MITSUBISHI

Mitsubishi Industrial Robot

CRn-500 series INSTRUCTION MANUAL
Expansion Serial Interface

MELFA

BFP-A8106-C

■ CE マーキング対策部品取付方法説明書
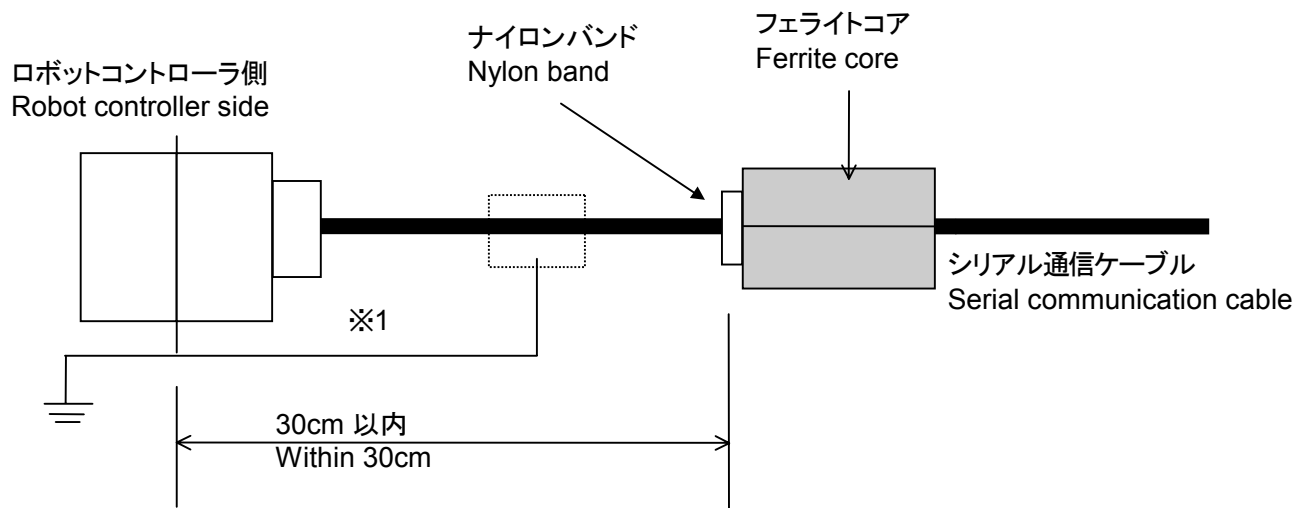# ■ EMC Installation guideline and procedure

増設シリアル通信ケーブルへのフェライトコア取り付け要領
Coupling procedure of Ferrite core for serial communication cable

　ロボットコントローラ内蔵の増設シリアルカードと通信ユニット（パソコンなど）を接続する RS-232C 通信ケーブルに、添付のフェライトコアを下図のように取り付けてください。また、フェライトコアはコネクタ接続部から 30cm 以内に配置ください。
　それ以外は、ノイズによる誤動作を起こす可能性があります。

The Ferrite core should be installed to the serial communication cable between controller and other communication unit within 30 cm from the controller (See below).
　If the customer do not install to the CC-Link cable with the Ferrite core, it will be become a trouble by Immunity and emission noise.

ナイロンバンド
Nylon band

フェライトコア
Ferrite core

ロボットコントローラ側
Robot controller side

※1

シリアル通信ケーブル
Serial communication cable

30cm 以内
Within 30cm

※1　注意　-Caution-
もし、ノイズによる影響を受けやすい環境下で使用する場合は、ケーブルのカバーを剥き、アース端子を利用してシールドを直接筐体のアースに落としてください。
If necessary, in case of under the environment of much immunity noise, remove the sheath of the serial communication cable, and connect the shield that is inside a cable with the Earth [PE] terminal directly by cable.

■ History

Print date	Instruction manual No.	Revision content
2000-04-18	BFP-A8106Z	First print
2000-04-25	BFP-A8106	Formal style
2003-09-24	BFP-A8106-A	Error in writing correction.
2007-02-21	BFP-A8106-B	Expansion serial interface (RZ581B) cards support option slot 3.
		Error in writing correction.
2009-09-30	BFP-A8106-C	The EC Declaration of Conformity was changed.
		(Correspond to the EMC directive; 2006/42/EC)
2000-04-18	BFP-A8106Z	First print

■Preface
Thank you very much for employing Mitsubishi Electric Industrial Robot CRn-500 Series.
The expansion serial interface is an option to add the communication channel to the robot controller in combination with CRn-500 Series controller. Before use, be sure to read through the manual for sufficient understanding. Then use the expansion serial interface.
The information contained in this document has been written to be accurate as much as possible. Please interpret that items not described in this document "cannot be performed.". Please contact your nearest dealer if you find any doubtful, wrong or skipped point.

■ Symbols & Notation Method in This Manual

⚠DANGER This indicates a situation in which a mistake in handling will expose the user to the danger of death or severe injury.

⚠WARNING This indicates a situation in which a mistake in handling has the possibility of resulting in death or severe injury of the user.

⚠CAUTION This indicates a situation in which a mistake in handling has the danger of causing injury to the user. Equipment damage is also possible.

⚠ Safety Precautions

Always read the following precautions and the separate
"Safety Manual" before starting use of the robot to learn the
required measures to be taken.

⚠CAUTION　All teaching work must be carried out by an operator who has received special training.
(This also applies to maintenance work with the power source turned ON.)
Enforcement of safety training

⚠CAUTION　For teaching work, prepare a work plan related to the methods and procedures of
operating the robot, and to the measures to be taken when an error occurs or when
restarting. Carry out work following this plan. (This also applies to maintenance work with
the power source turned ON.)
Preparation of work plan

⚠WARNING
Prepare a device that allows operation to be stopped immediately during teaching work.
(This also applies to maintenance work with the power source turned ON.)
Setting of emergency stop switch

⚠CAUTION　During teaching work, place a sign indicating that teaching work is in progress on the start
switch, etc. (This also applies to maintenance work with the power source turned ON.)
Indication of teaching work in progress

⚠WARNING　Provide a fence or enclosure during operation to prevent contact of the operator and
robot.
Installation of safety fence

⚠CAUTION

Establish a set signaling method to the related operators for starting work, and follow this
method.
Signaling of operation start

⚠CAUTION

As a principle turn the power OFF during maintenance work.　Place a sign indicating that
maintenance work is in progress on the start switch, etc.

⚠CAUTION　Indication of maintenance work in progress

Before starting work, inspect the robot, emergency stop switch and other related devices,
etc., and confirm that there are no errors.
Inspection before starting work

The points of the precautions given in the separate "Safety Manual" are given below.
Refer to the actual "Safety Manual" for details.

⚠CAUTION Use the robot within the environment given in the specifications. Failure to do so could lead to a drop or reliability or faults. (Temperature, humidity, atmosphere, noise environment, etc.)

⚠CAUTION Transport the robot with the designated transportation posture. Transporting the robot in a non-designated posture could lead to personal injuries or faults from dropping.

⚠CAUTION Always use the robot installed on a secure table. Use in an instable posture could lead to positional deviation and vibration.

⚠CAUTION Wire the cable as far away from noise sources as possible. If placed near a noise source, positional deviation or malfunction could occur.

⚠CAUTION Do not apply excessive force on the connector or excessively bend the cable. Failure to observe this could lead to contact defects or wire breakage.

⚠CAUTION Make sure that the work piece weight, including the hand, does not exceed the rated load or tolerable torque. Exceeding these values could lead to alarms or faults.

⚠WARNING Securely install the hand and tool, and securely grasp the work piece. Failure to observe this could lead to personal injuries or damage if the object comes off or flies off during operation.

⚠WARNING Securely ground the robot and controller. Failure to observe this could lead to malfunctioning by noise or to electric shock accidents.

⚠CAUTION Indicate the operation state during robot operation. Failure to indicate the state could lead to operators approaching the robot or to incorrect operation.

⚠WARNING When carrying out teaching work in the robot's movement range, always secure the priority right for the robot control. Failure to observe this could lead to personal injuries or damage if the robot is started with external commands.

⚠CAUTION Keep the jog speed as low as possible, and always watch the robot. Failure to do so could lead to interference with the work piece or peripheral devices.

⚠CAUTION After editing the program, always confirm the operation with step operation before starting automatic operation. Failure to do so could lead to interference with peripheral devices because of programming mistakes, etc.

⚠CAUTION Make sure that if the safety fence entrance door is opened during automatic operation, the door is locked or that the robot will automatically stop. Failure to do so could lead to personal injuries.

⚠CAUTION Never carry out modifications based on personal judgments, or use non-designated maintenance parts.
⚠WARNING Failure to observe this could lead to faults or failures.

When the robot arm has to be moved by hand from an external area, do not place hands or fingers in the openings. Failure to observe this could lead to hands or fingers catching depending on the posture.

⚠CAUTION Do not stop the robot or apply emergency stop by turning the robot controller's main power OFF. If the robot controller main power is turned OFF during automatic operation, the robot accuracy could be adversely affected. Moreover, it may interfere with the peripheral device by drop or move by inertia of the arm.

⚠CAUTION Do not turn off the main power to the robot controller while rewriting the internal information of the robot controller such as the program or parameters.
If the main power to the robot controller is turned off while in automatic operation or rewriting the program or parameters, the internal information of the robot controller may be damaged.

Precautions for the basic configuration are shown below.
(When CR1-571/CR1B-571 is used for the controller.)

⚠CAUTION Provide an earth leakage breaker that packed together on the primary power supply of the controller as protection against electric leakage. Confirm the setting connector of the input power supply voltage of the controller, if the type which more than one power supply voltage can be used. Then connect the power supply.
Failure to do so could lead to electric shock accidents.

Power supply *RV-1A/2AJ series and RP-1AH/3AH/5AH series: Single phase 90-132VAC, 180-253VAC.
        *Except the above: Single phase 180-253VAC.

Rear side of controller

Earth leakage breaker (NV)

Cover

Cover

Terminal

Protective earth terminal (PE)

Terminal cover
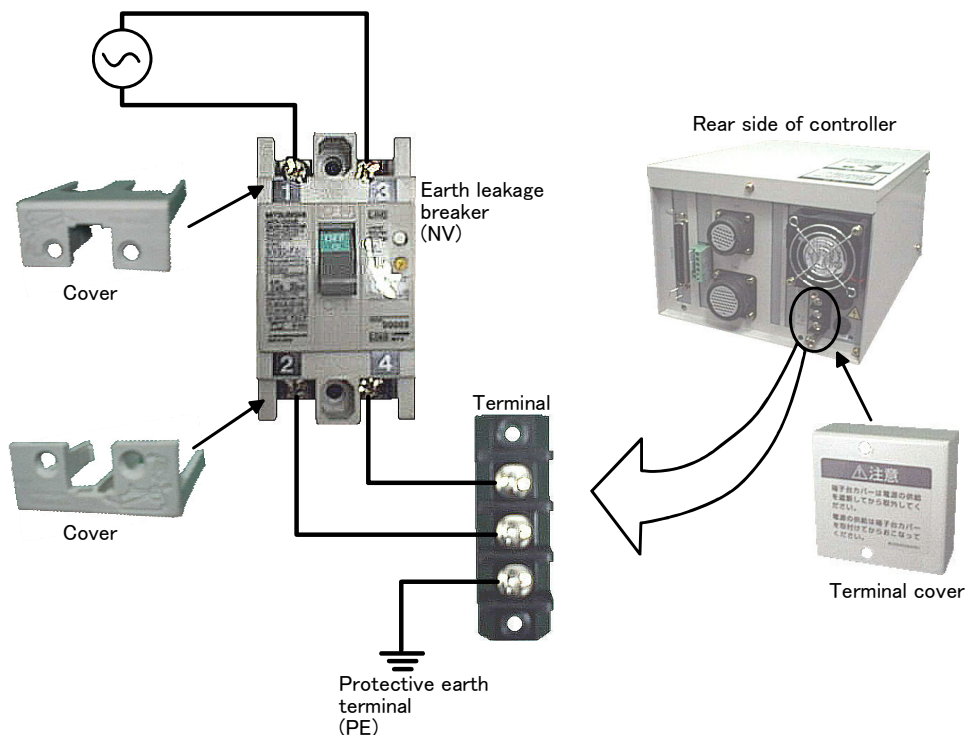
⚠WARNING For using RH-5AH/10AH/15AH series or RH-6SH/12SH/18SH series.
While pressing the brake releasing switch on the robot arm, beware of the arm which may drop with its own weight.
Dropping of the hand could lead to a collision with the peripheral equipment or catch the hands or fingers.

Contents

1.Before use

This chapter describes the confirmation items and cautionary items which must be read before practical use of the expansion serial interface.

1.1.How to use the instruction manual

1.1.1.Content of instruction manual

Through the following configuration, this document introduces the functions which are added or changed in the expansion serial interface.   For the functions and their operating methods provided in the standard robot controller, refer to "instruction manual" appended to the robot controller.

Table 1.1   Details of instruction manual

Chapter	Title	Details
1	Before use	Together with the using method of the instruction manual, the confirmation items and cautionary items are introduced to use the expansion serial interface. Read through the chapter before practical use of the expansion serial interface.
2	Preparation before use	The preparatory work is introduced to use the expansion serial interface. Referring to the chapter, install the interface card, apply the cable wiring and check the other setting items.
3	Trial for operation	Using the system configured in "Chapter 2 Preparation before use, this document", this chapter introduces a series of the operating methods from the start-up to the stop. Referring to each introduction, understand the basic operating methods.
4	Design and engineering	It introduces the specifications of the connectors and the introduction examples of the systems necessary to introduce the expansion serial interface. Referring to this chapter, take full advantage of the expansion serial interface further more.

1.2.Terms used in the instruction manual

The following terms are used in this document.

(1) Expansion serial interface

The expansion serial interface is an option which adds the serial channels to the robot controller in combination with CRn-500 Series controller.

(2) RS-232C

It is one of the serial communication standards standardized by Electronic Industries Alliance (EIA) of America. It is the most popular serial communication system, being equipped in most of the personal computers. The maximum length of the cable is approximate 15m. On this product, it is used to connect the robot controller to the personal computer, vision sensor and other calculators. The connector of the card is a D-sub 25 pin type.

(3) RS-422

It is one of the serial communication standards standardized by Electronic Industries Alliance (EIA) of America, being the upward compatible type of RS-232C which is the most popular. Our vision sensor uses RS-422. The maximum length of the applicable cable is 500mm, On this product, it is used to connect the robot controller to the vision sensor and other calculators. The connector of the card is a D-sub 25 pin type.

(4) RS-485

It is one of the interface standards of the serial transmission. It can be connected to a maximum of 32 drivers and receivers. The transmission distance is a maximum of 1200m but is different depending on the transmission speed. (10Mbps:12m, 1Mbps:120m, 100Kbps:1200m)

(5) T/B

It is the abbreviation of the teaching pendant. (The teaching pendant is optional.)

1.3.Check of product

The standard configuration of the product procured by the customer is as follows. Check the configuration.

No.	Part name	Type	Qty.	Remarks
<1>	Instruction manual (this document)	BFP-A8106	1	
<2>	Tracking Function Manual	BFP-A8524	1	
<3>	Expansion serial interface card	RZ581□	1	The "□" show the version of printed circuit board.
<4>	Ferrite core	E04SR301334	4	Be sure to install this for noise countermeasure.

Note) The numbers in the table correspond to the figure shown below.
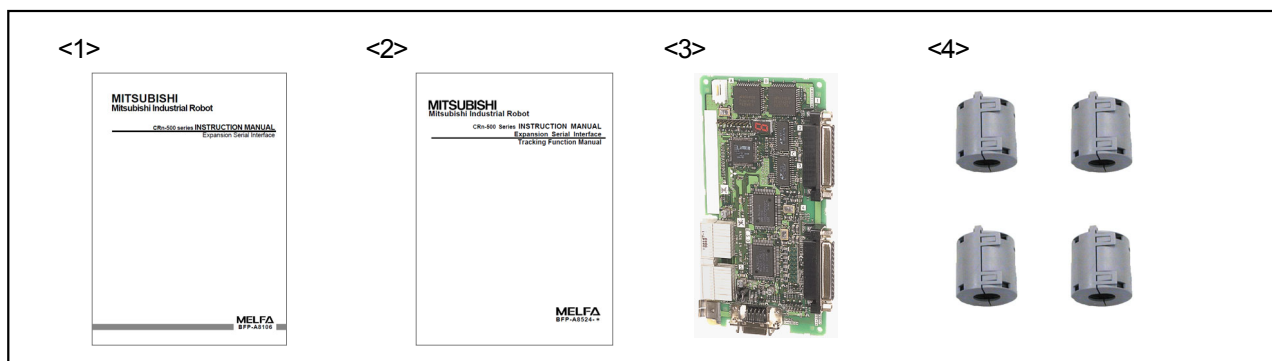
1.4.Devices Procured by Customers

In addition to the standard robot system configuration, the following are necessary.
These devices are separately procured by the customer.

No.	Part name	Type	Qty.	Remarks
<5>	Personal computer, vision sensor, etc.		1 or more	Two channel per one board.
<6>	Communication cable	RS-232C or RS-422	1 or more	

Note) The numbers in the table correspond to the figure shown below.
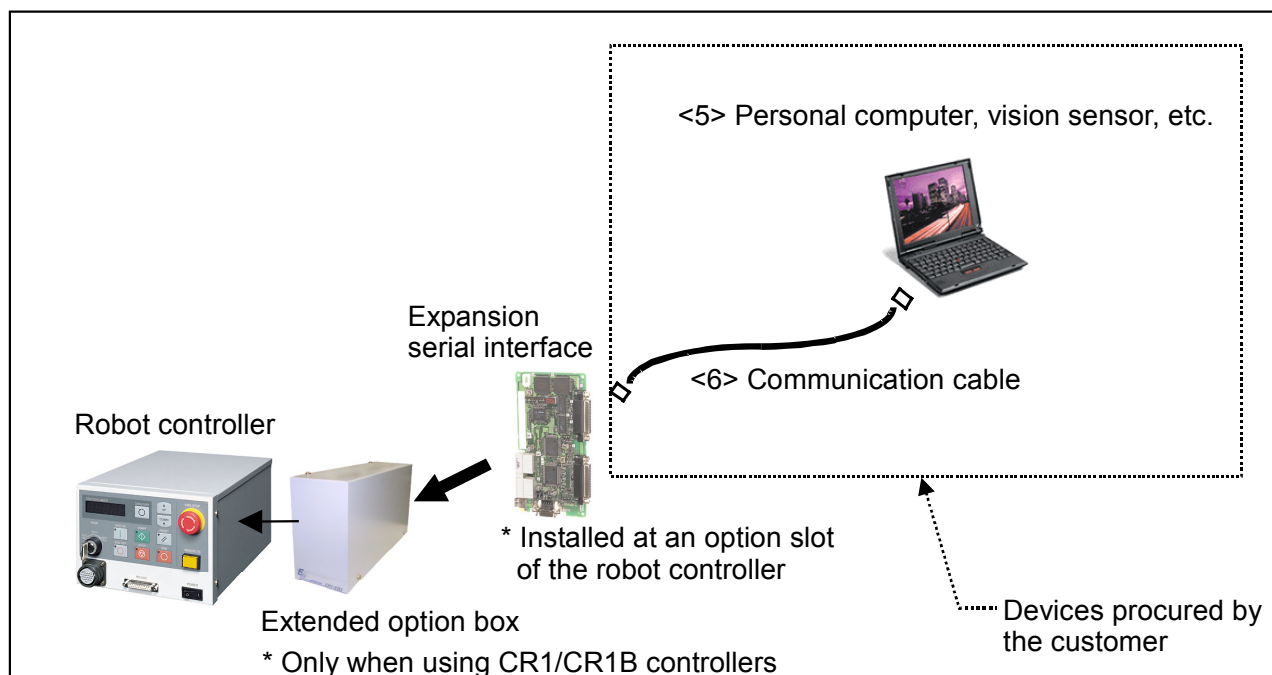
1.5.Expansion serial interface

The expansion serial interface has the following functions

(1) One card can expand the communication line to maximum 2 channels.

(2) The channel 1 is exclusive for RS-232C.

(3) The channel 2 is alternative for RS-232C or RS-422.

   If the channel is connected with the cable of the RS-232C pin assignment later introduced, it works as RS-232C. If it is connected with the cable of the RS-422 pin assignment, it works as RS-422. Here, it is not especially necessary to set the parameters with the setting pin or T/B.

(4) Three cards can be installed on one controller. [Note1)]

   (The communication line of maximum 6 channels cable connected.)

   Note1) Up to slot 3 can now be supported due to a specification change of the expansion serial interface cards.

Type	Supporting software version		Remarks
	From the version E1 to version K6	Version K7 or later	
RZ581**A** or earlier	□	□	Unrelated to the software version, up to two boards can be used. (Option slot 1(OPT1)/ 2(OPT2))
RZ581**B** or later	□ (*1)	○	Up to three boards can be used, by using with version K7 or later. (Option slot 1(OPT1)/ 2(OPT2)/ 3(OPT3))

   □: The option slot 1(OPT1) or 2(OPT2) is available. (Up to two boards can be used.)

   ○: Every option slot is available. (Up to three boards can be used.)

   (*1) Operation is compatible with RZ581A.

(5) The expanded communication channel can similarly function like RS-232C on the front side of the controller equipped as standard.

No.	Function outline
1	Support software function The personal computer support software (applicable to the separately available RS-232C) is used to allow the communication with the robot controller via RS-232C/RS-422. (Program up/down load, status monitor, etc.)
2	Data link function MELFABASICIV language (OPEN/PRINT/INPUT) is used to allow the data link of the numerical value/position data.

2.Preparation before use

What must be done before use is herein described.

| 1. Installation of expansion serial interface ··· Refer to 2.1. |

⬇

| 2. Parameter setting ······································· Refer to 2.2. |

2.1.Installation of expansion serial interface

This section explains how to install extension serial interface cards for each controller.
If you are using a CR1/CR1B controller, refer to "2.1.1. In the case of CR1/CR1B controller." If you are using a CR2A/CR2B controller, refer to "2.1.2. In the case of CR2A/CR2B controller." Finally, if you are using a CR2/CR3/CR4/CR7/CR8 controller, refer to "2.1.3. In the case of CR2/CR3/CR4/CR7/CR8."
For the detailed explanation of installation, refer to the separate "Instruction Manual/Controller setup, basic operation, and maintenance".

2.1.1.In the case of CR1/CR1B controller

An expansion serial interface card can be installed at any option slot in the extended option box.
Option slot name: OPT1, OPT2, OPT3

[Note] Depending on the version, there may be the case where an expansion serial interface card cannot be installed at option slot 3 (OPT3). Use expansion serial interface cards upon checking the type.

Type	Supporting software version		Remarks
	From the version E1 to version K6	Version K7 or later	
RZ581A or earlier	□	□	Unrelated to the software version, up to two boards can be used. (Option slot 1(OPT1)/ 2(OPT2))
RZ581B or later	□ (*1)	○	Up to three boards can be used, by using with version K7 or later. (Option slot 1(OPT1)/ 2(OPT2)/ 3(OPT3))

□: The option slot 1(OPT1) or 2(OPT2) is available. (Up to two boards can be used.)

○: Every option slot is available. (Up to three boards can be used.)

(*1) Operation is compatible with RZ581A.

Expansion Serial Interface

Connector

Installation screw (Four positions)

Rail plate (2 pcs.)

Option card

Cable lead-out port

Option slot 1(OPT1)
・Ethernet interface
・Extended serial interface
・Additional axis interface
・PROFIBUS interface
・Tracking interface

Option slot 2(OPT2)
・Extended serial interface
・CC-Link interface
・Additional axis interface
・PROFIBUS interface
・Tracking interface

Option slot 3(OPT3)
・Additional axis interface
・PROFIBUS interface
・Extended serial interface
・Tracking interface

2.1.2. In the case of CR2A/CR2B controller

An expansion serial interface card can be installed at any option slot in the expansion option box.
Option slot name: OPT1, OPT2, OPT3

[Note] Depending on the version, there may be the case where an expansion serial interface card cannot be
installed at option slot 3 (OPT3). Use expansion serial interface cards upon checking the type.

Type	Supporting software version		Remarks
	From the version E1 to version K6	Version K7 or later	
RZ581A or earlier	□	□	Unrelated to the software version, up to two boards can be used. (Option slot 1(OPT1)/ 2(OPT2))
RZ581B or later	□ (*1)	○	Up to three boards can be used, by using with version K7 or later. (Option slot 1(OPT1)/ 2(OPT2)/ 3(OPT3))

□: The option slot 1(OPT1) or 2(OPT2) is available. (Up to two boards can be used.)

○: Every option slot is available. (Up to three boards can be used.)

(*1) Operation is compatible with RZ581A.

Expansion Serial Interface

Connector

Installation screw
(Four positions)

RZ326A/RZ327 card

Cable lead-out port

Rail plate
(Two pcs. in front and back)

Option slot 1(OPT1)
・Ethernet interface
・Extended serial interface
・Additional axis interface
・PROFIBUS interface
・Tracking interface

Option slot 2(OPT2)
・Extended serial interface
・CC-Link interface
・Additional axis interface
・PROFIBUS interface
・Tracking interface

Option slot 3(OPT3)
・Additional axis interface
・PROFIBUS interface
・Extended serial interface
・Tracking interface

Detailed of option card installation

Rail plate
(Two pcs. in
front and back)

Installation screw
(Four positions)

Option card

2.1.3. In the case of CR2/CR3/CR4/CR7/CR8 controller

An expansion serial interface card can be installed at option slots 1 and 2 in R6x2CPU.
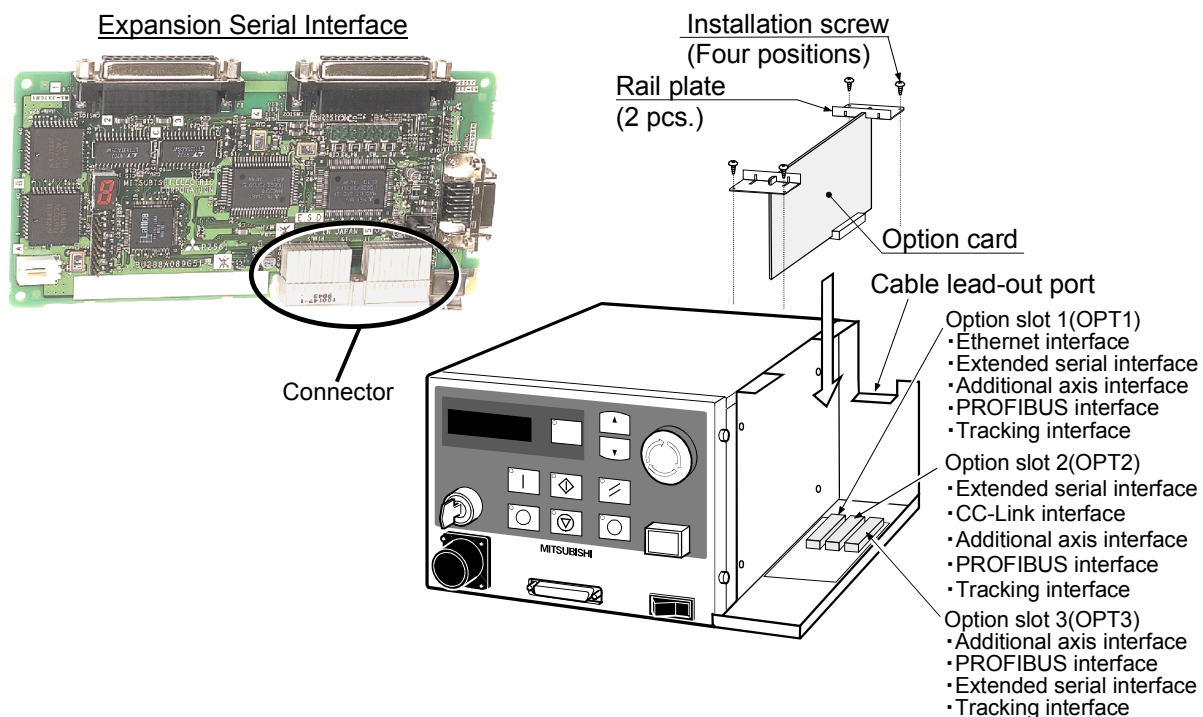Option slot name: OPT1, OPT2

For the detailed explanation of installation and removal of R6x2CPU, refer to the separate "Instruction Manual/Controller setup, basic operation, and maintenance".
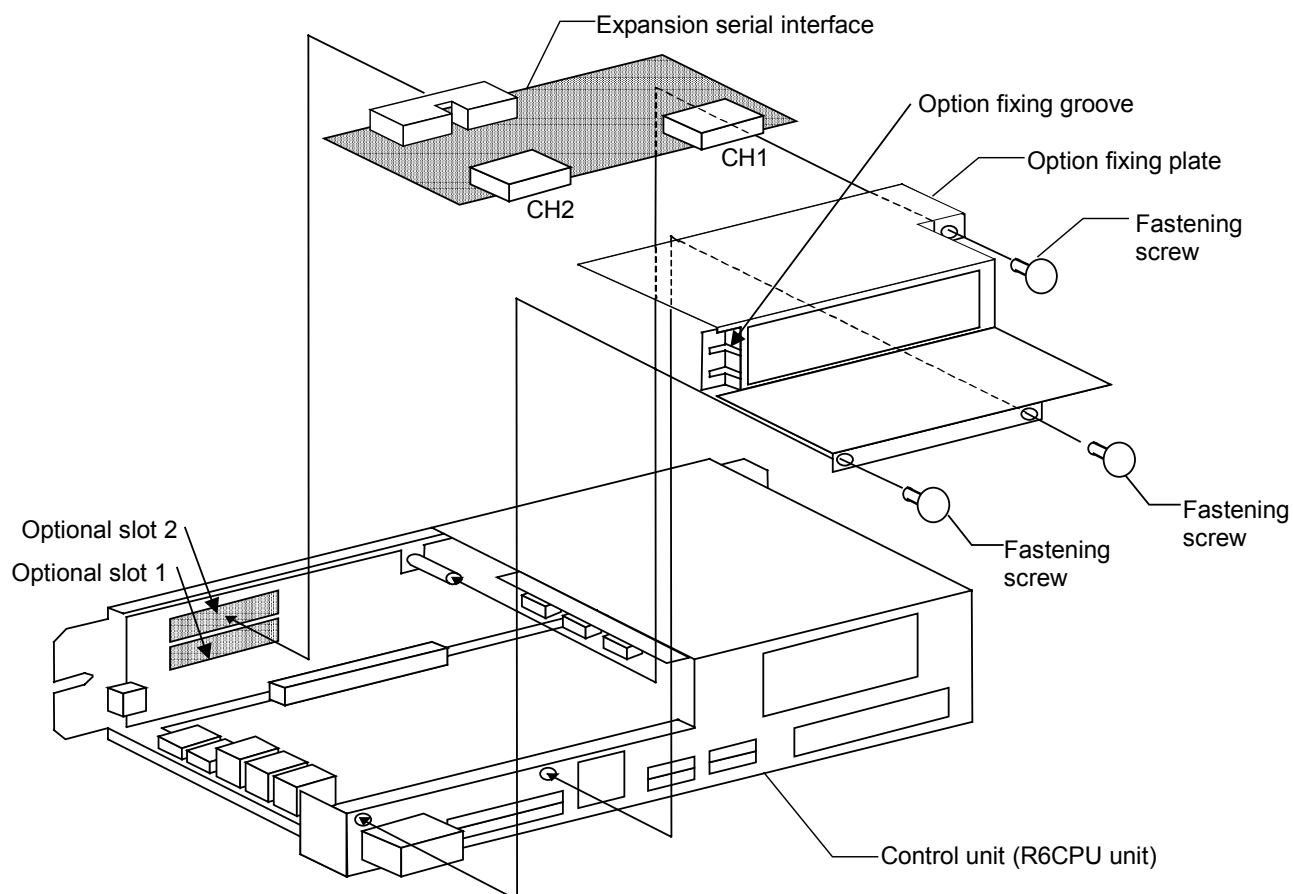
2.2.Parameter setting

Before use, it is necessary to set the parameters. At shipment,
(1) Personal computer support software function (2) Baud rate 9600 (3) Character length 8 bits
(4) Parity even (5) Stop bit 2 they are factory-set as follows.
These parameters are shown below. For the setting method of the parameters, refer to the instruction
manual of the controller.

⚠CAUTION   After changing the parameters, turn the power supply of the controller from OFF to ON.
Unless this is done, the changed parameters will not become valid.

■ Parameter list

The parameters are listed below.
The slot and CH in the table correspond to the lower 2 digit
number of each parameter name.

·In the "SLT" column of the list, the parameter of "1" is
changed when the expansion serial interface is installed
at Option slot 1(OPT1) but the parameter of "2" is changed
when it is installed at Option slot 2 (OPT2).

·CH shows the connector which connects the cable.
"1" means connecting to CON1, and "2" means connecting
to CON2 for RS232C, and "3" means connecting to CON2
for RS422.

Instruction of expansion serial card connector

RS-232C (CON1)

RS-232C RS-422 (CON2)

Connector on the installation side of the controller
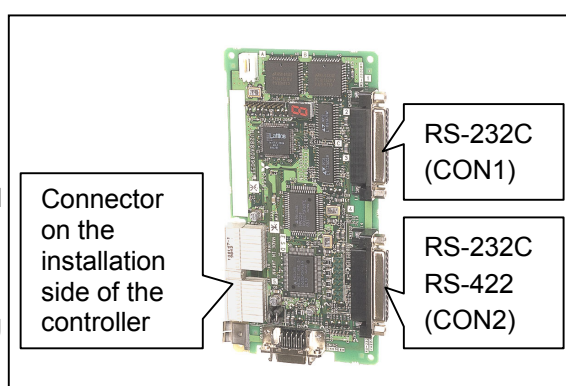
Table Parameter List

| SLT	CH	Parameter name	Description	Number of elements	Default value
1	1	CBAUE11	Communication baud rate [2400/4800/9600/19200]	Numerical value 1	9600
		CLENE11	Character length [8/7]	Numerical value 1	8
		CPRTYE11	Parity [0/1/2 = No/Odd/Even]	Numerical value 1	2
		CSTOPE11	Stop bit [1/2]	Numerical value 1	2
		CTERME11	End code [0/1 = CR/CR+LF] "0" is set when our personal computer support software is used.	Numerical value 1	0
		CPRCE11	Protocol [0/1/2 = support software/reserved/data link function]	Numerical value 1	0
		CDTRE11	DTR control [0/1 = No/Yes] When "No" is selected, DTR is always ON. "0" is set when our personal computer support software and MELFA-BASICIV language are used.	Numerical value 1	0
	2	CBAUE12	Communication baud rate [2400/4800/9600/19200]	Numerical value 1	9600
		CLENE12	Character length [8/7]	Numerical value 1	8
		CPRTYE12	Parity [0/1/2 = No/Odd/Even]	Numerical value 1	2
		CSTOPE12	Stop bit [1/2]	Numerical value 1	2
		CTERME12	End code [0/1 = CR/CR+LF]	Numerical value 1	0
		CPRCE12	Protocol [0/1/2 = support software/reserved/data link function]	Numerical value 1	0
		CDTRE12	DTR control [0/1 = No/Yes] When "No" is selected, DTR is always ON.	Numerical value 1	0

SLT	CH	Parameter name	Description	Number of elements	Default value
	3	CBAUE13	Communication baud rate [2400/4800/9600/19200]	Numerical value 1	9600
		CLENE13	Character length [8/7]	Numerical value 1	8
		CPRTYE13	Parity [0/1/2 = No/Odd/Even]	Numerical value 1	2
		CSTOPE13	Stop bit [1/2]	Numerical value 1	2
		CTERME13	End code [0/1 = CR/CR+LF]	Numerical value 1	0
		CPRCE13	Protocol [0/1/2 = support software/reserved/data link function]	Numerical value 1	0
		CDTRE13	DTR control [0/1 = No/Yes] When "No" is selected, DTR is always ON.	Numerical value 1	0
2	1	CBAUE21	Communication baud rate [2400/4800/9600/19200]	Numerical value 1	9600
		CLENE21	Character length [8/7]	Numerical value 1	8
		CPRTYE21	Parity [0/1/2 = No/Odd/Even]	Numerical value 1	2
		CSTOPE21	Stop bit [1/2]	Numerical value 1	2
		CTERME21	End code [0/1 = CR/CR+LF]	Numerical value 1	0
		CPRCE21	Protocol [0/1/2 = support software/reserved/data link function]	Numerical value 1	0
		CDTRE21	DTR control [0/1 = No/Yes] When "No" is selected, DTR is always ON.	Numerical value 1	0
	2	CBAUE22	Communication baud rate [2400/4800/9600/19200]	Numerical value 1	9600
		CLENE22	Character length [8/7]	Numerical value 1	8
		CPRTYE22	Parity [0/1/2 = No/Odd/Even]	Numerical value 1	2
		CSTOPE22	Stop bit [1/2]	Numerical value 1	2
		CTERME22	End code [0/1 = CR/CR+LF]	Numerical value 1	0
		CPRCE22	Protocol [0/1/2 = support software/reserved/data link function]	Numerical value 1	0
		CDTRE22	DTR control [0/1 = No/Yes] When "No" is selected, DTR is always ON.	Numerical value 1	0
	3	CBAUE23	Communication baud rate [2400/4800/9600/19200]	Numerical value 1	9600
		CLENE23	Character length [8/7]	Numerical value 1	8
		CPRTYE23	Parity [0/1/2 = No/Odd/Even]	Numerical value 1	2
		CSTOPE23	Parity [0/1/2 = No/Odd/Even]	Numerical value 1	2
		CTERME23	End code [0/1 = CR/CR+LF]	Numerical value 1	0
		CPRCE23	Protocol [0/1/2 = support software/reserved/data link function]	Numerical value 1	0
		CDTRE23	DTR control [0/1 = No/Yes] When "No" is selected, DTR is always ON.	Numerical value 1	0
3	1	CBAUE31	Communication baud rate [2400/4800/9600/19200]	Numerical value 1	9600
		CLENE31	Character length [8/7]	Numerical value 1	8
		CPRTYE31	Parity [0/1/2 = No/Odd/Even]	Numerical value 1	2
		CSTOPE31	Stop bit [1/2]	Numerical value 1	2
		CTERME31	End code [0/1 = CR/CR+LF]	Numerical value 1	0
		CPRCE31	Protocol [0/1/2 = support software/reserved/data link function]	Numerical value 1	0
		CDTRE31	DTR control [0/1 = No/Yes] When "No" is selected, DTR is always ON.	Numerical value 1	0
	2	CBAUE32	Communication baud rate [2400/4800/9600/19200]	Numerical value 1	9600
		CLENE32	Character length [8/7]	Numerical value 1	8
		CPRTYE32	Parity [0/1/2 = No/Odd/Even]	Numerical value 1	2
		CSTOPE32	Stop bit [1/2]	Numerical value 1	2

SLT	CH	Parameter name	Description	Number of elements	Default value
		CTERME32	End code [0/1 = CR/CR+LF]	Numerical value 1	0
		CPRCE32	Protocol [0/1/2 = support software/reserved/data link function]	Numerical value 1	0
		CDTRE32	DTR control [0/1 = No/Yes] When "No" is selected, DTR is always ON.	Numerical value 1	0
	3	CBAUE33	Communication baud rate [2400/4800/9600/19200]	Numerical value 1	9600
		CLENE33	Character length [8/7]	Numerical value 1	8
		CPRTYE33	Parity [0/1/2 = No/Odd/Even]	Numerical value 1	2
		CSTOPE33	Parity [0/1/2 = No/Odd/Even]	Numerical value 1	2
		CTERME33	End code [0/1 = CR/CR+LF]	Numerical value 1	0
		CPRCE33	Protocol [0/1/2 = support software/reserved/data link function]	Numerical value 1	0
		CDTRE33	DTR control [0/1 = No/Yes] When "No" is selected, DTR is always ON.	Numerical value 1	0

Parameter name	Description	Number of elements	Default value
COMDEV	The parameter is necessary to set for the data link. It is specified with OPEN sentence of the program. The device which corresponds to COMn is specified with the parameter. (n in the range of 1 to 8) COM1, COM2...COM8 are sequential from the left of the parameter element. When the expansion serial interface is used for COM, the following are input as the values of the parameters. At the installation slot 1, "OPT11" for CH1 At the installation slot 1, "OPT12" for CH2(RS-232) At the installation slot 1, "OPT13" for CH2(RS-422) At the installation slot 2, "OPT21" for CH1 At the installation slot 2, "OPT22" for CH2(RS-232) At the installation slot 2, "OPT23" for CH2(RS-422) At the installation slot 3, "OPT31" for CH1 At the installation slot 3, "OPT32" for CH2(RS-232) At the installation slot 3, "OPT33" for CH2(RS-422) For example, when CH1("OPT11") is used at the installation slot 1 and it is allocated to COM2:, "RS-232", "OPT11" , , , , , , are set. When CH2 ("OPT22") is used at the installation slot 2 and it is allocated to COM3:, "RS-232", ,"OPT22" , , , , , are set. Here, the standard RS-232C on the front side of the controller is previously allocated to COM1:.	Character string 8	RS232, , , , , , ,

2.3. Connection confirmation

Before use, confirm the following items again.

2-13

No.	Confirmation items	Check
1	Is the expansion serial interface card securely installed in the slot of the controller?	
2	Is the expansion serial interface card properly connected to the communication cable of the external unit prepared?	
3	Does the communication parameter of the robot controller (2.2 Parameter setting) match the communication parameter of the external device?	
4	Is the power supply of the controller turned off once after the parameter is set?	
5	Is "2" set at the parameter CPRCE□□[Note1] when the data link function is used? Is the COM number allocated at the parameter COMDEV?	
6	It is connected to our optional personal computer support software and Is "0" set at CDTRE□□[Note1] when the robot language MELFA-BASSICIV is used?	
7	Is it transmitted after CTS and DTR are turned on in order to transmit the data from the external device when the power supply is turned on?	
8	Is it properly connected to the pins assigned to the cable used?	

Note1) □□= 11, 12, 13, 21, 22, 23, 31, 32, 33

3.Trial for operation

3.1.Personal computer support software function (optional)

(1) Before using the optional personal computer support software, confirm that [communication setting] of the personal computer support software matches the parameter setting of the controller. Here, the parameters factory-set at shipment are used without change.
(when the personal computer support software is factory-set at shipment).

(2) If the personal computer support software separately sold is bought and the communication software is manufactured by the customer, refer to the instruction manual of the personal computer support software.

Before use, confirm the pin assignment, connection and communication parameters of the cable.

1. Set the necessary communication parameters.

⬇

2. Connect the cable between the robot controller and the external device prepared by the customer.

⬇

3. Turn on the power supply of the external device and turn on the power supply of the robot controller.

⬇

4. Take the communication test.   When the support software is used, it is properly communicated if the window of the communication server becomes blue.

⬇

5. At the end, turn off the power supply of the controller and external unit.

3.2. Data link function

Here, it explains such a case as the expansion serial interface is installed at the option slot 1(OPT1) and CH1 is used.

1. Set the necessary communication parameters. ············· Refer to "3.2.1 Parameter setting".

⬇

2. Connect the cable between the robot controller and the external device prepared by the customer.

⬇

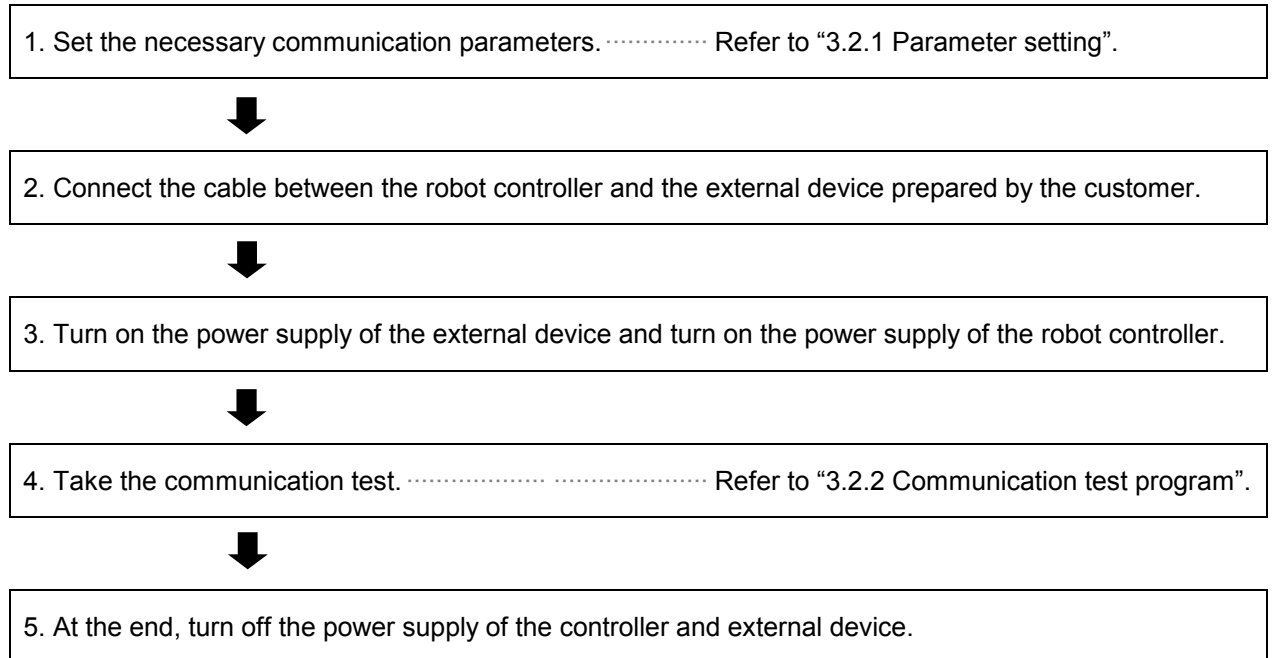| 3. Turn on the power supply of the external device and turn on the power supply of the robot controller. |
| --- |

⬇

4. Take the communication test. ······················· ····················· Refer to "3.2.2 Communication test program".

⬇

5. At the end, turn off the power supply of the controller and external device.

3.2.1.Parameter setting

Name of changed parameter	Before/after change	Parameter value
CPRCE11	Before	0
	After	2
COMDEV	Before	RS232, , , , , , ,
	After	RS232,OPT11 , , , , , ,

⚠CAUTION   When the parameter is changed, it is necessary to surely turn off the power supply once.

3.2.2.Communication test program

The test program is applied to an example of data link between the robot and personal computer.
(1) When the robot transmits the following data to the personal computer, the data will be processed by the personal computer.
"START"(CR)   (CR) represents the CR code.
(2) When the personal computer receives "START", the data will be processed and the result will be sent in the following format. "Numerical value data, position data X, position data Y, position data Z"(CR) (CR) represents the CR code.
 (Example: "0, 10.03, 15.38, 1.98" (CR))
(3) When the numerical value data is 0, the robot will be moved from the current position to the fetched position shifted in the tool coordinate system. If any other value except 0 is set, nothing will be done.
The program to repeat the operation is shown as an example.

＜Robot program＞

```
 10 OPEN "COM2:" AS #1
 20 PRINT #1,"START"
 30 P0=P_NULL
 40 INPUT #1,M1,P0.X,P0.y,P0.Z
 50 IF M1 <> 0 GOTO 11
 60 MOV P_CURR ＊ P0
 70 GOTO 11
```

＜Personal computer -- N88BASIC as an example＞

```
 10 OPEN "COM1:E83NN" AS #1
 20 INPUT #1,A$
 30 IF A$<>"START" GOTO *ERR
 :(Process)
 100 PRINT #1,0,MX,My,MZ
 101 GOTO 11
 :
 200 *ERR
 201 PRINT #1,1          'It is unnecessary to transmit X, Y and Z data.
 202 GOTO 11
```

4.Design and engineering

4.1.Connector pin assignment

The connector pin assignments of the expansion serial interface are shown.

Explanation of RZ581□ board connector

D-SUB 25-pin female connector
(RZ581□ on the board side)
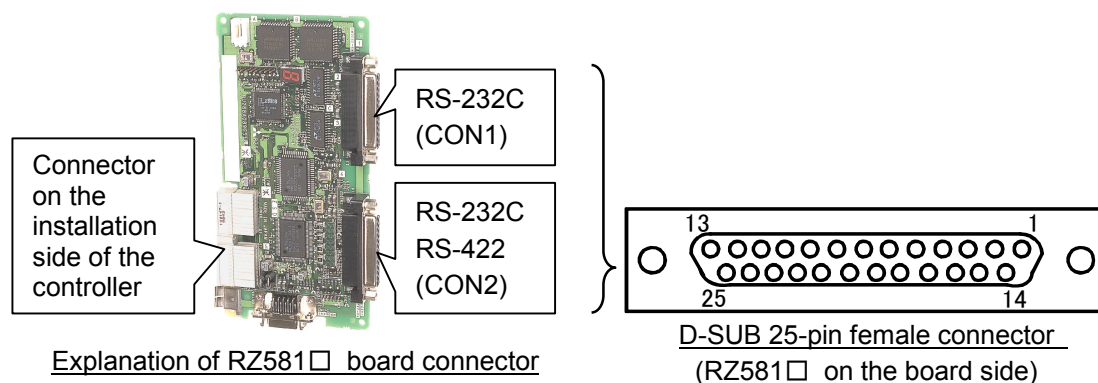
(1) Pin assignment of RS-232C of CON1 (channel 1)

Pin No.	Signal name	Description	I/O	Remarks
2	TXD	Data transmitted to external device	O	
3	RXD	Data received from external device	I	
4	RTS	Request To Send	O	
5	CTS	Clear To Send	I	
6	DSR	Data Set Ready	I	
20	DTR	Data Terminal Ready	O	
7	SG	Control power supply 0V	—	
1	FG	Earth	—	Connect earth to shield of cable
8	DCD	Receiving carrier detect	I	
22	RI	Ring Indicator	I	

(2) Pin assignment of RS-232C of CON2 (channel 2)

Pin No.	Signal name	Description	I/O	Remarks
2	TXD	Data transmitted to external device	O	
3	RXD	Data received from external device	I	
4	RTS	Request To Send	O	
5	CTS	Clear To Send	I	
6	DSR	Data Set Ready	I	
20	DTR	Data Terminal Ready	O	
7	SG	Control power supply 0V	—	
1	FG	Earth	—	Connect earth to shield of cable

(3) Pin assignment of RS-422 of CON2 (channel 2)

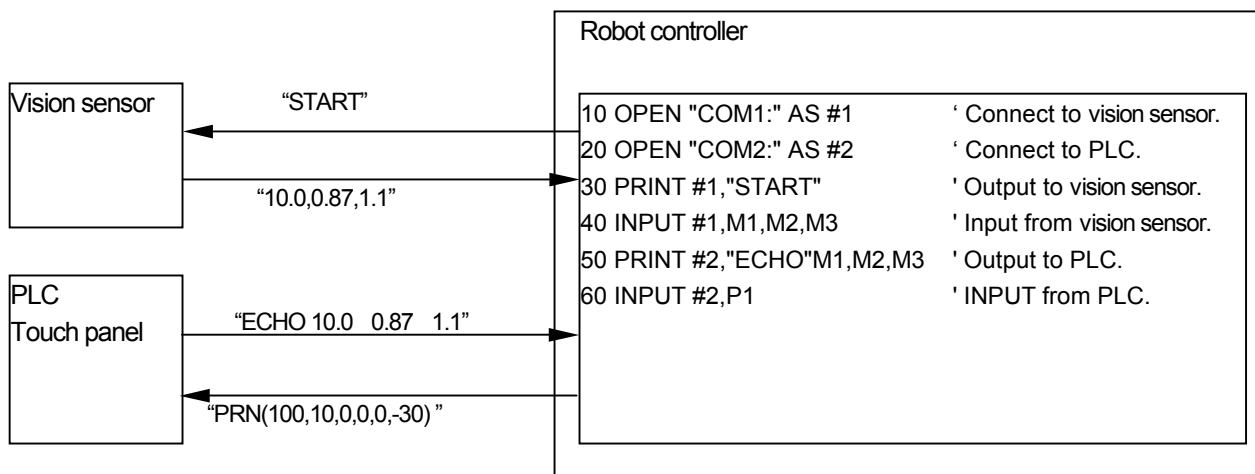| Pin No.	Signal name	Description	I/O	Remarks
13	TXDH	Transmitted data + side	O	
12	RXDH	Received data + side	I	
11	DTRH	Data Terminal Ready＋side	O	
10	DSRH	Data Set Ready＋side	I	
25	TXDL	Transmitted data - side	O	
24	RXDL	Received data - side	I	
23	DTRL	Data Terminal Ready－side	O	
22	DSRL	Data Set Ready－side	I	
9	SG	Control power supply 0V	—	

4.2.Data communication among robot program, vision sensor and PLC

(1) System configuration

An example of data communication between a robot program, a vision sensor and a PLC is shown below. Specifically, data is output to an external device from the robot program using the PRINT instruction, and then data is acquired from the external device and transmitted to the robot program using the INPUT instruction.

Note that if the vision sensor and PLC communicate asynchronously, it is necessary to separate the program used for communicating with the PLC and the program used for communicating with the vision sensor, and perform multitasking operations.

Example) If the vision is connected to RS-232C on the front side of the controller, the expansion serial interface is installed in the optional slot 1 and PLC is connected to CON1.

```
                                    ┌─────────────────────────────────────────────────────────┐
                                    │ Robot controller                                        │
                                    │                                                         │
 ┌──────────────┐    "START"        │ 10 OPEN "COM1:" AS #1      ' Connect to vision sensor.   │
 │Vision sensor │◄──────────────    │ 20 OPEN "COM2:" AS #2      ' Connect to PLC.             │
 │              │                   │ 30 PRINT #1,"START"        ' Output to vision sensor.    │
 │              │    "10.0,0.87,1.1"│ 40 INPUT #1,M1,M2,M3       ' Input from vision sensor.   │
 └──────────────┘──────────────►    │ 50 PRINT #2,"ECHO"M1,M2,M3 ' Output to PLC.             │
                                    │ 60 INPUT #2,P1             ' INPUT from PLC.             │
 ┌──────────────┐"ECHO 10.0 0.87 1.1"│                                                        │
 │PLC           │──────────────►    │                                                         │
 │Touch panel   │                   │                                                         │
 │              │"PRN(100,10,0,0,0,-30)"                                                      │
 └──────────────┘◄──────────────    │                                                         │
                                    └─────────────────────────────────────────────────────────┘
```

Parameter setting: COMDEV = "RS232","OPT11","OPT12", , , , ,
CPRCE232 = 2
CPRCE11 = 0

[Communication specifications]
- The communication data are formatted in ASCII alone but the binary data are not processed.
- When "0" is set at OPRCE□□[Note1)], it is necessary to add the character PRN to the head of the data transmitted from the external device. In this case, it can be connected to the personal computer support software of our company without changing the parameter (CPRCE□□[Note1)]). (It is necessary that the communication speed, character length, etc. match the setting.) If it is communicated with the external device when "2" is set at CPRCE□□[Note1)], reset CPRCE□□[Note1)] to "0" once to connect the personal computer support software of our company.
- Comma or space is used as the separator when plural data is transmitted from the external device to the controller.
- The fetched data is automatically converted and substituted, identifying the argument type of INPUT command.
- In case of the above COMDEV setting, CON2 of the expansion serial I/F becomes "COM3:".

Note1) □□= 11, 12, 13, 21, 22, 23, 31, 32, 33

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