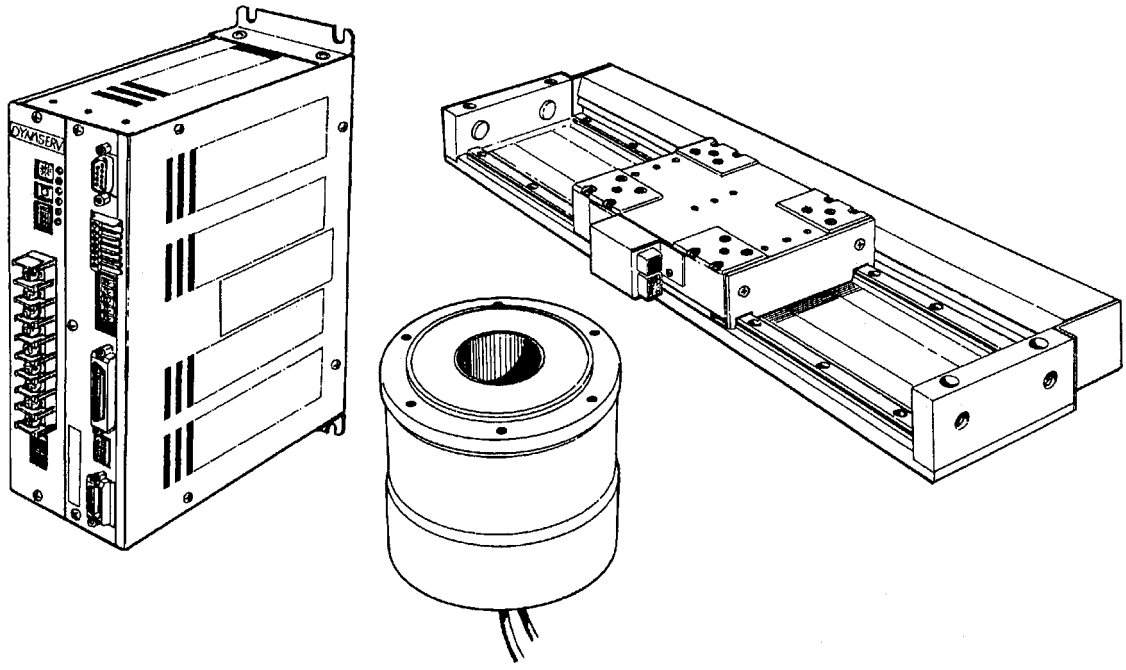
Technical Manual

DYNASERV & LINEARSERV
Field Network/CC – Link Interface



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Introduction

Thank you very much for your purchase of the DD servo actuator DYNASERV/LINEARSERV. The DYNASERV/LINEARSERV are an outer rotor type DD servo actuator that achieves high torque, high speed and high precision. It can be used in a wide rang e of applications in the field of factory automation-related devices, including automated assembly machines and index units.
This technical manual explains its compatibility of the DrvMII type driver with open field networks.
Please refer to this technical manual thoroughly when you use the product.

Precautions for Using this Technical Manual

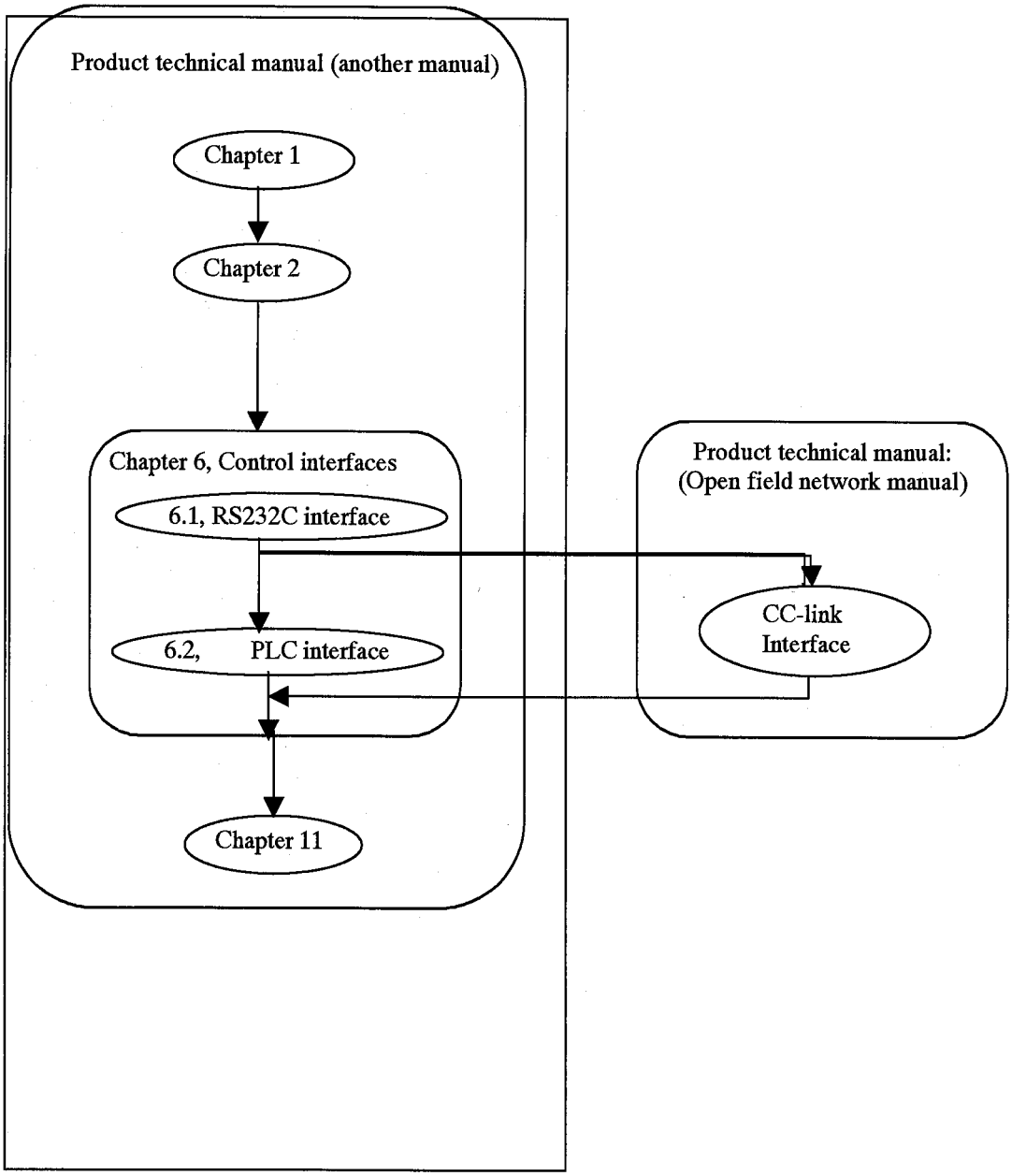
1. Please make sure that this manual is handed out to the end user.
2. Please read this manual thoroughly and understand the contents fully before proceeding to th e operation of the product.
3. Please note that the safety protection may be lost and the proper safety may not be guaranteed if the product is not used according to the instructions described in this manual.
4. Always make sure that this manual is handy f or the operator when using this product. If it is stained or lost, we will distribute copies upon request, subject to charge.
5. This manual explains details of the features included in the product and does not guarantee to meet the specific purpose of the customers.
6. No part of this manual may be reprinted or reproduced in any form without permission.
7. The information in this document is subject to change without notice.
8. The information contained in this document is believed to be accurate at the t ime of publication, but if you notice any inaccuracies, errors, or omissions, please contact our sales or service staff.

How to read this technical manual

■Configuration of this manual

This technical manual has been instructed the content of 「Chapter.6.1,PLC interface」 in product technical manual (another manual) for each field network.
This technical manual has been instructed for interface of device net.

Please read product technical manual (another manual) before you start reading this technical manual.



Regarding the safe usage of this device

- This product has been marked with ⚠ and ⚠ Warnings signs so that it can be used safely. Ignoring precautions and prohibitions related to these signs and using this product in an incorrect way may cause danger to the life and body of the operator. Always follow the precautions and observe the prohibitions explained below.
- Please make sure to understand the information given below completely before you start reading the instruction manual.
- Please keep the instruction manual and this sheet handy while using the product . In addition, make sure that they are handed out to the operator of the product.

⚠ Warnings

● Operation warning:

The motor periphery part of this device rotates at a high speed. People and objects should be kept outside the rotation radius when a load is attached.

● Warning about electric shock:

Make sure to connect the device to ground to avoid electric shock.
Make sure to turn the power off when connecting cables to the driver part.
Make sure to turn the power off when removing the cover of the driver part while performing adjustment operations, etc.

● Fire and electric shock warning:

If any abnormalities such as abnormal noise, bad smell, or release of fumes that coming from the device are detected while it is in operation, turn the power off immediately, pull out the power supply plug, and contact us.
If the device is dropped or given a strong impact, stop the operation immediately, turn the power off, and contact us.
Do not operate at power supply voltages other than the one indicated on the device.

● Fire and electric shock warning:

Avoid dropping or inserting metal shards or combustible materials, or allowing water to get into the opening parts of the device (e.g., the clearance between the rotor and stator of the motor part, or the air vent of the driver part). In such an eventuality, turn the power off immediately and contact us.
The cables coming out from the motor part or the bottom of the index part should not be forcibly bent, twisted, pulled, heated, or placed under a heavy object.
Never try to remodel or repair the device by yourself.

- This product has been marked with ⚠ and ⚠Precautions signs so that it can be used safely. Ignoring precautions and prohibitions related to these signs and using this product in an incorrect way may cause danger to the life and body of the operator. Always follow the precautions and observe the prohibitions explained below.
- Please make sure to understand the information given below completely before you start reading the instruction manual.
- Please keep the instruction manual and this sheet handy while using the product. In addition, make sure that they are handed out to the operator of the product.

⚠ Precautions

- Make sure to read the instruction manual before using the device.
  Operational mistakes and faulty wiring may result in damages and failure of the device.
- Make sure to check the wiring once more before turning the power on.
  Faulty wiring may result in fire, electric shock, or damage of the device.
- Confirm that the proper combination of motor and driver parts is used. Using the device with an incorrect configuration may result in failure. (Be sure to confirm the model --MODEL--on the rating nameplates.)
- Make sure the conditions of temperature, humidity, dust, etc. are as specified for the installation and storage environments.
- Do not block the air vent of the device. Keep the specified open space around the device as well. Poor ventilation may cause overheating, leading to failure.
- Some of the motor parts are very heavy; please pay sufficient attention to this when carrying and installing the parts. If the weight is more than 10kg (22.04 lbs), carrying or lifting tools should be used as much as possible.
- Both the motor and driver parts should be installed in the sp ecified orientation.
- Keep the protection cover (transparent plastic plate) attached on the power supply terminal part of the driver. It is provided to prevent inadvertent electric shock accidents.

Chapter 1
CC-Link Interface

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1. Overview

The PLC interface for this driver can be chosen from a list of selectable options. It is possible to select a digital I/O interface, CC-Link interface , PROFIBUS-DP interface, and DeviceNet interface.
The digital I/O interface is an I/O interface with 32 input points (sink type output support photo coupler inputs) and 20 output points (sink type open collector output).
CC-Link (Control & Communication Link) interface is multi-vendor compatible field network interfaces. They allow for a reduction of wiring, high-speed data communication, and communication with various intelligen t devices.
In this technical manual, only the CC-Link interface is explained.

1.1 Details of the Front Panel of the Driver

The figure below shows a detailed layout of the front panel of the driver, at which the CC-Link interface is mounted. The interface part is identical for all models, although there may be slight differences depending on the driver capacity and availability of optional equipment.

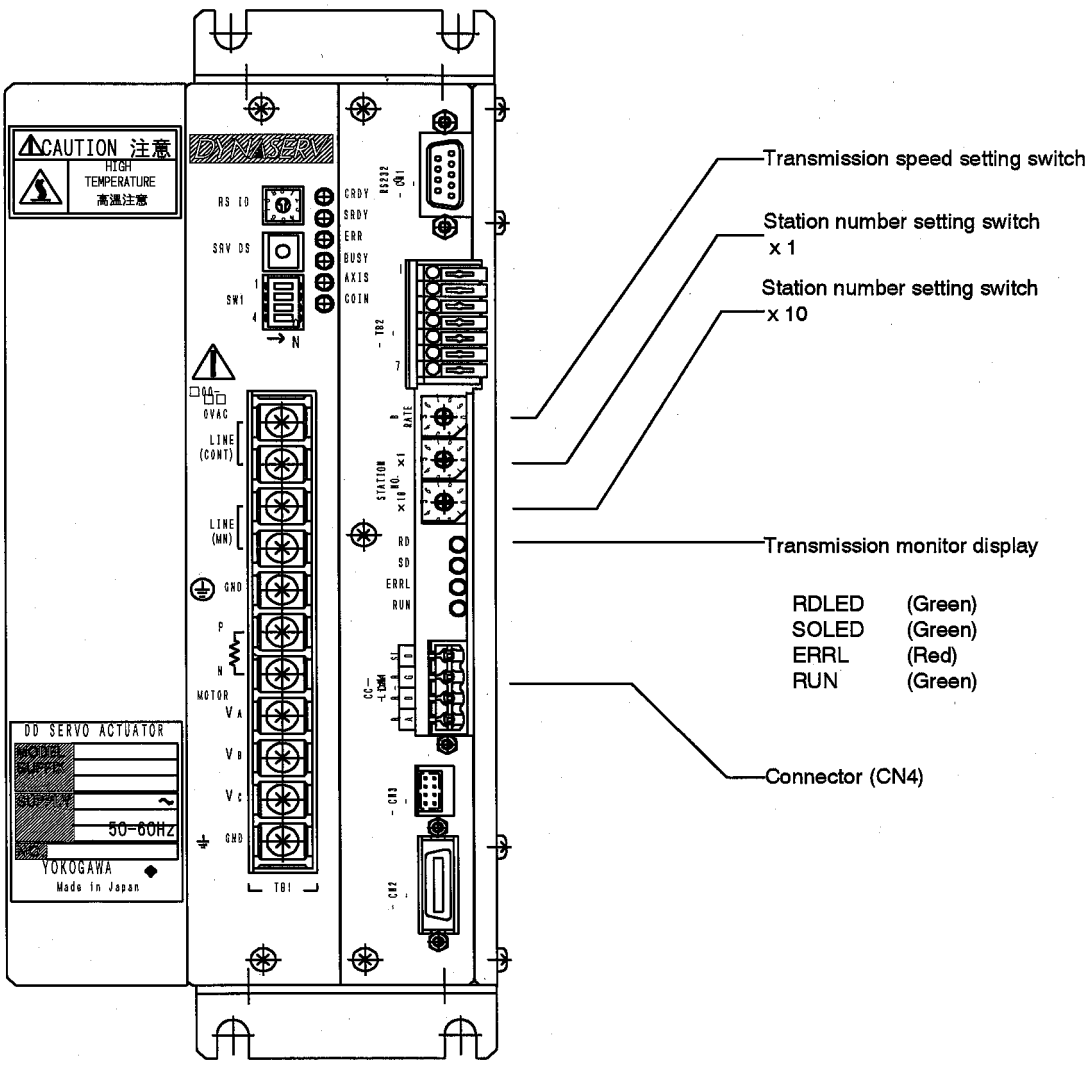


Figure *. * Detailed layout of the front panel of the driver

2. Connection and Hardware Setting

2.1 Transmission Speed Setting Switch

The choice of transmission speeds is restricted, depending on the overall cable distance. Refer to the CC-Link Interface User's Manual, etc. for detailed information on transmission speed and maximum cable length.

The transmission speeds that can be set are as follows:

Number	Communication speed	Overall cable length	Cable length between stations
0	156 kbps	1200 m	More than 0.2 m
1	625 kbps	600 m	
2	2.5 Mbps	200 m	
3	5 Mbps	150 m	
4	10 Mbps	100 m	
Other than 0 to 4	Setting error	---	

In the case of FANC-SB (110 Ω)

2.2 Station Number Setting Switches

Any number from 1 to 64 can be set for each remote station according to the CC-Link interface specifications. This device is classified as a remote device station. Therefore, it occupies an assigned station and the next station. Avoid 0 (the station number reserved for the master station) and 64 (the last st ation number) when setting the station number. The station number should be set in such a way that it does not conflict with numbers for other stations on the network.

The following example sets the driver to be the first station.

Station number	Most significant	Least significant	Remarks
0	0	0	Reserved for the master station
1	0	1	Setting for station number 1 and number 2
2	0	2	Setting for station number 2 and 3
:			
63	6	3	Setting for station number 63 and 64
64	6	4	Cannot be set for this driver.

2.3 Transmission Monitor Display

The LEDs of the transmission monitor display show the communication status of the CC-Link. The table below lists the details for each LED.

LED name	On	Off	Flashing
RUN	Refresh & polling normal reception	Carrier detection error before joining the network Resetting time over	-----
ERRL	CRC error Switch setting error	Resetting normal communication	Switch setting changed from the switch setting when canceling a reset.
SDLED	Transmitting	At error occurrence or resetting	-----
RDLED	Detecting a carrier	At error occurrence or resetting	-----

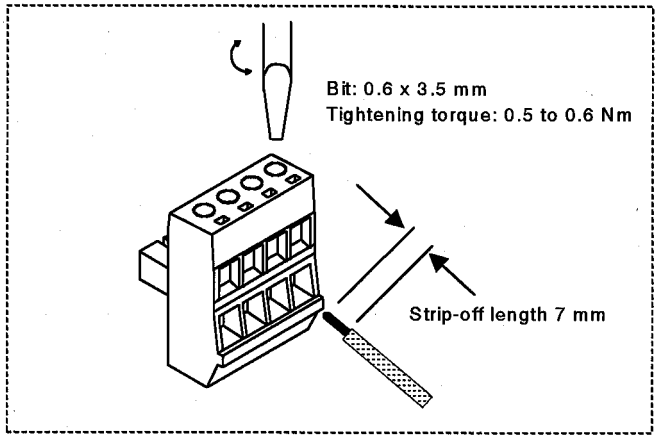
2.4 Connector

[CN4]

Phoenix Contact
TMSTBP 2, 5/4-ST-5, 08

Pin #	Signal name
01	DA
02	DB
03	DG
04	SLD

For pin numbers, refer to the panel of the driver.



Wiring of communication cable

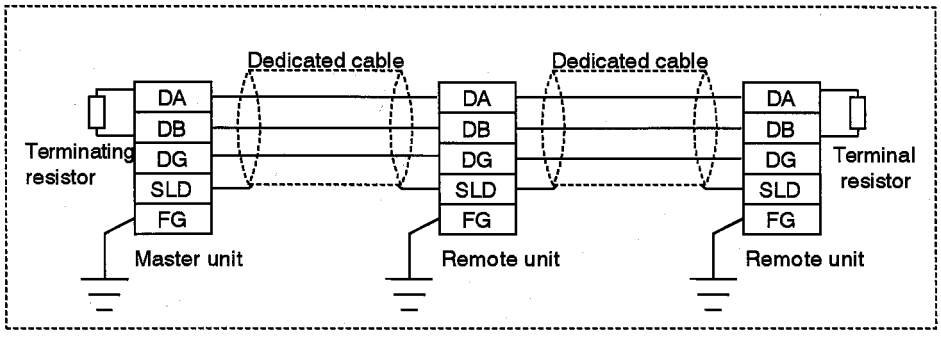
2.5 Communication Cable and Terminating Resistor

Two types of dedicated cables can be used for the CC-Link system: FANC-SBH and FANC-SB. The table below lists the different terminating resistors that should be used according to the model name of the CC -Link dedicated cable. In addition, note that the performance cannot be guaranteed when cables other than the CC -Link dedicated cables are used. Refer to the CC-Link Interface User's Manual, etc. for details about the CC-Link dedicated cables.
FANC-SB and FANC-SBH are product model names of Kuramo Electric Co., Ltd.

Cable	FANC-SBH	FANC-SB
Terminating resistor	130 Ω, 1/2 w	110 Ω, 1/2 w

2.6 Unit Connection Method

The figure below shows a typical example of a configuration when connecting this driver with the CC-Link. The transmission path is a bus type (conforming to EIA RS-485). Note that the specific system configuration will be different for each customer. Refer to the user's manuals, etc. of the CC-Link master station and the CC -Link interface for detailed information.



2.7 Details of Linking Method

Refer to the user's manuals, etc. of the CC-Link master station and the CC -Link interface to which this driver is linked.

3. I/O Map

[I/O map]

Master station → Remote station (this driver)

Remote output

	7	6	5	4	3	2	1	0
RY(n+0)7.. 0	IN _MODE.3	IN _MODE.2	IN _MODE.1	IN _MODE.0	IN _MODE _STOP	IN _MODE _START	IN _SERVO	IN _EMG
RY(n+0)F.. 8	IN_1_ CODE.7	IN_1_ CODE.6	IN_1_ CODE.5	IN_1_ CODE.4	IN_1_ CODE.3	IN_1_ CODE.2	IN_1_ CODE.1	IN_1_ CODE.0
RY(n+1)7.. 0	IN _POS_INH	IN_FN	reserve	IN _M_ANS	IN _ERR _RESET	IN _ABORT	IN _INTER LOCK	IN _PRG _REWIND
RY(n+1)F.. 8	IN_GAIN	IN _ABS _STR_OPT	IN_ ROTDIR_ STR_OPT1	IN_ ROTDIR_ STR_OPT0	IN _SIGN _INDEX	IN _OVER RIDE_SEL	IN _JOG_DN	IN _JOG_UP
RY(n+2)7.. 0	reserve	IN_MON _B_CHNG _REQ	reserve	IN_MON _A_CHNG _REQ	reserve	IN _PRM _RD_REQ	reserve	IN _PRM _WR_REQ
RY(n+2)F.. 8	reserve	reserve	reserve	reserve	reserve	reserve	reserve	reserve
RY(n+3)7.. 0	reserve	reserve	reserve	reserve	reserve	reserve	reserve	reserve
RY(n+3)F.. 8	reserve	reserve	reserve	reserve	reserve	(Note) reserve	(Note) reserve	(Note) reserve

n: Address assigned to the master unit by the station number setting

Remote register

RWw(n+0)	IN_WR_PRM_NO	Parameter write	Parameter number
RWw(n+1)	IN_RD_PRM_NO	Parameter/monitor read number	Parameter/monitor number
RWw(n+2)	IN_MON_A_PRM_NO	Parameter/monitor display A	Parameter/monitor number
RWw(n+3)	IN_MON_B_PRM_NO	Parameter/monitor displayB	Parameter/monitor display B
RWw(n+4)	IN_WR_PRM_DATA(Low)	Parameter write	Data to be written
RWw(n+5)	IN_WR_PRM_DATA(High)	Parameter write	Data to be written
RWw(n+6)	reserve		
RWw(n+7)	reserve		

n: Address assigned to the master unit by the station number setting

Note: This driver does not support RY(n+3)8 [initial data processing complete flag], RY(n+3)9 [initial data setting request flag], and RY(n+3)A [error reset request flag], which are all defined in the CC-Link system specifications. In order to utilize these functions, commands specific to this driver should be used.

[I/O map]

Remote station (this driver) → Master station

Remote input

	7	6	5	4	3	2	1	0
RX(n+0)7.. 0	OUT_COORDI_RDY	reserve	OUT_M_EN	OUT_ALARM	OUT_ERR	OUT_MODE_EXE	OUT_SRDY	OUT_CRDY
RX(n+0)F.. 8	OUT_0_CODE.7	OUT_0_CODE.6	OUT_0_CODE.5	OUT_0_CODE.4	OUT_0_CODE.3	OUT_0_CODE.2	OUT_0_CODE.1	OUT_0_CODE.0
RX(n+1)7.. 0	reserve	reserve	reserve	reserve	OUT_AREASIG.1	OUT_AREASIG.0	OUT_POS	OUT_COIN
RX(n+1)F.. 8	OUT_MON_B_CHNG_OK	OUT_MON_B_CHNG_END	OUT_MON_A_CHNG_OK	OUT_MON_A_CHNG_END	OUT_PRM_RD_OK	OUT_PRM_RD_END	OUT_PRM_WR_OK	OUT_PRM_WR_END
RX(n+2)7.. 0	reserve	reserve	reserve	reserve	reserve	reserve	reserve	reserve
RX(n+2)F.. 8	reserve	reserve	reserve	reserve	reserve	reserve	reserve	reserve
RX(n+3)7.. 0	reserve	reserve	reserve	reserve	reserve	reserve	reserve	reserve
RX(n+3)F.. 8	reserve	reserve	reserve	reserve	OUT_REMOTE_READY	(Note) reserve	(Note) reserve	(Note) reserve

n: Address assigned to the master unit by the station number setting

Remote register

RWr(n+0)	OUT_RD_PRM_DATA(Low)	Parameter/monitor read	Data to be read
RWw(n+1)	OUT_RD_PRM_DATA(High)	Parameter/monibr read	Data to be read
RWw(n+2)	OUT_MON_A_PRM_DATA(Low)	Parameter/monitor display A	Data to be read
RWw(n+3)	OUT_MON_A_PRM_DATA(High)	Parameter/monitor displayB	Data to be read
RWw(n+4)	OUT_MON_B__PRM_DATA(Low)	Parameter/monitor display A	Data to be read
RWw(n+5)	OUT_MON_B__PRM_DATA(High)	Parameter/monitor displayB	Data to be read
RWw(n+6)	ERR_CODE	Error code (upper 8 bits: main code, lower 8 bits: subcode)	
RWw(n+7)	reserve		

n: Address assigned to the master unit by the station number setting

Note: This driver does not support RX(n+3)8 [initial data processing request flag], RX(n+3)9 [initial data setting complete flag], and RX(n+3)A [error status flag], which are all defined in the CC-Link system specifications. In order to utilize these functions, commands specific to this driver should be used.

4. Operation 1

Some of the operations commanded by input signals via the PLC interface may not function depending on the *operation mode* setting. Refer to Section 5.1 in product technical manual, "*Operation Mode*" for an explanation of the operation mode. In this section, the operations of the CC-Link interface will be explained.

4.1 Explanation of Signals

[Input signals]

Abbreviated name	Signal name	CC-Link
IN_EMG	Emergency stop input	RY(n+0)0
IN_SERVO	Servo command input	RY(n+0)1
IN_MODE_START	Operating action start command input (start)	RY(n+0)2
IN_MODE_STOP	Operating action end command input (stop)	RY(n+0)3
IN_MODE [3..0]	Operation mode number input (binary)	RY(n+0)7 to 4
IN_I_CODE [7..0]	Code input (BCD)	RY(n+0)F to 8
IN_PRG_REWIND	Program auto-rewind input	RY(n+1)0
IN_INTERLOCK	Interlock command input	RY(n+1)1
IN_ABORT	Operating action abort command input (abort)	RY(n+1)2
IN_ERR_RESET	Error reset command input	RY(n+1)3
IN_FN	Position control bandwidth selection	RY(n+1)6
IN_M_ANS	M answer input	RY(n+1)4
IN_POS_INH	Integral position control operation disable input	RY(n+1)7
IN_JOG_UP	Jog + command input	RY(n+1)8
IN_JOG_DN	Jog – command input	RY(n+1)9
IN_OVERRIDE_SEL	Velocity override selection input	RY(n+1)A
IN_SIGN_INDEX	± sign input during index operation	RY(n+1)B
IN_ROTDIR_STR_OPT [1..0]	Moving direction at rotational coordinate start-up option input (binary)	RY(n+1)D to C
IN_ABS_STR_OPT	ABS/INC start-up option input	RY(n+1)E
IN_GAIN	Velocity control bandwidth selection	RY(n+1)F
IN_PRM_WR_REQ	Parameter write request input	RY(n+2)0
IN_PRM_RD_REQ	Parameter/monitor read request input	RY(n+2)2
IN_MON_A_CHNG_REQ	Parameter/monitor display A change request input	RY(n+2)4
IN_MON_B_CHNG_REQ	Parameter/monitor display B change request input	RY(n+2)6
IN_WR_PRM_NO[15..8]	Parameter write number input (binary)	RWwn+0
IN_WR_PRM_NO[7..0]		
IN_RD_PRM_NO[15..8]	Parameter/monitor read number input (binary)	RWwn+1
IN_RD_PRM_NO[7..0]		
IN_MON_A_PRM_NO[15..8]	Parameter/monitor display A number input (binary)	RWwn+2
IN_MON_A_PRM_NO[7..0]		
IN_MON_B_PRM_NO[15..8]	Parameter/monitor display B number input (binary)	RWwn+3
IN_MON_B_PRM_NO[7..0]		
IN_WR_PRM_DATA[31..24]	Parameter write data input (binary)	RWwn+5 Note
IN_WR_PRM_DATA[23..16]		
IN_WR_PRM_DATA[15..8]		RWwn+4 Note
IN_WR_PRM_DATA[7..0]		

Note: Pay attention to the order of data.

[Output signals]

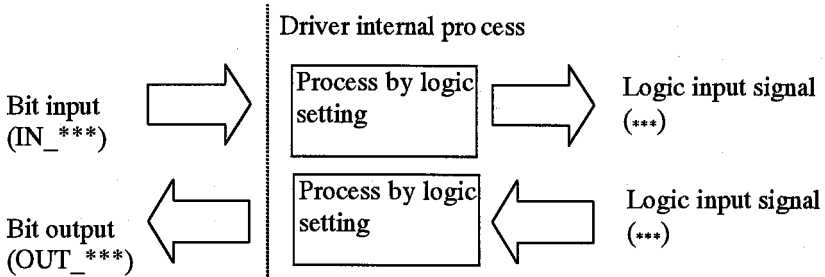
Abbreviated name	Signal name	CC-Link
OUT_CPURDY	CPU ready output	RX(n+0)0
OUT_SRDY	Servo ready output	RX(n+0)1
OUT_MODE_EXE	Operation under execution output	RX(n+0)2
OUT_ERR	Error status output	RX(n+0)3
OUT_ALARM	Alarm status output	RX(n+0)4
OUT_M_EN	M code enable output	RX(n+0)5
OUT_COORDI_RDY	Coordinate adjustment output	RX(n+0)7
OUT_O_CODE [7..0]	Code output (BCD)	RX(n+0)F to 8
OUT_COIN	Position settling status output	RX(n+1)0
OUT_POS	Position status output	RX(n+1)1
OUT_AREA0	Area signal 0 output	RX(n+1)2
OUT_AREA1	Area signal 0 output	RX(n+1)3
OUT_PRM_WR_END	Parameter write end output	RX(n+1)8
OUT_PRM_WR_OK	Parameter write normal output	RX(n+1)9
OUT_PRM_RD_END	Parameter/monitor read end output	RX(n+1)A
OUT_PRM_RD_OK	Parameter/monitor read normal output	RX(n+1)B
OUT_MON_A_CHNG_END	Parameter monitor display A change end output	RX(n+1)C
OUT_MON_A_CHNG_OK	Parameter monitor display A change normal output	RX(n+1)D
OUT_MON_B_CHNG_END	Parameter monitor display B change end output	RX(n+1)E
OUT_MON_B_CHNG_OK	Parameter monitor display B change normal output	RX(n+1)F
OUT_REMOTE_READY	Remote station ready output	RX(n+3)B
OUT_RD_PRM_DATA[31..24]	Parameter/monitor read data output (binary)	RWm+1 Note
OUT_RD_PRM_DATA[23..16]		
OUT_RD_PRM_DATA[15..8]		RWm+0 Note
OUT_RD_PRM_DATA[7..0]		
OUT_MON_A_DATA[31..24]	Parameter/monitor display A data output (binary)	RWm+3 Note
OUT_MON_A_DATA[23..16]		
OUT_MON_A_DATA[15..8]		RWm+2 Note
OUT_MON_A_DATA[7..0]		
OUT_MON_B_DATA[31..24]	Parameter/monitor display B data output (binary)	RWm+5 Note
OUT_MON_B_DATA[23..16]		
OUT_MON_B_DATA[15..8]		RWm+4 Note
OUT_MON_B_DATA[7..0]		
OUT_ERR_CODE_MAIN[7..0]	Error code (main code) output	RWw(n+6)F-8
OUT_ERR_CODE_SUB[7..0]	Error code (subcode) output	RWw(n+6)7-0

Note: Pay attention to the order of data.

4.2 I/O Logic Setting

In the CC-Link interface, it is possible to set the logical relationship of the bit status on the interface and the driver signal status for all available input and output signals. These settings can be made in contact and bit units, respectively.
The input signals IN_*** are processed via the I/O logical conversion and are then expressed as a logical input signal ***. If the signal status is reached, it is expressed as 1 and if the status is not reached, expressed as 0.
A logical output signal *** is expressed as 1 if the status is reached and 0 if the status is not reached. After conversion via the I/O logical setting, it becomes an output signal OUT_***.
The logical setting at shipping from our factories is set to positive logic for all input and output signals. This means that the internal input and output signals are in the status 1 when the corresponding bit is 1. It is possible, however, to use the RS232C interface to confirm the basic operation under the conditions at shipping without connecting the PLC interface by setting IN_SERVO to negative logic via the PC utility.
Refer to Chapter 7 "DrvMII PC Utility" in product technical manual of how to set the I/O logic.
There is no logic setting function regarding remote resister input and output. Remote resister INPUT I N_*** becomes logic input *** and logic output becomes remote resister OUTPUT OUT_***.

Logic setting	Bit Input/Output status	Logic signal
Positive logic setting	0	Status 0
	1	Status 1
Negative logic setting	0	Status 1
	1	Status 0



4.3 Establishing the CC-Link Communication REMOTE_READY

The driver make the REMOTE_READY signal to status 1 when communication with the upper controller is established via the CC-Link interface.
The driver make the REMOTE_READY signal to status 0 when detect an error in the driver.
Be sure to confirm the status of the REMOTE_READY signal first when operating the driver from the host device.

4.4 Servo ON/OFF (SERVO)

The servo command input changes function depending on whether the main operation authority by the operation mode is given to the RS232C interface or the PLC interface.
If the operation mode is set to the RS232C interface, the servo command input functions as the Servo ON enable/disable function. Servo ON is enabled in the status 1. Servo ON is enabled at bit 1 by positive logic setting for the input signal IN_SERVO (the setting at shipment). By negative logic setting, Servo ON is enabled at bit 0. Refer to Section 6.1.4 in technical manual, "@ Commands" for an explanation of how to use the Servo ON/OFF command in the RS232C interface operation mode.
If the operation mode is set to the PLC interface, the servo command input functions as the Servo ON/OFF command function. It becomes a Servo ON command when in the status 1. It becomes a Servo ON command at bit 1 by positive logic setting for the input signal IN_SERVO (the setting at shipment). By negative logic setting, it becomes a Servo ON command at bit 0. Other than by this command, the actual S ervo ON/OFF status is also affected by the setting of the Servo ON disable switch SRV DS on the front panel. See the table below.

Servo ON/OFF SERVO	SRV DS Servo ON disable on the front panel	Actual servo status
Status 0	Disabled	Servo OFF
	Enabled	
Status 1	Disabled	
	Enabled	Servo ON

4.5 Start and Stop (MODE_START MODE_STOP MODE [3..0])

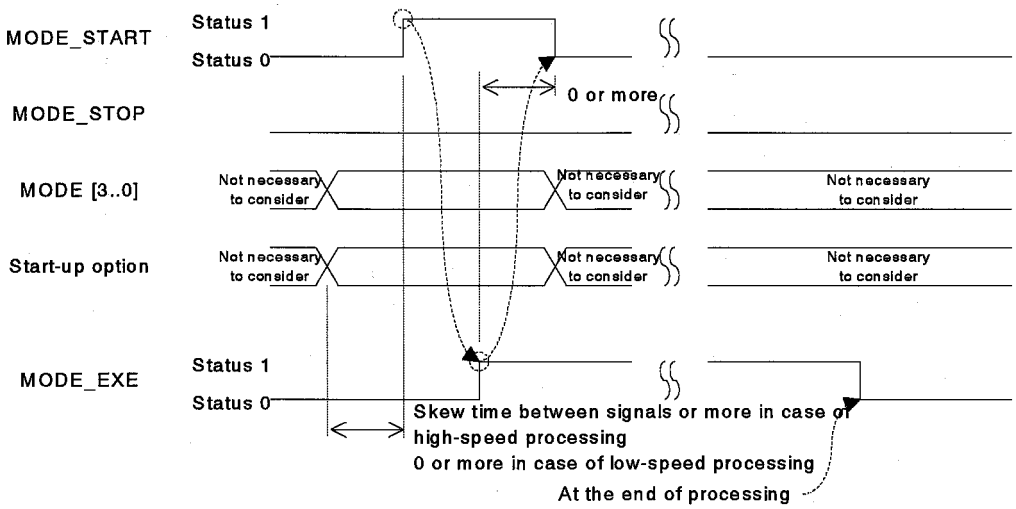
The MODE_START and MODE_STOP commands start and stop operating actions other than jo g moves. They can be issued via the PLC interface when the setting of the operation mode has given the main operation authority to the PLC interface rather than the RS232C interface.
The operating action start and stop commands are issued in the status 1.
When a start command is issued by MODE_START it depends on the operating a ction which signals (start -up options) that must be preset. When issuing a MODE [3..0] command, the number of the operating action you wish to perform must be always set. See the table below.
Moreover, if high-speed processing is not selected in the setting of the *#215 PLC operation: Start signal processing speed selection* parameter, the processing of start commands by MODE [3..0] and start -up options takes place at the next 10 ms scan. In this case, the content of each signal is read and processed after 10 ms has passed after the start command was issued. If the time delay between outputs by the PLC is in the order of several ms, the commands will function properly provided that they are set to the same time or before the start command is issued by MODE_START. However, the time wasted with respect to issuing the start command should be added (10 ms) instead. The total amount of wasted time until the motor start is thus 10 ms (scan time) + 10 ms (read delay) + internal delay time.
When high -speed processing is selected in the #215 parameter setting, the processing of the start command takes place at the next 2 ms scan. In this case, the content of each signal when the start command is issued is read and processed. The time lag between outputs must be taken into consideration on the PLC side and set that much earlier. On the other hand, the time wasted with respect to the start command itself can be eliminated. The total amount of wasted time until the motor start is the 2 ms (scan time) + internal delay time.
In MODE_STOP, the driver response to a stop command varies depending on the operating action. See the table below. Note furthermore that operations of the *self-end type*, which end automatically when the operation is completed, do not require a stop command. Operations of the *non-self-end type*, which cannot complete the operation by itself, must be ended by a stop command by MODE_STOP. In case of operations of the *non-end type*, which cannot be stopped once started, the stop command issued by MODE_STOP is invalid. Refer to Section 5.3 in technical manual , "Operation Functions" for a listing of the end types of the different operations.
Outputs during MODE_EXE operation execution maintain their under -execution status during MODE_START command status (during stat us 1) after the operation is started, even after the operation is over.

No.	Name	Start-up option	End type	Response to stop command
1	Test operation	None	Non-self-end	End the operation upon returning to the start position.
2	Auto-tuning operation		Self-end	End the operation when the oscillation command to the motor is completed.
3	Homing operation			Immediately decelerate and stop the move, and end the operation.
4	Program operation	I_CODE [7..0]		End the operation when execution of the current block is completed.
5	Signal search operation	None		Immediately decelerate and stop the move, and end the operation.
7	MDI operation		Non-self-end	End the operation when execution of the current NC executable statement or parameter statement input via RS232C is completed.
8	Index Type A operation	I_CODE [7..0], SIGN_INDEX, ROTDIR_STR_OPT [1..0] (when necessary), ABS_STR_OPT (when necessary)	Self-end	Invalid (ignored)
9	Index Type B operation			
10	Table reference operation	I_CODE [7..0], ROTDIR_STR_OPT[1..0] (when necessary), ABS_STR_OPT (when necessary)		
15	Mechanical setting mode	None	Non-end	Invalid because the operation cannot be ended (ignored).

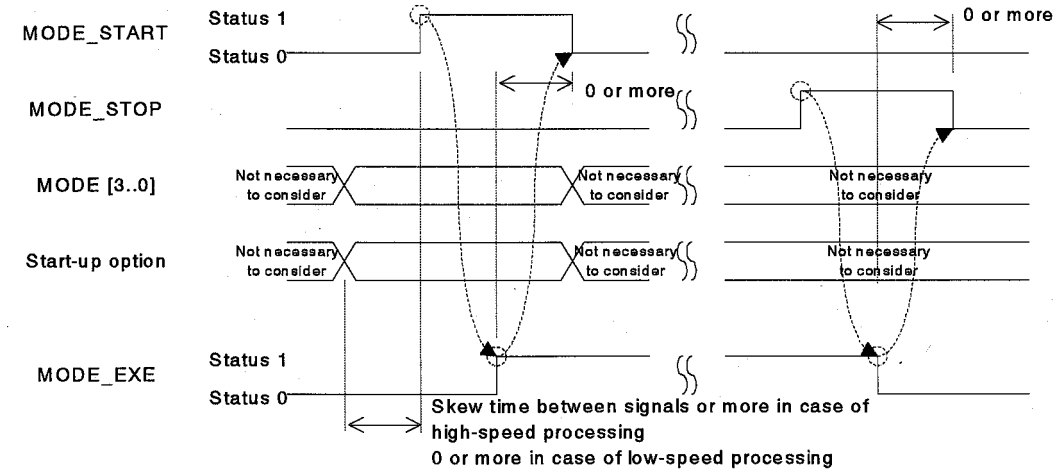
[Related parameters]

#215	PLC operation: Start signal processing speed selection

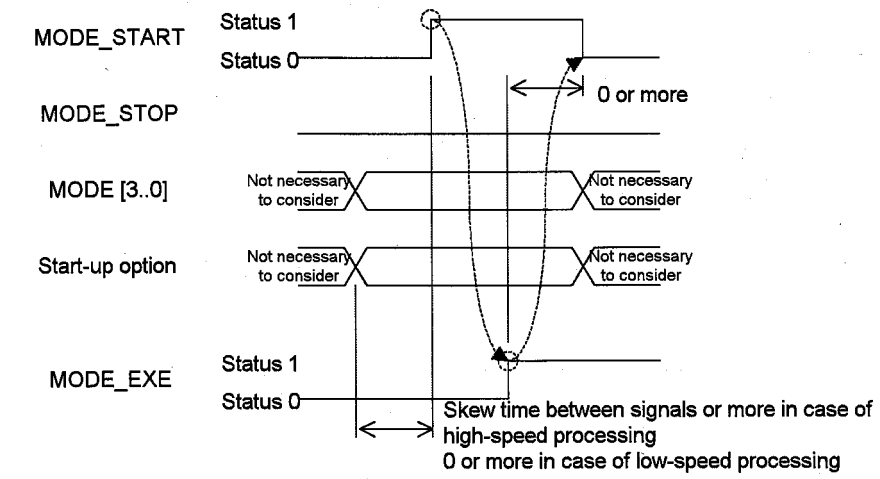
[Self-end type]



[Non-self-end type]



[Non-end type]



[Start-up option at program operation]

The program number to be started at program operation is provided by the I -CODE [7..0] code entry.
In a setting where it is prop erly read as a BCD code, the program with the set number is executed from the top.
In a setting where it is not properly read as a BCD code, the program with the stored execution program number is executed from the block with the stored block number.

[Start-up options at index Type A operation and index Type B operation]

In index Type A and B operations, the index number is provided by the I_CODE [7..0] code entry and the SIGN_INDEX sign entry at index operation, the choice between absolute or incremental move is provided by the ABS_STR_OPT ABS/INC start-up option entry, and the moving direction option is provided by ROTDIR_STR_OPT [1..0].
I_CODE [7..0] must be set so that it can be read properly as a BCD code. When SIGN_INDEX is the in status 1, the value read by I_CODE [7..0] is treated as a negative value, and when in the status 0, treated as a positive value. In case of an incremental move the value is treated as a value relative to the current operation command value and in case of an absolute move, it is treated as the target operation command value.
ABS_STR_OPT indicates an absolute move in the status 1 and an incremental move in the status 0. When the *#104 ABS/INC setting during table index operation* parameter is set to anything other than *start-up option dependence*, the option specification given by ABS_STR_OPT is invalid.
ROTDIR_STR_OPT [1..0] indicates Type 0 when 0 or 3 is provided by binary code, Type 1 when 1 is provided, and Type 2 when 2 is provided. When the *#105 moving direction option for rotational coordinates* parameter is set to anything other than *start-up option dependence*, the option specification given by ROTDIR_STR_OPT [1..0] is invalid.

[Related parameters]

#104	ABS/INC setting during table index operation
#105	Moving direction opton for rotational coordinates

[Start-up option at table reference operation]

In table reference operations, the table entry is provided by the I_CODE [7..0] code entry, the choice between an absolute and incremental move is provided by the ABS_STR_OPT ABS/INC start-up option entry, and the moving direction option is provided by ROTDIR_STR_OPT [1..0].
I_CODE [7..0] must be set so that it can be read properly as a BCD code. The table data value and option are obtained based on the specified number. The value of the obtained table data is treated as a value relative to the current operation command value in case of an incremental move and in case of an absolute move it is treated as the target operation command value.
ABS_STR_OPT indicates an absolute move in the status 1 and an incremental move in the status 0. When the *#104 ABS/INC setting during table index operation* parameter is set to anything other than *start-up option dependence*, the option specification given by ABS_STR_OPT is invalid.
ROTDIR_STR_OPT [1..0] indicates Type 0 when 0 or 3 is provided by binary code, Type 1 when 1 is provided, and Type 2 when 2 is provided. When the *#105 Moving direction option for rotational coordinates* parameter is set to anything other than *start-up option dependence*, the option specification given by ROTDIR_STR_OPT [1..0] is invalid.

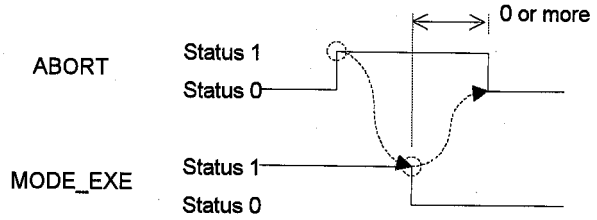
[Related parameters]

#104	ABS/INC setting during table index operation
#105	Moving direction option for rotational coordinates

Note: Regarding the moving direction in rotational coordinates
- Type0 Proximity rotational move (multiple rotations are not allowed).
- Type1 Does not cross the rotational coordinate's home position (multiple rotations are not allowed).
- Type2 Calculates the target position relative to the current rotational coordinate's home position and determines the direction (multiple rotations are allowed).

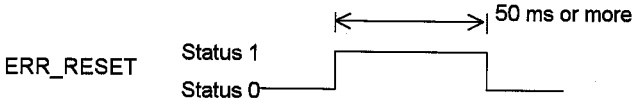
4.6 Abort (ABORT)

An operation abort command, ABORT, stops any operation other than a jog move. It functions irrespectively of the operation mode.
The operation abort command is issued as the status 1.
Unlike MODE_STOP, the operating action stop command, the motor immediately decelerates and stops and ends the operation even during an operation involving movement. In case the M function is being executed, the execution is aborted and the operation is stopped.



4.7 Error Reset (ERR_RESET)

The error reset command, ERR_RESET, cancels an error status in the driver. It functions irrespectively of the operation mode. It can only be executed while in the idle status.
The error reset command is issued as the status 1.
Depending on the error content, there are errors that cannot be canceled or errors that cause identical errors immediately after canceling. Avoid creating a program that maintains ERR_RESET and waits unti l ERR, the error status output, is canceled.



4.8 Interlock and Velocity Override Selection (INTERLOCK OVERRIDE_SEL)

Both the interlock command INTERLOCK and the velocity override selection OVERRIDE_SEL select a velocity override value of the driver. They function irrespectively of the operation mode.
The relationship between the INTERLOCK and OVERRIDE_SEL status and the velocity override value can be seen in the table below.

Interlock INTERLOCK	Velocity override selection OVERRIDE_SEL	Selected velocity override value
Status 0	Status 0	#16 Velocity override percentage 1
	Status 1	#17 Velocity override percentage 2
Status 1	Status 0	0
	Status 1	

[Related parameters]

#16	Velocity override percentage 1
#17	Velocity override percentage 2

4.9 Program Auto-Rewind (PRG_REWIND)

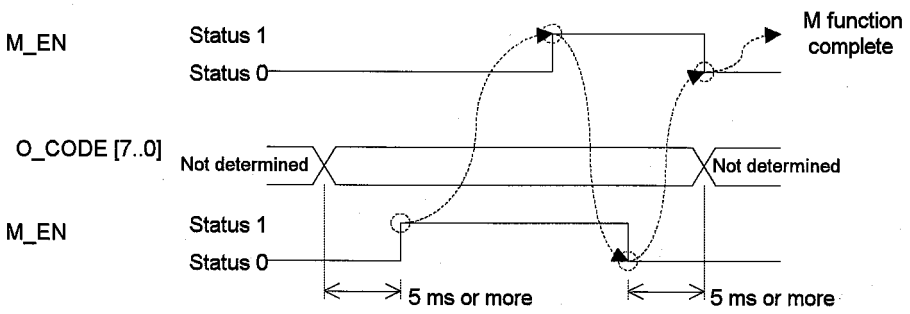
The program auto-rewind PRG_REWIND is a signal that specifies whether or not to repeat the program from the top block when the execution of the last block of the program is completed in program operation. If the program is repeated, it also monitors the signal status each time execution of the last block is completed and judges whether or not to repeat again. It functions irrespectively of the operation mode.
The program is repeated if the status of the signal is 1.

4.10 Integral Position Control Operation Inhibition (POS_INH)

The integral position control operation inhibition POS_INH is a signal that prohibits the integral operation at the position control part. It can be issued via the PLC interface when the setting of t he operation mode has given the main operation authority to the PLC interface.
Integral operation is inhibited in the status 1 and allowed in the status 0.

4.11 M Function (M_ANS, M_EN, O_CODE [7..0])

The *M function* operates under the PLC interface when the *#102 Enabling the selection of RS232C for the M function interface* parameter is set in such a way that the M function communicates with the host device via the PLC interface. See Section 5.7, "M Function" in product technical manual for details about the M function.
The notification from the driver takes place through the use of M_EN and O_CODE [7..0]. In O_CODE [7..0], the M function is expressed by a two-digit BCD code. It notifies that an M code is issued by setting M_EN to the status 1. The host device connected via the PLC interface, upon detecting the notification of the M code from the driver, performs the necessary processing on its own side, then responds to the driver by setting M_ANS to the status 1. The driver sets M_EN to 0 when receiving t his response. Hereafter, the driver detects when M_ANS is set to the status 0 and completes the rest of the M function interface.



4.12 Jog Move Command (JOG_UP , JOG_DN)

A jog move command via the PLC interface functions in the idle status when the *#217 Jog move operation: RS232C selection* parameter is set so that operations are performed via the PLC interface.
A jog move is executed by JOG_UP and JOG_DN as explained in the table below.
In the idle status, a jog move is executed according to the command as it is. If a start command is issued during the jog move, the jog move is immediately decelerated and stopped, after which the operation is started. After that, when the operation ends, the jog move is performed according to the jog move command after stopping.

Jog (–) command JOG_DN	Jog (+) command JOG_UP	Jog move command
Status 0	Status 0	Stop command
	Status 1	(+) direction move command
Status 1	Status 0	(-) direction move command
	Status 1	Stop command

4.13 Position control bandwidth selection FN

The FN position control bandwidth selection signal selects to use either ***#50 Position control bandwidth 1 parameter*** or ***#62 Position control bandwidth 2 parameter*** for the position control bandwidth value. Position control bandwidth 1 is selected with status 0, and position control bandwidth 2 is selected with status 1. Current selected value in position control bandwidth can be referred via monitor #375.

4.14 Velocity Control Bandwidth Selection GAIN

The GAIN velocity control bandwidth selection signal selects to use either ***#51 Velocity control bandwidth 1 parameter*** or the ***#63 Velocity control bandwidth 2 parameter*** for the velocity control bandwidth value. Velocity control bandwidth 1 is selected with status 0, and velocity control bandwidth 2 is selected with status 1. Current selected value in velocity control bandwidth can be referred via monitor #376.

Caution

- The closer the position control bandwidth and velocity control bandwidth are, the more the waveform will oscillate Therefore, please operate according turns which is departed from position bandwidth and velocity bandwidth. (In case of increasing bandwidth, Increase position control bandwidth after increase velocity control bandwidth. In case of decreasing bandwidth, deease velocity control bandwidth after decrease position control bandwidth)

4.15 Coordinate setting status output COORDI_RDY

COORDI_RDY coordinate setting status output signal output the status of ***coordinate setting status*** monitor #306. Status 0 indicates non-coordinate setting status and Status 1 indicates setting status. Refresh cycle for status is 2msec.

4.16 Positioning status selection

POS positioning status output signal output positioning complete status. Status 0 indicates axis operating sta tus and Status 1 indicates positioning complete status. POS signal turn status 1after wait until enter within the width of ***#58 Position setting width parameter*** when it makes "execute settling wait" of ***#106 settling wait enable parameter.*** Notwithstanding position settling status, POS signal immediately turn 1 status after internal controller command output is completed when it makes "Does not execute settling wait"
In addition, it is not effect to the status of positioning settling status during axis operat ing and after position complete output. The status of refresh cycle is 2msec.

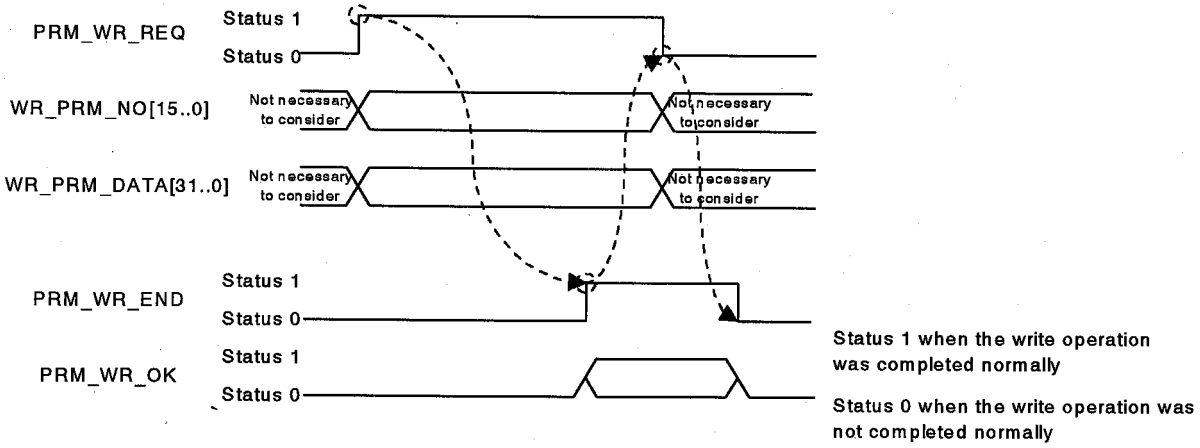
5. Operation 2

5.1 Error Code Request Function ERR_CODE_MAIN [7..0], ERR_CODE_SUB [7..0]

The error code request function operates irrespectively of the operation mode.
The driver notifies about the presence of an error code using ERR_CODE_MAIN [7..0] and ERR_CODE_SUB [7..0]. In ERR_CODE_MAIN [7..0], the error code is expressed as a two-digit BCD code. In ERR_CODE_SUB [7..0], the details about the error are expressed as a two-digit BCD code.
If no error has occurred, 0 is output as the error code.

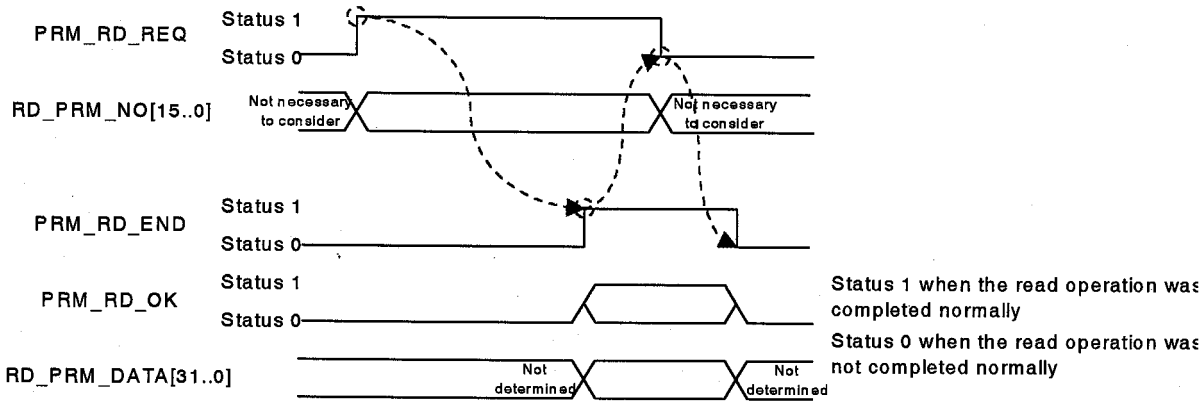
5.2 Parameter Write Function PRM_WR_REQ, WR_PRM_NO [15..0], WR_PRM_DATA [31..0], PRM_WR_END, PRM_WR_OK

The parameter write function operates irrespectively of the operation mode.
First, after storing the parameter number to be written in WR_PRM_NO and the parameter data to be written in WR_PRM_DATA, the host device connected to the PLC interface sets PRM_WR_REQ tothe status 1. Then the driver processes the parameter write operation and sets PRM_WR_END to the status 1 to notify that the processing is completed. If the write operation is completed normally, it sets both PRM_WR_END and PRM_WR_OK to the status 1. If the write operation is not completed normally, PRM_WR_OK remains at the status 0 when PRM_WR_END is set to the status 1.



5.3 Parameter/Monitor Read Function PRM_RD_REQ, RD_PRM_NO [15..0], PRM_RD_END, PRM_RD_OK, RD_PRM_DATA [31..0]

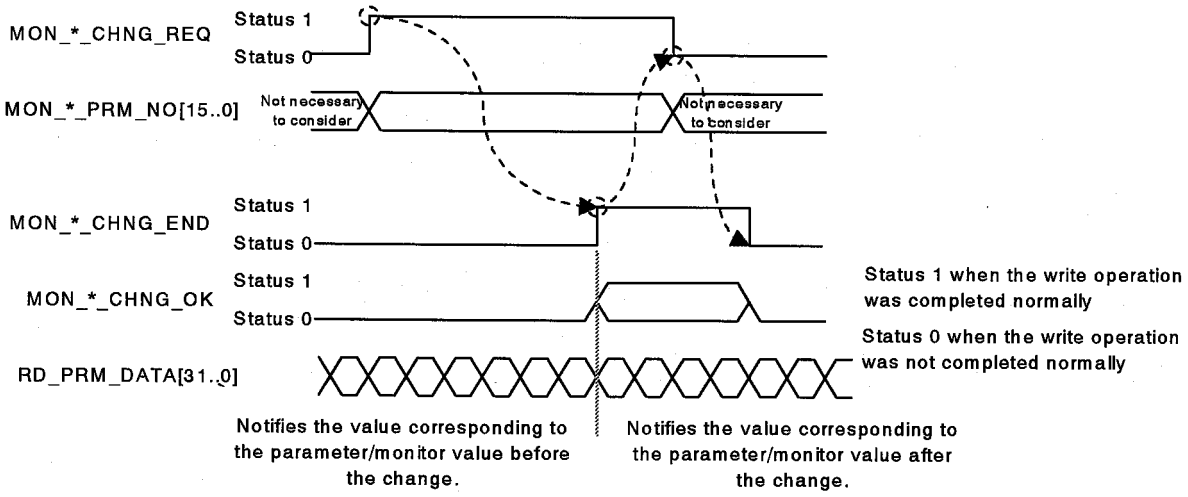
The parameter/monitor read function operates irrespectively of the operation mode.
First, after storing the parameter/monitor number to be read in RD_PRM_NO, the host device connected to the PLC interface sets PRM_RD_REQ to the status 1. Then the driver processes the parameter/monitor read operation and sets PRM_RD_END to the status 1 to notify that the processing is completed. If the read operation is completed normally, it sets PRM_RD_END to the status 1, and stores the read data in RD_PRM_DATA and sets PRM_RD_OK to the status 1. If the read operation is not completed normally, PRM_RD_OK remains at the status 0 and RD_PRM_DATA becomes 0 when PRM_RD_END is set to the status 1.



5.4 Parameter/Monitor Display A and B Functions

MON_A_CHNG_REQ,
MON_A_PRM_NO [15..0],
MON_A_CHNG_END,
MON_A_CHNG_OK,
MON_A_DATA [31..0]
MON_B_CHNG_REQ,
MON_B_PRM_NO [15..0],
MON_B_CHNG_END,
MON_B_CHNG_OK,
MON_B_DATA [31..0]

The parameter/monitor display A and B functions operate irrespectively of the operation mode.
The purpose of these functions is to display set parameter/monitor values periodically. The refresh interval is approximately 10 msec. The parameter/monitor numbers are set to 320 for A and 321 for B by default when the power is turned on.
When changing a parameter/monitor number to be displayed, the host dev ice connected to the PLC interface first stores the new parameter/monitor number in either MON_A_PRM_NO or MON_B_PRM_NO, and then sets MON_A_CHNG_REQ or MON_B_CHNG_REQ tothe status 1 accordingly. The driver processes the parameter/monitor number change an d sets either MON_A_CHNG_END or MON_B_CHNG_END to the status 1 to notify that the change processing is completed. If the number is changed normally, it sets MON_A_CHNG_END and MON_A_CHNG_OK or MON_B_CHNG_END and MON_B_CHNG_OK tothe status 1. If the number is not changed normally, MON_A_CHNG_OK or MON_B_CHNG_OK remains at the status 0 when MON_A_CHNG_END or MON_B_CHNG_END is set to the status 1.



6. Reference material
6.1 CC-Link Association

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