

WARNING

INSTALLATION SHOULD ONLY BE
PERFORMED BY QUALIFIED
INSTALLATION PERSONNEL AND MUST
CONFORM TO ALL NATIONAL AND
LOCAL CODES



## **Hi5 Controller Function Manual**

**Servo Hand** 









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## 1.1. Specification

- (1) Method of operation: AC servo motor by a ball screw
- (2) Control section: built within the robot controller

  Controls hand position, speed, or squeeze force
- (3) Basic Function: controls the servo hand manually

  Controls the location for attaching/detaching a workpiece automatically/manually

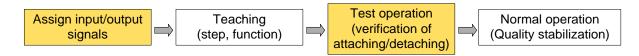
  Controls electric current
- (4) Servo hand main body specifications
  - Stroke (Max, Min)
  - Maximum squeeze force
- (5) Control specifications

Item	data	Remarks
Squeeze force error	±4%	
Minimum practical squeeze force setting	50kgf	TRIES CO.,LTD.
Maximum squeeze force setting		
Practical squeeze force resolution	1kgf	to the servo hand specification.
Maximum stroke setting	3000mm	

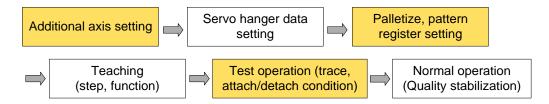
## 1.2. Servo Hand Operation Flowchart

Following the charts compare operation flows of pneumatic hand and servo hand.

#### [Pneumatic hand]



#### [Servo hand]



(1) For a servo hand, set the additional axis constant, referring to "Instruction Manual (Additional Axis Function)", to operate the servo hand using a motor.

Y INDUSTRIES CO..LTD.

- (2) Set the servo hand data to attach/detach a workpiece.
- (3) Set the information for palletizing. (Refer to "Palletizing Manual")
- (4) Proceed with Teaching palletizing program.
- (5) Review and confirm the trace of the palletizing program as well as the condition of attaching/detaching a workpiece.
- (6) Start the normal operation of the servo hand.

## 1.3. Getting started Teaching

Before you begin Teaching, you should set up below operation.

- (1) Verify that the data (robot type and the additional axis) for the robot main body is set.
- (2) Verify that the standard position of the servo hand axis is set.
- (3) Verify that the servo hand data are set corresponding to the using environment (i.e. distance of opening/squeezing, squeeze force, etc.).
- (4) Verify that the palletizing pattern information is normally set.
- (5) Read 「Palletizing Manual」 thoroughly to understand how to create a palletizing program before proceeding with teaching steps.









## 2.1. Registration of robot type and additional axis constant

#### 2.1.1. Setting robot type and the number of additional axes

- (1) Enter the Engineer Code (R314)
- (2) In Manual mode, select  $\llbracket [F2]$ : System $\rrbracket \to \llbracket 5$ : Initialize $\rrbracket \to \llbracket 2$ : Robot type selection $\rrbracket$ .



Figure 2.1 Robot Type Selection

(3) After selecting  $\llbracket [F2]$ : System  $\rrbracket \to \llbracket 5$ : Initialize  $\rrbracket \to \llbracket 2$ : Robot type selection  $\rrbracket$  in Manual mode, define number of additional axes to use, and press  $\llbracket [F7]$ : Run  $\rrbracket$ . The following message will be prompted in the information frame.



Figure 2.2 Entry of number of additional axes



(4) Press "Yes" and "Set the number? [Yes]/ [No]" message will appear. When "Set additional axis parameter?" message pops up, press "Enter" to define the additional axis parameter.



Figure 2.3 Additional Axis Parameter Setting Menu

(5) In "Additional Axis Parameter" setting, define axis specification, axis location, reduction ration, soft limit range, AMP specification, etc., as seen in the below figure.



Figure 2.4 Additional Axis Parameter Setting

## 2.1.2. Additional axis parameter setting

(1) Select  $\llbracket [F2]$ : System $\rrbracket \to \llbracket 5$ : Initialize $\rrbracket \to \llbracket 5$ : Additional axis parameter $\rrbracket$  from the menu in manual mode.

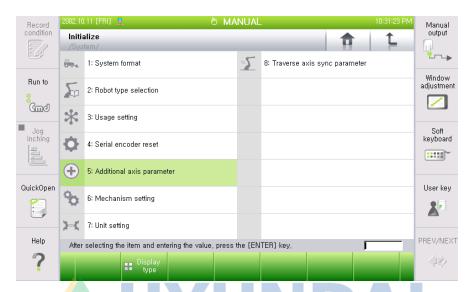


Figure 2.5 Additional axis parameter Setting Menu

- \* To select the above item, move to the menu screen
  - as entering the Engineer code (R314) in Teaching mode
  - in the Motors off status
  - while locating at an additional axis.

1. Additional axis parameter Axis spec = Base Servo gun Positioner Jig Servo hand Axis configuration = Linear Window adjustment Run to = BD 1 DSP 1 Axis 4 Axis location = 5 Reduction ratio = + ▼ 360 / 100 [mm/rev] Cmd Softlimit = Min 0,000 Max 0,000 [mm] Soft keyboard Jog inching = SAZ - 2 (HX 25-P) -----= 2,0KW - TSM1008N8230E235 V Motor spec Maximum speed Acc/Dec param = -59 [mm/s] QuickOpen 1000 [ms] User key Help PREV/NEXT Select the specification of axis, Complete R Next

(2) Define the additional axis parameter.

Figure 2.6 Additional axis parameter setting



 While up to six additional axes in total may be set for Hi5 Controller, only one axis can be defined for the servo hand.

#### Additional axis parameter

#### (1) Axis specification

Select an additional axis type from <br/>base, servo gun, positioner, jig, servo hand>.

When deciding an additional axis specification, the order of [base  $\rightarrow$  servo gun  $\rightarrow$  positioner  $\rightarrow$  jig  $\rightarrow$  servo hand] should be observed, according to the logical order of the additional axis.

#### (2) Axis configuration

Select the operating form and direction of the axis.

Select <X> for front/rear axis movement, <Y> for left/right axis movement and <Z> for up/down axis movement when using a translation base axis (drive axis).

Select <Any> and execute 「Base axis calibration」 if the base axis is not installed in the same direction as the robot coordinate system.

Select Rx/Ry/Rz or <Any> and execute Base axis calibration for a rotation base axis, in the same manner as for translation base axis.

Refer to <code>"servo gun function manual"</code> if setting servo gun, and <code>"Positioner synchronization function manual"</code> if using positioner.

#### (3) Axis location

Assign mechanical configuration of additional axis to be used by user.

BD =[1](1~2) => Assign BD542 board No. (2DSP/1Board)

DSP =[1](1~2) => Assign DSP No. inside of DSP BD542 board. (4Axis/1DSP)

Axis = $[4](1\sim4)$  => Assign axis No.

Ex.) If assigning as 1,1,4 for setting additional axis No. 7...

Basic axis 6 axes - main 3 axes (BD542 No. 1, DSP No. 1, 1~3 axes)

3 wrist axes (BD542 No. 1, DSP No. 2, 1~3 axes)

Additional 1 axis (BD542 No. 1, DSP No. 1, axis No. 4)

#### (4) Reduction ratio

Register the moving distance of the axis per motor rotation.

Register the moving distance of axis per number of motor rotations in mm, and the rotation angle of the axis per motor rotation in degrees for translation axis. Set "+" for symbol if the grid value of the additional axis is increased, and "-" for symbol if the grid value of the additional axis is decreased, since the forward direction of the motor (direction of encoder is increased) conforms to the direction of axis motion. Please refer to the following examples.

Ex. 1) For a rotation axis using 1/100 reduction gear only...

Axis rotates 360 degrees with 100 rotations of the motor,

Reduction ratio = +360 / 100 [deg/rev]

Ex. 2) For a translation axis using 1/20 reduction gear and PCD 110mm rack and pinion...

Axis moves 110xPhi (=3.14159)=345.5749[mm] with 20 motor rotations Reduction ratio = + 3455749 /200000 [mm/rev]

0) 5 ( ) ( ) ( ) ( ) ( ) ( )

Ex. 3) For a translation axis using 1/5 reduction gear and Lead 5mm ball screw...

Axis moves 5 mm with 5 motor rotations

Reduction ratio = +5/5 [mm/rev]



#### (5) Soft limit

Set valid moving zone of robot (Soft limit of additional axis). If setting translation axis in [mm] and rotation axis in [degrees], setting values will be reflected in  $\[ [F2] : System \] \rightarrow \[ \] 3: Robot parameter \] \rightarrow \[ \] 3: Soft limit \].$ 

#### (6) AMP specification

Select the AMP specification to be used for the additional axis.

Select the AMP specification by selecting the IPM signal form and inputting Hall Sensor specification as a number from 0 to 5. The form specification of AMP is as follows.

<ul> <li>AMP (DRIVER UNIT) model number formation;</li> </ul>	SA1 - 1 - V
Servo Amplifier Number of configured axes (1) IPM symbol – 1 axis Number of configured axes (1) IPM symbol – 1 axis Version No. Change history (a, b,) Hall Sensor per axis Year of manufacture Month of manufacture Serial number	

The following rated capacity will be given according to IPM symbols and Hall Sensor symbols.

AMP Model	IPM symbols	IPM Current rate	Hall Sensor	Full Scale current
	L	150Apeak	0	140.62Apeak
	Х	100Apeak	1	93.75Apeak
Lorgo	Y	75Apeak	2	46.87Apeak
Large	Z	50Apeak	3	28.12Apeak
			4	18.75Apeak
			5	9.37Apeak
	А	30Apeak	3	28.12Apeak
Small	D	10Apeak	4	18.75Apeak
A	HEA	VY INDUSTI	RIES COLLT	9.37Apeak

#### (7) Motor specification

Select the motor specification used for additional axis.

Select motor capacity first, and then select motor specification.

#### (8) Acceleration and deceleration parameter

Set the maximum speed and acceleration time of the additional axis.

These setting values will be applied in the same manner as the setting values of  $\[\]$  System $\] \to \[\]$  3: Robot parameter $\] \to \[\]$  34: Accel and decel parameter $\]$ . The maximum speed of the additional axis is assigned by the user, and is restricted according to the rated speed of motor.

If vibration occurs during the operation of an additional axis, acceleration time should be adjusted.



## **Warning**

- In case of setting additional axes for both base and servo hand axes, register them for the base axis and the servo hand axis, respectively.
- Up to six additional axes may be registered.
- Only one additional axis can be registered for the servo hand. Examples of setting additional axis are as follows.

Table 2-1 [Example 1] Setting an additional axis for the servo hand only

Additional axis	Axis spec	Hand number
1st axis	Servo Hand	1

Table 2-2 [Example 2] Setting additional axes for both the base and the servo hand

Additional axis	Axis spec	Hand number
1st axis	Base	A I .
2nd axis	Servo Hand	<b>/</b>

- Multi servo hand is not available.
- Once additional axis and/or servo parameter settings are complete, re-supply the main power
  of the controller and verify that no error occurs in relation to encoder. Refer to

  "Controller
  Repair Manual," for any error.
- If the servo hand axis is normal without any error, conduct an encoder calibration.
   Once the encoder calibration is complete, supply power to the motor (Motor ON) and operate the additional axis at a low speed. Meanwhile, verify that a Bit constant is accurate.
   To verify an accurate Bit constant, compare the servo hand axis data displayed on the monitor to the actual distance that the servo hand travelled, if both data are identical.
- Inspections and tuning (speed adjustment, gain, etc.) on structural assemblies are required if any vibration or shaking occurs during the manual and/or automatic speed operation.



## 2.2. Servo Hand Standard Position Setting

- (1) After confirming the normal operation of the servo hand, set the standard position of the servo hand axis.
- (2) In Manual mode, select  $\[ \[ \] \]$  System  $\] \to \[ \] \]$  Robot parameter  $\] \to \[ \] \]$  2: Axis constant to run  $\[ \] \]$  .
- (3) To set a standard position, squeeze the moving hand (right) to the stopper of the fixing hand (left) along the direction of a force, and then record the axis data.

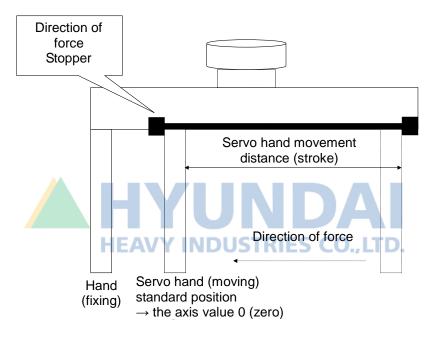


Figure 2.7 Servo Hand Standard Position Setting

## 2.3. Servo Hand Parameter Setting

Set parameters to use with the servo hand in the menu,  $\llbracket [F2]$ : System  $\rrbracket \to \llbracket 4$ : Application parameter  $\rrbracket \to \llbracket 3$ : Palletizing  $\rrbracket \to \llbracket 3$ : Servo hand parameter  $\rrbracket$ .

If an additional axis is registered for the servo hand, an initial value is set as creating a constant file. Adjust the value in accordance with the squeeze force condition.

#### 2.3.1. Servohand parameter

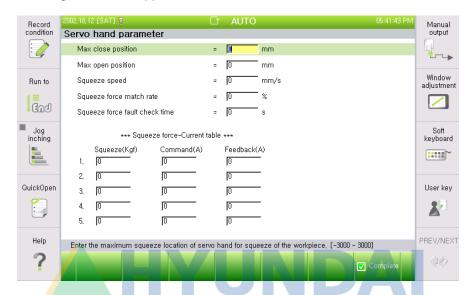
- (1) Max close position [-3000 to 3000]mm Refers to the maximum distance of squeezing the servo hand, this is also a target position of automatic/manual squeezing.
- (2) Max open position [-3000 to 3000]mm
  Refers to the maximum distance of opening the servo hand, this is also a target position of manual opening. In automatic opening, this information is considered an opening limit. While no opening offset distance is entered in HANDOPEN command, if the servo hand opening exceeds the opening stroke, "E1327 Servo hand maximum open position is exceeded, error will occur.
- (3) Squeeze speed [1 1000]mm/s
  Refers to the movement speed of the servo hand (moving side) while being squeezed.
- (4) Squeeze force match rate [1 100]%

  If an actual squeeze force reaches within the squeeze force range set during the squeeze force match assessment, the squeeze force is determined to match.
- (5) Squeeze force error detection delay [0.0 5.0]sec
  Determines the time from beginning squeezing to when the squeeze force matches the setting. If the squeeze force does not match within this time set, "E1329 Servo hand squeeze alignment detection time is exceeded," error message will be indicated to stop the operation.
- (6) Squeeze force Current table Defines the relationship between the squeeze force occurring at the servo hand and the electric current level of which current is applied through the motor. The Squeeze force-Current table is available for setting electric current values for any of 5 squeeze forces. The upper and the lower limitations of squeeze force set here further become the range limitation for squeeze force of automatic or manual operation. As an assigned electric current may be different from an actual electric current, it is recommended that both electric currents be observed to create the Squeeze force-Current table.



## 2.3.2. Servo hand parameter setting

- (1) Select  $\llbracket [F2]$ : System $\to \llbracket 4$ : Application Parameter $\to \llbracket 3$ : Palletizing $\to \llbracket 3$ : Servo Hand Parameter $\rrbracket$ .
- (2) The following screen will appear.



(3) Enter values and press [SET].



## 2.4. End

Once the configuration is complete, move to <code>"Service / 5</code>: File manager\_menu and save ROBOT.MCH, ROBOT.CON file into an auxiliary memory (e.g., USB).











Record steps and enter HANDPRES and HANDOPEN commands so that the operation of a workpiece can be executed by Servo hand manually or automatically. Prior to beginning teaching, verify that the following steps are completed.

- (1) Set parameters for robot body.
  - Registration of additional axes (Servo hand axis, Servo parameter)
  - Encoder offset, Axis constant, Softlimit, Servo hand parameter etc.....
- (2) Assign a user key.
  - Servo hand manual squeezing, servo hand manual opening
- (3) Complete the servo hand axis basic operation (jog) and servo tuning.



## 3.1. Manual squeeze/open

In Teaching mode, manual squeezing or opening of the servo hand axis is available. With simple operation, servo hand can be squeezed and moved to the maximum opening position, allowing easy Teaching.

#### 3.1.1. How to Operate

Before squeezing/opening servo hand manually, assign <code>"svhand man press: Servo hand manual squeezing"</code> and <code>"svhand man open: Servo hand manual opening"</code> in SHIFT + user key.



Figure 3.1 User Key Setting

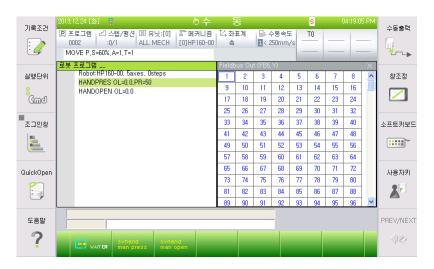


Figure 3.2 Manual operation of squeezing/opening of the servo hand axis

- (1) Select the manual mode and, select the motor ON.
- (2) In Teach pendant, press [SHIFT] together with a corresponding [F] key assigned for svhand man press or svhand man open.
- (3) Proceed to squeeze/open the servo hand manually as seen in the below figure.

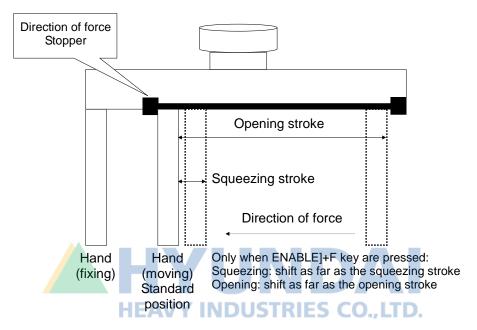


Figure 3.3 Manual operation of squeezing/opening

#### Notes

- The operation of squeezing stops when the squeeze forces match together while the operation of opening stops when the opening reaches at the maximum opening position.
- The squeeze speed at the servo hand axis corresponds to the servo hand speed parameter.
   The opening speed at the servo hand axis corresponds to the maximum speed of the servo hand axis.
- If the [F] key is released during operation of squeezing/opening, the operation will stop. Releasing the [SHIFT] key only however does not stop the operation. If the [F] key is pressed again, the operation moves forward from the previously stopped position.



## 3.2. Jog Operation of Servo Hand

To operate jogging of a servo hand in Teach pendant, set the additional axes mechanism in "System" 5: Initialize  $\rightarrow$  "6: Mechanism Setting screen.



Figure 3.4 Mechanism setting

Press [Unit/Mechanism] of Teach pendant. The mechanism number and the axis number are indicated on top of the Teach pendant.



Figure 3.5 Mechanism (Servo hand axis) when available for jog operation

Press [X-] and [X+] keys according to the axis order to control the servo hand axis manually. As only the jog key is available for operating corresponding to the order of additional axes set in the mechanism, jog operation by robot is not available. The servo hand axis will have the same jog operation regardless of the system of coordinates. The maximum speed of jog operation at the additional axis is limited by 250mm/sec.



## 3.3. Recording Steps

- (1) The servo hand position is recorded as an additional axis by [Record] key of Teach pendant, same as the robot axis.
- (2) Record the squeeze position of a workpiece temporarily.
- (3) Conduct manual squeezing/opening and examine the squeeze position that the workpiece can be safely handled.
- (4) Finally determine the step position.





## 3.4. Recordation of Servo Hand Squeezing/Opening Commands

### 3.4.1. Servo Hand Squeezing Command (HANDPRES)

determined further inside than the Teaching point.

With respect to squeezing of servo hand, two parameters are to set as follows.

#### HANDPRES OL=0.0, PR=50

- (1) OL: Squeeze offset distance [-2000 2000]mm

  This sets a position to start squeezing at the servo's moving hand. The position to start squeezing is determined by adding the squeeze offset distance to the Teaching point. If the squeeze offset distance has a negative (-) value, the position to start squeezing will be
- (2) PR: Squeeze force [1.0 1000.0]kgf
  This is the factor to determine the strength of the force squeezing a workpiece. Thoroughly review the squeeze force value before input to ensure that an actual workpiece would not get

#### Note

damage.

- The servo hand squeeze function must be recorded as the first function in the step.
   Otherwise the function will not be executed.
- The target position of the step where the servo hand squeeze function (HANDPRESS) is located may be the very Teaching point as recorded, or higher or lower than the point, subject to the squeeze offset distance as set in the function. The reason being is to reduce the cycle time by adjusting the point to start squeezing according to the size of a product for handling.
- If the point to start squeezing as calculated from the squeeze offset distance is lower than the
  maximum squeeze position of servo hand, "E1328 Servo hand maximum squeeze position
  is exceeded," error will appear.



#### 3.4.2. How to Operate

- (1) Select Manual mode.
- (2) Move the robot/servo hand axis to the point where to start squeezing and press [Record] key to record the step.
- (3) After entering HANDPRES command, enter <code>"squeeze offset distance"</code> , <code>"squeeze force parameter"</code> .
- (4) To do so, choose a program for Teaching and select  $\llbracket [F6] \rrbracket$ : Command input  $\longrightarrow \llbracket [F6] \rrbracket$ : Handling  $\longrightarrow \llbracket [F6] \rrbracket$ : HANDPRES  $\rrbracket$ .

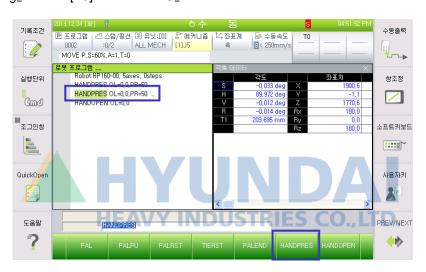


Figure 3.6 HANDPRES Command Input

### 3.4.3. Servo Hand Opening Command (HANDOPEN)

With respect to opening servo hand, the following parameter is to be set.

#### **HANDOPEN OL=0.0**

(1) Opening offset distance [0 - 2000]

This sets a position of opening the servo's moving hand. The opening position is determined by adding the opening offset distance to the Teaching point.

#### Note

- The servo hand opening function can be located at any part of the step.
- The target position of the step where the servo hand opening function (HANDOPEN) is located is the very point as recorded in the memory at Teaching. To ensure the safe handling of a workpiece, set the accuracy level of the step condition as 0 (zero).
- If the opening point as calculated from the opening offset distance is higher than the
  maximum opening position of servo hand, "E1327 Servo hand maximum opening position
  is exceeded... error will appear.





### 3.4.4. How to Operate

- (1) Select Manual mode.
- (2) Move the robot/servo hand axis to the point where to start opening and press [Record] key to record the step.
- (3) After entering HANDOPEN command, enter <code>"opening offset distance"</code> .
- (4) To do so, choose a program for Teaching and select  $\llbracket [F6]$ : Command input  $\to \llbracket [F6]$ : Handling  $\to \llbracket [F7]$ : HANDOPEN  $\rrbracket$



Figure 3.7 HANDOPEN Command Input





## 4.1. Step movement

Describes the operation of servo hand axis and the robot axis when moving a step (position).

#### (1) Interpolation Off

Servo hand axis and robot axis start simultaneously and reach the target position at the same time.

#### (2) Linear interpolation

Servo's fixing hand reaches at the target position by linear interpolation (trace, position to be maintained).

Same as "interpolation OFF" operation, servo hand axis and robot axis start simultaneously and reach the target position at the same time.

#### (3) Circular interpolation

Servo's fixing hand reaches at the target position by circular interpolation (trace, position to be maintained).

Same as "interpolation OFF" operation, servo hand axis and robot axis start simultaneously and reach the target position at the same time.

#### (4) Shift

All functions for shift (offline, online, search, palletize) are applied for the robot only. Servo hand axis is only moved to the position as recorded.

#### (5) Coordinate transformation

Only shift elements for the robot are transformed. The target value for the servo hand axis is to be written same as recorded.

#### (6) Applying pendant program calls

As writing a relative program, only the relative position for the robot is applied. The target value for the servo hand axis is to be written same as recorded.

#### (7) mirror image

Only applicable when the base axis is selected for additional axis specification. Not applicable for the servo hand axis.



## 4.2. Servo Hand Squeeze/Opening

The operation of squeezing or opening of the servo hand axis for handling a workpiece is as shown in the following figure.

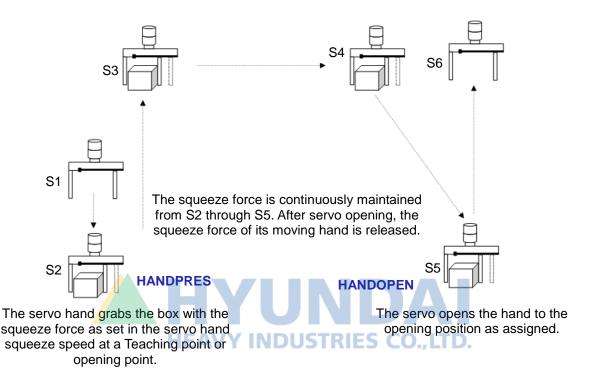


Figure 4.1 The operation of squeezing or opening of the servo hand for handling a workpiece

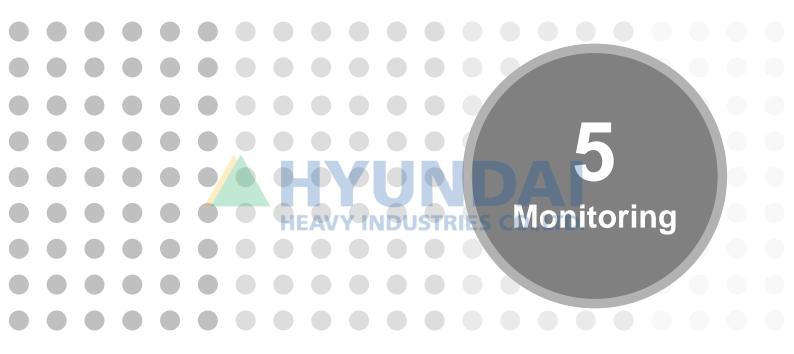
- (1) If the step where HANDPRESS function is recorded is used, the robot moves to the position as recorded from the previous step position. The servo hand's moving axis moves to the point where the squeeze offset distance of the HANDPRES function is added to the recorded position. Meanwhile, both the robot axis and the servo hand axis reach the target position at the same time.
- (2) Start squeezing with the squeeze force as defined. This time, the movement speed corresponds to the servo hand's squeeze speed.
- (3) When the squeeze force matches, grab a workpiece and move to the step for loading.
- (4) Move to the step where HANDOPEN function is recorded and open the servo hand to the opening position as set. Meanwhile, the servo hand axis reaches at the maximum speed.
- (5) Once opening is complete, move to the next step.

## **Warning**

- In Manual mode, step forward/backward is always available for operating regardless the selection of the step forward/backward function in the configuration.
- Servo hand axis' squeeze/opening positions should not exceed the soft limit position.
- A desired work may not be fulfilled if squeeze force of the servo hand axis is too weak.
- Consider the distance between a workpiece and the position to start squeezing to adjust the accuracy level of the step that contains HANDPRES function.









## 5.1. Servo Hand Axis Monitoring

### 5.1.1. Display Items

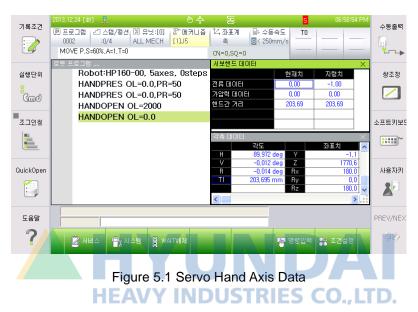
Verifies the encoder of the current value and the assigned value of the servo hand axis as well as the angle from each axis' data, squeeze force, electric current, and distance between hands from the servo hand data

- (1) Encoder data
  Displays the encoder value of the servo hand axis (bit)
- (2) Current data
  Displays electric current flow at the servo hand axis and the assigned electric current (A)
- (3) Squeeze data
  Displays the actual squeeze force calculated from feedback current and the assigned squeeze force (Kgf)
- (4) Distance between hands
  Displays the distance between the standard position and servo hand axis (mm)



#### 5.1.2. How to Operate

- (1) Select  $\llbracket [F1]$ : Service  $\to$   $\rrbracket 1$ : Monitoring  $\to$   $\rrbracket 9$ : Servo Hand Axis Data  $\rrbracket$  .
- (2) Select  $\llbracket [F1]$ : Service  $\to$   $\rrbracket 1$ : Monitoring  $\to$   $\rrbracket 1$ : Data of each axis  $_{\bot}$ .
- (3) The following screen will appear.









## 6. Exception and Error Handling

Servo hand

Code	E1328 Servo hand maximum squeeze position is exceeded	
Description	The squeeze position of servo hand squeeze step is lower than the maximum squeeze position set in the [System/Application Parameter/Palletizing/Servo Hand Parameter Setting] menu.	
Measure	Either extend the offset distance of the servo hand squeeze step or reduce the maximum squeeze position in the servo hand parameter setting menu.	

Code	E1329 Servo hand squeeze alignment detection time is exceeded	
Description	While squeezing at the servo hand squeeze step, the squeeze force fails to reach the range set in the [System/Application Parameter/Palletizing/Servo Hand Parameter Setting] menu until [squeeze error detection delay] time has passed.	
Measure	<ol> <li>Adjust the servo hand squeeze position.</li> <li>Set "Squeeze force-Current table" in System/Application         Parameter/Palletizing/Servo Hand Parameter.</li> <li>Adjust the degree of squeeze force.</li> <li>Adjust the squeeze error detection delay time.</li> </ol>	

Code	E1452 Servo hand environment setting error	
Description	Verify if System/Initialize/Additional Axis Constant Setting/Axis Specification is set	
Measure		



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