



**VARILIMIT<sup>®</sup>**

Electronic limit Switch

**VS-12PB**

**SPECIFICATIONS  
&  
OPERATION MANUAL**



# GENERAL SAFETY RULES



(Please read this safety guide carefully before operation)

Thank you very much for purchasing our product. Before operating this product, be sure to carefully read this manual so that you may fully understand the product, safety instructions and precautions.

- Please submit this manual to the operators actually involved in operation.
- Please keep this manual in a handy place.



## Signal Words

Safety precautions in this guide are classified into DANGER and CAUTION.

Symbol	Meaning
 DANGER	Incorrect handling may cause a hazardous situation that will result in death or serious injury.
 CAUTION	Incorrect handling may cause a hazardous situation that will result in moderate injury or physical damage.

Instructions accompanied by a symbol  may also result in serious damage or injury. Be sure to follow the all instructions accompanied by the symbol.

## Graphic Symbols







Symbol	Meaning
	Indicates prohibited items.
	Indicates items that must be performed to.




## 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.

## 1. Handling Precautions



 DANGER	
	- Do not touch components inside of the controller; otherwise, it will cause electric shock.
	- Do not damage the cable by applying excessive load, placing heavy objects on it, or clamping; otherwise, it will cause electric shock or fire.
	- Turn the power supply OFF before wiring, transporting, and inspecting the controller; otherwise, it may cause electric shock.
	- Provide an external safety circuit so that the entire system functions safely even when the controller is faulty.
	- Connect the grounding terminal of the controller; otherwise, it may cause electric shock or malfunction.

 CAUTION	
	- Do not use the controller in the following places; water splashes, the atmosphere of the corrosion, the atmosphere of the flammable vapor, and the side of the combustibility. Doing so may result in fire or the controller may become faulty.
	- Be sure to use the controller and the ABSOCODER sensor in the environment designated by the general specifications in the manual. Failure to do so may result in electric shock, fire, malfunction or unit failure. - Be sure to use the specified combination of the ABSOCODER sensor, controller and sensor cable; otherwise, it may cause fire or controller malfunction.




## 2. Storage

 CAUTION	
	- Do not store the controller in a place exposed to water, or toxic gas and liquid.
	- Be sure to store the controller in designed temperature and humidity range, and do not exposed to direct sunlight. - Be sure to consult with NSD when the controller is stored for long periods.



## 3. Transport



 CAUTION	
	- Do not hold the cable or shaft of ABSOCODER sensor during transport; otherwise, it will cause injury or controller malfunction.

## 4. Installation




 CAUTION	
	- Do not step on the ABSOCODER sensor or place heavy objects on the controller; otherwise, it will cause injury. - Do not block the exhaust port or allow any foreign matter to enter the controller; otherwise, it will cause fire or unit failure.
	- Be sure to secure the controller and ABSOCODER sensor with the provided brackets; otherwise, it may cause malfunction, injury, or drop. - Be sure to secure the specified distance between the main body and the control panel or other equipments; otherwise, it may cause malfunction.

## 5. Wiring




 DANGER	
	- Be sure to secure the terminal block firmly; otherwise, it may have risk of fire. - Be sure to mount the terminal cover provided with the controller, before supplying the power, starting operation after the installation, and wiring; otherwise, it may cause electric shock.

 CAUTION	
	- Be sure to keep the sensor cable, control cable, and communication cable at least 300 mm away from the main circuit and power line; otherwise it may cause injury or malfunction. - Be sure to connect all cables correctly; otherwise, it may cause injury or controller malfunction. - Be sure to firmly connect the external I/O connectors and sensor connectors; otherwise, it may cause incorrect inputs and outputs or injury.



## 6. Operation

 CAUTION	
	- Do not change the controller's function switch settings during the operation; otherwise, it will cause injury. - Do not approach the machine after instantaneous power failure has been recovered. Doing so may result in injury if the machine starts abruptly, it will cause injury.
	- Be sure to check that the power supply specifications are correct; otherwise, it may caused controller failure. - Be sure to provide an external emergency stop circuit so that operation can be stopped with power supply terminated immediately. - Be sure to conduct independent trial runs for the controller before mounting the controller to the machine; otherwise, it may cause injury. - When an error occur, be sure to eliminate the cause, ensure safety, and reset the error before restarting operation; otherwise, it may cause injury.

## 7. Maintenance And Inspection

 CAUTION	
	- Do not disassemble, remodel, or repair the unit; otherwise, it will cause electric shock, fire, and unit malfunction.
	- The capacitor of the power line deteriorates through prolonged use. We recommended that the capacitor be replaced every five years to prevent secondary damage.

## 8. Disposal

 CAUTION	
	- Be sure to handle the controller as industrial waste while disposing of it.

# REVISION HISTORY

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

Document No.	Date	Revision Description
NSP-Z0006-2	27, May, 2016	2nd Edition Japanese document: NSP-99024-3
NSP-Z0006-3	12, Jul., 2019	3rd Edition Japanese document: NSP-99024-4
NSP-Z0006-4	18, Oct., 2021	4th Edition Japanese document: NSP-99024-5

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# INTRODUCTORY SECTION

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1. General
2. System Configuration
3. Functions

# 1. General

The VARILIMIT VS-12PB is a positioning Controller unit which is used together with NSD's unique ABSOCODER sensor to achieve high-precision positioning control.

Applications: Transport systems, press machines, assemble equipment, and packaging equipment, etc.

## 1-1. Features

Some of the main VS-12PB features are described below.

### (1) Absolute Position Detection

Rotational or linear positions are monitored by absolute position detection format. Even when a power outage, etc., occurs, the correct address of the ABSOCODER sensor's current position will be instantly detected when power is restored.

### (2) Limit Switch Function

Limit switch outputs are possible at up to 8 points as positioning is executed toward the target position.

### (3) Learning Function Enable Highly Accurate Positioning

When a discrepancy exists between the target position and the actual STOP position after a positioning operation, the Learning function will automatically make the necessary calculations to eliminate this discrepancy at the next positioning operation.

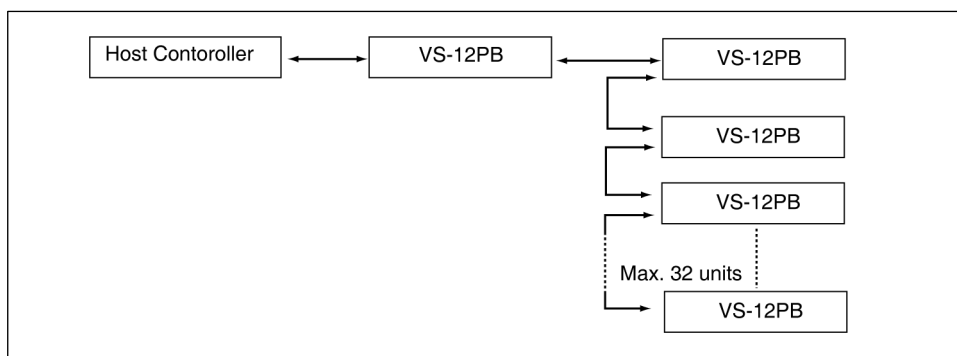
Furthermore, if a positioning operation ends without entering the "In-Position" zone, the positioning operation will automatically be executed again.

### (4) Self-Diagnosis Function

This function detects severed / disconnected sensor cables, checks the control outputs, and monitors the braking count.

### (5) Communication With Host Controller

Setting data can be down-loaded from and up-loaded to a Host Controller. Moreover, up to 32 VS-12PB units can be controlled by a single Host Controller.



### (6) Fine Positioning (Inching Function)

Extremely fine, slow-speed positioning control is enabled by short-period On/OFF switching of the positioning signals.

### (7) Unidirectional Positioning Function

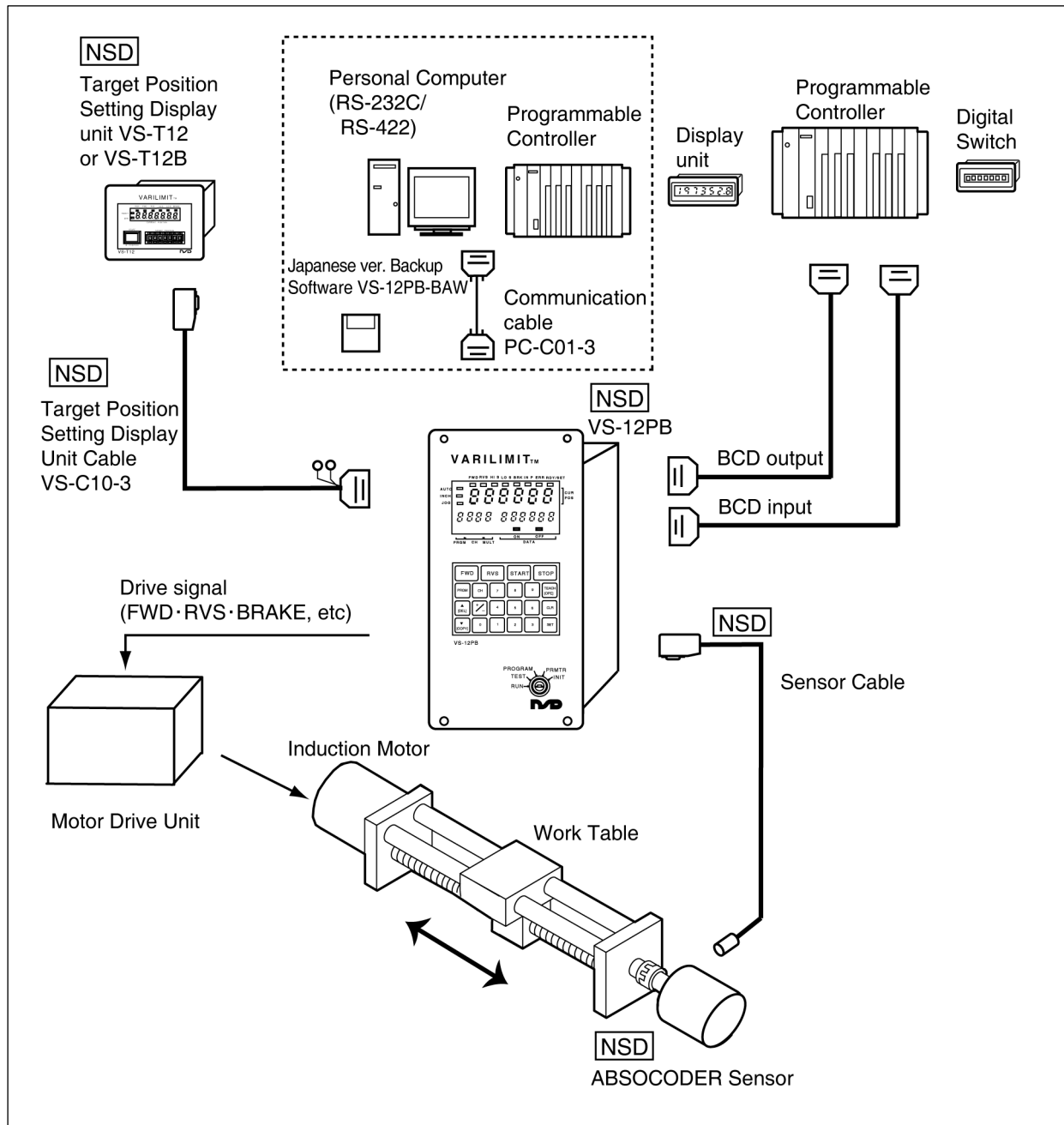
Unidirectional positioning minimizes positioning errors caused by backlash.

## 2. System Configuration

### 2-1. System configuration

This basic VS-12PB system configuration is shown below.

#### ● Basic System Configuration



NSD components are indicated by NSD mark. All other components must be supplied by the user.

#### Note

When the VS-T12 or VS-T12B setting display unit is used, settings cannot be specified by communications with a personal computer or programmable controller because the VS-T12 or VS-T12B uses the controller's communication port.

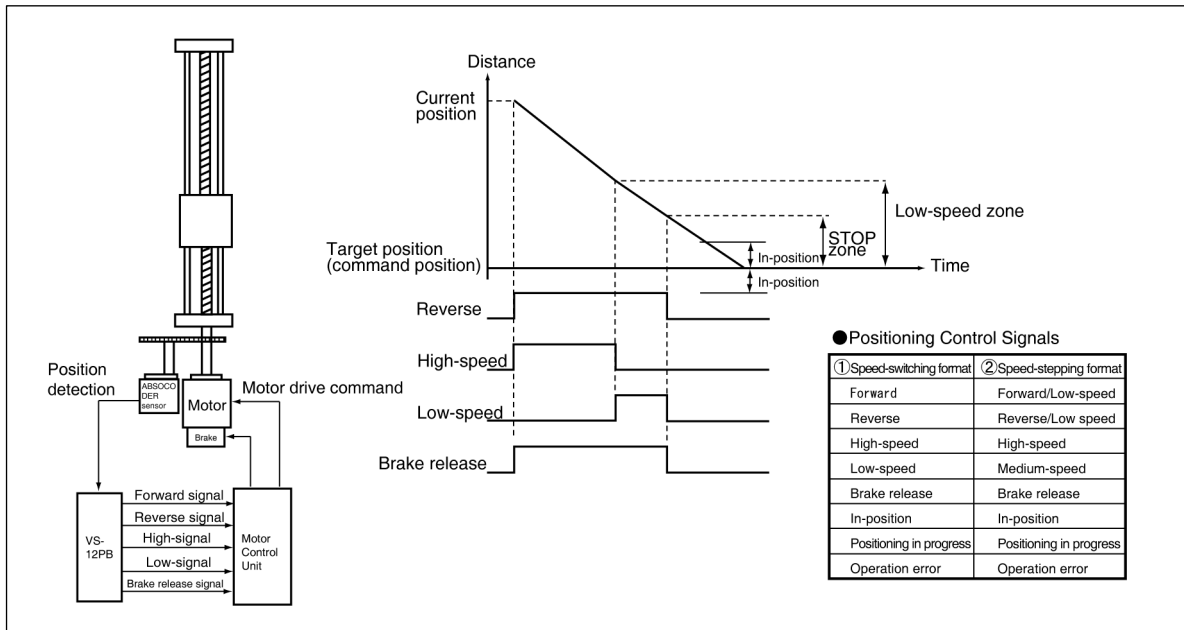
# 3. Functions

## 3-1. Position Setting Function

### 3-1-1. Automatic Positioning Function (AUTO)

The ABSOCODER sensor detects the machine's current position, and this position is compared with the target position. The motor control signals are then output according to this comparison.

● Example of Automatic Positioning Control

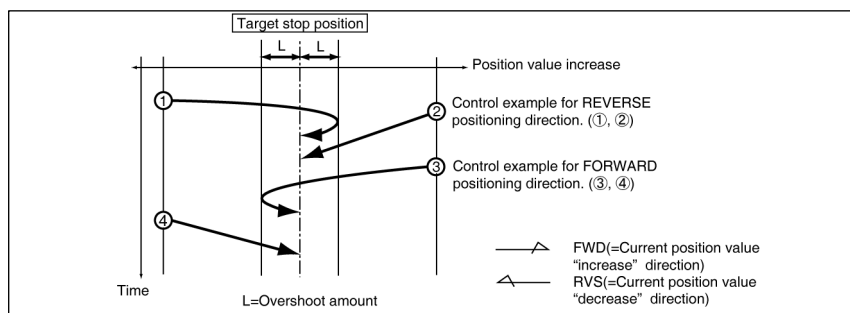


### 3-1-2. Unidirectional Positioning

A unidirectional format is used for VS-12PB positioning in order to minimize positioning errors caused by gear backlash, etc.

To execute positioning from the opposite direction, the target stop position must be overshoot first, with positioning then occurring from the prescribed direction after making a U-turn.

The VS-12PB 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 parameter-designated positioning direction (parameter No.42 : FWD or RVS). Direction designated by the parameter setting.



Note:

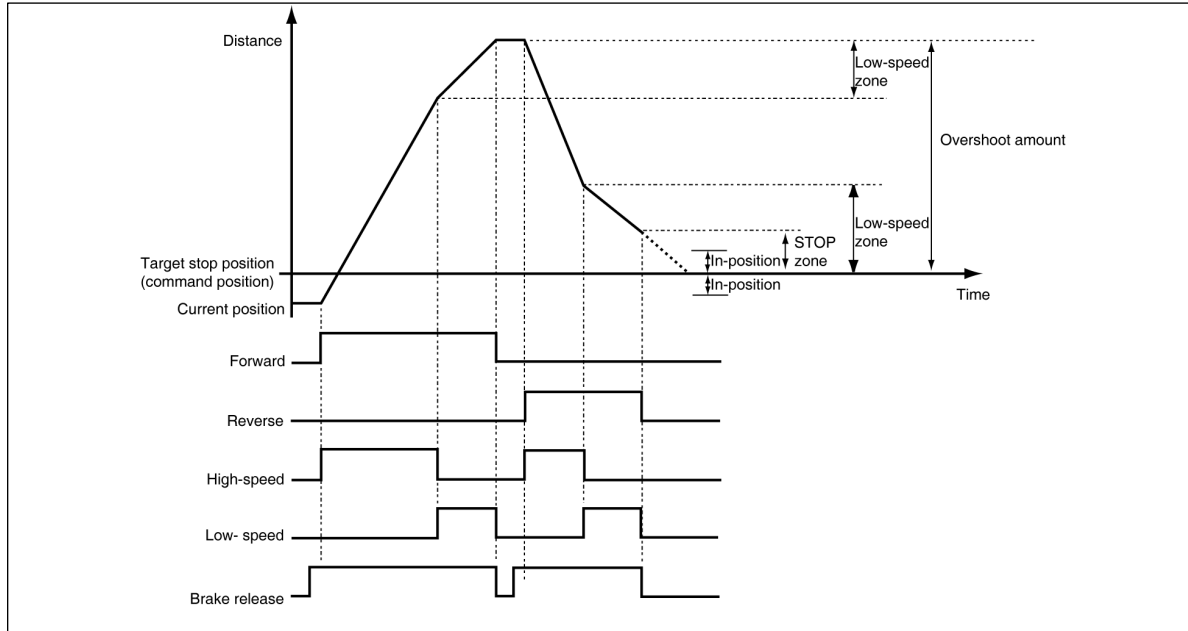
The overshoot amount is designated by a parameter setting.

If designated as "0", bidirectional positioning (no overshooting) will occur.

### 3-1-3. Speed-Switching Format

With the Speed-Switching format, the speed switching signals (high-speed and low-speed) operate independently, with the high-speed signal being ON during high-speed operation, and low-speed signal being ON during low-speed operation.

#### ●Control Timing (For U-Turn Positioning)

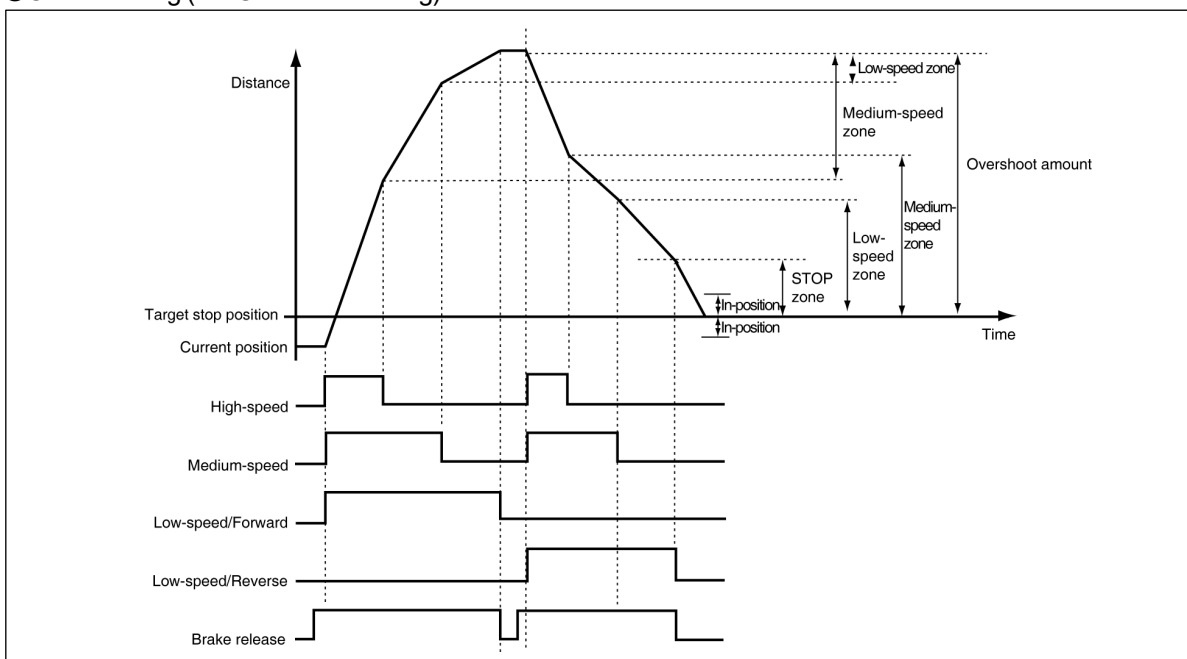


### 3-1-4. Speed-Stepping Format

With the Speed-stepping format, the high-speed, medium-speed, and low-speed signals do not operate independently.

Instead, they are combined to produce a stepped speed switching output.

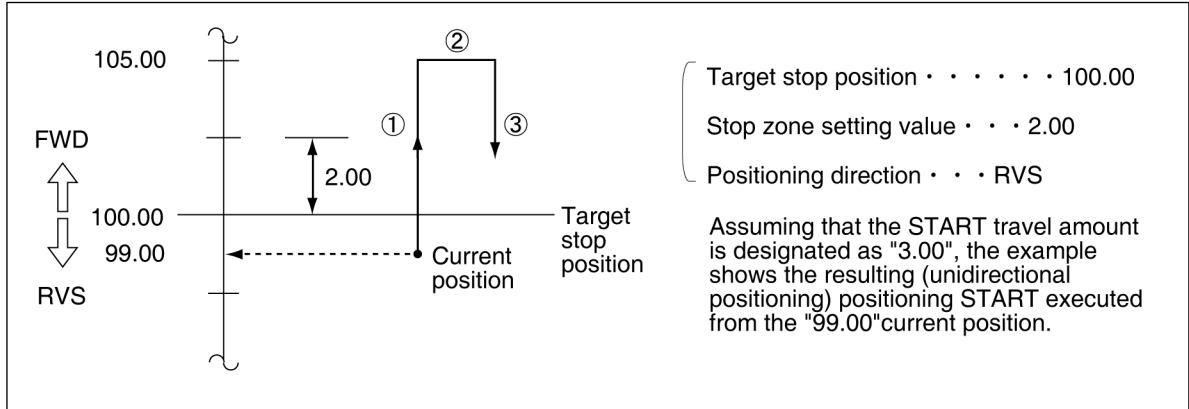
#### ●Control Timing (For U-Turn Positioning)



### 3-1-5. Starting Operation From Inside STOP Zone

When the STOP zone is entered, the motor control signals for the positioning operation are switched OFF, and the brake is applied. With the VS-12PB unit, it is possible to start operation from inside the STOP zone if so designated at parameter No.48.

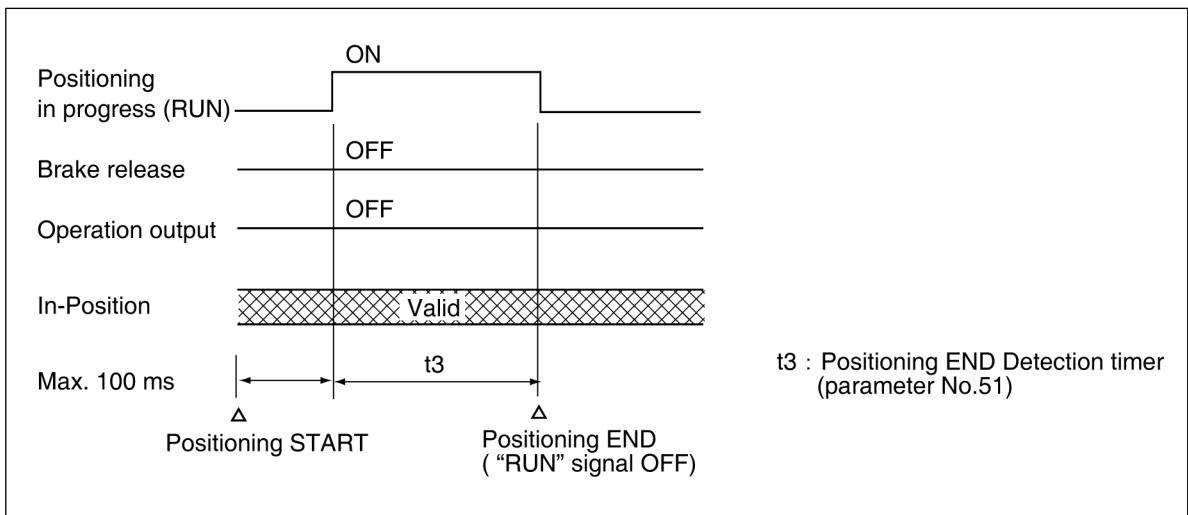
The procedure for starting operation from inside the STOP zone is as shown below.



- ① Move the current position in the opposite direction from the parameter-designated positioning direction, by the amount of the [ stop zone] + [START travel amount].
- ② Stop movement at that position.
- ③ Execute the positioning operation again for the target stop position in question.

**Note**

1. For bidirectional positioning, a directional determination (FORWARD or REVERSE) is required at step ① above, depending on the current position when the START occurs.
2. Operation will occur as shown below if the parameter No.48 setting is designated as "0" (Start From STOP Zone Disabled).

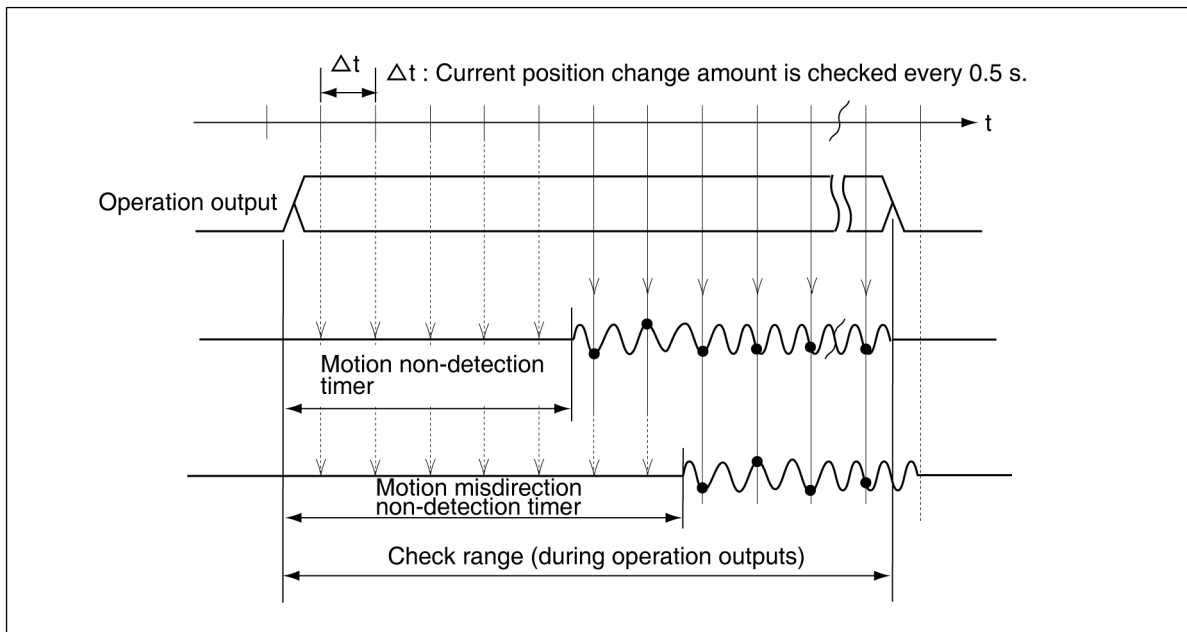


### 3-1-6. Timer Settings

#### (Motion Non-Detection Timer & Motion Misdirection Non-Detection Timer)

The “motion non-detection timer” setting designates the period from the point when positioning begins, until the point when the motion error function begins. Motion errors are determined by a monitoring function which checks the amount of change in the current position value every 0.5 s.

The “motion misdirection non-detection timer” setting designates the period from the point when positioning begins, until the point when the motion direction error detection function begins. Motion direction errors occur when motion direction is opposite from the command direction. The motion direction is checked every 0.5 s. The operation timing for these timers is as shown below.



The timer periods are designated by parameter settings.

### 3-1-7. Learning Function

When positioning is completed, the Learning function checks the discrepancy between the target stop position and the actual stop position. It then automatically adjusts the STOP zone for the next operation based on the discrepancy.

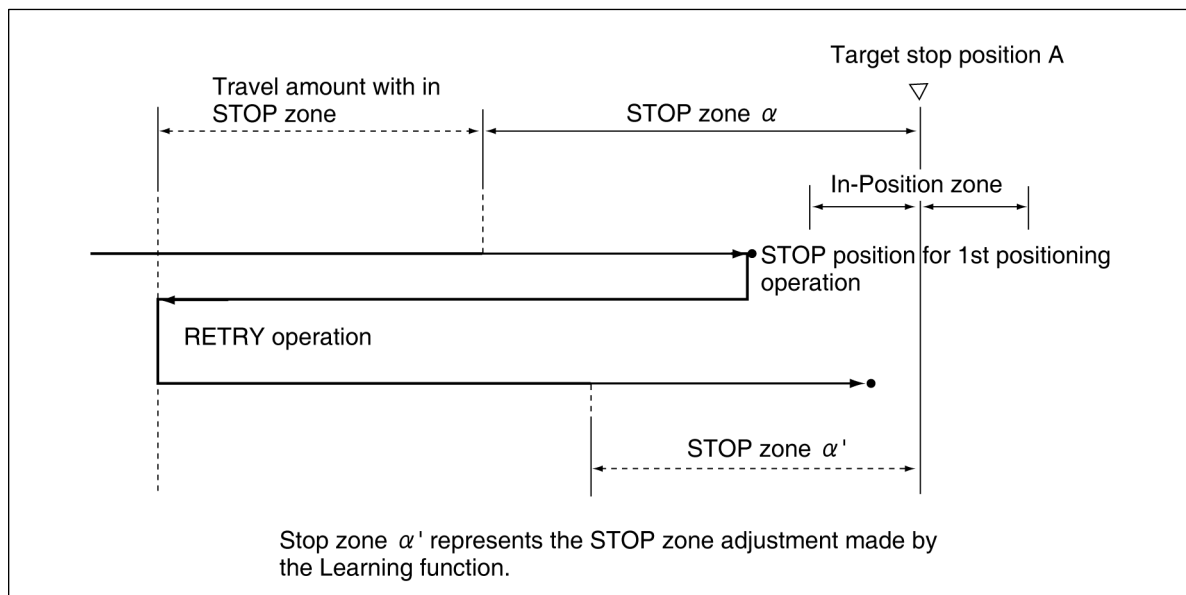
Depending on the positioning direction, either the FORWARD or REVERSE stop zone will be adjusted. (The STOP zone is not corrected for "START from STOP zone" positioning operations.)

Stop zone corrections are performed when the "positioning completed" signal output occurs ("positioning" signal is off). Machines with large inertias can be accommodated by changing the "positioning completed" detection timer (parameter No.51).

If the stop position following a positioning operation is not within the In-Position zone, positioning will be repeated maximum two times (RETRY operation) based on the STOP zone adjustment made by the Learning function.

#### Note

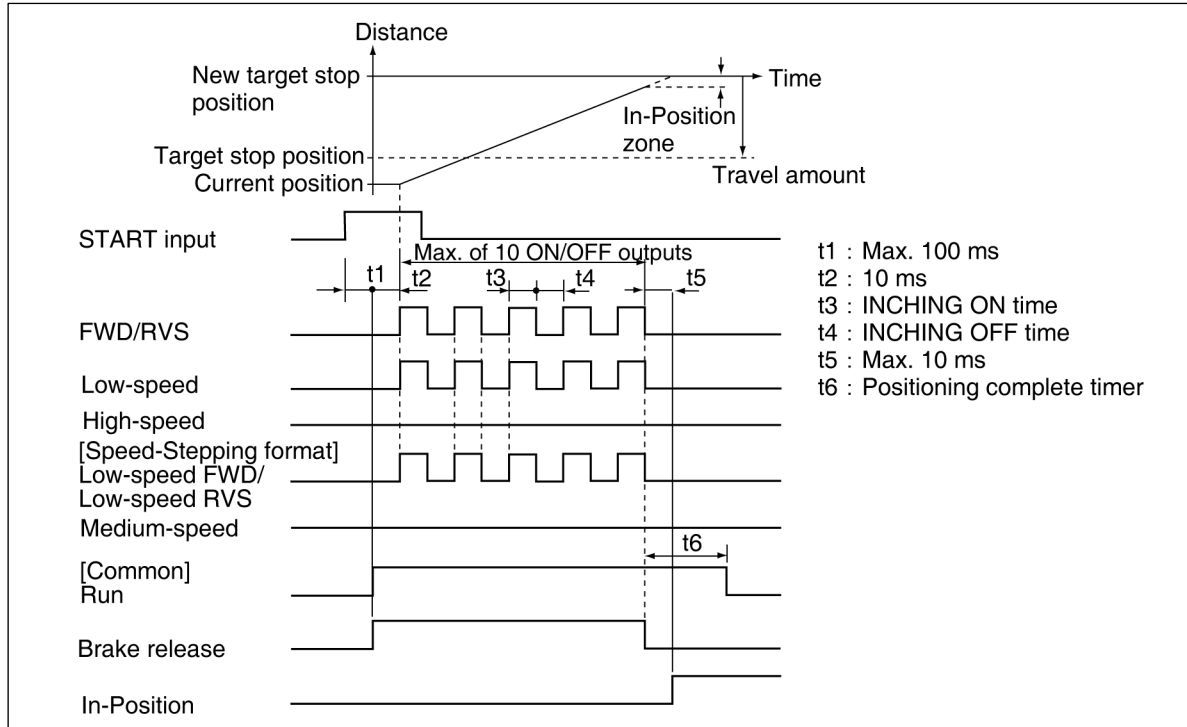
The Learning function is not always effective for all positioning applications.





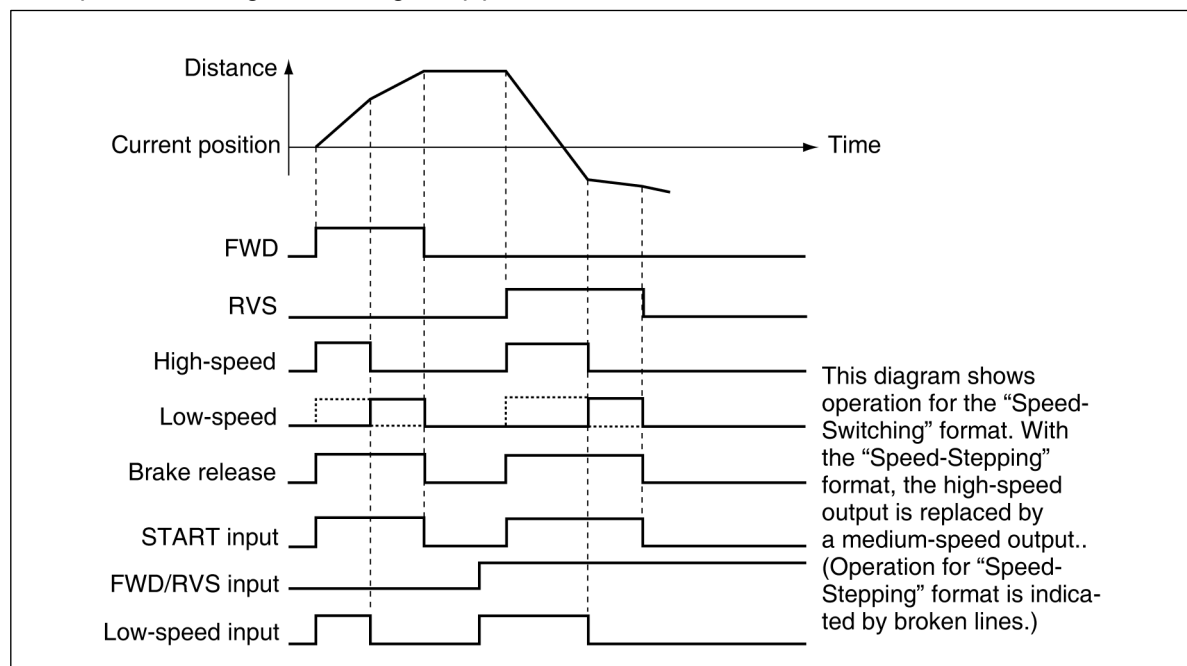
### 3-1-8. INCH Function (INCH)

The INCH function compensates for positional deviations caused by machine friction, etc., by adding the preset INCH zone amount (parameter setting no.52) to the target position so that extremely low-speed positioning occurs. When executing positioning operations for press dies, this function permits corrections for minute deviations caused by machine wear and deformation, etc.



### 3-1-9. JOG Function

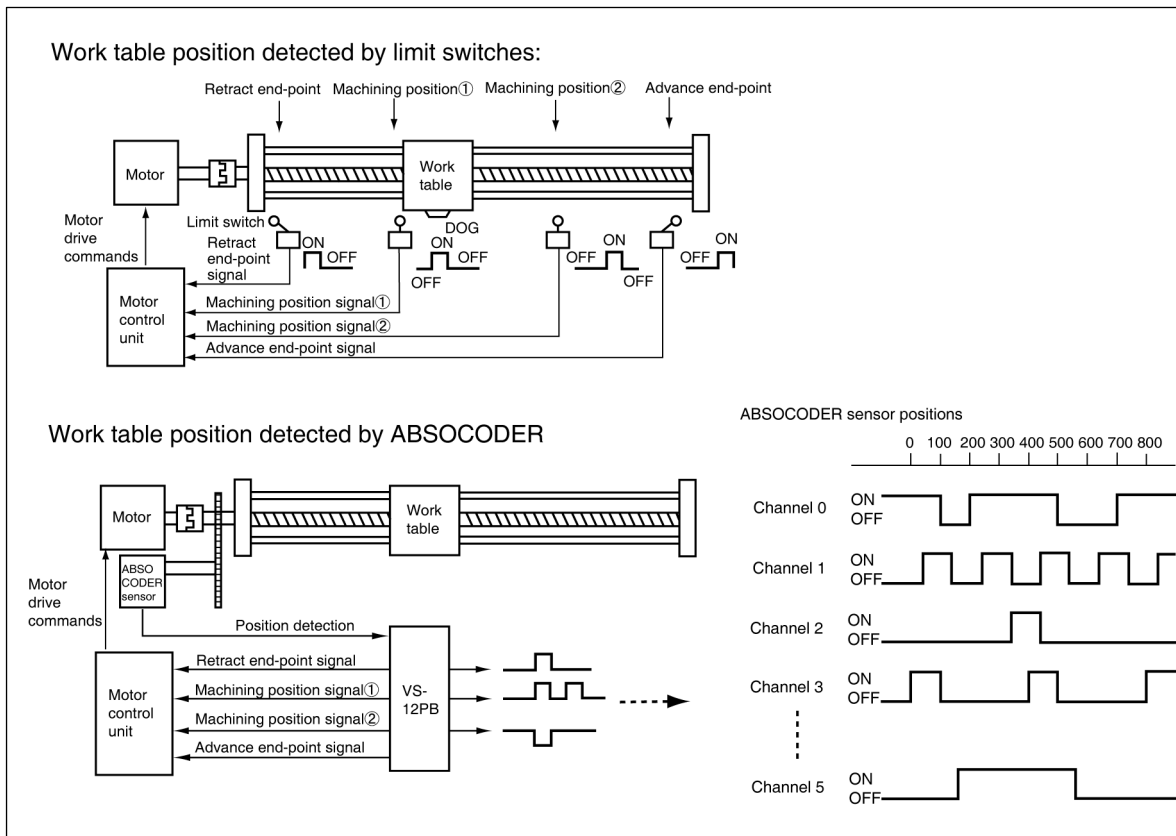
The JOG function permits positioning to be executed by external inputs, communication, or by key inputs at the control panel without regard to the target stop position.



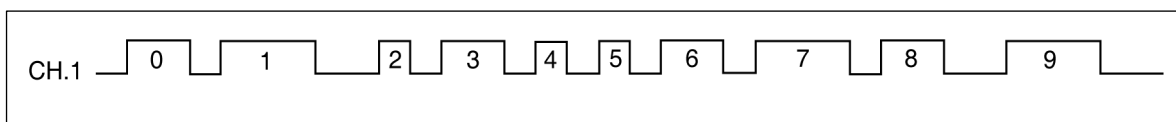
## 3-2. Limit Switch Output Function

With this function, the machine's travel amount is detected by the ABSOCODER sensor, and external ON/OFF signal outputs are used in place of conventional limit switches.

### ●Limit Switch Output Example



With the VS-12PB, up to 10 ON / OFF outputs per channel are possible.



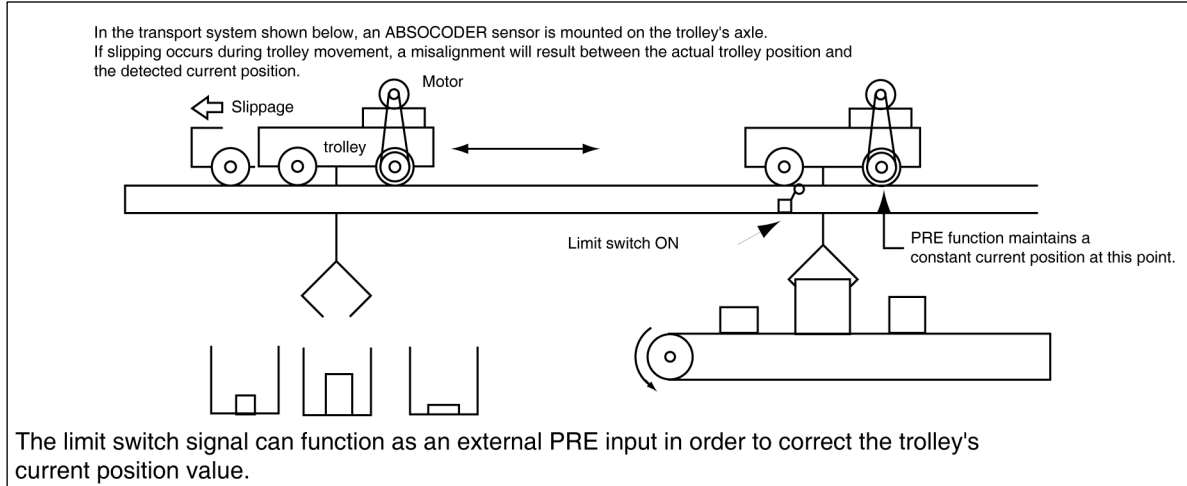
### 3-2-1. Protected Switch Function

This function prevents limit switch output ON/OFF settings from being changed by the usual method. The protected switch settings can be changed in the same manner as regular switches if "0" is specified at the "number of protected switches" parameter setting item.

### 3-3. Current Position Preset Function

When this function is executed (by external input), the machine's current position will be moved (corrected) to the "PRE" position which has been pre-designated. The PRE function is enabled by "PRE input 1.2".

#### ●Application Example



The VS-12PB automatically identifies the travel direction by comparing the current position values every 100ms.

Once a "PRE" input is executed, any other "PRE" inputs within a period of 100ms will be ignored.

When a current position preset input is changed (both ON and OFF changes), subsequent preset inputs are ignored for a period of 100ms. The CCW speeds are as shown below. Speeds of less than the shown values will be interpreted as CW operations.

MRE			VLS	
32SP	32SS	0.44 (r / min)	256PWB	0.12 mm/s
G64SP	G64SS	0.88 (r / min)		
G128SP	G128SS	1.76 (r / min)	512PWB	0.23 mm/s
G160SP	G160SS	2.20 (r / min)	1024PW	0.47 mm/s
G256SP	G256SS	3.52 (r / min)	512PYB	0.12 mm/s
G320SP	G320SS	4.40 (r / min)		
—	G640SS	8.80 (r / min)	1024PYB	0.23 mm/s
—	G1280SS	17.60 (r / min)	2048PY	0.47 mm/s
—	G2560SS	35.20 (r / min)		

### 3-4. Machine Position Check Function

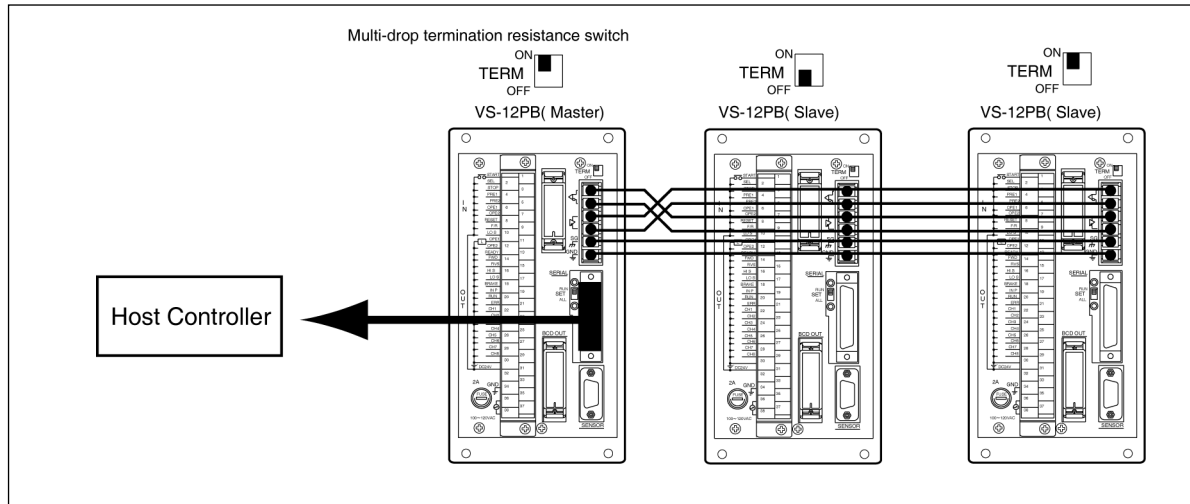
This function checks for deviations between the actual machine position and the current position indicated by the controller.

If "Machine position confirmation:2" is specified at the "current position preset function selection" parameter setting, the current position is compared with the current position preset 2 value during a FORWARD or REVERSE operation, but the current position value is not corrected in accordance with preset input 2.

Although the current position preset function actually changes the controller's current position value, this machine position confirmation function does not. It simply activates a self-diagnosis ("excessive correction amount change" detection function). Even if the machine position confirmation function is selected, the current position preset function operates in accordance with preset input 1.

## 3-5. Communication Function

The VS-12PB permits target positions and parameter settings to be specified from a programmable controller or a personal computer by using this communication function. For details, please contact your NSD sales representative. Moreover, as shown in the illustration below, up to 32 VS-12PB units can be controlled from a single host programmable controller.



## 3-6. Self-Diagnosis Function

### (1) Travel Detection and Travel Direction Error Detection Functions

Changes in the current position detected (every 0.5s) by the ABSOCODER sensor are checked to verify that travel is occurring in accordance with the controller commands.

The interval between a positioning start and the point when error detection begins is determined by parameter settings ( "no travel" detection timer, and "travel direction error" detection timer).

### (2) STOP zone Upper / Lower Limit Over Detection Function

In cases where the STOP zone has been adjusted by the Learning function, this function checks the adjustment amount to determine if it exceeds the pre-designated upper or lower STOP zone limit.

### (3) Excessive Current Position Change Detection Function

The amount of current position change is checked every 20ms. This function detects cases where the amount of change exceeds the "permissible current position change amount" designated by parameter No.65.

### (4) Excessive Correction Amount Detection Function

This function detects cases where the amount of current position correction executed by the "current position preset" function exceeds the "permissible correction amount" designated by parameter No.66.

### (5) Upper Limit Violation detection Function

This function detects cases where the current position value exceeds the upper limit setting designated by parameter No.61.

### (6) Lower Limit Violation Detection Function

This function detects cases where the current position value is below the lower limit setting designated by parameter No.62.

# **SPECIFICATIONS SECTION**

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- 4. Specifications**
- 5. Outer Dimensions**
- 6. Ordering Information**

## 4. Specifications

### 4-1. VS-12PB Specifications

The VS-12PB specifications are as shown below.

#### 4-1-1. General Specifications

Item	Specifications
Power voltage	100 / 120 VAC 50 / 60Hz
Permissible power voltage range	85 to 132 VAC
Power consumption	15 or less
Leakage current	1 mA or less
Ambient operating temperature	0 to 55 °C
Ambient storage humidity	-10 to 80 °C
Ambient operating humidity	20 - 90 % RH (no condensation)
Vibration resistance	Conforms to the JIS C 0040 standard
Noise tolerance	Noise tolerance : 1500 VAC Noise width : 1 μs
Withstand resistance	1500 VAC for 1 minute between AC power terminals and case.
Insulation resistance	20 MΩ or more, measured between AC power terminals and case (measured by 500VDC insulation ohmmeter)
Operating atmosphere	Free of corrosive gases and excessive dust.
Construction	Panel mounted
Mass	2 kg or less (4.4 lb or less)

#### 4-1-2. Performance Specifications

Item	Specifications	
Number of position detection axes	1	
Position detection format	Absolute detection using multi-turn or linear type ABSOCODER sensor	
Positioning function	Control format	Unidirectional positioning (bidirectional positioning also possible)
	Target stop position setting format	- By key input at control panel (2 data save) - By communication - By external BCD input
	Output signals	8 points FWD (Forward) BRAKE (Brake release) RVS (Reverse) INP (In-Position) HIS (High-speed) RUN (Positioning progress) LOS (Low-speed) ERR (Operation error)
Limit switch output function	Number of programs	1 (1 additional program is possible when "communication" format is used)
	Number of output channels	8 channels per program
	Data setting format	Key input at control panel (and input by communication)
Functions	Main functions	Automatic positioning function, INCHING function, JOG function
	Auxiliary functions	PRE, Learning function, STOP zone upper / lower limit violation detection, excessive current position change detection, excessive correction amount detection, upper limit violation detection, lower limit violation detection, protected switch function
Sampling time	Limit SW signals	1ms
	Position output signals	
	External current position output	n × 4 ms (n=0 to 64) By DTC input when n=0
Minimum position setting units	0.00001	
Data storage format	EEPROM	

\* For VS-T12 specifications, refer to the VS-T12 Specifications / Operation Manual.

For VS-T12B specifications, refer to the VS-T12B Specifications / Operation Manual.

### 4-1-3. Input/Output Signal Specifications

#### (1) Control Input/Output Signal Specifications

Input Signals			Output Signals		
Item	Specification		Item	Specification	
Number of input points	10 points		Item	19 points	
Isolation format	Photo-coupler		Number of output points	Photo-coupler	
Rated input voltage	24 VDC		Isolation format	24 VDC	
Rated input current	10 mA		Rated load voltage	20.4 to 30 VDC	
Input voltage range used	20.4 to 30 VDC		Load voltage range used	100 mA	
ON voltage	12 VDC or more		Max. Load current	0.4 A	
OFF voltage	4 VDC or less		Current leakage when OFF	0.1 mA or less	
			Max. Voltage drop when ON	0.5 VDC (at 100 mA)	
Response time(μs)	OFF → ON	40 (with input voltage of 24 V)	Response time(μs)	OFF → ON	40 (when load current is 100 mA)
	ON → OFF	200 (with input voltage of 24 V)		ON → OFF	200 (when load current is 100 mA)
External cable connection format	Plug type terminal board F5014-38P				

#### (2) BCD Input / Output Signal Specifications

Input Signals			Output Signals		
Item	Specification		Item	Specification	
Number of input points	BCD inputs: 24 points Symbol inputs: 1 point DTC inputs: 1 point		Number of output points	BCD outputs: 24 points Symbol outputs: 1 point latch pulse outputs: 1 point	
Isolation format	Photo-coupler		Isolation format	Photo-coupler	
Rated input voltage	24 VDC		Rated load voltage	24 VDC	
Rated input current	10 mA		Load voltage range used	20.4 to 30 VDC	
Input voltage range used	20.4 to 30 VDC		Max. Load current	100 mA	
ON voltage	12 VDC or more		Max. Rush current	0.4 A	
OFF voltage	4 VDC or less		Current leakage when OFF	0.1 mA or less	
			Max. Voltage drop when ON	0.5 VDC (at 100 mA)	
Response time(μs)	OFF → ON	40(with input voltage of 24 V)	Response time(μs)	OFF → ON	40(when load current is 100 mA)
	ON → OFF	200(with input voltage of 24 V)		ON → OFF	200(when load current is 100 mA)
External cable connection format	Connector MR-34RMA				

## 4-2. ABSOCODER Sensor Specifications

The ABSOCODER sensor specifications are as shown below.

The VS-12PB is compatible with either the multi-turn or linear type ABSOCODER sensor.

### 4-2-1. Multi-Turn Type MRE Sensor (2-phase)

Item		Model	MRE-□SP062□□C				
			32	G64	G128	G160	G256
Outer dimensions (mm)		φ62.5×L 105	φ62.5×L 85.5				
Mass		1.5 kg	1 kg				
Divisions / Turn		4096	2048	1024	819.2	512	409.6
Number of turns		32	64	128	160	256	320
Scale length		[Travel amount per turn]×[number of turns]					
Total number of divisions		131072 (2 <sup>17</sup> )					
Shaft friction torque		4.9 × 10 <sup>-2</sup> N·m or less (0.5 kgf·cm or less)					
Moment of inertia		6.7×10 <sup>-6</sup> kg·m <sup>2</sup> (6.8×10 <sup>-5</sup> kgf·cm·s <sup>2</sup> )	3.9×10 <sup>-6</sup> kg·m <sup>2</sup> (4.0×10 <sup>-5</sup> kgf·cm·s <sup>2</sup> )				
Permissible shaft load	Radial	98 N (10 kgf)					
	Thrust	49 N (5 kgf)					
Permissible mechanical speed(RPM)		3600 r/min					
Vibration resistance		2.0×10 <sup>2</sup> m/s <sup>2</sup> (20G) 200Hz, up/down 4h, forward/back 2h (conforms to JIS D1601 standard)					
Protective construction		IP52f (conforms to JEM 1030 standard)					
Ambient temperature	Operation	-20 to +60°C					
	Storage	-30 to +90°C					
Maximum extension cable length	4P-S	100m					
	4P-RBT	40m	70m				

### 4-2-2. Multi-Turn Type MRE Sensor (3-phase)

Item		Model	MRE-□SS062FAL								
			32	G64	G128	G160	G256	G320	G640	G1280	G2560
Outer dimensions (mm)		φ62.5×L 96.5	φ62.5×L 85.5								
Mass		1.5 kg	0.8 kg								
Divisions / Turn		4096	2048	1024	819.2	512	409.6	204.8	102.4	51.2	
Number of turns		32	64	128	160	256	320	640	1280	2560	
Scale length		[Travel amount per turn]×[number of turns]									
Total number of divisions		131072 (2 <sup>17</sup> )									
Shaft friction torque		4.9 × 10 <sup>-2</sup> N·m or less (0.5 kgf·cm or less)									
Moment of inertia		5.9×10 <sup>-6</sup> kg·m <sup>2</sup> (6.0×10 <sup>-5</sup> kgf·cm·s <sup>2</sup> )	3.9×10 <sup>-6</sup> kg·m <sup>2</sup> (4.0×10 <sup>-5</sup> kgf·cm·s <sup>2</sup> )								
Permissible shaft load	Radial	78 N (8 kgf)	59 N (6 kgf)								
	Thrust	39 N (4 kgf)	29 N (3 kgf)								
Permissible mechanical speed(RPM)		2000 r/min	3600 r/min								
Vibration resistance		2.0×10 <sup>2</sup> m/s <sup>2</sup> (20G)	98 m/s <sup>2</sup> (10G)								
		200Hz, up/down 4h, forward/back 2h (conforms to JIS D1601 standard)									
Protective construction		IP52f (conforms to JEM 1030 standard)									
Ambient temperature	Operation	-20 to +60°C									
	Storage	-30 to +90°C									
Maximum extension cable length		3S-RBT	100m								



### 4-2-3. Linear Type VLS Sensor

Item \ Model	VLS-512PYB	VLS-1024PY B	VLS-2048PY	VLS-256PWB	VLS-512PWB	VLS-1024PW
Outer dimensions (mm)	68 × 652	90 × 1194	145 × 2438	68 × 396	90 × 682	145 × 1414
Mass	1 kg	2.1 kg	10.2 kg	0.9 kg	1.7 kg	8 kg
Resolution	0.0039062m m	0.0078125m m	0.015625mm	0.0039062m m	0.0078125m m	0.015625mm
Absolute position detection range	512mm	1024mm	2048mm	256mm	512mm	1024mm
Total number of divisions	131072 (2 <sup>17</sup> )			65536 (2 <sup>16</sup> )		
Permissible mechanical parallelism	±0.1mm or less					
Max. Operating speed	250mm/s	500mm/s	1000mm/s		2000mm/s	
Protective constructions	IP40 (conforms to JEM1030 standard)					
Ambient temperature	Operation	-20 to +60°C				
	Storage	-30 to +90°C				
Ambient operating humidity	20 to 90%RH					
Max. Cable length	4P-S	60m		100m		
	4P-RBT	30m		50m		

### 4-3. Sensor Cable

Item \ Model	4P-S-□	4P-RBT-□	3S-RBT-□
Cable	Standard cable	Robotic cable	
Characteristics	Extensible for long distances	Superior flexibility; ideal for moving components	
Operating temperature range (°C)	-5 to 60		
Insulator	Irradiated, formed polyethylene	ETFE plastic (resin)	
Sheath	Vinyl chloride mixture		
Color	Gray	Black	Blue
Compatible sensors	MRE-32SP062□□C MRE-G□SP062□□C VLS-□PY□ VLS-□PW□	MRE-32SP062□□C MRE-G□SP062□□C VLS-□PY□ VLS-□PW□	MRE-32SS062FAL MRE-G□SS062FAL

# 5. Outer Dimensions

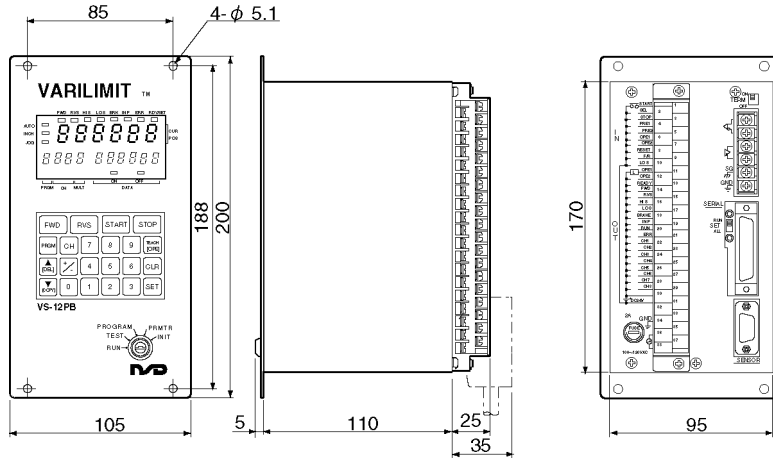
## 5-1. VS-12PB Controller

The VS-12PB outer dimensions are as shown below.

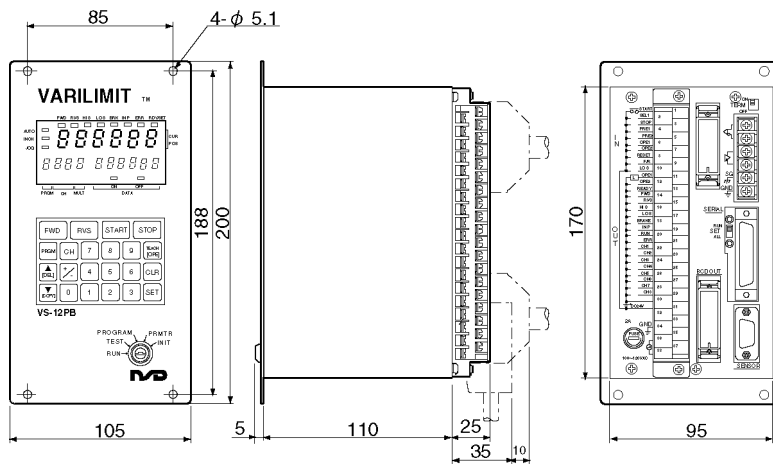
□: Sensor code entered here.

●VS-12PB-□

Units: mm

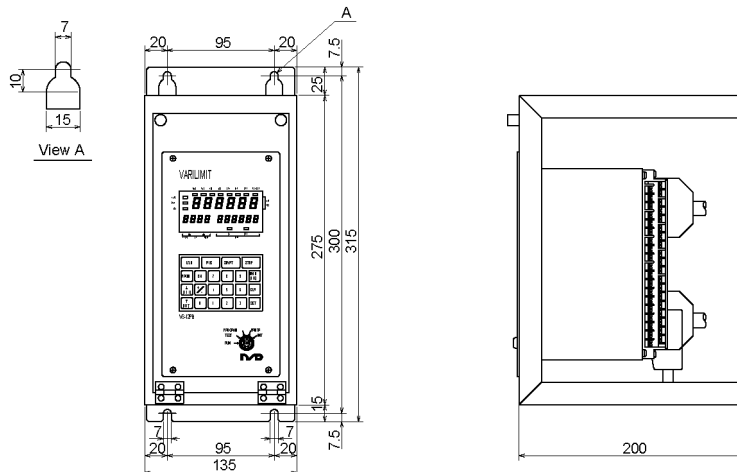


●VS-12PB-□D (With external BCD input / output function)



OVS-K12 Option

(Mount fixture for control board)

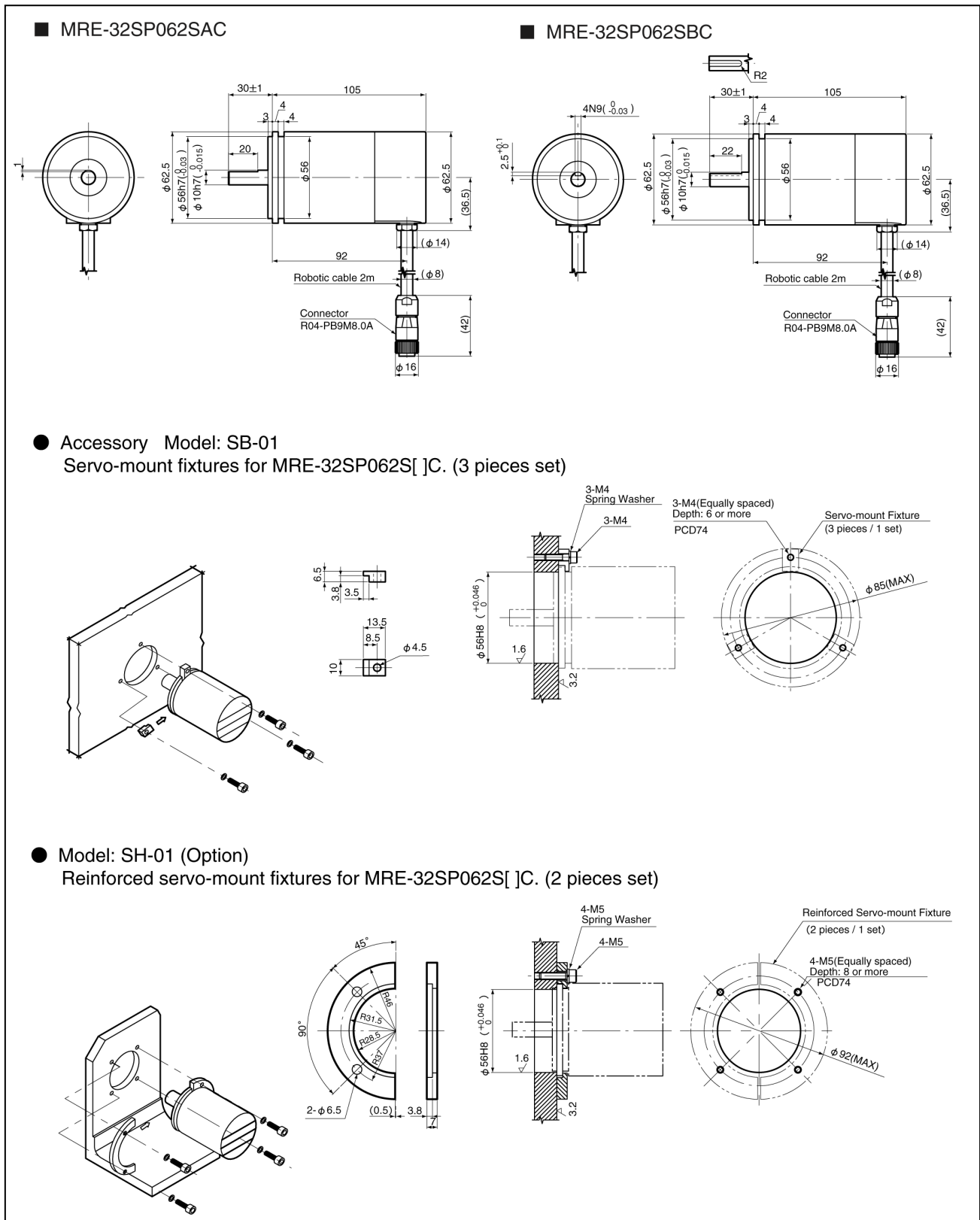


## 5-2. ABSOCODER Sensors

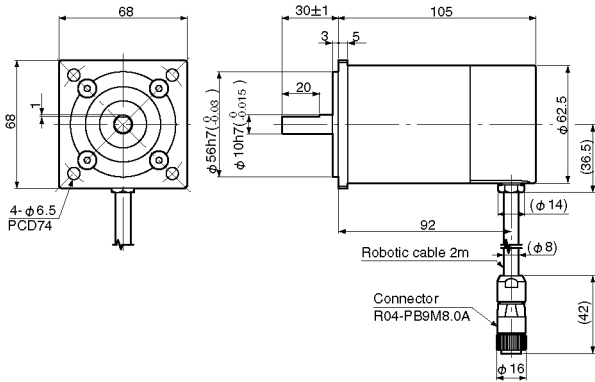
The ABSOCODER sensor outer dimensions are as shown below.

### 5-2-1. Multi-Turn Type MRE Sensor (2-phase)

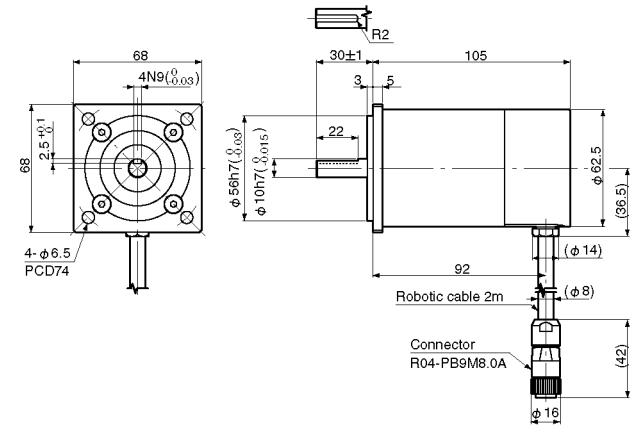
Units: mm



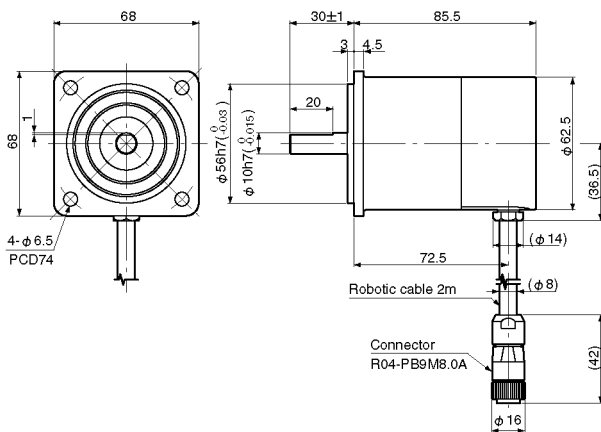
■ MRE-32SP062FAC



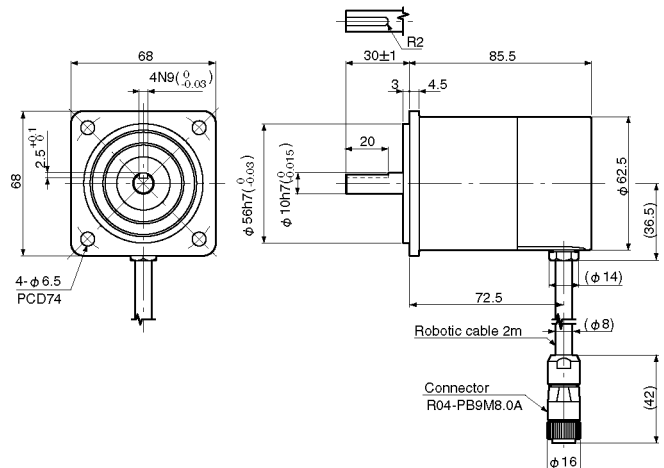
■ MRE-32SP062FBC



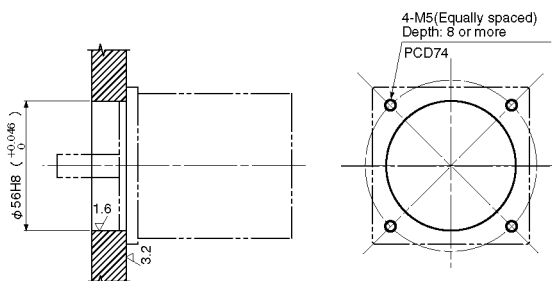
■ MRE-G[ ]SP062FAC ([ ]:64, 128, 160, 256, 320)



■ MRE-G[ ]SP062FBC ([ ]:64, 128, 160, 256, 320)



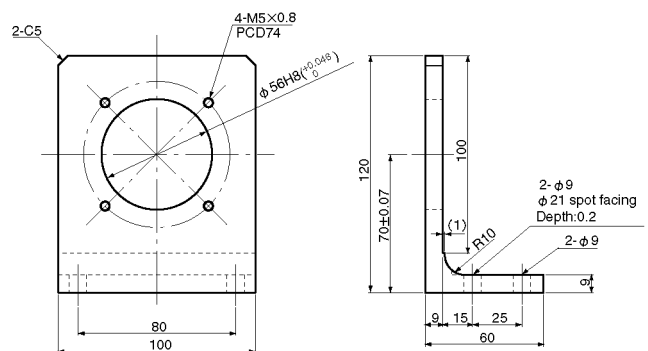
● Mounting hole dimensions for flange



● Model: RB-01 (Option)

L-type flange for MRE-32SP062·MRE-G[ ]SP062

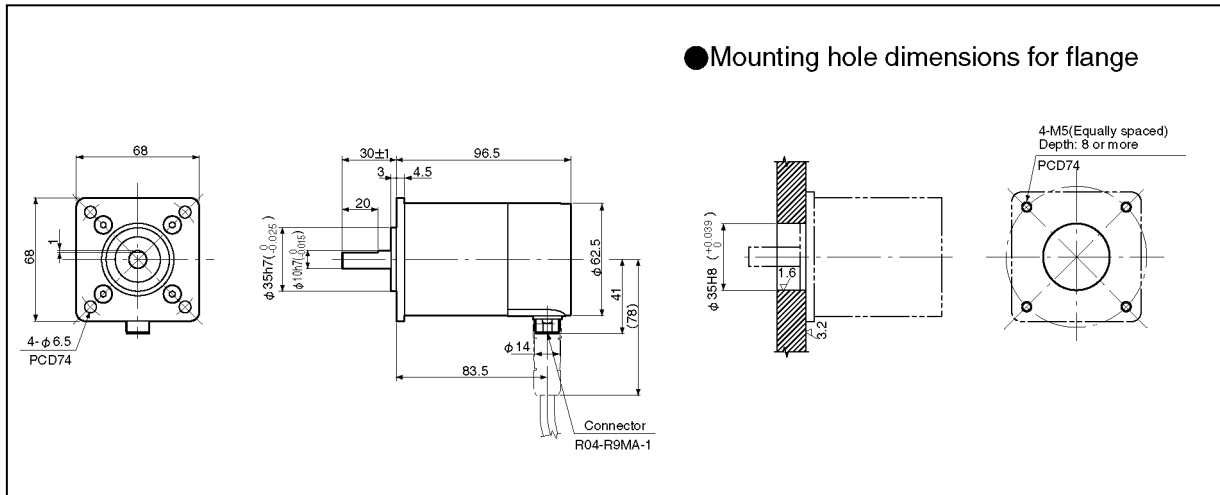
Applicable sensors are following.  
 MRE-32SP062S[ ]C + SH-01  
 MRE-32SP062F[ ]C  
 MRE-G[ ]SP062F[ ]C



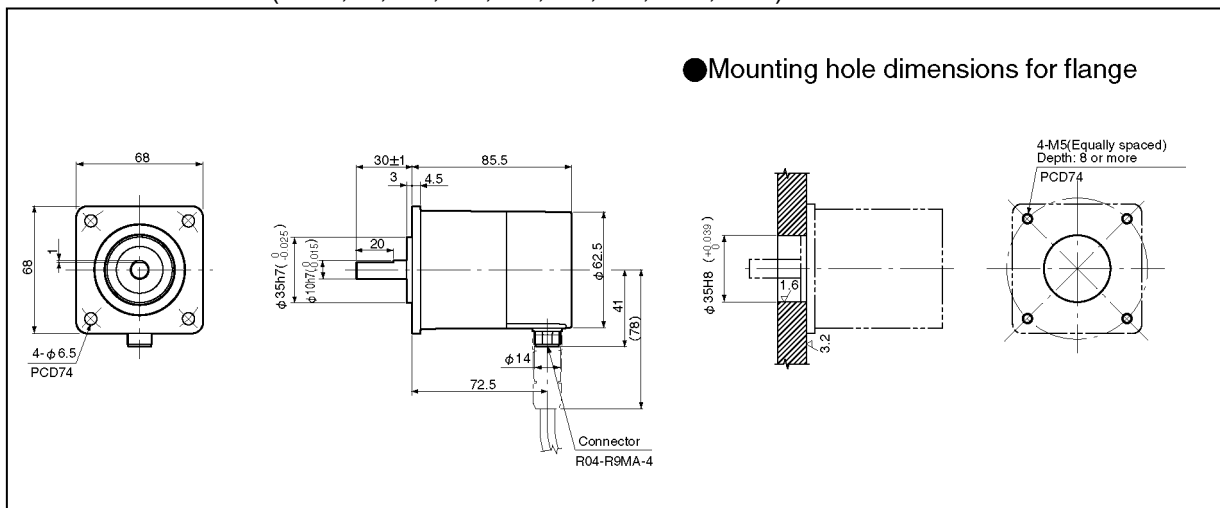
## 5-2-2 Multi-Turn Type MRE Sensor (3-phase)

■ MRE-32SS062FAL

Units: mm

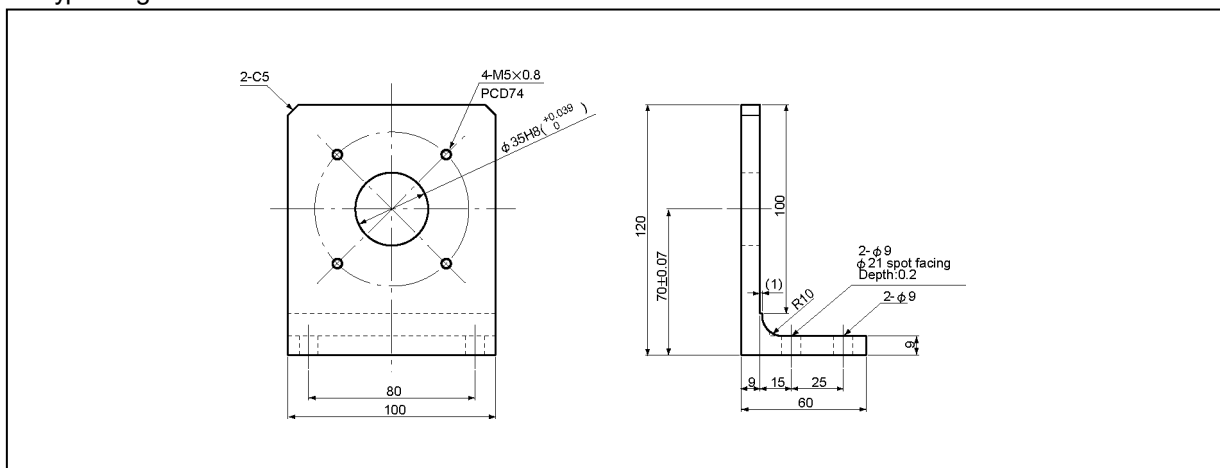


■ MRE-G□SS062FAL (□: 32, 64, 128, 160, 256, 320, 640, 1280, 2560)



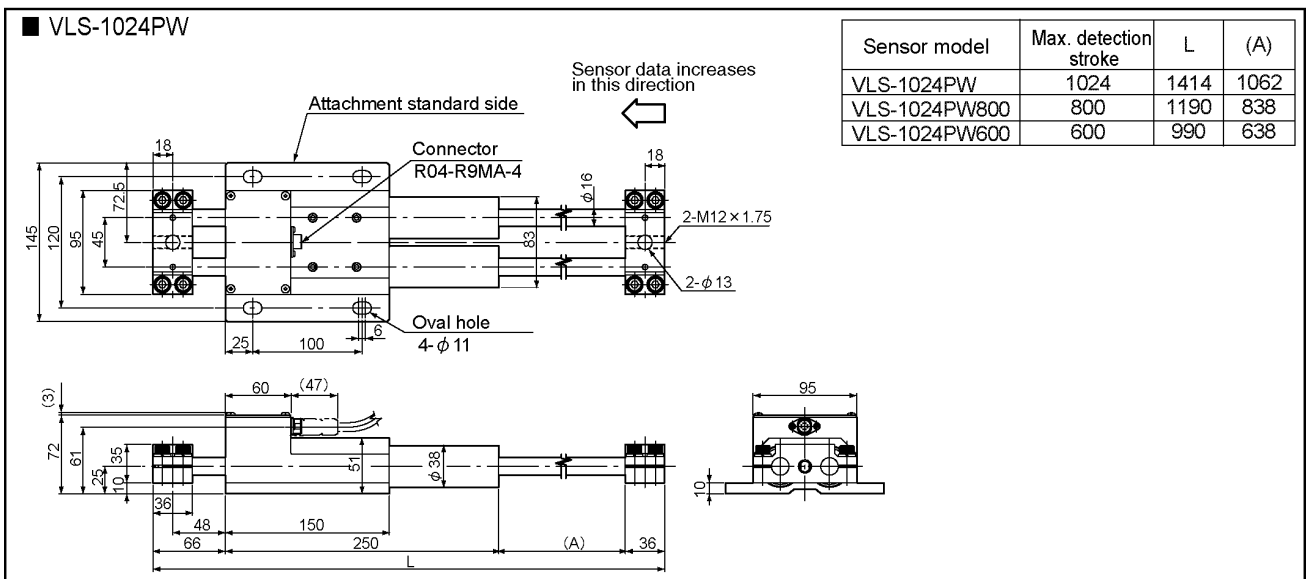
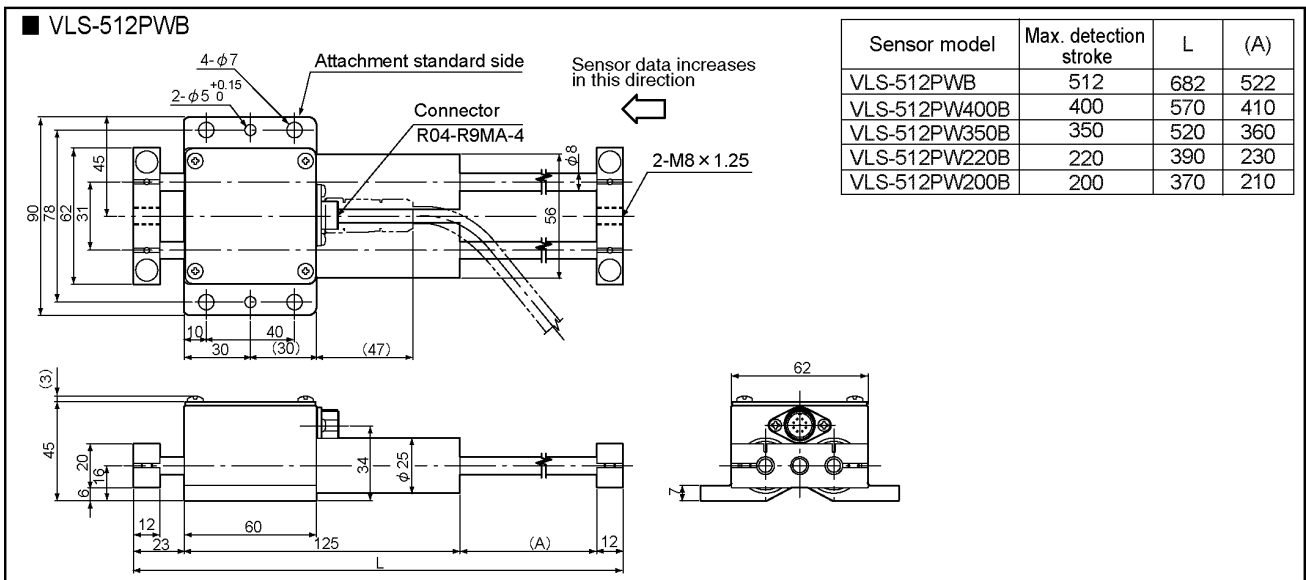
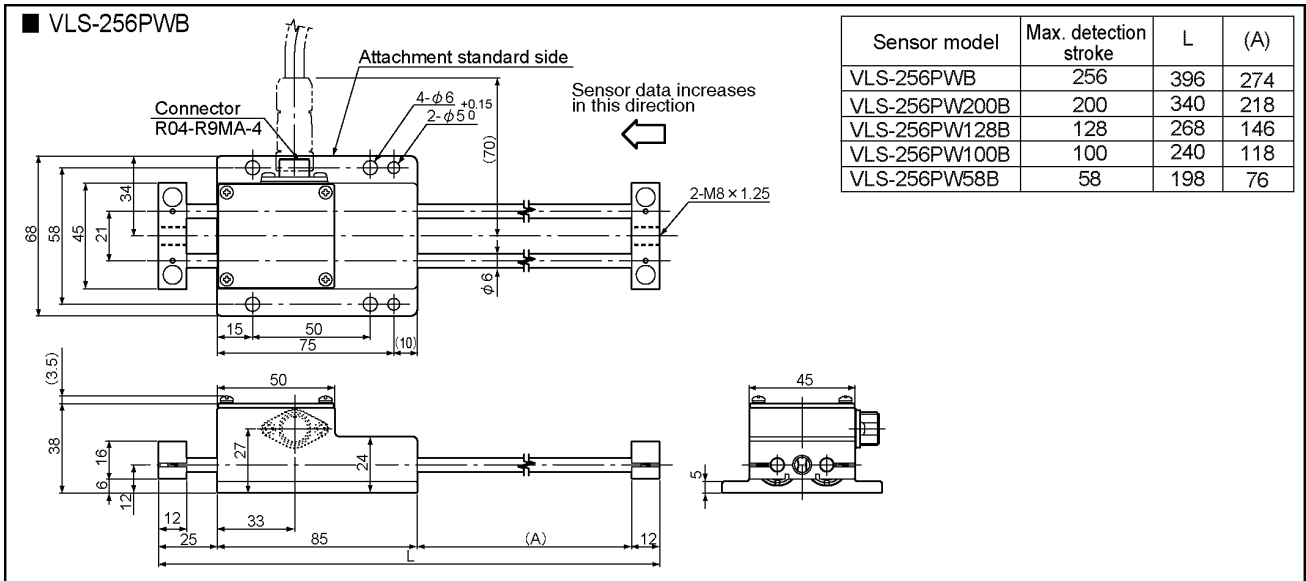
■ RB-02 (Option)

L type flange-mount fixture for MRE-32SS062FAL and MRE-G□SS062FAL



### 5-2-3. Linear Type VLS Sensor

Units: mm



Units: mm

**■ VLS-512PYB**

Attachment standard side  
Connector R04-R9MA-4  
2- $\phi 5^{+0.15}_0$   
6  
70  
Sensor data increases in this direction  
2-M8 x 1.25  
68  
58  
45  
21  
34  
15  
50  
75  
10  
 $\phi 6$   
(3.5)  
50  
38  
6  
16  
12  
12  
25  
33  
85  
(A)  
12  
45  
5

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**

Attachment standard side  
2- $\phi 5^{+0.15}_0$   
6  
Oval hole (4- $\phi 7$ )  
Connector R04-R9MA-4  
Sensor data increases in this direction  
2-M8 x 1.25  
90  
78  
62  
31  
45  
10  
40  
30  
(30)  
(47)  
 $\phi 8$   
56  
12  
23  
60  
125  
(A)  
12  
62  
7

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**

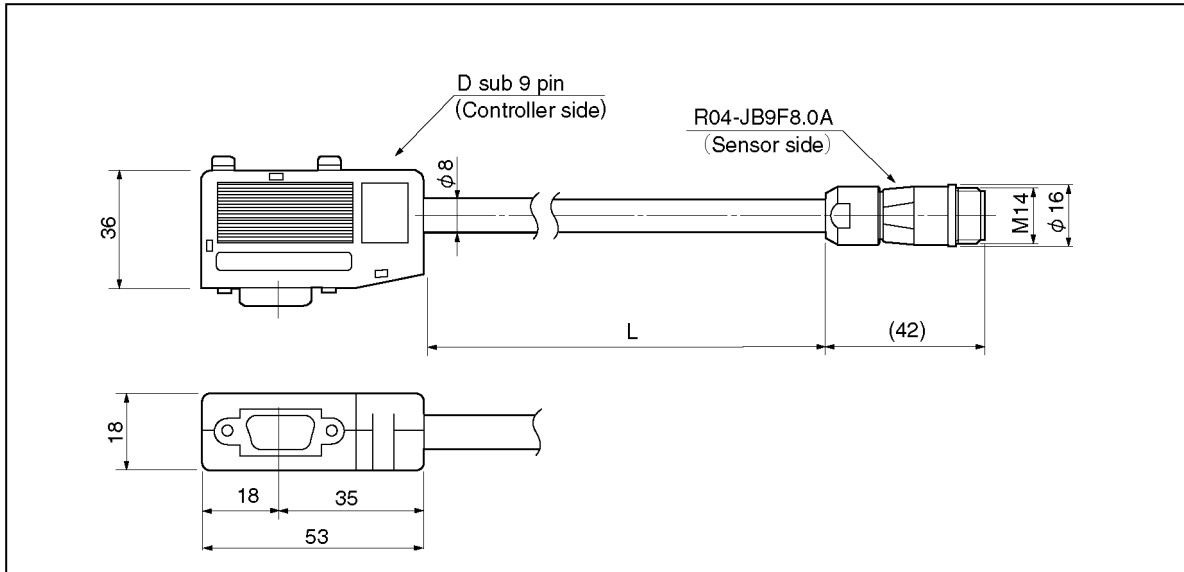
Attachment standard side  
Connector R04-R9MA-4  
Sensor data increases in this direction  
2-M12 x 1.75  
2- $\phi 13$   
145  
120  
95  
72.5  
45  
18  
25  
100  
6  
Oval hole (4- $\phi 11$ )  
 $\phi 16$   
83  
18  
60  
(47)  
72  
61  
25  
10  
35  
36  
48  
150  
250  
(A)  
36  
95  
10

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

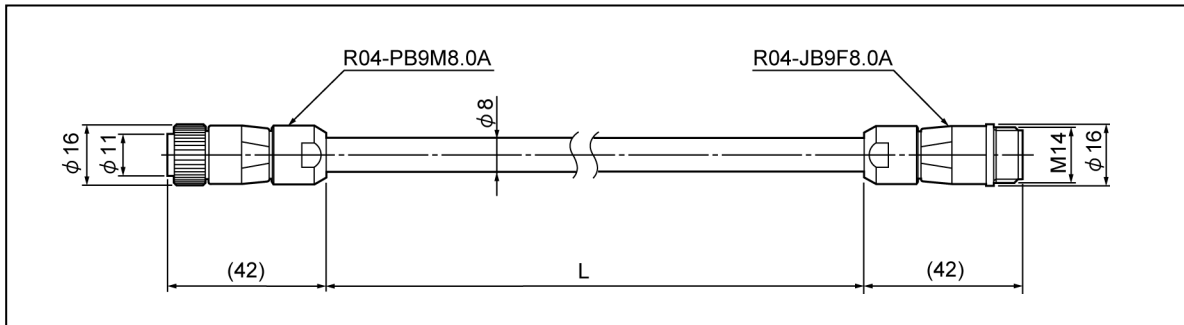
# 5-3. Cable

(1) 4S-RBT-8002-□ / 4P-S-8002-□ / 3S-RBT-8002-□

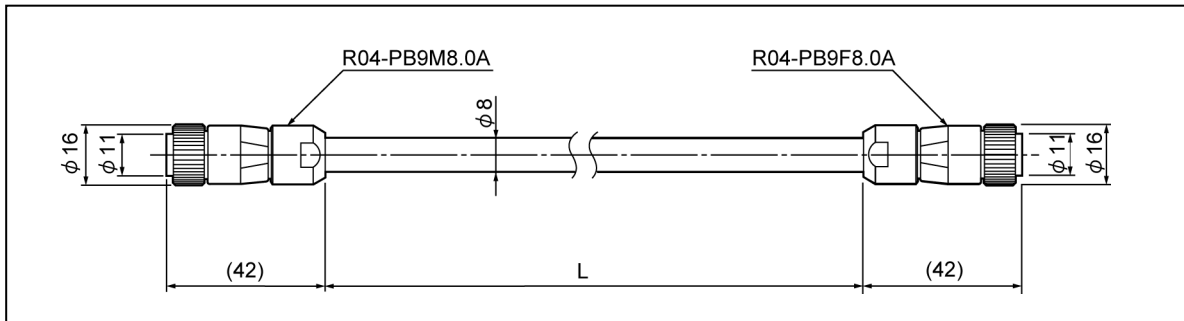
Units: mm



(2) 4P-RBT-0102-□ / 4P-S-0102-□

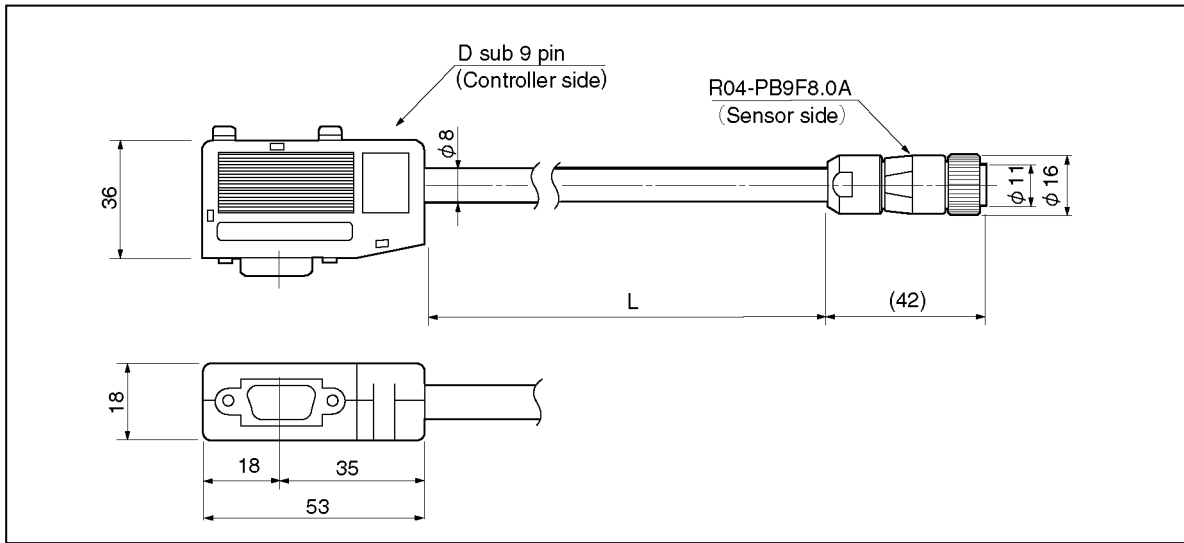


(3) 4P-RBT-0103-□ / 4P-S-0103-□

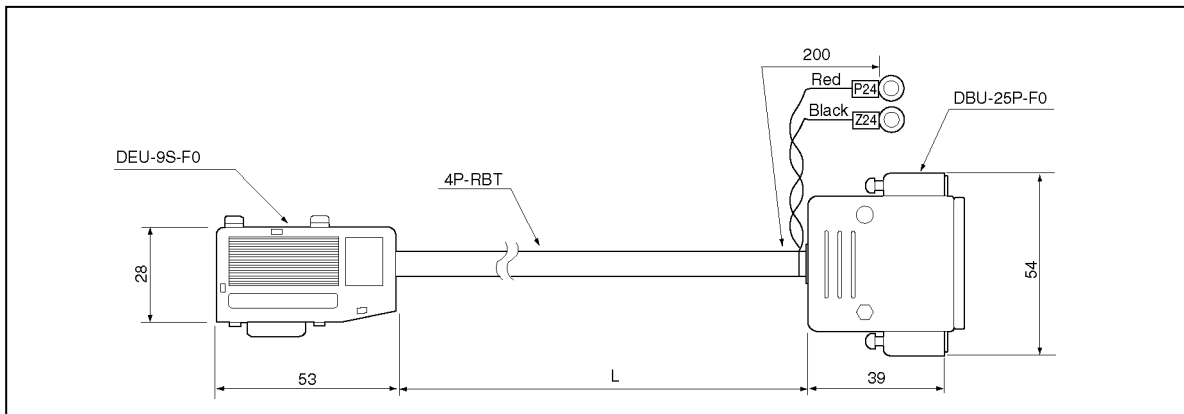




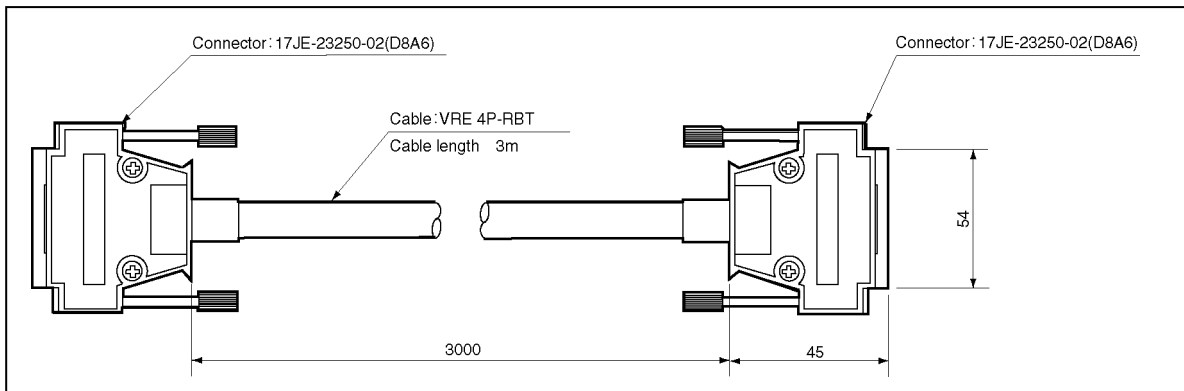
(4) 3S-RBT-8003-□ / 4P-RBT-8003-□



(5) Connecting cable for VS-T12 or VS-T12B VS-C10-□



(6) Communication Cable (RS-232C) PC-C01-3

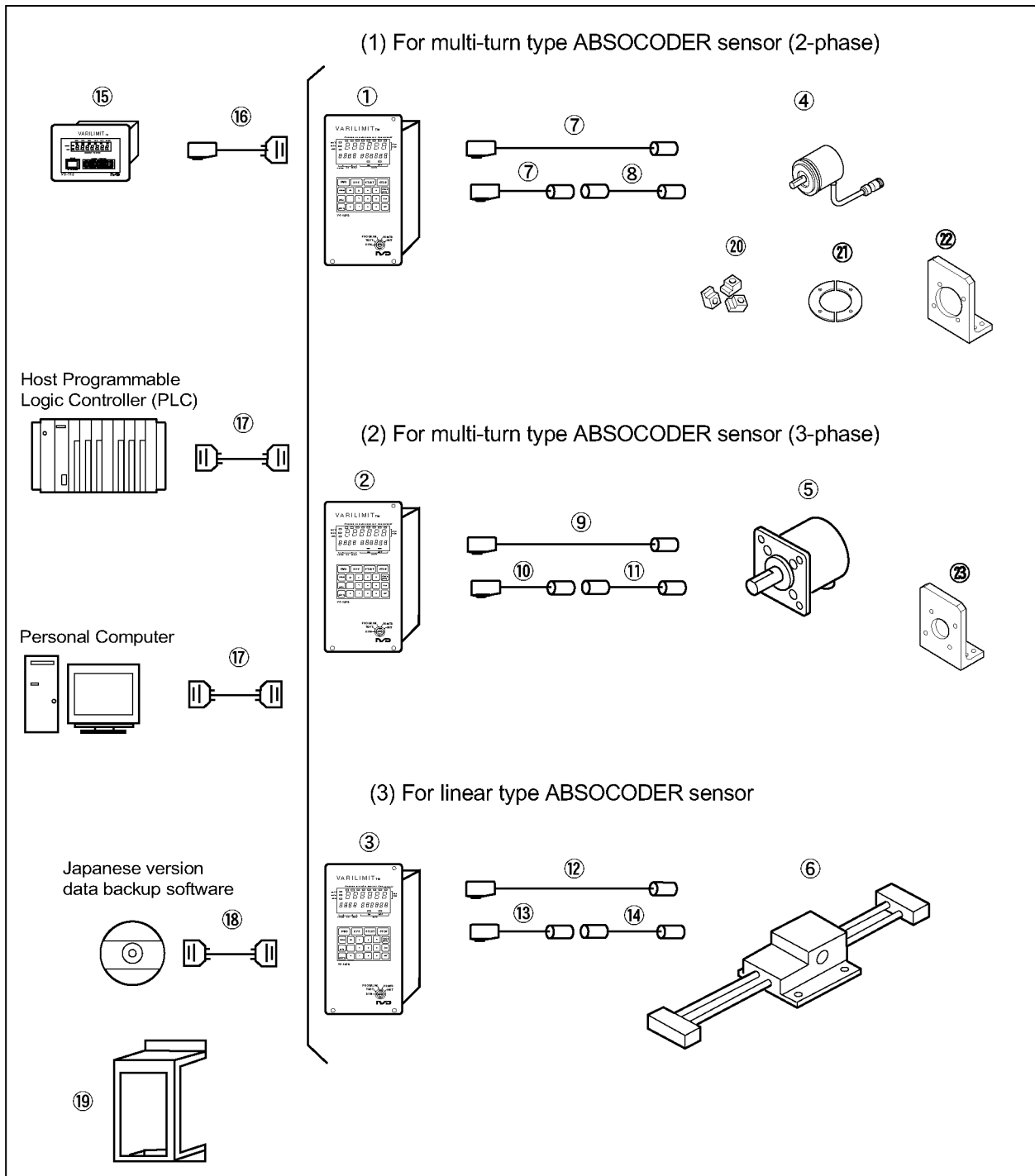


# 6. Ordering Information

Information required for selecting equipment models, etc., is provided below.

## 6-1. Configuration & Combinations

The basic VS-12PB configuration and combinations are shown below. Items ① to ⑱ in the figure below should be selected from the Ordering List on the following page.



**Note**

The VS-12PB-□D “external BCD input/output” function cannot be used with the VS-T12 (VS-T12B) to designate target stop positions settings. Either the “external BCD input/output” function or the VS-T12 (VS-T12B) must be used.

## (1) For multi-turn type ABSOCODER sensor (2-phase)

No.	Name	Model	Remarks
1	Controller	VS-12PB-M2PG	
		VS-12PB-M2PGD	External BCD input (6-digit); current position output
4	ABSOCODER sensor	MRE-32SP062SAC	32-turn type, servo-mount type
		MRE-32SP062SBC	32-turn type, servo-mount type, key way
		MRE-32SP062FAC	32-turn type, flange-mount type
		MRE-32SP062FBC	32-turn type, flange-mount type, key way
		MRE-G□SP062FAC	□: number of turns: 64,128,160,256,320 flange-mount type
		MRE-G□SP062FAC	□: number of turns: 64,128,160,256,320 flange-mount type, key way
7	Sensor cable	4P-RBT-8002-□	□: Cable length [m]
		4P-S-8002-□	□: Cable length [m]
8	Sensor cable	4P-RBT-0102-□	□: Cable length [m]
		4P-S-0102-□	□: Cable length [m]
20	Servo-mount fixture	SB-01	Accessory for MRE-32SP062SAC and MRE-32SP062SBC
21	Reinforced servo-mount fixture	SH-01	Option for MRE-32SP062SAC, MRE-32SP062SBC
22	L type flange-mount fixture	RB-01	Option for flange-mount and reinforced servo-mount fixture

## (2) For multi-turn type ABSOCODER sensor (3-phase)

No.	Name	Model	Remarks
2	Controller	VS-12PB-M	
		VS-12PB-MD	External BCD input (6-digit); current position output
5	ABSOCODER sensor	MRE-32SS062FAL	32-turn type, flange-mount type
		MRE-G□SS062FAL	□: number of turns: 64,128,160,256,320,640,1280,2560 flange-mount type
9	Sensor cable	3S-RBT-8003-□	□: Cable length [m]
10	Sensor cable	3S-RBT-8002-□	□: Cable length [m]
11	Sensor cable	3S-RBT-0103-□	□: Cable length [m]
23	L type flange-mount fixture	RB-02	Option for flange-mount.

## (3) For linear type ABSOCODER sensor

No.	Name	Model	Remarks
3	Controller	VS-12PB-L	
		VS-12PB-LD	External BCD input (6-digit); current position output
6	ABSOCODER sensor	VLS-512PY□B	□: Detection stroke (Max. 512mm)
		VLS-1024PY□B	□: Detection stroke (Max. 1024mm)
		VLS-20484PY□	□: Detection stroke (Max. 2048mm)
		VLS-256PW□B	□: Detection stroke (Max. 256mm)
		VLS-512PW□B	□: Detection stroke (Max. 512mm)
		VLS-1024PW□	□: Detection stroke (Max. 1024mm)
12	Sensor cable	4P-RBT-8003-□	□: Cable length [m]
13	Sensor cable	4P-S-8002-□	□: Cable length [m]
		4P-RBT-8002-□	□: Cable length [m]
14	Sensor cable	4P-S-0103-□	□: Cable length [m]

## (4) Peripheral device

No.	Name	Model	Remarks
15	Target position setting display unit	VS-T12 or VS-T12B	
16	Target position setting display unit cable	VS-C10-3	3m
		VS-C10-5	5m
17	Communication cable	PC-C01-3	3m
18	Japanese version data backup software	VS-12PB-BAW	For Windows XP/Vista/7 with 2-meter cable
19	Mount fixture for control board	VS-K12	



# **INSTALLATION & WIRING SECTION**

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**7. Wiring**

**8. Installation**

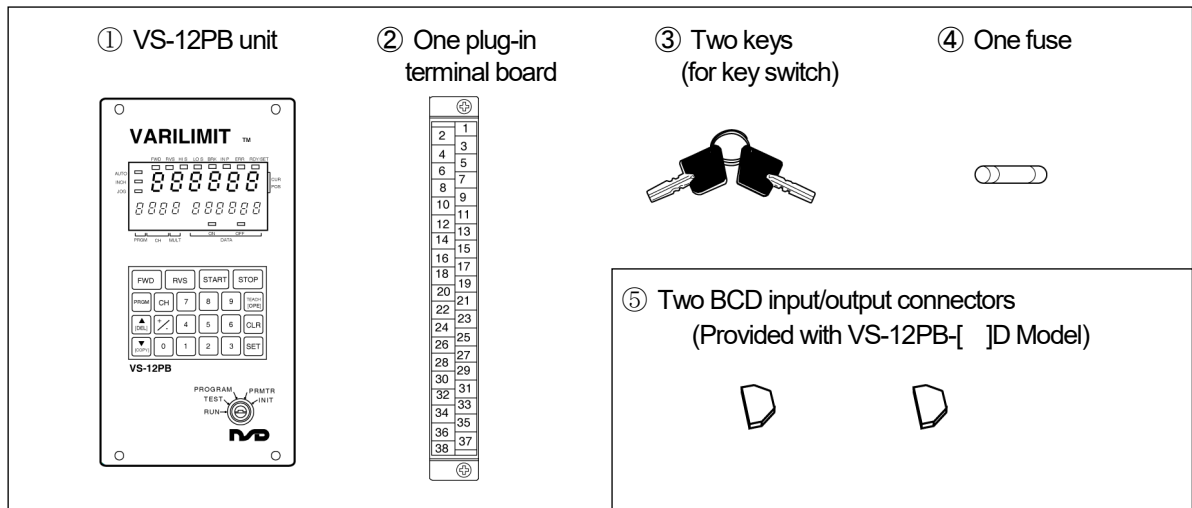
# 7. Installation

This section describes the procedures to be followed when unpacking and installing the unit.

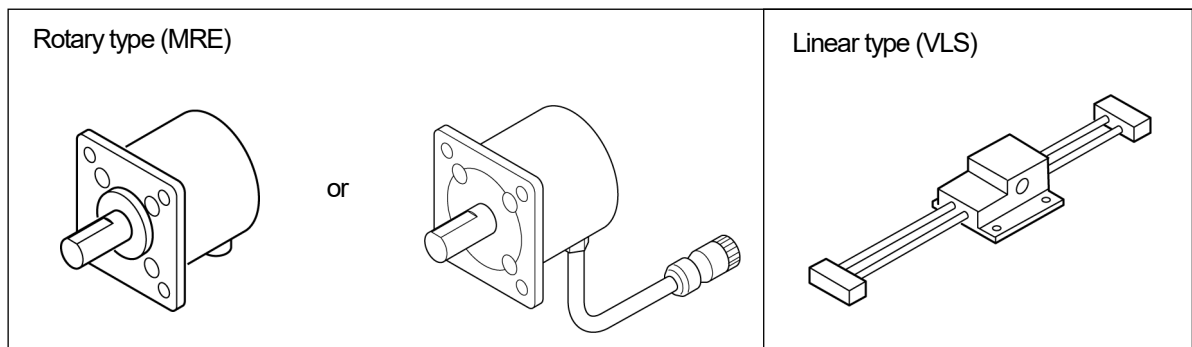
## 7-1. Verifying The Shipping Container Contents

When unpacking the unit, be sure to verify that all the components are present.

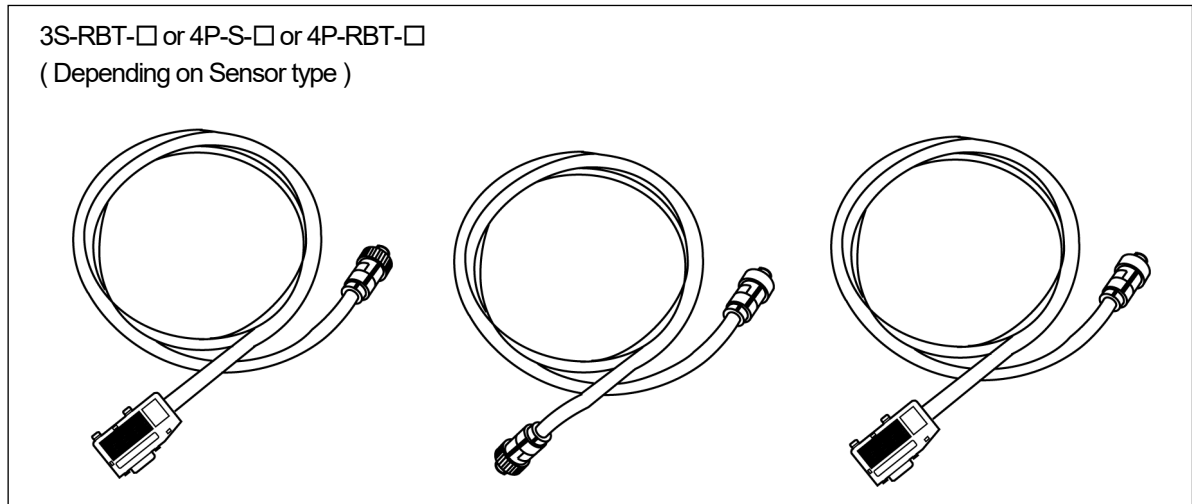
### (1) VS-12PB



### (2) ABSOCODER Sensor



### (3) Sensor Cable



## 7-2. Installation Condition & Precautions

The installation conditions and precautions for each of the system components are described in this section.

### 7-2-1. Controller Installation

When installing the VS-12PB controller, the following conditions and precautions should be observed.

#### ● Installation Site

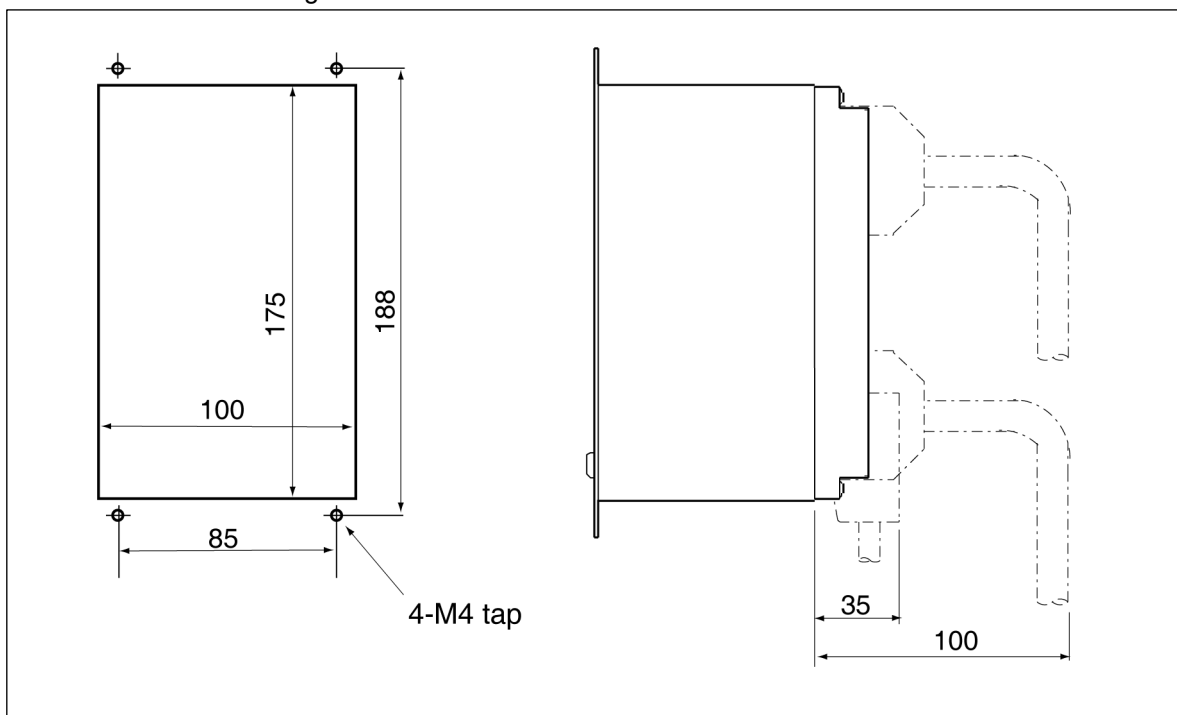
The following conditions should be satisfied:

- ① Avoid sites where the unit is exposed to direct sunlight.
- ② The ambient temperature should never exceed a 0 - 55°C range.
- ③ The ambient humidity should never exceed a 20 - 90% RH range.
- ④ Do not install the unit in areas where condensation is likely to occur (high humidity with extreme temperature changes).
- ⑤ Avoid sites where dust is excessive.
- ⑥ Do not install in areas with an excessive amount of salt and / or metal chips.
- ⑦ Do not install in areas where flammable and / or corrosive gases are present.
- ⑧ Avoid areas where splashing water, oil, or chemicals is likely to occur.
- ⑨ Avoid areas where vibration and shocks are excessive.

#### ● Installation Precautions

- ① The unit should firmly secured by 4 bolts.
- ② Noise prevention measures should be taken.
  - Install as far as possible from high-voltage lines and power lines.
  - Mount on a grounded metal plate.

#### ● Installation Reference Diagram



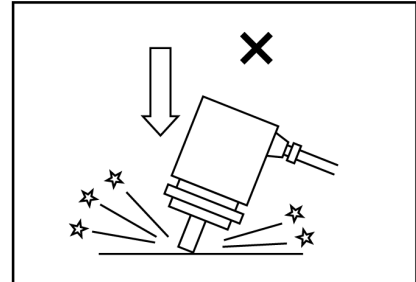
## 7-2-2. ABSOCODER Sensor Installation

For the installation conditions and precautions for ABSOCODER sensor, refer to ABSOCODER Handling Guide (NSP-99022). This manual is available upon request.

### Note

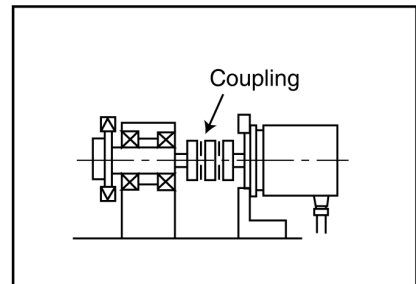
#### (1) Installation of rotary type (MRE) ABSOCODER sensor

- ① Do not subject the sensor to excessive shocks and unbalanced loads.



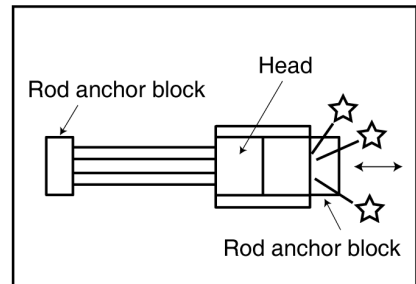
- ② If connected to a shaft, a coupling format should be used.

\* Contact your NSD representative for the selection of coupling device.

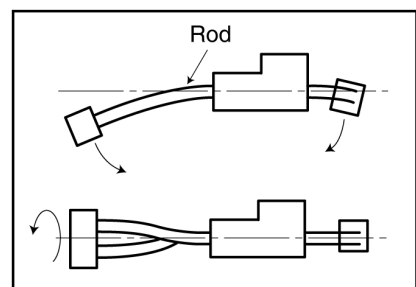


#### (2) Installation of linear type (VLS) ABSOCODER sensor

- ① Avoid a configuration in which an impact occurs between the rod anchor blocks and the head.

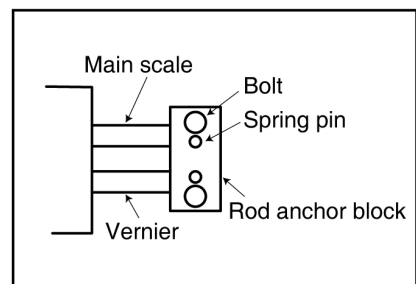


- ② Avoid bending or twisting the sensor rod.



- ③ Never remove or loosen the bolts and spring pins at the rod anchor blocks.

\* The main scale and vernier have been positioned relative to the rod anchor blocks. Therefore if the blocks are removed, normal operation will be impossible.

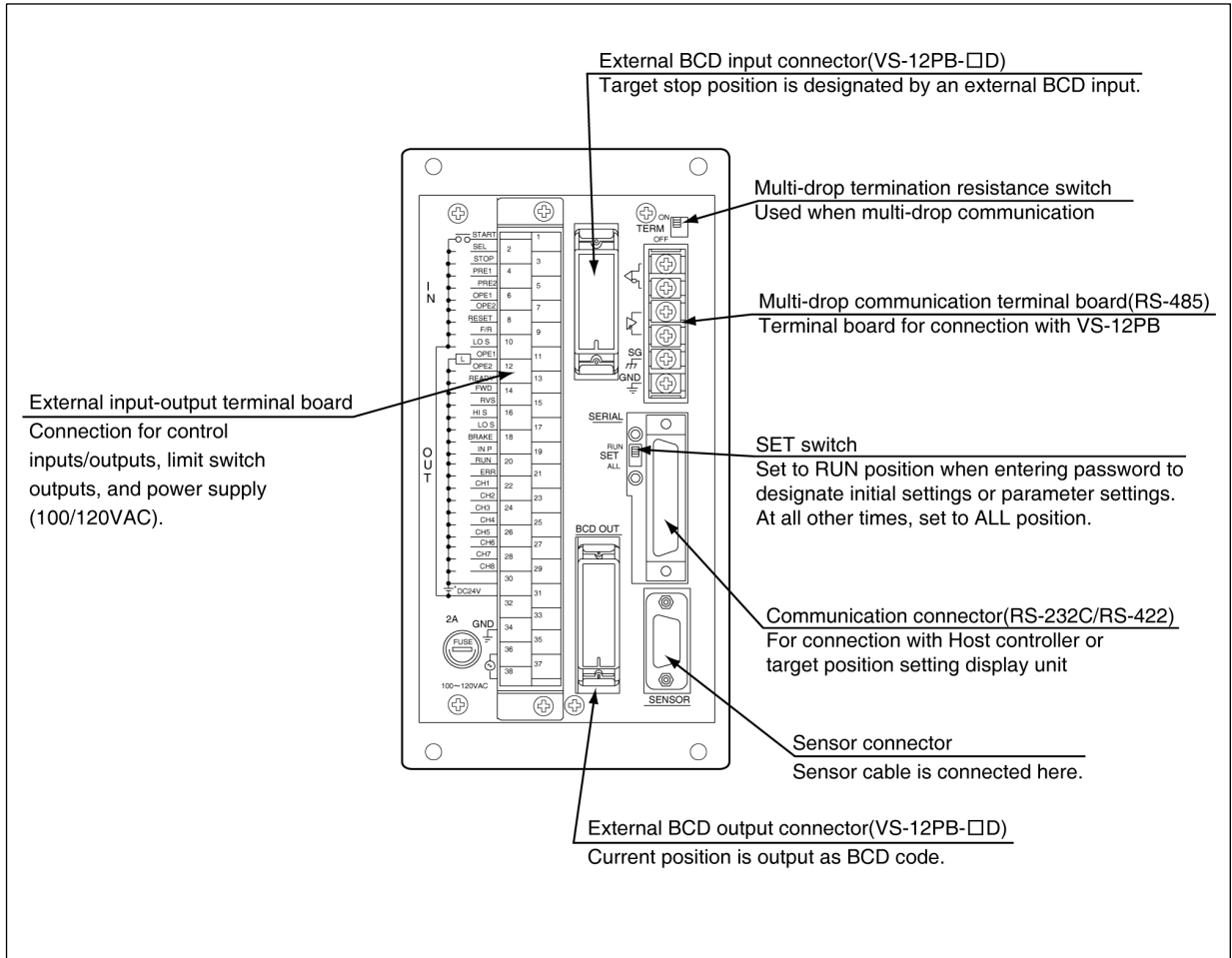




# 8. Wiring

## 8-1. Terminal Board & Connector Connection

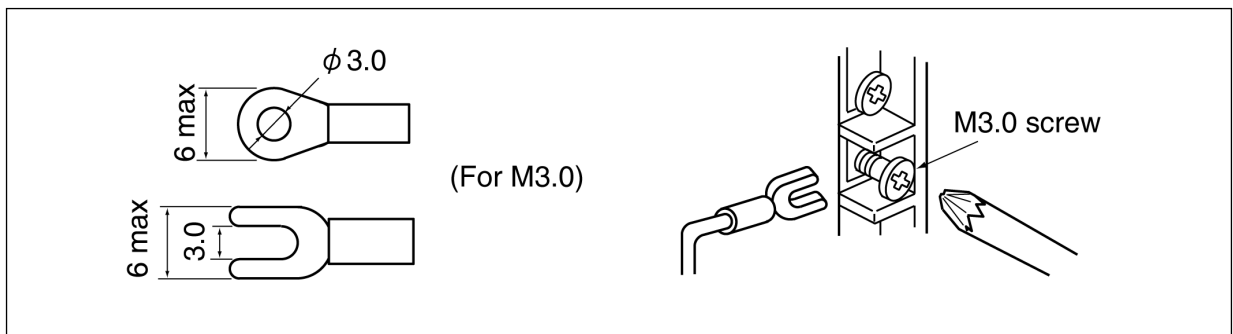
●The VS-12PB terminal and connector names (rear face)



●Crimp Type Terminal Connection

Crimp type terminals must satisfy the following requirements.

- An M3.0 screw must be used. The crimp terminal type shown below must be used.



## 8-1-1. Power Supply Connection

The power supply should be connected as described below.

### (1) Power Supply

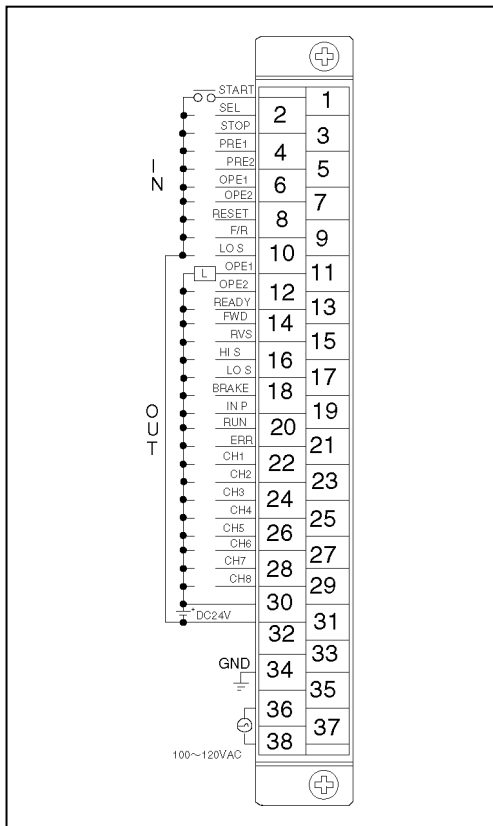
- 100 / 120V, 15VA, 50/60Hz.
- The power cable should be as thick as possible to minimize voltage drops.
- A twisted cable should be used.

### (2) Ground

- The unit should be securely grounded (ground resistance of 100 ohm or less) to prevent electrical shocks.
- The ground cable should be as thick as possible.

## 8-1-2. Control I/O Signals

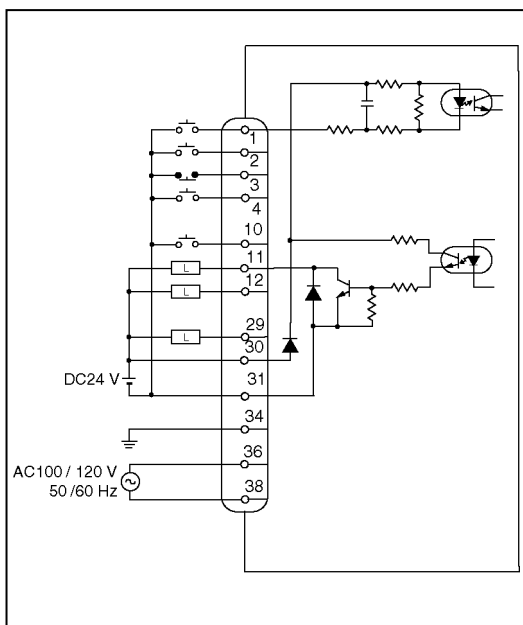
### ● Terminal board wiring diagram



### ● Terminal Names

	Terminal No.	Name	Signal Name	
			Speed-Switching Format	Speed-Stepping Format
Input	1	START	Start	
	2	SEL	Target stop position select	
	3	STOP	Stop	
	4	PRE1	PRE input 1	
	5	PRE2	PRE input 2	
	6	OPE1	Operation selection 1	
	7	OPE2	Operation selection 2	
	8	RESET	Error cancel	
	9	F/R	FWD / RVS selection	
	10	LOS	Low-speed	
Output	11	OPE1	Operation selection answerback 1	
	12	OPE2	Operation selection answerback 2	
	13	READY	System ready	
	14	FWD	Forward	Forward, low-speed
	15	RVS	Reverse	Reverse, low-speed
	16	HIS	High-speed	
	17	LOS	Low-speed	Medium-speed
	18	BRAKE	Brake release	
	19	INP	In-Position	
	20	RUN	Positioning in progress	
	21	ERR	Operation error	
	22	CH.1	Limit SW channel 1	
	23	CH.2	Limit SW channel 2	
	24	CH.3	Limit SW channel 3	
	25	CH.4	Limit SW channel 4	
	26	CH.5	Limit SW channel 5	
	27	CH.6	Limit SW channel 6	
	28	CH.7	Limit SW channel 7	
	29	CH.8	Limit SW channel 8	
Power/ Ground	30	DC24V+	24 VDC(+) power supply for I/O	
	31	DC24V-	24 VDC(-) power supply for I/O	
	32	—	Vacant	
	33	—	Vacant	
	34	GND	Ground	
	35	—	Vacant	
	36	ACH	100 / 120 VAC power supply	
	37	—	Vacant	
	38	ACL	100 / 120 VAC power supply	

### ● Circuit Diagram



●Wiring Example

Perform the wiring with reference to the illustration below.

**Note**

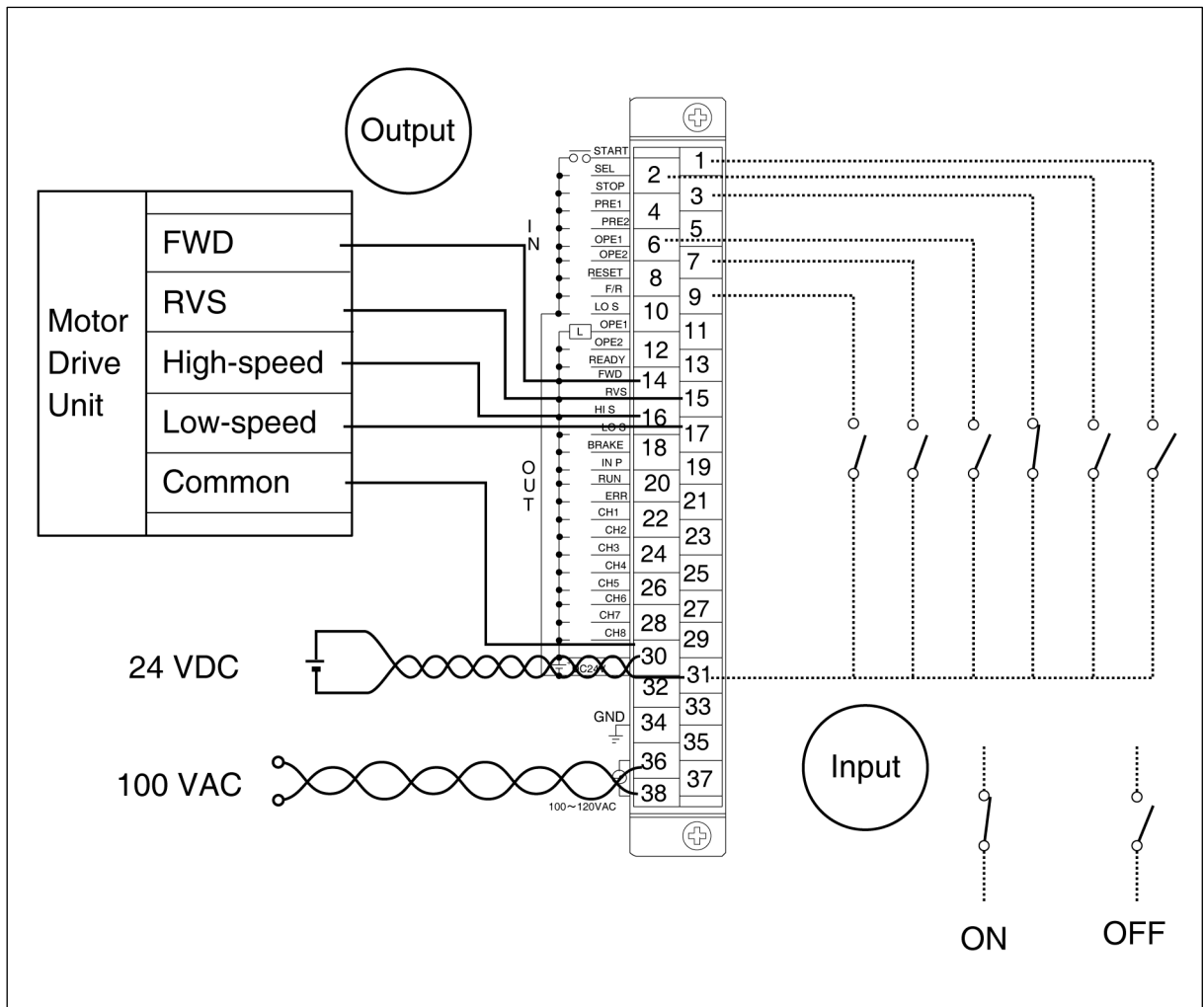
The VS-12PB has no power switch. ON/OFF switching is performed by an external switch.

Output signals are indicated by solid lines, and input signals by dotted lines.

Incorrect wiring could cause malfunctions and equipment failure.

**Note**

- For details regarding connections to motor drive units (inverters), refer to the relevant operation manuals.
- The VS-12PB will not operate unless both 24 VDC and 100 VAC cables are connected.



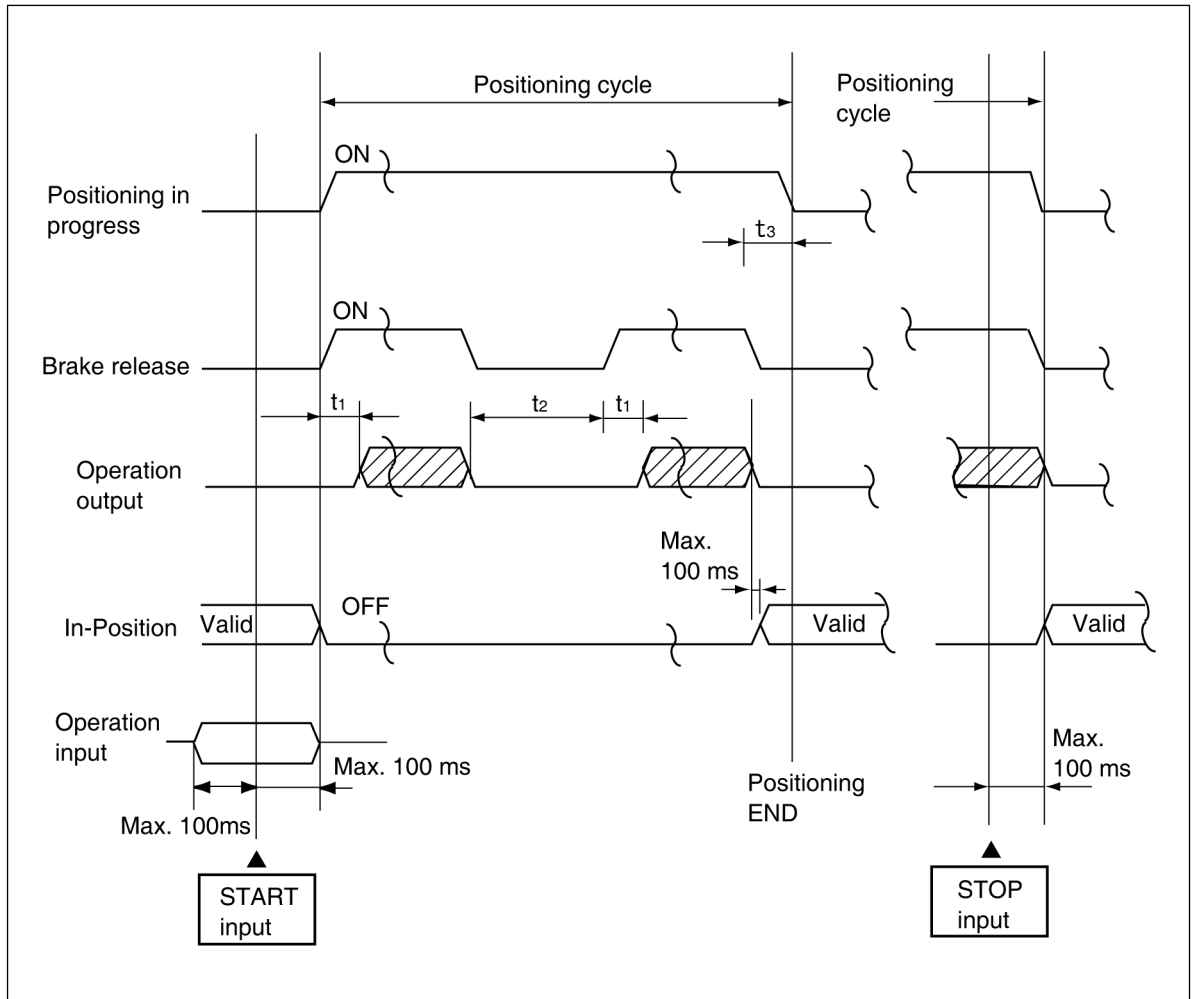
● Signal name and description

	Name	Signal Name		Description															
		Speed-Switching Format	Speed-Stepping Format																
Input	START	Start		Inputs the positioning START signal. Positioning begin when this signal switches from OFF to ON.															
	SEL	Target stop position select		Selects the target position for automatic positioning. <table border="1" style="margin-top: 5px;"> <thead> <tr> <th>SEL input</th> <th colspan="3">Target position</th> </tr> </thead> <tbody> <tr> <td>ON</td> <td colspan="3">P1</td> </tr> <tr> <td>OFF</td> <td>P0</td> <td>External BCD input</td> <td>Serial communication input</td> </tr> </tbody> </table> The P0 and P1 positioning target positions are specified in the program. The SEL input OFF target position is determined by the parameter No.40 setting.	SEL input	Target position			ON	P1			OFF	P0	External BCD input	Serial communication input			
	SEL input	Target position																	
	ON	P1																	
	OFF	P0	External BCD input	Serial communication input															
	STOP	Stop		Stops the positioning operation. Positioning stops when this signal is OFF (brake-contact input).															
	PRE1	PRE input 1		This is the current position preset 1 input. When switched from OFF to ON, travel direction is identified and a current position preset is performed.															
	PRE2	PRE input 2		This is the current position preset 2 input. When switched from OFF to ON, travel direction is identified and a current position preset is performed. When "machine position confirmation" function is selected, the current position is compared with the reference position.															
	OPE1	Operation selection 1		Selects the positioning operation. <table border="1" style="margin-top: 5px;"> <thead> <tr> <th>Signal</th> <th>Operation</th> <th>Auto Positioning</th> <th>INCH Positioning</th> <th>JOG</th> </tr> </thead> <tbody> <tr> <td>OPE1</td> <td></td> <td>OFF</td> <td>ON</td> <td>ON</td> </tr> <tr> <td>OPE2</td> <td></td> <td>ON</td> <td>ON</td> <td>OFF</td> </tr> </tbody> </table>	Signal	Operation	Auto Positioning	INCH Positioning	JOG	OPE1		OFF	ON	ON	OPE2		ON	ON	OFF
	Signal	Operation	Auto Positioning		INCH Positioning	JOG													
OPE1		OFF	ON	ON															
OPE2		ON	ON	OFF															
OPE2	Operation selection 2																		
RESET	Error cancel		Used to cancel an error status.																
F/R	FWD / RVS selection		Selects the travel direction for INCH and JOG operations. (ON: Reverse, OFF: Forward)																
LOS	Low- speed		Selects the travel speed for INCH and JOG operations. (ON: High-speed, OFF: Low-speed)																
Output	OPE1	Operation selection answerback 1		Outputs the currently selected positioning operation. The output ON/OFF signals are identical to the OPE1 and OPE2 input signals.															
	OPE2	Operation selection answerback 2																	
	READY	System ready		Switches ON when the system and sensor are normal (in RUN and TEST mode).															
	FWD	Forward	Forward,low-speed	Positioning control outputs	Forward														
	RVS	Reverse	Reverse,low-speed		Reverse														
	HIS	High-speed			High-speed														
	LOS	Low-speed	Medium-speed		Low-speed at speed switching, or medium-speed at speed additions.														
	BRAKE	Brake release			Brake release														
	INP	In-Position			Switches ON when current position enters the target position's in-position zone.														
	RUN	Positioning in progress			Switches ON while positioning is in progress.														
ERR	Operation error		Switches outputs OFF when an operation error occurs.																
CH.1 to 8	Limit switch channel		Outputs the limit switch signals.																

●Control Timing

The timing for each of the control signals is as shown below.

●Control timing for “overshoot” positioning when positioning START signal switches ON:



① The “ $t_1$ ,  $t_2$ , and  $t_3$ ” times shown above represent the following:

- $t_1$ : The delay period from the point when the brake is released, until the point when the operation output switches ON. (10 ms)
- $t_2$ : The stop time required for a U-turn when overshooting occurs. After the operation switches OFF and the brake switches ON (occurs simultaneously), a STOP status will be recognized based on the amount proceed to the next operation.
- $t_3$ : The delay period (after positioning is stopped) from the brake ON point, to the point when the RUN signal goes OFF (positioning completed). This delay period is designated by a parameter setting (positioning END detection timer).

② During RETRY operations, the RUN signal will not switch OFF.

③ Do not change the operation input within a period of 100 ms before or after the operation START .  
Operation input signal: SEL, STOP, OPE1, OPE2, F/R, LOS, BCD

**Note**

Error No.40 occurs if the operation input signal statuses are changed 100 ms before or after a START input.

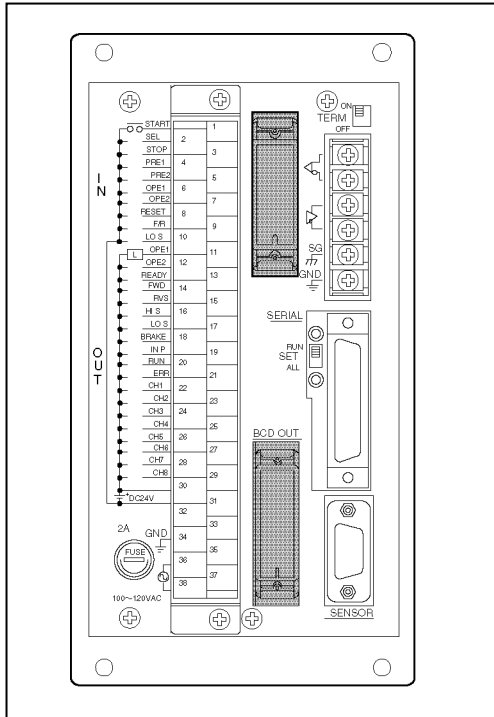
### 8-1-3. BCD Input / Output Connections

The BCD input / output connections are as shown below. The VS-12PB[ ]-D Model is equipped with this BCD input / output function.

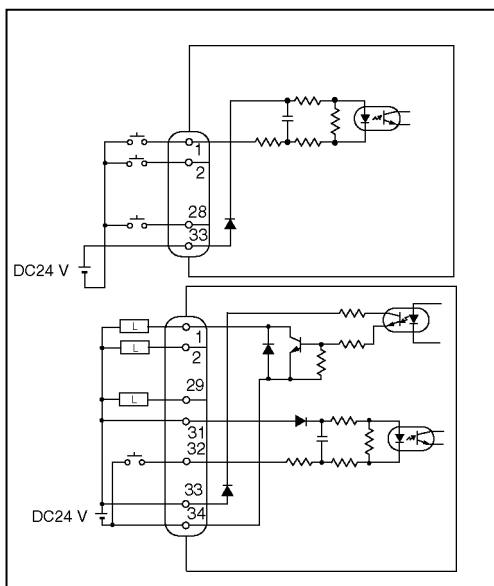
● Connector Pin layout

Model: MR-34RMA

The same model is used for both the input and output connectors.



● Circuit Diagram



● Signal Names

Pin No.	Signal Name			
	BCD Input connector		BCD Output connector	
1	BCD INPUT	1×1	BCD OUTPUT	1×1
2	BCD INPUT	1×2	BCD OUTPUT	1×2
3	BCD INPUT	1×4	BCD OUTPUT	1×4
4	BCD INPUT	1×8	BCD OUTPUT	1×8
5	BCD INPUT	10×1	BCD OUTPUT	10×1
6	BCD INPUT	10×2	BCD OUTPUT	10×2
7	BCD INPUT	10×4	BCD OUTPUT	10×4
8	BCD INPUT	10×8	BCD OUTPUT	10×8
9	BCD INPUT	100×1	BCD OUTPUT	100×1
10	BCD INPUT	100×2	BCD OUTPUT	100×2
11	BCD INPUT	100×4	BCD OUTPUT	100×4
12	BCD INPUT	100×8	BCD OUTPUT	100×8
13	BCD INPUT	1000×1	BCD OUTPUT	1000×1
14	BCD INPUT	1000×2	BCD OUTPUT	1000×2
15	BCD INPUT	1000×4	BCD OUTPUT	1000×4
16	BCD INPUT	1000×8	BCD OUTPUT	1000×8
17	BCD INPUT	10000×1	BCD OUTPUT	10000×1
18	BCD INPUT	10000×2	BCD OUTPUT	10000×2
19	BCD INPUT	10000×4	BCD OUTPUT	10000×4
20	BCD INPUT	10000×8	BCD OUTPUT	10000×8
21	BCD INPUT	100000×1	BCD OUTPUT	100000×1
22	BCD INPUT	100000×2	BCD OUTPUT	100000×2
23	BCD INPUT	100000×4	BCD OUTPUT	100000×4
24	BCD INPUT	100000×8	BCD OUTPUT	100000×8
25		Vacant		Vacant
26		Vacant		Vacant
27		Vacant		Vacant
28		Minus symbol input		Minus symbol output
29		Vacant		Latch pulse output
30		Vacant		Vacant
31		Vacant		DTC input +
32		Vacant		DTC input -
33		24VDC +		24VDC +
34		Vacant		24VDC -

● Signal Names & descriptions

	Signal Name	Description
Input	BCD input	Target stop position is designated by an external input.
	Minus symbol input	A minus symbol input is executed.
	DTC input *	A current position value "HOLD" status is established.
Output	BCD output	The current position value is output in BCD code.
	Minus symbol output	Output occurs when the current position is a minus value.
	Latch pulse output	A timing output to ensure that the current position value is read while stable.

**Note**

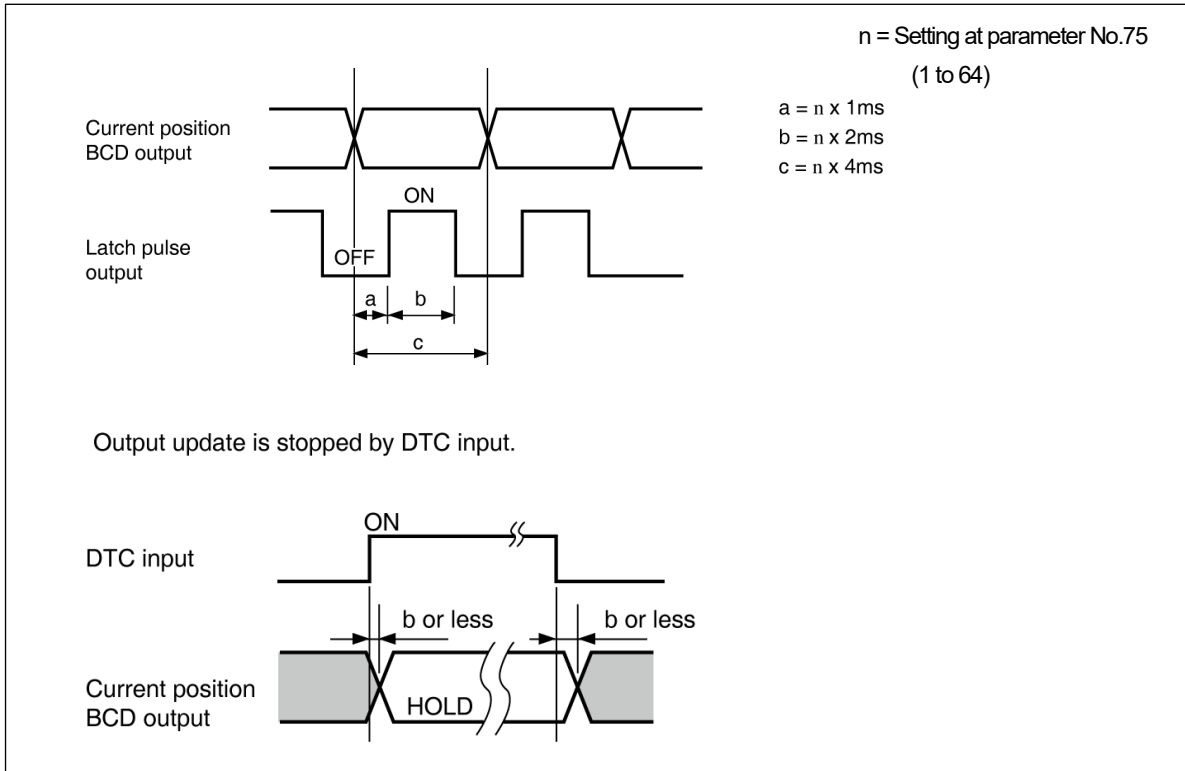
DTC input signal is connected to the BCD output connector.

●BCD (current position) Output Reading Timing

The BCD (current position) output can be read by either of the following two ways:

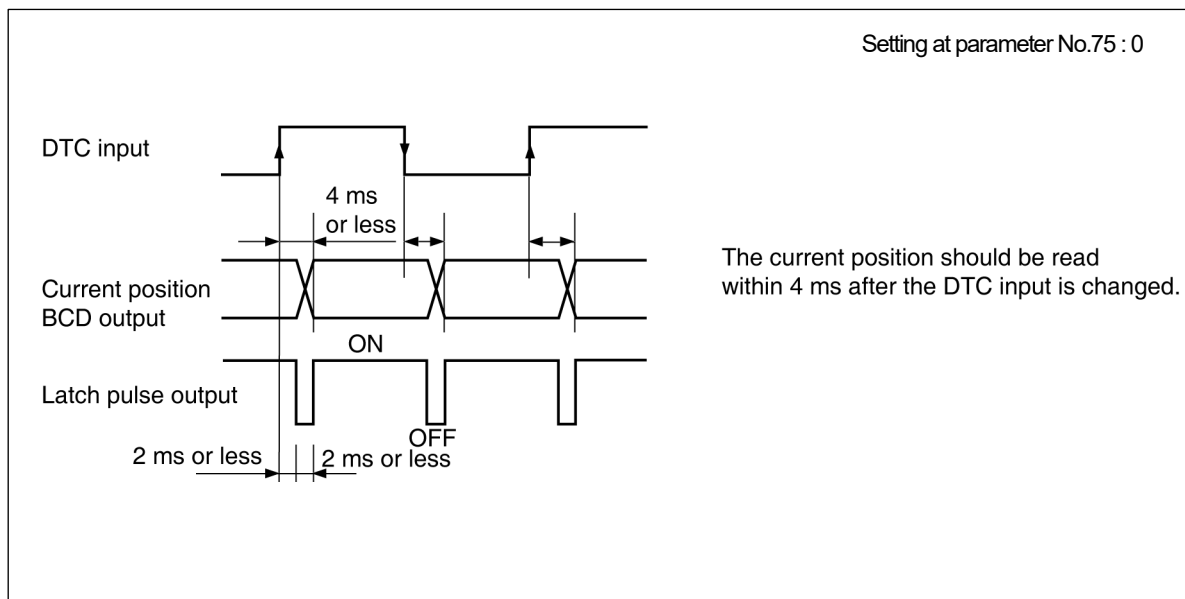
① Current Position Reading At Latch Pulse Output ON

The current position output stabilizes when the latch pulse output switches ON, and is read at that time. When the latch pulse is OFF, the current position is being updated, and is therefore unstable.



② Current Position Output By External DTC Input

The current position value is updated when the DTC input is changed. The DTC input is changed from a programmable controller, etc., the data is updated, and the current position is then read. With this format, current position reading can be synchronized with the programmable controller's scan time.





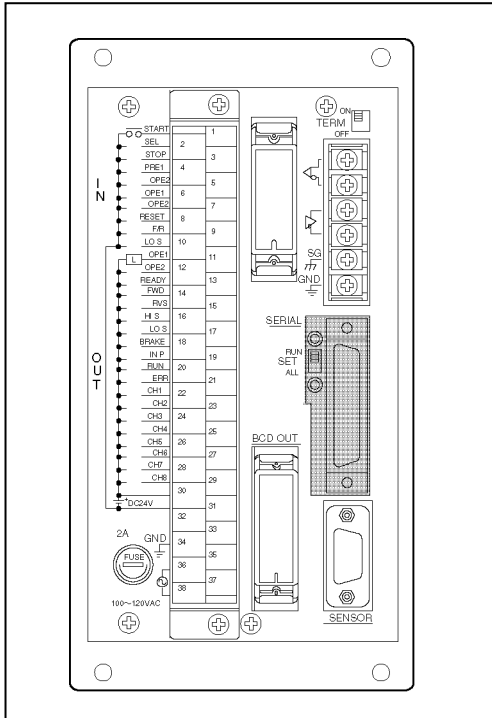
## 8-1-4. Communication Connector (RS-232C, RS-422)

The communication connections are described below.

### Notes

- The RS-232C and RS-422 formats cannot be used together.
- Pin No.6 (DSR) and 20 (DTR) connections are inside the VS-12PB.

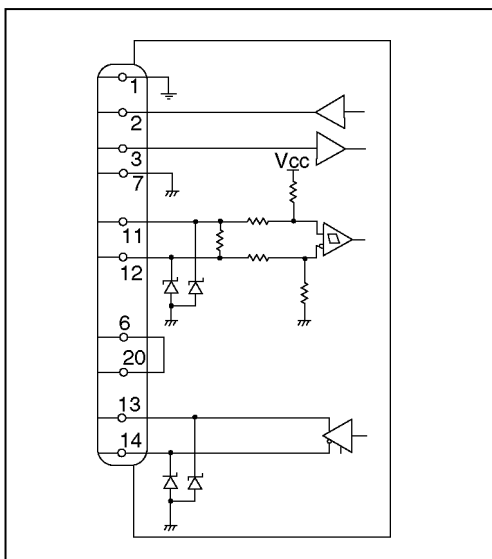
### ●Connector Layout



### ●Signal Names

Pin No.	Signal Name	Description	
1	F.G	Shield	
2	TXD1	Transmission data	RS-232C
3	RXD1	Reception data	
4	RTS		
5	CTS		
6	(DSR)		
7	0V	Signal GND	
8			
9			
10			
11	RXD2+	Reception data +	RS-422
12	RXD2-	Reception data -	
13	TXD2+	Transmission data +	
14	TXD2-	Transmission data -	
15			
16			
17			
18			
19			
20	(DTR)	RS-232C	
21			
22			
23			
24			
25			

### ●RS-232C / RS-422 Communication Circuit Connector :DBLC-J25SAF-13L6 (JAE)



### Note

Don't connect to unused pins.

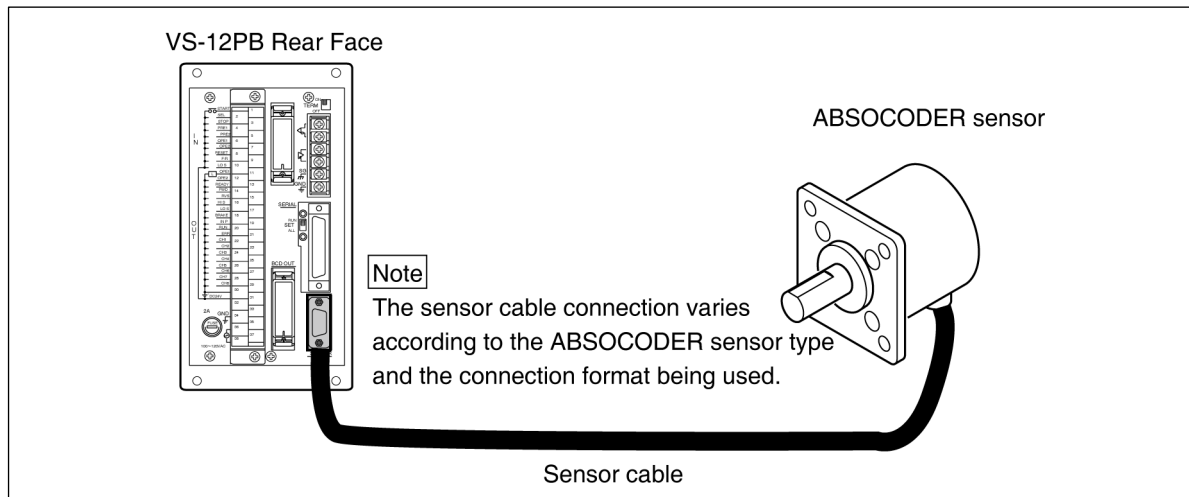
## 8-2. Sensor Cable Connection

The VS-12PB and ABSOCODER sensor connection is described below.

The special NSD sensor cable must be used for this purpose.

The maximum sensor cable length varies according to the ABSOCODER sensor and cable models being used. (Refer to section 4-2. for details.)

### ● Sensor Cable Connection Diagram



### ● Wiring Precautions

Precautions	
The sensor cable should be clamped as shown at right to prevent excessive tension from being applied to the cable connectors.	
The sensor cable should be located as far as possible from power lines and other lines which generate a high level of electrical noise.	
If the cable movement (when used at moving component) is such that it is bent into a U-shape, a robotic cable should be used. The bend radius should never be less than 75 mm.	

# OPERATION SECTION

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## 9. Operation

# 9. Operation

This section described the VS-12PB operation procedures.

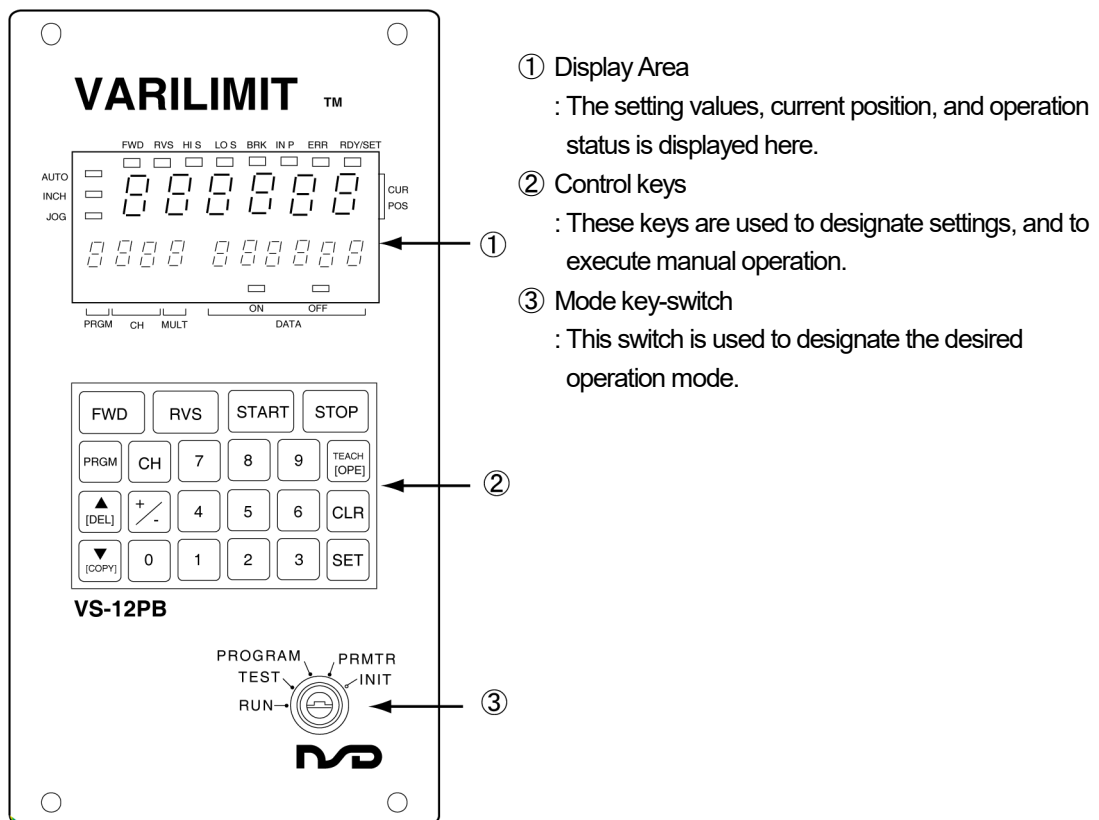
## 9-1. Before Beginning Operation

The control panel nomenclature and the operation sequence are described below.

### 9-1-1. Control Panel Nomenclature

A description of the VS-12PB control panel is provided below. Be sure to study this information carefully before attempting operation.

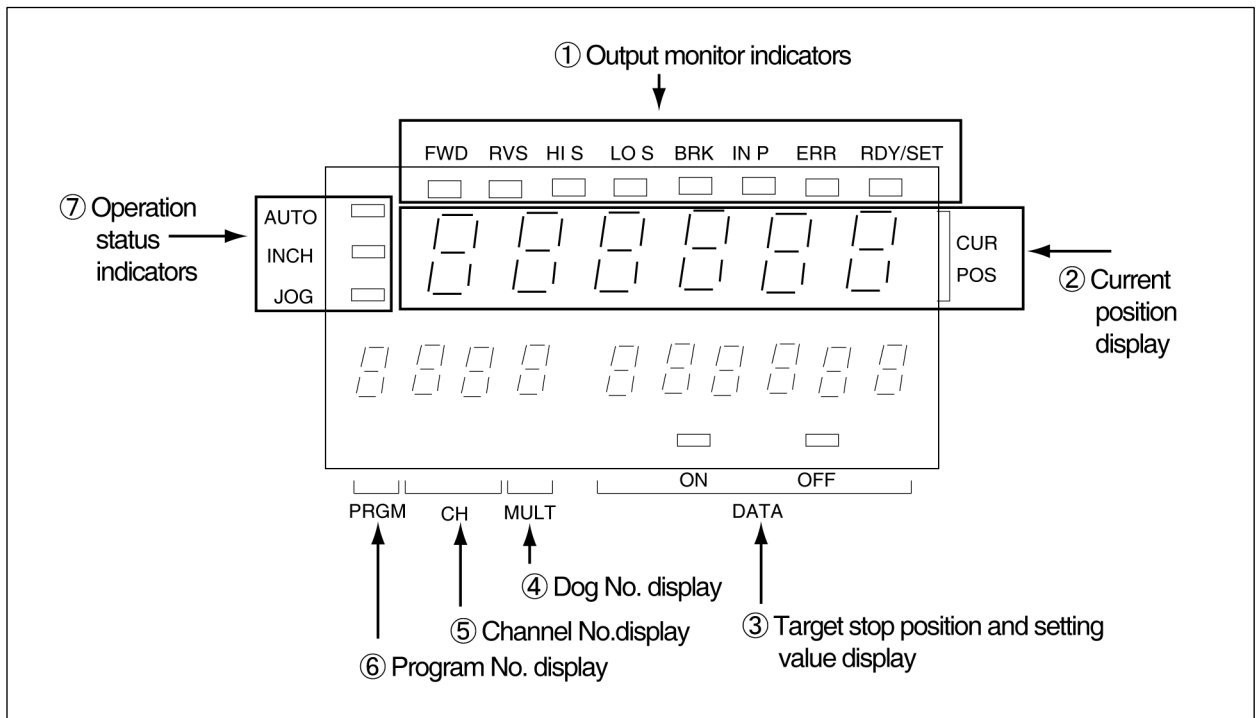
The VS-12PB control panel consists of 3 main areas, as shown below.



Detailed descriptions of the above items are given in the following pages.

① Display Area

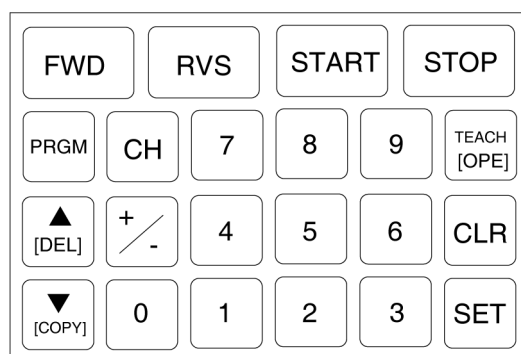
The display area consist of the data value display, and the output and operation status LED indicators.



	Names	Description																
①	Output monitor indicators	<p>These are the positioning output status indicators.</p> <table border="1"> <tr> <td>FWD</td> <td>On When the FORWARD signal output occurs.</td> </tr> <tr> <td>REV</td> <td>On when the REVERSE signal output occurs.</td> </tr> <tr> <td>HIS</td> <td>ON when the HIGH-SPEED signal output occurs.</td> </tr> <tr> <td>LOS</td> <td>ON when the LOW-SPEED or MEDIUM-SPEED signal output occurs.</td> </tr> <tr> <td>BRK</td> <td>ON when the BRAKE release signal output occurs.</td> </tr> <tr> <td>INP</td> <td>ON when the current position is within the target stop position's INPOSITION zone.</td> </tr> <tr> <td>ERR</td> <td>ON when an operation error is detected.</td> </tr> <tr> <td>RDY / SET</td> <td>ON when the system is functioning normally, and when the setting data is operative.</td> </tr> </table>	FWD	On When the FORWARD signal output occurs.	REV	On when the REVERSE signal output occurs.	HIS	ON when the HIGH-SPEED signal output occurs.	LOS	ON when the LOW-SPEED or MEDIUM-SPEED signal output occurs.	BRK	ON when the BRAKE release signal output occurs.	INP	ON when the current position is within the target stop position's INPOSITION zone.	ERR	ON when an operation error is detected.	RDY / SET	ON when the system is functioning normally, and when the setting data is operative.
FWD	On When the FORWARD signal output occurs.																	
REV	On when the REVERSE signal output occurs.																	
HIS	ON when the HIGH-SPEED signal output occurs.																	
LOS	ON when the LOW-SPEED or MEDIUM-SPEED signal output occurs.																	
BRK	ON when the BRAKE release signal output occurs.																	
INP	ON when the current position is within the target stop position's INPOSITION zone.																	
ERR	ON when an operation error is detected.																	
RDY / SET	ON when the system is functioning normally, and when the setting data is operative.																	
②	Current position display	The current position value and values which have been corrected by the Learning function are displayed here. During positioning operations, only the current position is displayed.																
③	Setting value display	Target stop position and setting values are displayed here. Error codes are displayed here when an error is detected.。																
④	Dog No. display	Dog Nos. 0-9 are displayed here.																
⑤	Channel No. display	When in the PROGRAM mode, channel Nos. 1-8 are displayed here. When in the INIT or PRMTR modes, the parameter Nos. and initial Nos. are displayed.																
⑥	Program No. display	Program Nos. 0-1 are displayed here.																
⑦	Operation status indicators	AUTO: ON during automatic positioning operations. INCH: ON during inching positioning operations. JOG: ON during jog operations.																

## ② Control Keys

The control key functions are described below.



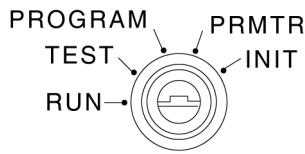
R: RUN mode T: TSET mode I: INIT mode PM: PARAMETER mode PG: PROGRAM mode

Key	Name	Description	Mode Where Operative				
			R	T	I	PM	PG
	FORWARD key	Used to execute forward travel during JOG operations.					
	REVERSE key	Used to execute reverse travel during JOG operations.		○			
	START key	Used to start positioning at AUTO and INCHING operation.					
	STOP key	Used to execute a forced stop of an AUTO or INCHING positioning operation.		○			
	PROGRAM key	Used to designate the desired program No.			○	○	○
	CHANNEL key	Used to designate the desired parameter No.			○	○	
		Used to designate the desired channel No.					○
	UP key	Each time this key is pressed, the value of the dog output ON/OFF position will be increased.					○
		Each time this key is pressed, the parameter No. will be increased.			○	○	
	DATA DELETE key	Used to delete the dog output ON/OFF position data.					○
	DOWN key	Each time this key is pressed, the value of the dog output ON/OFF position will be decreased.					○
		Each time this key is pressed, the parameter No. will be decreased.			○	○	
	DATA COPY key (Channel copy also possible)	This key is used to copy the dog output ON/OFF position data of a given program to another program. (Operative during communication operations.)					○
	+/- symbol key	Used to enter a minus setting value. It is also used to change a minus value to a plus value.		○	○	○	○
	Sub-Parameter No. key	Used to designate the Sub-No. or a given parameter No. (e.g.: 80-1.80-6. 46-1.46-2)			○	○	
	Ten-Key	Used to enter setting values, program Nos., and channel Nos.		○	○	○	○
	TEACH key	Used to designate the current position (actual machine position) as a position setting.				○	○
	Positioning Operation Switching key	Used to designate the desired positioning operation.		○			
	CLEAR key	Used to delete a displayed value during setting operations.		○	○	○	○
		Used to cancel an error status (reset key).	○	○	○	○	○
	SET key	Used to register a designated setting.			○	○	○
	Limit SW Output key	Used to execute limit SW outputs.		○			

### ③ Mode Key-Switch

This switch is used to designate any one of the 5 modes described below.

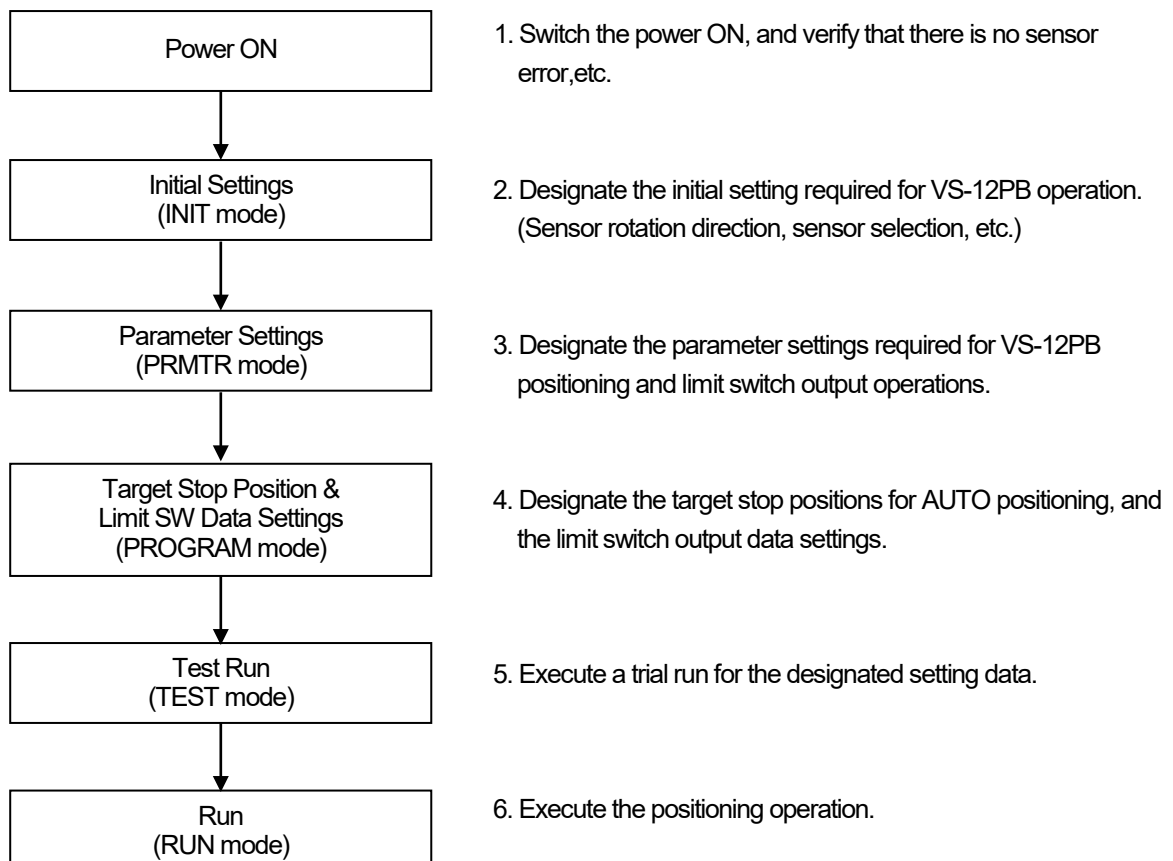
These modes can be divided into 2 main categories : Setting modes, and Operation modes.



	Mode	Description
Setting Modes	INIT (Initial Setting)	The INIT mode is used to designate the initial settings required for VS-12PB operation (communication specs., sensor selection, scale length, etc.).
	PRMTR Mode (Parameter Setting)	The PRMTR mode is used to designate the parameter settings required for VS-12PB positioning control, and for the limit switch output function.
	PROGRAM Mode	The PROGRAM mode is used to designate and edit the target stop position and limit switch output data.
Operation Modes	TEST (Test Run)	The TEST mode is used to execute a trial runs for each of the positioning operations (AUTO, INCH, JOG) from the VS-12PB control panel.
	RUN	The RUN mode is used to execute positioning control and limit switch output operation.

## 9-1-2. Operation Sequence

The basic VS-12PB operation sequence is shown below.



## 9-2. Power ON

The VS-12PB has no power switch. ON/OFF switching is performed by an external switch.

### Note

- Before switching the power on, verify that the wiring is correct, and that there are no loose terminal connections.
- Be sure to connect the VS-12PB init to the ABSOCODER sensor.
- An error may occur if the power is switched ON when in the following.

Mode	Error No.	Cancel Method
TEST·RUN	Error 51	Cancels when initial setting is specified.
TEST·RUN	Error 80	Cancels when 24VDC is supplied to the control input/output terminal board.
RUN	Error 52	Cancels when external input signals (OPE1, OPE2) are input.

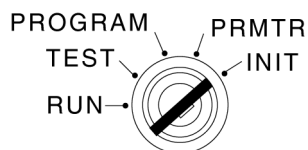
## 9-3. Designating The Initial Settings

### 9-3-1. Basic initial settings

The basic initial settings for the VS-12PB is described below.

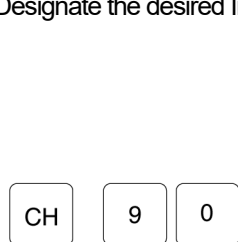
Refer to the following page for details regarding initial Nos. 90 to 95.

[1] Select the INIT mode.

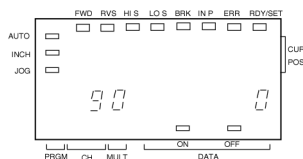


Turn the mode key-switch to the INIT.

[2] Designate the desired Initial No.



Press the **CH** key, then enter the appropriate numeric values.



### Note

If Error 51 occurs when in the TEST or RUN mode, key in the setting data using the ten-key pad and the **SET** key, even if the displayed data is the same as the setting. Press the **+ / -** key to select the initial number's sub-number.

[3] Enter the data setting.



Key in the setting value.

[4] Register (write) the setting.

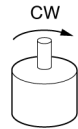

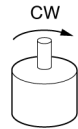

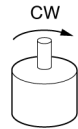



Press the **SET** key to register the designated settings. At that time, the displayed Initial or Parameter No. will automatically change to the next No.



## 9-3-2. Initial Settings

Be sure to specify the following initial settings (initial Nos. 90 to 95) before beginning VS-12PB operation. Failure to do so will result in Error 51 when the TEST or RUN mode is selected.

Init. No.	Item	Description	Setting Data	Setting value									
90	Sensor rotation direction selection	Designates the sensor rotation (travel) direction.	CW: 0 CCW: 1										
		<table border="1"> <tr> <td></td> <td>Multi-turn type </td> <td>Linear type </td> </tr> <tr> <td>CW</td> <td>Current position value is increased by CW rotation.</td> <td>Current position value is increased by rightward direction travel.</td> </tr> <tr> <td>CCW</td> <td>Current position value is increased by CCW rotation.</td> <td>Current position value is decreased by leftward direction travel.</td> </tr> </table>				Multi-turn type 	Linear type 	CW	Current position value is increased by CW rotation.	Current position value is increased by rightward direction travel.	CCW	Current position value is increased by CCW rotation.	Current position value is decreased by leftward direction travel.
					Multi-turn type 	Linear type 							
		CW			Current position value is increased by CW rotation.	Current position value is increased by rightward direction travel.							
CCW	Current position value is increased by CCW rotation.	Current position value is decreased by leftward direction travel.											
91	Decimal point setting	Designates the decimal point position.	000000. : 0 00000.0 : 1 0000.00 : 2 000.000 : 3 00.0000 : 4 0.00000 : 5										
92	Sensor selection	Designates the sensor which is to be used.	MRE : 0 VLS-256PWB : 3 VLS-512PWB : 4 VLS-1024PW : 5 VLS-512PYB : 6 VLS-1024PYB : 7 VLS-2048PY : 8										
93	Scale length	Designates the maximum distance over which position detection is possible.	Setting range [100 to 999999]										
94	Minimum current position value	Designates the minimum current position value which will be displayed.	Setting range [-99999 to 1000000 -scale length]										
95	Current position value	Designates the point within the actual detection range where the machine is currently positioned.	Setting range [Min. current pos. value to (Min. current pos. value + scale length -1)]										

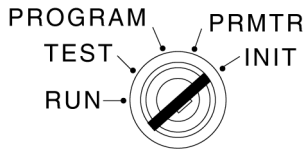
Setting data designated at the Controller should be recorded at Setting Value section above.

### Important

If Error 51 displays when the TEST or RUN mode is selected, key in the setting data using the ten-key pad and the  key, even if the entered setting data is the same as the displayed data.

### 9-3-2-1. Sensor Rotation (Travel) Direction Settings

[1] Select the INIT mode.



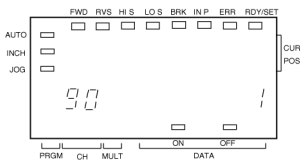
Turn the mode key-switch to the INIT.

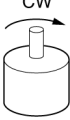
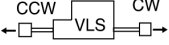
[2] Designate Initial No.90.



Designate the sensor rotation (travel) direction. The sensor rotation (travel) direction indicates the direction in which the current position value increases.

[3] Enter the data setting.(Ex.: 1)



	Rotary type 	Linear type 	Setting data
CW	Current position value is increased by CW rotation.	Current position value is increased in the CW direction.	0
CCW	Current position value is increased by CCW rotation.	Current position value is increased in the CCW direction.	1

[4] Register (write) the setting.



Press the **SET** key to register the designated settings.

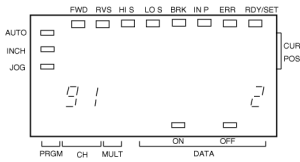
The system will automatically proceed to Initial No.91.

### 9-3-2-2. Decimal point setting (Initial No.91)

Designates the decimal point position.

[1] Setting the decimal point. (Ex. : 2)

2



Press the **2** key.

Setting data	
000000.	0
00000.0	1
0000.00	2
000.000	3
00.0000	4
0.00000	5

[2] Register (write) the setting.

SET

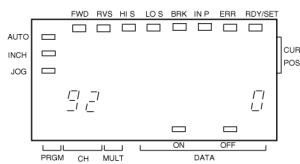
Press the **SET** key to register the designated settings.

Initial No. will automatically change to No.92.

### 9-3-2-3. Sensor selection (Initial No.92)

[1] Select the sensor.(Ex.: MRE)

0



Press the **0** key.

Designates the sensor type which is to be used.

Setting data	
MRE	0
VLS-256PWB	3
VLS-512PWB	4
VLS-1024PW	5
VLS-512PYB	6
VLS-1024PYB	7
VLS-2048PY	8

[2] Register (write) the setting.

SET

Press the **SET** key to register the designated settings.

Initial No. will automatically change to No.93.

### 9-3-2-4. Scale length setting (Initial No.93)

Obtain the required scale length for the sensor in question as shown below.

For multi-turn type (MRE) sensors, this distance is the travel amount which corresponds to the prescribed number of turns for that sensor (32, 64, 160,256,320,640,1280,2560)

For linear type (VLS) sensors, the scale length is indicated in the box portion of the model name. (Ex.VLS-256 PW, VLS-1024 PY)

 **NOTES**

For example, "256" is the Absolute Detection Range and is set as the Scale Length when using VLS-256PW200B; however, the actual stroke length is "200".

#### [1] Scale Length Setting

The scale length would be calculated as shown below when a 128 turn MRE sensor is coupled directly to a ballscrew (lead length of 10mm) feed mechanism where the drive unit's minimum setting unit is 0.01mm (This setting unit is designated at Initial No.91)

Actual detection distance = 10 mm × 128 turns = 1280 mm

$$\text{Scale length} = \frac{\text{Actual detection distance}}{\text{Minimum setting unit}} = \frac{1280}{0.01} = 128000 \quad (1280.00)$$



Designate the scale length using the numerical keys as desired.

**Note**

The setting may not exceed 6 digits. To accommodate settings of more than 6 digits, change the decimal point position.

#### [2] Register (provisional) the Scale length setting.



Press the SET key to register the designated Scale Length setting.

**Note**

Nos.93 and 94 must be set as a pair. The settings are Only valid when both are set. They cannot be set individually.

The system will automatically proceed to Initial No.94.

### 9-3-2-5. Minimum current position value (Initial No.94)

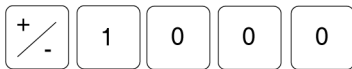
Designates the minimum current position value which will be displayed.

**Note**

Setting range: -99999 to 1000000 - Scale length

[1] Setting the minimum current position value. (Ex.: -10)

Designates the setting value using numeric key as desired.



[2] Enter the data setting.

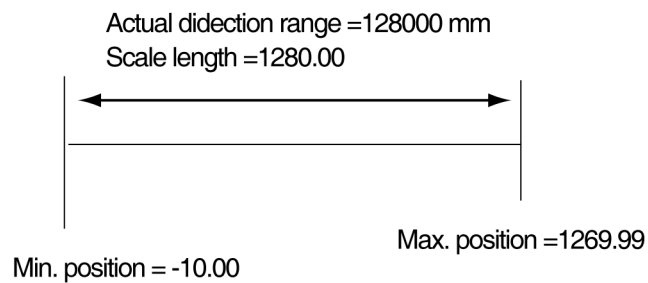


Press the **SET** key twice

**Note**

The **SET** key must be pressed twice to set the data.

The above setting enables position detection through a “-1000 (-10.00) to 126999 (1269.99)” range.



The system will automatically proceed to Initial No.95.

**Note**

Initial No.93 and No.94 setting items must be designated as a pair in order to be valid.

### 9-3-2-6. Current position value setting (Initial No.95)

Designates the point within the actual detection range where the machine is currently positioned.

**Note**

Detection range: -1000(-10.00) to 126999(1269.99)

[1] Setting the current position value. (Ex.: 0 (0.00))



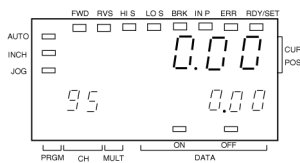
Press the ten-key.

[2] Register (write) the setting.



Press the **SET** key to register the designated setting.

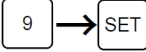
[3] The displayed current position changes.



This complete the description of the required initial settings.

### 9-3-3. Other Initial Settings

The initial settings shown below are required in order to use special functions. If such functions are not being used, these settings should be left at their default (factory set) values.

Init. No.	Item	Description	Setting Data	Setting value
80-1	Multi-drop communication selection	Designate whether or not multidrop communication format (RS-485) is to be used between VS-12PB units.	NO: <input type="text" value="0"/> YES: 1	
80-6	Slave No. selection	Specifies the unit No. communication with multiple units. Set to "0" if connected to the host controller.	0 to 31 <input type="text" value="1"/>	
81	Communication specifications selection	Selects the communication specifications in systems where communication is to occur with a host controller. (Select "3:VS-T12 (VS-T12B)" if connected to the positioning setting display unit. See Note 1.)	NO: <input type="text" value="0"/> RS-232C: 1 RS-422: 2 VS-T12 (VS-T12B): 3	
82	Permissible communication setting range	Selects the setting change range in systems where settings can be changed from a host controller. * Settings changed in this manner are lost at power OFF.	82-1 Initial settings NO: <input type="text" value="1"/>	
			82-2 Parameter 1 (PRMTR:60 to 75) NO: <input type="text" value="1"/> YES: 2	
			82-3 Parameter 2 (PRMTR:40 to 55) NO: <input type="text" value="1"/> YES: 2	
			82-4 Program NO: <input type="text" value="1"/> YES: 2	
82-5	Command communication	Designates whether or not communication control is possible.	NO: <input type="text" value="1"/> YES: 2	
83	Communication format selection	Designates the format for communication with Host Controller.	Personal computer: <input type="text" value="0"/> AJ71C24-S8: 1 VS-T12 (VS-T12B): 2	
85	Brake monitor	Designates whether or not an operation error will be detected based on the braking count	NO: <input type="text" value="0"/> YES: 1	
86	Braking count display & 0 set	The braking count is displayed. Reset is possible by entering password as follows: 	<input type="text" value="0"/> The actual braking count value is the displayed value × 1000.	
87	Max. braking count setting	Sets the maximum number of brake operations.	Setting range: [1 to 999999] <input type="text" value="999999"/> The actual braking count value is the displayed value × 1000.	
89	Downloading enabled selection	Designates whether or not down loading by communication format is possible. <b>Note</b> "1" must be designated for each downloading operation.	NO: <input type="text" value="0"/> YES: 1	

#### Note 1

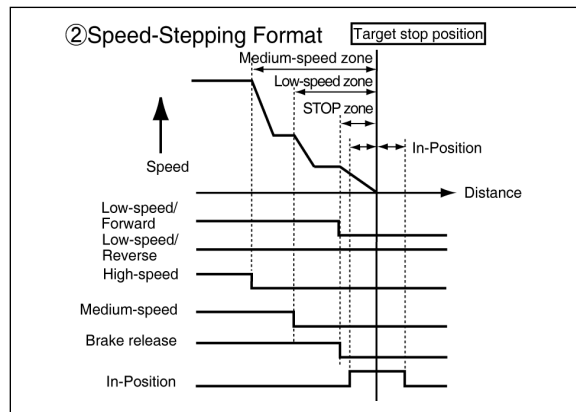
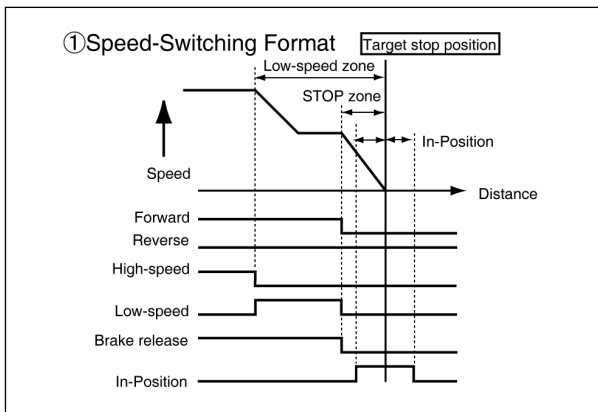
When "3: VS-T12 (VS-T12B)" is selected, the setting data at initial setting Nos. 80-1, 82, 83, and at parameter No.40 become invalid, and the VS-T12 (VS-T12B) is enable in the controller.

# 9-4. Parameter Settings

Parameter settings are used in positioning operations to determine such things as the low- speed range and the braking timing, etc. They also determine the function settings for the various functions which are used (e.g. the limit switch output function). Be sure to check the functions which are to be used before specifying the parameter settings.

## 9-4-1. Setting Items for Dual Speed Positioning

Parameter No.	Item	Description	Setting Data	Setting Value
40	Target stop pos. input selection	Designates where the target stop positions are to be entered from.	VS-12PB(P0): <input type="text" value="0"/> Communication input: 1 External BCD input: 2	
41	Learning function selection	Designates whether or not the Learning function is to be used during AUTO positioning. A "retry" function can also be designated together with the Learning function.	OFF: <input type="text" value="0"/> ON: 1 ON + Retry: 2	
42	Positioning direction	Designates the positioning direction for AUTO positioning operations.	CW: <input type="text" value="0"/> CCW: 1	
43	Overshoot amount	As the VS-12PB features a unidirectional positioning format, opposite direction positioning is executed by first overshooting the target stop position, then making a U-turn. This setting designates the overshoot amount. <b>Note</b> For bidirectional positioning, designate a setting of "0".	Setting range: <input type="text" value="0 to 999999"/> <input type="text" value="100"/>	
45	Low-speed zone	Designates the zone where low-speed positioning is to occur.	Setting range: <input type="text" value="0 to 999999"/> <input type="text" value="1000"/>	
46-1	CW STOP zone	Designate the distance between the target stop position and the braking point for CW positioning operations.	Setting range: <input type="text" value="0 to 999999"/> <input type="text" value="100"/>	
46-2	CCW STOP zone	Designate the distance between the target stop position and the braking point for CCW positioning operations.	Setting range: <input type="text" value="0 to 999999"/> <input type="text" value="100"/>	
47	In-Position zone	Designate the zone which serves as the criterion for determining whether positioning has stopped at the target stop position.	Setting range: <input type="text" value="0 to 999999"/> <input type="text" value="100"/>	
48	Travel amount for START from STOP zone	When positioning is started from within the STOP zone, this setting designates how far out of the STOP zone travel is to occur before repositioning is executed. <b>Note</b> If a setting of 0 is designated, the "START from STOP zone" function will be inoperative.	Setting range: <input type="text" value="0 to 999999"/> <input type="text" value="1000"/>	
60	Speed control format selection	Designates either the "speed-switching" or the "speed stepping" format.	Speed-switching: <input type="text" value="0"/> Speed-stepping: 1	

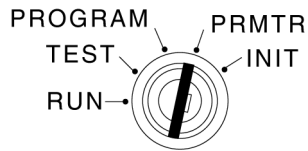




## 9-4-2. Basic Parameter Setting Procedure

VS-12PB parameter settings are designated as described below.

[1] Select the Parameter mode.



Turn the mode key-switch to the PRMTR.

[2] Designate the parameter No.



Press the **CH** key, then enter the appropriate numeric values.

### Note

If the existing setting can be used, as is, press **[DEL]** key to proceed to the next setting item.

Press the **+/-** key to select the initial number's subnumber.

[3] Enter the data setting.



Key in the setting value.

[4] Register (write) the setting.



Press the **SET** key to register the designated settings.

At that time, the displayed Parameter No. will automatically change to the next No.

### 9-4-3. Other Parameter Settings

The following parameter settings should be designated only when the function is being used.

The factory setting values (default values) are shown in box. Unless another setting is desired, these setting items can be skipped.

Parameter No.	Item	Description	Setting data	Setting Value
44	Medium-speed zone	When the "speed-stepping" format is used, this setting designates the medium-speed zone for the positioning operation.	Setting range: [0~999999] <input type="text" value="10000"/>	
49	Motion non-detection timer	Designates the time period from the point when positioning is started, until the point when motion error monitoring begins. <b>Note</b> If a setting of "0" is designated, the motion nondetection timer function will be inoperative.	Setting range: [0.00~99.99s] <input type="text" value="10.00"/>	
50	Motion mis-direction non-detection timer	Designates the time period from the point when positioning is started, until the point when direction error monitoring begins. <b>Note</b> If a setting of "0" is designated, the motion misdirection non-detection timer function will be inoperative.	Setting range: [0.00~99.99s] <input type="text" value="10.00"/>	
51	Positioning END detection timer	Designates the delay time period from the point when the operation output switches OFF, until the point when the RUN signal switches OFF.	Setting range: [0.00~99.99s] <input type="text" value="0.10"/>	
52	INCHING zone	Add the INCHING zone to the target stop position when using the INCH function. Designates this adding INCHING zone.	Setting range: [-99999~999999] <input type="text" value="100"/>	
53	INCHING ON time	Designates the INCHING ON time during Inching operation.	Setting range: [1~9999ms] <input type="text" value="100"/>	
54	INCHING OFF time	Designates the INCHING OFF time during Inching operation.	Setting range: [1~9999ms] <input type="text" value="100"/>	
55	INCHING In-Position zone	Designates the INCHING In-position zone which serves as the criterion for determining whether positioning has stopped at the target stop position.	Setting range: [0~999999] <input type="text" value="100"/>	
61	Upper limit	Designates the plus direction limit.	Setting range: [-99999~999999] <input type="text" value="999999"/>	
62	Lower limit	Designates the minus direction limit.	Setting range: [-99999~999999] <input type="text" value="-99999"/>	
63	STOP zone max. value	Designates the Learning function's maximum STOP zone correction value.	Setting range: [0~999999] <input type="text" value="999999"/>	
64	STOP zone min. value	Designates the Learning function's minimum STOP zone correction value.	Setting range: [0~999999] <input type="text" value="0"/>	
65	Permissible current pos. change amount	The ABSOCODER sensor checks the amount of change in the current position every 20 ms. This setting designates the maximum amount of change which is to be permissible.	Setting range: [0~999999] <input type="text" value="999999"/>	
66	Permissible correction amount	Designates the maximum current position correction which is to be permitted during current position PRE operations.	Setting range: [0~999999] <input type="text" value="999999"/>	

Parameter No.	Item	Description	Setting Data	Setting Value															
67	Number of protected switches	Designates the number of "protected" channels. If no channels are to be protected, designate a setting of "0".	Number of channels: 0 to 8 <input type="text" value="0"/>																
68	Limit SW output status selection	Designates the limit SW statuses for the TEST, PROGRAM, PRMTR, and INIT modes. <table border="1" style="margin: 10px auto;"> <thead> <tr> <th>TEST</th> <th>INIT,PRMTR,PROG</th> <th>Setting</th> </tr> </thead> <tbody> <tr> <td>All points</td> <td>All points OFF</td> <td>0</td> </tr> <tr> <td>HOLD</td> <td>HOLD</td> <td>1</td> </tr> <tr> <td>All points OFF→limit SW output</td> <td>All points OFF</td> <td>2</td> </tr> <tr> <td>HOLD→limit SW output</td> <td>HOLD</td> <td>3</td> </tr> </tbody> </table> <b>Note</b> When a setting of "2" or "3" is designated, limit SW outputs can be designated by pressing the [SET] key in the TEST mode.	TEST	INIT,PRMTR,PROG	Setting	All points	All points OFF	0	HOLD	HOLD	1	All points OFF→limit SW output	All points OFF	2	HOLD→limit SW output	HOLD	3	<input type="text" value="0"/> 1 2 3	
TEST	INIT,PRMTR,PROG	Setting																	
All points	All points OFF	0																	
HOLD	HOLD	1																	
All points OFF→limit SW output	All points OFF	2																	
HOLD→limit SW output	HOLD	3																	
69	Off-line output status selection	Designates the switch output status when the RUN mode is off-line.	All points OFF: <input type="text" value="0"/> HOLD: 1																
70	Current position PRE function selection	Determines whether or not the "current position preset" and "machine position confirmation" functions are to be used. The "machine position confirmation" function uses preset input 2 as the machine position confirmation input. Preset input 1 is used as the "current position preset" function.	None: <input type="text" value="0"/> Current position PRE function: 1 Machine position check: 2																
71	CW Current pos. PRE1	Designates the preset value for input 1 during CW travel (current position preset value).	Setting range: [Min.current pos. value to (Min. current pos. value + scale length-1)] <input type="text" value="0"/>																
72	CCW Current pos. PRE1	Designates the preset value for input 1 during CCW travel	<input type="text" value="0"/>																
73	CW Current pos. PRE2	Designates the preset value for input 2 during CW travel	<input type="text" value="0"/>																
74	CCW Current pos. PRE2	Designates the preset value for input 2 during CCW travel	<input type="text" value="0"/>																
75	Current pos.output time	Designate the current pos. output and latch pulse timing. [time setting] n × 4 ms n = 1 to 64  <b>Note</b> A setting of "0" should be designated if the current pos. output is to be updated by a DTC input. Refer to section 8-1-3 for details regarding the DTC input.	Setting range: [0 to 64] <input type="text" value="1"/>																

## 9-5. RUN

RUN operations for the VS-12PB are described below.

RUN operations consist of normal operations and trial run operations (TEST mode).

- In the TEST mode, the following 3 operations can be performed, and the limit switch outputs can be checked.

Positioning	Limit switch output
AUTO positioning	Limit switch output
INCHING	
JOG	

The 4 main operation keys (located on the control panel) are shown below.



Test RUN operations are executed in the TEST mode.

During Test Run operations, all external inputs except the RESET, PRE1, and PRE2 inputs are inoperative. (However, the SEL input is operative during INCHING operations.)

- The VS-12PB RUN operations consist of positioning control and limit switch outputs.

External Input Signals	OPE1	OPE2
Control Outputs		
AUTO positioning	OFF	ON
INCHING	ON	ON
JOG	ON	OFF

Each operation is selected by the external input signals.

For detail regarding Limit switch output, refer to 9-6 Limit switch output setting.

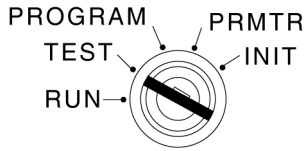
### Note

Numerical inputs can be performed by keying in the values directly from the ten-key pad, or by using the teaching function (current position input). In this manual, teaching inputs are indicated by an apostrophe mark ( ' ) following the procedure step number (e.g. [4']).

## 9-5-1. AUTO Positioning

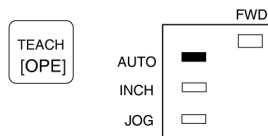
### ●TEST RUN

[1] Select the TEST mode.



Turn the mode key-switch to the TEST mode position.

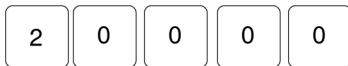
[2] Establish the AUTO positioning mode.



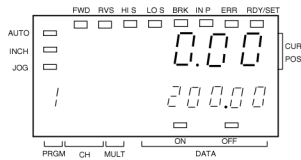
Press the **TEACH [OPE]** key to establish the AUTO positioning mode. The AUTO indicator lamp switches ON.

[3] Designate the target stop position

[Ex.: 20000 (200.00)]



Key in the values directly from the ten-key pad



#### Note

Setting must be made each time.

Pressing the **SET** key is not required.

[4] Operation start.



Press the **START** key to begin the AUTO positioning operation. Sensor value (current position value) is displayed at panel.

#### Important

STOP inputs are invalid when in the TEST mode. Therefore, to perform an emergency stop in the TEST mode, turning the motor power supply off is required.

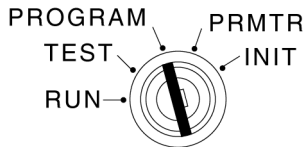
## ● RUN Operation

Do not perform a positioning operation until the target positions have been specified. The device where target position settings are specified varies according to the Parameter No.40 setting. In the explanation below, target positions are specified at the VS-12PB.

### Notes

- When the mode-key switch is set to RUN, all of the keys (on control panel) except for **CLR** key is disabled.
- The VS-12PB remains inoperative until the STOP signal input occurs.

[1] Select the PROGRAM mode.



Turn the mode key-switch to the PROGRAM mode position.

[2] Designate Program No. 1.

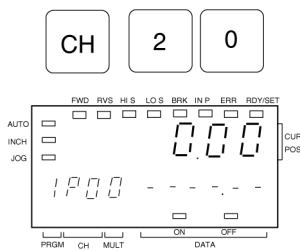


Press the **PRGM** key, then enter "1".

### Note

Target position settings for AUTO positioning operations can be only made at program No.1.

[3] Designate the target position No.



Press the **CH** key, then enter the desired value.

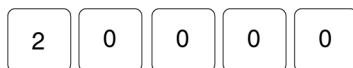
### Note

Although target positions can be set at 2 points, only 1 point displays.

Target position No.	Input value(CH)
P0	<b>CH</b> 2 0
P1	<b>CH</b> 2 1

[4] Designate the target position setting values.

[Ex.: 20000 (200.00)]

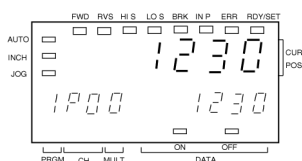


Use the numeric keys to enter the desired setting value.

[4 ] Teaching input method



Press the **TEACH [OPE]** key to designate the machine's current position as the setting value.



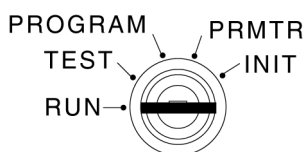
[5] Register the setting data.



Press the **SET** key to register the designated setting data. The RDY/SET LED indicator is lit.

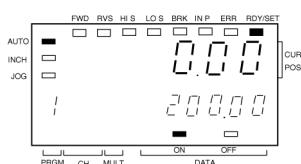


[6] RUN mode.



Turn the mode key-switch to the RUN mode position.

[7] Current position and Target position display



**Note**

The setting value for CH20 (P0) displays. To display the setting value for CH21 (P1), perform an external input of the target position selection signal (SEL).

[8] RUN operation

Perform an external START signal input.

(1) Select the operation condition.

- OPE1: OFF
- OPE2: ON

**Note**

The (1) and (2) inputs shown at left are not required when Initial Setting No.81 is set to "3" (VS-T12 or VS-T12B).

(2) Select the target position value.

- SEL: ON or OFF

Parameter setting	Setting data	Target position select: SEL	
		OFF	ON
Target position input selection (Parameter No.40)	0	VS-12PB(P0)	VS-12PB (P1)
	1	Communication input	
	2	External BCD input	

(3) Establish the AUTO positioning status.

- STOP: ON

It is required 100ms or longer time period from the point when the STOP input is switched ON, until the point when the start input is switched ON.

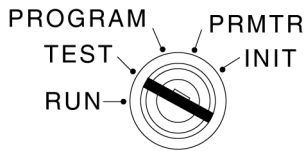
(4) Operation start.

- START: OFF → ON

## 9-5-2. JOG Operation

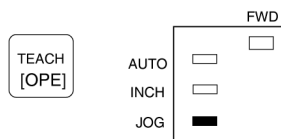
### ●TEST mode

[1] Select the TEST mode.



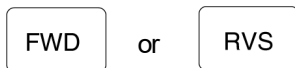
Turn the mode key-switch to the TEST mode position.

[2] Establish the JOG Positioning status.



Press the **TEACH [OPE]** key until the JOG indicator lamp is ON.

[3] Operation start.



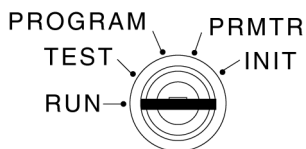
Press the **FWD** key for forward operation, and the **RVS** key for reverse operation. Operation will continue only while the key is being pressed.

### ●RUN mode

#### Note

When the mode-key switch is set to RUN, all of the keys (on control panel) except for **CLR** key is disabled.

[1] RUN mode selection



Turn the mode key-switch to the RUN mode position.

[2] RUN operation

Perform an external START input.

(1) Select the operation condition.

OPE1: ON  
OPE2: OFF

#### Note

The JOG operation in the RUN mode is inoperative when Initial Setting No.81 is set to "3" (VS-T12 or VS-T12B).

(2) Establish the positioning status

STOP: ON

(3) Operation start

F/R: ON (Reverse) or OFF (Forward)  
LOS: ON (High-speed) or OFF (Low-speed)  
START: ON

#### Note

Operation will continue only while the START input is activated.



## 9-6. Limit Switch Output Settings

The limit switch output setting procedure is described below.

### ● Limit Switch Output Setting Conditions

(1) Detection range = Minimum current position value to Minimum current position value + Scale length - 1

(2)

	No. of Programs	No. of Channels	No. of Dogs (per CH.)
No. of settings	1	8	10

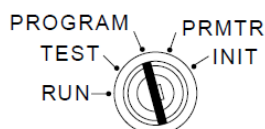
(3) Dog output are designated in ON/OFF pairs.

### 9-6-1. Limit Switch Settings

#### Note

When the selected switch No. is protected, cancel the protected switch function.

[1] Select the PROGRAM mode.



Turn the mode key-switch to the PROGRAM mode position.

[2] Designate the program No.1



Press the **PRGM** key, then enter "1"

#### Note

The program No. can be selected from either 0 or 1, but the setting value of Program No.0 cannot be stored.

Use the program No.0 for checking the communication data.

[3] Designate the desired Channel No. (01-08)

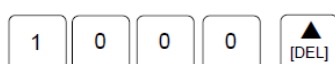


Press the **CH** key, then enter the desired Channel No.

#### Note

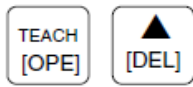
A digit input is required. To designate Channel No.1, for example, enter "01".


[4] ON position setting.



After ON position setting, press the **[DEL]** key to enter the OFF position setting. At this time, the ON LED begins flashing, and the OFF LED is switched ON.

[4] ON position setting by Teaching



Move the machine to the desired ON position, then press  the key. The current position value will then be adopted as the ON position setting value.

Press the  key to enter the OFF position. At this time, the ON LED begins flashing and the OFF LED is switched ON.


[5] OFF position setting by numeric input.



Enter the OFF position setting value.


[5] OFF position setting by Teaching



Move the machine to the desired OFF position, then press the  key. The current position value will then be adopted as the OFF position setting value.

[6] Register the ON/OFF position settings.



Press the  key to register the designated ON/OFF position settings. At this time, the MULTI display will be changed from "0" to "1", and the Dog No.1 ON position setting status will be established.

◎ Precaution of Limit Switch Output In the TEST mode

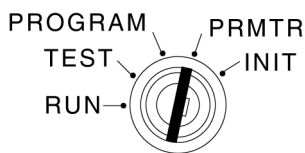
A parameter No. 68 setting is required so that the Limit Switch function is operative in the TEST mode.

● Limit Switch Output Status in each mode: TEST, PROGRAM, PRMTR, INIT

Parameter No. 68 setting

MODE	RUN	TEST	PROG. PRMTR. INIT	Setting value
Limit Switch Output Status	Output valid	OFF	OFF	0
		Switch output HOLD status	Switch output HOLD status	1
		OFF → Press [SET] key → Switch output valid	OFF	2
		HOLD status → Press [SET] key → Switch output valid	Switch output HOLD status	3

[1] Select the PRMTR mode.



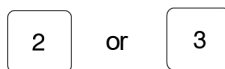
Turn the mode key-switch to the PRMTR mode position.

[2] Designate the Parameter No.68.



Press the  key and press  .

[3] Designate "2" or "3".



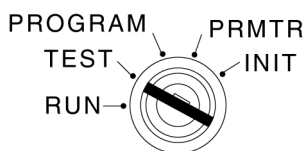
Press  or .

[4] Register the setting.



Press the  key to register the designated setting.

[5] Select the TEST mode.



Turn the mode key-switch to the TEST mode position.

[6] Select the operation condition by pressing the  key.

In addition to AUTO positioning, INCHING, and JOG operations, a limit switch output operation is also possible in the TEST mode.

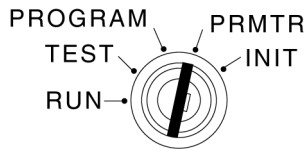
[7] Switch to a limit switch output mode



## 9-6-2. Protected Switch Function

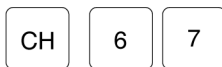
As protected switch settings cannot be changed or deleted by normal operation procedures, the following special procedure is used.

[1] Select the PRMTR mode.



Turn the mode key-switch to the PRMTR mode position.

[2] Designate Parameter No.67.



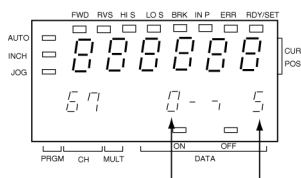
### Note

Parameter No. 67 can not be designated by pressing

the keys.

Press the key, then key in "67".

[3] Designate the "No. of Protected Switches" setting (A setting of "5" will be designated in this example)



Previous setting value      New setting value

Press key to designate the number of protected switches.

Press the key to register (provisional) the setting.

Press the key to check the setting value.

At this time, the previous and new setting values will both flash.

Press the key to register the setting.

[4] Register the setting data.



### Notes

- Switch settings for Nos. 0 to 5 cannot be changed or deleted by normal operation.
- To cancel the protected switch settings, enter "0" as number of protected switches at Step [3] above.

At this time, the system will automatically proceed to Parameter No. 68.

### 9-6-3. Dog Output Delete

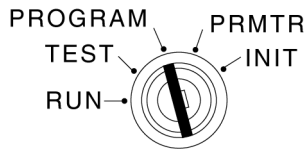
The Dog output deletion procedure is described below.

**Note**

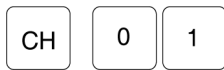
This Dog output deletion is not operative at protected switch channel.

[1] Select the PROGRAM mode.

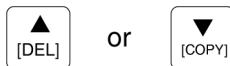
Turn the mode key-switch to the PROGRAM mode position.



[2] Designate the Channel with Dog setting to be deleted.



[3] Designate the Dog No. to be deleted.



Press the [DEL] key or the [COPY] key, then enter the No. of the Dog to be deleted.

[4] Designate the Dog's ON/OFF position setting as "0".



Designate the ON position setting as "0", then press the [DEL] key to register (provisional) this setting. Next, designate the OFF position setting as "0".

[5] Delete the ON/OFF settings.



Press the SET key to delete the designated Dog No. settings. After the settings are deleted, the settings for the next Dog No. will automatically be displayed.

## 9-6-4. Dog Output Insert

The procedure for inserting a Dog output is described below.

To insert a new Dog output setting, simply enter the desired ON/OFF position settings for that Dog.

The No. of that Dog will automatically be determined according to the size the setting value entered.

< Ex. >

Before Insertion

Dog OutputNo.	Setting value	
Dog output No.0	ON	10
	OFF	20
Dog output No.1	ON	50
	OFF	60
Dog output No.2	ON	Nosetting
	OFF	Nosetting

→

Dog Output No.2 Input

Dog OutputNo.	Setting value	
Dog output No.0	ON	10
	OFF	20
Dog output No.1	ON	50
	OFF	60
Dog output No.2	ON	30
	OFF	40

→

After Insertion

Dog OutputNo.	Setting value	
Dog output No.0	ON	10
	OFF	20
Dog output No.1	ON	30
	OFF	40
Dog output No.2	ON	50
	OFF	60

[Operation Procedure]

Dog insertions are executed by the procedure as that described for the limit Switch Output settings.

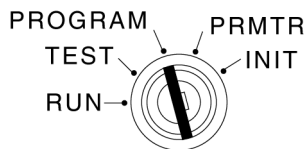
## 9-6-5. Channel Delete

Limit switch output settings can be deleted in Channel units.

**Note**

This Channel deletion is not operative at protected switch channel.

[1] Select the PROGRAM mode.



Turn the mode key-switch to the PROGRAM mode position.

[2] Designate the Channel No. where deletion is desired.

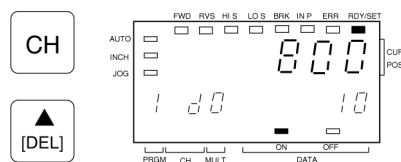


Press the **CH** key, then enter the No. of the Channel where deletion is desired.

**Note**

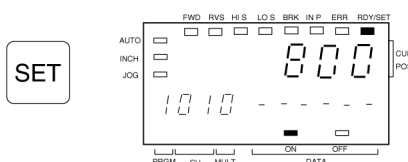
The Channel No. designation must be a 2-digit input.

[3] Establish the "Channel delete" mode.



Press the **CH** key again to establish the Channel Delete mode. Press the **[DEL]** key to verify the Channel No. where deletion is to occur.

[4] Delete the designated Channel No.



Press the **SET** key to execute the deletion.

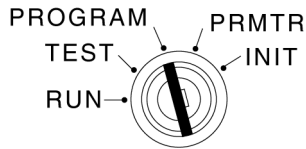
## 9-6-6. Program Batch Delete

With this function, batch deletion of Limit switch outputs can be executed in Program units.

### Note

This operation will be impossible if a protected status is in effect.

[1] Select the PROGRAM mode.



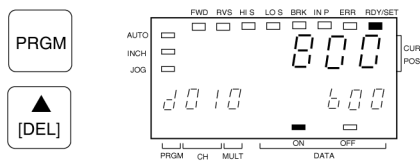
Turn the mode key-switch to the PROGRAM mode position.

[2] Designate the Program No. where the deletion is desired.



Press the **PRGM** key, then enter the No. of the Program where the deletion is to occur.

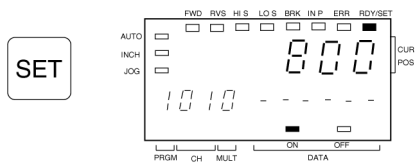
[3] Establish the "Program Delete" mode.



Press the **[DEL]** key again to establish the Program Delete mode.

Press the **PRGM** key to verify the Program to be deleted.

[4] Delete the designated Program.



Press the **SET** key to execute the batch deletion at that Program.

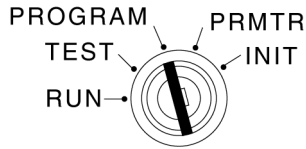
## 9-6-7. Program Batch Copy

With this function, Program data settings can be read/written in batch, to and from the Host Controller.

### Note

This function is operative regardless of the "Protect" status.

[1] Select the PROGRAM mode.



Turn the mode key-switch to the PROGRAM mode position.

[2] Designate the Program No. where copy is desired.



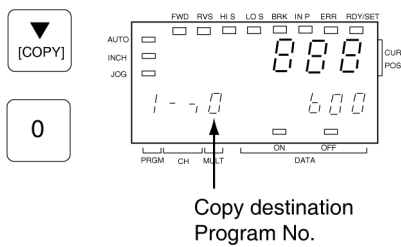
Press the **PRGM** key, then enter the number of the Program where copy is desired.

[3] Establish the "Program Copy" mode.



Press the **PRGM** key to establish the Program copy mode.

[4] Designate the copy destination Program No.



Press the **[COPY]** key, then enter the copy destination Program No. (Program No.1 - Program No.0)

[5] Copy the Program.



Press the **SET** key to copy the Program.



# 9-7. Other Operations

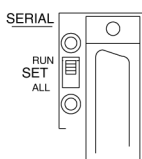
## 9-7-1. Use of Password to Protect Data

The VS-12PB features a password function to protect the Initial and Parameter setting data. When the password function is used, the Initial and Parameter setting data cannot be changed without first entering the password. The password input procedure is described below.

**Note**

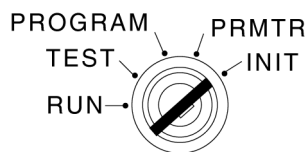
The password input should be executed before setting the Initial and Parameter data.

[1] Designate the password input status.

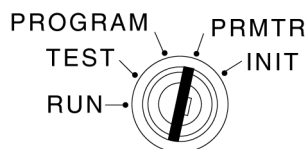


Set the “SET” switch at the rear of the VS-12PB to the RUN position to enable the password function. Once designated, settings cannot be made without first entering the password.

[2] Designate the desired mode.



or



Turn the mode key switch to the desired mode (INIT or PRMTR) position.

**Note**

Once this mode is changed, setting changes will be impossible by normal procedures.

[3] Enter the password.



Press the **PRGM** key, then enter the password **1** **2** .

[4] Register the password.



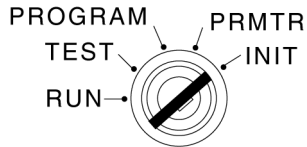
Press the **SET** key to register the password.

[5] Designate the Initial or Parameter setting.

## 9-7-2. All Data Delete (Initialize)

This function is used to delete all data settings which have been designated at the VS-12PB. When executed, the VS-12PB will be restored to its initial status, and all user-designated settings will be deleted.

[1] Designate the INIT mode.



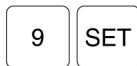
Turn the mode key switch to the INIT position.

[2] Designate Channel No.90.



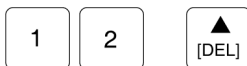
Press the  key, then enter "90".

[3] Designate data "9".



Enter "9", then press the  key.

[4] Designate password "12".



Enter "12", then press the  key.

The password "12" will no be displayed on-screen.

[5] Delete all data.



Press the  key to delete all the data.

# **MAINTENANCE SECTION**

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**10. Troubleshooting  
APPENDIX**

# 10. Troubleshooting

Error causes and countermeasures are described in this section.

## 10-1. Error Display & Countermeasures

An error code is output at the VS-12PB when a Controller or ABSOCODER sensor error occurs. When this happens, refer to the Table below to determine the cause and the appropriate countermeasure.

●Error Display Causes & Countermeasures Table


Error Code	Name	Output Status	Detection timing	Cause	Countermeasure
10	Error in communication from Slave	Normal output	During communicating with Master	<ul style="list-style-type: none"> <li>- An error is found in communication data from Slave VS- 12PB.</li> <li>1) Framing error</li> <li>2) overrun error</li> <li>3) Parity error</li> <li>4) BCC error (Check sum error)</li> <li>5) Command error (undefined command input)</li> <li>6) END command mismatch</li> <li>7) Answer data mismatch</li> </ul>	<ul style="list-style-type: none"> <li>- Correct the communication data.</li> </ul>
20	Upper limit overtravel	Operation error OFF	In RUN and TEST mode	<ul style="list-style-type: none"> <li>- Current pos. value exceeds upper limit.</li> </ul>	<ul style="list-style-type: none"> <li>- Move the machine back into the lower limit to upper limit range.</li> <li>- Correct the positioning setting data.</li> <li>- Correct the upper / lower limit setting.</li> </ul>
21	Lower limit overtravel			<ul style="list-style-type: none"> <li>- Current pos. value is below lower limit.</li> </ul>	
22	Sensor error	System Ready OFF	Always	<ul style="list-style-type: none"> <li>- ABSOCODER sensor is disconnected.</li> </ul>	<ul style="list-style-type: none"> <li>- Connect the ABSOCODER sensor.</li> </ul>
				<ul style="list-style-type: none"> <li>- Sensor cable is severed.</li> </ul>	<ul style="list-style-type: none"> <li>- Check the cable's continuity.</li> </ul>
				<ul style="list-style-type: none"> <li>- Wires inside ABSOCODER sensor is severed.</li> </ul>	<ul style="list-style-type: none"> <li>- Replace the ABSOCODER sensor.</li> </ul>
23	Excessive correction amount	Operation error OFF	<ul style="list-style-type: none"> <li>- During PRE operation</li> <li>- During machine position check operation</li> </ul>	<ul style="list-style-type: none"> <li>- ABSOCODER sensor position deviation is caused by machine slippage, backlash, etc..</li> </ul>	<ul style="list-style-type: none"> <li>- Adjust the machine.</li> <li>- Re-designate the "max. correction amount" parameter setting (parameter No.66)</li> <li>- Re-designate the "current position preset value" parameter setting (parameter No.71 to 74).</li> </ul>
				<ul style="list-style-type: none"> <li>- Deviation of the PRE (current pos. preset) input signal reading position.</li> </ul>	
				<ul style="list-style-type: none"> <li>- Incorrect "max. current amount" setting (parameter setting)</li> <li>- Incorrect "current position preset value" setting.</li> </ul>	
24	Excessive current position change	Operation error OFF	Always	<ul style="list-style-type: none"> <li>- ABSOCODER sensor rotation speed was detected in each 20ms is too fast.</li> <li>- Incorrect "max. current pos. change" setting (parameter setting)</li> <li>- The ABSOCODER sensor rotation exceeded the absolute detection range.</li> </ul>	<ul style="list-style-type: none"> <li>- Check the ABSOCODER sensor's rotation (travel) speed.</li> <li>- Re-designate the "max. current pos. change" parameter setting (parameter No.65).</li> </ul>

Error Code	Name	Output Status	Detection timing	Cause	Countermeasure
25	STOP zone error	Operation error OFF	At positioning END	<ul style="list-style-type: none"> <li>- STOP zone adjustment by learning function exceeds the permissible change amount.</li> <li>- Brake life has expired.</li> </ul>	<ul style="list-style-type: none"> <li>- Re-designate the STOP zone upper / lower limit setting at parameter Nos. 63 and 64.</li> </ul>
26	Overshoot amount error	Operation error OFF	In RUN mode	<ul style="list-style-type: none"> <li>- Incorrect "overshoot amount" setting (parameter No.43)</li> </ul>	<ul style="list-style-type: none"> <li>- Correct the "overshoot amount" setting.</li> <li>- In the case of the learning function is operative; [STOP zone] + [travel amount within STOP zone] &lt; [Overshoot amount]</li> <li>- In the case of the learning function is inoperative; [STOP zone]&lt;[Overshoot amount]</li> </ul>
30	Program No. error	System Ready OFF	In RUN mode	<ul style="list-style-type: none"> <li>- Incorrect Program No. designated by the communication input.</li> </ul>	<ul style="list-style-type: none"> <li>- Designate the Program No. as 0 or 1.</li> </ul>
31	Operation switching during positioning	Operation error OFF	In RUN mode	<ul style="list-style-type: none"> <li>- The operation selection signal was changed while positioning was in progress.</li> </ul>	<ul style="list-style-type: none"> <li>- Restore the setting which exist during the positioning operation.</li> </ul>
32	Program No.0 data error	System Ready OFF	In RUN mode	<ul style="list-style-type: none"> <li>- An error exists in the Program No.0 (communication) data.</li> </ul>	<ul style="list-style-type: none"> <li>- Correct the data.</li> </ul>
40	Invalid START input	Operation error OFF	At positioning START	<ul style="list-style-type: none"> <li>- Another error except error code 10 and 46 is detected.</li> <li>- STOP input is OFF</li> <li>- Communication is offline.</li> <li>- The operation input is changed within a period of 100ms before or after the operation START</li> </ul>	<ul style="list-style-type: none"> <li>- Clear other errors occurred.</li> <li>- Turn ON the STOP input.</li> <li>- Establish the communication to online.</li> </ul> <p><b>Note</b> Switch the sequence ready ON when the communication control is designated to be possible (Parameter setting No.82-5).</p>
41	Target stop position setting error	Operation error OFF	At positioning START	<ul style="list-style-type: none"> <li>- Target stop position is outside the detection range.</li> <li>- Target stop position is outside the upper/lower limit range.</li> </ul>	<ul style="list-style-type: none"> <li>- Correct the target stop position setting.</li> <li>- Correct the "scale length", "min. current pos. value", and "overshoot amount" settings.</li> </ul>
42	Motion error detection	Operation error OFF	During positioning operation	<ul style="list-style-type: none"> <li>- The current position value isn't changed (traveled) when the operation output is executed.</li> </ul>	<ul style="list-style-type: none"> <li>- Check the operation output connections.</li> <li>- Check the motor control unit.</li> <li>- Re-designate the "motion non-detection timer" setting (parameter No.49).</li> </ul>
43	Motion direction error	Operation error OFF	During positioning operation	<ul style="list-style-type: none"> <li>- The current position value is changed to opposite from command direction when the operation output was executed.</li> </ul>	<ul style="list-style-type: none"> <li>- Check the operation output connections.</li> <li>- Check the motor control unit.</li> <li>- Re-designate the "motion mis-direction non-detection timer" setting (parameter No.50).</li> </ul>
44	Max. brake count value detection	Operation error OFF	At positioning END	<ul style="list-style-type: none"> <li>- The number of braking operations has exceeded the limited value designated by the Initial setting No.87.</li> </ul>	<ul style="list-style-type: none"> <li>- Set the Initial No.86 (braking count) to "0".</li> <li>- Change the "max. braking count value" setting at the Initial setting No.87.</li> <li>- Replace the brake.</li> </ul>

Error Code	Name	Output Status	Detection timing	Cause	Countermeasure
45	INCHING error	Operation error OFF	At positioning END	- Inching positioning has ended, but the machine is not positioned at the target stop position. - The difference between the current position value prior to the INCHING operation, and the target stop position value was too great.	- Re-designate the target stop position setting.
46	INCHING direction input error	Positioning STOP	During positioning operation	- The INCHING direction was different from that designated by the external direction input (F/R).	- Set external direction input so that it matches the Initial setting No.42 direction. <b>Note</b> An error reset is not required.
50	PRE data error	Operation error OFF	During PRE operation	- A value designated by the current position PRE input was outside the detection range.	- Correct the current position PRE input value. - Correct the "scale length" and "min. current pos. value" settings.
51	No initial setting	System Ready OFF	In RUN and TEST modes	- Initial setting and/or parameter setting has not been designated.	- designate the Initial settings.
52	Operation selection input error	System Ready OFF	In RUN mode	- Both the OPE1 and OPE2 operation selection signals (external inputs) are OFF.	- Correct the operation selection input. <b>Note</b> An error reset is not required.
60	Parameter data error	System Ready OFF	At power ON, program changes	- Parameter setting data is incorrect.	- Correct the parameter setting data. - Check all the data.
61	Program No.1 data error	System Ready OFF	At power ON, program changes	- Program No.1 setting data is incorrect.	- Correct the Program No.1 setting data.
69	Current pos. data error	System Ready OFF	At power ON	- One of the following setting is Incorrect: Current pos. value, FWD STOP zone, RVS STOP zone, brake count, target stop position.	- Check the settings, and re-designate the error data.
70	Data reading error	System Ready OFF	At internal data change	- Data has not been written correctly.	- Re-designate the setting data.
80	External output error	System Ready OFF	In RUN and TEST modes.	- An output malfunction at one of the following: forward (FWD), reverse (RVS), operation error (ERR), System Ready (READY). - External 24V power supply is disconnected.	- Check 4 output signals of the external line shown in left column. - VS-12PB has a malfunction. Contact your NSD representative.

## 10-2. Error Reset Procedure

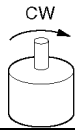
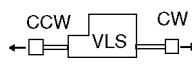
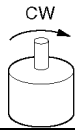
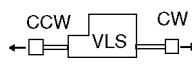
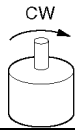
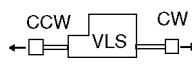
After the error cause has been corrected (see section 10-1 Table), reset the error status by one of the following methods.

Reset method 1	Switch the external reset input ON.
Reset method 2	Press the  key at the control panel.

# APPENDIX

## APPENDIX 1. Initial Setting Data Sheet

Be sure to specify the following initial settings (initial Nos. 90 to 95) before beginning VS-12PB operation. Failure to do so will result in Error 51 when the TEST or RUN mode is selected.

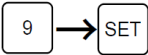
Init. No.	Item	Description	Setting Data	Setting value												
90	Sensor rotation direction selection	Designates the sensor rotation (travel) direction. <table border="1" style="margin: 10px auto; width: 80%;"> <thead> <tr> <th></th> <th>Multi-turn type</th> <th>Linear type</th> </tr> </thead> <tbody> <tr> <td></td> <td style="text-align: center;">  </td> <td style="text-align: center;">  </td> </tr> <tr> <td>CW</td> <td>Current position value is increased by CW rotation.</td> <td>Current position value is increased by rightward direction travel.</td> </tr> <tr> <td>CCW</td> <td>Current position value is increased by CCW rotation.</td> <td>Current position value is decreased by leftward direction travel.</td> </tr> </tbody> </table>		Multi-turn type	Linear type				CW	Current position value is increased by CW rotation.	Current position value is increased by rightward direction travel.	CCW	Current position value is increased by CCW rotation.	Current position value is decreased by leftward direction travel.	CW: 0 CCW: 1	
	Multi-turn type	Linear type														
																
CW	Current position value is increased by CW rotation.	Current position value is increased by rightward direction travel.														
CCW	Current position value is increased by CCW rotation.	Current position value is decreased by leftward direction travel.														
91	Decimal point setting	Designates the decimal point position.	000000.: 0 00000.0 : 1 0000.00 : 2 000.000 : 3 00.0000 : 4 0.00000 : 5													
92	Sensor selection	Designates the sensor which is to be used.	MRE : 0 VLS-256PWB : 3 VLS-512PWB : 4 VLS-1024PW : 5 VLS-512PYB : 6 VLS-1024PYB : 7 VLS-2048PY : 8													
93	Scale length	Designates the maximum distance over which position detection is possible.	Setting range [100 ~ 999999]													
94	Minimum current position value	Designates the minimum current position value which will be displayed.	Setting range [-99999 ~ 1000000 - scale length]													
95	Current position value	Designates the point within the actual detection range where the machine is currently positioned.	Setting range [Min. current pos. value to (Min. current pos. value + scale length - 1)]													

Setting data designated at the Controller should be recorded at Setting Value section above.

### Important

If Error 51 displays when the TEST or RUN mode is selected, key in the setting data using the ten-key pad and the SET key, even if the entered setting data is the same as the displayed data.

The initial settings shown below are required in order to use special functions. If such functions are not being used, these settings should be left at their default (factory set) values.

Init. No.	Item	Description	Setting Data	Setting value	
80-1	Multi-drop communication selection	Designate whether or not multidrop communication format (RS-485) is to be used between VS-12PB units.	NO: <input type="checkbox"/> YES: 1		
80-6	Slave No. selection	Specifies the unit No. communication with multiple units. Set to "0" if connected to the host controller.	0 ~ 31 <input type="text" value="1"/>		
81	Communication specifications selection	Selects the communication specifications in systems where communication is to occur with a host controller. (Select "3: VS-T12 (VS-T12B)" if connected to the positioning setting display unit. See Note 1.)	NO: <input type="checkbox"/> RS-232C: 1 RS-422: 2 VS-T12 (VS-T12B): 3		
82	Permissible communication setting range	Selects the setting change range in systems where settings can be changed from a host controller. * Settings changed in this manner are lost at power OFF.	82-1 Initial settings	NO: <input type="checkbox"/> YES: 2	
			82-2 Parameter 1 (PRMTR:60 ~ 75)	NO: <input type="checkbox"/> YES: 2	
			82-3 Parameter 2 (PRMTR:40 ~ 55)	NO: <input type="checkbox"/> YES: 2	
			82-4 Program	NO: <input type="checkbox"/> YES: 2	
82-5	Command communication	Designates whether or not communication control is possible.	NO: <input type="checkbox"/> YES: 2		
83	Communication format selection	Designates the format for communication with Host Controller.	Personal computer: <input type="checkbox"/> AJ71C24-S8: 1 VS-T12 (VS-T12B): 2		
85	Brake monitor	Designates whether or not an operation error will be detected based on the braking count.	NO: <input type="checkbox"/> YES: 1		
86	Braking count display & 0 set	The braking count is displayed. Reset is possible by entering password as follows: 	<input type="checkbox"/>  The actual braking count value is the displayed value × 1000.		
87	Max. braking count setting	Sets the maximum number of brake operations.	Setting range [1 ~ 999999] <input type="text" value="999999"/> The actual braking count value is the displayed value × 1000.		
89	Downloading enabled selection	Designates whether or not down loading by communication format is possible. <b>Note</b> "1" must be designated for each downloading operation.	NO: <input type="checkbox"/> YES: 1		

**Note 1**

When "3: VS-T12 (VS-T12B)" is selected, the setting data at initial setting Nos. 80-1, 82, 83, and at parameter No.40 become invalid, and the VS-T12 (VS-T12B) is enable in the controller.



## APPENDIX 2. Parameter Setting Data Sheet

Parameter settings are used in positioning operations to determine such things as the low-speed range and the braking timing, etc. They also determine the function settings for the various functions which are used (e.g. the limit switch output function). Be sure to check the functions which are to be used before specifying the parameter settings. If such functions are not being used, these settings should be left at their default (factory set) values.

Parameter No.	Item	Description	Setting Data	Setting value
40	Target stop pos. input selection	Designates where the target stop positions are to be entered from.	VS-12PB(P0) : <input type="checkbox"/> Communication input : 1 External BCD input : 2	
41	Learning function selection	Designates whether or not the Learning function is to be used during AUTO positioning. A "retry" function can also be designated together with the Learning function.	OFF : <input type="checkbox"/> ON : 1 ON + Retry : 2	
42	Positioning direction	Designates the positioning direction for AUTO positioning operations.	CW : <input type="checkbox"/> CCW : 1	
43	Overshoot amount	As the VS-12PB features a unidirectional positioning format, opposite direction positioning is executed by first overshooting the target stop position, then making a U-turn. This setting designates the overshoot amount. <u>Note</u> For bidirectional positioning, designate a setting of "0".	Setting range: [0 ~ 99999] <input type="text" value="100"/>	
44	Medium-speed zone	When the "speed-stepping" format is used, this setting designates the medium-speed zone for the positioning operation.	Setting range: [0 ~ 999999] <input type="text" value="10000"/>	
45	Low-speed zone	Designates the zone where low-speed positioning is to occur.	Setting range: [0 ~ 999999] <input type="text" value="1000"/>	
46-1	CW STOP zone	Designate the distance between the target stop position and the braking point for CW positioning operations.	Setting range: [0 ~ 999999] <input type="text" value="100"/>	
46-2	CCW STOP zone	Designate the distance between the target stop position and the braking point for CCW positioning operations.	Setting range: [0 ~ 999999] <input type="text" value="100"/>	
47	In-Position zone	Designate the zone which serves as the criterion for determining whether positioning has stopped at the target stop position.	Setting range: [0 ~ 999999] <input type="text" value="100"/>	
48	Travel amount for START from STOP zone	When positioning is started from within the STOP zone, this setting designates how far out of the STOP zone travel is to occur before repositioning is executed. <u>Note</u> If a setting of 0 is designated, the "START from STOP zone" function will be inoperative.	Setting range: [0 ~ 999999] <input type="text" value="1000"/>	
49	Motion non-detection timer	Designates the time period from the point when positioning is started, until the point when motion error monitoring begins. <u>Note</u> If a setting of "0" is designated, the motion nondetection timer function will be inoperative.	Setting range: [0.00 ~ 99.99s] <input type="text" value="10.00"/>	
50	Motion mis-direction non-detection timer	Designates the time period from the point when positioning is started, until the point when direction error monitoring begins. <u>Note</u> If a setting of "0" is designated, the motion misdirection non-detection timer function will be inoperative.	Setting range: [0.00 ~ 99.99s] <input type="text" value="10.00"/>	

Parameter No.	Item	Description	Setting Data	Setting value															
51	Positioning END detection timer	Designates the delay time period from the point when the operation output switches OFF, until the point when the RUN signal switches OFF.	Setting range: [0.00 ~ 99.99s] 0.10																
52	INCHING zone	Add the INCHING zone to the target stop position when using the INCH function. Designates this adding INCHING zone.	Setting range: [-99999 ~ 999999] 100																
53	INCHING ON time	Designates the INCHING ON time during Inching operation.	Setting range: [1 ~ 9999ms] 100																
54	INCHING OFF time	Designates the INCHING OFF time during Inching operation.	Setting range: [1 ~ 9999ms] 100																
55	INCHING In-Position zone	Designates the INCHING In-position zone which serves as the criterion for determining whether positioning has stopped at the target stop position.	Setting range: [0 ~ 999999] 100																
60	Speed control format selection	Designates either the "speed-switching" or the "speed stepping" format.	Speed-switching: 0 Speed-stepping: 1																
61	Upper limit	Designates the plus direction limit.	Setting range: [-99999 ~ 999999] 999999																
62	Lower limit	Designates the minus direction limit.	Setting range: [-99999 ~ 999999] -99999																
63	STOP zone max. value	Designates the Learning function's maximum STOP zone correction value.	Setting range: [0 ~ 999999] 999999																
64	STOP zone min. value	Designates the Learning function's minimum STOP zone correction value.	Setting range: [0 ~ 999999] 0																
65	Permissible current pos. change amount	The ABSOCODER sensor checks the amount of change in the current position every 20 ms. This setting designates the maximum amount of change which is to be permissible.	Setting range: [0 ~ 999999] 999999																
66	Permissible correction amount	Designates the maximum current position correction which is to be permitted during current position PRE operations.	Setting range: [0 ~ 999999] 999999																
67	Number of protected switches	Designates the number of "protected" channels. If no channels are to be protected, designate a setting of "0".	Number of channels 0 ~ 8 0																
68	Limit SW output status selection	Designates the limit SW statuses for the TEST, PROGRAM, PRMTR, and INIT modes. <table border="1" data-bbox="518 1657 1005 1814"> <thead> <tr> <th>TEST</th> <th>INIT, PRMTR, PROG</th> <th>Setting data</th> </tr> </thead> <tbody> <tr> <td>All points OFF</td> <td>All points OFF</td> <td>0</td> </tr> <tr> <td>HOLD</td> <td>HOLD</td> <td>1</td> </tr> <tr> <td>All points OFF→limit SW output</td> <td>All points OFF</td> <td>2</td> </tr> <tr> <td>HOLD→limit SW output</td> <td>HOLD</td> <td>3</td> </tr> </tbody> </table> <p>Note When a setting of "2" or "3" is designated, limit SW outputs can be designated by pressing the [SET] key in the TEST mode.</p>	TEST	INIT, PRMTR, PROG	Setting data	All points OFF	All points OFF	0	HOLD	HOLD	1	All points OFF→limit SW output	All points OFF	2	HOLD→limit SW output	HOLD	3	0 1 2 3	
TEST	INIT, PRMTR, PROG	Setting data																	
All points OFF	All points OFF	0																	
HOLD	HOLD	1																	
All points OFF→limit SW output	All points OFF	2																	
HOLD→limit SW output	HOLD	3																	

Parameter No.	Item	Description	Setting Data	Setting value
69	Off-line output status selection	Designates the switch output status when the RUN mode is off-line.	All points OFF : <input type="text" value="0"/> HOLD : 1	
70	Current position PRE function selection	Determines whether or not the "current position preset" and "machine position confirmation" functions are to be used. The "machine position confirmation" function uses preset input 2 as the machine position confirmation input. Preset input 1 is used as the "current position preset" function.	None : <input type="text" value="0"/> Current position PRE function : 1 Machine position check : 2	
71	CW Current pos.PRE1	Designates the preset value for input 1 during CW travel (current position preset value).	Setting range [Min.current pos. value to (Min. current pos. value + scale length-1)] <input type="text" value="0"/>	
72	CCW Current pos.PRE1	Designates the preset value for input 1 during CCW travel	<input type="text" value="0"/>	
73	CW Current pos.PRE2	Designates the preset value for input 2 during CW travel	<input type="text" value="0"/>	
74	CCW Current pos. PRE2	Designates the preset value for input 2 during CCW travel	<input type="text" value="0"/>	
75	Current pos.output time	Designate the current pos. output and latch pulse timing. [time setting] n × 4 ms n = 1 ~ 64  <u>Note</u> A setting of "0" should be designated if the current pos. output is to be updated by a DTC input. Refer to section 8-1-3 for details regarding the DTC input	Setting range: [0 ~ 64] <input type="text" value="1"/>	

# APPENDIX 3. Limit Switch Output Setting Data Sheet

Program No. 0 (Input method: communication)

Limit SW No.	Dog No.																			
	0		1		2		3		4		5		6		7		8		9	
	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF
1.																				
2.																				
3.																				
4.																				
5.																				
6.																				
7.																				
8.																				

Program No. 1 (Input method: panel key input on VS-12PB)

Limit SW No.	Dog No.																			
	0		1		2		3		4		5		6		7		8		9	
	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF	ON	OFF
1.																				
2.																				
3.																				
4.																				
5.																				
6.																				
7.																				
8.																				





NSD Group

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