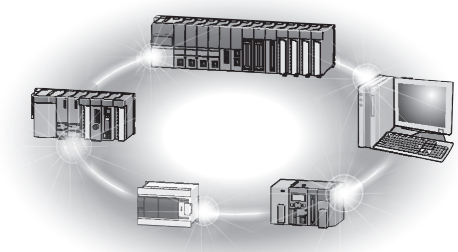
Mitsubishi Programmable Controller

High-Speed Counter Module Type AJ65BT-D62/AJ65BT-D62D/AJ65BT-D62D-S1 User's Manual



• SAFETY PRECAUTIONS •

(Read these precautions before using this product.)

Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.
The precautions given in this manual are concerned with this product only. For the safety precautions of the programmable controller system, refer to the user's manual for the CPU module used.
In this manual, the safety precautions are classified into two levels: "⚠WARNING" and "⚠CAUTION".

⚠WARNING	Indicates that incorrect handling may cause hazardous conditions, resulting in death or severe injury.
⚠CAUTION	Indicates that incorrect handling may cause hazardous conditions, resulting in minor or moderate injury or property damage.

Items marked with an exclamation point in a triangle ⚠ could also cause severe consequences, depending on the circumstances, if not handled properly.
They indicate information that should be taken seriously and observed conscientiously.
Manuals supplied with the products should be stored carefully where they can be accessed whenever necessary, and should always be passed on to the end user along with the equipment.

[Design Precautions]

⚠WARNING

- When a communication error occurs in data link, the faulty station will result in the following status. Using the communication status information, configure up an interlock circuit in the sequence program to make the system safe.
  Misoutput or misoperation may cause an accident.
  (1) General-purpose inputs from this module all switch off.
  (2) General-purpose outputs from this module all switch off.

- Some module failures may keep input/output on or off. Provide an external monitoring circuit for I/O signals which may lead to serious accidents.

⚠CAUTION

- Do not bundle control lines or communication cables with main circuit or power lines or lay them near these lines.
  As a guideline, separate the cables at least 100mm.
  Not doing so could result in noise that would cause erroneous operation.

[Security Precautions]

⚠WARNING

- To maintain the security (confidentiality, integrity, and availability) of the programmable controller and the system against unauthorized access, denial-of-service (DoS) attacks, computer viruses, and other cyberattacks from external devices via the network, take appropriate measures such as firewalls, virtual private networks (VPNs), and antivirus solutions.

[Installation Precautions]

⚠CAUTION

- Use the module in an environment that conforms to the general specifications in the manual. Otherwise, an electric shock, fire, misoperation or product damage or deterioration can occur.

- Securely fix the module using the DIN rail or mounting screws and fully tighten the mounting screws within the specified torque range.
  Undertightening can cause a drop or misoperation.
  Overtightening can cause a drop or misoperation due to damaged screws or module.

- Do not touch the conductive areas of the module directly.
  Otherwise, the module can misoperate or fail.

[Wiring Precautions]

⚠WARNING

- Before starting mounting, wiring or other work, always switch power off externally in all phases.
  Otherwise, an electric shock, product damage or misoperation may occur.
- When switching power on or starting operation after mounting, wiring or other work, always install the supplied terminal cover to the product.
  Otherwise, you may get an electric shock.

⚠CAUTION

- Be sure to shut off all phases of the external power supply used by the system before installation or wiring.
  Not doing so can cause the product to be damaged or malfunction.
- Ground the FG terminal to the protective ground conductor dedicated to the programmable controller.
  Failure to do so may result in electric shock or malfunction.
- Use applicable solderless terminals and tighten them with the specified torque. If any solderless spade terminal is used, it may be disconnected when the terminal screw comes loose, resulting in failure.
- Before wiring the module, confirm the rated voltage and terminal arrangement of the product.
  A fire or failure can occur if the power supply connected is different from the rating or wiring is incorrect.
- Tighten the terminal screws within the specified torque range.
  Undertightening can cause a short circuit or misoperation.
  Overtightening can cause a short circuit or misoperation due to damaged screws or module.
- Ensure that foreign matters such as chips and wire off-cuts do not enter the module.
  They can cause a fire, failure or misoperation.

[Wiring Precautions]

⚠CAUTION

- Always secure the wires or cables connected to the module, e.g. run them in conduits or clamp them.
  Otherwise, the module or cables can be damaged due to dangling, moved or accidentally pulled cables or misoperation can occur due to improper cable connection.

- Do not install the control lines or communication cables together with the main circuit lines or power cables.
  Failure to do so may result in malfunction due to noise.

- Do not hold the cable part when unplugging the communication or power cable connected to the module.
  When the cable is fitted with a connector, hold the connector of the cable part connected to the module.
  When the cable is not fitted with a connector, loosen the screw in the cable part connected to the module. If you pull the cable connected to the module, the module or cable can be damaged or misoperation can occur due to improper cable connection.

[Starting and Maintenance Precautions]

⚠WARNING

- Do not touch the terminals while power is on.
  This can cause misoperation.

- Before starting cleaning or terminal screw retightening, always switch power off externally in all phases.
  Otherwise, a module failure or misoperation can occur.

[Starting and Maintenance Precautions]

⚠CAUTION

- Do not touch the terminals while the power is on.
  Doing so may cause malfunction.

- Do not drop or apply strong shock to the module.
  Failure to do so may damage the module.

- Do not disassemble or modify the module.
  This can cause a failure, misoperation, injury or fire.

- The module case is made of resin. Do not drop it or give it hard impact.
  This can damage the module.

- Be sure to shut off all phases of the external power supply used by the system before mounting or dismounting the module to or from the panel.
  Not doing so can cause the module to fail or malfunction.

- Do not install/remove the terminal block more than 50 times after the first use of the product. (IEC 61131-2 compliant)

- Before handling the module, always touch grounded metal, etc. to discharge static electricity from the human body.
  Failure to do so can cause the module to fail or malfunction.

- The pulse/external input voltage setting pins must be set after switching power off externally in all phases.
  Otherwise, the module can fail or misoperate.

[Precautions Regarding Product Disposal]

⚠CAUTION

- When disposing of the product, handle it as industrial waste.

• CONDITIONS OF USE FOR THE PRODUCT •

(1) Mitsubishi programmable controller ("the PRODUCT") shall be used in conditions;
i) where any problem, fault or failure occurring in the PRODUCT, if any, shall not lead to any major or serious accident; and
ii) where the backup and fail-safe function are systematically or automatically provided outside of the PRODUCT for the case of any problem, fault or failure occurring in the PRODUCT.

(2) The PRODUCT has been designed and manufactured for the purpose of being used in general industries.
MITSUBISHI SHALL HAVE NO RESPONSIBILITY OR LIABILITY (INCLUDING, BUT NOT LIMITED TO ANY AND ALL RESPONSIBILITY OR LIABILITY BASED ON CONTRACT, WARRANTY, TORT, PRODUCT LIABILITY) FOR ANY INJURY OR DEATH TO PERSONS OR LOSS OR DAMAGE TO PROPERTY CAUSED BY the PRODUCT THAT ARE OPERATED OR USED IN APPLICATION NOT INTENDED OR EXCLUDED BY INSTRUCTIONS, PRECAUTIONS, OR WARNING CONTAINED IN MITSUBISHI'S USER, INSTRUCTION AND/OR SAFETY MANUALS, TECHNICAL BULLETINS AND GUIDELINES FOR the PRODUCT.
("Prohibited Application")
Prohibited Applications include, but not limited to, the use of the PRODUCT in;
- Nuclear Power Plants and any other power plants operated by Power companies, and/or any other cases in which the public could be affected if any problem or fault occurs in the PRODUCT.
- Railway companies or Public service purposes, and/or any other cases in which establishment of a special quality assurance system is required by the Purchaser or End User.
- Aircraft or Aerospace, Medical applications, Train equipment, transport equipment such as Elevator and Escalator, Incineration and Fuel devices, Vehicles, Manned transportation, Equipment for Recreation and Amusement, and Safety devices, handling of Nuclear or Hazardous Materials or Chemicals, Mining and Drilling, and/or other applications where there is a significant risk of injury to the public or property.

Notwithstanding the above, restrictions Mitsubishi may in its sole discretion, authorize use of the PRODUCT in one or more of the Prohibited Applications, provided that the usage of the PRODUCT is limited only for the specific applications agreed to by Mitsubishi and provided further that no special quality assurance or fail-safe, redundant or other safety features which exceed the general specifications of the PRODUCTs are required. For details, please contact the Mitsubishi representative in your region.

(3) Mitsubishi Electric shall have no responsibility or liability for any problems involving programmable controller trouble and system trouble caused by DoS attacks, unauthorized access, computer viruses, and other cyberattacks.

REVISIONS

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

Print Date	*Manual Number	Revision
Oct.,1997	IB(NA)-66823-A	First edition
Mar.,2000	IB(NA)-66823-B	Contents of 3.4 greatly changed Output signal list in 3.7 (2) modified Partial correction made to POINT in 7.3 Partial addition made to contents of 10.2 Partial addition made to Appendix 1 Partial correction made to 4.2.1 (2) Partial correction made to 11.3 (4)
Dec.,2003	IB(NA)-66823-C	Addition Conformation to the EMC Directive and Low Voltage Instruction Product configuration Partial Correction SAFETY PRECAUTIONS, About the Manuals, Section 2.1, 2.2, 3.1, 3.2, 3.4, 3.8, 4.2.1, 4.3, 4.4.1, 4.4.2, 9.1, 9.5, 11.3 Delete Section 1.2, 3.3, 3.4
Jul.,2005	IB(NA)-66823-D	Partial Correction SAFETY PRECAUTIONS, Section 3.5, 4.3, 4.4.6, 5.3, 9.1, 9.3, 9.4, 9.5
Mar.,2006	IB(NA)-66823-E	Partial Correction SAFETY PRECAUTIONS, Conformation to the EMC Directive and Low Voltage Instruction, Section 10.6.4
Sep.,2006	IB(NA)-66823-F	Partial Correction SAFETY PRECAUTIONS Addition Section 11.4 Section number change Section 11.4 → 11.5
Apr., 2012	IB(NA)-66823-G	Partial Correction SAFETY PRECAUTIONS, MANUALS, COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES, GENERAL NAME AND ABBREVIATION, Chapter 1, Section 1.1, 2.1, 2.2, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.8, 4.1, 4.2.1, 4.3, 4.4, 4.5, 4.6.1, 4.6.3, 4.6.4, 4.6.5, 5.1, 5.2, 5.3, 6.1, 6.1.1, 7.1, 7.2, 7.3, 8.1, 8.1.1, 9.1, 9.1.2, 9.3, 9.4, 10.2, 10.3.1 to 10.3.8, 10.4.1 to 10.4.8, 10.5.1 to 10.5.8, 10.6.1 to 10.6.8, 11.1, 11.4, Appendix 1, WARRANTY Addition CONDITIONS OF USE FOR THE PRODUCT Delete Section 4.6.1 Section number change Section 4.6.2 → 4.6.1, 4.6.3 → 4.6.2, 4.6.4 → 4.6.3, 4.6.5 → 4.6.4, 4.6.6 → 4.6.5

Print Date	*Manual Number	Revision
Oct.,2014	IB(NA)-66823-H	Partial Correction GENERAL NAME AND ABBREVIATION, Section 3.1, 3.2, 3.4, 4.3, 11.1, 11.3, 11.4, Appendix 1
Apr., 2024	IB(NA)-66823-I	Partial Correction SAFETY PRECAUTIONS, CONDITIONS OF USE FOR THE PRODUCT, Section 3.5, 4.6.1

Japanese Manual Version SH-3637-I

INTRODUCTION

Thank you for purchasing the Mitsubishi Electric MELSEC-A series programmable controllers.
Please read this manual carefully so that equipment is used to its optimum.
A copy of this manual should be forwarded to the end user.

CONTENTS

MANUALS

The manuals related to this product are listed below.
Please place an order as needed.

Related Manuals

Manual Name	Manual No. (Model Code)
CC-Link System Master · Local Module type AJ61BT11/A1SJ61BT11 User's Manual Describes the system configuration, performance specifications, functions, handling, wiring and troubleshooting of the AJ61BT11 and A1SJ61BT11. (Option)	IB-66721 (13J872)
CC-Link System Master · Local Module type AJ61QBT11/A1SJ61QBT11 User's Manual Describes the system configuration, performance specifications, functions, handling, wiring and troubleshooting of the AJ61QBT11 and A1SJ61QBT11. (Option)	IB-66722 (13J873)
CC-Link System Master/Local Module User's Manual Describes the system configuration, performance specifications, functions, handling, wiring and troubleshooting of the CC-Link module (Option)	SH-080394E (13JR64)
MELSEC-L CC-Link System Master/Local Module User's Manual Describes the system configuration, performance specifications, functions, handling, wiring and troubleshooting of the L26CPU-BT and LJ61BT11 (Option)	SH-080895ENG (13JZ41)
Type AnSHCPU/AnACPU/AnUCPU/QCPU-A (A Mode) Programming Manual (Dedicated Instructions) Describes the instructions extended for the AnSHCPU/AnACPU/AnUCPU. (Option)	IB-66251 (13J742)

COMPLIANCE WITH EMC AND LOW VOLTAGE DIRECTIVES

(1) Method of ensuring compliance
To ensure that Mitsubishi programmable controllers maintain EMC and Low Voltage Directives when incorporated into other machinery or equipment, certain measures may be necessary. Please refer to one of the following manuals.

- User's manual for the CPU module or head module used
- Safety Guidelines
  (This manual is included with the CPU module, base unit, or head module.)

The CE mark on the side of the programmable controller indicates compliance with EMC and Low Voltage Directives.

(2) Additional measures
To ensure that this product maintains EMC and Low Voltage Directives, please refer to one of the manuals listed under (1).

GENERAL NAME AND ABBREVIATION

Unless otherwise specified, this manual describes the AJ65BT-D62/AJ65BT-D62D/AJ65BT-D62D-S1 type high-speed counter module using general name and abbreviation described below:

General name/abbreviation	Description of general name and abbreviation
GX Developer	Product name of the software package for the MELSEC programmable controllers
GX Works2	
ACPU	General name of A0J2CPU, A0J2HCPU, A1CPU, A2CPU, A2CPU-S1, A3CPU, A1SCPU, A1SCPUC24-R2, A1SHCPU, A1SJCPU, A1SJCPU-S3, A1SJHCPU, A1NCPU, A2NCPU, A2NCPU-S1, A3NCPU, A3MCPU, A3HCPU, A2SCPU, A2HCPU, A2ACPU, A2ACPU-S1, A3ACPU, A2UCPU, A2UCPU-S1, A2ACPU, A2ACPU-S1, A2UHCPU-S1, A3UCPU and A4UCPU
QnACPU	General name of Q2ACPU, Q2ACPU-S1, Q2ASCPU, Q2ASCPU-S1, Q2ASHCPU, Q2ASHCPU-S1, Q3ACPU, Q4ACPU and Q4RCPU
QCPU (A mode)	General name of QO2CPU-A, QO2HCPU-A and QO6HCPU-A
QCPU (Q mode)	General name of Q00JCPU, Q00CPU, Q01CPU, Q02CPU, Q02HCPU, Q06HCPU, Q12HCPU, Q25HCPU, Q02PHCPU, Q06PHCPU, Q12PHCPU, Q25PHCPU, Q12PRHCPU, Q25PRHCPU, Q00UJCPU, Q00UCPU, Q01UCPU, Q02UCPU, Q03UDCPU, Q04UDHCPU, Q06UDHCPU, Q10UDHCPU, Q13UDHCPU, Q20UDHCPU, Q26UDHCPU, Q03UDECPU, Q04UDEHCPU, Q06UDEHCPU, Q10UDEHCPU, Q13UDEHCPU, Q20UDEHCPU, Q26UDEHCPU, Q50UDEHCPU, Q100UDEHCPU, Q03UDVCPU, Q04UDVCPU, Q06UDVCPU, Q13UDVCPU, and Q26UDVCPU
LCPU	General name of L02SCPU, L02CPU, L02CPU-P, L06CPU, L26CPU, L26CPU-BT, and L26CPU-PBT
Master station	Station that controls the data link system. 1 station is required for 1 system.
Local station	Station with programmable controller CPU that communicates with the master station and other local station.
Remote I/O station	Station that handles bit information only. (Input/output is performed with external devices.) (AJ65BTB1-16D, AJ65SBTB1-16D, etc.)
Remote device station	Station that handles bit information and word information. (Input/output with external devices, analog data conversion)
Remote station	General name of remote I/O station and remote device station. It is controlled by master station.
Intelligent device station	Station (e.g. AJ65BT-R2) that can perform transient transmission. (Including local station)
Master module	General name for modules that can be used as the master station
Local module	General name for modules that can be used as the local station
Remote module	General name of AJ65BTB1-16D, AJ65SBTB1-16D, AJ65BT-64AD, AJ65BT-64DAV, AJ65BT-64DAI, A852GOT, etc.
SB	Link special relay (for CC-Link) Bit information that indicates master station/local station module operation status and data link status. It is indicated by SB for convenience.
SW	Link special register (for CC-Link) 16 bit information that indicates master station/local station modul operation status and data link status. It is indicated by SW for convenience.
RX	Remote input (for CC-Link) Bit information input from the remote station to the master station. It is indicated by RX for convenience.
RY	Remote output (for CC-Link) Bit information output from the master station to the remote station. It is indicated by RY for convenience.
RWw	Remote register (write area for CC-Link) 16-bit information output from the master station to the remote device station. It is indicated by RWw for convenience.
RWr	Remote register (read area for CC-Link) 16-bit information input from the remote device station to the master station. It is indicated by RWr for convenience.

PACKING LIST

The following items are included in the package of this product.

Product name	Quantity
AJ65BT-D62 type high-speed counter module	1
AJ65BT-D62D type high-speed counter module	
AJ65BT-D62D-S1 type high-speed counter module	
AJ65BT-D62/AJ65BT-D62D/AJ65BT-D62D-S1 type high-speed counter module user's manual (Hardware)	1

MEMO

1. INTRODUCTION

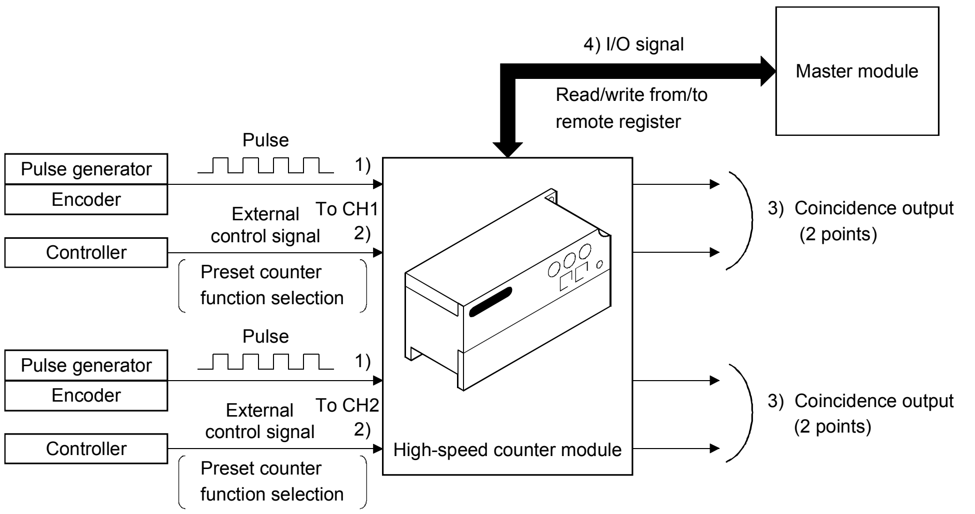
This user's manual describes specifications, handling, and programming of the AJ65BT-D62/ D62D/ D62D-S1 high-speed counter modules (hereafter abbreviated as high-speed counter module) to be used in a CC-Link system.
The high-speed counter module can import and count pulses of a pulse generator which cannot be imported by a programmable controller CPU.
The high-speed counter module can detect and count up to 400,000 pulses per second.
The high-speed counter module is available in the following three different types.

Item		AJ65BT-D62	AJ65BT-D62D	AJ65BT-D62D-S1
Type		DC input sink output type	Differential input sink output type	
External input	Preset	5/12/24VDC 2 to 15mA		Differential input
	Function start			5/12/24VDC 2 to 5mA
Max. counting speed		Max. 200kPPS	Max. 400kPPS	
CC-Link station type		Remote device station		
Counting range		24-bit binary (0 to 16777215)		
Counting switch-over		200k/10k	1 phase: 400k 2 phases: 300k /10k	

The high-speed counter module counts 1-phase and 2-phase pulse inputs as described below.

1-phase pulse input multiplied by one............Counts on the leading edge or trailing edge of a pulse.
1-phase pulse input multiplied by two ....Counts on the leading edge and trailing edge of a pulse.
2-phase pulse input multiplied by one............Counts on the leading edge or trailing edge of a phase A pulse.
2-phase pulse input multiplied by two ....Counts on the leading edge and trailing edge of a phase A pulse.
2-phase pulse input multiplied by four............Counts on the leading edge and trailing edge of phase A and phase B pulses.

The following diagram outlines how the high-speed counter module operates.



* Only the AJ65BT-D62D-S1 accepts one input and provides one coincidence output. However, it can use two points for the counter value magnitude comparison (coincidence, greater, less) signals.

1) Pulses input to the high-speed counter module are counted.

2) The preset or counter function can be selected with an external control signal.

3) The pulse is compared as a coincidence output with the present count value and a signal is issued accordingly.

4) The sequence program can be used to confirm the I/O signals and remote register status of the high-speed counter module and to start, stop and preset the counter.

1.1 Features

The high-speed counter module has the following features.

(1) Pulses can be counted in a wide range from 0 to 16777215.
The count value is stored in 24-bit binary.

(2) Count value can be multiplied.
Multiplication by either one or two can be selected for 1-phase pulse inputs, or multiplication by one, two or four for 2-phase pulse inputs.

(3) Maximum counting speed can be switched.
Since the maximum counting speed of either 400k (200k for the D62) or 10k can be selected, pulses can be counted without errors on gentle leading and trailing edges.

(4) Coincidence output is available.
ON/OFF signals are issued according to the comparison between the preset output status of a selected channel and the present counter value.
One module can accept two inputs and issues two outputs to one input, which can serve as upper and lower limit signals.
The AJ65BT-D62D-S1 accepts one input and provides one coincidence output. Note that it can use two points for counter value (coincidence, greater, less) signals.

(5) Ring counter function is available.
Counting repeats between the preset value and the ring counter value, and this function is effective in controlling fixed-pitch feed.

(6) Four counter functions are available.
Any of the following functions can be selected and used.

(a) Latch counter function .... Latches the present counter value in response to an input signal.

(b) Sampling counter function .... Counts incoming pulses within the preset period of time starting from a signal input.

(c) Periodic pulse counter function .... Stores the present and previous counter values at preset intervals during a signal input.

(d) Count disable function .... Stops pulse counting with an input signal entered while the count enable command is on.

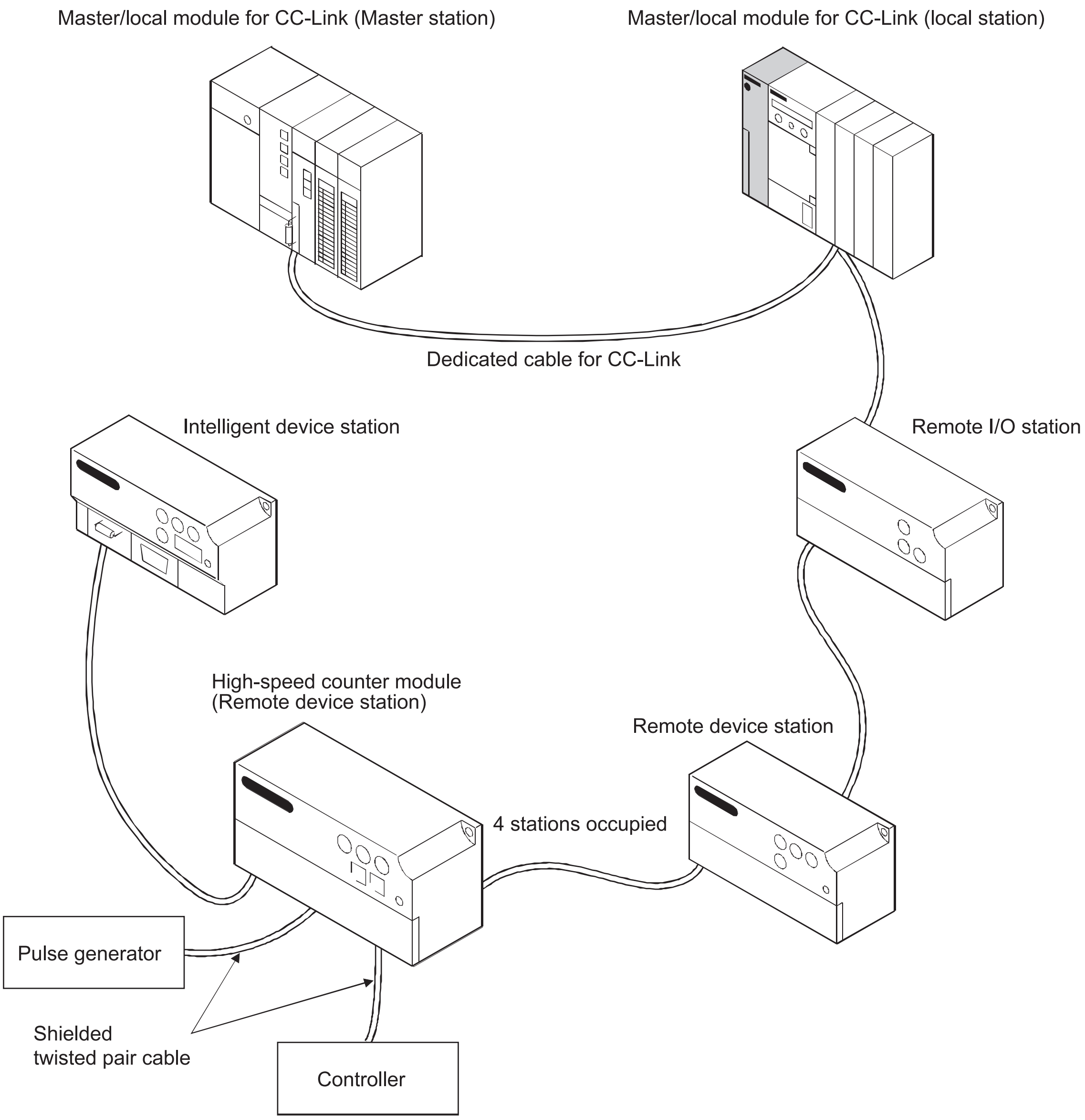
(7) The preset function or counter function selection can be executed using external control signals.
(a) Applying voltage to the PRESET (Preset) terminal executes the preset function.
(b) Applying voltage to the F.START (Function start) terminal executes counter function selection and the selected function.
These functions are used to eliminate the influence of scan time.

2. SYSTEM CONFIGURATION

This chapter describes a system configuration using the high-speed counter module.

2.1 Overall Configuration

The overall configuration using the high-speed counter module is shown below.



2.2 Applicable System

Application system is described.

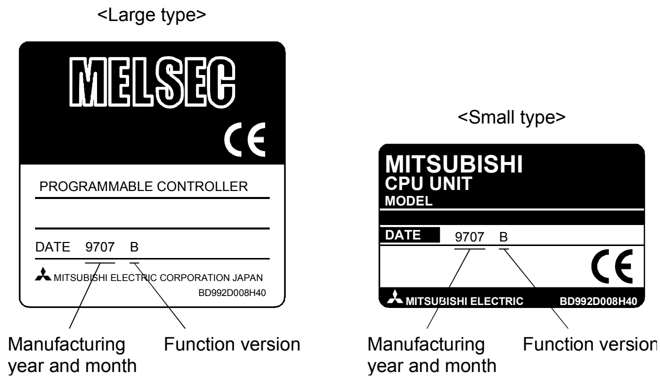
(1) Applicable master module
For available master modules, visit the CC-Link Partner Associations (CLPA) website at:
http://www.cc-link.org/

REMARK

Check the specifications of the master module before use.

POINT

When AJ61BT11, A1SJ61BT11, AJ61QBT11 and A1SJ61QBT11 are used, be sure to use the type with the number (9707 B or later) in the date column of the rating nameplate shown below. The system cannot be used with the module which does not indicate "9707 B" in the date column.



(2) Limitations for use of dedicated command (RLPA, RRPA) for CC-Link
The dedicated command (RLPA, RRPA) for CC-Link may not be used depending on the programmable controller CPU and the master module.
For details of limitations, refer to the A series master module user's manual (Detail) and the AnSHCPU/AnACPU/AnUCPU programming manual (Dedicated command).
Dedicated commands other than RLPA and RRPA cannot be used on the high-speed counter module.
Refer to Section 10.5 for a program example using dedicated command (RLPA, RRPA).

3. SPECIFICATIONS

3.1 General Specifications

The following table lists the general specifications of the high-speed counter module.(common to the AJ65BT-D62, AJ65BT-D62D and AJ65BT-D62D-S1)

<table>
<tr><th>Item</th><th colspan="6">Specifications</th></tr>
<tr><td>Operating ambient temperature</td><td colspan="6">0 to 55°C</td></tr>
<tr><td>Storage ambient temperature</td><td colspan="6">-20 to 75°C</td></tr>
<tr><td>Operating ambient humidity</td><td colspan="6" rowspan="2">10 to 90%RH, non-condensing</td></tr>
<tr><td>Storage ambient humidity</td></tr>
<tr><td rowspan="5">Vibration resistance</td><td rowspan="5">Compliant with JIS B 3502 and IEC 61131-2</td><td></td><td>Frequency</td><td>Acceleration</td><td>Amplitude</td><td>Sweep Count</td></tr>
<tr><td rowspan="2">Under intermittent vibration</td><td>5 to 8.4Hz</td><td>———</td><td>3.5mm</td><td rowspan="2">10 times each in X, Y, Z directions</td></tr>
<tr><td>8.4 to 150Hz</td><td>9.8m/s^2</td><td>———</td></tr>
<tr><td rowspan="2">Under continuous vibration</td><td>5 to 8.4Hz</td><td>———</td><td>1.75mm</td><td rowspan="2">———</td></tr>
<tr><td>8.4 to 150Hz</td><td>4.9m/s^2</td><td>———</td></tr>
<tr><td>Shock resistance</td><td colspan="6">Compliant with JIS B 3502 and IEC 61131-2 (147 m/s^2, 3 times each in 3 directions X, Y, Z)</td></tr>
<tr><td>Operating atmosphere</td><td colspan="6">No corrosive gas</td></tr>
<tr><td>Operating altitude*1</td><td colspan="6">0 to 2000m</td></tr>
<tr><td>Installation location</td><td colspan="6">Inside control panel</td></tr>
<tr><td>Overvoltage category*2</td><td colspan="6">II or less</td></tr>
<tr><td>Pollution degree*3</td><td colspan="6">2 or less</td></tr>
</table>

*1 Do not use or store the programmable controller under pressure higher than the atmospheric pressure of altitude 0m. Doing so may cause malfunction. When using the programmable controller under pressure, please consult your local Mitsubishi Electric representative.

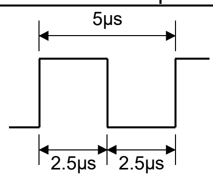
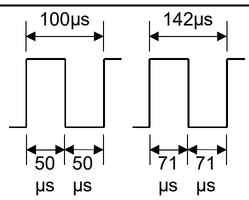
*2 This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within premises.
Category II applies to equipment for which electrical power is supplied from fixed facilities. The surge voltage withstand level for up to the rated voltage of 300V is 2500V.

*3 This index indicates the degree to which conductive material is generated in terms of the environment in which the equipment is used.
Pollution level 2 is when only non-conductive pollution occurs. A temporary conductivity caused by condensing must be expected occasionally.

3.2 Performance Specifications

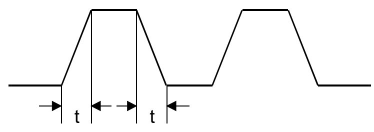
The following table gives the performance specifications of the high-speed counter module.

(1) Performance specifications of the AJ65BT-D62

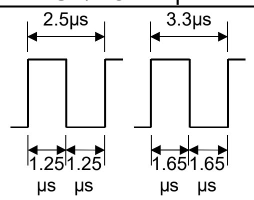
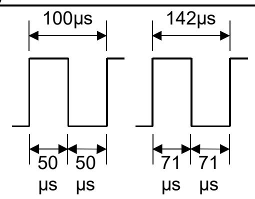
Item			Specifications	
Counting speed setting switch			HIGH position	LOW position
Number of channels			2 channels	
Count input signal	Phase		1-phase input, 2-phase input	
	Signal level (ϕA, ϕB)		5VDC, 12VDC, 24VDC } 2 to 5mA	
Counter	Counting speed (max.)*	1-phase input	200kPPS	10kPPS
		2-phase input	200kPPS	7kPPS
	Counting range		24-bit binary, 0 to 16777215	
	Type		UP/DOWN preset counter and ring counter functions	
	Minimum pulse width that can be counted (Adjust rise/fall time of input to 2.5μs or less. Duty ratio: 50%)		 (1, 2-phase input)	 (1-phase input) (2-phase input)
Coinciden-ce output	Comparison range		24-bit binary	
	Comparison result		Set value < count value, set value = count value, set value > count value	
External input	Preset		5/12/24VDC, 2 to 5mA	
	Function start			
	Response time		OFF→ON 0.5ms or less ON→OFF 3ms or less	
External output	Coincidence output		2A/1 common	
	Response time		0.1ms or less	
CC-Link station type			Remote device station	
Number of stations occupied			4 stations	
Connection cable			Dedicated cable for CC-Link	
Withstanding voltage			500VAC for 1 minute across all DC external terminals and grounding terminal.	
Insulation resistance			10MΩ or more across all DC external terminals and grounding terminal using a 500VDC insulation resistance tester.	
Noise immunity			Measure using a noise simulator of noise voltage 500Vp-p, noise width 1μs and noise frequency 25 to 60Hz.	
Terminal block			27-pin terminal block (M3.5×7 screws)	
Applicable cable size			0.75 to 2.00mm^2	
Applicable crimping terminal			RAV1.25-3, RAV2-3.5 (conforming to JIS C2805)	
Module mounting screws			Screws of M4×0.7mm×16mm or larger (tightening torque range: 0.78 to 1.18N・m) DIN rail may also be used for mounting.	
Applicable DIN rails			TH35-7.5Fe, TH35-7.5Al, (conforming to JIS C2812)	
External power supply			18 to 28.8VDC Current consumption: 70 mA (for 24VDC)	
Permissible instantaneous power fail-ure time			1ms	
Weight			0.41kg	

*Counting speed is influenced by pulse rise time and fall time. Countable speeds are as follows.
Note that counting of a pulse having long rise and fall times may result in miscounting.

Counting Speed Setting Switch	HIGH		LOW	
Rise/fall time	1-phase input	2-phase input	1-phase input	2-phase input
t=2μs or less	200kPPS	200kPPS	10kPPS	7kPPS
t=25μs or less	10kPPS	10kPPS	1kPPS	700PPS
t=500μs	——	——	500PPS	250PPS

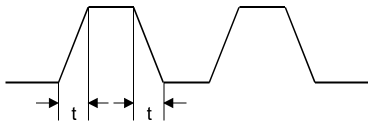


(2) Performance specifications of the AJ65BT-D62D

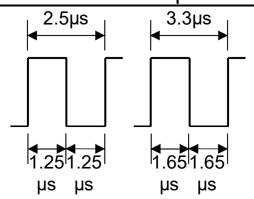
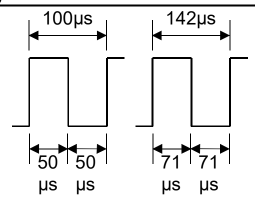
Item			Specifications	
Counting speed setting switch			HIGH position	LOW position
Number of channels			2 channels	
Count input signal	Phase		1-phase input, 2-phase input	
	Signal level (ϕA, ϕB)		EIA Standard RS-422-A differential type line driver level {equivalent to AM26LS31 (Japan Texas Instruments make)}	
Counter	Counting speed (max.)*	1-phase input	400kPPS	10kPPS
		2-phase input	300kPPS	7kPPS
	Counting range		24-bit binary, 0 to 16777215	
	Type		UP/DOWN preset counter and ring counter functions	
	Minimum pulse width that can be counted (Adjust rise/fall time of input to 0.1μs or less. Duty ratio: 50%)		 (1-phase input) (2-phase input)	 (1-phase input) (2-phase input)
Coinciden-ce output	Comparison range		24-bit binary	
	Comparison result		Set value < count value, set value = count value, set value > count value	
External input	Preset		5/12/24VDC, 2 to 5mA	
	Function start			
	Response time		OFF→ON 0.5ms or less ON→OFF 3ms or less	
External output	Coincidence output		2A/1 common	
	Response time		0.1ms or less	
CC-Link station type			Remote device station	
Number of stations occupied			4 stations	
Connection cable			Dedicated cable for CC-Link	
Withstanding voltage			500VAC for 1 minute across all DC external terminals and grounding terminal.	
Insulation resistance			10MΩ or more across all DC external terminals and grounding terminal using a 500VDC insulation resistance tester.	
Noise immunity			Measure using a noise simulator of noise voltage 500Vp-p, noise width 1μs and noise frequency 25 to 60Hz.	
Terminal block			27-pin terminal block (M3.5×7 screws)	
Applicable cable size			0.75 to 2.00mm^2	
Applicable crimping terminal			RAV1.25-3, RAV2-3.5 (conforming to JIS C2805)	
Module mounting screws			Screws of M4×0.7mm×16mm or larger (tightening torque range: 0.78 to 1.18N·m) DIN rail may also be used for mounting.	
Applicable DIN rails			TH35-7.5Fe, TH35-7.5Al, (conforming to JIS C2812)	
External power supply			18 to 28.8VDC	
			Current consumption: 100mA (for 24VDC)	
Permissible instantaneous power failure time			1ms	
Weight			0.42kg	

*Counting speed is influenced by pulse rise time and fall time. Countable speeds are as follows.
Note that counting of a pulse having long rise and fall times may result in miscounting.

Counting Speed Setting Switch	HIGH		LOW	
Rise/fall time	1-phase input	2-phase input	1-phase input	2-phase input
t=0.1μs or less	400kPPS	300kPPS	——	——
t=1.25μs or less	200kPPS	200kPPS	10kPPS	7kPPS
t=12.5μs or less	20kPPS	20kPPS	1kPPS	700PPS
t=250μs	——	——	500PPS	250PPS

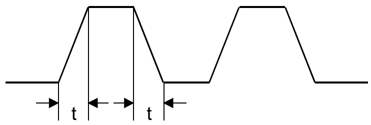


(3) Performance specifications of the AJ65BT-D62D-S1

Item			Specifications	
Counting speed setting switch			HIGH position	LOW position
Number of channels			2 channels	
Count input signal	Phase		1-phase input, 2-phase input	
	Signal level (ϕA, ϕB)		EIA Standard RS-422-A differential type line driver level {equivalent to AM26LS31 (Japan Texas Instruments make)}	
Counter	Counting speed (max.)*	1-phase input	400kPPS	10kPPS
		2-phase input	300kPPS	7kPPS
	Counting range		24-bit binary, 0 to 16777215	
	Type		UP/DOWN preset counter and ring counter functions	
	Minimum pulse width that can be counted (Adjust rise/fall time of input to 0.1μs or less. Duty ratio: 50%)		 (1-phase input) (2-phase input)	 (1-phase input) (2-phase input)
Coinciden-ce output	Comparison range		24-bit binary	
	Comparison result		Set value < count value, set value = count value, set value > count value	
External input	Preset		EIA Standard RS-422-A differential type line driver level {equivalent to AM26LS31 (Japan Texas Instruments make)}	
	Function start		5/12/24VDC, 2 to 5mA	
	Response time		OFF→ON 0.5ms or less ON→OFF 3ms or less	
External output	Coincidence output		2A/1 common	
	Response time		0.1ms or less	
CC-Link station type			Remote device station	
Number of stations occupied			4 stations	
Connection cable			Dedicated cable for CC-Link	
Withstanding voltage			500VAC for 1 minute across all DC external terminals and grounding terminal.	
Insulation resistance			10MΩ or more across all DC external terminals and grounding terminal using a 500VDC insulation resistance tester.	
Noise immunity			Measure using a noise simulator of noise voltage 500Vp-p, noise width 1μs and noise frequency 25 to 60Hz.	
Terminal block			27-pin terminal block (M3.5×7 screws)	
Applicable cable size			0.75 to 2.00mm^2	
Applicable crimping terminal			RAV1.25-3, RAV2-3.5 (conforming to JIS C2805)	
Module mounting screws			Screws of M4×0.7mm×16mm or larger (tightening torque range: 0.78 to 1.18N·m) DIN rail may also be used for mounting.	
Applicable DIN rails			TH35-7.5Fe, TH35-7.5Al, (conforming to JIS C2812)	
External power supply			18 to 28.8VDC	
			Current consumption: 120mA (for 24VDC)	
Permissible instantaneous power failure time			1ms	
Weight			0.42kg	

*Counting speed is influenced by pulse rise time and fall time. Countable speeds are as follows.
Note that counting of a pulse having long rise and fall times may result in miscounting.

Counting Speed Setting Switch	HIGH		LOW	
Rise/fall time	1-phase input	2-phase input	1-phase input	2-phase input
t=0.1μs or less	400kPPS	300kPPS	——	——
t=1.25μs or less	200kPPS	200kPPS	10kPPS	7kPPS
t=12.5μs or less	20kPPS	20kPPS	1kPPS	700PPS
t=250μs	——	——	500PPS	250PPS



3.3 Functions

The following table lists the high-speed counter module functions.

<table>
<tr><th colspan="2">Name</th><th>Description</th><th>Refer To</th></tr>
<tr><td colspan="2">Coincidence output function</td><td>Outputs an ON/OFF signal in a specified output status, comparing it with the present value.</td><td>Section 6.1</td></tr>
<tr><td colspan="2">Preset function</td><td>Counting alternates between the preset value and the ring counter value.
The preset operation can be done either by a sequence program or by an external preset input.</td><td>Section 7.1</td></tr>
<tr><td colspan="2">Ring counter function</td><td>Counting alternates between the preset value and the ring counter.</td><td>Section 8.1</td></tr>
<tr><td rowspan="4">Counter function selection</td><td>Count disable function</td><td>Stops counting pulses while the count enable command is ON.</td><td>Section 9.2</td></tr>
<tr><td>Latch counter function</td><td>Stores the present value of the counter into the remote registers when the signal of the counter function selection start command is input.</td><td>Section 9.3</td></tr>
<tr><td>Sampling counter function</td><td>After the signal of the counter function selection start command is input, input pulses are counted during a preset sampling period and stored into the remote registers.</td><td>Section 9.4</td></tr>
<tr><td>Periodic pulse counter function</td><td>While the signal of the counter function selection start command is input, input pulses are stored into the remote registers at preset intervals.</td><td>Section 9.5</td></tr>
</table>

POINT

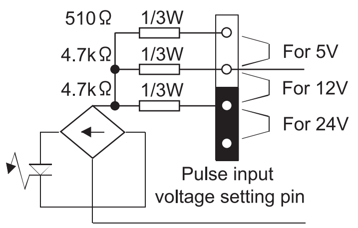
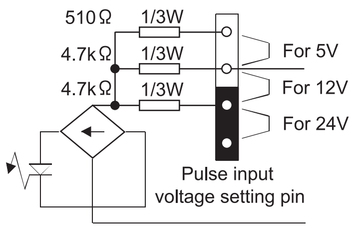
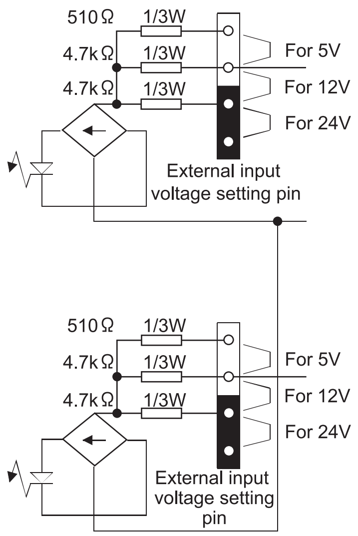
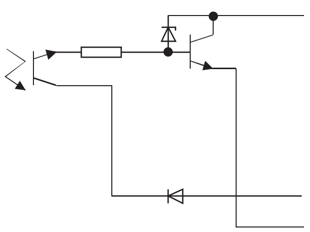
(1) These functions can be used together. However, only one function can be selected from the counter function selection.

(2) The preset function and counter function selection can be executed not only through a sequence program, but also through external input.
- To use the preset function, apply voltage to the PRESET terminal.
- To use a function from the counter function selection, apply voltage to the F.START terminal.

3.4 Interfaces with External Devices

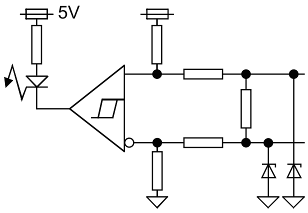
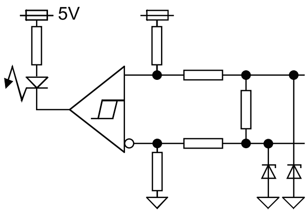
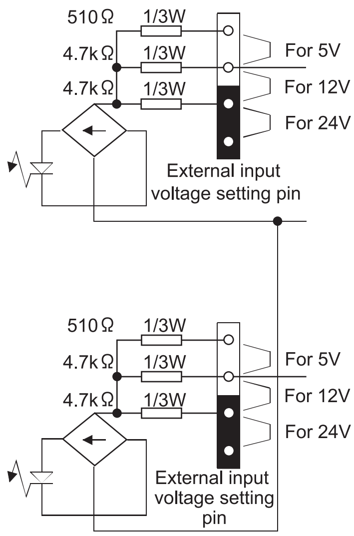
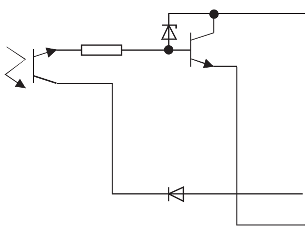
The following tables give lists of the interfaces of the high-speed counter module with external devices.

(1) Interfaces of the AJ65BT-D62 with external devices

Input/ Output	Internal Circuit	Terminal Number *1	Signal Name	ON/OFF	Input Voltage (Guaranteed)	Operating Current (Guaranteed)
Input		8 (15)	Phase A pulse input 24V	ON	21.6 to 26.4V	2 to 5mA
				OFF	5V or less	0.1mA or less
			Phase A pulse input 12V	ON	10.8 to 13.2V	2 to 5mA
				OFF	4V or less	0.1mA or less
			Phase A pulse input 5V	ON	4.5 to 5.5V	2 to 5mA
				OFF	2V or less	0.1mA or less
		9 (16)	Phase A pulse input COM			
		10 (17)	Phase B pulse input 24V	ON	21.6 to 26.4V	2 to 5mA
				OFF	5V or less	0.1mA or less
			Phase B pulse input 12V	ON	10.8 to 13.2V	2 to 5mA
				OFF	4V or less	0.1mA or less
			Phase B pulse input 5V	ON	4.5 to 5.5V	2 to 5mA
				OFF	2V or less	0.1mA or less
		11 (18)	Phase B pulse input COM			
Input		12 (19)	Preset input 24V	ON	21.6 to 26.4V	2 to 5mA
				OFF	5V or less	0.1mA or less
			Preset input 12V	ON	10.8 to 13.2V	2 to 5mA
				OFF	4V or less	0.1mA or less
			Preset input 5V	ON	4.5 to 5.5V	2 to 5mA
				OFF	2V or less	0.1mA or less
		13 (20)	COM	Respon-se time	OFF→ON 0.5ms or less	ON→OFF 3ms or less
Input		14 (21)	Function start input 24V	ON	21.6 to 26.4V	2 to 5mA
				OFF	5V or less	0.1mA or less
			Function start input 12V	ON	10.8 to 13.2V	2 to 5mA
				OFF	4V or less	0.1mA or less
			Function start input 5V	ON	4.5 to 5.5V	2 to 5mA
				OFF	2V or less	0.1mA or less
		——	——	Respon-se time	OFF→ON 0.5ms or less	ON→OFF 3ms or less
Output		22 (24)	EQU1	Operating voltage 10.2 to 30V Rated current 0.5A/point Max. inrush current 4A 10ms Max. voltage drop at ON 1.5V Response time OFF→ON 0.1ms or less ON→OFF 0.1ms or less		
		23 (25)	EQU2			
		26	12/24V	Input voltage 10.2 to 30V		
		27	0V	Current consumption 8mA(TYP 24VDC)		

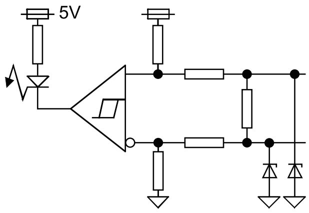
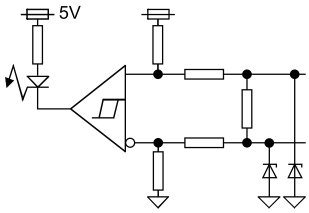
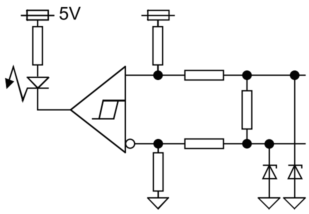
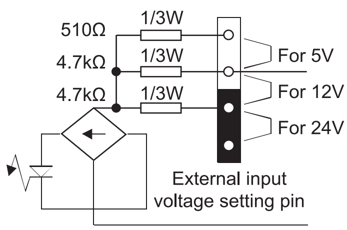
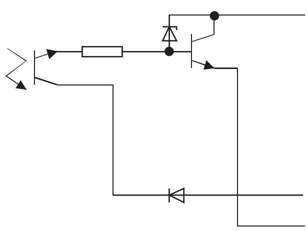
*1···The number within parentheses represents the terminal number of channel 2.

(2) Interfaces of the AJ65BT-D62D with external devices

Input/ Output	Internal Circuit	Terminal Number *1	Signal Name	ON/OFF	Input Voltage (Guaranteed)	Operating Current (Guaranteed)
Input		8 (15)	Phase A pulse input	EIA Standard RS-422-A line receiver (AM26C32 (manufactured by Texas Instruments Japan Limited.) or equivalent) The specifications of line receiver are as follows: • VIT+ differential input ON voltage (H level threshold voltage): 0.1V • VIT- differential input OFF voltage (L level threshold voltage): -0.1V • Vhys hysteresis voltage (VIT+ - VIT-): 60mV (A current type line driver cannot be used.)		
		9 (16)	Phase $\overline{A}$ pulse input			
		10 (17)	Phase B pulse input			
		11 (18)	Phase $\overline{B}$ pulse input			
Input		12 (19)	Preset input 24V	ON	21.6 to 26.4V	2 to 5mA
				OFF	5Vor less	0.1mA or less
			Preset input 12V	ON	10.8 to 13.2V	2 to 5mA
				OFF	4V or less	0.1mA or less
			Preset input 5V	ON	4.5 to 5.5V	2 to 5mA
				OFF	2V or less	0.1mA or less
		13 (20)	COM	Respon-se time	OFF→ON 0.5ms or less	ON→OFF 3ms or less
Input		14 (21)	Function start input 24V	ON	21.6 to 26.4V	2 to 5mA
				OFF	5V or less	0.1mA or less
			Function start input 12V	ON	10.8 to 13.2V	2 to 5mA
				OFF	4V or less	0.1mA or less
			Function start input 5V	ON	4.5 to 5.5V	2 to 5mA
				OFF	2V or less	0.1mA or less
		——	——	Respon-se time	OFF→ON 0.5ms or less	ON→OFF 3ms or less
Output		22 (24)	EQU1	Operating voltage 10.2 to 30V Rated current 0.5A/point Max. inrush current 4A 10ms Max. voltage drop at ON 1.5V Response time OFF→ON 0.1ms or less ON→OFF 0.1ms or less		
		23 (25)	EQU2			
		26	12/24V	Input voltage 10.2 to 30V		
		27	0V	Current consumption 8mA(TYP 24VDC)		

*1···The number within parentheses represents the terminal number of channel 2.

(3) Interfaces of the AJ65BT-D62D-S1 with external devices

<table>
<tr><th>Input/ Output</th><th>Internal Circuit</th><th>Terminal Number *1</th><th>Signal Name</th><th>ON/OFF</th><th>Input Voltage (Guaranteed)</th><th>Operating Current (Guaranteed)</th></tr>
<tr><td rowspan="4">Input</td><td rowspan="2"></td><td>8
(16)</td><td>Phase A pulse input</td><td colspan="3" rowspan="6">EIA Standard RS-422-A line receiver (AM26C32 (manufactured by Texas Instruments Japan Limited.) or equivalent)
The specifications of line receiver are as follows:
• VIT+ differential input ON voltage (H level threshold voltage): 0.1V
• VIT- differential input OFF voltage (L level threshold voltage): -0.1V
• Vhys hysteresis voltage (VIT+ - VIT-): 60mV
(A current type line driver cannot be used.)</td></tr>
<tr><td>9
(17)</td><td>Phase $\overline{A}$ pulse input</td></tr>
<tr><td rowspan="2"></td><td>10
(18)</td><td>Phase B pulse input</td></tr>
<tr><td>11
(19)</td><td>Phase $\overline{B}$ pulse input</td></tr>
<tr><td rowspan="2">Input</td><td rowspan="2"></td><td>12
(20)</td><td>Preset input</td></tr>
<tr><td>13
(21)</td><td>$\overline{\text{Preset}}$ input</td></tr>
<tr><td rowspan="7">Input</td><td rowspan="7"></td><td rowspan="6">14
(22)</td><td rowspan="2">Function start input 24V</td><td>ON</td><td>21.6 to 26.4V</td><td>2 to 5mA</td></tr>
<tr><td>OFF</td><td>5V or less</td><td>0.1mA or less</td></tr>
<tr><td rowspan="2">Function start input 12V</td><td>ON</td><td>10.8 to 13.2V</td><td>2 to 5mA</td></tr>
<tr><td>OFF</td><td>4V or less</td><td>0.1mA or less</td></tr>
<tr><td rowspan="2">Function start input 5V</td><td>ON</td><td>4.5 to 5.5V</td><td>2 to 5mA</td></tr>
<tr><td>OFF</td><td>2V or less</td><td>0.1mA or less</td></tr>
<tr><td>15
(23)</td><td>Function start input COM</td><td>Respon-se time</td><td>OFF→ON
0.5ms or less</td><td>ON→OFF
3ms or less</td></tr>
<tr><td rowspan="3">Output</td><td rowspan="3"></td><td>24
(25)</td><td>EQU1</td><td colspan="3">Operating voltage 10.2 to 30V
Rated current 0.5A/point
Max. inrush current 4A 10ms
Max. voltage drop at ON 1.5V
Response time
OFF→ON 0.1ms or less
ON→OFF 0.1ms or less</td></tr>
<tr><td>26</td><td>12/24V</td><td colspan="3">Input voltage 10.2 to 30V</td></tr>
<tr><td>27</td><td>0V</td><td colspan="3">Current consumption 8mA(TYP 24VDC)</td></tr>
</table>

*1···The number within parentheses represents the terminal number of channel 2.

3.5 I/O Signals Transferred to/from the Master Module

This section explains the input/output signals (RX, RY) of the high-speed counter module transferred to/from the master module.

(1) Input signals

The following table lists the input signals of the high-speed counter module transmitted to the master module.

Input Signals		Signal Name High-speed counter module → master module	Description	Refer To
CH1	CH2			
RXn0	RXn4	Counter value greater (point No. 1)	Turned on if the counter value is greater than the set value No. 1.	Section 6.1
RXn1	RXn5	Counter value coincidence (point No. 1)	Latched on if the counter value is equal to the set value No. 1 turned off by the coincidence signal reset command.	Section 6.1 Section 8.1
RXn2	RXn6	Counter value less (point No. 1)	Turned on when the counter value is less than the set value No. 1.	Section 6.1
RXn3	RXn7	External preset command detection	Latched on when the preset request is given from external input. Turned off by the external preset detection reset command.	Section 7.3
RXn8	RXnB	Counter value greater (point No. 2)	Turned on if the counter value is greater than the set value No. 2.	Section 6.1
RXn9	RXnC	Counter value coincidence (point No. 2)	Latched on if the counter value is equal to the set value No. 2 turned off by the coincidence signal reset command.	
RXnA	RXnD	Counter value less (point No. 2)	Turned on when the counter value is less than the set value No. 2.	
RXnE	RXnF	———	Unusable	———
RX(n+1)0	RX(n+1)2	Preset completion	Turned on on completion of the preset function executed when the preset command {(RY(n+1)1(RY(n+1)8)} turns on. Turned off when the preset command switches from ON to OFF.	Section 7.2
RX(n+1)1	RX(n+1)3	Counter function detection	Turned on at counter function start (execution) when the counter function selection start command {(RY(n+1)6(RY(n+1)D)} turns on. Turned off when the counter function selection start command switches from ON to OFF.	Section 9.2 Section 9.3 Section 9.4 Section 9.5
RX(n+1)4 to RX(n+7)7		———	Unusable	———
RX(n+7)8		Initial data processing request flag	Turned on by the high-speed counter module to request initial data setting after power-on or hardware reset. Turned off on initial data processing completion (when initial data processing completion flag (RY(N+7)8) turns on).	
RX(n+7)9 to RX(n+7)A		———	Unusable	
RX(n+7)B		Remote ready	Turned on when the high-speed counter module is in the ready state on completion of initial data setting after power-on or hardware reset.	
RX(n+7)C to RX(n+7)F		———	Unusable	

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

POINT

The unusable devices are used in the system and should not be used by the user.
If any of them is used by the user, normal operation cannot be guaranteed.

(2) Output signals

The following table lists the output signals transmitted by the master module to the high-speed counter module.

⋯Valid on leading edge(OFF to ON) of signal

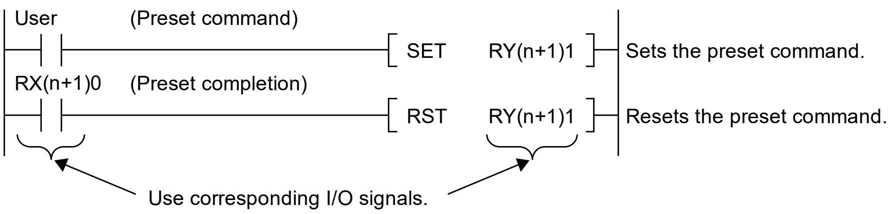
⋯Valid while signal is ON.

Input Signals CH1	Input Signals CH2	Signal Name Master module → high-speed counter module	Operation Timing*	Description	Refer To
RYn0 to RYnF		———	———	Unusable	———
RY(n+1)0	RY(n+1)7	Point No. 1 coincidence signal reset command		Resets the ring counter value coincidence signal (latch) and the coincidence output No. 1 signal to the external device.	Section 6.1 Section 8.1
RY(n+1)1	RY(n+1)8	Preset command		Performs preset value write.	Section 7.2
RY(n+1)2	RY(n+1)9	Coincidence signal enable		Turn on this signal to output the counter value coincidence signal to the external device.	Section 6.1
RY(n+1)3	RY(n+1)A	Down count command		Down count is performed when this signal is on in the 1-phase mode.	Chapter 5
RY(n+1)4	RY(n+1)B	Count enable		Turn on this signal to enable count operation.	Chapters 6 to 9
RY(n+1)5	RY(n+1)C	———	———	Unusable	———
RY(n+1)6	RY(n+1)D	Counter function selection start command	/	Starts (executes) counter function selection.	Chapter 9
RY(n+1)E to RY(n+1)F		———	———	Unusable	———
RY(n+2)0	RY(n+2)2	External preset detection reset command		Resets external preset detection.	Section 7.3
RY(n+2)1	RY(n+2)3	Point No. 2 coincidence signal reset command		Resets the point No. 2 coincidence signal.	Section 6.1 Section 8.1
RY(n+2)4 to RY(n+7)7		———	———	Unusable	———
RY(n+7)8		Initial data processing completion flag		Turned on after completion of initial data processing performed after power-on or hardware reset.	
RY(n+7)9 to RY(n+7)F		———	———	Unusable	

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

*For the output signal whose operation timing is "", use the corresponding input signal as an interlock for turning off that output signal.

(Example) Preset command operation



POINT

The unusable devices are used in the system and should not be used by the user.
If any of them is used by the user, normal operation cannot be guaranteed.

3.6 Remote Register Allocation

The following table gives the assignment of the remote registers in the high-speed counter module.
The initial values of the remote registers are set when power is switched on or the programmable controller CPU is reset.

Transmission Direction	Addresses		Description	Initial Value	Read/Write	Refer To
	CH1	CH2				
Write area of master station ↓ High-speed counter module	RWwm	RWwm+8	Preset value setting area (L)	0	Write only	Section 7.2 Section 7.3
	RWwm+1	RWwm+9	Preset value setting area (H)			
	RWwm+2	RWwm+A	Pulse input mode/function selection register/ external output hold or clear setting area*1			Chapter 5 Chapter 9
	RWwm+3	RWwm+B	Coincidence output point No. 1 setting area (L)			Chapter 6
	RWwm+4	RWwm+C	Coincidence output point No. 1 setting area (H)			
	RWwm+5	RWwm+D	Sampling/cycle time setting area			Section 9.4 Section 9.5
	RWwm+6	RWwm+E	Coincidence output point No. 2 setting area*2 (L)			Chapter 6
	RWwm+7	RWwm+F	Coincidence output point No. 2 setting area*2 (H)			
High-speed counter module ↓ Read area of master station	RWrn	RWrn+8	Present value storage area (L)		Read only	Section 5.3
	RWrn+1	RWrn+9	Present value storage area (H)			
	RWrn+2	RWrn+A	Latch count value/sampling count value/periodic pulse count previous value storage area (L)			Section 9.3 Section 9.4 Section 9.5
	RWrn+3	RWrn+B	Latch count value/sampling count value/periodic pulse count previous value storage area (H)			
	RWrn+4	RWrn+C	Periodic pulse count present value storage area (L)			Section 9.5
	RWrn+5	RWrn+D	Periodic pulse count present value storage area (H)			
	RWrn+6		Sampling/periodic counter flag storage area (for both CH1 and CH2)			Section 9.4 Section 9.5
	RWrn+7 RWrn+E RWrn+F		Unusable			———

m, n: Addresses assigned to the master station by station number setting.

*1 External output hold or clear setting is used for both CH1 and CH2.
The value set to the remote register of CH1 is valid.

*2 In the AJ65BT-D62D-S1, external output (coincidence output) does not switch on-off if coincidence output No. 2 is set. However, the counter value magnitude comparison (coincidence, greater, less) output signals (X signals) switch on-off as ordinarily.

POINT

The unusable remote registers are used in the system and should not be used by the user.
If any of them is used by the user, normal operation cannot be guaranteed.

3.7 Applicable Encoders

The following encoders may be connected to the high-speed counter module.

(1) Encoders connectable to the AJ65BT-D62

(a) Open collector type encoder

(b) CMOS output type encoder
(Make sure that the output voltage of the encoder complies with the specifications of the module.)

(2) Encoder connectable to the AJ65BT-D62D and AJ65BT-D62D-S1

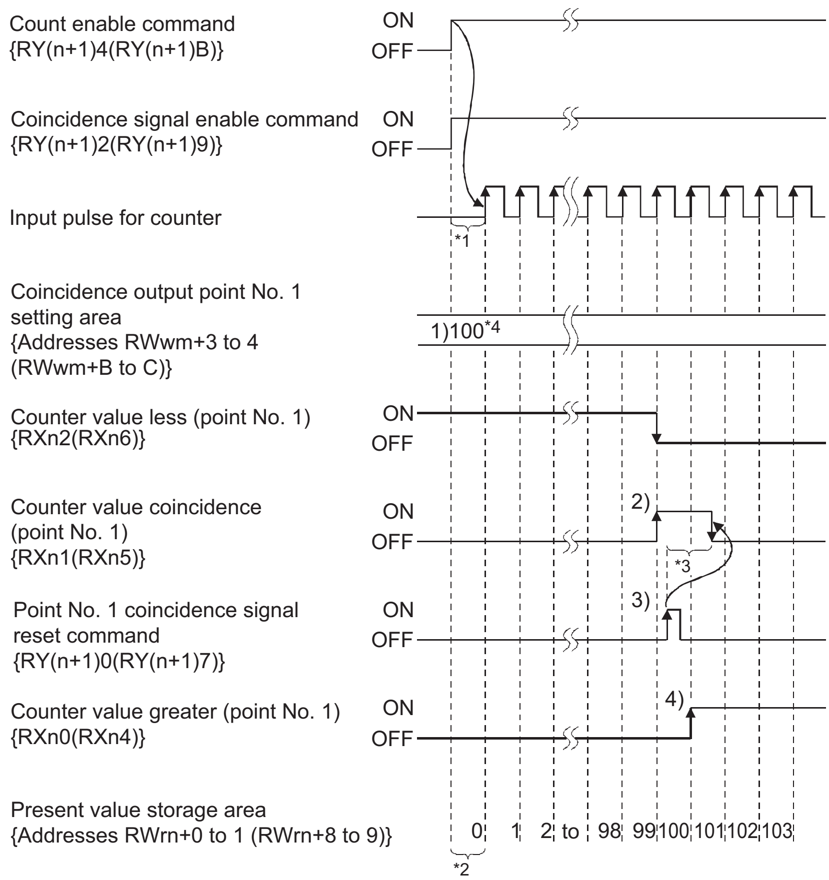
(a) Line driver output type encoder
(Make sure that the output voltage of the encoder complies with the specifications of the module.)

POINT

The following type of encoder cannot be used.
• TTL output type encoder

3.8 Data Link Processing Times

In the high-speed counter module, it takes data link processing time described in this section to execute each function. For link scan time, refer to the user's manual for the master module used. As an example, this section explains processing times at *1 to *4 in a coincidence output operation. (The master module is the QJ61BT11 in asynchronous mode.)



*1 Master station (RY) → remote device station (RY) processing time (Normal value)
The following is the processing time takes for the remote device station to start pulse input when the count enable signal {RY(n+1)4 (RY(n+1)B)} is turned on.

[Formula]

$$SM+LS\times 1+\underbrace{\text{remote device station processing time(1ms)}}_{\text{high-speed counter module}}\ [ms]$$

SM: Scan time of master station sequence program
LS : Link scan time

*2 Master station (RWr) ← remote device station (RWr) processing time (Normal value)
The following is the processing time takes for the master station to read the counter value counted at the remote station.

[Formula]

$$SM+LS\times 1+\underbrace{\text{remote device station processing time(1ms)}}_{\text{high-speed counter module}}\ [ms]$$

SM: Scan time of master station sequence program
LS : Link scan time

*3 Master station (RX) ← remote device station (RX) processing time (Normal value)
The following is the processing time takes for the remote device station to receive a coincidence signal reset command and for the master station to receive information that the counter value coincidence (point No. 1) signal {RXn1 (RXn5)} turned off at the remote station.
* The time takes to transmit the coincidence signal reset command to the remote station is not included.

[Formula]

$$SM+LS\times 1+\underbrace{\text{remote device station processing time(1ms)}}_{\text{high-speed counter module}}\ [ms]$$

SM: Scan time of master station sequence program
LS : Link scan time

*4 Master station (RWw) → remote device station (RWw) processing time
The following is the transmission time to set coincidence output point No.1 set value at the remote device station.

[Formula]

$$SM+LS\times 1+\underbrace{\text{remote device station processing time(1ms)}}_{\text{high-speed counter module}}\ \text{[ms]}$$

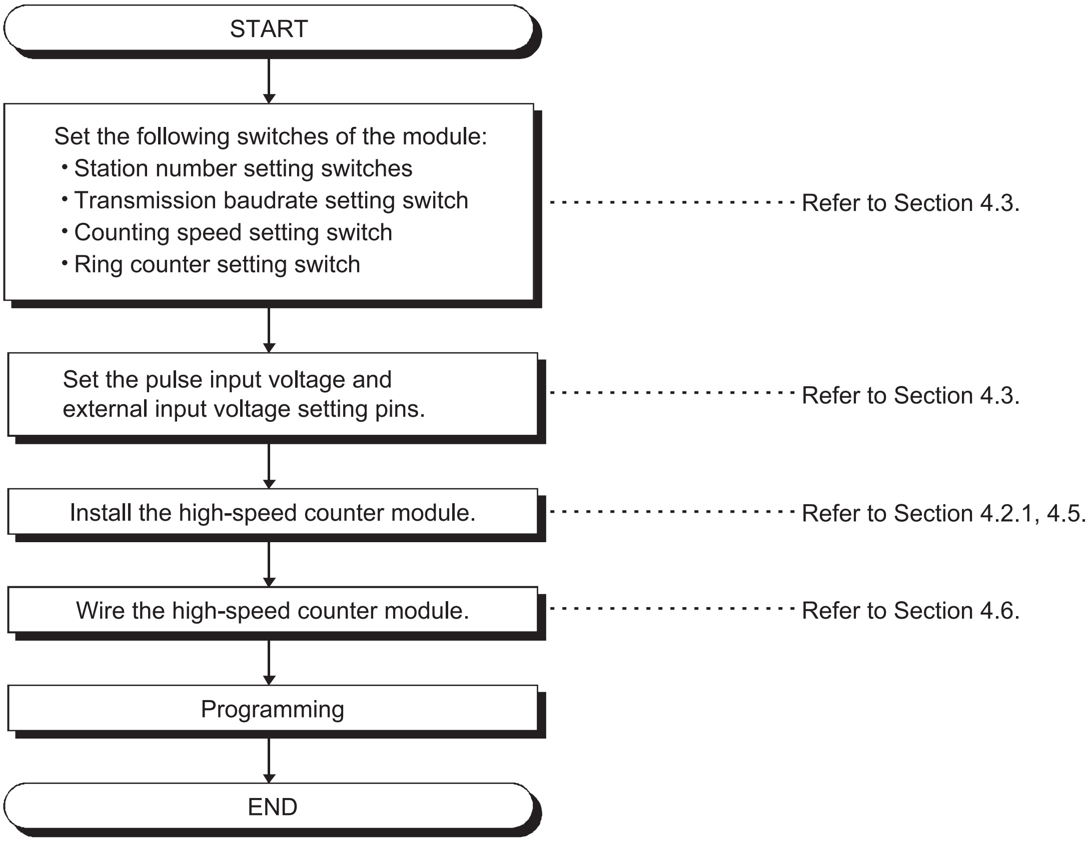
SM: Scan time of master station sequence program
LS : Link scan time

4. INSTALLATION AND PRE-OPERATION SETTING PROCEDURE

This chapter describes the pre-operation procedure of the high-speed counter module, the names and settings of each part, and the wiring method.

4.1 Pre-Operation Setting Procedure

Use the following procedure to make pre-operation setting for the high-speed counter module.



4.2 Installation

This section gives the handling instructions to be followed from unpacking to installation of the high-speed counter module and its installation environment.

4.2.1 Handling instructions

This section gives the handling instructions of the high-speed counter module.

⚠WARNING

- Do not touch any terminal while power is on.
  Failure to do so may cause malfunction.

⚠CAUTION

- Securely fix the module using the DIN rail or mounting screws and fully tighten the mounting screws within the specified torque range.
  Undertightening can cause a drop or misoperation.
  Overtightening can cause a drop or misoperation due to damaged screws or module.
- Do not touch the conductive areas of the module directly.
  Otherwise, the module can misoperate or fail.
- Tighten the terminal screws within the specified torque range.
  Undertightening the terminal screws can cause short circuit or malfunction.
  Overtightening can damage the screw and/or module, resulting in drop, short circuit, or malfunction.
- Ensure that foreign matters such as chips and wire off-cuts do not enter the module.
  They can cause a fire, failure or misoperation.
- Do not disassemble or modify the module.
  This can cause a failure, misoperation, injury or fire.
- Do not drop or apply strong shock to the module.
  Failure to do so may damage the module.
- Before mounting or dismounting the module to or from an enclosure, always switch power off externally in all phases.
  Otherwise, the module can fail or misoperate.
- When disposing of the product, handle it as industrial waste.

(1) Tighten the terminal screws and fixing screws of the module within the following ranges

Screw Location	Tightening Torque Range
Module mounting screw (M4 screw)	0.78 to 1.18N・m
Terminal block terminal screw (M3.5 screw)	0.59 to 0.88N・m
Terminal block mounting screw (M4 screw)	0.78 to 1.18N・m

(2) When using the DIN rail adapter, note the following in mounting the DIN rail.
  (a) Applicable DIN rail type (conforming to JIS C2812)
    TH35-7.5Fe
    TH35-7.5Al

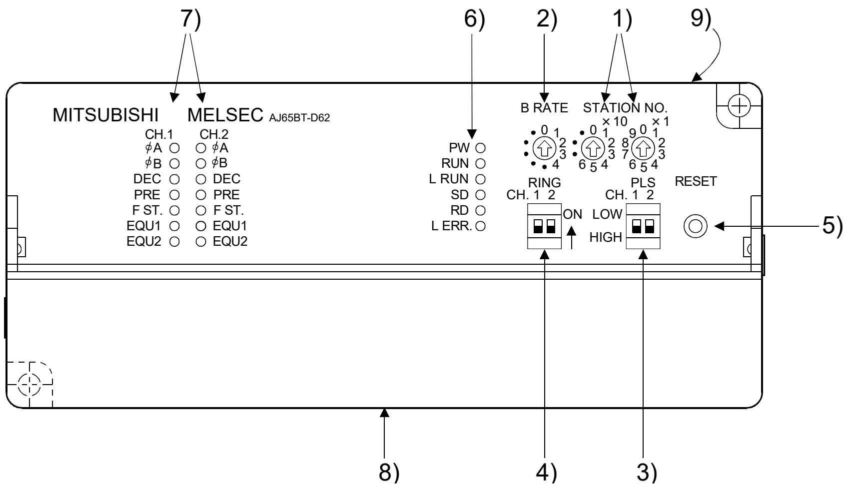
  (b) DIN rail mounting screw pitch
    When mounting the DIN rail, tighten screws in 200mm or less pitch.

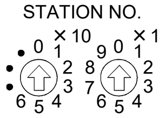
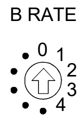
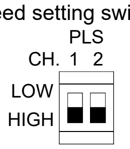
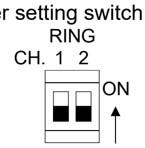
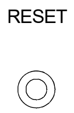
4.2.2 Installation environment

⚠CAUTION	When installing the module, avoid the following environment. If the environment of the module used is outside the range of general specifications, an electric shock, fire, misoperation or product damage or deterioration can occur • Ambient temperature outside the range 0 to 55°C • Ambient humidity outside the range 10 to 90%RH • Condensation due to sudden temperature changes • Corrosive or combustible gasses • Dust, conductive powder (e.g. metal filings), oil mist, salt and organic solvent • Direct sunlight • Strong power and magnetic fields • Vibration and impact

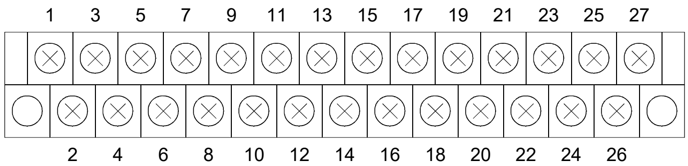
4.3 Part Names and Settings

This section gives the names and settings of the high-speed counter module controls.



Number	Name	Description
1)	Station number setting switches 	Used to set the station number of the high-speed counter module between 1 and 61. Use "×10" to set the tens. Use "×1" to set the modules. (Factory setting: 00)
2)	Transmission baud rate setting switch 	Used to set the transmission speed of the high-speed counter module. (For data link) <table><tr><th>Number to Be Set</th><th>Transmission Baud rate</th></tr><tr><td>0</td><td>156kbps (factory setting)</td></tr><tr><td>1</td><td>625kbps</td></tr><tr><td>2</td><td>2.5Mbps</td></tr><tr><td>3</td><td>5Mbps</td></tr><tr><td>4</td><td>10Mbps</td></tr><tr><td>Other than 0 to 4</td><td>Unused (If the value set is other than 0 to 4, the L ERR. LED lights up to indicate a communication error.)</td></tr></table>
3)	Counting speed setting switch 	LOW position: Up to 10kPPS can be counted for 1-phase input or up to 7kPPS for 2-phase input. HIGH position: Up to 400(200)kPPS can be counted for 1-phase input or up to 300 (200)kPPS for 2-phase input. Values in parentheses are those for use of the AJ65BT-D62. (Factory setting: HIGH position)
4)	Ring counter setting switch 	Used to select whether the ring counter function is used or not. When using the ring counter: ON When not using the ring counter: OFF (Factory setting: OFF position)
5)	Reset switch 	Hardware reset Used to initialize the remote registers in the high-speed counter module. By turning this switch on, the initial data processing flag switches on.

Number	Name		Description
6)	LED indicators PW ○ RUN ○ L RUN ○ SD ○ RD ○ L ERR. ○	PW	On: Power on Off: Power off
		RUN	On: Normal operation Off: 24VDC power off or WDT error
		L RUN	On: Normal communication Off: Communication break (time excess error)
		SD	Lit to indicate data transmission
		RD	Lit to indicate data receive
		L ERR.	On: Communication data error (CRC error) Flashing at constant interval: Station number settings and baud rate settings are changed during power supply. Flashing at non-constant interval: Termination resistor is not provided or the unit or the dedicated cable for CC-Link is subject to noise. Off: Normal communication
7)	LED indicators CH.1 CH.2 ϕA ○ ○ ϕA ϕB ○ ○ ϕB DEC ○ ○ DEC PRE ○ ○ PRE F ST. ○ ○ F ST. EQU1 ○ ○ EQU1 EQU2 ○ ○ EQU2	ϕ A	Lit to indicate that voltage is being applied to the phase A pulse input terminal.
		ϕ B	Lit to indicate that voltage is being applied to the phase B pulse input terminal.
		DEC	Lit to indicate down count.
		PRE	Lit to indicate that voltage is applied to the PRESET terminal, and remains lit. Turns off on the trailing edge of the external preset detection reset command.
		F ST.	Lit to indicate that voltage is being applied to the F.START terminal.
		EQU1	Lit to indicate that the coincidence output setting No. 1 is equal to the counter value.
		EQU2	Lit to indicate that the coincidence output setting No. 2 is equal to the counter value. (The AJ65BT-D62D-S1 does not have this LED.)
8)	Terminal block		(see below)



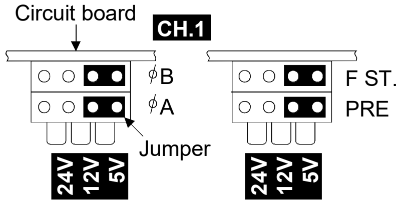
Pin-to-signal correspondences are indicated below.

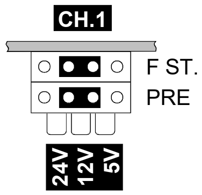
For the AJ65BT-D62

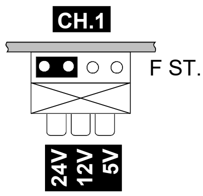
Pin Number	Signal name		Pin Number	Signal name	
1	DA		15	CH2	ϕ A
2	DB		16		
3	DG		17		ϕ B
4	SLD		18		
5	24V		19		PRESET
6	F.G.		20		COM
7	24G		21		F.START
8	CH1	ϕ A	22	CH1	EQU1
9			23		EQU2
10		ϕ B	24	CH2	EQU1
11			25		EQU2
12		PRESET	26	12/24V	
13		COM	27	COM	
14		F.START			

<table>
<tr><th>Number</th><th>Name</th><th>Description</th></tr>
<tr><td>8)</td><td>Terminal block</td><td>
For the AJ65BT-D62D
<table>
<tr><th>Pin Number</th><th colspan="3">Signal name</th><th>Pin Number</th><th colspan="3">Signal name</th></tr>
<tr><td>1</td><td colspan="3">DA</td><td>15</td><td rowspan="7">CH2</td><td rowspan="2">φ A</td><td>A</td></tr>
<tr><td>2</td><td colspan="3">DB</td><td>16</td><td>$\overline{A}$</td></tr>
<tr><td>3</td><td colspan="3">DG</td><td>17</td><td rowspan="2">φ B</td><td>B</td></tr>
<tr><td>4</td><td colspan="3">SLD</td><td>18</td><td>$\overline{B}$</td></tr>
<tr><td>5</td><td colspan="3">24V</td><td>19</td><td colspan="2">PRESET</td></tr>
<tr><td>6</td><td colspan="3">F.G.</td><td>20</td><td colspan="2">COM</td></tr>
<tr><td>7</td><td colspan="3">24G</td><td>21</td><td colspan="2">F.START</td></tr>
<tr><td>8</td><td rowspan="7">CH1</td><td rowspan="2">φ A</td><td>A</td><td>22</td><td rowspan="2">CH1</td><td colspan="2">EQU1</td></tr>
<tr><td>9</td><td>$\overline{A}$</td><td>23</td><td colspan="2">EQU2</td></tr>
<tr><td>10</td><td rowspan="2">φ B</td><td>B</td><td>24</td><td rowspan="2">CH2</td><td colspan="2">EQU1</td></tr>
<tr><td>11</td><td>$\overline{B}$</td><td>25</td><td colspan="2">EQU2</td></tr>
<tr><td>12</td><td colspan="2">PRESET</td><td>26</td><td colspan="3">12/24V</td></tr>
<tr><td>13</td><td colspan="2">COM</td><td>27</td><td colspan="3">COM</td></tr>
<tr><td>14</td><td colspan="2">F.START</td><td></td><td colspan="3"></td></tr>
</table>

For the AJ65BT-D62D-S1
<table>
<tr><th>Pin Number</th><th colspan="3">Signal name</th><th>Pin Number</th><th colspan="3">Signal name</th></tr>
<tr><td>1</td><td colspan="3">DA</td><td>16</td><td rowspan="8">CH2</td><td rowspan="2">φ A</td><td>A</td></tr>
<tr><td>2</td><td colspan="3">DB</td><td>17</td><td>$\overline{A}$</td></tr>
<tr><td>3</td><td colspan="3">DG</td><td>18</td><td rowspan="2">φ B</td><td>B</td></tr>
<tr><td>4</td><td colspan="3">SLD</td><td>19</td><td>$\overline{B}$</td></tr>
<tr><td>5</td><td colspan="3">24V</td><td>20</td><td colspan="2">PRESET</td></tr>
<tr><td>6</td><td colspan="3">F.G.</td><td>21</td><td colspan="2">$\overline{\text{PRESET}}$</td></tr>
<tr><td>7</td><td colspan="3">24G</td><td>22</td><td colspan="2" rowspan="2">F.START</td></tr>
<tr><td>8</td><td rowspan="8">CH1</td><td rowspan="2">φ A</td><td>A</td><td>23</td></tr>
<tr><td>9</td><td>$\overline{A}$</td><td>24</td><td>CH1</td><td colspan="2">EQU1</td></tr>
<tr><td>10</td><td rowspan="2">φ B</td><td>B</td><td>25</td><td>CH2</td><td colspan="2">EQU1</td></tr>
<tr><td>11</td><td>$\overline{B}$</td><td>26</td><td colspan="3">12/24V</td></tr>
<tr><td>12</td><td colspan="2">PRESET</td><td>27</td><td colspan="3">COM</td></tr>
<tr><td>13</td><td colspan="2">$\overline{\text{PRESET}}$</td><td></td><td colspan="3"></td></tr>
<tr><td>14</td><td colspan="2" rowspan="2">F.START</td><td></td><td colspan="3"></td></tr>
<tr><td>15</td><td></td><td colspan="3"></td></tr>
</table>
</td></tr>
</table>

<table>
<tr><th>Number</th><th>Name</th><th>Description</th></tr>
<tr><td>9)</td><td>Pulse/external input voltage setting pins</td><td>The also applies to CH2.
AJ65BT-D62


(Jumper connected to 5V)
AJ65BT-D62D


(Jumper connected to 12V)
AJ65BT-D62D-S1


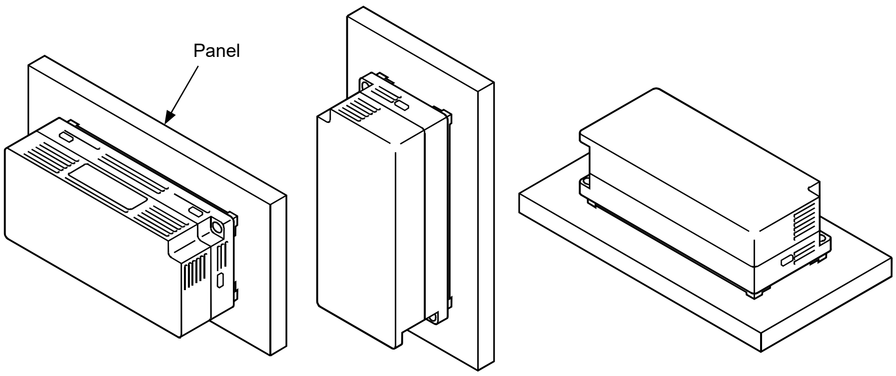
(Jumper connected to 24V)
(Factory setting: 24V)</td></tr>
</table>

4.4 Station Number Setting

The buffer memory addresses of the master module, where the remote I/O signals and read/write data are stored, are determined by the station number setting of the high-speed counter module.
For details, refer to the user's manual (details) of the used master module.

4.5 Orientation of Module Installation

The following shows the possible orientation for high-speed counter module installation.



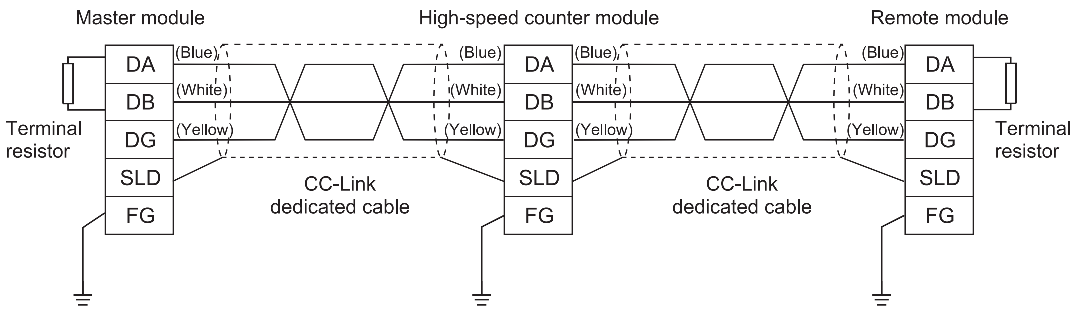
When installing alongside the panel

When installing on the panel

4.6 Wiring

4.6.1 Connection of cables with the modules

The following diagram shows the wiring of the master module, remote module and high-speed counter module with dedicated cable for CC-Link.



POINT
The "terminal resistors" supplied with the master module must be connected to the modules at both ends of data link. (Connect them across DA-DB.)

4.6.2 Instructions for wiring pulse generator

When connecting a pulse generator to the high-speed counter module, take the following precautions.

(1) When using high speed pulse inputs, take the following precautions against noise

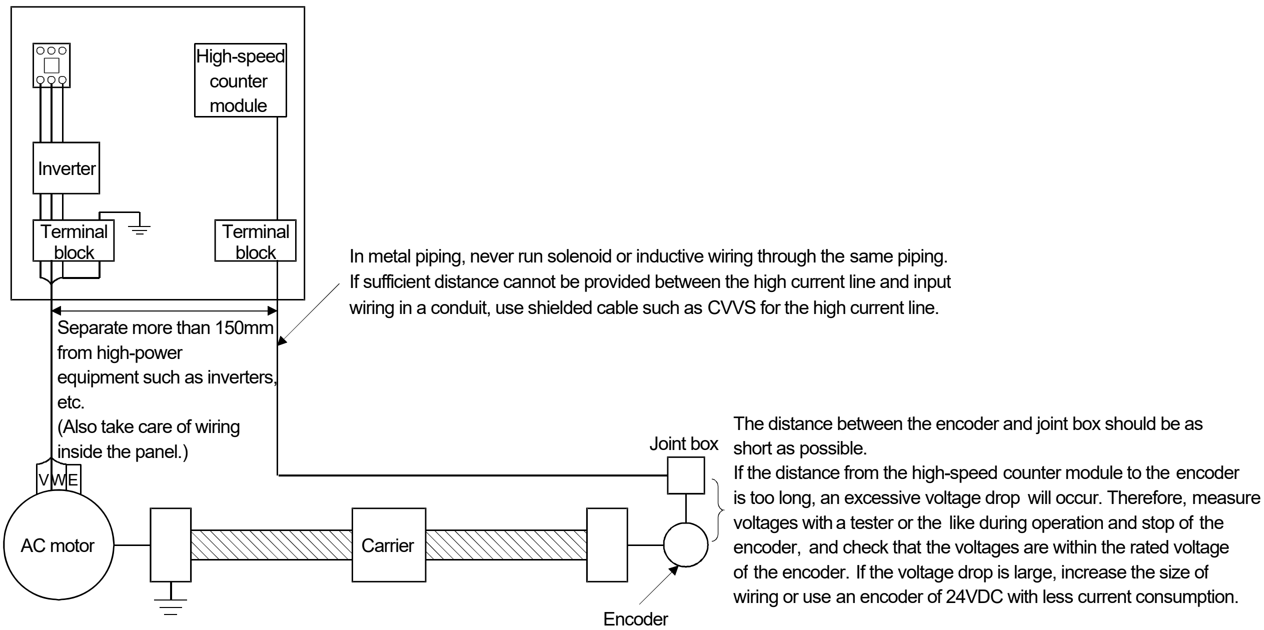
(a) Always use shielded twisted cables. Also provide Class 3 grounding.

(b) Do not run a twisted pair cable in parallel with any power line, I/O line, etc. which may generate noise. It is necessary to run the twisted pair cable at least 150mm away from the above lines and over the shortest possible distance

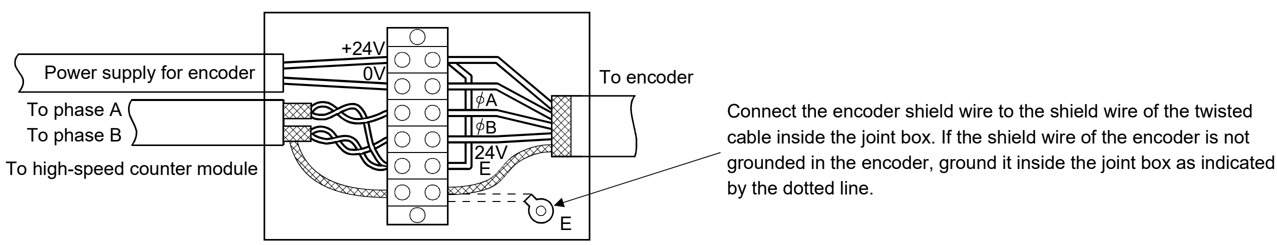
(2) For a 1-phase input, always connect the count input pulse to phase A.

(3) If the high-speed counter module picks up noise, it will count incorrectly.

(4) The diagram below indicates the type of precautions required to prevent the wiring from picking up noise.

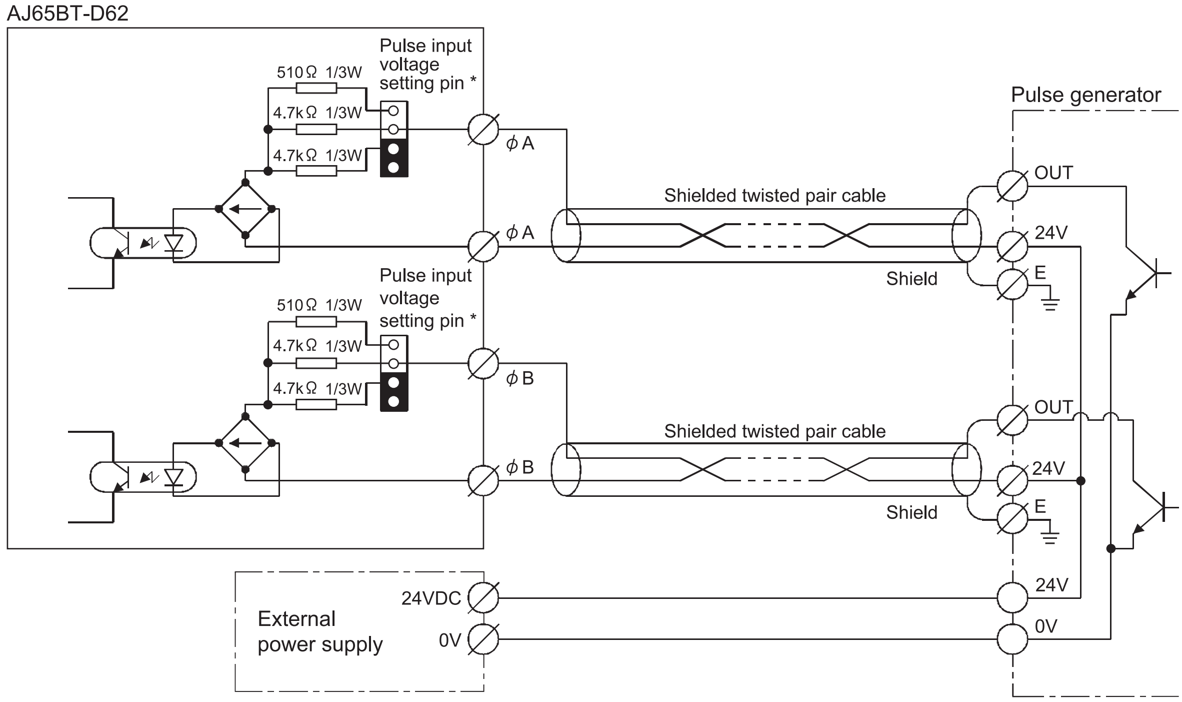


· Ground the twisted shield cable on the encoder side (joint box). (This is a connection example for 24V sink load.)



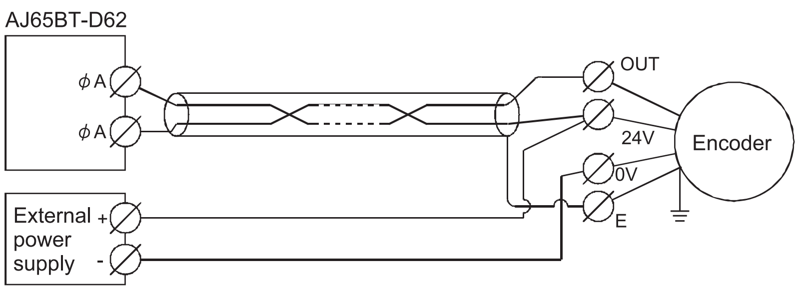
4.6.3 Wiring examples of pulse generators

(1) Pulse generator is open collector output type (24VDC)

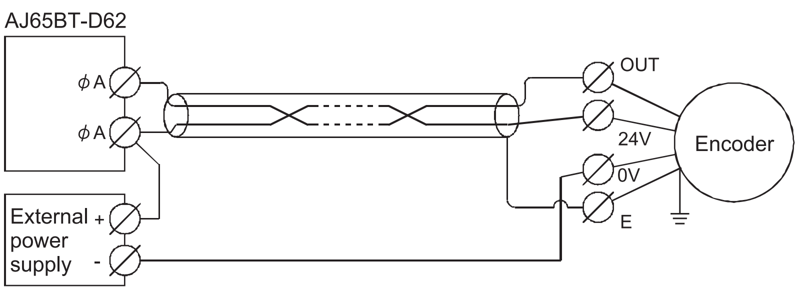


POINT

When wiring the AJ65BT-D62 and encoder, separate the power supply and signal lines as shown below.



Incorrect Wiring Example

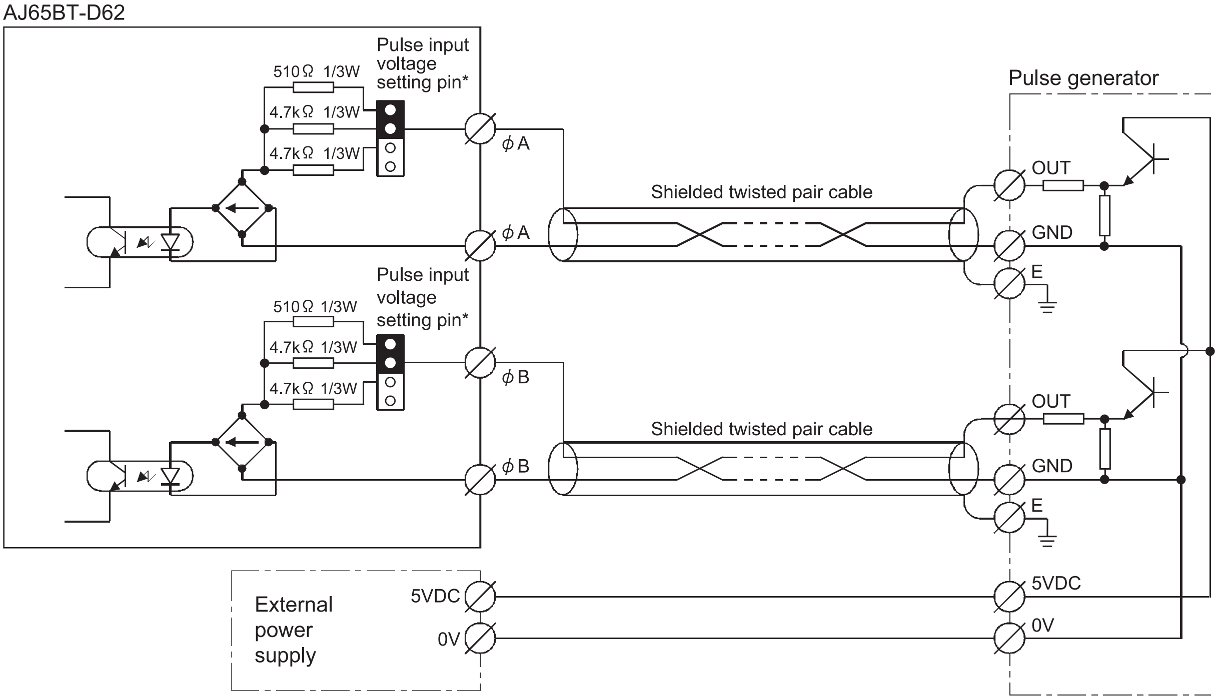


Since the same twisted wire is used for both the encoder signal and power supply, the canceling effect will reduce and electro-magnetic induction may occur.

REMARK

*............Set the pulse input voltage setting pins in the ■ position.

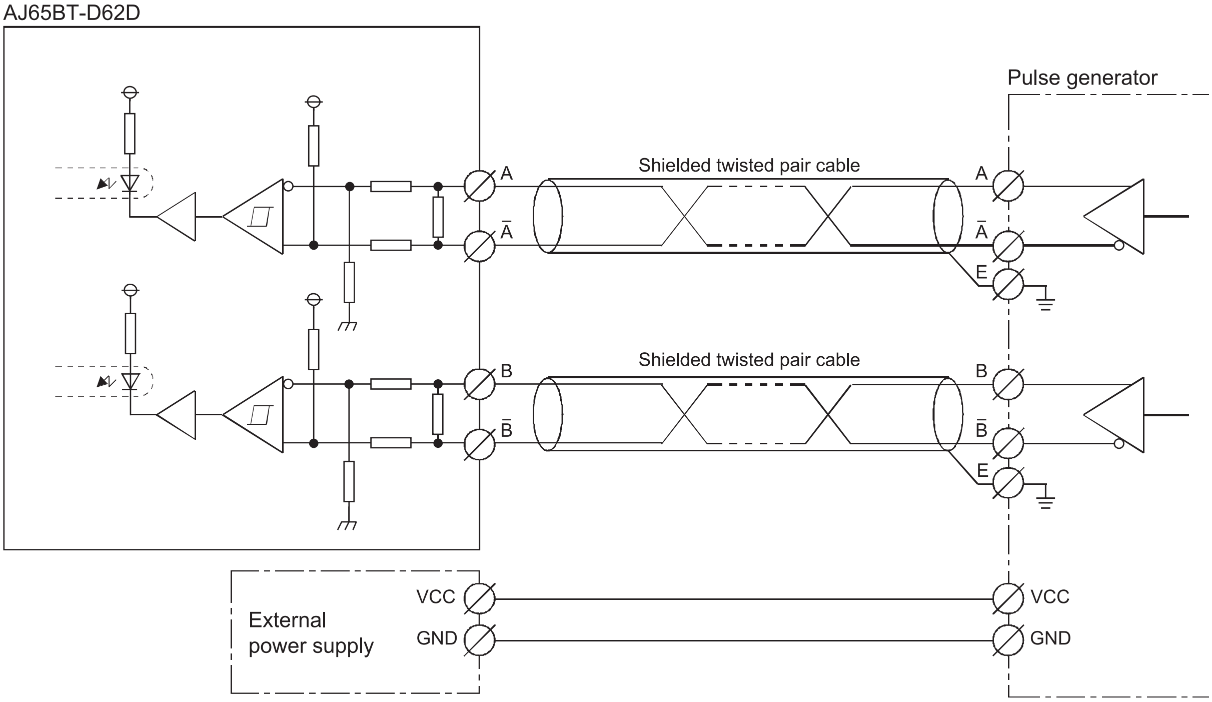
(2) Pulse generator is voltage output type (5VDC)

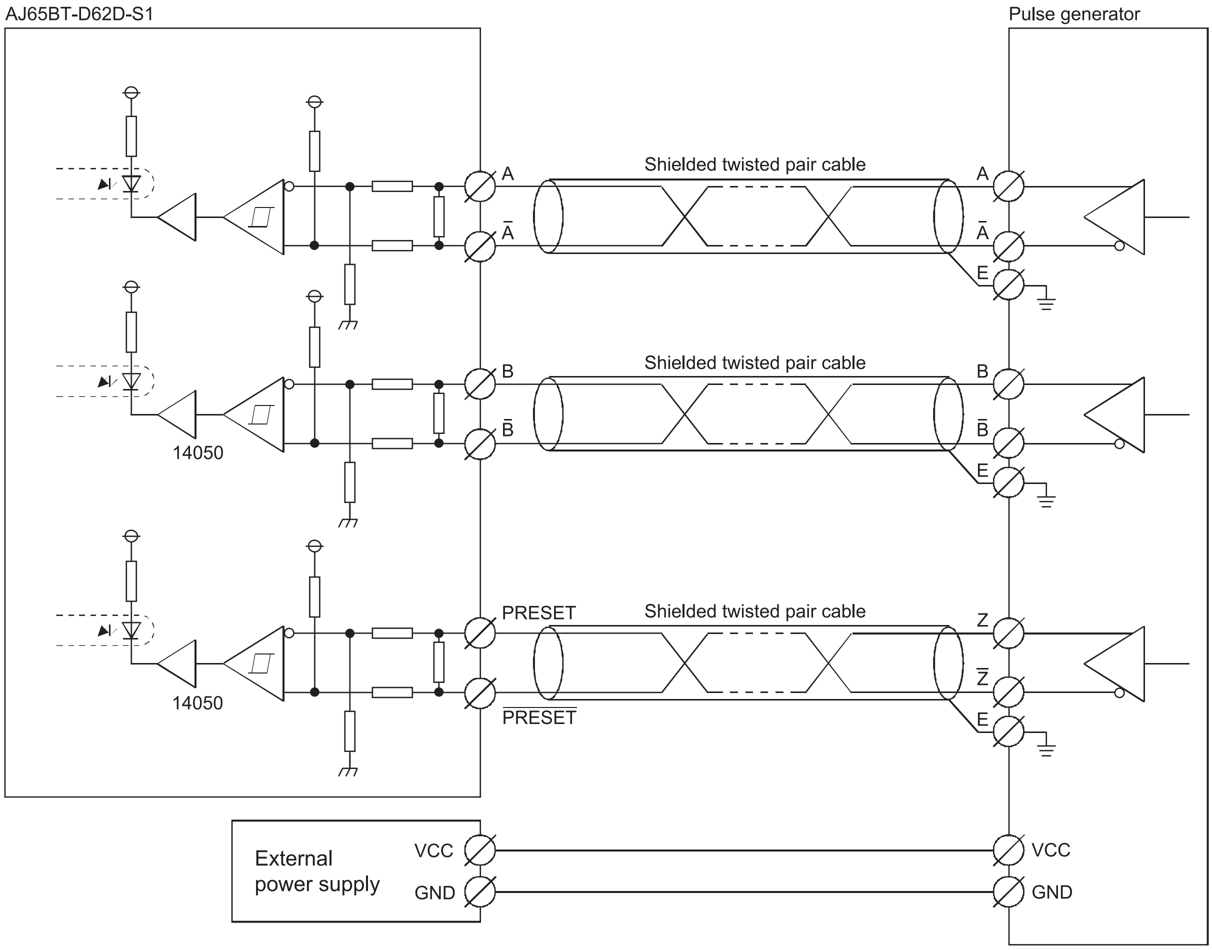


REMARK

*.............Set the pulse input voltage setting pins in the ▮ position.

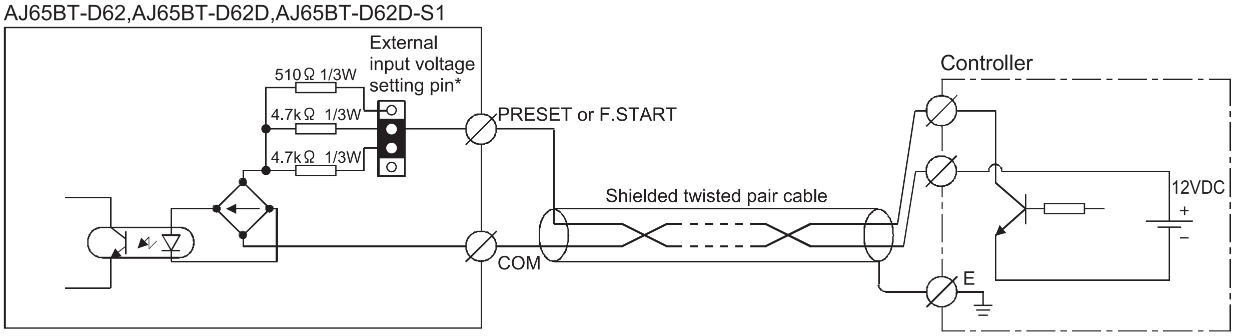
(3) Pulse generator is line driver (equivalent to AM26LS31)





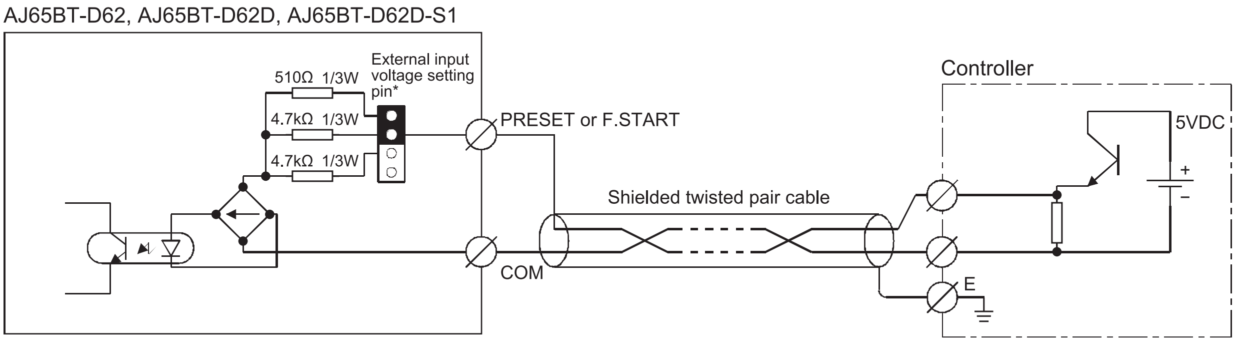
4.6.4 Wiring examples of controller and external input (PRESET, F.START) terminals

(1) Controller (sink load type) is 12V



• Internal circuit is set to PRESET.
• AJ65BT-D62D-S1 has F.START only.

(2) Controller (source load type) is 5V



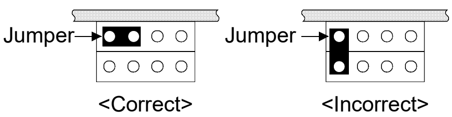
• Internal circuit is set to PRESET.
• AJ65BT-D62D-S1 has F.START only.

REMARK

*.............Set the external input voltage setting pins in the position.

⚠ CAUTION

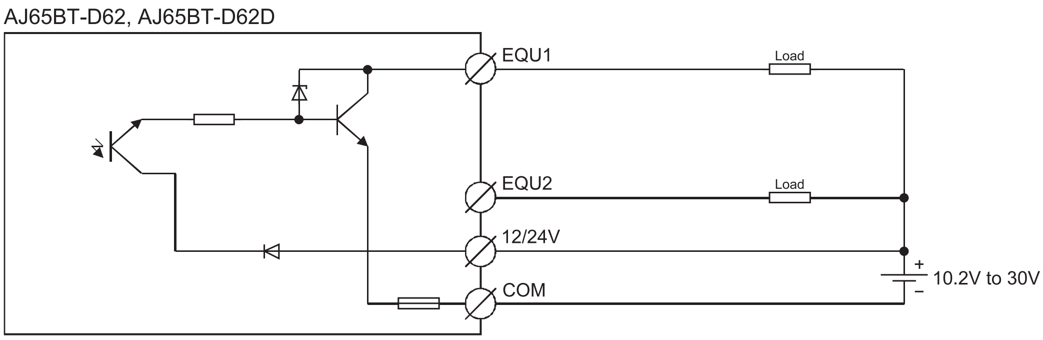
- Set the pulse/external input voltage setting pins correctly after confirming the rated voltage of the external power supply.
  Miss-wiring (wrong setting) can cause a fire or failure.
- The pulse/external input voltage setting pins must be set after switching power off externally in all phases.
  Otherwise, the module can fail or misoperate.
- Set the jumper to the pulse/external input voltage setting pins in the correct inserting orientation.
  Otherwise, a failure can occur.



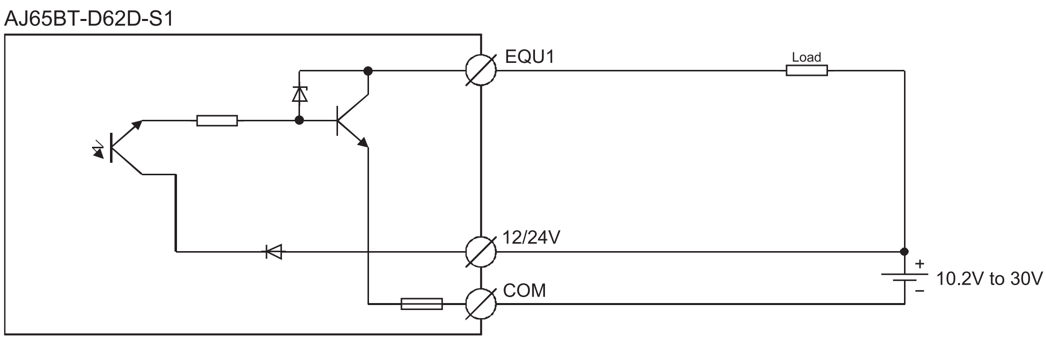
4.6.5 Wiring examples of external output (EQU1, EQU2) terminals

When using the EQU terminals, a 10.2VDC to 30VDC external power supply is required to activate the internal photocoupler. Connection methods are as follows.

(1) AJ65BT-D62, AJ65BT-D62D



(2) AJ65BT-D62D-S1

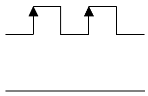
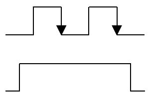
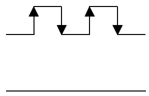
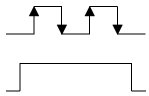
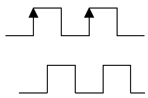
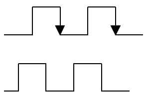
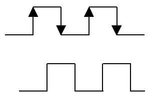
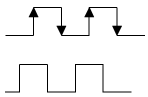
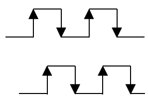
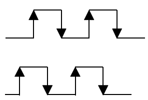


POINT
Even when not using an EQU terminal, wire the 12/24V terminal (pin number: 26) and the COM terminal (pin number: 27) to an external power supply. If they are not wired, SW0088 to SW008B (fuse blown status) of the master module would be on.

5. PULSE INPUT AND COUNTING METHOD

This chapter describes the pulse input and counting modes of the high-speed counter module.

(1) The pulse input mode is classified into 1-phase pulse input and 2-phase pulse input. 1-phase pulse input is subdivided into multiplication by one and multiplication by two, whereas 2-phase pulse input covers multiplication by one, two and four.
The following table indicates the pulse input modes and count timing.

Pulse Input Mode	Count Timing		
1-phase, multiplied by one	Up counting	φA φB RY(n+1)3 (RY(n+1)A) 	Counts a pulse on leading edge of phase φA. Phase φB and RY(n+1)3 (RY(n+1)A) are off.
	Down counting	φA φB RY(n+1)3 (RY(n+1)A) 	Counts a pulse on trailing edge of phase φA. Phase φB or RY(n+1)3 (RY(n+1)A) is on.
1-phase, multiplied by two	Up counting	φA φB RY(n+1)3 (RY(n+1)A) 	Counts a pulse on leading and trailing edges of phase φA. Phase φB and RY(n+1)3 (RY(n+1)A) are off.
	Down counting	φA φB RY(n+1)3 (RY(n+1)A) 	Counts a pulse on leading and trailing edges of phase φA. Phase φB or RY(n+1)3 (RY(n+1)A) is on.
2-phase, multiplied by one	Up counting	φA φB 	Counts a pulse on leading edge of phase φA. Count increases in response to phase difference between phases φA and φB.
	Down counting	φA φB 	Counts a pulse on trailing edge of phase φA. Count decreases in response to phase difference between phases φA and φB.
2-phase, multiplied by two	Up counting	φA φB 	Counts a pulse on leading and trailing edges of phase φA. Count increases in response to phase difference between phases φA and φB.
	Down counting	φA φB 	Counts a pulse on leading and trailing edges of phase φA. Count decreases in response to phase difference between phases φA and φB.
2-phase, multiplied by four	Up counting	φA φB 	Counts a pulse on leading and trailing edges of phases φA and φB. Count increases in response to phase difference between phases φA and φB.
	Down counting	φA φB 	Counts a pulse on leading and trailing edges of phases φA and φB. Count decreases in response to phase difference between phases φA and φB.

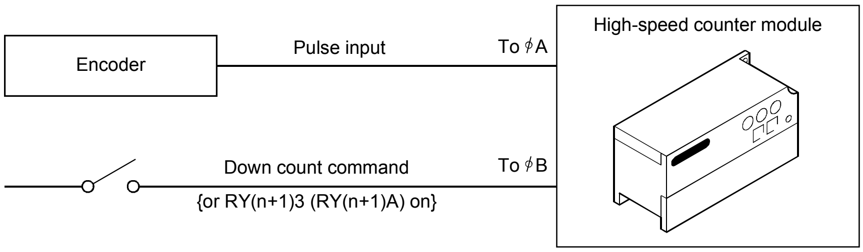
(2) Even if the pulse input mode is changed, counting will start from the value at the time the mode is changed.

5.1 1-phase pulse input

In 1-phase pulse input, multiplication by one or two can be selected for counting.

(1) Relationship between phase A pulse input and down count command

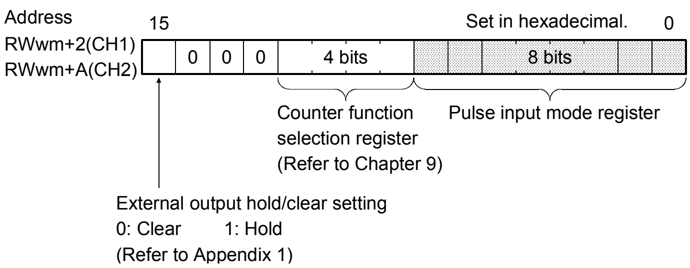
The following diagram shows the relationship between phase A pulse input and down count command.



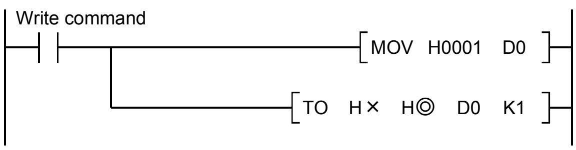
(2) Counting mode setting

To use this counting mode, set the following value to the lower 8 bits of the remote register {address RWwm+2 (RWwm+A)} using the sequence program.
When the value set is not the following set value, the initial value (1-phase multiplication by one) is set.

Counting Mode	Set Value
1-phase multiplication by one	00H
1-phase multiplication by two	01H



[Sequence program example]
• Counting in 1-phase, multiplied-by-two mode



×: First I/O number of master module
◎: Corresponding station register address of master module buffer memory

POINT

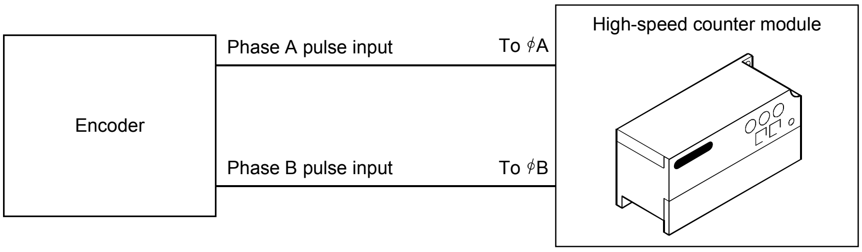
Exercise care when setting the pulse input mode, since the upper 8 bits are used for the counter function selection register and external output hold/clear setting.

5.2 2-phase pulse input

In 2-phase pulse input, the counting mode can be selected from multiplication by one, two and four.

(1) Relationship between phase A pulse input and phase B pulse input

The following diagram shows the relationship between phase A pulse input and phase B pulse input.

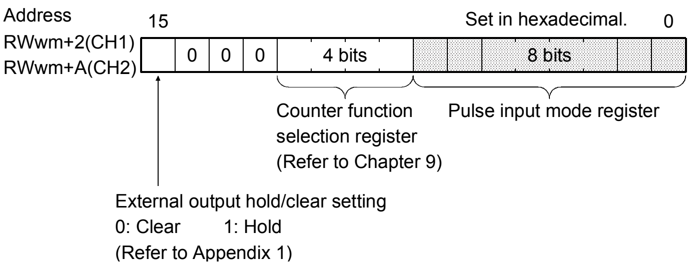


(2) Counting mode setting

To use this counting mode, set the following value to the lower 8 bits of the remote register {address RWwm+2 (RWwm+A)} using the sequence program.

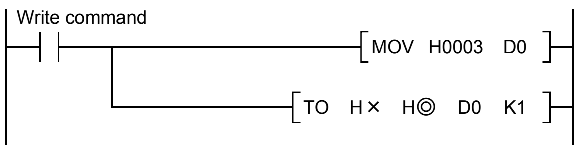
When the value set is not the following set value, the initial value (1-phase multiplication by one) is set.

Counting Mode	Setting
2-phase multiplication by one	02H
2-phase multiplication by two	03H
2-phase multiplication by four	04H



[Sequence program example]

• Counting in 1-phase, multiplied-by-two mode



×: First I/O number of master module
◎: Corresponding station register address of master module buffer memory

POINT

Exercise care when setting the pulse input mode, since the upper 8 bits are used for the counter function selection register and external output hold/clear setting.

5.3 Reading the Present Value

This section gives details on the present value stored in the present value storage area {addresses RWrn+0 to 1 (addresses RWrn+8 to 9)} and how to read it.

(1) The present value storage area stores the present value at a time when any counter function is executed.
When each function of latch counter, sampling counter or periodic pulse counter is executed, the count value will be stored, aside from the present value storage buffer memory, in the remote registers indicated below.

Description		Latch Count Value/ Sampling Count Value/Periodic Pulse Count Previous Value	Periodic Pulse Count Present Value
Remote register addresses	CH1	RWrn+2 to 3	RWrn+4 to 5
	CH2	RWrn+A to B	RWrn+C to D

(2) The present value (0 to 16777215) is stored in 24-bit binary in the present value storage area.

(3) In up counting, the present value storage area returns to 0 when the count value exceeds 16777215.
In down counting, the present value storage area returns to 16777215 when the count value exceeds 0.

6. EXECUTING THE COINCIDENCE OUTPUT FUNCTION

This chapter describes the coincidence output function.

6.1 Coincidence Output Function

The coincidence output function issues a signal when a preset count value is compared with and matches the present counter value.
You can set two coincidence output points.
To use the coincidence output function, set the coincidence signal enable command {RY(n+1)2 (RYn+1)9)} to ON.

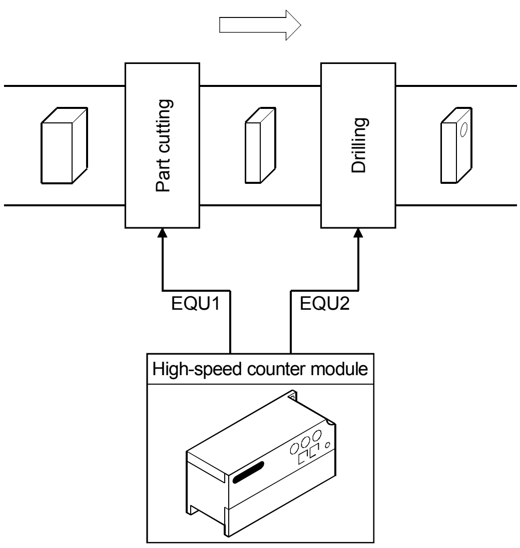
[Remote registers used]

Address	Description	
RWwm+3	CH1 coincidence output point No. 1 setting area	(L)
RWwm+4		(H)
RWwm+6	CH1 coincidence output point No. 2 setting area	(L)
RWwm+7		(H)
RWwm+B	CH2 coincidence output point No. 1 setting area	(L)
RWwm+C		(H)
RWwm+E	CH2 coincidence output point No. 2 setting area	(L)
RWwm+F		(H)

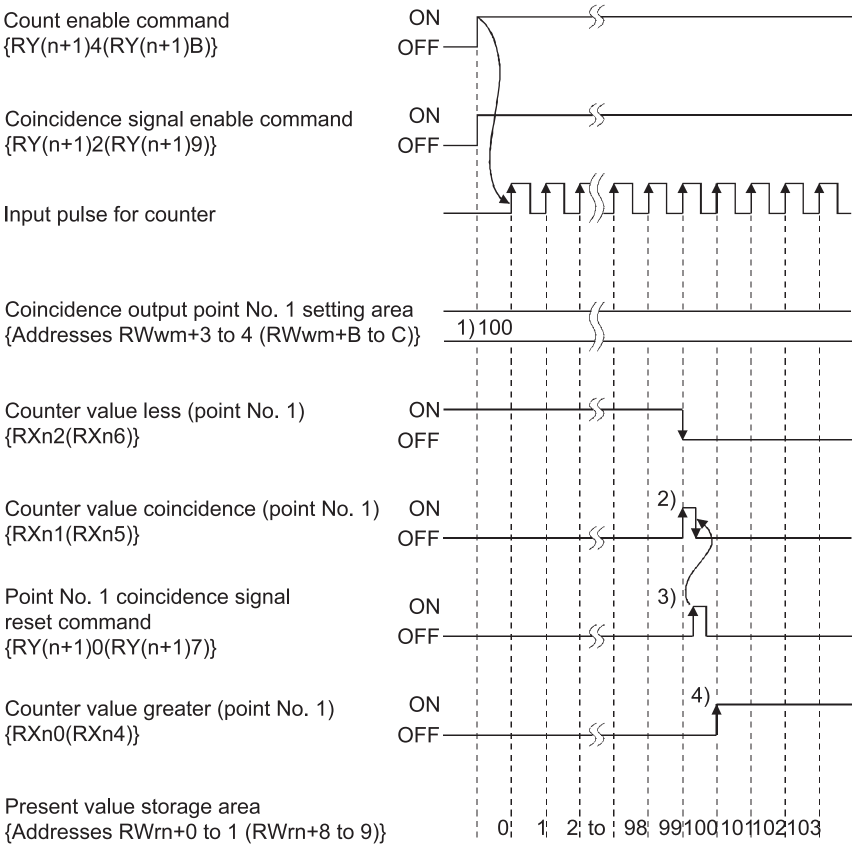
*In the AJ65BT-D62D-S1, its external output (coincidence output) does not switch on-off if the coincidence output No. 2 is set. However, the counter value comparison (coincidence, greater, less) output signals (X signals) switch on-off as ordinarily.

[Example of using the coincidence output function]
In a machining line system, machining operations are performed in response to the corresponding coincidence outputs to turn out products.

1) Materials are carried on a belt conveyor.
2) Material positions are identified as the present count values determined by the pulses sent to the high-speed module.
3) As soon as the materials reach the specified positions, the relevant machining operations are performed in response to the coincidence outputs (EQU1, EQU2) from the high-speed counter module.



6.1.1 Coincidence output function operation



1) ......Write a value in advance in 24-bit binary to the coincidence output point No. 1 setting area {addresses RWwm+3 to 4 (RWwm+B to C)}.

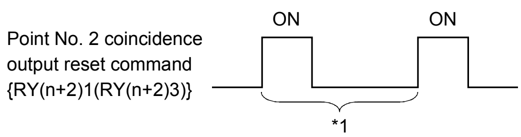
2) ......When the counter value reaches the set coincidence output point value, the counter value less signal switches off and the counter value coincidence signal switches on.

3) ......The coincidence signal reset command is switched on to reset the counter value coincidence signal.
If the counter value coincidence signal remains on, the next coincident signal cannot be issued.

4) ......When the counter value becomes greater than the set coincidence signal output point value, the counter value greater signal switches on.

POINT

- For the coincidence output function, preset a coincidence output point and reset coincidence output before turning on the coincidence signal enable command.
  If the coincidence signal enable command is turned on without the operation above, coincidence output occurs since the coincidence output point and the count value are the same in the initial state.
- If the following time is not satisfied for the execution of the point No.2 coincidence output reset command, the point No. 2 coincidence output reset command will not switch on-off.



*1..... 10 link scans+2 sequence scans

As the point No. 2 coincidence output reset command is only valid on the leading edge (OFF→ON) of the signal, always make sure that the point No. 2 signal is off before executing the command.

7. EXECUTING THE PRESET FUNCTION

This chapter explains the preset function.

7.1 Preset Function

The preset function is used to rewrite the counter's present value into any value.
This new value is called the preset value.
The preset function can be used when a pulse count is started from the set value.
The preset function is available in two modes: "preset by the sequence program (preset command {RY(n+1)1 (RY(n+1)8)}" and "preset from the external control signal (by applying a voltage to the external terminal)".

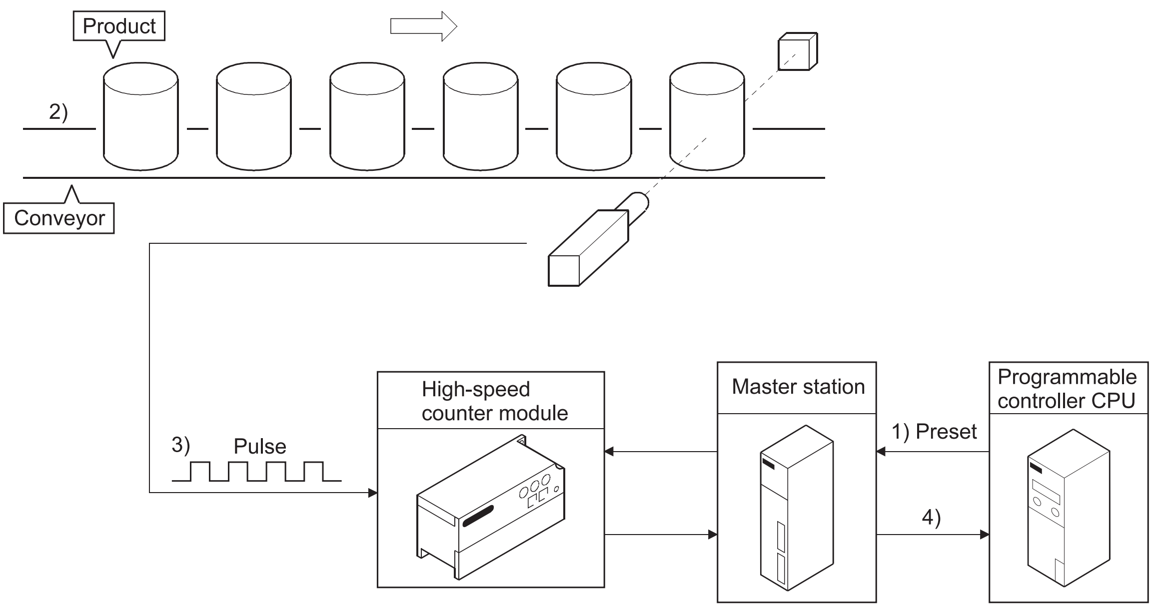
[Remote registers used]

Address	Description
RWwm+0	CH1 Preset value setting area (L)
RWwm+1	CH1 Preset value setting area (H)
RWwm+8	CH2 Preset value setting area (L)
RWwm+9	CH2 Preset value setting area (H)

[Example of using the preset function]

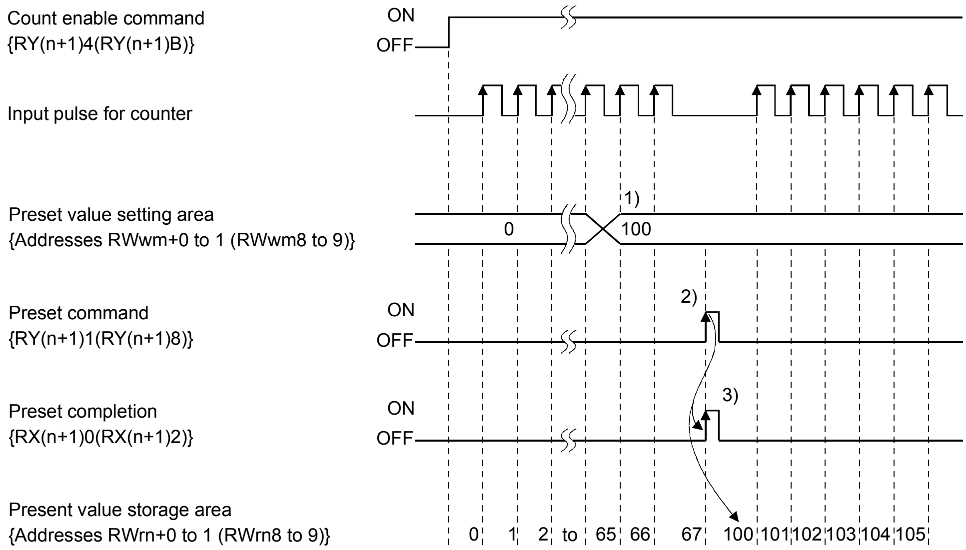
By using the preset function, the production count can be continued from the previous day.

1) Production amount of the previous day is preset from the programmable controller CPU to the high-speed counter module.
2) Products are carried on a conveyor.
3) Production amount is counted using the pulse input from the photoelectric switch.
4) At the end of daily production, the counter value in the present value storage area is stored to the word device (D, W, etc.) in the programmable controller CPU latch range.



7.2 Preset Using the Sequence Program

Turn on the preset command {RY(n+1)1 (RY(n+1)8} in the sequence program to execute the preset function.



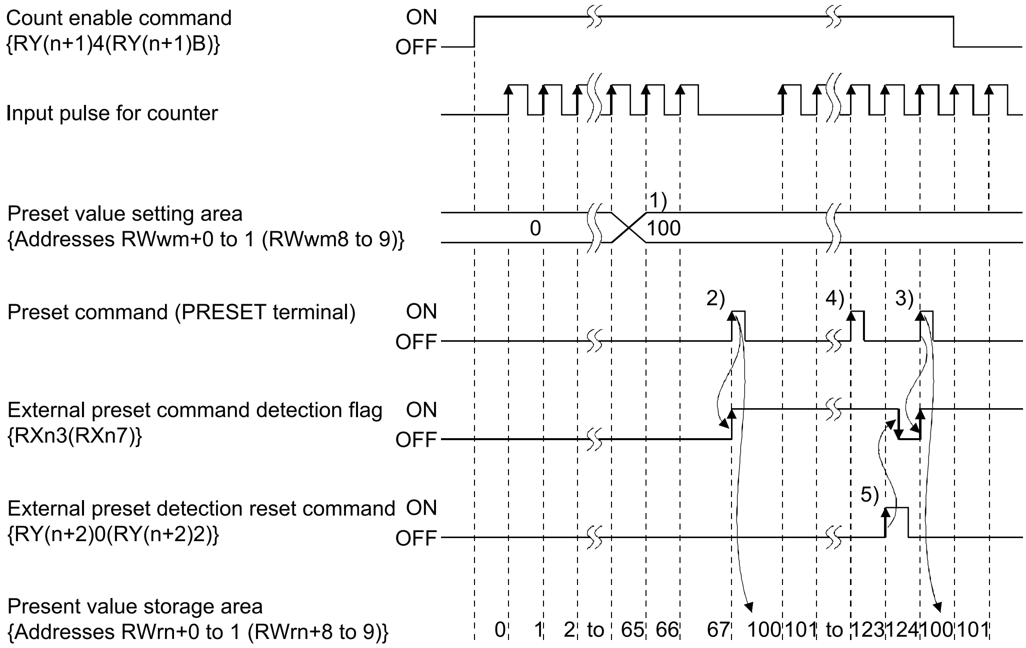
1) ...... Write any value in advance in 24-bit binary to the preset value setting area {addresses RWwm+0 to 1 (RWwm+8 to 9)}.

2) ...... On the leading edge (OFF → ON) of the preset command {RY(n+1)1 (RY(n+1)8}, the value in the preset value setting area is preset to the present value storage area. Preset can be executed independently of whether the count enable command {RY(n+1)1 (RY(n+1)8)} is on or off.

3) ...... When the preset function is executed by the preset command {RY(n+1)1 (RY(n+1)8} switched on, the preset completion signal {RY(n+1)1 (RY(n+1)8)} switches on. When the preset command switches off, the preset completion signal also switches off.

7.3 Preset by External Control Signal

A voltage is applied to the external input PRESET terminal to execute preset.



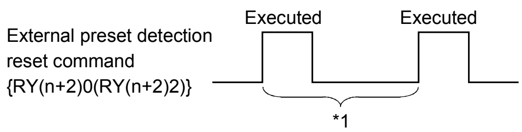
1) ......Write any value in advance in 24-bit binary to the preset value setting area {addresses RWwm+0 to 1 (RWwm+8 to 9)}.

2) ......When the preset command switches on (voltage is applied to the PRESET terminal), the value in the preset value setting area is preset to the present value storage area.

3) ......Preset can be executed independently of whether the count enable command {RY(n+1)4 (RY(n+1)B)} is on or off.

POINT

- For the preset function through external input, reset external preset detection (5) in the figure above) every time after the execution of the preset function is completed. Doing so allows the next external input.
- While the external preset command detection {RXn3 (RXn7)} is on (4) in the figure above), the next execution of the preset function through external input or a sequence program is not allowed.
- If the following time is not satisfied for the execution of the external preset detection reset command , the external preset detection reset command will not switch on-off.



*1..... 10 link scans+2 sequence scans

8. EXECUTING THE RING COUNTER FUNCTION

This chapter describes the ring counter function.

8.1 Ring Counter Function

The ring counter function repeats counting between the preset value set by the ring counter command and the ring counter value.
The ring counter function can be used for control such as fixed-pitch feed.
When using the ring counter, preset the ring counter setting switch of the high-speed counter module to ON. Also, set the preset value and ring counter value to the remote registers.

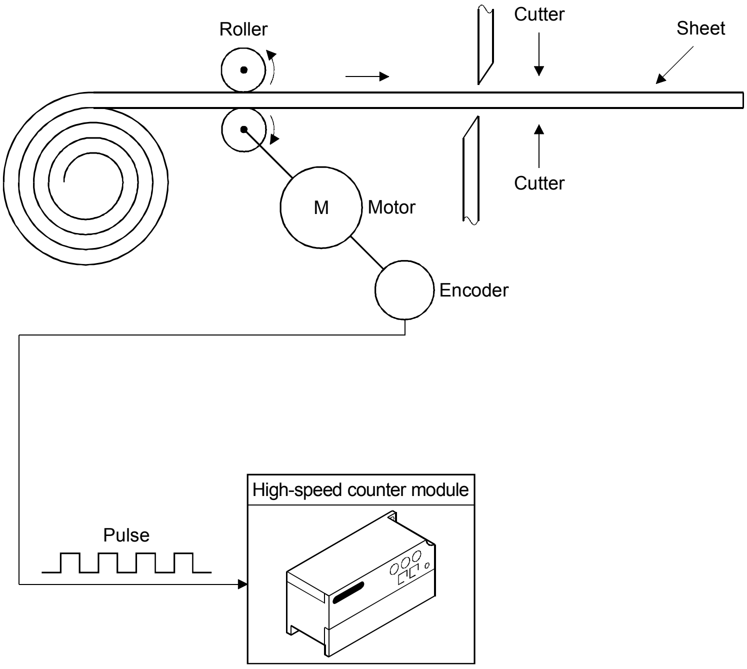
[Remote registers used]

Address	Description
RWwm+0	CH1 Preset value setting area (L)
RWwm+1	CH1 Preset value setting area (H)
RWwm+3	CH1 Coincidence output point No. 1 setting area (L)
RWwm+4	CH1 Coincidence output point No. 1 setting area (H)
RWwm+8	CH2 Preset value setting area (L)
RWwm+9	CH2 Preset value setting area (H)
RWwm+B	CH2 Coincidence output point No. 2 setting area (L)
RWwm+C	CH2 Coincidence output point No. 2 setting area (H)

[Example of using the ring counter function]

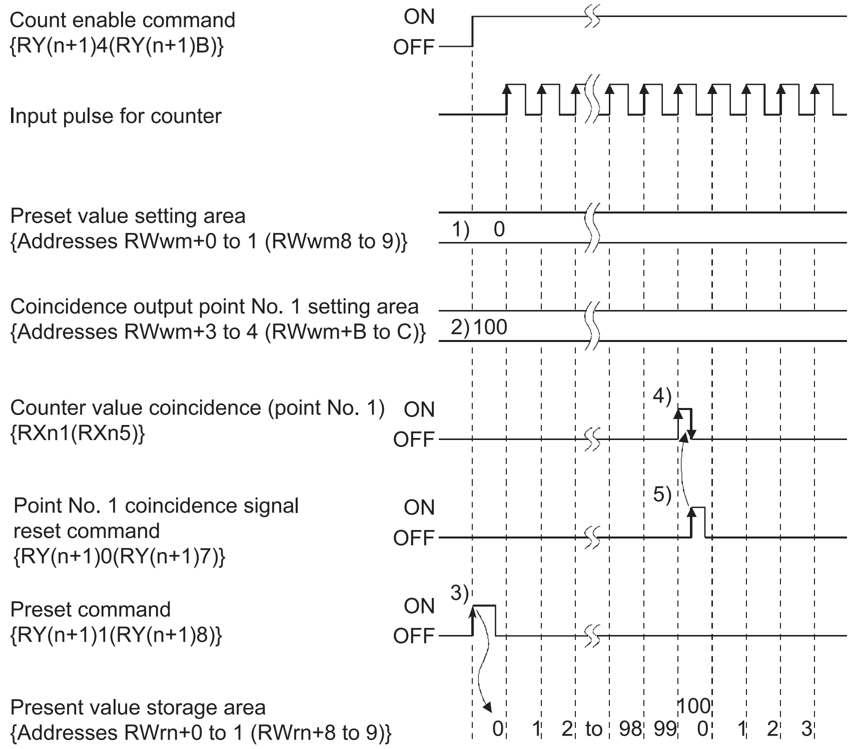
In a system where a sheet is cut to the specified size, set the ring counter value to roller-feed a sheet in fixed pitch and cut it to the given length.

1) Set the preset and ring counter values to execute the ring counter function.
2) The motor is run to rotate the rollers.
3) The motor is stopped as soon as the given length of the sheet is fed by the rollers.
4) The sheet is cut.
5) The operations in steps 2) to 4) are repeated.



8.1.1 Ring counter function operation

When using the ring counter function, preset the ring counter setting switch of the high-speed counter module to ON.
Also set the preset value and ring count value to the remote registers.



1) ......Write a preset value in advance in 24-bit binary to the preset value setting area {addresses RWwm+0 to 1 (RWwm8 to 9)}.

2) ......Write a ring counter value in advance in 24-bit binary to the coincidence output point No. 1 setting area {addresses RWwm+3 to 4 (RWwm+B to C)}.

3) ......On the leading edge (OFF→ON) of the preset command {RY(n+1)1 (RY(n+1)8}, the value in the preset value setting area is preset to the present value storage area. Preset can be executed independently of whether the count enable command {RY(n+1)4 (RY(n+1)B)} is on or off.

4) ......When the counter value reaches the ring counter value, the counter value coincidence signal switches on to execute presetting. When the present value is read at the execution of presetting, the ring counter value or preset value is read.

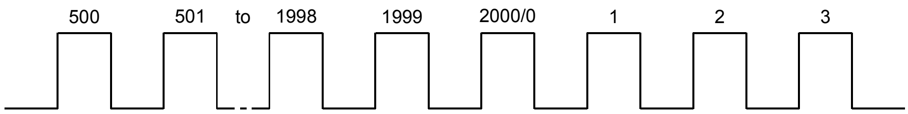
5) ......Reset the counter value coincidence signal by turning on the point No. 1 coincidence signal reset command.
If the counter value coincidence signal is on, a value cannot be preset for the next operation.

8.1.2 Count range

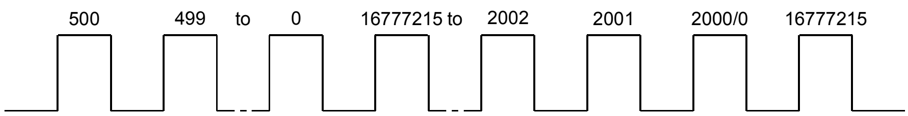
As shown below, the count range of the ring counter function differs depending on the relationship between the preset value, ring counter value, present value and counting mode (up/down count).

(1) If preset value≤present value≤ring counter value
The following operation is performed if the ring counter function is executed at the preset value of 0, ring counter value of 2000, and present value of 500.

1) In up count, the present value returns to the preset value (0) as soon as it is counted up to the ring counter value (2000)

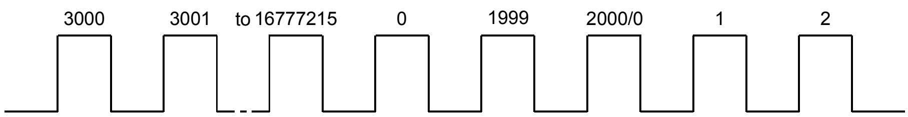


2) In down count, the present value returns to the maximum value (16777215) when it is counted down to the preset value (0).
Then, when the present value is counted down to the ring counter value (2000), it returns to the preset value(0).

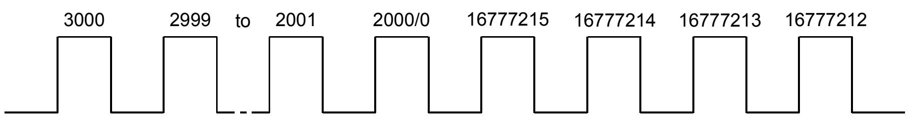


(2) If preset value≤ring counter value≤present value
The following operation is performed if the ring counter function is executed at the preset value of 0, ring counter value of 2000, and present value of 3000.

1) In up count, the present value returns to the minimum value (0) when it is counted up to the maximum value (16777215).
Then, when the present value is counted up to the ring counter value (2000), it returns to the preset value(0).



2) In down count, the present value returns to the preset value (0) as soon as it is counted down to the ring counter value (2000).



POINT

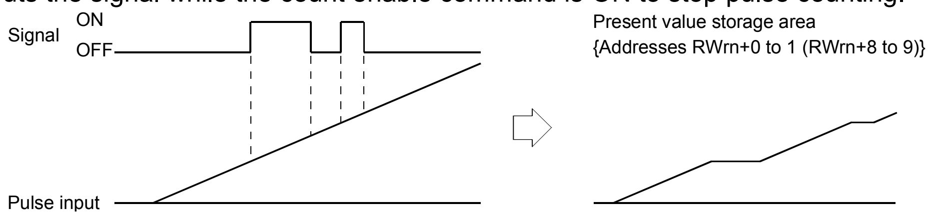
- Do not write the preset and ring counter values during execution of the ring counter function. If they are written, the ring counter operation may not be performed properly.
- Note that the ring counter function is not activated when the following expression is satisfied.
  Ring counter cycle ≤ 10-link scan time+2-sequence scan time

9. SELECTING AND EXECUTING THE COUNTER FUNCTION

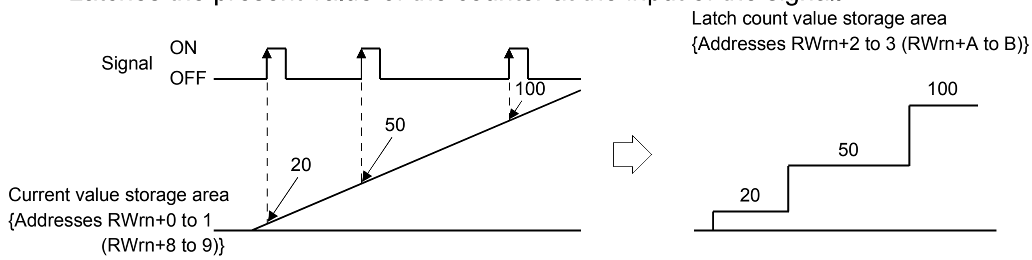
9.1 Selecting the Counter Function

Select and execute one of the following four counter functions.
Execute the selected function by switching on the counter function selection start command or by applying a voltage to the external F.START terminal.

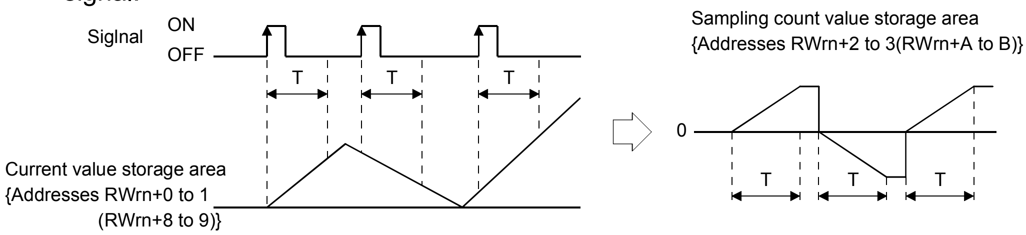
1) Count disable function.......................Refer to Section 9.2
Inputs the signal while the count enable command is ON to stop pulse counting.



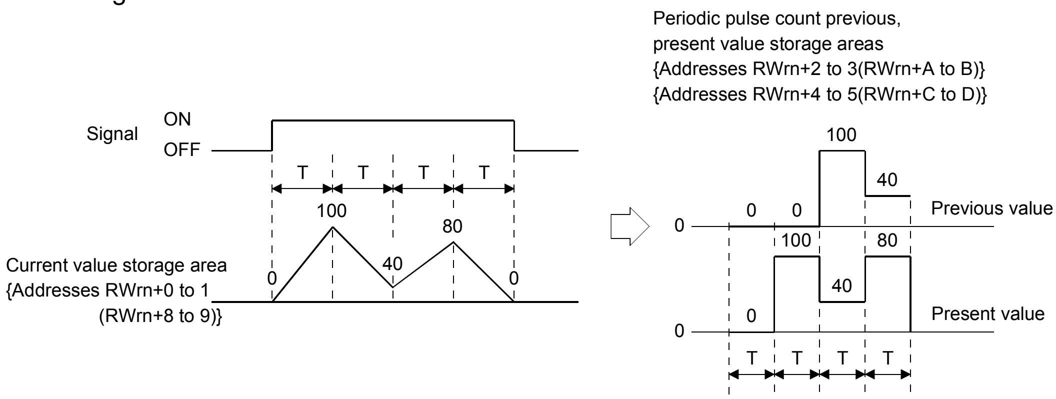
2) Latch counter function.......................Refer to Section 9.3
Latches the present value of the counter at the input of the signal.



3) Sampling counter function................Refer to Section 9.4
Counts pulses entered during a preset time (T) which begins with the input of the signal.

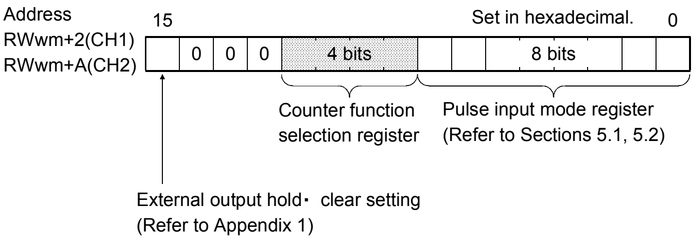


4) Periodic pulse counter function.........Refer to Section 9.5
Stores the present and previous counter values at preset intervals (T) while the signal is entered.



(1) Select any of the counter functions by writing a value to the lower 4 bits in the upper bits of the remote register {address RWwm+2 (RWwm+A)}.
When the value set is other than the following set value, the initial value (count disable function selection) is set.
However, when changing the counter function, make sure that the counter function selection start command {RY(n+1)6 (RY(n+1)D)} and F.START terminal are off.

Counter Function Selection	Set Value
Count disable function	0H
Latch counter function	1H
Sampling counter function	2H
Periodic pulse counter function	3H



(2) A selected function can be executed using the counter function selection start command {RY(n+1)6 (RY(n+1)D)} or the F.START terminal (external input). The signal input earlier is prioritized.

(3) Set the time for the sampling counter function and periodic counter function between 1 and 65535 in 10ms increments.
The unit of time is 10 [ms] and the precision is less than 1 count.

Example: When 420 is set to the sampling/interval time setting area {address RWwm+5 (RWwm+D)}
420×10=4200[ms]

POINT
The sampling and interval time values are set to the same address of the remote register, but the value set is that of the function selected.

9.1.1 Reading the counter function selection count value

The counter function selection count value is the count value at a time when a counter function selection is made.
This section describes how to read the counter function selection count value.

(1) The counter function selection count values are stored in the following remote registers.

Description		Latch Count Value/ Sampling Count Value/Periodic Pulse Count Previous Value	Periodic Pulse Count Present Value
Remote register	CH1	RWrn+2 to 3	RWrn+4 to 5
	CH2	RWrn+A to B	RWrn+C to D

(2) The counter function selection count value (0 to 16777215) is stored in 24-bit binary.

(3) In up count, the counter function selection count value returns to 0 when it exceeds 1677715.
In down count, the counter function selection count value returns to 1677715 when it exceeds 0.

POINT

The latch count value, sampling count value and periodic pulse count previous value are stored in the same address but the value stored is the count value selected.

9.1.2 Counting errors

When the selected function is executed through external input (applying voltage to the F.START terminal) or a sequence program (turning on the counter function selection start command), a count error occurs.

(1) For external input, there is the following count delay range.

[Maximum count delay]
1[ms]×pulse input speed [PPS]×multiplication number [count]

[Minimum count delay]
0.1[ms]×pulse input speed [PPS]×multiplication number [count]

(2) When a counter function selection is made by the sequence program, the number of pulses counted during one sequence scan plus three link scans is added to the counting delay in above (1).

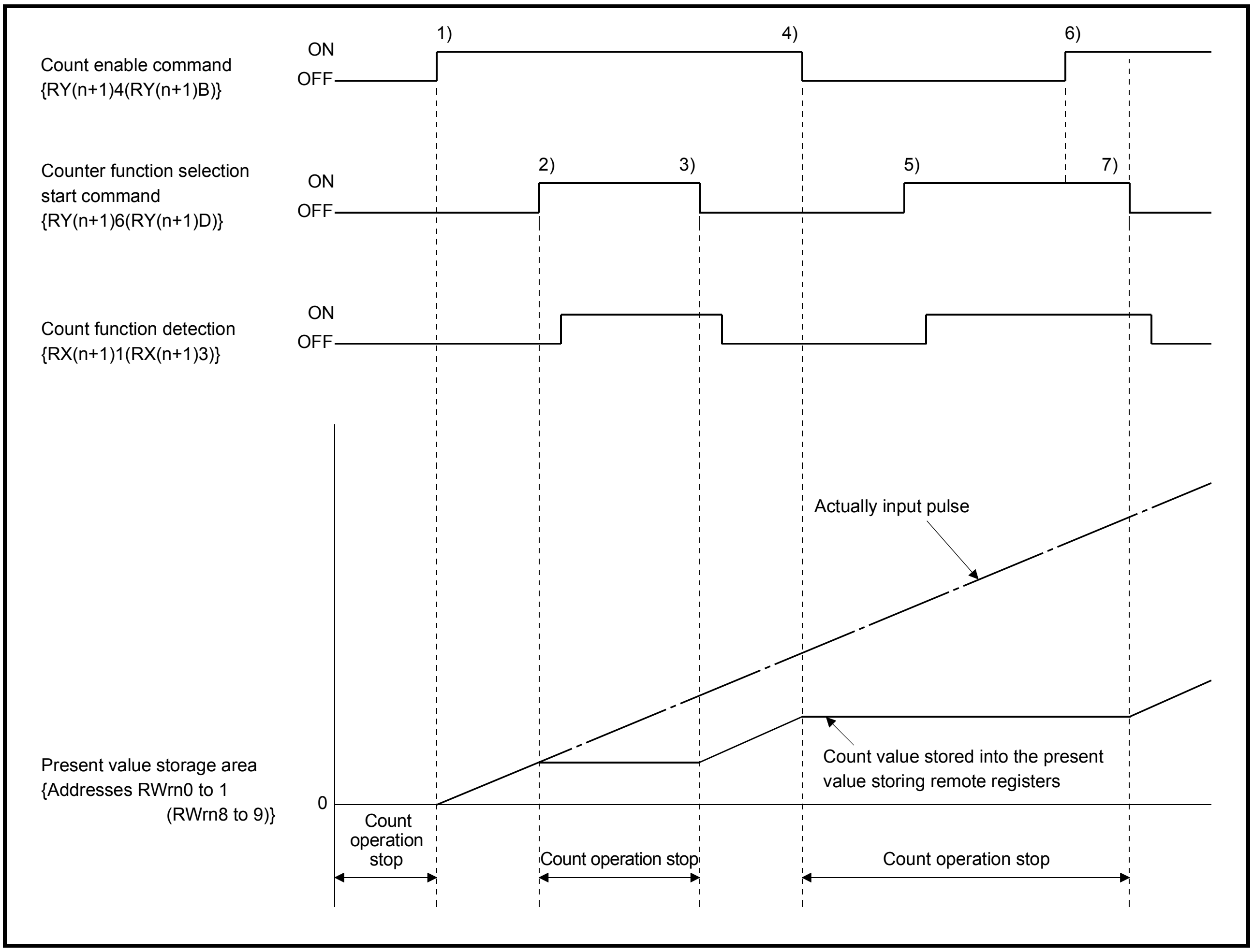
(3) The internal clock error is calculated as follows.

$$\frac{\text{Set time}}{10000} \times \text{pulse input speed [PPS]} \times \text{multiplication number [count]}$$

POINT
It is recommended to use the external input to make a counter function selection.

9.2 Count Disable Function

This function stops the counting operation while the count enable command is on.
The following chart shows the relationships between the count enable command, the counter function selection start command and the counter's present value.



1) ...... Count operation starts when the count enable command {RY(n+1)4 (RY(n+1)B} switches on.

2) ...... Count operation stops when the counter function selection start command {RY(n+1)6 (RY(n+1)D), F.START terminal} switches on.
Also, the counter function detection {RX(n+1)1 (RX(n+1)3)} switches on when the counter function selection start command {RY(n+1)6 (RY(n+1)D)} switches on.

3) ...... Count operation resumes when the counter function selection start command {RY(n+1)6 (RY(n+1)D), F.START terminal} switches off.
Also, the counter function detection {RX(n+1)1 (RX(n+1)3)} switches off when the counter function selection start command {RY(n+1)6 (RY(n+1)D)} switches off.

4) ...... Count operation stops when the count enable command {RY(n+1)4 (RY(n+1)B} switches off.

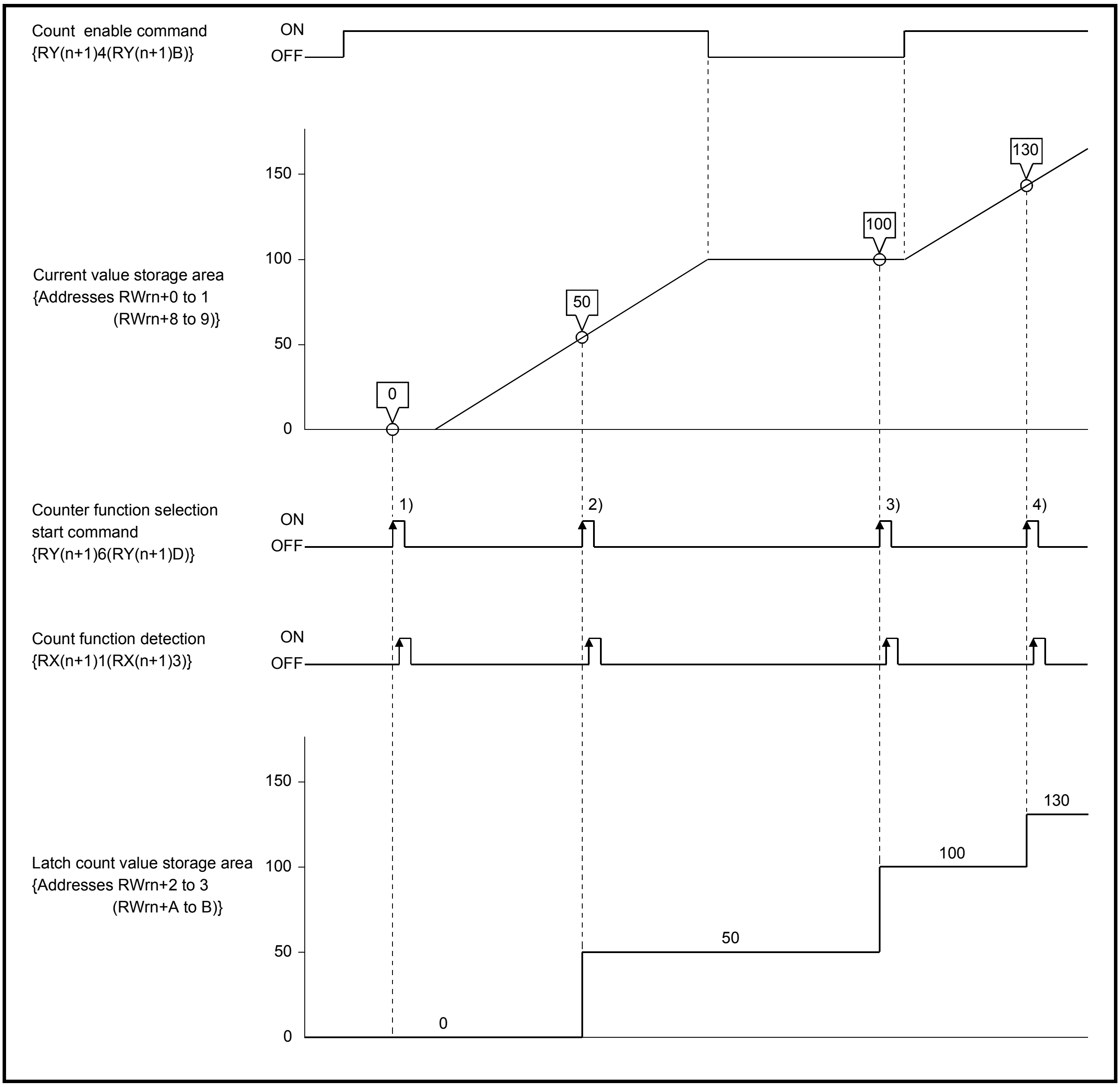
5) ...... Since the count enable command {RY(n+1)4 (RY(n+1)B} is off, count operation stops independently of whether the counter function selection start command {RY(n+1)6 (RY(n+1)D, F.START terminal}.

6) ...... If the count enable command {RY(n+1)4 (RY(n+1)B} is switched on, count operation remains stopped since the counter function selection start command {RY(n+1)6 (RY(n+1)D), F.START terminal} is on.

7) ...... Count operation resumes when the counter function selection start command {RY(n+1)6 (RY(n+1)D), F.START terminal} switches off.

9.3 Latch Counter Function

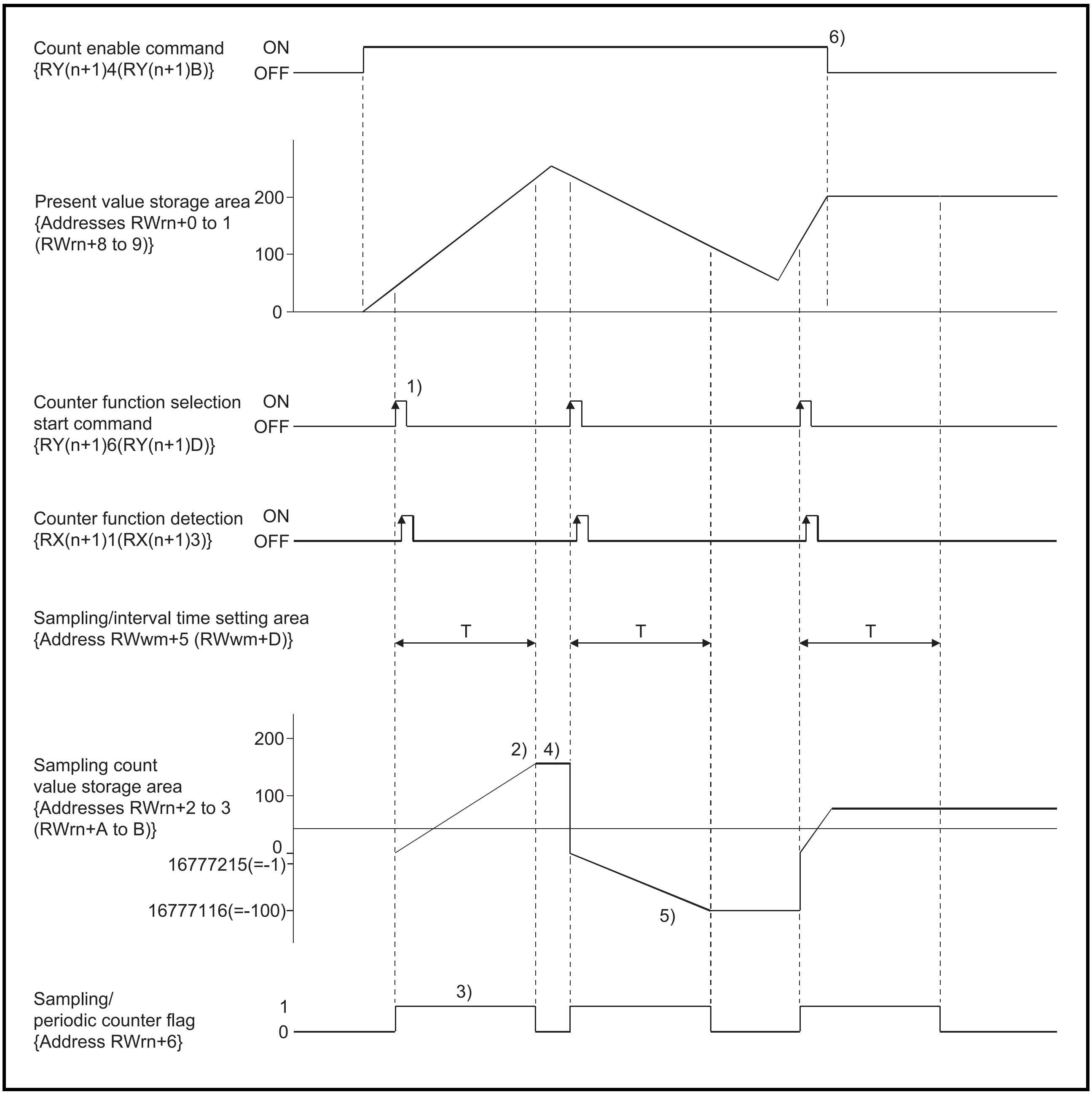
This function latches the counter's present value at a time when the signal is input.
The following chart shows the relationships between the counter's present value, counter function selection start command and latch count value storage area.



On the leading edges 1) to 4) of the counter function selection start command {RY(n+1)6 (RY(n+1)D), F.START terminal}, the counter's present value is stored into the latch count value storage area {addresses RWrn2 to 3 (RWrnA to B)}.
The latch counter function is executed regardless of the ON/OFF status of the count enable command {RY(n+1)4 (RY(n+1)B)}. Also, turning on the counter function selection start command {RY(n+1)6 (RY(n+1)D)} turns on the counter function detection signal {RX(n+1)1(RX(n+1)3)}. Turning off the counter function selection start command {RY(n+1)6 (RY(n+1)D)} turns off the counter function detection signal {RX(n+1)1(RX(n+1)3)}.

9.4 Sampling Counter Function

This function counts pulses input during a preset sampling period.
The following chart shows the relationships between the signals of the sampling counter function, remote registers and others.



1) ...... On the leading edge of the counter function selection start command {RY(n+1)6 (RY(n+1)D), F.START terminal}, pulses input are counted from 0. Also, the counter detection function signal {RX(n+1)1 (RX(n+1)3)} switches on when the counter function selection start command {RY(n+1)6 (RY(n+1)D)} switches on, and the counter detection signal {RX(n+1)1 (RX(n+1)3)} switches off when the counter function selection start command {RY(n+1)6 (RY(n+1)D)} switches off.

2) ...... Counting stops when the preset sampling time elapses.

3) ...... While the sampling counter function is being executed, the following value is stored into the sampling/periodic counter flag storage area.

Operating Status	During Execution at CH1 Only	During Execution at CH2 Only	During Execution at CH1 and CH2
Remote register address (RWrn+6)	K1	K2	K3

4) ...... If the sampling counter function ends, the value in the sampling count value storage area is held.

5) ...... When the counter value reaches 0 when values are counted down, the high-speed counter module continues to count down from the maximum positive value since negative values cannot be counted. The counter value at the end of a sampling cycle is stored. For details, refer to Section 8.1.2 (2).

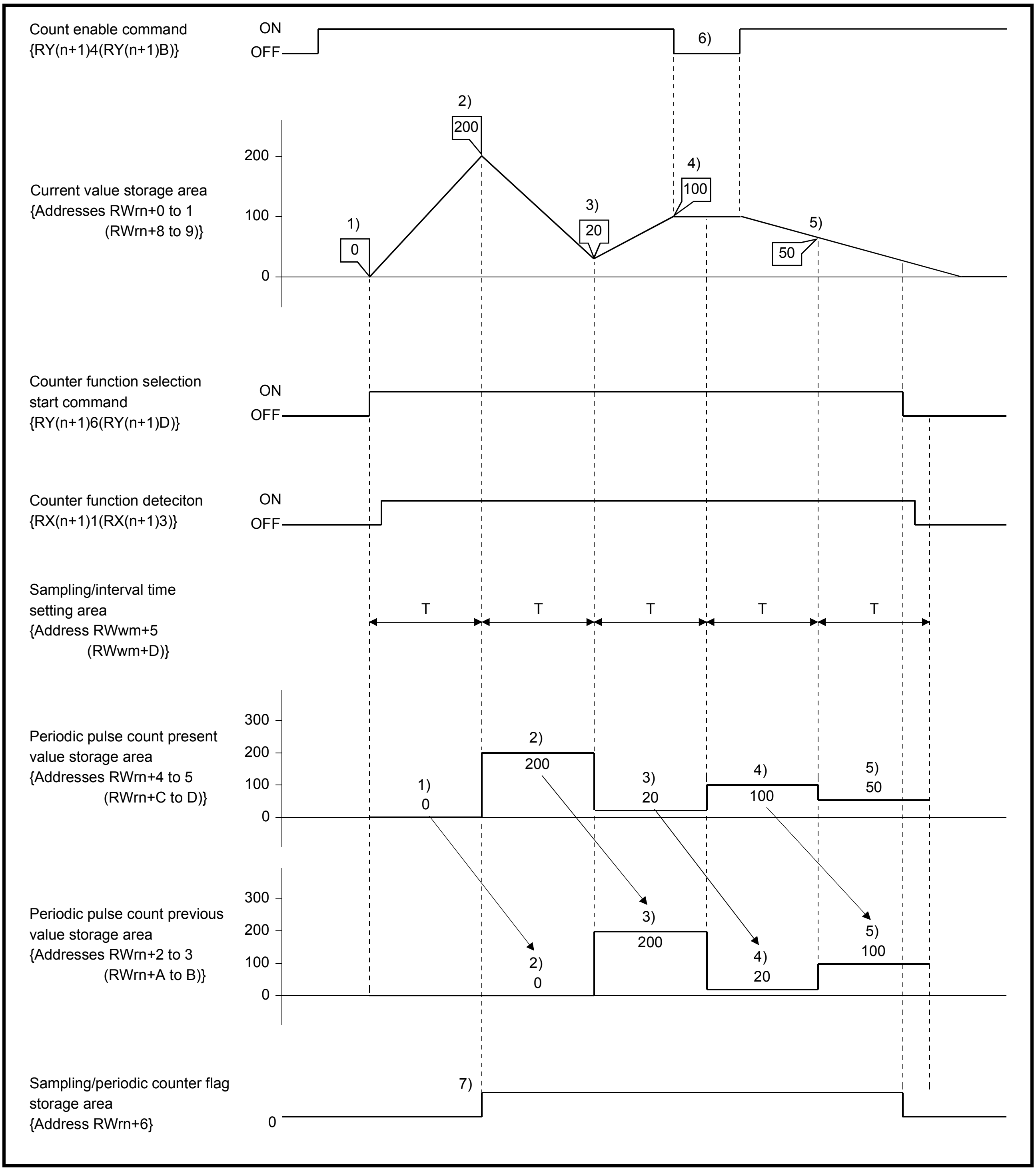
6) ...... The sampling counter function is executed independently of whether the count enable command {RY(n+1)4 (RY(n+1)B)} is on or off.

9.5 Periodic Pulse Counter Function

This function stores the present and previous counter values in the corresponding periodic pulse count present and previous value storage areas at preset intervals (T).

The unit of frequency is 10 ms and the precision is less than 1 count.

The following chart shows the relationships between the signals, remote registers and others.



1) ...... The counter's present value 0 is stored into the periodic pulse count present value storage area {addresses RWrn+4 to 5 (RWrn+C to D)} (hereinafter called the present value storage area).
2) ...... The counter's present value 200 is stored into the present value storage area. The count value 0 stored until then is stored into the periodic pulse count previous value storage area {addresses RWrn+2 to 3 (RWrn+A to B)} (hereinafter called the previous value storage area).
3) ...... The counter's present value 20 is stored into the present value storage area. The count value 200 stored until then is stored into the previous value storage area.
4) ...... The counter's present value 100 is stored into the present value storage area. The count value 20 stored until then is stored into the previous value storage area.
5) ...... The counter's present value 50 is stored into the present value remote register. The count value 100 stored until then is stored into the previous value storage area.
6) ...... The periodic pulse counter function is executed independently of whether the count enable command {RY(n+1)4 (RY(n+1)B)} is on or off.
7) ...... While the periodic pulse counter function is being executed, the following value is stored into the sampling/periodic counter flag storage area.

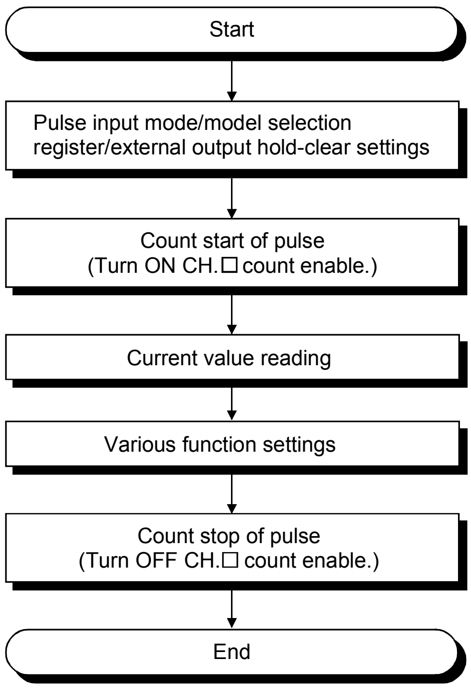
Operating Status	During Execution at CH1 Only	During Execution at CH2 Only	During Execution at CH1 and CH2
Remote register address (RWrn+6)	K1	K2	K3

10. PROGRAMMING

Program examples such as programming procedure, current value reading and various function settings of the high-speed counter module are described.
When program examples introduced in this chapter are used in the actual system, make sure that the control on the system concerned is acceptable.
Refer to the applicable master module user's manual (Detail) for the master module, Section 3.6 for the remote register and the AnSHCPU/AnACPU/AnUCPU programming manual (Dedicated command) for details of dedicated command.

10.1 Programming Procedures

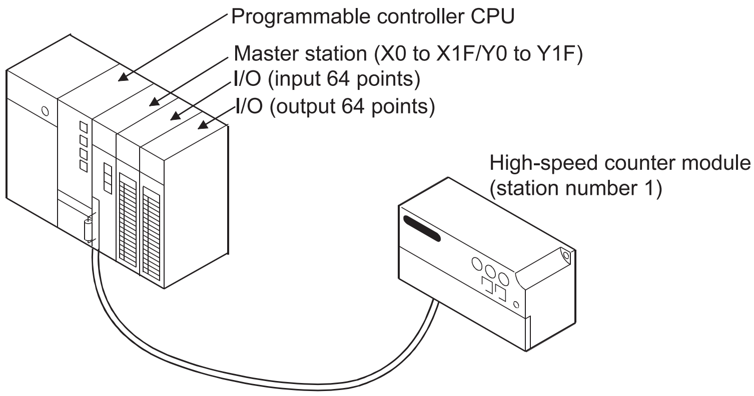
Create the high-speed counter module program with the procedures below:



10.2 Condition of Program Example

Program examples in this chapter are created under the conditions below:

(1) System configuration



(2) Relation of programmable controller CPU, master module and high-speed counter module

Programmable controller CPU | **Master module** | **High-speed counter module (station number 1)**

Device X	Address	Remote input (RX)	Remote input (RX)
X400 to X40F	E0H	RX00 to RX0F	RX00 to RX0F
X410 to X41F	E1H	RX10 to RX1F	RX10 to RX1F
X420 to X42F	E2H	RX20 to RX2F	RX20 to RX2F
X430 to X43F	E3H	RX30 to RX3F	RX30 to RX3F
X440 to X44F	E4H	RX40 to RX4F	RX40 to RX4F
X450 to X45F	E5H	RX50 to RX5F	RX50 to RX5F
X460 to X46F	E6H	RX60 to RX6F	RX60 to RX6F
X470 to X47F	E7H	RX70 to RX7F	RX70 to RX7F

Device Y		Remote output (RY)	Remote output (RY)
Y400 to Y40F	160H	RY00 to RY0F	RY00 to RY0F
Y410 to Y41F	161H	RY10 to RY1F	RY10 to RY1F
Y420 to Y42F	162H	RY20 to RY2F	RY20 to RY2F
Y430 to Y43F	163H	RY30 to RY3F	RY30 to RY3F
Y440 to Y44F	164H	RY40 to RY4F	RY40 to RY4F
Y450 to Y45F	165H	RY50 to RY5F	RY50 to RY5F
Y460 to Y46F	166H	RY60 to RY6F	RY60 to RY6F
Y470 to Y47F	167H	RY70 to RY7F	RY70 to RY7F

Device D		Remote register (RWw)
D200	1E0H	RWw0
D201	1E1H	RWw1
D202	1E2H	RWw2
D203	1E3H	RWw3
D204	1E4H	RWw4
D205	1E5H	RWw5
to	to	to
D214	1EEH	RWwE
D215	1EFH	RWwF

Remote register (RWw) (high-speed counter module)	
RWw0 RWw1	CH.1 preset value set area
RWw2	CH.1 pulse input/function selection/hold-clear settings
RWw3 RWw4	CH.1 coincidence output point No. 1 set area
RWw5	CH.1 sampling/synchronous time set area
to	
RWwE RWwF	CH.2 coincidence output point No. 2 set area

Device D*		Remote register (RWr)
D300	2E0H	RWr0
D301	2E1H	RWr1
D302	2E2H	RWr2
D303	2E3H	RWr3
D304	2E4H	RWr4
D305	2E5H	RWr5
D306	2E6H	RWr6
to	to	to
D315	2EFH	RWrF

Remote register (RWr) (high-speed counter module)	
RWr0 RWr1	CH.1 current value storage area
RWr2	CH.1 latch count value/sampling count value
RWr3	Frequency pulse count previous value storage area
RWr4 RWr5	CH.1 frequency pulse count current value storage area
RWr6	Sampling/frequency counter flag storage area
to	
RWrF	Not allowed for use.

* In the program example (Refer to Section 10.5) using RRPA command (automatic refresh parameter setting) in ACPU/QCPU (A mode), RWr0 to RWr6 are assigned to D456 to D462.

POINT

A device used in program examples in this chapter may not be used depending on your CPU module. Refer to your CPU module user's manual for the range of device setting.
For example, devices of X100 and Y100 or later cannot be used for A1SCPU. Use devices of B or M.

(3) Set description

Set description of program examples for each function is shown below:

(a) Program example of coincidence output function

Set item	Set description
CH. 1 pulse input mode/function selection register/external output hold-clear settings (RWw2)	2-phase 2 multiplex
CH. 1 coincidence output point No. 1 set area (RWw3, RWw4)	100

(b) Program example for preset execution with sequence program

Set item	Set description
CH. 1 pulse input mode/function selection register/external output hold-clear settings (RWw2)	2-phase 2 multiplex
CH. 1 preset value set area (RWw0, RWw1)	100

(c) Program example for preset execution with external control signal

Set item	Set description
CH. 1 pulse input mode/function selection register/external output hold-clear settings (RWw2)	2-phase 2 multiplex
CH. 1 preset value set area (RWw0, RWw1)	100

(d) Program example of ring counter function

Set item	Set description
CH. 1 pulse input mode/function selection register/external output hold-clear settings (RWw2)	2-phase 2 multiplex
CH. 1 sampling/frequency time set area (RWw6)	20000ms

(e) Program example of count disable function

Set item	Set description
CH. 1 pulse input mode/function selection register/external output hold-clear settings (RWw2)	2-phase 2 multiplex

(f) Program example of latch counter function

Set item	Set description
CH. 1 pulse input mode/function selection register/external output hold-clear settings (RWw2)	2-phase 2 multiplex, latch counter function

(g) Program example of sampling counter function

Set item	Set description
CH. 1 pulse input mode/function selection register/external output hold-clear settings (RWw2)	2-phase 2 multiplex, sampling counter function
CH. 1 sampling/frequency time set area (RWw5)	20000ms

(h) Program example of frequency pulse counter function

Set item	Set description
CH. 1 pulse input mode/function selection register/external output hold-clear settings (RWw2)	2-phase 2 multiplex, frequency pulse counter function
CH. 1 sampling/frequency time set area (RWw5)	5000ms

10.3 Program Example when QCPU (Q mode) is Used

The network parameter and the automatic refresh parameter are set by the GX Developer.

(1) Parameter settings

(a) Network parameter settings

	1
Start I/O No	0000
Operational setting	Operational settings
Type	Master station
Master station data link type	PLC parameter auto start
Mode	Remote net(Ver.1 mode)
All connect count	1
Remote input(RX)	
Remote output(RY)	
Remote register(RWr)	
Remote register(RWw)	
Ver.2 Remote input(RX)	
Ver.2 Remote output(RY)	
Ver.2 Remote register(RWr)	
Ver.2 Remote register(RWw)	
Special relay(SB)	
Special register(SW)	
Retry count	3
Automatic reconnection station count	1
Stand by master station No.	
PLC down select	Stop
Scan mode setting	Asynchronous
Delay information setting	0
Station information setting	Station information
Remote device station initial setting	Initial settings
Interrupt setting	Interrupt settings

Station No.	Station type	Expanded cyclic setting	Exclusive station count	Remote station points	Reserve/invalid station select	Intelligent buffer select(word) Send	Receive	Automatic
1/1	Remote device station	single	Exclusive station 4	128 points	No setting			

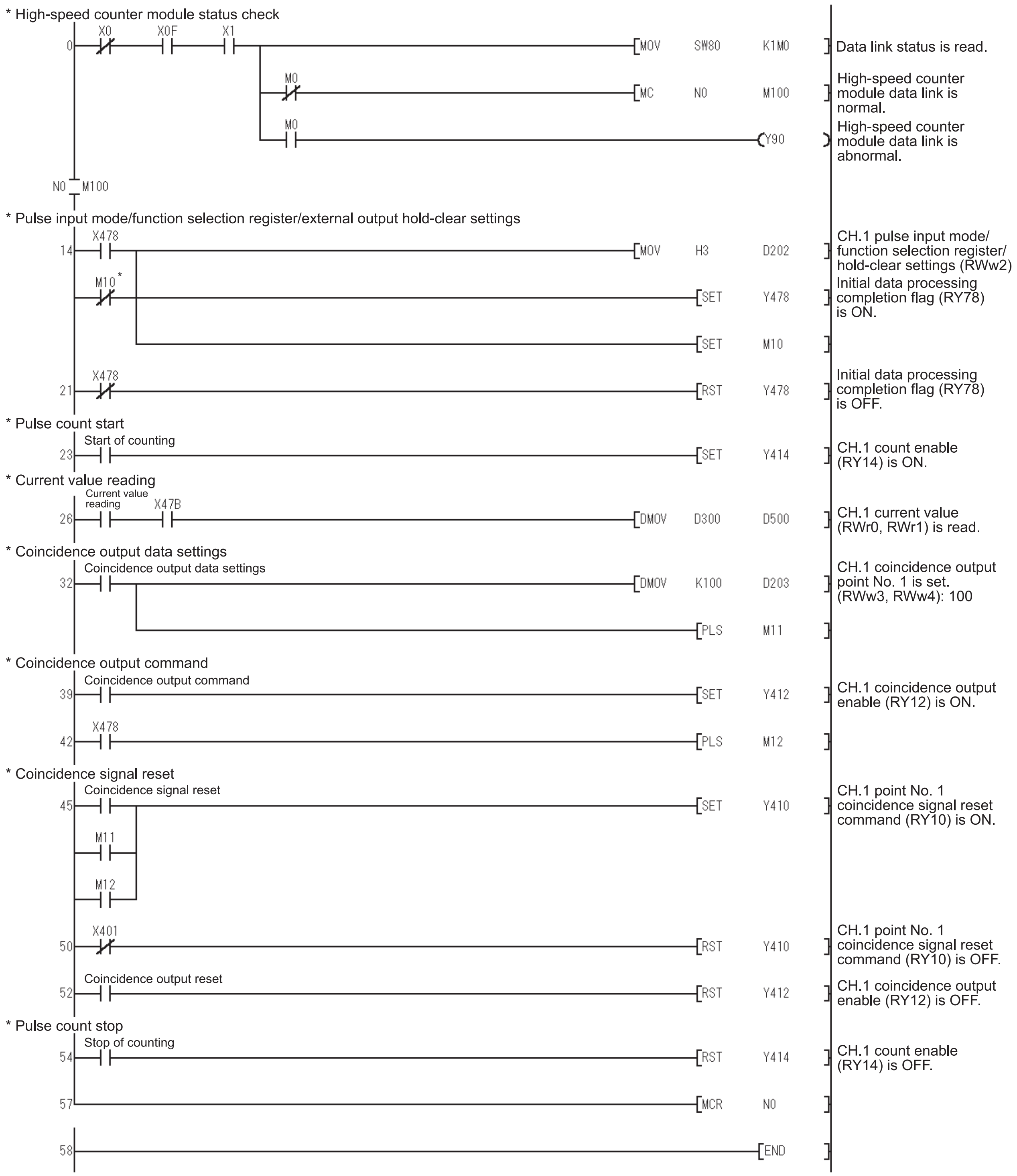
(b) Automatic refresh parameter settings

	1
Start I/O No	0000
Operational setting	Operational settings
Type	Master station
Master station data link type	PLC parameter auto start
Mode	Remote net(Ver.1 mode)
All connect count	1
Remote input(RX)	X400
Remote output(RY)	Y400
Remote register(RWr)	D300
Remote register(RWw)	D200
Ver.2 Remote input(RX)	
Ver.2 Remote output(RY)	
Ver.2 Remote register(RWr)	
Ver.2 Remote register(RWw)	
Special relay(SB)	SB0
Special register(SW)	SW0
Retry count	3
Automatic reconnection station count	1
Stand by master station No.	
PLC down select	Stop
Scan mode setting	Asynchronous
Delay information setting	0
Station information setting	Station information
Remote device station initial setting	Initial settings
Interrupt setting	Interrupt settings

POINT

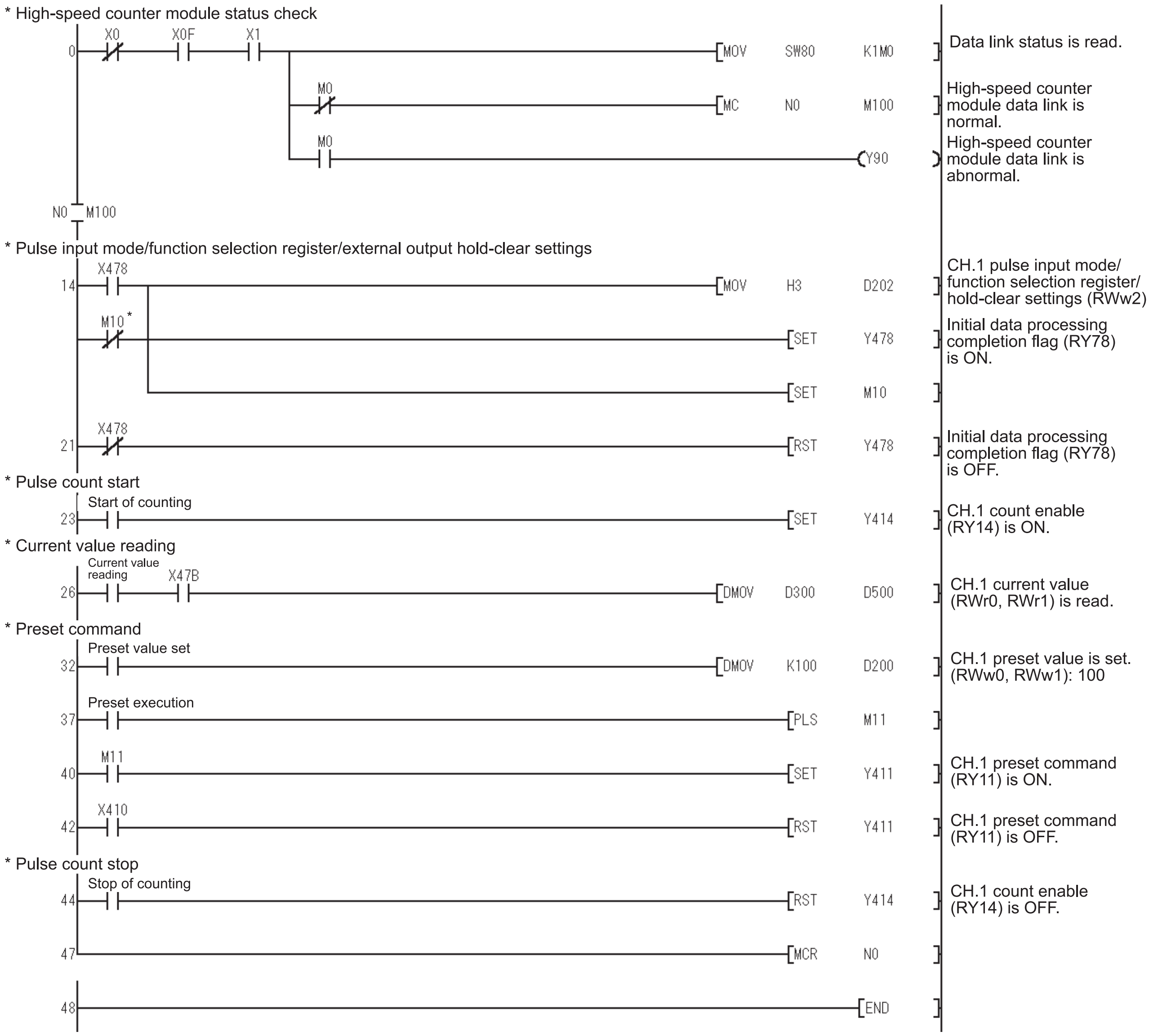
The remote device station initialization step registration function cannot be used.
When the remote device station initialization step registration instruction (SB000D) is turned OFF after initialization processing, the remote register value set in the initialization step registration is cleared. Set the pulse input mode/function selection register/external output hold-clear in the sequence program.
For program examples in this chapter, the pulse input mode/function selection register/external output hold-clear are set in the sequence program.

10.3.1 Program example of coincidence output function



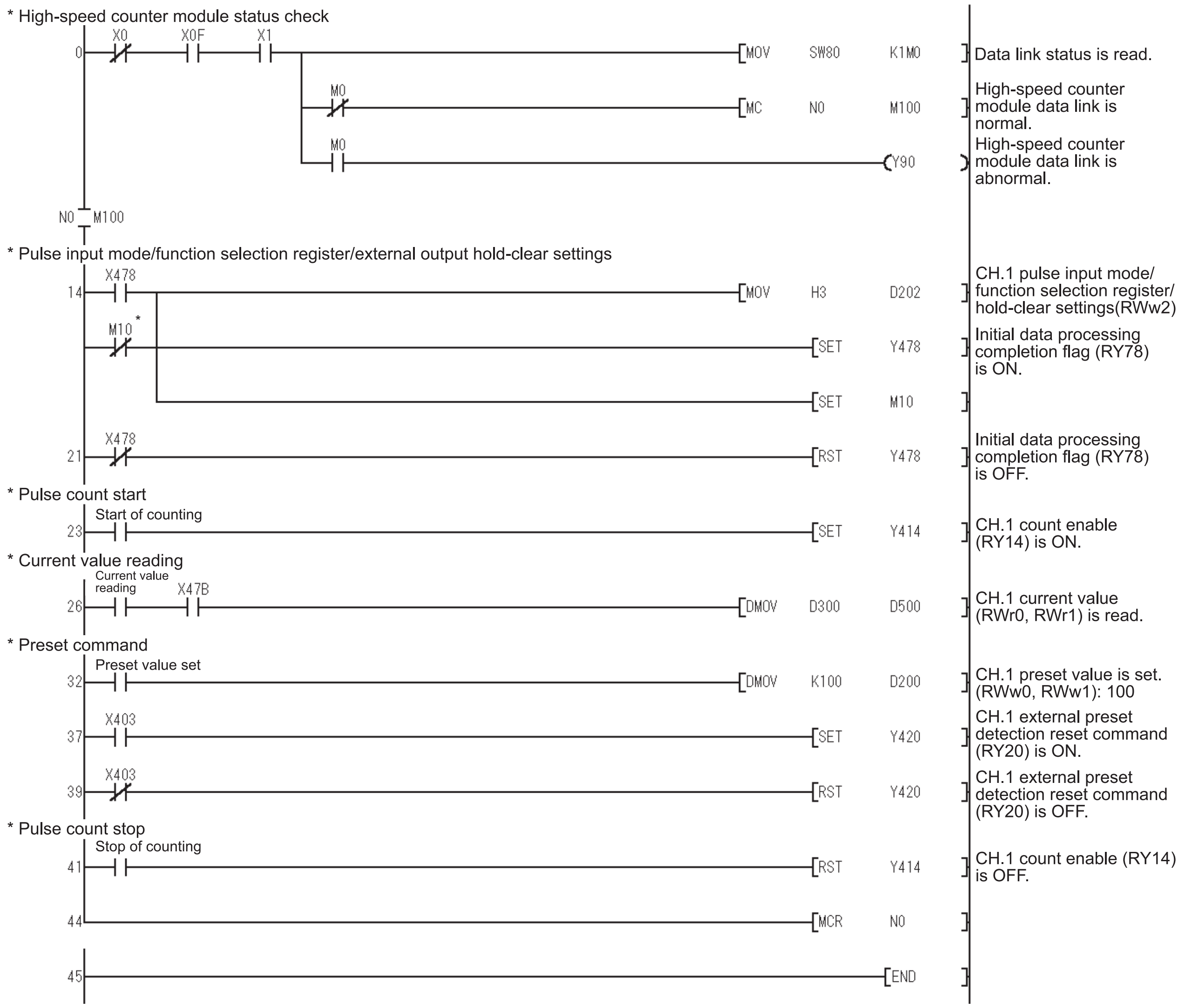
* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

10.3.2 Program example of preset with sequence program



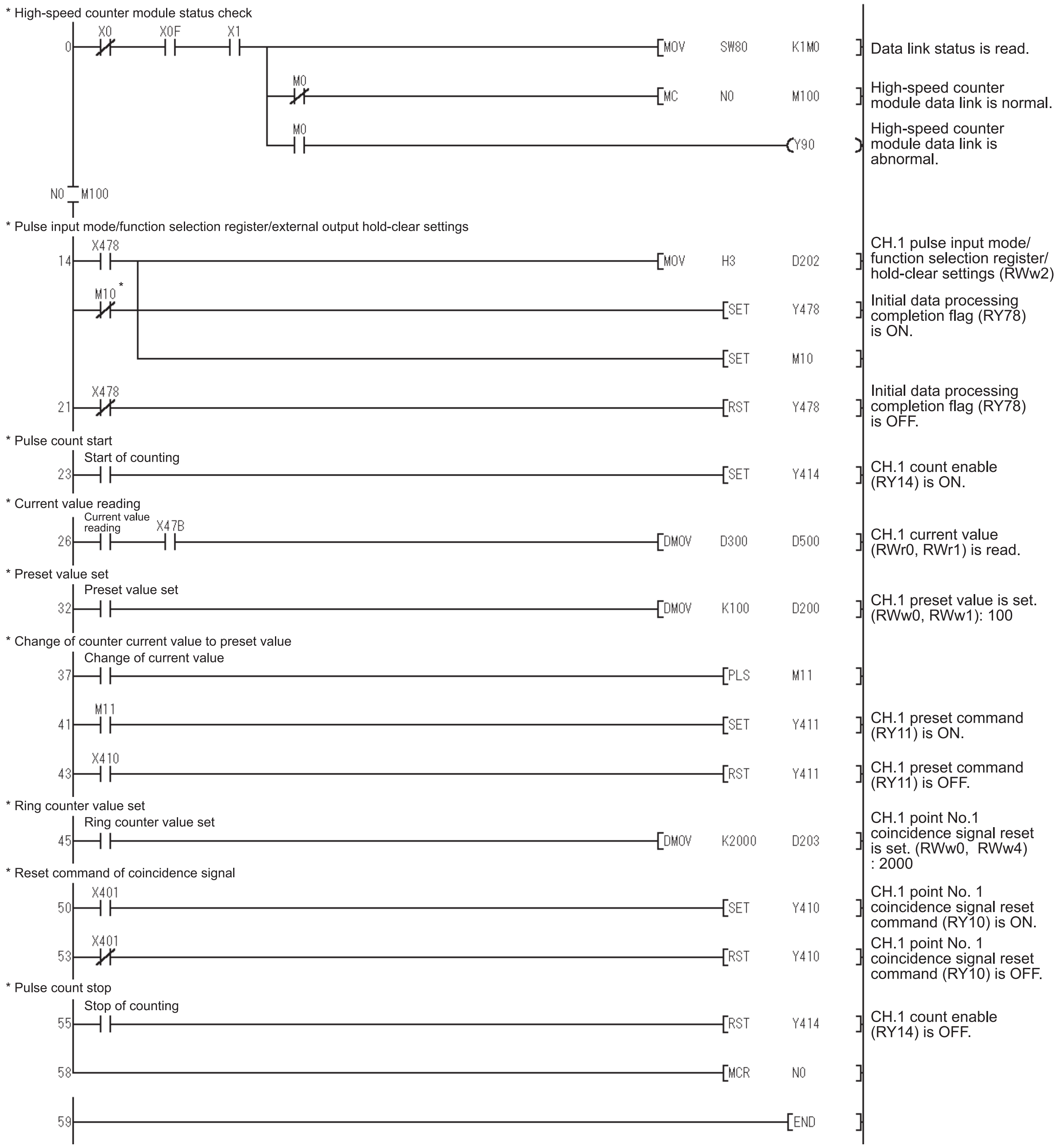
* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

10.3.3 Program example of preset with external control signal



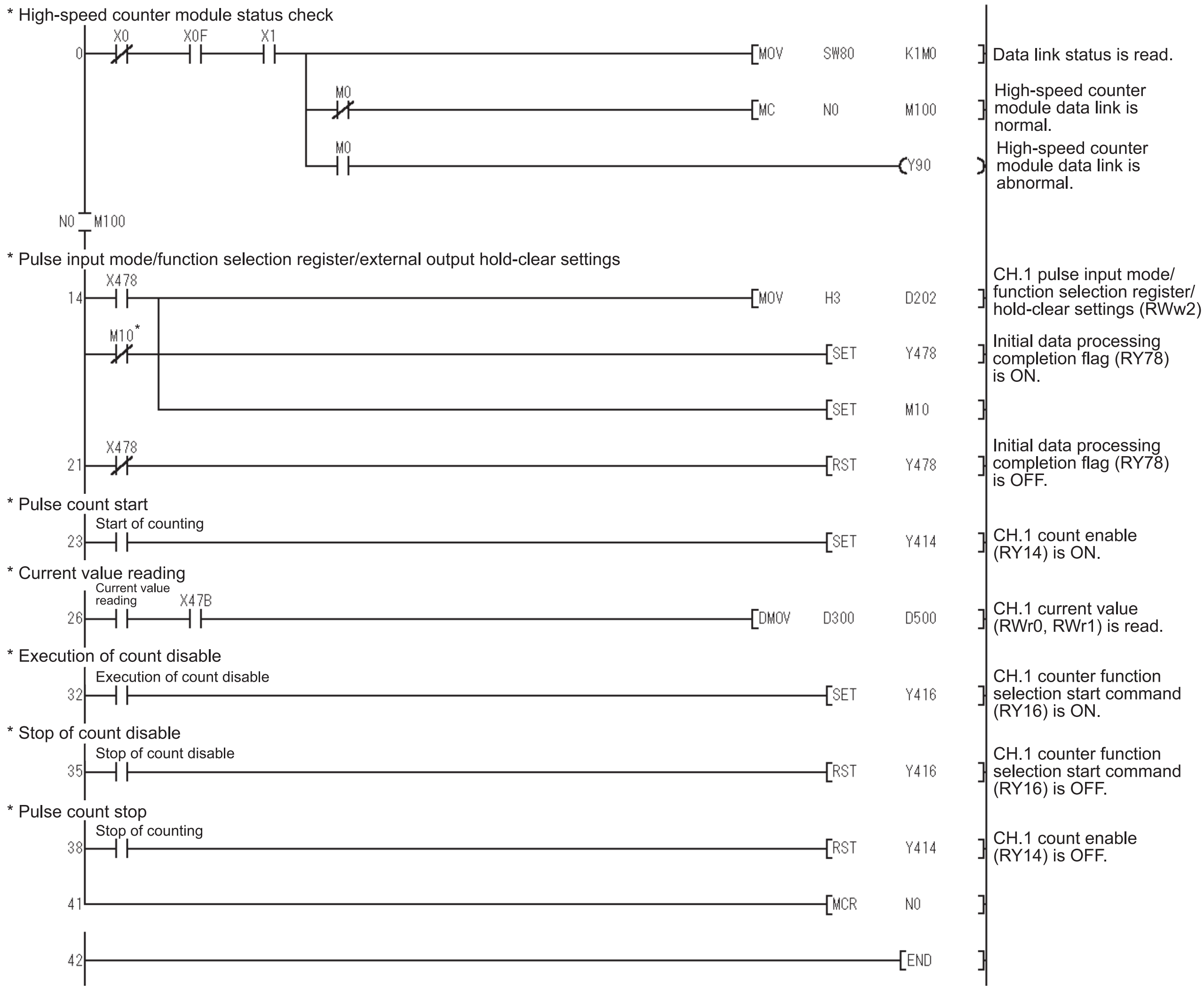
* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

10.3.4 Program example of ring counter function



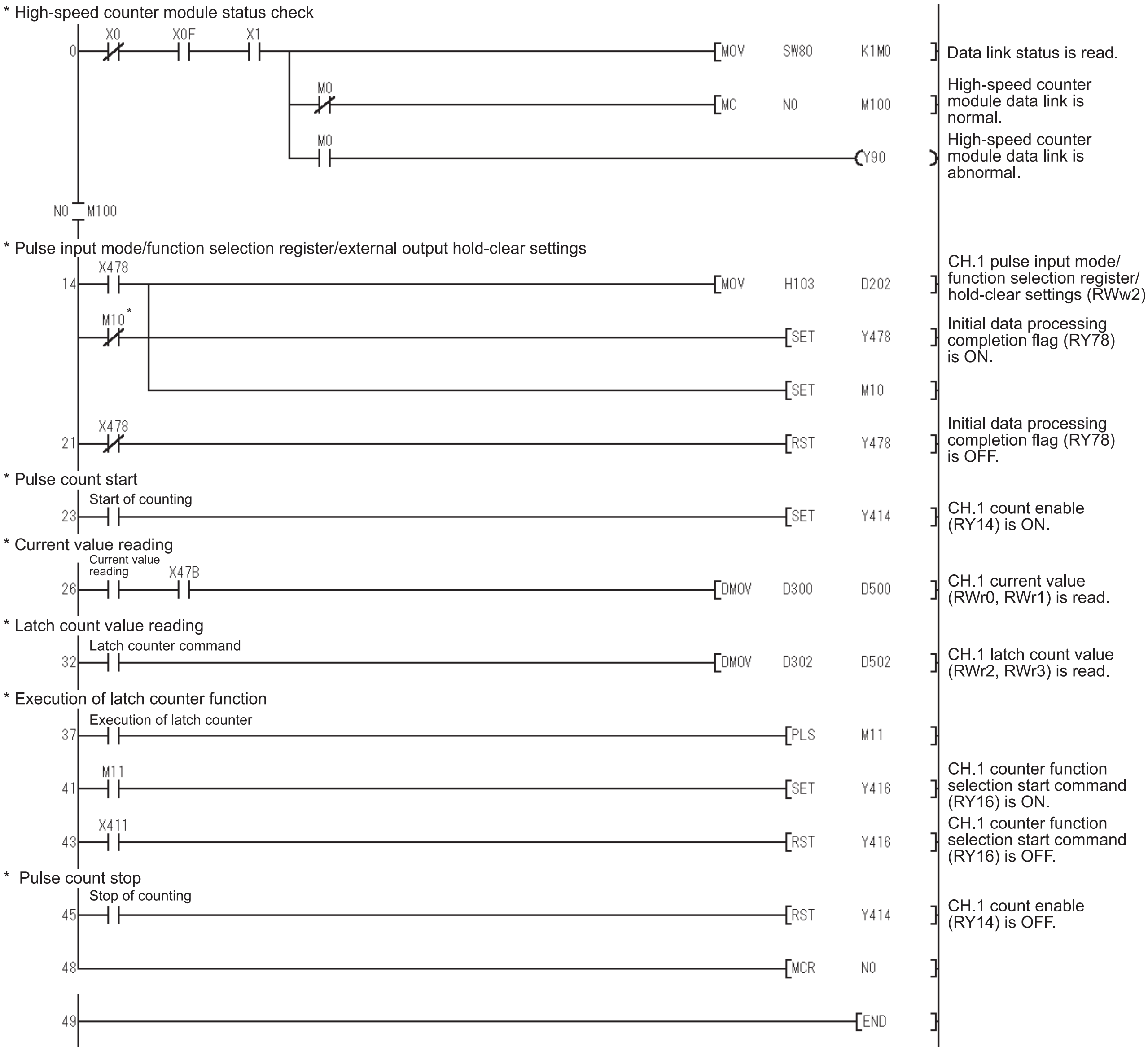
* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

10.3.5 Program example of count disable function



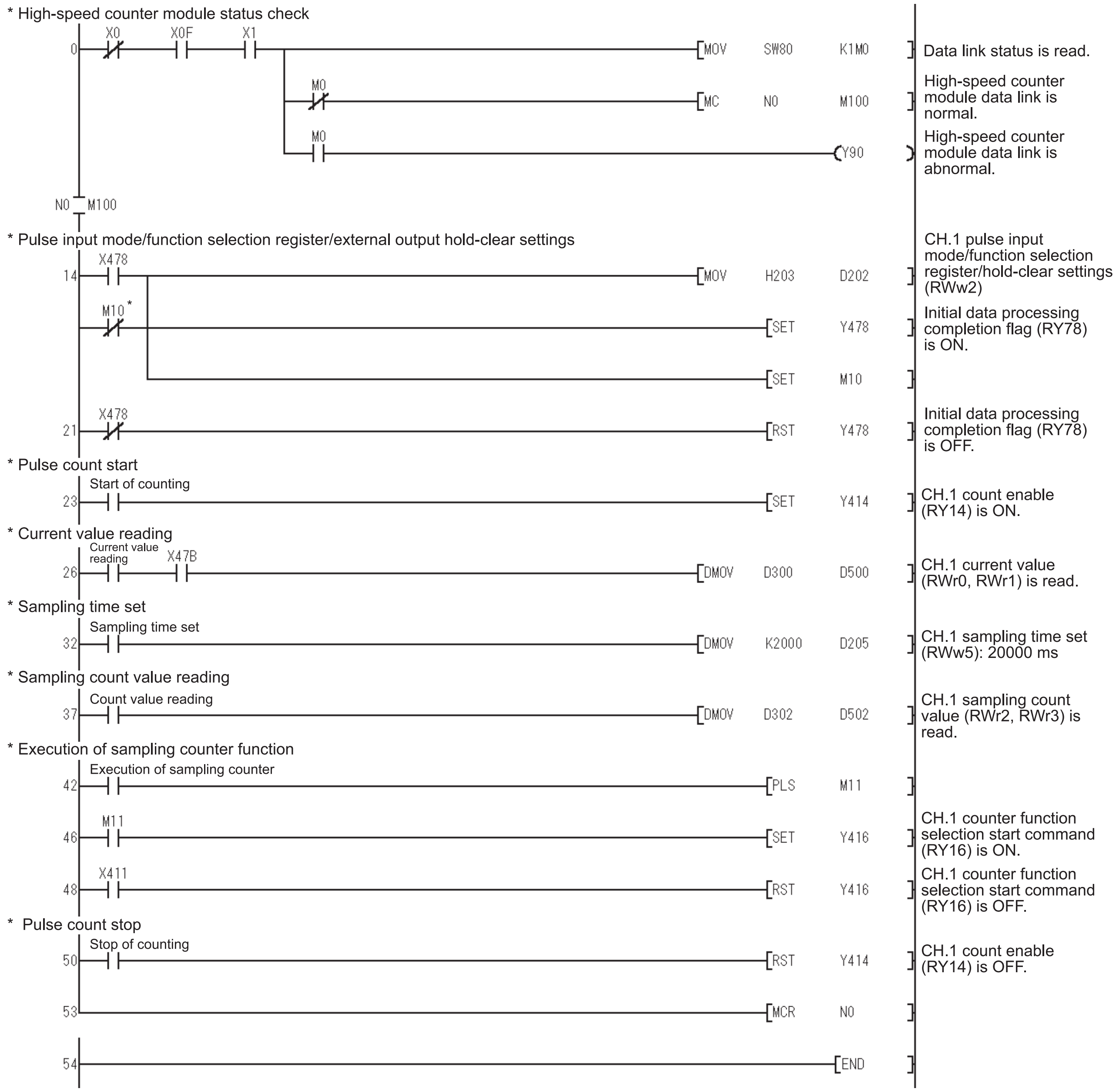
* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

10.3.6 Program example of latch counter function



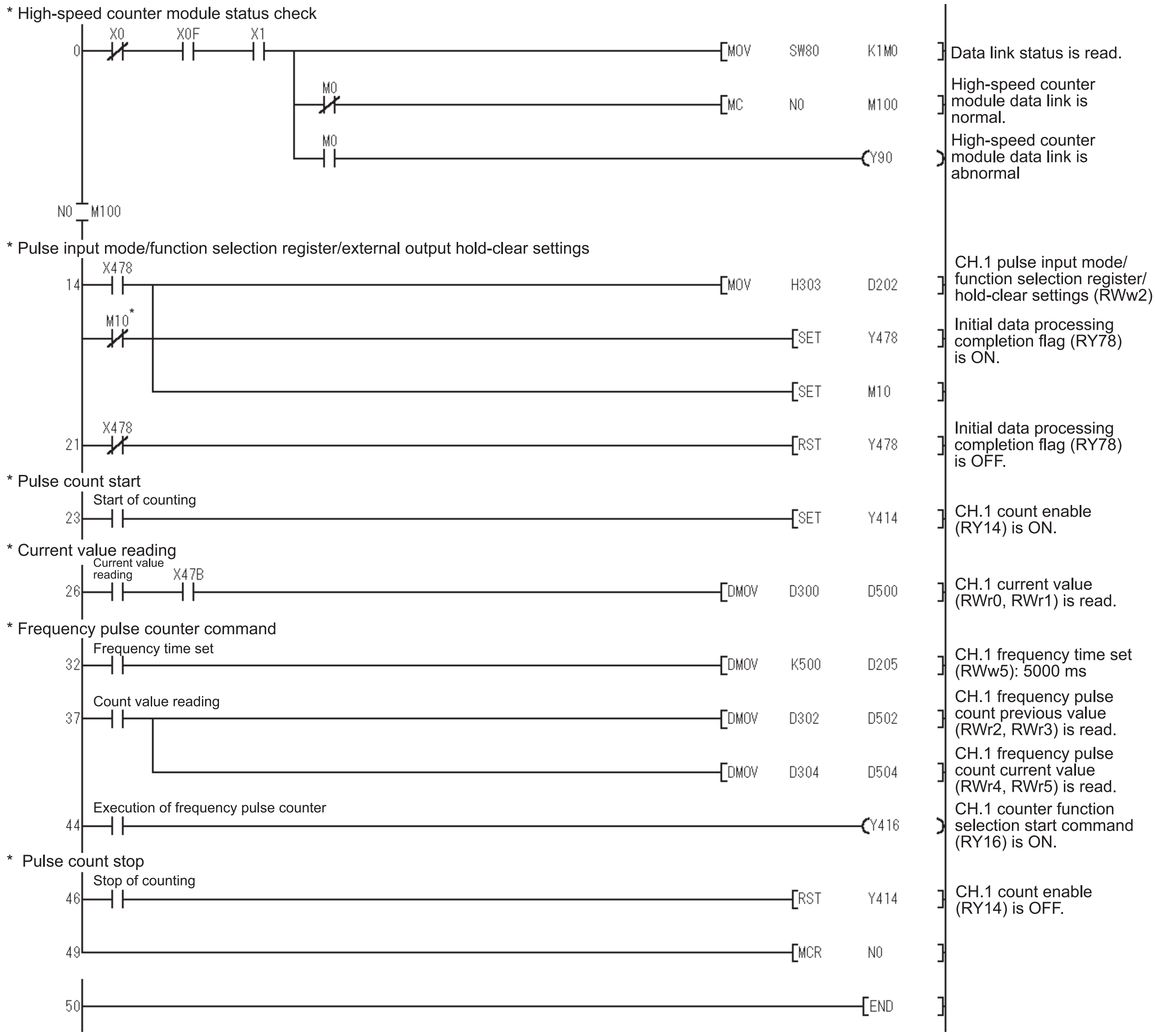
* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

10.3.7 Program example of sampling counter function



* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

10.3.8 Program example of frequency pulse counter function



* When the pogrammable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

10.4 Program Example when QnACPU is Used

The network parameter and the automatic refresh parameter are set by the GX Developer.

(1) Parameter settings

(a) Network parameter settings

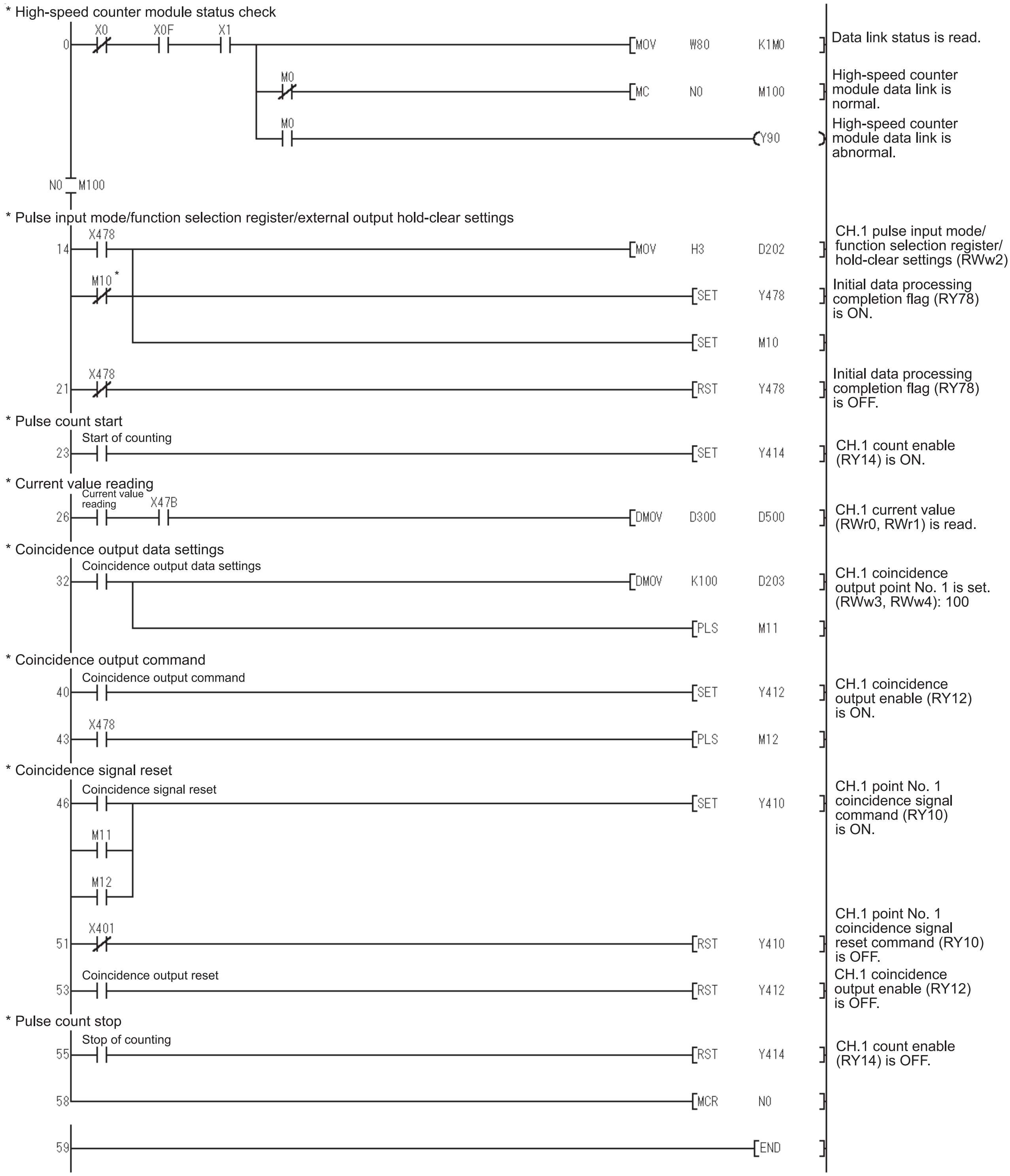
	1
Start I/O No.	0000
Type	Master station
All connect count	1
Remote input(RX)	
Remote output(RY)	
Remote register(RWr)	
Remote register(RWw)	
Special relay(SB)	
Special register(SW)	
Retry count	3
Automatic reconnection station count	1
Wait master station No.	0
PLC down select	Stop
Scan mode setting	Asynchronously
Delay information setting	0
Station information setting	Station information

Station No.	Station type	Exclusive station count	Reserve/invalid station select	Intelligent buffer select(word) Send	Receive	Automatic
1/1	Remote device station	Exclusive station 4	No setting			

(b) Automatic refresh parameter settings

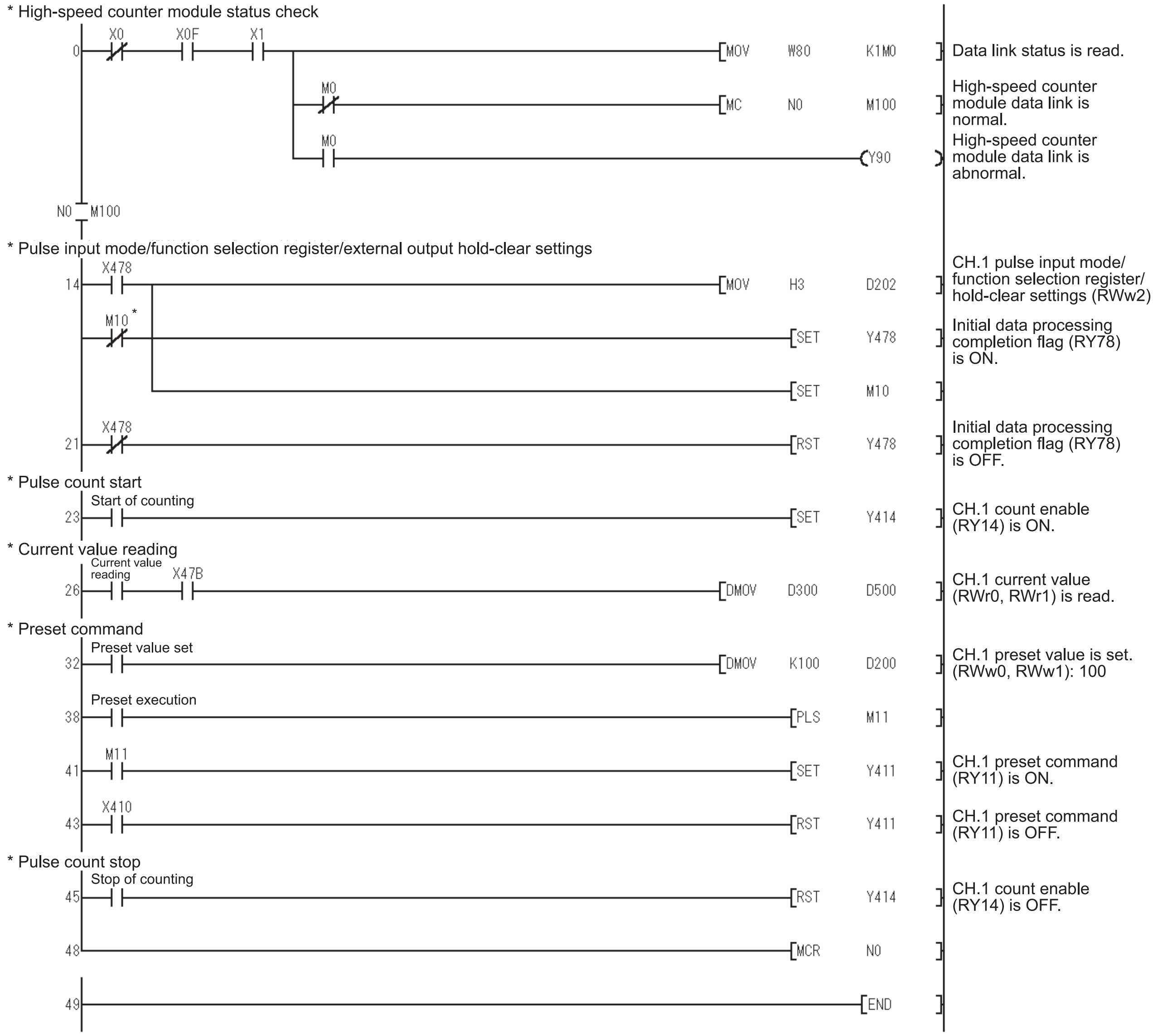
	1
Start I/O No	0000
Operational setting	Operational settings
Type	Master station
Master station data link type	PLC parameter auto start
Mode	Remote net(Ver.1 mode)
All connect count	1
Remote input(RX)	X400
Remote output(RY)	Y400
Remote register(RWr)	D300
Remote register(RWw)	D200
Ver.2 Remote input(RX)	
Ver.2 Remote output(RY)	
Ver.2 Remote register(RWr)	
Ver.2 Remote register(RWw)	
Special relay(SB)	SB0
Special register(SW)	SW0
Retry count	3
Automatic reconnection station count	1
Stand by master station No.	
PLC down select	Stop
Scan mode setting	Asynchronous
Delay information setting	0
Station information setting	Station information
Remote device station initial setting	Initial settings
Interrupt setting	Interrupt settings

10.4.1 When preset is made by sequence program



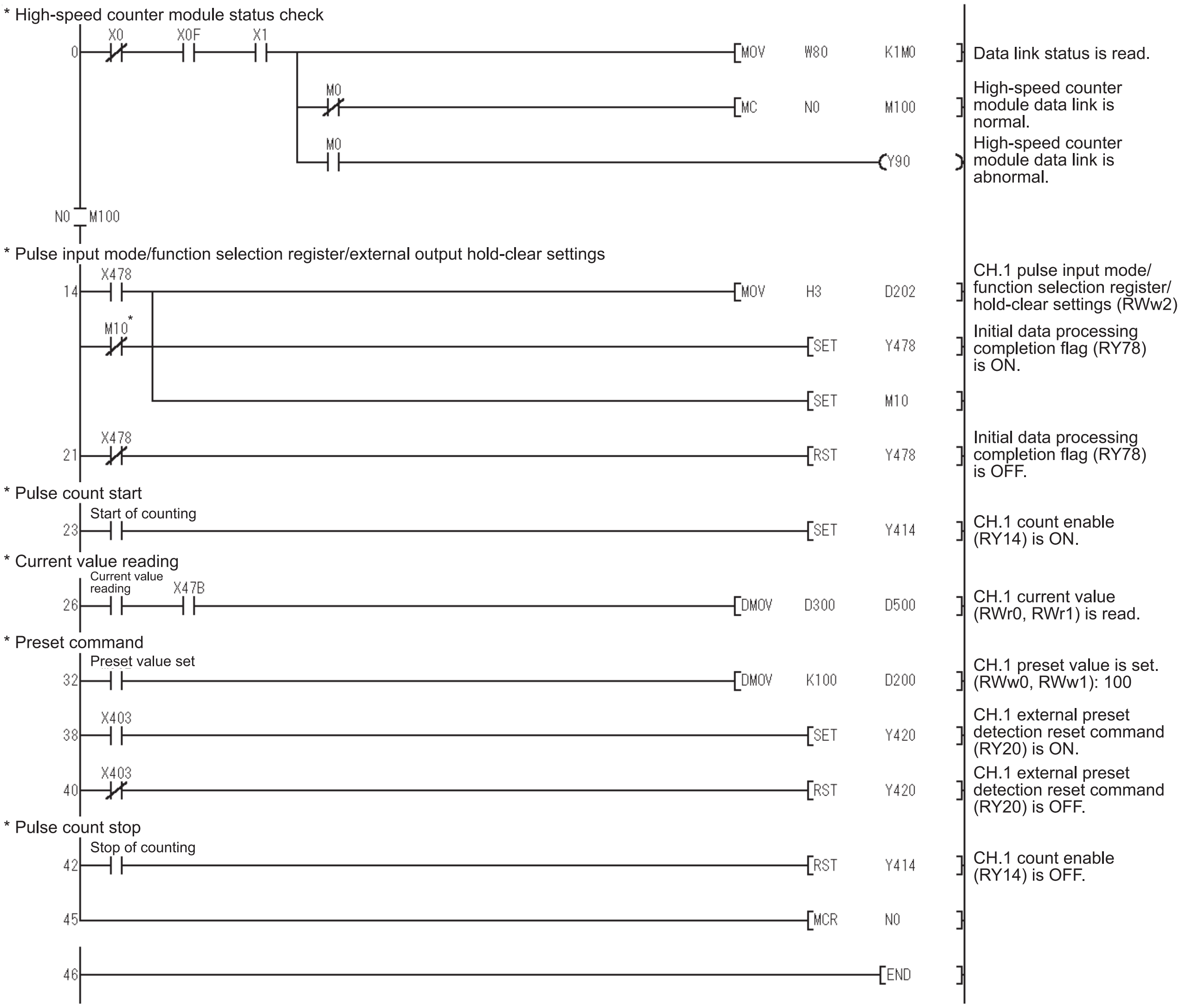
* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

10.4.2 Program example of preset with sequence program



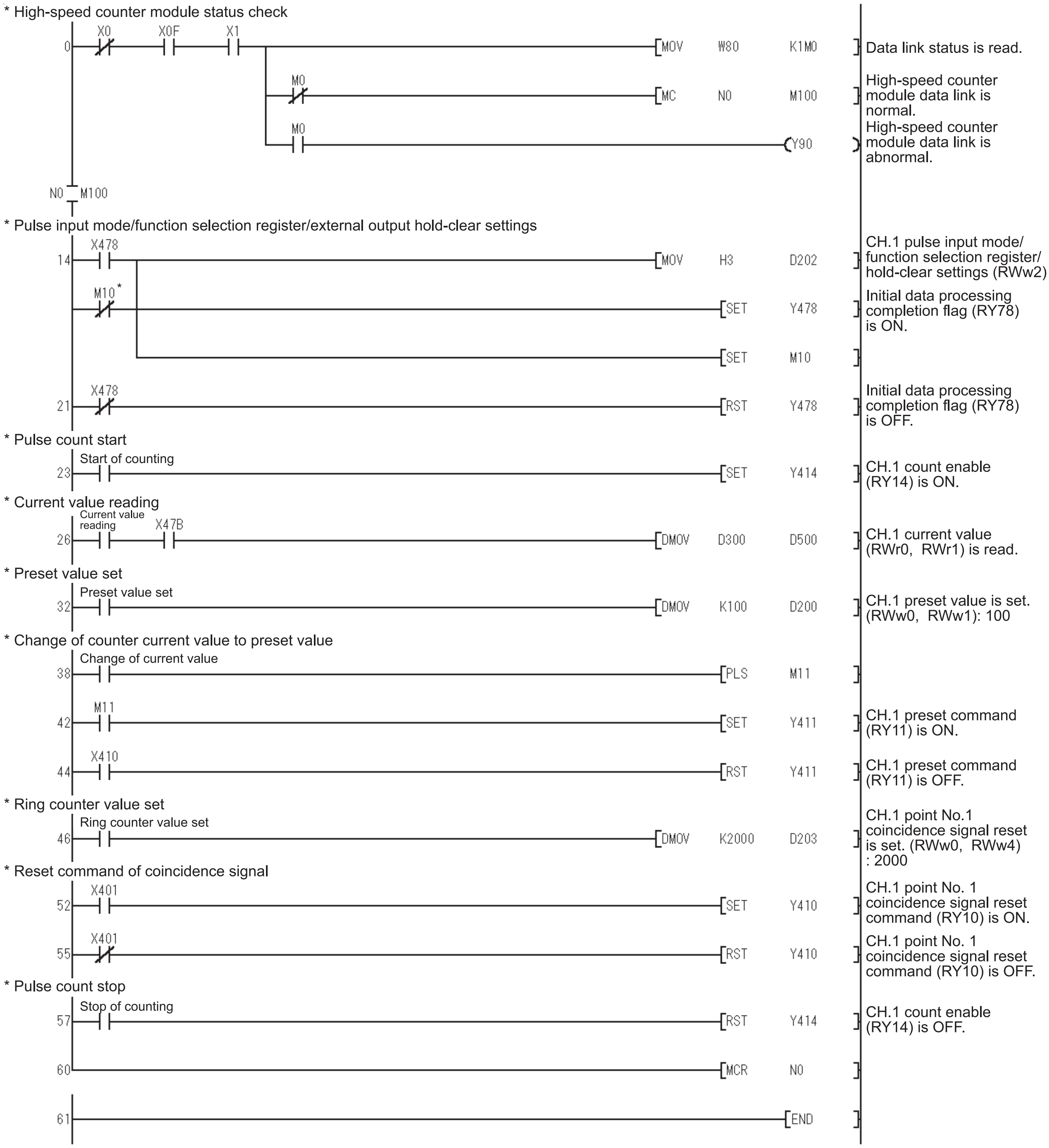
* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

10.4.3 Program example of preset with external control signal



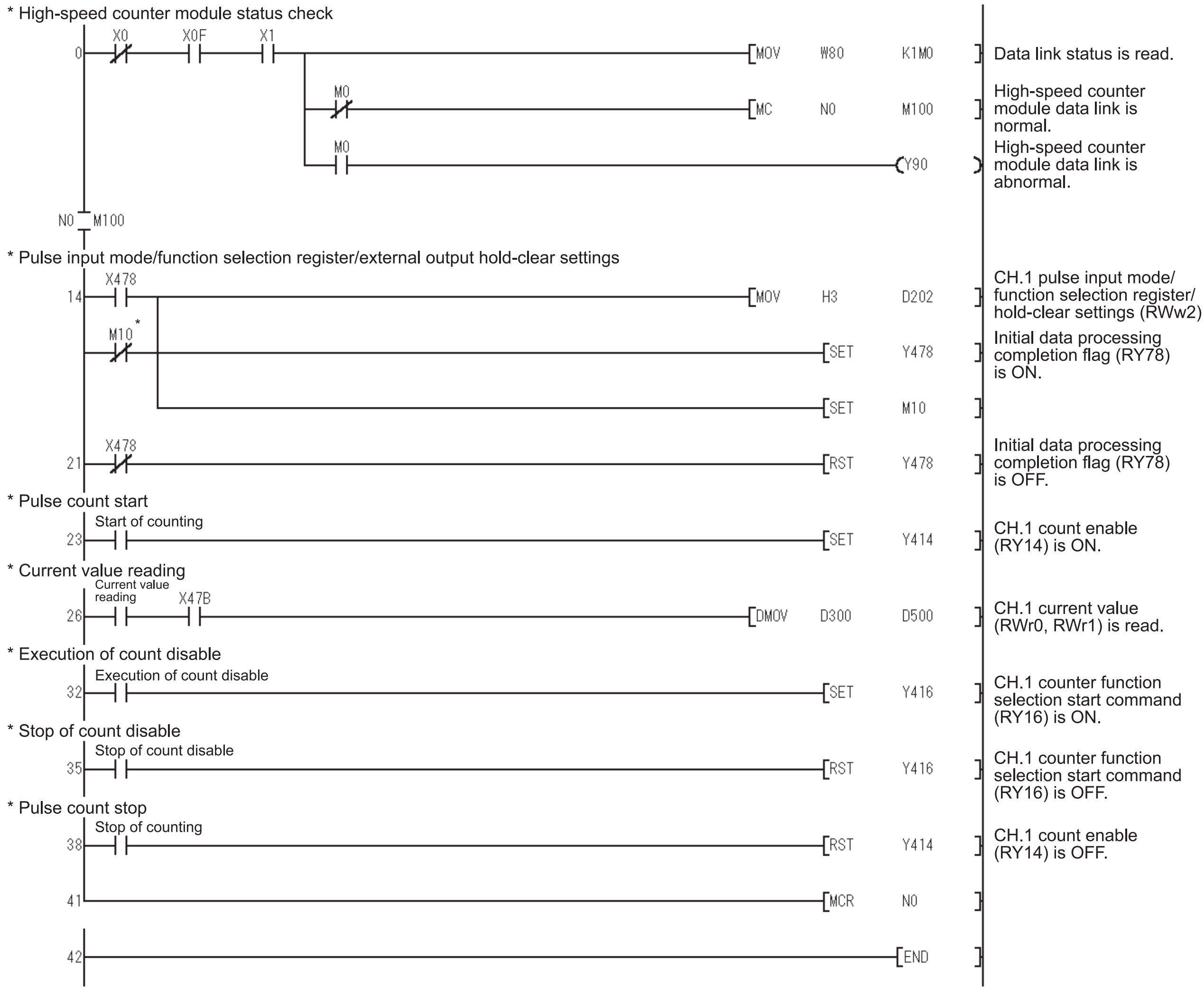
* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

10.4.4 Program example of ring counter function



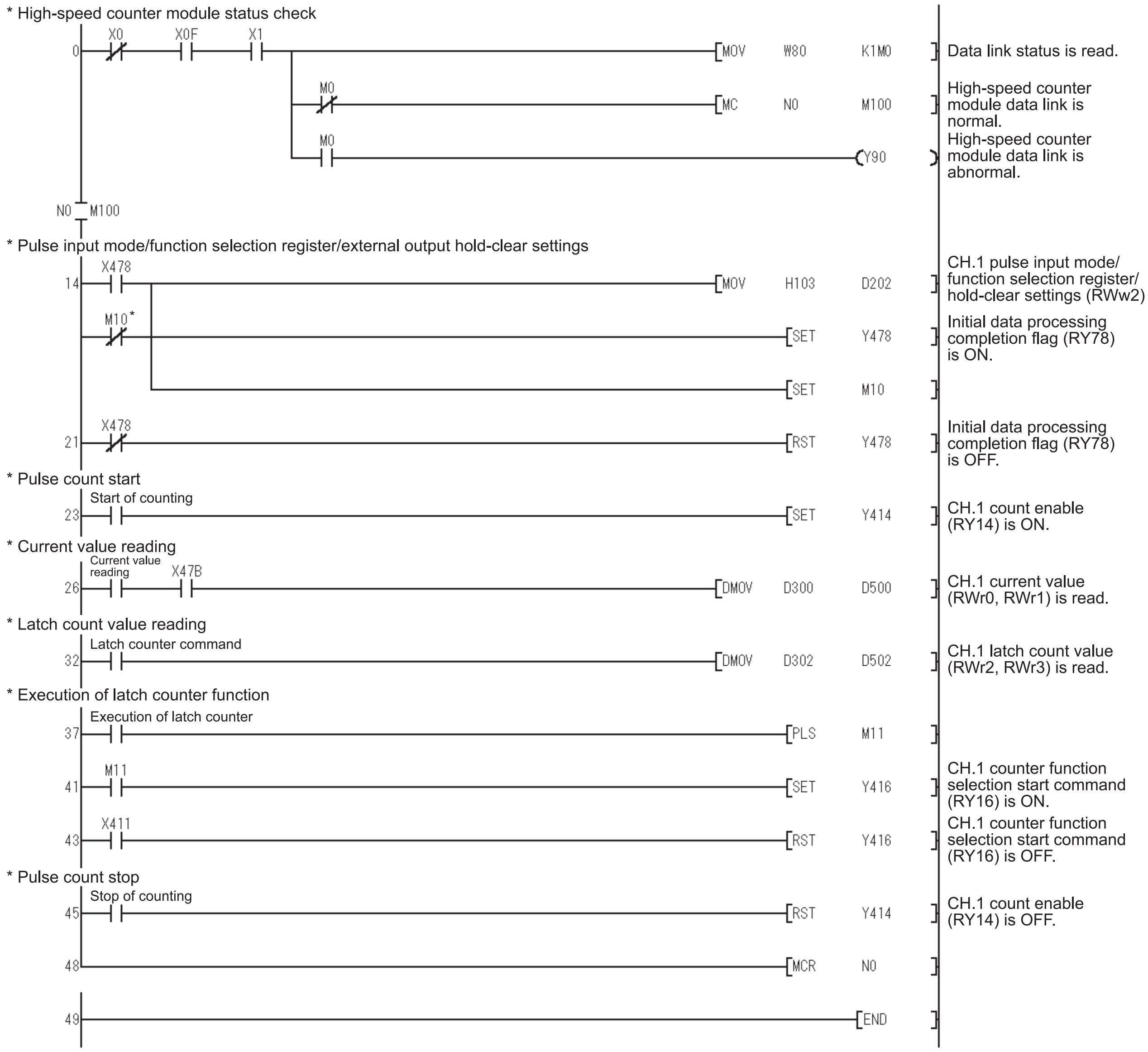
* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

10.4.5 Program example of count disable function



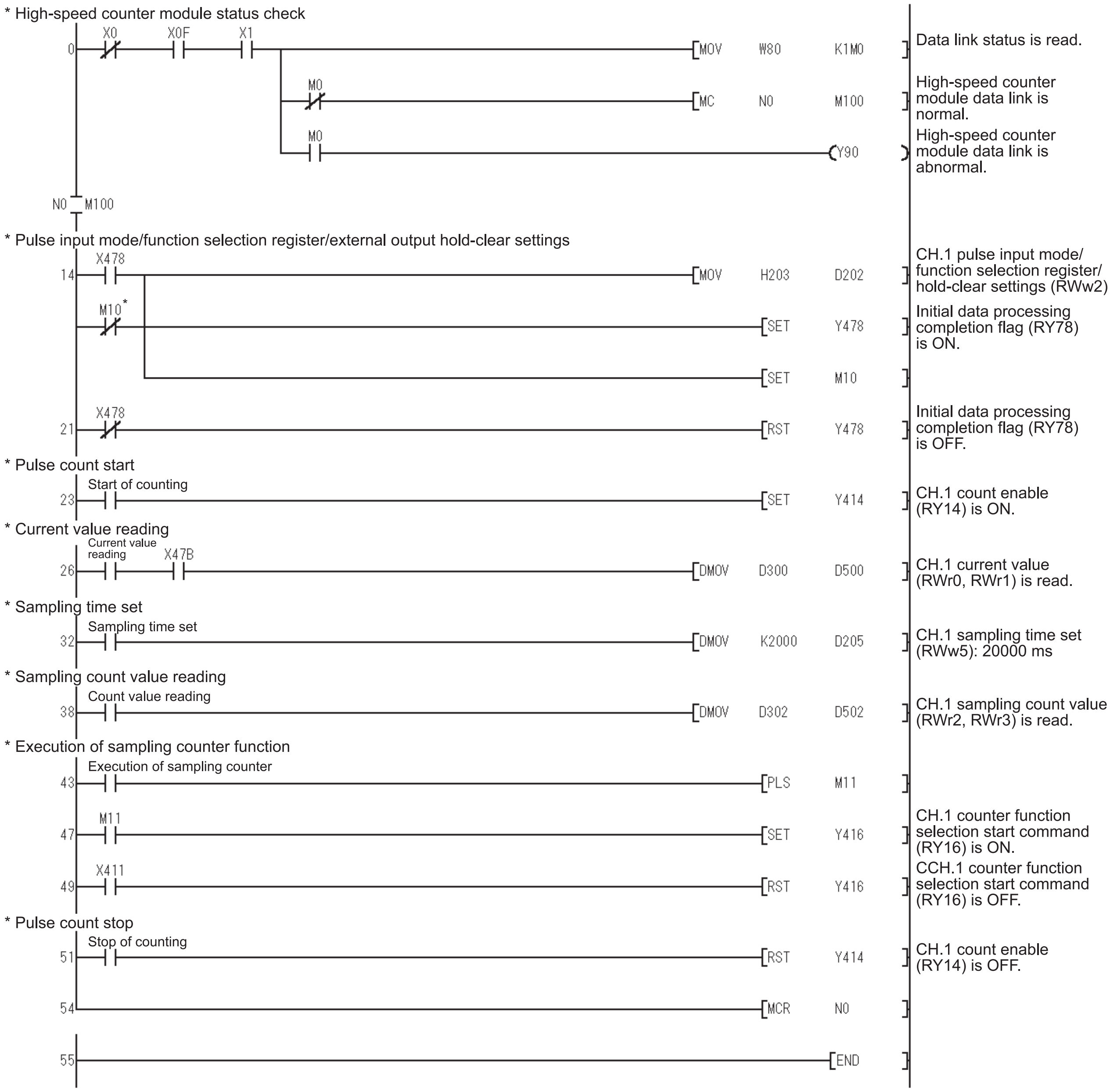
* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

10.4.6 Program example of latch counter function



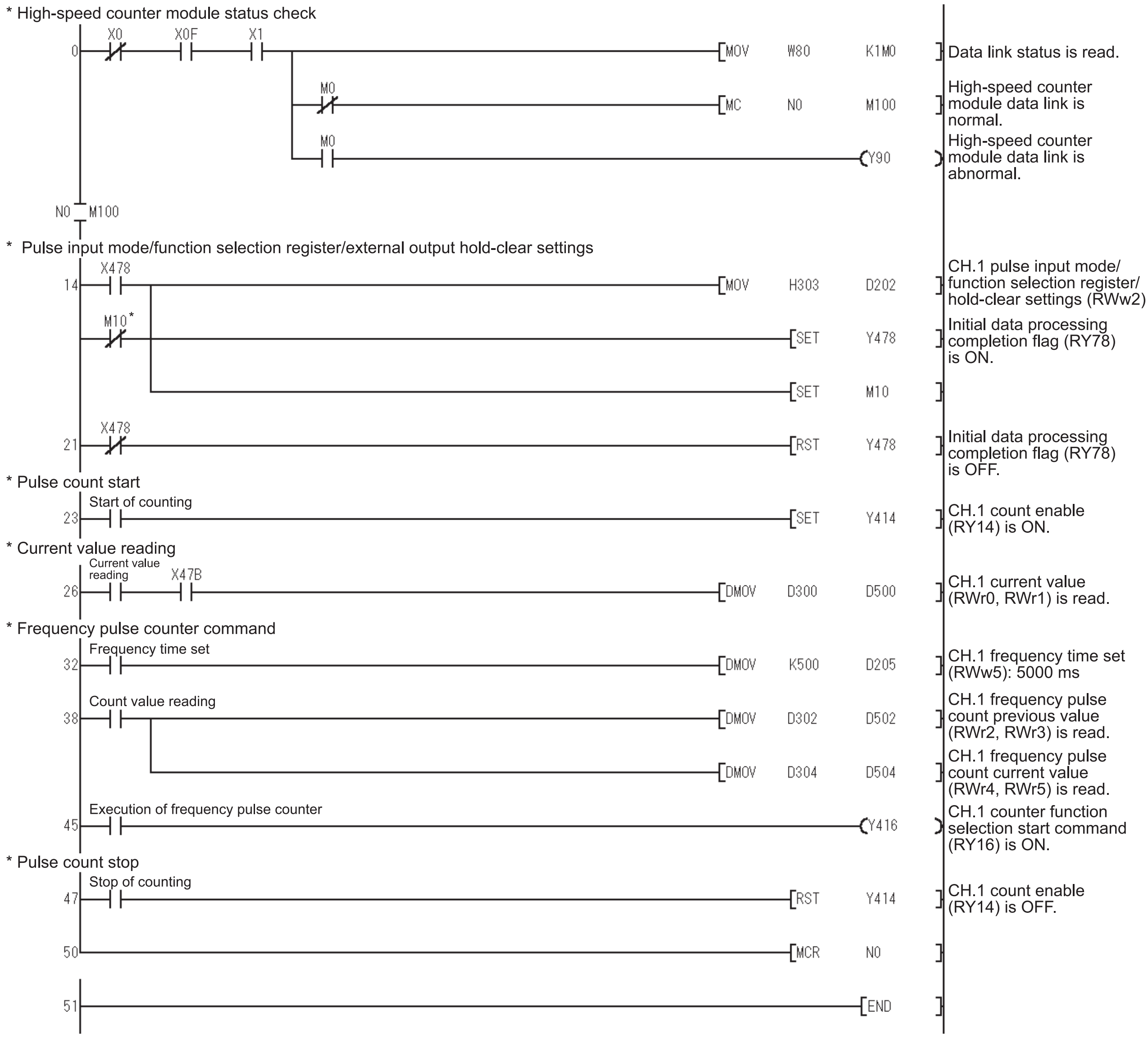
* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

10.4.7 Program example of sampling counter function



* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

10.4.8 Program example of frequency pulse counter function

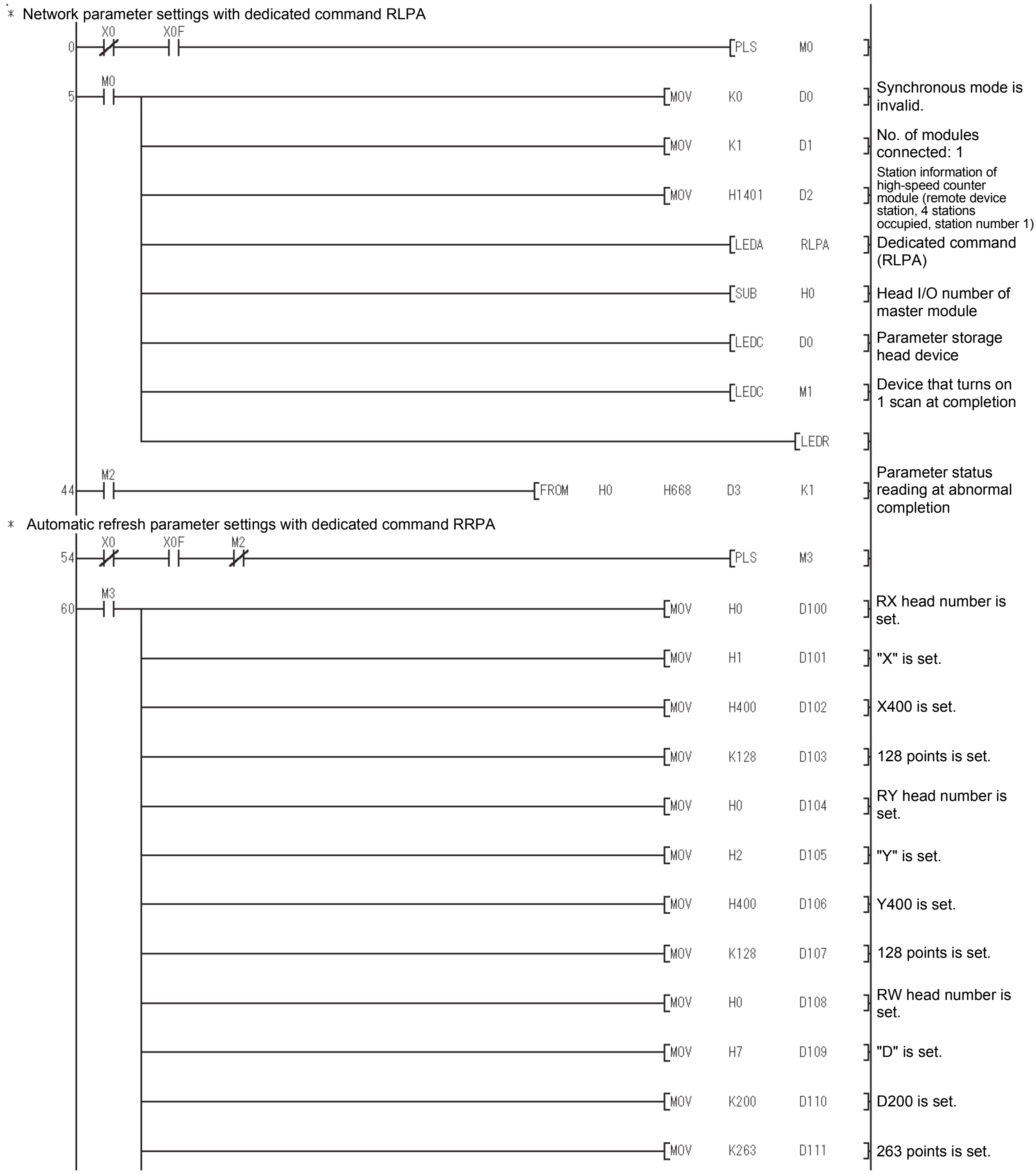


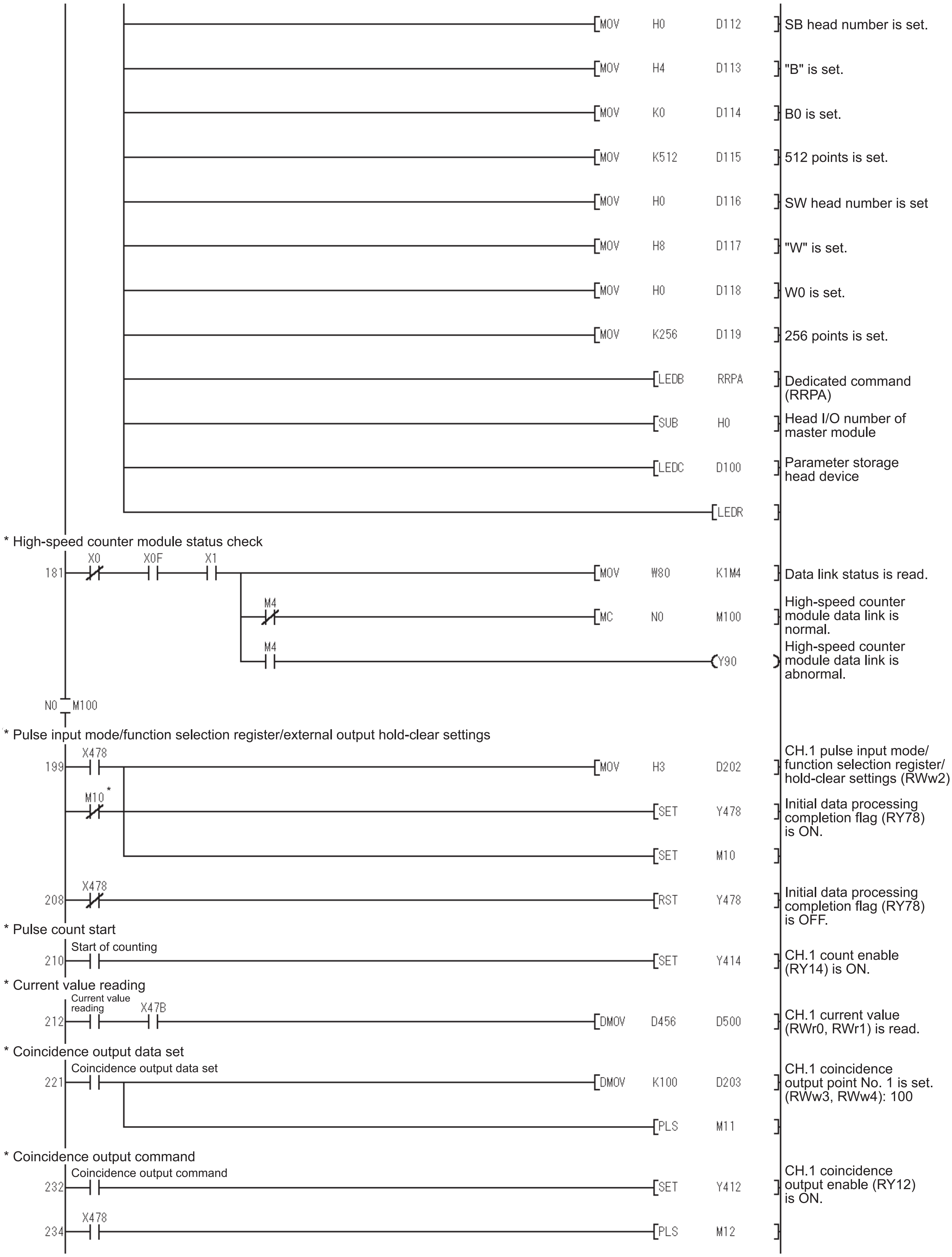
* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

10.5 Program Example when ACPU/QCPU (A Mode) is Used (Dedicated Command)

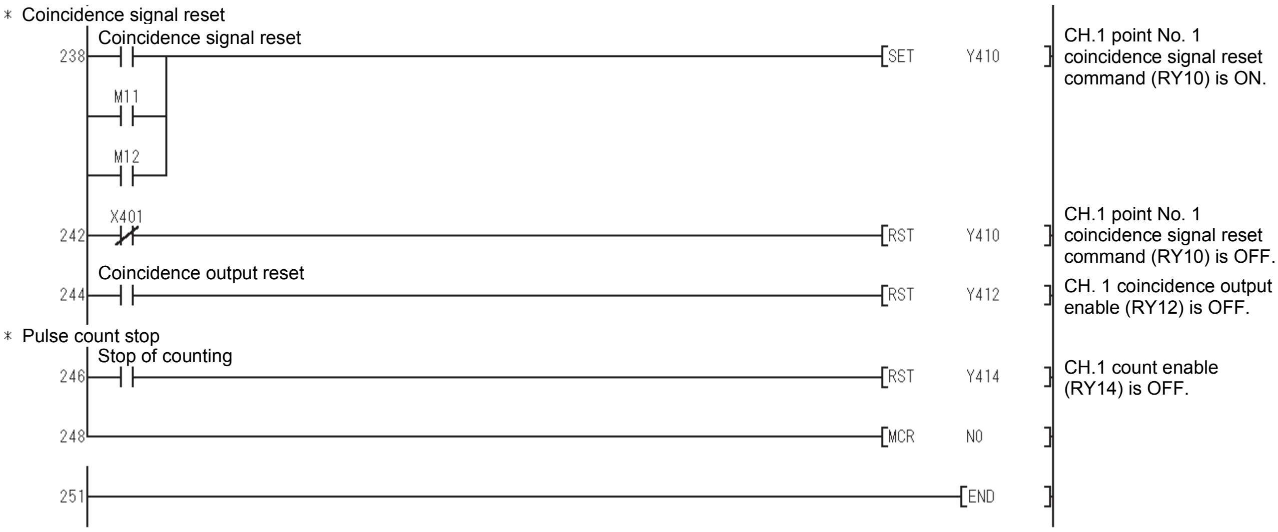
The network parameter and the automatic refresh parameter are set by the sequence program.

10.5.1 Program example of coincidence output function





* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.


* Coincidence signal reset
Coincidence signal reset
238
SET Y410
CH.1 point No. 1 coincidence signal reset command (RY10) is ON.
M11
M12
X401
242
RST Y410
CH.1 point No. 1 coincidence signal reset command (RY10) is OFF.
Coincidence output reset
244
RST Y412
CH. 1 coincidence output enable (RY12) is OFF.
* Pulse count stop
Stop of counting
246
RST Y414
CH.1 count enable (RY14) is OFF.
248
MCR N0
251
END

10.5.2 Program example of preset with sequence program

∗ Network parameter settings with dedicated command RLPA

0	X0 (NC), X0F	[PLS M0]	
5	M0	[MOV K0 D0]	Synchronous mode is invalid.
		[MOV K1 D1]	No. of modules connected: 1
		[MOV H1401 D2]	Station information of high-speed counter module (remote device station, 4 stations occupied, station number 1)
		[LEDA RLPA]	Dedicated command (RLPA)
		[SUB H0]	Head I/O number of master module
		[LEDC D0]	Parameter storage head device
		[LEDC M1]	Device that turns on 1 scan at completion
		[LEDR]	
44	M2	[FROM H0 H668 D3 K1]	Parameter status reading at abnormal completion

∗ Automatic refresh parameter settings with dedicated command RRPA

54	X0 (NC), X0F, M2 (NC)	[PLS M3]	
60	M3	[MOV H0 D100]	RX head number is set.
		[MOV H1 D101]	"X" is set.
		[MOV H400 D102]	X400 is set.
		[MOV K128 D103]	128 points is set.
		[MOV H0 D104]	RY head number is set.
		[MOV H2 D105]	"Y" is set.
		[MOV H400 D106]	Y400 is set.
		[MOV K128 D107]	128 points is set.
		[MOV H0 D108]	RW head number is set.
		[MOV H7 D109]	"D" is set.
		[MOV K200 D110]	D200 is set.
		[MOV K263 D111]	263 points is set.
		[MOV H0 D112]	SB head number is set.
		[MOV H4 D113]	"B" is set.
		[MOV K0 D114]	B0 is set.
		[MOV K512 D115]	512 points is set.

		MOV	H0	D116	SW head number is set
		MOV	H8	D117	"W" is set.
		MOV	H0	D118	W0 is set.
		MOV	K256	D119	256 points is set.
		LEDB	RRPA		Dedicated command (RRPA)
		SUB	H0		Head I/O number of master module
		LEDC	D100		Parameter storage head device
		LEDR			

* High-speed counter module status check

181	X0 (NC), X0F, X1	MOV	W80	K1M4	Data link status is read.
	M4 (NC)	MC	N0	M100	High-speed counter module data link is normal.
	M4	OUT	Y90		High-speed counter module data link is abnormal.
N0 M100					

* Pulse input mode/function selection register/external output hold-clear settings

199	X478, M10* (NC)	MOV	H3	D202	CH.1 pulse input mode/ function selection register/ hold-clear settings (RWw2)
		SET	Y478		Initial data processing completion flag (RY78) is ON.
		SET	M10		
208	X478 (NC)	RST	Y478		Initial data processing completion flag (RY78) is OFF.

* Pulse count start

210	Start of counting	SET	Y414		CH.1 count enable (RY14) is ON.

* Current value reading

212	Current value reading, X47B	DMOV	D456	D500	CH.1 current value (RWr0, RWr1) is read.

* Preset command

221	Preset value set	DMOV	K100	D200	CH.1 preset value is set. (RWw0, RWw1): 100
229	Execution of preset	PLS	M11		
233	M11	SET	Y411		CH.1 preset command (RY11) is ON.
235	X410	RST	Y411		CH.1 preset command (RY11) is OFF.

* Pulse count stop

237	Stop of counting	RST	Y414		CH.1 count enable (RY14) is OFF.
239		MCR	N0		
242		END			

* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

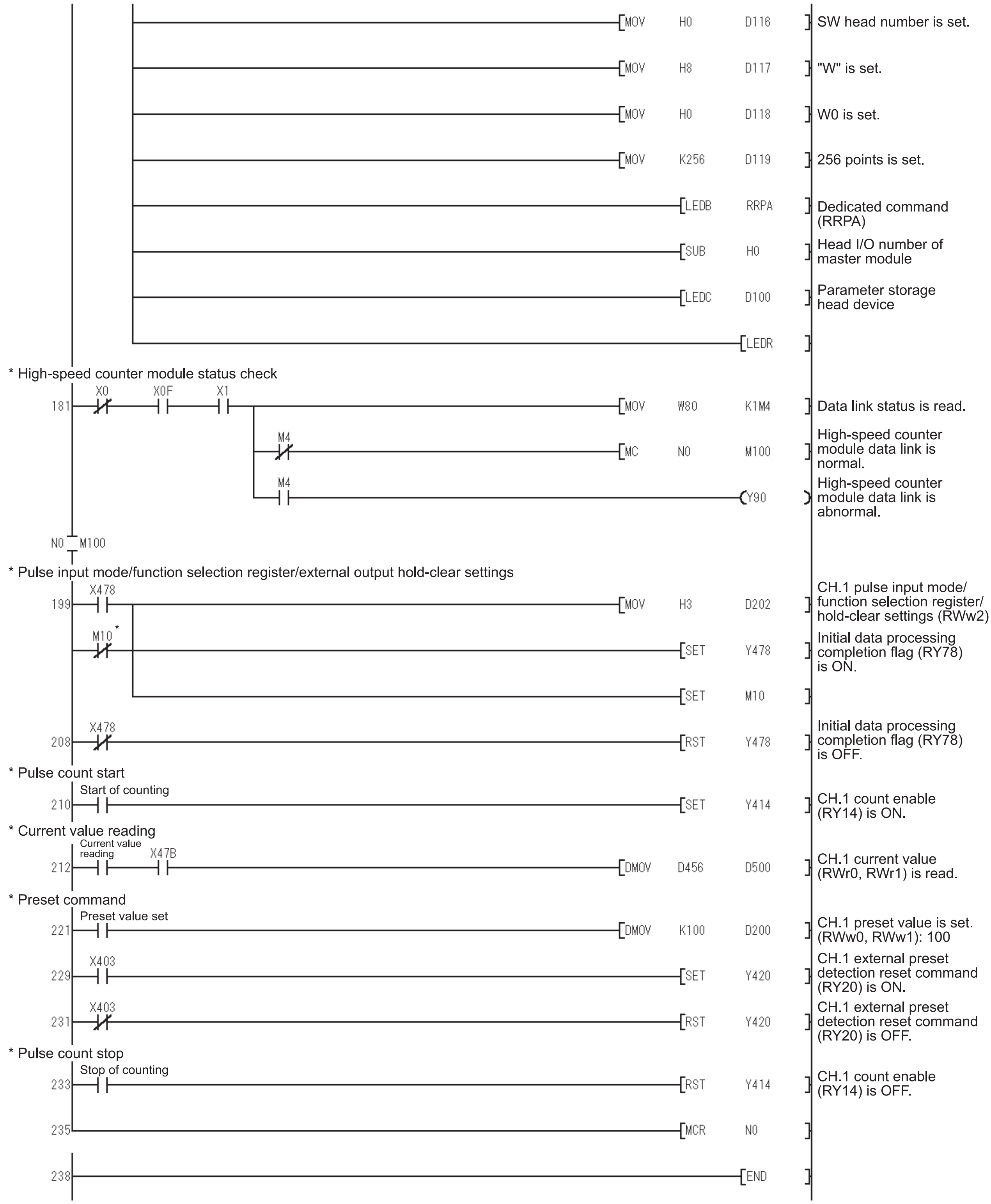
10.5.3 Program example of preset with external control signal

* Network parameter settings with dedicated command RLPA

0	X0 (NC) X0F	[PLS M0]	
5	M0	[MOV K0 D0]	Synchronous mode is invalid.
		[MOV K1 D1]	No. of modules connected: 1
		[MOV H1401 D2]	Station information of high-speed counter module (remote device station, 4 stations occupied, station number 1)
		[LEDA RLPA]	Dedicated command (RLPA)
		[SUB H0]	Head I/O number of master module
		[LEDC D0]	Parameter storage head device
		[LEDC M1]	Device that turns on 1 scan at completion
		[LEDR]	
44	M2	[FROM H0 H668 D3 K1]	Parameter status reading at abnormal completion

* Automatic refresh parameter settings with dedicated command RRPA

54	X0 (NC) X0F M2 (NC)	[PLS M3]	
60	M3	[MOV H0 D100]	RX head number is set.
		[MOV H1 D101]	"X" is set.
		[MOV H400 D102]	X400 is set.
		[MOV K128 D103]	128 points is set.
		[MOV H0 D104]	RY head number is set.
		[MOV H2 D105]	"Y" is set.
		[MOV H400 D106]	Y400 is set.
		[MOV K128 D107]	128 points is set.
		[MOV H0 D108]	RW head number is set.
		[MOV H7 D109]	"D" is set.
		[MOV K200 D110]	D200 is set.
		[MOV K263 D111]	263 points is set.
		[MOV H0 D112]	SB head number is set.
		[MOV H4 D113]	"B" is set.
		[MOV K0 D114]	B0 is set.
		[MOV K512 D115]	512 points is set.



* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

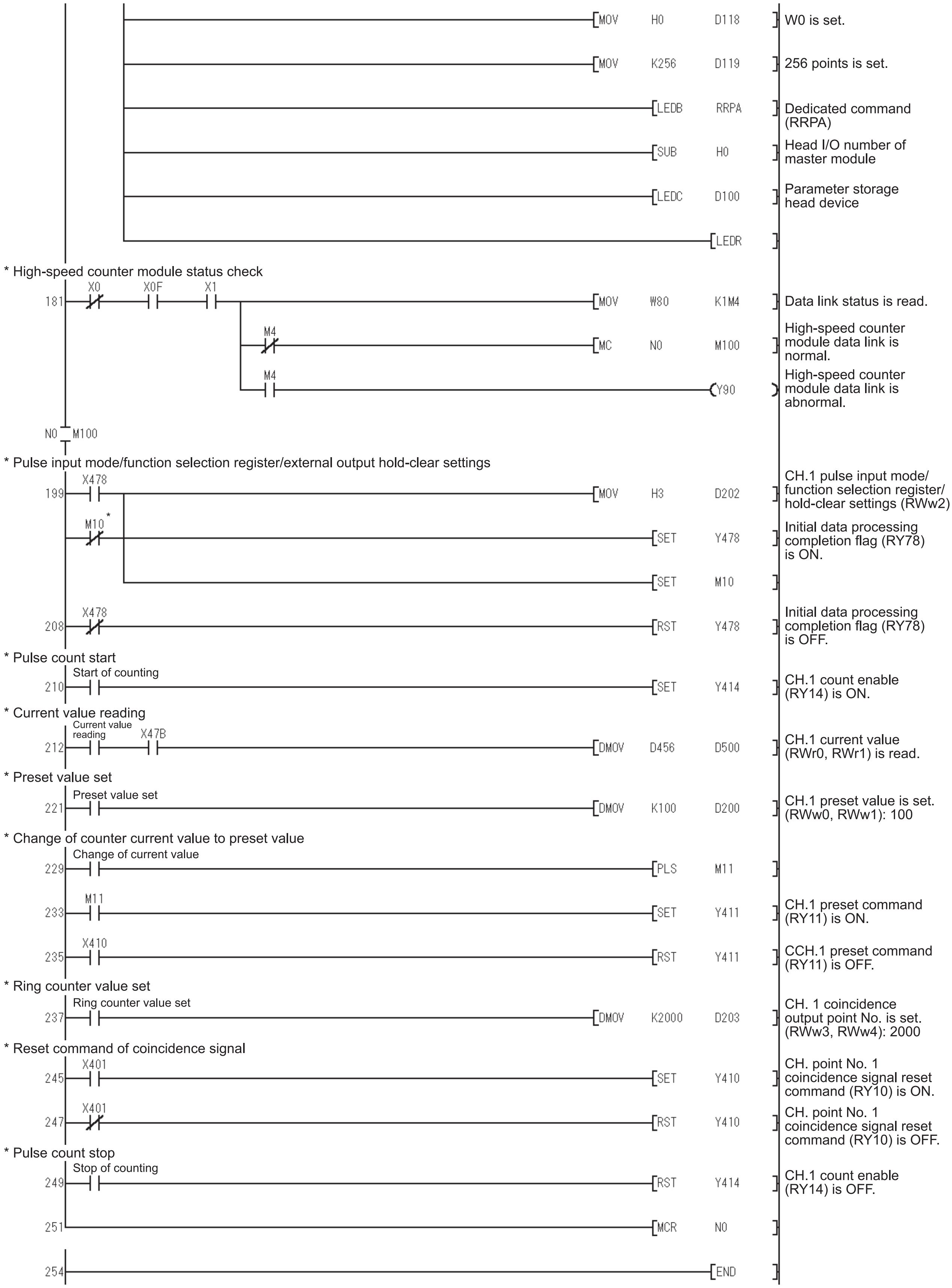
10.5.4 Program example of ring counter function

* Network parameter settings with dedicated command RLPA

0	X0 (NC), X0F	[PLS M0]	
5	M0	[MOV K0 D0]	Synchronous mode is invalid.
		[MOV K1 D1]	No. of modules connected : 1
		[MOV H1401 D2]	Station information of high-speed counter module (remote device station, 4 stations occupied, station number 1)
		[LEDA RLPA]	Dedicated command (RLPA)
		[SUB H0]	Head I/O number of master module
		[LEDC D0]	Parameter storage head device
		[LEDC M1]	Device that turns on 1 scan at completion
		[LEDR]	
44	M2	[FROM H0 H668 D3 K1]	Parameter status reading at abnormal completion

* Automatic refresh parameter settings with dedicated command RRPA

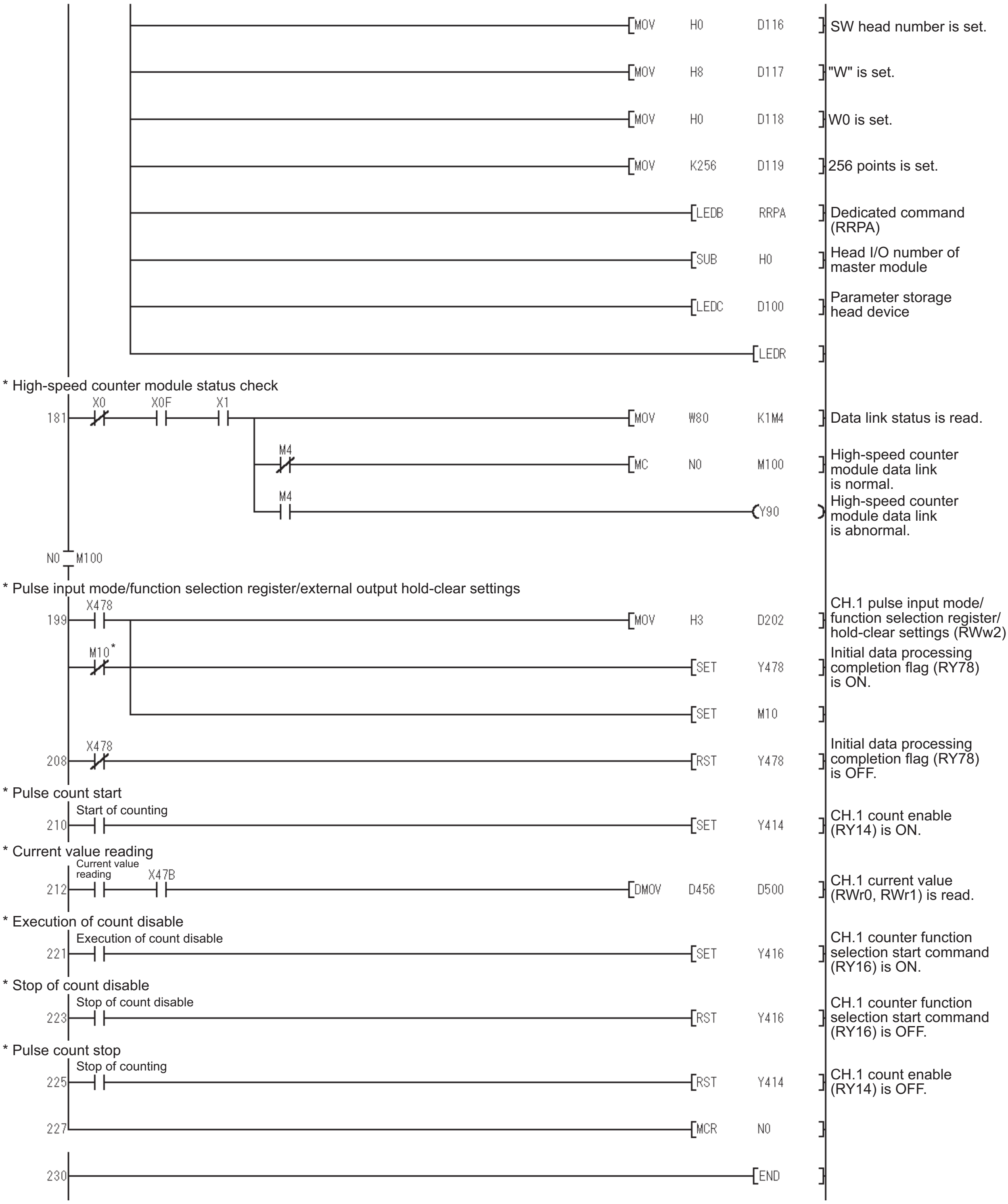
54	X0 (NC), X0F, M2 (NC)	[PLS M3]	
60	M3	[MOV H0 D100]	RX head number is set.
		[MOV H1 D101]	"X" is set.
		[MOV H400 D102]	X400 is set.
		[MOV K128 D103]	128 points is set.
		[MOV H0 D104]	RY head number is set.
		[MOV H2 D105]	"Y" is set.
		[MOV H400 D106]	Y400 is set.
		[MOV K128 D107]	128 points is set.
		[MOV H0 D108]	RW head number is set.
		[MOV H7 D109]	"D" is set.
		[MOV K200 D110]	D200 is set.
		[MOV K263 D111]	263 points is set.
		[MOV H0 D112]	SB head number is set.
		[MOV H4 D113]	"B" is set.
		[MOV K0 D114]	B0 is set.
		[MOV K512 D115]	512 points is set.
		[MOV H0 D116]	SW head number is set.
		[MOV H8 D117]	"W" is set.



* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

10.5.5 Program example of count disable function

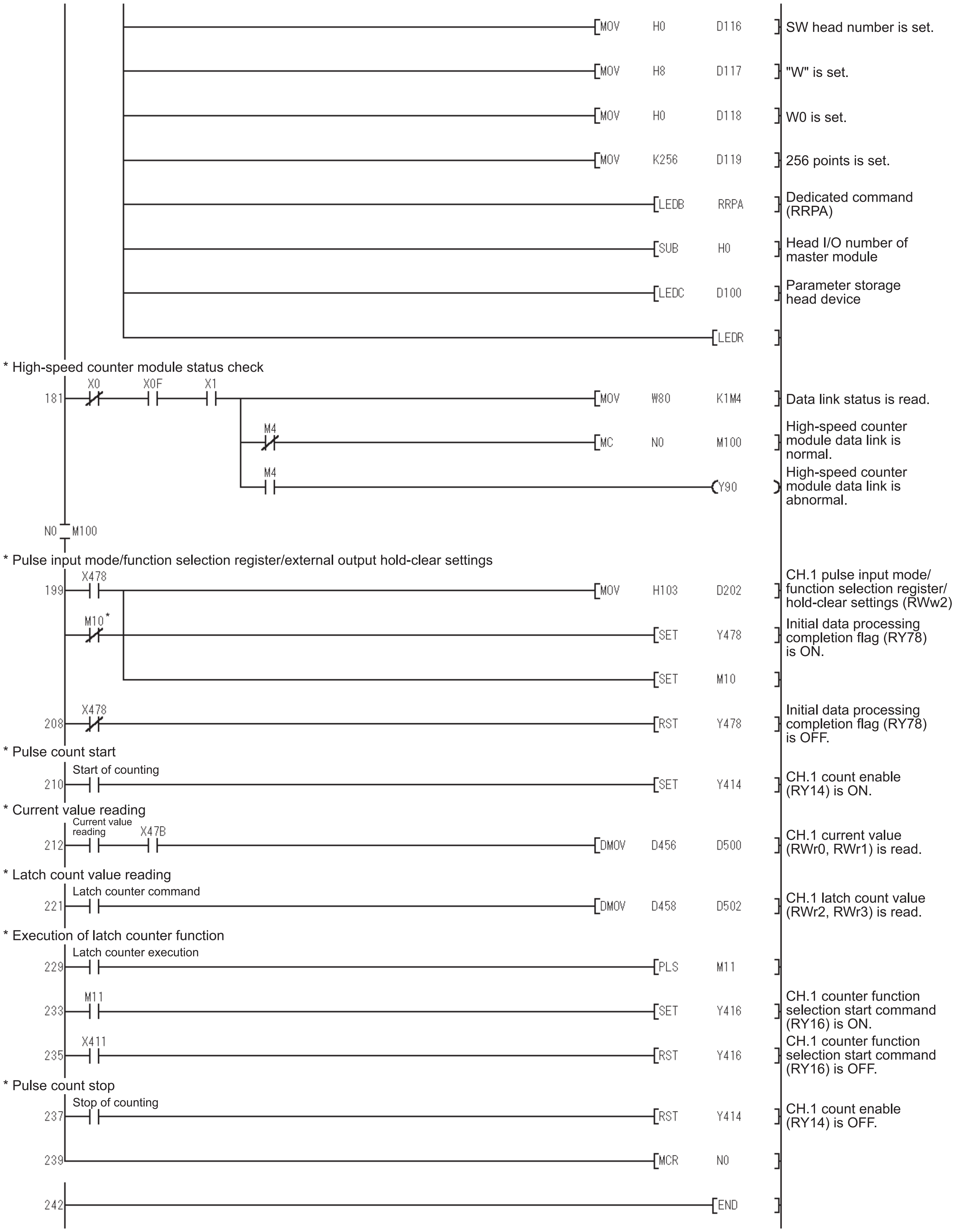
```
* Network parameter settings with dedicated command RLPA
 0  X0(b) X0F                         [PLS   M0          ]
 5  M0                                [MOV   K0     D0   ]  Synchronous mode is invalid.
                                      [MOV   K1     D1   ]  No. of modules connected: 1
                                      [MOV   H1401  D2   ]  Station information of high-speed counter module (remote device station, 4 stations occupied, station number 1)
                                      [LEDA  RLPA        ]  Dedicated command (RLPA)
                                      [SUB   H0          ]  Head I/O number of master module
                                      [LEDC  D0          ]  Parameter storage head device
                                      [LEDC  M1          ]  Device that turns on 1 scan at completion
                                      [LEDR              ]
44  M2                   [FROM  H0  H668  D3  K1         ]  Parameter status reading at abnormal completion
* Automatic refresh parameter settings with dedicated command RRPA
54  X0(b) X0F  M2(b)                  [PLS   M3          ]
60  M3                                [MOV   H0     D100 ]  RX head number is set.
                                      [MOV   H1     D101 ]  "X" is set.
                                      [MOV   H400   D102 ]  X400 is set.
                                      [MOV   K128   D103 ]  128 points is set.
                                      [MOV   H0     D104 ]  RY head number is set.
                                      [MOV   H2     D105 ]  "Y" is set.
                                      [MOV   H400   D106 ]  Y400 is set.
                                      [MOV   K128   D107 ]  128 points is set.
                                      [MOV   H0     D108 ]  RW head number is set.
                                      [MOV   H7     D109 ]  "D" is set.
                                      [MOV   K200   D110 ]  D200 is set.
                                      [MOV   K263   D111 ]  263 points is set.
                                      [MOV   H0     D112 ]  SB head number is set.
                                      [MOV   H4     D113 ]  "B" is set.
                                      [MOV   K0     D114 ]  B0 is set.
                                      [MOV   K512   D115 ]  512 points is set.
```



* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

10.5.6 Program example of latch counter function

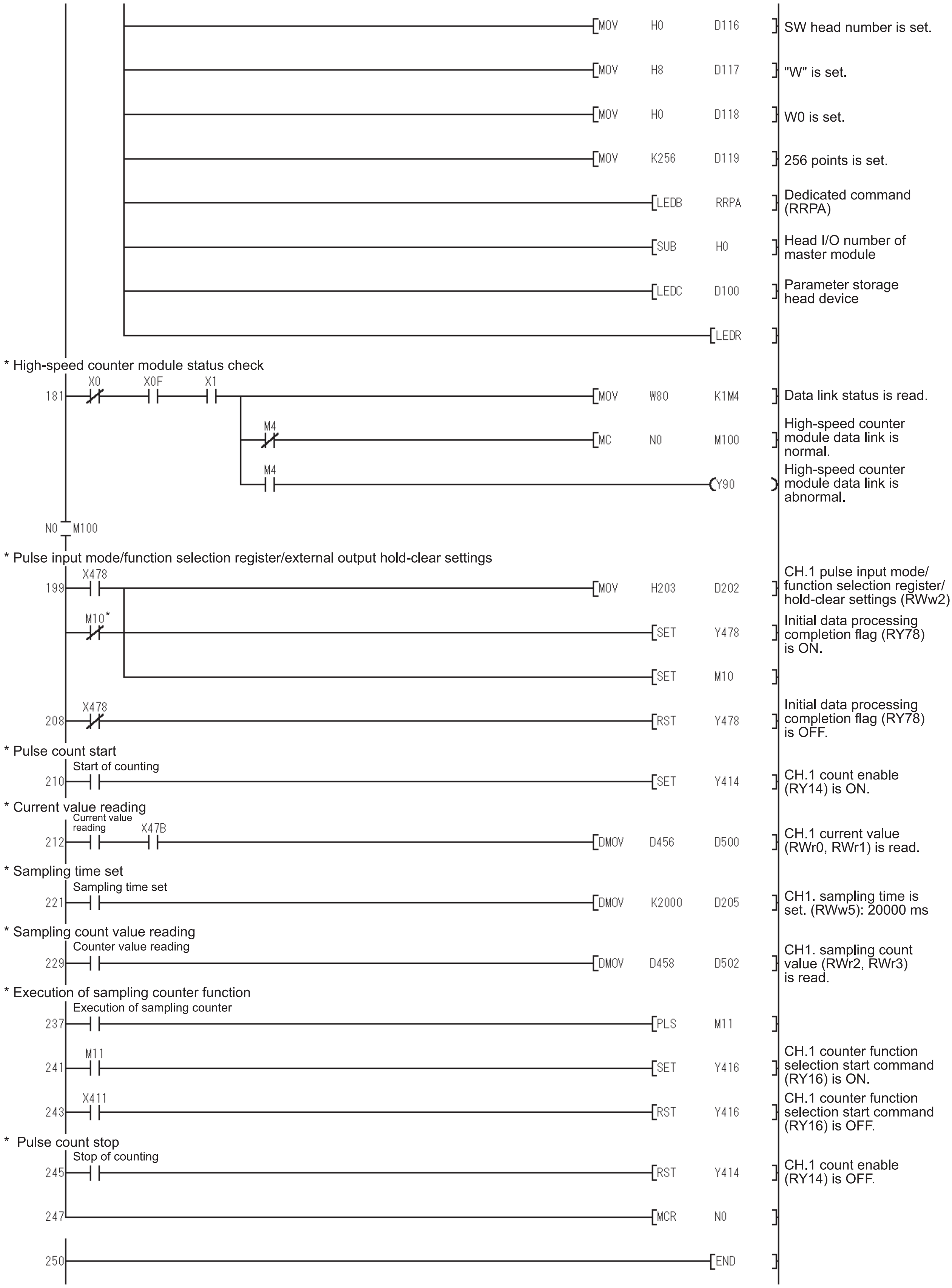
```
* Network parameter settings with dedicated command RLPA
 0  -|/|- X0  -| |- X0F                    [PLS   M0        ]
 5  -| |- M0  ---------------------------- [MOV   K0     D0 ]  Synchronous mode is invalid.
             ----------------------------- [MOV   K1     D1 ]  No. of modules connected: 1
             ----------------------------- [MOV   H1401  D2 ]  Station information of high-speed counter module (remote device station, 4 stations occupied, station number 1)
             ----------------------------- [LEDA  RLPA      ]  Dedicated command (RLPA)
             ----------------------------- [SUB   H0        ]  Head I/O number of master module
             ----------------------------- [LEDC  D0        ]  Parameter storage head device
             ----------------------------- [LEDC  M1        ]  Device that turns on 1 scan at completion
             ----------------------------- [LEDR            ]
44  -| |- M2  ---------------------------- [FROM  H0  H668  D3  K1 ]  Parameter status reading at abnormal completion
* Automatic refresh parameter settings with dedicated command RRPA
54  -|/|- X0  -| |- X0F  -|/|- M2          [PLS   M3        ]
60  -| |- M3  ---------------------------- [MOV   H0     D100 ]  RX head number is set.
             ----------------------------- [MOV   H1     D101 ]  "X" is set.
             ----------------------------- [MOV   H400   D102 ]  X400 is set.
             ----------------------------- [MOV   K128   D103 ]  128 points is set.
             ----------------------------- [MOV   H0     D104 ]  RY head number is set.
             ----------------------------- [MOV   H2     D105 ]  "Y" is set.
             ----------------------------- [MOV   H400   D106 ]  Y400 is set.
             ----------------------------- [MOV   K128   D107 ]  128 points is set.
             ----------------------------- [MOV   H0     D108 ]  RW head number is set.
             ----------------------------- [MOV   H7     D109 ]  "D" is set.
             ----------------------------- [MOV   K200   D110 ]  D200 is set.
             ----------------------------- [MOV   K263   D111 ]  263 points is set.
             ----------------------------- [MOV   H0     D112 ]  SB head number is set.
             ----------------------------- [MOV   H4     D113 ]  "B" is set.
             ----------------------------- [MOV   K0     D114 ]  B0 is set.
             ----------------------------- [MOV   K512   D115 ]  512 points is set.
```



* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

10.5.7 Program example of sampling counter function

			* Network parameter settings with dedicated command RLPA
0	X0 (NC), X0F (NO)	[PLS M0]	
5	M0 (NO)	[MOV K0 D0]	Synchronous mode is invalid.
		[MOV K1 D1]	No. of modules connected: 1
		[MOV H1401 D2]	Station information of high-speed counter module (remote device station, 4 stations occupied, station number 1)
		[LEDA RLPA]	Dedicated command (RLPA)
		[SUB H0]	Head I/O number of master module
		[LEDC D0]	Parameter storage head device
		[LEDC M1]	Device that turns on 1 scan at completion
		[LEDR]	
44	M2 (NO)	[FROM H0 H668 D3 K1]	Parameter status reading at abnormal completion
			* Automatic refresh parameter settings with dedicated command RRPA
54	X0 (NC), X0F (NO), M2 (NC)	[PLS M3]	
60	M3 (NO)	[MOV H0 D100]	RX head number is set.
		[MOV H1 D101]	"X" is set.
		[MOV H400 D102]	X400 is set.
		[MOV K128 D103]	128 points is set.
		[MOV H0 D104]	RY head number is set.
		[MOV H2 D105]	"Y" is set.
		[MOV H400 D106]	Y400 is set.
		[MOV K128 D107]	128 points is set.
		[MOV H0 D108]	RW head number is set.
		[MOV H7 D109]	"D" is set.
		[MOV K200 D110]	D200 is set.
		[MOV K263 D111]	263 points is set.
		[MOV H0 D112]	SB head number is set.
		[MOV H4 D113]	"B" is set.
		[MOV K0 D114]	B0 is set.
		[MOV K512 D115]	512 points is set.



* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

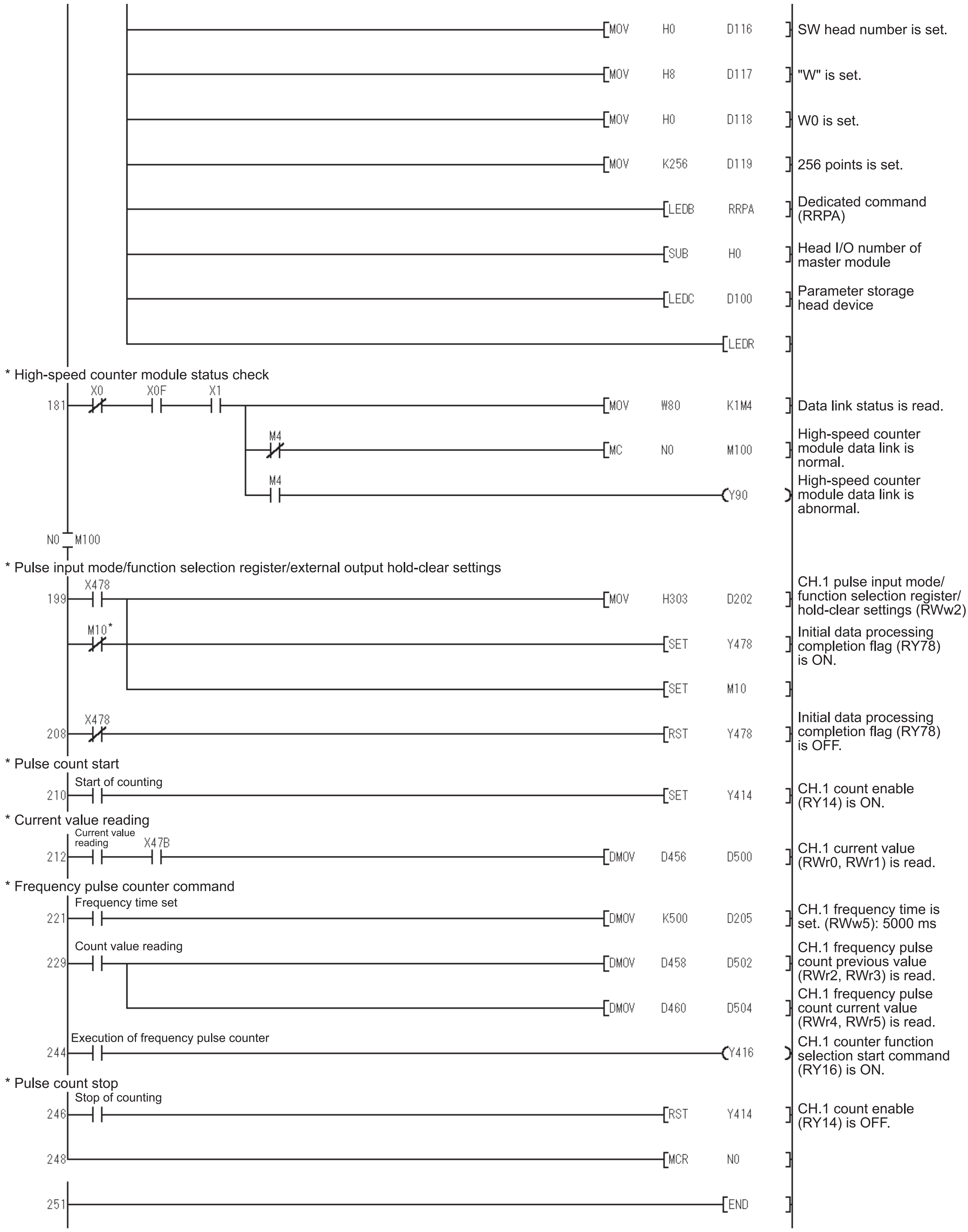
10.5.8 Program example of frequency pulse counter function

* Network parameter settings with dedicated command RLPA

0	X0 (NC), X0F	[PLS M0]	
5	M0	[MOV K0 D0]	Synchronous mode is invalid.
		[MOV K1 D1]	No. of modules connected: 1
		[MOV H1401 D2]	Station information of high-speed counter module (remote device station, 4 stations occupied, station number 1)
		[LEDA RLPA]	Dedicated command (RLPA)
		[SUB H0]	Head I/O number of master module
		[LEDC D0]	Parameter storage head device
		[LEDC M1]	Device that turns on 1 scan at completion
		[LEDR]	
44	M2	[FROM H0 H668 D3 K1]	Parameter status reading at abnormal completion

* Automatic refresh parameter settings with dedicated command RRPA

54	X0 (NC), X0F, M2 (NC)	[PLS M3]	
60	M3	[MOV H0 D100]	RX head number is set.
		[MOV H1 D101]	"X" is set.
		[MOV H400 D102]	X400 is set.
		[MOV K128 D103]	128 points is set.
		[MOV H0 D104]	RY head number is set.
		[MOV H2 D105]	"Y" is set.
		[MOV H400 D106]	Y400 is set.
		[MOV K128 D107]	128 points is set.
		[MOV H0 D108]	RW head number is set.
		[MOV H7 D109]	"D" is set.
		[MOV K200 D110]	D200 is set.
		[MOV K263 D111]	263 points is set.
		[MOV H0 D112]	SB head number is set.
		[MOV H4 D113]	"B" is set.
		[MOV K0 D114]	B0 is set.
		[MOV K512 D115]	512 points is set.

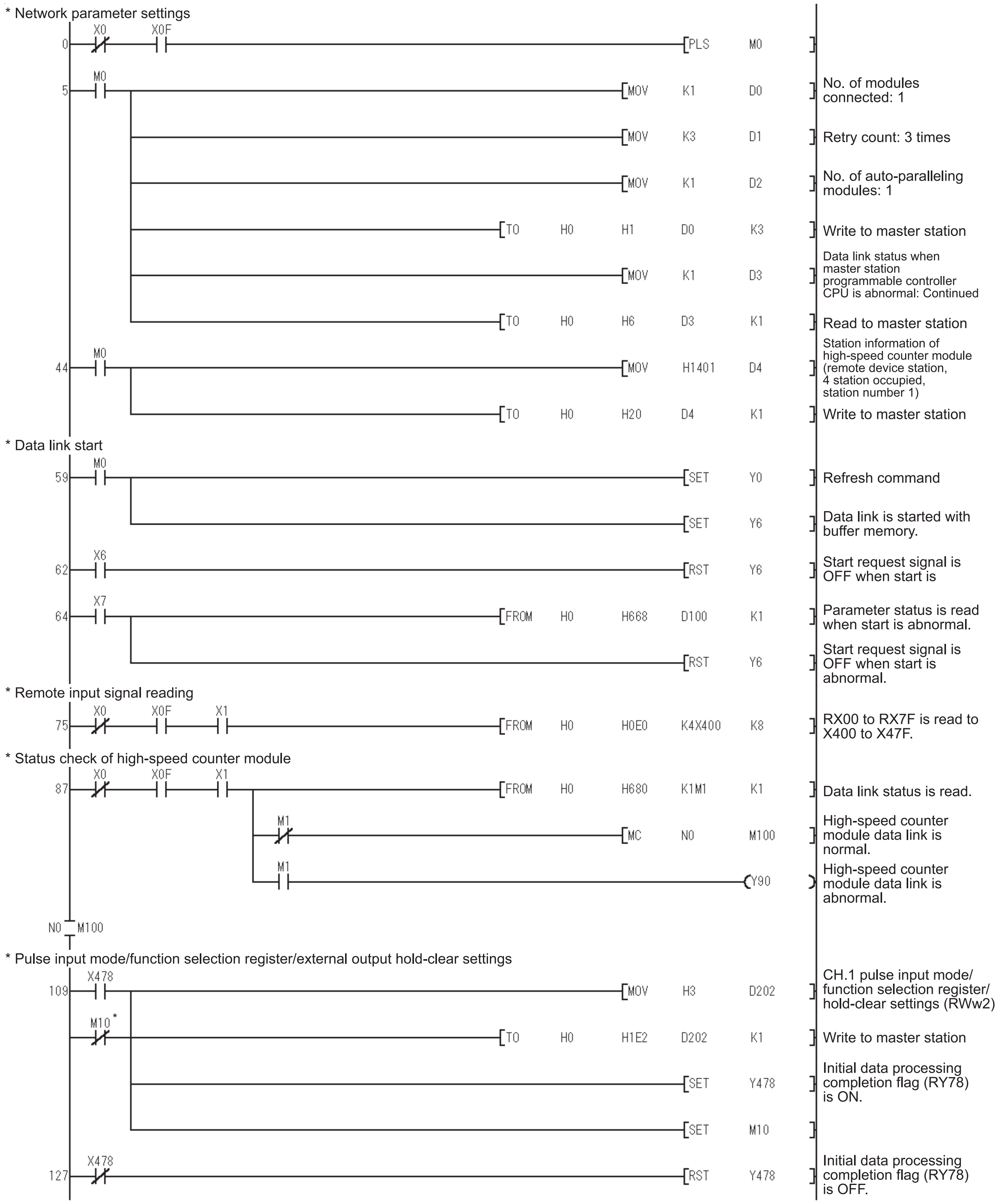


* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

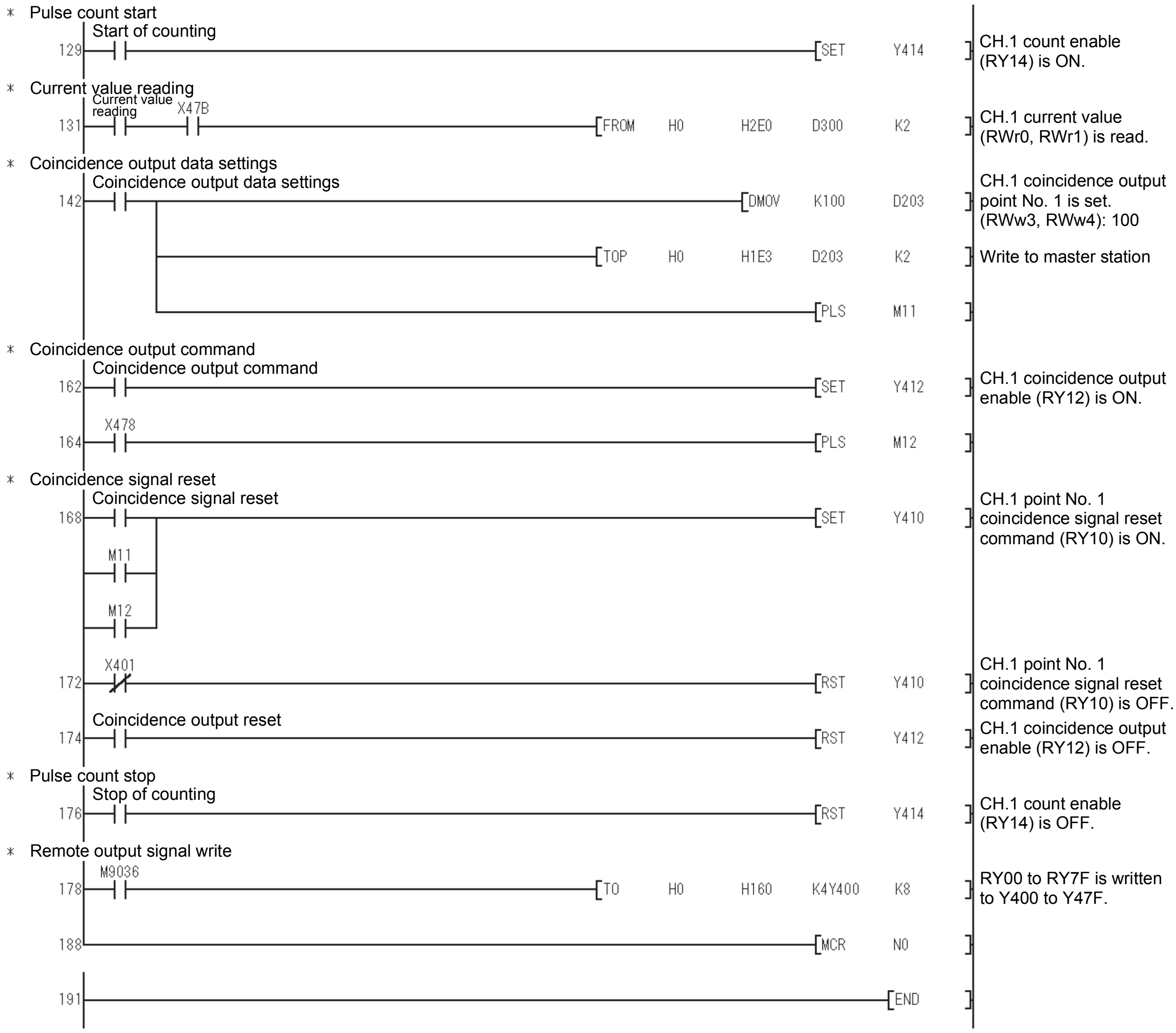
10.6 Program Example when ACPU/QCPU (A Mode) is Used (From/To Command)

Network parameters are set by the sequence program.

10.6.1 Program example of coincidence output function



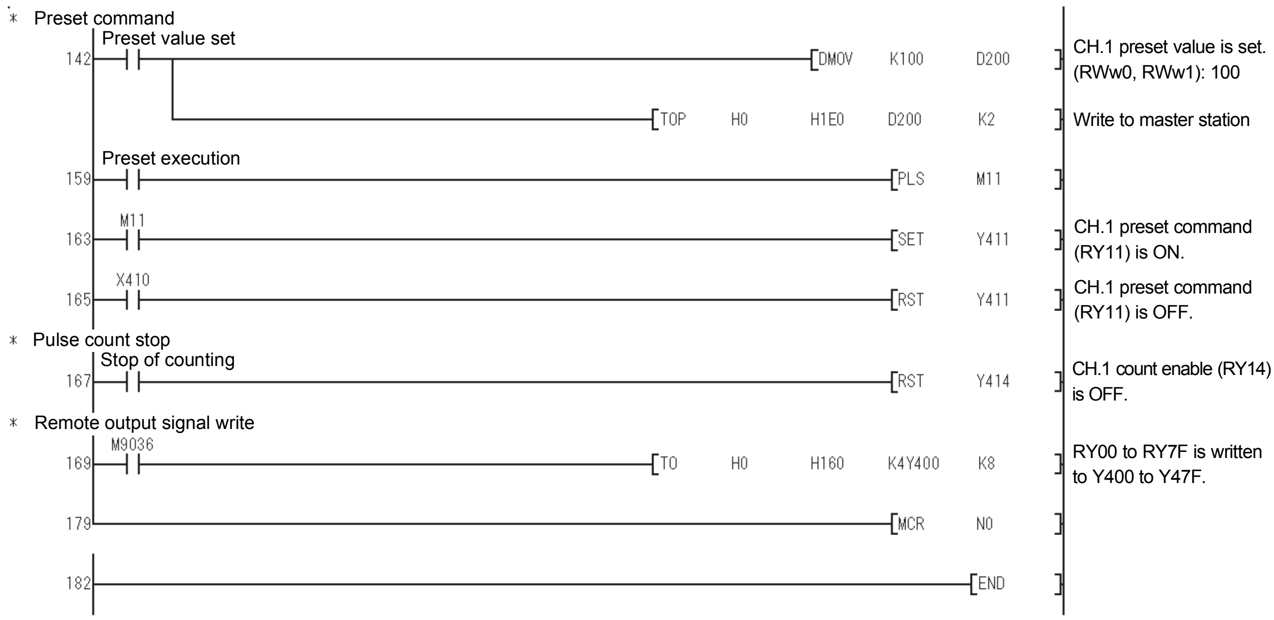
* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.


* Pulse count start
Start of counting
129
SET Y414
CH.1 count enable (RY14) is ON.
* Current value reading
Current value reading
X47B
131
FROM H0 H2E0 D300 K2
CH.1 current value (RWr0, RWr1) is read.
* Coincidence output data settings
Coincidence output data settings
142
DMOV K100 D203
CH.1 coincidence output point No. 1 is set. (RWw3, RWw4): 100
TOP H0 H1E3 D203 K2
Write to master station
PLS M11
* Coincidence output command
Coincidence output command
162
SET Y412
CH.1 coincidence output enable (RY12) is ON.
X478
164
PLS M12
* Coincidence signal reset
Coincidence signal reset
168
SET Y410
CH.1 point No. 1 coincidence signal reset command (RY10) is ON.
M11
M12
X401
172
RST Y410
CH.1 point No. 1 coincidence signal reset command (RY10) is OFF.
Coincidence output reset
174
RST Y412
CH.1 coincidence output enable (RY12) is OFF.
* Pulse count stop
Stop of counting
176
RST Y414
CH.1 count enable (RY14) is OFF.
* Remote output signal write
M9036
178
TO H0 H160 K4Y400 K8
RY00 to RY7F is written to Y400 to Y47F.
188
MCR N0
191
END

10.6.2 Program example of preset with sequence program

	* Network parameter settings		
0	X0 (NC), X0F	[PLS M0]	
5	M0	[MOV K1 D0]	No. of modules connected: 1
		[MOV K3 D1]	Retry count: 3 times
		[MOV K1 D2]	No. of auto-paralleling modules: 1
		[TO H0 H1 D0 K3]	Write to master station
		[MOV K1 D3]	Data link status when master station programmable controller CPU is abnormal: Continued
		[TO H0 H6 D3 K1]	Read to master station
44	M0	[MOV H1401 D4]	Station information of high-speed counter module (remote device station, 4 station occupied, station number 1)
		[TO H0 H20 D4 K1]	Write to master station
	* Data link start		
59	M0	[SET Y0]	Refresh command
		[SET Y6]	Data link is started with buffer memory.
62	X6	[RST Y6]	Start request signal is OFF when start is normal.
64	X7	[FROM H0 H668 D100 K1]	Parameter status is read when start is abnormal.
		[RST Y6]	Start request signal is OFF when start is abnormal.
	* Remote input signal reading		
75	X0 (NC), X0F, X1	[FROM H0 H0E0 K4X400 K8]	RX00 to RX7F is read to X400 to X47F.
	* Status check of high-speed counter module		
87	X0 (NC), X0F, X1	[FROM H0 H680 K1M1 K1]	Data link status is read.
	M1 (NC)	[MC N0 M100]	High-speed counter module data link is normal.
	M1	(Y90)	High-speed counter module data link is abnormal.
	N0 M100		
	* Pulse input mode/function selection register/external output hold-clear settings		
109	X478, M10* (NC)	[MOV H3 D202]	CH.1 pulse input mode/ function selection register/ hold-clear settings (RWw2)
		[TO H0 H1E2 D202 K1]	Write to master station
		[SET Y478]	Initial data processing completion flag (RY78) is ON.
		[SET M10]	
127	X478 (NC)	[RST Y478]	Initial data processing completion flag (RY78) is OFF.
	* Pulse count start		
129	Start of counting	[SET Y414]	CH.1 count enable (RY14) is ON.
	* Current value reading		
131	Current value reading, X47B	[FROM H0 H2E0 D300 K2]	CH.1 current value (RWr0, RWr1) is read.

* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.


* Preset command
Preset value set
142
DMOV K100 D200
CH.1 preset value is set. (RWw0, RWw1): 100
TOP H0 H1E0 D200 K2
Write to master station
Preset execution
159
PLS M11
M11
163
SET Y411
CH.1 preset command (RY11) is ON.
X410
165
RST Y411
CH.1 preset command (RY11) is OFF.
* Pulse count stop
Stop of counting
167
RST Y414
CH.1 count enable (RY14) is OFF.
* Remote output signal write
M9036
169
TO H0 H160 K4Y400 K8
RY00 to RY7F is written to Y400 to Y47F.
179
MCR N0
182
END

10.6.3 Program example of preset with external control signal

	* Network parameter settings		
0	X0 (NC), X0F	[PLS M0]	
5	M0	[MOV K1 D0]	No. of modules connected: 1
		[MOV K3 D1]	Retry count: 3 times
		[MOV K1 D2]	No. of auto-paralleling modules: 1
		[TO H0 H1 D0 K3]	Write to master station
		[MOV K1 D3]	Data link status when master station programmable controller CPU is abnormal: Continued
		[TO H0 H6 D3 K1]	Read to master station
44	M0	[MOV H1401 D4]	Station information of high-speed counter module (remote device station, 4 station occupied, station number 1)
		[TO H0 H20 D4 K1]	Write to master station
	* Data link start		
59	M0	[SET Y0]	Refresh command
		[SET Y6]	Data link is started with buffer memory.
62	X6	[RST Y6]	Start request signal is OFF when start is normal.
64	X7	[FROM H0 H668 D100 K1]	Parameter status is read when start is abnormal.
		[RST Y6]	Start request signal is OFF when start is abnormal.
	* Remote input signal reading		
75	X0 (NC), X0F, X1	[FROM H0 H0E0 K4X400 K8]	RX00 to RX7F is read to X400 to X47F.
	* Status check of high-speed counter module		
87	X0 (NC), X0F, X1	[FROM H0 H680 K1M1 K1]	Data link status is read.
	M1 (NC)	[MC N0 M100]	High-speed counter module data link is normal.
	M1	(Y90)	High-speed counter module data link is abnormal.
N0	M100		
	* Pulse input mode/function selection register/external output hold-clear settings		
109	X478	[MOV H3 D202]	CH.1 pulse input mode/ function selection register/ hold-clear settings (RWw2)
	M10 * (NC)	[TO H0 H1E2 D202 K1]	Write to master station
		[SET Y478]	Initial data processing completion flag (RY78) is ON.
		[SET M10]	
127	X478 (NC)	[RST Y478]	Initial data processing completion flag (RY78) is OFF.
	* Pulse count start		
129	Start of counting	[SET Y414]	CH.1 count enable (RY14) is ON.
	* Current value reading		
131	Current value reading, X47B	[FROM H0 H2E0 D300 K2]	CH.1 current value (RWr0, RWr1) is read.

* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

* Preset command

142	Preset value set	[DMOV K100 D200]	CH.1 preset value is set. (RWw0, RWw1): 100
		[TOP H0 H1E0 D200 K2]	Write to master station
159	X403	[SET Y420]	CH.1 external preset detection reset command (RY20) is ON.
161	X403 (NC)	[RST Y420]	CH.1 external preset detection reset command (RY20) is OFF.

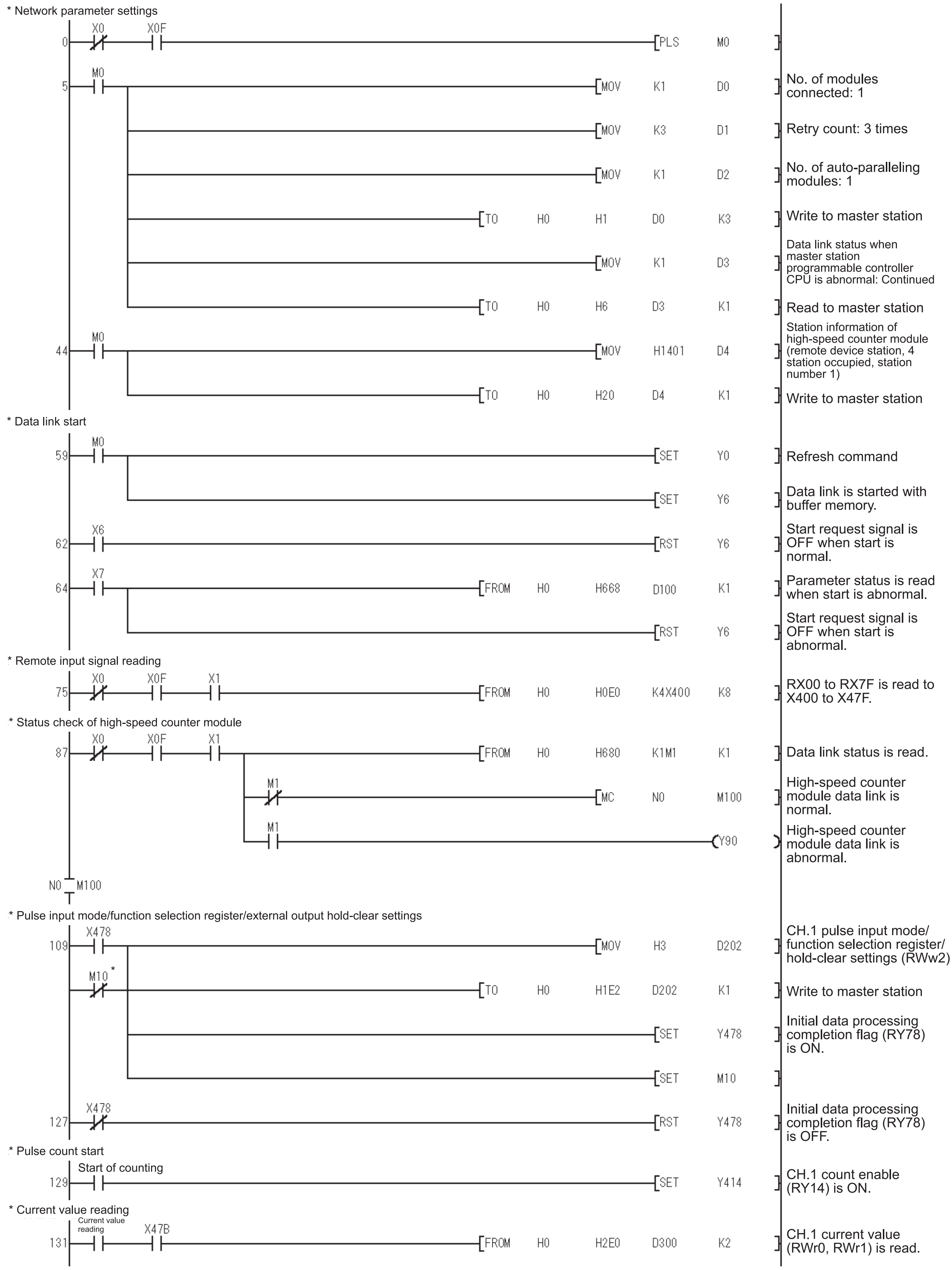
* Pulse count stop

163	Stop of counting	[RST Y414]	CH.1 count enable (RY14) is OFF.

* Remote output signal write

165	M9036	[TO H0 H160 K4Y400 K8]	RY00 to RY7F is written to Y400 to Y47F.
175		[MCR N0]	
178		[END]	

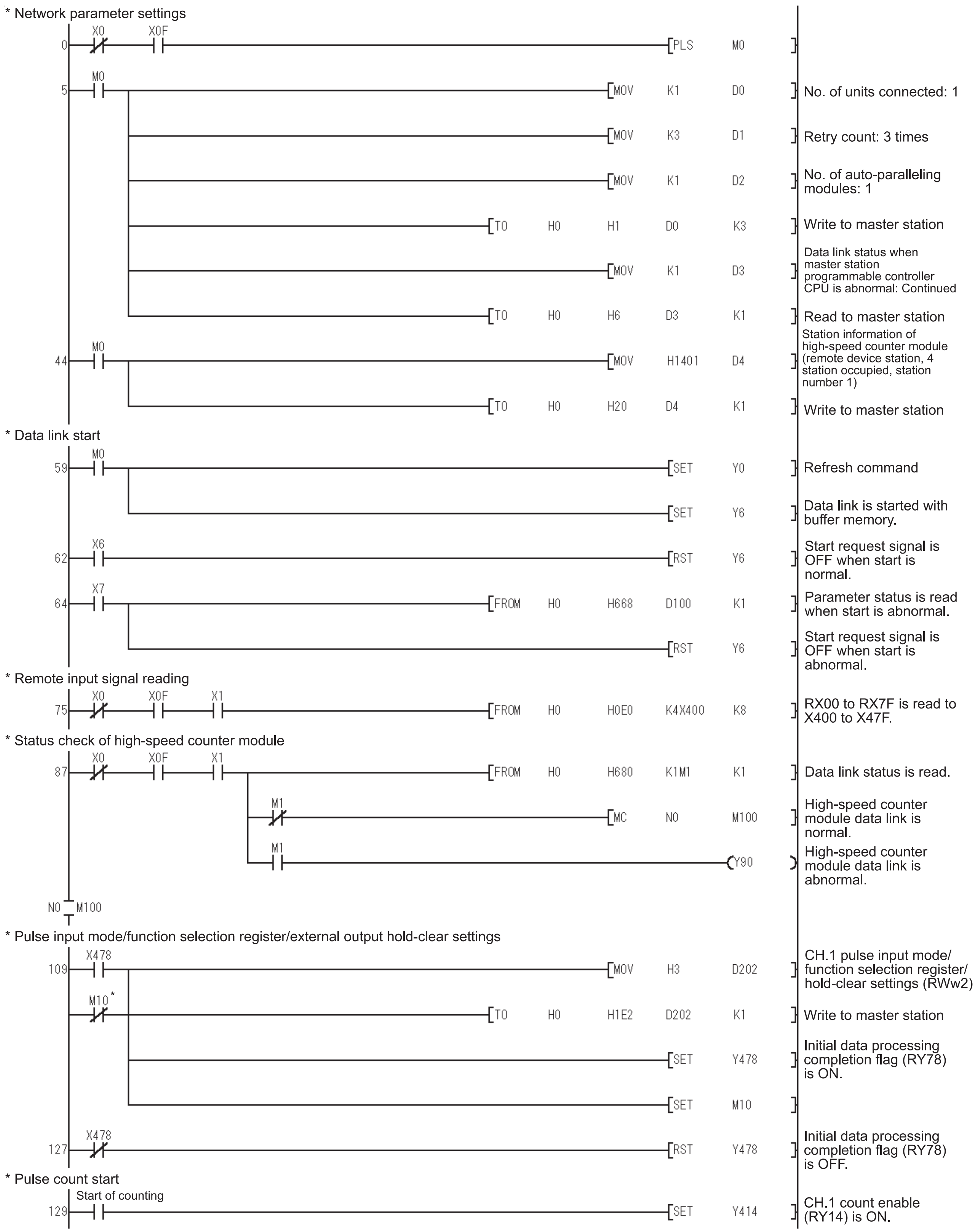
10.6.4 Program example of ring counter function



* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

Step	Comment / Contact	Instruction	Description
	* Preset command		
142	Preset value set	DMOV K100 D100	CH.1 preset value is set. (RWw0, RWw1): 100
		TOP H0 H1E0 D200 K2	Write to master station
	* Change of counter current value to preset value		
159	Change of current value	PLS M11	
163	M11	SET Y411	CH.1 preset command (RY11) is ON.
165	X410	RST Y411	CH.1 preset command (RY11) is OFF.
	* Ring counter value set		
167	Ring counter value set	DMOV K2000 D203	CH.1 coincidence output point No. 1 set (RWw3, RWw4): 2000
		TOP H0 H1E3 D203 K2	Write to master station
184	X401	SET Y410	CH.1 point No. 1 coincidence signal reset command (RY10) is ON.
	* Reset command of coincidence signal		
186	X401 (NC)	RST Y410	CH.1 point No. 1 coincidence signal reset command (RY10) is OFF.
	* Pulse count stop		
188	Stop of counting	RST Y414	CH.1 count enable (RY14) is OFF.
	* Remote output signal write		
190	M9036	TO H0 H160 K4Y400 K8	RY00 to RY7F is written to Y400 to Y47F.
200		MCR N0	
203		END	

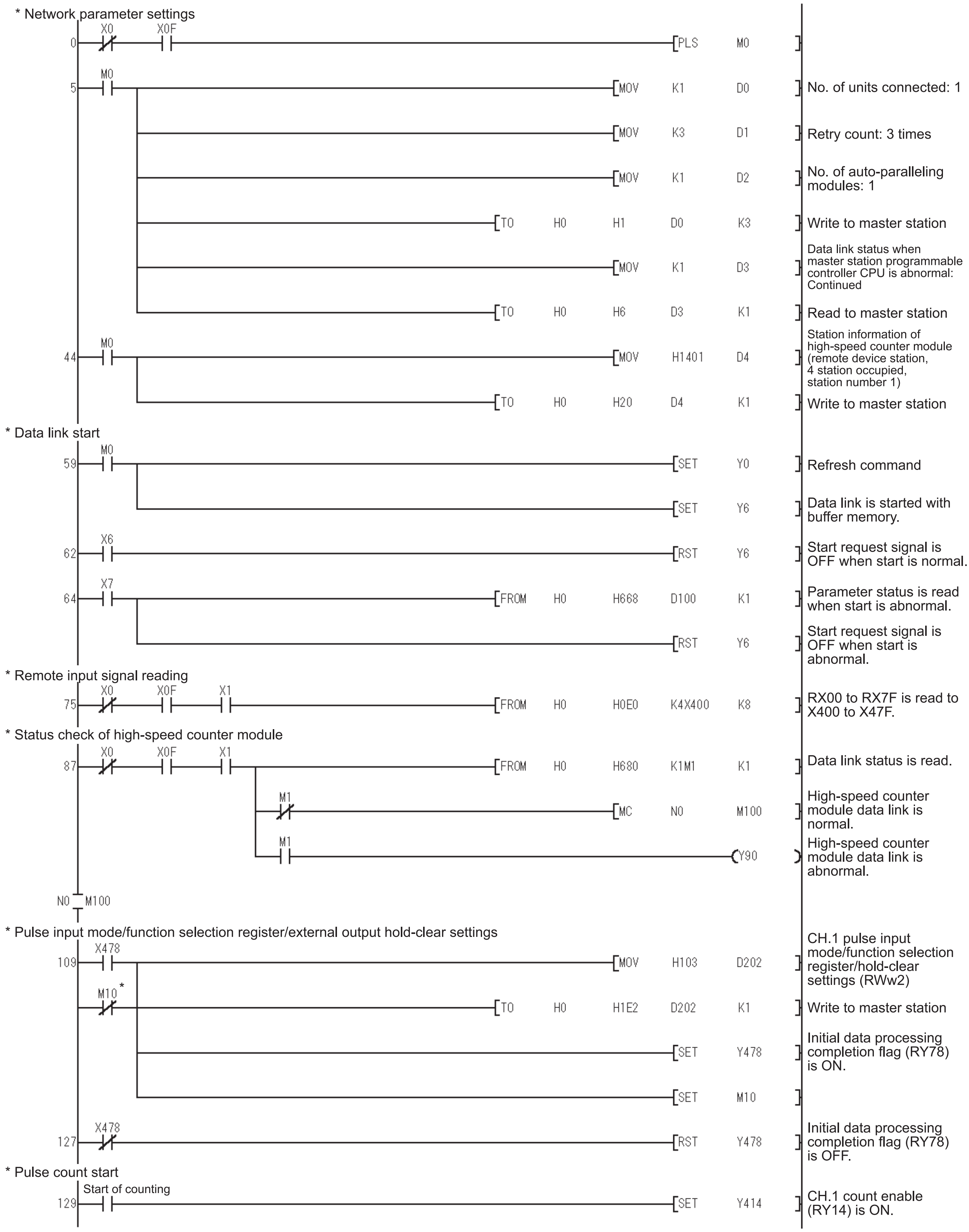
10.6.5 Program example of count disable function



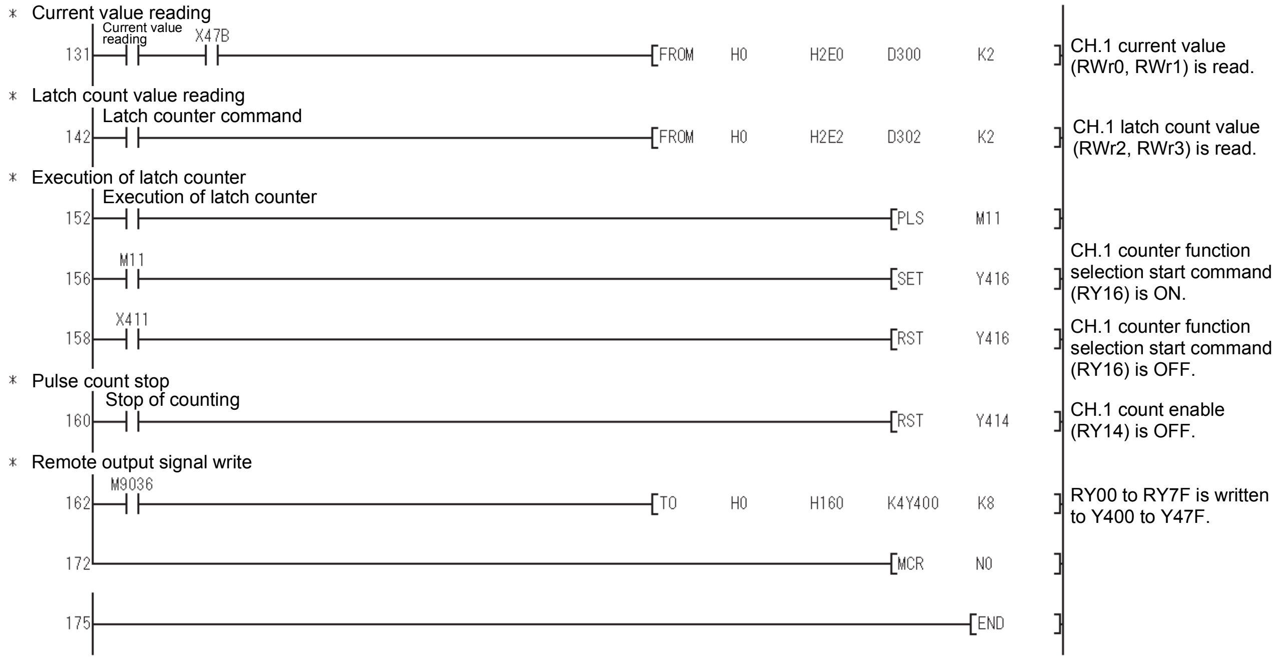
* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

```
* Current value reading
     Current value
     reading      X47B
131 ──┤ ├──────┤ ├──────────────────────[FROM  H0   H2E0  D300   K2 ]   CH.1 current value
                                                                         (RWr0, RWr1) is read.
* Execution of count disable
     Execution of count disable
142 ──┤ ├────────────────────────────────────────────[SET   Y416 ]     CH.1 counter function
                                                                         selection start command
                                                                         (RY16) is ON.
* Stop of count disable
     Stop of count disable
144 ──┤ ├────────────────────────────────────────────[RST   Y416 ]     CH.1 counter function
                                                                         selection start command
                                                                         (RY16) is OFF.
* Pulse count stop
     Stop of counting
146 ──┤ ├────────────────────────────────────────────[RST   Y414 ]     CH.1 count enable
                                                                         (RY14) is OFF.
* Remote output signal write
     M9036
148 ──┤ ├───────────────────────────────[TO    H0   H160  K4Y400  K8 ]   RY00 to RY7F is written
                                                                         to Y400 to Y47F.

158 ─────────────────────────────────────────────────[MCR   N0 ]

161 ──────────────────────────────────────────────────────[END ]
```

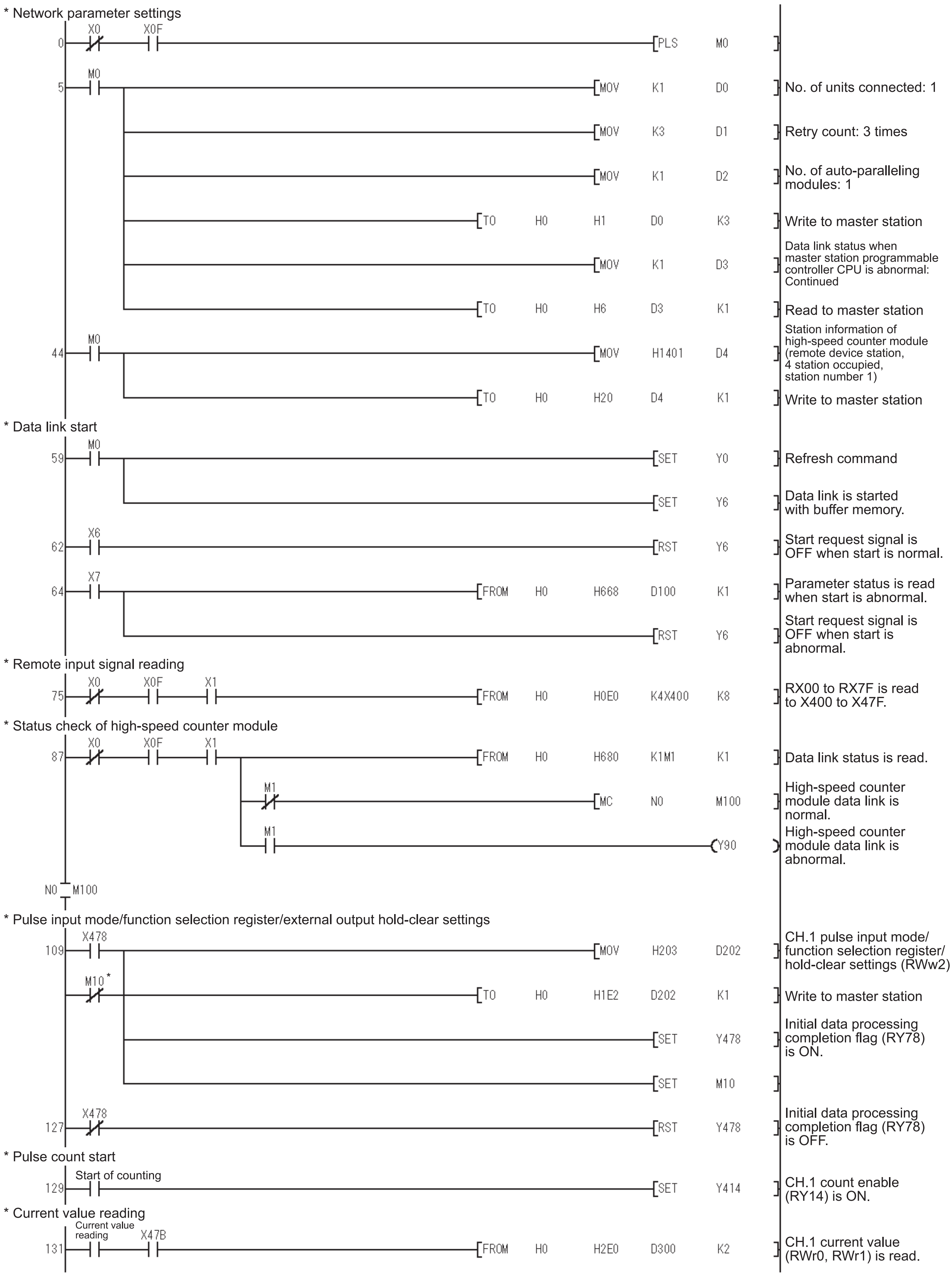
10.6.6 Program example of latch counter function



* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.


* Current value reading
Current value reading
X47B
131
FROM H0 H2E0 D300 K2
CH.1 current value (RWr0, RWr1) is read.
* Latch count value reading
Latch counter command
142
FROM H0 H2E2 D302 K2
CH.1 latch count value (RWr2, RWr3) is read.
* Execution of latch counter
Execution of latch counter
152
PLS M11
M11
156
SET Y416
CH.1 counter function selection start command (RY16) is ON.
X411
158
RST Y416
CH.1 counter function selection start command (RY16) is OFF.
* Pulse count stop
Stop of counting
160
RST Y414
CH.1 count enable (RY14) is OFF.
* Remote output signal write
M9036
162
TO H0 H160 K4Y400 K8
RY00 to RY7F is written to Y400 to Y47F.
172
MCR N0
175
END

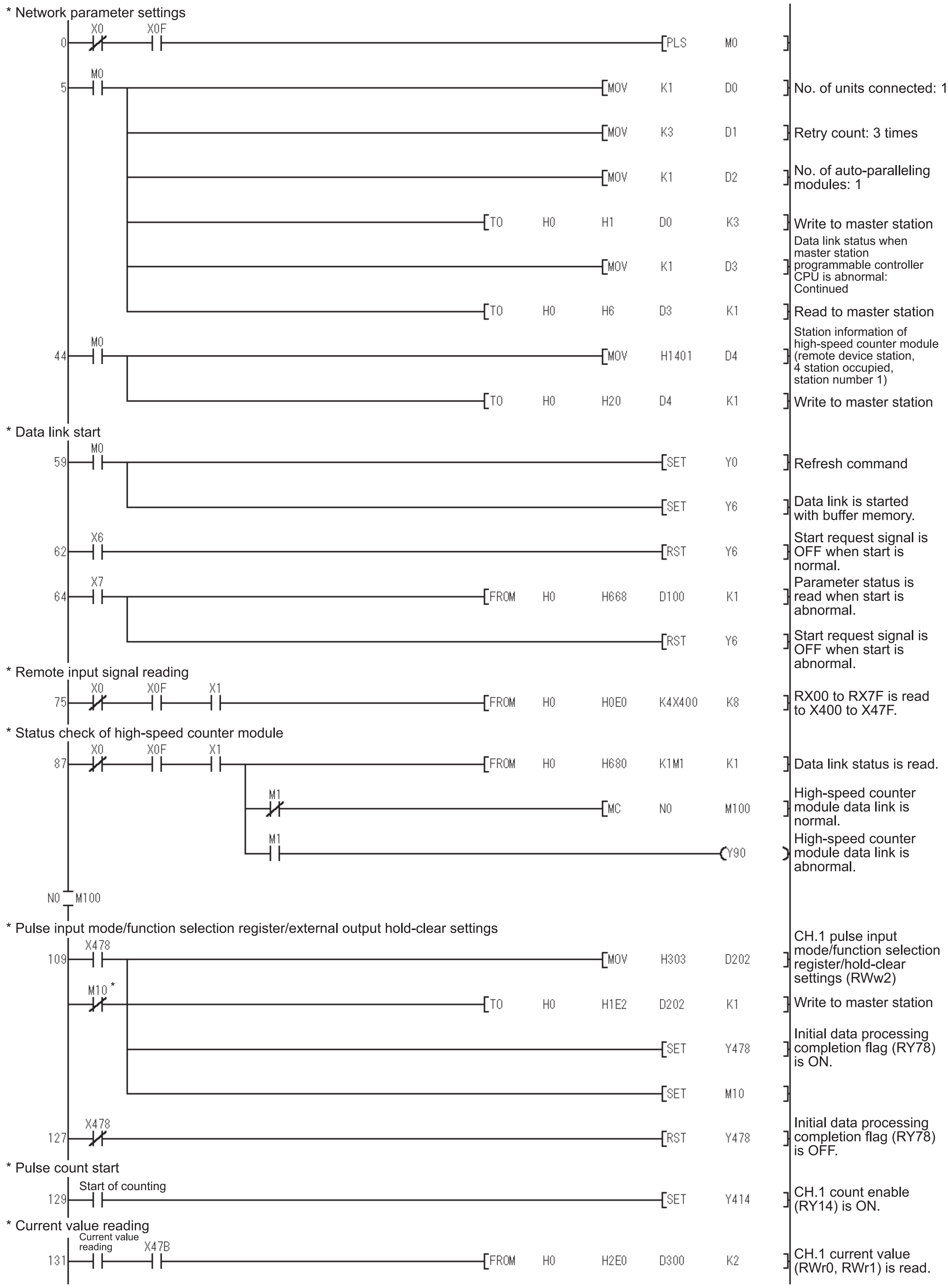
10.6.7 Program example of sampling counter function



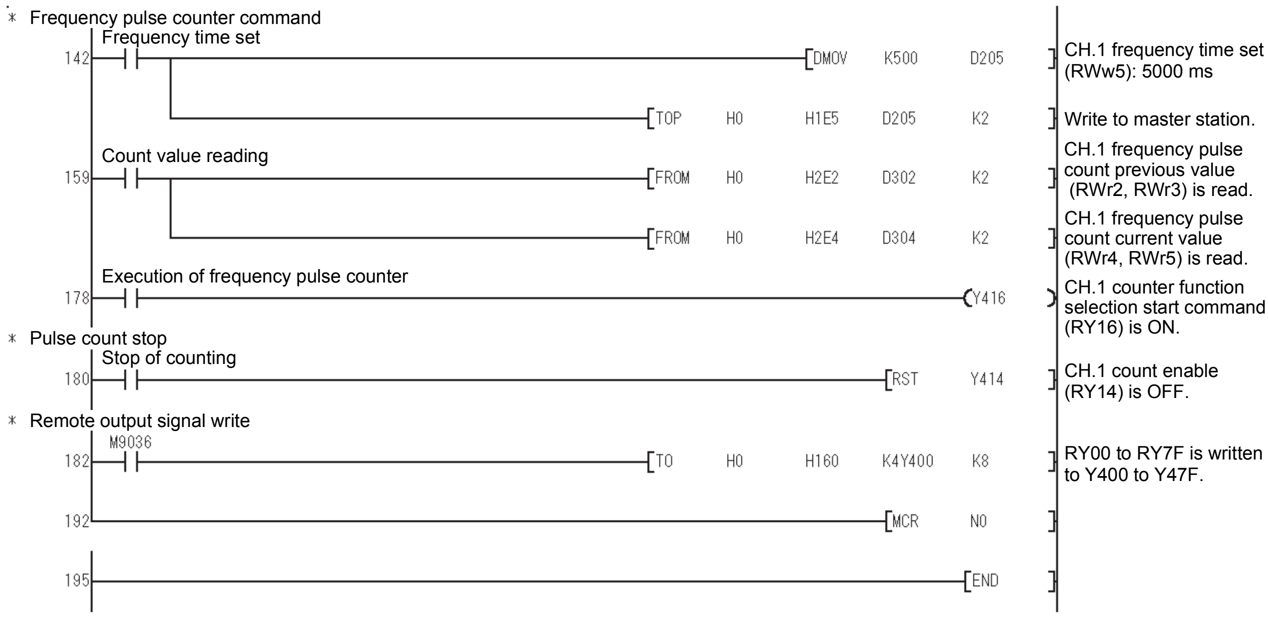
* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

```
* Sampling time set
     Sampling time set
142--| |----------------------------------[DMOV  K2000  D205      ]  CH.1 sampling time set
                                                                     (RWw5): 20000 ms
          |
          +------------------[TOP   H0    H1E5   D205   K2        ]  Write to master station.

* Sampling count value reading
     Count value reading
159--| |-------------------------[FROM  H0    H2E2   D302   K2     ]  CH.1 sampling count
                                                                     value (RWr2, RWr3) is
                                                                     read.
* Execution of sampling counter function
     Execution of sampling counter
169--| |------------------------------------------[PLS   M11      ]

     M11                                                             CH.1 counter function
173--| |------------------------------------------[SET   Y416     ]  selection start command
                                                                     (RY16) is ON.
     X411                                                            CH.1 counter function
175--| |------------------------------------------[RST   Y416     ]  selection start command
                                                                     (RY16) is OFF.
* Pulse count stop
     Stop of counting
177--| |------------------------------------------[RST   Y414     ]  CH.1 count enable
                                                                     (RY14) is OFF.
* Remote output signal write
     M9036
179--| |-------------------------[TO    H0    H160   K4Y400  K8    ]  RY00 to RY7F is written
                                                                     to Y400 to Y47F.

189-----------------------------------------------[MCR   N0       ]

192-----------------------------------------------------[END      ]
```

10.6.8 Program example of frequency pulse counter function



* When the programmable controller CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.


* Frequency pulse counter command
Frequency time set
142
DMOV K500 D205
CH.1 frequency time set (RWw5): 5000 ms
TOP H0 H1E5 D205 K2
Write to master station.
Count value reading
159
FROM H0 H2E2 D302 K2
CH.1 frequency pulse count previous value (RWr2, RWr3) is read.
FROM H0 H2E4 D304 K2
CH.1 frequency pulse count current value (RWr4, RWr5) is read.
Execution of frequency pulse counter
178
Y416
CH.1 counter function selection start command (RY16) is ON.
* Pulse count stop
Stop of counting
180
RST Y414
CH.1 count enable (RY14) is OFF.
* Remote output signal write
M9036
182
TO H0 H160 K4Y400 K8
RY00 to RY7F is written to Y400 to Y47F.
192
MCR N0
195
END

11. TROUBLESHOOTING

11.1 Count Value Is Incorrect

The following table lists check items for use when the count value is incorrect.

Check Item	Corrective Action
Is the pulse input mode consistent with the pulse input setting in the remote register?	Make the pulse input mode consistent with the pulse input setting in the remote register.
Is the sequence program data processed in 24-bit binary?	Correct the sequence program so that the data is processed in 24-bit binary.
Is the terminal for pulse input wired using a shielded twisted pair cable?	Use a shielded twisted pair cable for to wire a terminal for pulse input.
Does noise enter through the ground of the high-speed counter module?	• Disconnect the high-speed counter module from the ground. • If the high-speed counter module is in contact with the ground, separate it from the ground.
Have adequate measures been taken against noise in the panel or noise resulting from the other equipment?	Provide CR surge suppression to magnetic switches, etc.
Is sufficient distance provided between heavy current equipment and counter input line?	Wire the pulse input line independently, and separate in-panel wiring 150mm or more from power line.
Is the count value the same at CH1 and CH2 after the same count value was entered?	If the count values are different, the hardware is faulty. Please consult your local Mitsubishi representative.
Does the input pulse waveform match the performance specifications?	Monitor and confirm the pulse waveform using a synchroscope. If the waveform does not match the specifications, enter pulses of a correct waveform.

11.2 Count Operation Is Not Performed

The following table lists check items for use when count operation is not performed.

Check Item	Corrective Action
Is the external wiring of phases ϕA and ϕB correct?	Check the external wiring and make correction.
When a voltage is applied directly to the pulse input terminals of phases ϕA and ϕB, are the LEDs of phases ϕA and ϕB lit?	• If they are lit, check the external wiring and pulse generator and make correction. • If they are not lit, the hardware is faulty. Please consult your local Mitsubishi representative.
Is the count enable command {RY(n+1)4 (RY(n+1)B} on?	Switch on the count enable command {RY(n+1)4 (RY(n+1)B} using the sequence program.
Does the master module indicate an error?	If the master module is in error, refer to the troubleshooting procedure of the manual of the master module used and make operation normal.
Is the counter function selection start command {RY(n+1)6 (RY(n+1)D)} on or a voltage applied to the F.START terminal?	When the count disable function has been set by the counter function selection, switch off {RY(n+1)6 (RY(n+1)D)} or F.START terminal.

11.3 How to Check an Error with the LED Lamps

This section describes how to check an error using the LED lamps of the high-speed counter module.
For errors related to the programmable controller CPU and master module, refer to the programmable controller CPU and master module user's manuals.

(1) If the RUN LED of the high-speed counter module goes off

Cause	Corrective Action
Watchdog timer error occurred.	Switch on power of the high-speed counter module again*1. If the RUN LED is not lit after power is switched on again, the hardware may be faulty. Please consult your local Mitsubishi representative.

(2) If the L RUN LED of the high-speed counter module goes off

Cause	Corrective Action
Watchdog timer error occurred.	Switch on power of the high-speed counter module again*1. If the L RUN LED is not lit after power is switched on again, the hardware may be faulty. Please consult your local Mitsubishi representative.
Cable is broken or shorted.	Check for a broken or shorted cable among transmission cables and repair it.
Master station stopped link.	Check for an error at master station.
24V power is not supplied to the high-speed counter module or voltage is insufficient.	Check the 24V power voltage.
Station number was repeated.	Switch power on again*1 after correcting the station number setting of the module of which station number was repeated.
Switch setting is outside the permissible range (station number 0 or not less than 62, transmission speed 5 to 9).	Correct the switching setting and switch power on again*1.

(3) If the L ERR. LED of the high-speed counter module flickers

Cause	Corrective Action
Station number or transmission speed switch setting was changed during normal operation.	Return the station number or transmission speed switch setting to the old value and switch power on again*1. If the L RUN LED is not lit after power is switched on again, the hardware may be faulty. Please consult your local Mitsubishi representative.
Station number or transmission speed switch is faulty	If the L ERR. LED begins to flicker even though switch setting was not changed during operation, the hardware may be faulty. Please consult your local Mitsubishi representative.

(4) If the L ERR. LED of the high-speed counter module is lit

Cause	Corrective Action
Switch setting is outside the permissible range (station number 0 or not less than 62, transmission speed 5 to 9).	Correct the switching setting and switch power on again*1.
Terminal resistor is not connected.	Confirm that terminal resistor is connected. If not connected, connect it and switch power on again*1.
Module or transmission cable is affected by noise.	• Connect both ends of the shielded wire of the Dedicated cable for CC-Link to ground (class D grounding) via SLD and FG of each module. • Securely connect the FG terminal of the module to ground. • Securely ground the piping when running cables in piping.

*1: Switch power on again: Switch power on again or turn on the reset switch.

11.4 When SW0088 to SW008B (fuse blown status) of master station is turned ON

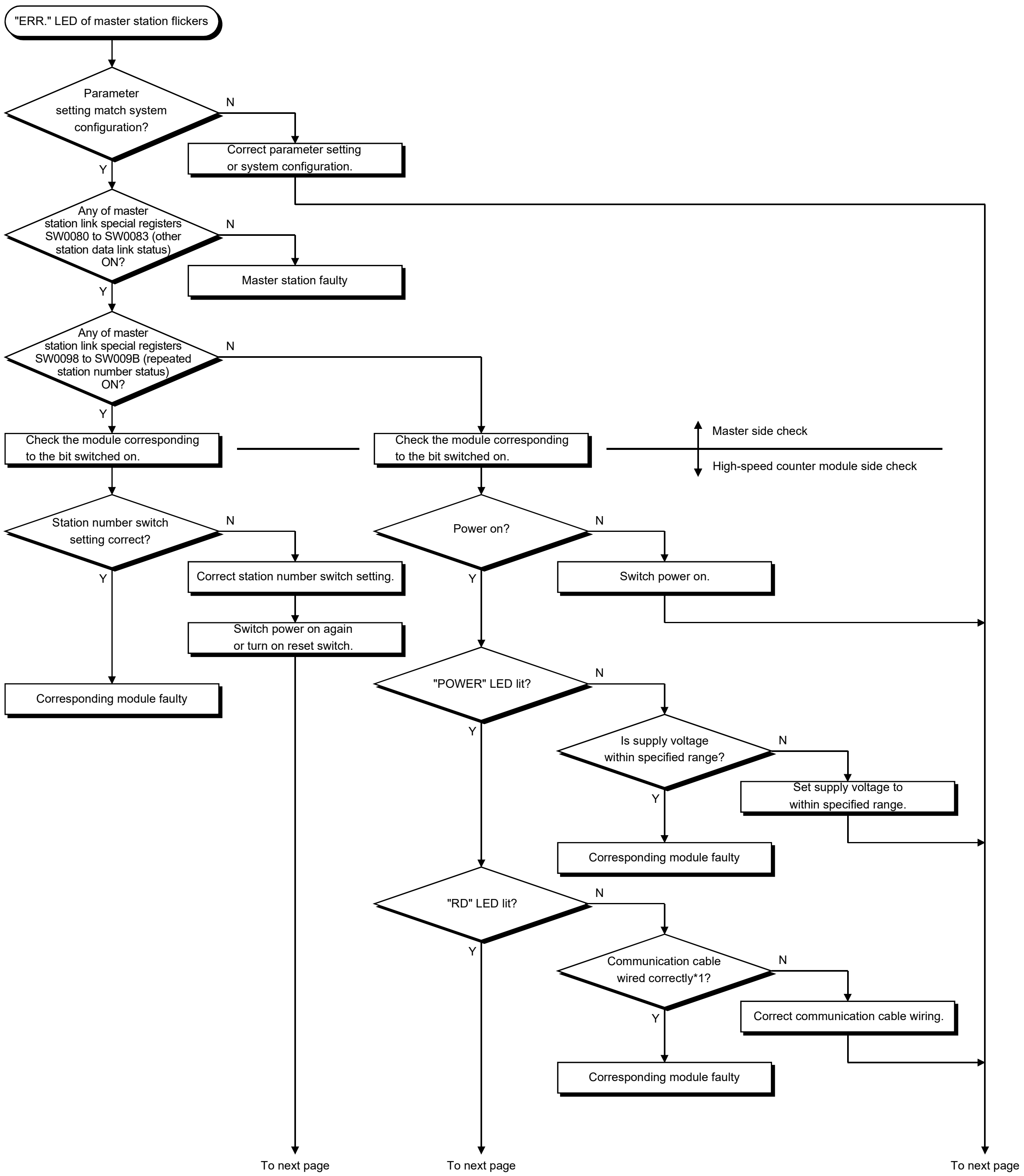
If the fuse of the high-speed counter module is blown, it can be confirmed by monitoring the link special registers for other station fuse blown status in the master station.

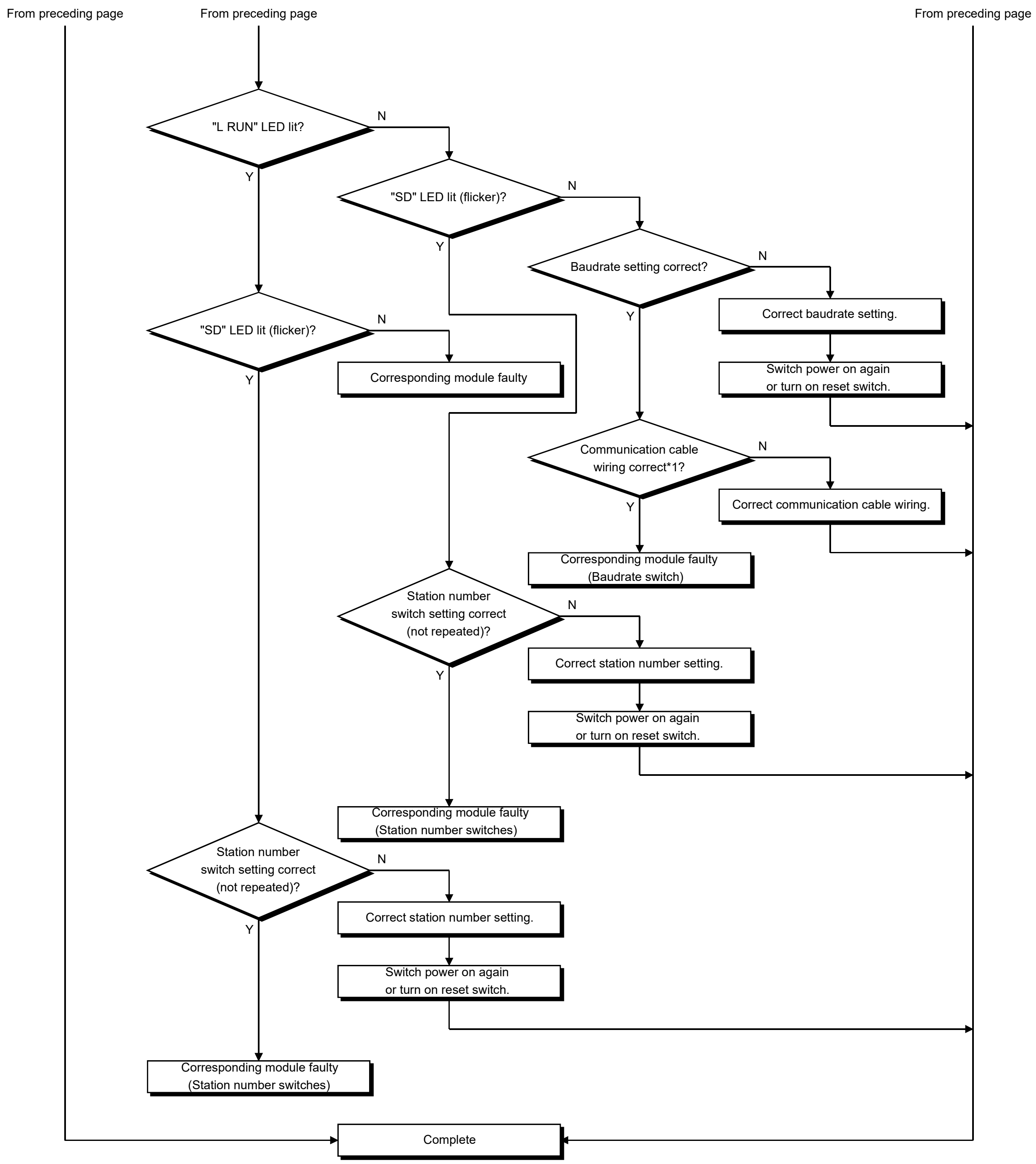
Cause	Corrective Action
External power supply is not wired	Wire an external power supply to the high-speed counter module. When using the external output (EQU1 to EQU2) terminals, wire an 10.2VDC to 30VDC external power supply as it is needed. Even when not using external output terminals (EQU1 to EQU2), wire the 12/24V terminal (pin number: 26) and the COM terminal (pin number: 27) to an external power supply. (Refer to Section 4.6.5)
Fuse is blown	The coincidence output function signal is not output. (Fuse for external power supply which operates the internal photocoupler when the EQU terminals are used) The fuse cannot be changed by the user. Please consult your local Mitsubishi representative.

11.5 If Communication Error Occurs between Master Station and This Module

If any repeated station number bit in any of the link special registers SW0098 to SW009B (repeated station number status) switches on, check the high-speed counter module of the corresponding station number in the following flowchart.

Troubleshooting flowchart used when the "ERR." LED of the master station flickers





*1: Check for short circuit, reverse connection, wire breakage, no terminal resistor, improper FG connection, improper overall distance and improper interstation distance.

APPENDICES

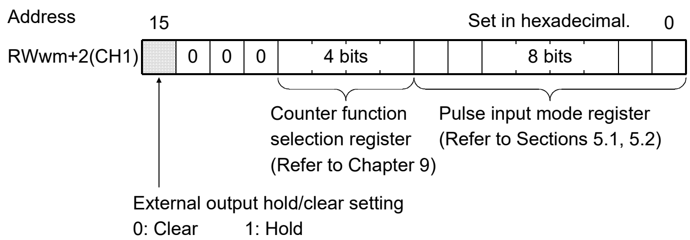
Appendix 1 Directions for Use

(1) For the master station, you can select whether data is cleared or held when a communication error or WDT error occurs or when remote device power switches off, using the condition setting switch.
Make setting according to the system.

*The above error can be confirmed by monitoring the link special registers for other station communication status in the master station.
When the error has occurred, the status of the corresponding station is stored into the following area in bit pattern.

SW0080 to SW0083: Data link status (0: normal, 1: data link error occurrence)
SW0084 to SW0087: WDT error status (0: normal, 1: WDT error occurrence)

(2) For the remote device station, you can select whether the external output (coincidence) status is held or cleared when a communication error, programmable controller CPU stop or master station reset is detected, using the external output hold/clear setting area of the remote register {most significant bit of address RWwn+2}.
As the external output hold/clear setting is used for both CH1 and CH2, set it to the remote register of CH1.



(3) When a hardware reset or WDT error occurs, the external output (coincidence output) is forcibly switched off.

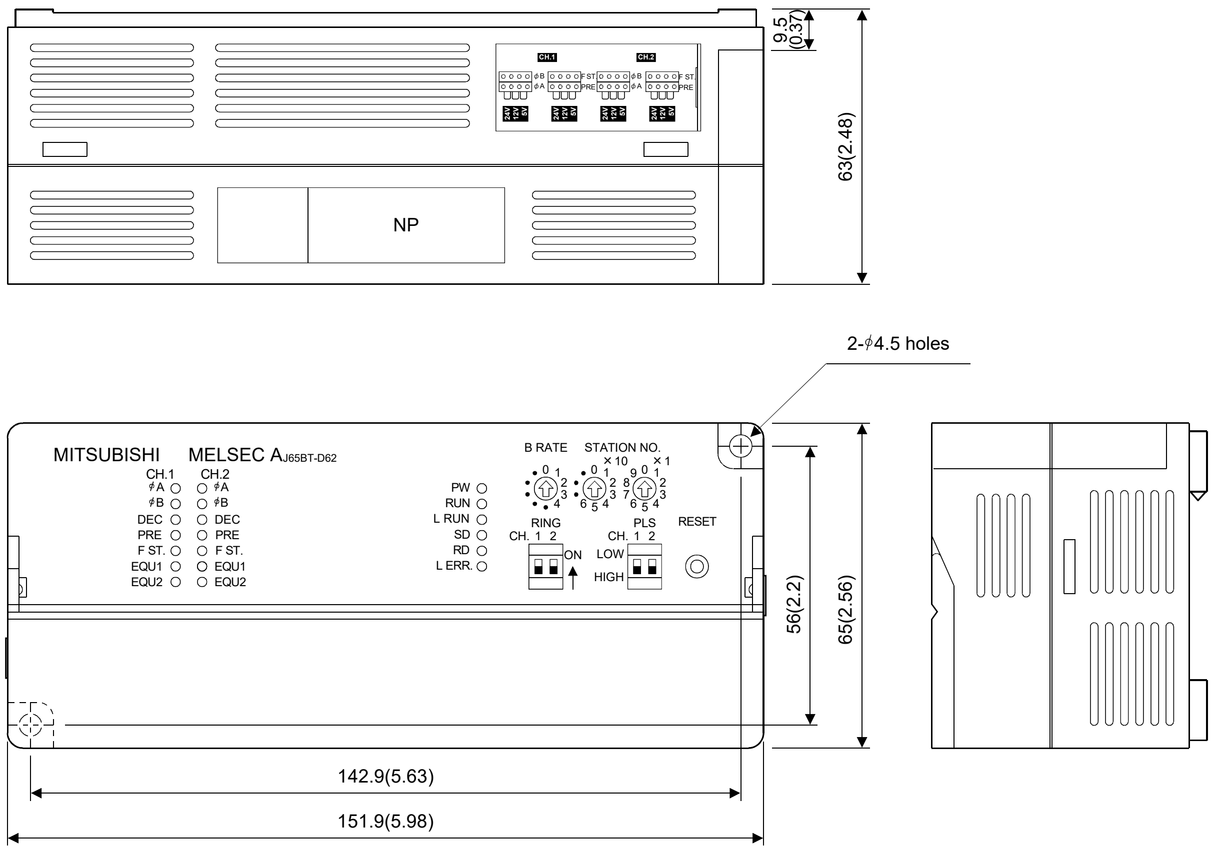
(4) If the fuse of the high-speed counter module is blown, it can be confirmed by monitoring the link special registers for other station fuse blown status in the master station.

SW0088 to SW008B: Fuse blown status (0: normal, 1: fuse blown)
If the "fuse blown" bit is set, check the following once.

Cause	Corrective Action
External power supply is not wired	Wire an external power supply to the high-speed counter module. When using the external output (EQU1 to EQU2) terminals, wire an 10.2VDC to 30VDC external power supply as it is needed. Even when not using external output terminals (EQU1 to EQU2), wire the 12/24V terminal (pin number: 26) and the COM terminal (pin number: 27) to an external power supply. (Refer to Section 4.6.5)
Fuse is blown	The coincidence output function signal is not output. (Fuse for external power supply which operates the internal photocoupler when the EQU terminals are used) The fuse cannot be changed by the user. Please consult your local Mitsubishi representative.

Appendix 2 Outline Drawing

The following is the outline drawing of the AJ65BT-D62.
(This applies also to the AJ65BT-D62D and AJ65BT-D62D-S1.)



Unit: mm

MEMO

WARRANTY

Please confirm the following product warranty details before using this product.

1. Gratis Warranty Term and Gratis Warranty Range

If any faults or defects (hereinafter "Failure") found to be the responsibility of Mitsubishi occurs during use of the product within the gratis warranty term, the product shall be repaired at no cost via the sales representative or Mitsubishi Service Company.

However, if repairs are required onsite at domestic or overseas location, expenses to send an engineer will be solely at the customer's discretion. Mitsubishi shall not be held responsible for any re-commissioning, maintenance, or testing on-site that involves replacement of the failed module.

[Gratis Warranty Term]

The gratis warranty term of the product shall be for one year after the date of purchase or delivery to a designated place. Note that after manufacture and shipment from Mitsubishi, the maximum distribution period shall be six (6) months, and the longest gratis warranty term after manufacturing shall be eighteen (18) months. The gratis warranty term of repair parts shall not exceed the gratis warranty term before repairs.

[Gratis Warranty Range]

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

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

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

2. Onerous repair term after discontinuation of production

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

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

3. Overseas service

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

4. Exclusion of loss in opportunity and secondary loss from warranty liability

Regardless of the gratis warranty term, Mitsubishi shall not be liable for compensation of damages caused by any cause found not to be the responsibility of Mitsubishi, loss in opportunity, lost profits incurred to the user by Failures of Mitsubishi products, special damages and secondary damages whether foreseeable or not, compensation for accidents, and compensation for damages to products other than Mitsubishi products, replacement by the user, maintenance of on-site equipment, start-up test run and other tasks.

5. Changes in product specifications

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

TRADEMARKS

Microsoft, Microsoft Access, Excel, Visual Basic, Visual C++, Windows, Windows NT, Windows Vista, and Windows XP are trademarks of the Microsoft group of companies.
Celeron, Intel, and Pentium are either registered trademarks or trademarks of Intel Corporation in the United States and/or other countries.
The company names, system names and product names mentioned in this manual are either registered trademarks or trademarks of their respective companies.
In some cases, trademark symbols such as '™' or '®' are not specified in this manual.

IB(NA)-66823-I(2404)MEE
MODEL: AJ65BT-D62-U-E
MODEL CODE: 13JL45

MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE: TOKYO BLDG., 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
NAGOYA WORKS: 1-14, YADA-MINAMI 5-CHOME, HIGASHI-KU, NAGOYA 461-8670, JAPAN