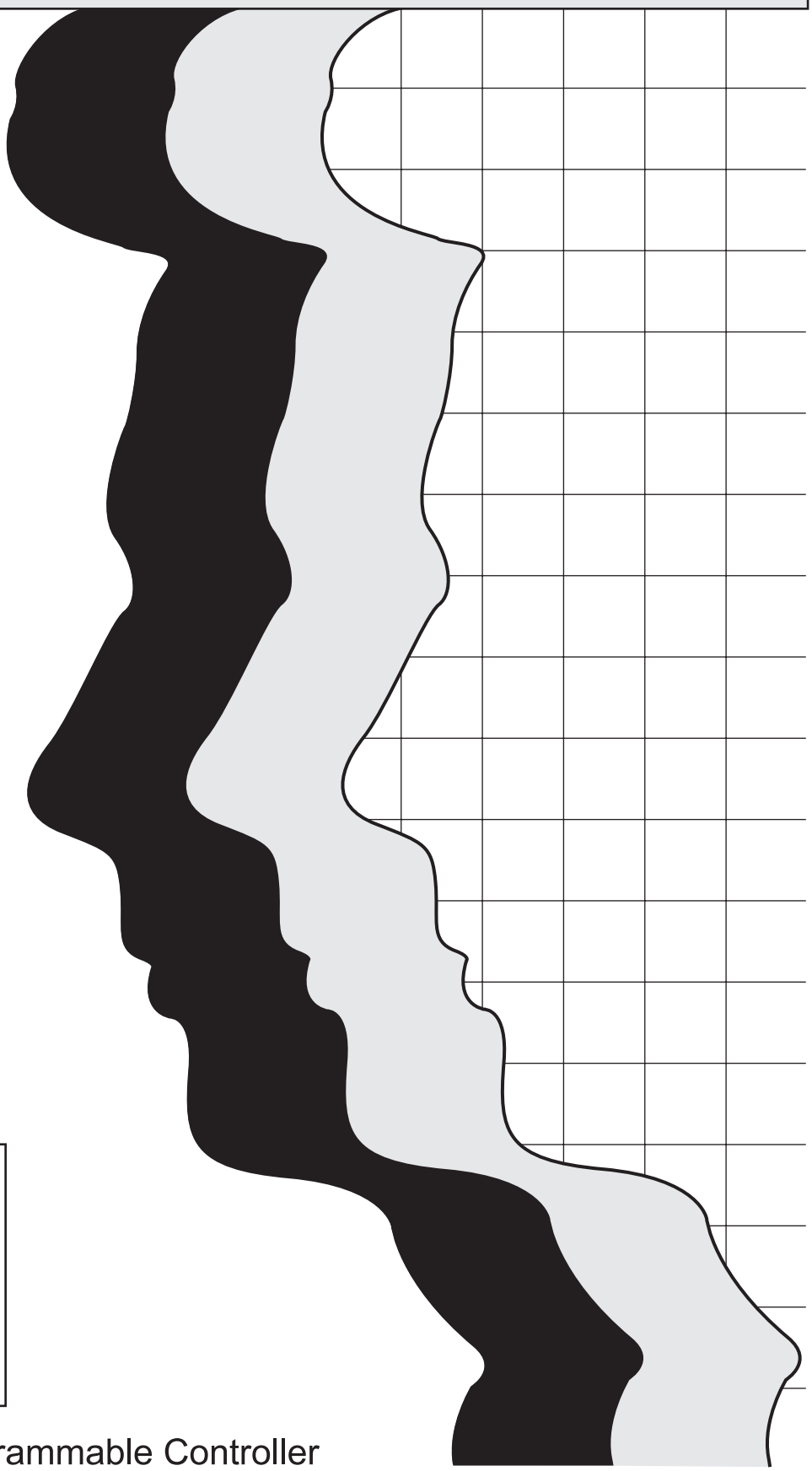
MITSUBISHI

High Speed Counter Module
Type A1SD62, A1SD62E, A1SD62D(S1)

# User's Manual



MELSEC

Mitsubishi Programmable Controller

# • SAFETY PRECAUTIONS •

(Read these precautions before using this product.)

Before using this product, please read this manual and the relevant manuals carefully and pay full attention to safety to handle the product correctly.
The safety cautions given here apply to this product in isolation. For information on the safety of the programmable controller system as a whole, refer to the CPU module User's Manual.
In this manual, the safety precautions are classified into two levels: "⚠ WARNING" and "⚠ CAUTION".

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

Under some circumstances, failure to observe the precautions given under "⚠ CAUTION" may lead to serious consequences.
Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[Design Precautions]

**⚠ WARNING**

- An external output transistor failure may keep output ON or OFF. Add an external monitoring circuit for output signals whose incorrect exetution could result in serious accidents.

**⚠ CAUTION**

- Use the programmable controller in the environment indicated in the general specifications of the manual.
  Using this programmable controller in an environment outside the range of the general specifications may cause electric shock, fire, malfunction, and damage to or deterioration of the product.

- Do not bundle control lines or communication wires together with main circuit or power lines, or lay them close to these lines.
  As a guide, separate the lines by a distance of at least 150 mm, otherwise malfunctions may occur due to noise.

[Installation Precautions]

**⚠ CAUTION**

- Do not touch any conductive part of the module directly.
  Doing so may cause malfunction or failure in the module.

- Mount the module after fully inserting the fixing projection on the bottom of the module into the fixing hole in the base unit, and then tighten the module fixing screws to the specified torque.
  Not doing so can cause a malfunction, failure or drop of the module.

[Wiring Precautions]

**⚠ CAUTION**

- Ground the shield wire to the encoder (relay box)(using class D (class 3) grounding or higher). Otherwise, malfunctioning will result.
- Carry out wiring to the programmable controller correctly, checking the rated voltage and terminal arrangement of the product. Using a power supply that does not conform to the rated voltage, or carrying out wiring incorrectly, will cause fire or failure.
- Input voltage in excess of the voltage set by the setting pin will cause failures.
- Tighten the terminal screws to the stipulated torque. Loose screws will cause short circuits, fire, or malfunctions. Overtightening may cause a short circuit or malfunctions due to a damaged screw.
- Make sure that no foreign matter such as chips or wiring offcuts gets inside the module. It will cause fire, failure or malfunction.

[Startup/Maintenance Precautions]

**⚠ WARNING**

- Do not touch terminals while the power is ON.
  Doing so may result in an electric shock or malfunction.
- Be sure to shut off all phases of the external power supply used by the system before cleaning or retightening the terminal screws. Carrying out this work while the power is ON will cause failure or malfunction of the module.

**⚠ CAUTION**

- Do not disassemble or modify any module.
  This will cause failure, malfunction, injuries, or fire.
- 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.
  Mounting or removing it with the power ON can cause failure or malfunction of the module.
- Do not mount/remove the module onto/from the base unit more than 50 times (IEC 61131-2-compliant), after the first use of the product.
  Doing so may cause malfunctions.
- Before handling the module, always touch grounded metal, etc. to discharge static electricity from the human body. Failure to do so can cause the module to fail or malfunction.

[Disposal Precautions]

**⚠ CAUTION**

- Dispose of this product as industrial waste.

# • CONDITIONS OF USE FOR THE PRODUCT •

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

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

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

## REVISIONS

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

| Print Date | *Manual Number | Revision |
|---|---|---|
| Dec., 1995 | IB (NA) 66593-A | First edition |
| Oct., 2002 | IB (NA) 66593-B | Add the A1SD62D-S1.<br>Addition<br>Section 3.2, 3.4, 3.5, 3.6, 4.3, 4.4.1, 4.4.2, 4.4.3, 4.4.4, Appendix 1, 2<br>Partial correction<br>SAFETY PRECAUTIONS, Chapter 2, Section 3.1, 3.2, 3.4, 3.5, 3.6, 4.3, 4.4.4, 5.3, 6.1.1, 6.1.2, 7.2.2, 7.3.1, 7.3.2, 8.1.3, 9.1, 9.2, 9.3.1, 9.4, 9.5, 11.3 |
| Sep., 2004 | IB (NA) 66593-C | Partial correction<br>Section 3.1, 5.3, 9.1, 9.1.2, 9.3, 9.4, 9.5 |
| Jul., 2005 | IB (NA) 66593-D | Partial correction<br>Section 9.5 |
| Jul., 2007 | IB (NA) 66593-E | Partial addition<br>SAFETY PRECAUTIONS<br>Partial correction<br>Section 9.3.1 |
| Mar., 2010 | IB (NA) 66593-F | Partial addition<br>SAFETY PRECAUTION, Chapter 2, Section 1.1, 3.1, 3.3, 9.4, "PLC" was changed to "programmable controller"<br>Addition<br>CONDITIONS OF USE FOR THE PRODUCT |
| | | |

Japanese Manual Version SH-3561-K

# INTRODUCTION

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

# CONTENTS

# MEMO

# 1. INTRODUCTION

This user's manual describes the specifications, handling and programming of the A1SD62/A1SD62E/A1SD62D(S1) type high-speed counter module (hereinafter called the A1SD62(E/D/D-S1)) to be used in combination with a MELSEC-A series CPU module (hereinafter called the programmable controller CPU).

The A1SD62, A1SD62E and A1SD62D(S1) are a DC input sink output type, a DC input source output type and a differential input sink output type, respectively.

The maximum counting speed is 100 kpps (A1SD62(E)) or 200 kpps (A1SD62D(S1)).

The A1SD62(E/D/D-S1) counts single-phase and 2-phase pulse inputs as shown below:

Single-phase pulse input multiplied by one

.....Counts at the rise or fall of the pulse.

Single-phase pulse input multiplied by two

.....Counts at the rise and fall of pulse.

2-phase pulse input multiplied by one

.....Counts at the rise or fall of the phase A pulse.

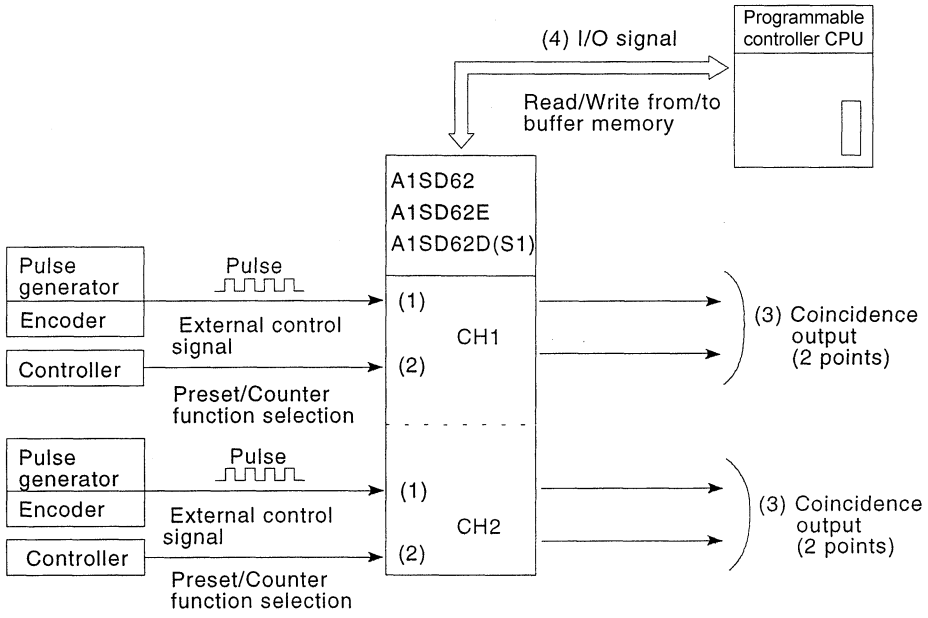
2-phase pulse input multiplied by two

.....Counts at the rise and fall of the phase A pulse.

2-phase pulse input multiplied by four

.....Counts at the rise and fall of the phase A and phase B pulses.

The following diagram outlines how the A1SD62(E/D/D-S1) operates.




(1) Input pulses to the A1SD62/A1SD62E/A1SD62D(S1) 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 helps confirm the I/O signals of the A1SD62/A1SD62E/A1SD62D(S1) and the buffer memory status, and start, stop and preset the counter.

## 1.1 Features

The following are the features of the A1SD62(E/D/D-S1):

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

(2) The count value can be multiplied (see Section 5).
Multiplication by either one or two can be selected for single-phase pulse inputs, or multiplication by one, two or four for 2-phase pulse inputs.

(3) The maximum counting speed can be switched (see Sections 3.2 and 4.3).
Since a maximum counting speed of either 100 k or 10 k can be selected with the A1SD62(E), or 200 k or 10 k with the A1SD62D(S1), accurate pulse counting is possible even with a slow rise/fall.

(4) Coincidence output is available (see Section 6).
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.

(5) A ring counter function is available (see Section 8).
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 selectable (see Section 9).
One 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 the incoming pulses within the preset period of time from signal input.

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

(d) Count disable function ..... Stops pulse counting with an input signal while the count enabled command is executed.

(7) The preset or counter function can be selected with an external control signal (see Section 7.3 and Section 9).

Applying the voltage to the PRESET (preset) terminal can be executed the preset function.
Applying the voltage to the F.START (function start) input terminal can be executed the preset function.
These functions can be used to eliminate the influence of scan time.

# 2. SYSTEM CONFIGURATION

(1) Appilcable CPUs

- A1SJCPU(S3)
- A1SJHCPU(S8)
- A1SCPU(S1)
- A1SCPUC24-R2
- A1SHCPU
- A2SCPU(S1)
- A2SHCPU(S1)
- A2ASCPU(S1/S30)
- A2USHCPU-S1
- Q2ASCPU(S1)
- Q2ASHCPU(S1)
- A52GCPU(T21B)

(2) Number mountable

Any number of modules can be used, provided the number of I/O points of the appilcable CPU is not exceeded.

(3) Available slots

The module can be installed to any slot in the base unit with the exception of the following cases.
When installing mounting modules in an extension base unit that does not have a power supply (A1S52B(S1), A1S55B(S1), A1S58B(S1)), the power supply capacity may be insufficient. Note that.
When installing an A1SD62(E/D/D-S1) to the extension base unit that has no power supply module, select the power supply module, main base unit, extension base unit and extension cable after fully considering the following factors:

1) Current capacity of the power supply module on the main base unit
2) Voltage drop at the main base unit
3) Voltage drop at the extension base unit
4) Voltage drop in the extension base cable

(4) Data link system

In a data link system, the module can be installed at a master station, local station, or remote I/O station. For an example of a remote I/O station program, refer to the MELSECNET, MELSECNET/B Data Link System Reference Manual.

**REMARK**

For Details on the ranges for the number of I/O points, and on calculating voltage drops, refer to the following manuais:

- Type A1S/A1SC24-R2/A2SCPU(S1) User's Manual ..... IB (NA)-66320
- Type A2ASCPU(S1) User's Manual ..... IB (NA)-66455
- Type A1SJH(S8)/A1SH/A2SHCPU(S1) User's Manual ..... IB-66779
- Type A2USHCPU-S1 User's Manual ..... IB-66789
- Model Q2AS(H)CPU(S1) User's Manual ..... SH-3599

# 3. SPECIFICATIONS

This section describes the general specifications of the A-series programmable controller CPUs, performance specifications of the A1SD62(E/D/D-S1), specifications of I/O signals to a programmable controller CPU and buffer memory.

## 3.1 General Specifications

Table 3.1 gives the general specifications of the A-series programmable controller CPUs.

**Table 3.1 General Specifications**

<table>
<tr><th>Item</th><th colspan="5">Specifications</th></tr>
<tr><td>Operating ambient temperature</td><td colspan="5">0 to 55 °C</td></tr>
<tr><td>Storage ambient temperature</td><td colspan="5">–20 to 75 °C</td></tr>
<tr><td>Operating ambient humidity</td><td colspan="5">10 to 90% RH, no dewing</td></tr>
<tr><td>Storage ambient humidity</td><td colspan="5">10 to 90% RH, no dewing</td></tr>
<tr><td rowspan="8">Vibration resistance</td><td rowspan="8">*3<br>Conforms to JIS B 3502 and IEC 61131-2.</td><td colspan="4">In case of intermittent vibration</td></tr>
<tr><td>Frequency</td><td>Acceleration</td><td>Amplitude</td><td>Sweep count</td></tr>
<tr><td>10 to 57 Hz</td><td>—</td><td>0.075 mm (0.003 inch)</td><td rowspan="2">10 times in each of X, Y and Z directions</td></tr>
<tr><td>57 to 150 Hz</td><td>9.8m/s$^2$</td><td>—</td></tr>
<tr><td colspan="4">In case of continuous vibration</td></tr>
<tr><td>Frequency</td><td>Acceleration</td><td>Amplitude</td><td>Sweep count</td></tr>
<tr><td>10 to 57 Hz</td><td>—</td><td>0.075 mm (0.003 inch)</td><td rowspan="2">—</td></tr>
<tr><td>57 to 150 Hz</td><td>9.8m/s$^2$</td><td>—</td></tr>
<tr><td>Shock resistance</td><td colspan="5">Conforms to JIS B 3502 and IEC 61131-2. (147 m/s$^2$, 3 times in each of three directions)</td></tr>
<tr><td>Operating atmosphere</td><td colspan="5">The atmosphere shall not contain corrosive gas.</td></tr>
<tr><td>Operating altitude *4</td><td colspan="5">2000 m (2187 yd.) or lower</td></tr>
<tr><td>Installation site</td><td colspan="5">Inside control panel</td></tr>
<tr><td>Overvoltage category *1</td><td colspan="5">II or lower</td></tr>
<tr><td>Contamination level *2</td><td colspan="5">2 or lower</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 300 V is 2,500 V.

*2 This is an index which 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.

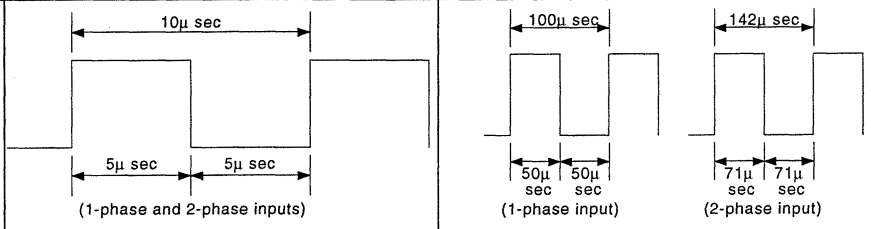
*3 JIS : Japanese Industrial Standard

*4 Do not use or store the programmable controller in the environment where the applied pressure is higher than the atmospheric pressure at the altitude of 0m. Doing so may cause a malfunction. When using under such pressure, consult our representative in a branch.

## 3.2 Performance Specifications

Table 3.2 gives the performance specifications of the A1SD62(E), and table 3.3 gives the performance specifications of the A1SD62D(S1).

**Table 3.2 Performance Specifications (A1SD62(E))**

<table>
<tr><th colspan="2">Item</th><th colspan="3">Specifications</th></tr>
<tr><td colspan="2">Counting speed switching pin</td><td colspan="2">100K</td><td>10K</td></tr>
<tr><td colspan="2">Number of I/O occupied points</td><td colspan="3">32</td></tr>
<tr><td colspan="2">Number of channels</td><td colspan="3">Two</td></tr>
<tr><td rowspan="2">Count input signal</td><td>Phase</td><td colspan="3">1-phase and 2-phase inputs</td></tr>
<tr><td>Signal levels (ØA and ØB)</td><td colspan="3">5 VDC<br>12 VDC<br>24 VDC<br>2 to 5 mA</td></tr>
<tr><td rowspan="5">Counter</td><td rowspan="2">Maximum counting speed*</td><td>1-phase input</td><td>100k pps</td><td>10k pps</td></tr>
<tr><td>2-phase input</td><td>100k pps</td><td>7k pps</td></tr>
<tr><td>Counting range</td><td colspan="3">24-bit binary<br>0 to 16777215</td></tr>
<tr><td>Type</td><td colspan="3">Equipped with UP/DOWN preset counter and ring counter functions</td></tr>
<tr><td>Minimum pulse width that can be counted(Adjust so that the rise/fall time of the input is 2.5µ sec or less. Duty ratio: 50 %)</td><td colspan="3"> 
</td></tr>
<tr><td rowspan="2">Coincidence output</td><td>Comparison range</td><td colspan="3">24-bit binary</td></tr>
<tr><td>Comparison result</td><td colspan="3">Set value < Count value<br>Set value = Count value<br>Set value > Count value</td></tr>
<tr><td rowspan="2">External input</td><td>Preset</td><td colspan="3" rowspan="2">5/12/24 VDC<br>2 to 5 mA</td></tr>
<tr><td>Function start</td></tr>
<tr><td rowspan="2">External output</td><td rowspan="2">Coincidence output</td><td>A1SD62</td><td colspan="2">Transistor (sink type) output 12/24 VDC 0.5 A/point 2 A/common</td></tr>
<tr><td>A1SD62E</td><td colspan="2">Transistor (source type) output 12/24 VDC 0.1 A/point 0.4 A/common</td></tr>
<tr><td colspan="2">Internal power consumption(5 VDC)</td><td colspan="3">0.1 A</td></tr>
<tr><td colspan="2">Weight</td><td colspan="3">0.25 kg</td></tr>
<tr><td colspan="2">Noise resistance</td><td colspan="3">Measure with a noise simulator which can generate 1500 Vp-p, 1-µs-wide, 25 to 60-Hz noise.</td></tr>
<tr><td colspan="2">Isolation specifications</td><td colspan="3"><table>
<tr><th>Specific isolated area</th><th>Isolation method</th><th>Dielectric withstand voltage</th><th>Insulation resistance</th></tr>
<tr><td>Between pulse input terminal and programmable controller power supply</td><td rowspan="4">Photocoupler isolation</td><td rowspan="4">500VAC for 1 minute</td><td rowspan="4">5MΩ or more (measured with a 500V DC insulation resistance tester)</td></tr>
<tr><td>Between present input terminal and programmable controller power supply</td></tr>
<tr><td>Between function start input terminal and programmable controller power supply</td></tr>
<tr><td>Between coincidence output terminal and programmable controller power supply</td></tr>
</table></td></tr>
<tr><td colspan="2">Grounding</td><td colspan="3">Class D grounding. Connect the grounding wire to the control box if grounding is impossible.</td></tr>
<tr><td colspan="2">Operating atmosphere</td><td colspan="3">The operating atmosphere shall not contain corrosive gases or excessive dust.</td></tr>
<tr><td colspan="2">Cooling method</td><td colspan="3">Self-cooling</td></tr>
</table>

* The counting speed is influenced by the pulse rise/fall time. The following counting speeds are possible. If a pulse is counted with a leading edge/fall time that is too long, a counter error may be caused.

| Counting Speed Setting Pin | 100K | | 10K | |
|---|---|---|---|---|
| Leading Edge/fall Time | 1-phase Input | 2-phase Input | 1-phase Input | 2-phase Input |
| t=2.5 μ sec or less | 100k pps | 100k pps | 10k pps | 7k pps |
| t=25 μ sec or less | 10k pps | 10k pps | 1k pps | 700 pps |
| t=500 μ sec | — | — | 500 pps | 250 pps |

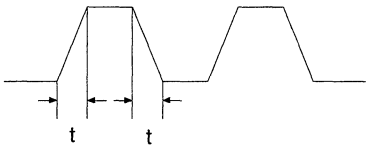
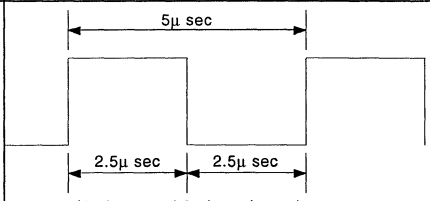
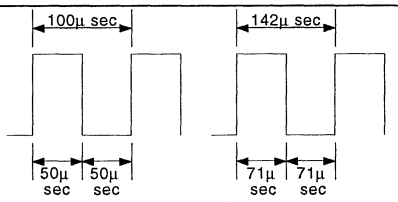



**Table 3.3 Performance Specifications (A1SD62D(S1))**

| Item | | Specifications | | |
|---|---|---|---|---|
| Counting speed switching pin | | 200K | | 10K |
| Number of I/O occupied points | | 32 | | |
| Number of channels | | Two | | |
| Count input signal | Phase | 1-phase and 2-phase inputs | | |
| | Signal levels (ØA and ØB) | EIA Standard RS-422-A Differential type line driver level {Am26LS31 (TEXAS INSTRUMENTS) or equivalent} | | |
| Counter | Maximum counting speed* | 1-phase input | 200k pps | 10k pps |
| | | 2-phase input | 200k pps | 7k pps |
| | Counting range | 24-bit binary 0 to 16777215 | | |
| | Type | Equipped with UP/DOWN preset counter and ring counter functions | | |
| | Minimum pulse width that can be counted(Adjust so that the rise/fall time of the input is 1.25μ sec or less. Duty ratio: 50 %) |   (1-phase and 2-phase inputs) | |   (1-phase input) (2-phase input) |
| Coincidence output | Comparison range | 24-bit binary | | |
| | Comparison result | Set value < Count value<br>Set value = Count value<br>Set value > Count value | | |
| External input | Preset | A1SD62D | 5/12/24VDC 2 to 5mA | |
| | | A1SD62D-S1 | EIA Standard RS-422-A Differential type line driver level (Am26LS31 or equivalent) | |
| | Function start | 5/12/24 VDC 2 to 5 mA | | |
| External output | Coincidence output | Transistor (sink type) output 12/24 VDC 0.5 A/point 2 A/common | | |
| Internal power consumption (5 VDC) | | 0.25 A | | |
| Weight | | 0.25 kg | | |

<table>
<tr><th>Item</th><th>Specifications</th></tr>
<tr><td>Noise resistance</td><td>Measure with a noise simulator which can generate 1500 Vp-p, 1-μs-wide, 25 to 60-Hz noise.</td></tr>
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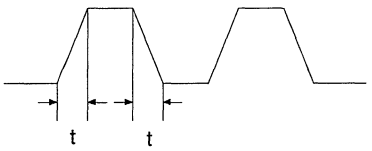
</table>

* The counting speed is influenced by the pulse rise/fall time. The following counting speeds are possible. If a pulse is counted with a rise/fall time that is too long, a counter error may be caused.

| Counting Speed Setting Pin | 200K | | 10K | |
|---|---|---|---|---|
| **Rise/fall Time** | **1-phase Input** | **2-phase Input** | **1-phase Input** | **2-phase Input** |
| t=1.25 μ sec or less | 200k pps | 200k pps | 10k pps | 7k pps |
| t=12.5 μ sec or less | 20k pps | 20k pps | 1k pps | 700 pps |
| t=250 μ sec | — | — | 500 pps | 250 pps |



## 3.3 Functions

Table 3.4 gives the functions of the A1SD62(E/D/D-S1).

**Table 3.4 Function Specifications**

| Function | | Description | Reference Section |
|---|---|---|---|
| Coincidence output function | | • Outputs an ON/OFF signal in a specified output status, comparing it with the present value of the counter. | 6 |
| Preset | | • Changes the present value of the counter.<br>• The preset operation can be done either by a sequence program or by an external preset input. | 7 |
| Ring counter | | • Counting alternates between the preset value and the ring counter value. | 8 |
| Counter function selection | Count disable | • Stops counting pulses while the count enable command is ON. | 9.2 |
| | Latch counter | • Stores the present value of the counter into the buffer memory when the signal of the counter function selection start command is input. | 9.3 |
| | Sampling counter function | • After inputting the signal of the counter function selection start command, the input pulse is counted during a specified period and stored in the buffer memory. | 9.4 |
| | Periodic pulse counter | • While inputting the signal of the counter function selection start command, the input pulses are stored in the buffer memory at specified intervals. | 9.5 |

**POINT**

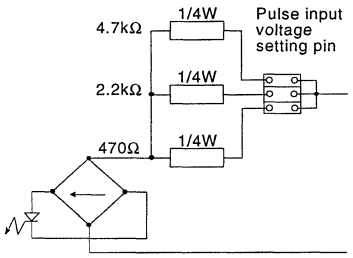
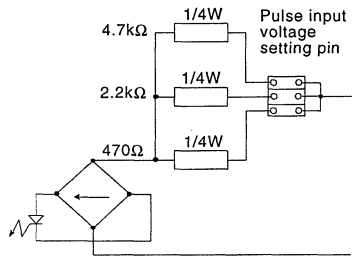
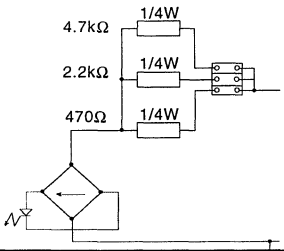
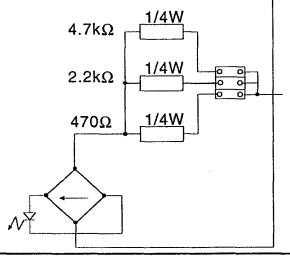
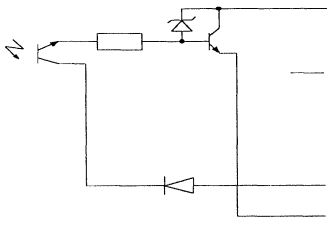
(1) Each function can be used in combination.
However, only one of the four functions can be selected in counter function selection.

(2) The preset function and counter function selection can be executed by a sequence program and external inputs.
- To use the preset function, apply the voltage to the PRESET (preset) terminal.
- To use counter function selection, apply the voltage to the F.START (function start) input terminal.

## 3.4 Interfaces with External Devices

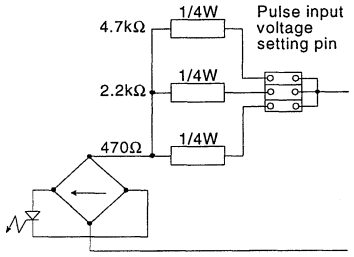
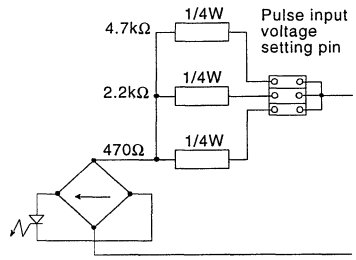
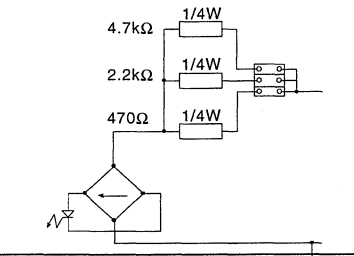
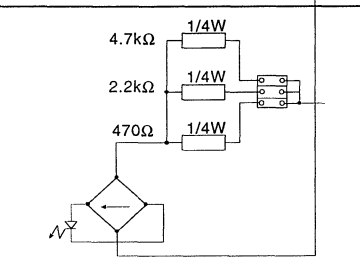
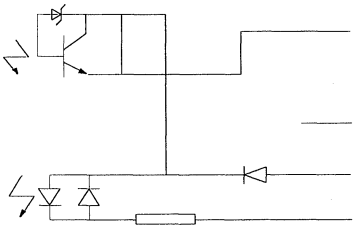
Tables 3.5, 3.6, 3.7 and 3.8 show a list of the interfaces of the A1SD62, A1SD62E and A1SD62D(S1) with external devices.

**Table 3.5 Interfaces with External Devices (A1SD62)**

| Input/ Output | Internal Circuit | Terminal No. *1 | Signal Name | ON/OFF | Input Voltage (Guaranteed Value) | Operating Current (Guaranteed Value) |
|---|---|---|---|---|---|---|
| Input |  | 1 (8) | Phase A pulse input 24V | ON | 21.6 to 26.4 V | 2 to 5 mA |
| | | | | OFF | 5 V or lower | 0.1 mA or lower |
| | | | Phase A pulse input 12V | ON | 10.8 to 13.2 V | 2 to 5 mA |
| | | | | OFF | 4 V or lower | 0.1 mA or lower |
| | | | Phase A pulse input 5V | ON | 4.5 to 5.5 V | 2 to 5mA |
| | | | | OFF | 2 V or lower | 0.1mA or lower |
| | | 2 (9) | COM | | | |
| |  | 3 (10) | Phase B pulse input 24V | ON | 21.6 to 26.4 V | 2 to 5 mA |
| | | | | OFF | 5 V or lower | 0.1mA or lower |
| | | | Phase B pulse input 12V | ON | 10.8 to 13.2 V | 2 to 5 mA |
| | | | | OFF | 4V or lower | 0.1mA or lower |
| | | | Phase B pulse input 5V | ON | 4.5 to 5.5 V | 2 to 5 mA |
| | | | | OFF | 2 V or lower | 0.1 mA or lower |
| | | 4 (11) | COM | | | |
| Input |  | 5 (12) | Preset input 24V | ON | 21.6 to 26.4 V | 2 to 5 mA |
| | | | | OFF | 5 V or lower | 0.1mA or lower |
| | | | Preset input 12V | ON | 10.8 to 13.2 V | 2 to 5 mA |
| | | | | OFF | 4 V or lower | 0.1mA or lower |
| | | | Preset input 5V | ON | 4.5 to 5.5 V | 2 to 5 mA |
| | | | | OFF | 2 V or lower | 0.1 mA or lower |
| | | 6 (13) | COM | Response time | OFF → ON 0.5 ms or less | ON → OFF 3 ms or less |
| Input |  | 7 (14) | Function start input 24V | ON | 21.6 to 26.4 V | 2 to 5 mA |
| | | | | OFF | 5 V or lower | 0.1 mA or lower |
| | | | Function start input 12V | ON | 10.8 to 13.2 V | 2 to 5 mA |
| | | | | OFF | 4 V or lower | 0.1 mA or lower |
| | | | Function start input 5V | ON | 4.5 to 5.5 V | 2 to 5 mA |
| | | | | OFF | 2 V or lower | 0.1 mA or lower |
| | | | | Response time | OFF → ON 0.5 ms or less | ON → OFF 3 ms or less |
| Output |  | 15 (17) | EQU1 | Operating voltage: 10.2 to 30 V<br>Rated current: 0.5 A/point<br>Maximum rush current: 4 A 10 ms<br>Maximum voltage drop at ON: 1.5 V<br>Response time: OFF → ON 0.1 ms or less<br>ON → OFF 0.1 ms or less | | |
| | | 16 (18) | EQU2 | | | |
| | | 19 | 12/24 V | Input voltage: 10.2 to 30 V<br>Current consumption: 8 mA (TYP 24 VDC) | | |
| | | 20 | OV | | | |

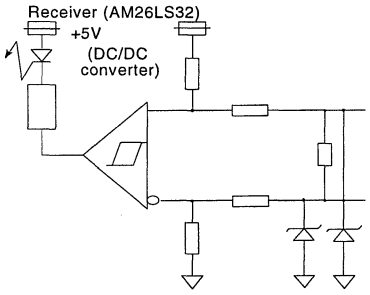
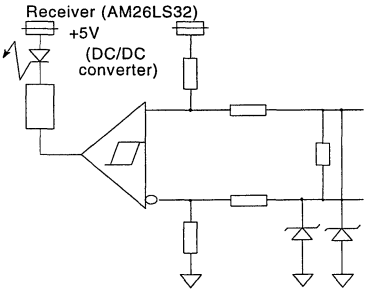
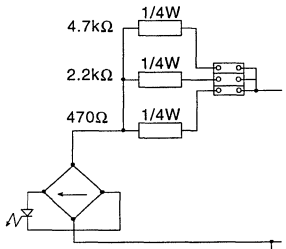
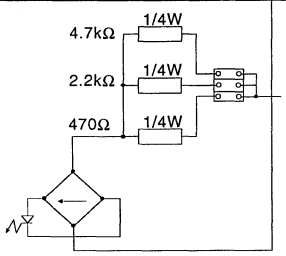
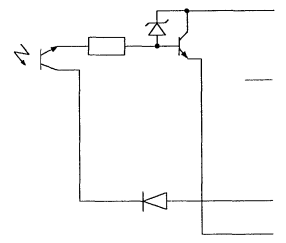
*1: The number without parentheses represents the terminal number of CH1, and that in parentheses indicates the terminal number of CH2.

**Table 3.6 Interfaces with External Devices (A1SD62E)**

| Input/ Output | Internal Circuit | Terminal No. *1 | Signal Name | ON/OFF | Input Voltage (Guaranteed Value) | Operating Current (Guaranteed Value) |
|---|---|---|---|---|---|---|
| Input |  | 1 (8) | Phase A pulse input 24V | ON | 21.6 to 26.4 V | 2 to 5 mA |
| | | | | OFF | 5 V or lower | 0.1 mA or lower |
| | | | Phase A pulse input 12V | ON | 10.8 to 13.2 V | 2 to 5 mA |
| | | | | OFF | 4 V or lower | 0.1 mA or lower |
| | | | Phase A pulse input 5V | ON | 4.5 to 5.5 V | 2 to 5mA |
| | | | | OFF | 2 V or lower | 0.1mA or lower |
| | | 2 (9) | COM | | | |
| |  | 3 (10) | Phase B pulse input 24V | ON | 21.6 to 26.4 V | 2 to 5 mA |
| | | | | OFF | 5 V or lower | 0.1mA |
| | | | Phase B pulse input 12V | ON | 10.8 to 13.2 V | 2 to 5 mA |
| | | | | OFF | 4 V or lower | 0.1mA or lower |
| | | | Phase B pulse input 5V | ON | 4.5 to 5.5 V | 2 to 5 mA |
| | | | | OFF | 2 V or lower | 0.1 mA or lower |
| | | 4 (11) | COM | | | |
| Input |  | 5 (12) | Preset input 24V | ON | 21.6 to 26.4 V | 2 to 5 mA |
| | | | | OFF | 5 V or lower | 0.1mA or lower |
| | | | Preset input 12V | ON | 10.8 to 13.2 V | 2 to 5 mA |
| | | | | OFF | 4 V or lower | 0.1mA or lower |
| | | | Preset input 5V | ON | 4.5 to 5.5 V | 2 to 5 mA |
| | | | | OFF | 2 V or lower | 0.1 mA or lower |
| | | 6 (13) | COM | Response time | OFF → ON 0.5 ms or less | ON → OFF 3 ms or less |
| Input |  | 7 (14) | Function start input 24V | ON | 21.6 to 26.4 V | 2 to 5 mA |
| | | | | OFF | 5 V or lower | 0.1 mA or lower |
| | | | Function start input 12V | ON | 10.8 to 13.2 V | 2 to 5 mA |
| | | | | OFF | 4 V or lower | 0.1 mA or lower |
| | | | Function start input 5V | ON | 4.5 to 5.5 V | 2 to 5 mA |
| | | | | OFF | 2 V or lower | 0.1 mA or lower |
| | | | | Response time | OFF → ON 0.5 ms or less | ON → OFF 3 ms or less |
| Output |  | 15 (17) | EQU1 | Operating voltage: 10.2 to 30 V<br>Rated current: 0.1 A/point<br>Maximum rush current: 4 A 10 ms<br>Maximum voltage drop at ON: 1.5 V<br>Response time: OFF→ ON 0.3 ms or less<br>ON → OFF 0.3 ms or less | | |
| | | 16 (18) | EQU2 | | | |
| | | 19 | 12/24 V | Input voltage: 10.2 to 30 V<br>Current consumption: 8 mA (TYP 24 VDC) | | |
| | | 20 | OV | | | |

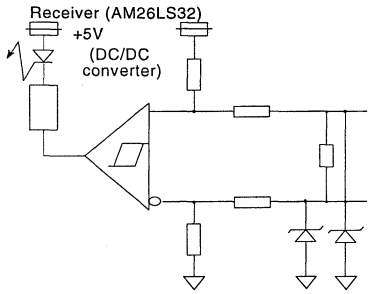
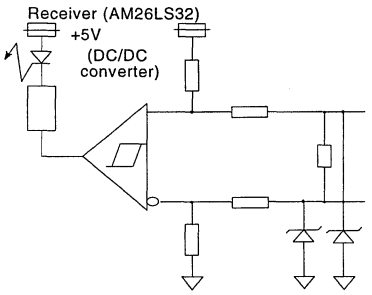
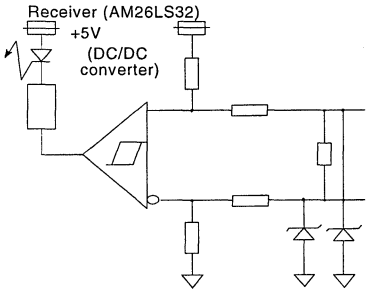
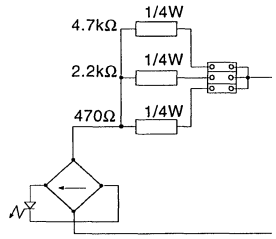
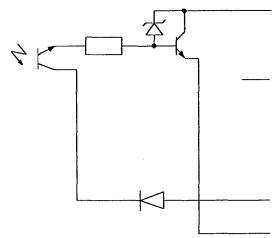
*1: The number without parentheses represents the terminal number of CH1, and that in parentheses indicates the terminal number of CH2.

**Table 3.7 Interfaces with External Devices (A1SD62D)**

<table>
<tr><th>Input/ Output</th><th>Internal Circuit</th><th>Terminal No. *1</th><th>Signal Name</th><th>ON/OFF</th><th>Input Voltage (Guaranteed Value)</th><th>Operating Current (Guaranteed Value)</th></tr>
<tr><td rowspan="2">Input</td><td rowspan="2"> 
</td><td>2 (9)</td><td>Phase $\overline{A}$ pulse input</td><td colspan="3" rowspan="2">EIA Standard RS-422-A line driver level {Am26LS31 (TEXAS INSTRUMENTS) or equivalent)}<br>$V_{hys}$ Hysteresis ($V_{T+}$ -$V_{T-}$) 60mV<br>$V_{IH(E)}$ "H" level enable input voltage 2V or more<br>$V_{IL(E)}$ "L" level enable input voltage 0.8V or less<br>*A current type line driver is not available.</td></tr>
<tr><td>1 (8)</td><td>Phase A pulse input</td></tr>
<tr><td rowspan="2">Input</td><td rowspan="2"> 
</td><td>4 (11)</td><td>Phase $\overline{B}$ pulse input</td><td colspan="3" rowspan="2">Same as above</td></tr>
<tr><td>3 (10)</td><td>Phase B pulse input</td></tr>
<tr><td rowspan="7">Input</td><td rowspan="7"> 
</td><td rowspan="6">5 (12)</td><td rowspan="2">Preset input 24V</td><td>ON</td><td>21.6 to 26.4 V</td><td>2 to 5 mA</td></tr>
<tr><td>OFF</td><td>5 V or lower</td><td>0.1mA or lower</td></tr>
<tr><td rowspan="2">Preset input 12V</td><td>ON</td><td>10.8 to 13.2 V</td><td>2 to 5 mA</td></tr>
<tr><td>OFF</td><td>4 V or lower</td><td>0.1mA or lower</td></tr>
<tr><td rowspan="2">Preset input 5V</td><td>ON</td><td>4.5 to 5.5 V</td><td>2 to 5 mA</td></tr>
<tr><td>OFF</td><td>2 V or lower</td><td>0.1 mA or lower</td></tr>
<tr><td>6 (13)</td><td>COM</td><td>Response time</td><td>OFF → ON 0.5 ms or less</td><td>ON → OFF 3 ms or less</td></tr>
<tr><td rowspan="7">Input</td><td rowspan="7"> 
</td><td rowspan="6">7 (14)</td><td rowspan="2">Function start input 24V</td><td>ON</td><td>21.6 to 26.4 V</td><td>2 to 5 mA</td></tr>
<tr><td>OFF</td><td>5 V or lower</td><td>0.1 mA or lower</td></tr>
<tr><td rowspan="2">Function start input 12V</td><td>ON</td><td>10.8 to 13.2 V</td><td>2 to 5 mA</td></tr>
<tr><td>OFF</td><td>4 V or lower</td><td>0.1 mA or lower</td></tr>
<tr><td rowspan="2">Function start input 5V</td><td>ON</td><td>4.5 to 5.5 V</td><td>2 to 5 mA</td></tr>
<tr><td>OFF</td><td>2 V or lower</td><td>0.1 mA or lower</td></tr>
<tr><td></td><td></td><td>Response time</td><td>OFF → ON 0.5 ms or less</td><td>ON → OFF 3 ms or less</td></tr>
<tr><td rowspan="4">Output</td><td rowspan="4">  </td><td>15 (17)</td><td>EQU1</td><td colspan="3" rowspan="2">Operating voltage: 10.2 to 30 V<br>Rated current: 0.5 A/point<br>Maximum rush current: 4 A 10 ms<br>Maximum voltage drop at ON: 1.5 V<br>Response time: OFF → ON 0.1 ms or less<br>ON → OFF 0.1 ms or less</td></tr>
<tr><td>16 (18)</td><td>EQU2</td></tr>
<tr><td>19</td><td>12/24 V</td><td colspan="3" rowspan="2">Input voltage: 10.2 to 30 V<br>Current consumption: 8 mA (TYP 24 VDC)</td></tr>
<tr><td>20</td><td>0V</td></tr>
</table>

*1: The number without parentheses represents the terminal number of CH1, and that in parentheses indicates the terminal number of CH2.

**Table 3.8 Interfaces with External Devices (A1SD62D-S1)**

<table>
<tr><th>Input/ Output</th><th>Internal Circuit</th><th>Terminal No. *1</th><th>Signal Name</th><th>ON/OFF</th><th>Input Voltage (Guaranteed Value)</th><th>Operating Current (Guaranteed Value)</th></tr>
<tr><td rowspan="2">Input</td><td rowspan="2"> 
</td><td>2 (10)</td><td>Phase $\overline{A}$ pulse input</td><td colspan="3" rowspan="2">EIA Standard RS-422-A line driver level {Am26LS31 (TEXAS INSTRUMENTS) or equivalent)}<br>$V_{hys}$ Hysteresis ($V_{T+}$ -$V_{T-}$) 60mV<br>$V_{IH(E)}$ "H" level enable input voltage 2V or more<br>$V_{IL(E)}$ "L" level enable input voltage 0.8V or less<br>*A current type line driver is not available.</td></tr>
<tr><td>1 (9)</td><td>Phase A pulse input</td></tr>
<tr><td rowspan="2">Input</td><td rowspan="2"> 
</td><td>4 (12)</td><td>Phase $\overline{B}$ pulse input</td><td colspan="3" rowspan="2">Same as above</td></tr>
<tr><td>3 (11)</td><td>Phase B pulse input</td></tr>
<tr><td rowspan="2">Input</td><td rowspan="2"> 
</td><td>6 (14)</td><td>$\overline{\text{Preset input}}$</td><td colspan="3" rowspan="2">Same as above</td></tr>
<tr><td>5 (13)</td><td>Preset input</td></tr>
<tr><td rowspan="9">Input</td><td rowspan="9"> 
</td><td rowspan="8">7 (15)</td><td rowspan="2">Function start input 24V</td><td>ON</td><td>21.6 to 26.4 V</td><td>2 to 5 mA</td></tr>
<tr><td>OFF</td><td>5 V or lower</td><td>0.1 mA or lower</td></tr>
<tr><td rowspan="2">Function start input 12V</td><td>ON</td><td>10.8 to 13.2 V</td><td>2 to 5 mA</td></tr>
<tr><td>OFF</td><td>4 V or lower</td><td>0.1 mA or lower</td></tr>
<tr><td rowspan="2">Function start input 5V</td><td>ON</td><td>4.5 to 5.5 V</td><td>2 to 5 mA</td></tr>
<tr><td>OFF</td><td>2 V or lower</td><td>0.1 mA or lower</td></tr>
<tr><td>Response time</td><td>OFF → ON<br>0.5 ms or less</td><td>ON → OFF<br>3 ms or less</td></tr>
<tr><td>8 (16)</td><td>COM</td><td colspan="3"></td></tr>
<tr><td rowspan="4">Output</td><td rowspan="4">  </td><td>17 (18)</td><td>EQU</td><td colspan="3">Operating voltage: 10.2 to 30 V<br>Rated current: 0.5 A/point<br>Maximum rush current: 4 A 10 ms<br>Maximum voltage drop at ON: 1.5 V<br>Response time: OFF → ON 0.1 ms or less<br>ON → OFF 0.1 ms or less</td></tr>
<tr><td>19</td><td>12/24 V</td><td colspan="3" rowspan="2">Input voltage: 10.2 to 30 V<br>Current consumption:<br>8 mA (TYP 24 VDC)</td></tr>
<tr><td>20</td><td>0V</td></tr>
</table>

*1: The number without parentheses represents the terminal number of CH1, and that in parentheses indicates the terminal number of CH2.

## 3.5 I/O Signals from/to the Programmable Controller CPU

Table 3.9 to 3.11 show the I/O signals from the A1SD62(E/D/D-S1) to the programmable controller CPU.

All of the I/O signal numbers (X, Y) and I/O addresses quoted hereafter are those when the A1SD62(E/D/D-S1) is loaded in I/O slot 0 of the base unit.

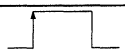
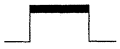
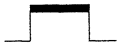
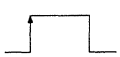
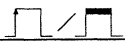
**Table 3.9 Input Signals (A1SD62(E/D))**

| Input Signal | | Signal Name | Description | Reference Section |
|---|---|---|---|---|
| CH1 | CH2 | Programmable controller CPU ← A1SD62 (E/D) | | |
| X00 | X04 | Counter value large (point No. 1) | Turned on when the counter value is larger than set value No. 1. | 6.1 |
| X01 | X05 | Counter value coincidence (point No. 1) | Turned on when the counter value matches set value No. 1, and turned off with a coincidence signal reset command. | |
| X02 | X06 | Counter value small (point No. 1) | Turned on when the counter value is smaller than set value No. 1. | |
| X03 | X07 | External preset request detection | Turned on when an input preset request is issued from an external device, and turned off with an external preset detection reset command. | 7.3 |
| X08 | X0B | Counter value large (point No. 2) | Turned on when the counter value is larger than set value No. 2. | 6.1 |
| X09 | X0C | Counter value coincidence (point No.2) | Turned on when the counter value matches set value No. 2, and turned off with a coincidence signal reset command. | |
| X0A | X0D | Counter value small (point No. 2) | Turned on when the counter value is smaller than set value No. 2. | |
| X0E | | Fuse/External power cutoff detection flag | Turned on when the limit switch output fuse has blown or when voltage is not applied to the EQU terminal. | ——— |
| X0F to X1F | | ——— | Unusable | ——— |

**Table 3.10 Input Signals (A1SD62D-S1)**

| Input Signal | | Signal Name | Description | Reference Section |
|---|---|---|---|---|
| CH1 | CH2 | Programmable controller CPU ← A1SD62D-S1 | | |
| X00 | X04 | Counter value large | Turned on when the counter value is larger than the set value. | 6.1 |
| X01 | X05 | Counter value coincidence | Latched on when the counter value equals the set value, and turned off with a coincidence signal reset command. | |
| X02 | X06 | Counter value small | Turned on when the counter value is smaller than the set value. | |
| X03 | X07 | External preset request detection | Turned on when an input preset request is issued from an external device, and turned off with an external preset detection reset command. | 7.3 |
| X08 | X0B | ——— | Unusable | ——— |
| X09 | X0C | | | |
| X0A | X0D | | | |
| X0E | | Fuse/External power cutoff detection flag | Turned on when the limit switch output fuse is blown or voltage is not supplied to the EQU terminal. | ——— |
| X0F to X1F | | ——— | Unusable | ——— |

**Table 3.11 Output Signals (A1SD62(E/D/D-S1))**

| Output Signal | | Signal Name | Operating Timing | Description | Reference Section |
|---|---|---|---|---|---|
| CH1 | CH2 | Programmable controller CPU ← A1SD62 (E/D/D-S1) | | | |
| Y00 to Y0F | | ——— | ——— | Unusable | ——— |
| Y10 | Y17 | Coincidence signal reset command |  | The signal to reset the coincidence output No. 1 signal to the external device. | 6.1 |
| Y11 | Y18 | Preset command |  | The signal to write a preset value. | 7.2.1 |
| Y12 | Y19 | Coincidence signal enable command |  | As soon as this signal is turned on, a counter value coincidence signal is issued to the external device. | 6.1 |
| Y13 | Y1A | Down count command |  | Countdown is performed while this signal remains ON in single-phase mode. | 5 |
| Y14 | Y1B | Count enable command |  | Counting is enabled when this signal is ON. | ——— |
| Y15 | Y1C | Count value read request |  | The count value is written to the buffer memory at the rise of this signal. | ——— |
| Y16 | Y1D | Counter function selection start command |  | Executes counter function selection. | 9.2, 9.3, 9.4, 9.5 |
| Y1E | ——— | ——— | ——— | Unusable | ——— |
| Y1F | | | | | |

**REMARK**

(1) The operating timing shown in Table 3.11 is as follows:

-  Valid while the signal is ON.
-  Valid at the rise of the signal.

## 3.6 Buffer Memory Allocation

Table 3.12 and 3.13 show how the A1SD62(E/D/D-S1) buffer memory (without battery backup) is allocated.
Initial values are set in the buffer memory when the power to the A1SD62(E/D/D-S1) is turned on and the programmable controller CPU is reset. Data can be read/written from/to the buffer memory with FROM/TO instructions of the programmable controller CPU sequence program.

**Table 3.12 Buffer Memory Allocation (A1SD62(E/D))**

| Address *1 | Setting | Initial Value | Read/Write | Reference Section |
|---|---|---|---|---|
| 1 (33) | Preset value setting (L) | 0 | Read/Write possible | 7.2.1 |
| 2 (34) | Preset value setting (H) | | | 7.3.1 |
| 3 (35) | Pulse input mode setting | 0 | | 5 |
| 4 (36) | Present value (L) | 0 | Read only | 5.3 |
| 5 (37) | Present value (H) | | | |
| 6 (38) | Coincidence output point setting No. 1 (L) | 0 | Read/Write possible | 6.1 (8.1) |
| 7 (39) | Coincidence output point setting No. 1 (H) | | | |
| 8 (40) | Counter function selection setting | 0 | | 9.1 |
| 9 (41) | Sampling/periodic time setting 1 to 65535 [10ms increments] | 0 | | 9.4, 9.5 |
| 10 (42) | External preset detection reset command | —— | Write only | 7.3 |
| 11 (43) | Point No. 2 coincidence signal reset command | —— | | 6.1 |
| 12 (44) | Coincidence output point setting No. 2 (L) | 0 | Read/Write possible | 6.1 |
| 13 (45) | Coincidence output point setting No. 2 (H) | | | |
| 14 (46) | Latch count value (L) | 0 | Read only | 5.3 |
| 15 (47) | Latch count value (H) | | | |
| 16 (48) | Sampling count value (L) | 0 | | |
| 17 (49) | Sampling count value (H) | | | |
| 18 (50) | Periodic pulse counter previous value (L) | 0 | | |
| 19 (51) | Periodic pulse counter previous value (H) | | | |
| 20 (52) | Periodic pulse counter present value (L) | 0 | | |
| 21 (53) | Periodic pulse counter present value (H) | | | |
| 22 | Sampling/periodic counter flag (for both CH1 and CH2) | 0 | | |

*1: The number without parentheses represents the address number of CH1, and that in parentheses indicate the address number of CH2.

**Table 3.13 Buffer Memory Allocation (A1SD62D-S1)**

| Address *1 | Setting | Initial Value | Read/Write | Reference Section |
|---|---|---|---|---|
| 1 (33) | Preset value setting (L) | 0 | Read/Write possible | 7.2.1 |
| 2 (34) | Preset value setting (H) | | | 7.3.1 |
| 3 (35) | Pulse input mode setting | 0 | | 5 |
| 4 (36) | Present value (L) | 0 | Read only | 5.3 |
| 5 (37) | Present value (H) | | | |
| 6 (38) | Coincidence output point setting (L) | 0 | Read/Write possible | 6.1 (8.1) |
| 7 (39) | Coincidence output point setting (H) | | | |
| 8 (40) | Counter function selection setting | 0 | | 9.1 |
| 9 (41) | Sampling/periodic time setting | 0 | | 9.4, 9.5 |
| 10 (42) | External preset detection reset command | — | Write only | 7.3 |
| 11 (43) | Unusable | — | — | — |
| 12 (44) | | | | |
| 13 (45) | | | | |
| 14 (46) | Latch count value (L) | 0 | Read only | 5.3 |
| 15 (47) | Latch count value (H) | | | |
| 16 (48) | Sampling count value (L) | 0 | | |
| 17 (49) | Sampling count value (H) | | | |
| 18 (50) | Periodic pulse counter previous value (L) | 0 | | |
| 19 (51) | Periodic pulse counter previous value (H) | | | |
| 20 (52) | Periodic pulse counter present value (L) | 0 | | |
| 21 (53) | Periodic pulse counter present value (H) | | | |
| 22 | Sampling/periodic counter flag (for both CH1 and CH2) | 0 | | |

*1: The number without parentheses represents the address number of CH1, and that in parentheses indicate the address number of CH2.

### 3.7 Applicable Encoders

The encoders applicable to the A1SD62(E/D/D-S1) are shown below:

(1) Encoders connectable to the A1SD62(E)

(a) Open-collector type

(b) CMOS output type

(Make sure that the output voltage of the encoder complies with the A1SD62(E) specifications.)

(2) Encoder connectable to the A1SD62D(S1)

(a) Line drive output type encoder
(Confirm whether the encoder output voltage meets the A1SD62D (S1) specifications.)

**POINT**

The following types of encoders cannot be used with the A1SD62 (E/D/D-S1):

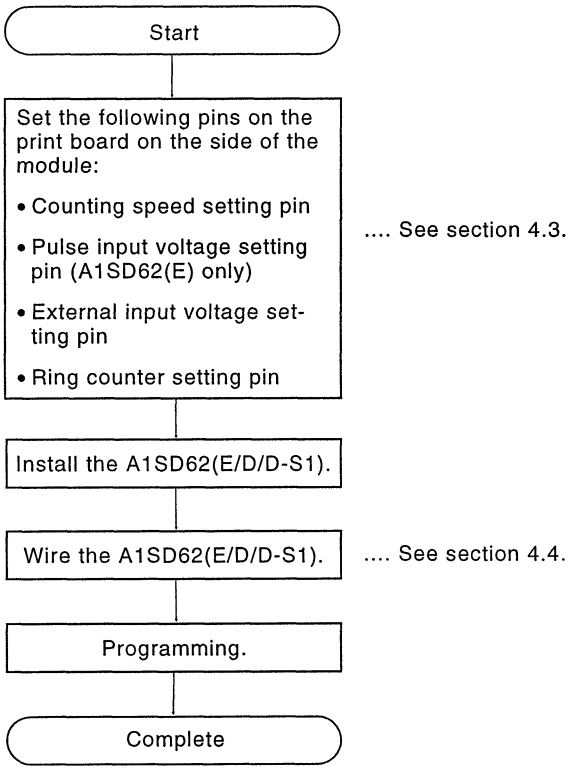
- TTL output type

# 4. INSTALLATION AND PRE-OPERATION SETTING PROCEDURE

This section describes the pre-operation procedure of the A1SD62(E/D/D-S1), the names and settings of each part of the A1SD62(E/D/D-S1), and the wiring method.

## 4.1 Pre-Operation Setting Procedure

The pre-operation setting procedure of the A1SD62(E/D/D-S1) is shown below:



## 4.2 Handling Precautions

Handling precautions for the A1SD62(E/D/D-S1) are given below:

(1) Protect the case and the terminal block from impact, since they are made from resin.

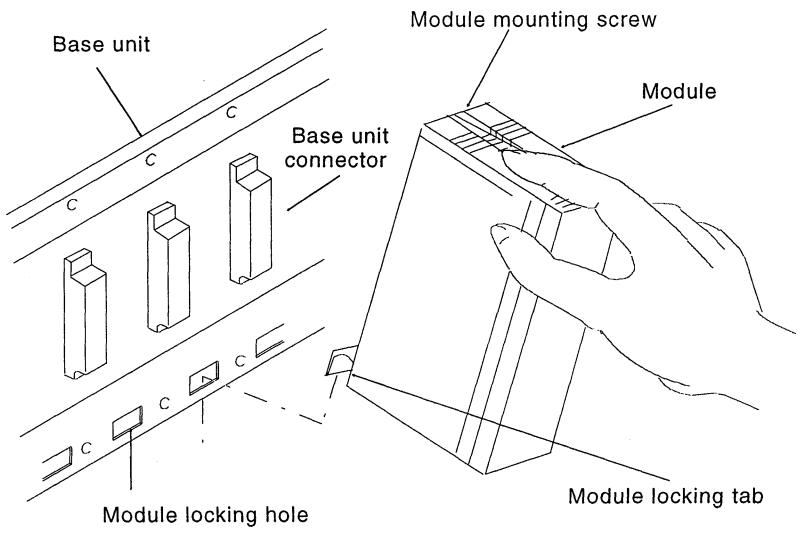
(2) Do not remove the printed circuit board from the case. Doing so can cause a failure.

(3) When wiring, make sure that no wire offcuts remain around the terminal block. Remove foreign matter if it has entered.

(4) Tighten the module mounting screws and terminal screws within the following ranges.

| Screw Location | Tightening Torque Range |
|---|---|
| Module mounting screw (M4 screw) | 78 to 118 N•cm |
| Terminal block terminal screw (M3.5 screw) | 59 to 88 N•cm |
| Terminal block mounting screw (M4 screw) | 78 to 118 N•cm |

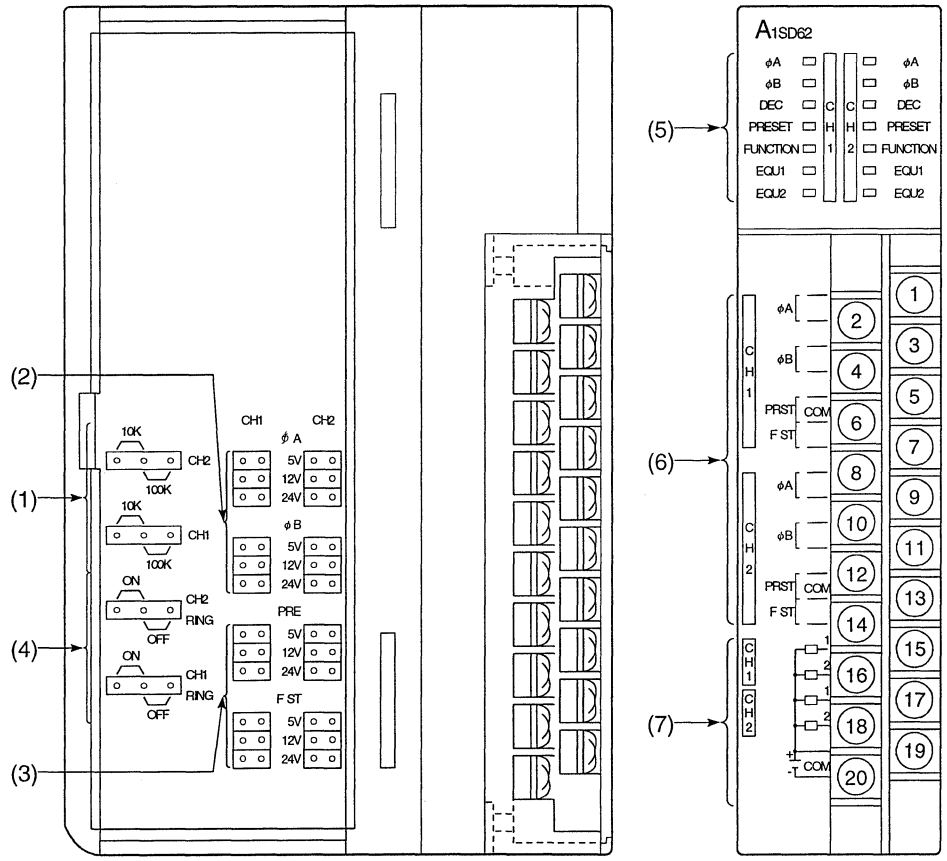
(5) Install the module on the base unit by engaging the module locking tabs in the module locking holes in the base unit and tightening the module mounting screws. To remove the module from the base unit, unfasten the module mounting screws, then disengage the module locking tabs from the module locking holes.



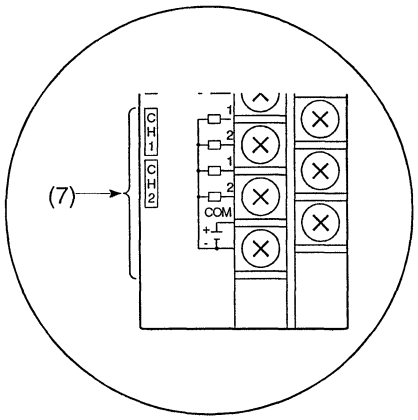
## 4.3 Part Names and Settings

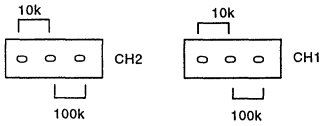
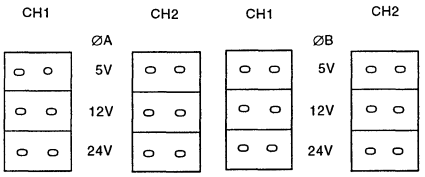
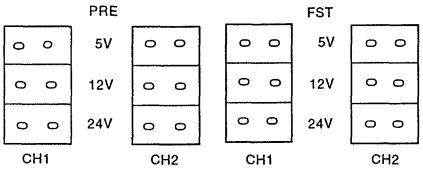
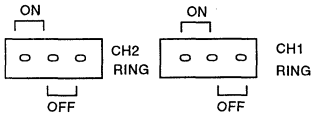
The names of each part of the A1SD62(E/D/D-S1) and the settings are shown below:

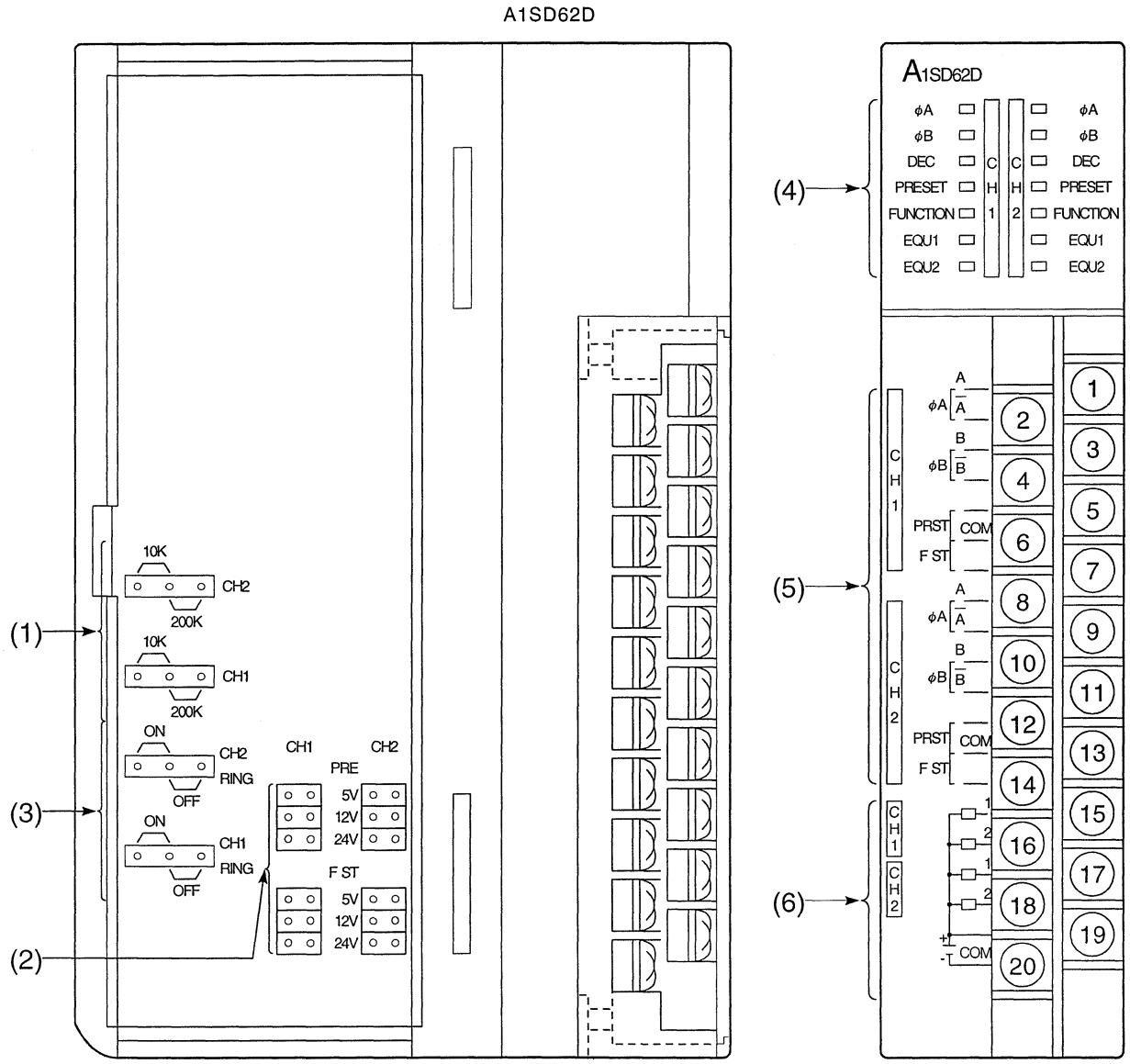
A1SD62(E)

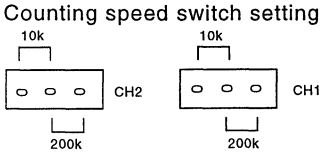
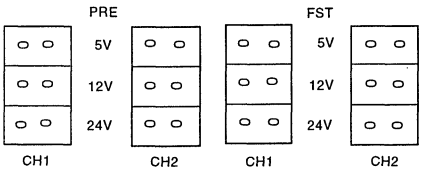
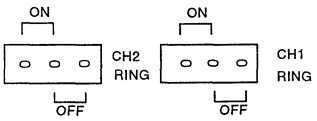



*The portion of (7) of the A1SD62E is as shown in the following figure:

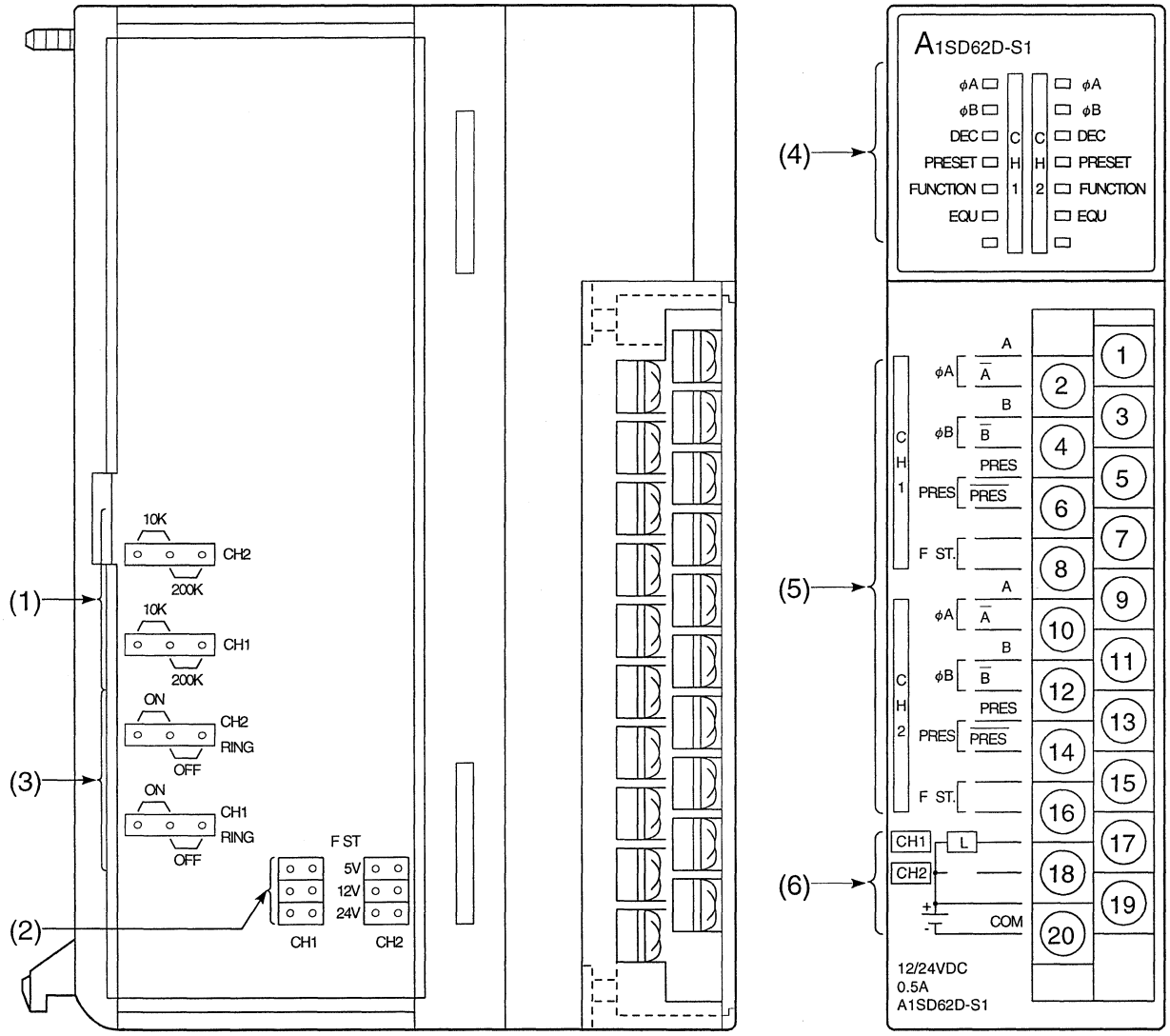


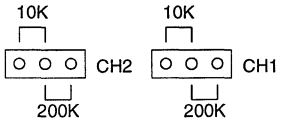
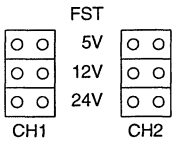
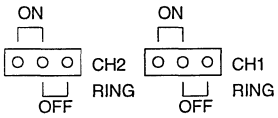
| No. | Name | | Description |
|---|---|---|---|
| (1) | Counting speed switch setting pin<br>  | | 100 k : Counts single-phase/2-phase pulse inputs at a speed of up to 100 kpps.<br>10 k : Counts single-phase pulse inputs at a speed of up to 10 kpps, and 2-phase pulse inputs at a speed of up to 7 kpps.<br>(Factory setting: 100k)<br>(Set using a jumper) |
| (2) | Pulse input voltage setting pin<br>  | | Used to set the pulse input voltage to phase A/phase B.<br>(Factory setting: 24 V)<br>(Set using a jumper) |
| (3) | External input voltage setting pin<br>  | | Used to set the input voltage to be applied to the PRESET/F.START terminals.<br>(Factory setting: 24 V)<br>(Set using a jumper) |
| (4) | Ring counter setting pin<br>  | | Used to set whether to use the ring counter function.<br>(Factory setting: OFF)<br>(Set using a jumper) |
| (5) | LED indicators | ØA | Remains lit while voltage is applied to the phase A pulse input terminal. |
| | | ØB | Remains lit while voltage is applied to the phase B pulse input terminal. |
| | | DEC | Remains lit during subtraction. |
| | | PRESET | Remains lit while voltage is applied to the PRESET terminal, and goes off with an external preset detection reset command (write to buffer memory addresses 10 and 42). |
| | | FUNCTION | Remains lit while voltage is applied to the F.START terminal. |
| | | EQU1 | Remains lit while external coincidence output from CH1 is executed. |
| | | EQU2 | Remains lit while external coincidence output from CH2 is executed. |
| (6) | Input terminals | ØA/ØB | Pulse input terminal |
| | | PRST | The terminal to which voltage is applied to execute presetting in response to an external preset command. |
| | | FST | The terminal to which voltage is applied to select a counter function. |
| (7) | Output terminals | EQU1 to EQU2 | External output terminals for coincidence output.<br>The coincidence signal is held until writing to the output signal Y10 (Y17) is performed. |


A1SD62D
A1SD62D
(1)
(2)
(3)
(4)
(5)
(6)
10K
CH2
200K
10K
CH1
200K
ON
CH2
RING
OFF
ON
CH1
RING
OFF
CH1
CH2
PRE
5V
12V
24V
F ST
5V
12V
24V
φA
φB
DEC
PRESET
FUNCTION
EQU1
EQU2
CH1
CH2
PRST
COM
F ST
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20

| No. | Name | | Description |
|---|---|---|---|
| (1) | Counting speed switch setting pin<br>  | | 200 k : Counts single-phase/2-phase pulse inputs at a speed of up to 200 kpps.<br>10 k : Counts single-phase pulse inputs at a speed of up to 10 kpps, and 2-phase pulse inputs at a speed of up to 7 kpps.<br>(Factory setting: 200 k)<br>(Set using a jumper) |
| (2) | External input voltage setting pin<br>  | | Used to set the input voltage to be applied to the PRESET/F.START terminals.<br>(Factory setting: 24 V)<br>(Set using a jumper) |
| (3) | Ring counter setting pin<br>  | | Used to set whether to use the ring counter function.<br>(Factory setting: OFF)<br>(Set using a jumper) |
| (4) | LED indicators | ØA | Remains lit while voltage is applied to the phase A pulse input terminal. |
| | | ØB | Remains lit while voltage is applied to the phase B pulse input terminal. |
| | | DEC | Remains lit during subtraction. |
| | | PRESET | Remains lit while voltage is applied to the PRESET terminal, and goes off with an external preset detection reset command (write to buffer memory addresses 10 and 42). |
| | | FUNCTION | Remains lit while voltage is applied to the F.START terminal. |
| | | EQU1 | Remains lit while external coincidence output from CH1 is executed. |
| | | EQU2 | Remains lit while external coincidence output from CH2 is executed. |
| (5) | Input terminals | ØA/ØB | Pulse input terminal |
| | | PRST | The terminal to which voltage is applied to execute presetting in response to an external preset command. |
| | | FST | The terminal to which voltage is applied to select a counter function. |
| (6) | Output terminals | EQU1 to EQU2 | External output terminals for coincidence output<br>The coincidence signal is held until writing to the output signal Y10 (Y17) is performed. |

A1SD62D-S1


A1SD62D-S1
φA
φB
DEC
PRESET
FUNCTION
EQU
CH1
CH2
(1)
(2)
(3)
(4)
(5)
(6)
10K
CH2
200K
10K
CH1
200K
ON
CH2
RING
OFF
ON
CH1
RING
OFF
F ST
5V
12V
24V
CH1
CH2
A
B
PRES
F ST.
L
COM
12/24VDC
0.5A
A1SD62D-S1

| No. | Name | | Description |
|---|---|---|---|
| (1) | Counting speed switch setting pin<br>  | | 200 k : Counts single-phase/2-phase pulse inputs at a speed of up to 200 kpps.<br>10 k : Counts single-phase pulse inputs at a speed of up to 10 kpps, and 2-phase pulse inputs at a speed of up to 7 kpps.<br>(Factory setting: 200 k)<br>(Set using a jumper) |
| (2) | External input voltage setting pin<br>  | | Used to set the input voltage to be applied to the F.START terminal.<br>(Factory setting: 24 V)<br>(Set using a jumper) |
| (3) | Ring counter setting pin<br>  | | Used to set whether to use the ring counter function.<br>(Factory setting: OFF)<br>(Set using a jumper) |
| (4) | LED indicators | ØA | Remains lit while voltage is applied to the phase A pulse input terminal. |
| | | ØB | Remains lit while voltage is applied to the phase B pulse input terminal. |
| | | DEC | Remains lit during subtraction. |
| | | PRESET | Remains lit while voltage is applied to the PRESET terminal, and goes off with an external preset detection reset command (write to buffer memory addresses 10 and 42). |
| | | FUNCTION | Remains lit while voltage is applied to the F.START terminal. |
| | | EQU | Remains lit while external coincidence output from channel is executed. |
| (5) | Input terminals | ØA/ØB | Pulse input terminal |
| | | PRST | The terminal to which voltage is applied to execute presetting in response to an external preset command. |
| | | FST | The terminal to which voltage is applied to select a counter function. |
| (6) | Output terminals | EQU | External output terminals for coincidence output<br>The coincidence signal is held until writing to the output signal Y10 (Y17) is performed. |

## 4.4 Wiring

Details on how to wire a pulse generator device to the A1SD62(E/D/D-S1) are described below:

### 4.4.1 Wiring preconditions

The preconditions when a pulse generator device is wired to the A1SD62 (E/D/D-S1) are described below:

(1) For a high-speed pulse input, take the following counter measures against noise:

(a) Be sure to use shielded twisted pair cables. Also, make sure it is grounded to Class 3 specifications.

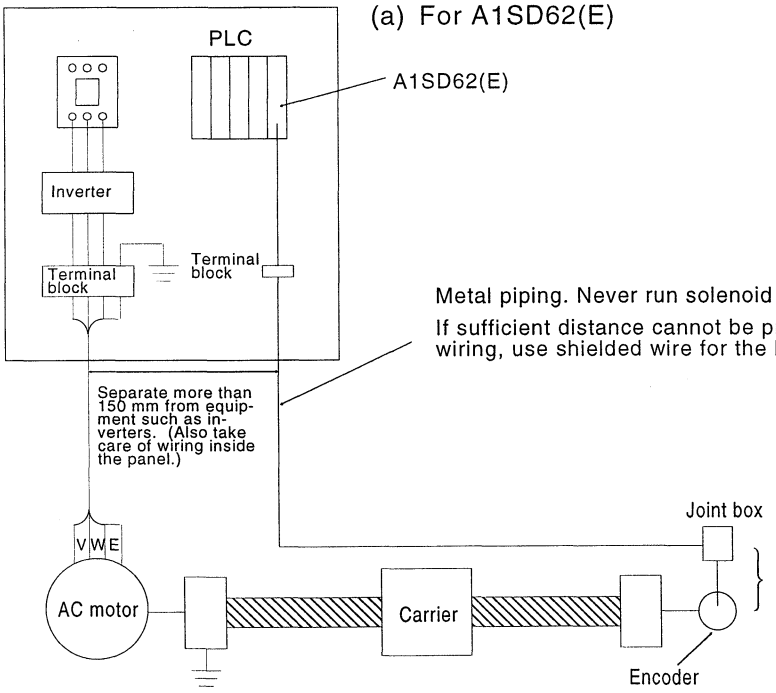
(b) Do not run a twisted pair cable in parallel with power cables or other I/O lines which may generate noise. Run cables at least 150 mm (5.91 in.) away from the above-mentioned lines and over the shortest distance possible.

(2) For 1-phase input, connect count input signal to phase A only.

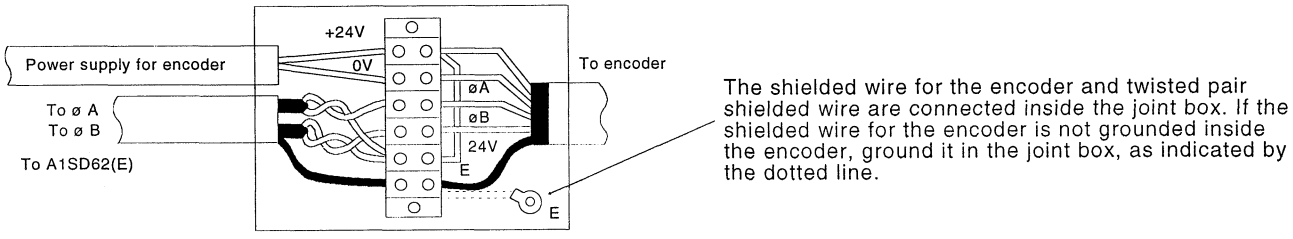
(3) If the A1SD62(E/D/D-S1) picks up pulse noise, it will count incorrectly.

(4) The specific measures against noise are shown below:

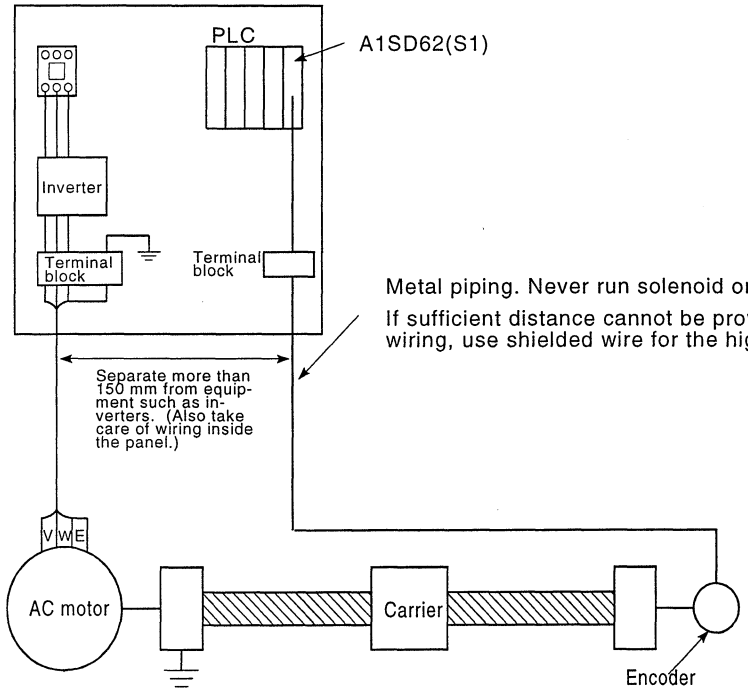
(a) For A1SD62(E)




• Ground twisted shielded wire on the encoder side (joint box). (This is a connection example for 24 V sink loading.)

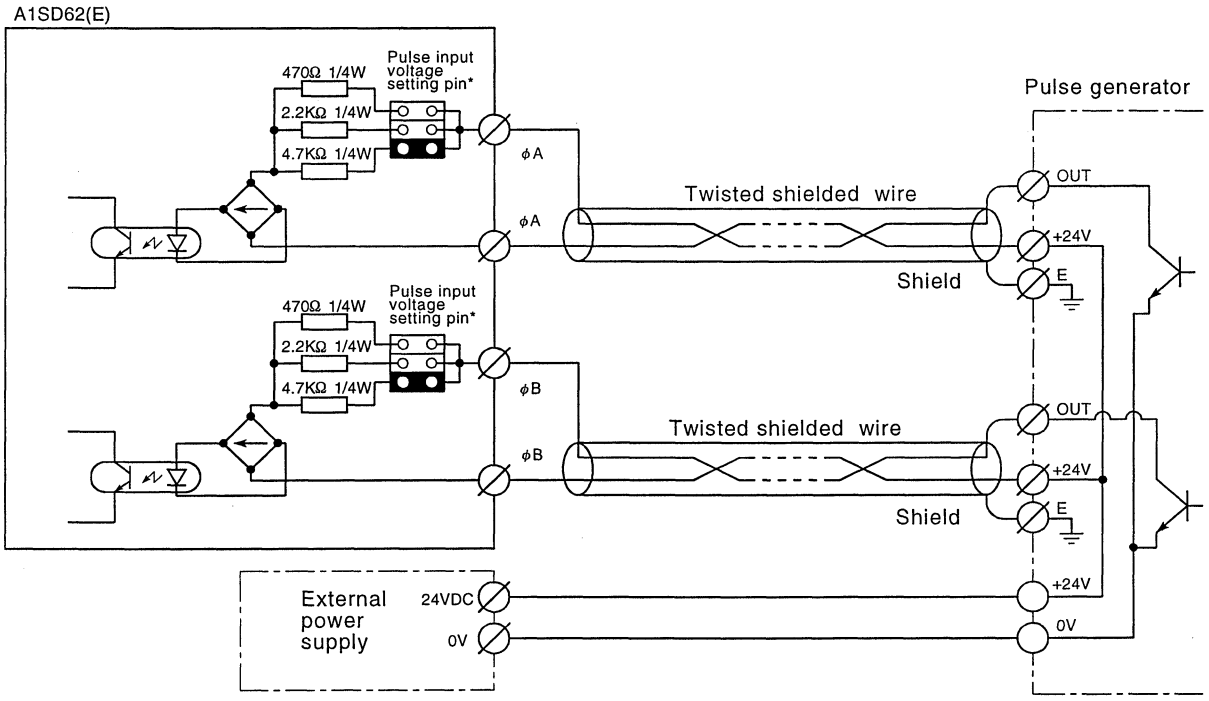


(b) For A1SD62(S1)



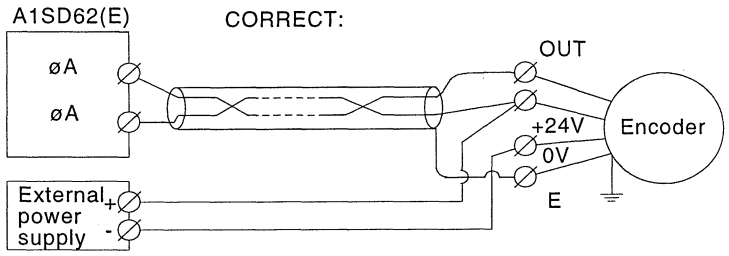
### 4.4.2 Wiring example of module and pulse generator

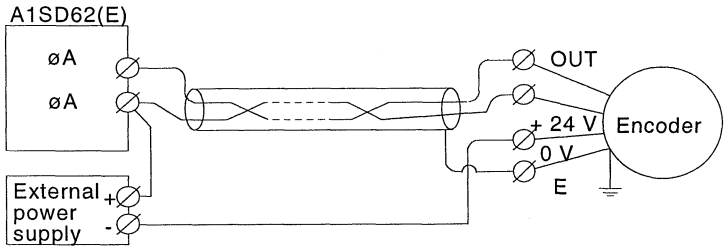
(1) Wiring example for connection with open collector output type pulse generator (24VDC)




**POINT**

For the wiring of the A1SD62(E) and encoder, separate the power supply cable from signal cable. An example is shown below.



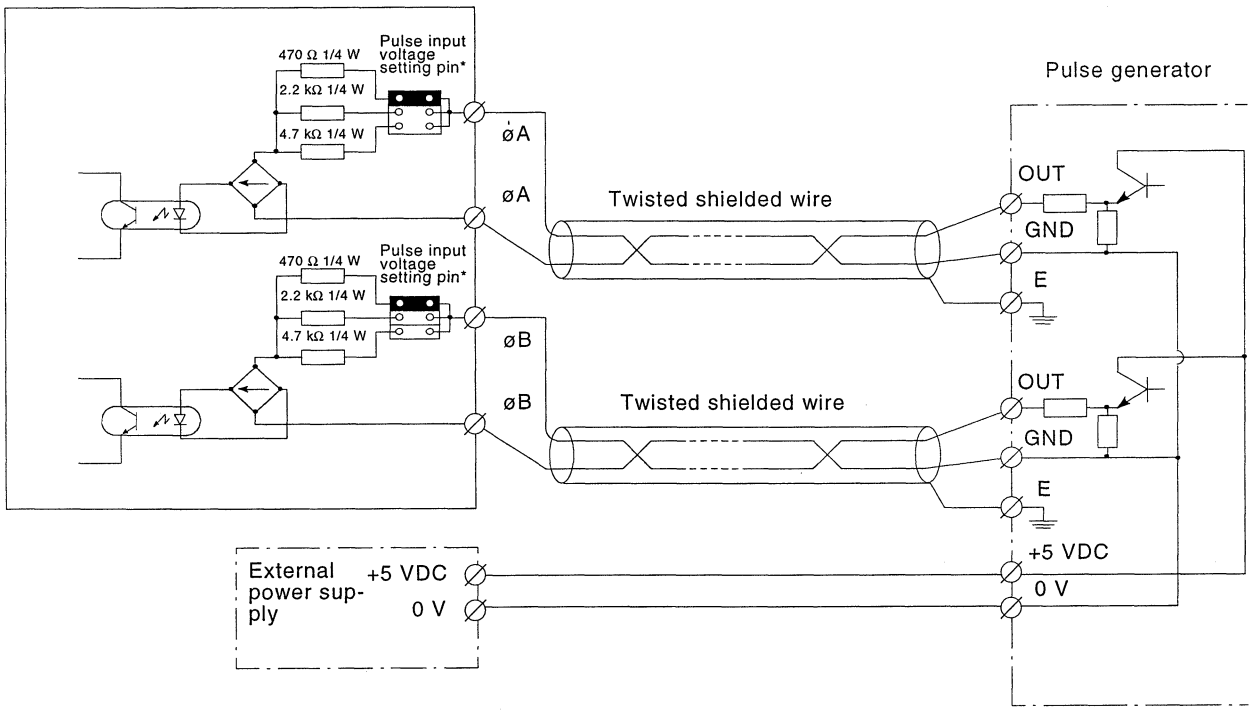

Since currents flow in the twisted pair cable in the same direction, a canceling effect is lost and the module becomes susceptible to electromagnetic induction.

**REMARK**

1) * Set the pulse input voltage setting pin to the ● ● position.

(2) Connection of a voltage output pulse generator (5 VDC)

A1SD62(E)

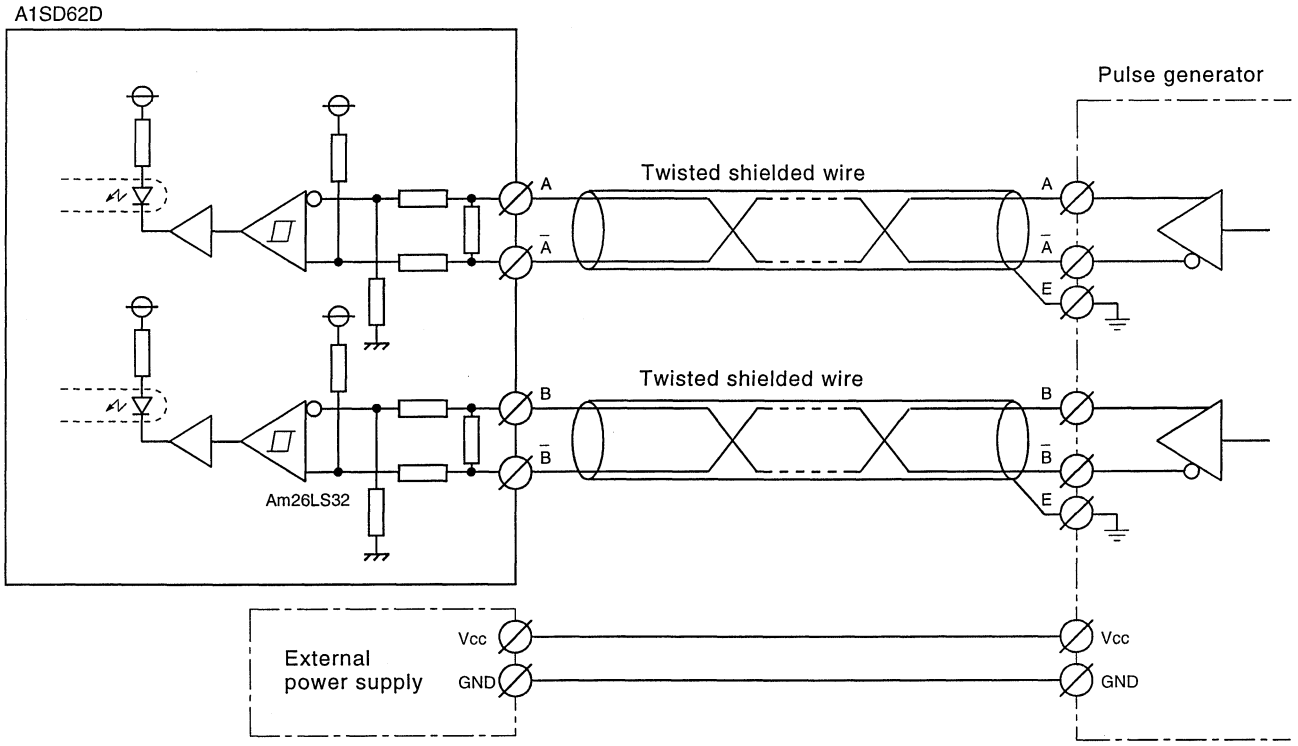



**REMARK**

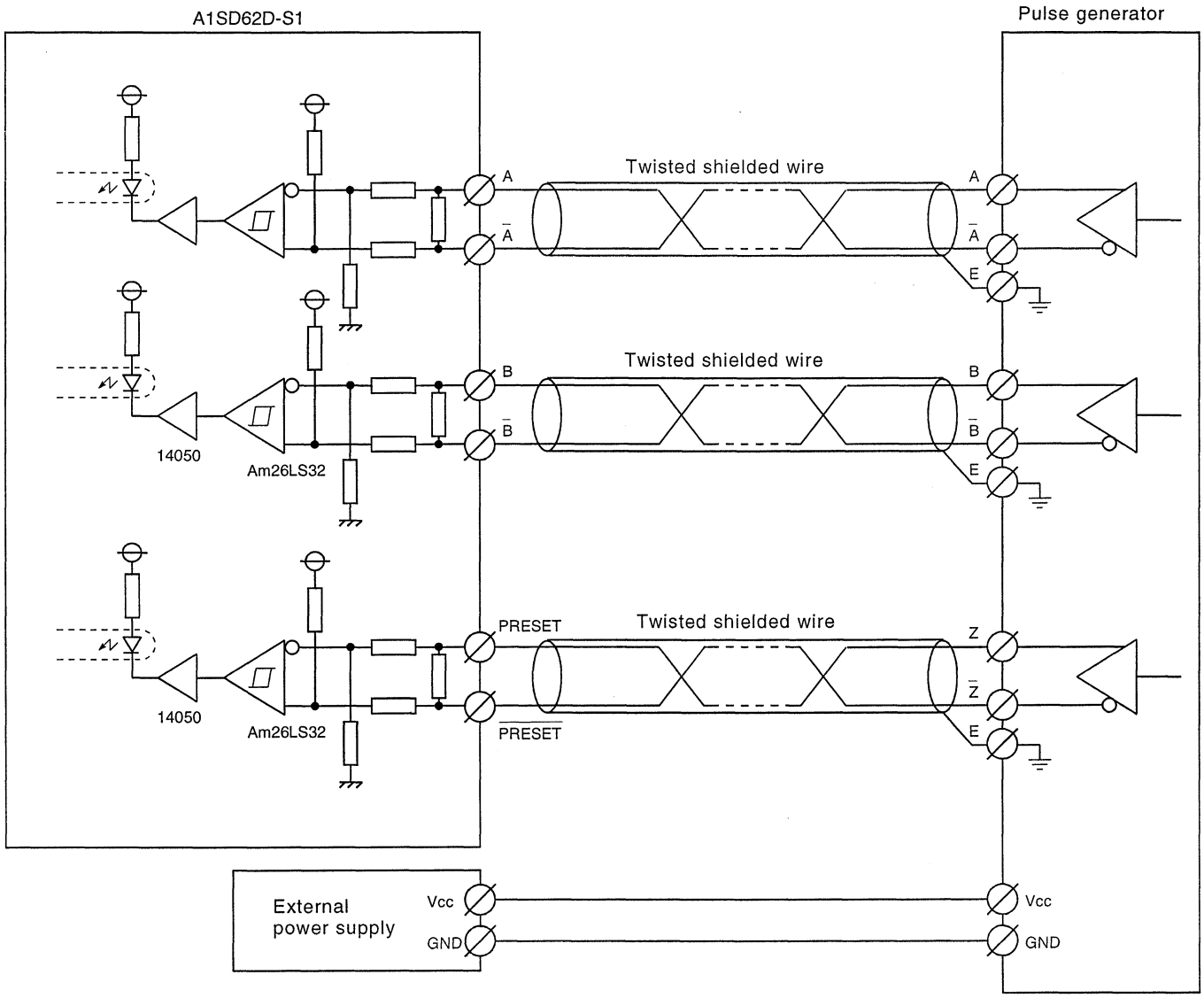
1) * Set the pulse input voltage setting pin to the ● ● position.

(3) Wiring example for connection with pulse generator of line driver (Am26LS31 or equivalent)

(a) For A1SD62D



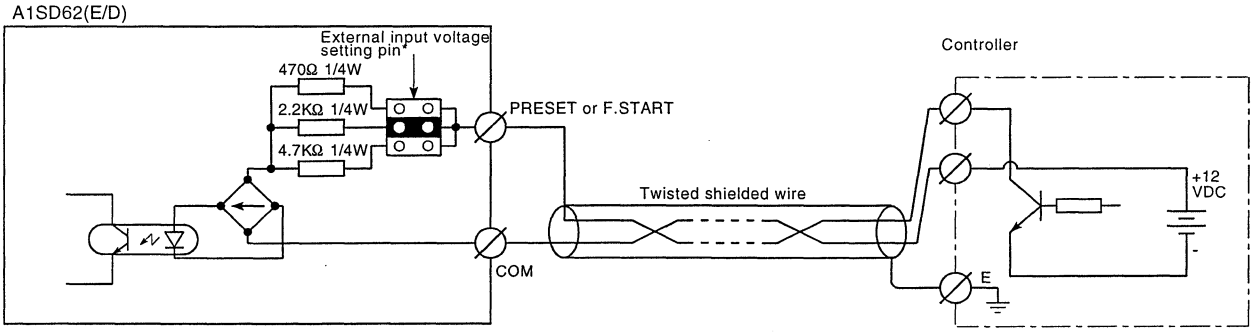
(b) For A1SD62D-S1



### 4.4.3 Wiring example for the connection of a controller to external input terminals (PRESET and F.START)

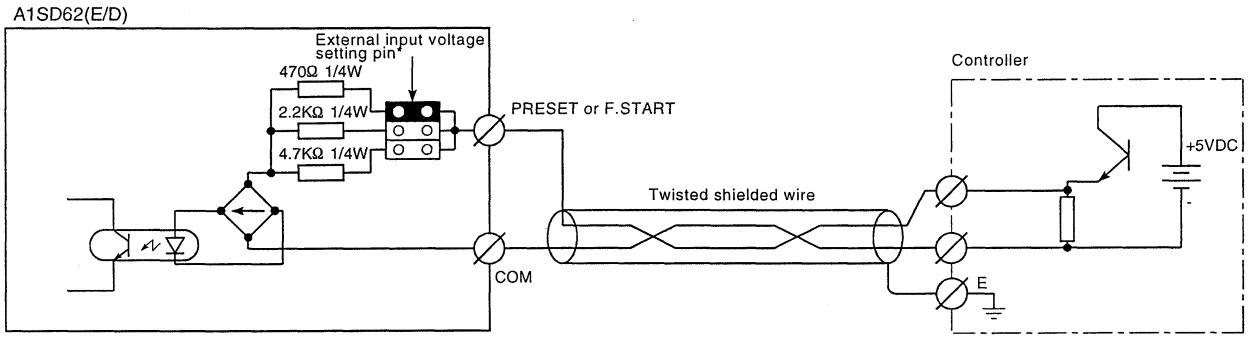
(1) For A1SD62(E/D)

(a) When a controller (sink load type) is supplied with 12 V:




This diagram assumes that the internal circuit is set to PRESET.

(b) When a controller (source load type) is supplied with 5 V:



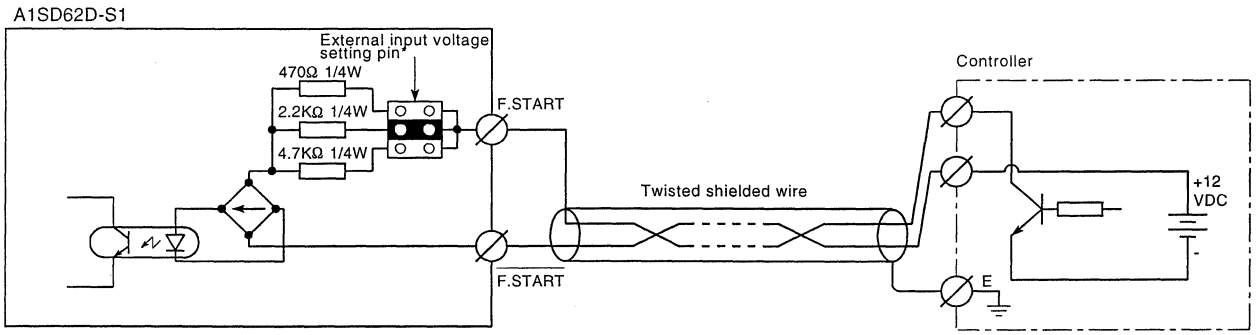

This diagram assumes that the internal circuit is set to PRESET.

**REMARK**

(1) * Set the external input voltage setting pin to the  position.

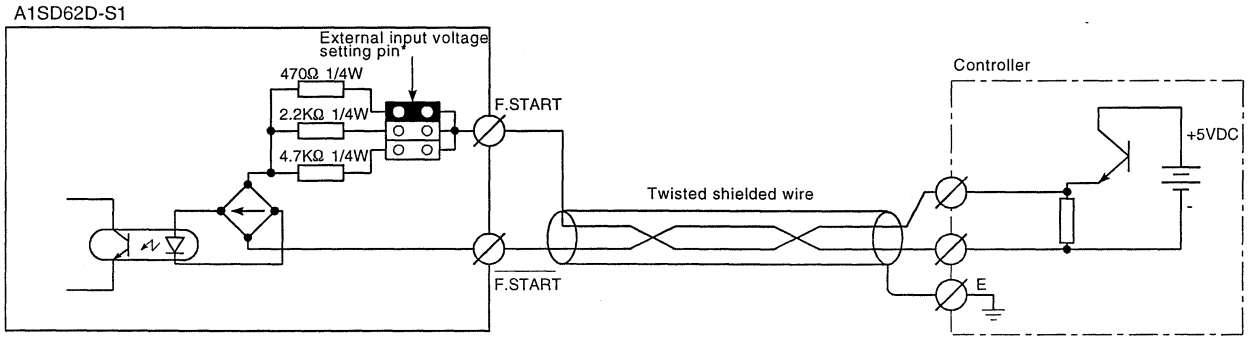
(2) For A1SD62D-S1

(a) When a controller (sink load type) is supplied with 12 V:




This diagram assumes that the internal circuit is set to PRESET.

(b) When a controller (source load type) is supplied with 5 V:




This diagram assumes that the internal circuit is set to PRESET.

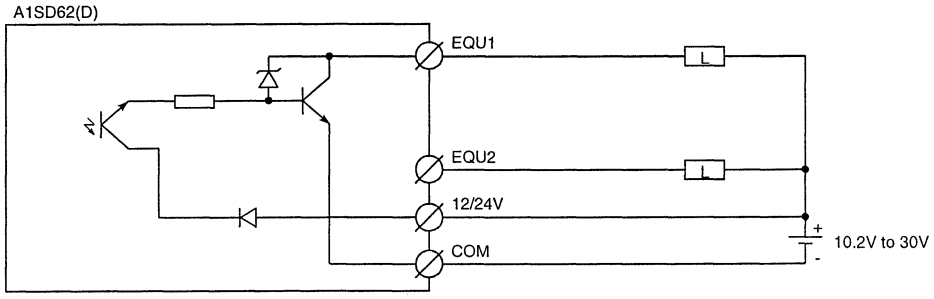
**REMARK**

(1) * Set the external input voltage setting pin to the  position.

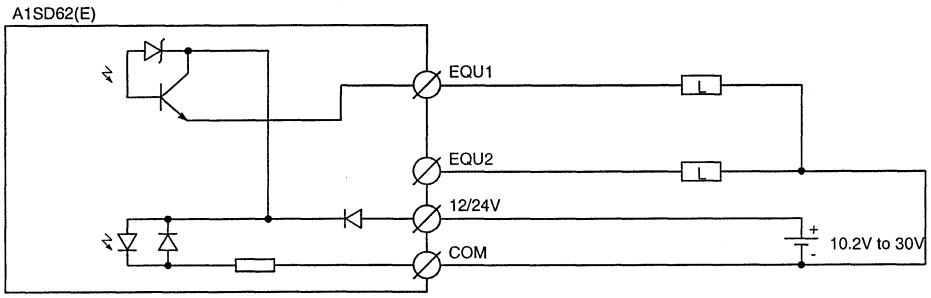
### 4.4.4 Wiring examples at external output terminals (EQU)

To use an EQU terminal, the internal photocoupler should be activated. For this example, 10.2 to 30 VDC external power is necessary. Connection methods are as follows:

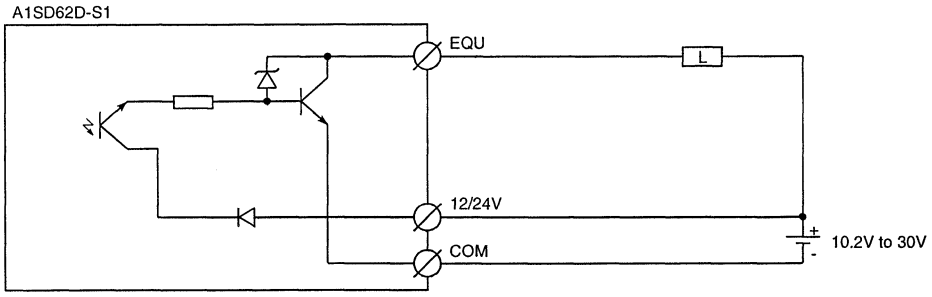
(1) A1SD62(D)




(2) A1SD62E




(3) A1SD62D-S1

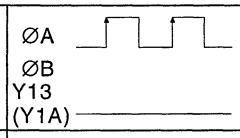
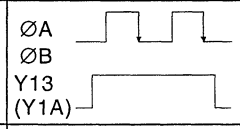
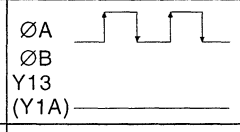
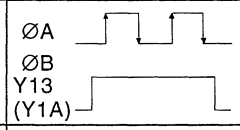
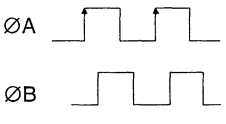
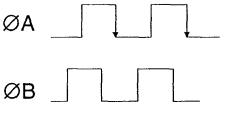
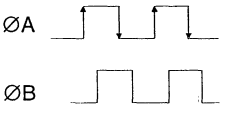
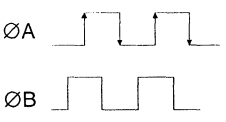


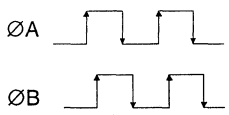
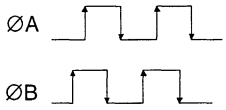
# 5. PULSE INPUT AND COUNTING METHOD

This section describes the pulse input and counting method of the A1SD62 (E/D/D-S1).

(1) The pulse input mode is classified into single-phase pulse input and 2-phase pulse input. Single-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.
Table 5.1 shows the pulse input modes and the count timing.

**Table 5.1 Pulse Input mode and Count Timing**

| Pulse Input Mode | Count Timing | | |
|---|---|---|---|
| Single-phase, multiplied by one | In up count |  | Counts a pulse at ↑ of ØA. Ø B, Y13 (Y1A) are OFF. |
| | In down count |  | Counts a pulse at ↓ of ØA. Ø B, Y13 (Y1A) are ON. |
| Single-phase, multiplied by two | In up count |  | Counts a pulse at ↑ and ↓ of ØA. Ø B, Y13 (Y1A) are OFF. |
| | In down count |  | Counts a pulse at ↑ and ↓ of ØA.Ø B, Y13 (Y1A) are ON. |
| 2-phase, multiplied by one | In up count |  | Counts a pulse at ↑ of ØA. The pulse count increases in response to the phase difference between ØA and ØB. |
| | In down count |  | Counts a pulse at ↓ of ØA. The pulse count decreases in response to the phase difference between ØA and ØB. |
| 2-phase, multiplied by two | In up count |  | Counts a pulse at ↑ and ↓ of ØA. The pulse count increases in response to the phase difference between ØA and ØB. |
| | In down count |  | Counts a pulse at ↑ and ↓ of ØA. The pulse count decreases in response to the phase difference between ØA and ØB. |

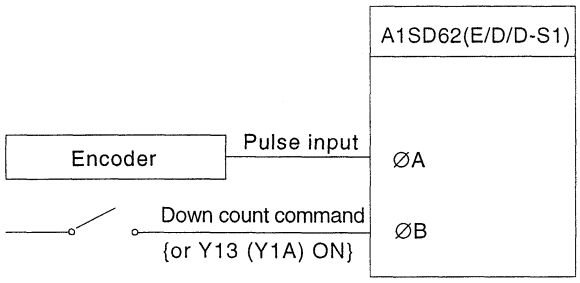
| Pulse Input Mode | Count Timing | | |
|---|---|---|---|
| 2-phase, multiplied by four | In up count | ØA<br>ØB  | Counts a pulse at ↑ and ↓ of ØA and ØB. The pulse count increases in response to the phase difference between ØA and ØB. |
| | In down count | ØA<br>ØB  | Counts a pulse at ↑ and ↓ of ØA and ØB. The pulse count decreases in response to the phase difference between ØA and ØB. |

(2) If the pulse input mode is changed, counting will continue from the last value before the mode change.

## 5.1 Single-Phase Pulse Input

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

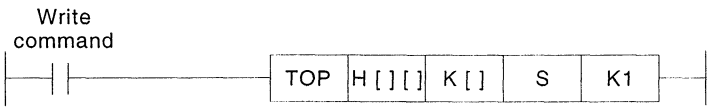
(1) The following figure shows the relationship between phase A pulse input and a down count command.




(2) Counting mode setting
To use this counting mode, set the pulse input mode setting buffer memory {address 3 (35)} of the A1SD62(E/D/D-S1) using the sequence program.

| Counting Mode | Set Value |
|---|---|
| Multiplication by one | K0 |
| Multiplication by two | K8 |

[Sequence program]




**REMARKS**

(1) In [ ][ ], set the first two digits of the hexadecimal three-digit first I/O number allocated to the A1SD62(E/D/D-S1).

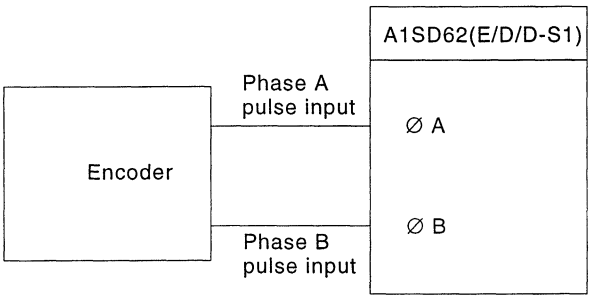
(2) Set 3 in [ ] for CH1, or 35 for CH2.

(3) In S, set K0 representing multiplication by one, or K8 for multiplication by two.

## 5.2 Counting at 2-Phase Pulse Input

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

(1) The relationship between the phase A pulse input and the phase B pulse input is given below:

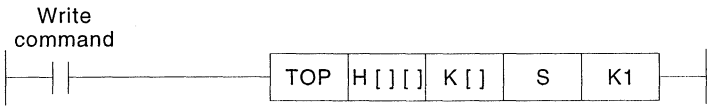



(2) Counter processing mode setting

When using any of these counting modes, set the following value to the pulse input mode setting buffer memory {address 3 (35)} of the A1SD62(E/D/D-S1) in the sequence program.

| Counting Mode | Setting Value |
|---|---|
| Multiplied by one | K2 |
| Multiplied by two | K10 |
| Multiplied by four | K18 |

[Sequence program]




**REMARKS**

1) In [ ][ ], set the first two digits of the hexadecimal three-digit first I/O number allocated to the A1SD62(E/D/D-S1).
2) Set 3 in [ ] for CH1, or 35 for CH2.
3) In S, set K2 representing multiplication by one, K10 for multiplication by two, or K18 for multiplication by four.

## 5.3 Reading the Present Value

This section gives details on the present value stored in the A1SD62(E/D/D-S1)'s present value storage buffer memory {addresses 4 to 5 (36 to 37)}, and how to read it.

(1) The present value storage buffer memory stores the present value when any function is used.
When the latch counter, sampling counter or periodic pulse counter function is executed, the count value is stored into the counter function selection count value storage buffer memory indicated in table 5.2, aside from the present value storage buffer memory. (Refer to Chapter 9.)

**Table 5.3 Counter Function Selection Count Value Storage Buffer Memory**

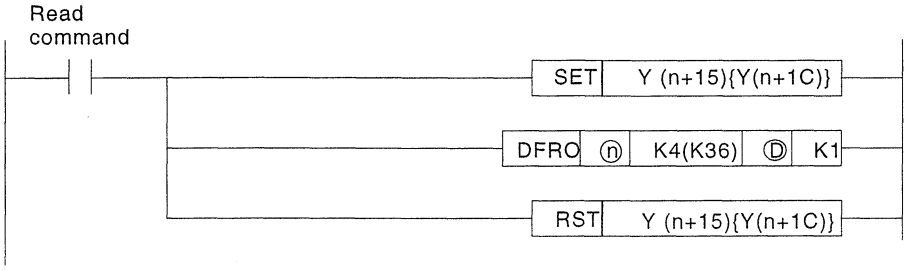
| Description | | Latch Count Value | Sampling Count Value | Periodic Pulse Count Previous Value | Periodic Pulse Count Present Value |
|---|---|---|---|---|---|
| Buffer memory address | CH1 | 14 to 15 | 16 to 17 | 18 to 19 | 20 to 21 |
| | CH2 | 46 to 47 | 48 to 49 | 50 to 51 | 52 to 53 |

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

(3) In up count, the present value storage buffer memory returns to 0 when the count value reaches 16777215.
In down count, the buffer memory returns to 16777215 when the count value reaches 0.

(4) Shown below is the sequence program to read the present value stored in the present value storage buffer memory.

(a) Reading using FROM/TO instructions (when the direct method is selected as the programmable controller CPU I/O control method)

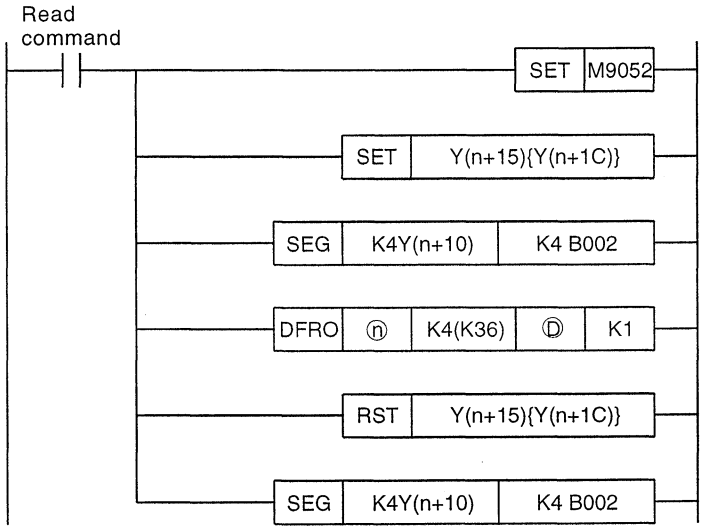



Set data

| | |
|---|---|
| ⓝ | A1SD62(E/D/D-S1)'s first I/O number from which the present value will be read |
| Ⓓ | First device number to store the read present value |

1) Set a count value read request Y(n + 15) (for channel 1) or Y(n+1C) (for channel 2).
2) The present value is read from the I/O number of the A1SD62(E/D/D-S1) set for ⓝ, and is stored in the device set for Ⓓ.
   In present value reading, data is read directly from A1SD62(E/D/D-S1)'s buffer memory addresses No. 4 and No. 5 (for CH1) or No. 36 and No. 37 (for CH2).
3) Reset the count value read request Y(n + 15) (for channel 1) or Y(n+1C) (for channel 2).

(b) Reading using FROM/TO instructions (when the refresh method is selected as the programmable controller CPU I/O control method)

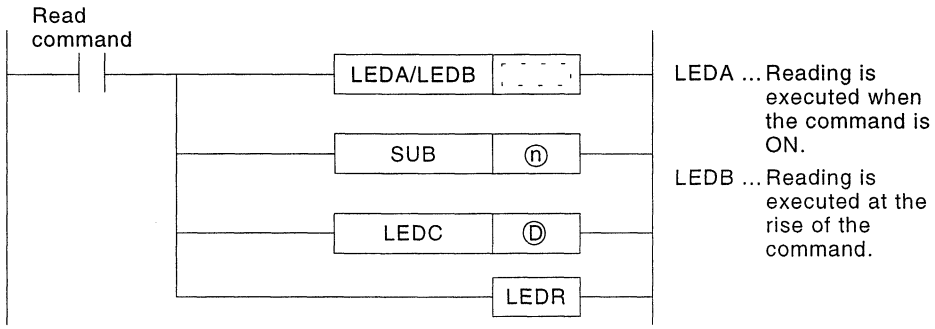



Set data

| | |
|---|---|
| ⓝ | A1SD62(E/D/D-S1)'s first I/O number from which the present value will be read |
| Ⓓ | First device number to store the read present value |

1) Designate partial refresh.
2) Set a count value read request Y(n + 15) (for channel 1) or Y(n+1C) (for channel 2).
3) Y(n+10) to Y(n+1F) are partially refreshed.
4) The present value is read from the I/O number of the A1SD62(E/D/D-S1) set for ⓝ, and is stored in the device set for Ⓓ.
   In present value reading, data is read directly from A1SD62(E/D/D-S1)'s buffer memory addresses No. 4 and No. 5 (for CH1) or No. 36 and No. 37 (for CH2).
5) Reset the count value read request Y(n + 15) (for channel 1) or Y(n+1C) (for channel 2).
6) Y(n+10) to Y(n+1F) are partially refreshed.

(c) Reading using an A2ASCPU(S1/S30)/A2USHCPU-S1 dedicated instruction




Instruction symbol in

| PVRD1, PVRD2 |
|---|

Set data

| | |
|---|---|
| ⓝ | A1SD62(E/D/D-S1)'s first I/O number from which the present value will be read |
| Ⓓ | First device number to store the read present value. |

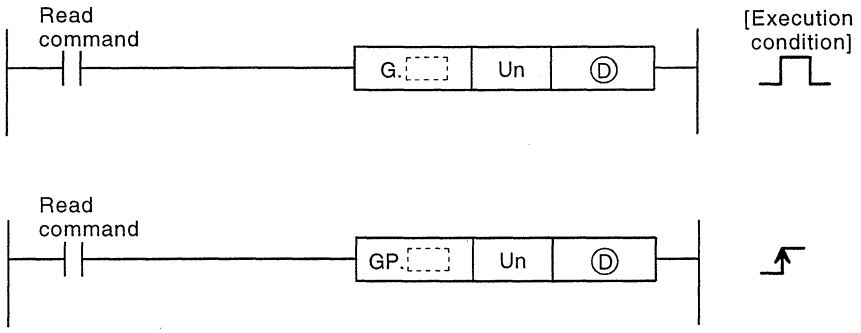
1) The present value is read from the I/O number of the A1SD62(E/D/D-S1) set for ⓝ, and is stored to the device set for Ⓓ.
In present value reading, data is read directly from A1SD62(E/D/D-S1)'s buffer memory addresses No. 4 and No. 5 (for CH1) or No. 36 and No. 37 (for CH2).
The channel for present value reading depends on the instruction to be used.
PVRD1 instruction .....For CH1
PVRD2 instruction .....For CH2

2) In present value reading using a PVRD1 or PVRD2 instruction, ON/OFF control of the A1SD62(E/D/D-S1) I/O signals Y(n+15), Y(n+1C) (count value read request) is automatically executed internally, which means that the user does not have to execute it.

**POINT**

To perform communications with a special function module using an A2ASCPU(S1/S30)/A2USHCPU-S1 dedicated instruction, register AD61 as the module type when setting parameters.

(d) Reading using an Q2AS(H)CPU(S1) dedicated instruction




Instruction symbol in

| PVRD1, PVRD2 |
|---|

Set data

| | |
|---|---|
| Un | A1SD62(E/D/D-S1)'s first I/O number from which the present value will be read |
| Ⓓ | First device number to store the read present value. |

1) The present value is read from the I/O number of the A1SD62(E/D/D-S1) set for ⓝ, and is stored to the device set forⒹ.
In present value reading, data is read directly from A1SD62(E/D/D-S1)'s buffer memory addresses No. 4 and No. 5 (for CH1) or No. 36 and No. 37 (for CH2).
The channel for present value reading depends on the instruction to be used.
PVRD1 instruction .....For CH1
PVRD2 instruction .....For CH2

2) In present value reading using a PVRD1 or PVRD2 instruction, ON/OFF control of the A1SD62(E/D/D-S1) I/O signals Y(n+15), Y(n+1C) (count value read request) is automatically executed internally, which means that the user does not have to execute it.

**POINT**

To perform communications with a special function module using an Q2AS(H)CPU(S1) dedicated instruction, register AD61 as the module type when setting parameters

# 6. EXECUTING THE COINCIDENCE OUTPUT FUNCTION

This section 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.
For coincidence output, two points can be set to the A1SD62(E/D), and one point to the A1SD62D-S1.
To use the coincidence output function, set the coincidence signal enable command to ON.

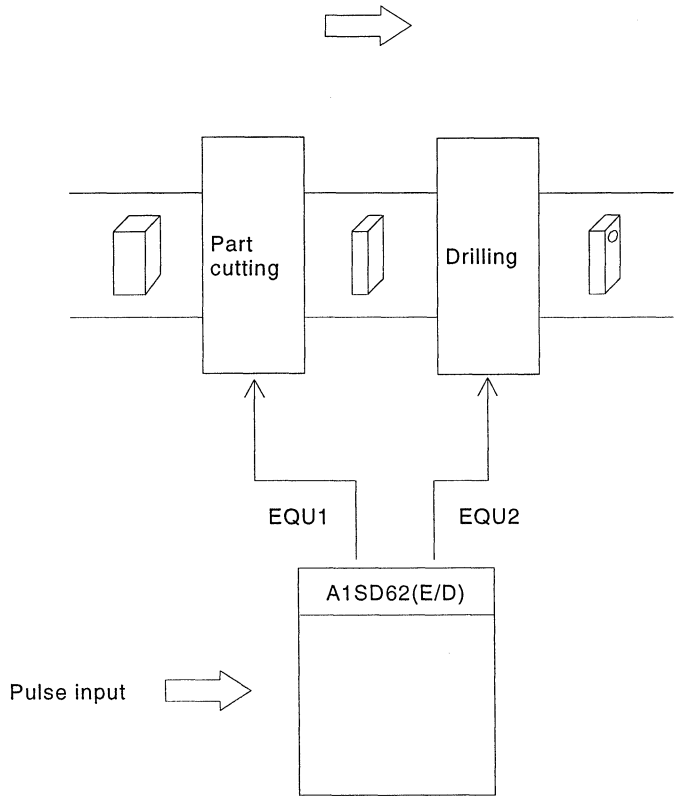
[Example of how to use the coincidence output function]

The following is an example for the use of the A1SD62(E/D).
Manufacturing products by performing each machining operation in response to a coincidence output in a machining line system.

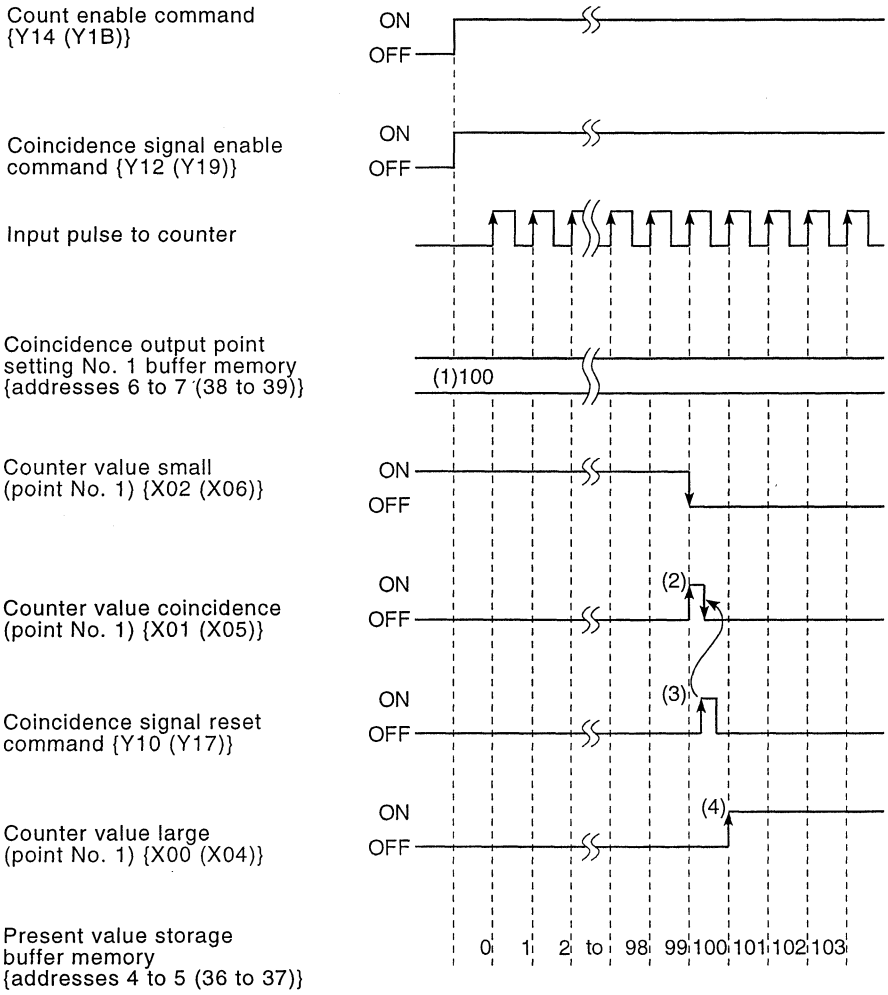
(1) The material is conveyed by a belt conveyor.

(2) The material position can be identified as the present count value which is determined by a pulse sent to the A1SD62(E/D).

(3) As soon as the material is located at each specified position, the relevant machining operation takes place in response to a coincidence output (EQU1, EQU2) from the A1SD62(E/D).



### 6.1.1 Coincidence output function operation




(1) ... The set coincidence output point value is written in 24-bit binary to the coincidence output point setting No. 1 buffer memory {addresses 6 to 7 (38 to 39)} of the A1SD62(E/D/D-S1) in advance.

(2) ... When the counter value reaches the set coincidence output point value, the counter value small signal is turned off, and the counter value coincidence signal is turned on.

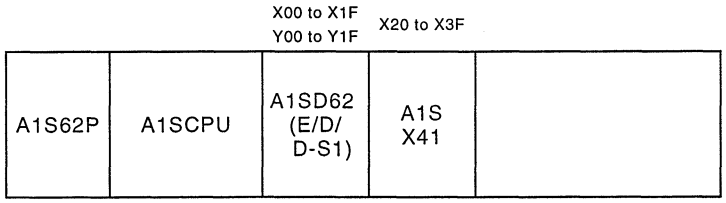
(3) ... The coincidence signal reset command is turned on, and the counter value coincidence signal is reset.
The subsequent coincidence signal output does not take place as long as the counter value coincidence signal remains on.
(Point No. 2 is reset by writing to the buffer memory address 11 (43). Any value may be written.)

(4) ... When the counter value is larger than the set coincidence output point value, the counter value large signal is turned on.

### 6.1.2 Program Examples

The following program is designed to count pulses in the 2-phase pulse input multiplied by one mode using CH1, and execute the coincidence output function.

[System configuration]

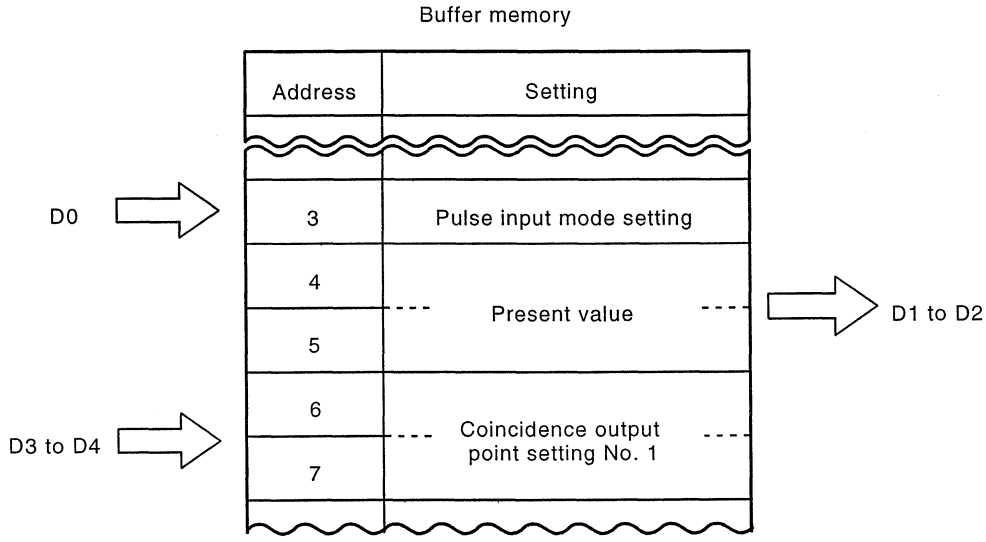



[Devices to be used]

(1) Execution commands

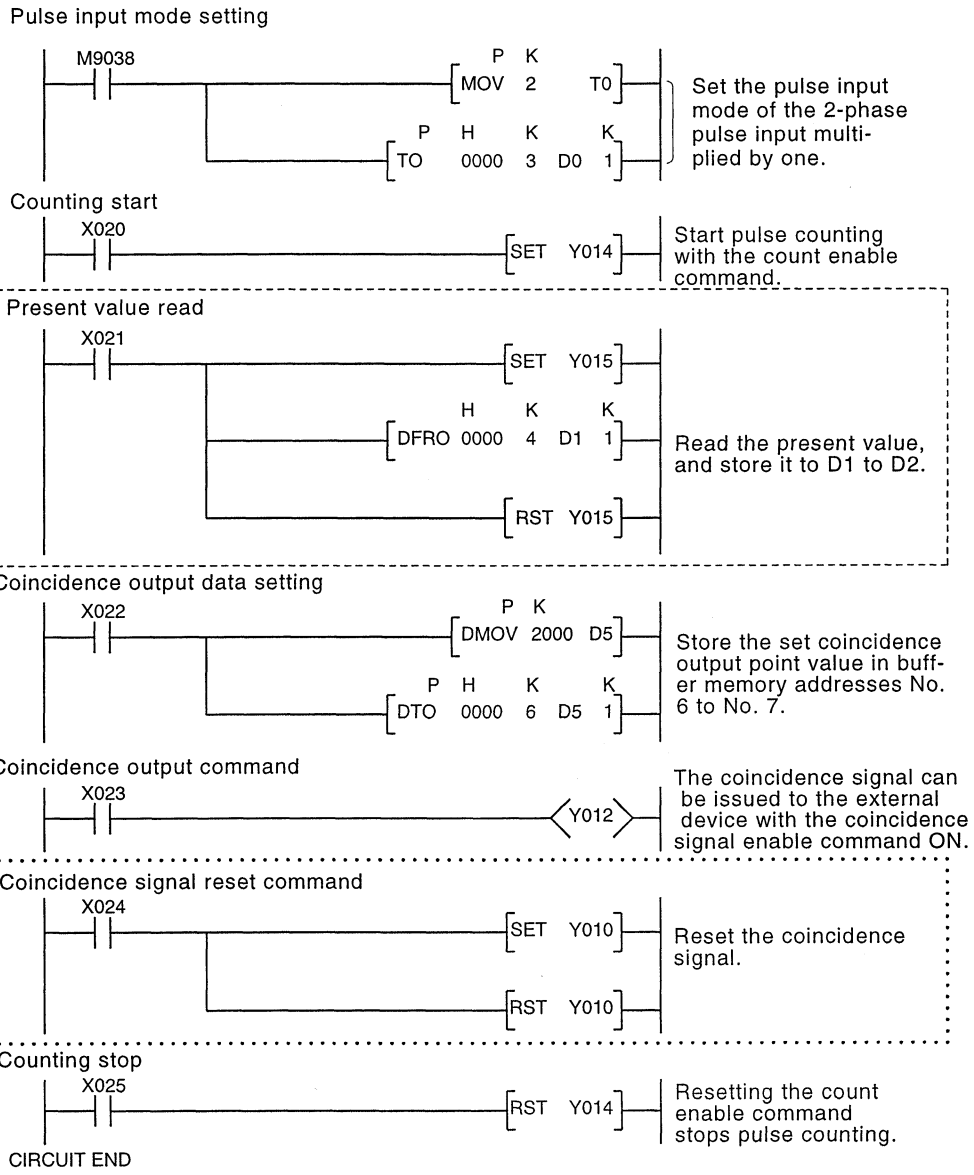
(a) Pulse input mode setting command ..... M9038
(b) Counting start command ..... X20
(c) Present value read command ..... X21
(d) Coincidence output data setting command ..... X22
(e) Coincidence output command ..... X23
(f) Coincidence signal reset command ..... X24
(g) Counting stop command ..... X25

(2) Relationship between data registers (D0 to D4) and the buffer memory



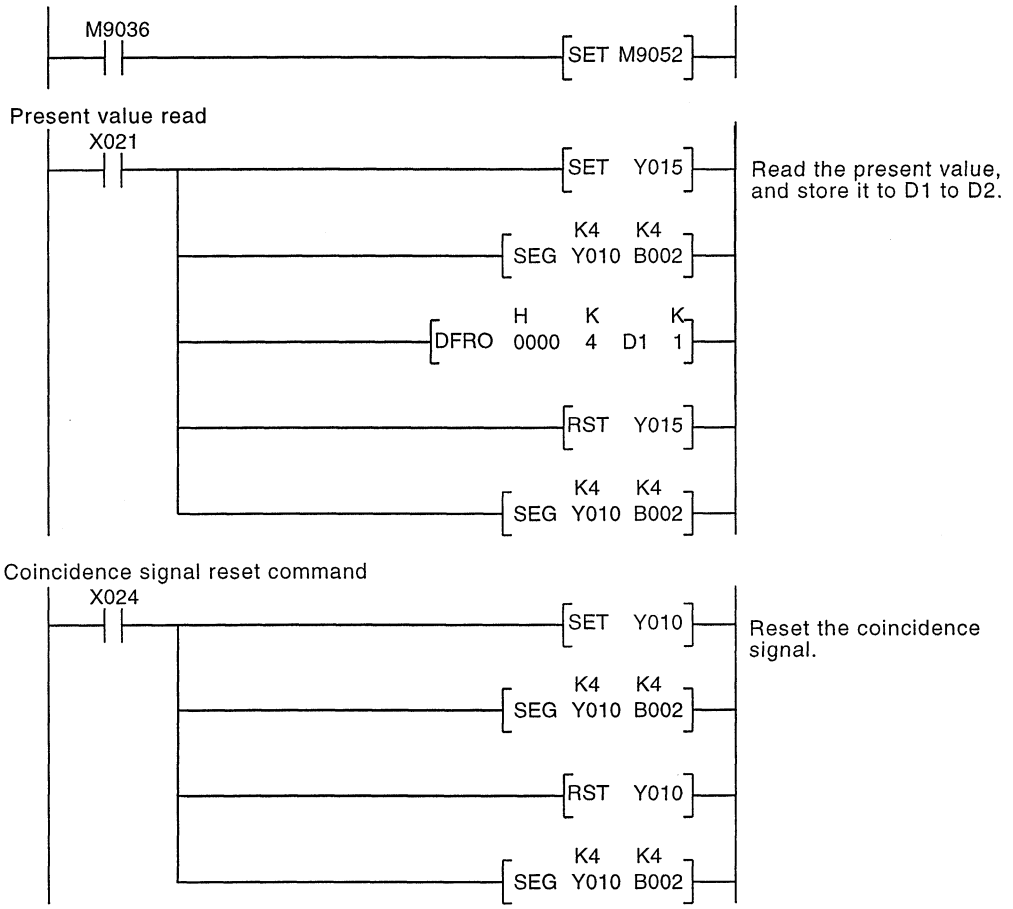
(a) Execution using FROM/TO instructions (when the direct method is selected as the programmable controller CPU I/O control method)

[Program]



(b) Execution using FROM/TO instructions (when the refresh method is selected as the programmable controller CPU I/O control method)

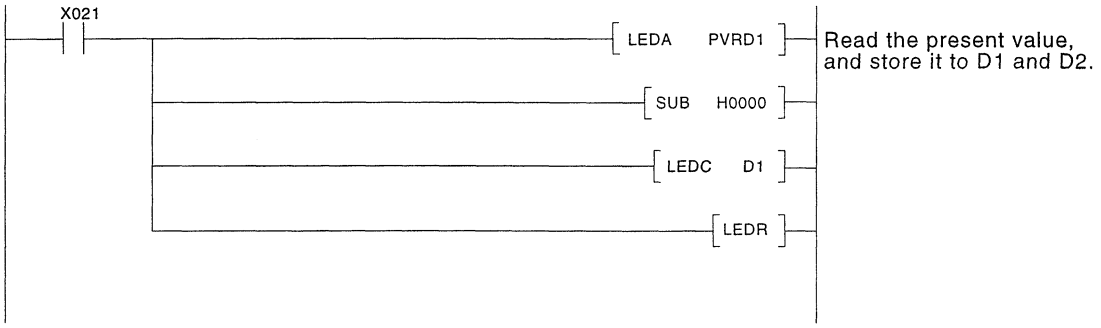
The portions of the program example shown in (a) enclosed by the broken and dotted lines must be replaced with the following:



(c) Execution using A2ASCPU(S1/S30)/A2USHCPU-S1 dedicated instructions

As shown below, AnUSCPU dedicated instructions can be used in place of the portion of the program example shown in (a) enclosed by the broken line.

Present value read



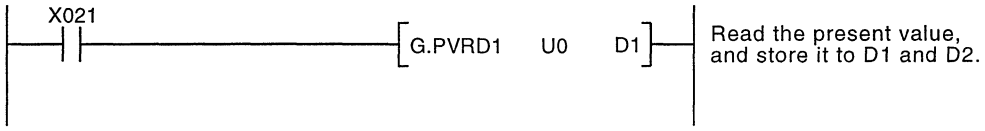

**POINT**

- To perform communications with a special function module using an A2ASCPU(S1/S30)/A2USHCPU-S1 dedicated instruction, register AD61 as the module type when setting parameters.
- Dedicated instructions cannot be used for the coincidence output point setting No. 2.

(d) Execution using Q2AS(H)CPU(S1) dedicated instructions

As shown below, Q2AS(H)CPU(S1) dedicated instructions can be used in place of the portion of the program example shown in (a) enclosed by the broken line.

Present value read




**POINT**

- To perform communications with a special function module using an Q2AS(H)CPU(S1) dedicated instruction, register AD61 as the module type when setting parameters.
- Dedicated instructions cannot be used for the coincidence output point setting No. 2.

# 7. EXECUTING THE PRESET FUNCTION

This section explains the preset function.

## 7.1 Preset Function

The preset function is used for converting the counter's present value to a different value.

This changed 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 consists of two modes: preset by the sequence program and preset from the external control signal (applying the voltage to the external terminal).

[Preset function application example]

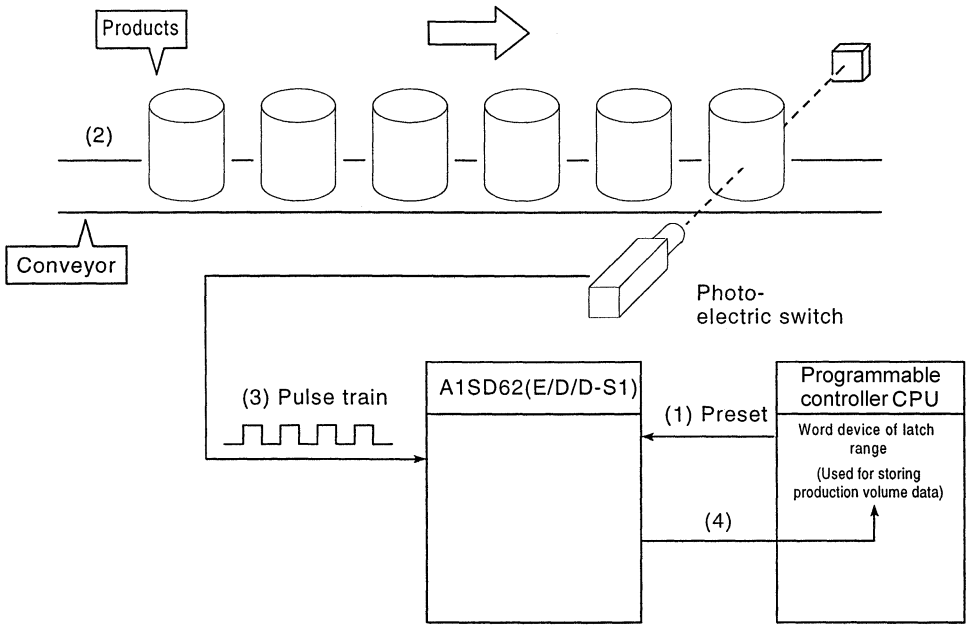
By using the preset function, the production count can be continued from the previous day.

(1) The production volume of the previous day is "preset" from the programmable controller CPU to the A1SD62(E/D/D-S1).

(2) Products are carried by a conveyor.

(3) The production volume is counted by inputting the pulse from the photo-electric switch.

(4) At the end of the daily production, the counter value in the buffer memory is stored to a word device (D, W, etc.) in the programmable controller CPU latch range.

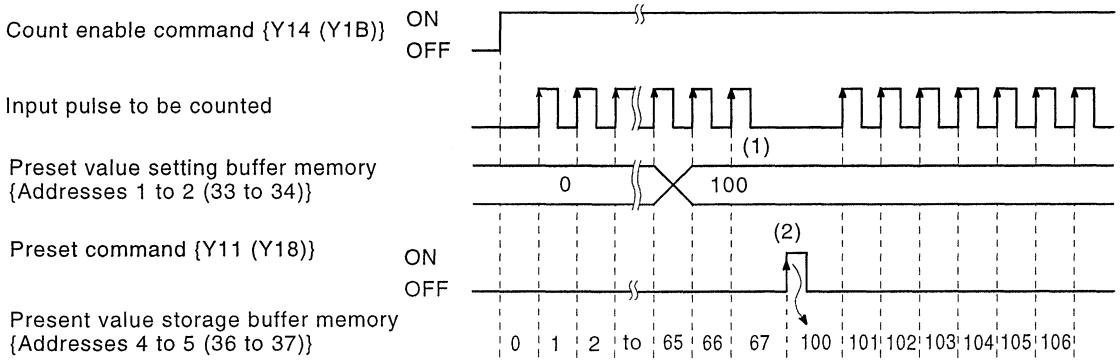


## 7.2 Preset Using the Sequence Program

The following describes the preset function executed by the sequence program.

### 7.2.1 Executing the preset function using the sequence program

Turn ON the preset command {Y11 (Y18)} in the sequence program to execute the preset.



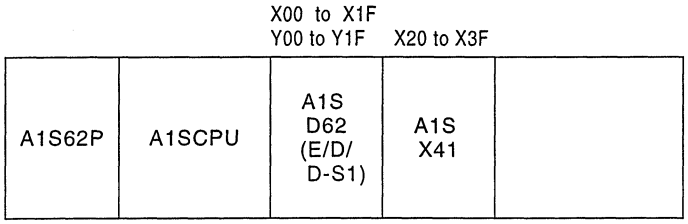

1) Write a given value to the preset value setting buffer memory {addresses 1 to 2 (33 to 34)} of the A1SD62(E/D/D-S1) in 24-bit binary format.
2) At the rise (OFF to ON) of the preset command {Y11 (Y18)}, the preset value in the preset value setting buffer memory is preset to the present value storing buffer memory.

   The preset function can be used whether the count enable command {Y14(Y1B)} is ON or OFF.

### 7.2.2 Example program

The following program is to count pulses in 2-phase pulse input multiplied by one mode using CH1 and execute the preset function using the sequence program.

[System configuration]

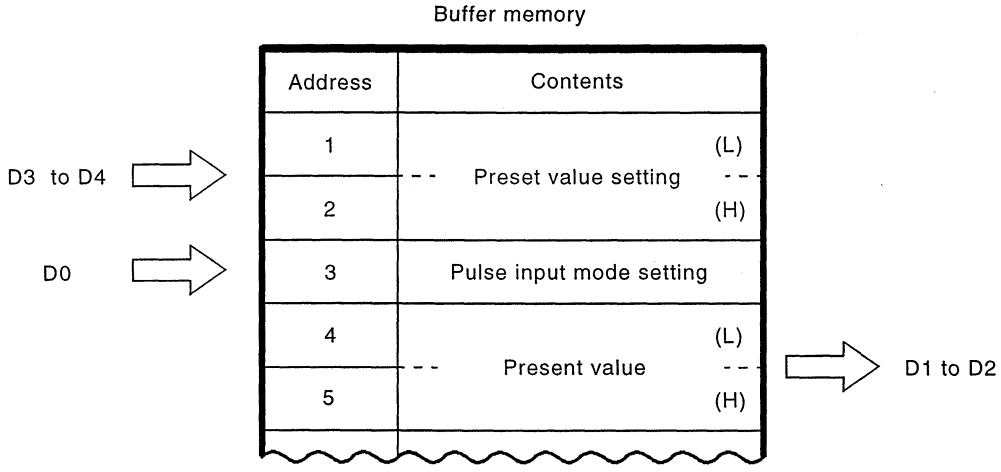



[Devices to be used]

(1) Execution commands

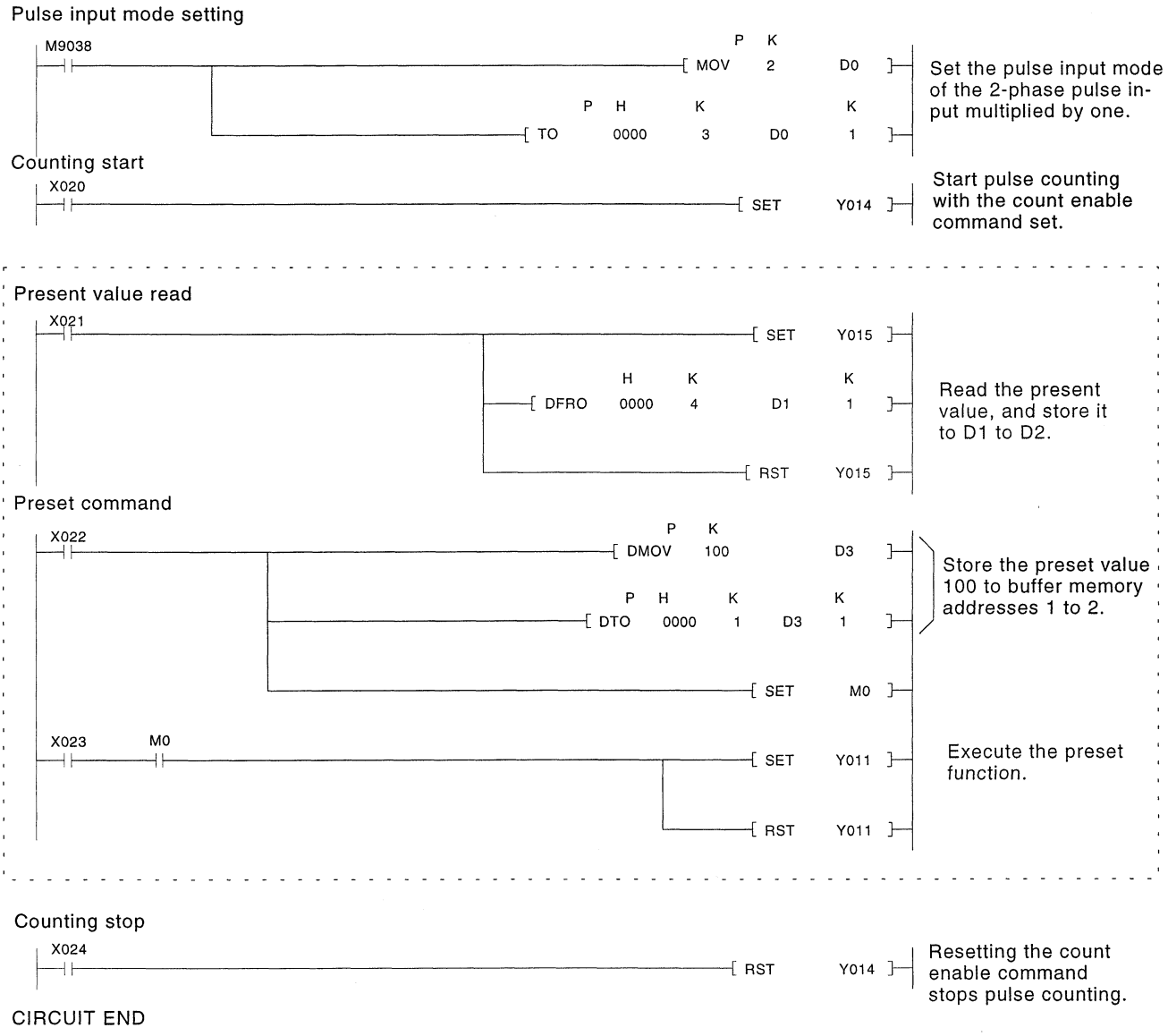
(a) Pulse input mode setting command ..... M9038
(b) Count operation start command ..... X20
(c) Present value read command ..... X21
(d) Preset value write command ..... X22
(e) Preset command ..... X23
(f) Count operation stop command ..... X24

(2) Relationship between data register (D0 to D4) and buffer memory



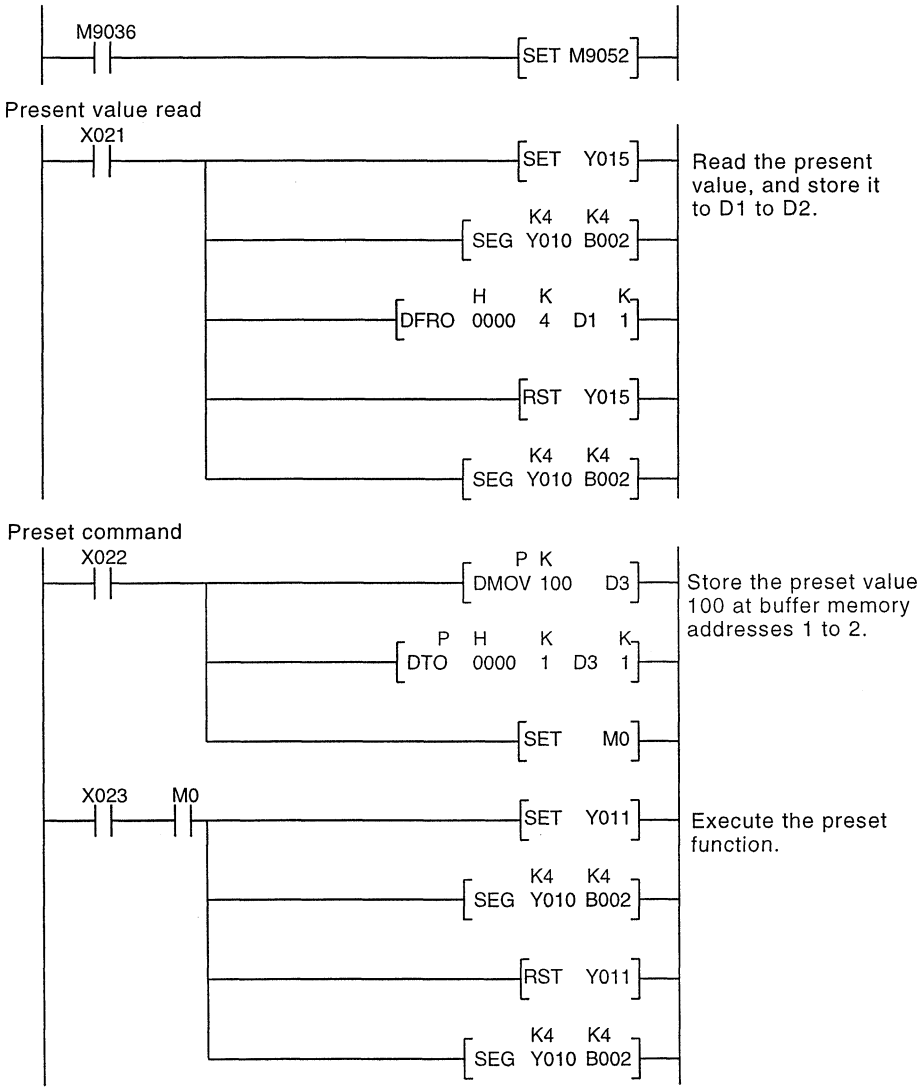
(a) Execution using FROM/TO instructions (when the direct method is selected as the programmable controller CPU I/O control method)

[Program]



(b) Execution using FROM/TO instructions (when the refresh method is selected as the programmable controller CPU I/O control method)

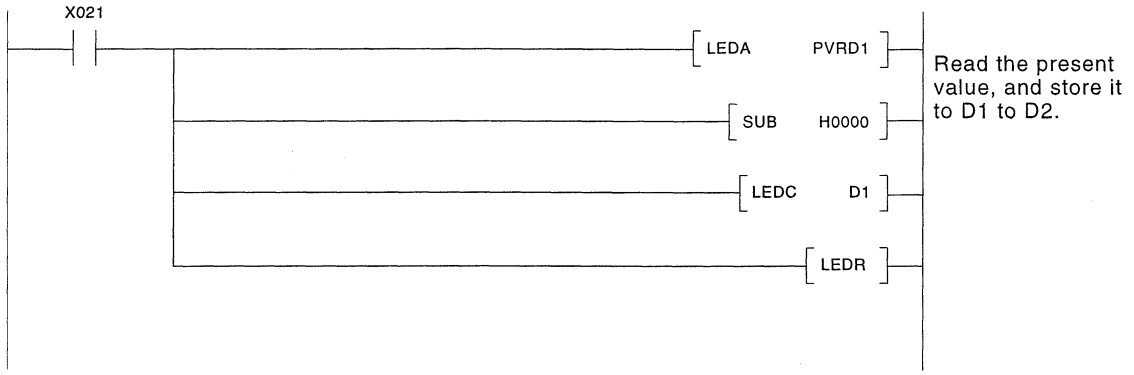
The portion of the program example shown in (a) enclosed by the broken line must be replaced with the following:



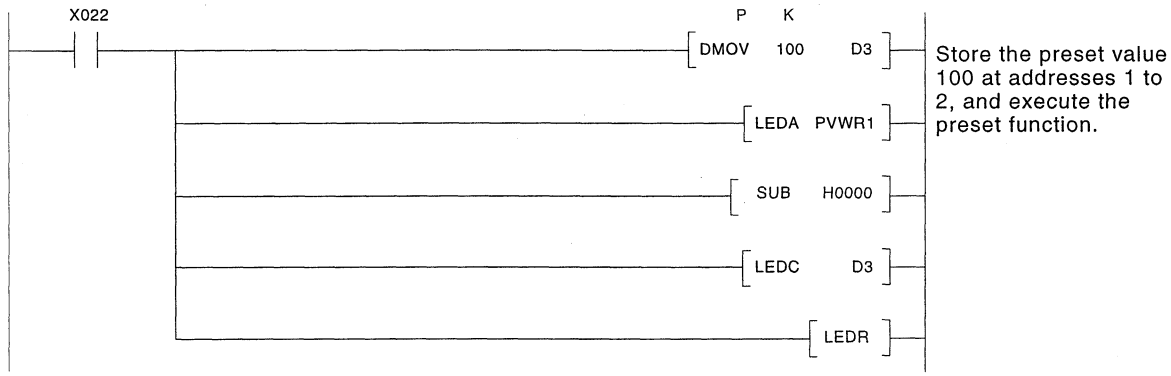
(c) Execution using A2ASCPU(S1/S30)/A2USHCPU-S1 dedicated instructions

As shown below, A2ASCPU(S1/S30)/A2USHCPU-S1 dedicated instructions can be used in place of the portion of the program example shown in (a) enclosed by the broken line.

Present value read




Preset command

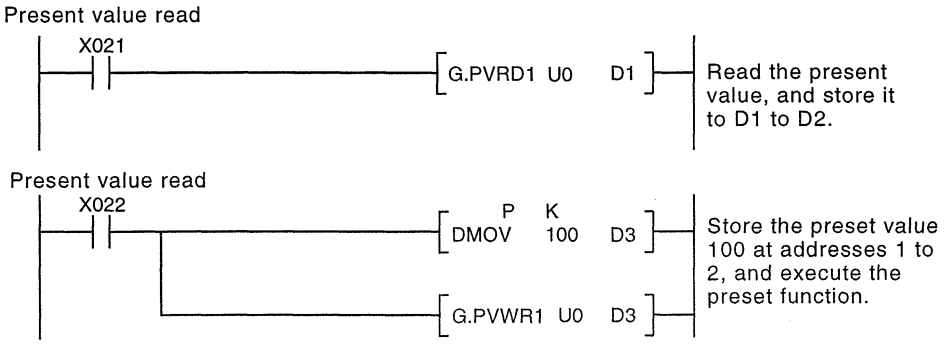



**POINT**

To perform communications with a special function module using an A2ASCPU(S1/S30)/A2USHCPU-S1 dedicated instruction, register AD61 as the module type when setting parameters.

(d) Execution using Q2AS(H)CPU(S1) dedicated instructions

As shown below, Q2AS(H)CPU(S1) dedicated instructions can be used in place of the portion of the program example shown in (a) enclosed by the broken line.




**POINT**

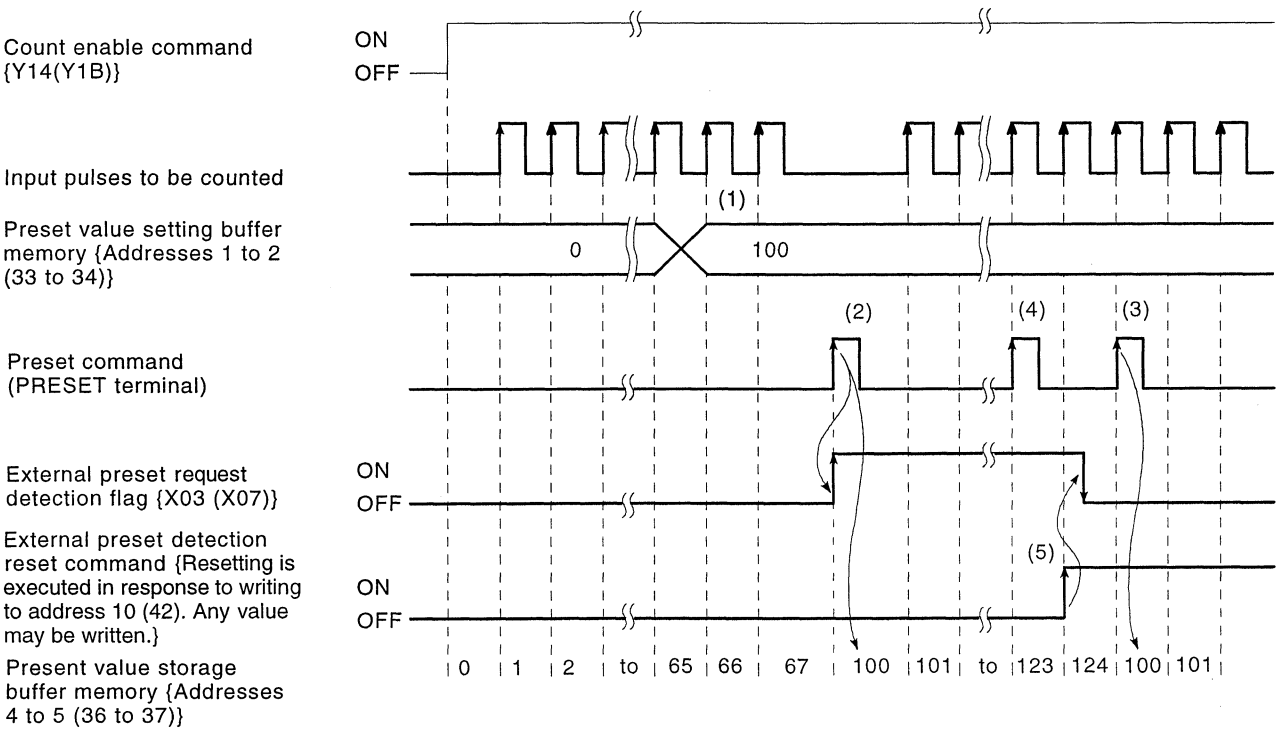
To perform communications with a special function module using an Q2AS(H)CPU(S1) dedicated instruction, register AD61 as the module type when setting parameters.

## 7.3 Preset by External Control Signal

The following describes the preset by the external control signal.

### 7.3.1 When the preset is executed by external control signal

Execute the preset by applying the voltage to the external input PRESET terminal.




1) Write a given value to the preset value setting buffer memory {addresses 1 to 2 (33 to 34)} of the A1SD62(E/D/D-S1) in 24-bit binary format.
2) Executing the preset command (applying the voltage to the PRESET terminal) sets the preset value in the buffer memory to the present value buffer memory.
3) The preset function can be used whether the count enable command {Y14 (Y1B)} is ON or OFF.

**POINT**

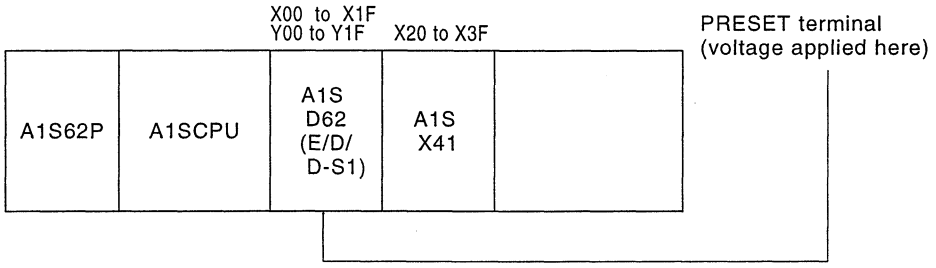
(1) When the external preset detection flag {X03 (X07)} is ON (see (4) in the above-indicated diagram), even if the voltage is applied to the PRESET terminal, the preset function cannot be executed.

In this case, by turning ON (see (5) in the above-indicated diagram) the external preset command detection reset command {resetting is executed in response to writing to address 10 (42)} and turning OFF the external preset command detection flag {X03 (X07), the preset function can be executed.

### 7.3.2 Example program

The following program is to count pulses in 2-phase pulse input multiplied by one mode using CH1 and execute the preset function in response to external input.

[System configuration]

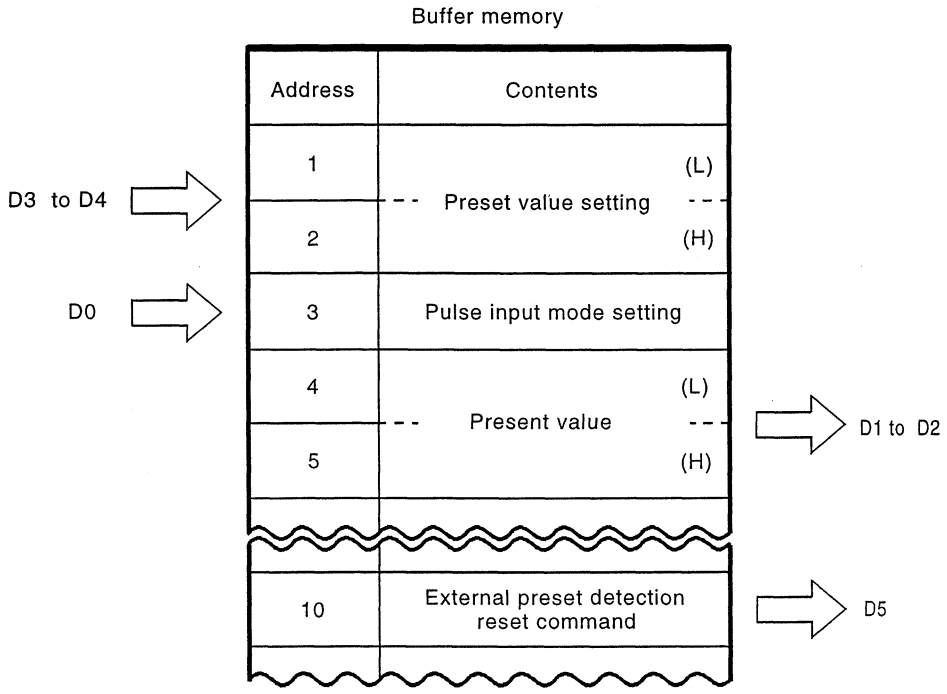



[Devices to be used]

(1) Execution commands

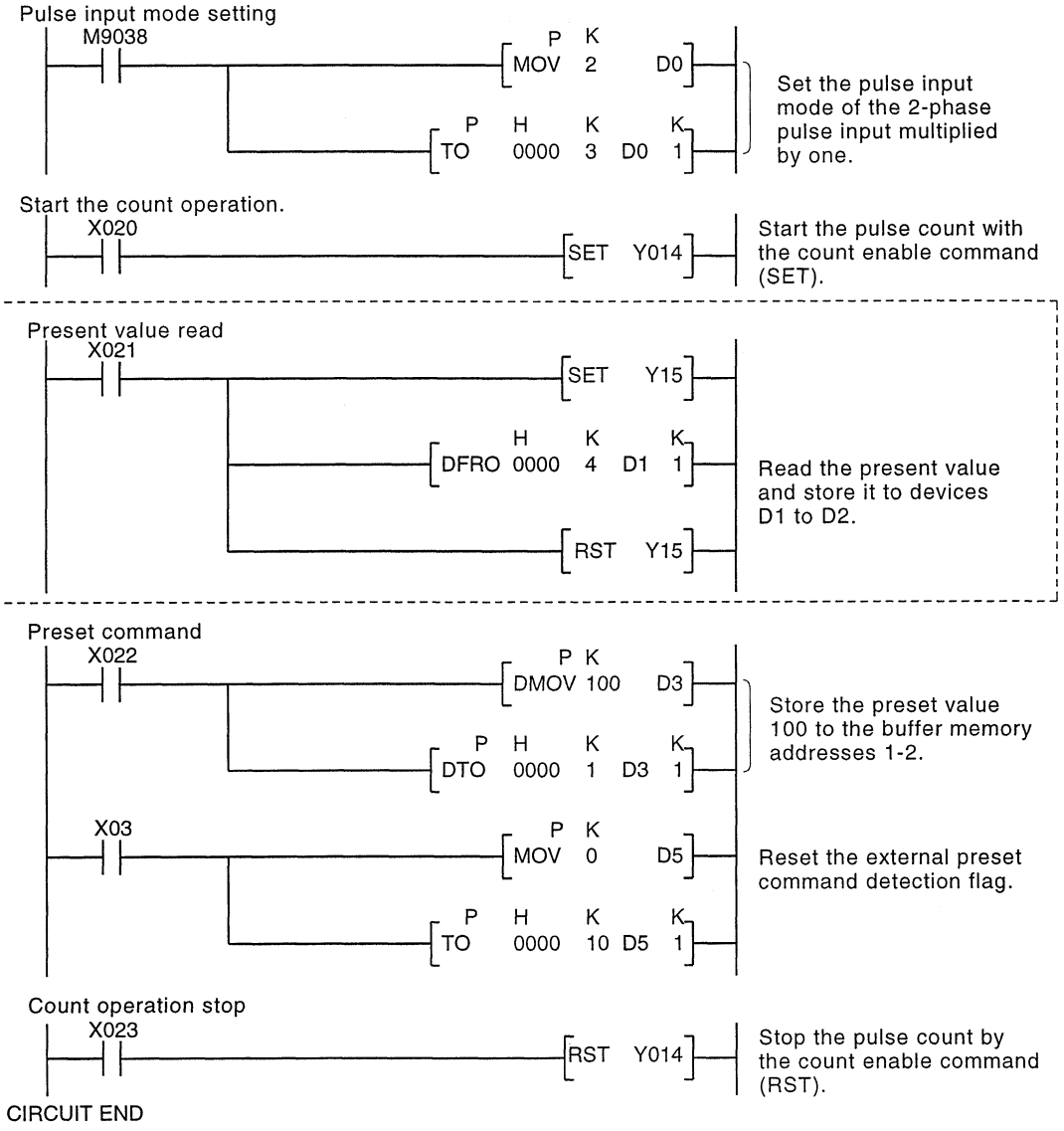
(a) Pulse input mode setting command ..... M9038
(b) Count operation start command ..... X20
(c) Present value read command ..... X21
(d) Preset value write command ..... X22
(e) External preset request detection flag reset command ..... X03
(f) Count operation stop command ..... X23

(2) Relationship between data register (D0 to D4) and buffer memory



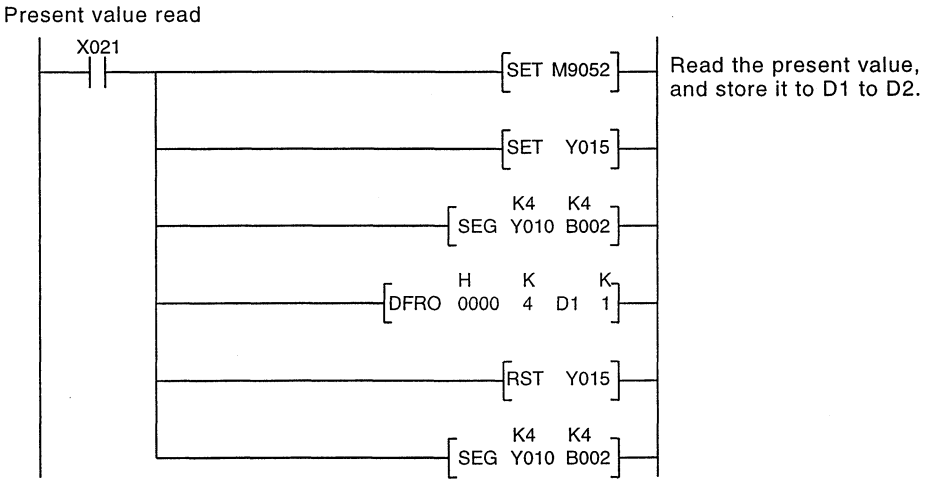
(a) Execution using FROM/TO instructions (when the direct method is selected as the programmable controller CPU I/O control method)

[Program]



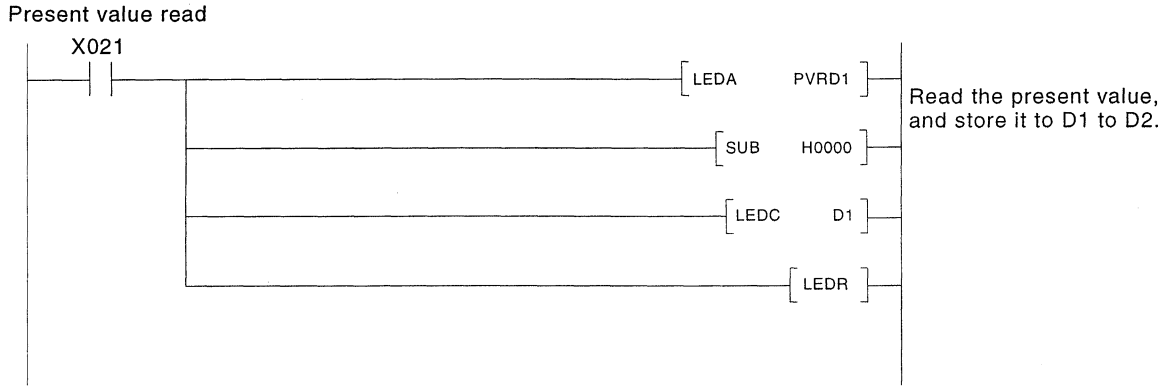
(b) Execution using FROM/TO instructions (when the refresh method is selected as the programmable controller CPU I/O control method)

The portion of the program example shown in (a) enclosed by the broken line must be replaced with the following:



(c) Execution using A2ASCPU(S1/S30)/A2USHCPU-S1 dedicated instructions

As shown below, A2ASCPU(S1/S30)/A2USHCPU-S1 dedicated instructions can be used in place of the portion of the program example shown in (a) enclosed by the broken line.

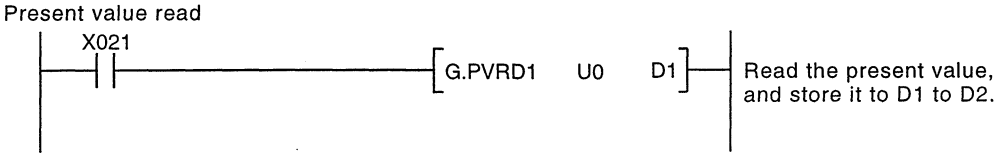



**POINT**

To perform communications with a special function module using an A2ASCPU(S1/S30)/A2USHCPU-S1 dedicated instruction, register AD61 as the module type when setting parameters.

(d) Execution using Q2AS(H)CPU(S1) dedicated instructions

As shown below, Q2AS(H)CPU(S1) dedicated instructions can be used in place of the portion of the program example shown in (a) enclosed by the broken line.




**POINT**

To perform communications with a special function module using an Q2AS(H)CPU(S1) dedicated instruction, register AD61 as the module type when setting parameters.

# 8. EXECUTING THE RING COUNTER FUNCTION

This section describes the ring counter function.

## 8.1 Ring Counter Function

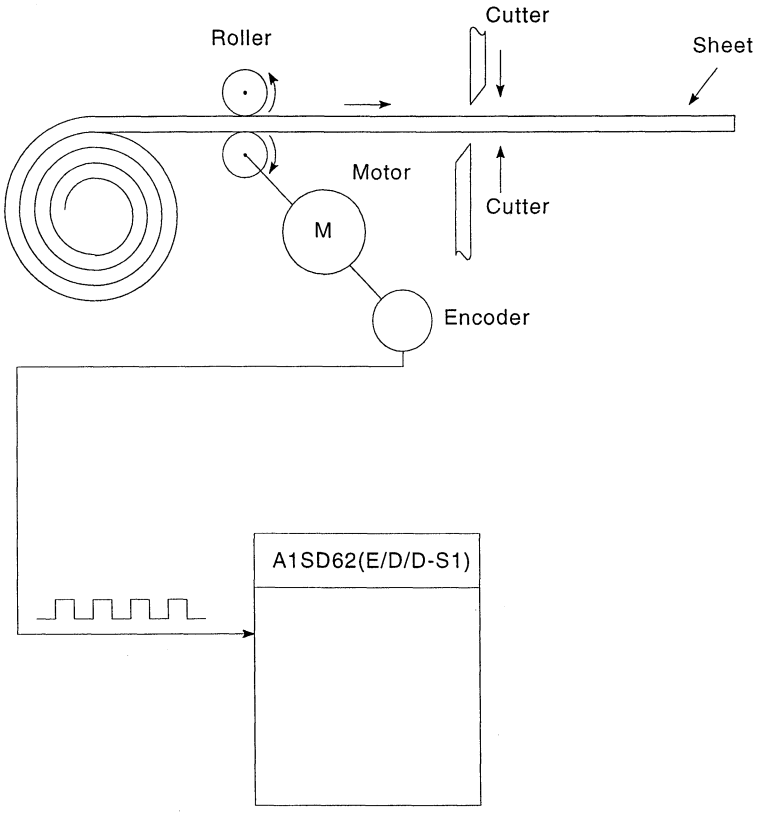
The ring counter function allows repeated pulse counting between the preset value and ring counter value set with the ring counter command.

The ring counter can be used for a control such as fixed-pitch feed.

[Ring counter function application example]

Using a system to cut a sheet to a specified size, adjust its rollers by setting the ring counter value, and cut the sheet to the specified size.

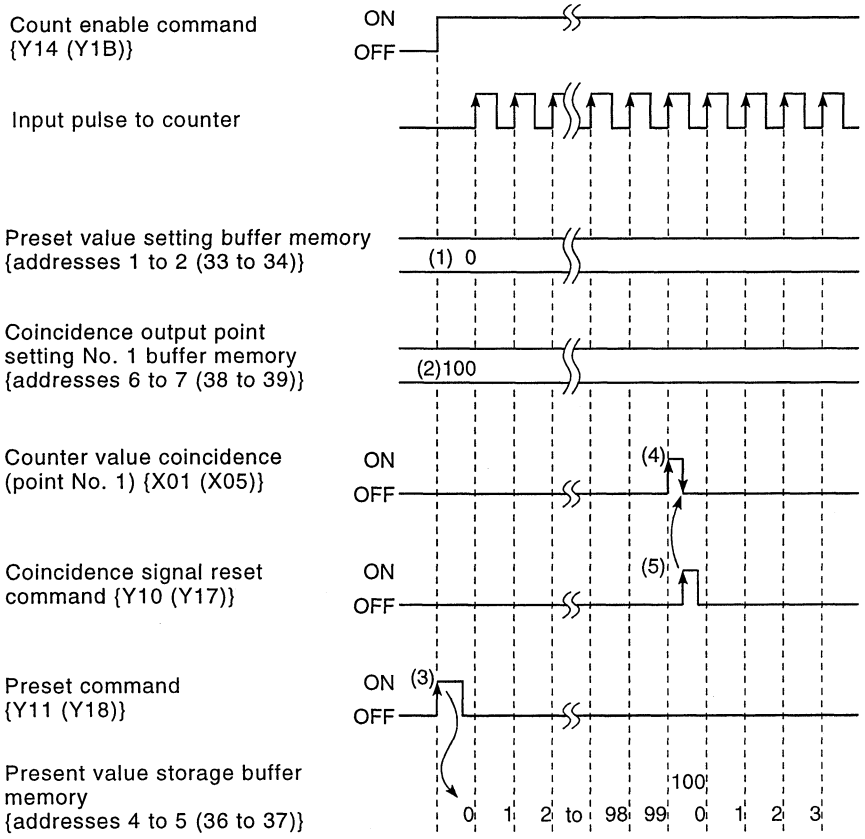
1) Set the preset and ring counter values to execute the ring counter function.
2) Turn on the motor to operate the rollers.
3) Operate the rollers so that the sheet can be cut to the specified size.
4) Cut the sheet.
5) Repeat steps 2 to 4.



### 8.1.1 Ring counter function operation

To use the ring counter function, set the ring counter setting pin on the A1SD62(E/D/D-S1) circuit board to ON in advance.

Set the preset value and the ring count value in the buffer memory.




(1).... The preset value is written in 24-bit binary to the preset value setting buffer memory {addresses 1 to 2 (33 to 34)} of the A1SD62(E/D/D-S1) in advance.

(2).... The ring counter value is written in 24-bit binary to the coincidence output point setting No. 1 buffer memory {addresses 6 to 7 (38 to 39)} of the A1SD62(E/D/D-S1) in advance.

(3).... At the rise (OFF to ON) of the preset command {Y11 (Y18)}, the preset value in the preset value setting buffer memory is preset to the present value storing buffer memory.
The preset function can be used whether the count enable command {Y14 (Y1B)} is ON or OFF.

(4).... When the counter value reaches the ring counter value, the counter value coincidence signal is turned on to execute presetting. By reading the present value during presetting, the ring counter value or preset value is read.

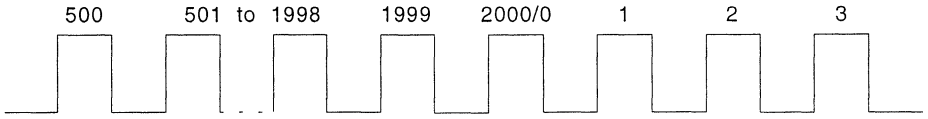
(5).... The coincidence signal reset command is turned on, and the counter value coincidence signal is reset.
If the counter value coincidence signal remains ON, the next preset cannot be executed.

### 8.1.2 Count range

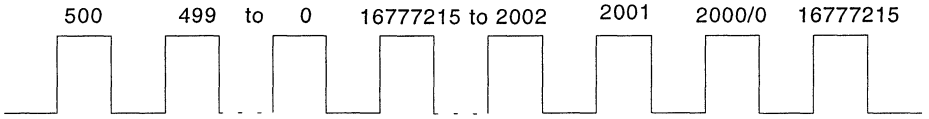
As shown below, the count range of the ring counter function differs depending on the relationship between the preset value, the ring counter value, the present value and the counting mode (up count/down count).

(1) When preset value ≤ present value ≤ ring counter value
If the ring counter function is executed when the preset value is 0, the ring counter value is 2000, and the present value is 500, the following events occur:

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

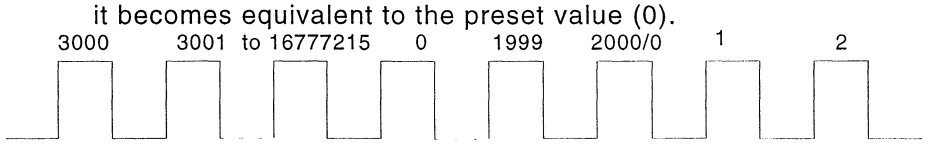



2) In down count, the present value returns to 16777215 after it has reached the preset value (0). Then, when the present value is counted down to the ring counter value (2000), it becomes equivalent to the preset value (0).

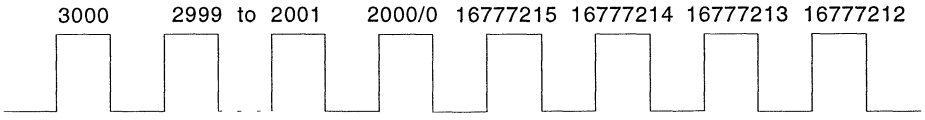



(2) When preset value ≤ ring counter value ≤ present value
If the ring counter function is executed when the preset value is 0, the ring counter value is 2000, and the present value is 3000, the following events occur:

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




2) In down count, the present value becomes equivalent to the preset value(0) when it is counted down to the ring counter value (2000).



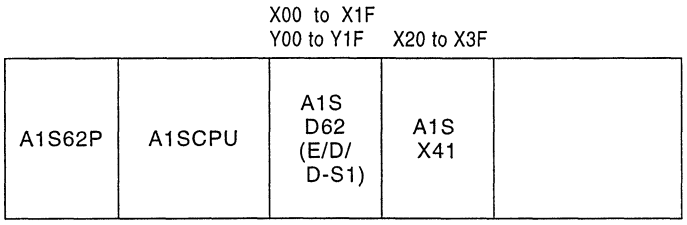

**POINT**

Do not write the preset and ring count values during execution of the ring counter function.

### 8.1.3 Example Program

The following program is to count pulses in 2-phase pulse input multiplied by one mode using CH1 and execute the ring counter function.

[System configuration]

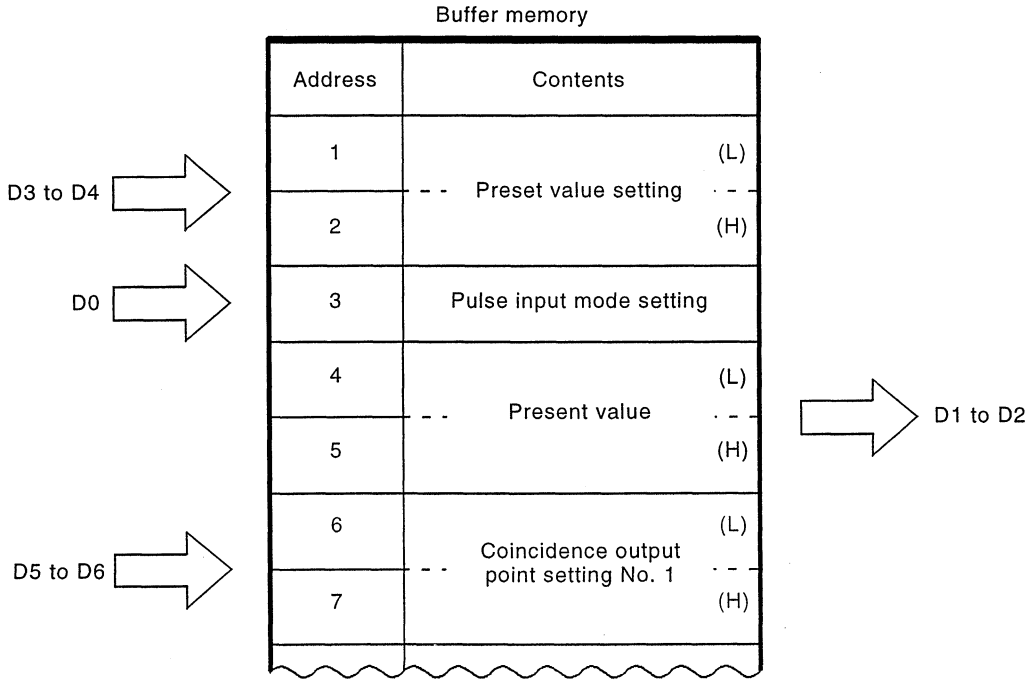



[Devices to be used]

(1) Execution commands

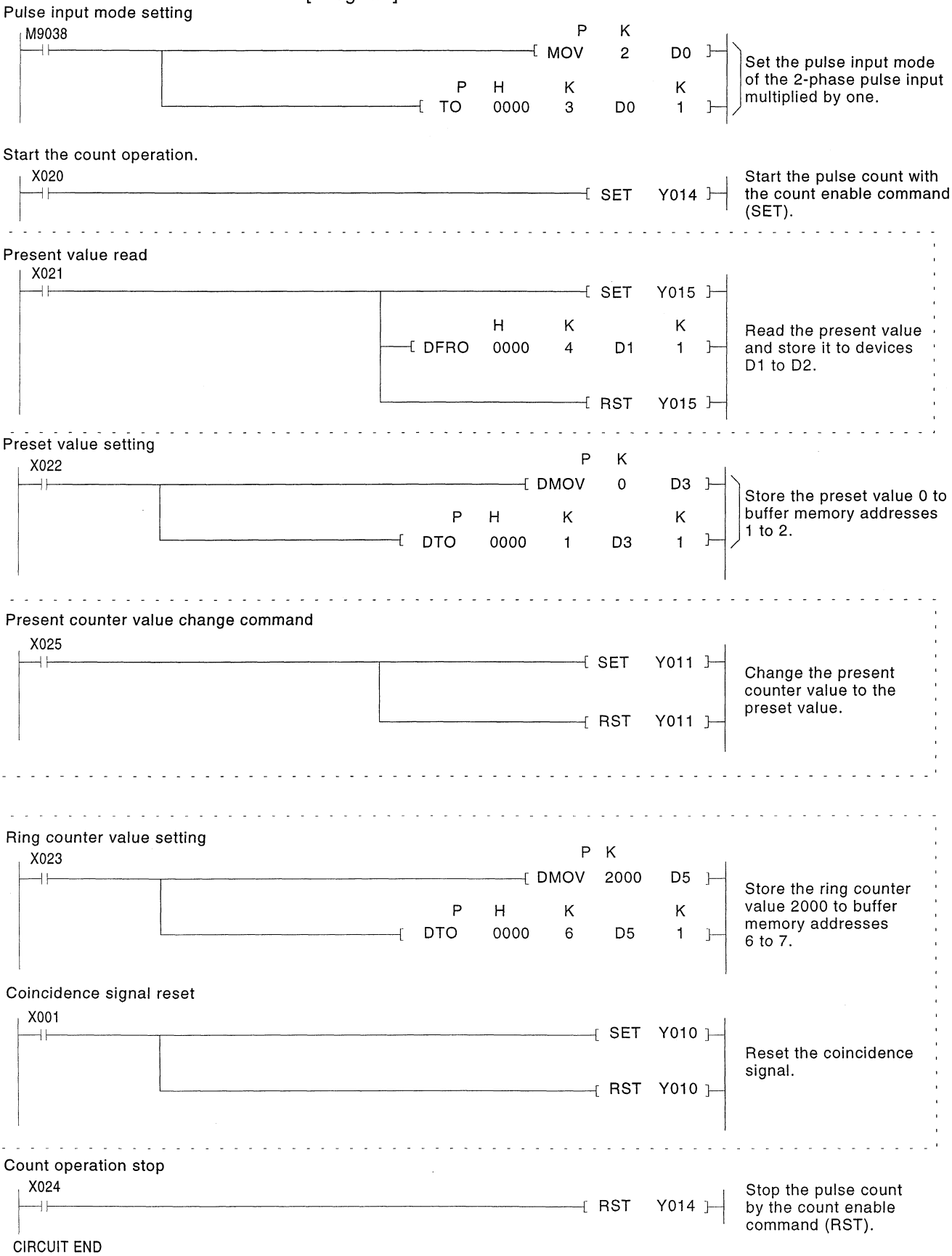
(a) Pulse input mode setting command ..... M9038
(b) Count operation start command ..... X20
(c) Present value read command ..... X21
(d) Preset value write command ..... X22
(e) Ring counter write command ..... X23
(f) Count operation stop command ..... X24
(g) Present counter value change command ..... X25

(2) Relationship between the data register (D0 to D6) and the buffer memory



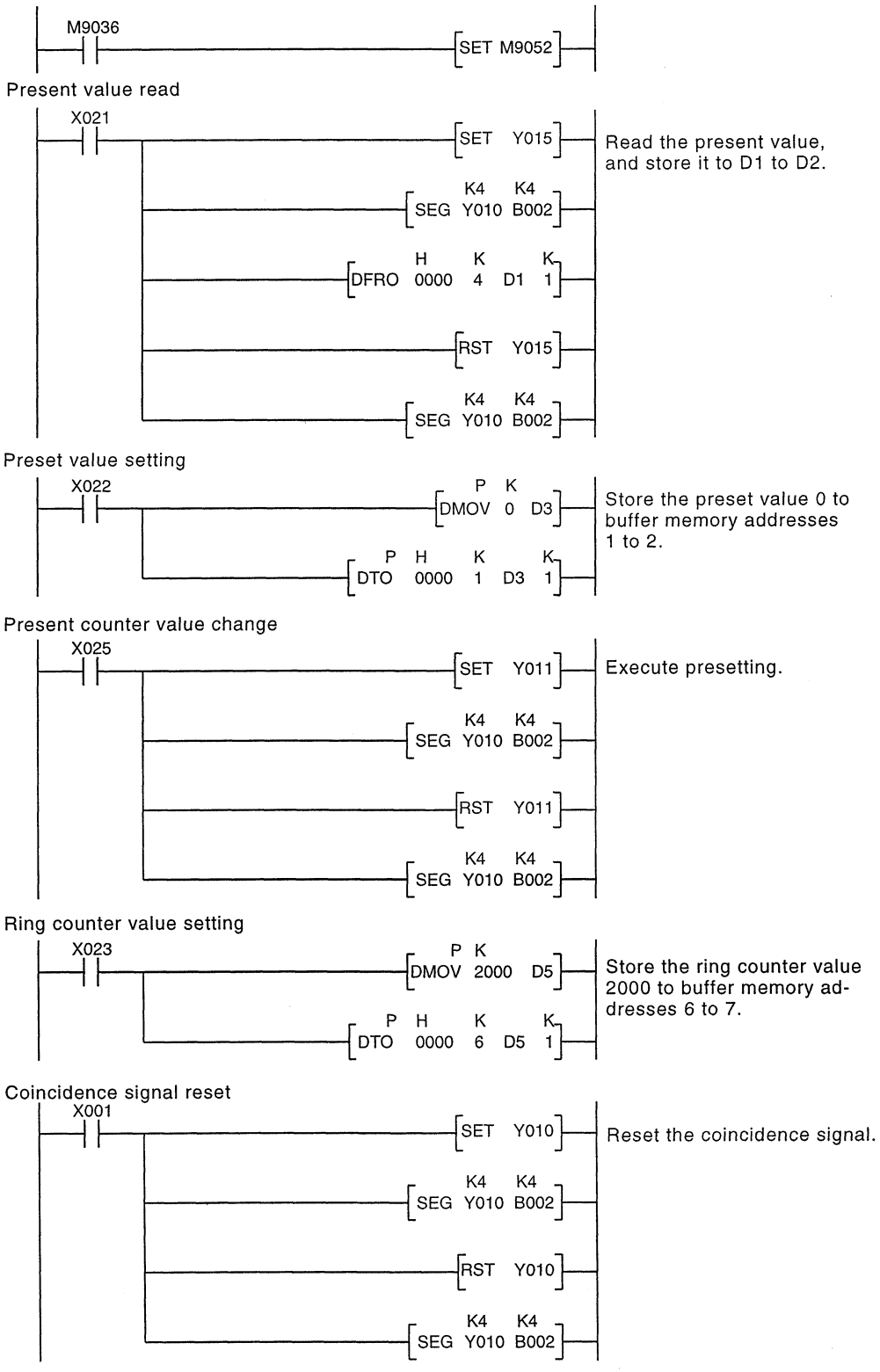
(a) Execution using FROM/TO instructions (when the direct method is selected as the programmable controller CPU I/O control method)

[Program]



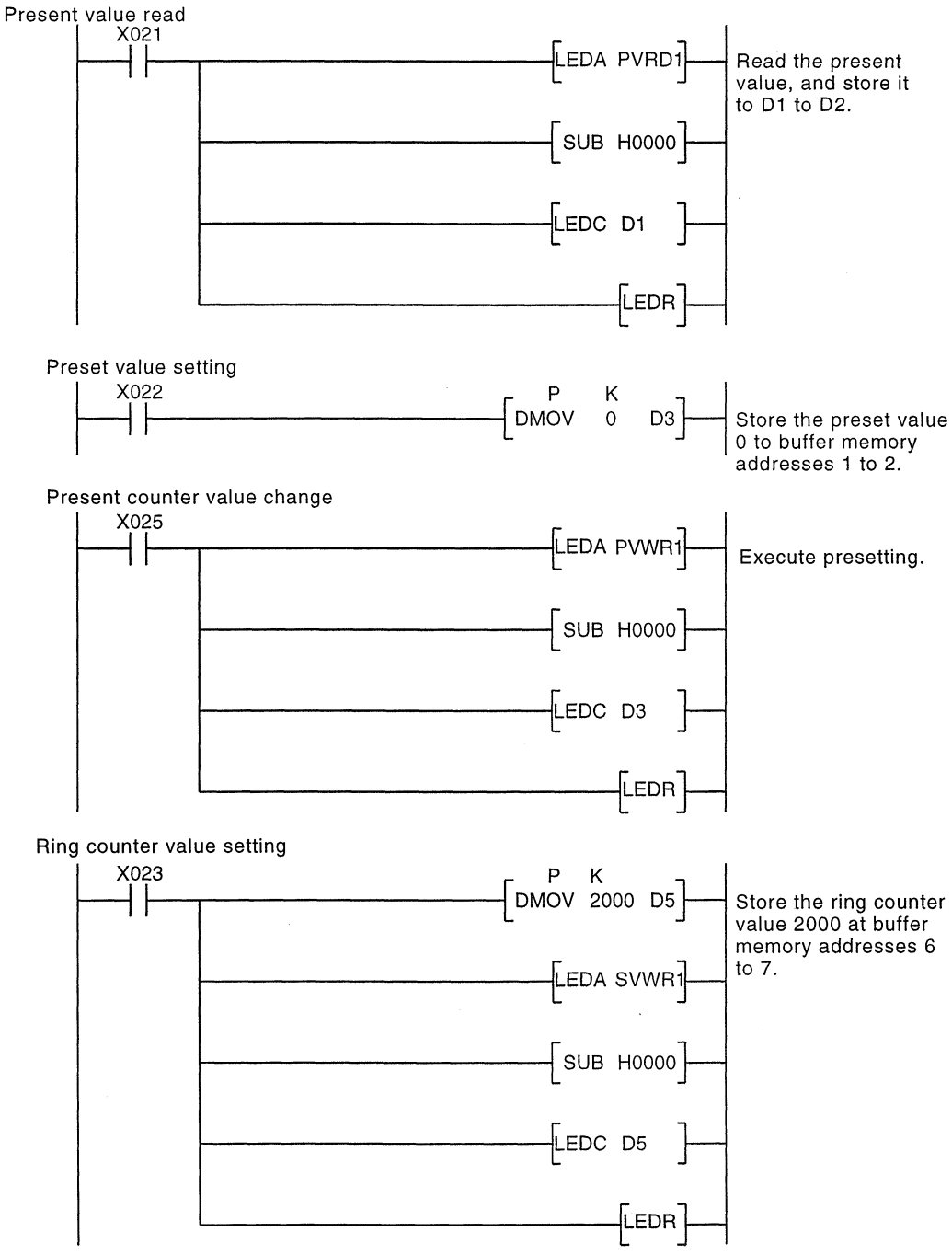
(b) Execution using FROM/TO instructions (when the refresh method is selected as the programmable controller CPU I/O control method)

The portion of the program example shown in (a) enclosed by the broken line must be replaced with the following:



(c) Execution using A2ASCPU(S1/S30)/A2USHCPU-S1 dedicated instructions

As shown below, A2ASCPU(S1/S30)/A2USHCPU-S1 dedicated instructions can be used in place of the portion of the program example shown in (a) enclosed by the broken line.

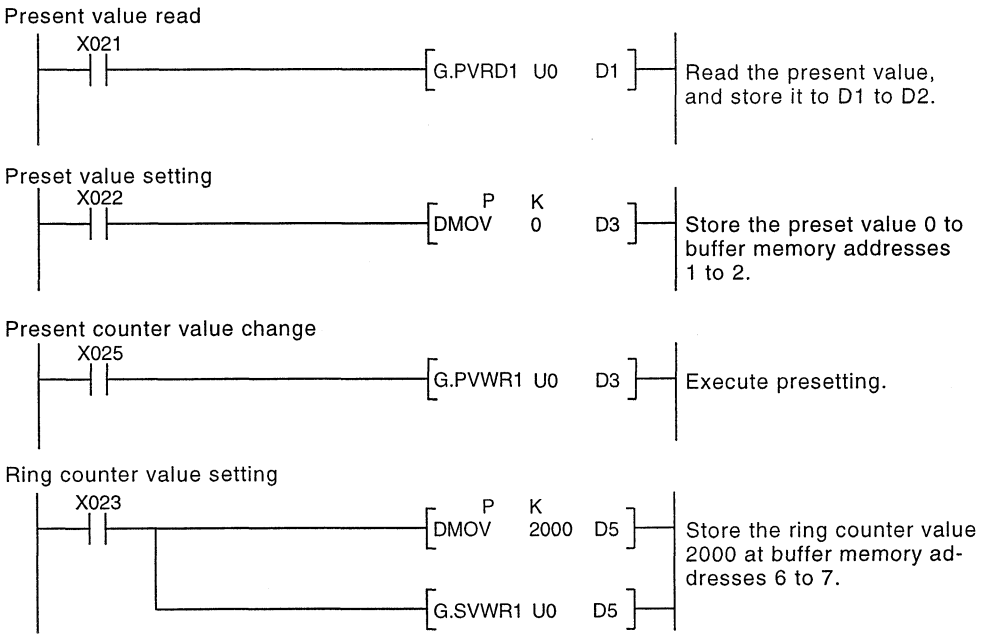



**POINT**

To perform communications with a special function module using an A2ASCPU(S1/S30)/A2USHCPU-S1 dedicated instruction, register AD61 as the module type when setting parameters.

(d) Execution using Q2AS(H)CPU(S1) dedicated instructions

As shown below, Q2AS(H)CPU(S1) dedicated instructions can be used in place of the portion of the program example shown in (a) enclosed by the broken line.




**POINT**

To perform communications with a special function module using an Q2AS(H)CPU(S1) dedicated instruction, register AD61 as the module type when setting parameters.

# 9. SELECTING AND EXECUTING THE COUNTER FUNCTION

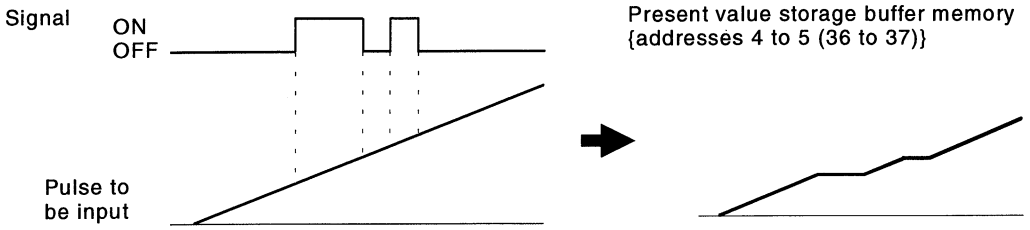
## 9.1 Selecting a Counter Function

Select one of the four counter functions and execute it.

Execute the selected function by turning ON the counter function selection start command {Y16(Y1D)} or applying voltage to the external F.START terminal.

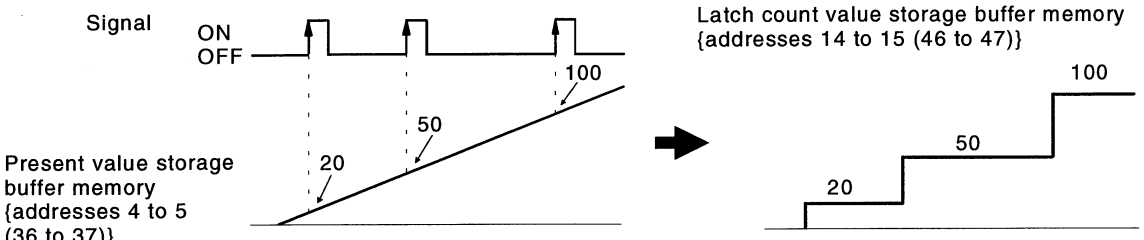
1) Count disable function: See section 9.2.

Inputs the signals when the count enable command is ON, stopping the pulse count.



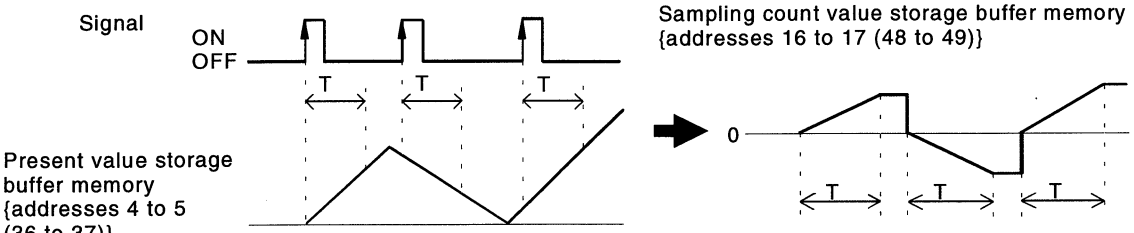

2) Latch counter function: See section 9.3.

Latches the present value of the counter when the signal is input.



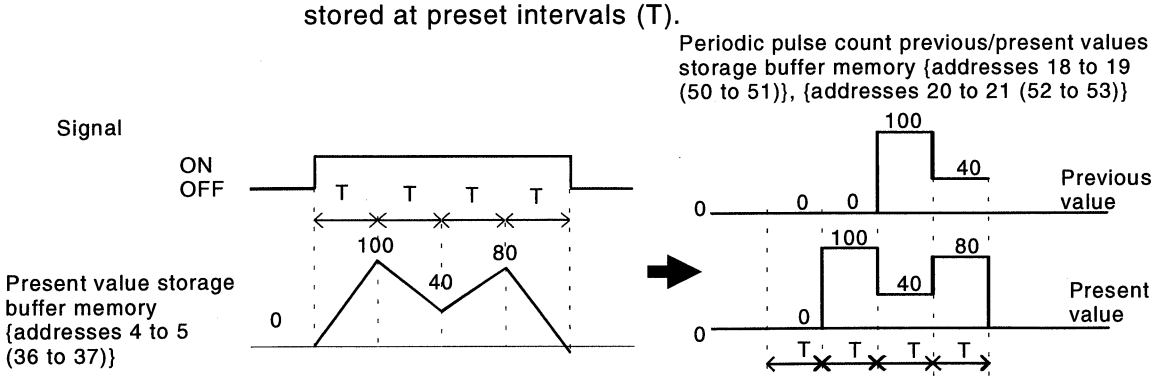

3) Sampling the counter function: See section 9.4.

Counts the input pulse times that are specified by the signal.




4) Periodic pulse counter function: See section 9.5.

During signal input, the present and previous counter values are stored at preset intervals (T).



(1) Select a counter function by writing a value to the counter setting buffer memory {address 8(40)} as shown in the following table:

However, when the counter function is changed, make sure that the counter start command {Y16(Y1D), F.START terminal} is OFF.

| Counter Function Selection | Setting Value |
|---|---|
| Count disable function | 0 |
| Latch counter function | 1 |
| Sampling counter function | 2 |
| Periodic pulse counter function | 3 |

(2) The counter function can be selected by using either the counter start command {Y16(Y1D)} or the F.START terminal (external input).

When both of the signals are input during a certain period, priority is given to the first signal input.

(3) Set the sampling counter function/periodic pulse counter function time between 1 and 65535.
The time can be set in 10ms increments and the accuracy is less than 1 count.

Example) When 420 is set to the sampling/periodic time setting buffer memory
420 x 10 = 4200 [ms]

### 9.1.1 Reading the counter function selection count value

The counter function selection counter value means the count value when the counter function is selected.
This section describes how to read the counter function selection count value.

(1) The counter function selection count value is stored in the buffer memory shown in Table 9.1.

**Table 9.1 Counter Function Selection Count Value Storage Buffer Memory**

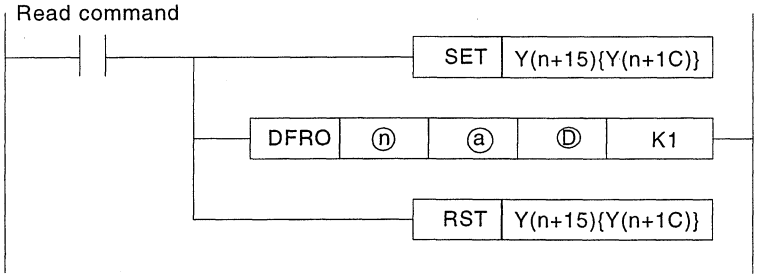
| Description | | Latch Count Value | Sampling Count Value | Periodic Pulse Count Previous Value | Periodic Pulse Count Present Value |
|---|---|---|---|---|---|
| Buffer memory address | CH1 | 14 to 15 | 16 to 17 | 18 to 19 | 20 to 21 |
| | CH2 | 46 to 47 | 48 to 49 | 50 to 51 | 52 to 53 |

(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 after it has reached 16777215.
In down count, the counter function selection count value returns to 16777215 after it has reached 0.

(4) Shown below is the sequence program to read the counter function selection count value:

(a) Reading using FROM/TO instructions (when the direct method is selected as the programmable controller CPU I/O control method)

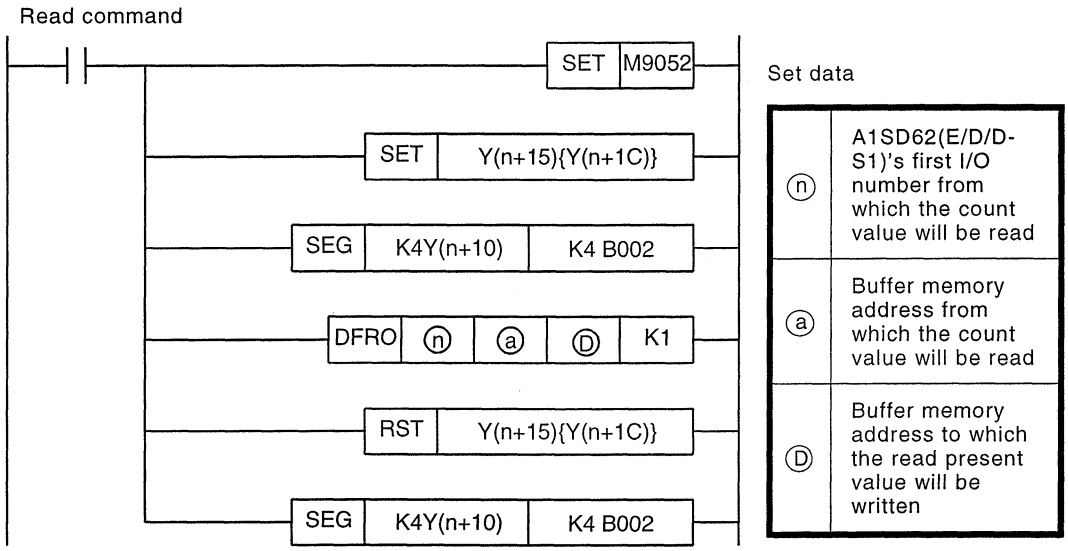



Set data

| | |
|---|---|
| ⓝ | A1SD62(E/D/D-S1)'s first I/O number from which the count value will be read |
| ⓐ | Buffer memory address from which the count value will be read |
| Ⓓ | Buffer memory address to which the read present value will be stored |

1) Set a count value read request $Y_{(n+15)}$ (for channel 1) or Y(n+1C) (for channel 2).
2) The counter function selection count value is read from the I/O number set for ⓝ of the A1SD62(E/D/D-S1)'s buffer memory address specified for ⓐ, and is stored in the device set for Ⓓ.
3) Reset the count value read request $Y_{(n+15)}$ (for channel 1) or Y(n+1C) (for channel 2).

(b) Reading using FROM/TO instructions (when the refresh method is selected as the programmable controller CPU I/O control method)




1) Designate partial refresh.
2) Set a count value read request Y(n + 15) (for channel 1) or Y(n+1C) (for channel 2).
3) Y(n+10) to Y(n+1F) are partially refreshed.
4) The counter function selection count value is read from the I/O number set for ⓝ of the A1SD62(E/D/D-S1)'s buffer memory address specified for ⓐ, and is stored in the device set for Ⓓ.
5) Reset the count value read request Y(n + 15) (for channel 1) or Y(n+1C) (for channel 2).
6) Y(n+10) to Y(n+1F) are partially refreshed.

### 9.1.2 Count errors

When the counter function selection is executed by the external input (applying the voltage to the F.START terminal) or by the sequence program (turning ON the counter function selection start command), there is an error in counting.

(1) The error range when the counter function is executed by the external input is shown below:

**[Max. count error]**

$$\left(\frac{1\ [ms]}{1000}\right)\ [s] \times \text{pulse input speed [PPS]} \times \text{multiplication number [count]}$$

**[Min. count error]**

$$\left(\frac{0.1\ [ms]}{1000}\right)\ [s] \times \text{pulse input speed [PPS]} \times \text{multiplication number [count]}$$

(2) When the counter function is executed by the sequence program, there is an additional error for one scan of the programmable controller CPU besides the error as shown in (1).

(3) The internal clock error can be calculated as follows:

$$\left(\frac{\text{Sampling/periodic setting value x 10 [ms]}}{1000}\right)\ [s] \times \frac{\text{Error in parts dimensions, 100 [ppm]}}{1000000}$$

x pulse input speed [PPS] x multiple [count]

$$= \frac{\text{(Sample/periodic setting value (unit: 10ms))} \times \text{pulse input speed [PPS]} \times \text{multiple [count]}}{1000000}$$

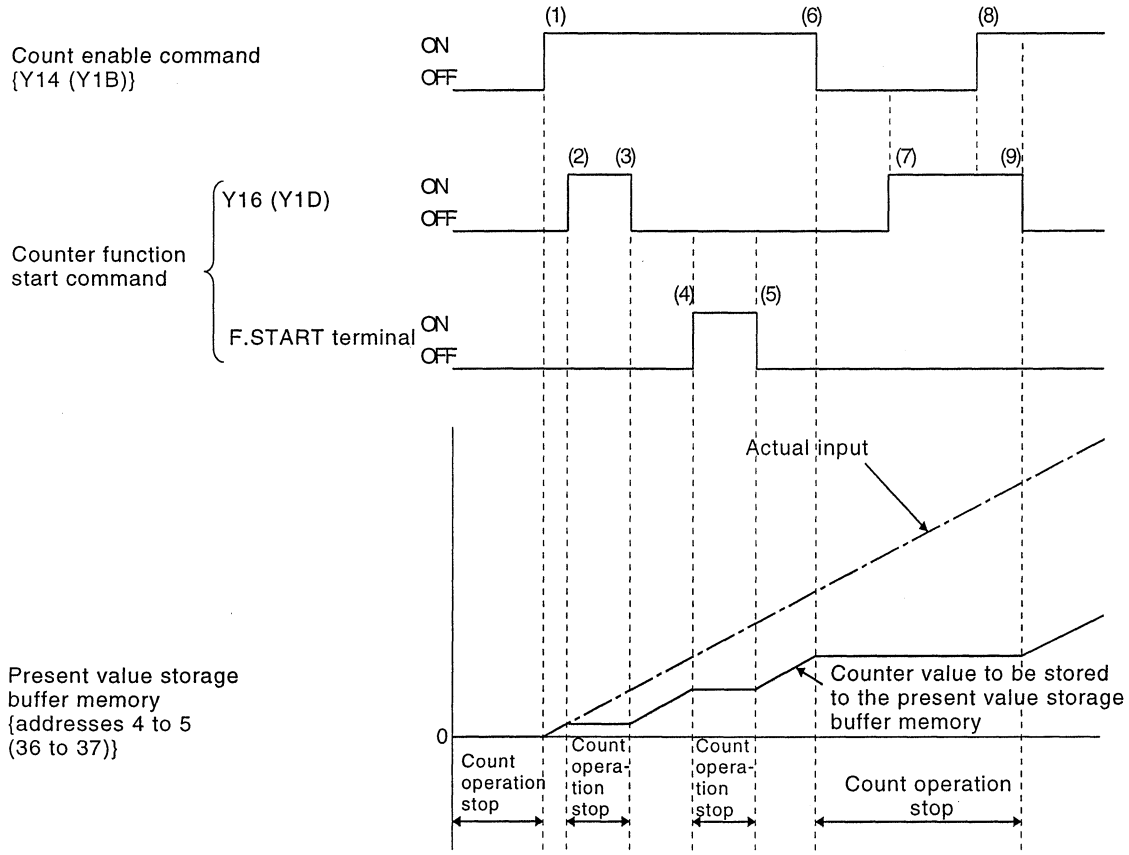
**POINT**

Mitsubishi recommends that the counter function selection should be executed by the external input.

## 9.2 Count Disable Function

Stop the count operation while the count enable command is ON.

The relationships between the count enable command and the counter start command and between them and the counter present value are shown below:

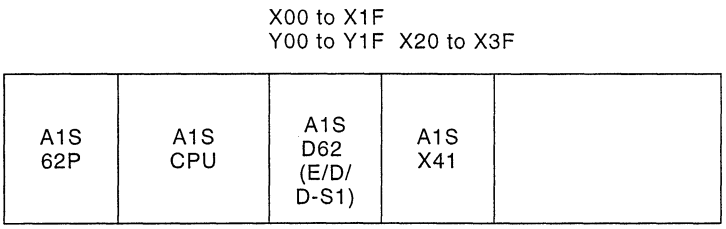



1) Starts counting pulses when the count enable command {Y14 (Y1B)} is turned ON.
2) Stops counting when the counter function start command {Y16 (Y1D)} is turned ON.
3) Resumes the counting when the counter function start command {Y16 (Y1D)} is turned OFF.
4) Stops counting when the counter function start command (F.START terminal) is turned ON.
5) Resumes the counting when the counter function start command (F.START terminal) is turned OFF.
6) Stops the counting when the count enable command {Y14 (Y1B)} is turned OFF.
7) Stops counting independently of the counter function start command {Y16(Y1D)}, since the count enable command {Y14(Y1B)} is OFF.
8) Continues to stop the counting even when the count enable command {Y14(Y1B)} is turned ON, since the counter function start command {Y16(Y1D)} is ON.
9) Resumes the counting when the counter function start command {Y16(Y1D)} is OFF.

### 9.2.1 Example program

The following program is to count pulses in 2-phase pulse input multiplied by one mode using CH1 and execute count disable.

[System configuration]

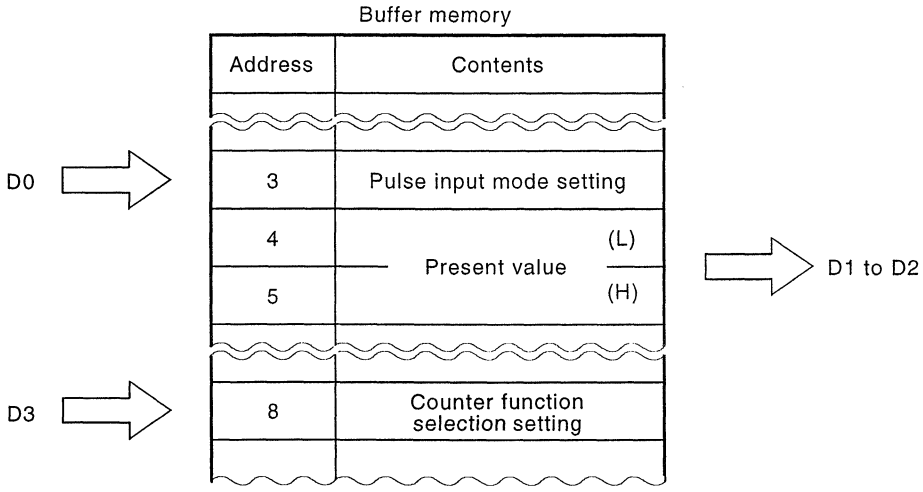



[Devices to be used]

(1) Execution commands

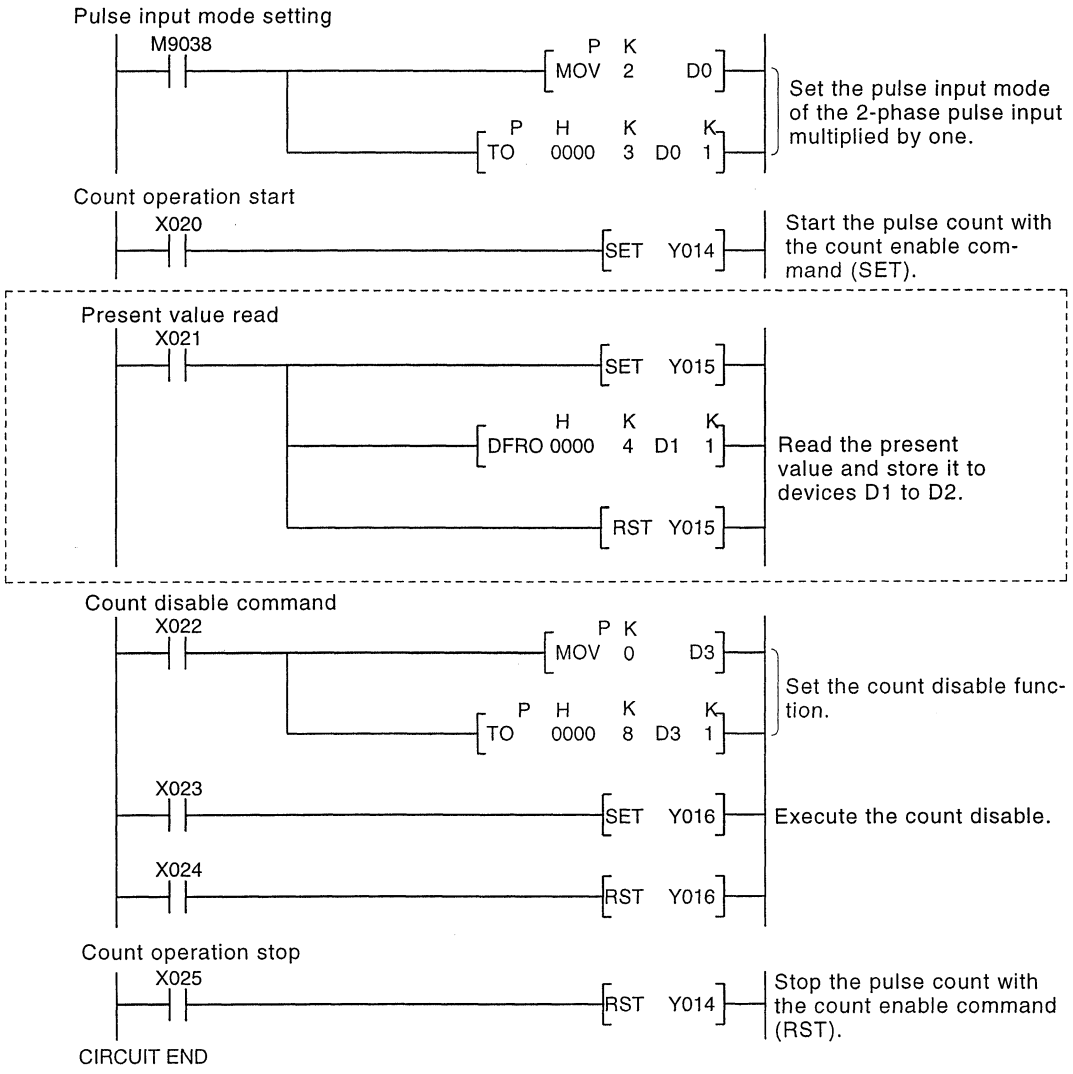
(a) Pulse input mode setting command ..... M9038
(b) Count operation start command ..... X20
(c) Present value read command ..... X21
(d) Count disable function setting command ..... X22
(e) Count disable start command ..... X23
(f) Count operation stop command ..... X24

(2) Relationship between the data register (D0 to D3) and the buffer memory

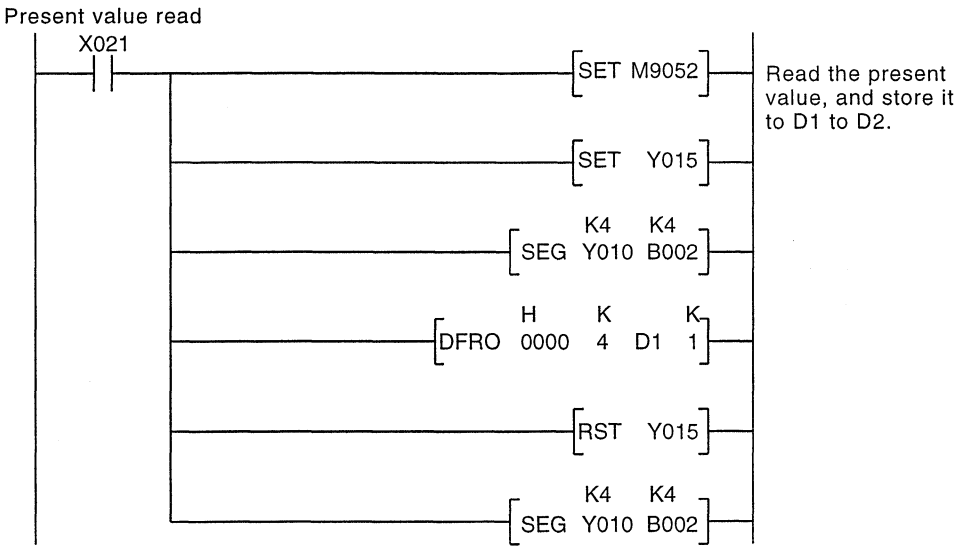


(a) Execution using FROM/TO instructions (when the direct method is selected as the programmable controller CPU I/O control method)

[Program]

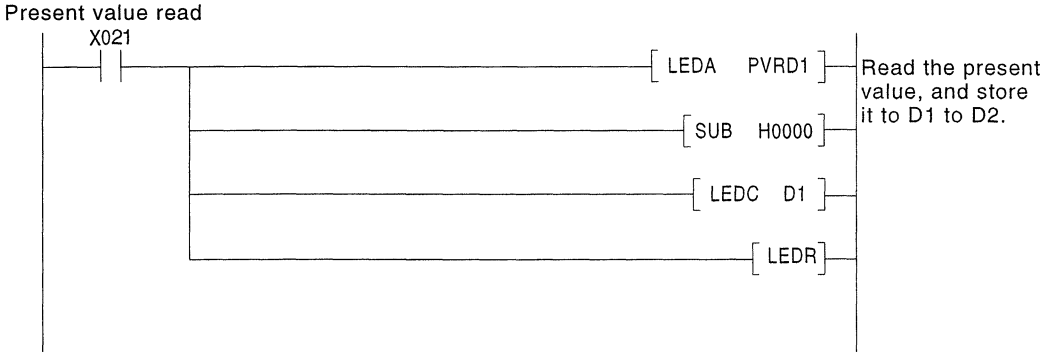


(b) Execution using FROM/TO instructions (when the refresh method is selected as the programmable controller CPU I/O control method)
The portion of the program example shown in (a) enclosed by the broken line must be replaced with the following:



(c) Execution using A2ASCPU(S1/S30)/A2USHCPU-S1 dedicated instructions

As shown below, A2ASCPU(S1/S30)/A2USHCPU-S1 dedicated instructions can be used in place of the portion of the program example shown in (a) enclosed by the broken line.

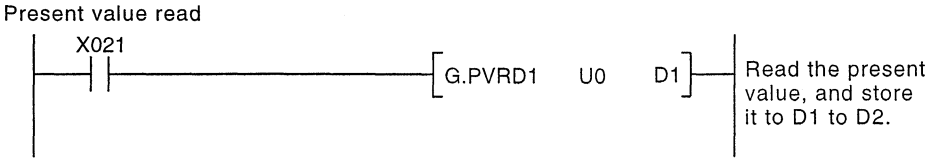



**POINT**

To perform communications with a special function module using an A2ASCPU(S1/S30)/A2USHCPU-S1 dedicated instruction, register AD61 as the module type when setting parameters.

(d) Execution using Q2AS(H)CPU(S1) dedicated instructions

As shown below, Q2AS(H)CPU(S1) dedicated instructions can be used in place of the portion of the program example shown in (a) enclosed by the broken line.



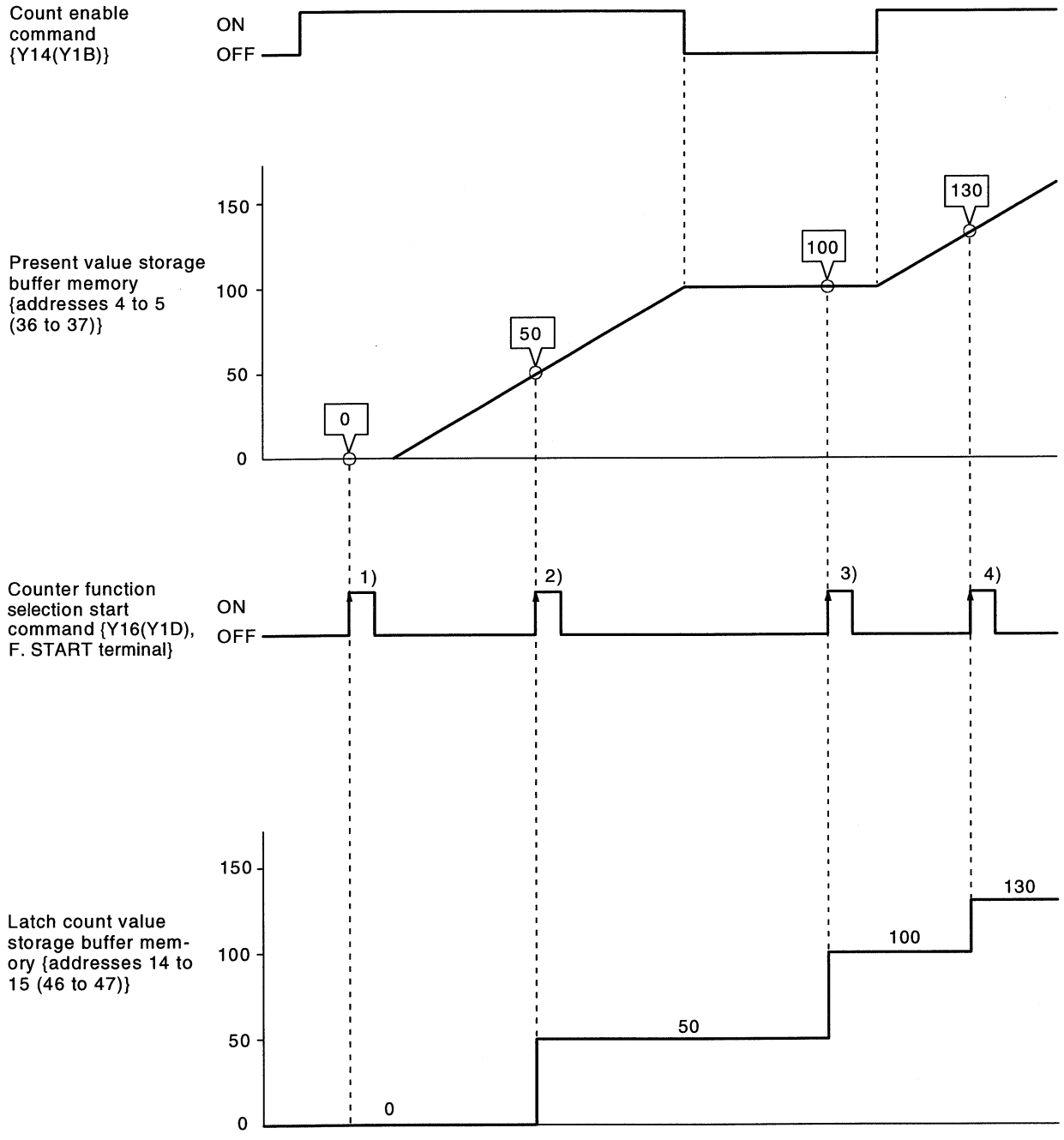

**POINT**

To perform communications with a special function module using an Q2AS(H)CPU(S1) dedicated instruction, register AD61 as the module type when setting parameters.

## 9.3 Latch Counter Function

Latch the present value of the counter when a signal input is done.

The relationships between the counter present value and the counter start command and between the present value and the latch count value storage buffer memory are shown below:



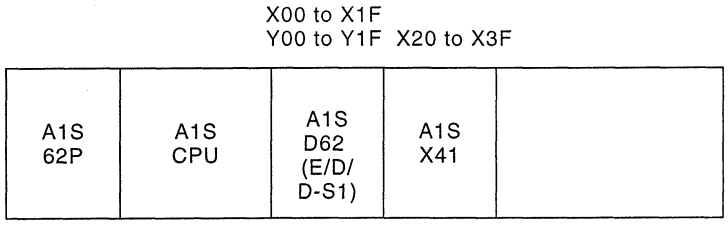

At the rise of the counter function selection start command {Y16(Y1D), F.START terminal} (corresponding to 1) to 4) in the above diagram), the counter present value is stored to Latch count value storage buffer memory {addresses 14 to 15 (46 to 47)}.

The latch counter function works whether the count enable command {Y14(Y1B)} is ON or OFF.

### 9.3.1 Example program

The following program is to count pulses in 2-phase pulse input multiplied by one mode using CH1 and execute latch count.

[System configuration]

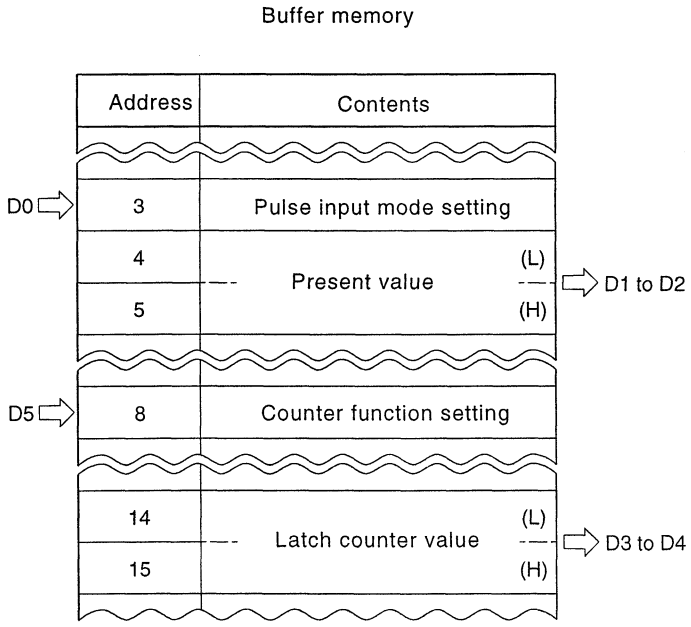



[Devices to be used]

(1) Execution commands

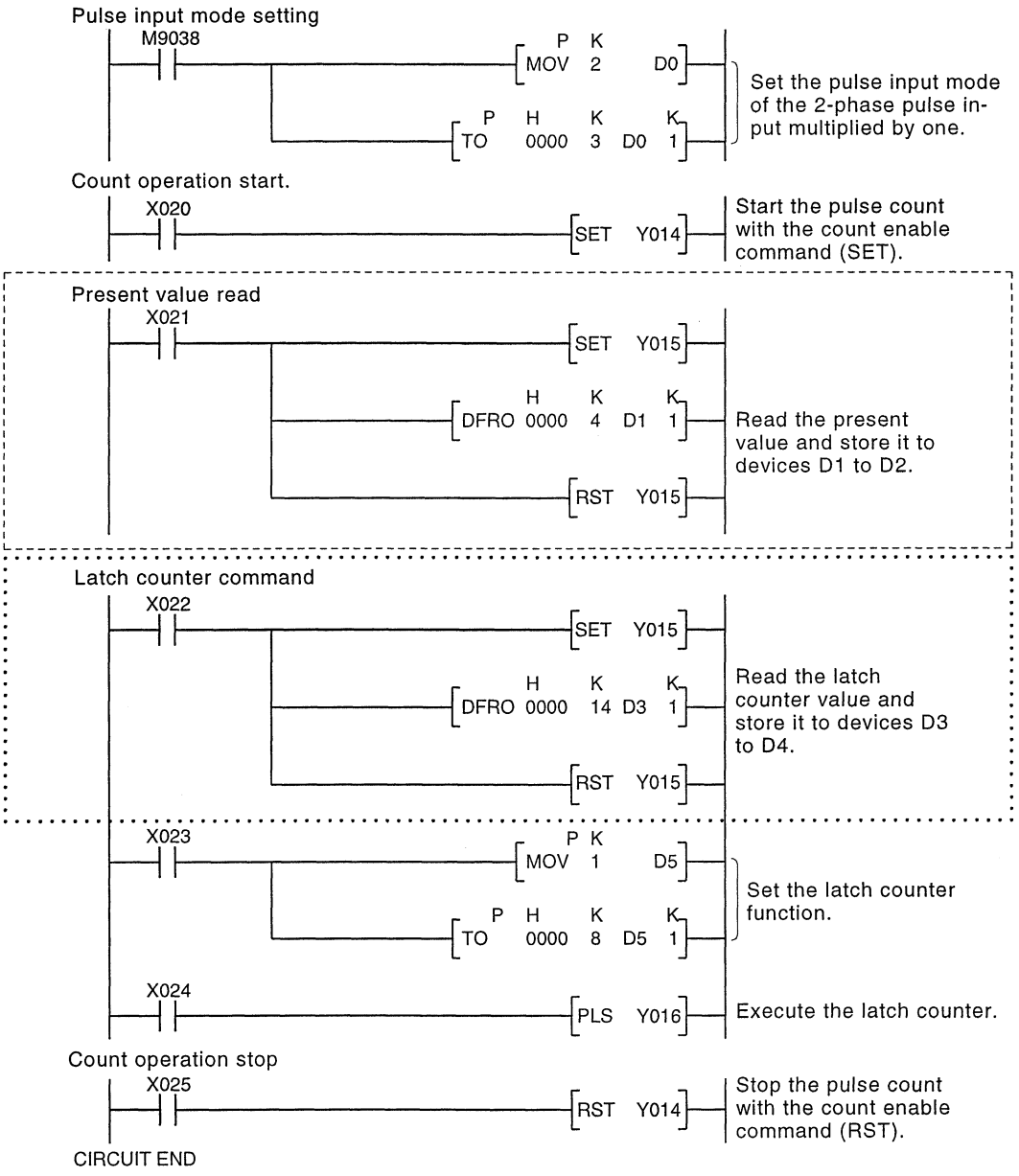
(a) Pulse input mode setting command ..... M9038
(b) Count operation start command ..... X20
(c) Present value read command ..... X21
(d) Latch count value read command ..... X22
(e) Latch counter function setting command ..... X23
(f) Latch counter execution command ..... X24
(g) Count operation stop command ..... X25

(2) Relationship between the data register (D0 to D5) and the buffer memory

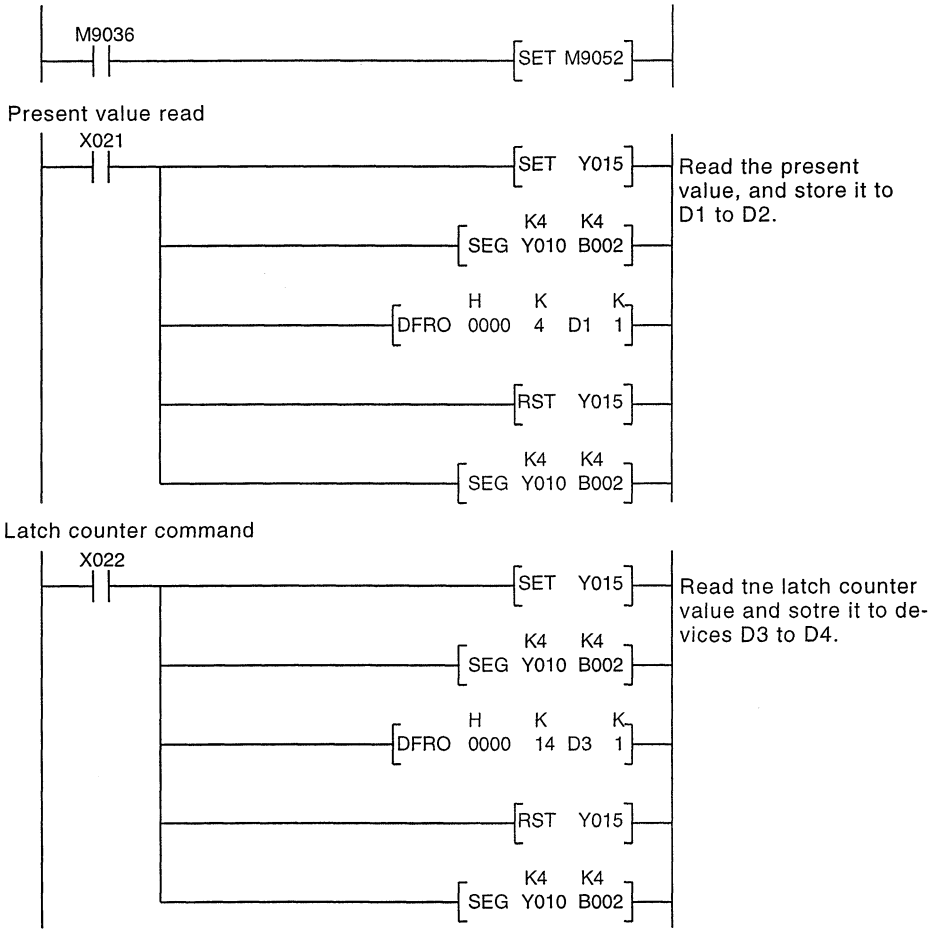


(a) Execution using FROM/TO instructions (when the direct method is selected as the programmable controller CPU I/O control method)

[Program]



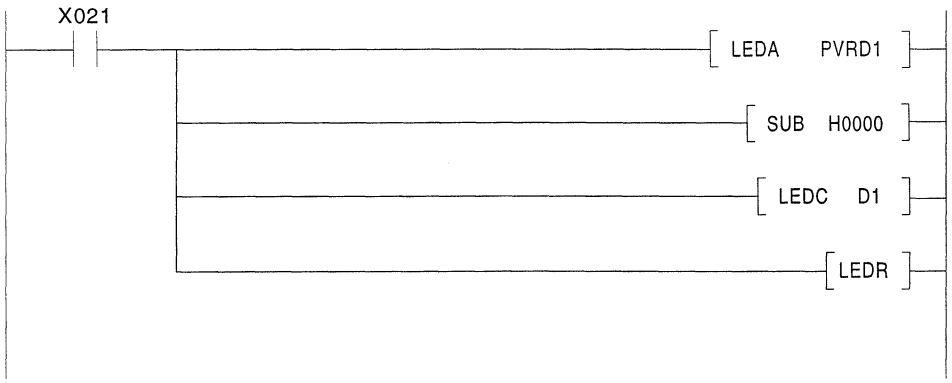
(b) Execution using FROM/TO instructions (when the refresh method is selected as the programmable controller CPU I/O control method)
The portions of the program example shown in (a) enclosed by the broken and dotted lines must be replaced with the following:



(c) Execution using A2ASCPU(S1/S30)/A2USHCPU-S1 dedicated instructions

As shown below, A2ASCPU(S1/S30)/A2USHCPU-S1 dedicated instructions can be used in place of the portion of the program example shown in (a) enclosed by the broken line.

Present value read

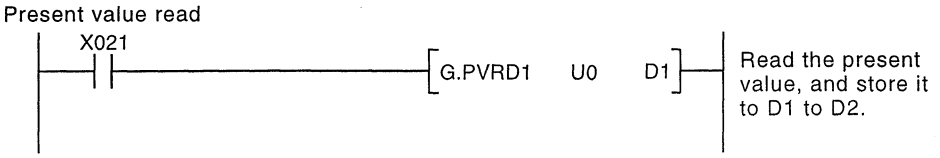



**POINT**

To perform communications with a special function module using an A2ASCPU(S1/S30)/A2USHCPU-S1 dedicated instruction, register AD61 as the module type when setting parameters.

(d) Execution using Q2AS(H)CPU(S1) dedicated instructions

As shown below, Q2AS(H)CPU(S1) dedicated instructions can be used in place of the portion of the program example shown in (a) enclosed by the broken line.




**POINT**

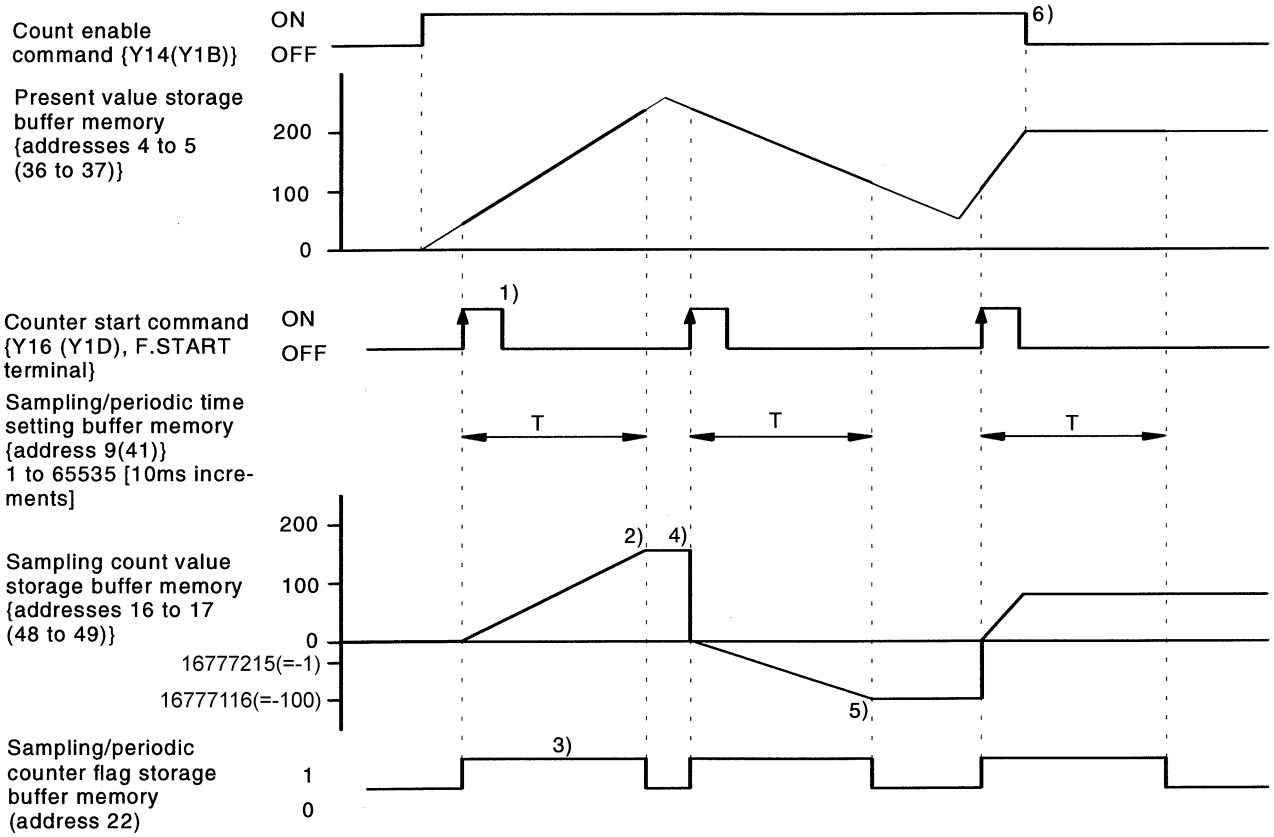
To perform communications with a special function module using an Q2AS(H)CPU(S1) dedicated instruction, register AD61 as the module type when setting parameters.

## 9.4 Sampling Counter Function

Count the pulses when a sampling time is specified.

The sampling time is set in 10ms increments and the accuracy is less than 1 count.

The relationship between each signal and the buffer memory is shown below:




1) Starts counting input pulses from 0 at the rise of the counter function command {Y16(Y1D), F.START terminal}.

2) Stops counting after the specified sampling time.

3) One of the following values is stored to the sampling/cycle counter flag storage buffer memory during execution of the sampling counter function:

| Operating Status | When Only CH1 is Executing Function | When Only CH2 is Executing Function | When Both CH1 and CH2 are Executing Function |
|---|---|---|---|
| Buffer memory address (22) | K1 | K2 | K3 |

4) Retains the value stored in the sampling count value storage buffer memory after completing the sampling counter function.

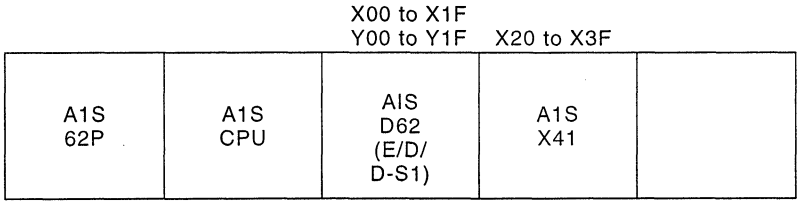
5) When the sampling counter value is lower than 0 by the count down function, the value subtracted from a maximum positive value is stored. (The value is not negative.)
For details, refer to Section 8.1.2(2).

6) The sampling counter function works whether the count enable command {Y14(Y1B)} is ON or OFF.

### 9.4.1 Example program

The following program is to count pulses in 2-phase pulse input multiplied by one mode using CH1 and execute the sampling counter function.

[System configuration]

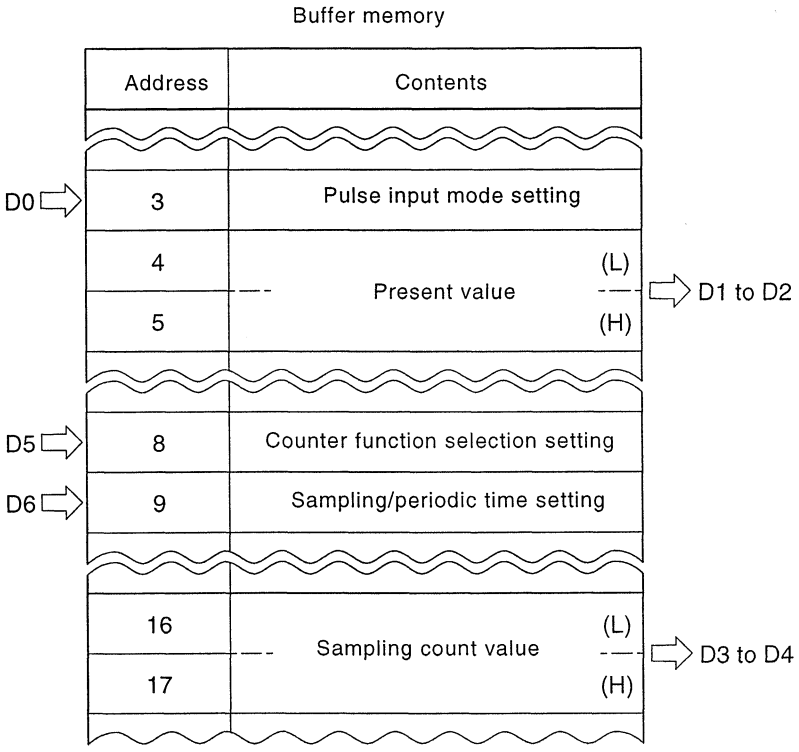



[Devices to be used]

(1) Execution commands

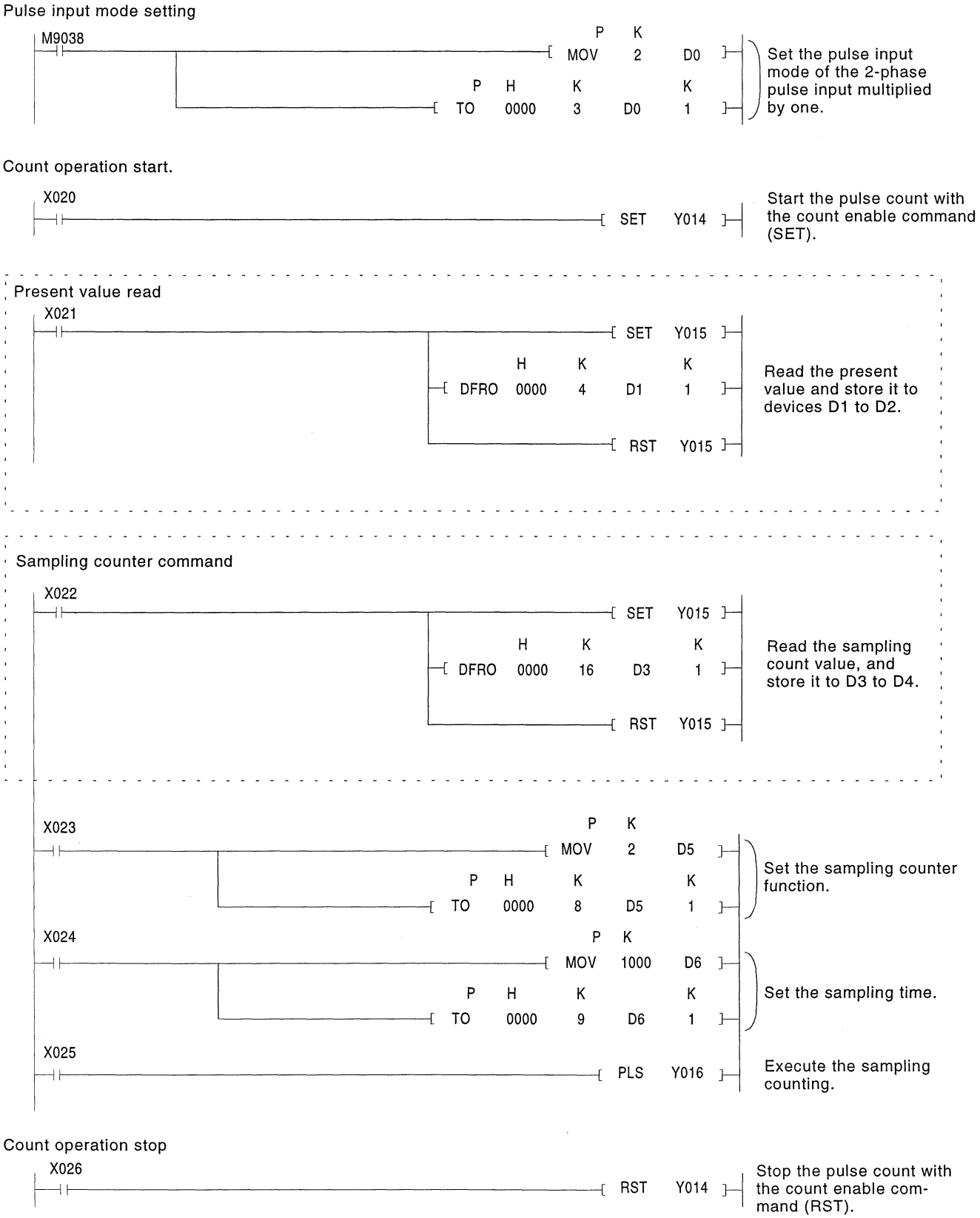
(a) Pulse input mode setting command ..... M9038
(b) Count operation start command ..... X20
(c) Present value read command ..... X21
(d) Sampling count value read command ..... X22
(e) Sampling counter function setting command ..... X23
(f) Sampling time setting command ..... X24
(g) Sampling counter execution command ..... X25
(h) Count operation stop command: ..... X26

(2) Relationship between the data register (D0 to D6) and the buffer memory

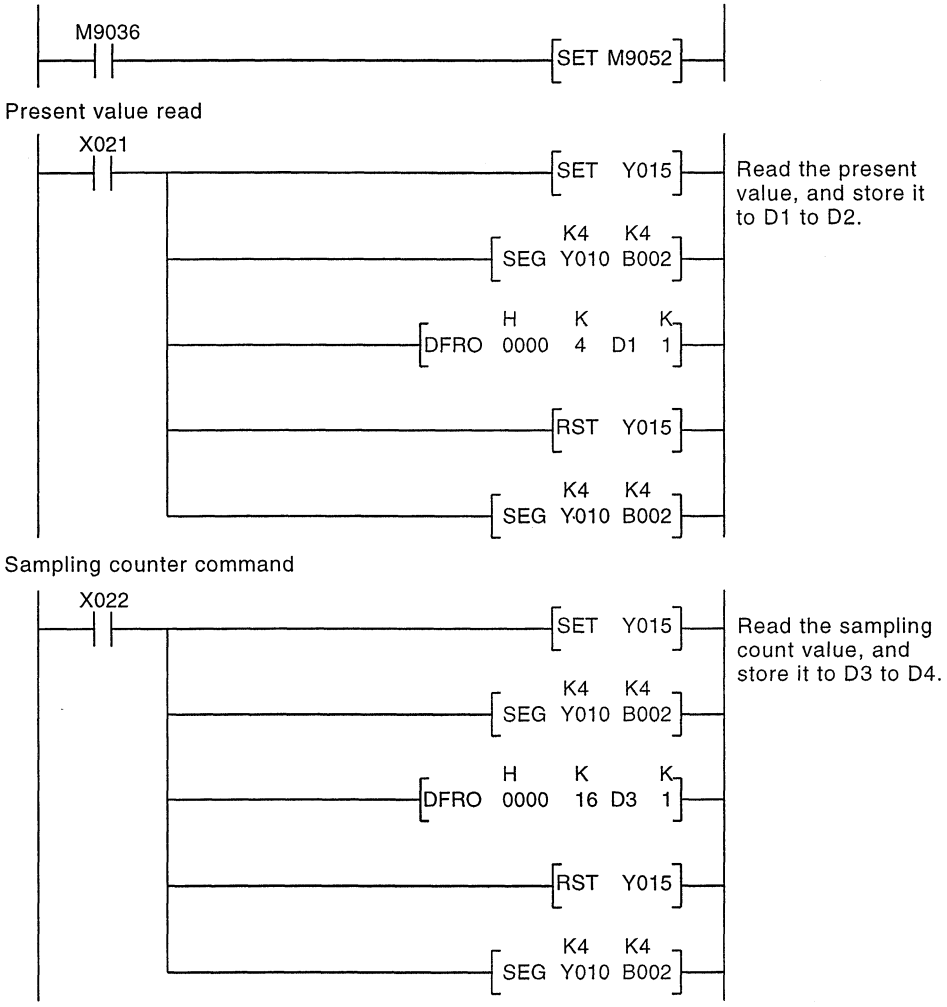


(a) Execution using FROM/TO instructions (when the direct method is selected as the programmable controller CPU I/O control method)

[Program]

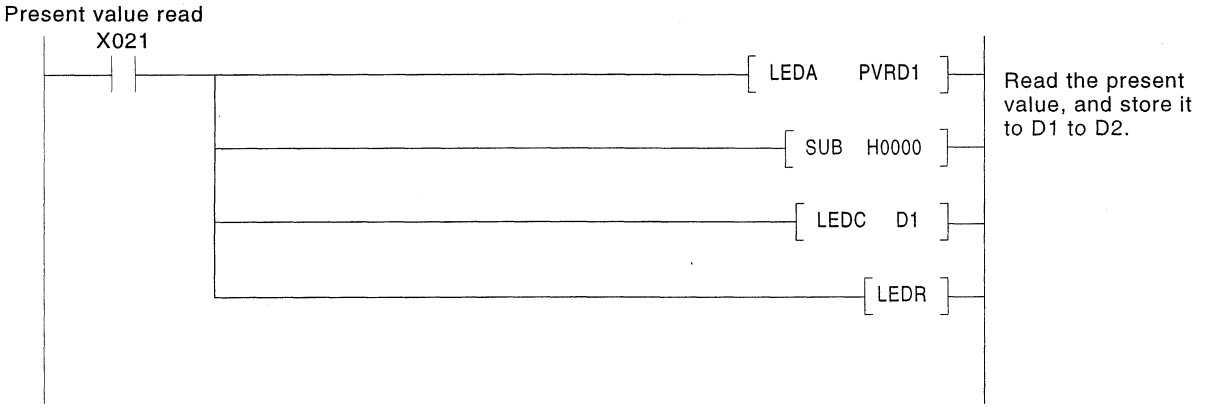


(b) Execution using FROM/TO instructions (when the refresh method is selected as the programmable controller CPU I/O control method)
The portions of the program example shown in (a) enclosed by the broken and dotted lines must be replaced with the following:



(c) Execution using A2ASCPU(S1/S30)/A2USHCPU-S1 dedicated instructions

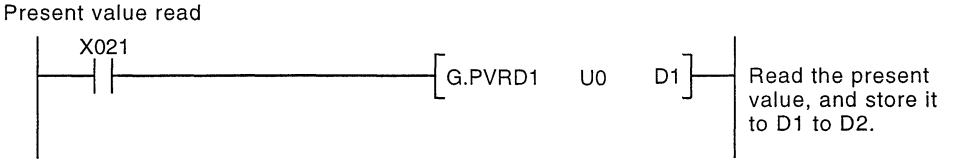
As shown below, A2ASCPU(S1/S30)/A2USHCPU-S1 dedicated instructions can be used in place of the portion of the program example shown in (a) enclosed by the broken line.




**POINT**

To perform communications with a special function module using an A2ASCPU(S1/S30)/A2USHCPU-S1 dedicated instruction, register AD61 as the module type when setting parameters.

(d) Execution using Q2AS(H)CPU(S1) dedicated instructions
As shown below, Q2AS(H)CPU(S1) dedicated instructions can be used in place of the portion of the program example shown in (a) enclosed by the broken line.




**POINT**

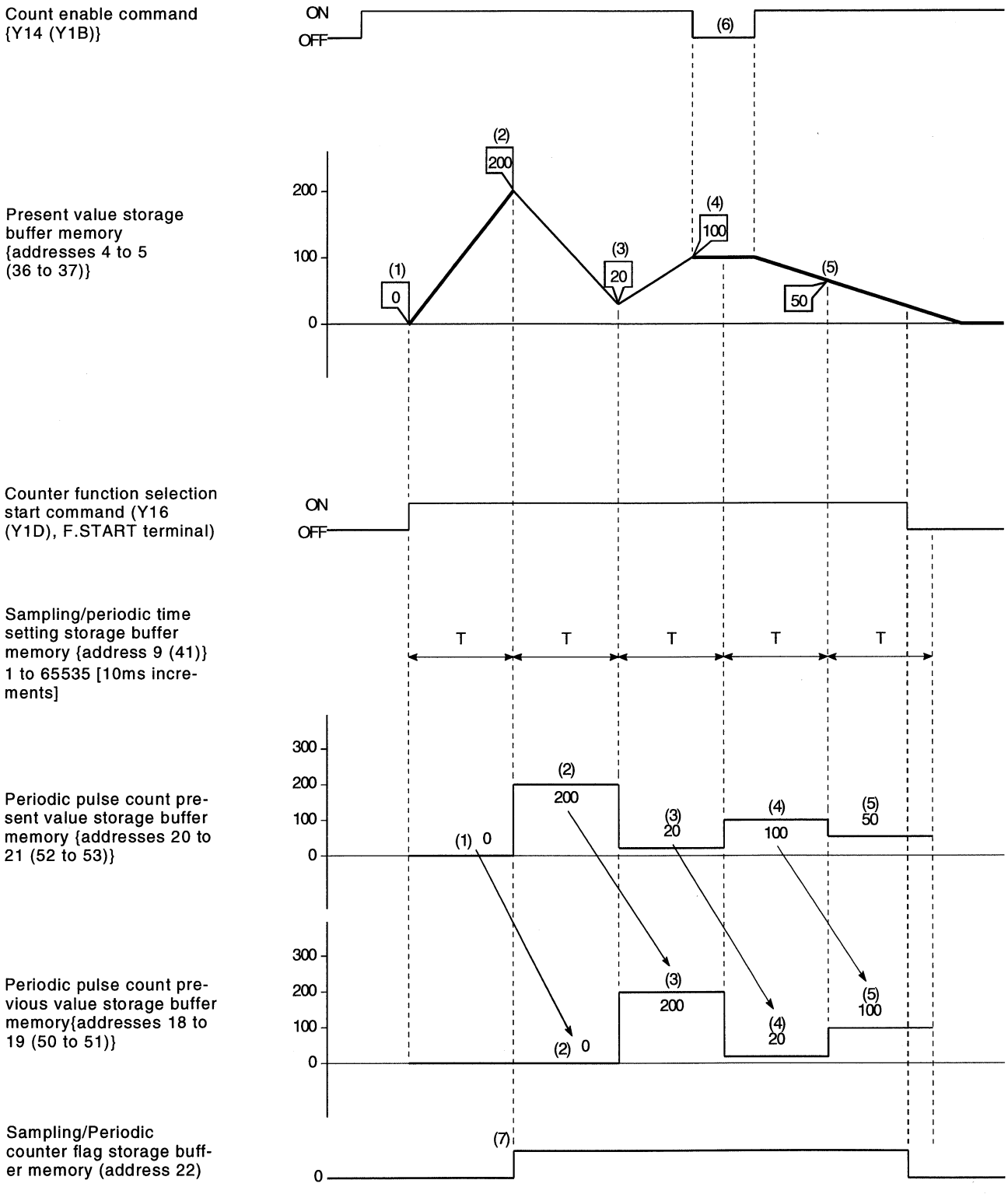
To perform communications with a special function module using an Q2AS(H)CPU(S1) dedicated instruction, register AD61 as the module type when setting parameters.

## 9.5 Periodic Pulse Counter Function

The periodic pulse counter function allows the present and previous counter values to be stored into the storage addresses for respective periodic pulse count values at intervals of the preset cycle time (T).

The cycle time is set in 10ms increments and the accuracy is less than 1 count.

The relationships between each signal and each buffer memory when the periodic pulse counter function is executed are shown below:



(1).... The present counter value 0 is stored to the periodic pulse count present value storage buffer memory {addresses 20 to 21 (52 to 53)} (hereinafter called the present value buffer memory).
(2).... The present counter value 200 is stored to the present value buffer memory.
The count value 0, which has been stored in the present value buffer memory, is written to the periodic pulse count previous value storage buffer memory {addresses 18 to 19 (50 to 51)} (hereafter called the pre vious value buffer memory).
(3).... The present counter value 20 is stored to the present value buffer memory.
The count value 200, which has been stored in the present value buffer memory, is written to the previous value buffer memory.
(4).... The present counter value 100 is stored to the present value buffer memory.
The count value 20, which has been stored in the present value buffer memory, is written to the previous value buffer memory.
(5).... The present counter value 50 is stored to the present value buffer memory.
The count value 100, which has been stored in the present value buffer memory, is written to the previous value buffer memory.
(6).... The periodic pulse counter function is executed whether the count enable command {Y14 (Y1B)} is ON or OFF.
(7).... One of the following values is stored to the sampling/cycle counter flag storage buffer memory during execution of the periodic pulse counter function:

| Operating Status | When Only CH1 is Executing Function | When Only CH2 is Executing Function | When Both CH1 and CH2 are Executing Function |
|---|---|---|---|
| Buffer memory address (22) | K1 | K2 | K3 |

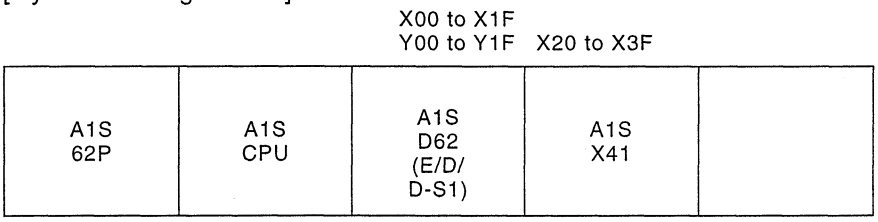
**POINT**

Depending on the relation between the update timings of the previous and present periodic pulse count values inside the module and the read timing in the sequence program, the previous value may be the same as the present value.
If this has occurred, execute the reading again.

### 9.5.1 Example program

The following program is to count pulses in 2-phase pulse input multiplied by one mode using CH1 and execute the periodic pulse counter function.

[System configuration]

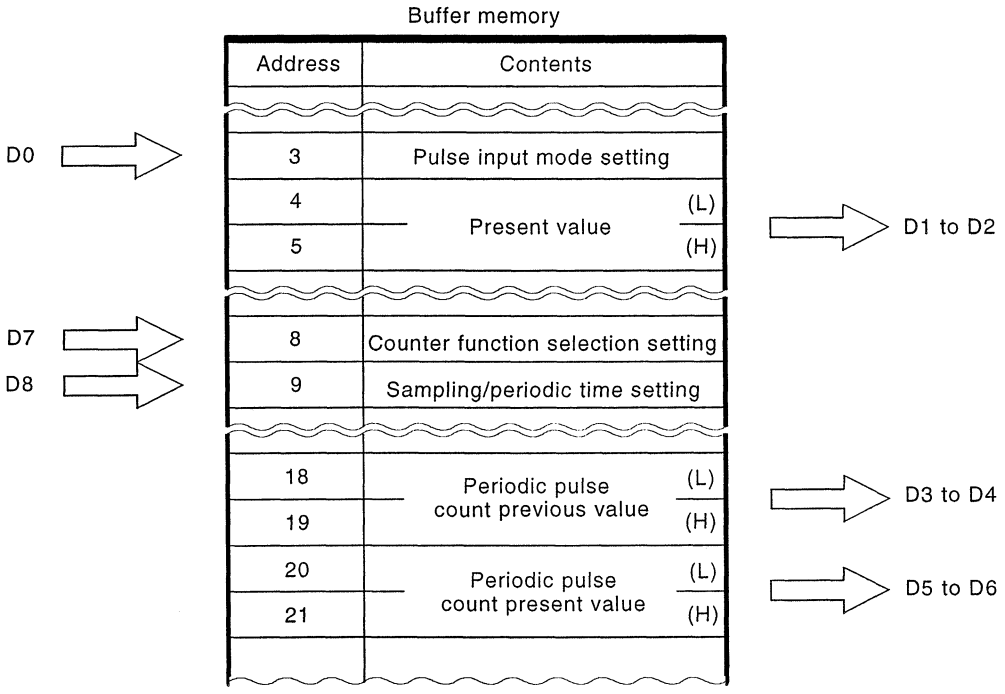



[Devices to be used]

(1) Execution commands

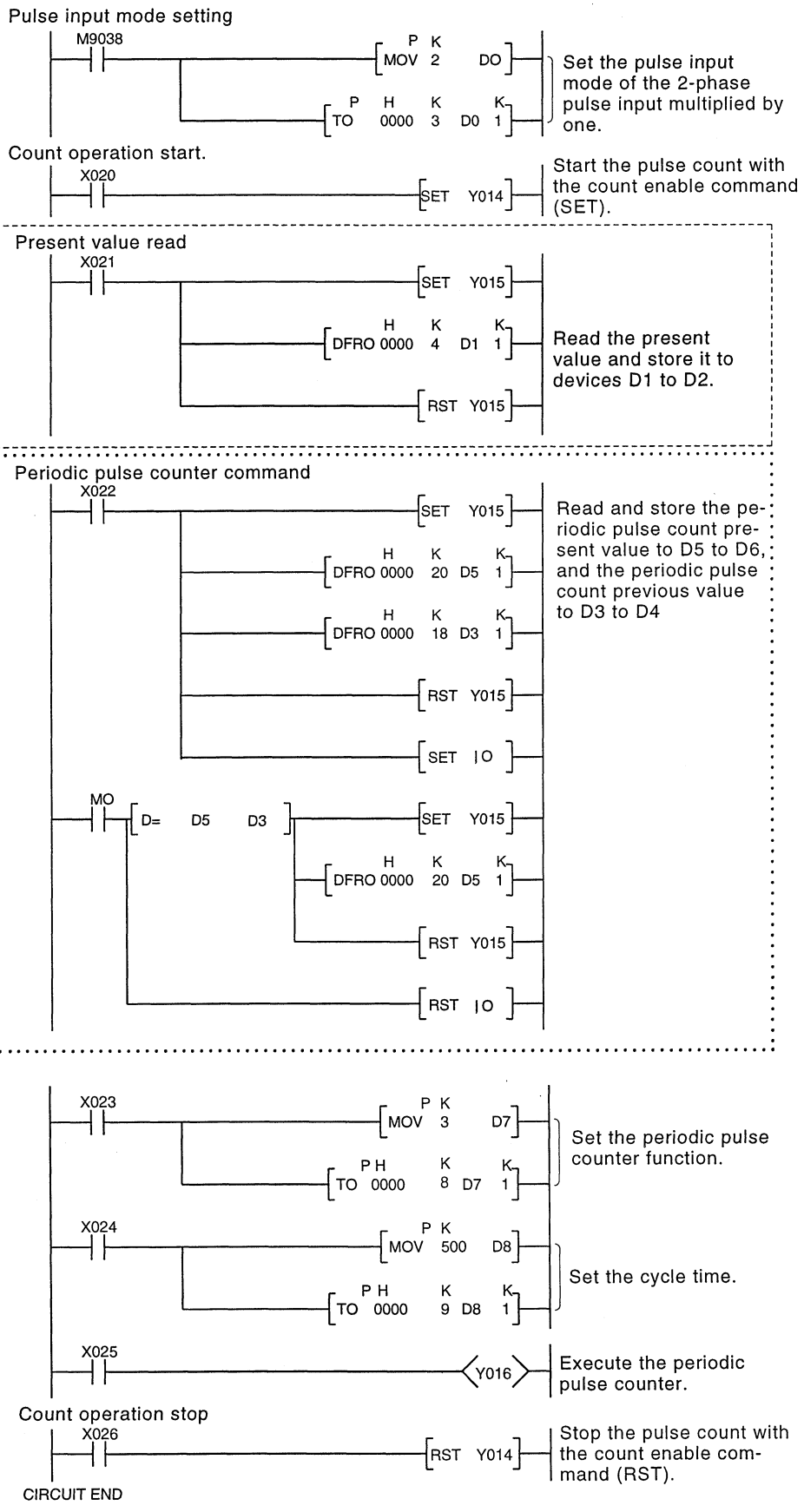
(a) Pulse input mode setting command ..... M9038
(b) Count operation start command ..... X20
(c) Present value read command ..... X21
(d) Periodic pulse count value read command ..... X22
(e) Periodic pulse counter function setting command ..... X23
(f) Periodic time setting command ..... X24
(g) Periodic pulse counter execution command ..... X25
(h) Count operation stop command ..... X26

(2) Relationship between the data register (D0 to D8) and the buffer memory

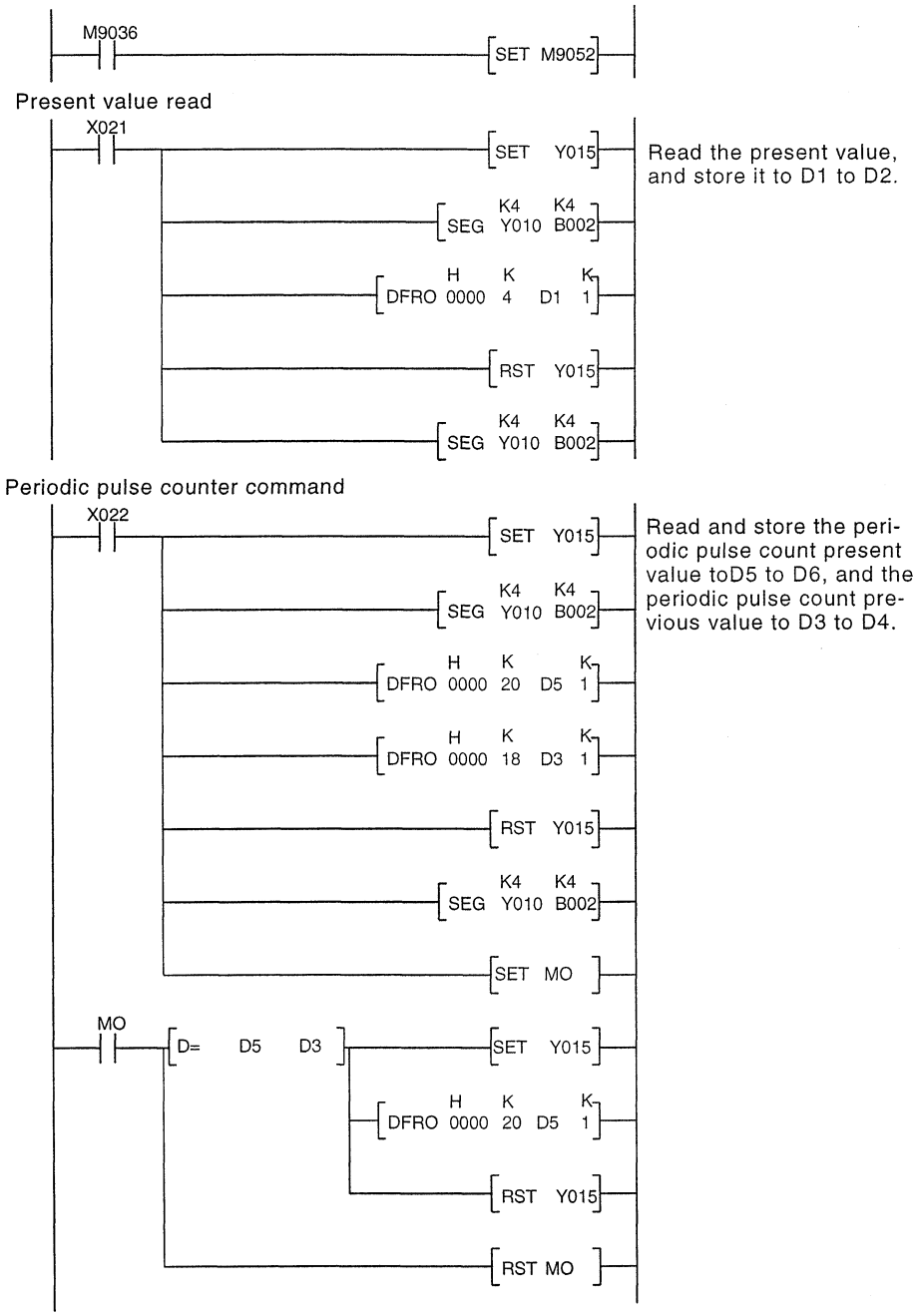


(a) Execution using FROM/TO instructions (when the direct method is selected as the programmable controller CPU I/O control method)

[Program]



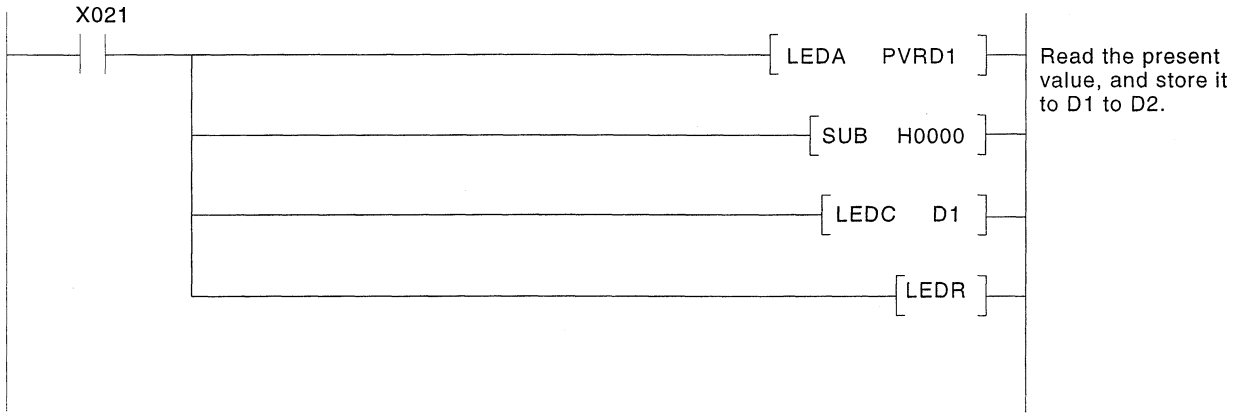
(b) Execution using FROM/TO instructions (when the refresh method is selected as the programmable controller CPU I/O control method)
The portions of the program example shown in (a) enclosed by the broken and dotted lines must be replaced with the following:



(c) Execution using A2ASCPU(S1/S30)/A2USHCPU-S1 dedicated instructions

As shown below, A2ASCPU(S1/S30)/A2USHCPU-S1 dedicated instructions can be used in place of the portion of the program example shown in (a) enclosed by the broken line.

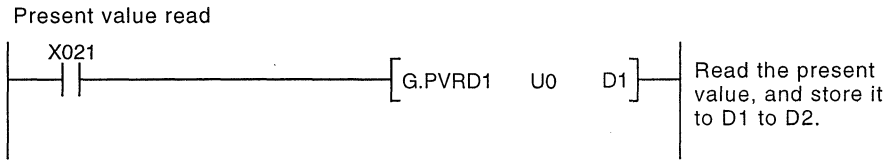
Present value read




**POINT**

To perform communications with a special function module using an A2ASCPU(S1/S30)/A2USHCPU-S1 dedicated instruction, register AD61 as the module type when setting parameters.

(d) Execution using Q2AS(H)CPU(S1) dedicated instructions
As shown below, Q2AS(H)CPU(S1) dedicated instructions can be used in place of the portion of the program example shown in (a) enclosed by the broken line.



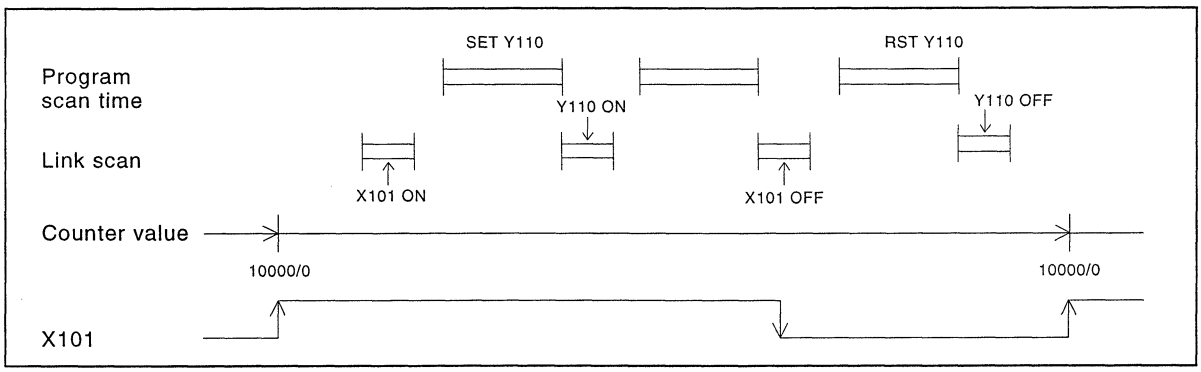

**POINT**

To perform communications with a special function module using an Q2AS(H)CPU(S1) dedicated instruction, register AD61 as the module type when setting parameters.

# 10. PROGRAMMING FOR USE OF A1SD62(E/D/D-S1) ON REMOTE I/O STATION

This section describes programming for use of the A1SD62(E/D/D-S1) on a remote I/O station.

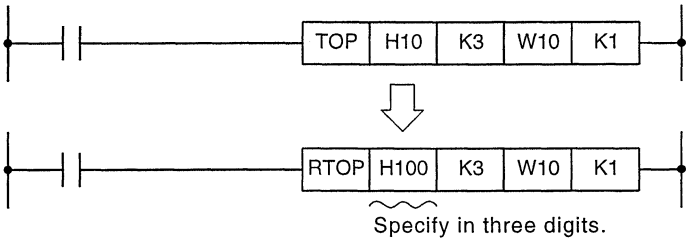
(1) When the A1SD62(E/D/D-S1) is used with a remote I/O station, all data and I/O signals are processed through a link unit.
Communication with this link unit takes place only once after the END instruction of the sequence program has been executed.
Thus, several scan times are required to complete all handshake signals between the A1SD62(E/D/D-S1) and the programmable controller CPU.
As an example, resetting a counter coincidence signal(X01) with a coincidence signal reset command(Y10) is described below, on the assumption that the A1SD62(E/D/D-S1) is allocated to the slot corresponding to the first I/O numbers X100 and Y100 and the set coincidence output point value is 10000.




Since the time the counter requires to count from 0 to the set coincidence output point value(10000) is longer than the handshake signal processing time between the A1SD62(E/D/D-S1) and the programmable controller CPU, A1SD62(E/D/D-S1) operates normally.
However, if the counting time is shorter than the handshake signal processing time (the set coincidence output point value is smaller than 10000, or the pulse frequency to be counted is large), the A1SD62(E/D/D-S1) performs incorrect operations, or counts a larger value than the set value. (In such a case, the A1SD62(E/D/D-S1) cannot be used with a remote I/O station. Mount it at the master station or a local station.)
The above factors may make it difficult to use the A1SD62(E/D/D-S1) for a remote I/O station. Consider the program scan time, link scan time and count-up time carefully to allow the A1SD62(E/D/D-S1) to operate properly.
To operate the A1SD62(E/D/D-S1) through a data link, it is advisable to use it with the master station or a local station.
(When using the A1SD62(E/D/D-S1) with a remote I/O station, examine the above handshake sequence with extreme care.)

(2) When creating a program for the remote I/O station, use RTOP as an instruction to write to the A1SD62(E/D/D-S1) and RFRP as an instruction to read from the A1SD62(E/D/D-S1).
These instructions are executed in the same way as TO and FROM, however, the following points are different.
Although the first I/O number of the A1SD62(E/D/D-S1) is usually specified with the first two digitals, use all digits in this case.
(See the MELSECNET and MELSECNET/B Data Link System Reference Manual.)

<Example> When the first I/O number of the A1SD62(E/D/D-S1) is allocated to X100/Y100 to X11F/Y11F




All data is processed through link registers, W, and it is necessary to set the link registers when setting the programmable controller CPU parameters.

**POINT**

To execute the RFRP/RTOP instructions, the system uses the corresponding number of points to the number of special function modules loaded in the remote I/O station from the first device in the M → R area of the link register.
Set the link register to be used for the RTOP instruction so that it will not conflict with that for the system. (See the MELSECNET and MELSECNET/B Data Link System Reference Manual.)

# 11. TROUBLE SHOOTING

This section describes error information detected by the A1SD62(E/D/D-S1) and troubleshooting for count errors.

## 11.1 Error Information

The A1SD62(E/D/D-S1) turns on the fuse/external power cutoff detection flag (X0E) when the coincidence output fuse has blown or voltage is not applied to the EQU terminals.

## 11.2 Counter Value is Incorrect

| Check Item | Corrective Action |
|---|---|
| Is the pulse input method same with the pulse input mode setting in the buffer memory? | Match the pulse input method with the pulse input mode setting in the buffer memory (refer to Chapter 5). |
| Is the sequence program data treated in 24-bit binary? | Correct the sequence program so that the data can be treated in 24-bit binary. |
| Is the shielded twisted pair cable used for pulse input wiring? | Use the shielded twisted pair cable for pulse input wiring. |
| Doesn't any noise come from the ground part of the A1SD62(E/D/D-S1)? | • Separate the ground cable of the A1SD62(E/D/D-S1) from the ground part.<br>• When the A1SD62(E/D/D-S1) case touches to the ground part, separate it. |
| Has the measures against noise been taken to the adjacent devices and inside the control panel? | Take noise reduction measures (e.g. attach a CR surge suppressor to the magnet switch). |
| Is the distance between the high voltage equipment and pulse input line kept enough? | Bundle the pulse input lines and put them in a single tube, and keep a distance of 150 mm (5.91 inch) or more with the power line even inside the control panel. |
| Is the count value the same at CH1 and CH2 after the same count value was entered? | If they differ, it is a hardware failure. Please consult your local Mitsubishi representative, explaining a detailed description of the problem. |
| Does the input pulse waveform meet the performance specifications? | Check the pulse waveform with synchronoscope. When the input pulse does not meet the performance specifications, input the pulse which meets the performance specifications. |

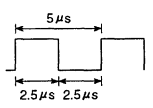
## 11.3 Count Cannot be Made

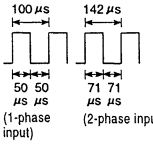
| Check Item | Corrective Action |
|---|---|
| Is the external wiring of ØA and ØB normal? | Check the external wiring and correct the error. |
| Do the LEDs of ØA and ØB turn ON by directly applying voltage to pulse input terminals of ØA and ØB? | If they turn ON, check the external wiring and encoder side and correct the error.<br>If they remain OFF, it is a hardware failure. Please consult your local Mitsubishi representative, explaining a detailed description of the problem. |
| Is the count enable command {Y14 (Y1B)} ON? | Turn ON the count enable command {Y14 (Y1B)} with the sequence program. |
| Is the count value read request {Y15 (Y1C)} set or reset? | Set or reset the count value read request {Y15 (Y1C)} with the sequence program. |
| Doesn't the programmable controller CPU indicate an error? | If the programmable controller CPU is an error, correct the error with reference to troubleshooting in the programmable controller CPU's manual for normal operation. |
| Is the counter function selection start command {Y16 (Y1D)} ON or isn't the voltage being applied to the F.START terminal? | When the counter disable function has been set by the counter function selection, turn OFF {Y16 (Y1D)} or the F.START terminal. |

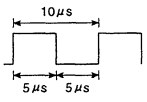
# APPENDICES

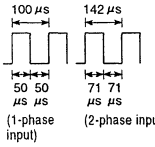
## Appendix 1 PERFORMANCE COMPARISON BETWEEN THE A1SD62(E/D/D-S1), THE A1SD61, AND THE AD61(S1)

### Table APP-1 Performance Comparison

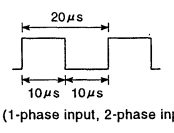
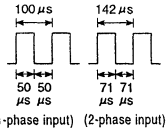
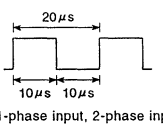
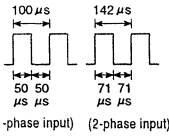
<table>
<tr><th colspan="3" rowspan="2">Item</th><th colspan="6">Specifications</th></tr>
<tr><th colspan="3">A1SD62D(S1)</th><th colspan="3">A1SD62 (E)</th></tr>
<tr><td colspan="3">Counting Speed Setting Pin</td><td colspan="2">200K</td><td>10K</td><td colspan="2">100K</td><td>10K</td></tr>
<tr><td colspan="3">Number of occupied I/O points</td><td colspan="6">32 points</td></tr>
<tr><td colspan="3">Number of channels</td><td colspan="6">2 channels</td></tr>
<tr><td rowspan="2">Count input signal</td><td colspan="2">Phase</td><td colspan="6">1-phase input, 2-phase input</td></tr>
<tr><td colspan="2">Signal level (ØA, ØB)</td><td colspan="3">EIA Standard RS-422-A<br>Differential type line driver level (Am26LS31 or equivalent)</td><td colspan="3">5 VDC<br>12 VDC<br>24 VDC } 2 to 5 mA</td></tr>
<tr><td rowspan="5">Counter</td><td rowspan="2">Counting speed *(maximum)</td><td>1-Phase input</td><td colspan="2">200k pps</td><td>10k pps</td><td colspan="2">100k pps</td><td>10k pps</td></tr>
<tr><td>2-Phase input</td><td colspan="2">200k pps</td><td>7k pps</td><td colspan="2">100k pps</td><td>7k pps</td></tr>
<tr><td colspan="2">Count range</td><td colspan="6">24-bit binary<br>0 to 16777215</td></tr>
<tr><td colspan="2">Type</td><td colspan="6">UP/DOWN preset counter + ring counter functions</td></tr>
<tr><td colspan="2">Minimum count pulse width (Duty ratio = 50 %)</td><td colspan="2"> 

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

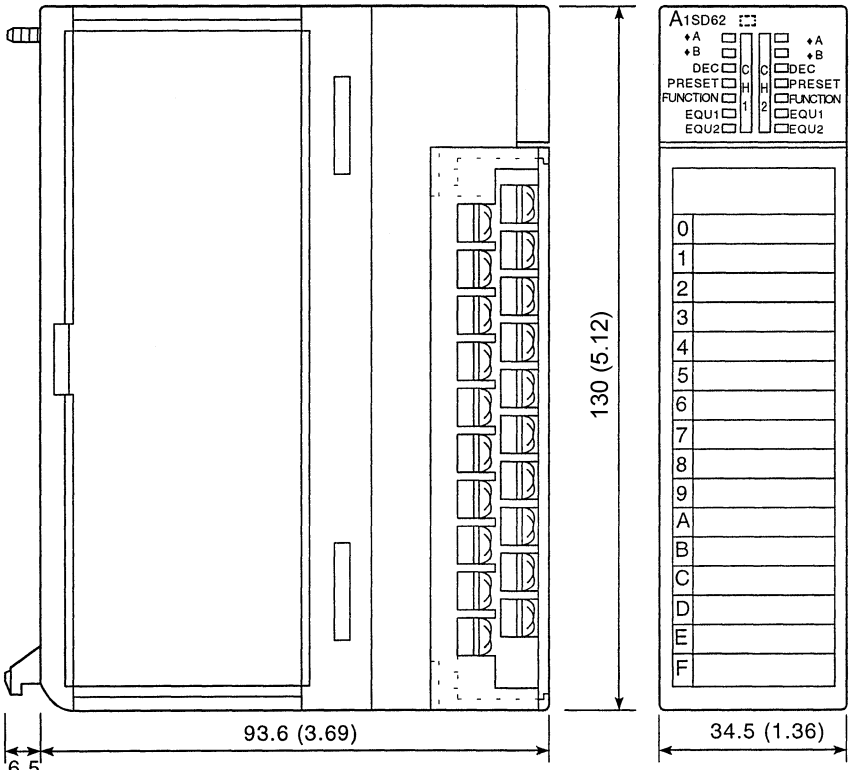
(1-phase input) (2-phase input)</td><td colspan="2"> 

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

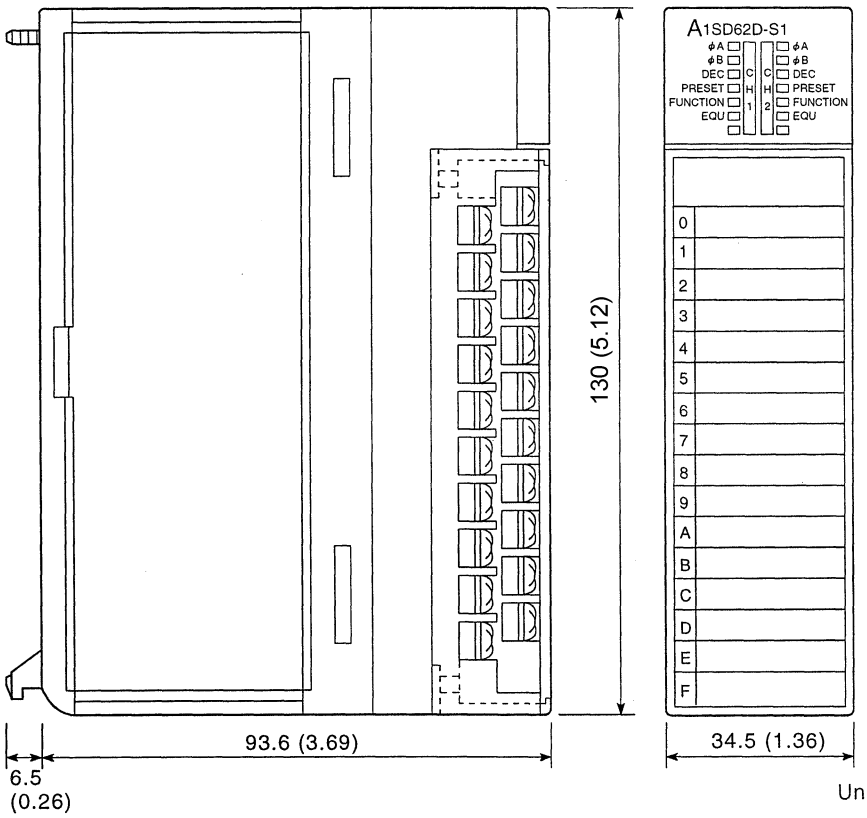
(1-phase input) (2-phase input)</td></tr>
<tr><td rowspan="2">Comparison output</td><td colspan="2">Comparison range</td><td colspan="6">24-bit binary</td></tr>
<tr><td colspan="2">Comparison result</td><td colspan="6">Set value < Count value<br>Set value = Count value<br>Set value > Count value</td></tr>
<tr><td colspan="3" rowspan="3">External input</td><td rowspan="2">Preset</td><td>A1SD62D</td><td>5/12/24 VDC 2 to 5 mA</td><td colspan="3" rowspan="3">5/12/24 VDC 2 to 5 mA</td></tr>
<tr><td>A1SD62D-S1</td><td>EIA Standard RS-422-A Differential type line driver level (Am26LS31 or equivalent)</td></tr>
<tr><td>Function start</td><td colspan="2">5/12/24 VDC 2 to 5 mA</td></tr>
<tr><td colspan="3" rowspan="2">External output</td><td rowspan="2">Coincidence output</td><td colspan="2" rowspan="2">Transistor (sink type) output<br>12/24 VDC, 0.5 A/point, 2 A/common</td><td rowspan="2">Coincidence output</td><td>A1SD62</td><td>Transistor (sink type) output<br>12/24 VDC, 0.5 A/point, 2 A/common</td></tr>
<tr><td>A1SD62E</td><td>Transistor (sink type) output<br>12/24 VDC, 0.1 A/point, 0.4 A/common</td></tr>
<tr><td colspan="3">Internal current consumption (5 VDC)</td><td colspan="3">0.25A</td><td colspan="3">0.1A</td></tr>
</table>

| Item | | | Specifications | | | |
|---|---|---|---|---|---|---|
| | | | A1SD61 | | AD61 | AD61-S1 |
| Counting Speed Setting Pin | | | 50K | 10K | | |
| Number of I/O occupied points | | | 32 points | | | |
| Number of channels | | | 1 channel | | 2 channels | |
| Count input signal | Phase | | 1-phase input, 2-phase input | | | |
| | Signal level (øA, øB) | | 5 VDC / 12 VDC / 24 VDC } 2 to 5 mA | | | |
| Counter | Counting speed | 1-Phase input | 50k pps | 10k pps | 50k pps | 10k pps |
| | | 2-Phase input | 50k pps | 7k pps | 50k pps | 7k pps |
| | Counting Range | | Signed 32-bit binary<br>–2147483648 to 2147483647 | | 24-bit binary<br>0 to 16777215 | |
| | Type | | UP/DOWN preset counter + ring counter function | | | |
| | Minimum count pulse width (Duty ratio = 50 %) | |  (1-phase input, 2-phase input) |  (1-phase input) (2-phase input) |  (1-phase input, 2-phase input) |  (1-phase input) (2-phase input) |
| Comparison output | Comparison range | | Signed 32-bit binary | | 24-bit binary | |
| | Comparison results | | Limit switch output<br>A contact operation:<br>Dog ON address ≤ Counter value ≤ Dog OFF address<br>B contact operation:<br>Dog OFF address ≤ Counter value ≤ Dog ON address | | Set value < Counter value<br>Set value = Counter value<br>Set value > Counter value | |
| External input | | Preset | 12/24 VDC, 3/6 mA<br>5 VDC, 5 mA | | Preset | 12/24 VDC, 3/6 mA<br>5 VDC, 5 mA |
| | | Function start | | | Count disable | |
| External output | | Comparison output | Transistor (open colle tor) output<br>12/24 VDC, 0.1 A/point, 0.8 A/common | | Coincidence output | Transistor (open collector) output<br>12/24 VDC, 5mA |
| Internal current consumption (5 VDC) | | | 0.35 A | | 0.3 A | |

## Appendix 2 EXTERNAL DIMENSIONS




Unit: mm (in)




Unit: mm (in)

# 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.

High Speed Counter Module
Type A1SD62, A1SD62E, A1SD62D(S1)

# User's Manual

| | |
|---|---|
| MODEL | A1SD62-U-E |
| MODEL CODE | 13J816 |
| IB(NA)-66593-F(1003)MEE | |

MITSUBISHI ELECTRIC CORPORATION
HEAD OFFICE : TOKYO BUILDING, 2-7-3 MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN
NAGOYA WORKS : 1-14 , YADA-MINAMI 5-CHOME , HIGASHI-KU, NAGOYA , JAPAN