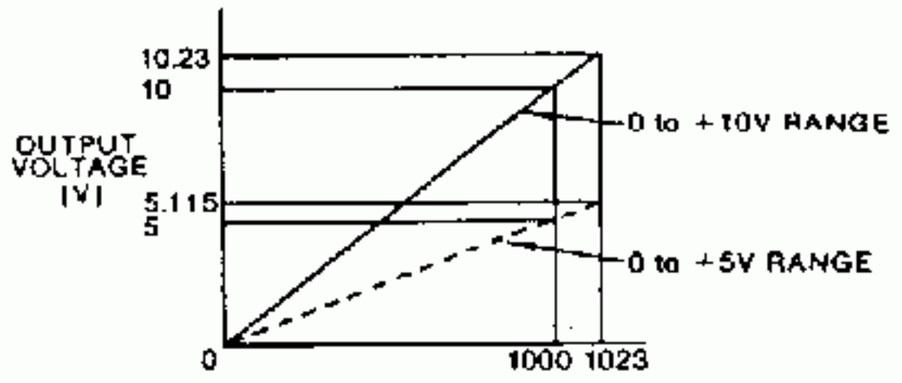
Table 3.3 D/A Conversion Module Specifications

Item	Specifications
General Specifications	
Conversion Time	Up to 100μs (settling time)
Conversion Cycle	Output will be altered for each scan of the processor.
No. of Circuits	2 per module
Indicators	1-No.1 ACTIVE, 1-No.2 ACTIVE (lighting up during normal operation)
Protection Circuit	In the event of reverse polarity or overvoltage (18 V or more) from external power supply, fuse* (0.25 A) will blow.
External Power Supply	• +15.00 VDC ±0.5 V, 60 mA per circuit. • −15.00 VDC ±0.5 V, 50 mA per circuit.
Electrical Characteristics	
Output Range†	• Standard JAMSC-B1072B-1 : 0 to +10 V • Optional JAMSC-B1072B-2 : 0 to +5 V JAMSC-B1072B-3 : −5 to +5 V JAMSC-B1072B-4 : −10 to +10 V
Resolution	1 bit in 1024
Linearity Error	Less than 0.1 % of full scale
Temperature Coefficient	• 0 to +10 V, 0 to +5 V range Gain : 40 ppm/°C (full scale) Offset : 10 ppm/°C (full scale) • −5 to +5 V, −10 to +10 V range Gain : 40 ppm/°C (full scale) Offset : 20 ppm/°C (full scale)
Accuracy	Less than 0.2 %, 25°C
Output Impedance	1 Ω or less
Max Output Current	10 mA
Cross Talk between Outputs	−80 dB or adove
Isolation Resistance	• 50MΩ between outputs at 500 VDC • 50MΩ between output and internal circuit at 500 VDC
Isolation Voltage	500 VDC (continuous)

*LITTEL Fuse 275250
†Two outputs are in the same range.

3.2.1 Conversion Characteristics

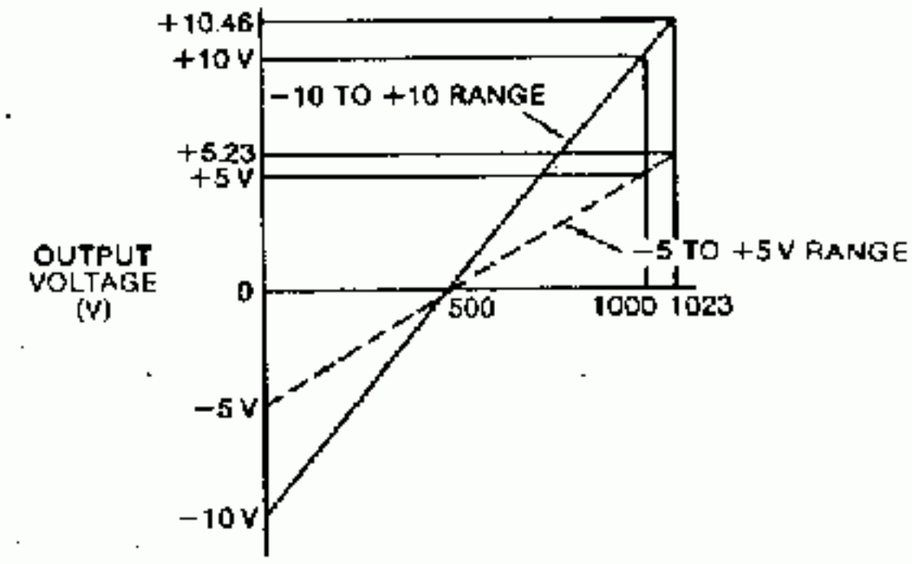
Depending on an output range, the conversion characteristics of JAMSC-B1072B (abbreviated to B1072B) vary as shown in Fig. 3.6.



Contents of Output Register	Analog Output Voltage V	
	0 to +10 V Range	0 to +5 V Range
000	0.00	0.000
001	0.01	0.005
500	5.00	2.500
999	9.99	4.995
1000*	10.00	5.000
1023*	10.23	5.115

*In the case of the R84H, "INV" will be displayed for input register 1000 and 1023 if monitoring is performed by programming panel P180.

(a) Unipolar Conversion Characteristics



Contents of Output Register	Analog Output Voltage V	
	−5 to +5 V Range	−10 to +10 V Range
000	−5.00	−10.00
001	−4.99	− 9.98
500	0.00	0.00
999	+4.99	+ 9.98
1000*	+5.00	+10.00
1023*	+5.23	+10 46

*In the case of the R84H, "INV" will be displayed for input register 1000 and 1023 if monitoring is performed by programming panel P180.

(b) Bipolar Conversion Characteristics

Fig. 3.6 Conversion Characteristics of B1072B

3.2.2 Function

Conforming to the characteristics shown in Fig. 3.6, B1072B converts the contents of 2 output registers in processor to analog signals(Voltage signals). The number of the output register being connected to the B1072B is determined by the I/O allocation table. In the case of R84H, U84 and U84S, two consecutive output registers are used for B1072B. The smaller numbered output register is connected to the first circuit and the larger numbered one is connected to the second circuit.

In the case of the 584, the contents of output register which is assigned at the beginning of the I/O allocation table among the applicable slots is connected to the first circuit of B1072B. By the command from the processor, B1072B sequentially inputs the contents of the output registers, applies D/A conversion, amplifies and then outputs analog signals. All of these processes are automatically performed in the internal circuits so that, without adding any special control circuit, B1072B can be handled like other output modules.

3.2.3 Usage

B1072B is mounted on the 1000 series mounting base like any other 1000 series I/O module. Following notes should be referred to when B1072B is used.

- B1072B can be installed in one slot space like other discrete I/O modules.
- Output registers used for B1072B should be specified as binary in the I/O allocation table. B1072B occupies only the numbers of output registers assigned by the I/O allocation table.
- B1072B needs +15V and -15V from external power supply.

  +15V: +15.00V ±0.5V, 60 mA per circuit
  -15V: -15.00V ±0.5V, 50 mA per circuit

- Minimizing the variation of the ambient temperature should be considered. The accuracy of B1072B is 0.2% with the same input under the same temperature. Changes of the ambient temperature directly affect the gain as well as offset as described in the specification. Therefore, ambient temperature changes should be kept to a minimum, especially for a work where high accuracy is required.
- The output range must be specified when ordering. If an output range needs to be changed, it should be readjusted by Yaskawa representative. Note that both output circuits must be in the same range.
- The first circuit and the second circuit are insulated inside the module.

3.2.4 Block Diagram

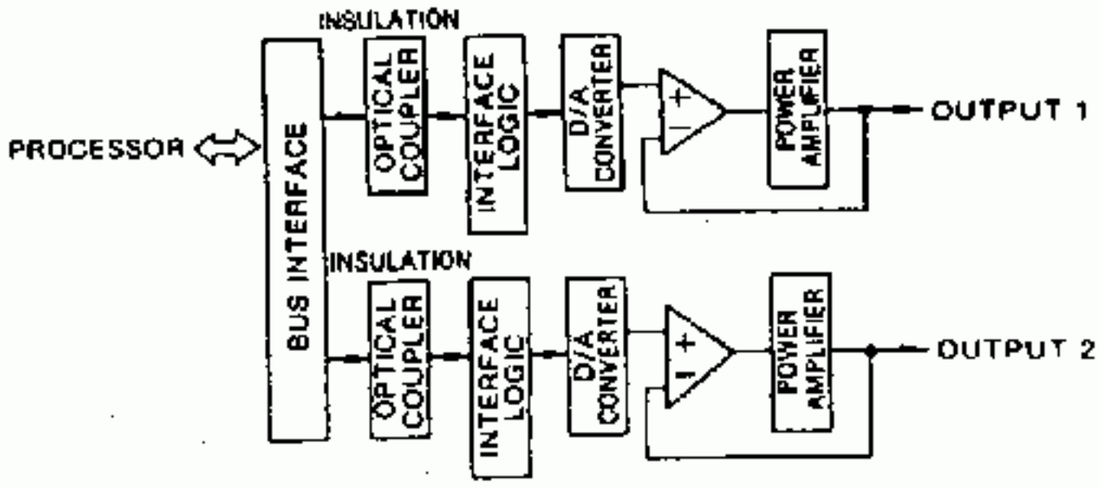
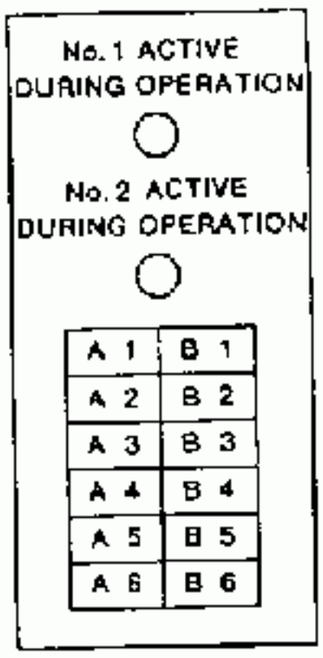


Fig. 3.7 Block Diagram of B1072B

3.2.5 Terminal Numbers



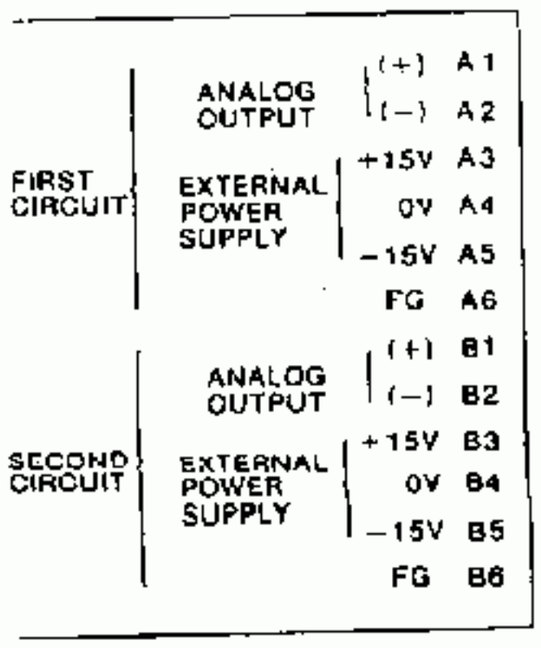
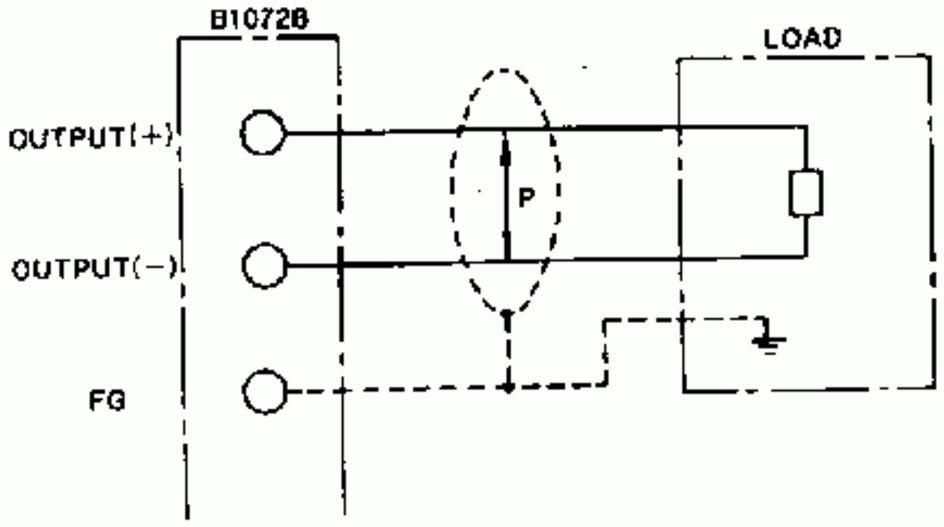


Fig. 3.8 Terminal Numbers of B1072B

3.2.6 Connections

Output signals should be connected as shown in Fig. 3.9. The connection should be made by 2-core twisted shielded cable.



Note: The shield of the cable should be connected to either the load side or the module side.

For connection across external power supply (±15 V) and module, use twisted cable larger than 1.25 mm². The wiring distance should be as short as possible. Do not run the cables and other control lines in the same duct. If they run through a duct, use shielded cables.

Fig. 3.9 Connection of B1072B

3.2.7 I/O Allocation

The Table 3.4 shows an example of I/O allocation for input register, where B1072B is inserted into slot YY of the R84H.

Table 3.4 I/O Allocation Example of B1072B for R84H

R84H Register No.	Stored Digits	Output Register	Analog Output
40 YY	010	40×× 40×× +1	1 2
	020	40×× 40×× +1	1 2

3.3 A/D CONVERSION MODULES (JAMSC-B1075)

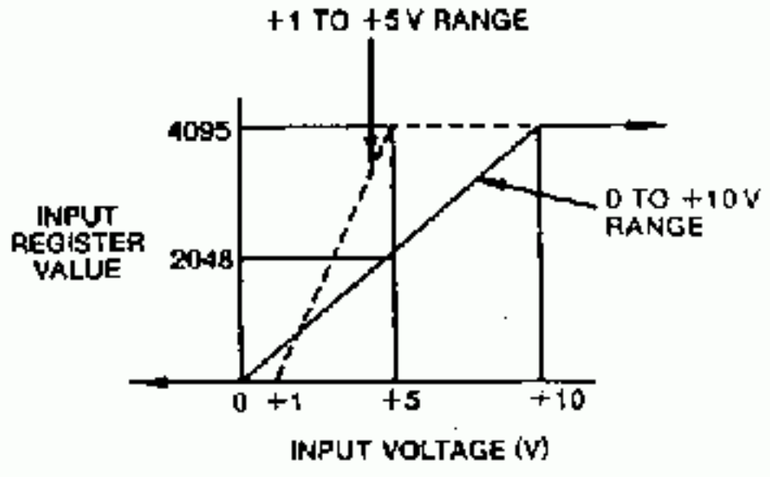
Table 3.5 A/D Conversion Module Specifications

Item	Specifications
General Specifications	
Conversion Type	Successive approximation
Conversion Speed	Approx 70 μs/channel
Sampling Cycle	Every scan of mainframe
No. of Circuits	4 per module (All four inputs are updated on each controller scan.)
Indicators	• 1-BUS (while communicating with the processor) • 1-POWER (while external power supply is normal)
Protection Circuit	In the event of reverse polarity or overvoltage (18 V or more) from external power supply, fuse* (0.25A) will blow.
External Power Supply	• +15 VDC ±0.5 V, 120 mA • −15 VDC ±0.5 V, 40 mA
Electrical Characteristics	
Input Range†	JAMSC-B1075-1 : 0 to +10 V JAMSC-B1075-2 (optional) : +1 to +5 V
Resolution	1 bit in 4096
Linearity Error	Less than 0.1 % of full scale
Temperature Coefficient	• 0 to +10 V Range Gain : 40 ppm/°C (full scale) Offset : 10 ppm/°C (full scale) • +1 to +5 V Range Gain : 60 ppm/°C (full scale) Offset : 20 ppm/°C (full scale)
Accuracy	Less than 0.2 %, 25°C
Input Impedance	2MΩ (normal input)
Max Allowable Input	±15 V
Cross Talk between Inputs	−70 dB or above
Isolation Resistance	• 2MΩ between inputs at 100 VAC • 50MΩ between input and internal circuit at 500 VDC
Isolation Voltage	500 VDC (continuous)

*LITTEL Fuse 275250
†Four inputs are in the same range.

3.3.1 Conversion Characteristics

Depending on an input range, the conversion characteristics of JAMSC-B1075 (abbreviated to B1075) vary as shown in Fig. 3.10.



Analg Input Voltage V		Input Register Value
0 to +10 V Range	+1 to +5 V Range	
≤ 0.00	≤ 1.000	0000
0.0025	1.001	0001
5.000	3.000	2048
9.9975	4.999	4094
10.000	5.000	4095

Note: Input register value is always within 4095.

Fig. 3.10 Conversion Characteristics of B1075

3.3.2 Function

Conforming to the characteristics shown in Fig. 3.10, the B1075 sequentially converts 4 analog inputs (voltage signals) to 12-bit binary numerical values. The converted numerical values are sent to the processor and are presented in up to 4 consecutive input registers. The Number of numerical values sent to the processor and the input register numbers are determined by the I/O allocation table.

In the case of the R84H, U84 and U84S the numerical values will be stored in consecutively numbered input registers (up to 4) where the numerical value in the first circuit will be stored in the lowest numbered input register. In the case of the 584, depending on the setting of the I/O allocation table, numerical values are not always stored in consecutively numbered input registers. The numerical value in the first circuit will be stored in the input register which is assigned at the first position of the I/O allocation table among applicable slots for the B1075.

The B1075 automatically performs input signal conditioning, A/D conversion, and numerical value storing into the input register by the command from the processor so that, without adding any special control circuit, B1075 can be handled in the same way as discrete input modules.

3.3.3 Usage

The B1075 is mounted on the 1000 series mounting base like any other 1000 series I/O module. Following notes should be referred to when B1075 is used.

- B1075 can be installed in one slot space like other discrete I/O modules.
- Input registers used for B1075 should be specified as binary in the I/O allocation. B1075 occupies only the numbers of input registers assigned by the I/O allocation table.
- In the case of current input, a proper resistor should be connected between input terminals of the B1073. (e.g. 250Ω resistor converts 4 to 20 mA into 1 to 5 V.) The resistor should be more than or equal to 1/2 W with small temperature coefficient (less than 50 ppm/°C).
- B1075 needs +15V and -15V from external power supply.

  +15V: +15.00V ±0.5V, 120 mA
  -15V: -15.00V ±0.5V, 40 mA

- Minimizing the variation of the ambient temperature should be considered. The accuracy of B1075 is 0.2% of full scale with the same input under the same temperature. Changes of the ambient temperature can directly affect the gain as well as offset as described in the specification. Therefore, ambient temperature changes should be kept to a minimum, especially for a work where high accuracy is required.
- The input range must be specified when ordering. If an input range needs to be changed, it should be readjusted by Yaskawa representative. Note that all four input circuits must be in the same range.

3.3.4 Block Diagram

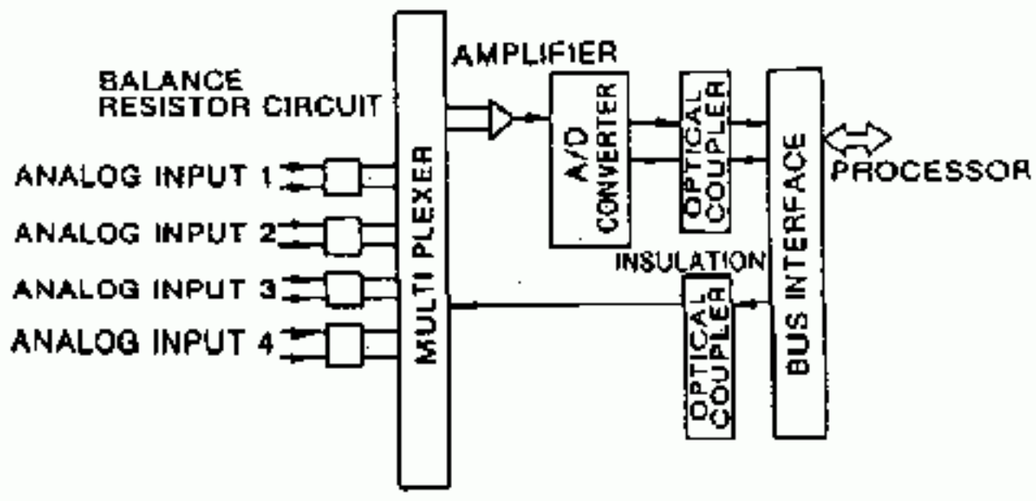
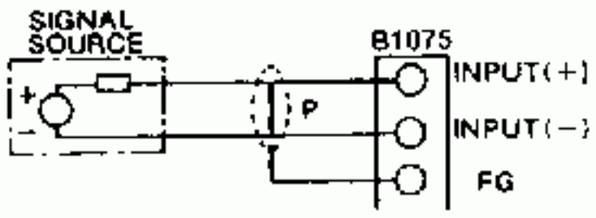


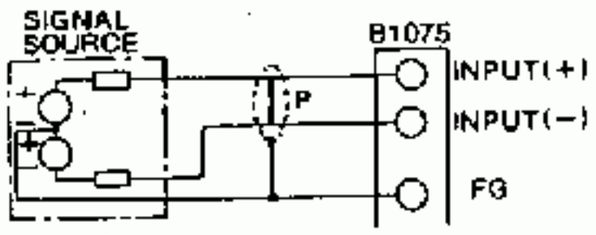
Fig. 3.11 Block Diagram of B1075

3.3.5 Connections

Input signals should be connected as shown in Fig. 3.12. The connection should be made by 2-core twisted shielded cable. Each input terminal of the B1075 is connected through resistors, to 0V (GND) of external power supply, however, this 0V is isolated from frame ground(FG). As a rule, all input signals should be floating relative to earth ground at signal source side, and 0V of external power supply should be grounded at one point. (Fig. 3.13)



(a) Single Ended Connection

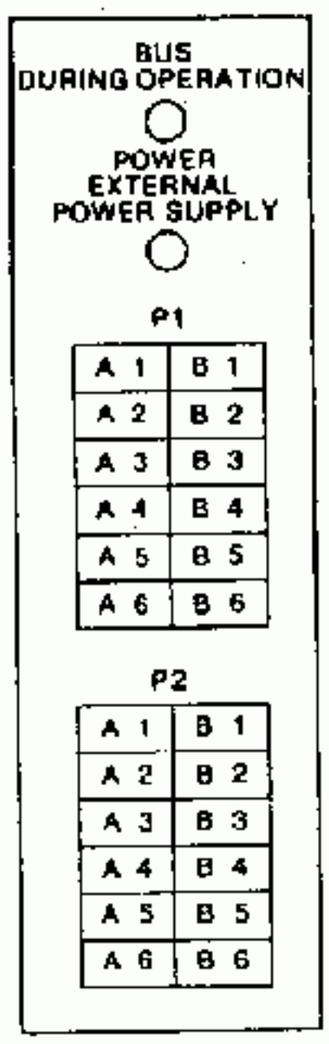


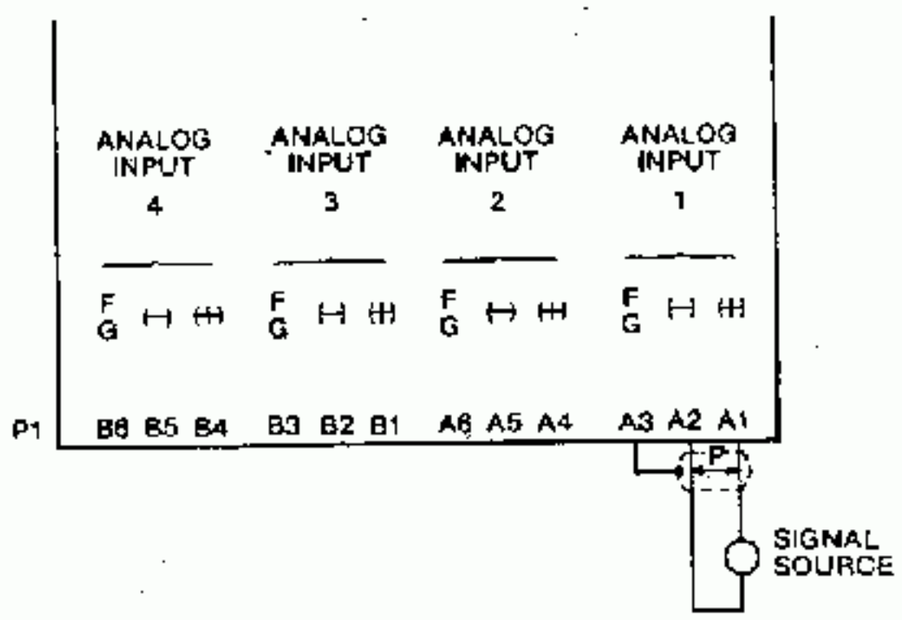
(b) Differential Connection

Note:
1. Any unused circuit should have their input terminals jumpered togetner and connect to the shield terminal FG.
2. Connect the shield of cable to shield terminal FG of the B1075.
3. For connection across external power supply (±15 V) and module, use twisted cables larger than 1.25 mm². The wiring distance should be as short as possible. Do not run the cables and other control lines in the same dust. If they run through a duct, use shielded cables.

Fig. 3.12 Connection of B1075

3.3.6 Terminal Numbers





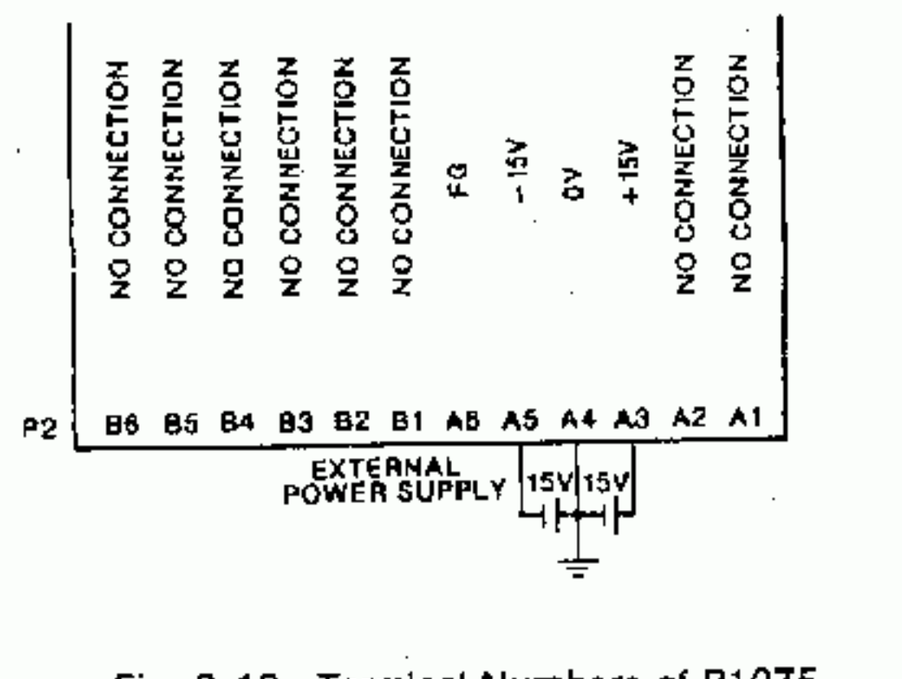


Fig. 3.13 Terminal Numbers of B1075

3.3.7 I/O Allocation

① I/O allocation setting for U84 and U84S

Fig. 3.14 shows an example of I/O allocation for input register, where B1075 is inserted into slot 1 (rack 2, channel 1) of the U84 or U84S.

Programming Panel P190 Display

```
CHANNEL : 01                    RACK : 2

INPUT

                DISCRETE                        REGISTER
SLOT  REF #     POINTS      REF #       BCD     BINARY
 1    -----     INH         3 x x x x   INH     N
```

N	Analog Input	Input Register
N=1	1	3 x x x x
N=2	1	3 x x x x
	2	3 x x x x +1
N=3	1	3 x x x x
	2	3 x x x x +1
	3	3 x x x x +2
N=4	1	3 x x x x
	2	3 x x x x +1
	3	3 x x x x +2
	4	3 x x x x +3

Fig. 3.14 I/O Allocation Example of B1075 for U84, U84S

② I/O allocation setting for 584

Where B1075 is connected to 584, I/O adapter for 584 (type DISCT-J1040) is required. I/O allocation should be set to both 584 and J1040 adapter. For I/O allocation setting of J1040 adapter, refer to "Memocon-SC 584 I/O adapters" (SIE-C815-7.80).

Fig. 3.15 shows allocation setting example of 584 shown on I/O allocation conversion table and programming panel P190 display.

Input					Output				
584			1000 series I/O		584			1000 series I/O	
SLOT		Input	R/D	SLOT	SLOT		Output	R/D	SLOT
Odd Channel	1	30001	R	01	Odd Channel	1	INHIBIT	—	—
	2	30002	R	01		2	INHIBIT	—	—
	3	30003	R	01		3	INHIBIT	—	—
	4	30004	R	01		4	INHIBIT	—	—

```
CHANNEL : 01

        INPUT                          OUTPUT

SLOT  REF #   TYPE      SLOT  REF #   TYPE
 1    30001   BIN REG    1    -----   INHIBIT
 2    30002   BIN REG    2    -----   INHIBIT
 3    30003   BIN REG    3    -----   INHIBIT
 4    30004   BIN REG    4    -----   INHIBIT
```

Fig. 3.15 I/O Allocation Sample of B1075 for 584

3.4 D/A CONVERSION MODULES (JAMSC-B1074)

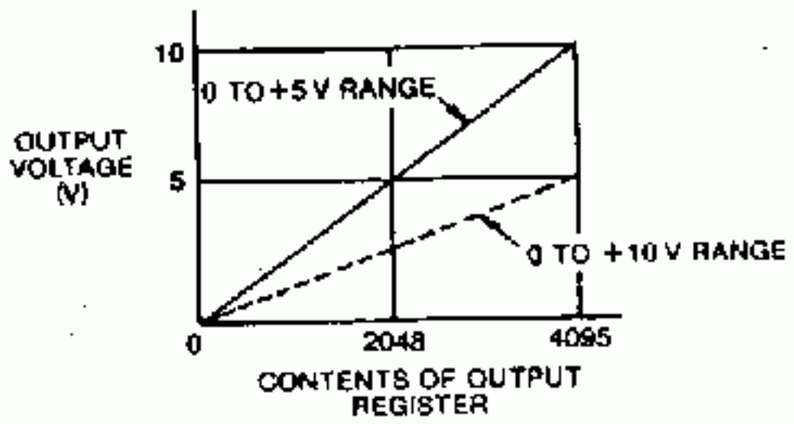
Table 3.8 D/A Conversion Module Specifications

Item	Specifications
General Specifications	
Conversion time	Up to 100 μs (settling time)
Conversion Cycle	Output will be altered for each scan of the processor.
No. of Circuits	2 per module
Indicators	1-No.1 ACTIVE, 1-No.2 ACTIVE (lighting up during normal operation)
Protection Circuit	In the event of reverse polarity or overvoltage (18 V or more) from external power supply, fuse* (0.25 A) will blow.
External Power Supply	• +15.00 VDC ±0.5 V, 60 mA per circuit • −15.00 VDC ±0.5 V, 50 mA per circuit
Electrical Characteristics	
Output Range†	• Standard JAMSC-B1074-1 : 0 to +10 V • Optional JAMSC-B1074-2 : 0 to +5 V JAMSC-B1074-3 : −5 to +5 V JAMSC-B1074-4 : −10 to +10 V
Resolution	1 bit in 4096
Linearity Error	Less than 0.1 % of full scale
Temperature Coefficient	• 0 to +10 V, 0 to +5 V Range Gain : 40 ppm/°C (full scale) Offset : 10 ppm/°C (full scale) • −5 to +5V, −10 to +10 V Range Gain : 40 ppm/°C (full scale) Offset : 20 ppm/°C (full scale)
Accuracy	Less than 0.2 %, 25°C
Output Impedance	1Ω or less
Max Output Current	10 mA
Cross Talk between Outputs	−80 dB or above
Isolation Resistance	• 50MΩ between outputs at 500 VDC • 50MΩ between output and internal circuit at 500 VDC
Isolation Voltage	500 VDC (continuous)

*LITTEL Fuse 275250
†Two outputs are in the same range.

3.4.1 Conversion Characteristics

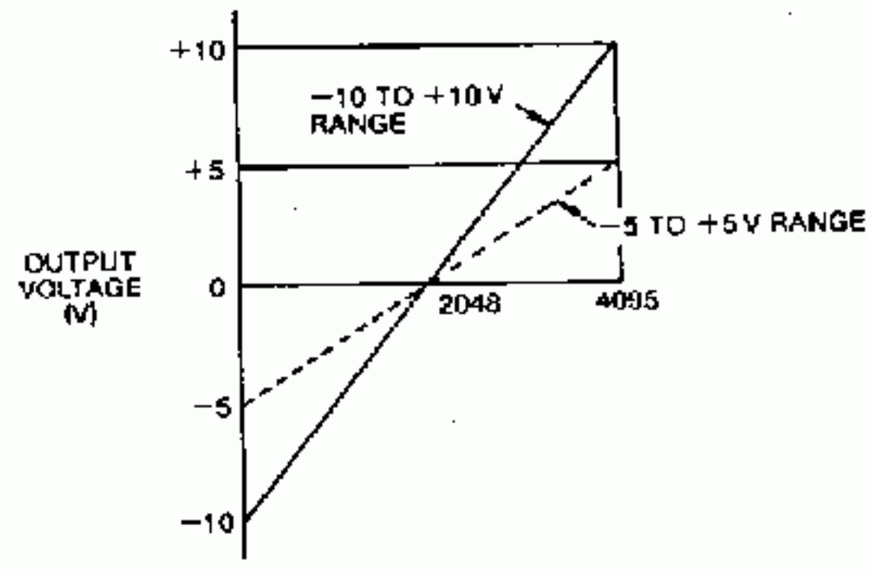
Depending on an output range, the conversion characteristics of JAMSC-B1074 (abbreviated to B1074) vary as shown in Fig. 3.16.



Contents of Output Register	Analog Input Voltage V	
	0 to 10 V Range	0 to 5 V Range
0000	0.000	0.000
0001	0.0025	0.001
2048	+ 5.000	+2.500
4094	+ 9.9975	+4.999
4095	+10.000	+5.000

Note: When the content of output register exceeds 4095, analog output voltage is fixed at 4095 on content of output register.

(a) Unipolar Conversion Characteristics



Contents of Output Register	Analog Input Voltage V	
	−5 to +5 V Range	−10 to +10 V Range
0000	−5.000	−10.000
0001	−4.9975	− 9.995
2048	0.000	0.000
4094	+4.9975	+ 9.995
4095	+5.000	+10.000

Note: When the content of output register exceeds 4095, analog output voltage is fixed at 4095 on content of output register.

(b) Bipolar Conversion Characteristics

Fig. 3.16 Conversion Characteristics of B1074

3.4.2 Function

Conforming to the characteristics shown in Fig. 3.16, B1074 converts the contents of 2 output registers in processor to analog signals (voltage signals). The number of the output register being connected to the B1074 is determined by the I/O allocation table. In the case of R84H, U84 and U84S, two consecutive output registers are used for B1074. The smaller numbered output register is connected to the first circuit and the larger numbered one is connected to the second circuit.

In the case of the 584, the contents of output register which is assigned at the beginning of the I/O allocation table among the applicable slots is connected to the first circuit of B1074. By the command from the processor, B1074 sequentially inputs the contents of the output registers, applies D/A conversion, amplifies and then outputs analog signals. All of these processes are automatically performed in the internal circuits so that, without adding any special control circuit, B1074 can be handled like other output modules.

3.4.3 Usage

B1074 is mounted on the 1000 series mounting base like any other 1000 series I/O module. Following notes should be referred to when B1074 is used.

- B1074 can be installed in one slot space like other discrete I/O modules.
- Output registers used for B1074 should be specified as binary in the I/O allocation table. B1074 occupies only the numbers of output registers assigned by the I/O allocation table.
- B1074 needs +15V and -15V from external power supply.

  +15V: +15.00V ±0.5V, 100 mA per circuit
  -15V: -15.00V ±0.5V, 40 mA per circuit

- Minimizing the variation of the ambient temperature should be considered. The accuracy of B1074 is 0.2% with the same input under the same temperature. Changes of the ambient temperature directly affect the gain as well as offset as described in the specification. Therefore, ambient temperature changes should be kept to a minimum, especially for a work where high accuracy is required.
- The output range must be specified when ordering. If an output range needs to be changed, it should be readjusted by Yaskawa representative. Note that both output circuits must be in the same rang
- The first circuit and the second circuit are insulated inside the module including external power supply.

3.4.4 Block Diagram

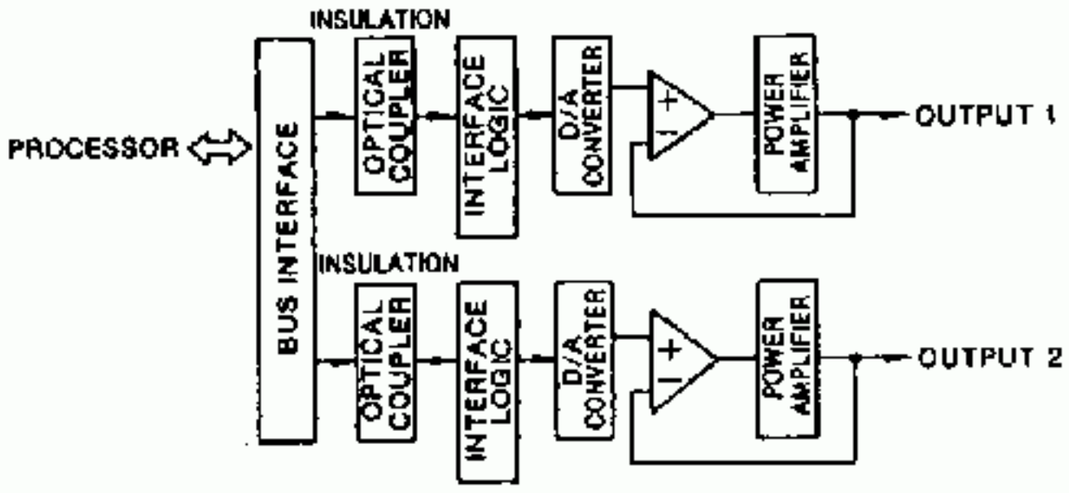
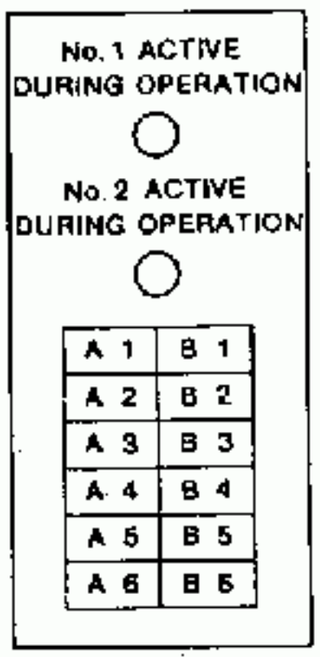


Fig. 3.17 Block Diagram of B1074

3.4.5 Terminal Numbers

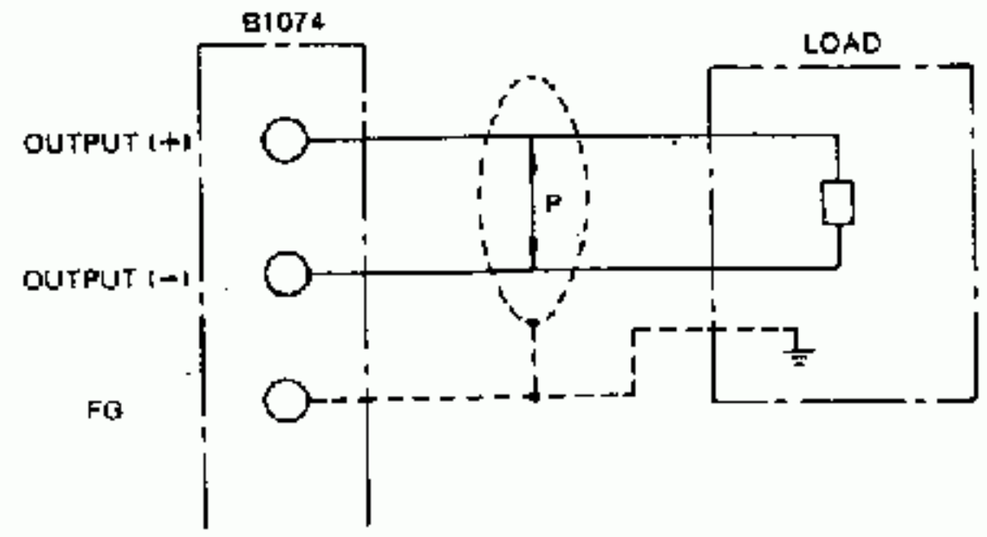


FIRST CIRCUIT	ANALOG OUTPUT	(+)	A1
		(−)	A2
	EXTERNAL POWER SUPPLY	+15V	A3
		0V	A4
		−15V	A5
		FG	A6
SECOND CIRCUIT	ANALOG OUTPUT	(+)	B1
		(−)	B2
	EXTERNAL POWER SUPPLY	+15V	B3
		0V	B4
		−15V	B5
		FG	B6

Fig. 3.18 Terminal Numbers of B1074

3.4.6 Connections

Output signals should be connected as shown in Fig. 3.19. The connection should be made by 2-core twisted shielded cable.



Note: The shield of the cable should be connected to either the load side or the module side.

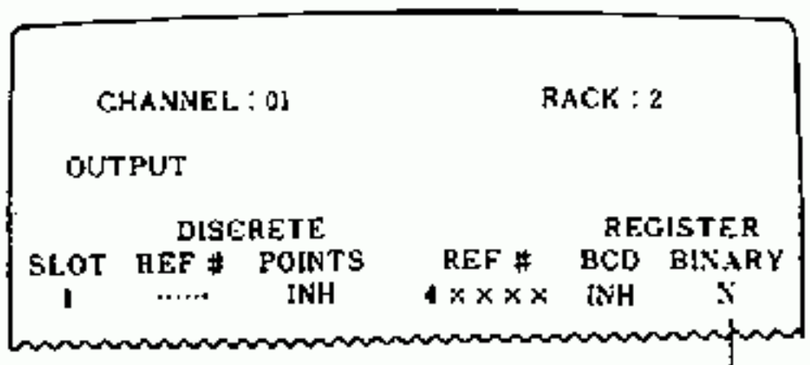
For connection across external power supply (±15 V) and module, use twisted cable larger than 1.25 mm². The wiring distance should be as short as possible. Do not run the cables and other control lines in the same duct. If they run through a duct, use shielded cables.

Fig. 3.19 Connection of B1074 to Load

3.4.7 I/O Allocation

① I/O allocation setting for U84 and U84S

Fig. 3.20 shows an example of I/O allocation for output register, where B1074 is inserted into slot 1 (rack 2, channel 1) of the U84 or U84S.



N	Output Register	Analog Output
N=1	4××××	1
N=2	4×××× 4×××× +1	1 2

Fig. 3.20 I/O Allocation Example of B1074 for U84, U84S

3.4.7 I/O Allocation (Cont'd)

② I/O allocation setting for 584

Where B1074 is connected to 584, I/O adapter for 584 (Type DISCT-J1040) is required. I/O allocation should be set to both 584 and J1040 adapter. For I/O allocation setting of J1040 adapter, refer to "Memocon-SC 584 I/O adapters" (SIE-C815-7.80).

Fig. 3.21 shows allocation setting example of 584 shown on I/O allocation conversion table and display of Programming panel P190.

		Input				Output				
		584		1000 series I/O			584		1000 series I/O	
	SLOT	Input		R/D	SLOT	SLOT	Output		R/D	SLOT
Odd Channel	1	INHIBIT		—	—	1	40001	Odd Channel	R	01
	2	INHIBIT		—	—	2	40002		R	01

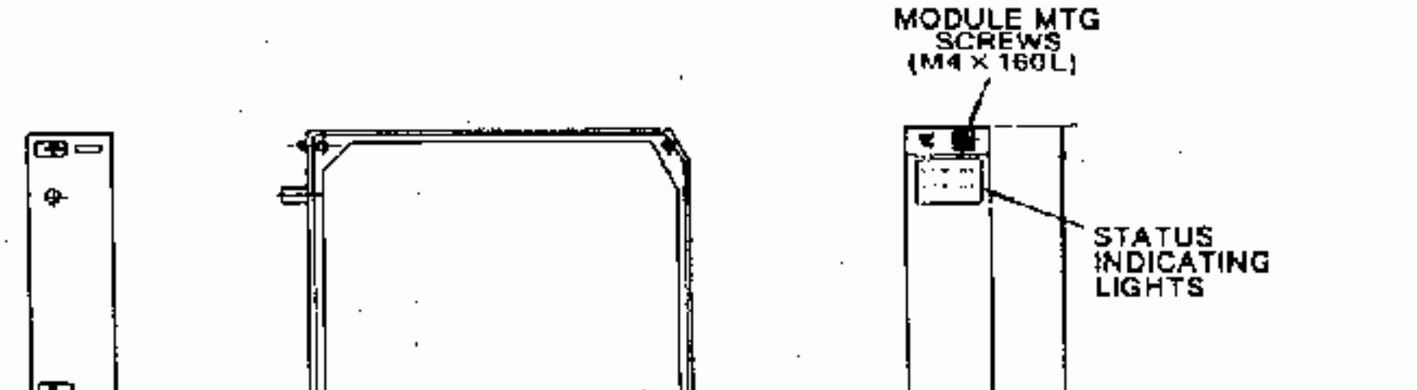
Programming Panel P190 Display

```
CHANNEL : 01

          INPUT                          OUTPUT

SLOT  REF #   TYPE          SLOT  REF #   TYPE
 1    ------  INHIBIT        1    40001  BIN REG
 2    ------  INHIBIT        2    40002  BIN REG
```

Fig. 3.21 I/O Allocation Example of B1074 for 584

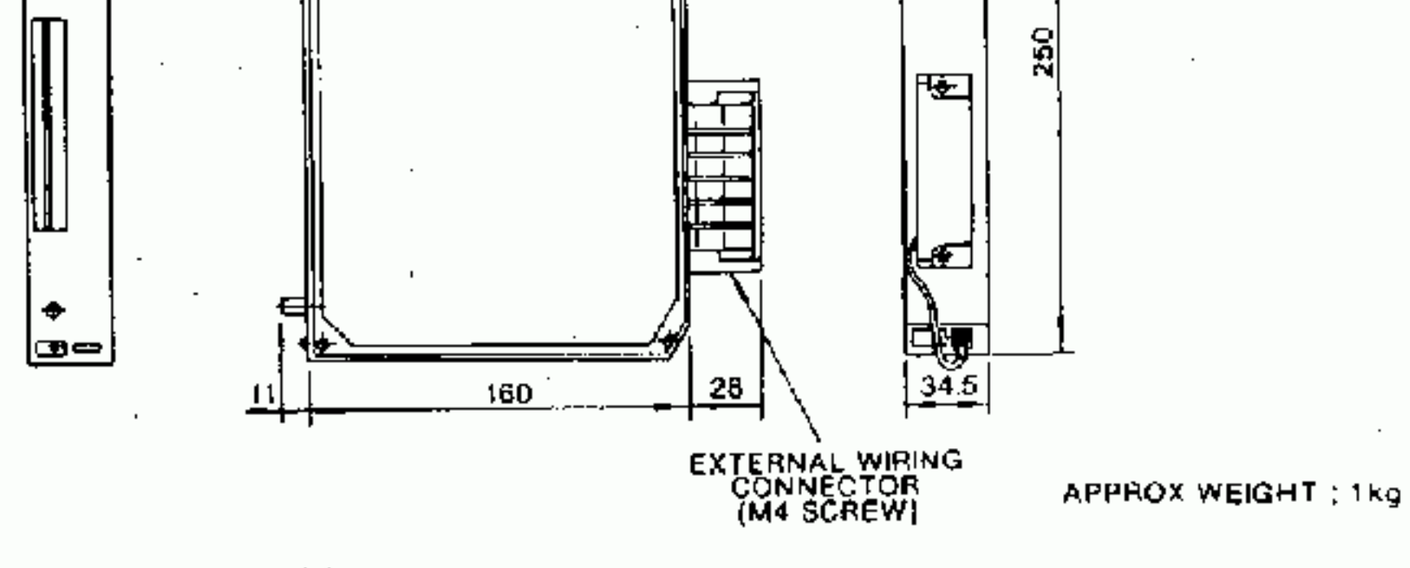
4. DIMENSIONS in mm

4.1 A/D CONVERSION MODULES (JAMSC-B1073, -B1075)



APPROX WEIGHT : 1kg

4.2 D/A CONVERSION MODULES (JAMSC-B1072B, -B1074)



APPROX WEIGHT : 1kg

APPENDIX

A/D conversion modules (B1073, B1075) have 4 input channels. Each channel is not insulated from one another. When isolation of input signals is necessary, use commercial isolation amplifier. Output of D/A conversion modules(B1072B, B1074) are voltage signal, however, current signal is frequently used in the field of industrial measurement. When current output signal is necessary, use commercial voltage/current converter.

Some examples of commercial isolation amplifier and voltage/current converter are shown in the supplemental tables.

Isolation Amplifier, Voltage/Current Converter and Other Converters†

Item	Input	Output	Accuracy	Linearity	Repeatability	Remarks	Type
Isolater Isolation Voltage Converter	Voltage input : 0—10mVDC 0—100mVDC 0—1VDC 0—10VDC 0—5VDC 1—5VDC Current input : 4—20mADC 2—10mADC 1—5mADC 0—20mADC 0—16mADC 0—1mADC	0—10VDC 1—5VDC Other outputs : 4—20mADC 2—10mADC 1—5mADC 0—20mADC 0—16mADC 0—1mADC 0—10mADC 0—100mADC 0—1VDC 0—5VDC −10 to +10VDC	0.25 % FS	0.1 % FS	0.1 % FS	Voltage/current converter	SV
Voltage Converter*			0.25 %	0.1 %	0.1 %	Voltage/current converter	CV
Linearlizer			0.25 %	0.1 %	0.1 %	Converts irregular input to linear signal.	FX
Limiter			0.25 %	0.1 %	0.1 %	Sets upper limit and lower limit.	LX
Analog Memory			0.5 %	0.2 %	0.2 %	Holds output value by using control signal.	AM
Peak Holder			0.5 %	0.2 %	0.2 %	Holds peak value by using control signal.	PH
First-order Lag Converter			0.5 %	0.2 %	0.2 %	Responds within 0.5 to 20 seconds delay.	CD
Thermocouple Transmitter	Various thermocouples		0.5 %	0.3 %	0.1 %	—	TCS
Resistance Bulb Converter*	PT 100 Ω PT 50 Ω	Voltage and current signals except above	0.3 %	0.2 %	0.1 %	—	RBS
	PT 100 Ω PT 50 Ω		0.5 %	0.2 %	0.1 %	—	RB
Potentiometer	Various potentiometers (100 Ω — 10 kΩ)		0.25 %	0.1 %	0.1 %	—	PM
CT Converter	0—1A AC 0—5A AC		0.5 %	0.3 %	0.1 %	—	CT
PT Converter	0—110VAC 0—150VAC		0.5 %	0.2 %	0.1 %	—	PT
TG (Tachometer Generator) Converter	0—150VAC		1 %	0.2 %	0.1 %	—	TG
Slow Pulse Converter	0—3 kHz		0.5 %	0.3 %	0.1 %	—	PS
Ultra Slow Pulse Converter	0—0.1 Hz 0—1 Hz 0—10 Hz		0.25 %	0.1 %	0.1 %	—	EP
Common Specifications	Power source 100 VAC, 200 VAC, 24 VDC ± 10 %, Approx 4 VA Ambient temperature : − 5 to + 55 ℃ (Storage temperature : − 25 to + 85 ℃) Insulation resistance : 100 MΩ or more 500 VDC						

*Input/output insulation is not equipped for voltage converter and type RB resistance bulb converter.
†Made by M. System Co., Ltd.

Note: All are plug-in types. For details contact Yaskawa representative.

ANALOG MODULES TYPE JAMSC-B1072B, -B1073, -B1074, -B1075

Isolation Amplifier and Voltage/Current Converter*

Item \ Type	M3000B	M3001B	M3002B	M3006B	M3007B
Applications	V/V (for general)	V/V (for high accuracy)	V/I	V/I	V/I
Gain	± 10 V ± 10 V	± 5 V/± 5 V	0 – 1/4 – 20 mA	1 – 5/4 – 20 mA	0 – 5/4 – 20 mA
Gain Drift	± 20 ppm/℃ max	± 10 ppm/℃ max	± 50 ppm/℃ max	± 50 ppm/℃ max	± 50 ppm/℃ max
Linearity	± 0.05 % F.S max	± 0.01 % F.S max	± 0.1 % F.S max	± 0.1 % F.S max	± 0.1 % F.S max
Load Resistance (at 25℃)	—	—	800 Ω max	800 Ω max	800 Ω max
Offset Drift	± 100 μV/℃ max	± 50 μV/℃ max	± 50 μV/℃ max	± 50 μV/℃ max	± 50 μV/℃ max
Input Signal Voltage	± 10 V max	± 5 V max	+ 1 V max	5 V max	5 V max
Allowable Input Voltage	± 20 V max	± 15 V max	+ 15 V max	+ 15 V max	+ 15 V max
Input Impedance	1 MΩ min	10 MΩ min	1 MΩ min	1 MΩ min	1 MΩ min
Output Voltage	± 10 V max	± 5 V max	24 V (open)	24 V (open)	24 V (open)
Output Current	± 3 mA max	± 5 mA max	30 mA (saturation)	30 mA (saturation)	30 mA (saturation)
Output Impedance	0.1 Ω typ	0.1 Ω typ	1 MΩ min	1 MΩ min	1 MΩ min
Frequency Response	1 kHz - 3 dB	1 kHz - 3 dB	400 Hz - 3 dB	400 Hz - 3 dB	400 Hz - 3 dB
Response Time	200 μ sec	200 μ sec	—	—	—
Settling Time	—	1.2 m sec (0.1 %)	—	—	—
Isolation Voltage	1500 VDC for 1 minute				
CMRR	100 dB				
Power Supply Voltage and Current	15 V ± 2 % 50 mA		15 V ± 2 % 130 mA		
Ambient Temperature (Storage Temperature)	0 to 60℃ (– 20 to 85℃)				
Dimensions	70 × 50 × 18 mm				

*Made by MTT Instrumentation Inc.

Note:
All items are mounted on printed board. Following types are also available:
MB3000B series — stored in a case for easy installation
M3200 series — Used for 100 VAC power supply

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