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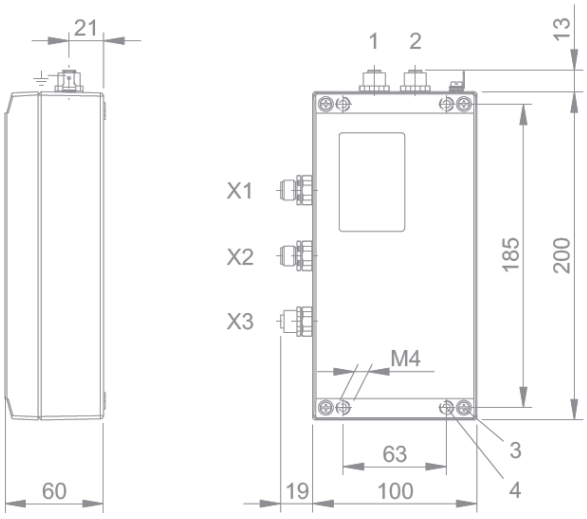
BIS M-699 CC-Link Processor

Technical Description, User's Guide

BISM



English

www.balluff.com

Safety instruction

Read this section thoroughly before using the device!

Before using the controller, read this manual carefully.
During installation and operation, pay close attention to the safety aspect.

Planning the System

Design the system to work safety if the processor should be damaged or the power unit malfunction.
Do not exceed the specifications for supply voltage, conditions for use, etc. as indicated in this manual.

Handling the System

Observe the rated voltage that is indicated in the specifications.
Misuse may cause excessive heat leading to possible to fire.
Take care when connecting the system, as incorrect wiring may cause unexpected malfunction of the machine.
Ensure the power is switched off during installation or maintenance operations.
Do not dismantle or modify the devices. This could cause malfunction or overheating.

[Contents]

<NOTE>
(1) The contents and the specification are subject to change without notice.
(2) If any mistakes or errors are found in this manual, please inform us.

1 User instructions

1.1 CE Declaration of Conformity and user safety

This product was developed and produced in compliance with applicable European standards and directives.

Declaration of Conformity
This product was developed and produced in compliance with applicable European standards and directives.

Note
You can request a Declaration of Conformity separately.
For additional safety instructions, refer to the "2 Safety" section on page 8

1.2 Scope of delivery

Included in the scope of delivery:
- BIS C-699 CC-Link Processor
- Cover cap for Head 2 and X3 CC-Link out
- BIS software CD
- Operating instructions in printed form (GER/ENG)

1.3 About this manual

This manual describes processors in the series BIS M-699 identification system as well as start-up instructions for immediate operation.
The present manual does not describe:
- Start-up, operation, and care of the "PC and PLC'',
- Installation and operation of accessories and expansion devices,

1.4 Structure of the manual

The manual is organized so that the sections build on each other.

Section 2: Basic safety information
Section 3: Key steps for installing the Identification System
Section 4: Introduction to the material
Section 5: Technical data for the processor
Section 6: Handling instructions and installing environment
Section 7: Functions
Section 8: Status Indication and user-defined settings
Section 9: Prior to programming
Section 10: Programming procedure to communicate with data carrier
Section 11: Trouble Shooting

1.5 Typographical conventions

Enumerations

Enumerations are shown as a list with en-dash.
- Entry 1,
- entry 2.

Actions

Action instructions are indicated by a preceding triangle.
The result of an action is indicated by an arrow.

► Action instruction 1.
  Action result.
► Action instruction 2.

Syntax

Numbers
- Decimal numbers are shown without additional indicators (e.g. 123),
- Hexadecimal numbers are shown with the additional indicator hex (e.g. 00_{hex}).

Parameters
Parameters are shown in italics (e.g. CRC_*16*).

Cross-references

Cross-references indicate where additional information on the topic can be found (see ‘‘5. Technical Data‘‘ section on page 21).

1.6 Symbols

Attention!
This symbol indicates a safety instruction that must be followed.

Note, tip
This symbol indicates general notes.

1.7 Abbreviations

BIS	Balluff Identification System
CRC	Cyclic Redundancy Check
EMC	Electromagnetic Compatibility
PC	Personal Computer
PLC	Programmable Logic Controller
RFID	Radio Frequency Identification

2 Safety

2.1 Abbreviations

The BIS M-699 processor is a component of the BIS M Identification System. Within the Identification System it is used to for connecting to a host computer (PLC, PC). It may be used only for this purpose in an industrial environment corresponding to Class A of the EMC Law.
This description is valid for processors in series BIS M-699

2.2 General safety notes

Installation and start up
Installation and start up are to be performed only by trained personnel. Any damage resulting from unauthorized manipulation or improper use voids the manufacturer's guarantee and warranty.
When connecting the processor to an external controller, observe proper selection and polarity of the connection as well as the power supply (see "6. Implementation and Installation" section on page 23).
The processor may be operated only using an approved power supply (see "5. Technical Data'' section on page 21)

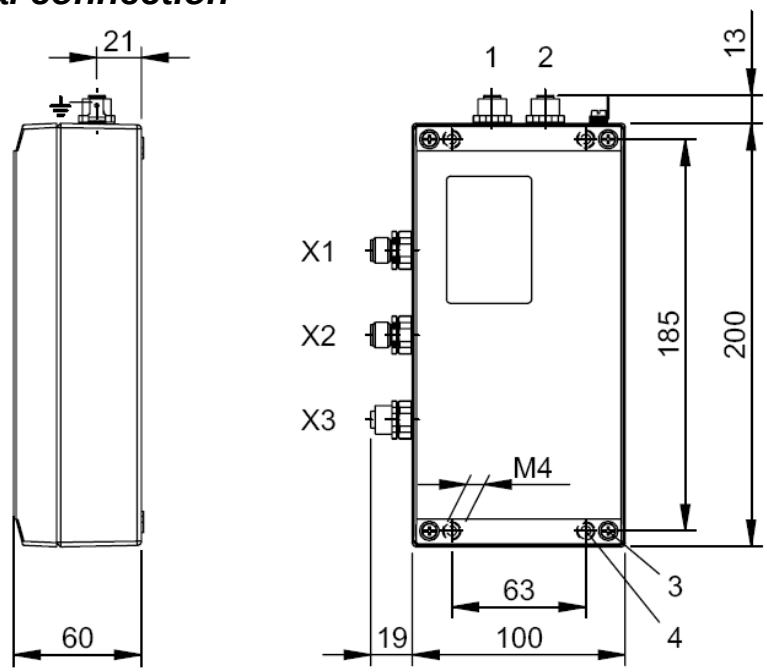
Operation and testing
The operator is responsible for ensuring that local safety regulations are observed.
When defects and non-clearable faults in the Identification System occur, take the system out of service and secure it against unauthorized use.

2.3 Meaning of the warning notes

Attention!
The pictogram together with the expression "Attention!‘‘ warns of a possible hazardous situation for the health of persons or of equipment damage. Disregard of these warning notes may result in injury or damage to equipment.
► Always observe the described measures for preventing this danger.

3 Getting Start

3.1 Mechanical connection

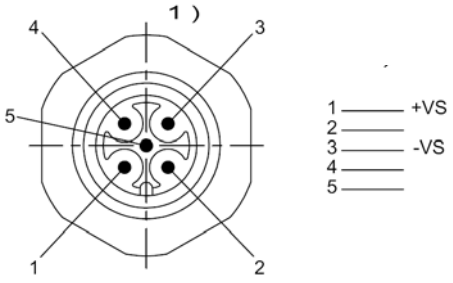


Mechanical connection (dimensions in mm)

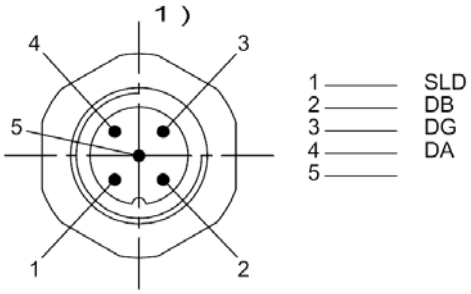
1 Connector head 2
2 Connector head 1
3 Tightening torque 0,8…1,2 Nm,
4 Tightening torque 7,8... 11,8 Nm,
► Attach processor using 4 M4 screws.

3.2 Electrical connection

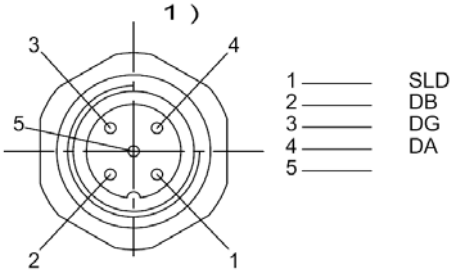
X1 Power - male 5 pol.



X2 CC-Link In - **male 5 pol.**



X3 CC-Link Out - female **5 pol.**



1) View towards connector

Attention!
Make the ground connection either directly or using an RC combination to ground.
When making your connection to the CC-Link, be sure that the shield is perfectly connected to the connector body.

3.2 Project administration

Project administration with Mitsubishi PLC Q CPU

Exemplarily used modules:

Balluff Identifications system: BIS M-699-052-050-03-ST11

Programming software: GX IEC Developer from Mitsubishi

Mitsubishi controller (PLC):

Base Unit	Q38B-E		
Power supply	Q61P		
CPU	Q03UDCPU	connected via USB interface to PC	
CC-Link System Master	QJ61BT11N	slot 0	mandatory
Input Module	QX80-TS	slot 1	optional
Output Module	QY80-TS	slot 2	optional

For this example used hardware settings and wiring:
Settings according to “8. Indications and Settings” page 39 and
wiring according “6.3 Interface information/ Wiring diagrams” to page 24

CC-Link System Master Module:

Station number 0	look at user manual Mitsubishi System Master System
Baud rate	10 Mbps

BIS M 699

Station number 1	Switch 1 ON (STATION No)
Baud rate 10 Mbps	Switch 4 ON (B RATE)
Mode 2 heads activ	RYn2 OFF

Step by step

Step 1:

Power On

Status LED of BIS M 699:
PW --> ON
RUN --> ON
L-RUN --> ON
SD --> ON
RD --> ON

Step 2:

Open customer project.

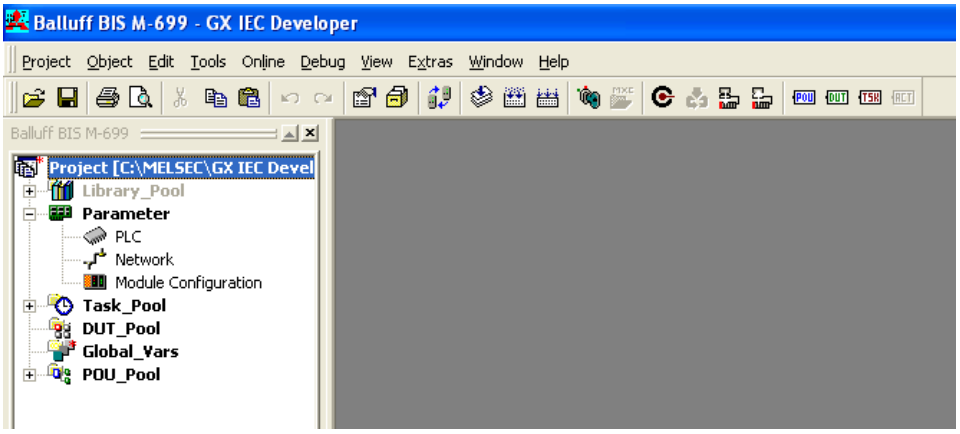


Figure 1: Project

Step 3:

Read PLC data

Set the PLC structure at the folder I/O assignment.

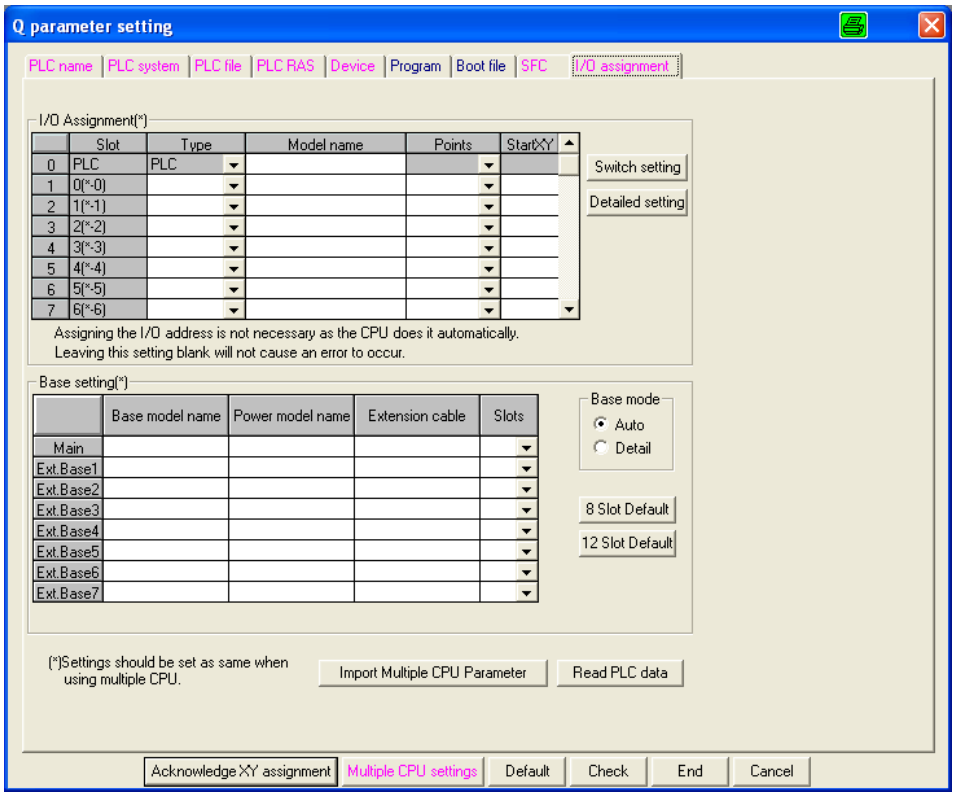


Figure 2: PLC parameter

Press the button "Read PLC data" to read out the assignment.

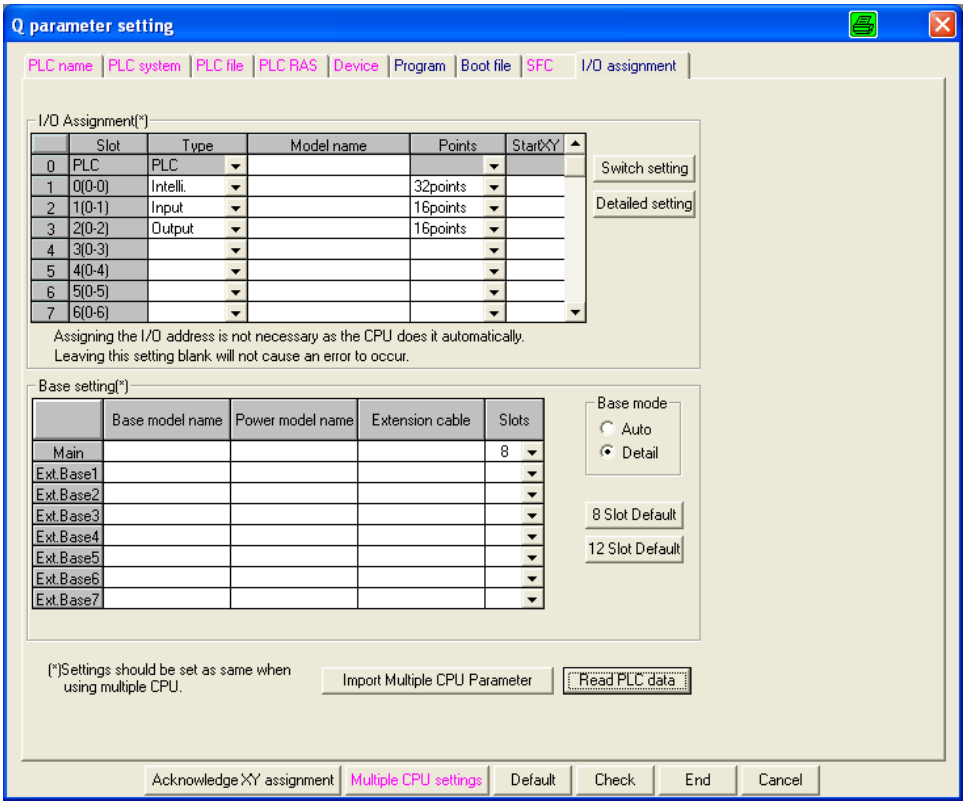


Figure 3: I/O assignment

Press the button "Check" and "End" to store the settings.
To verify the settings press „Acknowledge XY assignment“.

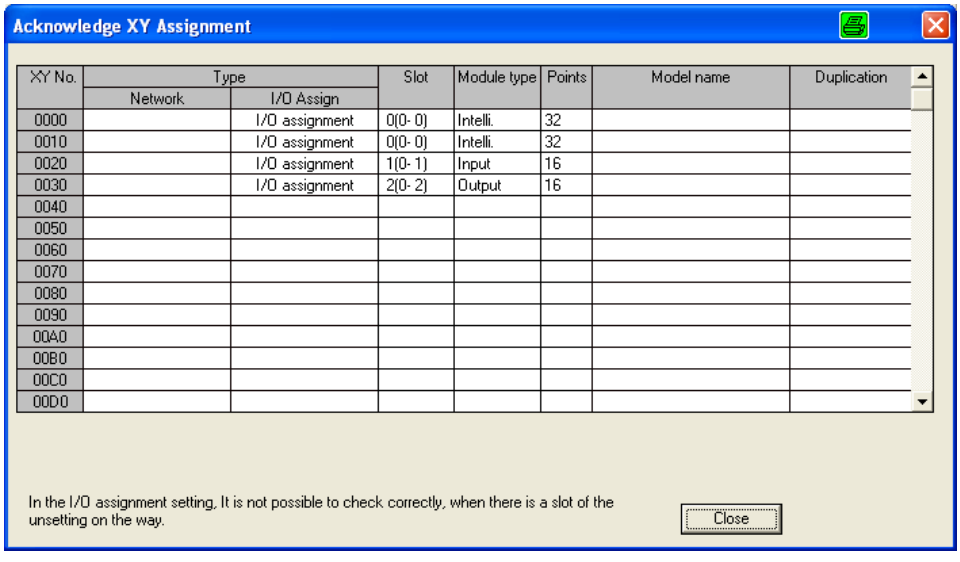


Figure 4: I/O assignment

Step 4:

CC-Link Network

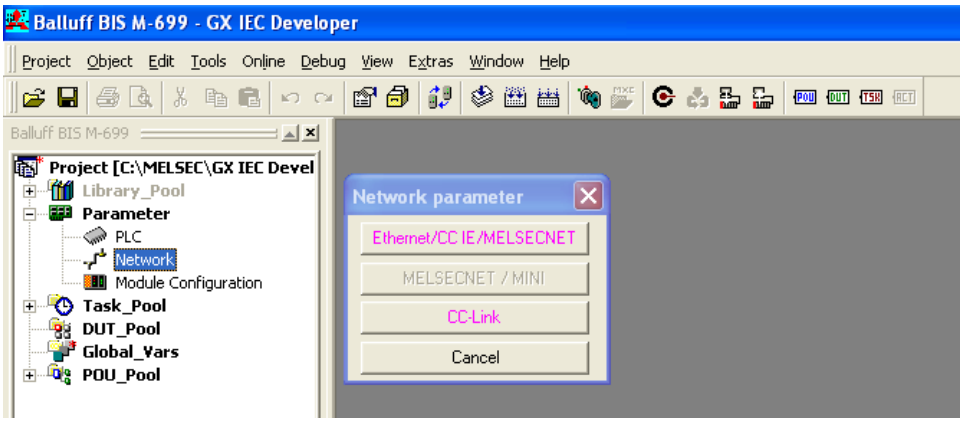


Figure 5: Network parameter

Press the button "CC-Link" to open network parameter setting.

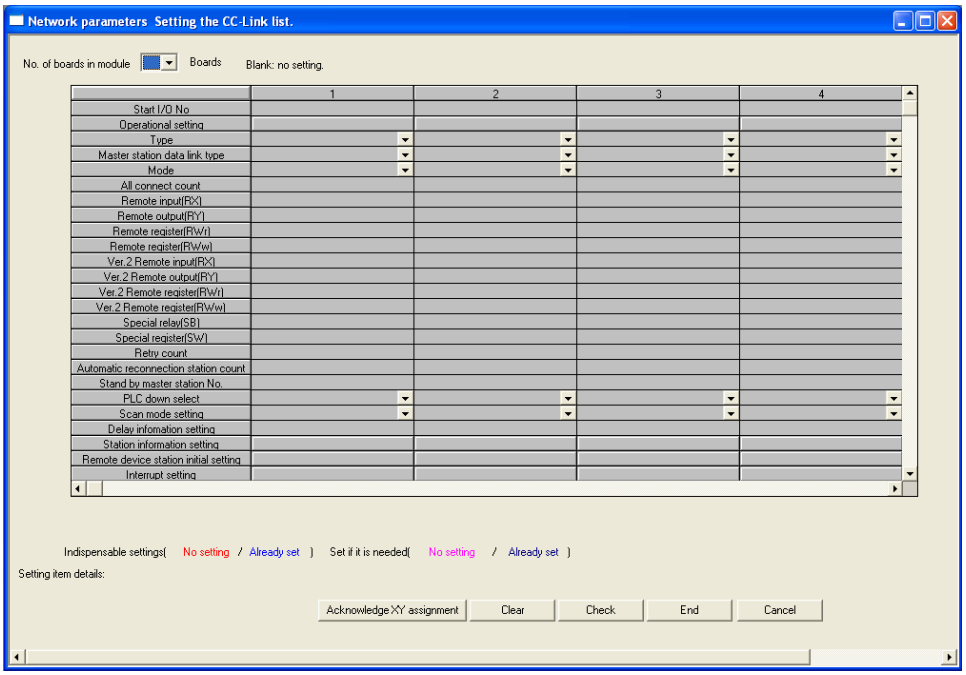


Figure 6: Network setting

In the table is to see the network settings for the example:

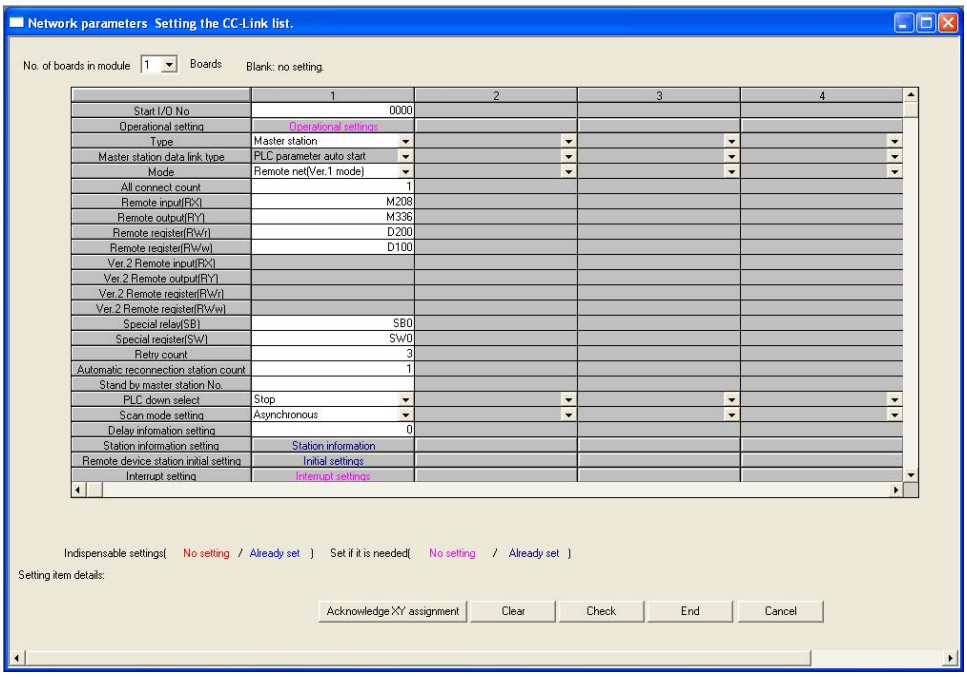


Figure 7: CC-Link settings

For more details see “10.6 Initial setting“.

No. of boards in module	1 board
Start I/O No.	0000
Type	Master-Station
Mode	Remote Net (Ver. 1 Mode)
All connect count	1
Remote input RX	M208
Remote output RY	M336
Remote Register (RWr)	D200
Remote Register (RWw)	D100
Special relay (SB)	SB0
Special Register (SW)	SW0
Retry count	3
Automatic reconnection station count	1
Delay information setting	0

Station information setting:

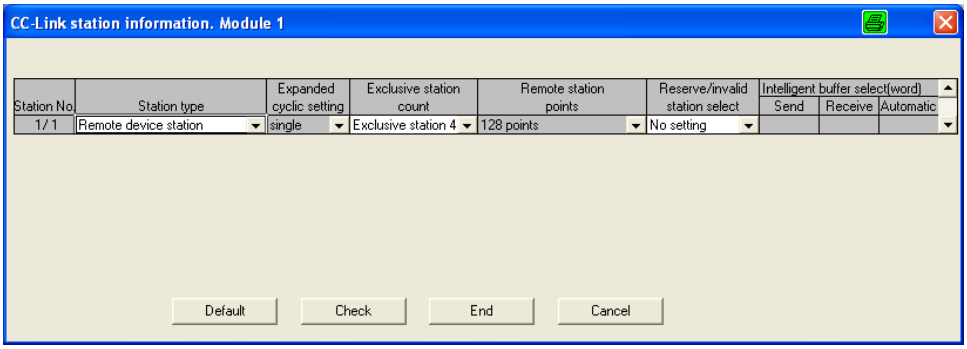


Figure 8: Station information setting

Station type	Remote device station
Exclusive station count	Exclusive station 4

Remote device station initial setting:

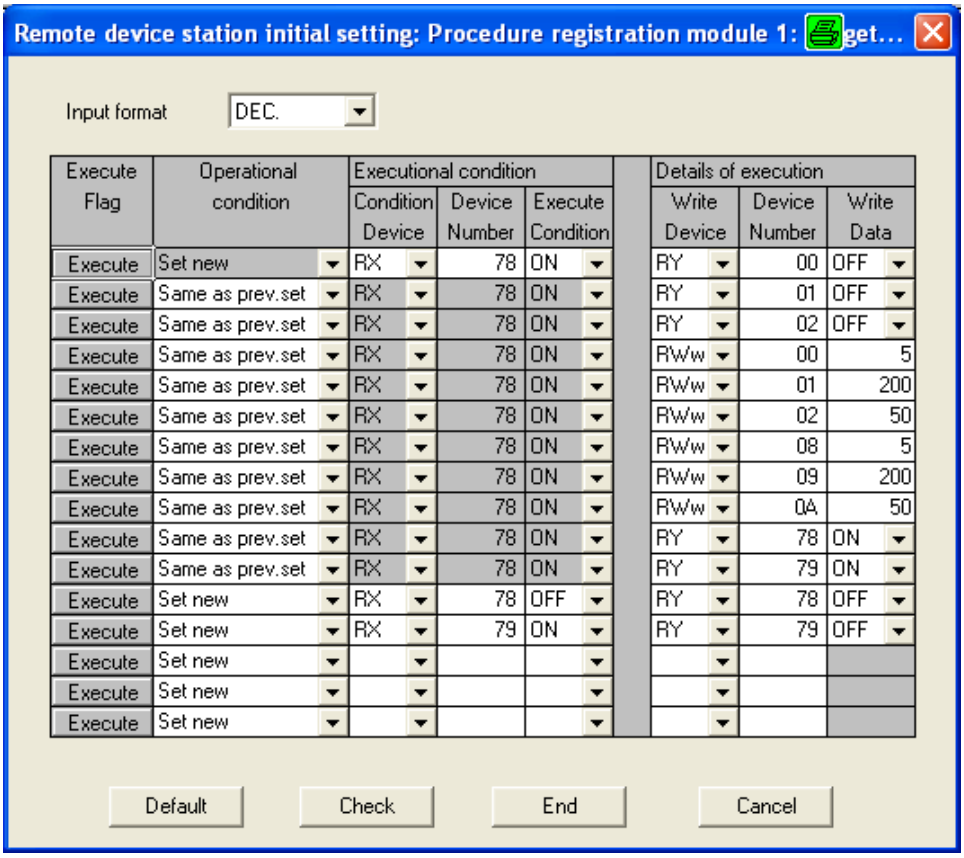


Figure 9: Initial setting

These settings will be executed during the PLC boot up to initialise the BIS M-699.
For more details see “10.6 Initial setting”.

Step 5:

Initialise ladder

This ladder is needed to start the communication with BIS M-699 and to activate the R/W head.

For more details see *"*7.2.2 Input-Output Signal details*", "*7.3.1 Remote Resistor list*", "*7.3.2 Remote Resistor details*"* *and "*10.6 Initial setting*".*

Example generated in POU "MAIN_PRG_LD".

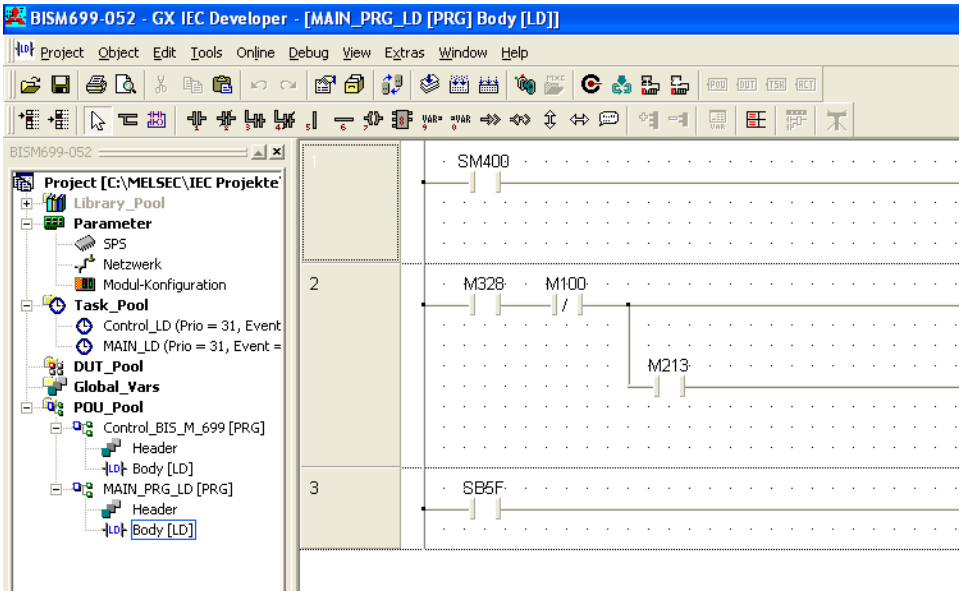


Figure 10: POU_Pool

Ladder structure:

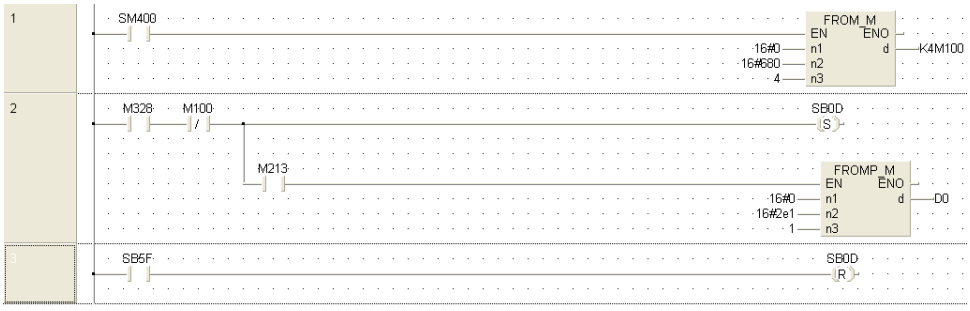


Figure 11: Init ladder

Step 6:

Save project

Compile project (Menu --> Project -->"rebuilt all")

Transfer project to CPU

CPU RESET

CPU RUN

LED state information of CPU:

MODE	green/ON
RUN	green/ON

LED state of CC-Link System Master Module

RUN	green/ON
L_RUN	green/ON
MST	green/ON
SD	green/ON

LED state of BIS M-699

RUN	red/ON
L_RUN	red/ON
MST	red/ON
SD	red/ON
RD	red/ON

Head1:

IN-Z	red/ON	if data carrier in field.

Head2:

IN-Z	red/ON	if data carrier in field.

Read-/Write function

see manual

4 Basic Knowledge

4.1 Function principle of Identification Systems

The BIS M Identification System is classified as a non-contacting system with read and write function. This makes it possible to not only transport information which is fixed programmed in the data carrier, but also to collect and pass on current information.

The main components of the BIS M Identification System are:
- Processor,
- Read/write heads,
- Data carriers.

The main areas of application are:
- In production for controlling material flow (e.g. in model-specific processes), in work piece transport with conveying systems, for acquiring safety-relevant data,
- In warehousing for monitoring material movement,
- Transporting and conveying.

4.2 Product description

Processor BIS M-699:
is connected to CC-Link as a remote device station and communicates with sequencer CPU of master/ local station.
- Metal housing,
- Supply voltage X1 and CC-Link connections X2 / X3 with M12 connectors,
- Two read/write heads can be connected,
- Read/write heads are suitable for dynamic and static operation,
- Power for the system components provided by the processor,
- Power for the data carrier provided by the read/write heads via carrier signal.

Arrangement of the read/write heads:
Which arrangement of the read/write heads makes the most sense depends essentially on the possible spatial arrangement of the components. There are no functional restrictions. Distance and relative speed depend on the characteristics of the data carriers used.

Note
If two read/write heads are connected to the BIS M-699 processor, both can be operated independently of each other:
One data carrier can be read at the first read/write head, while a different data carrier can be written to at the second read/write head.

4.3 Control function

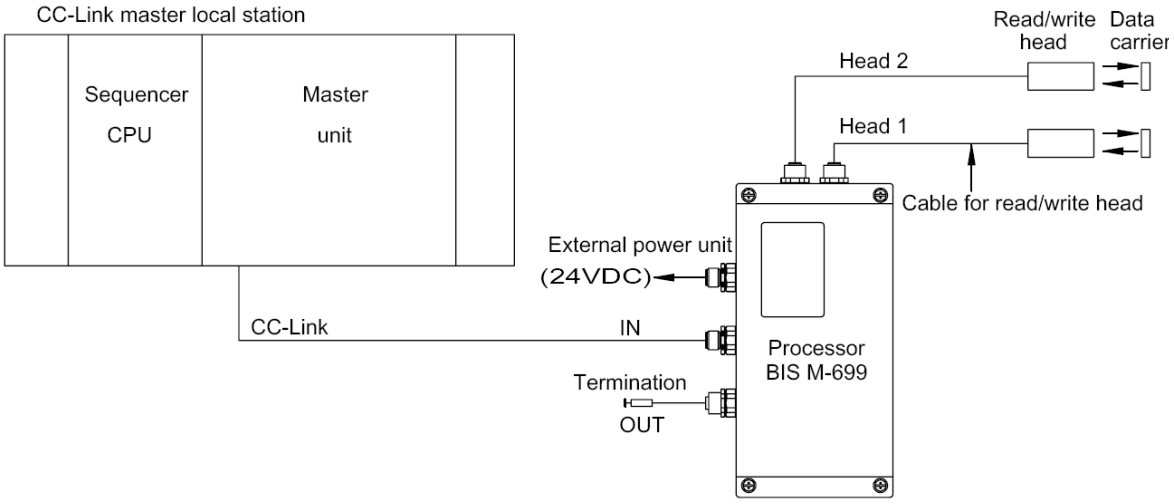
The processor is the link between data carrier and controlling system. It manages two-way data transfer between data carrier and read/write head and provides buffer storage.
The processor uses the read/write head to write data from the controlling system to the data carrier or reads the data from the carrier and makes it available to the controlling system.

Host systems may be the following:
- A control computer (e.g. industrial PC),
- A PLC.

4.4 Bus connection

Processor and controlling system are connected via CC-Link.
The CC-Link (decentralized peripheral) is tailored to communication between a controller and decentralized field devices.

4.5 System configuration



Function of each Component

Component	Function
Data carrier	A data medium that stores and retains information (data).
Read/write head	It reads and writes data carrier information/data without physical contact as well as supplies power for data carrier.
Processor	When it receives instructions from sequencer CPU, it executes reading or writing data to or from data carrier. It can be connected 1 or 2 read/write head(s).
CC-Link Master/Local Station	A sequencer CPU unit which instructs for CC-link and a master unit station which controls CC-Link system.

Note for System construction

The occupied stations of Processor BIS M-699 are 4 stations, therefore, plural processors can be connected to a master unit within the allowable number of station.

Please decide the number of processors to be connected to the master unit in considering the following points.

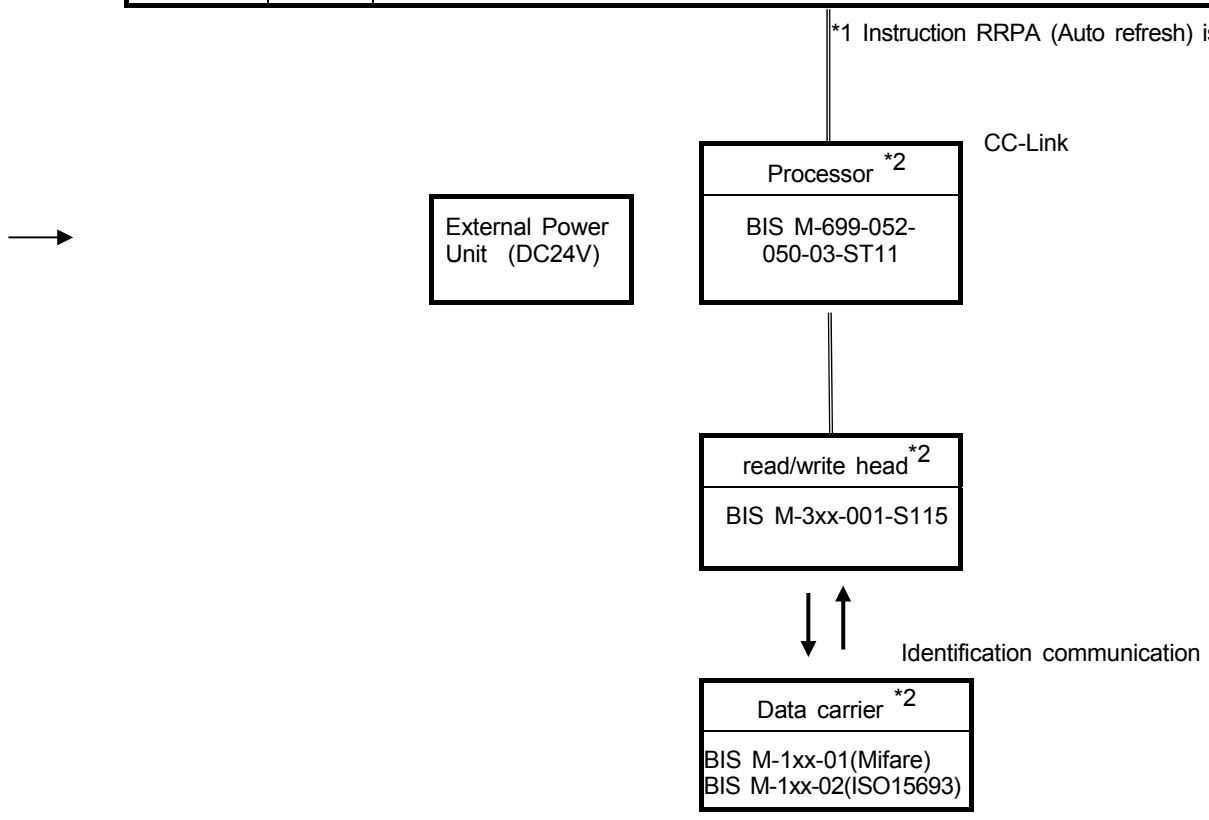
(1) Maximum number of connectable stations for master unit is 16. (occupied 4 stations)
(2) The number of occupied station of the units (input/output card etc.) except processors, and Input/Output occupied numbers.
(3) Processing time as well as influence to tact time in programming (ladder).

4.6 Construction of the Components and applicable units

The construction of components of CC-Link system that can be used by the processor BIS M-699 and applicable
Units are indicated by the following.
The Processor cannot be connected to other units.

CC-Link master / Local station (Sequencer CPU unit)			
Sequencer CPU unit	Type number	ACPU	A1SHCPU / A1SJHCPU / A2SHCPU A2UCPU / A2UCPU-S1/ A3UCPU/ A4UCPU (After software version Q. For after version K, refer to *1) A2USCPU / A2USCPU-S1 (After software version E. For after version A, refer to *1) A2USHCPU-S1 (After software version L. For after version G, refer to *1)
		QnACPU	Q02CPU / Q2ACPU-S1 / Q3ACPU / Q4ACPU / Q2ASCPU, Q2ASCPU-S1 / Q2ASHCPU / Q2ASHCPU-S1 (After function version B)
		QCPU(A mode)	Q02CPU-A / Q02HCPU-A / Q06HCPU-A
		QCPU(Q mode)	Q02CPU / Q02HCPU-A / Q06HCPU / Q12HCPU / Q25HCPU
Master unit	Type Number	AJ61BT11/ A1SJ61BT11/ AJ61QBT11/ A1SJ61QBT11 (After 9707B is indicated in DATE) QJ61BT11	

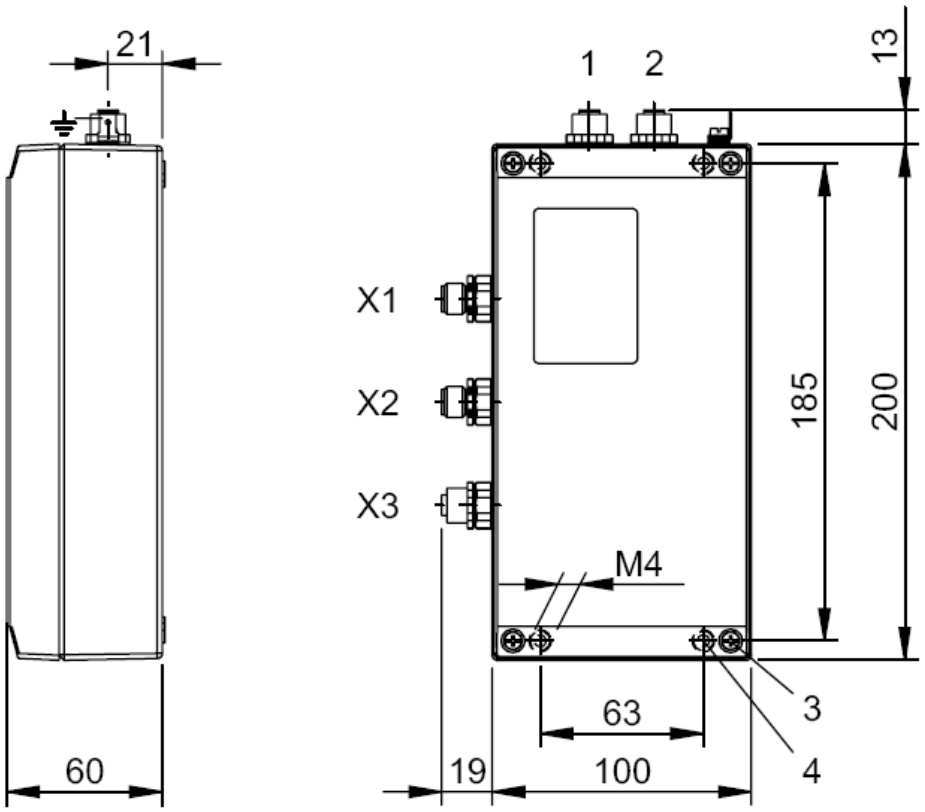
*1 Instruction RRPA (Auto refresh) is only available



*2 ISO15693-compliant data carrier can be used if lot number of the ID controller is 0814JP or later and software of R/W head is newer than V2.0.
(To check the lot number or the version, please see a label attached to a unit)

5. Technical Data

5.1 Dimension



1 Connector head 2
2 Connector head 1
3 Tightening torque 0,8…1,2 Nm,
4 Tightening torque 7,8... 11,8 Nm,

5.2 Mechanical Data

Housing material	GD-Al
X1 – POWER	5 pin, male, M12, a-coded
X2 – CC-Link In	5 pin, male, M12, a-coded
X3 – CC-Link Out	5 pin, female, M12, a-coded
Head 1, 2 (read/write head connections)	8 pin, female, M12, a-coded
Enclosure rating	IP65 (with connectors)
Weight	1150 g
Mounting screw for unit	4 x M4 x 25 mm – 8.8-A2B D912 (Tightening torque :7,8...11,8Nm)

5.3 Electrical Data

Supply voltage VS	24 V DC ±10 % LPS / Class 2 supplied only
Ripple	≤ 10 %
Current draw	≤ 800 mA
Device interface	CC-Link

5.4 Operating Conditions

Ambient temperature range	0 °C…+55 °C
Storage temperature	-20 °C...+75 °C
EMC	
– EN 61000-4-2/3/4/5/6	– Schärfegrad 2A/2A/3B/2B/XA
– EN 55016-2-3	– class A
Vibration/ Shock	EN 60068 Part 2-6/27/29/64/32
Operating atmosphere	Without corrosive gas, heavy dust

5.5 Function Indicators

BIS operating states for Head 1 and 2	SD	head is sending data	LED red
	RD	head is receiving data	LED red
	ID-ERR.	error	LED red
	IN-Z	data carrier is in zone	LED red
CC-Link status	PW	power on	LED red
	RUN	operating normally	LED red
	L RUN	communicating normally	LED red
	SD	sending data to CC-Link	LED red
	RD	receiving data from CC-Link	LED red
	L-ERR.	Communicating data error	LED red

Note
For detailed description see "8. Indications and Settings" on page 39.

5.6 Performance specification

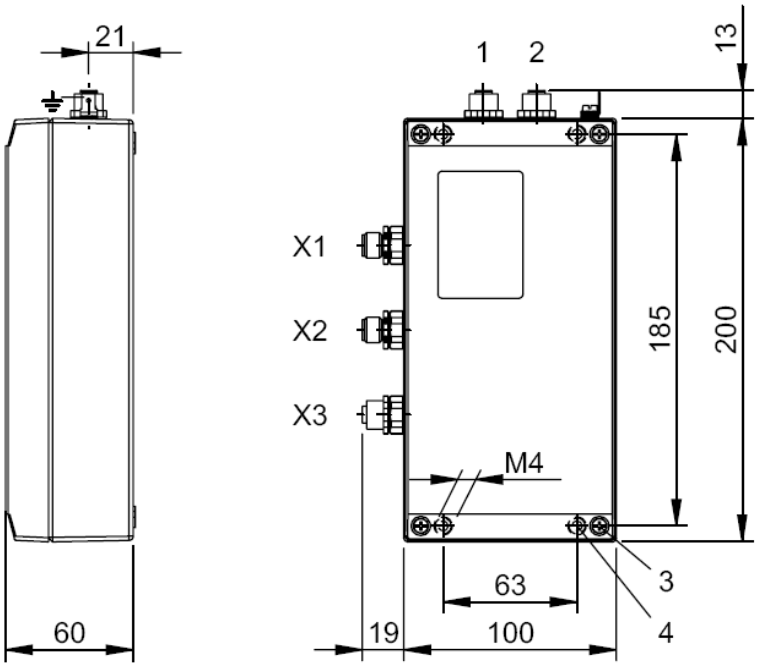
Applicable data carrier	BIS M-1xx-01/x	BIS M-1xx-02/x
Memory Data retention period	752 bytes(EEPROM) 10 years	2000 bytes(FRAM) 10 years
Connectable read/write head	BIS M-3xx-001-S115	
ID antenna cable length	50m (Max.)	
Number of connectable r/w head	2	
Number of read/write heads	Using only Head1	Using Head1, Head2
Number of RWr／RWw	16 words	8 words per each head (total 16)
Communicating data		
Communicating address range (word address)	0...999	0...999
Data amount per 1 communication with master unit	1...12 words	1...5 words
Data amount per 1 communication with head and data carrier	1...1000 words	1...1000 words
CC-Link version	Ver. 1.10	
Sort of CC-Link station	Remote device station	
Occupied station	4 stations (RX/RY each 128, RWr / RWw each 16)	

Note
Read/write command can be available up to 1000 words (3E8H)
When larger command than memory capacity is given to data carrier of 752 bytes (376 words), ID processor will accept and execute it. In that case, read/write function is normally executed within the range of memory, but it shows "data carrier communication error" when you access the address outside of the range.
For example, "data carrier communication error" is displayed after writing up to 376 words when the command "write to BIS M-1xx-01 (Mifare 376 words) from 0 to 1000 words" is executed.

6. Implementation and Installation

6.1 Attaching

Note:
1) Connector head 2
2) Connector Head 1



► Attach processor using with 4 M4 screws.

When installing processor (BIS M-699), pay close attention to the following points.

(1) Tightening torque for unit and casing cover

Place to screw	Tightening torque
4) screws for unit (M4)	7,8...11,8 Nm
3) casing cover mounting screws	…0,8…1,2 Nm

6.2 Positioning

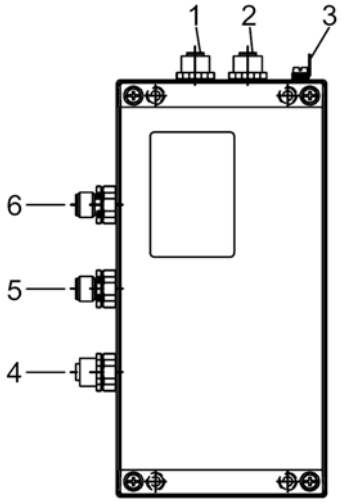
Please install processor BIS M-699 avoiding situations where.

a. Operating temperature exceeds the range of 0...55 degrees C.
b. Dew condensation caused by severe temperature change.
c. Relative humidity exceeds 5...95%
d. Processor is exposed to heavy corrosive gas, combustible gas or dust.
e. Shock or vibration directly to processor.
f. Water, oil or chemical is sprayed on the processor.

This Processor is conformed to EMC directive and acquired CE marking.
Same as Melsec PLC, the test has been carried out where processor had been installed in the control board.

<Attentions>
When installing the processor in a panel, please pay close attention to the following points.
*Keep adequate ventilation space around the processor.
*Processor should be kept apart from radiate heating machine (heater, trance, resistor etc.).
*Installing a fan or cooler is recommended in the case of temperature is higher than 55 degrees C.

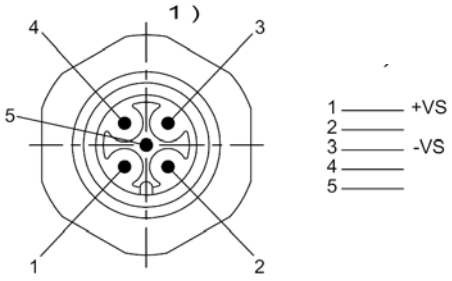
6.3 Interface information/ Wiring diagrams



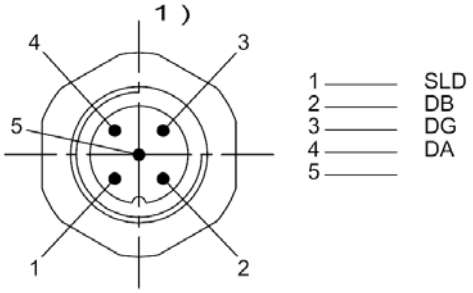
Connections

1 Head 2 – Read/ write head 2
2 Head 1 – Read/ write head 1
3 Function ground PE
4 X3 – CC-Link Out
5 X2 – CC-Link In
6 X1 – Supply voltage

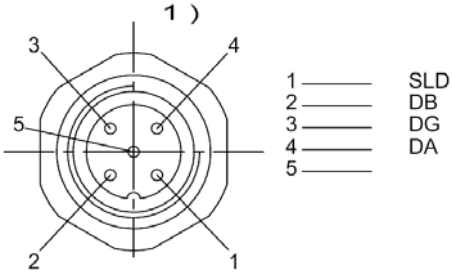
X1 Power - male 5 pol.



X2 CC-Link In - **male 5 pol.**



X3 CC-Link Out - f**emale 5 pol.**



1) View towards connector

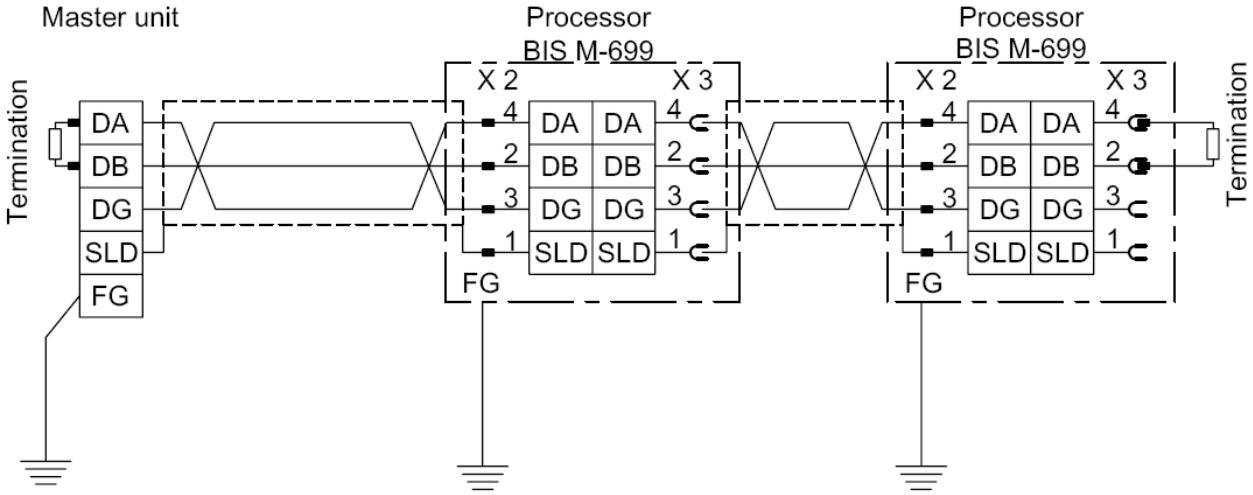
Attention!
Make the ground connection either directly or using an RC combination to ground.
When making your connection to the CC-Link, be sure that the shield is perfectly connected to the connector body.
When making your function ground, be sure that ‘‘Function ground PE’’ is perfectly connected to the function ground of whole system installation.

6.3.1 Cable for CC-Link

Use exclusive cable for CC-Link system because the efficiency of CC-Link system is not warranted in applications with any other cable.
Refer to brochure CC-Link regarding the specification of cable for CC-Link and inquiry.

6.3.2 Wiring to Each Unit

(1) Wiring Master Unit and Processor Unit
Refer to following wiring diagram for wiring master unit and Processor unit with cable for CC-Link.



<Attention>
"Termination resistor" should be connected between DA-DB on both units at the end of CC-Link.
In connecting termination resistor with DA-DB, use the termination resistor attached to master unit.
(Refer to the user's manual for CC-Link system master and local unit.)

(2) Wiring of External Power Unit and Frame Gland

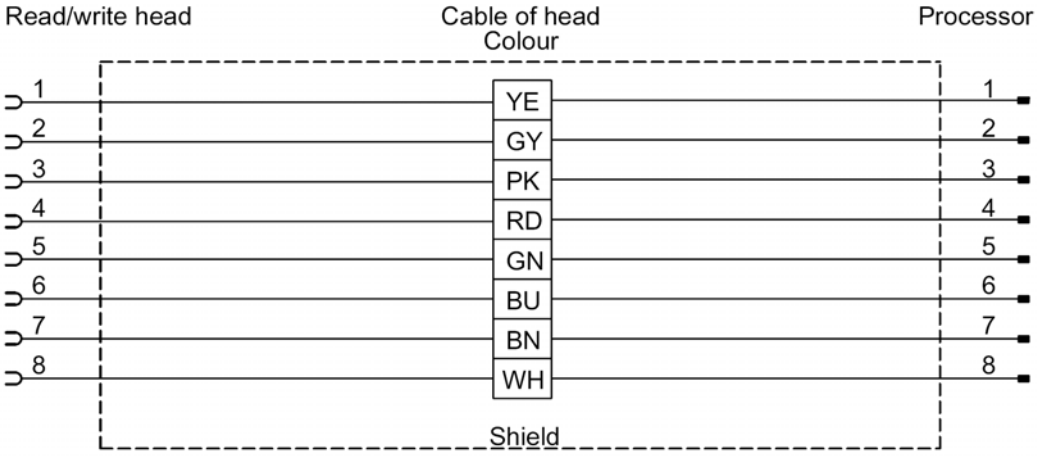
Refer to the above wiring diagram to connect external power unit (24V DC) and frame ground.
Connect [+] side of 24V DC power unit to the terminal indicated [+], and [-] side to [-].
Connect frame ground to [FG] terminal.

(3) Wiring of Read/write head

Reference the following diagram, when wiring the read/write head cable to the processor. There are two connectors Head1 and Head2 for connecting two heads.

[Wiring diagram]

Wiring of connector cable for read/write head
Connector cable: BIS-Z-501-PU1-_ _/E (enclosed BKS-S117-00)
BIS-Z-502-PU1-_ _/E (enclosed BKS-S117-00)



Appropriate connector
BKS-S117-00

<Attention>
Cable of read/write head should be kept apart from other power cable and high voltage machines.
When installing read/write heads on a metal frame, the frame should be grounded to the protective ground conductor.

7. Function

7.1 Function list

The following functions can be performed with the processor (BIS M-699).

Functions	Instructions & Commands	Instruction cod		Process	Reference
		ASCII	Hex.		
Reading	Reading	RD CR	4452H 5243H	Reads data from data carrier. Compares data to confirmation.	10.7.1
	Sequential Reading	AR SR	5241H 5253H	Executes reading in sequence until data carrier gets into communication area, and then executes reading. After that, compares data to check.	10.7.2
Writing	Writing	WD CW	4457H 5743H	Writes data to data carrier. Compares data to check.	10.8.1
	Sequential Writing	AW SW	5741H 5753H	Executes writing in sequence until data carrier gets into communication area, and then executes writing. After that, compares data to check.	10.8.2
	Batch writing	FI	4946H	Writes specified data to specified area in data carrier simultaneously.	10.8.3
Check	Comparing	CM	4D43H	Compares data of processor with data in data carrier.	10.9
Clearance	Clearing	CL	4C43H	Clears specified area in data carrier with "0"	10.10
Command	Stop Sequence instruction			Cancels sequence instruction compulsively.	10.11
	Error cancellation			Executes error canceling process. (Clearing error LED, resetting error detected signal, Clearing executing result store area in remote resister)	10.12

7.1.1 Outline of functions

Description of the functions of processor (BIS M-699) is explained in this chapter and for more details, please refer to "10. Communication Procedure with data carrier".

(1) Reading
Reads data in data carrier.
<Reading Instruction (RD,CR)>
Reads data in data carrier
<Sequence Reading Instruction (AR,SR)>
Reads data in data carrier after waiting for the data carrier to get into communication area of read/writeh ead.

(2) Writing
Writes data to data carrier.
<Writing Instruction (WD,CW)>
Writes data to data carrier.
<Sequence Writing Instruction (AW,SW)>
Reads data in the data carrier after waiting for data carrier to get into communication area of read/write head.
<Batch Writing Instruction (FI)>
Writes specified 1-word data from specified address to specified area simultaneously.

(3) Check<Comparing (CM)>
Compares data in a processor with read data in data carrier.

(4) Clearance <Clearing (CL)>
Can make the data to "0" of specified area from specified address.

(5) Sequence Instruction Cancellation
Cancels sequence instruction (AR,SR,AW,SW) compulsively while instruction is executing.

(6) Error Cancellation
Cancels error condition after an error has occurred.

7.2 I/O Signals for Master Unit

Input-output signal (RX, RY) to the master unit of processor (BIS M-699) is explained in this chapter. Device [RX] is the input signal from the processor to the master unit and Device [RY] is the output signal from the master unit to the processor.

7.2.1 Input-Output Signal list

Input-output signals of processor (BIS M-699) are indicated in the following table.

<table>
<tr><td colspan="3">Signal direction : from processor to master unit</td><td colspan="3">Signal direction : from master unit to processor</td></tr>
<tr><td colspan="2">Device No. (input)
Head1 | Head2</td><td rowspan="2">Signals</td><td colspan="2">Device No. (output)
Head1 | Head2</td><td rowspan="2">Signals</td></tr>
<tr><td>RXn0</td><td>RXn8</td><td>———</td><td colspan="2">RYn0</td><td>Selecting initial setting</td></tr>
<tr><td>RXn1</td><td>RXn9</td><td>Comparing result signal</td><td colspan="2">RYn1</td><td>Selecting processing unit</td></tr>
<tr><td>RXn2</td><td>RXnA</td><td>In zone</td><td colspan="2">RYn2</td><td>Selecting number of head</td></tr>
<tr><td>RXn3</td><td>RXnB</td><td>ID-BUSY</td><td>RYn3</td><td>RYnB</td><td>———</td></tr>
<tr><td>RXn4</td><td>RXnC</td><td>Identification instruction completed</td><td>RYn4</td><td>RYnC</td><td>Require executing identification instruction</td></tr>
<tr><td>RXn5</td><td>RXnD</td><td>Error detection</td><td>RYn5</td><td>RYnD</td><td>Unused</td></tr>
<tr><td>RXn6</td><td>RXnE</td><td>Unused</td><td>RYn6</td><td>RYnE</td><td>Unused</td></tr>
<tr><td>RXn7</td><td>RXnF</td><td>Require divided data</td><td>RYn7</td><td>RYnF</td><td>Divided data completed</td></tr>
<tr><td rowspan="2">RX(n+1)0
...
RX(n+3)F</td><td rowspan="2">RX(n+4)0
...
RX(n+6)F</td><td rowspan="2">Unused</td><td colspan="2">RYn8...RYnA</td><td>Unavailable</td></tr>
<tr><td>RY(n+1)0
...
RY(n+3)F</td><td>RY(n+4)0
...
RY(n+6)F</td><td>Unused</td></tr>
<tr><td colspan="2">RX(n+7)0...RX(n+7)7</td><td>Unavailable</td><td colspan="2">RY(n+7)0...RY(n+7)7</td><td>Unavailable</td></tr>
<tr><td colspan="2">RX(n+7)8</td><td>Flag for requiring to process initial data</td><td colspan="2">RY(n+7)8</td><td>Flag for finishing to process initial data</td></tr>
<tr><td colspan="2">RX(n+7)9</td><td>Flag for finishing to set initial data</td><td colspan="2">RY(n+7)9</td><td>Flag for requiring to set initial data</td></tr>
<tr><td colspan="2">RX(n+7)A</td><td>Unavailable</td><td colspan="2" rowspan="3">RY(n+7)A...RY(n+7)F</td><td rowspan="3">Unavailable</td></tr>
<tr><td colspan="2">RX(n+7)B</td><td>Remote READY</td></tr>
<tr><td colspan="2">RX(n+7)C...RX(n+7)F</td><td>Unavailable</td></tr>
</table>

n : Address that was allocated to the master station with setting station number.

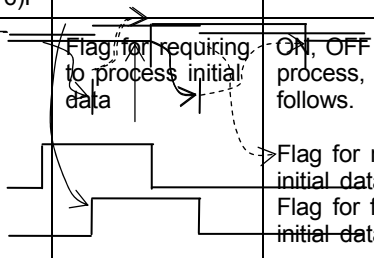
<Attention>
The devices that indicated as "Unavailable" should not be used by user as they are used in the system.
If any "Unavailable" device is used by the user, normal operation would not be warranted.

7.2.2 Input-Output Signal details

Details of Input-Output signals of processor (BIS M-699) are indicated in the following table.

(1) Remote Input (RX)

Device No. Head1	Head2	Signals	Contents
RXn1	RXn9	Comparing result signal	ON when comparing result is in agreement after reading, writing or comparing (CR,SR,CW,SW,CM). It will be cleared with resetting of RYn4,RYnC, latch the other setting with SET instruction when the comparing result is needed to retain.
RXn2	RXnA	In zone	ON while inzone has been detected in executing sequence instruction (AR,SR,AW,SW).
RXn3	RXnB	ID-BUSY	ON when instruction is executing, and OFF when the instruction is finished executing.
RXn4	RXnC	Finish identification instruction	ON after instruction is executed, and finished executing instruction normally. It remains OFF when executing instruction is stopped with sequence instruction cancellation while executing sequence instruction (AR,SR,AW,SW). When error is occurred, it won't be ON and error detection signal (Xn5,XnD) will be ON. Require executing Identification instruction or special instruction ID-BUSY Finish identification instruction
RXn5	RXnD	Error detection	OFF when require executing identification instruction (RYn4,RYnC) is OFF. Error cancel instruction Require executing identification instruction or special instruction Error detection Executing error cancel Error occur Executing error cancel
RXn6	RXnE	Unused	Unused
RXn7	RXnF	Require divided data	ON flag for requiring divided data to require next data when treating data exceeds certain quantity (using 1 head : 12 words, 2 heads : 5 words). Executes reading or writing when require divided data flag is ON. ON finish divided data flag when executing read or write data. After that, require divided data flag will be OFF, then finish divided data flag. Require divided data Executing read and write Finish divided data

Device No.		Signal	Contents
Head1	Head2		
RX(n+1)0 ... RX(n+3)F	RX(n+4)0 ... RX(n+6)F	Unused	Unused
RX(n+7)8		Flag for requiring to process initial data	ON, OFF timing of requiring to process initial data, finishing to process, finishing to set, and requiring to set are indicated as follows.  Flag for requiring to process initial data RX(n+7)8 Flag for finishing to process initial data RY(n+7)8
RX(n+7)9		Flag for finishing to set initial data	Flag for finishing to set initial data RX(n+7)9 Flag for requiring to set initial data RY(n+7)9  Execute initializing Remote READY RX(n+7)B Executed by sequence program Executed by processor
RX(n+7)B		Remote READY	ON when processor finished setting of initial data and became ready after power is on or resetting of hardware.

(2) Remote output (RY)

Device No.		Signals	Contents
Head1	Head2		
RYn0		Selecting initial setting	Specify processing unit or number of head to use with "user setting" or "factory setting". By selecting "user setting", processing unit, number of using head could be selected by user. OFF : User setting ON : Factory setting (Setting contents : word unit, both of Head1, Head2 are used)
RYn1		Selecting processing unit	Specify processing unit of processing data. Setting is effective when select initial setting (RYn0) is OFF (user setting). It is only word unit setting. OFF : word unit ON : unused (to set ON, it will be word unit.)
RYn2		Selecting number of heads	Specify number of head to use. Setting is effective when selecting initial setting (RYn0) is OFF (user setting). OFF : both of Head1, Head2 are used ON : only Head1 is used
RYn4	RYnC	Require executing ID instruction	Executes instruction when require executing identification instruction is ON.
RYn5	RYnD	Unused	Unused
RYn6	RYnE	Unused	Unused
RYn7	RYnF	Finish divided data	Refer to RXn7, RXnF.
RY(n+1)0 ... RY(n+6)F		Unused	Unused
RY(n+7)8		Flag for finishing to process initial data	Refer to RX(n+7)8, RX(n+7)9.
RY(n+7)9		Flag for requiring to set initial data	

7.3 Remote Register allocation

Allocation for remote resistor of processor (BIS M-699) is explained in this chapter.
The remote resistor is set initial value when power is supplied or sequencer CPU is reset.

7.3.1 Remote Resistor list

Remote resistor of processor (BIS M-699) is indicated in the following table.

Using head	Direction of receiving	Address Head1	Address Head2	Contents	Initial digit	Reference
Both of Using Head1, Head2	Writing area master station ↓ Processor	RWwm	RWwm+8	Specifying area for instruction code	———	7.3.2 (1)
		RWwm+1	RWwm+9	Specifying area for first address	———	7.3.2 (2)
		RWwm+2	RWwm+A	Specifying area for processing number	———	7.3.2 (3)
		RWwm+3 RWwm+7	RWwm+B RWwm+F	Specifying area for writing data 1 Specifying area for writing data 5	———	7.3.2 (4)
	Processor ↓ Reading area master station	RWrn	RWrn+8	Storing area for instruction code result	———	7.3.2 (5)
		RWrn+1	RWrn+9	Storing area for executing result	———	7.3.2 (6)
		RWrn+2	RWrn+A	Unused	———	———
		RWrn+3 RWrn+7	RWrn+B RWrn+F	Storing area for reading data 1 Storing area for reading data 5	———	7.3.2 (7)
Using only Head1	Writing area master station ↓ Processor	RWwm		Unavailable	———	———
		RWwm+1		Specifying area for instruction code	———	7.3.2 (1)
		RWwm+2		Specifying area for first address	———	7.3.2 (2)
		RWwm+3		Specifying area for processing number	———	7.3.2 (3)
		RWwm+4 RWwm+F		Specifying area for writing data 1 Specifying area for writing data 12	———	7.3.2 (4)
	Processor ↓ Reading area master station	RWrn		Unavailable	———	———
		RWrn+1		Storing area for instruction code result	———	7.3.2 (5)
		RWrn+2		Storing area for executing result	———	7.3.2 (6)
		RWrn+3		Unused	———	———
		RWrn+4 RWrn+F		Storing area for reading data 1 Storing area for reading data 12	———	7.3.2 (7)
Initial setting	Writing area master station ↓ Processor	RWwm		Specifying area for retry count	———	7.3.2 (8)
		RWwm+1		Specifying area for inzone detecting time	———	7.3.2 (9)
		RWwm+2		Specifying area for interval of executing sequence instruction	———	7.3.2 (10)
		RWwm+3		Unavailable	———	———
		RWwm+4 RWwm+F		Unavailable	———	———

m,n : Address that was allocated to master station with station number setting

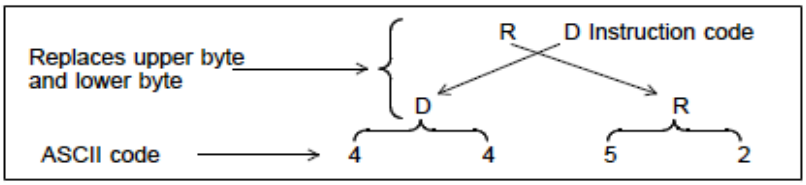
<Attention>
The remote register that indicated "Unavailable" should not be used by the user because they are used in the system.
If unavailable remote resistor is used by the user, normal operation would not be warranted.

7.3.2 Remote Resistor details

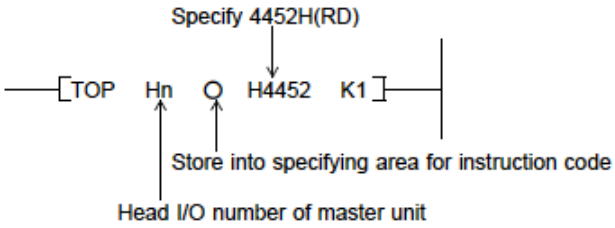
(1) Specifying area for instruction code

Specifies instruction to data carrier.
[ex.] Specifying reading instruction (RD) (using 2 heads)
Replaces upper byte and lower byte, and converts it to ASCII code then stores the code.

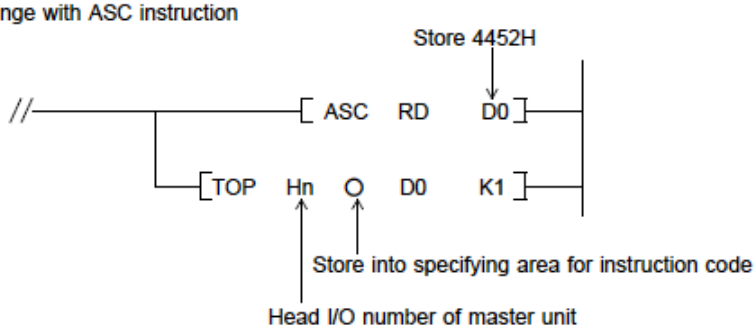
Initial digit : 4452H



Ex.1 Specify ASCII code directly



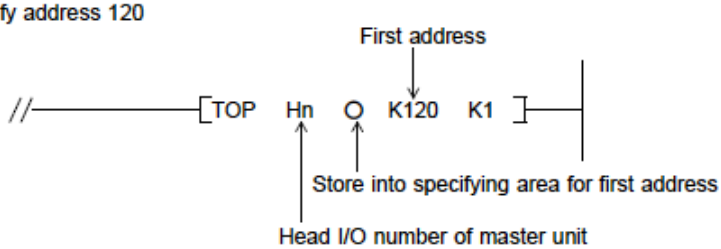
Ex.2 Change with ASC instruction



(2) Specifying area for the first address
Specify the first address of data carrier memory to read or write data.

Specifying range : 0 ... 999 (0H ... 3E7H)
Initial value : 0

[ex.] Specify address 120

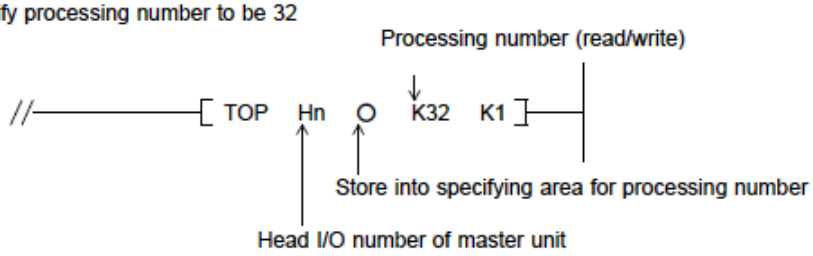


<Attention>
Specify within the following range.
・First address + Processing numbers =< 1000 (3E8H)
When the specified address of processing exceed the memory capacity of the data carrier, reading or writing process is executed within memory and then display "data carrier communication error".

(3) Specifying area for processing number
Specify processing number of data to be read or written.

Specifying range : 1 ... 1000(1H ... 3E8H)
Initial value : 1

[ex.] Specify processing number to be 32

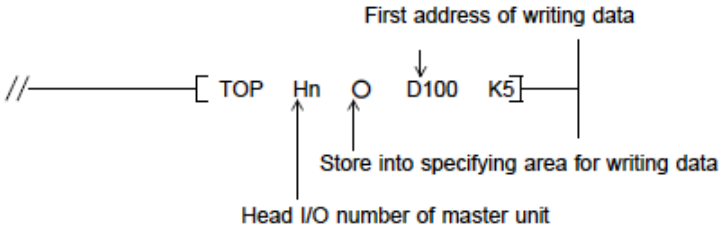


<Attention>
Specify in the following range.
・First address + Processing numbers =< 1000 (3E8H)
When the specified 'first address + processing number' exceed the memory capacity of data carrier, reading or writing process is executed within memory and then display "data carrier communication error".

(4) Specifying area for writing data

Specify data to be written into data carrier.

[ex.] Specify contents of D100...D104 to writing data (selected 2 channels).



(5) Storing area for instruction code result
Stores instruction code that executed to processor (BIS M-699).

(6) Storing area for executing result
Stores error code.

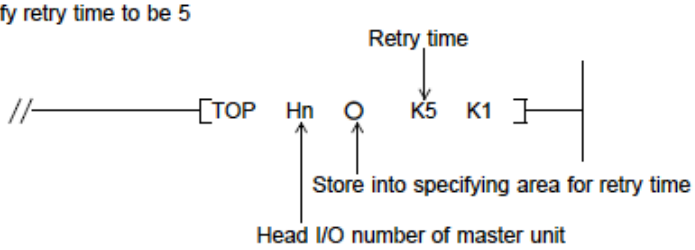
(7) Storing area for reading data
Stores reading data from data carrier.

(8) Specifying area for retry count (effective in initial setting only)
Specify retry time that processor BIS M-699 executes instruction when error occurs in data communication.

Specifying range : 0 ... 32767 (0 ... 32767 times) ... If the specified number exceeds 32767, the retry time would be 32767 times.

Initial value : 3

[ex.] Specify retry time to be 5

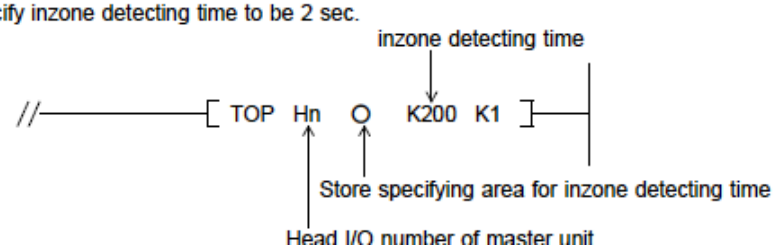


(9) Specifying area for in zone detecting time (valid in initial setting only)
Specifies standby time per 10 ms when the data carrier gets into communication area to in zone detection
(Starting communication) in executing sequence instruction.

Specifying range : 0 ... 32767 (0 ... 327670 ms) ... if the specified number exceeds 32767, inzone detection time would be 327670ms

Initial value : 0

[ex.] Specify inzone detecting time to be 2 sec.



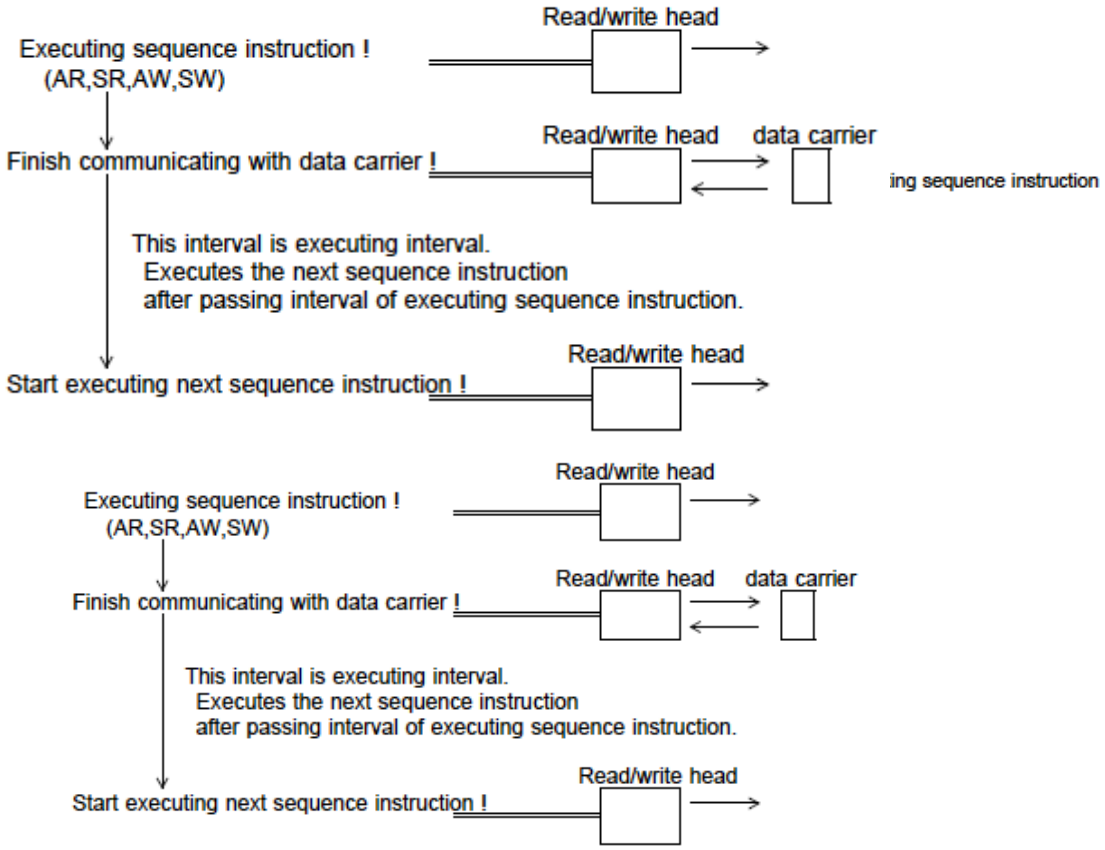
In zone detecting time is;
Standby time since data carrier getting into communication area until starting communication. By specifying this setting, it can communicate with avoiding unstable range.

(10) Specifying area for interval of executing sequence instruction (effective in initial setting only)
Specify executing instruction interval of sequence instruction per 100 ms.

Specifying range : 0 ... 32767 (0ms ... 3276700ms) ... if the specified number exceeds 32767, executing interval would be 3276700ms

Initial value : 0

Executing interval of sequence instruction



7.4 Memory Address of data carrier

The memory of data carrier of "BIS M series" constitute "page" per unit of 16 bytes however, on the upper unit side, pocessing is possible by a "word" unit without being conscious of this "page" .

(1) Address construction of data carrier "memory"

BIS M-1xx-01 (Mifare)
<752 byte / data carrier address>

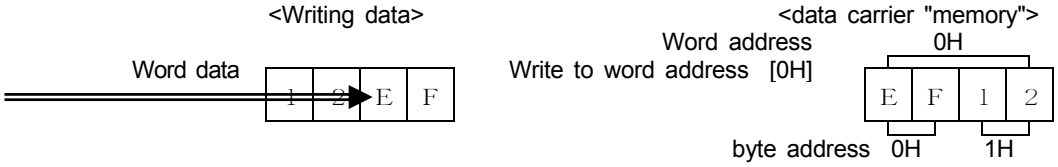
data carrier address (Hex.)		
page	word address	
	START	END
0	0	7
1	8	F
2	10	17
3	18	1F
4	20	27
	(omission)	
44	160	167
45	168	16F
46	170	177

BIS M-1xx-02 (ISO15693)
<2000 byte / data carrier address>

data carrier address (Hex.)		
Page	word address	
	START	END
0	0	7
1	8	F
2	10	17
3	18	1F
4	20	27
	(omission)	
122	3D0	3D7
123	3D8	3DF
124	3E0	3E7

<Attention>
Data proccessing of this processor is performed per words.
The data amount of one communication is up to 1000 words.

(2) Data store format of data carrier "memory"



7.5 Data processing time

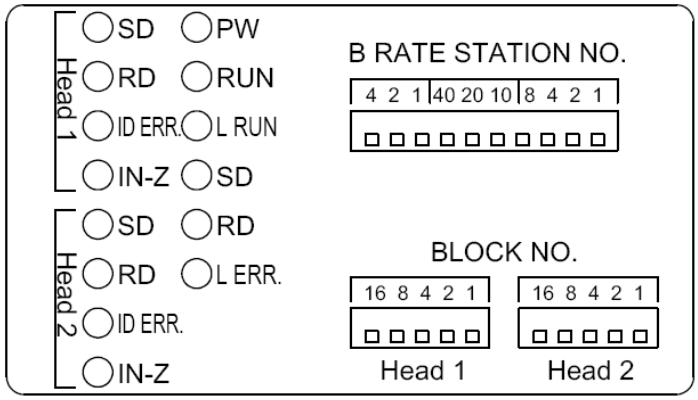
Processing time for read and write data is indicated in following table.

BIS M-1xx-01 (Mifare) < 752 byte data carrier >		
Data number	Processing time	
word	reading	writing
1	0.04sec	0.05sec
50	0.30sec	0.50sec
100	0.60sec	1.00sec
150	0.90sec	1.40sec
200	1.20sec	1.80sec
250	1.50sec	2.20sec
300	1.80sec	2.60sec
350	2.10sec	3.00sec
376	2.30sec	3.30sec

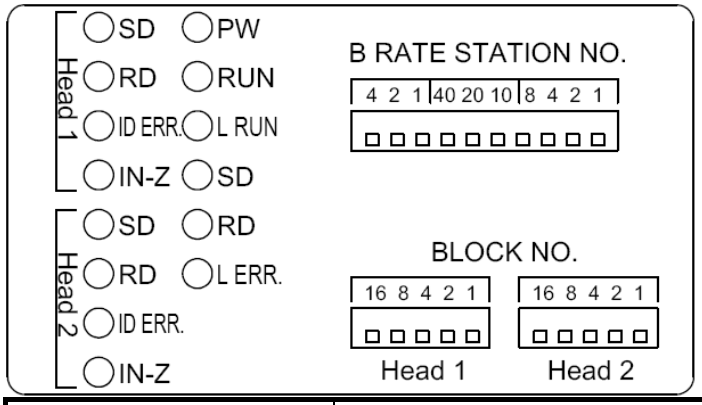
BIS M-1xx-02 (ISO15693) < 2000 byte data carrier >		
Data number	Processing time	
word	reading	writing
1	0.05sec	0.08sec
50	0.4sec	0.6sec
100	0.7sec	1.1sec
150	1.0sec	1.6sec
200	1.3sec	2.1sec
250	1.6sec	2.5sec
300	2.0sec	2.9sec
350	2.3sec	3.3sec
400	2.6sec	3.7sec
450	2.9sec	4.1sec
500	3.2sec	4.5sec
550	3.5sec	4.9sec
600	3.8sec	5.3sec
650	4.2sec	5.7sec
700	4.5sec	6.1sec
750	4.8sec	6.5sec
800	5.1sec	6.9sec
850	5.4sec	7.3sec
900	5.7sec	7.7sec
950	6.0sec	8.1sec
1000	6.3sec	8.5sec

(Note 1) Processing time is the time that processing takes for each data consecutively.
(Note 2) Processing time is the time since "request communication" turns "ON" until "finish ID instruction" turns "ON".
(Note 3) Measuring conditions: connect 1 processor (occupied 4 stations) to master unit, with read/ write 2 heads.
It is including link scan time-and time delay of transmission.
Refer to user's manual for CC-Link system master/local module on the detail of link scan time, time delay of transmission.

8. Indications and Settings



Name of parts			Description
LED indication	PW		Light on : Power ON Light off : Power OFF
	RUN		Light on : Operating normally Light off : Cut off power 24V DC,or WDT error
	L RUN		Light on : Communicating normally Light off : Cut off communicating (time over error)
	SD		Light on while sending data
	RD		Light on while receiving data
	L ERR.		Light on : Communicating data error (CRC error), station number, setting switch for transmitting rate of data link error Blink regular interval when setting switch for station number or transmitting rate of data link is changed while power is supplied. Blink irregular interval terminal resistor is not connected or unit or cable for CC-Link is influenced by noise. Light off : Communicating normally
	Head1	SD	Light on : while sending read/write Head1
		RD	Light on : while receiving read/write Head1
		ID-ERR.	Light on : wrong condition read/write Head1 when setting switch for block no. is out of set range Blinking : when setting switch for block no. is changed (in set range) Light off : normal condition
		IN-Z	Light on : when detects in zone Light off : cable breakage of read/write head
	Head2	SD	Light on : while sending read/write Head2
		RD	Light on : while receiving read/write Head2
		ID-ERR.	Light on : wrong condition read/write Head2 when setting switch for block no. is out of set range Blinking : when setting switch for block no. is changed (in set range) Light off : normal condition
		IN-Z	Light on : when detects in zone Light off : cable breakage of read/write head



Name of parts	Description

Setting switch for station (STATION NO.)

The second digit of station	Switch No. 40	20	10
0	OFF	OFF	OFF
10	OFF	OFF	ON
20	OFF	ON	OFF
30	OFF	ON	ON
40	ON	OFF	OFF
50	ON	OFF	ON
60	ON	ON	OFF

The first digit of station	Switch No. 8	4	2	1
0	OFF	OFF	OFF	OFF
1	OFF	OFF	OFF	ON
2	OFF	OFF	ON	OFF
3	OFF	OFF	ON	ON
4	OFF	ON	OFF	OFF
5	OFF	ON	OFF	ON
6	OFF	ON	ON	OFF
7	OFF	ON	ON	ON
8	ON	OFF	OFF	OFF
9	ON	OFF	OFF	ON

Setting switch for transmitting rate of data link (B RATE)

Transmission rate of data link	Switch No. 4	2	1
156kbps	OFF	OFF	OFF
625kbps	OFF	OFF	ON
2.5Mbps	OFF	ON	OFF
5Mbps	OFF	ON	ON
10Mbps	ON	OFF	OFF

Setting switch for write protection (BLOCK NO.) ※for Head1, Head2

Setting	Switch No. 16	8	4	2	1
nil	OFF	OFF	OFF	OFF	OFF
0...7	OFF	OFF	OFF	OFF	ON
0...F	OFF	OFF	OFF	ON	OFF
0...17	OFF	OFF	ON	OFF	OFF
0...1F	OFF	ON	OFF	OFF	OFF
all	OFF	ON	ON	ON	ON

When a write command includes the area that is write protected, a write protection error occures.

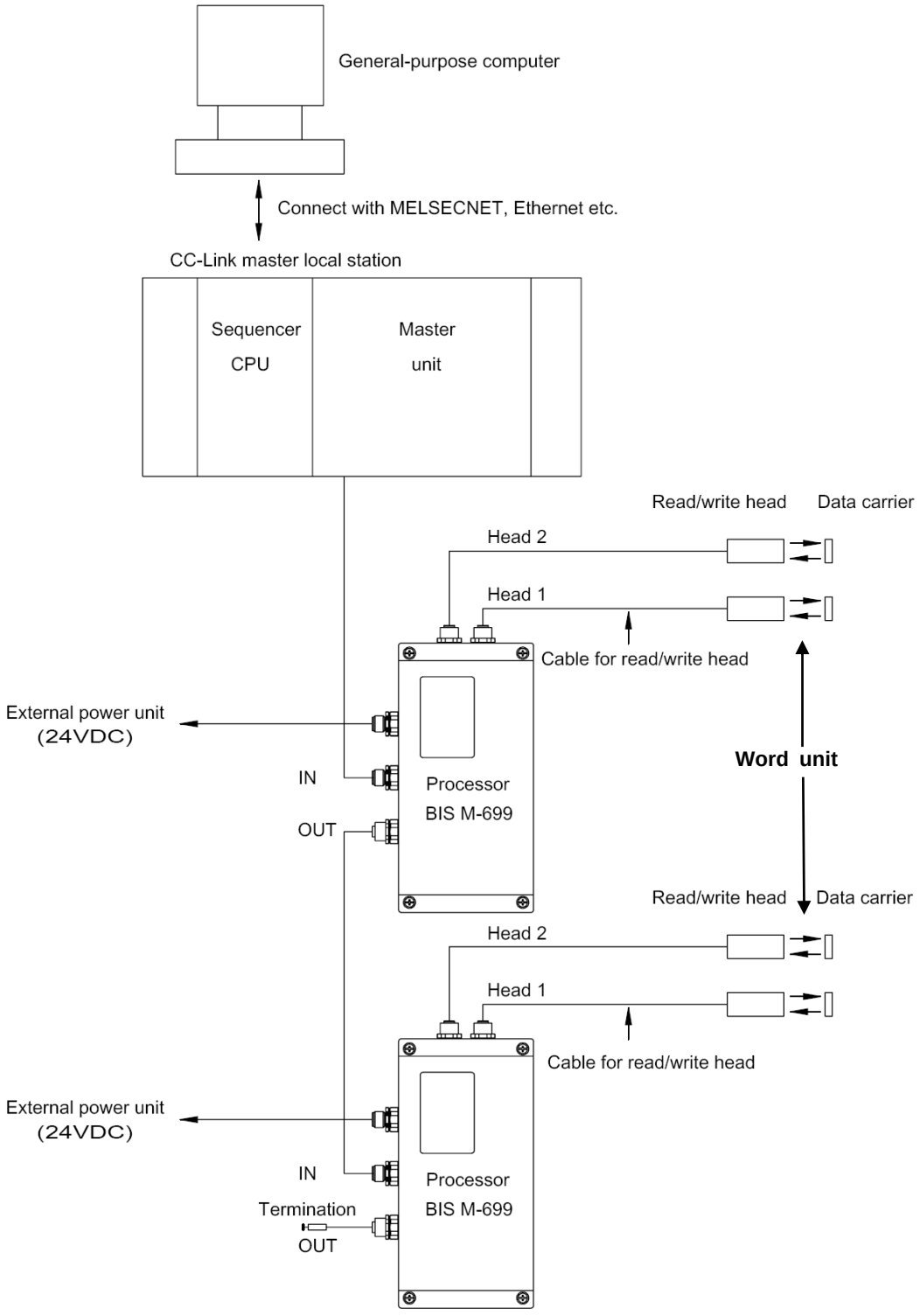
Write protection can be set per "page" and details are shown as below;

- nil : no write protection
- 0 : setting on page 0 8 words of address 0...7
- 0...1 : setting on page 0...1 16 words of address 0...F
- 0...2 : setting on page 0...2 24 words of address 0...17
- 0...3 : setting on page 0...3 32 words of address 0...1F
- all : setting on all pages 1000 words of address 0...3E7

9. Prior to programming

9.1 Connecting example of the System and Processing Data

Processor BIS M-699 reads and writes data of device in sequencer to data carrier.
The processing unit of data when communicating with the data carrier is a one word unit (16 bits, 2 bytes). To keep data interchangeability, the processing unit should be a unified word unit in a host system if the sequencer and personal computer are intermingled

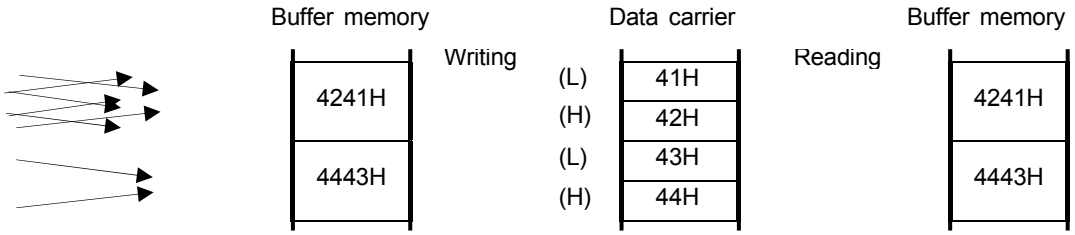


9.2 Data structure (Processing unit)

Processing data of identification system is carried out with word unit.

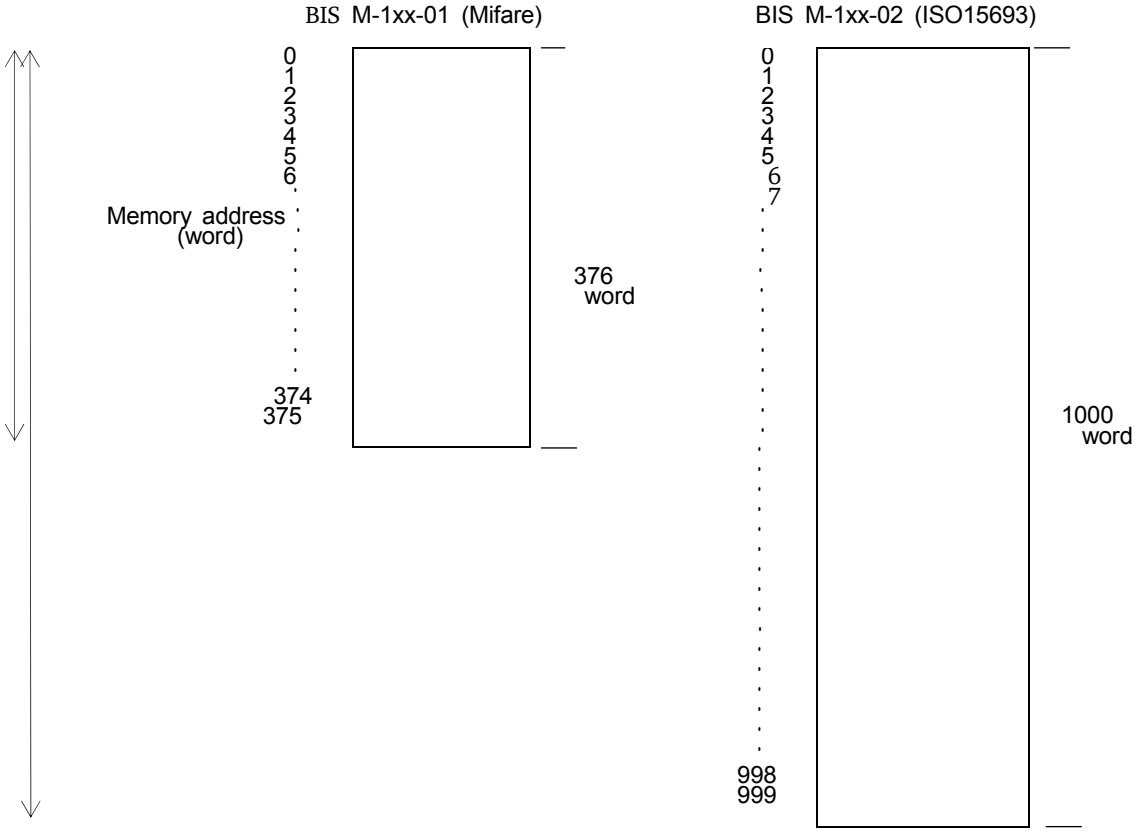
> <Note>
> Selecting a processing unit for a Initializing instruction (RYn1) should be OFF in this system.

(1) Data flow chart per word unit



9.3 data carrier memory

The following memory of the data carrier can communicate with processor BIS M-699.
Read/write command can be available up to 1000words.
Construction of memory in data carrier



9.4 Interlock

Matching of the input-output signals are dependent on instructions in the following table.
Set interlock to match input output signal dependent on instruction.

RXn3/RXnB.....ID-BUSY
RXn4/RXnC.....Finish ID instruction
RXn5/RXnD.....Error detection
RX(n+7)8.....Flag for requiring to process initial data
RX(n+7)B.....Remote READY
RYn4/RYnC.....Require executing identification instruction
RYn5/RYnD.....Require executing special instruction

... Signal for Head2

Instructions	Codes		Input-output signal (Interlock signal)						
	ASCII	Hex.	RXn3 / RXnB	RXn4 / RXnC	RXn5 / RXnD	RX(n+7)8	RX(n+7)B	RYn4 / RYnC	RYn5 / RYnD
Reading	RD	4452H	Yes	Yes	No	No	Yes	Yes	No
	CR	5243H							
Sequentil reading	AR	5241H							
	SR	5253H							
Writing	WD	4457H							
Comparison writing	CW	5743H							
Sequence reading	AW	5741H							
Sequence Comparison writing	SW	5753H							
Batch writing	FI	4946H							
Comparison	CM	4D43H							
Clear	CL	4C43H							
Specifying stop sequence instruction	——	——	No	Yes	Yes	No	No	Yes	No
Specifying error cancel	——	——		No					
Specifying interval for executing sequence instruction	——	——	No	No	No	Yes	No	No	No
Specifying retry count	——	——							
Specifying processing unit	——	——							
Specifying in zone detection time	——	——							
Select head number	——	——							

Yes"'Interlock is required.
No"'Interlock is not required.

9.5 Faulty Condition of Data Link

The following table shows condition of processor BIS M-699 and communication with data carrier when the dat a link is in a fault condition.

(1) Condition of Processor

Condition of data link	Condition of Processor			
	Remote input (RX)	Remote output (RY)	Remote resistor (RWw)	Remote resistor (RWr)
When sequencer CPU of master station has been stopped (Data link continuation)	Continuation	All OFF	Continuation	Continuation
When sequencer CPU is reset When sequencer CPU occurs error When processor released data link (Data link stop)	Continuation ∗1	All OFF	Hold	Continuation ∗1

∗1 Since data link has been stopped, data will not be transmitted to master station.

(2) Condition of communication with data carrier

Condition of data link	Condition of communication with data carrier					
	Uncommunicating		Executing communication		Divided sending or receiving condition	
	Normal instruction	Sequence Instruction	Normal instruction	Sequence Instruction	Normal instruction	Sequence Instruction
When sequencer CPU of master station has been stopped (Data link continuation)	Stop	Stop	∗2	∗3	Stop	Stop
When sequencer CPU is reset When sequencer CPUoccurs error When processor released data link (Data link stop)	Stop	Stop	∗2	∗3	Stop	Stop

*2 Stop after communication with data carrier is completed.
*3 Stop after outzone is detected.

10. Communication Procedure with data carrier

Programming procedure to communicate with data carrier is explained per function (instruction) in this chapter.

> <Attention>
> Programs are not written for "initial setting of master unit" after 6.7 in this chapter and therefore, program 10.5 (1)should be written to the first part of the program in executing program after 10.7.

10.1 Instruction for programming

Refer to following notes in using this processor to communicate with data carrier before creating programs.

(1) Input-output signals for handshake with sequencer CPU
Signal to execute identification instruction from sequence program, or signal that finished identification instruction is called Input-output signals for handshake, and the signals are necessary signal to communicate with data carrier.
Handshake signals should be inserted.
Refer to 9.4 on signals for handshake.

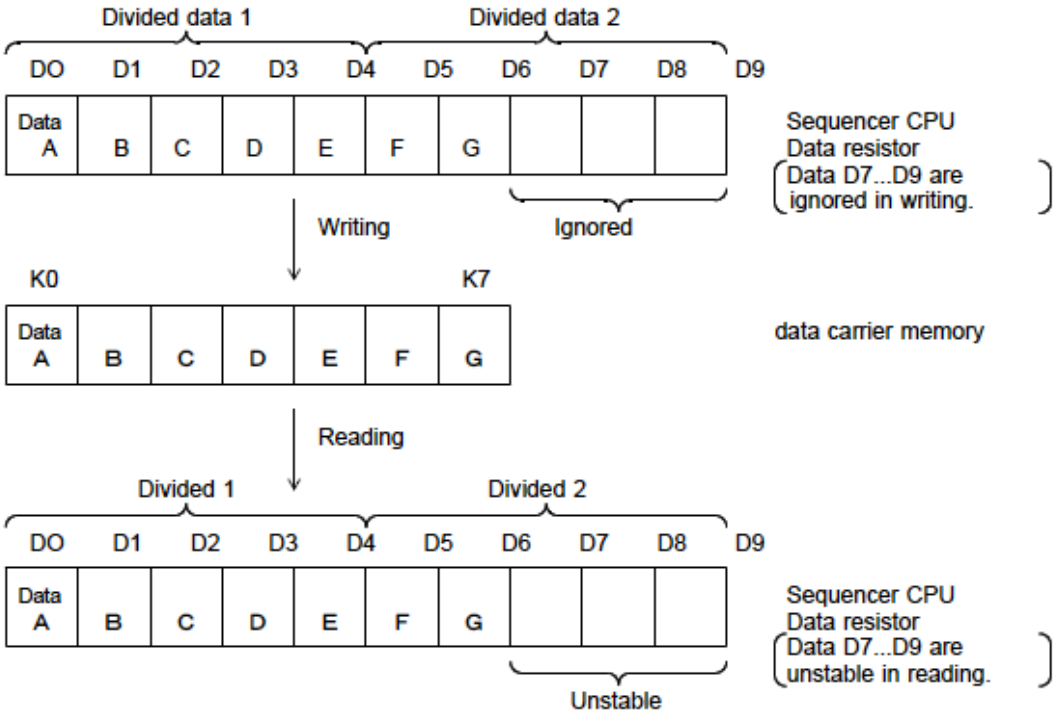
(2) Reading and writing of remote register
Sequence program to read or write of remote register is necessary to communicate with data carrier.
Create a sequence program for needed part.
Default digit is written when processor is standing.

1. Remote register is not taken battery back up
It needs to write set or changed data every time because all data return to default digit when power is supplied, operated reset, or changed mode.
2. Changing default digit of remote resistor
It needs to create sequence program to change default digit to communicate with data carrier.

(3) Condition of retaining data in data carrier when error occurred
Data is rewritten per 8 words with new data and old data mixed when error occurred while communicating with data carrier.
Execute instruction again after error cancellation as measure to this condition when error occurred while e xecuting writing instruction (WD, CW, AW, SW, FI).

(4) Notes for divided reading and writing
It should be done per 5 words (using both of Head1, Head2)12 words (using only 1 head) in storing divided data to data register in using instruction indicated below. When unused register (does not store communication data) occurred in allocated data register at this time, the register would be unsettled in reading, unused in writing.
Objective instruction: RD, CR, AR, SR, WD, CW, AW, SW, CM

[ex.]
Using both of Head 1, Head 2
The first address for reading and writing to data carrier 0
Number of words for reading and writing to data carrier 7
Allocation data of sequencer CPU to resistor D0...D9



10.2 List of Instructions and Commands

The following instructions and commands can be executed with the processor (BIS M-699).

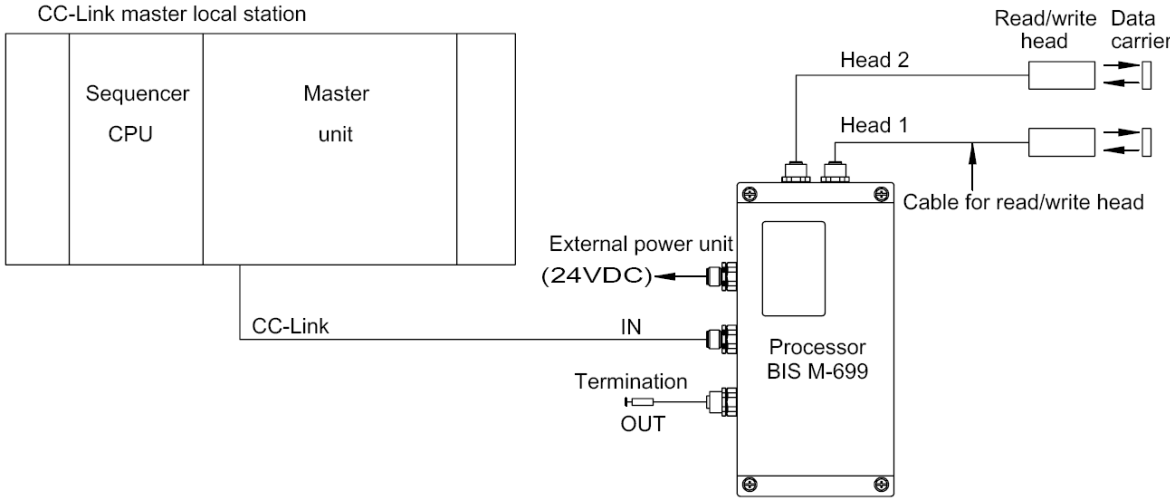
Functions	Instructions/ Commands	Instruction code ASCII	Instruction code Hex.	Process	Reference
Reading	Reading	RD CR	4452H 5243H	Reads data from data carrier. Compares data to check.	10.7.1
	Sequence Reading	AR SR	5241H 5253H	Executes reading in sequence until data carrier enter communication area, and executes reading when data carrier enter communication After that, compares data to check.	10.7.2
Writing	Writing	WD CW	4457H 5743H	Writes data to data carrier. Compares data to check.	10.8.1
	Sequence Writing	AW SW	5741H 5753H	Executes writing in sequence until data carrier enter communication area, and executes writing when data carrier enter communication After that, compares data to check.	10.8.2
	Batch writing	FI	4946H	Writes specified data to specified area in data carrier simultaneously.	10.8.3
Check	Comparing	CM	4D43H	Compares data of processor to data in data carrier.	10.9
Clearance	Clearing	CL	4C43H	Clears specified area in data carrier with "0"	10.10
Command	Sequence instruction Cancellation			Cancels sequence instruction compulsively.	10.11
	Error cancellation			Executes error cancelling process. (Clearing error LED, resetting error detected signal, Clearing executing result store area in remote register)	10.12

10.3 System be used in this Chapter

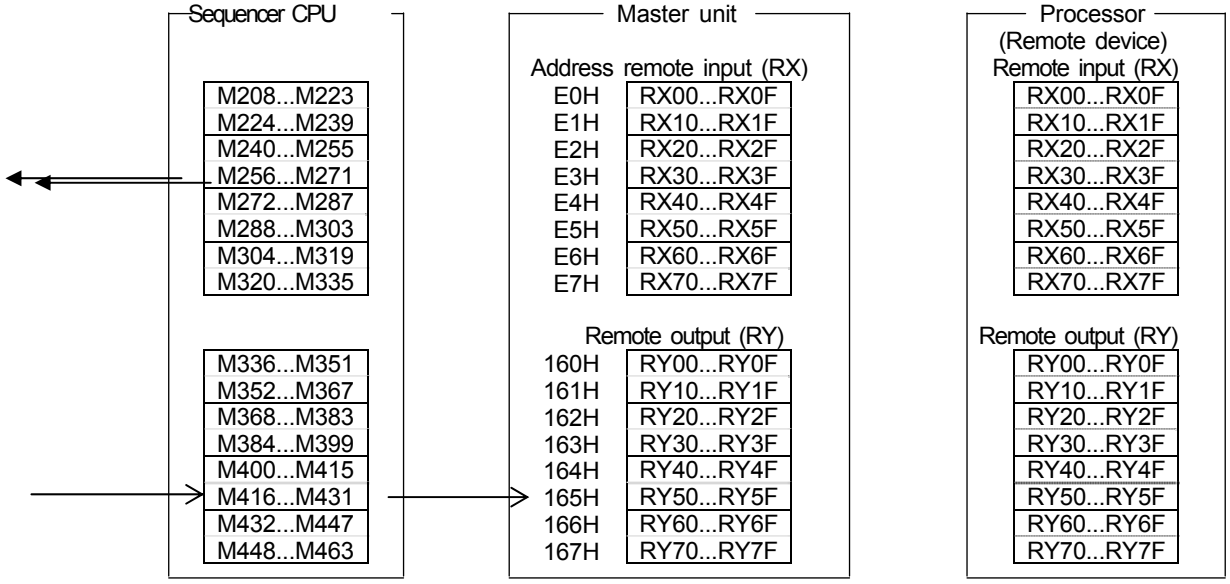
The example of the sequence program that is explained in this chapter applies to the following system. Refer to user's manual for CC-Link master unit (detail) on sequence program of whole CC-Link system.

(1) Construction of system in programming example

CC-Link master / local station　　Processor　Station : 1 station
(BIS M-699)　Occupied : 4 stations using both of Head1, Head2



(2) Relation of sequencer CPU, buffer memory of master unit and remote device station



* For QCPU(Q mode),QnACPU
When using ACPU : it will be RX :M200...M327, RY:M328...M355

10.4 Sequence Program for ACPU

Sequence program for QCPU (Q mode), QnACPU is written on 6.7 in this chapter.
In using as sequence program for ACPU, pay attention to following points.

(1) Replace of relay
Replace the following contacts for ACPU or QCPU(Q mode), QnACPU.

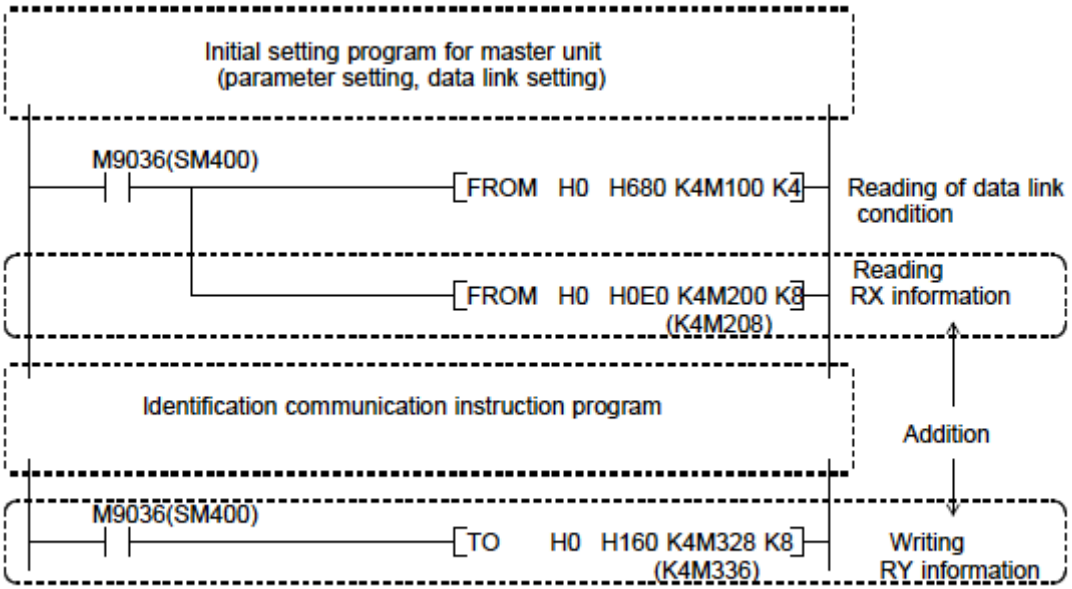
ACPU		QCPU(Q mode) / QnACPU	Contents
M9036	⟷	SM400（SM1036）	always ON
M9037		SM401（SM1037）	always OFF
M9038		SM402（SM1038）	after RUN, ON only 1 scan
M9039		SM403（SM1039）	after RUN, OFF only 1 scan

* SM1036...SM1039 is special relay when contact is converted from A to Q/QnA.

(2) Setting of RX, RY
Regards in using for ACPU that RX and RY varies ; RX : M200...M327, RY : M328...M355.

(3) Additional sequence program for refreshing RX, RY
The following sequence program should be added.

In the case of the following setting is set, sequence program for refresh is not required.
Using QJ61BT11,AJ61QBT11,A1SJ61QBT11
Set automatic refresh parameter with GX Developer
Using AJ61BT11,A1SJ61BT11
Set automatic refresh with instruction for CC-Link

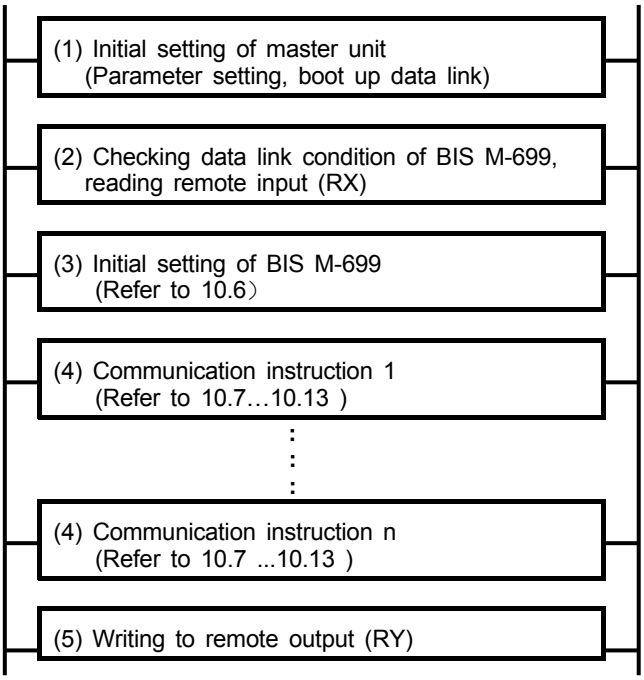


* Example of sequence program for ACPU. Digits for QCPU (Q mode), QnACPU are indicated in ( ).

<Attention>
Automatic refresh is not done if automatic refresh parameter is not set.

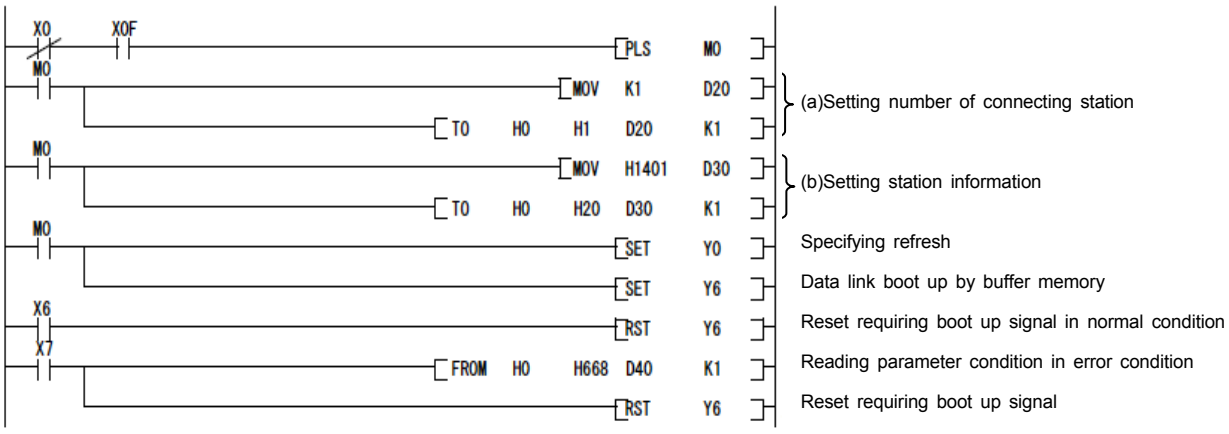
10.5 Basic Format of Program

The followings are basic format of program.
Programs are created as following order.
Refer to 10.3 on program condition.



(1) Initial setting of master unit

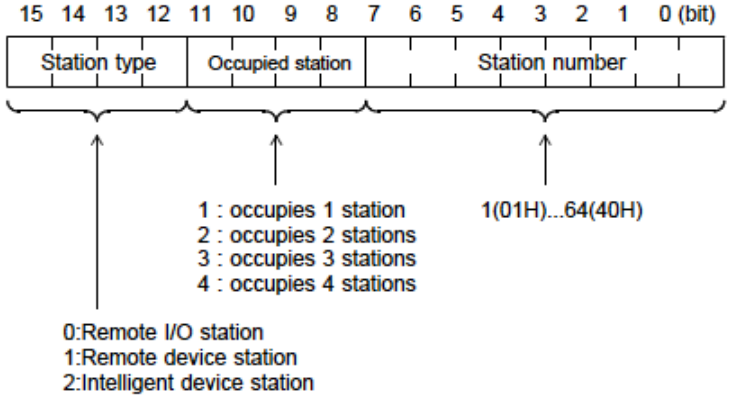
Creates program to stand data link with CC-Link refresh command after setting of parameter. [ex.] Number of connecting station: 1
Connecting station: BIS M-699 (station number 1, occupies 4 stations)



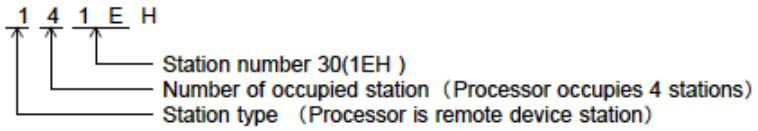
<Attention>
Program (a), (b) is not needed when CC-Link parameter is set with GX Developer in using QCPU (Q mode) or QnACPU.

(a) Setting of the number of connecting stations (buffer memory address of master unit : 1H)
Set the number of stations to be connected to master unit such as remote I/O station, remote device station, intelligent device station, local station (including reserve station).

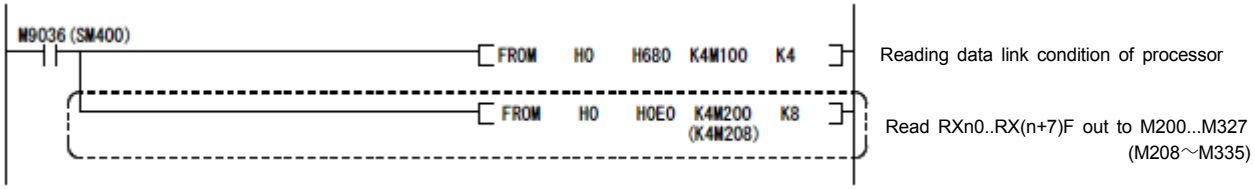
(b) Setting of station information
(Buffer memory address of master unit : the first station(20H)...64th station(5FH))
Set the type of stations to be connected to master unit such as remote I/O station, remote device station, intelligent device station, local station.
Needed to set for all number of connecting stations.



[ex.] Set the Processor to station number 30



(2) Reading data link condition of processor, remote input (RX)
Create program to interlock after detecting data link condition of processor.
Read RXn0...RX(n+7)F out to M200～M327(M208～M335).



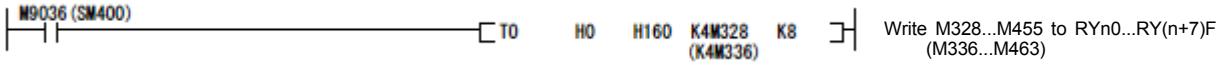
* Example of sequence program for ACPU. Digits for QCPU (Q mode), QnACPU are indicated in ( ).

<Attention>
Delete the sequence program indicated within above dashed line, when the following setting is set.
*Using QJ61BT11,AJ61QBT11,A1SJ61QBT11
Set automatic refresh parameter with GX Developer
*Using AJ61BT11, A1SJ61BT11
Set automatic refresh with instruction for CC-Link

(3) Initial setting of processor
Create the program to execute initial setting of processor (refer to 10.6).

(4) Communication instruction
Create the program to execute identification communication instruction (refer to 10.7...10.13).

(5) Writing to remote output (RY)
Create the following program and write M328...M455(M336...M463) to RYn0...RY(n+7)F.

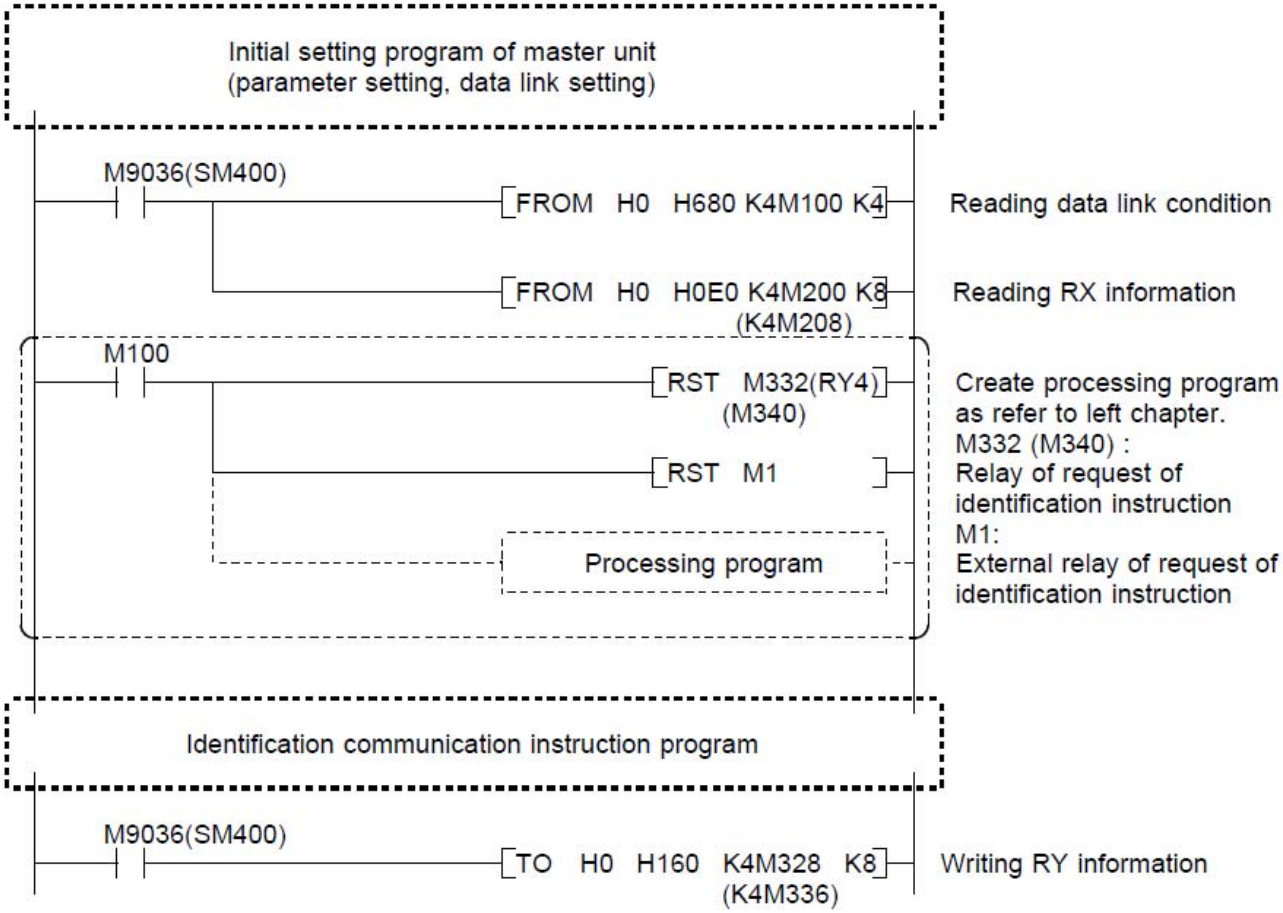


* Example of sequence program for ACPU. Digits for QCPU (Q mode), QnACPU are indicated in ( ).

<Attention>
Delete the sequence program in above chart when the following setting is set .
*Using QJ61BT11,AJ61QBT11,A1SJ61QBT11
Set automatic refresh parameter with GX Developer
*Using AJ61BT11, A1SJ61BT11
Set automatic refresh with instruction for CC-Link

10.5.1 Processing program when fault condition occurred

Reference the chart below to create a program for fault conditions.



* Example of sequence program for ACPU. Digits for QCPU (Q mode), QnACPU are indicated in ( ).

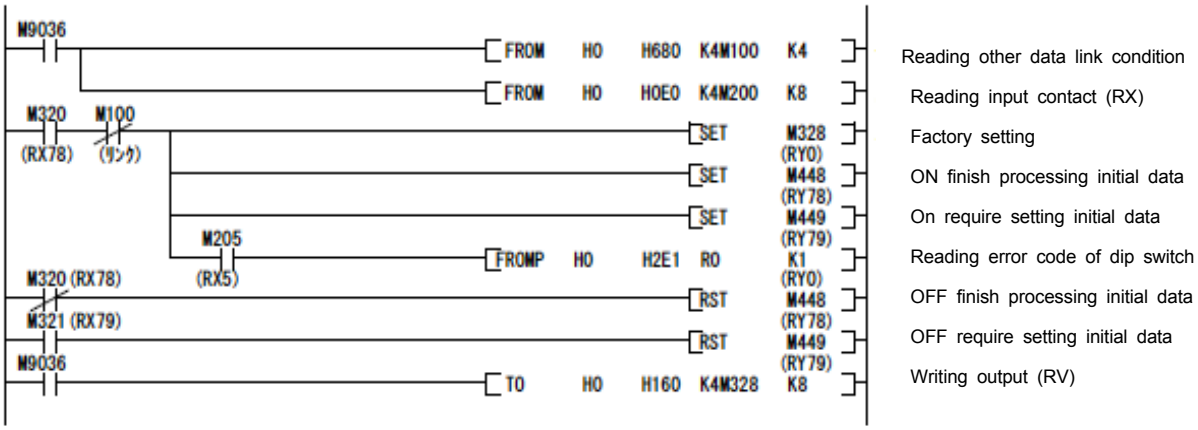
<Attention>
Reset request of identification instruction to avoid unexpected communication in program when fault is occurred.
The instruction is executed again after recovery of link in the case of external contact (M1) for starting identification instruction is not reset.

10.6 Initial setting

Following initial setting is needed to communicate with data carrier.

(1) Initial setting with factory setting

(a) In using ACPU
* Regard that the following example shows RX : M200...M327, RY : M328...M455.



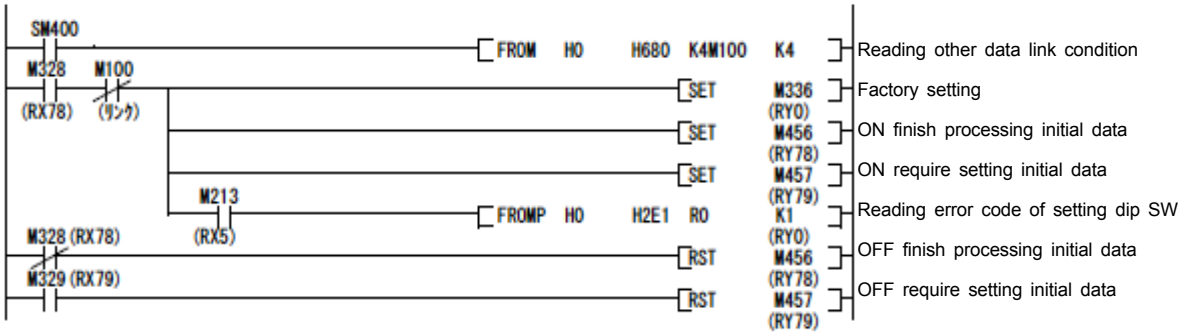
(b) In using QnACPU
Automatic refresh parameter is set with GX Developer as followings.
* Regard that the following example shows refresh range RX : M208...M335, RY : M336...M463

1. Setting with GX Developer

- Start I/O No. : 0000
- Type : Master station
- All connect count : 1
- Remote input (RX) : M208
- Remote output (RY) : M336
- Remote register (RWr) : D200
- Remote register (RWw) : D100
- Special relay (SB) : -
- Special register (SW) : -
- Retry count : 3
- Automatic connection station count : 1
- Standby master station number : 0
- PLC down select : Stop
- Scan mode setting : asynchronous
- Delay information setting : 0
- Station information setting : station information

Station information setting
Set the station information according to the system constitution.
For more information, refer to the manual of the master unit.

2. Program



(C) In using QCPU (Q mode)

Automatic refresh parameter and initial setting are set with GX Developer as followings.

* Regard that the following example shows refresh range RX : M208...M335, RY : M336...M463

1. Setting with GX Developer

<Automatic refresh parameter>

- Start I/O No. : 0000
- Operation setting : -
- Type : Master station
- Master station data link type : PLC parameter auto start
- Mode setting : Online (Remote net mode)
- All connect count : 1
- Remote input (RX) refresh device : M208
- Remote output (RY) refresh device : M336
- Remote register (RWr) refresh device : D200
- Remote register (RWw) refresh device : D100
- Special relay (SB) refresh device : SB0
- Special register (SW) refresh device : SW0
- Retry count : 3
- Automatic reconection station count : 1
- Standby master station number : 0
- PLC down selec : Stop
- Scan mode setting : Asynchronous
- Delay information setting : 0
- Station information setting : Station information
- Initial setting of remote device : Initial setting
- Interrupt setting : -

<Initial setting>

Input format: Hex.

Execute flag	Operating condition	Condition of executing procedure			Contents of executing			
		Condition device	Device number	executing condition	Writing device	Device number	Writing data	
Execute	Set new	RX	78	ON	RY	00	ON	Factory setting
Execute	Same as prev. set	RX	78	ON	RY	78	ON	
Execute	Same as prev. set	RX	78	ON	RY	79	ON	
Execute	Set new	RX	78	OFF	RY	78	OFF	
Execute	Set new	RX	79	ON	RY	79	OFF	
Execute	Set new							
Execute	Set new							
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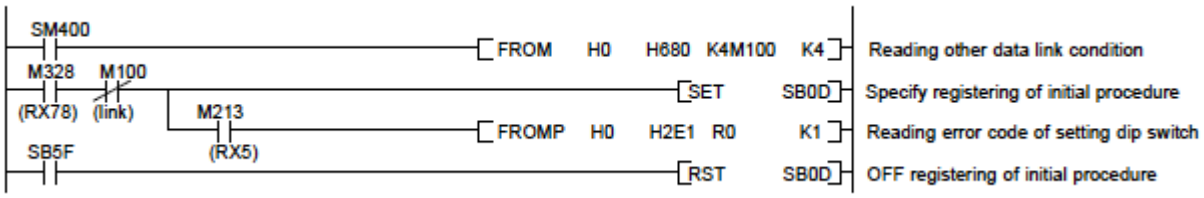
Execute	Set new							

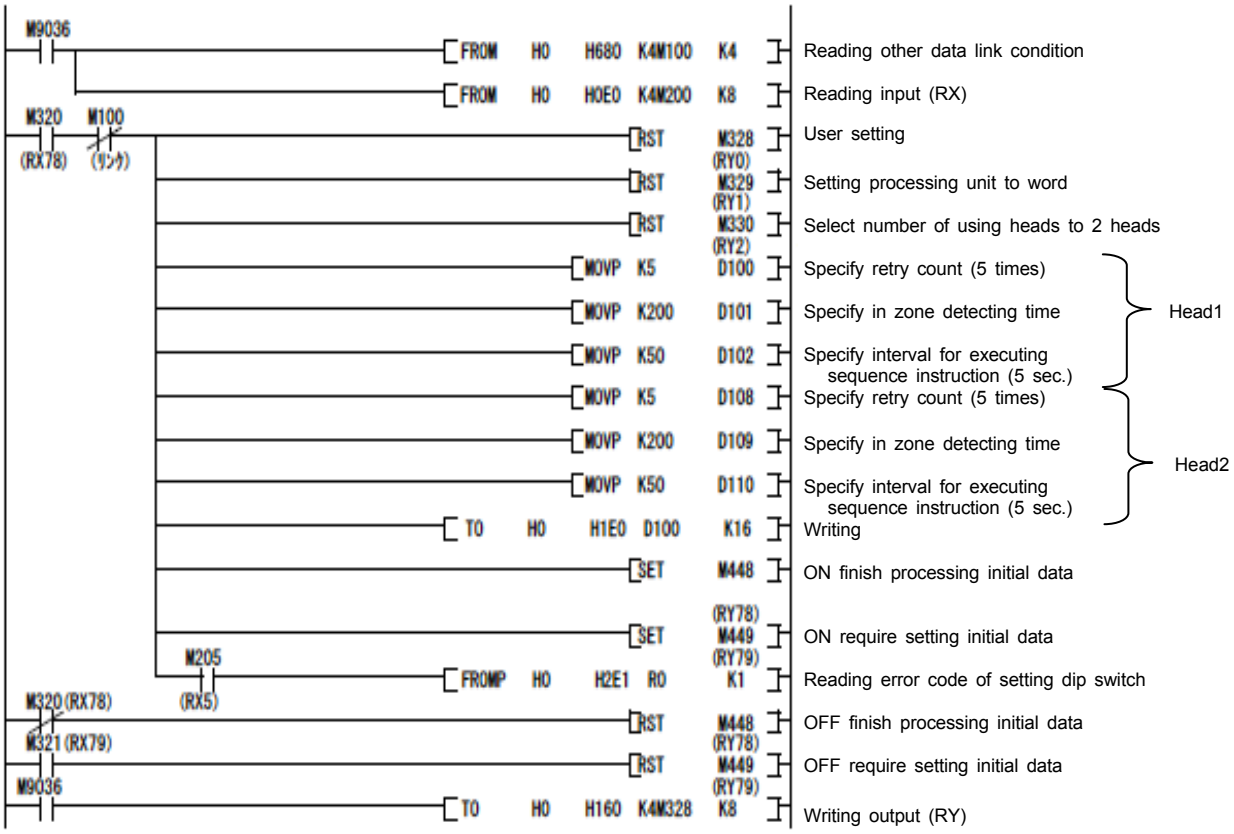
2 Program



(2) Initial setting by user

<Attention>
Writing initial setting to remote register should be done only once when the processor is standing.
Initial setting is accepted only when the processor is ON request of initial data (RX78).
To change initial setting, change the program and turn on power again, or reset processor.

(a) In using ACPU



(b) In using QnACPU

Automatic refresh parameter is set with GX Developer as followings.

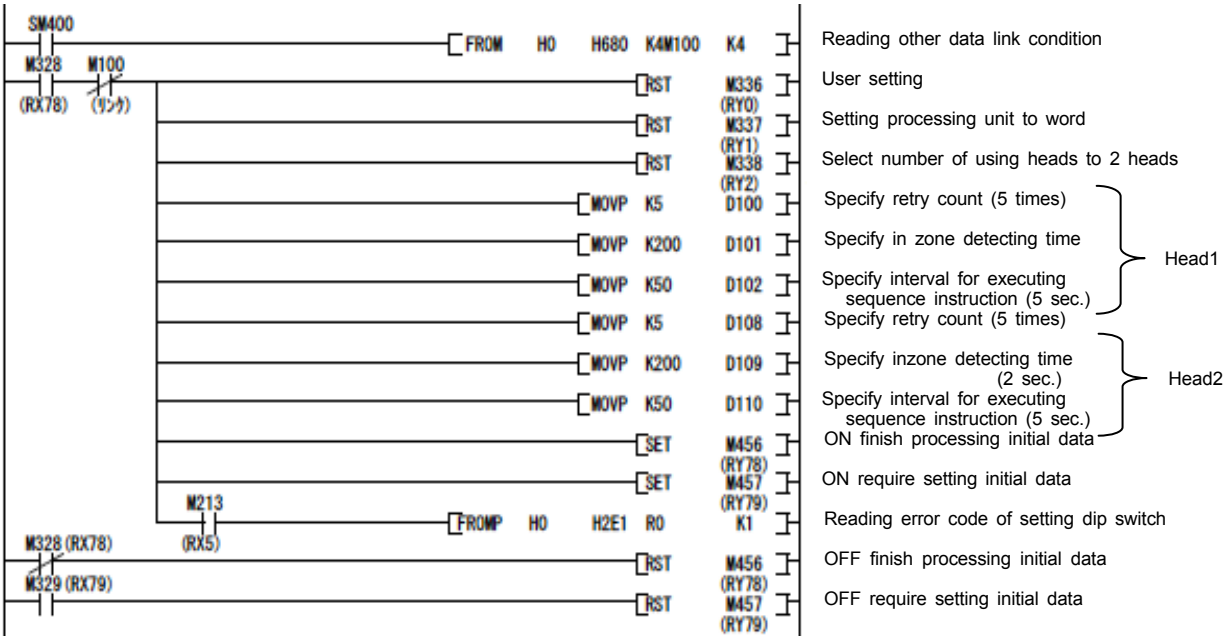
* Regard that the following example shows refresh range RX : M208...M335, RY : M336...M463

1. Setting with GX Developer

· Start I/O No.	: 0000
· Type	: Master station
· All connect count	: 1
· Remote input (RX)	: M208
· Remote output (RY)	: M336
· Remote register (RWr)	: D200
· Remote register (RWw)	: D100
· Special relay (SB)	: -
· Special register (SW)	: -
· Retry count	: 3
· Automatic reconnection station count	: 1
· PLC down select	: Stop
· Scan mode setting	: Asynchronous
· Delay information setting	: 0
· Station information setting	: Station information

Station information setting ·
Set the station information according to the system constitution.
For more information, refer to the manual of the master unit.

2. Program



(C) In using QCPU (Q mode)

Setting of automatic refresh parameter, program is the same procedure as initial setting of factory setting (refer to 10.6 (1)(c)).

Display for initial setting is as follows.

Input format: decimal

Executing flag	Operating condition	Condition of executing procedure			Contents of executing			
		Condition device	Device number	Executing condition	Writing device	Device number	Writing data	
Execute	Set new	RX	78	ON	RY	00	OFF	User setting
Execute	Same as prev. set	RX	78	ON	RY	01	OFF	Word unit
Execute	Same as prev. set	RX	78	ON	RY	02	OFF	Using 2 heads
Execute	Same as prev. set	RX	78	ON	RWw	00	5	Retry count (Head1)
Execute	Same as prev. set	RX	78	ON	RWw	01	200	In zone detecting time
Execute	Same as prev. set	RX	78	ON	RWw	02	50	Executing sequence instruction
Execute	Same as prev. set	RX	78	ON	RWw	08	5	
Execute	Same as prev. set	RX	78	ON	RWw	09	200	
Execute	Same as prev. set	RX	78	ON	RWw	0A	50	
Execute	Same as prev. set	RX	78	ON	RY	78	ON	
Execute	Same as prev. set	RX	78	ON	RY	79	ON	
Execute	Set new	RX	78	OFF	RY	78	OFF	
Execute	Set new	RX	79	ON	RY	79	OFF	
Execute	Set new							
Execute	Set new							
Execute	Set new							
Execute	Set new							

10.7 Reading Data Instruction

Following are the instructions to read out data from data carrier.

10.7.1 Reading instruction (RD, CR)

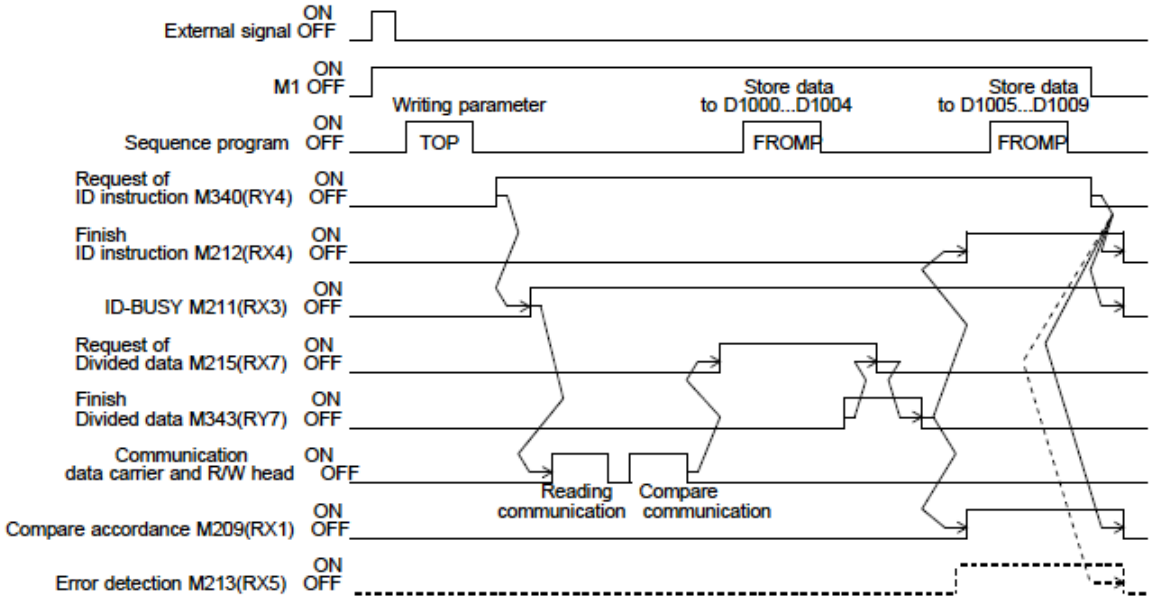
Execute reading data in data carrier.

<Reading instruction (RD, CR)>
Stores the data read from data carrier to remote register in processor.
Reads data out again to check data and compares the data.

Instruction code

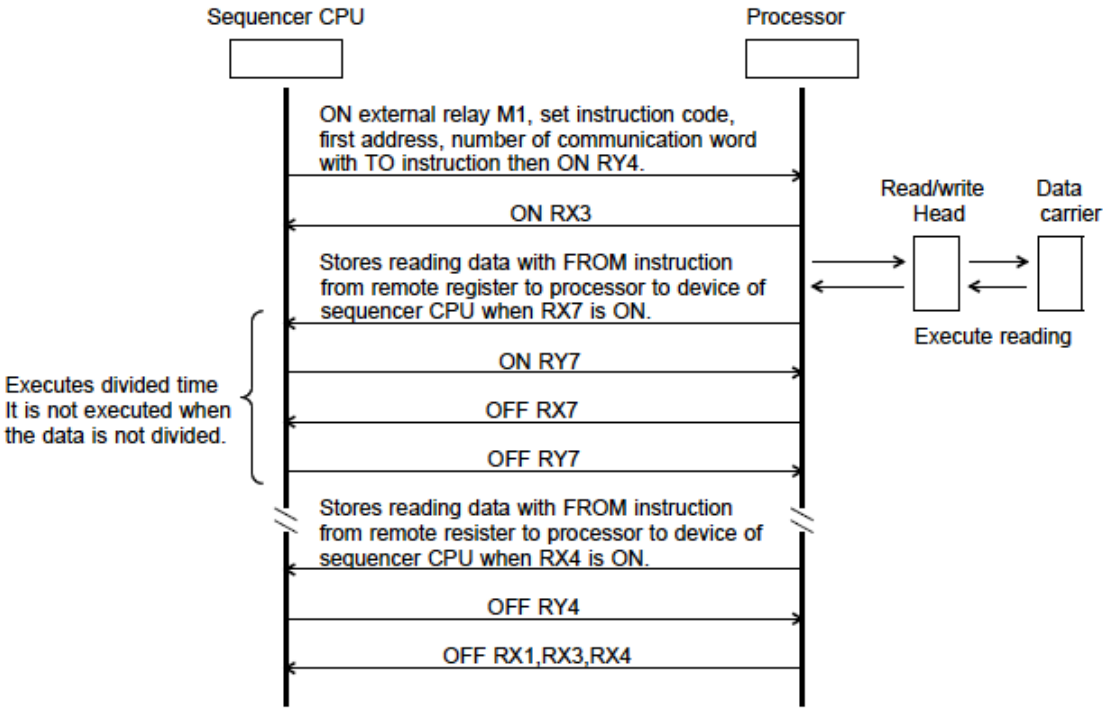
Reading instruction : RD Code : 4452H
CR Code : 5243H

(1) Operation timing
The following chart shows operating timing.



(2) Explanation of operating

The following explains the timing operation.

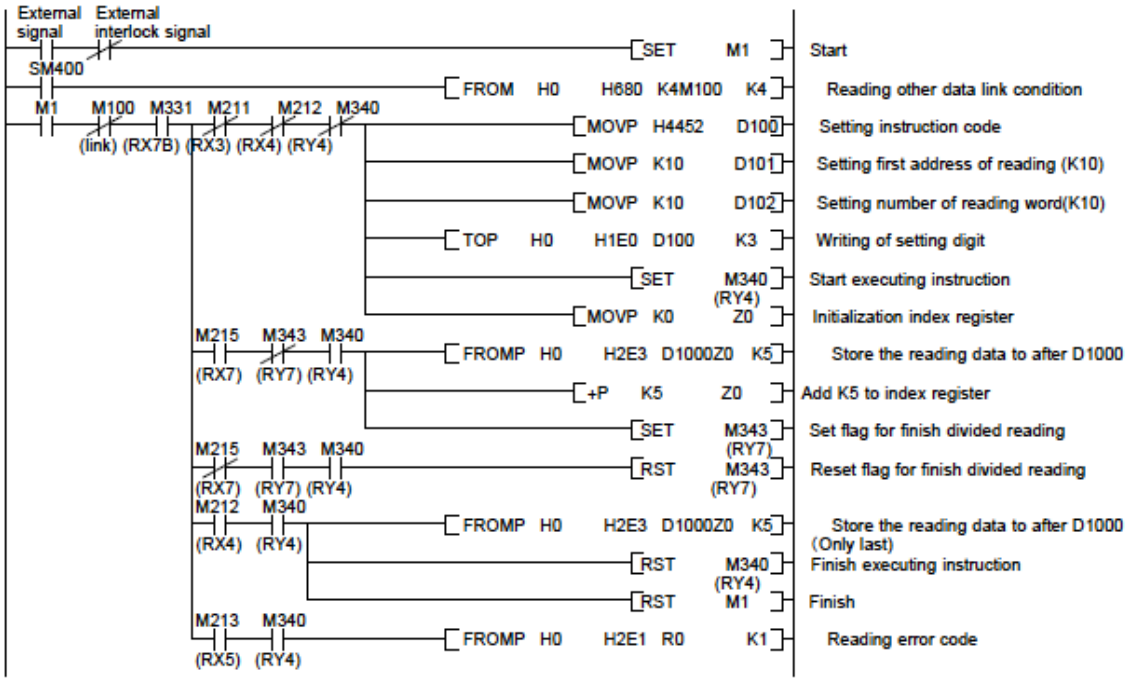


<Attention>
It executes instructions for number of retry times and occurs error in the case of the code tag is not present when reading instruction (RD, CR) is executed.

(3) Example of programming

The example is programmed on the following condition.
(Comparing result signal (RX1) is not used in the following program.)

Using head Head1
Instruction code ..... RD (4452H)
First reading address of data carrier..... 10
Number of reading word 10
Store area of reading data ..... D1000...D1009
Store area of error code R0



10.7.2 Sequence Reading Instruction (AR, SR)

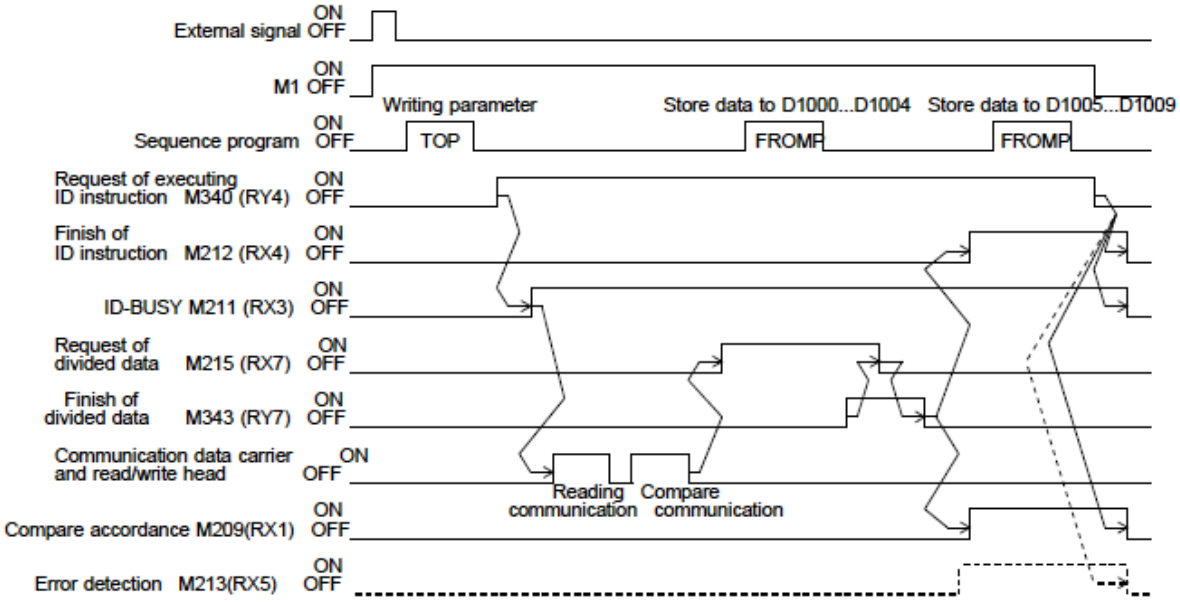
When using the sequence reading instruction, reading data is executed when data carrier gets into communication area.

< Sequence Reading Instruction (AR, SR) >
Executes reading in sequence until data carrier gets into communication area.
Reads the data when data carrier gets into communication area and store it to remote register of processor.
After that, reads data out to check, and compares the data.

Instruction code

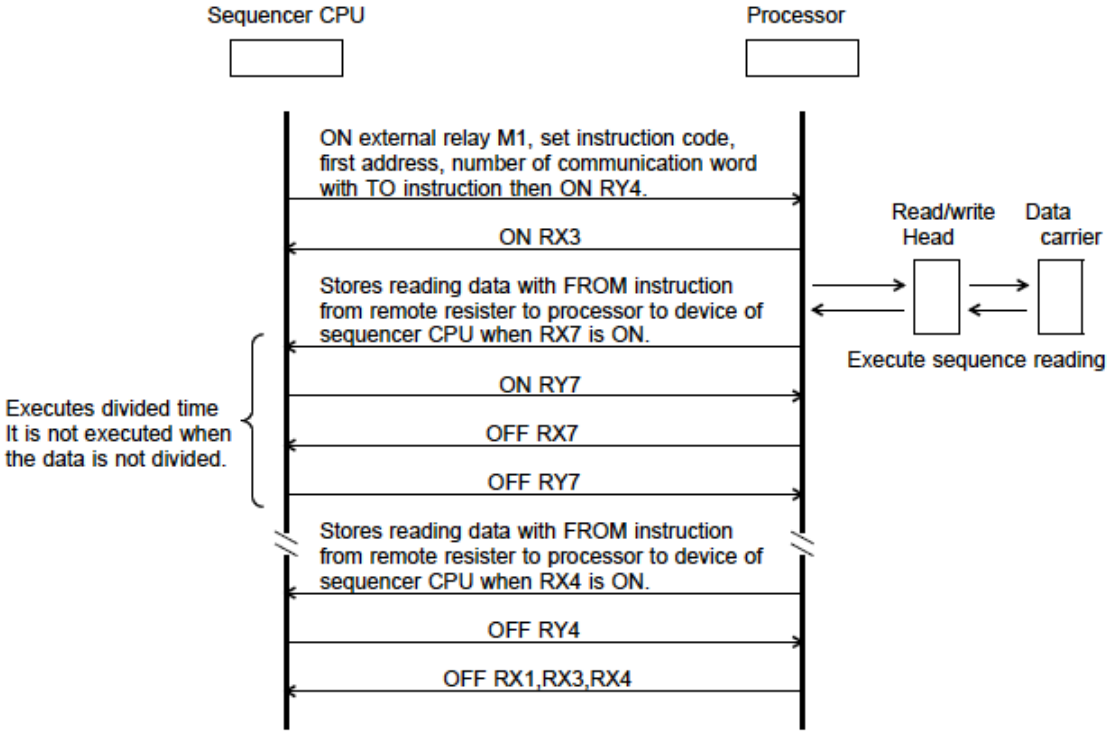
Sequence reading instruction: AR code: 5241H
SR code: 5253H

(1) Operation timing
The following chart shows operation timing.



(2) Explanation of operation

The following explains operation of the timimg chart.

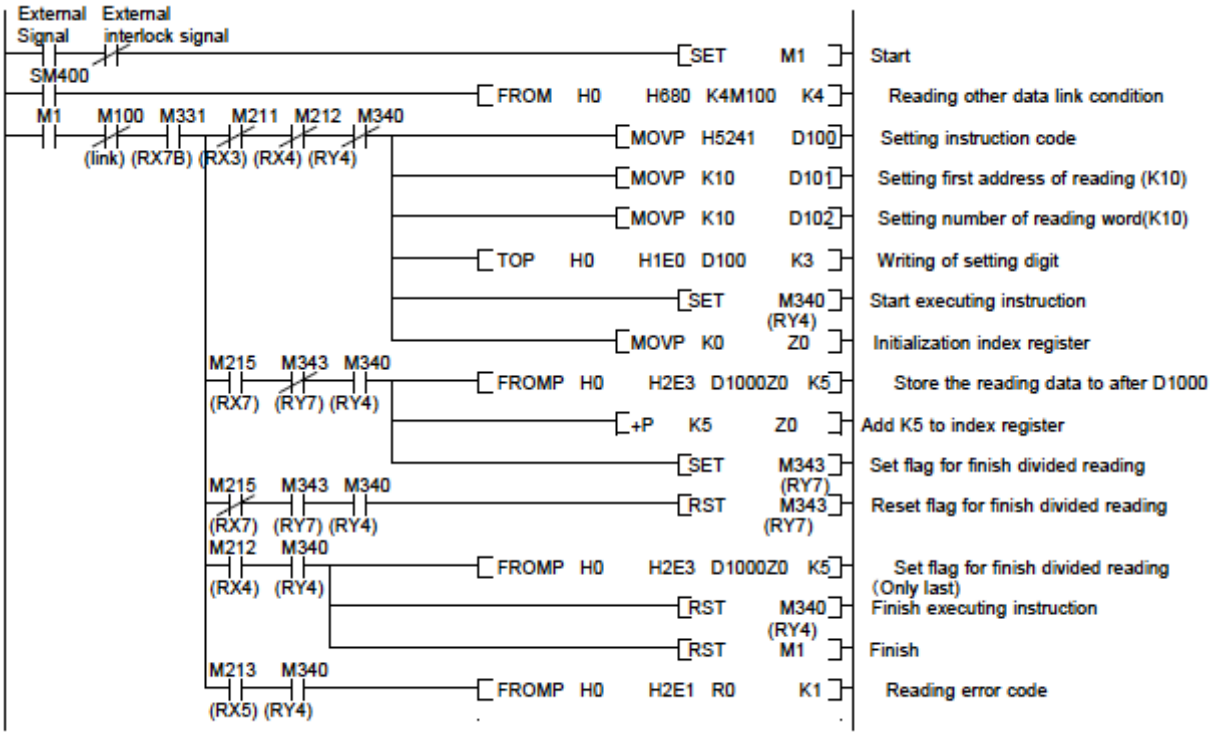


<Attention>
Sequence reading (AR, SR) executes reading in sequence until data carrier gets into communication area. Reading is executed eternally when data carrier does not get into communication area.
Execute sequence instruction cancellation to stop execution. (Refer to 10.12)

(3) Example of programming

The example is programmed on the following condition.
(Comparing result signal (RX1) is not used in the following program.)

Using head Head1
Instruction code ..... AR (5241H)
First reading address of data carrier 10
Number of reading word 10
Store area of reading data ..... D1000...D1009
Store area of error code R0



10.8 Writing Data Instruction

The following explains the instructions to write data to data carrier.

10.8.1 Writing *instruction* (WD,CW)

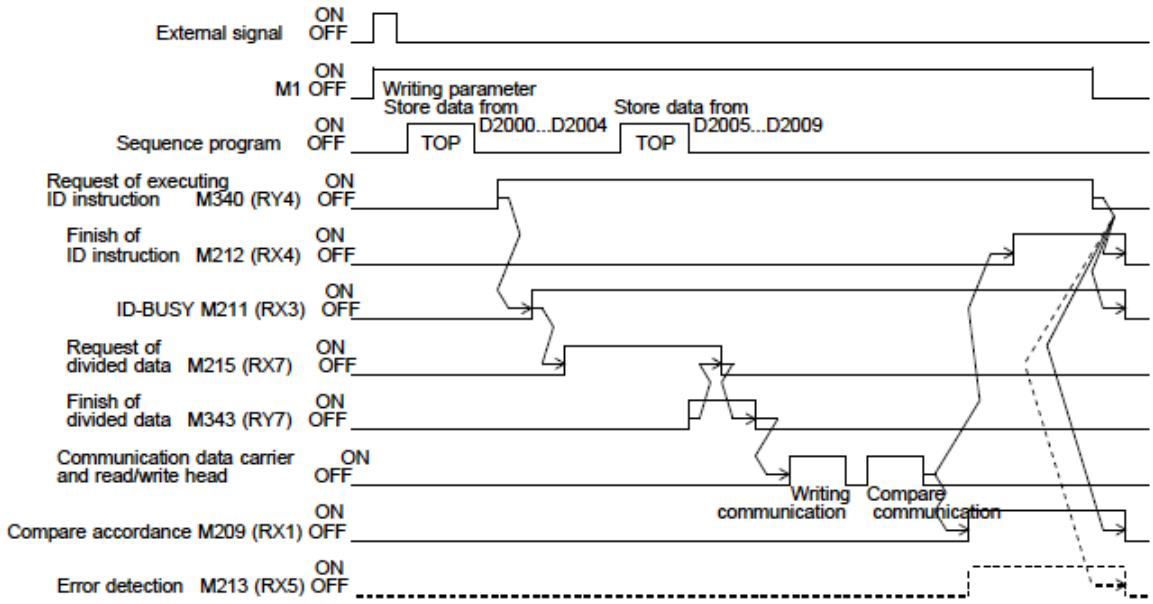
Execute writing data to data carrier.

< Writing instruction (WD, CW)>
Write data that stored in remote register to data carrier.
Stores the data read from data carrier to remote register in processor.
Reads data out to check data and compares the data after writing.

Instruction code

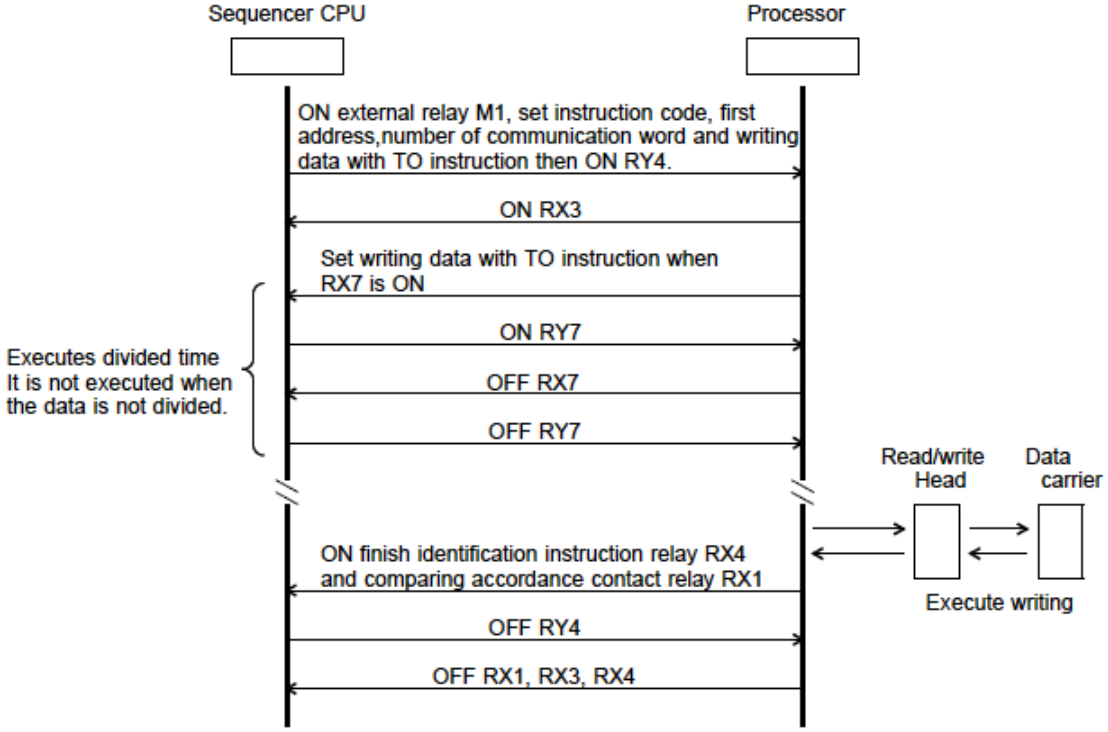
Writing instruction : WD Code: 4457H
CW Code: 5743H

(1) Operation timing
The following chart shows operating timing.



(2) Explanation of operating

The following explains operation of the timimg chart.

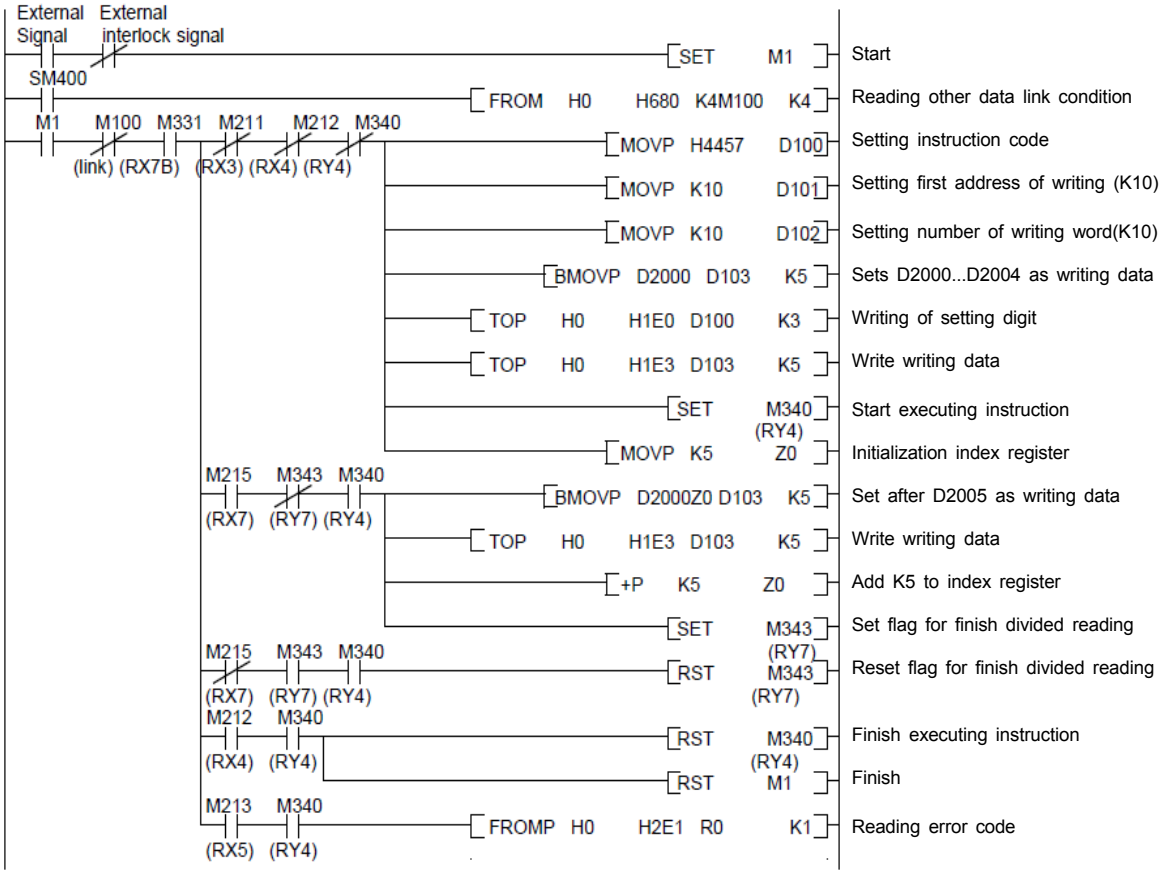


<Attention>
When area for writing is including write protection area, write protection error occurs. (It does not execute writing to area except write protection area.)
It executes instructions for the number of retry times and occurs error in the case of data carrier is not present when writing instruction (WD, CW) is executed.

(3) Example of programming

The example is programmed on the following condition.
(Comparing result signal (RX1) is not used in the following program.)

Using head Head1
Instruction code ..... WD (4457H)
First writing address of data carrier 10
Number of writing word 10
Store area of writing data ..... D2000...D2009
Store area of error code R0



10.8.2 Sequence Writing Instruction (AW, SW)

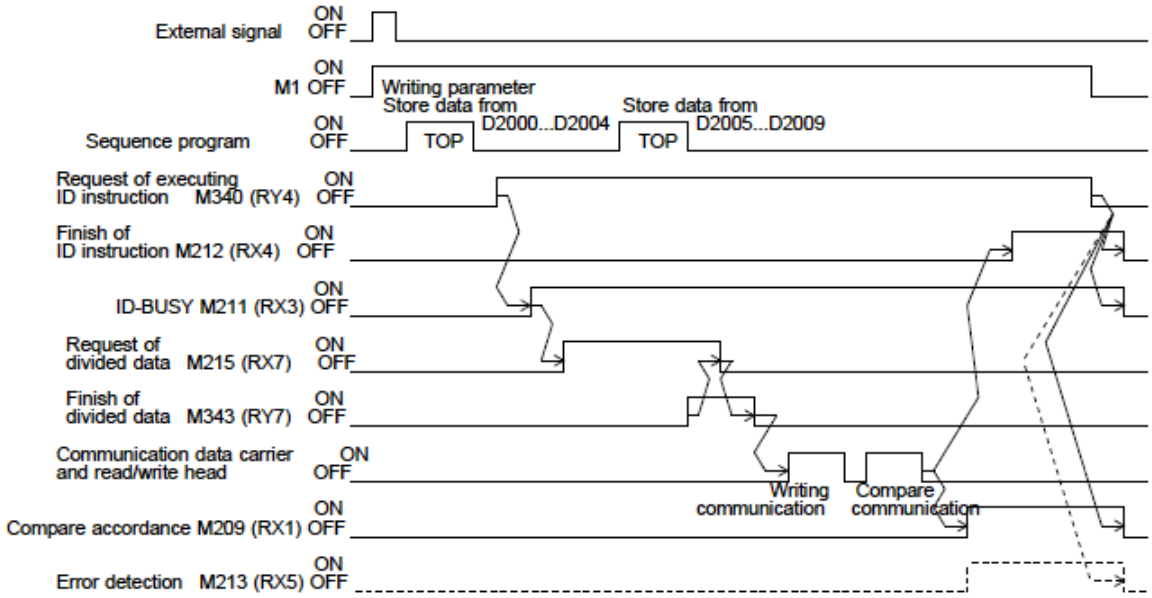
When using the sequence writing instruction, writing data is executed when data carrier enters communication a rea.

< Sequence Writing Instruction (AW,SW) >
Executes writing in sequence until data carrier gets into communication area .
Writes the data that stored in remote register of processor when data carrier gets into communication area.
After that, read data out to check, and compares the data.

Instruction code

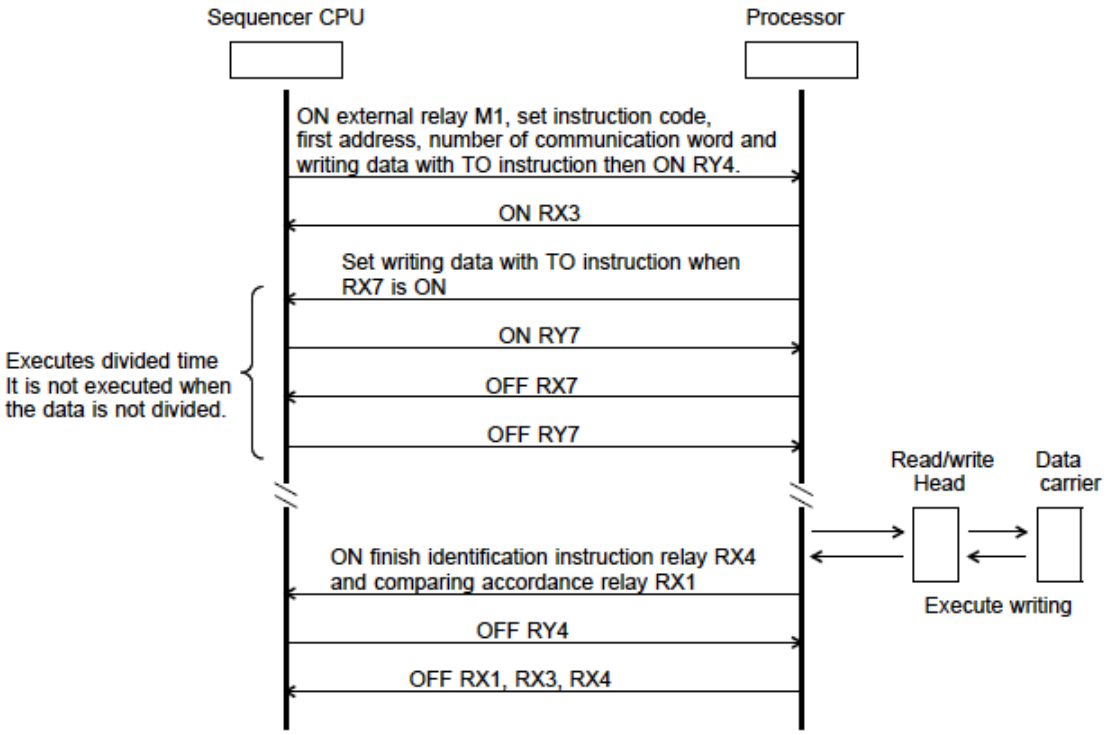
Sequence Writing Instruction : AW code: 5741H
SW code: 5753H

(1) Operation timing
The following chart shows operating timing.



(2) Explanation of operating

The following explains operation of the timimg chart.

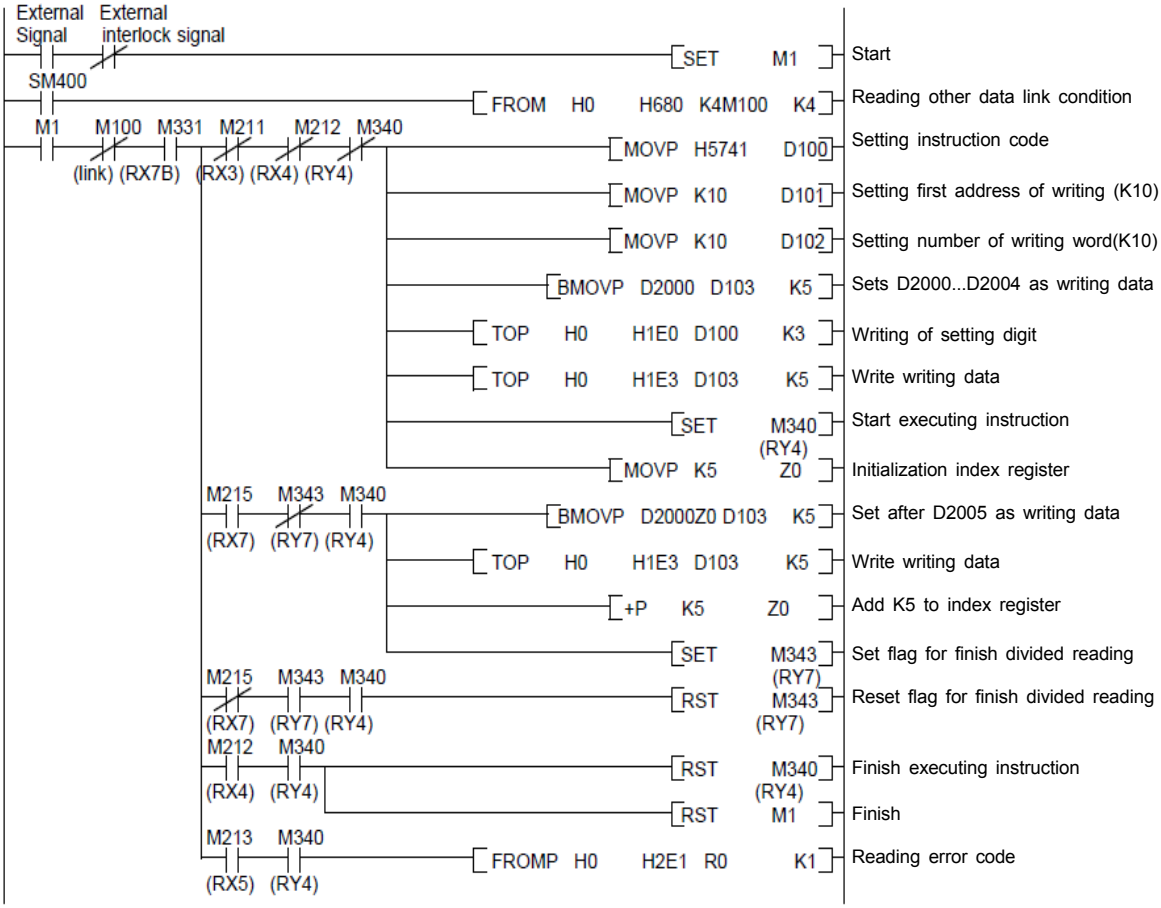


<Attention>
When a write command includes the area that is write protected, a wirte protection error occurs.
(It does not execute writing to area except write protection area.)
Sequence writing (AW, SW) executes writing in sequence until data carrier gets into communication area. Writing is executed eternally when data carrier does not get into communication area.
Execute sequence instruction cancellation to stop execution. (10.12)

(3) Example of programming

The example is programmed on the following condition.
(Comparing result signal (RX1) is not used in the following program.)

Using head Head1
Instruction code ..... AW (5741H)
First writing address of data carrier 10
Number of writing words 10
Store area of writing data ..... D2000...D2009
Store area of error code R0



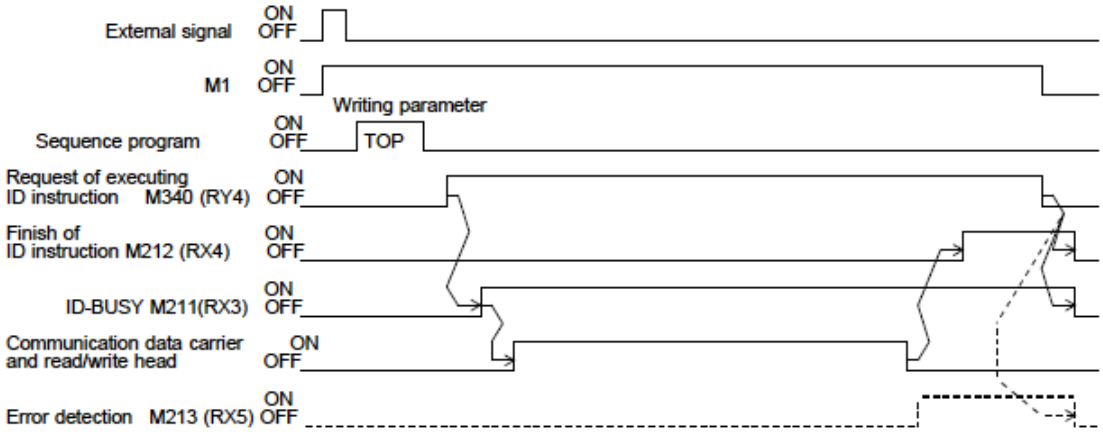
10.8.3 Batch Writing Instruction (FI)

Batch writing instruction clears the share of processing data from a specified address with 1-word specify data.
Use clear instruction (CL) to zero clear all data.

Instruction code

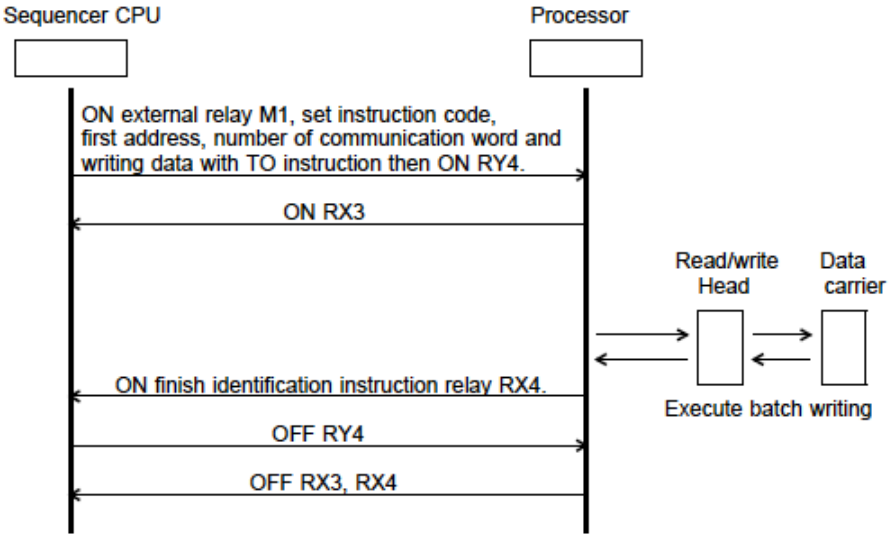
Instruction : FI Code : 4946H

(1) Operation timing
The following chrat shows operating timing.



(2) Explanation of operating

The following explains operation of the timimg chart.

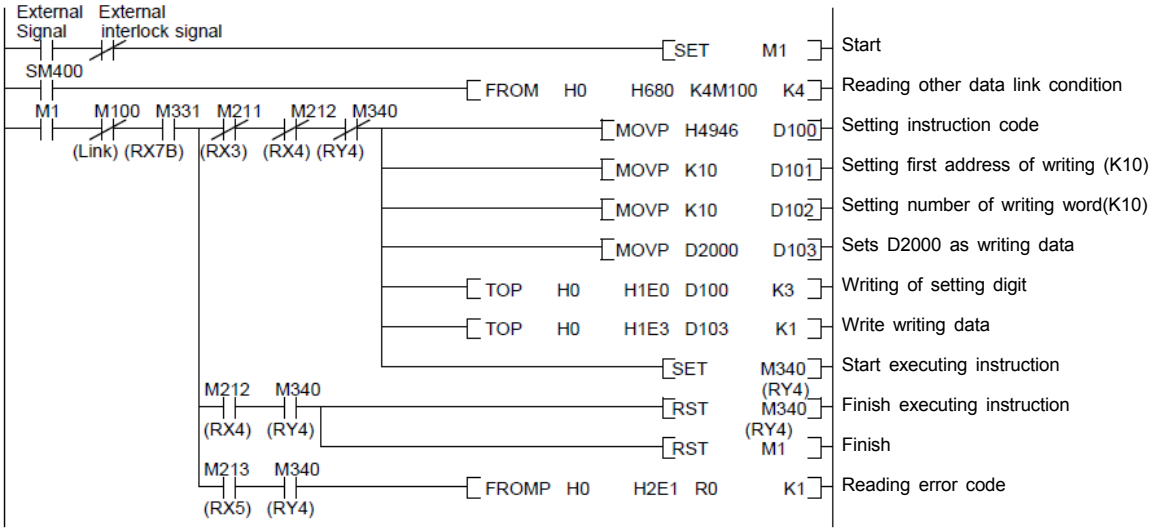


<Attention>
It executes instructions for the number of retry times and occurs error in the case of data carrier is not present when batch writing instruction (FI) is executed.
When area for writing is including write protection area, write protection error occurs. (It does not execute writing to area except write protection area.)

(3) Example of programming

The example is programmed on the following condition.

Using head Head1
Instruction code ..... FI (4946H)
First writing address of data carrier 10
Number of writing word 10
Store area of writing data D2000
Store area of error code R0



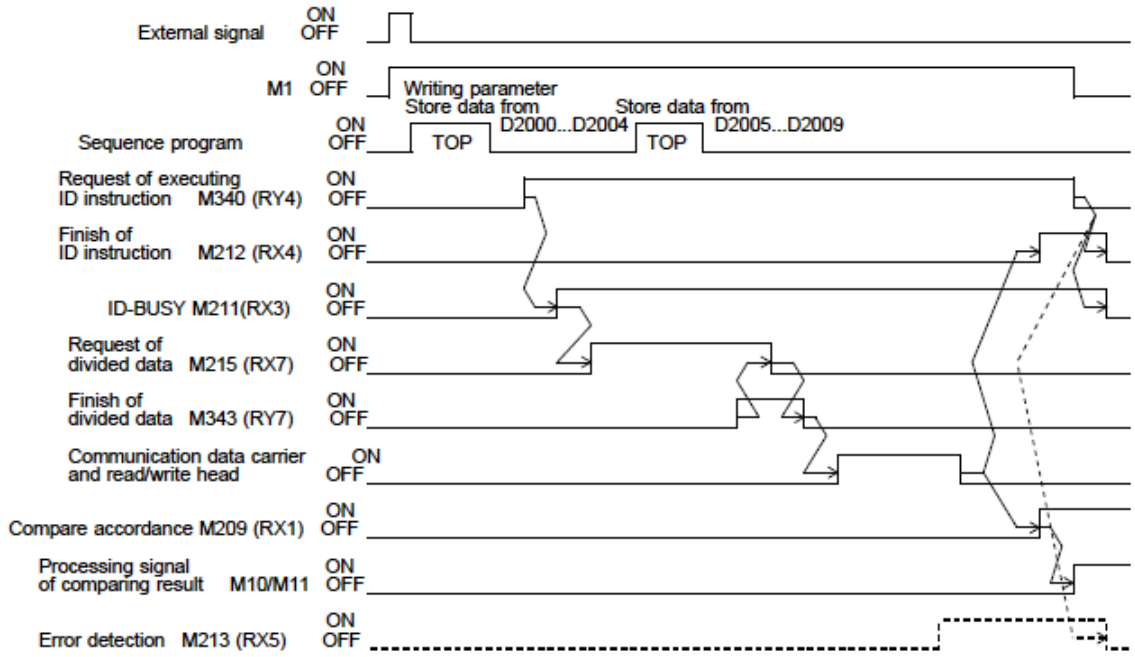
10.9 Comparison Instruction (CM)

Comparison instruction (CM) compares data that stores in remote register and data in data carrier so the comp ared
data can be checked as relay (RX1/RX9).

Instruction code

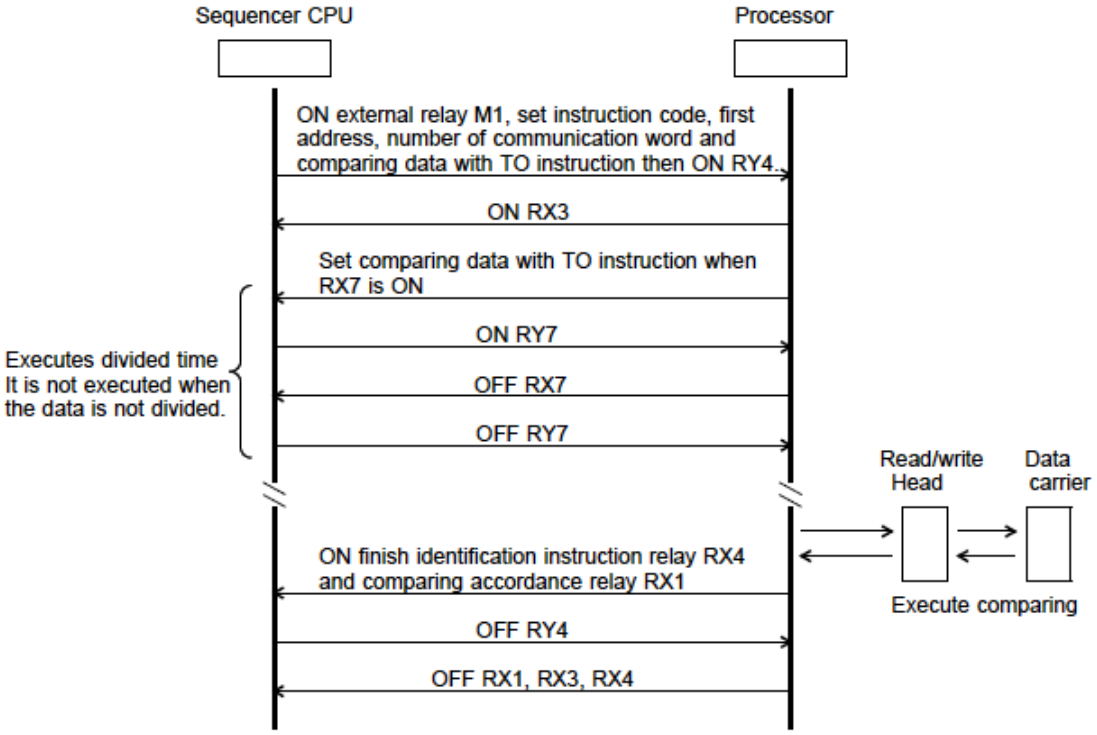
Instruction : CM Code : 4D43H

(1) Operation timing
The following chart shows operating timing.



(2) Explanation of operating

The following explains operation of the timimg chart.

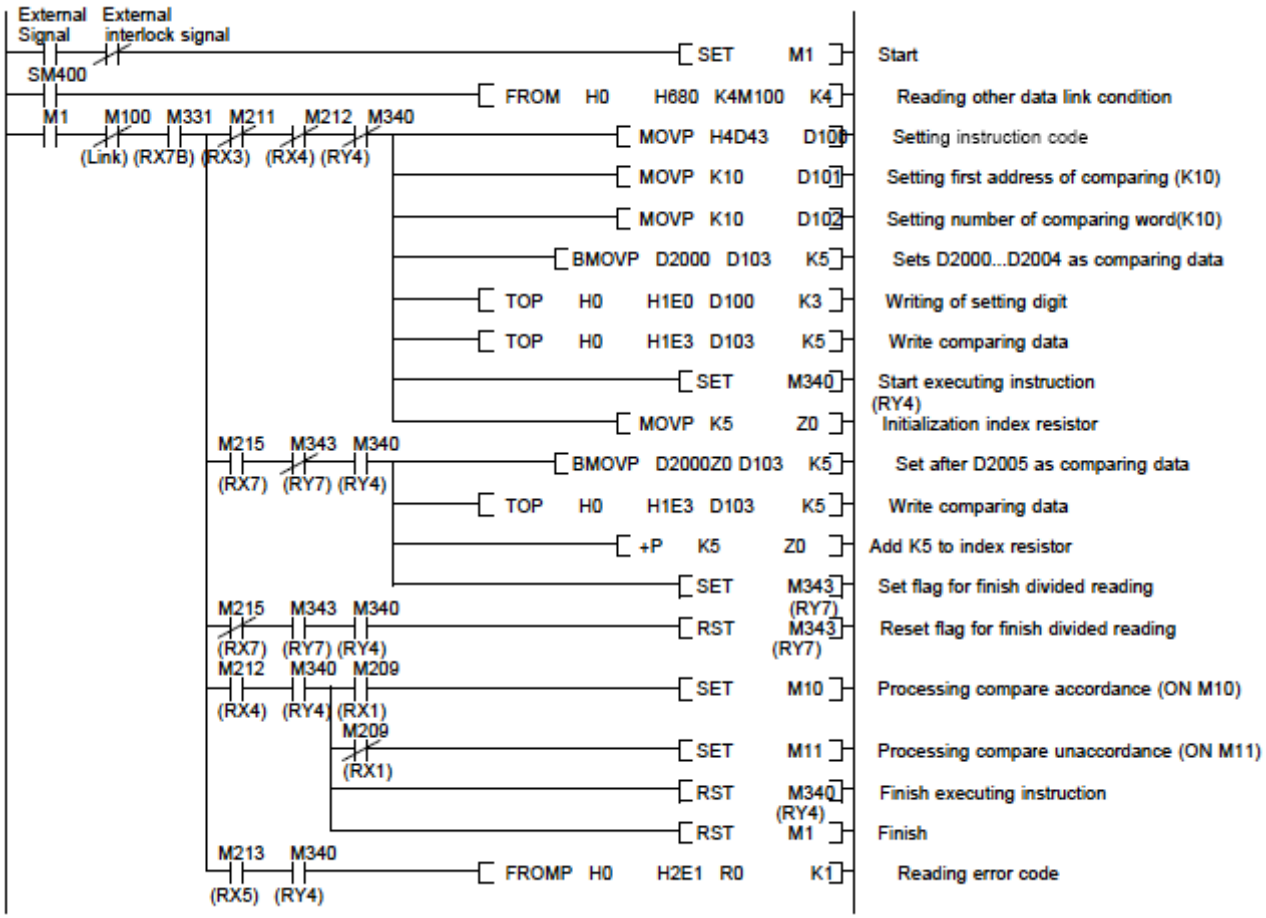


<Attention>
It executes instructions for the number of retry times and occurs error in the case of data carrier is not present when comparison instruction (CM) is executed.

(3) Example of programming

The example is programmed on the following condition.

Using head Head1
Instruction code ..... CM (4D43H)
First writing address of data carrier 10
Number of writing word 10
Store area of writing data D2000
Store area of error code R0



10.10 Clear Instruction (CL)

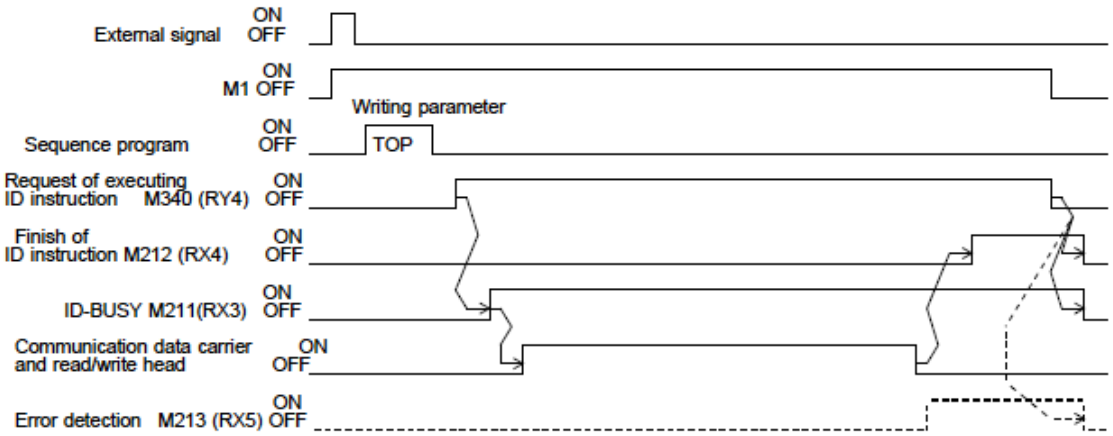
Clear instruction (CL) clears data number of processing with "0" from specified address.

Instruction code

Instruction : CL Code : 4C43H

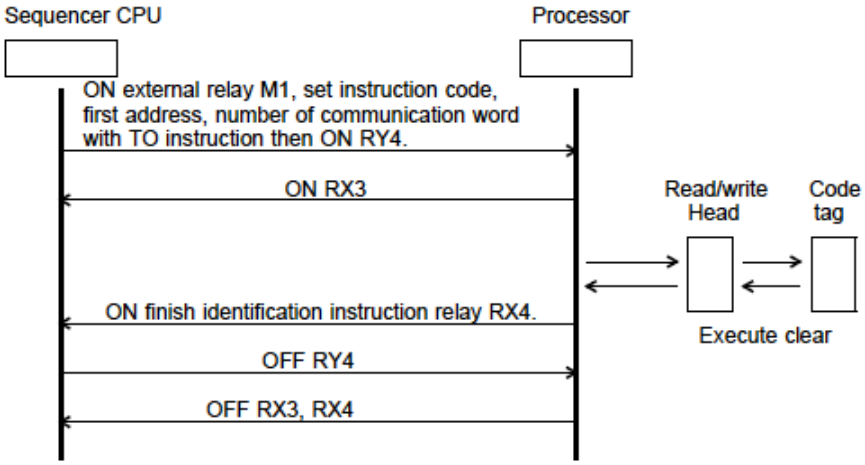
(1) Operation timing

The following chart shows operating timing.



(2) Explanation of operating

The following explains the timimg operation.



<Attention>

It executes instructions for the number of retry times and occurs error in the case of data carrier is not present when clear instruction (CL) is executed.

Clear instruction (CL) clears specified range data with "0". To clear data with specified data, use batch writing instruction (FI).

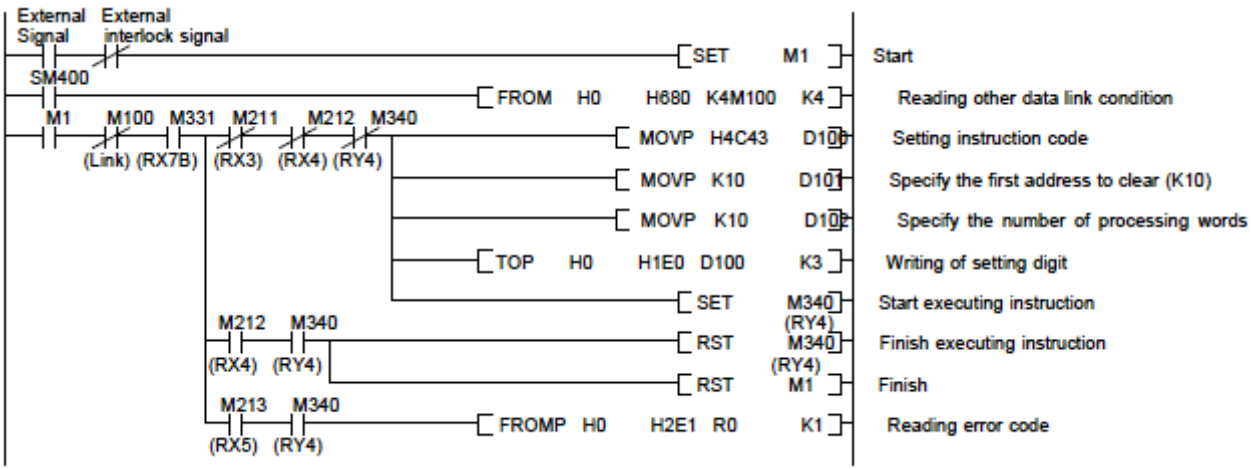
The area that set write protection is not cleared.

Write protection error does not occur.

(3) Example of programming

The example is programmed on the following condition.

Using head Head1
Instruction code ..... CL (4C43H)
First address of data carrier to clear 10
Number of processing words 10
Store area of error code R0



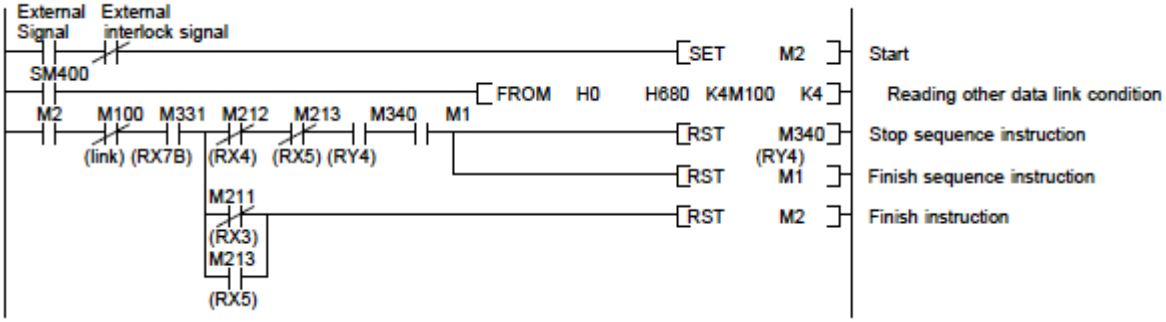
10.11 Stop Command of Sequence Instruction

Stop command of the sequence instruction stops the sequence instruction (AR, SR, AW, SW)

Example of programming

The example is programmed on the following condition.
(Program to stop sequence instructions that is written in this chapter.)

Using head Head1



<Attention>
Reset instruction after timer counting in the case of stop command of sequence instruction is executed while the timer of executing interval of sequence instruction is operating.

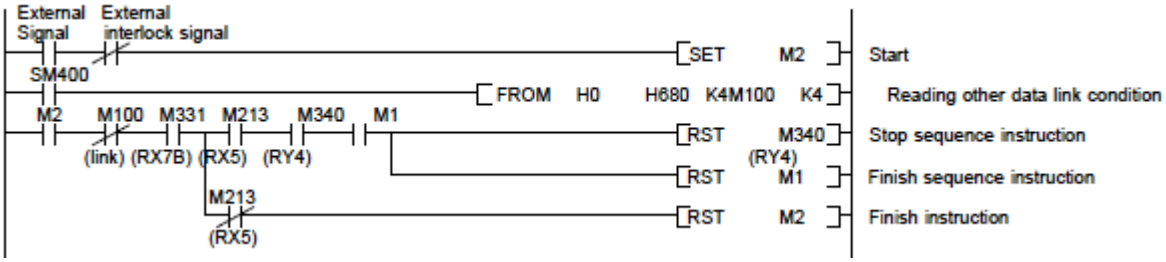
10.12 Error Cancellation Instruction

Error cancellation instruction cancels the error that occurred.

Example of programming

The example is programmed on the following condition.
(Program to cancel error that occurred in using instructions written in this chapter.)

Using head Head1



11. Trouble Shooting

Error that occurred in using this controller (BIS M-699) and trouble shooting is explained in this chapter.

11.1 List of Error Code

Errors that occurred in using this controller (BIS M-699), error, processing procedure are indicated below.
The newest error code is stored in the stored area for executing result.
The following digits are stored in ** of error code.

- All instructions"""00H
- RD"""""01H
- WD"""""02H
- AR"""""03H
- AW"""""04H
- CM"""""05H
- CL,FI"""06H
- CR"""""0BH
- CW"""""0CH
- SR"""""0DH
- SW"""""OEH

Error code Hex.	Error name	Error contents	LED	Processing procedure
**01H	Number of executing word error	Number of specified address + word exceed 4096 words.	ID-ERR.	Check "number of address + word" are not exceed the last address (1000)
**03H	Write protect setting switch error	Write Block setting switch exceeds setting range.		Check Write Block setting switch does not exceed setting range.
**11H	Set address error	Setting address exceeds setting range.		Check "address" of sequence program does not exceed setting range of address.
**12H	Number of setting word error	Setting word digit exceeds setting range.		Check "word digit" of sequence program does not exceed setting range of word digit.
**13H	data carrier unpresent error	data carrier is unpresent in communication area. R/W head cable breakage.		Put data carrier into communication area. Check wiring of read/write head.
**14H	data carrier communication error	Error occurs while communicating with data carrier		Check communication distance of data carrier and center off-set.
**16H	Write protection error	Executed writing to write protection area.		Check "address" and "address + communication word digit" are not in write protection area.
**22H	Instruction code error	Set instruction code that is not defined.		Check instruction code.

11.2 Trouble Shooting

11.2.1 Confirming Procedure with LED indicator

Confirmation procedure on LED indicator is indicated below.
Refer to the following table for the proper procedure.

(1) LED "PW" turns off

	Points to be checked	Procedure
1.	Power is supplied or not.	Supply power.
2.	Polarity of external power supply is appropriate or not.	Connect polarity of external power supply appropriately
3.	Wiring is correct or not.	Check for correct wiring.
4.	The voltage of external power supply is in the range of specification or not.	Adjust supply voltage per specification.
5.	Supply capacity is OK or not.	Calculate current consumption before selecting power unit.
6.	The LED does not turn on when power is supplied again after checking these points.	Possible hardware problem. Consult manufacture for details of the fault condition.

(2) LED "RUN" turns off

	Cause	Procedure
1.	"PW" LED is on or not.	Check the above procedure (1) LED "PW" turns off.
2.	Watch dog timer error occurred.	Reset hardware with reset switch.
3.	The LED does not turn on when power is supplied again after checking these points.	Possible hardware problem. Consult manufacture on detail of fault condition.

(3) LED "L RUN" turns off

	Cause	Procedure
1.	Watch dog timer error occurred.	Reset hardware with reset switch.
2.	Breakage or short circuit of cable.	Repair broken or short circuit cable.
3.	Master unit stops link.	Check master unit whether error occurred or not.
4.	Power is not supplied.	Check the voltage of 24V power unit.
5.	Station number is duplicated.	Correct station setting the duplicated units then supply power again or push reset switch.
6.	Setting switch (station number, transmitting rate) is out of range.	Correct switch setting (station number, transmitting rate) then supply power again or push reset switch.

(4) LED "L ERR." turns on

	Cause	Procedure
1.	Setting switch (station number, transmitting rate) is out of range.	Correct switch setting (station number, transmitting rate) then supply power again or push reset switch.

(5) LED "L ERR." blinks at fixed interval

	Cause	Procedure
1.	Setting switch (station number, transmitting rate) is changed.	Return the setting of switch. Supply power again or push reset switch to set the changed setting.
2.	Setting switch (station number, transmitting rate) is faulty.	There might be hardware fault. If the switch setting is not changed. Consult manufacture on details of fault condition.

(6) LED "L ERR." blinks at unsettled interval.

	Cause	Procedure
1.	Terminal resistor is not connected.	Check to see if the terminal resistor is connected or not. Connect terminal resistor when it is not connected, then supply power again or push reset switch.
2.	Unit or cable for CC-Link is affected by noise.	Ground to the protective ground conductor and both edges of the shield line of cable for CC-Link through SLD of each unit and FG. Ground FG terminal of unit surely. To make wiring in pipe, ground pipe surely.

(7) LED "ID- ERR." turns on

	Cause	Procedure
1.	Contents of error code	Confirm contents of error code. Check the sequence of the program, refer to procedure 11.1.
2.	Write protection setting switch is changed to out of range.	Reset switch setting in setting range. LED turns off when the setting is returned from former setting. LED blinks when the setting is changed in setting range, but different setting from former. Supply power again or push reset switch to set the changed setting.

(8) LED "ID- ERR." blinks

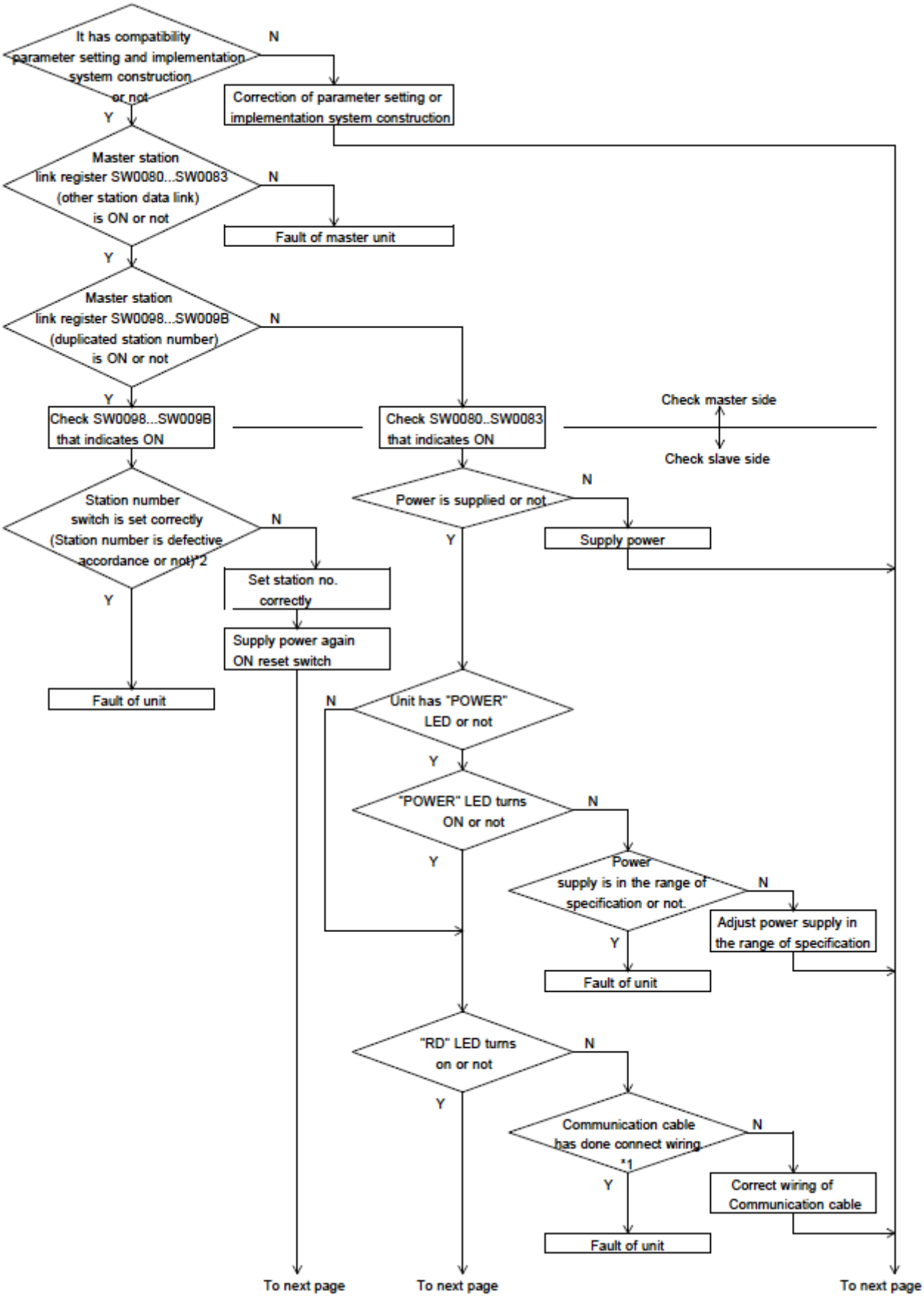
	Cause	Procedure
1.	Write protection setting switch is changed.	Return the switch setting. Supply power again or push reset switch to set the changed setting.
2.	It does not settle after checking these points.	Possible hardware problem. Consult manufacture on detail of fault condition.

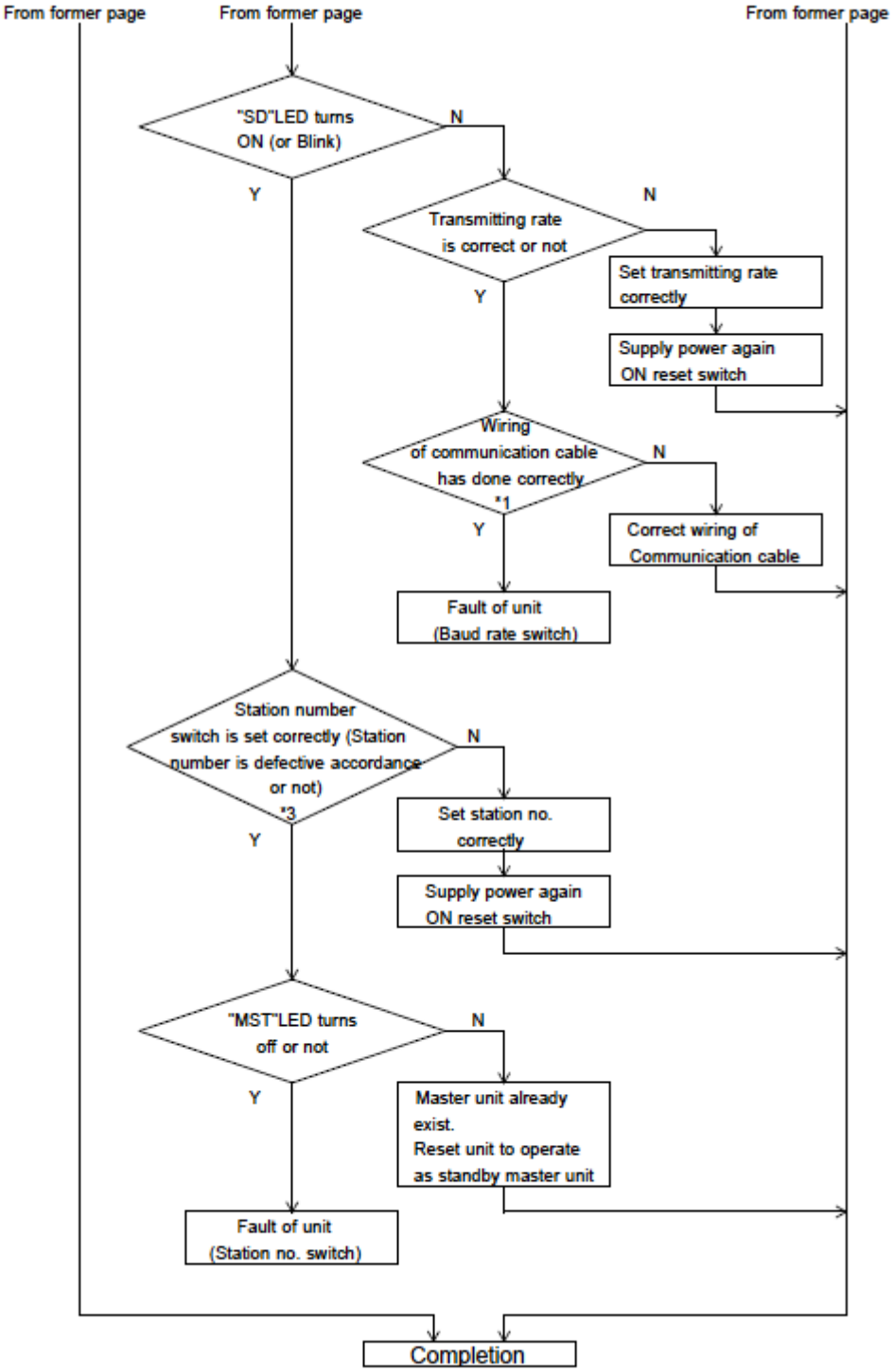
(9) LED "IN-Z" blinks

	Cause	Procedure
1.	Read/write head is connected correctly.	Check wiring.
2.	Wiring has done correctly.	Make the correct wiring. Check cable breakage.
3.	It does not settle after checking these points.	Read/write head might be faulty. Replace the Read/write head.

11.2.2 Procedure for Fault of Data Link

In the case of LED "ERR." of master unit blinks or, the system cannot transmit correct data in spite of data link, take proper procedure. Refer to the following trouble shooting.

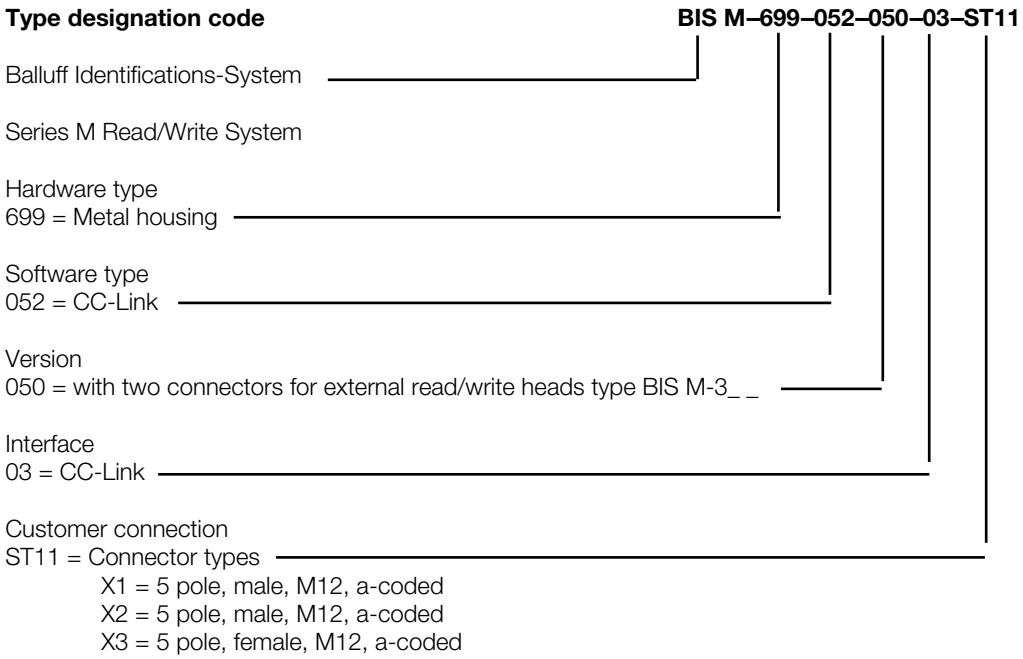




*1 : Check for short circuit, reversal connection, cable breakage, terminal resistor, FG connection, total extended distance, and distance between stations.
*2 : Part of station number setting is duplicated.
*3 : Station number setting is duplicated completely.

Appendix

A1 BIS M-699 Ordering information



A2 Accessories (optional, not included)

Type		Ordering code
Connector	for X1 female	BKS-S 79-00
	for X2 female	BKS-S 92-00
	for X3 male	BKS-S 94-00
CC-Link	cable	show Industrial Networking und Connectivity catalogue
	T- Adapter	show Industrial Networking und Connectivity catalogue
	Terminator	show Industrial Networking und Connectivity catalogue

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