



ZEF006082504

MELSEC-Q PLC Module Converter

VS-QA62-V1PG

User's Manual

Applicable sensor: VRE-P062
VRE-P028



CONTENTS

SAFETY PRECAUTIONS	i
INTRODUCTION	iii
TRADEMARKS	iii
REVISION HISTORY	iv
1. OVERVIEW	1
1.1 Features	4
1.2 Definitions	5
2. SYSTEM CONFIGURATION	7
2.1 Overall Configuration	7
2.2 Applicable System	8
2.3 Function Block Diagram	8
3. VS-QA62 SPECIFICATIONS	9
3.1 General Specifications	9
3.2 Performance Specifications	10
3.3 Interface Specifications	11
3.3.1 External input/output specifications	11
3.4 Input/Output Signals between VS-QA62-V1PG and PLC CPU	14
3.4.1 Input/output signal details	15
3.5 Buffer Memory	17
3.5.1 'Current position value' storage area (Address 0 and 1)	18
3.5.2 'Error code' storage area (Address 7)	18
3.5.3 'Switch output' storage area (Address 10~ 17)	18
3.5.4 Rotation direction change request storage area (Address 18)	18
3.5.5 'Sensor rotation direction' storage area (Address 19)	18
3.5.6 Current position value change request storage area (Address 20)	19
3.5.7 'Current position setting value' storage area (Address 21)	19
3.5.8 'Switch output ON/OFF setting value' storage area (Address 22 ~277)	19
3.5.9 'Number of pulses' storage area (Address 278)	19
4. HANDLING AND WIRING	21
4.1 VS-QA62-V1PG Handling Precautions	21
4.2 Name of Parts	22
4.3 Wiring Precautions	23
4.3.1 Wiring precautions	23
4.4 ABSOCODER Sensor Installation Precautions	24
4.4.1 Installation of ABSOCODER sensor	24
4.4.2 Precautions when connecting ABSOCODER sensor	26
5. CURRENT POSITION DETECTION FUNCTION	27
5.1 Function Description	27
5.1.1 Current position detection function	27
5.1.2 External origin setting function	27
5.1.3 Current position setting function	28
5.1.4 Sensor rotation direction setting	28
5.1.5 Switch output function	29
5.1.6 Pulse output function	31
5.2 Programming	32
5.2.1 Program creation precautions	32
5.2.2 Program for current position monitor display	33
5.2.3 Program for error code readout and reset	35
5.2.4 Program for current position setting	37
5.2.5 Program for sensor rotation direction setting	38
5.2.6 Program for switch output setting	39
5.2.7 Number of pulses setting program	40

6. TROUBLESHOOTING	41
6.1 Error Code List.....	41
6.2 Troubleshooting Flowchart.....	42
6.3 Flowchart for No Switch Output from VS-QA62-V1PG.....	43
6.4 Flowchart when External Origin Setting is Impossible.....	44
6.5 Flowchart when Current Position Setting is Impossible.....	45
6.6 Flowchart when ABSOCODER's Current Position Value doesn't Change.....	46
6.7 Flowchart when Stored Data is Lost, or when Erroneous Data is Stored.....	47
APPENDIX 1 CE Marking	49
APPENDIX 2 UL STANDARD	50
APPENDIX 3 KC MARK	51
APPENDIX 4 ABSOCODER SENSOR SPECIFICATIONS	53
Appendix 4.1 ABSOCODER Sensor for VS-QA62-V1PG.....	53
Appendix 4.1.1 Specifications.....	53
Appendix 4.1.2 ABSOCODER sensor dimensions.....	54
Appendix 4.2 ABSOCODER Cable.....	57
Appendix 4.2.1 Specifications.....	57
Appendix 4.2.2 Cable length restrictions.....	57
Appendix 4.2.3 ABSOCODER Cable Dimensions.....	57
Appendix 4.2.4 ABSOCODER Cable Connection.....	58
APPENDIX 5 DIMENSIONS	59
Appendix 5.1 VS-QA62-V1PG Position Detection Module.....	59
Appendix 5.2 External I/O Cable (VS-CQA62).....	60
Appendix 5.3 Cable for the Upgrading (VS-CQA62-R01).....	61
APPENDIX 6. ABSOCODER Check List	63
APPENDIX 7 I/O SIGNALS and BUFFER MEMORY FUNCTION LIST	65
APPENDIX 8 DATA SHEET	66
Appendix 8.1 Initial Setting.....	66
Appendix 8.2 Switch Output.....	67

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.

Depending on circumstances, procedures indicated by  CAUTION may also be linked to serious results.

Store this manual in a safe place so that you can take it out and read it whenever necessary. Always forward it to the end user.

【Application Limitation】

This product is not designed to be used under any situation affecting human life. When you are considering to use 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 PC 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 external 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. Connect the former cables at least 300 mm or more away from the latter cables. Failure to do so may cause noise, resulting in malfunction.

【Installation Precautions】



CAUTION

- Use the PC under the environment described in general specifications of the manual. Failure to do so may result in electrical shock, fire, malfunction, product damage, or deterioration of performance.
- Be sure to shut off all power before mounting/removing this module. Failure to do this could result in electrical shocks or equipment damage.
- Install the unit while pressing the unit's mounting lever (at bottom), verifying that the unit's mounting protuberance is properly inserted into the base unit's mounting hole. Mounting the unit incorrectly may cause erroneous operation, failure, or the unit could fall. In environments with high vibration levels, the unit should be secured with screws.
- Never directly touch this module's conductive areas or electrical components, as this can cause this module to malfunction or fail.
- Verify that the external input/output connectors and the sensor connectors are securely connected to the unit. Poor connections may result in poor contact, causing incorrect inputs and outputs.



CAUTION

- Check the terminal arrangement and connect the wires correctly.
- Terminal screws should be tightened to within the specified torque range. Loose screws can cause shorting and other malfunctions. Over-torque can cause screw or equipment damage resulting in this module falling, shorting, or malfunctioning.
- Do not allow any foreign object (e.g. cutting chips, wire strips) into this module. This 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, etc. Loose or over-tightened screws can result in this module falling, shorting, or malfunctioning.



CAUTION

- Do not disassemble, or modify this module. Doing so may result in electrical shock, fire, or this module malfunction.
- Be sure to shut off all power before mounting/removing this module. Failure to do this could result in failure or malfunction.

【Disposal Precautions】



CAUTION

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

INTRODUCTION

Thank you for purchasing the VS-QA62-V1PG module.
Always read through this manual, and fully comprehend the functions and performance of VS-QA62-V1PG 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.

1. OVERVIEW

1. OVERVIEW

This User's Manual contains the specifications, and operation/programming procedures for the VS-QA62-V1PG which is to be used in conjunction with Mitsubishi Electric corp. MELSEC-Q Series CPU module.

VS-QA62-V1PG is used by combining the single-turn type ABSOCODER sensor, and it can receive the switch output signal of the sensor to detect the position of the machine being controlled. The module converter can be used to automatically control the position detection of the conveyor, press machine, assembly machine, packing machine, and etc..

This User's Manual contains the specifications about down below.

Model	Applicable sensor
VS-QA62-V1PG	VRE-P062 VRE-P028

Current Position Detection Function

VS-QA62-V1PG's current position detection function detects the current position using an ABSOCODER. Conventionally, this was detected using an incremental format encoder in conjunction with a counter unit.

The above conventional method has several disadvantages; the units must be converted when displaying the current position value origin-point return is necessary when power supply is interrupted due to power failure, etc.

VS-QA62-V1PG current position detection function has eliminated these problems by offering a flexible setting format which provides maintenance-free operation.

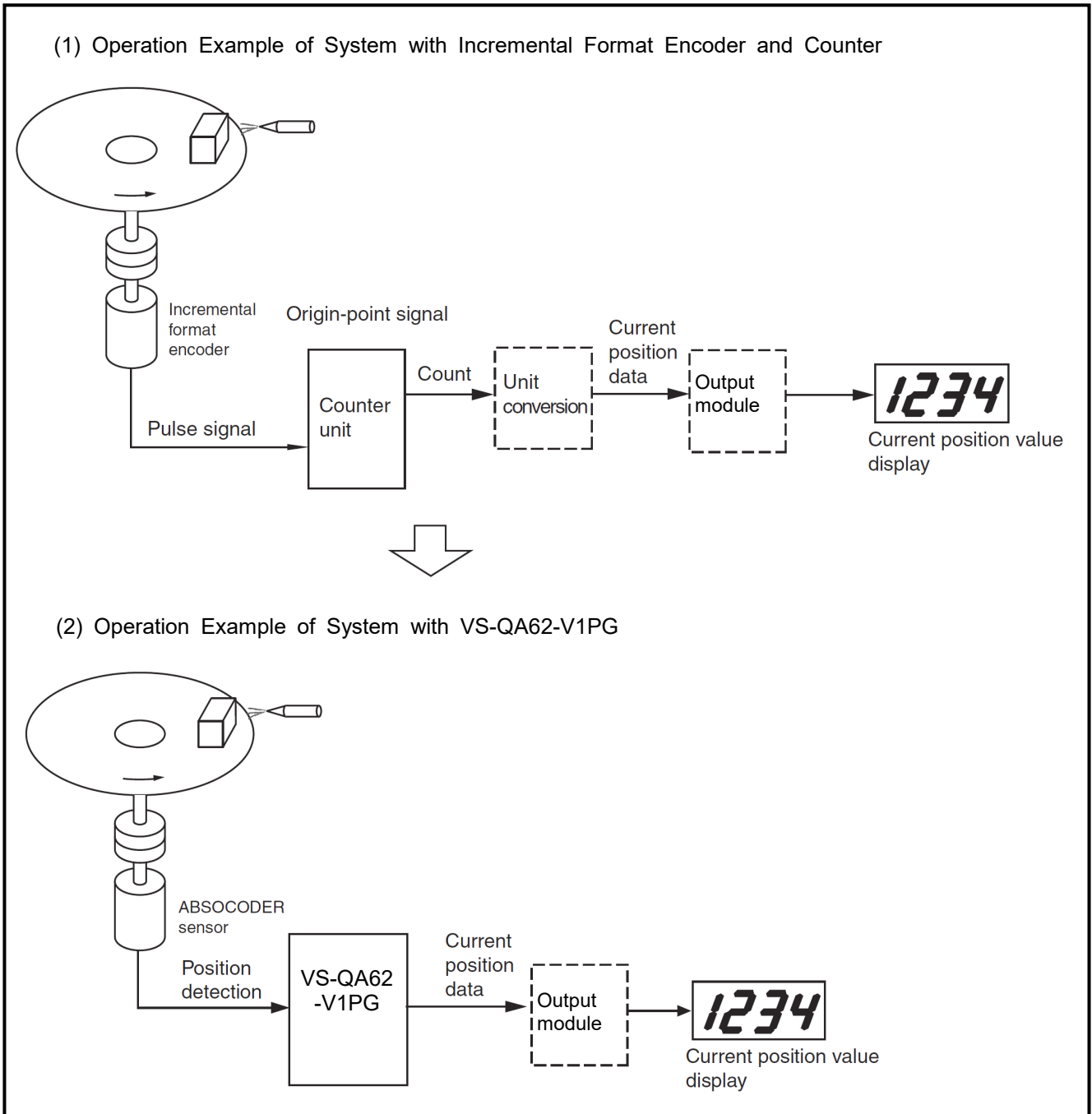


Fig. 1.1 Example of Current Position Detection Function

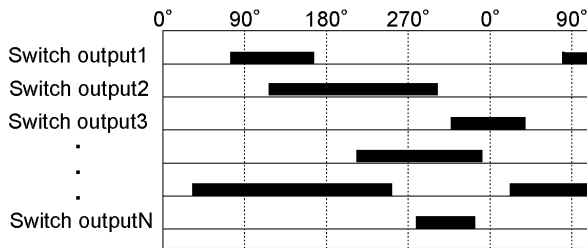
Switch Output Function

The switch output works the same function as the mechanical format cam switch that is configured with a cam disk and limit switch.

ON/OFF settings are designated at VS-QA62-V1PG, and switch output ON/OFF operations occur according to the rotation angle of ABSOCODER.

<Setting example>	ON Angle	OFF Angle
Switch output1	75°	165°
Switch output2	120°	300°
Switch output3	320°	45°
:	210°	350°
:	30°	250°
Switch output N	280°	340°

- Describes relationship between setting value and output
 - Switch output 1 in the setting example is designated following;
ON angle = 75°, OFF angle = 165°
Output is ON in the range “75° ≤ current position < 165° ” .
 - Switch output 3 in the setting example is designated following;
ON angle = 320°, OFF angle = 45°(The switch output 3 is set to pass 0 degree.)
The output turns ON in the following range.
“320° ≤ Current position and Current position < 45° ”



1.1 Features

VS-QA62-V1PG has the following features:

- (1) Switch output 128 points
The buffer memory has 128-point (SW1 to 128) of the switch output.
- (2) 7-point's switch output for the I/O
VS-QA62-V1PG has 7-point's switch output for the I/O.
- (3) High-speed response
2-point's switch outputs (SW1 to 2) of the I/O connector respond 0.4ms.
The rest of 5-point's switch outputs (SW3 to 7) respond 2ms.
- (4) Current position value output
The current position value (rotation angle) is output to the buffer memory.
*1: Output range: 0 ~ 3599 (0 ~ 359.9) However, decimal points cannot be output.
- (5) External origin setting function
After the machine moving to the origin position, the current position value can be changed to "0" by inputting the external origin set signal from the I/O connector.
- (6) Current position setting function
The current position value can be set to the desired value by using the buffer memory from the PLC.
- (7) I/O pulse output
VS-QA62-V1PG has a 1-point pulse output function that depends on the rotation angle.
The number of pulses can be designated the desired value between 1 and 100.
- (8) Compliance with UL and CE standards
VS-QA62-V1PG 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.
- (9) Compliance with KC mark (Korea Certification Mark)
The VS-QA62-V1PG 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

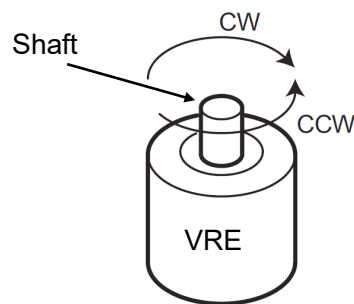
(1) **ABSOCODER**

ABSOCODER is the generic name given to the 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 ABSOCODER sensor is built-in to VS-QA62-V1PG.

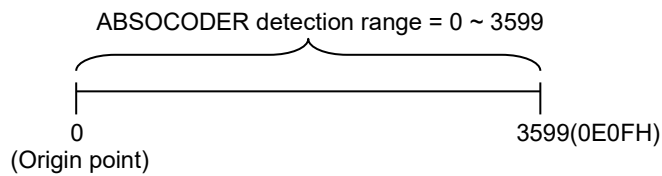
(2) **Sensor shaft rotation direction**

Depending on the direction in which the ABSOCODER sensor shaft rotates, the position data value will increase or decrease.



(3) **Current position value**

This value indicated where the machine is currently positioned within the detection range.



2. SYSTEM CONFIGURATION

2. SYSTEM CONFIGURATION

2.1 Overall Configuration

The overall configuration of the Mitsubishi Electric corp. MELSEC-Q Series using VS-QA62-V1PG is shown below.

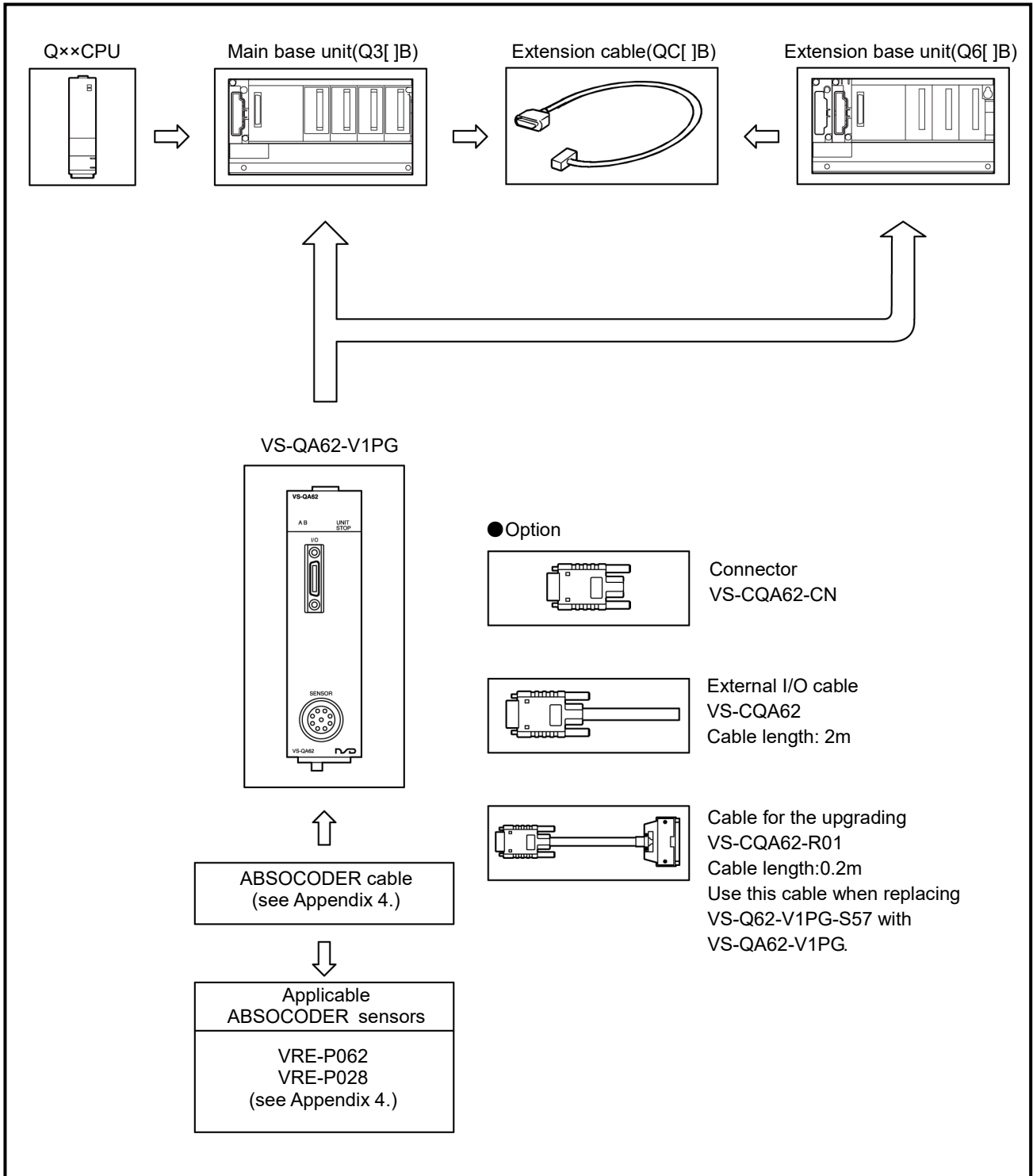


Fig. 2.1 VS-QA62-V1PG System Configuration

2.2 Applicable System

VS-QA62-V1PG can be used in the following system.

(1) Applicable CPU module

Refer to NSD web site for CPU module models with which VS-QA62 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-QA62 can be installed to any I/O slot of a base unit.

2.3 Function Block Diagram

Fig. 2.2 shows the block diagram of the VS-QA62-V1PG functions.

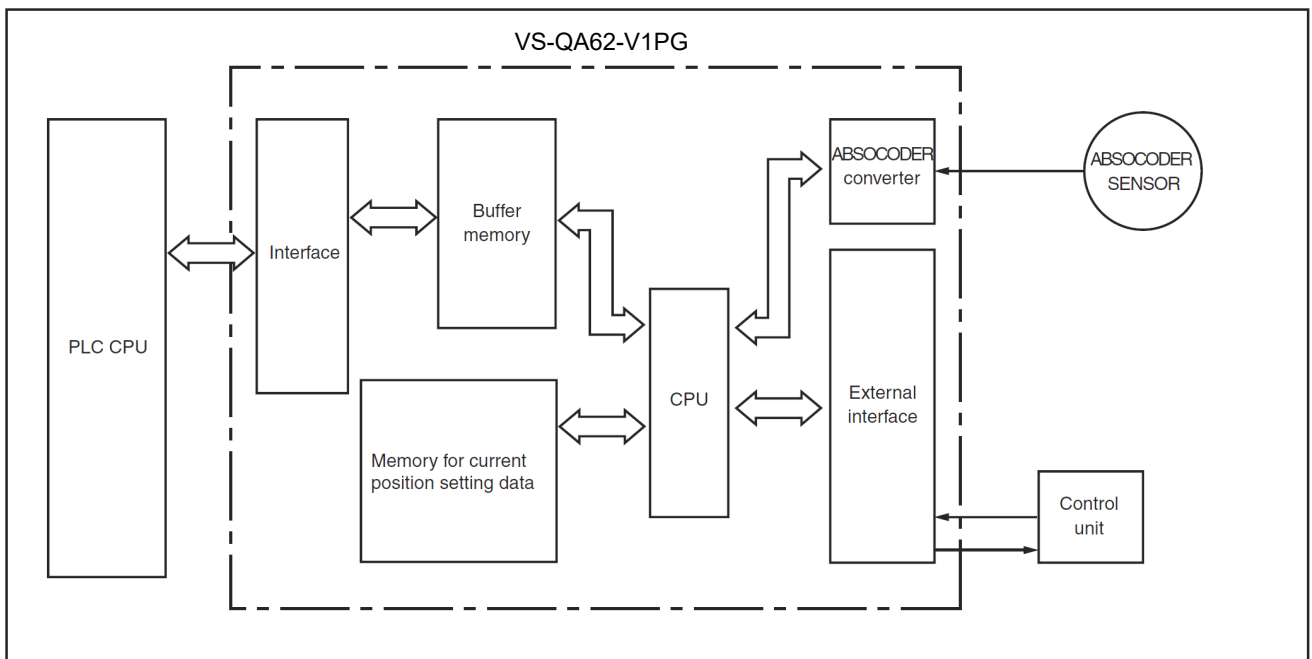


Fig. 2.2 Block Diagram of VS-QA62-V1PG Functions

3. VS-QA62 SPECIFICATIONS

3. VS-QA62 SPECIFICATIONS

3.1 General 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	5 to 95%RH *4, non-condensing					
Storage ambient humidity						
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

Item		Specifications	Remarks
Number of position detection axis		1	
Position detection format		Absolute position detection by ABSOCODER sensor	
Number of divisions		8192 divisions×1 turn	
Switch output function	Number of programs	1	Data is not held when power is OFF.
	Number of Multi-dogs (Dogs/SW)	1	
	Output to	I/O: 7 (SW1 ~ 7) Buffer memory: 128 (SW1 ~ 128)	
	Data setting method	Writing from programmable controller is enabled all times	
Functions		- Current position setting - External origin set function - Pulse output	
Number of pulse outputs		0 to 100	
Updating cycle (ms)	Current position value output	0.4	Max. response delay time due to internal processing
	Switch output (SW1 ~ 2)	0.4	
	Switch output (SW3 ~ SW128)	2.0	
Number of I/O signals		32	Intelligent function module 32 points
Internal power consumption (5VDC) (A)		0.70	
Outer dimensions (mm)		98 (H)×27.4 (W)×90 (D)	
Mass (kg)		0.2	
Display of module model names in PLC		008 VS-QA62-V1PG	

3.3 Interface Specifications

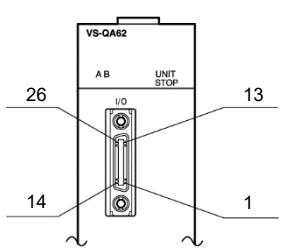
This section describes the external input/output interface specifications.

3.3.1 External input/output specifications

Table 3.3 External Input/Output Specifications

Input Signals			Output Signals		
Item	Specifications		Item	Specifications	
Isolation format	Photo-coupler		Isolation format	Photo-coupler	
Rated input voltage	12VDC	24VDC	Rated load voltage	12/24VDC	
Rated input current	3mA	6.5mA	Load voltage range	10.2 to 30VDC	
Input voltage range	10.2 to 30.0VDC		Max. load current	50mA	
ON voltage	10VDC or more		Max. rush current	0.4A (10msec or less)	
OFF voltage	2VDC or less		Current leakage when OFF	0.1mA or less	
			Max. voltage drop when ON	2.0V or less at 50mA 1.7V or less at 10mA	
Response time	OFF→ON	0.04ms (with input voltage of 24V)	Response time	OFF→ON	1ms (at 50mA , resistance load)
	ON→OFF	0.5ms (with input voltage of 24V)		ON→OFF	1ms (at 50mA , resistance load)
Common connections	1 common for 1 point (common terminal : 11, 12)		Common connections	1 common for 8 points (common terminal : 24, 25)	
External cable connection format	26 pins connector				
Compatible wire size	AWG28 max				

External Connections *1

Pin arrangement	Pin No	Signal Name
<p>When viewed from the front of the module</p> 	1	Pulse output
	2	SW1
	3	SW2
	4	SW3
	5	SW4
	6	SW5
	7	SW6
	8	SW7
	9	External origin setting input
	10	Not used
	11	Control input common
	12	Control input common
	13	Not used
	14	Not used
	15	Not used
	16	Not used
	17	Not used
	18	Not used
	19	Not used
	20	Not used
	21	Not used
	22	Not used
	23	Not used
	24	Control output common
	25	Control output common
	26	Not used

*1: Select any one of the options when using the external I/O cable.

(1) Soldering-type connector

Model code: VS-CQA62-CN

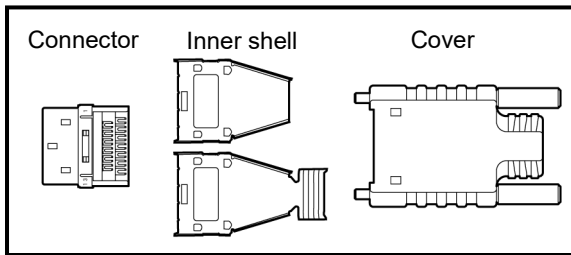
Manufacturer: HONDA TSUSHIN KOGYO CO., LTD.

Model code of manufacturer: HDR-E26MSG1+ (connector), HDR-E26LPMP+ (cover)

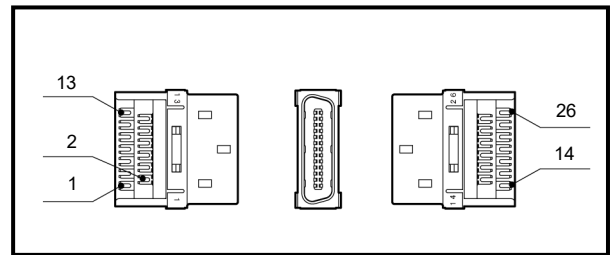
The connector must be soldered by the customers.

For the assembly method, ask "HONDA TSUSHIN KOGYO CO., LTD.".

● Contents



● Pin No. at the terminal side which must be soldered



(2) Cable with a connector (One side of the cable end has a connector)

Model code: VS-CQA62 (Cable length: 2m)

Process the cable terminal according to the customers' devices.

For more details of the cable, refer to "Appendix 5.2".

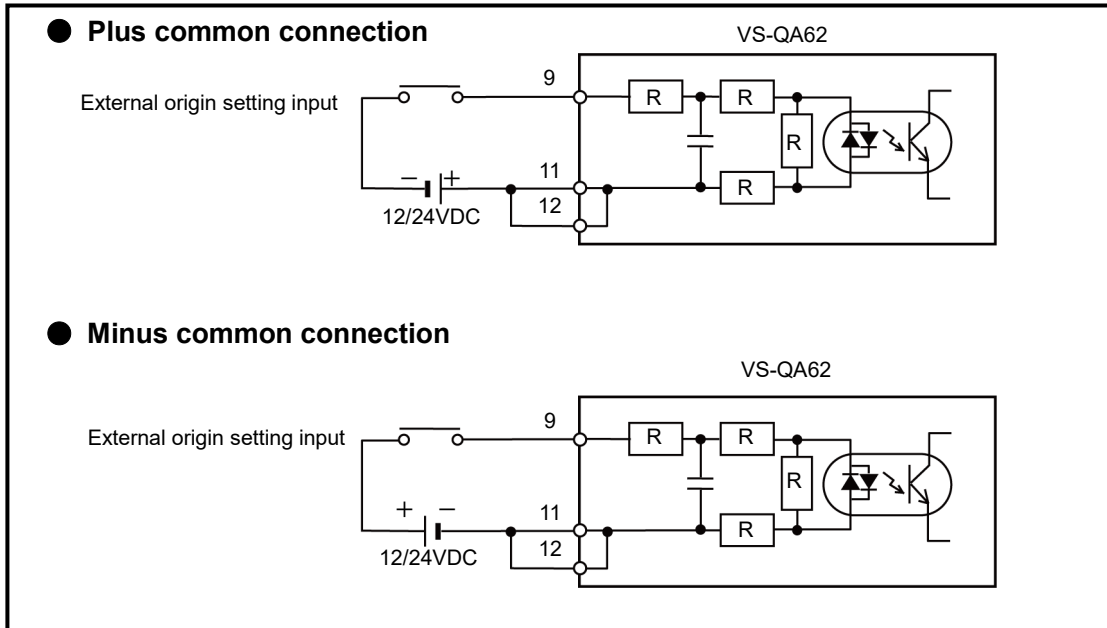
(3) Cable for the upgrading (Both cable ends have connectors)

Model code: VS-CQA62-R01 (Cable length: 0.2m)

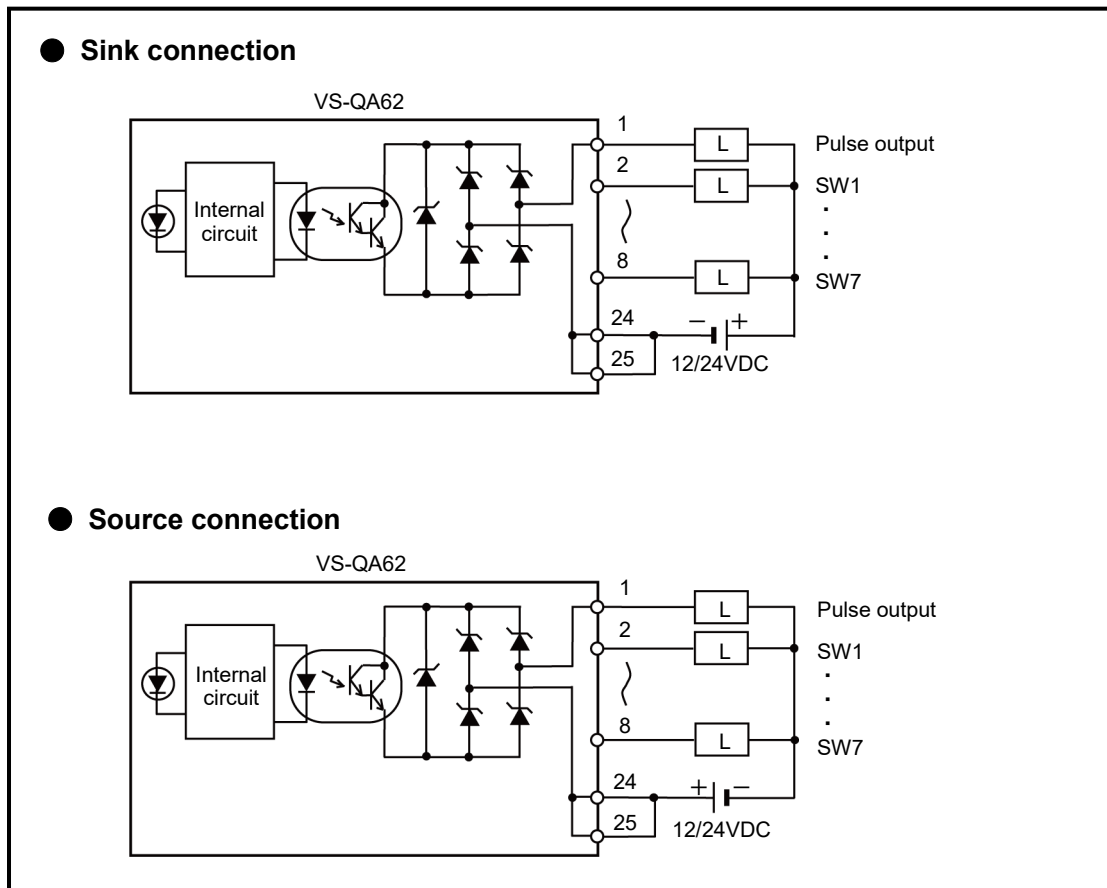
Use the cable when replacing VS-Q62-V1PG-S57 with VS-QA62-V1PG.

For more details of the cable, refer to "Appendix 5.3".

(1) Input circuit



(2) Output circuit



3.4 Input/Output Signals between VS-QA62-V1PG and PLC CPU

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

- (1) Input/output signals between VS-QA62-V1PG and PLC CPU is executed according to the following format:
 Input: 16 points Output: 16 points
- (2) In the table below, the input/output signals are classified as follows:
 - (a) Device X: Input signals from VS-QA62-V1PG to PLC CPU.
 - (b) Device Y: Output signals from PLC CPU to VS-QA62-V1PG.
- (3) Table 3.4 below illustrates the signal input/output configuration when VS-QA62-V1PG is installed at the base unit's No. 0 slots.

Table 3.4 Input/Output Signals

Signal direction : VS-QA62-V1PG → PLC CPU		Signal direction : PLC CPU → VS-QA62-V1PG		
Device No.	Signal Name	Device No.	Signal Name	
X 0	Unit ready [VS-QA62 detection]	Y 0	Use prohibited	
X 1	VS-QA62 operation status (online/offline)	Y 1		
X 2	Use prohibited	Y 2		
X 3		Y 3		
X 4	Sensor error detection	Y 4		
X 5	Use prohibited	Y 5		
X 6		Y 6		
X 7	Error detection	Y 7		
X 8		Y 8		
X 9		Y 9		
X A		Y A		
X B		Y B		
X C		Y C		
X D		Y D		
X E		Y E		
X F		Y F		
X 10			Y 10	PLC ready
X 11		Use prohibited	Y 11	Use prohibited
X 12	Y 12			
X 13	Y 13			
X 14	Y 14			
X 15	Y 15			
X 16		Y 16	Error reset	
X 17		Y 17	Use prohibited	
X 18		Y 18		
X 19		Y 19		
X 1A		Y 1A		
X 1B		Y 1B		
X 1C		Y 1C		
X 1D		Y 1D		
X 1E		Y 1E		
X 1F				Y 1F

IMPORTANT

VS-QA62-V1PG operation cannot be guaranteed if ON/OFF switching of Y0 - YF, Y11 - Y15, Y17 - Y1F is executed by the sequence program.

3.4.1 Input/output signal details

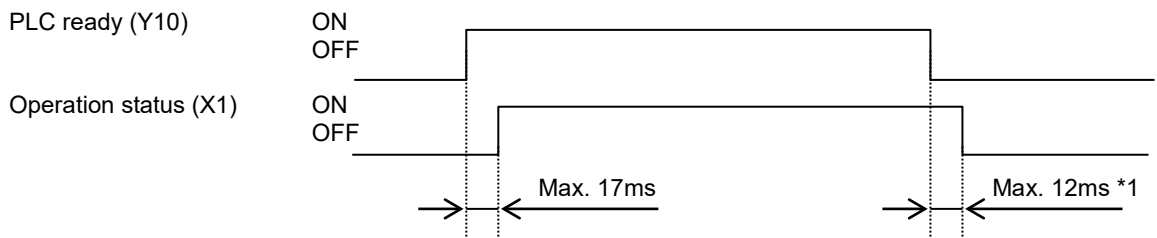
The ON/OFF timing and other conditions for signal input/output between VS-QA62-V1PG and PLC CPU are explained below.

(1) Unit ready (X0):

This signal comes OFF when a watchdog timer error is detected by VS-QA62-V1PG's self-diagnosis function. At this time, all external outputs from VS-QA62-V1PG are switched OFF. When 'X0' comes OFF, this indicates a VS-QA62-V1PG hardware error.

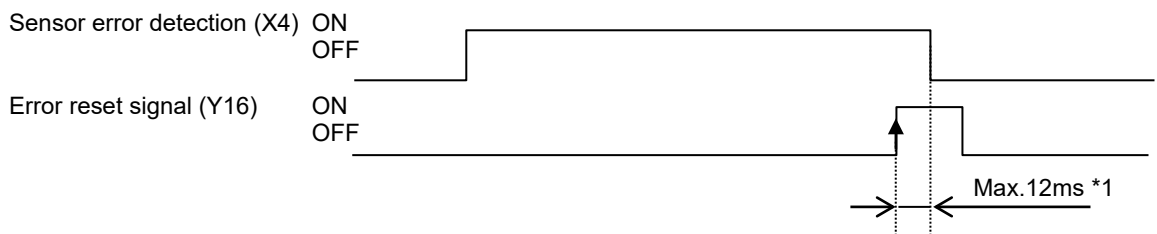
(2) VS-QA62-V1PG Operation status (Outline/Offline) (X1):

If the 'PLC ready' signal (Y10) is turned ON by the sequence program, VS-QA62-V1PG will be set to an 'online' status, and 'X1' will turn ON. 'X1' will go OFF when 'Y10' is turned OFF.



(3) Sensor error (X4):

This signal turns ON when an error occurs in the ABSOCODER's position detection system, due to a disconnected sensor cable, etc. After the problem has been corrected, 'X4' will go OFF when 'Y16' (error rest signal) is turned ON by the sequence program.



(4) Error detection (X7):

This signal comes ON when 'X4' signal comes ON, or when any of the error signals shown in section 6.1 occur. After the problem has been corrected, 'X7' will go OFF when 'Y16' (error rest signal) is turned ON by the sequence program.



*1: Except remote I/O network function

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

This signal is used to switch VS-QA62-V1PG's operation status (online/offline).

Y10 ON : Online

Y10 OFF : Offline

(6) Error reset signal (Y16):

After the problem has been corrected, the following operation error signals will be reset when 'Y16' (error reset signal) is turned ON by the sequence program.

X4 (Sensor error detection)

X7 (Error detection)

The error code which has been stored in the buffer memory (Address: 7) will also be cleared (0) at this time. The error 'reset' and error code 'clear' timing is continuously operative while Y16 is ON.

3.5 Buffer Memory

VS-QA62-V1PG 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)		Writing Conditions
0	(L) Current position value	Writing disabled
1	(H) 0.0°~ 359.9°(0000 ~ 0E0Fh)	
2	Reserved	
3		
4		
5	Not used	
6		
7	Error code	Writing disabled
8	Not used	Do not access this address.
9		
10	SW 16 ----- SW 1	Writing disabled
11	SW 32 ----- SW 17	
12	SW 48 ----- SW 33	
13	SW 64 ----- SW 49	
14	SW 80 ----- SW 65	
15	SW 96 ----- SW 81	
16	SW 112 ----- SW 97	
17	SW 128 ----- SW 113	
18	Rotation direction change request	The data can be written on the buffer memory, even if it is online or offline. The data should be written on the internal memory on the main unit after writing a value on the buffer memory in order to validating the setting value. Switch the PLC read signal (Y10) from OFF (0) to ON (1).
19	Sensor rotation direction (0: CW 1: CCW)	
20	Current position value change request	
21	Current position setting value	
22	SW1 ON setting data	
23	SW1 OFF setting data	
24	SW2 ON setting data	
...	...	
274	SW127 ON setting data	
275	SW127 OFF setting data	
276	SW128 ON setting data	
277	SW128 OFF setting data	
278	Number of pulses	Do not access this address.[]
279	Not used	

IMPORTANT

The setting data of the switch output ON/OFF setting value storage area (address 22 to 27) and the number of pulses storage area (address 278) are not stored in the internal memory of this unit when the power supply is turned off. After turning on the power supply, the data must be set.

3.5.1 'Current position value' storage area (Address 0 and 1)

The machine's current position is detected by the ABSOCODER sensor, and that position is stored in this area.

The current position value range is 0.0 ~ 359.9° (0000h ~ 0E0Fh). *1
A resolution is 0.1°.

*1: Output range: 0 ~ 3599 However, decimal points cannot be output.

3.5.2 'Error code' storage area (Address 7)

When errors occur, the error codes are stored here.
For error code details, refer to section 6.1.

- (1) Error codes are stored as binary values.
- (2) This storage area is cleared by any of the following actions:
 - (a) When the sequence program turns the Y16 signal ON, thereby executing an 'error reset'.
 - (b) When the PLC CPU is reset.
 - (c) When the PLC power is turned OFF.

3.5.3 'Switch output' storage area (Address 10~ 17)

The switch output status (sw1 ~ 128) is stored at this area.

3.5.4 Rotation direction change request storage area (Address 18)

The change request of the rotation direction is stored at this area.

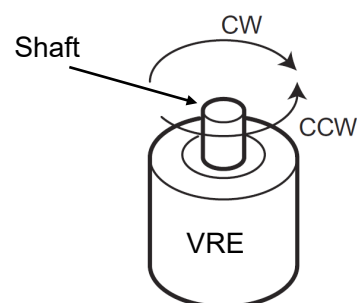
After setting the 55AAh at this area and switching the PLC ready "Y10" from OFF (0) to ON (1), the current position data is either increased or decreased at the rotation direction which is set at storage area (address 19).

For the details of this function, refer to "5.1.4 Sensor rotation direction setting".

3.5.5 'Sensor rotation direction' storage area (Address 19)

The sensor rotation direction status is stored at this area.

The direction is CW when setting "0" this area, and it is CCW when setting "1".



For the details of this function, refer to "5.1.4 Sensor rotation direction setting".

3.5.6 Current position value change request storage area (Address 20)

The change request of the current position value is stored at this area.
After setting the 55AAh at this area and switching the PLC ready "Y10" from OFF (0) to ON (1), the value is changed to the current position data which is designated to the current position setting value storage area (Address 21).
For the details of this function, refer to "5.1.3 Current position value setting function".

3.5.7 'Current position setting value' storage area (Address 21)

The current position setting value is set at this area.
After setting the value at the range between 0 and 3599 and switching the PLC ready "Y10" from OFF (0) to ON (1), the setting value is written in the internal memory of this unit.
For the details of this function, refer to "5.1.3 Current position value setting function".

3.5.8 'Switch output ON/OFF setting value' storage area (Address 22 ~277)

The ON/OFF data used for the switch output (SW1 ~ 128) is set at this area.
The switch setting value is written in the internal memory of this unit when PLC ready "Y10" is switched from OFF (0) to ON (1) after the setting, and then switch output is turned ON or OFF.
For the details of this function, refer to "5.1.5 Switch output function".

3.5.9 'Number of pulses' storage area (Address 278)

The number of pulses is set at this area.
The number of pulses should be set between 0 and 100, and The setting value is read when changing the PLC ready "Y10" from OFF (0) to ON (1).
For the details of this function, refer to "5.1.6 Pulse output function".

4. HANDLING and WIRING

4. HANDLING AND WIRING

This section explains how to unpack and connect VS-QA62-V1PG.

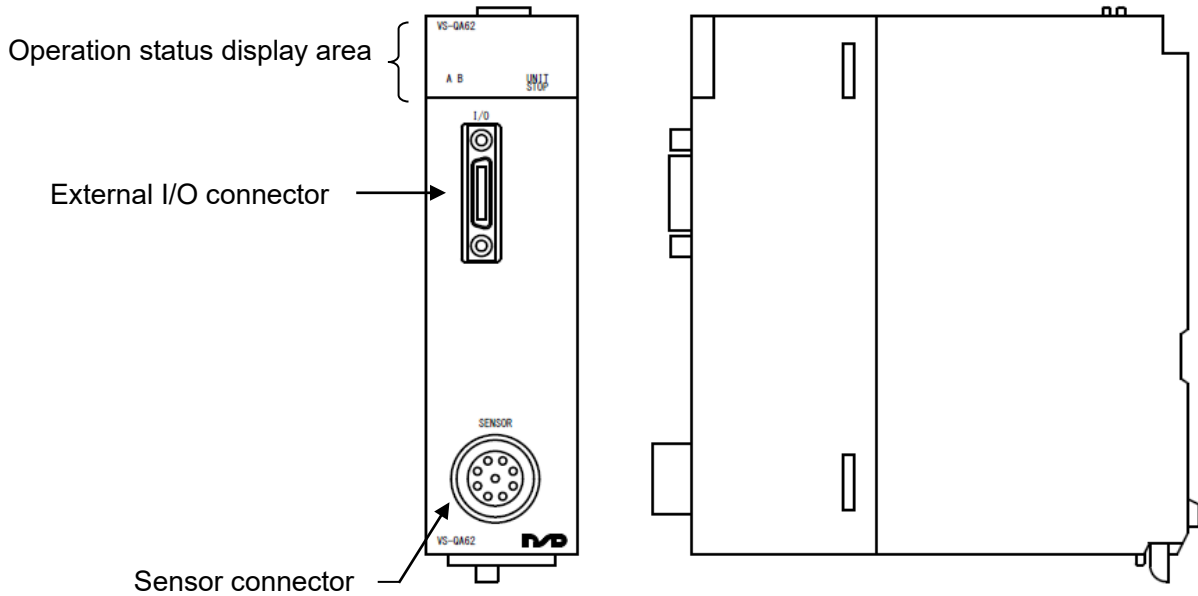
4.1 VS-QA62-V1PG Handling Precautions

The following precautions should be observed when handling VS-QA62-V1PG.

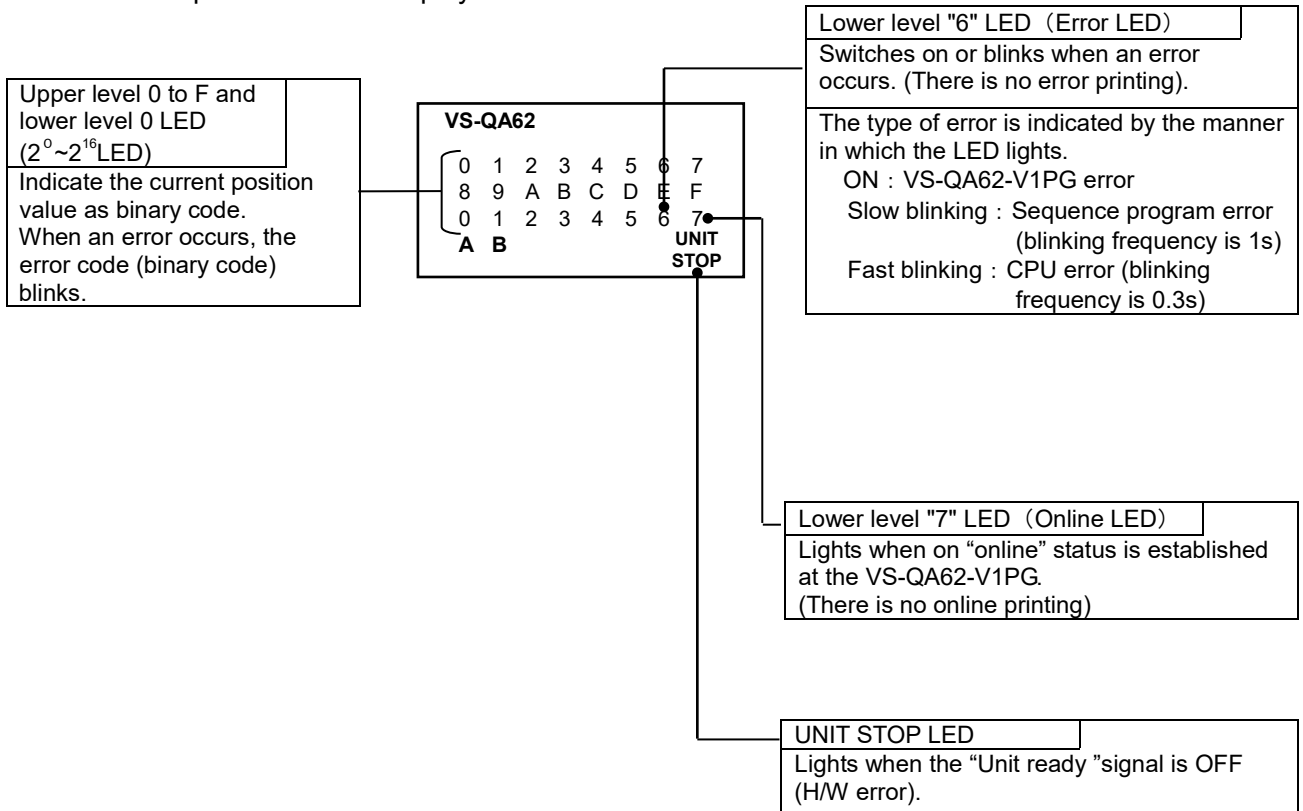
- (1) As VS-QA62-V1PG is constructed from a resin-based material, it should not be dropped or subjected to severe shocks.
- (2) Never remove the PCBs from VS-QA62-V1PG's case. Failure to do so may result in failure.
- (3) Turn OFF the PLC power supply before mounting and removing VS-QA62-V1PG to and from the base unit.
- (4) During the wiring procedure, do not allow any foreign object (e.g. wire strips, etc.) to get into VS-QA62-V1PG.
The top part of VS-QA62-V1PG is particularly vulnerable.
- (5) Tighten the VS-QA62-V1PG securing screws (M3) within the torque range of 0.36 to 0.48N·m.

4.2 Name of Parts

The illustration below shows the nomenclature of VS-QA62-V1PG.



Functions of operation status display area



4.3 Wiring Precautions

The wiring precautions for connections between VS-QA62-V1PG and external devices, and details regarding wiring connectors are explained in this section.

4.3.1 Wiring precautions

The following wiring precautions should be observed when connecting VS-QA62-V1PG to external devices.

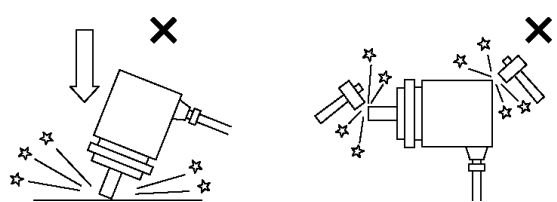
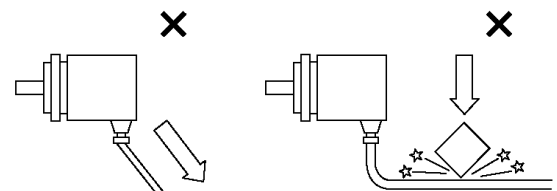
- (1) VS-QA62-V1PG signal lines and ABSOCODER sensor cable should be located as far as possible from power lines and other lines which generate a high level of electrical noise.
- (2) If location near the above power lines is unavoidable, the cable duct should be separated, with individual wiring conduits being provided.
- (3) When wiring conduits are used, they should be securely grounded.

4.4 ABSOCODER Sensor Installation Precautions

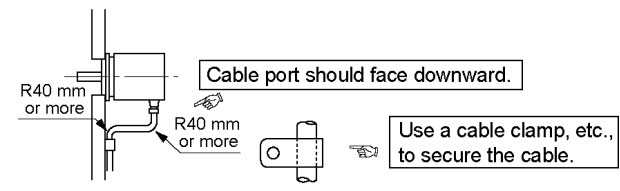
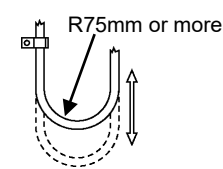
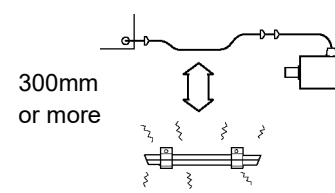
This section explains precautions for ABSOCODER sensor installation.

4.4.1 Installation of ABSOCODER sensor

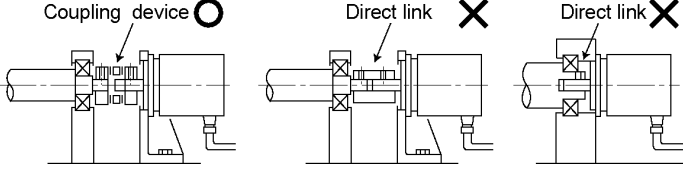
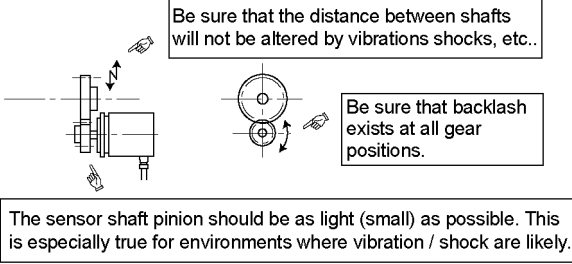
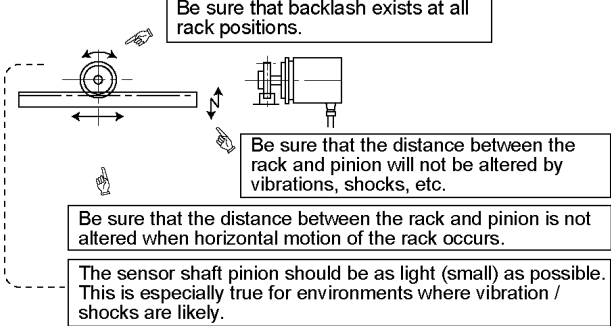
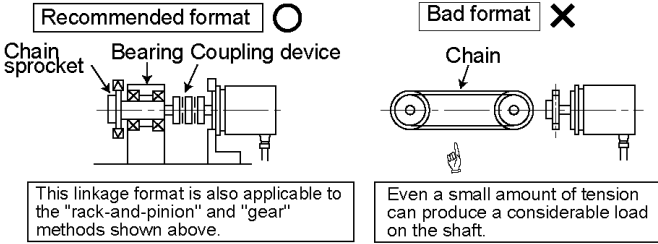
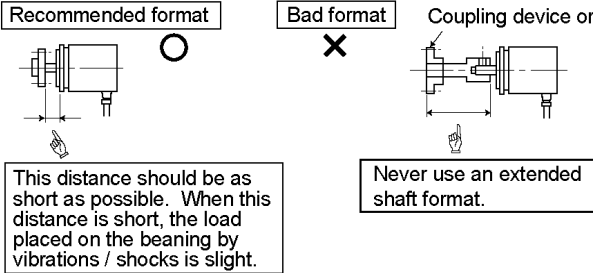
● Handling of Turn-type ABSOCODER sensor

Item	Explanation
1) Main unit	<p>Never drop the Sensor, or subject it to excessive forces or shocks.</p> 
2) Cable	<p>Avoid stepping on, or applying excessive stress to the cable.</p> 

● Mounting of Turn-type ABSOCODER sensor

Item	Explanation	Precaution
1) Mounting	For details regarding mounting dimensions, refer to each ABSOCODER sensor dimensions.	
2) Cable port	<p>Cable port should face downward.</p> 	
3) Cable	<p>The bend radius for movable parts should never be less than 75 mm(ϕ 150) (robotic cable).</p> 	Do not use the standard cable for movable parts. (Use robotic cable.)
4) Wiring	<p>The sensor cable should be located at least 300mm away from power lines and other lines which generate a high level of electrical noise.</p> 	

● Mounting of Turn-type ABSOCODER sensor

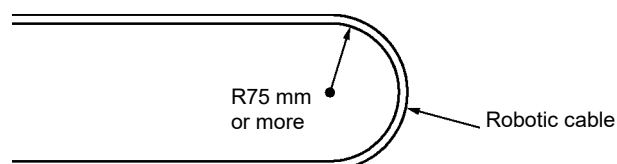
Item	Explanation	Precaution
1) Coupling of machine shaft and sensor shaft	<p>Be sure to use a coupling device to link the 2 shafts.</p> 	<p>A "direct-link" format will result in shaft fatigue and / or breakage after long periods. Therefore, be sure to use a coupling device to link the shafts.</p>
2) For gear-type linkage	<p>If a gear linkage is used, be sure that some backlash exists.</p> 	<p>Incorrect gear mounting can result in shaft bending or breakage.</p>
3) For rack and pinion type linkage	<p>Be sure that backlash exists at all rack positions.</p> 	<p>Incorrect rack and pinion mounting can result in shaft bending or breakage.</p>
4) Chain or timing belt linkage	<p>When a chain or timing belt linkage format is used, there is an inherent risk of the shaft's load being increased by the resulting tension. Therefore, a bearing should be used, with the shafts being linked by a coupling device immediately behind the bearing.</p> 	
5) Shaft mounting position	<p>The shaft should be attached to the coupling device or gear at a point which is as near to the sensor body as possible.</p> 	

● Coupling of Turn-type ABSOCODER sensor

Item	Explanation	Precaution
<p>1) Coupling device selection precaution</p>	<p>1. Selection of the coupling device should be based on the following factors;</p> <ul style="list-style-type: none"> - The amount of a mounting error caused by the machine design. - The permissible error of coupling device. - Reaction force of coupling device. - Permissible shaft load of the sensor. <div style="text-align: center; margin: 10px 0;"> <p>The amount of a mounting error caused by the machine design <math>\ll</math> The permissible error of the coupling device <math>\ll</math> Reaction force of the coupling device <math>\ll</math> Permissible shaft load of the sensor</p> </div> <hr/> <p>Mounting error</p> <div style="text-align: center;"> <p>Eccentricity → Load generated by the eccentricity Deflection → Load generated by the deflection Shaft-direction displacement → Load generated by the shaft direction displacement</p> <p>Radial load (from eccentricity and deflection) Thrust load (from shaft-direction displacement)</p> </div> <p>2. If the selected coupling device is larger than necessary (When used in high vibration/shock environments), the load which is applied to the shaft by the vibrations/shocks will be increased by the weight of the coupling device.</p> <p>3. Be sure to select a coupling device with an adequate transmission torque surplus relative to the sensor shaft's torque.</p>	<p>The selection of a larger coupling than necessary will increase the shaft load which is caused by the mounting error amount. Excessive force applied to the shaft can deform the coupling and reduce durability.</p>
<p>2) Coupling device installation precaution</p>	<p>Avoid bending or damaging the coupling.</p> <div style="text-align: center;"> </div>	

4.4.2 Precautions when connecting ABSOCODER sensor

- (1) Connection should be made using the special cable, with the connector being securely tightened.
- (2) If further length is desired, an extension cable (with connector) 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 special ABSOCODER sensor 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.



5. CURRENT POSITION DETECTION FUNCTION

5. CURRENT POSITION DETECTION FUNCTION

5.1 Function Description

This section explains VS-QA62-V1PG's current position detection function.

5.1.1 Current position detection function

VS-QA62-V1PG's current position detection function detects the current position the ABSOCODER sensor.

Conventionally, this was detected by an incremental format encoder in conjunction with a counter unit. As shown in Fig. 5.1, the current position value appropriate for the rotation position of the ABSOCODER sensor is stored in the buffer memory while rotating the ABSOCODER sensor by the motor.

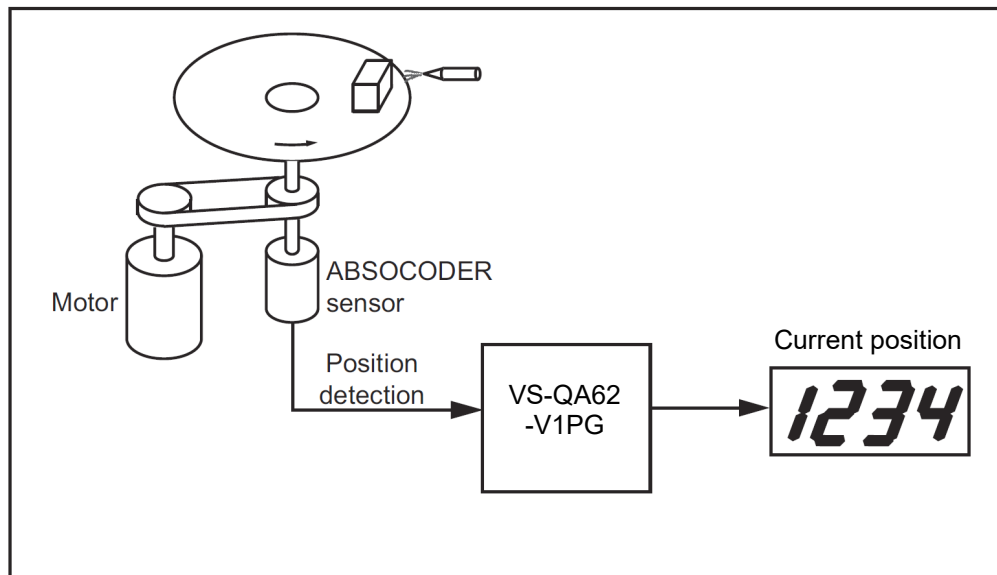


Fig. 5.1 Example of using VS-QA62-V1PG

5.1.2 External origin setting function

This is the function that the current position value of the buffer memory is changed to "0" by inputting the external origin setting signal from I/O connector.

This is the function that the current position value of the buffer memory (Address 0 or 1) is changed to "0" by inputting the external origin setting signal (leading edge) from I/O connector.

The following conditions are required for validating the external origin setting function;

- ① The sensor error (error code 22 [H16]) isn't occurred.
- ② The status should be online.

VS-QA62 operation status is also turned ON (1) (online) when the PLC ready "Y10" is turned ON (1).

5.1.3 Current position setting function

The current position setting is the function that the current position value of VS-QA62-V1PG is changed to a value which corresponds to the current machine angle.

The current position setting value (Address 21) can be changed to a value which was previously designated through the buffer memory.

The following conditions are required for validating the current position setting function;

- ① The sensor error (error code 22 [H16]) isn't occurred.

Setting procedures

- (1) Turn OFF the PLD ready (Y10) (offline status)
- (2) Write the desirable value (0 to 3599) to the current position setting value storage area (Address 21) of the buffer memory
The current position value cannot be changed and output an error code when a value which is out of range is written.
- (3) Write 55AAh to the current position value change request storage area (Address 20) of the buffer memory.
- (4) The current position value cannot be changed when other value is written.
- (5) The PLC ready (Y10) is switched from OFF (0) to ON (1).
- (6) The current position value of the buffer memory (Address 0 and 1) is changed to desirable value.

5.1.4 Sensor rotation direction setting

The sensor rotation direction setting is described in this section.

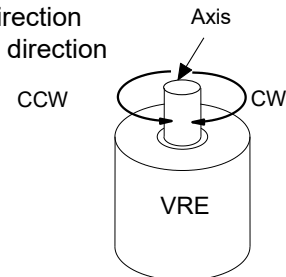
The increase direction of the current position value can be designated accordance with the rotation of the ABSOCODER sensor.

CW setting: The current position value increases in CW direction

CCW setting: The current position value increases in CCW direction

The setting contents are the following;

Setting	Item	Sensor rotation direction
0		CW
1		CCW



The following conditions are required for setting the sensor rotation direction;

- ① The status is on offline.
The operation status of VS-QA62 (X1) is also turned OFF (0) (offline) when the PLC ready (Y10) is OFF.

Setting procedures

- (1) Turn OFF the PLD ready (Y10) (offline status)
- (2) Write the setting value to the rotation direction storage area (Address 19) of the buffer memory.
The rotation direction cannot be changed and output an error code when a value which is out of range is written.
- (3) Write 55AAh to the rotation direction change request storage area (Address 18) of the buffer memory.
The rotation direction cannot be changed when other value is written.
- (4) The PLC ready (Y10) is switched from OFF (0) to ON (1).

IMPORTANT

The current position value is changed when changing the sensor rotation direction; therefore, execute the current position setting or external origin setting.

5.1.5 Switch output function

The switch output function (SW 1 to 128) is described in this section. It outputs the ON/OFF signal to the external device instead of cam switch with detecting the machine position by the ABSOCODER sensor. ON/OFF position can be set your desirable one. The position which is detected by the ABSOCODE sensor is set to ON/OFF position as indicated in the figure 5.1.5 (2). Comparing the rotation position of the ABSOCODER sensor with setting ON/OFF position, ON/OFF signal is output to the external device accordance with rotating the ABSOCODER sensor by a motor.

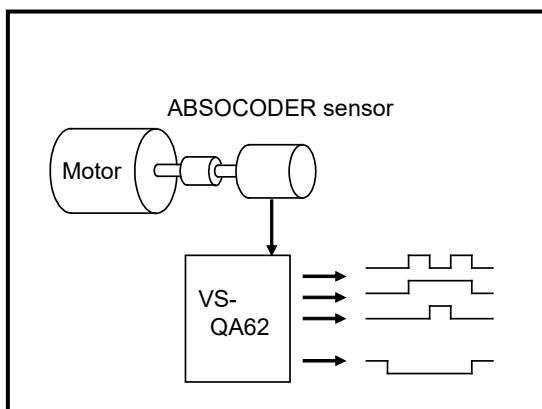


Fig. 5.1.5(1) Example of VS-QA62 operation

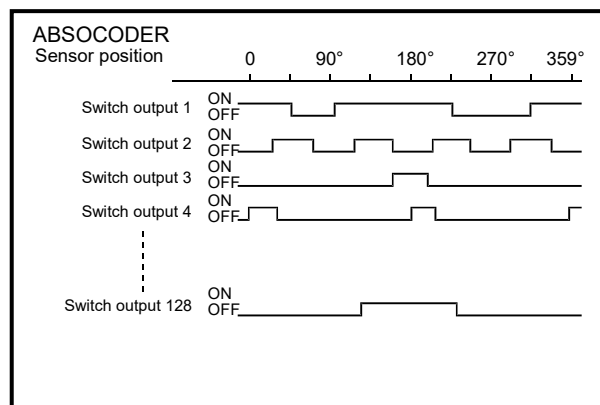


Fig. 5.1.5(2) Switch Output Example

5.1.5.1 Switch output setting

The setting value is written in the switch output ON/OFF setting value storage area of the buffer memory (Address 22 to 277) when setting the switch output. Pay attention the following contents when writing the setting value.

- ① The factory setting is "0".
- ② The switch is not output when setting "0" to both ON and OFF angles.
- ③ ON<OFF: a contact point output
ON>OFF: b contact point output
- ④ Outputs an error code when a value which is out of range is written. After that, the switch cannot be set.
 - Both or either ON and OFF angles are set a value except between 0 and 3599.
 - Both ON and OFF angles are set an same numeric value in the range between 1 and 3599.

For details of the error code, refer to "6.1".

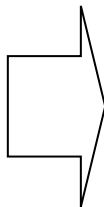
- ⑤ Check the VS-QA62 operation status (X1) is OFF after writing the data to the buffer memory, and switch the PLC ready (Y10) from OFF (0) to ON (1).
- ⑥ The switch output data is not stored in the internal memory of this unit. In the following cases, set the switch output data again.
 - Turning On the power supply
 - Recovery from the blackout
 - PLC's CPU is reset.

Setting procedures

- (1) Turn OFF the PLD ready (Y10) (offline status)
- (2) Write the switch setting value to the switch ON/OFF setting value storage area (Address 22 to 277) of the buffer memory.
The rotation direction cannot be changed and output an error code when a value which is out of range is written.
- (3) The PLC ready (Y10) is switched from OFF (0) to ON (1).
- (4) The I/O connector (SW1 to 7) and switch output status storage area (Address 10 to 17) is turned ON/OFF.

Switch setting example

Switch No.	ON angle	OFF angle
1	0.0	100.0
2	100.0	0.0
3	100.0	200.0
.		
.		
.		
127	200.0	100.0
128	0.0	359.9



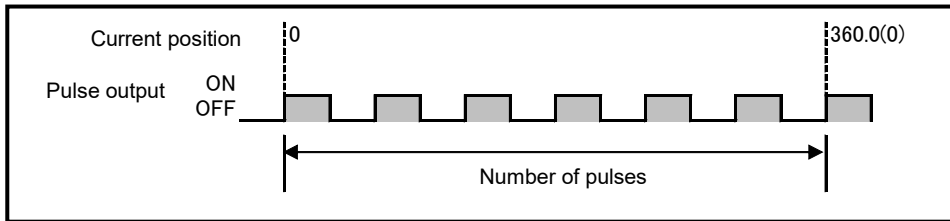
Address	Setting value	description
22	0	Switch 1 ON
23	1000	Switch 1 OFF
24	1000	Switch 2 ON
25	0	Switch 2 OFF
26	1000	Switch 3 ON
27	2000	Switch 3 OFF
.		
.		
.		
274	2000	Switch 127 ON
275	1000	Switch 127 OFF
276	0	Switch 128 ON
277	3599	Switch 128 OFF

5.1.6 Pulse output function

This section explains the pulse output function.

The function outputs the pulse signal to the external device that 1 turn of the ABSOCODER sensor is divided equally.

The number of pulses can be designated the desired value between 1 and 100.



Write the setting value to the number of pulses storage area (Address 278) of the buffer memory when setting the number of pulses. Note the following when writing the setting value.

- ① The factory setting is 100.
- ② An error signal is output when the writing number is out of the range.
The pulse output number cannot be set.
For a more detailed error code, refer to "6.1".
- ③ After writing data to the buffer memory, change the PLC ready (Y10) from OFF (0) to ON (1) after confirming the VS-QA62 operation status (X1) is OFF (0).
- ④ The number of pulses isn't stored in the internal memory of VS-QA62.
Reset the number of pulses in the following cases;
-Turning ON the power supply
-Recovering from the power outage
-Resetting the PLC's CPU

Setting procedures

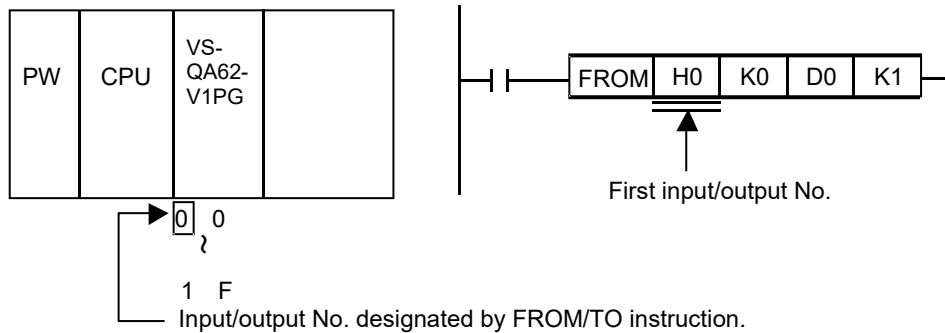
- (1) Turn OFF the PLC ready (Y10). (Offline)
- (2) Write the desired number (1 to 100) to the number of pulses storage area (Address 278) of the buffer memory.
- (3) Switch the PLC ready (Y10) from OFF (0) to ON (1).
- (4) The output pulse of the I/O connector turns ON/OFF.

5.2 Programming

This section explains how to create the sequence program using VS-QA62-V1PG.

5.2.1 Program creation precautions

- (1) VS-QA62-V1PG is an intelligent function module containing 32 exclusive input and output points.
- (2) In response to 'FROM/TO' instructions, the first input/output No. of VS-QA62-V1PG's slot will be designated.



- (3) Instructions are executed from the VS-QA62-V1PG (as an intelligent function module) as follows:

Instruction format : U[]#G[]

- Buffer memory address
- VS-QA62-V1PG initial input/output No.

Settings : First 2 digits when the VS-QA62-V1PG initial input/output No. is expressed as a 3-digit value. "0E" (U0E#G0) when the VS-QA62-V1PG I/O begins with 0E0.

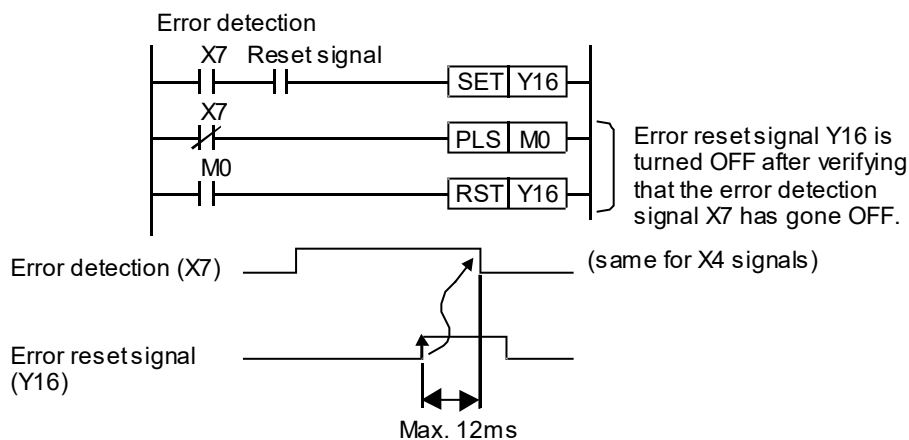
- (4) VS-QA62-V1PG control begins when Y10 (PLC ready signal) turn ON:

- (5) To stop all VS-QA62-V1PG control, turn Y10 (PLC ready signal) OFF:

- (6) Error reset:

It takes the VS-QA62-V1PG 12ms to detected the Y16 (error reset) signal after it has been turned ON. Therefore, if the ON period of the Y16 signal is less than 12ms, it may not be detected, and the 'error detection' signal will not go OFF.

To prevent this, the following programming method should be used.



5.2.2 Program for current position monitor display

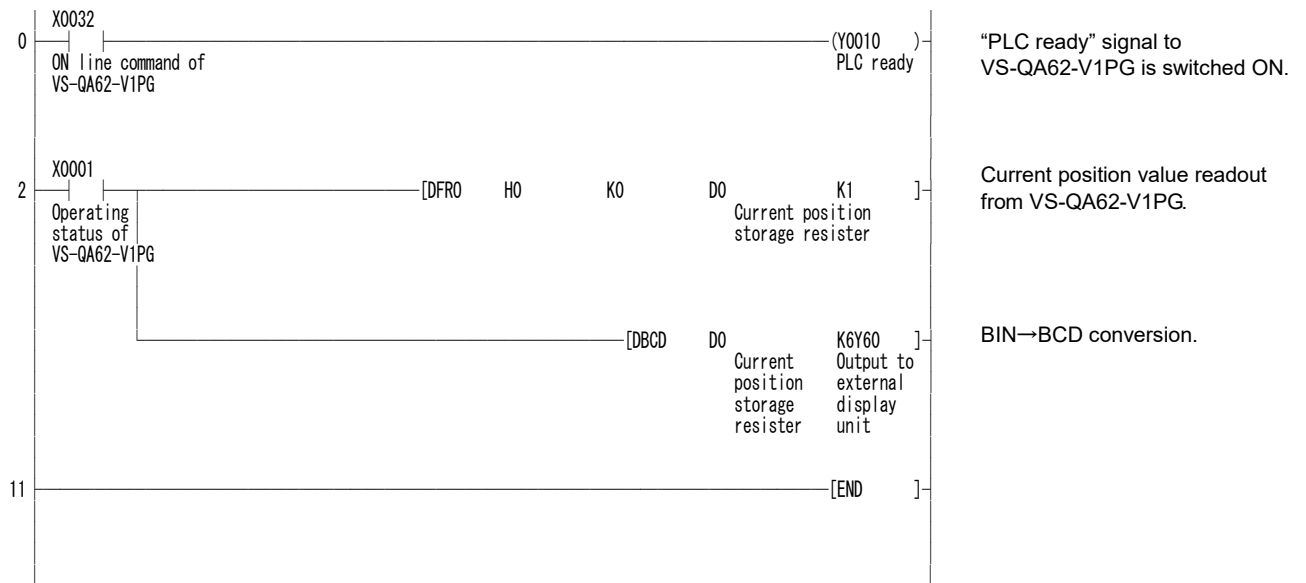
A program example for the current position monitor display is given below.

Conditions

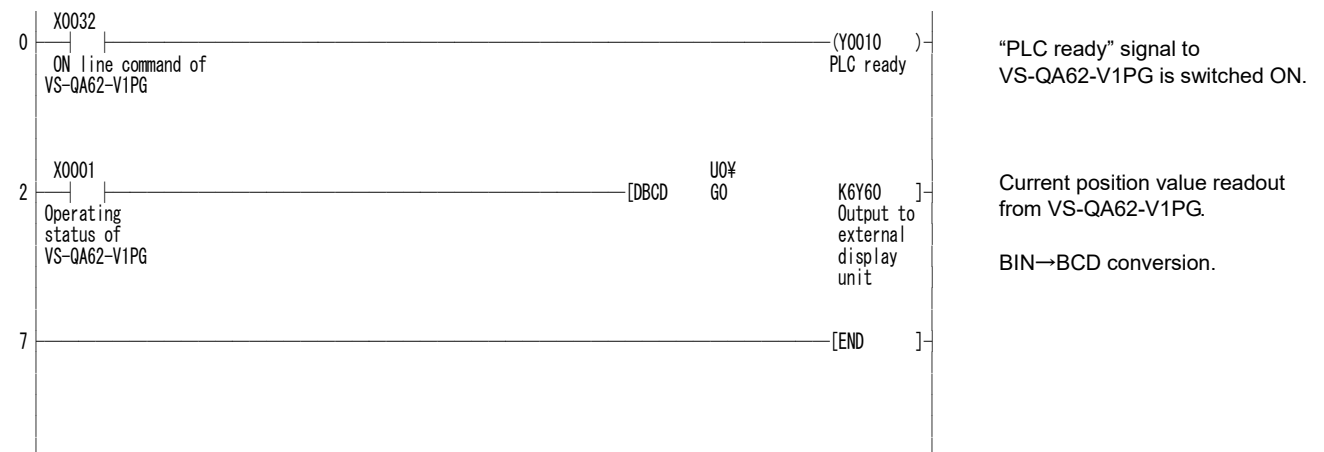
- (1) The following signal assignments are used to control VS-QA62-V1PG:
 VS-QA62-V1PG 'online' commandX32
 Current position (sensor binary) storage resisterD0, D1
 Current position (sensor binary) output to external display unit.....Y60 to Y77

Program example

(1) Example of program using FROM/TO instructions



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



Explanation

(1) When VS-QA62-V1PG is online, the 'X1' signal turns ON.

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



5.2.3 Program for error code readout and reset

A program example for the error code readout and error reset operation which is used when a VS-QA62-V1PG 'error detection' occurs is given below.

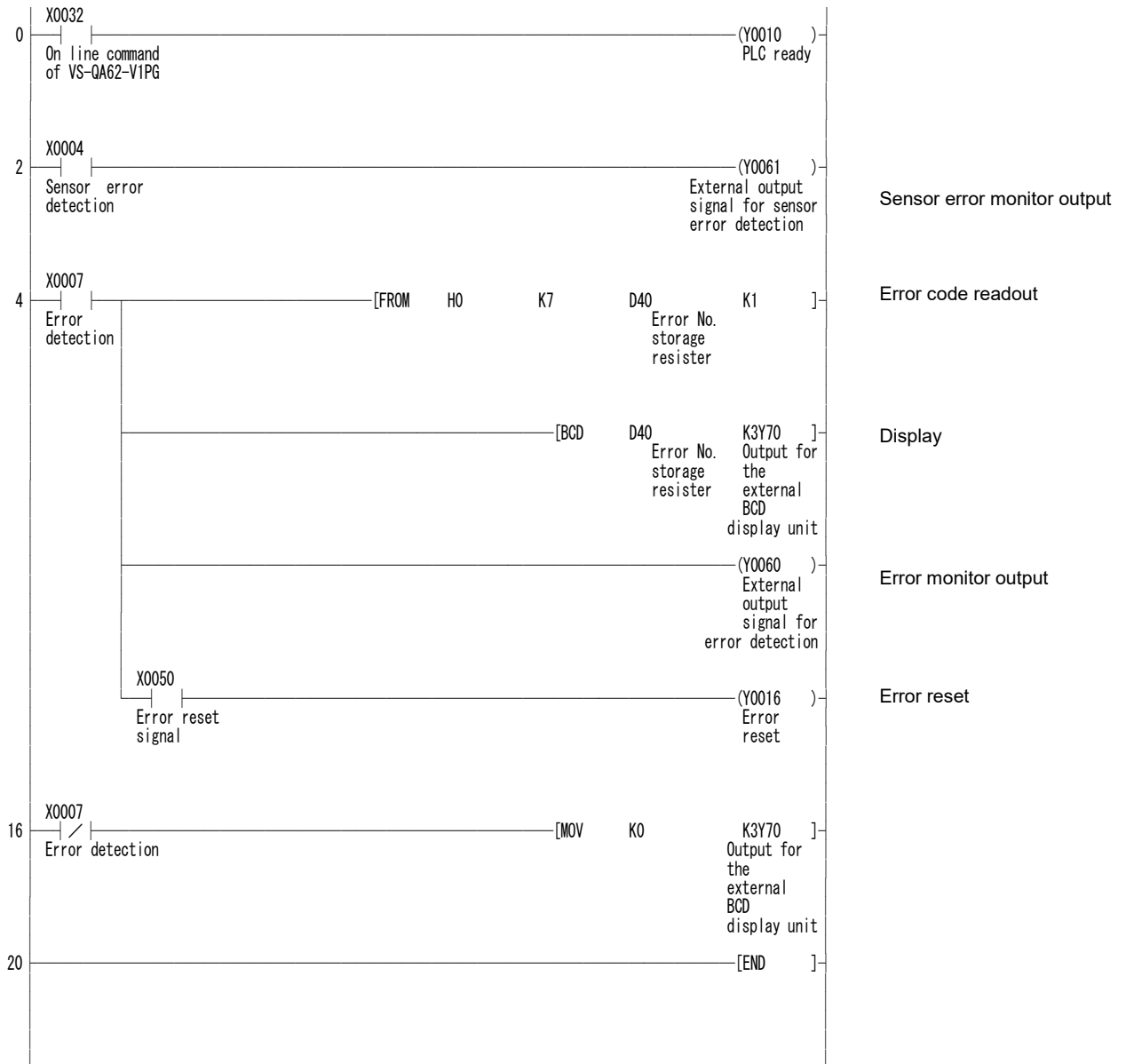
Conditions

The following signal assignments are used to control VS-QA62-V1PG:

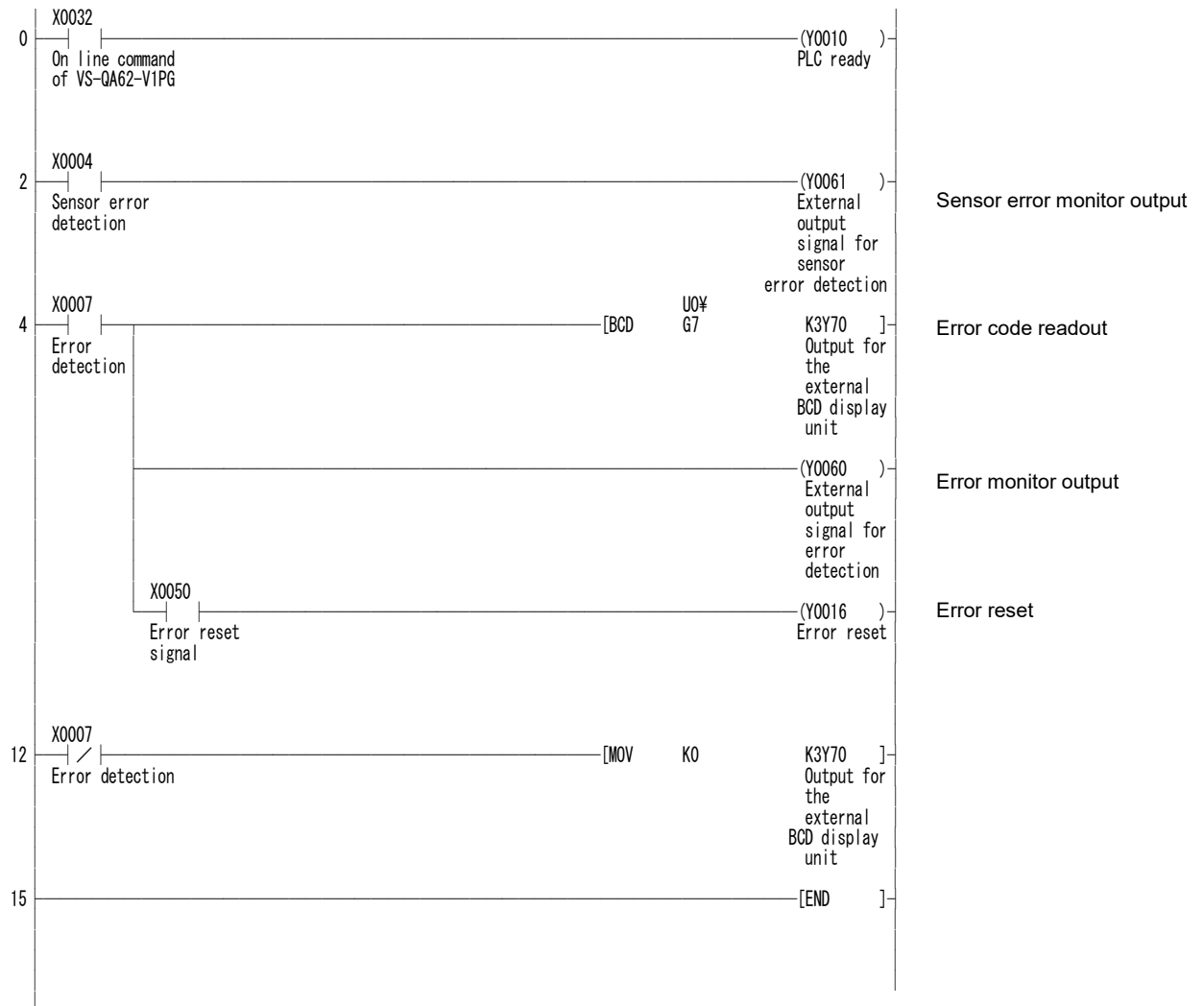
- Output for the external BCD display unit Y70 to Y7B
- External output signal for error detection Y60
- External output signal for sensor error detection Y61
- VS-QA62-V1PG 'online' command X32
- Error reset signal X50

Program Example

(1) Example of program using FROM/TO instructions



(2) Example of program using an intelligent function device (U[]#G[]).



Explanation]

- (1) The X4 signal turns ON when a sensor error occurs.
- (2) The X7 signal turns ON when an error occurs.
- (3) The error code is stored at address 7 of the buffer memory as a binary value.
- (4) VS-QA62-V1PG errors are reset when the Y16 signal is turned ON.
- (5) The error display is cleared when an error reset occurs.

5.2.4 Program for current position setting

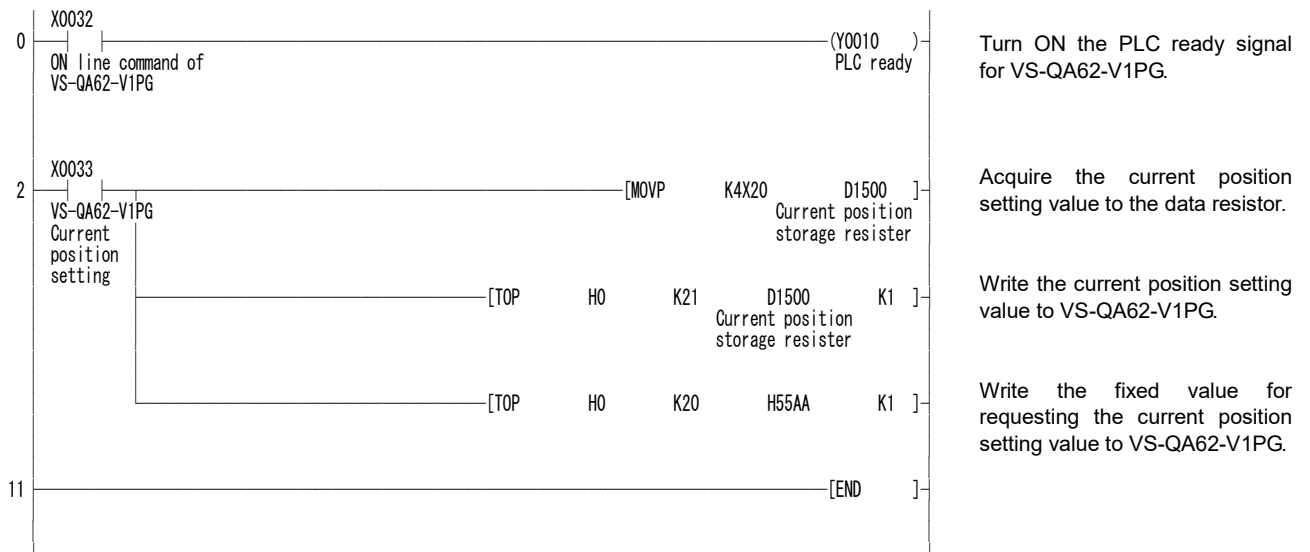
A program example for the current position setting is given below.

Conditions

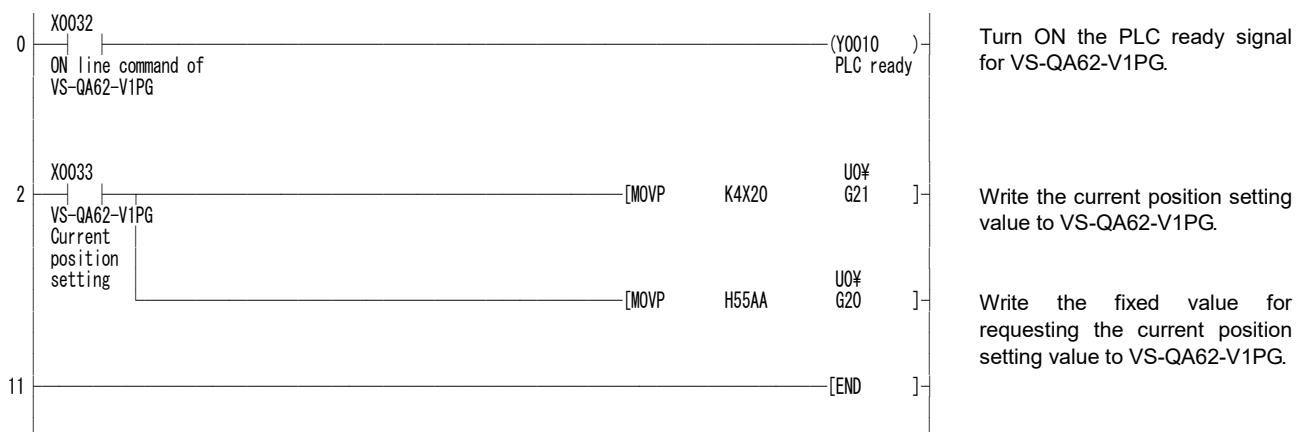
- (1) The following signal assignments are used to control VS-QA62-V1PG:
- VS-QA62-V1PG 'online' commandX32
 - 'Current position setting' commandX33
 - Current position setting valueX20 to X2F
 - 'Current position setting value' storage resistorD1500

Program example

- (1) Example of program using FROM/TO instructions



- (2) Example of program using an intelligent function device (U[]#G[]).



Explanation

- 1) The current position setting value (buffer memory address 21) and current position value change request (buffer memory address 20) can be written anytime.
- 2) The value which is written on the buffer memory becomes valid at the timing that the PLC ready (Y10) turns OFF to ON.

5.2.5 Program for sensor rotation direction setting

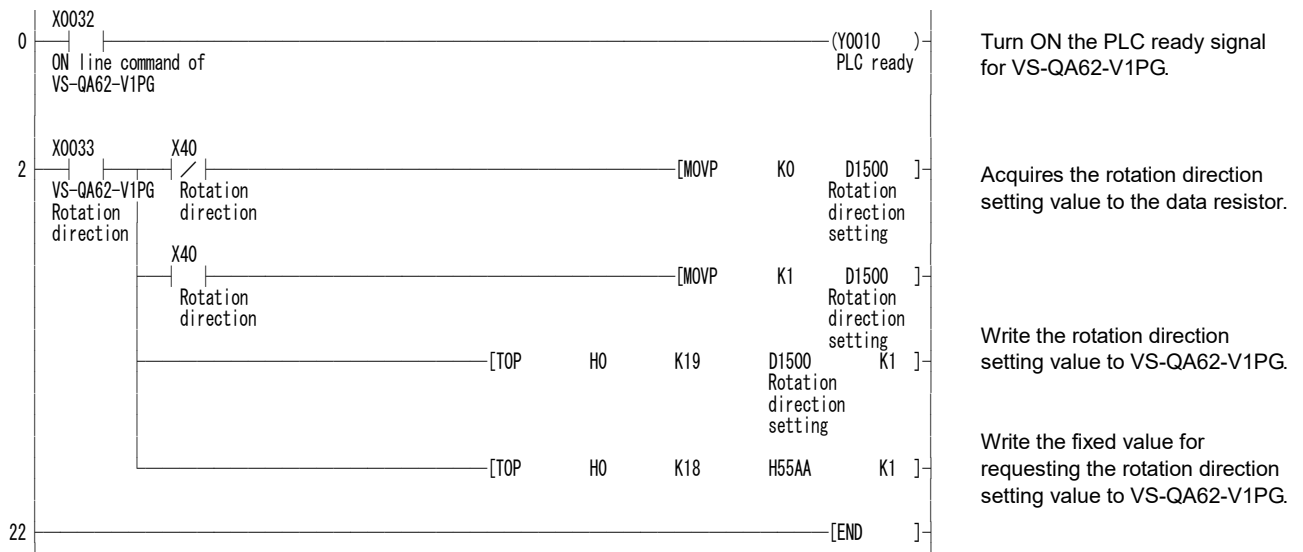
A program example for the sensor rotation direction setting is given below.

Conditions

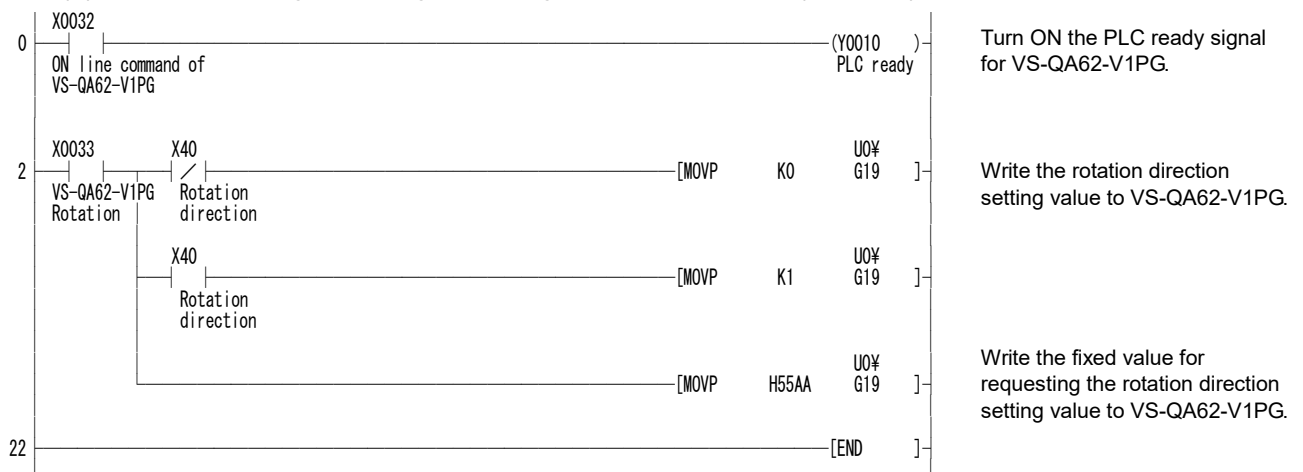
- (1) The following signal assignments are used to control VS-QA62-V1PG:
- VS-QA62-V1PG 'online' command X32
 - 'Sensor rotation direction' command X33
 - Rotation direction setting value X40
 - 'Rotation direction setting value' storage resistor D1500

Program example

(1) Example of program using FROM/TO instructions



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



Explanation

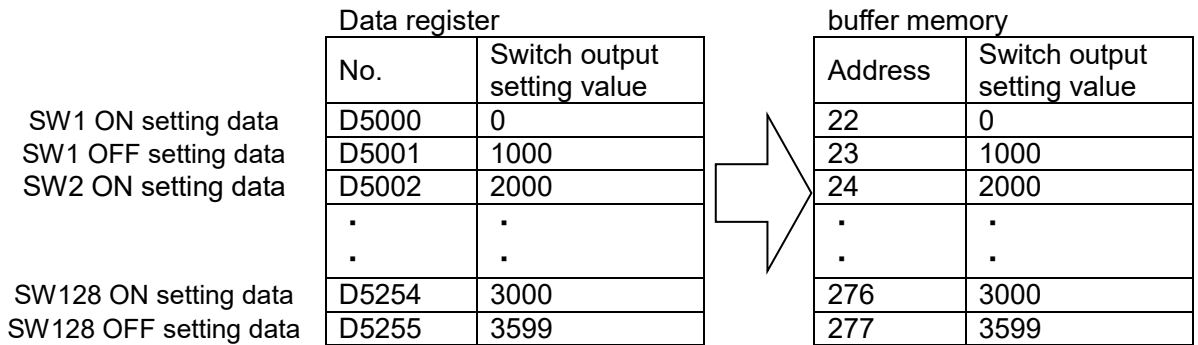
- 1) The rotation direction setting value (buffer memory address 19) and rotation direction value change request (buffer memory address 18) can be written anytime.
- 2) The value which is written on the buffer memory becomes valid at the timing that the PLC ready (Y10) turns OFF to ON.

5.2.6 Program for switch output setting

A program example for the switch output setting is given below.

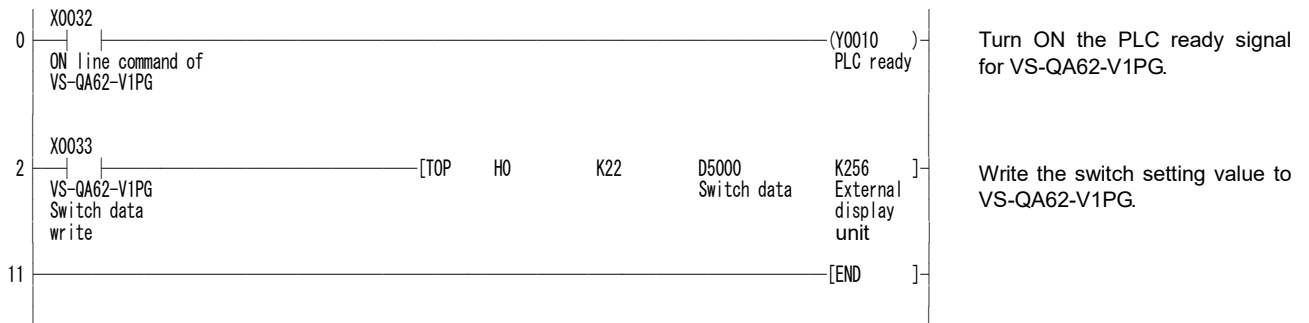
Conditions

- (1) The following signal assignments are used to control VS-QA62-V1PG:
 VS-QA62-V1PG 'online' commandX32
 'Switch data write' commandX33
 'Switch output setting value' storage registerD5000
- (2) The switch output setting value has already been stored at the data register.

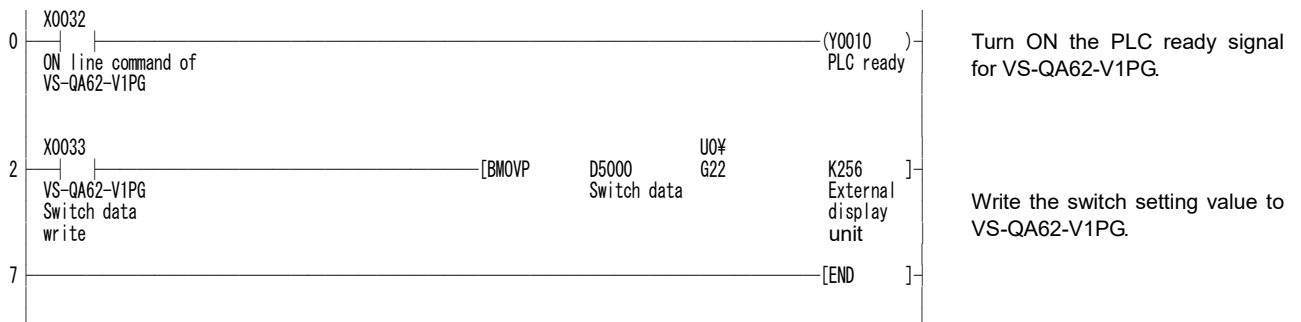


Program example

- (1) Example of program using FROM/TO instructions



- (2) Example of program using an intelligent function device (U[]G[]).



Explanation

- 1) The switch ON/OFF setting value (buffer memory address 22 to 277) can be written anytime.
- 2) The value which is written on the buffer memory becomes valid at the timing that the PLC ready (Y10) turns OFF to ON.

5.2.7 Number of pulses setting program

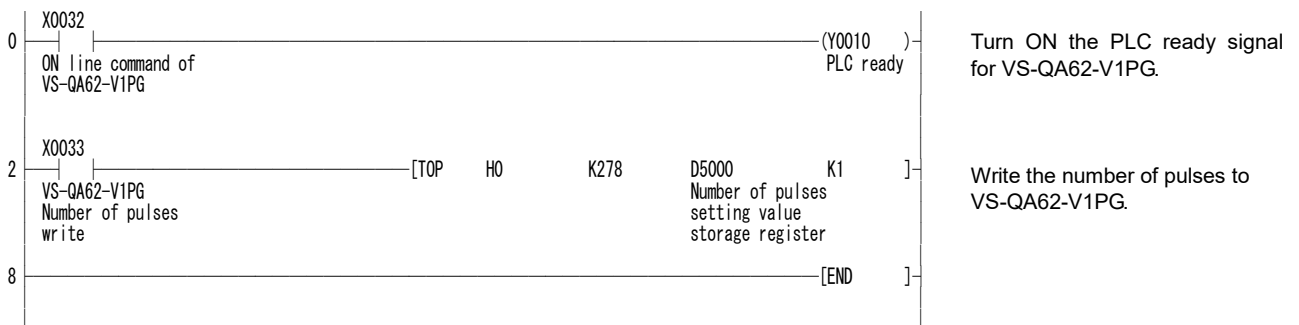
A program example for the number of pulses setting is indicated below.

Conditions

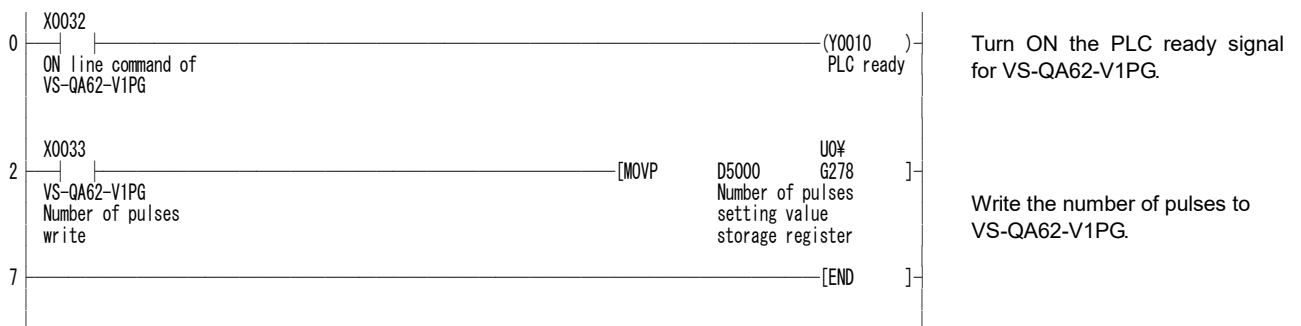
- 1) The following signal assignments are used to control VS-QA62-V1PG:
 VS-QA62-V1PG 'online' commandX32
 'Number of pulses write' commandX33
 Number of pulses setting value storage registerD5000
- 2) The number of pulses setting value has already been stored at the data register.

Program example

(1) Example of program using FROM/TO instructions



(2) Example of program using an intelligent function device (U[]#G[]).



Explanation

- 1) The number of pulses (buffer memory address 278) can be written anytime.
- 2) The value which is written on the buffer memory becomes valid at the timing that the PLC ready (Y10) turns OFF to ON.

6. TROUBLESHOOTING

6. TROUBLESHOOTING

VS-QA62-V1PG operation errors and troubleshooting procedures are described in this section.

6.1 Error Code List

VS-QA62-V1PG error codes are described below. When VS-QA62-V1PG detects an error, the corresponding error code is stored at address 7 of the buffer memory. At that time the 'error detection' signal (X7) is turned ON. At this time, the LED lower "6" switches ON or blinking, and an error code blinks at the LED display area by binary code.

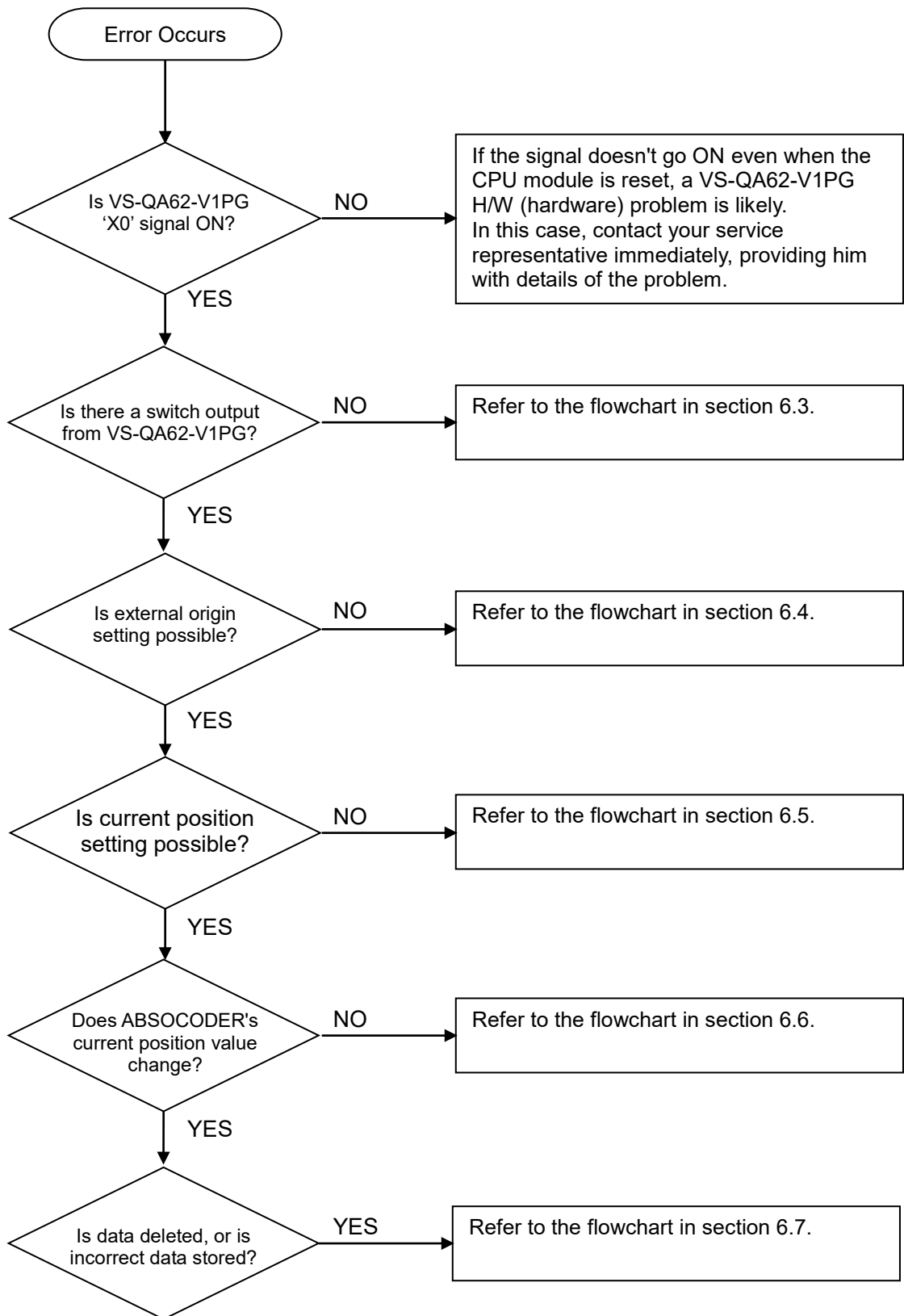
Error codes are shown below. (The codes in parenthesis in the error code list is indicated in binary code.)

Error type	Lower level "6" LED	Error code	Description	When detected	Countermeasure	
'Buffer memory writing prohibited' errors	Blinks	10, 11 (HA, HB)	Activated when writing (by sequence program 'TO' instruction) is attempted at the 'writing prohibited' area of buffer memory.	Current position value (Address 0, 1)	During online status	Revise the sequence program so that writing is not attempted at a 'writing prohibited' area of the buffer memory.
		17 (H11)		Error code (Address 7)		
		1010 (H3F2) 1017 (H3F9)		Switch output (Address 10~17)		
Detection errors	Lit on	22 (H16)	VS-QA62-V1PG detected a sensor error. Sensor error causes are as follows: - ABSOCODER sensor is disconnected. - Severed/disconnected ABSOCODER connector cable. - Malfunction in VS-QA62-V1PG position detection circuit.	Always	- Connect the ABSOCODER sensor if disconnected. - Replace the ABSOCODER sensor. - Check the electrical condition of the sensor cable. (continuity, shorts) - If the problem appears to be caused by a malfunction at the VS-QA62-V1PG position detection circuit, please contact your service representative.	
Data error	Lit on	69 (H45)	VS-QA62-V1PG detected a backup data error.	When power is turned ON.	Re-designate the current position setting value or rotation direction.	
Current position setting value error	Blinks	117 (H75)	The value which is out of the current position setting value range is written.	When Y10 is turned ON.	Correct the current position setting value	
Number of pulses setting error	Blinks	120 (H78)	The number of pulses that is out of the range was set.	When Y10 is turned ON.	Correct the number of pulses, and reset it.	
Switch setting data error	Blinks	2022 (H7E6) 2277 (H8E5)	The data set to the switch output ON/OFF data setting area is incorrect. The error code is the relevant buffer memory address +2000.	When Y10 is turned ON.	Clear the error, and designate the correct data	
CPU reset	High speed blinks	—	Error detected at programmable controller CPU. "PLC CPU reset" is executed	Always	Check the PLC system.	

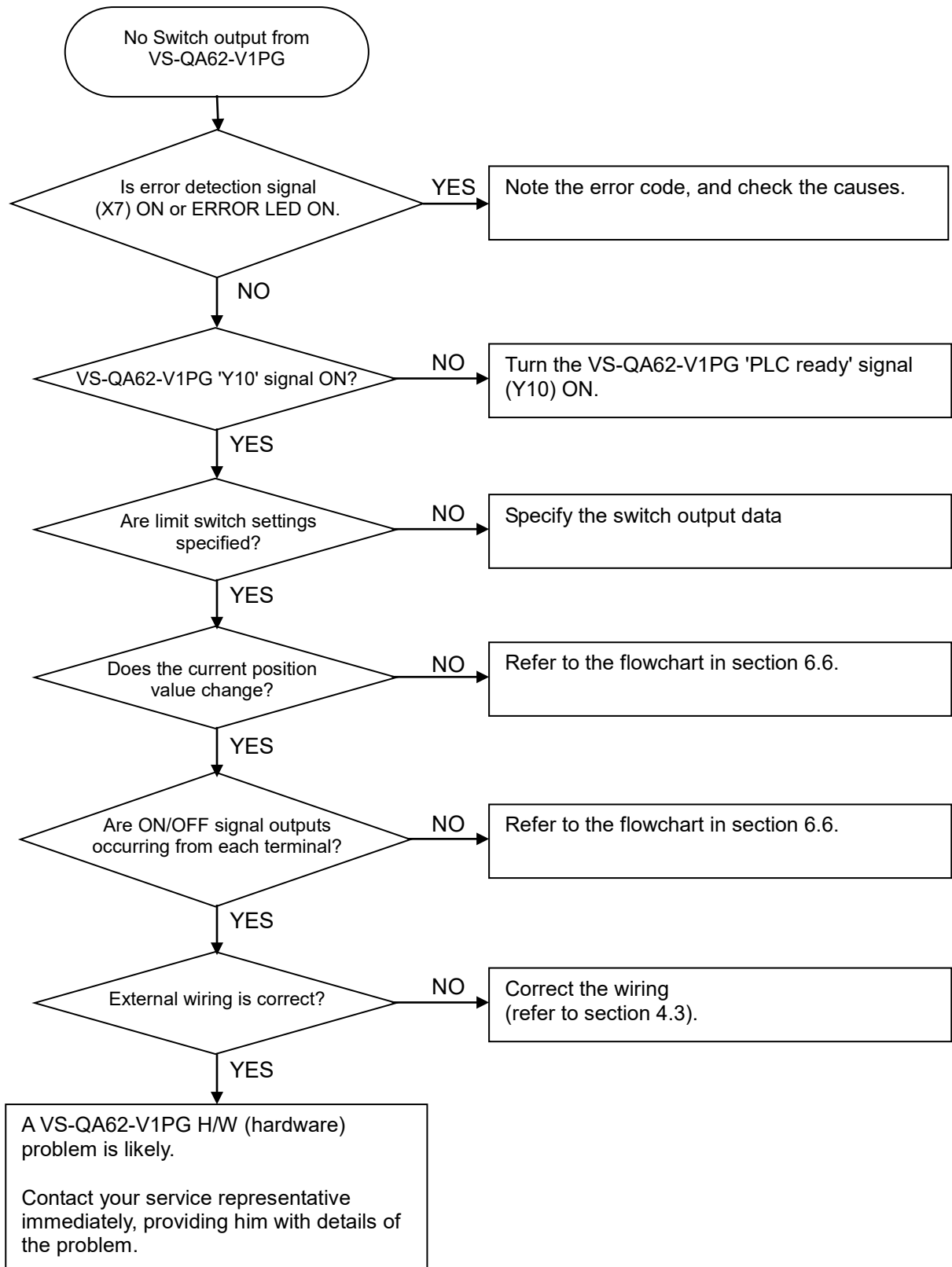
- (1) Each time an error occurs, the previous error code stored in the buffer memory will be deleted, and replaced by the new error code.
- (2) The error code will be stored in the buffer memory when "CPU reset" error occurs. The error will be automatically cleared when "CPU reset" error is cancelled.
- (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 following:
 - (a) Turn Y16 ON using the sequence program.
 - (b) Reset the PLC CPU.
 - (c) Turn OFF the PLC power supply.

6.2 Troubleshooting Flowchart

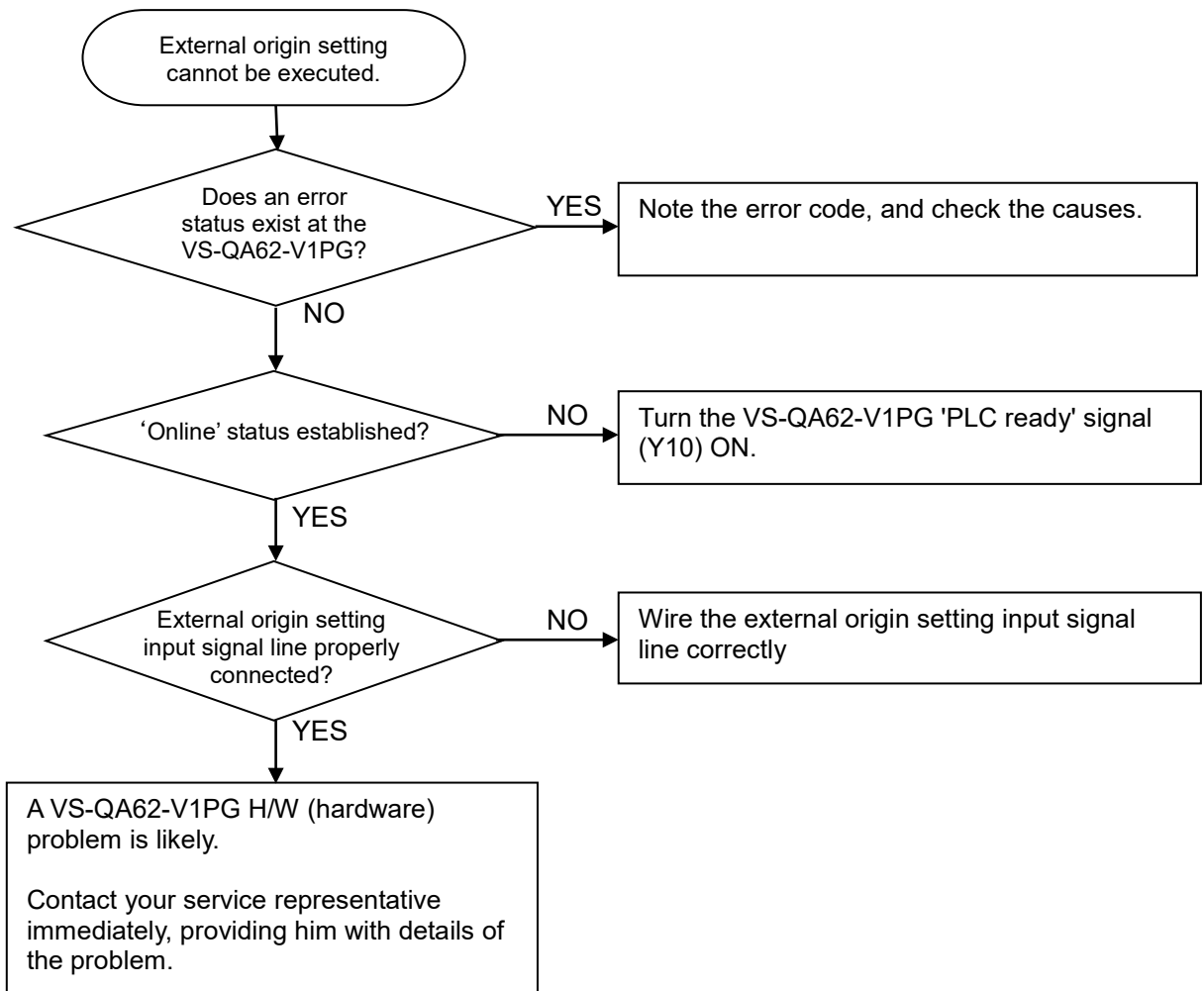
The VS-QA62-V1PG troubleshooting procedure is explained below.
For CPU module related problems, consult the manual for the CPU module in question.



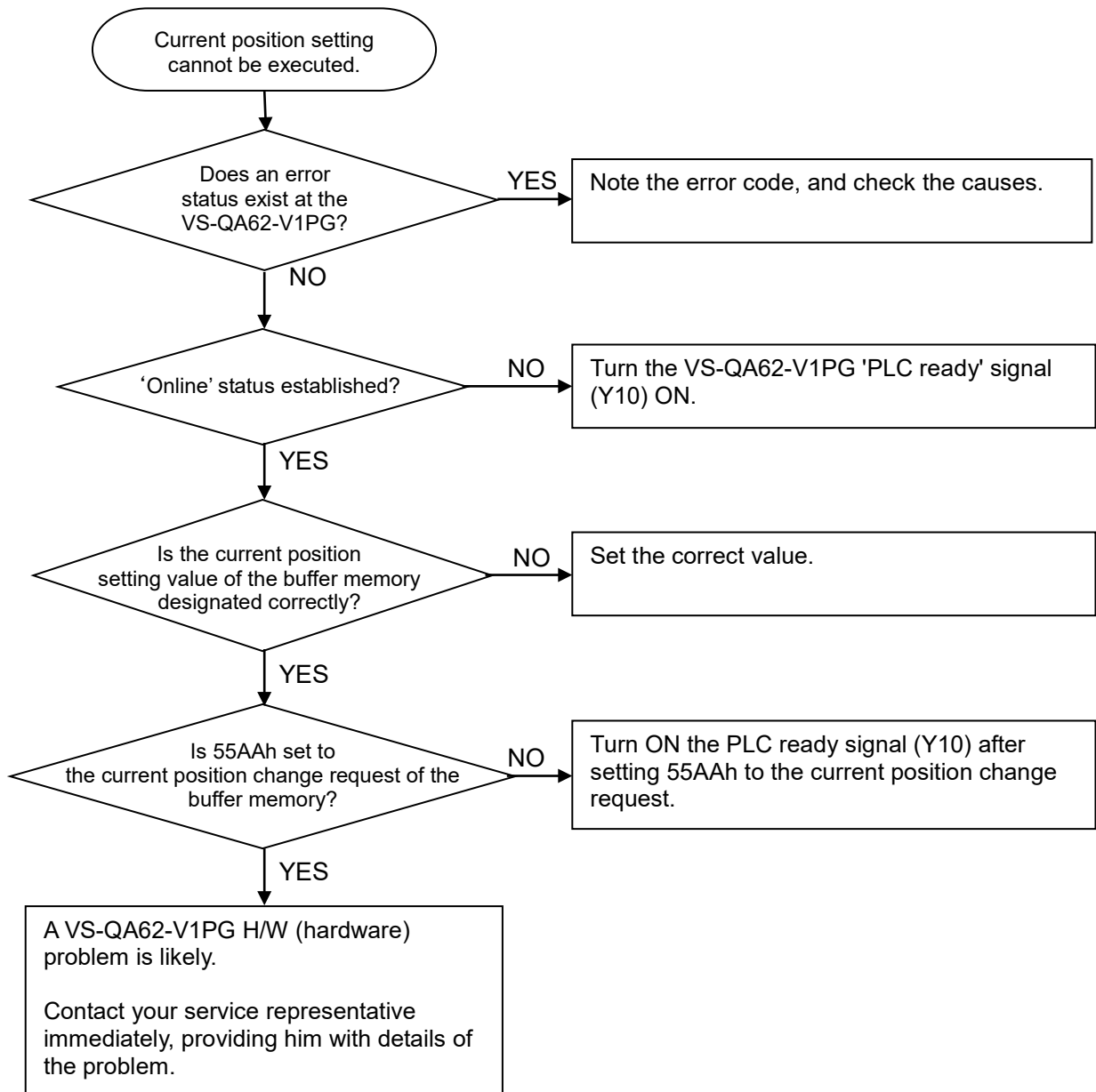
6.3 Flowchart for No Switch Output from VS-QA62-V1PG



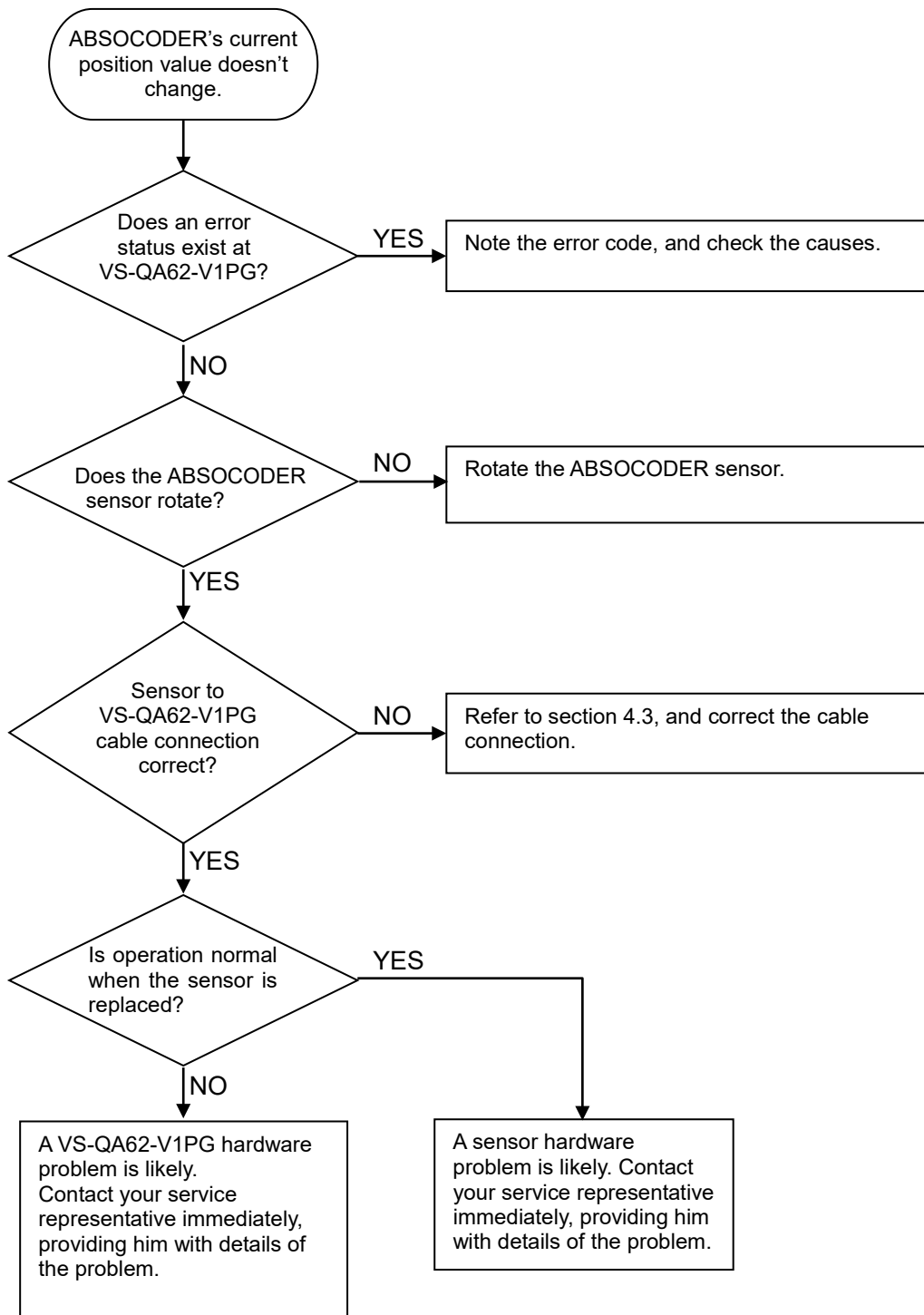
6.4 Flowchart when External Origin Setting is Impossible



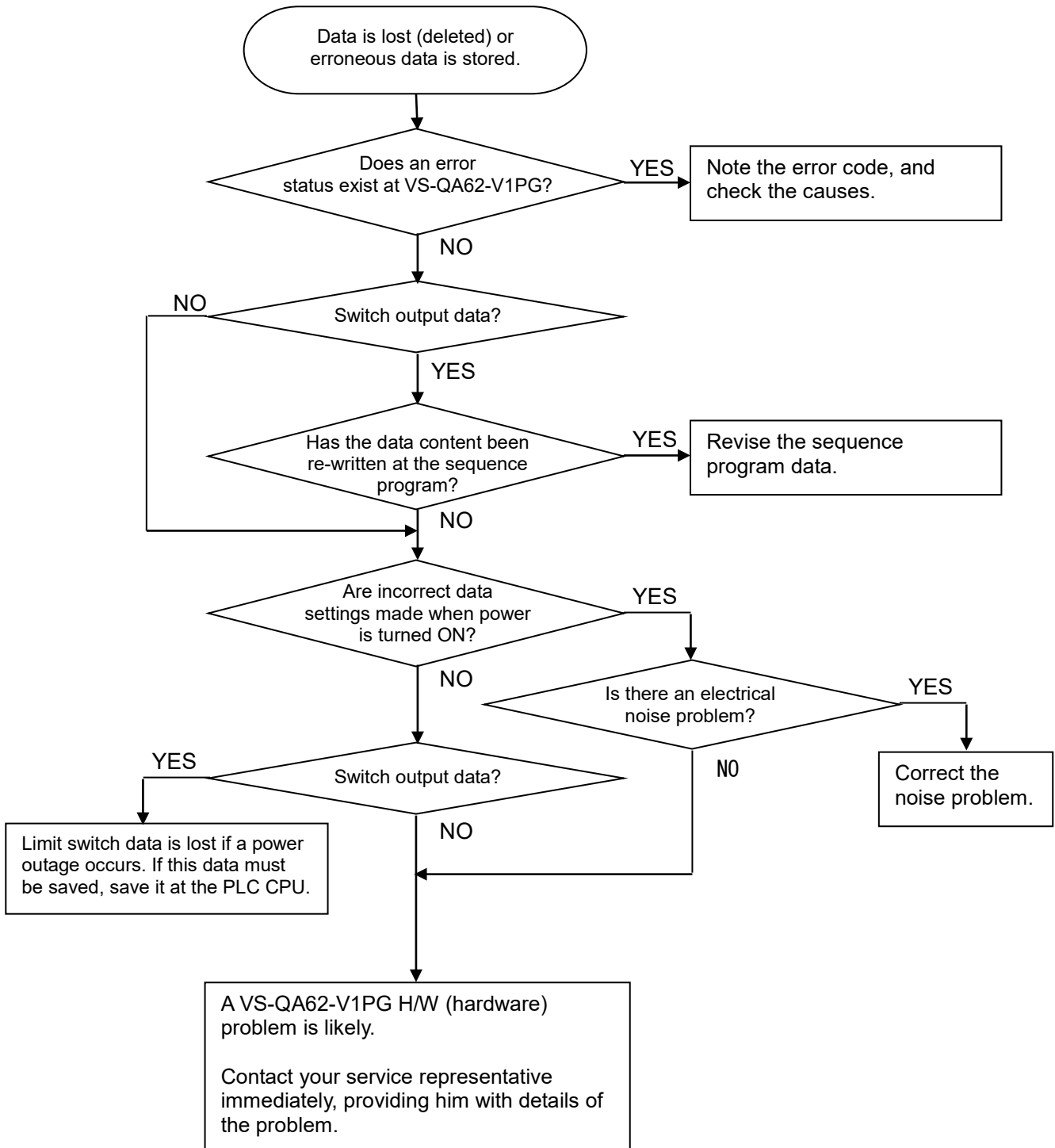
6.5 Flowchart when Current Position Setting is Impossible



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



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



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APPENDIX

APPENDIX 1 CE Marking

VS-QA62 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 20 ϕ	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: $\phi 9$)	TDK

APPENDIX 2 UL STANDARD

The VS-QA62 Series corresponds to the UL standard.
Read this page carefully and use the VS-QA62 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°C to 55°C.
- Built in to Q-series PLC by Mitsubishi Electric Co.

(2) Compliance power supply

- VS-QA62 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°C 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
<p data-bbox="199 349 1460 416">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.</p> <p data-bbox="199 450 1157 517">이 기기는 업무용 환경에서 사용할 목적으로 적합성평가를 받은 기기로서 가정용 환경에서 사용하는 경우 전파간섭의 우려가 있습니다.</p>

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APPENDIX 4 ABSOCODER SENSOR SPECIFICATIONS

Appendix 4.1 ABSOCODER Sensor for VS-QA62-V1PG

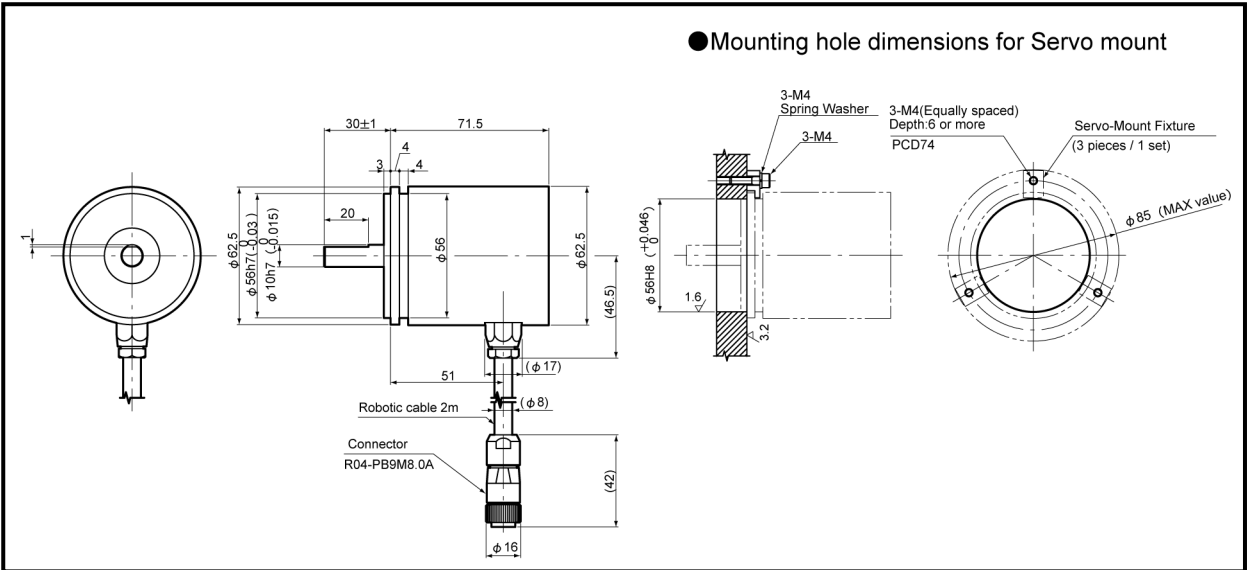
Appendix 4.1.1 Specifications

Item		Specifications	
Sensor model		VRE-P028	VRE-P062
Total number of turns		1	
Divisions		8192 (2 ¹³)	
Mass		0.25 kg	1.3 kg
Linearity error		1.5° Max.	1° Max.
Moment of inertia GD ² /4(J)		9.3 X 10 ⁻⁸ kg·m ² (9.5 X 10 ⁻⁷ kgf·cm·s ²)	6.4 X 10 ⁻⁶ kg·m ² (6.5 X 10 ⁻⁵ kgf·cm·s ²)
Starting torque		1.5 X 10 ⁻³ N·m or less (0.015 kgf·cm or less)	4.9 X 10 ⁻² N·m or less (0.5 kgf·cm or less)
Permissible shaft load	Radial	15N (1.5 kgf)	98N (10 kgf)
	Thrust	9.8N (1.0 kgf)	49N (5 kgf)
Permissible mechanical speed		6000 r/min	3600 r/min
Bearing life		8.0 X 10 ⁴ h (at 6000 r/min)	5.5 X 10 ⁴ h (at 3600 r/min)
Ambient temperature	Operating	-20 to +60°C	
	Storage	-30 to +90°C	
Vibration resistance		2.0 X 10 ² m/s ² (20G) 2000Hz, up/down 4 h, forward/back 2 h, conforms to JIS D 1601 standard	
Shock resistance		4.9 X 10 ³ m/s ² (500G) 0.5 ms, up/down/forward/back X 3 times each, conforms to JIS C 5026 standard	
Protection rating		IP40, conforms to JEM 1030 standard	IP52f, conforms to JEM 1030 standard
Max. sensor cable length	Standard cable	100 m (3P-S)	
	Robotic cable	100 m (3P-RBT)	
Interconnecting sensor cable		2 m	

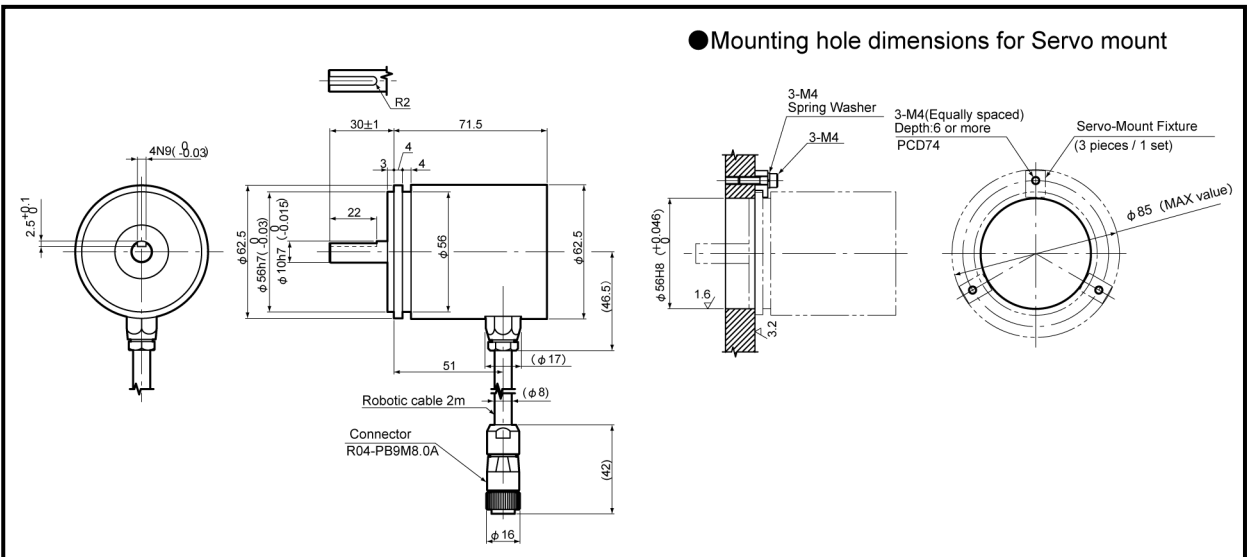
Appendix 4.1.2 ABSOCODER sensor dimensions

(1) VRE-P062SAC

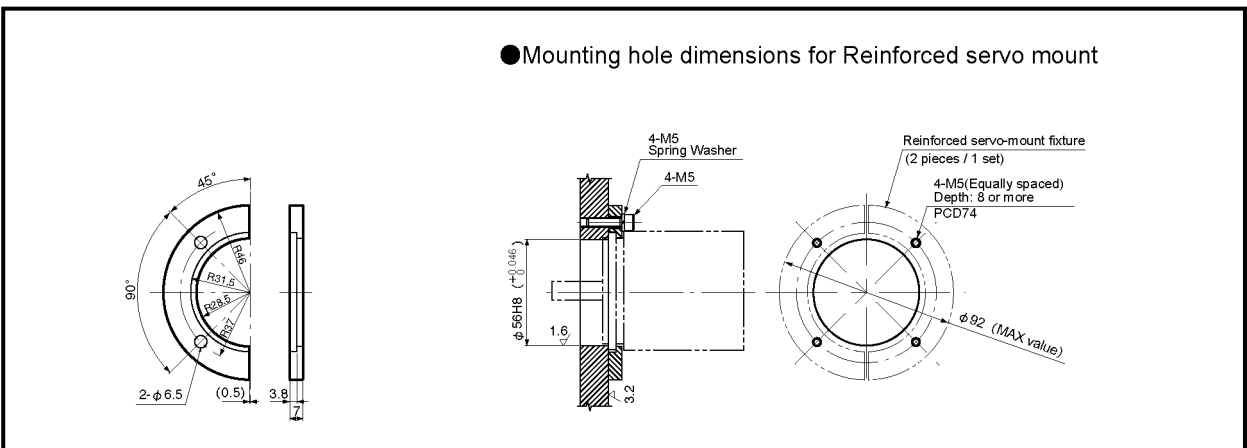
Units: mm



(2) VRE-P062SBC

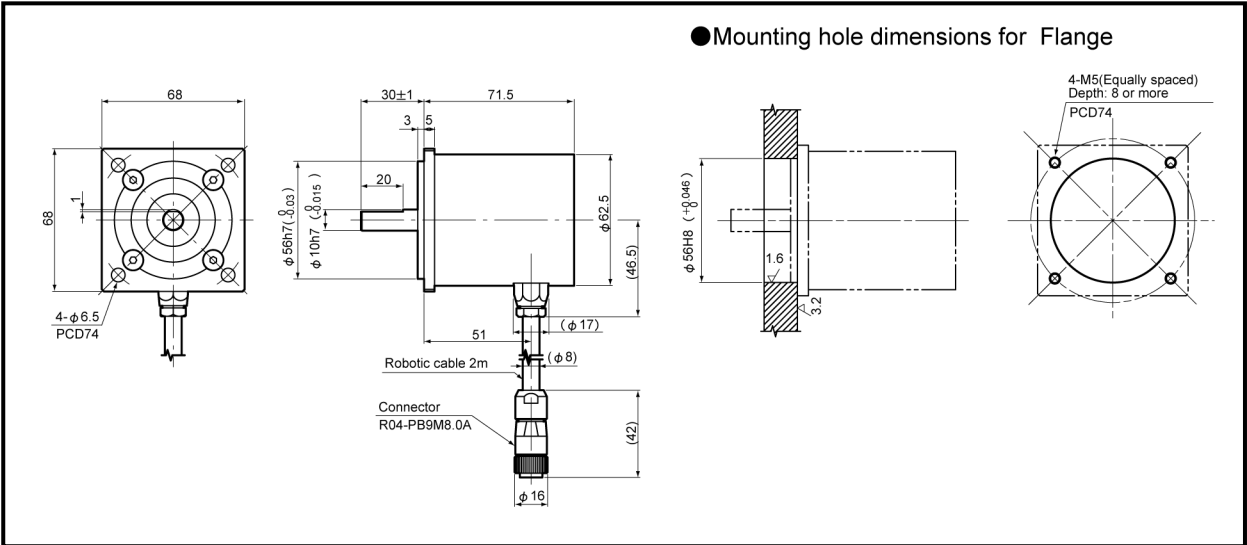


(3) SH-01 (Reinforced servo-mount fixture for VRE-P062SAC / SBC) Option (2 pieces / 1set)

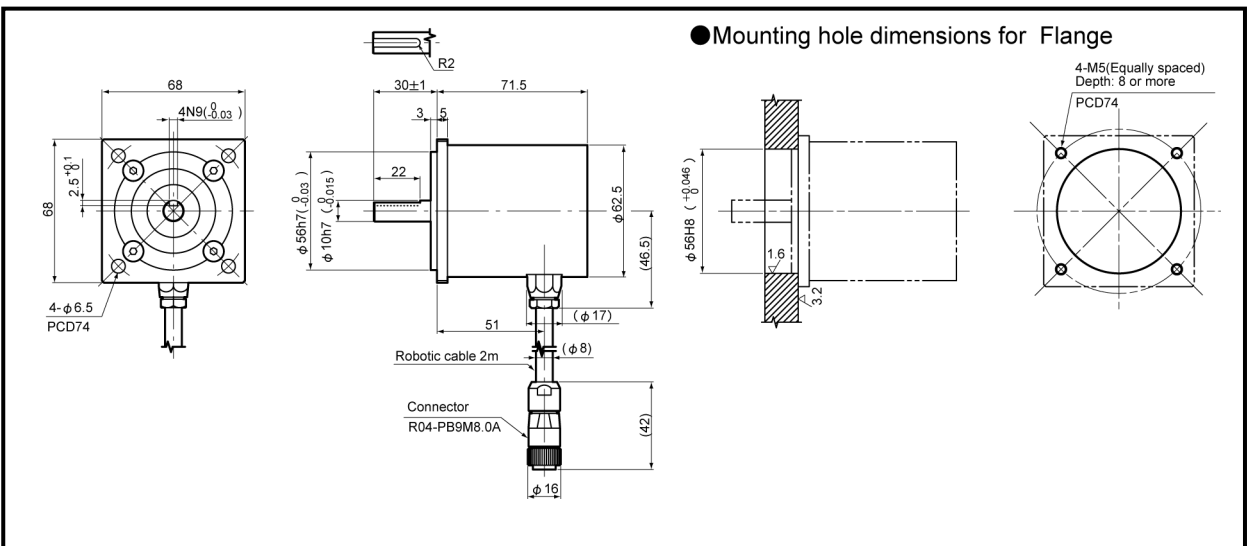


(4) VRE-P062FAC

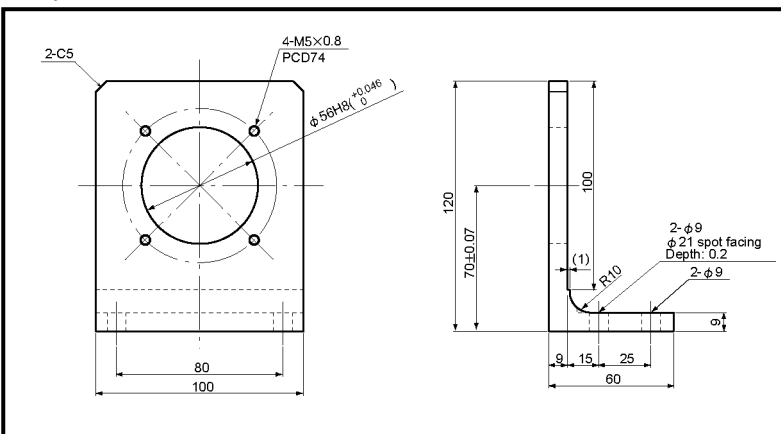
Units: mm



(5) VRE-P062FBC

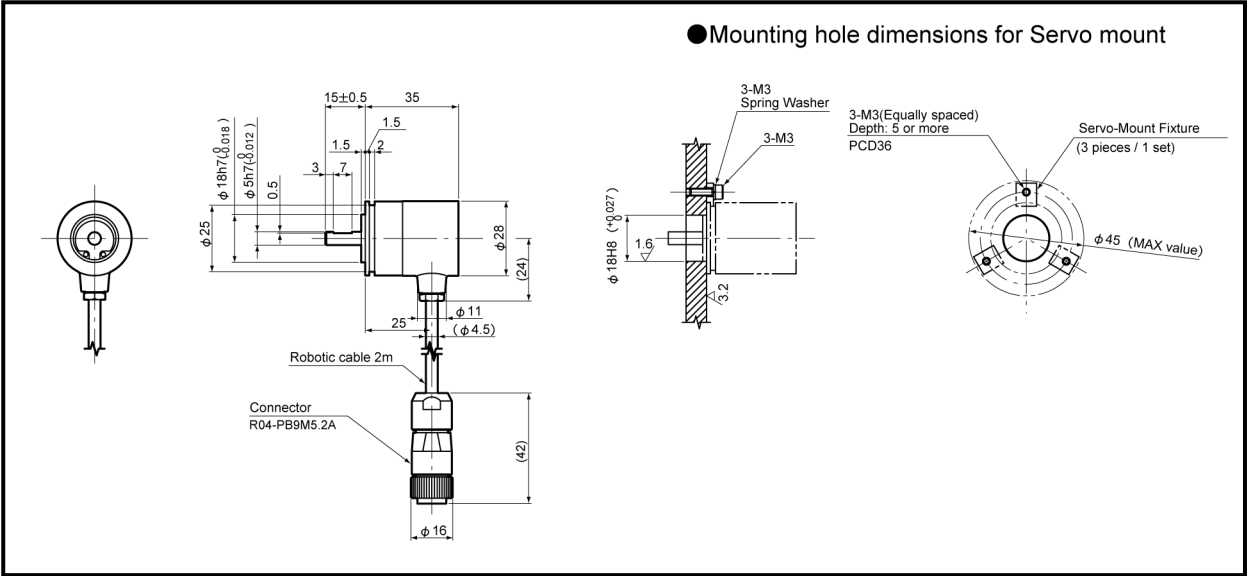


(6) RB-01 (L type flange-mount fixture)
Option



L type flange-mount fixture is for VRE-P062.
Following combinations are able to use with.

- VRE-P062SAC/SBC + SH-01
- VRE-P062FAC/FBC



Appendix 4.2 ABSOCODER Cable

VS-QA62-V1PG and ABSOCODER connector cable specifications are given below.

Appendix 4.2.1 Specifications

Items		Specifications	
Model code		3P-S	3P-RBT
Cable type		Standard cable	Robotic cable
Diameter		$\phi 8$	
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		6-core, 2 pairs without shield + 1 pair with shield	
Color of sheath		Gray	Black
Advantage		Extensible for long distances	Superior flexibility; ideal for moving place

Appendix 4.2.2 Cable length restrictions

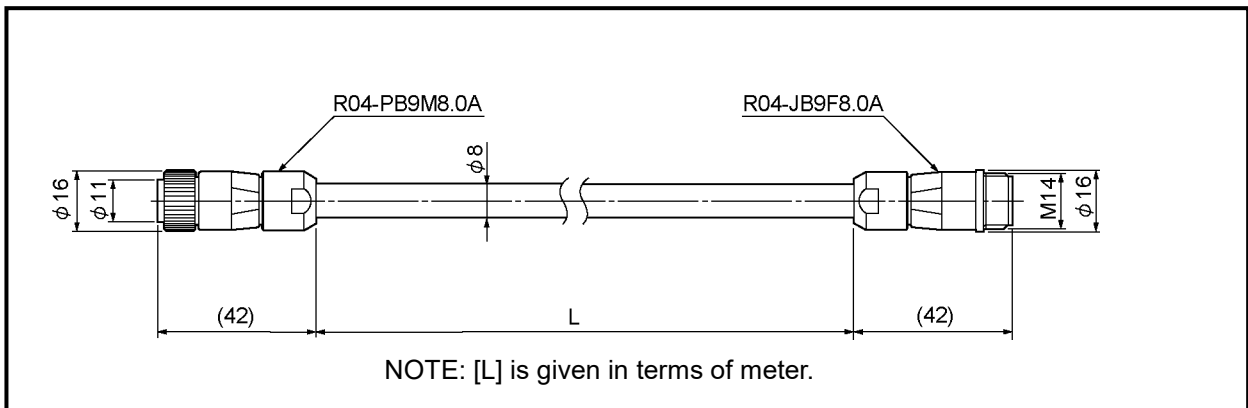
The permissible length of the extension cable varies according to the ABSOCODER sensor model, as shown in the following table.

Cable model / Sensor model	3P-S	3P-RBT
VRE-P062	100m	100m
VRE-P028	100m	100m

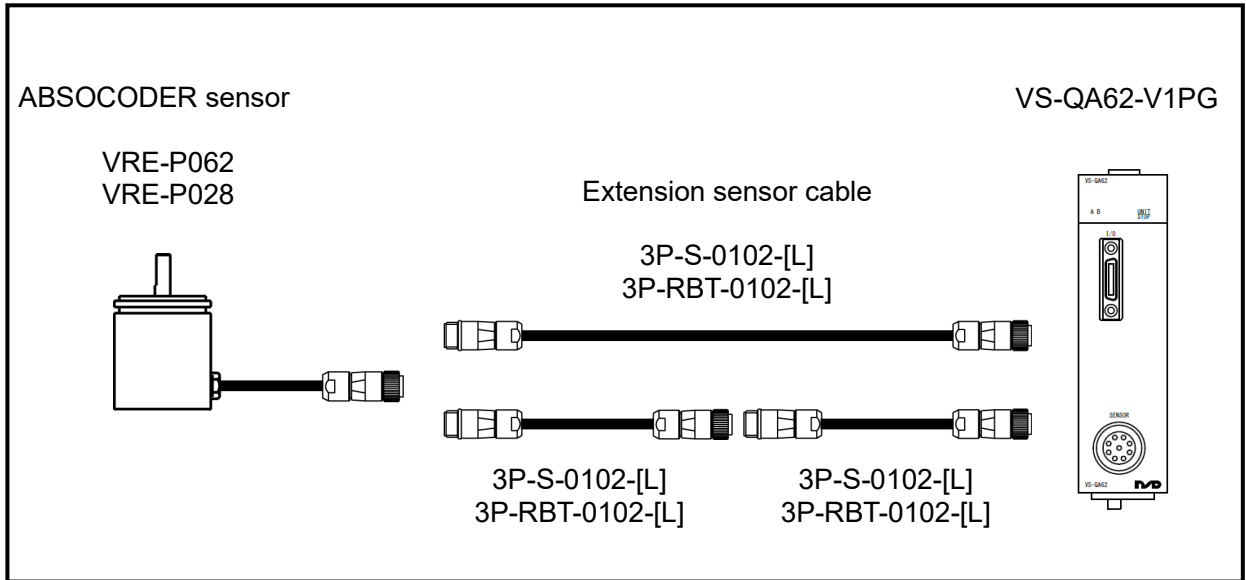
Appendix 4.2.3 ABSOCODER Cable Dimensions

(1) 3P-S-0102-[L] / 3P-RBT-0102-[L]

Units: mm



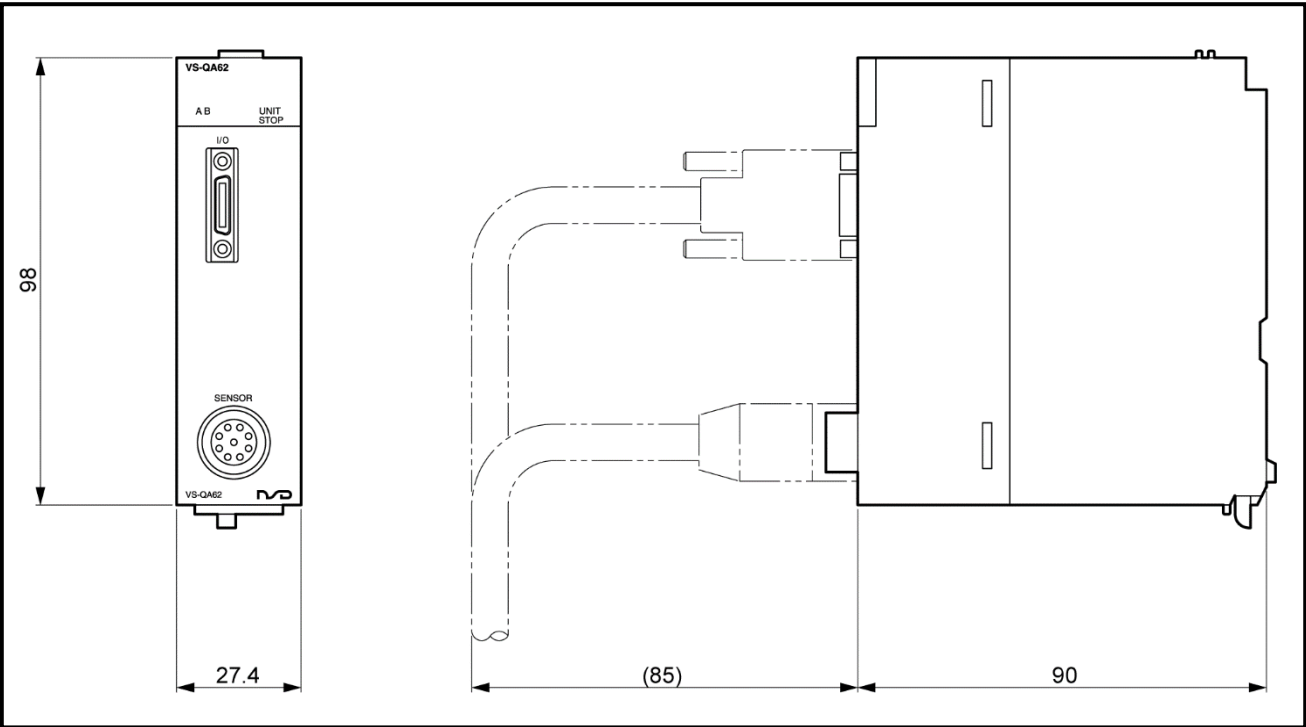
Appendix 4.2.4 ABSOCODER Cable Connection



APPENDIX 5 DIMENSIONS

Appendix 5.1 VS-QA62-V1PG Position Detection Module

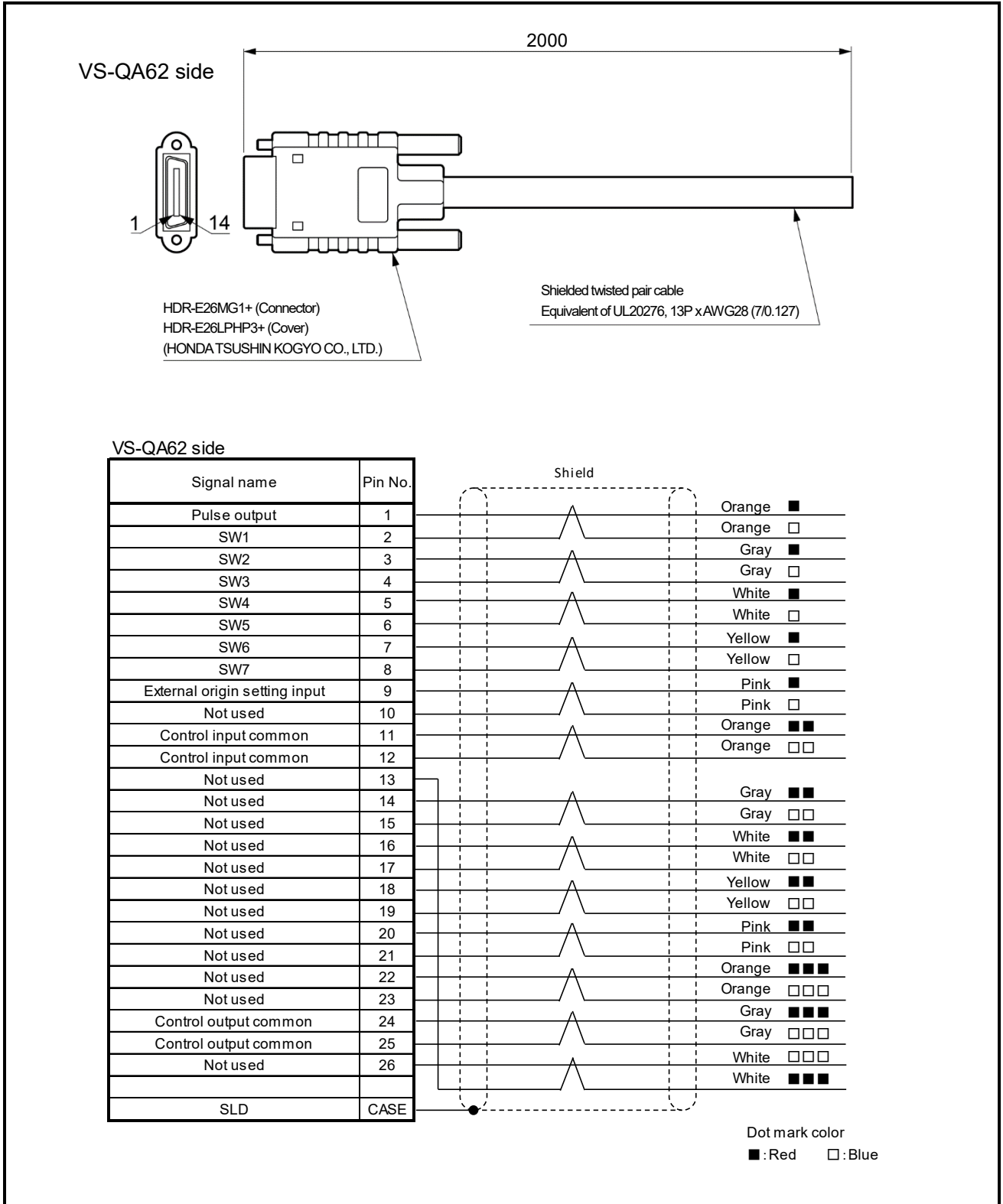
Units: mm



Appendix 5.2 External I/O Cable (VS-CQA62)

●VS-CQA62

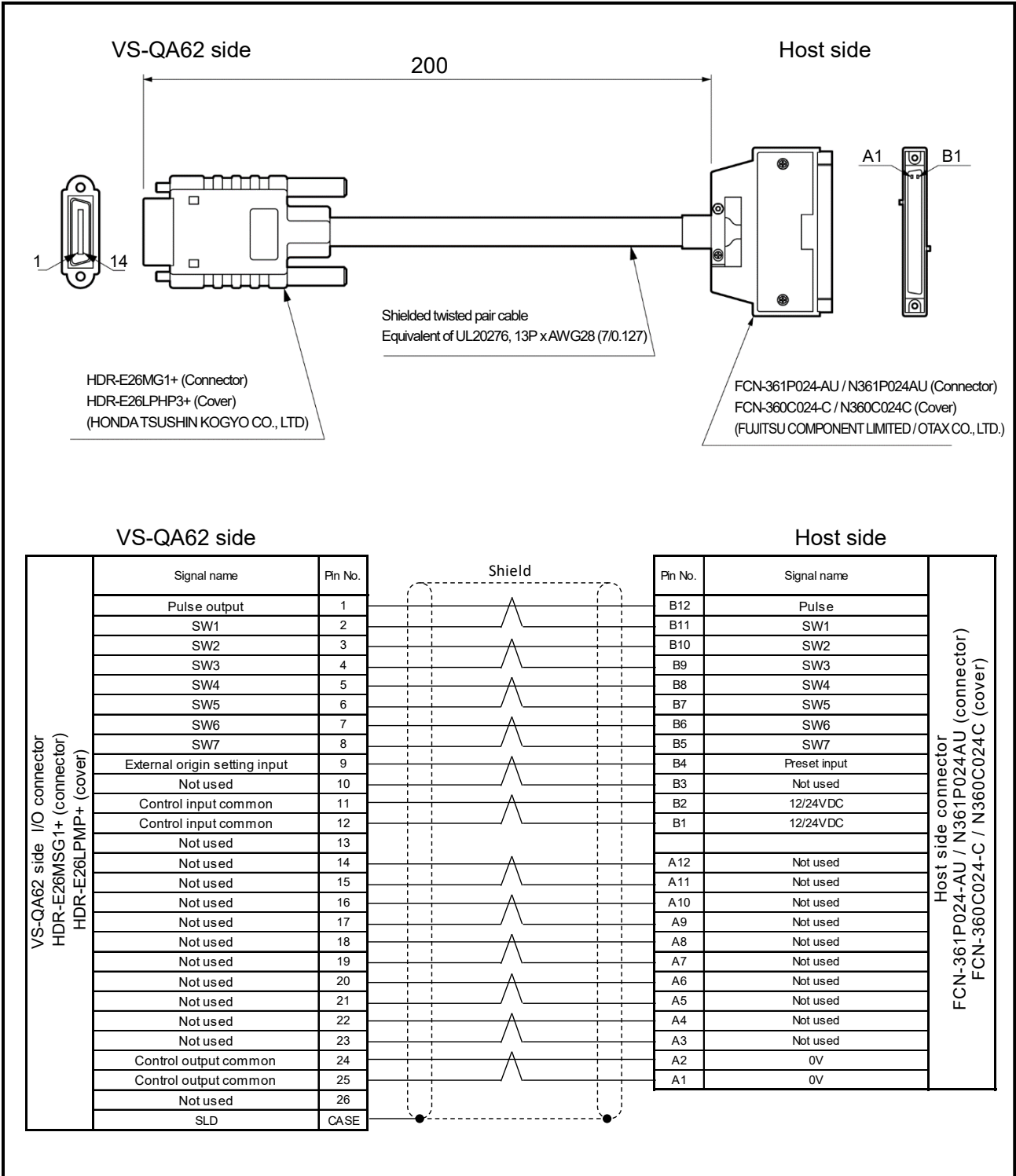
Units: mm



Appendix 5.3 Cable for the Upgrading (VS-CQA62-R01)

●VS-CQA62-R01

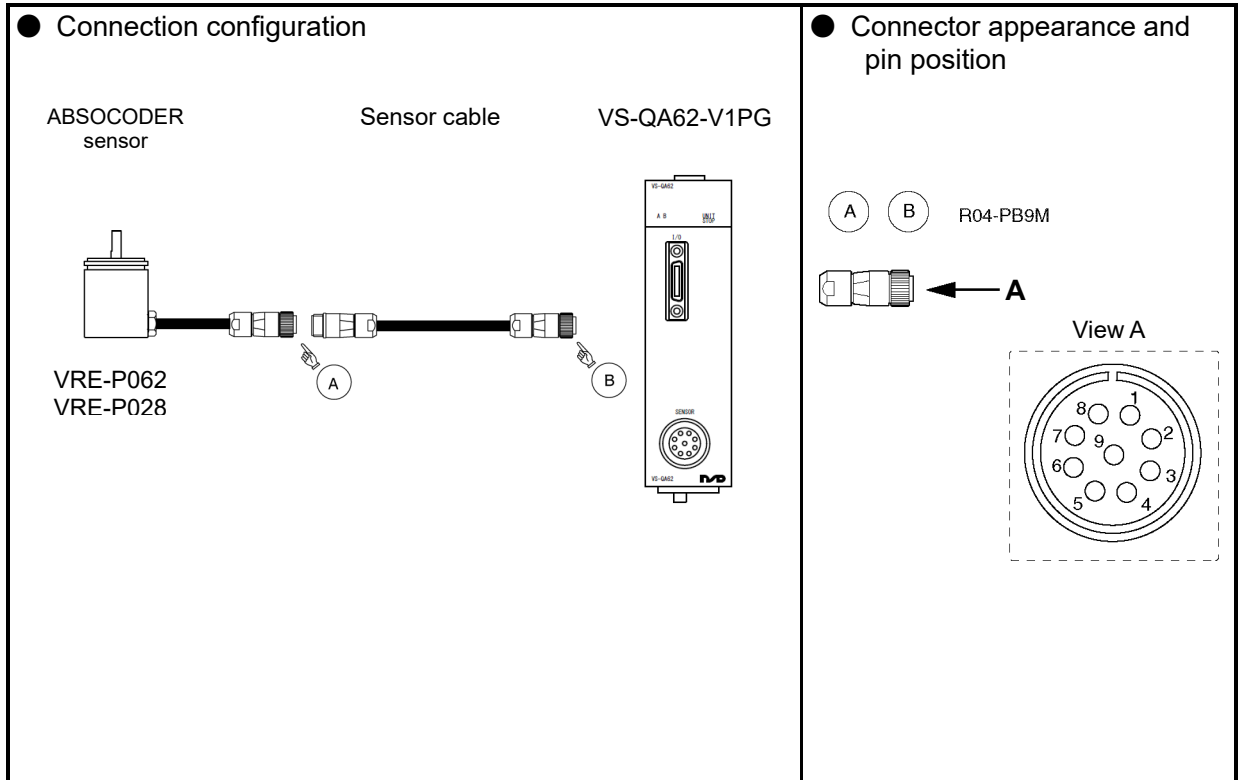
Units: mm



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APPENDIX 6. ABSOCODER Check List

- Applicable ABSOCODER models
VRE-P028
VRE-P062



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

- Connector pin position and standard coil resistance ranges (at 25°C)

Connector pin No.	Signal name	Wiring color	Standard coil resistance [Ω]	
			VRE-P028	VRE-P062
1	SIN+	Brown	14.5 to 20.5	3 to 5
2	SIN-	Red		
3	-COS+	Orange	14.5 to 20.5	3 to 5
4	-COS-	Yellow		
5	OUT1+	Green	28.5 to 40.5	5 to 9
6	OUT1-	Blue		
7	—	—	—	—
8	—	—	—	—
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.
If 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, shield	∞
Between orange and yellow		Between orange and green, shield	
Between green and blue		Between green and shield	
		Between frame and each wire	

*1: If checks are done at Point B, the measurement value is [Standard coil resistance + extension sensor cable resistance (cable length (m) x 0.2 (Ω))].
The resistance value of the NSD special 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, shield	10MΩ or more
Between orange and green, shield	
Between green and shield	
Between frame and each wire	

 NOTES
<ol style="list-style-type: none"> 1. Make sure to disconnect the ABSOCODER sensor from VS-QA62 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-QA62.

APPENDIX 7 I/O SIGNALS and BUFFER MEMORY FUNCTION LIST

○: Input/output enabled
 ×: Input/output disabled

Signal type	VS-QA62 (online/offline)		Online	Offline	Remarks
	Signal No.	Address, Pin No., & Name			
Signal inputs to PLC CPU	X0	Unit ready [VS-QA62 detection]	○	○	
	X1	VS-QA62 operation status (online/offline)	ON	OFF	
	X4	'Sensor error' detection	○	○	
	X7	Error detection	○	○	
Signal outputs from PLC CPU	Y10	'PLC ready' signal	ON	OFF	
	Y16	Error reset	○	○	
Buffer memory	0, 1	'Current position value' storage area	○	○	
	7	'Error code' storage area	○	○	
	10 to 17	'Switch output status' storage area	○	○	
	18	Rotation direction change request' storage area	○	○	
	19	'Sensor rotation direction' storage area	○	○	
	20	'Current position value change request' storage area	○	○	
	21	'Current position setting value' storage area	○	○	
	22 to 277	'Switch output ON/OFF setting value' storage area	○	○	
	278	'Number of pulses storage' area	○	○	
External inputs	Pin No. 9	External origin setting signal	○	×	
External output	Pin No. 2 to 8	Switch output SW 1 to 7	○	○	
	Pin No. 1	Pulse output	○	○	

APPENDIX 8 DATA SHEET

Appendix 8.1 Initial Setting

Address	Item	Default Value	Setting Value
19	Sensor rotation direction (0: CW / 1: CCW)	0	
21	Current position setting value Setting range: 0 to 3599	0	
278	Pulse output Setting range: 1 to 100	100	

Appendix 8.2 Switch Output

Switch No.	Switch name	Address		Setting value
1		22	ON	
		23	OFF	
2		24	ON	
		25	OFF	
3		26	ON	
		27	OFF	
4		28	ON	
		29	OFF	
5		30	ON	
		31	OFF	
6		32	ON	
		33	OFF	
7		34	ON	
		35	OFF	
8		36	ON	
		37	OFF	
9		38	ON	
		39	OFF	
10		40	ON	
		41	OFF	
11		42	ON	
		43	OFF	
12		44	ON	
		45	OFF	
13		46	ON	
		47	OFF	
14		48	ON	
		49	OFF	
15		50	ON	
		51	OFF	
16		52	ON	
		53	OFF	
17		54	ON	
		55	OFF	
18		56	ON	
		57	OFF	
19		58	ON	
		59	OFF	
20		60	ON	
		61	OFF	
21		62	ON	
		63	OFF	
22		64	ON	
		65	OFF	
23		66	ON	
		67	OFF	
24		68	ON	
		69	OFF	
25		70	ON	
		71	OFF	
26		72	ON	
		73	OFF	

Switch No.	Switch name	Address		Setting value
27		74	ON	
		75	OFF	
28		76	ON	
		77	OFF	
29		78	ON	
		79	OFF	
30		80	ON	
		81	OFF	
31		82	ON	
		83	OFF	
32		84	ON	
		85	OFF	
33		86	ON	
		87	OFF	
34		88	ON	
		89	OFF	
35		90	ON	
		91	OFF	
36		92	ON	
		93	OFF	
37		94	ON	
		95	OFF	
38		96	ON	
		97	OFF	
39		98	ON	
		99	OFF	
40		100	ON	
		101	OFF	
41		102	ON	
		103	OFF	
42		104	ON	
		105	OFF	
43		106	ON	
		107	OFF	
44		108	ON	
		109	OFF	
45		110	ON	
		111	OFF	
46		112	ON	
		113	OFF	
47		114	ON	
		115	OFF	
48		116	ON	
		117	OFF	
49		118	ON	
		119	OFF	
50		120	ON	
		121	OFF	
51		122	ON	
		123	OFF	
52		124	ON	
		125	OFF	

Switch No.	Switch name	Address		Setting value
53		126	ON	
		127	OFF	
54		128	ON	
		129	OFF	
55		130	ON	
		131	OFF	
56		132	ON	
		133	OFF	
57		134	ON	
		135	OFF	
58		136	ON	
		137	OFF	
59		138	ON	
		139	OFF	
60		140	ON	
		141	OFF	
61		142	ON	
		143	OFF	
62		144	ON	
		145	OFF	
63		146	ON	
		147	OFF	
64		148	ON	
		149	OFF	
65		150	ON	
		151	OFF	
66		152	ON	
		153	OFF	
67		154	ON	
		155	OFF	
68		156	ON	
		157	OFF	
69		158	ON	
		159	OFF	
70		160	ON	
		161	OFF	
71		162	ON	
		163	OFF	
72		164	ON	
		165	OFF	
73		166	ON	
		167	OFF	
74		168	ON	
		169	OFF	
75		170	ON	
		171	OFF	
76		172	ON	
		173	OFF	
77		174	ON	
		175	OFF	
78		176	ON	
		177	OFF	

Switch No.	Switch name	Address		Setting value
79		178	ON	
		179	OFF	
80		180	ON	
		181	OFF	
81		182	ON	
		183	OFF	
82		184	ON	
		185	OFF	
83		186	ON	
		187	OFF	
84		188	ON	
		189	OFF	
85		190	ON	
		191	OFF	
86		192	ON	
		193	OFF	
87		194	ON	
		195	OFF	
88		196	ON	
		197	OFF	
89		198	ON	
		199	OFF	
90		200	ON	
		201	OFF	
91		202	ON	
		203	OFF	
92		204	ON	
		205	OFF	
93		206	ON	
		207	OFF	
94		208	ON	
		209	OFF	
95		210	ON	
		211	OFF	
96		212	ON	
		213	OFF	
97		214	ON	
		215	OFF	
98		216	ON	
		217	OFF	
99		218	ON	
		219	OFF	
100		220	ON	
		221	OFF	
101		222	ON	
		223	OFF	
102		224	ON	
		225	OFF	
103		226	ON	
		227	OFF	
104		228	ON	
		229	OFF	

Switch No.	Switch name	Address		Setting value
105		230	ON	
		231	OFF	
106		232	ON	
		233	OFF	
107		234	ON	
		235	OFF	
108		236	ON	
		237	OFF	
109		238	ON	
		239	OFF	
110		240	ON	
		241	OFF	
111		242	ON	
		243	OFF	
112		244	ON	
		245	OFF	
113		246	ON	
		247	OFF	
114		248	ON	
		249	OFF	
115		250	ON	
		251	OFF	
116		252	ON	
		253	OFF	
117		254	ON	
		255	OFF	
118		256	ON	
		257	OFF	
119		258	ON	
		259	OFF	
120		260	ON	
		261	OFF	
121		262	ON	
		263	OFF	
122		264	ON	
		265	OFF	
123		266	ON	
		267	OFF	
124		268	ON	
		269	OFF	
125		270	ON	
		271	OFF	
126		272	ON	
		273	OFF	
127		274	ON	
		275	OFF	
128		276	ON	
		277	OFF	



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