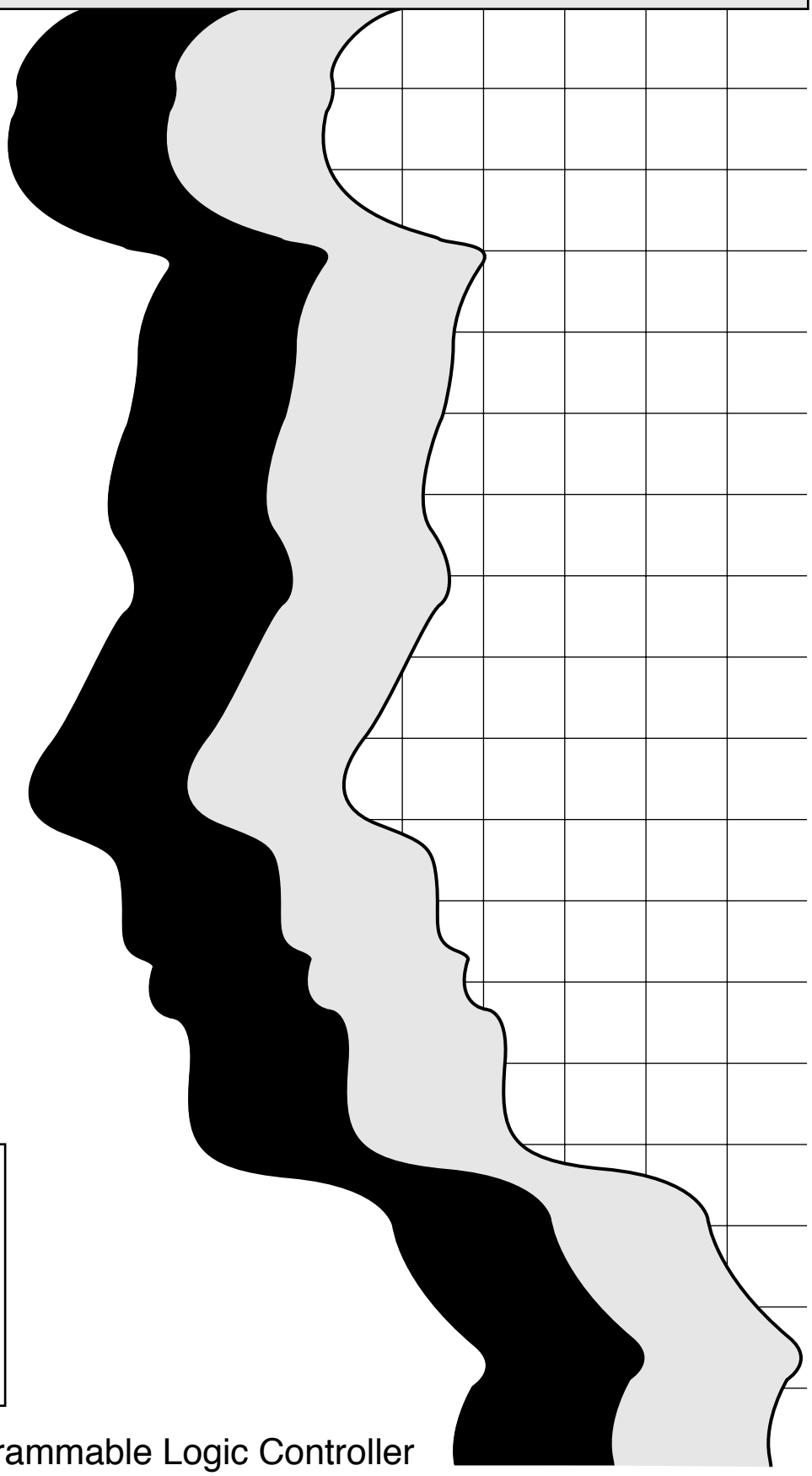
MITSUBISHI

High-Speed Counter Module
Type AJ65BT-D62/AJ65BT-D62D/AJ65BT-D62D-S1

# User's Manual



MELSEC

Mitsubishi Programmable Logic Controller

# • SAFETY PRECAUTIONS •

(Always read this instruction before using the equipment)

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

| | |
|---|---|
| DANGER | Improper handling could cause hazardous conditions resulting in severe injury or death. |
| CAUTION | Indicates that incorrect handling may cause hazardous conditions, resulting in medium or slight personal injury or physical 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]

**DANGER**

- 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(3.94inch).
  Not doing so could result in noise that would cause erroneous operation.

## [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]

**⚠ DANGER**

- 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.

- Always connect the FG terminal to the ground using class 3 or higher grounding exclusively designed for PC.
  Otherwise, an electric shock or misoperation may occur.

- 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.<br>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.<br><br>• Do not install the control lines together with the communication cables, or bring them close to each other. Failure to do so may cause malfunctions due to noise.<br><br>• Do not hold the cable part when unplugging the communication or power cable connected to the module.<br>When the cable is fitted with a connector, hold the connector of the cable part connected to the module.<br>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]

| ⚠ DANGER |
|---|
| • Do not touch the terminals while power is on.<br>This can cause misoperation.<br><br>• Before starting cleaning or terminal screw retightening, always switch power off externally in all phases.<br>Otherwise, a module failure or misoperation can occur.<br>Undertightening can cause a drop, short circuit or misoperation.<br>Overtightening can cause a drop, short circuit or misoperation due to damaged screws or module. |

| ⚠ CAUTION |
|---|
| • Do not touch the terminals while the power is on.<br>Doing so may cause malfunction.<br><br>• Be sure to shut off all phases of the external power supply used by the system before cleaning.<br>Not doing so can cause the module to fail or malfunction.<br><br>• Do not disassemble or modify the module.<br>This can cause a failure, misoperation, injury or fire.<br><br>• The module case is made of resin. Do not drop it or give it hard impact.<br>This can damage the module.<br><br>• 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.<br>Not doing so can cause the module to fail or malfunction.<br><br>• Do not install/remove the terminal block more than 50 times after the first use of the product.<br>(IEC 61131-2 compliant)<br><br>• Before handling the module, always touch grounded metal, etc. to discharge static electricity from the human body.<br>Failure to do so can cause the module to fail or malfunction.<br><br>• The pulse/external input voltage setting pins must be set after switching power off externally in all phases.<br>Otherwise, the module can fail or misoperate. |

## [Precautions Regarding Product Disposal ]

| ⚠ CAUTION |
|---|
| • When disposing of the product, handle it as industrial waste. |

## 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<br>Output signal list in 3.7 (2) modified<br>Partial correction made to POINT in 7.3<br>Partial addition made to contents of 10.2<br>Partial addition made to Appendix 1<br>Partial correction made to 4.2.1 (2)<br>Partial correction made to 11.3 (4) |
| Dec.,2003 | IB(NA)-66823-C | Addition<br>Conformation to the EMC Directive and Low Voltage Instruction<br>Product configuration<br>Partial Correction<br>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<br>Delete<br>Section 1.2, 3.3, 3.4 |
| Jul.,2005 | IB(NA)-66823-D | Partial Correction<br>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<br>SAFETY PRECAUTIONS, Conformation to the EMC Directive and Low Voltage Instruction, Section 10.6.4 |
| Sep.,2006 | IB(NA)-66823-F | Partial Correction<br>SAFETY PRECAUTIONS<br>Addition<br>Section 11.4<br>Section number change<br>Section 11.4 → 11.5 |
| | | |

Japanese Manual Version SH-3637-F

# Introduction

Thank you for the Mitsubishi MELSEC-A Series of General Purpose 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

## About the Manuals

The following product manuals are available. Please use this table as a reference to request the appropriate manual as necessary.

### Related Manuals

| Manual Name | Manual No. (Model Code) |
|---|---|
| High-Speed Counter Module type AJ65BT-D62/AJ65BT-D62D/AJ65BT-D62D-S1/ User's Manual(Hardware)<br>Describes the module specifications, applicable systems, handling, wiring and other information for use of the module.<br>(Option) | IB-66822 (13JL44) |
| CC-Link System Master · Local Module type AJ61BT11/A1SJ61BT11 User's Manual<br>Describes the system configuration, performance specifications, functions, handling, wiring and troubleshooting of the AJ61BT11 and A1SJ61BT11.<br>(Option) | IB-66721 (13J872) |
| CC-Link System Master · Local Module type AJ61QBT11/A1SJ61QBT11 User's Manual<br>Describes the system configuration, performance specifications, functions, handling, wiring and troubleshooting of the AJ61QBT11 and A1SJ61QBT11.<br>(Option) | IB-66722 (13J873) |

## Conformation to the EMC Directive and Low Voltage Instruction

When incorporating a Mitsubishi PLC that is compliant with the EMC and low voltage directives into any other product and ensuring compliance with these directives, refer to Chapter 3 "EMC and Low Voltage Directives" of the User's Manual (Hardware) for the PLC CPU included with the CPU module or base unit.

A module compliant with the EMC and low voltage directives bears a CE mark logo printed on the rating plate.

To make this product compliant with the EMC and low voltage directives, refer to "CC-Link module" in Chapter 3 "EMC and Low Voltage Directives" of the User's Manual (Hardware) for the CPU module.

BY making this product conform to the EMC directive and low voltage instruction, it is not necessary to make those steps individually.

## 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 | General name of product model SWnD5C-GPPW, SWnD5C-GPPW-A, SWnD5C-GPPW-V and SWnD5C-GPPW-VA.<br>n in the model name is 4 or more. |
| 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 QO2CPU, QO2HCPU, QO6HCPU, Q12HCPU and Q25HCPU. |
| Master station | Station that controls the data link system.<br>1 station is required for 1 system. |
| Local station | Station with PLC 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.)<br>(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 when QJ61BT11, AJ61BT11, A1SJ61BT11, AJ61QBT11 and A1SJ61QBT11 are used as master station |
| Local module | General name when QJ61BT11, AJ61BT11, A1SJ61BT11, AJ61QBT11 and A1SJ61QBT11 are used as 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)<br>Bit information that indicates master station/local station module operation status and data link status.<br>It is indicated by SB for convenience. |
| SW | Link special register (for CC-Link)<br>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)<br>Bit information input from the remote station to the master station. It is indicated by RX for convenience. |
| RY | Remote output (for CC-Link)<br>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)<br>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)<br>16-bit information input from the remote device station to the master station. It is indicated by RWr for convenience. |

## Product configuration

The configuration of this product is shown below:

| 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 |

# 1. INTRODUCTION

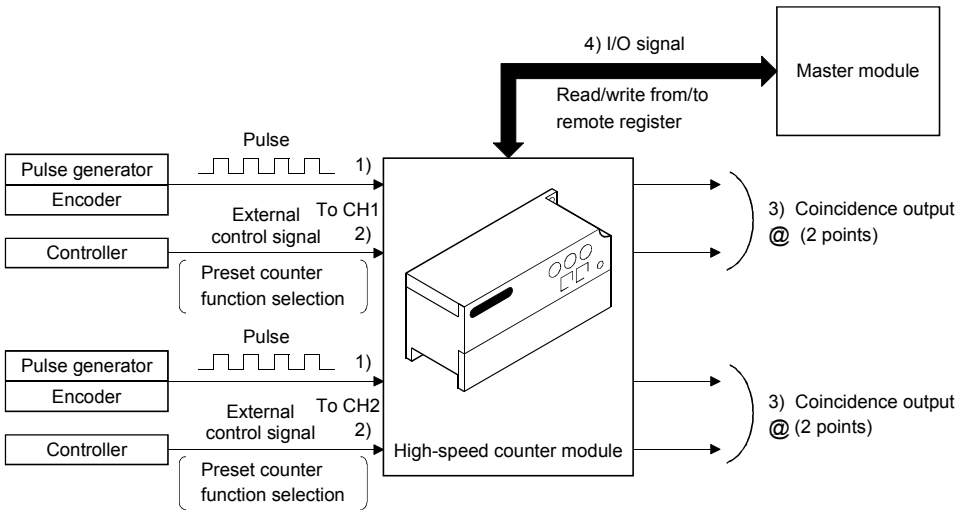
This user's manual describes the specifications, handling and programming of the AJ65BT-D62/D62D/D62D-S1 type high-speed counter module (hereinafter called the high-speed counter module) to be used in a Control Communication Link (hereinafter called CC-Link) system.
The high-speed counter module can 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.

<table>
<tr><th colspan="2">Item</th><th>AJ65BT-D62</th><th>AJ65BT-D62D</th><th>AJ65BT-D62D-S1</th></tr>
<tr><td colspan="2">Type</td><td>DC input<br>sink output type</td><td colspan="2">Differential input sink output type</td></tr>
<tr><td rowspan="2">External input</td><td>Preset</td><td rowspan="2" colspan="2">5/12/24VDC 2 to 15mA</td><td>Differential input</td></tr>
<tr><td>Function start</td><td>5/12/24VDC<br>2 to 5mA</td></tr>
<tr><td colspan="2">Max. counting speed</td><td>Max. 200kPPS</td><td colspan="2">Max. 400kPPS</td></tr>
<tr><td colspan="2">CC-Link station type</td><td colspan="3">Remote device station</td></tr>
<tr><td colspan="2">Counting range</td><td colspan="3">24-bit binary (0 to 16777215)</td></tr>
<tr><td colspan="2">Counting switch-over</td><td>200k/10k</td><td colspan="2">1 phase:400k<br>2 phases:300k/10k</td></tr>
</table>

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.

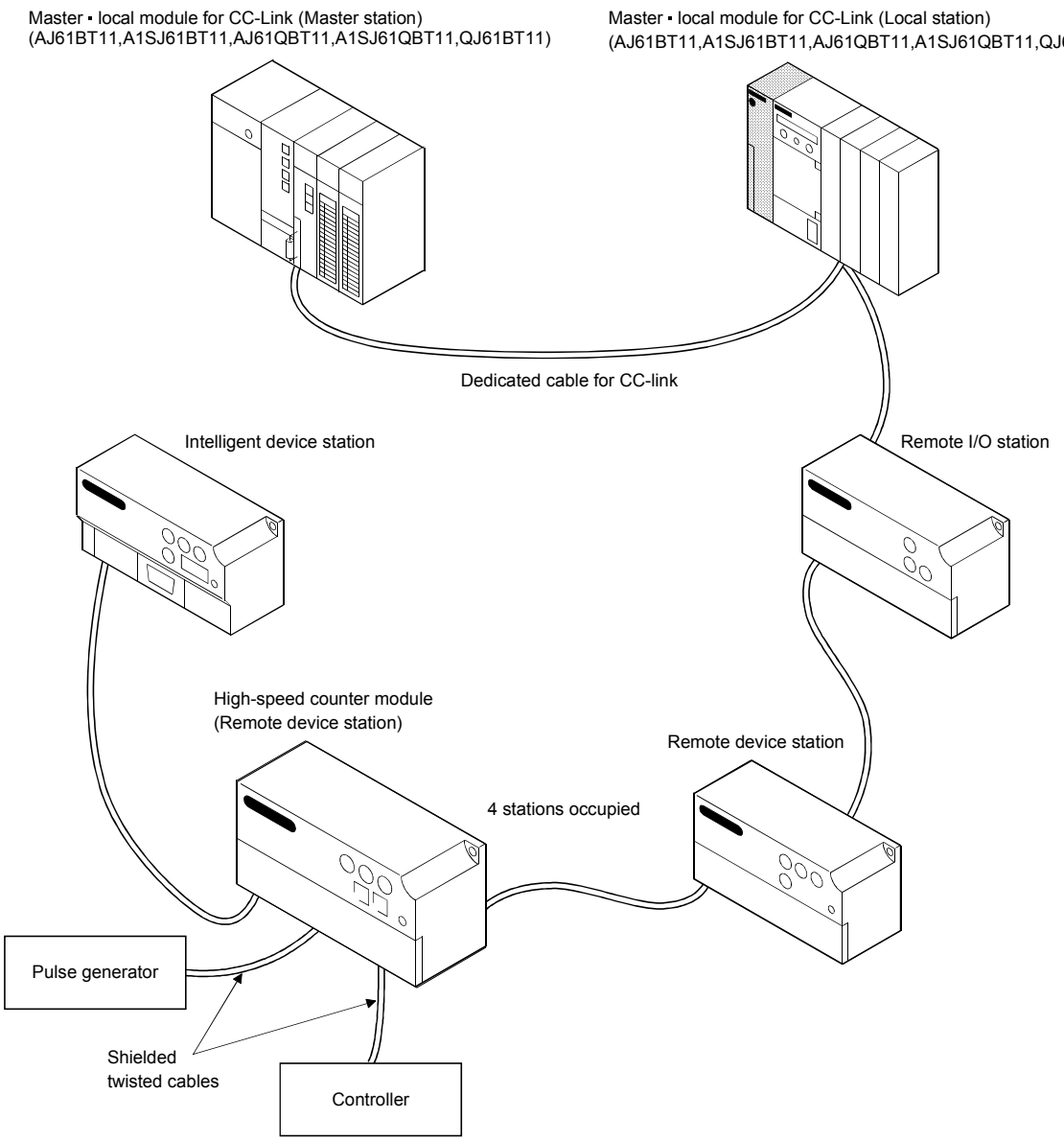
(7) Preset or counter function can be selected with an external control signal.
By applying a voltage to the external PRESET (Preset) or F.START (Function start) terminal, the preset or counter function can be selected.
These functions are used to eliminate the influence of scantime.

# 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

Master modules that use the high counter unit are shown below:

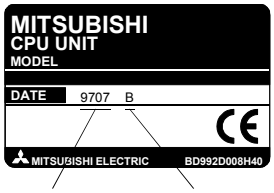
- AJ61BT11
- A1SJ61BT11
- AJ61QBT11
- A1SJ61QBT11
- QJ61BT11

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.

<Large type>


<Small type>




(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 PLC 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">10 to 90%RH, non-condensing</td></tr>
<tr><td>Storage ambient humidity</td><td colspan="6">10 to 90%RH, non-condensing</td></tr>
<tr><td rowspan="5">Vibration resistance</td><td rowspan="5">Conforms to JIS B3502 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">In case of intermittent vibration</td><td>10 to 57Hz</td><td>———</td><td>0.075mm (0.003in.)</td><td rowspan="4">10 times in each of X, Y and Z directions (for 80 minutes)</td></tr>
<tr><td>57 to 150Hz</td><td>9.8m/s$^2$</td><td>———</td></tr>
<tr><td rowspan="2">In case of continuous vibration</td><td>10 to 57Hz</td><td>———</td><td>0.035mm (0.001in.)</td></tr>
<tr><td>57 to 150Hz</td><td>4.9m/s$^2$</td><td>———</td></tr>
<tr><td>Shock resistance</td><td colspan="6">Conforms to JIS B3502 and IEC 61131-2 (147m/s$^2$, 3 times in each of three directions).</td></tr>
<tr><td>Operating atmosphere</td><td colspan="6">No corrosive gas</td></tr>
<tr><td>Operating altitude</td><td colspan="6">2000m(6557.38feet) or less</td></tr>
<tr><td>Installation site</td><td colspan="6">Inside control panel</td></tr>
<tr><td>Overvoltage category*1</td><td colspan="6">II or less</td></tr>
<tr><td>Contamination level*2</td><td colspan="6">2 or less</td></tr>
</table>

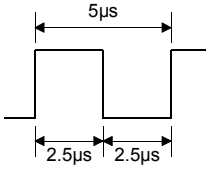
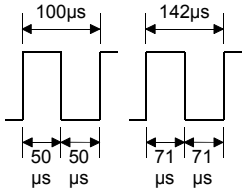
*1: Indicates the element in the distribution system between the public electricity grid and the mechanical equipment inside the premises that the relevant device is assumed to be connected to.
Category II applies to devices such as those that draw their power supply from fixed installations.
The surge voltage withstand capability of devices with ratings up to 300V is 2,500V.

*2: This index gives a measure of the incidence of conductive materials in the environment in which the device is used.
A contamination level of 2 indicates an environment in which there is only contamination by non-conducting materials, but due to occasional condensation, conductivity may occur.

## 3.2 Performance Specifications

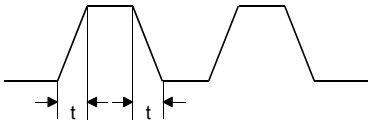
The following table gives the performance specifications of the high-speed counter module.

(1) Performance specifications of the AJ65BT-D62

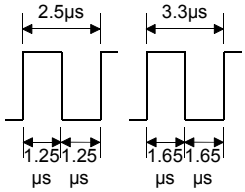
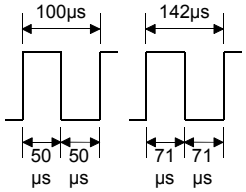
| Item | | | Specifications | |
|---|---|---|---|---|
| Counting speed setting switch | | | HIGH position | LOW position |
| Number of channels | | | 2 channels | |
| Count input signal | Phase | | 1-phase input, 2-phase input | |
| | Signal level ( $\phi$ A, $\phi$ B) | | 5VDC / 12VDC / 24VDC } 2 to 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) |
| Coincidence 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<br>ON→OFF 3ms or less | |
| External output | Coincidence output | | 2A/1common | |
| | Response time | | 0.1ms or less | |
| CC-Link station type | | | Remote device station | |
| Number of stations occupied | | | 4 stations (RX/RY 128 points each, RWw/RWr 16 points each) | |
| 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(0.03inch)×16mm(0.63inch) or larger (tightening torque range: 78 to 118N·cm)<br>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 | |
| | | | Power consumption: 70 mA | |
| Permissible instantaneous power failure time | | | 1ms | |
| Weight | | | 0.41kg(0.91lb) | |

*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 |

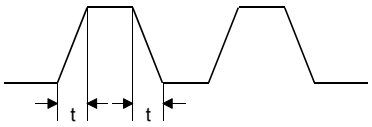


(2) Performance specifications of the AJ65BT-D62D

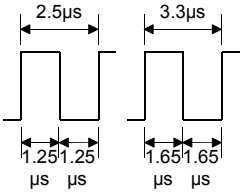
| Item | | | Specifications | |
|---|---|---|---|---|
| Counting speed setting switch | | | HIGH position | LOW position |
| Number of channels | | | 2 channels | |
| Count input signal | Phase | | 1-phase input, 2-phase input | |
| | Signal level ( $\phi$ A, $\phi$ B) | | EIA Standard RS-422-A differential 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) |
| Coincidence 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<br>ON→OFF 3ms or less | |
| External output | Coincidence output | | 2A/1common | |
| | Response time | | 0.1ms or less | |
| CC-Link station type | | | Remote device station | |
| Number of stations occupied | | | 4 stations (RX/RY 128 points each, RWw/RWr 16 points each) | |
| 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(0.03inch)×16mm(0.63inch) or larger (tightening torque range: 78 to 118N·cm) DIN rail may also be used for mounting. | |
| Applicable DIN rails | | | TH35-7.5Fe, TH35-7.5Al, (conforming to JIS C2812) | |
| Power supply voltage | | | 18 to 28.8VDC | |
| Permissible instantaneous power failure time | | | 1ms | |
| Current consumption (24VDC) | | | 100mA | |
| Weight | | | 0.42kg(0.93lb) | |

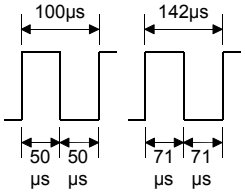
*Counting speed is influenced by pulse rise time and fall time.Countable speeds are as follows.
Note that counting of a pulse having long rise and fall times may result in miscounting.

| 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

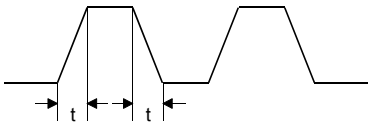
<table>
<tr><td colspan="3">Item</td><td colspan="2">Specifications</td></tr>
<tr><td colspan="3">Counting speed setting switch</td><td>HIGH position</td><td>LOW position</td></tr>
<tr><td colspan="3">Number of channels</td><td colspan="2">2 channels</td></tr>
<tr><td rowspan="2">Count input signal</td><td colspan="2">Phase</td><td colspan="2">1-phase input, 2-phase input</td></tr>
<tr><td colspan="2">Signal level ( $\phi$ A, $\phi$ B)</td><td colspan="2">EIA Standard RS-422-A differential type line driver level<br>{equivalent to Am26LS31 (Japan Texas Instruments make)}</td></tr>
<tr><td rowspan="6">Counter</td><td rowspan="2">Counting speed (max.)*</td><td>1-phase input</td><td>400kPPS</td><td>10kPPS</td></tr>
<tr><td>2-phase input</td><td>300kPPS</td><td>7kPPS</td></tr>
<tr><td colspan="2">Counting range</td><td colspan="2">24-bit binary, 0 to 16777215</td></tr>
<tr><td colspan="2">Type</td><td colspan="2">UP/DOWN preset counter and ring counter functions</td></tr>
<tr><td colspan="2">Minimum pulse width that can be counted<br>(Adjust rise/fall time of input to 0.1μs or less. Duty ratio: 50%)</td><td> 

(1-phase input) (2-phase input)</td><td> 

(1-phase input) (2-phase input)</td></tr>
<tr><td rowspan="2">Coincidence output</td><td colspan="2">Comparison range</td><td colspan="2">24-bit binary</td></tr>
<tr><td colspan="2">Comparison result</td><td colspan="2">Set value < count value, set value = count value, set value > count value</td></tr>
<tr><td rowspan="3">External input</td><td colspan="2">Preset</td><td colspan="2">EIA Standard RS-422-A differential type line driver level<br>{equivalent to Am26LS31 (Japan Texas Instruments make)}</td></tr>
<tr><td colspan="2">Function start</td><td colspan="2">5/12/24VDC 2 to 5mA</td></tr>
<tr><td colspan="2">Response time</td><td colspan="2">OFF→ON 0.5ms or less<br>ON→OFF 3ms or less</td></tr>
<tr><td rowspan="2">External output</td><td colspan="2">Coincidence output</td><td colspan="2">2A/1common</td></tr>
<tr><td colspan="2">Response time</td><td colspan="2">0.1ms or less</td></tr>
<tr><td colspan="3">CC-Link station type</td><td colspan="2">Remote device station</td></tr>
<tr><td colspan="3">Number of stations occupied</td><td colspan="2">4 stations (RX/RY 128 points each, RWw/RWr 16 points each)</td></tr>
<tr><td colspan="3">Connection cable</td><td colspan="2">Dedicated cable for CC-Link</td></tr>
<tr><td colspan="3">Withstanding voltage</td><td colspan="2">500VAC for 1 minute across all DC external terminals and grounding terminal.</td></tr>
<tr><td colspan="3">Insulation resistance</td><td colspan="2">10MΩ or more across all DC external terminals and grounding terminal using a 500VDC insulation resistance tester.</td></tr>
<tr><td colspan="3">Noise immunity</td><td colspan="2">Measure using a noise simulator of noise voltage 500Vp-p, noise width 1μs and noise frequency 25 to 60Hz.</td></tr>
<tr><td colspan="3">Terminal block</td><td colspan="2">27-pin terminal block (M3.5×7 screws)</td></tr>
<tr><td colspan="3">Applicable cable size</td><td colspan="2">0.75 to 2.00mm$^2$</td></tr>
<tr><td colspan="3">Applicable crimping terminal</td><td colspan="2">RAV1.25-3, RAV2-3.5 (conforming to JIS C2805)</td></tr>
<tr><td colspan="3">Module mounting screws</td><td colspan="2">Screws of M4×0.7mm(0.03inch)×16mm(0.63inch) or larger<br>(tightening torque range: 78 to 118N·cm)<br>DIN rail may also be used for mounting.</td></tr>
<tr><td colspan="3">Applicable DIN rails</td><td colspan="2">TH35-7.5Fe, TH35-7.5Al, (conforming to JIS C2812)</td></tr>
<tr><td colspan="3">Power supply voltage</td><td colspan="2">18 to 28.8VDC</td></tr>
<tr><td colspan="3">Permissible instantaneous power failure time</td><td colspan="2">1ms</td></tr>
<tr><td colspan="3">Current consumption (24VDC)</td><td colspan="2">120mA</td></tr>
<tr><td colspan="3">Weight</td><td colspan="2">0.42kg(0.93lb)</td></tr>
</table>

*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.

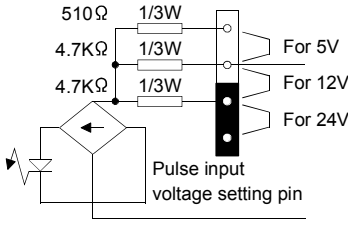
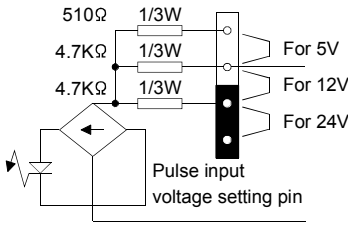
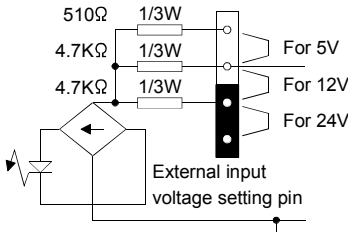
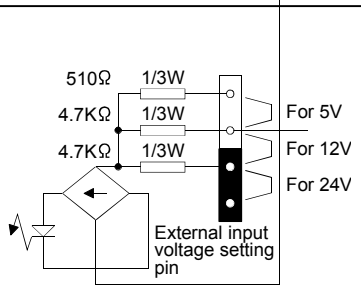
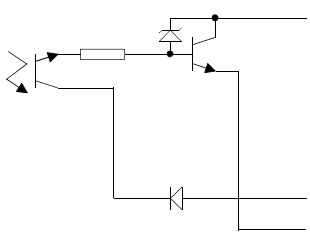
| Name | | Description | Refer To |
|---|---|---|---|
| Coincidence output function | | Outputs an ON/OFF signal in a specified output status, comparing it with the present value. | Section 6.1 |
| Preset function | | Counting alternates between the preset value and the ring counter value.<br>The preset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

*These functions may be used together. However, only one function may be selected from among the four counter function selection functions.

## 3.4 Interfaces with External Devices

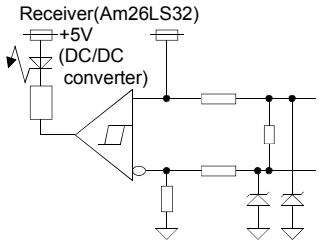
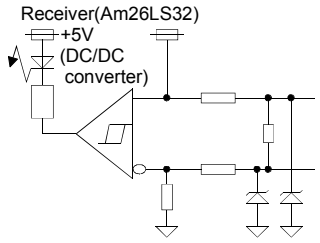
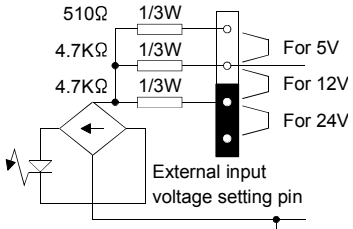
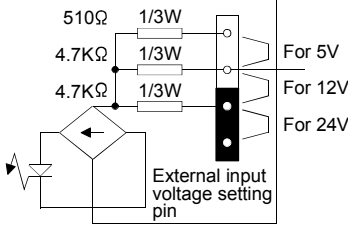
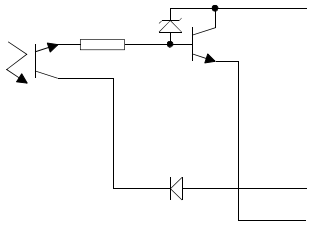
The following tables give lists of the interfaces of the high-speed counter module with external devices.

(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<br>Rated current 0.5A/point<br>Max. inrush current 4A 10ms<br>Max. voltage drop at ON 1.5V<br>Response time<br>OFF→ON 0.1ms or less<br>ON→OFF 0.1ms or less | | |
| | | 23 (25) | EQU2 | | | |
| | | 26 | 12/24V | Input voltage 10.2 to 30V<br>Current consumption 8mA(TYP 24VDC) | | |
| | | 27 | 0V | | | |

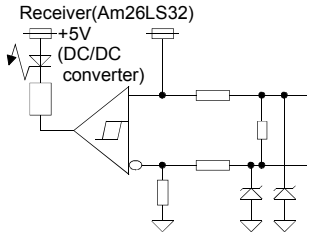
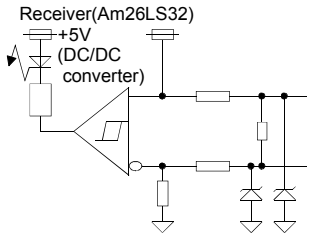
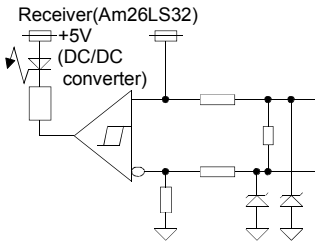
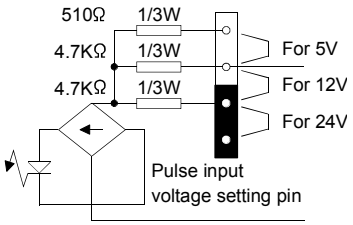
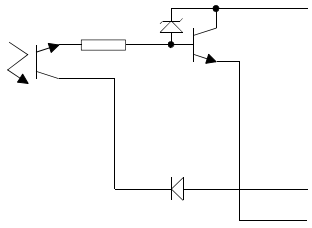
*1···The number within parentheses represents the terminal number of channel 2.

(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 driver level {Am26LS31 (Japan TexasInstruments make or equivalent)}<br>Vhys hysteresis ($V_{T+}$-$V_{T-}$) 60 mV<br>$V_{IH(E)}$ "H" level enable input voltage: 2V or more<br>$V_{IL(E)}$ "L" level enable input voltage: 0.8V or more<br>* 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<br>Rated current 0.5A/point<br>Max. inrush current 4A 10ms<br>Max. voltage drop at ON 1.5V<br>Response time<br>OFF→ON 0.1ms or less<br>ON→OFF 0.1ms or less | | |
| | | 23 (25) | EQU2 | | | |
| | | 26 | 12/24V | Input voltage 10.2 to 30V<br>Current consumption 8mA(TYP 24VDC) | | |
| | | 27 | 0V | | | |

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

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

| Input/ Output | Internal Circuit | Terminal Number *1 | Signal Name | ON/OFF | Input Voltage (Guaranteed) | Operating Current (Guaranteed) |
|---|---|---|---|---|---|---|
| Input |  | 8 (16) | Phase A pulse input | EIA Standard RS-422-A line driver level {Am26LS31 (Japan Texas Instruments make or equivalent)}<br>Vhys hysteresis ($V_{T+}$-$V_{T-}$) 60 mV<br>$V_{IH(E)}$ "H" level enable input voltage: 2V or more<br>$V_{IL(E)}$ "L" level enable input voltage: 0.8V or more<br>* Current type line driver cannot be used. | | |
| | | 9 (17) | Phase $\overline{A}$ pulse input | | | |
| |  | 10 (18) | Phase B pulse input | | | |
| | | 11 (19) | Phase $\overline{B}$ pulse input | | | |
| Input |  | 12 (20) | Preset input | | | |
| | | 13 (21) | $\overline{\text{Preset}}$ input | | | |
| Input |  | 14 (22) | 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 |
| | | 15 (23) | Function start input COM | Respon-se time | OFF→ON 0.5ms or less | ON→OFF 3ms or less |
| Output |  | 24 (25) | EQU1 | Operating voltage 10.2 to 30V<br>Rated current 0.5A/point<br>Max. inrush current 4A 10ms<br>Max. voltage drop at ON 1.5V<br>Response time<br>OFF→ON 0.1ms or less<br>ON→OFF 0.1ms or less | | |
| | | 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.

## 3.5 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<br>High-speed counter module<br>→ 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<br>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.<br>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.<br>Turned off when the counter function selection start command switches from ON to OFF. | Section 9.2<br>Section 9.3<br>Section 9.4<br>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 | |

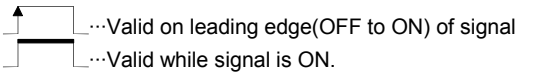
n: Address assigned to the master station by station number setting.

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.

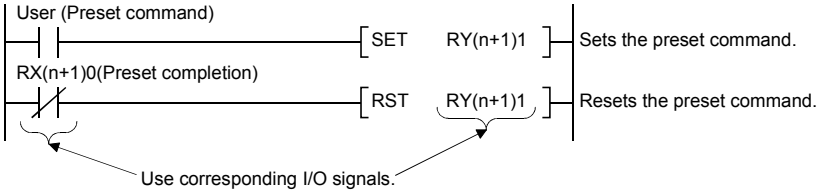



| Input Signals | | Signal Name<br>Master module → high-speed counter module | Operation Timing* | Description | Refer To |
|---|---|---|---|---|---|
| CH1 | CH2 | | | | |
| RYn0 to RYnF | | ——— | ——— | Unusable | ——— |
| RY(n+1)0 | RY(n+1)7 | Point No. 1 coincidence signal reset command |  | Resets the ring counter value coincidence signal (latch) and the coincidence output No. 1 signal to the external device. | Section 6.1<br>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<br>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.<br>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 PC CPU is reset.

| Transmission Direction | Addresses CH1 | Addresses CH2 | Description | Initial Value | Read/Write | Refer To |
|---|---|---|---|---|---|---|
| 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.)

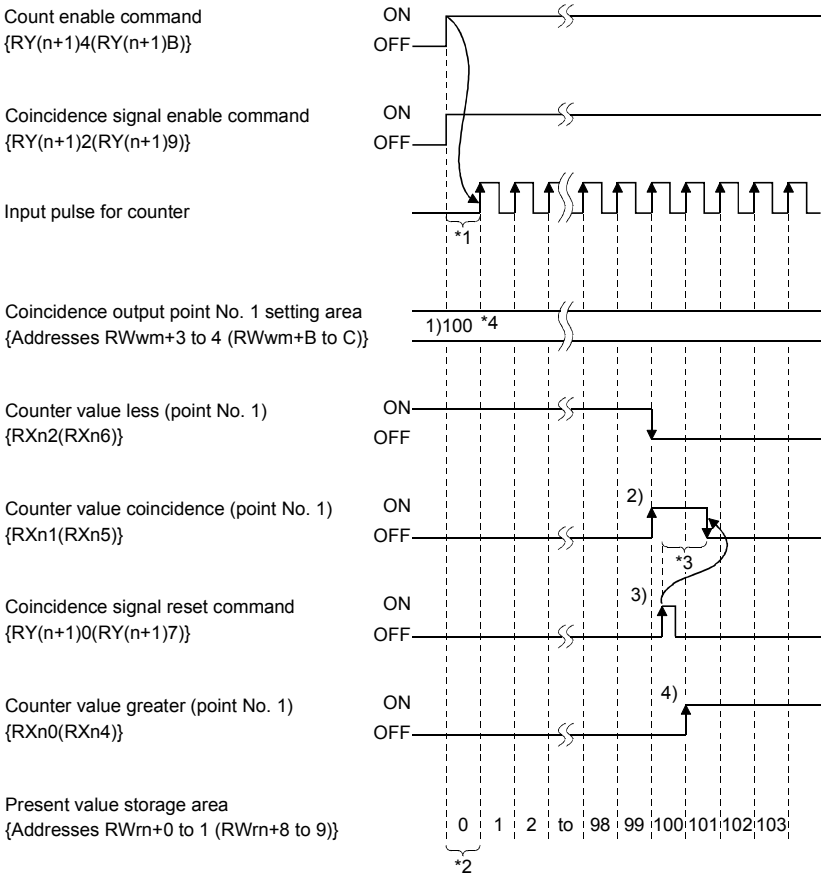
(2) Encoder connectable to the AJ65BT-D62D and AJ65BT-D62D-S1

(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.<br>· TTL output type encoder |

## 3.8 Data Link Processing Times

In the high-speed counter module, the following data link processing times are required to execute the corresponding function. For the link scan time, refer to the master module user's manual (Detail). The following example shows processing times *1 to *4 in coincidence output operation. (The master module is QJ61BT11 in asynchronous mode.)



*1 Master station (RY) → remote device station (RY) processing time (Normal value)
The following processing time is required until the remote device station starts pulse input when the count enable signal {RY(n+1)4 (RY(n+1)B)} turns on.

[Formula]

SM+LS×1+remote device station processing time(1ms) [ms]
high-speed counter module

SM:Scantime of master station sequence program
LS :Link scantime

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

[Formula]

SM+LS×1+remote device station processing time(1ms) [ms]
high-speed counter module

SM:Scantime of master station sequence program
LS :Link scantime

*3 Master station (RX) ← remote device station (RX) processing time (Normal value)
The following processing time is required from when the remote device station receives the coincidence signal reset command until when the coincidence signal {RXn1 (RXn5)} turned off at the remote device station is transmitted to the master station.
* The processing time required to transmit the coincidence signal reset command to the remote device station is not included.

[Formula]

SM+LS×1+remote device station processing time(1ms) [ms]
high-speed counter module

SM:Scantime of master station sequence program
LS :Link scantime

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

[Formula]

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

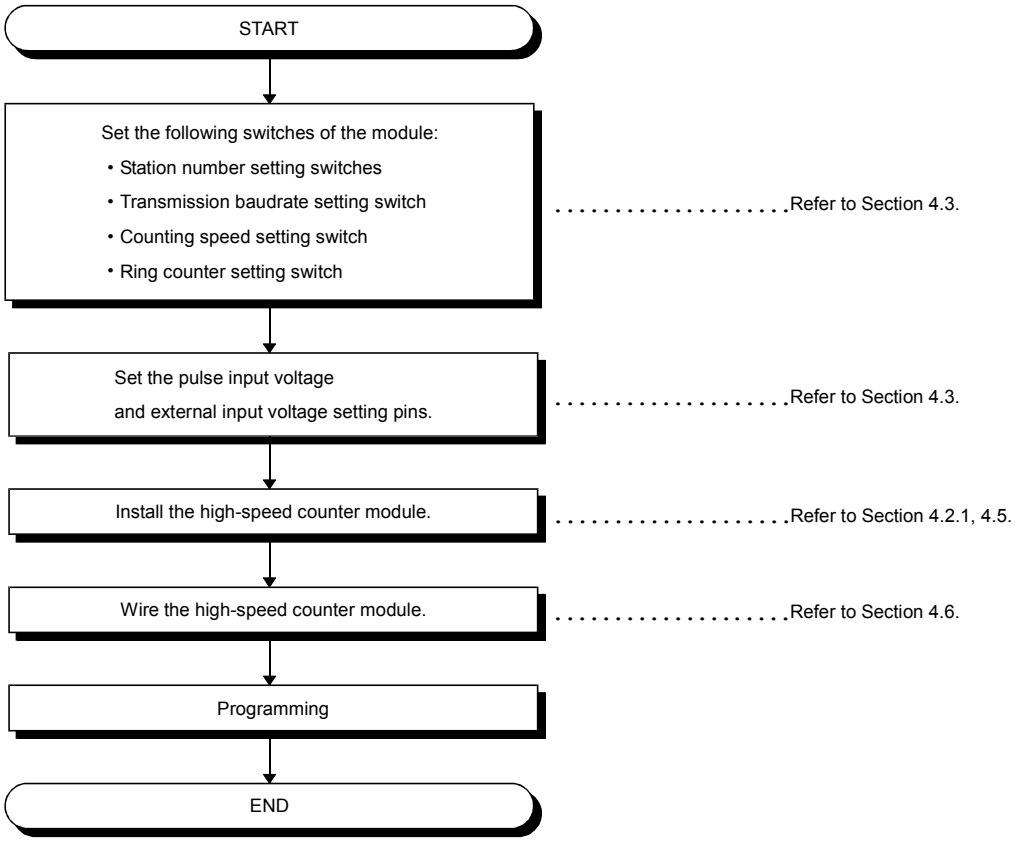
SM:Scantime of master station sequence program
LS :Link scantime

# 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 the terminals and connectors while power is on.
- This can cause an electric shock or misoperation.

**⚠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 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.
- 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.
- 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) | 78 to 118N·cm |
| Terminal block terminal screw (M3.5 screw) | 59 to 88N·cm |
| Terminal block mounting screw (M3.5 screw) | 98 to 137N·cm |

(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(7.88inch) or less pitch.

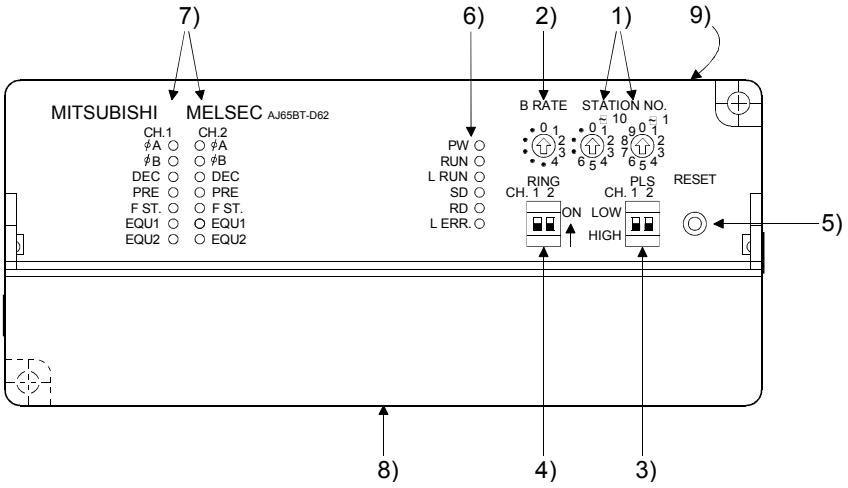
### 4.2.2 Installation environment

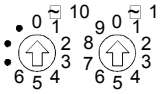
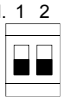
**⚠CAUTION** When installing the module, avoid the following environment. If the environment of the module used is outside the range of general specifications, an electric shock, fire, misoperation or product damage or deterioration can occur

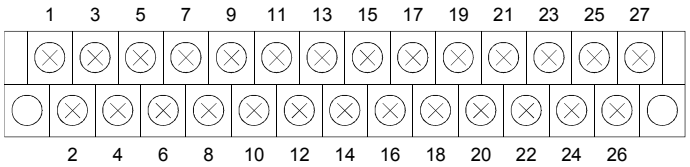
- Ambient temperature outside the range 0 to 55°C
- Ambient humidity outside the range 10 to 90%RH
- Condensation due to sudden temperature changes
- Corrosive or combustible gasses
- Dust, conductive powder (e.g. metal filings), oil mist, salt and organic solvent
- Direct sunlight
- Strong power and 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<br>STATION NO.<br>  | Used to set the station number of the high-speed counter module between 1 and 61.<br>Use "×10" to set the tens.<br>Use "×1" to set the modules.<br>(Factory setting: 0) |
| 2) | Transmission baudrate setting switch<br>B RATE<br>  | Used to set the transmission speed of the high-speed counter module.<br>(For data link)<br>Number to Be Set / Transmission Baudrate:<br>0: 156kBPS (factory setting)<br>1: 625kBPS<br>2: 2.5MBPS<br>3: 5MBPS<br>4: 10MBPS<br>Other than 0 to 4: Unused (If the value set is other than 0 to 4, the L ERR. LED lights up to indicate a communication error.) |
| 3) | Counting speed setting switch<br>PLS<br>CH. 1 2<br>LOW<br>HIGH<br>  | LOW position:Up to 10kPPS can be counted for 1-phase input or up to 7kPPS for 2-phase input.<br>HIGH position:Up to 400k(200)PPS can be counted for 1-phase input or up to 300k(200)PPS for 2-phase input.<br>Values in parentheses are those for use of the AJ65BT-D62.<br>(Factory setting: HIGH position) |
| 4) | Ring counter setting switch<br>RING<br>CH. 1 2<br>ON<br>  | Used to select whether the ring counter function is used or not.<br>When using the ring counter:ON<br>When not using the ring counter:OFF<br>(Factory setting: OFF position) |
| 5) | Reset switch<br>RESET<br>  | Hardware reset<br>Used to initialize the remote registers in the high-speed counter module.<br>By turning this switch on, the initial data processing flag switches on. |

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


Pin-to-signal correspondences are indicated below.<br><br>For the AJ65BT-D62
<table>
<tr><th>Pin Number</th><th colspan="2">Signal name</th><th>Pin Number</th><th colspan="2">Signal name</th></tr>
<tr><td>1</td><td colspan="2">DA</td><td>15</td><td rowspan="7">CH2</td><td rowspan="2">ϕ A</td></tr>
<tr><td>2</td><td colspan="2">DB</td><td>16</td></tr>
<tr><td>3</td><td colspan="2">DG</td><td>17</td><td rowspan="2">ϕ B</td></tr>
<tr><td>4</td><td colspan="2">SLD</td><td>18</td></tr>
<tr><td>5</td><td colspan="2">24V</td><td>19</td><td>PRESET</td></tr>
<tr><td>6</td><td colspan="2">F.G.</td><td>20</td><td>COM</td></tr>
<tr><td>7</td><td colspan="2">24G</td><td>21</td><td>F.START</td></tr>
<tr><td>8</td><td rowspan="7">CH1</td><td rowspan="2">ϕ A</td><td>22</td><td rowspan="2">CH1</td><td>EQU1</td></tr>
<tr><td>9</td><td>23</td><td>EQU2</td></tr>
<tr><td>10</td><td rowspan="2">ϕ B</td><td>24</td><td rowspan="2">CH2</td><td>EQU1</td></tr>
<tr><td>11</td><td>25</td><td>EQU2</td></tr>
<tr><td>12</td><td>PRESET</td><td>26</td><td colspan="2">12/24V</td></tr>
<tr><td>13</td><td>COM</td><td>27</td><td colspan="2">COM</td></tr>
<tr><td>14</td><td>F.START</td><td colspan="3"></td></tr>
</table>
</td></tr>
</table>

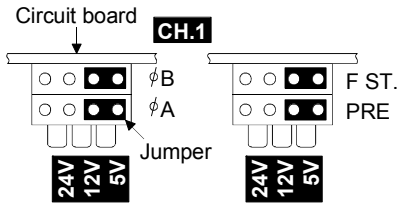
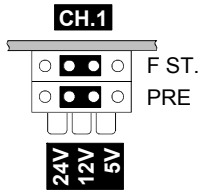
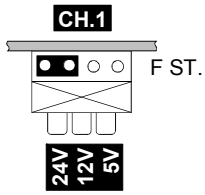
| Number | Name | Description |
|---|---|---|
| 8) | Terminal block | For the AJ65BT-D62D<br>For the AJ65BT-D62D-S1 |

For the AJ65BT-D62D

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

For the AJ65BT-D62D-S1

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

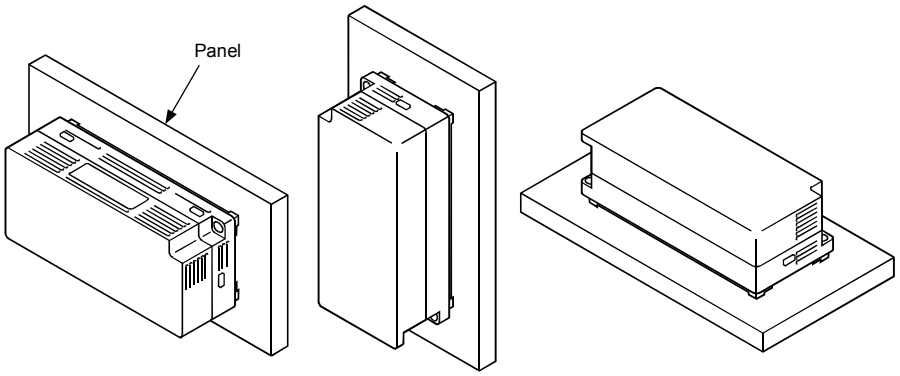
| Number | Name | Description |
|---|---|---|
| 9) | Pulse/external input voltage setting pins | The also applies to CH2.<br>AJ65BT-D62<br>  <br>(Jumper connected to 5V)<br>AJ65BT-D62D<br>  <br>(Jumper connected to 12V)<br>AJ65BT-D62D-S1<br>  <br>(Jumper connected to 24V)<br>(Factory setting: 24V) |

## 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 AJ65BT-64RD.
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 AJ65BT-64RD installation.




When installing alongside the panel

When installing on the panel

## 4.6 Wiring

### 4.6.1 Dedicated cable for CC-link handling instructions

If dedicated cable for CC-link are handled roughly, they will be damaged. Therefore.

(1) Do not compress the cable with a sharp edge.

(2) Do not twist the cable roughly.

(3) Do not pull the cable roughly (more than allowable tension).

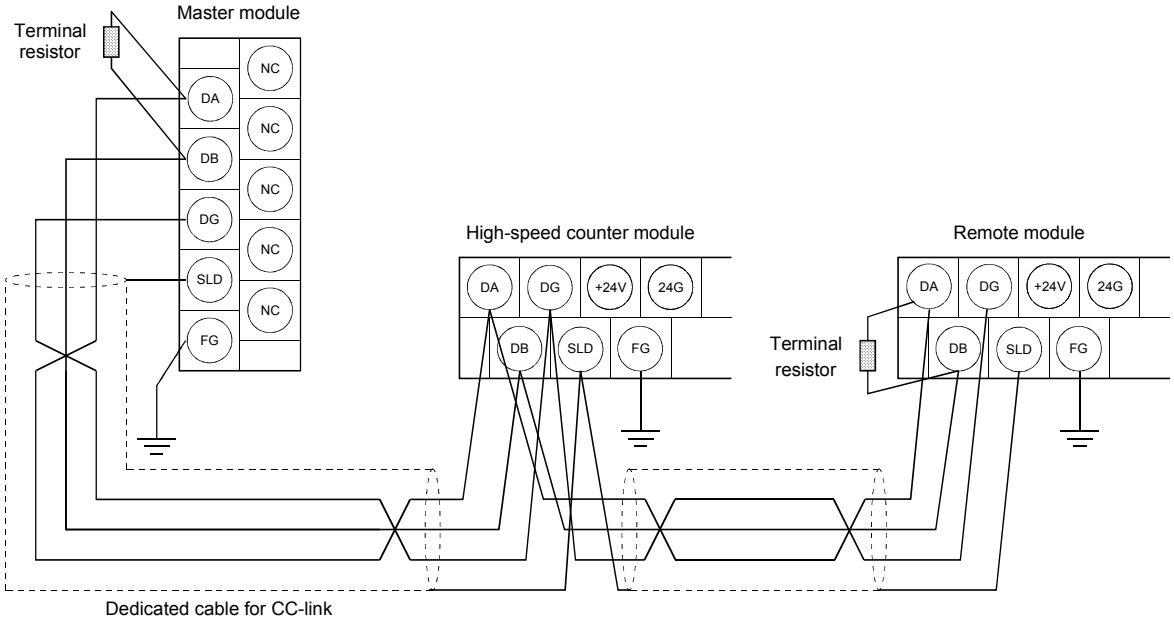
(4) Do not stamp on the cable.

(5) Do not put anything on the cable.

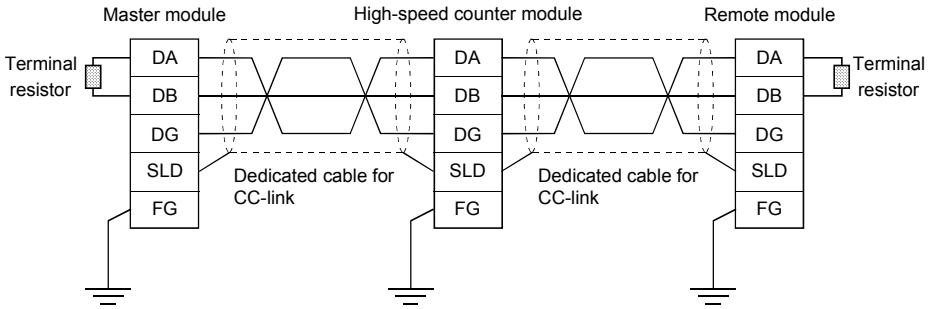
(6) Do not scratch the cable sheath.

## 4.6.2 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.




[Sketch]




| 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.) |

## 4.6.3 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

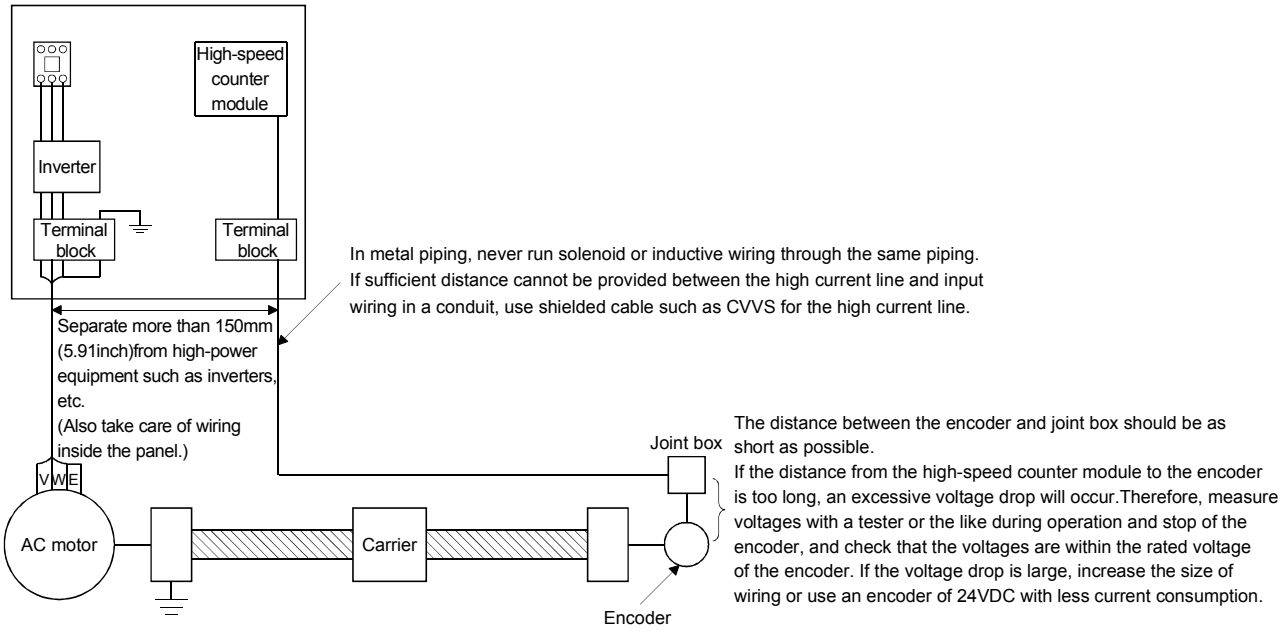
(a) Always use shielded twisted cables. Also provide Class 3 grounding.

(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(5.91inch) away from the above lines and over the shortest possible distance

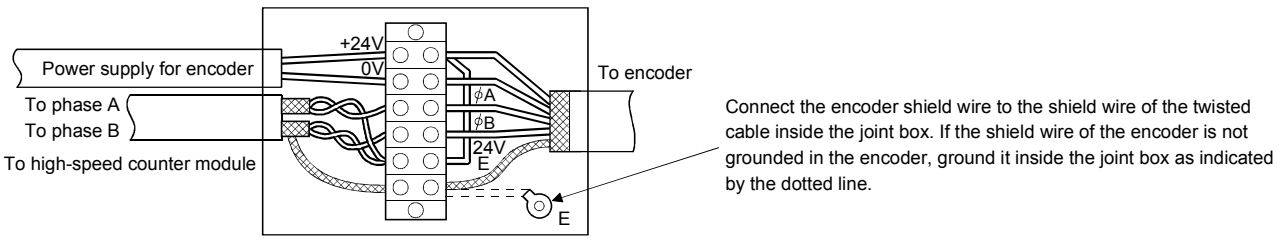
(2) For a 1-phase input, always connect the count input pulse to phase A.

(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.

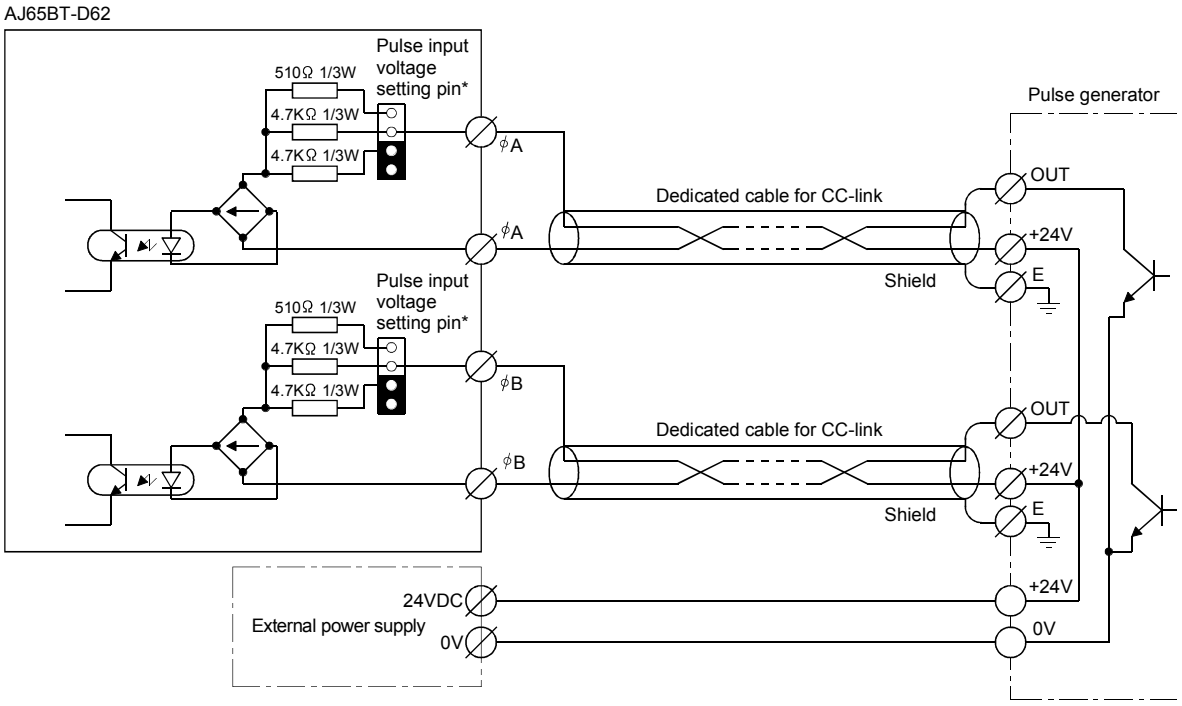



· Ground the twisted shield cable on the encoder side (joint box). (This is a connection example for 24V sink load.)



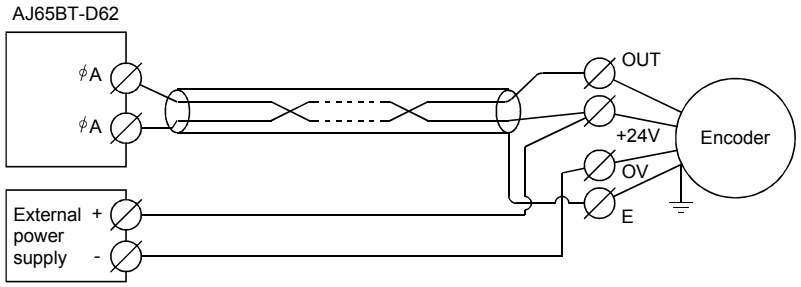
## 4.6.4 Wiring examples of pulse generators

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

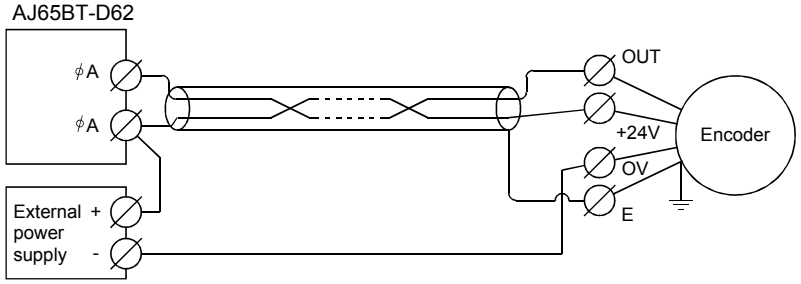



POINT

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




Incorrect Wiring Example

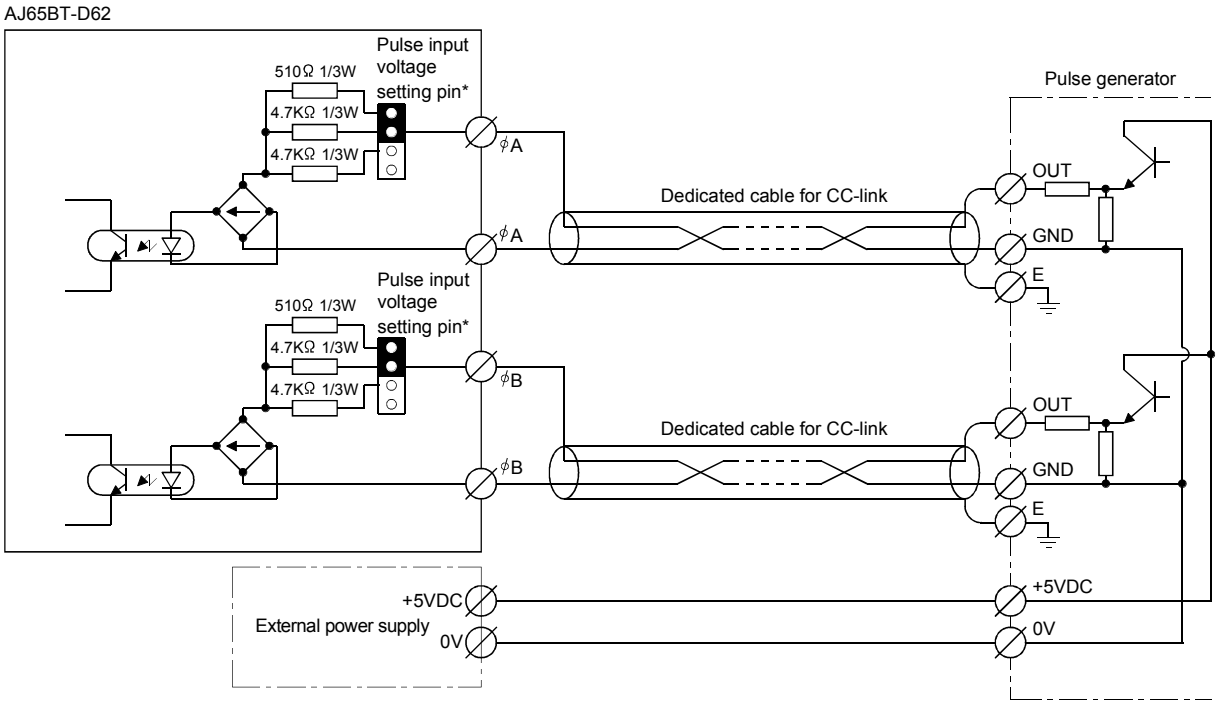



Since the same twisted wire is used for both the encoder signal and power supply, the canceling effect will reduce and electro-magnetic induction may occur.

REMARK

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

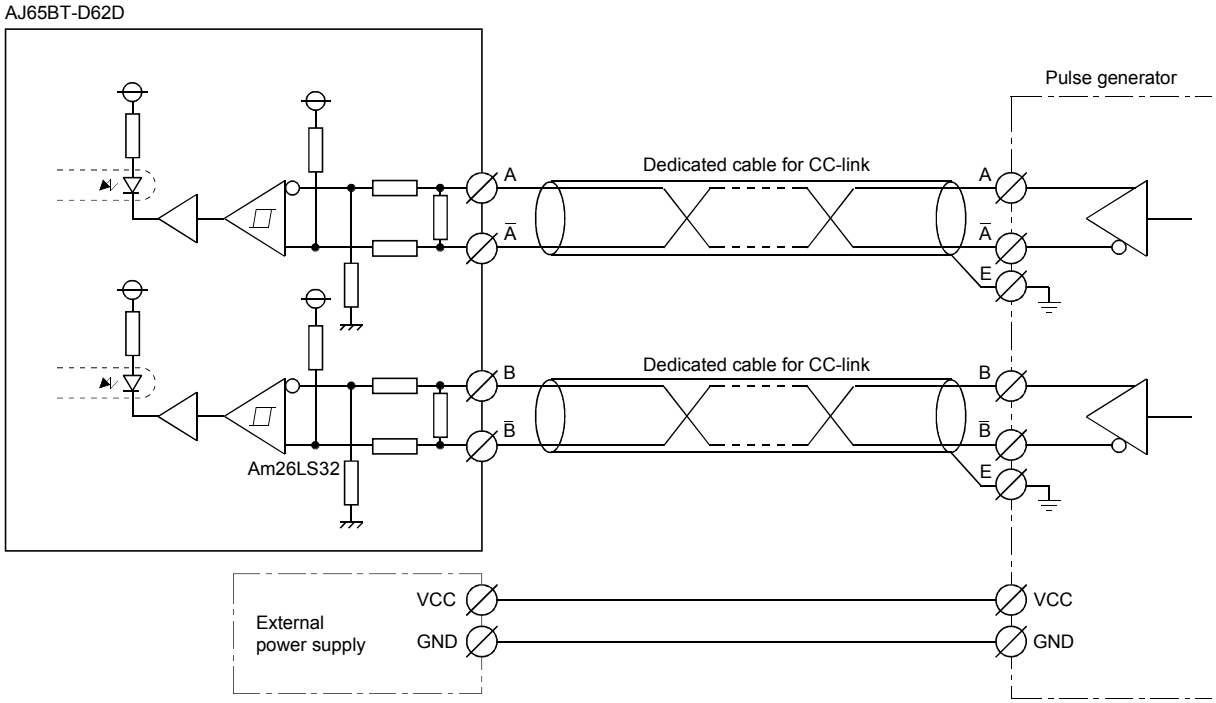
(2) Pulse generator is voltage output type (5VDC)

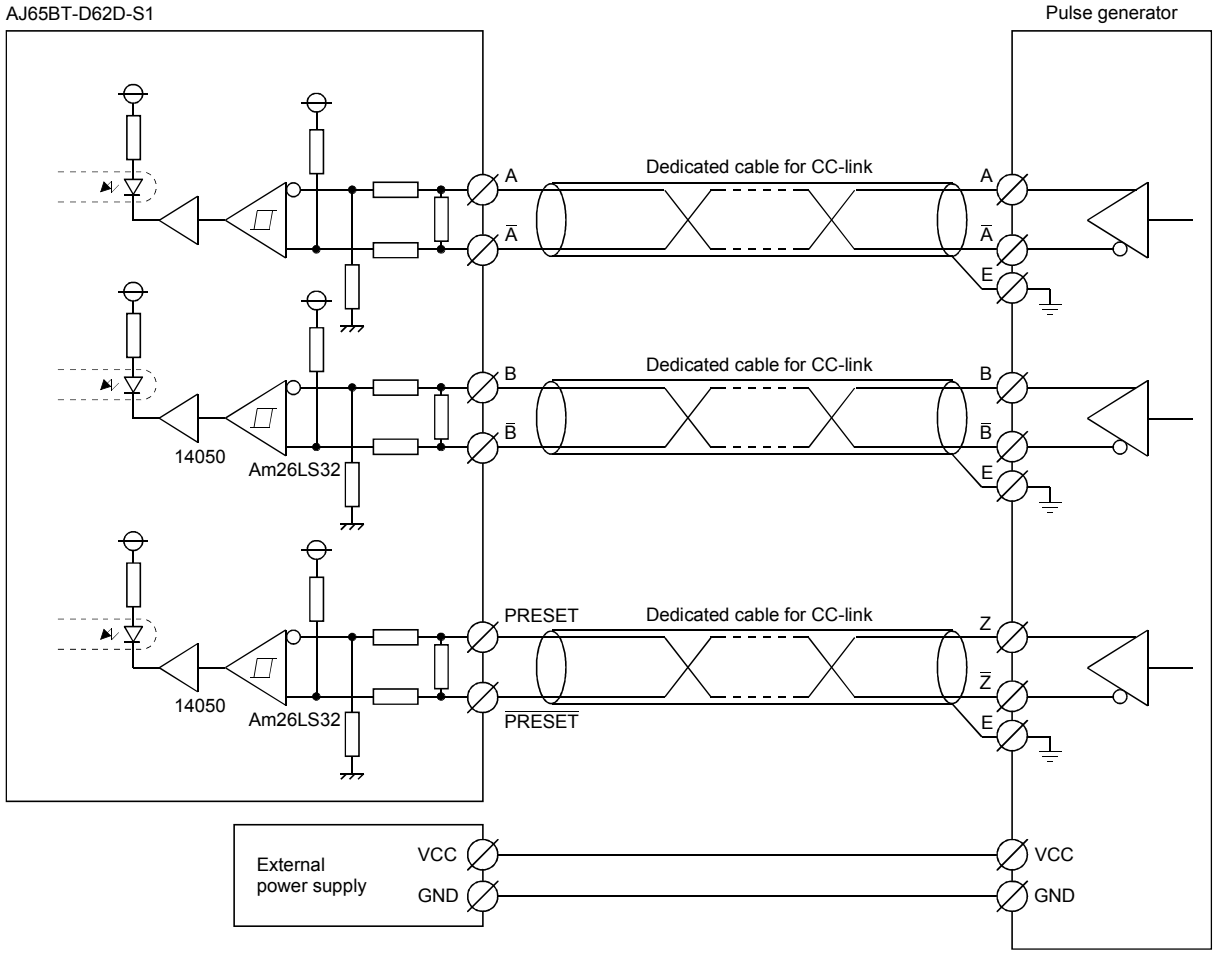



REMARK

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

(3) Pulse generator is line driver (equivalent to Am26LS31)

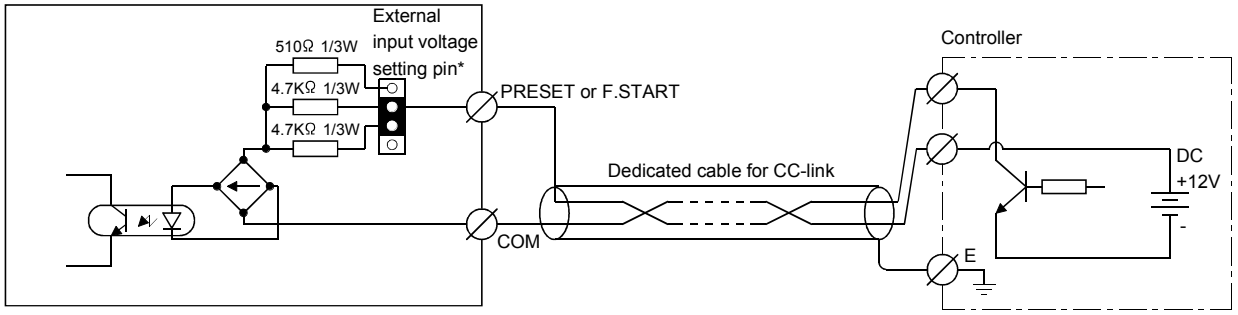


## 4.6.5 Wiring examples of controller and external input (PRESET, F.START) terminals

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

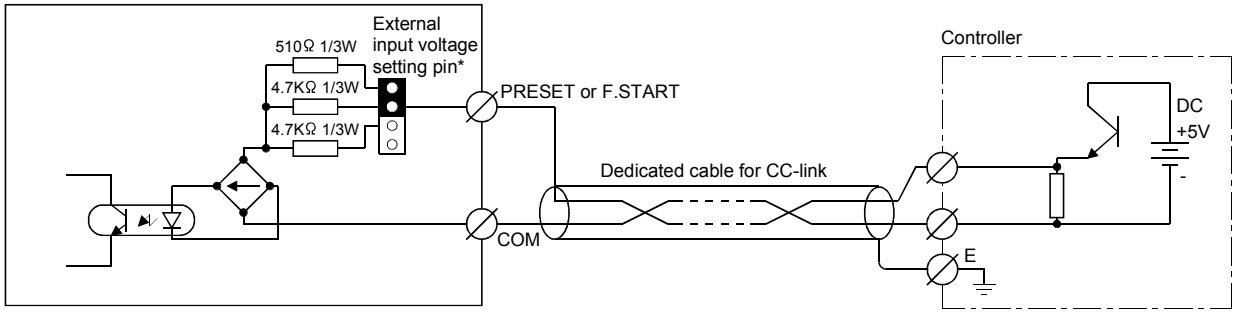
AJ65BT-D62,AJ65BT-D62D,AJ65BT-D62D-S1




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

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

AJ65BT-D62,AJ65BT-D62D,AJ65BT-D62D-S1



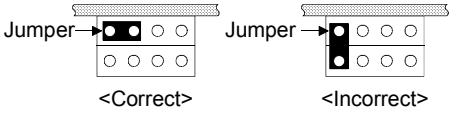

- Internal circuit is set to PRESET.
- AJ65BT-D62D-S1 has F.START only.

REMARK

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

**⚠CAUTION**

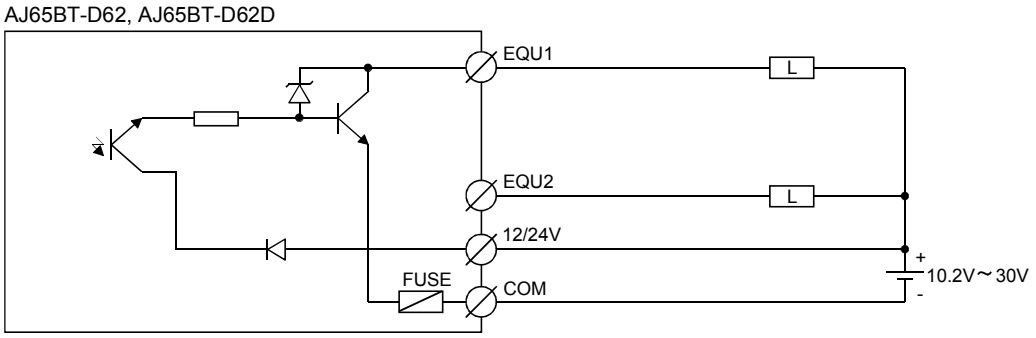
- Set the pulse/external input voltage setting pins correctly after confirming the rated voltage of the external power supply.
  Miss-wiring (wrong setting) can cause a fire or failure.
- The pulse/external input voltage setting pins must be set after switching power off externally in all phases.
  Otherwise,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



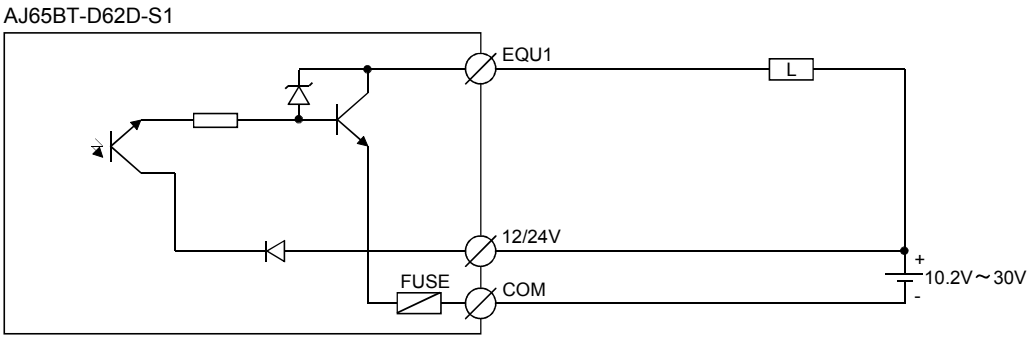
## 4.6.6 Wiring examples of external output (EQU1, EQU2) terminals

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

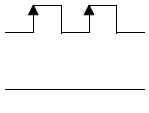
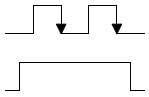
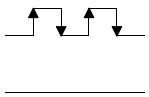
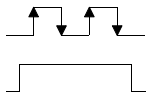
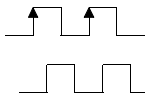
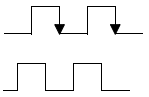
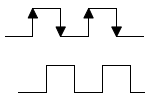
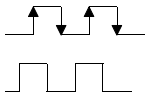
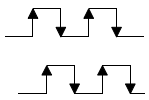
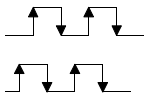


# 5. PULSE INPUT AND COUNTING METHOD

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

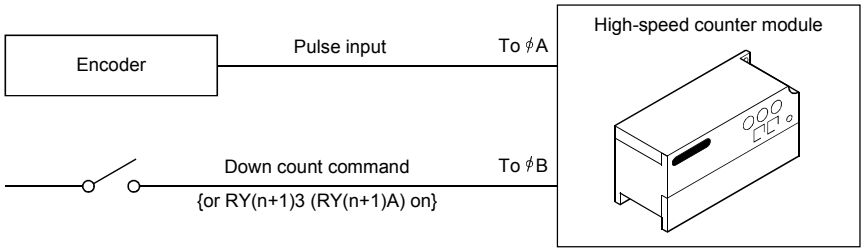
(2) Even if the pulse input mode is changed, counting will start from the value at the time the mode is changed.

## 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.

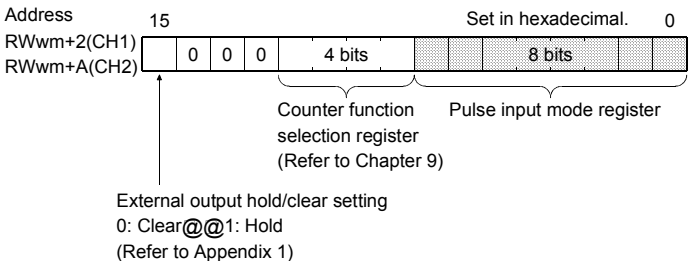



(2) Counting mode setting

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

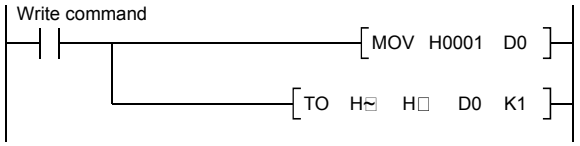
When the value set is not the following set value, the initial value (1-phase multiplication by one) is set.

| 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

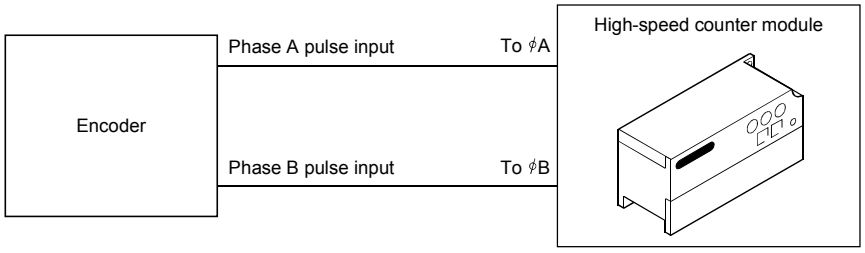
| POINT |
|---|
| Exercise care when setting the pulse input mode, since the upper 8 bits are used for the counter function selection register and external output hold/clear setting. |

## 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.

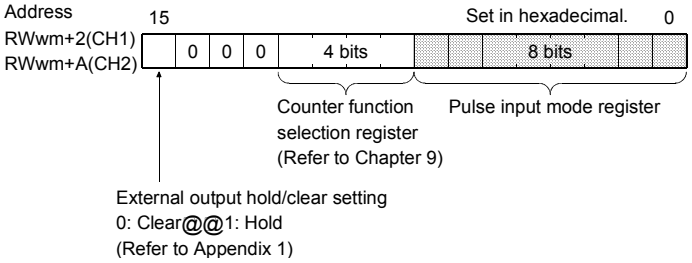



(2) Counting mode setting

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

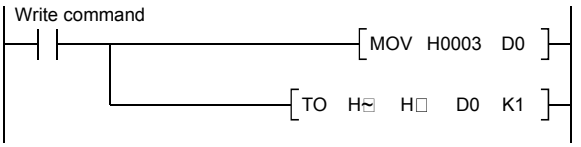
When the value set is not the following set value, the initial value (1-phase multiplication by one) is set.

| 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 (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

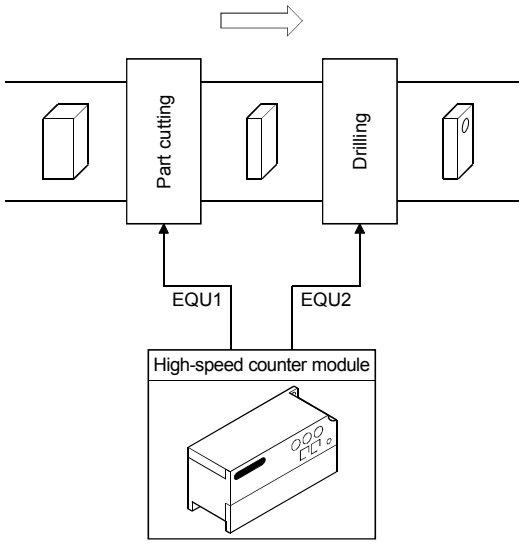
The coincidence output function issues a signal when a preset count value is compared with and matches the present counter value.
You can set two coincidence output points.
To use the coincidence output function, set the coincidence signal enable command {RY(n+1)2 (RYn+1)9)} to ON.

[Remote registers used]

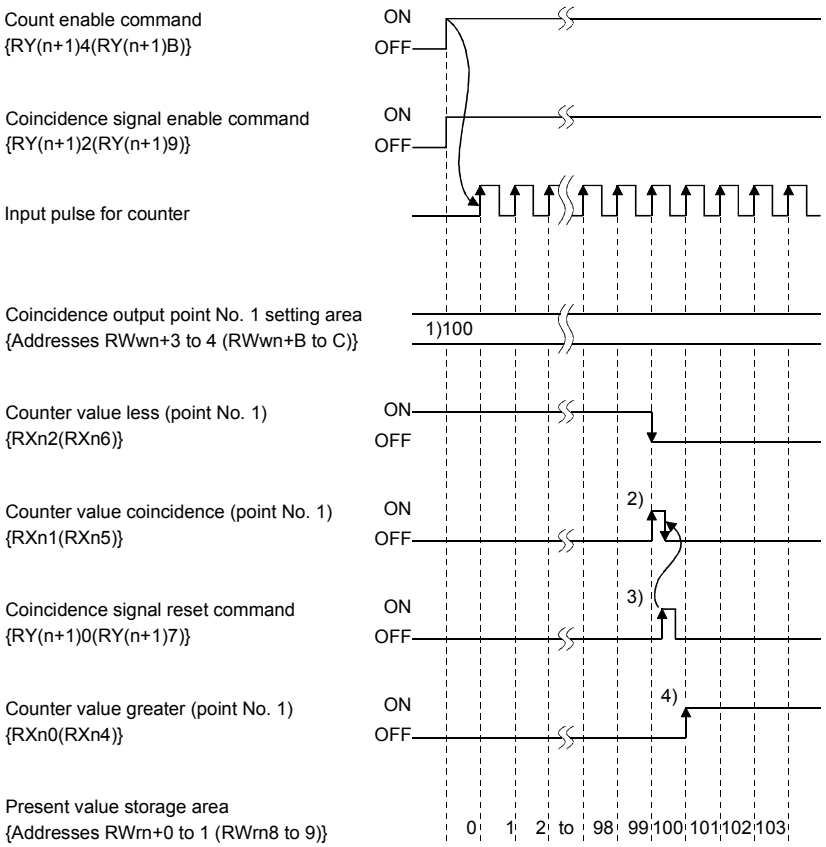
| Address | Description |
|---|---|
| RWwm+3 | CH1 coincidence output point No. 1 setting (L) |
| RWwm+4 | CH1 coincidence output point No. 1 setting (H) |
| RWwm+6 | CH1 coincidence output point No. 2 setting (L) |
| RWwm+7 | CH1 coincidence output point No. 2 setting (H) |
| RWwm+B | CH2 coincidence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

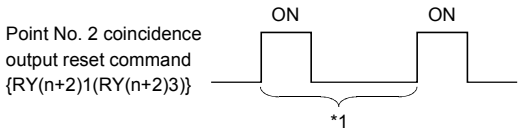
3).....The coincidence signal reset command is switched on to reset the counter value coincidence signal.
If the counter value coincidence signal remains on, the next coincident signal cannot be issued.

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 the coincidence output point and reset the coincidence output before switching on the coincidence signal enable. If the coincidence signal enable is switched on without the above operation being performed, the coincidence output is provided since the coincidence output point and count value matches 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)".

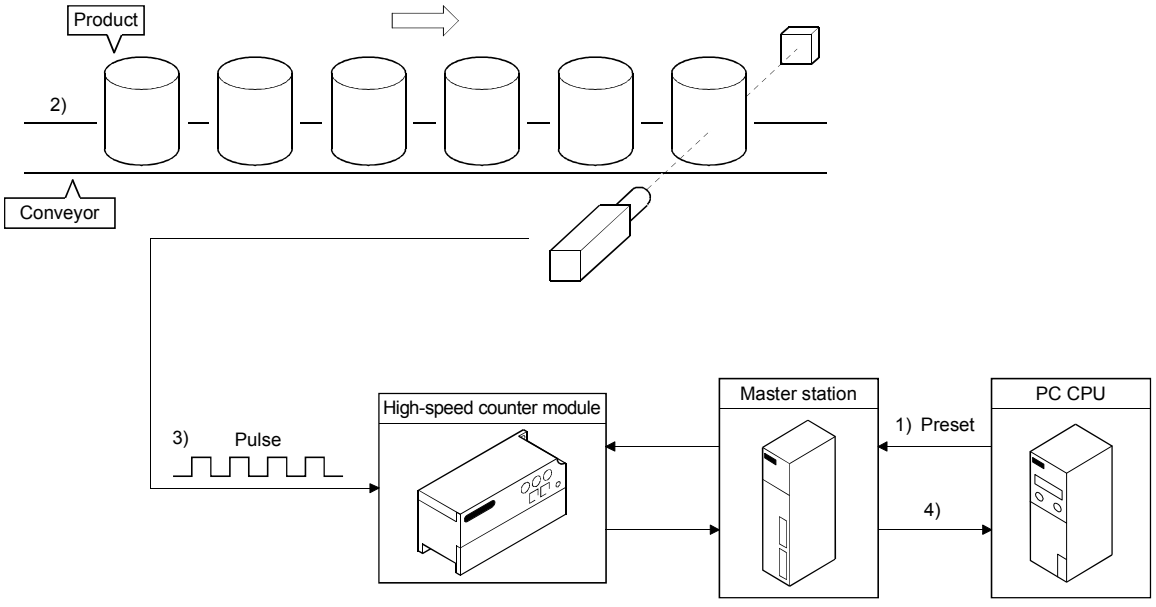
[Remote registers used]

| Address | Description |
|---|---|
| RWwm+0 | CH1 preset value setting (L) |
| RWwm+1 | CH1 preset value setting (H) |
| RWwm+8 | CH2 preset value setting (L) |
| RWwm+9 | CH2 preset value setting (H) |

[Example of using the preset function]

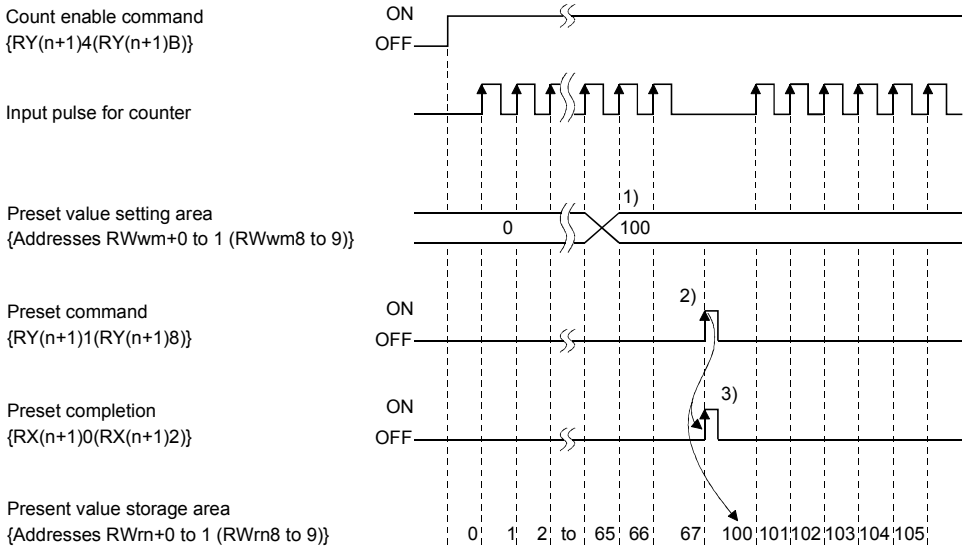
By using the preset function, the production count can be continued from the previous day.

1) Production amount of the previous day is preset from the PC 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 PC 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.



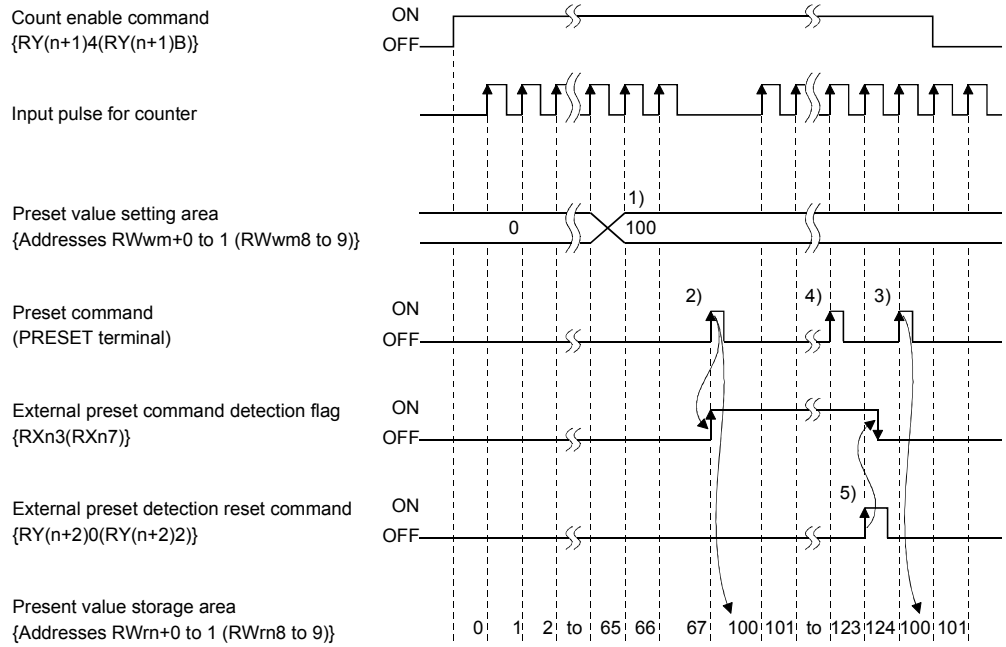

1).....Write any value in advance in 24-bit binary to the preset value setting area {addresses RWwm+0 to 1 (RWwm+8 to 9)}.

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.

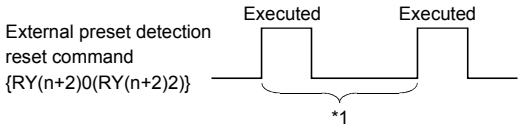
3).....Preset can be executed independently of whether the count enable command {RY(n+1)4 (RY(n+1)B)} is on or off.

POINT

·For externally input preset, make an external preset detection reset after every preset is completed. Resetting enables the next external input to be provided.

·If the external preset request detection {RXn3(RXn7)} is ON, the preset by the next external input and the next external input by the sequence program are not enabled.

·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.

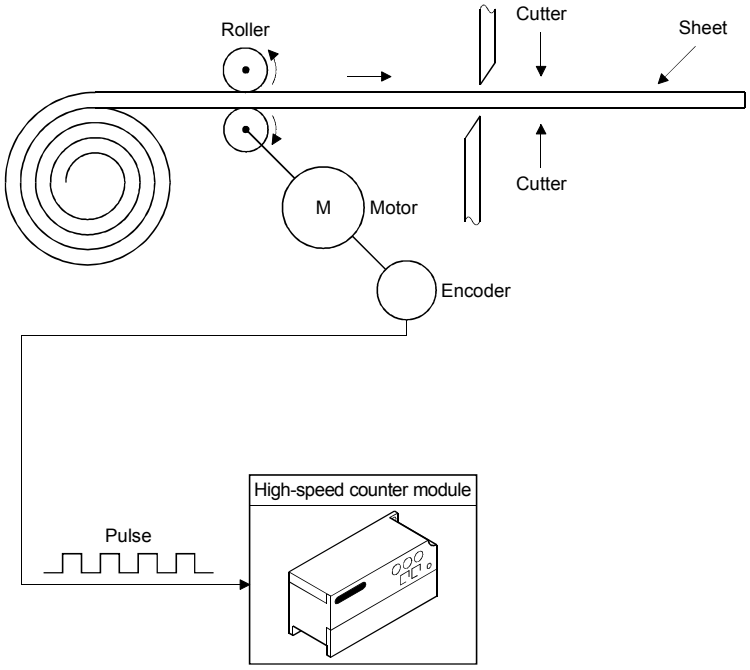
[Remote registers used]

| Address | Description |
|---|---|
| RWwm+0 | CH1 preset value setting (L) |
| RWwm+1 | CH1 preset value setting (H) |
| RWwm+3 | CH1 coincidence output pointer No. 1 setting (L) |
| RWwm+4 | CH1 coincidence output pointer No. 1 setting (H) |
| RWwm+8 | CH2 preset value setting (L) |
| RWwm+9 | CH2 preset value setting (H) |
| RWwm+B | CH2 coincidence output pointer No. 1 setting (L) |
| RWwm+C | CH2 coincidence output pointer No. 1 setting (H) |

[Example of using the ring counter function]

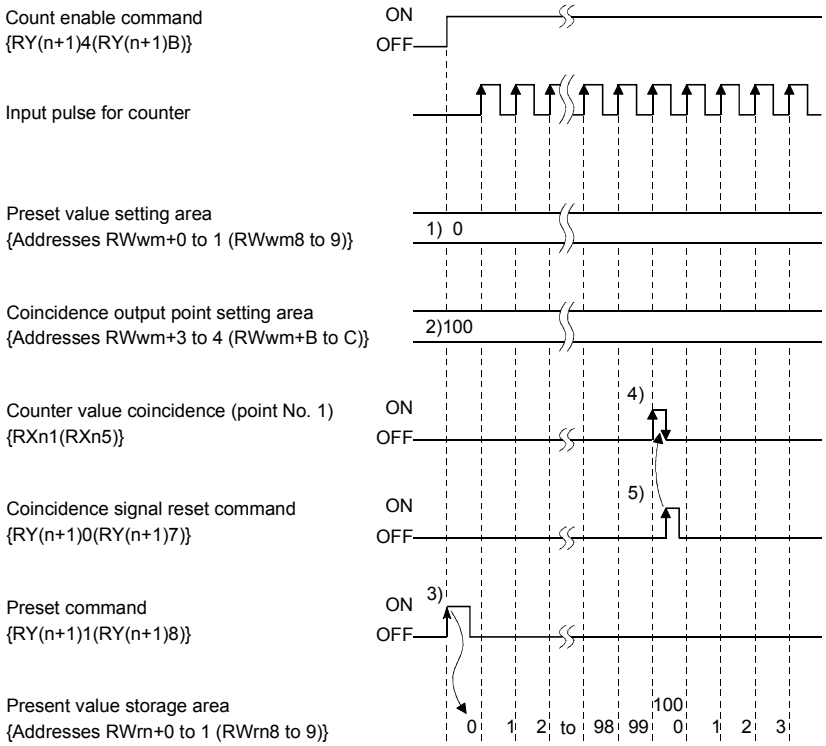
In a system where a sheet is cut to the specified size, set the ring counter value to roller-feed a sheet in fixed pitch and cut it to the given length.

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.

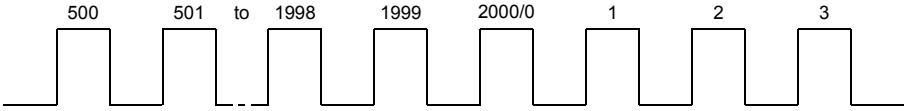
5).....The coincidence signal reset command is switched on to reset the counter value coincidence signal.If the counter value coincidence signal remains on, the next presetting cannot be performed.

## 8.1.2 Count range

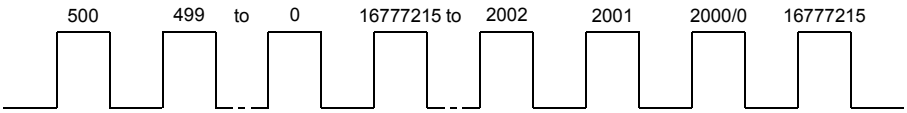
As shown below, the count range of the ring counter function differs depending on the relationship between the preset value, ring counter value, present value and counting mode (up/down count).

(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)

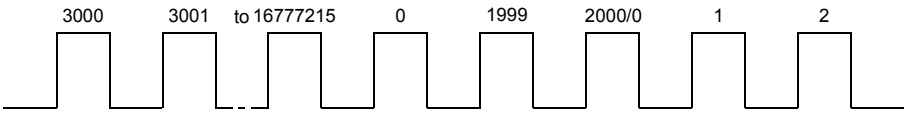



2) In down count, the present value returns to the maximum value (16777215) when it is counted down to the preset value (0).
Then, when the present value is counted down to the ring counter value (2000), it returns to the preset value(0).

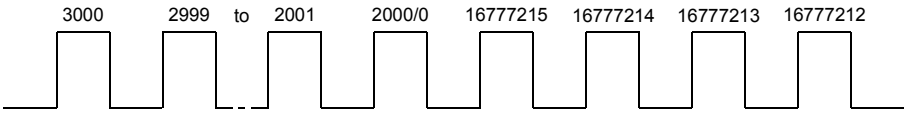



(2) If preset value≤ring counter value≤present value
The following operation is performed if the ring counter function is executed at the preset value of 0, ring counter value of 2000, and present value of 3000.

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).



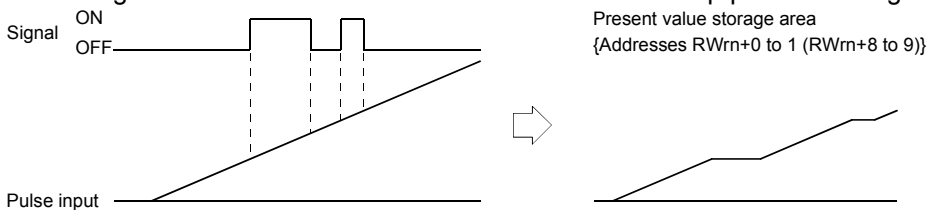

| POINT |
|---|
| ·Do not write the preset and ring counter values during execution of the ring counter function. If they are written, the ring counter operation may not be performed properly.<br>·Note that the ring counter function is not activated when the following expression is satisfied.<br>Ring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

# 9. SELECTING AND EXECUTING THE COUNTER FUNCTION

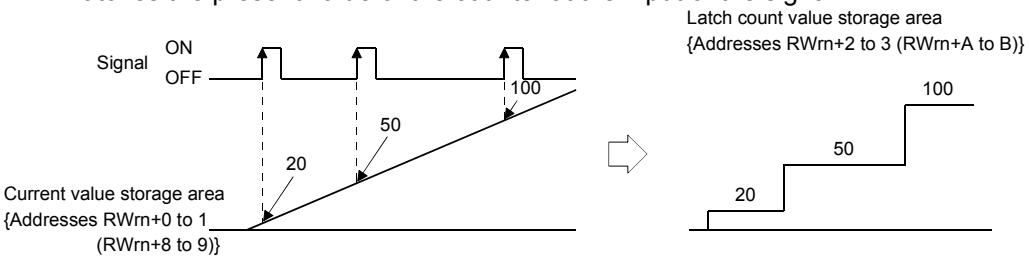
## 9.1 Selecting the Counter Function

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.

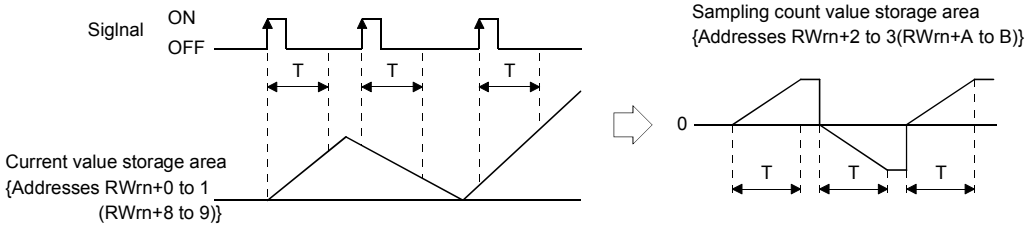
1) Count disable function.....Refer to Section 9.2
Inputs the signal while the count enable command is ON to stop pulse counting.



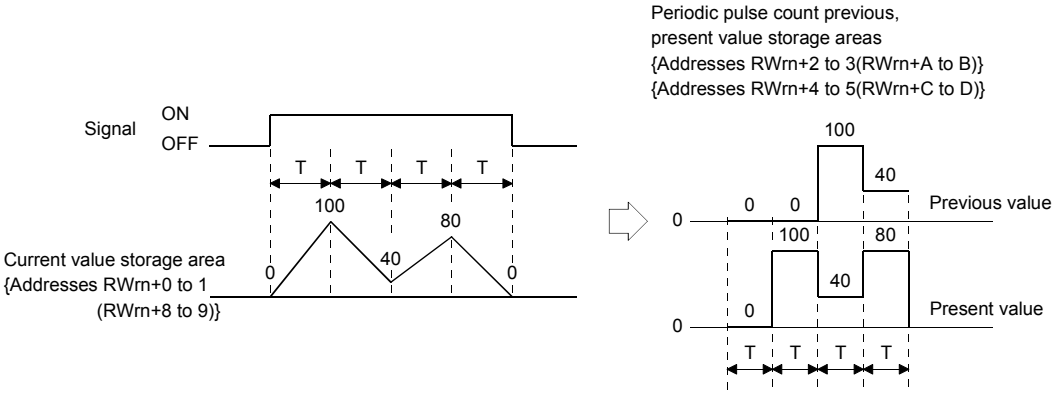

2) Latch counter function..... Refer to Section 9.3
Latches the present value of the counter at the input of the signal.




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.

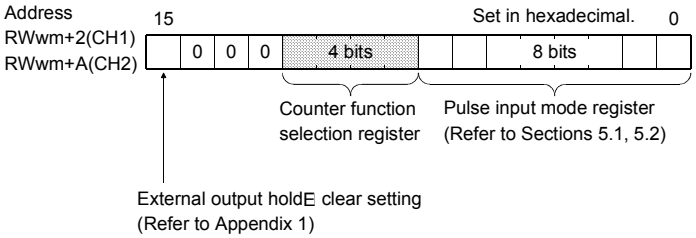



4) Periodic pulse counter function ..... Refer to Section 9.5
Stores the present and previous counter values at preset intervals (T) while the signal is entered.



(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) Either of the counter function selection start command {RY(n+1)6 (RY(n+1)D)} and F.START terminal (external input) may be used to make a counter function selection. The earlier one of the above input signals overrides the latter.

(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 {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

An error is produced in counting when a counter function selection is made by the external input (by applying a voltage to the F.START terminal) or by the sequence program (by turning on the counter function selection start command).

(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).

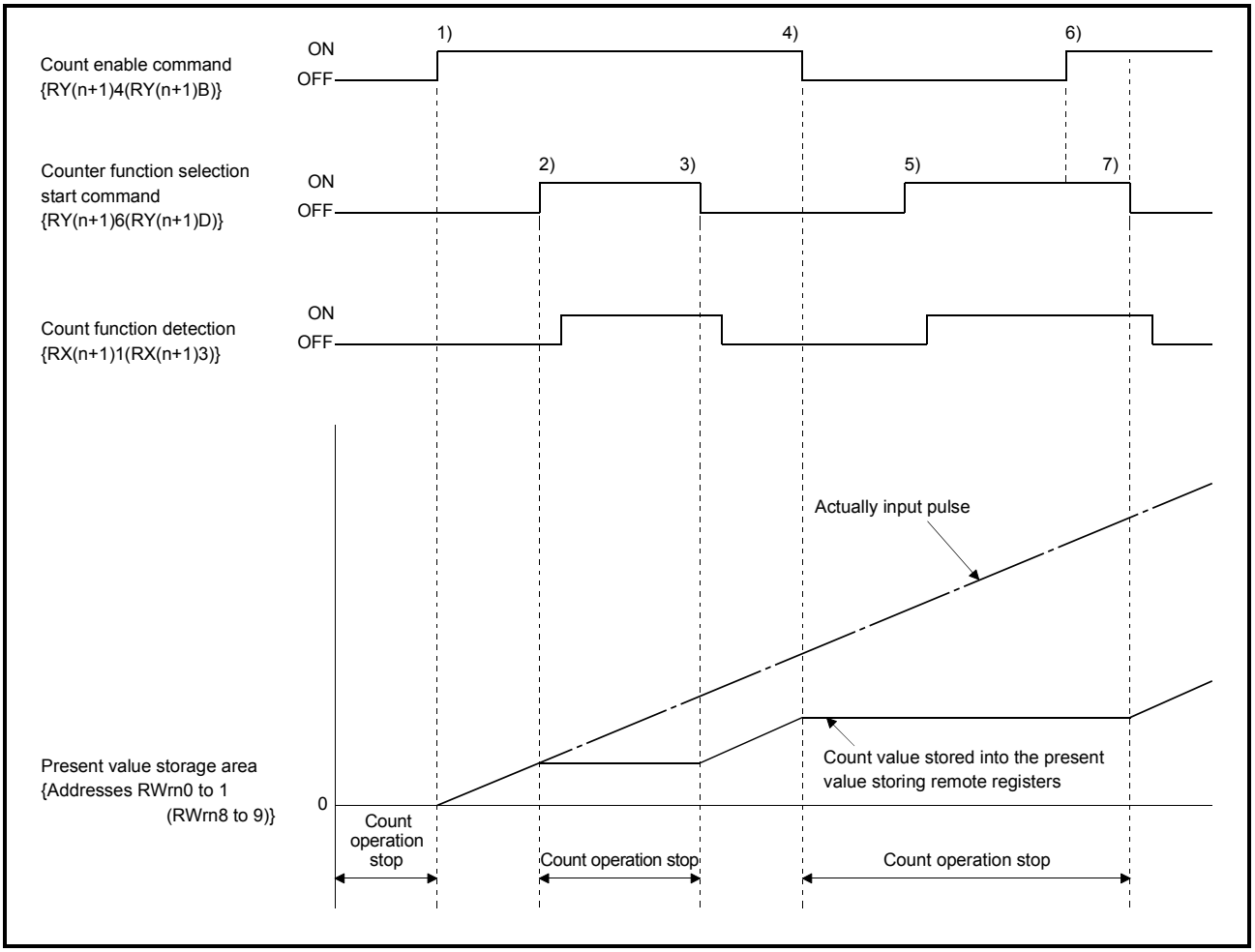
(3) The internal clock error is calculated as follows.

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

| 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.

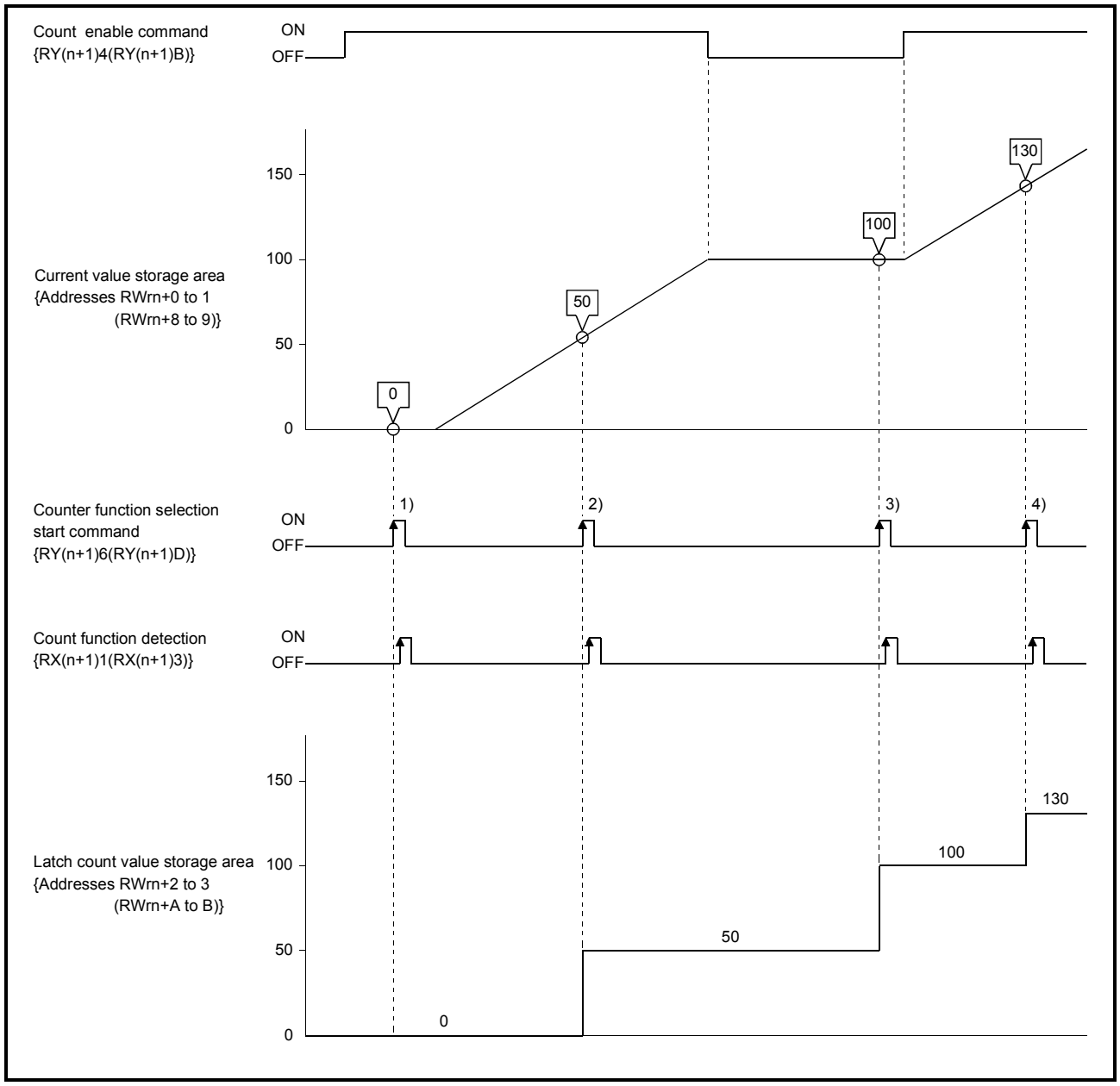
5).....Since the count enable command {RY(n+1)4 (RY(n+1)B} is off, count operation stops independently of whether the counter function selection start command {RY(n+1)6 (RY(n+1)D, F.START terminal}.

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

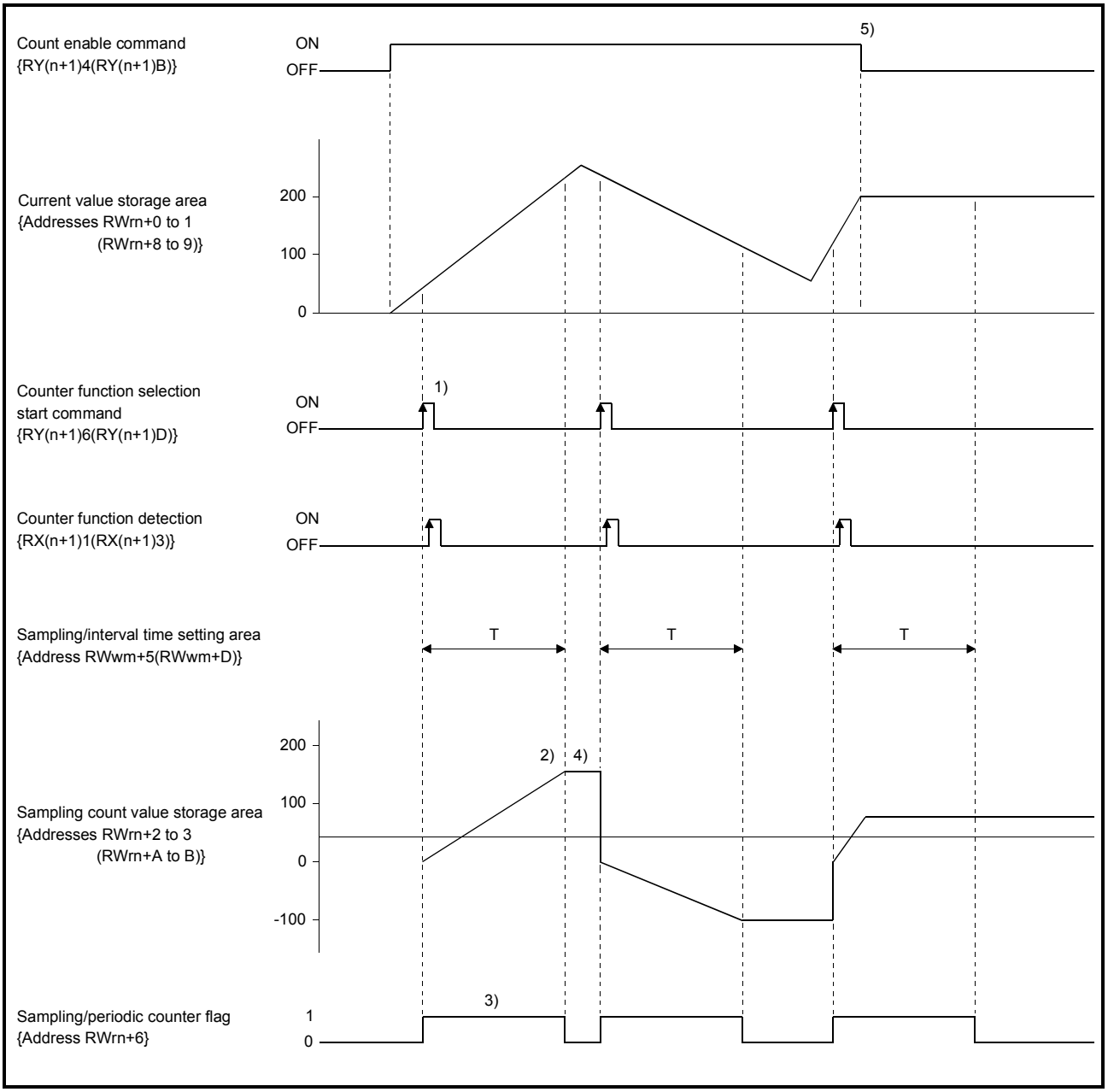
This function latches the counter's present value at a time when the signal is input.
The following chart shows the relationships between the counter's present value, counter function selection start command and latch count value storage area.




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 independently of whether the count enable command {RY(n+1)4 (RY(n+1)B)} is on or off. Also, the counter function detection 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 count function 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.

## 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.

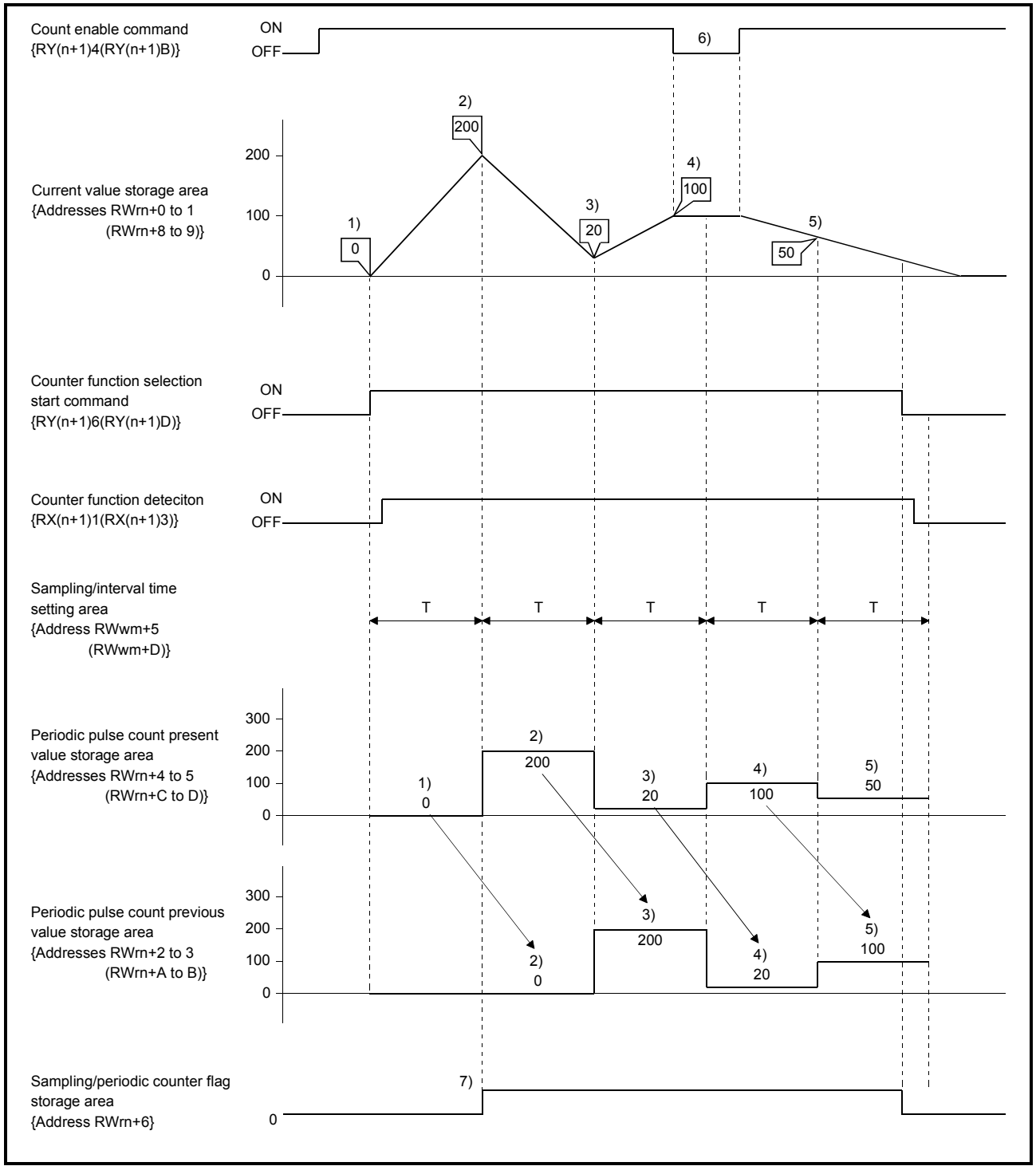
| Operating Status | During Execution at CH1 Only | During Execution at CH2 Only | During Execution at CH1 and CH2 |
|---|---|---|---|
| Remote register address (RWrn+6) | K1 | K2 | K3 |

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

5).....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.

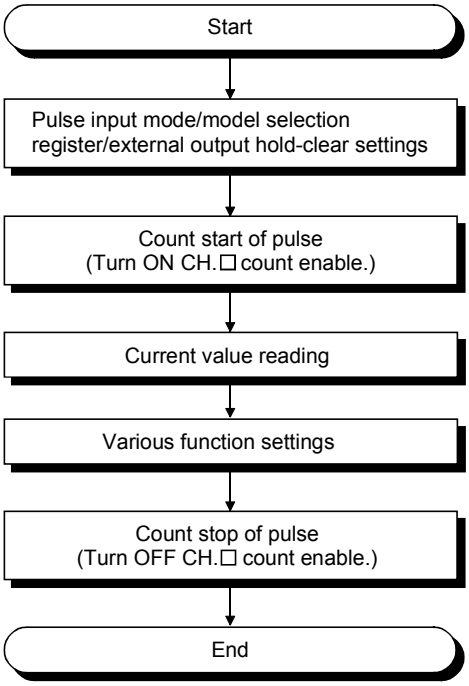
| Operating Status | During Execution at CH1 Only | During Execution at CH2 Only | During Execution at CH1 and CH2 |
|---|---|---|---|
| Remote register address (RWrn+6) | K1 | K2 | K3 |

# 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

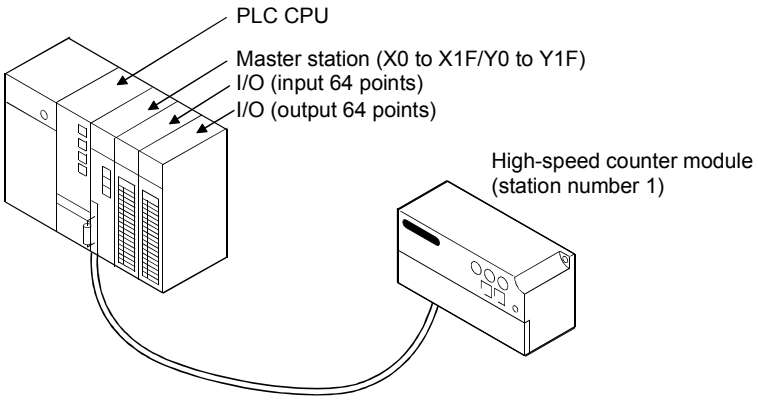
Create the high-speed counter module program with the procedures below:



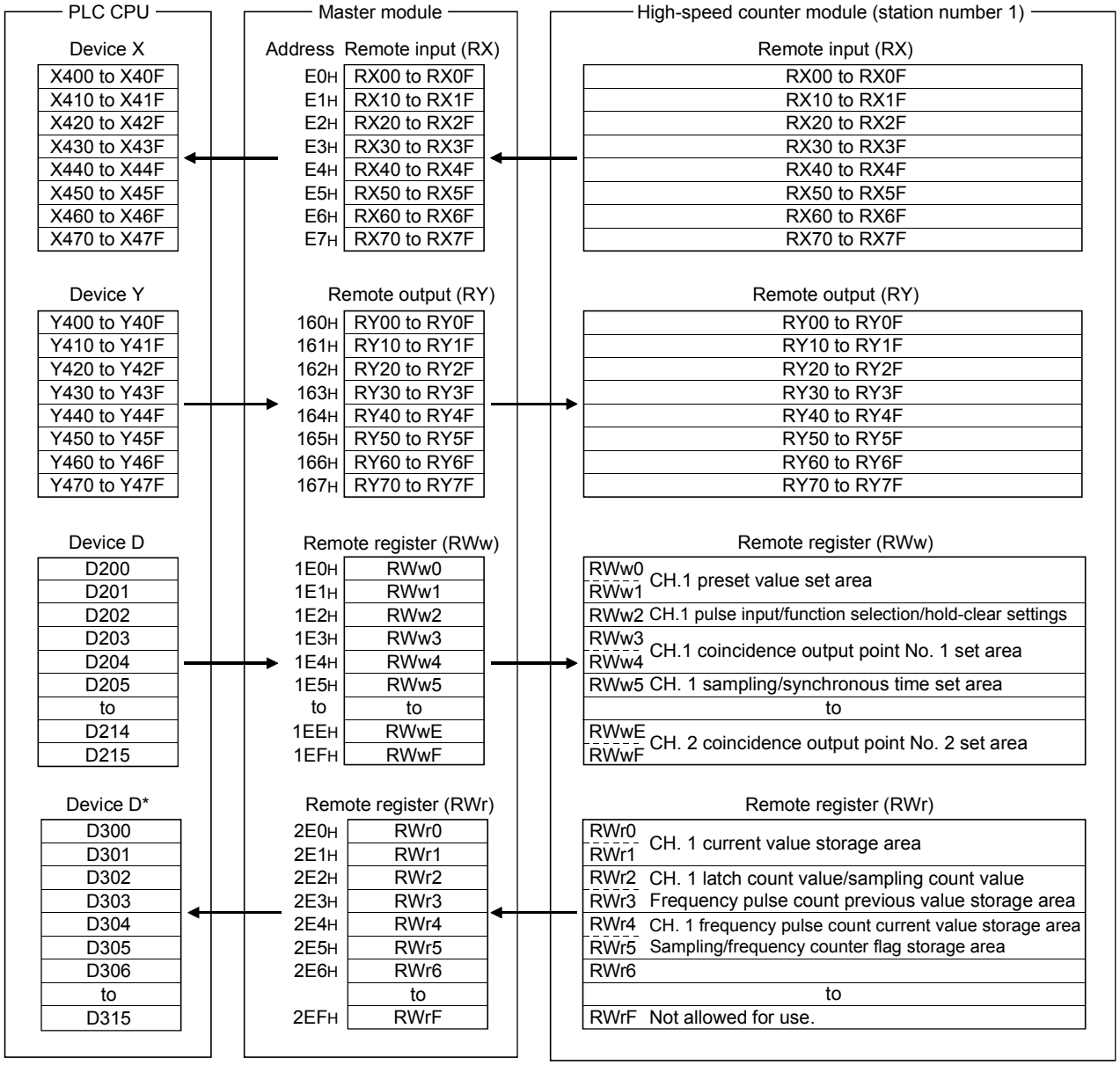

## 10.2 Condition of Program Example

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

(1) System configuration



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




* 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 | | | |

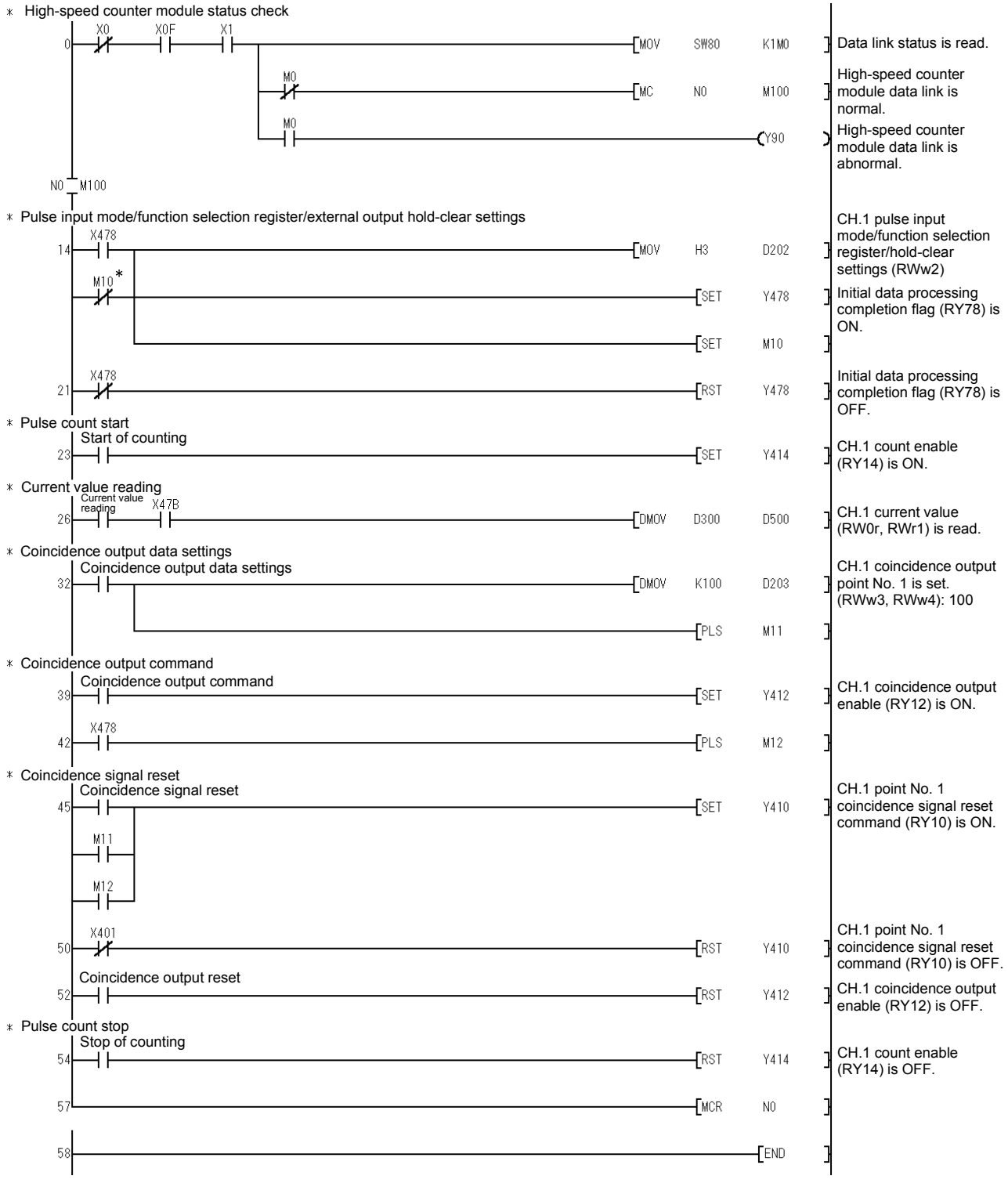
(b) Automatic refresh parameter settings

| | 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**

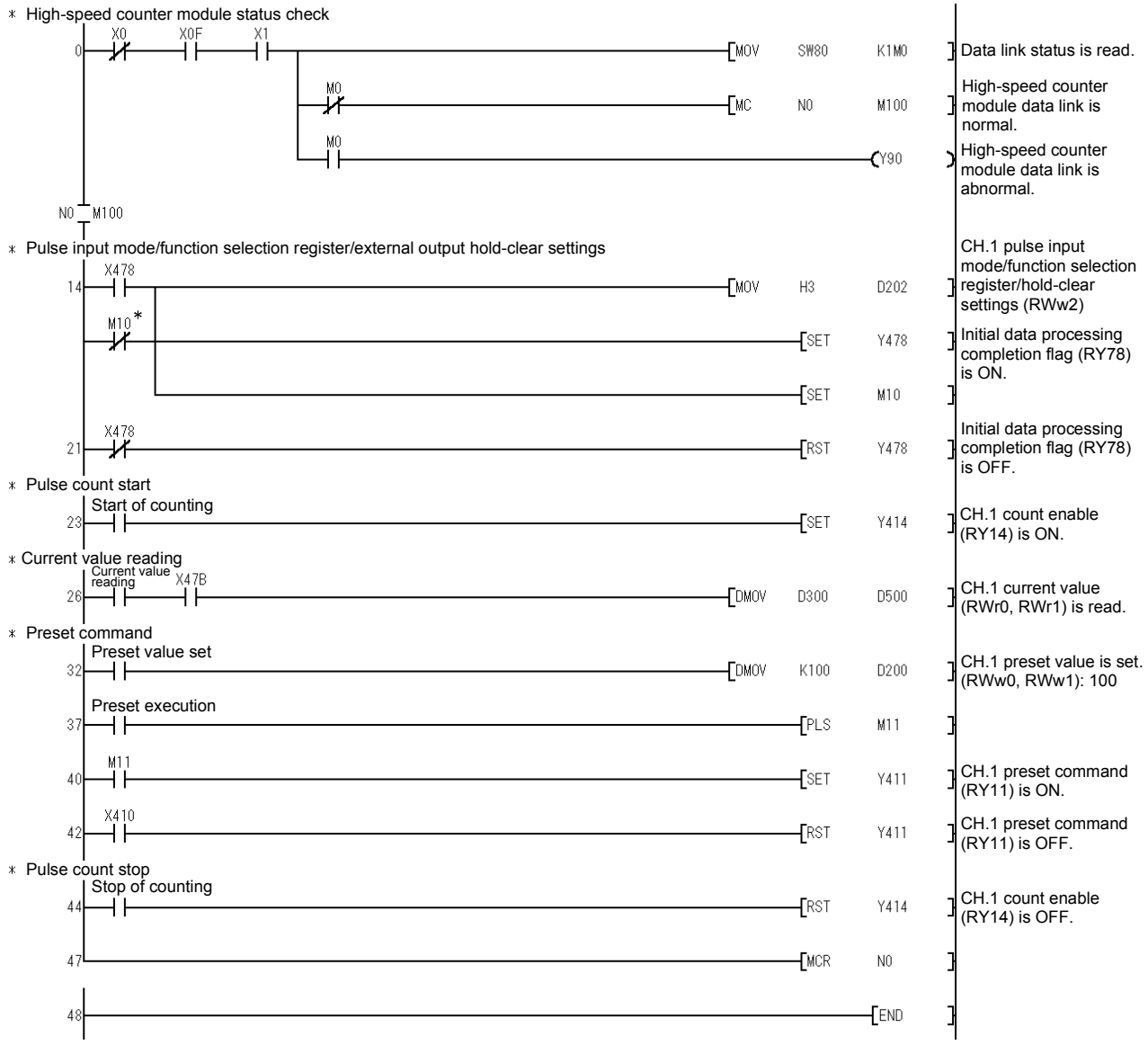
The remote device station initialization step registration function cannot be used.
When the remote device station initialization step registration instruction (SB000D) is turned OFF after initialization processing, the remote register value set in the initialization step registration is cleared. Set 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



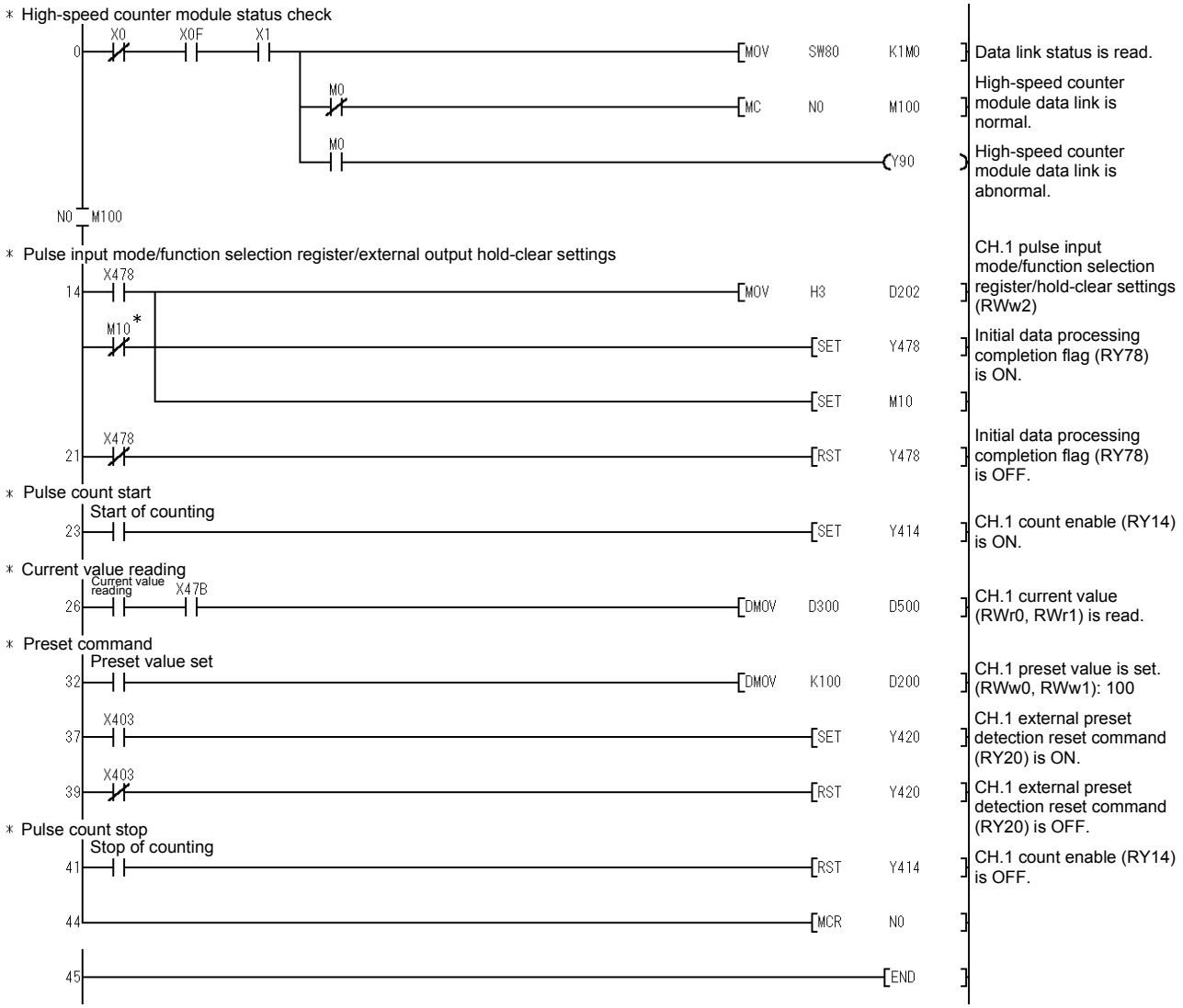

* When the PLC CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

## 10.3.2 Program example of preset with sequence program



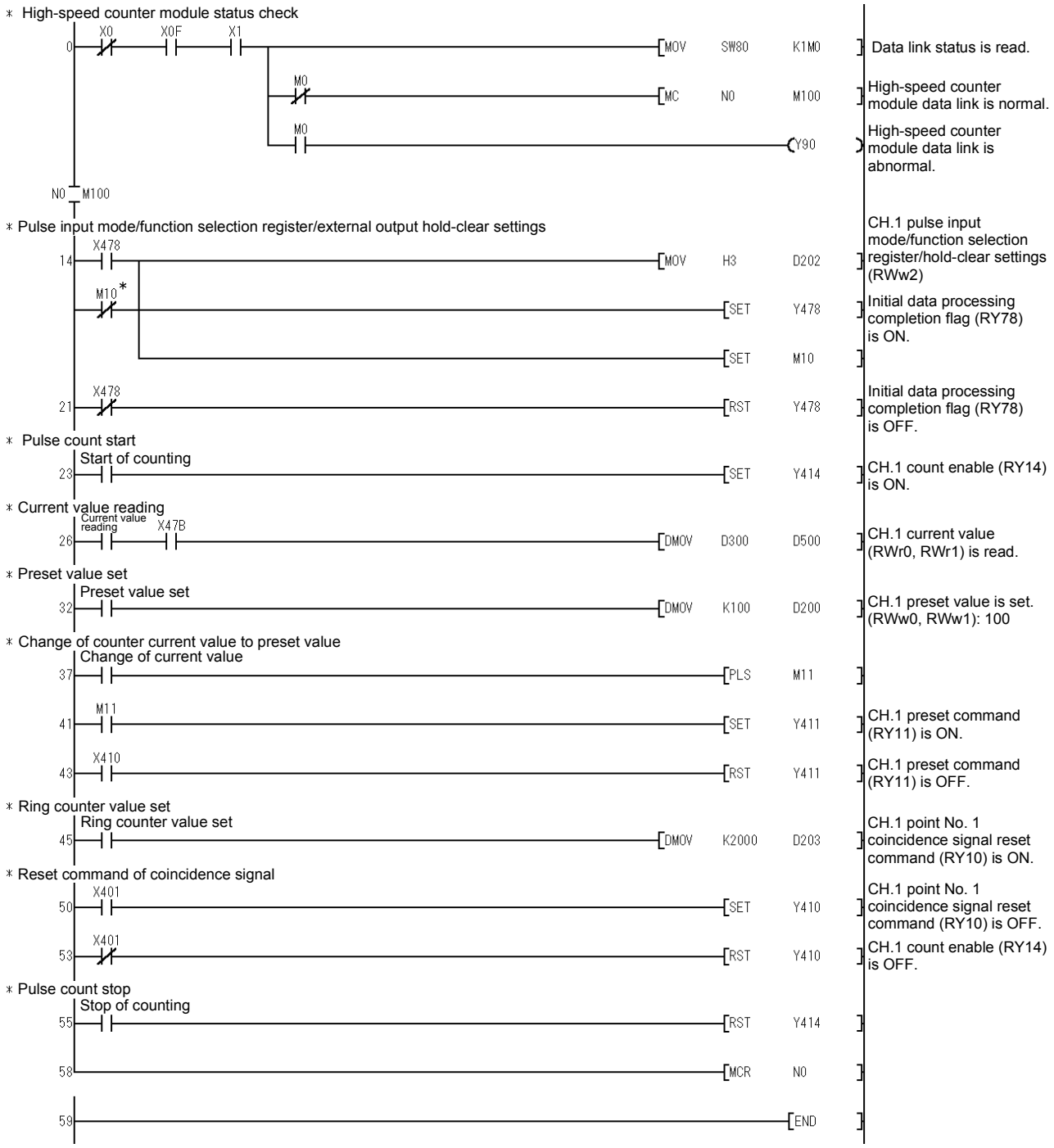

* When the PLC CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

## 10.3.3 Program example of preset with external control signal



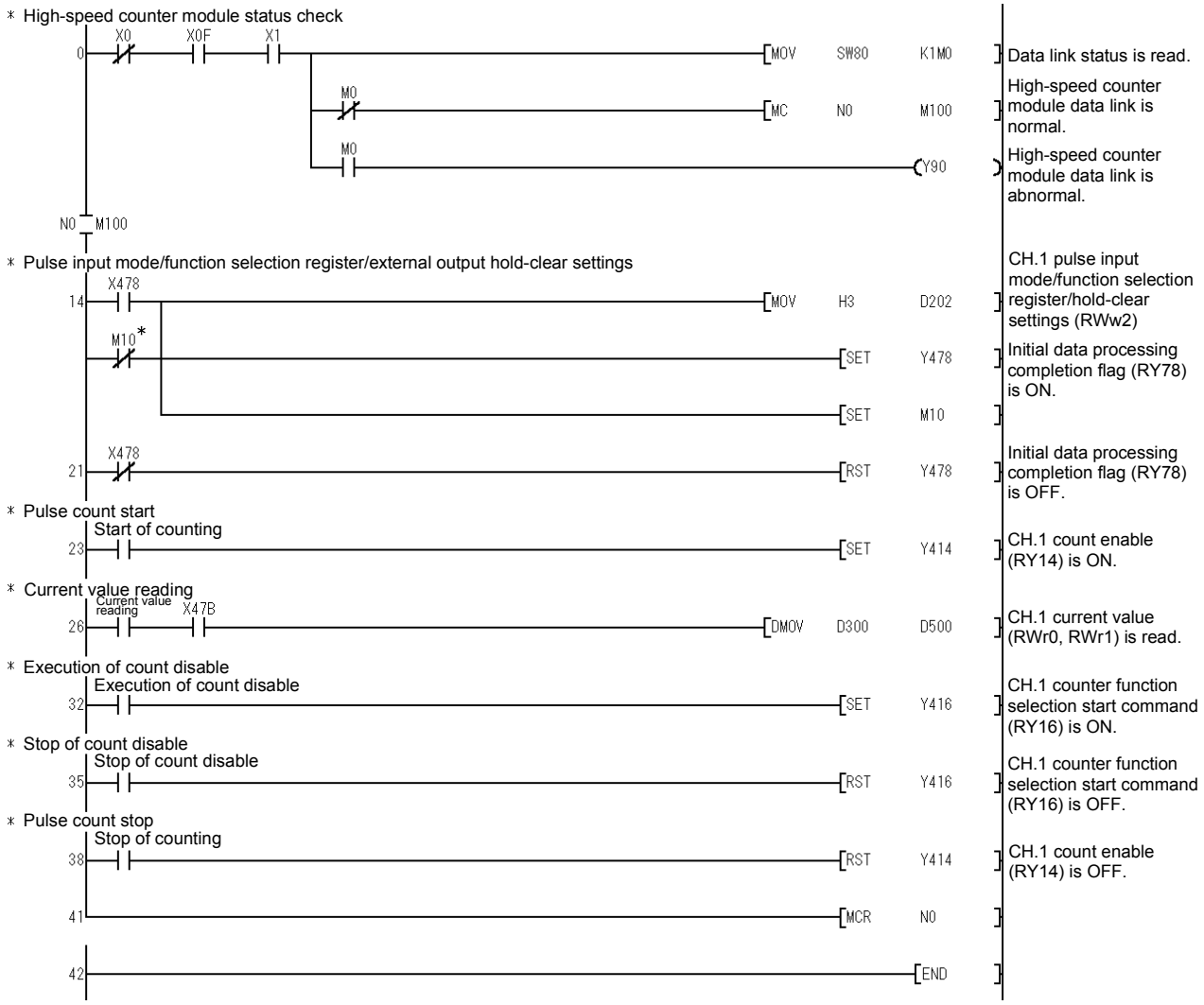

* When the PLC CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

## 10.3.4 Program example of ring counter function



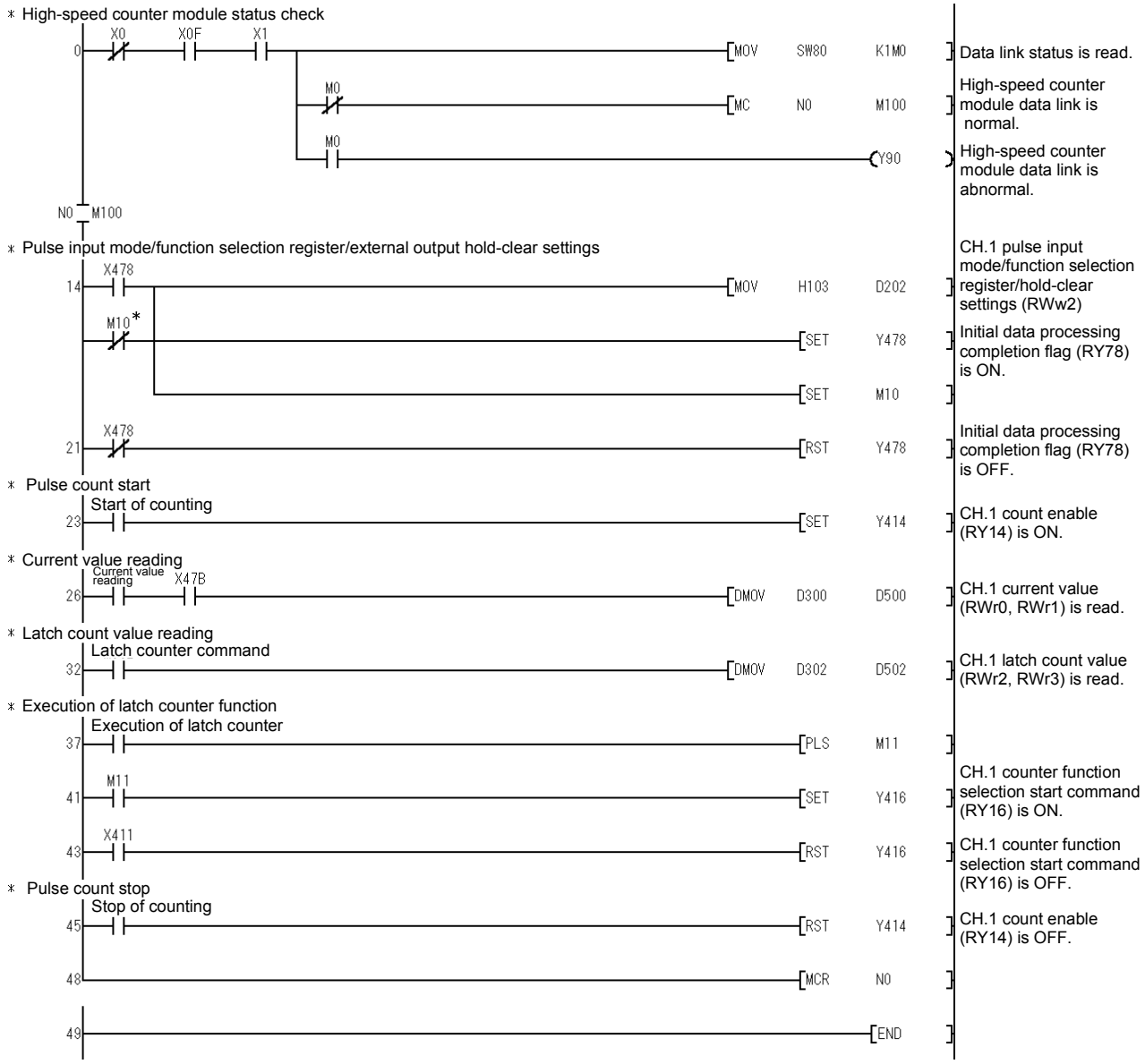

* When the PLC CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

## 10.3.5 Program example of count disable function



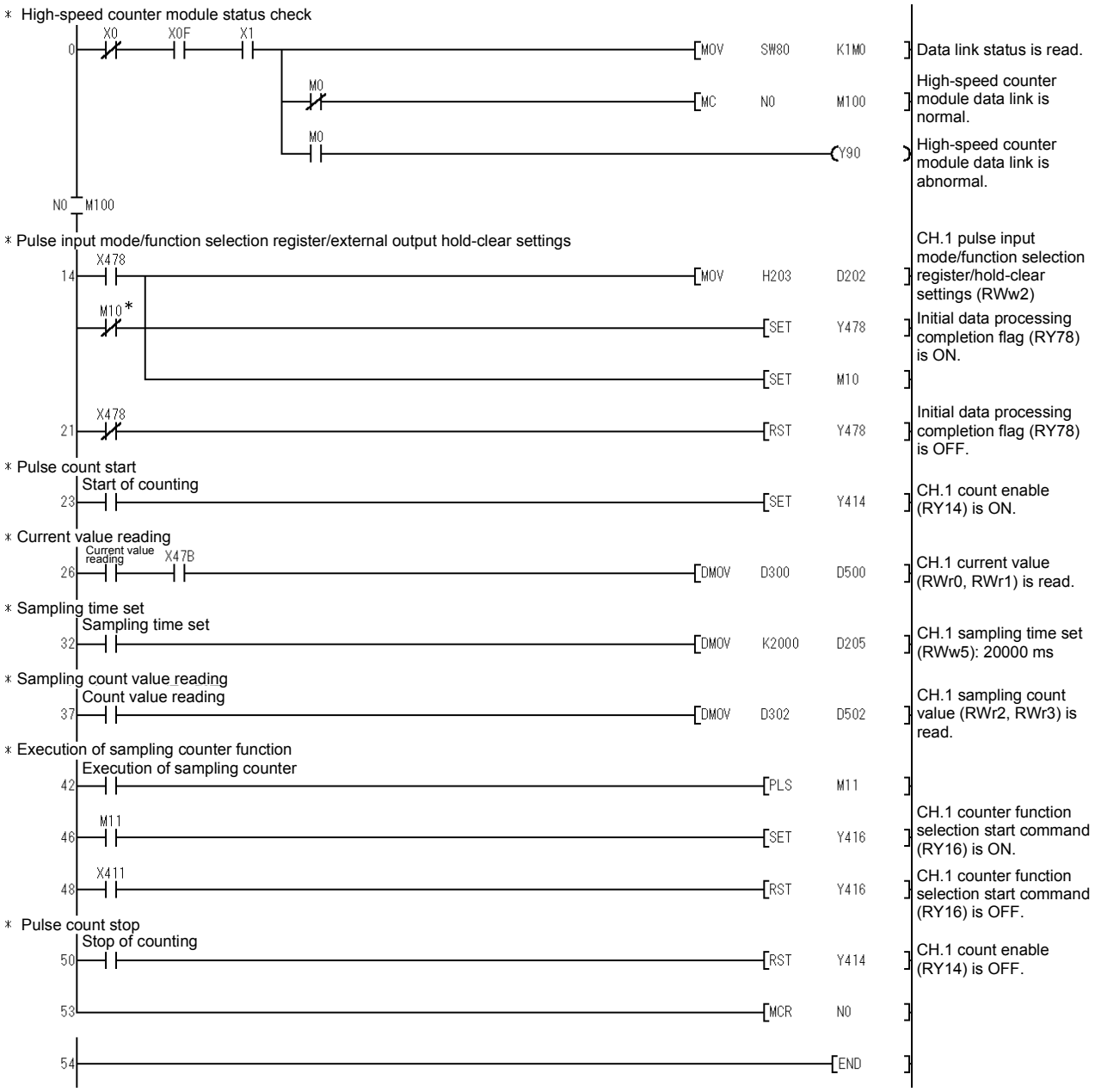

* When the PLC CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

## 10.3.6 Program example of latch counter function



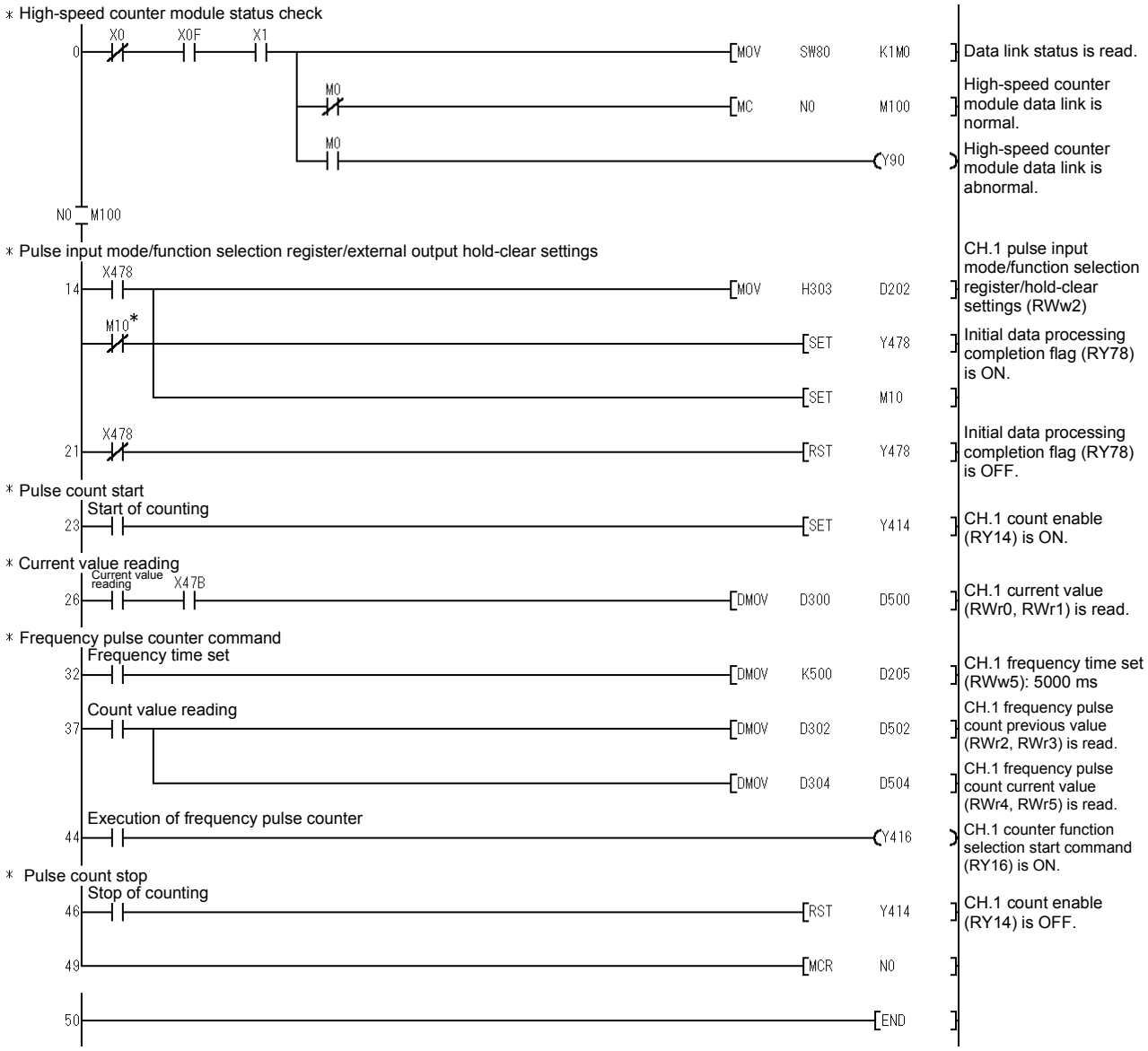

* When the PLC CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

## 10.3.7 Program example of sampling counter function




* When the PLC 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 PLC 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

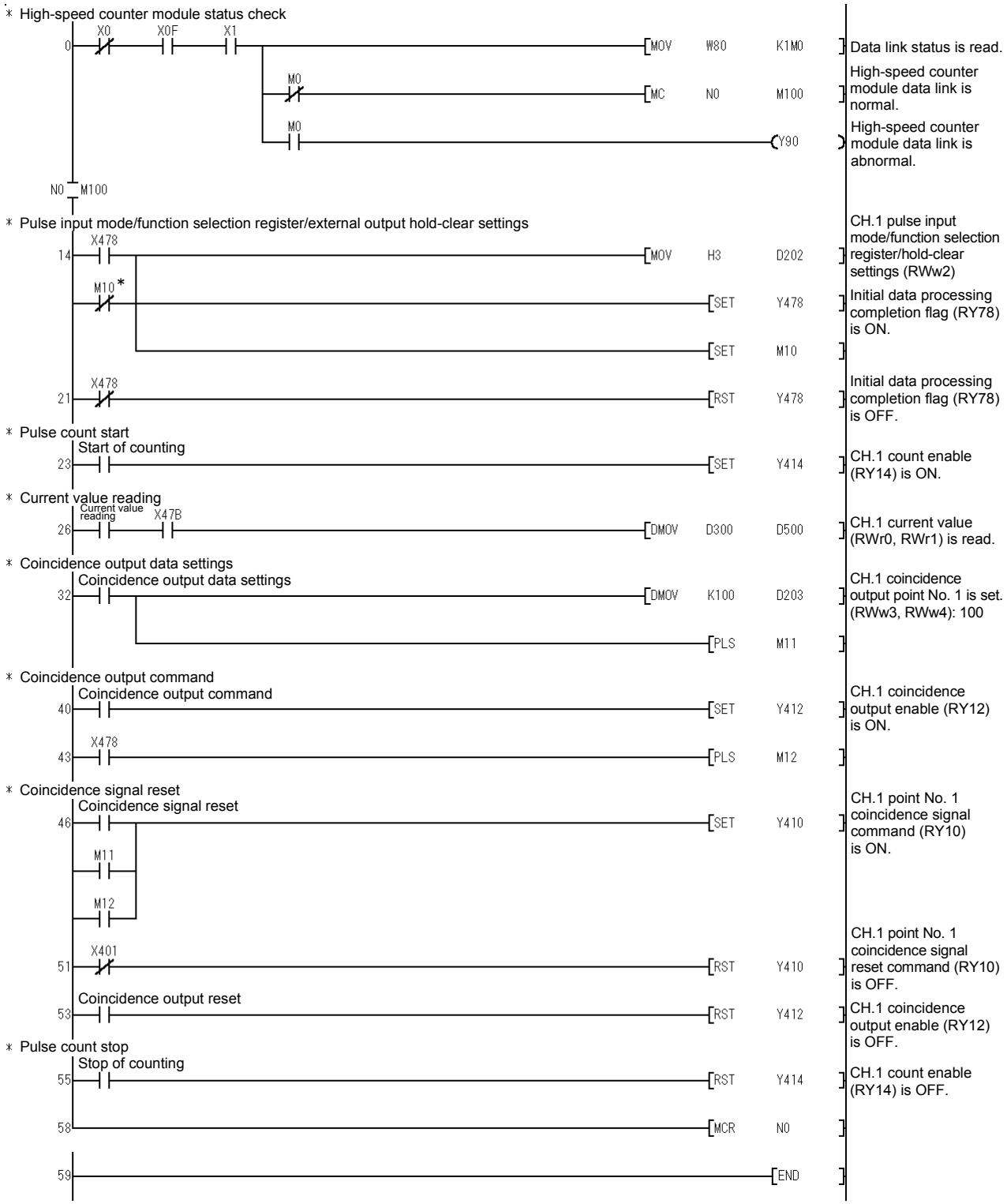
| | 1 |
|---|---|
| Start I/O No. | 0000 |
| Type | Master station |
| All connect count | 1 |
| Remote input(RX) | |
| Remote output(RY) | |
| Remote register(RWr) | |
| Remote register(RWw) | |
| Special relay(SB) | |
| Special register(SW) | |
| Retry count | 3 |
| Automatic reconnection station count | 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

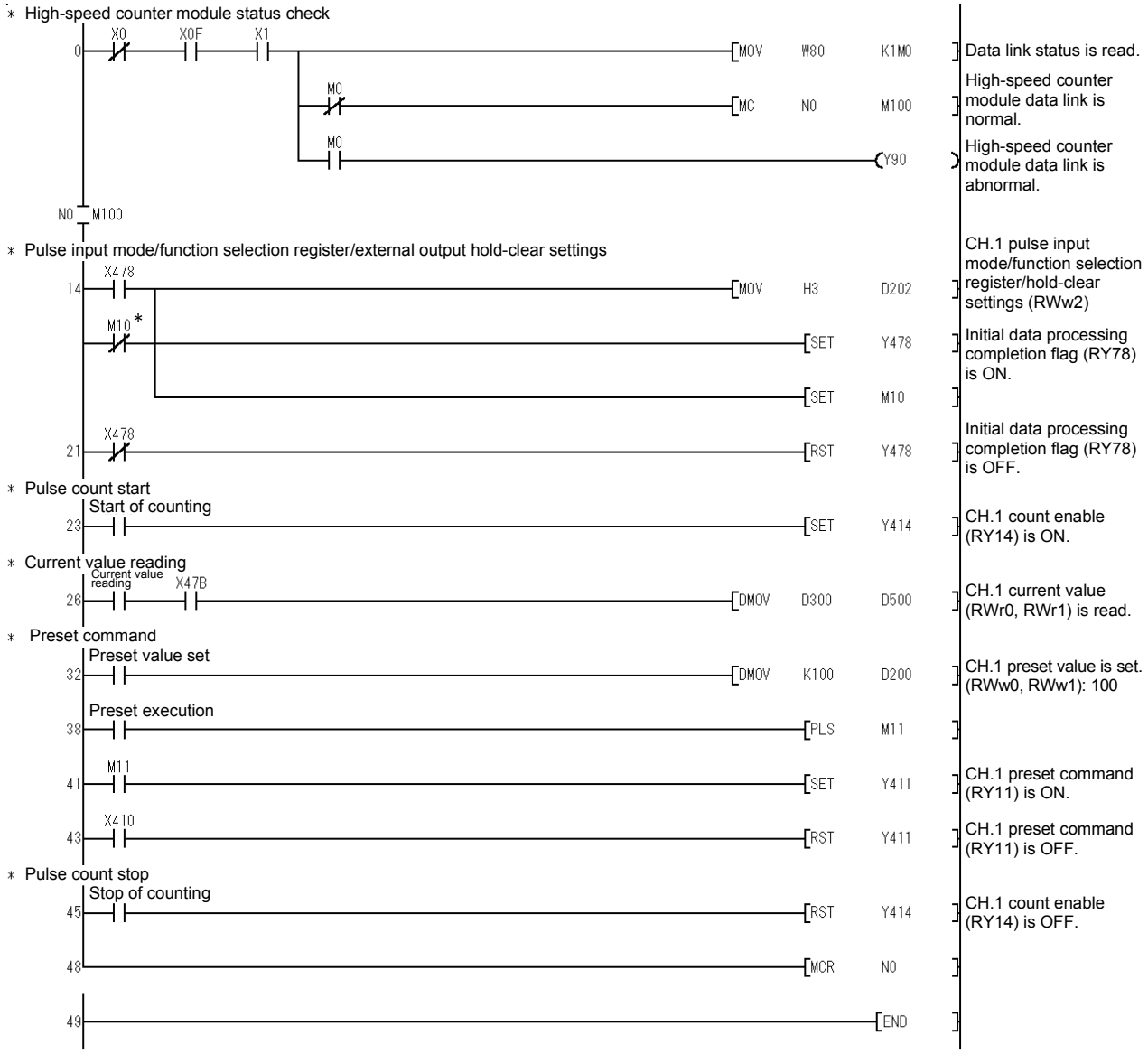
| | 1 |
|---|---|
| Start I/O No | 0000 |
| Operational setting | Operational settings |
| Type | Master station |
| Master station data link type | PLC parameter auto start |
| Mode | Remote net(Ver.1 mode) |
| All connect count | 1 |
| Remote input(RX) | X400 |
| Remote output(RY) | Y400 |
| Remote 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



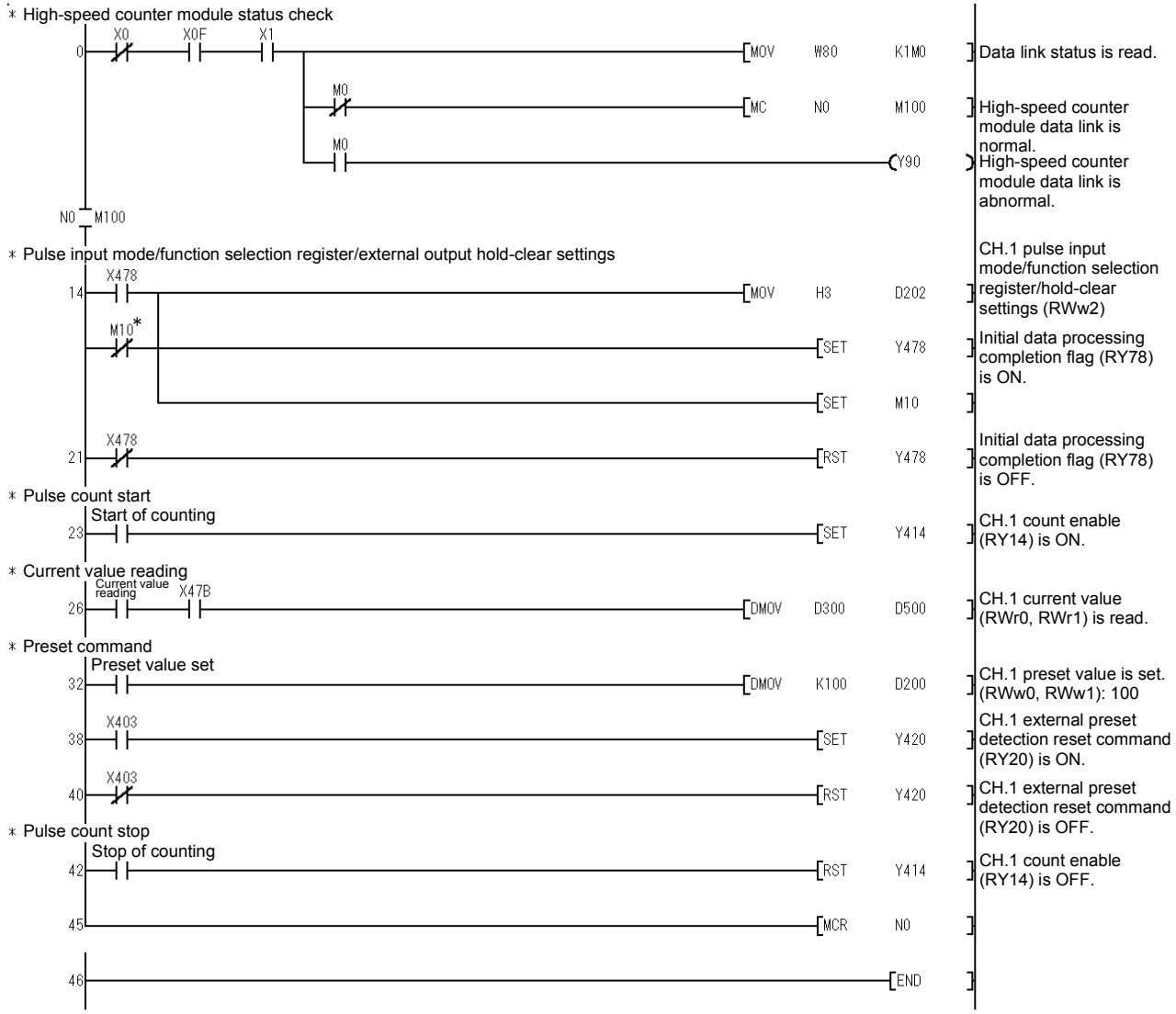

* When the PLC CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

## 10.4.2 Program example of preset with sequence program



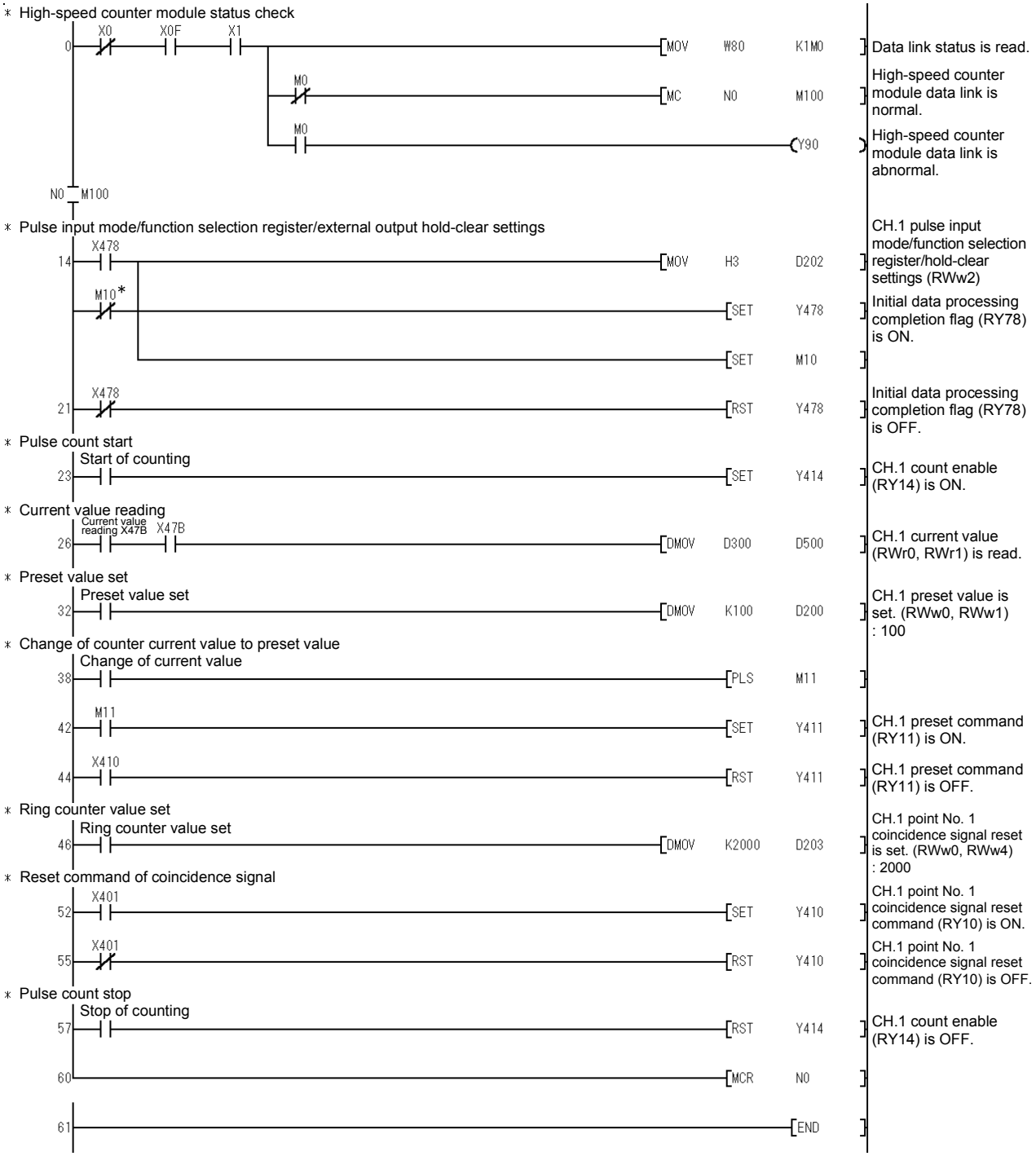

* When the PLC CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

## 10.4.3 Program example of preset with external control signal



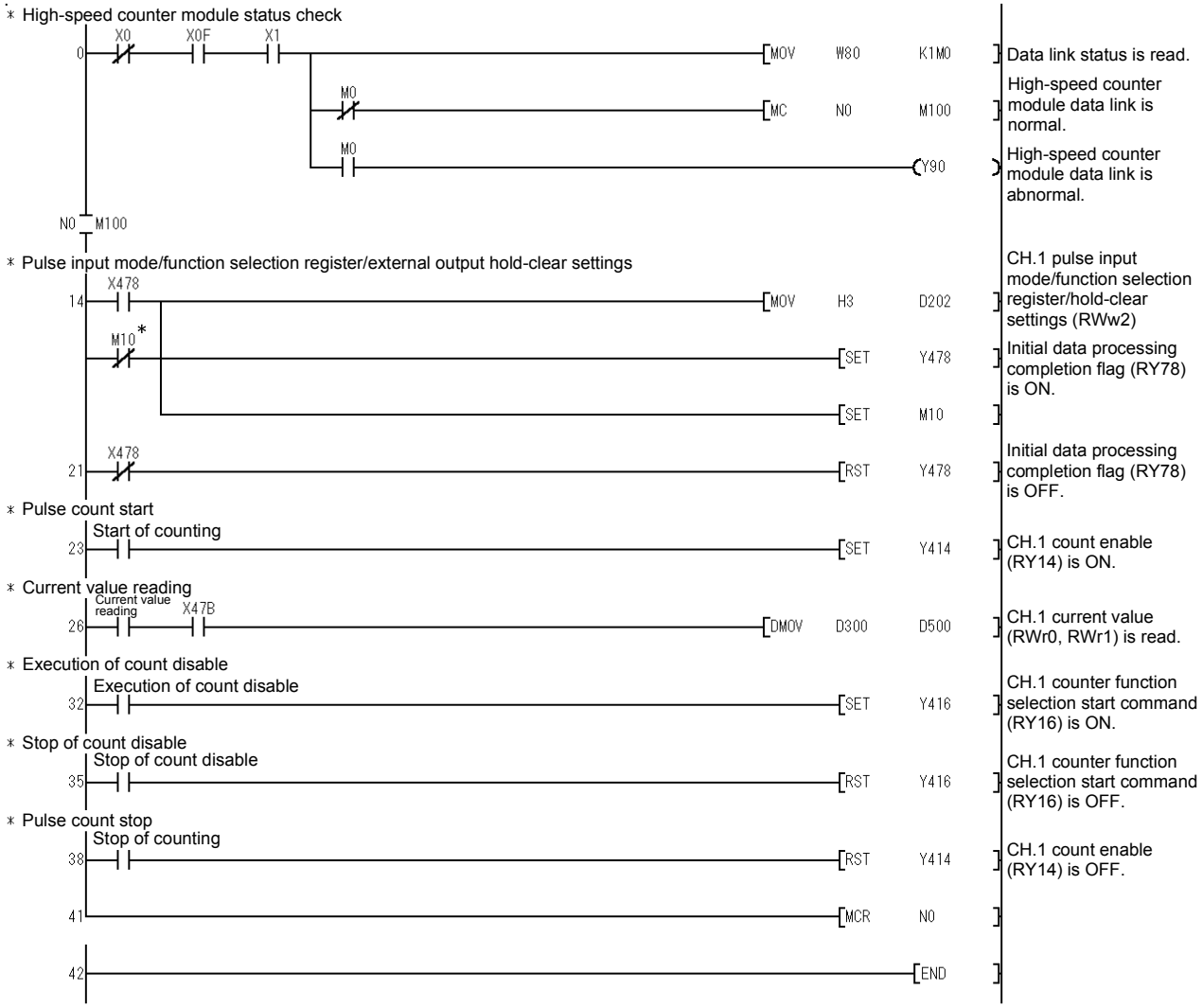

* When the PLC CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

## 10.4.4 Program example of ring counter function



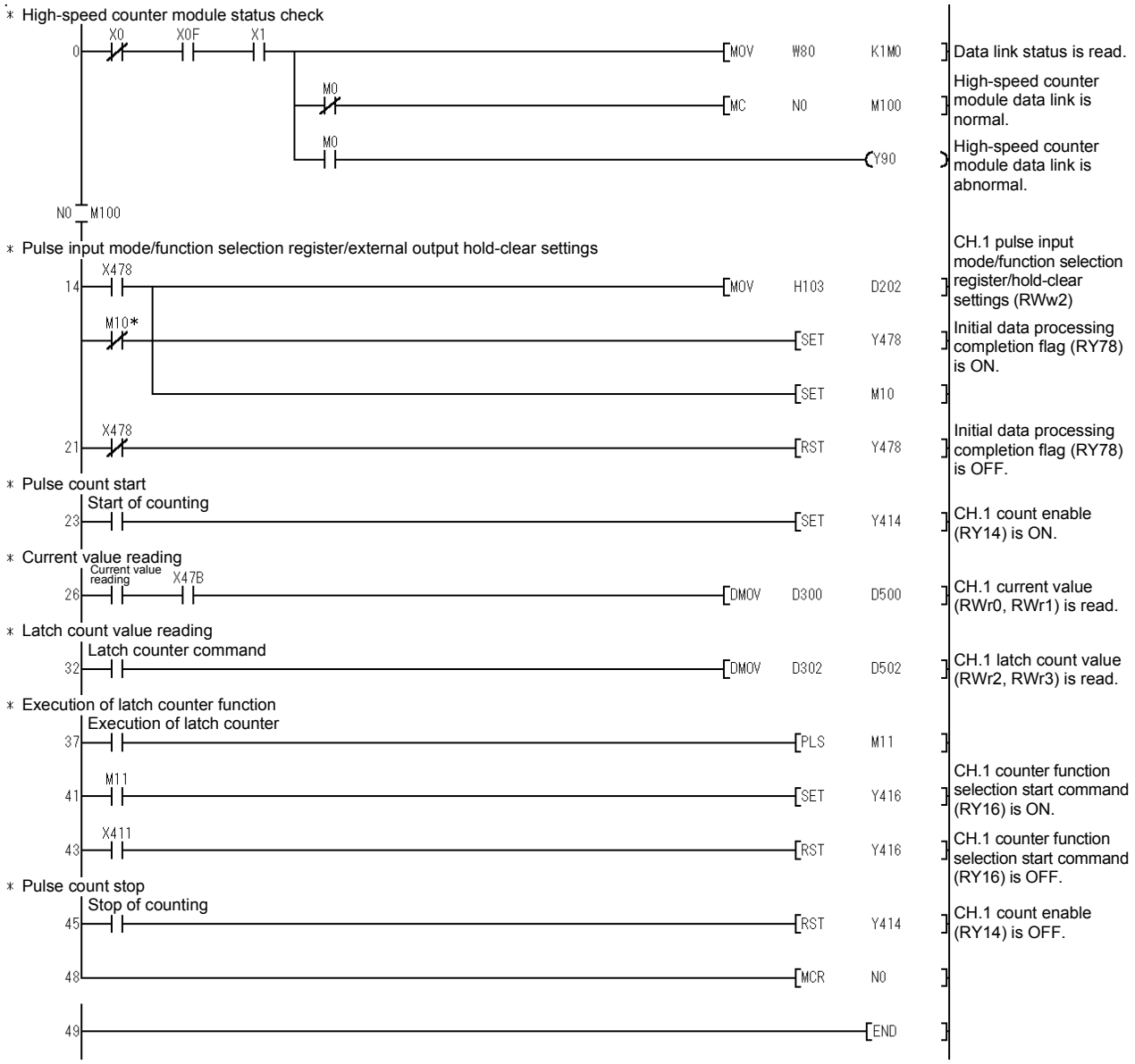

* When the PLC CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

## 10.4.5 Program example of count disable function



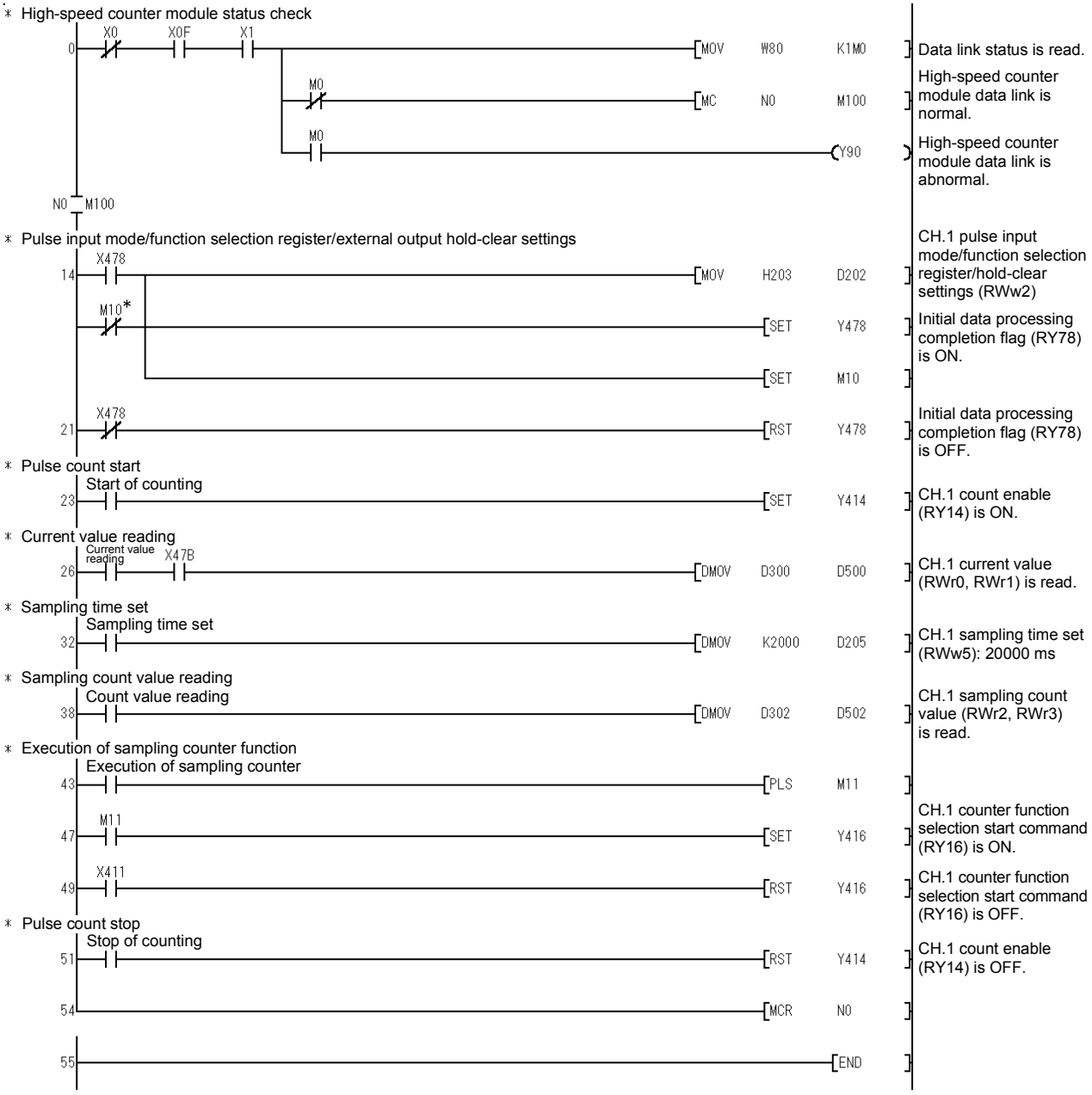

* When the PLC CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

## 10.4.6 Program example of latch counter function



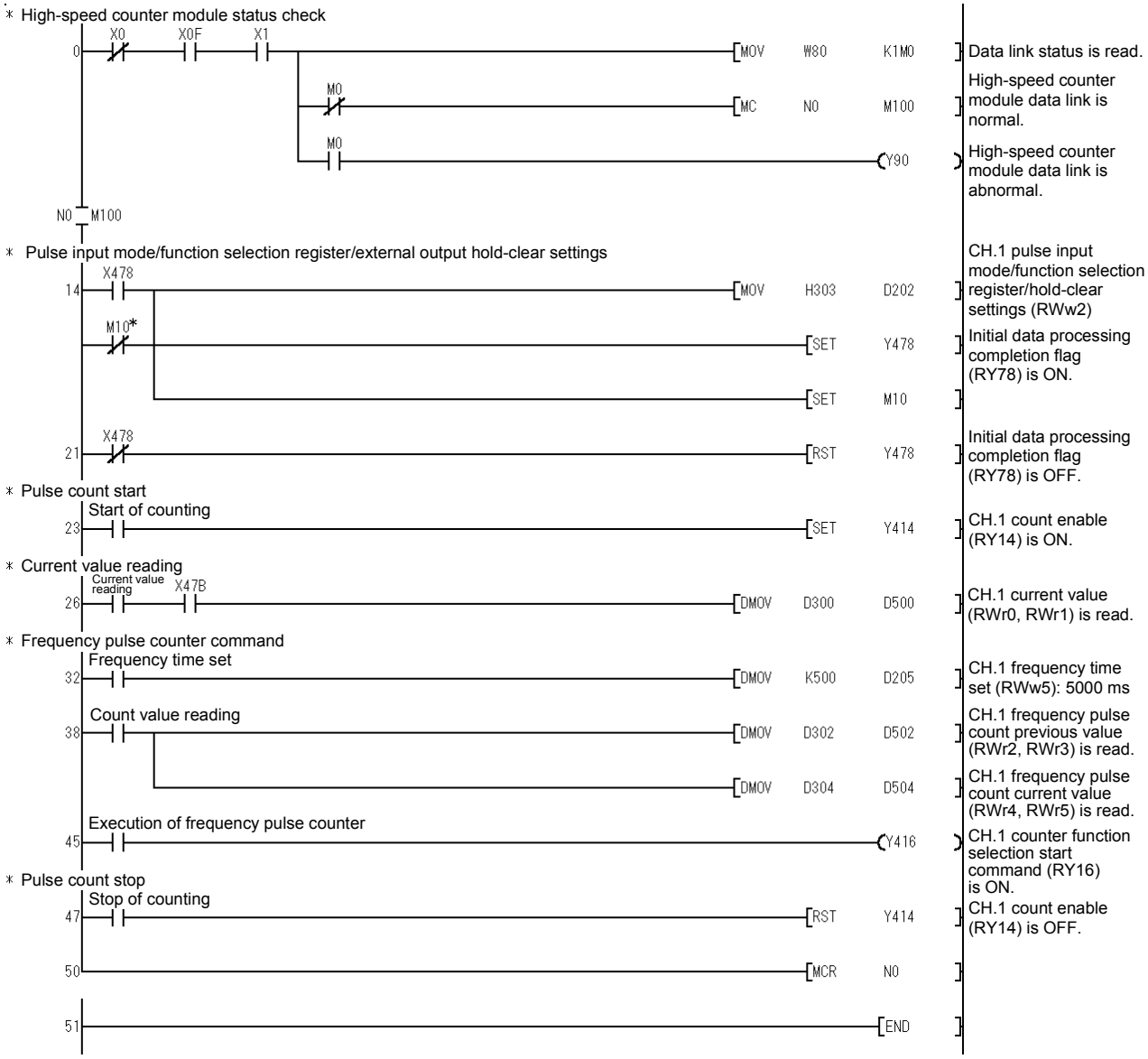

* When the PLC CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

## 10.4.7 Program example of sampling counter function




* When the PLC 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

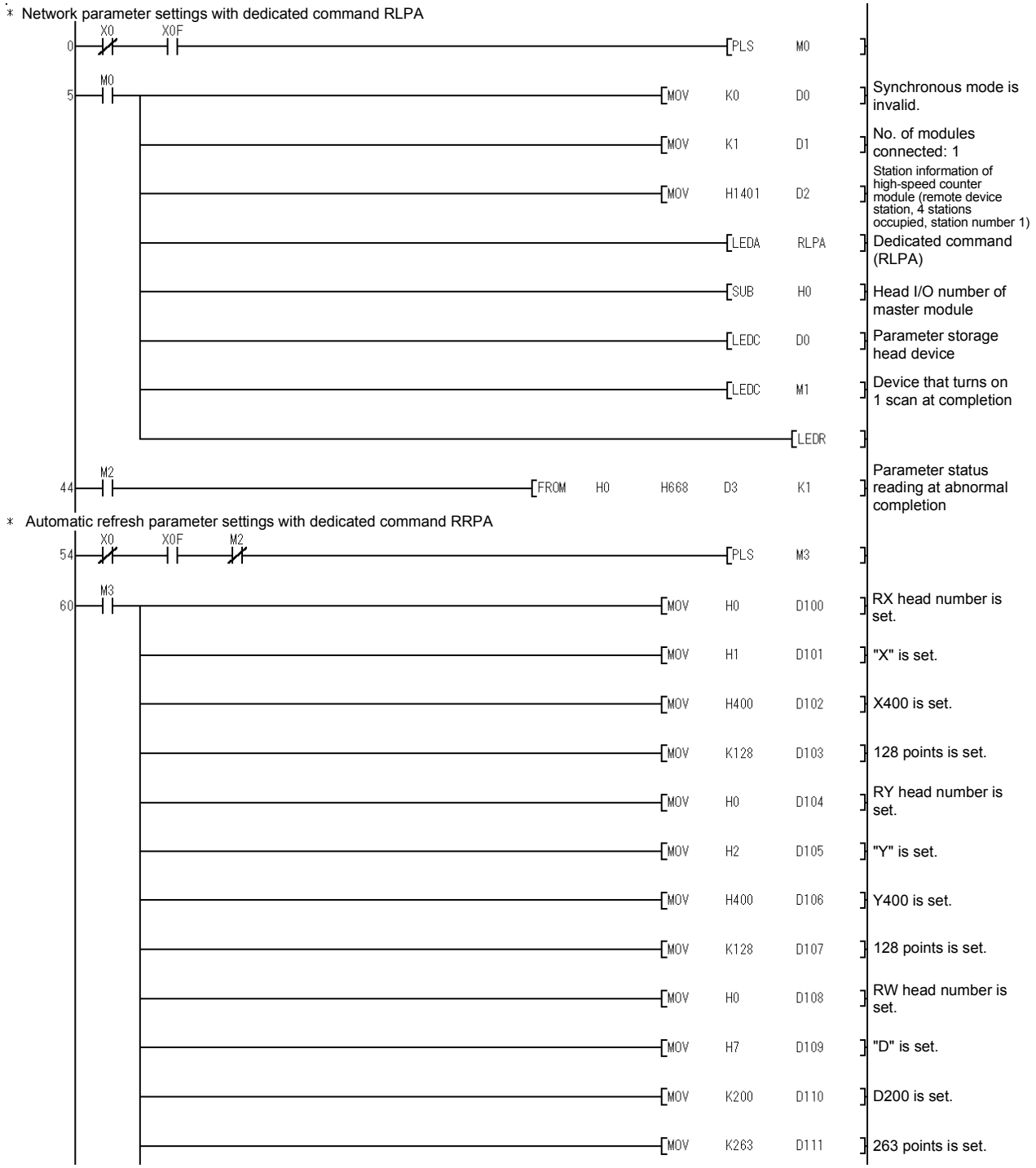


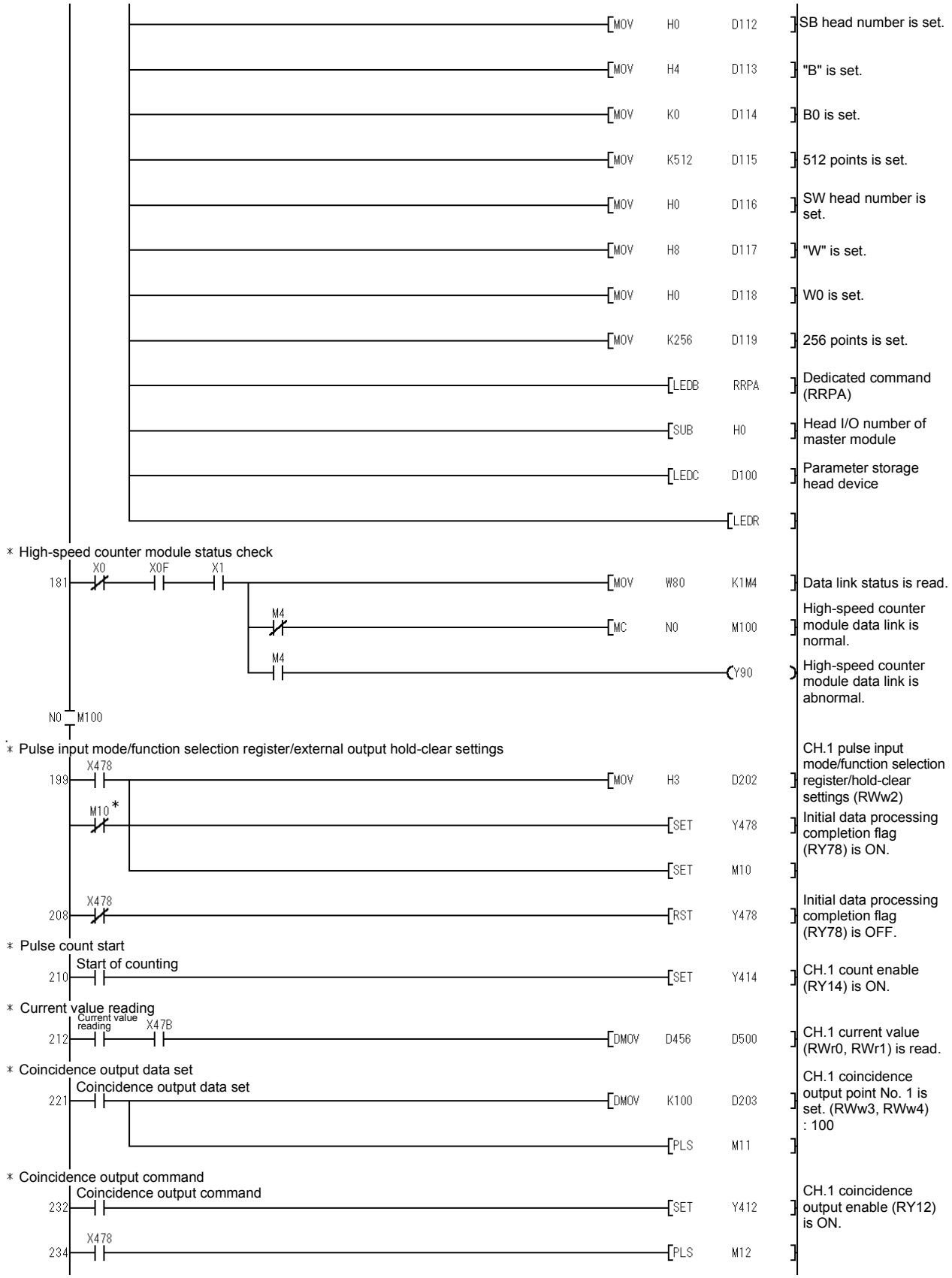

* When the PLC CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

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

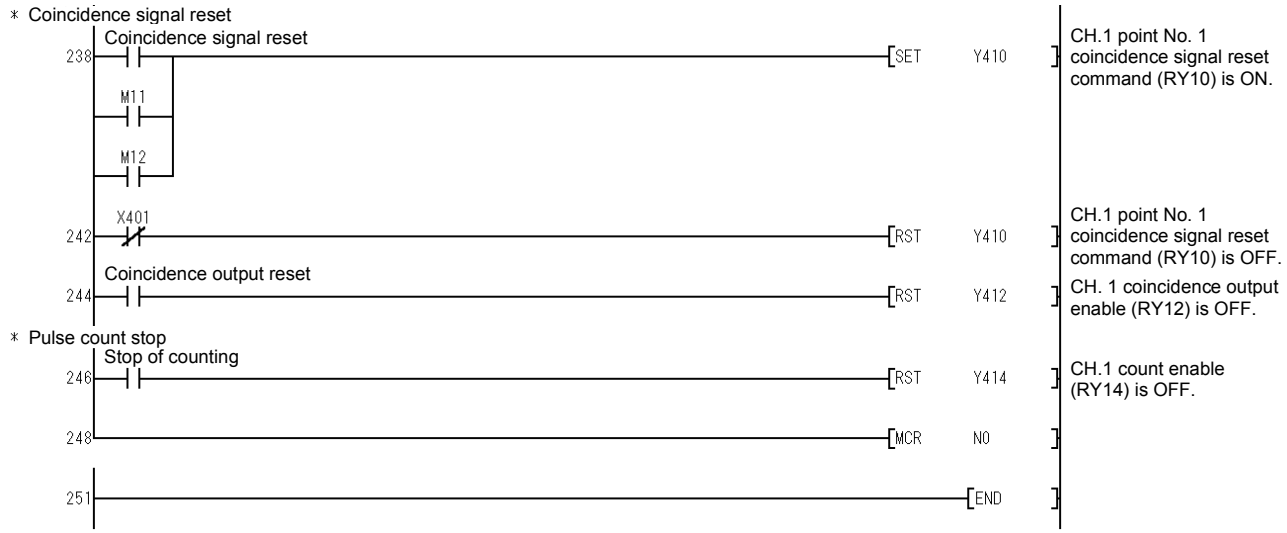
The network parameter and the automatic refresh parameter are set by the sequence program.

### 10.5.1 Program example of coincidence output function

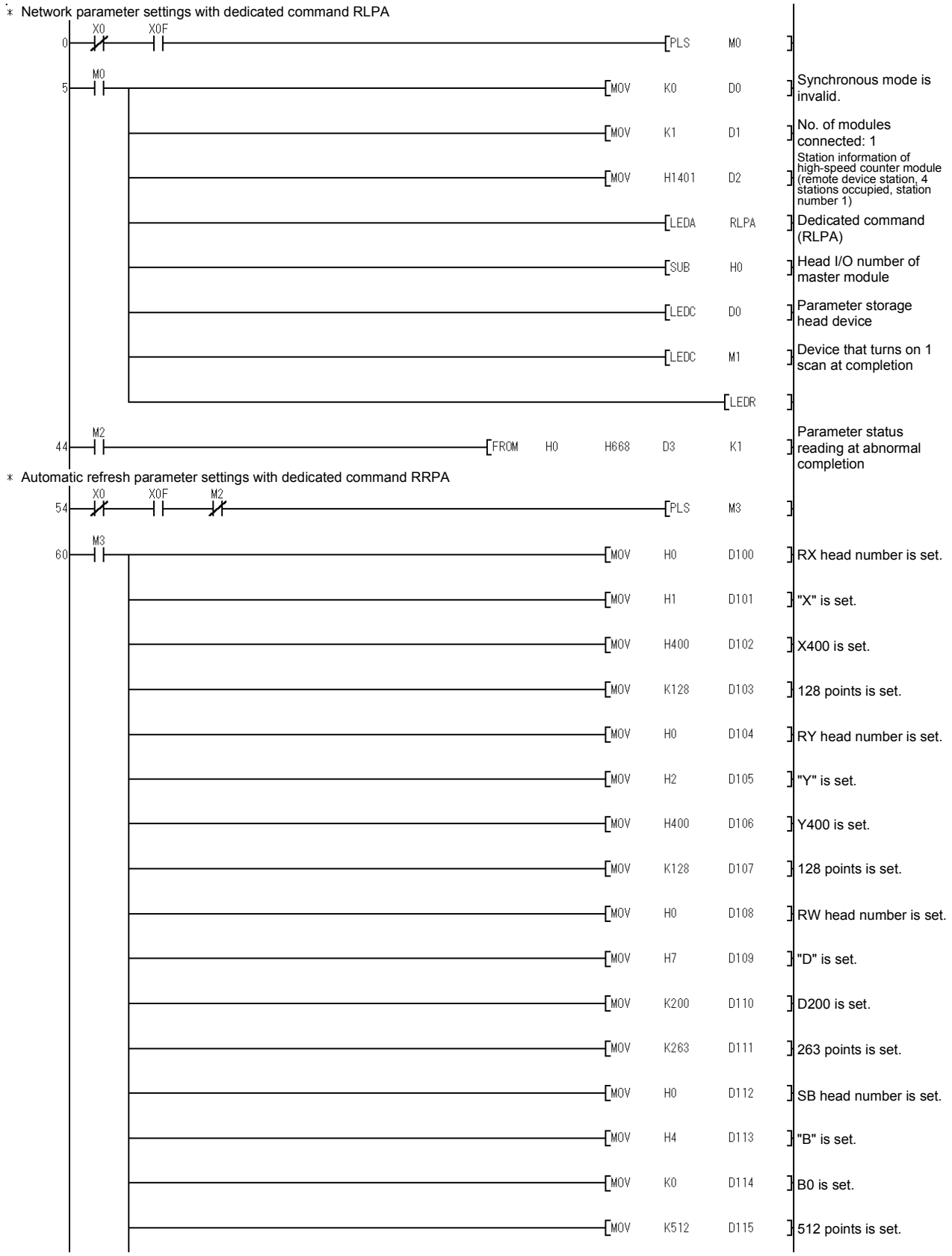


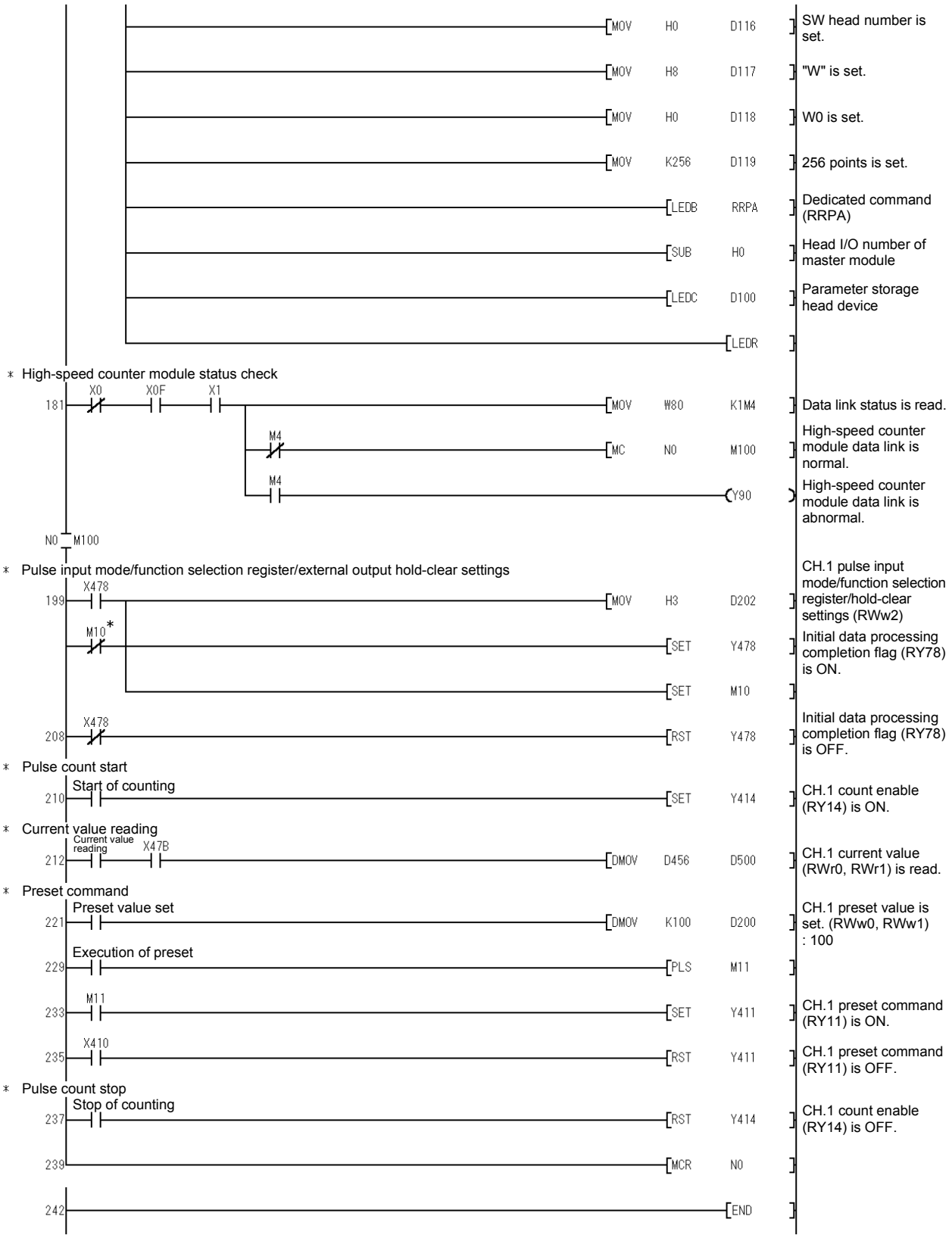



* When the PLC CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.


* Coincidence signal reset
Coincidence signal reset
238
SET Y410
M11
M12
CH.1 point No. 1 coincidence signal reset command (RY10) is ON.
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

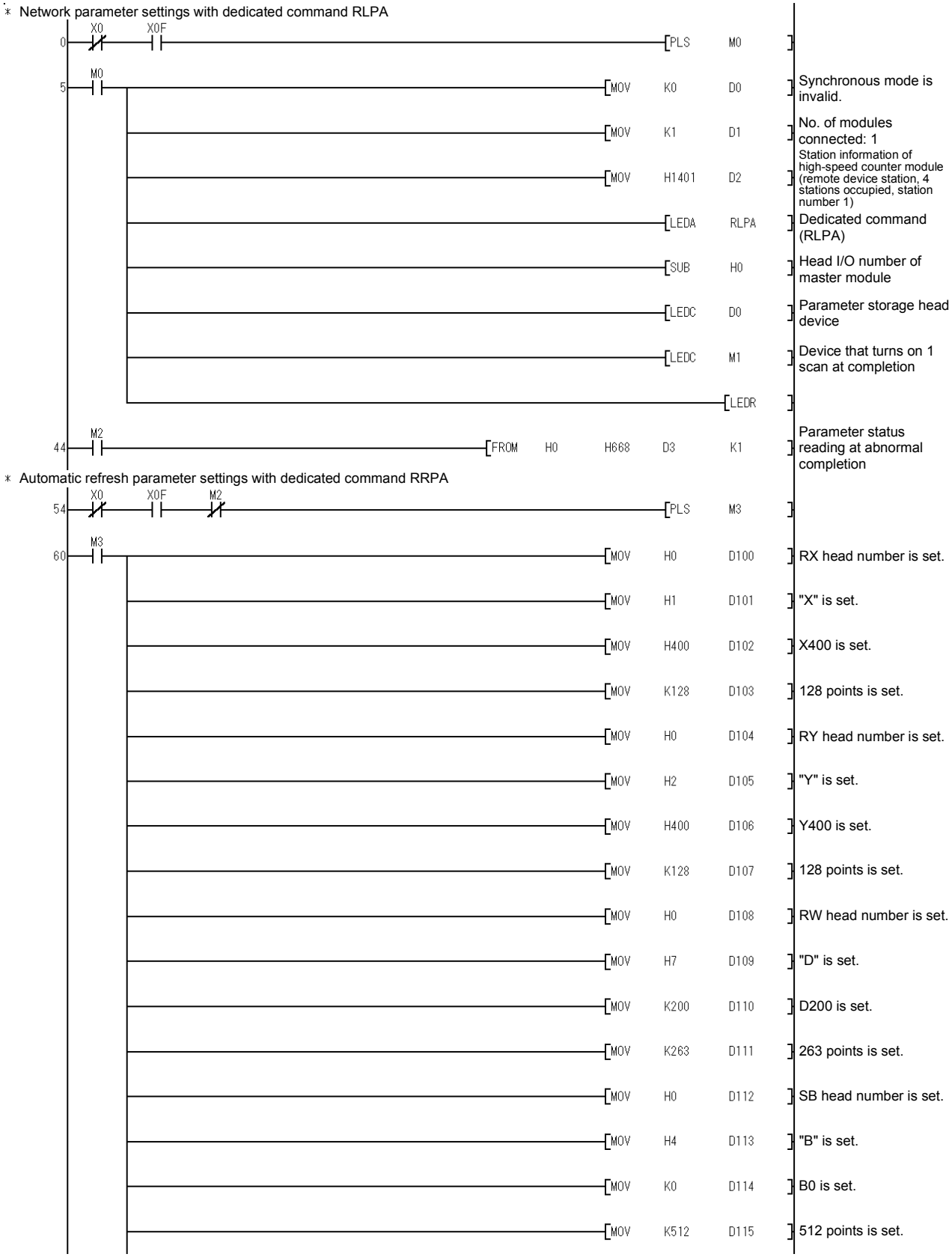
## 10.5.2 Program example of preset with sequence program

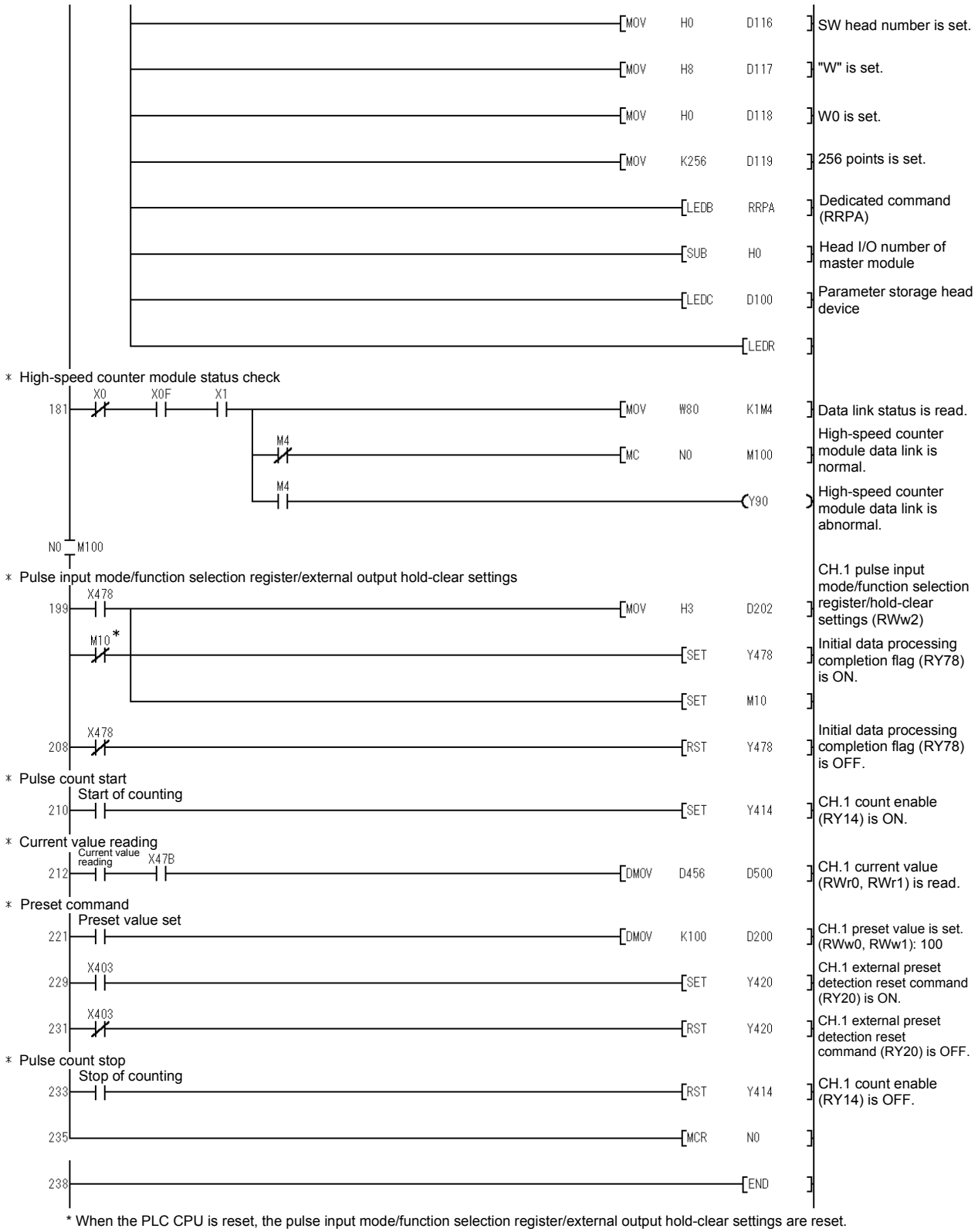





* When the PLC CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

## 10.5.3 Program example of preset with external control signal

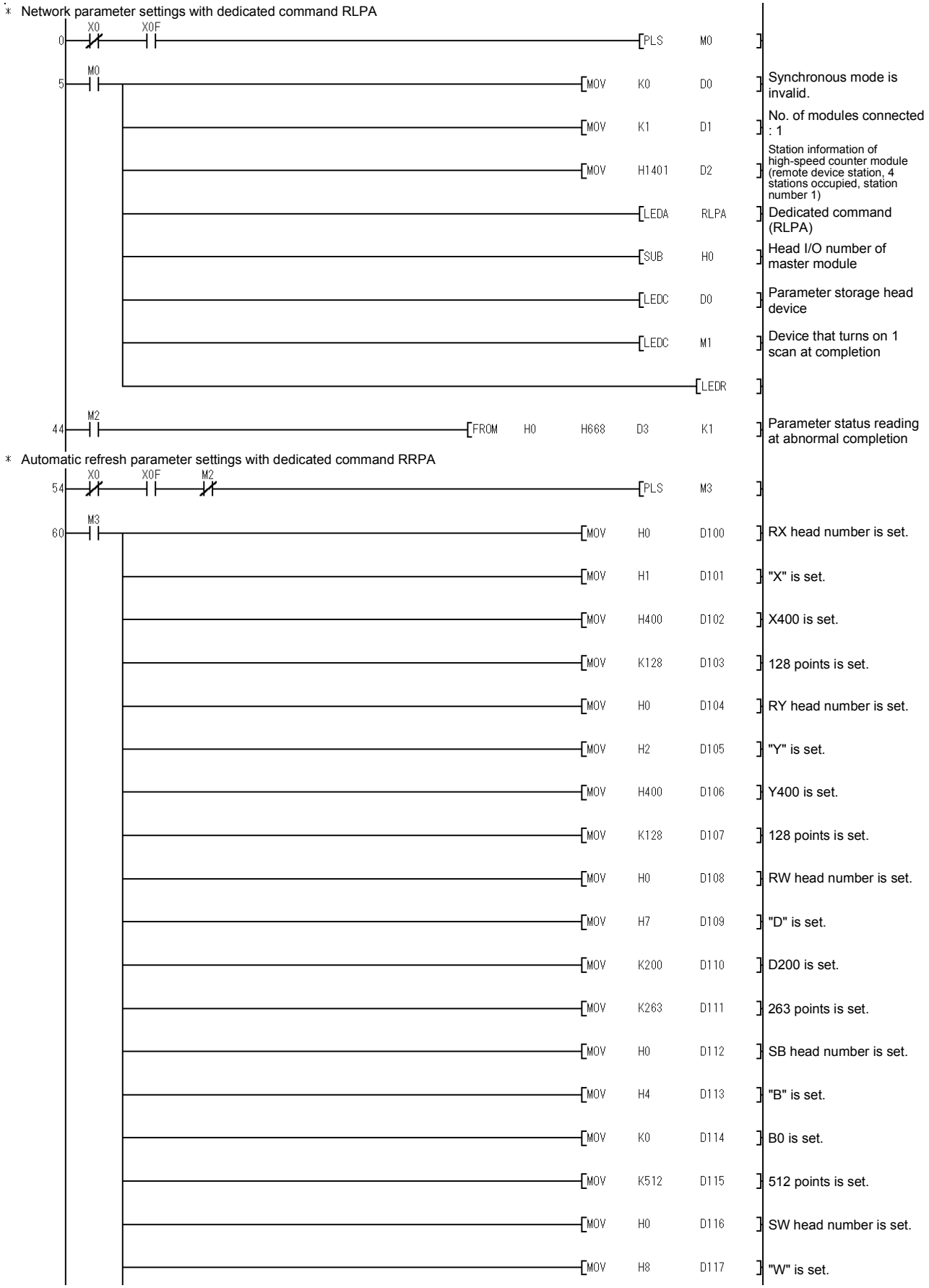




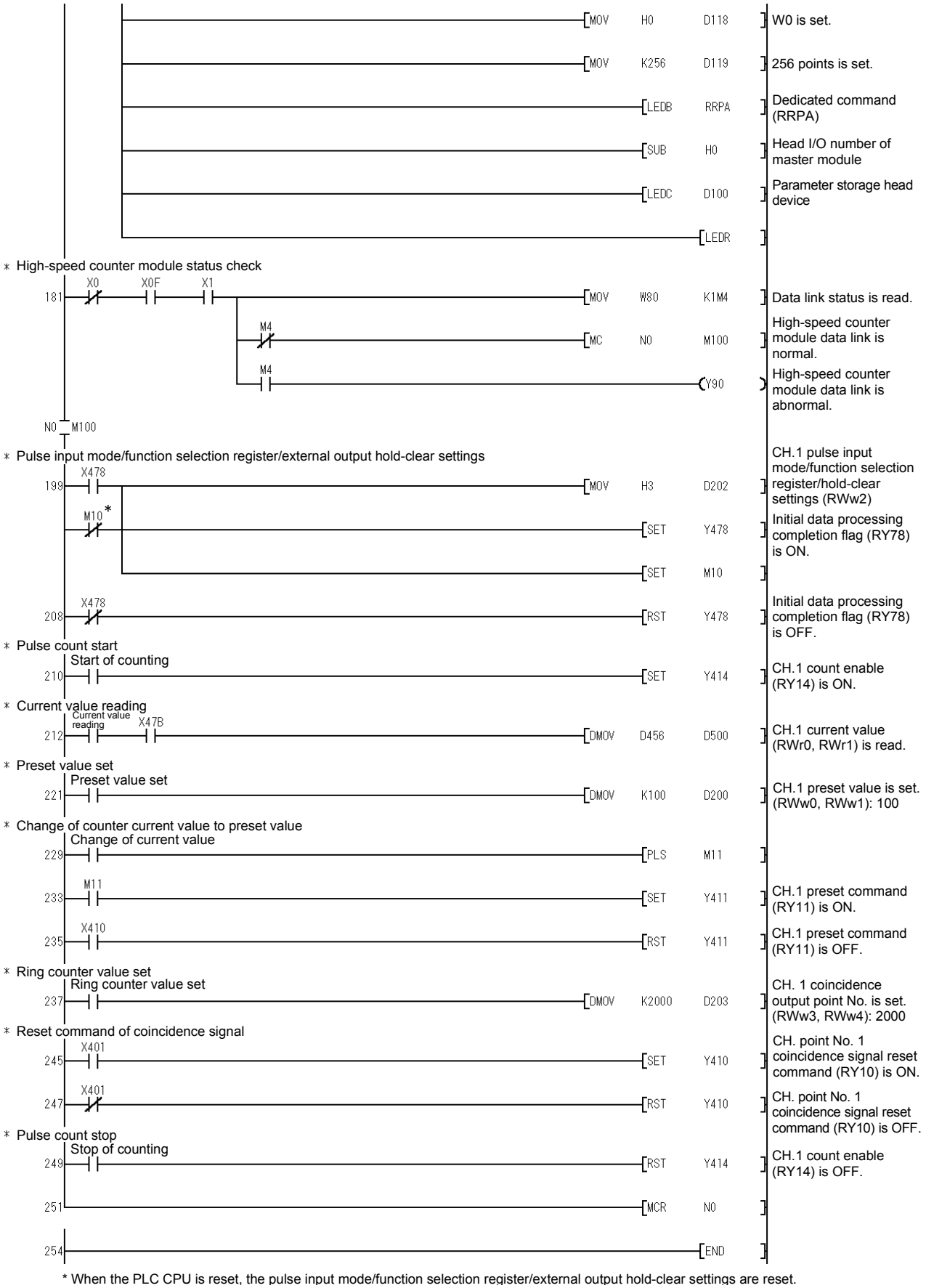

* When the PLC CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

## 10.5.4 Program example of ring counter function

* Network parameter settings with dedicated command RLPA

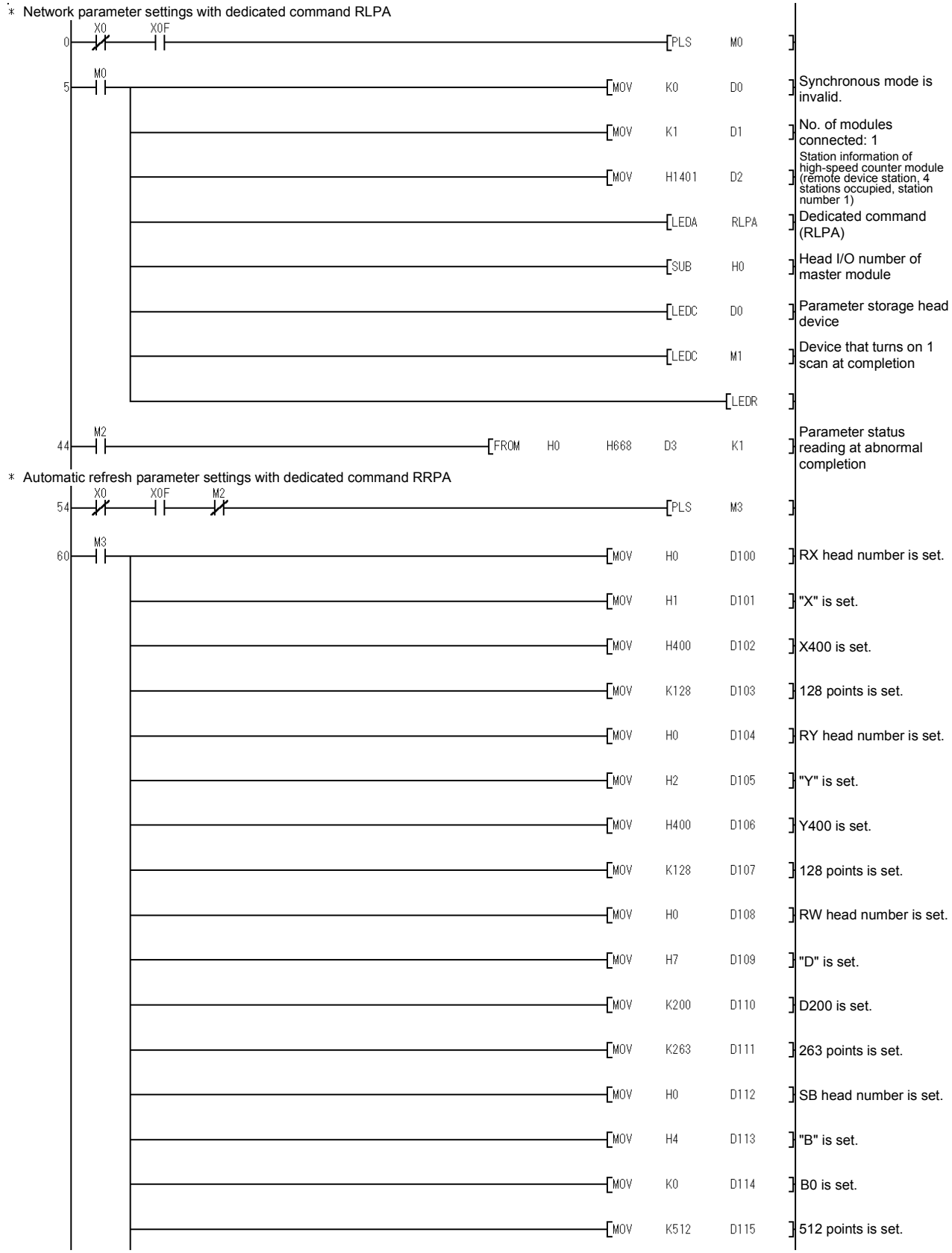


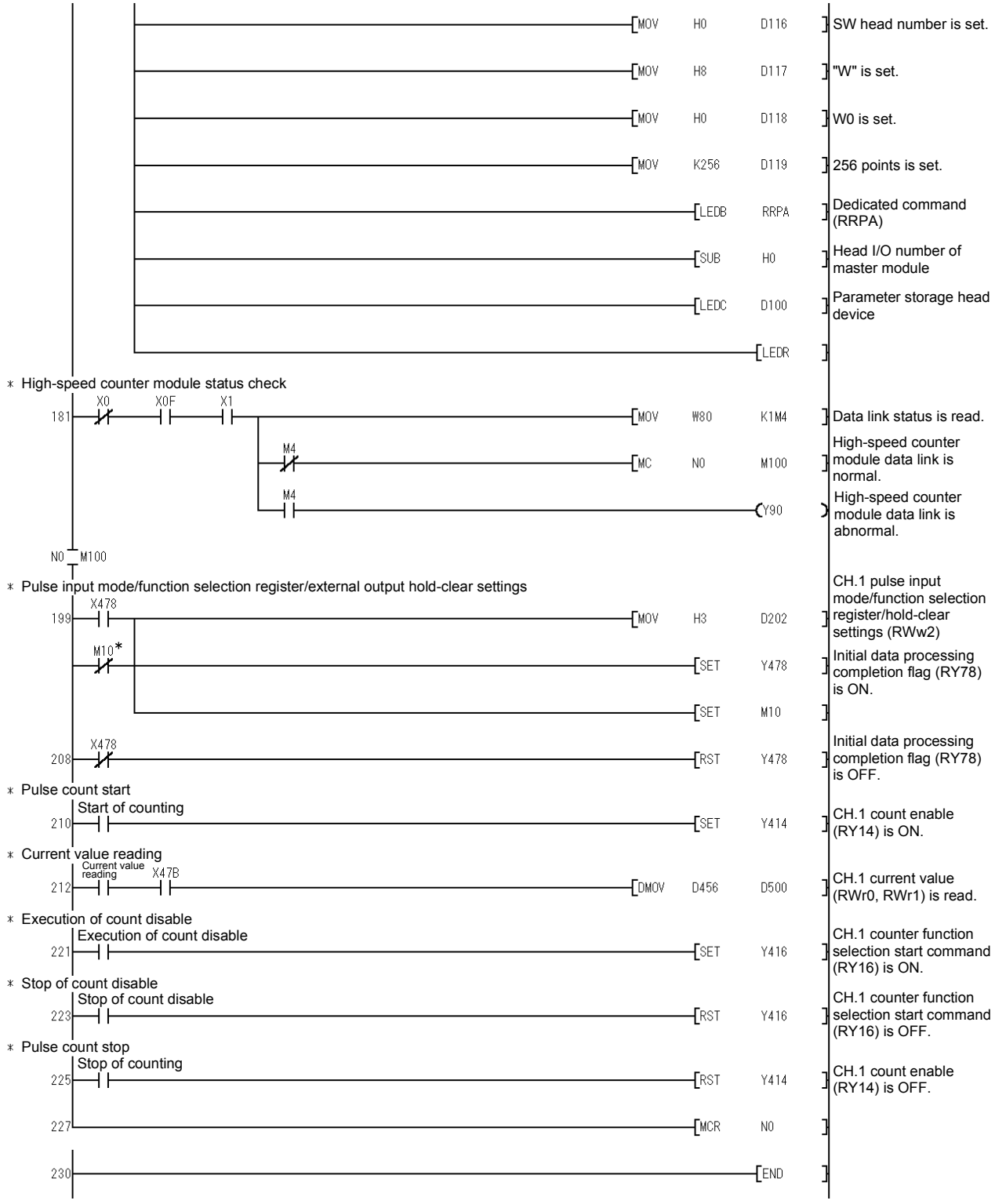

* Automatic refresh parameter settings with dedicated command RRPA




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

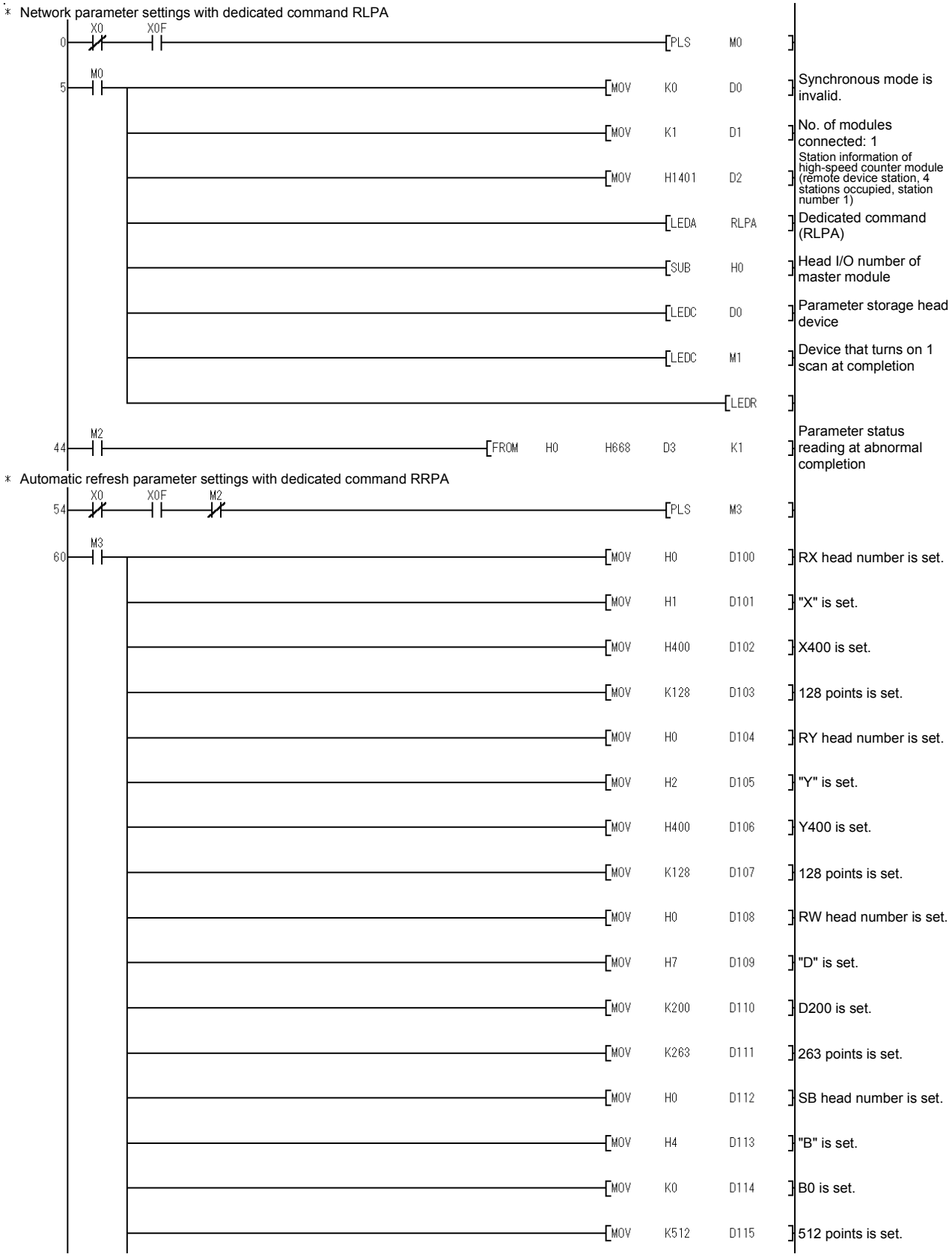
## 10.5.5 Program example of count disable function

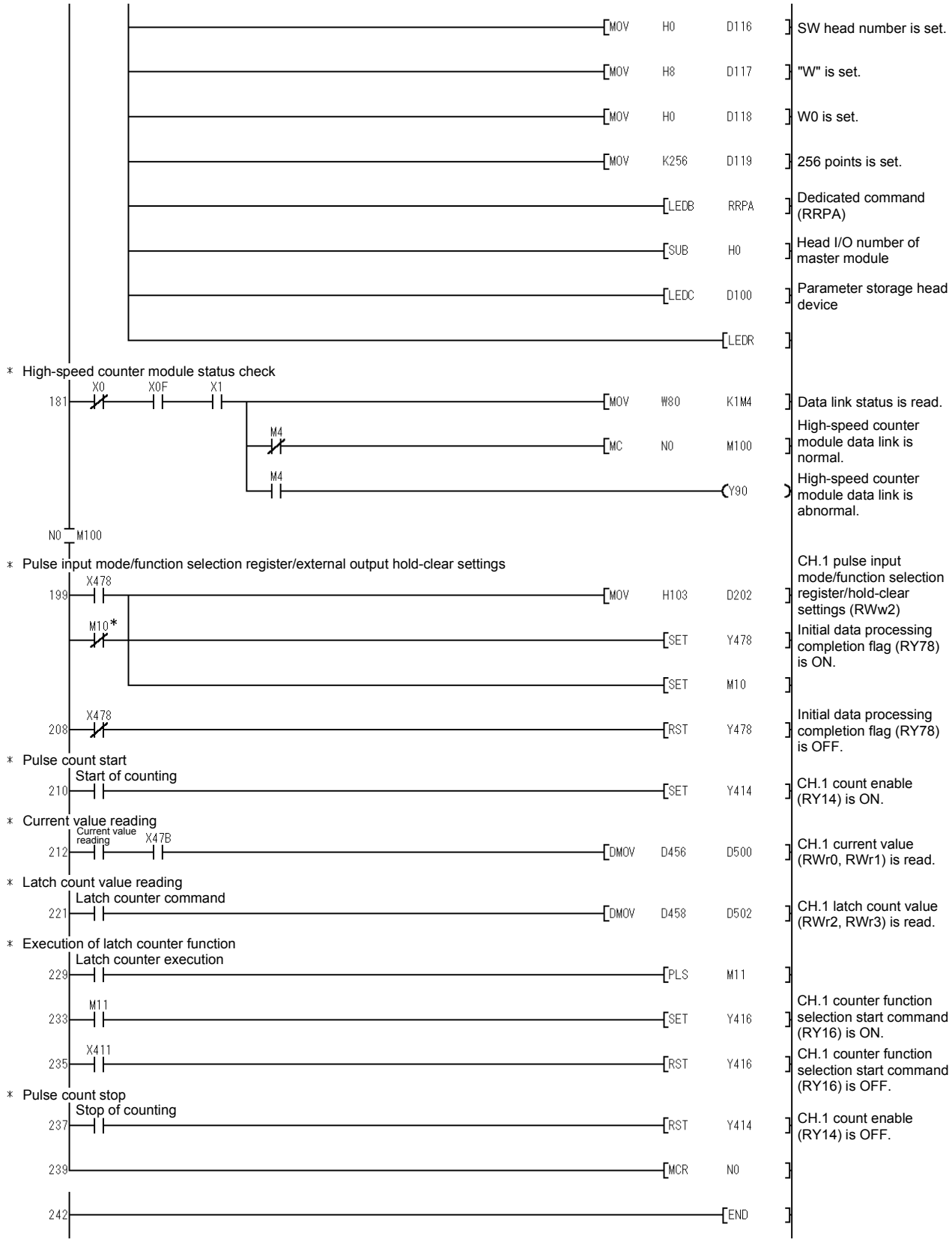





* When the PLC CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

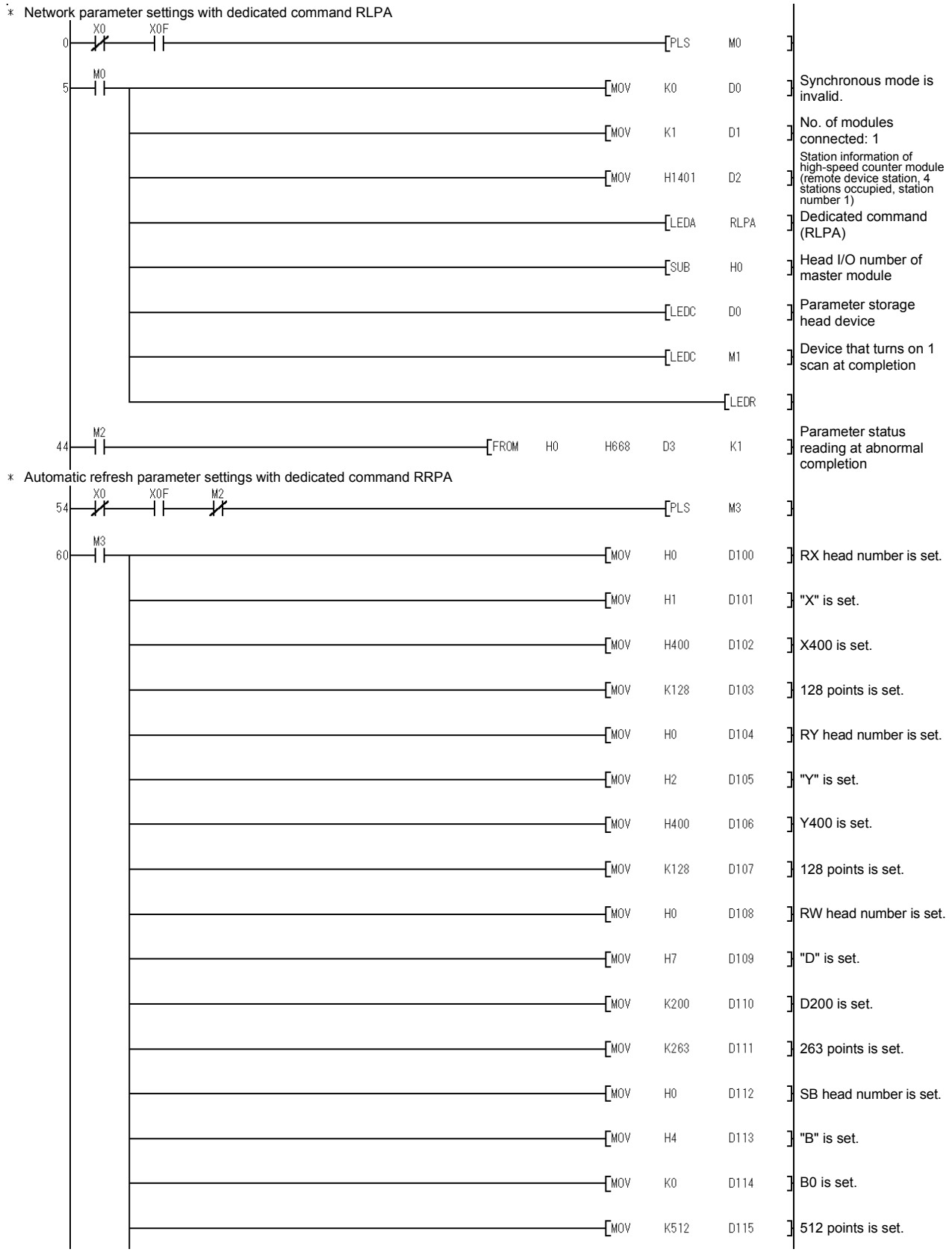
## 10.5.6 Program example of latch counter function

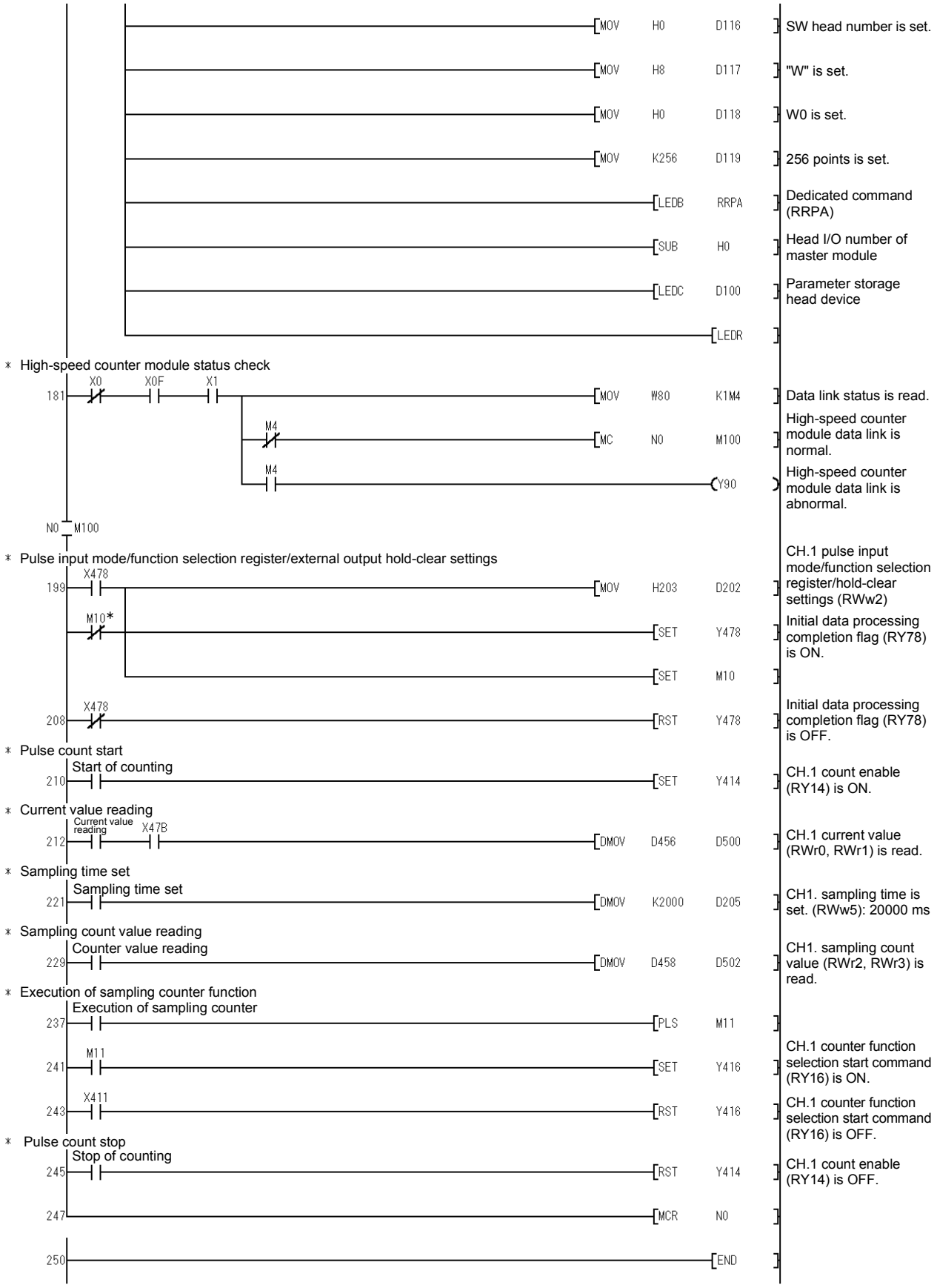





* When the PLC CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

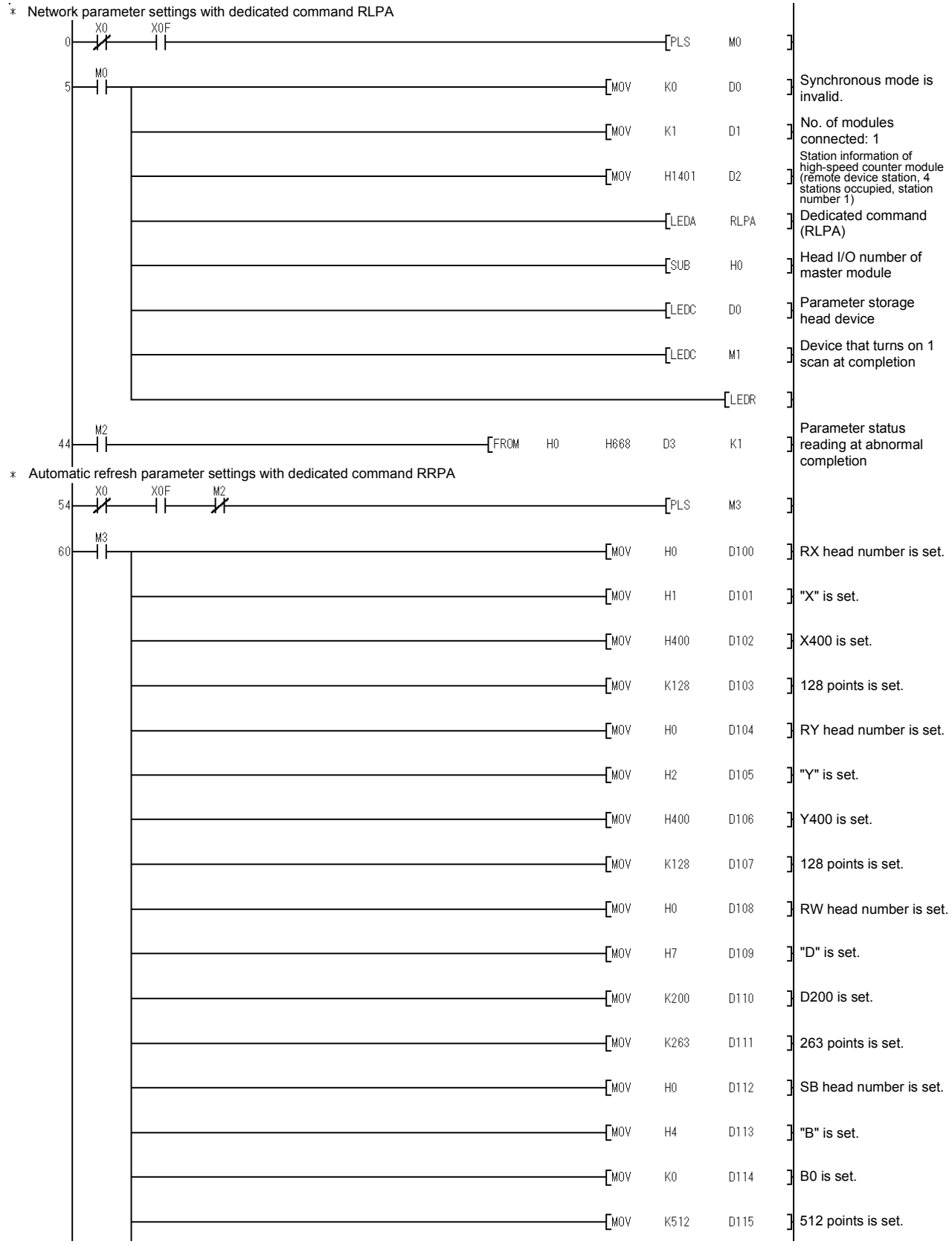
## 10.5.7 Program example of sampling counter function

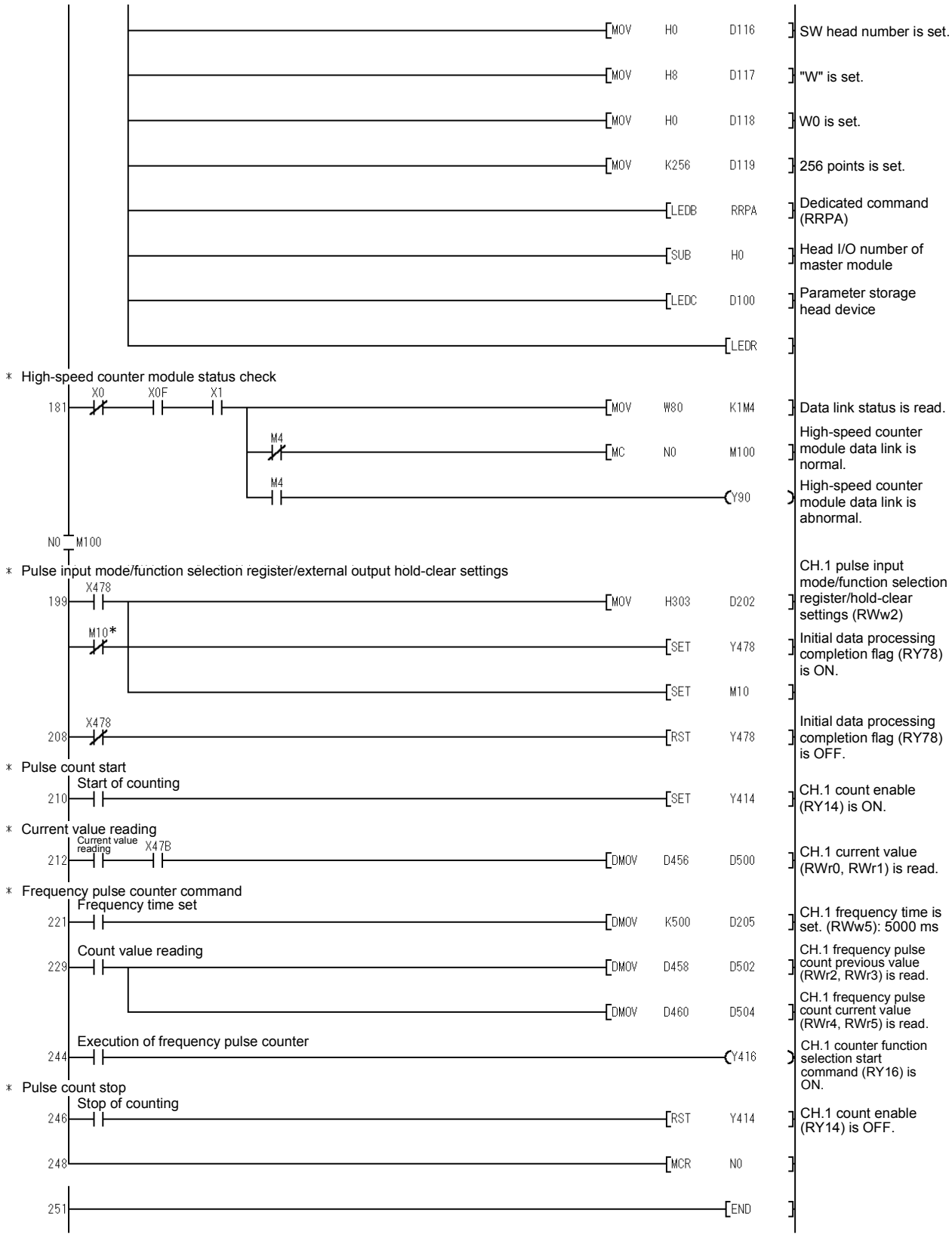





* When the PLC CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

## 10.5.8 Program example of frequency pulse counter function



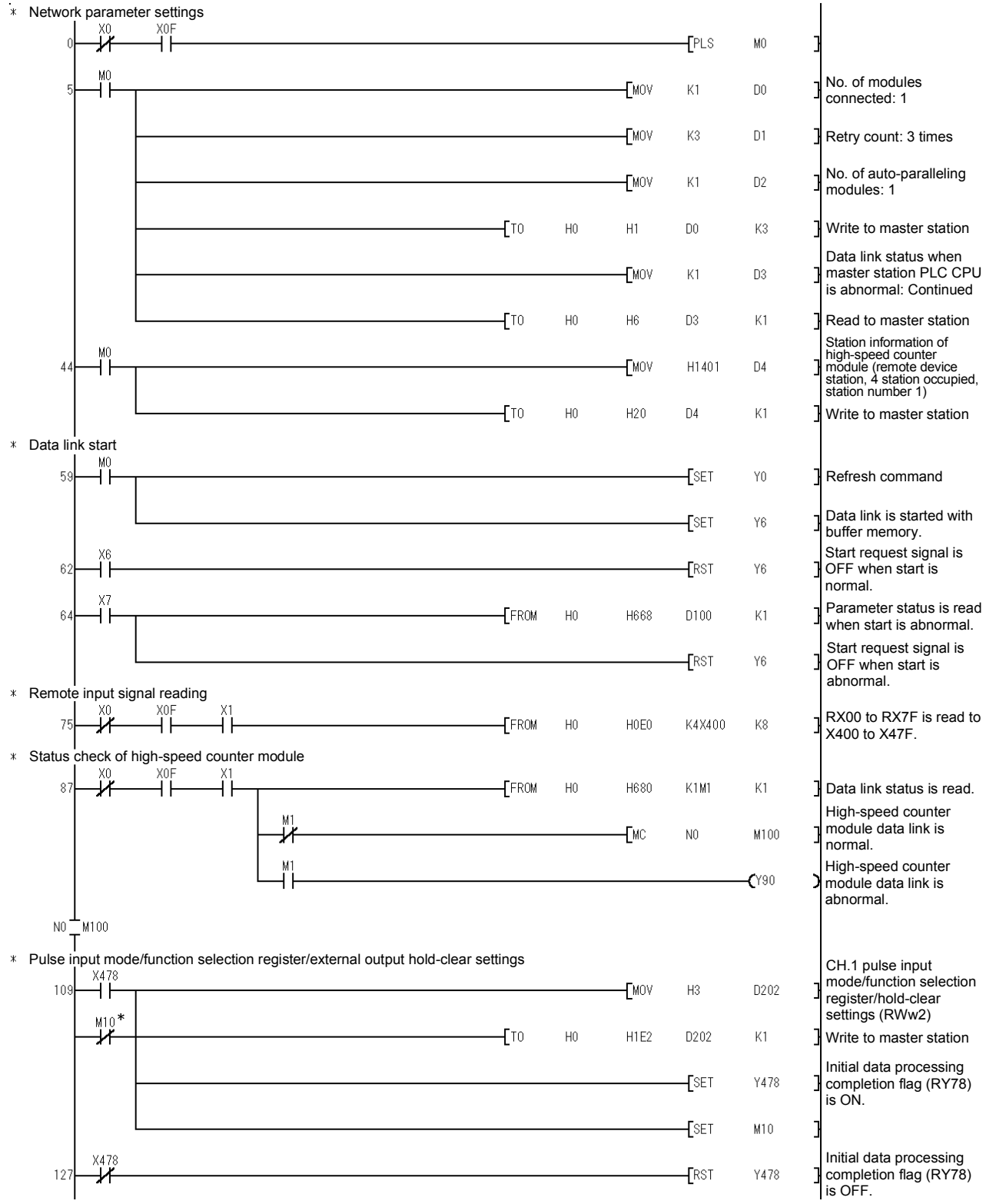



* When the PLC CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.

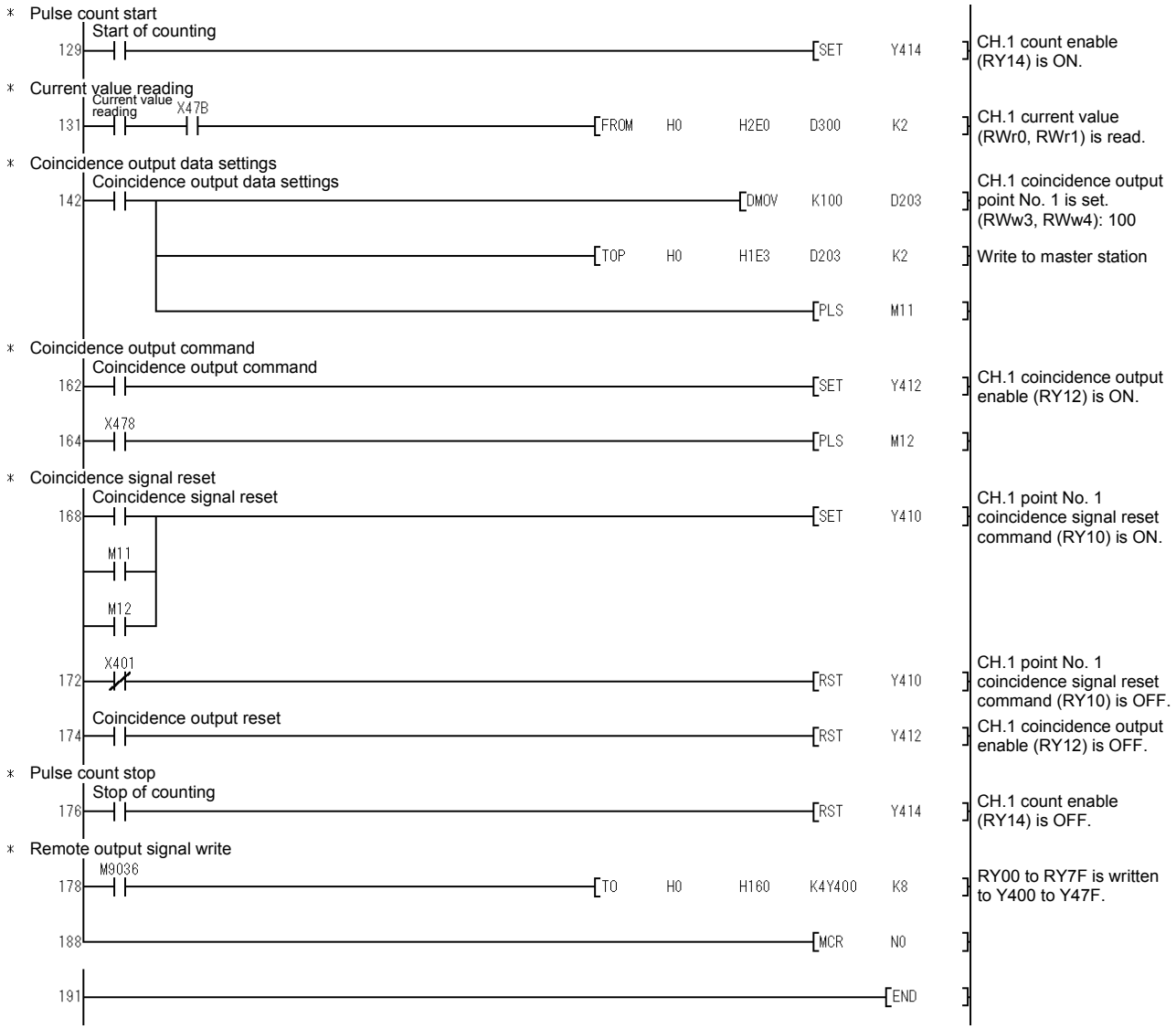
## 10.6 Program Example when ACPU/QCPU (A Mode) is Used (From/To Command)

Network parameters are set by the sequence program.

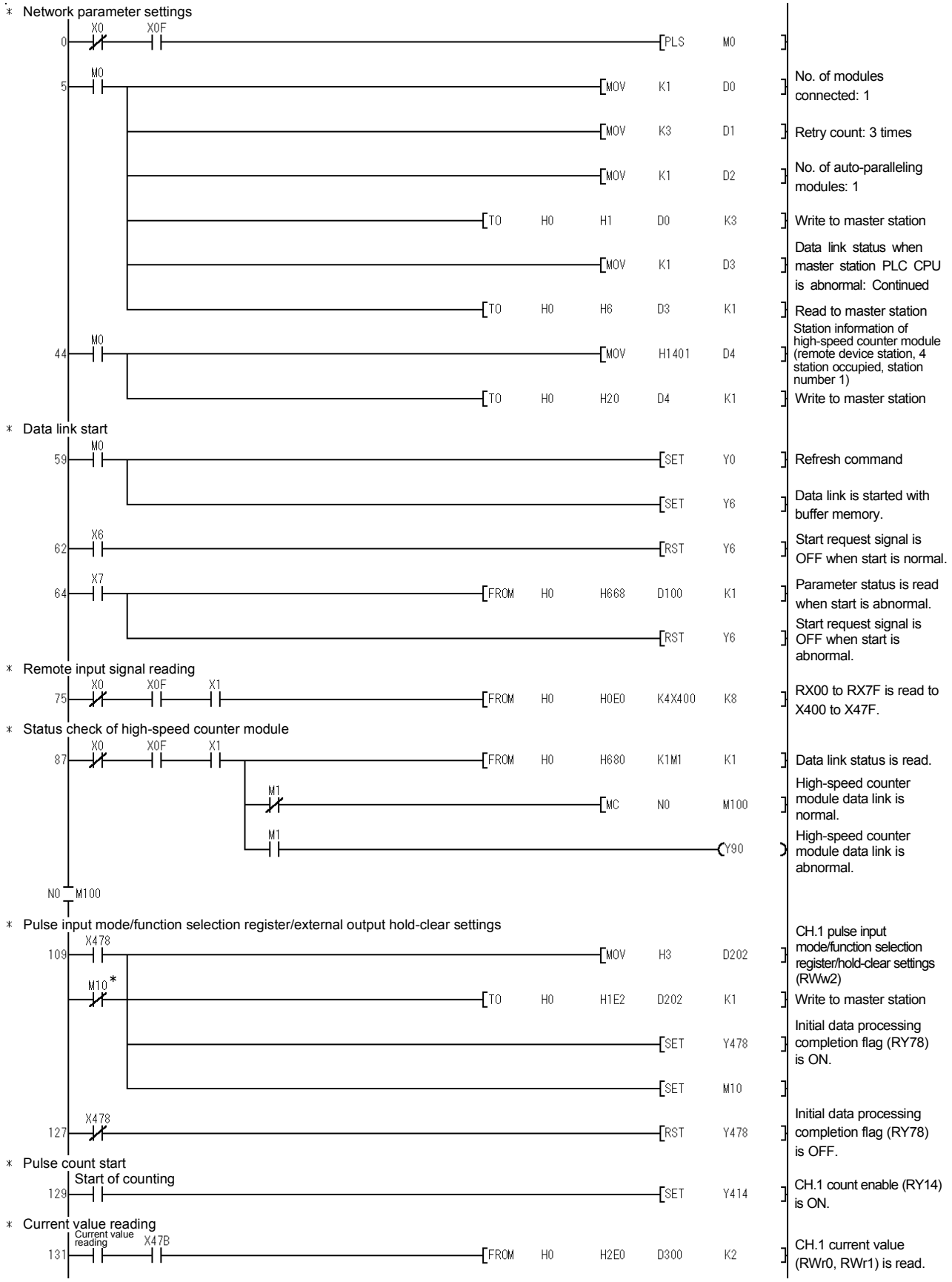
### 10.6.1 Program example of coincidence output function



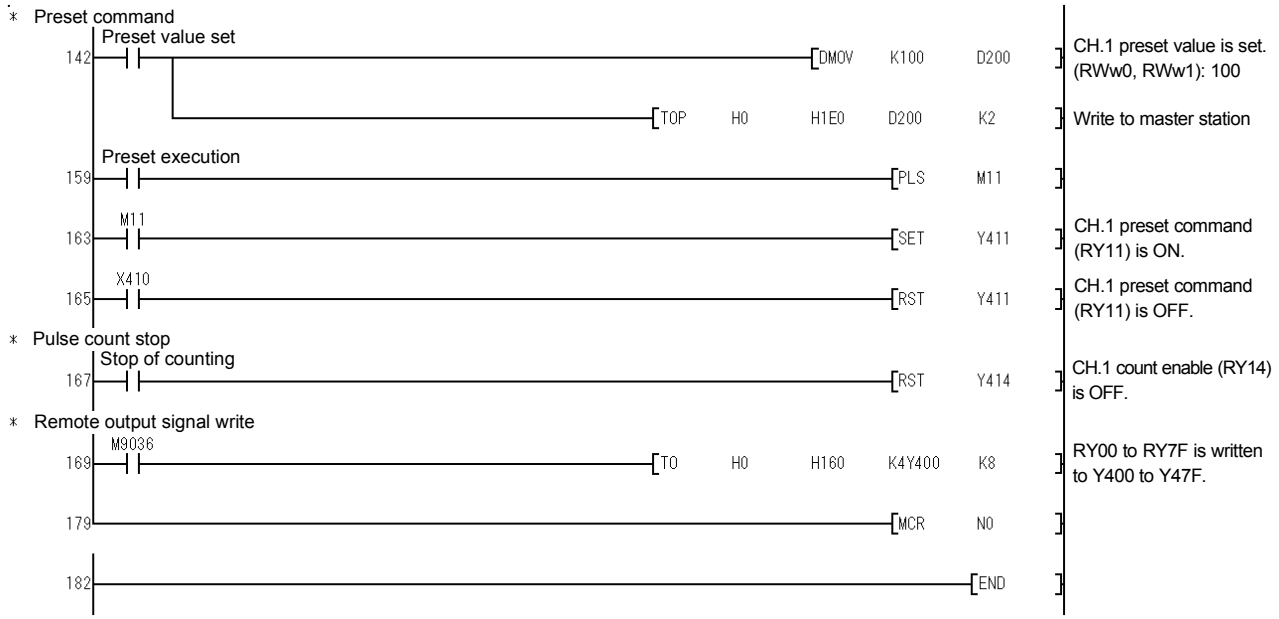

* When the PLC CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.


* 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

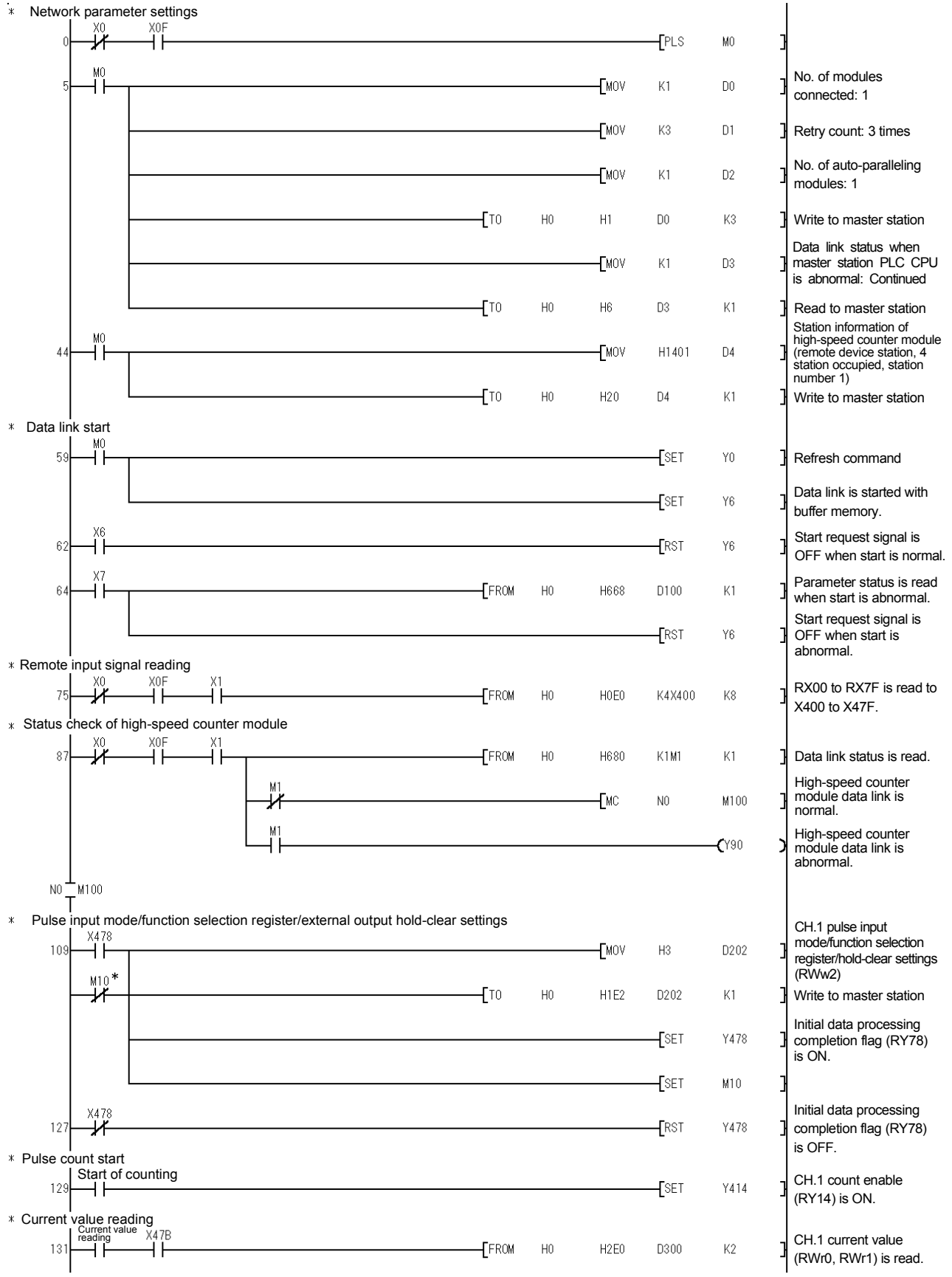
## 10.6.2 Program example of preset with sequence program



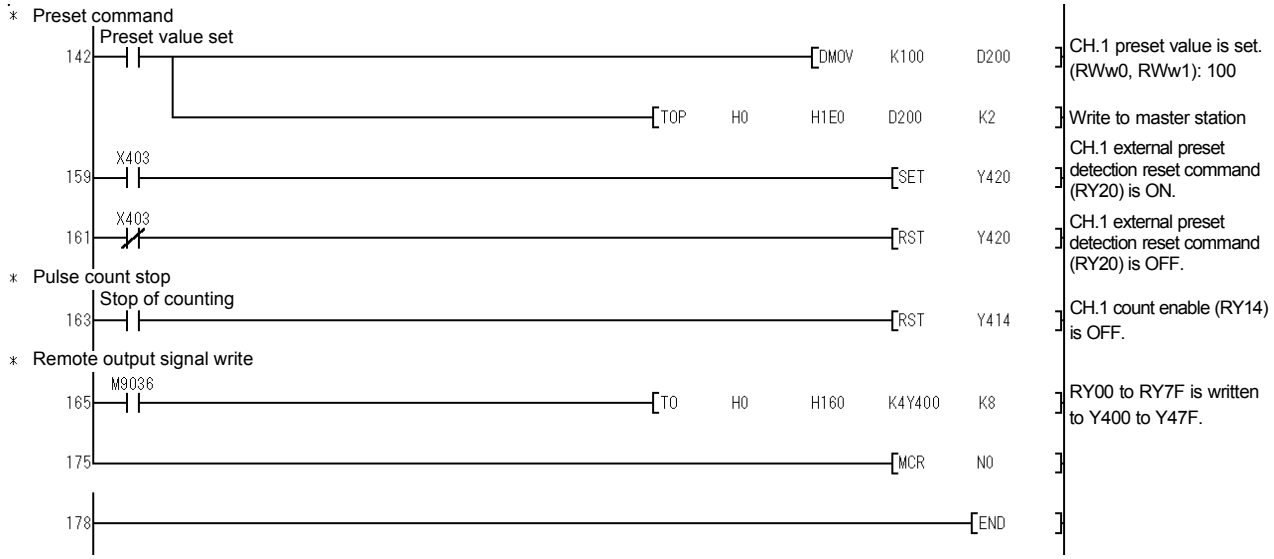

* When the PLC CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.


* 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

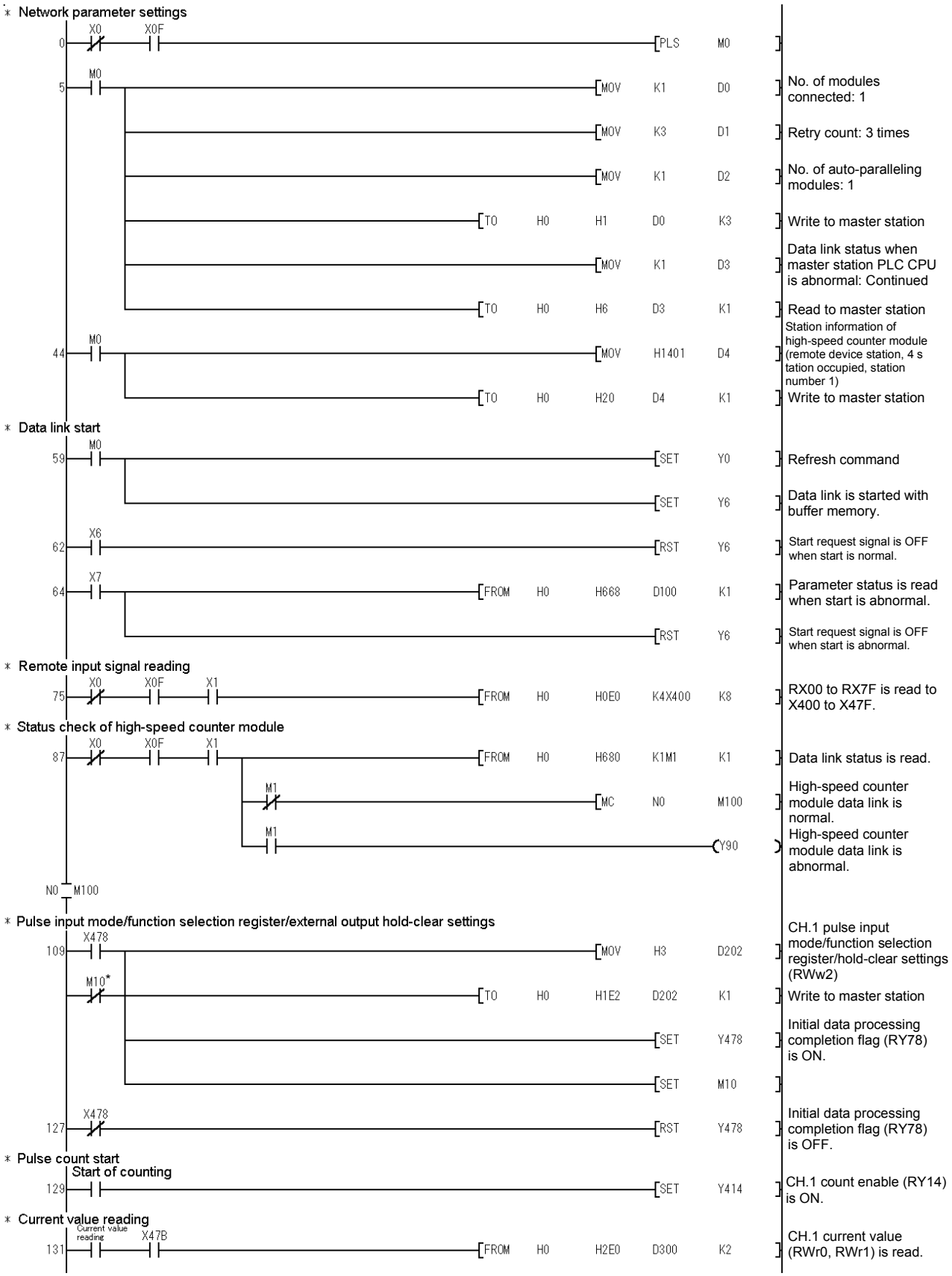
## 10.6.3 Program example of preset with external control signal



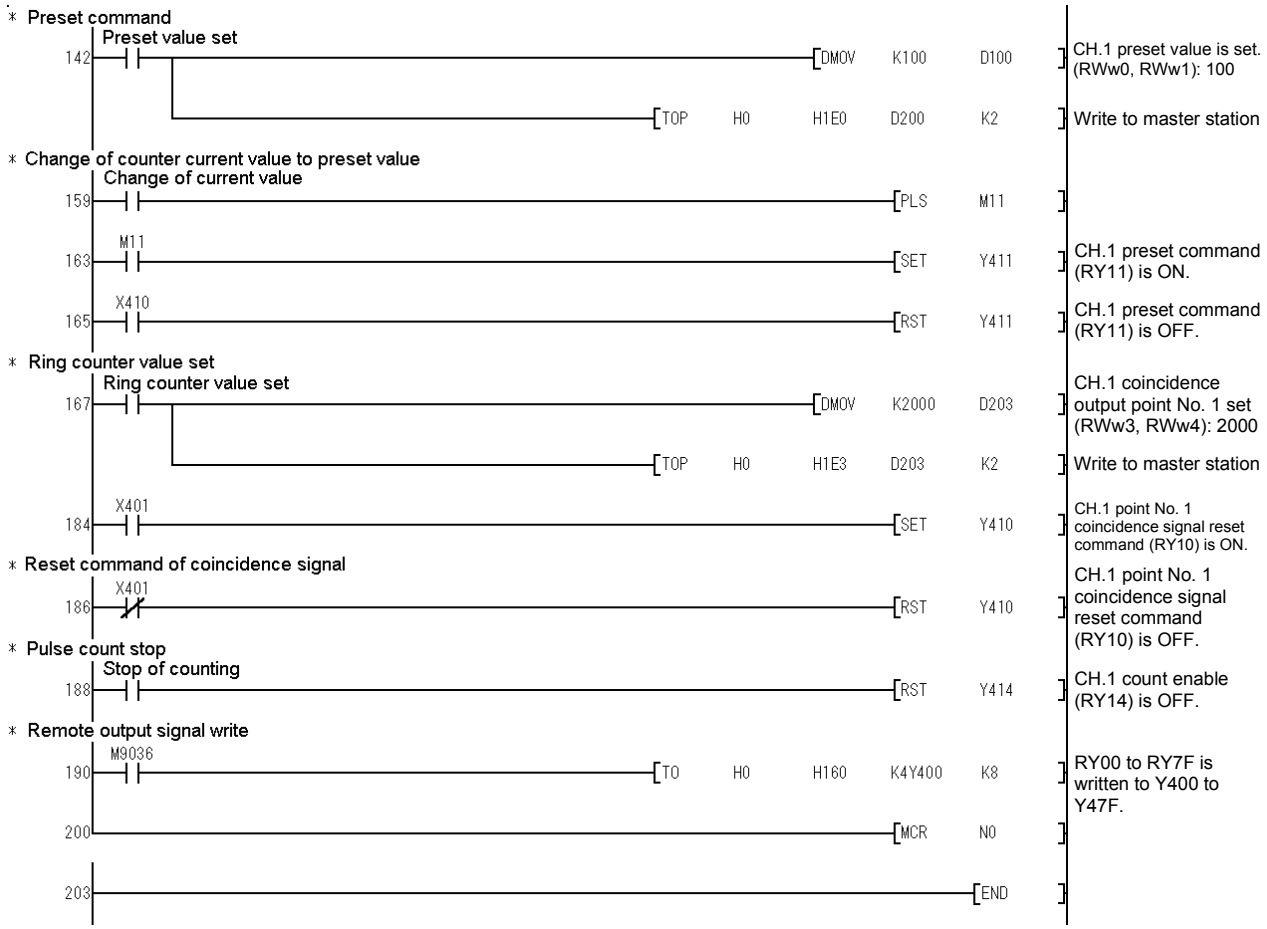

* When the PLC CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.


* 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
X403
159
SET Y420
CH.1 external preset detection reset command (RY20) is ON.
X403
161
RST Y420
CH.1 external preset detection reset command (RY20) is OFF.
* Pulse count stop
Stop of counting
163
RST Y414
CH.1 count enable (RY14) is OFF.
* Remote output signal write
M9036
165
TO H0 H160 K4Y400 K8
RY00 to RY7F is written to Y400 to Y47F.
175
MCR N0
178
END

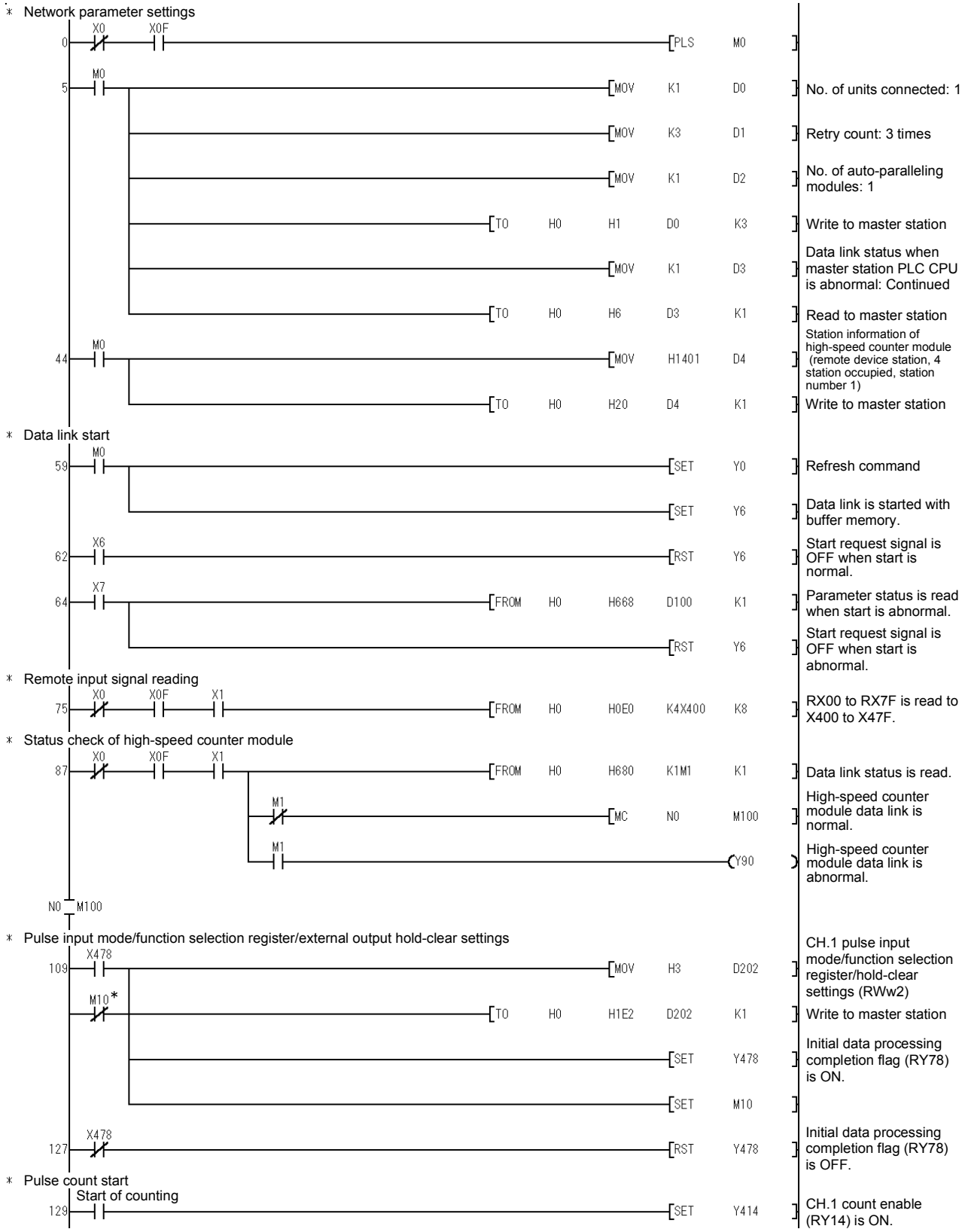
## 10.6.4 Program example of ring counter function



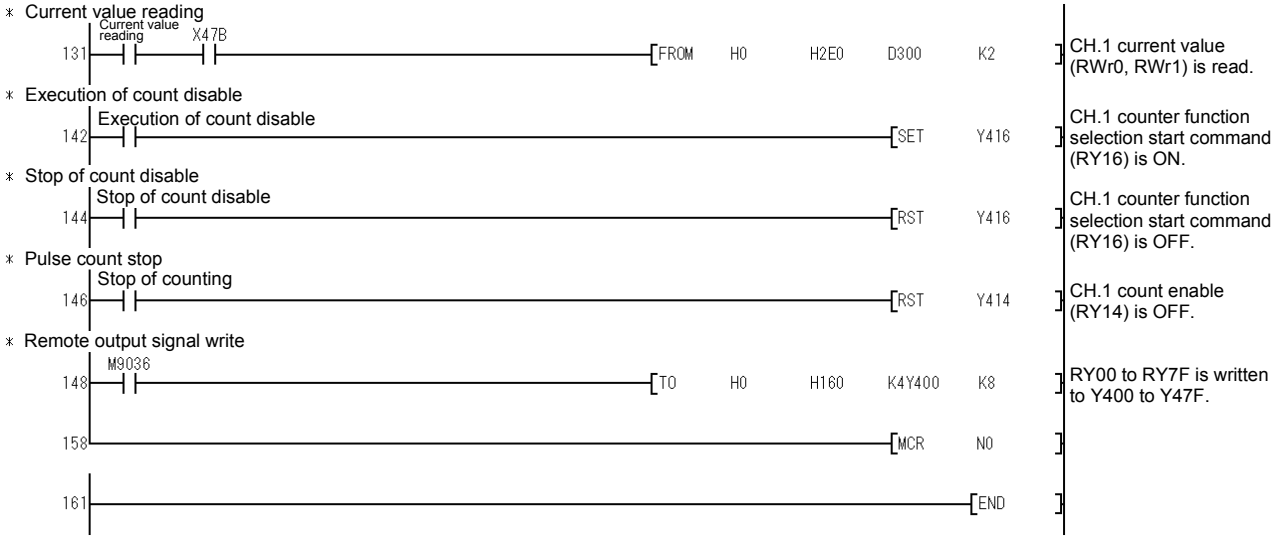

* When the PLC CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.


* Preset command
Preset value set
142
DMOV K100 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
Change of current value
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.
* Ring counter value set
Ring counter value set
167
DMOV K2000 D203
CH.1 coincidence output point No. 1 set (RWw3, RWw4): 2000
TOP H0 H1E3 D203 K2
Write to master station
X401
184
SET Y410
CH.1 point No. 1 coincidence signal reset command (RY10) is ON.
* Reset command of coincidence signal
X401
186
RST Y410
CH.1 point No. 1 coincidence signal reset command (RY10) is OFF.
* Pulse count stop
Stop of counting
188
RST Y414
CH.1 count enable (RY14) is OFF.
* Remote output signal write
M9036
190
TO H0 H160 K4Y400 K8
RY00 to RY7F is written to Y400 to Y47F.
200
MCR N0
203
END

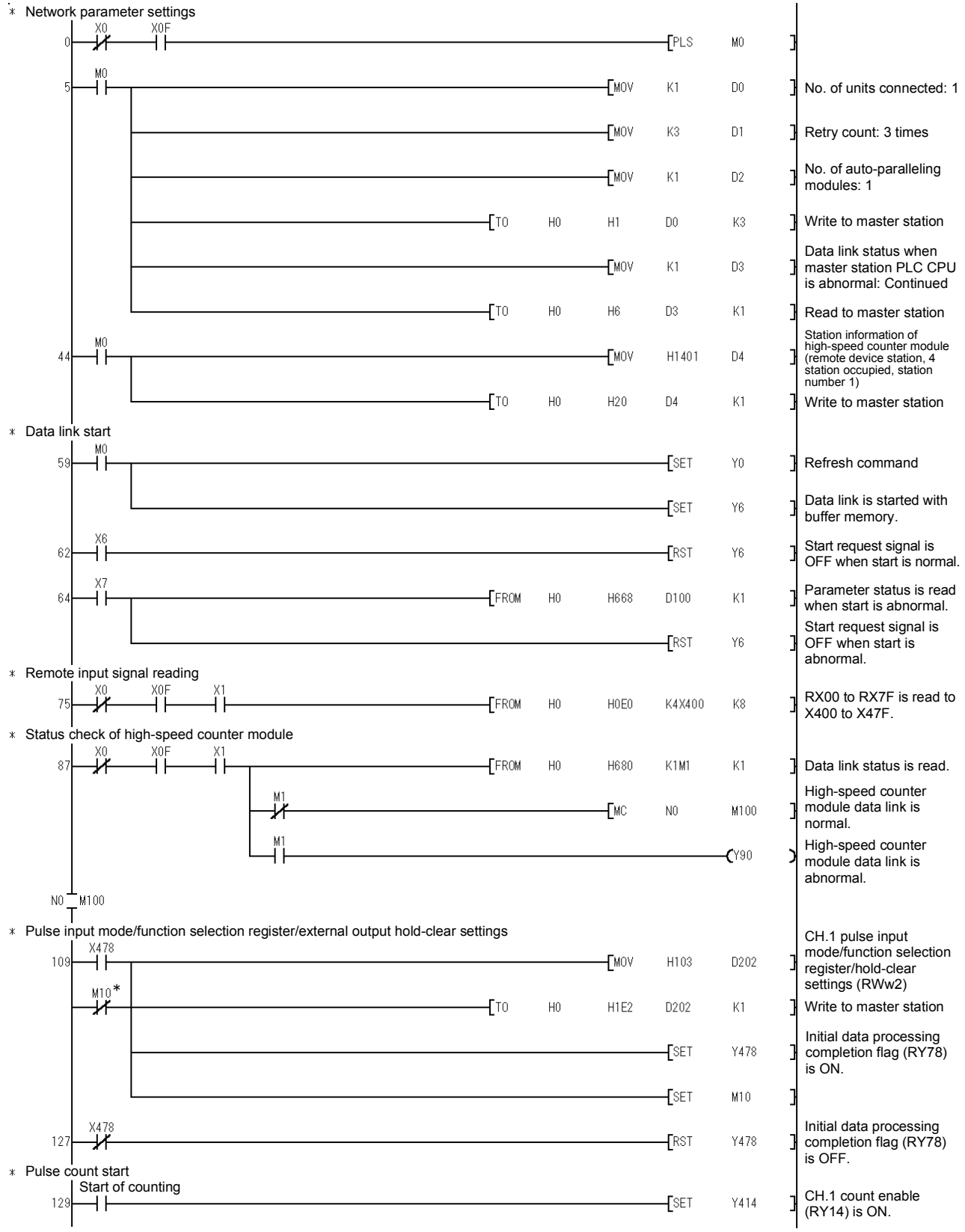
## 10.6.5 Program example of count disable function



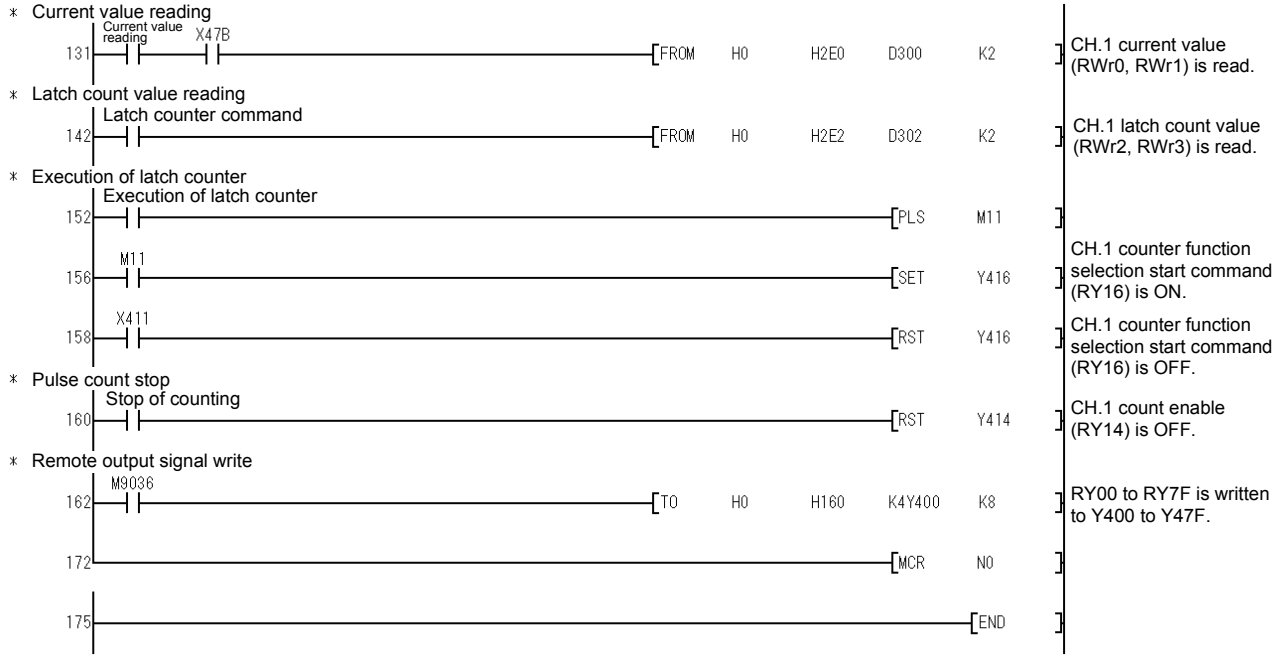

* When the PLC CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.


* 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

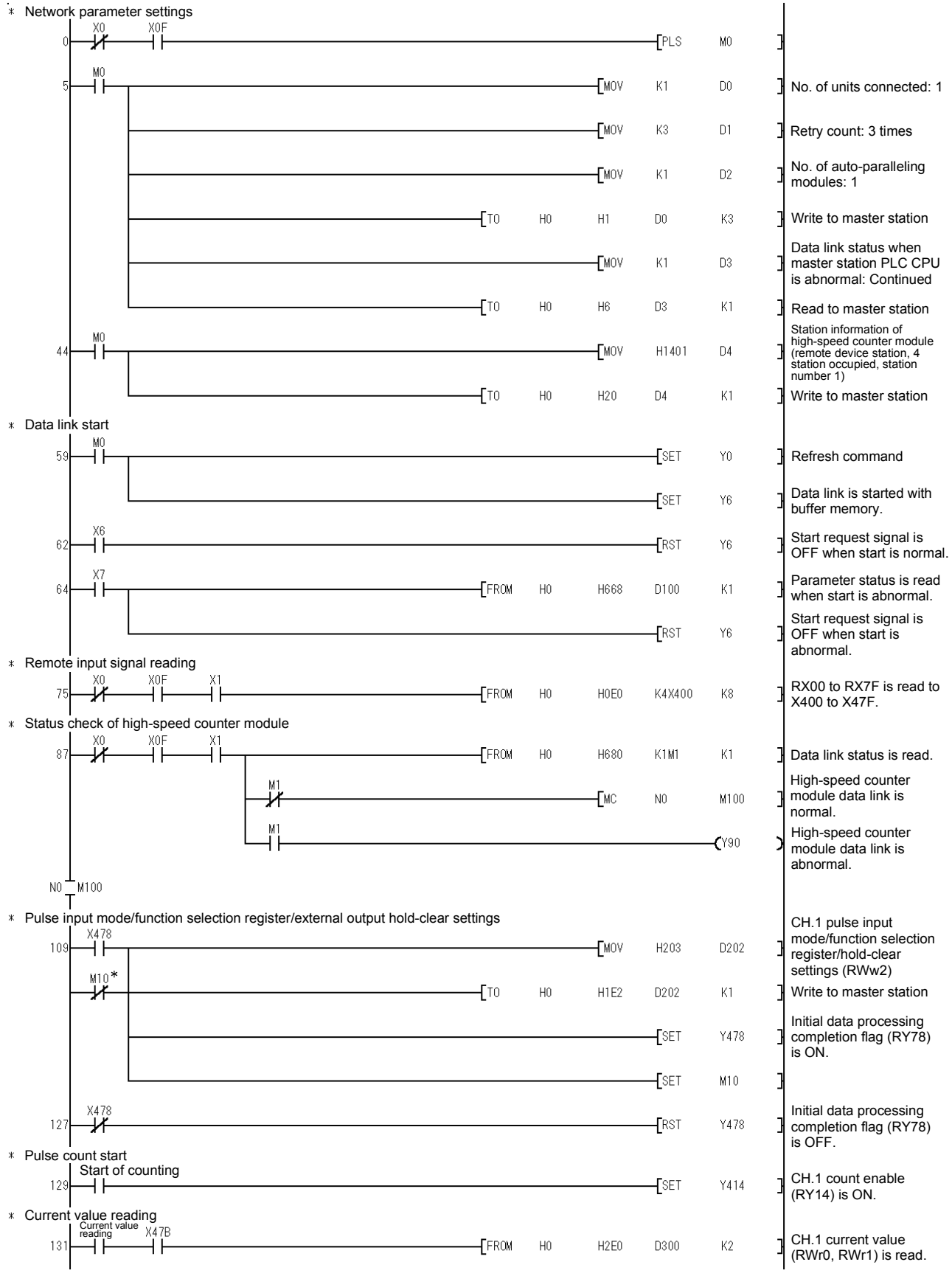
## 10.6.6 Program example of latch counter function



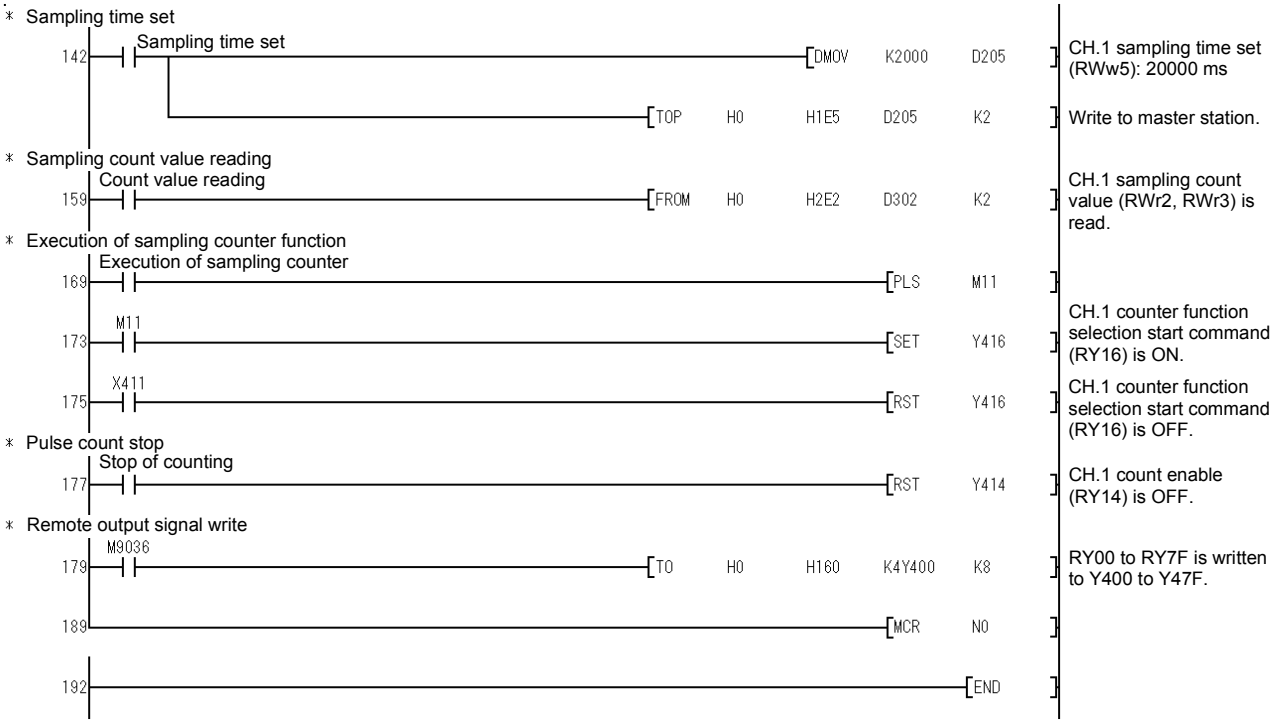

* When the PLC CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.


* 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

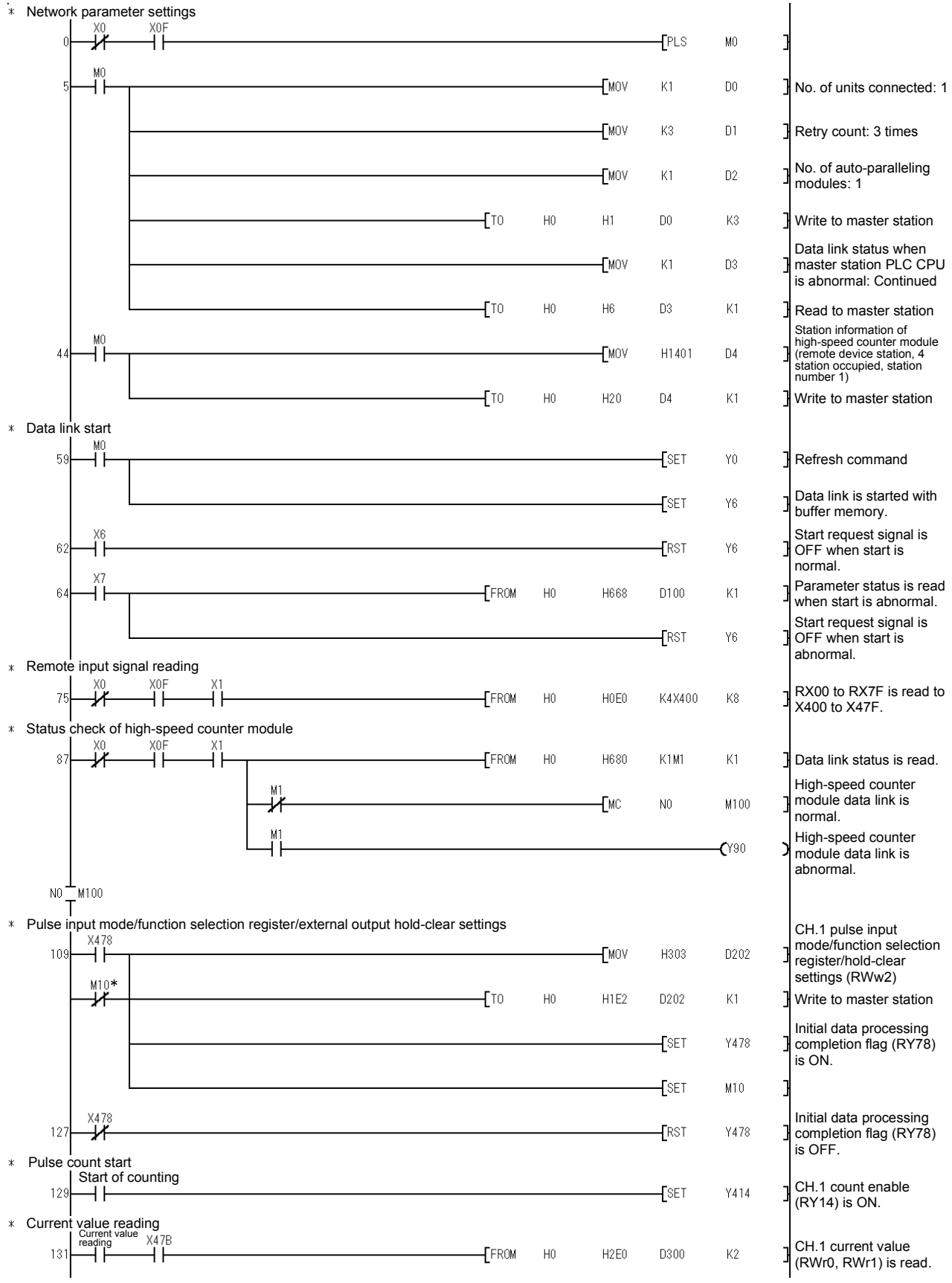
## 10.6.7 Program example of sampling counter function



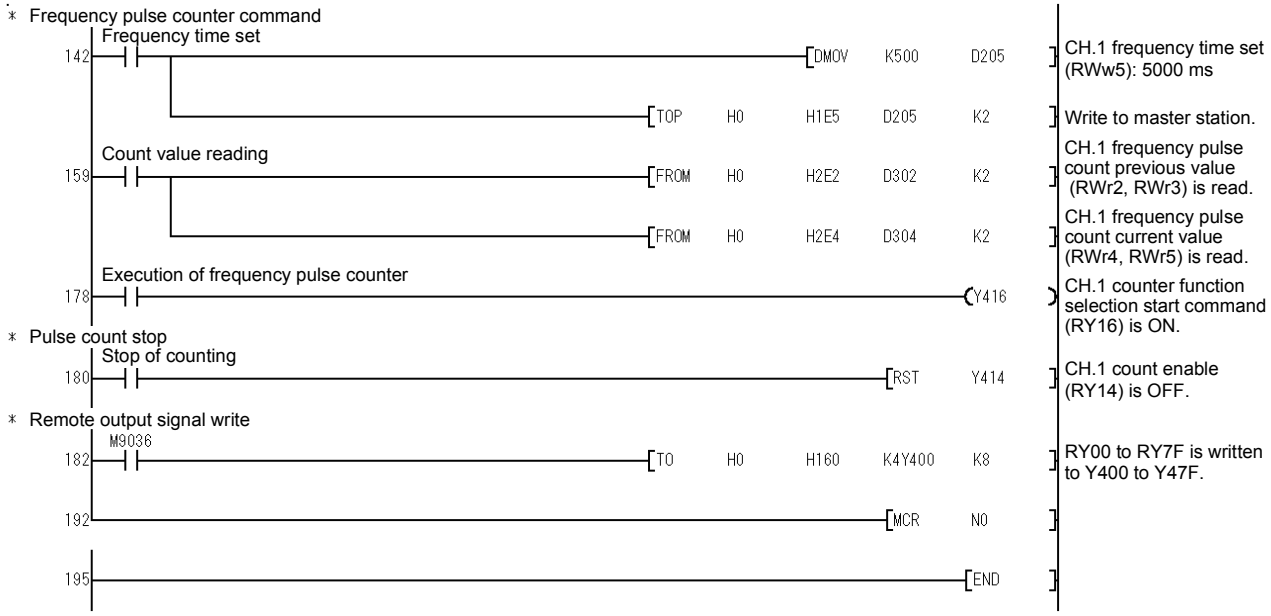

* When the PLC CPU is reset, the pulse input mode/function selection register/external output hold-clear settings are reset.


* 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
173
SET Y416
CH.1 counter function selection start command (RY16) is ON.
X411
175
RST Y416
CH.1 counter function 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 PLC 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 a twisted shielded cable used for pulse input wiring? | Use a twisted cable for wiring. |
| Does noise enter through the ground of the high-speed counter module? | · Disconnect the high-speed counter module from the ground.<br>· 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 (5.91 inch) 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, hardware is faulty. Check the cause of the fault and contact your sales 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 $\phi$A and $\phi$B correct? | Check the external wiring and make correction. |
| When a voltage is applied directly to the pulse input terminals of phases $\phi$A and $\phi$B, are the LEDs of phases $\phi$A and $\phi$B lit? | · If they are lit, check the external wiring and pulse generator and make correction.<br>· If they are not lit, hardware is faulty. Check the cause of the fault and contact your sales 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 PC CPU and master module, refer to the PC 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.<br>If the RUN LED is not lit after power is switched on again, the hardware may be faulty. Consult your sales 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.<br>If the L RUN LED is not lit after power is switched on again, the hardware may be faulty.<br>Consult your sales 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.<br>If the L RUN LED is not lit after power is switched on again, the hardware may be faulty.<br>Consult your sales representative. |
| Station number or transmission speed switch is faulty | If the L ERR. LED begins to flicker though switch setting was not changed during operation, the hardware may be faulty.<br>Consult your sales 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.<br>· Securely connect the FG terminal of the module to ground.<br>· 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

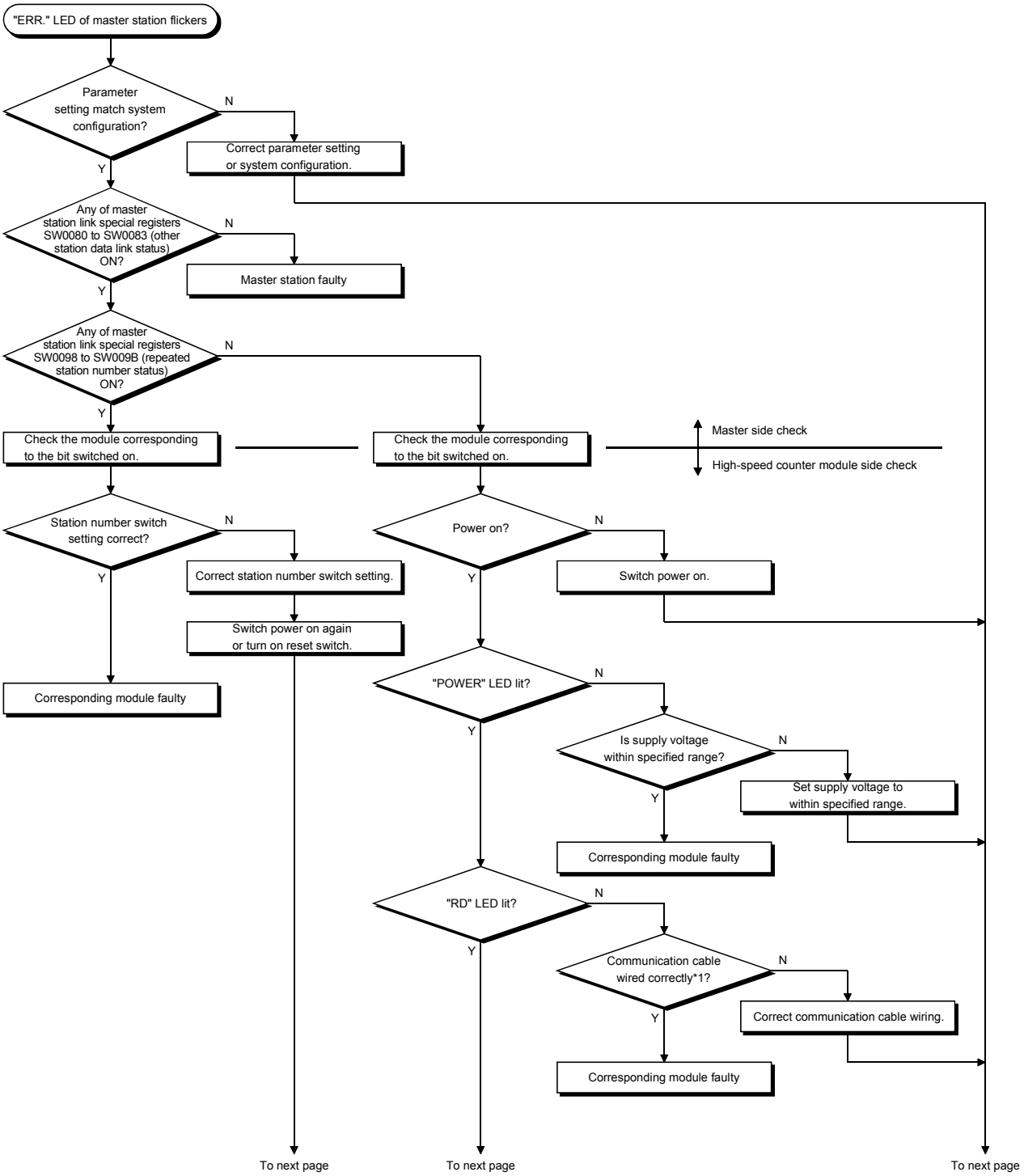
If the fuse of the high-speed counter module is blown, it can be confirmed by monitoring the link special registers for other station fuse blown status in the master station.

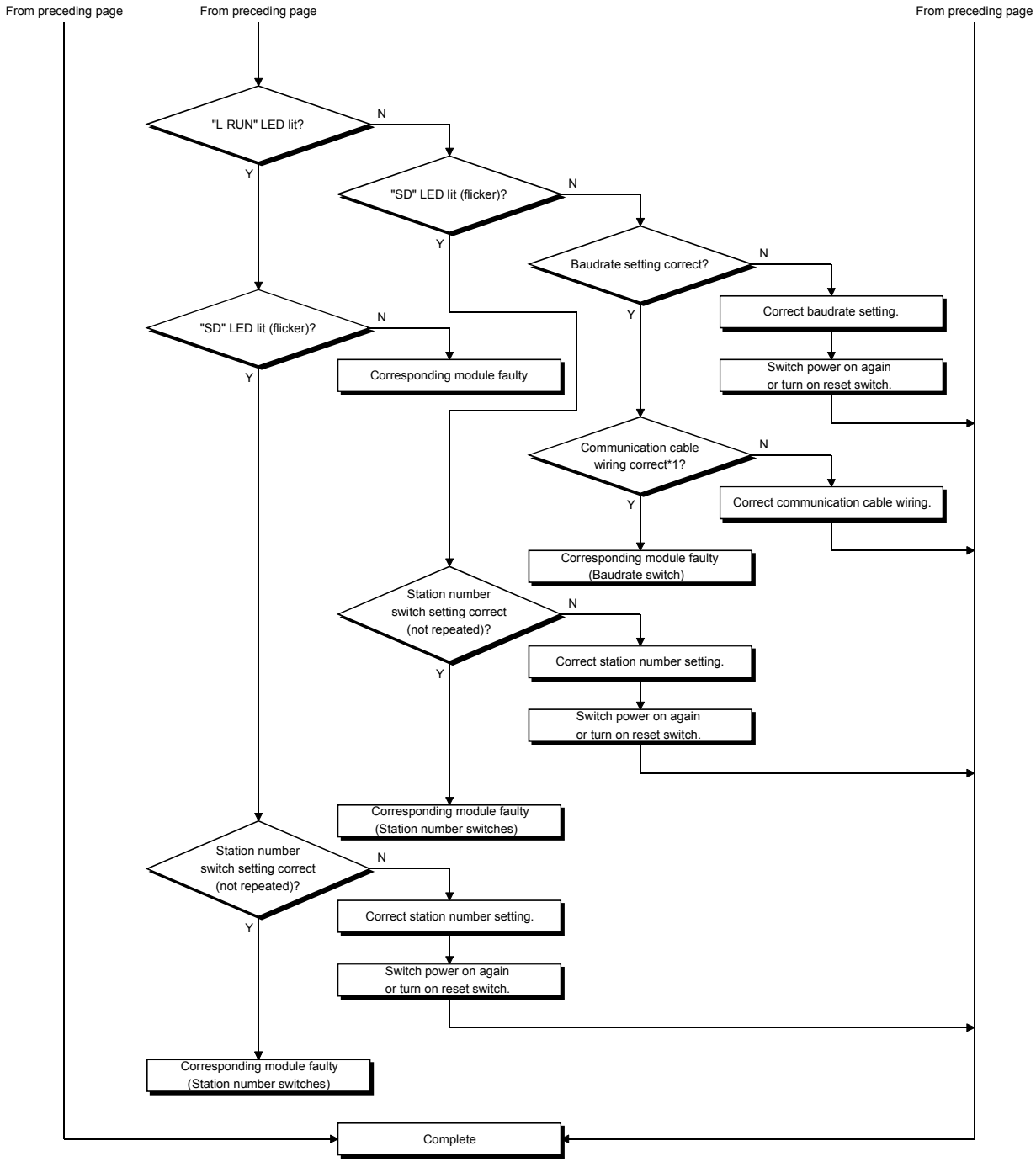
| Cause | Corrective Action |
|---|---|
| External power supply is not wired | When using the external output (EQU1 to EQU2) terminals, wire an 10.2VDC to 30VDC external power supply as it is needed. (Refer to 4.4.6) |
| Fuse is blown | The coincidence output function signal is not output.<br>(Fuse for external power supply which operates the internal photocoupler when the EQU terminals are used)<br>Since the fuse cannot be changed by the user, give details of the fault and consult our branch or sales 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.

# APPENDIX

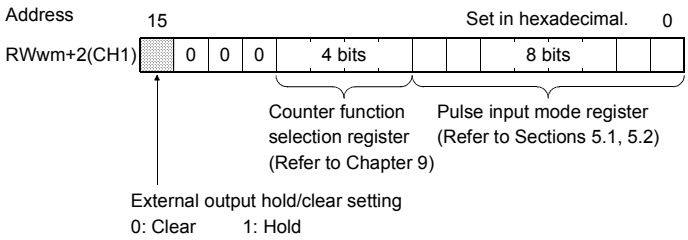
## Appendix 1 Directions for Use

(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, PC 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.

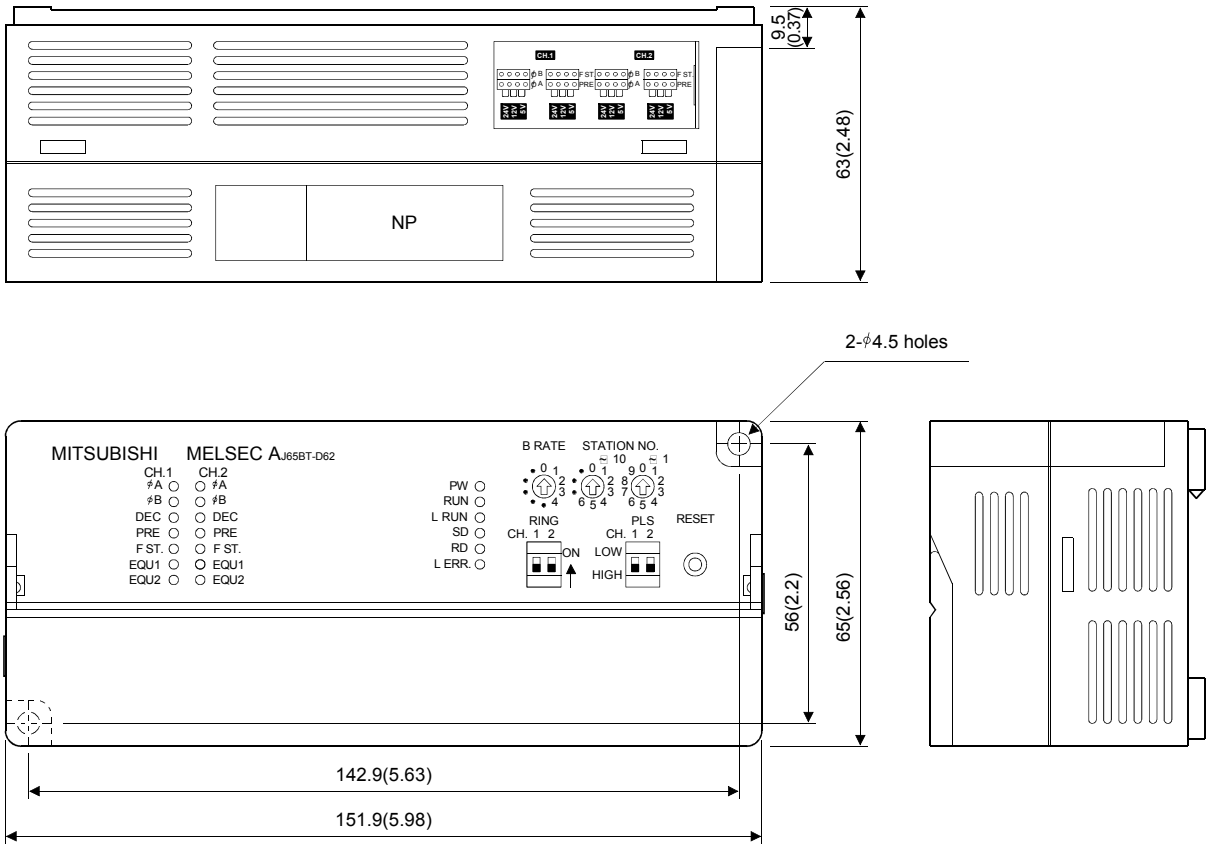
(4) If the fuse of the high-speed counter module is blown, it can be confirmed by monitoring the link special registers for other station fuse blown status in the master station.

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 | When using the external output (EQU1 to EQU2) terminals, wire an 10.2VDC to 30VDC external power supply as it is needed. (Refer to 4.4.6) |
| Fuse is blown | The coincidence output function signal is not output.<br>(Fuse for external power supply which operates the internal photocoupler when the EQU terminals are used)<br>Since the fuse cannot be changed by the user, give details of the fault and consult our branch or sales 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(inch)

# 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.

## 6. Product application

(1) In using the Mitsubishi MELSEC programmable logic controller, the usage conditions shall be that the application will not lead to a major accident even if any problem or fault should occur in the programmable logic controller device, and that backup and fail-safe functions are systematically provided outside of the device for any problem or fault.
(2) The Mitsubishi programmable logic controller has been designed and manufactured for applications in general industries, etc. Thus, applications in which the public could be affected such as in nuclear power plants and other power plants operated by respective power companies, and applications in which a special quality assurance system is required, such as for Railway companies or Public service purposes shall be excluded from the programmable logic controller applications.
In addition, applications in which human life or property that could be greatly affected, such as in aircraft, medical applications, incineration and fuel devices, manned transportation, equipment for recreation and amusement, and safety devices, shall also be excluded from the programmable logic controller range of applications.
However, in certain cases, some applications may be possible, providing the user consults their local Mitsubishi representative outlining the special requirements of the project, and providing that all parties concerned agree to the special circumstances, solely at the users discretion.

High-Speed Counter Module
Type AJ65BT-D62/AJ65BT-D62D/AJ65BT-D62D-S1

# User's Manual

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|---|---|
| MODEL | AJ65BT-D62-U-E |
| MODEL CODE | 13JL45 |
| IB(NA)-66823-F(0609)MEE | |

MITSUBISHI ELECTRIC CORPORATION

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