

mitsubishi

Digital-Analog Conversion Module

User's Manual
(Hardware)

AJ65BT-64DAV/DAI

Thank you for buying the Mitsubishi general-purpose programmable controller MELSEC-A Series

Prior to use, please read both this manual and detailed manual thoroughly and familiarize yourself with the product.



MODEL	AJ65BT-64DA-U-H-E
MODEL CODE	13J894
IB (NA)-66750-E(0810)MEE	

● SAFETY PRECAUTIONS ●

(Read these precautions before using this product.)

Before using this product, please read this manual and the relevant manuals introduced in this manual carefully and pay full attention to safety to handle the product correctly.

The precautions given this manual are concerned with this product. Refer to the User's Manual of the CPU module in use for details on the safety precautions for the programmable controller system.

In this manual, the safety precautions are classified into two levels: "DANGER" and "CAUTION".




DANGER

Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.



CAUTION

Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

Under some circumstances, failure to observe the precautions given under " CAUTION" may lead to serious consequences.

Observe the precautions of both levels because they are important for personal and system safety.

Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[Design Precautions]

DANGER

- Configure safety circuits external to the programmable controller to ensure that the entire system operates safely even when a fault occurs in the external power supply or the programmable controller. Failure to do so may result in an accident due to an incorrect output or malfunction.
 - (1) The status of analog output depends on the setting of various functions that control the analog output. Exercise great caution when setting those functions.

For details of analog output status, refer to Section 3.4.5 "Combinations of various functions" in the user's manual for the module.
 - (2) Due to failure of the output element or internal circuit, normal output may not be obtained correctly.

Configure an external circuit for monitoring output signals that could cause a serious accident.

CAUTION

- Do not install the control lines or communication cables together with the main circuit lines or power cables.
Keep a distance of 100mm (3.94 inches) or more between them.
Failure to do so may result in malfunction due to noise.

[Design Precautions]

CAUTION

- When a module is powered ON/OFF, voltage or current may instantaneously be output from the output terminal of this module. In such case, wait until the analog output becomes stable. Then, start controlling the external device.

[Installation Precautions]

CAUTION

- Use the programmable controller in an environment that meets the general specifications in this manual. Failure to do so may result in electric shock, fire, malfunction, or damage to or deterioration of the product.
- For protection of the switches, do not remove the cushioning material before installation.
- When using a module, securely fix the module seated P-shape pan screws to the installation holes (two locations).
Incorrect fixing may cause failure or drop of the module.
- Do not directly touch any conductive part of the module.
Doing so can cause malfunction or failure of the module.

[Wiring Precautions]

CAUTION

- Shut off the external power supply for the system in all phases before wiring.
Failure to do so may result in damage to the product.
- Ground the FG terminals to the protective ground conductor dedicated to the programmable controller. Failure to do so may result in malfunction.
- Use applicable solderless terminals and tighten them within the specified torque range. If any spade solderless terminal is used, it may be disconnected when the terminal screw comes loose, resulting in failure.
- Check the rated voltage and terminal layout before wiring to the module, and connect the cables correctly.
Connecting a power supply with a different voltage rating or incorrect wiring may cause a fire or failure.
- Tighten the terminal screw within the specified torque range.
Undertightening can cause short circuit or malfunction.
- Prevent foreign matter such as dust or wire chips from entering the module.
Such foreign matter can cause a fire, failure, or malfunction.

[Wiring Precautions]

CAUTION

- Do not install the control lines or communication cables together with the main circuit lines or power cables. Failure to do so may result in malfunction due to noise.
- Place the cables in a duct or clamp them.
If not, dangling cable may swing or inadvertently be pulled, resulting in damage to the module or cables or malfunction due to poor contact.
- When disconnecting the cable from the module, do not pull the cable by the cable part.
Loosen the screws of connector before disconnecting the cable.
Failure to do so may result in damage to the module or cable or malfunction due to poor contact.

[Startup and Maintenance Precautions]

CAUTION

- Do not touch any terminal while power is on.
Doing so may cause malfunction.
- Shut off the external power supply for the system in all phases before cleaning the module or retightening the terminal screws.
Failure to do so may cause the module to fail or malfunction.
Undertightening the terminal screws can cause short circuit or malfunction.
Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- Do not disassemble or modify the modules.
Doing so may cause failure, malfunction, injury, or a fire.
- Do not drop or apply strong shock to the module.
Doing so may damage the module.
- Shut off the external power supply for the system in all phases before mounting or removing the module to or from the panel.
Failure to do so may cause the module to fail or malfunction.
- After the first use of the product, do not mount/remove the terminal block to/from the module more than 50 times (IEC 61131-2 compliant).
- Before handling the module, touch a grounded metal object to discharge the static electricity from the human body.
Failure to do so may cause the module to fail or malfunction.

[Disposal Precautions]

CAUTION

- When disposing of this product, treat it as industrial waste.

About Manuals

The following are manuals related to this product.
Request for the manuals as needed according to the chart below.

Detailed Manual

Manual name	Manual No. (Model code)
AJ65BT-64DAV/DAI Digital-Analog Conversion Module User's Manual	SH-3615 (13J895)

Related Manuals

Manual name	Manual No. (Model code)
CC-Link System Master/Local Module User's Manual type AJ61BT11/A1SJ61BT11	IB-66721 (13J872)
CC-Link System Master/Local Module User's Manual type AJ61QBT11/A1SJ61QBT11	IB-66722 (13J873)
CC-Link System Master/Local Module User's Manual type QJ61BT11N	SH-080394E (13JR64)

Compliance with the EMC and Low Voltage Directives

(1) For programmable controller system

To configure a system meeting the requirements of the EMC and Low Voltage Directives when incorporating the Mitsubishi programmable controller (EMC and Low Voltage Directives compliant) into other machinery or equipment, refer to the "EMC AND LOW VOLTAGE DIRECTIVES" chapter of the User's Manual for the CPU module used.

The CE mark, indicating compliance with the EMC and Low Voltage Directives, is printed on the rating plate of the programmable controller.

(2) For the product

For the compliance of this product with the EMC and Low Voltage Directives, refer to the "CC-Link module" section in the "EMC AND LOW VOLTAGE DIRECTIVES" chapter of the User's Manual for the CPU module used.

1. Overview

This user's manual describes the specification and handling of AJ65BT-64DAV digital analog-voltage conversion module (abbreviated as AJ65BT-64DAV from here on) and AJ65BT-64DAI digital-analog current conversion module (abbreviated as AJ65BT-64DAI from here on), which is used as the remote device station for the Control & Communication-Link (abbreviated as CC-Link from here on) data system.

After opening the package for AJ65BT-64DAV/DAI, check that the following components have been included.

For AJ65BT-64DAV

Model	Part name	Quantity
AJ65BT-64DAV	AJ65BT-64DAV digital analog conversion module.	1

For AJ65BT-64DAI

Model	Part name	Quantity
AJ65BT-64DAI	AJ65BT-64DAI digital analog conversion module	1

2. Specifications

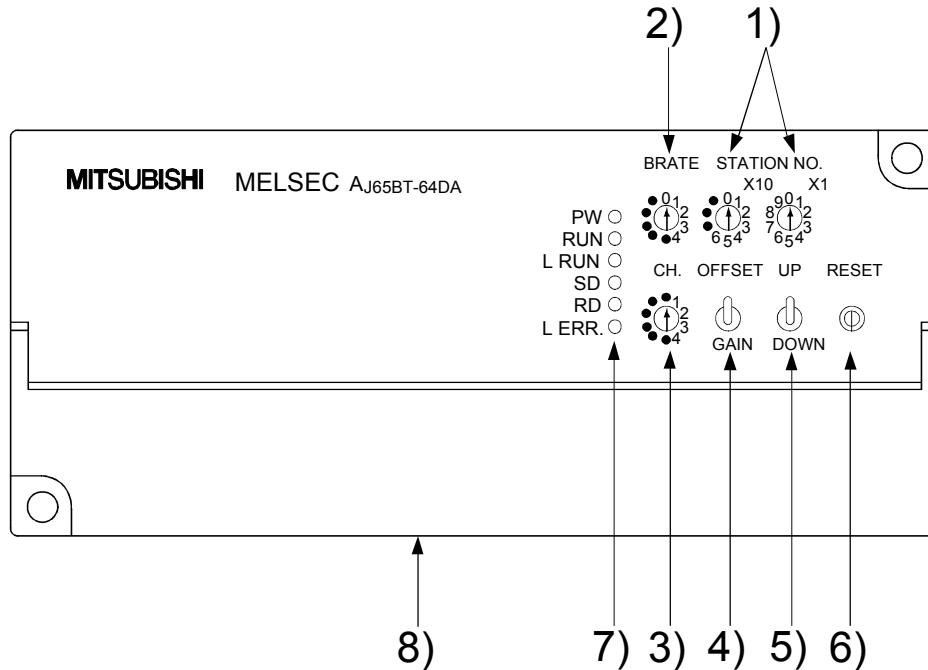
The performance specifications of the AJ65BT-64DAV/DAI is shown below.

Item	Specification			
	AJ65BT-64DAV		AJ65BT-64DAI	
Digital input value	-2048 to 2047		0 to 4095	
Analog conversion value	-10 to 10 VDC (External load resistance: 2K Ω to 1M Ω)		4 to 20mADC (External load resistance: 0 to 600 Ω)	
I/O characteristics	Digital input value	Analog output value	Digital input value	Analog output value
	2000	10V	4000	20mA
	1000	5V	2000	12mA
	0	0V	0	4mA
	-1000	-5V		
	-2000	-10V		
Maximum resolution	5mA		4 μ A	
Total accuracy (accuracy for the maximum value)	\pm 1% (\pm 100mV)		\pm 1% (\pm 200 μ A)	
Maximum conversion speed	Max. 1ms channels (4ms per 4 channels)			
Output short-circuit protection	Yes			
Analog output points	4 channels per module			
Offset/gain adjustment	Yes (user setting or factory setting)			
CC-Link station type	Remote device station			
I/O occupied points	2 stations			
Connection terminal block	27-point terminal block (M3.5 \times 7screws)			
Supported cable size	0.75 to 2.00mm ²			
Supported solderless terminal	RAV 1.25-3.5 (according to JIS C2805), RAV2-3.5			
Module mounting screw	M4 \times 0.7mm \times 16mm or larger screw (tightening torque 78 to 118 N \cdot cm) Installable within the DIN rail.			
Supported DIN rail	TH35-7.5Fe, TH35-7.5Al, TH35-15Fe (conforming to JIS C 2812)			
External supply power	24V DC (20.4V DC to 26.4V DC)			
	Inrush current: 1.5A, within 0.67ms		Inrush current: 3.2A, within 0.43ms	
	Current consumption:0.18A		Current consumption:0.27A	
Noise resistance	Noise voltage:500V _{P-P} Measured using a noise simulator with 1 μ s of noise amplitude and 25 to 60Hz of noise frequency.			
Dielectric withstand voltage	Power and communications systems batch-Analog output batch, 500VAC, one minute			
Insulation resistor	Power and communication systems batch-Analog output batch, 500VDC 10M Ω or more at the insulation resistance tester			
Weight	0.4kg			

3. Name and Setting of Each Part

The name of each part in the AJ65BT-64DAV/DAI is described.

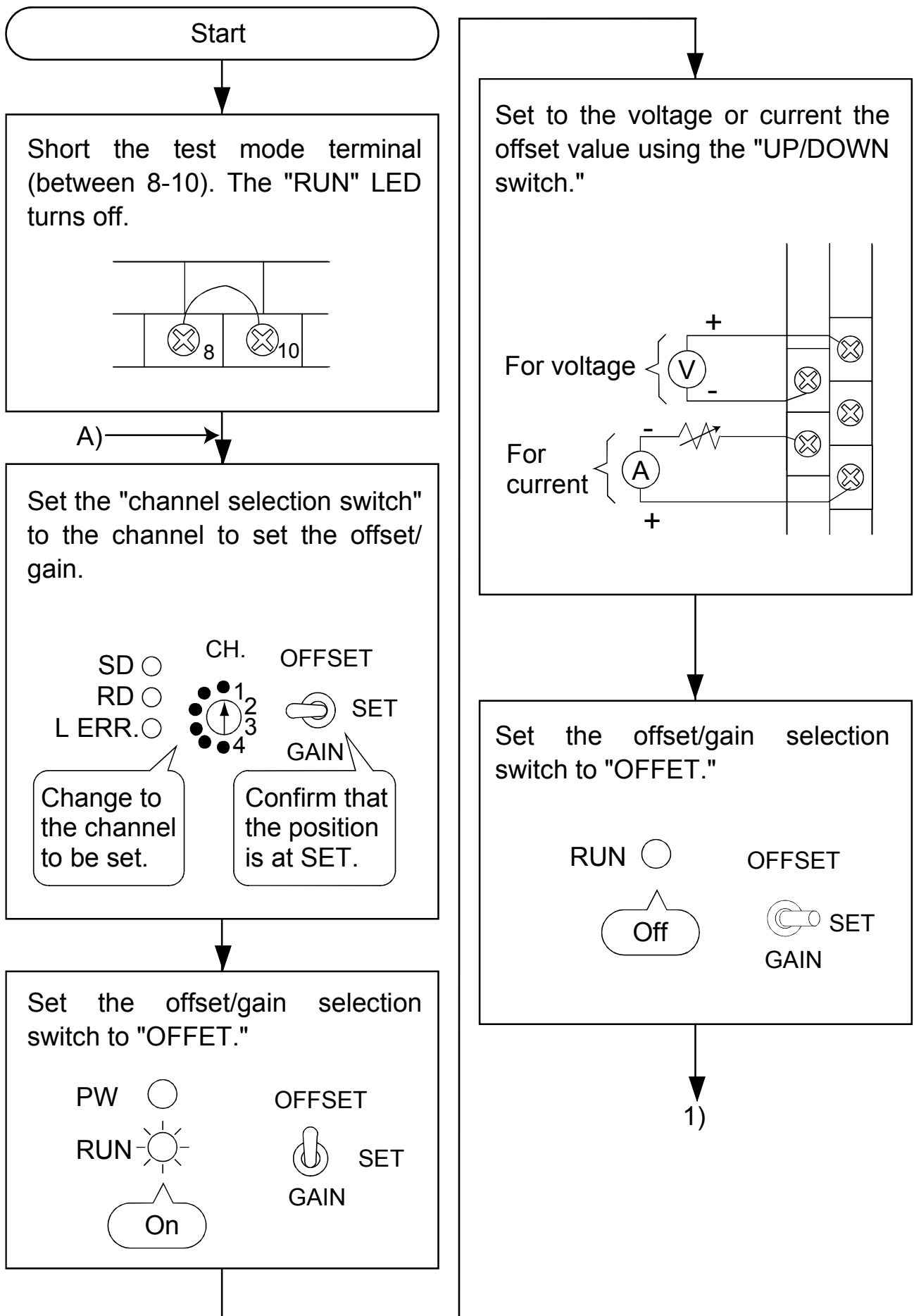
3.1 Name of each part



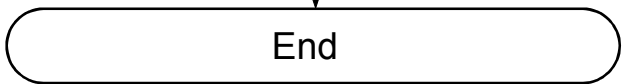
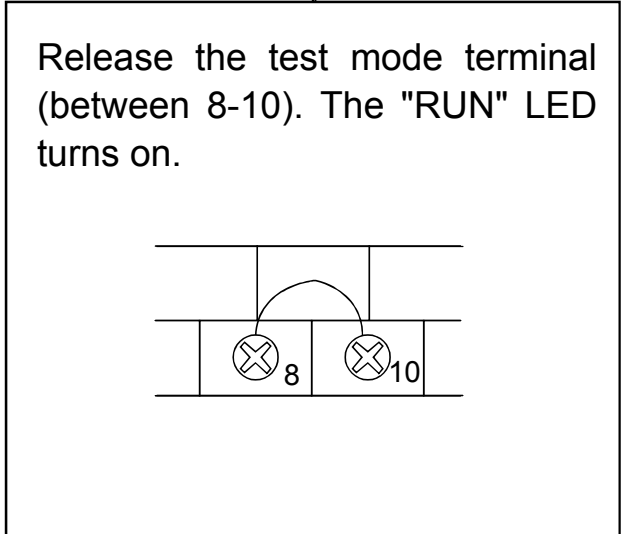
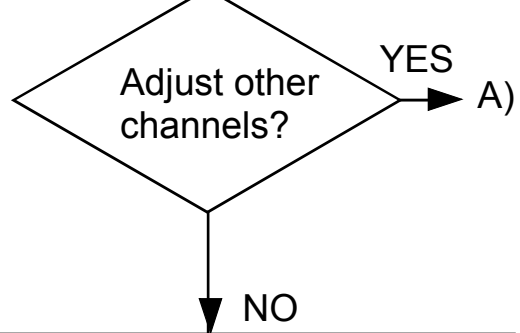
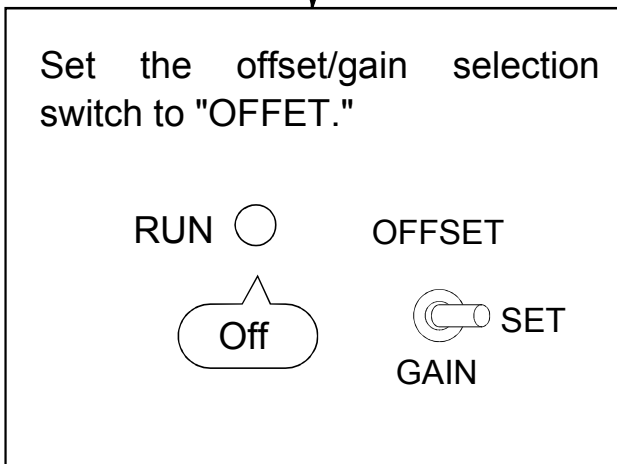
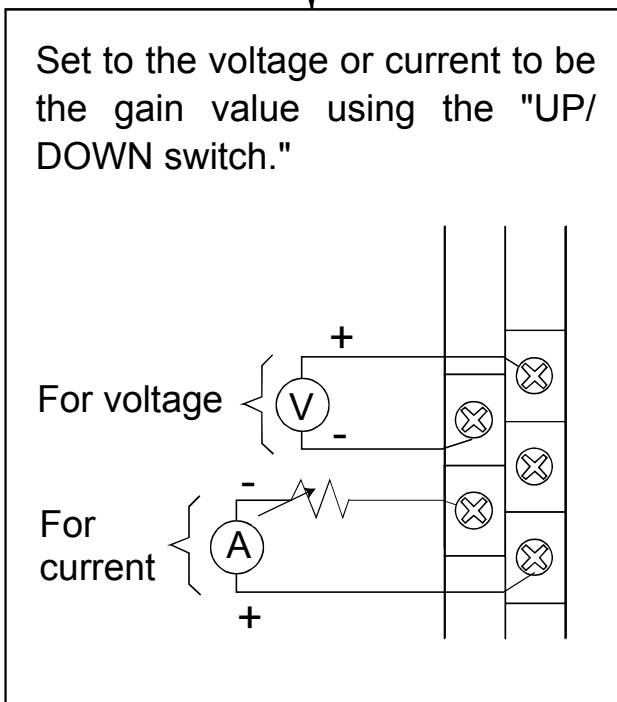
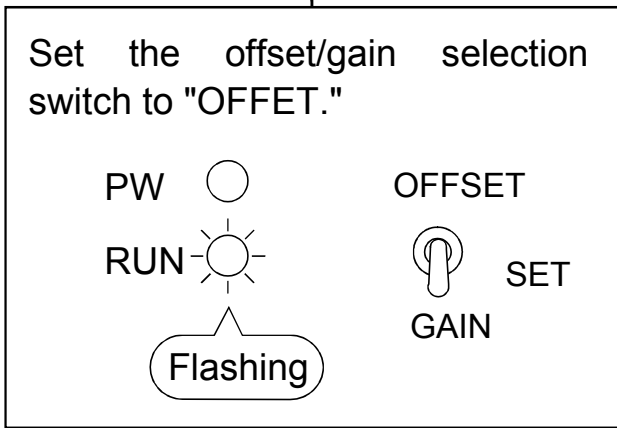
No.	Name	Description	
1)	Station number setting switch	⬆X10 ⬆X1	The AJ65BT-64DAV/DAI station number is set within the range 1 to 63
2)	B RATE (transfer baud rate) setup switch	Setting number	Transfer baud rate
		0	156k bps(Factory shipment setting)
		1	625kbps
		2	2.5Mbps
		3	5Mbps
		4	10Mbps
	Other than 0 to 4	Unused (When a value other than 0 to 4 is set, L ERR. LED turns on, and results in a communication error.)	
3)	CH.(CHANNEL) selection switch	Select the channel to perform offset adjustment or gain adjustment. (Positions other than 1 to 4 are not processed.)	
4)	OFFSET/GAIN (Offset/gain) setting switch	The switch to set the offset/gain values during test mode. (1) OFFSET position : Calibration mode for the offset value (2) GAIN position : Calibration mode for gain (3) SET position : When the switch is set from the OFFSET/GAIN position, which are modes to record offset/gain value to the SET position, to the SET position, the offset/gain value is recorded.	
5)	UP/DOWN switch	The switch to adjust the analog output value for the offset/gain of the specified channel. The analog output value increases/decreases by turning on the UP/DOWN switch	
6)	RESET switch	Resets the H/W. Initializes the AJ65-BT-64DAV/DAI I/O signals, remote register, and operation processing. When the switch is turned on, the AJ65BT-64DAV/DAI initial data processing request flag turns on.	

No.	Name	Description																																																											
7)	Operation status display LED	PW LED	ON : When the power is on OFF: When the power is shut off																																																										
		RUN LED	<table border="0"> <tr> <td data-bbox="678 197 837 344">Normal mode</td> <td data-bbox="837 197 1513 344"> ON : Normal operation Flashing : Write data error OFF : 24VDC power shutoff or watchdog time error </td> </tr> <tr> <td data-bbox="678 344 837 714">Test mode</td> <td data-bbox="837 344 1513 714"> ON (Flashing): Flashes in 0.5 second intervals when the offset/gain setting switch is at OFFSET or GAIN. Flashes in 0.1 second intervals when exceeding the upper or lower limits of the allowable setting using the UP/DOWN switch. OFF : When the offset/gain setting switch is at SET. </td> </tr> </table>	Normal mode	ON : Normal operation Flashing : Write data error OFF : 24VDC power shutoff or watchdog time error	Test mode	ON (Flashing): Flashes in 0.5 second intervals when the offset/gain setting switch is at OFFSET or GAIN. Flashes in 0.1 second intervals when exceeding the upper or lower limits of the allowable setting using the UP/DOWN switch. OFF : When the offset/gain setting switch is at SET.																																																						
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		L RUN LED	ON : Normal communication OFF: Communication interrupted (timeout error)																																																										
		SD LED	ON : Data being transferred																																																										
		RD LED	ON : Data being transferred																																																										
L ERR. LED	On : When the baud rate or the station number setting is out of range. Flashing at regular intervals : When the baud rate or station number setting is changed after power-on or reset. Flashing at irregular intervals : When you forgot fitting the termination resistors or the module or CC-Link dedicated cable is affected by noise. Off : Normal communication																																																												
8)	Terminal block	AJ65BT-64DAV																																																											
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AJ65BT-64DAI		<table border="1" style="width:100%; border-collapse: collapse; text-align: center;"> <tr> <td>1</td><td>3</td><td>5</td><td>7</td><td>9</td><td>11</td><td>13</td><td>15</td><td>17</td><td>19</td><td>21</td><td>23</td><td>25</td><td>27</td> </tr> <tr> <td>DA</td><td>DG</td><td>+24V</td><td>24G</td><td>HLD/CLR</td><td>HLD/CLR</td><td></td><td>CH1/I+</td><td></td><td>CH2 I+</td><td></td><td>CH3 I+</td><td></td><td>CH4 I+</td> </tr> <tr> <td>○</td><td>2</td><td>4</td><td>6</td><td>8</td><td>10</td><td>12</td><td>14</td><td>16</td><td>18</td><td>20</td><td>22</td><td>24</td><td>26</td><td>○</td> </tr> <tr> <td></td><td>DB</td><td>SLD</td><td>(FG)</td><td>TEST</td><td>TEST</td><td></td><td>COM</td><td></td><td>COM</td><td></td><td>COM</td><td></td><td>COM</td><td></td> </tr> </table>		1	3	5	7	9	11	13	15	17	19	21	23	25	27	DA	DG	+24V	24G	HLD/CLR	HLD/CLR		CH1/I+		CH2 I+		CH3 I+		CH4 I+	○	2	4	6	8	10	12	14	16	18	20	22	24	26	○		DB	SLD	(FG)	TEST	TEST		COM		COM		COM		COM	
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	DB	SLD	(FG)	TEST	TEST		COM		COM		COM		COM																																																
HOLD/CLEAR setting terminal HOLD is set by shorting between terminals, and CLEAR is set by releasing. Test mode setting terminal By shorting between terminals, the system enters the test mode.																																																													

3.2 Offset/gain setting



1)



4. Handling

4.1 Precautions when handling

- (1) The case and terminal block of the AJ65BT-64DAV/DAI are made of resin. Do not fall them or apply a strong shock to them.
- (2) Do not remove the module print board from the case. This may cause breakdowns.
- (3) When wiring, be careful not to let foreign matter such as wire chips get inside the module. If this occurs, make sure to remove it.
- (4) Tighten the screws such as module mounting screws with the following torque:

Screw location	Tightening torque range
Module mounting screw (M4 screw)	78 to 118N • cm
Terminal block terminal screw (M3.5 screw)	59 to 88N • cm
Terminal block installation screw (M4 screw)	78 to 118N • cm

4.2 Installation environment

When an A sequencer is installed, avoid the following environments.

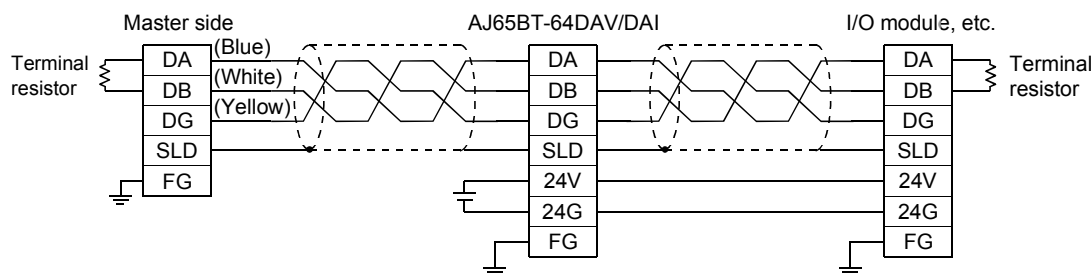
- (1) A location where the ambient temperature exceeds 0 to 55°C.
- (2) A location where the ambient humidity exceeds 10 to 90%RH.
- (3) Locations where rapid changes in temperature could create condensation.
- (4) Locations with corrosive or flammable gases.
- (5) Locations with high concentrations of dust, oil mist, salt, organic solvents or metal particles that could conduct electricity.
- (6) Locations exposed to direct sunlight.
- (7) Locations with strong electrical or magnetic fields.
- (8) Locations that could subject the main unit to direct impact or vibration.

5. Wiring the Data Link Cable

This section introduces the wiring of the dedicated CC-Link cable used for connecting the AJ65BT-64DAV/DAI to the master module.

5.1 CC-Link dedicated cable connections

The CC-Link dedicated cable connections between the AJ65BT-64DAV/DAI and master module are as follows:



6. Wiring

The precautions when wiring and the module connection example are shown in the following.

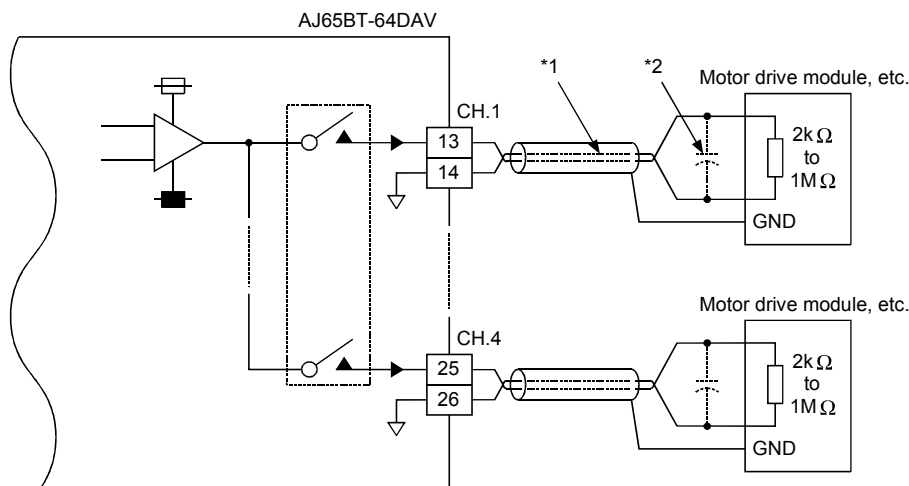
6.1 Precautions when wiring

To obtain maximum performance from the functions of AJ65BT-64DAV/DAI and improve the system reliability, an external wiring with high durability against noise is required. The precautions performing external wiring for the AJ65BT-64DAV/DAI are shown below:

- (1) Do not bunch the control wires or load cables from other than the programmable controller with the wires to the module, or install them close to each other. Doing this makes the wiring easy to accept the noise, surge or induction effects.
- (2) Perform a one-point grounding for the shielded line or the shield of the shielded cable.

6.2 Module connection example

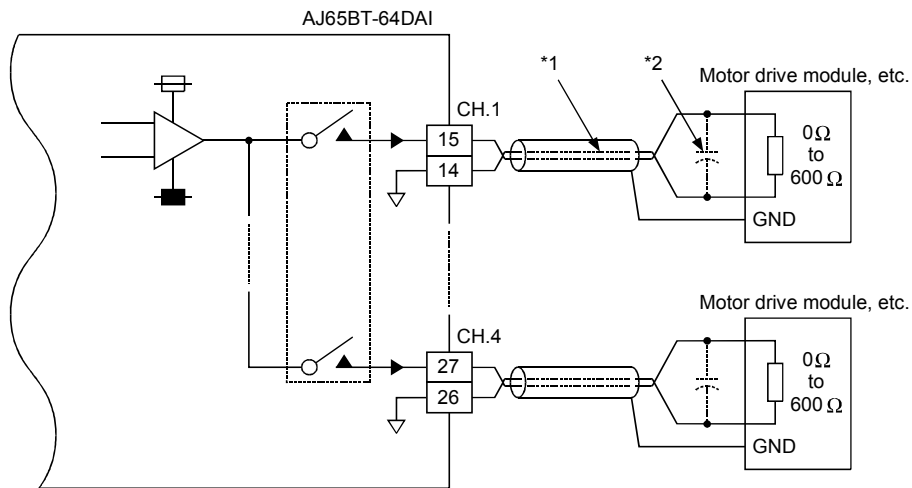
- (1) The wiring example to external devices for AJ65BT-64DAV is shown below:



*1: Use two-core shielded line for the wiring.

*2: When noise or ripple generates within the external wiring, connect a condenser with 0.1 to 0.47μF (25V or more voltage resistance parts) specification to the input terminal of the external device.

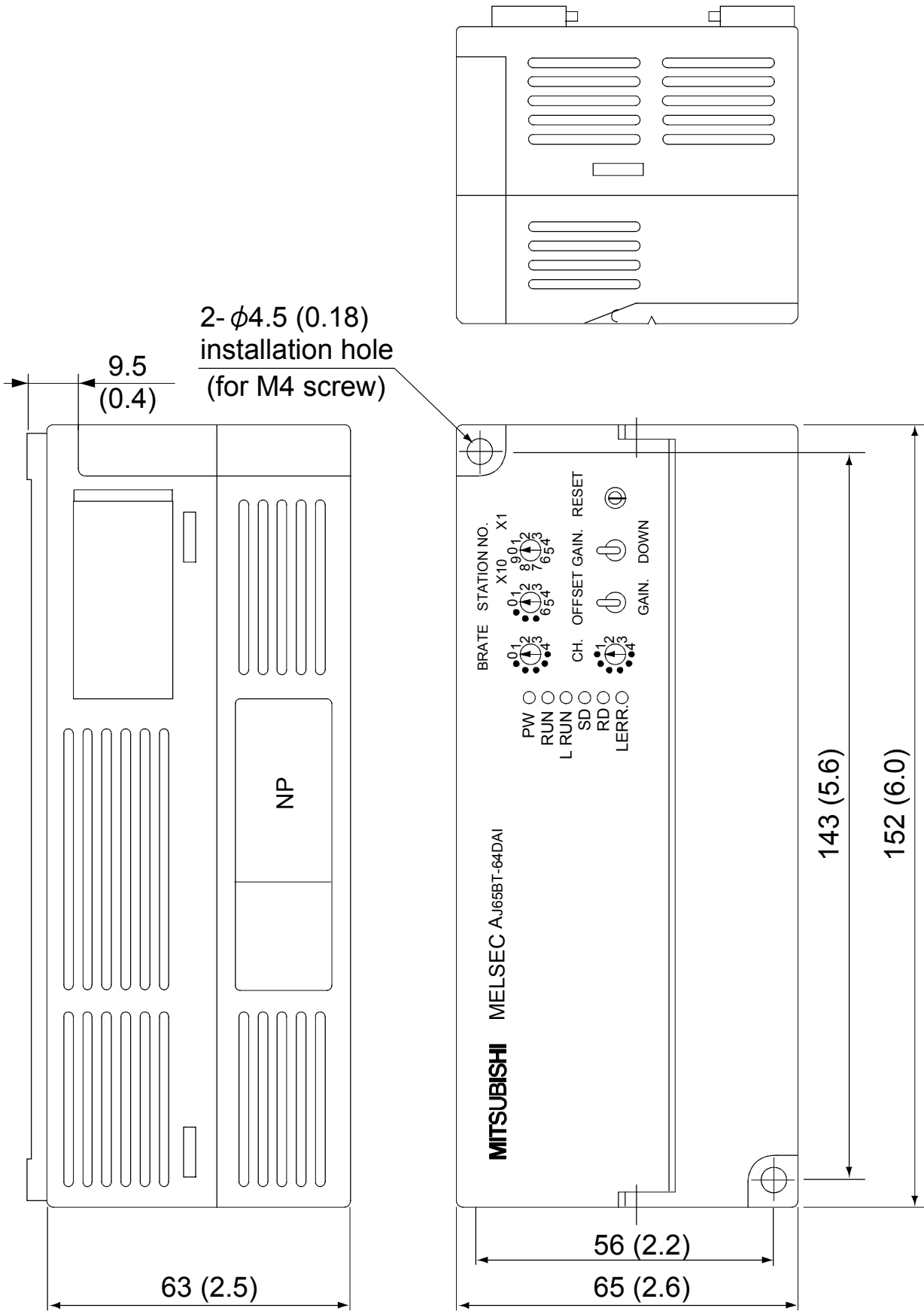
(2) The wiring example to external device for AJ65BT-64DAI is shown below:



*1: Use two-core twist shielded line for the wiring.

*2: When noise or ripple generates within the external wiring, connect a condenser with 0.1 to 0.47 μ F (25V or more voltage resistance parts) specification to the input terminal of the external device.

7. External Dimensions Diagram



Unit:mm(inch)

Warranty

Mitsubishi will not be held liable for damage caused by factors found not to be the cause of Mitsubishi; machine damage or lost profits caused by faults in the Mitsubishi products; damage, secondary damage, accident compensation caused by special factors unpredictable by Mitsubishi; damages to products other than Mitsubishi products; and to other duties.

⚠ For safe use

- This product has been manufactured as a general-purpose part for general industries, and has not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the product for special purposes such as nuclear power, electric power, aerospace, medicine or passenger movement vehicles, consult with Mitsubishi.
- This product has been manufactured under strict quality control. However, when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions in the system.

Country/Region	Sales office/Tel	Country/Region	Sales office/Tel
U.S.A	Mitsubishi Electric Automation Inc. 500 Corporate Woods Parkway Vernon Hills, IL 60061, U.S.A. Tel : +1-847-478-2100	Hong Kong	Mitsubishi Electric Automation (Hong Kong) Ltd. 10th Floor, Manulife Tower, 169 Electric Road, North Point, Hong Kong Tel : +852-2887-8870
Brazil	MELCO-TEC Rep. Com.e Assessoria Tecnica Ltda. Rua Correia Dias, 184, Edificio Paraiso Trade Center-8 andar Paraiso, Sao Paulo, SP Brazil Tel : +55-11-5908-8331	China	Mitsubishi Electric Automation (Shanghai) Ltd. 4/F Zhi Fu Plazz, No.80 Xin Chang Road, Shanghai 200003, China Tel : +86-21-6120-0808
Germany	Mitsubishi Electric Europe B.V. German Branch Gothaer Strasse 8 D-40880 Ratingen, GERMANY Tel : +49-2102-486-0	Taiwan	Setsuyo Enterprise Co., Ltd. 6F No.105 Wu-Kung 3rd.Rd, Wu-Ku Hsiang, Taipei Hsine, Taiwan Tel : +886-2-2299-2499
U.K	Mitsubishi Electric Europe B.V. UK Branch Travellers Lane, Hatfield, Hertfordshire., AL10 8XB, U.K. Tel : +44-1707-276100	Korea	Mitsubishi Electric Automation Korea Co., Ltd. 1480-6, Gayang-dong, Gangseo-ku Seoul 157-200, Korea Tel : +82-2-3660-9552
Italy	Mitsubishi Electric Europe B.V. Italian Branch Centro Dir. Colleoni, Pal. Perseo-Ingr.2 Via Paracelso 12, I-20041 Agrate Brianza., Milano, Italy Tel : +39-039-60531	Singapore	Mitsubishi Electric Asia Pte, Ltd. 307 Alexandra Road #05-01/02, Mitsubishi Electric Building, Singapore 159943 Tel : +65-6470-2460
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