1. Communication specifications

1.1 Communication parameter specifications

The communication parameters on the mating unit, such as personal computer must be set as follows. Refer to the relevant unit's operation manual for the setting procedure.

■ **Communication parameter specifications**

Parameter	Setting
Baudrate	38,400bps
Data bit	8 bits
Parity	Odd
Stop bit	1 bit
Flow control	None

NOTE
> Data that does not conform to the controller specifications may be received due to a variety of factors during RS-232C communication.

1.2 Communication command specifications

The C1/C21/C22 controller provides ASCII character string communication commands to communicate with an external communication device.
The communication commands are classified into four categories as follows.

Type	Contents
Robot operation command	Operates or stops the robot.
Status change command	Changes the servo or brake status.
Edit command	Writes the parameter or point data.
Query command	Reads the data or robot status.

NOTE
> The communication commands are applicable to the controller software version Ver.1.04.106 or higher.

The basic format of the communication command is as follows.

Data transmission format

```
@<command>[<data number/status>][.n] c/r l/f
@<command>[<data number>][.n]=<setting value> c/r l/f
```

n: Node number

Data response format

```
OK.n c/r l/f
NG.n=<alarm number>c/r l/f
RUN.n c/r l/f
END.n c/r l/f
```

n: Node number

• All communication commands consist of an ASCII character string that begins with a start code '@'(=40h) and ends with c/r(=0Dh)l/f(=0Ah).
• 'n' (node number) is used for the daisy chain connection. One host communication device communicates with one robot controller, or with all the daisy-chained controllers (up to 16 controllers).

NOTE
> When 'n' (node number) is omitted, commands are sent to all the daisy-chained controllers.

⚠ CAUTION
> **Make sure to perform automatic node number setting when you first use the daisy-chained controller or when you have replaced the controllers.**
> **To perform the node number setting, execute "Automatic node number assignment" in the support software RS-Manager or send the "Automatic node number setting (SETID)" command (communication command).**

• The number of bytes, which can be output by one command response, is 255.
• " , " (comma) means the same as c/r l/f during data transmission.

2. Communication command lists

■ Robot operation commands

Command	Format	Command Description
START	@START<point number>[.<n>]	Positioning operation
STOP	@STOP[.<n>]	Operation stop
ORG	@ORG[.<n>]	Return-to-origin
JOG+	@JOG+[.<n>]	JOG movement (+ direction)
JOG-	@JOG-[.<n>]	JOG movement (- direction)
INCH+	@INCH+[.<n>]	Inching movement (+ direction)
INCH-	@INCH-[.<n>]	Inching movement (- direction)

n: Node number

■ Status change commands

Command	Format	Command Description
SRVO	@SRVO<1 or 0>[.<n>]	Servo status change
BRK	@BRK<1 or 0>[.<n>]	Brake status change
RESET	@RESET[.<n>]	Reset

n: Node number

■ Edit commands

Command	Format	Command Description	
M	@M<point number>[.<n>]=<setting value>	Point data writing	Operation type
P	@P<point number>[.<n>]=<setting value>		Position (Data is not saved into the memory.)
P_	@P_<point number>[.<n>]=<setting value>		Position (Data is not saved into the memory.)
S	@S<point number>[.<n>]=<setting value>		Speed (Data is not saved into the memory.)
S_	@S_<point number>[.<n>]=<setting value>		Speed (Data is not saved into the memory.)
AC	@AC<point number>[.<n>]=<setting value>		Acceleration (Data is not saved into the memory.)
AC_	@AC_<point number>[.<n>]=<setting value>		Acceleration (Data is not saved into the memory.)
DC	@DC<point number>[.<n>]=<setting value>		Deceleration (Data is not saved into the memory.)
DC_	@DC_<point number>[.<n>]=<setting value>		Deceleration (Data is not saved into the memory.)
Q	@Q<point number>[.<n>]=<setting value>		Push (Data is not saved into the memory.)
Q_	@Q_<point number>[.<n>]=<setting value>		Push (Data is not saved into the memory.)
ZL	@ZL<point number>[.<n>]=<setting value>		Zone (-)
ZH	@ZH<point number>[.<n>]=<setting value>		Zone (+)
N	@N<point number>[.<n>]=<setting value>		Near width
J	@J<point number>[.<n>]=<setting value>		Jump
F	@F<point number>[.<n>]=<setting value>		Flag
T	@T<point number>[.<n>]=<setting value>		Timer
TEACH	@TEACH<point number>[.<n>]	Current position teaching	
COPY	@COPY<point number 1>-<point number 2>[.<n>]	Point data copying	
DEL	@DEL<point number 1>[-<point number 2>][.<n>]	Point data deleting	
K	@K<parameter number>[.<n>]=<setting value>	Parameter data writing	
SETID	@SETID	Automatic node number setting (when daisy chain function is used)	

n: Node number

■ **Query commands**

Command	Format	Command Description	
?M	@?M<point number>[.<n>]	Point data reading	Operation type
?P	@?P<point number>[.<n>]		Position
?S	@?S<point number>[.<n>]		Speed
?AC	@?AC<point number>[.<n>]		Acceleration
?DC	@?DC<point number>[.<n>]		Deceleration
?Q	@?Q<point number>[.<n>]		Push
?ZL	@?ZL<point number>[.<n>]		Zone (-)
?ZH	@?ZH<point number>[.<n>]		Zone (+)
?N	@?N<point number>[.<n>]		Near width
?J	@?J<point number>[.<n>]		Jump
?F	@?F<point number>[.<n>]		Flag
?T	@?T<point number>[.<n>]		Timer
?K	@?K<parameter number>[.<n>]	Parameter data reading	
?D	@?D<status number>[.<n>]	Status information reading	
?IN	@?IN<input number>[.<n>]	Input information reading	
?INB	@?INB<input bit number>[.<n>]	Input information (bit) reading	
?OUT	@?OUT<output number>[.<n>]	Output information reading	
?OUTB	@?OUTB<output bit number>[.<n>]	Output information (bit) reading	
?WIN	@?WIN<word input number>[.<n>]	Input word information reading	
?WOUT	@?WOUT<word output number>[.<n>]	Output word information reading	
?OPT	@?OPT<option number>[.<n>]	Option information reading	
?OPTB	@?OPTB<option bit number>[.<n>]	Option information (bit) reading	
?ALM	@?ALM<alarm occurrence number>[.<n>]	Alarm information reading	
?WARN	@?WARN<warning occurrence number>[.<n>]	Warning information reading	

n: Node number

3. Communication command description

3.1 Robot operation commands

The robot operation commands are intended to operate or stop the robot.

Positioning operation (START)

Format	@START<point number>[.<node number>] c/r l/f @START<point number>[#P<position data>][.<node number>] c/r l/f
Meaning	Starts the positioning operation of specified point data.

Function

This command has the same function as the start (START) input.

When #P<position data> is added to a portion immediately after the position number, the operation can be performed by registering the position data into the point data again.

This is called direct position designation positioning operation.

The unit of the position data is the same as that used for the point data writing. For details, refer to section 3.3 "Edit commands" in this Communication Command Guide.

> 💡 NOTE ───
>   The direct position designation positioning operation is available from controller's software version Ver.1.11.125.

Setting

<Point number> : 1 to 255

<Node number> : 1 to 16 (This setting can be omitted when the same command is sent to all the controllers connected with the host device, as by daisy chain connection.)

Communication example

Transmission	Response	
@START1.1 c/r l/f		Positioning operation of point data 1
	RUN.1 c/r l/f	Starts the positioning operation.
	END.1 c/r l/f	Normal end
@START2.1 c/r l/f		Positioning operation of point data 2
	RUN.1 c/r l/f	Accepts the positioning operation and starts it.
	NG.1=44 c/r l/f	Abnormal end (Operation is stopped by alarm "44: SOFTLIMIT OVER".)
@START1#P10000.1 c/r		Operates by registering "position = 100.00mm" into the point data 1.
	RUN.1 c/r l/f	Starts the positioning operation.
	END.1 c/r l/f	Normal end

Operation stop (STOP)

Format	@STOP[.<node number>] c/r l/f
Meaning	Stops the operation.

Function

Stops the operation/movement of the robot.

When the operation/movement is stopped by this command, the robot decelerates, and then stops.

Setting

<Node number> : 1 to 16 (This setting can be omitted when the same command is sent to all the controllers connected with the host device, as by daisy chain connection.)

Communication example

Transmission	Response	
@START1.1 c/r l/f		Positioning operation of point data 1
	RUN.1 c/r l/f	Starts the positioning operation.
@STOP.1 c/r l/f		Stop
	NG.1=46 c/r l/f	Abnormal end (Operation is stopped by alarm "46: STOP KEY".)

Return-to-origin (ORG)

Format	@ORG[.<node number>] c/r l/f
Meaning	Performs the return-to-origin.

Function

This command has the same function as the return-to-origin (ORG) input.

Setting

<Node number> : 1 to 16 (This setting can be omitted when the same command is sent to all the controllers connected with the host device, as by daisy chain connection.)

Communication example

Transmission	Response	
@ORG.1 c/r l/f		Return-to-origin operation
	RUN.1 c/r l/f	Starts the return-to-origin.
	END.1 c/r l/f	Normal end

JOG movement (JOG+, JOG-)

Format	@JOG+[.<node number>] c/r l/f @JOG-[.<node number>] c/r l/f
Meaning	Performs the JOG movement in the + or - direction.

Function

Performs the JOG movement of the robot in a specified direction (+/-).

> NOTE
> • The JOG movement speed is set using "JOG speed (K10)" of the RUN parameter.
>   (See also Chapter 3, section 4.2 "Parameter details" of the Controller Guide.)
> • The JOG movement using the communication command does not relate to the manual mode status.

Setting

<Node number> : 1 to 16 (This setting can be omitted when the same command is sent to all the controllers connected with the host device, as by daisy chain connection.)

Communication example

Transmission	Response	
@JOG+.1 c/r l/f		JOG movement in the + direction.
	RUN.1 c/r l/f	Starts the JOG movement.
@STOP.1 c/r l/f		Transmits the operation stop.
	OK.1 c/r l/f	JOG movement normal stop

Inching movement (INCH+, INCH-)

Format	@INCH+[.<node number>] c/r l/f @INCH-[.<node number>] c/r l/f
Meaning	Performs the inching movement in the + or - direction.

Function

Performs the inching movement of the robot in a specified direction (+/-).

NOTE
- The inching width (amount) is set using "Inching width (K11)" of the RUN parameter.
  (See also Chapter 3, section 4.2 "Parameter details" of the Controller Guide.)
- The inching movement using the communication command does not relate to the manual mode status.

Setting

<Node number> : 1 to 16 (This setting can be omitted when the same command is sent to all the controllers connected with the host device, as by daisy chain connection.)

Communication example

Transmission	Response	
@INCH-.1 c/r l/f		Inching movement in the - direction.
	RUN.1 c/r l/f	Starts the inching movement.
	END.1 c/r l/f	Normal end

Communication Command Guide

3.2   Status change commands

The status change commands are intended to change the servo or brake status.

Servo status change (SRVO)

Format	@SRVO<1 or 0>[.<node number>] c/r l/f
Meaning	Changes the servo status.

Function

This command has the same function as the servo ON (SERVO) input.

Setting

<1 or 0>   : 1 Servo ON, 0 Servo OFF

<Node number> : 1 to 16 (This setting can be omitted when the same command is sent to all the controllers connected with the host device, as by daisy chain connection.)

Communication example

Transmission	Response
@SRVO1.1 c/r l/f	Servo ON
OK.1 c/r l/f	Normal end

Brake status change (BRK)

Format	@BRK<1 or 0>[.<node number>] c/r l/f
Meaning	Changes the brake status.

Function

Changes the brake status. Note that the brake status cannot be changed while the servo is ON.

Setting

<1 or 0>   : 1 Brake ON, 0 Brake release

<Node number> : 1 to 16 (This setting can be omitted when the same command is sent to all the controllers connected with the host device, as by daisy chain connection.)

Communication example

Transmission	Response
@BRK0.1 c/r l/f	Brake release
OK.1 c/r l/f	Normal end

Reset (RESET)

Format	@RESET[.<node number>] c/r l/f
Meaning	Performs the reset.

Function

This command has the same function as the reset (RESET) input.
When executing this command, the following operations are performed.

    (1) Resets the alarm.

    (2) Clears the point number output.

    (3) Clears the remaining movement amount of the relative positioning operation.

Setting

<Node number> : 1 to 16 (This setting can be omitted when the same command is sent to all the controllers connected with the host device, as by daisy chain connection.)

Communication example

Transmission	Response
@RESET.1 c/r l/f	Reset
OK.1 c/r l/f	Normal end

3.3 Edit commands

The edit commands are intended to write data, such as parameter or point.

Point data writing 1 (M, P, S, AC, DC, Q, ZL, ZH, N, J, F, T)

Format	@M\<point number>[.\<node number>]=\<setting value> c/r l/f @P\<point number>[.\<node number>]=\<setting value> c/r l/f @S\<point number>[.\<node number>]=\<setting value> c/r l/f @AC\<point number>[.\<node number>]=\<setting value> c/r l/f @DC\<point number>[.\<node number>]=\<setting value> c/r l/f @Q\<point number>[.\<node number>]=\<setting value> c/r l/f @ZL\<point number>[.\<node number>]=\<setting value> c/r l/f @ZH\<point number>[.\<node number>]=\<setting value> c/r l/f @N\<point number>[.\<node number>]=\<setting value> c/r l/f @J\<point number>[.\<node number>]=\<setting value> c/r l/f @F\<point number>[.\<node number>]=\<setting value> c/r l/f @T\<point number>[.\<node number>]=\<setting value> c/r l/f
Meaning	Writes the setting value to the individual data of a specified point, and saves it into the memory.

Function

Writes the setting value to the individual data of a specified point. The written data is saved into the memory (EEPROM). The command may vary depending on the type of individual data. For details, see the table below.

■ Command and data type

Command	Type	Unit	
		Standard Setting	**Custom Setting**
M	Operation type	-	
P	Position	0.01mm	
S	Speed	%	0.01mm/s
AC	Acceleration	%	$0.01m/s^2$
DC	Deceleration	%	
Q	Push	%	
ZL	Zone (-)	0.01mm	
ZH	Zone (+)	0.01mm	
N	Near width	0.01mm	
J	Jump	-	
F	Flag	-	
T	Timer	ms	

⚠ **CAUTION**

There is a limit to the number of data writing cycles for the memory (EEPROM). So, when it is required to frequently write the data to the memory, use commands described in "point data writing 2".

💡 **NOTE**

The individual data of the point data related to the position or speed may include the decimal point due to the specifications. However, when handling such data using the communication command, all of data are handled as integer values. For example, when the position data is 20(mm), the communication command handles this value as "2000(10^{-2}mm)" not including the decimal point.

TIP

For point data details, see Chapter 3, section 2, "Point data" of the Controller Guide.

Communication Command Guide

Setting

<Point number> : 1 to 255

<Node number> : 1 to 16 (This setting can be omitted when the same command is sent to all the controllers connected with the host device, as by daisy chain connection.)

Communication example

Transmission	Response	
@P1.1=30000 c/r l/f		Writes "30000" to "Position" of point data 1.
	OK.1 c/r l/f	Normal end
@S1.1=50 c/r l/f		Writes "50" to "Speed" of point data 1.
	OK.1 c/r l/f	Normal end
@AC1.1=100 c/r l/f		Writes "100" to "Acceleration" of point data 1.
	OK.1 c/r l/f	Normal end
@DC1.1=50 c/r l/f		Writes "50" to "Deceleration" of point data 1.
	OK.1 c/r l/f	Normal end
@M1.1=1 c/r l/f		Writes "1" (ABS) to "Operation type" of point data 1.
	OK.1 c/r l/f	Normal end

Point data writing 2 (P_, S_, AC_, DC_, Q_)

Format	@P_<point number>[.<node number>]=<setting value> c/r l/f @S_<point number>[.<node number>]=<setting value> c/r l/f @AC_<point number>[.<node number>]=<setting value> c/r l/f @DC_<point number>[.<node number>]=<setting value> c/r l/f @Q_<point number>[.<node number>]=<setting value> c/r l/f
Meaning	Writes the setting value to the individual data of a specified point.

Function

Writes the setting value to the individual data of a specified point. The written data is not saved into the memory. The command may vary depending on the type of individual data. For details, see the table below.

■ Command and data type

Command	Type	Unit	
		Standard Setting	**Custom Setting**
P_	Position	0.01mm	
S_	Speed	%	0.01mm/s
AC_	Acceleration	%	0.01m/s^2
DC_	Deceleration	%	
Q_	Push	%	

NOTE
- Even when the setting value is written using this command, the value is not saved into the memory. So, the value is returned to its previous value after the power has been turned off, and then turned on again. When the setting value needs to be saved into the memory, it is necessary to write the operation type (M) after the setting value has been written.
- The individual data of the point data related to the position or speed may include the decimal point due to the specifications. However, when handling such data using the communication command, all of data are handled as integer values. For example, when the position data is 20(mm), the communication command handles this value as "2000(10^{-2}mm)" not including the decimal point.
- This command is valid from version 1.04.xxx or higher.

TIP
For point data details, see Chapter 3, section 2, "Point data" of the Controller Guide.

Setting

<Point number> : 1 to 255

<Node number> : 1 to 16 (This setting can be omitted when the same command is sent to all the controllers connected with the host device, as by daisy chain connection.)

Communication example

Transmission	Response	
@P_1.1=30000 c/r l/f		Writes "30000" to "Position" of point data 1.
	OK.1 c/r l/f	Normal end
@S_1.1=50 c/r l/f		Writes "50" to "Speed" of point data 1.
	OK.1 c/r l/f	Normal end
@AC_1.1=100 c/r l/f		Writes "100" to "Acceleration" of point data 1.
	OK.1 c/r l/f	Normal end
@DC_1.1=50 c/r l/f		Writes "50" to "Deceleration" of point data 1.
	OK.1 c/r l/f	Normal end

Current position teaching (TEACH)

Format	@TEACH<point number>[.<node number>] c/r l/f
Meaning	Teaches the current position to the position data of specified point data.

Function

This command has the same function as the current position teaching (TEACH) input.

NOTE
- The current position teaching using the communication command does not relate to the manual mode and interlock statuses.
- If the return-to-origin is not completed, the abnormal end is returned.

Setting

<Point number> : 1 to 255

<Node number> : 1 to 16 (This setting can be omitted when the same command is sent to all the controllers connected with the host device, as by daisy chain connection.)

Communication example

Transmission	Response	
@TEACH2.1 c/r l/f		Teaches the current position to point data 2.
	OK.1 c/r l/f	Normal end

Point data copying (COPY)

Format	@COPY<point number 1>-<point number 2>[.<node number>] c/r l/f
Meaning	Copies the data of the point number 1 to the data of the point number 2.

Function

Copies the data of point number 1 to point number 2.

Setting

<Point number> : 1 to 255

　　　　　　< Point number 1> Copy source number

　　　　　　< Point number 2> Copy destination number

<Node number> : 1 to 16 (This setting can be omitted when the same command is sent to all the controllers connected with the host device, as by daisy chain connection.)

Communication example

Transmission	Response	
@COPY2-3.1 c/r l/f		Copies point data 2 to point data 3.
	OK.1 c/r l/f	Normal end

Point data deleting (DEL)

Format	@DEL<point number 1>[-<point number 2>][.<n>] c/r l/f
Meaning	Deletes specified point data.

Function

Deletes the point data between Point No.1 and Point No.2.

> **NOTE**
>
> If the number specified for Point No.1 is larger than that of Point No.2, the point data between Point No.2 and Point No.1 is deleted.

Setting

<Point number> : 1 to 255

< Point number 1> Delete start number

< Point number 2> Delete end number

When the number of point data you want to delete is "1", < point number 2> can be omitted.

<Node number> : 1 to 16 (This setting can be omitted when the same command is sent to all the controllers connected with the host device, as by daisy chain connection.)

Communication example

Transmission	Response	
@DEL1.1 c/r l/f		Deletes point data 1.
	OK.1 c/r l/f	Normal end
@DEL1-3.1 c/r l/f		Deletes point data 1 to 3.
	OK.1 c/r l/f	Normal end

Parameter data writing (K)

Format	@K<parameter number>[.<node number>]=<setting value> c/r l/f
Meaning	Writes the setting value to a specified parameter.

Function

Writes the setting value to a specified parameter.

> ⚠ **CAUTION**
>
> **When parameters need to be edited, do not edit parameters not described in this guide. Doing so may cause a communication failure or malfunction.**

> **NOTE**
>
> • Some parameter data may include the decimal point due to the specifications. However, when handling such data using the communication command, all of data are handled as integer values.For example, when K1 ((-) software limit) is 20(mm), the communication command handles this value as "2000(10^{-2}mm)" not including the decimal point.
> • The operation parameter, I/O parameter, and option parameter you have changed become valid after the power has been turned off, and then turned on again.

Setting

<Parameter number> :1 to 138

<Node number>   :1 to 16 (This setting can be omitted when the same command is sent to all the controllers connected with the host device, as by daisy chain connection.)

> **TIP**
>
> For parameter number details, see Chapter 3, section 4, "Parameter data" of the Controller Guide.

Communication example

Transmission	Response	
@K10.1=50 c/r l/f		Writes "50" to parameter data K10 (JOG speed).
	OK.1 c/r l/f	Normal end

Automatic node number setting (SETID)

Format	@SETID
Meaning	Sets node numbers for daisy-chained controllers.

Function

Sets the node numbers to the daisy-chained controllers from "1" in order of distance starting from the controller nearest to the host communication device.

⚠ WARNING ───

- THE MAXIMUM NUMBER OF CONTROLLERS THAT CAN BE DAISY-CHAINED IS 16. IF 17 OR MORE CONTROLLERS ARE CONNECTED, THEY MAY NOT OPERATE PROPERLY.
- MAKE SURE THAT THERE ARE NO DAISY-CHAINED CONTROLLERS HAVING THE SAME NODE NUMBER BEFORE SENDING OTHER COMMAND.
  IF THERE ARE CONTROLLERS WITH THE SAME NODE NUMBER, PERFORM AUTOMATIC NODE NUMBER SETTING AGAIN. IF YOU DO NOT DO THIS, THE SYSTEM MAY NOT OPERATE PROPERLY.

Communication example (16 daisy-chained controllers)

Transmission	Response	
@SETID c/r l/f		Performs automatic node number setting
	OK.1 c/r l/f	Node number 1 setting end
	OK.2 c/r l/f	Node number 2 setting end
	:	
	OK.16 c/r l/f	Node number 16 setting end

⚠ CAUTION ───

If you receive several identical responses, there is a duplication of node number.
(Example) When reading the node number (K38) from all the nodes by query command

Transmission	Response	
@?K38 c/r l/f	K38.1=1 c/r l/f	
	OK.1 c/r l/f	
	K38.2=2 c/r l/f	⎤
	OK.2 c/r l/f	⎥ Duplication
	K38.2=2 c/r l/f	⎥
	OK.2 c/r l/f	⎦

In this case, be sure to perform automatic node number setting.

Communication Command Guide

3.4　Query commands

The query commands are intended to read the data or robot status.

Point data reading (?M, ?P, ?S, ?AC, ?DC, ?Q, ?ZL, ?ZH, ?N, ?J, ?F, ?T)

Format	@?M<point number>[.<node number>] c/r l/f @?P<point number>[.<node number>] c/r l/f @?S<point number>[.<node number>] c/r l/f @?AC<point number>[.<node number>] c/r l/f @?DC<point number>[.<node number>] c/r l/f @?Q<point number>[.<node number>] c/r l/f @?ZL<point number>[.<node number>] c/r l/f @?ZH<point number>[.<node number>] c/r l/f @?N<point number>[.<node number>] c/r l/f @?J<point number>[.<node number>] c/r l/f @?F<point number>[.<node number>] c/r l/f @?T<point number>[.<node number>] c/r l/f
Meaning	Reads the individual data of a specified point.

Function

Reads the individual data of a specified point.
The command may vary depending on the type of individual data. For details, see the table below.

■ Command and data type

Command	Type	Unit	
		Standard Setting	Custom Setting
?M	Operation type	-	
?P	Position	0.01mm	
?S	Speed	%	0.01mm/s
?AC	Acceleration	%	0.01m/s^2
?DC	Deceleration	%	
?Q	Push	%	
?ZL	Zone (-)	0.01mm	
?ZH	Zone (+)	0.01mm	
?N	Near width	0.01mm	
?J	Jump	-	
?F	Flag	-	
?T	Timer	ms	

> **NOTE**
> The individual data of the point data related to the position or speed may include the decimal point due to the specifications. However, when handling such data using the communication command, all of data are handled as integer values. For example, when the position data is 20(mm), the communication command handles this value as " 2000(10^{-2}mm)" not including the decimal point.

Setting

<Point number> : 1 to 255

<Node number> : 1 to 16 (This setting can be omitted when the same command is sent to all the controllers connected with the host device, as by daisy chain connection.)

Communication example

Transmission	Response	
@?P1.1 c/r l/f		Reads "Position" of point data 1.
	P1.1=30000 c/r l/f	Receives the data.
	OK.1 c/r l/f	Normal end
@?S2.1 c/r l/f		Reads "Speed" of point data 2.
	S2.1=100 c/r l/f	Receives the data.
	OK.1	Normal end

Parameter data reading (?K)

Format	@?K<parameter number>[.<node number>] c/r l/f
Meaning	Reads a specified parameter.

Function

Reads the setting value of a specified parameter.

NOTE

Some parameter data may include the decimal point due to the specifications. However, when handling such data using the communication command, all of data are handled as integer values. For example, when K1 ((-) software limit) is 20(mm), the communication command handles this value as " 2000(10^{-2}mm)" not including the decimal point.

Setting

<Parameter number> :1 to 138

<Node number>   :1 to 16 (This setting can be omitted when the same command is sent to all the controllers connected with the host device, as by daisy chain connection.)

TIP

For parameter number details, see Chapter 3, section 4, "Parameter data" of the Controller Guide.

Communication example

Transmission	Response	
@?K10.1 c/r l/f		Reads parameter data K10 (JOG speed).
	K10.1=50 c/r l/f	Receives the data.
	OK.1 c/r l/f	Normal end

Status data reading (?D)

Format	@?D<status number>[.<node number>] c/r l/f
Meaning	Reads specified status information.

Function

Reads the status information, such as current position or speed.

Setting

<Status number> : 0 to 20 (See the table below.)

<Node number> : 1 to 16 (This setting can be omitted when the same command is sent to all the controllers connected with the host device, as by daisy chain connection.)

■ Data number and type of status information

Number	Name	Unit	Contents
0	Current position	0.01mm	Current position information
1	Current speed	0.01mm/s	Actual speed information
2	Electrical current	%	Percentage of electrical current to rated current
6	Position command	0.01mm	Position command information currently running
7	Speed command	0.01mm/s	Speed command information currently running
9	Voltage value	0.1V	Motor drive voltage
10	Temperature	°C	Temperature of motor drive module
13	Current point number	-	Point number of positioning operation currently running
14	Load rate	%	Overload error occurs if the load rate reaches 100%.
17	Machine reference	%	Machine reference (See the explanation on Machine reference stated in Chapter 5, section 2.3, "Origin point and coordinates relationship" of the Controller Guide.)
18	Operation status	-	(see table below)

Value	Meaning	
-1	Return-to-origin is being executed.	
0	Stopping	
1	Operation type	ABS
2		INC
3		ABS merge
4		INC merge
5		ABS push
6		INC push
7		ABS deceleration push
8		INC deceleration push

Communication example

Transmission	Response
@?D0.1 c/r l/f	Reads the information on status number 0 (current position).
	D0.1=32000 c/r l/f — Receives the data.
	OK.1 c/r l/f — Normal end

Input/output information reading (?IN, ?INB, ?OUT, ?OUTB)

Format	Input information @?IN<input number>[.<node number>] c/r l/f @?INB<input bit number>[.<node number>] c/r l/f Output information @?OUT<output number>[.<node number>] c/r l/f @?OUTB<output bit number>[.<node number>] c/r l/f
Meaning	Reads specified input/output information.

Function

Reads the information on specified input/output signal.

The read-out results of the input/output information in decimal notation are returned.

Setting

<Input/output number>   :1 (See the table below.)

<Input/output bit number> :0 to 15 (See the table below.)

<Node number>   :1 to 16 (This setting can be omitted when the same command is sent to all the controllers connected with the host device, as by daisy chain connection.)

■ Input/output information type

Input/output Number	Input/output Bit Number	Input		Output	
		Symbol	Meaning	Symbol	Meaning
1	0	PIN0	Point number selection	POUT0	Point number output
	1	PIN1		POUT1	
	2	PIN2		POUT2	
	3	PIN3		POUT3	
	4	PIN4		POUT4	
	5	PIN5		POUT5	
	6	PIN6		POUT6	
	7	PIN7		POUT7	
	8	JOG+	JOG movement (+ direction)	OUT0	Control output
	9	JOG-	JOG movement (- direction)	OUT1	
	10	MANUAL	Manual mode	OUT2	
	11	ORG	Return-to-origin	OUT3	
	12	/LOCK	Interlock	BUSY	Operation is being executed.
	13	START	Start	END	Operation completion
	14	RESET	Reset	/ALM	Alarm
	15	SERVO	Servo ON	SRV-S	Servo status

Communication example

Transmission	Response	
@?IN1.1 c/r l/f		Reads the information on input 1 (bit 15 to 0).
	IN1.1=36864 c/r l/f	Receives the data. 36864 = 9000h
	OK.1 c/r l/f	Normal end
@?OUTB0.1 c/r l/f		Reads the information on output bit 0.
	OUTB0.1=1 c/r l/f	Receives the data.
	OK.1 c/r l/f	Normal end

Word input/output information reading (?WIN, ?WOUT)

Format	Input information @?WIN\<word input number>[.\<node number>]c/r l/f Output information @?WOUT\<word output number>[.\<node number>]c/r l/f
Meaning	Reads specified word input/output information.

Function

Reads the word input/output information.

The read-out results of the word input/output information in decimal notation are returned.

> 💡 NOTE
>
> The word input/output is a data area to be used by the remote command.

Setting

\<Word input/output number> : 0 to 3 (See the table below.)

\<Node number>   : 1 to 16 (This setting can be omitted when the same command is sent to all the controllers connected with the host device, as by daisy chain connection.)

■ Input/output information type

Input/output Number	Input		Output	
	Symbol	**Meaning**	**Symbol**	**Meaning**
0	WIN0	Execution command	WOUT0	Status
1	WIN1		WOUT1	
2	WIN2	Command option	WOUT2	Command response
3	WIN3		WOUT3	

Communication example

Transmission	Response	
@?WIN1.1 c/r l/f		Reads the information on word input 1 (WIN1).
	WIN1.1=4096 c/r l/f	Receives the data. 4069 = 1000h
	OK.1 c/r l/f	Normal end

Option information reading (?OPT, ?OPTB)

Format	@?OPT<option number>[.<node number>] c/r l/f @?OPTB<option bit number>[.<node number>] c/r l/f
Meaning	Reads specified option information.

Function

Reads the option information, such as zone output or emergency stop status.

The read-out results of the option information in decimal notation are returned.

Setting

<Option number> : 0 to 2 (See the table below.)

<Option bit number> : 0 to 31 (See the table below.)

<Node number> : 1 to 16 (This setting can be omitted when the same command is sent to all the controllers connected with the host device, as by daisy chain connection.)

■ Option information type

	Option Number	Option Bit Number	Symbol	Meaning
Option Information 1	0	1		
			0	PZONE	Individual zone output
			1	NEAR	Near width output
			2	TLM-S	Push status
			3	ORG-S	Return-to-origin completion status
			4	ZONE	Zone output
			5	MOVE	Moving
			6	WARN	Warning output (1: Warning occurs.)
			7	MANU-S	Manual mode status
			8	BUSY	Operation is being executed.
			9	END	Operation completion
			10	ALM	Alarm (1: Alarm status)
			11	SRV-S	Servo status
			12	LOCK	Interlock (1: Interlock status)
			13	BRAKE	Brake status
			14	E-STOP	Emergency stop status (1: Emergency stop)
			15	-	(Reserved.)
Option Information 2		2	16	-	(Reserved.)
			17	-	(Reserved.)
			18	-	(Reserved.)
			19	LINK	Network link status
			20	ORGSEN	Origin sensor signal input
			21 to 31	-	(Reserved.)

NOTE

When option number 0 is specified, all of the 32-bit information are output at once in binary notation.

Communication example

Transmission	Response	
@?OPT1.1 c/r l/f		Reads option information 1 (bit 15 to 0).
	OPT1.1=35336 c/r l/f	Receives the data. 35336 = 8A08h
	OK.1 c/r l/f	Normal end
@?OPTB11.1 c/r l/f		Reads option information bit 11.
	OPTB11.1=1 c/r l/f	SRV-S = 1 (Servo ON status)
	OK.1 c/r l/f	Normal end

Alarm/warning information reading (?ALM, ?WARN)

Format	@?ALM<alarm occurrence number>[.<node number>] c/r l/f
	@?WARN<warning occurrence number>[.<node number>] c/r l/f
Meaning	Reads the alarm/warning information currently occurring.

Function

Reads the alarm/warning information currently occurring.

TIP

For details regarding the alarm and warning numbers and their contents, see Chapter 6 "Troubleshooting" of the Controller Guide.

Setting

<Alarm/warning occurrence number> : 1 to 32

<Node number>   : 1 to 16 (This setting can be omitted when the same command is sent to all the controllers connected with the host device, as by daisy chain connection.)

NOTE

If multiple alarms and warnings occur, the alarm/warning occurrence numbers are sequentially assigned to 1, 2, and so on from a smaller alarm number.
Example) If overload (86) and emergency stop (C1) occur, the alarm occurrence numbers are assigned as follows.
        Alarm occurrence number 1 = 86 (overload)
        Alarm occurrence number 2 = C1 (emergency stop)

Communication example

Transmission	Response	
@?ALM1.1 c/r l/f		Reads the alarm information.
	ALM1.1=86 c/r l/f	Receives the data. Alarm number 86: Overload error is occurring.
	OK.1 c/r l/f	Normal end
@?WARN1.1 c/r l/f		Reads the warning information.
	OK.1 c/r l/f	Normal end (No warning occurs.)