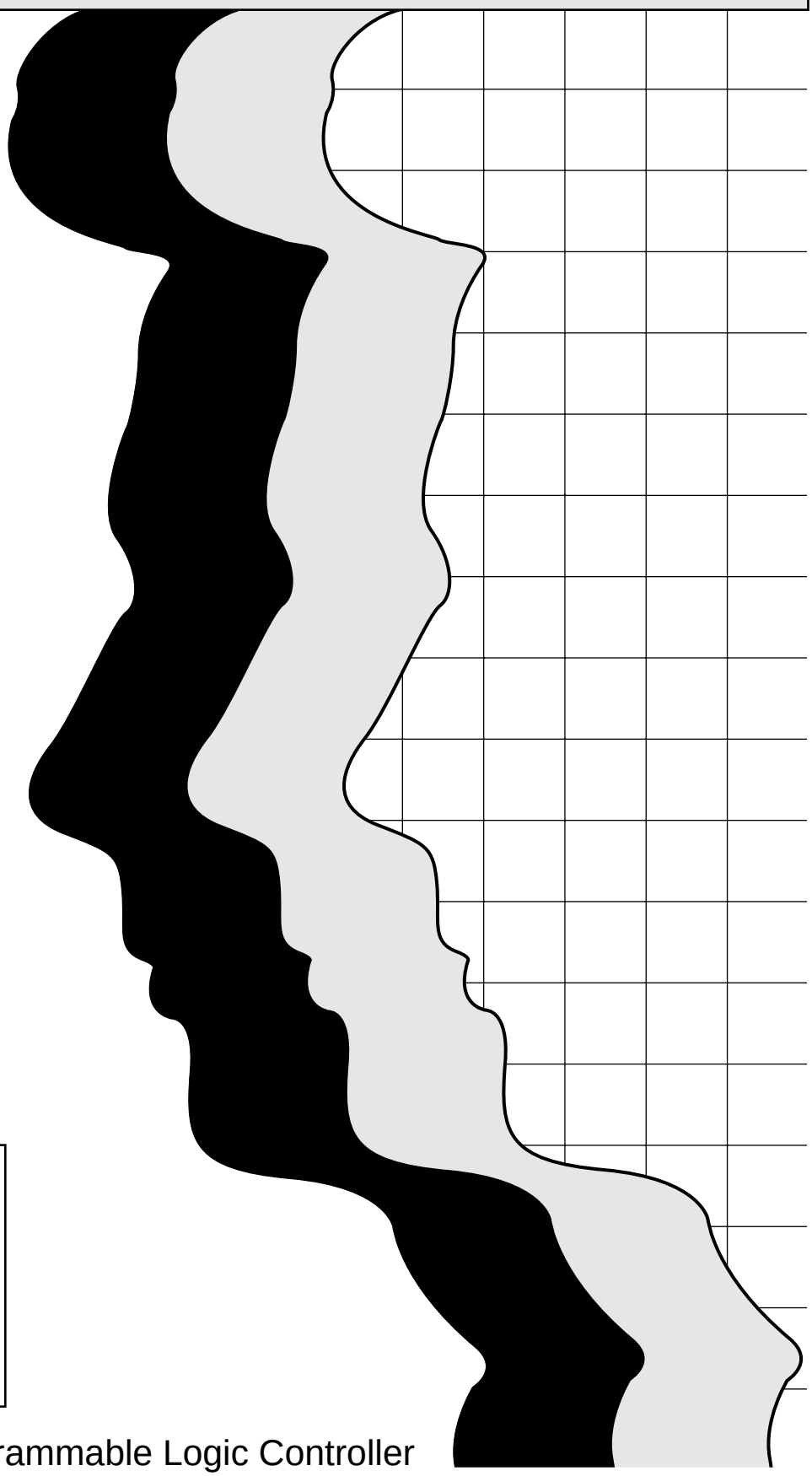
MITSUBISHI

ID Interface Module
type AD35ID1, AD35ID2, A1SD35ID1,A1SD35ID2

User's Manual



MELSEC

Mitsubishi Programmable Logic Controller

• SAFETY PRECAUTIONS •

(Always read these instructions before using this equipment.)

Before using this product, please read this manual and the relevant manuals introduced in this manual carefully and pay full attention to safety to handle the product correctly.
The instructions given in this manual are concerned with this product. For the safety instructions of the programmable controller system, please read the CPU module user's manual.
In this manual, the safety instructions are ranked as "DANGER" and "CAUTION".

⚠ DANGER	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠ CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical damage.

Note that the ⚠CAUTION level may lead to a serious consequence according to the circumstances. Always follow the instructions of both levels because they are important to personal safety.

Please save this manual to make it accessible when required and always forward it to the end user.

[DESIGN PRECAUTIONS]

⚠ DANGER

- Provide a safety circuit externally to the PLC so that the safety of the overall system is always maintained in case of an external power supply failure or a PLC main unit breakdown.
  Accidents may occur due to an erroneous output or a malfunction.
- Design the circuit in such a way that the external power supply is turned on after the PLC main unit is powered on.
  Turning on the external power supply first may cause accidents due to an erroneous output or a malfunction.

A - 1

[DESIGN PRECAUTIONS]

⚠ CAUTION

- Do not bundle the reader writer cables together with the main circuit or the power cable, and do not install them close to each other.
  They should be installed at least 100 mm away from each other.
  Failure to do so may generate noise, resulting in a malfunction.

[INSTALLATION PRECAUTIONS]

⚠ CAUTION

- Use the PLC in an operating environment that meets the general specifications described in the manual.
  Using the PLC in any other operating environments may cause an electric shock, a fire or a malfunction, or may damage or degrade the PLC.
- Before installing the module, securely insert the module fastening latch at the lower part of the module into the installation hole on the base unit. (A1S Series modules must be fixed to the base unit with screws using the specified torque.)
  If the module is not installed properly, it may cause the module to malfunction, fail or fall off.
- Tighten the installation screws within the specified torque.
  If the screws are loose, it may cause the module to fall off or malfunction.
  If the screws are tightened excessively, it may damage the screws and the module, and cause the module to fall off or malfunction.
- Connect the reader writer cables securely to the connectors of the module. After connecting, make sure to check that the cables are not loose.
  If the cables are loose, poor cable connections may cause erroneous inputs and/or outputs.
- Do not directly touch the conducting parts and electronic parts of the module.
  It may cause the module to malfunction or fail.

[WIRING PRECAUTIONS]

⚠ CAUTION

- Before starting any installation or wiring work, make sure to shut off all phases of the power supply externally.
  Failure to completely shut off all phases of the power supply may result in an electric shock as well as a damage or a malfunction of the product.
- Before turning on the power or operating the module after installation or wiring work, make sure to install the attached terminal covers to the product. Failure to install the terminal covers may result in an electric shock.
- Always ground the FG terminal using Class D grounding (Class 3 grounding) or higher designated specifically for the PLC.
  Otherwise, there is a risk of an electric shock or a malfunction.
- Wire correctly to the PLC upon checking the rated voltage and terminal layout of the product.
  Connecting a power supply not having the rated voltage or conducting incorrect wiring may cause a fire or a breakdown.
- Tighten the terminal screws using the specified torque.
  If the terminal screws are loose, it may cause the module to short-circuit or malfunction.
  If the terminal screws are tightened excessively, it may damage the screws and the module, resulting in a short circuit or a malfunction.
- Be careful not to let any foreign particles such as chips and wire burrs get inside the module.
  They may cause a fire, as well as a breakdown or a malfunction of the module.
- Make sure to place the communication cable and the power cable to be connected to the module in a duct or fasten them using a cable clamp.
  If the cables are not placed in a duct or fastened with a cable clamp, their positions may become unstable or moved, and they may be pulled inadvertently. This may damage the module and the cables or result in a malfunction because of poor cable contact.
- When disconnecting the communication cable and the power cable from the module, do not pull the cables by hand.
  Loosen the screws in the part of the cable connected to the module, and then remove the cable.
  If the cable is pulled while being connected to the module, it may damage the module or the cable, or result in a malfunction because of poor cable contact.

A - 3

[SETUP AND MAINTENANCE PRECAUTIONS]

⚠ CAUTION

- Do not touch the terminals while the power is on.
  Doing so may result in an electric shock or a malfunction.
- Before cleaning the module or re-tightening the terminal screws, make sure to shut off all phases of the power supply externally.
  Failure to do so may cause the module to breakdown or malfunction.
  If the screws are loose, it may cause the module to short-circuit, malfunction or fall off.
  If the screws are tightened excessively, it may damage the screws and the module, and cause the module to fall off, short-circuit or malfunction.
- Never disassemble or modify the module.
  This may result in a breakdown, a malfunction, an injury or a fire.
- Because the module case is made from resin, do not drop it or subject it to a strong impact.
  This may damage the module.
- Before mounting or dismounting the module, make sure to shut off all phases of the power supply externally.
  Failure to do so may cause the module to breakdown or malfunction.

[DISPOSAL PRECAUTIONS]

⚠ CAUTION

- Treat this product as an industrial waste when disposing of it.

A - 4

REVISIONS

* The manual number is given on the bottom left of the back cover.

Print Date	* Manual Number	Revision
Jan., 2001	SH (NA) 080147-A	First printing

A - 5

INTRODUCTION

Thank you for purchasing the Mitsubishi General-Purpose PLC MELSEC-A Series product.
Before using the equipment, please read this manual carefully to develop full familiarity with the functions and performance of the A-series PLC you have purchased, so as to ensure correct use . Please forward a copy of this manuals to the end user.

CONTENTS

About Manuals

The following manuals are also related to this product.

In necessary, order them by quoting the details in the tables below.

Related Manuals

Manual Name	Manual Number (Model Code)
AD35ID1/AD35ID2/A1SD35ID1/A1SD35ID2 ID Interface Module User's Manual (Hardware) This manual explains the specifications, handling, wiring and other important items of the module. (Supplied with the module)	IB-0800164 (13JT33)

About the Generic Terms, Abbreviations, and Vocabularies Used in This Manual

This manual uses the following generic terms, abbreviations, and vocabularies to describe the ID interface module.

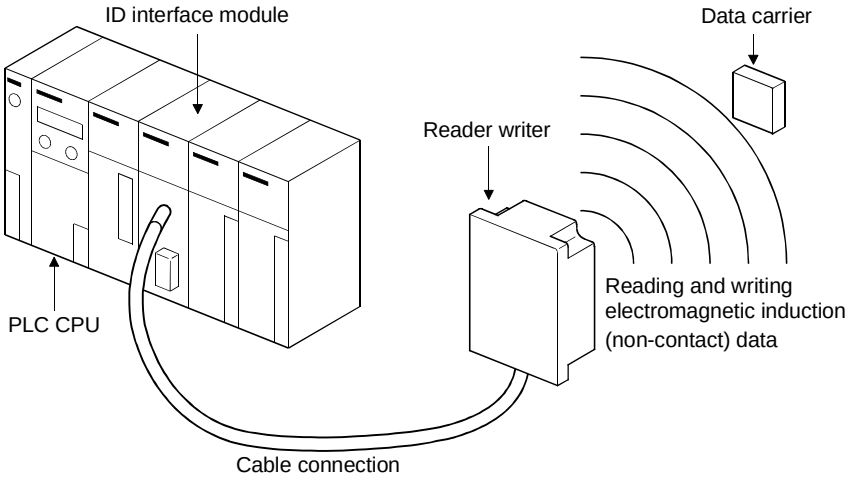
Generic term/ abbreviation/vocabulary	Description of generic term/abbreviation/vocabulary
ID interface module	Generic term for the AD35ID1, AD35ID2, A1SD35ID1, and A1SD35ID2.
D-2N Series	Series consisting of the D-2N422RW, D-2N422RW-C2, D-2N422RWS, D-2N422RWS-C2, D-2N03PS, and D-2N03PM (batteryless type).
Data carrier	Generic term for the D-2N03PS and D-2N03PM.
Reader writer	Generic term for the D-2N422RW reader writer, D-2N422RW-C2 reader writer, D-2N422RWS reader writer, and D-2N422RWS-C2 reader writer.
Cable	Generic term for the D-NS422CAB10, D-NS422CAB20, D-NS422CAB40, and D-NS422CAB100.

1 OVERVIEW

This User's Manual explains the specifications and handling of the AD35ID1/AD35ID2/A1SD35ID1/A1SD35ID2 ID interface modules as well as how to communicate with the data carrier.
This module is compatible with the D-2N Series (batteryless type).

1.1 Overview of the ID Interface Module

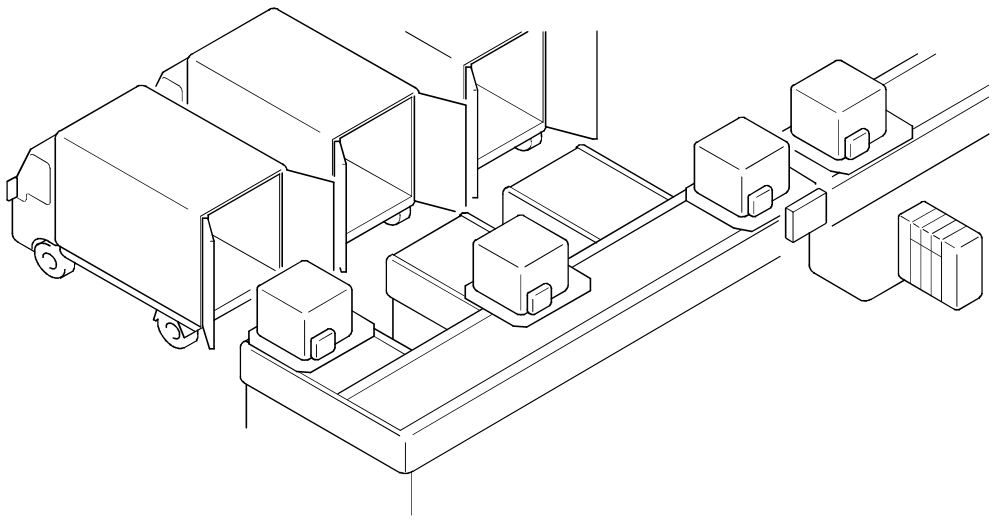
The ID interface module is equipped with one or two connection channels for the reader writer. It is used to perform read and write operations to the data carrier and to interface with the PLC CPU.



The ID interface module can mainly be used as follows:

Supporting distribution systems

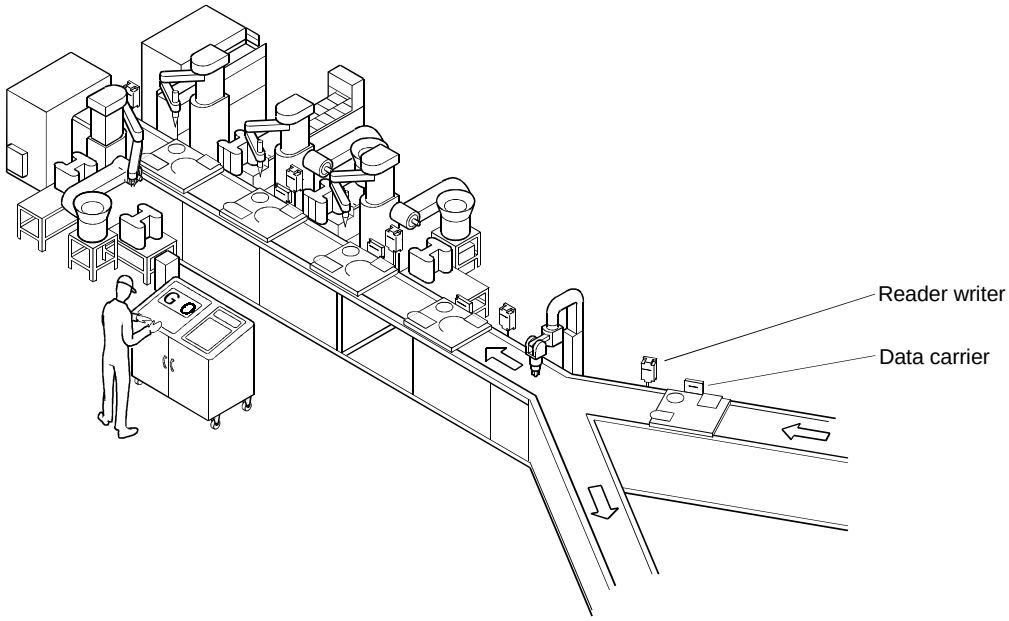
Decentralized control of product flow can be performed by implementing the ID interface module in transfer/product sorting lines, automated warehousing, etc.



1 - 1

Supporting production lines

By implementing the ID interface module in production/inspection lines, decentralized control can be performed for automated machines, mounting instructions in combination with indicators devices, speedy support of production planning, and inspection data management.

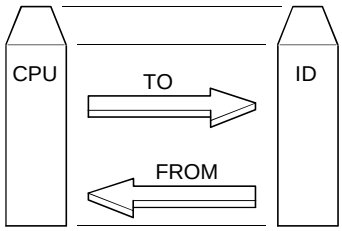


1.2 Features of the ID Interface Module

This section explains the features of the ID interface module.

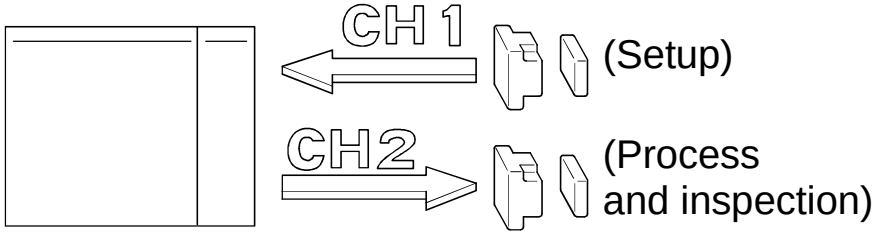
(1) Simple programming

Data read and write operations between the ID interface module and the data carrier can be executed easily via the buffer memory of the ID interface module using the FROM/TO instructions.



(2) The reader writer operates independent of the ID interface module equipped with two channels.

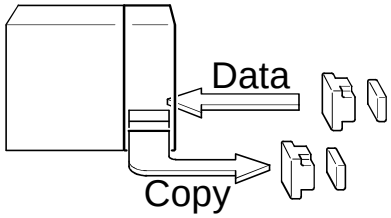
Both the AD35ID2 and A1SD35ID2 can communicate with the data carrier using a different instruction for each channel.



1 - 2

(3) Data can be copied between data carriers by a data copy instruction.

Data can be copied between data carriers without using the PLC CPU.

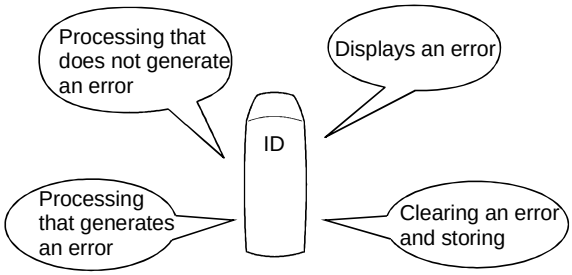


(4) Simultaneity of data can be maintained by batch communication of 160 words.

A maximum of 160 words of data can be communicated in batch mode using the FROM/TO instructions. As a result, the ID interface module communicates with the data carrier by maintaining simultaneity of data.

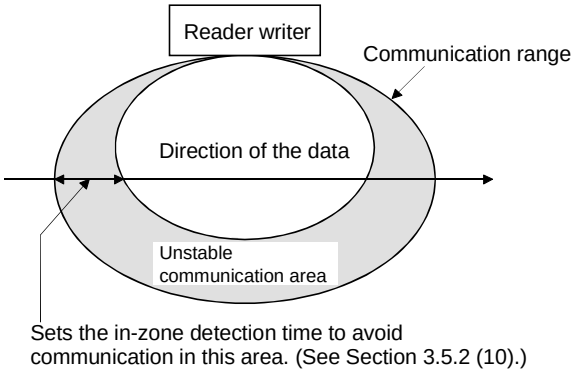
(5) Sophisticated sequence control can be performed using a variety of error handling.

Various sequence control operations such as checking the error LED display status, clearing errors by a program, checking the error codes for the past four errors, and setting the retry count at the time of a communication error can be performed using sequence programs.



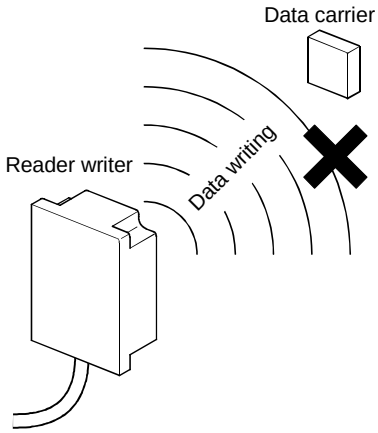
(6) In-zone detection can be performed.

The ID interface module recognizes the first data carrier that enters the communication range. While that data carrier is within the communication range, interference can be prevented with the in-zone function that continuously detects the existence of the data carrier.



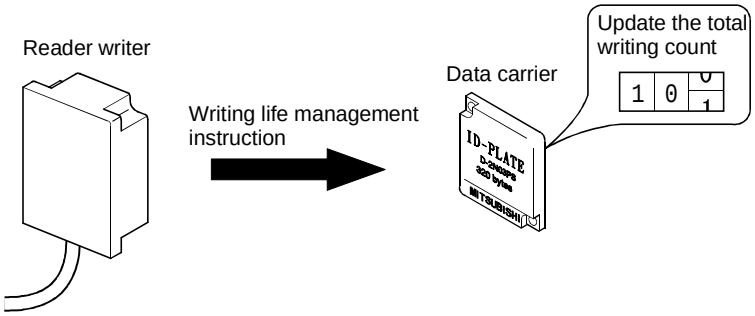
(7) Erroneous writing can be prevented using the write-protect function.

This function prevents an accidental loss of important data such as product form and machine model that are saved in the data carrier due to unintended writing of data.



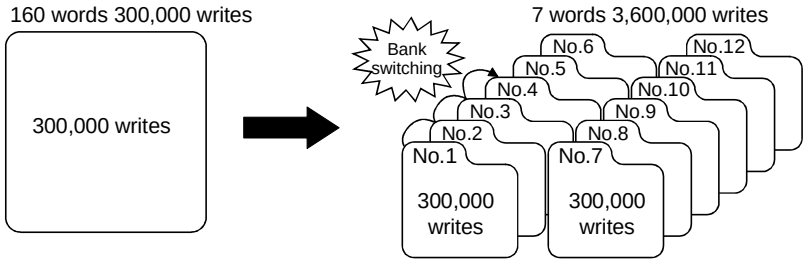
(8) Writing life can be managed.

Since the writing count can be managed using the writing life management function, the writing life of the data carrier can easily be managed.



(9) The data carrier life can be extended by bank switching.

The writing life of the data carrier (300,000 writes) can be increased up to 3.6 million writes using the Life Extension Bank Switching function.

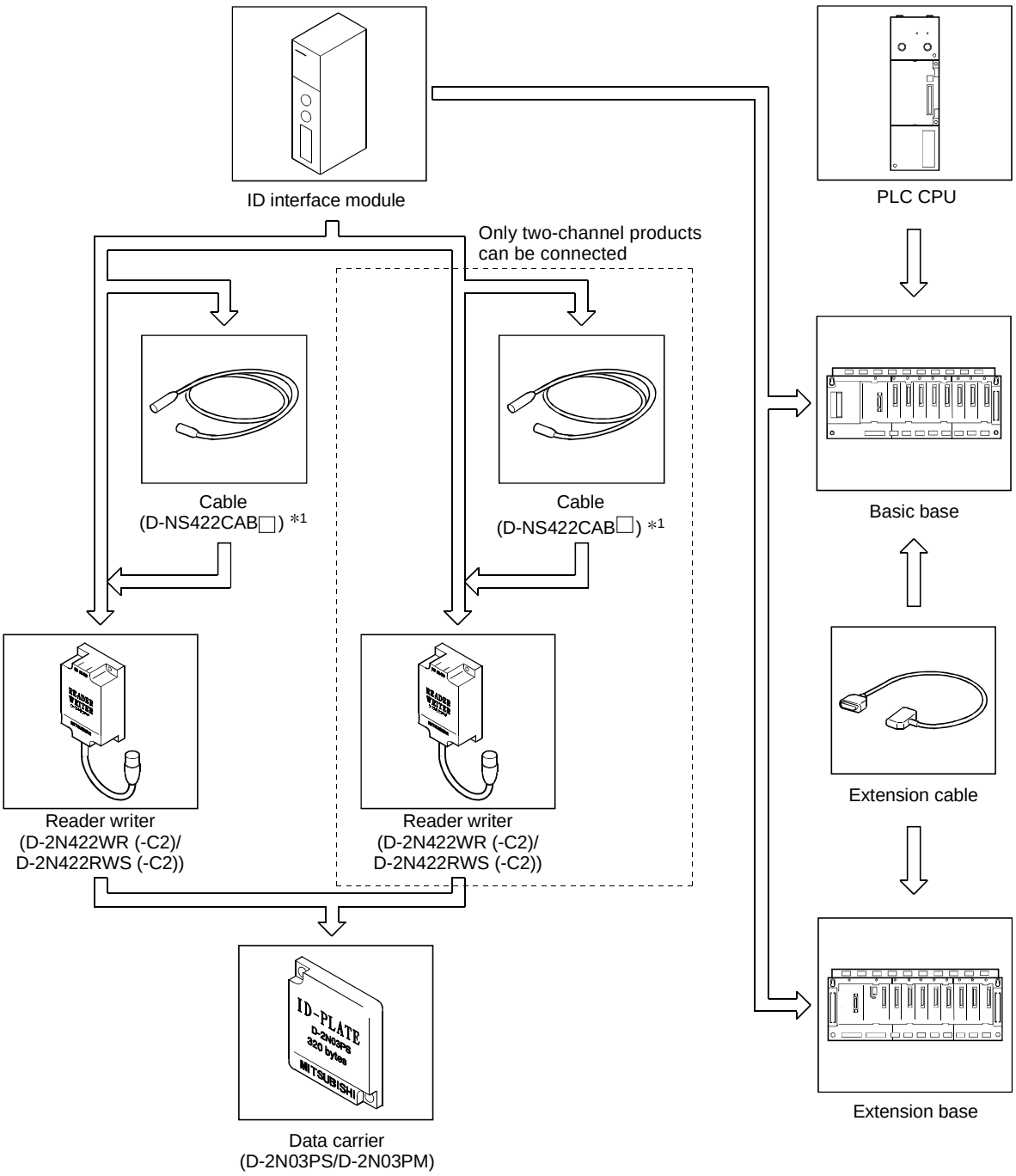


2 SYSTEM CONFIGURATION

This chapter explains the systems that can be combined with the ID interface module.

2.1 Overall Configuration

2



*1: Up to two cables can be linked for use.

2 - 1

2.2 Precautions on the System Configuration

(1) Utilizing programs of other series

The programs of the D and D-NS Series can be executed in the ID interface module without any modification. However, the address specification range of the data carrier for these programs is limited to the range of 160 words (320 bytes).

(2) Exclusive use for the D-2N Series

This ID interface module is exclusively used for the D-2N Series (batteryless type). To use for the D-NS Series, use the AD32ID□/A1SD32ID□. To use for the D Series, use the AJ71ID□-R4/A1SJ71ID□-R4.

(3) Number of modules that can be installed

The maximum number of modules that can be installed is equal to the number of I/O points of the applicable CPU. The ID interface module occupies 32 I/O points and one slot.

(4) Number of base units that can be installed

The ID interface module can be installed in any slot of the basic base unit or the extension base unit except the following case:
If the ID interface module is installed in the extension base unit without the power supply unit (A5□B, A1S5□B extension base unit), the power supply capacity may not be sufficient. Thus, avoid installing in such a unit.
If the ID interface module is installed in the extension base unit described above, select the power supply unit and the extension cable by considering the current capacity of the power supply unit of the basic base unit and the voltage drop of the extension cable.
(For details, refer to the User's Manual of the PLC CPU to be used.)

(5) Installing in a remote I/O station not permitted

The ID interface module cannot be installed in a remote I/O station.

2 - 2

(6) Applicable PLC CPUs

The following tables list the applicable PLC CPUs:

(a) When the AD35ID1 or AD35ID2 is used

Applicable PLC CPU		
MELSEC-QnA Series CPU	Large type	Q2ACPU, Q2ACPU-S1, Q3ACPU, Q4ACPU, Q4ARCPU
	Compact type	Installed in the extension base (A62B, A65B, A68B, A52B, A55B, A58B) of Q2ASCPU, Q2ASCPU-S1, Q2ASHCPU, Q2ASH-S1
MELSEC-A Series CPU	Large type	A1NCPU, A2NCPU, A2NCPUP21/R21, A3NCPU, A3NCPUP21/R21, A2UCPU, A2UCPU-S1, A3UCPU, A4UCPU, A2ACPU, A2ACPUP21/R21, A2ACPU-S1, A2ACPU-S1P21/R21, A3ACPU, A3ACPUP21/R21
	Compact type	Installed in the extension base (A62B, A65B, A68B, A52B, A55B, A58B) of A2USCPU, A2USCPU-S1, A2USHCPU-S1, A1SCPU, A1SHCPU, A1SJCPU, A1SJCPU-S3, A1SJHCPU, A2SCPU, A2SHCPU, A0J2HCPU

(b) When the A1SD35ID1 or A1SD35ID2 is used

Applicable PLC CPU		
MELSEC-Q Series CPU	A mode	Q02CPU-A, Q02HCPU-A, Q06HCPU-A
	Q mode	Installed in the extension base (QA1S65B, QA1S68B) of Q02CPU, Q02HCPU, Q06HCPU, Q12HCPU, Q25HCPU
MELSEC-QnA Series CPU	Compact type	Q2ASCPU, Q2ASCPU-S1, Q2ASHCPU, Q2ASH-S1
MELSEC-A Series CPU	Compact type	A2USCPU, A2USCPU-S1, A2USHCPU-S1, A1SCPU, A1SHCPU, A1SJCPU, A1SJCPU-S3, A1SJHCPU, A2SCPU, A2SHCPU, A0J2HCPU

2.3 List of Component Devices

The following lists the devices that are required to use the ID interface module:

Product name	Model name	Remarks	
ID interface module	AD35ID1	ID interface module for the A Series, connecting one reader writer unit	
	AD35ID2	ID interface module for the A Series, connecting two reader writer units	
	A1SD35ID1	ID interface module for the AnS Series, connecting one reader writer unit	
	A1SD35ID2	ID interface module for the AnS Series, connecting two reader writer units	
Reader writer	D-2N422RW(-C2)	For communication with the data carrier	
	D-2N422RWS(-C2)	For communication with the data carrier, compact type	
Data carrier	D-2N03PS	Memory size 320 bytes (160 words), compact type	
	D-2N03PM	Memory size 320 bytes (160 words), metal direct mounting type	
Cable	D-NS422CAB10	Length: 10m	For reader writer extension
	D-NS422CAB20	Length: 20m	
	D-NS422CAB40	Length: 40m	
	D-NS422CAB100	Length: 100m	

2.4 Selection of the Machine Model

Select the machine model applicable to the system to be used by referencing this section.

(1) Selecting the machine models of the ID interface module and the ID controller

(a) If the volume of read/write data is large, use the bus connection ID interface module (AD35ID☐, A1SD35ID☐).

(b) If the volume of read/write data is small (several bytes) or the number of reader writers is many, use the ID interface module for CC-Link (AJ65BT-D351D2).

(c) If the higher controller requires an RS-232C communication port, use the ID controller for RS-232C (D-2N232IF2).

(2) Selecting the machine model by static communication and mobile unit communication

(a) Precautions on the use of a mobile unit

1) With the ID controller for RS-232C (D-2N232IF2) and the ID interface module for CC-Link (AJ65BT-D35ID2), do not perform continuous communication with the data carrier using two or more instructions. (If two or more continuous communications are performed (for example, AW is executed after AR execution), the processing time (PC's program execution time, CC-Link's scan time) of the higher controller will become long. Therefore, the data carrier may pass the communication range prior to the second communication.)

2) If continuous communication is performed using the mobile unit, use the AD35ID☐ or A1SD35ID☐.

(3) Selecting the machine model by the communication time

If the data volume is large, the communication time of the ID interface module for CC-Link (AJ65BT-D35ID2) will become long. Instead, use either the AD35ID☐ or A1SD35ID☐.

3 SPECIFICATIONS

This chapter explains the specifications and functions of the ID system.

3.1 General Specifications

The general specifications of the ID interface modules (AD35ID1, AD35ID2, A1SD35ID1 and A1SD35ID2) are shown below.

Table 3.1 General specifications

Item	Specification					
Operating ambient temperature	0 to 55°C					
Storage ambient temperature	-20 to 75°C					
Operating ambient humidity	10 to 90% RH, no condensation					
Storage ambient humidity	10 to 90% RH, no condensation					
Vibration resistance	Conforming to JIS B 3501, IEC 1131-2		Frequency	Acceleration	Amplitude	Sweep count
		When there is intermittent vibration	10 to 57 Hz	—	0.075 mm	10 times in each direction of X, Y and Z (80 min.)
			57 to 150 Hz	9.8 m/s^2	—	
		When there is continuous vibration	10 to 57 Hz	—	0.035 mm	
			57 to 150 Hz	4.9 m/s^2	—	
Shock resistance	Conforming to JIS B 3501, IEC 1131-2 (147 m/s^2, 3 times each in each direction of X,Y and Z)					
Operating atmosphere	No corrosive gas should be present.					
Operating height	2000 m or less					
Installation area	Inside the control panel					
Over-voltage category ∗1	II or less					
Contamination level ∗2	2 or less					

∗1: Indicates to which power distribution area the device is assumed to be connected from the public power distribution network to the equipment on the premises.
Category II is applicable to devices to which power is supplied from a fixed facility.
The surge resistance voltage of devices with a rating of up to 300V is 2500V.

∗2: This index indicates the occurrence rate of conductive substances in the environment where the device is used.
Contamination level 2 indicates that only non-conductive contamination may occur with a possibility of generating temporary conductivity due to accidental condensation.

3.2 Performance Specifications

The performance specifications of the ID interface module are shown below.

Item		Specifications			
Model name		AD35ID1	AD35ID2	A1SD35ID1	A1SD35ID2
Connectable reader writer		D-2N422RW(-C2), D-2N422RWS(-C2)			
Number of connectable reader writer		1	2	1	2
Connectable cable		D-NS422CAB10(10m), D-NS422CAB20(20m), D-NS422CAB40(40m), D-NS422CAB100(100m) (Up to two cables can be combined for use.)			
Data carrier that can be used		D-2N03PS, D-2N03PM			
Occupied points		32 points			
Occupied slot		1 slot			
Current consumption	5V DC	0.25A (power supplied internally from the PLC)			
	External power supply 24V DC	0.17A	0.33A	0.17A	0.33A
Weight		0.35kg	0.36kg	0.26kg	0.27kg

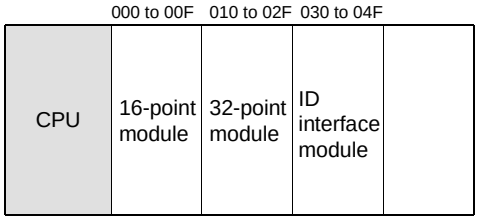
3.3 Functions

The following lists the functions that can be performed by the ID interface module:

Function	Instruction/ command	Instruction code	Description	Reference section
Read	Read	RD (4452H)	Reads data from the data carrier.	6.4.1
	Continuous Read	AR (5241H)	Reads data continuously until the data carrier enters the communication range of the reader writer, after which data is read from the data carrier.	
	Read and Compare	CR (5243H)	Reads data from the data carrier and compares data.	6.4.2
	Continuous Read and Compare	SR (5253H)	Reads data continuously until the data carrier enters the communication range of the reader writer, after which data is read from the data carrier and compared.	
Write	Write	WD (4457H)	Writes data into the data carrier.	6.5.1
	Continuous Write	AW (5741H)	Writes data continuously until the data carrier enters the communication range of the reader writer, after which data is written to the data carrier.	
	Write and Compare	CW (5743H)	Writes data into the data carrier and compares data.	6.5.2
	Continuous Write and Compare	SW (5753H)	Continuously writes data until the data carrier enters the communication range of the reader writer, after which data is written to the data carrier and compared.	
	Fill	FI (4946H)	Fills the designated area of the data carrier with specified data.	6.5.3
Verification	Compare	CM (4D43H)	Compares data in the ID interface module with data in the data carrier.	6.6
Copy	Copy Data	CO (4F43H)	Copies data in the data carrier between CH. 1 and CH. 2.	6.7
Deletion	Clear	CL (4C43H)	Clears all data in the data carrier to "0".	6.8
Write-protect	Read Write-Protect Setting	RP (5052H)	Reads the write-protect setting in the data carrier.	6.9.2
	Write Write-Protect Setting	WP (5057H)	Writes write-protect setting into the data carrier.	6.9.3
Memory Setting	Life Extension Bank Switching	BK (4B42H)	Sets memory type (number of banks) in the data carrier.	6.10.2
Life Management	Count Write	MW (574DH)	Writes data into the data carrier and increments the write count.	6.11.2
	Continuous Count Write	LW (574CH)	Writes data continuously until the data carrier enters the communication range of the reader writer, after which data is written to the data carrier and the write count is incremented.	
	Update Write Count	MD (444DH)	Increments the write count by a specific value.	6.11.3
Commands	Abort Continuous Instruction	—	Aborts from a continuous instruction.	6.13
	Error Reset	—	Performs error reset. (Turns off the Error LED, resets error detection signal, and clears error code storage area of buffer memory.)	6.14

3.4 Input/Output Signals for the PLC CPU

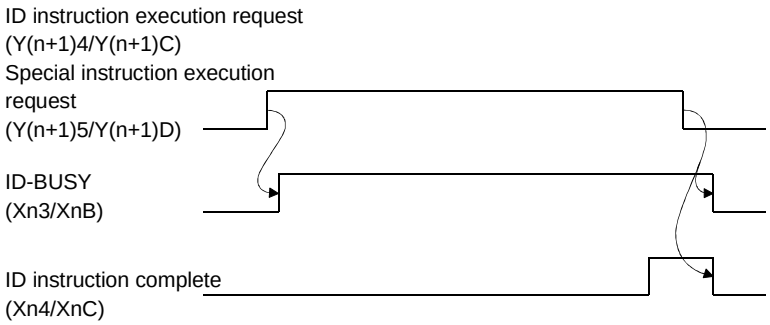
This section explains the input/output signals for the PLC CPU when the ID interface module is used.
For the (n) with X or Y number, designate the upper two digits when the head I/O number of the slot in which the ID interface module is mounted is expressed in three digits (hexadecimal).

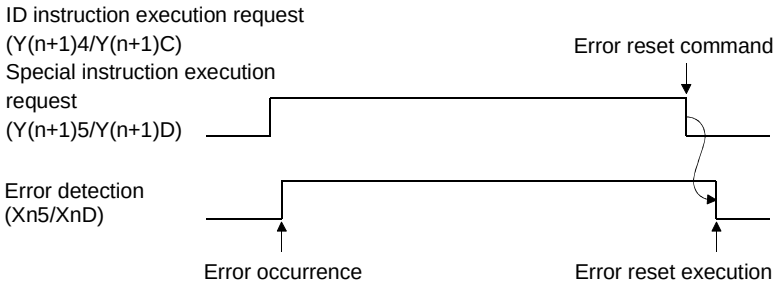


Since 48 points are used before the ID interface module, the head I/O number of the ID interface module is "030." Thus, "Xn1" will be "X31," and "Y(n+1)4" will be "Y44."

(1) Input signals (ID interface module → PLC CPU)

There are 16 points (Xn0 to XnF) of input signals, each of which is turned ON/OFF by the ID interface module.

Input signal		Signal name	Description
CH. 1	CH. 2 *1		
Xn0		Watchdog timer error	Turns ON when a watchdog timer error occurs in the ID interface module. It is set to OFF during normal operation.
Xn1	Xn9	Comparison result signal	Turns ON when the execution result of a Comparison instruction (CR, SR, CW, SW, CM) matches. This cannot be used by the ID dedicated instructions of the QnA. The signal is cleared by resetting Y(n+1)4 and Y(n+1)C. To retain the comparison result, latch other contacts by the SET instruction, etc.
Xn2	XnA	In-zone contact	Turns ON when an in-zone is being detected during the execution of a Continuous instruction (AR, SR, AW, SW, LW).
Xn3	XnB	ID-BUSY	Turns ON when the ID instruction is executed, and turns OFF after the execution of the instruction is completed. Turns OFF when Y(n+1)4/Y(n+1)C or Y(n+1)5/Y(n+1)D is OFF.
Xn4	XnC	ID instruction complete	Turns ON at the completion of the ID instruction execution after Y(n+1)4/Y(n+1)C or Y(n+1)5/Y(n+1)D is turned ON. During the execution of a Continuous instruction (AR, SR, AW, SW, LW), if the execution of the instruction is normally stopped by the Continuous Instruction Stop command, the signal stays OFF and will not turn ON. If an error occurs, this signal will not turn ON, but the error detection signal (Xn5, XnD) will be turned ON instead. 

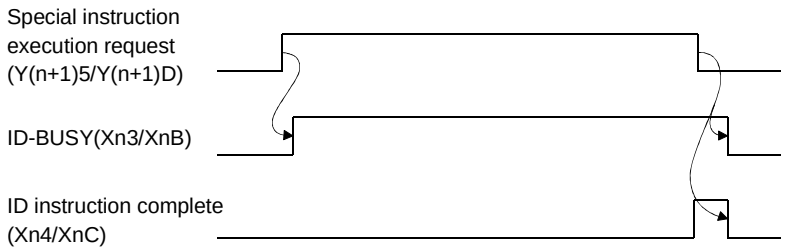
Input signal		Signal name	Description
CH. 1	CH. 2 ∗1		
Xn5	XnD	Error detection	Turns ON when an error occurs. Turns OFF when Y(n+1)4/Y(n+1)C or Y(n+1)5/Y(n+1)D is turned OFF. 
Xn6		ID ready signal	Turns ON when the ID interface module is ready after the power is turned on and the PLC CPU is reset. (Turns ON after several seconds after power-on.) Turns OFF when errors such as that the ID interface module cannot continue operating or the 24 V DC LED goes off occurs. This does not turn OFF when errors such as that the ERR. or ID-ERR. LED is lit occurs.
Xn7	XnF	Life evaluation result signal	Turns ON when the execution result of the Writing Life Management instruction (MD, MW, LW) exceeds the writing life evaluation value.
Xn8	XnE	—	Cannot be used.

∗1 Valid only when the AD35ID2 or A1SD35ID2 is used.

POINT
Do not use the devices that are not allowed to use since they are being used by the system. If any of such devices is used by the user, normal operation cannot be guaranteed.

(2) Output signals (PLC CPU → ID interface module)

There are 16 points (Y(n+1)0 to Y(n+1)F) of output signals, each of which is turned ON/OFF by the sequence program.

Output signal		Signal name	Description
CH. 1	CH. 2 ∗1		
Y(n+1)0/ Y(n+1)3	Y(n+1)8/ Y(n+1)B	—	Cannot be used.
Y(n+1)4	Y(n+1)C	ID instruction execution request	If this signal is turned ON by the sequence program, the set ID instruction will be executed. (Turns OFF Y(n+1)4/Y(n+1)C after Xn4/XnC is turned ON.)
Y(n+1)5	Y(n+1)D	Execution request for special instruction	If this signal is turned ON by the sequence program, the special instruction (RP, WP, BK) will be executed. 
Y(n+1)6	Y(n+1)E	—	Cannot be used.
Y(n+1)7	Y(n+1)F		

∗1 Valid only when the AD35ID2 or A1SD35ID2 is used.

POINT

Do not use the devices that are not allowed to use since they are being used by the system. If any of such devices is used by the user, normal operation cannot be guaranteed.

3.5 Buffer Memory

The buffer memory is an area that stores the read/write data and the control information for transferring data between the data carrier and the PLC CPU.
The buffer memory can be accessed by the FROM/TO instructions from the sequence program. The setting contents of the buffer memory return to the default values by power-off or PLC CPU reset.

3.5.1 Buffer memory list

Each address of the buffer memory consists of 16 bits (one word), and the buffer memory is not backed up with a battery.
Therefore, store error codes and other data in the file register of the PLC CPU as necessary.

Address				Buffer memory address name		Default	R/W ＊1	Reference section
CH. 1		CH. 2						
Decimal	Hexa-decimal	Decimal	Hexa-decimal					
0	0	4000	0FA0	Instruction code designation area ＊2		4452H	R/W	3.5.2 (1)
1	1	4001	0FA1	Head address designation area ＊2		0	R/W	3.5.2 (2)
2	2	4002	0FA2	Number of processing points designation area ＊2		1	R/W	3.5.2 (3)
3	3	4003	0FA3	Continuous instruction execution interval designation area (100 ms interval) ＊2		0	R/W	3.5.2 (4)
4	4	4004	0FA4	Data match result storage area ＊2		0	R/W	3.5.2 (5)
5	5	4005	0FA5	Data mismatch result storage area ＊2		0	R/W	3.5.2 (6)
6	6	4006	0FA6	Writing life evaluation value designation area (10,000 units)		30	R/W	6.11.1
7	7	4007	0FA7	Writing life evaluation result storage area ＊2		0	R/W	
8	8	4008	0FA8	Retry count designation area ＊3		3	R/W	3.5.2 (7)
9	9	—	—	Processing unit designation area ＊3		0	R/W	3.5.2 (8)
—	—	4010	0FAA	Data copy direction designation area ＊2		12	R/W	3.5.2 (9)
11	B	4011	0FAB	In-zone detection time designation area (10 ms interval) ＊3		0	R/W	3.5.2 (10)
12	C	4012	0FAC	Error LED display status storage area		0	R	3.5.2 (11)
13	D	4013	0FAD	Cannot be used.		—	—	—
14	E	4014	0FAE	Latest error code storage area		0	R	3.5.2 (12)
15	F	4015	0FAF	Error history 1	Error history storage area	0	R	3.5.2 (13)
16	10	4016	0FB0	Error history 2		0	R	
17	11	4017	0FB1	Error history 3		0	R	
18	12	4018	0FB2	Error history 4		0	R	
19 to 21	13 to 15	4019 to 4021	0FB3 to 0FB5	Cannot be used.		—	—	—
22	16	4022	0FB6	Write count storage area (lower 16 bits)		0	R	6.11.1
23	17	4023	0FB7	Write count storage area (upper 16 bits)		0	R	
24 to 25	18 to 19	4024 to 4025	0FB8 to 0FB9	Cannot be used.		—	—	—
26	20	4026	0FBA	Write count increment value designation area (MD instruction only)		1	R/W	6.11.1
27 to 31	1B to 1F	4027 to 4031	0FBB to 0FBF	Cannot be used.		—	—	—
32	20	4032	0FC0	Write-protect setting area		0	R/W	6.9.1
33	21	4033	0FC1	Write-protect starting page address designation area		0	R/W	
34	22	4034	0FC2	Write-protect end page address designation area		0	R/W	

＊1 Indicates whether a read or write operation can be executed from the sequence program. R: Can be read, W: Can be written.

＊2 The setting value is retained after the execution of the instruction. Therefore, initialize the required items with the TOP instruction to prevent malfunction.

＊3 This can be changed only the duration from power-on or PLC CPU reset until the first ID instruction execution request or a special instruction execution request is turned ON.

Address				Buffer memory address name	Default	R/W ＊1	Reference section
CH. 1		CH. 2					
Decimal	Hexa-decimal	Decimal	Hexa-decimal				
35 to 39	23 to 27	4035 to 4039	0FC3 to 0FC7	Cannot be used.	—	—	—
40	28	4040	0FC8	Memory type designation area	0	R/W	6.10.1
41	29	4041	0FC9	Memory type storage area	0	R	
42 to 99	2A to 63	4042 to 4099	0FCA to 1003	Cannot be used.	—	—	—
100 to 419	64 to 1A3	4100 to 4419	1004 to 1143	Data storage area (320 words)	Undefined	R/W	3.5.2 (14)

＊1 Indicates whether a read or write operation can be executed from the sequence program.
R: Can be read, W: Can be written.

POINT

Do not use the devices that are not allowed to use since they are being used by the system. If any of such devices is used by the user, normal operation cannot be guaranteed.

3.5.2 Details of the buffer memory

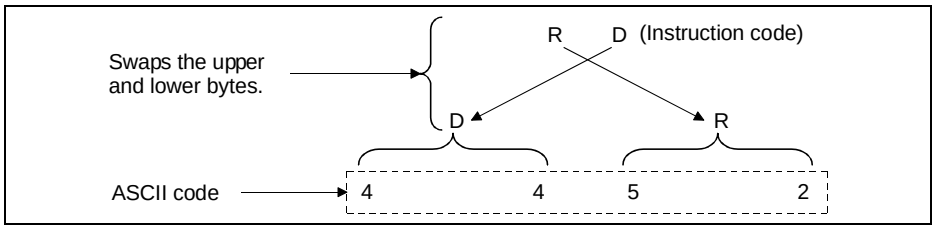
(1) Instruction code designation area (address 0 (0H)/ 4000 (0FA0H))

Designates the instructions for the data carrier.

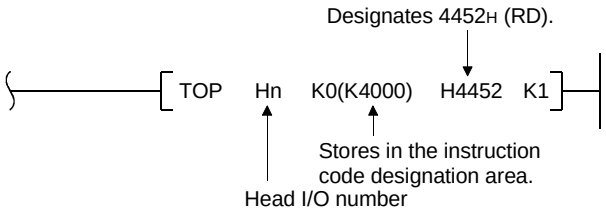
[Example] To designate the Read instruction (RD)

Swaps the upper and lower bytes of the instruction to be set, and stores after converting into ASCII code.

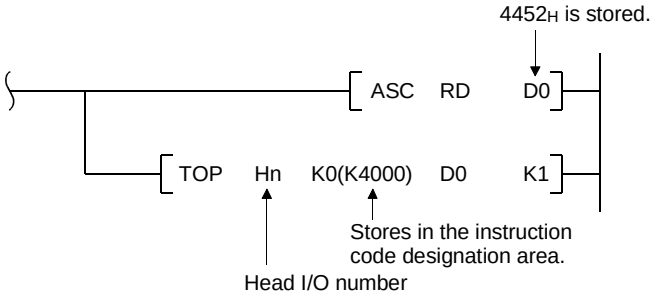
Default: 4452H



1) To designate ASCII code directly



2) To convert using the ASC instruction

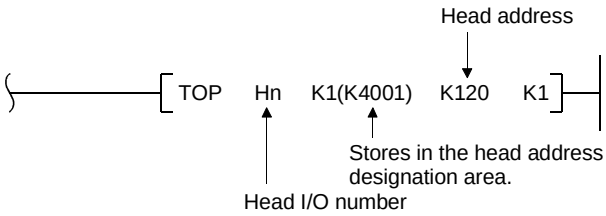


(2) Head address designation area (address 1 (1H)/ 4001 (0FA1H))

Designates the head memory address of the data carrier that reads or writes data.

Applicable range: 0 to 159 (0H to 9FH) for word unit
0 to 319 (0H to 13FH) for byte unit
Default: 0

[Example] To designate address 120



POINT

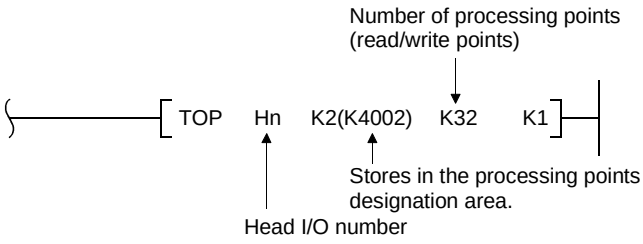
Designate the address within the following range:
• Head address + number of processing points ≦ 160 (A0H) (For byte unit: 320 (140H))

(3) Number of processing points designation area (address 2 (2H) / 4002 (0FA2H))

Designates the number of processing points of data to be read or written.

Applicable range: 0 to 160 (0H to A0H) for word unit
0 to 320 (0H to 140H) for byte unit
Default: 1

[Example] To set the number of processing points to 32 points



POINT

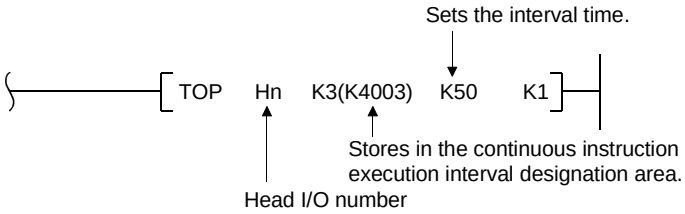
Designate the address within the following range:
• Head address + number of processing points ≦ 160 (A0H) (For byte unit: 320 (140H))

(4) Continuous instruction execution interval designation area (address 3 (3H)/ 4003 (0FA3H))

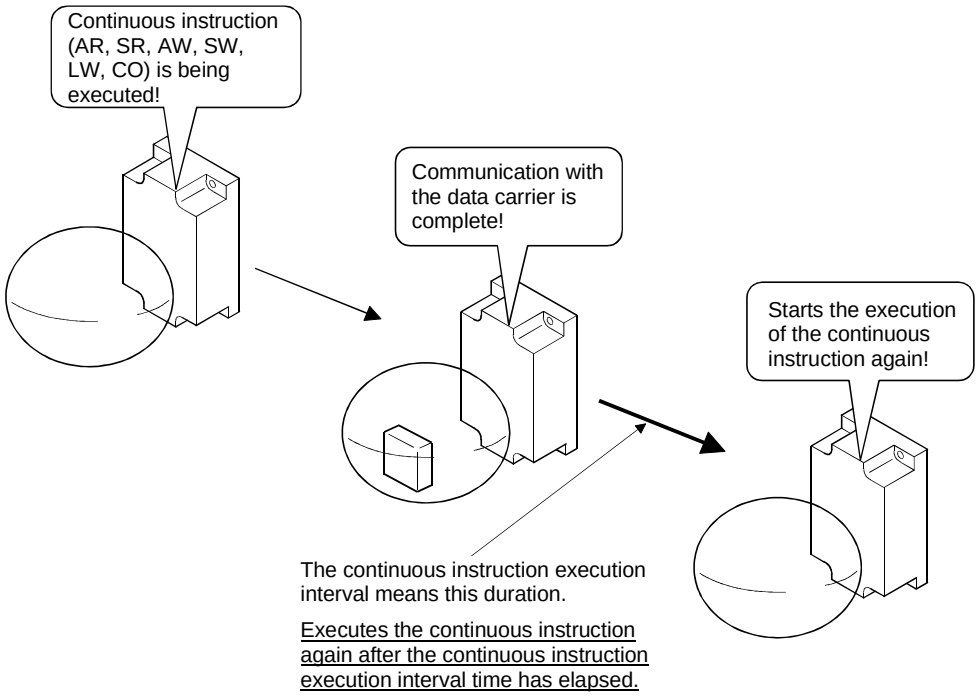
Designates the instruction execution interval of the Continuous instruction in 100ms units.

Applicable range: 0 to 32767 (0ms to 3276700ms)
Default: 0

[Example] To set the continuous instruction execution interval to 5 seconds (5000ms)



What is the continuous instruction execution interval?



3 - 10

(5) Data match result storage area (address 4 (4H)/ 4004 (0FA4H))

Stores the result only if data matches after the Comparison instruction (CR, SR, CW, SW, CM) is executed.

Default: 0

POINT
The matched result remains in the buffer memory unless it is reset by the sequence program. Clear it by writing "0" in the data match result storage area before executing the Comparison instruction again.

(6) Data mismatch result storage area (address 5 (5H) / 4005 (0FA5H))

Stores the result only if data does not match after the Comparison instruction (CR, SR, CW, SW, CM) is executed.

Default: 0

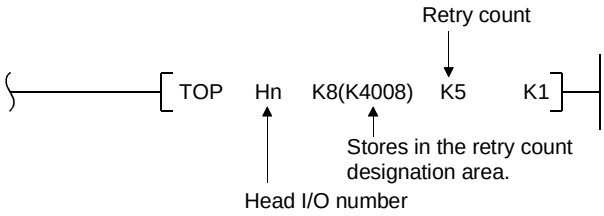
POINT
The mismatched result remains in the buffer memory unless it is reset by the sequence program. Clear it by writing "0" in the data mismatch result storage area before executing the Comparison instruction again.

(7) Retry count designation area (address 8 (8H)/ 4008 (0FA8H))

Designates the retry count for the ID interface module to execute an instruction when an error occurs during data communication.

Applicable range: 0 to 32767 (0 to 32767 times)
Default: 3

[Example] To set the retry count to 5 times



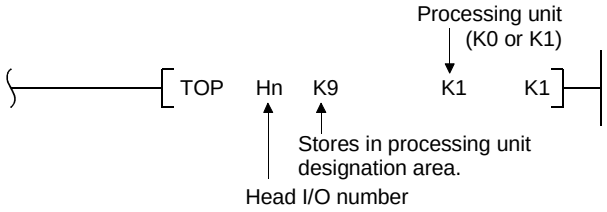
POINT
If the designated value is out of the applicable range, the default value (K3) will be set when the ID instruction is executed.

(8) Processing unit designation area (address 9 (9H)/ -)

Designates the processing unit (word/byte) during data communication.

Applicable range: 0 (word unit), 1 (byte unit)
Default: 0

[Example] To set the processing unit to byte unit



POINT

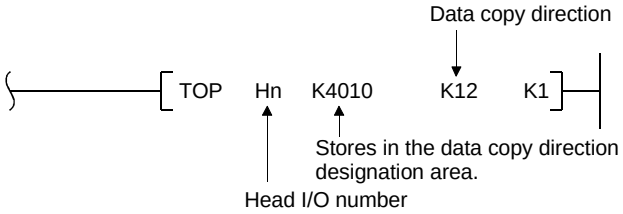
- If the byte unit is set as the processing unit, the write data will be different from the read data. For more details on the data structure, see Section 5.2.
- If the designated value is out of the applicable range, the default value (0) will be set when the ID instruction is executed.

(9) Data copy direction designation area (address - / 4010 (0FAAH))

Designates the copy direction when the Copy Data (C0) instruction is executed.

Applicable range: 12 (CH. 1 → CH. 2), 21 (CH. 2 → CH. 1)
Default: 12

[Example] To set the data copy direction from CH. 1 to CH. 2

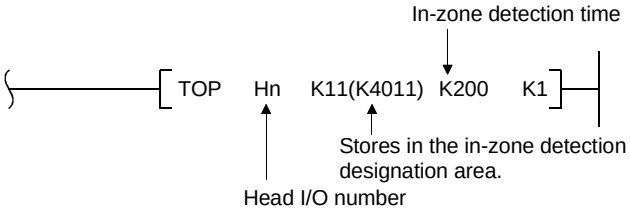


(10) In-zone detection time designation area (address 11 (BH)/ 4011 (0FABH))

Designates the standby time from when the data carrier enters the communication range to when the data carrier detects an in-zone when the Continuous instruction (AR, SR, AW, SW, LW, CO) is executed.

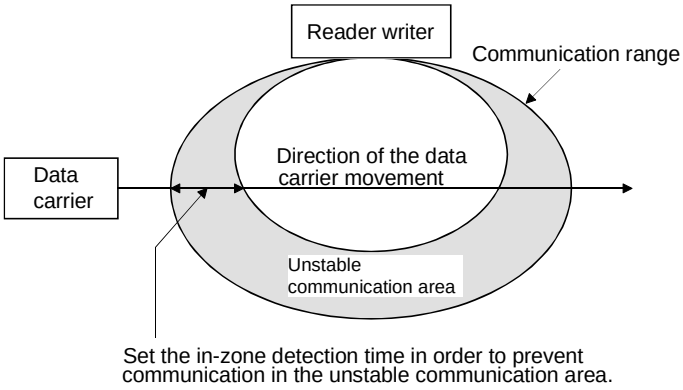
Applicable range: 0 to 32767 (0ms to 327670ms)
Default: 0

[Example] To set the in-zone detection time to 2 seconds



What is the In-zone detection time?

It is the standby time from when the data carrier enters the communication range to when the data carrier starts communicating. By setting the in-zone detection time, communication can be performed avoiding unstable communication areas.



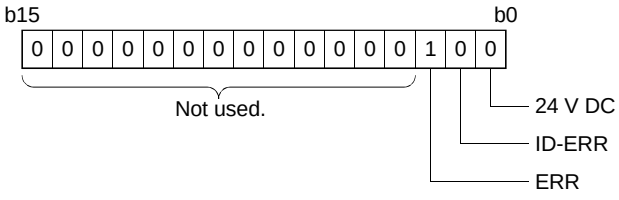
POINT
If the designated value is out of the applicable range, the default value (K1) will be set when the ID instruction is executed

(11) Error LED display status storage area (address 12 (CH)/ 4012 (0FACH))

Error LED information is stored by the operating system of the ID interface module.

For normal operation, "0" is stored; if an error occurs, "1" is stored.

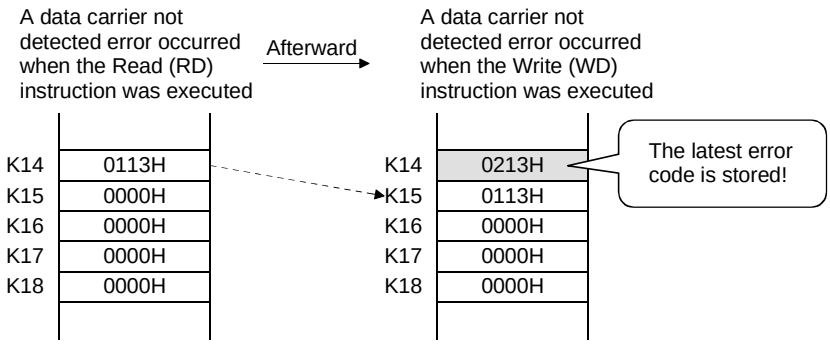
Default : K0



(12) Latest error code storage area (address 14 (EH)/ 4014 (0FAEH))

The latest error code when an error occurs is stored.
For details on the error codes, see Section 7.1.
The latest error code is zero-cleared after the error reset command (see Section 6.14) is executed, and is also stored in the error history storage area while shifting the stored error codes.

[Example] When an error occurred during the execution of the Read (RD) instruction on CH. 1, and an error also occurred when the next Write (WD) instruction was executed



(13) Error history storage area (addresses 15 to 18 (FH to 12H)/ 4015 to 4018 (0FAFH to 0FB2H))

The last four error codes are stored. For details on the error codes, see Section 7.1.

(14) Data storage area (addresses 100 to 419 (64H to 1A3H)/ 4100 to 4419 (1004H to 1143H))

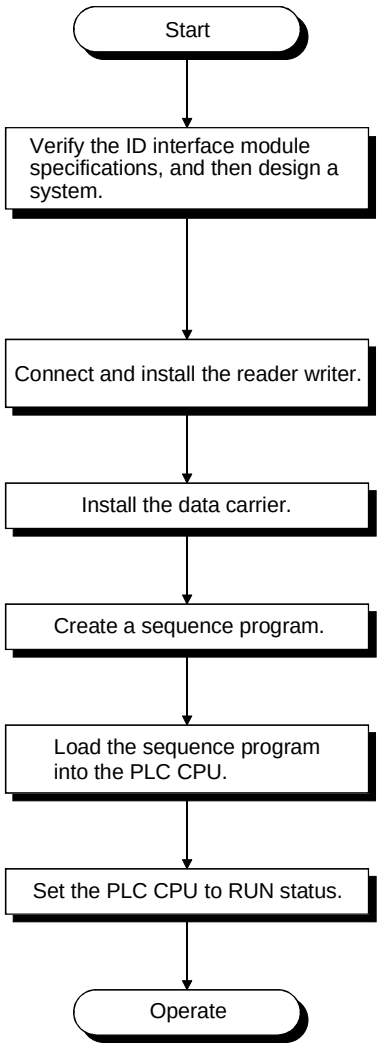
Write data is set, and read data is stored.

POINT
Data is written from the head address (100 (64H)/4100 (1004H)) of the buffer memory to the designated head address of the data carrier during the write operation. During the read operation, the data equivalent to the number of the designated processing points beginning with the designated head address of the data carrier is stored beginning with the head address (100 (64H)/4100 (1004H)) of the buffer memory.

4 PROCEDURES BEFORE OPERATING THE ID INTERFACE MODULE

The following flowchart explains the procedures up to starting up the system that uses the ID interface module.

4.1 Procedures before Operating the ID Interface Module

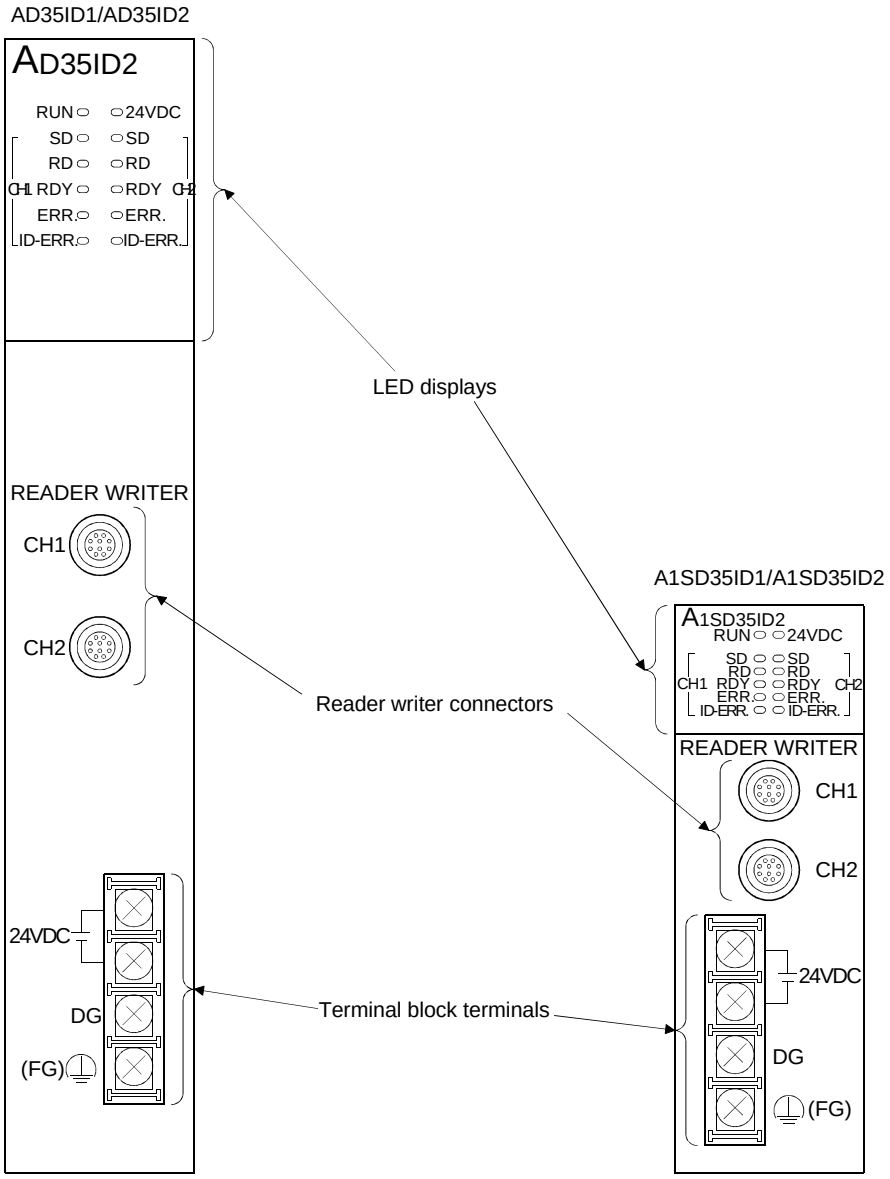


	Reference section
• Verify the configuration of a system that uses the ID interface module.	Section 2.1
• Verify both the general and performance specifications of the ID interface module.	Section 3.1 Section 3.2
• Connect the reader writer to the ID interface module. • Verify the installation location, and then install the reader writer. • Install the data carrier to the work or pallet.	Section 4.5
• Create a sequence program to control the ID system.	Chapter 6

4 - 1

4.2 Component Names

The following explains the name of each component of the ID interface module:

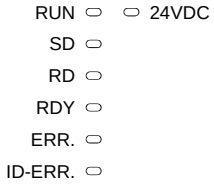


*The figure above shows 2-channel modules.

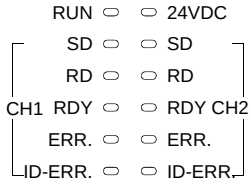
4 - 2

4.3 Description of LED Displays

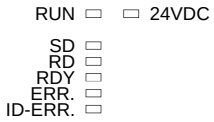
(1) LED display of the AD35ID1



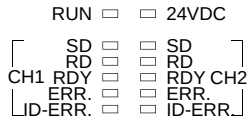
(2) LED display of the AD35ID2



(3) LED display of the A1SD35ID1



(4) LED display of the A1SD35ID2



	LED name		Description of LED display	When the LED is ON (ON/ flashing)	When the LED is OFF (OFF)	LED initial status
	AD35ID1 A1SD35ID1	AD35ID2 A1SD35ID2				
—	RUN		Normal operation display	Normal	Abnormal	ON
	24 V DC		Power being supplied to the reader writer	Normal	Abnormal	ON
CH. 1	SD		CH. 1 transmission in progress	Transmitting	—	OFF
	RD		CH. 1 reception in progress	Receiving	—	OFF
	RDY		CH. 1 can transmit/receive	Can transmit/ receive	Cannot transmit/ receive	ON
	ERR.		Communication error between CH. 1 and the PLC CPU	Error occurred	Normal	OFF
	ID-ERR.		Communication error between CH. 1 and the data carrier	Error occurred	Normal	OFF
CH. 2	—	SD	CH. 2 transmission in progress	Transmitting	—	OFF
		RD	CH. 2 reception in progress	Receiving	—	OFF
		RDY	CH. 2 can transmit/receive	Can transmit/ receive	Cannot transmit/ receive	ON
		ERR.	Communication error between CH. 2 and the PLC CPU	Error occurred	Normal	OFF
		ID-ERR.	Communication error between CH. 2 and the data carrier	Error occurred	Normal	OFF

POINT

If the continuous instruction execution interval is set, the RDY signal flashes while the timer is in operation.

4.4 Installation

This section explains precautions from unpacking to the installation of the ID interface module, as well as the installation environment.
For details on mounting and installing the ID interface module, refer to the User's Manual of the PLC CPU in use.

4.4.1 Handling precautions

The following explains the precautions for handling the ID interface module:

POINT

For the precautions for mounting and dismounting the ID interface module, see the Safety Precautions in the beginning of this manual.

(1) Be sure to tighten the terminal screws and the fastening screws using the clamping torque within the range shown below.

Screw location	Clamping torque range
Terminal block terminal screws (M4 screws)	98 to 137N • cm
Module mounting screws (M4 screws)	78 to 118N • cm

4.4.2 Installation environment

⚠CAUTION

When installing the A Series PLC, the following environment must be avoided. Using the operating environment that does not meet the general specifications may cause an electric shock, a fire or a malfunction, or may damage or degrade the product.

- Locations where the ambient temperature exceeds the range of 0 to 55°C.
- Locations where the ambient humidity exceeds the range of 10 to 90% RH.
- Locations where condensation occurs due to a sudden temperature change.
- Locations where there are corrosive or inflammable gases.
- Locations exposed to considerable amounts of conductive powdery substances such as dust and iron filing, oil mist, salt, or organic solvents.
- Locations exposed to direct sunlight.
- Location exposed to strong electric or magnetic fields.
- Location where vibrations or impacts are directly applied to the main unit.

4.5 Wiring

This section explains the wiring of the ID interface module.

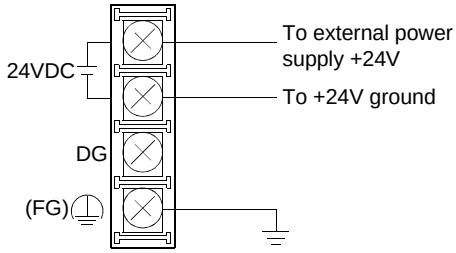
4.5.1 Wiring precautions

⚠CAUTION

- Do not bundle the cables together with the main circuit cable, a high-voltage cable, or a cable from other than the PLC, and do not install them close to each other. Failure to do so may expose the system to noise and surge induction, resulting in a malfunction.
  The cables should be installed at least 100 mm away from each other.
- If a group of devices such as an inverter and a servomotor are to be used, always ground the terminal using Class D grounding (Class 3 grounding). Otherwise, they may be affected by the magnetic field from the main unit and the cables, and there is the risk of malfunction.
- Do not connect the external power supply by reversing the polarities of +24V and 24G. If they are connected in reverse, the ID interface module will not operate.

4.5.2 Wiring of power supply terminals

Perform the wiring of the power supply terminals as shown in the figure below.



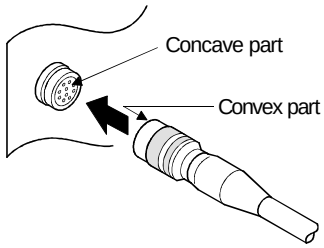
POINT

The DG terminal must always be open.
There is the risk of reader writer malfunction due to external connection.

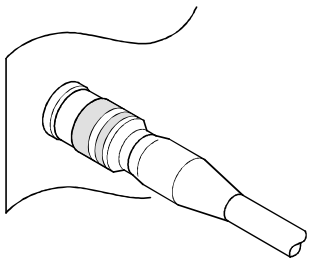
4.5.3 Connecting and disconnecting the reader writer and the cables

The following shows how to connect and disconnect the reader writer and the cables:

(1) Connecting

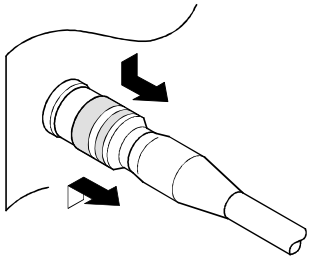


1. Insert the convex part of the plug into the concave part of the jack.

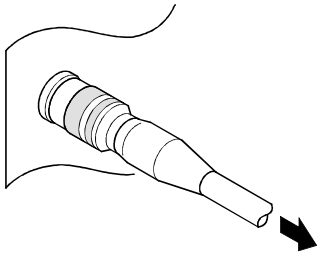


2. Insert the plug securely into the position until the plug locks (you will hear a click sound).

(2) Disconnecting



1. Release the lock by pulling the lock release mechanism section of the plug in the direction of the arrows.

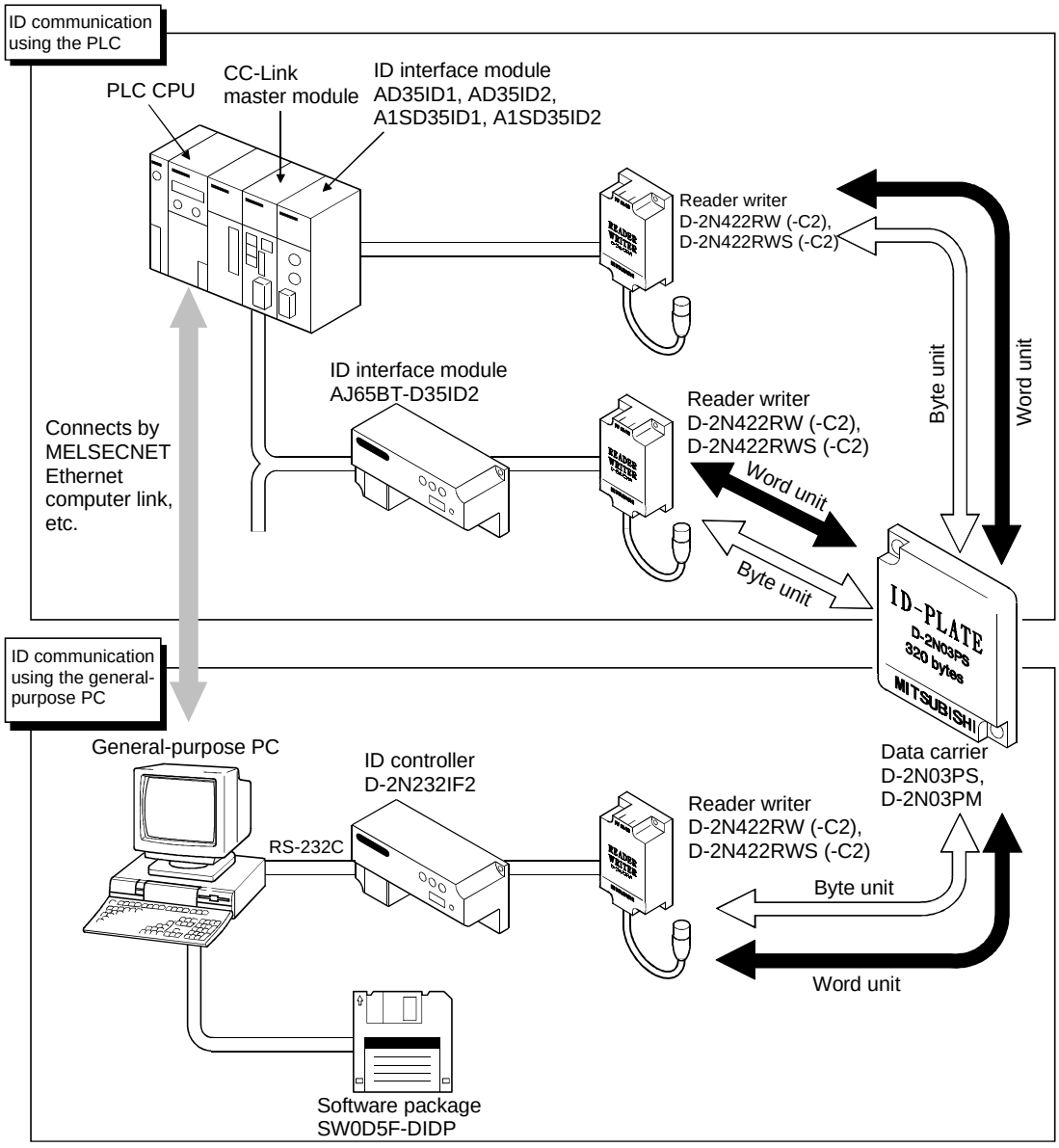


2. Hold and pull the plug in the direction of the arrow.

5 ITEMS TO BE ACKNOWLEDGED PRIOR TO PROGRAMMING

5.1 System Connection Example and Data Handling

The ID system reads/writes data in the PLC devices and PC memory to the data carrier.
In addition, it is possible to use either bytes (8 bits) or words (16 bits, 2 bytes) as the data processing unit when communicating with the data carrier.
However, in order to maintain data compatibility, select either word unit or byte unit uniformly as the processing unit in a system that contains a PLC or a PC as the host.



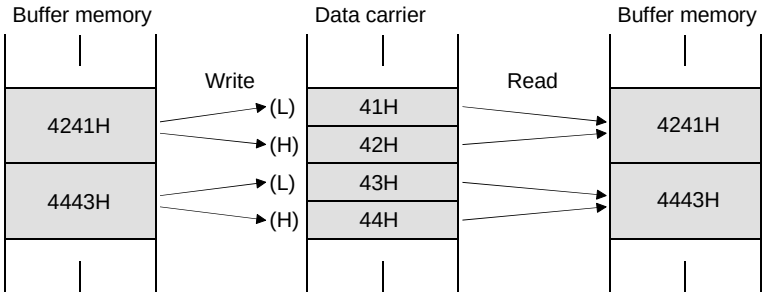
POINT
The data processing unit of the ID controller D-2N232IF2 is the byte unit. It can easily be used in the word unit by installing the software package SW0D5F-DIDP.

5.2 Data Structure (Processing Unit)

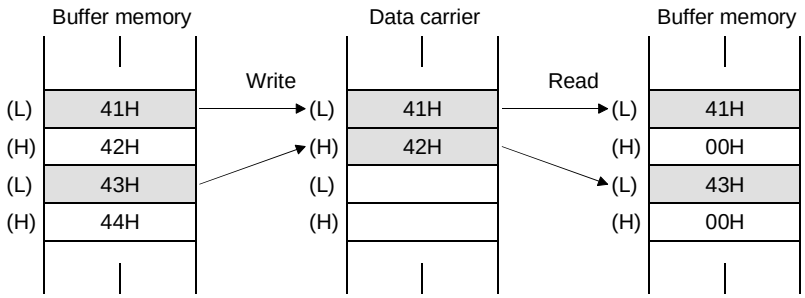
The data processing of the ID system consists of two types of processing: processing by word unit and processing by byte unit.
The default data structure of the ID system is the word unit. To operate in the byte unit, set "1" in the processing unit designation area (9) of the buffer memory.

POINT
Processing in byte unit requires a special data structure, and the write data and the read data will be different. Processing in word unit is described in this manual. It is recommended to perform processing in word unit when operating the ID system.

(1) Data flow in word unit

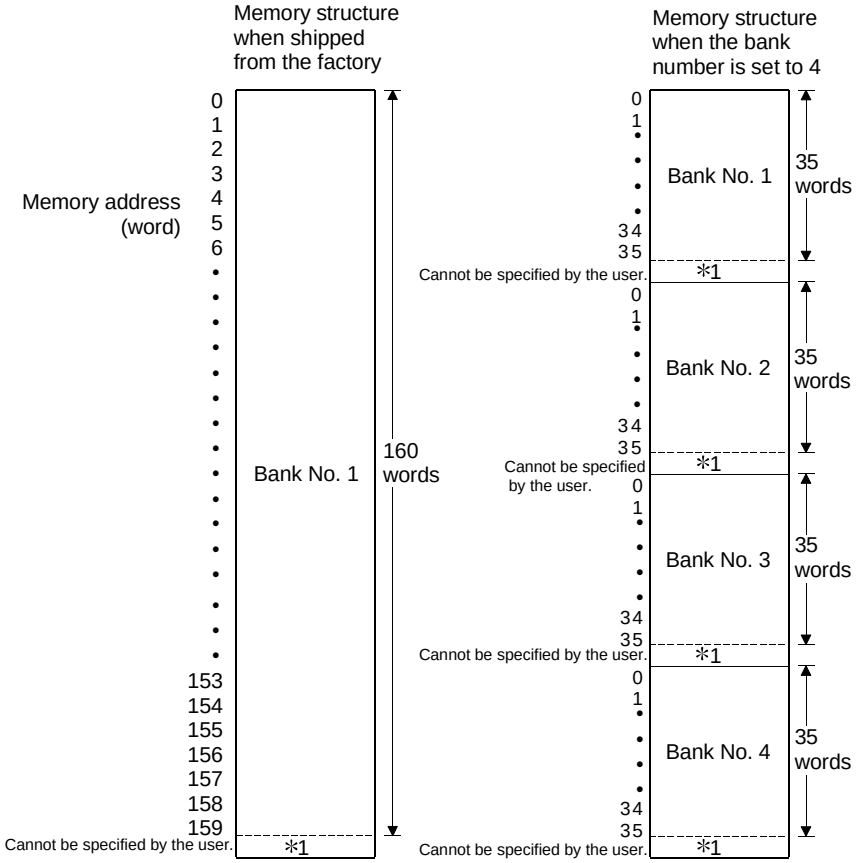


(2) Data flow in byte unit



5.3 Memory of the Data Carrier

The following shows the memory structure of the data carrier (D-2N03PS, D-2N03PM) that can communicate with the ID interface module.
However, the data size and data area that can be used vary depending on the memory type. For more details, see Section 6.10.



*1: Write count storage area (MD, MW, and LW instructions)

POINT

For the differences of processing in word unit and byte unit, see Section 5.2.
The write count storage area is automatically assigned for each bank. It stores the write count values when the MD, MW or LW instruction is executed.

5.4 Interlock

The following lists combinations of the I/O signals by instruction.
Use an interlock by combining I/O signals depending on the instruction.

Xn0 • • • • • • • • • • • • • • Watchdog timer error
Xn3/XnB • • • • • • • • • • • ID-BUSY
Xn4/XnC • • • • • • • • • • • ID instruction complete
Xn5/XnD • • • • • • • • • • • Error detection
Xn6 • • • • • • • • • • • • • • ID ready signal
Y(n+1)4/Y(n+1)C • • • • ID instruction execution request
Y(n+1)5/Y(n+1)D • • • • Special instruction execution request

• • • Indicates a signal for CH. 2.

Instruction	Instruction code		I/O signal (interlock signal)						
	ASCII	Hexadecimal	Xn0	Xn3 / XnB	Xn4 / XnC	Xn5 / XnD	Xn6	Y(n+1)4 / Y(n+1)C	Y(n+1)5 / Y(n+1)D
Read	RD	4452H	○	○	○	○	○	○	×
Read and Compare	CR	5243H							
Continuous Read	AR	5241H							
Continuous Read and Compare	SR	5253H							
Write	WD	4457H							
Write and Compare	CW	5743H							
Continuous Write	AW	5741H							
Continuous Write and Compare	SW	5753H							
Fill	FI	4946H							
Compare	CM	4D43H							
Copy Data	CO	4F43H							
Clear	CL	4C43H							
Read Write-Protect Setting	RP	5052H	○	○	○	○	○	×	○
Write Write-Protect Setting	WP	5057H							
Life Extension Bank Switching	BK	424BH							
Count Write	MW	4D57H	○	○	○	○	○	○	×
Continuous Count Write	LW	4C57H							
Update Write Count	MD	4D44H							
Continuous Instruction Abort Command	—	—	○	×	×	○	○	○	×
Error Reset Command	—	—							○
Continuous Instruction Execution Interval Designation	—	—	○	×	×	○	○	×	×
Retry Count	—	—							
Processing Unit Designation	—	—							
In-Zone Detection Time Designation	—	—							

○ • • • Interlock is required.
× • • • Interlock is not required.

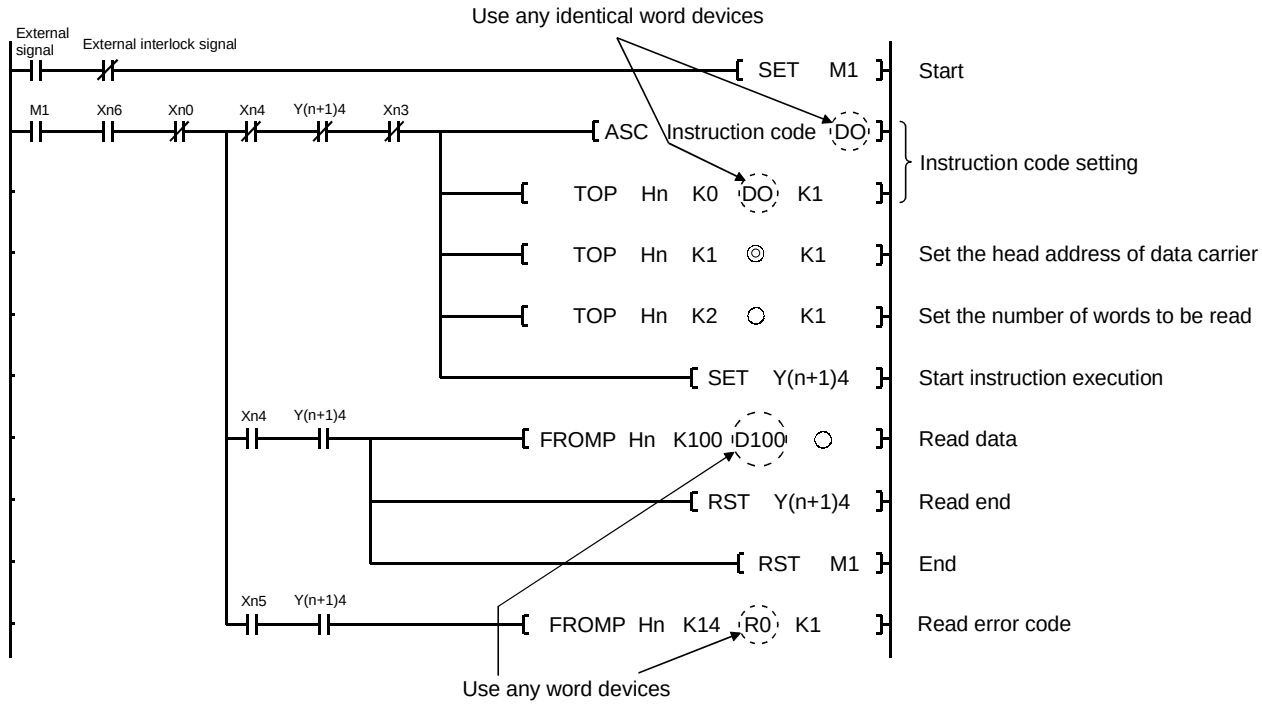
5.5 Basic Format of the Program

This section explains the basic program for communicating between the PLC CPU and the data carrier. This section describes a program when CH. 1 is used. If CH. 2 is to be used, use the contacts and buffer memory that are compatible with CH. 2.

5.5.1 Basic program of the read instructions

(1) The following shows the basic program when the instructions listed below are used:

• Read (RD) • Read and Compare (CR) • Continuous Read (AR)
• Continuous Read and Compare (SR)

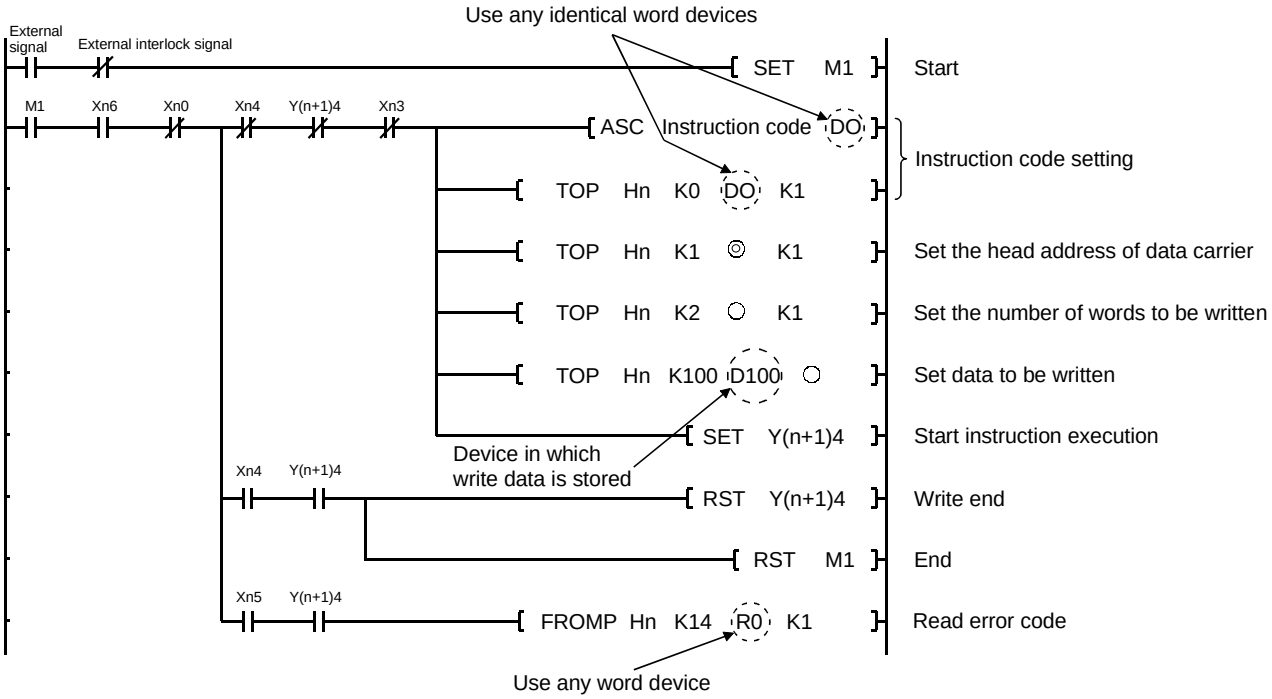


◎ • • • Head address of the data carrier
○ • • • Number of words to be read

5.5.2 Basic program of the write instructions

(1) The following shows the basic program when the instructions listed below are used:

• Write (WD) • Write and Compare (CW) • Continuous Write (AW)
• Continuous Write and Compare (SW) • Fill (FI) • Count Write (MW)
• Continuous Count Write (LW)



◎ • • • Head address of the data carrier
○ • • • Number of words to be written

6 COMMUNICATION WITH THE DATA CARRIER

This chapter explains the programming method in order to communicate with the data carrier using instructions.

6.1 Precautions on Programming

This section describes the precautions for creating programs in order to communicate with the data carrier using the ID interface module.

(1) Handshake I/O signals for the PLC CPU

Signals that execute the ID instructions from a sequence program and signals indicating the completion of ID instructions are called handshake I/O signals. These signals are required for communication with the data carrier.
Always insert handshake I/O signals. For details, see Section 5.4, "Handshake I/O Signals."

(2) Reading/writing of buffer memory

A sequence program that reads from and writes to buffer memory is required in order to communicate with the data carrier.
Create the necessary parts of the sequence program.
The default values are written into the buffer when the ID interface module is started up.

(a) Buffer memory has no battery backup.
All previously written data reverts to the default values upon power-up, CPU reset or mode change. In such cases, it is necessary to write setting or modified data.

(b) Modifying the default values for a specific area used in buffer memory
If the default values are required to be changed in order to communicate with the data carrier, you must prepare a sequence program that performs the modification.

(3) Data retention by the data carrier when an error occurs

When an error occurs while communicating with the data carrier, data is modified by mixing new data and old data in units of seven words.
Therefore, if an error occurs while executing a write-type instruction (WD, CW, AW, SW, FI, MW, LW, WP, CO, BK, MD), execute the instruction again after requesting an error reset.

(4) Countermeasure if the data carrier skips reading

If the mobile unit is moving too fast during mobile communication or in case of data carrier malfunction, the data carrier on the mobile unit may not communicate with the reader writer without generating a communication error.
If such skipping by the data carrier can expect a serious problem, install a method of detecting the mobile object by a limit switch, etc.

6.2 List of Instructions and Commands

The following table lists the instructions and commands that can be used by the ID interface module.

Function	Instruction/ command	Instruction code	Description	Reference section
Read	Read	RD (4452H)	Reads data from the data carrier.	6.4.1
	Continuous Read	AR (5241H)	Reads data continuously until the data carrier enters the communication range of the reader writer, after which data is read from the data carrier.	
	Read and Compare	CR (5243H)	Reads data from the data carrier and compares data.	6.4.2
	Continuous Read and Compare	SR (5253H)	Reads data continuously until the data carrier enters the communication range of the reader writer, after which data is read from the data carrier and compared.	
Write	Write	WD (4457H)	Writes data into the data carrier.	6.5.1
	Continuous Write	AW (5741H)	Writes data continuously until the data carrier enters the communication range of the reader writer, after which data is written to the data carrier.	
	Write and Compare	CW (5743H)	Writes data into the data carrier and compares data.	6.5.2
	Continuous Write and Compare	SW (5753H)	Continuously writes data until the data carrier enters the communication range of the reader writer, after which data is written to the data carrier and compared.	
	Fill	FI (4946H)	Fills the designated area of the data carrier with specified data.	6.5.3
Verification	Compare	CM (4D43H)	Compares data in the ID interface module with data in the data carrier.	6.6
Copy	Copy Data	CO (4F43H)	Copies data in the data carrier between CH. 1 and CH. 2.	6.7
Deletion	Clear	CL (4C43H)	Clears all data in the data carrier to "0".	6.8
Write Protect	Read Write-Protect Setting	RP (5052H)	Reads the write-protect setting in the data carrier.	6.9.2
	Write Write-Protect Setting	WP (5057H)	Writes write-protect setting into the data carrier.	6.9.3
Memory Setting	Life Extension Bank Switching	BK (4B42H)	Sets memory type (number of banks) in the data carrier.	6.10.2
Life Management	Count Write	MW (574DH)	Writes data into the data carrier and increments the write count.	6.11.2
	Continuous Count Write	LW (574CH)	Writes data continuously until the data carrier enters the communication range of the reader writer, after which data is written to the data carrier and the write count is incremented.	
	Update Write Count	MD (444DH)	Increments the write count by a specific value.	6.11.3
Commands	Abort Continuous Instruction	—	Aborts from a continuous instruction.	6.13
	Error Reset	—	Performs error reset. (Turns off the Error LED, resets error detection signal, and clears error code storage area of buffer memory.)	6.14

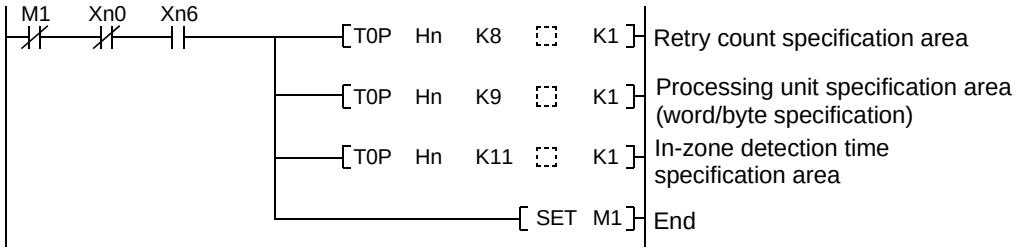
6 - 2

6.3 Initial Settings

If data communication is to be performed using the data carrier other than the default settings, be sure to write into the following buffer memory.

Buffer memory address				Description of buffer memory
CH. 1		CH. 2		
Decimal	Hexa-decimal	Decimal	Hexa-decimal	
8	8	4008	0FA8	Retry count specification area
9	9	9	9	Processing unit specification area (word/byte specification)
11	B	4011	0FAB	In-zone detection time specification area

(Example) Program for CH. 1



POINT

- Writing into buffer memory during initial setting can be executed only once when the ID interface module is started up.
- Initial settings are valid until the first instruction is executed. After executing an instruction, modification of initial settings will be ignored. To modify the initial settings, the CPU must be reset.

6.4 Data Read Instructions

This section explains the instructions used to read data from the data carrier.

6.4.1 Read (RD) instruction, continuous read (AR) instruction

<Read (RD) Instruction>

Stores the data read from the data carrier into buffer memory of the ID interface module.

<Continuous Read (AR) Instruction>

Continuously reads data until the data carrier enters the communication range of the reader writer. Stores data into buffer memory of the ID interface module after the data carrier enters the communication range.

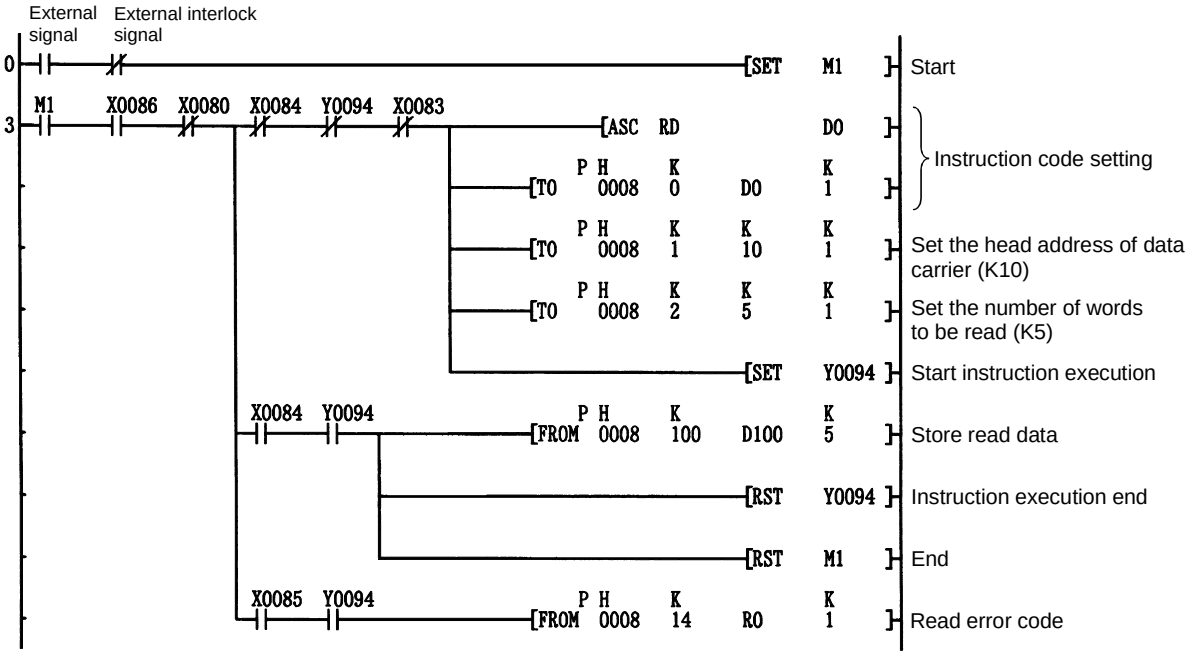
Instruction Code

Read instruction : RD Code: 4452H
Continuous Read instruction : AR Code: 5241H

(1) Sample program

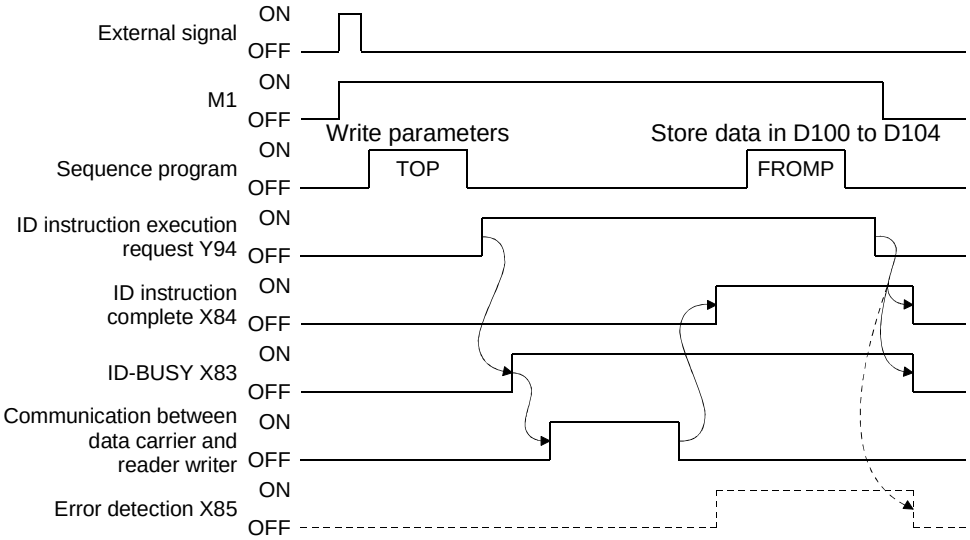
The following shows an example of a program with the following conditions: Set D0 to "AR" instead of "RD" if the Continuous Read instruction is to be executed.

Head I/O number of ID interface module	080 (n = 8)
Channel used	CH. 1
Read head address of data carrier	K10
Number of words to be read	K5
Storage destination of read data	D100 to D104
Error code storage destination	R0



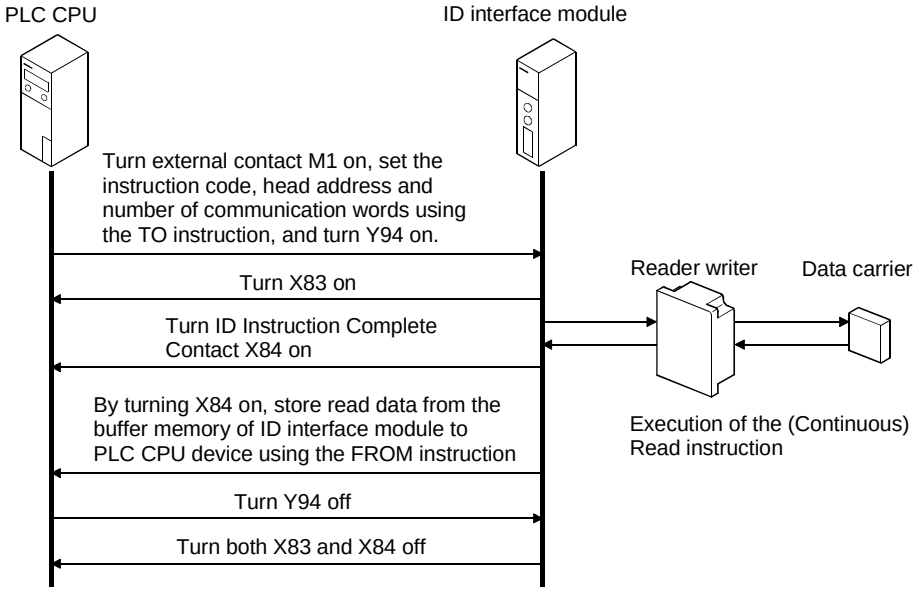
(2) Operation timing

The following shows the operation timing:



(3) Explanation of operation

The operation of the above timing chart is explained below.



POINT

- If the data carrier does not exist when executing the Read (RD) instruction, the instruction is repeated for the retry count, and an error is generated.
- When the Continuous Read (AR) instruction is executed, data is read continuously until the data carrier enters the communication range.
  If the data carrier does not enter the communication range, the instruction will continue indefinitely.
  To abort the execution, execute the Abort Continuous Instruction command. (See Section 6.13)

6.4.2 Read and compare (CR) instruction, continuous read and compare (SR) instruction

The (Continuous) Read and Compare instruction verifies whether data has been correctly read from the data carrier, thus improving the reliability of data.

<Read and Compare (CR) Instruction>

Compares the data read from the data carrier and stores it into the buffer memory of the ID interface module.
Data read time will be approximately twice of that for the Read (RD) instruction.

<Continuous Read and Compare (SR) Instruction>

Continuously performs the Read and Compare instruction until the data carrier enters the communication range of the reader writer.
When the data carrier enters the communication range, data is read and compared, and it will be stored in the buffer memory of the ID interface module.
When this instruction is used to read from a low-speed mobile unit that is located close to the communication range limit, this is a useful method in handling errors and distorted data.
However, since the read time will be approximately twice of that for the Continuous Read (AR) instruction, this is not suitable for high-speed mobile units.

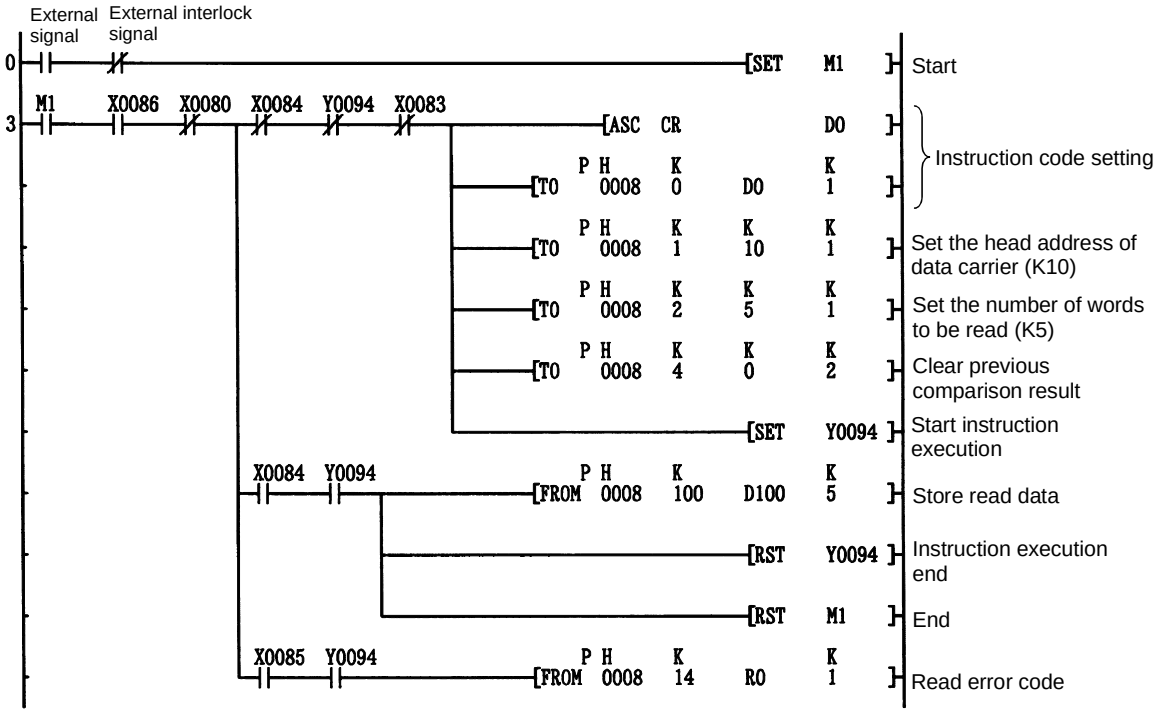
Instruction Code

Read and Compare instruction : CR Code: 5243H
Continuous Read and Compare instruction : SR Code: 5253H

(1) Sample program

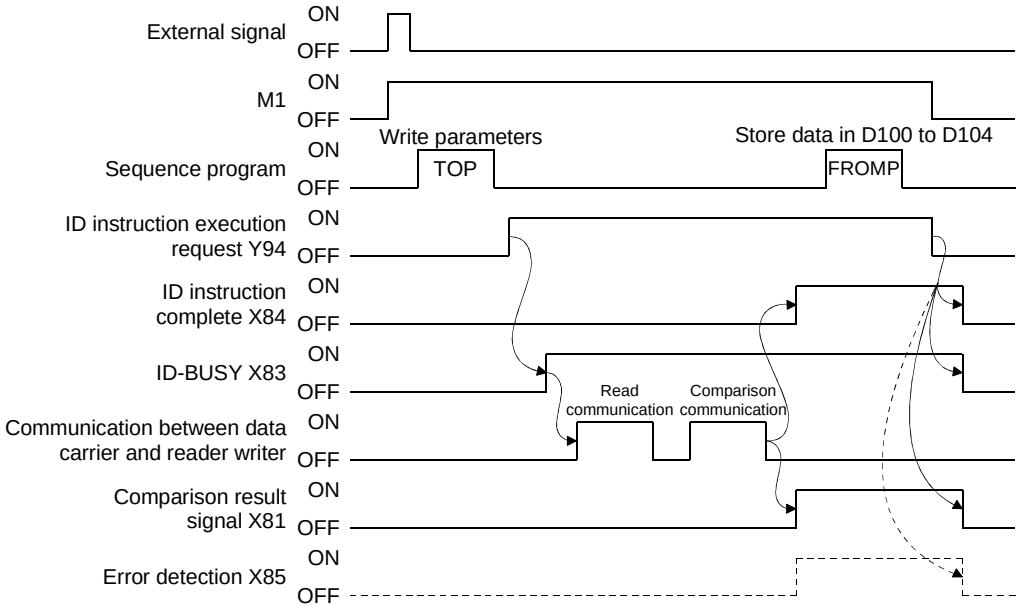
The following shows an example of a program with the following conditions:
Set D0 to "SR" instead of "CR" if the Continuous Read and Compare instruction is to be executed.
(In the following program, the comparison result signal (Xn1) is not used.)

Head I/O number of ID interface module	080 (n = 8)
Channel used	CH. 1
Read head address of data carrier	K10
Number of words to be read	K5
Storage destination of read data	D100 to D104
Error code storage destination	R0



(2) Operation timing

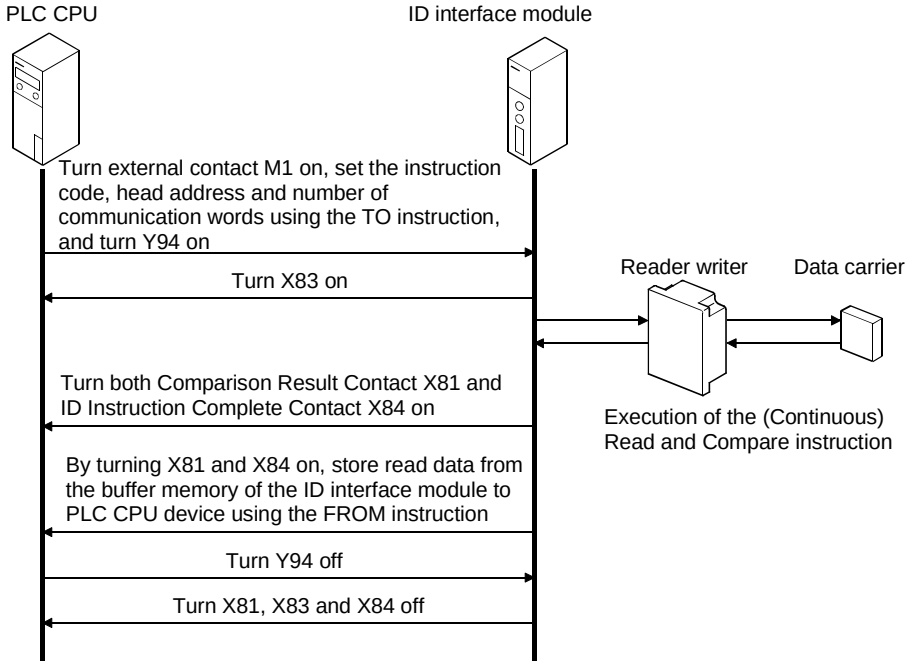
The following shows the operation timing:



6 - 7

(3) Explanation of operation

The operation of the above timing chart is explained below.



POINT

- If the data carrier does not exist when executing the Read and Compare (CR) instruction, the instruction is repeated for the retry count, and an error is generated. An error is also generated when the comparison result is not matched.
- When the Continuous Read and Compare (SR) instruction is executed, data is read continuously until the data carrier enters the communication range.
  If the data carrier does not enter the communication range, the instruction will continue indefinitely.
  To abort the execution, execute the Abort Continuous Instruction command. (See Section 6.13.)

6 - 8

6.5 Write Instructions

This sections explains the instructions used to write data to the data carrier.
The communication time of write instructions is approximately twice as long as that of the read instructions.

6.5.1 Write (WD) instruction, continuous write (AW) instruction

<Write (WD) Instruction>

Writes data stored in buffer memory into the data carrier.

<Continuous Write (AW) Instruction>

Continuously writes data until the data carrier enters the communication range of the reader writer. Writes data stored in buffer memory into the data carrier after the data carrier enters the communication range.

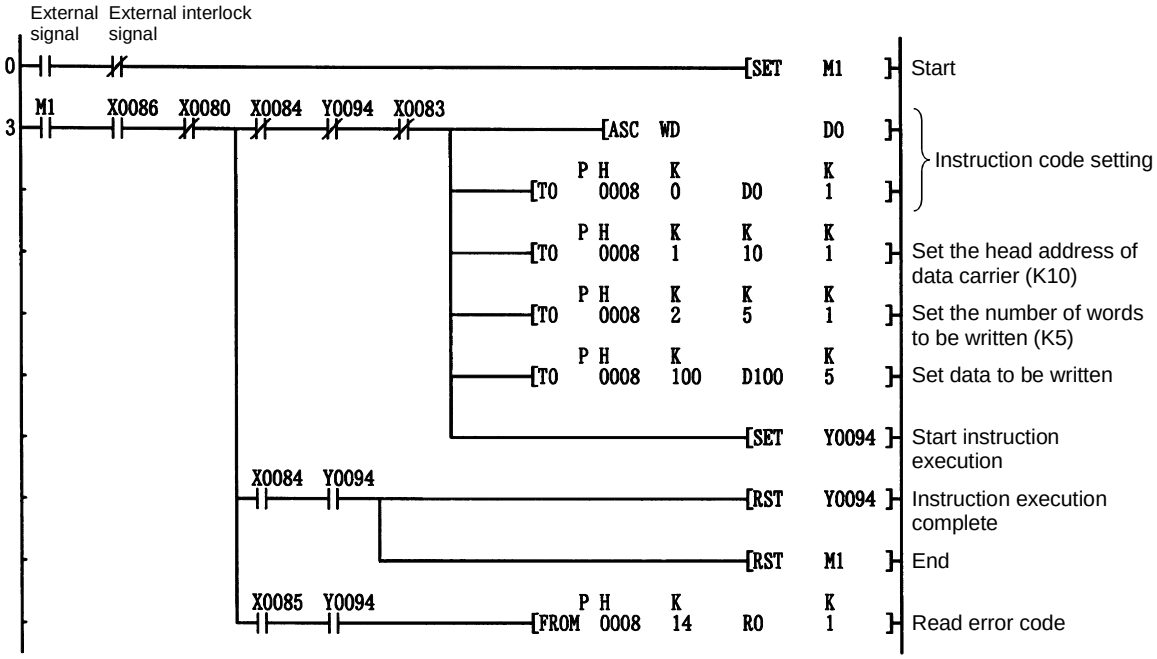
Instruction Code

Write instruction : WD Code: 4457H
Continuous Write instruction : AW Code: 5741H

(1) Sample program

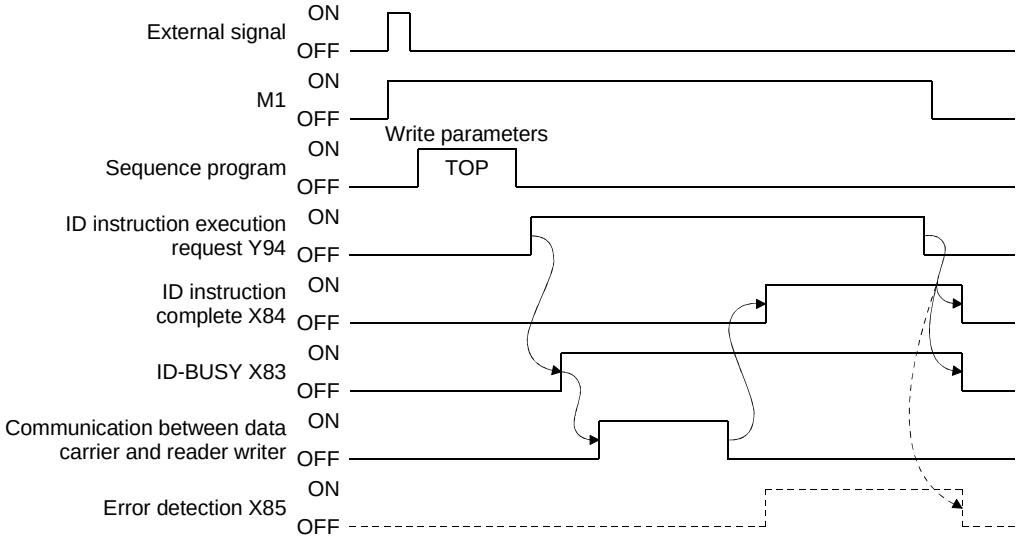
The following shows an example of a program with the following conditions: Set D0 to "AW" instead of "WD" if the Continuous Write instruction is to be executed.

Head I/O number of ID interface module	080 (n = 8)
Channel used	CH. 1
Write head address of data carrier	K10
Number of words to be written	K5
Storage destination of write data	D100 to D104
Error code storage destination	R0



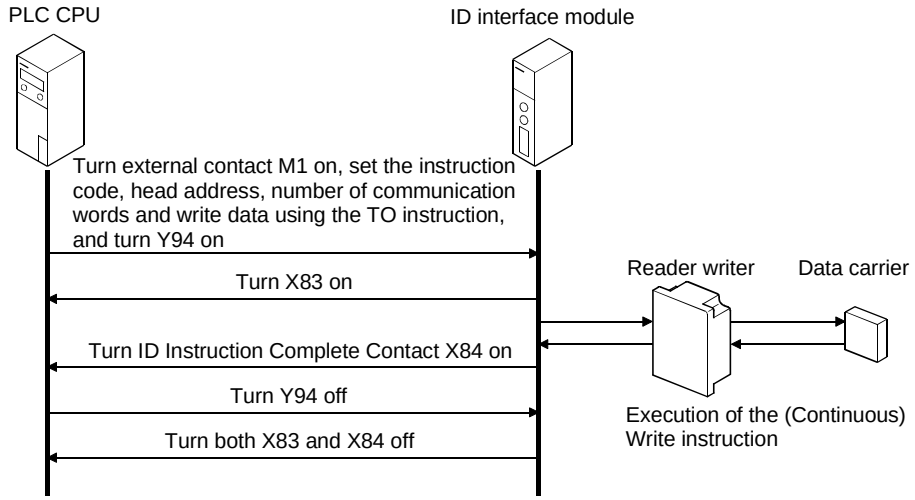
(2) Operation timing

The following shows the operation timing:



(3) Explanation of operation

The operation of the above timing chart is explained below.



POINT

- If the area to be written includes a write-protected area, a write-protect error is generated. (In addition, writing to a non-write-protected area is not performed.)
- If the data carrier does not exist when executing the Write (WD) instruction, the instruction is repeated for the retry count, and an error is generated.
- When the Continuous Write (AW) instruction is executed, data is continuously written until the data carrier enters the communication range.
  If the data carrier does not enter the communication range, the instruction will continue indefinitely.
  To abort the execution, execute the Abort Continuous Instruction command. (See Section 6.13.)

6.5.2 Write and compare (CW) instruction, continuous write and compare (SW) instruction

The (Continuous) Write and Compare instruction verifies whether data has been correctly written into the data carrier, thus improving the reliability of data.

< Write and Compare (CW) Instruction >

After writing data in buffer memory into the data carrier, compares the data in buffer memory with the data in the data carrier.
Data write time will be approximately twice of that for the Write (WD) instruction.

< Continuous Write and Compare (SW) Instruction >

Continuously performs the Write and Compare instruction until the data carrier enters the communication range of the reader writer.
When the data carrier enters the communication range, data stored in buffer memory is written into the data carrier.
When this instruction is used to write to a low-speed mobile unit that is located close to the communication range limit, this is a useful method in handling errors and distorted data.
However, since the write time will be approximately twice of that for the Continuous Write (AW) instruction, this is not suitable for high-speed mobile units.

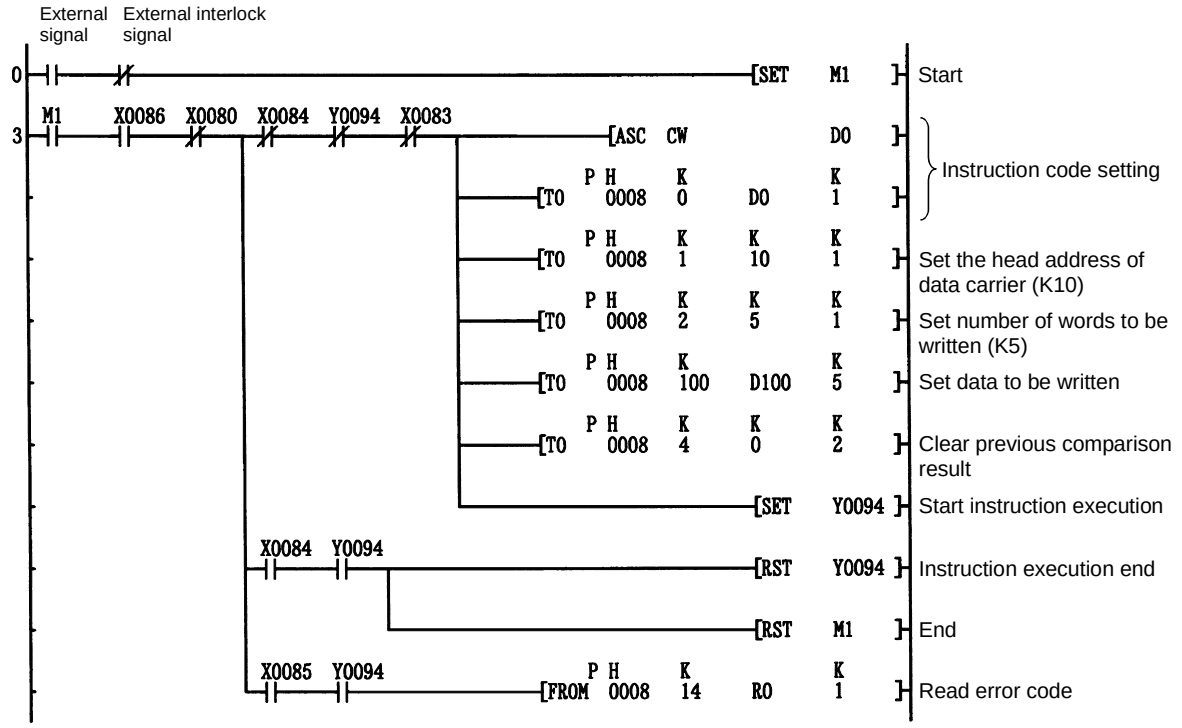
Instruction Code

Write and Compare instruction : CW Code: 5743H
Continuous Write and Compare instruction : SW Code: 5753H

(1) Sample program

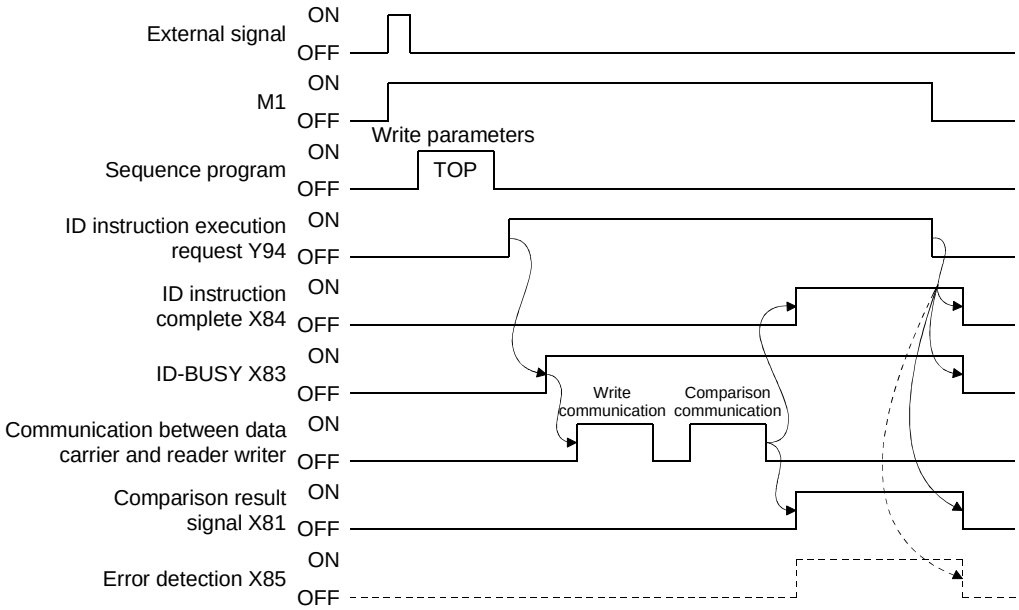
The following shows an example of a program with the following conditions:
Set D0 to "SW" instead of "CW" if the Continuous Write and Compare instruction is to be executed.
(In the following program, the comparison result signal (Xn1) is not used.)

Head I/O number of ID interface module	080 (n = 8)
Channel used	CH. 1
Write head address of data carrier	K10
Number of words to be written	K5
Storage destination of write data	D100 to D104
Error code storage destination	R0



(2) Operation timing

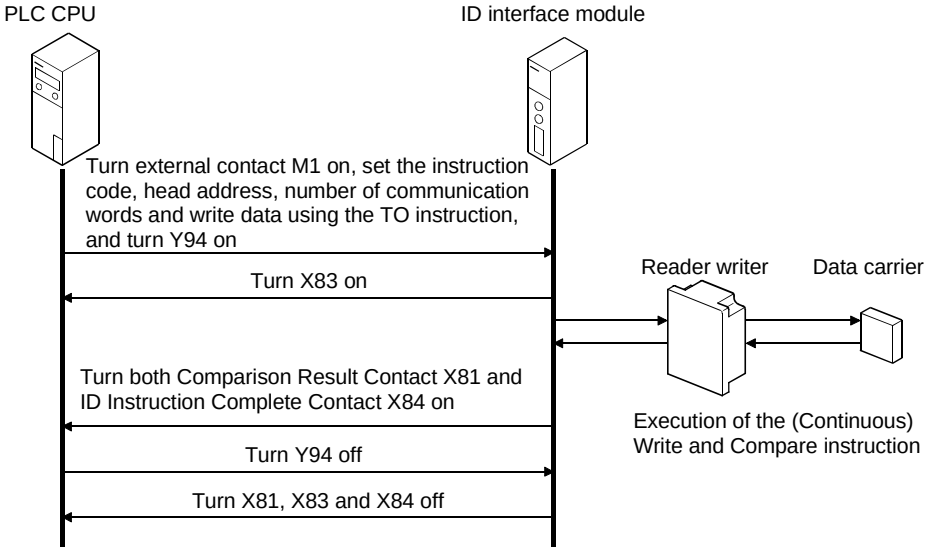
The following shows the operation timing:



6 - 12

(3) Explanation of operation

The operation of the above timing chart is explained below.



POINT

- If the area to be written includes a write-protected area, a write-protect error is generated. (In addition, writing to a non-write-protected area is not performed.)
- If the data carrier does not exist when executing the Write and Compare (CW) instruction, the instruction is repeated for the retry count, and an error is generated.
  An error is also generated when the comparison result is not matched.
- When the Continuous Write and Compare (SW) instruction is executed, data is written continuously until the data carrier enters the communication range.
  If the data carrier does not enter the communication range, the instruction will continue indefinitely.
  To abort the execution, execute the Abort Continuous Instruction command. (See Section 6.13.)

6.5.3 Fill (FI) instruction

The Fill (FI) instruction clears data starting from the certain specified address for the specified length specified by a one-word data. To zero-clear all data, use the Clear (CL) instruction.

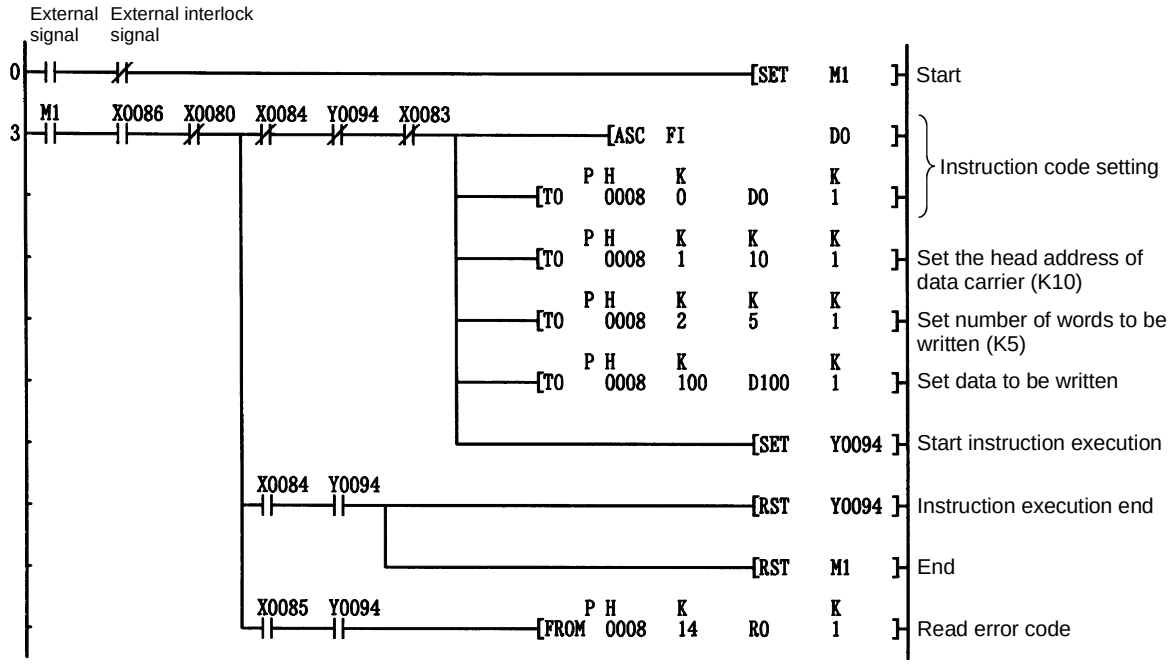
Instruction Code

Instruction : FI Code: 4946H

(1) Sample program

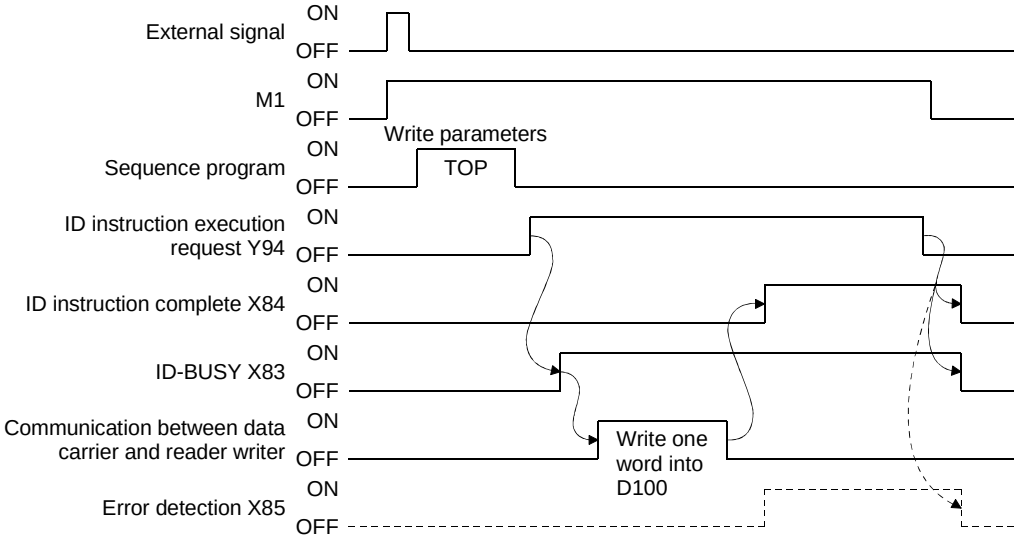
The following shows an example of a program with the following conditions:

Head I/O number of ID interface module	080 (n = 8)
Channel used	CH. 1
Write head address of data carrier	K10
Number of words to be written	K5
Storage destination of write data	D100
Error code storage destination	R0



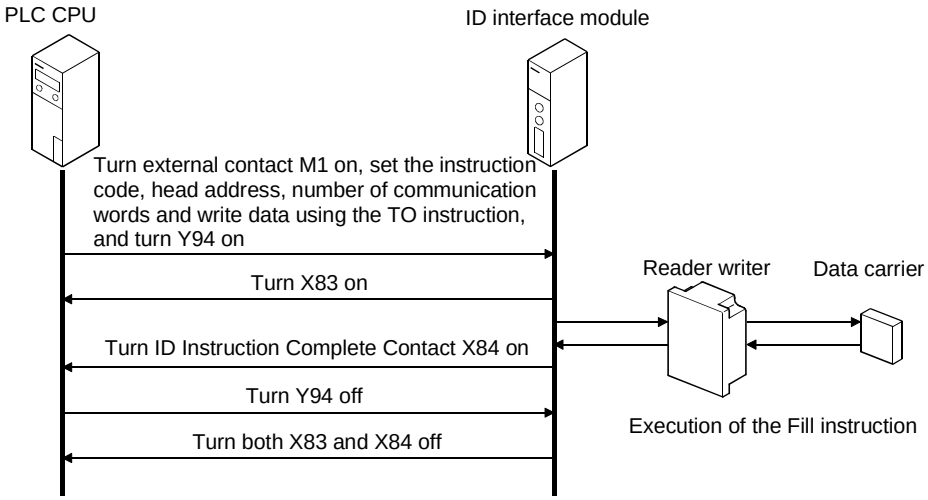
(2) Operation timing

The following shows the operation timing:



(3) Explanation of operation

The operation of the above timing chart is explained below.



POINT

- If the data carrier does not exist when executing the Fill (FI) instruction, the instruction is repeated for the retry count, and an error is generated.
- If the area to be written includes a write-protected area, a write-protect error is generated. (In addition, writing to a non-write-protected area is not performed.)

6.6 Compare (CM) Instruction

The Compare (CM) instruction compares the data stored in buffer memory and the data in the data carrier, and stores the comparison result in buffer memory. The comparison result can also be checked as contacts (Xn1/Xn9.)

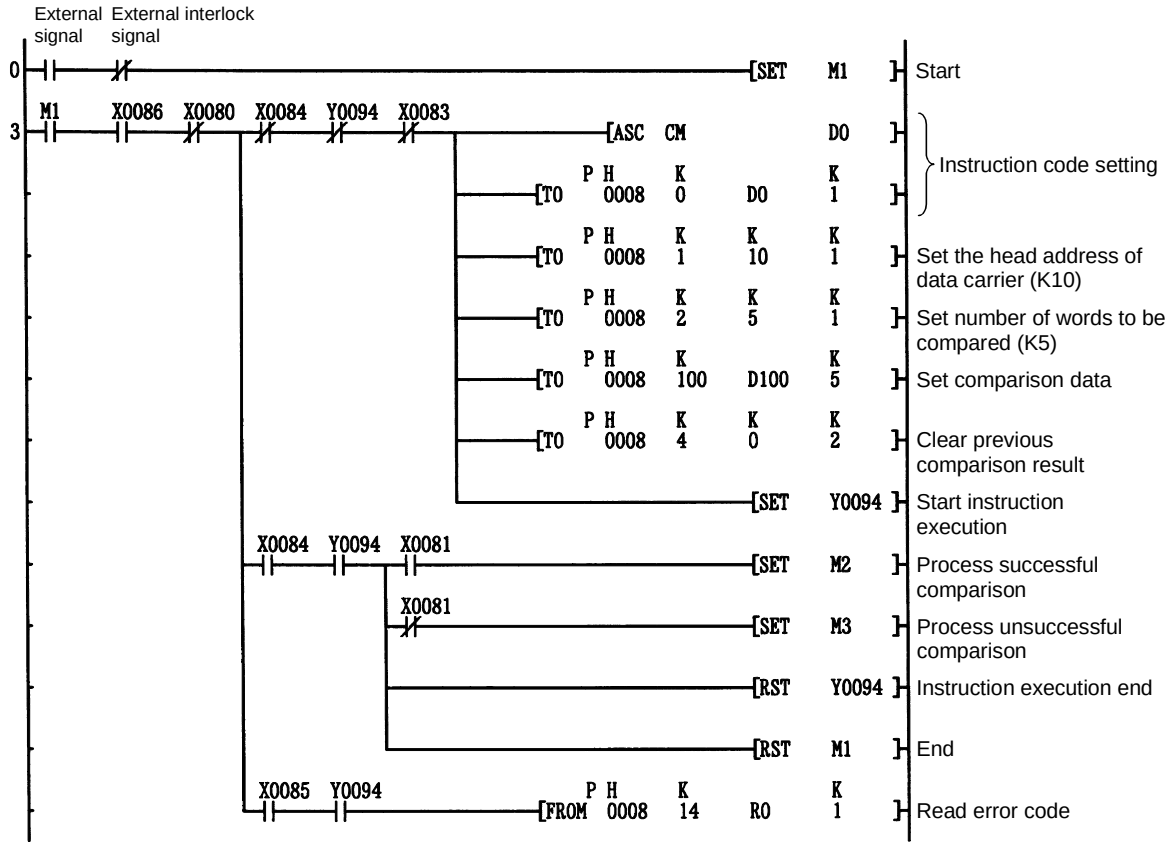
Instruction Code

Instruction : CM Code: 4D43H

(1) Sample program

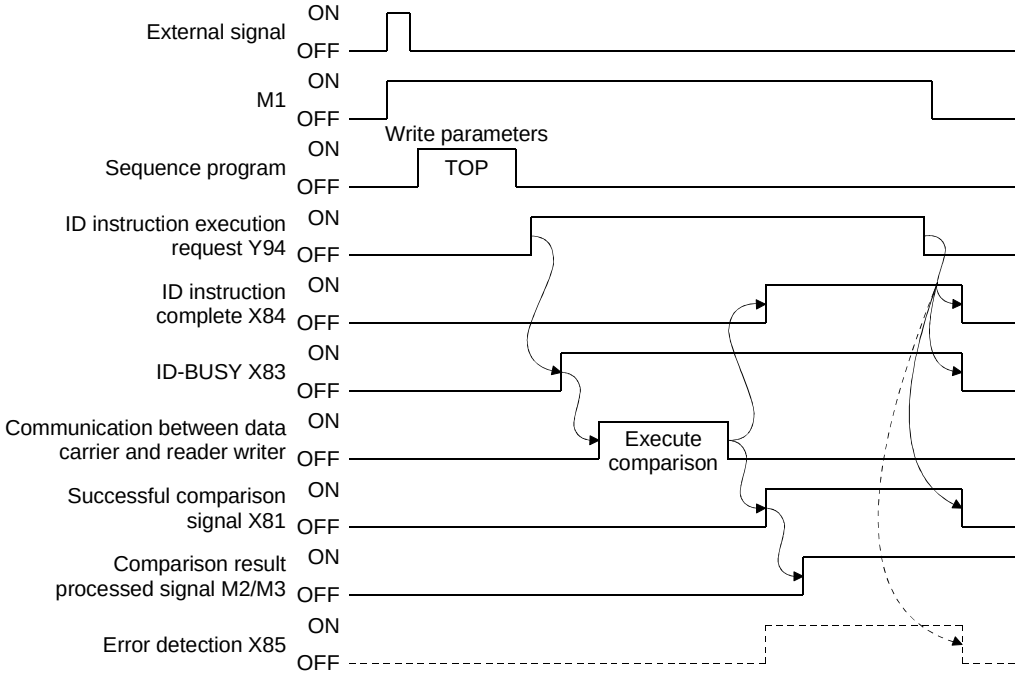
The following shows an example of a program with the following conditions: (The example below is a program that turns M2 on when comparison succeeds and turns M3 on when comparison fails.)

Head I/O number of ID interface module	080 (n = 8)
Channel used	CH. 1
Comparison head address of data carrier	K10
Number of words to be compared	K5
Storage destination of compared data	D100 to D104
Error code storage destination	R0



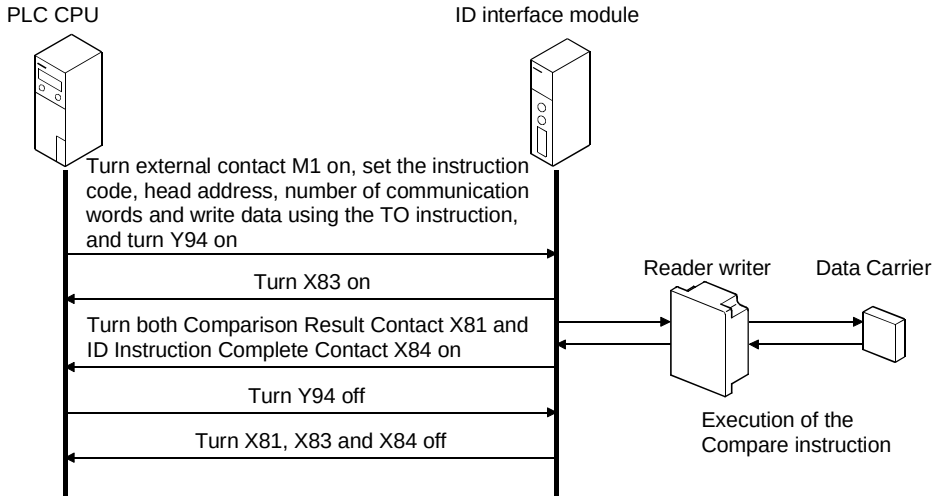
(2) Operation timing

The following shows the operation timing:



(3) Explanation of operation

The operation of the above timing chart is explained below.



POINT

- If the data carrier does not exist when executing the Compare (CM) instruction, the instruction is repeated for the retry count, and an error is generated.
- Before executing the Compare instruction, make sure that comparison result storage area in the buffer memory (4 (4H), 5 (5H)/4004 (0FA4H), 4005 (0FA5H)) are zero-cleared.

6.7 Copy Data (CO) Instruction

The Copy Data (CO) instruction copies data between data carriers.

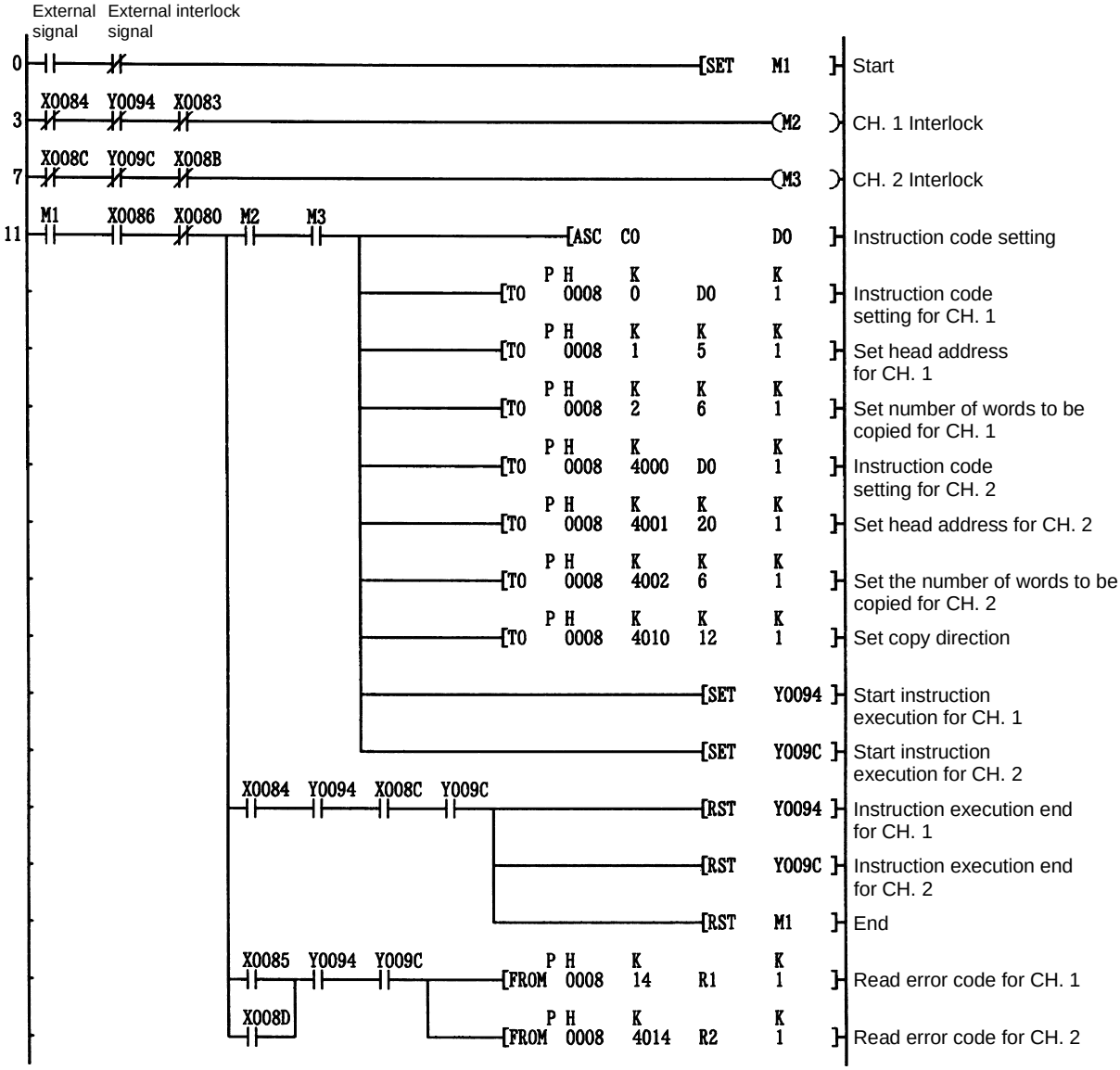
Instruction Code

Instruction : CO Code: 4F43H

(1) Sample program

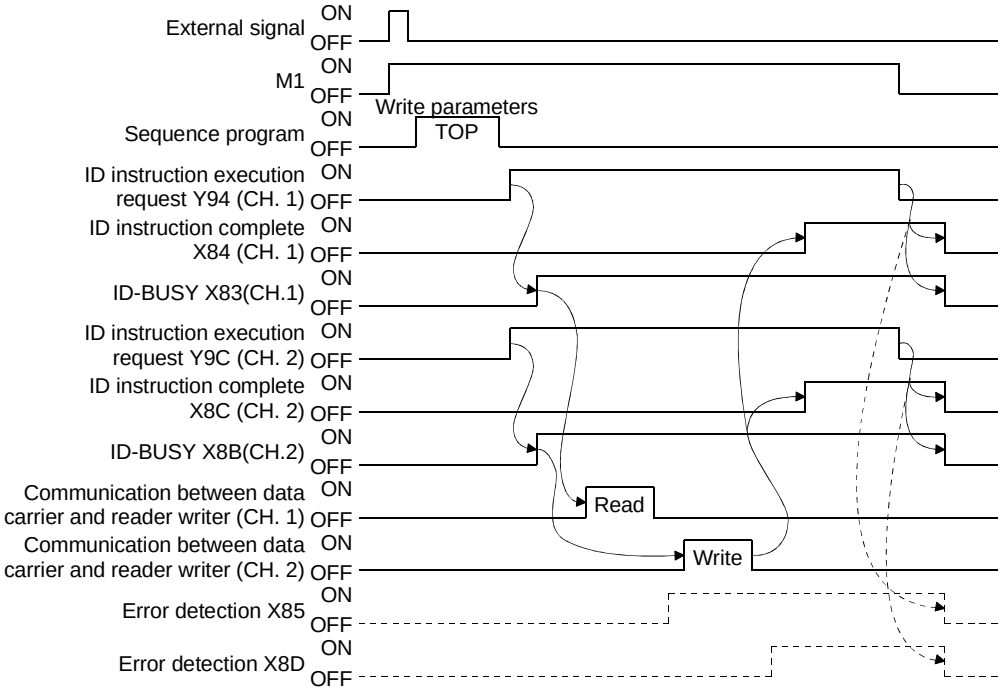
The following shows an example of a program with the following conditions:

Head I/O number of ID interface module	080 (n = 8)
Copy direction	From CH. 1 to CH. 2
Copy source head address (CH. 1)	K5
Copy destination head address (CH. 2)	K20
Number of words to be copied	K6
Error code storage destination	R1 (CH. 1), R2 (CH. 2)



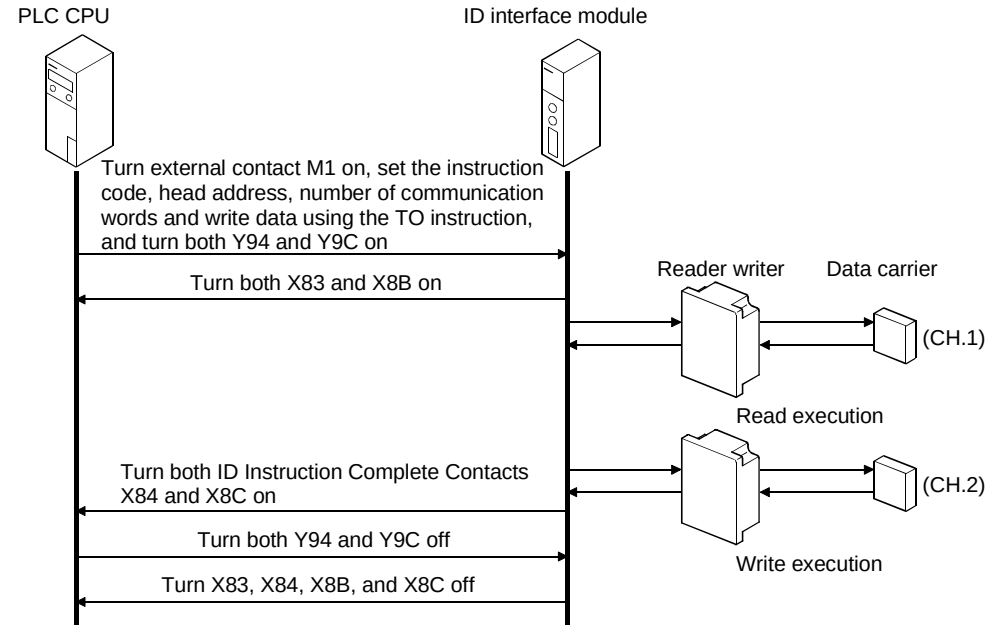
(2) Operation timing

The following shows the operation timing:



(3) Explanation of operation

The operation of the above timing chart is explained below.



POINT

- The Copy Data (CO) instruction copies data between data carriers without using any devices in PLC CPU.
- If the copy destination data carrier includes a write-protected area, a write-protect error is generated.

6.8 Clear (CL) Instruction

The Clear (CL) instruction clears buffer memory of the data carrier with zeros.

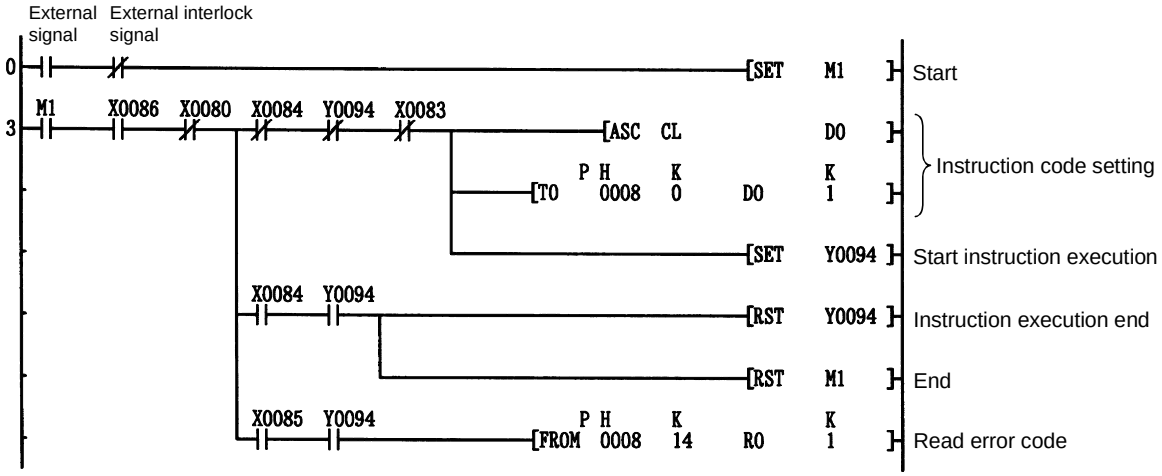
Instruction Code

Instruction : CL Code: 4C43H

(1) Sample Program

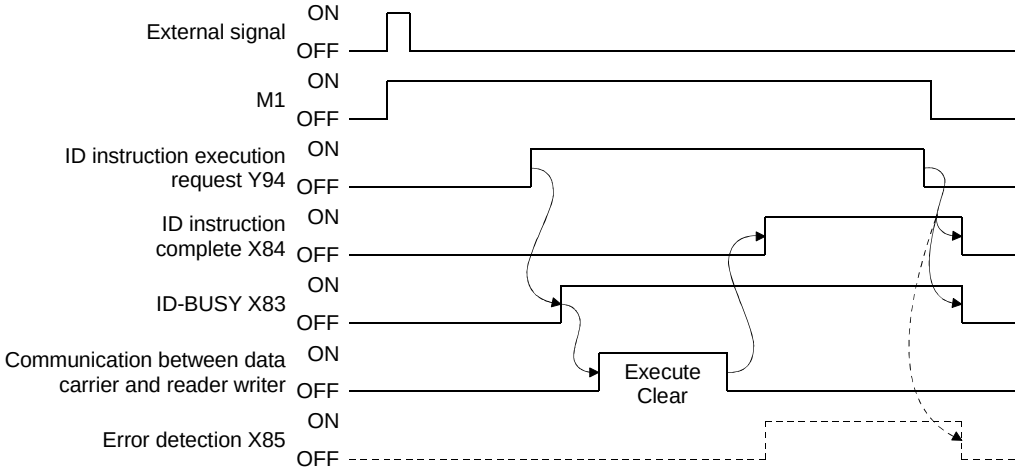
The following shows an example of a program with the following conditions:

Head I/O number of ID interface module	080 (n = 8)
Channel used	CH. 1
Error code storage destination	R0



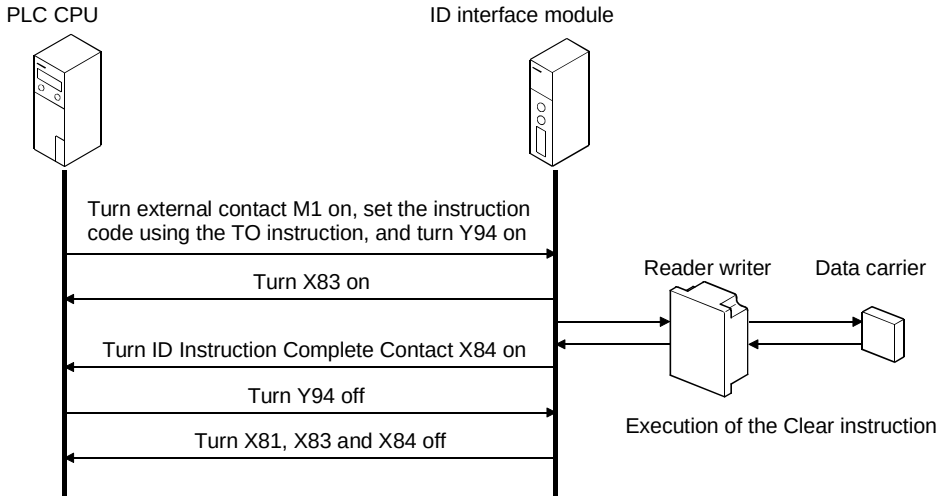
(2) Operation timing

The following shows the operation timing:



(3) Explanation of operation

The operation of the above timing chart is explained below.



POINT

- If the data carrier does not exist when executing a Clear (CL) instruction, the instruction is repeated for the retry count, and an error is generated.
- The Clear (CL) Instruction clears all data with zeros. To fill all data with a specific value, use the Fill (FI) instruction.
- The write-protected area will not be cleared. A write-protect error will not be generated.

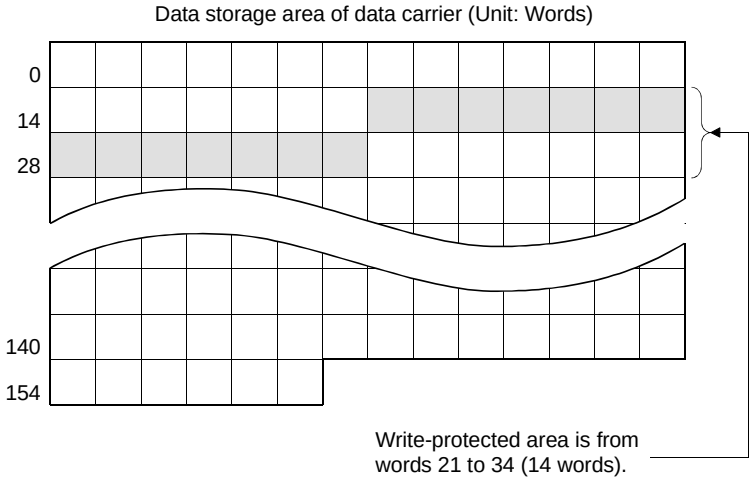
6 - 21

6.9 Write Protect Instructions

This section explains the instructions used to set and clear the write-protected areas of the data carrier.

6.9.1 About write-protect

Write-protect prohibits writing of data to a user-specified memory area of the data carrier.
Write-protect uses the buffer memory as shown below and the Write Write-Protect Setting (WP) instruction. (See Section 6.9.3.) The write-protect setting unit is in 7 words (14 bytes).



(1) Write-Protect Designation Area (Address 32 (20H)/4032 (0FC0H))
Specifies setting (1) or clearing (0) of the write-protected area.

Applicable Range: 0 (Clear write-protect), 1 (Set write-protect)
Default : 0

POINT
The write-protected area must be a single continuous range. Multiple write-protected areas cannot be set within a single data carrier.

(2) Write-Protect Starting Page Address Designation Area (Address 33 (21H)/4033 (0FC1H))
Specifies the starting page address to write-protect. Unit is in 7 words (14 bytes). This setting will be the starting page address for the bank of the data carrier.

Applicable Range: 0 to 22 (must not exceed the write-protect end page address)
Default : 0

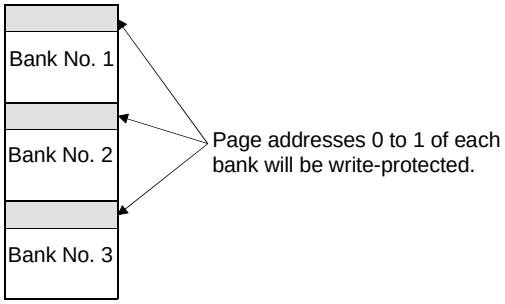
(3) Write-Protect End Page Address Designation Area (Address 34 (22H)/4034 (0FC2H))

Specifies the end page address to write-protect. Unit is in 7 words (14 bytes). This setting will be the end page address for the bank of the data carrier.

Applicable Range: 0 to 22 (must not be less than the write-protect starting page address)
Default : 0

[Example] Banks: 3, Starting page address: 0, End page address: 1

Since each bank will be set as write-protected, the page address must be set so that the memory range of each bank will not be violated.



6 - 23

<Address conversion table>

Page address		In words		In bytes	
Decimal	Hexadecimal	Decimal	Hexadecimal	Decimal	Hexadecimal
0	0H	0 to 6	00H to 06H	0 to 13	000H to 00DH
1	1H	7 to 13	07H to 0DH	14 to 27	00EH to 01BH
2	2H	14 to 20	0EH to 14H	28 to 41	01CH to 029H
3	3H	21 to 27	15H to 1BH	42 to 55	02AH to 037H
4	4H	28 to 34	1CH to 22H	56 to 69	038H to 045H
5	5H	35 to 41	23H to 29H	70 to 83	046H to 053H
6	6H	42 to 48	2AH to 30H	84 to 97	054H to 061H
7	7H	49 to 55	31H to 37H	98 to 111	062H to 06FH
8	8H	56 to 62	38H to 3EH	112 to 125	070H to 07DH
9	9H	63 to 69	3FH to 45H	126 to 139	07EH to 08BH
10	AH	70 to 76	46H to 4CH	140 to 153	08CH to 099H
11	BH	77 to 83	4DH to 53H	154 to 167	09AH to 0A7H
12	CH	84 to 90	54H to 5AH	168 to 181	0A8H to 0B5H
13	DH	91 to 97	5BH to 61H	182 to 195	0B6H to 0C3H
14	EH	98 to 104	62H to 68H	196 to 209	0C4H to 0D1H
15	FH	105 to 111	69H to 6FH	210 to 223	0D2H to 0DFH
16	10H	112 to 118	70H to 76H	224 to 237	0E0H to 0EDH
17	11H	119 to 125	77H to 7DH	238 to 251	0EEH to 0FBH
18	12H	126 to 132	7EH to 84H	252 to 265	0FCH to 109H
19	13H	133 to 139	85H to 8BH	266 to 279	10AH to 117H
20	14H	140 to 146	8CH to 92H	280 to 293	118H to 125H
21	15H	147 to 153	93H to 99H	294 to 307	126H to 133H
22	16H	154 to 159	9AH to 9FH	308 to 319	134H to 13FH

* Depending on the memory type, the range of page addresses may vary as shown in the table below:

Memory type	Page address	
	Decimal	Hexadecimal
160 words (320-byte specification)	0 to 22	0H to 15H
77 words (154-byte specification)	0 to 10	0H to AH
49 words (98-byte specification)	0 to 6	0H to 6H
35 words (70-byte specification)	0 to 4	0H to 4H
21 words (42-byte specification)	0 to 2	0H to 2H
14 words (28-byte specification)	0 to 1	0H to 1H
7 words (14-byte specification)	0	0H

6 - 24

6.9.2 Read write-protect setting (RP) instruction

The Read Write-Protect Setting (RP) instruction reads the write-protect information set within the data carrier.

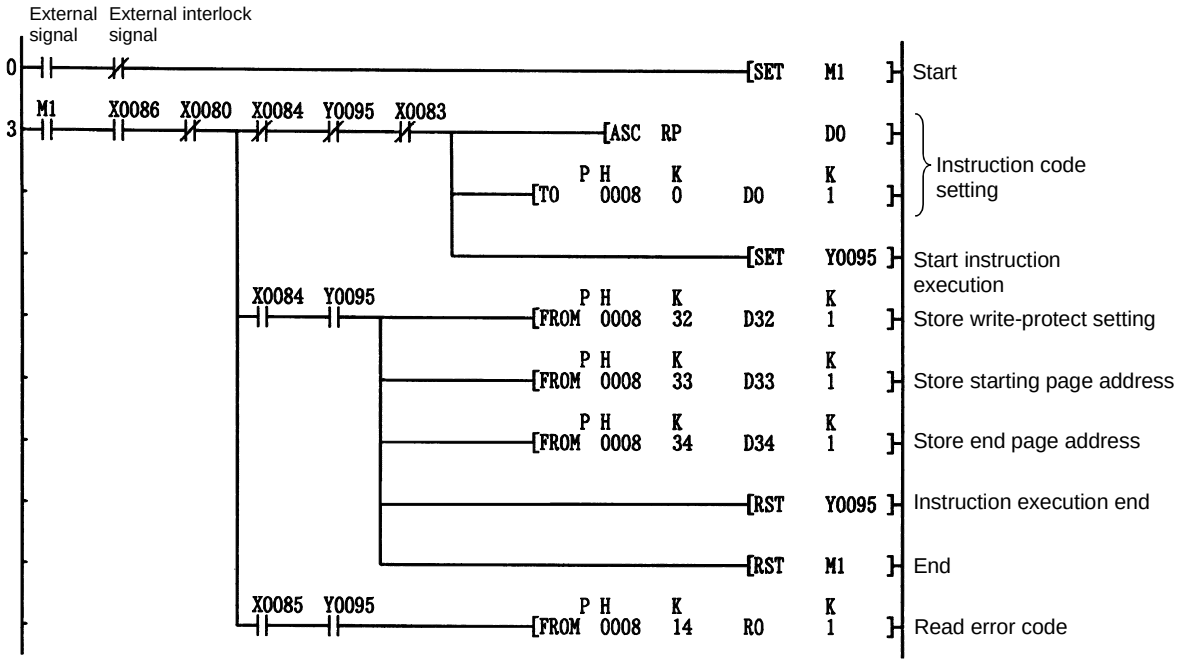
Instruction Code

Instruction : RP Code: 5052H

(1) Sample program

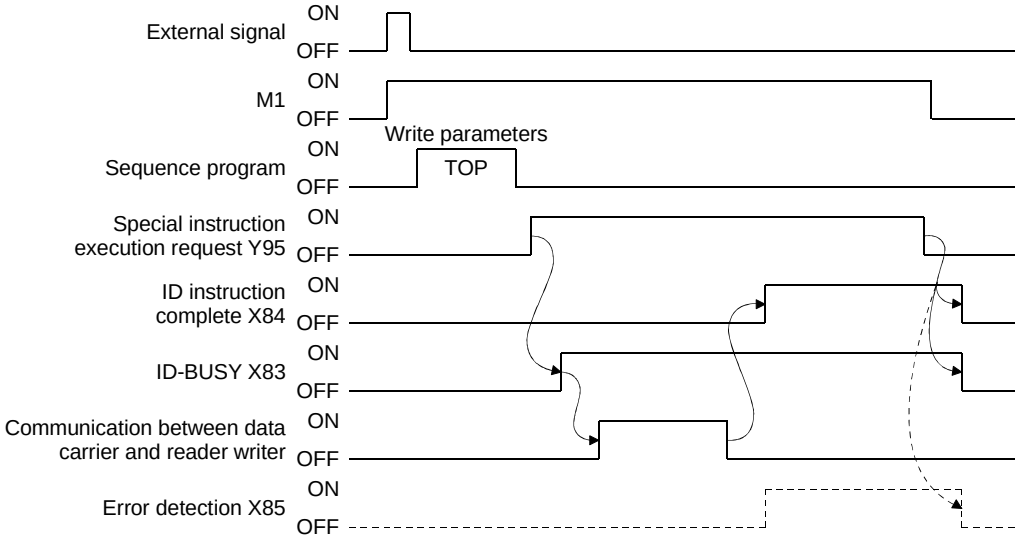
The following shows an example of a program with the following conditions:

Head I/O number of ID interface module	080 (n = 8)
Channel used	CH. 1
Write-protect setting storage destination	D32
Starting page address storage destination	D33
End page address storage destination	D34
Error code storage destination	R0



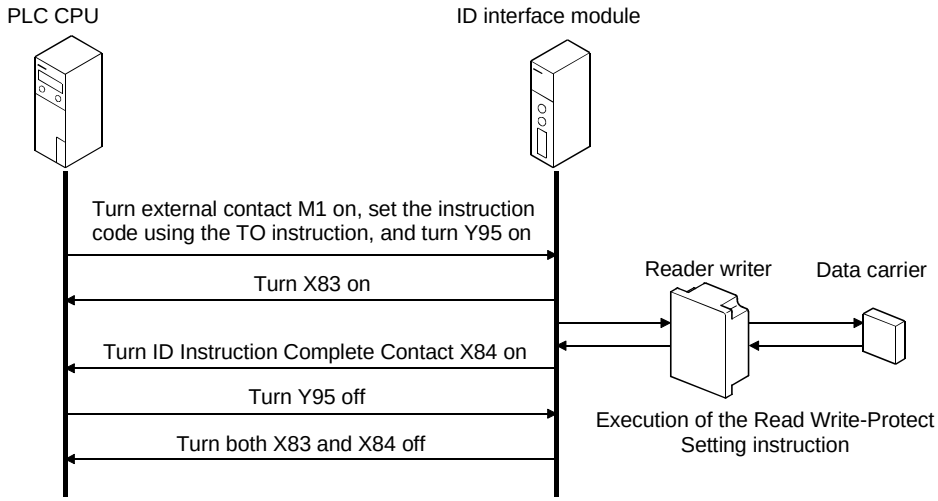
(2) Operation timing

The following shows the operation timing:



(3) Explanation of operation

The operation of the above timing chart is explained below.



POINT

If the data carrier does not exist when executing the Read Write-Protect Setting (RP) instruction, the instruction is repeated for the retry count, and an error is generated.

6 - 26

6.9.3 Write write-protect setting (WP) instruction

The Write Write-Protect Setting (WP) instruction specifies the write-protected area within the data carrier.

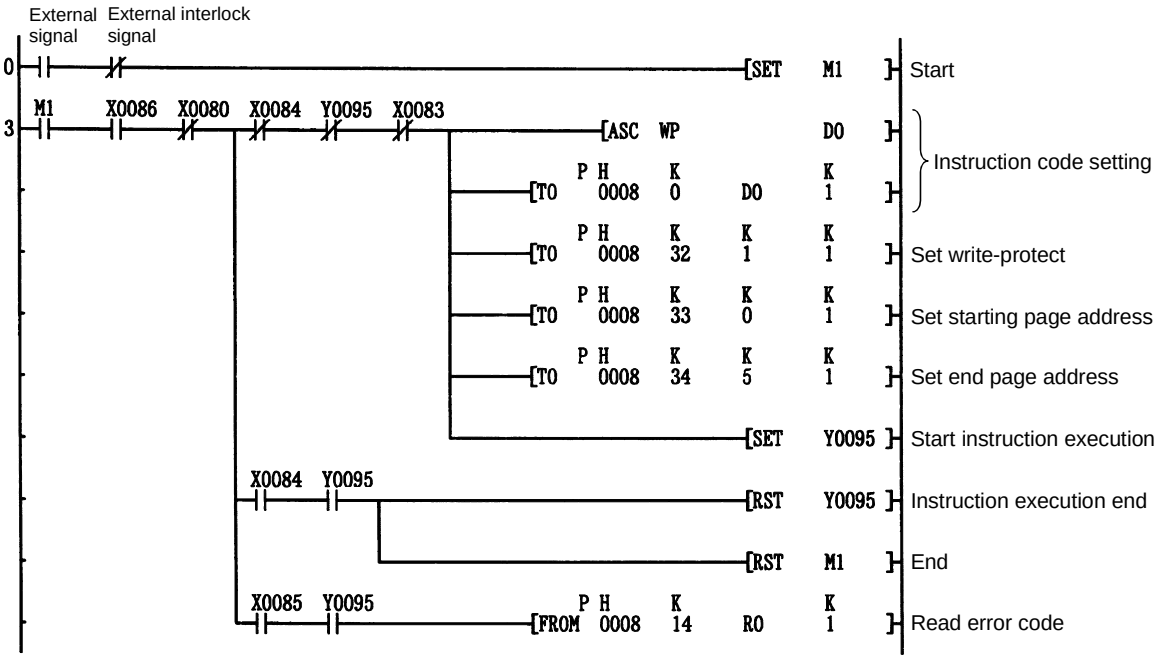
Instruction Code

Instruction : WP Code: 5057H

(1) Sample program

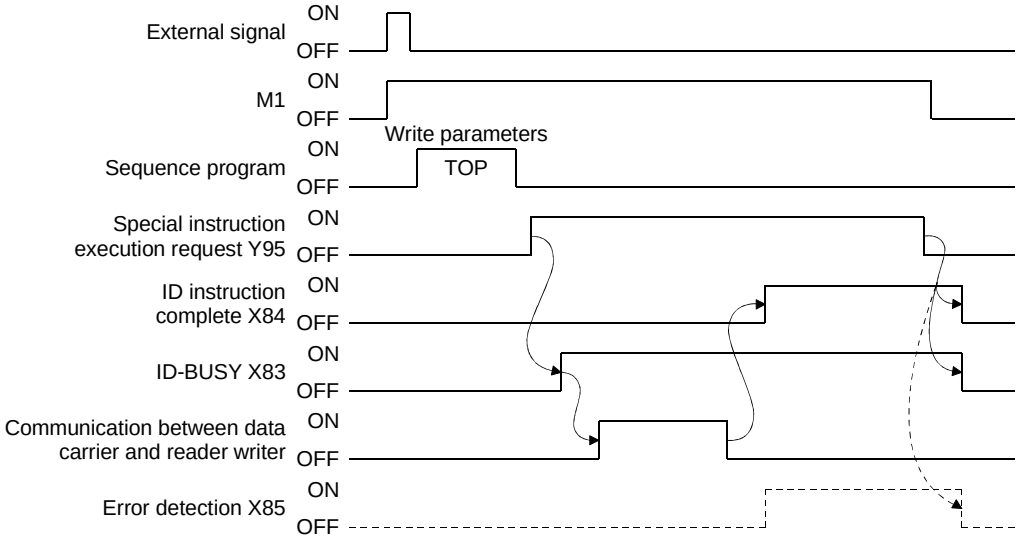
The following shows an example of a program with the following conditions: (For details, see Section 3.5.2 (14) to (16).)

Head I/O number of ID interface module • • • • • •	080 (n = 8)
Channel used •	CH. 1
Write-protect setting area • • • • • • • • • • • • • • • • •	0 to 47 (Page Addresses: 0 to 5)
Error code storage destination • • • • • • • • • • • • •	R0



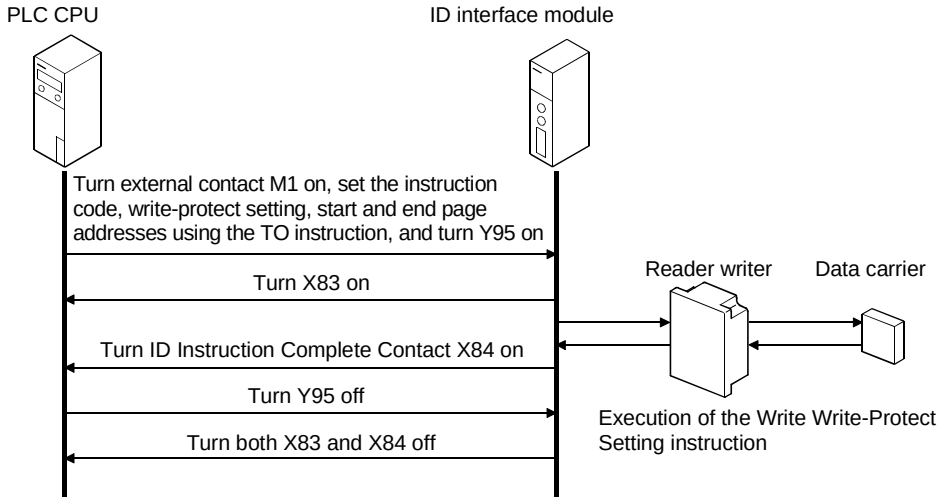
(2) Operation timing

The following shows the operation timing:



(3) Explanation of operation

The operation of the above timing chart is explained below.



POINT

If the data carrier does not exist when executing a Write Write-Protect Setting (WP) instruction, the instruction is repeated for the retry count, and an error is generated.

6.10 Memory Setting Instruction

This section explains the data carrier memory type and the instruction used to set the memory type. For program details, see Section 6.12.

6.10.1 About memory type

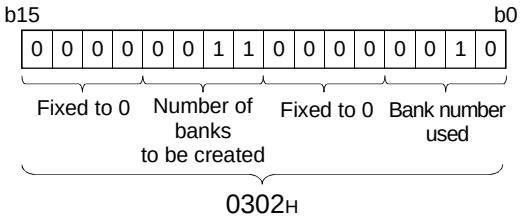
The D-2N Series allows the user to arbitrarily divide data carrier memory (160 words) into multiple banks.
The user can switch banks in a rotating manner to extend the life of the data carrier.
A guaranteed life of the data carrier is 300,000 accesses per bank (-20°C to +60°C)

The memory type is set using buffer memory and the Life Extension Bank Switching (BK) instruction (see Section 6.10.2), which are described below.

(1) Memory Type Designation Area (Address 40 (28H)/4040 (0FC8H))

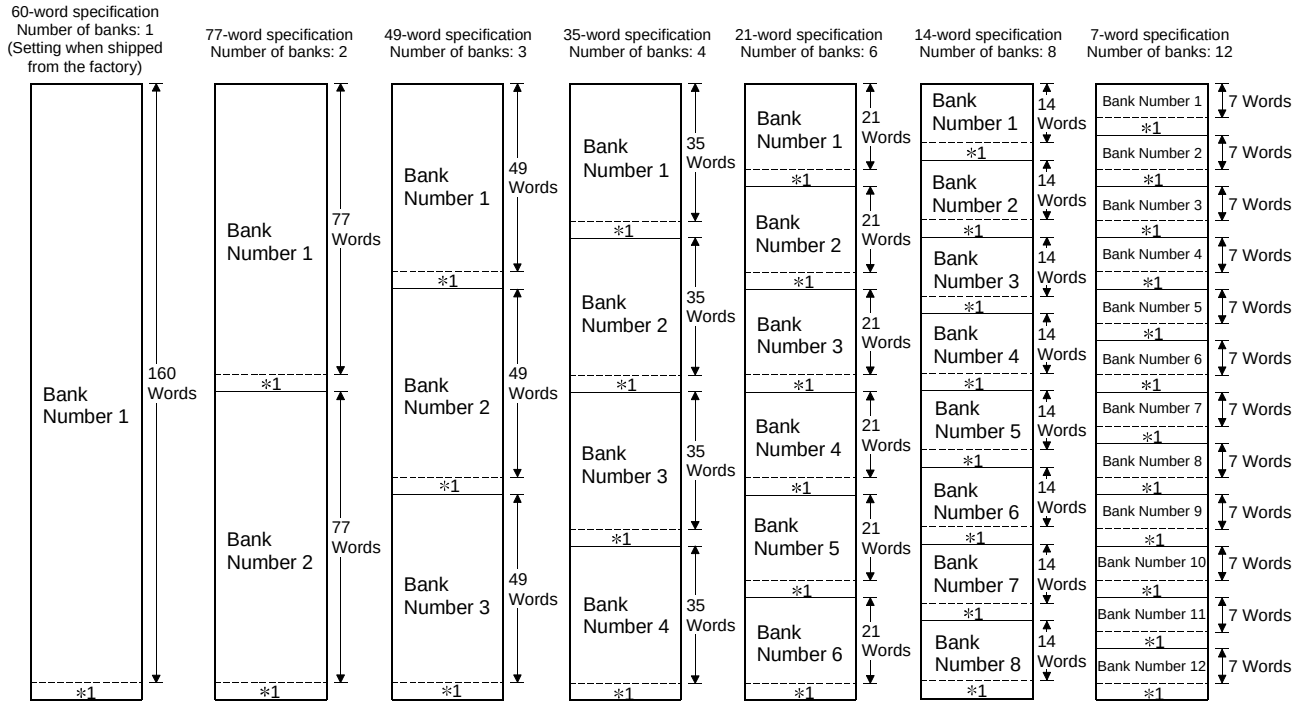
Specifies the memory type of the data carrier to be set by the Life Extension Bank Switching (BK) instruction.

Default: 0
An example below illustrates the case where three banks are created and the active bank is a bank numbered 2.



(a) Number of banks to be created
Sets the number of banks to be created in the data carrier.
The number of banks that can be set must be one of the following seven types:

1H: 160-word specification (Number of banks to create = 1)
(Setting when shipped from the factory)
2H: 77-word specification (Number of banks to create = 2)
3H: 49-word specification (Number of banks to create = 3)
4H: 35-word specification (Number of banks to create = 4)
6H: 21-word specification (Number of banks to create = 6)
8H: 14-word specification (Number of banks to create = 8)
CH: 7-word specification (Number of banks to create = 12)



*1 Write Count Storage Area (MD, MW, and LW instructions)

(b) Bank number used

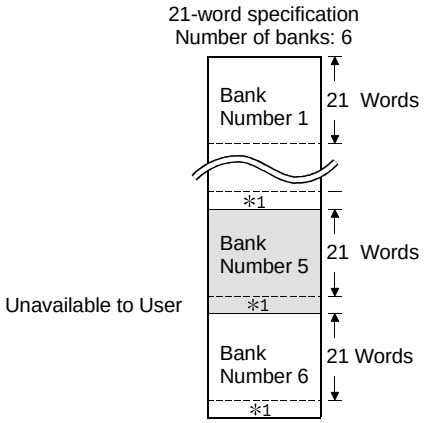
Specifies the bank number of the data carrier bank on which read and write are performed.

When read or write operation on another bank is to be performed, bank switching must be performed using the BK instruction.

[Example] When setting "Number of banks to create" to 6 and "Bank number used" to 5

Setting value: 0605H

Only bank number 5 can be used.



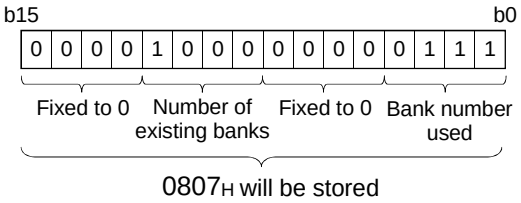
*1 Write Count Storage Area (MD, MW, and LW instructions)

POINT
If the number of banks is changed while using the data carrier, all data in the data carrier will be deleted. Set the number of banks only when you perform memory setting for the first time.

(2) Memory Type Storage Area (Address 41 (29H)/4041 (0FC9H))

The memory type of the data carrier is stored when an ID communication instruction completes successfully.
Data to be stored is the same as that for Memory Type Designation Area (40 (28H)/4040 (0FC8H)).

Default: 0
An example below illustrates the case where there are 8 banks and active bank number is 7.



6.10.2 Life extension bank switching (BK) instruction

The Life Extension Bank Switching (BK) instruction sets the number of banks in the data carrier and the active bank number.
A guaranteed life of the data carrier is 300,000 accesses per bank (-20°C to +60°C)
If the number of banks is set to "12," maximum of 3,600,000 reads/writes can be obtained by utilizing bank switching.

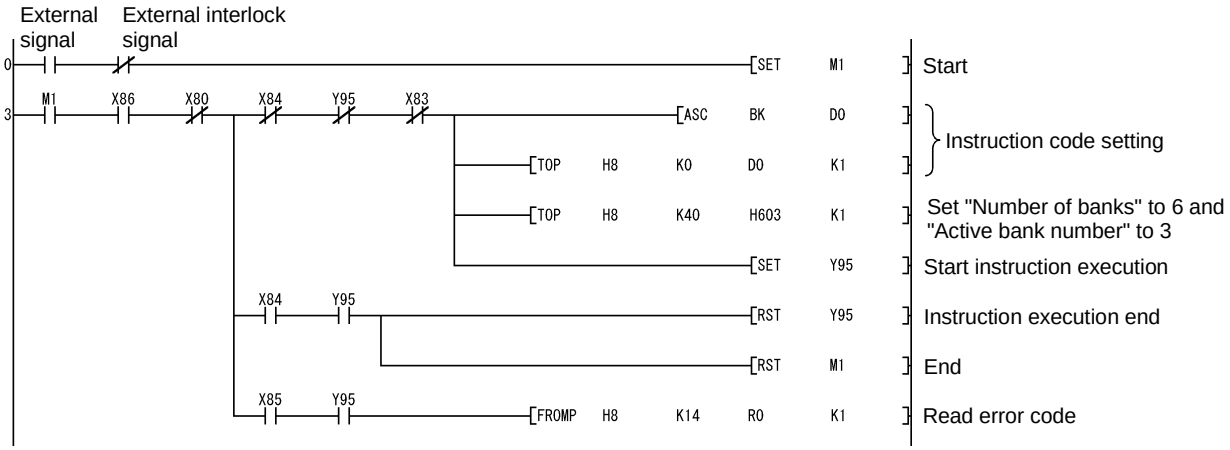
Instruction Code

Instruction : BK Code: 4B42H

(1) Sample Program

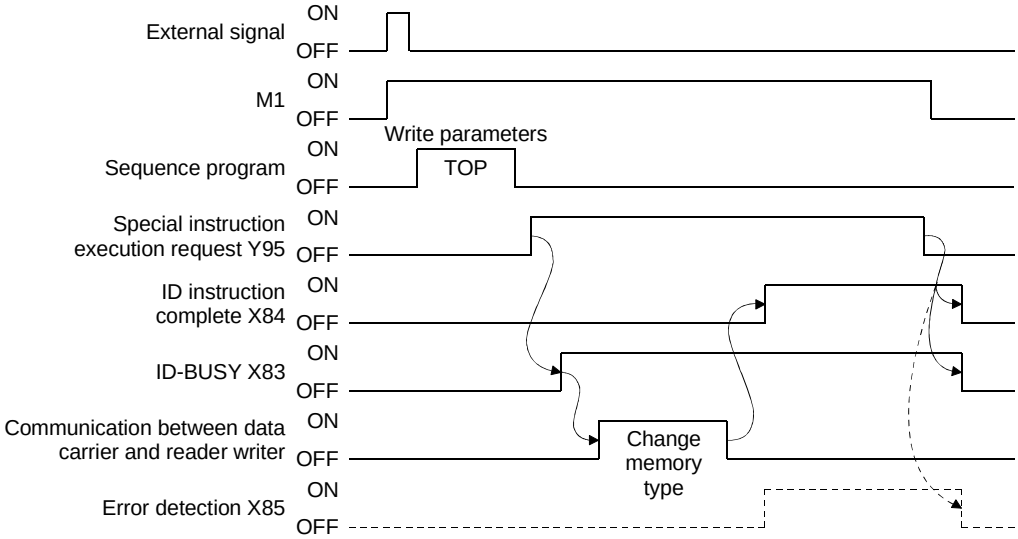
The following shows an example of a program with the following conditions:

Head I/O number of ID interface module	080 (n = 8)
Channel used	CH. 1
Number banks to be set	6
Bank number to be used	3
Error code storage destination	R0



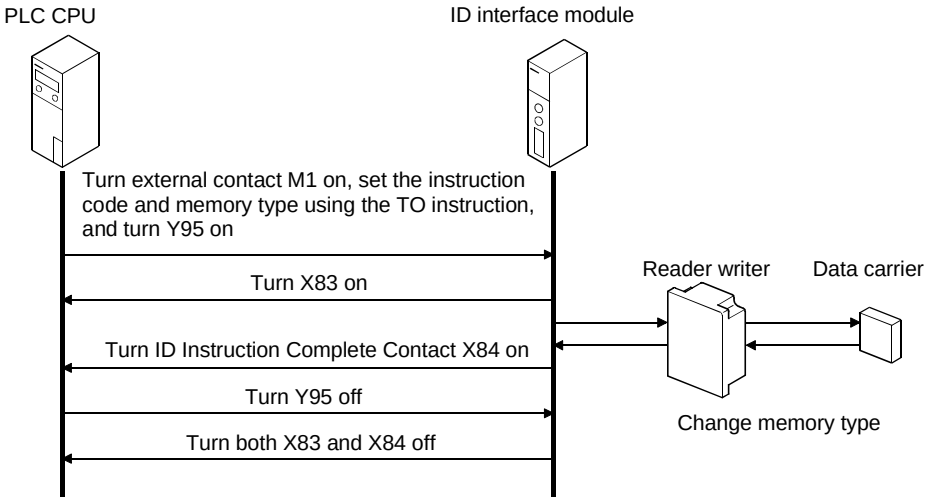
(2) Operation timing

The following shows the operation timing:



(3) Explanation of operation

The operation of the above timing chart is explained below.



POINT

- If the memory type specified is the same as the existing memory type, write count will not be initialized.
- If a write-protected area is set when changing the number of banks, a write-protect error is generated, and the memory type cannot be set.
- If a write-protected area is set, only the bank number to be used can be changed. The write-protect setting will be shifted as well.

6 - 32

6.11 Life Management Instructions

This section explains the instructions used to manage the lifespan of the data carrier. See Section 6.12 for programming details.

POINT
The write count is not updated automatically. The MD, MW, and LW instructions should be used to update the write count.

6.11.1 About evaluating the writing life of data carrier

The D-2N Series allows to count the number of writes performed on the data carrier and to evaluate the life of the data carrier.
The evaluation of the writing life of the data carrier is performed using the buffer memory, Count Write (MW) instruction, Continuous Count Write (MW) instruction (See Section 6.11.2) and Update Write Count (LW) instruction (See Section 6.11.3).

(1) Writing Life Evaluation Value Designation Area (Address 6 (6H)/4006 (0FA6H))

Specifies the evaluation value of the writing life of the data carrier.
This value expresses the lifespan of the date carrier in tens of thousands of writes.
The only three instructions that can be used to evaluate the writing life of the date carrier are "Update Write Count (MD)," "Count Write (MW)," and "Continuous Count Write (LW)."

Applicable Range: 0 to 32767 (When "0" is specified, life evaluation will not be performed.)
Default: 30 (300,000 writes)

(2) Writing Life Evaluation Result Storage Area (Address 7 (7H)/4007 (0FA7H))

Stores the evaluation result of the writing life of the data carrier.
The only three instructions that can be used to evaluate the writing life of the date carrier are "Update Write Count (MD)," "Count Write (MW)," and "Continuous Count Write (LW)."

Default: 0
If the data carrier has reached its life: "1" will be stored.
If the data carrier has not reached its life: "0" will be stored.

POINT
The writing life evaluation result will continuously be stored unless it is reset by a sequence program. Before performing another MD, MW or LW instruction, store “0” in the Writing Life Evaluation Result Storage Area to clear the result values.

(3) Write Count Storage Area (Addresses 22 to 23 (16H to 17H)/4022 to 4023 (0FB6H to 0FB7H))

Write count value of the data carrier is stored automatically after each successful completion of the Count Write (MW) instruction, Continuous Count Write (LW) instruction, or the Update Write Count (MD) instruction.
"0" will be stored upon an erroneous completion.

Default: 0

(4) Write Count Increment Value Designation Area (Address 26 (20H)/4026 (0FBAH))

Specifies the write count increment for the Update Write Count (MD) instruction.

Applicable Range: 0 to 32767
Default: 1

POINT

- The Write Count Increment Value Designation Area is valid only when the Update Write Count (MD) instruction is used.
- The increment value for the Count Write (MW) or Continuous Count Write (LW) instruction will always be "1" regardless of the write address or the number of points.

6 - 34

6.11.2 Count write (MW) instruction, continuous count write (LW) instruction

<Count Write (MW) Instruction>

After writing the data stored in buffer memory into the data carrier, increments the total write count of the data carrier by 1.
Regardless of the write address or the number of bytes written, increment value will always be 1.
After a successful communication, the total write count will be stored in the Write Count Storage Area (Addresses 22 to 23 (16H to 17H)/4022 to 4023 (0FB6H to 0FB7H)) of buffer memory.
In addition, life evaluation will be performed by comparing this value with the writing life evaluation value. If the data carrier has reached its life, "1" will be stored in the Writing Life Evaluation Result Storage Area (Address 7 (7H)/4007 (0FA7H)) of the buffer memory, or the Life Evaluation Result Signal (Xn7/XnF) will turn on.
However, this instruction takes approximately 0.1 seconds longer than the Write Data (WD) instruction.

<Continuous Count Write (LW) Instruction>

Continuously writes data until the data carrier enters the communication range of the reader writer. After the data carrier enters the communication range, data stored in buffer memory is written into the data carrier and the total write count of the data carrier is incremented by 1.
Regardless of the write address or the number of bytes written, increment value will always be 1.
After a successful communication, the total write count will be stored in the Write Count Storage Area (Addresses 22 to 23 (16H to 17H)/4022 to 4023 (0FB6H to 0FB7H)) of buffer memory.
In addition, life evaluation will be performed by comparing this value with the writing life evaluation value. If the data carrier has reached its life, "1" will be stored in the Writing Life Evaluation Result Storage Area (Address 7 (7H)/4007 (0FA7H)) of the buffer memory, or the Life Evaluation Result Signal (Xn7/XnF) will turn on.
However, this instruction takes approximately 0.1 seconds longer than the Continuous Write (AW) instruction. Therefore, this command is not suitable for high-speed mobile units.

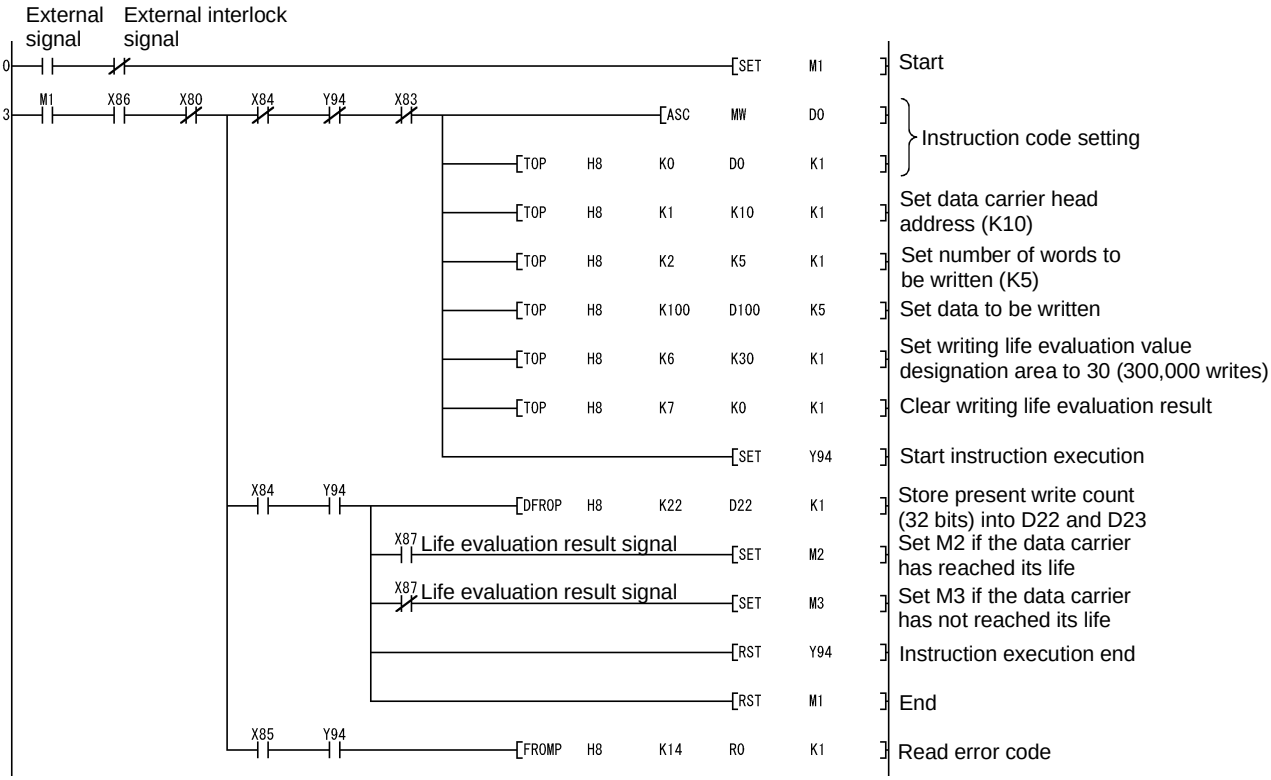
Instruction Code

Count Write instruction : MW Code: 574DH
Continuous Count Write instruction : LW Code: 574CH

(1) Sample program

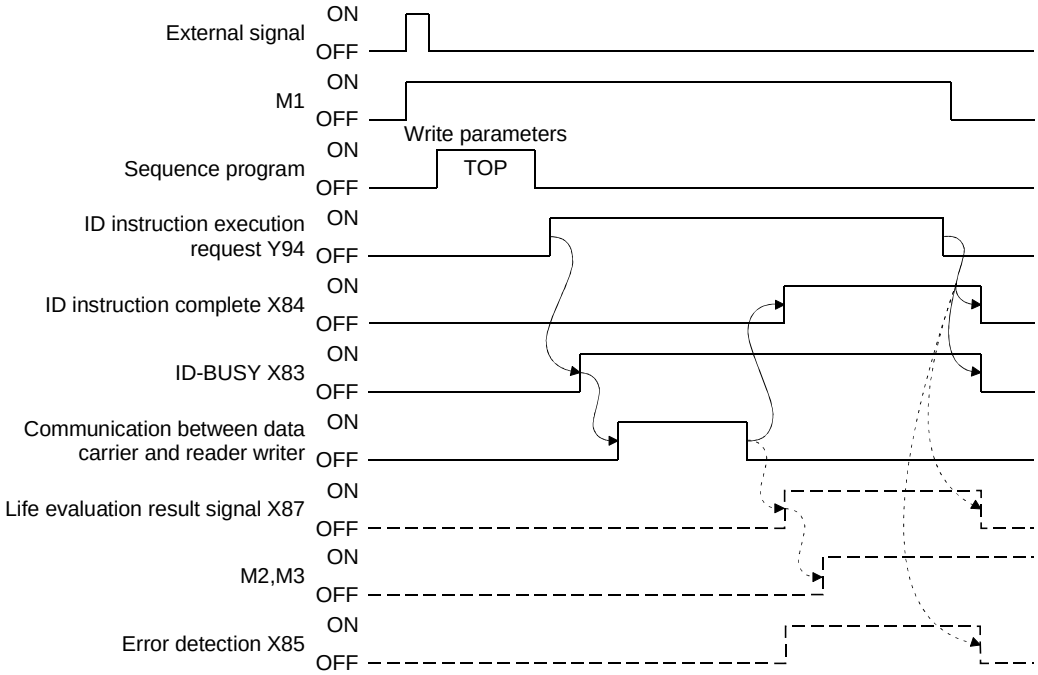
The following shows an example of a program with the following conditions:
Set D0 to "LW" instead of "MW" if the Continuous Count Write instruction is to be executed.

Head I/O number of ID interface module	080 (n = 8)
Channel used	CH. 1
Write head address of data carrier	K10
Number of words to be written	K5
Storage destination of write data	D100
Present write count storage destination	D22, D23
Error code storage destination	R0



(2) Operation timing

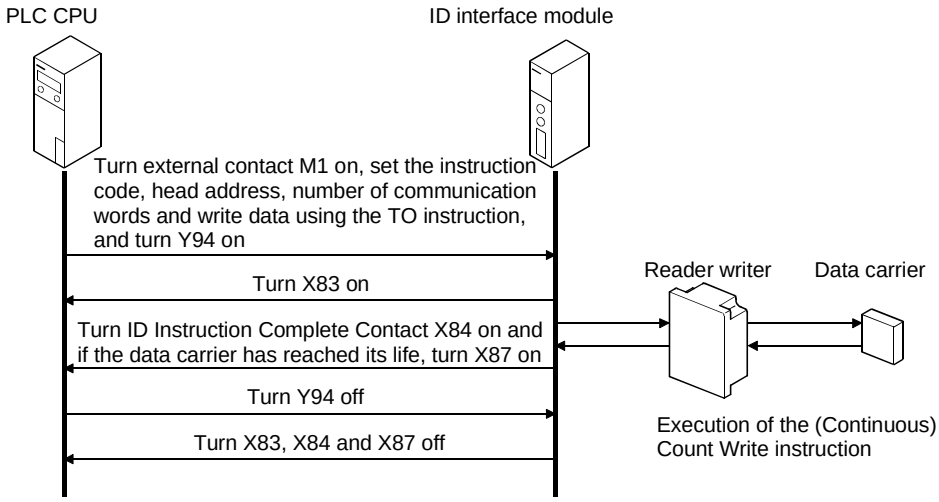
The following shows the operation timing:



6 - 36

(3) Explanation of operation

The operation of the above timing chart is explained below.



POINT

- If the data carrier does not exist, the instruction is repeated for the retry count, and an error is generated.
- If the write destination area includes a write-protected area, a write-protect error is generated.
  (In addition, writing to non-write-protected areas is not performed.)

6 - 37

6.11.3 Update write count (MD) instruction

Increments the total write count of the data carrier by the value stored in the Write Count Increment Value Designation Area (Address 26 (20H)/4026 (0FBAH)).
After a successful communication, the total write count will be stored in the Write Count Storage Area (Addresses 22 to 23 (16H to 17H)/4022 to 4023 (0FB6H to 0FB7H)) of buffer memory.
In addition, life evaluation will be performed by comparing this value with the writing life evaluation value. If the data carrier has reached its life, "1" will be stored in the Writing Life Evaluation Result Storage Area (Address 7 (7H)/4007 (0FA7H)) of the buffer memory, or the Life Evaluation Result Signal (Xn7/XnF) will turn on.

POINT

If this instruction is executed when a "0" is stored in the Write Count Increment Value Designation Area, the total write count of the data carrier can be read without increasing the write count.

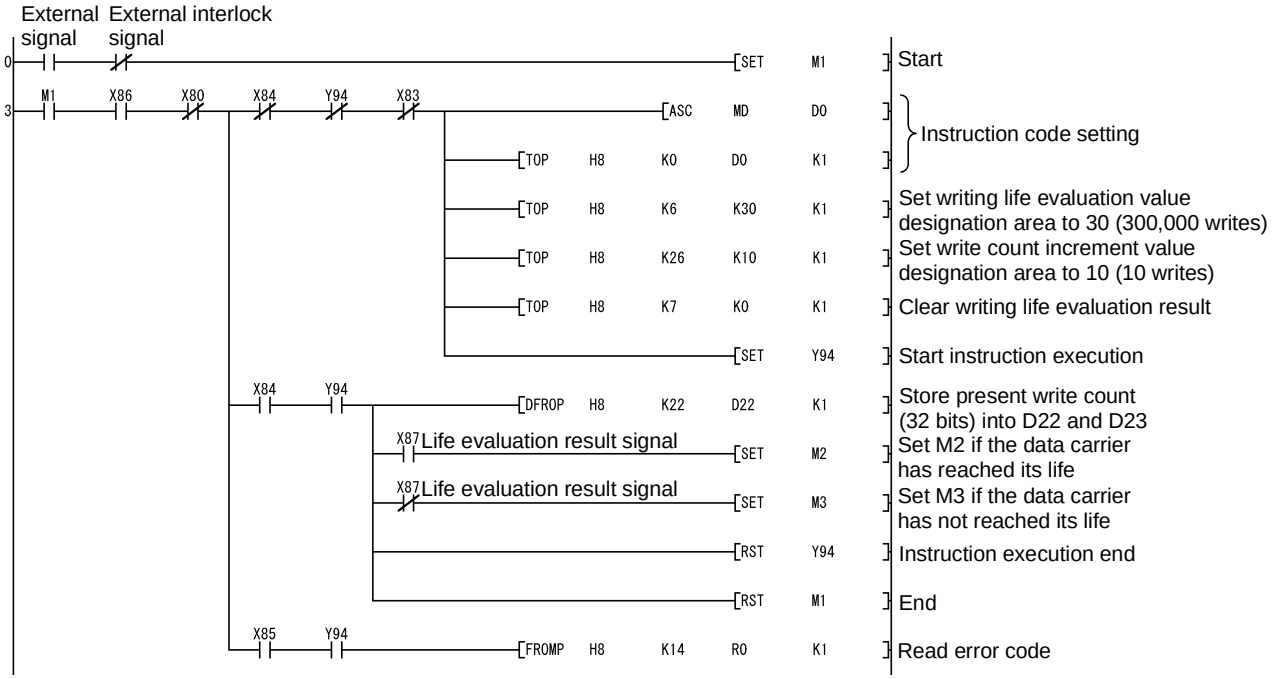
Instruction Code

Instruction : MD Code: 444DH

(1) Sample program

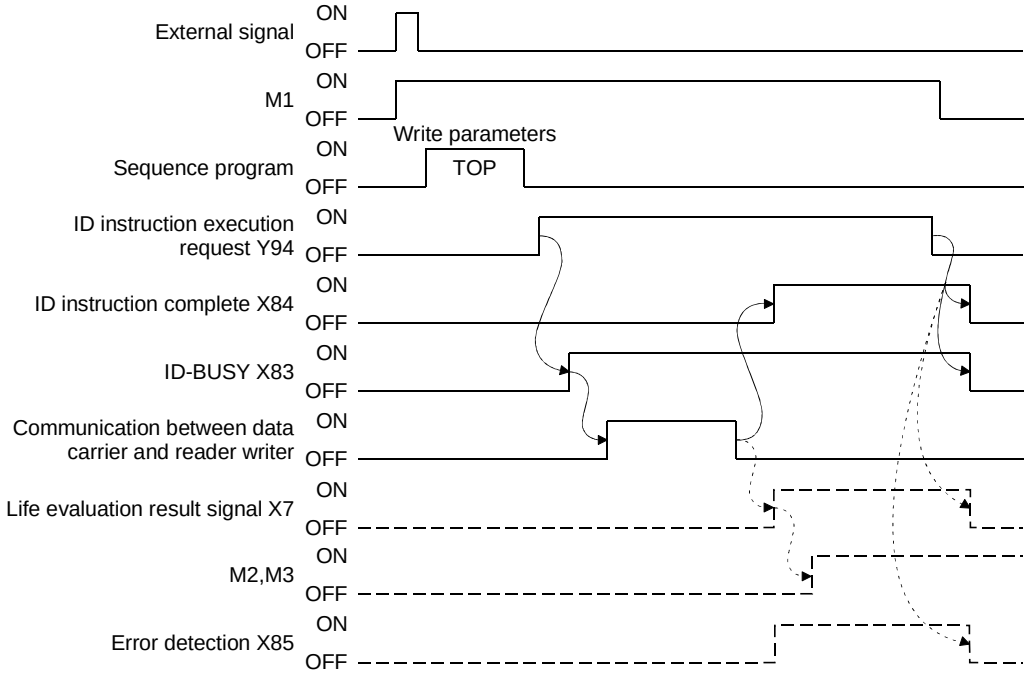
The following shows an example of a program with the following conditions:

Head I/O number of ID interface module	080 (n = 8)
Channel used	CH. 1
Writing life evaluation value	300,000 writes
Write count increment	10
Present write count storage destination	D22, D23
Error code storage destination	R0



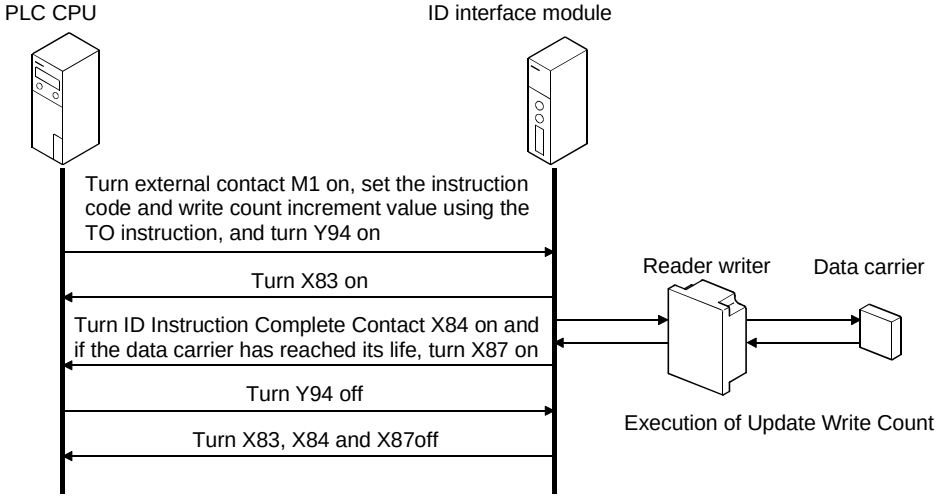
(2) Operation timing

The following shows the operation timing:



(3) Explanation of operation

The operation of the above timing chart is explained below.



POINT

- If the data carrier does not exist, the instruction is repeated for the retry count, and an error is generated.
- The MD instruction will be executed regardless of write-protect setting.

6 - 39

6.12 Writing Life Management and Life Extension

This section explains how to perform writing life management and life extension on the date carrier using the Life Management (MW, LW and MD) and Life Extension Bank Switching (BK) instructions.

6.12.1 About the writing life of the date carrier

Memory used in the data carrier of the D-2N Series may deteriorate as the number of writes performed on it increases.
The data carrier of the D-2N Series sets its guaranteed number of writes at 300,000 (-20°C to +60°C). If writes are to be performed beyond this value, memory deterioration may occur resulting in malfunction such as data corruption.
When data carrier memory reaches its life, data may not be written correctly.
In such cases, if regular Write instructions (WD, AW and FI) are used, even though the instruction seems to complete successfully, incorrect data may have been written.

6.12.2 Prevention of malfunction caused by writing life of the data carrier

(1) Use Write and Compare instructions

Use Write and Compare instructions (CW and SW) instead of the regular Write instructions (WD, AW and FI).
The Write and Compare instructions read and compare the written data after performing regular Write processes. If incorrect data has been written, an error is returned.
When the number of writes exceeds 300,000, use the Write and Compare instructions (CW and SW). If communication errors occur after 300,000 communications have been performed, replace the data carrier.

(2) Perform Writing Life Management (See Section 6.11)

Manage the write count of the data carrier using the Writing Life Management instructions (MW, LW and MD) to keep the write count from exceeding the guaranteed number.
The following describes practical applications of these instructions:

(a) Count Write (MW) and Continuous Count Write (LW) instructions

By using these instructions in place of the regular Write (WD) and Continuous Write (AW) instructions, writing and write count updating can both be executed at the same time. The present write count of the data carrier will be stored automatically in the write count storage area of buffer memory after the MW or LW instruction is executed.

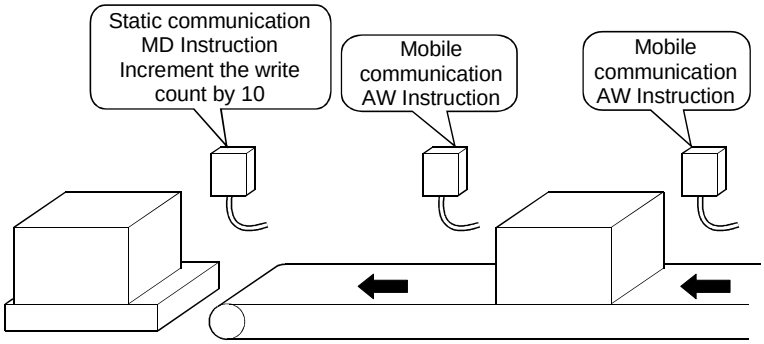
POINT
The Count Write (MW) and Continuous Count Write (LW) instructions take approximately 0.1 seconds longer than the Write (WD) and Continuous Write (AW) instruction, which means that the speed of the mobile unit is degraded. Therefore, these cannot be used to communicate with high-speed mobile units. Use the AW instruction when communicating with high-speed mobile units and perform life management using the Update Write Count (MD) instruction.

(b) Update Write Count (MD) instruction

When the MW or LW instructions cannot be used during communication with mobile units, the write count can be managed by updating the write count for the entire production line in a batch.

The present write count of the data carrier will be stored automatically in the write count storage area of buffer memory after the MD instruction is executed.

By setting the write count increment value to "0," only the present write count without incrementing the write count can be checked.



Total of 10 writes in the production line

6 - 41

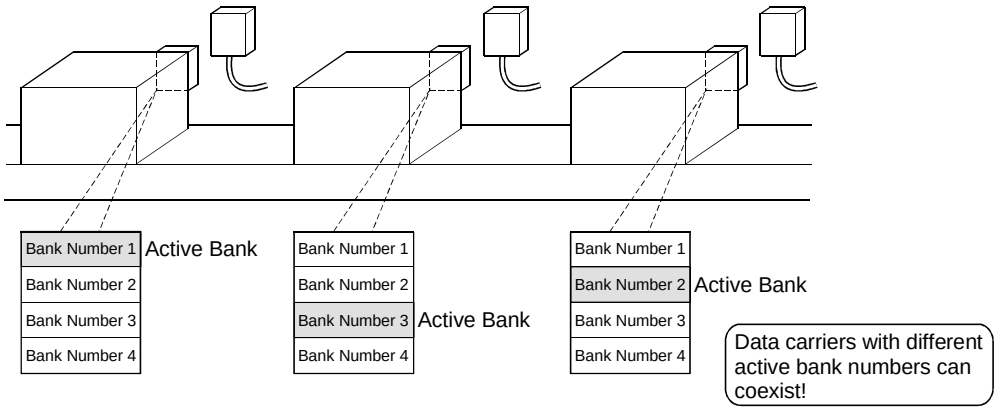
6.12.3 Writing life extension by bank switching

By using the data carrier's writing life management and the Life Extension Bank Switching (BK) instruction, more than 300,000 writes can be supported.
For details, see Section 6.10, "Life Extension Bank Switching (BK) Instruction."

(1) Features of the bank switching function

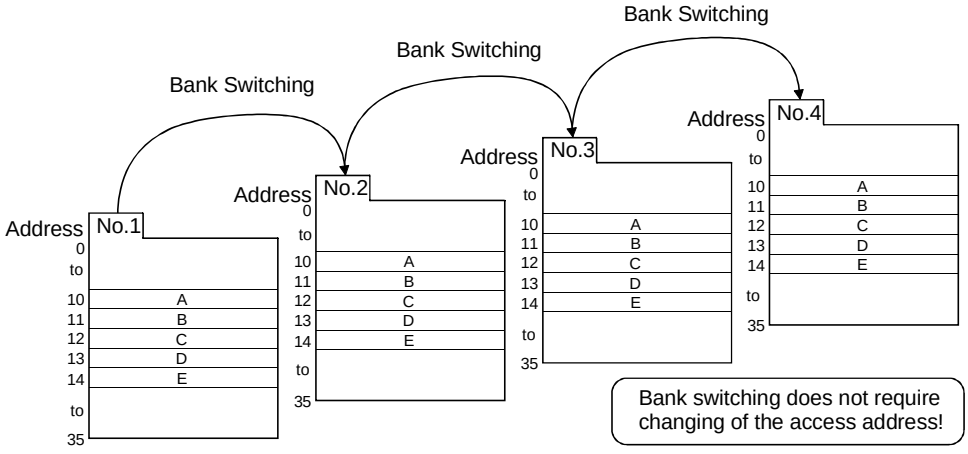
(a) Data carrier's memory can be divided and used with bank switching to allow a maximum of 3,600,000 writes.

(b) Since each data carrier stores its own memory type information (number of banks and active bank number) and since ID interface modules are designed to access only a specific bank, data carriers with different active bank numbers can coexist within a single production line.



(c) If the number of banks remains the same and only the active bank number changes, data in the old bank is automatically copied onto the new bank, eliminating the need to change the access address of the data carrier or to write any data.
The write-protect setting will also be copied automatically.

[Example bank switching with bank number of 4 (35-word specification)]

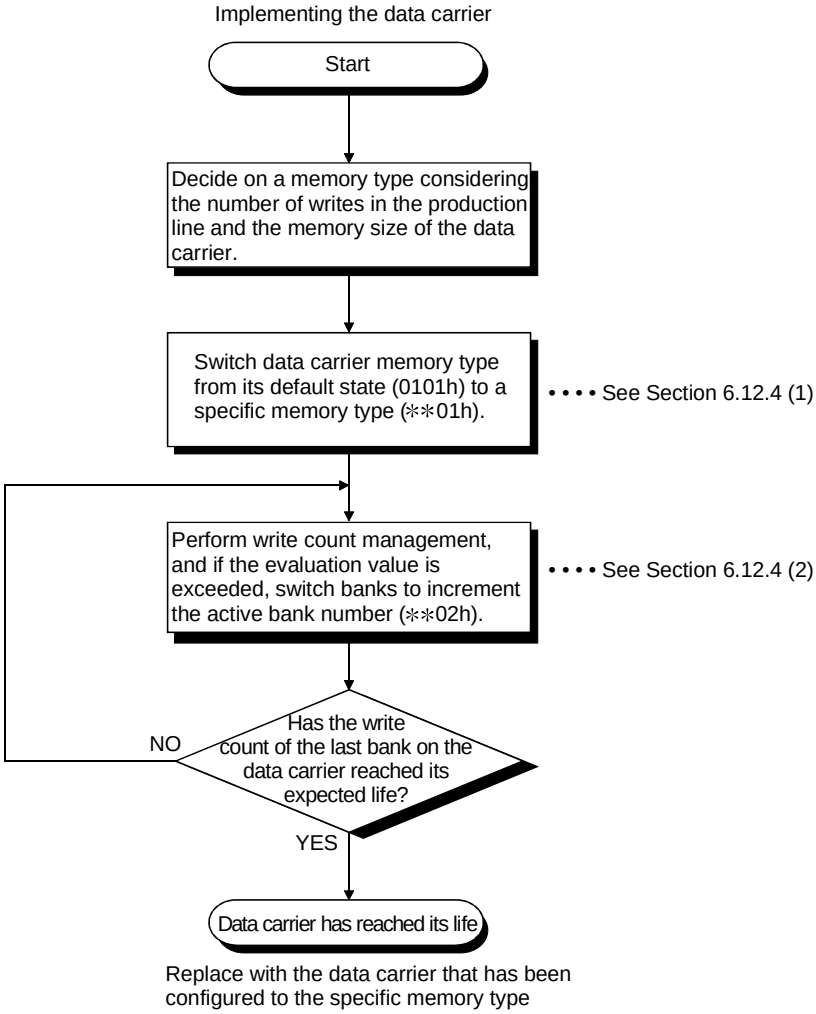


POINT

The Life Extension Bank Switching (BK) instruction rewrites the system area of the data carrier. Therefore, in order to prevent data corruption from communication errors, do not use this instruction during communication of mobile units.

(2) Bank switching flowchart

The following flowchart illustrates how to use the data carrier utilizing bank switching.



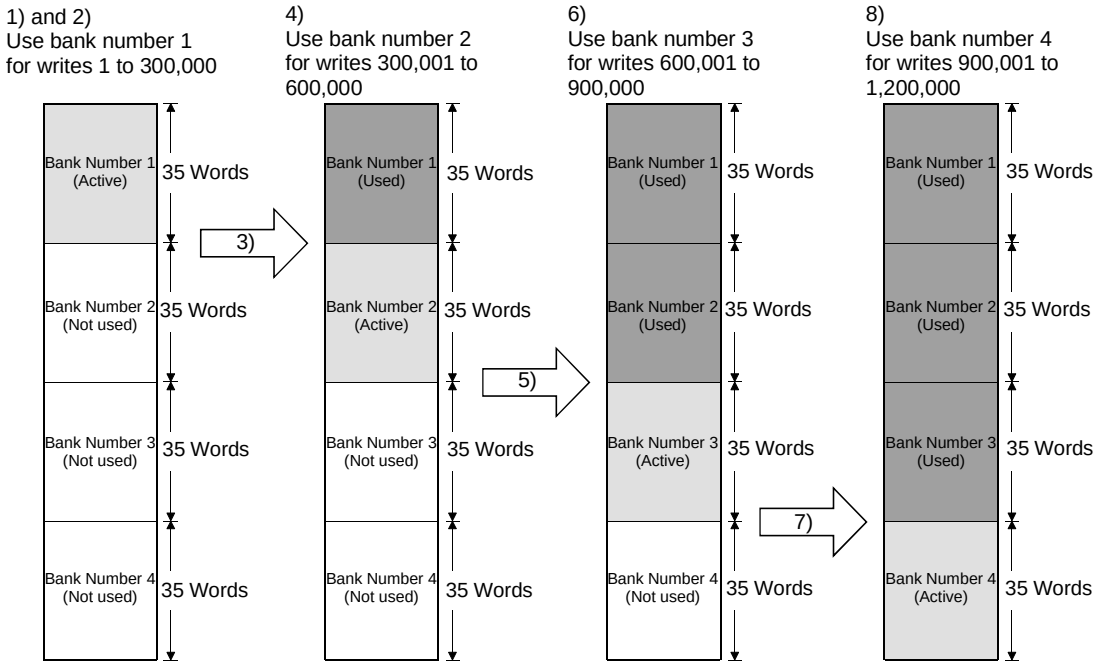
POINT
If the Life Extension Bank Switching (BK) instruction is executed, communication will be restricted in the specified bank only. Therefore, the data size will be limited by the size of the specified bank. Please choose which memory type to use by considering the amount of data to be used and the number of writes to be performed. For each data carrier, memory type setting (changing the number of banks from the initial 160-word specification) should be done only once at the beginning of its use. If the number of banks is changed after setting memory, the total write count will be cleared to 0.

(3) Data carrier memory map after bank switching

The memory map of the data carrier after bank switching using a memory type 35-word (70-byte) specification is shown below:

<Operating Procedure>

Number	Description
1)	Set the memory type of the data carrier to 0401H (35-word specification, bank number 1) before starting.
2)	Evaluate the writing life (300,000 writes) using the Life Management (MD, MW and LW) instructions.
3)	Use the Life Extension Bank Switching (BK) instruction to change the memory type to 0402H (35-word specification, bank number 2). Data in memory is copied from bank number 1 to bank number 2.
4)	Evaluate the writing life (300,000 writes) as in step 2. (Total of 600,000 writes)
5)	Use the Life Extension Bank Switching (BK) instruction to change the memory type to 0403H (35-word specification, bank number 3). Data in memory is copied from bank number 2 to bank number 3.
6)	Evaluate the writing life (300,000 writes) as in step 2. (Total of 900,000 writes)
7)	Use the Life Extension Bank Switching (BK) instruction to change the memory type to 0404H (35-word specification, bank number 4). Data in memory is copied from bank number 3 to bank number 4.
8)	Evaluate the writing life (300,000 writes) as in step 2. (Total of 1,200,000 writes)



POINT

It is recommended that the bank numbers are changed in sequential order, i.e. numbers 1, 2, 3, ... , as shown above, when switching banks. This will simplify memory management and programming. (For sample programs, see Section 6.12.4.)

6 - 44

6.12.4 Sample programs

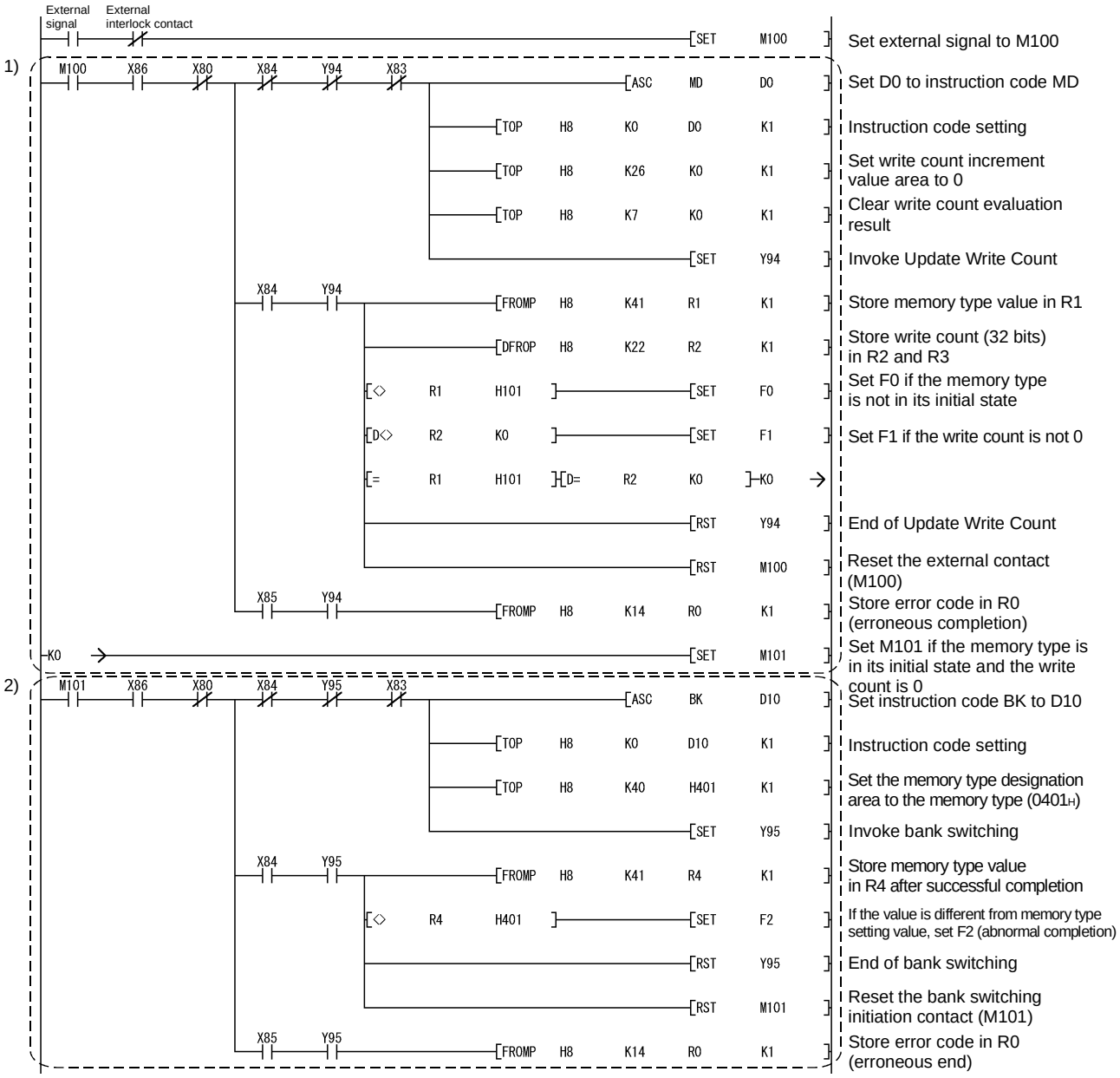
(1) Memory type initialization

A sample program that initializes data carrier memory type to 0401H (number of banks 4, bank number 1) is shown below.
The following program is to be used only once on an unused data carrier at the beginning of its use.
For instance when starting a production line, note that if you execute the following program more than once on a single data carrier, an error will be generated and F0 or F1 will be set if the following program is executed after using one of the write count incrementing instructions (MW, LW and MD).
Also, set the memory type for reserved data carriers.

<Operating procedure>

Number	Description
1)	Execute the Update Write Count (MD) instruction with write count increment value of 0 to obtain the memory type and the total write count of the data carrier. If the data carrier is not used, set the bank switching activate (M101) to on. Set F0 if the memory type is not in its initial state and set F1 if the write count is not 0.
2)	Set the memory type with the Life Extension Bank Switching (BK) instruction.

<Sample program>



POINT

- Setting of the memory type (modifying the number of banks from the initial 160 words specification) of the data carrier is to be done only once on a data carrier at the beginning of its use. Do not change the number of banks on the data carrier if it has already been set unless replacing the data carrier.
  If you change the number of banks after setting the memory type, data and write count will be deleted at that time, and therefore life management cannot be performed correctly.
- Communication must be stationary when executing the Life Extension Bank Switching (BK) instruction.
- If the memory type of the replacement data carrier is in its initial state (0101H), the data carrier will function correctly until the initial writing life is reached, but when updating the memory type to ＊＊02H, a Life Extension Bank Switching (BK) instruction error occurs.

6 - 46

(2) Life Extension using the Update Write Count (MD) instruction

The following shows a sample program that supports 1,200,000 writes of data carrier's writing life using the bank switching technique.
Reader writers 1 through 10 perform a mobile unit communication using the Continuous Write (AW) instruction. Within the production line, reader writer 11 (using static communication) updates the write count. If the write count exceeds the evaluation value, the bank will be switched.

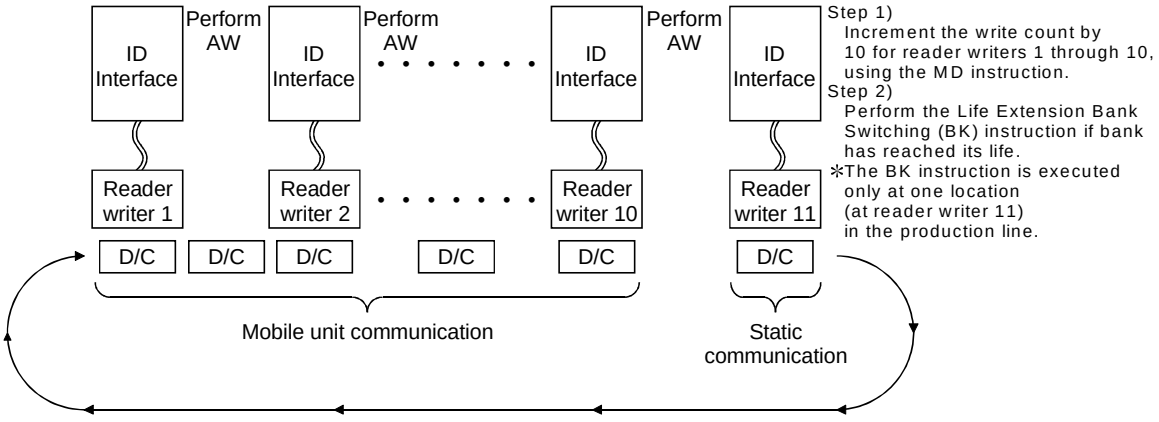
<Preprocessing>

Initialize the memory type of the data carrier in advance so that the number of banks is 4 and the active bank number is 1 (0401H) using the Life Extension Bank Switching (BK) instruction.
(For program details, see item (1).)

<Operating procedure>

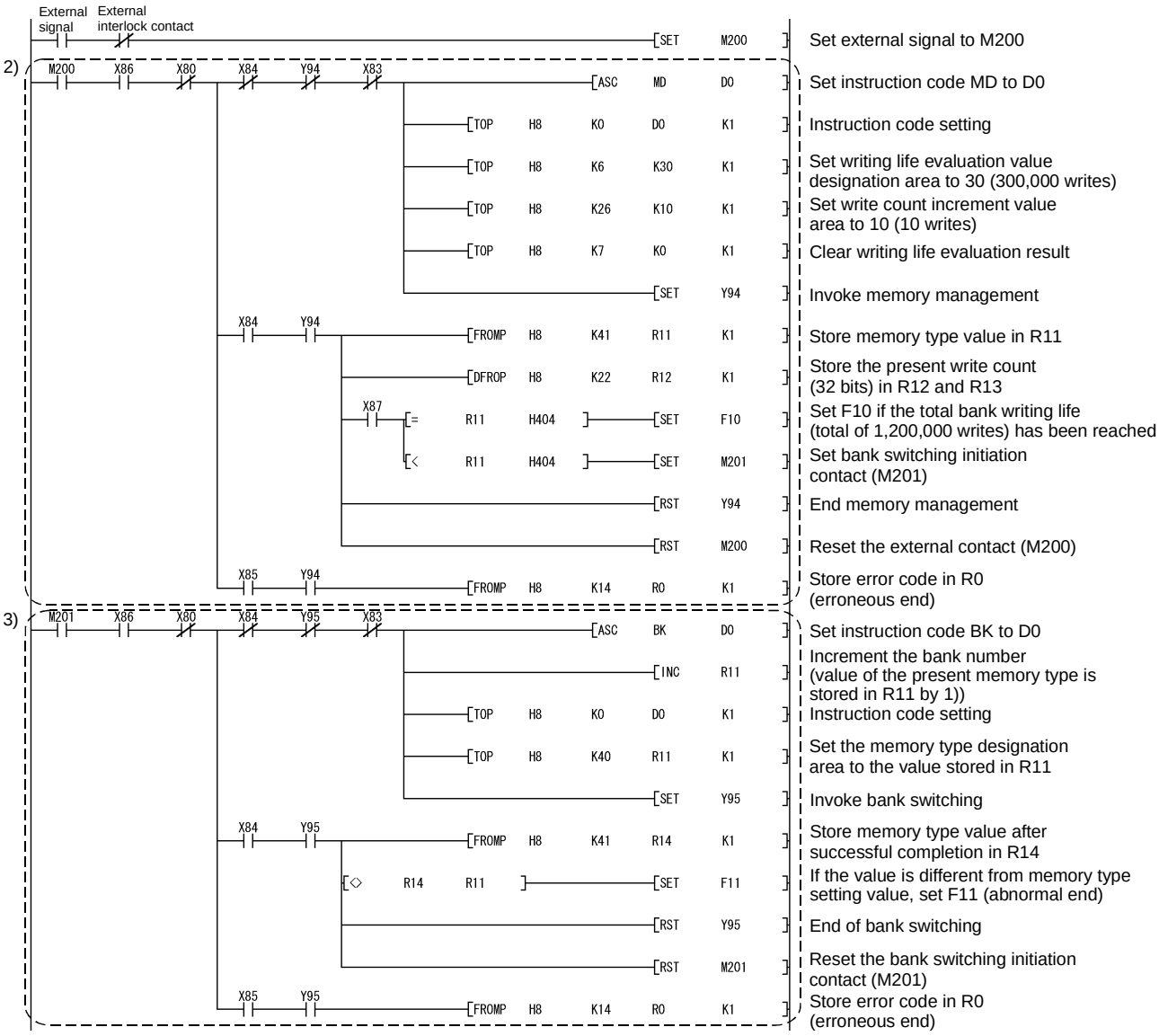
Number	Description
1)	Perform a write using the Continuous Write (AW) instruction (see Section 6.5.1).
2)	Perform the Update Write Count (MD) instruction with writing life evaluation value as 30 (300,000 writes) and write count increment value as 10 (total of 10 writes.) Perform [3] if the bank reaches its life. However, in the case of bank number 4, the data carrier itself has reached its life, so the operation terminates (setting F10).
3)	Increment the bank number using the Life Extension Bank Switching (BK) instruction.

[System Structure When Using Mobile Unit Communication (AW)]



6 - 47

<Sample program>



6 - 48

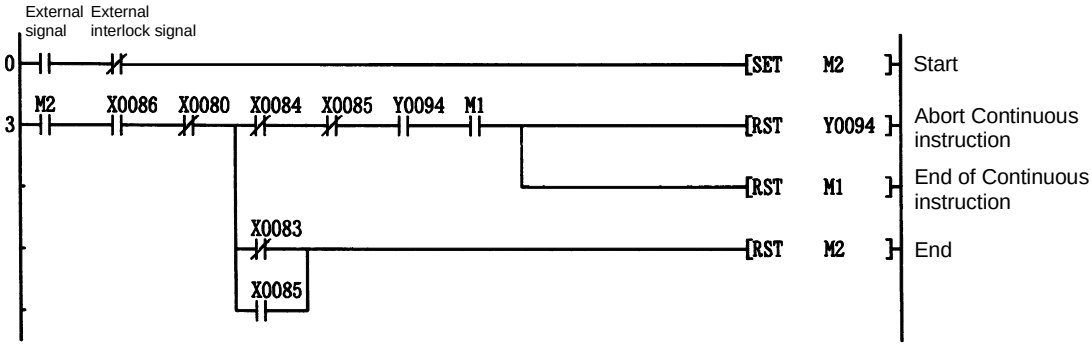
6.13 Abort Continuous Instruction Command

The Abort Continuous Instruction command aborts the execution of the Continuous instructions (AR, SR, AW, SW, LW, and CO).

(1) Sample program

The following shows an example of a program with the following conditions: (This is a sample program that aborts the Continuous instruction described in this chapter.)

Head I/O number of ID interface module : 080 (n = 8)
Channel used : CH. 1



POINT

- If the Abort Continuous Instruction command is issued while communication is undergoing with the data carrier (data carrier is present), in order to preserve data integrity, communication will not be aborted and the Abort Continuous Instruction command will be ignored.
- If the Abort Continuous Instruction command is issued while Continuous Instruction interval timer is operating, the instruction will be reset after the timer returns.

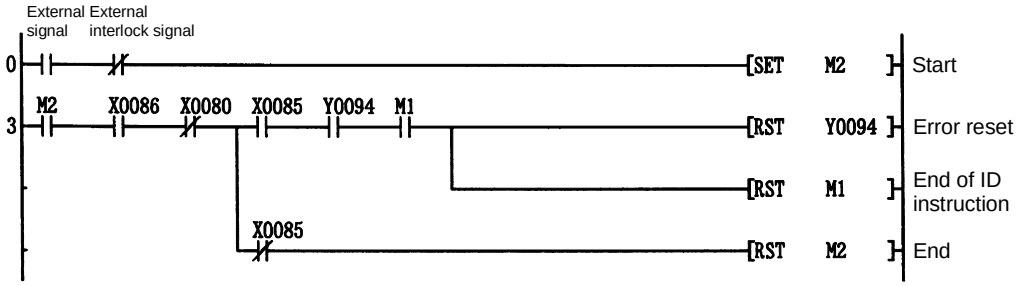
6.14 Error Reset Command

The Error Reset command resets an error that has been generated.

(1) Sample program

The following shows an example of a program with the following conditions: (This is a sample program that resets an error generated by the instruction described in this chapter.)

Head I/O number of ID interface module : 080 (n = 8)
Channel used : CH. 1



6 - 50

6.15 In-Zone Function of Continuous Instructions

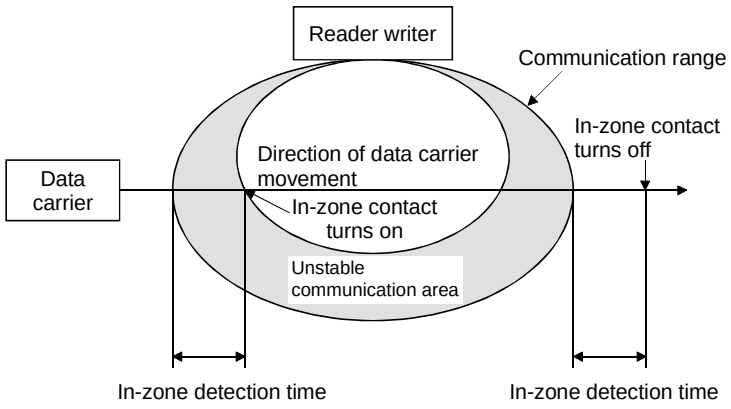
The in-zone function can recognize the unique information of the first data carrier that enters the communication range (the first data carrier to communicate with) and to continue detecting the existence of the data carrier while the data carrier is within the communication range.
The above state is also referred to as "in-zone detection." The state in which the existence of the recognized data carrier can no longer be detected (out of communication range) is referred to as "out-zone detection."

6.15.1 Characteristics of in-zone detection

(1) It is only valid during the execution of the Continuous instruction (AR, SR, AW, SW, LW, or CO.)
(2) During the in-zone detection of the data carrier, the ID interface module communicates only with this recognized data carrier, even if another data carrier enters the communication range. In addition, if another Continuous instruction is issued, the ID interface module communicates only with the data carrier that has already been recognized.
(3) In-zone contacts (Xn2, XnA) stay on during the in-zone detection and turn off by out-zone detection.
(4) The in-zone detection is effective until either an out-zone detection occurs or a non-Continuous instruction is issued. The in-zone detection is still effective after the Continuous instruction has completed and ID instruction execution request contacts (Y(n+1)4, Y(n+1)C) have been reset.
(5) By setting the in-zone detection time, the in-zone detection within an unstable communication area can be prevented.

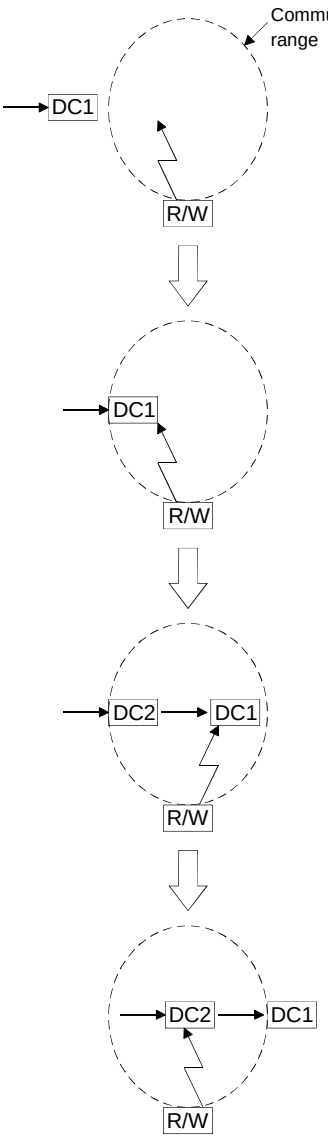
6.15.2 In-zone function general diagram

(1) In-zone function general diagram



6 - 51

(2) Positional relationship between the reader writer and the data carrier



1) Starts the execution of a Continuous instruction.

2) Data carrier 1 enters the communication range.
   - The in-zone detection of data carrier 1 starts.

3) Data carrier 2 also enters the communication range.
   (Data carrier 2 is unable to establish communication.)
   - Data carrier 1 is under in-zone detection.
   - The execution of an instruction for data carrier 1 completes.

4) Data carrier 1 leaves the communication range, leaving data carrier 2 in the communication range.
   (Data carrier 2 is able to establish communication.)
   - Data carrier 1 is under out-zone detection.
   - Data carrier 2 is under in-zone detection by the start of Continuous instruction execution.

POINT
If multiple data carriers enter the communication range simultaneously, the in-zone function may not function correctly.

6 - 52

6.15.3 How to utilize the in-zone function

The in-zone function can prevent interference during communication with a moving data carrier (mobile unit communication) and can improve communication reliability.

(1) When preventing interference by using the Continuous instructions

By using the Continuous instructions in regular ladder programs, interference can be prevented against cases where multiple data carriers enter the communication range.

(2) When using in-zone contacts to prevent interference and improve reliability

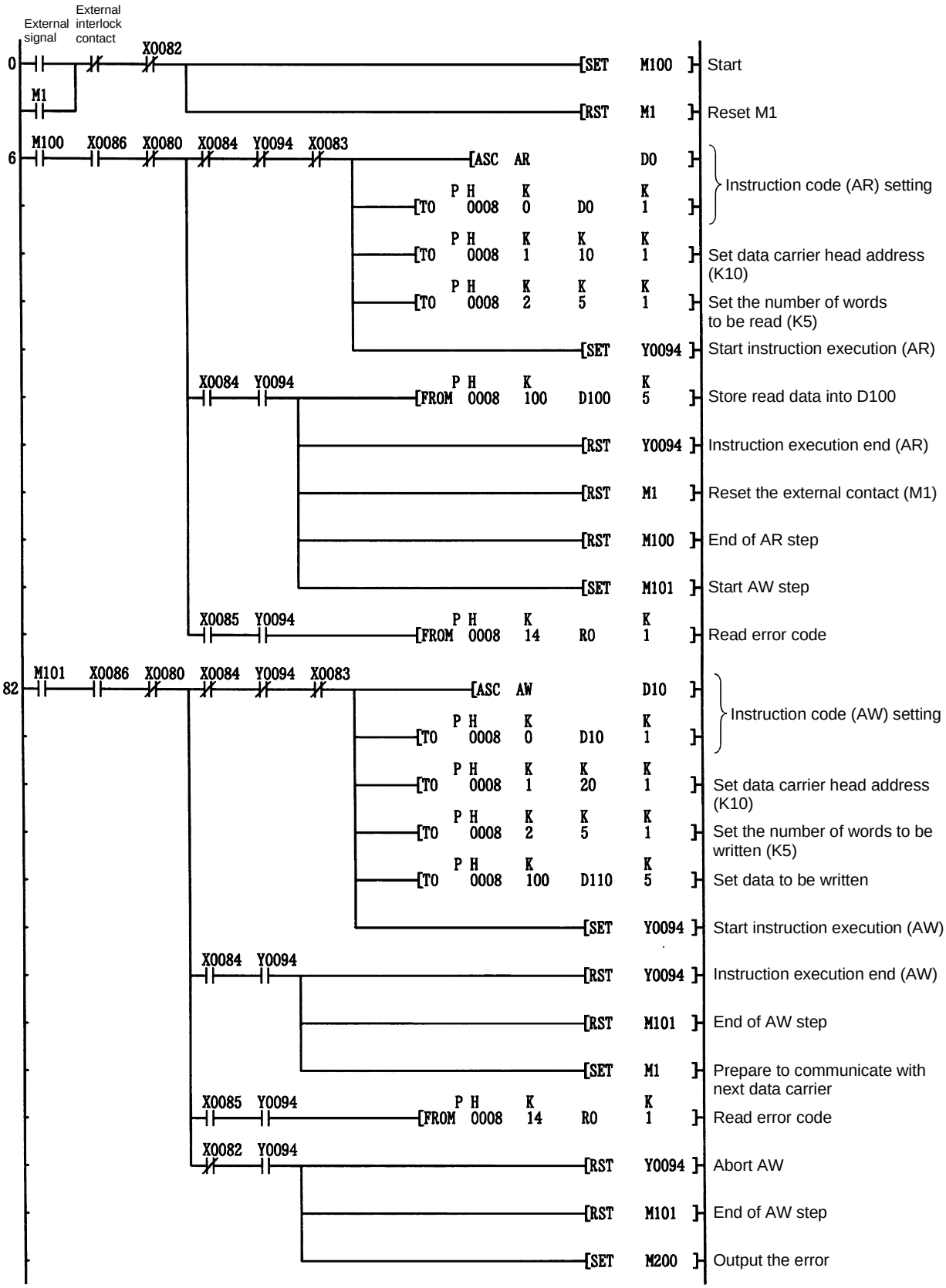
When multiple instructions are to be issued to a single data carrier via mobile unit communication, by using in-zone contacts, it is possible to control communication to the next data carrier after communication to one data carrier is completed successfully.

<Sample program>

The following shows a program executing the AR and AW instructions to a single data carrier.
After communication with the first data carrier completes and the data carrier leaves the communication range, external contact M100 for communication execution of the next data carrier is turned on.
After completing the AR instruction for the first data carrier, if the data carrier leaves the communication range before executing the AW instruction, error contact M200 is turned on.

• Program conditions

Channel used	CH. 1
Read head address of data carrier	K10
Number of words to be read	K5
Storage destination of read data	D100 to D104
Write head address of data carrier	K20
Number of words to be written	K5
Storage destination of write data	D110 to D114
Error code storage destination	R0
Communication execution enabled flag for the next data carrier	M100
Error generated when out-of-range	Turns M200 ON


External signal
External interlock contact
X0082
M1
[SET M100] Start
[RST M1] Reset M1
M100 X0086 X0080 X0084 Y0094 X0083
[ASC AR D0]
[TO P H K K 0008 0 D0 1]
Instruction code (AR) setting
[TO P H K K K 0008 1 10 1] Set data carrier head address (K10)
[TO P H K K K 0008 2 5 1] Set the number of words to be read (K5)
[SET Y0094] Start instruction execution (AR)
X0084 Y0094
[FROM P H K K 0008 100 D100 5] Store read data into D100
[RST Y0094] Instruction execution end (AR)
[RST M1] Reset the external contact (M1)
[RST M100] End of AR step
[SET M101] Start AW step
X0085 Y0094
[FROM P H K K 0008 14 R0 1] Read error code
M101 X0086 X0080 X0084 Y0094 X0083
[ASC AW D10]
[TO P H K K 0008 0 D10 1]
Instruction code (AW) setting
[TO P H K K K 0008 1 20 1] Set data carrier head address (K10)
[TO P H K K K 0008 2 5 1] Set the number of words to be written (K5)
[TO P H K K 0008 100 D110 5] Set data to be written
[SET Y0094] Start instruction execution (AW)
X0084 Y0094
[RST Y0094] Instruction execution end (AW)
[RST M101] End of AW step
[SET M1] Prepare to communicate with next data carrier
X0085 Y0094
[FROM P H K K 0008 14 R0 1] Read error code
X0082 Y0094
[RST Y0094] Abort AW
[RST M101] End of AW step
[SET M200] Output the error

7 TROUBLESHOOTING

This chapter explains the errors generated when using the ID interface module and troubleshooting.

7.1 Error Code Table

The following shows a list of error codes, their contents, and how to handle the errors.
The latest error code is stored in K14 (CH. 1)/K4014 (CH. 2) of buffer memory.
In the error codes, ＊＊ will hold one of the values listed below depending on the instruction.

• All Instructions • • • •	00H	• CL, FI • • •	06H	• WP • • •	14H
• RD • • • • • • • • • • • •	01H	• CO • • • •	0AH	• RP • • •	15H
• WD • • • • • • • • • • • •	02H	• CR • • • •	0BH	• BK • • •	18H
• AR • • • • • • • • • • • •	03H	• CW • • • •	0CH	• MD • • •	19H
• AW • • • • • • • • • • • •	04H	• SR • • • •	0DH	• MW • • •	1AH
• CM • • • • • • • • • • • •	05H	• SW • • • •	0EH	• LW • • •	1BH

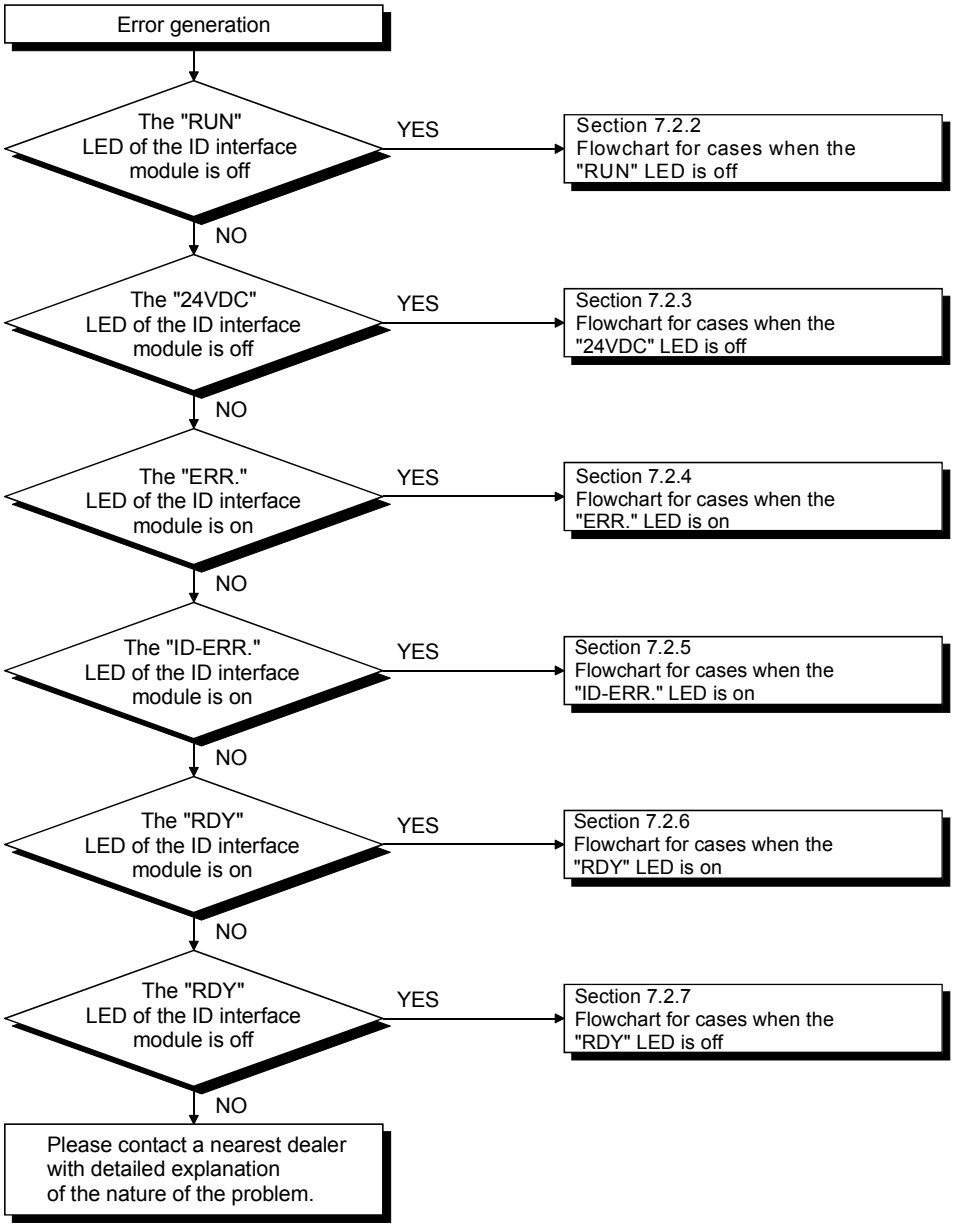
Error code (hexadecimal)	Name	Description	Corresponding LED	Action to take
＊＊01H	Execution number of words error	When communicating with the data carrier, the number of words to be executed is incorrect.	ID-ERR.	Check that the "number of words + address" value of the sequence program does not exceed the last address of the data carrier. (Check memory type.)
＊＊02H	Execution address error	When communicating with the data carrier, the execution address is incorrect. (For the WP instruction, the page address is incorrect.)	ID-ERR.	Check that the "address" (page address value for the WP instruction) of the sequence program does not exceed the last address of the data carrier. (Check memory type.)
＊＊11H	Address setting error	The address setting is outside the valid range. (For the WP instruction, the page address is outside the valid range.)	ERR.	Check if the "address" (page address value for the WP instruction) of the sequence program does not exceed outside the valid address setting range.
＊＊12H	Number of words setting error	The number of words setting is outside the valid range. (For the WP instruction, the setting/clearing value is outside the valid range.)	ERR.	Check if the "number of communication words" (setting/clearing value for the WP instruction) of the sequence program does not exceed outside the valid address setting range.
＊＊13H	Data carrier not detected error	No data carrier is in the communication range. Series number of data carrier or reader writer is invalid.	ID-ERR.	Bring the data carrier into the communication range. Check the wiring of the reader writer. Check if the data carrier and the reader writer are of the D-2N Series.
＊＊14H	Data carrier communication error	An error (such as a parity error) was generated while communicating with the data carrier.	ID-ERR.	Reexamine the communication distance and moving speed of the data carrier. Recheck the grounding of the interface module and the PLC CPU.
＊＊16H	Write-protect error	A write was attempted on a write-protected area.	ID-ERR.	Check that the "address" and the "address" + "number of communication words" of the sequence program is not in a write-protected area.
1821H	Memory type designation error	Designated memory type value is invalid.	ERR.	Reexamine the designated memory type.
＊＊22H	Instruction code error	Undefined instruction code has been specified.	ERR.	Reexamine the instruction code.
＊＊24H	Continuous instruction execution timer interval setting error	Continuous instruction execution timer interval setting value is outside the valid range.	ERR.	Reexamine the setting value of the continuous instruction execution timer interval of the sequence program.
0A26H	Copy direction designation error	Copy direction designation value is not a valid value (neither 12 nor 21).	ERR.	Reexamine the copy direction designation setting of the sequence program.
＊＊28H	Write count error	Write count increment value is outside the valid range (between 0 and 32767). (MD instruction) Life evaluation value is outside the valid range (between 0 and 32767). (MD, MW or LW instruction)	ERR.	Reexamine the write count increment value and the life evaluation value of the sequence program.
0031H	24V DC error	External power (24V DC) is not supplied.	24V DC	Provide 24V DC power.

7.2 Troubleshooting

This section explains the basic troubleshooting procedures to be applied when using the ID interface module. For troubleshooting related to the CPU, see the User's Manual for the CPU module to be used.

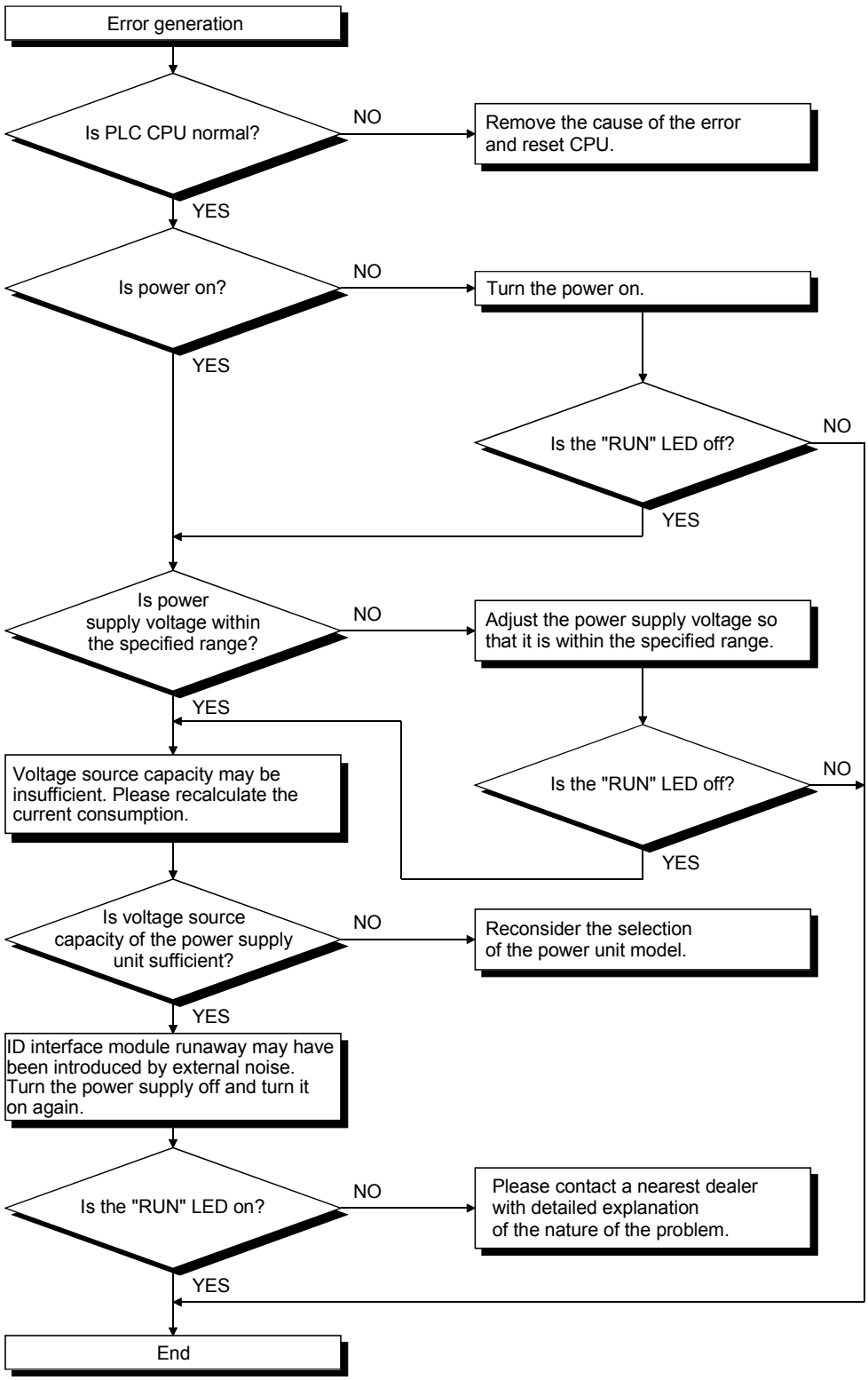
7.2.1 Troubleshooting flowchart

This section explains the types of errors based on the abnormality observed.

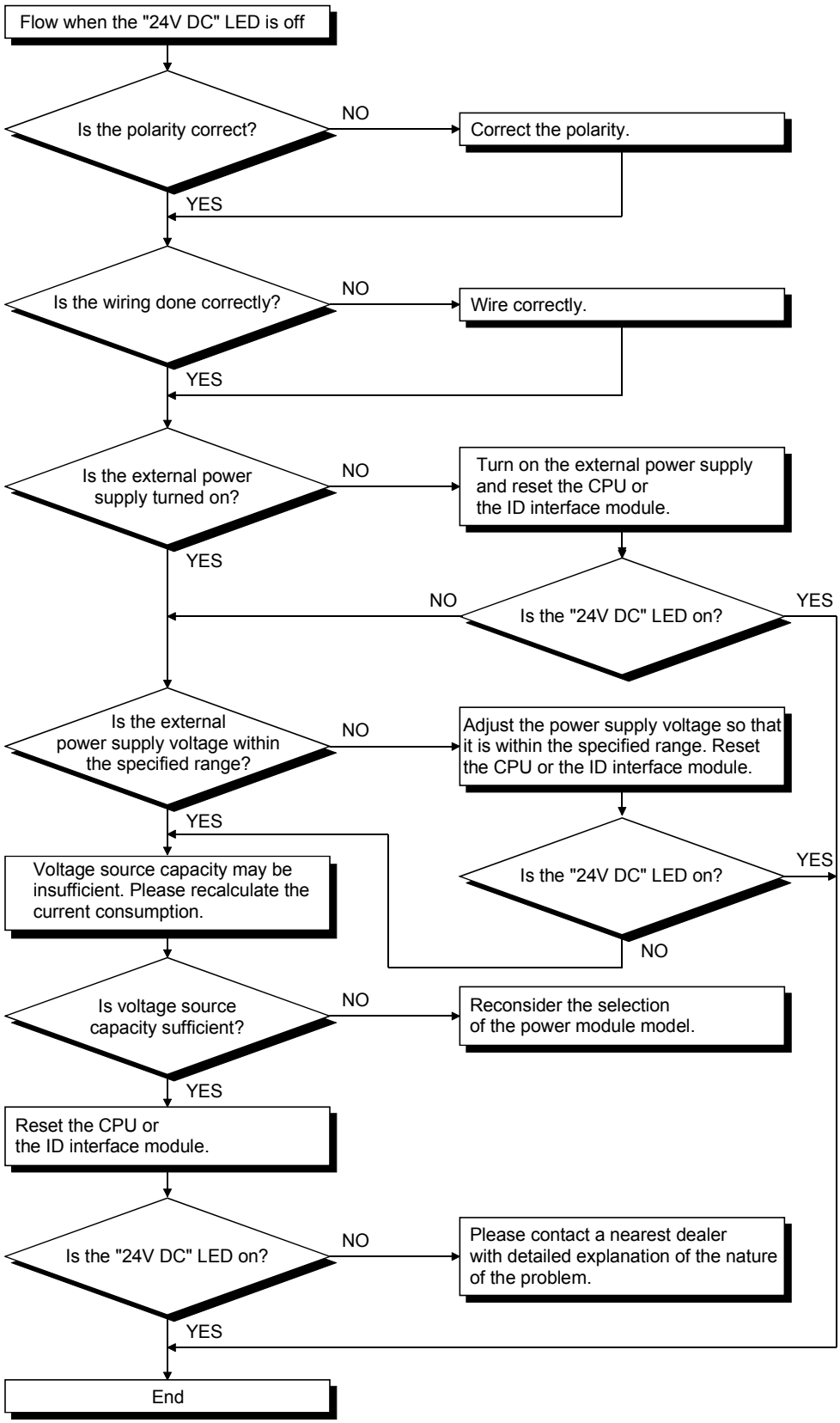


7 - 2

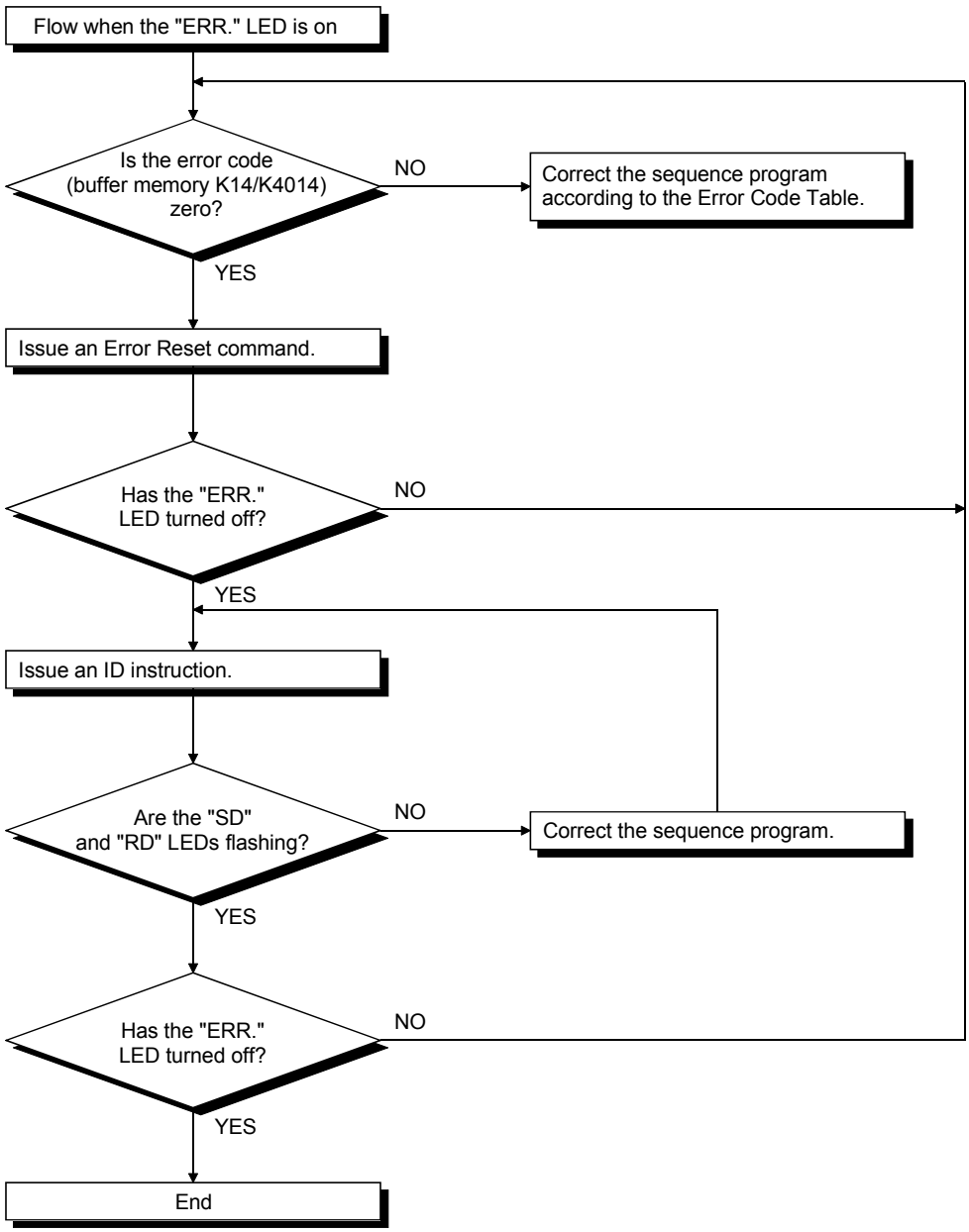
7.2.2 Flowchart for cases when the "RUN" LED is off



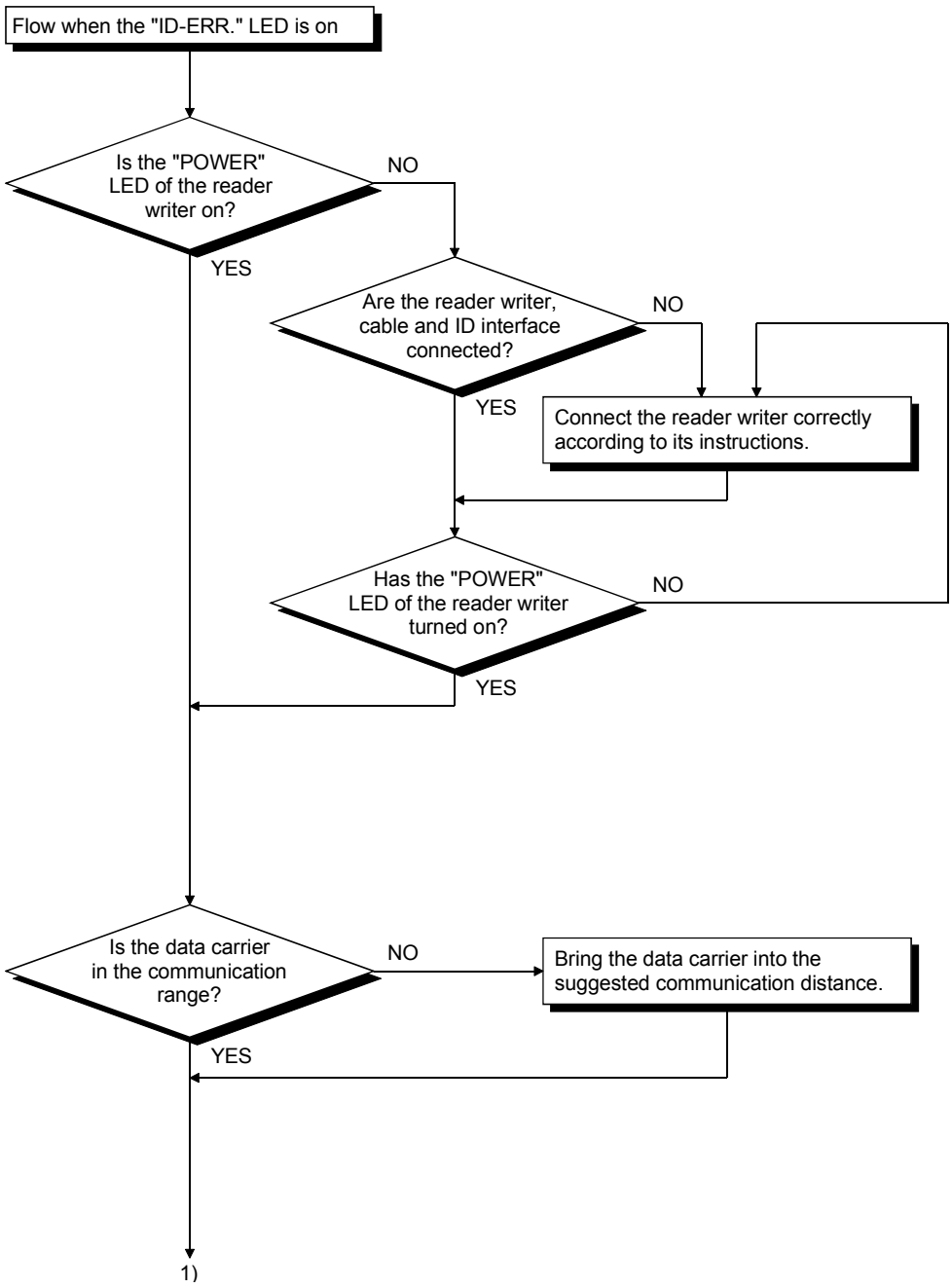
7.2.3 Flowchart for cases when the "24V DC " LED is off

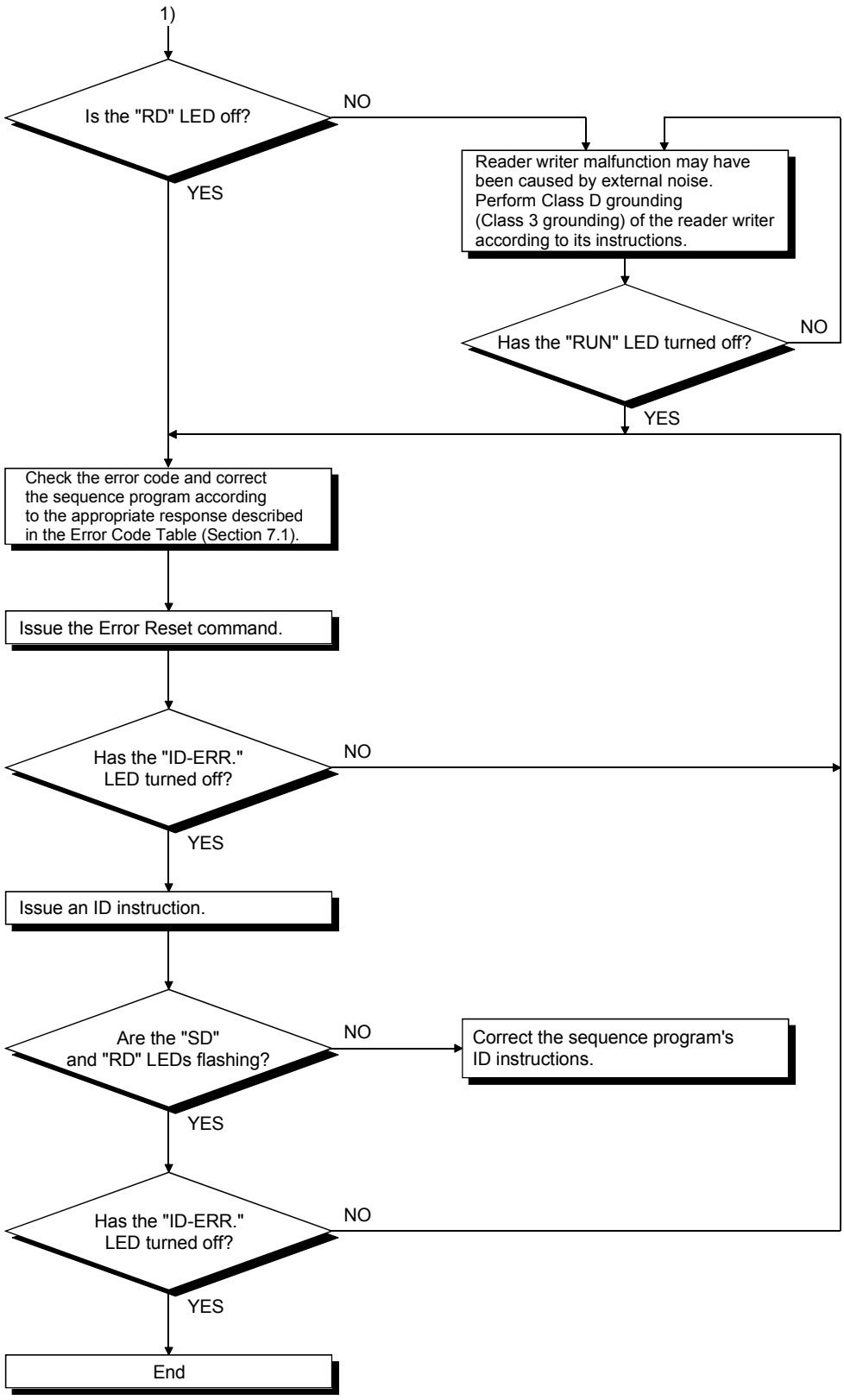


7.2.4 Flowchart for cases when the "ERR." LED is on



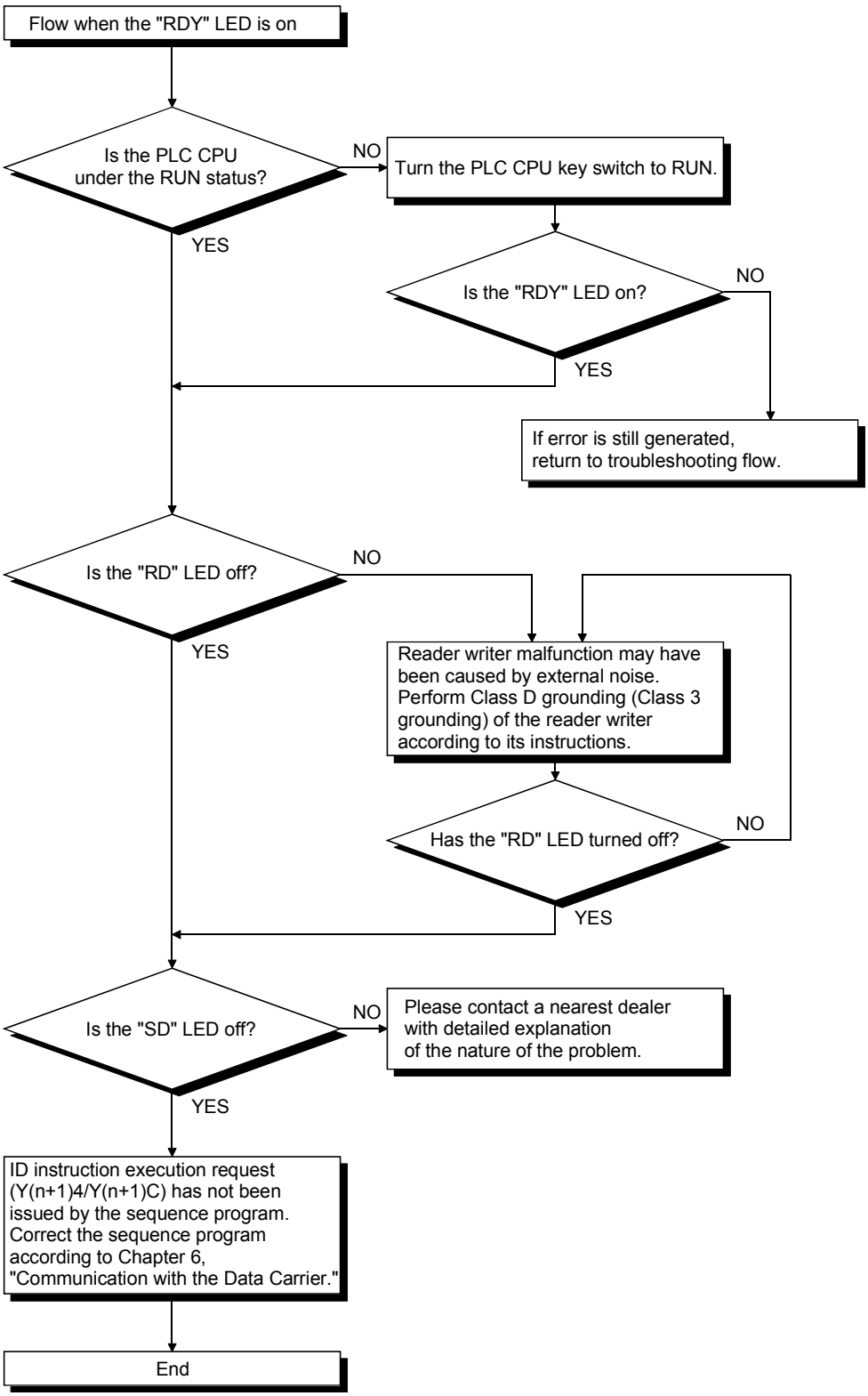
7.2.5 Flowchart for cases when the "ID-ERR." LED is on



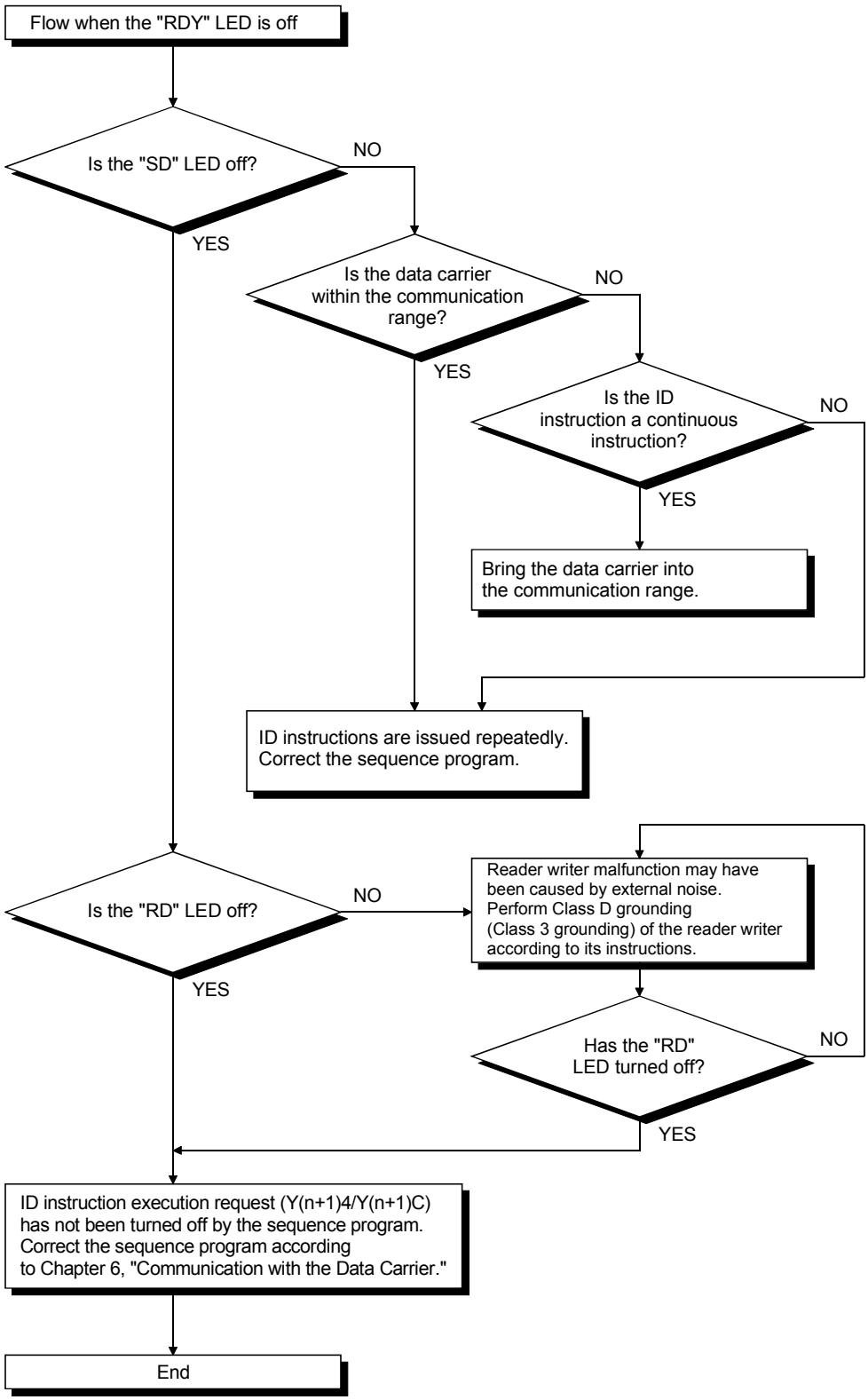

1)
Is the "RD" LED off?
NO
YES
Reader writer malfunction may have been caused by external noise. Perform Class D grounding (Class 3 grounding) of the reader writer according to its instructions.
Has the "RUN" LED turned off?
NO
YES
Check the error code and correct the sequence program according to the appropriate response described in the Error Code Table (Section 7.1).
Issue the Error Reset command.
Has the "ID-ERR." LED turned off?
NO
YES
Issue an ID instruction.
Are the "SD" and "RD" LEDs flashing?
NO
Correct the sequence program's ID instructions.
YES
Has the "ID-ERR." LED turned off?
NO
YES
End

7 - 7

7.2.6 Flowchart for cases when the "RDY" LED is on



7.2.7 Flowchart for cases when the "RDY" LED is off



7.3 List of Items to be Checked when a Trouble Occurs

The following lists the items that should be checked when a trouble occurs.

No.	Category	Purpose	Item to be checked	Detail
1	Electric circuit noise	Preventing malfunction	Class D grounding (Class 3 grounding) must be used for the FG terminal of the ID interface module.	Class D grounding (Class 3 grounding) will be performed to prevent reader writer malfunctions caused by harmonics from grounding. Do not detach the wiring of the FG terminal of the ID interface module when wiring.
2			Class D grounding (Class 3 grounding) must be used for the inverter and the servomotor.	Be sure to perform Class D grounding (Class 3 grounding) to prevent reader writer malfunctions caused by harmonics from the inverter and the servomotor, which are common sources of noise.
3			Connect the ID interface module to the LG of external power supply.	If Class D grounding (Class 3 grounding) cannot be performed temporarily during debugging or startup, connect the LG terminal of the external power supply and the FG terminal of the ID interface module. However, Class D grounding (Class 3 grounding) must be performed before the system is used.
4	Communication time	System reliability	Allocate the communication time of at least twice the necessary communication time.	To allow a retry in case of a communication error, set the communication time at least twice the necessary communication time.
5	Communication distance	Data reliability	Use 50% of the maximum communication distance (optimal communication distance) as the communication distance.	Read and write will be unstable at the communication range boundaries due to data carrier displacement. Therefore, the data carrier should be used at the center of the communication range (optimal communication distance).
6	Moving speed	System reliability	Use 50% or less of the maximum speed as the moving speed.	The moving speed should be at most 50% of the maximum speed in order to allow a retry in case of a moving speed fluctuation or a communication error.
7	Moving communication distance	Data reliability	If the data carrier is to be used by attaching to a mobile unit, its communication distance should be between 40% and 70% of the maximum communication distance.	To allow stable communication, use the communication distance that takes the longest time for the data carrier to cross the communication range. If the communication distance is too close, the communication will be disconnected at a side lobe.
8	Moving speed	Data reliability	If the data carrier attached to a mobile unit vibrates, perform data read/write after detecting the mobile unit, for instance, by using a microswitch.	If the moving speed is low (50mm/s or below) and the data carrier is installed on a hanger, the data carrier attached to the mobile unit vibrates, resulting in unstable reading and writing around the communication range boundaries. In this case, detect the mobile unit, for instance, by using a microswitch, and perform read/write within a stable communication range. If the mobile unit cannot be detected, use the Continuous Read and Compare (SR), and Continuous Write and Compare (SW) instructions to improve reliability.
9	Interference	Preventing troubles arising from interference	Install reader writers at least 200mm apart from each other.	A communication error occurs and normal communication cannot be achieved. Reconsider the installation location.
10			Install data carriers at least 200mm apart from each other.	A communication error occurs and normal communication cannot be achieved. Reconsider the installation location.
11	Program	Preventing PLC CPU errors	Execute the FROM (P)/TO (P) instructions to buffer memory via an Xn contact.	Executing the continuous FROM (P)/TO (P) instructions may result in an SP. UNIT DOWN ERR. or a communication error, and also requires a longer scan time. Execute the FROM (P)/TO (P) instructions via an ID instruction complete (Xn4/XnC) or an ID error detection (Xn5/XnD.)
		Disallowing continuous FROM/TO instructions	Do not use continuous FROM/TO instructions on buffer memory; instead, use the FROMP/TOP instructions.	The continuous FROM/TO instructions may affect the interface processing, resulting in a communication error.

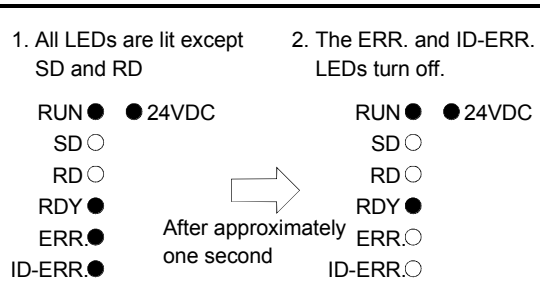
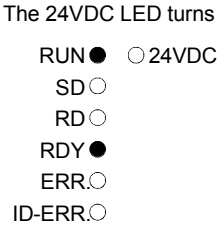
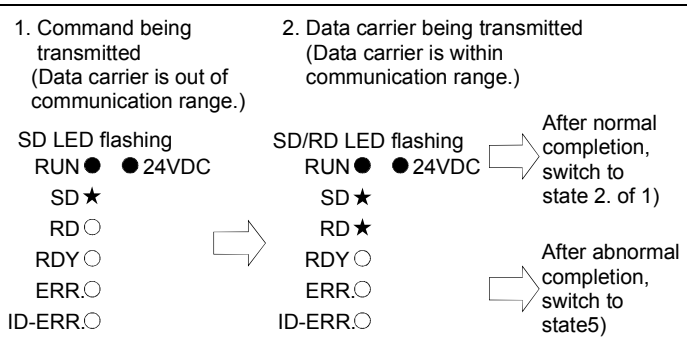
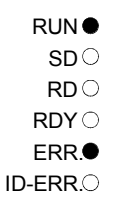
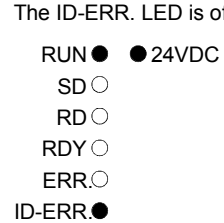
<table>
<tr><th>No.</th><th>Category</th><th>Purpose</th><th>Item to be checked</th><th>Detail</th></tr>
<tr><td>12</td><td>PLC CPU stop</td><td>Preventing error resets</td><td>Do not stop the PLC CPU after the ID interface module generates an error.</td><td>When the PLC CPU is stopped, the Y contact for the ID execution request turns off, and then the error is cleared.
If necessary, create a program that handles external signal latch, loads error information into file registers, etc.</td></tr>
<tr><td>13</td><td>PLC CPU stop</td><td>Preventing error corruption</td><td>The ID interface module does not abort the ID instruction when the PLC CPU status is changed from RUN to STOP during communication.</td><td>If the PLC CPU status is changed from RUN to STOP during communication, the communication will not be interrupted and the execution of the ID instruction that has been issued will be completed. (The data in the data carrier will be updated normally.) Any succeeding ID instructions will not be executed.</td></tr>
<tr><td>14</td><td>Running the PLC CPU again</td><td>Normal end of the program</td><td>If the PLC CPU status is changed from RUN to STOP, and then back to RUN, the ID interface module reissues the ID instruction.</td><td>The ID instruction will be executed again to revert to the Y contact status (ON) before the CPU was stopped.
Program terminates normally and obtains data correctly.</td></tr>
<tr><td>15</td><td>Abnormal operation</td><td>Preventing troubles arising from abnormal operation</td><td>Do not disconnect the reader writer during communication.</td><td>A communication error will occur and normal communication cannot be performed.
Stop the ID instruction and check the connector.</td></tr>
<tr><td>16</td><td>Wiring</td><td>Preventing system failure</td><td>Do not reverse the polarities of the 24V DC external power supply for the ID interface module.</td><td>The ID interface module will not function.</td></tr>
<tr><td>17</td><td>Power supply</td><td>Preventing voltage drop</td><td>Select the 24V DC external power supply for the ID interface module that can withstand the inrush current.</td><td>When 24V DC power is supplied to the ID interface module, inrush current may cause a voltage drop in the external power supply. Select a power supply that can prevent the malfunction of the PLC and the sensors due to voltage drop.</td></tr>
<tr><td>18</td><td>Spatial noise</td><td>Preventing malfunction</td><td colspan="2">Data carriers and reader writers should be installed away from each other according to the table below to prevent malfunction due to noise propagated through the air.
<table>
<tr><th>Noise source</th><th>Noise base frequency</th><th>D-2N422RW, D-2N422RWS, and all data carriers</th></tr>
<tr><td>Main circuit wiring (50/60Hz), Transformers</td><td>60Hz</td><td rowspan="2">At least 10cm</td></tr>
<tr><td>Cellular phones ＊1</td><td>800MHz, 1.5GHz</td></tr>
<tr><td>Switching power supplies</td><td>100 to 150kHz</td><td rowspan="5">At least 30cm</td></tr>
<tr><td>PC CRT monitors and EL displays</td><td>100 to 150kHz</td></tr>
<tr><td>Grounding (servomotors, including robots, and inverters)</td><td>2.7kHz, 9kHz, 14.5kHz</td></tr>
<tr><td>Servomotors, inverters, robots, and motors</td><td>2.7kHz, 9kHz, 14.5kHz</td></tr>
<tr><td>Arc from welding machines (50A)</td><td>———</td></tr>
<tr><td>Arc from magnet welding machines (above 50A)</td><td>450kHz</td><td rowspan="2">At least 300cm</td></tr>
<tr><td>High frequency furnaces, electric discharge machine</td><td>425kHz</td></tr>
</table>
＊1: Radio wave from PHS phones (1.9GHz) is too weak to affect the system.</td></tr>
</table>

7 - 11

7.4 Checking the LED Display Status

This section explains how to check the LED display status for various statuses of the ID interface module.
The LED display screen shown is of an AD35ID1.

●: On ○: Off ★: Flashing

	Module operation status	LED display status	Procedure
1)	The module entered the stand-by mode normally after power supply had been turned on		Under normal stand-by status, the RUN, DC24V and RDY LEDs turn on. The RDY LED turns off while the ID instruction is being executed. The DC24V and RUN LEDs stay on while communicating with the data carrier.
2)	External 24V DC power supply input error		Enter external 24V DC correctly.
3)	ID instruction is being executed		—
4)	Setting error		Check if the data carrier communication range exceeds 320 bytes (160 words). Check if the instruction codes and ID instruction execution request contacts are correct.
5)	Communication error		Reexamine the communication distance and moving speed of the data carrier. Check that the address and number of communication words have not exceeded the valid range when switching banks.

7 - 12

●: On ○: Off ★: Flashing

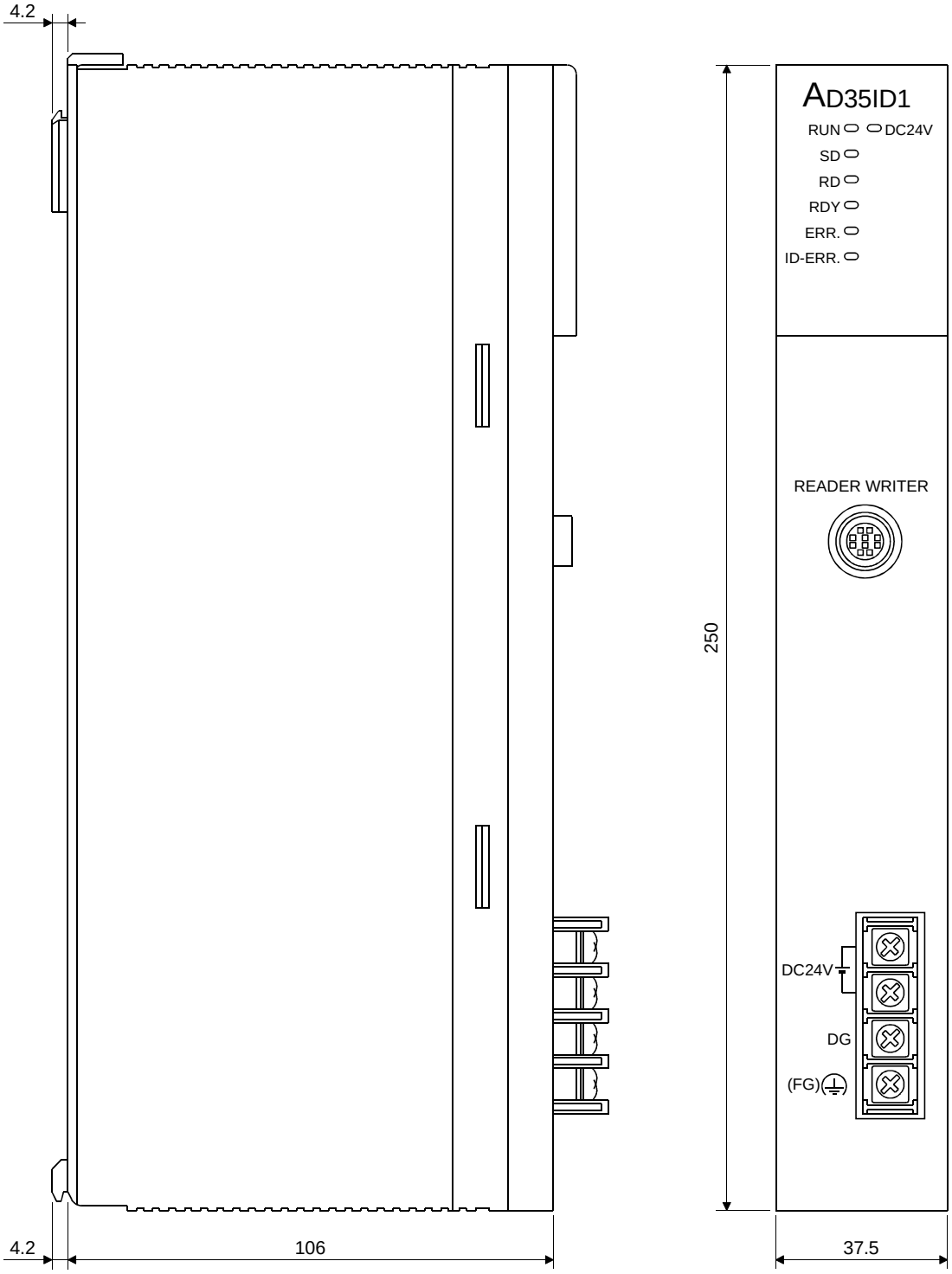
	Module operation status	LED display status	Procedure
6)	Setting the continuous instruction execution interval	1. Continuous instruction is being executed 2. Standing by (Waiting for timer) (The RDY LED flashes at an interval of approximately one second.) From state 3) RUN● ●24VDC SD○ RD○ RDY★ ERR.○ ID-ERR.○ Switch to state 3) if executing the Continuous instruction Switch to state 5) in case of abnormal completion	The state shown to the left will occur only when the continuous instruction execution interval is set and then the continuous instruction is executed.
7)	Received external noise	The RDY LED is lit. The RD LED flashes or is lit. RUN● ●24VDC SD○ RD★ RDY● ERR.○ ID-ERR.○	The reader writer is receiving external noise. Reexamine the installation environment of reader writer.

APPENDIX

Appendix 1 External Dimensions

Appendix 1.1 AD35ID1 and AD35ID2

The following figure shows the external dimensions of the AD35ID1. The AD35ID2 has the same external dimensions.



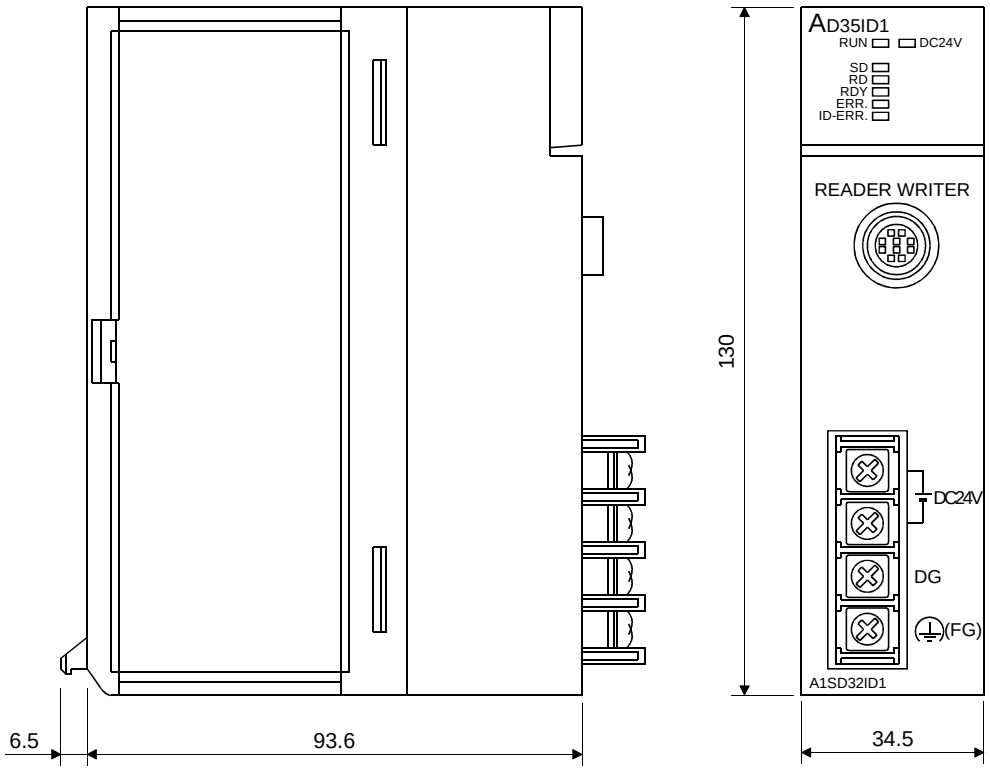
Unit: mm

App

App - 1

Appendix 1.2 A1SD35ID1 and A1SD35ID2

The following figure shows the external dimensions of the A1SD35ID1. The A1SD35ID2 has the same external dimensions.

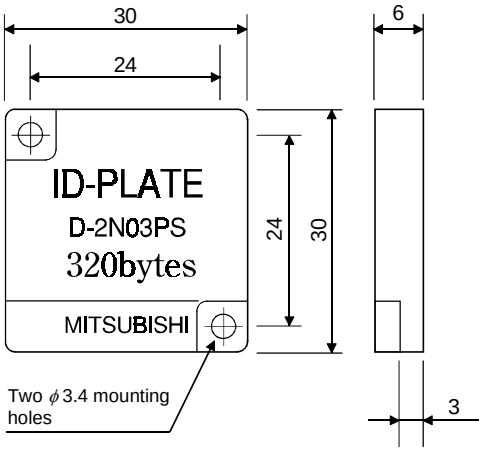


Unit: mm

App

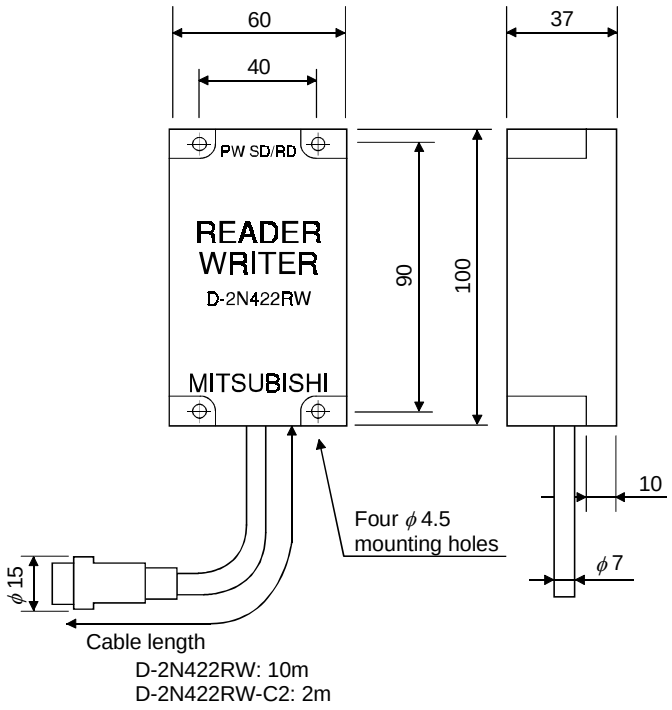
Appendix 1.3 D-2N03PS and D-2N03PM

The following figure shows the external dimensions of the D-2N03PS. The D-2N03PM has the same external dimensions.



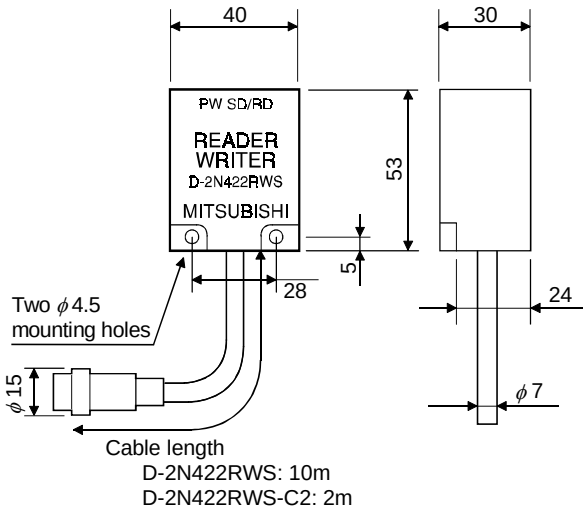
Unit: mm

Appendix 1.4 D-2N422RW (-C2)



Unit: mm

Appendix 1.5 D-2N422RWS (-C2)



Unit: mm

App - 3

WARRANTY

Please confirm the following product warranty details before starting use.

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the dealer or Mitsubishi Service Company. Note that if repairs are required at a site overseas, on a detached island or remote place, expenses to dispatch an engineer shall be charged for.

[Gratis Warranty Term]

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place.

Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

[Gratis Warranty Range]

(1) The range shall be limited to normal use within the usage state, usage methods and usage environment, etc., which follow the conditions and precautions, etc., given in the instruction manual, user's manual and caution labels on the product.

(2) Even within the gratis warranty term, repairs shall be charged for in the following cases.

1. Failure occurring from inappropriate storage or handling, carelessness or negligence by the user. Failure caused by the user's hardware or software design.
2. Failure caused by unapproved modifications, etc., to the product by the user.
3. When the Mitsubishi product is assembled into a user's device, Failure that could have been avoided if functions or structures, judged as necessary in the legal safety measures the user's device is subject to or as necessary by industry standards, had been provided.
4. Failure that could have been avoided if consumable parts (battery, backlight, fuse, etc.) designated in the instruction manual had been correctly serviced or replaced.
5. Failure caused by external irresistible forces such as fires or abnormal voltages, and Failure caused by force majeure such as earthquakes, lightning, wind and water damage.
6. Failure caused by reasons unpredictable by scientific technology standards at time of shipment from Mitsubishi.
7. Any other failure found not to be the responsibility of Mitsubishi or the user.

2. Onerous repair term after discontinuation of production

(1) Mitsubishi shall accept onerous product repairs for seven (7) years after production of the product is discontinued. Discontinuation of production shall be notified with Mitsubishi Technical Bulletins, etc.

(2) Product supply (including repair parts) is not possible after production is discontinued.

3. Overseas service

Overseas, repairs shall be accepted by Mitsubishi's local overseas FA Center. Note that the repair conditions at each FA Center may differ.

4. Exclusion of chance loss and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation to damages caused by any cause found not to be the responsibility of Mitsubishi, chance losses, lost profits incurred to the user by Failures of Mitsubishi products, damages and secondary damages caused from special reasons regardless of Mitsubishi's expectations, compensation for accidents, and compensation for damages to products other than Mitsubishi products and other duties.

5. Changes in product specifications

The specifications given in the catalogs, manuals or technical documents are subject to change without prior notice.

6. Product application

(1) In using the Mitsubishi MELSEC programmable logic controller, the usage conditions shall be that the application will not lead to a major accident even if any problem or fault should occur in the programmable logic controller device, and that backup and fail-safe functions are systematically provided outside of the device for any problem or fault.

(2) The Mitsubishi general-purpose programmable logic controller has been designed and manufactured for applications in general industries, etc. Thus, applications in which the public could be affected such as in nuclear power plants and other power plants operated by respective power companies, and applications in which a special quality assurance system is required, such as for Railway companies or National Defense purposes shall be excluded from the programmable logic controller applications.

Note that even with these applications, if the user approves that the application is to be limited and a special quality is not required, application shall be possible.

When considering use in aircraft, medical applications, railways, incineration and fuel devices, manned transport devices, equipment for recreation and amusement, and safety devices, in which human life or assets could be greatly affected and for which a particularly high reliability is required in terms of safety and control system, please consult with Mitsubishi and discuss the required specifications.

ID Interface Module
type AD35ID1, AD35ID2, A1SD35ID1,A1SD35ID2

User's Manual

MODEL	AD/A1SD35ID-U-S-E
MODEL CODE	13JR35
SH(NA)080147-A(0101)MEE	

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE : MITSUBISHI DENKI BLDG MARUNOUCHI TOKYO 100-8310 TELEX : J24532 CABLE MELCO TOKYO
NAGOYA WORKS : 1-14 , YADA-MINAMI 5 , HIGASHI-KU, NAGOYA , JAPAN