

MITSUBISHI

AJ71QC24

Serial Communications Module

User's Manual (Hardware)

Thank you for choosing the Mitsubishi MELSEC-QnA Series of General Purpose Programmable Controllers. To ensure correct use of this equipment, please read this manual carefully before operating it.



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IB(NA)-66609-A (9603) MEE

Related Manuals

The following manuals are available for this equipment. Refer to the table given below to choose suitable manuals.

Manual Name	Manual No (Type Code)
Guide Book for the AJ71QC24 Serial Communications Module	IB-66622
User's Manual for the AJ71QC24(-R2/R4) Serial Communications Module	IB-66612

● Safety Precautions ●

Before using this equipment, please read this and related manuals thoroughly. Also pay special attention to safe and correct use of the equipment.

The safety precautions given in this section relate to this equipment only. For precautions regarding the programmable controller system, refer to the User's Manual for the CPU module.

The following two safety precaution categories are used in this manual:

- ⚠ DANGER:** Describes precautions that should be observed to prevent the danger of serious injury or death to the user in case of incorrect use of the equipment.
- ⚠ CAUTION:** Describes precautions that should be observed to prevent the danger of medium or light injury to the user or physical damage to the equipment in case of incorrect use of the equipment.

However, note that incorrect use denoted by "⚠ CAUTION" may result in serious accident in some cases. Make sure that all the precautions given in this section are strictly observed.

Keep the manual in a safe place so that it can be referred to whenever necessary. Also make sure that this manual is forwarded to the final user.

[Precautions regarding system design]

⚠ CAUTION

- Never place the control cables and communication cables near the main circuit and power cables. Never bind them with the main circuit and power cables. Make sure that they are placed at least 100 mm away from the main circuit and power cables. Failure to observe this may result in malfunction of the equipment due to noise.

[Precautions regarding installation]

⚠ CAUTION

- Make sure that the equipment is used in the operating environment specified in this manual, otherwise electric shock, fire, malfunction, damage or deterioration of the equipment may result.
- When installing the equipment, make sure that the fixing projections provided at the base of the equipment are inserted into the holes on the base unit properly. If they are not properly inserted, a malfunction, breakdown or fall of the equipment may result.

[Precautions regarding wiring]

⚠ CAUTION

- Before connecting the cables, check the type of interface to be connected. If the cables are connected to an incorrect interface, damage to the equipment or external device may result.
- Make sure that each terminal screw is tightened with the specified torque. If the terminal screws are loose, short-circuit or malfunction may result.
- Take care not to allow any foreign matter, such as cutting refuse or wire bits, to enter the equipment. If they enter, fire, breakdown or malfunction may result.

[Precautions regarding set-up and maintenance]

⚠ DANGER

- Never touch the terminals while the power is supplied, otherwise malfunction may result.
- Before cleaning the equipment or re-tightening terminal screws, make sure that the power is turned OFF. If cleaning or re-tightening is carried out while the power is ON, breakdown or malfunction of the equipment may result.

⚠ CAUTION

- Never attempt to disassemble or modify the equipment, otherwise breakdown, malfunction, injury or fire may result.
- Before installing or removing the equipment, make sure that the power is turned OFF. If the equipment is installed or removed while the power is ON, breakdown or malfunction of the equipment may result.

[Precautions regarding disposal]

⚠ CAUTION

- When disposing of the equipment, treat it as industrial waste.

1. General Description

This manual describes specifications and names of each part of the AJ71QC24 serial communications module, which is used in conjunction with the MELSEC-QnA series programmable controller CPU

When unpacking the equipment, check that the unit and parts listed in the table below are present

Product Name	Qty.
AJ71QC24 serial communications module	1
Terminator (330Ω, 1/4W (orange/orange/brown/□))	2
Terminator (110Ω, 1/2W (brown/brown/brown/□))	2

2. System Configuration

2.1 Applicable System (Applicable CPU module and allowable number of modules)

The following table shows programmable controller CPU module and network module (for remote station) which can be used with the equipment. The allowable number of modules to be installed is also given

Applicable Module	Allowable Number	Remarks
CPU module Q2A (S1) Q3A Q4A	Not limited	The allowable number of modules is determined according to the number of available input/output signals of the CPU module and remote station
Network module AJ72QLP25 AJ72QBR15		

3. Specifications

3.1 Communications

The communications specifications of the equipment is given below

Item	Specifications			
	CH1	CH2		
Interface.	RS-232C	RS-422/485		
Communications method	Full-duplex/Half-duplex (selectable)	Full-duplex		
Synchronization.	Start-stop system			
Baud rate	300 to 19200 BPS (CH1 and CH2 in total)			
Data format	Start bit. 1			
	Data bit 7/8			
	Parity bit. 1 (yes) / 0 (no)			
	Stop bit. 1/2			
Error detection	Parity check. Yes (odd/even) / No			
	Sum check code. Yes / No			
Control method	DTR/DSR Yes / No	—		
	DC code. Yes (DC1/DC3, DC2/DC4) / No	—		
Writing to EEPROM.	100,000 times for the same area (Max)			
Network connection:	Independent mode	Dedicated protocol	1 1	1 1, 1 n, m n
		Modeless protocol		
		Bidirectional protocol		
	Interlock mode	Dedicated protocol	1 n, m . n	Data transfer disabled
		Modeless protocol	1 . n	
		Bidirectional protocol		
Allowable communications distance.	15 m or less	1200 m or less		
Power consumption	5 VDC, 0.3A			
Number of I/O points.	32 points			
Weight	0.385 kg			

3.2 RS-232C Interface

3.2.1 Connector Pin Assignment

Pin No	Signal Name	Signal Code	Signal Direction (AJ71QC24)
1	Frame ground	FG	↔ External Device
2	Sent data	SD (TXD)	→
3	Received data	RD (RXD)	←
4	Request to send	RS (RTS)	→
5	Clear to send	CS (CTS)	←
6	Data set ready	DSR (DR)	←
7	Signal ground	SG	↔ External Device
8	Carrier detection	CD	←
20	Data terminal ready	DTR (ER)	→

The following type of the RS-232C connector is used. The counter connector must match this connector

25-pin D-sub (female) screw type
17LE-13250-22-D2AC (Daiichi Denshi Kogyo)

3.2.2 RS-232C Interface Cable

The RS-232C interface cable must be of 15 m or shorter and conform to the RS-232C standard

(Recommended cable)
7/0 127! iP HRV-SV

Number of twisted wires
In the case of 13 twisted wires (7/0 127 13P HRV-SV)

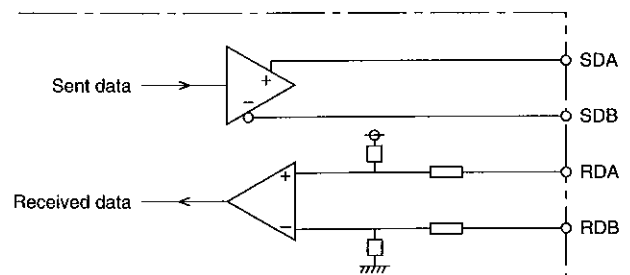
3.3 RS-422/485 Interface

3.3.1 Connector Pin Assignment

(1) Pin assignment of the RS-422/485 interface connector used for connection with an external device or with another AJ71QC24 is described below

Signal Code	Signal Direction (AJ71QC24)	Description
SDA	→	Sent data
SDB	→	Sent data
RDA	←	Received data
RDB	←	Received data
SG	↔ External Device	Signal ground
FG	↔ External Device	Frame ground
NC	—	Not used

(2) Function block diagram for the RS-422/485 interface is given below



3.3.2 RS-422/485 Interface Cable

The RS-422/485 interface cable must be of 1200 m or shorter and conform to the RS-422/485 standard

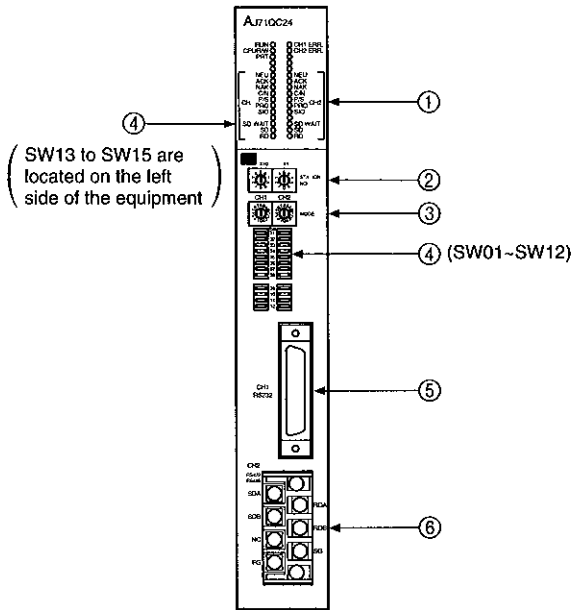
(Recommended cable)
SPEV(SB)-MPC-0 2x3P
SPEV(SB)-0 2x3P

It is also possible to use another cable which conforms to the specifications given in the table below. When you use a cable other than the recommended one, make sure that the cable conforms to the specifications given below

Item	Specification
Cable type	Shielded cable
Number of pair wires	3P
Conductor resistance (at 20°C)	88.0 Ω/km or less
Insulation resistance	10,000 MΩkm or higher
Withstand voltage	500 VDC (for 1 minute)
Electrostatic capacity (1 kHz)	60 nF/km or less (average)
Characteristic impedance (100 kHz)	110 ±10Ω

4. Name of Each Part

Description for each part of the equipment is given below



No	Name	Description																																																																																																																														
①	<table border="0"> <tr> <td>RUN</td><td>○</td><td>○</td><td>CH1 ERR</td></tr> <tr> <td>CPUR/W</td><td>○</td><td>○</td><td>CH2 ERR</td></tr> <tr> <td>PRT</td><td>○</td><td>○</td><td></td></tr> <tr> <td>NEU</td><td>○</td><td>○</td><td>NEU</td></tr> <tr> <td>ACK</td><td>○</td><td>○</td><td>ACK</td></tr> <tr> <td>NAK</td><td>○</td><td>○</td><td>NAK</td></tr> <tr> <td>C/N</td><td>○</td><td>○</td><td>C/N</td></tr> <tr> <td>P/S</td><td>○</td><td>○</td><td>P/S</td></tr> <tr> <td>CH1 PRO</td><td>○</td><td>○</td><td>CH2 PRO</td></tr> <tr> <td>SIO</td><td>○</td><td>○</td><td>SIO</td></tr> <tr> <td>SD WAIT</td><td>○</td><td>○</td><td>SD WAIT</td></tr> <tr> <td>SD</td><td>○</td><td>○</td><td>SD</td></tr> <tr> <td>RD</td><td>○</td><td>○</td><td>RD</td></tr> </table>	RUN	○	○	CH1 ERR	CPUR/W	○	○	CH2 ERR	PRT	○	○		NEU	○	○	NEU	ACK	○	○	ACK	NAK	○	○	NAK	C/N	○	○	C/N	P/S	○	○	P/S	CH1 PRO	○	○	CH2 PRO	SIO	○	○	SIO	SD WAIT	○	○	SD WAIT	SD	○	○	SD	RD	○	○	RD	<table border="0"> <tr> <td>RUN</td><td>Operation state</td></tr> <tr> <td>ON</td><td>Normal</td></tr> <tr> <td>OFF</td><td>Abnormal</td></tr> <tr> <td>CPUR/W</td><td>Communications state with PC</td></tr> <tr> <td>ON</td><td>Communications is in progress</td></tr> <tr> <td>OFF</td><td>Communications is in halt</td></tr> <tr> <td>NEU:</td><td>Neutral state (CH1/2)</td></tr> <tr> <td>ON</td><td>Transmission sequence is initialized</td></tr> <tr> <td>OFF</td><td>Reception of ENQ is complete.</td></tr> <tr> <td>ACK</td><td>ACK transmission state (CH1/2)</td></tr> <tr> <td>ON</td><td>When ACK is transmitted</td></tr> <tr> <td>OFF</td><td>When NAK is transmitted</td></tr> <tr> <td>NAK</td><td>NAK transmission state (CH1/2)</td></tr> <tr> <td>ON</td><td>NAK is transmitted</td></tr> <tr> <td>OFF</td><td>ACK is transmitted</td></tr> <tr> <td>C/N</td><td>Communications state between CH1/2 and programmable controller CPU</td></tr> <tr> <td>ON</td><td>Abnormal</td></tr> <tr> <td>OFF</td><td>Normal</td></tr> <tr> <td>P/S</td><td>Parity/sum check error (CH1/2)</td></tr> <tr> <td>ON</td><td>Error</td></tr> <tr> <td>OFF</td><td>Normal</td></tr> <tr> <td>PRO</td><td>Protocol error (CH1/2)</td></tr> <tr> <td>ON</td><td>Error</td></tr> <tr> <td>OFF</td><td>Normal</td></tr> <tr> <td>SIO</td><td>SIO error (CH1/2)</td></tr> <tr> <td>ON</td><td>Received data is disposed of due to overrun, framing error or OS receive area full</td></tr> <tr> <td>OFF</td><td>Normal</td></tr> <tr> <td>SD WAIT</td><td>Wait state</td></tr> <tr> <td>ON</td><td>Awaiting data transmission</td></tr> <tr> <td>OFF</td><td>Transmission is started</td></tr> <tr> <td>SD</td><td>Transmission state (CH1/2)</td></tr> <tr> <td>Blink</td><td>Data transmission is in progress</td></tr> <tr> <td>RD</td><td>Reception state (CH1/2)</td></tr> <tr> <td>Blink</td><td>Data reception is in progress.</td></tr> <tr> <td>CH1/2 ERR</td><td>Error (CH1/2)</td></tr> <tr> <td>ON</td><td>Switch setting error, mode switch error, transmission error, reception error, on-demand error</td></tr> <tr> <td>OFF</td><td>Normal</td></tr> </table>	RUN	Operation state	ON	Normal	OFF	Abnormal	CPUR/W	Communications state with PC	ON	Communications is in progress	OFF	Communications is in halt	NEU:	Neutral state (CH1/2)	ON	Transmission sequence is initialized	OFF	Reception of ENQ is complete.	ACK	ACK transmission state (CH1/2)	ON	When ACK is transmitted	OFF	When NAK is transmitted	NAK	NAK transmission state (CH1/2)	ON	NAK is transmitted	OFF	ACK is transmitted	C/N	Communications state between CH1/2 and programmable controller CPU	ON	Abnormal	OFF	Normal	P/S	Parity/sum check error (CH1/2)	ON	Error	OFF	Normal	PRO	Protocol error (CH1/2)	ON	Error	OFF	Normal	SIO	SIO error (CH1/2)	ON	Received data is disposed of due to overrun, framing error or OS receive area full	OFF	Normal	SD WAIT	Wait state	ON	Awaiting data transmission	OFF	Transmission is started	SD	Transmission state (CH1/2)	Blink	Data transmission is in progress	RD	Reception state (CH1/2)	Blink	Data reception is in progress.	CH1/2 ERR	Error (CH1/2)	ON	Switch setting error, mode switch error, transmission error, reception error, on-demand error	OFF	Normal
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②	Station No setting switch 	Used to set the station No <Setting range> 0 to 31 x10 Used to set the tens digit of the station No x1 Used to set the units digit of the station No.																																														
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*1 Switch for CH1 must be set to OFF Switch for CH2 can be set to either ON or OFF

*2 Baud rate

Baud rate (BPS)	300	600	1200	2400	4800	9600	19200
SW09	OFF	ON	OFF	ON	OFF	ON	OFF
SW10	OFF	OFF	ON	ON	OFF	OFF	ON
SW11	OFF	OFF	OFF	OFF	ON	ON	ON
SW12	OFF	OFF	OFF	OFF	OFF	OFF	OFF

No.	Name	Description
⑤	RS-232C interface	Used to connect the equipment to external device.
⑥	RS-422/485 interface	Used to connect the equipment to external device.

5. Handling Precautions

The equipment must be secured using screws. Allowable tightening torque range for the screws is given below.

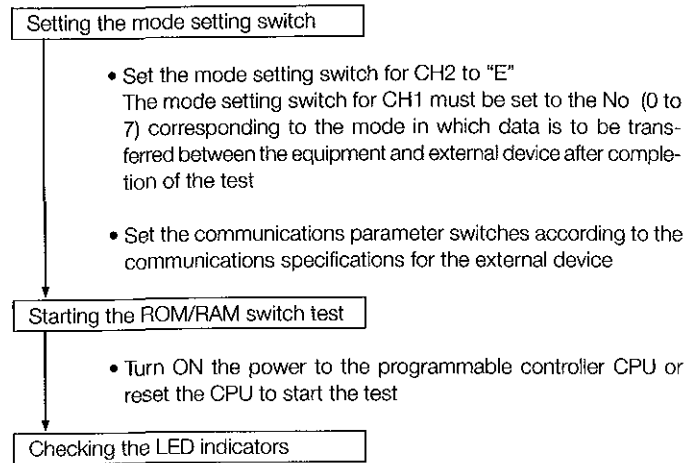
Screw	Tightening Torque
RS-422/485 terminal block screws (M3.5)	58 to 88 N cm (6 to 9 kg cm)
Unit fixing screws (M4)	78 to 117 N cm (8 to 12 kg cm)
RS-422/485 terminal block screws (M3)	49 to 78 N cm (5 to 8 kg cm)

6.2 Self-Test

The following functions are provided to check whether the equipment can operate correctly, without being connected to an external device.

Make sure that the test is carried out with the programmable controller CPU in stop state. Also make sure that the power is turned OFF before connecting the cables and setting the switches.

6.2.1 ROM/RAM/Switch Test



Check Item	LED Name	Normal	Abnormal	
(Test end)	SD WAIT *1		ON	
ROM check	CH1.ERR	OFF	ON	
RAM check	CH2.ERR	OFF	ON	
Switch check	Station No	Located just below CH2.ERR	OFF	ON
	Mode	C/N *2	OFF	ON
	Communications parameter	P/S *2	OFF	ON
Interlock setting check	Mode	CH1-PRO	OFF	ON
	Communications parameter	CH1-SIO	OFF	ON

*1 LED for both CH1 and CH2

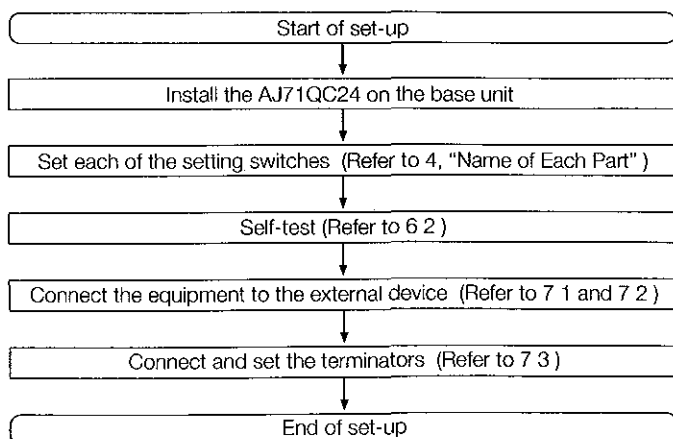
*2 LED for the interface where the setting error is occurring

6. Starting up the Equipment

6.1 Set-up Procedure

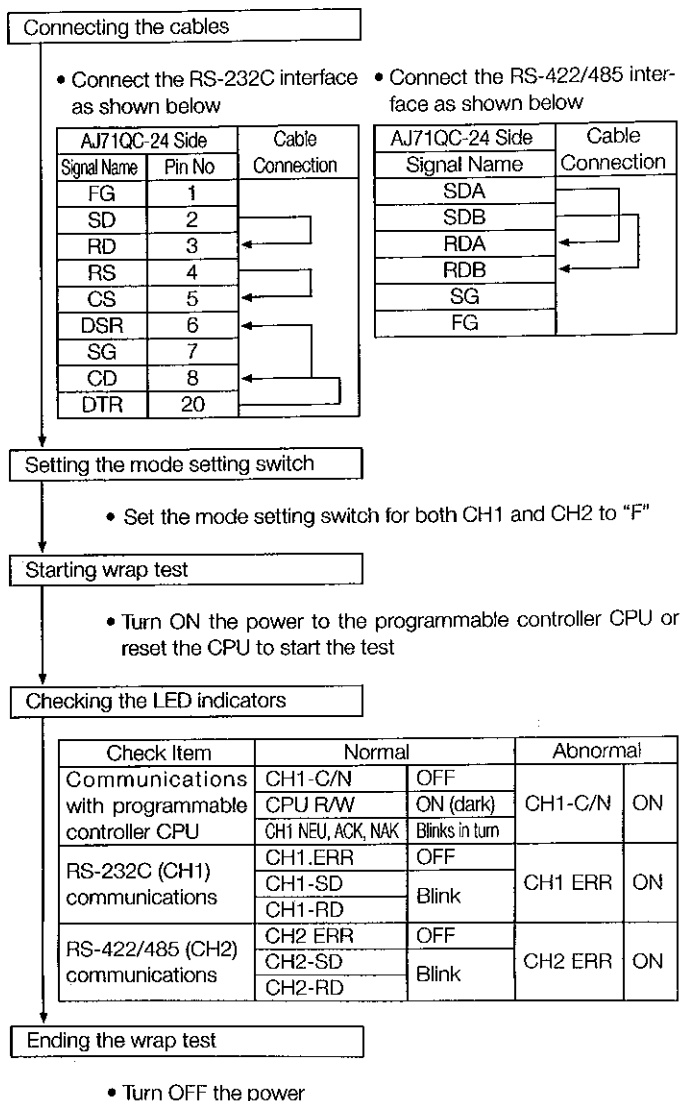
This section describes how to start up the equipment.

For a detail description, refer to the User's Manual for the AJ71QC24(-R2/R4) Serial Communications Module.



7. External Wiring

6.2.2 Wrap Test

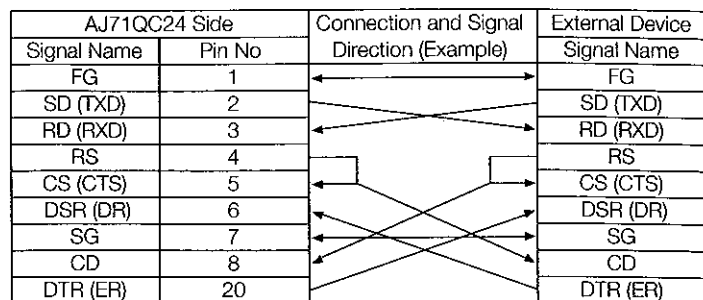


After the test is complete, change the mode setting switch to enable data transfer with the external device
 (Make sure that the mode setting switch for the interface via which data transfer is not to be carried out is set to one of 1 to 7)

7.1 Connecting the RS-232C Interface

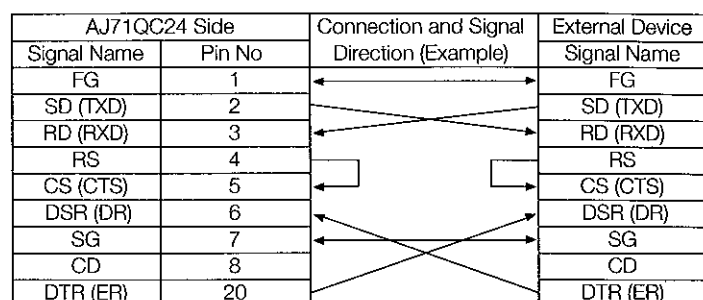
Typical connecting method for the RS-232C interface is described below

(1) An example of connecting to an external device which is capable of turning ON/OFF the CD signal (pin 8)

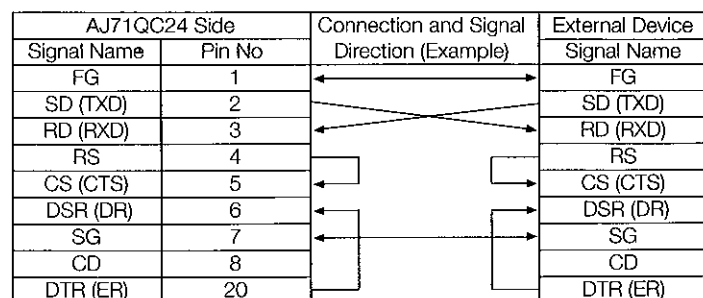


(2) An example of connecting to an external device which is not capable of turning ON/OFF the CD signal (pin 8)

(a) An example for DC code control or DTR/DSR control

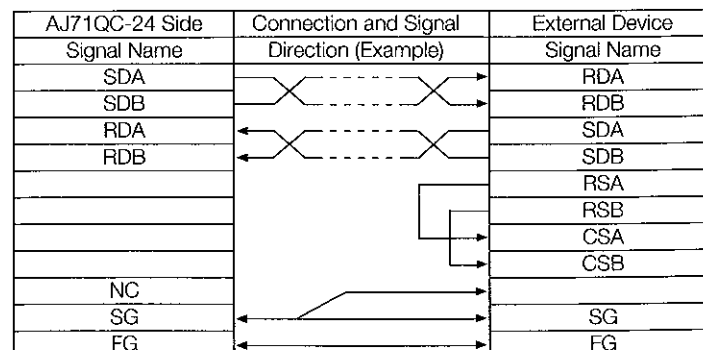


(b) An example for DC code control



7.2 Connecting the RS-422 /485 Interface

Typical connecting method for the RS-422/485 interface is described below



8. Outside Dimension

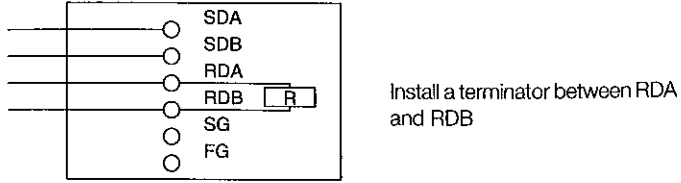
7.3 Connecting the Terminators

If the equipment is used as the first or last station in the network, install a terminator as follows. If no terminator is installed, problems may result during data transfer.

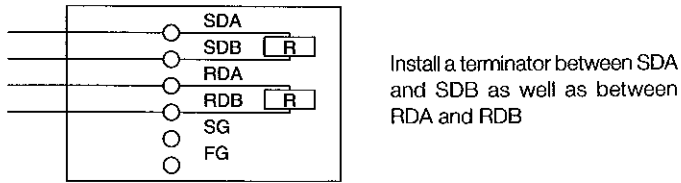
The terminators to be connected vary according to the type of interface, as shown below.

- RS-422 330Ω
- RS-485 110Ω

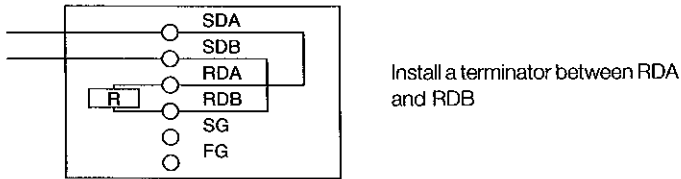
(1) One to one connection (one external device to one AJ71QC24)



(2) 1 to n connection (one external device to n pieces of AJ71QC24)



(3) m to n connection (m pieces of external device to n pieces of AJ71QC24):



7.4 Installing the RS-422/485 Interface Terminal Block

The RS-422/485 interface accommodates a two-piece type terminal block, to enable replacement of the unit without having to remove the signal lines. The method of mounting the terminal block is illustrated below.

