ZEF006082801

MELSEC-Q
PLC Module Converter

VS-QA262-L

User's Manual

Applicable sensor:

VLS-256PWB
VLS-512PWB
VLS-1024PW
VLS-512PYB
VLS-1024PYB
VLS-2048PY

CONTENTS

SAFETY PRECAUTIONS

(Read these precautions before using this product.)

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

⚠ **WARNING**	Procedures which may lead to a dangerous condition and cause death or serious injury if not carried out properly.
⚠ **CAUTION**	Procedures which may lead to a dangerous condition and cause superficial to medium injury, or physical damage only, if not carried out properly.

Under some circumstances, failure to observe the precautions given under " ⚠ CAUTION" may lead to serious consequences.
Observe the precautions of both levels because they are important for personal and system safety.
Make sure that the end users read this manual and then keep the manual in a safe place for future reference.

[Application Limitation]

This product is not designed to be used under any situation affecting human life. When you are considering using this product for special purposes such as medical equipment, aerospace equipment, nuclear power control systems, traffic systems, and etc., please consult with NSD.
This product is designed to be used under the industrial environments categorized in Class A device.
The supplier and user may be required to take appropriate measures.

[Design Precautions]

⚠ WARNING

- Provide an external safety circuit so that the entire system functions safely even when the external power supply or the CPU module is faulty.
  Failure to do so may lead to incorrect output or malfunction, resulting in an accident.
  (1) Provide an external circuit of PLC emergency stop circuit and an interlock circuit to prevent the machine from being damaged (e.g. position detection upper and lower limits).
  (2) When this module detects an error, all output signals may turn OFF depending on the type of the error. Provide an external fail safe circuit.
  (3) Output may remain ON or OFF depending on failure of external output devices, such as a transistor. Provide a circuit that can be monitored externally for output signals that may result in serious accidents.

⚠ CAUTION

- Do not bind or close the control cable and the communication cable with the main circuit cable and the power cable. Keep the former cables at least 300 mm or more away from the latter cables.
  Failure to do so may result in malfunction due to noise.

[Installation Precautions]

⚠ CAUTION

- Use the programmable controller in an environment that meets the general specifications contained in the CPU User's Manual.
  Failure to do so may result in electrical shock, fire, malfunction, product damage, or deterioration of performance.

- Install the module while pressing the mounting lever at the bottom of module, verifying that the module's mounting protuberance is properly inserted into the base unit's mounting hole.
  Failure to do so may result in malfunction, failure, or this module falling.
  For use in vibratory environment, tighten the module with screws.
  Tighten the screws within the specified torque range.
  Loose screws can cause drops of the screws, short circuit or malfunction.
  Overt-tightening screws may damage the screws and/or the module, This can cause drops, short circuit or malfunction.

- Be sure to shut off all power before mounting/removing this module.
  Failure to do this could result in equipment damage.

- Never directly touch this module's conductive areas or electrical components, because this can cause this module to malfunction or failure.

- Firmly connect the sensor connector to this module's connector.
  Failure to do so may result in poor contact, leading to incorrect input and output.

[Wiring Precautions]

⚠ CAUTION

- Be sure to shut off all power before wiring.
  Failure to do so may result in electrical shock, or equipment damage.

- Do not allow any foreign object (e.g. cutting chips, wire strips) to get into this module.
  Failure to do so may result in fire, failure, or malfunction.

[Start-up and Maintenance Precautions]

⚠ WARNING

- Be sure to shut off all power before cleaning this module or tightening screws.
  Failure to do so may result in failure or malfunction of this module.
  Loose screws can cause drops of the screws, short circuit or malfunction.
  Overt-tightening screws may damage the screws and/or the module, This can cause drops, short circuit or malfunction.

⚠ CAUTION

- Do not disassemble, or modify this module.
  Failure to do so may result in failure, malfunction, injury, or fire.

- Be sure to shut off all power before mounting/removing this module.
  Failure to do this could result in failure or malfunction of this module.

- Do not mount/remove the module to/from the base unit more than 50 times after the first use of the product. (IEC 61131-2 compliant)
  Failure to do so may cause malfunction.

- Before starting test operation, set the parameter speed limit value to the slowest value, and make sure that operation can be stopped immediately if a hazardous state occurs.

- Always make sure to touch a grounded metal to discharge the static electricity from your body, etc., before touching the module.
  Failure to do so may cause a failure or malfunctions of this module.

[Disposal Precautions]

⚠ CAUTION

- Be sure to handle this module as industrial waste when disposing of it.

INTRODUCTION

Thank you for purchasing the VS-QA262 module.
Always read through this manual, and fully comprehend the functions and performance of VS-QA262 before starting use to ensure correct usage of this product.
Please submit this manual to the end user.

TRADEMARKS

MELSEC is the trademark or registered trademark of Mitsubishi Electric Corporation.
Other companies' and products' names are the trademark or registered trademark of each company.

REVISION HISTORY

The document No. appears at the upper right of this manual's cover page.

Document No.	Date	Revision Description
ZEF006082800	28, Jan., 2022	1st Edition Japanese document: ZEF006081100
ZEF006082801	26, Dec., 2022	2nd Edition Japanese document: ZEF006081101

1. OVERVIEW

1. OVERVIEW

VS-QA262 is a built-in module for the MELSEC-Q Series PLC made by MITSUBISHI ELECTRONIC CORPORATION. Combination of VS-QA262 with two ABSOCODER sensors makes the biaxial positioning control possible.

The ABSOCODER sensor is a magnetic position sensor which can replace incremental type encoders which have been widely used until now.

VS-QA262 can be used to automatically control the position detection of the conveyor, press machine, assembly machine, packing machine, etc.

VS-QA262 has a lot of auxiliary functions in addition to three main functions such as detection of the current position value, limit SW output and positioning. As for details of those functions, refer to section 3.3..

The above main functions of detection of current position value, limit SW output and positioning are outlined as follows:

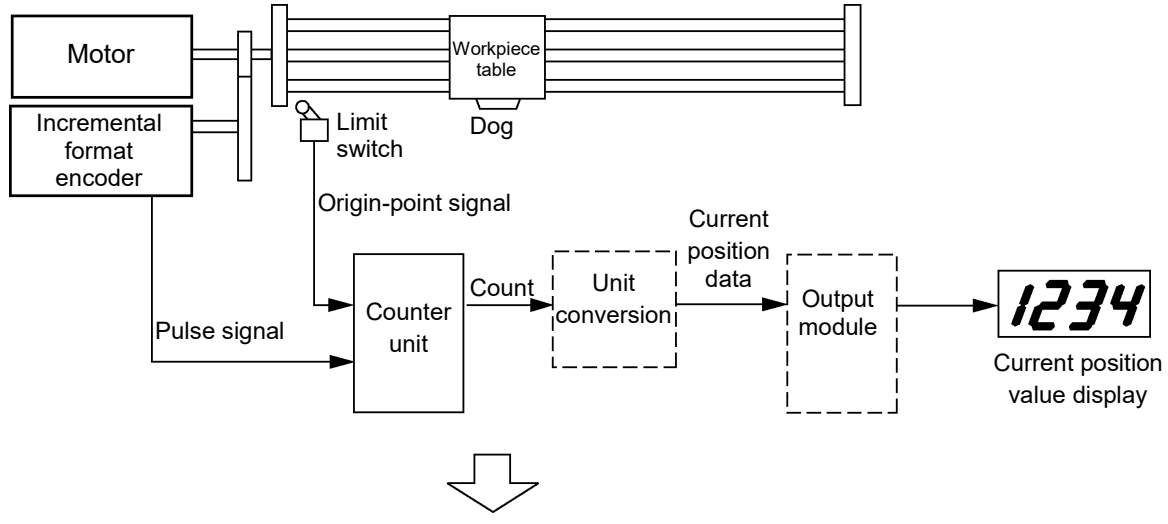
Note:
With ABSOCODER sensors, either VLS-[ ]PW or VLS-[ ]PY should be used for both Axis 1 and Axis 2.

●HOW TO READ THIS MANUAL
A module name 'VS-QA262-L' is shown as VS-QA262 on this manual.
Device numbers of I/O signals and buffer memory addresses of the 2nd axis are described in square brackets.

Current Position Detection Function

VS-QA262's current position detection function detects the current position using an ABSOCODER sensor. Conventionally, this was detected using an incremental format encoder in conjunction with a counter unit.
The above conventional method has several disadvantages; origin-point return is necessary when power supply is interrupted due to power failure, etc.
VS-QA262's current position detection function has eliminated these problems by offering a flexible setting format which provides maintenance-free operation.

(1) Operation Example of System with Incremental Format Encoder and Counter



(2) Operation Example of System with VS-QA262

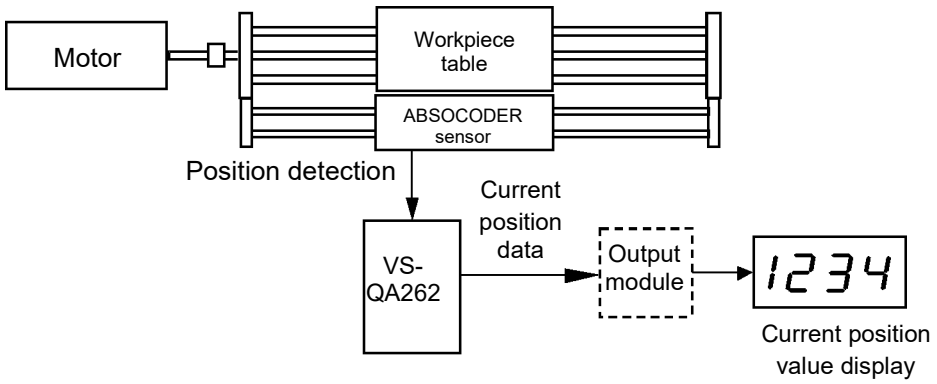
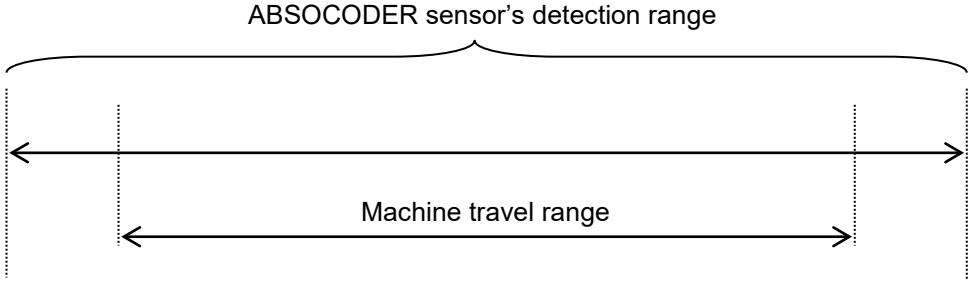


Fig. 1.1 Example of Current Position Detection Function

IMPORTANT

Select an ABOSOCODER which has a scale length range (distance which absolute position detection is possible) that exceeds the machine's travel amount.



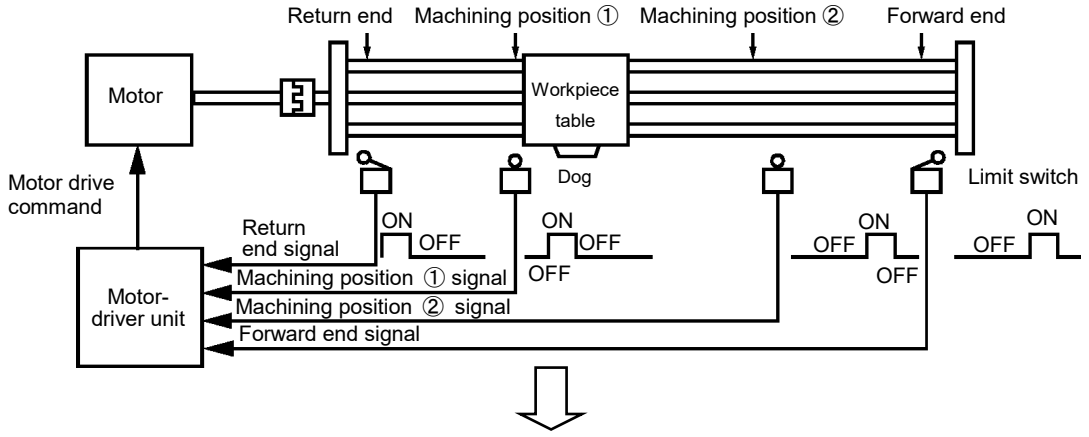
Limit SW output Function

The VS-QA262 limit SW output function differs from that of other systems. The limit switch position data is pre-designated at VS-QA262, without the need for limit switches. The ABSOCODER sensor detects the machine's travel amount and ON/OFF signal outputs occur when the machine's position matches pre-designated positions.

Although limit switches are widely used for position detection, they are troublesome to set, inaccurate, and are not durable.
The VS-QA262 limit SW output function has eliminated these problems by offering a flexible setting format which provides high-precision, maintenance-free operation.

(1) With conventional limit switches:

Explanation Workpiece table position is determined using mechanical limit switches.



(2) With the VS-QA262 System:

Explanation Workpiece table position is determined using the ABSOCODER sensor.

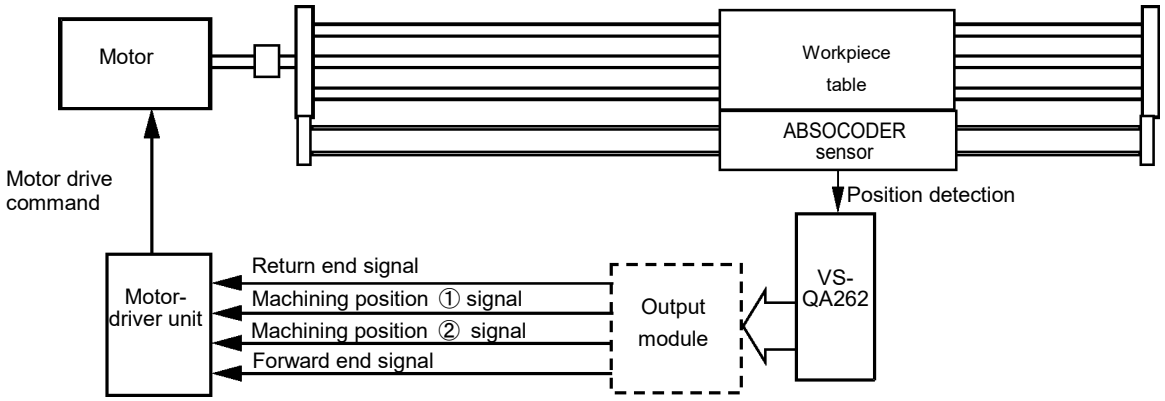


Fig. 1.2 Example of limit SW output function

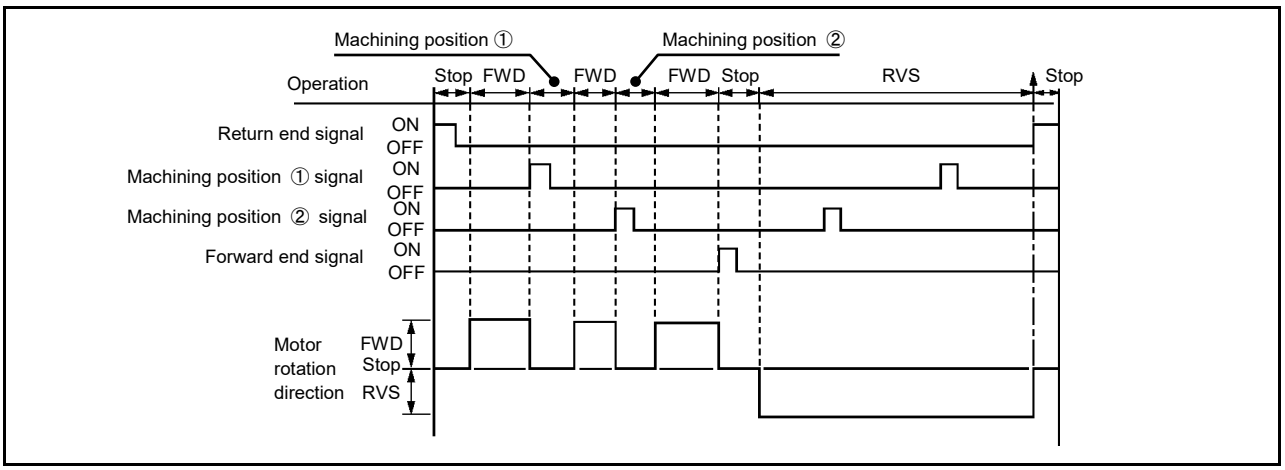


Fig. 1.3 Limit SW output control timing

Positioning Function

All positioning data such as the target stop positions and speed switching positions, etc., are pre-designated at VS-QA262.
The ABSOCODER sensor then detects the machine's travel amount, with the appropriate speed switching or STOP signals being output when the machine's position matches the pre-designated position. With this positioning function, the following two output formats for positioning signals can be used.

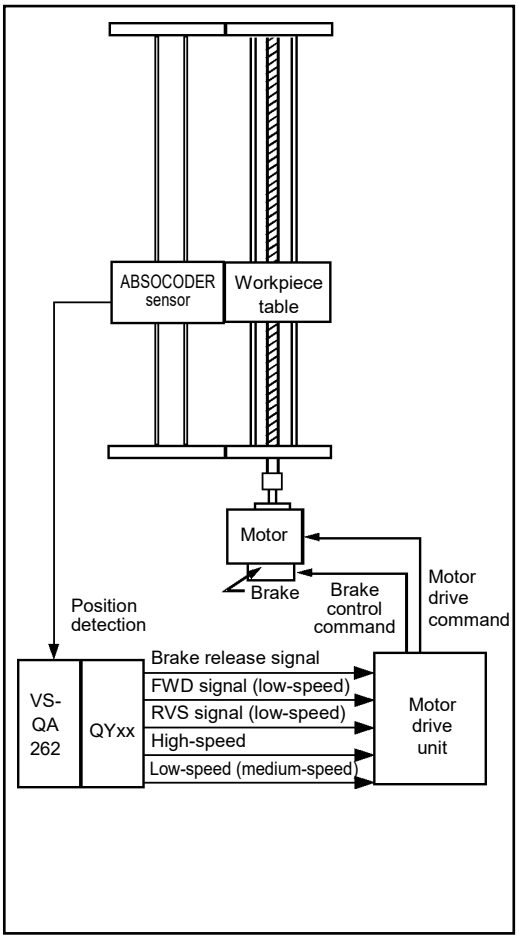


Fig.1.4 Example of positioning function operation

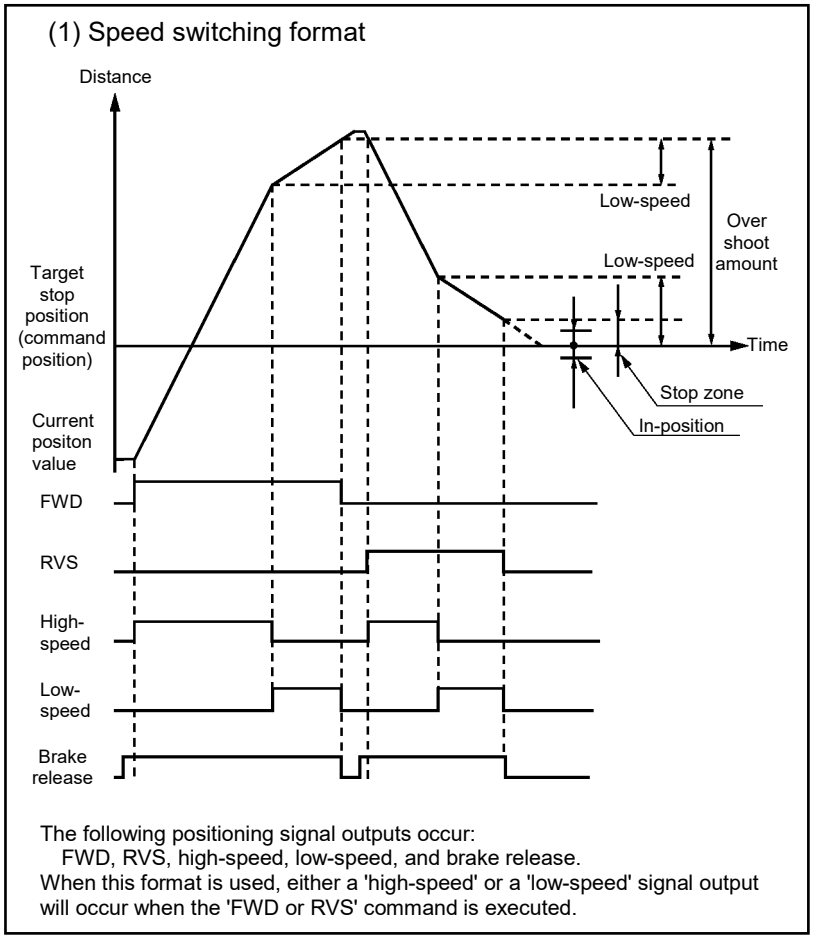


Fig.1.5 Control timing for speed switching format

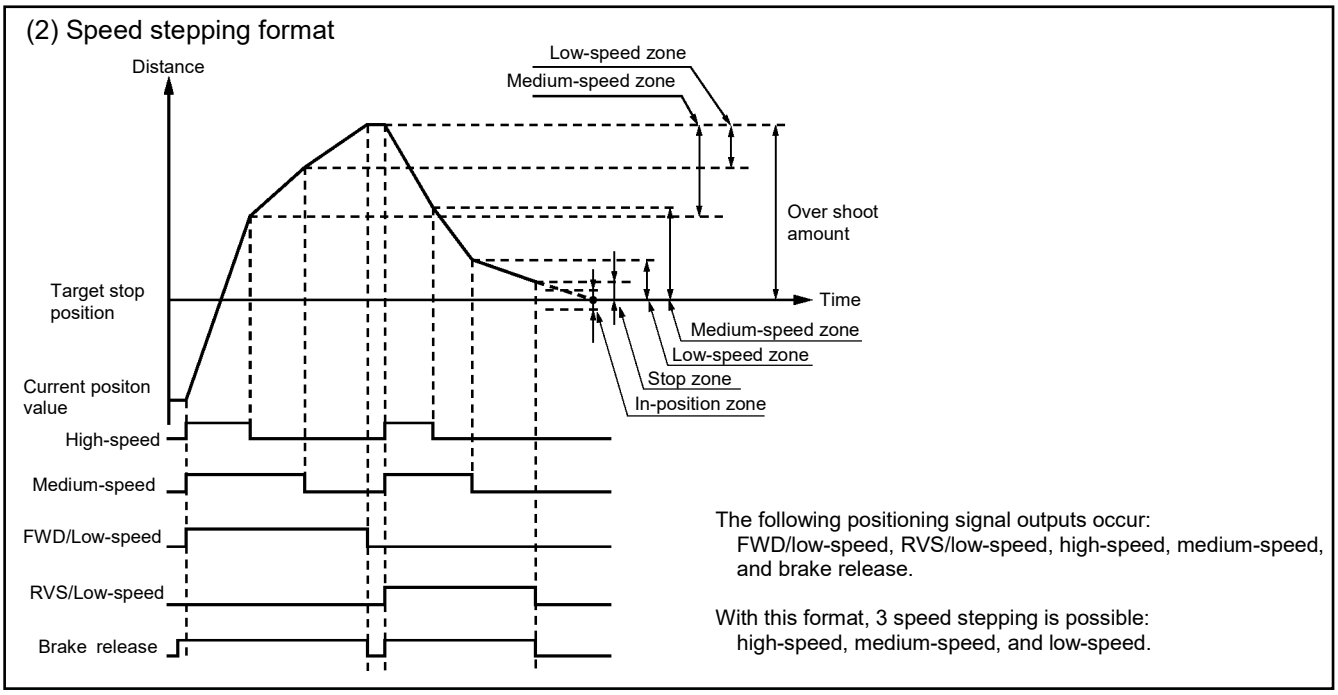


Fig. 1.6 Control timing for speed stepping format

1.1 Features

VS-QA262 has the following features:

(1) Absolute position detection:
Linear position is detected by an absolute position detection method.
Even when a power outage, etc., occurs, the correct position of the ABSOCODER sensor will be instantly detected when power is turned back ON.

(2) Able to handle two sensors:
Two ABSOCODER sensors can be connected.

(3) High resolution:
The VLS-[ ]PY linear-type ABSOCODER sensor (the VLS Series) offers a resolution factor of 131072 divisions per absolute detection range of the sensor rod.
The resolution factor for the VLS-[ ]PW linear-type ABSOCODER sensor is 65536 divisions per absolute detection range. Refer to Appendix 4 for details of the absolute detection range and resolution.

(4) High-speed response:
VS-QA262 can detect the position every 0.8ms.

(5) Current position preset function:
When a position gap between the machine position and the detecting position of the ABSOCODER sensor is developed, the current position value can be changed to the targeted value by input signals from the PLC CPU.

(6) Current position hold function:
The current position value is stored in the buffer memory by input signals from the PLC CPU.

(7) Speed detection function:
The ABSOCODER sensor's travel speed can be monitored.
The detected value (change in position per specified time) is stored in the buffer memory as sensor binary value.

(8) Unidirectional positioning format:
Positioning toward the target stop position is always executed from a single direction.
When positioning is required in the opposite direction, the target stop position will be overshot, and positioning will then occur from the prescribed direction (U-turn is made).
The unidirectional positioning format is useful in reducing stop position errors caused by backlash.

(9) Combination use of positioning function and limit SW output funtion
During the positioning work, limit SW output signal can be output toward the PLC CPU.

(10) Two speed control formats:
Either of two speed control formats can be used for the positioning operation:
The speed switching format in which low-speed/high-speed signal switching occurs.
The speed stepping format in which a series of low-speed/medium-speed/high-speed changes occur.

(11) Extension of positioning pattern data:
The desired item of positioning pattern data; medium-speed zone, low-speed zone, stop zone, or in-position zone can be changed via the buffer memory.
The stop zone data can be changed separately for forward direction and reverse direction.

(12) Positioning command speed limit function:
Some limitation can be applied to speed command output for positioning via the buffer memory.

(13) Highly accurate positioning by simple learning function:
When a positional discrepancy occurs between the target position and the current position upon completion of positioning, the discrepancy will be automatically corrected for the next positioning.

(14) Compliance with UL and CE standards:
VS-QA262 complies with both UL (UL508) and CE (EMC Directive) standards, and therefore presents no problems when used in equipment which is to be exported abroad.

(15) Compliance with KC mark (Korea Certification Mark)
The VS-QA262 complies with KC mark. (It is only certified under the Radio Waves Act of South Korea.)
KC mark is the same directives as CE marking. For more details, refer to "APPENDIX 1 CE marking".

1.2 Definitions

(1) ABSOCODER

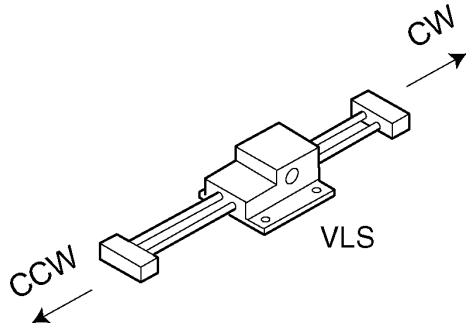
ABSOCODER is the generic name given to the NSD-developed position sensor which detects rotational/linear displacement, speed, and acceleration, using an absolute position detection method with a digital (or analog) output.

The ABSOCODER sensor consists of two main components:
The sensor, where displacement is detected by the change in magnetic resistance, and the converter, where the sensor's output signal (when an AC excitation signal has been applied to the sensor) is converted into absolute data.
The converter for a linear type ABSOCODER sensor is built-in to VS-QA262.

(2) Sensor Rod Travel Direction

Depending on the direction in which the ABSOCODER sensor rod travels, the position data value will increase or decrease.
The direction of travel in which the position data value increases can be designated as either 'CW' or 'CCW' as desired.

CW setting: Position data values will increase when the sensor rod travels in the CW direction as shown in the right figure.
CCW setting: Position data values will increase when the sensor rod travels in the CCW direction as shown in the right figure.



(3) Scale Length

This is the maximum distance over which the ABSOCODER sensor can perform absolute position detection. The scale length can be specified in a system-of-unis (millimeter, centimeter, inch etc.) that is appropriate to the machine's travel amount. With millimeters, the scale length is the value of the absolute detection range contained in the sensor model code.

NOTES

For example, "512" is the Absolute Detection Range and is set as the Scale Length when using VLS-512PW350B; however, the actual stroke length is "350".

Example 1: When set in millimeters
In the case of VLS-**512**PW350B, '512' represents the scale length.
When the resolution unit is 0.1mm unit, set to '5120'.
When the resolution unit is 0.01, set to '51200'.

Example 2: When set in inches
The absolute detection range value, when converted into inch, represents the scale length.
With VLS-512PW350B, the scale length is calculated as follows:
Scale length=512/25.4=20.157
The scale length is set to 20157. (When the resolution unit is 1/1000 inch)

IMPORTANT

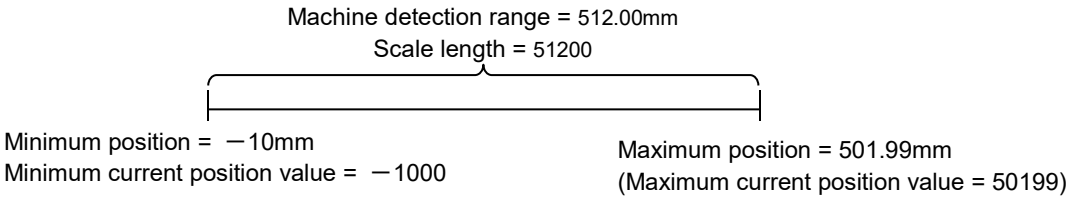
Although absolute position detection is possible within the detection range (scale length), the current position value will immediately jump the entire amount of the scale length when the detection range is exceeded. Therefore, be sure that the machine's travel range does not exceed the scale length.
Refer to section 7.1.8 for details.

(4) Minimum Current Position value

This is the minimum value of the scale length which can be displayed.
This value can be designated as desired within the following range: －99999 to [1000000－scale length].

<Example>
Given the same conditions as those described in the 'Scale length' item above, and with the actual minimum position of the machine detection range being －10 mm, the following will apply:
(When the resolution unit is 0.01mm)

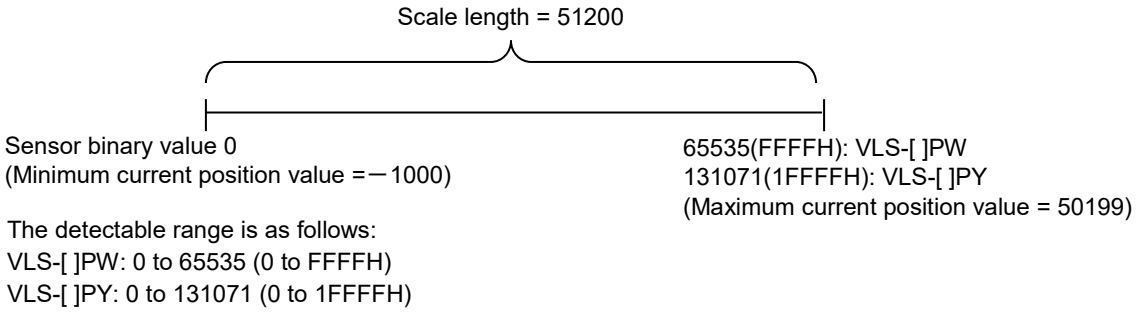
$$\text{Minimum current position value [K]} = \frac{\text{Actual minimum position}}{\text{Minimum setting unit}} \qquad K = \frac{-10}{0.01} = -1000$$



(5) Current Position value

This value indicates where the machine is currently positioned within the machine detection range. This can be expressed in two ways: By a sensor binary current position value, or by a scaling binary current position value.

(a) Sensor binary current position value:
This value is indicated the absolute value with machine positions which were detected by the ABSOCODER sensor. The position which is set as the minimum current position value in item (4) above is designated '0' as an absolute value.

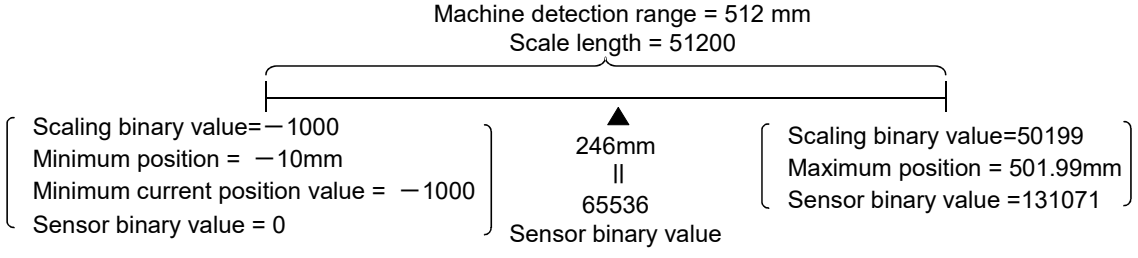


The detectable range is as follows:
VLS-[ ]PW: 0 to 65535 (0 to FFFFH)
VLS-[ ]PY: 0 to 131071 (0 to 1FFFFH)

(b) Scaling binary current position value:
This value can be obtained by adding the minimum current position value to the sensor binary current position value unit-converted (inch/mm). This value is expressed in binary code.

$$\text{Scaling binary value} = \frac{\text{Scale length [L]}}{\begin{matrix}131072(\text{VLS-[ ]PY}) \\ \text{or} \\ 65536(\text{VLS-[ ]PW})\end{matrix}} \times \text{Sensor binary value} + \text{Minimum current position value [K]}$$

<Example>
When executing the position detection by VLS-512PY with a scale length of 51200 and the minimum current position value of -1000, the scaling binary value will be as shown below when the machine's actual position is at the 246mm point:

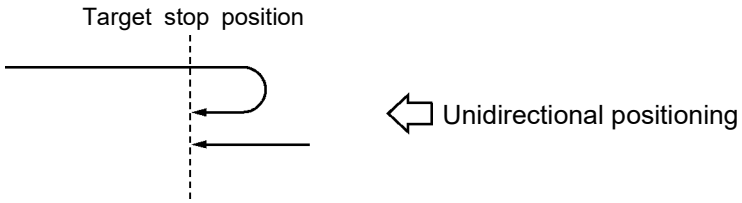


The scaling binary value at the 246mm position will be as follows:

$$\frac{51200}{131072} \times 65536 + (-1000) = 24600$$

(6) Unidirectional Positioning

Positioning toward the target stop position is always executed from a single direction.
When positioning is required in the opposite direction, the target stop position will be overshot, and positioning will then occur from the prescribed direction (U-turn is made).
The unidirectional positioning format is useful in reducing stop position errors caused by backlash.



(7) Overshoot Amount

This refers to the amount by which the target stop position is overshot before a U-turn is made during unidirectional positioning.

(8) In-Position Zone

During the positioning operation, there may be a slight discrepancy between the point where positioning ends and the target stop position.
At such times, a judgement is required to determine whether the discrepancy is within a permissible limit.
The in-position zone is a +/- value to determine 'in-position'.
When the positional discrepancy is within the in-position zone, the in-position signal output will occur.

(9) Stop Zone

This is the distance between the target stop position and the point where the motor is switched OFF (and the brake applied) when positioning is being executed.
The stop zone value can be set as desired by the parameter.

(10) Brake Release

This is the output signal which releases the brake in positioning systems where the motor is equipped with a brake.

(11) FWD/RVS

For the VS-QA262 system, the current position value increases in the FWD (forward) direction and decreases in the RVS (reverse) direction.

(12) Simple Learning Function

When a positional discrepancy occurs between the target position and the current position upon completion of positioning, the discrepancy will be automatically corrected for the next positioning.

2. SYSTEM CONFIGURATION

2. SYSTEM CONFIGURATION

2.1 Overall Configuration

The overall configuration of the Mitsubishi Electric corp. MELSEC-Q Series using VS-QA262 is shown below.

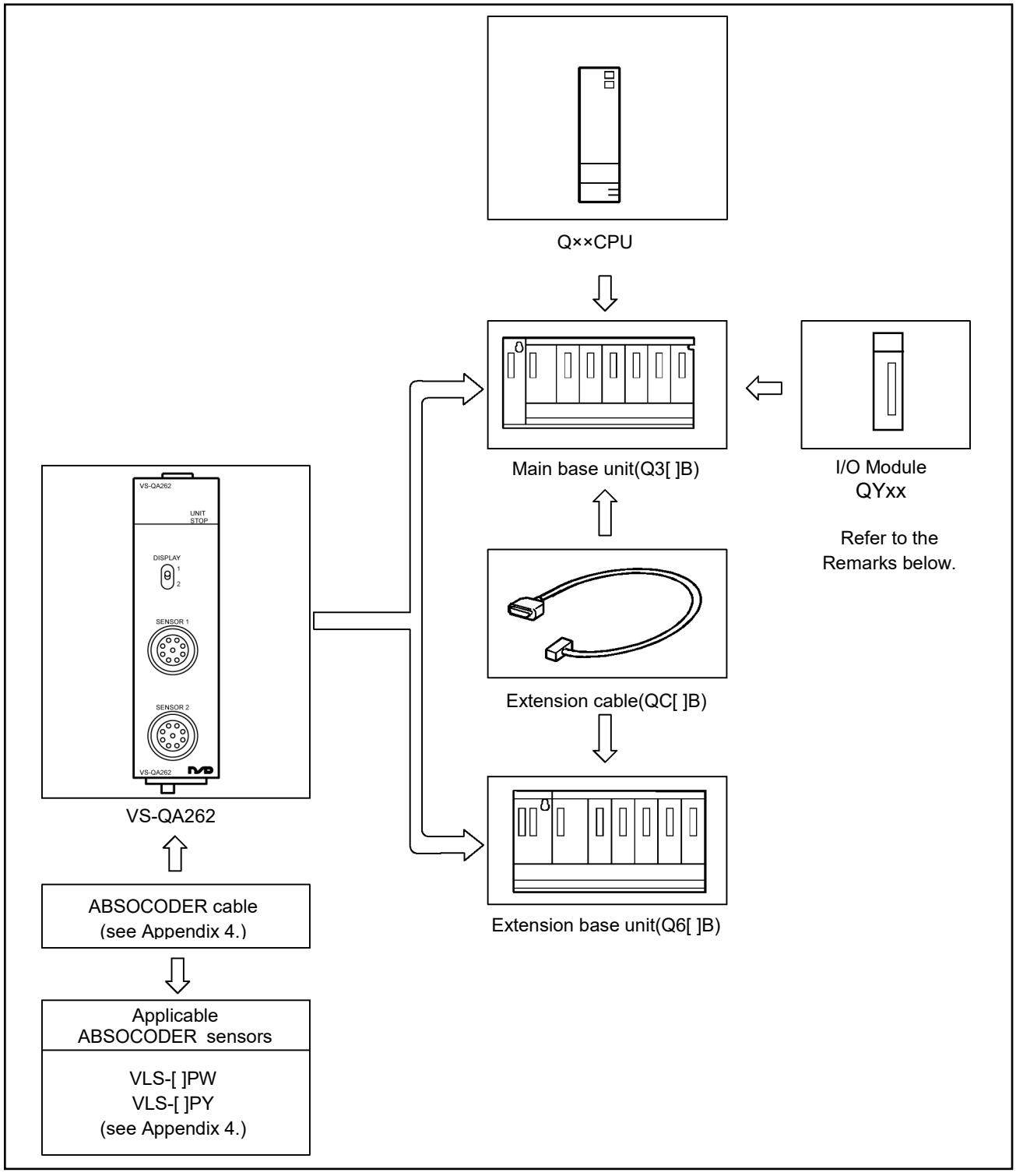


Fig. 2.1 VS-QA262 System Configuration

REMARKS

- With ABSOCODER sensors, either VLS-[ ]PW or VLS-[ ]PY should be used for both Axis 1 and Axis 2.
- As VS-QA262 does not have an external input/output circuit, input and output have to be executed using a sequence program. Select and prepare an input/output module according to the required functions.

2.2 Applicable System

VS-QA262 can be used in the following system.

(1) Applicable CPU module

Refer to NSD web site for CPU module models with which VS-QA262 can be used.

(2) Number of mountable modules

Pay attention to the power supply capacity before mounting modules.
Change the combination of the modules if the power supply capacity is insufficient.

(3) Applicable base units

VS-QA262 can be installed to any I/O slot of a base unit.

Remarks

As VS-QA262 does not have an external input/output circuit, input and output have to be executed using the sequence program.
If VS-QA262 is installed to a remote I/O station, it may become impossible to assure response performance. Be careful when attempting to reduce the sequence scan time effect using a fixed-scan execution type program or high-speed interrupt function.
About fixed-scan execution type programs and high-speed interrupt functions, refer to the User's Manual (‘Function Explanation: Program Fundamentals’) and/or the Programming Manual for your CPU module.

2.3 Function Block Diagram

Fig. 2.2 shows the block diagram of the VS-QA262 functions.

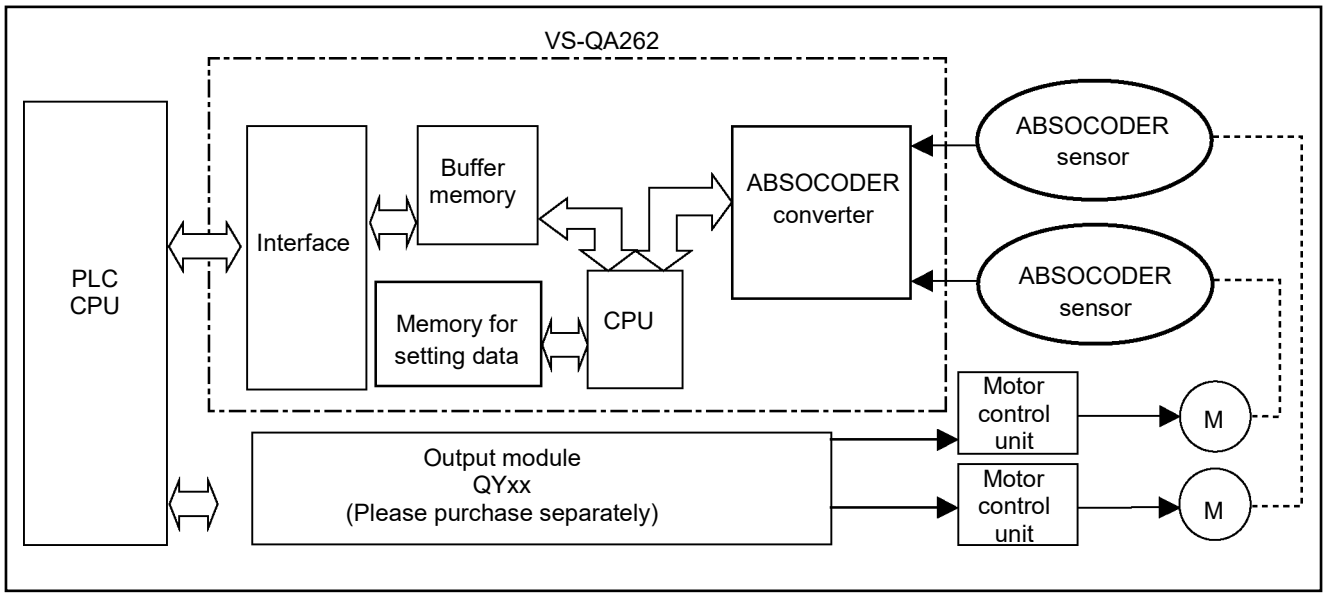


Fig. 2.2 Block Diagram of VS-QA262 Functions

3. VS-QA262 SPECIFICATIONS

3. VS-QA262 SPECIFICATIONS

3.1 General Specifications

Shown below are the VS-QA262 specifications.
About the ABSOCODER sensor specifications, refer to Appendix 4, 'ABSOCODER SENSOR SPECIFICATIONS'.

Table 3.1 General Specifications

Items	Specifications					
Operating ambient temperature	0 to 55°C					
Storage ambient temperature	-25 to 75°C *3					
Operating ambient humidity Storage ambient humidity	5 to 95%RH *4, non-condensing					
Vibration resistance	Compliant with JIS B 3502 and IEC 61131-2		Frequency	Constant acceleration	Half amplitude	Sweep count
		Under intermittent vibration	5 to 8.4Hz	—	3.5mm	10 times each in X, Y, Z directions
			8.4 to 150Hz	9.8m/s^2	—	
		Under continuous vibration	5 to 8.4Hz	—	1.75mm	—
			8.4 to 150Hz	4.9m/s^2	—	
Shock resistance	Compliant with JIS B 3502 and IEC 61131-2 (147 m/s^2, 3 times each in 3 directions X, Y, Z)					
Operating atmosphere	No corrosive gases					
Operating altitude *5	0 to 2000m					
Installation location	Inside a control panel					
Over voltage category *1	II or less					
Pollution degree *2	2 or less					
Equipment class	Class I					

*1: This indicates the section of the power supply to which the equipment is assumed to be connected between the public electrical power distribution network and the machinery within premises.
Category II applies to equipment for which electrical power is supplied from fixed facilities. The surge voltage withstand level for up to the rated voltage of 300V is 2500V.
*2: This index indicates the degree to which conductive material is generated in terms of the environment in which the equipment is used.
Pollution level 2 is when only non-conductive pollution occurs. A temporary conductivity caused by condensing must be expected occasionally.
*3: The storage ambient temperature is -20 to 75°C if the system includes the AnS/A series modules.
*4: The operating ambient humidity and storage ambient humidity are 10 to 90%RH if the system includes the AnS/A series modules.
*5: Do not use or store the programmable controller under pressure higher than the atmospheric pressure of altitude 0m.
Doing so may cause malfunction.

3.2 Performance Specifications

Table 3.2 Performance Specifications

<table>
<tr><th colspan="2">Items</th><th colspan="3">Specifications</th><th>Remarks</th></tr>
<tr><td colspan="2">Number of position detection axes</td><td colspan="3">2</td><td></td></tr>
<tr><td colspan="2">Position detection method</td><td colspan="3">Absolute position detection by ABSOCODER sensors</td><td></td></tr>
<tr><td colspan="2">Number of divisions</td><td colspan="3">65536: VLS-[ ]PW
131072: VLS-[ ]PY</td><td>Refer to Appendix 4 for details.</td></tr>
<tr><td rowspan="5">Limit SW output function</td><td rowspan="2">Number of programs</td><td rowspan="2">9</td><td>Program No. 0</td><td></td><td>Data is not held when power is OFF.</td></tr>
<tr><td>Program No. 1 to 8</td><td></td><td>Data is held when power is OFF.</td></tr>
<tr><td>Number of multi-dogs (dog/CH.)</td><td colspan="3">10</td><td></td></tr>
<tr><td rowspan="3">Number of output channels (CH./1 program)</td><td>Function selection / Output destination</td><td>For limit SW output function only</td><td>For limit SW output and positioning functions</td><td rowspan="3"></td></tr>
<tr><td>Device X</td><td>8</td><td>0</td></tr>
<tr><td>Buffer memory</td><td>16</td><td>16</td></tr>
<tr><td>Data setting method</td><td colspan="3">Sequence program</td><td></td></tr>
<tr><td rowspan="6">Positioning function</td><td>Control format</td><td colspan="3">Unidirectional positioning</td><td>Bidirectional positioning when 'overshoot amount' is set to '0'</td></tr>
<tr><td>Target position setting method</td><td colspan="3">1-point setting prior to positioning operation by the sequence program</td><td></td></tr>
<tr><td>Max. number of positioning points</td><td colspan="3">1</td><td></td></tr>
<tr><td>Number of registered positioning pattern data</td><td colspan="3">2</td><td>Pattern is according to parameter setting or buffer memory.</td></tr>
<tr><td>Number of channels for positioning signal output (CH./axis)</td><td colspan="3">8
FWD, RVS, High-speed, Low-speed, Brake release, In-position, Positioning in progress, Operation error</td><td></td></tr>
<tr><td>Data setting method</td><td colspan="3">Writing by the sequence program is enabled when selecting the ‘initial setting’ or the ‘parameter’.</td><td></td></tr>
<tr><td colspan="2">Current position setting function</td><td colspan="3">Current position setting,
Current position preset setting</td><td></td></tr>
<tr><td colspan="2">JOG operation function</td><td colspan="3">JOG operation executed by FWD JOG/RVS JOG signal inputs</td><td></td></tr>
<tr><td rowspan="2">Sampling time (ms)</td><td>Limit SW output signal & positioning output signal</td><td colspan="3">1.6</td><td rowspan="2"></td></tr>
<tr><td>Current position value output</td><td colspan="3">0.8</td></tr>
<tr><td rowspan="2">Response time (ms)</td><td>Limit SW output signal & positioning output signal</td><td colspan="3">3.2</td><td rowspan="2">Max. response delay time due to internal processing</td></tr>
<tr><td>Current position value output</td><td colspan="3">1.6</td></tr>
<tr><td>Gate time (ms)</td><td>Speed output</td><td colspan="3">Able to select by parameter setting
8, 16, 32, 64, 128, 3.2, 6.4, 12.8, 25.6, 51.2</td><td></td></tr>
<tr><td colspan="2">No. of occupied I/O points</td><td colspan="3">32</td><td>I/O assignment: 32 points for intelligent function module</td></tr>
<tr><td colspan="2">Internal current consumption (5VDC) [A]</td><td colspan="3">0.7</td><td></td></tr>
<tr><td colspan="2">Outline dimensions [mm]</td><td colspan="3">98(h) x 27.4(w) x 90(d)</td><td></td></tr>
<tr><td colspan="2">Mass [kg]</td><td colspan="3">0.2</td><td></td></tr>
<tr><td colspan="2">Display of module model names in PLC</td><td colspan="3">008 VS-QA262-L</td><td></td></tr>
<tr><td colspan="2">Applicable standard</td><td colspan="3">UL508
CSA C22.2 No.142
(Compliance with c-RU standard)
CE Marking (EMC Directive)
KC mark (Korea Certification Mark)</td><td></td></tr>
</table>

3.3 Function List

As shown in table 3.3, VS-QA262's functions are divided into two groups consisting of 'main functions' and 'auxiliary functions'. The main functions of VS-QA262 are useful for actual system control, and the auxiliary functions are to support the main function operations.

Table 3.3 Function List

Function		Description	Reference
Main functions	Current position detection function	The machine position is detected by the ABSOCODER sensor.	Section 5.1
	Limit SW output function	The machine position which has been detected by the ABSOCODER sensor is compared to the pre-designated limit switch position, with ON/OFF signal outputs being executed accordingly.	Section 6.1
	Positioning function	The machine position which has been detected by the ABSOCODER sensor is compared to the pre-designated target stop position, with positioning signals being output until the machine has been positioned at the target stop position.	Section 7.1
Auxiliary functions	Current position preset function	This function is used to adjust the current position value to the preset value, with 'current position preset command' signal being input, in case a gap is developed between the actual machine position and the current position value.	Section 5.1.2
	Current position hold function	This function is used to store the current position value in the buffer memory by detecting the leading edge of 'current position preset command' signal. (Response delay: max. 4 ms)	Section 3.5.12
	'Excessive current position change' detection function	Position detection is executed by the ABSOCODER sensor every 20 ms, and the difference between the previously detected current position value and the present value is calculated. The 'excessive current position change' detection function is used to determine whether this difference is within the 'permissible current position change amount' designated by the parameter. When the permissible range is exceeded, the following errors will occur: (1) 'Excessive current position change' detection signal (XB[XE]) turns ON. (2) Error code '24' is stored in the error code area of buffer memory (address: 7[1007]).	Section 5.4.3
	'Excessive correction amount' detection function	When the 'current position preset command' signal input occurs, the difference between the uncorrected current position value and the preset value is calculated. The 'excessive correction amount' detection function is used to determine whether this difference is within the 'permissible correction amount' designated by the parameter. When the permissible range is exceeded, the following errors will occur: (1) 'Excessive correction amount' detection signal (XA [XD]) turns ON. (2) Error code '23' is stored in the error code area of buffer memory (address: 7 [1007]).	Section 5.4.4

Function		Description	Reference
Auxiliary functions	'Upper limit overtravel' detection function	This function monitors the current position detected by ABSOCODER sensor to determine whether it has exceeded the upper limit value (upper limit of travel range) that was designated by the parameter. When the upper limit has been exceeded, the following errors will occur: (1) Upper limit signal (X2[X6]) turns ON. (2) Error code '20' is stored in the error code area of buffer memory (address: 7[1007]).	Section 7.4.7
	'Lower limit overtravel' detection function	This function monitors the current position detected by ABSOCODER sensor to determine whether it has exceeded the lower limit value (lower limit of travel range) that was designated by the parameter. When the lower limit has been exceeded, the following errors will occur: (1) Lower limit signal (X3[X7]) turns ON. (2) Error code '21' is stored in the error code area of buffer memory (address: 7[1007]).	Section 7.4.7
	Speed detection function	This function calculates the travel speed based on the current position value which was detected by the ABSOCODER sensor, and stores the speed in the buffer memory.	Section 5.4.7
	Simple learning function	This function is used to enhance positioning accuracy by automatically correcting the stop zone according to the discrepancy between the target stop position and the current position upon completion of the previous positioning.	Section 7.1.5

3.4 Input/Output Signals between VS-QA262 and PLC CPU

Below shows the input and output signals to the PLC CPU.

(1) Input/output signals between VS-QA262 and the PLC CPU are executed according to the following format:
Input: 32 points Output: 32 points

(2) In the table below, the input/output signals are classified as follows:
(a) Device X: Input signals from VS-QA262 to the PLC CPU.
(b) Device Y: Output signals from the PLC CPU to VS-QA262.

(3) Input/output signal configuration when VS-QA262 is installed at the base unit's Slot 0.

Signal direction : VS-QA262 → PLC CPU								Signal direction : PLC CPU → VS-QA262		
Device No.	Signal Name							Device No.	Signal Name	
X0	Unit ready (VS-QA262 detection item)							Y0	Use Prohibited	
X1	VS-QA262 operation status (online/offline)							Y1		
X2	Axis 1	'Upper limit overtravel' detection						Y2		
X3		'Lower limit overtravel' detection						Y3		
X4		Sensor error detection						Y4		
X5		Error detection						Y5		
X6	Axis 2	'Upper limit overtravel' detection						Y6		
X7		'Lower limit overtravel' detection						Y7		
X8		Sensor error detection						Y8		
X9		Error detection						Y9		
XA	Axis 1	'Excessive correction amount' detection						YA		
XB		'Excessive current position change' detection						YB		
XC	Use prohibited							YC		
XD	Axis 2	'Excessive correction amount' detection						YD		
XE		'Excessive current position change' detection						YE		
XF	Use prohibited							YF		
X10	Axis 1	For limit SW output function only	Channel 0	For limit SW output and positioning functions (Speed switching format)	FWD	For limit SW output and positioning functions (Speed stepping format)	FWD/ Low-speed	Y10	PLC ready	
X11			Channel 1		RVS		RVS/ Low-speed	Y11	Axis 1	Positioning START (Detected at leading edge)
X12			Channel 2		High-speed		High-speed	Y12		Positioning STOP (Detected at leading edge)
X13			Channel 3		Low-speed		Medium-speed	Y13		Current position preset command 1 (Detected at leading edge)
X14			Channel 4		Brake release		Brake release	Y14	Axis 2	Positioning START (Detected at leading edge)
X15			Channel 5		In-position		In-position	Y15		Positioning STOP (Detected at leading edge)
X16			Channel 6		Positioning in progress		Positioning in progress	Y16		Current position preset command 1 (Detected at leading edge)
X17			Channel 7		Operation error		Operation error	Y17	Axis 1	FWD (Forward) JOG (operation occurs when ON)
X18	Axis 2	For limit SW output function only	Channel 0	For limit SW output and positioning functions (Speed switching format)	FWD	For limit SW output and positioning functions (Speedstepping format)	FWD /Low-speed	Y18		RVS (Reverse) JOG (operation occurs when ON)
X19			Channel 1		RVS		RVS/ Low-speed	Y19	Axis 2	FWD (Forward) JOG (operation occurs when ON)
X1A			Channel 2		High-speed		High-speed	Y1A		RVS (Reverse) JOG (operation occurs when ON)
X1B			Channel 3		Low-speed		Medium-speed	Y1B	Limit SW output enabled	
X1C			Channel 4		Brake release		Brake release	Y1C	Error reset (Detected at leading edge)	
X1D			Channel 5		In-position		In-position	Y1D	Use Prohibited	
X1E			Channel 6		Positioning in progress		Positioning in progress	Y1E	Axis 1	Current position preset command 2 (Detected at leading edge)
X1F			Channel 7		Operation error		Operation error	Y1F	Axis 2	Current position preset command 2 (Detected at leading edge)

IMPORTANT

VS-QA262's operation cannot be guaranteed when ON/OFF switching of Y0 to YF, and Y1D is executed by the sequence program.

3.4.1 Input/output signal details

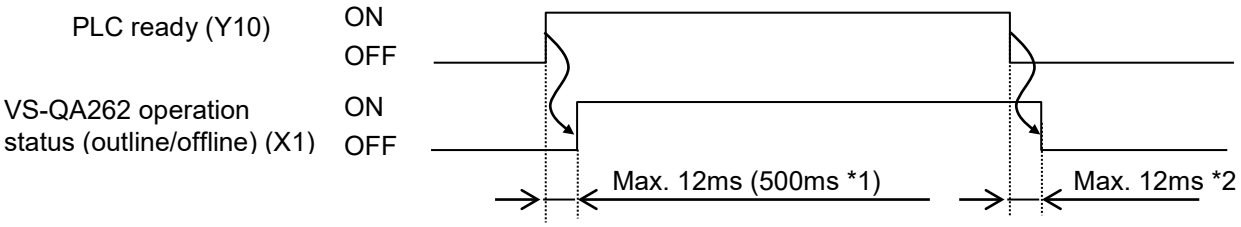
The ON/OFF timing and other conditions for signal input/output between VS-QA262 and the PLC CPU are explained below.

(1) Unit ready (X0):

This signal comes OFF when a watchdog timer error is detected by VS-QA262's self-diagnosis function.
When 'X0' comes OFF, this indicates a VS-QA262 hardware error.

(2) VS-QA262 operation status (outline/offline) (X1):

When the 'PLC ready' signal (Y10) is turned ON by the sequence program, VS-QA262 will be set to an 'online' status, and 'X1' will turn ON.
'X1' will go OFF when 'Y10' is turned OFF.

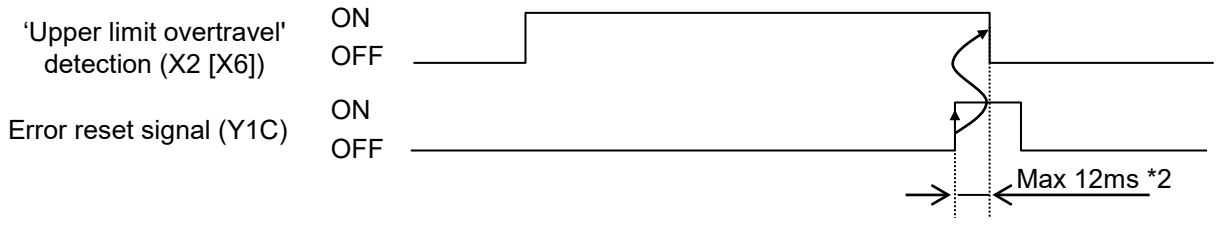


*1: The module cannot go online for a period of 500 ms immediately after the power is turned on or the PLC CPU is reset, even if the 'PLC ready' signal (Y10) is ON.

*2: When connected to a remote I/O, the remote I/O network's transmission delay time will be added to the response time.

(3) 'Upper limit overtravel' detection (X2 [X6]):

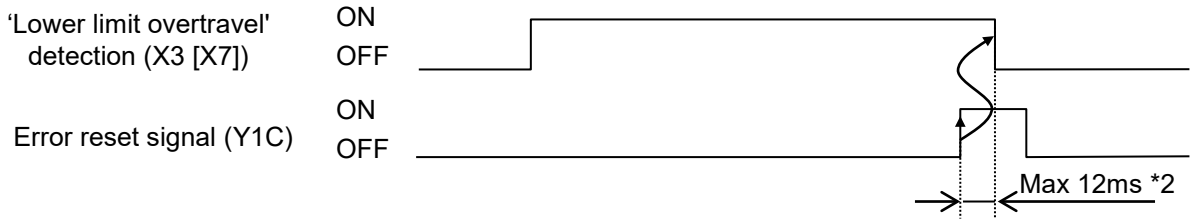
This signal turns ON when the current position value exceeds the upper limit value designated by the parameter.
At this time, VS-QA262's positioning and limit switch functions continue the respective works.
Upper limit overtravel is detected only during an 'online' status.
'X2 [X6]' will go OFF after the current position value has been corrected within the prescribed range and 'Y1C' (error reset signal) has been turned ON by the sequence program.



*2: When connected to a remote I/O, the remote I/O network's transmission delay time will be added to the response time.

(4) ‘Lower limit overtravel' detection (X3 [X7]):

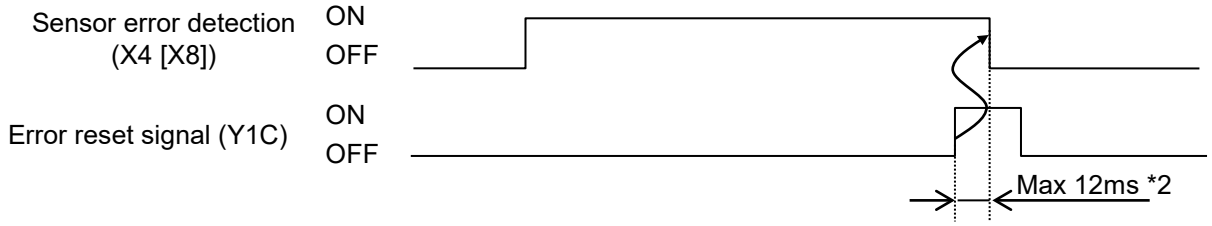
This signal turns ON when the current position value falls below the lower limit value designated by the parameter.
At this time, VS-QA262’s positioning function and limit switch functions continue the respective works.
Lower limit overtravel is detected only during an 'online' status.
'X3 [X7]' will go OFF after the current position value has been corrected within the prescribed range and 'Y1C' (error reset signal) has been turned ON by the sequence program.



*2: When connected to a remote I/O, the remote I/O network's transmission delay time will be added to the response time.

(5) Sensor error detection (X4 [X8]):

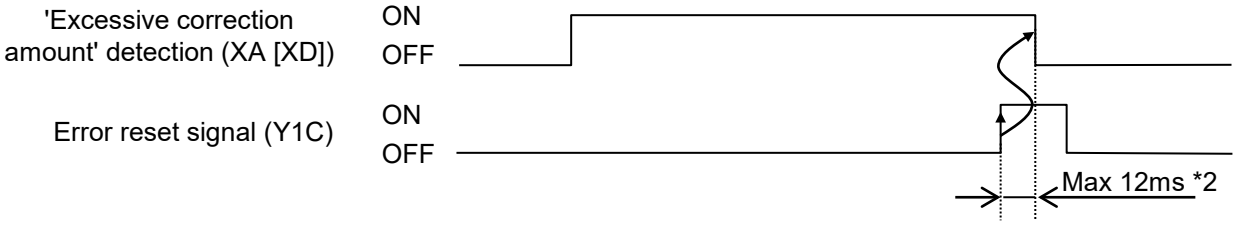
This signal turns ON when an error occurs in ABSOCODER’s position detection system, due to a disconnected ABSOCODER cable, etc.
After the problem has been corrected, ‘X4 [X8]’ will go OFF when ‘Y1C’ (error rest signal) is turned ON by the sequence program.



*2: When connected to a remote I/O, the remote I/O network's transmission delay time will be added to the response time.

(6) 'Excessive correction amount' detection (XA [XD]):

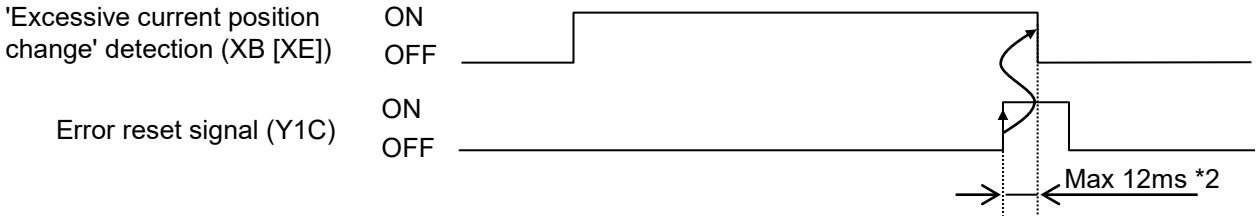
Current position values (scaling binary) can be adjusted with ‘current position preset command' signal being input. The ‘excessive correction amount’ detection turns ON in case the change amount of the current position value (scaling binary) exceeds the ‘permissible correction amount' designated by the parameter.
Even when XA [XD] turns ON, the current position value changes, and positioning and limit switch functions continue the respective works.
When Y1C(error reset signal) is turned ON by the sequence program, XA [XD] goes OFF.



*2: When connected to a remote I/O, the remote I/O network's transmission delay time will be added to the response time.

(7) 'Excessive current position change' detection (XB [XE]):

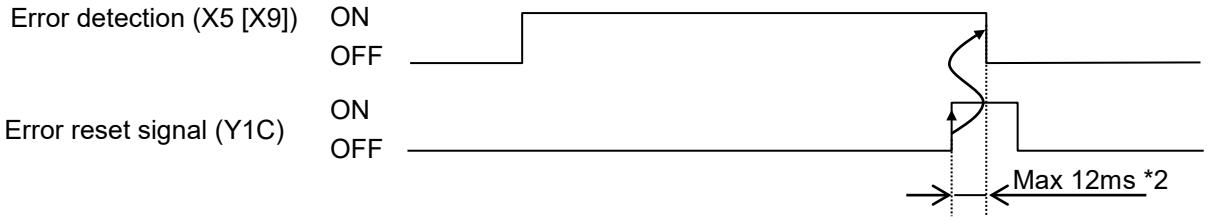
This signal turns ON in case any change amount of the current position value (scaling binary) for 20ms exceeds the ‘permissible current position change amount' designated by the parameter. Even when XB [XE] turns on, positioning and limit switch functions continue the respective works. When Y1C (error reset signal) is turned ON by the sequence program, XB [XE] goes OFF.



*2: When connected to a remote I/O, the remote I/O network's transmission delay time will be added to the response time.

(8) Error detection (X5 [X9]):

This signal comes ON when any of the X2 [X6], X3 [X7], X4 [X8] ,XA [XD], and XB [XE] signals come ON, or when any of the errors shown in section 8.1 occurs.
After the problem has been corrected, ‘X5 [X9]’ will go OFF when ‘Y1C’ (error rest signal) is turned ON by the sequence program.



*2: When connected to a remote I/O, the remote I/O network's transmission delay time will be added to the response time.

(9) Limit SW output or positioning output (X10 [X18] to X17 [X1F]):

Signals are output from channels 0 to 7 when the limit SW output function only is active. Positioning signals (FWD, RVS, etc.) are output when the positioning function is also in operation.

(10) 'PLC ready' signal (Y10):

This signal is used to switch the VS-QA262 operation status (online/offline).
Y10 ON: Online
Y10 OFF: Offline

REMARKS

The difference between the 'online' and 'offline' status is shown below.

Online

PLC ready (Y10) ON

↓

Online (X1) ON

↓

Operation	Processing
Positioning	Started when Y11 [Y14] ↑ comes ON, with Y12 [Y15] OFF Stopped when Y12 [Y15] ↑ comes ON.
JOG	'Forward' when Y17 [Y19] comes ON; 'Reverse' when Y18 [Y1A] comes ON; 'Stop' when goes OFF.
Limit SW output	Y1B ON: Limit SW output occurs. Y1B OFF: Limit SW output stopps (all points OFF).
Preset operation	Enabled
Initial setting and parameter writing	Writing to buffer memory enabled. Writing to VS-QA262, however, is disabled.
Limit switch settings writing	Writing to program 0 enabled

Note 1: Positioning operation and JOG commands will not be received when the 'error detection' signal (X5 [X9]) is ON.
Note 2: JOG command will not be received during the positioning operation.
Note 3: Positioning commands will not be received during the JOG operation.
Note 4: Positioning and JOG commands will not be received when any function other than the 'limit SW output function and the positioning function' has been designated at the 'function' parameter (address 711 [1711]).

Offline

PLC ready (Y10) OFF

↓

Online (X1) OFF

↓

Operation	Processing
Positioning	Positioning output OFF
JOG	Positioning output OFF
Limit SW output Note 1)	①All points OFF
	②Last status is maintained
Preset operation	Disabled
Initial setting, parameter writing	Writing to VS-QA262 enabled.
Limit switch settings writing	Writing to VS-QA262 enabled.

Note 1: The limit SW output status follows the setting upon the offline channel output status (address 735 [1735]).
Note 2: When switched to 'offline' during an 'online' positioning operation, all positioning outputs will go OFF.

(11) 'Positioning START' signal (Y11 [Y14]):

This signal starts the positioning operation.
The positioning operation signals will go ON when the following conditions are established:
- Online status
- Y12 [Y15] (positioning STOP signal) is OFF.
- Y11 [Y14] is turned ON by the sequence program.
  Positioning will begin when the leading edge of Y11 [Y14] is detected. At this time, the Y12 [Y15] (positioning STOP) signal must be OFF.

(12) 'Positioning STOP' signal (Y12 [Y15])

This signal stops the positioning operation.
When Y12 [Y15] is turned ON by the sequence program, the positioning operation stops, and positioning operation signals turn OFF.
The positioning operation stops when the leading edge of Y12 [Y15] is detected.

(13) 'FWD (Forward) JOG' signal (Y17 [Y19]):

This is the forward direction JOG signal.
During online operation, VS-QA262 will keep the FWD signal ON as long as Y17 [Y19] is kept ON by the sequence program.
When Y17 [Y19] is turned ON during the positioning operation, it will be invalid.

(14) 'RVS (Reverse) JOG' signal (Y18 [Y1A]):

This is the reverse direction JOG signal.
During online operation, VS-QA262 will keep the RVS signal ON as long as Y18 [Y1A] is kept ON by the sequence program.
When Y18 [Y1A] is turned ON during the positioning operation, it will be invalid.

(15) 'Limit SW output enabled' signal (Y1B):

When Y1B is turned ON by the sequence program during online operation, VS-QA262 will go ON limit SW outputs.
Y1B is not related in any way to the positioning control signals.
When Y1B is turned OFF, limit SW outputs will also be turned OFF.

(16) 'Error reset' signal (Y1C):

The following operation error signals will be reset after the cause of the error has been corrected, and the ‘Y1C’ (error reset signal) has been turned ON by the sequence program.

X2 [X6] ('Upper limit overtravel' detection)
X3 [X7] ('Lower limit overtravel' detection)
X4 [X8] (Sensor error detection)
XA [XD] ('Excessive correction amount' detection)
XB [XE] ('Excessive current position change' detection)
X5 [X9] (Error detection)

The error code which has been stored in the buffer memory (address: 7 [1007]) will also be cleared (0) at this time.
Reset of the error detection signals and clearing of the error codes will be valid when the Y1C turns ON. (Will be detected at leading edge)

Do not use a pulse instruction for an Error reset signal (Y1C).

(17) 'Current position preset command 1/2' signal (Y13 [Y16] and Y1E [Y1F]):

When the current position preset function is based on the parameter format or the buffer memory format, Y13 [Y16] and Y1E [Y1F] goes ON as the current position preset command.
When the current position preset function is based on the sequence format, Y13 [Y16] goes ON as the current position preset command. Y1E [Y1F] will not go ON as the current position preset command.
Despite the current position preset function setting, Y13 [Y16] and Y1E [Y1F] also goes ON as the current position hold command.
Do not use a pulse instruction for the current position preset command 2 signal (Y1E [Y1F]).

3.5 Buffer Memory

VS-QA262 contains a buffer memory which is used for data communication with the PLC CPU.
The buffer memory configuration and content are shown below.
Data readout of all areas can be executed by the sequence program.

Address (decimal) [ ]: Address for axis 2			Writing conditions by sequence program
0[1000]	(L)	Current position value (scaling binary)	Writing disabled
1[1001]	(H)		
2[1002]	(L)	Current position value (sensor binary)	
3[1003]	(H)		
4[1004]	Limit SW output status		
5[1005]	Program No. answerback		
6[1006]	I/O status		
7[1007]	Error code		
8[1008]	Limit SW output disabled setting		Writing enabled at any time
9[1009]	Program No. setting		
10[1010]	(L)	Target stop position setting data (scaling binary)	
11[1011]	(H)		
12[1012]	CH. 0	Number of multi-dogs	Writing enabled at any time Note that writing to VS-QA262 is disabled unless the program bit and writing selection bit of data memory flag are '1' in the offline status.
13[1013]		(L) Dog 0 ON position setting data	
14[1014]		(H)	
15[1015]		(L) Dog 0 OFF position setting data	
16[1016]		(H)	
51[1051]		(L) Dog 9 OFF position setting data	
52[1052]		(H)	
53[1053]	CH. 1	Number of multi-dogs	
54[1054]		(L) Dog 0 ON position setting data	
55[1055]		(H)	
56[1056]		(L) Dog 0 OFF position setting data	
57[1057]		(H)	
92[1092]		(L) Dog 9 OFF position setting data	
93[1093]		(H)	
94[1094]	CH. 2	Number of multi-dogs	
95[1095]		(L) Dog 0 ON position setting data	
96[1096]		(H)	
97[1097]		(L) Dog 0 OFF position setting data	
98[1098]		(H)	
664[1664]		(L) Dog 9 ON position setting data	
665[1665]		(H)	
666[1666]	CH. 15	(L) Dog 9 OFF position setting data	
667[1667]		(H)	

Address (decimal) [ ]: Address for axis 2			Writing conditions by sequence program
668[1668]	(L)	Speed output	Writing disabled
669[1669]	(H)		
670[1670]	(L)	Hold current position (scaling binary)	
671[1671]	(H)		
672[1672]	(L)	Hold current position (sensor binary)	
673[1673]	(H)		
674[1674]	(L)	FWD stop zone after learning	
675[1675]	(H)		
676[1676]	(L)	RVS stop zone after learning	
677[1677]	(H)		
678[1678]	Speed limit		Writing enabled at any time
679[1679]	Positioning pattern data buffer memory selection		
680[1680]	(L)	Medium-speed zone	
681[1681]	(H)		
682[1682]	(L)	Low-speed zone	
683[1683]	(H)		
684[1684]	(L)	FWD stop zone	
685[1685]	(H)		
686[1686]	(L)	RVS stop zone	
687[1687]	(H)		
688[1688]	(L)	In-position zone	
689[1689]	(H)		
690[1690]	(L)	Current position preset value 1	
691[1691]	(H)		
692[1692]	(L)	Current position preset value 2	
693[1693]	(H)		
694[1694]	Current position preset command disabled setting		
695[1695]	Not used		
696[1696]			
697[1697]			
698[1698]			
699[1699]	Not used		

Address (decimal) [ ]: Address for axis 2			Writing conditions by sequence program
700[－]	Data memory flag		Writing enabled
701[－]	Data memory flag answerback		Writing disabled
702[1702]	Sensor selection/sensor travel direction		(Initial setting)
703[1703]	Not used		
704[1704]	(L)	Scale length	Writing enabled at any time
705[1705]	(H)		
706[1706]	Not used		Note that writing to VS-QA262 is disabled unless the initial setting bit of data memory flag is ‘1’ in the offline status.
707[1707]	(L)	Minimum current position value	
708[1708]	(H)		
709[1709]	(L)	Current position value	
710[1710]	(H)		
711[1711]	Function		(Parameter)
712[1712]	Positioning format		
713[1713]	Positioning direction		
714[1714]	(L)	Overshoot amount	
715[1715]	(H)		
716[1716]	(L)	Medium-speed zone	
717[1717]	(H)		
718[1718]	(L)	Low-speed zone	
719[1719]	(H)		
720[1720]	(L)	Stop zone	
721[1721]	(H)		
722[1722]	(L)	In-position zone	
723[1723]	(H)		
724[1724]	(L)	Upper limit value	
725[1725]	(H)		
726[1726]	(L)	Lower limit value	
727[1727]	(H)		
728[1728]	Start from stop zone		Writing enabled at any time Note that writing to VS-QA262 is disabled unless the parameter bit of data memory flag is ‘1’ in the offline status.
729[1729]	Motion non-detection timer		
730[1730]	Motion misdirection non-detection timer		
731[1731]	Positioning end detection timer		
732[1732]	JOG low-speed timer		
733[1733]	Not used		
734[1734]			
735[1735]	Offline channel output status		
736[1736]	(L)	Permissible current position change amount	
737[1737]	(H)		
738[1738]	(L)	Permissible correction amount	
739[1739]	(H)		
740[1740]	Current position preset function		
741[1741]	(L)	FWD current position preset value 1	
742[1742]	(H)		
743[1743]	(L)	RVS current position preset value 1	
744[1744]	(H)		
745[1745]	(L)	FWD current position preset value 2	
746[1746]	(H)		
747[1747]	(L)	RVS current position preset value 2	
748[1748]	(H)		
749[1749]	Speed gate time		
750[1750]	Speed sampling time		
751[1751]	Current position change command		Writing enabled at any time

3.5.1 'Current position value (sensor binary)' storage area

The machine's current position within the scale length is detected by the ABSOCODER sensor, and that position value is stored in this area as a 'sensor binary value'.
The ranges for sensor binary current position values are as follows:
VLS-[ ]PW: 0 to 65535(0 to FFFFH)
VLS-[ ]PY: 0 to 131071(0 to 1FFFFH)

3.5.2 'Current position value (scaling binary)' storage area

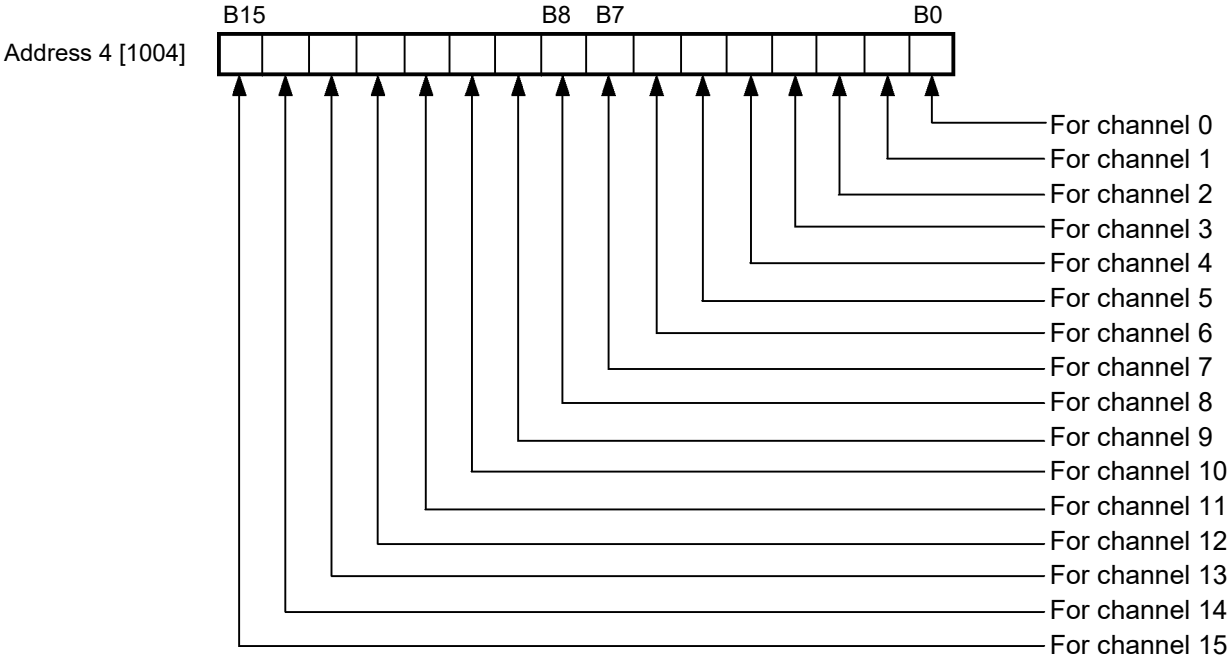
The sensor binary current position value is converted to 'mm', 'inch', or any other appropriate unit based on a scale length, and the 'minimum current position value' is then added to produce the 'scaling binary current position' value which is stored in this area.
The current position value is stored as a binary value.

(1) Range for scaling binary current position values: -99999 to 999999 (FFFE7961H to 000F423FH)

(2) Minus current position values are stored in a two's complement format.

3.5.3 'Limit SW output status' storage area

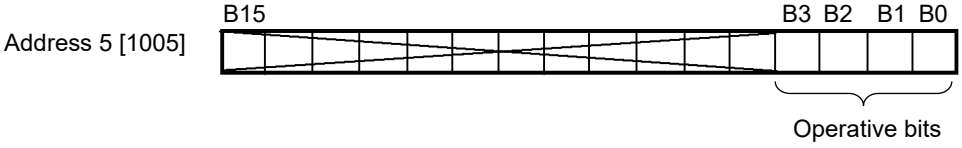
This area is used to store the limit SW output status (ON/OFF status).
(1) The limit SW output statuses are stored as follows:



'1' is stored at the bit which corresponds to the channel which is ON.

3.5.4 'Program No. answerback' storage area

The answerback for the program No. is stored in this area.
In this area, the lower 4 bits only become valid and the binary values of 0 to 9 are stored.

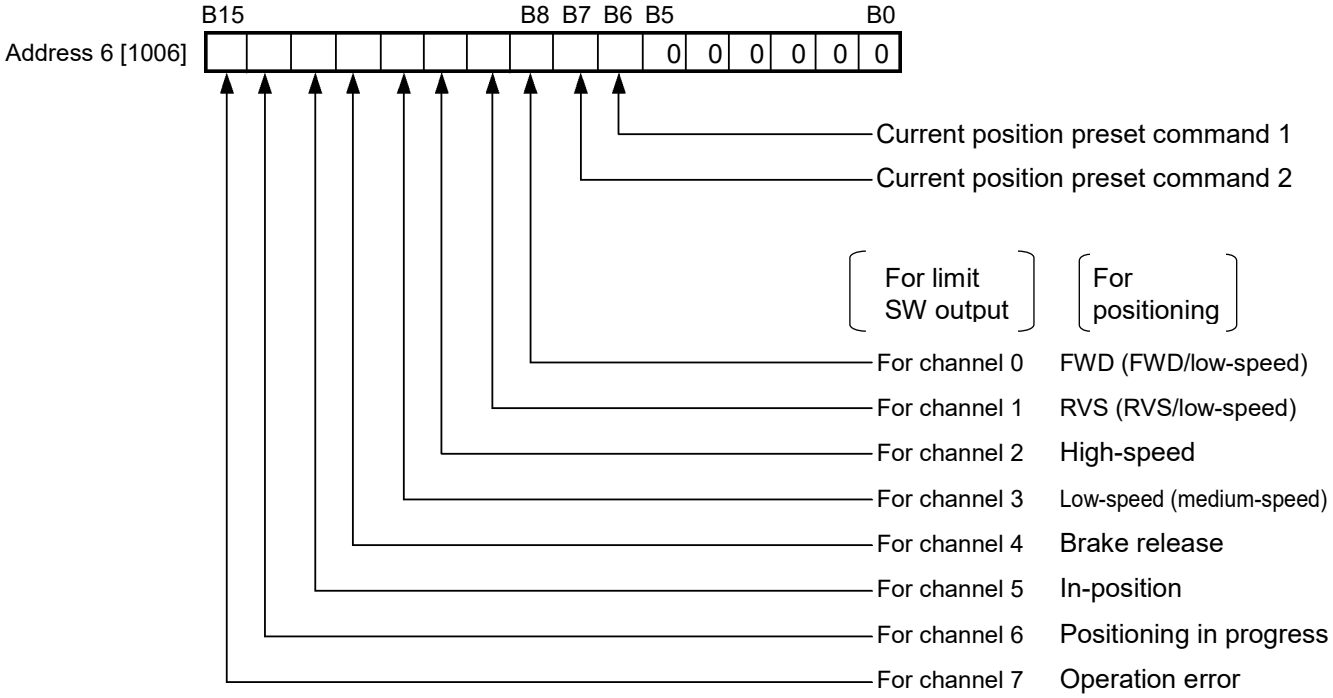


When this area is switched to the program 0, the binary value of 9 is stored until the switchover is completed.

3.5.5 I/O status storage area

This area is used to store the I/O status.
(a) Current position preset command input status
(b) Limit SW output status (ON/OFF status)
(c) Positioning output status

The I/O statuses are stored as follows:



'1' is stored at the bit which corresponds to the input/output which is ON.

3.5.6 Error code storage area

This is the area where error codes are stored when errors occur. (Address 7 [1007])
For error code details, refer to section 8.1.

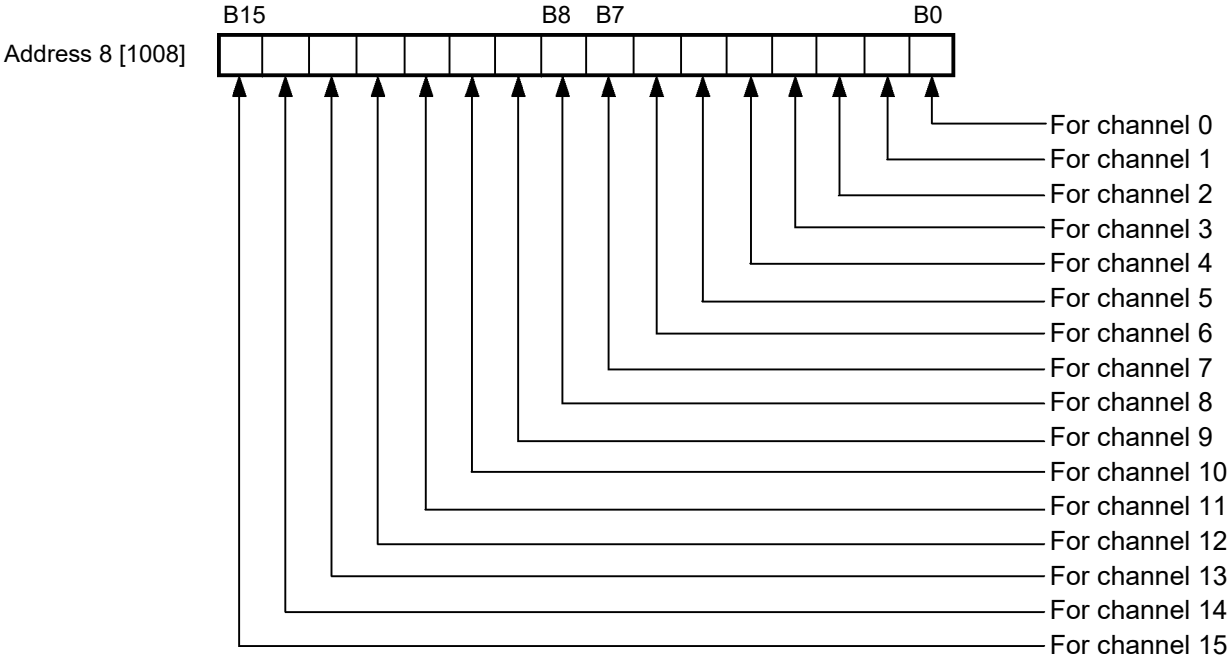
(1) Error codes are stored as binary values.

(2) This storage area is cleared by any of the following actions:
(a) When turning the Y1C (error reset) signal ON by the sequence program.
(b) When the PLC CPU is reset.
(c) When the PLC power supply is turned OFF.

3.5.7 'Limit SW output disabled setting' area

The settings made at this area determine for each channel whether or not limit SW outputs are to occur. Although this area can be written to at any time by the sequence program, the settings are only operative when online status is established.

(1) Settings are made by designating '0' or '1' for the bits which correspond to each of the channels:
0: Limit SW output enabled
1: Limit SW output disabled



(2) For current position detection function, the contents set in this area are invalid.

(3) Operation cannot be verified at the VS-QA262 monitor LEDs for channels where the limit SW output ‘disabled' is designated.

(4) Despite the limit SW output 'enabled' being designated, limit SW outputs will not occur when VS-QA262's Y10 (PLC ready) or Y1B (limit SW output enabled) signals are OFF.

(5) When the power is turned ON, or when the PLC CPU is reset, the default setting value '0' (limit SW output enabled) will be designated at all channels.

3.5.8 Program No. setting area

This is the area where the program Nos. (total of 9) to be used for the limit SW output function are designated.
This area can be written to at any time by the sequence program.

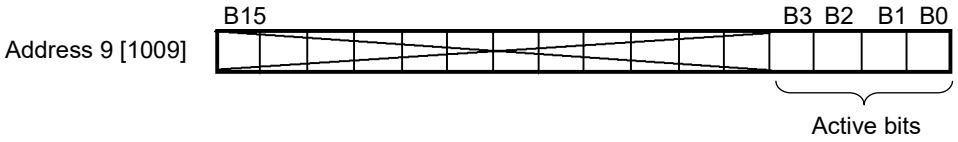
(1) Settings are made by designating the program No. (0 to 8) where limit SW output ON/OFF data is registered.

Program 0 differs from programs 1 to 8 as described below.

Program 0: When the power is OFF, the limit SW output ON/OFF data are not storeed inside VS-QA262.
Every time the power is turned ON, the limit SW output ON/OFF data have to be written to VS-QA262.
(When renewing the data of program 0, write the program No. ‘9’ first, and then write ’0’again.)

Programs 1 to 8 : When the power is OFF, the limit SW output ON/OFF data are stored in VS-QA262.

As shown below, only the lower four bits are active in this area.
When the numeric value indicated at the lower four bits is in the AH to FH range, error code '30' will come ON.



3.5.9 'Target stop position setting data' area

This is the area where the target stop position for the positioning function is designated.
This area can be written to at any time by the sequence program.
The setting data is only operative, when online status is established and the positioning START signal (Y11 [Y14]) is ON.

(1) The setting value is written as a ‘scaling binary' value.

(2) The permissible setting range is as follows:
[Minimum current position value] to [Minimum current position value + scale length -1].

(3) When a setting value is designated outside the permissible range, VS-QA262 will turn the X5 [X9] signal (error detection) ON, and error code '41' will be stored at address 7 [1007] of the buffer memory.
Despite the target stop position setting within the permissible range, the same error as above will occur when the following conditions exist:
- When the position following a positioning overshoot is outside the permissible setting range.
- When a positioning START occurs within the stop zone, a position of the 'length of the stop zone multiplied by 2' from the target stop position is outside the permissible setting range.

3.5.10 Limit SW output ON/OFF data setting area

The ON/OFF data used for the limit SW output function is stored at this area.

(1) The data setting must be designated for each channel, and consists of the 'number of multi-dogs', and the ON/OFF position data for each dog.

(2) The 'number of multi-dogs' setting is written as binary values.
The ON/OFF position data is written as 'scaling binary' values.
An error will occur when dog positions are outside the detection range or when overlapping dogs exist.
The error code is the relevant buffer memory address + 1000.

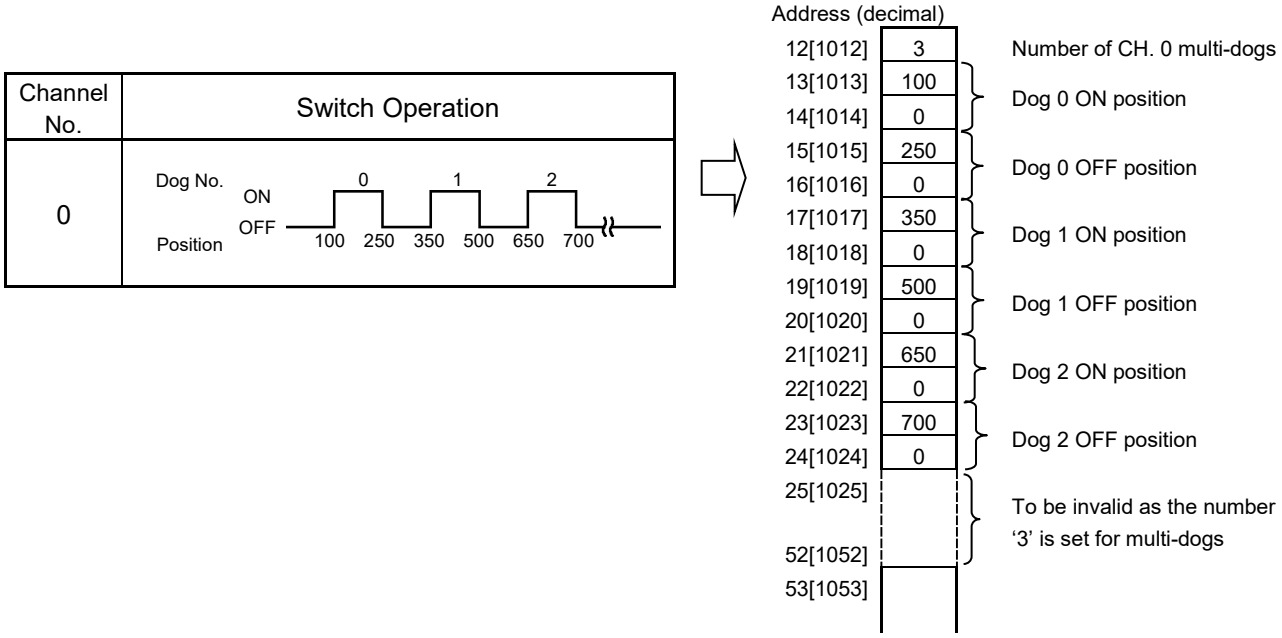
There are separate ON setting and OFF setting areas for writing the dog position data.

Discrimination between the ON and OFF writing areas is executed automatically according to the data content of dog No.0.

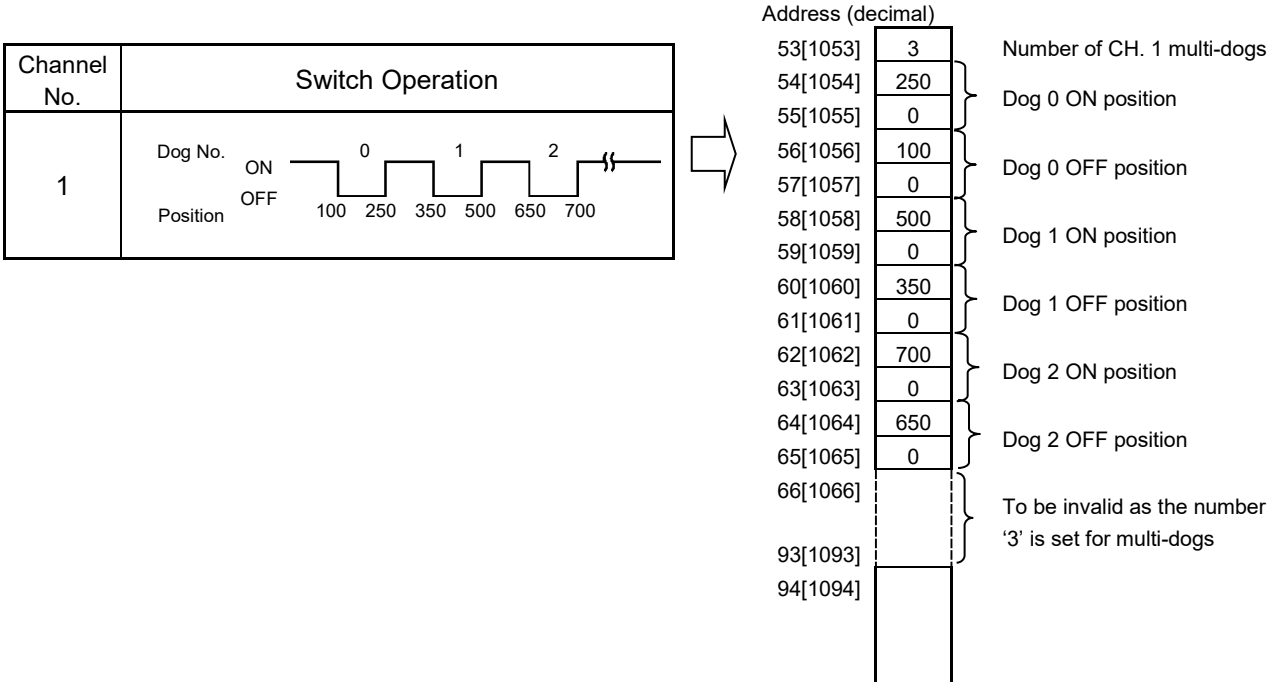
There can be no mixing of ON and OFF areas on a single channel.

Examples of the ON area and OFF area position writing are given on the following line.

① 'ON Area' [Limit SW 'closed (a) contact' Operation] Dog Position Writing:
'ON area' should be written by a pair of the ON position data and the OFF position data. At this time, the ON position data should be smaller than the OFF position data.
When the numerical values for each dog are not written in order, beginning from the lowest and proceeding to the highest, an error will occur. (The value of dog No. 0 position must be smaller than that of dog No. 1 position.)



② 'OFF Area' [Limit SW 'open (b) contact' operation] Dog Position Writing:
The 'OFF area' should be written by a pair of the ON position data and the OFF position data. At this time, the ON position data should be larger than the OFF position data.
When the numerical values for each dog are not written in order, beginning from the lowest and proceeding to the highest, an error will occur.

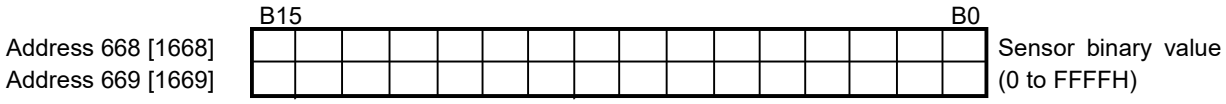


(3) The 'number of multi-dogs' setting range is as follows:
0 to 10 (only the lower four bits of setting data are operative)
When a setting of '0' is designated, the dog ON/OFF position data at that channel will be inoperative.
Any setting exceeding '10' will be processed as '10'.

(4) The setting range for the ON/OFF position data (scaling binary values) is as follows:
[Minimum current position value] to [Minimum current position value + scale length -1]

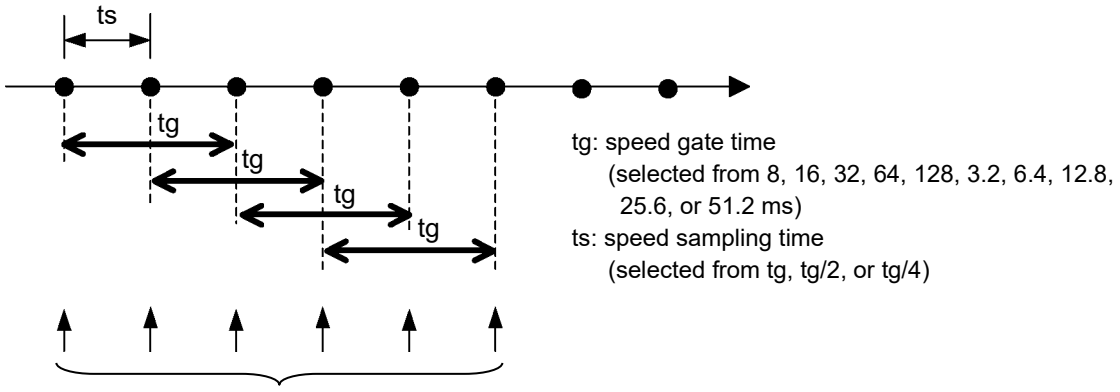
3.5.11 Speed output storage area

This is the area where the travel speed of the ABSOCODER sensor is stored.
The stored speed value is ‘amounts of the sensor binary value change’ which is within the specified speed gate time is stored in the absolute value.



The largest sensor binary value of the position change is FFFFH, therefore ‘0’ is stored at address 669 [1669].

The graph below shows the speed gate time and the speed sampling time.
[When speed sampling time = 1/2 of speed gate time]



Data update of the speed output storage area

The next gate time starts when the current sampling finishes.

REMARKS
Do not select any other value than 0 to 4 or 6 to 10 for the ‘speed gate time’.

3.5.12 Hold current position storage area

This is the area where the current position value is stored when 'current position preset command' 1 or 2 is turned ON (detected at leading edge). The scaling binary value and the sensor binary value are stored. When the 'current position preset' function is active, the current position value before preset is stored.

Below are operation examples when 'current position preset command' is turned ON.

Current position preset function	Address 740 [1740]	Current position value	Preset value	Current position hold		Current position preset	
				Operation	Hold current position value	Operation	Preset current position value
Disabled	0	300	100	Held	300	Invalid	300
Parameter format	1	300	100	Held	300	Valid	100
Buffer memory format	2	300	100	Held	300	Valid	100
Sequence format	3	300	100	Held	300	Valid	100

REMARKS

(1) The current position preset command signal is commonly used for the current position preset function and the current position hold function.
(2) The current position hold function is active when either 'current position preset command' 1 (Y13 [Y16]) or 2 (Y1E [Y1F]) is turned ON.
(3) The current position hold function is active while power is ON.
(4) On the sequence format, the current position preset does not work even when the current position preset command 2(Y1E [Y1F]) goes ON.

3.5.13 FWD/RVS stop zone after learning storage area

This is the area where the stop zone corrected by the learning function is stored.
Two zones are provided, one for the FWD (forward) direction and the other for the RVS (reverse) direction.
When the learning function is disabled, the stop zone used for positioning is stored.

3.5.14 Speed limit setting area

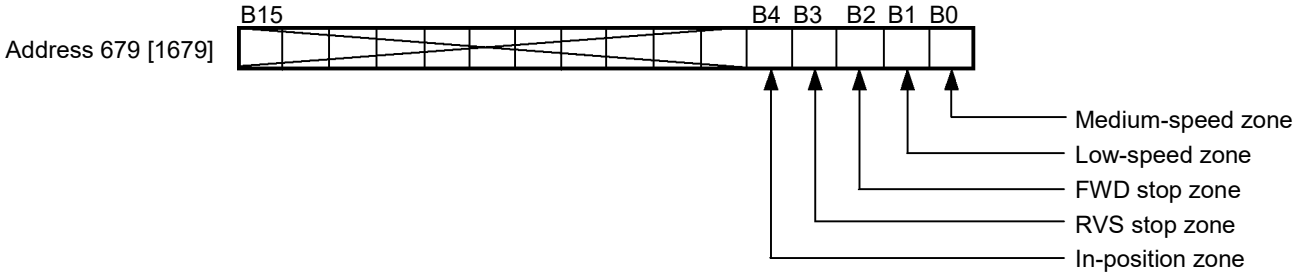
This is the area where speed limitation is applied to positioning by a speed stepping format or a speed switching format.
This can be written to at any time by the sequence program.
The setting applies when the positioning START signal (Y11 [Y14]) is turned ON while online.
When any of the following operations is made, '3' (No speed limit) is set for the default value.
(a) Reset the PLC CPU.
(b) Turn OFF the PLC power supply.
(c) Initial setting
(d) Parameter setting

Speed limit setting	Speed stepping format	Speed switching format
1	Positioning only at low speed	Positioning only at low speed
2	No output at high speed	No speed limitation applied
3	No speed limitation applied	

Any setting other than 1 to 3 will cause an error.
Speed limitation cannot be applied to the JOG operation.

3.5.15 Positioning pattern data buffer memory selection area

This is the area where the pattern data used for positioning is selected to via buffer memory (addresses 680 [1680] to 689 [1689]) or parameter setting (addresses 716 [1716] to 723 [1723]).
When selected to via buffer memory, the data can be changed by the PLC CPU even while online.
The following shows how to set this area. Only the lower five bits are active.



For the use of positioning pattern data of buffer memory (addresses 680 [1680] to 689 [1689]), set the appropriate bit to ‘1’.
Set the bits for parameter setting values (addresses 716 [1716] to 723 [1723]) to ‘0’.
When the PLC CPU is reset, the above settings are reset to '0'.
The initial setting and the parameter setting also reset the settings to ‘0’.

3.5.16 Medium-speed zone setting area

This is the area where the medium-speed zone used for positioning by the speed stepping format is set.
This area can be written to at any time by the sequence program.
The setting applies only when '1' is set to Bit 0 of the positioning pattern data buffer memory selection area (address 679 [1679]) and then the positioning START signal (Y11 [Y14]) is turned ON while online.
When the PLC CPU is reset or the power of PLC is turned OFF, the value which is stored in the medium-speed zone of the parameter is set as a default in this area.
When the medium-speed zone of the parameter is set, the same value is set also in this area.
The setting value is written as the scaling binary value.
Writing a value out of the setting range will cause an error.

3.5.17 Low-speed zone setting area

This is the area where the low-speed zone used for positioning by the speed stepping format or the speed switching format is set.
This area can be written to at any time by the sequence program.
The setting applies only when '1' is set to Bit 1 of the positioning pattern data buffer memory selection area (address 679 [1679]) and then the positioning START signal (Y11 [Y14]) is turned ON while online.
When the PLC CPU is reset or the power of PLC is turned OFF, the value which is stored in the low-speed zone of the parameter is set as a default in this area.
When the low-speed zone of the parameter is set, the same value is set also in this area.
The setting value is written as the scaling binary value.
Writing a value out of the setting range will cause an error.

3.5.18 FWD/RVS stop zone setting area

This is the area where the stop zone used for positioning by the speed stepping format or the speed switching format is set.
This area can be written to at any time by the sequence program.
The setting applies only when '1' is set to Bit 2 or 3 of the positioning pattern data buffer memory selection area (address 679 [1679]) and then the positioning START signal (Y11 [Y14]) is turned ON while online.
When the PLC CPU is reset or the power of PLC is turned OFF, the value which is stored in the stop zone of the parameter is set as a default in this area.
When the stop zone of the parameter is set, the same value is set also in this area.
The setting value is written as the scaling binary value.
Writing a value out of the setting range will cause an error.
Two zones are provided, one for FWD (forward) and the other for RVS (reverse).

3.5.19 In-position zone setting area

This is the area where the in-position zone used for positioning by the speed stepping format or the speed switching format is set.
This area can be written to at any time by the sequence program.
The setting applies only when '1' is set to the Bit 4 of the positioning pattern data buffer memory selection area (address 679 [1679]) and then the positioning START signal (Y11 [Y14]) is turned ON while online.
When the PLC CPU is reset or the power of PLC is turned OFF, the value which is stored in the in-position zone of parameter is set as a default in this area.
When the in-position zone of the parameter is set, the same value is set also in this area.
The setting value is written as the scaling binary value.
Writing a value out of the setting range will cause an error.

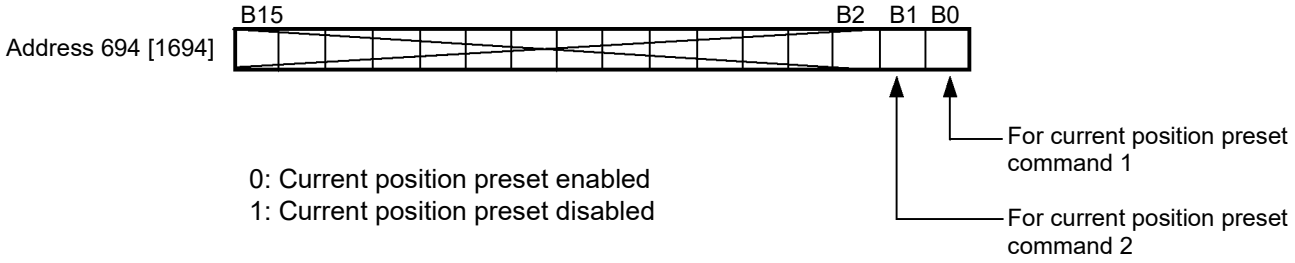
3.5.20 Current position preset value 1 and 2

This is the area where the preset value used for the current position preset function by the buffer memory format or the sequence format is stored.
This area can be written to at any time by the sequence program.
'0' is automatically stored as a default when the PLC CPU is reset or the PLC power supply is turned OFF.
The setting value is written as the scaling binary value.
The setting range is from [minimum current position value] to [minimum current position value + scale length -1]. Writing a value out of the range will cause an error.

The preset value for the current position preset command 1 is used for current position preset by the sequence format.

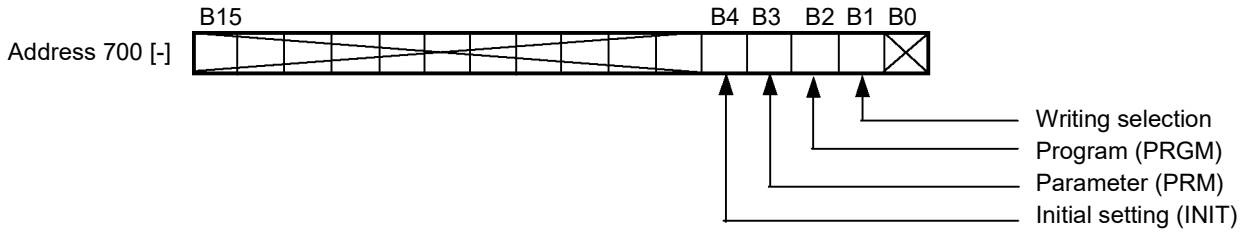
3.5.21 Current position preset command disabled setting area

When the parameter format or the buffer memory format is selected for the current position preset function, this area determins whether the curent position value is to be preset or not.
This area can be written to at any time by the sequence program.
'0' is automatically stored as a default when the PLC CPU is reset or the PLC power supply is turned OFF.



3.5.22 Data memory flag area

This is the area that commands writing of the initial setting and the parameter, and writing/reading of the limit SW output ON/OFF data by the PLC CPU.
As this is the common area for the axes 1 and 2, writing/reading of the both axes can be done simultaneously.



(1) The initial setting and the parameter
In the initial setting and the parameter, '1' is specified at the bit corresponding to the data which is to be written.
When '1' is specified for both items, the initial setting and the parameter data will be written simultaneously.

- When online
  Writing to VS-QA262 is disabled.

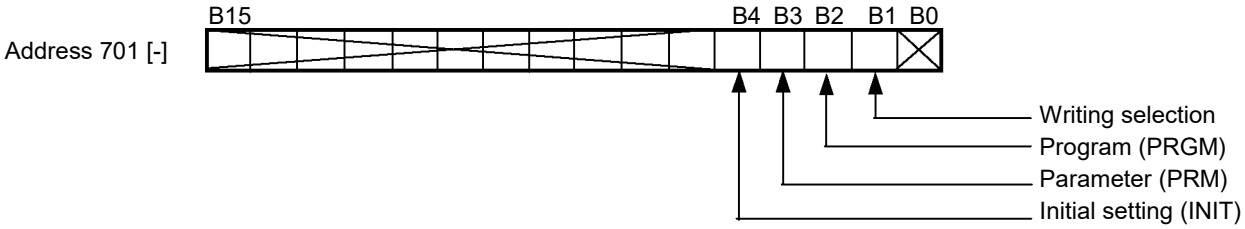
- When offline
  When either the data memory flag's 'parameter' or 'initial setting' bit changes to '1', the buffer memory contents for that bit is written to VS-QA262.

REMARKS
When the initial setting or the parameter setting is done, some values of the buffer memory change as follows:
- The speed limit setting area (address 678 [1678]) changes to '3' (No speed limit)
- The positioning pattern data buffer memory selection (address 679[1679]) changes to '0' (parameter setting value selection).

(2) Limit SW output ON/OFF data
When writing the limit SW output ON/OFF data, set the program and writing selection bits to '1'.
When reading the limit SW output ON/OFF data, set the program bit to '1' to start transfer of the data to the buffer memory.
In case both the parameter (or the initial setting) bit and the program bit are set to '1', an error occurs.

3.5.23 Data memory flag answerback area

This is the area where the flag selected at the ‘data memory flag area’ is stored.



When writing/reading is completed, ‘1’ is stored at the corresponding bit of the data memory flag.
‘0’ is stored at all other bits.

REMARKS
When writing is completed, check the content of error codes (address 7 [1007]) of the buffer memory and confirm if it is rightly written.

3.5.24 Current position change command area

This is the area that commands changes of current position values by the PLC CPU.
This area can be written to at any time by the sequence program.
The function is usable when the the initial setting bit in the data memory flag area' (address 700 [-]) is 1.
1: To change current position values
0: Not to change current position values

'0' is automatically stored as a default when the PLC CPU is reset or the PLC power supply is turned OFF.

3.5.25 Initial settings and parameters storage/setting area

These are the areas where the current data set as initial settings and parameters are stored.
These data can be written by the sequence program.

Initial setting area of the buffer memory: Addresses 702 [1702] to 710 [1710]
Parameter area of the buffer memory: Addresses 711 [1711] to 750 [1750]

4. HANDLING and WIRING

4 HANDLING and WIRING

This section explains how to unpack and connect VS-QA262.

4.1 VS-QA262 Handling Precautions

The following precautions should be observed when handling VS-QA262.

(1) As VS-QA262 is constructed from a resin-based material, it should not be dropped or subjected to severe shocks.

(2) Never remove the PCBs from VS-QA262's case. Failure to do so may result in failure.

(3) Turn OFF the PLC power supply before mounting and removing VS-QA262 to and from the base unit.

(4) During the wiring procedure, do not allow any foreign object (e.g. wire strips, etc.) to get into VS-QA262. The top part of VS-QA262 is particularly vulnerable.

(5) Tighten the VS-QA262 securing screws (M3) within the torque range of 0.36 to 0.48N·m.

4.2 Precautions for Wiring ABSOCODER Cables

The wiring precautions for the ABSOCODER cable are explained in this section.

(1) The ABSOCODER cable should be located as far as possible from power lines and other lines which generate a high level electrical noise.

(2) If location near the above power lines is unavoidable, the cable duct should be separated, with individual wiring conduits being provided.

(3) When wiring conduits are used, they should be securely grounded.

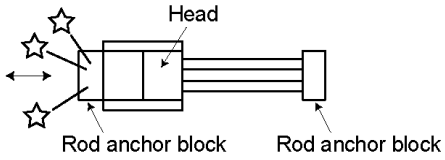
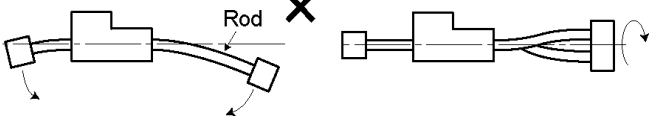
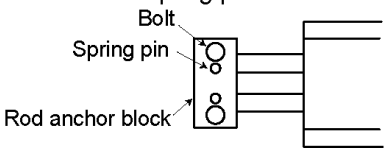
4.3 Precautions for Installation of ABSOCODER Sensors

The installation conditions and precautions for the ABSOCODER sensor are described in this section.

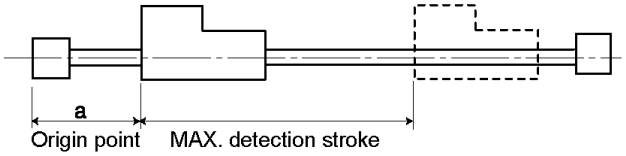
4.3.1 VLS Series ABSOCODER Sensor Installation

For the installation of ABSOCODER sensors, follow the dimension instruction shown in Appendix 4.1.2 ABSOCODER Sensor Dimensions.

● **Handling of Linear-type ABSOCODER**

Item	Explanation
(1) ABSOCODER unit	Avoid a situation where the rod anchor blocks impact against head.  ✕
(2) Sensor rod	Avoid bending or twisting the sensor rod.  ✕ ✕
(3) Anchor method	Never remove or loosen the bolts and spring pins at the rod anchor block. 

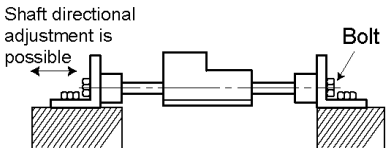
● **Operation Range of Linear type ABSOCODER**

Item	Explanation
(1) Operation range	Please use linear-type ABSOCODER within the limits of the maximum detection stroke from the origin point. The maximum detection stroke changes with sensor model. Please refer to a sensor dimensions. 

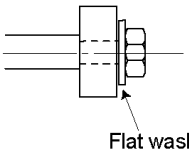
Model	Origin point (a) mm
VLS-256PWB	25±1
VLS-512PWB	23±1
VLS-1024PW	66±2
VLS-512PYB	25±1
VLS-1024PYB	23±1
VLS-2048PY	66±2

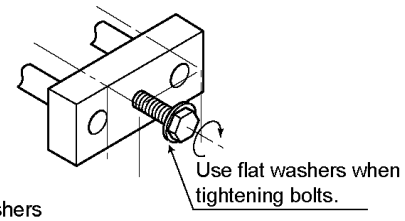
● Mounting of Linear-type ABSOCODER

Item	Explanation
(1) Mounting conditions	1. The rod anchor blocks must be supported at both ends. (If only one side is supported, rod vibration and bending may occur, affecting the durability of the unit.)



2. Secure the rod anchor block when tightening the mounting bolt, in order to prevent the rod anchor block from twisting. The bolt should be fitted with a flat washer.

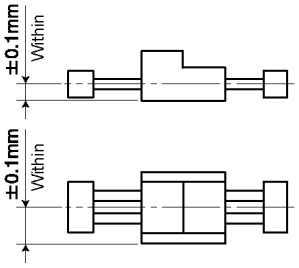




3. The mounting parallelism and squareness should be as shown in the following figures.

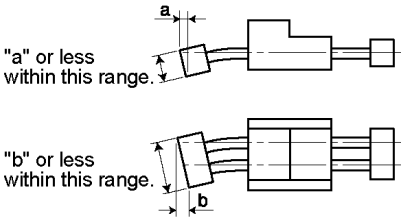
● Parallelism

When mounting the sensor, the parallelism of the sensor rod and the rod anchor block must be as shown in the figure at right.



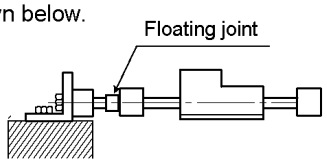
● Squareness

Model	a , b (mm)
VLS-256PWB	0.03
VLS-512PWB	0.05
VLS-1024PW	0.1
VLS-512PYB	0.03
VLS-1024PYB	0.05
VLS-2048PY	0.1

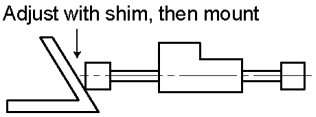


* In cases where the parallelism and squareness conditions shown above are not possible, use one of the mounting methods shown below.

[Method 1]
Use a floating joint at the mounting area of the rod anchor block.

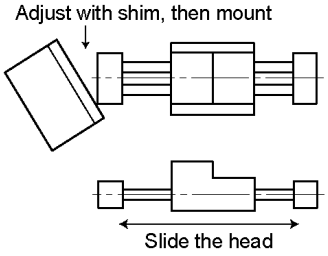


[Method 2]
Use the gauging method as shown in the figure at right. Use a shim at the rod anchor block, and adjust until the rod and head sliding action is smooth. The rod's flexibility will enable a smooth sliding action at the rod center.



The sliding action resistance should be as shown in the table below.

Model	Max. sliding resistance **N (Kgf)**
VLS-256PWB	4.9 N (0.5)
VLS-512PWB	7.8 N (0.8)
VLS-1024PW	19.6 N (2.0)
VLS-512PYB	4.9 N (0.5)
VLS-1024PYB	7.8 N (0.8)
VLS-2048PY	19.6 N (2.0)



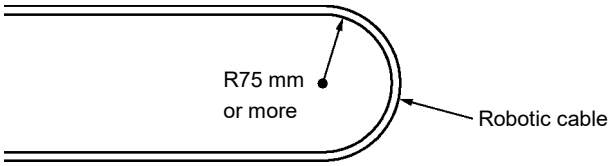
4.3.2 Precautions for connecting ABSOCODER sensors

(1) Connection should be made using the ABSOCODER cable, with the connector being securely tightened.

(2) If further length is desired, an extension cable must be ordered separately.
Refer to Appendix 4.2 for details regarding extension cables.

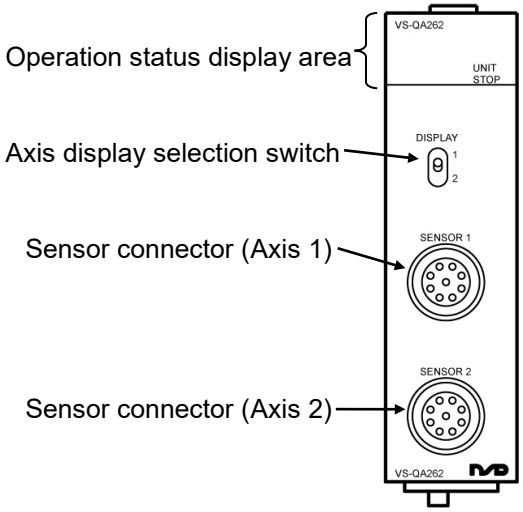
(3) The maximum length for which extension is possible varies according to the ABSOCODER sensor model which is used. Refer to Appendix 4.2.2 for details.

(4) A robotic cable must be used if the ABSOCODER cable is to be used at a movable area of the system. In such a case, the cable should never be bent to from a radius of less than 75mm.



4.4 Name of Parts

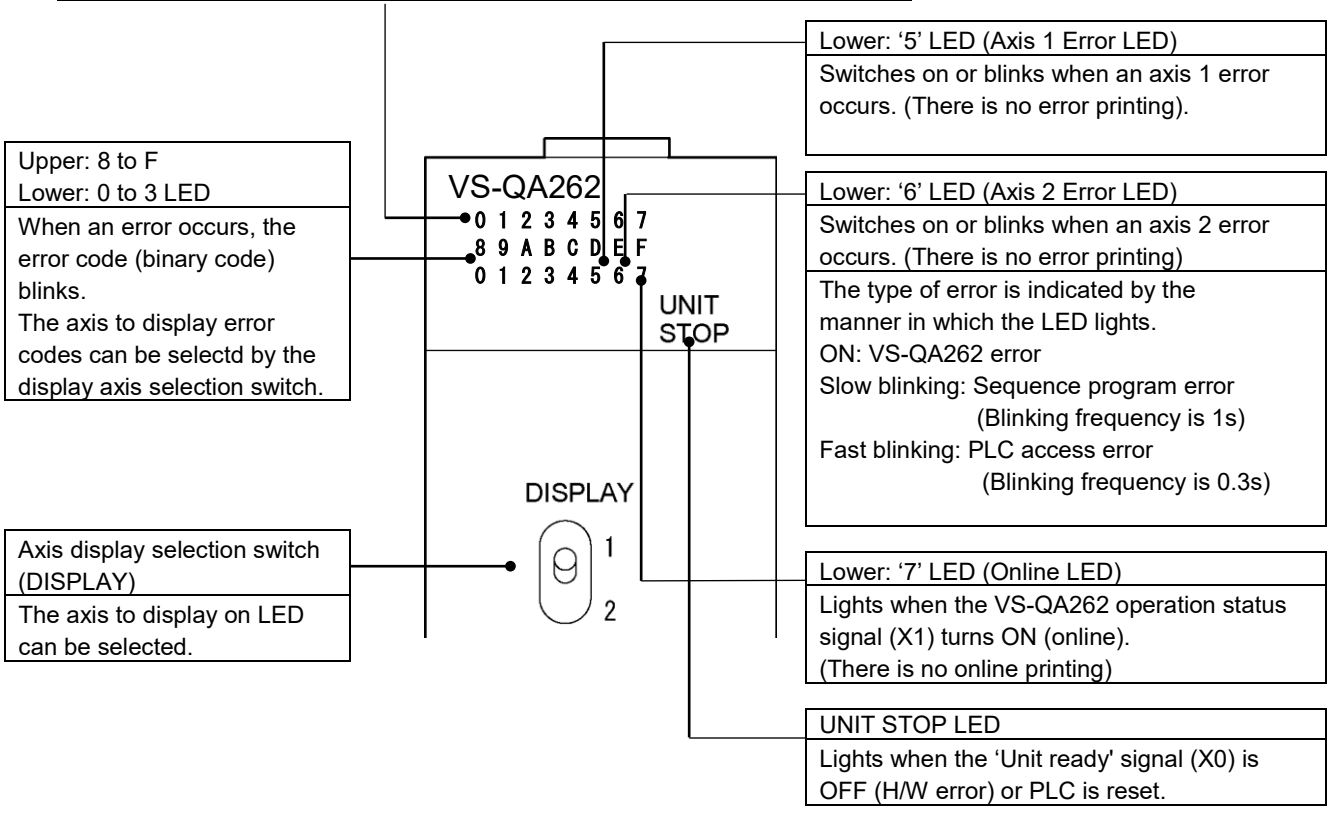
The illustration below shows the nomenclature of VS-QA262.



Functions of operation status display area

Output status display area					
LED		Current positon detection function	Limit SW output function	Positioning	
				For speed switching format	For speed stepping format
Upper	0	Light out	CH.0	FWD	FWD / Low-speed
	1	Light out	CH.1	RVS	RVS / Low-speed
	2	Light out	CH.2	High-speed	High-speed
	3	Light out	CH.3	Low-speed	Medium-speed
	4	Light out	CH.4	Break release	Break release
	5	Light out	CH.5	In-position	In-position
	6	Light out	CH.6	Positioning in progress	Positioning in progress
	7	Light out	CH.7	Operation error	Operation error

At the operation status display area, the axis to display can be selected by the axis display selection switch.



MEMO

5. CURRENT POSITION DETECTION FUNCTION

5. CURRENT POSITION DETECTION FUNCTION

5.1 Function Description

This section explains VS-QA262's current position detection function.

5.1.1 Current position detection function

VS-QA262's current position detection function detects the current position using an ABSOCODER sensor. Conventionally, this was detected using an incremental format encoder in conjunction with a counter unit.

As shown in Fig. 5.1, the current position value appropriate for the travel position of the ABSOCODER sensor is stored in the buffer memory while traveling the ABSOCODER sensor by the motor.

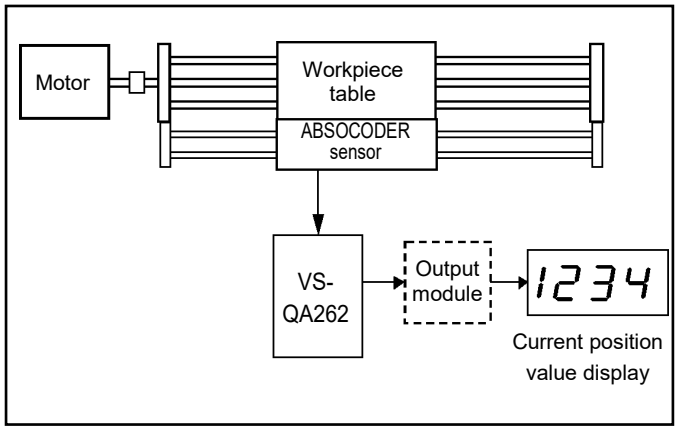


Fig. 5.1 Example of using VS-QA262

(1) The current position value can be stored in the buffer memory as the sensor binary or scaling binary.

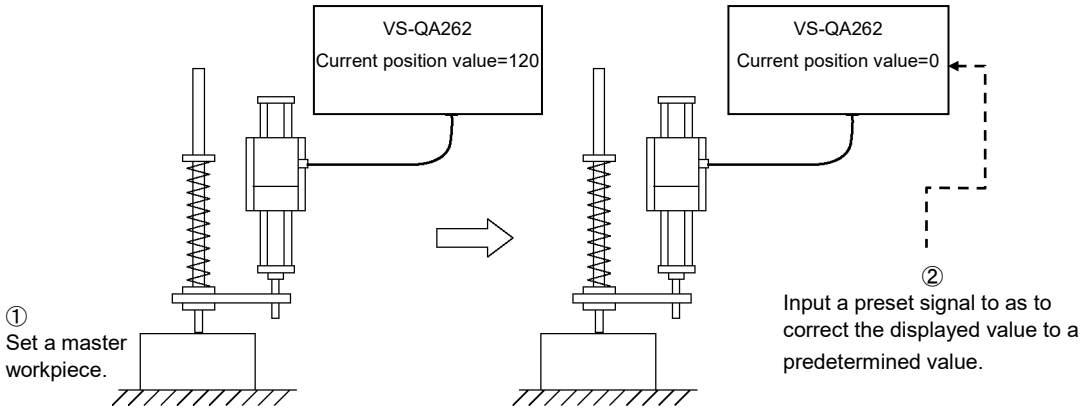
(2) When current position value unit conversion and origin-point setting are not necessary, no setting is required for VS-QA262.

(3) The current position detection function can be used with the limit SW output function (section 6) and the positioning function (section 7). Select the desired function.

5.1.2 Current position 'PRESET' function

This section explains VS-QA262's current position ‘preset’ function.
When the current position 'preset' function is executed, the machine's ‘current position' will be set (corrected) to the 'preset position’ which has been designated in advance.
This function is used when a misalignment occurs between the detected position and the actual machine position, as shown below.

Before measuring a workpiece, the VS-QA262 Current Position Value can be corrected so as to Match the actual master workpiece position.



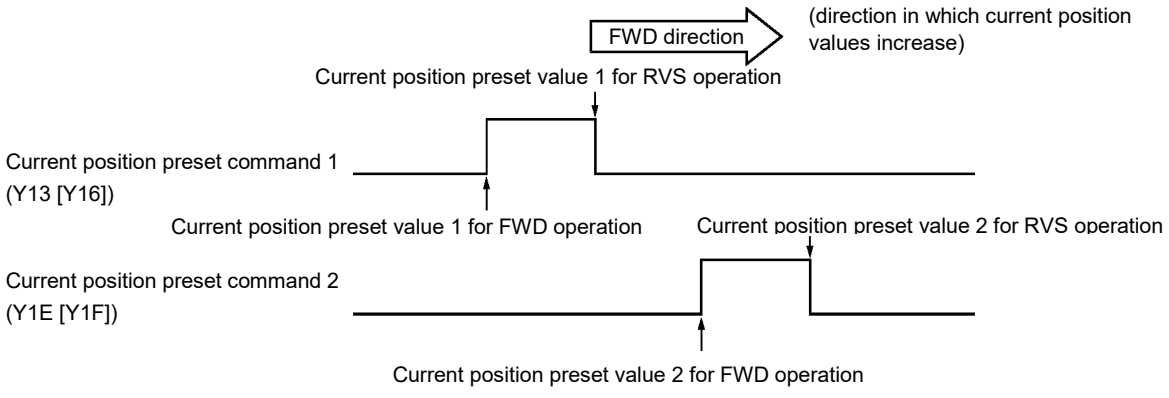
The following three formats are available for the current position preset function.

Item \ Format	Parameter format	Buffer memory format	Sequence format
Setting value of buffer memory address 740 [1740]	1	2	3
Number of preset data	4 data set by parameter Addresses 741 [1714] to 748 [1748]	2 data set by buffer memory Addresses 690 [1690] to 693 [1693]	1 data set by buffer memory Addresses 690 [1690] to 691 [1691]
Input destination of preset signals	Signal from PLC CPU Y13 [Y16], Y1E [Y1F]	Signal from PLC CPU Y13 [Y16], Y1E [Y1F]	Signal from PLC CPU Y13 [Y16]
Determination of data used	To determine by the direction in which current position values change and by the input destination where preset signals are input.	To determine by the input destination where preset signals are input.	Fixed to buffer memory

(1) The parameter format and buffer memory format have individual two current position preset commands and each of them operates independently.

(2) The current position preset command is detected at its leading edge.

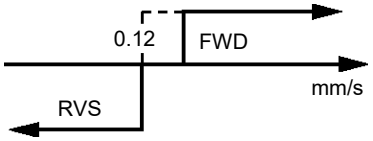
(3) For the parameter format, two preset values must be set; one for the FWD (forward) direction and the other for the RVS (reverse) direction.



(4) The current position preset commands is commonly used for the current position hold function.

(5) For the parameter format, the automatic travel direction determination by VS-QA262 is made by successively comparing the current position values at a 100 ms interval. However, when the reverse speed is below the levels shown in the following table, VS-QA262 will determine that the current travel is in forward direction.

For VLS-256PW



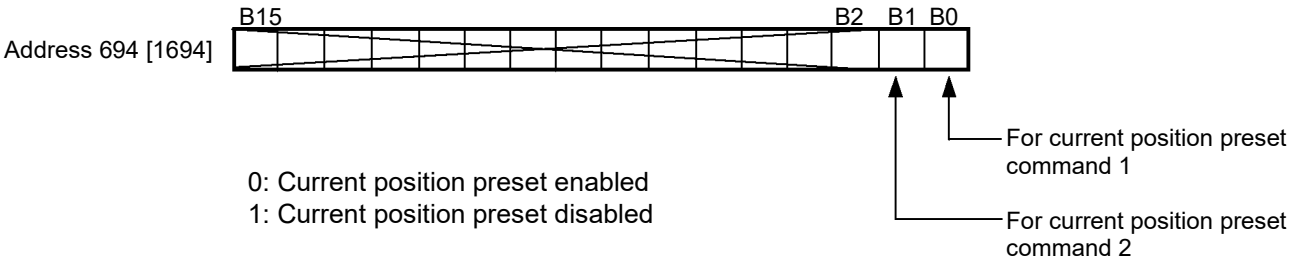
ABSOCODER models	Speed(mm/min)
VLS-256PW	0.12
VLS-512PW	0.23
VLS-1024PW	0.47
VLS-512PY	0.12
VLS-1024PY	0.23
VLS-2048PY	0.47

(6) The following conditions must be satisfied in order for the current position preset function to be operative:

(a) The current position preset function must be designated as 'enabled' at the parameter.

Address	Item	Setting value	Contents
740 [1740]	Current position preset function	1	Parameter format
		2	Buffer memory format
		3	Sequence format

(b) Any sensor error must be reset.
(c) Online status is established.
(d) '0' is set to the 'current position preset command disabled setting' area.
When '1' is set to each corresponding bit in the 'current position preset command disabled setting' area, preset operation becomes disabled.



(7) The current position preset function will not occur if the current position preset command is already ON when the power is turned ON.

(8) When both the current position preset command 1 (Y13 [Y16]) and 2 (Y1E [Y1F]) are executed simultaneously, the 'current position preset command 1' will be executed and the 'preset commad 2' will be invalid.

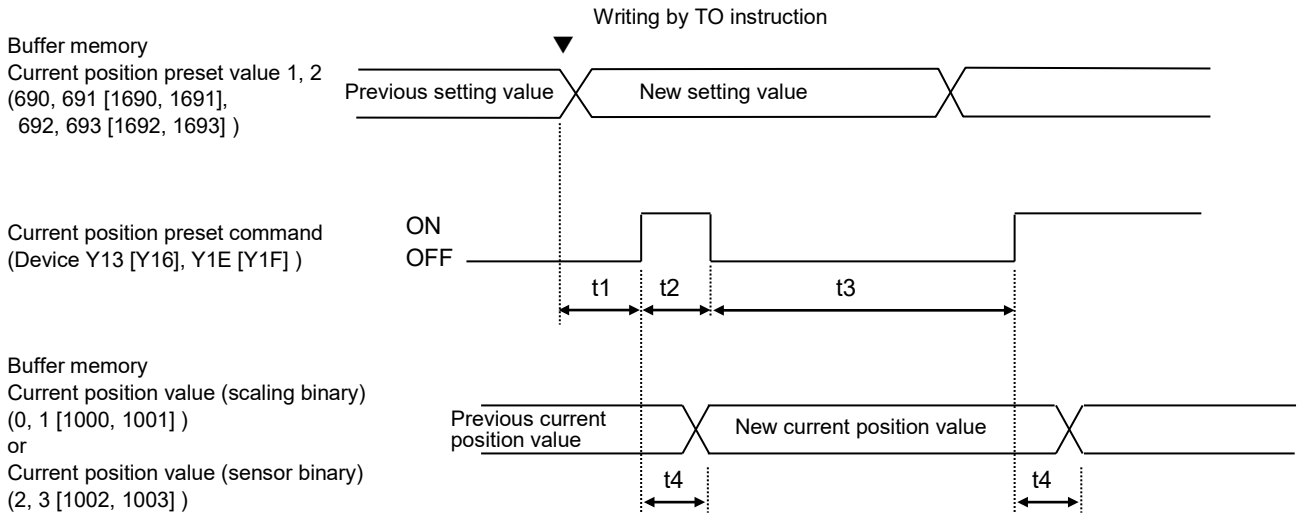
(9) When a current position preset command occurs during the machine stop status, the forward direction will be adopted.

(10) Once a current position preset command is accepted, the following current position preset commands will be invalid for 100ms.

(11) When the current position preset function is executed during a positioning operation, and when the resultant positioning is to be in the reverse direction, motion will be stopped momentarily and then automatically re-started.

(12) For any current position preset command, no pulse instruction can be used.

(13) Current position preset timing



t1: Preset command effect time (Refer to *1 below)

This is the time required for a current position preset command 1 and 2 to become effective after the current position preset values of the buffer memory is written by the TO instruction. Be careful that if a current position preset command is turned ON within this period of time, the values may be set back to the previous values.

t1 ≧ 12ms

t2: Current position preset command ON time

This is the current position preset command receiving time. Pulse instructions can be used only for a current position preset command 1 (Y13 [Y16]). (Not for a current position preset command 2 (Y1E [Y1F])

t2 ≧ scan time

t3: Current position preset command repeat time

To repeat current position preset command inputs, the signal must remain OFF for this duration before the next input is made.

t3 ≧ 100ms

t4: Current position preset command response time *1

This is the time required for VS-QA262 to actually change a current position value after the current position preset command is turned ON.

t4 ≦ 2ms

*1: When connected to a remote I/O, the remote I/O network's transmission delay time will be added to the response time.

REMARKS

As VS-QA262 has no current position preset by external inputs, the current position preset commands have to be executed using the sequence program.

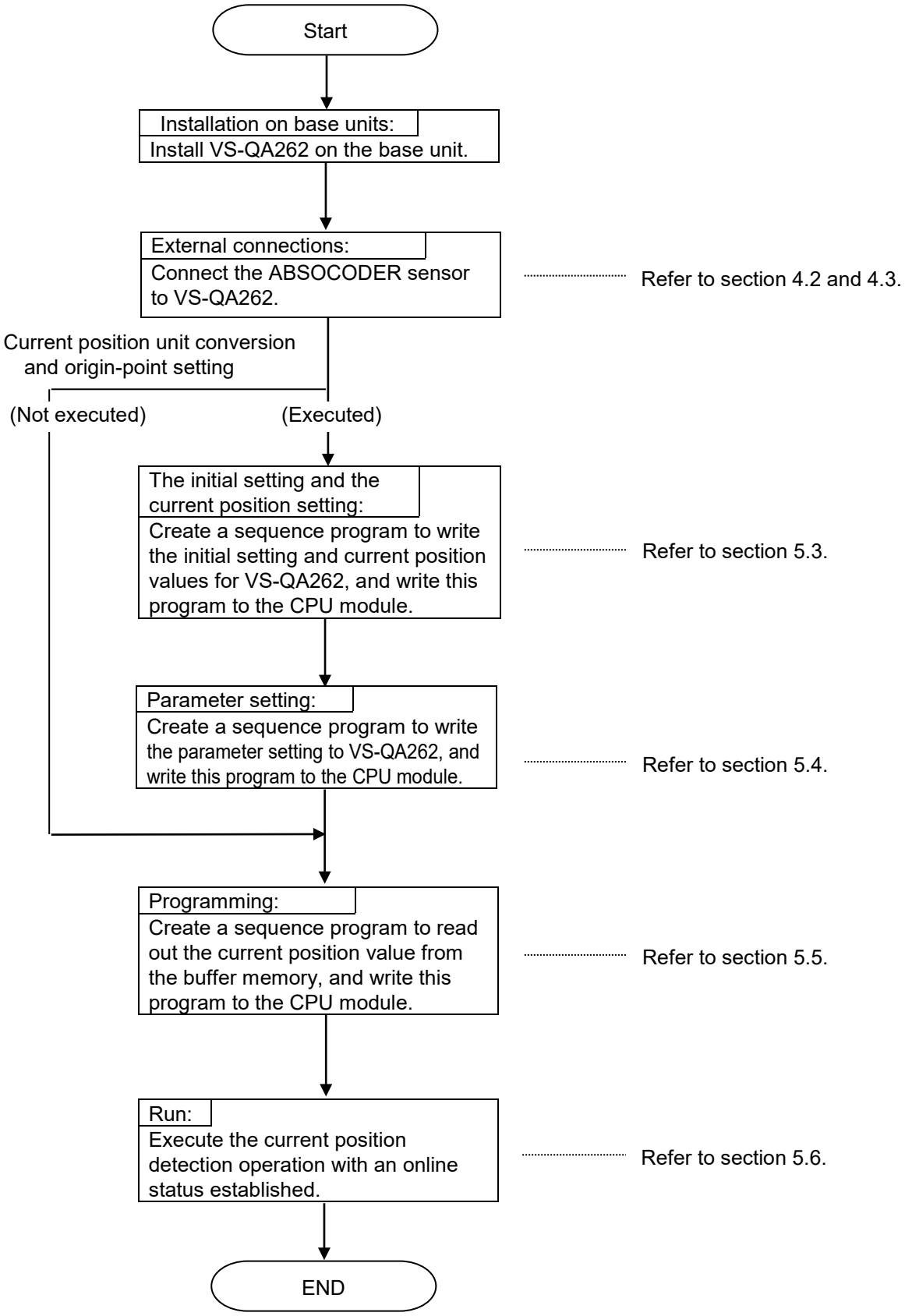
In case the current position preset is executed while the machine moves, the response of the current position preset signal may delay because it is affected by the sequence scan time. This will result in a gap between a machine position and a current position value.

In such case, turn the current position preset commands ON/OFF making use of the fixed scan execution type program or the high-speed interrupt function.

About fixed-scan execution type programs and high-speed interrupt functions, refer to the User's Manual (‘Function Explanation: Program Fundamentals’) and/or the Programming Manual for your CPU module.

5.2 Pre-Operation Setting Sequence

This section explains setting sequences for the current position detection function.



*1: When using VLS-[ ]PY, settings of the sensor selection/sensor travel direction selection is required in the initial setting.

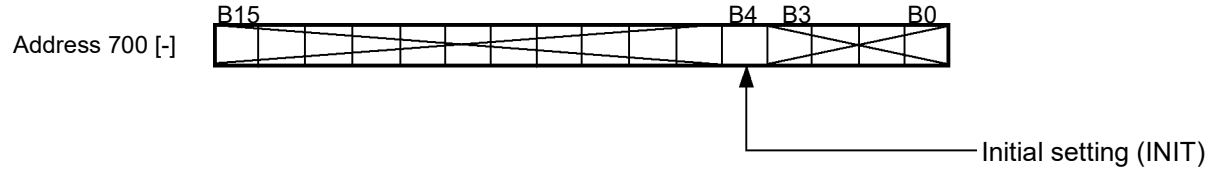
REMARKS

Settings other than the current position setting can be done even when the ABSOCODER sensor is not connected.

5.3 Initial setting

This section explains VS-QA262's initial settings.
Initial setting values are factory-set (default).
Designate only the initial setting item which is required to change.
To enter settings, specify ’1’ at the relevant bit of the buffer memory's data memory flag (address 700 [-]).

The initial settings of axes 1 and 2 are executed simultaneously.



Writing to the initial setting buffer memory area is enabled at all times.
When offline, however, initial setting data writing to VS-QA262 is not possible until the initial setting bit of the data memory flag (address 700 [-]) is set to ‘1’.

Setting sequence for the initial setting is different from that for the current position setting.
Refer to 5.3.5 for the initial setting sequence and 5.3.6. for the current position setting sequence.

5.3.1 Initial setting list

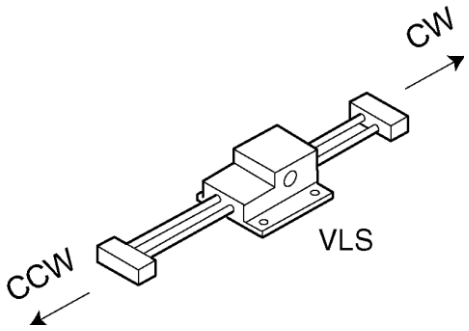
Initial setting list for VS-QA262 is shown below:

Address	Item	Setting value		Default value
702 [1702]	Sensor selection/ sensor travel direction	0: VLS-[ ]PW/CW 1: VLS-[ ]PW/CCW	2: VLS-[ ]PY/CW 3: VLS-[ ]PY/CCW	0
		99: No sensor		
704 [1704] 705 [1705]	Scale length (L)	1000 to 999999		131072
707 [1707] (L) 708 [1708] (H)	Minimum current position value (K)	[- 99999 to (1000000 - L)]		0
709 [1709] (L) 710 [1710] (H)	Current position value	K to (K + L - 1)		65536

5.3.2 Sensor selection/sensor travel direction setting

This section explains the sensor selection / the sensor travel direction settings (address 702 [1702]). The ABSOCODER sensor to be used is set. The direction of travel in which the position data value increases is designated as either ‘CW’ or ‘CCW’.

CW setting: Position data values will increase when the sensor rod travels in the CW direction.
CCW setting: Position data values will increase when the sensor rod travels in the CCW direction.
No sensor: No corresponding axis is used.
(No error occurs even when the ABSOCODER sensor is not connected.)



Setting contents are as below.

Item / Data	Sensor selection	Sensor travel direction
0	VLS-[ ]PW	CW
1		CCW
2	VLS-[ ]PY	CW
3		CCW
99	No sensor	

IMPORTANT

With ABSOCODER sensors, either VLS-[ ]PW or VLS-[ ]PY should be used for both Axis 1 and Axis 2. Designate a sensor that is the same as Axis 1 and Axis 2 in sensor selection. (address 702 [1702])
(It is not necessary to designate the same setting as the ‘absolute detection range’ and ‘sensor travel direction’.)
An error (error code 1702 or 2702) will occur when designating different sensor.

Even when the ABSOCODER sensor is connected with the axis set to ‘99’, the current position value data work rightly.
However, the connection under the situation is dangerous because an error can not be detected. Be sure to restore any one of the setting between ‘0’ and ‘3’.

5.3.3 Scale length and minimum current position value setting

This section explains how to set scale lengths (addresses 704 [1704] to 705 [1705]) and the minimum current position value (addresses 707 [1707] to 708 [1708]).
Only the scale length or the minimum current position value can be set.
Refer to section 1.2 for definitions of the scale length and the minimum current position value.

POINT

The machine's detection range is determined by the scale length and the minimum current position value. Therefore, consider the relationship of these items.

- Effect on parameter settings:
  When either the scale length or the minimum current position value is set, be sure to set the parameters that affect the 'distance' again.

Function	Address	Item
Positioning function	714 [1714] (L) 715 [1715] (H)	Overshoot amount
	716 [1716] (L) 717 [1717] (H)	Medium-speed zone
	718 [1718] (L) 719 [1719] (H)	Low-speed zone
	720 [1720] (L) 721 [1721] (H)	Stop zone
	722 [1722] (L) 723 [1723] (H)	In-position zone
	724 [1724] (L) 725 [1725] (H)	Upper limit value
	726 [1726] (L) 727 [1727] (H)	Lower limit value
Current position detection function	709 [1709] (L) 710 [1710] (H)	Current position value
	736 [1736] (L) 737 [1737] (H)	Permissible current position change amount
	738 [1738] (L) 739 [1739] (H)	Permissible correction amount
	741 [1741] (L) 742 [1742] (H)	FWD current position preset value 1
	743 [1743] (L) 744 [1744] (H)	RVS current position preset value 1
	745 [1745] (L) 746 [1746] (H)	FWD current position preset value 2
	747 [1747] (L) 748 [1748] (H)	RVS current position preset value 2

REMARKS

When the scale length and the minimum current position value are set, the setting value of the current position value and the current position preset will be confirmed if both are within the setting range.
When either of setting values is out of the range, an error will occur.
(Error code: 1709 [2709], 1741 [2741], 1743 [2743], 1745 [2745], 1747 [2747])
The default of both the current position value and the current position preset is '0'. When a numerical value of 'More than one' is set as the minimum current position value, an error will occur.
In this case, the current position preset value of the parameter should be set before the initial setting. The current position value of initial setting should be changed within the detection range.

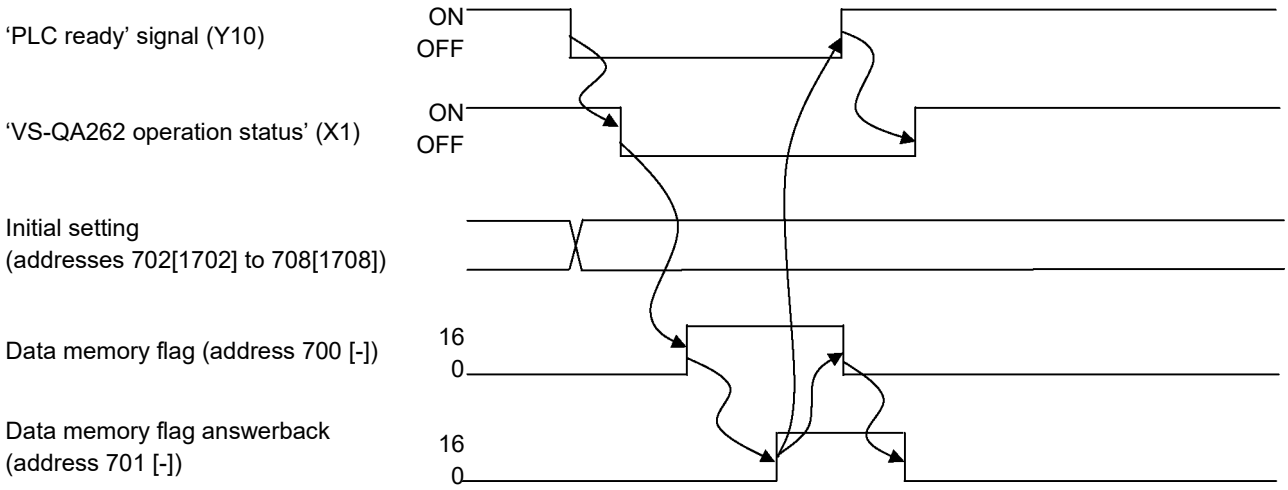
5.3.4 Current position setting

This section explains how to set the current position values (addresses 709 [1709] to 710 [1710]).
The 'current position' setting consists of designating a numeric value which corresponds to a given machine position.
For example, when the machine is moved to its 100 mm position, the 'current position' setting which corresponds to that position would be designated as '10000' (when resolution is 0.01).
The 'current position' setting provides a reference value on which the detection range ([minimum current position value] to [minimum current position value + scale length - 1]) is based.

5.3.5 Initial setting sequence

(a) Turn the 'PLC ready' signal (Y10) OFF.
(b) Write the setting data to the buffer memory addresses 702 [1702], 704 [1704], 705 [1705], 707 [1707], and 708 [1708].
(c) After verifying that the operation status is 'offline', specify '1' at the initial setting (INIT) bit of the data memory flag (address 700 [-]).
(d) Verify that the initial setting (INIT) bit of the buffer memory's data memory flag answerback (address 701 [-]) is '1' (initial setting received), then write the buffer memory address 700 [-] to '0'.
(e) Turn the 'PLC ready' signal (Y10) ON.

(f) The 'VS-QA262 operation status' (X1) will be ON.

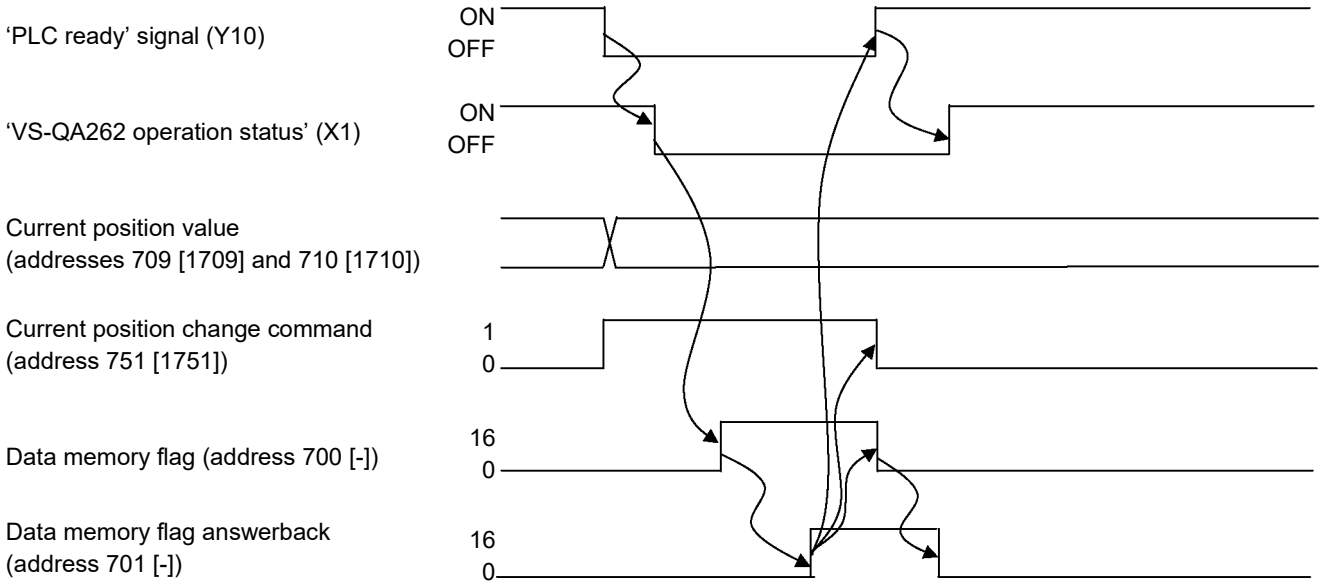


Note: When the above procedures are executed, the data of initial setting area except the current position value of the buffer memory for both axes are written to the internal memory of VS-QA262.

REMARKS
When there is an abnormality of the initial setting data, the data memory flag answerback remains '0'.
Check the contents of the error code (address 7 [1007]) and change the write data.

5.3.6 Current position setting sequence

(a) Move the machine to the desired setting position.
(b) Turn the 'PLC ready' signal (Y10) OFF.
(c) Write the setting data to the buffer memory addresses 709 [1709] (L) and 710 [1710] (H). (At this time, the current position setting is not yet completed.)
(d) Write '1' to the buffer memory address 751 [1751].
(e) After verifying that the operation status is 'offline', specify '1' at the initial setting (INIT) bit of the data memory flag (address 700 [-]). (The current position setting is now completed.)
(f) Verify that the initial setting (INIT) bit of the buffer memory's data memory flag answerback (address 701 [-]) is '1' (current position setting received), then write '0' to buffer memory addresses 700 and 751 [1751].
(g) Turn the 'PLC ready' signal (Y10) ON.
(h) The 'VS-QA262 operation status' (X1) will be ON.



Note: When the above procedures are executed, all the data of the buffer memory initial setting area for both axes are written to the internal memory of VS-QA262.

REMARKS
Depending on the minimum unit of current position value change (resolution), there may be cases in which the current position value will vary slightly from the current position setting value.
(This occurs when the value of scale length is larger than the total number of divesions of the ABSOCODER sensor.)
When a current position value is within the minimum unit, the larger value will be selected.

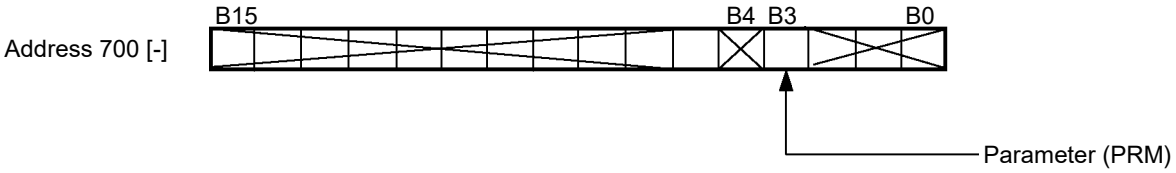
Ex.) Current position value change: 0→ 3→ 7→ 11. Because the current position setting value is 10 between 7 and 11, the larger value of '11' will be designated as the current position value.

Current position setting value: 10

REMARKS
When the current position value is designated outside of the detection range, the data memory flag answerback remains '0'.
Change the current position value (addresses 709 [1709] and 710 [1710]).

5.4 Parameter settings

This section explains the parameters active for VS-QA262's current position detection function.
Parameters are factory-set (default).
Designate only the parameter item which is required to change.
When default values are acceptable, it is not necessary to specify settings.
When writing the parameters, specify ’1’ at the relevant bit of the buffer memory's data memory flag (address 700 [-]).



Writing to the parameter buffer memory area is enabled at all times.
When offline, however, parameter data writing to VS-QA262 is not possible until the parameter bit of the data memory flag (address 700 [-]) is set to ‘1’.

The parameter settings of axes 1 and 2 are executed simultaneously.

REMARKS

The VS-QA262 parameters consist of the 'current position detection function', the ’limit SW output function' and the 'positioning function'.
Only the parameters used for the current position detection function are explained here.
For details regarding the limit SW output function parameters, refer to section 6.4, and for the positioning function parameters, refer to section 7.4.
When the limit SW output and positioning functions are used jointly, parameters for both functions must be designated.

5.4.1 Parameter list

[ ]: Address for axis 2

Address	Item	Content	Setting data	Default
711 [1711]	Function	Designates 'Current position detection function only', 'limit SW output function only' or limit SW output function & positioning function.	0: Limit SW output function & positioning function 1: Limit SW output function only 2: Current position detection function only	2
736 [1736] 737 [1737]	Permissible current position change amount	Designates the permissible amount of current position change which can occur every 20ms. When this amount is exceeded, an error will occur.	0 to 999999	999999
738 [1738] 739 [1739]	Permissible correction amount	Designates the permissible amount of correction which can occur when the current position preset function is executed. When this amount is exceeded, an error will occur.	0 to 999999	999999
740 [1740]	Current position preset function	Designates whether or not to use current position preset function, and the method when using it.	0: Disabled 1: By the parameter format 2: By the buffer memory format 3: By the sequence format	0
741 [1741] 742 [1742]	FWD current position preset value 1	Can be used when the parameter format is specified by the current position preset function. Designates the current position value which varies when the current position preset command ‘1’ is turned ON while moving in the FWD direction.	Minimum current position value to [minimum current position value + scale length -1].	0
743 [1743] 744 [1744]	RVS current position preset value 1	Can be used when the parameter format is specified by the current position preset function. Designates the current position value which varies when the current position preset command ‘1’ is turned ON while moving in the RVS direction.	Minimum current position value to [minimum current position value + scale length -1].	0
745 [1745] 746 [1746]	FWD current position preset value 2	Can be used when the parameter format is specified by the current position preset function. Designates the current position value which varies when the current position preset command ‘2’ is turned ON while moving in the FWD direction.	Minimum current position value to [minimum current position value + scale length -1].	0
747 [1747] 748 [1748]	RVS current position preset value 2	Can be used when the parameter format is designated by current position preset function. Designates the current position value which varies when the current position preset command ‘2’ is turned ON while moving in the RVS direction.	Minimum current position value to [minimum current position value + scale length -1].	0
749 [1749]	Speed gate time	Selects the desired speed gate time to detect the change in the amount of sensor travel speed in binary values or the sensor's travel speed. Note: “5” cannot be set.	0: 8ms 1: 16ms 2: 32ms 3: 64ms 4: 128ms 6: 3.2ms 7: 6.4ms 8: 12.8ms 9: 25.6ms 10: 51.2ms	0
750 [1750]	Speed sampling time	Selects the speed sampling time for the speed gate time selected by address 749 [1749].	0: Same as the speed gate time 1: 1/2 of the speed gate time 2: 1/4 of the speed gate time	0

5.4.2 Function setting

This section explains how to set functions.
VS-QA262 consists of 3 functions: The 'current position detection function', the 'limit SW output function', and the 'positioning function'.
The function which is to be used is designated by 'function' parameter settings.

The function selections are as follows:

0: For both the 'limit SW output function' and the 'positioning function' (X10 to 17 [X18 to 1F] outputs are used for the positioning function.)
1: The ‘limit SW output function’ only (X10 to 17 [X18 to 1F] outputs are used for the ‘limit SW output function’.)
2: The ‘current position detection function’ only (X10 to 17 [X18 to 1F] outputs are not used. All outputs are turn OFF.)

When set to '0', the limit SW output status (ON/OFF status) is stored at buffer memory address 4 [1004].
When set to '1', the limit SW output status (ON/OFF status) is stored at X10 to 17 [X18 to 1F] outputs and buffer memory address 4 [1004].
The function setting is designated at buffer memory address 711 [1711].

5.4.3 Permissible current position change amount setting

This section explains how to set the permissible current position change amount.

VS-QA262 executes a current position detection operation every 20 ms, and the difference between the currently detected position and the previously detected position is calculated. When this value exceeds the ‘permissible current position change amount', the 'Excessive current position change' detection XB [XE]' signal will turn ON.
The 'permissible current position change amount' setting is designated at addresses 736 [1736] (L) and 737 [1737] (H).

(1) Turn Y1C ON by the sequence program to reset 'excessive current position change detection'.
(2) VS-QA262 will continue the operation of positioning and limit SW functions even when an ‘excessive current position change' is detected.
(3) The 'Excessive current position change' detection XB [XE]' signal will not turn ON when the current position value is changed by the 'current position preset command' or when the current position value is designated by the initial setting.

5.4.4 Permissible correction amount setting

This section explains how to set the permissible correction amount.

The 'permissible correction amount' is the amount of current position correction which is allowed when the current position preset function is executed. When this permissible amount is exceeded, the 'Excessive correction amount' detection XA [XD]' signal will turn ON.
The 'permissible correction amount' setting is designated at addresses 738 [1738] (L) and 739 [1739] (H).

(1) Turn Y1C ON by the sequence program to reset the 'excessive correction amount detection' and the 'error detection'.
(2) VS-QA262 executes the current position value correction by the current position preset function even when an excessive correction amount is detected.

5.4.5 Current position preset function setting

This section explains how to set the current position preset function.

This setting determines whether or not to execute the current position preset, and the method if executing it.

0: Disabled
1: By the parameter format
2: By the buffer memory format
3: By the sequence format

The current position preset function is set to buffer memory address 740 [1740].

Refer to section 5.1.2 for details of the current position preset function.

5.4.6 Current position preset value setting

This section explains how to set the current position preset value.

The current position preset value is used when changing the current position value to the preset value by the current position preset command. (Select '1: By the parameter format' for the current position preset function of address 740 [1740].)
The table below shows the addresses and their current position preset values.

Address	Item
741 [1741](L) 742 [1742](H)	FWD current position preset value 1
743 [1743](L) 744 [1744](H)	RVS current position preset value 1
745 [1745](L) 746 [1746](H)	FWD current position preset value 2
747 [1747](L) 748 [1748](H)	RVS current position preset value 2

(1) Settings exceeding the detection range between [minimum current position value and (minimum current position value +scale length -1)] are not accepted.
(2) When the detection range is changed after the preset value has been set, the preset value remains the same even when this is out of the detection range.
When preset operation is executed in this state, an error (error No. 50) will occur and current position preset cannot be completed successfully.

REMARKS
Depending on the minimum unit of current position value change (resolution), there may be cases in which the current position value will vary slightly from the preset value.
(This occurs when the value of scale length is larger than the total number of divesions of the ABSOCODER sensor.)
When a current position value is within the minimum unit, the larger value will be selected.

Ex.) Current position value change: 0→ 3→ 7→ 11

Preset value: 10

Because the current position preset value is 10 between 7 and 11, the larger value of '11' will be designated as the current position value.

5.4.7 Speed gate time and speed sampling time setting

This section explains how to set the speed gate time and the speed sampling time.

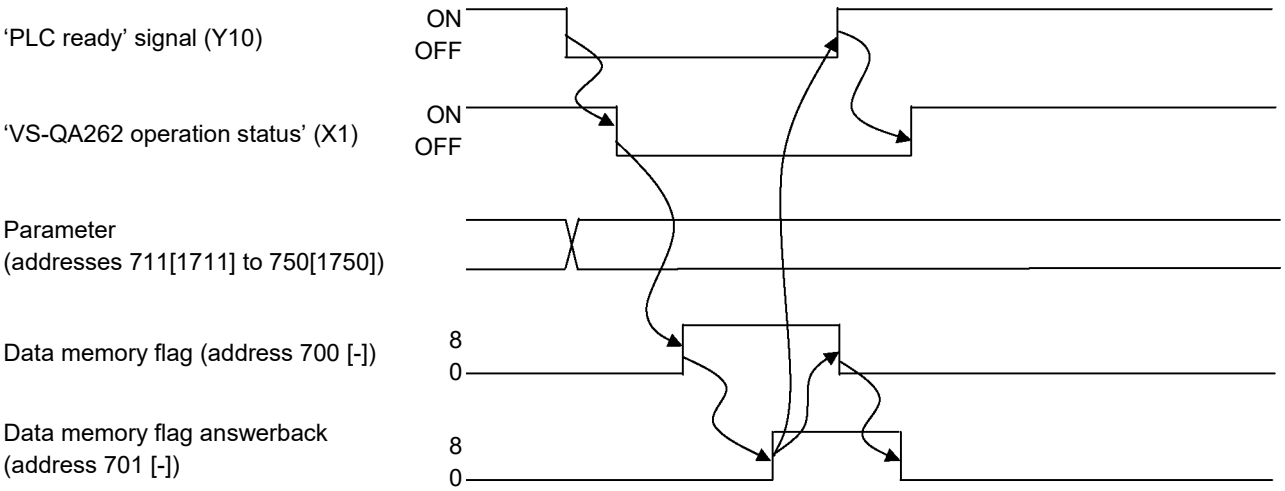
This setting determines the measurement conditions of the data stored in the speed output area of the buffer memory addresses 668 [1668] (L) and 669 [1699] (H).
The speed gate time is set to buffer memory address 749 [1749].
Speed sampling time is set to buffer memory address 750 [1750].
Setting contents are as below.

Address	Item	Content	Setting data
749 [1749]	Speed gate time	Selects the desired speed gate time to detect the change in the amount of sensor travel speed in binary values or the sensor's travel speed. Note: “5” cannot be set.	0 : 8ms 1 : 16ms 2 : 32ms 3 : 64ms 4 : 128ms 6 : 3.2ms 7 : 6.4ms 8 : 12.8ms 9 : 25.6ms 10: 51.2ms
750 [1750]	Speed sampling time	Selects the speed sampling time for the speed gate time selected by address 749 [1749].	0: Same as the speed gate time 1: 1/2 of the speed gate time 2: 1/4 of the speed gate time

Refer to section 3.5.11 for details of the speed output.

5.4.8 Parameter setting sequence

(a) Turn the ’PLC ready’ signal (Y10) OFF.
(b) Write the setting data to buffer memory addresses 711 [1711] to 750 [1750].
(c) After verifying that the operation status is ‘offline’, specify ‘1‘ at the paramerer (PRM) bit of the buffer memory's data memory flag (address 700 [-]).
(d) Verify that the parameter (PRM) bit of the buffer memory's data memory flag answerback (address 701 [-]) is ‘1’, then write ‘0’ to buffer memory address 700 [-].
(e) Turn the ‘PLC ready’ signal (Y10) ON.
(f) The ‘VS-QA262 operation status’ (X1) will be ON.



Note: When the above precedures are executed, all the data of the buffer memory parameter area for both axes are written to the internal memory of VS-QA262.

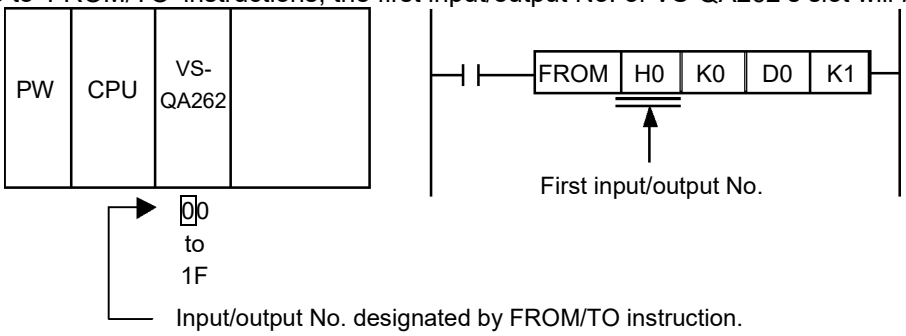
REMARKS
When there is an abnormality of the parameter data, the data memory flag answerback remains ‘0’.
Check the contents of the error code (address 7 [1007]) and change the write data.

5.5 Programming

This section explains how to create the sequence program using VS-QA262.

5.5.1 Program creation precautions

(1) VS-QA262 is an intelligent function module that occupies thirty two I/O points.
(2) In response to 'FROM/TO' instructions, the first input/output No. of VS-QA262's slot will be designated.



(3) The following designation enables to execute instructions to VS-QA262 as an intelligent function device.
Designation method: U[ ]¥G[ ]

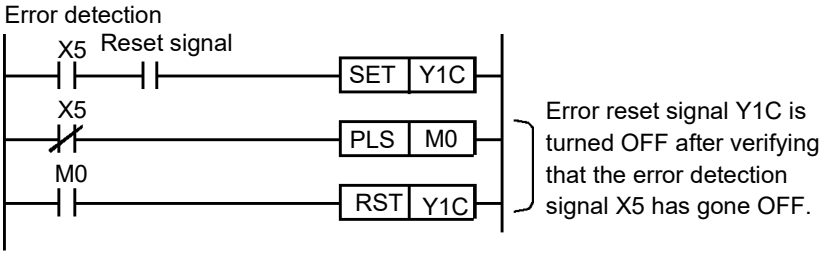
- Buffer memory address
- VS-QA262's first input/output No.

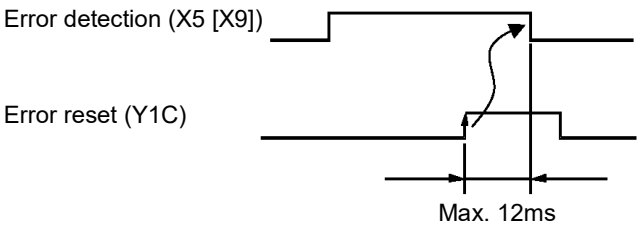
Setting: When the VS-QA262 first input/output No. is expressed as a 3-digit No., the upper 2 digits are specified.
When the VS-QA262 first input/output No. begins with 0E0, "0E" is specified. (U0E¥G0).

(4) VS-QA262 control begins when the Y10 signal (PLC ready signal) is turned ON.

(5) To stop all VS-QA262 control, turn Y10 (PLC ready signal) OFF.

(6) Error reset:
It takes 12 ms for VS-QA262 to detect the Y1C signal (error reset) after it has been turned ON. Therefore, if the ON period of the Y1C signal is less than 12 ms, it may not be detected, and the 'error detection' signal will not go OFF.
To prevent this, the following programming method should be used.





5.5.2 Initial setting and parameter setting data write program

A program example for writing the initial setting and the parameter data to the VS-QA262 buffer memory is given below.

Writing of the initial setting and parameter data for both axes is executed simultaneously. However, the individual current position setting is also possible.

Example 1):
The setting data saved at the programmable controller CPU's data register is written to the initial setting area, and the current position value is set.

Conditions

(1) The following signal assignments are used to control VS-QA262.
VS-QA262 online command X20
Initial setting write command.....X21
Data memory flag answerback storage register D0

(2) The initial setting data should be stored in the data register in advance.

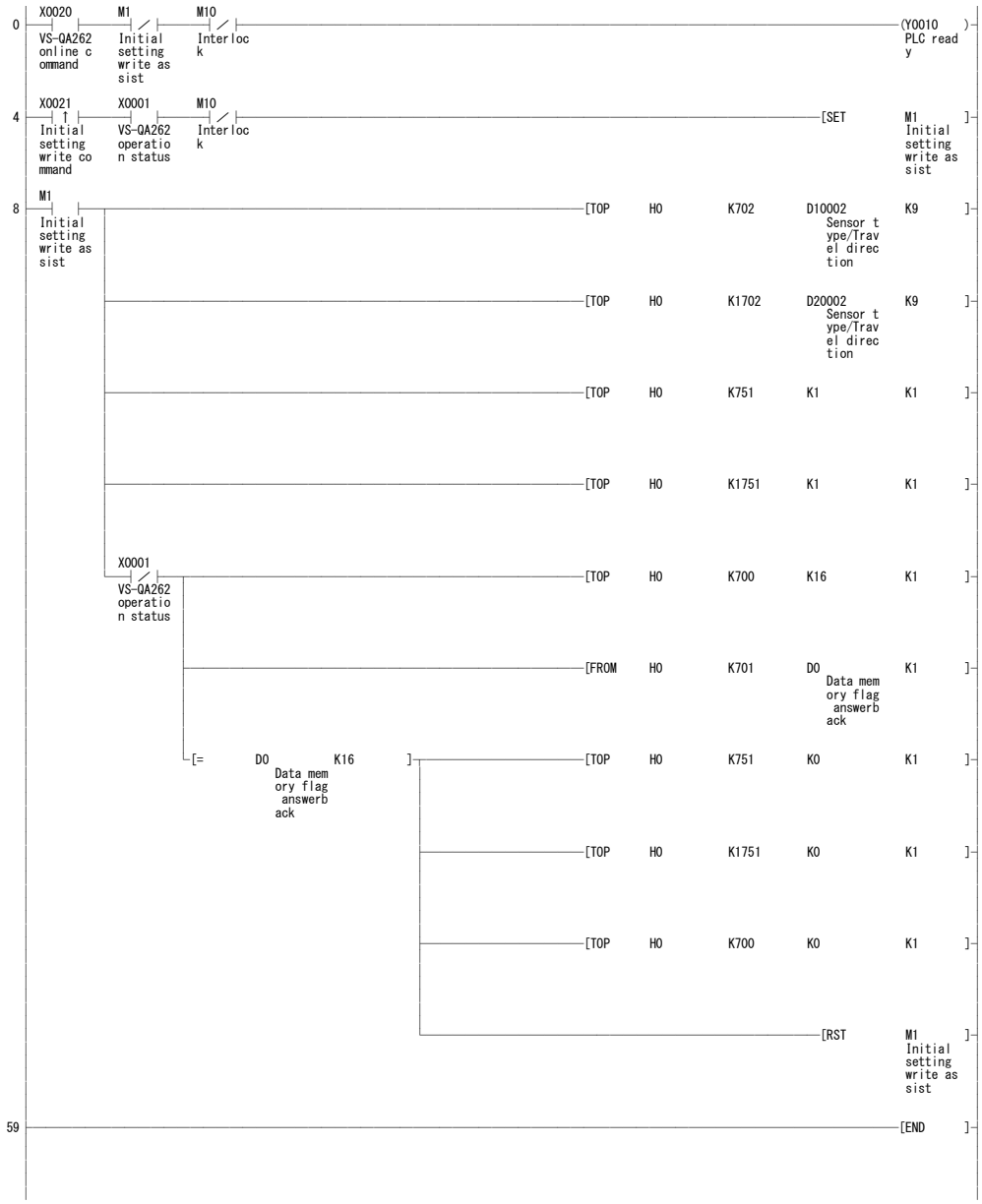
Axis 1 data register		Buffer memory	
D10002		702	Sensor selection/sensor travel direction
D10003		703	Not used
D10004		704	(L) Scale length
D10005		705	(H)
D10006		706	Not used
D10007		707	(L) Minimum current position value
D10008		708	(H)
D10009		709	(L) Current position value
D10010		710	(H)

Axis 2 data register		Buffer memory	
D20002		1702	Sensor selection/sensor travel direction
D20003		1703	Not used
D20004		1704	(L) Scale length
D20005		1705	(H)
D20006		1706	Not used
D20007		1707	(L) Minimum current position value
D20008		1708	(H)
D20009		1709	(L) Current position value
D20010		1710	(H)

(3) Move the machine to the reference position before writing data with this sequence program.

Program Example

(1) Examples of programs using the FROM/TO instructions



The PLC ready signal of VS-QA262 is turned ON.

Initial setting write command

Writes the axis 1 initial setting to the buffer memory.

Writes the axis 2 initial setting to the buffer memory.

Writes the axis 1 current position change command to the buffer memory.

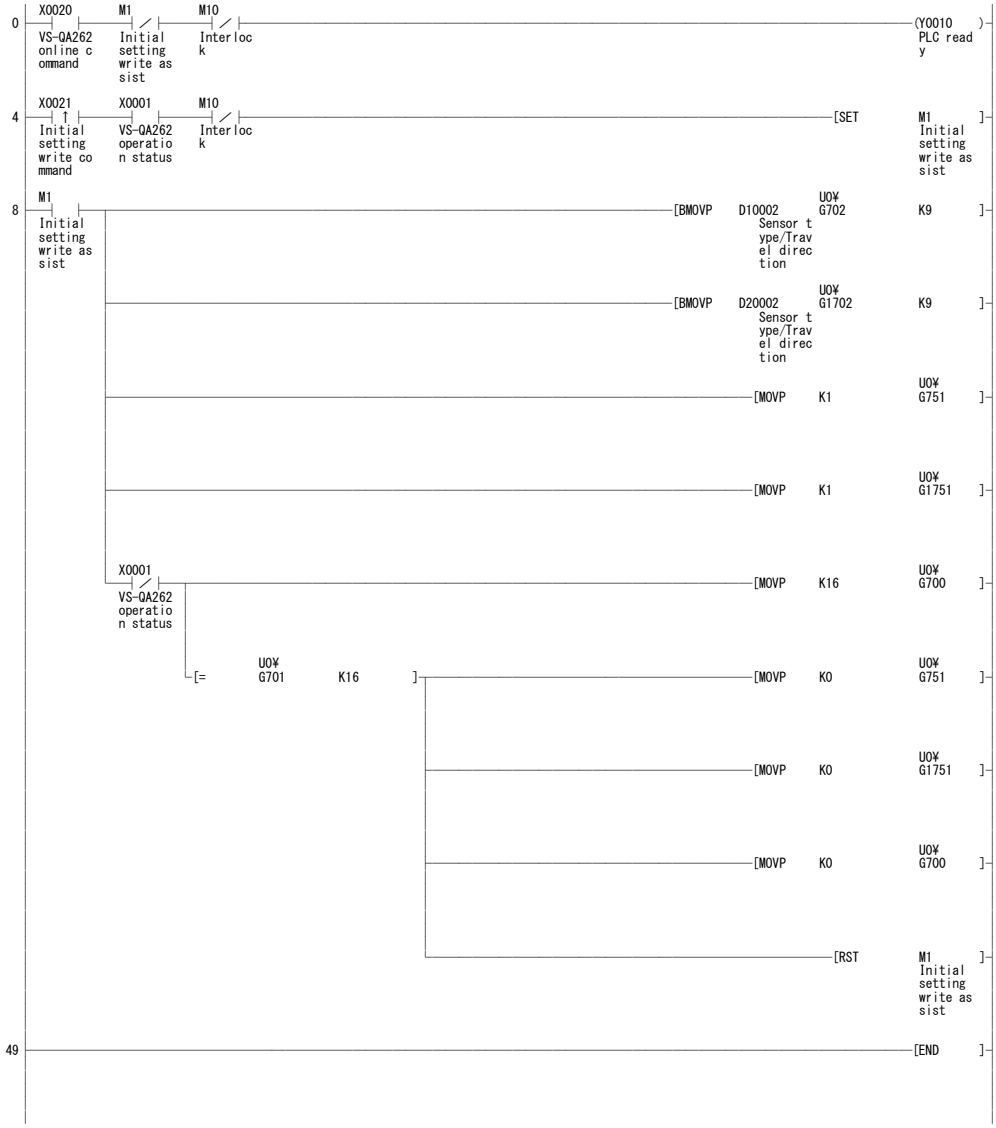
Writes the axis 2 current position change command to the buffer memory.

Writes the initial setting bit to the buffer memory's data memory flag.

The buffer memory's data memory flag answerback is read.

The data memory flag and the current position change command clear when initial setting writing is completed.

(2) Example of a program using an intelligent function device (U[ ]¥G[ ])



The PLC ready signal of VS-QA262 is turned ON.

Initial setting write command

Writes the axis 1 initial setting to the buffer memory.

Writes the axis 2 initial setting to the buffer memory.

Writes the axis 1 current position change command to the buffer memory.

Writes the axis 2 current position change command to the buffer memory.

Writes the initial setting bit to the buffer memory's data memory flag.

The buffer memory's data memory flag answerback is read.

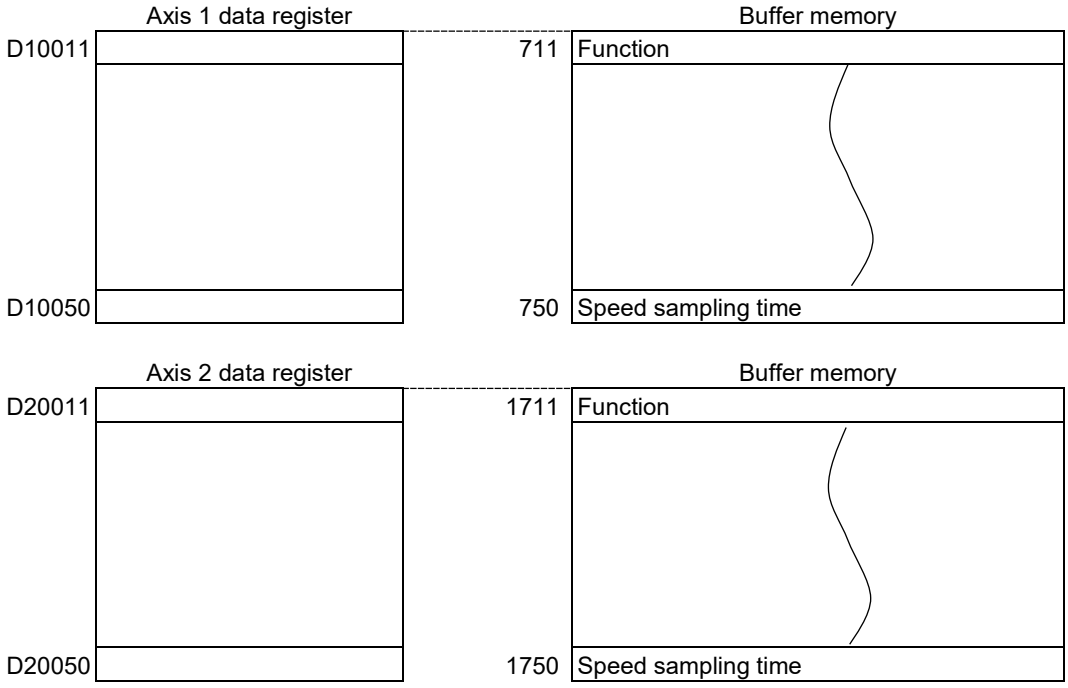
The data memory flag and the current position change command clear when initial setting writing is completed.

Example 2):
The setting data saved at the programmable controller CPU's data register is written to the parameter area.

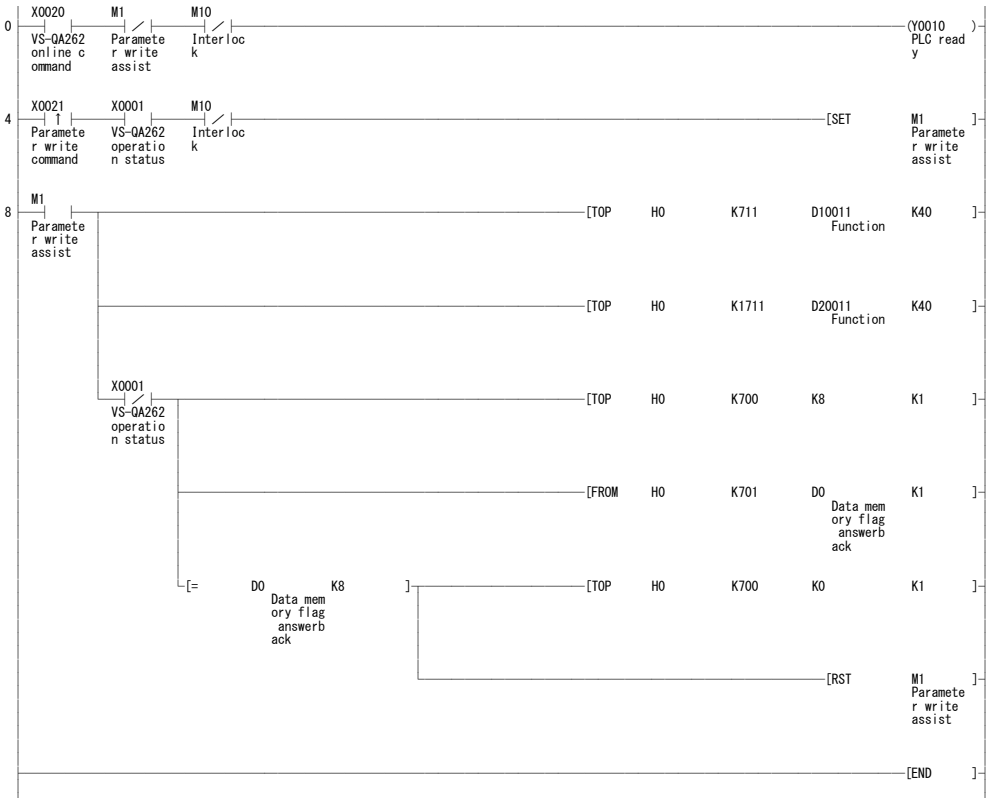
Conditions

(1) The following signal assignments are used to control VS-QA262.
VS-QA262 online command.....X20
Parameter write command X21
Data memory flag answerback storage register.....D0

(2) The parameter data should be stored in the data register in advance.



Program Example



The PLC ready signal of VS-QA262 is turned ON.

Parameter setting write command

Writes the axis 1 parameter data to the buffer memory

Writes the axis 2 parameter data to the buffer memory

Writes the parameter bit to the buffer memory's data memory flag.

The buffer memory's data memory flag answerback is read.

The data memory flag clear when parameter writing is completed.

Example 3):
The setting data saved at the programmable controller CPU's data register is written to the initial setting and parameter areas, and the current position value is set.

Conditions

(1) The following signal assignments are used to control VS-QA262.
VS-QA262 online command.....X20
Initial setting and parameter writing command X21
Data memory flag answerback storage register D0

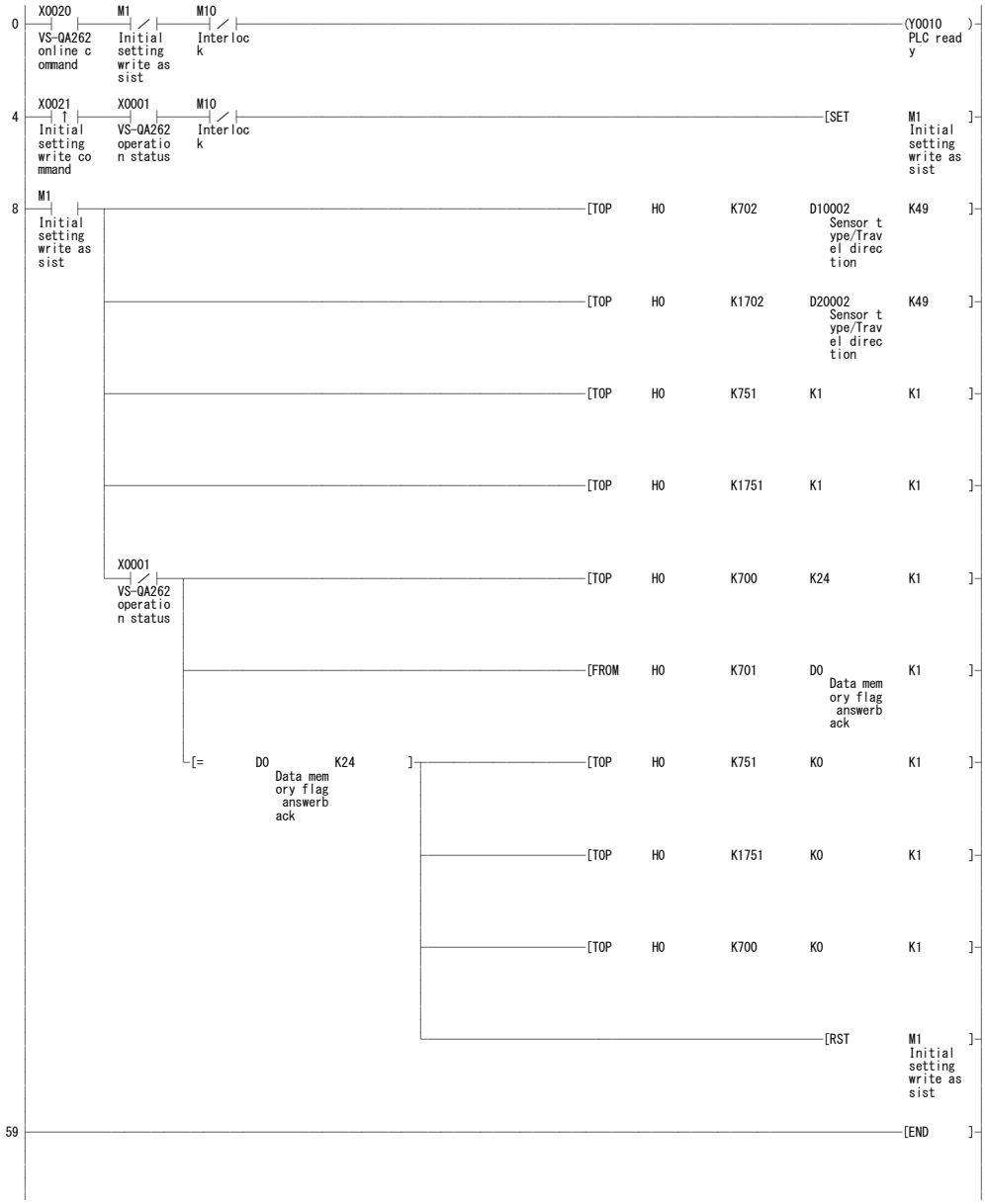
(2) The initial setting data and parameter setting data should be stored in the data register in advance.

Axis 1 data register		Buffer memory	
D10002		702	Sensor selection/sensor travel direction
D10003		703	Not used
D10004		704	(L) Scale length
D10005		705	(H)
D10006		706	Not used
D10007		707	(L) Minimum current position value
D10008		708	(H)
D10009		709	(L) Current position value
D10010		710	(H)
D10011		711	Function
			≀
D10050		750	Speed sampling time

Axis 2 data register		Buffer memory	
D20002		1702	Sensor selection/sensor travel direction
D20003		1703	Not used
D20004		1704	(L) Scale length
D20005		1705	(H)
D20006		1706	Not used
D20007		1707	(L) Minimum current position value
D20008		1708	(H)
D20009		1709	(L) Current position value
D20010		1710	(H)
D20011		1711	Function
			≀
D20050		1750	Speed sampling time

(3) Move the machine to the reference position before writing data with this sequence program.

Program Example



The PLC ready signal of VS-QA262 is turned ON.

Initial setting write command

Writes the axis 1 initial setting and parameter to the buffer memory.

Writes the axis 2 initial setting and parameter to the buffer memory.

Writes the axis 1 current position change command to the buffer memory.

Writes the axis 2 current position change command to the buffer memory.

Writes the initial setting bit and the parameter bit to the buffer memory's data memory flag.

The buffer memory's data memory flag answerback is read.

The data memory flag and the current position change command clear when initial setting and parameter writing is completed.

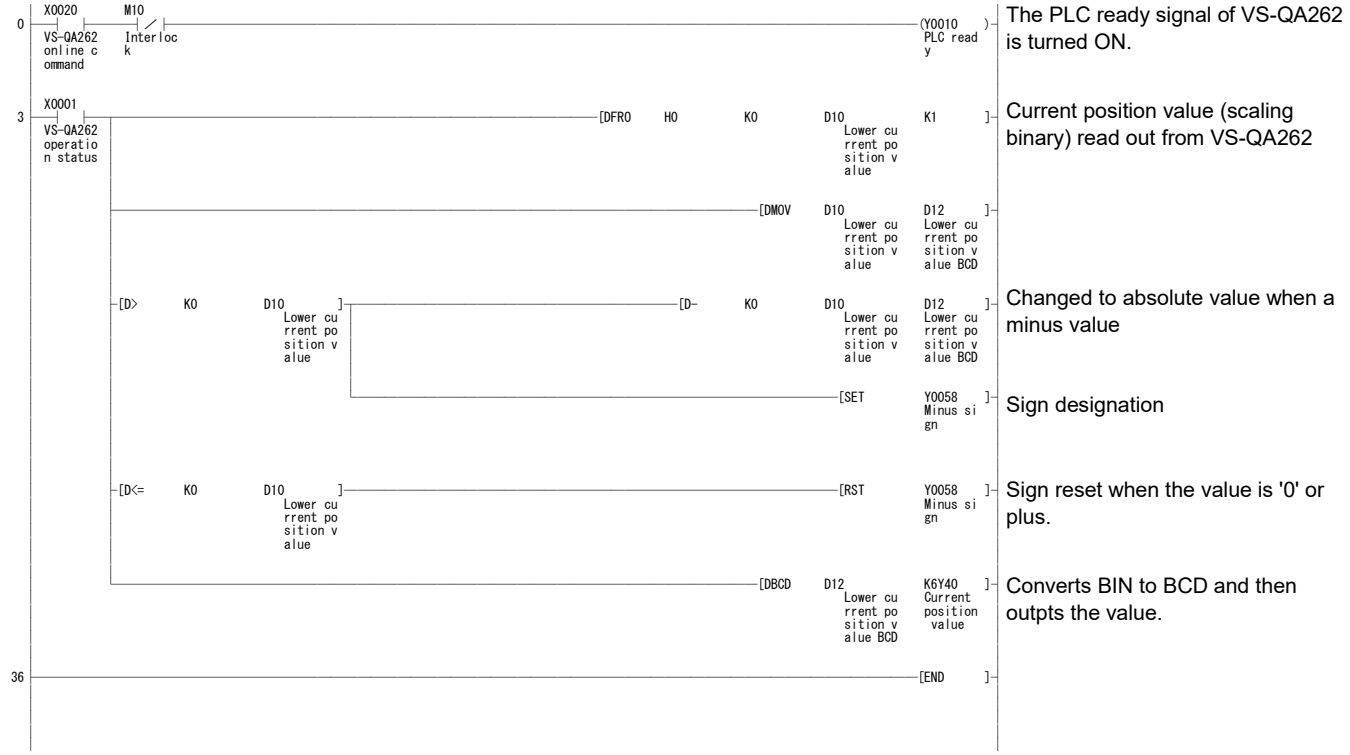
5.5.3 Program for current position monitor display

A program example for the current position monitor display is given below.
This program example is for axis 1. Axis 2 programs can be generated in the same way.

Conditions

The following signal assignments are used to control VS-QA262.
VS-QA262 online command·····X20
Current position value (scaling binary) storage resister ·····D10, D11, D12, D13
Current position value (scaling binary) output to external display units·Y40 to Y57
External output signal for minus sign·····Y58

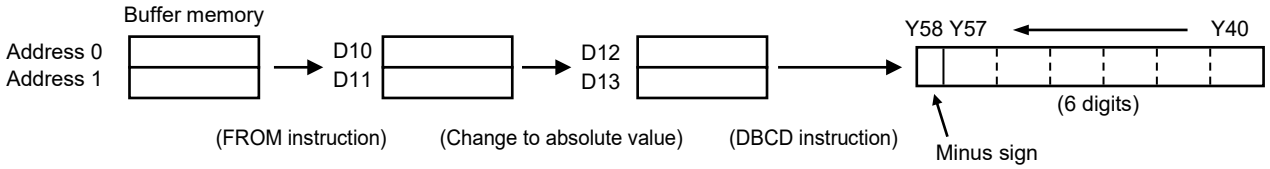
Program Example



Explanation

(1) When VS-QA262 is online, the ‘X1’ signal turns ON.

(2) The current position value (scaling binary) is readout from the buffer memory as follows:



5.5.4 Program for error code readout and reset

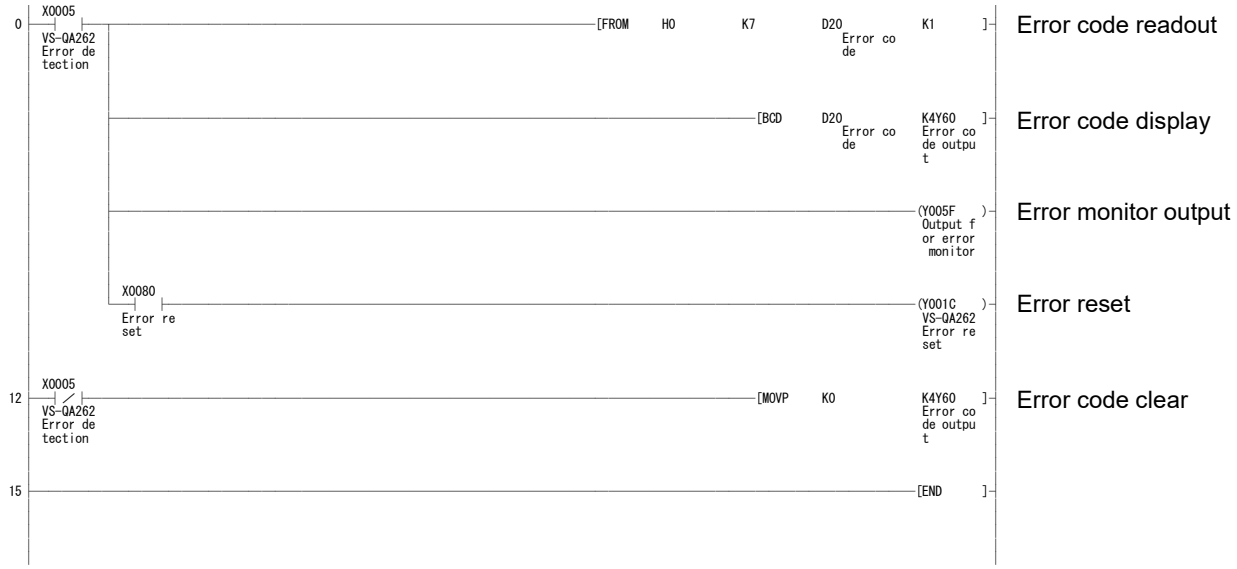
A program example for the error code readout and error reset operation which is used when VS-QA262's 'error detection' occurs is given below.
This program example is for axis 1. Axis 2 programs can be generated in the same way.

Conditions

The following signal assignments are used to control VS-QA262.

Output for error code display ·····Y60 to Y6F
Output for 'error detection' monitor·····Y5F
Error reset signal ·····X80

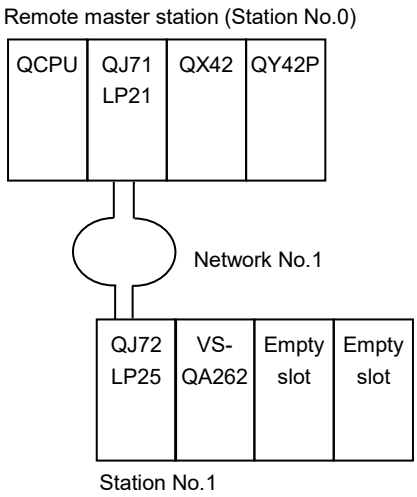
Program Example



5.5.5 Remote I/O station programming

The master station (CPU) programming which is required when VS-QA262 is installed in a remote station is explained below.

(1)System configuration



The following is an example of a program which permits a monitor display of the current position value for VS-QA262 which is installed in a remote station.

Conditions

(a) The following signal assignments are used to control VS-QA262.
VS-QA262 online command····· X20
Current position value (scaling binary) storage resister ····· D10, D11, D12, D13
Current position value (scaling binary) output to external display units ····· Y40 to Y57
External output signal for minus sign····· Y58

(b) The XY settings are specified in the network range assignment of the network parameters as shown below.

XY settings												
Station No.	Master station -> Remote station						Remote station -> Master station					
	Y			Y			X			X		
	Points	Start	End	Points	Start	End	Points	Start	End	Points	Start	End
1	32	0300	031F	32	0000	001F	32	0300	031F	32	0000	001F

(c) The refresh parameters are specified in the network parameters as shown below.

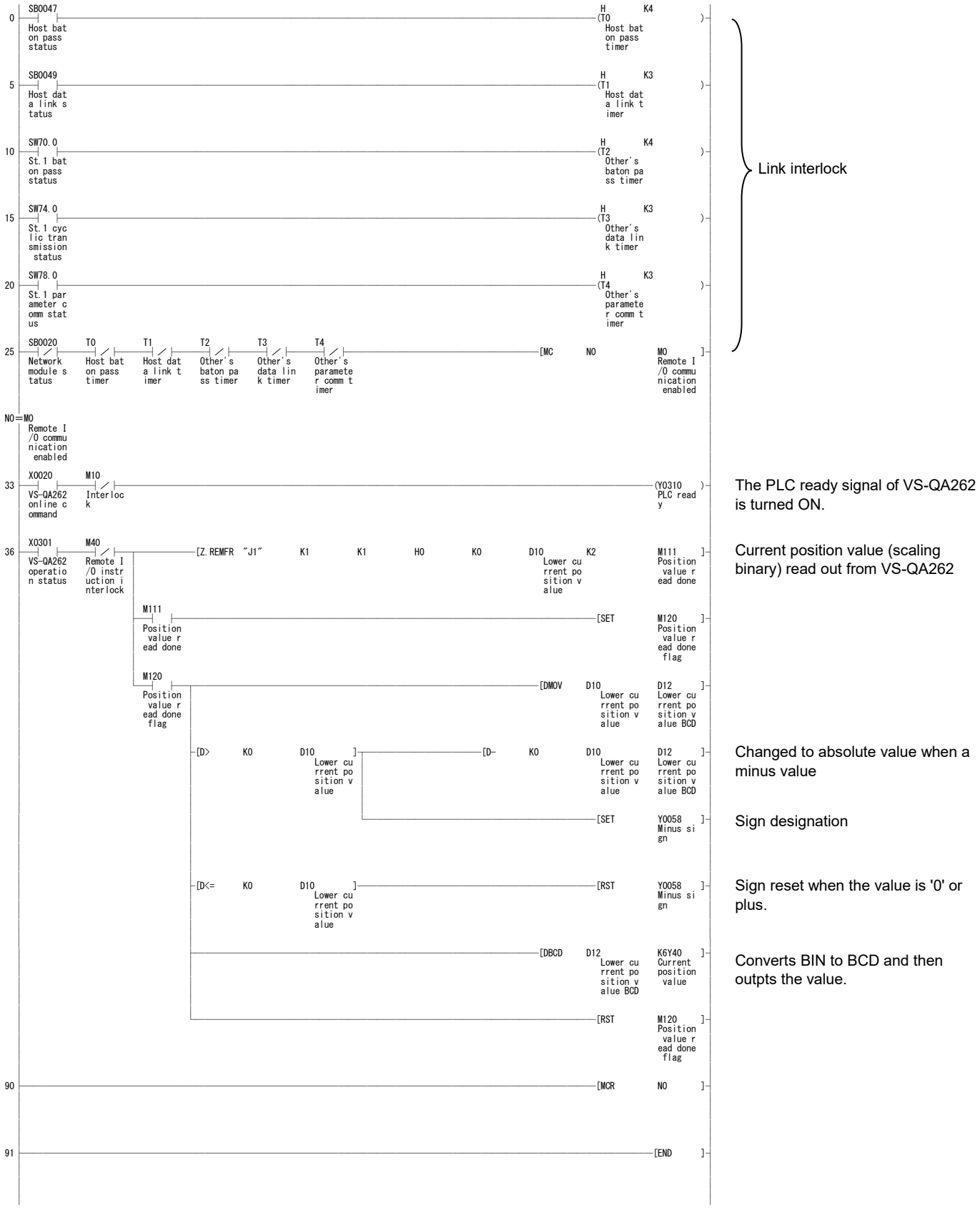
Refresh parameter settings									
	Link side					CPU side			
	Device name	Points	Start	End		Device name	Points	Start	End
Transfer 'm'	LX	32	0300	031F	←→	X	32	0300	031F
Transfer 'n'	LY	32	0300	031F	←→	Y	32	0300	031F

Note:
This program example does not apply to the basic models (Q00JCPU, Q00CPU, Q01CPU) because those models do not have a remote I/O network function.

To read or write multiple data items at the same time, use different channel numbers for the link-dedicated instructions.

As VS-QA262 has no external input/output, a current position preset command has to be executed by the sequence program. The scan time for the sequnce program or the communication time for remote I/O may affect the response time of a current position preset. In case current position preset is excecuted while the machine moves, review the preset position and moving speed by considering the above points.

(2) Program Example



5.6 Operation

The VS-QA262 online status is established when the ‘PLC ready’ signal (Y10) turns ON, and the current position detection function and the current position preset function are enabled.

6. LIMIT SW OUTPUT FUNCTION

6. LIMIT SW OUTPUT FUNCTION

6.1 Function Description

This section explains VS-QA262's limit SW output function.

6.1.1 Limit SW output function

With this function, the machine's travel amount is detected by the absolute value of the ABSOCODER sensor, and ON/OFF signal outputs are used in place of conventional limit switches.
As shown in Fig. 6.2, the ON/OFF positions can be designated at any of the points where the ABSOCODER sensor's detection occurs.
When the ABSOCODER sensor is traveled by a motor, etc., the sensor's travel position is compared with the pre-designated ON/OFF position data, and ON/OFF signals are output.

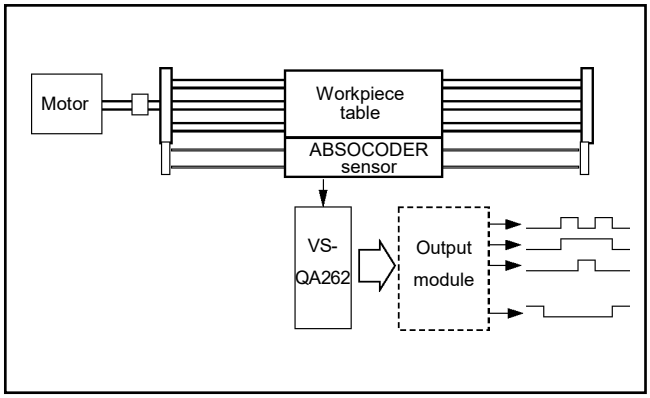


Fig. 6.1 Example of using VS-QA262

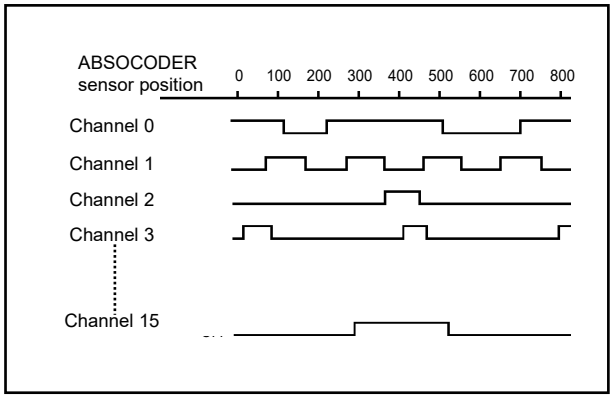


Fig. 6.2 Limit Switch Example

(1) Up to 16 channels (Channels 0 to 15) can be used for limit SW outputs.

(2) Up to 9 programs (Program Nos. 0 to 8) containing each channel's ON/OFF data setting can be registered. The programs to be used are then selected when operation is to occur.

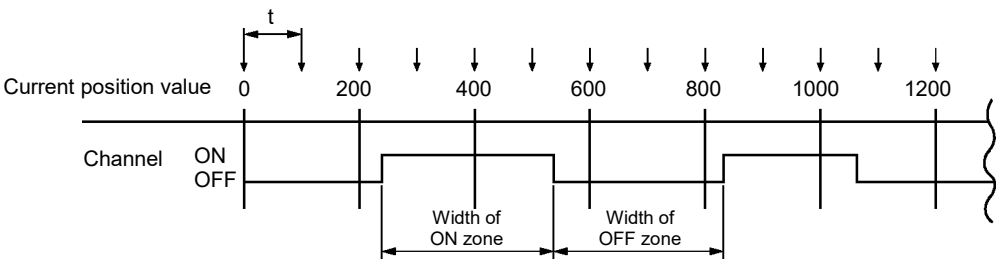
Program 0: At the time of power outage or programmable controller reset, data are not stored in the internal memory VS-QA262. When the power is turned ON, the data become cleared.
Programs 1 to 8: Data are stored in the internal memory VS-QA262.

(3) The program No. to be used is designated by the sequence program which writes that program No. at the buffer memory's 'program No. setting' area (address 9 [1009]).

(4) The ON/OFF settings can be designated by the sequence program.
Refer to section 6.5 for details regarding the setting procedure.

REMARKS
As VS-QA262 has no external output, the limit SW output has to be executed externally by the sequence program. In such use where high-speed response is required, the scan time for the sequnce program may cause some problems. The limit SW output should be given to an output modlule making use of the fixed scan execution type program or the high-speed interrupt function.
For details of the program and the function, please refer to the User's Manual (Function Explanation, Program Fundamentals) and the Programming Manual of CPU Module used.

(5) The minimum setting width the ON/OFF zone is determined by the scan time of the sequence program and the sampling time of VS-QA262.



t: Scan time of the sequence program + Sampling time of VS-QA262

The limit SW output function of VS-QA262 samples the position data every 1.6ms and outputs the limit SW signal as compared with ON/OFF data set. The scan time of the sequence program is affected when the limit SW signal outputs to the output module.
When the machine travels by exceeding a given permissible speed, position detection at each minimum setting unit of the scale length will become impossible, and the outputs of ON and OFF signals as designated will also be impossible.

In such cases, the width of the ON and OFF signal zones must be increased.

The following formula is used to calculate the permissible speed:

$$\text{Permissible speed} = \frac{\text{Minimum setting unit of the scale length}}{t} \times \frac{\text{Width of signal zone}}{\text{Minimum setting unit of the scale length}}$$

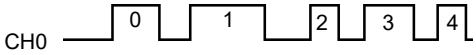
Example:
When the ' minimum setting unit of the scale length ' is 0.01 mm, and the 'width of signal zone' is 0.1 mm:
(When the scan time for the sequnce program is 10ms)

$$\text{Permissible speed} = \frac{0.01\text{mm}}{1.6\text{ms}+10\text{ms}} \times \frac{0.1\text{mm}}{0.01\text{mm}}$$

$$= 8.62\text{mm/s}$$

When the higher permissible speed or the smaller setting width is desired, use the fixed scan execution type program or the high-speed interrupt function. The output will be executed without any effect by the scan time of the sequnce program.

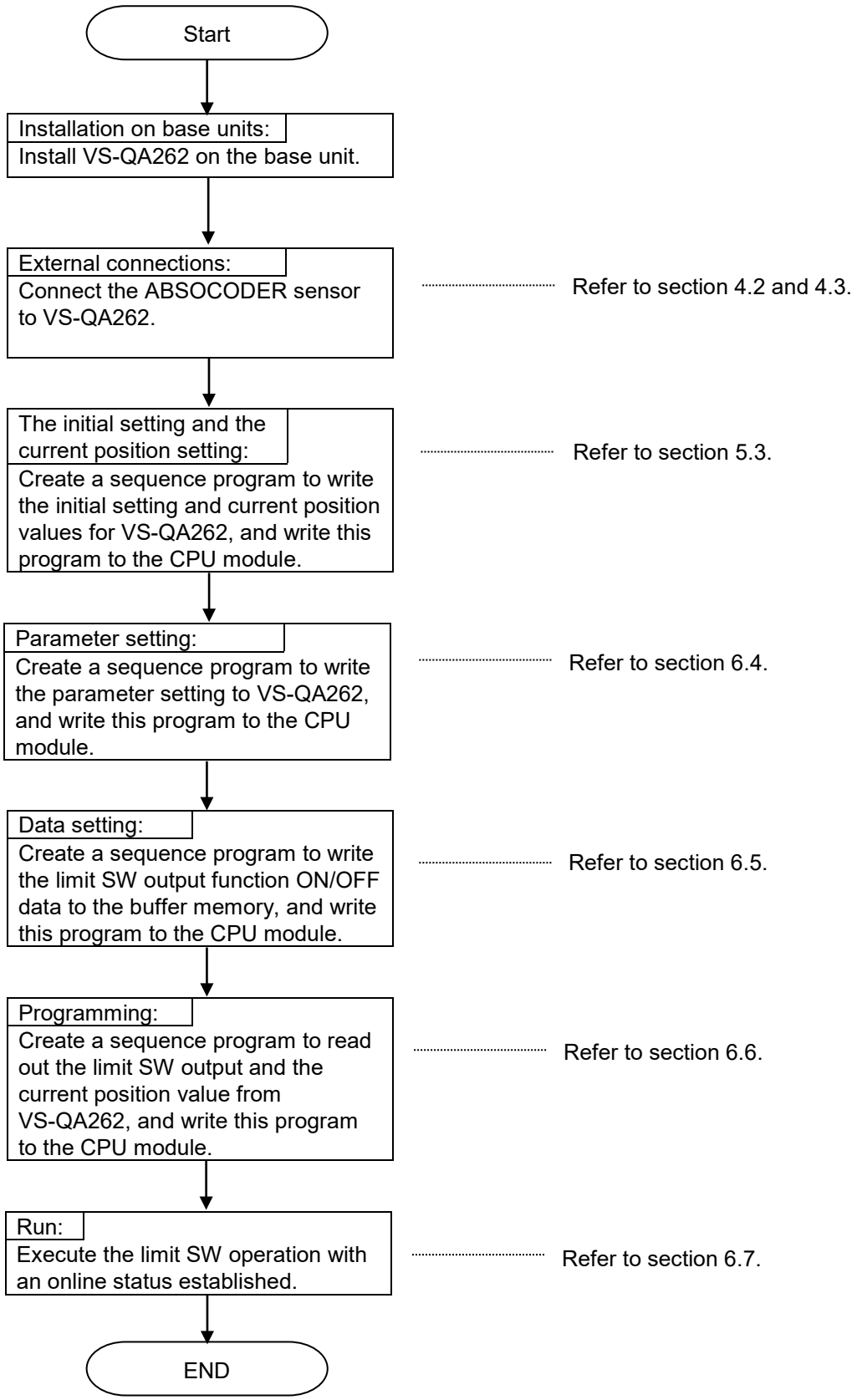
(6) Up to 10 ON/OFF data settings can be designated for each VS-QA262 channel.
This is referred to as the 'multi-dog setting function'.



Numerals indicate the multi-dog Nos.

6.2 Pre-Operation Setting Sequence

This section explains the setting sequence for the limit switch function.



REMARKS

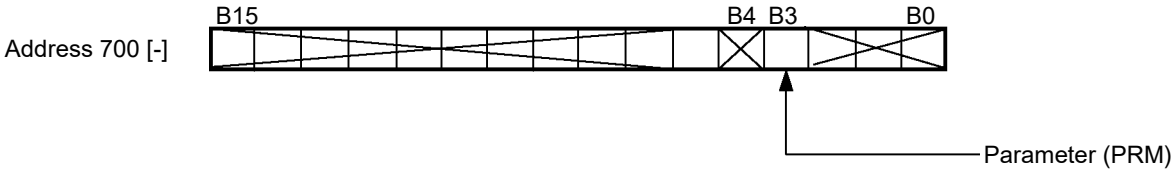
Settings other than the current position setting can be done even when the ABSOCODER sensor is not connected.

6.3 Initial Settings

Refer to 5.3 for VS-QA262's initial settings.
The initial settings are commonly used for the current position detection function, the limit SW output function, and the positioning function.

6.4 Parameter Settings

This section explains the parameter settings for the VS-QA262's limit SW output function.
Parameters are factory-set (default).
Designate only the parameter item which is required to change.
When writing the parameters, specify ’1’ at the relevant bit of the buffer memory's data memory flag (address 700 [-]).



Writing to the parameter buffer memory area is enabled at all times.
When offline, however, parameter data writing to VS-QA262 is not possible until the parameter bit of the data memory flag (address 700 [-]) is set to ‘1’.

The parameter settings of axes 1 and 2 are executed simultateously.

REMARKS
The VS-QA262 parameters consist of the 'current position detection function', the ’limit SW output function' and the 'positioning function'.
Only the parameters used for the limit SW output function are explained here.
For details regarding the current position detection function parameters, refer to section 5.4, and for the positioning function parameters, refer to section 7.4.
When the limit SW output and positioning functions are used jointly, parameters for both functions must be designated.

6.4.1 Parameter list

[ ]: Address for axis 2

Address	Item	Content	Setting data	Default
711 [1711]	Function	Designates 'Current position detection function only', 'limit SW output function only' or limit SW output function & positioning function.	0: Limit SW output function & positioning function 1: Limit SW output function only 2: Current position detection function only	2
735 [1735]	Offline channel output status	Designates the limit SW output status when offline.	0: All-points OFF 1: Hold	0

6.4.2 Function setting

For details regarding the function setting (address 711 [1711]) parameter, refer to section 5.4.2.

6.4.3 Offline channel output status setting

This section explains the setting of the limit SW output status when offline.
The offline limit SW output status is designated at address 735 [1735].
The setting content is as follows.

Address	Item	Content	Setting data
735 [1735]	Offline channel output status	Designates the limit SW output status when offline.	0: All-points OFF 1: Hold

A 'HOLD' setting means that the most recent limit SW output status is maintained.
In case the power is turned OFF when an 'output HOLD' status exists, that limit SW output will be turned OFF when the power is turned back ON.
The limit SW output will also be turned OFF when the PLC CPU is reset.

6.4.4 Parameter setting sequence

For details regarding the parameter setting sequence, refer to section 5.4.8.
The parameter setting sequence is commonly used for the current position detection function, the limit SW output function, and the positioning function.

6.5 Data Setting

This section explains VS-QA262's limit SW output data settings.

There are 9 programs (programs 0 to 8) to set limit SW outputs.
The setting sequence for program 0 is different from those for Programs.1 to 8.

(1) Program 0
Program 0 does is not kept any data within VS-QA262 when the power is turned OFF or when the PLC is reset. When ‘0’ is written for the program No. setting, the limit SW output works according to the contents (data) of the limit SW output ON/OFF data setting area (addresses 12 [1012] to 667 [1667]) of the buffer memory. To change the SW data during the operation of program 0, write ‘9’ for the program No. setting and then write ‘0’ again.

(2) Programs 1 to 8
Programs 1 to 8 are kept data within VS-QA262 when the power is turned OFF or when the PLC is reset. Making use of data memory flag, the contents of the limit SW output ON/OFF data setting area of the buffer memory can be stored. When 1 to 8 are written for the program No. setting, outputs can be executed by the setting data stored.

6.5.1 Data Setting

This section explains the data setting for the limit SW output function.

(1) The setting data must be designated for each channel, and consists of the 'number of multi-dogs', and the ON/OFF position data for each dog.

(2) The 'number of multi-dogs' setting is written as binary values.
The ON/OFF position data is written as 'scaling binary' values.
An error will occur when dog positions are outside the detection range or when overlapping dogs exist.
The error code is the relevant buffer memory address + 1000.

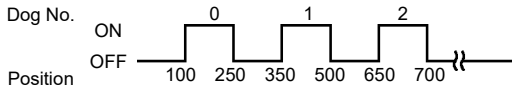
There are separate ON setting and OFF setting areas for writing the dog position data.

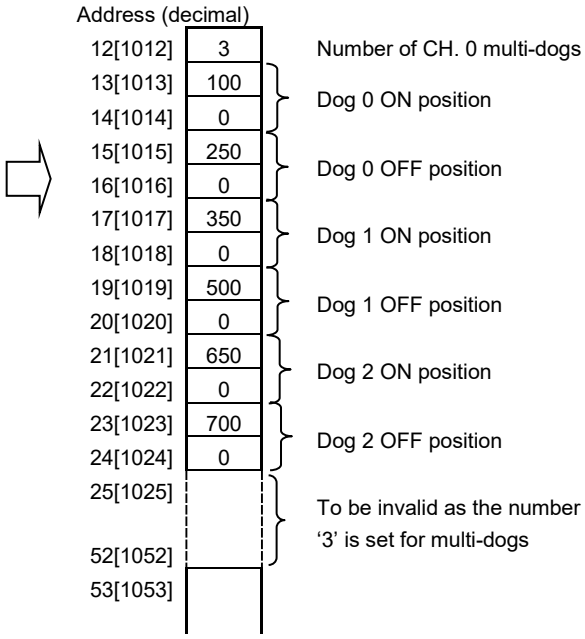
Discrimination between the ON and OFF writing areas is executed automatically according to the data content of dog No.0.

There can be no mixing of ON and OFF areas on a single channel.

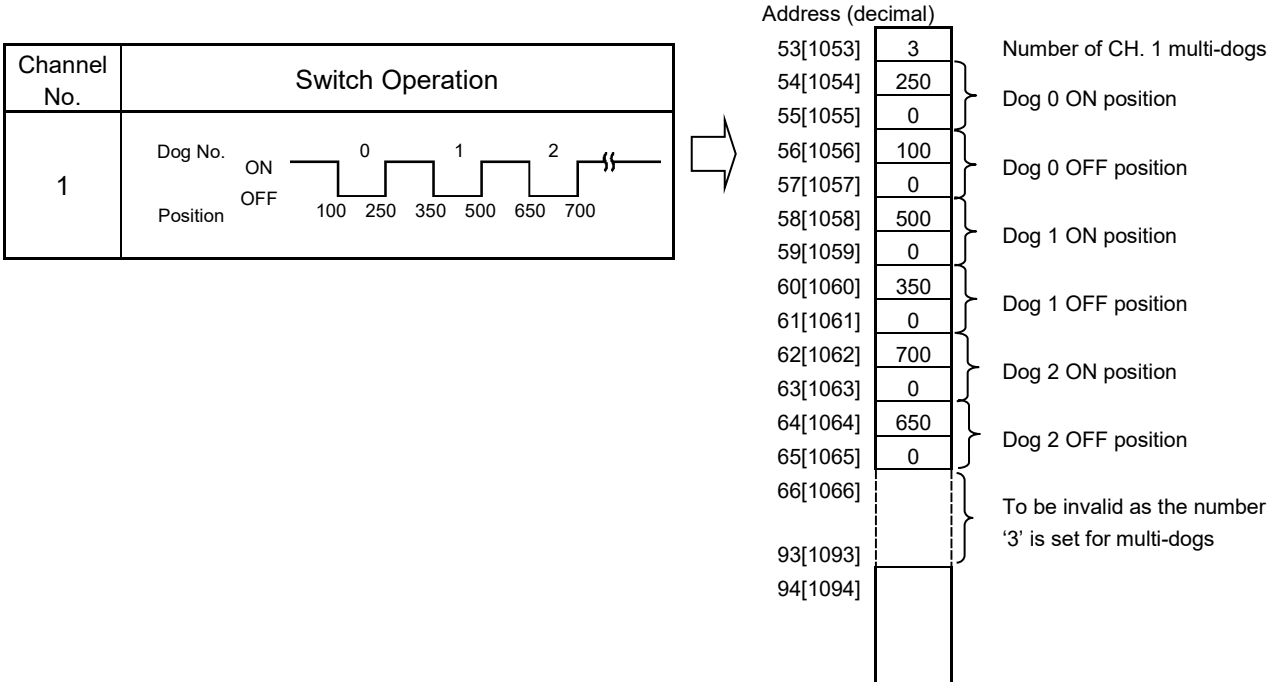
Examples of the ON area and OFF area position writing are given on the following line.

① 'ON Area' [Limit SW 'closed (a) contact' Operation] Dog Position Writing:
'ON area' should be written by a pair of the ON position data and the OFF position data. At this time, the ON position data should be smaller than the OFF position data.
When the numerical values for each dog are not written in order, beginning from the lowest and proceeding to the highest, an error will occur. (The value of dog No. 0 position must be smaller than that of dog No. 1 position.)

Channel No.	Switch Operation
0	



② 'OFF Area' [Limit SW 'open (b) contact' operation] Dog Position Writing:
The 'OFF area' should be written by a pair of the ON position data and the OFF position data. At this time, the ON position data should be larger than the OFF position data.
When the numerical values for each dog are not written in order, beginning from the lowest and proceeding to the highest, an error will occur.



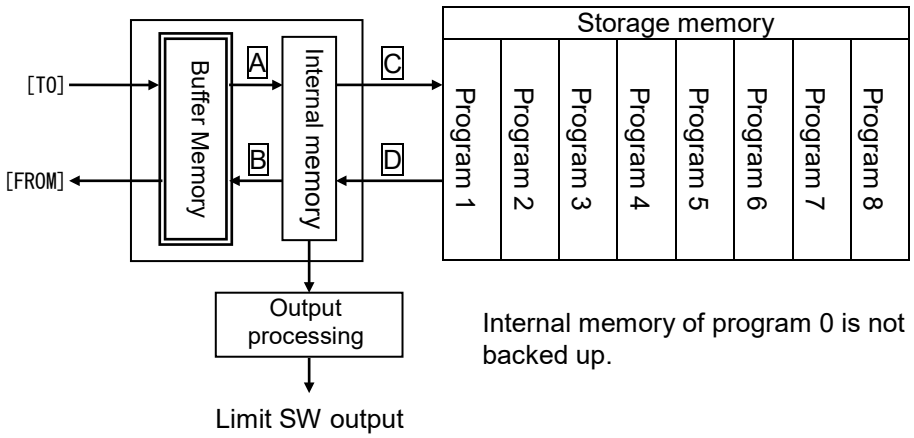
(3) The 'number of multi-dogs' setting range is as follows:
0 to 10 (only the lower four bits of setting data are operative)
When a setting of '0' is designated, the dog ON/OFF position data at that channel will be inoperative.
Any setting exceeding '10' will be processed as '10'.

(4) The setting range for the ON/OFF position data (scaling binary values) is as follows:
[Minimum current position value] to [Minimum current position value + scale length -1]

6.5.2 Limit Switch Data Flow

As the figure shown below, setting of limit SW consists of three memory areas as the buffer memory, the internal memory, and the storage memory.

- The buffer memory is used for data communication with the PLC CPU.
- ON/OFF operation of limit SW outputs can be executed by data of the internal memory.
- Data inside the storage memory do not vary even when the power is turned OFF or the PLC is reset. Therefore, limit SW outputs can be executed by selecting a program No..



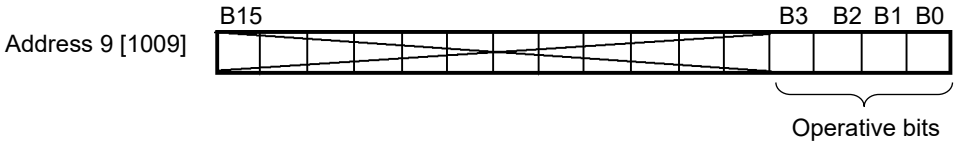
When program 0 is selected: [A]
When programs 1 to 8 are selected: [D]
When programs 1 to 8 are written: [A], [C]
When programs 1 to 8 are read out: [D], [B]

6.5.3 Program 0 data setting

The limit SW output cannot be executed only by writing limit SW output ON/OFF data to the buffer memory. It is necessary to load the data into the internal memory.

By writing '0' for the program No. setting (address 9 [1009]), the data of the limit SW setting of the buffer memory can be written into the internal memory of VS-QA262.

To change limit SW data during the operation of program 0, write '9' for the program No. setting (address 9 [1009]) and then write '0' again.



(1) Data written from the PLC CPU to the buffer memory by 'TO' instruction is loaded into the internal memory (operation [A] above) by writing '0' for the program No. setting (address 9 [1009]) while online.

(2) An error will be detected when improper data is loaded into the internal memory with the program No. setting of '0'. The error code will be the 'buffer memory address where the error was detected +1000', and the program No. answerback does not become '0'. (The previous status is held)
When errors are detected, the Limit SW does not output new data. The output will differs according to the operational condition as follows:

Previous status	Status after a limit switch setting error is detected
Online	To maintain the status at the time when the program No. has been set to '0' (HOLD)
Offline	All points OFF or HOLD (according to parameter setting)

6.5.4 Writing of Programs 1 to 8

As VS-QA262 keeps the contents of program 1 to 8 internally, the data do not vary due to the power-off or the reset of the PLC.

The data of the limit SW output ON/OFF setting area of the buffer memory are stored in each program of VS-QA262 using the data memory flag. When required, the limit SW output can be changed by setting of program No. from 1 to 8.

Procedure for writing

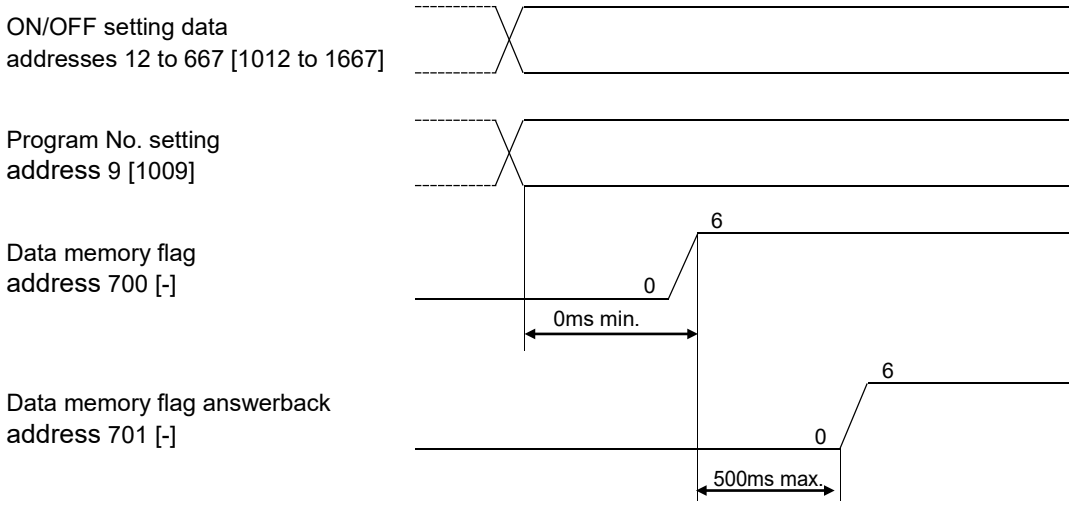
(a) Turn the 'PLC ready' signal (Y10) OFF.

(b) Write the data in the limit SW output ON/OFF data setting area (addresses 12 to 667 [1012 to1667]) of the buffer memory.

(c) Write such program No. to store in program No. setting area (address 9 [1009]) of the buffer memory.

(d) Write '6' in the data memory flag area (address 700 [-]) of buffer memory (write '1' for program bit and the writing selection bit).
(A program numbers with any number other than 1 to 8 will cause error code 30.)

(e) When the data memory flag answerback area (address 700[-]) of the buffer memory becomes '6' (the program bit and the writing selection bit become '1'), writing is completed.



REMARKS
In VS-QA262, in case there is an error (error codes 1012 to 1667 [2012 to 2667]) with the limit SW output data written, the value for the data memory flag answerback does not vary.
Check the data for the error code (address 7 [1007]) and change the write data.

6.5.5 Read-out of Programs 1 to 8

The data of programs 1 to 8 are stored within VS-QA262 when the power is turned OFF and when the PLC is reset.
Making use of data memory flag, limit SW output ON/OFF setting data stored in each program of VS-QA262 can be read out on the buffer memory.

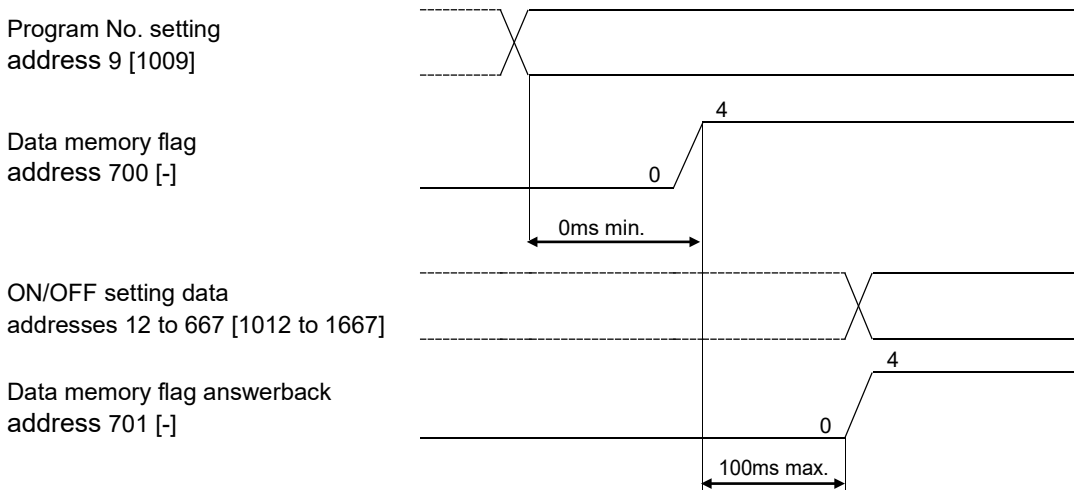
Procedure for Reading-out

(a) Turn the ‘PLC ready' signal (Y10) OFF.

(b) Write program No. of desired limit SW data in the program No. setting area (address 9 [1009]) of the buffer memory.

(c) Write ‘4’ in the data memory flag area (aaddress 700 [-]) of the buffer memory (write ‘1’ for the program bit).
(A program numbers with any number other than 1 to 8 will cause error code 30.)

(d) When the data memory flag answerback area (address 701 [-]) becomes ‘4’ (the program bit becomes ‘1’), reading-out is completed.



REMARKS
In VS-QA262, in case there is an error (error Codes 61 to 68) with limit SW output data to be read out, the value for data memory flag answerback does not vary.

6.6 Programming

This section explains how to create the sequence program using VS-QA262 for the limit SW output.

6.6.1 The Initial Setting and the Parameter Setting Data Writing Program

For details regarding the initial setting and the parameter setting data writing program, refer to section 5.5.2.

6.6.2 Program for the limit SW output function

Example 1):
The limit SW output function is started when one of programs (1 to 3) which is set in VS-QA262 is designated by external input.
This program example is for axis 1. Axis 2 programs can be generated in the same way.

Conditions

(1) The following signal assignments are used to control VS-QA262.

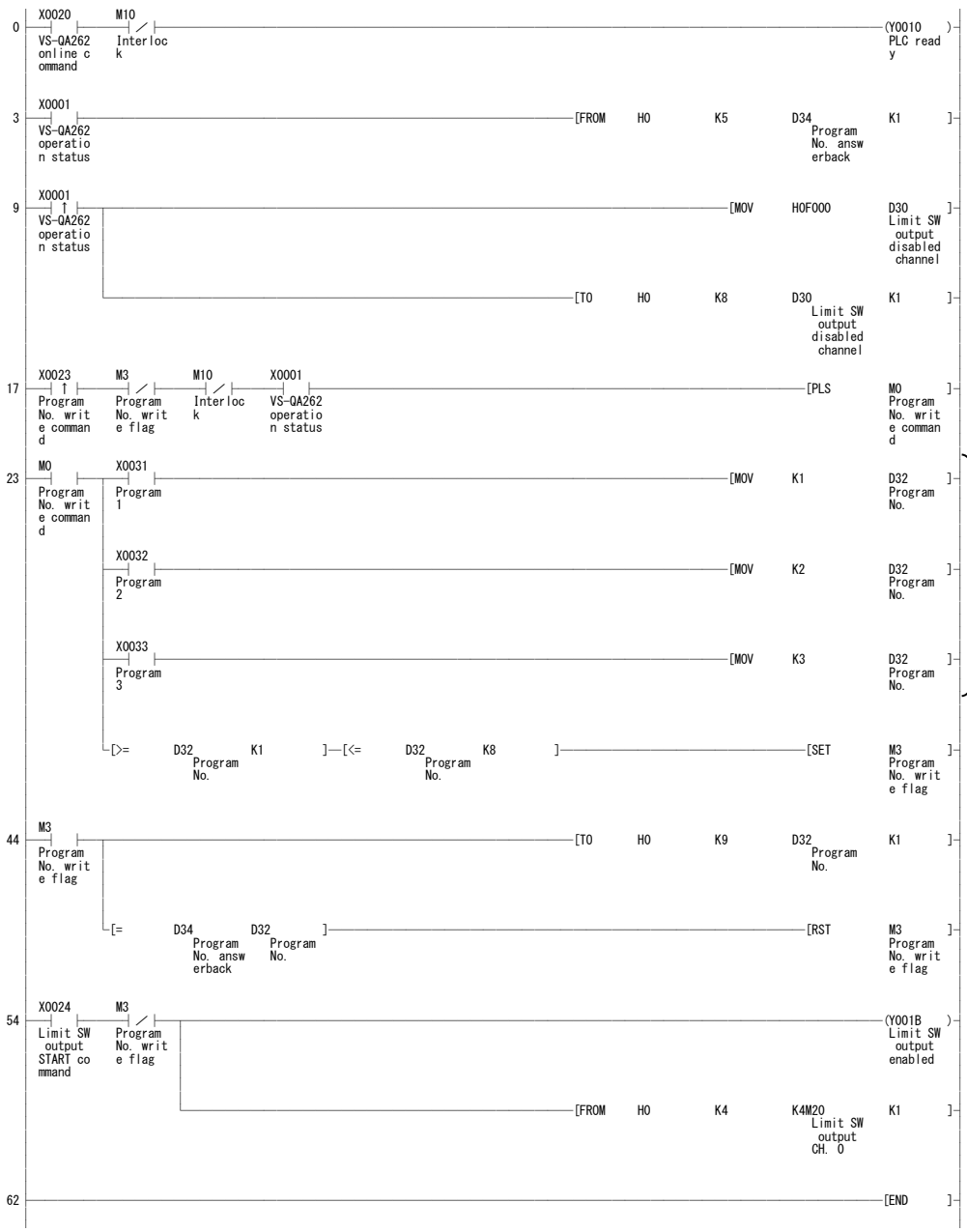
VS-QA262 online command	X20
Program No. write command	X23
Limit SW output function START command	X24
Program No. selection switch	X31 (For program 1)
	X32 (For program 2)
	X33 (For program 3)
Limit SW output disabled channel information storage register	D30
Program No. storage register	D32
Program No. answerback storage register	D34
Limit SW output storage register	D35
Limit SW output CH. 0 to CH. 15	M20 to M35

(2) The setting data of programs 1 to 3 is designated in advance at VS-QA262.

(3) VS-QA262 channels 0 to 11 are designated for use.

REMARKS
In VS-QA262, in case there is an error (error codes 61 to 68) with limit SW data of the program No. designated, the value for the program No. answerback does not vary.

Program Example



PLC ready signal of VS-QA262 is turned ON.

Read out program No. answerback

Write output disabled channels in VS-QA262

Program write command

Program No. selection

Write program Nos. in VS-QA262

If the written program Nos. and program No. answerback values are the same, the procedure will be completed.

Limit SW output function START command

The output statuses of all buffer memory channels are developed at M20 to M35.

Example 2):
An example to start the limit SW output function by writing the setting data which is stored at the PLC CPU's data register into the program 0 area.

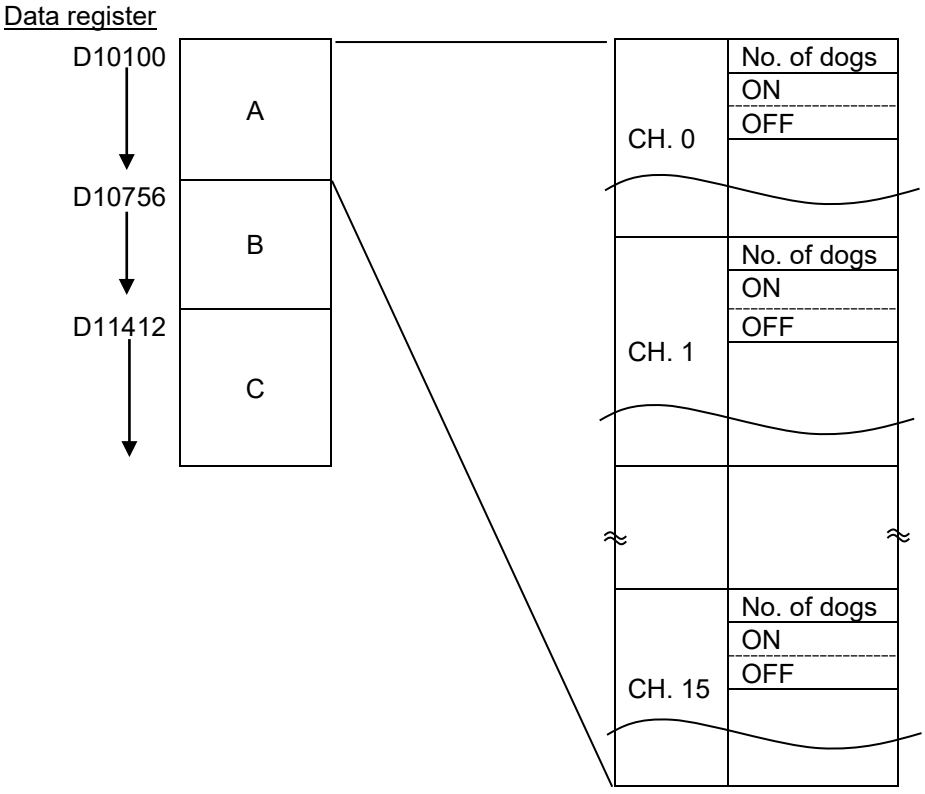
This program example is for axis 1. Axis 2 programs can be generated in the same way.

Conditions

(1) The following signal assignments are used to control VS-QA262.

VS-QA262 online command ····· X20
Program No. write command ····· X23
Limit SW output function START command ····· X24
Program No. selection switch ····· X3A (For program A)
····· X3B (For program B)
····· X3C (For program C)
Limit SW output disabled channel information storage register····· D30
Program No. storage register ····· D32
Program No. answerback storage register····· D34
Error code storage resister····· D38
Limit SW output CH. 0 to CH. 15 ····· M20 to M35

(2) The setting data for programs A to C has already been saved at the data register.

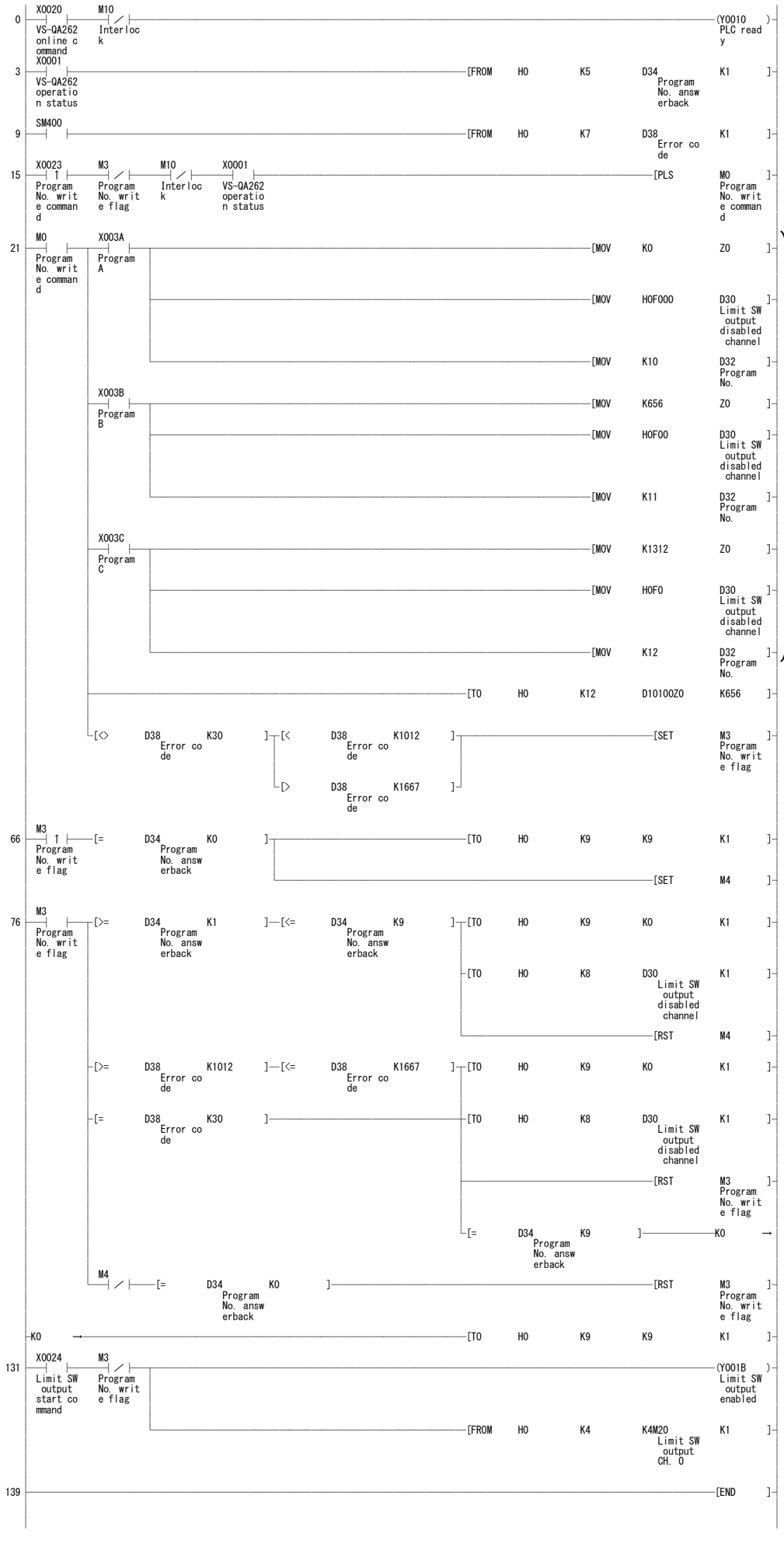


(3) The number of channels varies according to the program used:

Program A: Channels 0 to 11
Program B: Channels 0 to 7, 12 to 15
Program C: Channels 0 to 3, 8 to 15

REMARKS
In VS-QA262, in case there is an error (erroe code 1012 to 1667 [2012 to 2667]) with the limit switch data written, the value for program No.answerback does not vary.

Program Example



PLC ready signal of VS-QA262 is turned ON.

Read out program No. answerback

Read out error code

Program write command

Program selection
- Data register address setting
- Change output disabled channels in the program selected

Write limit SW data in VS-QA262

Check limit SW data errors

When the program No. is ‘0’, 9' is written in program No setting once.

When the program No. is other than ‘0’, write ‘0’ in the program No. setting.

Write output disabled channels in VS-QA262.

When a limit SW data error or a program No. error is found, write ‘0’ in the program No. setting.
Further, when the program No. anserback is ‘9’, write ‘9’ in the program No. setting.

Limit SW output function START command

The output statuses of all buffer memory channels are developed at M20 to M35.

6.6.3 Writing program to programs 1 to 8

This section provides an example of the program to write the ON/OFF data stored in the PLC CPU file register to VS-QA262's programs 1 to 8.
This program example is for axis 1. Axis 2 programs can be generated in the same way.

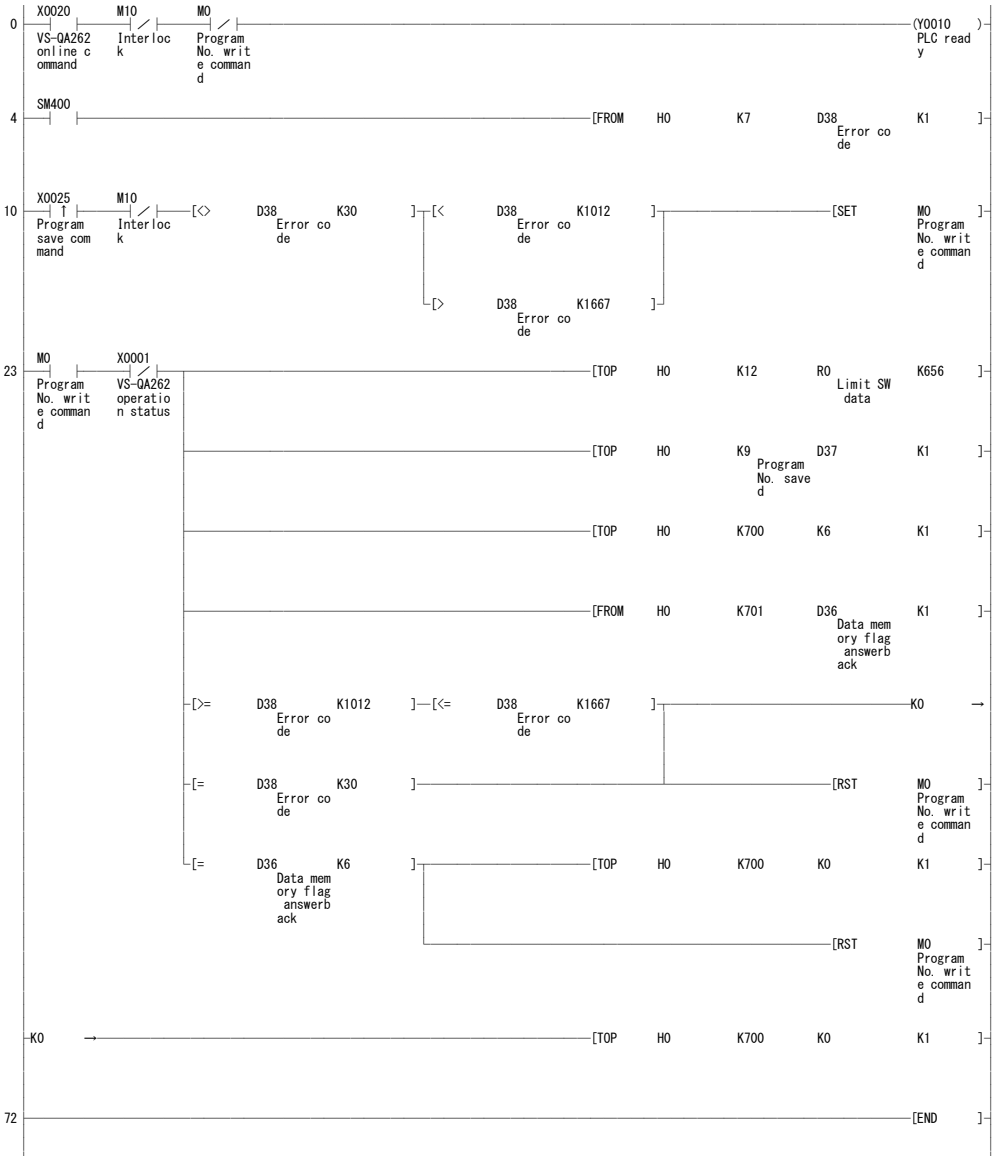
Conditions

(1) The following signal assignments are used to control VS-QA262.
VS-QA262 online command····· X20
Program saving command····· X25
Data memory flag answerback storage register····· D36
Saved program No. storage register ····· D37
Error code storage resister ····· D38
Limit SW output ON/OFF data error flag····· M10

(2) Limit SW output ON/OFF data assumed to be stored in file register R0 in advance.
(3) Program No. (1 to 8) is assumed to be stored in data register D37 in advance.

REMARKS
In VS-QA262, in case there is an error (error codes 1012 to 1667 [2012 to 2667]) with the limit SW output data written, the value for the data memory flag answerback does not vary.
Check the data for the error code (address 7[1007]) and change the write data.

Program Example



6.6.4 Reading program from programs 1 to 8

This section provides an example of the program to read the setting data from the areas of VS-QA262's programs 1 to 8 to the PLC CPU file register.
This program example is for axis 1. Axis 2 programs can be generated in the same way.

Conditions

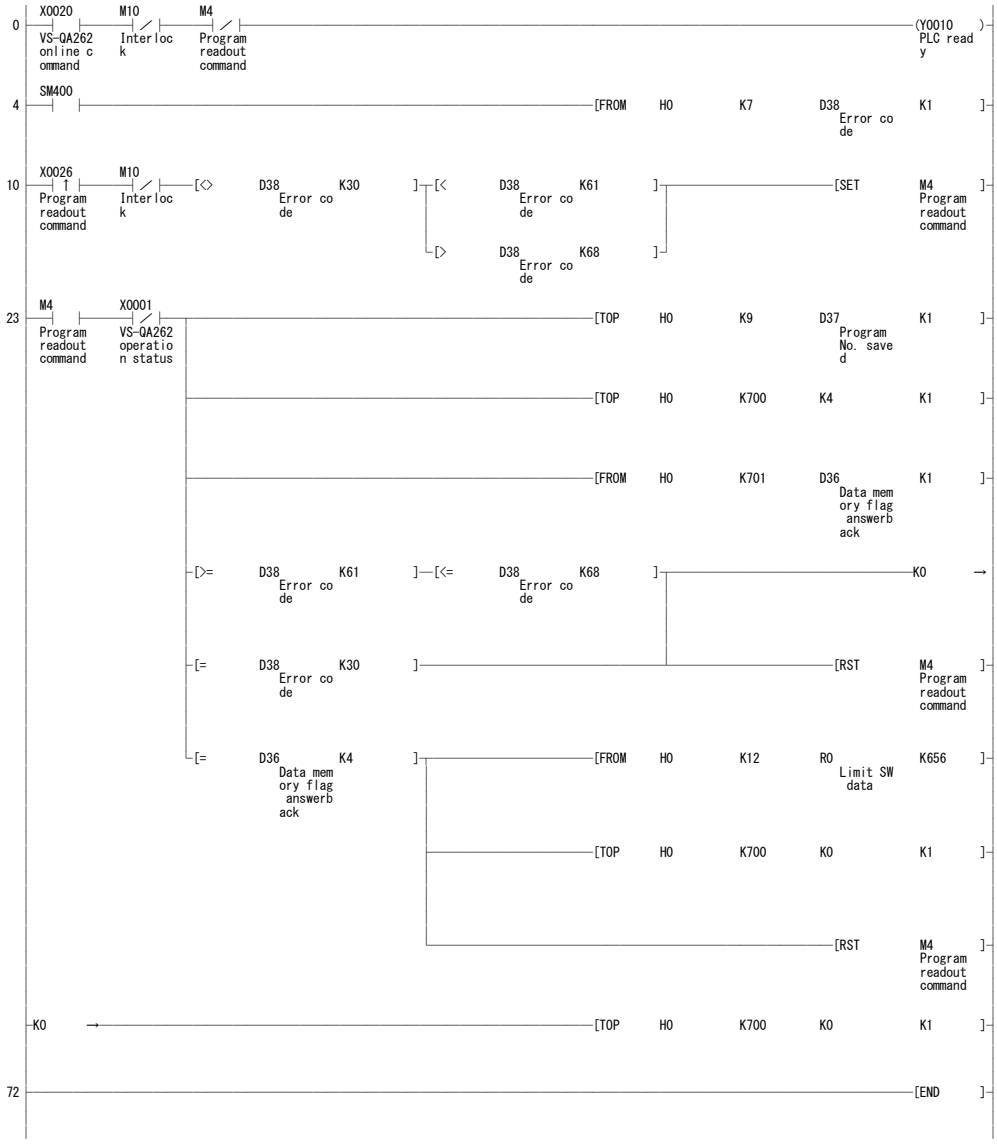
(1) The following signal assignments are used to control VS-QA262.
VS-QA262 online command ····· X20
Program read out command ····· X26
Data memory flag answerback storage register ····· D36
Saved program No. storage register ····· D37
Error code storage resister ····· D38

(2) The Limit SW output ON/OFF data are read out in file register R0.
(3) Program No. (1 to 8) is assumed to be stored in data register D37 in advance.

REMARKS

In VS-QA262, in case there is an error (error code 61 to 68) with the limit switch data to be read out, the value for data memory flag answerback does not vary.

Program Example



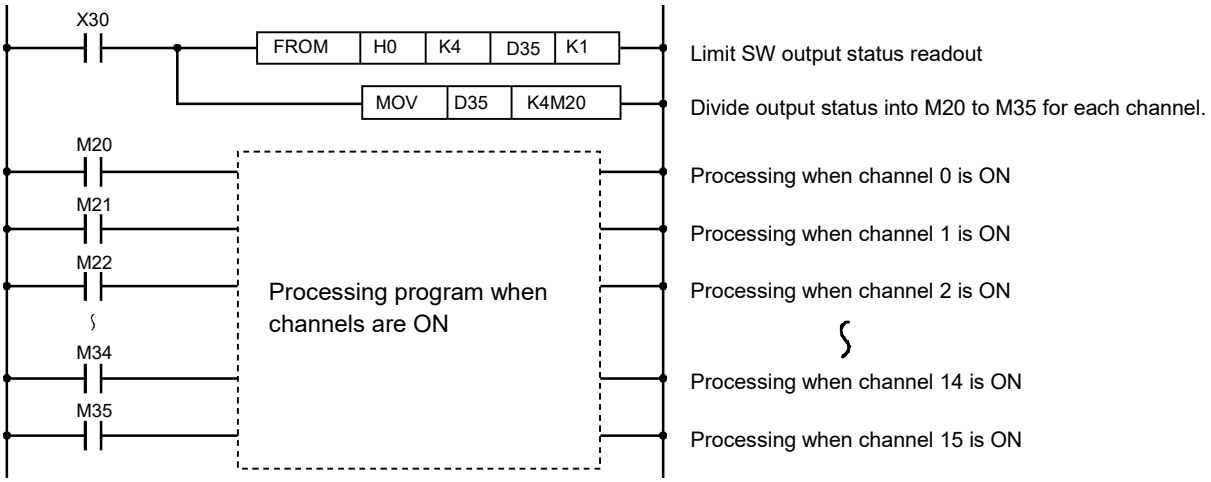
6.6.5 Program for limit SW output status readout

A program example for the ON/OFF status readout of the 16 channels is given below.
This program example is for axis 1. Axis 2 programs can be generated in the same way.

Conditions

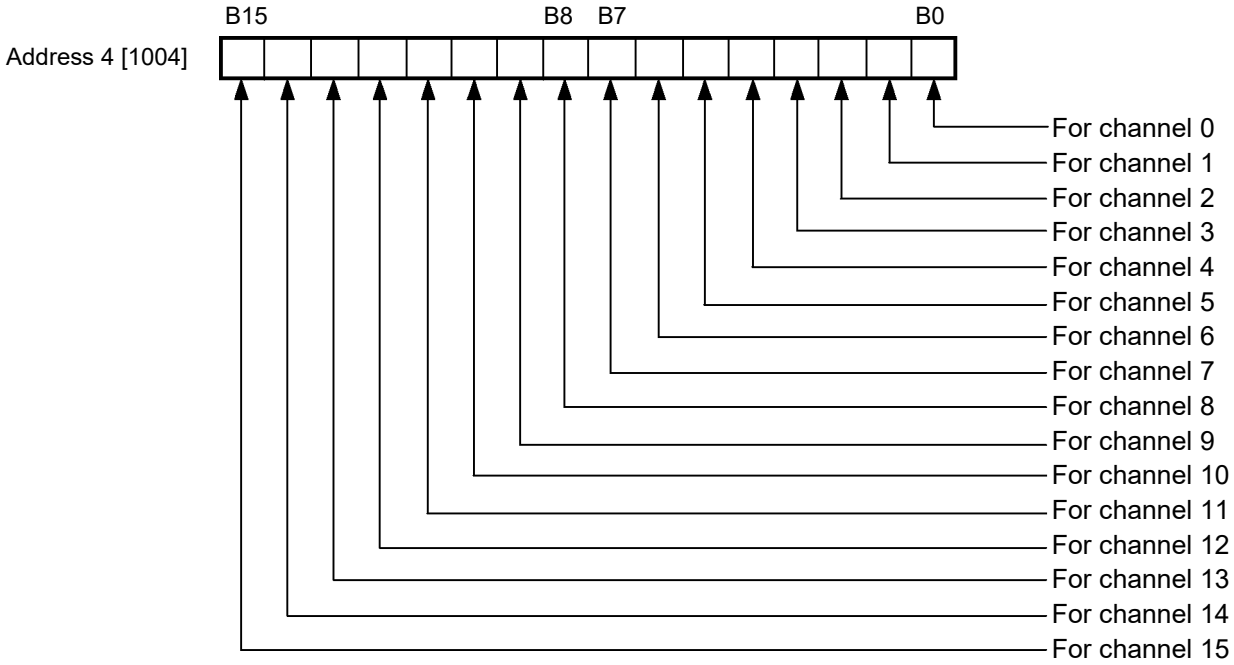
(1) The following signal assignments are used to control VS-QA262.
Limit SW output status storage register ····· D35
Limit SW output status detection for each channel ····· M20 to M35
Limit SW output status readout command ····· X30

Program Example



Explanation

(1) The output status is stored at address 4 [1004] of the buffer memory as follows:

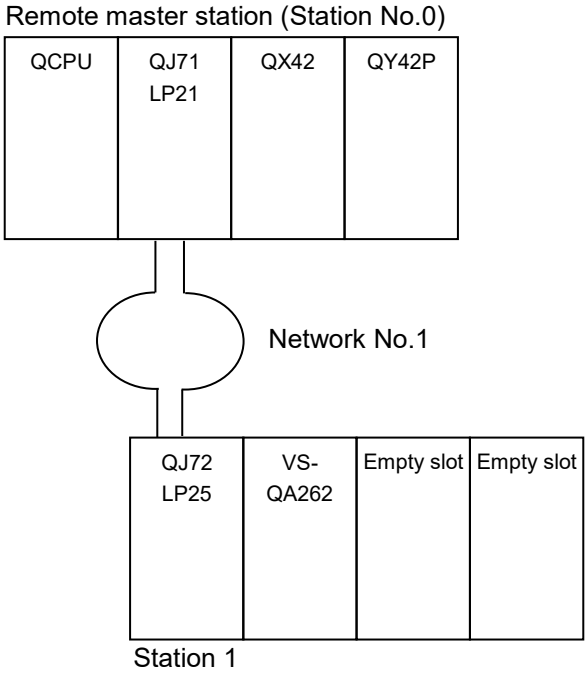


Note:
As VS-QA262 has no external input/output, limit SW signals are output by a sequence program. The scan time for the sequnce program may affect the response time of the limit SW output. In case this causes a problem, review the system structure by taking the above points into account.

6.6.6 Remote I/O station programming

The master station (CPU) programming which is required when VS-QA262 is installed in a remote station is explained below.
This program example is for axis 1. Axis 2 programs can be generated in the same way.

(1)System configuration



An example shows how to start the limit SW output function when designating one of programs(1 to 3) by external input.

Conditions

(1) The following signal assignments are used to control VS-QA262.
VS-QA262 online command ····· X20
Program No. write command ····· X23
Limit SW output function START command ····· X24
Program No. selection switch ····· X31 (For program 1)
····· X32 (For program 2)
····· X33 (For program 3)
Limit SW output disabled channel information storage register····· D30
Program No. storage register····· D32
Program No. answerback storage register ····· D34
Limit SW output CH. 0 to CH. 15 ····· M20 to M35

(2) The setting data of programs 1 to 3 is designated in advance at VS-QA262.

(3) VS-QA262 channels 0 to 11 are designated for use.

REMARKS

In VS-QA262, in case there is an error (erroe codes 61 to 68) with the limit SW data of the program No. designated, the value for program No. answerback does not vary.

(4) The XY settings are specified in the network range assignment of the network parameters as shown below.

XY settings												
Station No.	Master station -> Remote station						Remote station -> Master station					
	Y			Y			X			X		
	Points	Start	End	Points	Start	End	Points	Start	End	Points	Start	End
1	32	0300	031F	32	0000	001F	32	0300	031F	32	0000	001F

(5) The refresh parameters are specified in the network parameters as shown below.

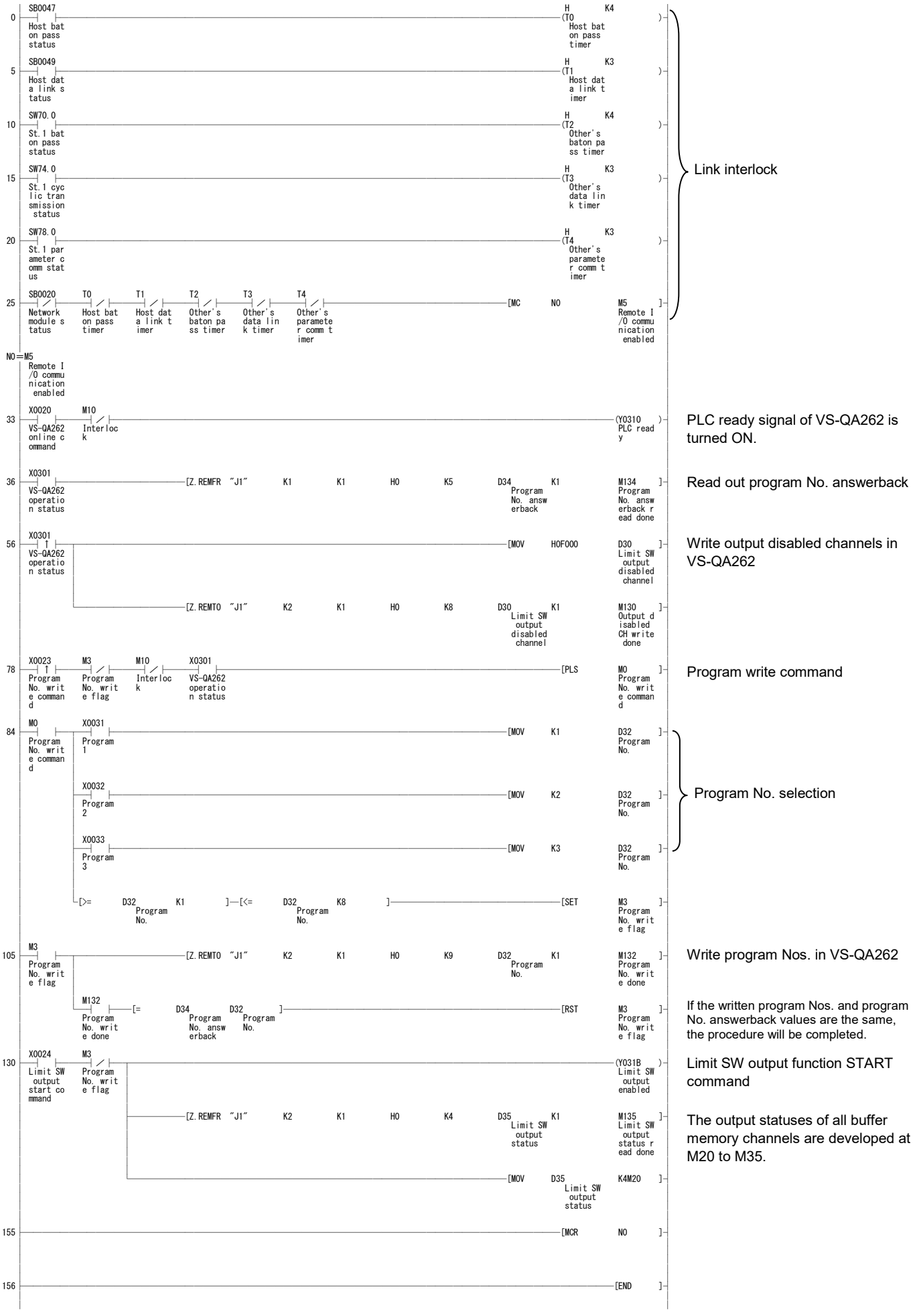
Refresh parameter settings									
	Link side					CPU side			
	Device name	Points	Start	End		Device name	Points	Start	End
Transfer 'm'	LX	32	0300	031F	←→	X	32	0300	031F
Transfer 'n'	LY	32	0300	031F	←→	Y	32	0300	031F

Note:
This program example does not apply to basic models (Q00JCPU, Q00CPU, Q01CPU) because those models do not have a remote I/O network function.

To read or write multiple data items at the same time, use different channel numbers for the link-dedicated instructions.

As VS-QA262 has no external input/output, limit SW signals are output by a sequence program. The scan time for the sequnce program or the communication time for remote I/O may affect the response time of limit SW output. In case it causes a problem, review the system struture by taking the points into account.

(2) Program Example



6.7 Operation

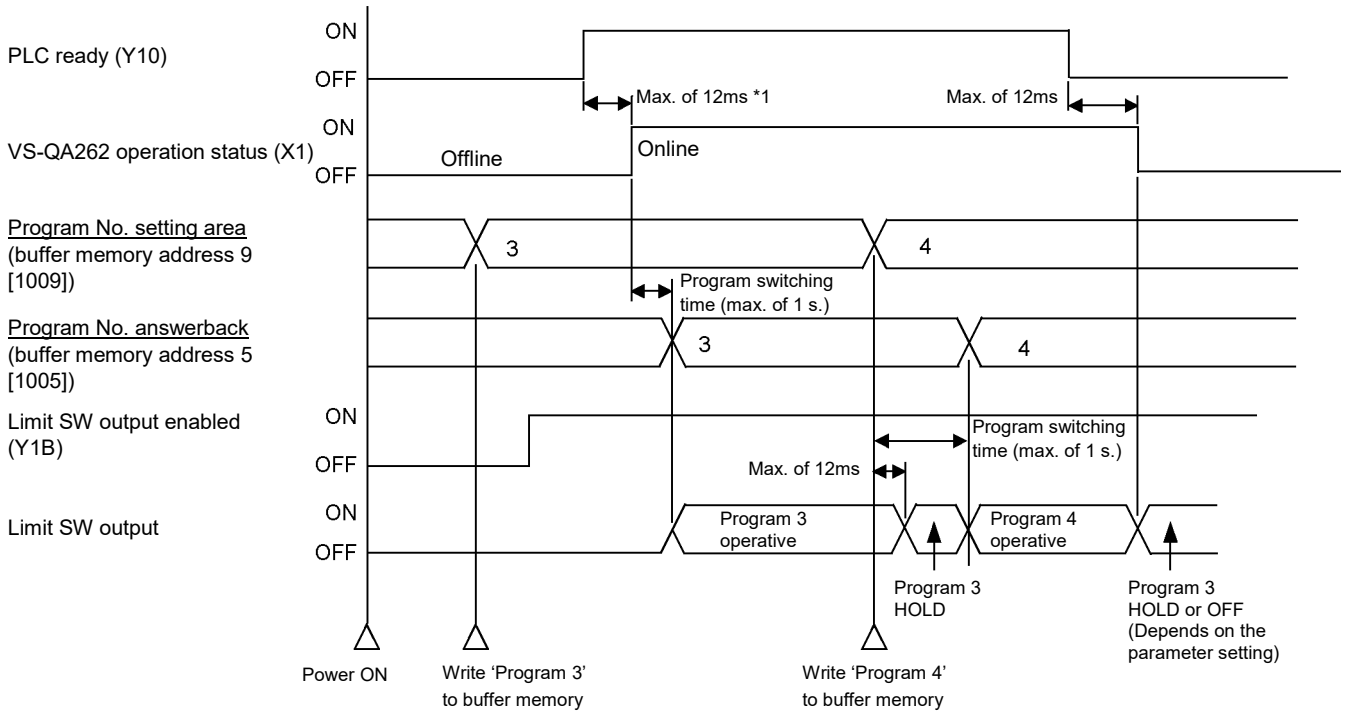
The VS-QA262 online status is established when the ‘PLC ready’ signal (Y10) turns ON, and the limit SW output function and the current position preset function are enabled.

6.7.1 Program switching

The limit SW output program switching procedure is explained below.
When VS-QA262 is online, the limit SW output function is executed according to the content of the buffer memory's program No. setting area (address 9 [1009]).

When the power is turned ON and the PLC CPU is reset, ‘0’ is stored in the program No. setting area. The buffer memory's limit SW output ON/OFF data will be cleared. Therefore, the limit SW output will remain OFF even when an online status is established.

The following timing chart shows the operational flows just given an online status after writing ‘3’ in the program No. setting area in the offline status when the power is turned ON.



The program switching time varies between 0.03 to 1s according to the number of dogs used in the program.

*1: For 500ms after the power is turned ON or the CPU resetting is released, online status is not established even when the ‘PLC ready' signal (Y10) is turned ON.

6.7.2 Operation of program 0

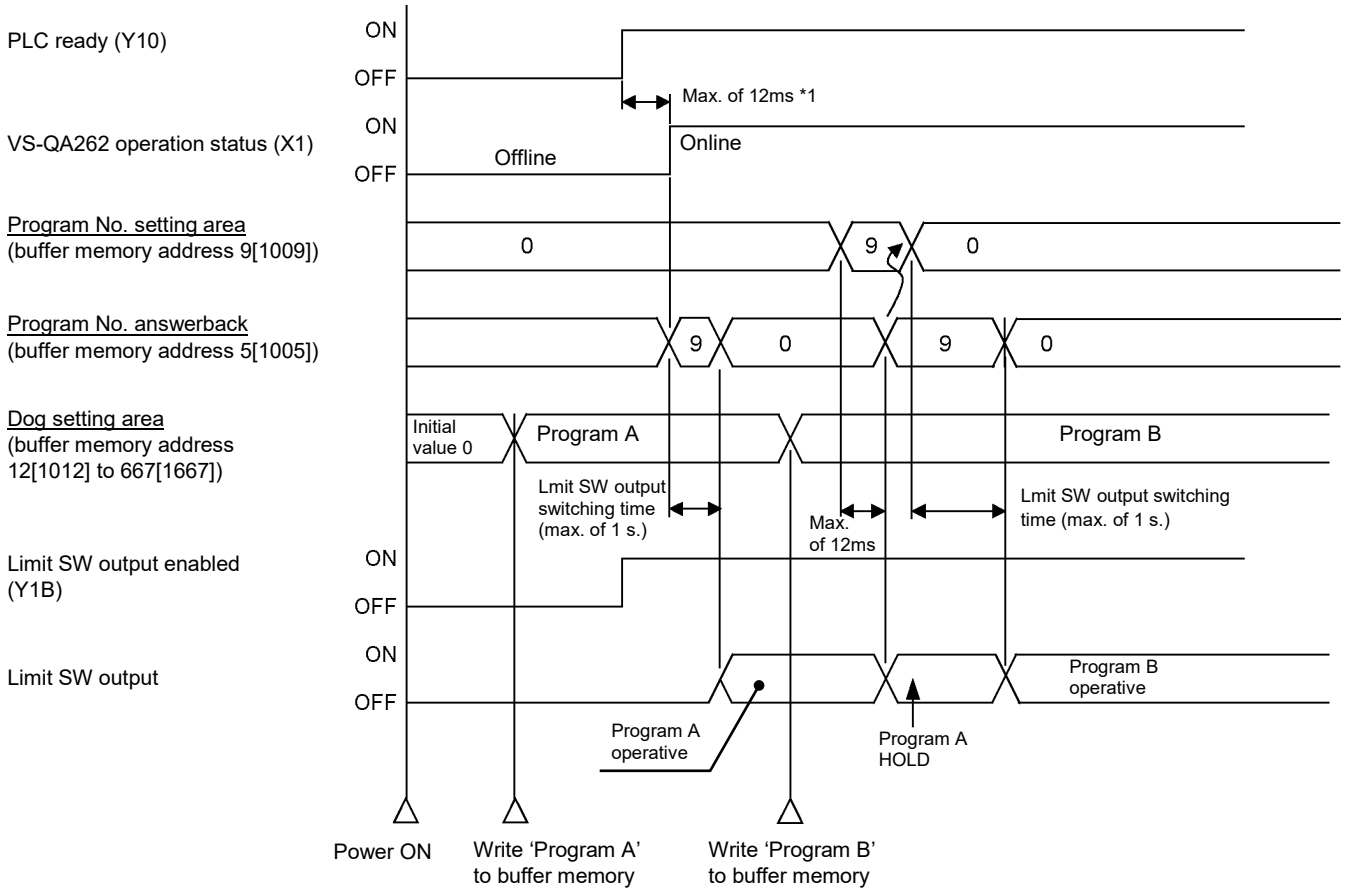
Some precautions regarding the program 0 operation are explained below.
Program 0 settings for the dog ON/OFF positions are normally written to the buffer memory by the sequence program.
The buffer memory content is written to the internal memory and limit SW output settings become operative at the following times (refer to section 6.5.3 for details regarding program 0 settings):

(a) When '0' is written at Program No. setting area (buffer memory address 9 [1009]) during an online status.

(b) When the setting value at address 9 [1009] of the buffer memory was '0' when the operation status was switched from 'offline' to 'online'.

If the dog ON/OFF setting value stored in the buffer memory are changed during program No. 0 operation, the limit switch outputs will not be changed at that time.
In order to change the limit switch outputs; write ‘9’ for the program No. setting (address 9 [1009]), and then write ‘0’ again, or the operation status must be turned to 'offline', and then back to 'online'.

(1) The figure below shows the timing chart when the following operations are done after the power is turned ON.
(a) In the case of switching offline to online status after writing the dog setting values to the buffer memory
(b) In the case of changing the limit switch data which is set at the buffer memory during online status



*1: For 500ms after the power is turned ON or the CPU resetting is released, online status is not established even when the ‘PLC ready' signal (Y10) is turned ON.

(2) During switching the program when the program No. setting is ‘0’, ‘9’ is stored in the program No. answerback.

MEMO

7. POSITIONING FUNCTION

This section explains the VS-QA262 positioning function.

7.1 Function Description

The positioning function consists of an operation in which the ABSOCODER sensor detects the machine's current position value and compares that value with the pre-designated speed-change data and target stop position data. After that the appropriate positioning signals are output in order to move the machine to the target stop position.
The positioning range is the span in which the ABSOCODER sensor can execute absolute position detection.
The machine travel range must be within the absolute position detection range.

(1) The parameter settings or buffer memories of the low-speed zone, stop zone, in-position zone, and medium-speed zone (if required) are designated.
Positioning will begin when the START input signal is turned ON, after the target stop position has been written to the buffer memory by the sequence program.

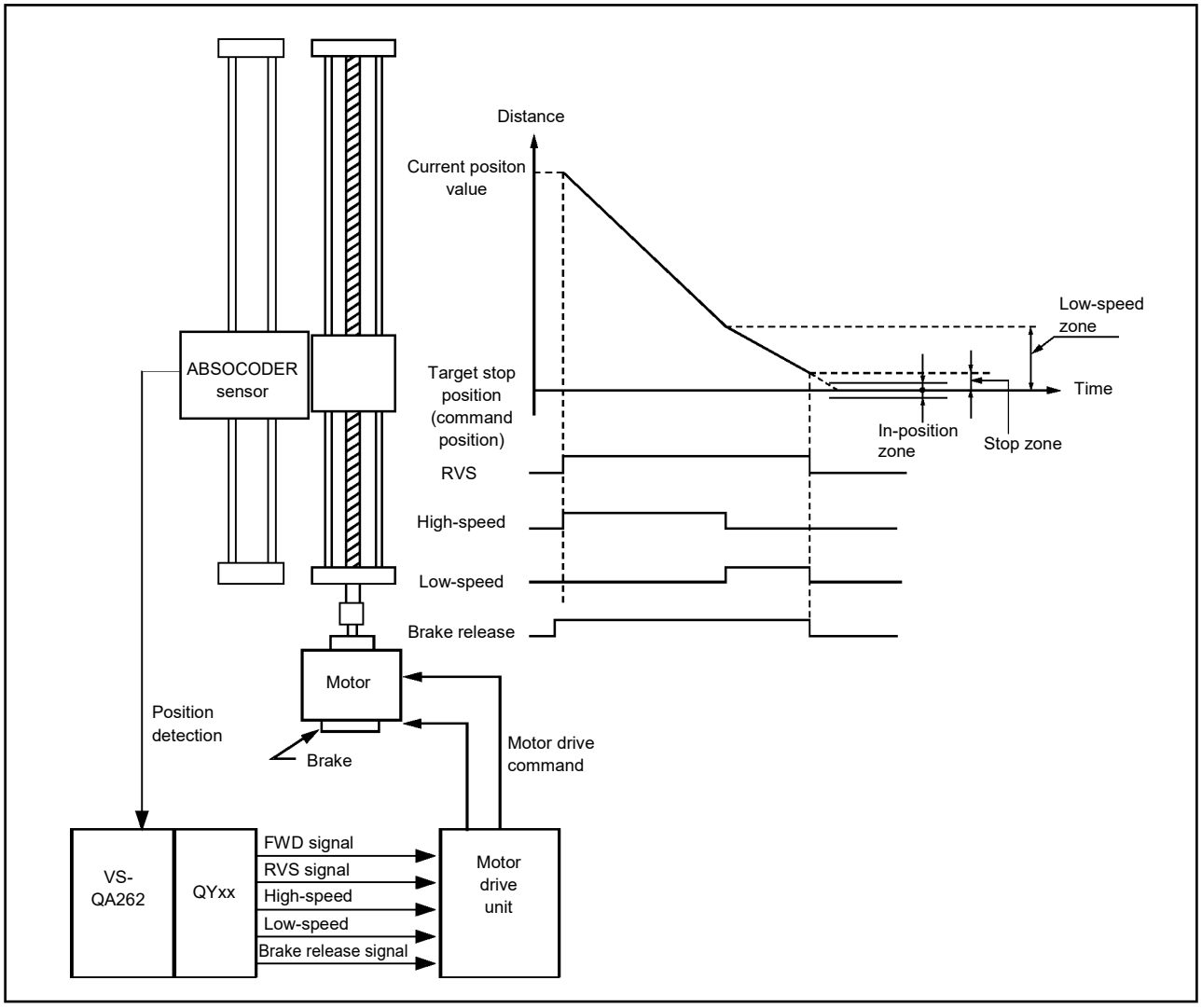


Fig. 7.1 Example of the Speed Switching Format without Positioning Overshoot

(2) The positioning operation is controlled by the following 8 output signals:
X10 [X18] FWD (FWD/low-speed for the 'speed stepping format')
X11 [X19] RVS(RVS/low-speed for the 'speed stepping format')
X12 [X1A] High-speed
X13 [X1B] Low-speed (Medium-speed for the 'speed stepping format')
X14 [X1C] Brake release
X15 [X1D] In-position
X16 [X1E] Positioning in progress
X17 [X1F] Operation error

Refer to section 7.1.4 for details regarding the timing of each signal.

(3) The limit SW output function can be used while using the positioning function.

(4) The positioning function starts when the VS-QA262's Y11 [Y14] signal is turned ON.

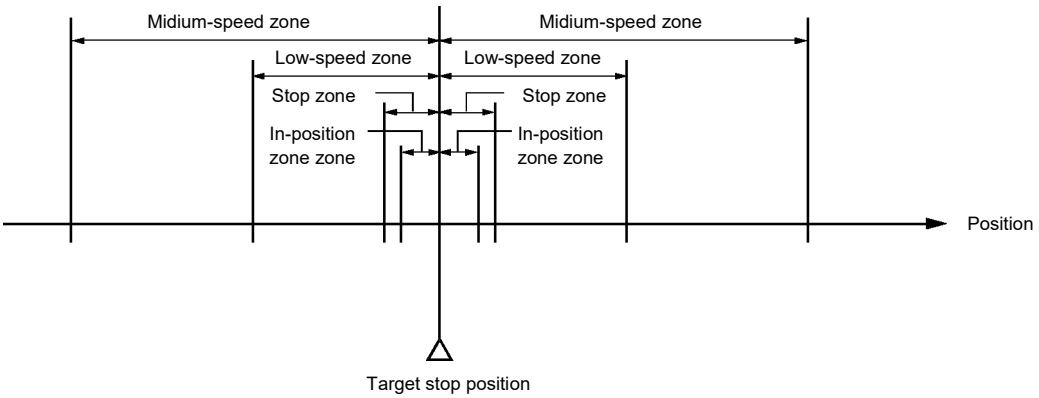
(5) A target stop position setting can be written to the buffer memory (addresses 10 [1010], 11 [1011]) while the VS-QA262 positioning operation is in progress.
Positioning begins when the Y11 [Y14] signal is turned ON; the target stop position setting read at that time, subsequent changes made in the target stop position setting will not affect the positioning operation already in progress.
Target stop position setting changes should be made when the 'positioning in progress' signal (X16 [X1E]) is OFF.

(6) The permissible setting range for the target stop position is according to the 'scale length' and the 'minimum current position value' as follows:

Permissible setting range = [minimum current position value] to [scale length + minimum current position value -1]

Positioning cannot be operated because the error 41 occurs under the following conditions;
- When the position following a positioning overshoot is outside the permissible setting range.
- When a positioning START occurs within the stop zone, a position of the 'length of the stop zone multiplied by 2' from the target stop position is outside the permissible setting range.

(7) The medium-speed zone, the low-speed zone, the stop zone, and the in-position zone are shown below relative to the target stop position.



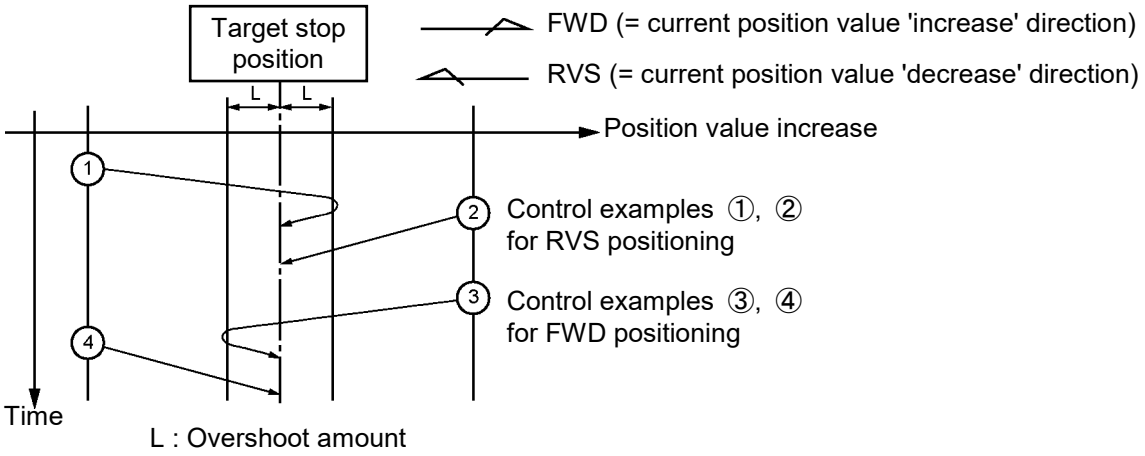
Although the brake is applied at the stop zone position, subsequent motion due to inertia should be considered when designating the stop zone setting in order to ensure that motion is stopped at the target stop position.

REMARKS
As VS-QA262 has no external output, the positioning signal has to be output externally by the sequence program. In such use where positioning accuracy is required, the scan time for the sequnce program may cause some problems. The positioning signals should be given to an output modlule making use of the fixed scan execution type program and the high-speed interrupt function. For details of the program and the function, please refer to User's Manual (Function Explanation, Program Fundamentals) and the Programming Manual of CPU Module used.

7.1.1 Unidirectional positioning

Positioning of VS-QA262 can be executed in one single direction only.
To execute positioning in the opposite direction, the target stop position must be overshot first, with positioning then occurring from the prescribed direction after making a U-turn.
The unidirectional positioning format reduces positioning errors caused by gear backlash, etc.

(1) VS-QA262 automatically determines if a position overshoot is necessary based on whether the current position value is larger or smaller than the target stop position value, and on the FWD (forward) or RVS (reverse) positioning direction designated by parameter.



(2) The overshoot amount is determined by a parameter (addresses 714 [1714] to 715 [1715]).
Refer to section 7.4 for details.
When the overshoot amount is designated as '0', a bidirectional positioning (no overshoot) will occur.

7.1.2 Positioning by speed switching format

In the 'speed switching' format, the 'high-speed' and the 'low-speed' switching signals operate independently, with the high-speed signal being ON during the high-speed operation, and the low-speed signal being ON during the low-speed operation.
Fig. 7.2 below shows the control timing for the speed switching format.

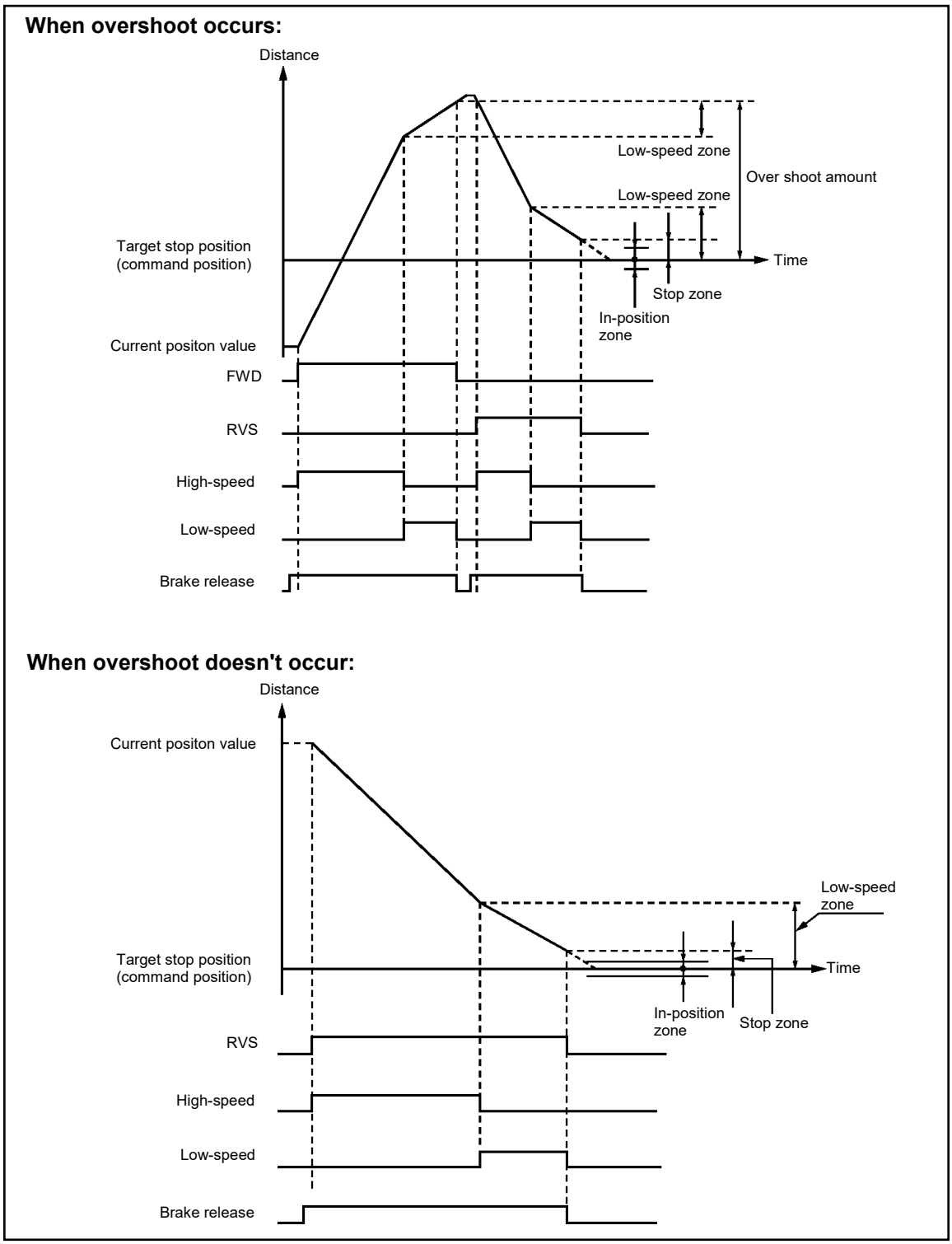


Fig. 7.2 Control Timing for Speed Switching Format

(1)Positioning of VS-QA262 is excuted by follwing procedures;
(a) Set the low-speed zone, stop zone, and in-position zone of the prarmeter or buffer memory in advance.
(b) Write the target stop position (addresses 10 [1010] to 11 [1011]) to the buffer memory by the sequesnce program.
(c) Turn ON the positioning START signal (Y11 [Y14]).
Refer to section 7.4 for details regarding, the low-speed zone, the stop zone, and the in-position zone parameter settings.

7.1.3 Positioning by speed stepping format

In the 'speed stepping' format, the high-speed zone, the medium-speed zone, and the low-speed zone signals do not operate independently. They are combined to produce a stepped speed switching output. Fig. 7.3 below shows the signal timing for the speed stepping format.

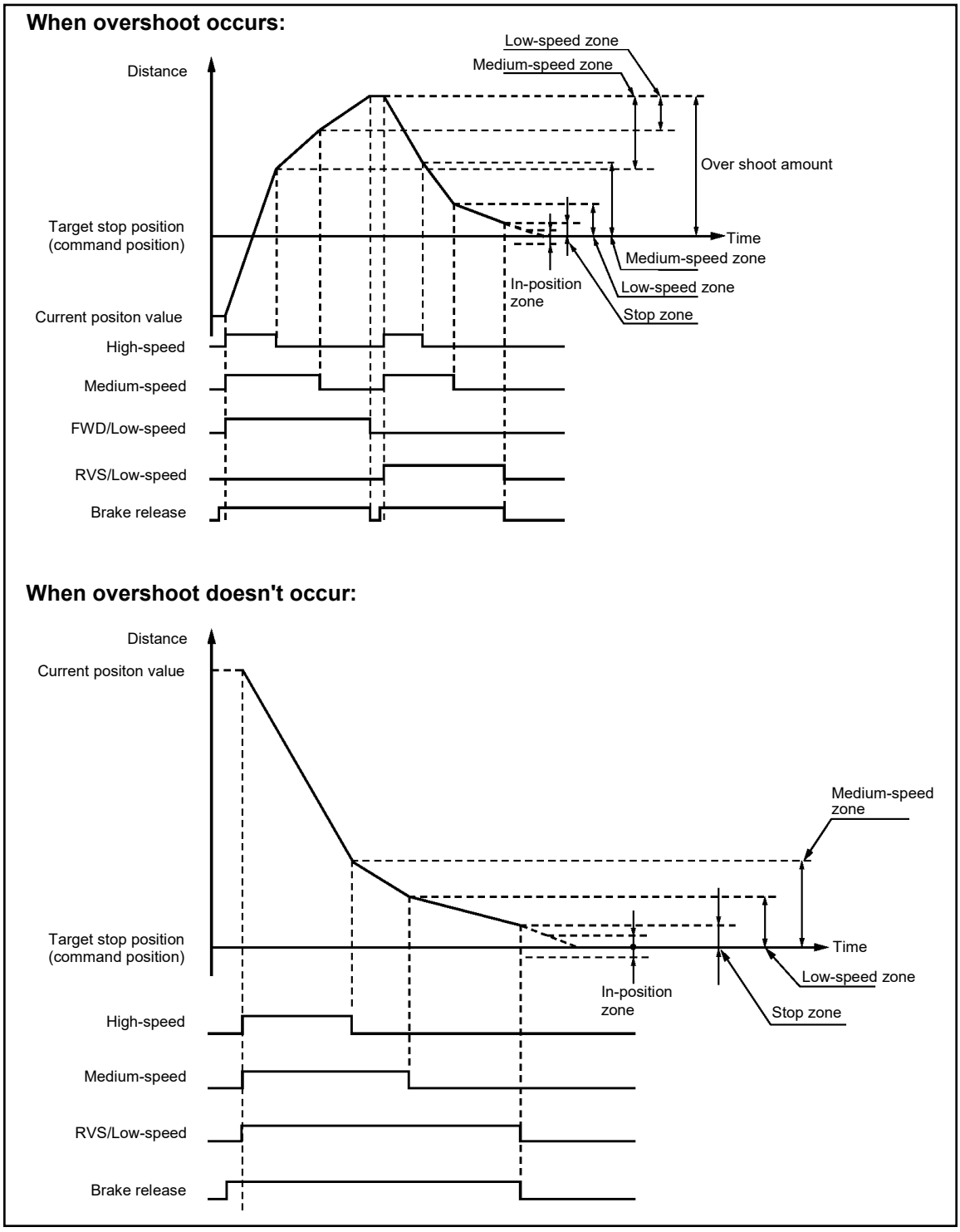


Fig. 7.3 Control Signal Timing for Speed Stepping Format

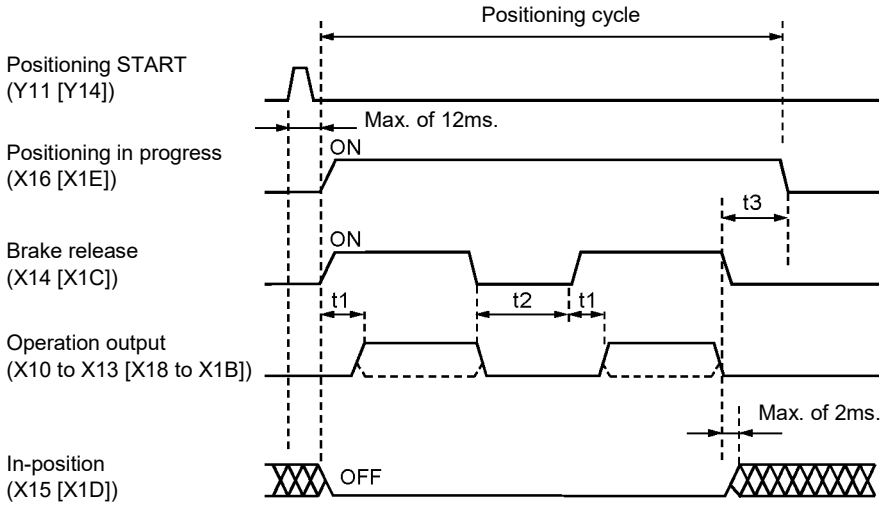
(1) Positioning of VS-QA262 is excuted by follwing procedures;
  (a) Set the medium-speed zone, low-speed zone, stop zone, and in-position zone of the prarmeter or buffer memory in advance.
  (b) Write the target stop position (addresses 10 [1010] to 11 [1011]) to the buffer memory by the sequesnce program.
  (c) Turn ON the positioning START signal (Y11 [Y14]).

Refer to section 7.4 for details regarding the medium-speed, the low-speed zone, the stop zone, and the in-position zone parameter settings.

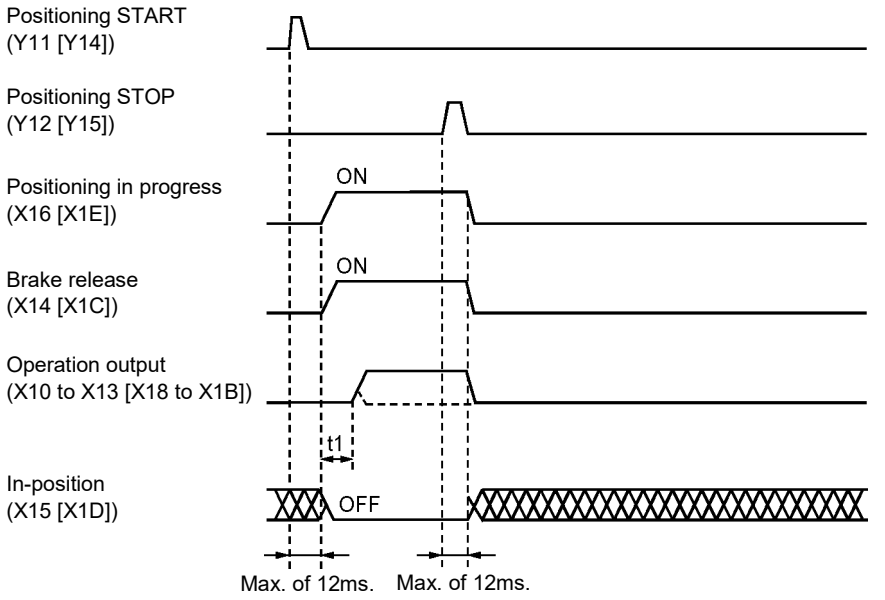
7.1.4 Control timing

The following charts show the ON/OFF timing for each of the positioning control signals.

When 'overshoot positioning' is started by turning the positioning START signal ON:



When positioning is stopped by turning the positioning STOP signal ON:



(1) The 'operation output' item shown above consists of the following outputs:

Speed switching format	FWD, RVS, high-speed, low-speed
Speed stepping format	FWD low-speed, RVS low-speed, high-speed, medium-speed

(2) 't1' indicates the delay period of time from the point when the brake is released, until the point when the operation output comes ON. (10ms)

(3) 't2' indicates the 'stop detection' time required before a U-turn can occur after overshooting.
After VS-QA262 has turned the operation output OFF and the 'brake release' signal goes OFF (brake ON), a 'stop' status is recognized when the amount of current position value change per each 100 ms is plus/minus 2 bits (as a sensor binary value). As soon as a stop status is detected, reverse direction travel will be executed.
The operation signal and the 'brake release' signal are turned OFF simultaneously.

(4) 't3' indicates the delay period from the point when the 'brake release' signal goes OFF (brake ON) to the point when the 'positioning in progress' signal goes OFF (positioning is completed).
The 't3' period is designated by the ‘positioning end detection timer' parameter (buffer memory address 731 [1731]).
Refer to section 7.4 for details.

(5) The 'in-position' signal (X15 [X1D]) is OFF during the positioning cycle (the 'positioning in progress' signal (X16 [X1E]) is ON), except during the 't3' period. During the 't3' period, or after positioning is completed, when the current position value is within the in-position zone of the designated target stop position in the cycle, the 'in-position' signal will turn ON.
Although the in-position zone is passed through during the overshoot operation, the 'in-position' signal (X15 [X1D]) will not turn ON at that time.
The in-position zone is designated by the parameter (buffer memory addresses 722 [1722] and 723 [1723]).
Refer to section 7.4 for details.

(6) The 'in-position' signal (X15 [X1D]) will always go OFF when the power is turned ON.
During an 'online' status, the 'in-position' signal will turn ON after positioning is completed when the current position at that time is within the in-position zone of the designated target stop position.
The 'in-position' signal is always the final output which occurs after all positioning is completed.
When the operation status is switched from 'online' to 'offline' while the 'in-position' signal is ON, the in-position' signal will go OFF. However, if the operation status is switched back to 'online', the 'in-position' signal will come back ON when the current position at that time is still within the in-position zone of the designated target stop position.

(7) Even when the current position value following the completion of the positioning cycle is outside either the in-position zone or the stop zone, the positioning operation will not be resumed. An 'in-position' status should be checked that the ‘in-position’ signal (X15 [X1D]) is turned ON by the sequence program.

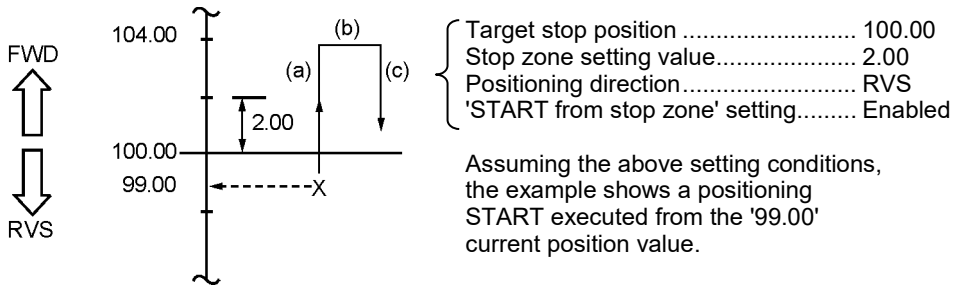
(8) When the current position value is already within the in-position zone of the target stop position before the positioning starts, positioning will not begin, although the 'positioning in progress' signal (X16 [X1E]) will come ON for a 't3' period (Refer to section 7.1.5 (3) for details).

(9) Although the FWD and RVS signals are never output simultaneously during the positioning operation, a 'hardware interlock' condition should be established at the motor, etc., drive circuits as an additional precaution.

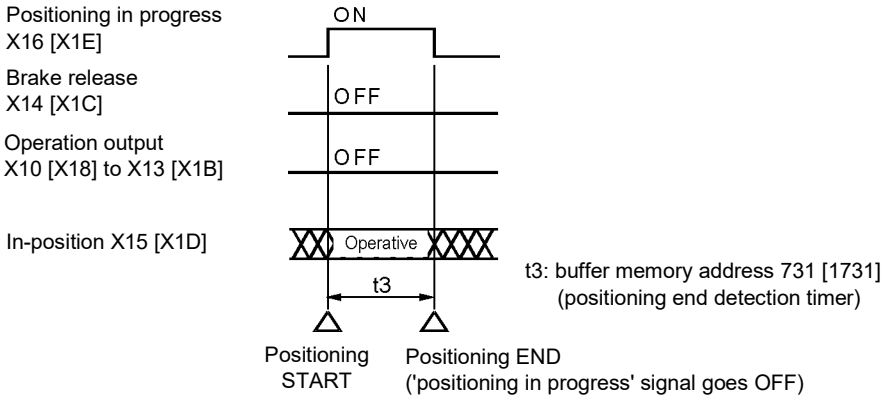
7.1.5 Starting operation from stop zone

The procedure to start the positioning function from inside the stop zone is explained below.
Within the stop zone, the positioning signals are turned OFF, and the brake is applied.
Though, in the course of normal operations, it is impossible to begin a positioning operation from inside a stop zone, VS-QA262 can perform this operation when necessary.

When the positioning starts from the stop zone, the operation is indicated as follows;
(a) Moves the current position twice the distance of the stop zone, in the opposite direction to the parameter designated positioning direction.
(b) Stops the movement at that position, and then the positioning executes again toward the target stop position.



(1) The control timing for a 'START from stop zone' operation is identical to that shown in section 7.1.4.
(2) The parameter setting determines whether or not VS-QA262 can execute a 'START from stop zone' operation. (Refer to section 7.4 for details.)
(3) When the 'START from stop zone disabled' is designated by the parameter (buffer memory address 728 [1728]), positioning cannot start from within a stop zone.
However, the 'positioning in progress' signal will come ON at the time shown below.



(4) Even when the 'START from stop zone' operation occurs, positioning will not be executed within the in-position zone. However, the 'positioning in progress' signal will come ON at the same time as shown in item (3) above.

7.1.6 Simple learning function

When a positional discrepancy occurs between the target stop position and the current position upon completion of positioning, the discrepancy will be automatically corrected for the next positioning.
At this time, either the FWD stop zone or the RVS stop zone is corrected depending on the positioning direction.
(No correction will be provided with the stop zone when the positioning starts within the range which is the twice distance of the stop zone from the target stop position.)
This improves the accuracy when executing the positioning.
An error will occur when the corrected value (stop zone) is not within the low-speed zone.
Correction of the stop zone is provided when the ‘positioning in progress' signal (X16 [X1E])’ is turned OFF. Therefore, set the time for the machine to stop by the ‘positioning end detection timer' parameter (address 731 [1731])

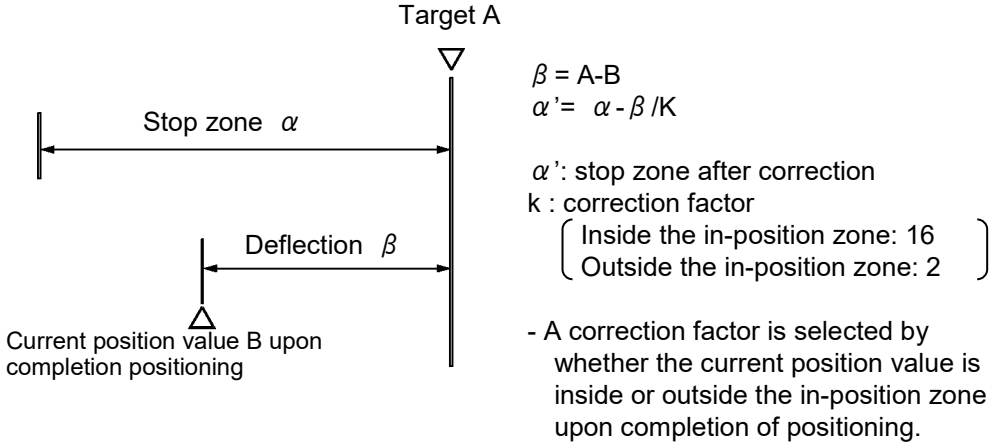
Improved positioning due to this simple learning function is explained below.

(1) Setting the 'stop zone' parameter becomes easier.
The 'stop zone' parameter was conventionally set based on the predicted value. When using the simple learning function, the stop zone is automatically corrected by simply setting any value and repeating operation.

(2) The 'stop zone' does not need to be manually corrected as the brake becomes worn.
The 'stop zone' is automatically corrected even for the change in the amount of brake slides due to wear.

(3) The 'stop zone' is not affected by load variation.
Load may vary due to travel in the reverse direction, such as the machine's up/down motion and trolley's advance and retract motion. In VS-QA262, two 'stop zones' are provided; one for the FWD (forward) direction and another for the RVS (reverse) direction. The simple learning function effectively works even for load variation.

REMARKS
When power supply is interrupted, the learned stop zone is stored in VS-QA262’s internal memory and restored in the buffer memory when power is supplied next.



*: Learning is carried out also in case the stop zone area (address 684 [1684] to 687 [1687]) of the buffer memory is made effective by setting the positioning pattern data buffer memory selection area (address 679 [1679]).
However, when the data which is stored in the stop zone area is changed (address 684 [1684] to 687 [1687]), the PLC CPU is reset, or the power of PLC is turned OFF, the stop zone learned is lost.

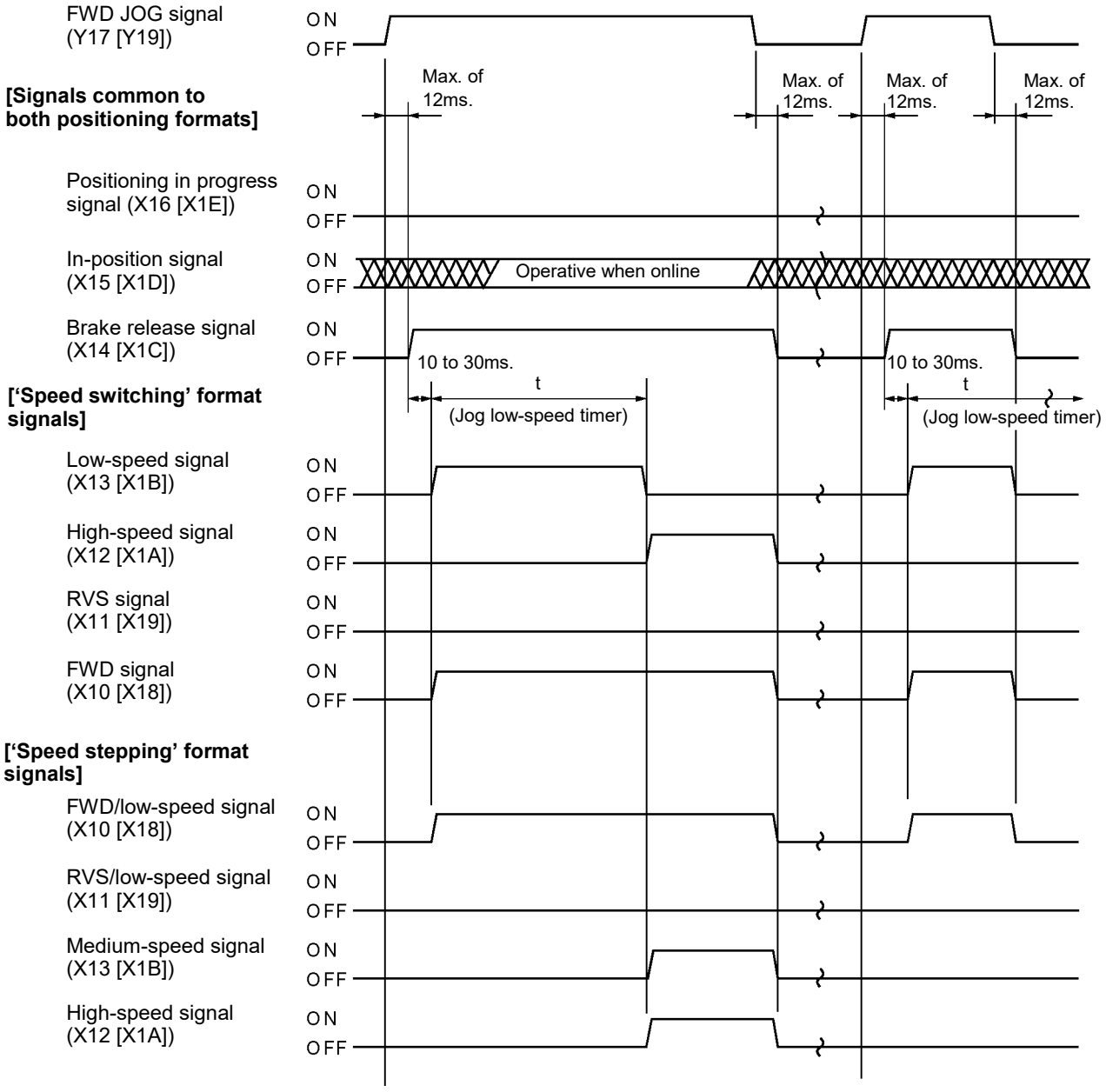
7.1.7 JOG operation

The JOG operation can be executed only in an 'online' status established. The following requirements must be satisfied before the JOG operation can occur:

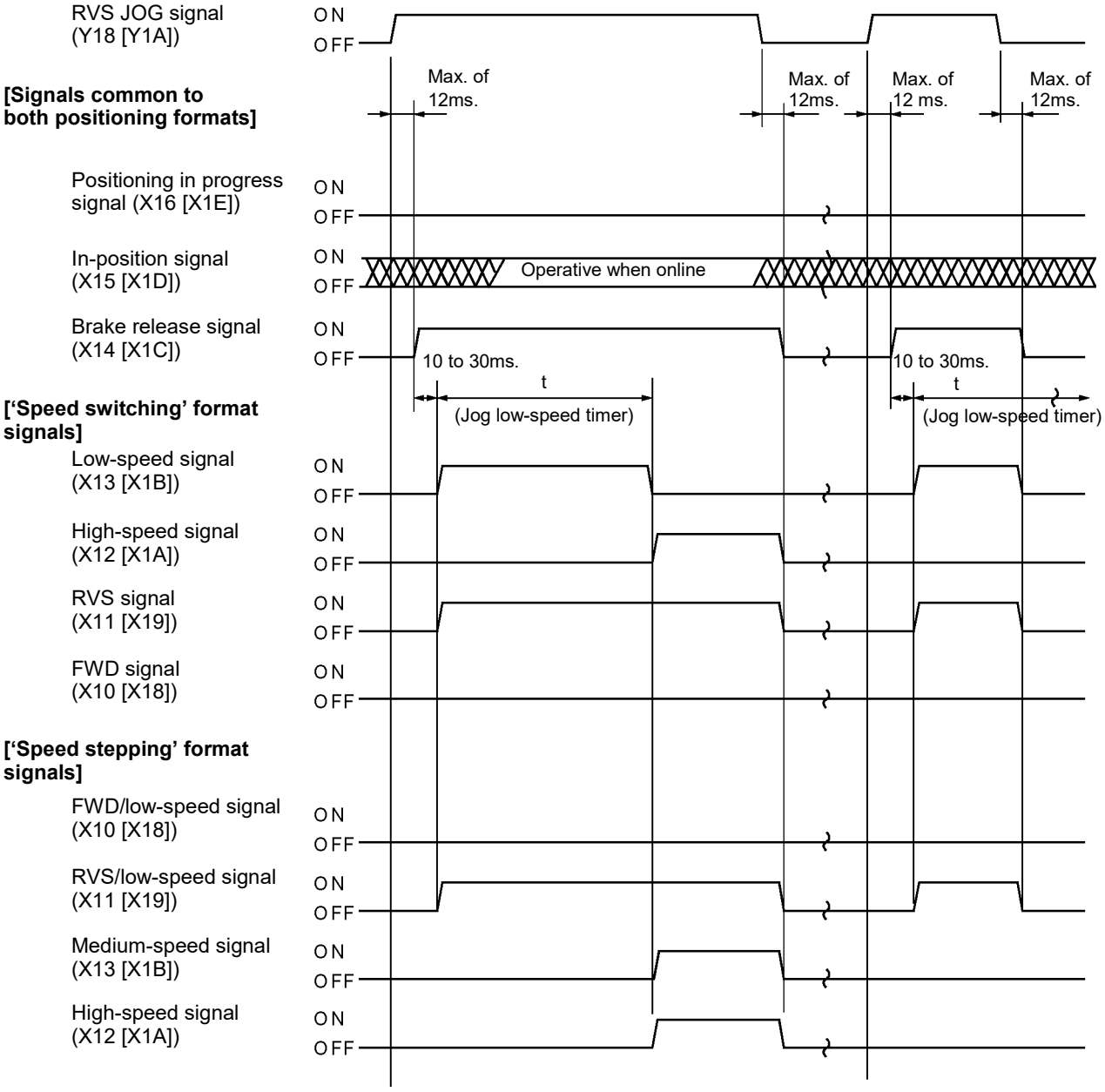
(a) The parameter (function) must be set to 'Limit SW output function & Positioning function'.
(b) The 'operation error' signal must be OFF.
(c) Positioning must not be in progress.

The JOG operation occurs when the 'FWD JOG' signal (Y17 [Y19]) or the 'RVS JOG' signal (Y18 [Y1A]) is turned ON by the sequence program.

(1) The timing chart for the 'FWD JOG' operation is shown below.



(2) The timing chart for the 'RVS JOG' operation is shown below.



(3) When the JOG signal is ON after the 'JOG low-speed timer' period ('t' at item (1) and (2) timing charts above) has elapsed, an automatic low-speed to high-speed switch will occur.
The 'JOG low-speed timer' value period is designated by the parameter (buffer memory address 732 [1732]). Even when a 't = 0.00s' is designated, a low-speed output of up to 10 ms may occur.

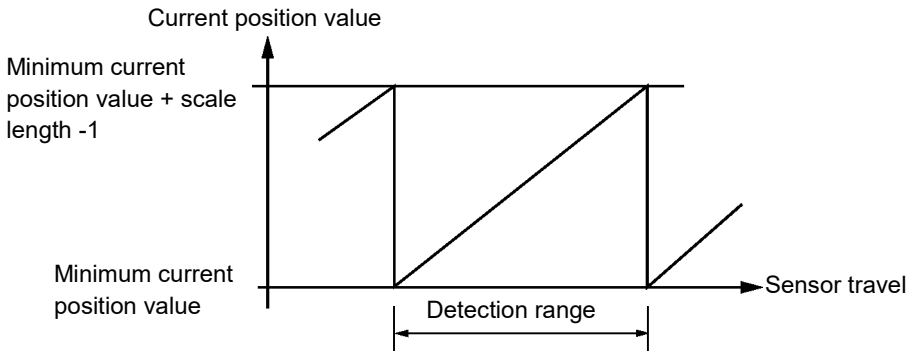
(4) The positioning START signal (Y11 [Y14]) will be inoperative during a JOG operation.

(5) A 'RVS JOG' signal (Y18 [Y1A]) will be inoperative during the 'FWD JOG' signal (Y17 [Y19]) operation, and vice versa.

(6) Operation stops when the 'FWD JOG' signal (Y17 [Y19]) and the 'RVS JOG' signal (Y18 [Y1A]) are switched on simultaneously.

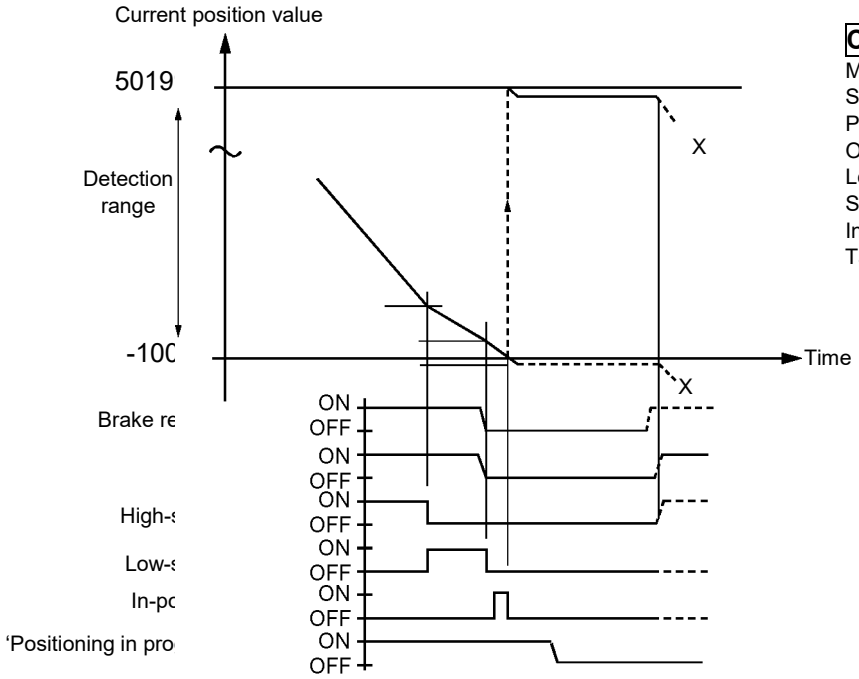
7.1.8 Operation when detection range is exceeded

VS-QA262 executes absolute position detection within the detection range. However, when this detection range is exceeded, the current position value will immediately change by the amount of the entire scale length.
The following diagram shows the relationship between the sensor travel and the current position value.



Precautions regarding a positioning operation which occurs near the limits of the detection range are explained below.

(1) The following example shows a case in which the detection range was exceeded during a positioning operation near the minimum current position value point.



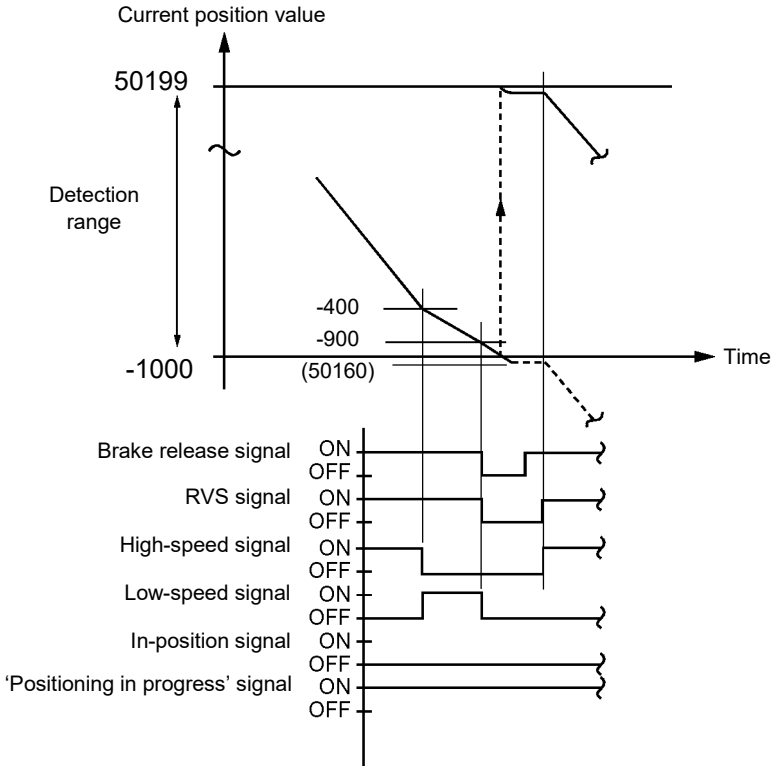
Conditions

Minimum current position value:	-1000
Scale length:	51200
Positioning format: 'Speed switching' format	
Overshoot amount:	0
Low-speed zone:	500
Stop zone:	150
In-position zone:	100
Target stop position:	-1000

In the above example, the stop position of -850 is overshot by 240 during the RVS positioning, with the resulting current position of 50110 exceeding the detection range limit of -1000.
Because the -1000 limit has been exceeded, the current position will be detected as 50110 even though it is still within the in-position range of plus/minus 100, and the 'in-position' signal will not turn ON.

When positioning toward the target stop position of -1000 is re-started from this status, reverse positioning will occur.
When the detection range is exceeded, the JOG operation, etc., should be used to move the current position back within the detection range prior to resuming the positioning operation.

(2) The following example shows a case in which the overshoot point is designated near the minimum current position value point, resulting in an 'overshoot stop' position which is outside the detection range.



Conditions

Minimum current position value:	-1000
Scale length:	51200
Positioning format: 'Speed switching' format	
Positioning direction:	FWD
Overshoot amount:	600
Low-speed zone:	500
Stop zone:	150
In-position zone:	100
Target stop position:	-300

The target position of '-300' with an overshoot amount of '600' in the forward positioning is determined as an overshoot of '-900'.
In this example, the overshoot point of -900 is overshot in the reverse direction by the amount of 140 before a stop occurs. As a result, the detection range limit of -1000 is exceeded, and the current position will be detected as 50160. At that time, overshoot positioning is automatically re-started toward the -900 target position.
Use caution regarding the above type of setting, as it could create a considerable risk depending on the machine being used.

(3) VS-QA262's 'excessive current position change' error detection function can be used to detect detection range violations.
To do this, the 'excessive current position change' setting (buffer memory addresses 736 [1736] to 737 [1737]) should be designated according to the machine being controlled, allowing a slight margin in the travel amount per each 20 ms.
The 'upper limit overtravel' and the lower limit overtravel' detection function can also be used to detect detection range violations. In this case, an error will be detected when the prescribed range is exceeded, and operation will be stopped.

Regardless of which function is used, a sequence program interlock condition must be established using the 'excessive current position change' detection (XB [XE]), the 'upper limit overtravel' detection (X2 [X6]), and the 'lower limit overtravel' detection (X3 [X7]) signals.

IMPORTANT

(1) The positioning operation should not be used near the upper and lower limits of the detection range.
(2) When the use of the positioning operation near the upper/lower limit is unavoidable, be sure that a sequence program interlock condition is established, using the appropriate error detection signals.
(3) As a backup safety measure, mechanical limit switches should be installed.

7.1.9 Current position presetting during positioning operation

The 'current position preset' function is operative even when positioning is in progress. The resulting operation is explained below.

(1) When the positioning direction is not changed as a result of the current position preset function:
The positioning operation is not interrupted.
However, because positioning control will now be based on the current position value which exists after the current position preset function is executed, the speed may be switched from high-speed to medium-speed or low-speed, depending on the new position's distance from the target position.

(2) When the positioning direction is reversed as a result of the current position preset function:
Positioning will be stopped, and after a 'stop detection' has occurred, positioning toward the target position will be re-started based on the current position value which exists after the current position preset function is executed.
After being re-started, positioning occurs in the normal manner.

(3) When the current position value is within the stop zone as a result of the current position preset function:
Positioning will be stopped, and after a 'stop detection' has occurred, a 'START from stop zone' operation will automatically be executed, with positioning being based on the current position value which exists after the current position preset function is executed.

Positioning will not be re-started when the stop position is within the in-position zone.
When the stop position is within the stop zone and the 'START from stop zone disabled' parameter setting has been designated, positioning will not be re-started.

(4) VS-QA262 automatically recognizes a 'stop status'; (stop detection) when the change in the current position value per each 100 ms is plus/minus 2 bits (expresses as a sensor binary value).

7.1.10 Operation error

When the following errors are detected during a JOG or positioning operation, operation will automatically be stopped (operation output OFF).

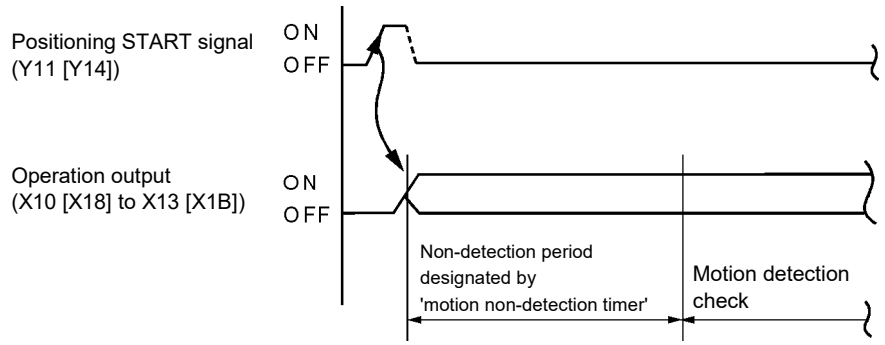
Following this, the 'operation error' signal (X17 [X1F]) output will be turned ON.
(a) Sensor error (error code 22)
(b) Motion detection error (error code 42)
(c) Motion direction error (error code 43)

The VS-QA262 operation will continue when any error other than the above is detected. To stop the operation, turn the ‘positioning STOP' signal (Y12 [Y15]) ON at the sequence program.

Both the JOG and positioning functions are inoperative while the 'operation error' signal (X17 [X1F]) is ON. The 'operation error' signal (X17 [X1F]) can be reset by turning the ‘error reset’ signal (Y1C) ON at the sequence program.

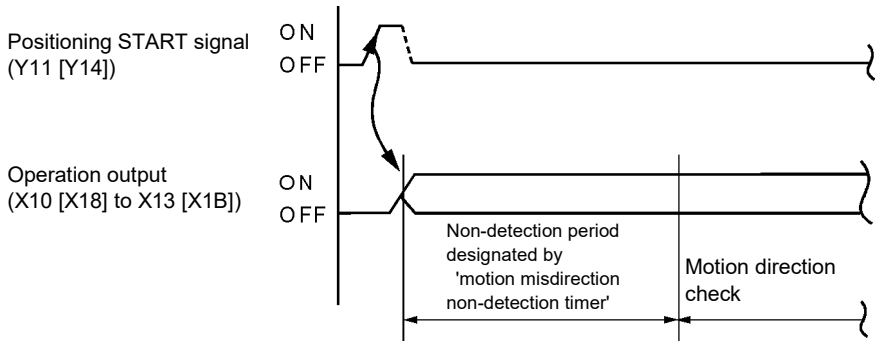
(1) The 'motion detection error' detects such irregularity that the current position value does not vary while the VS-QA262 positioning signals are ON. When the change in the current position value per each 0.5 sec. is plus/minus 2 bits or less (sensor binary value) under the operation output ON status, this irregularity can be detected.
A 'non-detection period' can be set with considering the response delay of the external motor drive circuits.

The 'non-detection period' is designated by the ‘motion non-detection timer' parameter (buffer memory address 729 [1729]).



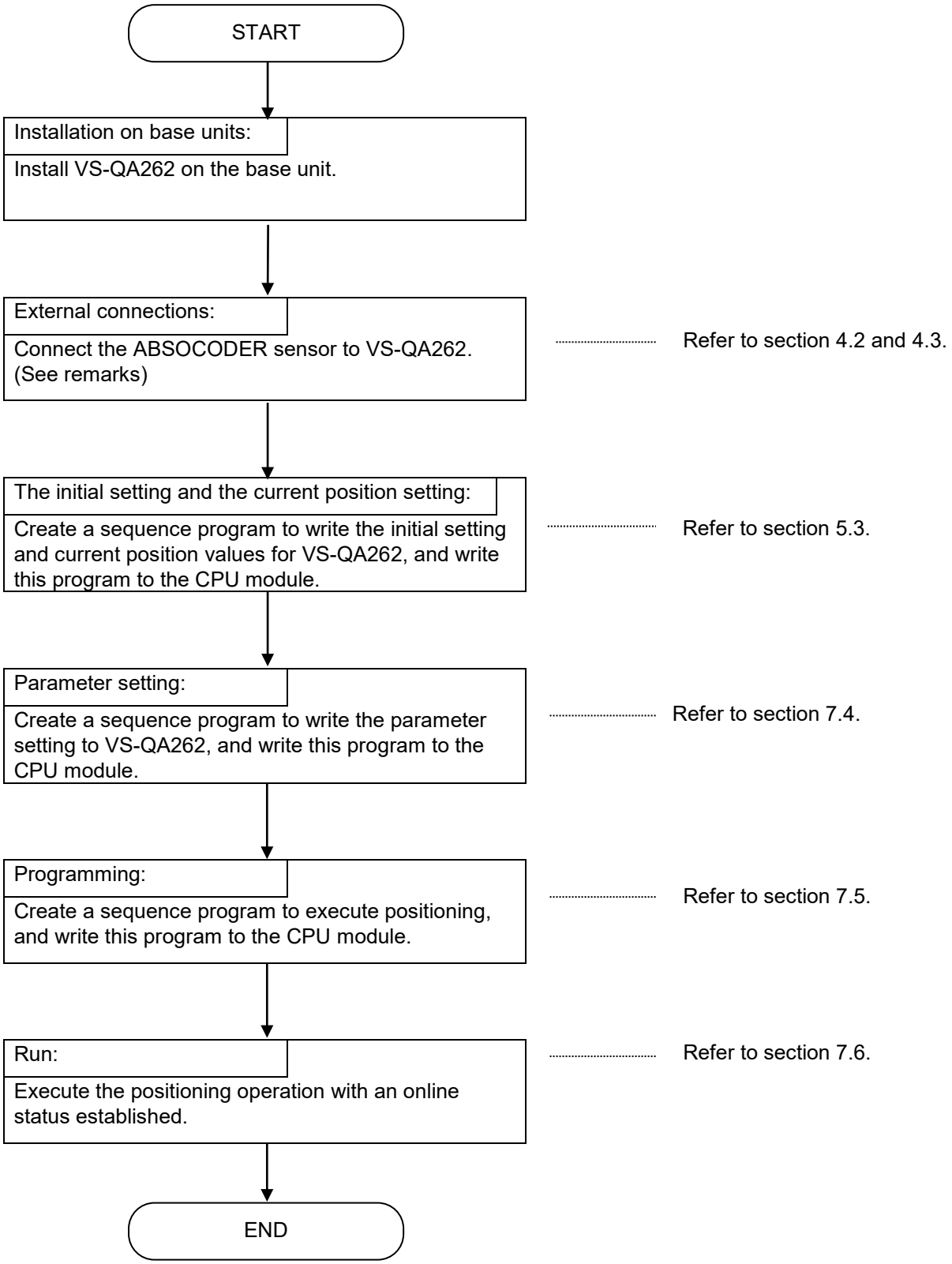
(2) The 'motion direction error' detects that the current position value changes in the opposite direction under the operation output ON status to the direction that VS-QA262 designates. This can be detected when the change in the opposite direction per each 0.5 seconds is plus/minus 3 bits or more (sensor binary value).

A 'non-detection period' can also be set in the same manner as for the 'motion detection error' above. The 'non-detection period' is designated by the ‘motion misdirection non-detection timer' parameter (buffer memory address 730 [1730]).



7.2 Positioning Function Setting and Operation Sequence

The procedure for executing the positioning function is as below.



REMARKS

Settings other than current position setting can be done even when the ABSOCODER sensor is not connected.

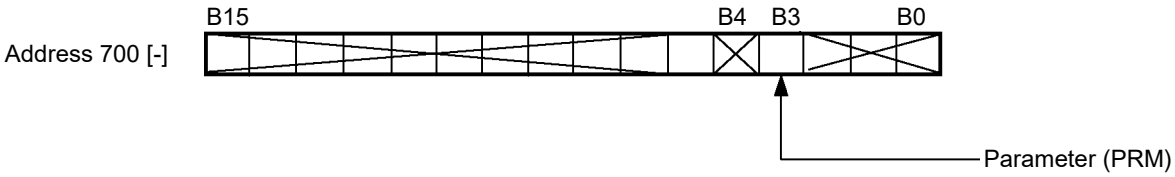
7.3 Initial Settings

Refer to 5.3 for VS-QA262's initial settings.

The initial settings are commonly used for the current position detection function, the limit SW output function, and the positioning function.

7.4 Parameter Settings

This section explains the parameter settings for VS-QA262's positioning function.
Parameters are factory-set (default).
Designate only the initial setting item which is required to change.
When writing the parameters, specify ’1’ at the relevant bit of the buffer memory's data memory flag (address 700 [-]).



Writing to the parameter buffer memory area is enabled at all times.
When offline, however, parameter data writing to VS-QA262 is not possible until the parameter bit of the data memory flag (address 700 [-]) is set to ‘1’.

The parameter settings of axes 1 and 2 are executed simultaneously.

REMARKS
The VS-QA262 parameters consist of the 'current position detection function', the ’limit SW output function' and the 'positioning function'.
Only the parameters used for the positioning function are explained here.
For details regarding the current position detection function parameters, refer to section 5.4, and for the limit SW output function parameters, refer to section 6.4.
When the limit SW output and positioning functions are used jointly, parameters for both functions must be designated.

7.4.1 Parameter list

[ ]: Address for axis 2

Address	Item	Content	Setting data	Default
711 [1711]	Function	Designates 'Current position detection function only', 'limit SW output function only' or limit SW output function & positioning function.	0: Limit SW output function & positioning function 1: Limit SW output function only 2: Current position detection function only	2
712 [1712]	Positioning format	Designates whether the 'speed switching' format or the 'speed stepping' format is to be used. Also, designates with or without of the learing function.	0: Speed switching format without learning function 1: Speed stepping format without learning function 2: Speed switching format with learning function 3: Speed stepping format with learning function	0
713 [1713]	Positioning direction	Designates whether unidirectional positioning is to be executed in the FWD (forward) or the RVS (reverse) direction.	0: FWD direction 1: RVS direction	0
714 [1714] 715 [1715]	Overshoot amount	Designates the target position overshoot amount when positioning occurs in the opposite direction to the prescribed positioning direction.	0 to 999999	100
716 [1716] 717 [1717]	Medium-speed zone	Designates the distance prior to the target stop position over which medium-speed is to occur when the ‘speed stepping format’ is used.	0 to 999999	10000
718 [1718] 719 [1719]	Low-speed zone	Designates the distance prior to the target stop position over which low-speed is to occur.	0 to 999999	1000
720 [1720] 721 [1721]	Stop zone	Designates the distance between the stop position and the point where the brake is to be applied.	0 to 999999	100
722 [1722] 723 [1723]	In-position zone	Designates a reference distance (relative to the target position) used to determine if machine is stopped at the target stop position.	0 to 999999	100
724 [1724] 725 [1725]	Upper limit(+limit)	Designates the '+' direction limit value.	-99999 to 999999	999999
726 [1726] 727 [1727]	Lower limit(-limit)	Designates the '－' direction limit value.	-99999 to 999999	-99999
728 [1728]	START from stop zone	Designates whether positioning is to occur when the START position is already within the stop zone.	0: Disable 1: Enable	1
729 [1729]	Motion non-detection timer	Designates the period from the point when positioning is started until the point when the 'motion error' detection function begins.	0 to 9999 10ms units	1000
730 [1730]	Motion misdirection non-detection timer	Designates the period from the point when positioning is started until the point when the 'motion direction error' detection function begins.	0 to 9999 10ms units	1000
731 [1731]	‘Positioning end’ detection timer	Designates the delay period from the point when positioning control ends until the point when the 'positioning in progress' signal goes OFF.	0 to 9999 10ms units	10
732 [1732]	JOG low-speed timer	Designates the low-speed operation period for the JOG operation.	0 to 9999 10ms units When '9999', 'Low-Speed' is always specified.	9999

7.4.2 Function setting

For details regarding the function setting (address 711 [1711]) parameter, refer to section 5.4.2.

7.4.3 Selection of positioning format

VS-QA262 features two positioning formats:
The 'speed switching' format and the 'speed stepping' format.
Also, designates with or without of the learing function.
The positioning format selection is designated at the parameter as follows:

0: Speed switching format without learning function
1: Speed stepping format without learning function
2: Speed switching format with learning function
3: Speed stepping format with learning function

Set the desired positioning format to buffer memory address 712 [1712].

7.4.4 Designation of positioning direction

The positioning direction (for unidirectional position) is designated as FWD (forward) or RVS (reverse).
The positioning direction is designated by the parameter as follows:

0: FWD direction
1: RVS direction

Set the desired positioning direction to buffer memory address 713 [1713].

7.4.5 Designation of overshoot amount

The 'overshoot amount' is effective during unidirectional positioning operations, designating how far the target position is to be overshot when positioning is executed in the opposite direction to the prescribed positioning direction.
The overshoot amount is designated within a setting range of 0 to 999999.
When the overshoot amount is designated as '0', a bidirectional positioning (FWD and RVS) will occur.
Set the desired overshoot amount to buffer memory addresses 714 [1714] (L) and 715 [1715] (H).

7.4.6 Designation of medium-speed, low-speed, stop, and the in-position zones

The procedure for designating the 'medium-speed zone', the 'low-speed zone', the 'stop zone', and the 'in-position zone' settings is explained below.

The 'medium-speed zone' setting is used only with the 'speed stepping' positioning format, and designates the distance prior to the target stop position over which medium-speed is to occur.
The 'medium-speed zone' setting is designated at buffer memory addresses 716 [1716] (L) and 717 [1717] (H).
This setting is inoperative when the 'speed switching' positioning format is used.

The 'low-speed zone' setting designates the distance prior to the target stop position over which low-speed is to occur.
The 'low-speed zone' setting is designated at buffer memory addresses 718 [1718] (L) and 719 [1719] (H).

The 'stop zone' setting designates the distance between the point where the positioning brake is applied and the target stop position.
The 'stop zone' setting is designated at buffer memory addresses 720 [1720] (L) and 721 [1721] (H).

The 'in-position zone' setting designates a reference distance from the target stop position, this distance is used to determine if machine has stopped at the target stop position.
The 'in-position zone' setting is designated at buffer memory addresses 722 [1722] (L) and 723 [1723] (H).

The setting range for each of the above zones is 0 to 999999.

7.4.7 Designation of upper and lower limits

When the ABSOCODER sensor current position value exceeds the upper limit value, VS-QA262 will turn the X2 [X6] signal ON. When it exceeds the lower limit value, the X3 [X7] signal will be turned ON.

Even when the X2 [X6] or X3 [X7] signal comes ON, the VS-QA262 operation will be continued. A stop can be designated in the sequence program.

The setting range for the upper/lower limit is -99999 to 999999.

The 'upper limit' setting is designated at buffer memory addresses 724 [1724] (L) and 725 [1725] (H), and the 'lower limit' setting at buffer memory addresses 726 [1726] (L) and 727 [1727] (H).

7.4.8 Start from stop zone setting

This setting determines whether or not positioning will be executed when the 'positioning START' position is already in the stop zone.
The 'START from stop zone' setting is designated at buffer memory address 728 [1728].

The setting of 'START from stop zone' positioning is designated by the parameter as follows:

0: Disabled
1: Enabled

7.4.9 Timer settings

The procedure for designating the 'motion non-detection timer', the 'motion misdirection non-detection timer', the 'positioning end detection timer', and the 'JOG low-speed timer' settings is explained below. The minimum timer increment is 10ms.

(1) The 'motion non-detection timer' setting designates the period from the point when the positioning or the JOG operation is started, until the point when the motion error detection function begins.

(a) The setting range for this timer is 0 to 9999.
(b) When this timer setting is designated as '0', motion error detection will not occur.
(c) This timer setting is designated at buffer memory address 729 [1729].

(2) The 'motion misdirection non-detection timer' setting designates the period from the point when the positioning or the JOG operation is started, until the point when the motion direction error detection function begins.

(a) The setting range for this timer is 0 to 9999.
(b) When this timer setting is designated as '0', motion direction error detection will not occur.
(c) This timer setting is designated at buffer memory address 730 [1730].

(3) The 'positioning end detection timer' setting designates the delay period from the point when positioning is completed, until the point when the 'positioning in progress' signal goes OFF.

(a) The setting range for this timer is 0 to 9999.
(b) This timer setting is designated at buffer memory address 731 [1731].
(c) With the difference between the current position value and positioning target stop value when the positioning in progress signal is turned OFF, the learning function works and corrects the stop zone.

(4) The 'JOG low-speed timer' setting designates the low-speed period during the JOG operation.

(a) The setting range for this timer is 0 to 9999.
(b) When a setting of '9999' is designated, the entire JOG operation will be executed at low-speed.
(c) This timer setting is designated at buffer memory address 732 [1732].

7.4.10 Parameter setting sequence

For details regarding the parameter setting sequence, refer to section 5.4.8.
The parameter setting sequence is commonly used for the current position detection function, the limit SW output function, and the positioning function.

7.5 Programming

This section explains how to create the sequence program using VS-QA262 for positioning operation.

7.5.1 Initial setting and parameter setting data writing program

For details regarding the initial setting and the parameter setting data writing program, refer to section 5.5.2.

7.5.2 Program for positioning function

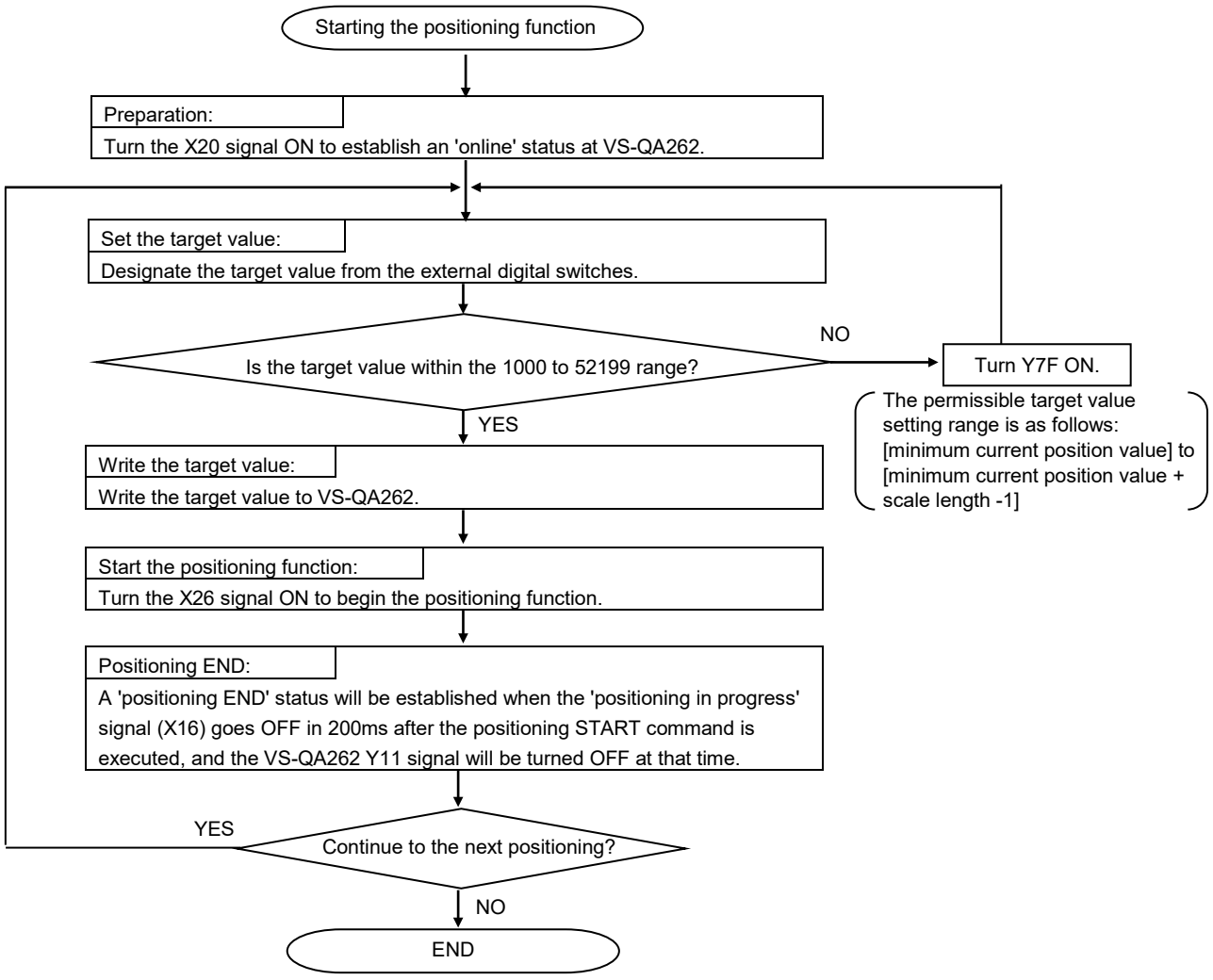
The following example shows a program used to designate the target stop position value and to start the positioning function.
This program example is for axis 1. Axis 2 programs can be generated in the same way.

Conditions

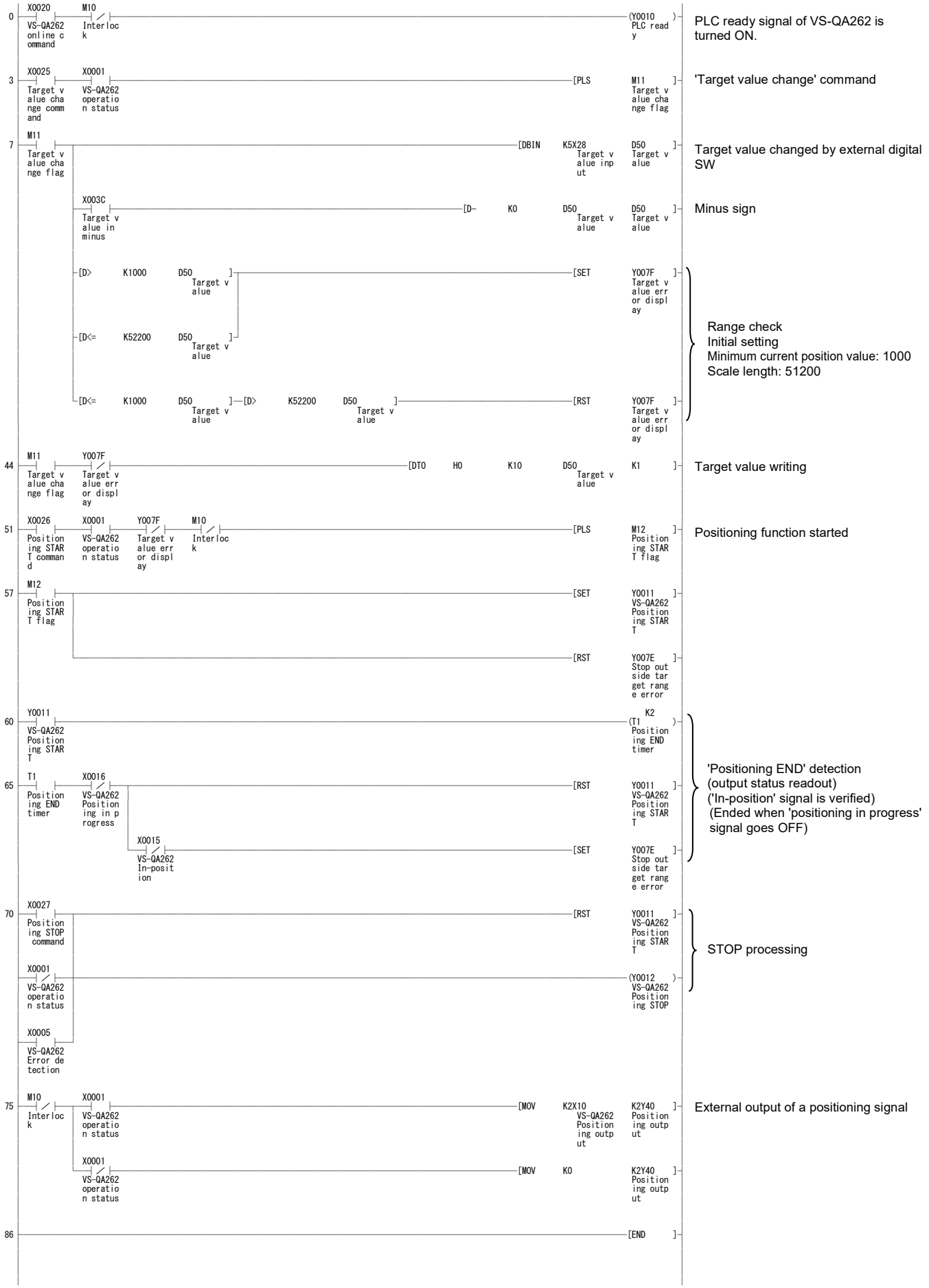
(1) The following signal assignments are used to control VS-QA262.

VS-QA262 online command ····· X20
'Target value change' command ····· X25
Positioning START command ····· X26
Positioning STOP command ····· X27
Target value commands ····· X28 to X3B (Digital SW, BCD 5-digit)
X3C (Digital SW, minus sign)
Positioning signal outputs ····· Y40 to Y47
Target value error display ····· Y7F (This example applies when outside a range of 1000 to 52199.)
'Stopped outside target range' error display ····· Y7E
Target value storage register ····· D50, D51

(2) The program creation and the operation procedure are as follows:



Program Example



Explanation

(1) The positioning function begins when the Y10 and Y11 signals turn ON.

(2) X1 is the ON signal when the VS-QA262 online status has been established (Y10 ON).

(3) The target value must be designated within the following range:
[Minimum current position value] to [minimum current position value + scale length -1].
A range check is executed by the sequence program.

(4) A 'positioning END' status is established when the "positioning in progress' signal (X16) goes OFF in 200ms after the positioning START signal is turned ON.

(5) In case the positioning accuracy cannot be obtained due to the sequence scan time, output the positioning signal externally using the fixed scan execution type program or the high-speed interrupt function.

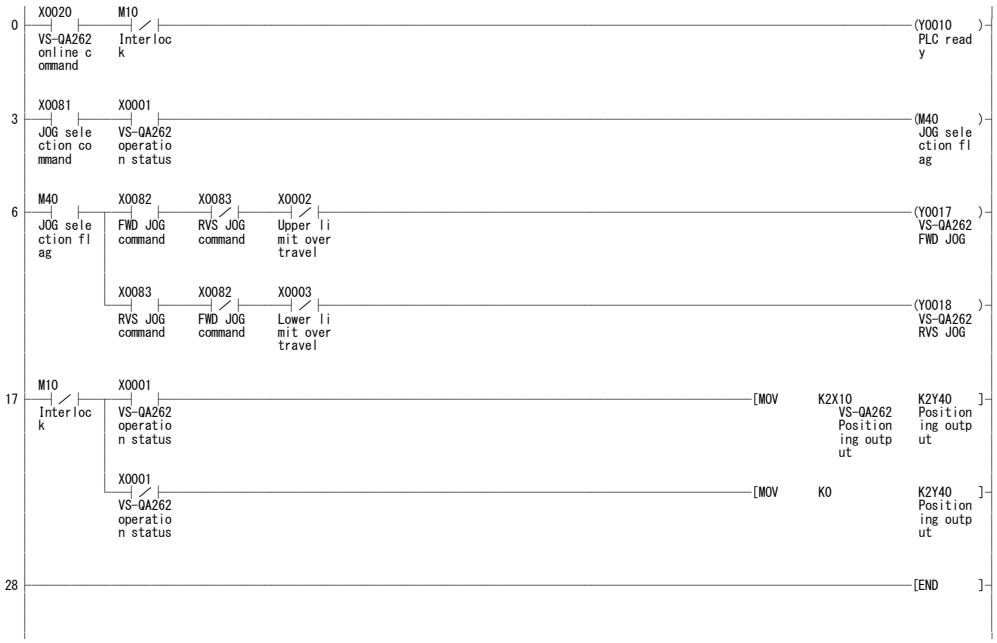
7.5.3 Program for JOG operation

This section explains how to create the sequence program for the JOG operation.
This program example is for axis 1. Axis 2 programs can be generated in the same way.

Conditions

(1) The following signal assignments are used to control VS-QA262.
VS-QA262 online command ····· X20
'JOG mode selection' command ····· X81
FWD JOG command····· X82
RVS JOG command X83

Program Example



PLC ready signal of VS-QA262 is turned ON.

FWD JOG command ON

RVS JOG command ON

External output of a positioning signal

Explanation

(1) X1 is the ON signal when the VS-QA262 online status has been established (Y10 ON).

(2) X2 is the 'upper limit overtravel' detection signal.

(3) X3 is the 'lower limit overtravel' detection signal.

(4) JOG operation begins when the Y10 and Y17 (or Y18) signals turn ON.

(5) The part of the external output of a positioning signal in the program can share with the '7.5.2 Program for positioning function'.

IMPORTANT

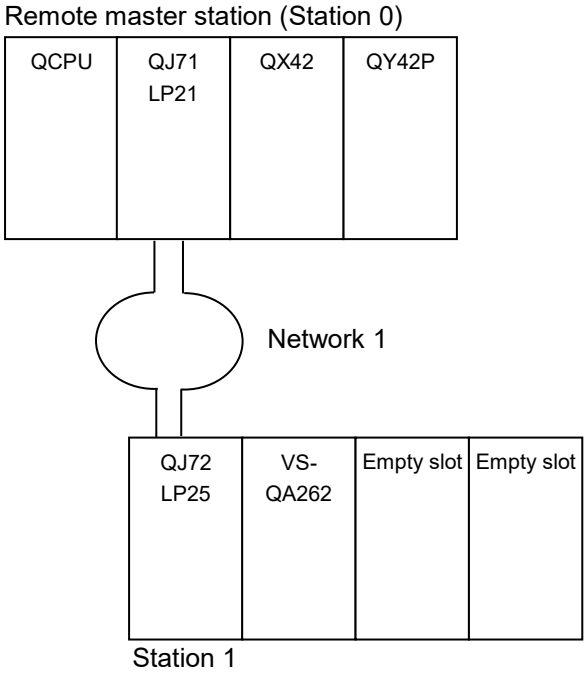
If the motor wiring is incorrect, the RVS signal may be turned ON when the FWD signal is designated. Be sure the wiring is correct.

For the JOG operation, the following interlock conditions are required at the sequence program:
(1) Simultaneous FWD and RVS operation.
(2) FWD and upper limit overtravel (X2 [X6]).
(3) RVS and lower limit overtravel (X3 [X7]).

7.5.4 Remote I/O station programming

The master station (CPU) programming which is required when VS-QA262 is installed in a remote station is explained below.
This program example is for axis 1. Axis 2 programs can be generated in the same way.

(1)System configuration



The following example shows a program used to designate the positioning target value and to start the positioning function for VS-QA262 equipped at the remote station.

Conditions

(1) The following signal assignments are used to control VS-QA262.
- VS-QA262 online command ····· X20
- 'Target value change' command ····· X25
- Positioning START command ····· X26
- Positioning STOP command ····· X27
- Target value commands ····· X28 to X3B (Digital SW, BCD 5-digit)
  ..... X3C (Digital SW, Minus sign)
- Positioning signal outputs ····· Y40 to Y47
- Target value error display ····· Y7F(This example applies when outside a range of 1000 to 52199.)
- 'Stopped outside target range' error display ····· Y7E
- Target value storage register ····· D50, D51

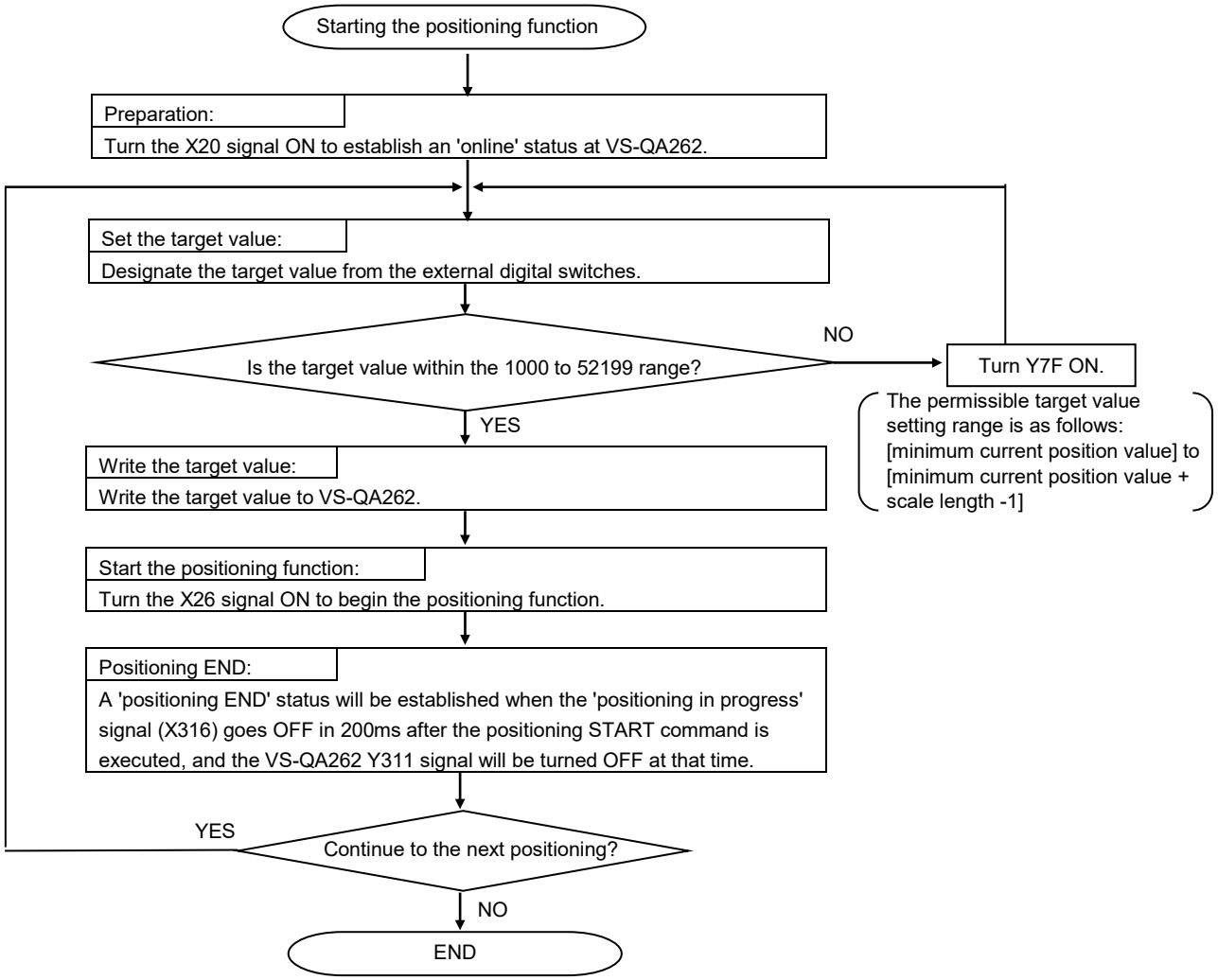
(2) The XY settings are specified in the network range assignment of the network parameters as shown below.

XY settings												
Station No.	Master station -> Remote station						Remote station -> Master station					
	Y			Y			X			X		
	Points	Start	End	Points	Start	End	Points	Start	End	Points	Start	End
1	32	0300	031F	32	0000	001F	32	0300	031F	32	0000	001F

(3) The refresh parameters are specified in the network parameters as shown below.

Refresh parameter settings									
	Link side					CPU side			
	Device name	Points	Start	End		Device name	Points	Start	End
Transfer 'm'	LX	32	0300	031F	←→	X	32	0300	031F
Transfer 'n'	LY	32	0300	031F	←→	Y	32	0300	031F

(4) The program creation and the operation procedure are as follows:

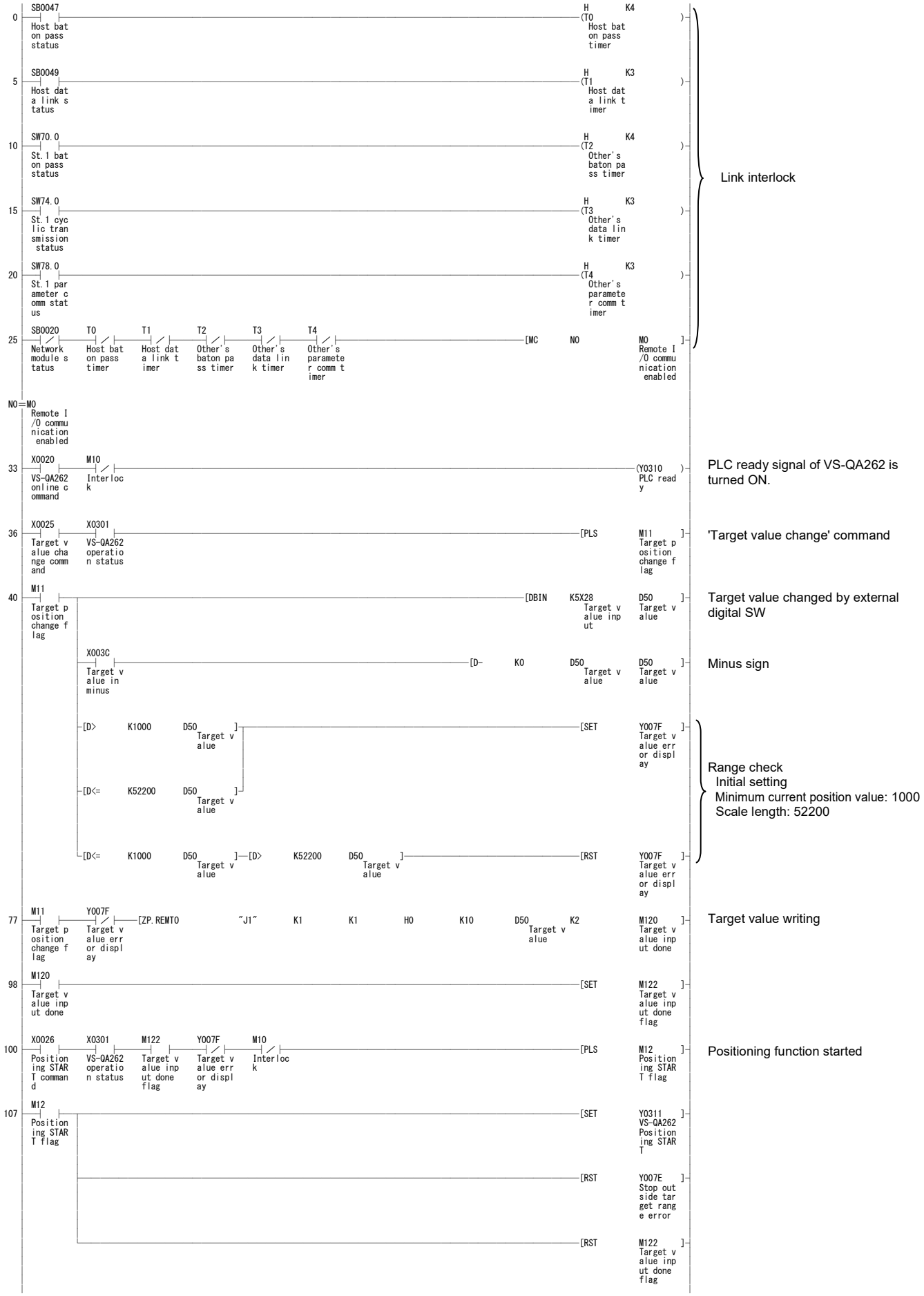


Note:
This program example does not apply to the basic models (Q00JCPU, Q00CPU, Q01CPU) because those models do not have a remote I/O network function.

To read or write multiple data items at the same time, use different channel numbers for the link-dedicated instructions.

As VS-QA262 has no external input/output, the positioning signal has to be output externaly by the sequence program. The scan time for the sequnce program or the communication time for remote I/O may affect the response of the positioning signal output and reduce the positioning accuracy. In case it causes a problem, review the system structure by taking this point into account.

Program Example



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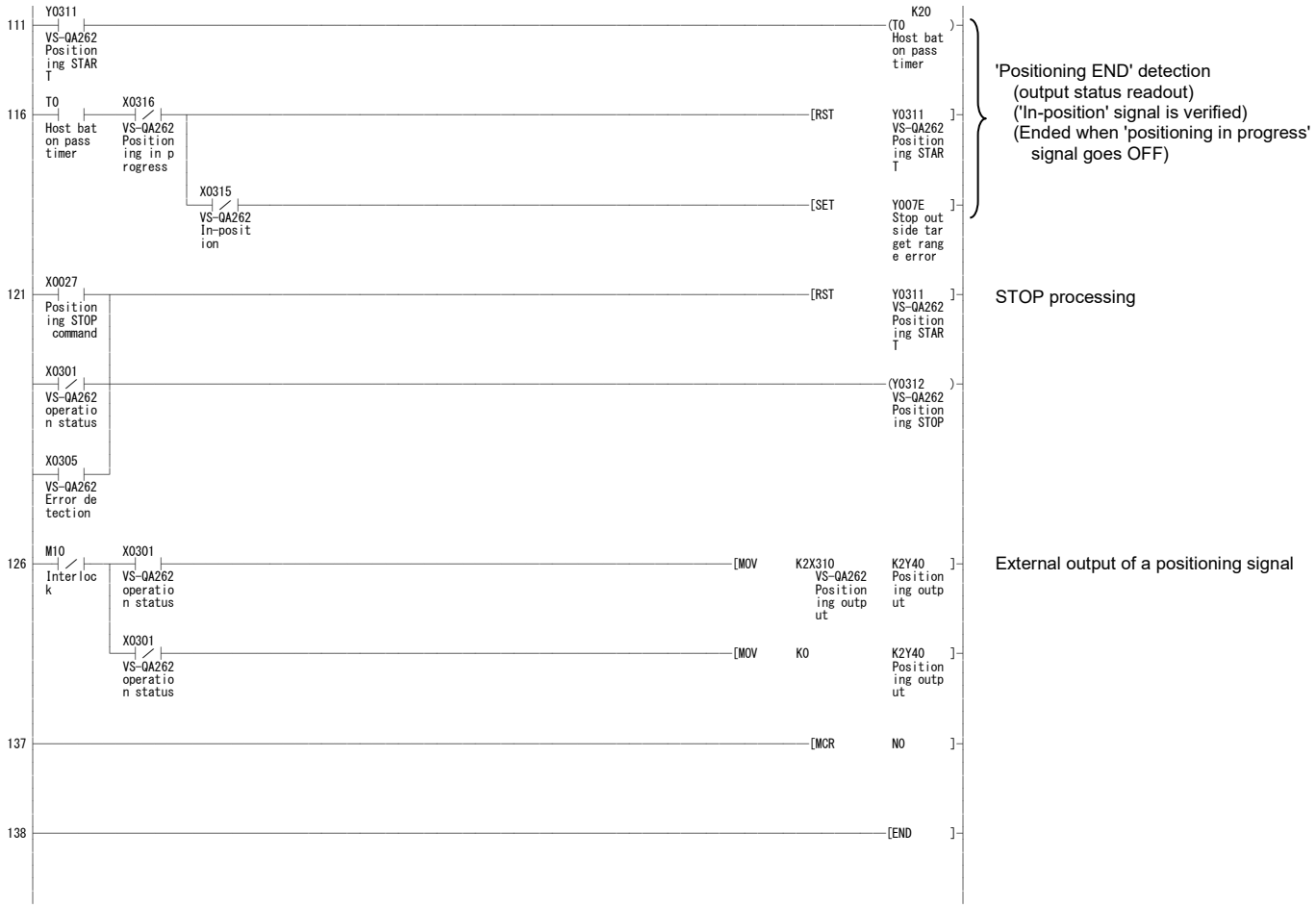
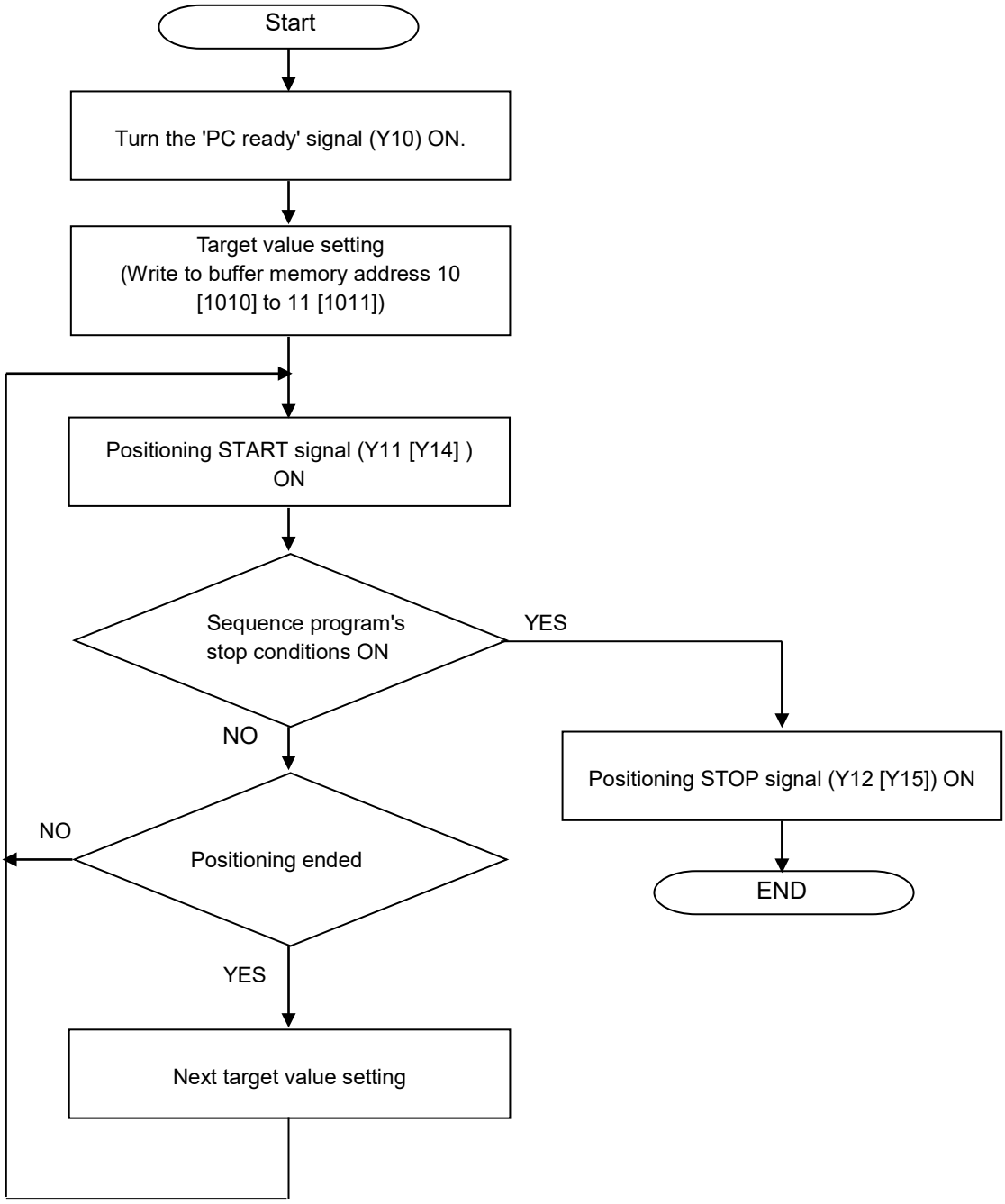


7.6 Operation

This section explains the operation of the positioning function.
The VS-QA262 online status is established when the ‘PLC ready’ signal (Y10) switches ON, and the positioning and the preset functions are enabled.

7.6.1 Basic operation procedure

The basic procedure for executing the positioning function is shown below.



8. TROUBLESHOOTING

VS-QA262's operation errors and trouble shooting procedures are described in this section.

8.1 Error Code List

The VS-QA262 error codes are described below.
When VS-QA262 detects an error, the corresponding error code is stored in address 7 [1007] of the buffer memory. At that time the 'error detection' signal (X5 [X9]) is turned ON.
At the same time, the operation status display area will show the lower 5 [6] lit or blinking, with the error code (binary code) blinking.
Listed below are the possible error codes (with each hexadecimal code in parenthesis).

[ ]: Address for axis 2

Error type	Lower 5 [6] LED	Error code	Description		When detected	Countermeasure
'Buffer memory writing disabled' errors	Blinks	10,11 (HA,HB)	Activated when writing (using the sequence program 'TO' instruction) is attempted in a 'writing disabled' area of the buffer memory.	Current position value area (scaling binary) (address 0, 1 [1000, 1001])	During online status	Revise the sequence program so that writing is not attempted in a 'writing disabled' area of the buffer memory.
		12, 13 (HC,HD)		Current position value area (sensor binary) (address 2, 3 [1002, 1003])		
		14 (HE)		Limit SW output status area (address 4 [1004])		
		15 (HF)		Program No. answerback area (address 5 [1005])		
		16 (H10)		I/O status area (address 6 [1006])		
		17 (H11)		Error code area (address 7 [1007])		
		18 (H12)	Activated when writing (using the sequence program 'TO' instruction) is attempted in a 'writing disabled' area of the buffer memory. (addresses 668 to 677 [1668 to 1677] and 701[−])	Speed output area (address 668, 669 [1668, 1669])		
				Hold current position area (scaling binary) (address 670, 671 [1670, 1671])		
				Hold current position area (sensor binary) (address 672, 673 [1672, 1673])		
				FWD stop zone area after learning (address 674, 675 [1674, 1675])		
				RVS stop zone area after learning (address 676, 677 [1676, 1677])		
				Data memory flag answerback area (address 701 [−])		
Detection errors	Blinks	20 (H14)	VS-QA262 detected an 'upper limit overtravel' condition. X2 [X6] switches ON.		During online status	- Move the machine back within the 'lower-limit to upper-limit' range. - Revise the target stop position setting data. - Revise the positioning parameter settings. - Revise the 'lower -limit/upper-limit' settings.
		21 (H15)	VS-QA262 detected a 'lower limit overtravel' condition. X3 [X7] switches ON.			
	Lit on	22 (H16)	VS-QA262 detected a sensor error. X4 [X8] switches ON. Possible sensor error causes are as follows: - ABSOCODER sensor is disconnected. - ABSOCODER cable is severed. - Malfunction at VS-QA262's internal position detection circuit - ABSOCODER sensor failure		Always	- Connect the ABSOCODER sensor. - Replace the ABSOCODER sensor. - Check the electrical condition of the ABSOCODER cable. - In case the problem seems to be caused by a malfunction at VS-QA262's internal position detection circuit, please contact your service representative.

[ ]: Address for axis 2, Error code

Error type	Lower 5 [6] LED	Error code	Description	When detected	Countermeasure
Detection errors	Blinks	23 (H17)	VS-QA262 detected the ‘excessive correction amount'. XA [XD] switches ON. The causes are as follows: - Misalignment between ABSOCODER sensor's detected position and actual position, caused by machine slippage, backlash, etc. - Deviation in the position where the 'current position preset command' signal is received. - Incorrect 'permissible correction amount' parameter.	During the 'current position preset' operation	- Adjust the machine. - Revise the 'permissible correction amount' parameter.
		24 (H18)	VS-QA262 detected an 'excessive current position change'. XB [XE] switches ON. The causes are as follows: - Too fast machine speed - Exceeding the detection range (minimum current position value to (minimum current position value + scale length -1) - Incorrect 'permissible current position change amount' parameter. - ABSOCODER cable is severed. - ABSOCODER sensor failure - Malfunction at VS-QA262’s internal position detection circuit	Always	- Check the machine speed. - Revise the 'permissible current position change amount' parameter. - Check the electrical condition of the ABSOCODER cable. - Replace the ABSOCODER sensor. - In case the problem seems to be caused by a malfunction at VS-QA262’s internal position detection circuit, please contact your service representative.
Learning data error	Blinks	25 (H19)	The stop zone corrected by the simple learning function has exceeded the low-speed zone.	When positioning is completed	- Check the 'operation output' connections. - Adjust the machine. - Revise the positioning parameter.
Control errors	Blinks	30 (H1E)	Numeric values other than 0 to 9 were designated at the limit SW function's program No.	Always	Revise the sequence program so that no numeric values other than 0 to 9 will be written at the buffer memory.
		1012 [2012] (H3F4 [H7DC]) to 1667 [2667] (H683 [A6B])	The data set to the limit SW output ON/OFF data setting area is incorrect. The error code is the relevant buffer memory address +1000.	When writing in programs 1 to 8 When selecting program 0	Set the correct data setting.
		40 (H28)	START input inoperative. The causes are as follows: -Designates a value which is except '0'(either ‘1’ or ‘2’) to function parameter at address 711 [1711]. - An offline status exists. - 'Operation error' (X17 [X1F]) is ON. - JOG operation in progress. - Positioning STOP signal (Y12 [Y15]) is ON.	During ‘positioning START' input (Except for during positioning operation)	Check each of the probable causes, and make the necessary corrections.
		41 (H29)	The positioning target data is outside the detection range. At the time of overshoot or of executing the start within the stop zone, the stop position is outside the detection range.	When positioning begins	- Designate the correct target value for the positioning operation. - Revise the scale length, the minimum current position value, the overshoot amount, and the stop zone settings.
		42 (H2A)	VS-QA262 detected a 'motion error' (no motion) during an 'operation output' is ON.	During positioning, or JOG operation	- Check the 'operation output' connections. - Check the motor. - Revise the 'motion non-detection timer' setting.
		43 (H2B)	VS-QA262 detected a 'motion direction error' (motion in opposite direction) during an 'operation output' is ON.		- Check the 'operation output' connections. - Check the motor. - Revise the 'motion misdirection non-detection timer' setting.
		50 (H32)	A 'current position preset' was attempted to a point outside the detection range	During the 'current position preset' operation	- Revise the 'current position preset' value. - Revise the scale length and the minimum current position value.

[ ]: Address for axis 2, Error code

Error type	Lower 5 [6] LED	Error code	Description		When detected	Countermeasure
Data errors	Lit on	60(H3C)	Detected the initial setting or the parameter data error.		When turning the power ON	Re-designate the initial setting data and the parameter data.
		61(H3D)	Detected a program 1 setting error.		When turning the power ON When designating program No.	Re-designate the setting data.
		62(H3E)	Detected a program 2 setting error.			
		63(H3F)	Detected a program 3 setting error.			
		64(H40)	Detected a program 4 setting error.			
		65(H41)	Detected a program 5 setting error.			
		66(H42)	Detected a program 6 setting error.			
		67(H43)	Detected a program 7 setting error.			
		68(H44)	Detected a program 8 setting error.			
		69(H45)	Detected an error in the current position value or the 'stop zone after learning'		When turning the Power ON	Re-designate the current position value. (The stop zone learned is lost.)
Buffer memory data errors	Blinks	1678[2678] (H68E[HA76])	Activated when incorrect data writing (using the sequence program 'TO' instruction) is attempted in a 'writing enabled' area of the buffer memory. (addresses 678 to 693 [1678 to 1693] and 702 to 710 [1702 to 1710]) The error code is the relevant buffer memory address +1000.	Speed limit area	When positioning begins	Revise the sequence program so as not to write the incorrect data in the buffer memory.
		1680[2680] (H690[HA78])		Medium-speed zone area		
		1682[2682] (H692[HA7A])		Low-speed zone area		
		1684[2684] (H694[HA7C])		FWD stop zone area		
		1686[2686] (H696[HA7E])		RVS stop zone area		
		1688[2688] (H698[HA80])		In-position zone area		
		1690[2690] (H69A[HA82])		Current position preset value 1 area	When operating the 'current position preset'	
		1692[2692] (H69C[HA84])		Current position preset value 2 area		
		1702[2702] (H6A6[HA8E])		Sensor selection/sensor travel direction area *1	When writing the initial setting data	
		1704[2704] (H6A8[HA90])		Scale length area		
		1707[2707] (H6AB[HA93])		Minimum current position value area		
		1709[2709] (H6AD[HA95])		Current position value area		

*1: With ABSOCODER sensors, either VLS-[ ]PW or VLS-[ ]PY should be used for both Axis 1 and Axis 2.
Check that the 'sensor selection' of Axis 1 is same as that of Axis 2. (address 702 [1702])
(Even when the 'sensor travel direction' is different in Axis 1 and Axis 2, the error does not occur.)

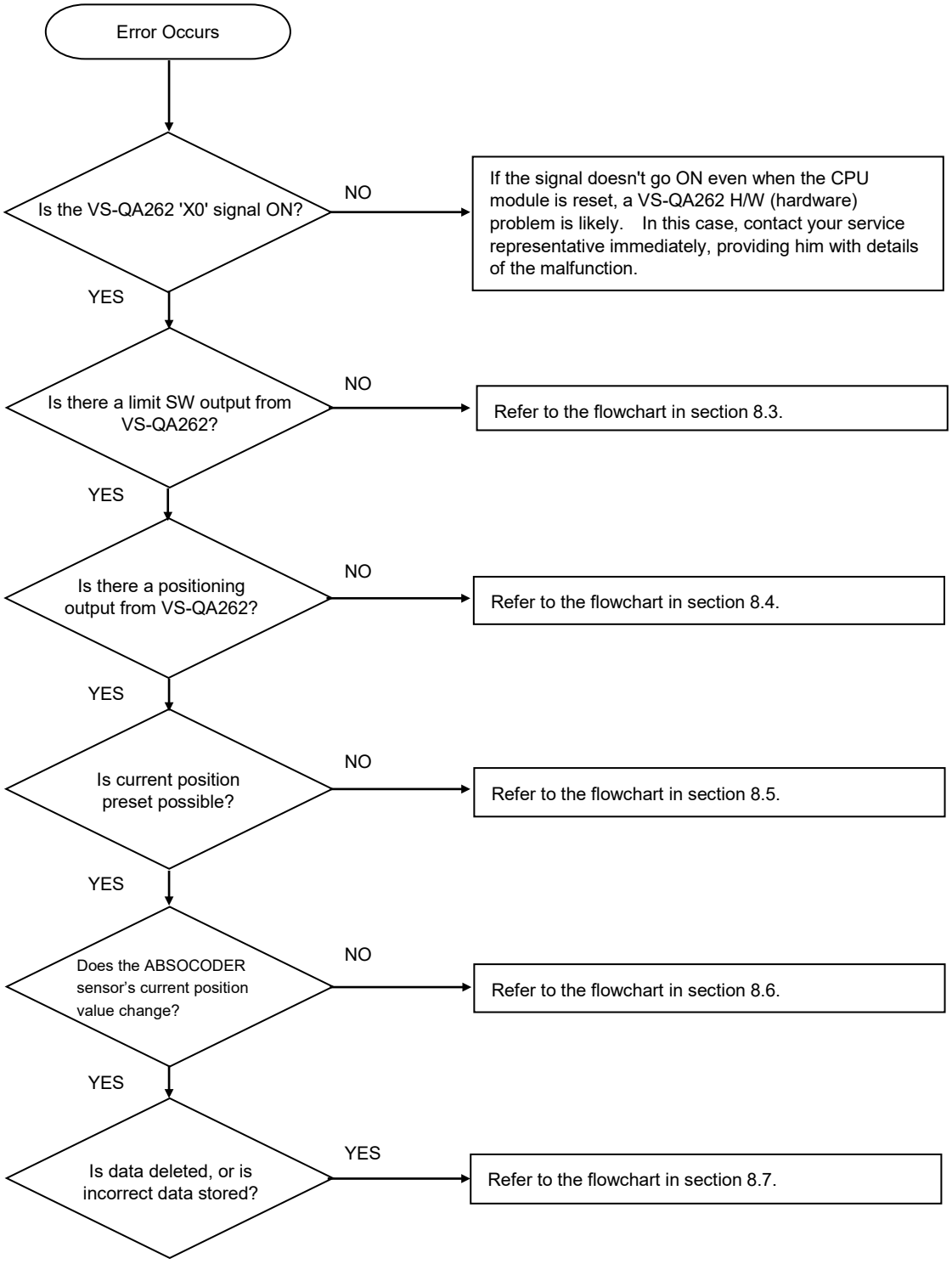
[ ]: Address for axis 2, Error code

Error type	Lower 5 [6] LED	Error code	Description		When detected	Countermeasure
Buffer memory data errors	Blinks	1711[2711] (H6AF[HA97])	Activated when incorrect data writing (using the sequence program 'TO' instruction) is attempted in a 'writing enabled' area of the buffer memory. (addresses 711 to 750 [1711 to 1750]) The error code is the relevant buffer memory address +1000.	Function area	When writing the parameter data	Revise the sequence program so as not to write the incorrect data in the buffer memory.
		1712[2712] (H6B0[HA98])		Positioning format area		
		1713[2713] (H6B1[HA99])		Positioning direction area		
		1714[2714] (H6B2[HA9A])		Overshoot amount area		
		1716[2716] (H6B4[HA9C])		Medium-speed zone area		
		1718[2718] (H6B6[HA9E])		Low-speed zone area		
		1720[2720] (H6B8[HAA0])		Stop zone area		
		1722[2722] (H6BA[HAA2])		In-position zone area		
		1724[2724] (H6BC[HAA4])		Upper limit value area		
		1726[2726] (H6BE[HAA6])		Lower limit value area		
		1728[2728] (H6C0[HAA8])		Start from stop zone area		
		1729[2729] (H6C1[HAA9])		Motion non-detection timer		
		1730[2730] (H6C2[HAAA])		'Motion misdirection non-detection timer' area		
		1731[2731] (H6C3[HAAB])		Positioning end detection timer area		
		1732[2732] (H6C4[HAAC])		JOG low-speed timer area		
		1735[2735] (H6C7[HAAF])		Offline channel output status area		
		1736[2736] (H6C8[HAB0])		Permissible current position change amount area		
		1738[2738] (H6CA[HAB2])		Permissible correction amount area		
		1740[2740] (H6CC[HAB4])		Current position preset function area		
		1741[2741] (H6CD[HAB5])		FWD current position preset value 1 area		
		1743[2743] (H6CF[HAB7])		RVS current position preset value 1 area		
		1745[2745] (H6D1[HAB9])		FWD current position preset value 2 area		
		1747[2747] (H6D3[HABB])		RVS current position preset value 2 area		
		1749[2749] (H6D5[HABD])		Speed gate time area		
		1750[2750] (H6D6[HABE])		Speed sampling time area		
		1751[2751] (H6D7[HABF])		Current position change command area	When writing the initial setting data	
Access error	Fast blinks	—	A PLC CPU access error has been detected.		Always	Check the PLC system.

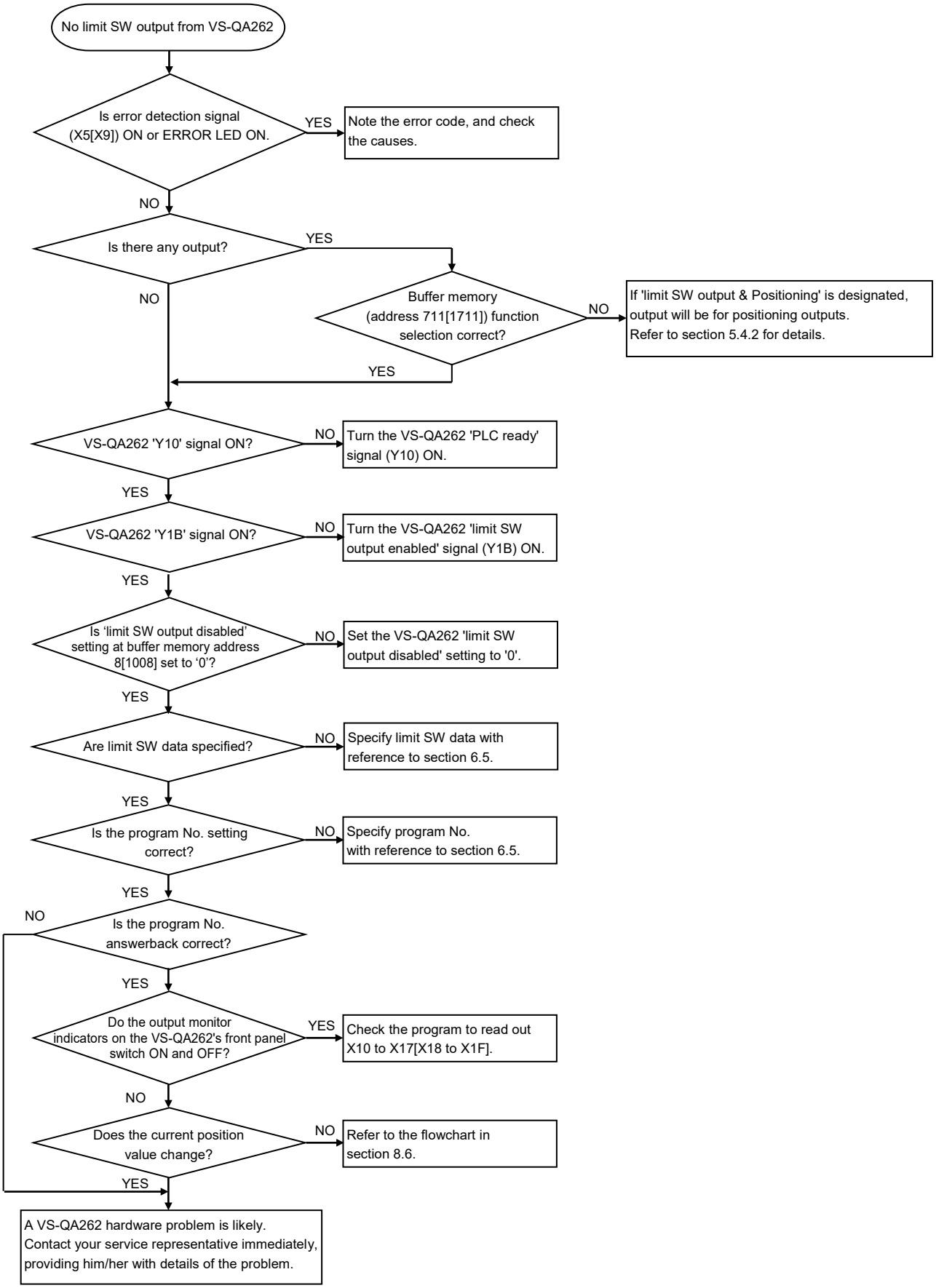
(1) Each time an error occurs, the previous error code stored in the buffer memory will be deleted, and replaced by the new error code.
(2) The error status will be automatically cleared when the PLC CPU reset status is canceled.
(3) The error code stored in the buffer memory will not be cleared (returned to '0') simply by correcting the cause of the error.
To clear the buffer memory error code, execute one of the followings:
(a) Turn Y1C ON by the sequence program. (The pulse instruction cannot be used.)
(b) Reset the PLC CPU.
(c) Turn OFF the PLC power supply.

8.2 Troubleshooting Flowchart

The VS-QA262 troubleshooting procedure is explained below.
For CPU module related problems, consult the manual for the CPU module in question.

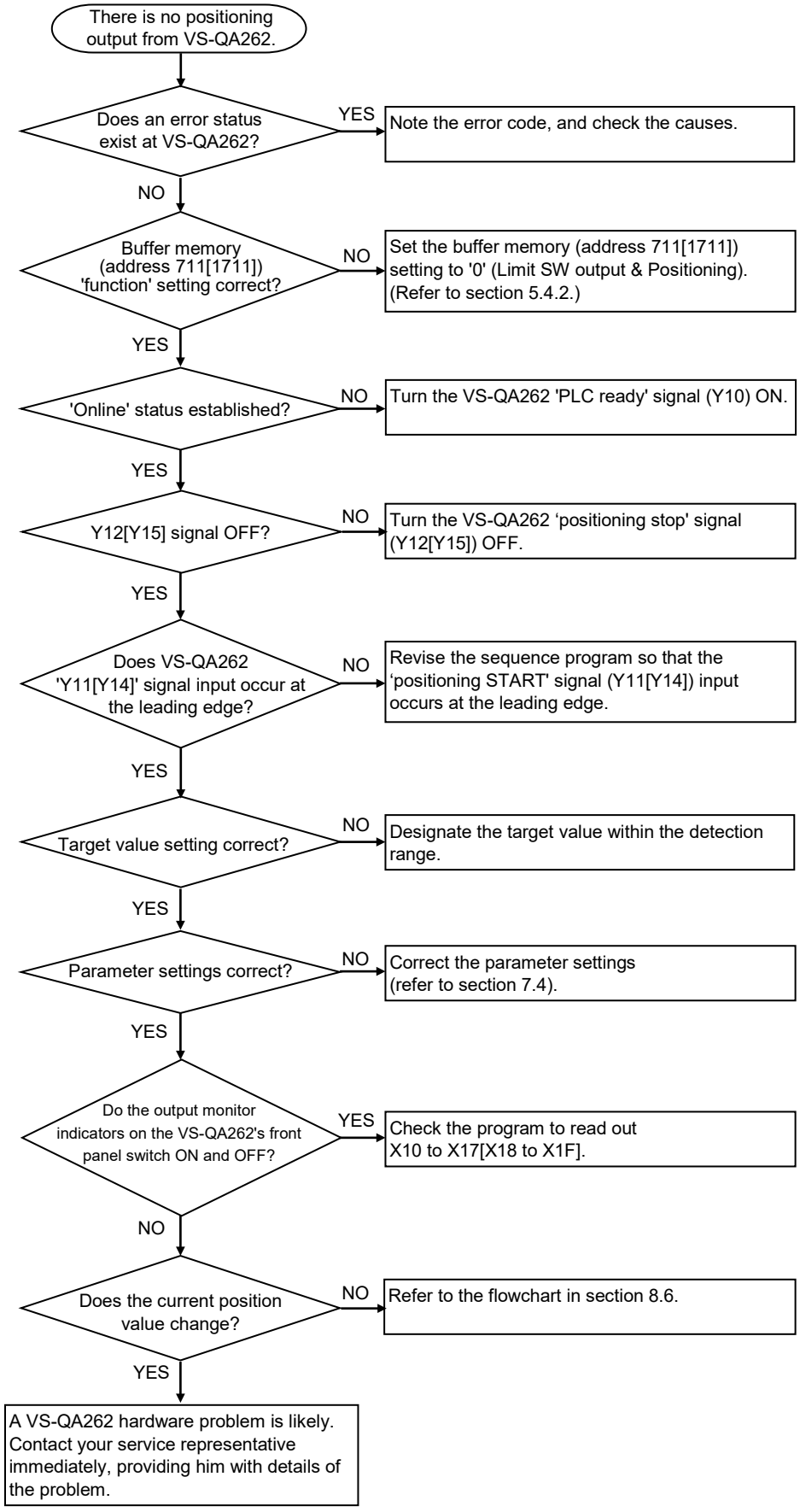


8.3 Flowchart for No Limit SW output from VS-QA262



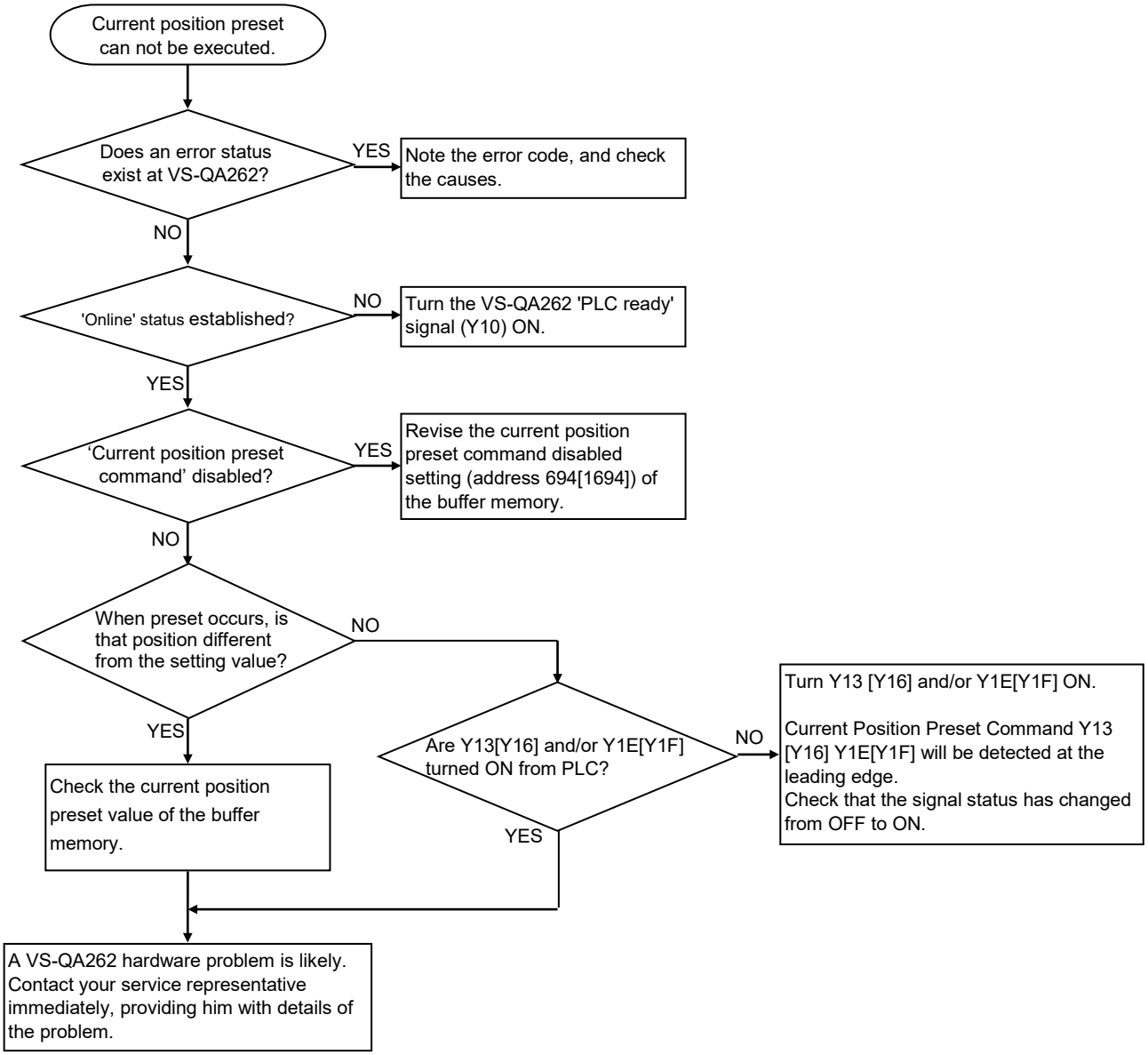
*: Only by rewriting the buffer memory, the initial setting and the parameter can not be effective. Rewrite the internal data of VS-QA262 (Refer to 5.3 and 5.4 of this Manual).
When the power is turned ON or the PLC reset is executed while the PLC CPU remains STOP, the internal data of VS-QA262 can be read to the buffer memory.

8.4 Flowchart for No Positioning Output from VS-QA262



*: Only by rewriting the buffer memory, the initial setting and the parameter can not be effective. Rewrite the internal data of VS-QA262 (Refer to 5.3 and 5.4 of this Manual).
When the power is turned ON or the PLC reset is executed while the PLC CPU remains STOP, the internal data of VS-QA262 can be read to the buffer memory.

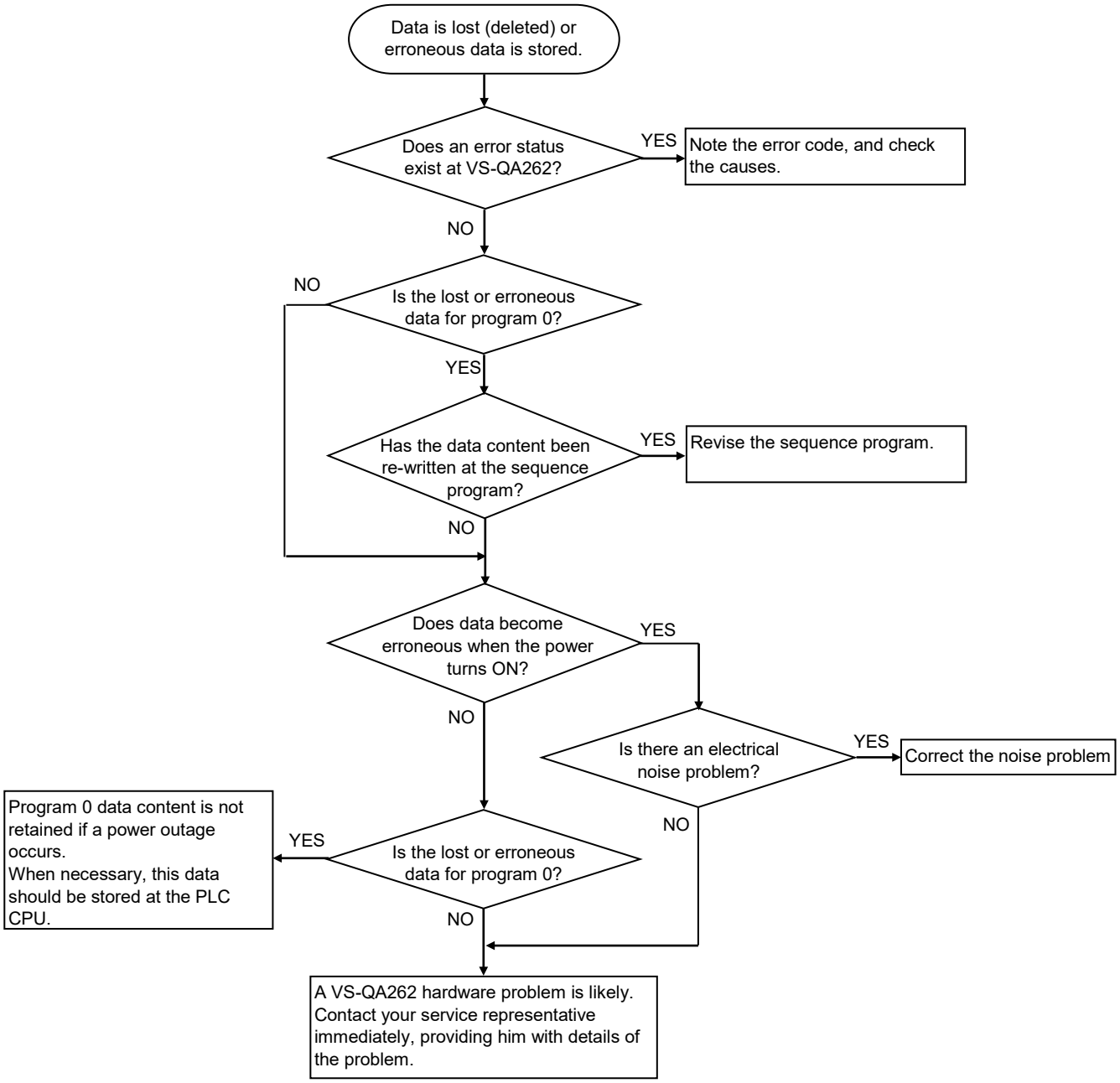
8.5 Flowchart when Current Position Preset is Impossible



8.6 Flowchart when ABSOCODER's Current Position Value doesn't Change

*: Only by rewriting the buffer memory, the initial setting and the parameter can not be effective. Rewrite the internal data of VS-QA262 (Refer to 5.3 and 5.4 of this Manual).
When the power is turned ON or the PLC reset is executed while the PLC CPU remains STOP, the internal data of VS-QA262 can be read to the buffer memory.

8.7 Flowchart when Stored Data is Lost, or when Erroneous Data is Stored



APPENDIX

APPENDIX 1 CE MARKING

VS-QA262 series conforms to EMC directive, but stands outside scope of the low voltage directive.

(1) EMC Directives

It is necessary to do CE marking in the customer's responsibility in the state of a final product. Confirm EMC compliance of the machine and the entire device by customer because EMC changes configuration of the control panel, wiring, and layout.

(2) EMC Directive and Standards

EMC Directive consists of immunity and emission items.
It conforms to Table 01(see below) of EMC standards and Testing.

Table 01 EMC Standard and Testing

Class	Standard No.	Name
EMC	EN61131-2	Equipment requirements and tests of programmable controllers
EMI (Emission)	EN55011 Class A	Electromagnetic Radiation Disturbance
EMS (Immunity)	EN61000-6-2	Generic standards. Immunity standard for industrial environments
	EN61000-4-2	Electrostatic Discharge
	EN61000-4-3	Radiated, Radio frequency, Electromagnetic Field
	EN61000-4-4	Electrical Fast Transient / Burst
	EN61000-4-5	Surge Immunity
	EN61000-4-6	Conducted Disturbances, Induced by Radio-Frequency Fields
	EN61000-4-8	Power Frequency Magnetic Field

(4) Restrictions for EMC Compliance

- PLC must be installed in the control panel.
  Refer to the CPU user's manual (Hardware Design / Maintenance and Inspection) for details of the install method.
- The length of I/O cable must be under 30m.
- Install the zippertubing around the cable when sensor cable is used 30m or more. The shield of zippertubing should grounded.

Recommendation zippertubing

Mounting location	Model	Manufacturer
Sensor cable	MTFS 20ϕ	ZIPPERTUBING(JAPAN), LTD.

[Reference]

It may be improved when clamp ferrite core is added to the extension sensor cable and I/O cable when it operates faultily by the influence from the peripheral device.

Recommendation Clamp Ferrite Core

Mounting location	Clamp ferrite core model	Manufacturer
- Extension sensor cable - I/O cable	ZCAT2032-0930 (Inner dimensions: ϕ9)	TDK

APPENDIX 2 UL STANDARD

The VS-QA262 Series corresponds to the UL standard.
Read this page carefully and use the VS-QA262 Series by following the described items.

(1) Installation

- Install inside the control cabinet.
- For use in pollution degree 2 environment.
- Within the surrounding air temperature 0℃ to 55℃.
- Built in to Q-series PLC by Mitsubishi Electric Co.

(2) Compliance power supply

- The VS-QA262 Series shall not conform to UL and cUL standards, unless a power supply to a PLC base is made by Mitsubishi Electric Co., that is insulated and whose secondary is LVLC (Limited voltage/current circuit) defined in UL508.
- Use only a Class 2 power supply to external input/output signal lines.

(3) Wiring for external I/O

- Use field installed conductors with a temperature rating of 75℃ or higher.

CAUTION

DO NOT CONNECT DIRECTLY TO LINE VOLTAGE. LINE VOLTAGE MUST BE SUPPLIED BY A SUITABLE, APPROVED ISOLATING POWER SUPPLY HAVING SHORT CIRCUIT CAPACITY NOT EXCEEDING 100 VA MAXIMUM

APPENDIX 3 KC MARK

Notification for users 사용자안내문
This product complied with the relevant Korean Safety Standard for use in the industrial environment. Thus, radio frequency interference could occur if it is used in a domestic environment. 이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.

MEMO

APPENDIX 4 ABSOCODER SENSOR SPECIFICATIONS

Appendix 4.1 ABSOCODER Sensor for VS-QA262-L

Appendix 4.1.1 Specifications

VLS-[ ]PW

Items		Specifications		
Sensor model		VLS-256PWB	VLS-512PWB	VLS-1024PW
Absolute detection range		256mm	512mm	1024mm
Resolution		3.90625 μm	7.8125 μm	15.625 μm
Total number of divisions		65536 (2^{16})		
Linearity error		0.05mm Max.	0.1mm Max.	0.4mm Max.
Mass		0.9kg	1.7kg	8.0kg
Sliding resistance		4.9N or less (0.5kgf or less)	7.8N or less (0.8kgf or less)	19.6N or less (2.0kgf or less)
Permissible mechanical speed		1000mm/s	1000mm/s	2000mm/s
Permissible mechanical parallelism		±0.1mm		
Ambient temperature	Operating	−30 to +90℃		
	Storage	−20 to +60℃		
Vibration resistance		110 m/s^2 (11.3G) 66.7Hz, up/down 4h, forward/back/left/right 2h each, conforms to JIS D1601 standard		
Shock resistance		2000 m/s^2 (200G), up/down x 3 times each, conforms to JIS C5026 standard		
Protection rating		IP40, conforms to JEM 1030 standard		
Max. sensor cable length	Standard cable	100m（4P-S）		
	Robotic cable	50m（4P-RBT）		

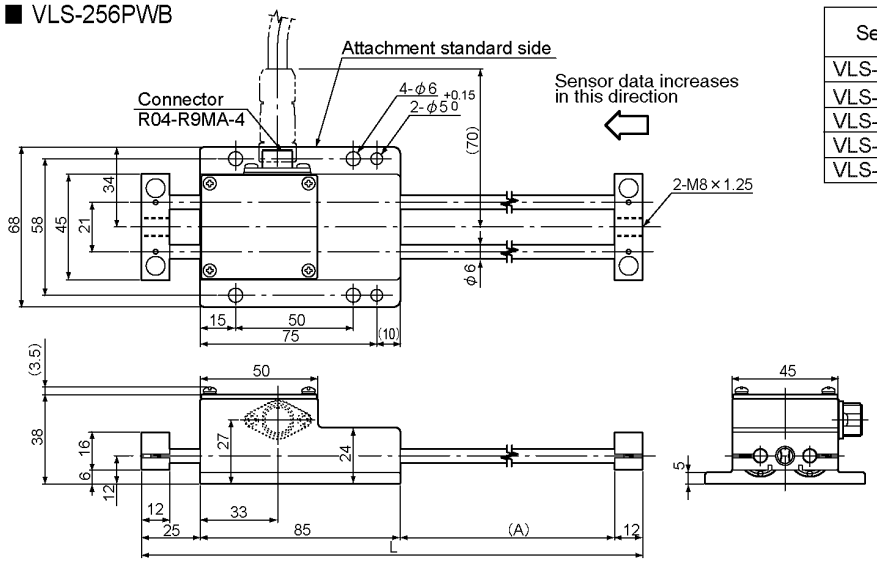
VLS-[ ]PY

Items		Specifications		
Sensor model		VLS-512PYB	VLS-1024PYB	VLS-2048PY
Absolute detection range		512mm	1024mm	2048mm
Resolution		3.90625 μm	7.8125 μm	15.625 μm
Total number of divisions		131072 (2^{17})		
Linearity error		0.1mm Max.	0.2mm Max.	0.5mm Max.
Mass		1.0kg	2.1kg	10.2kg
Sliding resistance		4.9N or less (0.5kgf or less)	7.8N or less (0.8kgf or less)	19.6N or less (2.0kgf or less)
Permissible mechanical speed		250mm/s	500mm/s	1000mm/s
Permissible mechanical parallelism		±0.1mm		
Ambient temperature	Operating	−30 to +90℃		
	Storage	−20 to +60℃		
Vibration resistance		110 m/s^2 (11.3G) 66.7Hz, up/down 4h, forward/back/left/right 2h each, conforms to JIS D1601 standard		
Shock resistance		1000 m/s^2 (100G), up/down x 3 times each, conforms to JIS C5026 standard		
Protection rating		IP40, conforms to JEM 1030 standard		
Max. sensor cable length	Standard cable	60m（4P-S）		
	Robotic cable	30m（4P-RBT）		

Appendix 4.1.2 ABSOCODER Sensor Dimensions

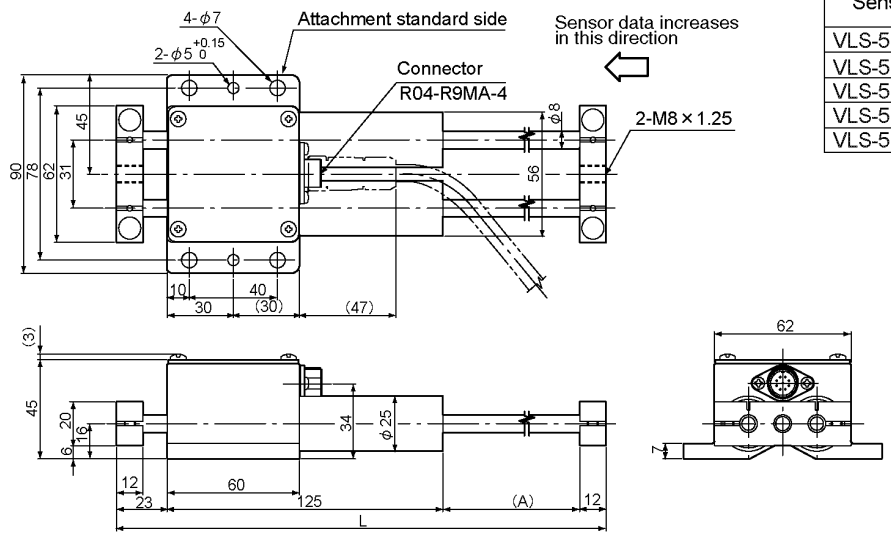
Units: mm

■ VLS-256PWB



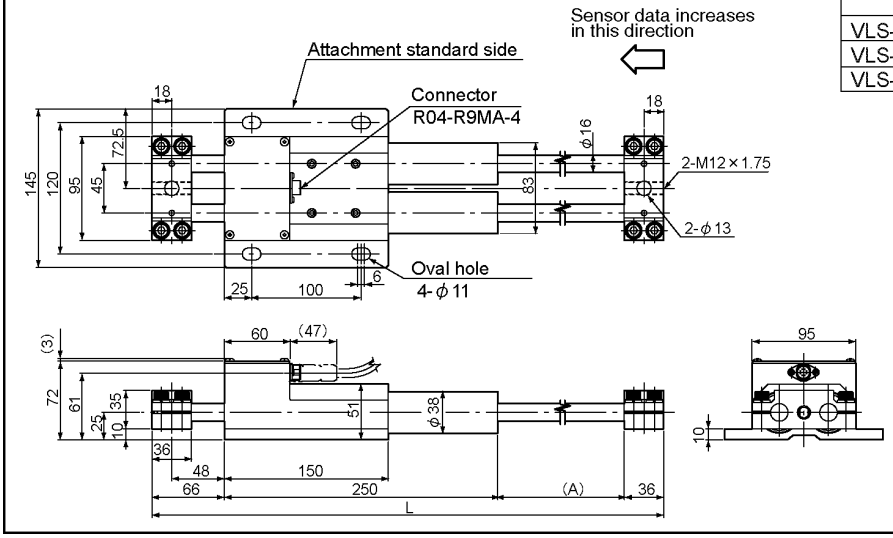
Sensor model	Max. detection stroke	L	(A)
VLS-256PWB	256	396	274
VLS-256PW200B	200	340	218
VLS-256PW128B	128	268	146
VLS-256PW100B	100	240	118
VLS-256PW58B	58	198	76

■ VLS-512PWB



Sensor model	Max. detection stroke	L	(A)
VLS-512PWB	512	682	522
VLS-512PW400B	400	570	410
VLS-512PW350B	350	520	360
VLS-512PW220B	220	390	230
VLS-512PW200B	200	370	210

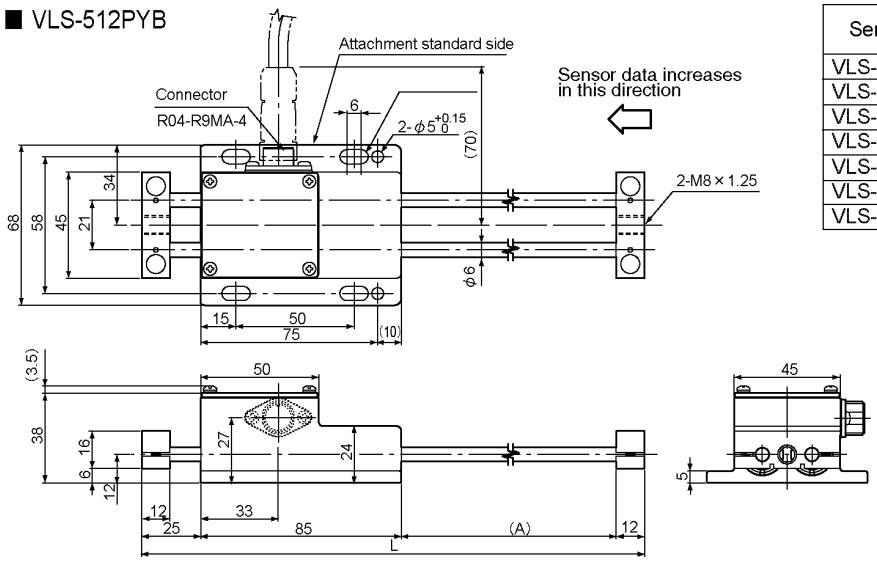
■ VLS-1024PW



Sensor model	Max. detection stroke	L	(A)
VLS-1024PW	1024	1414	1062
VLS-1024PW800	800	1190	838
VLS-1024PW600	600	990	638

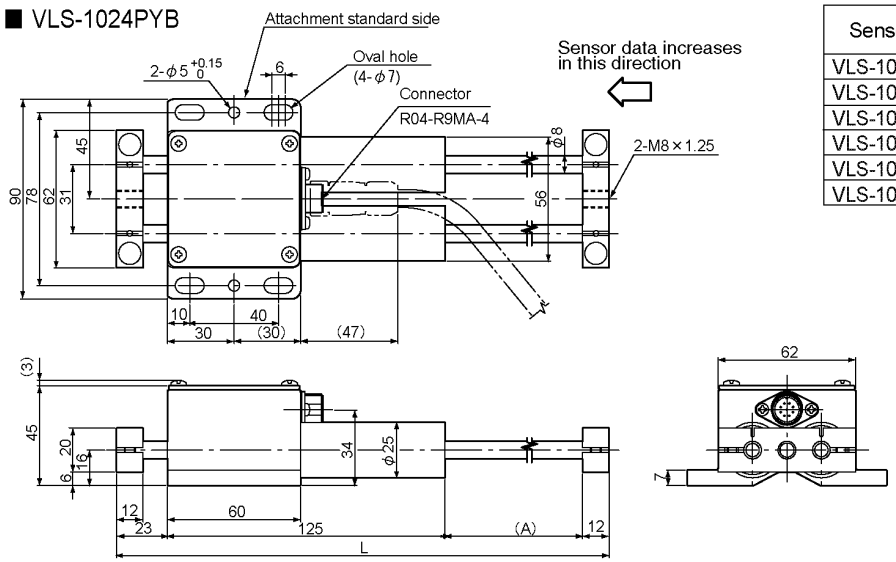
Units: mm

■ VLS-512PYB



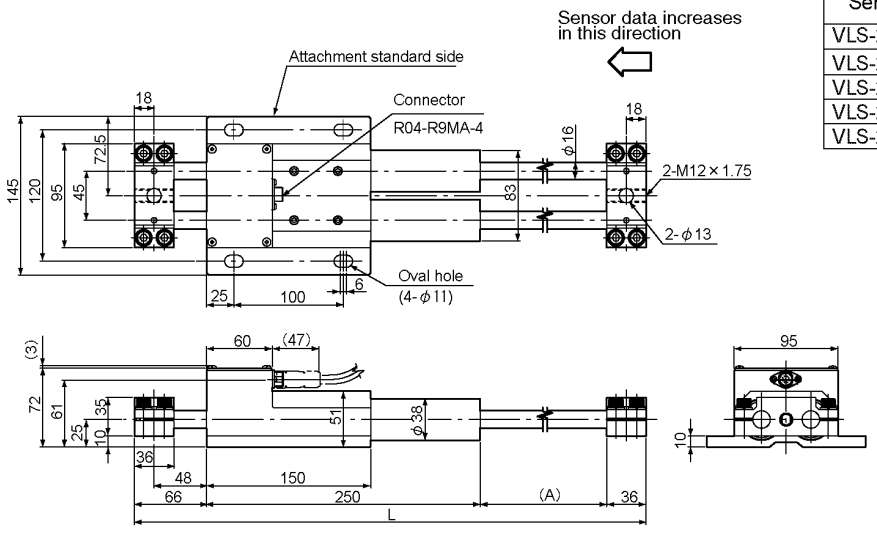
Sensor model	Max. detection stroke	L	(A)
VLS-512PYB	512	652	530
VLS-512PY350B	350	490	368
VLS-512PY256B	256	396	274
VLS-512PY150B	150	290	168
VLS-512PY110B	110	250	128
VLS-512PY70B	70	210	88
VLS-512PY58B	58	198	76

■ VLS-1024PYB



Sensor model	Max. detection stroke	L	(A)
VLS-1024PYB	1024	1194	1034
VLS-1024PY800B	800	970	810
VLS-1024PY600B	600	770	610
VLS-1024PY512B	512	682	522
VLS-1024PY350B	350	520	360
VLS-1024PY220B	220	390	230

■ VLS-2048PY



Sensor model	Max. detection stroke	L	(A)
VLS-2048PY	2048	2438	2086
VLS-2048PY1800	1800	2190	1838
VLS-2048PY1600	1600	1990	1638
VLS-2048PY1500	1500	1890	1538
VLS-2048PY1200	1200	1590	1238

Appendix 4.2 ABSOCODER Cable

Appendix 4.2.1 Specifications

Items		Specifications	
Model code		4P-S	4P-RBT
Cable type		Standard cable	Robotic cable
Diameter		ϕ8	
Ambient temperature	Operating	−5 to +60°C	−5 to +60°C
	Storage	−5 to +60°C	−10 to +60°C
Insulator		Irradiated cross linked formed polyethylene	ETFE plastic
Sheath		Vinyl chloride mixture	
Construction		8-core, 2 pairs without shield + 2 pairs with shield	
Color of sheath		Gray	Black
Advantage		Extendable for long distances	Superior flexibility; ideal for moving place

Appendix 4.2.2 Cable length restrictions

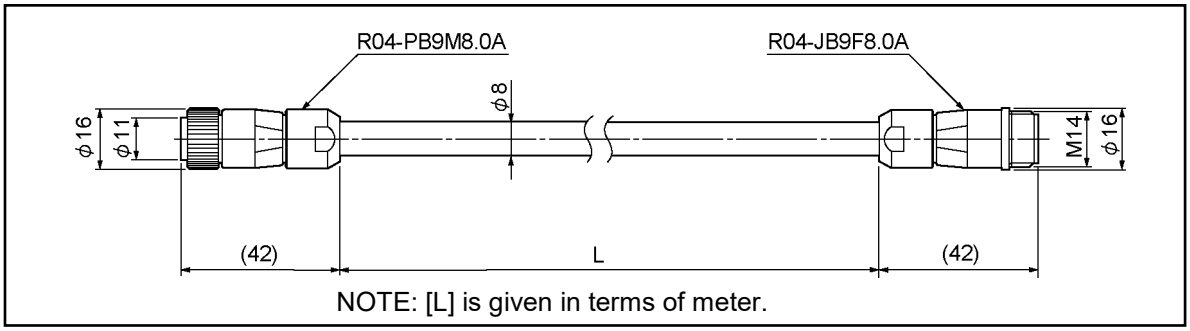
The permissible length of the extension cable varies according to the ABSOCODER sensor model, as shown in the following table.

Sensor model \ Cable model	4P-S	4P-RBT
VLS-256PW[ ]B	100m	50m
VLS-512PW[ ]B		
VLS-1024PW[ ]		
VLS-512PY[ ]B	60m	30m
VLS-1024PY[ ]B		
VLS-2048PY[ ]		

REMARKS
Contact your NSD representative when the ABSOCODER cable combines different types of cables.
The ABSOCODER cable is a dedicated product and is not interchangeable with any other type of cable.

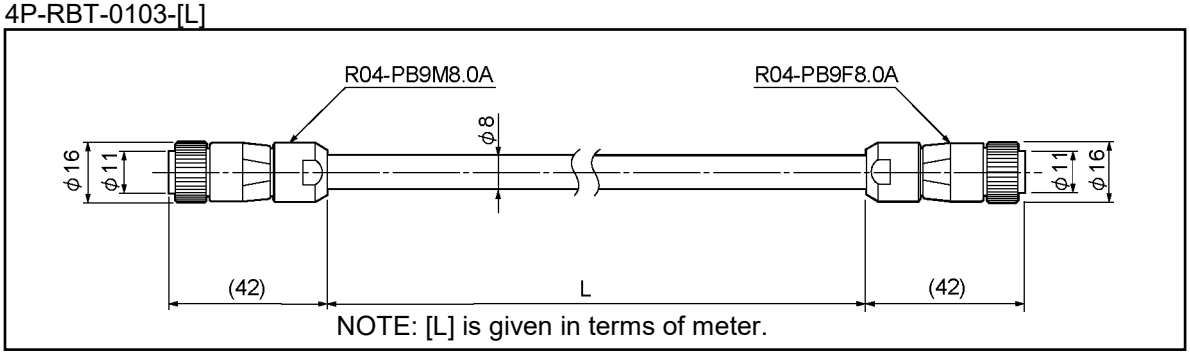
Appendix 4.2.3 ABSOCODER Cable Dimensions

4P-S-0102-[L], 4P-RBT-0102-[L] Units: mm



NOTE: [L] is given in terms of meter.

4P-RBT-0103-[L]



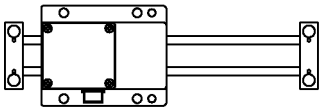
NOTE: [L] is given in terms of meter.

Appendix 4.2.4 ABSOCODER Cable Connection

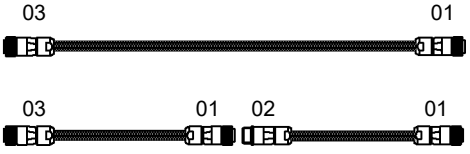
VS-QA262

ABSOCODER sensor

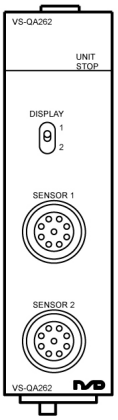
VLS-256PW[ ]B VLS-512PW[ ]B
VLS-1024PW[ ]
VLS-512PY[ ]B VLS-1024PY[ ]B
VLS-2048PY[ ]



4P-RBT-0103-[L]



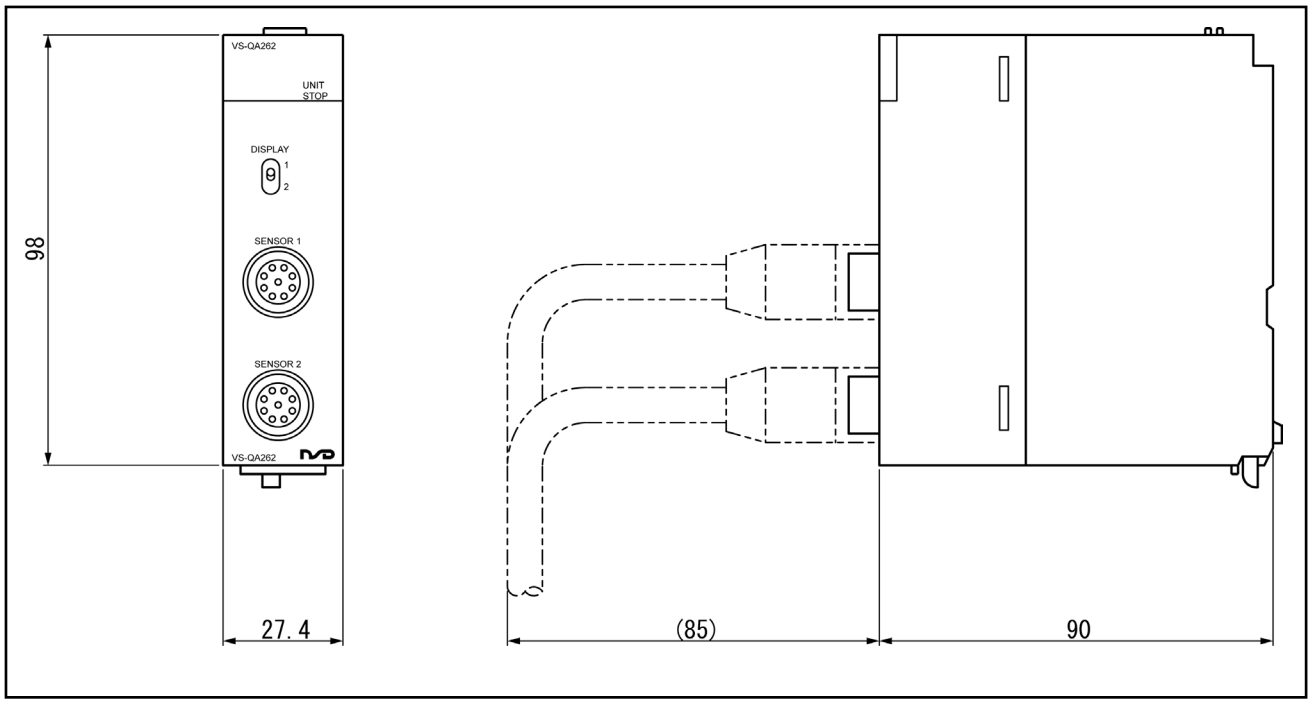
4P-RBT-0103-[L] 4P-S-0102-[L]
or
4P-RBT-0102-[L]



APPENDIX 5 DIMENSIONS

Appendix 5.1 VS-QA262

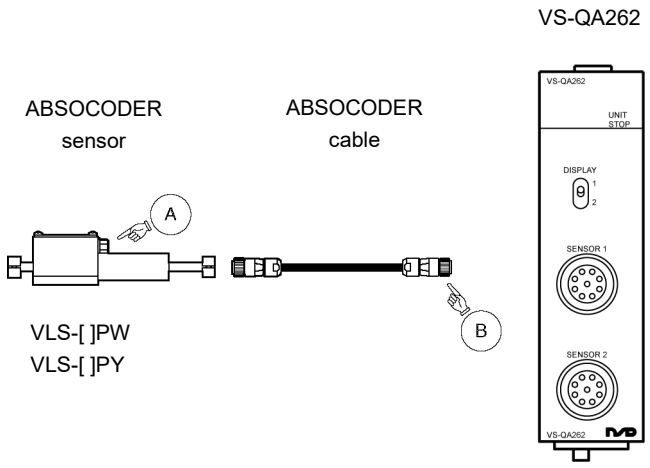
Units: mm



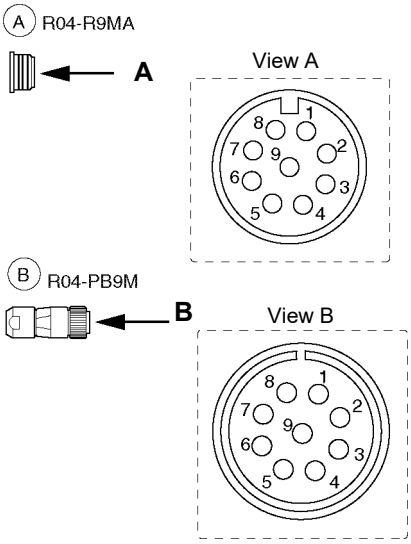
APPENDIX 6 ABSOCODER SENSOR CHECK LIST

● **Applicable ABSOCODER sensor models**
VLS-[ ]PW
VLS-[ ]PY

● **Connection configuration**



● **Connector appearance and pin position**



Checks at Point B should be carried out with Point A connected.

● **Connector pin position and standard coil resistance ranges (at 25℃)**

Connector pin No.	Signal name	Wiring color	Standard coil resistance [Ω]		
			VLS-256PWB VLS-512PYB	VLS-512PWB VLS-1024PYB	VLS-1024PW VLS-2048PY
1	SIN+	Brown	46 to 62	90 to 116	141 to 181
2	SIN-	Red			
3	-COS+	Orange	46 to 62	90 to 116	141 to 181
4	-COS-	Yellow			
5	OUT1+	Green	24 to 32	27 to 35	27 to 37
6	OUT1-	Blue			
7	OUT2+	Violet	24 to 32	27to 35	27 to 37
8	OUT2-	Gray			
9	Shield	Shield	—	—	—
—	—	—			

The above standard coil resistance ranges are referential data to assist wiring disconnection diagnosis and are not product specification values. There may be no wiring disconnection even when the resistance measurement is out of the standard resistance range.

● **Circuit resistance check**

[Measurement method]
Measure resistance at Point A or B using a circuit tester or other appropriate device.
When the connector is off, identify the line by the wiring color.

[Check details]
Refer to the previous page for the connector pin number.

Check position	Criterion	Check position	Criterion
Between brown and red	The measured value should be in the range of the standard coil resistance. *1	Between brown and orange, green, violet, shield	∞
Between orange and yellow		Between orange and green, violet, shield	
Between green and blue		Between green and violet, shield	
Between violet and gray		Between violet and shield	
		Between frame and each wire	

*1: When checks are done at Point B, the measurement value is [Standard coil resistance + ABSOCODER cable resistance (cable length (m) x 0.2 (Ω)).
(The resistance value of the ABSOCODER cable is 0.2Ω/m (loop resistance)).
Consider resistance variations due to temperature, which, relative to the standard temperature (25°C), increases 0.4% when the temperature rises 1°C and decreases 0.4% when the temperature falls 1°C.

● **Insulation check**

[Measurement method]
Measure using a 500 VDC megger.

[Check details]
Refer to the previous page for the connector pin number.

Check position	Criterion
Between brown and orange, green, violet, shield	10MΩ or more
Between orange and green, violet, shield	
Between green and violet, shield	
Between violet and shield	
Between frame and each wire	

⚠ **NOTES**

1. Make sure to disconnect the ABSOCODER sensor from VS-QA262 before carrying out insulation checks.
2. If there is a risk that energization may cause damages to the electronic circuits in and around the machine, remove the ABSOCODER sensor from the machine.
3. After completing the checks, short-circuit between the pins to discharge remaining voltage before connecting the ABSOCODER sensor to VS-QA262.

APPENDIX 7 I/O SIGNALS and BUFFER MEMORY FUNCTION LIST

○: Function enabled ×: Function disabled

<table>
<tr><th>Signal type</th><th>Device No. and name / VS-QA262 (online/offline)</th><th colspan="2"></th><th>Online</th><th>Offline</th><th>Remarks</th></tr>
<tr><td rowspan="25">Signal inputs to PLC CPU</td><td>X0</td><td colspan="2">Unit ready (VS-QA262 detection item)</td><td>○</td><td>○</td><td></td></tr>
<tr><td>X1</td><td colspan="2">VS-QA262 operation status (online/offline)</td><td>ON</td><td>OFF</td><td>This signal turns ON(online) when Y10 is turned ON</td></tr>
<tr><td>X2</td><td rowspan="4">Axis 1</td><td>'Upper limit overtravel' detection</td><td>○</td><td>×</td><td></td></tr>
<tr><td>X3</td><td>'Lower limit overtravel' detection</td><td>○</td><td>×</td><td></td></tr>
<tr><td>X4</td><td>Sensor error detection</td><td>○</td><td>○</td><td></td></tr>
<tr><td>X5</td><td>Error detection</td><td>○</td><td>○</td><td></td></tr>
<tr><td>X6</td><td rowspan="4">Axis 2</td><td>'Upper limit overtravel' detection</td><td>○</td><td>×</td><td></td></tr>
<tr><td>X7</td><td>'Lower limit overtravel' detection</td><td>○</td><td>×</td><td></td></tr>
<tr><td>X8</td><td>Sensor error detection</td><td>○</td><td>○</td><td></td></tr>
<tr><td>X9</td><td>Error detection</td><td>○</td><td>○</td><td></td></tr>
<tr><td>XA</td><td rowspan="2">Axis 1</td><td>'Excessive correction amount' detection</td><td>○</td><td>×</td><td></td></tr>
<tr><td>XB</td><td>'Excessive current position change' detection</td><td>○</td><td>○</td><td></td></tr>
<tr><td>XC</td><td colspan="2">Use prohibited</td><td></td><td></td><td></td></tr>
<tr><td>XD</td><td rowspan="2">Axis 2</td><td>'Excessive correction amount' detection</td><td>○</td><td>×</td><td></td></tr>
<tr><td>XE</td><td>'Excessive current position change' detection</td><td>○</td><td>○</td><td></td></tr>
<tr><td>XF</td><td colspan="2">Use prohibited</td><td></td><td></td><td></td></tr>
<tr><td>X10 t to X17
[X18 to X1F]</td><td colspan="2">Content varies according to function
<table>
<tr><th rowspan="2">Axis 1</th><th rowspan="2">Axis 2</th><th rowspan="2">Limit SW output function</th><th colspan="2">Limit SW output function & positioning function</th></tr>
<tr><th>Using ‘speed switching’ format</th><th>Using ‘speed stepping’ format</th></tr>
<tr><td>X10</td><td>X18</td><td>CH.0</td><td>FWD</td><td>FWD/Low-speed</td></tr>
<tr><td>X11</td><td>X19</td><td>CH.1</td><td>RVS</td><td>RVS/Low-speed</td></tr>
<tr><td>X12</td><td>X1A</td><td>CH.2</td><td>High-speed</td><td>High-speed</td></tr>
<tr><td>X13</td><td>X1B</td><td>CH.3</td><td>Low-speed</td><td>Medium-speed</td></tr>
<tr><td>X14</td><td>X1C</td><td>CH.4</td><td>Brake release</td><td>Brake release</td></tr>
<tr><td>X15</td><td>X1D</td><td>CH.5</td><td>In-position</td><td>In-position</td></tr>
<tr><td>X16</td><td>X1E</td><td>CH.6</td><td>Positioning in progress</td><td>Positioning in progress</td></tr>
<tr><td>X17</td><td>X1F</td><td>CH.7</td><td>Operation error</td><td>Operation error</td></tr>
</table></td><td>○</td><td>×</td><td></td></tr>
<tr><td rowspan="19">Signal outputs from PLC CPU</td><td>Y10</td><td colspan="2">PLC ready</td><td>ON</td><td>OFF</td><td>Online/offline status is designated by this signal</td></tr>
<tr><td>Y11</td><td rowspan="3">Axis 1</td><td>Positioning START</td><td>○</td><td>×</td><td>Detected at leading edge</td></tr>
<tr><td>Y12</td><td>Positioning STOP</td><td>○</td><td>×</td><td>Detected at leading edge</td></tr>
<tr><td>Y13</td><td>Current position preset command 1</td><td>○</td><td>×</td><td>Detected at leading edge</td></tr>
<tr><td>Y14</td><td rowspan="3">Axis 2</td><td>Positioning START</td><td>○</td><td>×</td><td>Detected at leading edge</td></tr>
<tr><td>Y15</td><td>Positioning STOP</td><td>○</td><td>×</td><td>Detected at leading edge</td></tr>
<tr><td>Y16</td><td>Current position preset command 1</td><td>○</td><td>×</td><td>Detected at leading edge</td></tr>
<tr><td>Y17</td><td rowspan="2">Axis 1</td><td>FWD (Forward) JOG
(Operation occurs when ON)</td><td>○</td><td>×</td><td></td></tr>
<tr><td>Y18</td><td>RVS (Reverse) JOG
(Operation occurs when ON)</td><td>○</td><td>×</td><td></td></tr>
<tr><td>Y19</td><td rowspan="2">Axis 2</td><td>FWD (Forward) JOG
(Operation occurs when ON)</td><td>○</td><td>×</td><td></td></tr>
<tr><td>Y1A</td><td>RVS (Reverse) JOG
(Operation occurs when ON)</td><td>○</td><td>×</td><td></td></tr>
<tr><td>Y1B</td><td colspan="2">Limit SW output enabled</td><td>○</td><td>×</td><td></td></tr>
<tr><td>Y1C</td><td colspan="2">Error reset</td><td>○</td><td>○</td><td>Detected at leading edge</td></tr>
<tr><td>Y1D</td><td colspan="2">Use prohibited</td><td></td><td></td><td></td></tr>
<tr><td>Y1E</td><td>Axis 1</td><td>Current position preset command 2</td><td>○</td><td>×</td><td>Detected at leading edge</td></tr>
<tr><td>Y1F</td><td>Axis 2</td><td>Current position preset command 2</td><td>○</td><td>×</td><td>Detected at leading edge</td></tr>
</table>

Signal type	Address and name [ ]: Address for axis 2 / VS-QA262 (online/offline)		Online	Offline	Remarks
Buffer memory	0[1000], 1[1001]	Current position value (scaling binary)	○	×	
	2[1002], 3[1003]	Current position value (sensor binary)	○	×	
	4[1004]	Limit SW output status	○	×	
	5[1005]	Program No. answerback	○	○	
	6[1006]	I/O status	○	○	
	7[1007]	Error code	○	○	
	8[1008]	Limit SW output disabled setting	○	×	
	9[1009]	Program No. setting	○	○	During offline, writing is valid, however, switch output is invalid.
	10[1010], 11[1011]	Target stop position setting data (scaling binary)	○	×	
	12[1012] to 667[1667]	CHs. 0 to 15: limit SW ON/OFF position settings	○	○	During offline, writing is valid, however, switch output is invalid.
	668[1668], 669[1669]	Speed output	○	×	
	670[1670], 671[1671]	Hold current position (scaling binary)	○	○	
	672[1672], 673[1673]	Hold current position (sensor binary)	○	○	
	674[1674], 675[1675]	FWD stop zone after learning	○	×	
	676[1676], 677[1677]	RVS stop zone after learning	○	×	
	678[1678]	Speed limit	○	×	
	679[1679]	Positioning pattern data buffer memory selection	○	×	
	680[1680], 681[1681]	Medium-speed zone	○	×	
	682[1682], 683[1683]	Low-speed zone	○	×	
	684[1684], 685[1685]	FWD stop zone	○	×	
	686[1686], 687[1687]	RVS stop zone	○	×	
	688[1688], 689[1689]	In-position zone	○	×	
	690[1690], 691[1691]	Current position preset value 1	○	×	
	692[1692], 693[1693]	Current position preset value 2	○	×	
	694[1694]	Current position preset command disabled setting	○	×	
	700[－]	Data memory flag	×	○	
	701[－]	Data memory flag answerback	×	○	
	702[1702]	Sensor selection/sensor travel direction	×	○	
	704[1704], 705[1705]	Scale length	×	○	
	707[1707], 708[1708]	Minimum current position value	×	○	
	709[1709], 710[1710]	Current position value	×	○	
	711[1711]	Function	×	○	
	712[1712]	Positioning format	×	○	
	713[1713]	Positioning direction	×	○	
	714[1714], 715[1715]	Overshoot amount	×	○	
	716[1716], 717[1717]	Medium-speed zone	×	○	
	718[1718], 719[1719]	Low-speed zone	×	○	
	720[1720], 721[1721]	Stop zone	×	○	
	722[1722], 723[1723]	In-position zone	×	○	
	724[1724], 725[1725]	Upper limit value	×	○	
	726[1726], 727[1727]	Lower limit value	×	○	
	728[1728]	Start from stop zone	×	○	
	729[1729]	Motion non-detection timer	×	○	
	730[1730]	Motion misdirection non-detection timer	×	○	
	731[1731]	Positioning end detection timer	×	○	
	732[1732]	JOG low-speed timer	×	○	
	735[1735]	Offline channel output status	×	○	
	736[1736], 737[1737]	Permissible current position change amount	×	○	
	738[1738], 739[1739]	Permissible correction amount	×	○	
	740[1740]	Current position preset function	×	○	
	741[1741], 742[1742]	FWD current position preset value 1	×	○	
	743[1743], 744[1744]	RVS current position preset value 1	×	○	
	745[1745], 746[1746]	FWD current position preset value 2	×	○	
	747[1747], 748[1748]	RVS current position preset value 2	×	○	
	749[1749]	Speed gate time	×	○	
	750[1750]	Speed sampling time	×	○	
	751[1751]	Current position change command	×	○	

APPENDIX 8 DATA SHEET

Appendix 8.1 Initial Setting and Parameter Setting Sheet

[For axis 1]

Initial Setting							
Address	Item	Default value	Setting value	Address	Item	Default value	Setting value
702	Sensor selection/sensor travel direction 0: VLS-[ ]PW/CW 1: VLS-[ ]PW/CCW 2: VLS-[ ]PY/CW 3: VLS-[ ]PY/CCW 99 : No sensor	0		704 705	Scale length (→L) [1000 to 999999]	131072	
				707 708	Minimum current position value (→K) [−99999 to (1000000−L)]	0	
				709 710	Current position value [K to (K+L−1)]	65536	

Parameter							
Address	Item	Default Value	Setting Value	Address	Item	Default Value	Setting Value
711	Function 0: Limit SW output function & positioning function 1: Limit SW output function only 2: Current position detection function only	2		735	Offline channel output status 0: All-points OFF 1: Hold	0	
712	Positioning format 0: Speed switching format without learning function 1: Speed stepping format without learning function 2: Speed switching format with learning function 3: Speed stepping format with learning function	0		736 737	Permissible current position change amount [0 to 999999]	999999	
				738 739	Permissible correction amount [0 to 999999]	999999	
				740	Current position preset function 0: Disabled 1: By parameter format 2: By buffer memory format 3: By sequence format	0	
				741 742	FWD current position preset value 1 [K to (K+L−1)]	0	
713	Positioning direction 0: FWD direction 1: RVS direction	0		743 744	RVS current position preset value 1 [K to (K+L−1)]	0	
714 715	Overshoot amount [0 to 999999]	100		745 746	FWD current position preset value 2 [K to (K+L−1)]	0	
716 717	Medium-speed zone [0 to 999999]	10000		747 748	RVS current position preset value 2 [K to (K+L−1)]	0	
718 719	Low-speed zone [0 to 999999]	1000		749	Speed gate time 0: 8ms 1: 16ms 2: 32ms 3: 64ms 4: 128ms 6: 3.2ms 7: 6.4ms 8: 12.8ms 9: 25.6ms 10: 51.2ms	0	
720 721	Stop zone [0 to 999999]	100					
722 723	In-position zone [0 to 999999]	100					
724 725	Upper limit(+limit) [−99999 to 999999]	999999					
726 727	Lower limit(-limit) [−99999 to 999999]	−99999		750	Speed sampling time 0: Same as speed gate time 1: 1/2 of speed gate time 2: 1/4 of speed gate time	0	
728	START from stop zone 0: Disable 1: Enable	1					
729	Motion non-detection timer [0.00 to 99.99] (s)	1000					
730	Motion misdirection non-detection timer [0.00 to 99.99] (s)	1000					
731	'Positioning end' detection timer [0.00 to 99.99] (s)	10					
732	JOG low-speed timer [0.00 to 99.99] (s)	9999					

[For axis 2]

Initial Setting							
Address	Item	Default Value	Setting Value	Address	Item	Default Value	Setting Value
1702	Sensor selection/sensor travel direction 0: VLS-[ ]PW/CW 1: VLS-[ ]PW/CCW 2: VLS-[ ]PY/CW 3: VLS-[ ]PY/CCW 99 : No sensor	0		1704 1705	Scale length (→L) [1000 to 999999]	131072	
				1707 1708	Minimum current position value (→K) [－99999 to (1000000－L)]	0	
				1709 1710	Current position value [K to (K＋L－1)]	65536	

Parameter							
Address	Item	Default Value	Setting Value	Address	Item	Default Value	Setting Value
1711	Function 0: Limit SW output function & positioning function 1: Limit SW output function only 2: Current position detection function only	2		1735	Offline channel output status 0: All-points OFF 1: Hold	0	
1712	Positioning format 0: Speed switching format without learning function 1: Speed stepping format without learning function 2: Speed switching format with learning function 3: Speed stepping format with learning function	0		1736 1737	Permissible current position change amount [0 to 999999]	999999	
				1738 1739	Permissible correction amount [0 to 999999]	999999	
				1740	Current position preset function 0: Disabled 1: By parameter format 2: By buffer memory format 3: By sequence format	0	
				1741 1742	FWD current position preset value 1 [K to (K＋L－1)]	0	
1713	Positioning direction 0: FWD direction 1: RVS direction	0		1743 1744	RVS current position preset value 1 [K to (K＋L－1)]	0	
1714 1715	Overshoot amount [0 to 999999]	100		1745 1746	FWD current position preset value 2 [K to (K＋L－1)]	0	
1716 1717	Medium-speed zone [0 to 999999]	10000		1747 1748	RVS current position preset value 2 [K to (K＋L－1)]	0	
1718 1719	Low-speed zone [0 to 999999]	1000		1749	Speed gate time 0: 8ms 1: 16ms 2: 32ms 3: 64ms 4: 128ms 6: 3.2ms 7: 6.4ms 8: 12.8ms 9: 25.6ms 10: 51.2ms	0	
1720 1721	Stop zone [0 to 999999]	100					
1722 1723	In-position zone [0 to 999999]	100					
1724 1725	Upper limit(+limit) [－99999 to 999999]	999999					
1726 1727	Lower limit(-limit) [－99999 to 999999]	－99999		1750	Speed sampling time 0: Same as speed gate time 1: 1/2 of speed gate time 2: 1/4 of speed gate time	0	
1728	START from stop zone 0: Disable 1: Enable	1					
1729	Motion non-detection timer [0.00 to 99.99] (s)	1000					
1730	Motion misdirection non-detection timer [0.00 to 99.99] (s)	1000					
1731	'Positioning end' detection timer [0.00 to 99.99] (s)	10					
1732	JOG low-speed timer [0.00 to 99.99] (s)	9999					

Appendix 8.2 Limit switch data sheet

[For axis 1] Limit switch data sheet CH.0 to CH.3

NAME								
Item	CH.0		CH.1		CH.2		CH.3	
	Address	Setting value	Address	Setting value	Address	Setting value	Address	Setting value
Number of Multi-dogs	12		53		94		135	
Dog 0 ON	13(L)		54(L)		95(L)		136(L)	
	14(H)		55(H)		96(H)		137(H)	
Dog 0 OFF	15(L)		56(L)		97(L)		138(L)	
	16(H)		57(H)		98(H)		139(H)	
Dog 1 ON	17(L)		58(L)		99(L)		140(L)	
	18(H)		59(H)		100(H)		141(H)	
Dog 1 OFF	19(L)		60(L)		101(L)		142(L)	
	20(H)		61(H)		102(H)		143(H)	
Dog 2 ON	21(L)		62(L)		103(L)		144(L)	
	22(H)		63(H)		104(H)		145(H)	
Dog 2 OFF	23(L)		64(L)		105(L)		146(L)	
	24(H)		65(H)		106(H)		147(H)	
Dog 3 ON	25(L)		66(L)		107(L)		148(L)	
	26(H)		67(H)		108(H)		149(H)	
Dog 3 OFF	27(L)		68(L)		109(L)		150(L)	
	28(H)		69(H)		110(H)		151(H)	
Dog 4 ON	29(L)		70(L)		111(L)		152(L)	
	30(H)		71(H)		112(H)		153(H)	
Dog 4 OFF	31(L)		72(L)		113(L)		154(L)	
	32(H)		73(H)		114(H)		155(H)	
Dog 5 ON	33(L)		74(L)		115(L)		156(L)	
	34(H)		75(H)		116(H)		157(H)	
Dog 5 OFF	35(L)		76(L)		117(L)		158(L)	
	36(H)		77(H)		118(H)		159(H)	
Dog 6 ON	37(L)		78(L)		119(L)		160(L)	
	38(H)		79(H)		120(H)		161(H)	
Dog 6 OFF	39(L)		80(L)		121(L)		162(L)	
	40(H)		81(H)		122(H)		163(H)	
Dog 7 ON	41(L)		82(L)		123(L)		164(L)	
	42(H)		83(H)		124(H)		165(H)	
Dog 7 OFF	43(L)		84(L)		125(L)		166(L)	
	44(H)		85(H)		126(H)		167(H)	
Dog 8 ON	45(L)		86(L)		127(L)		168(L)	
	46(H)		87(H)		128(H)		169(H)	
Dog 8 OFF	47(L)		88(L)		129(L)		170(L)	
	48(H)		89(H)		130(H)		171(H)	
Dog 9 ON	49(L)		90(L)		131(L)		172(L)	
	50(H)		91(H)		132(H)		173(H)	
Dog 9 OFF	51(L)		92(L)		133(L)		174(L)	
	52(H)		93(H)		134(H)		175(H)	

[For axis 1] Limit switch data sheet CH.4 to CH.7

NAME								
Item	CH.4		CH.5		CH.6		CH.7	
	Address	Setting value	Address	Setting value	Address	Setting value	Address	Setting value
Number of Multi-dogs	176		217		258		299	
Dog 0 ON	177(L)		218(L)		259(L)		300(L)	
	178(H)		219(H)		260(H)		301(H)	
Dog 0 OFF	179(L)		220(L)		261(L)		302(L)	
	180(H)		221(H)		262(H)		303(H)	
Dog 1 ON	181(L)		222(L)		263(L)		304(L)	
	182(H)		223(H)		264(H)		305(H)	
Dog 1 OFF	183(L)		224(L)		265(L)		306(L)	
	184(H)		225(H)		266(H)		307(H)	
Dog 2 ON	185(L)		226(L)		267(L)		308(L)	
	186(H)		227(H)		268(H)		309(H)	
Dog 2 OFF	187(L)		228(L)		269(L)		310(L)	
	188(H)		229(H)		270(H)		311(H)	
Dog 3 ON	189(L)		230(L)		271(L)		312(L)	
	190(H)		231(H)		272(H)		313(H)	
Dog 3 OFF	191(L)		232(L)		273(L)		314(L)	
	192(H)		233(H)		274(H)		315(H)	
Dog 4 ON	193(L)		234(L)		275(L)		316(L)	
	194(H)		235(H)		276(H)		317(H)	
Dog 4 OFF	195(L)		236(L)		277(L)		318(L)	
	196(H)		237(H)		278(H)		319(H)	
Dog 5 ON	197(L)		238(L)		279(L)		320(L)	
	198(H)		239(H)		280(H)		321(H)	
Dog 5 OFF	199(L)		240(L)		281(L)		322(L)	
	200(H)		241(H)		282(H)		323(H)	
Dog 6 ON	201(L)		242(L)		283(L)		324(L)	
	202(H)		243(H)		284(H)		325(H)	
Dog 6 OFF	203(L)		244(L)		285(L)		326(L)	
	204(H)		245(H)		286(H)		327(H)	
Dog 7 ON	205(L)		246(L)		287(L)		328(L)	
	206(H)		247(H)		288(H)		329(H)	
Dog 7 OFF	207(L)		248(L)		289(L)		330(L)	
	208(H)		249(H)		290(H)		331(H)	
Dog 8 ON	209(L)		250(L)		291(L)		332(L)	
	210(H)		251(H)		292(H)		333(H)	
Dog 8 OFF	211(L)		252(L)		293(L)		334(L)	
	212(H)		253(H)		294(H)		335(H)	
Dog 9 ON	213(L)		254(L)		295(L)		336(L)	
	214(H)		255(H)		296(H)		337(H)	
Dog 9 OFF	215(L)		256(L)		297(L)		338(L)	
	216(H)		257(H)		298(H)		339(H)	

[For axis 1] Limit switch data sheet CH.8 to CH.11

NAME								
Item	CH.8		CH.9		CH.10		CH.11	
	Address	Setting value	Address	Setting value	Address	Setting value	Address	Setting value
Number of Multi-dogs	340		381		422		463	
Dog 0 ON	341(L)		382(L)		423(L)		464(L)	
	342(H)		383(H)		424(H)		465(H)	
Dog 0 OFF	343(L)		384(L)		425(L)		466(L)	
	344(H)		385(H)		426(H)		467(H)	
Dog 1 ON	345(L)		386(L)		427(L)		468(L)	
	346(H)		387(H)		428(H)		469(H)	
Dog 1 OFF	347(L)		388(L)		429(L)		470(L)	
	348(H)		389(H)		430(H)		471(H)	
Dog 2 ON	349(L)		390(L)		431(L)		472(L)	
	350(H)		391(H)		432(H)		473(H)	
Dog 2 OFF	351(L)		392(L)		433(L)		474(L)	
	352(H)		393(H)		434(H)		475(H)	
Dog 3 ON	353(L)		394(L)		435(L)		476(L)	
	354(H)		395(H)		436(H)		477(H)	
Dog 3 OFF	355(L)		396(L)		437(L)		478(L)	
	356(H)		397(H)		438(H)		479(H)	
Dog 4 ON	357(L)		398(L)		439(L)		480(L)	
	358(H)		399(H)		440(H)		481(H)	
Dog 4 OFF	359(L)		400(L)		441(L)		482(L)	
	360(H)		401(H)		442(H)		483(H)	
Dog 5 ON	361(L)		402(L)		443(L)		484(L)	
	362(H)		403(H)		444(H)		485(H)	
Dog 5 OFF	363(L)		404(L)		445(L)		486(L)	
	364(H)		405(H)		446(H)		487(H)	
Dog 6 ON	365(L)		406(L)		447(L)		488(L)	
	366(H)		407(H)		448(H)		489(H)	
Dog 6 OFF	367(L)		408(L)		449(L)		490(L)	
	368(H)		409(H)		450(H)		491(H)	
Dog 7 ON	369(L)		410(L)		451(L)		492(L)	
	370(H)		411(H)		452(H)		493(H)	
Dog 7 OFF	371(L)		412(L)		453(L)		494(L)	
	372(H)		413(H)		454(H)		495(H)	
Dog 8 ON	373(L)		414(L)		455(L)		496(L)	
	374(H)		415(H)		456(H)		497(H)	
Dog 8 OFF	375(L)		416(L)		457(L)		498(L)	
	376(H)		417(H)		458(H)		499(H)	
Dog 9 ON	377(L)		418(L)		459(L)		500(L)	
	378(H)		419(H)		460(H)		501(H)	
Dog 9 OFF	379(L)		420(L)		461(L)		502(L)	
	380(H)		421(H)		462(H)		503(H)	

[For axis 1] Limit switch data sheet CH.12 to CH.15

NAME								
Item	CH.12		CH.13		CH.14		CH.15	
	Address	Setting value	Address	Setting value	Address	Setting value	Address	Setting value
Number of Multi-dogs	504		545		586		627	
Dog 0 ON	505(L)		546(L)		587(L)		628(L)	
	506(H)		547(H)		588(H)		629(H)	
Dog 0 OFF	507(L)		548(L)		589(L)		630(L)	
	508(H)		549(H)		590(H)		631(H)	
Dog 1 ON	509(L)		550(L)		591(L)		632(L)	
	510(H)		551(H)		592(H)		633(H)	
Dog 1 OFF	511(L)		552(L)		593(L)		634(L)	
	512(H)		553(H)		594(H)		635(H)	
Dog 2 ON	513(L)		554(L)		595(L)		636(L)	
	514(H)		555(H)		596(H)		637(H)	
Dog 2 OFF	515(L)		556(L)		597(L)		638(L)	
	516(H)		557(H)		598(H)		639(H)	
Dog 3 ON	517(L)		558(L)		599(L)		640(L)	
	518(H)		559(H)		600(H)		641(H)	
Dog 3 OFF	519(L)		560(L)		601(L)		642(L)	
	520(H)		561(H)		602(H)		643(H)	
Dog 4 ON	521(L)		562(L)		603(L)		644(L)	
	522(H)		563(H)		604(H)		645(H)	
Dog 4 OFF	523(L)		564(L)		605(L)		646(L)	
	524(H)		565(H)		606(H)		647(H)	
Dog 5 ON	525(L)		566(L)		607(L)		648(L)	
	526(H)		567(H)		608(H)		649(H)	
Dog 5 OFF	527(L)		568(L)		609(L)		650(L)	
	528(H)		569(H)		610(H)		651(H)	
Dog 6 ON	529(L)		570(L)		611(L)		652(L)	
	530(H)		571(H)		612(H)		653(H)	
Dog 6 OFF	531(L)		572(L)		613(L)		654(L)	
	532(H)		573(H)		614(H)		655(H)	
Dog 7 ON	533(L)		574(L)		615(L)		656(L)	
	534(H)		575(H)		616(H)		657(H)	
Dog 7 OFF	535(L)		576(L)		617(L)		658(L)	
	536(H)		577(H)		618(H)		659(H)	
Dog 8 ON	537(L)		578(L)		619(L)		660(L)	
	538(H)		579(H)		620(H)		661(H)	
Dog 8 OFF	539(L)		580(L)		621(L)		662(L)	
	540(H)		581(H)		622(H)		663(H)	
Dog 9 ON	541(L)		582(L)		623(L)		664(L)	
	542(H)		583(H)		624(H)		665(H)	
Dog 9 OFF	543(L)		584(L)		625(L)		666(L)	
	544(H)		585(H)		626(H)		667(H)	

[For axis 2] Limit switch data sheet CH.0 to CH.3

NAME								
Item	CH.0		CH.1		CH.2		CH.3	
	Address	Setting value	Address	Setting value	Address	Setting value	Address	Setting value
Number of Multi-dogs	1012		1053		1094		1135	
Dog 0 ON	1013(L)		1054(L)		1095(L)		1136(L)	
	1014(H)		1055(H)		1096(H)		1137(H)	
Dog 0 OFF	1015(L)		1056(L)		1097(L)		1138(L)	
	1016(H)		1057(H)		1098(H)		1139(H)	
Dog 1 ON	1017(L)		1058(L)		1099(L)		1140(L)	
	1018(H)		1059(H)		1100(H)		1141(H)	
Dog 1 OFF	1019(L)		1060(L)		1101(L)		1142(L)	
	1020(H)		1061(H)		1102(H)		1143(H)	
Dog 2 ON	1021(L)		1062(L)		1103(L)		1144(L)	
	1022(H)		1063(H)		1104(H)		1145(H)	
Dog 2 OFF	1023(L)		1064(L)		1105(L)		1146(L)	
	1024(H)		1065(H)		1106(H)		1147(H)	
Dog 3 ON	1025(L)		1066(L)		1107(L)		1148(L)	
	1026(H)		1067(H)		1108(H)		1149(H)	
Dog 3 OFF	1027(L)		1068(L)		1109(L)		1150(L)	
	1028(H)		1069(H)		1110(H)		1151(H)	
Dog 4 ON	1029(L)		1070(L)		1111(L)		1152(L)	
	1030(H)		1071(H)		1112(H)		1153(H)	
Dog 4 OFF	1031(L)		1072(L)		1113(L)		1154(L)	
	1032(H)		1073(H)		1114(H)		1155(H)	
Dog 5 ON	1033(L)		1074(L)		1115(L)		1156(L)	
	1034(H)		1075(H)		1116(H)		1157(H)	
Dog 5 OFF	1035(L)		1076(L)		1117(L)		1158(L)	
	1036(H)		1077(H)		1118(H)		1159(H)	
Dog 6 ON	1037(L)		1078(L)		1119(L)		1160(L)	
	1038(H)		1079(H)		1120(H)		1161(H)	
Dog 6 OFF	1039(L)		1080(L)		1121(L)		1162(L)	
	1040(H)		1081(H)		1122(H)		1163(H)	
Dog 7 ON	1041(L)		1082(L)		1123(L)		1164(L)	
	1042(H)		1083(H)		1124(H)		1165(H)	
Dog 7 OFF	1043(L)		1084(L)		1125(L)		1166(L)	
	1044(H)		1085(H)		1126(H)		1167(H)	
Dog 8 ON	1045(L)		1086(L)		1127(L)		1168(L)	
	1046(H)		1087(H)		1128(H)		1169(H)	
Dog 8 OFF	1047(L)		1088(L)		1129(L)		1170(L)	
	1048(H)		1089(H)		1130(H)		1171(H)	
Dog 9 ON	1049(L)		1090(L)		1131(L)		1172(L)	
	1050(H)		1091(H)		1132(H)		1173(H)	
Dog 9 OFF	1051(L)		1092(L)		1133(L)		1174(L)	
	1052(H)		1093(H)		1134(H)		1175(H)	

[For axis 2] Limit switch data sheet CH.4 to CH.7

NAME								
Item	CH.4		CH.5		CH.6		CH.7	
	Address	Setting value	Address	Setting value	Address	Setting value	Address	Setting value
Number of Multi-dogs	1176		1217		1258		1299	
Dog 0 ON	1177(L)		1218(L)		1259(L)		1300(L)	
	1178(H)		1219(H)		1260(H)		1301(H)	
Dog 0 OFF	1179(L)		1220(L)		1261(L)		1302(L)	
	1180(H)		1221(H)		1262(H)		1303(H)	
Dog 1 ON	1181(L)		1222(L)		1263(L)		1304(L)	
	1182(H)		1223(H)		1264(H)		1305(H)	
Dog 1 OFF	1183(L)		1224(L)		1265(L)		1306(L)	
	1184(H)		1225(H)		1266(H)		1307(H)	
Dog 2 ON	1185(L)		1226(L)		1267(L)		1308(L)	
	1186(H)		1227(H)		1268(H)		1309(H)	
Dog 2 OFF	1187(L)		1228(L)		1269(L)		1310(L)	
	1188(H)		1229(H)		1270(H)		1311(H)	
Dog 3 ON	1189(L)		1230(L)		1271(L)		1312(L)	
	1190(H)		1231(H)		1272(H)		1313(H)	
Dog 3 OFF	1191(L)		1232(L)		1273(L)		1314(L)	
	1192(H)		1233(H)		1274(H)		1315(H)	
Dog 4 ON	1193(L)		1234(L)		1275(L)		1316(L)	
	1194(H)		1235(H)		1276(H)		1317(H)	
Dog 4 OFF	1195(L)		1236(L)		1277(L)		1318(L)	
	1196(H)		1237(H)		1278(H)		1319(H)	
Dog 5 ON	1197(L)		1238(L)		1279(L)		1320(L)	
	1198(H)		1239(H)		1280(H)		1321(H)	
Dog 5 OFF	1199(L)		1240(L)		1281(L)		1322(L)	
	1200(H)		1241(H)		1282(H)		1323(H)	
Dog 6 ON	1201(L)		1242(L)		1283(L)		1324(L)	
	1202(H)		1243(H)		1284(H)		1325(H)	
Dog 6 OFF	1203(L)		1244(L)		1285(L)		1326(L)	
	1204(H)		1245(H)		1286(H)		1327(H)	
Dog 7 ON	1205(L)		1246(L)		1287(L)		1328(L)	
	1206(H)		1247(H)		1288(H)		1329(H)	
Dog 7 OFF	1207(L)		1248(L)		1289(L)		1330(L)	
	1208(H)		1249(H)		1290(H)		1331(H)	
Dog 8 ON	1209(L)		1250(L)		1291(L)		1332(L)	
	1210(H)		1251(H)		1292(H)		1333(H)	
Dog 8 OFF	1211(L)		1252(L)		1293(L)		1334(L)	
	1212(H)		1253(H)		1294(H)		1335(H)	
Dog 9 ON	1213(L)		1254(L)		1295(L)		1336(L)	
	1214(H)		1255(H)		1296(H)		1337(H)	
Dog 9 OFF	1215(L)		1256(L)		1297(L)		1338(L)	
	1216(H)		1257(H)		1298(H)		1339(H)	

[For axis 2] Limit switch data sheet CH.8 to CH.11

NAME								
Item	CH.8		CH.9		CH.10		CH.11	
	Address	Setting value	Address	Setting value	Address	Setting value	Address	Setting value
Number of Multi-dogs	1340		1381		1422		1463	
Dog 0 ON	1341(L)		1382(L)		1423(L)		1464(L)	
	1342(H)		1383(H)		1424(H)		1465(H)	
Dog 0 OFF	1343(L)		1384(L)		1425(L)		1466(L)	
	1344(H)		1385(H)		1426(H)		1467(H)	
Dog 1 ON	1345(L)		1386(L)		1427(L)		1468(L)	
	1346(H)		1387(H)		1428(H)		1469(H)	
Dog 1 OFF	1347(L)		1388(L)		1429(L)		1470(L)	
	1348(H)		1389(H)		1430(H)		1471(H)	
Dog 2 ON	1349(L)		1390(L)		1431(L)		1472(L)	
	1350(H)		1391(H)		1432(H)		1473(H)	
Dog 2 OFF	1351(L)		1392(L)		1433(L)		1474(L)	
	1352(H)		1393(H)		1434(H)		1475(H)	
Dog 3 ON	1353(L)		1394(L)		1435(L)		1476(L)	
	1354(H)		1395(H)		1436(H)		1477(H)	
Dog 3 OFF	1355(L)		1396(L)		1437(L)		1478(L)	
	1356(H)		1397(H)		1438(H)		1479(H)	
Dog 4 ON	1357(L)		1398(L)		1439(L)		1480(L)	
	1358(H)		1399(H)		1440(H)		1481(H)	
Dog 4 OFF	1359(L)		1400(L)		1441(L)		1482(L)	
	1360(H)		1401(H)		1442(H)		1483(H)	
Dog 5 ON	1361(L)		1402(L)		1443(L)		1484(L)	
	1362(H)		1403(H)		1444(H)		1485(H)	
Dog 5 OFF	1363(L)		1404(L)		1445(L)		1486(L)	
	1364(H)		1405(H)		1446(H)		1487(H)	
Dog 6 ON	1365(L)		1406(L)		1447(L)		1488(L)	
	1366(H)		1407(H)		1448(H)		1489(H)	
Dog 6 OFF	1367(L)		1408(L)		1449(L)		1490(L)	
	1368(H)		1409(H)		1450(H)		1491(H)	
Dog 7 ON	1369(L)		1410(L)		1451(L)		1492(L)	
	1370(H)		1411(H)		1452(H)		1493(H)	
Dog 7 OFF	1371(L)		1412(L)		1453(L)		1494(L)	
	1372(H)		1413(H)		1454(H)		1495(H)	
Dog 8 ON	1373(L)		1414(L)		1455(L)		1496(L)	
	1374(H)		1415(H)		1456(H)		1497(H)	
Dog 8 OFF	1375(L)		1416(L)		1457(L)		1498(L)	
	1376(H)		1417(H)		1458(H)		1499(H)	
Dog 9 ON	1377(L)		1418(L)		1459(L)		1500(L)	
	1378(H)		1419(H)		1460(H)		1501(H)	
Dog 9 OFF	1379(L)		1420(L)		1461(L)		1502(L)	
	1380(H)		1421(H)		1462(H)		1503(H)	

[For axis 2] Limit switch data sheet CH.12 to CH.15

NAME								
Item	CH.12		CH.13		CH.14		CH.15	
	Address	Setting value	Address	Setting value	Address	Setting value	Address	Setting value
Number of Multi-dogs	1504		1545		1586		1627	
Dog 0 ON	1505(L)		1546(L)		1587(L)		1628(L)	
	1506(H)		1547(H)		1588(H)		1629(H)	
Dog 0 OFF	1507(L)		1548(L)		1589(L)		1630(L)	
	1508(H)		1549(H)		1590(H)		1631(H)	
Dog 1 ON	1509(L)		1550(L)		1591(L)		1632(L)	
	1510(H)		1551(H)		1592(H)		1633(H)	
Dog 1 OFF	1511(L)		1552(L)		1593(L)		1634(L)	
	1512(H)		1553(H)		1594(H)		1635(H)	
Dog 2 ON	1513(L)		1554(L)		1595(L)		1636(L)	
	1514(H)		1555(H)		1596(H)		1637(H)	
Dog 2 OFF	1515(L)		1556(L)		1597(L)		1638(L)	
	1516(H)		1557(H)		1598(H)		1639(H)	
Dog 3 ON	1517(L)		1558(L)		1599(L)		1640(L)	
	1518(H)		1559(H)		1600(H)		1641(H)	
Dog 3 OFF	1519(L)		1560(L)		1601(L)		1642(L)	
	1520(H)		1561(H)		1602(H)		1643(H)	
Dog 4 ON	1521(L)		1562(L)		1603(L)		1644(L)	
	1522(H)		1563(H)		1604(H)		1645(H)	
Dog 4 OFF	1523(L)		1564(L)		1605(L)		1646(L)	
	1524(H)		1565(H)		1606(H)		1647(H)	
Dog 5 ON	1525(L)		1566(L)		1607(L)		1648(L)	
	1526(H)		1567(H)		1608(H)		1649(H)	
Dog 5 OFF	1527(L)		1568(L)		1609(L)		1650(L)	
	1528(H)		1569(H)		1610(H)		1651(H)	
Dog 6 ON	1529(L)		1570(L)		1611(L)		1652(L)	
	1530(H)		1571(H)		1612(H)		1653(H)	
Dog 6 OFF	1531(L)		1572(L)		1613(L)		1654(L)	
	1532(H)		1573(H)		1614(H)		1655(H)	
Dog 7 ON	1533(L)		1574(L)		1615(L)		1656(L)	
	1534(H)		1575(H)		1616(H)		1657(H)	
Dog 7 OFF	1535(L)		1576(L)		1617(L)		1658(L)	
	1536(H)		1577(H)		1618(H)		1659(H)	
Dog 8 ON	1537(L)		1578(L)		1619(L)		1660(L)	
	1538(H)		1579(H)		1620(H)		1661(H)	
Dog 8 OFF	1539(L)		1580(L)		1621(L)		1662(L)	
	1540(H)		1581(H)		1622(H)		1663(H)	
Dog 9 ON	1541(L)		1582(L)		1623(L)		1664(L)	
	1542(H)		1583(H)		1624(H)		1665(H)	
Dog 9 OFF	1543(L)		1584(L)		1625(L)		1666(L)	
	1544(H)		1585(H)		1626(H)		1667(H)	

NSD Group

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